

Rose Street Affordable Housing

City of Barrie

Traffic Impact and Parking Study for: Simcoe County Housing Corporation

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Executive Summary

This report summarizes the traffic impact and parking study prepared for the proposed affordable housing development located between Highway 400 and Rose Street, west of Bayfield Street in the City of Barrie [City]. The report assesses the impact of traffic related to the development on the adjacent roadway and provides recommendations to accommodate this traffic in a safe and efficient manner.

The proposed redevelopment includes the construction of 215 residential units and 78,490 ft² (7,292 m²) of leasable commercial space. The commercial space is anticipated to include the following:

- Community Agency Space #1 – 16,009 ft² (1,487 m²)
- Community Agency Space #2 – 3,227 ft² (300 m²);
- Community Agency Space #3 – 8,095 ft² (752 m²);
- Licensed Child Care – 5,492 ft² (510 m²); and
- Ontario Works/Children services – 45,671 ft² (4,243 m²).

The proposed redevelopment will include two full-movement access driveways onto Rose Street [East Access & West Access].

The scope of this analysis includes a review of the following intersections:

- East Access / Rose Street;
- West Access / Rose Street;
- Rose Street / Highway 400 NB ON Ramp;
- Rose Street & Highway 400 NB OFF Ramp / Bayfield Street;
- Rose Street / St. Vincent Street;
- Grove Street / Bayfield Street; and
- Grove Street / Peel Street.

Conclusions

1. The proposed development has been assumed to generate a total of 272 AM and 273 PM peak hour trips. This is a conservative estimate of the amount of traffic that will be generated by the subject site.
2. Detailed intersection counts were obtained and conducted at the study intersections.
3. An intersection operation analysis was completed at the study area intersections, using the existing and background (2025, 2028, 2030 and 2035) traffic volumes. The 2028 horizon year included the analysis Pre- and Post-Highway 400 / Rose Street improvements. This enabled a review of existing and future traffic deficiencies that would be present without the influence of the proposed development. The following improvements are recommended:

Bayfield Street / Grove Street

Background (2028)

- Signal timing adjustments:
 - i. Addition of a protected eastbound left turn phase.
- Addition of a “Do Not Block Driveway” sign is recommended on the south side of Grove Street West, west of the parking lot driveway for 218 Bayfield Street and a “Do Not Block Intersection” sign is recommended, on the north side of Grove Street East, west of Drury Lane.

Bayfield Street / Rose Street & Highway 400 NB OFF Ramp

Background (2028)

- Signal timing adjustments:
 - i. Adjustment of phase lengths to increase the protected southbound left-turn phase.

The City should continue to monitor queuing on Grove Street at Bayfield Street to assess the need for a road widening to provide additional storage.

4. An estimate of the amount of traffic that would be generated by the Subject Site was prepared and assigned to the study area roads and intersections.
5. An intersection operation analysis was completed under total (2025, 2028, 2030 and 2035) traffic volumes with the proposed development operational at the study area intersections. No additional improvements are recommended within the study area.
6. The proposed site accesses will operate efficiently with one-way stop control for egress movements. A single lane for ingress and egress movements will provide the necessary capacity to convey the traffic volume generated by the proposed development.
7. The sight distance available for the proposed site accesses is suitable for the intended use.
8. The location of the proposed site access connections are considered appropriate with respect to minimum corner clearance and spacing requirements as identified in the Transportation Association of Canada Design Guide for Canadian Roads (2017).
9. Pedestrian operations were reviewed within the study area. The following improvements are recommended:
 - Extension of the Rose Street sidewalk (north side) along the frontage of the Subject Site and along the frontage of 42-48 Rose Street.
 - Provision of a Level 2 Type D pedestrian crossing at the Rose Street / Peel Street intersection; and
 - Provision of a pedestrian connection between Bayfield Street and the future Rose Street dead-end, within the MTO right-of-way.
10. The Swept Path Analysis demonstrates that the proposed site layout can accommodate the typical traffic movements;
11. The proposed parking supply is appropriate for the intended use;
12. In summary, the proposed development will not cause any operational issues and will not add significant delay or congestion to the local roadway network.

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1 Introduction

1.1 Background

County of Simcoe [the Developer] is proposing an affordable housing development located between Highway 400 and Rose Street, west of Bayfield Street in the City of Barrie [City].

The proposed redevelopment includes the construction of 215 residential units and 78,490 ft² (7,292 m²) of leasable commercial space. The commercial space is anticipated to include the following:

- Community Agency Space #1 – 16,009 ft² (1,487 m²)
- Community Agency Space #2 – 3,227 ft² (300 m²);
- Community Agency Space #3 – 8,095 ft² (752 m²);
- Licensed Child Care – 5,492 ft² (510 m²); and
- Ontario Works/Children services – 45,671 ft² (4,243 m²).

It is anticipated that ultimate build-out will occur by 2025.

The proposed redevelopment will include two full-movement access driveways onto Rose Street [East Access & West Access].

The Developer has retained **JD Northcote Engineering Inc.** [JD Engineering] to prepare this traffic brief in support of the proposed development.

1.2 Study Area

Figure 1 illustrates the location of the subject site and study area intersections in relation to the surrounding area. The Site Plan by McKnight Charron Limited Architects is shown in **Appendix A**. The subject site is bound by Highway 400 to the north and west, Rose Street to the south and existing residential property to the east.

Through consultation with City staff, the following intersections are included in the traffic impact study:

- East Access / Rose Street;
- West Access / Rose Street;
- Rose Street / Highway 400 NB ON Ramp;
- Rose Street & Highway 400 NB OFF Ramp / Bayfield Street;
- Rose Street / St. Vincent Street;
- Grove Street / Bayfield Street; and
- Grove Street / Peel Street.

1.3 Study Scope and Objectives

The purpose of this study is to identify the potential impacts to traffic flow at the site access and on the surrounding roadway network. The study analysis includes the following tasks:

- Determine existing traffic volumes and circulation patterns;
- Estimate future traffic volumes if the proposed development was not constructed, including the impact of additional proposed developments in the area;

- Complete level-of-service [LOS] analysis of horizon year (without the proposed development) traffic conditions (pre- and post-Highway 400 / Rose Street improvements) and identify operational deficiencies;
- Estimate the amount of traffic that would be generated by the proposed development and assign to the roadway network;
- Complete LOS analysis of horizon year (with the proposed development) traffic conditions and (pre- and post-Highway 400 / Rose Street improvements) identify additional operational deficiencies;
- Identify improvement options to address operational deficiencies;
- Review the available sight distance at the proposed site access driveways;
- Complete a review of the proposed intersection spacing;
- Review the proposed parking supply and assess the suitability for the proposed development;
- Review and comment on the construction staging plan;
- Review and comment on the pedestrian connectivity and operations;
- Complete an AutoPATH swept path analysis for applicable vehicle types; and
- Document findings and recommendations in a final report.

Figure 1 – Proposed Site Location and Study Area



1.4 Analysis Periods

Traffic scenarios for the existing year, build-out year (2025), the 3-year horizon year (2028), the 5-year horizon year (2030), and 10-year horizon year (2035) were selected for analysis of traffic operations in the study area. The 2028 horizon year has been chosen to consider traffic operation pre- and post-Highway 400 / Rose Street improvements. Given the residential and employment nature of the development, the weekday morning [AM] and weekday afternoon [PM] peak hours have been selected as the analysis periods for this study.

2 Information Gathering

2.1 Street and Intersection Characteristics

Bayfield Street is an arterial road with five-lanes north of Rose Street and four-lanes south of Rose Street, within the study area. Bayfield Street has an urban cross-section and a sidewalk on both sides of the road. The posted speed limit on Bayfield Street is 50km/h within the study area. Bayfield Street is under the jurisdiction of the City.

St. Vincent Street is a four-lane arterial road with an urban cross-section and sidewalk on both sides of the road within the study area. St. Vincent Street has a posted speed limit of 50km/h and is under the jurisdiction of the City.

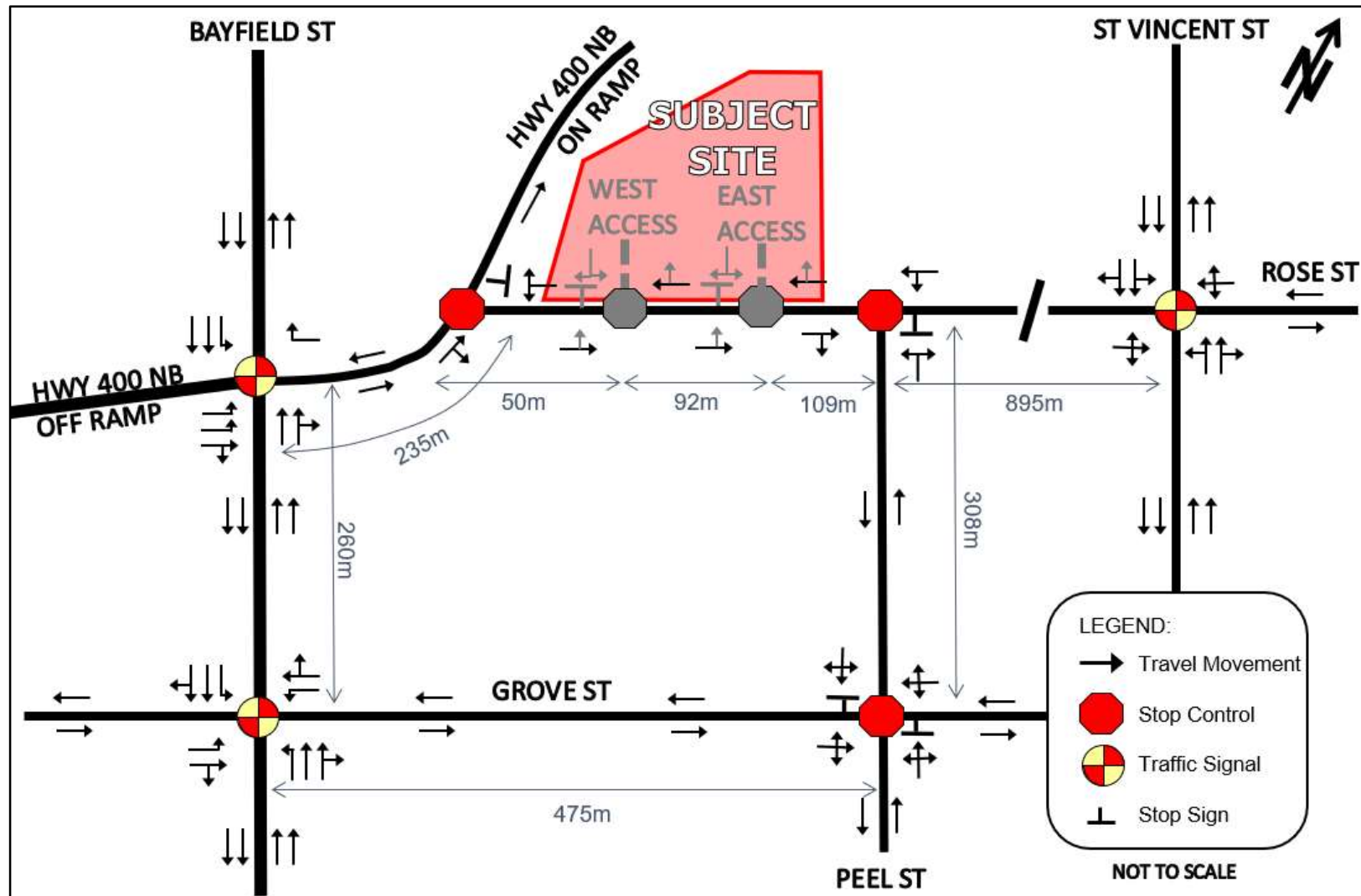
Grove Street is a two-lane minor collector road with an urban cross-section and a posted speed limit of 50km/h. West of Bayfield Street, Grove Street has sidewalk on the south side of the road. Between Bayfield Street and Owen Street, Grove Street has sidewalk on the north side of the road. East of Owen Street, Grove Street has sidewalk on both sides of the road. Grove Street is a signed bicycle route with additional sharrow pavement markings on both sides of the road within the study area. Grove Street is under jurisdiction of the City.

Rose Street is a two-lane minor collector road with a posted speed limit of 50km/h. Between Bayfield Street and the Highway 400 ON ramp, Rose Street has semi-urban cross-section and a sidewalk on the south side of the road. Between the Highway 400 ON ramp and Peel Street, Rose Street has an urban cross-section with sidewalk on the south side of the road. East of Peel Street, Rose Street has sidewalk on both sides of the road. Rose Street is under jurisdiction of the City.

Peel Street is a two-lane local road with an urban cross-section. Between Agnes Street and Grove Street, Peel Street has sidewalk on the west side of the road. South of Grove Street, Peel Street has sidewalk on the east side of the road.

The existing intersection spacing and lane configuration within the study area is illustrated in **Figure 2**.

Figure 2 – Existing Lane Configuration within Study Area



2.2 Transit Access

Barrie Transit provides multiple bus routes within the study area. The No. 100 and No. 101 Routes provide bus service along Bayfield Street, the No 7. route provides bus service along Bayfield Street south of Grove Street and on Grove Street east of Bayfield Street.

The No. 100 bus route operates between 07:06 – 23:03 on weekdays with daytime service every 20-25 minutes. On Saturdays, the route operates between 07:40 – 22:50 and provides daytime service every 20-25 minutes . On Sunday the route operates between 07:46 – 23:19 and provides service every 45 minutes.

The No. 101 bus route operates between 07:05 – 22:42 on weekdays with daytime service every 20-25 minutes . On Saturdays, the route operates between 07:15 – 22:48 and provides daytime service every half hour. On Sunday the route operates between 07:20 – 22:51 and provides service every 45 minutes.

The No. 7A bus route operates between 05:30 – 00:11 on weekdays with daytime service every half hour. On Saturdays, the route operates between 06:30 – 00:11 and provides daytime service every half hour. On Sunday the route operates between 09:30 – 22:11 and provides service every hour

The No. 7B bus route operates between 05:30 – 23:43 on weekdays with daytime service every half hour. On Saturdays, the route operates between 06:29 – 23:43 and provides daytime service every half hour. On Sunday the route operates between 09:23 – 21:24 and provides service every hour

The closest bus stops to the subject site for the No. 100 and No. 101 bus routes are located at the southeast and southwest corners of the intersection of Bayfield Street / Rose Street & Highway 400 Off Ramp intersection (approximately 300m west of the subject site).

The closest bus stops to the subject site for the No. 7 bus route are located at the southeast and northwest corners of the intersection of Owen Street / Grove Street respectively (approximately 580m from the subject site).

The proposed development includes the opportunity for a future bus stop at the northwest corner of the East Access / Rose Street intersection. It is recommended that the City consider a transit route adjustment to provide service to this bus stop.

Figure 3 illustrates the location of the subject site in relation to local transit routes.

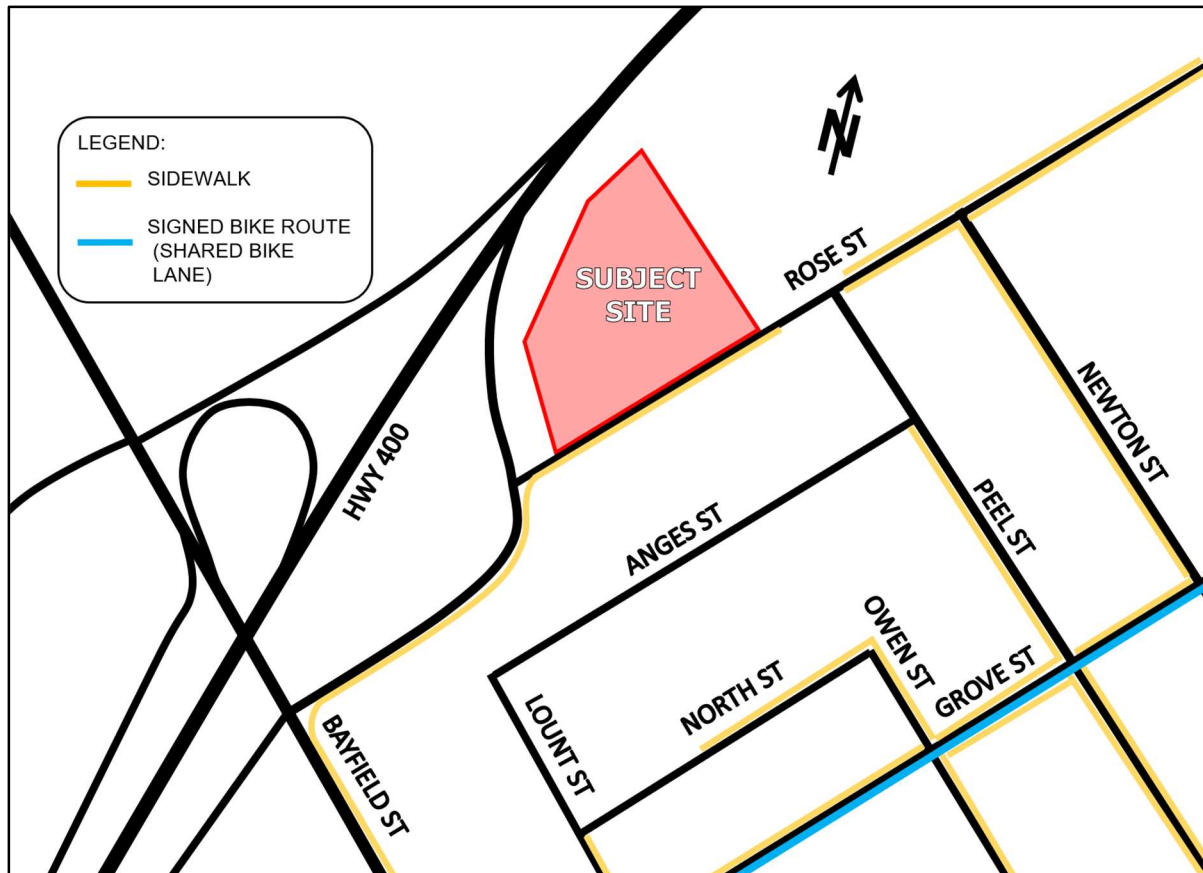
Figure 3 – Existing (2024) Study Area Transit Routes



2.3 Active Transportation

The existing active transportation infrastructure within the study area is illustrated in **Figure 4**.

Figure 4 – Study Area Active Transportation Infrastructure



It is recommended that the City continue to prioritize active transportation infrastructure in the area to provide a safe and efficient alternative to private vehicle transportation.

2.4 Local Road Improvements

Based on the City's Transportation Master Plan [TMP] (April 2019), the following active transportation improvements are planned in the study area:

- Grove Street (Toronto Street to Penetanguishene Road)
 - Addition of bike lanes;
- Grove Street (Bayfield Street to Owen Street)
 - Provide sidewalk on one side of road;
- Peel Street (Grove Street to Rose Street)
 - Provide sidewalk on one side of road;
- Rose Street (Davidson Street to St. Vincent Street)
 - Addition of signed bike route;
- Rose Street (West limits to Currie Street)
 - Provide sidewalk on both sides of road; and
- St. Vincent Street (within study area)
 - Addition of buffered bike lanes.

Based on the City's TMP, the following road improvements listed:

- St. Vincent Street (Bell Farm Road to Grove Street) - prior to 2026
 - Addition of a Two-Way Left Turn Lane
- Bayfield Street (Highway 400 NB Off Ramp to Grove Street) – Concurrent with MTO interchange improvements
 - Addition of a Two-Way Left Turn Lane

Improvements to St. Vincent Street have been assumed to be constructed by the 2028 horizon year.

Based on the Highway 400 Improvements Transportation Environmental Study Report Addendum [Highway 400 TESR] (AECOM, November 2017) and the recommended plan drawings contained therein, the following road improvements are identified within the study area:

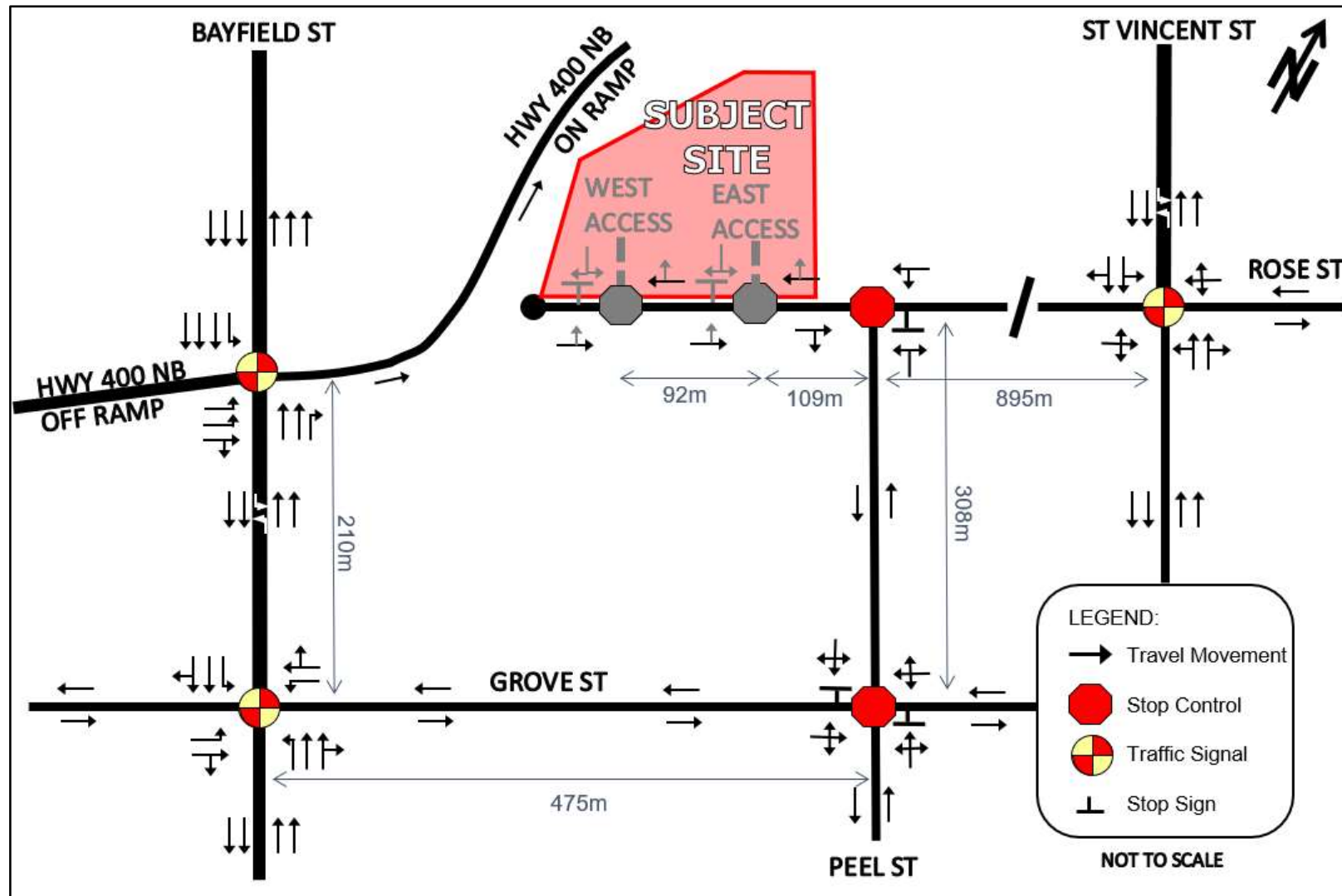
- Rose Street / Highway 400 NB ON Ramp
 - Rose Street from Bayfield Street to Highway 400 NB ON Ramp to be removed;
 - Rose Street to be decommissioned at replaced with a cul-de-sac at the west limits.
- Bayfield Street / Highway 400 NB OFF Ramp & Rose Street
 - Additional 2-lanes (one-lane per direction) on Bayfield Street, north of the Highway 400 NB OFF Ramp;
 - Additional northbound right turn lane; and
 - Former east leg of intersection (Rose Street) to be replaced with a single lane northbound on ramp.

The exact timing for the Highway 400 / Rose Street improvements is not currently known. Consequently, the 2028 horizon year scenario has been analyzed with and without the above-noted Highway 400 / Rose Street improvements.

The 2030 and 2035 horizon year scenarios include all the above-noted improvements.

The ultimate 2030 and 2035 horizon year intersection spacing and lane configuration within the study area is illustrated in **Figure 5**.

Figure 5 – Ultimate (2030 & 2035) Horizon Year Lane Configuration within Study Area



2.5 Other Developments within the Study Area

Through correspondence with City staff, the 10-12 Grove Street West development has been included in our detailed traffic review to assess the impact on the local traffic volumes / infrastructure capacity.

It is noted the impact for development growth within and external to the study area has been inherently considered by utilizing the City's EMME models for future traffic projections (which consider development traffic volumes throughout the City).

2.5.1 10-12 Grove Street West

The 10-12 Grove Street West development is located south of Highway 400, north of Grove Street and west of Bayfield Street, in the City. The proposed development is anticipated to include 924 units.

Trip generation and distribution for the development have been established based on the *Grove Street Residential Development* (JD Northcote Engineering Inc., revised September 13th, 2017), excerpts of which are provided in **Appendix B**. The AM and PM peak hour traffic volumes are illustrated in **Figure 7**. It is assumed that build-out of the 10-12 Grove Street West development will occur by 2028.

2.6 Background Traffic Growth

2.6.1 Other Studies

The 10-12 Grove Street West development utilized a growth rate of 1.0% per year for all roadways.

2.6.2 EMME Data

In review of the available EMME data, there is a minimal increase in traffic volumes along the arterial and collector roads within the study area. Nevertheless, a conservative 1% per annum background traffic growth rate has been applied to all traffic volumes in the study area. It is further noted that the adjacent development volumes and the redistribution effect of the Highway 400 / Rose Street improvements have been considered above and beyond the background growth rate.

2.7 Traffic Counts

Detailed turning movement traffic and pedestrian counts were obtained from the City, MTO and commissioned by JD Engineering at the study intersections. **Table 1** summarizes the traffic count data collection information.

Table 1 – Traffic Count Data

Intersection (N-S Street / E-W Street)	Count Date	AM Peak Hour	PM Peak Hour	Source
Bayfield St / Highway 400 NB Off Ramp & Rose St	Tuesday March 21, 2023	08:00 – 09:00	16:30 – 17:30	City
Bayfield St / Grove St	Tuesday March 21, 2023	07:45 – 08:45	16:30 – 17:30	City
Highway 400 NB On Ramp / Rose St	Wednesday March 3, 2021	07:30 – 08:30	16:30 – 17:30	JD Eng.*
Peel St / Grove St	Wednesday March 3, 2021	07:30 – 08:30	16:45 – 17:45	JD Eng.*
Highway 400 NB On Ramp	June 14 – 21, 2016	07:00 – 08:00	16:00 – 17:00	MTO
St. Vincent St / Rose St	Wednesday April 5, 2023	07:45 – 08:45	16:30 – 17:30	City

*Traffic counts were completed by AccuTraffic Inc. on behalf of JD Engineering.

Detailed traffic count data can be found in **Appendix C**. Heavy vehicle percentages from the traffic count data have also been included in the Synchro analysis.

Recognizing that the timing of the commencement of this study coincided with the physical distancing requirements related to the COVID-19 pandemic, the following steps were taken to adjust the 2021 traffic counts:

- All historic traffic data were projected to the 2023 existing year using the 1% per background annum growth discussed in Section 2.5;
- Northbound through / right turn volumes and westbound left turn volumes at the intersection of Rose Street / Highway 400 NB On Ramp were increased to match the 2023 existing volumes on the east leg (Rose Street) of the Bayfield Street / Highway 400 NB Off Ramp & Rose Street;
- The remaining westbound right turn volumes at the intersection of Rose Street / Highway 400 NB On Ramp were increased to match the 2023 projected volumes on the Highway 400 NB On Ramp (which utilized 2016 pre-COVID data);
- Volumes on Rose Street, adjacent the subject site, were carried from the west at the adjusted Bayfield Street / Highway 400 NB Off Ramp & Rose Street; and
- Volumes at the intersection of Peel Street / Grove Street were increased based on traffic volume fluctuation observed on Rose Street between Bayfield Street (2023 Post-COVID count) and Highway 400 NB On Ramp (2021 COVID count). A 10% and 30% increase were utilized for the AM and PM peak hours, respectively.

2.8 Existing Traffic Volumes

The 2023 existing AM and PM peak hour traffic volumes in the study area are illustrated in **Figure 8**, established based on the conducted and obtained counts, adjusted to reflect the annual background growth rate of 1.0% in addition to the effects of the COVID-19 pandemic as outlined in Section 2.6.

2.9 Horizon Year Traffic Volumes (Pre-Improvement)

The background (2025 and 2028) horizon year traffic volumes prior to the Highway 400 / Rose Street improvements configuration are illustrated in **Figure 9** and **Figure 10**. The background volumes are based on the conducted and obtained counts, adjusted to reflect the annual background growth rate of 1.0% in addition to the aforementioned COVID-19 pandemic adjustment as outlined in Section 2.6.

2.10 Rose Street Dead-End & Highway 400 Improvement Traffic Redistribution

As previously mentioned, the 2028 horizon year has been chosen to analyze the study area intersections both with and without the Highway 400 / Rose Street improvements.

In context with existing intersection configurations, the Rose Street – Bayfield Street connection currently provides the following permitted movements for motorists:

- Direct access **TO** Highway 400 northbound;
- Access **TO** the Highway 400 southbound, north of the study area;
- Access **TO/FROM** the Bayfield Street corridor, north of the study area;
- Access **FROM** Highway 400 northbound; and
- Access **FROM** the Bayfield Street corridor, south of the study area.

As a result of the improvement, traffic volumes that would typically utilize the Rose Street – Bayfield Street connection will be rerouted through surrounding road network (both internal and external to the study area). **Table 2** summarizes the 2028 rerouted volumes and their assumed distributions.

Table 2 – Rose – Bayfield Street Connection Redistributed volumes

Direction	Pre-Improvement Movement	2028 Volumes		Post-Improvement Movements	Assumed % Distribution
		AM Peak Hour	PM Peak Hour		
Direct TO Highway 400 NB	WBR at Rose St / Hwy 400 ON Ramp	99	87	WBR at Grove / Bayfield + NBR at Bayfield / Hwy 400 NB	40%
				NBT at Grove / Bayfield + NBR at Bayfield / Hwy 400 NB	10%
				EBL or NBT at St. Vincent / Rose	20%
				External to Study Area	30%
Travelling TO Highway 400 SB or North Bayfield St Area	WBL at Rose St / Hwy 400 ON Ramp	172	154	WBR at Grove / Bayfield + NBT at Bayfield / Hwy 400 NB	40%
				NBT at Grove / Bayfield + NBT at Bayfield / Hwy 400 NB	10%
				EBL or NBT at St. Vincent / Rose	20%
				External to Study Area	30%
From Highway 400 NB Ramp	EBT at Bayfield / Hwy 400 OFF Ramp	150	226	EBR at Bayfield / Hwy 400 NB + SBL or SBT at Grove / Bayfield	40%
				EBL at Bayfield / Hwy 400 NB	20%
				External to Study Area	40%

In addition to the rerouted volumes shown above, traffic volume fluctuations will occur at the study area intersections as a result of the new configuration. The following summarizes the assumptions and procedures taken to derive the traffic volume redistribution:

- Pre-improvement – 100% of the EBT movements at the Highway 400 OFF Ramp will be making a subsequent right turn onto Rose Street (rather than continuing as a through movement onto Highway 400, as motorists have just exited from the Highway);
- Utilizing the above-noted assumption, we can derive the remaining right turn movements on Rose Street (at the Highway 400 ON Ramp) by subtracting the EBT movements from the

Highway 400 OFF Ramp. These remaining right turning volumes on Rose Street would be made up of SBL and NBR turning movements from Bayfield Street. Based on the existing turning volumes at Bayfield Street, we have assumed that 75% of the remaining volumes would be SBL movements and 25% NBR movements;

- Recognizing that the above-noted movements will not longer be able to utilize the Bayfield Street -Rose Street connection, the following diversions have been applied:
 - The SBL movements on Bayfield Street will now become a SBT and subsequent SBL onto Grove Street
 - The NBR movements will be removed and applied as a NBR at Bayfield Street / Grove Street. A proportionate reduction in the NBT on at Bayfield Street / Grove Street has been applied;
- All EBT movements at Bayfield Street / Rose Street will be removed. As outlined in the above table, the following redistributions have been assumed:
 - 40% of this traffic volume will travel south on Bayfield and make a subsequent SBL or SBT at Grove Street;
 - 20% of this traffic volume will travel north on Bayfield; and
 - The remaining 40% have been assumed to utilize alternated routes, external to the study area (i.e. Duckworth/Dunlop Interchanges);
- All WB traffic traveling through the Rose Street – Bayfield Street connection (WBR at Bayfield) will be removed. As outlined in the above table, the following redistributions have been assumed:
 - 40% of this traffic volume will utilize the Grove Street (WBR) to connect to Bayfield Street;
 - 10% will travel from the south on Bayfield Street (NBT);
 - 20% will travel through the St. Vincent intersection; and
 - The remaining 30% have been assumed to utilize alternated routes external to the study area.
- Diverted traffic on Grove Street has been assigned to the Grove Street / Peel Street intersection assuming an 80% through (Grove Street), 10% north and 10% south distribution.

The traffic volume redistribution through the study area has been separated into the anticipated traffic volumes increases, decreases and net volumes, illustrated in **Figure 11** through **Figure 13**, respectively.

The assumptions for rerouting traffic volumes external to the study area and the resulting background (2028, 2030 and 2035) horizon year traffic volumes within the study area have been reviewed and compared to the City's EMME model (2031). Based on this review the above-noted assumptions and the resulting background (2028, 2030 and 2035) horizon year traffic volumes represent a more conservative estimate of the future traffic volumes.

2.11 Horizon Year Traffic Volumes (Post-Improvements)

The background (2028, 2030 and 2035) horizon year traffic volumes post-Highway 400 / Rose Street improvements are illustrated in **Figure 14** through **Figure 16**. The background volumes are based on the conducted and obtained counts adjusted to reflect the annual background growth rate of 1.0% in addition to the aforementioned COVID-19 pandemic adjustment as outlined in Section 2.6 and redistribution assumptions outlined in Section 2.9.

Volumes on Rose Street, adjacent the subject site, have been estimated based on number of existing residential properties on Rose Street in context with ITE trip generations rates.

3 Intersection Operation without Proposed Development

3.1 Introduction

Existing and background horizon operational conditions were established to determine how the street network within the study area is currently functioning without the proposed development. This provides a base case scenario to compare with future development scenarios. Traffic operations within the study area were evaluated using the existing and future background traffic volumes with the existing road configuration and traffic control. The intersection performance was measured using the traffic analysis software, Synchro 11, a deterministic model that employs Highway Capacity Manual and Intersection Capacity Utilization methodologies for analyzing intersection operations. These procedures are accepted by provincial and municipal agencies throughout North America.

Synchro 11 enables the study area to be graphically defined in terms of streets and intersections, along with their geometric and traffic control characteristics. The user is able to evaluate both signalized and unsignalized intersections in relation to each other, thus not only providing level of service for the individual intersections, but also enabling an assessment of the impact the various intersections in a network have on each other in terms of spacing, traffic congestion, delay, and queuing.

Individual turning movements with a volume-to-capacity [V/C] ratio of 0.85 or greater are considered to be critical movements and have been highlighted in the LOS tables.

The intersection operations were also evaluated in terms of the LOS. LOS is a common measure of the quality of performance at an intersection and is defined in terms of vehicular delay. This delay includes deceleration delay, queue move-up time, stopped delay, and acceleration delay. LOS is expressed on a scale of A through F, where LOS A represents very little delay (i.e. less than 10 seconds per vehicle) and LOS F represents very high delay (i.e. greater than 50 seconds per vehicle for a stop sign controlled intersection and greater than 80 seconds per vehicle for a signalized intersection).

The LOS criteria for signalized and stop sign-controlled intersections are shown in **Table 3**. A description of traffic performance characteristics is included for each LOS.

Table 3 – Level of Service Criteria for Intersections

LOS	LOS Description	Control Delay (seconds per vehicle)	
		Signalized Intersections	Stop Controlled Intersections
A	Very low delay; most vehicles do not stop (Excellent)	less than 10.0	less than 10.0
B	Higher delay; more vehicles stop (Very Good)	between 10.0 and 20.0	between 10.0 and 15.0
C	Higher level of congestion; number of vehicles stopping is significant, although many still pass through intersection without stopping (Good)	between 20.0 and 35.0	between 15.0 and 25.0
D	Congestion becomes noticeable; vehicles must sometimes wait through more than one red light; many vehicles stop (Satisfactory)	between 35.0 and 55.0	between 25.0 and 35.0
E	Vehicles must often wait through more than one red light; considered by many agencies to be the limit of acceptable delay	between 55.0 and 80.0	between 35.0 and 50.0
F	This level is considered to be unacceptable to most drivers; occurs when arrival flow rates exceed the capacity of the intersection (Unacceptable)	greater than 80.0	greater than 50.0

3.2 Existing Intersection Operation

The results of the LOS analysis under existing (2023) traffic volumes during the AM and PM peak hour can be found below in **Table 4**. Existing intersection geometry and traffic control have been utilized for this scenario. Detailed output of the Synchro analysis can be found in **Appendix D**.

Table 4 – Existing (2023) LOS

Location (N-S Street / E-W Street)	Weekday AM Peak Hour					Weekday PM Peak Hour				
	V/C	Delay (s)	LOS	95% Queue (m)		V/C	Delay (s)	LOS	95% Queue (m)	
				Storage	Model				Storage	Model
Bayfield St / Rose St & Hwy 400 NB OFF Ramp (signalized)	0.62	25.1	C	-	-	0.97	44.9	D	-	-
EBL	0.84	40.9	D	520	91	0.92	58.4	E	520	189
EBR	0.72	38.1	D	360	88	0.70	46.4	D	360	144
WBR	0.11	27.4	C	-	-	0.10	33.9	C	-	-
NB	0.39	19.1	B	-	-	0.76	39.5	D	-	-
SBL	0.49	10.5	B	120	31	0.98	87.4	F	120	123
SB	0.31	9.9	A	-	-	0.34	16.9	B	-	-
Bayfield St / Grove St (signalized)	0.41	15.6	B	-	-	0.54	16.3	B	-	-
EBL	0.16	24.0	C	20	10	0.33	25.0	C	20	21
EB	0.07	23.3	C	-	-	0.11	23.7	C	-	-
WBL	0.48	33.3	C	25	30	0.31	32.8	C	25	18
WB	0.53	34.5	C	-	-	0.39	33.3	C	-	-
NBL	0.01	12.1	B	30	2	0.01	11.7	B	30	1
NB	0.29	14.3	B	-	-	0.62	18.1	B	-	-
SBL	0.23	7.7	A	50	20	0.46	10.5	B	50	18
SB	0.36	9.1	A	-	-	0.36	8.7	A	-	-
Rose St / Hwy 400 ON Ramp (unsignalized)	-	5.4	A	-	-	-	5.9	B	-	-
WB	0.43	14.8	B	-	-	0.56	20.9	C	-	-
NB	0.29	0.0	-	-	-	0.43	0.0	-	-	-
SB	0.00	0.0	-	-	-	0.00	0.0	-	-	-
Peel St / Grove St (unsignalized)	-	1.4	A	-	-	-	1.6	A	-	-
EB	0.01	0.3	A	-	-	0.01	0.3	A	-	-
WB	0.01	0.2	A	-	-	0.01	0.4	A	-	-
NB	0.07	13.2	B	-	-	0.06	12.6	B	-	-
SB	0.04	12.6	B	-	-	0.04	11.3	B	-	-
St. Vincent St / Rose St (signalized)	0.36	11.8	B	-	-	0.48	13.4	B	-	-
EB	0.69	38.5	D	-	-	0.75	42.0	D	-	-
WB	0.16	28.1	C	-	-	0.10	27.3	C	-	-
NB	0.26	6.0	A	-	-	0.32	7.6	A	-	-
SB	0.23	5.8	A	-	-	0.39	8.2	A	-	-

The results of the LOS analysis indicate that the majority of the study intersections are operating within the typical design limits noted in Section 3.1. The exception occurs during the PM peak hour where the southbound left turn movement at the Bayfield Street / Rose Street & Highway 400 NB OFF Ramp intersection will experience a LOS F. However, these operations are not considered an infrastructure deficiency given that the delay only exceeds the LOS F threshold during the PM peak hour, while the southbound approach and overall intersection provides satisfactory operations. These operations are reflective of intersections located in densely developed areas, providing access to major travel routes.

95th percentile queue lengths exceed the existing storage lengths at the Bayfield Street intersections. No adverse operational or safety concerns are expected as a result of such queuing.

A review of the need for auxiliary right and left turn lanes at unsignalized study area intersections was completed as part of our analysis. The results of the Synchro analysis indicate that there is excess capacity for all movements; consequently, auxiliary turn lanes are not recommended at any unsignalized study area intersections.

Based on the Ontario Traffic Manual Book 12 *Signal Justification*, traffic signals are not warranted at the unsignalized intersections in the study area (results are provided in **Appendix H**).

No additional improvements are recommended within the study area.

3.3 Background (2025) Intersection Operation (Pre-Improvement)

The results of the LOS analysis under background (2025) traffic volumes during the AM and PM peak hour, prior to the Highway 400 / Rose Street improvements can be found below in **Table 5**. Minor traffic signal timings adjustments have been made to ensure optimal operations (namely the addition of a protected eastbound left turn phase the Bayfield Street / Grove Street intersection and an increase to the southbound left-turn green time at the intersection Bayfield Street / Rose Street & Highway 400 NB OFF Ramp intersection). Overall cycle length timings have been maintained. Detailed output of the Synchro analysis can be found in **Appendix E**.

Table 5 – Background (2025) LOS (Pre-Improvement)

Location (N-S Street / E-W Street)	Weekday AM Peak Hour					Weekday PM Peak Hour				
	V/C	Delay (s)	LOS	95% Queue (m)		V/C	Delay (s)	LOS	95% Queue (m)	
				Storage	Model				Storage	Model
Bayfield St / Rose St & Hwy 400 NB OFF Ramp (signalized)	0.64	25.5	C	-	-	0.94	47.5	D	-	-
EBL	0.85	41.5	D	520	94	0.94	62.3	E	520	206
EBR	0.73	38.2	D	360	91	0.71	46.6	D	360	148
WBR	0.12	27.1	C	-	-	0.10	33.7	C	-	-
NB	0.40	19.6	B	-	-	0.84	47.0	D	-	-
SBL	0.51	10.9	B	120	33	0.91	75.9	E	120	122
SB	0.32	10.1	B	-	-	0.35	17.2	B	-	-
Bayfield St / Grove St (signalized)	0.43	15.5	B	-	-	0.56	16.5	B	-	-
EBL	0.15	21.6	C	20	10	0.34	25.0	C	20	22
EB	0.07	20.9	C	-	-	0.11	23.6	C	-	-
WBL	0.48	31.0	C	25	29	0.31	32.8	C	25	19
WB	0.52	32.0	C	-	-	0.40	33.4	C	-	-
NBL	0.01	12.0	B	30	2	0.01	11.7	B	30	2
NB	0.31	15.3	B	-	-	0.64	18.4	B	-	-
SBL	0.25	8.3	A	50	21	0.48	10.8	B	50	19
SB	0.39	9.9	A	-	-	0.37	8.8	A	-	-
Rose St / Hwy 400 ON Ramp (unsignalized)	-	5.5	A	-	-	-	4.9	B	-	-
WB	0.45	15.1	C	-	-	0.49	18.6	C	-	-
NB	0.29	0.0	-	-	-	0.42	0.0	-	-	-
SB	0.00	0.0	-	-	-	0.00	0.0	-	-	-
Peel St / Grove St (unsignalized)	-	1.4	A	-	-	-	1.6	A	-	-
EB	0.01	0.3	A	-	-	0.01	0.3	A	-	-
WB	0.01	0.2	A	-	-	0.01	0.4	A	-	-
NB	0.07	13.1	B	-	-	0.07	12.7	B	-	-
SB	0.04	12.5	B	-	-	0.04	11.4	B	-	-
St. Vincent St / Rose St (signalized)	0.36	11.9	B	-	-	0.50	13.6	B	-	-
EB	0.69	28.7	D	-	-	0.75	41.9	D	-	-
WB	0.16	28.0	C	-	-	0.10	27.1	C	-	-
NB	0.27	6.1	A	-	-	0.33	7.8	A	-	-
SB	0.24	5.9	A	-	-	0.40	8.5	A	-	-

The results of the LOS analysis indicate that the majority of the study intersections are operating within the typical design limits noted in Section 3.1.

95th percentile queue lengths are expected to exceed the existing storage length for the westbound and eastbound left turn lane on Grove Street at Bayfield Street. A “Do Not Block Driveway” sign is recommended on the south side of Grove Street West, west of the parking lot driveway for 218 Bayfield Street and a “Do Not Block Intersection” sign is recommended, on the north side of Grove Street East, west of Drury Lane. The City should continue to monitor queuing on Grove Street at Bayfield Street to assess the need for a road widening to provide additional storage.

The above LOS and queuing operations are reflective of intersections located in densely developed areas, providing access to major commuter routes.

A review of the need for auxiliary right and left turn lanes at unsignalized study area intersections was completed as part of our analysis. The results of the Synchro analysis indicate that there is excess capacity for all movements; consequently, auxiliary turn lanes are not recommended at any unsignalized study area intersections.

Based on the Ontario Traffic Manual Book 12 *Signal Justification*, traffic signals are not warranted at the unsignalized intersections in the study area (results are provided in **Appendix H**).

No infrastructure improvements recommended within the study area to accommodate the background (2025) traffic volumes.

3.4 Background (2028) Intersection Operation (Pre-Improvement)

The results of the LOS analysis under background (2028) traffic volumes during the AM and PM peak hour, prior to the Highway 400 / Rose Street improvements can be found below in **Table 6**. Minor traffic signal timings adjustments have been made to ensure optimal operations (namely the addition of a protected eastbound left turn phase the Bayfield Street / Grove Street intersection and an increase to the southbound left-turn green time at the intersection Bayfield Street / Rose Street & Highway 400 NB OFF Ramp intersection). Overall cycle length timings have been maintained. Detailed output of the Synchro analysis can be found in **Appendix E**.

Table 6 – Background (2028) LOS (Pre-Improvement)

Location (N-S Street / E-W Street)	Weekday AM Peak Hour					Weekday PM Peak Hour				
	V/C	Delay (s)	LOS	95% Queue (m)		V/C	Delay (s)	LOS	95% Queue (m)	
				Storage	Model				Storage	Model
Bayfield St / Rose St & Hwy 400 NB OFF Ramp (signalized)	0.72	27.1	C	-	-	0.97	54.6	D	-	-
EBL	0.86	41.6	D	520	99	0.96	65.0	E	520	216
EBR	0.81	43.1	D	360	115	0.94	70.1	E	360	232
WBR	0.12	26.8	C	-	-	0.10	33.3	C	-	-
NB	0.53	21.9	C	-	-	0.92	55.1	E	-	-
SBL	0.61	14.1	B	120	33	0.94	84.2	F	120	130
SB	0.32	10.4	B	-	-	0.36	17.6	B	-	-
Bayfield St / Grove St (signalized)	0.54	18.7	B	-	-	0.63	17.2	B	-	-
EBL	0.54	22.7	C	20	37	0.50	26.0	C	20	33
EB	0.08	18.9	B	-	-	0.08	23.1	C	-	-
WBL	0.54	35.1	D	25	31	0.34	34.0	C	25	19
WB	0.38	32.5	C	-	-	0.28	33.2	C	-	-
NBL	0.01	15.7	B	30	2	0.05	12.7	B	30	4
NB	0.37	18.8	B	-	-	0.66	19.5	B	-	-
SBL	0.29	11.0	B	50	21	0.52	12.2	B	50	18
SB	0.44	13.2	B	-	-	0.45	10.0	B	-	-
Rose St / Hwy 400 ON Ramp (unsignalized)	-	5.7	A	-	-	-	5.2	B	-	-
WB	0.47	15.8	C	-	-	0.52	19.8	C	-	-
NB	0.31	0.0	-	-	-	0.44	0.0	-	-	-
SB	0.00	0.0	-	-	-	0.00	0.0	-	-	-
Peel St / Grove St (unsignalized)	-	1.4	A	-	-	-	1.6	A	-	-
EB	0.01	0.3	A	-	-	0.01	0.3	A	-	-
WB	0.01	0.2	A	-	-	0.01	0.4	A	-	-
NB	0.08	13.2	B	-	-	0.07	12.7	B	-	-
SB	0.04	12.7	B	-	-	0.04	11.4	B	-	-
St. Vincent St / Rose St (signalized)	0.39	11.9	B	-	-	0.45	13.3	B	-	-
EB	0.70	39.0	D	-	-	0.76	42.3	D	-	-
WB	0.16	27.7	C	-	-	0.10	26.9	C	-	-
NBL	0.11	5.7	A	25	10	0.10	6.9	A	25	8
NB	0.20	5.9	A	-	-	0.28	7.6	A	-	-
SBL	0.02	5.1	A	25	3	0.11	6.9	A	25	10
SB	0.23	6.0	A	-	-	0.34	8.1	A	-	-

The results of the LOS analysis indicate that the majority of the study intersections are operating within the typical design limits noted in Section 3.1. Similar to the existing conditions, exception occurs during the PM peak hour where the southbound left turn movement at the Bayfield Street / Rose Street & Highway 400 NB OFF Ramp intersection will experience a LOS F. However, these operations are not considered an infrastructure deficiency given the delay only exceeds the LOS F threshold during the PM peak hour, while the southbound approach and overall intersection provides a satisfactory operation.

95th percentile queue lengths are expected to exceed the existing storage length for the southbound left turn lane on Bayfield Street at Rose Street and westbound and eastbound left turn lane on Grove Street at Bayfield Street. A “Do Not Block Driveway” sign is recommended on the south side of Grove Street West, west of the parking lot driveway for 218 Bayfield Street and a “Do Not Block Intersection” sign is recommended, on the north side of Grove Street East, west of Drury Lane. The City should continue to monitor queuing on Grove Street at Bayfield Street to assess the need for a road widening to provide additional storage.

The above LOS and queuing operations are reflective of intersections located in densely developed areas, providing access to major commuter routes.

A review of the need for auxiliary right and left turn lanes at unsignalized study area intersections was completed as part of our analysis. The results of the Synchro analysis indicate that there is excess capacity for all movements; consequently, auxiliary turn lanes are not recommended at any unsignalized study area intersections.

Based on the Ontario Traffic Manual Book 12 *Signal Justification*, traffic signals are not warranted at the unsignalized intersections in the study area (results are provided in **Appendix H**).

No infrastructure improvements recommended within the study area to accommodate the background (2028) traffic volumes.

3.5 Background (2028) Intersection Operation (Post-Improvement)

The results of the LOS analysis under background (2028) traffic volumes during the AM and PM peak hour, with the inclusion of the Highway 400 / Rose Street improvements can be found below in **Table 7**. Minor traffic signal timings adjustments have been made to ensure optimal operations (namely the addition of a protected eastbound left turn phase the Bayfield Street / Grove Street intersection). The intersection cycle length has been maintained. Detailed output of the Synchro analysis can be found in **Appendix E**.

Table 7 – Background (2028) LOS (Post-Improvement)

Location (N-S Street / E-W Street)	Weekday AM Peak Hour					Weekday PM Peak Hour				
	V/C	Delay (s)	LOS	95% Queue (m)		V/C	Delay (s)	LOS	95% Queue (m)	
				Storage	Model				Storage	Model
Bayfield St / Hwy 400 NB ON & OFF Ramps (signalized)	0.62	23.5	C	-	-	0.88	38.2	D	-	-
EBL	0.86	42.3	D	520	101	0.92	54.9	D	520	203
EBR	0.47	30.6	C	360	52	0.60	39.3	D	360	113
NB	0.35	18.1	B	-	-	0.56	34.9	C	-	-
NBR	0.09	15.8	B	35		0.24	29.9	C	35	41
SBL	0.47	10.4	B	115	27	0.83	40.3	D	115	75
SB	0.24	9.5	A	-		0.29	18.9	B	-	
Bayfield St / Grove St (signalized)	0.56	18.3	B	-	-	0.80	21.9	C	-	-
EBL	0.55	23.0	C	20	37	0.69	35.0	D	20	36
EB	0.08	19.0	B	-	-	0.08	23.7	C	-	-
WBL	0.52	34.5	C	25	31	0.30	33.4	C	25	18
WB	0.28	31.5	C	-	-	0.34	33.6	C	-	-
NBL	0.01	15.4	B	30	2	0.06	15.7	B	30	5
NB	0.38	18.8	B	-	-	0.78	26.0	C	-	-
SBL	0.48	11.8	B	200	32	0.76	27.2	C	200	60
SB	0.46	13.0	B	-	-	0.46	9.9	A	-	-
Peel St / Grove St (unsignalized)	-	1.4	A	-	-	-	1.9	A	-	-
EB	0.01	0.5	A	-	-	0.02	0.6	A	-	-
WB	0.01	0.3	A	-	-	0.01	0.3	A	-	-
NB	0.09	14.6	B	-	-	0.13	16.9	C	-	-
SB	0.04	13.7	B	-	-	0.06	12.4	B	-	-
St. Vincent St / Rose St (signalized)	0.38	12.8	B	-	-	0.50	14.5	B	-	-
EB	0.74	39.7	D	-	-	0.80	43.9	D	-	-
WB	0.15	26.6	C	-	-	0.09	26.1	C	-	-
NBL	0.12	6.5	A	25	11	0.10	7.7	A	25	8
NB	0.22	6.7	A	-	-	0.30	8.5	A	-	-
SBL	0.02	5.7	A	25	3	0.11	7.7	A	25	11
SB	0.25	6.9	A	-	-	0.38	9.2	A	-	-

The results of the LOS analysis indicate that all intersections are operating within the typical design limits noted in Section 3.1.

95th percentile queue lengths are expected to exceed the existing storage length for the northbound right turn lane on Bayfield Street at Rose Street and the eastbound and westbound left turn lanes on Grove Street at Bayfield Street. A “Do Not Block Driveway” sign is recommended on the south side of Grove Street West, west of the parking lot driveway for 218 Bayfield Street and a “Do Not Block Intersection” sign is recommended, on the north side of Grove Street East, west of Drury Lane. The City should continue to monitor queuing on Grove Street at Bayfield Street to assess the need for a road widening to provide additional storage.

The above LOS and queuing operations are reflective of intersections located in densely developed areas, providing access to major commuter routes.

A review of the need for auxiliary right and left turn lanes at unsignalized study area intersections was completed as part of our analysis. The results of the Synchro analysis indicate that there is excess capacity for all movements; consequently, auxiliary turn lanes are not recommended at any unsignalized study area intersections.

Based on the Ontario Traffic Manual Book 12 *Signal Justification*, traffic signals are not warranted at the unsignalized intersections in the study area (results are provided in **Appendix H**).

No additional infrastructure improvements recommended within the study area to accommodate the background (2028) traffic volumes.

3.6 Background (2030) Intersection Operation

The results of the LOS analysis under background (2030) traffic volumes during the AM and PM peak hour can be found below in **Table 8**. Minor traffic signal timings adjustments have been made to ensure optimal operations (namely the addition of a protected eastbound left turn phase. Intersection cycle length has been maintained in all cases. Detailed output of the Synchro analysis can be found in **Appendix E**.

Table 8 – Background (2030) LOS

Location (N-S Street / E-W Street)	Weekday AM Peak Hour					Weekday PM Peak Hour				
	V/C	Delay (s)	LOS	95% Queue (m)		V/C	Delay (s)	LOS	95% Queue (m)	
				Storage	Model				Storage	Model
Bayfield St / Hwy 400 NB ON & OFF Ramps (signalized)	0.63	23.7	C	-	-	0.90	39.3	D	-	-
EBL	0.87	42.5	D	520	110	0.93	56.4	E	520	219
EBR	0.49	30.7	C	360	51	0.62	39.7	D	360	119
NB	0.36	18.5	B	-	-	0.57	35.5	D	-	-
NBR	0.09	16.1	B	35	11	0.25	30.4	C	35	43
SBL	0.49	10.7	B	115	28	0.85	45.8	D	115	82
SB	0.24	9.7	A	-	-	0.29	19.2	B	-	-
Bayfield St / Grove St (signalized)	0.58	18.5	B	-	-	0.80	22.9	C	-	-
EBL	0.56	23.3	C	20	38	0.65	32.0	C	20	35
EB	0.08	19.0	B	-	-	0.08	23.4	C	-	-
WBL	0.53	34.8	C	25	32	0.31	34.0	C	25	19
WB	0.29	31.6	C	-	-	0.35	34.1	C	-	-
NBL	0.01	15.5	B	30	3	0.06	16.3	B	30	6
NB	0.39	19.0	B	-	-	0.81	28.0	C	-	-
SBL	0.50	12.0	B	200	33	0.77	29.2	C	200	64
SB	0.47	13.2	B	-	-	0.48	10.5	B	-	-
Peel St / Grove St (unsignalized)	-	1.4	A	-	-	-	1.9	A	-	-
EB	0.01	0.5	A	-	-	0.02	0.6	A	-	-
WB	0.01	0.3	A	-	-	0.01	0.3	A	-	-
NB	0.09	14.8	B	-	-	0.13	17.2	C	-	-
SB	0.04	13.9	B	-	-	0.06	12.5	B	-	-
St. Vincent St / Rose St (signalized)	0.38	12.9	B	-	-	0.51	14.7	B	-	-
EB	0.74	39.7	D	-	-	0.80	44.4	D	-	-
WB	0.15	26.5	C	-	-	0.09	25.9	C	-	-
NBL	0.13	6.7	A	25	12	0.11	7.9	A	25	9
NB	0.23	6.9	A	-	-	0.31	8.7	A	-	-
SBL	0.02	5.8	A	25	4	0.12	7.9	A	25	11
SB	0.26	7.0	A	-	-	0.39	9.4	A	-	-

The results of the LOS analysis indicate that all intersections are operating within the typical design limits noted in Section 3.1.

95th percentile queue lengths are expected to exceed the existing storage length for the northbound right turn lane on Bayfield Street at Rose Street and the eastbound and westbound left turn lanes on Grove Street at Bayfield Street.

The above LOS and queuing operations are reflective of intersections located in densely developed areas, providing access to major commuter routes.

Based on the Ontario Traffic Manual Book 12 *Signal Justification*, traffic signals are not warranted at the unsignalized intersections in the study area (results are provided in **Appendix H**).

No additional infrastructure improvements recommended within the study area to accommodate the background (2030) traffic volumes.

3.7 Background (2035) Intersection Operation

The results of the LOS analysis under background (2035) traffic volumes during the AM and PM peak hour can be found below in **Table 9**. Minor traffic signal timings adjustments have been made to ensure optimal operations (namely the addition of a protected eastbound left turn phase. Intersection cycle length has been maintained in all cases. Detailed output of the Synchro analysis can be found in **Appendix E**.

Table 9 – Background (2035) LOS

Location (N-S Street / E-W Street)	Weekday AM Peak Hour					Weekday PM Peak Hour				
	V/C	Delay (s)	LOS	95% Queue (m)		V/C	Delay (s)	LOS	95% Queue (m)	
				Storage	Model				Storage	Model
Bayfield St / Hwy 400 NB ON & OFF Ramps (signalized)	0.67	25.0	C	-	-	0.96	43.2	D	-	-
EBL	0.90	45.9	D	520	119	0.97	62.1	E	520	239
EBR	0.55	31.7	C	360	64	0.67	40.8	D	360	133
NB	0.38	19.2	B	-	-	0.62	37.6	D	-	-
NBR	0.09	16.5	B	35	12	0.27	31.8	C	35	45
SBL	0.53	11.4	B	115	29	0.92	67.2	E	115	101
SB	0.26	9.9	A	-	-	0.31	19.9	B	-	-
Bayfield St / Grove St (signalized)	0.62	18.9	B	-	-	0.83	24.8	C	-	-
EBL	0.61	24.3	C	20	40	0.69	33.8	C	20	37
EB	0.08	18.9	B	-	-	0.09	23.4	C	-	-
WBL	0.55	35.1	D	25	34	0.33	34.0	C	25	20
WB	0.30	31.6	C	-	-	0.36	34.2	C	-	-
NBL	0.01	15.7	B	30	3	0.07	16.9	B	30	6
NB	0.41	19.4	B	-	-	0.87	31.7	C	-	-
SBL	0.54	12.9	B	200	35	0.79	31.2	C	200	70
SB	0.49	13.7	B	-	-	0.50	10.9	B	-	-
Peel St / Grove St (unsignalized)	-	1.5	A	-	-	-	2.0	A	-	-
EB	0.01	0.5	A	-	-	0.02	0.6	A	-	-
WB	0.01	0.2	A	-	-	0.01	0.4	A	-	-
NB	0.10	15.4	C	-	-	0.14	18.2	C	-	-
SB	0.05	14.4	B	-	-	0.07	12.9	B	-	-
St. Vincent St / Rose St (signalized)	0.40	13.1	B	-	-	0.54	15.4	B	-	-
EB	0.74	38.8	D	-	-	0.82	46.0	D	-	-
WB	0.15	26.1	C	-	-	0.10	25.6	C	-	-
NBL	0.14	7.1	A	25	13	0.12	8.3	A	25	9
NB	0.24	7.3	A	-	-	0.33	9.2	A	-	-
SBL	0.03	6.1	A	25	4	0.13	8.3	A	25	12
SB	0.28	7.5	A	-	-	0.42	10.1	B	-	-

The results of the LOS analysis indicate that all intersections are operating within the typical design limits noted in Section 3.1.

95th percentile queue lengths are expected to exceed the existing storage length for the northbound right turn lane on Bayfield Street at Rose Street and the eastbound and westbound left turn lanes on Grove Street at Bayfield Street.

The above LOS and queuing operations are reflective of intersections located in densely developed areas, providing access to major commuter routes.

Based on the Ontario Traffic Manual Book 12 *Signal Justification*, traffic signals are not warranted at the unsignalized intersections in the study area (results are provided in **Appendix H**).

No additional infrastructure improvements recommended within the study area to accommodate the background (2035) traffic volumes.

4 Proposed Development

4.1 Traffic Generation

The traffic generation for proposed development has been estimated based the type of land use, development size and data provided in the Institute of Transportation Engineers [ITE] *Trip generation Manual* (11th Edition) [ITE Trip Generation Manual]. The following ITE land use has been applied to estimate the traffic for the proposed development:

- ITE land use 221 (Multifamily Housing (Mid-Rise)) – General Urban/Suburban Setting;
- ITE land use 710 (General Office Building) – General Urban/Suburban Setting; and
- ITE land use 565 (Day Care Centre) – General Urban/Suburban Setting.

It is noted that the ITE Trip Generation Manual provides a land use code for Affordable Housing (ITE code 223) but cautions the utilization of such code due to its limited sample size (2 studies). As such, the Multifamily Housing code was utilized to provide a robust and conservative statistical estimate of the generated traffic.

For trip rates showing a strong statistical relationship, fitted curve equations have been utilized. The traffic rates and equations are summarized in **Table 10**.

Table 10 – ITE Traffic Generation Trip Rates & Fitted Curve Equations

Land Use	Trip Basis	AM Peak Hour			PM Peak Hour		
		IN	OUT	TOTAL	IN	OUT	TOTAL
Multifamily Housing (Mid-Rise) ITE Land Use: 221	equation (1000 ft ² GFA)	$T = 0.44 X - 11.61$			$T = 0.39 X + 0.34$		
	distribution	23%	77%	100%	61%	39%	100%
General Office Building ITE Land Use: 710	Equation (1000 ft ² GFA)	$\ln(T) = 0.86 \ln(x) + 1.16$			$\ln(T) = 0.83 \ln(x) + 1.29$		
	distribution	88%	12%	100%	17%	83%	100%
Day Care Centre ITE Land Use: 565	rate (units)	5.83	5.17	11.0	5.23	5.89	11.12
	distribution	53%	47%	100%	47%	53%	100%

The estimated trip generation for the proposed development is illustrated below in **Table 11**.

Table 11 – Estimated Traffic Generation of Proposed Development

Land Use	Size	AM Peak Hour			PM Peak Hour		
		IN	OUT	TOTAL	IN	OUT	TOTAL
Multifamily Housing (Mid-Rise) ITE Land Use: 221	215 units	19	64	83	51	33	84
General Office Building ITE Land Use: 710	73,002 ft ² GFA ¹	112	16	128	22	106	128
Day Care Centre ITE Land Use: 565	5,492 ft ² GFA	32	29	61	29	32	61
Total		163	109	272	102	171	273

¹ The General Office Building Land Use code has been applied to the total combined community agency space, and the Ontario Works/Children Services space.

As summarized, the proposed development is estimated to generate 272 trips and 273 trips during the AM and PM peak hours, respectively. No transportation modal split has been applied to the above-noted traffic generation calculation. Furthermore, no internal capture rate has been applied for the Day Care Centre to account for the use of this facility by residents of the subject site. It is noted that the actual traffic generation from the residential units is expected to be notably lower than what is identified in **Table 11**; however, this conservative estimate has been used for the traffic analysis.

4.2 Traffic Assignment

For the purposes of this study, it has been assumed that all traffic generated by the proposed development will be new traffic and would not be in the study area if the development was not constructed.

The ITE data provides the anticipated percentage of new traffic entering and exiting during the peak hour. The distribution of traffic has been calculated based on the 2016 Transportation Tomorrow Survey [TTS] data for traffic zone 8508 retrieved using the TTS Internet Data Retrieval System [IDRS] (output attached as **Appendix F**). TTS data provides historical origin and destination trip percentages for specific areas within the County and the Greater Toronto and Hamilton Area [GTHA].

Traffic distribution for the trips generated by the development land uses is expected to generally follow commuter travel patterns. Our analysis is based on egress traffic during the AM peak hour. Logically, the distribution of ingress traffic will follow the inverse of the exiting traffic distribution. For each of the individual areas identified in the TTS data, we have selected the probable route of travel, assuming that people will select their route primarily based on travel time.

The distribution of site generated trips is illustrated in **Table 12** using the methodology outlined above.

Table 12 – Proposed Development Traffic Distribution Summary

Travel Direction (to/from)		Percent of Total Traffic Generation
North	via Highway 400	10%
	via City Roads	14%
South	via Highway 400	15%
	via City Roads	16%
East	via City Roads	34%
West	via City Roads	11%
Total		100%

Further distribution to the study area intersections and Site Access points has been based on the overall distribution in conjunction with the motorists' anticipated travel route.

Figure 17 illustrates the traffic assignment for the proposed development prior to the Highway 400 / Rose Street improvements. **Figure 18** illustrates the traffic assignment post-improvements.

4.3 Total Horizon Year Traffic Volumes with the Proposed Development

For the total (2025, 2028, 2030 and 2035) horizon year traffic volumes, the proposed development traffic was added to the background (2025, 2028, 2030 and 2035) traffic volumes. Both pre- and post-Highway 400 improvement scenarios were considered for the total (2028) horizon year.

The resulting total (2025 and 2028) pre-improvement, total (2028) post-improvement and total (2030 and 2035) horizon year traffic volumes for the AM and PM peak hour are illustrated in **Figure 19** through **Figure 22**.

5 Intersection Operation with Proposed Development

5.1 Total (2025) Intersection Operation (Pre-Improvement)

The results of the LOS analysis under total (2025) traffic volumes during the AM and PM peak hour, prior to the Highway 400/Rose Street improvements can be found below in **Table 13**. Minor traffic signal timings adjustments have been made to ensure optimal operations (namely the addition of an eastbound left turn phase the Bayfield Street / Grove Street intersection and an increase to the southbound left-turn green time at the intersection Bayfield Street / Rose Street & Highway 400 NB OFF Ramp intersection). Intersection cycle length has been maintained in all cases. Stop control has been assumed at the Site Access egress movements. Detailed output of the Synchro analysis can be found in **Appendix G**.

Table 13 – Total (2025) LOS (Pre-Improvement)

Location (N-S Street / E-W Street)	Weekday AM Peak Hour					Weekday PM Peak Hour				
	V/C	Delay (s)	LOS	95% Queue (m)		V/C	Delay (s)	LOS	95% Queue (m)	
				Storage	Model				Storage	Model
Bayfield St / Rose St & Hwy 400 NB OFF Ramp (signalized)	0.70	26.3	C	-	-	0.98	49.5	D	-	-
EBL	0.85	41.5	D	520	94	0.94	62.3	E	520	206
EBR	0.79	42.2	D	360	109	0.73	47.9	D	360	155
WBR	0.14	27.3	C	-	-	0.14	34.2	C	-	-
NB	0.42	20.5	C	-	-	0.86	49.0	D	-	-
SBL	0.59	12.4	B	120	39	0.98	92.1	F	120	143
SB	0.32	10.1	B	-	-	0.35	17.2	B	-	-
Bayfield St / Grove St (signalized)	0.43	15.5	B	-	-	0.56	16.5	B	-	-
EBL	0.15	21.6	C	20	10	0.34	25.0	C	20	22
EB	0.07	20.9	C	-	-	0.11	23.6	C	-	-
WBL	0.48	31.0	C	25	29	0.31	32.8	C	25	19
WB	0.52	32.0	C	-	-	0.40	33.4	C	-	-
NBL	0.01	12.0	B	30	2	0.01	11.7	B	30	2
NB	0.31	14.3	B	-	-	0.64	18.4	B	-	-
SBL	0.25	8.3	A	50	21	0.48	10.8	B	50	19
SB	0.39	9.9	A	-	-	0.37	8.8	A	-	-
Rose St / Hwy 400 ON Ramp (unsignalized)	-	6.5	A	-	-	-	7.9	C	-	-
WB	0.55	17.7	C	-	-	0.67	25.8	D	-	-
NB	0.34	0.0	-	-	-	0.45	0.0	-	-	-
SB	0.00	0.0	-	-	-	0.00	0.0	-	-	-
Peel St / Grove St (unsignalized)	-	2.8	A	-	-	-	3.0	A	-	-
EB	0.01	0.3	A	-	-	0.01	0.3	A	-	-
WB	0.01	0.2	A	-	-	0.01	0.4	A	-	-
NB	0.17	14.8	B	-	-	0.12	13.4	B	-	-
SB	0.10	14.1	B	-	-	0.12	13.0	B	-	-
St. Vincent St / Rose St (signalized)	0.39	13.7	B	-	-	0.56	16.9	B	-	-
EB	0.71	37.5	D	-	-	0.83	46.6	D	-	-
WB	0.21	26.8	C	-	-	0.12	25.6	C	-	-
NB	0.27	7.1	A	-	-	0.35	9.7	A	-	-
SB	0.22	6.7	A	-	-	0.44	10.6	B	-	-
West Access / Rose St (unsignalized)	-	1.2	A	-	-	-	1.5	A	-	-
SB	0.08	12.5	B	-	-	0.13	13.0	B	-	-
East Access / Rose St (unsignalized)	-	2.0	A	-	-	-	2.5	A	-	-
SB	0.16	14.0	B	-	-	0.24	14.8	B	-	-

The results of the LOS analysis indicate that the majority of the study intersections are operating within the typical design limits noted in Section 3.1. Similar to the background conditions, the exception occurs during the PM peak hour where the southbound left turn movement at the Bayfield Street / Rose Street & Highway 400 NB OFF Ramp intersection will experience a LOS F. However, these operations are not considered an infrastructure deficiency given the delay only exceeds the LOS F threshold during

the PM peak hour, while the southbound approach and overall intersection provides a satisfactory operation.

95th percentile queue lengths are expected to exceed the existing storage length for the southbound left turn lane on Bayfield Street at Rose Street and eastbound and westbound left turn lanes on Grove Street at Bayfield Street.

The above LOS and queuing operations are reflective of intersections located in densely developed areas, providing access to major travel routes. It is noted that the study area intersections will operate at near identical levels to those experienced under background conditions, indicating that the proposed development will have minimal impact on the study area. In this regard, it is evident that the study area intersections can support the proposed development volumes with no operational or traffic safety concerns.

A review of the need for auxiliary right and left turn lanes at unsignalized study area intersections was completed as part of our analysis. The results of the Synchro analysis indicate that there is excess capacity for all movements; consequently, auxiliary turn lanes are not recommended at any unsignalized study area intersections.

Based on the Ontario Traffic Manual Book 12 *Signal Justification*, traffic signals are not warranted at the unsignalized intersections in the study area (results are provided in **Appendix H**).

No infrastructure improvements recommended within the study area to accommodate the total (2028) traffic volumes.

5.2 Total (2028) Intersection Operation (Pre-Improvement)

The results of the LOS analysis under total (2028) traffic volumes during the AM and PM peak hour, prior to the Highway 400/Rose Street improvements can be found below in **Table 14**. Minor traffic signal timings adjustments have been made to ensure optimal operations (namely the addition of an eastbound left turn phase the Bayfield Street / Grove Street intersection and an increase to the southbound left-turn green time at the intersection Bayfield Street / Rose Street & Highway 400 NB OFF Ramp intersection). Intersection cycle length has been maintained in all cases. Stop control has been assumed at the Site Access egress movements. Detailed output of the Synchro analysis can be found in **Appendix G**.

Table 14 – Total (2028) LOS (Pre-Improvement)

Location (N-S Street / E-W Street)	Weekday AM Peak Hour					Weekday PM Peak Hour				
	V/C	Delay (s)	LOS	95% Queue (m)		V/C	Delay (s)	LOS	95% Queue (m)	
				Storage	Model				Storage	Model
Bayfield St / Rose St & Hwy 400 NB OFF Ramp (signalized)	0.79	28.7	C	-	-	1.01	57.5	E	-	-
EBL	0.86	41.9	D	520	100	0.96	65.0	E	520	217
EBR	0.87	50.3	D	360	130	0.97	76.4	E	360	244
WBR	0.14	27.0	C	-	-	0.14	33.8	C	-	-
NB	0.54	22.9	C	-	-	0.94	57.7	E	-	-
SBL	0.71	17.8	B	120	42	1.00	100.5	F	120	150
SB	0.32	10.4	B	-	-	0.36	17.6	B	-	-
Bayfield St / Grove St (signalized)	0.54	18.7	B	-	-	0.63	17.2	B	-	-
EBL	0.54	22.7	C	20	38	0.50	26.0	C	20	34
EB	0.08	18.9	B	-	-	0.08	23.1	C	-	-
WBL	0.54	35.1	D	25	31	0.34	34.0	C	25	19
WB	0.38	32.5	C	-	-	0.28	33.2	C	-	-
NBL	0.01	15.7	B	30	3	0.05	12.7	B	30	5
NB	0.37	18.8	B	-	-	0.66	19.5	B	-	-
SBL	0.29	11.0	B	50	22	0.52	12.2	B	50	18
SB	0.44	13.2	B	-	-	0.45	10.0	B	-	-
Rose St / Hwy 400 ON Ramp (unsignalized)	-	6.9	B	-	-	-	8.6	C	-	-
WB	0.58	18.8	C	-	-	0.71	28.3	D	-	-
NB	0.35	0.0	-	-	-	0.46	0.0	-	-	-
SB	0.0	0.0	-	-	-	0.00	0.0	-	-	-
Peel St / Grove St (unsignalized)	-	2.8	A	-	-	-	3.0	A	-	-
EB	0.01	0.3	A	-	-	0.01	0.3	A	-	-
WB	0.01	0.2	A	-	-	0.01	0.4	A	-	-
NB	0.18	15.0	B	-	-	0.12	13.4	B	-	-
SB	0.11	14.3	B	-	-	0.12	13.0	B	-	-
St. Vincent St / Rose St (signalized)	0.37	13.3	B	-	-	0.52	16.5	B	-	-
EB	0.72	37.8	D	-	-	0.84	47.1	D	-	-
WB	0.22	26.7	C	-	-	0.12	25.5	C	-	-
NBL	0.12	6.7	A	25	12	0.11	8.5	A	25	9
NB	0.21	6.8	A	-	-	0.30	9.3	A	-	-
SBL	0.02	5.9	A	25	4	0.11	8.5	A	25	11
SB	0.25	7.1	A	-	-	0.37	10.0	B	-	-

West Access / Rose St (unsignalized)	-	1.2	A	-	-	-	1.4	A	-	-
SB	0.08	12.5	B	-	-	0.13	13.2	B	-	-
East Access / Rose St (unsignalized)	-	1.8	A	-	-	-	2.5	A	-	-
SB	0.14	13.6	B	-	-	0.25	15.0	C	-	-

The results of the LOS analysis indicate that the majority of the study intersections are operating within the typical design limits noted in Section 3.1. Similar to the background conditions, the exception occurs during the PM peak hour where the southbound left turn movement at the Bayfield Street / Rose Street & Highway 400 NB OFF Ramp intersection will experience a LOS F. However, these operations are not considered an infrastructure deficiency given the delay only exceeds the LOS F threshold during the PM peak hour, while the southbound approach and overall intersection provides a satisfactory operation.

95th percentile queue lengths are expected to exceed the existing storage length for the southbound left turn lane on Bayfield Street at Rose Street and eastbound and westbound left turn lanes on Grove Street at Bayfield Street.

The above LOS and queuing operations are reflective of intersections located in densely developed areas, providing access to major travel routes. It is noted that the study area intersections will operate at near identical levels to those experienced under background conditions, indicating that the proposed development will have minimal impact on the study area. In this regard, it is evident that the study area intersections can support the proposed development volumes with no operational or traffic safety concerns.

A review of the need for auxiliary right and left turn lanes at unsignalized study area intersections was completed as part of our analysis. The results of the Synchro analysis indicate that there is excess capacity for all movements; consequently, auxiliary turn lanes are not recommended at any unsignalized study area intersections.

Based on the Ontario Traffic Manual Book 12 *Signal Justification*, traffic signals are not warranted at the unsignalized intersections in the study area (results are provided in **Appendix H**).

No infrastructure improvements recommended within the study area to accommodate the total (2028) traffic volumes.

5.3 Total (2028) Intersection Operation (Post-Improvement)

The results of the LOS analysis under total (2028) traffic volumes during the AM and PM peak hour, with the inclusion of the Highway 400/Rose Street improvements can be found below in **Table 15**. Minor traffic signal timings adjustments have been made to ensure optimal operations (namely the addition of an eastbound left turn phase the Bayfield Street / Grove Street intersection). Intersection cycle length has been maintained in all cases. Detailed output of the Synchro analysis can be found in **Appendix G**.

Table 15 – Background (2028) LOS (Post- Improvement)

Location (N-S Street / E-W Street)	Weekday AM Peak Hour					Weekday PM Peak Hour				
	V/C	Delay (s)	LOS	95% Queue (m)		V/C	Delay (s)	LOS	95% Queue (m)	
				Storage	Model				Storage	Model
Bayfield St / Hwy 400 NB ON & OFF Ramps (signalized)	0.62	23.4	C	-	-	0.90	38.7	D	-	-
EBL	0.86	41.5	D	520	102	0.92	54.9	D	520	203
EBR	0.55	31.9	C	360	63	0.64	40.7	D	360	121
NB	0.36	18.4	B	-	-	0.58	35.4	D	-	-
NBR	0.10	16.0	B	35	12	0.27	30.4	C	35	45
SBL	0.48	10.7	B	115	27	0.85	46.5	D	115	82
SB	0.25	9.7	A	-	-	0.30	19.1	B	-	-
Bayfield St / Grove St (signalized)	0.67	18.8	B	-	-	0.84	23.8	C	-	-
EBL	0.61	24.7	C	20	38	0.70	35.8	D	20	36
EB	0.08	19.0	B	-	-	0.08	23.6	C	-	-
WBL	0.52	34.5	C	25	31	0.29	33.2	C	25	19
WB	0.31	31.7	C	-	-	0.37	33.8	C	-	-
NBL	0.01	15.4	B	30	2	0.06	16.8	B	30	6
NB	0.38	18.8	B	-	-	0.82	28.6	C	-	-
SBL	0.62	14.1	B	200	41	0.81	31.9	C	200	78
SB	0.46	13.0	B	-	-	0.46	10.1	B	-	-
Peel St / Grove St (unsignalized)	-	4.3	A	-	-	-	4.8	A	-	-
EB	0.06	1.9	A	-	-	0.05	1.5	A	-	-
WB	0.01	0.3	A	-	-	0.01	0.3	A	-	-
NB	0.25	20.8	C	-	-	0.26	22.9	C	-	-
SB	0.20	15.5	C	-	-	0.29	15.5	C	-	-
St. Vincent St / Rose St (signalized)	0.43	14.6	B	-	-	0.58	18.9	B	-	-
EB	0.76	39.1	D	-	-	0.88	51.9	D	-	-
WB	0.20	25.5	C	-	-	0.11	24.6	C	-	-
NBL	0.14	7.9	A	25	13	0.12	9.9	A	25	9
NB	0.23	8.0	A	-	-	0.32	10.8	B	-	-
SBL	0.02	6.8	A	25	4	0.12	9.8	A	25	11
SB	0.29	8.1	A	-	-	0.42	11.9	B	-	-
West Access / Rose St (unsignalized)	-	2.8	A	-	-	-	4.1	A	-	-
SB	0.04	8.9	A	-	-	0.06	9.0	A	-	-
East Access / Rose St (unsignalized)	-	2.6	A	-	-	-	4.0	A	-	-
SB	0.10	9.9	A	-	-	0.16	10.1	B	-	-

The results of the LOS analysis indicate that all intersections are operating within the typical design limits noted in Section 3.1.

95th percentile queue lengths are expected to exceed the existing storage length for the northbound Right turn lane on Bayfield Street at Rose Street and eastbound left turn lane on Grove Street at Bayfield Street.

The above LOS and queuing operations are reflective of intersections located in densely developed areas, providing access to major travel routes. It is again noted that the study area intersections will operate at near identical levels to those experienced under background conditions, indicating that the proposed development will have minimal impact on the study area. In this regard, it is evident that the study area intersections can support the proposed development volumes with no operational or traffic safety concerns.

A review of the need for auxiliary right and left turn lanes at unsignalized study area intersections was completed as part of our analysis. The results of the Synchro analysis indicate that there is excess capacity for all movements; consequently, auxiliary turn lanes are not recommended at any unsignalized study area intersections.

Based on the Ontario Traffic Manual Book 12 *Signal Justification*, traffic signals are not warranted at the unsignalized intersections in the study area (results are provided in **Appendix H**).

No additional infrastructure improvements recommended within the study area to accommodate the total (2028) traffic volumes.

5.4 Total (2030) Intersection Operation

The results of the LOS analysis under total (2030) traffic volumes during the AM and PM peak hour can be found below in **Table 16**. Minor traffic signal timings adjustments have been made to ensure optimal operations (namely the addition of an eastbound left turn phase the Bayfield Street / Grove Street intersection). Intersection cycle length has been maintained in all cases. Detailed output of the Synchro analysis can be found in **Appendix G**.

Table 16 – Total (2030) LOS

Location (N-S Street / E-W Street)	Weekday AM Peak Hour					Weekday PM Peak Hour				
	V/C	Delay (s)	LOS	95% Queue (m)		V/C	Delay (s)	LOS	95% Queue (m)	
				Storage	Model				Storage	Model
Bayfield St / Hwy 400 NB ON & OFF Ramps (signalized)	0.64	23.8	C	-	-	0.92	40.0	D	-	-
EBL	0.87	42.5	D	520	110	0.93	56.4	E	520	219
EBR	0.58	32.5	C	360	67	0.66	41.0	D	360	129
NB	0.37	18.6	B	-	-	0.60	36.3	D	-	-
NBR	0.10	16.2	B	35	12	0.28	31.1	C	35	47
SBL	0.50	10.8	B	115	28	0.88	53.5	D	115	89
SB	0.25	9.8	A	-	-	0.30	19.4	B	-	-
Bayfield St / Grove St (signalized)	0.69	19.1	B	-	-	0.84	25.0	C	-	-
EBL	0.62	25.0	C	20	38	0.66	32.3	C	20	35
EB	0.08	19.0	B	-	-	0.08	23.3	C	-	-
WBL	0.53	34.8	C	25	32	0.30	33.8	C	25	19
WB	0.32	31.8	C	-	-	0.38	34.3	C	-	-
NBL	0.01	15.5	B	30	3	0.06	17.4	B	30	6
NB	0.39	19.0	B	-	-	0.85	31.0	C	-	-
SBL	0.64	14.9	B	200	42	0.82	34.2	C	200	82
SB	0.47	13.2	B	-	-	0.48	10.7	B	-	-
Peel St / Grove St (unsignalized)	-	4.3	A	-	-	-	4.9	B	-	-
EB	0.06	1.9	A	-	-	0.05	1.5	A	-	-
WB	0.01	0.3	A	-	-	0.01	0.3	A	-	-
NB	0.26	21.2	C	-	-	0.26	23.4	C	-	-
SB	0.21	15.7	C	-	-	0.29	15.7	C	-	-
St. Vincent St / Rose St (signalized)	0.43	14.7	B	-	-	0.59	19.3	B	-	-
EB	0.76	39.2	D	-	-	0.89	52.8	D	-	-
WB	0.20	25.4	C	-	-	0.11	24.4	C	-	-
NBL	0.14	8.1	A	25	13	0.12	10.1	B	25	9
NB	0.24	8.2	A	-	-	0.33	11.1	B	-	-
SBL	0.03	6.9	A	25	4	0.13	10.0	B	25	11
SB	0.29	8.6	A	-	-	0.43	12.2	B	-	-
West Access / Rose St (unsignalized)	-	2.8	A	-	-	-	4.1	A	-	-
SB	0.04	8.9	A	-	-	0.06	9.0	A	-	-
East Access / Rose St (unsignalized)	-	2.6	A	-	-	-	4.0	A	-	-
SB	0.10	9.9	A	-	-	0.16	10.1	B	-	-

The results of the LOS analysis indicate that all intersections are operating within the typical design limits noted in Section 3.1.

95th percentile queue lengths are expected to exceed the existing storage length for the northbound Right turn lane on Bayfield Street at Rose Street and eastbound and westbound left turn lanes on Grove Street at Bayfield Street.

Again, study area intersections will operate at near identical levels to those experienced under background conditions. The proposed development will have minimal impact on the study area.

A review of the need for auxiliary right and left turn lanes at unsignalized study area intersections was completed as part of our analysis. The results of the Synchro analysis indicate that there is excess capacity for all movements; consequently, auxiliary turn lanes are not recommended at any unsignalized study area intersections.

Based on the Ontario Traffic Manual Book 12 *Signal Justification*, traffic signals are not warranted at the unsignalized intersections in the study area (results are provided in **Appendix H**).

No additional improvements are recommended within the study area.

5.5 Total (2035) Intersection Operation

The results of the LOS analysis under total (2035) traffic volumes during the AM and PM peak hour can be found below in **Table 17**. Minor traffic signal timings adjustments have been made to ensure optimal operations (namely the addition of an eastbound left turn phase the Bayfield Street / Grove Street intersection). Intersection cycle length has been maintained in all cases. Detailed output of the Synchro analysis can be found in **Appendix G**.

Table 17 – Total (2035) LOS

Location (N-S Street / E-W Street)	Weekday AM Peak Hour					Weekday PM Peak Hour				
	V/C	Delay (s)	LOS	95% Queue (m)		V/C	Delay (s)	LOS	95% Queue (m)	
				Storage	Model				Storage	Model
Bayfield St / Hwy 400 NB ON & OFF Ramps (signalized)	0.68	25.2	C	-	-	0.97	44.0	D	-	-
EBL	0.90	45.9	D	520	119	0.97	62.1	E	520	231
EBR	0.63	34.0	C	360	76	0.70	42.4	D	360	136
NB	0.39	19.3	B	-	-	0.64	38.5	D	-	-
NBR	0.10	16.6	B	35	12	0.30	32.6	C	35	48
SBL	0.54	11.6	B	115	29	0.94	75.7	E	115	98
SB	0.27	10.0	B	-	-	0.32	20.0	C	-	-
Bayfield St / Grove St (signalized)	0.73	19.7	B	-	-	0.88	27.1	C	-	-
EBL	0.65	26.3	C	20	40	0.69	34.4	C	20	37
EB	0.08	18.9	B	-	-	0.08	23.3	C	-	-
WBL	0.55	35.1	D	25	33	0.32	33.8	C	25	20
WB	0.33	31.8	C	-	-	0.39	34.4	C	-	-
NBL	0.01	15.7	B	30	3	0.07	17.7	B	30	6
NB	0.41	19.4	B	-	-	0.89	34.5	C	-	-
SBL	0.68	17.0	B	200	46	0.86	39.7	D	200	89
SB	0.49	13.7	B	-	-	0.50	11.1	B	-	-
Peel St / Grove St (unsignalized)	-	4.4	A	-	-	-	5.0	B	-	-
EB	0.05	1.9	A	-	-	0.05	1.5	A	-	-
WB	0.01	0.2	A	-	-	0.01	0.4	A	-	-
NB	0.28	22.5	C	-	-	0.29	25.4	D	-	-
SB	0.22	16.4	C	-	-	0.31	16.4	C	-	-
St. Vincent St / Rose St (signalized)	0.46	15.2	B	-	-	0.61	19.7	B	-	-
EB	0.78	39.7	D	-	-	0.89	53.0	D	-	-
WB	0.20	25.1	C	-	-	0.11	24.2	C	-	-
NBL	0.16	8.6	A	25	15	0.14	10.7	B	25	9
NB	0.26	8.7	A	-	-	0.35	11.6	B	-	-
SBL	0.03	7.3	A	25	5	0.14	10.5	B	25	12
SB	0.31	9.1	A	-	-	0.46	12.9	B	-	-
West Access / Rose St (unsignalized)	-	2.8	A	-	-	-	4.1	A	-	-
SB	0.04	8.9	A	-	-	0.06	9.0	A	-	-
East Access / Rose St (unsignalized)	-	2.6	A	-	-	-	3.7	A	-	-
SB	0.09	9.9	A	-	-	0.16	10.1	B	-	-

The results of the LOS analysis indicate that all intersections are operating within the typical design limits noted in Section 3.1.

95th percentile queue lengths are expected to exceed the existing storage length for the northbound Right turn lane on Bayfield Street at Rose Street and eastbound and westbound left turn lanes on Grove Street at Bayfield Street.

Again, study area intersections will operate at near identical levels to those experienced under background conditions. The proposed development will have minimal impact on the study area.

A review of the need for auxiliary right and left turn lanes at unsignalized study area intersections was completed as part of our analysis. The results of the Synchro analysis indicate that there is excess capacity for all movements; consequently, auxiliary turn lanes are not recommended at any unsignalized study area intersections.

Based on the Ontario Traffic Manual Book 12 *Signal Justification*, traffic signals are not warranted at the unsignalized intersections in the study area (results are provided in **Appendix H**).

No additional improvements are recommended within the study area.

5.6 Supplementary Analysis – MTO Comments

The Ontario Ministry of Transportation [MTO] provided their review comments to the 3rd submission of this report, on June 24, 2024. MTO highlighted that the Highway 400 / Bayfield Street interchange will experience v/c ratios of 0.75 or higher within the 10-year horizon, which is outside the MTO design parameters for an interchange.

It is noted that the analysis in this report is based on our understanding of the anticipated interchange improvements noted in the Highway 400 TESR (discussed in Section 2.4), and did not consider any additional improvements other than the traffic signal changes noted in Section 3.4. It was our understanding that the interchange improvements represented the preferred design based on the local constraints, as identified in the Highway 400 TESR. Nevertheless, an additional iterative analysis was completed for the Total (2035) horizon year (worst-case scenario) to identify additional improvements that may improve operations at this intersection.

Based on our review of the traffic model for the projected total 2035 traffic volumes, a v/c ratio of 0.75 or less is not achievable without providing extensive lane improvements, namely triple eastbound left turn lanes for the Highway 400 OFF Ramp. However, a v/c ratio of 0.85 or less is achievable with the following improvements:

- Provision of an additional southbound left turn lane (Dual Left Turn Lanes);
- Provision of an additional receiving lane at the east leg of the intersection;
- And improved overall cycle length of 130 seconds; and
- Protected phasing for the southbound left turn phase.

Detailed output of the Synchro analysis can be found in **Appendix G**.

It is noted that the Subject Site traffic is conservatively estimated to result in an additional 94 AM and 96 PM peak hour trips through the Highway 400 / Bayfield Street intersection, translating to less than 1.4% of the total peak hour trips through the intersection. Consequently, Subject Site has a negligible effect on future operations at the Highway 400 / Bayfield Street intersection and any required improvements.

Notwithstanding the above, it is evident that the typical MTO design threshold of a 0.75 v/c ratio cannot be achieved at this interchange for the future traffic demand, unless significant corridor improvements are made. The lane improvement required to achieve v/c ratio of 0.75 would have significant impact on existing local development, consequently, this approach is not recommended. Rather than expanding the infrastructure beyond what is noted in the Highway 400 TESR, it is recommended that both the City and MTO continue work towards an improved non-auto modal split to increase transportation capacity through the study area.

5.7 Pedestrian Operations

City Staff has indicated the need to review the following pedestrian operations in the study area:

- Rose Street connectivity adjacent the Subject Site;
- Rose Street crossing operations; and
- Bayfield Street pedestrian connection (post MTO improvements).

An additional addendum letter was prepared by JD Engineering, dated April 29th, 2024, and should be read in unison with this report.

5.7.1 Rose Street Connectivity

As noted in Section 2.1 sidewalk is currently available on the south side of Rose Street (adjacent the subject site), and on both sides of the Rose Street, east of Peel Street. As noted in Section 2.3, Rose Street is to be improved to include sidewalk on both sides of the road from its West limits to Currie Street.

However, based on our correspondence with the project team and City Staff, it is our understanding that the sidewalk extension along the 42-48 Rose Street frontage cannot be provided in the short-term due to property and grading constraints. Consequently, a Level 2 Type D pedestrian crossing is recommended at the East Access, to provide pedestrian connectivity east and west of the Subject Site via the existing sidewalk on the south side of Rose Street.

5.7.2 Rose Street Crossing

With regards to the Rose Street pedestrian crossing operations, City Staff highlighted the specific concern for pedestrians choosing to cross Rose Street in order to access existing transit services to the south, along Grove Street. For residents and employees of the Subject Site, this crossing movement would occur at the East Access of the Subject Site.

A review of the need for pedestrian signals was undertaken based on the Ontario Traffic Manual Book 12 Signal Justification – Justification 6. Using the Total (2028) Pre-Improvement traffic volumes (worst-case scenario), the average annual daily traffic [AADT] on Rose Street has been estimated using the following formula:

- $AADT = PM \text{ Peak Hour} \times 10^1$

The 8-hour traffic volumes in the study area were calculated using the following formula:

- $8\text{-hour traffic volumes} = AADT/2^2$

A summary of the Total (2028) Pre-Improvement AADT and 8-hour traffic volumes are provided in **Table 18**.

¹ The PM peak hour was used in the AADT calculation to provide the most conservative estimate for the AADT

² This is consistent with the methodology outlined in Section 5.2.2 in Ontario Traffic Manual Book 15.

Table 18 – Rose Street Traffic Volume Summary

Traffic Volumes	Total (2028) Pre-Improvement
AADT	6580
8-Hour	3290

The Rose Street / Peel Street pedestrian crossing is expected to encompass a catchment area which includes the entire Subject Site and approximately 15 residential lots along the north side Rose Street. Pedestrian volumes have been estimated as follows:

- Subject Site pedestrian trips:
 - 40%³ of PM peak hour Residential trips;
 - 10% of PM peak hour Office and Day Care trips; and
- Rose Street Residential lot pedestrian trips = 0.5 peak hour trips per lot.

It has been further assumed that approximately 40% of the pedestrian crossings will be children under the age of 12, which are classified as “assisted” pedestrians, having an adjusted value of two times an “unassisted” pedestrian. The “equivalent adult pedestrians” volumes [EAPs] is a summation of the two volumes, equal to the following:

- *equivalent adult pedestrians = unassisted pedestrians + 2 x assisted pedestrians*

The estimated pedestrian crossing volumes at the Rose Street / Peel Street intersection are summarized in **Table 19**.

Table 19 – Rose Street Pedestrian Crossing Volume Summary

Subject Site		Existing Lots		Total Ped Peak Hour Trips	Daily Volume (Peak Hour x 10)	8-hour (Daily ÷ 2)	8-hour EAP Volumes
Total (2028) PM Peak Hour	Ped Trips	# of Lots	Ped Trips (0.5 / lot)				
Residential: 84 Office: 128 Day Care: 61	Residential: 34 Office: 13 Day Care: 6 Total: 53	15	8	61	610	305	427

Based on the above-noted conservative 8-hour traffic and pedestrian volumes, pedestrian traffic signals are not warranted at the Rose Street / Peel Street intersection under the Total (2028) Pre-improvement scenario (results are provided in **Appendix I**).

Based on the pedestrian system connectivity criteria, the proposed crossing meets the following criteria:

- Provides required connectivity between critical pedestrian origin / destination (transit stops);
- Pedestrian crossing demand is greater than 100 “equivalent adult pedestrians”;
- 8-hour vehicle volume is greater than 750 vehicles; and
- Closest traffic control device is greater than 200 metres.

³ A 40% estimate is considered highly conservative in context with TTS primary mode of travel information which shows a modal split of 0.10 for the 8508 Origin Zone.

Consequently, a PXO is recommended for the Rose Street / Peel Street intersection.

Based on the Ontario Traffic Manual Book 15 Pedestrian Crossing Facilities – Table 7: Pedestrian Crossover Selection Matrix, a Level 2 Type D pedestrian crossing is recommended for the Rose Street / Peel Street intersection (Table and PXO Figure provided in the **Appendix I**).

It should be noted that after the completion of the Highway 400 / Rose Street improvements, traffic volumes on Rose Street west of Peel Street will be reduced to only those vehicles accessing the existing residential lots and the proposed Subject Site (approximately 219AM and 181PM two-way vehicle trips). The resulting 8-hour traffic volumes (approximately 905 vehicles) will fall just above the threshold to recommend the implementation of any pedestrian crossover facility.

5.7.3 Bayfield Street Connection

As previously noted, the Highway 400 improvements include the decommissioning of the Rose Street – Bayfield Street connection and the implementation of a cul-de-sac at the Rose Street west limits. Although not specifically illustrated in the Highway 400 TESR recommended plan drawings, it is recommended that a pedestrian connection be constructed within the MTO right-of-way to allow for pedestrian travel between Bayfield Street and Rose Street.

5.8 Site Access & On-Site Circulation

The Site Access driveways will operate efficiently as full-movement driveways, with one-way stop control for the egress movements. Single ingress and egress lane will provide the necessary capacity to service the proposed development.

The proposed spacing between the Highway 400 NB ON Ramp, the West Access, East Access and Peel Street (measured edge of driveway to edge of road) meets the minimum driveway spacing requirements for a collector road as per the Transportation Association of Canada [TAC] Guidelines – Figure 8.8.2 (Suggested Minimum Corner Clearances to Accesses or Public Lanes at Major Intersections) – 20 metres for unsignalized condition.

The proposed Site Accesses will provide a minimum width of 8.0 metres, satisfying the suggested entrance width for a multiple residential land use as identified in the *City of Barrie Urban Design Manual* – 8 metres for two-lane entrances onto collector roads.

The Subject Sites internal roadway will provide two-way operations maintaining a minimum clear route width of 6.4 metres, satisfying the City's requirements. The 6.4 metre clear route is also sufficient to accommodate the manoeuvring of typical site generated traffic as well as emergency vehicles.

In consideration of the above, and further noting that the maneuvering of necessary design vehicles can be facilitated by the proposed accesses (Swept Path analysis provided in **Appendix J**), the proposed driveway width and internal configuration is acceptable for the intended use.

5.9 Swept Path Analysis

A swept path analysis has been provided in **Appendix J** to illustrate that the following vehicles can access the site as intended:

- City of Barrie – Recycling Truck; and
- TAC Passenger Vehicle.

5.10 Sight Distance Review

A review of the available sight distances for the proposed West Access and East Access was completed as part of this analysis.

The sight distance to the east on Rose Street from both the West Access and East Access (150+ metres) is greater than the minimum sight stopping and intersection sight distance requirements as per the TAC Guidelines for a design speed of 60 km/h (85 and 130 meters, respectively).

The sight distance to the west on Rose Street from the East Access (approximately 145 metres) is greater than the minimum sight stopping and intersection sight distance requirements as per the TAC Guidelines for a design speed of 60 km/h (85 and 130 meters, respectively).

The sight distance to the west on Rose Street from the West Access is limited by the existing intersection with the Highway 400 NB ON Ramp (approximately 77 metres). However, recognizing that all vehicles from the west will move onto Rose Street after completing a turning movement and a significant speed reduction, the sightlines are not considered a concern.

There are no issues with the sight distance available for the proposed Site Access.

5.11 Construction Staging

A review of the construction staging plan was reviewed as it relates to parking of trades people, delivery of construction material, maintenance of adjacent property access, pedestrian movements, City infrastructure, etc.

It is recommended that the parking of construction vehicles, vehicles owned by staff and subcontractors be formally directed (in writing where possible) to avoid parking on municipal streets. Recognizing that the existing subject site includes portions of open space land, the parking of trades vehicles will be maximized within the subject lands.

Access to the site will occur via Rose Street at the existing access driveways. Both accesses will accommodate small scale deliveries/trades vehicles as well as larger construction vehicles and construction materials.

The expected construction staging plan is not expected to impede or prevent access to the neighboring residential homes.

Pedestrian movements on Rose Street will remain largely unaffected by the construction of the proposed development. No long-term sidewalk closures are expected.

6 Parking Review

6.1 Scope

The purpose of this analysis is to estimate the minimum parking supply required to adequately service the subject site. The proposed Site Plan includes a total parking supply of 253 spaces, including 9 barrier-free parking spaces. An additional 44 parking spaces will be included within MTO's building set back limit, along the property's west and north boundaries. An additional addendum letter was prepared by JD Engineering, dated April 29th, 2024, and should be read in unison with this report.

6.2 Study Area Parking Infrastructure

There are a number of private surface parking lots located within the study area. There are also a variety of on-street parking restrictions.

Figure 6 illustrates the location of the above-noted existing parking in the study area.

Figure 6 – Existing Lane Configuration within Study Area



6.3 City of Barrie By-law

The City of Barrie Zoning By-Law 2009-141 [ZBL] (Office Consolidation January 2023) provides parking requirements for a variety of building types and land uses. The City's By-Law 2021-086 amends the ZBL parking requirements for residential uses located in the same building as institutional use. **Table 20** summarizes the parking requirement, according to the ZBL, for the proposed development.

Table 20 - Zoning By-law Parking Requirements

Category	Parking Standard	Size	Required	Provided	Net Parking Supply
Residential Building containing more than 3 Dwelling Units	1.0 spaces per unit	215 units	215 spaces	128 spaces	- 87 spaces
Day Care	1 space / class + 1 space / office	5 classes + 1 Office	6 spaces	6 spaces	-
Community Kitchen	1 space / 4 persons	20 persons	5 spaces	5 spaces	-
Community Agency Space #1 (SCDSB - School)	1 space / class and 1 space/ office + 1 space / 10 Students	15 offices + 100 students	25 spaces	25 spaces	-
Community Agency Space #2 (Social Services Facility)	1.0 space per 30m ² GFA	300 m ²	10 spaces	10 spaces	-
Community Agency Space #3 (Training & Rehab Centre)	1.0 space per 50m ² GFA	752 m ²	15 spaces	15 spaces	
Ontario Works / Child Services (Business, Professional or Administrative Office)	1.0 space per 30m ² GFA	4,243 m ²	141 spaces	64 spaces	- 77 spaces
TOTAL PARKING SPACES			417 spaces	253 spaces	- 164 spaces
<i>Visitor Parking (25% of Residential Parking spaces)</i>			<i>54 spaces</i>	<i>20 spaces</i>	<i>-34 spaces</i>
<i>Barrier-Free Parking</i>	<i>over 100 required spaces = 1 space + 3% of required spaces</i>		<i>15 spaces</i>	<i>9 spaces</i>	<i>-6 spaces</i>

As indicated, the proposed parking supply falls below the calculated requirement by 164 spaces. It is noted that the parking requirement for the residential portion of the site has been calculated based on the typical residential building use, recognizing that the City's ZBL does not provide parking standards for affordable housing units or specifically for the proposed Ontario Works land-use.

Further investigation into necessary parking provision for the affordable housing and Ontario Works portion of the subject site is provided in the proceeding sections.

6.4 Local Development and Amenities

The Subject Site is located within a 600 metre radius of the following services and amenities:

- Grocery Store;
- Child Care;
- Convenience Store;
- Pharmacy;
- Shopping Mall;
- Service Ontario;
- Hardware Store;
- Car repair and maintenance centre;
- Doctor;
- Law Office;
- Veterinary Clinic;
- Early Education Centre and Elementary School;

- City Parks;
- Barrie North Collegiate; and
- Numerous take-out and dine-in restaurants (Starbucks, KFC, Applebee's, Quesada Burritos and Tacos, Burger King, etc.);

Significant commercial/employment lands are located along the Bayfield Street corridor to the north, the St. Vincent Street and Bell Farm Road corridors to the east, and the City's downtown core to the south (all located within a 2-kilometre radius of the Subject Site).

6.5 TDM Measures

As indicated Section 2, the Subject Site is well serviced by transit and pedestrian infrastructure and is well-suited for a car-free commute.

The proposed development will provide a number of transportation demand management techniques, including:

- The construction of an internal sidewalk network, providing walkability around the entirety of the buildings.
- Preparation and distribution of transit information packages to all residents which will include bicycle maps, local transit map/schedule, information on transit incentives;
- Provide an information display board in a central location within the apartment buildings to share updated transportation information. The information board shall display travel information such as bicycle maps, local transit map/schedule and other relevant information;
- Provision of a physical rideshare notice board for residents within the apartment buildings;
- Provision of an indoor bicycle storage room; and
- Provision of an indoor scooter storage room.

6.6 Proxy Parking Counts

6.6.1 Affordable Housing

In order to estimate the parking demand for the proposed affordable housing units, parking surveys were conducted at four Simcoe County Housing proxy locations in the City:

- 1 Blake Street;
- 18 Sophia Street;
- 33 Brooks Street; and
- 108 Burton Avenue.

The parking surveys were conducted during the following times:

- Wednesday April 24th, 2024 – single spot count between 23:00 and 24:00; and
- Thursday April 25th, 2024 – single spot count between 23:00 and 24:00.

The timing of the spot surveys was chosen to capture the highest parking demand for the residential units (i.e. overnight). **Table 21** summarizes the results of the parking surveys.

Table 21 – Affordable Housing Parking Counts

Proxy Parking Site			Parking Utilization (Occupied Spaces)	
Location	Units	Parking Supply (Spaces)	Wednesday, April 24 th	Thursday, April 25 th
1 Blake Street	91	34	30	29
18 Sophia Street	30	16	9	10
33 Brooks Street	107	86	44	46
108 Burton	30	8	5	5
Total	258	144	88	90
Parking Unit Rate		0.59 spaces / unit	0.34 spaces / unit	0.35 spaces / unit

As indicated, the overall peak resident parking supply for the proxy sites is 0.59 spaces per unit and the parking demand for the proxy sites is between 0.34 and 0.35 spaces per unit.

In all cases, the parking supply was notably greater than the observed parking demand. This confirms that the parking supply did not constrain the parking demand at the proxy sites.

6.6.2 Ontario Works / Child Services

In order to estimate the parking demand for the proposed Ontario Works / Child Services offices, parking surveys were conducted at the existing Ontario Works / Child Services facility located at 250 West Street N, Orillia. The parking surveys were conducted during the following times:

- Wednesday April 10th, 2024 – single spot count between 10:00 and 11:00; and
- Thursday April 11th, 2024 – single spot count between 10:00 and 11:00.

The timing of the spot surveys was chosen to capture the highest parking demand for the office uses, as identified by the County. **Table 22** summarizes the results of the parking surveys.

Table 22 – Ontario Works / Child Services Parking Counts

Proxy Parking Site			Parking Utilization (Occupied Spaces)	
Location	Size	Parking Supply (Spaces)	Wednesday, April 10 th	Thursday, April 11 th
250 West St N, Orillia	13,756 ft ² (1,277 m ²)	52 ¹	21	19
Parking Unit Rate		1.0 space per 24m² GFA	1.0 space per 61m² GFA	1.0 space per 67m² GFA

¹ At the time of the parking counts, a temporary signed parking area was provided for the Ontario Works Office, as construction was continuing on site for the residential components of the building.

As indicated, the overall peak parking demand for the Ontario Works / Child Services Office space is 1.0 space per 61m².

The parking supply was notably greater than the observed parking demand. This confirms that the parking supply did not constrain the parking demand at the proxy site.

6.6.3 Parking Demand Analysis

As illustrated in **Table 21**, the existing affordable housing units in Barrie have a relatively low parking demand rate (a maximum of 0.35 spaces per unit). Based on the proxy parking demand, it is recommended that the Site Plan include a minimum of 0.45 parking spaces per unit (97 parking spaces) for the proposed 215 affordable units. This parking supply can accommodate the anticipated demand for resident parking and overnight visitor parking. It is noted that the estimated parking demand is based on the proxy sites where there is significant excess uncontrolled free parking supply. It is recommended that 0.09 spaces per unit (20 spaces) be designated as visitor spaces.

The proxy parking data shows that the existing Ontario Works Office in Orillia has a relatively low parking demand rate for an office use (a maximum of 1.0 spaces per 61m²), in comparison to the ZBL requirements (1.0 spaces per 30m²). Based on the proxy parking demand rate, it is recommended that the Site Plan include a minimum of 1.0 parking spaces per 45m² (94 parking spaces) for the proposed 4,243 m² of Ontario Works / Child Services office space.

The 44 parking spaces included within MTO's building set back limit are not required to service the anticipated parking. These spaces will provide additional parking capacity for the overall development.

6.7 Recommended Parking Supply

The recommended parking supply for the subject site is illustrated in **Table 23**.

Table 23 – Recommended Parking Supply

Category	Recommended Rate	Size	Recommended	Provided	Net Parking Supply
Residential Building containing more than 3 Dwelling Units	0.45 spaces per unit	215 units	97 spaces	98 spaces	+1 spaces
Day Care	1 space / class + 1 space / office	5 classes + 1 Office	6 spaces	6 spaces	-
Community Kitchen	1 space / 4 persons	20 persons	5 spaces	5 spaces	-
Community Agency Space #1 (SCDSB - School)	1 space / class and 1 space/ office + 1 space / 10 Students	15 offices + 100 students	25 spaces	25 spaces	-
Community Agency Space #2 (Social Services Facility)	1.0 space per 30m ² GFA	300 m ²	10 spaces	10 spaces	-
Community Agency Space #3 (Training & Rehab Centre)	1.0 space per 50m ² GFA	752 m ²	15 spaces	15 spaces	-
Ontario Works / Child Services (Business, Professional or Administrative Office)	1.0 space per 45m ² GFA	4,243 m ²	94 spaces	94 spaces	-
TOTAL PARKING SPACES			252 spaces	253 spaces	+ 1 spaces
<i>Residential Visitor Parking (0.09 spaces per unit)</i>			<i>20 spaces</i>	<i>20 spaces</i>	<i>-</i>
<i>Barrier-Free Parking</i>	<i>over 100 required spaces = 1 space + 3% of required spaces</i>		<i>9 spaces</i>	<i>9 spaces</i>	<i>-</i>

The above parking supply will adequately service the overall development demands. No parking overflow is anticipated to occur. It is noted that the 44 parking spaces included within MTO's building set back limit will provide additional parking capacity for the overall development.

Although not necessary to service the proposed development, the provision of on-street parking stalls may be available on Rose Street in the future, when the west end is converted into a dead-end.

7 Summary

McKnight Charron Limited Architects with **The Simcoe County Housing Corporation** retained **JD Engineering** to prepare this traffic impact and parking study in support of the proposed affordable housing development located on the north side of Rose Street between Highway 400 and Rose Street, west of Bayfield Street in the City of Barrie.

This chapter summarizes the conclusions and recommendations from the study.

1. The proposed development has been assumed to generate a total of 272 AM and 273 PM peak hour trips. This is a conservative estimate of the amount of traffic that will be generated by the subject site.
2. Detailed intersection counts were obtained and conducted at the study intersections.

3. An intersection operation analysis was completed at the study area intersections, using the existing and background (2025, 2028, 2030 and 2035) traffic volumes. The 2028 horizon year included the analysis Pre- and Post-Highway 400 / Rose Street improvements. This enabled a review of existing and future traffic deficiencies that would be present without the influence of the proposed development. The following improvements are recommended:

Bayfield Street / Grove Street

Background (2028)

- Signal timing adjustments:
 - i. Addition of a protected eastbound left turn phase.
- Addition of a “Do Not Block Driveway” sign is recommended on the south side of Grove Street West, west of the parking lot driveway for 218 Bayfield Street and a “Do Not Block Intersection” sign is recommended, on the north side of Grove Street East, west of Drury Lane.

Bayfield Street / Rose Street & Highway 400 NB OFF Ramp

Background (2028)

- Signal timing adjustments:
 - i. Adjustment of phase lengths to increase the protected southbound left-turn phase.

The City should continue to monitor queuing on Grove Street at Bayfield Street to assess the need for a road widening to provide additional storage.

4. An estimate of the amount of traffic that would be generated by the Subject Site was prepared and assigned to the study area roads and intersections.
5. An intersection operation analysis was completed under total (2025, 2028, 2030 and 2035) traffic volumes with the proposed development operational at the study area intersections. No additional improvements are recommended within the study area.
6. The proposed site accesses will operate efficiently with one-way stop control for egress movements. A single lane for ingress and egress movements will provide the necessary capacity to convey the traffic volume generated by the proposed development.
7. The sight distance available for the proposed site accesses is suitable for the intended use.
8. The location of the proposed site access connections are considered appropriate with respect to minimum corner clearance and spacing requirements as identified in the Transportation Association of Canada Design Guide for Canadian Roads (2017).
9. Pedestrian operations were reviewed within the study area. The following improvements are recommended:
 - Extension of the Rose Street sidewalk (north side) along the frontage of the Subject Site and along the frontage of 42-48 Rose Street.
 - Provision of a Level 2 Type D pedestrian crossing at the Rose Street / Peel Street intersection; and
 - Provision of a pedestrian connection between Bayfield Street and the future Rose Street dead-end, within the MTO right-of-way.
10. The Swept Path Analysis demonstrates that the proposed site layout can accommodate the typical traffic movements;

11. The proposed parking supply is appropriate for the intended use;
12. In summary, the proposed development will not cause any operational issues and will not add significant delay or congestion to the local roadway network.

Figure 7: Adjacent Development Traffic Volumes – 10-12 Grove Street (2028)

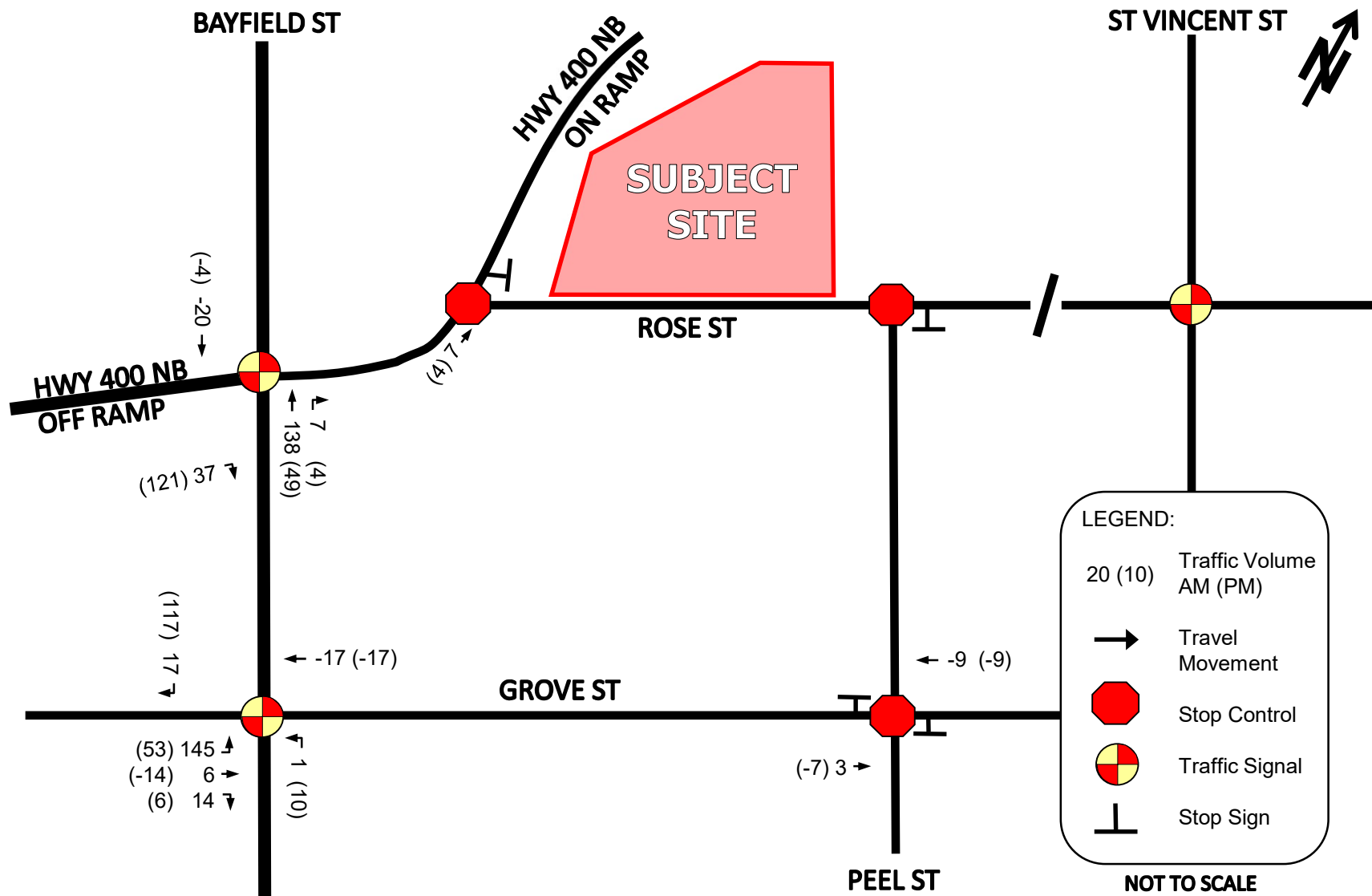


Figure 8: Existing (2023) Traffic Volumes

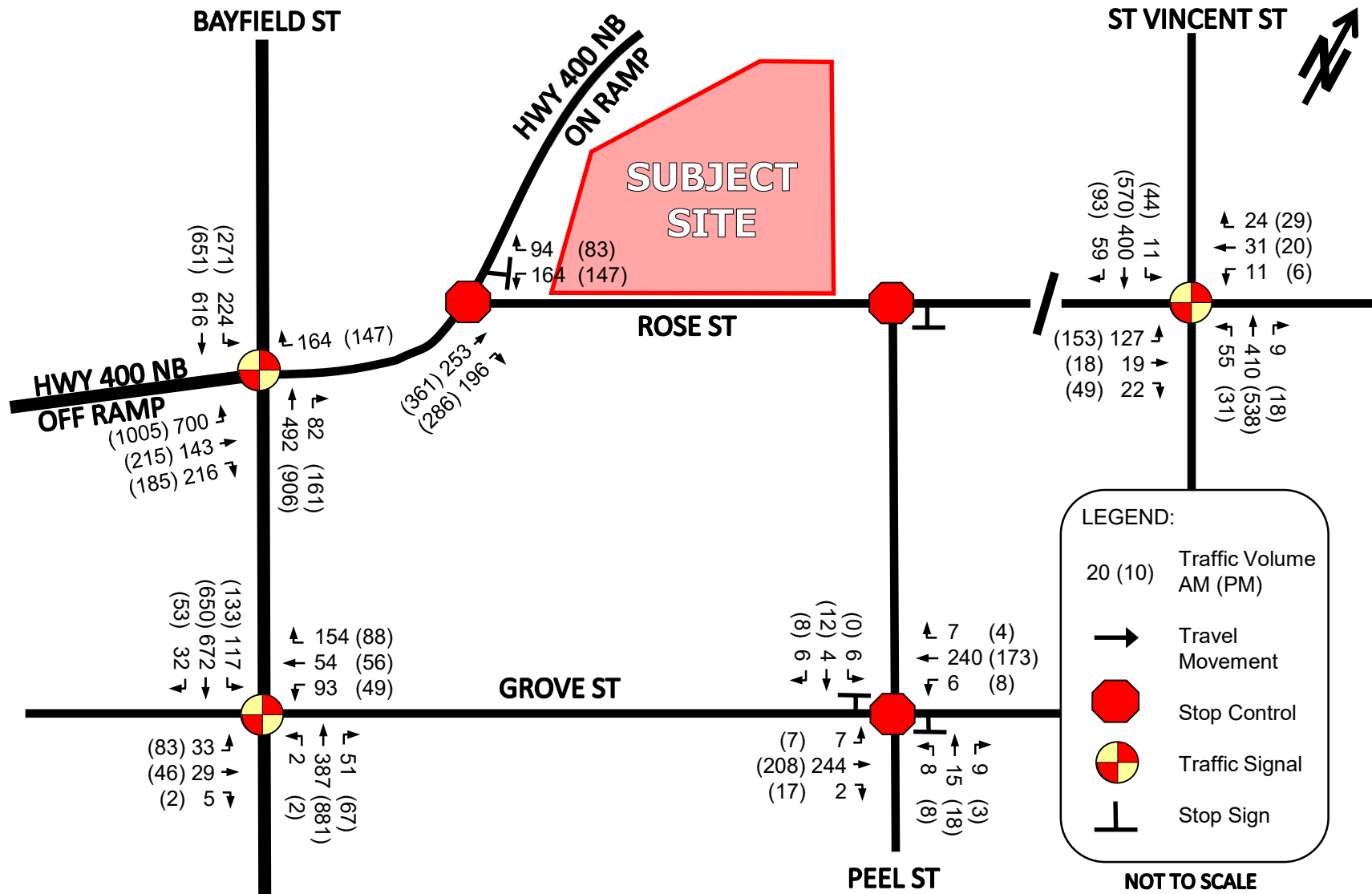


Figure 9: Background (2025) Traffic Volumes – Pre- Improvement

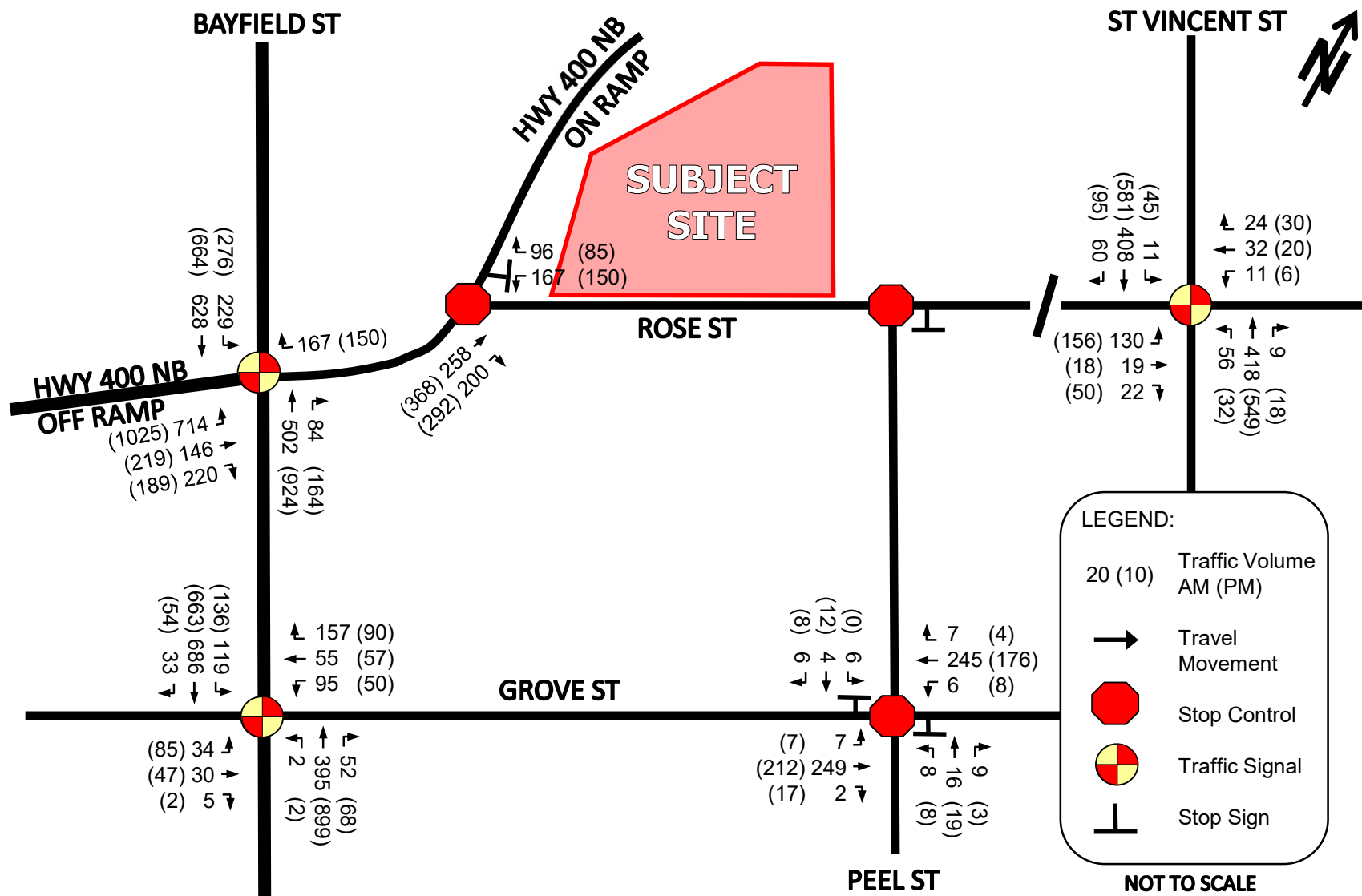


Figure 10: Background (2028) Traffic Volumes – Pre- Improvement

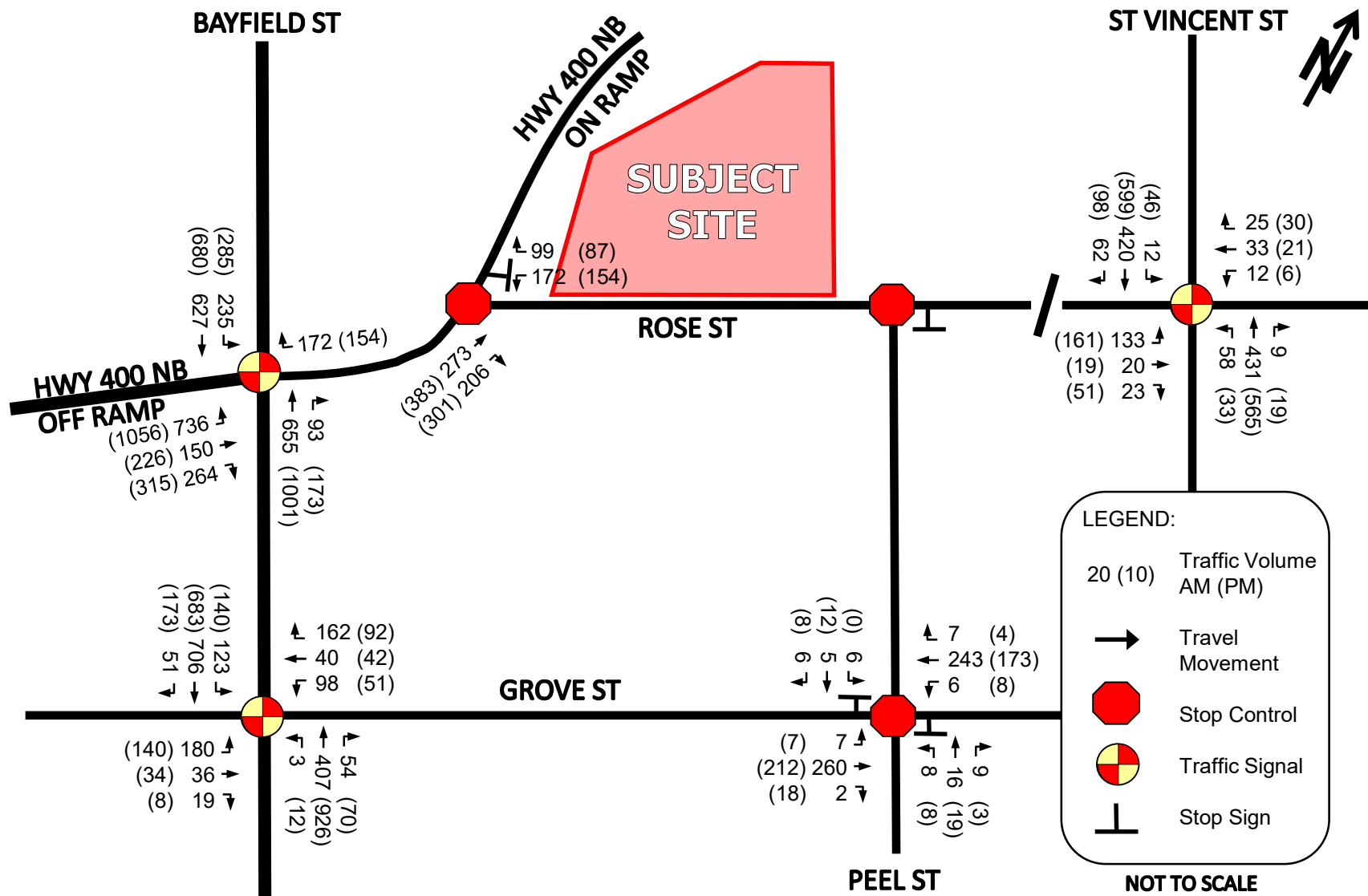


Figure 11: Rose Street Dead-End & Highway 400 Improvement Traffic Volume Redistribution (INCREASES)

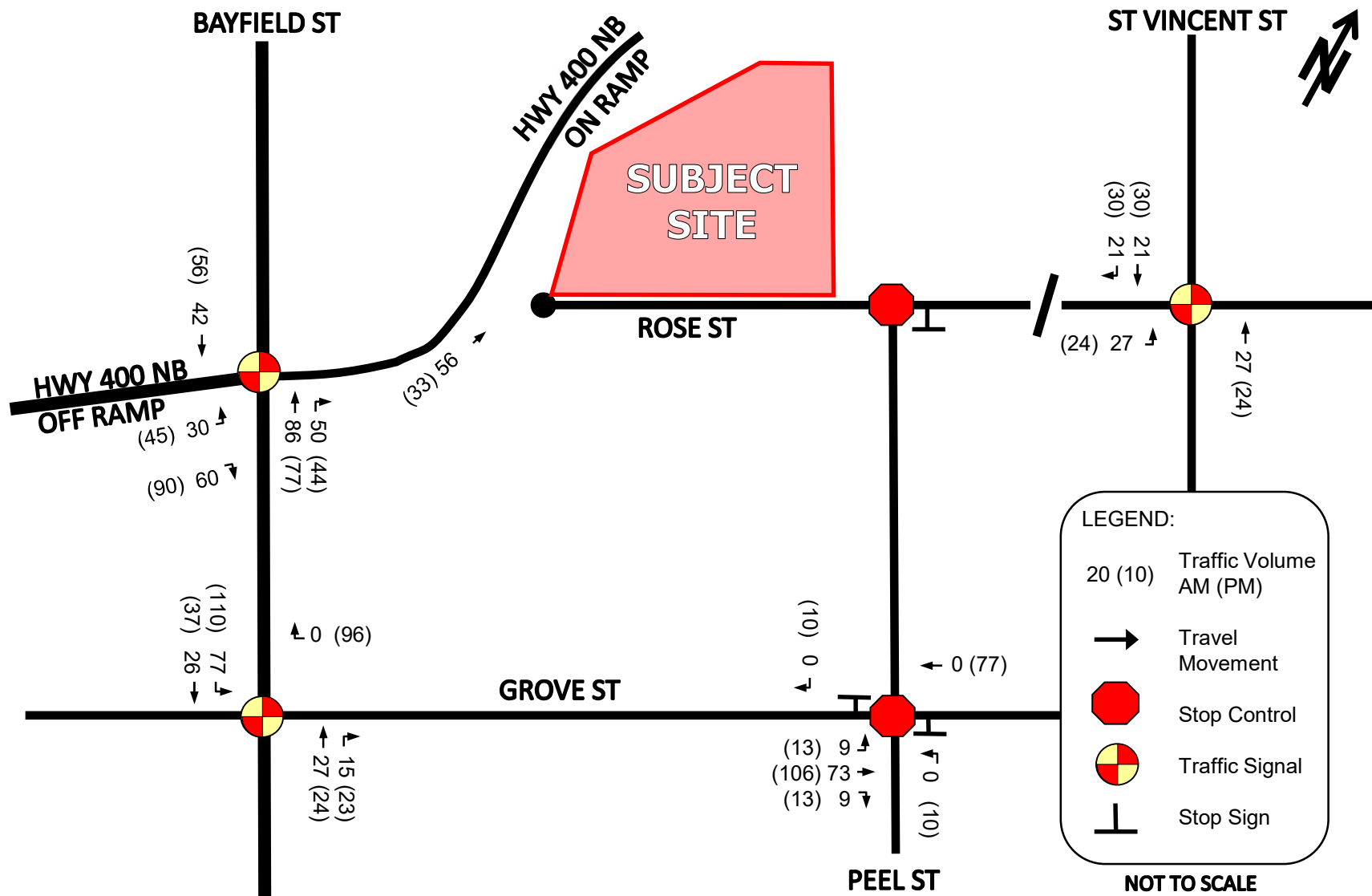


Figure 12: Rose Street Dead-End & Highway 400 Improvement Traffic Volume Redistribution (DECREASES)

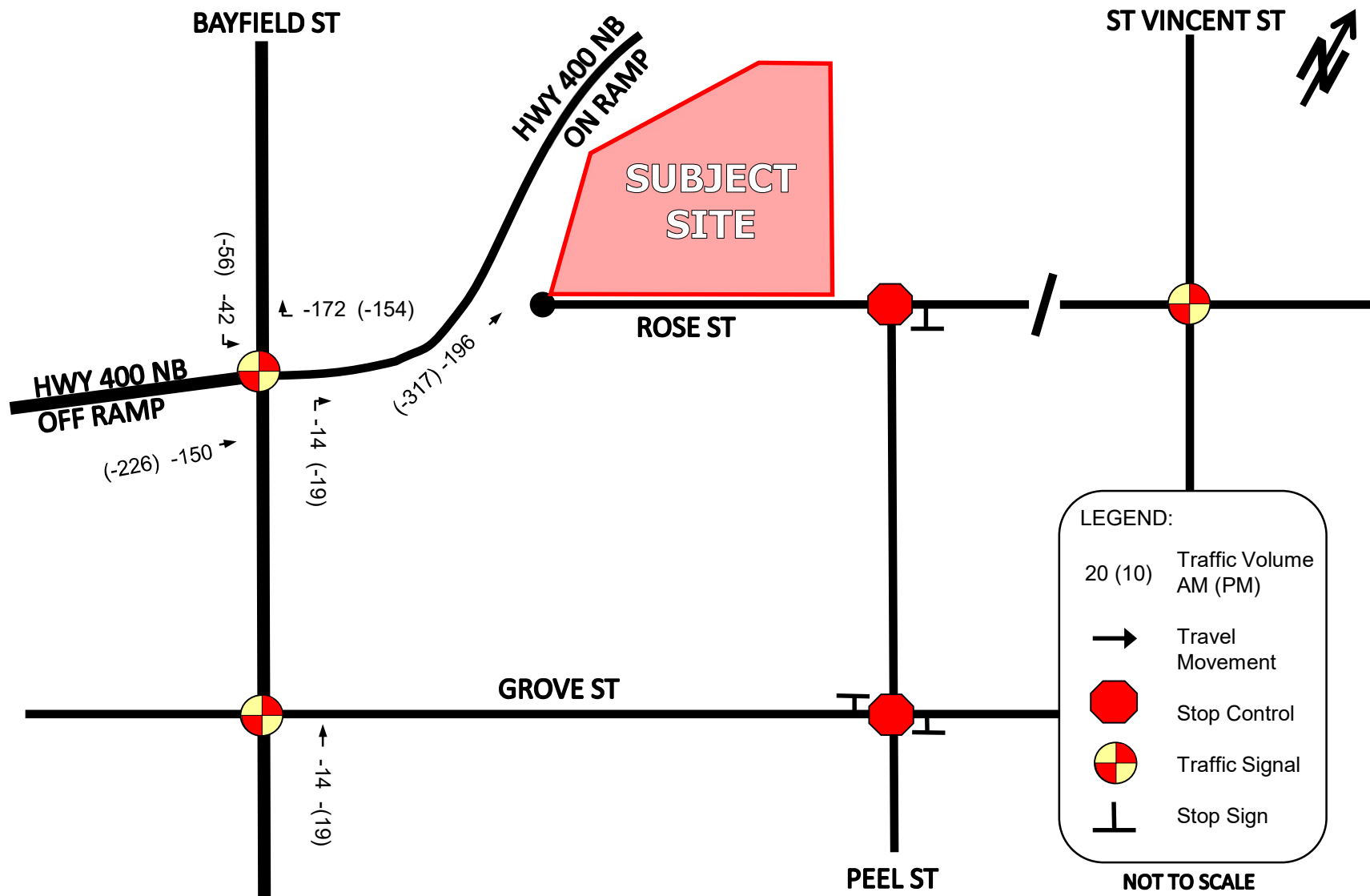


Figure 13: Rose Street Dead-End & Highway 400 Improvement Traffic Volume Redistribution (NET)

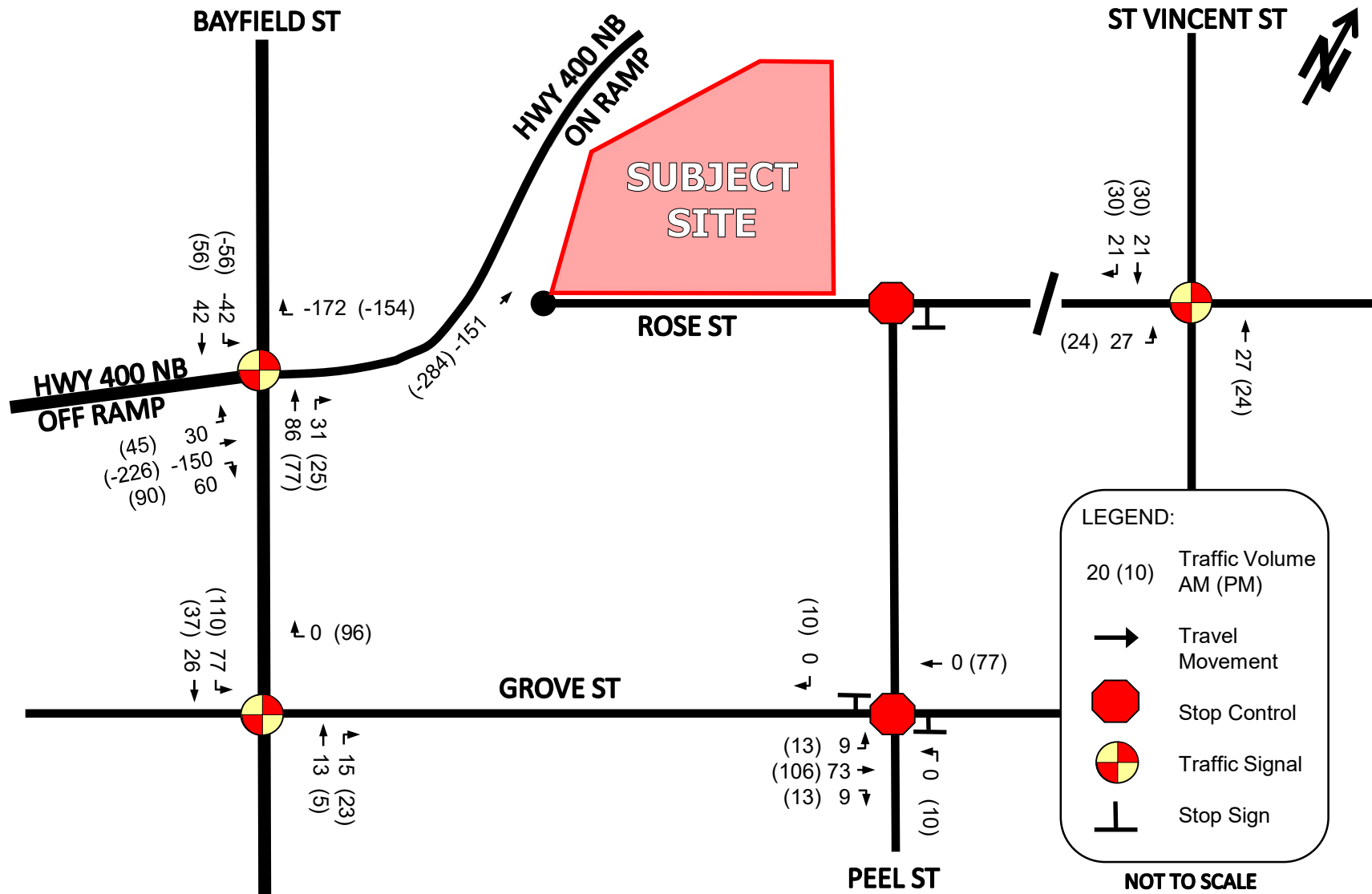


Figure 14: Background (2028) Traffic Volumes – Post- Improvement

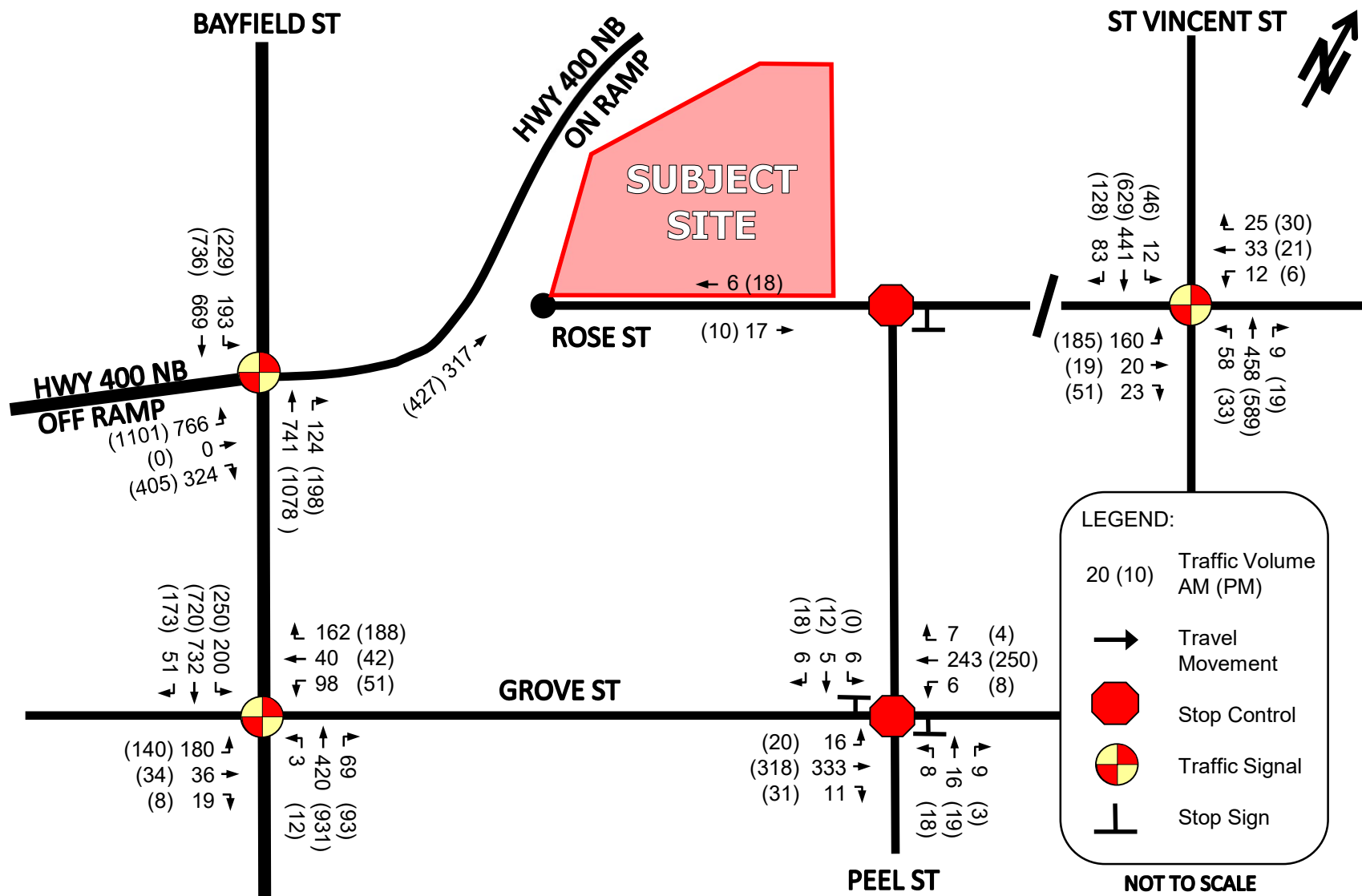


Figure 15: Background (2030) Traffic Volumes – Post- Improvement

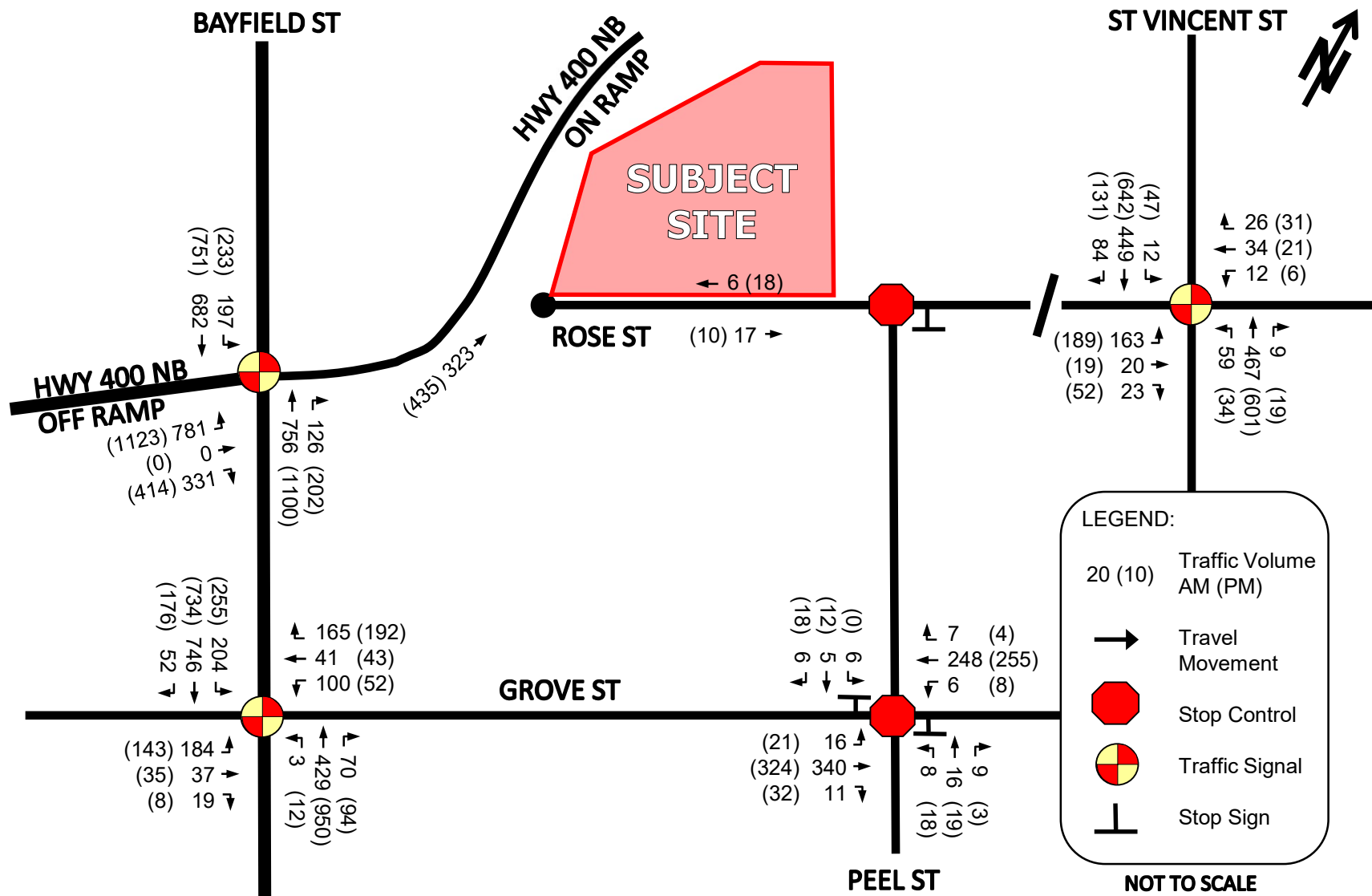


Figure 16: Background (2035) Traffic Volumes – Post- Improvement

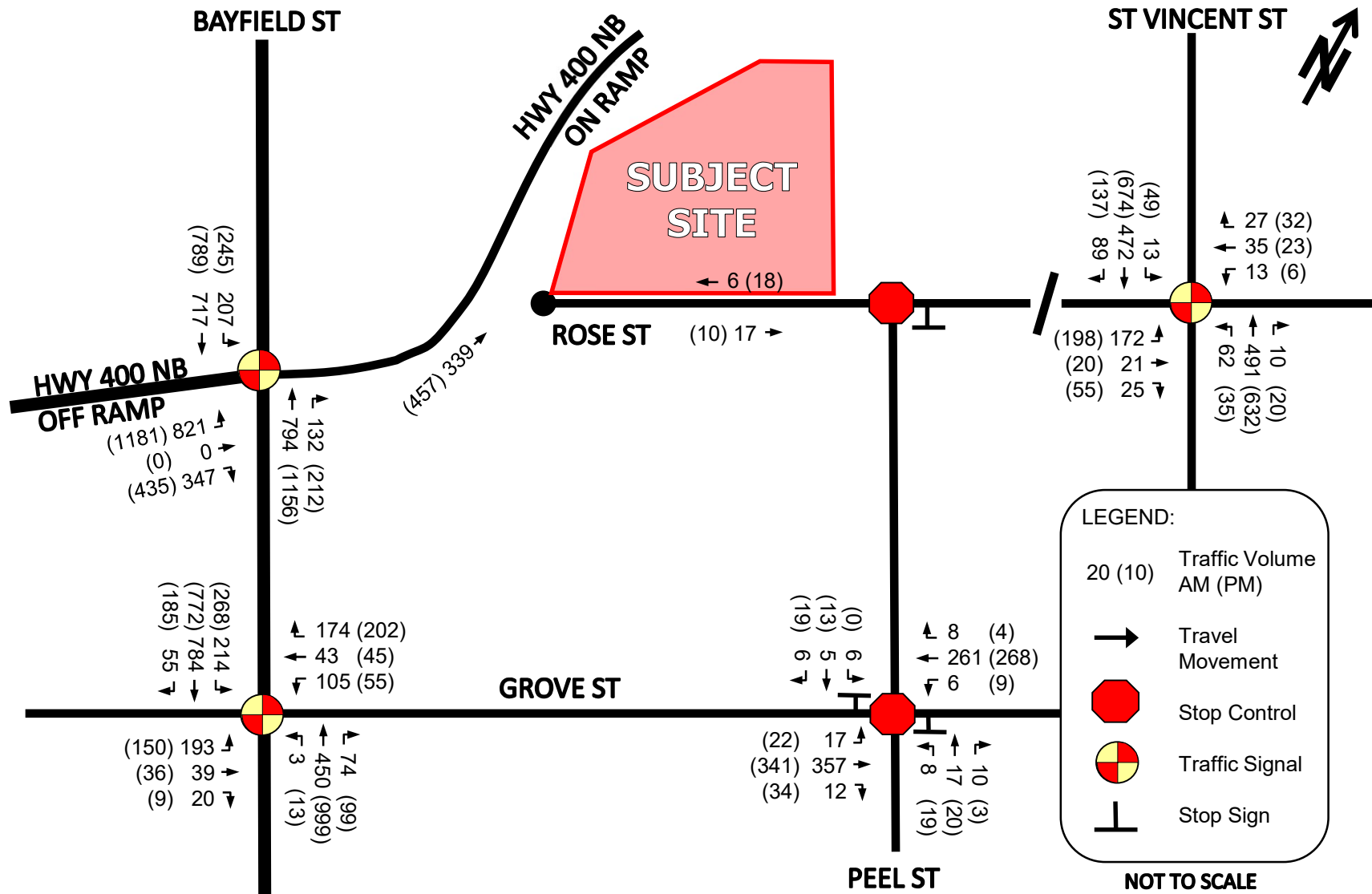


Figure 17: Site Traffic Assignment Traffic Volumes – Pre-Improvement

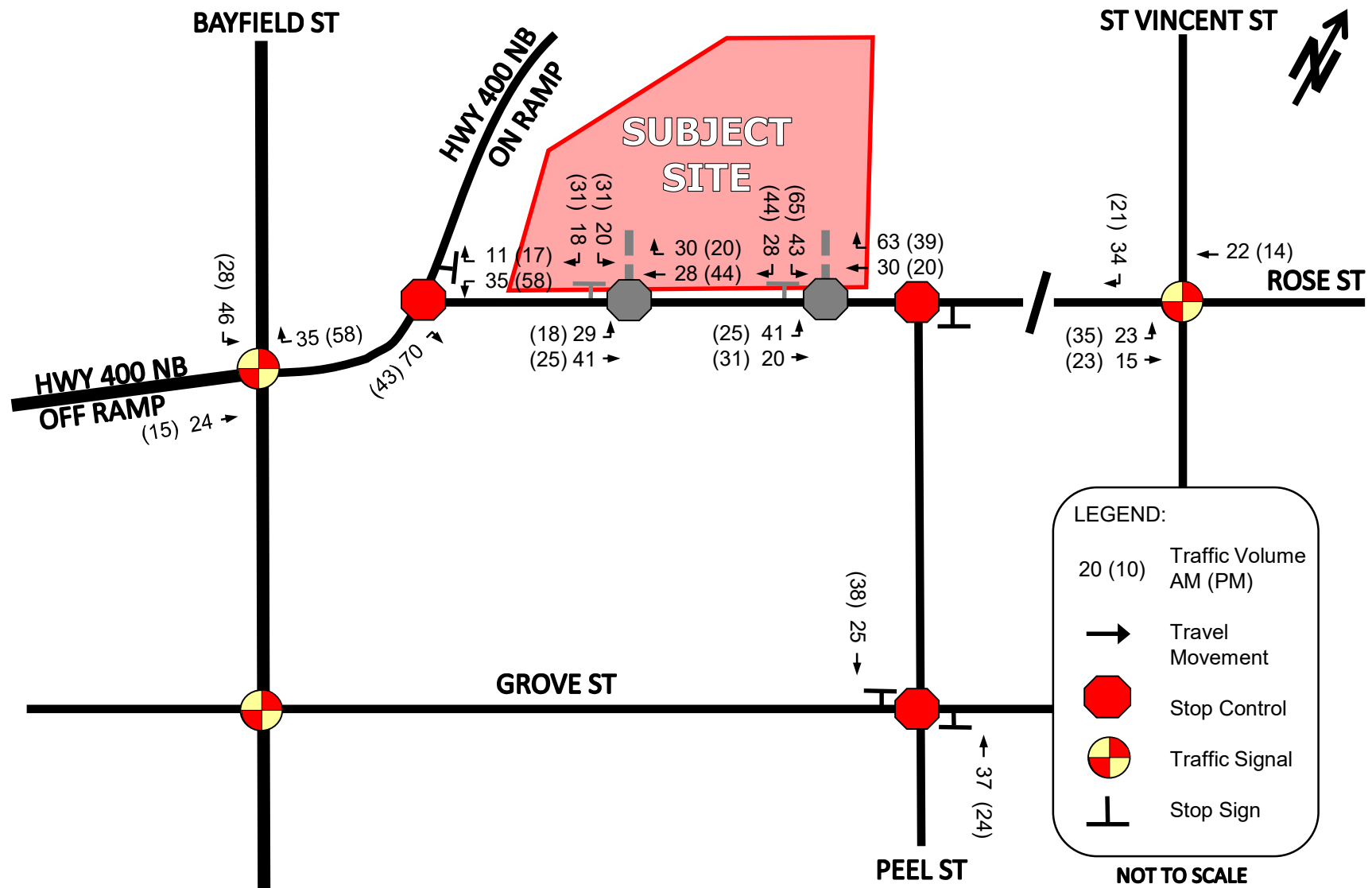


Figure 18: Site Traffic Assignment Traffic Volumes – Post-Improvement

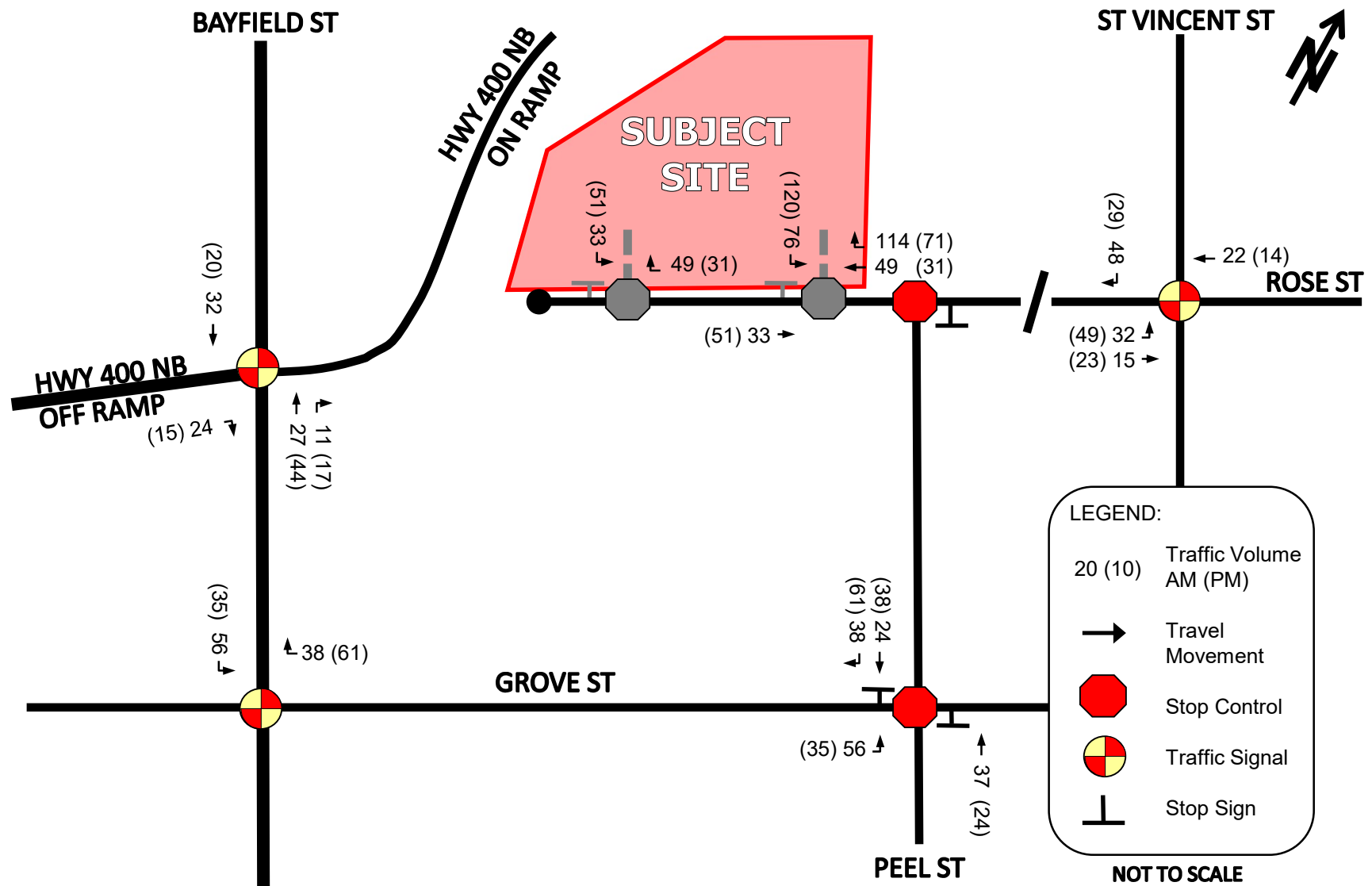


Figure 19: Total (2025) Traffic Volumes – Pre- Improvement

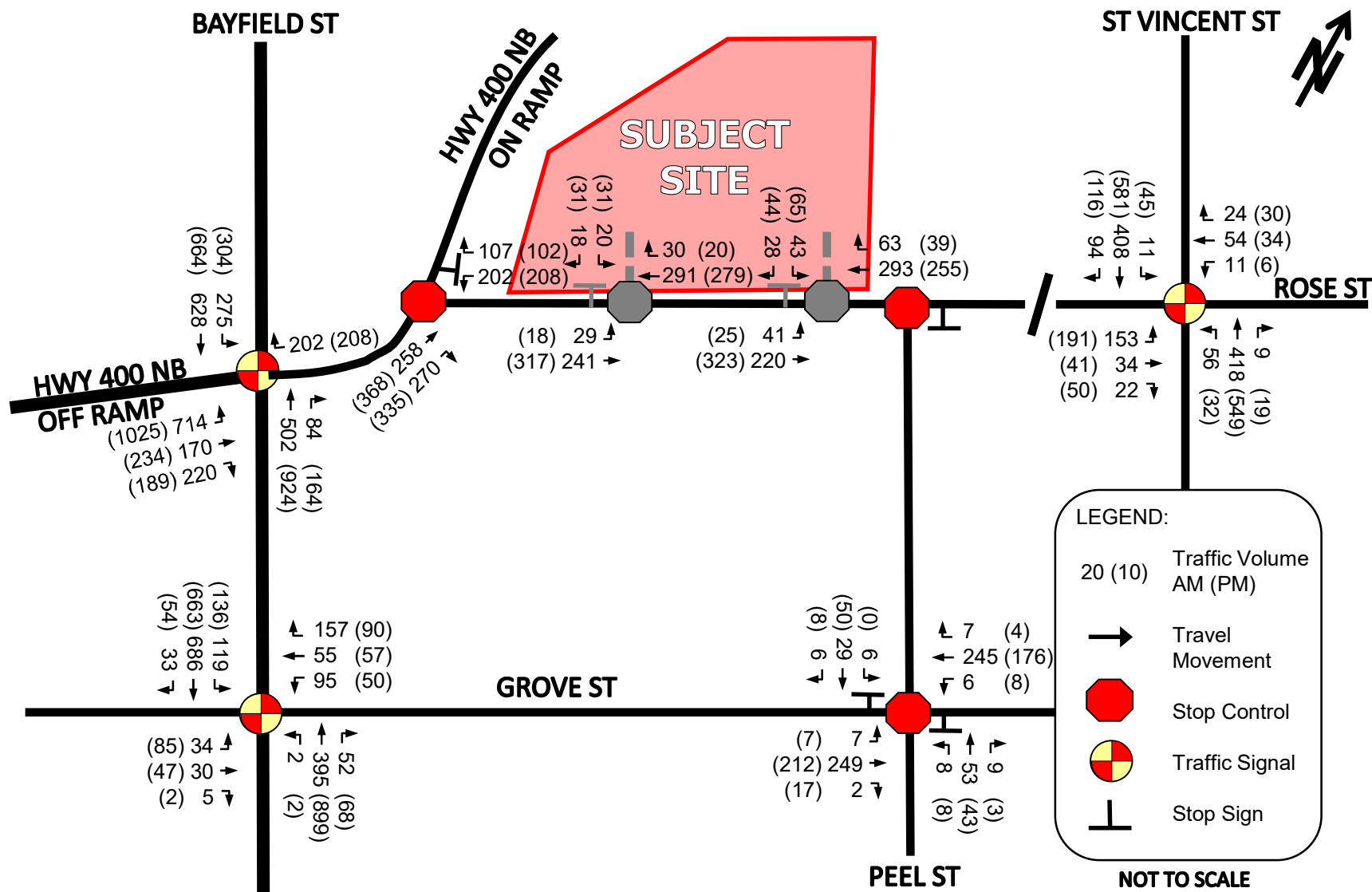


Figure 20: Total (2028) Traffic Volumes – Pre- Improvement

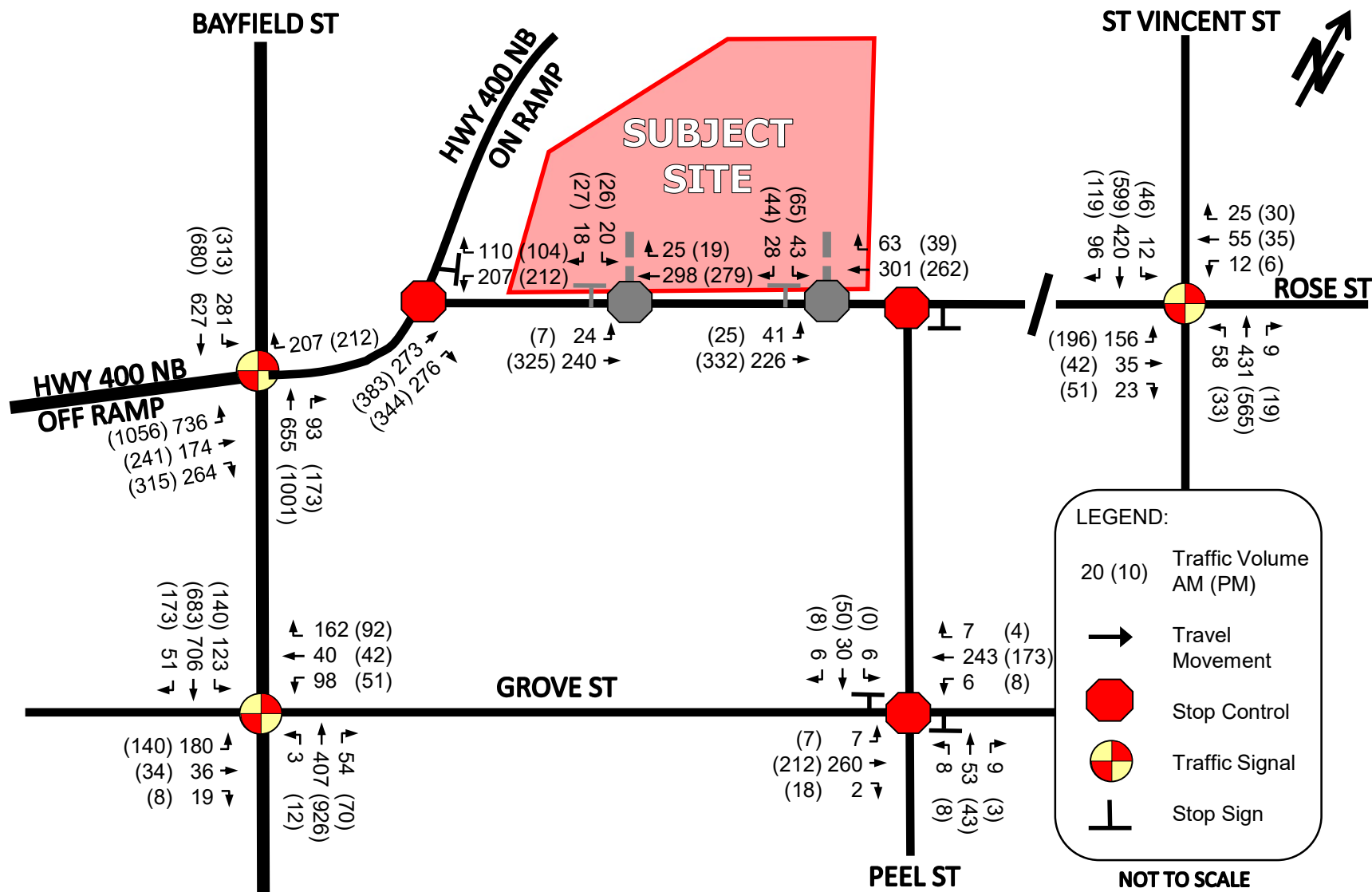


Figure 21: Total (2028) Traffic Volumes – Post-Improvement

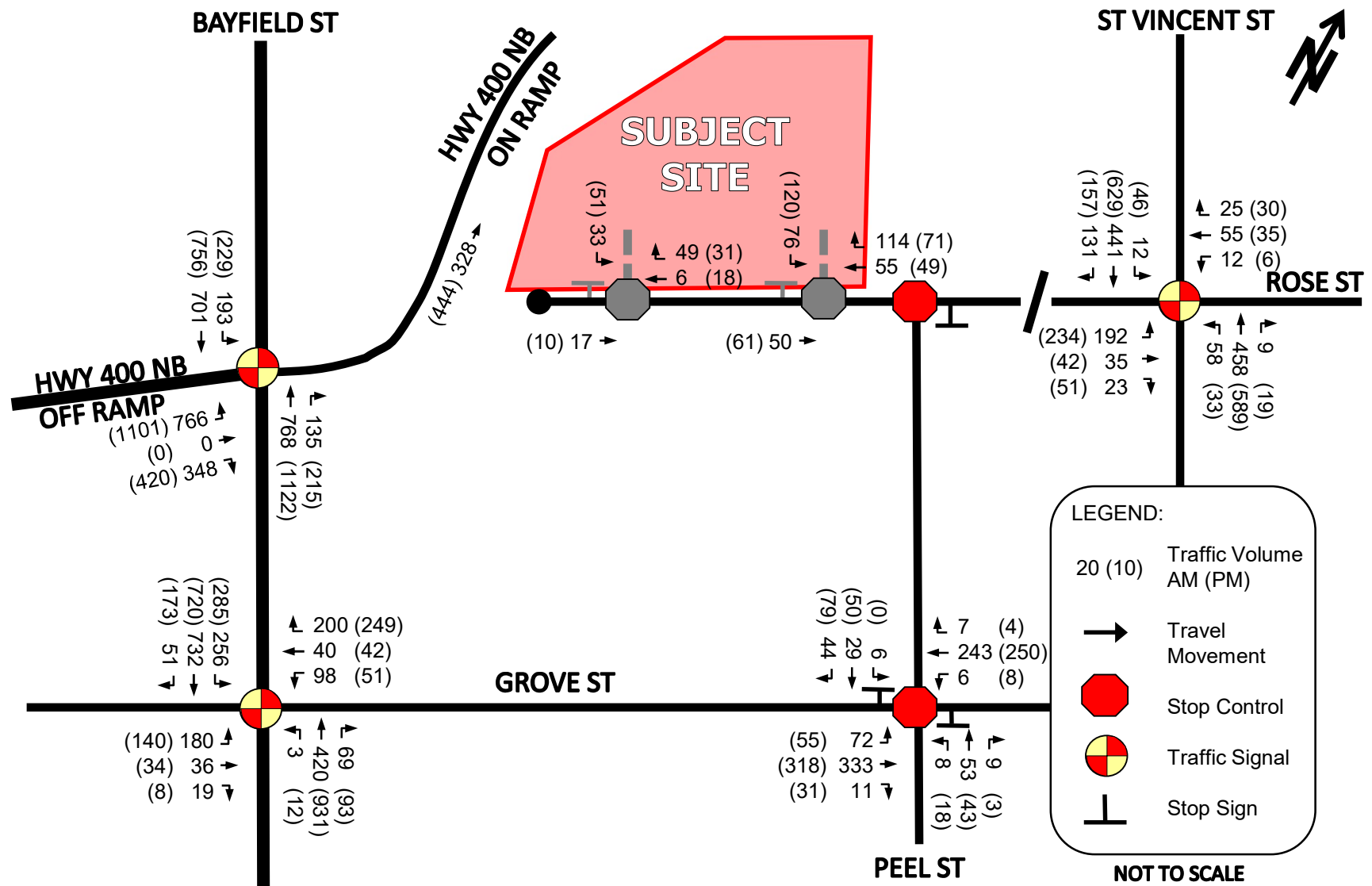


Figure 22: Total (2030) Traffic Volumes – Post-Improvement

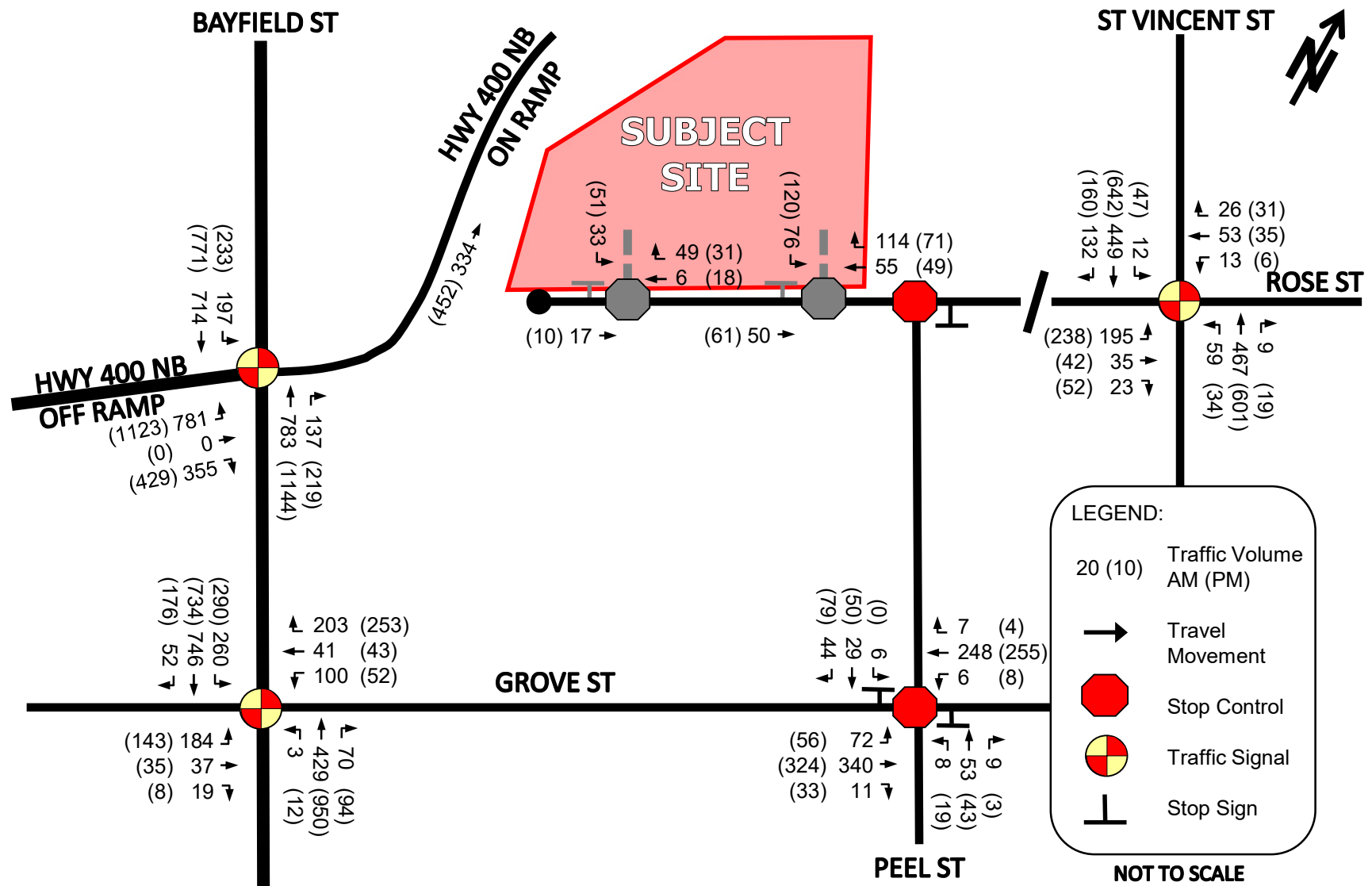
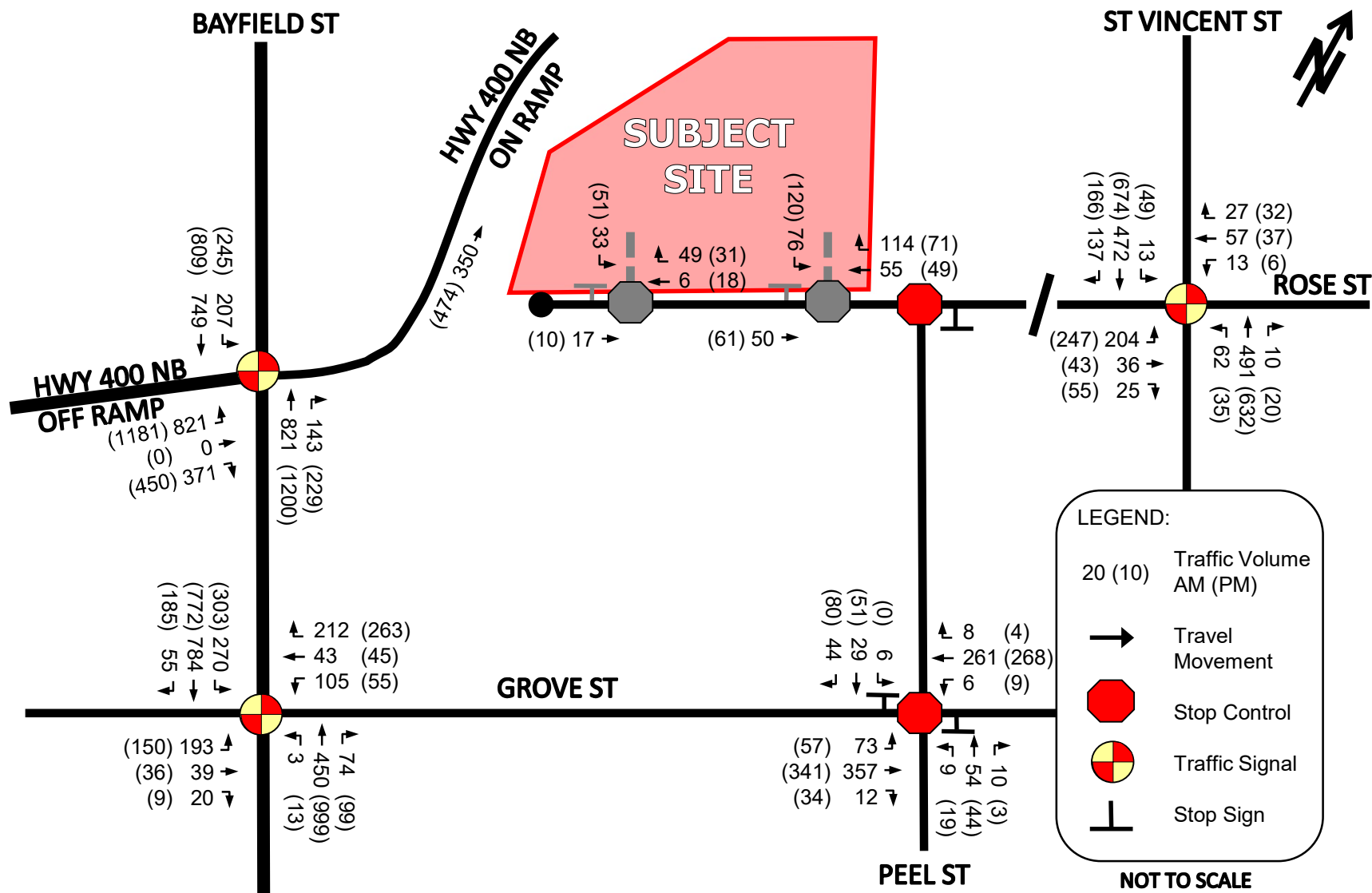
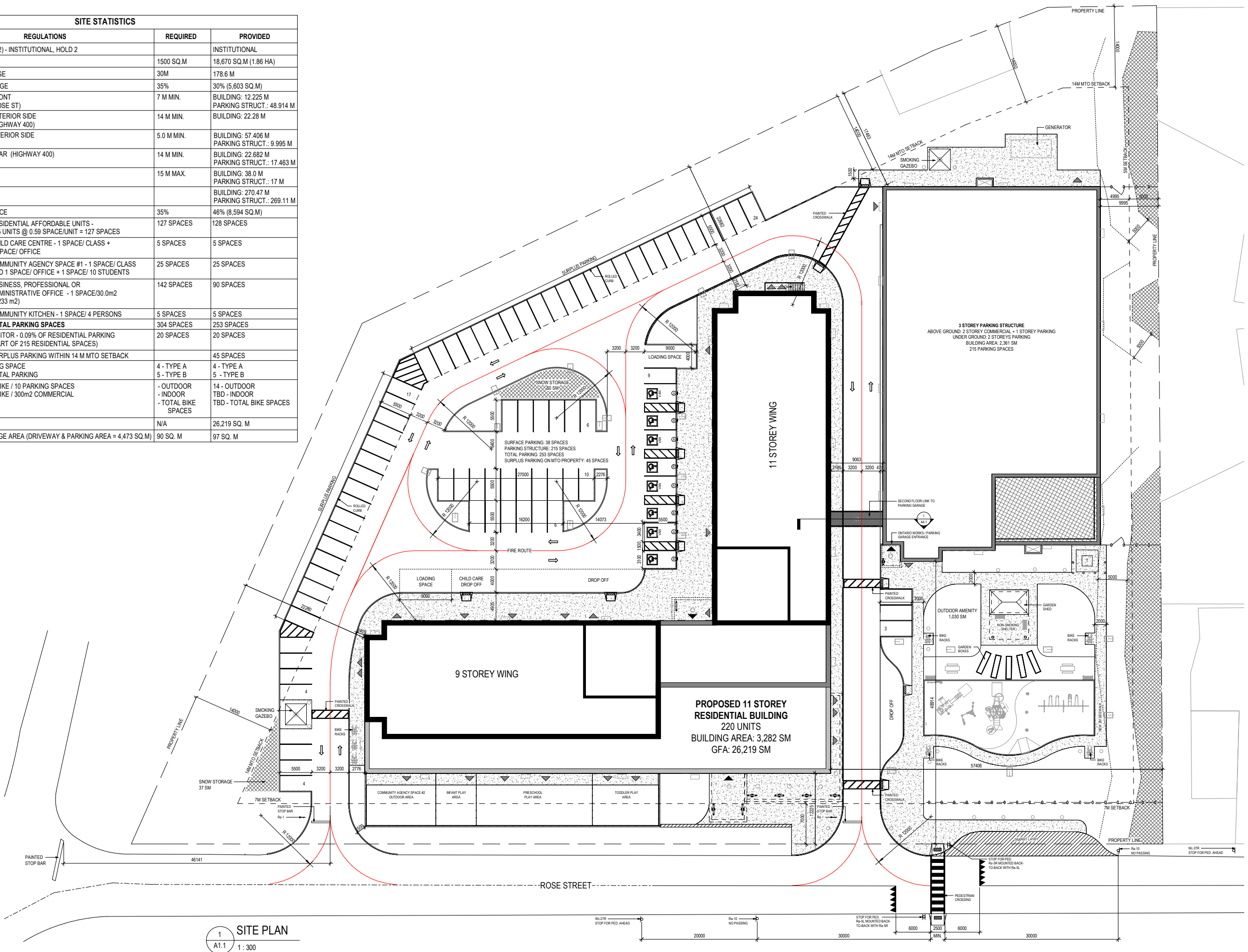


Figure 23: Total (2035) Traffic Volumes – Post-Improvement



Appendix A – Site Plan

SITE STATISTICS		
REGULATIONS	REQUIRED	PROVIDED
EXISTING ZONING: I1(H2) - INSTITUTIONAL, HOLD 2		INSTITUTIONAL
MINIMUM LOT AREA	1500 SQ.M	18,670 SQ.M (1.86 HA)
MINIMUM LOT FRONTAGE	30M	178.6 M
MAXIMUM LOT COVERAGE	35%	30% (5,603 SQ.M)
REQUIRED YARDS	FRONT (ROSE ST)	7 M MIN.
	EXTERIOR SIDE (HIGHWAY 400)	14 M MIN.
	INTERIOR SIDE	5.0 M MIN.
	REAR (HIGHWAY 400)	14 M MIN.
BUILDING HEIGHT	15 M MAX.	BUILDING: 38.0 M PARKING STRUCT.: 17 M
AVERAGE GRADE		BUILDING: 270.47 M PARKING STRUCT.: 269.11 M
MIN. LANDSCAPED SPACE	35%	46% (8,594 SQ.M)
PARKING SPACES	RESIDENTIAL AFFORDABLE UNITS - 215 UNITS @ 0.59 SPACE/UNIT = 127 SPACES	127 SPACES
	CHILD CARE CENTRE - 1 SPACE/ CLASS + 1 SPACE/ OFFICE	5 SPACES
	COMMUNITY AGENCY SPACE #1 - 1 SPACE/ CLASS AND 1 SPACE/ OFFICE + 1 SPACE/ 10 STUDENTS	25 SPACES
	BUSINESS, PROFESSIONAL OR ADMINISTRATIVE OFFICE - 1 SPACE/30.0m2 (4,233 m2)	142 SPACES
	COMMUNITY KITCHEN - 1 SPACE/ 4 PERSONS	5 SPACES
	TOTAL PARKING SPACES	304 SPACES
	VISITOR - 0.09% OF RESIDENTIAL PARKING (PART OF 215 RESIDENTIAL SPACES)	20 SPACES
	SURPLUS PARKING WITHIN 14 M MTO SETBACK	45 SPACES
BARRIER-FREE PARKING SPACE REQUIREMENTS OF TOTAL PARKING	4 - TYPE A 5 - TYPE B	4 - TYPE A 5 - TYPE B
BICYCLE PARKING SPACES	1 BIKE / 10 PARKING SPACES	14 - OUTDOOR
	1 BIKE / 300m2 COMMERCIAL	TBD - INDOOR TBD - TOTAL BIKE SPACES
TOTAL GFA	N/A	26,219 SQ. M
2% MIN. SNOW STORAGE AREA (DRIVEWAY & PARKING AREA = 4,473 SQ.M)	90 SQ. M	97 SQ. M

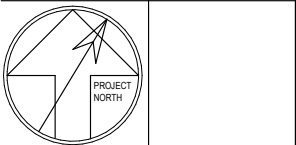


SITE PLAN LEGEND	
	EXISTING SPOT GRADE
	NEW FINISH GRADE
	BORE HOLE (BH) TEST PIT (TP)
	YARD HYDRANT
	CATCH BASIN
	PEDESTRIAN ENTRY DOOR LOCATION
	SERVICE/OVERHEAD DOOR LOCATION
	B.F. PARKING STALL
	B.F. CURB CUT - WITH DETECTABLE GROOVES
	SIAMESE CONNECTION
	LIGHT STANDARD
	WALL MOUNTED LIGHT FIXTURE
	CONTROL JOINT
	ASPHALT TYPE 1
	TACTILE INDICATOR
	FIRE HYDRANT
	HYDRO POLE
	TRANSFORMER
	PAINTED STOP BAR
	HOSE BIB
	LIGHT BOLLARD
	SITE FURNITURE

SIGN LEGEND	
	BARRIER FREE PARKING - TYPE A (VAN)
	BARRIER FREE PARKING - TYPE B
	VISITOR PARKING W/ PAINTED "V"
	STOP SIGN

REVISIONS		
No.	REVISION	DATE
1.	ISSUED FOR ZBA	TBD

ALL DIMENSIONS TO BE CHECKED AND VERIFIED ON SITE. DISCREPANCIES TO BE REPORTED TO THE ARCHITECT. LATEST APPROVED STAMPED DRAWINGS ONLY TO BE USED FOR CONSTRUCTION.



MCLARCHITECTS
MCKNIGHT CHARRON LIMITED

48 ALLIANCE BLVD. UNIT 110
BARRIE, ONTARIO L4M 5K3
WWW.MCLARCHITECTS.CA

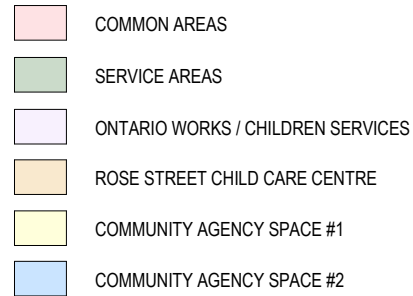
T: 705 722 6739
F: 705 726 5416

DRAWING TITLE:
SITE PLAN

PROJECT NAME:
COUNTY OF SIMCOE AFFORDABLE HOUSING DEVELOPMENT - BARRIE

20 ROSE STREET, BARRIE, ON

DATE: MARCH 08, 2024	PROJECT #	SHEET #
DRAWN BY: KC		A1.1
SCALE: As indicated		

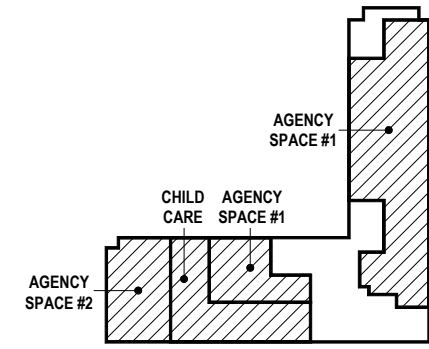


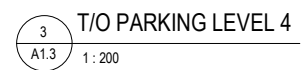
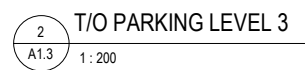
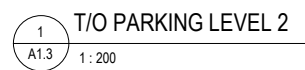
COMMERICAL AREAS		
LEVEL	AGENCY	AREA
BASEMENT	COMMUNITY AGENCY SPACE #3	752 SM (8,095 SF)
	PROGRAM ROOM	133 SM (1,429 SF)
	PUBLIC WASHROOMS	19 SM (204 SF)
LEVEL 1	COMMUNITY AGENCY SPACE #1	1,487 SM (16,009 SF)
	COMMUNITY AGENCY SPACE #2	300 SM (3,227 SF)
	ROSE STREET CHILD CARE CENTRE	510 SM (5,492 SF)
	PROGRAM ROOM	142 SM (1,527 SF)
	COMMUNITY KITCHEN	36 SM (393 SF)
	PUBLIC WASHROOMS	19 SM (209 SF)
	CENTRAL LOBBY	114 SM (1,222 SF)
PARKING GARAGE - LEVEL 3 & 4	ONTARIO WORKS/ CHILDREN SERVICES	4,243 SM (45,671 SF)
	TOTAL LEASABLE COMMERICAL AREA:	7,292 SM (78,490 SF)
	TOTAL COMMERICAL AREA: (LEASABLE & COMMON)	7,755 SM (83,474 SF)

REVISIONS



DATE: MARCH 11, 2024	PROJECT #	SHEET # A2.4
DRAWN BY: KC		
SCALE: 1 : 200		





REVISIONS	
ALL DIMENSIONS TO BE CHECKED AND VERIFIED ON SITE. DISCREPANCIES TO BE REPORTED TO THE ARCHITECT. LATEST APPROVED STAMPED DRAWINGS ONLY TO BE USED FOR CONSTRUCTION.	

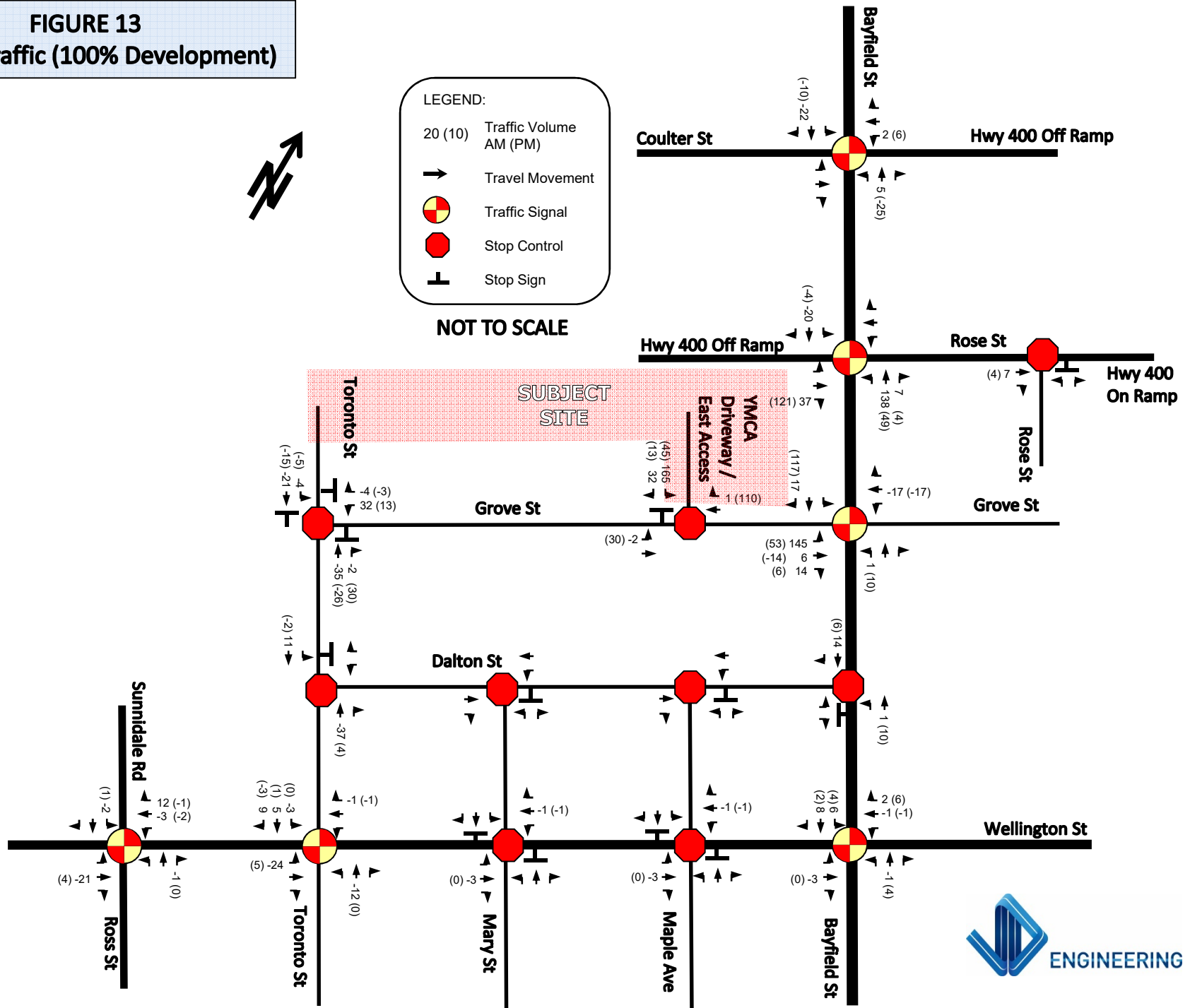
MCLARCHITECTS
MCKNIGHT CHARRON LIMITED

DRAWING TITLE:
PARKING STRUCTURE PLANS

DATE: MARCH 11, 2024	PROJECT #	SHEET # A1.3
DRAWN BY: KC		
SCALE: 1 : 200		

Appendix B – Background Development Excerpts

FIGURE 13
Net Site Traffic (100% Development)



Appendix C – Traffic Count Data

Project #23-037 - City of Barrie

Intersection Count Report

Intersection: Bayfield St & Grove St
Municipality: Barrie
Count Date: Tuesday, Mar 21, 2023
Site Code: 2303700020
Count Categories: Cars, Trucks, Bicycles, Pedestrians
Count Period: 07:00-09:00, 11:00-14:00, 15:00-18:00
Weather: Clear
Comments:

Peak Hour Diagram

Specified Period

From: 07:00:00
To: 09:00:00

One Hour Peak

From: 07:45:00
To: 08:45:00

Intersection: Bayfield St & Grove St
Site Code: 2303700020
Count Date: Mar 21, 2023

Weather conditions: Clear

**** Signalized Intersection ****

Major Road: Bayfield St runs N/S

North Approach

	Out	In	Total
	805	547	1352
	15	26	41
	1	1	2
Totals	821	574	1395

Bayfield St

	0	0	1	0
	0	10	5	0
	32	662	111	0
Totals	32	672	117	0






East Approach

	Out	In	Total
	280	189	469
	21	7	28
	0	1	1
Totals	301	197	498

Grove St W

				Totals
0	0	0	0	0
1	0	32	33	33
0	0	29	29	29
0	2	3	5	5






Peds: 13

Peds: 13



Peds: 16

Peds: 4

Grove St E

Totals			
0	0	0	0
154	144	10	0
54	51	3	0
93	85	8	0






West Approach

	Out	In	Total
	64	85	149
	2	3	5
	1	0	1
Totals	67	88	155

Totals				
	2	371	49	0
	0	16	2	0
	0	0	0	0

Bayfield St

South Approach

	Out	In	Total
	422	750	1172
	18	20	38
	0	0	0
Totals	440	770	1210

 - Cars

 - Trucks

 - Bicycles

Comments

Peak Hour Summary

Intersection: Bayfield St & Grove St
Site Code: 2303700020
Count Date: Mar 21, 2023
Period: 07:00 - 09:00

Peak Hour Data (07:45 - 08:45)

Start Time	North Approach Bayfield St						South Approach Bayfield St						East Approach Grove St E						West Approach Grove St W						Total Vehicles
	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	
07:45	54	138	7	0	10	199	1	90	15	0	0	106	48	16	63	0	3	127	9	12	1	0	8	22	454
08:00	24	150	2	0	0	176	0	82	12	0	1	94	29	13	42	0	2	84	7	10	3	0	1	20	374
08:15	21	201	10	0	3	232	1	101	10	0	1	112	8	15	21	0	4	44	8	4	0	0	2	12	400
08:30	18	183	13	0	0	214	0	114	14	0	2	128	8	10	28	0	7	46	9	3	1	0	2	13	401
Grand Total	117	672	32	0	13	821	2	387	51	0	4	440	93	54	154	0	16	301	33	29	5	0	13	67	1629
Approach %	14.3	81.9	3.9	0	-	-	0.5	88	11.6	0	-	-	30.9	17.9	51.2	0	-	-	49.3	43.3	7.5	0	-	-	-
Totals %	7.2	41.3	2	0	50.4	-	0.1	23.8	3.1	0	27	-	5.7	3.3	9.5	0	18.5	-	2	1.8	0.3	0	4.1	-	-
PHF	0.54	0.84	0.62	0	0.88	-	0.5	0.85	0.85	0	0.86	-	0.48	0.84	0.61	0	0.59	-	0.92	0.6	0.42	0	0.76	0.9	-
Cars	111	662	32	0	-	805	2	371	49	0	-	422	85	51	144	0	-	280	32	29	3	0	-	64	1571
% Cars	94.9	98.5	100	0	-	98.1	100	95.9	96.1	0	-	95.9	91.4	94.4	93.5	0	-	93	97	100	60	0	-	95.5	96.4
Trucks	5	10	0	0	-	15	0	16	2	0	-	18	8	3	10	0	-	21	0	0	2	0	-	2	56
% Trucks	4.3	1.5	0	0	-	1.8	0	4.1	3.9	0	-	4.1	8.6	5.6	6.5	0	-	7	0	0	40	0	-	3	3.4
Bicycles	1	0	0	0	-	1	0	0	0	0	-	0	0	0	0	0	-	0	1	0	0	0	-	1	2
% Bicycles	0.9	0	0	0	-	0.1	0	0	0	0	-	0	0	0	0	0	-	0	3	0	0	0	-	1.5	0.1
Peds	-	-	-	-	13	-	-	-	-	-	4	-	-	-	-	-	16	-	-	-	-	-	13	-	46
% Peds	-	-	-	-	28.3	-	-	-	-	-	8.7	-	-	-	-	-	34.8	-	-	-	-	-	28.3	-	-

Peak Hour Diagram

Specified Period

From: 11:00:00

To: 14:00:00

One Hour Peak

From: 12:45:00

To: 13:45:00

Intersection: Bayfield St & Grove St

Site Code: 2303700020

Count Date: Mar 21, 2023

Weather conditions: Clear

**** Signalized Intersection ****

Major Road: Bayfield St runs N/S

North Approach

	Out	In	Total
	779	751	1530
	15	19	34
	1	0	1
Totals	795	770	1565

Bayfield St

	0	1	0	0
	0	15	0	0
	38	677	64	0
Totals	38	693	64	0






East Approach

	Out	In	Total
	150	127	277
	5	5	10
	0	0	0
Totals	155	132	287

Grove St W

				Totals
0	0	0	0	0 
0	0	36	36	36 
0	0	21	21	21 
0	0	3	3	3 

Peds: 7

Peds: 22



Peds: 14

Peds: 6

Grove St E

Totals			
0	0	0	0
90	87	3	0
31	31	0	0
34	32	2	0

West Approach

	Out	In	Total
	60	76	136
	0	0	0
	0	0	0
Totals	60	76	136

				
Totals	7	644	47	0
	7	628	42	0
	0	16	5	0
	0	0	0	0

Bayfield St

South Approach

	Out	In	Total
	677	712	1389
	21	17	38
	0	1	1
Totals	698	730	1428

 - Cars

 - Trucks

 - Bicycles

Comments

Peak Hour Summary

Intersection: Bayfield St & Grove St
Site Code: 2303700020
Count Date: Mar 21, 2023
Period: 11:00 - 14:00

Peak Hour Data (12:45 - 13:45)

Start Time	North Approach Bayfield St						South Approach Bayfield St						East Approach Grove St E						West Approach Grove St W						Total Vehicles
	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	
12:45	16	193	10	0	0	219	2	160	14	0	0	176	10	10	22	0	4	42	8	7	2	0	8	17	454
13:00	18	171	10	0	0	199	2	155	9	0	1	166	7	8	28	0	1	43	7	4	1	0	2	12	420
13:15	13	163	4	0	1	180	1	155	7	0	4	163	8	6	14	0	8	28	13	5	0	0	5	18	389
13:30	17	166	14	0	6	197	2	174	17	0	1	193	9	7	26	0	1	42	8	5	0	0	7	13	445
Grand Total	64	693	38	0	7	795	7	644	47	0	6	698	34	31	90	0	14	155	36	21	3	0	22	60	1708
Approach %	8.1	87.2	4.8	0	-	-	1	92.3	6.7	0	-	-	21.9	20	58.1	0	-	-	60	35	5	0	-	-	-
Totals %	3.7	40.6	2.2	0	-	46.5	0.4	37.7	2.8	0	-	40.9	2	1.8	5.3	0	-	9.1	2.1	1.2	0.2	0	-	3.5	-
PHF	0.89	0.9	0.68	0	-	0.91	0.88	0.93	0.69	0	-	0.9	0.85	0.78	0.8	0	-	0.9	0.69	0.75	0.38	0	-	0.83	0.94
Cars	64	677	38	0	-	779	7	628	42	0	-	677	32	31	87	0	-	150	36	21	3	0	-	60	1666
% Cars	100	97.7	100	0	-	98	100	97.5	89.4	0	-	97	94.1	100	96.7	0	-	96.8	100	100	100	0	-	100	97.5
Trucks	0	15	0	0	-	15	0	16	5	0	-	21	2	0	3	0	-	5	0	0	0	0	-	0	41
% Trucks	0	2.2	0	0	-	1.9	0	2.5	10.6	0	-	3	5.9	0	3.3	0	-	3.2	0	0	0	0	-	0	2.4
Bicycles	0	1	0	0	-	1	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	1
% Bicycles	0	0.1	0	0	-	0.1	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0.1
Peds	-	-	-	-	7	-	-	-	-	-	6	-	-	-	-	-	14	-	-	-	-	-	22	-	49
% Peds	-	-	-	-	14.3	-	-	-	-	-	12.2	-	-	-	-	-	28.6	-	-	-	-	-	44.9	-	-

Peak Hour Diagram

Specified Period

From: 15:00:00
To: 18:00:00

One Hour Peak

From: 16:30:00
To: 17:30:00

Intersection: Bayfield St & Grove St
Site Code: 2303700020
Count Date: Mar 21, 2023

Weather conditions: Clear

**** Signalized Intersection ****

Major Road: Bayfield St runs N/S

North Approach

	Out	In	Total
	826	1037	1863
	9	15	24
	1	0	1
Totals	836	1052	1888

Bayfield St

	1	0	0	0
	0	9	0	0
	52	641	133	0
Totals	53	650	133	0

East Approach

	Out	In	Total
	186	245	431
	6	1	7
	1	0	1
Totals	193	246	439

Grove St W

				Totals
	0	0	0	0
	0	0	83	83
	0	0	46	46
	0	0	2	2

Peds: 8



Peds: 9

Grove St E

Totals			
0	0	0	0
88	85	3	0
56	55	1	0
49	46	2	1

Peds: 6

West Approach

	Out	In	Total
	131	109	240
	0	1	1
	0	1	1
Totals	131	111	242

Totals	2	881	67	0
	2	869	66	0
	0	12	1	0
	0	0	0	0

Bayfield St

South Approach

	Out	In	Total
	937	689	1626
	13	11	24
	0	1	1
Totals	950	701	1651

- Cars

- Trucks

- Bicycles

Comments

Peak Hour Summary

Intersection: Bayfield St & Grove St
Site Code: 2303700020
Count Date: Mar 21, 2023
Period: 15:00 - 18:00

Peak Hour Data (16:30 - 17:30)

Start Time	North Approach Bayfield St						South Approach Bayfield St						East Approach Grove St E						West Approach Grove St W						Total Vehicles
	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	
16:30	34	149	13	0	1	196	2	231	9	0	3	242	17	16	24	0	2	57	19	11	0	0	4	30	525
16:45	29	184	8	0	0	221	0	213	22	0	0	235	10	16	18	0	1	44	26	9	0	0	0	35	535
17:00	35	152	13	0	1	200	0	226	16	0	0	242	12	14	19	0	4	45	22	8	1	0	2	31	518
17:15	35	165	19	0	0	219	0	211	20	0	3	231	10	10	27	0	2	47	16	18	1	0	2	35	532
Grand Total	133	650	53	0	2	836	2	881	67	0	6	950	49	56	88	0	9	193	83	46	2	0	8	131	2110
Approach %	15.9	77.8	6.3	0	-	-	0.2	92.7	7.1	0	-	-	25.4	29	45.6	0	-	-	63.4	35.1	1.5	0	-	-	-
Totals %	6.3	30.8	2.5	0	-	39.6	0.1	41.8	3.2	0	-	45	2.3	2.7	4.2	0	-	9.1	3.9	2.2	0.1	0	-	6.2	-
PHF	0.95	0.88	0.7	0	-	0.95	0.25	0.95	0.76	0	-	0.98	0.72	0.88	0.81	0	-	0.85	0.8	0.64	0.5	0	-	0.94	0.99
Cars	133	641	52	0	-	826	2	869	66	0	-	937	46	55	85	0	-	186	83	46	2	0	-	131	2080
% Cars	100	98.6	98.1	0	-	98.8	100	98.6	98.5	0	-	98.6	93.9	98.2	96.6	0	-	96.4	100	100	100	0	-	100	98.6
Trucks	0	9	0	0	-	9	0	12	1	0	-	13	2	1	3	0	-	6	0	0	0	0	-	0	28
% Trucks	0	1.4	0	0	-	1.1	0	1.4	1.5	0	-	1.4	4.1	1.8	3.4	0	-	3.1	0	0	0	0	-	0	1.3
Bicycles	0	0	1	0	-	1	0	0	0	0	-	0	1	0	0	0	-	1	0	0	0	0	-	0	2
% Bicycles	0	0	1.9	0	-	0.1	0	0	0	0	-	0	2	0	0	0	-	0.5	0	0	0	0	-	0	0.1
Peds	-	-	-	-	2	-	-	-	-	-	6	-	-	-	-	-	9	-	-	-	-	-	8	-	25
% Peds	-	-	-	-	8	-	-	-	-	-	24	-	-	-	-	-	36	-	-	-	-	-	32	-	-

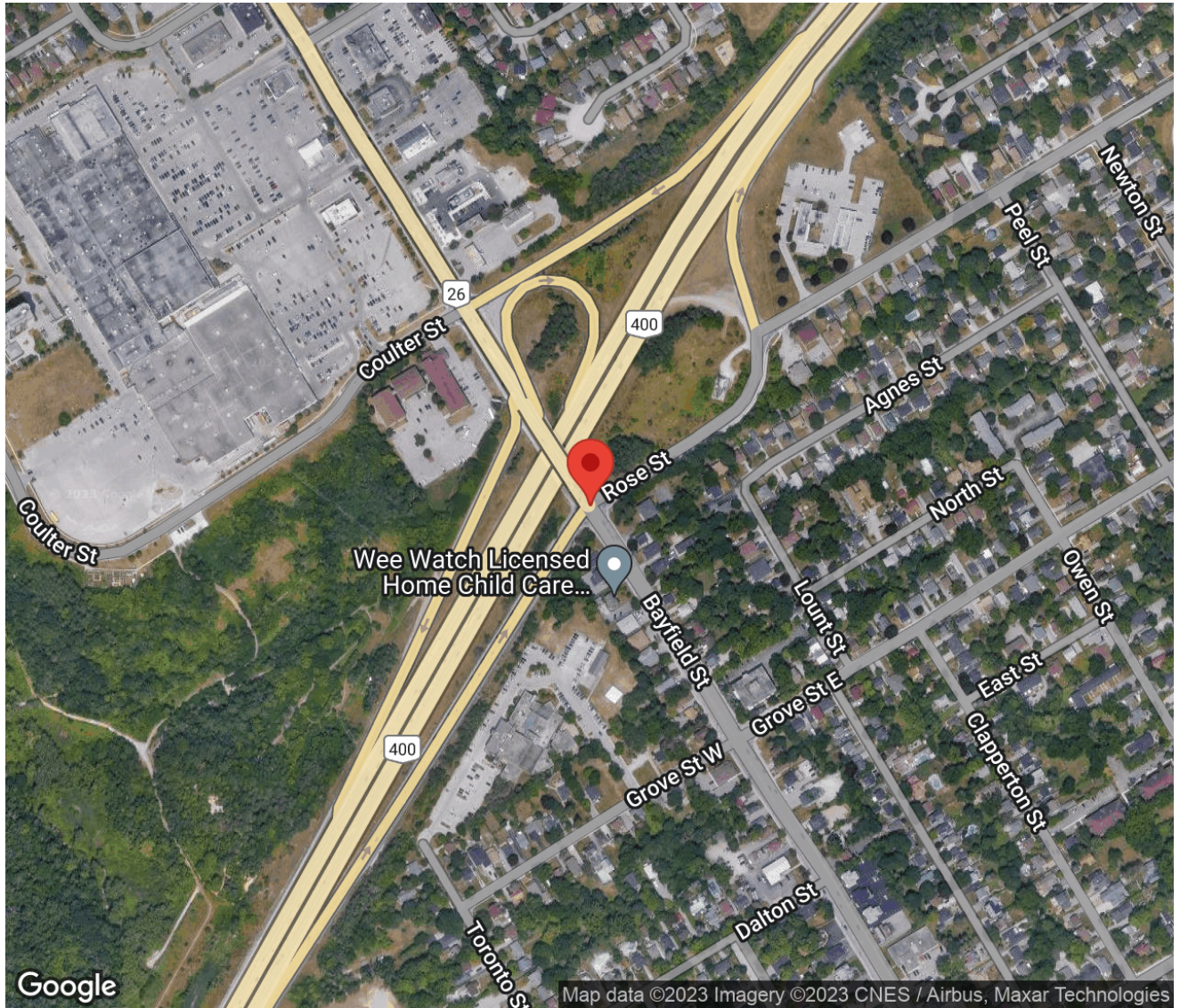
Project #23-037 - City of Barrie

Intersection Count Report

Intersection: Bayfield St & Rose St-Hwy 400 NB Off Ramp
Municipality: Barrie
Count Date: Tuesday, Mar 21, 2023
Site Code: 2303700024
Count Categories: Cars, Trucks, Bicycles, Pedestrians
Count Period: 07:00-09:00, 11:00-14:00, 15:00-18:00
Weather: Clear
Comments:

Traffic Count Map

Intersection:	Bayfield St & Rose St-Hwy 400 NB Off Ramp
Site Code:	2303700024
Municipality:	Barrie
Count Date:	Mar 21, 2023



Peak Hour Diagram

Specified Period

From: 07:00:00
To: 09:00:00

One Hour Peak

From: 08:00:00
To: 09:00:00

Intersection: Bayfield St & Rose St-Hwy 400 NB Off Ramp
Site Code: 2303700024
Count Date: Mar 21, 2023

Weather conditions: Clear

**** Signalized Intersection ****

Major Road: Bayfield St runs N/S

North Approach

	Out	In	Total
	817	1282	2099
	22	73	95
	1	1	2
	840	1356	2196

Bayfield St

	1	0	0
	17	5	0
	598	219	0
Totals	616	224	0

↓ ↘ ↻

East Approach

	Out	In	Total
	164	440	604
	0	9	9
	0	0	0
	164	449	613

Hwy 400 NB Off Ramp

				Totals
	0	56	644	700 ↑
	0	2	141	143 →
	0	0	216	216 ↓

Peds: 0



Peds: 13

Rose St

Totals			
0	0	0	0
164	164	0	0
0	0	0	0

Peds: 1

West Approach

	Out	In	Total
	1001	0	1001
	58	0	58
	0	0	0
	1059	0	1059

Totals	492	82	0
	474	80	0
	17	2	0
	1	0	0

Bayfield St

South Approach

	Out	In	Total
	554	814	1368
	19	17	36
	1	1	2
	574	832	1406

 - Cars

 - Trucks

 - Bicycles

Comments

Peak Hour Summary

Intersection: Bayfield St & Rose St-Hwy 400 NB Off Ramp
Site Code: 2303700024
Count Date: Mar 21, 2023
Period: 07:00 - 09:00

Peak Hour Data (08:00 - 09:00)

	North Approach Bayfield St						South Approach Bayfield St						East Approach Rose St						West Approach Hwy 400 NB Off Ramp						Total Vehicles				
Start Time					Peds	Total					Peds	Total					Peds	Total					Peds	Total					
08:00	66	137		0	0	203		118	16	0	0	134	0		39	0	2	39	148	38	37		0	223	599				
08:15	58	163		0	0	221		111	24	0	1	135	0		45	0	4	45	176	35	66		3	277	678				
08:30	53	156		0	0	209		119	22	0	0	141	0		33	0	5	33	172	30	63		1	265	648				
08:45	47	160		0	0	207		144	20	0	0	164	0		47	0	2	47	204	40	50		1	294	712				
Grand Total	224	616		0	0	840		492	82	0	1	574	0		164	0	13	164	700	143	216		5	1059	2637				
Approach %	26.7	73.3		0	-	-		85.7	14.3	0	-	-	0		100	0	-	-	66.1	13.5	20.4		-	-	-				
Totals %	8.5	23.4		0	-	31.9		18.7	3.1	0	-	21.8	0		6.2	0	-	6.2	26.5	5.4	8.2		-	40.2	-				
PHF	0.85	0.94		0	-	0.95		0.85	0.85	0	-	0.88	0		0.87	0	-	0.87	0.86	0.89	0.82		0.9	0.93	0.93				
Cars	219	598		0	-	817		474	80	0	-	554	0		164	0	-	164	644	141	216		1001	2536					
% Cars	97.8	97.1		0	-	97.3		96.3	97.6	0	-	96.5	0		100	0	-	100	92	98.6	100		94.5	96.2	96.2				
Trucks	5	17		0	-	22		17	2	0	-	19	0		0	0	-	0	56	2	0		58	99					
% Trucks	2.2	2.8		0	-	2.6		3.5	2.4	0	-	3.3	0		0	0	-	0	8	1.4	0		5.5	3.8	3.8				
Bicycles	0	1		0	-	1		1	0	0	-	1	0		0	0	-	0	0	0	0		0	2	2				
% Bicycles	0	0.2		0	-	0.1		0.2	0	0	-	0.2	0		0	0	-	0	0	0	0		0	0.1	0.1				
Peds						0	-						1	-						13	-						5	-	19
% Peds						0	-						5.3	-						68.4	-						26.3	-	-

Peak Hour Diagram

Specified Period

From: 11:00:00
To: 14:00:00

One Hour Peak

From: 13:00:00
To: 14:00:00

Intersection: Bayfield St & Rose St-Hwy 400 NB Off Ramp
Site Code: 2303700024
Count Date: Mar 21, 2023

Weather conditions: Clear

**** Signalized Intersection ****

Major Road: Bayfield St runs N/S

North Approach

	Out	In	Total
	851	1481	2332
	30	48	78
	1	0	1
Totals	882	1529	2411

Bayfield St

	1	0	0
	14	16	0
	641	210	0
Totals	656	226	0

↓ ↓ ↻

East Approach

	Out	In	Total
	132	392	524
	4	31	35
	0	0	0
Totals	136	423	559

Hwy 400 NB Off Ramp

	Out	In	Total	
	0	31	697	728 ↑
	0	10	93	103 →
	0	1	119	120 ↓

Peds: 0

Peds: 24



Peds: 16

Peds: 5

Rose St

Totals			
0	0	0	0
136	132	4	0
0	0	0	0

West Approach

	Out	In	Total
	909	0	909
	42	0	42
	0	0	0
Totals	951	0	951

Totals	665	94	0
	652	89	0
	13	5	0
	0	0	0

Bayfield St

South Approach

	Out	In	Total
	741	760	1501
	18	15	33
	0	1	1
Totals	759	776	1535

 - Cars

 - Trucks

 - Bicycles

Comments

Peak Hour Summary

Intersection: Bayfield St & Rose St-Hwy 400 NB Off Ramp
Site Code: 2303700024
Count Date: Mar 21, 2023
Period: 11:00 - 14:00

Peak Hour Data (13:00 - 14:00)

Start Time	North Approach Bayfield St						South Approach Bayfield St						East Approach Rose St						West Approach Hwy 400 NB Off Ramp						Total Vehicles
	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	
13:00	47	168		0	0	215		162	28	0	0	190	0		45	0	5	45	177	27	35		6	239	689
13:15	56	157		0	0	213		164	17	0	2	181	0		39	0	2	39	175	17	34		3	226	659
13:30	55	170		0	0	225		184	20	0	1	204	0		17	0	4	17	199	28	24		7	251	697
13:45	68	161		0	0	229		155	29	0	2	184	0		35	0	5	35	177	31	27		8	235	683
Grand Total	226	656		0	0	882		665	94	0	5	759	0		136	0	16	136	728	103	120		24	951	2728
Approach %	25.6	74.4		0	-			87.6	12.4	0	-		0		100	0	-		76.6	10.8	12.6		-		
Totals %	8.3	24		0	32.3			24.4	3.4	0	27.8		0		5	0	5		26.7	3.8	4.4		34.9		
PHF	0.83	0.96		0	0.96			0.9	0.81	0	0.93		0		0.76	0	0.76		0.91	0.83	0.86		0.95	0.98	
Cars	210	641		0		851		652	89	0		741	0		132	0		132	697	93	119			909	2633
% Cars	92.9	97.7		0		96.5		98	94.7	0		97.6	0		97.1	0		97.1	95.7	90.3	99.2			95.6	96.5
Trucks	16	14		0		30		13	5	0		18	0		4	0		4	31	10	1			42	94
% Trucks	7.1	2.1		0		3.4		2	5.3	0		2.4	0		2.9	0		2.9	4.3	9.7	0.8			4.4	3.4
Bicycles	0	1		0		1		0	0	0		0	0		0	0		0	0	0	0			0	1
% Bicycles	0	0.2		0		0.1		0	0	0		0	0		0	0		0	0	0	0			0	0
Peds					0	-					5	-					16	-					24	-	45
% Peds					0	-					11.1	-					35.6	-					53.3	-	

Peak Hour Diagram

Specified Period

From: 15:00:00
To: 18:00:00

One Hour Peak

From: 16:30:00
To: 17:30:00

Intersection: Bayfield St & Rose St-Hwy 400 NB Off Ramp
Site Code: 2303700024
Count Date: Mar 21, 2023

Weather conditions: Clear

**** Signalized Intersection ****

Major Road: Bayfield St runs N/S

North Approach

	Out	In	Total
	910	2024	2934
	11	33	44
	1	1	2
Totals	922	2058	2980

Bayfield St

	1	0	0
	8	3	0
	642	268	0
Totals	651	271	0

↓ ↓ ↻

East Approach

	Out	In	Total
	146	1079	1225
	0	9	9
	1	0	1
Totals	147	1088	1235

Hwy 400 NB Off Ramp

				Totals
	0	22	983	1005 ↑
	0	2	654	656 →
	0	1	184	185 ↓

Peds: 0

Rose St

Totals			
0	0	0	0
147	146	0	1
0	0	0	0

↻ ↑ ↓

Peds: 15



Peds: 10

Peds: 2

West Approach

	Out	In	Total
	1821	0	1821
	25	0	25
	0	0	0
Totals	1846	0	1846

Totals	906	161	0
	895	157	0
	11	4	0
	0	0	0

↑ → ↻

South Approach

	Out	In	Total
	1052	826	1878
	15	9	24
	0	1	1
Totals	1067	836	1903

Bayfield St

 - Cars

 - Trucks

 - Bicycles

Comments

Peak Hour Summary

Intersection: Bayfield St & Rose St-Hwy 400 NB Off Ramp
Site Code: 2303700024
Count Date: Mar 21, 2023
Period: 15:00 - 18:00

Peak Hour Data (16:30 - 17:30)

Start Time	North Approach Bayfield St						South Approach Bayfield St						East Approach Rose St						West Approach Hwy 400 NB Off Ramp						Total Vehicles
	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	
16:30	63	150		0	0	213		240	42	0	0	282	0		44	0	1	44	269	49	45		8	363	902
16:45	61	169		0	0	230		218	37	0	0	255	0		31	0	4	31	247	56	53		1	356	872
17:00	73	162		0	0	235		231	42	0	2	273	0		35	0	2	35	241	472	43		3	756	1299
17:15	74	170		0	0	244		217	40	0	0	257	0		37	0	3	37	248	79	44		3	371	909
Grand Total	271	651		0	0	922		906	161	0	2	1067	0		147	0	10	147	1005	656	185		15	1846	3982
Approach %	29.4	70.6		0	-	-		84.9	15.1	0	-	-	0		100	0	-	-	54.4	35.5	10		-	-	-
Totals %	6.8	16.3		0	-	23.2		22.8	4	0	-	26.8	0		3.7	0	-	3.7	25.2	16.5	4.6		-	46.4	-
PHF	0.92	0.96		0	-	0.94		0.94	0.96	0	-	0.95	0		0.84	0	-	0.84	0.93	0.35	0.87		0.61	0.77	-
Cars	268	642		0	-	910		895	157	0	-	1052	0		146	0	-	146	983	654	184		1821	3929	-
% Cars	98.9	98.6		0	-	98.7		98.8	97.5	0	-	98.6	0		99.3	0	-	99.3	97.8	99.7	99.5		98.6	98.7	-
Trucks	3	8		0	-	11		11	4	0	-	15	0		0	0	-	0	22	2	1		25	51	-
% Trucks	1.1	1.2		0	-	1.2		1.2	2.5	0	-	1.4	0		0	0	-	0	2.2	0.3	0.5		1.4	1.3	-
Bicycles	0	1		0	-	1		0	0	0	-	0	0		1	0	-	1	0	0	0		0	2	-
% Bicycles	0	0.2		0	-	0.1		0	0	0	-	0	0		0.7	0	-	0.7	0	0	0		0	0.1	-
Peds					0	-					2	-					10	-					15	-	27
% Peds					0	-					7.4	-					37	-					55.6	-	-

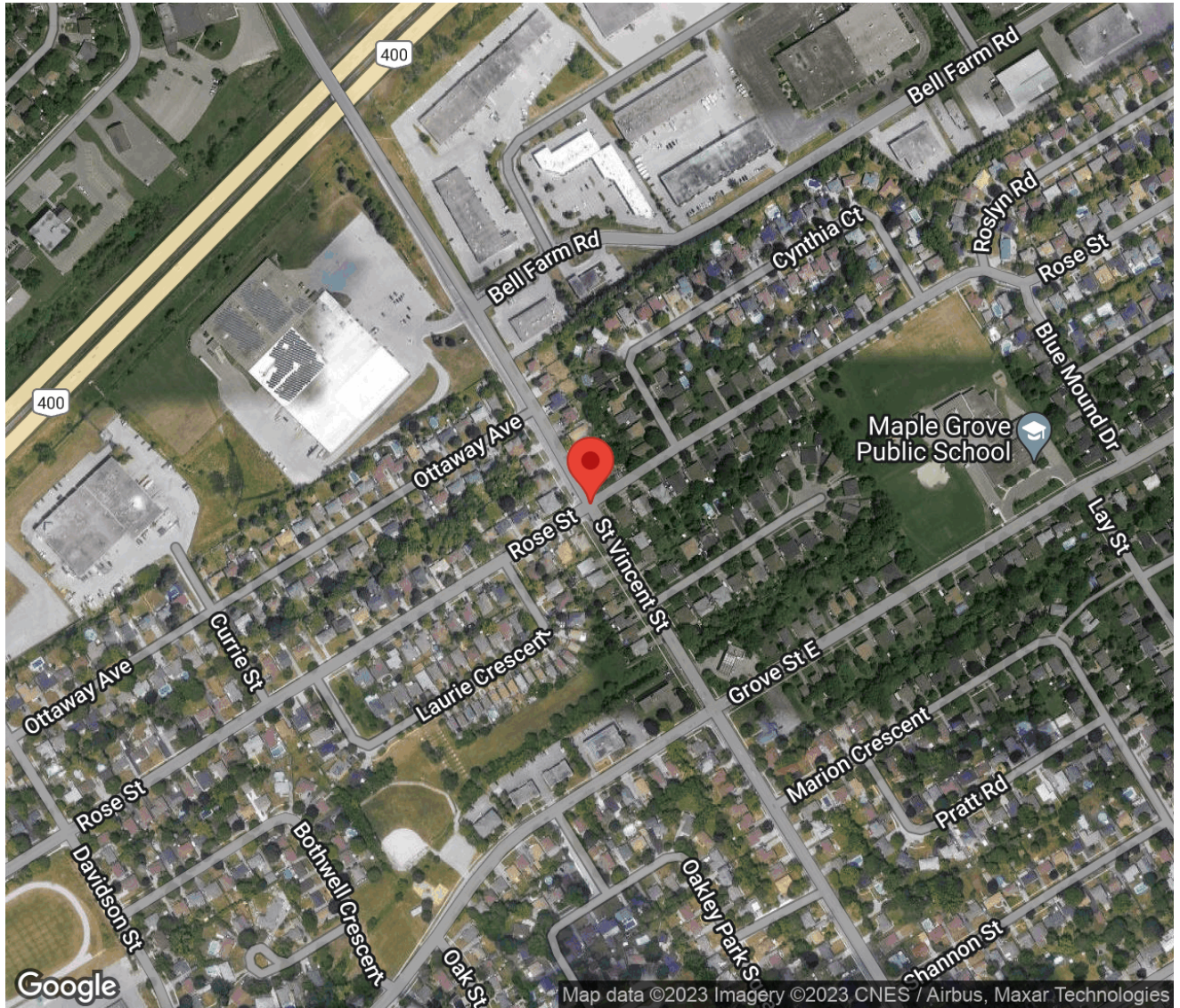
Project #23-037 - City of Barrie

Intersection Count Report

Intersection:	St. Vincent St & Rose St
Municipality:	Barrie
Count Date:	Wednesday, Apr 05, 2023
Site Code:	2303700178
Count Categories:	Cars, Trucks, Bicycles, Pedestrians
Count Period:	07:00-09:00, 11:00-14:00, 15:00-18:00
Weather:	Clear
Comments:	

Traffic Count Map

Intersection:	St. Vincent St & Rose St
Site Code:	2303700178
Municipality:	Barrie
Count Date:	Apr 05, 2023



Peak Hour Diagram

Specified Period

From: 07:00:00

To: 09:00:00

One Hour Peak

From: 07:45:00

To: 08:45:00

Intersection: St. Vincent St & Rose St

Site Code: 2303700178

Count Date: Apr 05, 2023

Weather conditions: Clear

**** Signalized Intersection ****

Major Road: St. Vincent St runs N/S

North Approach

	Out	In	Total
	465	558	1023
	9	7	16
	0	0	0
Totals	474	565	1039

St. Vincent St

	0	0	0	0
	2	7	0	0
	57	393	11	4
Totals	59	400	11	4

East Approach

	Out	In	Total
	65	39	104
	1	0	1
	0	0	0
Totals	66	39	105

Rose St

				Totals
	0	0	0	0
	0	4	123	127
	0	0	19	19
	0	1	21	22

Peds: 1



Peds: 0

Rose St

Totals			
	0	0	0
	24	24	0
	31	30	1
	11	11	0

West Approach

	Out	In	Total
	163	139	302
	5	6	11
	0	0	0
Totals	168	145	313

Totals				
	52	407	9	0
	3	3	0	0
	0	0	0	0

St. Vincent St

South Approach

	Out	In	Total
	468	425	893
	6	8	14
	0	0	0
Totals	474	433	907

 - Cars

 - Trucks

 - Bicycles

Comments

Peak Hour Summary

Intersection: St. Vincent St & Rose St
Site Code: 2303700178
Count Date: Apr 05, 2023
Period: 07:00 - 09:00

Peak Hour Data (07:45 - 08:45)

Start Time	North Approach St. Vincent St						South Approach St. Vincent St						East Approach Rose St						West Approach Rose St						Total Vehicles
	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	
07:45	2	130	24	0	0	156	22	107	2	0	0	131	2	5	2	0	0	9	43	6	6	0	1	55	351
08:00	3	82	14	4	0	103	13	91	2	0	0	106	1	8	7	0	0	16	28	5	4	0	2	37	262
08:15	4	77	13	0	0	94	10	117	2	0	0	129	4	8	9	0	0	21	30	2	6	0	0	38	282
08:30	2	111	8	0	1	121	10	95	3	0	0	108	4	10	6	0	0	20	26	6	6	0	0	38	287
Grand Total	11	400	59	4	1	474	55	410	9	0	0	474	11	31	24	0	0	66	127	19	22	0	3	168	1182
Approach %	2.3	84.4	12.4	0.8	-	-	11.6	86.5	1.9	0	-	-	16.7	47	36.4	0	-	-	75.6	11.3	13.1	0	-	-	-
Totals %	0.9	33.8	5	0.3	-	40.1	4.7	34.7	0.8	0	-	40.1	0.9	2.6	2	0	-	5.6	10.7	1.6	1.9	0	-	14.2	-
PHF	0.69	0.77	0.61	0.25	-	0.76	0.63	0.88	0.75	0	-	0.9	0.69	0.78	0.67	0	-	0.79	0.74	0.79	0.92	0	-	0.76	0.84
Cars	11	393	57	4	-	465	52	407	9	0	-	468	11	30	24	0	-	65	123	19	21	0	-	163	1161
% Cars	100	98.3	96.6	100	-	98.1	94.5	99.3	100	0	-	98.7	100	96.8	100	0	-	98.5	96.9	100	95.5	0	-	97	98.2
Trucks	0	7	2	0	-	9	3	3	0	0	-	6	0	1	0	0	-	1	4	0	1	0	-	5	21
% Trucks	0	1.8	3.4	0	-	1.9	5.5	0.7	0	0	-	1.3	0	3.2	0	0	-	1.5	3.1	0	4.5	0	-	3	1.8
Bicycles	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Bicycles	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
Peds	-	-	-	-	1	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	3	-	4
% Peds	-	-	-	-	25	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	75	-	-

Peak Hour Diagram

Specified Period

From: 11:00:00
To: 14:00:00

One Hour Peak

From: 12:15:00
To: 13:15:00

Intersection: St. Vincent St & Rose St
Site Code: 2303700178
Count Date: Apr 05, 2023

Weather conditions: Clear

**** Signalized Intersection ****

Major Road: St. Vincent St runs N/S

North Approach

	Out	In	Total
	508	587	1095
	6	7	13
	0	0	0
Totals	514	594	1108

St. Vincent St

	0	0	0	0
	1	5	0	0
	55	432	21	0
Totals	56	437	21	0






East Approach

	Out	In	Total
	86	54	140
	1	0	1
	0	0	0
Totals	87	54	141

Rose St

				Totals
	0	0	0	0
	0	3	74	77
	0	0	21	21
	0	1	29	30






Peds: 0



Peds: 1

Peds: 3

Peds: 1

Rose St

Totals			
0	0	0	0
39	39	0	0
30	29	1	0
18	18	0	0






West Approach

	Out	In	Total
	124	114	238
	4	2	6
	0	0	0
Totals	128	116	244

Totals				
30	30	474	12	0
	30	474	12	0
	0	4	0	0
	0	0	0	0

St. Vincent St

South Approach

	Out	In	Total
	516	479	995
	4	6	10
	0	0	0
Totals	520	485	1005

 - Cars

 - Trucks

 - Bicycles

Comments

Peak Hour Summary

Intersection: St. Vincent St & Rose St
Site Code: 2303700178
Count Date: Apr 05, 2023
Period: 11:00 - 14:00

Peak Hour Data (12:15 - 13:15)

Start Time	North Approach St. Vincent St						South Approach St. Vincent St						East Approach Rose St						West Approach Rose St						Total Vehicles
	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	
12:15	5	105	10	0	0	120	6	115	4	0	0	125	5	7	8	0	0	20	14	5	3	0	0	22	287
12:30	3	95	19	0	0	117	10	119	1	0	0	130	5	11	11	0	2	27	17	6	8	0	1	31	305
12:45	5	129	13	0	0	147	11	121	4	0	1	136	2	10	11	0	1	23	23	7	10	0	0	40	346
13:00	8	108	14	0	0	130	3	123	3	0	0	129	6	2	9	0	0	17	23	3	9	0	0	35	311
Grand Total	21	437	56	0	0	514	30	478	12	0	1	520	18	30	39	0	3	87	77	21	30	0	1	128	1249
Approach %	4.1	85	10.9	0	-	-	5.8	91.9	2.3	0	-	-	20.7	34.5	44.8	0	-	-	60.2	16.4	23.4	0	-	-	-
Totals %	1.7	35	4.5	0	-	41.2	2.4	38.3	1	0	-	41.6	1.4	2.4	3.1	0	-	7	6.2	1.7	2.4	0	-	10.2	-
PHF	0.66	0.85	0.74	0	-	0.87	0.68	0.97	0.75	0	-	0.96	0.75	0.68	0.89	0	-	0.81	0.84	0.75	0.75	0	-	0.8	0.9
Cars	21	432	55	0	-	508	30	474	12	0	-	516	18	29	39	0	-	86	74	21	29	0	-	124	1234
% Cars	100	98.9	98.2	0	-	98.8	100	99.2	100	0	-	99.2	100	96.7	100	0	-	98.9	96.1	100	96.7	0	-	96.9	98.8
Trucks	0	5	1	0	-	6	0	4	0	0	-	4	0	1	0	0	-	1	3	0	1	0	-	4	15
% Trucks	0	1.1	1.8	0	-	1.2	0	0.8	0	0	-	0.8	0	3.3	0	0	-	1.1	3.9	0	3.3	0	-	3.1	1.2
Bicycles	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Bicycles	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
Peds	-	-	-	-	0	-	-	-	-	-	1	-	-	-	-	-	3	-	-	-	-	-	1	-	5
% Peds	-	-	-	-	0	-	-	-	-	-	20	-	-	-	-	-	60	-	-	-	-	-	20	-	-

Peak Hour Diagram

Specified Period

From: 15:00:00
To: 18:00:00

One Hour Peak

From: 16:30:00
To: 17:30:00

Intersection: St. Vincent St & Rose St
Site Code: 2303700178
Count Date: Apr 05, 2023

Weather conditions: Clear

**** Signalized Intersection ****

Major Road: St. Vincent St runs N/S

North Approach

	Out	In	Total
	702	719	1421
	5	1	6
	0	0	0
Totals	707	720	1427

St. Vincent St

	0	0	0	0
	1	4	0	0
	92	566	44	0
Totals	93	570	44	0






East Approach

	Out	In	Total
	55	80	135
	0	0	0
	0	0	0
Totals	55	80	135

Rose St

				Totals
	0	0	0	0
	0	0	153	153
	0	0	18	18
	0	1	48	49

Peds: 2



Peds: 5

Peds: 7

Peds: 0

Rose St

Totals			
	0	0	0
	29	29	0
	20	20	0
	6	6	0

West Approach

	Out	In	Total
	219	143	362
	1	1	2
	0	0	0
Totals	220	144	364

Totals				
	31	537	18	0
	0	1	0	0
	0	0	0	0

St. Vincent St

South Approach

	Out	In	Total
	586	620	1206
	1	5	6
	0	0	0
Totals	587	625	1212

 - Cars

 - Trucks

 - Bicycles

Comments

Peak Hour Summary

Intersection: St. Vincent St & Rose St
Site Code: 2303700178
Count Date: Apr 05, 2023
Period: 15:00 - 18:00

Peak Hour Data (16:30 - 17:30)

Start Time	North Approach St. Vincent St						South Approach St. Vincent St						East Approach Rose St						West Approach Rose St						Total Vehicles
	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	←	↑	→	↻	Peds	Total	
16:30	11	153	28	0	0	192	4	128	1	0	0	133	0	4	5	0	1	9	29	1	11	0	0	41	375
16:45	12	149	21	0	0	182	9	159	6	0	0	174	3	5	8	0	2	16	46	7	14	0	1	67	439
17:00	9	135	23	0	0	167	16	136	3	0	0	155	1	4	10	0	4	15	38	3	11	0	4	52	389
17:15	12	133	21	0	2	166	2	115	8	0	0	125	2	7	6	0	0	15	40	7	13	0	0	60	366
Grand Total	44	570	93	0	2	707	31	538	18	0	0	587	6	20	29	0	7	55	153	18	49	0	5	220	1569
Approach %	6.2	80.6	13.2	0	-	-	5.3	91.7	3.1	0	-	-	10.9	36.4	52.7	0	-	-	69.5	8.2	22.3	0	-	-	-
Totals %	2.8	36.3	5.9	0	-	45.1	2	34.3	1.1	0	-	37.4	0.4	1.3	1.8	0	-	3.5	9.8	1.1	3.1	0	-	14	-
PHF	0.92	0.93	0.83	0	-	0.92	0.48	0.85	0.56	0	-	0.84	0.5	0.71	0.73	0	-	0.86	0.83	0.64	0.88	0	-	0.82	0.89
Cars	44	566	92	0	-	702	31	537	18	0	-	586	6	20	29	0	-	55	153	18	48	0	-	219	1562
% Cars	100	99.3	98.9	0	-	99.3	100	99.8	100	0	-	99.8	100	100	100	0	-	100	100	100	98	0	-	99.5	99.6
Trucks	0	4	1	0	-	5	0	1	0	0	-	1	0	0	0	0	-	0	0	0	1	0	-	1	7
% Trucks	0	0.7	1.1	0	-	0.7	0	0.2	0	0	-	0.2	0	0	0	0	-	0	0	0	2	0	-	0.5	0.4
Bicycles	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Bicycles	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
Peds	-	-	-	-	2	-	-	-	-	-	0	-	-	-	-	-	7	-	-	-	-	-	5	-	14
% Peds	-	-	-	-	14.3	-	-	-	-	-	0	-	-	-	-	-	50	-	-	-	-	-	35.7	-	-

Accu-Traffic Inc.

Morning Peak Diagram	Specified Period From: 7:00:00 To: 9:00:00	One Hour Peak From: 7:30:00 To: 8:30:00
Municipality: Barrie Site #: 2101200002 Intersection: Highway 400 NB Ramp & Rose St TFR File #: 1 Count date: 3-Mar-21	Weather conditions: Person counted: Person prepared: Person checked:	
** Non-Signalized Intersection **	Major Road: Highway 400 NB Ramp runs N/S	

North Leg Total: 266 North Entering: 0 North Peds: 0 Peds Cross:	<table style="width: 100%; border-collapse: collapse;"> <tr><td>Heavys</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr><td>Trucks</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr><td>Cars</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr style="border-top: 1px solid black;"><td>Totals</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> </table>	Heavys	0	0	0	0	Trucks	0	0	0	0	Cars	0	0	0	0	Totals	0	0	0	0	<table style="width: 100%; border-collapse: collapse;"> <tr><td>Heavys</td><td>12</td></tr> <tr><td>Trucks</td><td>3</td></tr> <tr><td>Cars</td><td>251</td></tr> <tr style="border-top: 1px solid black;"><td>Totals</td><td>266</td></tr> </table>	Heavys	12	Trucks	3	Cars	251	Totals	266	East Leg Total: 367 East Entering: 192 East Peds: 0 Peds Cross:
Heavys	0	0	0	0																											
Trucks	0	0	0	0																											
Cars	0	0	0	0																											
Totals	0	0	0	0																											
Heavys	12																														
Trucks	3																														
Cars	251																														
Totals	266																														

Heavys	Trucks	Cars	Totals
0	0	0	0

Highway 400 NB Ramp

Cars	Trucks	Heavys	Totals
37	0	3	40
0	0	0	0
147	3	2	152
184	3	5	

Heavys	Trucks	Cars	Totals
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0

Rose St

Cars	Trucks	Heavys	Totals
159	0	16	175

Peds Cross: West Peds: 0 West Entering: 0 West Leg Total: 0	<table style="width: 100%; border-collapse: collapse;"> <tr><td>Cars</td><td>147</td></tr> <tr><td>Trucks</td><td>3</td></tr> <tr><td>Heavys</td><td>2</td></tr> <tr style="border-top: 1px solid black;"><td>Totals</td><td>152</td></tr> </table>	Cars	147	Trucks	3	Heavys	2	Totals	152	<table style="width: 100%; border-collapse: collapse;"> <tr><td>Cars</td><td>0</td><td>214</td><td>159</td><td>373</td></tr> <tr><td>Trucks</td><td>0</td><td>3</td><td>0</td><td>3</td></tr> <tr><td>Heavys</td><td>0</td><td>9</td><td>16</td><td>25</td></tr> <tr style="border-top: 1px solid black;"><td>Totals</td><td>0</td><td>226</td><td>175</td><td></td></tr> </table>	Cars	0	214	159	373	Trucks	0	3	0	3	Heavys	0	9	16	25	Totals	0	226	175		Peds Cross: South Peds: 0 South Entering: 401 South Leg Total: 553
Cars	147																														
Trucks	3																														
Heavys	2																														
Totals	152																														
Cars	0	214	159	373																											
Trucks	0	3	0	3																											
Heavys	0	9	16	25																											
Totals	0	226	175																												

Comments

Accu-Traffic Inc.

Afternoon Peak Diagram	Specified Period From: 16:00:00 To: 19:00:00	One Hour Peak From: 16:30:00 To: 17:30:00
Municipality: Barrie Site #: 2101200002 Intersection: Highway 400 NB Ramp & Rose St TFR File #: 1 Count date: 3-Mar-21	Weather conditions: Person counted: Person prepared: Person checked:	
** Non-Signalized Intersection **	Major Road: Highway 400 NB Ramp runs N/S	

North Leg Total: 304 North Entering: 0 North Peds: 0 Peds Cross:	<table style="width: 100%; border-collapse: collapse;"> <tr><td>Heavys</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr><td>Trucks</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr><td>Cars</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr><td>Totals</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> </table>	Heavys	0	0	0	0	Trucks	0	0	0	0	Cars	0	0	0	0	Totals	0	0	0	0		<table style="width: 100%; border-collapse: collapse;"> <tr><td>Heavys</td><td>4</td></tr> <tr><td>Trucks</td><td>0</td></tr> <tr><td>Cars</td><td>300</td></tr> <tr><td>Totals</td><td>304</td></tr> </table>	Heavys	4	Trucks	0	Cars	300	Totals	304	East Leg Total: 379 East Entering: 160 East Peds: 0 Peds Cross:
Heavys	0	0	0	0																												
Trucks	0	0	0	0																												
Cars	0	0	0	0																												
Totals	0	0	0	0																												
Heavys	4																															
Trucks	0																															
Cars	300																															
Totals	304																															

Heavys	Trucks	Cars	Totals
0	0	0	0

Highway 400 NB Ramp

driveway

Cars	Trucks	Heavys	Totals
27	0	1	28
0	0	0	0
131	1	0	132
158	1	1	

Heavys	Trucks	Cars	Totals
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0

Rose St

Cars	Trucks	Heavys	Totals
218	0	1	219

Peds Cross: West Peds: 0 West Entering: 0 West Leg Total: 0	<table style="width: 100%; border-collapse: collapse;"> <tr><td>Cars</td><td>131</td></tr> <tr><td>Trucks</td><td>1</td></tr> <tr><td>Heavys</td><td>0</td></tr> <tr><td>Totals</td><td>132</td></tr> </table>	Cars	131	Trucks	1	Heavys	0	Totals	132		<table style="width: 100%; border-collapse: collapse;"> <tr><td>Cars</td><td>0</td><td>273</td><td>218</td><td>491</td></tr> <tr><td>Trucks</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr><td>Heavys</td><td>0</td><td>3</td><td>1</td><td>4</td></tr> <tr><td>Totals</td><td>0</td><td>276</td><td>219</td><td></td></tr> </table>	Cars	0	273	218	491	Trucks	0	0	0	0	Heavys	0	3	1	4	Totals	0	276	219		Peds Cross: South Peds: 0 South Entering: 495 South Leg Total: 627
Cars	131																															
Trucks	1																															
Heavys	0																															
Totals	132																															
Cars	0	273	218	491																												
Trucks	0	0	0	0																												
Heavys	0	3	1	4																												
Totals	0	276	219																													

Comments

Accu-Traffic Inc.

Morning Peak Diagram

Specified Period

From: 7:00:00

To: 9:00:00

One Hour Peak

From: 7:30:00

To: 8:30:00

Municipality: Barrie

Site #: 2101200003

Intersection: Grove St & Peel St

TFR File #: 1

Count date: 3-Mar-21

Weather conditions:

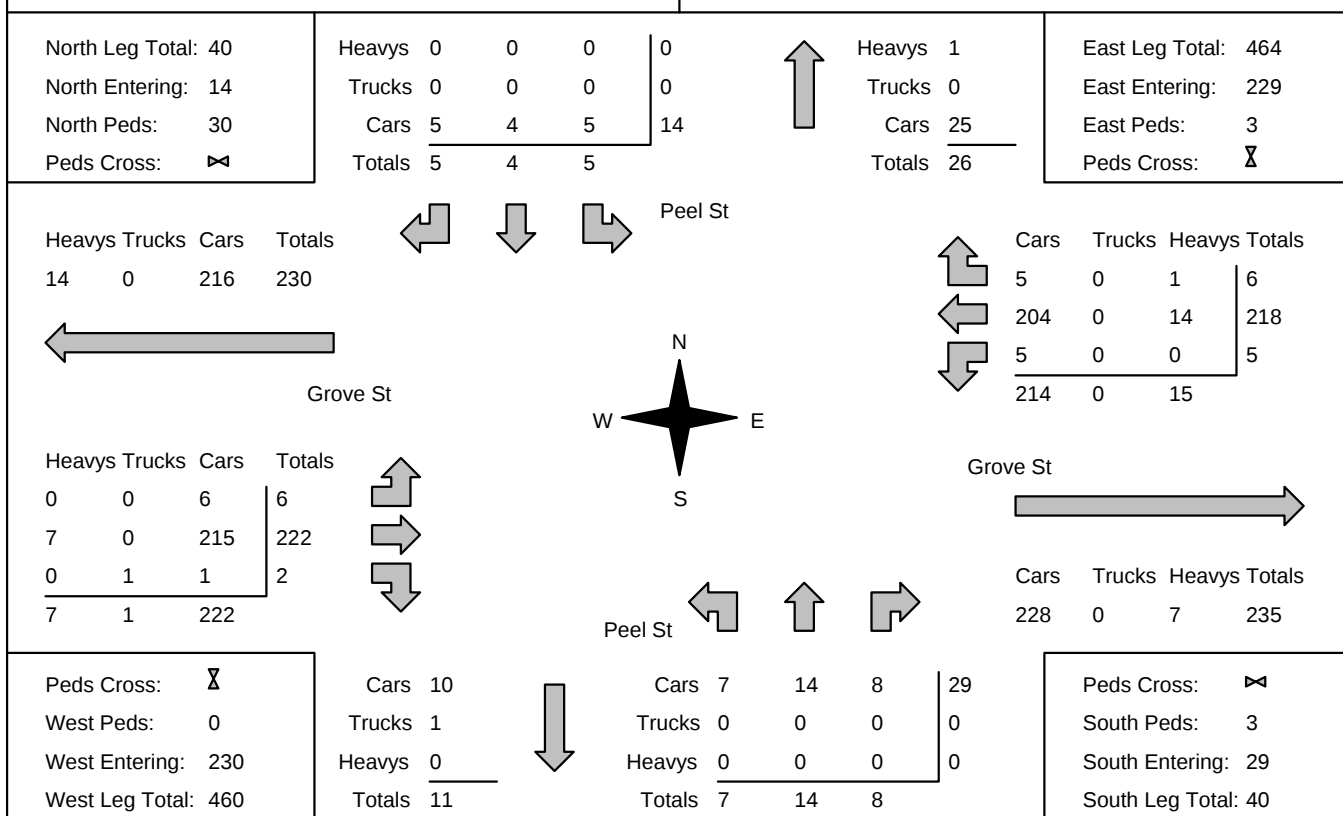
Person counted:

Person prepared:

Person checked:

** Non-Signalized Intersection **

Major Road: Grove St runs W/E



Comments

Accu-Traffic Inc.

Afternoon Peak Diagram	Specified Period From: 16:00:00 To: 19:00:00	One Hour Peak From: 16:45:00 To: 17:45:00
Municipality: Barrie Site #: 2101200003 Intersection: Grove St & Peel St TFR File #: 1 Count date: 3-Mar-21	Weather conditions: Person counted: Person prepared: Person checked:	
** Non-Signalized Intersection **	Major Road: Grove St runs W/E	

North Leg Total: 37 North Entering: 15 North Peds: 9 Peds Cross:	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="border-right: 1px solid black; padding: 2px;">Heavys</td> <td style="padding: 2px;">0</td> <td style="padding: 2px;">0</td> <td style="padding: 2px;">0</td> <td style="padding: 2px;">0</td> </tr> <tr> <td style="border-right: 1px solid black; padding: 2px;">Trucks</td> <td style="padding: 2px;">0</td> <td style="padding: 2px;">0</td> <td style="padding: 2px;">0</td> <td style="padding: 2px;">0</td> </tr> <tr> <td style="border-right: 1px solid black; padding: 2px;">Cars</td> <td style="padding: 2px;">6</td> <td style="padding: 2px;">9</td> <td style="padding: 2px;">0</td> <td style="padding: 2px;">15</td> </tr> <tr> <td style="border-right: 1px solid black; padding: 2px;">Totals</td> <td style="padding: 2px;">6</td> <td style="padding: 2px;">9</td> <td style="padding: 2px;">0</td> <td style="padding: 2px;"></td> </tr> </table>	Heavys	0	0	0	0	Trucks	0	0	0	0	Cars	6	9	0	15	Totals	6	9	0		<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="border-right: 1px solid black; padding: 2px;">Heavys</td> <td style="padding: 2px;">0</td> </tr> <tr> <td style="border-right: 1px solid black; padding: 2px;">Trucks</td> <td style="padding: 2px;">0</td> </tr> <tr> <td style="border-right: 1px solid black; padding: 2px;">Cars</td> <td style="padding: 2px;">22</td> </tr> <tr> <td style="border-right: 1px solid black; padding: 2px;">Totals</td> <td style="padding: 2px;">22</td> </tr> </table>	Heavys	0	Trucks	0	Cars	22	Totals	22	East Leg Total: 304 East Entering: 142 East Peds: 3 Peds Cross:
Heavys	0	0	0	0																											
Trucks	0	0	0	0																											
Cars	6	9	0	15																											
Totals	6	9	0																												
Heavys	0																														
Trucks	0																														
Cars	22																														
Totals	22																														

Heavys	Trucks	Cars	Totals
1	0	144	145

Peel St
 Grove St

Cars	Trucks	Heavys	Totals
3	0	0	3
132	0	1	133
6	0	0	6
141	0	1	

Heavys	Trucks	Cars	Totals
0	0	5	5
2	1	157	160
0	0	13	13
2	1	175	

Peel St
 Grove St

Cars	Trucks	Heavys	Totals
159	1	2	162

Peds Cross: West Peds: 5 West Entering: 178 West Leg Total: 323	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="border-right: 1px solid black; padding: 2px;">Cars</td> <td style="padding: 2px;">28</td> </tr> <tr> <td style="border-right: 1px solid black; padding: 2px;">Trucks</td> <td style="padding: 2px;">0</td> </tr> <tr> <td style="border-right: 1px solid black; padding: 2px;">Heavys</td> <td style="padding: 2px;">0</td> </tr> <tr> <td style="border-right: 1px solid black; padding: 2px;">Totals</td> <td style="padding: 2px;">28</td> </tr> </table>	Cars	28	Trucks	0	Heavys	0	Totals	28	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="border-right: 1px solid black; padding: 2px;">Cars</td> <td style="padding: 2px;">6</td> <td style="padding: 2px;">14</td> <td style="padding: 2px;">2</td> <td style="padding: 2px;">22</td> </tr> <tr> <td style="border-right: 1px solid black; padding: 2px;">Trucks</td> <td style="padding: 2px;">0</td> <td style="padding: 2px;">0</td> <td style="padding: 2px;">0</td> <td style="padding: 2px;">0</td> </tr> <tr> <td style="border-right: 1px solid black; padding: 2px;">Heavys</td> <td style="padding: 2px;">0</td> <td style="padding: 2px;">0</td> <td style="padding: 2px;">0</td> <td style="padding: 2px;">0</td> </tr> <tr> <td style="border-right: 1px solid black; padding: 2px;">Totals</td> <td style="padding: 2px;">6</td> <td style="padding: 2px;">14</td> <td style="padding: 2px;">2</td> <td style="padding: 2px;"></td> </tr> </table>	Cars	6	14	2	22	Trucks	0	0	0	0	Heavys	0	0	0	0	Totals	6	14	2		Peds Cross: South Peds: 4 South Entering: 22 South Leg Total: 50
Cars	28																														
Trucks	0																														
Heavys	0																														
Totals	28																														
Cars	6	14	2	22																											
Trucks	0	0	0	0																											
Heavys	0	0	0	0																											
Totals	6	14	2																												

Comments

Hwy: 400 **Between:** HWY 26 IC-98-BAYFIELD ST-BARRIE
TS: 212 **and:** DUCKWORTH ST IC-102
Regn: CENTRAL **Pattern:** CTR **PDCS:** 09
LHRS: 46900 **Offset:** 0 **Locn:** HWY 26 IC-98-BAYFIELD ST-BARRIE
Ramp: 42 **Lanes:** 1 **Speed:** **Dates:** 14-Jun-2016 to 21-Jun-2016

	Tue		Wed		Thu		Fri		Sat		Sun		Mon		Tue	
H. Interval	06/14		06/15	PK	06/16	PK	06/17	PK	06/18	PK	06/19	PK	06/20	PK	06/21	PK
00:00-01:00			21		13		39		47		66		23		18	
01:00-02:00			14		15		21		39		34		8		20	
02:00-03:00			10		12		26		19		28		9		21	
03:00-04:00			15		14		10		18		15		9		8	
04:00-05:00			16		22		9		14		15		10		19	
05:00-06:00			40		31		40		27		18		38		32	
06:00-07:00			120		133		126		76		44		121		132	
07:00-08:00			331	◀	336	◀	304		115		83		306	◀	306	◀
08:00-09:00			313		291		312	◀	161	◀	126	◀	299		297	
09:00-10:00			237		234		245		232		181		237		233	
10:00-11:00			235		213		253		269		223		232		204	
11:00-12:00			234		245		291		289		242		238		263	◀
AM Total			1586		1559		1676		1306		1075		1530		1553	
12:00-13:00	271		299	◀	265		337		314		292	◀	260			
13:00-14:00	313	◀	276		271	◀	398	◀	339	◀	253		266	◀		
14:00-15:00	316		320		342		361		282		279		314			
15:00-16:00	349		352		349		394		286		270	◀	312			
16:00-17:00	427	◀	423	◀	391	◀	402	◀	293	◀	218		379	◀		
17:00-18:00	364		323		362		391		253		203		333			
18:00-19:00	292		268		307		338		230		157		274			
19:00-20:00	246		231		258		260		193		155		223			
20:00-21:00	236		278		281		285		236		138		249			
21:00-22:00	218		195		256		219		175		112		168			
22:00-23:00	103		112		121		151		121		94		73			
23:00-00:00	57		59		62		83		78		47		58			
PM Total	3192		3136		3265		3619		2800		2218		2909			
24h. Total	3192		4722		4824		5295		4106		3293		4439		1553	
Noon - Noon	4778		4695		4941		4925		3875		3748		4462			
ADT																
AWD																
4489																
4719																

Appendix D – Synchro Analysis Output – Existing Traffic Volumes

Queues

1: Bayfield St & Hwy 400 NB Off/Rose St

Rose Street Affordable Housing

Existing (2023) - AM



Lane Group	EBL	EBT	WBR	NBT	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	700	143	164	492	224	616
Future Volume (vph)	700	143	164	492	224	616
Lane Group Flow (vph)	761	390	178	624	243	670
Turn Type	Perm	NA	Perm	NA	pm+pt	NA
Protected Phases		4		2	1	6
Permitted Phases	4		8		6	
Detector Phase	4	4	8	2	1	6
Switch Phase						
Minimum Initial (s)	12.0	12.0	12.0	24.0	7.0	24.0
Minimum Split (s)	30.0	30.0	30.0	30.0	11.5	30.0
Total Split (s)	35.0	35.0	35.0	45.0	20.0	65.0
Total Split (%)	35.0%	35.0%	35.0%	45.0%	20.0%	65.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	3.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	4.0	6.0
Lead/Lag				Lag	Lead	
Lead-Lag Optimize?				Yes	Yes	
Recall Mode	None	None	None	C-Max	None	C-Max
v/c Ratio	0.84	0.75	0.24	0.39	0.48	0.31
Control Delay	43.3	36.0	0.7	19.5	11.8	10.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	43.3	36.0	0.7	19.5	11.8	10.2
Queue Length 50th (m)	69.7	54.4	0.0	41.1	19.7	32.0
Queue Length 95th (m)	91.1	87.9	0.0	59.5	31.3	42.2
Internal Link Dist (m)		579.4		233.2		180.4
Turn Bay Length (m)					120.0	
Base Capacity (vph)	968	550	778	1580	561	2173
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.79	0.71	0.23	0.39	0.43	0.31

Intersection Summary

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 20 (20%), Referenced to phase 2:NBT and 6:SBTL, Start of Green

Natural Cycle: 75

Control Type: Actuated-Coordinated

Splits and Phases: 1: Bayfield St & Hwy 400 NB Off/Rose St



HCM Signalized Intersection Capacity Analysis

1: Bayfield St & Hwy 400 NB Off/Rose St

Rose Street Affordable Housing

Existing (2023) - AM

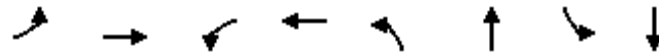
												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	700	143	216	0	0	164	0	492	82	224	616	0
Future Volume (vph)	700	143	216	0	0	164	0	492	82	224	616	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0				6.0		6.0		4.0	6.0	
Lane Util. Factor	0.97	1.00				1.00		0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99				1.00		0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00				1.00		1.00		1.00	1.00	
Frt	1.00	0.91				0.86		0.98		1.00	1.00	
Flt Protected	0.95	1.00				1.00		1.00		0.95	1.00	
Satd. Flow (prot)	3340	1708				1613		3478		1751	3579	
Flt Permitted	0.95	1.00				1.00		1.00		0.33	1.00	
Satd. Flow (perm)	3340	1708				1613		3478		605	3579	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	761	155	235	0	0	178	0	535	89	243	670	0
RTOR Reduction (vph)	0	56	0	0	0	129	0	12	0	0	0	0
Lane Group Flow (vph)	761	334	0	0	0	49	0	612	0	243	670	0
Confl. Peds. (#/hr)			5	5			14		10	10		14
Heavy Vehicles (%)	6%	0%	2%	0%	0%	3%	0%	2%	2%	4%	2%	0%
Turn Type	Perm	NA				Perm		NA		pm+pt	NA	
Protected Phases		4						2		1	6	
Permitted Phases	4					8				6		
Actuated Green, G (s)	27.3	27.3				27.3		45.0		60.7	60.7	
Effective Green, g (s)	27.3	27.3				27.3		45.0		60.7	60.7	
Actuated g/C Ratio	0.27	0.27				0.27		0.45		0.61	0.61	
Clearance Time (s)	6.0	6.0				6.0		6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0				3.0		3.0		3.0	3.0	
Lane Grp Cap (vph)	911	466				440		1565		501	2172	
v/s Ratio Prot		0.20						0.18		c0.06	0.19	
v/s Ratio Perm	c0.23					0.03				c0.24		
v/c Ratio	0.84	0.72				0.11		0.39		0.49	0.31	
Uniform Delay, d1	34.2	32.9				27.2		18.4		9.7	9.5	
Progression Factor	1.00	1.00				1.00		1.00		1.00	1.00	
Incremental Delay, d2	6.7	5.2				0.1		0.7		0.7	0.4	
Delay (s)	40.9	38.1				27.4		19.1		10.5	9.9	
Level of Service	D	D				C		B		B	A	
Approach Delay (s)		40.0			27.4			19.1			10.0	
Approach LOS		D			C			B			B	
Intersection Summary												
HCM 2000 Control Delay		25.1				HCM 2000 Level of Service		C				
HCM 2000 Volume to Capacity ratio		0.62										
Actuated Cycle Length (s)		100.0				Sum of lost time (s)		16.0				
Intersection Capacity Utilization		66.8%				ICU Level of Service		C				
Analysis Period (min)		15										
c Critical Lane Group												

Queues

2: Bayfield St & Grove St

Rose Street Affordable Housing

Existing (2023) - AM



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	33	29	93	54	2	387	117	672
Future Volume (vph)	33	29	93	54	2	387	117	672
Lane Group Flow (vph)	36	37	101	226	2	476	127	765
Turn Type	pm+pt	NA	Perm	NA	Perm	NA	pm+pt	NA
Protected Phases	7	4		8		2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	7	4	8	8	2	2	1	6
Switch Phase								
Minimum Initial (s)	7.0	10.0	10.0	10.0	24.0	24.0	7.0	24.0
Minimum Split (s)	11.0	30.0	30.0	30.0	30.0	30.0	11.0	30.0
Total Split (s)	11.0	45.0	34.0	34.0	44.0	44.0	11.0	55.0
Total Split (%)	11.0%	45.0%	34.0%	34.0%	44.0%	44.0%	11.0%	55.0%
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0	4.0	3.0	4.0
All-Red Time (s)	1.0	2.0	2.0	2.0	2.0	2.0	1.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0	6.0	6.0	6.0	6.0	4.0	6.0
Lead/Lag	Lead		Lag	Lag	Lag	Lag	Lead	
Lead-Lag Optimize?	Yes		Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	None	None	None	Max	Max	None	Max
v/c Ratio	0.13	0.09	0.47	0.70	0.01	0.29	0.22	0.35
Control Delay	21.5	19.8	39.3	25.4	16.0	14.9	9.0	10.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	21.5	19.8	39.3	25.4	16.0	14.9	9.0	10.0
Queue Length 50th (m)	4.1	3.8	15.3	12.6	0.2	23.5	7.8	31.0
Queue Length 95th (m)	10.2	10.2	29.8	35.9	1.5	41.5	19.6	55.5
Internal Link Dist (m)		140.8		181.1		201.3		233.2
Turn Bay Length (m)	20.0		25.0		30.0		50.0	
Base Capacity (vph)	270	865	442	518	320	1651	586	2162
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.13	0.04	0.23	0.44	0.01	0.29	0.22	0.35

Intersection Summary

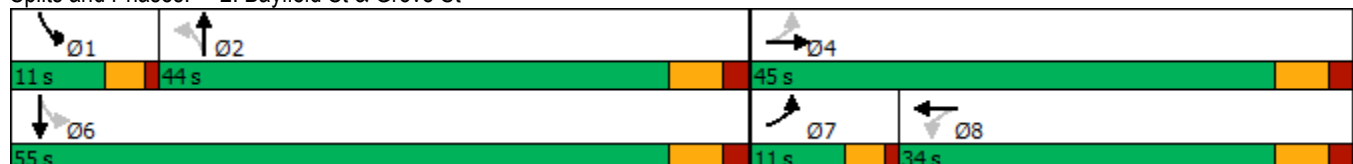
Cycle Length: 100

Actuated Cycle Length: 81.6

Natural Cycle: 85

Control Type: Semi Act-Uncoord

Splits and Phases: 2: Bayfield St & Grove St



HCM Signalized Intersection Capacity Analysis

2: Bayfield St & Grove St

Rose Street Affordable Housing

Existing (2023) - AM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	33	29	5	93	54	154	2	387	51	117	672	32
Future Volume (vph)	33	29	5	93	54	154	2	387	51	117	672	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		6.0	6.0		6.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.98		1.00	0.89		1.00	0.98		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1788	1780		1651	1227		1784	3481		1786	3549	
Flt Permitted	0.34	1.00		0.73	1.00		0.36	1.00		0.42	1.00	
Satd. Flow (perm)	638	1780		1274	1227		679	3481		791	3549	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	36	32	5	101	59	167	2	421	55	127	730	35
RTOR Reduction (vph)	0	4	0	0	119	0	0	9	0	0	3	0
Lane Group Flow (vph)	36	33	0	101	107	0	2	467	0	127	762	0
Confl. Peds. (#/hr)	5		5	5		5	5		6	6		5
Heavy Vehicles (%)	2%	4%	15%	10%	2%	50%	2%	2%	8%	2%	2%	2%
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	21.6	21.6		13.7	13.7		38.5	38.5		49.6	49.6	
Effective Green, g (s)	21.6	21.6		13.7	13.7		38.5	38.5		49.6	49.6	
Actuated g/C Ratio	0.26	0.26		0.16	0.16		0.46	0.46		0.60	0.60	
Clearance Time (s)	4.0	6.0		6.0	6.0		6.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	219	462		209	202		314	1610		556	2115	
v/s Ratio Prot	c0.01	0.02			c0.09			0.13		0.02	c0.21	
v/s Ratio Perm	0.03			0.08			0.00			0.12		
v/c Ratio	0.16	0.07		0.48	0.53		0.01	0.29		0.23	0.36	
Uniform Delay, d1	23.7	23.2		31.5	31.8		12.0	13.9		7.5	8.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.4	0.1		1.8	2.7		0.0	0.5		0.2	0.5	
Delay (s)	24.0	23.3		33.3	34.5		12.1	14.3		7.7	9.1	
Level of Service	C	C		C	C		B	B		A	A	
Approach Delay (s)		23.7			34.1			14.3			8.9	
Approach LOS		C			C			B			A	
Intersection Summary												
HCM 2000 Control Delay			15.6			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.41									
Actuated Cycle Length (s)			83.2			Sum of lost time (s)			20.0			
Intersection Capacity Utilization			78.5%			ICU Level of Service			D			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

3: Rose St & Hwy 400 NB On

Rose Street Affordable Housing
Existing (2023) - AM

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	164	94	253	196	0	0
Future Volume (Veh/h)	164	94	253	196	0	0
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	178	102	275	213	0	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (m)			246			
pX, platoon unblocked	0.97	0.97			0.97	
vC, conflicting volume	382	382			488	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	350	350			459	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	72	85			100	
cM capacity (veh/h)	630	674			1071	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	280	488	0			
Volume Left	178	0	0			
Volume Right	102	213	0			
cSH	645	1700	1700			
Volume to Capacity	0.43	0.29	0.00			
Queue Length 95th (m)	16.7	0.0	0.0			
Control Delay (s)	14.8	0.0	0.0			
Lane LOS	B					
Approach Delay (s)	14.8	0.0	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay		5.4				
Intersection Capacity Utilization		46.8%		ICU Level of Service		A
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis

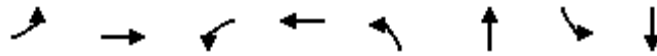
4: Peel St & Grove St

Rose Street Affordable Housing
Existing (2023) - AM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	7	244	2	6	240	7	8	15	9	6	4	6
Future Volume (Veh/h)	7	244	2	6	240	7	8	15	9	6	4	6
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
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)	8	265	2	7	261	8	9	16	10	7	4	7
Pedestrians		5			5			5			5	
Lane Width (m)		3.7			3.7			3.7			3.7	
Walking Speed (m/s)		1.1			1.1			1.1			1.1	
Percent Blockage		0			0			0			0	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	274			272			580	575	276	589	572	275
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	274			272			580	575	276	589	572	275
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			98	96	99	98	99	99
cM capacity (veh/h)	1283			1285			408	419	755	392	421	756
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	275	276	35	18								
Volume Left	8	7	9	7								
Volume Right	2	8	10	7								
cSH	1283	1285	476	492								
Volume to Capacity	0.01	0.01	0.07	0.04								
Queue Length 95th (m)	0.1	0.1	1.8	0.9								
Control Delay (s)	0.3	0.2	13.2	12.6								
Lane LOS	A	A	B	B								
Approach Delay (s)	0.3	0.2	13.2	12.6								
Approach LOS			B	B								
Intersection Summary												
Average Delay			1.4									
Intersection Capacity Utilization			27.8%		ICU Level of Service				A			
Analysis Period (min)			15									

Queues
5: St. Vincent St & Rose St

Rose Street Affordable Housing
Existing (2023) - AM

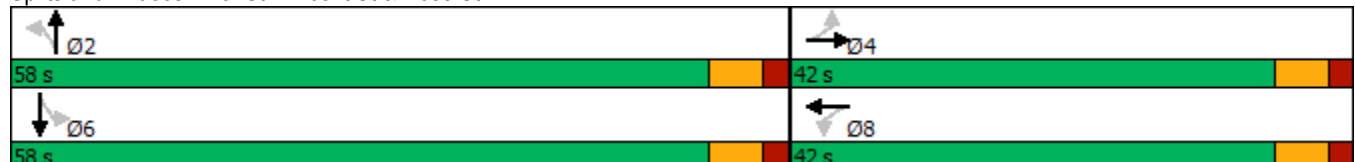


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations		↔		↔		↔		↔
Traffic Volume (vph)	127	19	11	31	55	410	11	400
Future Volume (vph)	127	19	11	31	55	410	11	400
Lane Group Flow (vph)	0	183	0	72	0	516	0	511
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	24.0	24.0	24.0	24.0
Minimum Split (s)	33.0	33.0	33.0	33.0	30.0	30.0	30.0	30.0
Total Split (s)	42.0	42.0	42.0	42.0	58.0	58.0	58.0	58.0
Total Split (%)	42.0%	42.0%	42.0%	42.0%	58.0%	58.0%	58.0%	58.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		0.0		0.0		0.0		0.0
Total Lost Time (s)		6.0		6.0		6.0		6.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	Max	Max	Max	Max
v/c Ratio		0.69		0.21		0.26		0.23
Control Delay		43.0		19.5		6.8		6.3
Queue Delay		0.0		0.0		0.0		0.0
Total Delay		43.0		19.5		6.8		6.3
Queue Length 50th (m)		24.8		5.8		14.8		13.7
Queue Length 95th (m)		44.6		15.9		28.4		26.4
Internal Link Dist (m)		114.8		126.2		135.5		109.5
Turn Bay Length (m)								
Base Capacity (vph)		585		741		1979		2180
Starvation Cap Reductn		0		0		0		0
Spillback Cap Reductn		0		0		0		0
Storage Cap Reductn		0		0		0		0
Reduced v/c Ratio		0.31		0.10		0.26		0.23

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 83
Natural Cycle: 65
Control Type: Semi Act-Uncoord

Splits and Phases: 5: St. Vincent St & Rose St



HCM Signalized Intersection Capacity Analysis

5: St. Vincent St & Rose St

Rose Street Affordable Housing
Existing (2023) - AM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	127	19	22	11	31	24	55	410	9	11	400	59
Future Volume (vph)	127	19	22	11	31	24	55	410	9	11	400	59
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0			6.0			6.0	
Lane Util. Factor		1.00			1.00			0.95			0.95	
Frpb, ped/bikes		1.00			0.99			1.00			0.99	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.98			0.95			1.00			0.98	
Flt Protected		0.96			0.99			0.99			1.00	
Satd. Flow (prot)		1758			1764			3540			3487	
Flt Permitted		0.73			0.94			0.84			0.94	
Satd. Flow (perm)		1336			1671			2990			3287	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	138	21	24	12	34	26	60	446	10	12	435	64
RTOR Reduction (vph)	0	6	0	0	21	0	0	1	0	0	8	0
Lane Group Flow (vph)	0	177	0	0	51	0	0	515	0	0	503	0
Confl. Peds. (#/hr)	5		10	10		5	10		5	5		10
Heavy Vehicles (%)	3%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		16.0			16.0			54.9			54.9	
Effective Green, g (s)		16.0			16.0			54.9			54.9	
Actuated g/C Ratio		0.19			0.19			0.66			0.66	
Clearance Time (s)		6.0			6.0			6.0			6.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		257			322			1980			2176	
v/s Ratio Prot												
v/s Ratio Perm		c0.13			0.03			c0.17			0.15	
v/c Ratio		0.69			0.16			0.26			0.23	
Uniform Delay, d1		31.1			27.8			5.7			5.6	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		7.4			0.2			0.3			0.2	
Delay (s)		38.5			28.1			6.0			5.8	
Level of Service		D			C			A			A	
Approach Delay (s)		38.5			28.1			6.0			5.8	
Approach LOS		D			C			A			A	
Intersection Summary												
HCM 2000 Control Delay		11.8			HCM 2000 Level of Service			B				
HCM 2000 Volume to Capacity ratio		0.36										
Actuated Cycle Length (s)		82.9			Sum of lost time (s)			12.0				
Intersection Capacity Utilization		72.3%			ICU Level of Service			C				
Analysis Period (min)		15										
c Critical Lane Group												

Queues

Rose Street Affordable Housing

1: Bayfield St & Hwy 400 NB Off/Rose St

Existing (2023) - PM



Lane Group	EBL	EBT	WBR	NBT	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	1005	215	147	906	271	651
Future Volume (vph)	1005	215	147	906	271	651
Lane Group Flow (vph)	1092	435	160	1160	295	708
Turn Type	Perm	NA	Perm	NA	pm+pt	NA
Protected Phases		4		2	1	6
Permitted Phases	4		8		6	
Detector Phase	4	4	8	2	1	6
Switch Phase						
Minimum Initial (s)	12.0	12.0	12.0	24.0	7.0	24.0
Minimum Split (s)	30.0	30.0	30.0	30.0	11.5	30.0
Total Split (s)	58.0	58.0	58.0	71.0	21.0	92.0
Total Split (%)	38.7%	38.7%	38.7%	47.3%	14.0%	61.3%
Yellow Time (s)	4.0	4.0	4.0	4.0	3.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	4.0	6.0
Lead/Lag				Lag	Lead	
Lead-Lag Optimize?				Yes	Yes	
Recall Mode	None	None	None	C-Max	None	C-Max
v/c Ratio	0.92	0.71	0.22	0.76	0.97	0.34
Control Delay	59.8	46.8	0.7	39.4	78.4	17.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	59.8	46.8	0.7	39.4	78.4	17.2
Queue Length 50th (m)	158.8	103.7	0.0	150.1	~62.4	56.7
Queue Length 95th (m)	#189.5	143.5	0.0	177.2	#123.4	69.4
Internal Link Dist (m)		579.4		233.2		180.4
Turn Bay Length (m)					120.0	
Base Capacity (vph)	1215	626	737	1523	304	2096
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.90	0.69	0.22	0.76	0.97	0.34

Intersection Summary

Cycle Length: 150

Actuated Cycle Length: 150

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

Natural Cycle: 80

Control Type: Actuated-Coordinated

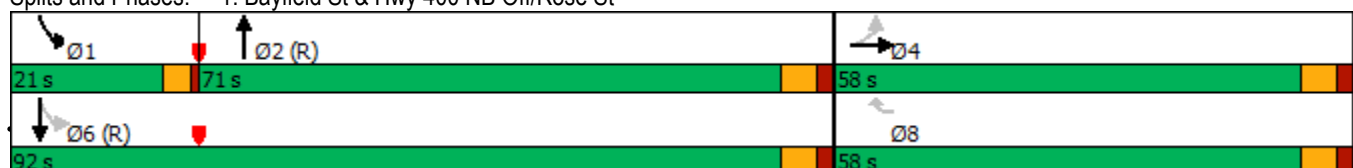
~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

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

Queue shown is maximum after two cycles.

Splits and Phases: 1: Bayfield St & Hwy 400 NB Off/Rose St



HCM Signalized Intersection Capacity Analysis

1: Bayfield St & Hwy 400 NB Off/Rose St

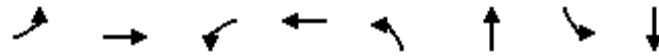
Rose Street Affordable Housing

Existing (2023) - PM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1005	215	185	0	0	147	0	906	161	271	651	0
Future Volume (vph)	1005	215	185	0	0	147	0	906	161	271	651	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0				6.0		6.0		4.0	6.0	
Lane Util. Factor	0.97	1.00				1.00		0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99				1.00		0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00				1.00		1.00		1.00	1.00	
Frt	1.00	0.93				0.86		0.98		1.00	1.00	
Flt Protected	0.95	1.00				1.00		1.00		0.95	1.00	
Satd. Flow (prot)	3506	1745				1629		3495		1807	3614	
Flt Permitted	0.95	1.00				1.00		1.00		0.10	1.00	
Satd. Flow (perm)	3506	1745				1629		3495		184	3614	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1092	234	201	0	0	160	0	985	175	295	708	0
RTOR Reduction (vph)	0	21	0	0	0	106	0	10	0	0	0	0
Lane Group Flow (vph)	1092	414	0	0	0	54	0	1150	0	295	708	0
Confl. Peds. (#/hr)			10	10			16		10	10		16
Heavy Vehicles (%)	1%	1%	1%	0%	0%	2%	0%	1%	2%	1%	1%	0%
Turn Type	Perm	NA				Perm		NA		pm+pt	NA	
Protected Phases		4						2		1	6	
Permitted Phases	4					8				6		
Actuated Green, G (s)	51.0	51.0				51.0		65.0		87.0	87.0	
Effective Green, g (s)	51.0	51.0				51.0		65.0		87.0	87.0	
Actuated g/C Ratio	0.34	0.34				0.34		0.43		0.58	0.58	
Clearance Time (s)	6.0	6.0				6.0		6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0				3.0		3.0		3.0	3.0	
Lane Grp Cap (vph)	1192	593				553		1514		301	2096	
v/s Ratio Prot		0.24						0.33		c0.12	0.20	
v/s Ratio Perm	c0.31					0.03				c0.45		
v/c Ratio	0.92	0.70				0.10		0.76		0.98	0.34	
Uniform Delay, d1	47.4	42.8				33.8		35.9		41.2	16.5	
Progression Factor	1.00	1.00				1.00		1.00		1.00	1.00	
Incremental Delay, d2	10.9	3.6				0.1		3.6		46.2	0.4	
Delay (s)	58.4	46.4				33.9		39.5		87.4	16.9	
Level of Service	E	D				C		D		F	B	
Approach Delay (s)		55.0			33.9			39.5			37.6	
Approach LOS		D			C			D			D	
Intersection Summary												
HCM 2000 Control Delay		44.9				HCM 2000 Level of Service		D				
HCM 2000 Volume to Capacity ratio		0.97										
Actuated Cycle Length (s)		150.0				Sum of lost time (s)		16.0				
Intersection Capacity Utilization		87.4%				ICU Level of Service		E				
Analysis Period (min)		15										
c Critical Lane Group												

Queues
2: Bayfield St & Grove St

Rose Street Affordable Housing
Existing (2023) - PM



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	83	46	49	56	2	881	133	650
Future Volume (vph)	83	46	49	56	2	881	133	650
Lane Group Flow (vph)	90	52	53	157	2	1031	145	765
Turn Type	pm+pt	NA	Perm	NA	Perm	NA	pm+pt	NA
Protected Phases	7	4		8		2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	7	4	8	8	2	2	1	6
Switch Phase								
Minimum Initial (s)	7.0	10.0	10.0	10.0	24.0	24.0	7.0	24.0
Minimum Split (s)	11.0	30.0	30.0	30.0	30.0	30.0	11.0	30.0
Total Split (s)	11.0	45.0	34.0	34.0	44.0	44.0	11.0	55.0
Total Split (%)	11.0%	45.0%	34.0%	34.0%	44.0%	44.0%	11.0%	55.0%
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0	4.0	3.0	4.0
All-Red Time (s)	1.0	2.0	2.0	2.0	2.0	2.0	1.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0	6.0	6.0	6.0	6.0	4.0	6.0
Lead/Lag	Lead		Lag	Lag	Lag	Lag	Lead	
Lead-Lag Optimize?	Yes		Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	None	None	None	Max	Max	None	Max
v/c Ratio	0.29	0.11	0.30	0.52	0.01	0.62	0.44	0.36
Control Delay	24.7	22.9	37.3	24.3	13.5	18.7	11.4	9.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.7	22.9	37.3	24.3	13.5	18.7	11.4	9.0
Queue Length 50th (m)	10.6	6.0	7.7	11.4	0.2	60.8	8.4	28.7
Queue Length 95th (m)	21.3	14.1	18.0	28.8	1.4	89.0	17.8	45.0
Internal Link Dist (m)		140.8		181.1		201.3		233.2
Turn Bay Length (m)	20.0		25.0		30.0		50.0	
Base Capacity (vph)	308	903	444	638	320	1666	327	2151
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.29	0.06	0.12	0.25	0.01	0.62	0.44	0.36

Intersection Summary

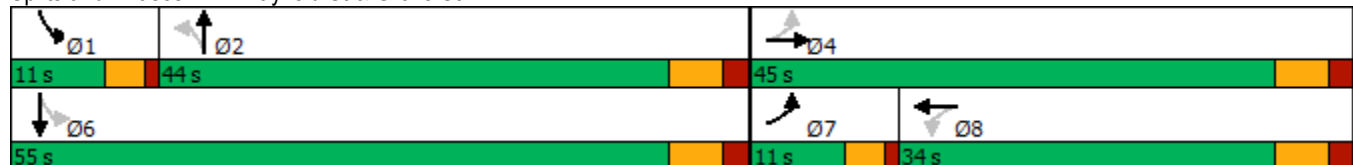
Cycle Length: 100

Actuated Cycle Length: 81

Natural Cycle: 85

Control Type: Semi Act-Uncoord

Splits and Phases: 2: Bayfield St & Grove St



HCM Signalized Intersection Capacity Analysis

2: Bayfield St & Grove St

Rose Street Affordable Housing

Existing (2023) - PM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	83	46	2	49	56	88	2	881	67	133	650	53
Future Volume (vph)	83	46	2	49	56	88	2	881	67	133	650	53
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		6.0	6.0		6.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.91		1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1786	1866		1682	1693		1784	3526		1789	3530	
Flt Permitted	0.45	1.00		0.72	1.00		0.36	1.00		0.17	1.00	
Satd. Flow (perm)	848	1866		1280	1693		679	3526		315	3530	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	90	50	2	53	61	96	2	958	73	145	707	58
RTOR Reduction (vph)	0	1	0	0	68	0	0	5	0	0	5	0
Lane Group Flow (vph)	90	51	0	53	89	0	2	1026	0	145	760	0
Confl. Peds. (#/hr)	5		5	5		5	5		10	10		5
Heavy Vehicles (%)	2%	2%	9%	8%	2%	2%	2%	2%	4%	2%	2%	2%
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	20.5	20.5		11.1	11.1		38.2	38.2		49.2	49.2	
Effective Green, g (s)	20.5	20.5		11.1	11.1		38.2	38.2		49.2	49.2	
Actuated g/C Ratio	0.25	0.25		0.14	0.14		0.47	0.47		0.60	0.60	
Clearance Time (s)	4.0	6.0		6.0	6.0		6.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	274	468		173	230		317	1648		315	2125	
v/s Ratio Prot	c0.02	0.03			0.05			c0.29		c0.04	0.22	
v/s Ratio Perm	c0.06			0.04			0.00			0.24		
v/c Ratio	0.33	0.11		0.31	0.39		0.01	0.62		0.46	0.36	
Uniform Delay, d1	24.3	23.6		31.8	32.2		11.6	16.3		9.4	8.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.7	0.1		1.0	1.1		0.0	1.8		1.1	0.5	
Delay (s)	25.0	23.7		32.8	33.3		11.7	18.1		10.5	8.7	
Level of Service	C	C		C	C		B	B		B	A	
Approach Delay (s)		24.5			33.2			18.1			9.0	
Approach LOS		C			C			B			A	
Intersection Summary												
HCM 2000 Control Delay			16.3			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.54									
Actuated Cycle Length (s)			81.7			Sum of lost time (s)			20.0			
Intersection Capacity Utilization			78.5%			ICU Level of Service			D			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

3: Rose St & Hwy 400 NB On

Rose Street Affordable Housing
Existing (2023) - PM

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	200	62	373	296	0	0
Future Volume (Veh/h)	200	62	373	296	0	0
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	217	67	405	322	0	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (m)			246			
pX, platoon unblocked	0.93	0.93			0.93	
vC, conflicting volume	566	566			727	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	490	490			665	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	56	87			100	
cM capacity (veh/h)	497	535			855	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	284	727	0			
Volume Left	217	0	0			
Volume Right	67	322	0			
cSH	505	1700	1700			
Volume to Capacity	0.56	0.43	0.00			
Queue Length 95th (m)	26.0	0.0	0.0			
Control Delay (s)	20.9	0.0	0.0			
Lane LOS	C					
Approach Delay (s)	20.9	0.0	0.0			
Approach LOS	C					
Intersection Summary						
Average Delay		5.9				
Intersection Capacity Utilization		59.2%		ICU Level of Service		B
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis

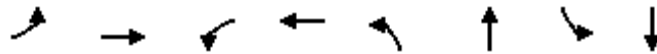
4: Peel St & Grove St

Rose Street Affordable Housing
Existing (2023) - PM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	7	208	17	8	173	4	8	18	3	0	12	8
Future Volume (Veh/h)	7	208	17	8	173	4	8	18	3	0	12	8
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
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)	8	226	18	9	188	4	9	20	3	0	13	9
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	192			244			474	461	235	472	468	190
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	192			244			474	461	235	472	468	190
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			98	96	100	100	97	99
cM capacity (veh/h)	1381			1322			480	491	804	480	487	852
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	252	201	32	22								
Volume Left	8	9	9	0								
Volume Right	18	4	3	9								
cSH	1381	1322	506	590								
Volume to Capacity	0.01	0.01	0.06	0.04								
Queue Length 95th (m)	0.1	0.2	1.5	0.9								
Control Delay (s)	0.3	0.4	12.6	11.3								
Lane LOS	A	A	B	B								
Approach Delay (s)	0.3	0.4	12.6	11.3								
Approach LOS			B	B								
Intersection Summary												
Average Delay			1.6									
Intersection Capacity Utilization			29.4%		ICU Level of Service				A			
Analysis Period (min)			15									

Queues
5: St. Vincent St & Rose St

Rose Street Affordable Housing
Existing (2023) - PM

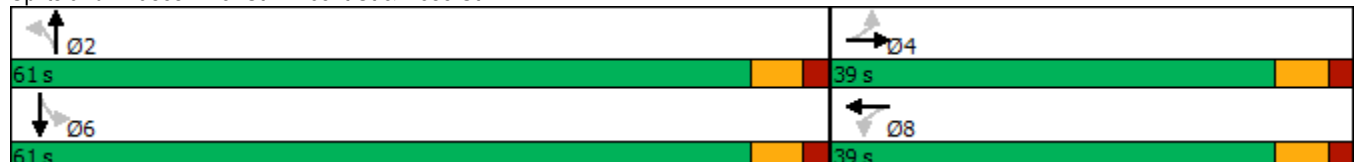


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations		↔		↔		↔		↔
Traffic Volume (vph)	153	18	6	20	31	538	44	570
Future Volume (vph)	153	18	6	20	31	538	44	570
Lane Group Flow (vph)	0	239	0	61	0	639	0	769
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	24.0	24.0	24.0	24.0
Minimum Split (s)	33.0	33.0	30.0	30.0	30.0	30.0	30.0	30.0
Total Split (s)	39.0	39.0	39.0	39.0	61.0	61.0	61.0	61.0
Total Split (%)	39.0%	39.0%	39.0%	39.0%	61.0%	61.0%	61.0%	61.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		0.0		0.0		0.0		0.0
Total Lost Time (s)		6.0		6.0		6.0		6.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	Max	Max	Max	Max
v/c Ratio		0.76		0.16		0.32		0.39
Control Delay		45.3		15.5		8.5		8.9
Queue Delay		0.0		0.0		0.0		0.0
Total Delay		45.3		15.5		8.5		8.9
Queue Length 50th (m)		34.8		3.8		22.5		27.7
Queue Length 95th (m)		59.0		12.9		42.2		51.9
Internal Link Dist (m)		114.8		126.2		135.5		109.5
Turn Bay Length (m)								
Base Capacity (vph)		519		637		2000		1950
Starvation Cap Reductn		0		0		0		0
Spillback Cap Reductn		0		0		0		0
Storage Cap Reductn		0		0		0		0
Reduced v/c Ratio		0.46		0.10		0.32		0.39

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 88.2
Natural Cycle: 65
Control Type: Semi Act-Uncoord

Splits and Phases: 5: St. Vincent St & Rose St



HCM Signalized Intersection Capacity Analysis

5: St. Vincent St & Rose St

Rose Street Affordable Housing
Existing (2023) - PM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	153	18	49	6	20	29	31	538	18	44	570	93
Future Volume (vph)	153	18	49	6	20	29	31	538	18	44	570	93
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0			6.0			6.0	
Lane Util. Factor		1.00			1.00			0.95			0.95	
Frpb, ped/bikes		0.99			0.99			1.00			0.99	
Flpb, ped/bikes		0.99			1.00			1.00			1.00	
Frt		0.97			0.93			1.00			0.98	
Flt Protected		0.97			0.99			1.00			1.00	
Satd. Flow (prot)		1743			1717			3528			3462	
Flt Permitted		0.75			0.96			0.88			0.87	
Satd. Flow (perm)		1361			1649			3123			3035	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	166	20	53	7	22	32	34	585	20	48	620	101
RTOR Reduction (vph)	0	12	0	0	25	0	0	2	0	0	10	0
Lane Group Flow (vph)	0	227	0	0	36	0	0	637	0	0	759	0
Confl. Peds. (#/hr)	10		10	10		10	10		20	10		20
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	10%	2%	2%	2%	2%	2%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		19.7			19.7			56.5			56.5	
Effective Green, g (s)		19.7			19.7			56.5			56.5	
Actuated g/C Ratio		0.22			0.22			0.64			0.64	
Clearance Time (s)		6.0			6.0			6.0			6.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		303			368			2000			1944	
v/s Ratio Prot												
v/s Ratio Perm		c0.17			0.02			0.20			c0.25	
v/c Ratio		0.75			0.10			0.32			0.39	
Uniform Delay, d1		32.0			27.2			7.2			7.6	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		10.0			0.1			0.4			0.6	
Delay (s)		42.0			27.3			7.6			8.2	
Level of Service		D			C			A			A	
Approach Delay (s)		42.0			27.3			7.6			8.2	
Approach LOS		D			C			A			A	
Intersection Summary												
HCM 2000 Control Delay		13.4			HCM 2000 Level of Service			B				
HCM 2000 Volume to Capacity ratio		0.48										
Actuated Cycle Length (s)		88.2			Sum of lost time (s)			12.0				
Intersection Capacity Utilization		74.8%			ICU Level of Service			D				
Analysis Period (min)		15										
c Critical Lane Group												

Appendix E – Synchro Analysis Output – Background Traffic Volumes

Queues

1: Bayfield St & Hwy 400 NB Off/Rose St

Rose Street Affordable Housing

BG (2028) - AM (No Dead End)



Lane Group	EBL	EBT	WBR	NBT	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	736	150	172	655	235	627
Future Volume (vph)	736	150	172	655	235	627
Lane Group Flow (vph)	800	450	187	813	255	682
Turn Type	Perm	NA	Perm	NA	pm+pt	NA
Protected Phases		4		2	1	6
Permitted Phases	4		8		6	
Detector Phase	4	4	8	2	1	6
Switch Phase						
Minimum Initial (s)	12.0	12.0	12.0	24.0	7.0	24.0
Minimum Split (s)	30.0	30.0	30.0	30.0	11.5	30.0
Total Split (s)	35.0	35.0	35.0	45.0	20.0	65.0
Total Split (%)	35.0%	35.0%	35.0%	45.0%	20.0%	65.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	3.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	4.0	6.0
Lead/Lag				Lag	Lead	
Lead-Lag Optimize?				Yes	Yes	
Recall Mode	None	None	None	C-Max	None	C-Max
v/c Ratio	0.86	0.83	0.26	0.53	0.60	0.32
Control Delay	44.6	41.5	0.9	22.4	15.1	10.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	44.6	41.5	0.9	22.4	15.1	10.6
Queue Length 50th (m)	74.6	65.9	0.0	58.6	20.8	32.7
Queue Length 95th (m)	#99.1	#115.0	0.0	82.2	32.9	43.1
Internal Link Dist (m)		579.4		233.2		180.4
Turn Bay Length (m)					120.0	
Base Capacity (vph)	958	554	729	1535	476	2141
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.84	0.81	0.26	0.53	0.54	0.32

Intersection Summary

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 20 (20%), Referenced to phase 2:NBT and 6:SBTL, Start of Green

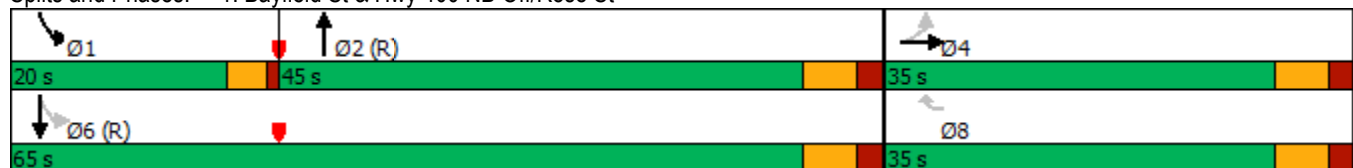
Natural Cycle: 75

Control Type: Actuated-Coordinated

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

Queue shown is maximum after two cycles.

Splits and Phases: 1: Bayfield St & Hwy 400 NB Off/Rose St



10-13-2023

JL

Synchro 10 Report

Page 1

HCM Signalized Intersection Capacity Analysis

1: Bayfield St & Hwy 400 NB Off/Rose St

Rose Street Affordable Housing

BG (2028) - AM (No Dead End)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	736	150	264	0	0	172	0	655	93	235	627	0
Future Volume (vph)	736	150	264	0	0	172	0	655	93	235	627	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0				6.0		6.0		4.0	6.0	
Lane Util. Factor	0.97	1.00				1.00		0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99				0.98		0.99		1.00	1.00	
Flpb, ped/bikes	0.99	1.00				1.00		1.00		1.00	1.00	
Frt	1.00	0.90				0.86		0.98		1.00	1.00	
Flt Protected	0.95	1.00				1.00		1.00		0.95	1.00	
Satd. Flow (prot)	3305	1696				1584		3491		1753	3579	
Flt Permitted	0.95	1.00				1.00		1.00		0.23	1.00	
Satd. Flow (perm)	3305	1696				1584		3491		429	3579	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	800	163	287	0	0	187	0	712	101	255	682	0
RTOR Reduction (vph)	0	64	0	0	0	134	0	10	0	0	0	0
Lane Group Flow (vph)	800	386	0	0	0	53	0	803	0	255	682	0
Confl. Peds. (#/hr)	5		5	5		5	15		10	10		15
Heavy Vehicles (%)	6%	0%	2%	0%	0%	3%	0%	2%	2%	4%	2%	0%
Turn Type	Perm	NA				Perm		NA		pm+pt	NA	
Protected Phases		4						2		1	6	
Permitted Phases	4					8				6		
Actuated Green, G (s)	28.2	28.2				28.2		43.7		59.8	59.8	
Effective Green, g (s)	28.2	28.2				28.2		43.7		59.8	59.8	
Actuated g/C Ratio	0.28	0.28				0.28		0.44		0.60	0.60	
Clearance Time (s)	6.0	6.0				6.0		6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0				3.0		3.0		3.0	3.0	
Lane Grp Cap (vph)	932	478				446		1525		416	2140	
v/s Ratio Prot		0.23						0.23		c0.07	0.19	
v/s Ratio Perm	c0.24					0.03				c0.29		
v/c Ratio	0.86	0.81				0.12		0.53		0.61	0.32	
Uniform Delay, d1	34.0	33.4				26.7		20.6		11.5	10.0	
Progression Factor	1.00	1.00				1.00		1.00		1.00	1.00	
Incremental Delay, d2	7.9	9.7				0.1		1.3		2.7	0.4	
Delay (s)	41.9	43.1				26.8		21.9		14.1	10.4	
Level of Service	D	D				C		C		B	B	
Approach Delay (s)		42.3			26.8			21.9			11.4	
Approach LOS		D			C			C			B	
Intersection Summary												
HCM 2000 Control Delay		27.1				HCM 2000 Level of Service		C				
HCM 2000 Volume to Capacity ratio		0.72										
Actuated Cycle Length (s)		100.0				Sum of lost time (s)		16.0				
Intersection Capacity Utilization		72.0%				ICU Level of Service		C				
Analysis Period (min)		15										
c Critical Lane Group												

Queues
2: Bayfield St & Grove St

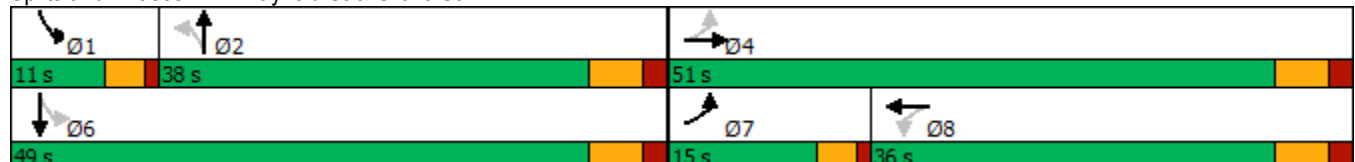
Rose Street Affordable Housing
BG (2028) - AM (No Dead End)

								
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	180	36	98	40	3	407	123	706
Future Volume (vph)	180	36	98	40	3	407	123	706
Lane Group Flow (vph)	196	60	107	219	3	501	134	822
Turn Type	pm+pt	NA	Perm	NA	Perm	NA	pm+pt	NA
Protected Phases	7	4		8		2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	7	4	8	8	2	2	1	6
Switch Phase								
Minimum Initial (s)	7.0	10.0	10.0	10.0	24.0	24.0	7.0	24.0
Minimum Split (s)	11.0	30.0	30.0	30.0	30.0	30.0	11.0	30.0
Total Split (s)	15.0	51.0	36.0	36.0	38.0	38.0	11.0	49.0
Total Split (%)	15.0%	51.0%	36.0%	36.0%	38.0%	38.0%	11.0%	49.0%
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0	4.0	3.0	4.0
All-Red Time (s)	1.0	2.0	2.0	2.0	2.0	2.0	1.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0	6.0	6.0	6.0	6.0	4.0	6.0
Lead/Lag	Lead		Lag	Lag	Lag	Lag	Lead	
Lead-Lag Optimize?	Yes		Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	None	None	None	Max	Max	None	Max
v/c Ratio	0.52	0.10	0.55	0.66	0.01	0.37	0.28	0.45
Control Delay	24.2	13.7	43.0	18.6	17.7	19.1	11.7	13.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.2	13.7	43.0	18.6	17.7	19.1	11.7	13.7
Queue Length 50th (m)	21.9	4.1	15.8	6.0	0.3	27.8	9.6	39.1
Queue Length 95th (m)	37.1	11.7	31.0	27.3	2.1	45.0	21.1	61.8
Internal Link Dist (m)		140.8		181.1		201.3		233.2
Turn Bay Length (m)	20.0		25.0		30.0		50.0	
Base Capacity (vph)	383	922	453	542	248	1354	478	1844
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.51	0.07	0.24	0.40	0.01	0.37	0.28	0.45

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 82.8
Natural Cycle: 85
Control Type: Semi Act-Uncoord

Splits and Phases: 2: Bayfield St & Grove St



HCM Signalized Intersection Capacity Analysis

2: Bayfield St & Grove St

Rose Street Affordable Housing

BG (2028) - AM (No Dead End)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	180	36	19	98	40	162	3	407	54	123	706	51
Future Volume (vph)	180	36	19	98	40	162	3	407	54	123	706	51
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		6.0	6.0		6.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.95		1.00	0.88		1.00	0.98		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1787	1678		1651	1185		1784	3476		1785	3536	
Flt Permitted	0.34	1.00		0.72	1.00		0.34	1.00		0.38	1.00	
Satd. Flow (perm)	646	1678		1248	1185		642	3476		716	3536	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	196	39	21	107	43	176	3	442	59	134	767	55
RTOR Reduction (vph)	0	14	0	0	148	0	0	9	0	0	4	0
Lane Group Flow (vph)	196	46	0	107	71	0	3	492	0	134	818	0
Confl. Peds. (#/hr)	5		5	5		5	5		10	10		5
Heavy Vehicles (%)	2%	4%	15%	10%	2%	50%	2%	2%	8%	2%	2%	2%
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	27.7	27.7		13.1	13.1		32.1	32.1		43.1	43.1	
Effective Green, g (s)	27.7	27.7		13.1	13.1		32.1	32.1		43.1	43.1	
Actuated g/C Ratio	0.33	0.33		0.16	0.16		0.39	0.39		0.52	0.52	
Clearance Time (s)	4.0	6.0		6.0	6.0		6.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	362	561		197	187		248	1347		463	1840	
v/s Ratio Prot	c0.07	0.03			0.06			0.14		0.02	c0.23	
v/s Ratio Perm	c0.11			0.09			0.00			0.13		
v/c Ratio	0.54	0.08		0.54	0.38		0.01	0.37		0.29	0.44	
Uniform Delay, d1	21.0	18.9		32.1	31.2		15.6	18.1		10.6	12.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.7	0.1		3.0	1.3		0.1	0.8		0.3	0.8	
Delay (s)	22.7	18.9		35.1	32.5		15.7	18.8		11.0	13.2	
Level of Service	C	B		D	C		B	B		B	B	
Approach Delay (s)		21.8			33.4			18.8			12.9	
Approach LOS		C			C			B			B	
Intersection Summary												
HCM 2000 Control Delay			18.7			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.54									
Actuated Cycle Length (s)			82.8			Sum of lost time (s)			20.0			
Intersection Capacity Utilization			83.1%			ICU Level of Service			E			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

3: Rose St & Hwy 400 NB On

Rose Street Affordable Housing
BG (2028) - AM (No Dead End)

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	172	99	273	206	0	0
Future Volume (Veh/h)	172	99	273	206	0	0
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	187	108	297	224	0	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (m)			246			
pX, platoon unblocked	0.96	0.96			0.96	
vC, conflicting volume	409	409			521	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	368	368			485	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	69	83			100	
cM capacity (veh/h)	609	653			1040	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	295	521	0			
Volume Left	187	0	0			
Volume Right	108	224	0			
cSH	624	1700	1700			
Volume to Capacity	0.47	0.31	0.00			
Queue Length 95th (m)	19.2	0.0	0.0			
Control Delay (s)	15.8	0.0	0.0			
Lane LOS	C					
Approach Delay (s)	15.8	0.0	0.0			
Approach LOS	C					
Intersection Summary						
Average Delay		5.7				
Intersection Capacity Utilization		49.2%		ICU Level of Service		A
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis

4: Peel St & Grove St

Rose Street Affordable Housing
BG (2028) - AM (No Dead End)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	7	260	2	6	243	7	8	16	9	6	5	6
Future Volume (Veh/h)	7	260	2	6	243	7	8	16	9	6	5	6
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
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)	8	283	2	7	264	8	9	17	10	7	5	7
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None				None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	272			285			592	586	284	600	583	268
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	272			285			592	586	284	600	583	268
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			98	96	99	98	99	99
cM capacity (veh/h)	1291			1277			407	417	755	391	419	771
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	293	279	36	19								
Volume Left	8	7	9	7								
Volume Right	2	8	10	7								
cSH	1291	1277	473	488								
Volume to Capacity	0.01	0.01	0.08	0.04								
Queue Length 95th (m)	0.1	0.1	1.9	0.9								
Control Delay (s)	0.3	0.2	13.2	12.7								
Lane LOS	A	A	B	B								
Approach Delay (s)	0.3	0.2	13.2	12.7								
Approach LOS			B	B								
Intersection Summary												
Average Delay			1.4									
Intersection Capacity Utilization			27.2%		ICU Level of Service				A			
Analysis Period (min)			15									

Queues
5: St. Vincent St & Rose St

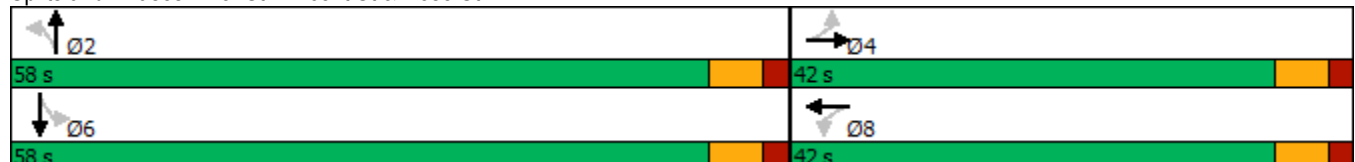
Rose Street Affordable Housing
BG (2028) - AM (No Dead End)

								
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	133	20	12	33	58	431	12	420
Future Volume (vph)	133	20	12	33	58	431	12	420
Lane Group Flow (vph)	0	192	0	76	63	478	13	524
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	24.0	24.0	24.0	24.0
Minimum Split (s)	33.0	33.0	33.0	33.0	30.0	30.0	30.0	30.0
Total Split (s)	42.0	42.0	42.0	42.0	58.0	58.0	58.0	58.0
Total Split (%)	42.0%	42.0%	42.0%	42.0%	58.0%	58.0%	58.0%	58.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		6.0		6.0	6.0	6.0	6.0	6.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	Max	Max	Max	Max
v/c Ratio		0.71		0.21	0.11	0.20	0.02	0.23
Control Delay		43.3		19.4	7.4	6.6	6.8	6.5
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0
Total Delay		43.3		19.4	7.4	6.6	6.8	6.5
Queue Length 50th (m)		26.2		6.2	3.2	13.5	0.6	14.4
Queue Length 95th (m)		46.8		16.4	9.9	25.8	3.1	27.6
Internal Link Dist (m)		114.8		126.2		135.5		109.5
Turn Bay Length (m)					25.0		25.0	
Base Capacity (vph)		581		738	557	2337	587	2295
Starvation Cap Reductn		0		0	0	0	0	0
Spillback Cap Reductn		0		0	0	0	0	0
Storage Cap Reductn		0		0	0	0	0	0
Reduced v/c Ratio		0.33		0.10	0.11	0.20	0.02	0.23

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 83.1
Natural Cycle: 65
Control Type: Semi Act-Uncoord

Splits and Phases: 5: St. Vincent St & Rose St



HCM Signalized Intersection Capacity Analysis

5: St. Vincent St & Rose St

Rose Street Affordable Housing
BG (2028) - AM (No Dead End)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	133	20	23	12	33	25	58	431	9	12	420	62
Future Volume (vph)	133	20	23	12	33	25	58	431	9	12	420	62
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00			0.99		1.00	1.00		1.00	0.99	
Flpb, ped/bikes		1.00			1.00		0.99	1.00		0.99	1.00	
Frt		0.98			0.95		1.00	1.00		1.00	0.98	
Flt Protected		0.96			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1759			1765		1768	3565		1778	3490	
Flt Permitted		0.73			0.94		0.46	1.00		0.48	1.00	
Satd. Flow (perm)		1331			1669		852	3565		896	3490	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	145	22	25	13	36	27	63	468	10	13	457	67
RTOR Reduction (vph)	0	6	0	0	22	0	0	1	0	0	8	0
Lane Group Flow (vph)	0	186	0	0	54	0	63	477	0	13	516	0
Confl. Peds. (#/hr)	5		10	10		5	10		5	5		10
Heavy Vehicles (%)	3%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		16.6			16.6		54.5	54.5		54.5	54.5	
Effective Green, g (s)		16.6			16.6		54.5	54.5		54.5	54.5	
Actuated g/C Ratio		0.20			0.20		0.66	0.66		0.66	0.66	
Clearance Time (s)		6.0			6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		265			333		558	2338		587	2288	
v/s Ratio Prot								0.13			c0.15	
v/s Ratio Perm		c0.14			0.03		0.07			0.01		
v/c Ratio		0.70			0.16		0.11	0.20		0.02	0.23	
Uniform Delay, d1		30.9			27.5		5.3	5.7		5.0	5.8	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		8.1			0.2		0.4	0.2		0.1	0.2	
Delay (s)		39.0			27.7		5.7	5.9		5.1	6.0	
Level of Service		D			C		A	A		A	A	
Approach Delay (s)		39.0			27.7			5.9			6.0	
Approach LOS		D			C			A			A	
Intersection Summary												
HCM 2000 Control Delay		11.9			HCM 2000 Level of Service			B				
HCM 2000 Volume to Capacity ratio		0.34										
Actuated Cycle Length (s)		83.1			Sum of lost time (s)			12.0				
Intersection Capacity Utilization		72.6%			ICU Level of Service			C				
Analysis Period (min)		15										
c Critical Lane Group												

Queues

1: Bayfield St & Hwy 400 NB Off/Rose St

Rose Street Affordable Housing

BG (2028) - PM (No Dead End)



Lane Group	EBL	EBT	WBR	NBT	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	1056	226	154	1001	285	680
Future Volume (vph)	1056	226	154	1001	285	680
Lane Group Flow (vph)	1148	588	167	1276	310	739
Turn Type	Perm	NA	Perm	NA	pm+pt	NA
Protected Phases		4		2	1	6
Permitted Phases	4		8		6	
Detector Phase	4	4	8	2	1	6
Switch Phase						
Minimum Initial (s)	12.0	12.0	12.0	24.0	7.0	24.0
Minimum Split (s)	30.0	30.0	30.0	30.0	11.5	30.0
Total Split (s)	58.0	58.0	58.0	64.0	28.0	92.0
Total Split (%)	38.7%	38.7%	38.7%	42.7%	18.7%	61.3%
Yellow Time (s)	4.0	4.0	4.0	4.0	3.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	4.0	6.0
Lead/Lag				Lag	Lead	
Lead-Lag Optimize?				Yes	Yes	
Recall Mode	None	None	None	C-Max	None	C-Max
v/c Ratio	0.96	0.94	0.22	0.92	0.94	0.36
Control Delay	65.8	67.7	0.6	54.8	80.1	17.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	65.8	67.7	0.6	54.8	80.1	17.8
Queue Length 50th (m)	172.2	158.2	0.0	189.6	74.9	59.8
Queue Length 95th (m)	#216.4	#232.2	0.0	#234.6	#129.9	72.9
Internal Link Dist (m)		579.4		233.2		180.4
Turn Bay Length (m)					120.0	
Base Capacity (vph)	1196	624	771	1383	341	2072
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.96	0.94	0.22	0.92	0.91	0.36

Intersection Summary

Cycle Length: 150

Actuated Cycle Length: 150

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

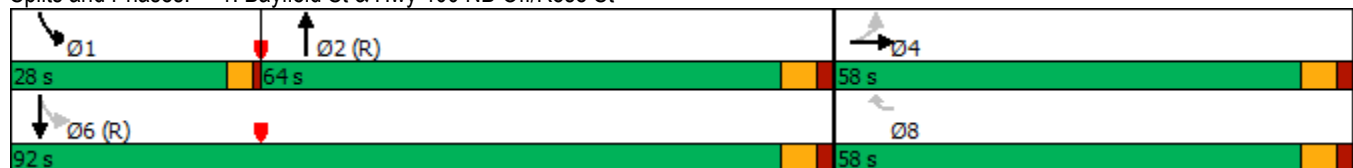
Natural Cycle: 100

Control Type: Actuated-Coordinated

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

Queue shown is maximum after two cycles.

Splits and Phases: 1: Bayfield St & Hwy 400 NB Off/Rose St



10-13-2023

JL

Synchro 10 Report

Page 1

HCM Signalized Intersection Capacity Analysis

1: Bayfield St & Hwy 400 NB Off/Rose St

Rose Street Affordable Housing

BG (2028) - PM (No Dead End)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1056	226	315	0	0	154	0	1001	173	285	680	0
Future Volume (vph)	1056	226	315	0	0	154	0	1001	173	285	680	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0				6.0		6.0		4.0	6.0	
Lane Util. Factor	0.97	1.00				1.00		0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.98				0.98		0.99		1.00	1.00	
Flpb, ped/bikes	0.98	1.00				1.00		1.00		1.00	1.00	
Frt	1.00	0.91				0.86		0.98		1.00	1.00	
Flt Protected	0.95	1.00				1.00		1.00		0.95	1.00	
Satd. Flow (prot)	3451	1705				1595		3497		1807	3614	
Flt Permitted	0.95	1.00				1.00		1.00		0.06	1.00	
Satd. Flow (perm)	3451	1705				1595		3497		121	3614	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1148	246	342	0	0	167	0	1088	188	310	739	0
RTOR Reduction (vph)	0	33	0	0	0	109	0	9	0	0	0	0
Lane Group Flow (vph)	1148	555	0	0	0	58	0	1267	0	310	739	0
Confl. Peds. (#/hr)	5		10	10		5	20		10	10		20
Heavy Vehicles (%)	1%	1%	1%	0%	0%	2%	0%	1%	2%	1%	1%	0%
Turn Type	Perm	NA				Perm		NA		pm+pt	NA	
Protected Phases		4						2		1	6	
Permitted Phases	4					8				6		
Actuated Green, G (s)	52.0	52.0				52.0		58.9		86.0	86.0	
Effective Green, g (s)	52.0	52.0				52.0		58.9		86.0	86.0	
Actuated g/C Ratio	0.35	0.35				0.35		0.39		0.57	0.57	
Clearance Time (s)	6.0	6.0				6.0		6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0				3.0		3.0		3.0	3.0	
Lane Grp Cap (vph)	1196	591				552		1373		329	2072	
v/s Ratio Prot		0.33						0.36		c0.15	0.20	
v/s Ratio Perm	c0.33					0.04				c0.40		
v/c Ratio	0.96	0.94				0.10		0.92		0.94	0.36	
Uniform Delay, d1	48.0	47.5				33.2		43.4		49.6	17.2	
Progression Factor	1.00	1.00				1.00		1.00		1.00	1.00	
Incremental Delay, d2	17.0	22.7				0.1		11.7		34.6	0.5	
Delay (s)	65.0	70.1				33.3		55.1		84.2	17.6	
Level of Service	E	E				C		E		F	B	
Approach Delay (s)		66.8			33.3			55.1			37.3	
Approach LOS		E			C			E			D	
Intersection Summary												
HCM 2000 Control Delay		54.6				HCM 2000 Level of Service		D				
HCM 2000 Volume to Capacity ratio		0.97										
Actuated Cycle Length (s)		150.0				Sum of lost time (s)		16.0				
Intersection Capacity Utilization		94.3%				ICU Level of Service		F				
Analysis Period (min)		15										
c Critical Lane Group												

Queues
2: Bayfield St & Grove St

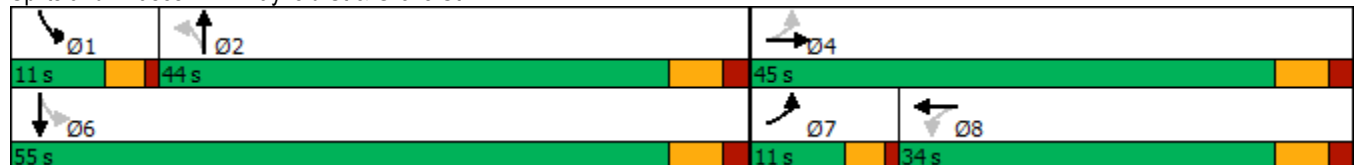
Rose Street Affordable Housing
BG (2028) - PM (No Dead End)

								
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	140	34	51	42	12	926	140	683
Future Volume (vph)	140	34	51	42	12	926	140	683
Lane Group Flow (vph)	152	46	55	146	13	1083	152	930
Turn Type	pm+pt	NA	Perm	NA	Perm	NA	pm+pt	NA
Protected Phases	7	4		8		2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	7	4	8	8	2	2	1	6
Switch Phase								
Minimum Initial (s)	7.0	10.0	10.0	10.0	24.0	24.0	7.0	24.0
Minimum Split (s)	11.0	30.0	30.0	30.0	30.0	30.0	11.0	30.0
Total Split (s)	11.0	45.0	34.0	34.0	44.0	44.0	11.0	55.0
Total Split (%)	11.0%	45.0%	34.0%	34.0%	44.0%	44.0%	11.0%	55.0%
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0	4.0	3.0	4.0
All-Red Time (s)	1.0	2.0	2.0	2.0	2.0	2.0	1.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0	6.0	6.0	6.0	6.0	4.0	6.0
Lead/Lag	Lead		Lag	Lag	Lag	Lag	Lead	
Lead-Lag Optimize?	Yes		Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	None	None	None	Max	Max	None	Max
v/c Ratio	0.47	0.10	0.34	0.49	0.05	0.67	0.51	0.45
Control Delay	28.3	20.1	38.9	18.6	13.5	19.8	13.0	9.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.3	20.1	38.9	18.6	13.5	19.8	13.0	9.8
Queue Length 50th (m)	18.6	4.4	8.0	6.6	1.1	65.4	8.8	36.0
Queue Length 95th (m)	33.4	12.0	18.8	22.8	4.4	91.4	17.5	53.0
Internal Link Dist (m)		140.8		181.1		201.3		233.2
Turn Bay Length (m)	20.0		25.0		30.0		50.0	
Base Capacity (vph)	326	852	433	629	264	1625	299	2060
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.47	0.05	0.13	0.23	0.05	0.67	0.51	0.45

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 82.6
Natural Cycle: 85
Control Type: Semi Act-Uncoord

Splits and Phases: 2: Bayfield St & Grove St



HCM Signalized Intersection Capacity Analysis

2: Bayfield St & Grove St

Rose Street Affordable Housing

BG (2028) - PM (No Dead End)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	140	34	8	51	42	92	12	926	70	140	683	173
Future Volume (vph)	140	34	8	51	42	92	12	926	70	140	683	173
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		6.0	6.0		6.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	0.98		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		0.99	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.97		1.00	0.90		1.00	0.99		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1783	1796		1673	1664		1781	3527		1789	3444	
Flt Permitted	0.47	1.00		0.73	1.00		0.31	1.00		0.15	1.00	
Satd. Flow (perm)	875	1796		1281	1664		576	3527		276	3444	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	152	37	9	55	46	100	13	1007	76	152	742	188
RTOR Reduction (vph)	0	7	0	0	87	0	0	5	0	0	18	0
Lane Group Flow (vph)	152	39	0	55	59	0	13	1078	0	152	912	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	2%	2%	9%	8%	2%	2%	2%	2%	4%	2%	2%	2%
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	21.6	21.6		10.6	10.6		38.0	38.0		49.0	49.0	
Effective Green, g (s)	21.6	21.6		10.6	10.6		38.0	38.0		49.0	49.0	
Actuated g/C Ratio	0.26	0.26		0.13	0.13		0.46	0.46		0.59	0.59	
Clearance Time (s)	4.0	6.0		6.0	6.0		6.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	305	469		164	213		264	1622		291	2043	
v/s Ratio Prot	c0.04	0.02			0.04			c0.31		0.04	c0.26	
v/s Ratio Perm	c0.09			0.04			0.02			0.26		
v/c Ratio	0.50	0.08		0.34	0.28		0.05	0.66		0.52	0.45	
Uniform Delay, d1	24.8	23.0		32.8	32.5		12.3	17.3		10.5	9.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.3	0.1		1.2	0.7		0.4	2.2		1.7	0.7	
Delay (s)	26.0	23.1		34.0	33.2		12.7	19.5		12.2	10.0	
Level of Service	C	C		C	C		B	B		B	B	
Approach Delay (s)		25.4			33.5			19.4			10.3	
Approach LOS		C			C			B			B	
Intersection Summary												
HCM 2000 Control Delay			17.2			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.63									
Actuated Cycle Length (s)			82.6			Sum of lost time (s)				20.0		
Intersection Capacity Utilization			84.6%			ICU Level of Service				E		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis 3: Rose St & Hwy 400 NB On

Rose Street Affordable Housing
BG (2028) - PM (No Dead End)

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	154	87	383	301	0	0
Future Volume (Veh/h)	154	87	383	301	0	0
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	167	95	416	327	0	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (m)			246			
pX, platoon unblocked	0.92	0.92			0.92	
vC, conflicting volume	580	580			743	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	497	497			675	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	66	82			100	
cM capacity (veh/h)	489	526			841	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	262	743	0			
Volume Left	167	0	0			
Volume Right	95	327	0			
cSH	502	1700	1700			
Volume to Capacity	0.52	0.44	0.00			
Queue Length 95th (m)	22.7	0.0	0.0			
Control Delay (s)	19.8	0.0	0.0			
Lane LOS	C					
Approach Delay (s)	19.8	0.0	0.0			
Approach LOS	C					
Intersection Summary						
Average Delay		5.2				
Intersection Capacity Utilization		59.1%		ICU Level of Service		B
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis

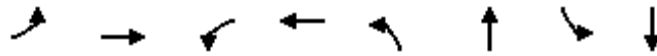
4: Peel St & Grove St

Rose Street Affordable Housing
BG (2028) - PM (No Dead End)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	7	212	18	8	173	4	8	19	3	0	12	8
Future Volume (Veh/h)	7	212	18	8	173	4	8	19	3	0	12	8
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
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)	8	230	20	9	188	4	9	21	3	0	13	9
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	192			250			480	466	240	478	474	190
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	192			250			480	466	240	478	474	190
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			98	96	100	100	97	99
cM capacity (veh/h)	1381			1316			477	488	799	475	483	852
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	258	201	33	22								
Volume Left	8	9	9	0								
Volume Right	20	4	3	9								
cSH	1381	1316	502	587								
Volume to Capacity	0.01	0.01	0.07	0.04								
Queue Length 95th (m)	0.1	0.2	1.6	0.9								
Control Delay (s)	0.3	0.4	12.7	11.4								
Lane LOS	A	A	B	B								
Approach Delay (s)	0.3	0.4	12.7	11.4								
Approach LOS			B	B								
Intersection Summary												
Average Delay			1.6									
Intersection Capacity Utilization			29.7%		ICU Level of Service				A			
Analysis Period (min)			15									

Queues
5: St. Vincent St & Rose St

Rose Street Affordable Housing
BG (2028) - PM (No Dead End)

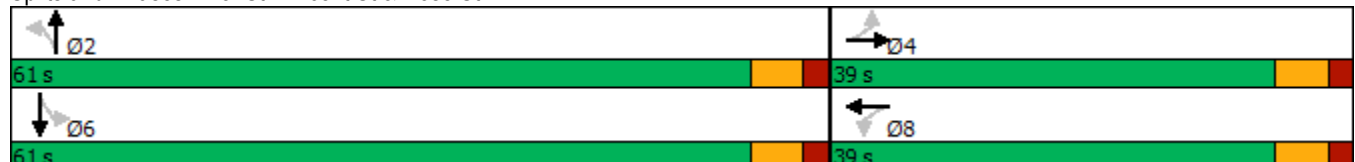


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations		↕		↕	↙	↕	↙	↕
Traffic Volume (vph)	161	19	6	21	33	565	46	599
Future Volume (vph)	161	19	6	21	33	565	46	599
Lane Group Flow (vph)	0	251	0	63	36	635	50	758
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	24.0	24.0	24.0	24.0
Minimum Split (s)	33.0	33.0	30.0	30.0	30.0	30.0	30.0	30.0
Total Split (s)	39.0	39.0	39.0	39.0	61.0	61.0	61.0	61.0
Total Split (%)	39.0%	39.0%	39.0%	39.0%	61.0%	61.0%	61.0%	61.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		6.0		6.0	6.0	6.0	6.0	6.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	Max	Max	Max	Max
v/c Ratio		0.77		0.15	0.10	0.28	0.11	0.35
Control Delay		45.8		15.3	9.3	8.6	9.1	8.8
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0
Total Delay		45.8		15.3	9.3	8.6	9.1	8.8
Queue Length 50th (m)		37.2		3.9	2.1	22.5	3.0	27.1
Queue Length 95th (m)		62.3		13.0	7.9	41.9	9.9	50.3
Internal Link Dist (m)		114.8		126.2		135.5		109.5
Turn Bay Length (m)					25.0		25.0	
Base Capacity (vph)		511		632	374	2245	468	2195
Starvation Cap Reductn		0		0	0	0	0	0
Spillback Cap Reductn		0		0	0	0	0	0
Storage Cap Reductn		0		0	0	0	0	0
Reduced v/c Ratio		0.49		0.10	0.10	0.28	0.11	0.35

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 88.9
Natural Cycle: 65
Control Type: Semi Act-Uncoord

Splits and Phases: 5: St. Vincent St & Rose St



HCM Signalized Intersection Capacity Analysis

5: St. Vincent St & Rose St

Rose Street Affordable Housing
BG (2028) - PM (No Dead End)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	161	19	51	6	21	30	33	565	19	46	599	98
Future Volume (vph)	161	19	51	6	21	30	33	565	19	46	599	98
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		0.99			0.98		1.00	1.00		1.00	0.99	
Flpb, ped/bikes		0.99			1.00		0.99	1.00		0.98	1.00	
Frt		0.97			0.93		1.00	1.00		1.00	0.98	
Flt Protected		0.97			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1734			1711		1639	3551		1761	3461	
Flt Permitted		0.75			0.96		0.34	1.00		0.40	1.00	
Satd. Flow (perm)		1351			1646		591	3551		742	3461	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	175	21	55	7	23	33	36	614	21	50	651	107
RTOR Reduction (vph)	0	12	0	0	25	0	0	2	0	0	11	0
Lane Group Flow (vph)	0	239	0	0	38	0	36	633	0	50	747	0
Confl. Peds. (#/hr)	15		15	15		15	15		25	15		25
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	10%	2%	2%	2%	2%	2%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		20.7			20.7		56.2	56.2		56.2	56.2	
Effective Green, g (s)		20.7			20.7		56.2	56.2		56.2	56.2	
Actuated g/C Ratio		0.23			0.23		0.63	0.63		0.63	0.63	
Clearance Time (s)		6.0			6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		314			383		373	2244		469	2187	
v/s Ratio Prot								0.18			c0.22	
v/s Ratio Perm		c0.18			0.02		0.06			0.07		
v/c Ratio		0.76			0.10		0.10	0.28		0.11	0.34	
Uniform Delay, d1		31.8			26.8		6.4	7.3		6.4	7.7	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		10.5			0.1		0.5	0.3		0.5	0.4	
Delay (s)		42.3			26.9		6.9	7.6		6.9	8.1	
Level of Service		D			C		A	A		A	A	
Approach Delay (s)		42.3			26.9			7.6			8.0	
Approach LOS		D			C			A			A	
Intersection Summary												
HCM 2000 Control Delay			13.3									
HCM 2000 Volume to Capacity ratio			0.45									
Actuated Cycle Length (s)			88.9									
Intersection Capacity Utilization			68.3%									
Analysis Period (min)			15									
c Critical Lane Group												

Queues
1: Bayfield St & Hwy 400 NB Off/Rose St

Rose Street Affordable Housing
BG (2025) - AM (No Dead End)

						
Lane Group	EBL	EBT	WBR	NBT	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	714	146	167	502	229	628
Future Volume (vph)	714	146	167	502	229	628
Lane Group Flow (vph)	776	398	182	637	249	683
Turn Type	Perm	NA	Perm	NA	pm+pt	NA
Protected Phases		4		2	1	6
Permitted Phases	4		8		6	
Detector Phase	4	4	8	2	1	6
Switch Phase						
Minimum Initial (s)	12.0	12.0	12.0	24.0	7.0	24.0
Minimum Split (s)	30.0	30.0	30.0	30.0	11.5	30.0
Total Split (s)	35.0	35.0	35.0	45.0	20.0	65.0
Total Split (%)	35.0%	35.0%	35.0%	45.0%	20.0%	65.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	3.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	4.0	6.0
Lead/Lag				Lag	Lead	
Lead-Lag Optimize?				Yes	Yes	
Recall Mode	None	None	None	C-Max	None	C-Max
v/c Ratio	0.85	0.75	0.24	0.41	0.50	0.32
Control Delay	43.9	36.3	0.8	20.1	12.2	10.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	43.9	36.3	0.8	20.1	12.2	10.5
Queue Length 50th (m)	71.7	56.4	0.0	42.4	20.2	32.8
Queue Length 95th (m)	93.7	90.6	0.0	61.1	32.1	43.2
Internal Link Dist (m)		579.4		233.2		180.4
Turn Bay Length (m)					120.0	
Base Capacity (vph)	958	549	766	1555	551	2157
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.81	0.72	0.24	0.41	0.45	0.32

Intersection Summary

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 20 (20%), Referenced to phase 2:NBT and 6:SBTL, Start of Green

Natural Cycle: 75

Control Type: Actuated-Coordinated

Splits and Phases: 1: Bayfield St & Hwy 400 NB Off/Rose St



HCM Signalized Intersection Capacity Analysis

1: Bayfield St & Hwy 400 NB Off/Rose St

Rose Street Affordable Housing

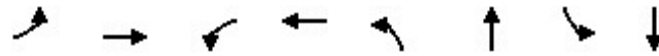
BG (2025) - AM (No Dead End)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	 							 			 	
Traffic Volume (vph)	714	146	220	0	0	167	0	502	84	229	628	0
Future Volume (vph)	714	146	220	0	0	167	0	502	84	229	628	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0				6.0		6.0		4.0	6.0	
Lane Util. Factor	0.97	1.00				1.00		0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99				0.98		0.99		1.00	1.00	
Flpb, ped/bikes	0.99	1.00				1.00		1.00		1.00	1.00	
Frt	1.00	0.91				0.86		0.98		1.00	1.00	
Flt Protected	0.95	1.00				1.00		1.00		0.95	1.00	
Satd. Flow (prot)	3305	1709				1584		3478		1751	3579	
Flt Permitted	0.95	1.00				1.00		1.00		0.32	1.00	
Satd. Flow (perm)	3305	1709				1584		3478		588	3579	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	776	159	239	0	0	182	0	546	91	249	683	0
RTOR Reduction (vph)	0	55	0	0	0	132	0	12	0	0	0	0
Lane Group Flow (vph)	776	343	0	0	0	50	0	625	0	249	683	0
Confl. Peds. (#/hr)	5		5	5		5	15		10	10		15
Heavy Vehicles (%)	6%	0%	2%	0%	0%	3%	0%	2%	2%	4%	2%	0%
Turn Type	Perm	NA				Perm		NA		pm+pt	NA	
Protected Phases		4						2		1	6	
Permitted Phases	4					8				6		
Actuated Green, G (s)	27.7	27.7				27.7		44.4		60.3	60.3	
Effective Green, g (s)	27.7	27.7				27.7		44.4		60.3	60.3	
Actuated g/C Ratio	0.28	0.28				0.28		0.44		0.60	0.60	
Clearance Time (s)	6.0	6.0				6.0		6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0				3.0		3.0		3.0	3.0	
Lane Grp Cap (vph)	915	473				438		1544		492	2158	
v/s Ratio Prot		0.20						0.18		c0.06	0.19	
v/s Ratio Perm	c0.23					0.03				c0.24		
v/c Ratio	0.85	0.73				0.12		0.40		0.51	0.32	
Uniform Delay, d1	34.2	32.7				27.0		18.8		10.0	9.7	
Progression Factor	1.00	1.00				1.00		1.00		1.00	1.00	
Incremental Delay, d2	7.4	5.5				0.1		0.8		0.8	0.4	
Delay (s)	41.5	38.2				27.1		19.6		10.9	10.1	
Level of Service	D	D				C		B		B	B	
Approach Delay (s)		40.4			27.1			19.6			10.3	
Approach LOS		D			C			B			B	
Intersection Summary												
HCM 2000 Control Delay		25.5				HCM 2000 Level of Service		C				
HCM 2000 Volume to Capacity ratio		0.64										
Actuated Cycle Length (s)		100.0				Sum of lost time (s)		16.0				
Intersection Capacity Utilization		67.6%				ICU Level of Service		C				
Analysis Period (min)		15										
c Critical Lane Group												

Queues

2: Bayfield St & Grove St

Rose Street Affordable Housing
BG (2025) - AM (No Dead End)

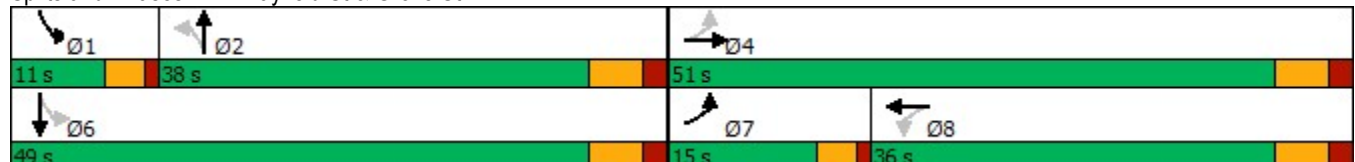


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	34	30	95	55	2	395	119	686
Future Volume (vph)	34	30	95	55	2	395	119	686
Lane Group Flow (vph)	37	38	103	231	2	486	129	782
Turn Type	pm+pt	NA	Perm	NA	Perm	NA	pm+pt	NA
Protected Phases	7	4		8		2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	7	4	8	8	2	2	1	6
Switch Phase								
Minimum Initial (s)	7.0	10.0	10.0	10.0	24.0	24.0	7.0	24.0
Minimum Split (s)	11.0	30.0	30.0	30.0	30.0	30.0	11.0	30.0
Total Split (s)	15.0	51.0	36.0	36.0	38.0	38.0	11.0	49.0
Total Split (%)	15.0%	51.0%	36.0%	36.0%	38.0%	38.0%	11.0%	49.0%
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0	4.0	3.0	4.0
All-Red Time (s)	1.0	2.0	2.0	2.0	2.0	2.0	1.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0	6.0	6.0	6.0	6.0	4.0	6.0
Lead/Lag	Lead		Lag	Lag	Lag	Lag	Lead	
Lead-Lag Optimize?	Yes		Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	None	None	None	Max	Max	None	Max
v/c Ratio	0.12	0.08	0.46	0.69	0.01	0.30	0.23	0.38
Control Delay	18.4	17.2	36.4	23.5	17.5	15.8	10.0	11.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	18.4	17.2	36.4	23.5	17.5	15.8	10.0	11.0
Queue Length 50th (m)	3.8	3.5	14.2	11.4	0.2	23.8	7.8	31.4
Queue Length 95th (m)	9.4	9.5	29.0	34.8	1.7	44.2	20.8	59.6
Internal Link Dist (m)		140.8		181.1		201.3		233.2
Turn Bay Length (m)	20.0		25.0		30.0		50.0	
Base Capacity (vph)	355	1076	511	580	309	1616	559	2049
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.10	0.04	0.20	0.40	0.01	0.30	0.23	0.38

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 75.8
Natural Cycle: 85
Control Type: Semi Act-Uncoord

Splits and Phases: 2: Bayfield St & Grove St



HCM Signalized Intersection Capacity Analysis

2: Bayfield St & Grove St

Rose Street Affordable Housing

BG (2025) - AM (No Dead End)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	34	30	5	95	55	157	2	395	52	119	686	33
Future Volume (vph)	34	30	5	95	55	157	2	395	52	119	686	33
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		6.0	6.0		6.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.98		1.00	0.89		1.00	0.98		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1788	1782		1651	1226		1784	3477		1784	3549	
Flt Permitted	0.35	1.00		0.73	1.00		0.36	1.00		0.41	1.00	
Satd. Flow (perm)	650	1782		1273	1226		668	3477		775	3549	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	37	33	5	103	60	171	2	429	57	129	746	36
RTOR Reduction (vph)	0	4	0	0	122	0	0	8	0	0	3	0
Lane Group Flow (vph)	37	34	0	103	109	0	2	478	0	129	779	0
Confl. Peds. (#/hr)	5		5	5		5	5		10	10		5
Heavy Vehicles (%)	2%	4%	15%	10%	2%	50%	2%	2%	8%	2%	2%	2%
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	21.7	21.7		13.3	13.3		35.1	35.1		44.6	44.6	
Effective Green, g (s)	21.7	21.7		13.3	13.3		35.1	35.1		44.6	44.6	
Actuated g/C Ratio	0.28	0.28		0.17	0.17		0.45	0.45		0.57	0.57	
Clearance Time (s)	4.0	6.0		6.0	6.0		6.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	244	493		216	208		299	1558		512	2021	
v/s Ratio Prot	c0.01	0.02			c0.09			0.14		0.02	c0.22	
v/s Ratio Perm	0.03			0.08			0.00			0.13		
v/c Ratio	0.15	0.07		0.48	0.52		0.01	0.31		0.25	0.39	
Uniform Delay, d1	21.3	20.9		29.4	29.6		12.0	13.8		8.0	9.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.3	0.1		1.7	2.4		0.0	0.5		0.3	0.6	
Delay (s)	21.6	20.9		31.0	32.0		12.0	14.3		8.3	9.9	
Level of Service	C	C		C	C		B	B		A	A	
Approach Delay (s)		21.2			31.7			14.3			9.6	
Approach LOS		C			C			B			A	
Intersection Summary												
HCM 2000 Control Delay			15.5			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.43									
Actuated Cycle Length (s)			78.3			Sum of lost time (s)			20.0			
Intersection Capacity Utilization			78.5%			ICU Level of Service			D			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

3: Rose St & Hwy 400 NB On

Rose Street Affordable Housing
BG (2025) - AM (No Dead End)

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	167	96	258	200	0	0
Future Volume (Veh/h)	167	96	258	200	0	0
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	182	104	280	217	0	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (m)			246			
pX, platoon unblocked	0.97	0.97			0.97	
vC, conflicting volume	388	388			497	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	353	353			465	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	71	84			100	
cM capacity (veh/h)	625	669			1062	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	286	497	0			
Volume Left	182	0	0			
Volume Right	104	217	0			
cSH	640	1700	1700			
Volume to Capacity	0.45	0.29	0.00			
Queue Length 95th (m)	17.5	0.0	0.0			
Control Delay (s)	15.1	0.0	0.0			
Lane LOS	C					
Approach Delay (s)	15.1	0.0	0.0			
Approach LOS	C					
Intersection Summary						
Average Delay		5.5				
Intersection Capacity Utilization		47.6%		ICU Level of Service		A
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis

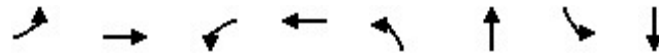
4: Peel St & Grove St

Rose Street Affordable Housing
BG (2025) - AM (No Dead End)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	7	249	2	6	245	7	8	16	9	6	4	6
Future Volume (Veh/h)	7	249	2	6	245	7	8	16	9	6	4	6
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
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)	8	271	2	7	266	8	9	17	10	7	4	7
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	274			273			581	576	272	590	573	270
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	274			273			581	576	272	590	573	270
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			98	96	99	98	99	99
cM capacity (veh/h)	1289			1290			414	423	767	397	425	769
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	281	281	36	18								
Volume Left	8	7	9	7								
Volume Right	2	8	10	7								
cSH	1289	1290	480	498								
Volume to Capacity	0.01	0.01	0.07	0.04								
Queue Length 95th (m)	0.1	0.1	1.8	0.9								
Control Delay (s)	0.3	0.2	13.1	12.5								
Lane LOS	A	A	B	B								
Approach Delay (s)	0.3	0.2	13.1	12.5								
Approach LOS			B	B								
Intersection Summary												
Average Delay			1.4									
Intersection Capacity Utilization			26.6%		ICU Level of Service				A			
Analysis Period (min)			15									

Queues
5: St. Vincent St & Rose St

Rose Street Affordable Housing
BG (2025) - AM (No Dead End)

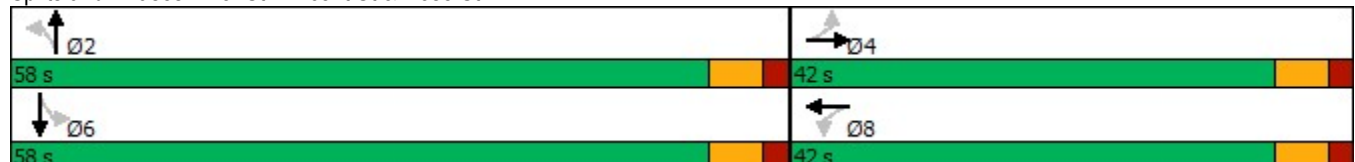


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations		↔		↔		↔		↔
Traffic Volume (vph)	130	19	11	32	56	418	11	408
Future Volume (vph)	130	19	11	32	56	418	11	408
Lane Group Flow (vph)	0	186	0	73	0	525	0	520
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	24.0	24.0	24.0	24.0
Minimum Split (s)	33.0	33.0	33.0	33.0	30.0	30.0	30.0	30.0
Total Split (s)	42.0	42.0	42.0	42.0	58.0	58.0	58.0	58.0
Total Split (%)	42.0%	42.0%	42.0%	42.0%	58.0%	58.0%	58.0%	58.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		0.0		0.0		0.0		0.0
Total Lost Time (s)		6.0		6.0		6.0		6.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	Max	Max	Max	Max
v/c Ratio		0.70		0.21		0.27		0.24
Control Delay		43.1		19.5		6.9		6.4
Queue Delay		0.0		0.0		0.0		0.0
Total Delay		43.1		19.5		6.9		6.4
Queue Length 50th (m)		25.2		5.9		15.3		14.2
Queue Length 95th (m)		45.4		16.0		29.3		27.2
Internal Link Dist (m)		114.8		126.2		135.5		109.5
Turn Bay Length (m)								
Base Capacity (vph)		583		741		1966		2173
Starvation Cap Reductn		0		0		0		0
Spillback Cap Reductn		0		0		0		0
Storage Cap Reductn		0		0		0		0
Reduced v/c Ratio		0.32		0.10		0.27		0.24

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 83.1
Natural Cycle: 65
Control Type: Semi Act-Uncoord

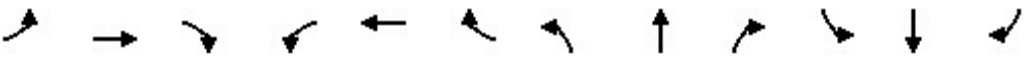
Splits and Phases: 5: St. Vincent St & Rose St



HCM Signalized Intersection Capacity Analysis

5: St. Vincent St & Rose St

Rose Street Affordable Housing
BG (2025) - AM (No Dead End)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Volume (vph)	130	19	22	11	32	24	56	418	9	11	408	60
Future Volume (vph)	130	19	22	11	32	24	56	418	9	11	408	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0			6.0			6.0	
Lane Util. Factor		1.00			1.00			0.95			0.95	
Frpb, ped/bikes		1.00			0.99			1.00			0.99	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.98			0.95			1.00			0.98	
Flt Protected		0.96			0.99			0.99			1.00	
Satd. Flow (prot)		1759			1765			3541			3488	
Flt Permitted		0.73			0.94			0.84			0.94	
Satd. Flow (perm)		1333			1674			2981			3287	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	141	21	24	12	35	26	61	454	10	12	443	65
RTOR Reduction (vph)	0	6	0	0	21	0	0	1	0	0	8	0
Lane Group Flow (vph)	0	180	0	0	52	0	0	524	0	0	512	0
Confl. Peds. (#/hr)	5		10	10		5	10		5	5		10
Heavy Vehicles (%)	3%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		16.2			16.2			54.8			54.8	
Effective Green, g (s)		16.2			16.2			54.8			54.8	
Actuated g/C Ratio		0.20			0.20			0.66			0.66	
Clearance Time (s)		6.0			6.0			6.0			6.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		260			326			1968			2170	
v/s Ratio Prot												
v/s Ratio Perm		c0.13			0.03			c0.18			0.16	
v/c Ratio		0.69			0.16			0.27			0.24	
Uniform Delay, d1		31.1			27.7			5.8			5.7	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		7.7			0.2			0.3			0.3	
Delay (s)		38.7			28.0			6.1			5.9	
Level of Service		D			C			A			A	
Approach Delay (s)		38.7			28.0			6.1			5.9	
Approach LOS		D			C			A			A	
Intersection Summary												
HCM 2000 Control Delay		11.9			HCM 2000 Level of Service			B				
HCM 2000 Volume to Capacity ratio		0.36										
Actuated Cycle Length (s)		83.0			Sum of lost time (s)			12.0				
Intersection Capacity Utilization		72.4%			ICU Level of Service			C				
Analysis Period (min)		15										

c Critical Lane Group

Queues

1: Bayfield St & Hwy 400 NB Off/Rose St

Rose Street Affordable Housing

BG (2028) - PM (No Dead End)



Lane Group	EBL	EBT	WBR	NBT	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	1025	219	150	924	276	664
Future Volume (vph)	1025	219	150	924	276	664
Lane Group Flow (vph)	1114	443	163	1182	300	722
Turn Type	Perm	NA	Perm	NA	pm+pt	NA
Protected Phases		4		2	1	6
Permitted Phases	4		8		6	
Detector Phase	4	4	8	2	1	6
Switch Phase						
Minimum Initial (s)	12.0	12.0	12.0	24.0	7.0	24.0
Minimum Split (s)	30.0	30.0	30.0	30.0	11.5	30.0
Total Split (s)	58.0	58.0	58.0	64.0	28.0	92.0
Total Split (%)	38.7%	38.7%	38.7%	42.7%	18.7%	61.3%
Yellow Time (s)	4.0	4.0	4.0	4.0	3.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	4.0	6.0
Lead/Lag				Lag	Lead	
Lead-Lag Optimize?				Yes	Yes	
Recall Mode	None	None	None	C-Max	None	C-Max
v/c Ratio	0.94	0.71	0.21	0.84	0.91	0.35
Control Delay	63.2	47.0	0.6	47.3	73.6	17.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	63.2	47.0	0.6	47.3	73.6	17.4
Queue Length 50th (m)	164.7	106.5	0.0	168.3	70.3	58.1
Queue Length 95th (m)	#205.6	147.2	0.0	198.4	#121.1	71.1
Internal Link Dist (m)		579.4		233.2		180.4
Turn Bay Length (m)					120.0	
Base Capacity (vph)	1196	626	775	1404	344	2085
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.93	0.71	0.21	0.84	0.87	0.35

Intersection Summary

Cycle Length: 150

Actuated Cycle Length: 150

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

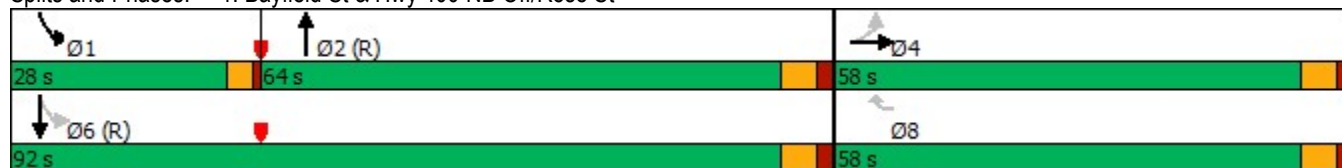
Natural Cycle: 90

Control Type: Actuated-Coordinated

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

Queue shown is maximum after two cycles.

Splits and Phases: 1: Bayfield St & Hwy 400 NB Off/Rose St



07/08/2024

JL

Synchro 11 Report

Page 1

HCM Signalized Intersection Capacity Analysis

1: Bayfield St & Hwy 400 NB Off/Rose St

Rose Street Affordable Housing

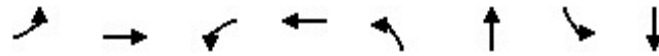
BG (2028) - PM (No Dead End)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1025	219	189	0	0	150	0	924	164	276	664	0
Future Volume (vph)	1025	219	189	0	0	150	0	924	164	276	664	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0				6.0		6.0		4.0	6.0	
Lane Util. Factor	0.97	1.00				1.00		0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99				0.98		0.99		1.00	1.00	
Flpb, ped/bikes	0.98	1.00				1.00		1.00		1.00	1.00	
Frt	1.00	0.93				0.86		0.98		1.00	1.00	
Flt Protected	0.95	1.00				1.00		1.00		0.95	1.00	
Satd. Flow (prot)	3451	1745				1595		3495		1807	3614	
Flt Permitted	0.95	1.00				1.00		1.00		0.07	1.00	
Satd. Flow (perm)	3451	1745				1595		3495		130	3614	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1114	238	205	0	0	163	0	1004	178	300	722	0
RTOR Reduction (vph)	0	21	0	0	0	107	0	10	0	0	0	0
Lane Group Flow (vph)	1114	422	0	0	0	56	0	1172	0	300	722	0
Confl. Peds. (#/hr)	5		10	10		5	20		10	10		20
Heavy Vehicles (%)	1%	1%	1%	0%	0%	2%	0%	1%	2%	1%	1%	0%
Turn Type	Perm	NA				Perm		NA		pm+pt	NA	
Protected Phases		4						2		1	6	
Permitted Phases	4					8				6		
Actuated Green, G (s)	51.4	51.4				51.4		59.9		86.6	86.6	
Effective Green, g (s)	51.4	51.4				51.4		59.9		86.6	86.6	
Actuated g/C Ratio	0.34	0.34				0.34		0.40		0.58	0.58	
Clearance Time (s)	6.0	6.0				6.0		6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0				3.0		3.0		3.0	3.0	
Lane Grp Cap (vph)	1182	597				546		1395		328	2086	
v/s Ratio Prot		0.24						0.34		c0.14	0.20	
v/s Ratio Perm	c0.32					0.04				c0.39		
v/c Ratio	0.94	0.71				0.10		0.84		0.91	0.35	
Uniform Delay, d1	47.9	42.8				33.6		40.7		47.2	16.7	
Progression Factor	1.00	1.00				1.00		1.00		1.00	1.00	
Incremental Delay, d2	14.5	3.8				0.1		6.3		28.8	0.5	
Delay (s)	62.3	46.6				33.7		47.0		75.9	17.2	
Level of Service	E	D				C		D		E	B	
Approach Delay (s)		57.8			33.7			47.0			34.4	
Approach LOS		E			C			D			C	
Intersection Summary												
HCM 2000 Control Delay		47.5				HCM 2000 Level of Service		D				
HCM 2000 Volume to Capacity ratio		0.94										
Actuated Cycle Length (s)		150.0				Sum of lost time (s)		16.0				
Intersection Capacity Utilization		88.8%				ICU Level of Service		E				
Analysis Period (min)		15										
c Critical Lane Group												

Queues

2: Bayfield St & Grove St

Rose Street Affordable Housing
BG (2028) - PM (No Dead End)

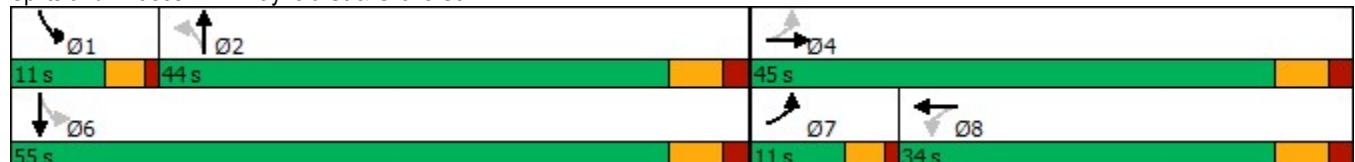


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	85	47	50	57	2	899	136	663
Future Volume (vph)	85	47	50	57	2	899	136	663
Lane Group Flow (vph)	92	53	54	160	2	1051	148	780
Turn Type	pm+pt	NA	Perm	NA	Perm	NA	pm+pt	NA
Protected Phases	7	4		8		2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	7	4	8	8	2	2	1	6
Switch Phase								
Minimum Initial (s)	7.0	10.0	10.0	10.0	24.0	24.0	7.0	24.0
Minimum Split (s)	11.0	30.0	30.0	30.0	30.0	30.0	11.0	30.0
Total Split (s)	11.0	45.0	34.0	34.0	44.0	44.0	11.0	55.0
Total Split (%)	11.0%	45.0%	34.0%	34.0%	44.0%	44.0%	11.0%	55.0%
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0	4.0	3.0	4.0
All-Red Time (s)	1.0	2.0	2.0	2.0	2.0	2.0	1.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0	6.0	6.0	6.0	6.0	4.0	6.0
Lead/Lag	Lead		Lag	Lag	Lag	Lag	Lead	
Lead-Lag Optimize?	Yes		Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	None	None	None	Max	Max	None	Max
v/c Ratio	0.30	0.12	0.31	0.53	0.01	0.63	0.46	0.36
Control Delay	24.8	22.9	37.4	24.8	13.5	19.0	11.9	9.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.8	22.9	37.4	24.8	13.5	19.0	11.9	9.2
Queue Length 50th (m)	10.9	6.1	7.9	11.9	0.2	62.6	8.5	29.5
Queue Length 95th (m)	21.7	14.3	18.3	29.6	1.4	91.8	18.2	46.3
Internal Link Dist (m)		140.8		181.1		201.3		233.2
Turn Bay Length (m)	20.0		25.0		30.0		50.0	
Base Capacity (vph)	305	903	440	636	314	1664	319	2148
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.30	0.06	0.12	0.25	0.01	0.63	0.46	0.36

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 81
Natural Cycle: 85
Control Type: Semi Act-Uncoord

Splits and Phases: 2: Bayfield St & Grove St



HCM Signalized Intersection Capacity Analysis

2: Bayfield St & Grove St

Rose Street Affordable Housing

BG (2028) - PM (No Dead End)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	85	47	2	50	57	90	2	899	68	136	663	54
Future Volume (vph)	85	47	2	50	57	90	2	899	68	136	663	54
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		6.0	6.0		6.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		0.99	1.00		0.99	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.91		1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1784	1866		1674	1687		1779	3527		1789	3528	
Flt Permitted	0.44	1.00		0.72	1.00		0.36	1.00		0.16	1.00	
Satd. Flow (perm)	835	1866		1273	1687		667	3527		302	3528	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	92	51	2	54	62	98	2	977	74	148	721	59
RTOR Reduction (vph)	0	1	0	0	68	0	0	5	0	0	5	0
Lane Group Flow (vph)	92	52	0	54	92	0	2	1046	0	148	775	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	2%	2%	9%	8%	2%	2%	2%	2%	4%	2%	2%	2%
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	20.6	20.6		11.2	11.2		38.2	38.2		49.2	49.2	
Effective Green, g (s)	20.6	20.6		11.2	11.2		38.2	38.2		49.2	49.2	
Actuated g/C Ratio	0.25	0.25		0.14	0.14		0.47	0.47		0.60	0.60	
Clearance Time (s)	4.0	6.0		6.0	6.0		6.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	272	469		174	230		311	1647		308	2121	
v/s Ratio Prot	c0.02	0.03			0.05			c0.30		c0.04	0.22	
v/s Ratio Perm	c0.06			0.04			0.00			0.25		
v/c Ratio	0.34	0.11		0.31	0.40		0.01	0.64		0.48	0.37	
Uniform Delay, d1	24.3	23.5		31.8	32.2		11.7	16.5		9.7	8.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.7	0.1		1.0	1.1		0.0	1.9		1.2	0.5	
Delay (s)	25.0	23.6		32.8	33.4		11.7	18.4		10.8	8.8	
Level of Service	C	C		C	C		B	B		B	A	
Approach Delay (s)		24.5			33.2			18.4			9.1	
Approach LOS		C			C			B			A	
Intersection Summary												
HCM 2000 Control Delay			16.5			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.56									
Actuated Cycle Length (s)			81.8			Sum of lost time (s)				20.0		
Intersection Capacity Utilization			80.1%			ICU Level of Service				D		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

3: Rose St & Hwy 400 NB On

Rose Street Affordable Housing
BG (2028) - PM (No Dead End)

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	150	85	368	292	0	0
Future Volume (Veh/h)	150	85	368	292	0	0
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	163	92	400	317	0	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (m)			246			
pX, platoon unblocked	0.92	0.92			0.92	
vC, conflicting volume	558	558			717	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	479	479			651	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	68	83			100	
cM capacity (veh/h)	503	541			863	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	255	717	0			
Volume Left	163	0	0			
Volume Right	92	317	0			
cSH	516	1700	1700			
Volume to Capacity	0.49	0.42	0.00			
Queue Length 95th (m)	20.6	0.0	0.0			
Control Delay (s)	18.6	0.0	0.0			
Lane LOS	C					
Approach Delay (s)	18.6	0.0	0.0			
Approach LOS	C					
Intersection Summary						
Average Delay		4.9				
Intersection Capacity Utilization		57.4%		ICU Level of Service		B
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis

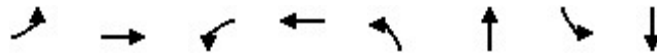
4: Peel St & Grove St

Rose Street Affordable Housing
BG (2028) - PM (No Dead End)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	7	212	17	8	176	4	8	19	3	0	12	8
Future Volume (Veh/h)	7	212	17	8	176	4	8	19	3	0	12	8
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
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)	8	230	18	9	191	4	9	21	3	0	13	9
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None			None								
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	195			248			482	468	239	480	475	193
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	195			248			482	468	239	480	475	193
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			98	96	100	100	97	99
cM capacity (veh/h)	1378			1318			475	487	800	474	482	849
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	256	204	33	22								
Volume Left	8	9	9	0								
Volume Right	18	4	3	9								
cSH	1378	1318	501	586								
Volume to Capacity	0.01	0.01	0.07	0.04								
Queue Length 95th (m)	0.1	0.2	1.6	0.9								
Control Delay (s)	0.3	0.4	12.7	11.4								
Lane LOS	A	A	B	B								
Approach Delay (s)	0.3	0.4	12.7	11.4								
Approach LOS			B	B								
Intersection Summary												
Average Delay			1.6									
Intersection Capacity Utilization			29.7%	ICU Level of Service					A			
Analysis Period (min)			15									

Queues
5: St. Vincent St & Rose St

Rose Street Affordable Housing
BG (2028) - PM (No Dead End)

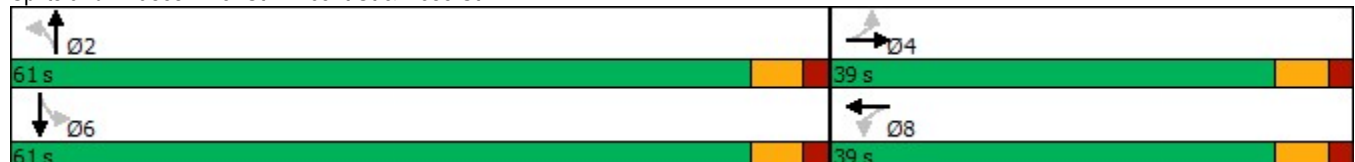


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations		↔		↔		↔		↔
Traffic Volume (vph)	156	18	6	20	32	549	45	581
Future Volume (vph)	156	18	6	20	32	549	45	581
Lane Group Flow (vph)	0	244	0	62	0	652	0	784
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	24.0	24.0	24.0	24.0
Minimum Split (s)	33.0	33.0	30.0	30.0	30.0	30.0	30.0	30.0
Total Split (s)	39.0	39.0	39.0	39.0	61.0	61.0	61.0	61.0
Total Split (%)	39.0%	39.0%	39.0%	39.0%	61.0%	61.0%	61.0%	61.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		0.0		0.0		0.0		0.0
Total Lost Time (s)		6.0		6.0		6.0		6.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	Max	Max	Max	Max
v/c Ratio		0.76		0.16		0.33		0.41
Control Delay		45.5		15.2		8.8		9.3
Queue Delay		0.0		0.0		0.0		0.0
Total Delay		45.5		15.2		8.8		9.3
Queue Length 50th (m)		35.8		3.8		23.4		29.2
Queue Length 95th (m)		60.4		12.9		44.2		54.5
Internal Link Dist (m)		114.8		126.2		135.5		109.5
Turn Bay Length (m)								
Base Capacity (vph)		513		633		1980		1927
Starvation Cap Reductn		0		0		0		0
Spillback Cap Reductn		0		0		0		0
Storage Cap Reductn		0		0		0		0
Reduced v/c Ratio		0.48		0.10		0.33		0.41

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 88.6
Natural Cycle: 65
Control Type: Semi Act-Uncoord

Splits and Phases: 5: St. Vincent St & Rose St



HCM Signalized Intersection Capacity Analysis

5: St. Vincent St & Rose St

Rose Street Affordable Housing
BG (2028) - PM (No Dead End)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	156	18	50	6	20	30	32	549	18	45	581	95
Future Volume (vph)	156	18	50	6	20	30	32	549	18	45	581	95
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0			6.0			6.0	
Lane Util. Factor		1.00			1.00			0.95			0.95	
Frpb, ped/bikes		0.99			0.98			1.00			0.99	
Flpb, ped/bikes		0.99			1.00			1.00			1.00	
Frt		0.97			0.93			1.00			0.98	
Flt Protected		0.97			0.99			1.00			1.00	
Satd. Flow (prot)		1733			1708			3526			3455	
Flt Permitted		0.75			0.96			0.88			0.87	
Satd. Flow (perm)		1352			1642			3110			3019	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	170	20	54	7	22	33	35	597	20	49	632	103
RTOR Reduction (vph)	0	12	0	0	25	0	0	2	0	0	10	0
Lane Group Flow (vph)	0	232	0	0	37	0	0	650	0	0	774	0
Confl. Peds. (#/hr)	15		15	15		15	15		25	15		25
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	10%	2%	2%	2%	2%	2%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		20.2			20.2			56.4			56.4	
Effective Green, g (s)		20.2			20.2			56.4			56.4	
Actuated g/C Ratio		0.23			0.23			0.64			0.64	
Clearance Time (s)		6.0			6.0			6.0			6.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		308			374			1979			1921	
v/s Ratio Prot												
v/s Ratio Perm		c0.17			0.02			0.21			c0.26	
v/c Ratio		0.75			0.10			0.33			0.40	
Uniform Delay, d1		31.9			27.0			7.4			7.9	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		10.0			0.1			0.4			0.6	
Delay (s)		41.9			27.1			7.8			8.5	
Level of Service		D			C			A			A	
Approach Delay (s)		41.9			27.1			7.8			8.5	
Approach LOS		D			C			A			A	
Intersection Summary												
HCM 2000 Control Delay		13.6			HCM 2000 Level of Service			B				
HCM 2000 Volume to Capacity ratio		0.50										
Actuated Cycle Length (s)		88.6			Sum of lost time (s)			12.0				
Intersection Capacity Utilization		75.5%			ICU Level of Service			D				
Analysis Period (min)		15										
c Critical Lane Group												

Queues

1: Bayfield St & Hwy 400 NB Off/Rose St

Rose Street Affordable Housing

BG (2028) - AM (w. Dead End)



Lane Group	EBL	EBT	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	766	0	741	124	193	669
Future Volume (vph)	766	0	741	124	193	669
Lane Group Flow (vph)	833	352	805	135	210	727
Turn Type	Perm	NA	NA	Perm	pm+pt	NA
Protected Phases		4	2		1	6
Permitted Phases	4			2	6	
Detector Phase	4	4	2	2	1	6
Switch Phase						
Minimum Initial (s)	12.0	12.0	24.0	24.0	7.0	24.0
Minimum Split (s)	30.0	30.0	30.0	30.0	11.5	30.0
Total Split (s)	35.0	35.0	45.0	45.0	20.0	65.0
Total Split (%)	35.0%	35.0%	45.0%	45.0%	20.0%	65.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	3.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	4.0	6.0
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?			Yes	Yes	Yes	
Recall Mode	None	None	C-Max	C-Max	None	C-Max
v/c Ratio	0.86	0.60	0.35	0.18	0.46	0.24
Control Delay	44.5	17.1	18.9	3.9	11.9	9.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	44.5	17.1	18.9	3.9	11.9	9.7
Queue Length 50th (m)	77.7	22.9	36.6	0.0	16.6	22.8
Queue Length 95th (m)	#101.3	51.6	49.4	10.7	27.0	29.3
Internal Link Dist (m)		579.4	203.2			180.4
Turn Bay Length (m)				35.0	115.0	
Base Capacity (vph)	1000	600	2329	764	523	3083
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.83	0.59	0.35	0.18	0.40	0.24

Intersection Summary

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 20 (20%), Referenced to phase 2:NBT and 6:SBTL, Start of Green

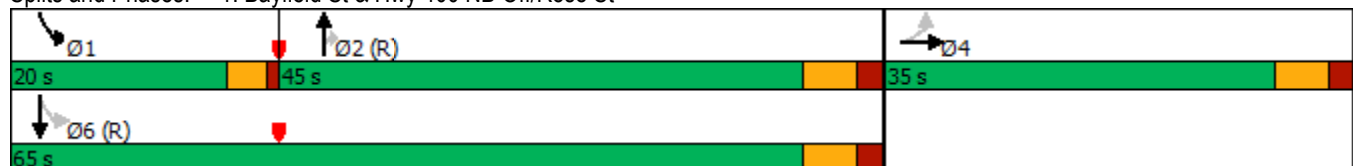
Natural Cycle: 75

Control Type: Actuated-Coordinated

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

Queue shown is maximum after two cycles.

Splits and Phases: 1: Bayfield St & Hwy 400 NB Off/Rose St



10-13-2023

JL

Synchro 10 Report

Page 1

HCM Signalized Intersection Capacity Analysis

1: Bayfield St & Hwy 400 NB Off/Rose St

Rose Street Affordable Housing

BG (2028) - AM (w. Dead End)

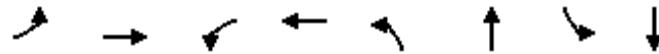
												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	 							  			  	
Traffic Volume (vph)	766	0	324	0	0	0	0	741	124	193	669	0
Future Volume (vph)	766	0	324	0	0	0	0	741	124	193	669	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0						6.0	6.0	4.0	6.0	
Lane Util. Factor	0.97	1.00						0.91	1.00	1.00	0.91	
Frpb, ped/bikes	1.00	0.98						1.00	0.95	1.00	1.00	
Flpb, ped/bikes	0.99	1.00						1.00	1.00	1.00	1.00	
Frt	1.00	0.85						1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00						1.00	1.00	0.95	1.00	
Satd. Flow (prot)	3449	1572						5142	1525	1786	5142	
Flt Permitted	0.95	1.00						1.00	1.00	0.28	1.00	
Satd. Flow (perm)	3449	1572						5142	1525	520	5142	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	833	0	352	0	0	0	0	805	135	210	727	0
RTOR Reduction (vph)	0	147	0	0	0	0	0	0	74	0	0	0
Lane Group Flow (vph)	833	205	0	0	0	0	0	805	61	210	727	0
Confl. Peds. (#/hr)	5		5	5		5	15		10	10		15
Turn Type	Perm	NA						NA	Perm	pm+pt	NA	
Protected Phases		4						2		1	6	
Permitted Phases	4								2	6		
Actuated Green, G (s)	28.0	28.0						45.3	45.3	60.0	60.0	
Effective Green, g (s)	28.0	28.0						45.3	45.3	60.0	60.0	
Actuated g/C Ratio	0.28	0.28						0.45	0.45	0.60	0.60	
Clearance Time (s)	6.0	6.0						6.0	6.0	4.0	6.0	
Vehicle Extension (s)	3.0	3.0						3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	965	440						2329	690	447	3085	
v/s Ratio Prot		0.13						0.16		c0.05	0.14	
v/s Ratio Perm	c0.24								0.04	c0.23		
v/c Ratio	0.86	0.47						0.35	0.09	0.47	0.24	
Uniform Delay, d1	34.2	29.8						17.7	15.6	9.6	9.3	
Progression Factor	1.00	1.00						1.00	1.00	1.00	1.00	
Incremental Delay, d2	8.1	0.8						0.4	0.3	0.8	0.2	
Delay (s)	42.3	30.6						18.1	15.8	10.4	9.5	
Level of Service	D	C						B	B	B	A	
Approach Delay (s)		38.8			0.0			17.8			9.7	
Approach LOS		D			A			B			A	
Intersection Summary												
HCM 2000 Control Delay		23.5			HCM 2000 Level of Service			C				
HCM 2000 Volume to Capacity ratio		0.62										
Actuated Cycle Length (s)		100.0			Sum of lost time (s)			16.0				
Intersection Capacity Utilization		65.9%			ICU Level of Service			C				
Analysis Period (min)		15										
c Critical Lane Group												

Queues

2: Bayfield St & Grove St

Rose Street Affordable Housing

BG (2028) - AM (w. Dead End)



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	180	36	98	40	3	420	200	732
Future Volume (vph)	180	36	98	40	3	420	200	732
Lane Group Flow (vph)	196	60	107	219	3	532	217	851
Turn Type	pm+pt	NA	Perm	NA	Perm	NA	pm+pt	NA
Protected Phases	7	4		8		2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	7	4	8	8	2	2	1	6
Switch Phase								
Minimum Initial (s)	7.0	10.0	10.0	10.0	24.0	24.0	7.0	24.0
Minimum Split (s)	11.0	30.0	30.0	30.0	30.0	30.0	11.0	30.0
Total Split (s)	15.0	51.0	36.0	36.0	38.0	38.0	11.0	49.0
Total Split (%)	15.0%	51.0%	36.0%	36.0%	38.0%	38.0%	11.0%	49.0%
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0	4.0	3.0	4.0
All-Red Time (s)	1.0	2.0	2.0	2.0	2.0	2.0	1.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0	6.0	6.0	6.0	6.0	4.0	6.0
Lead/Lag	Lead		Lag	Lag	Lag	Lag	Lead	
Lead-Lag Optimize?	Yes		Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	None	None	None	Max	Max	None	Max
v/c Ratio	0.53	0.10	0.52	0.55	0.01	0.39	0.47	0.46
Control Delay	24.6	13.8	41.9	14.2	17.3	18.9	13.9	13.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.6	13.8	41.9	14.2	17.3	18.9	13.9	13.6
Queue Length 50th (m)	21.9	4.1	15.7	6.0	0.3	29.2	16.0	40.2
Queue Length 95th (m)	37.3	11.8	30.6	24.8	2.0	46.2	31.7	62.2
Internal Link Dist (m)		140.8		181.1		201.3		203.2
Turn Bay Length (m)	20.0		25.0		30.0		200.0	
Base Capacity (vph)	377	981	491	707	243	1369	466	1857
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.52	0.06	0.22	0.31	0.01	0.39	0.47	0.46

Intersection Summary

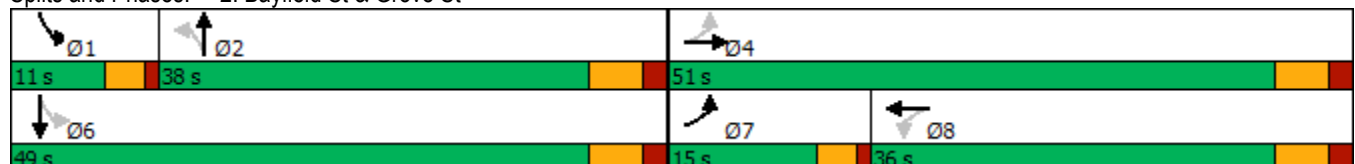
Cycle Length: 100

Actuated Cycle Length: 82.2

Natural Cycle: 85

Control Type: Semi Act-Uncoord

Splits and Phases: 2: Bayfield St & Grove St



HCM Signalized Intersection Capacity Analysis

2: Bayfield St & Grove St

Rose Street Affordable Housing

BG (2028) - AM (w. Dead End)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	180	36	19	98	40	162	3	420	69	200	732	51
Future Volume (vph)	180	36	19	98	40	162	3	420	69	200	732	51
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		6.0	6.0		6.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.95		1.00	0.88		1.00	0.98		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1788	1774		1781	1634		1785	3485		1785	3537	
Flt Permitted	0.33	1.00		0.72	1.00		0.33	1.00		0.36	1.00	
Satd. Flow (perm)	627	1774		1346	1634		624	3485		683	3537	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	196	39	21	107	43	176	3	457	75	217	796	55
RTOR Reduction (vph)	0	14	0	0	149	0	0	12	0	0	4	0
Lane Group Flow (vph)	196	46	0	107	70	0	3	520	0	217	847	0
Confl. Peds. (#/hr)	5		5	5		5	5		10	10		5
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	27.1	27.1		12.5	12.5		32.1	32.1		43.1	43.1	
Effective Green, g (s)	27.1	27.1		12.5	12.5		32.1	32.1		43.1	43.1	
Actuated g/C Ratio	0.33	0.33		0.15	0.15		0.39	0.39		0.52	0.52	
Clearance Time (s)	4.0	6.0		6.0	6.0		6.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	356	584		204	248		243	1360		451	1854	
v/s Ratio Prot	c0.07	0.03			0.04			0.15		0.04	c0.24	
v/s Ratio Perm	c0.11			0.08			0.00			c0.21		
v/c Ratio	0.55	0.08		0.52	0.28		0.01	0.38		0.48	0.46	
Uniform Delay, d1	21.2	19.0		32.1	30.9		15.3	18.0		11.0	12.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.8	0.1		2.4	0.6		0.1	0.8		0.8	0.8	
Delay (s)	23.0	19.0		34.5	31.5		15.4	18.8		11.8	13.0	
Level of Service	C	B		C	C		B	B		B	B	
Approach Delay (s)		22.1			32.5			18.7			12.8	
Approach LOS		C			C			B			B	
Intersection Summary												
HCM 2000 Control Delay			18.3			HCM 2000 Level of Service			B			
HCM 2000 Volume to Capacity ratio			0.56									
Actuated Cycle Length (s)			82.2			Sum of lost time (s)			20.0			
Intersection Capacity Utilization			83.9%			ICU Level of Service			E			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

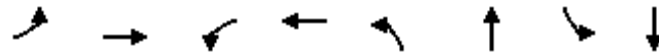
4: Peel St & Grove St

Rose Street Affordable Housing
BG (2028) - AM (w. Dead End)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	16	333	11	6	243	7	8	16	9	6	5	6
Future Volume (Veh/h)	16	333	11	6	243	7	8	16	9	6	5	6
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
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)	17	362	12	7	264	8	9	17	10	7	5	7
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None				None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	272			374			694	688	368	702	690	268
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	272			374			694	688	368	702	690	268
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			97	95	99	98	99	99
cM capacity (veh/h)	1291			1184			345	362	677	330	361	771
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	391	279	36	19								
Volume Left	17	7	9	7								
Volume Right	12	8	10	7								
cSH	1291	1184	410	431								
Volume to Capacity	0.01	0.01	0.09	0.04								
Queue Length 95th (m)	0.3	0.1	2.2	1.0								
Control Delay (s)	0.5	0.3	14.6	13.7								
Lane LOS	A	A	B	B								
Approach Delay (s)	0.5	0.3	14.6	13.7								
Approach LOS			B	B								
Intersection Summary												
Average Delay			1.4									
Intersection Capacity Utilization			36.0%		ICU Level of Service				A			
Analysis Period (min)			15									

Queues
5: St. Vincent St & Rose St

Rose Street Affordable Housing
BG (2028) - AM (w. Dead End)

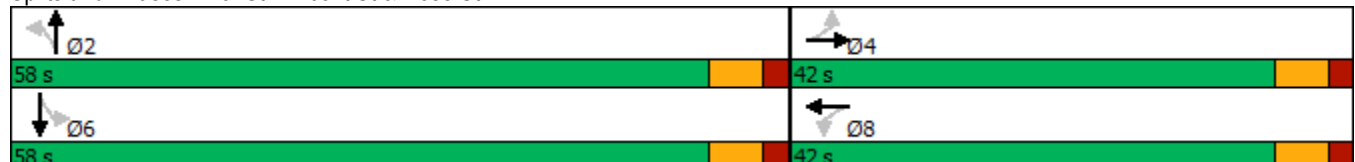


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations		↕		↕	↙	↕	↙	↕
Traffic Volume (vph)	160	20	12	33	58	458	12	441
Future Volume (vph)	160	20	12	33	58	458	12	441
Lane Group Flow (vph)	0	221	0	76	63	508	13	569
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	24.0	24.0	24.0	24.0
Minimum Split (s)	33.0	33.0	33.0	33.0	30.0	30.0	30.0	30.0
Total Split (s)	42.0	42.0	42.0	42.0	58.0	58.0	58.0	58.0
Total Split (%)	42.0%	42.0%	42.0%	42.0%	58.0%	58.0%	58.0%	58.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		6.0		6.0	6.0	6.0	6.0	6.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	Max	Max	Max	Max
v/c Ratio		0.74		0.20	0.12	0.22	0.02	0.26
Control Delay		44.2		18.7	8.4	7.5	7.8	7.4
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0
Total Delay		44.2		18.7	8.4	7.5	7.8	7.4
Queue Length 50th (m)		31.3		6.2	3.5	15.8	0.7	17.1
Queue Length 95th (m)		54.1		16.1	11.0	30.3	3.4	32.7
Internal Link Dist (m)		114.8		126.2		135.5		109.5
Turn Bay Length (m)					25.0		25.0	
Base Capacity (vph)		572		727	517	2268	553	2216
Starvation Cap Reductn		0		0	0	0	0	0
Spillback Cap Reductn		0		0	0	0	0	0
Storage Cap Reductn		0		0	0	0	0	0
Reduced v/c Ratio		0.39		0.10	0.12	0.22	0.02	0.26

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 84.3
Natural Cycle: 65
Control Type: Semi Act-Uncoord

Splits and Phases: 5: St. Vincent St & Rose St



HCM Signalized Intersection Capacity Analysis

5: St. Vincent St & Rose St

Rose Street Affordable Housing
BG (2028) - AM (w. Dead End)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	160	20	23	12	33	25	58	458	9	12	441	83
Future Volume (vph)	160	20	23	12	33	25	58	458	9	12	441	83
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00			0.99		1.00	1.00		1.00	0.99	
Flpb, ped/bikes		1.00			1.00		0.99	1.00		0.99	1.00	
Frt		0.98			0.95		1.00	1.00		1.00	0.98	
Flt Protected		0.96			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1773			1765		1769	3566		1778	3469	
Flt Permitted		0.72			0.94		0.44	1.00		0.47	1.00	
Satd. Flow (perm)		1329			1665		814	3566		870	3469	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	174	22	25	13	36	27	63	498	10	13	479	90
RTOR Reduction (vph)	0	5	0	0	21	0	0	1	0	0	12	0
Lane Group Flow (vph)	0	216	0	0	55	0	63	507	0	13	557	0
Confl. Peds. (#/hr)	5		10	10		5	10		5	5		10
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		18.6			18.6		53.6	53.6		53.6	53.6	
Effective Green, g (s)		18.6			18.6		53.6	53.6		53.6	53.6	
Actuated g/C Ratio		0.22			0.22		0.64	0.64		0.64	0.64	
Clearance Time (s)		6.0			6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		293			367		518	2270		553	2208	
v/s Ratio Prot								0.14			c0.16	
v/s Ratio Perm		c0.16			0.03		0.08			0.01		
v/c Ratio		0.74			0.15		0.12	0.22		0.02	0.25	
Uniform Delay, d1		30.5			26.4		6.0	6.5		5.6	6.6	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		9.2			0.2		0.5	0.2		0.1	0.3	
Delay (s)		39.7			26.6		6.5	6.7		5.7	6.9	
Level of Service		D			C		A	A		A	A	
Approach Delay (s)		39.7			26.6			6.7			6.9	
Approach LOS		D			C			A			A	
Intersection Summary												
HCM 2000 Control Delay		12.8			HCM 2000 Level of Service			B				
HCM 2000 Volume to Capacity ratio		0.38										
Actuated Cycle Length (s)		84.2			Sum of lost time (s)			12.0				
Intersection Capacity Utilization		73.6%			ICU Level of Service			D				
Analysis Period (min)		15										
c Critical Lane Group												

Queues

1: Bayfield St & Hwy 400 NB Off/Rose St

Rose Street Affordable Housing

BG (2028) - PM (w. Dead End)



Lane Group	EBL	EBT	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	1101	0	1078	198	229	736
Future Volume (vph)	1101	0	1078	198	229	736
Lane Group Flow (vph)	1197	440	1172	215	249	800
Turn Type	Perm	NA	NA	Perm	pm+pt	NA
Protected Phases		4	2		1	6
Permitted Phases	4			2	6	
Detector Phase	4	4	2	2	1	6
Switch Phase						
Minimum Initial (s)	12.0	12.0	24.0	24.0	7.0	24.0
Minimum Split (s)	30.0	30.0	30.0	30.0	11.5	30.0
Total Split (s)	64.0	64.0	65.0	65.0	21.0	86.0
Total Split (%)	42.7%	42.7%	43.3%	43.3%	14.0%	57.3%
Yellow Time (s)	4.0	4.0	4.0	4.0	3.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	4.0	6.0
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?			Yes	Yes	Yes	
Recall Mode	None	None	C-Max	C-Max	None	C-Max
v/c Ratio	0.92	0.65	0.56	0.32	0.82	0.29
Control Delay	56.3	30.7	35.5	16.0	43.2	19.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	56.3	30.7	35.5	16.0	43.2	19.2
Queue Length 50th (m)	171.8	74.4	99.8	20.1	37.9	46.8
Queue Length 95th (m)	202.5	112.6	114.7	40.6	#75.1	55.8
Internal Link Dist (m)		579.4	203.2			180.4
Turn Bay Length (m)				35.0	115.0	
Base Capacity (vph)	1329	684	2108	682	318	2782
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.90	0.64	0.56	0.32	0.78	0.29

Intersection Summary

Cycle Length: 150

Actuated Cycle Length: 150

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

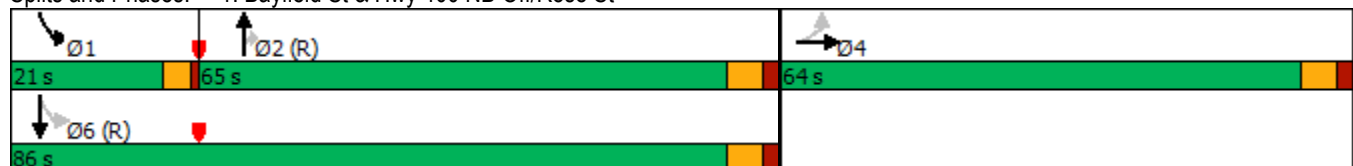
Natural Cycle: 80

Control Type: Actuated-Coordinated

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

Queue shown is maximum after two cycles.

Splits and Phases: 1: Bayfield St & Hwy 400 NB Off/Rose St



HCM Signalized Intersection Capacity Analysis

1: Bayfield St & Hwy 400 NB Off/Rose St

Rose Street Affordable Housing

BG (2028) - PM (w. Dead End)

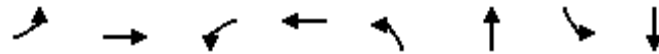
												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1101	0	405	0	0	0	0	1078	198	229	736	0
Future Volume (vph)	1101	0	405	0	0	0	0	1078	198	229	736	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0						6.0	6.0	4.0	6.0	
Lane Util. Factor	0.97	1.00						0.91	1.00	1.00	0.91	
Frpb, ped/bikes	1.00	0.97						1.00	0.94	1.00	1.00	
Flpb, ped/bikes	0.99	1.00						1.00	1.00	1.00	1.00	
Frt	1.00	0.85						1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00						1.00	1.00	0.95	1.00	
Satd. Flow (prot)	3439	1552						5142	1504	1789	5142	
Flt Permitted	0.95	1.00						1.00	1.00	0.14	1.00	
Satd. Flow (perm)	3439	1552						5142	1504	262	5142	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1197	0	440	0	0	0	0	1172	215	249	800	0
RTOR Reduction (vph)	0	85	0	0	0	0	0	0	65	0	0	0
Lane Group Flow (vph)	1197	355	0	0	0	0	0	1172	150	249	800	0
Confl. Peds. (#/hr)	5		10	10		5	20		10	10		20
Turn Type	Perm	NA						NA	Perm	pm+pt	NA	
Protected Phases		4						2		1	6	
Permitted Phases	4								2	6		
Actuated Green, G (s)	56.8	56.8						61.5	61.5	81.2	81.2	
Effective Green, g (s)	56.8	56.8						61.5	61.5	81.2	81.2	
Actuated g/C Ratio	0.38	0.38						0.41	0.41	0.54	0.54	
Clearance Time (s)	6.0	6.0						6.0	6.0	4.0	6.0	
Vehicle Extension (s)	3.0	3.0						3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	1302	587						2108	616	301	2783	
v/s Ratio Prot		0.23						0.23		c0.09	0.16	
v/s Ratio Perm	c0.35								0.10	c0.36		
v/c Ratio	0.92	0.60						0.56	0.24	0.83	0.29	
Uniform Delay, d1	44.4	37.6						33.8	29.0	23.5	18.7	
Progression Factor	1.00	1.00						1.00	1.00	1.00	1.00	
Incremental Delay, d2	10.5	1.8						1.1	0.9	16.8	0.3	
Delay (s)	54.9	39.3						34.9	29.9	40.3	18.9	
Level of Service	D	D						C	C	D	B	
Approach Delay (s)		50.7			0.0			34.1			24.0	
Approach LOS		D			A			C			C	
Intersection Summary												
HCM 2000 Control Delay		38.2			HCM 2000 Level of Service			D				
HCM 2000 Volume to Capacity ratio		0.88										
Actuated Cycle Length (s)		150.0			Sum of lost time (s)			16.0				
Intersection Capacity Utilization		78.3%			ICU Level of Service			D				
Analysis Period (min)		15										
c Critical Lane Group												

Queues

2: Bayfield St & Grove St

Rose Street Affordable Housing

BG (2028) - PM (w. Dead End)



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	140	34	51	42	12	931	250	720
Future Volume (vph)	140	34	51	42	12	931	250	720
Lane Group Flow (vph)	152	46	55	250	13	1113	272	971
Turn Type	pm+pt	NA	Perm	NA	Perm	NA	pm+pt	NA
Protected Phases	7	4		8		2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	7	4	8	8	2	2	1	6
Switch Phase								
Minimum Initial (s)	7.0	10.0	10.0	10.0	24.0	24.0	7.0	24.0
Minimum Split (s)	11.0	30.0	30.0	30.0	30.0	30.0	11.0	30.0
Total Split (s)	10.0	44.0	34.0	34.0	38.0	38.0	18.0	56.0
Total Split (%)	10.0%	44.0%	34.0%	34.0%	38.0%	38.0%	18.0%	56.0%
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0	4.0	3.0	4.0
All-Red Time (s)	1.0	2.0	2.0	2.0	2.0	2.0	1.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0	6.0	6.0	6.0	6.0	4.0	6.0
Lead/Lag	Lead		Lag	Lag	Lag	Lag	Lead	
Lead-Lag Optimize?	Yes		Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	None	None	None	Max	Max	None	Max
v/c Ratio	0.66	0.10	0.30	0.63	0.06	0.78	0.75	0.47
Control Delay	39.1	20.4	36.9	16.3	18.2	27.2	29.4	9.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	39.1	20.4	36.9	16.3	18.2	27.2	29.4	9.9
Queue Length 50th (m)	18.9	4.5	8.0	6.6	1.3	78.6	22.9	37.0
Queue Length 95th (m)	#35.8	12.1	18.4	27.6	5.3	#119.2	#59.5	59.4
Internal Link Dist (m)		140.8		181.1		201.3		203.2
Turn Bay Length (m)	20.0		25.0		30.0		200.0	
Base Capacity (vph)	230	836	455	680	222	1421	393	2088
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.66	0.06	0.12	0.37	0.06	0.78	0.69	0.47

Intersection Summary

Cycle Length: 100

Actuated Cycle Length: 83.3

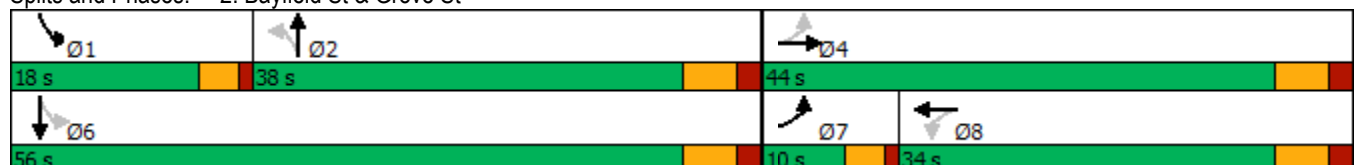
Natural Cycle: 85

Control Type: Semi Act-Uncoord

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

Queue shown is maximum after two cycles.

Splits and Phases: 2: Bayfield St & Grove St



HCM Signalized Intersection Capacity Analysis

2: Bayfield St & Grove St

Rose Street Affordable Housing

BG (2028) - PM (w. Dead End)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	140	34	8	51	42	188	12	931	93	250	720	173
Future Volume (vph)	140	34	8	51	42	188	12	931	93	250	720	173
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		6.0	6.0		6.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	0.98		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		0.99	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.97		1.00	0.88		1.00	0.99		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1787	1820		1772	1623		1781	3518		1789	3450	
Flt Permitted	0.26	1.00		0.73	1.00		0.29	1.00		0.11	1.00	
Satd. Flow (perm)	495	1820		1356	1623		553	3518		201	3450	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	152	37	9	55	46	204	13	1012	101	272	783	188
RTOR Reduction (vph)	0	7	0	0	177	0	0	7	0	0	17	0
Lane Group Flow (vph)	152	39	0	55	73	0	13	1106	0	272	954	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	21.2	21.2		11.2	11.2		33.5	33.5		50.0	50.0	
Effective Green, g (s)	21.2	21.2		11.2	11.2		33.5	33.5		50.0	50.0	
Actuated g/C Ratio	0.25	0.25		0.13	0.13		0.40	0.40		0.60	0.60	
Clearance Time (s)	4.0	6.0		6.0	6.0		6.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	219	463		182	218		222	1416		359	2073	
v/s Ratio Prot	c0.05	0.02			0.05			0.31		c0.11	0.28	
v/s Ratio Perm	c0.13			0.04			0.02			c0.34		
v/c Ratio	0.69	0.08		0.30	0.34		0.06	0.78		0.76	0.46	
Uniform Delay, d1	25.9	23.6		32.5	32.6		15.2	21.7		18.4	9.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	9.2	0.1		0.9	0.9		0.5	4.4		8.8	0.7	
Delay (s)	35.0	23.7		33.4	33.6		15.7	26.0		27.2	9.9	
Level of Service	D	C		C	C		B	C		C	A	
Approach Delay (s)		32.4			33.5			25.9			13.7	
Approach LOS		C			C			C			B	
Intersection Summary												
HCM 2000 Control Delay			21.9			HCM 2000 Level of Service				C		
HCM 2000 Volume to Capacity ratio			0.80									
Actuated Cycle Length (s)			83.2			Sum of lost time (s)				20.0		
Intersection Capacity Utilization			87.9%			ICU Level of Service				E		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

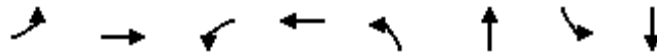
4: Peel St & Grove St

Rose Street Affordable Housing
BG (2028) - PM (w. Dead End)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	318	31	8	250	4	18	19	3	0	12	18
Future Volume (Veh/h)	20	318	31	8	250	4	18	19	3	0	12	18
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	22	346	34	9	272	4	20	21	3	0	13	20
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	276			380			726	701	363	712	716	274
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	276			380			726	701	363	712	716	274
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	98			99			94	94	100	100	96	97
cM capacity (veh/h)	1287			1178			316	354	682	324	347	765
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	402	285	44	33								
Volume Left	22	9	20	0								
Volume Right	34	4	3	20								
cSH	1287	1178	346	519								
Volume to Capacity	0.02	0.01	0.13	0.06								
Queue Length 95th (m)	0.4	0.2	3.3	1.5								
Control Delay (s)	0.6	0.3	16.9	12.4								
Lane LOS	A	A	C	B								
Approach Delay (s)	0.6	0.3	16.9	12.4								
Approach LOS			C	B								
Intersection Summary												
Average Delay			1.9									
Intersection Capacity Utilization			43.0%		ICU Level of Service				A			
Analysis Period (min)			15									

Queues
5: St. Vincent St & Rose St

Rose Street Affordable Housing
BG (2028) - PM (w. Dead End)

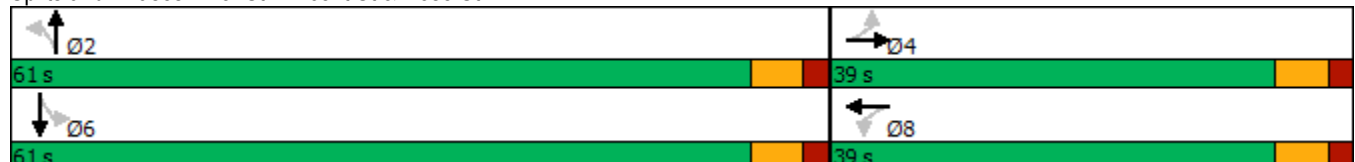


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations		↕		↕	↙	↕	↙	↕
Traffic Volume (vph)	185	19	6	21	33	589	46	629
Future Volume (vph)	185	19	6	21	33	589	46	629
Lane Group Flow (vph)	0	277	0	63	36	661	50	823
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	24.0	24.0	24.0	24.0
Minimum Split (s)	33.0	33.0	30.0	30.0	30.0	30.0	30.0	30.0
Total Split (s)	39.0	39.0	39.0	39.0	61.0	61.0	61.0	61.0
Total Split (%)	39.0%	39.0%	39.0%	39.0%	61.0%	61.0%	61.0%	61.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		6.0		6.0	6.0	6.0	6.0	6.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	Max	Max	Max	Max
v/c Ratio		0.80		0.14	0.10	0.30	0.11	0.39
Control Delay		47.6		14.8	10.2	9.5	10.0	9.9
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0
Total Delay		47.6		14.8	10.2	9.5	10.0	9.9
Queue Length 50th (m)		42.7		3.9	2.3	25.6	3.3	32.5
Queue Length 95th (m)		70.1		12.9	8.3	46.2	10.5	58.1
Internal Link Dist (m)		114.8		126.2		135.5		109.5
Turn Bay Length (m)					25.0		25.0	
Base Capacity (vph)		498		621	357	2188	438	2130
Starvation Cap Reductn		0		0	0	0	0	0
Spillback Cap Reductn		0		0	0	0	0	0
Storage Cap Reductn		0		0	0	0	0	0
Reduced v/c Ratio		0.56		0.10	0.10	0.30	0.11	0.39

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 90.5
Natural Cycle: 65
Control Type: Semi Act-Uncoord

Splits and Phases: 5: St. Vincent St & Rose St



HCM Signalized Intersection Capacity Analysis

5: St. Vincent St & Rose St

Rose Street Affordable Housing
BG (2028) - PM (w. Dead End)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	185	19	51	6	21	30	33	589	19	46	629	128
Future Volume (vph)	185	19	51	6	21	30	33	589	19	46	629	128
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		0.99			0.98		1.00	1.00		1.00	0.99	
Flpb, ped/bikes		0.99			1.00		0.99	1.00		0.99	1.00	
Frt		0.97			0.93		1.00	1.00		1.00	0.97	
Flt Protected		0.96			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1736			1711		1770	3552		1763	3438	
Flt Permitted		0.75			0.96		0.31	1.00		0.38	1.00	
Satd. Flow (perm)		1341			1645		579	3552		712	3438	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	201	21	55	7	23	33	36	640	21	50	684	139
RTOR Reduction (vph)	0	10	0	0	25	0	0	2	0	0	15	0
Lane Group Flow (vph)	0	267	0	0	38	0	36	659	0	50	808	0
Confl. Peds. (#/hr)	15		15	15		15	15		25	15		25
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		22.7			22.7		55.7	55.7		55.7	55.7	
Effective Green, g (s)		22.7			22.7		55.7	55.7		55.7	55.7	
Actuated g/C Ratio		0.25			0.25		0.62	0.62		0.62	0.62	
Clearance Time (s)		6.0			6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		336			413		356	2188		438	2118	
v/s Ratio Prot								0.19			c0.24	
v/s Ratio Perm		c0.20			0.02		0.06			0.07		
v/c Ratio		0.80			0.09		0.10	0.30		0.11	0.38	
Uniform Delay, d1		31.7			26.0		7.1	8.2		7.2	8.7	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		12.2			0.1		0.6	0.4		0.5	0.5	
Delay (s)		43.9			26.1		7.7	8.5		7.7	9.2	
Level of Service		D			C		A	A		A	A	
Approach Delay (s)		43.9			26.1			8.5			9.1	
Approach LOS		D			C			A			A	
Intersection Summary												
HCM 2000 Control Delay			14.5			HCM 2000 Level of Service			B			
HCM 2000 Volume to Capacity ratio			0.50									
Actuated Cycle Length (s)			90.4			Sum of lost time (s)			12.0			
Intersection Capacity Utilization			69.6%			ICU Level of Service			C			
Analysis Period (min)			15									
c Critical Lane Group												

Queues

1: Bayfield St & Hwy 400 NB Off/Rose St

Rose Street Affordable Housing

BG (2030) - AM (w. Dead End)



Lane Group	EBL	EBT	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	781	0	756	126	197	682
Future Volume (vph)	781	0	756	126	197	682
Lane Group Flow (vph)	849	360	822	137	214	741
Turn Type	Perm	NA	NA	Perm	pm+pt	NA
Protected Phases		4	2		1	6
Permitted Phases	4			2	6	
Detector Phase	4	4	2	2	1	6
Switch Phase						
Minimum Initial (s)	12.0	12.0	24.0	24.0	7.0	24.0
Minimum Split (s)	30.0	30.0	30.0	30.0	11.5	30.0
Total Split (s)	35.0	35.0	45.0	45.0	20.0	65.0
Total Split (%)	35.0%	35.0%	45.0%	45.0%	20.0%	65.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	3.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	4.0	6.0
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?			Yes	Yes	Yes	
Recall Mode	None	None	C-Max	C-Max	None	C-Max
v/c Ratio	0.87	0.62	0.36	0.18	0.48	0.24
Control Delay	45.0	18.5	19.2	3.9	12.3	9.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	45.0	18.5	19.2	3.9	12.3	9.8
Queue Length 50th (m)	79.6	25.8	37.6	0.0	16.9	23.4
Queue Length 95th (m)	#109.3	55.3	50.8	10.9	27.4	29.9
Internal Link Dist (m)		579.4	203.2			180.4
Turn Bay Length (m)				35.0	115.0	
Base Capacity (vph)	1000	595	2308	760	516	3070
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.85	0.61	0.36	0.18	0.41	0.24

Intersection Summary

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 20 (20%), Referenced to phase 2:NBT and 6:SBTL, Start of Green

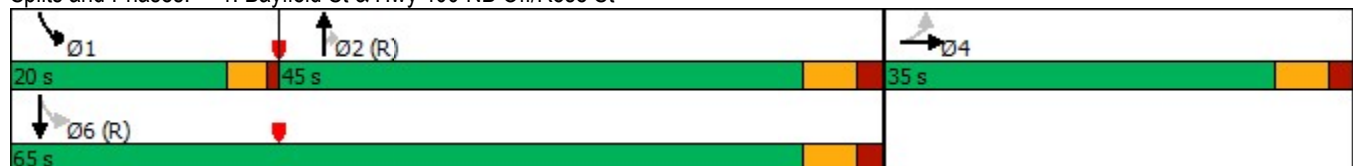
Natural Cycle: 75

Control Type: Actuated-Coordinated

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

Queue shown is maximum after two cycles.

Splits and Phases: 1: Bayfield St & Hwy 400 NB Off/Rose St



07/08/2024

JL

Synchro 11 Report

Page 1

HCM Signalized Intersection Capacity Analysis

1: Bayfield St & Hwy 400 NB Off/Rose St

Rose Street Affordable Housing

BG (2030) - AM (w. Dead End)

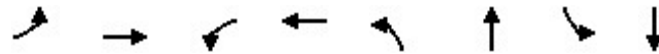
												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	781	0	331	0	0	0	0	756	126	197	682	0
Future Volume (vph)	781	0	331	0	0	0	0	756	126	197	682	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0						6.0	6.0	4.0	6.0	
Lane Util. Factor	0.97	1.00						0.91	1.00	1.00	0.91	
Frpb, ped/bikes	1.00	0.98						1.00	0.95	1.00	1.00	
Flpb, ped/bikes	0.99	1.00						1.00	1.00	1.00	1.00	
Frt	1.00	0.85						1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00						1.00	1.00	0.95	1.00	
Satd. Flow (prot)	3449	1572						5142	1525	1787	5142	
Flt Permitted	0.95	1.00						1.00	1.00	0.27	1.00	
Satd. Flow (perm)	3449	1572						5142	1525	505	5142	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	849	0	360	0	0	0	0	822	137	214	741	0
RTOR Reduction (vph)	0	141	0	0	0	0	0	0	75	0	0	0
Lane Group Flow (vph)	849	219	0	0	0	0	0	822	62	214	741	0
Confl. Peds. (#/hr)	5		5	5		5	15		10	10		15
Turn Type	Perm	NA						NA	Perm	pm+pt	NA	
Protected Phases		4						2		1	6	
Permitted Phases	4								2	6		
Actuated Green, G (s)	28.3	28.3						44.9	44.9	59.7	59.7	
Effective Green, g (s)	28.3	28.3						44.9	44.9	59.7	59.7	
Actuated g/C Ratio	0.28	0.28						0.45	0.45	0.60	0.60	
Clearance Time (s)	6.0	6.0						6.0	6.0	4.0	6.0	
Vehicle Extension (s)	3.0	3.0						3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	976	444						2308	684	439	3069	
v/s Ratio Prot		0.14						0.16		c0.05	0.14	
v/s Ratio Perm	c0.25								0.04	c0.24		
v/c Ratio	0.87	0.49						0.36	0.09	0.49	0.24	
Uniform Delay, d1	34.1	29.9						18.1	15.8	9.9	9.5	
Progression Factor	1.00	1.00						1.00	1.00	1.00	1.00	
Incremental Delay, d2	8.4	0.9						0.4	0.3	0.9	0.2	
Delay (s)	42.5	30.7						18.5	16.1	10.7	9.7	
Level of Service	D	C						B	B	B	A	
Approach Delay (s)		39.0			0.0			18.2			9.9	
Approach LOS		D			A			B			A	
Intersection Summary												
HCM 2000 Control Delay		23.7			HCM 2000 Level of Service			C				
HCM 2000 Volume to Capacity ratio		0.63										
Actuated Cycle Length (s)		100.0			Sum of lost time (s)			16.0				
Intersection Capacity Utilization		66.5%			ICU Level of Service			C				
Analysis Period (min)		15										
c Critical Lane Group												

Queues

2: Bayfield St & Grove St

Rose Street Affordable Housing

BG (2030) - AM (w. Dead End)



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	184	37	100	41	3	429	204	746
Future Volume (vph)	184	37	100	41	3	429	204	746
Lane Group Flow (vph)	200	61	109	224	3	542	222	868
Turn Type	pm+pt	NA	Perm	NA	Perm	NA	pm+pt	NA
Protected Phases	7	4		8		2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	7	4	8	8	2	2	1	6
Switch Phase								
Minimum Initial (s)	7.0	10.0	10.0	10.0	24.0	24.0	7.0	24.0
Minimum Split (s)	11.0	30.0	30.0	30.0	30.0	30.0	11.0	30.0
Total Split (s)	15.0	51.0	36.0	36.0	38.0	38.0	11.0	49.0
Total Split (%)	15.0%	51.0%	36.0%	36.0%	38.0%	38.0%	11.0%	49.0%
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0	4.0	3.0	4.0
All-Red Time (s)	1.0	2.0	2.0	2.0	2.0	2.0	1.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0	6.0	6.0	6.0	6.0	4.0	6.0
Lead/Lag	Lead		Lag	Lag	Lag	Lag	Lead	
Lead-Lag Optimize?	Yes		Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	None	None	None	Max	Max	None	Max
v/c Ratio	0.54	0.10	0.53	0.56	0.01	0.40	0.48	0.47
Control Delay	25.0	13.9	42.2	14.3	17.3	19.0	14.3	13.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	25.0	13.9	42.2	14.3	17.3	19.0	14.3	13.7
Queue Length 50th (m)	22.4	4.2	16.0	6.3	0.3	30.0	16.6	41.6
Queue Length 95th (m)	37.8	12.0	31.2	25.4	2.1	47.3	32.3	64.0
Internal Link Dist (m)		140.8		181.1		201.3		203.2
Turn Bay Length (m)	20.0		25.0		30.0		200.0	
Base Capacity (vph)	373	981	490	709	238	1368	460	1854
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.54	0.06	0.22	0.32	0.01	0.40	0.48	0.47

Intersection Summary

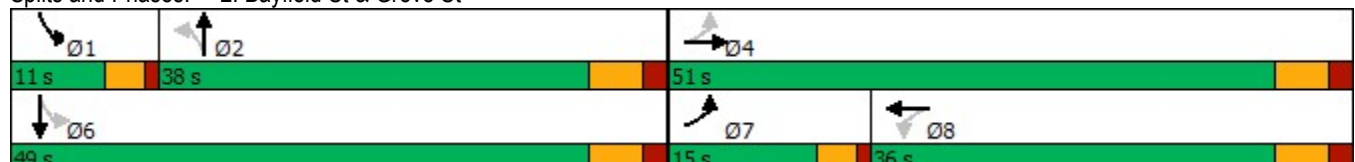
Cycle Length: 100

Actuated Cycle Length: 82.3

Natural Cycle: 85

Control Type: Semi Act-Uncoord

Splits and Phases: 2: Bayfield St & Grove St



HCM Signalized Intersection Capacity Analysis

2: Bayfield St & Grove St

Rose Street Affordable Housing

BG (2030) - AM (w. Dead End)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	184	37	19	100	41	165	3	429	70	204	746	52
Future Volume (vph)	184	37	19	100	41	165	3	429	70	204	746	52
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		6.0	6.0		6.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.95		1.00	0.88		1.00	0.98		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1788	1776		1781	1635		1785	3485		1785	3537	
Flt Permitted	0.32	1.00		0.72	1.00		0.33	1.00		0.36	1.00	
Satd. Flow (perm)	609	1776		1344	1635		614	3485		670	3537	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	200	40	21	109	45	179	3	466	76	222	811	57
RTOR Reduction (vph)	0	14	0	0	152	0	0	12	0	0	4	0
Lane Group Flow (vph)	200	47	0	109	72	0	3	530	0	222	864	0
Confl. Peds. (#/hr)	5		5	5		5	5		10	10		5
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases	7	4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	27.3	27.3		12.6	12.6		32.1	32.1		43.1	43.1	
Effective Green, g (s)	27.3	27.3		12.6	12.6		32.1	32.1		43.1	43.1	
Actuated g/C Ratio	0.33	0.33		0.15	0.15		0.39	0.39		0.52	0.52	
Clearance Time (s)	4.0	6.0		6.0	6.0		6.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	354	588		205	250		239	1357		445	1850	
v/s Ratio Prot	c0.07	0.03			0.04			0.15		0.04	c0.24	
v/s Ratio Perm	c0.11			0.08			0.00			c0.22		
v/c Ratio	0.56	0.08		0.53	0.29		0.01	0.39		0.50	0.47	
Uniform Delay, d1	21.2	18.9		32.2	30.9		15.4	18.1		11.2	12.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.1	0.1		2.6	0.6		0.1	0.8		0.9	0.8	
Delay (s)	23.3	19.0		34.8	31.6		15.5	19.0		12.0	13.2	
Level of Service	C	B		C	C		B	B		B	B	
Approach Delay (s)		22.3			32.6			18.9			13.0	
Approach LOS		C			C			B			B	
Intersection Summary												
HCM 2000 Control Delay			18.5			HCM 2000 Level of Service			B			
HCM 2000 Volume to Capacity ratio			0.58									
Actuated Cycle Length (s)			82.4			Sum of lost time (s)			20.0			
Intersection Capacity Utilization			84.7%			ICU Level of Service			E			
Analysis Period (min)			15									
c Critical Lane Group												

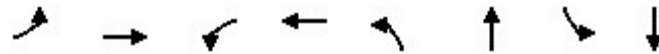
Rose Street Affordable Housing

BG (2030) - AM (w. Dead End)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	16	340	11	6	248	7	8	16	9	6	5	6
Future Volume (Veh/h)	16	340	11	6	248	7	8	16	9	6	5	6
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
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)	17	370	12	7	270	8	9	17	10	7	5	7
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None			None								
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	278			382			708	702	376	716	704	274
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	278			382			708	702	376	716	704	274
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			97	95	99	98	99	99
cM capacity (veh/h)	1285			1176			338	355	670	323	355	765
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	399	285	36	19								
Volume Left	17	7	9	7								
Volume Right	12	8	10	7								
cSH	1285	1176	403	423								
Volume to Capacity	0.01	0.01	0.09	0.04								
Queue Length 95th (m)	0.3	0.1	2.2	1.1								
Control Delay (s)	0.5	0.3	14.8	13.9								
Lane LOS	A	A	B	B								
Approach Delay (s)	0.5	0.3	14.8	13.9								
Approach LOS			B	B								
Intersection Summary												
Average Delay			1.4									
Intersection Capacity Utilization			36.4%		ICU Level of Service				A			
Analysis Period (min)			15									

Queues
5: St. Vincent St & Rose St

Rose Street Affordable Housing
BG (2030) - AM (w. Dead End)

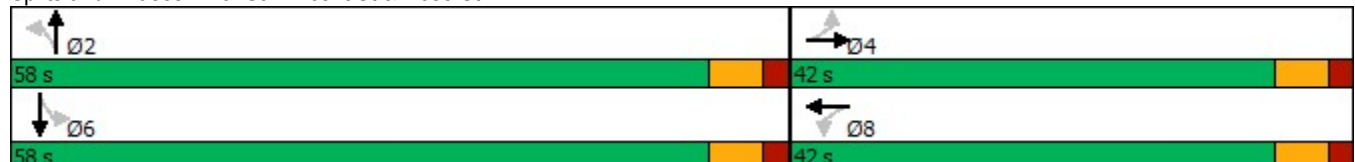


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations		↔		↔	↔	↔	↔	↔
Traffic Volume (vph)	163	20	12	34	59	467	12	449
Future Volume (vph)	163	20	12	34	59	467	12	449
Lane Group Flow (vph)	0	224	0	78	64	518	13	579
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	24.0	24.0	24.0	24.0
Minimum Split (s)	33.0	33.0	33.0	33.0	30.0	30.0	30.0	30.0
Total Split (s)	42.0	42.0	42.0	42.0	58.0	58.0	58.0	58.0
Total Split (%)	42.0%	42.0%	42.0%	42.0%	58.0%	58.0%	58.0%	58.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		6.0		6.0	6.0	6.0	6.0	6.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	Max	Max	Max	Max
v/c Ratio		0.74		0.20	0.13	0.23	0.02	0.26
Control Delay		44.3		18.5	8.6	7.7	8.0	7.5
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0
Total Delay		44.3		18.5	8.6	7.7	8.0	7.5
Queue Length 50th (m)		31.9		6.3	3.6	16.4	0.7	17.7
Queue Length 95th (m)		54.8		16.4	11.2	31.3	3.4	33.9
Internal Link Dist (m)		114.8		126.2		135.5		109.5
Turn Bay Length (m)					25.0		25.0	
Base Capacity (vph)		569		727	508	2260	546	2207
Starvation Cap Reductn		0		0	0	0	0	0
Spillback Cap Reductn		0		0	0	0	0	0
Storage Cap Reductn		0		0	0	0	0	0
Reduced v/c Ratio		0.39		0.11	0.13	0.23	0.02	0.26

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 84.4
Natural Cycle: 65
Control Type: Semi Act-Uncoord

Splits and Phases: 5: St. Vincent St & Rose St



HCM Signalized Intersection Capacity Analysis

5: St. Vincent St & Rose St

Rose Street Affordable Housing
BG (2030) - AM (w. Dead End)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	163	20	23	12	34	26	59	467	9	12	449	84
Future Volume (vph)	163	20	23	12	34	26	59	467	9	12	449	84
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00			0.99		1.00	1.00		1.00	0.99	
Flpb, ped/bikes		1.00			1.00		0.99	1.00		0.99	1.00	
Frt		0.98			0.95		1.00	1.00		1.00	0.98	
Flt Protected		0.96			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1773			1764		1770	3566		1778	3470	
Flt Permitted		0.72			0.94		0.43	1.00		0.46	1.00	
Satd. Flow (perm)		1325			1665		804	3566		862	3470	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	177	22	25	13	37	28	64	508	10	13	488	91
RTOR Reduction (vph)	0	5	0	0	22	0	0	1	0	0	12	0
Lane Group Flow (vph)	0	219	0	0	56	0	64	517	0	13	567	0
Confl. Peds. (#/hr)	5		10	10		5	10		5	5		10
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		18.9			18.9		53.5	53.5		53.5	53.5	
Effective Green, g (s)		18.9			18.9		53.5	53.5		53.5	53.5	
Actuated g/C Ratio		0.22			0.22		0.63	0.63		0.63	0.63	
Clearance Time (s)		6.0			6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		296			372		509	2260		546	2199	
v/s Ratio Prot								0.14				c0.16
v/s Ratio Perm		c0.16			0.03		0.08			0.02		
v/c Ratio		0.74			0.15		0.13	0.23		0.02	0.26	
Uniform Delay, d1		30.5			26.3		6.1	6.6		5.7	6.8	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		9.3			0.2		0.5	0.2		0.1	0.3	
Delay (s)		39.7			26.5		6.7	6.9		5.8	7.0	
Level of Service		D			C		A	A		A	A	
Approach Delay (s)		39.7			26.5			6.8			7.0	
Approach LOS		D			C			A			A	
Intersection Summary												
HCM 2000 Control Delay			12.9			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.38									
Actuated Cycle Length (s)			84.4			Sum of lost time (s)			12.0			
Intersection Capacity Utilization			73.8%			ICU Level of Service				D		
Analysis Period (min)			15									
c Critical Lane Group												

Queues

1: Bayfield St & Hwy 400 NB Off/Rose St

Rose Street Affordable Housing

BG (2033) - PM (w. Dead End)



Lane Group	EBL	EBT	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	1123	0	1100	202	233	751
Future Volume (vph)	1123	0	1100	202	233	751
Lane Group Flow (vph)	1221	450	1196	220	253	816
Turn Type	Perm	NA	NA	Perm	pm+pt	NA
Protected Phases		4	2		1	6
Permitted Phases	4			2	6	
Detector Phase	4	4	2	2	1	6
Switch Phase						
Minimum Initial (s)	12.0	12.0	24.0	24.0	7.0	24.0
Minimum Split (s)	30.0	30.0	30.0	30.0	11.5	30.0
Total Split (s)	64.0	64.0	65.0	65.0	21.0	86.0
Total Split (%)	42.7%	42.7%	43.3%	43.3%	14.0%	57.3%
Yellow Time (s)	4.0	4.0	4.0	4.0	3.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	4.0	6.0
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?			Yes	Yes	Yes	
Recall Mode	None	None	C-Max	C-Max	None	C-Max
v/c Ratio	0.93	0.67	0.57	0.33	0.84	0.29
Control Delay	57.6	32.0	36.1	16.5	47.8	19.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	57.6	32.0	36.1	16.5	47.8	19.5
Queue Length 50th (m)	177.1	79.3	102.4	21.3	39.2	48.0
Queue Length 95th (m)	#218.7	118.9	117.6	42.2	#81.8	57.0
Internal Link Dist (m)		579.4	203.2			180.4
Turn Bay Length (m)				35.0	115.0	
Base Capacity (vph)	1329	680	2089	676	311	2769
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.92	0.66	0.57	0.33	0.81	0.29

Intersection Summary

Cycle Length: 150

Actuated Cycle Length: 150

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

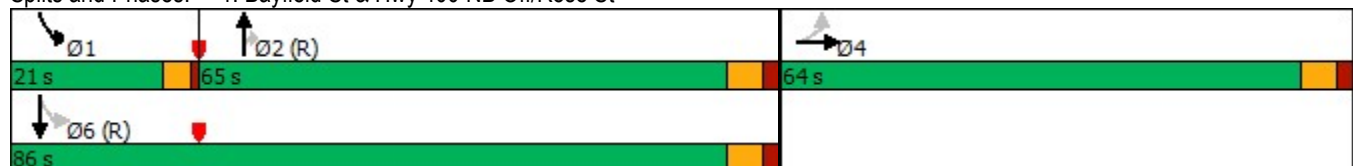
Natural Cycle: 80

Control Type: Actuated-Coordinated

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

Queue shown is maximum after two cycles.

Splits and Phases: 1: Bayfield St & Hwy 400 NB Off/Rose St



07/08/2024

JL

Synchro 11 Report

Page 1

HCM Signalized Intersection Capacity Analysis

1: Bayfield St & Hwy 400 NB Off/Rose St

Rose Street Affordable Housing

BG (2033) - PM (w. Dead End)

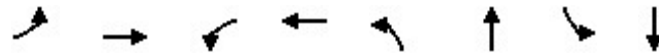
												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	 							  			  	
Traffic Volume (vph)	1123	0	414	0	0	0	0	1100	202	233	751	0
Future Volume (vph)	1123	0	414	0	0	0	0	1100	202	233	751	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0						6.0	6.0	4.0	6.0	
Lane Util. Factor	0.97	1.00						0.91	1.00	1.00	0.91	
Frpb, ped/bikes	1.00	0.97						1.00	0.94	1.00	1.00	
Flpb, ped/bikes	0.99	1.00						1.00	1.00	1.00	1.00	
Frt	1.00	0.85						1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00						1.00	1.00	0.95	1.00	
Satd. Flow (prot)	3439	1552						5142	1504	1789	5142	
Flt Permitted	0.95	1.00						1.00	1.00	0.13	1.00	
Satd. Flow (perm)	3439	1552						5142	1504	249	5142	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1221	0	450	0	0	0	0	1196	220	253	816	0
RTOR Reduction (vph)	0	81	0	0	0	0	0	0	66	0	0	0
Lane Group Flow (vph)	1221	369	0	0	0	0	0	1196	154	253	816	0
Confl. Peds. (#/hr)	5		10	10		5	20		10	10		20
Turn Type	Perm	NA						NA	Perm	pm+pt	NA	
Protected Phases		4						2		1	6	
Permitted Phases	4								2	6		
Actuated Green, G (s)	57.2	57.2						61.0	61.0	80.8	80.8	
Effective Green, g (s)	57.2	57.2						61.0	61.0	80.8	80.8	
Actuated g/C Ratio	0.38	0.38						0.41	0.41	0.54	0.54	
Clearance Time (s)	6.0	6.0						6.0	6.0	4.0	6.0	
Vehicle Extension (s)	3.0	3.0						3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	1311	591						2091	611	296	2769	
v/s Ratio Prot		0.24						0.23		c0.09	0.16	
v/s Ratio Perm	c0.36								0.10	c0.37		
v/c Ratio	0.93	0.62						0.57	0.25	0.85	0.29	
Uniform Delay, d1	44.5	37.7						34.4	29.4	25.1	19.0	
Progression Factor	1.00	1.00						1.00	1.00	1.00	1.00	
Incremental Delay, d2	11.9	2.1						1.1	1.0	20.7	0.3	
Delay (s)	56.4	39.7						35.5	30.4	45.8	19.2	
Level of Service	E	D						D	C	D	B	
Approach Delay (s)		51.9			0.0			34.8			25.5	
Approach LOS		D			A			C			C	
Intersection Summary												
HCM 2000 Control Delay		39.3			HCM 2000 Level of Service			D				
HCM 2000 Volume to Capacity ratio		0.90										
Actuated Cycle Length (s)		150.0			Sum of lost time (s)			16.0				
Intersection Capacity Utilization		79.5%			ICU Level of Service			D				
Analysis Period (min)		15										
c Critical Lane Group												

Queues

2: Bayfield St & Grove St

Rose Street Affordable Housing

BG (2033) - PM (w. Dead End)



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	143	35	52	43	12	950	255	734
Future Volume (vph)	143	35	52	43	12	950	255	734
Lane Group Flow (vph)	155	47	57	256	13	1135	277	989
Turn Type	pm+pt	NA	Perm	NA	Perm	NA	pm+pt	NA
Protected Phases	7	4		8		2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	7	4	8	8	2	2	1	6
Switch Phase								
Minimum Initial (s)	7.0	10.0	10.0	10.0	24.0	24.0	7.0	24.0
Minimum Split (s)	11.0	30.0	30.0	30.0	30.0	30.0	11.0	30.0
Total Split (s)	11.0	44.0	33.0	33.0	38.0	38.0	18.0	56.0
Total Split (%)	11.0%	44.0%	33.0%	33.0%	38.0%	38.0%	18.0%	56.0%
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0	4.0	3.0	4.0
All-Red Time (s)	1.0	2.0	2.0	2.0	2.0	2.0	1.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0	6.0	6.0	6.0	6.0	4.0	6.0
Lead/Lag	Lead		Lag	Lag	Lag	Lag	Lead	
Lead-Lag Optimize?	Yes		Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	None	None	None	Max	Max	None	Max
v/c Ratio	0.62	0.10	0.32	0.64	0.06	0.81	0.76	0.48
Control Delay	35.6	20.2	37.8	16.5	18.7	29.2	31.2	10.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.6	20.2	37.8	16.5	18.7	29.2	31.2	10.5
Queue Length 50th (m)	19.3	4.6	8.4	6.9	1.3	82.9	24.4	39.5
Queue Length 95th (m)	34.2	12.2	19.0	28.6	5.4	#131.8	#63.6	63.2
Internal Link Dist (m)		140.8		181.1		201.3		203.2
Turn Bay Length (m)	20.0		25.0		30.0		200.0	
Base Capacity (vph)	248	825	432	661	214	1395	388	2061
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.63	0.06	0.13	0.39	0.06	0.81	0.71	0.48

Intersection Summary

Cycle Length: 100

Actuated Cycle Length: 84.4

Natural Cycle: 85

Control Type: Semi Act-Uncoord

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

Queue shown is maximum after two cycles.

Splits and Phases: 2: Bayfield St & Grove St



HCM Signalized Intersection Capacity Analysis

2: Bayfield St & Grove St

Rose Street Affordable Housing

BG (2033) - PM (w. Dead End)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	143	35	8	52	43	192	12	950	94	255	734	176
Future Volume (vph)	143	35	8	52	43	192	12	950	94	255	734	176
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		6.0	6.0		6.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	0.98		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		0.99	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.97		1.00	0.88		1.00	0.99		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1787	1822		1772	1623		1781	3518		1789	3450	
Flt Permitted	0.26	1.00		0.73	1.00		0.29	1.00		0.11	1.00	
Satd. Flow (perm)	492	1822		1355	1623		543	3518		202	3450	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	155	38	9	57	47	209	13	1033	102	277	798	191
RTOR Reduction (vph)	0	7	0	0	181	0	0	7	0	0	17	0
Lane Group Flow (vph)	155	40	0	57	75	0	13	1128	0	277	972	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	22.3	22.3		11.3	11.3		33.3	33.3		50.0	50.0	
Effective Green, g (s)	22.3	22.3		11.3	11.3		33.3	33.3		50.0	50.0	
Actuated g/C Ratio	0.26	0.26		0.13	0.13		0.40	0.40		0.59	0.59	
Clearance Time (s)	4.0	6.0		6.0	6.0		6.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	237	481		181	217		214	1389		358	2046	
v/s Ratio Prot	c0.05	0.02			0.05			0.32		c0.12	0.28	
v/s Ratio Perm	c0.12			0.04			0.02			c0.34		
v/c Ratio	0.65	0.08		0.31	0.35		0.06	0.81		0.77	0.48	
Uniform Delay, d1	25.6	23.3		33.0	33.1		15.8	22.7		19.2	9.7	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	6.3	0.1		1.0	1.0		0.5	5.3		10.0	0.8	
Delay (s)	32.0	23.4		34.0	34.1		16.3	28.0		29.2	10.5	
Level of Service	C	C		C	C		B	C		C	B	
Approach Delay (s)		30.0			34.1			27.9			14.6	
Approach LOS		C			C			C			B	
Intersection Summary												
HCM 2000 Control Delay			22.9			HCM 2000 Level of Service			C			
HCM 2000 Volume to Capacity ratio			0.80									
Actuated Cycle Length (s)			84.3			Sum of lost time (s)			20.0			
Intersection Capacity Utilization			88.7%			ICU Level of Service			E			
Analysis Period (min)			15									
c Critical Lane Group												

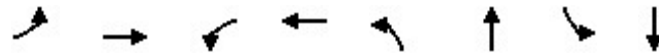
HCM Unsignalized Intersection Capacity Analysis4: Peel St & Grove St

Rose Street Affordable Housing
BG (2033) - PM (w. Dead End)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	21	324	32	8	255	4	18	19	3	0	12	18
Future Volume (Veh/h)	21	324	32	8	255	4	18	19	3	0	12	18
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
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)	23	352	35	9	277	4	20	21	3	0	13	20
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	281			387			739	714	370	726	730	279
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	281			387			739	714	370	726	730	279
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	98			99			94	94	100	100	96	97
cM capacity (veh/h)	1282			1171			309	347	676	317	340	760
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	410	290	44	33								
Volume Left	23	9	20	0								
Volume Right	35	4	3	20								
cSH	1282	1171	339	511								
Volume to Capacity	0.02	0.01	0.13	0.06								
Queue Length 95th (m)	0.4	0.2	3.4	1.6								
Control Delay (s)	0.6	0.3	17.2	12.5								
Lane LOS	A	A	C	B								
Approach Delay (s)	0.6	0.3	17.2	12.5								
Approach LOS			C	B								
Intersection Summary												
Average Delay			1.9									
Intersection Capacity Utilization			43.9%		ICU Level of Service				A			
Analysis Period (min)			15									

Queues
5: St. Vincent St & Rose St

Rose Street Affordable Housing
BG (2033) - PM (w. Dead End)

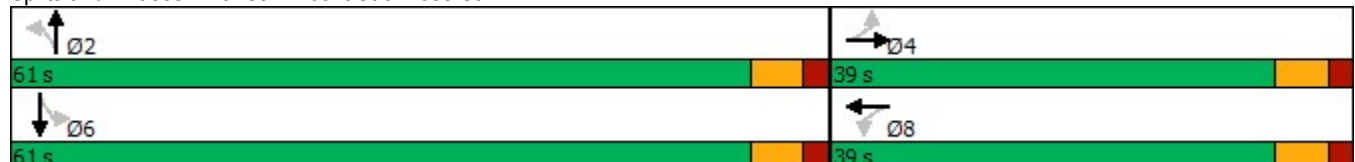


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations		↕		↕	↙	↕	↙	↕
Traffic Volume (vph)	189	19	6	21	34	601	47	642
Future Volume (vph)	189	19	6	21	34	601	47	642
Lane Group Flow (vph)	0	283	0	64	37	674	51	840
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	24.0	24.0	24.0	24.0
Minimum Split (s)	33.0	33.0	30.0	30.0	30.0	30.0	30.0	30.0
Total Split (s)	39.0	39.0	39.0	39.0	61.0	61.0	61.0	61.0
Total Split (%)	39.0%	39.0%	39.0%	39.0%	61.0%	61.0%	61.0%	61.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		6.0		6.0	6.0	6.0	6.0	6.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	Max	Max	Max	Max
v/c Ratio		0.81		0.14	0.11	0.31	0.12	0.40
Control Delay		48.0		14.6	10.4	9.7	10.2	10.1
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0
Total Delay		48.0		14.6	10.4	9.7	10.2	10.1
Queue Length 50th (m)		43.7		3.9	2.4	26.7	3.4	34.1
Queue Length 95th (m)		71.7		13.0	8.5	47.2	10.6	59.6
Internal Link Dist (m)		114.8		126.2		135.5		109.5
Turn Bay Length (m)					25.0		25.0	
Base Capacity (vph)		497		621	345	2178	429	2121
Starvation Cap Reductn		0		0	0	0	0	0
Spillback Cap Reductn		0		0	0	0	0	0
Storage Cap Reductn		0		0	0	0	0	0
Reduced v/c Ratio		0.57		0.10	0.11	0.31	0.12	0.40

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 90.7
Natural Cycle: 65
Control Type: Semi Act-Uncoord

Splits and Phases: 5: St. Vincent St & Rose St



HCM Signalized Intersection Capacity Analysis

5: St. Vincent St & Rose St

Rose Street Affordable Housing
BG (2033) - PM (w. Dead End)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	189	19	52	6	21	31	34	601	19	47	642	131
Future Volume (vph)	189	19	52	6	21	31	34	601	19	47	642	131
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		0.99			0.98		1.00	1.00		1.00	0.99	
Flpb, ped/bikes		0.99			1.00		0.99	1.00		0.99	1.00	
Frt		0.97			0.93		1.00	1.00		1.00	0.97	
Flt Protected		0.97			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1735			1709		1771	3552		1763	3438	
Flt Permitted		0.74			0.96		0.30	1.00		0.38	1.00	
Satd. Flow (perm)		1340			1643		565	3552		700	3438	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	205	21	57	7	23	34	37	653	21	51	698	142
RTOR Reduction (vph)	0	10	0	0	25	0	0	2	0	0	15	0
Lane Group Flow (vph)	0	273	0	0	39	0	37	672	0	51	825	0
Confl. Peds. (#/hr)	15		15	15		15	15		25	15		25
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		23.0			23.0		55.6	55.6		55.6	55.6	
Effective Green, g (s)		23.0			23.0		55.6	55.6		55.6	55.6	
Actuated g/C Ratio		0.25			0.25		0.61	0.61		0.61	0.61	
Clearance Time (s)		6.0			6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		340			417		346	2179		429	2109	
v/s Ratio Prot								0.19			c0.24	
v/s Ratio Perm		c0.20			0.02		0.07			0.07		
v/c Ratio		0.80			0.09		0.11	0.31		0.12	0.39	
Uniform Delay, d1		31.7			25.8		7.2	8.3		7.3	8.9	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		12.7			0.1		0.6	0.4		0.6	0.5	
Delay (s)		44.4			25.9		7.9	8.7		7.9	9.4	
Level of Service		D			C		A	A		A	A	
Approach Delay (s)		44.4			25.9			8.7			9.4	
Approach LOS		D			C			A			A	
Intersection Summary												
HCM 2000 Control Delay		14.7			HCM 2000 Level of Service			B				
HCM 2000 Volume to Capacity ratio		0.51										
Actuated Cycle Length (s)		90.6			Sum of lost time (s)			12.0				
Intersection Capacity Utilization		70.7%			ICU Level of Service			C				
Analysis Period (min)		15										
c Critical Lane Group												

Queues

1: Bayfield St & Hwy 400 NB Off/Rose St

Rose Street Affordable Housing

BG (2035) - AM (w. Dead End)



Lane Group	EBL	EBT	NBT	NBR	SBL	SBT
Lane Configurations	↰↰	↰	↰↰↰	↰	↰	↰↰↰
Traffic Volume (vph)	821	0	794	132	207	717
Future Volume (vph)	821	0	794	132	207	717
Lane Group Flow (vph)	892	377	863	143	225	779
Turn Type	Perm	NA	NA	Perm	pm+pt	NA
Protected Phases		4	2		1	6
Permitted Phases	4			2	6	
Detector Phase	4	4	2	2	1	6
Switch Phase						
Minimum Initial (s)	12.0	12.0	24.0	24.0	7.0	24.0
Minimum Split (s)	30.0	30.0	30.0	30.0	11.5	30.0
Total Split (s)	35.0	35.0	45.0	45.0	20.0	65.0
Total Split (%)	35.0%	35.0%	45.0%	45.0%	20.0%	65.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	3.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	4.0	6.0
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?			Yes	Yes	Yes	
Recall Mode	None	None	C-Max	C-Max	None	C-Max
v/c Ratio	0.91	0.65	0.38	0.19	0.52	0.25
Control Delay	48.3	21.7	19.8	3.9	13.1	10.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	48.3	21.7	19.8	3.9	13.1	10.0
Queue Length 50th (m)	85.1	32.4	40.2	0.0	18.0	24.8
Queue Length 95th (m)	#118.7	63.9	53.9	11.1	28.9	31.5
Internal Link Dist (m)		579.4	203.2			180.4
Turn Bay Length (m)				35.0	115.0	
Base Capacity (vph)	1000	584	2275	754	499	3055
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.89	0.65	0.38	0.19	0.45	0.25

Intersection Summary

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 20 (20%), Referenced to phase 2:NBT and 6:SBTL, Start of Green

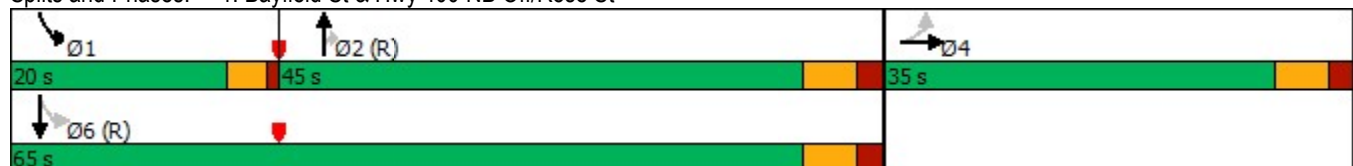
Natural Cycle: 75

Control Type: Actuated-Coordinated

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

Queue shown is maximum after two cycles.

Splits and Phases: 1: Bayfield St & Hwy 400 NB Off/Rose St



07/08/2024

JL

Synchro 11 Report

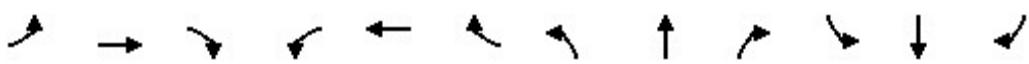
Page 1

HCM Signalized Intersection Capacity Analysis

1: Bayfield St & Hwy 400 NB Off/Rose St

Rose Street Affordable Housing

BG (2035) - AM (w. Dead End)

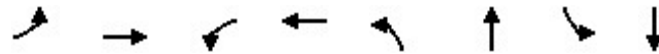
												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰↱	↱						↰↱↲	↱	↰	↰↱↲	
Traffic Volume (vph)	821	0	347	0	0	0	0	794	132	207	717	0
Future Volume (vph)	821	0	347	0	0	0	0	794	132	207	717	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0						6.0	6.0	4.0	6.0	
Lane Util. Factor	0.97	1.00						0.91	1.00	1.00	0.91	
Frpb, ped/bikes	1.00	0.98						1.00	0.95	1.00	1.00	
Flpb, ped/bikes	0.99	1.00						1.00	1.00	1.00	1.00	
Frt	1.00	0.85						1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00						1.00	1.00	0.95	1.00	
Satd. Flow (prot)	3449	1572						5142	1525	1787	5142	
Flt Permitted	0.95	1.00						1.00	1.00	0.25	1.00	
Satd. Flow (perm)	3449	1572						5142	1525	473	5142	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	892	0	377	0	0	0	0	863	143	225	779	0
RTOR Reduction (vph)	0	129	0	0	0	0	0	0	80	0	0	0
Lane Group Flow (vph)	892	248	0	0	0	0	0	863	63	225	779	0
Confl. Peds. (#/hr)	5		5	5		5	15		10	10		15
Turn Type	Perm	NA						NA	Perm	pm+pt	NA	
Protected Phases		4						2		1	6	
Permitted Phases	4								2	6		
Actuated Green, G (s)	28.6	28.6						44.2	44.2	59.4	59.4	
Effective Green, g (s)	28.6	28.6						44.2	44.2	59.4	59.4	
Actuated g/C Ratio	0.29	0.29						0.44	0.44	0.59	0.59	
Clearance Time (s)	6.0	6.0						6.0	6.0	4.0	6.0	
Vehicle Extension (s)	3.0	3.0						3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	986	449						2272	674	428	3054	
v/s Ratio Prot		0.16						0.17		c0.06	0.15	
v/s Ratio Perm	c0.26								0.04	c0.25		
v/c Ratio	0.90	0.55						0.38	0.09	0.53	0.26	
Uniform Delay, d1	34.4	30.3						18.7	16.2	10.2	9.7	
Progression Factor	1.00	1.00						1.00	1.00	1.00	1.00	
Incremental Delay, d2	11.5	1.5						0.5	0.3	1.2	0.2	
Delay (s)	45.9	31.7						19.2	16.5	11.4	9.9	
Level of Service	D	C						B	B	B	A	
Approach Delay (s)		41.7			0.0			18.8			10.2	
Approach LOS		D			A			B			B	
Intersection Summary												
HCM 2000 Control Delay		25.0			HCM 2000 Level of Service			C				
HCM 2000 Volume to Capacity ratio		0.67										
Actuated Cycle Length (s)		100.0			Sum of lost time (s)			16.0				
Intersection Capacity Utilization		68.2%			ICU Level of Service			C				
Analysis Period (min)		15										
c Critical Lane Group												

Queues

2: Bayfield St & Grove St

Rose Street Affordable Housing

BG (2035) - AM (w. Dead End)



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	193	39	105	43	3	450	214	784
Future Volume (vph)	193	39	105	43	3	450	214	784
Lane Group Flow (vph)	210	64	114	236	3	569	233	912
Turn Type	pm+pt	NA	Perm	NA	Perm	NA	pm+pt	NA
Protected Phases	7	4		8		2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	7	4	8	8	2	2	1	6
Switch Phase								
Minimum Initial (s)	7.0	10.0	10.0	10.0	24.0	24.0	7.0	24.0
Minimum Split (s)	11.0	30.0	30.0	30.0	30.0	30.0	11.0	30.0
Total Split (s)	15.0	51.0	36.0	36.0	38.0	38.0	11.0	49.0
Total Split (%)	15.0%	51.0%	36.0%	36.0%	38.0%	38.0%	11.0%	49.0%
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0	4.0	3.0	4.0
All-Red Time (s)	1.0	2.0	2.0	2.0	2.0	2.0	1.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0	6.0	6.0	6.0	6.0	4.0	6.0
Lead/Lag	Lead		Lag	Lag	Lag	Lag	Lead	
Lead-Lag Optimize?	Yes		Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	None	None	None	Max	Max	None	Max
v/c Ratio	0.58	0.11	0.55	0.57	0.01	0.42	0.52	0.49
Control Delay	26.1	13.8	42.7	14.2	17.7	19.5	15.5	14.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.1	13.8	42.7	14.2	17.7	19.5	15.5	14.2
Queue Length 50th (m)	23.6	4.5	16.8	6.5	0.3	32.1	17.6	44.8
Queue Length 95th (m)	39.7	12.3	32.3	26.2	2.1	50.4	34.5	69.0
Internal Link Dist (m)		140.8		181.1		201.3		203.2
Turn Bay Length (m)	20.0		25.0		30.0		200.0	
Base Capacity (vph)	366	977	486	714	228	1362	444	1847
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.57	0.07	0.23	0.33	0.01	0.42	0.52	0.49

Intersection Summary

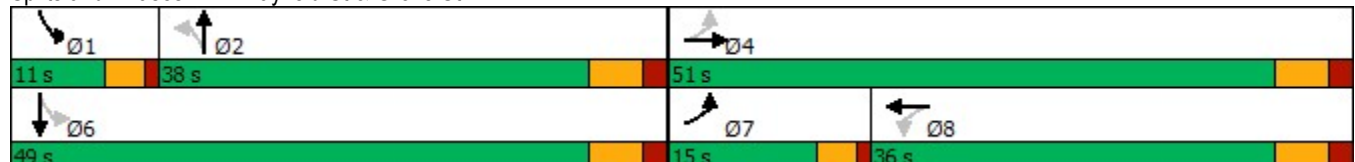
Cycle Length: 100

Actuated Cycle Length: 82.6

Natural Cycle: 85

Control Type: Semi Act-Uncoord

Splits and Phases: 2: Bayfield St & Grove St



HCM Signalized Intersection Capacity Analysis

2: Bayfield St & Grove St

Rose Street Affordable Housing

BG (2035) - AM (w. Dead End)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	193	39	20	105	43	174	3	450	74	214	784	55
Future Volume (vph)	193	39	20	105	43	174	3	450	74	214	784	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		6.0	6.0		6.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.95		1.00	0.88		1.00	0.98		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1788	1776		1781	1635		1785	3485		1786	3537	
Flt Permitted	0.30	1.00		0.72	1.00		0.31	1.00		0.34	1.00	
Satd. Flow (perm)	570	1776		1341	1635		588	3485		639	3537	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	210	42	22	114	47	189	3	489	80	233	852	60
RTOR Reduction (vph)	0	15	0	0	160	0	0	12	0	0	4	0
Lane Group Flow (vph)	210	49	0	114	76	0	3	557	0	233	908	0
Confl. Peds. (#/hr)	5		5	5		5	5		10	10		5
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	27.6	27.6		12.9	12.9		32.1	32.1		43.1	43.1	
Effective Green, g (s)	27.6	27.6		12.9	12.9		32.1	32.1		43.1	43.1	
Actuated g/C Ratio	0.33	0.33		0.16	0.16		0.39	0.39		0.52	0.52	
Clearance Time (s)	4.0	6.0		6.0	6.0		6.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	347	592		209	255		228	1352		430	1843	
v/s Ratio Prot	c0.08	0.03			0.05			0.16		0.05	c0.26	
v/s Ratio Perm	c0.12			0.09			0.01			c0.24		
v/c Ratio	0.61	0.08		0.55	0.30		0.01	0.41		0.54	0.49	
Uniform Delay, d1	21.3	18.9		32.2	30.9		15.6	18.4		11.5	12.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.0	0.1		2.9	0.7		0.1	0.9		1.4	0.9	
Delay (s)	24.3	18.9		35.1	31.6		15.7	19.4		12.9	13.7	
Level of Service	C	B		D	C		B	B		B	B	
Approach Delay (s)		23.1			32.7			19.3			13.5	
Approach LOS		C			C			B			B	
Intersection Summary												
HCM 2000 Control Delay			18.9			HCM 2000 Level of Service			B			
HCM 2000 Volume to Capacity ratio			0.62									
Actuated Cycle Length (s)			82.7			Sum of lost time (s)			20.0			
Intersection Capacity Utilization			86.9%			ICU Level of Service			E			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

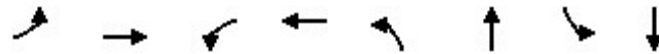
4: Peel St & Grove St

Rose Street Affordable Housing
BG (2035) - AM (w. Dead End)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	17	357	12	6	261	8	9	17	10	6	5	6
Future Volume (Veh/h)	17	357	12	6	261	8	9	17	10	6	5	6
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	18	388	13	7	284	9	10	18	11	7	5	7
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None				None							
Median storage veh												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	293			401			742	738	394	753	740	288
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	293			401			742	738	394	753	740	288
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			97	95	98	98	99	99
cM capacity (veh/h)	1269			1158			320	339	655	303	338	751
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	419	300	39	19								
Volume Left	18	7	10	7								
Volume Right	13	9	11	7								
cSH	1269	1158	385	402								
Volume to Capacity	0.01	0.01	0.10	0.05								
Queue Length 95th (m)	0.3	0.1	2.5	1.1								
Control Delay (s)	0.5	0.2	15.4	14.4								
Lane LOS	A	A	C	B								
Approach Delay (s)	0.5	0.2	15.4	14.4								
Approach LOS			C	B								
Intersection Summary												
Average Delay			1.5									
Intersection Capacity Utilization			38.1%		ICU Level of Service				A			
Analysis Period (min)			15									

Queues
5: St. Vincent St & Rose St

Rose Street Affordable Housing
BG (2035) - AM (w. Dead End)

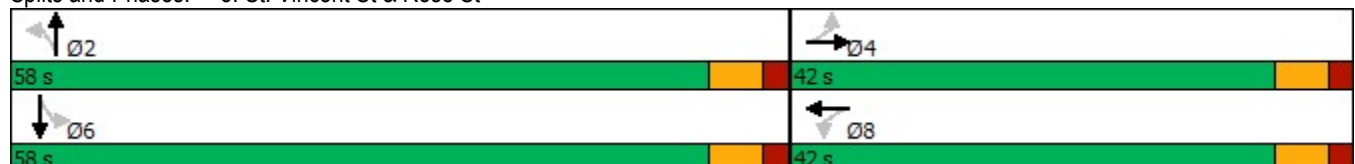


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations		↕		↕	↙	↕	↙	↕
Traffic Volume (vph)	172	21	13	35	62	491	13	472
Future Volume (vph)	172	21	13	35	62	491	13	472
Lane Group Flow (vph)	0	237	0	81	67	545	14	610
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	24.0	24.0	24.0	24.0
Minimum Split (s)	33.0	33.0	33.0	33.0	30.0	30.0	30.0	30.0
Total Split (s)	42.0	42.0	42.0	42.0	58.0	58.0	58.0	58.0
Total Split (%)	42.0%	42.0%	42.0%	42.0%	58.0%	58.0%	58.0%	58.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		6.0		6.0	6.0	6.0	6.0	6.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	Max	Max	Max	Max
v/c Ratio		0.74		0.20	0.14	0.24	0.03	0.28
Control Delay		43.0		18.2	9.2	8.2	8.4	8.1
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0
Total Delay		43.0		18.2	9.2	8.2	8.4	8.1
Queue Length 50th (m)		34.1		6.6	4.0	18.1	0.8	19.7
Queue Length 95th (m)		57.6		16.9	12.3	34.3	3.7	37.4
Internal Link Dist (m)		114.8		126.2		135.5		109.5
Turn Bay Length (m)					25.0		25.0	
Base Capacity (vph)		579		721	480	2229	524	2178
Starvation Cap Reductn		0		0	0	0	0	0
Spillback Cap Reductn		0		0	0	0	0	0
Storage Cap Reductn		0		0	0	0	0	0
Reduced v/c Ratio		0.41		0.11	0.14	0.24	0.03	0.28

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 85.1
Natural Cycle: 65
Control Type: Semi Act-Uncoord

Splits and Phases: 5: St. Vincent St & Rose St



HCM Signalized Intersection Capacity Analysis

5: St. Vincent St & Rose St

Rose Street Affordable Housing
BG (2035) - AM (w. Dead End)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	172	21	25	13	35	27	62	491	10	13	472	89
Future Volume (vph)	172	21	25	13	35	27	62	491	10	13	472	89
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00			0.99		1.00	1.00		1.00	0.99	
Flpb, ped/bikes		1.00			1.00		0.99	1.00		0.99	1.00	
Frt		0.98			0.95		1.00	1.00		1.00	0.98	
Flt Protected		0.96			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1773			1764		1771	3565		1779	3468	
Flt Permitted		0.74			0.93		0.41	1.00		0.45	1.00	
Satd. Flow (perm)		1355			1659		771	3565		839	3468	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	187	23	27	14	38	29	67	534	11	14	513	97
RTOR Reduction (vph)	0	5	0	0	22	0	0	1	0	0	12	0
Lane Group Flow (vph)	0	232	0	0	59	0	67	544	0	14	598	0
Confl. Peds. (#/hr)	5		10	10		5	10		5	5		10
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		19.8			19.8		53.2	53.2		53.2	53.2	
Effective Green, g (s)		19.8			19.8		53.2	53.2		53.2	53.2	
Actuated g/C Ratio		0.23			0.23		0.63	0.63		0.63	0.63	
Clearance Time (s)		6.0			6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		315			386		482	2231		525	2170	
v/s Ratio Prot								0.15				c0.17
v/s Ratio Perm		c0.17			0.04		0.09			0.02		
v/c Ratio		0.74			0.15		0.14	0.24		0.03	0.28	
Uniform Delay, d1		30.2			25.9		6.5	7.0		6.0	7.2	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		8.6			0.2		0.6	0.3		0.1	0.3	
Delay (s)		38.8			26.1		7.1	7.3		6.1	7.5	
Level of Service		D			C		A	A		A	A	
Approach Delay (s)		38.8			26.1			7.3			7.5	
Approach LOS		D			C			A			A	
Intersection Summary												
HCM 2000 Control Delay		13.1			HCM 2000 Level of Service			B				
HCM 2000 Volume to Capacity ratio		0.40										
Actuated Cycle Length (s)		85.0			Sum of lost time (s)			12.0				
Intersection Capacity Utilization		74.2%			ICU Level of Service			D				
Analysis Period (min)		15										
c Critical Lane Group												

Queues

1: Bayfield St & Hwy 400 NB Off/Rose St

Rose Street Affordable Housing

BG (2035) - PM (w. Dead End)



Lane Group	EBL	EBT	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	1181	0	1156	212	245	789
Future Volume (vph)	1181	0	1156	212	245	789
Lane Group Flow (vph)	1284	473	1257	230	266	858
Turn Type	Perm	NA	NA	Perm	pm+pt	NA
Protected Phases		4	2		1	6
Permitted Phases	4			2	6	
Detector Phase	4	4	2	2	1	6
Switch Phase						
Minimum Initial (s)	12.0	12.0	24.0	24.0	7.0	24.0
Minimum Split (s)	30.0	30.0	30.0	30.0	11.5	30.0
Total Split (s)	64.0	64.0	65.0	65.0	21.0	86.0
Total Split (%)	42.7%	42.7%	43.3%	43.3%	14.0%	57.3%
Yellow Time (s)	4.0	4.0	4.0	4.0	3.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	4.0	6.0
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?			Yes	Yes	Yes	
Recall Mode	None	None	C-Max	C-Max	None	C-Max
v/c Ratio	0.97	0.70	0.62	0.35	0.91	0.31
Control Delay	62.7	35.1	37.9	17.5	64.0	20.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	62.7	35.1	37.9	17.5	64.0	20.0
Queue Length 50th (m)	191.9	90.6	109.4	23.6	49.5	50.9
Queue Length 95th (m)	#238.7	132.9	125.0	45.0	#100.5	60.2
Internal Link Dist (m)		579.4	203.2			180.4
Turn Bay Length (m)				35.0	115.0	
Base Capacity (vph)	1329	672	2035	662	295	2742
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.97	0.70	0.62	0.35	0.90	0.31

Intersection Summary

Cycle Length: 150

Actuated Cycle Length: 150

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

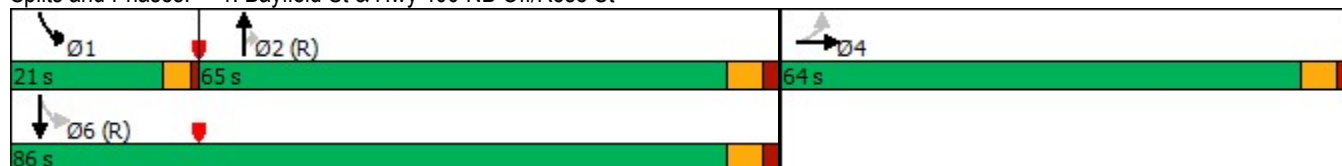
Natural Cycle: 90

Control Type: Actuated-Coordinated

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

Queue shown is maximum after two cycles.

Splits and Phases: 1: Bayfield St & Hwy 400 NB Off/Rose St



HCM Signalized Intersection Capacity Analysis

1: Bayfield St & Hwy 400 NB Off/Rose St

Rose Street Affordable Housing

BG (2035) - PM (w. Dead End)

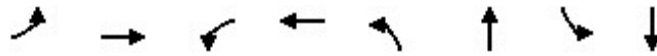
												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	 							  		 	  	
Traffic Volume (vph)	1181	0	435	0	0	0	0	1156	212	245	789	0
Future Volume (vph)	1181	0	435	0	0	0	0	1156	212	245	789	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0						6.0	6.0	4.0	6.0	
Lane Util. Factor	0.97	1.00						0.91	1.00	1.00	0.91	
Frpb, ped/bikes	1.00	0.97						1.00	0.94	1.00	1.00	
Flpb, ped/bikes	0.99	1.00						1.00	1.00	1.00	1.00	
Frt	1.00	0.85						1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00						1.00	1.00	0.95	1.00	
Satd. Flow (prot)	3439	1552						5142	1504	1789	5142	
Flt Permitted	0.95	1.00						1.00	1.00	0.11	1.00	
Satd. Flow (perm)	3439	1552						5142	1504	213	5142	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1284	0	473	0	0	0	0	1257	230	266	858	0
RTOR Reduction (vph)	0	72	0	0	0	0	0	0	67	0	0	0
Lane Group Flow (vph)	1284	401	0	0	0	0	0	1257	163	266	858	0
Confl. Peds. (#/hr)	5		10	10		5	20		10	10		20
Turn Type	Perm	NA						NA	Perm	pm+pt	NA	
Protected Phases		4						2		1	6	
Permitted Phases	4								2	6		
Actuated Green, G (s)	58.0	58.0						59.4	59.4	80.0	80.0	
Effective Green, g (s)	58.0	58.0						59.4	59.4	80.0	80.0	
Actuated g/C Ratio	0.39	0.39						0.40	0.40	0.53	0.53	
Clearance Time (s)	6.0	6.0						6.0	6.0	4.0	6.0	
Vehicle Extension (s)	3.0	3.0						3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	1329	600						2036	595	288	2742	
v/s Ratio Prot		0.26						0.24		c0.10	0.17	
v/s Ratio Perm	c0.37								0.11	c0.39		
v/c Ratio	0.97	0.67						0.62	0.27	0.92	0.31	
Uniform Delay, d1	45.0	38.0						36.2	30.7	33.7	19.6	
Progression Factor	1.00	1.00						1.00	1.00	1.00	1.00	
Incremental Delay, d2	17.1	2.8						1.4	1.1	33.4	0.3	
Delay (s)	62.1	40.8						37.6	31.8	67.2	19.9	
Level of Service	E	D						D	C	E	B	
Approach Delay (s)		56.4			0.0			36.7			31.1	
Approach LOS		E			A			D			C	
Intersection Summary												
HCM 2000 Control Delay		43.2			HCM 2000 Level of Service			D				
HCM 2000 Volume to Capacity ratio		0.96										
Actuated Cycle Length (s)		150.0			Sum of lost time (s)			16.0				
Intersection Capacity Utilization		82.9%			ICU Level of Service			E				
Analysis Period (min)		15										
c Critical Lane Group												

Queues

2: Bayfield St & Grove St

Rose Street Affordable Housing

BG (2035) - PM (w. Dead End)



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	150	36	55	45	13	999	268	772
Future Volume (vph)	150	36	55	45	13	999	268	772
Lane Group Flow (vph)	163	49	60	269	14	1194	291	1040
Turn Type	pm+pt	NA	Perm	NA	Perm	NA	pm+pt	NA
Protected Phases	7	4		8		2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	7	4	8	8	2	2	1	6
Switch Phase								
Minimum Initial (s)	7.0	10.0	10.0	10.0	24.0	24.0	7.0	24.0
Minimum Split (s)	11.0	30.0	30.0	30.0	30.0	30.0	11.0	30.0
Total Split (s)	11.0	44.0	33.0	33.0	38.0	38.0	18.0	56.0
Total Split (%)	11.0%	44.0%	33.0%	33.0%	38.0%	38.0%	18.0%	56.0%
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0	4.0	3.0	4.0
All-Red Time (s)	1.0	2.0	2.0	2.0	2.0	2.0	1.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0	6.0	6.0	6.0	6.0	4.0	6.0
Lead/Lag	Lead		Lag	Lag	Lag	Lag	Lead	
Lead-Lag Optimize?	Yes		Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	None	None	None	Max	Max	None	Max
v/c Ratio	0.66	0.10	0.33	0.66	0.07	0.87	0.78	0.51
Control Delay	37.6	19.9	38.0	16.6	19.1	32.8	32.9	10.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	37.6	19.9	38.0	16.6	19.1	32.8	32.9	10.9
Queue Length 50th (m)	20.5	4.7	8.9	7.2	1.4	89.4	26.6	42.5
Queue Length 95th (m)	#36.7	12.5	19.8	29.4	5.7	#144.9	#69.7	68.5
Internal Link Dist (m)		140.8		181.1		201.3		203.2
Turn Bay Length (m)	20.0		25.0		30.0		200.0	
Base Capacity (vph)	247	822	431	667	200	1373	388	2058
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.66	0.06	0.14	0.40	0.07	0.87	0.75	0.51

Intersection Summary

Cycle Length: 100

Actuated Cycle Length: 84.5

Natural Cycle: 85

Control Type: Semi Act-Uncoord

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

Queue shown is maximum after two cycles.

Splits and Phases: 2: Bayfield St & Grove St



HCM Signalized Intersection Capacity Analysis

2: Bayfield St & Grove St

Rose Street Affordable Housing

BG (2035) - PM (w. Dead End)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	150	36	9	55	45	202	13	999	99	268	772	185
Future Volume (vph)	150	36	9	55	45	202	13	999	99	268	772	185
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		6.0	6.0		6.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	0.98		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		0.99	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.97		1.00	0.88		1.00	0.99		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1787	1817		1772	1622		1782	3518		1789	3450	
Flt Permitted	0.26	1.00		0.73	1.00		0.28	1.00		0.11	1.00	
Satd. Flow (perm)	485	1817		1352	1622		517	3518		205	3450	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	163	39	10	60	49	220	14	1086	108	291	839	201
RTOR Reduction (vph)	0	7	0	0	190	0	0	7	0	0	17	0
Lane Group Flow (vph)	163	42	0	60	79	0	14	1187	0	291	1023	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	22.5	22.5		11.5	11.5		32.8	32.8		50.0	50.0	
Effective Green, g (s)	22.5	22.5		11.5	11.5		32.8	32.8		50.0	50.0	
Actuated g/C Ratio	0.27	0.27		0.14	0.14		0.39	0.39		0.59	0.59	
Clearance Time (s)	4.0	6.0		6.0	6.0		6.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	237	483		184	220		200	1365		368	2041	
v/s Ratio Prot	c0.06	0.02			0.05			c0.34		c0.12	0.30	
v/s Ratio Perm	c0.13			0.04			0.03			0.34		
v/c Ratio	0.69	0.09		0.33	0.36		0.07	0.87		0.79	0.50	
Uniform Delay, d1	25.8	23.3		33.0	33.2		16.3	23.9		20.2	10.0	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	8.0	0.1		1.0	1.0		0.7	7.8		11.0	0.9	
Delay (s)	33.8	23.4		34.0	34.2		16.9	31.7		31.2	10.9	
Level of Service	C	C		C	C		B	C		C	B	
Approach Delay (s)		31.4			34.1			31.5			15.3	
Approach LOS		C			C			C			B	
Intersection Summary												
HCM 2000 Control Delay			24.8			HCM 2000 Level of Service			C			
HCM 2000 Volume to Capacity ratio			0.83									
Actuated Cycle Length (s)			84.5			Sum of lost time (s)			20.0			
Intersection Capacity Utilization			91.0%			ICU Level of Service			E			
Analysis Period (min)			15									
c Critical Lane Group												

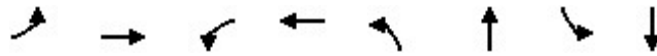
HCM Unsignalized Intersection Capacity Analysis4: Peel St & Grove St

Rose Street Affordable Housing
BG (2035) - PM (w. Dead End)

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (veh/h)	22	341	34	9	268	4	19	20	3	0	13	19	
Future Volume (Veh/h)	22	341	34	9	268	4	19	20	3	0	13	19	
Sign Control		Free			Free			Stop			Stop		
Grade		0%			0%			0%			0%		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Hourly flow rate (vph)	24	371	37	10	291	4	21	22	3	0	14	21	
Pedestrians													
Lane Width (m)													
Walking Speed (m/s)													
Percent Blockage													
Right turn flare (veh)													
Median type		None			None								
Median storage (veh)													
Upstream signal (m)													
pX, platoon unblocked													
vC, conflicting volume	295			408			778	752	390	764	769	293	
vC1, stage 1 conf vol													
vC2, stage 2 conf vol													
vCu, unblocked vol	295			408			778	752	390	764	769	293	
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2	
tC, 2 stage (s)													
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3	
p0 queue free %	98			99			93	93	100	100	96	97	
cM capacity (veh/h)	1266			1151			288	330	659	296	322	746	
Direction, Lane #	EB 1	WB 1	NB 1	SB 1									
Volume Total	432	305	46	35									
Volume Left	24	10	21	0									
Volume Right	37	4	3	21									
cSH	1266	1151	319	489									
Volume to Capacity	0.02	0.01	0.14	0.07									
Queue Length 95th (m)	0.4	0.2	3.8	1.8									
Control Delay (s)	0.6	0.4	18.2	12.9									
Lane LOS	A	A	C	B									
Approach Delay (s)	0.6	0.4	18.2	12.9									
Approach LOS			C	B									
Intersection Summary													
Average Delay			2.0										
Intersection Capacity Utilization			45.2%	ICU Level of Service				A					
Analysis Period (min)			15										

Queues
5: St. Vincent St & Rose St

Rose Street Affordable Housing
BG (2035) - PM (w. Dead End)

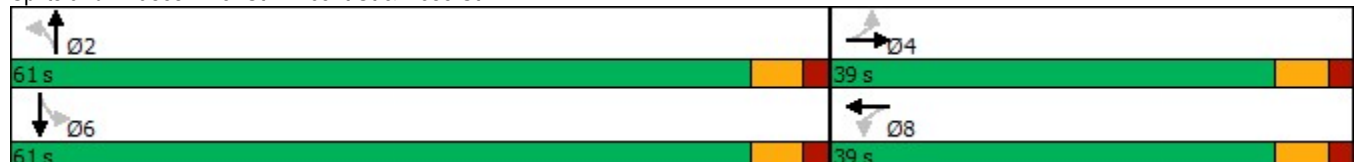


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations		↕		↕	↙	↕	↙	↕
Traffic Volume (vph)	198	20	6	23	35	632	49	674
Future Volume (vph)	198	20	6	23	35	632	49	674
Lane Group Flow (vph)	0	297	0	67	38	709	53	882
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	24.0	24.0	24.0	24.0
Minimum Split (s)	33.0	33.0	30.0	30.0	30.0	30.0	30.0	30.0
Total Split (s)	39.0	39.0	39.0	39.0	61.0	61.0	61.0	61.0
Total Split (%)	39.0%	39.0%	39.0%	39.0%	61.0%	61.0%	61.0%	61.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		6.0		6.0	6.0	6.0	6.0	6.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	Max	Max	Max	Max
v/c Ratio		0.83		0.15	0.12	0.33	0.13	0.42
Control Delay		49.6		14.6	10.9	10.2	10.7	10.7
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0
Total Delay		49.6		14.6	10.9	10.2	10.7	10.7
Queue Length 50th (m)		46.6		4.2	2.6	29.6	3.7	38.1
Queue Length 95th (m)		76.1		13.4	8.8	50.0	11.2	63.6
Internal Link Dist (m)		114.8		126.2		135.5		109.5
Turn Bay Length (m)					25.0		25.0	
Base Capacity (vph)		493		620	321	2155	404	2098
Starvation Cap Reductn		0		0	0	0	0	0
Spillback Cap Reductn		0		0	0	0	0	0
Storage Cap Reductn		0		0	0	0	0	0
Reduced v/c Ratio		0.60		0.11	0.12	0.33	0.13	0.42

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 91.3
Natural Cycle: 65
Control Type: Semi Act-Uncoord

Splits and Phases: 5: St. Vincent St & Rose St



HCM Signalized Intersection Capacity Analysis

5: St. Vincent St & Rose St

Rose Street Affordable Housing
BG (2035) - PM (w. Dead End)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	198	20	55	6	23	32	35	632	20	49	674	137
Future Volume (vph)	198	20	55	6	23	32	35	632	20	49	674	137
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		0.99			0.98		1.00	1.00		1.00	0.99	
Flpb, ped/bikes		0.99			1.00		0.99	1.00		0.99	1.00	
Frt		0.97			0.93		1.00	1.00		1.00	0.97	
Flt Protected		0.97			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1735			1712		1772	3552		1765	3437	
Flt Permitted		0.74			0.96		0.28	1.00		0.36	1.00	
Satd. Flow (perm)		1336			1648		531	3552		666	3437	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	215	22	60	7	25	35	38	687	22	53	733	149
RTOR Reduction (vph)	0	10	0	0	26	0	0	2	0	0	15	0
Lane Group Flow (vph)	0	287	0	0	41	0	38	707	0	53	867	0
Confl. Peds. (#/hr)	15		15	15		15	15		25	15		25
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		23.9			23.9		55.4	55.4		55.4	55.4	
Effective Green, g (s)		23.9			23.9		55.4	55.4		55.4	55.4	
Actuated g/C Ratio		0.26			0.26		0.61	0.61		0.61	0.61	
Clearance Time (s)		6.0			6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		349			431		322	2155		404	2085	
v/s Ratio Prot								0.20			c0.25	
v/s Ratio Perm		c0.21			0.02		0.07			0.08		
v/c Ratio		0.82			0.10		0.12	0.33		0.13	0.42	
Uniform Delay, d1		31.7			25.5		7.6	8.8		7.7	9.4	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		14.3			0.1		0.7	0.4		0.7	0.6	
Delay (s)		46.0			25.6		8.3	9.2		8.3	10.1	
Level of Service		D			C		A	A		A	B	
Approach Delay (s)		46.0			25.6			9.2			10.0	
Approach LOS		D			C			A			A	
Intersection Summary												
HCM 2000 Control Delay		15.4			HCM 2000 Level of Service			B				
HCM 2000 Volume to Capacity ratio		0.54										
Actuated Cycle Length (s)		91.3			Sum of lost time (s)			12.0				
Intersection Capacity Utilization		73.1%			ICU Level of Service			D				
Analysis Period (min)		15										
c Critical Lane Group												

Appendix F – Transportation Tomorrow Survey – Excerpt

2006 GTA Zone of Origin:

8508

Outside Barrie Planning District		Distribution						Total
		N (Hwy 400)	N	S (Hwy 400)	S	E	W	
PD 1 of Toronto	22			22				22
Newmarket	18			18				18
Aurora	20			20				20
Vaughan	12			12				12
Barrie	1799							
Innisfil	175			175				175
Bradford-West Gwillimbury	23			23				23
Essa	4			4				4
Springwater	132		132					132
Oro-Medonte	10	10						10
Ramara	62	62						62
Orillia	158	158						158
	636	230	132	274	0	0	0	636
Within Barrie 2006 GTA zone of Destination		Distribution						Total
		N (Hwy 400)	N	S (Hwy 400)	S	E	W	
8501	327				327			327
8502	4				4			
8503	11				11			
8504	31						31	
8506	8					8		
8507	260					260		
8508	231					231		
8509	140					140		
8510	179					179		
8511	18					18		
8512	18		18					
8513	13		13					
8514	171		171					
8515	14		14					
8516	66						66	
8518	12						12	
8520	4						4	
8521	160						160	
8523	32			32				
8524	56			56				
8526	11				11			11
8527	29				29			29
8528	4				4			4
								0
	1799	0	216	88	386	836	273	371
Totals	2435	230	348	362	386	836	273	2435
Distribution %		10%	14%	15%	16%	34%	11%	100%

Total Daily Trips 7547
Total Daily Walk + Transit Trips 732
Walk + Transit Modal Split 0.10

TTS Cross Tabulation

Cross Tabulation Query Form - Trip - 2016 v1.1

Filter Variables

2006 GTA zone of origin

2006 GTA zone of desti...

(Optional) Table Attribute

Group Attributes

Row Grouping

Column Grouping

Table Grouping

Grouping file:

Choose File

 No file chosen

Filter Selection +

☒

2006 GTA zone of origin

In

8508

And

☒

Start time of trip

In

600-900

And

☒

Planning district of destination

In

81,

Add Delete

Output

☐ Comma-delimited table

☒ Column format

Expansion Factor On

Click to Select Load

Load

Execute Query Select All Save As

Wed Apr 21 2021 15:52:11 GMT-0400 (Eastern Daylight Time) - Run Time: 2658ms

Cross Tabulation Query Form - Trip - 2016 v1.1

Row: 2006 GTA zone of origin - gta06_orig
Column: 2006 GTA zone of destination - gta06_dest

Filters:
(2006 GTA zone of origin - gta06_orig In 8508
and
Start time of trip - start_time In 600-900
and
Planning district of destination - pd_dest In 81,)

Trip 2016

ROW : gta06_orig

COLUMN : gta06_dest

gta06_orig	gta06_dest	total
8508	8501	327
8508	8502	4
8508	8503	11
8508	8504	31
8508	8506	8
8508	8507	260
8508	8508	231
8508	8509	140
8508	8510	179
8508	8511	18
8508	8512	18
8508	8513	13
8508	8514	171
8508	8515	14

8508	8516	66
8508	8518	12
8508	8520	4
8508	8521	160
8508	8523	32
8508	8524	56
8508	8526	11
8508	8527	29
8508	8528	4



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TTS Cross Tabulation

Cross Tabulation Query Form - Trip - 2016 v1.1

Filter Variables

2006 GTA zone of origin

Planning district of desti...

(Optional) Table Attribute

Group Attributes

Row Grouping

Column Grouping

Table Grouping

Grouping file:

Choose File

 No file chosen

Filter Selection +

☒ 2006 GTA zone of origin

In

8508

And

☒ Start time of trip

In

600-900

Add Delete

Output

☐ Comma-delimited table ☒ Column format

Expansion Factor On

Click to Select Load

Load

Execute Query

Select All

Save As

Wed Apr 21 2021 15:48:51 GMT-0400 (Eastern Daylight Time) - Run Time: 2948ms

Cross Tabulation Query Form - Trip - 2016 v1.1

Row: 2006 GTA zone of origin - gta06_orig
Column: Planning district of destination - pd_dest

Filters:
(2006 GTA zone of origin - gta06_orig In 8508
and
Start time of trip - start_time In 600-900)

Trip 2016

ROW : gta06_orig

COLUMN : pd_dest

gta06_orig	pd_dest	total
8508	1	22
8508	27	18
8508	28	20
8508	33	12
8508	81	1799
8508	82	175
8508	83	23
8508	86	4
8508	88	132
8508	133	10
8508	135	62
8508	136	158



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TTS Cross Tabulation

Cross Tabulation Query Form - Trip - 2016 v1.1

Filter Variables

2006 GTA zone of origin

Planning district of desti...

(Optional) Table Attribute

Group Attributes

Row Grouping

Column Grouping

Table Grouping

Grouping file:

Choose File

 No file chosen

Filter Selection +

☒ 2006 GTA zone of origin

In

8508

Add Delete

Output

☐ Comma-delimited table ☒ Column format Expansion Factor On

Click to Select Load

 Load

Execute Query Select All Save As

Tue Apr 27 2021 10:23:41 GMT-0400 (Eastern Daylight Time) - Run Time: 2752ms

Cross Tabulation Query Form - Trip - 2016 v1.1

Row: 2006 GTA zone of origin - gta06_orig
Column: Planning district of destination - pd_dest

Filters:
(2006 GTA zone of origin - gta06_orig In 8508)

Trip 2016

ROW : gta06_orig

COLUMN : pd_dest

gta06_orig	pd_dest	total
8508	1	63
8508	6	14
8508	10	24
8508	16	11
8508	27	41
8508	28	20
8508	29	6
8508	31	37
8508	33	12
8508	36	10
8508	65	6
8508	81	5577
8508	82	261
8508	83	109
8508	84	59
8508	86	241
8508	88	481
8508	128	15
8508	129	33
8508	131	7
8508	133	264
8508	135	72
8508	136	184



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Database Index DMG TTS CCP Contact Logout

TTS Cross Tabulation

Cross Tabulation Query Form - Trip - 2016 v1.1

Filter Variables

2006 GTA zone of origin

Planning district of desti...

(Optional) Table Attribute

Group Attributes

Row Grouping

Column Grouping

Table Grouping

Grouping file: Choose File No file chosen

Filter Selection +

☒ 2006 GTA zone of origin In

8508

And

☒ Primary travel mode of trip In

W, B, J

Add Delete

Output

☐ Comma-delimited table ☒ Column format Expansion Factor On Click to Select Load Load

Execute Query Select All Save As

Tue Apr 27 2021 10:25:29 GMT-0400 (Eastern Daylight Time) - Run Time: 2231ms

Cross Tabulation Query Form - Trip - 2016 v1.1

Row: 2006 GTA zone of origin - gta06_orig
Column: Planning district of destination - pd_dest

Filters:
(2006 GTA zone of origin - gta06_orig In 8508
and
Primary travel mode of trip - mode_prime In W, B, J)

Trip 2016

ROW : gta06_orig		
COLUMN : pd_dest		
gta06_orig	pd_dest	total
8508	81	732

Filter Tutorial Here about the c
[Open current page in new tab](#)

Primary Mode of Trav

Code	Description
B	Transit excluding GO
C	Cycle
D	Auto driver
G	GO rail only
J	Joint GO rail and loca
M	Motorcycle
O	Other
P	Auto passenger
S	School bus
T	Taxi passenger
U	Paid rideshare (2016
W	Walk
9	Unknown

Note: If any part of th
was made by transit,
primary mode of the
transit

Appendix G – Synchro Analysis Output – Total Traffic Volumes

Queues

1: Bayfield St & Hwy 400 NB Off/Rose St

Rose Street Affordable Housing

TT (2025) - AM (No Dead End)



Lane Group	EBL	EBT	WBR	NBT	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	714	170	202	502	275	628
Future Volume (vph)	714	170	202	502	275	628
Lane Group Flow (vph)	776	424	220	637	299	683
Turn Type	Perm	NA	Perm	NA	pm+pt	NA
Protected Phases		4		2	1	6
Permitted Phases	4		8		6	
Detector Phase	4	4	8	2	1	6
Switch Phase						
Minimum Initial (s)	12.0	12.0	12.0	24.0	7.0	24.0
Minimum Split (s)	30.0	30.0	30.0	30.0	11.5	30.0
Total Split (s)	35.0	35.0	35.0	45.0	20.0	65.0
Total Split (%)	35.0%	35.0%	35.0%	45.0%	20.0%	65.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	3.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	4.0	6.0
Lead/Lag				Lag	Lead	
Lead-Lag Optimize?				Yes	Yes	
Recall Mode	None	None	None	C-Max	None	C-Max
v/c Ratio	0.85	0.81	0.29	0.42	0.58	0.32
Control Delay	43.9	41.4	1.0	20.9	13.9	10.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	43.9	41.4	1.0	20.9	13.9	10.5
Queue Length 50th (m)	71.7	64.2	0.0	43.7	25.2	32.8
Queue Length 95th (m)	93.7	#108.4	0.0	61.2	38.8	43.2
Internal Link Dist (m)		579.4		233.2		180.4
Turn Bay Length (m)					120.0	
Base Capacity (vph)	958	545	766	1515	547	2157
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.81	0.78	0.29	0.42	0.55	0.32

Intersection Summary

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 20 (20%), Referenced to phase 2:NBT and 6:SBTL, Start of Green

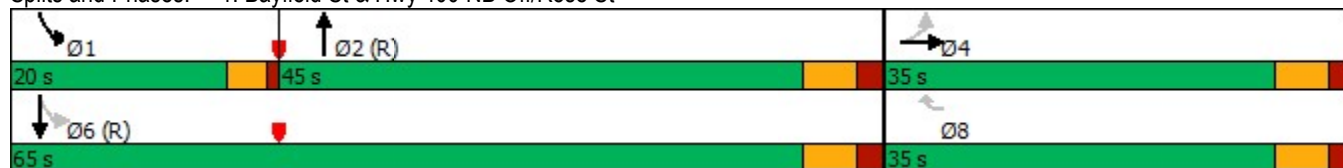
Natural Cycle: 75

Control Type: Actuated-Coordinated

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

Queue shown is maximum after two cycles.

Splits and Phases: 1: Bayfield St & Hwy 400 NB Off/Rose St



07/08/2024

JL

Synchro 11 Report

Page 1

HCM Signalized Intersection Capacity Analysis

1: Bayfield St & Hwy 400 NB Off/Rose St

Rose Street Affordable Housing

TT (2025) - AM (No Dead End)

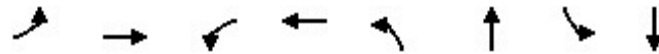
												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	 							 			 	
Traffic Volume (vph)	714	170	220	0	0	202	0	502	84	275	628	0
Future Volume (vph)	714	170	220	0	0	202	0	502	84	275	628	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0				6.0		6.0		4.0	6.0	
Lane Util. Factor	0.97	1.00				1.00		0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99				0.98		0.99		1.00	1.00	
Flpb, ped/bikes	0.99	1.00				1.00		1.00		1.00	1.00	
Frt	1.00	0.92				0.86		0.98		1.00	1.00	
Flt Protected	0.95	1.00				1.00		1.00		0.95	1.00	
Satd. Flow (prot)	3305	1721				1584		3478		1751	3579	
Flt Permitted	0.95	1.00				1.00		1.00		0.31	1.00	
Satd. Flow (perm)	3305	1721				1584		3478		580	3579	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	776	185	239	0	0	220	0	546	91	299	683	0
RTOR Reduction (vph)	0	48	0	0	0	159	0	12	0	0	0	0
Lane Group Flow (vph)	776	376	0	0	0	61	0	625	0	299	683	0
Confl. Peds. (#/hr)	5		5	5		5	15		10	10		15
Heavy Vehicles (%)	6%	0%	2%	0%	0%	3%	0%	2%	2%	4%	2%	0%
Turn Type	Perm	NA				Perm		NA		pm+pt	NA	
Protected Phases		4						2		1	6	
Permitted Phases	4					8				6		
Actuated Green, G (s)	27.7	27.7				27.7		43.2		60.3	60.3	
Effective Green, g (s)	27.7	27.7				27.7		43.2		60.3	60.3	
Actuated g/C Ratio	0.28	0.28				0.28		0.43		0.60	0.60	
Clearance Time (s)	6.0	6.0				6.0		6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0				3.0		3.0		3.0	3.0	
Lane Grp Cap (vph)	915	476				438		1502		503	2158	
v/s Ratio Prot		0.22						0.18		c0.08	0.19	
v/s Ratio Perm	c0.23					0.04				c0.28		
v/c Ratio	0.85	0.79				0.14		0.42		0.59	0.32	
Uniform Delay, d1	34.2	33.5				27.2		19.7		10.5	9.7	
Progression Factor	1.00	1.00				1.00		1.00		1.00	1.00	
Incremental Delay, d2	7.4	8.7				0.1		0.9		1.9	0.4	
Delay (s)	41.5	42.2				27.3		20.5		12.4	10.1	
Level of Service	D	D				C		C		B	B	
Approach Delay (s)		41.8			27.3			20.5			10.8	
Approach LOS		D			C			C			B	
Intersection Summary												
HCM 2000 Control Delay		26.3				HCM 2000 Level of Service		C				
HCM 2000 Volume to Capacity ratio		0.70										
Actuated Cycle Length (s)		100.0				Sum of lost time (s)		16.0				
Intersection Capacity Utilization		71.3%				ICU Level of Service		C				
Analysis Period (min)		15										
c Critical Lane Group												

Queues

2: Bayfield St & Grove St

Rose Street Affordable Housing

TT (2025) - AM (No Dead End)



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	34	30	95	55	2	395	119	686
Future Volume (vph)	34	30	95	55	2	395	119	686
Lane Group Flow (vph)	37	38	103	231	2	486	129	782
Turn Type	pm+pt	NA	Perm	NA	Perm	NA	pm+pt	NA
Protected Phases	7	4		8		2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	7	4	8	8	2	2	1	6
Switch Phase								
Minimum Initial (s)	7.0	10.0	10.0	10.0	24.0	24.0	7.0	24.0
Minimum Split (s)	11.0	30.0	30.0	30.0	30.0	30.0	11.0	30.0
Total Split (s)	15.0	51.0	36.0	36.0	38.0	38.0	11.0	49.0
Total Split (%)	15.0%	51.0%	36.0%	36.0%	38.0%	38.0%	11.0%	49.0%
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0	4.0	3.0	4.0
All-Red Time (s)	1.0	2.0	2.0	2.0	2.0	2.0	1.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0	6.0	6.0	6.0	6.0	4.0	6.0
Lead/Lag	Lead		Lag	Lag	Lag	Lag	Lead	
Lead-Lag Optimize?	Yes		Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	None	None	None	Max	Max	None	Max
v/c Ratio	0.12	0.08	0.46	0.69	0.01	0.30	0.23	0.38
Control Delay	18.4	17.2	36.4	23.5	17.5	15.8	10.0	11.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	18.4	17.2	36.4	23.5	17.5	15.8	10.0	11.0
Queue Length 50th (m)	3.8	3.5	14.2	11.4	0.2	23.8	7.8	31.4
Queue Length 95th (m)	9.4	9.5	29.0	34.8	1.7	44.2	20.8	59.6
Internal Link Dist (m)		140.8		181.1		201.3		233.2
Turn Bay Length (m)	20.0		25.0		30.0		50.0	
Base Capacity (vph)	355	1076	511	580	309	1616	559	2049
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.10	0.04	0.20	0.40	0.01	0.30	0.23	0.38

Intersection Summary

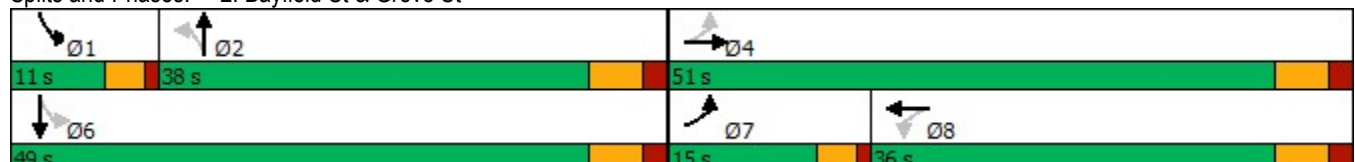
Cycle Length: 100

Actuated Cycle Length: 75.8

Natural Cycle: 85

Control Type: Semi Act-Uncoord

Splits and Phases: 2: Bayfield St & Grove St



HCM Signalized Intersection Capacity Analysis

2: Bayfield St & Grove St

Rose Street Affordable Housing

TT (2025) - AM (No Dead End)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	34	30	5	95	55	157	2	395	52	119	686	33
Future Volume (vph)	34	30	5	95	55	157	2	395	52	119	686	33
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		6.0	6.0		6.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.98		1.00	0.89		1.00	0.98		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1788	1782		1651	1226		1784	3477		1784	3549	
Flt Permitted	0.35	1.00		0.73	1.00		0.36	1.00		0.41	1.00	
Satd. Flow (perm)	650	1782		1273	1226		668	3477		775	3549	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	37	33	5	103	60	171	2	429	57	129	746	36
RTOR Reduction (vph)	0	4	0	0	122	0	0	8	0	0	3	0
Lane Group Flow (vph)	37	34	0	103	109	0	2	478	0	129	779	0
Confl. Peds. (#/hr)	5		5	5		5	5		10	10		5
Heavy Vehicles (%)	2%	4%	15%	10%	2%	50%	2%	2%	8%	2%	2%	2%
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	21.7	21.7		13.3	13.3		35.1	35.1		44.6	44.6	
Effective Green, g (s)	21.7	21.7		13.3	13.3		35.1	35.1		44.6	44.6	
Actuated g/C Ratio	0.28	0.28		0.17	0.17		0.45	0.45		0.57	0.57	
Clearance Time (s)	4.0	6.0		6.0	6.0		6.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	244	493		216	208		299	1558		512	2021	
v/s Ratio Prot	c0.01	0.02			c0.09			0.14		0.02	c0.22	
v/s Ratio Perm	0.03			0.08			0.00			0.13		
v/c Ratio	0.15	0.07		0.48	0.52		0.01	0.31		0.25	0.39	
Uniform Delay, d1	21.3	20.9		29.4	29.6		12.0	13.8		8.0	9.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.3	0.1		1.7	2.4		0.0	0.5		0.3	0.6	
Delay (s)	21.6	20.9		31.0	32.0		12.0	14.3		8.3	9.9	
Level of Service	C	C		C	C		B	B		A	A	
Approach Delay (s)		21.2			31.7			14.3			9.6	
Approach LOS		C			C			B			A	
Intersection Summary												
HCM 2000 Control Delay			15.5			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.43									
Actuated Cycle Length (s)			78.3			Sum of lost time (s)			20.0			
Intersection Capacity Utilization			78.5%			ICU Level of Service			D			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

3: Rose St & Hwy 400 NB On

Rose Street Affordable Housing
TT (2025) - AM (No Dead End)

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	202	107	258	270	0	0
Future Volume (Veh/h)	202	107	258	270	0	0
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	220	116	280	293	0	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (m)			246			
pX, platoon unblocked	0.94	0.94			0.94	
vC, conflicting volume	426	426			573	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	363	363			518	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	63	82			100	
cM capacity (veh/h)	601	644			989	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	336	573	0			
Volume Left	220	0	0			
Volume Right	116	293	0			
cSH	615	1700	1700			
Volume to Capacity	0.55	0.34	0.00			
Queue Length 95th (m)	25.1	0.0	0.0			
Control Delay (s)	17.7	0.0	0.0			
Lane LOS	C					
Approach Delay (s)	17.7	0.0	0.0			
Approach LOS	C					
Intersection Summary						
Average Delay		6.5				
Intersection Capacity Utilization		54.5%		ICU Level of Service		A
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis

4: Peel St & Grove St

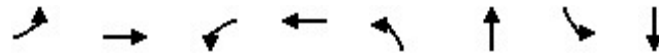
Rose Street Affordable Housing

TT (2025) - AM (No Dead End)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	7	249	2	6	245	7	8	53	9	6	29	6
Future Volume (Veh/h)	7	249	2	6	245	7	8	53	9	6	29	6
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
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)	8	271	2	7	266	8	9	58	10	7	32	7
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None			None								
Median storage veh												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	274			273			595	576	272	611	573	270
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	274			273			595	576	272	611	573	270
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			98	86	99	98	92	99
cM capacity (veh/h)	1289			1290			385	423	767	355	425	769
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	281	281	77	46								
Volume Left	8	7	9	7								
Volume Right	2	8	10	7								
cSH	1289	1290	444	442								
Volume to Capacity	0.01	0.01	0.17	0.10								
Queue Length 95th (m)	0.1	0.1	4.7	2.6								
Control Delay (s)	0.3	0.2	14.8	14.1								
Lane LOS	A	A	B	B								
Approach Delay (s)	0.3	0.2	14.8	14.1								
Approach LOS			B	B								
Intersection Summary												
Average Delay			2.8									
Intersection Capacity Utilization			28.0%	ICU Level of Service					A			
Analysis Period (min)			15									

Queues
5: St. Vincent St & Rose St

Rose Street Affordable Housing
TT (2025) - AM (No Dead End)

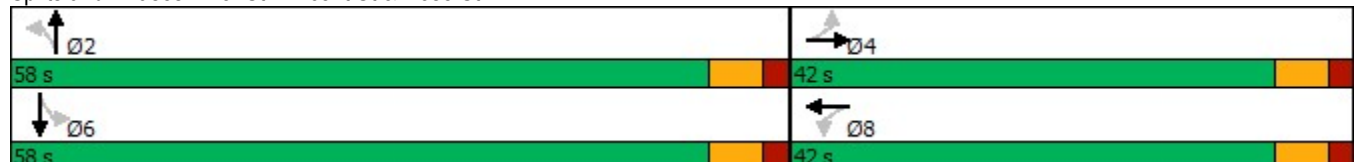


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations		↔		↔		↔		↔
Traffic Volume (vph)	153	34	11	54	56	418	11	408
Future Volume (vph)	153	34	11	54	56	418	11	408
Lane Group Flow (vph)	0	227	0	97	0	525	0	467
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	24.0	24.0	24.0	24.0
Minimum Split (s)	33.0	33.0	33.0	33.0	30.0	30.0	30.0	30.0
Total Split (s)	42.0	42.0	42.0	42.0	58.0	58.0	58.0	58.0
Total Split (%)	42.0%	42.0%	42.0%	42.0%	58.0%	58.0%	58.0%	58.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		0.0		0.0		0.0		0.0
Total Lost Time (s)		6.0		6.0		6.0		6.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	Max	Max	Max	Max
v/c Ratio		0.72		0.24		0.27		0.22
Control Delay		41.7		21.7		8.0		7.6
Queue Delay		0.0		0.0		0.0		0.0
Total Delay		41.7		21.7		8.0		7.6
Queue Length 50th (m)		32.0		9.8		17.1		14.5
Queue Length 95th (m)		54.8		21.3		32.8		28.1
Internal Link Dist (m)		114.8		126.2		135.5		109.5
Turn Bay Length (m)								
Base Capacity (vph)		609		752		1910		2123
Starvation Cap Reductn		0		0		0		0
Spillback Cap Reductn		0		0		0		0
Storage Cap Reductn		0		0		0		0
Reduced v/c Ratio		0.37		0.13		0.27		0.22

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 83.8
Natural Cycle: 65
Control Type: Semi Act-Uncoord

Splits and Phases: 5: St. Vincent St & Rose St



HCM Signalized Intersection Capacity Analysis

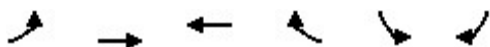
5: St. Vincent St & Rose St

Rose Street Affordable Housing
TT (2025) - AM (No Dead End)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	153	34	22	11	54	24	56	418	9	11	408	11
Future Volume (vph)	153	34	22	11	54	24	56	418	9	11	408	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0			6.0			6.0	
Lane Util. Factor		1.00			1.00			0.95			0.95	
Frpb, ped/bikes		1.00			1.00			1.00			1.00	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.99			0.96			1.00			1.00	
Flt Protected		0.96			0.99			0.99			1.00	
Satd. Flow (prot)		1768			1794			3540			3556	
Flt Permitted		0.77			0.95			0.85			0.94	
Satd. Flow (perm)		1406			1719			3011			3346	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	166	37	24	12	59	26	61	454	10	12	443	12
RTOR Reduction (vph)	0	5	0	0	16	0	0	1	0	0	1	0
Lane Group Flow (vph)	0	222	0	0	81	0	0	524	0	0	466	0
Confl. Peds. (#/hr)	5		10	10		5	10		5	5		10
Heavy Vehicles (%)	3%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		18.6			18.6			53.1			53.1	
Effective Green, g (s)		18.6			18.6			53.1			53.1	
Actuated g/C Ratio		0.22			0.22			0.63			0.63	
Clearance Time (s)		6.0			6.0			6.0			6.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		312			382			1910			2122	
v/s Ratio Prot												
v/s Ratio Perm		c0.16			0.05			c0.17			0.14	
v/c Ratio		0.71			0.21			0.27			0.22	
Uniform Delay, d1		30.1			26.6			6.8			6.5	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		7.4			0.3			0.4			0.2	
Delay (s)		37.5			26.8			7.1			6.7	
Level of Service		D			C			A			A	
Approach Delay (s)		37.5			26.8			7.1			6.7	
Approach LOS		D			C			A			A	
Intersection Summary												
HCM 2000 Control Delay		13.7			HCM 2000 Level of Service			B				
HCM 2000 Volume to Capacity ratio		0.39										
Actuated Cycle Length (s)		83.7			Sum of lost time (s)			12.0				
Intersection Capacity Utilization		73.8%			ICU Level of Service			D				
Analysis Period (min)		15										
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis6: Rose St & West Access

Rose Street Affordable Housing
TT (2025) - AM (No Dead End)

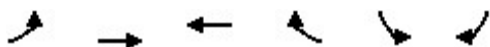


Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↩	↩		↩	
Traffic Volume (veh/h)	29	241	291	30	20	18
Future Volume (Veh/h)	29	241	291	30	20	18
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	32	262	316	33	22	20
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	349				658	332
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	349				658	332
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	97				95	97
cM capacity (veh/h)	1210				417	709
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	294	349	42			
Volume Left	32	0	22			
Volume Right	0	33	20			
cSH	1210	1700	519			
Volume to Capacity	0.03	0.21	0.08			
Queue Length 95th (m)	0.6	0.0	2.0			
Control Delay (s)	1.1	0.0	12.5			
Lane LOS	A		B			
Approach Delay (s)	1.1	0.0	12.5			
Approach LOS			B			
Intersection Summary						
Average Delay			1.2			
Intersection Capacity Utilization			44.8%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

7: Rose St & East Access

Rose Street Affordable Housing
TT (2025) - AM (No Dead End)



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	41	220	293	63	43	28
Future Volume (Veh/h)	41	220	293	63	43	28
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	45	239	318	68	47	30
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	386				681	352
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	386				681	352
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	96				88	96
cM capacity (veh/h)	1172				400	692
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	284	386	77			
Volume Left	45	0	47			
Volume Right	0	68	30			
cSH	1172	1700	479			
Volume to Capacity	0.04	0.23	0.16			
Queue Length 95th (m)	0.9	0.0	4.3			
Control Delay (s)	1.6	0.0	14.0			
Lane LOS	A		B			
Approach Delay (s)	1.6	0.0	14.0			
Approach LOS			B			
Intersection Summary						
Average Delay		2.0				
Intersection Capacity Utilization		47.2%		ICU Level of Service		A
Analysis Period (min)		15				

Queues

1: Bayfield St & Hwy 400 NB Off/Rose St

Rose Street Affordable Housing

TT (2025) - PM (No Dead End)



Lane Group	EBL	EBT	WBR	NBT	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	1025	234	208	924	304	664
Future Volume (vph)	1025	234	208	924	304	664
Lane Group Flow (vph)	1114	459	226	1182	330	722
Turn Type	Perm	NA	Perm	NA	pm+pt	NA
Protected Phases		4		2	1	6
Permitted Phases	4		8		6	
Detector Phase	4	4	8	2	1	6
Switch Phase						
Minimum Initial (s)	12.0	12.0	12.0	24.0	7.0	24.0
Minimum Split (s)	30.0	30.0	30.0	30.0	11.5	30.0
Total Split (s)	58.0	58.0	58.0	64.0	28.0	92.0
Total Split (%)	38.7%	38.7%	38.7%	42.7%	18.7%	61.3%
Yellow Time (s)	4.0	4.0	4.0	4.0	3.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	4.0	6.0
Lead/Lag				Lag	Lead	
Lead-Lag Optimize?				Yes	Yes	
Recall Mode	None	None	None	C-Max	None	C-Max
v/c Ratio	0.94	0.74	0.29	0.86	0.97	0.35
Control Delay	63.2	48.7	1.0	49.1	86.4	17.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	63.2	48.7	1.0	49.1	86.4	17.4
Queue Length 50th (m)	164.7	112.5	0.0	168.3	82.1	58.1
Queue Length 95th (m)	#205.6	154.5	0.0	198.4	#143.0	71.1
Internal Link Dist (m)		579.4		233.2		180.4
Turn Bay Length (m)					120.0	
Base Capacity (vph)	1196	626	775	1374	341	2085
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.93	0.73	0.29	0.86	0.97	0.35

Intersection Summary

Cycle Length: 150

Actuated Cycle Length: 150

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

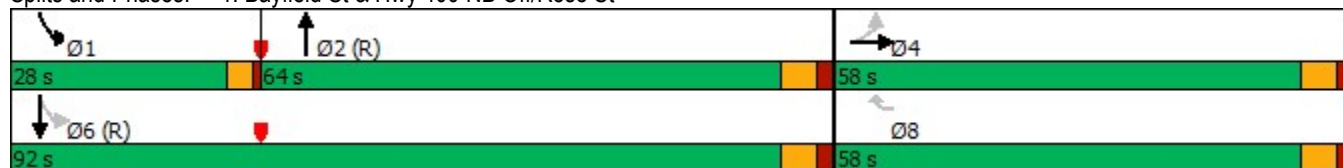
Natural Cycle: 90

Control Type: Actuated-Coordinated

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

Queue shown is maximum after two cycles.

Splits and Phases: 1: Bayfield St & Hwy 400 NB Off/Rose St



07/08/2024

JL

Synchro 11 Report

Page 1

HCM Signalized Intersection Capacity Analysis

1: Bayfield St & Hwy 400 NB Off/Rose St

Rose Street Affordable Housing

TT (2025) - PM (No Dead End)

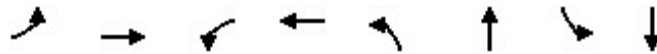
												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	 							 			 	
Traffic Volume (vph)	1025	234	189	0	0	208	0	924	164	304	664	0
Future Volume (vph)	1025	234	189	0	0	208	0	924	164	304	664	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0				6.0		6.0		4.0	6.0	
Lane Util. Factor	0.97	1.00				1.00		0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99				0.98		0.99		1.00	1.00	
Flpb, ped/bikes	0.98	1.00				1.00		1.00		1.00	1.00	
Frt	1.00	0.93				0.86		0.98		1.00	1.00	
Flt Protected	0.95	1.00				1.00		1.00		0.95	1.00	
Satd. Flow (prot)	3451	1751				1595		3495		1807	3614	
Flt Permitted	0.95	1.00				1.00		1.00		0.06	1.00	
Satd. Flow (perm)	3451	1751				1595		3495		121	3614	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1114	254	205	0	0	226	0	1004	178	330	722	0
RTOR Reduction (vph)	0	20	0	0	0	149	0	10	0	0	0	0
Lane Group Flow (vph)	1114	439	0	0	0	77	0	1172	0	330	722	0
Confl. Peds. (#/hr)	5		10	10		5	20		10	10		20
Heavy Vehicles (%)	1%	1%	1%	0%	0%	2%	0%	1%	2%	1%	1%	0%
Turn Type	Perm	NA				Perm		NA		pm+pt	NA	
Protected Phases		4						2		1	6	
Permitted Phases	4					8				6		
Actuated Green, G (s)	51.4	51.4				51.4		58.7		86.6	86.6	
Effective Green, g (s)	51.4	51.4				51.4		58.7		86.6	86.6	
Actuated g/C Ratio	0.34	0.34				0.34		0.39		0.58	0.58	
Clearance Time (s)	6.0	6.0				6.0		6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0				3.0		3.0		3.0	3.0	
Lane Grp Cap (vph)	1182	600				546		1367		338	2086	
v/s Ratio Prot		0.25						0.34		c0.16	0.20	
v/s Ratio Perm	c0.32					0.05				c0.41		
v/c Ratio	0.94	0.73				0.14		0.86		0.98	0.35	
Uniform Delay, d1	47.9	43.3				34.1		41.8		49.9	16.7	
Progression Factor	1.00	1.00				1.00		1.00		1.00	1.00	
Incremental Delay, d2	14.5	4.6				0.1		7.1		42.2	0.5	
Delay (s)	62.3	47.9				34.2		49.0		92.1	17.2	
Level of Service	E	D				C		D		F	B	
Approach Delay (s)		58.1			34.2			49.0			40.7	
Approach LOS		E			C			D			D	
Intersection Summary												
HCM 2000 Control Delay		49.5				HCM 2000 Level of Service		D				
HCM 2000 Volume to Capacity ratio		0.98										
Actuated Cycle Length (s)		150.0				Sum of lost time (s)		16.0				
Intersection Capacity Utilization		90.3%				ICU Level of Service		E				
Analysis Period (min)		15										
c Critical Lane Group												

Queues

2: Bayfield St & Grove St

Rose Street Affordable Housing

TT (2025) - PM (No Dead End)



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	85	47	50	57	2	899	136	663
Future Volume (vph)	85	47	50	57	2	899	136	663
Lane Group Flow (vph)	92	53	54	160	2	1051	148	780
Turn Type	pm+pt	NA	Perm	NA	Perm	NA	pm+pt	NA
Protected Phases	7	4		8		2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	7	4	8	8	2	2	1	6
Switch Phase								
Minimum Initial (s)	7.0	10.0	10.0	10.0	24.0	24.0	7.0	24.0
Minimum Split (s)	11.0	30.0	30.0	30.0	30.0	30.0	11.0	30.0
Total Split (s)	11.0	45.0	34.0	34.0	44.0	44.0	11.0	55.0
Total Split (%)	11.0%	45.0%	34.0%	34.0%	44.0%	44.0%	11.0%	55.0%
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0	4.0	3.0	4.0
All-Red Time (s)	1.0	2.0	2.0	2.0	2.0	2.0	1.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0	6.0	6.0	6.0	6.0	4.0	6.0
Lead/Lag	Lead		Lag	Lag	Lag	Lag	Lead	
Lead-Lag Optimize?	Yes		Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	None	None	None	Max	Max	None	Max
v/c Ratio	0.30	0.12	0.31	0.53	0.01	0.63	0.46	0.36
Control Delay	24.8	22.9	37.4	24.8	13.5	19.0	11.9	9.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.8	22.9	37.4	24.8	13.5	19.0	11.9	9.2
Queue Length 50th (m)	10.9	6.1	7.9	11.9	0.2	62.6	8.5	29.5
Queue Length 95th (m)	21.7	14.3	18.3	29.6	1.4	91.8	18.2	46.3
Internal Link Dist (m)		140.8		181.1		201.3		233.2
Turn Bay Length (m)	20.0		25.0		30.0		50.0	
Base Capacity (vph)	305	903	440	636	314	1664	319	2148
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.30	0.06	0.12	0.25	0.01	0.63	0.46	0.36

Intersection Summary

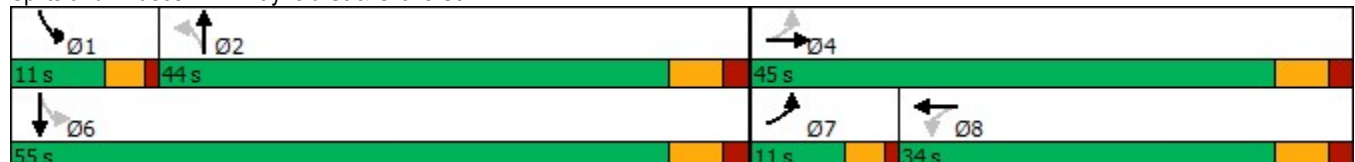
Cycle Length: 100

Actuated Cycle Length: 81

Natural Cycle: 85

Control Type: Semi Act-Uncoord

Splits and Phases: 2: Bayfield St & Grove St



HCM Signalized Intersection Capacity Analysis

2: Bayfield St & Grove St

Rose Street Affordable Housing

TT (2025) - PM (No Dead End)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	85	47	2	50	57	90	2	899	68	136	663	54
Future Volume (vph)	85	47	2	50	57	90	2	899	68	136	663	54
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		6.0	6.0		6.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		0.99	1.00		0.99	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.91		1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1784	1866		1674	1687		1779	3527		1789	3528	
Flt Permitted	0.44	1.00		0.72	1.00		0.36	1.00		0.16	1.00	
Satd. Flow (perm)	835	1866		1273	1687		667	3527		302	3528	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	92	51	2	54	62	98	2	977	74	148	721	59
RTOR Reduction (vph)	0	1	0	0	68	0	0	5	0	0	5	0
Lane Group Flow (vph)	92	52	0	54	92	0	2	1046	0	148	775	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	2%	2%	9%	8%	2%	2%	2%	2%	4%	2%	2%	2%
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	20.6	20.6		11.2	11.2		38.2	38.2		49.2	49.2	
Effective Green, g (s)	20.6	20.6		11.2	11.2		38.2	38.2		49.2	49.2	
Actuated g/C Ratio	0.25	0.25		0.14	0.14		0.47	0.47		0.60	0.60	
Clearance Time (s)	4.0	6.0		6.0	6.0		6.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	272	469		174	230		311	1647		308	2121	
v/s Ratio Prot	c0.02	0.03			0.05			c0.30		c0.04	0.22	
v/s Ratio Perm	c0.06			0.04			0.00			0.25		
v/c Ratio	0.34	0.11		0.31	0.40		0.01	0.64		0.48	0.37	
Uniform Delay, d1	24.3	23.5		31.8	32.2		11.7	16.5		9.7	8.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.7	0.1		1.0	1.1		0.0	1.9		1.2	0.5	
Delay (s)	25.0	23.6		32.8	33.4		11.7	18.4		10.8	8.8	
Level of Service	C	C		C	C		B	B		B	A	
Approach Delay (s)		24.5			33.2			18.4			9.1	
Approach LOS		C			C			B			A	
Intersection Summary												
HCM 2000 Control Delay			16.5			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.56									
Actuated Cycle Length (s)			81.8			Sum of lost time (s)				20.0		
Intersection Capacity Utilization			80.1%			ICU Level of Service				D		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis 3: Rose St & Hwy 400 NB On

Rose Street Affordable Housing
TT (2025) - PM (No Dead End)

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	208	102	368	335	0	0
Future Volume (Veh/h)	208	102	368	335	0	0
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	226	111	400	364	0	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (m)			246			
pX, platoon unblocked	0.91	0.91			0.91	
vC, conflicting volume	582	582			764	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	491	491			691	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	54	79			100	
cM capacity (veh/h)	488	525			822	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	337	764	0			
Volume Left	226	0	0			
Volume Right	111	364	0			
cSH	500	1700	1700			
Volume to Capacity	0.67	0.45	0.00			
Queue Length 95th (m)	37.9	0.0	0.0			
Control Delay (s)	25.8	0.0	0.0			
Lane LOS	D					
Approach Delay (s)	25.8	0.0	0.0			
Approach LOS	D					
Intersection Summary						
Average Delay		7.9				
Intersection Capacity Utilization		64.3%		ICU Level of Service		C
Analysis Period (min)		15				

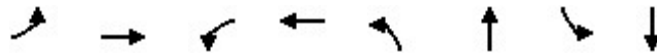
HCM Unsignalized Intersection Capacity Analysis4: Peel St & Grove St

Rose Street Affordable Housing
TT (2025) - PM (No Dead End)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	7	212	17	8	176	4	8	43	3	0	50	8
Future Volume (Veh/h)	7	212	17	8	176	4	8	43	3	0	50	8
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
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)	8	230	18	9	191	4	9	47	3	0	54	9
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	195			248			502	468	239	492	475	193
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	195			248			502	468	239	492	475	193
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			98	90	100	100	89	99
cM capacity (veh/h)	1378			1318			430	487	800	445	482	849
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	256	204	59	63								
Volume Left	8	9	9	0								
Volume Right	18	4	3	9								
cSH	1378	1318	486	514								
Volume to Capacity	0.01	0.01	0.12	0.12								
Queue Length 95th (m)	0.1	0.2	3.1	3.2								
Control Delay (s)	0.3	0.4	13.4	13.0								
Lane LOS	A	A	B	B								
Approach Delay (s)	0.3	0.4	13.4	13.0								
Approach LOS			B	B								
Intersection Summary												
Average Delay			3.0									
Intersection Capacity Utilization			30.7%	ICU Level of Service				A				
Analysis Period (min)			15									

Queues
5: St. Vincent St & Rose St

Rose Street Affordable Housing
TT (2025) - PM (No Dead End)

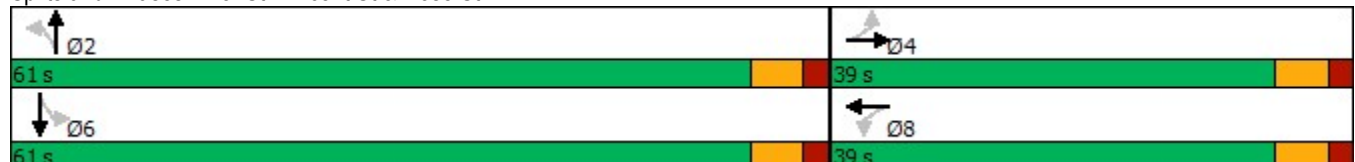


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations		↔		↔		↔		↔
Traffic Volume (vph)	191	41	6	34	32	549	45	581
Future Volume (vph)	191	41	6	34	32	549	45	581
Lane Group Flow (vph)	0	307	0	77	0	652	0	807
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	24.0	24.0	24.0	24.0
Minimum Split (s)	33.0	33.0	30.0	30.0	30.0	30.0	30.0	30.0
Total Split (s)	39.0	39.0	39.0	39.0	61.0	61.0	61.0	61.0
Total Split (%)	39.0%	39.0%	39.0%	39.0%	61.0%	61.0%	61.0%	61.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		0.0		0.0		0.0		0.0
Total Lost Time (s)		6.0		6.0		6.0		6.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	Max	Max	Max	Max
v/c Ratio		0.83		0.16		0.35		0.44
Control Delay		50.2		16.4		10.7		11.3
Queue Delay		0.0		0.0		0.0		0.0
Total Delay		50.2		16.4		10.7		11.3
Queue Length 50th (m)		49.2		5.8		28.3		36.2
Queue Length 95th (m)		79.5		15.9		47.5		60.4
Internal Link Dist (m)		114.8		126.2		135.5		109.5
Turn Bay Length (m)								
Base Capacity (vph)		495		629		1866		1820
Starvation Cap Reductn		0		0		0		0
Spillback Cap Reductn		0		0		0		0
Storage Cap Reductn		0		0		0		0
Reduced v/c Ratio		0.62		0.12		0.35		0.44

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 91.8
Natural Cycle: 65
Control Type: Semi Act-Uncoord

Splits and Phases: 5: St. Vincent St & Rose St



HCM Signalized Intersection Capacity Analysis

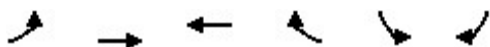
5: St. Vincent St & Rose St

Rose Street Affordable Housing
TT (2025) - PM (No Dead End)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	191	41	50	6	34	30	32	549	18	45	581	116
Future Volume (vph)	191	41	50	6	34	30	32	549	18	45	581	116
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0			6.0			6.0	
Lane Util. Factor		1.00			1.00			0.95			0.95	
Frpb, ped/bikes		0.99			0.99			1.00			0.99	
Flpb, ped/bikes		0.99			1.00			1.00			1.00	
Frt		0.98			0.94			1.00			0.98	
Flt Protected		0.97			1.00			1.00			1.00	
Satd. Flow (prot)		1748			1741			3526			3434	
Flt Permitted		0.75			0.96			0.88			0.87	
Satd. Flow (perm)		1355			1684			3096			3001	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	208	45	54	7	37	33	35	597	20	49	632	126
RTOR Reduction (vph)	0	8	0	0	24	0	0	2	0	0	13	0
Lane Group Flow (vph)	0	299	0	0	53	0	0	650	0	0	794	0
Confl. Peds. (#/hr)	15		15	15		15	15		25	15		25
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	10%	2%	2%	2%	2%	2%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		24.4			24.4			55.3			55.3	
Effective Green, g (s)		24.4			24.4			55.3			55.3	
Actuated g/C Ratio		0.27			0.27			0.60			0.60	
Clearance Time (s)		6.0			6.0			6.0			6.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		360			448			1867			1809	
v/s Ratio Prot												
v/s Ratio Perm		c0.22			0.03			0.21			c0.26	
v/c Ratio		0.83			0.12			0.35			0.44	
Uniform Delay, d1		31.7			25.5			9.1			9.8	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		14.9			0.1			0.5			0.8	
Delay (s)		46.6			25.6			9.7			10.6	
Level of Service		D			C			A			B	
Approach Delay (s)		46.6			25.6			9.7			10.6	
Approach LOS		D			C			A			B	
Intersection Summary												
HCM 2000 Control Delay		16.9			HCM 2000 Level of Service			B				
HCM 2000 Volume to Capacity ratio		0.56										
Actuated Cycle Length (s)		91.7			Sum of lost time (s)			12.0				
Intersection Capacity Utilization		79.1%			ICU Level of Service			D				
Analysis Period (min)		15										
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis6: Rose St & West Access

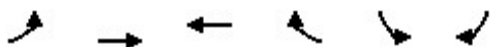
Rose Street Affordable Housing
TT (2025) - PM (No Dead End)



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	18	317	279	20	31	31
Future Volume (Veh/h)	18	317	279	20	31	31
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	20	345	303	22	34	34
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	325				699	314
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	325				699	314
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	98				91	95
cM capacity (veh/h)	1235				399	726
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	365	325	68			
Volume Left	20	0	34			
Volume Right	0	22	34			
cSH	1235	1700	515			
Volume to Capacity	0.02	0.19	0.13			
Queue Length 95th (m)	0.4	0.0	3.4			
Control Delay (s)	0.6	0.0	13.0			
Lane LOS	A		B			
Approach Delay (s)	0.6	0.0	13.0			
Approach LOS			B			
Intersection Summary						
Average Delay			1.5			
Intersection Capacity Utilization			41.7%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis 7: Rose St & East Access

Rose Street Affordable Housing
TT (2025) - PM (No Dead End)



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	25	323	255	39	65	44
Future Volume (Veh/h)	25	323	255	39	65	44
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	27	351	277	42	71	48
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	319				703	298
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	319				703	298
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	98				82	94
cM capacity (veh/h)	1241				395	741
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	378	319	119			
Volume Left	27	0	71			
Volume Right	0	42	48			
cSH	1241	1700	487			
Volume to Capacity	0.02	0.19	0.24			
Queue Length 95th (m)	0.5	0.0	7.2			
Control Delay (s)	0.8	0.0	14.8			
Lane LOS	A		B			
Approach Delay (s)	0.8	0.0	14.8			
Approach LOS			B			
Intersection Summary						
Average Delay			2.5			
Intersection Capacity Utilization			50.5%	ICU Level of Service		A
Analysis Period (min)			15			

Queues

1: Bayfield St & Hwy 400 NB Off/Rose St

Rose Street Affordable Housing

TT (2028) - AM (No Dead End)



Lane Group	EBL	EBT	WBR	NBT	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	736	174	207	655	281	627
Future Volume (vph)	736	174	207	655	281	627
Lane Group Flow (vph)	800	476	225	813	305	682
Turn Type	Perm	NA	Perm	NA	pm+pt	NA
Protected Phases		4		2	1	6
Permitted Phases	4		8		6	
Detector Phase	4	4	8	2	1	6
Switch Phase						
Minimum Initial (s)	12.0	12.0	12.0	24.0	7.0	24.0
Minimum Split (s)	30.0	30.0	30.0	30.0	11.5	30.0
Total Split (s)	35.0	35.0	35.0	45.0	20.0	65.0
Total Split (%)	35.0%	35.0%	35.0%	45.0%	20.0%	65.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	3.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	4.0	6.0
Lead/Lag				Lag	Lead	
Lead-Lag Optimize?				Yes	Yes	
Recall Mode	None	None	None	C-Max	None	C-Max
v/c Ratio	0.86	0.89	0.31	0.54	0.70	0.32
Control Delay	44.6	48.7	1.1	23.3	18.8	10.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	44.6	48.7	1.1	23.3	18.8	10.6
Queue Length 50th (m)	74.6	74.5	0.0	60.5	25.7	32.7
Queue Length 95th (m)	#99.1	#129.7	0.0	82.2	41.1	43.1
Internal Link Dist (m)		579.4		233.2		180.4
Turn Bay Length (m)					120.0	
Base Capacity (vph)	958	550	729	1496	471	2141
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.84	0.87	0.31	0.54	0.65	0.32

Intersection Summary

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 20 (20%), Referenced to phase 2:NBT and 6:SBTL, Start of Green

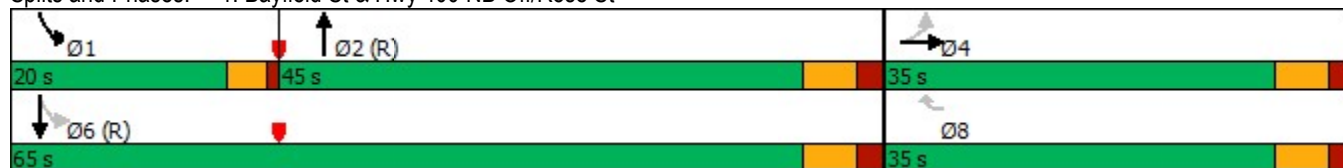
Natural Cycle: 75

Control Type: Actuated-Coordinated

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

Queue shown is maximum after two cycles.

Splits and Phases: 1: Bayfield St & Hwy 400 NB Off/Rose St



07/08/2024

JL

Synchro 11 Report

Page 1

HCM Signalized Intersection Capacity Analysis

1: Bayfield St & Hwy 400 NB Off/Rose St

Rose Street Affordable Housing

TT (2028) - AM (No Dead End)

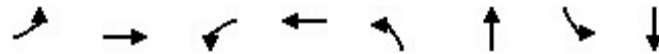
												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	 							 			 	
Traffic Volume (vph)	736	174	264	0	0	207	0	655	93	281	627	0
Future Volume (vph)	736	174	264	0	0	207	0	655	93	281	627	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0				6.0		6.0		4.0	6.0	
Lane Util. Factor	0.97	1.00				1.00		0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99				0.98		0.99		1.00	1.00	
Flpb, ped/bikes	0.99	1.00				1.00		1.00		1.00	1.00	
Frt	1.00	0.91				0.86		0.98		1.00	1.00	
Flt Protected	0.95	1.00				1.00		1.00		0.95	1.00	
Satd. Flow (prot)	3305	1708				1584		3491		1753	3579	
Flt Permitted	0.95	1.00				1.00		1.00		0.23	1.00	
Satd. Flow (perm)	3305	1708				1584		3491		418	3579	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	800	189	287	0	0	225	0	712	101	305	682	0
RTOR Reduction (vph)	0	55	0	0	0	162	0	10	0	0	0	0
Lane Group Flow (vph)	800	421	0	0	0	63	0	803	0	305	682	0
Confl. Peds. (#/hr)	5		5	5		5	15		10	10		15
Heavy Vehicles (%)	6%	0%	2%	0%	0%	3%	0%	2%	2%	4%	2%	0%
Turn Type	Perm	NA				Perm		NA		pm+pt	NA	
Protected Phases		4						2		1	6	
Permitted Phases	4					8				6		
Actuated Green, G (s)	28.2	28.2				28.2		42.5		59.8	59.8	
Effective Green, g (s)	28.2	28.2				28.2		42.5		59.8	59.8	
Actuated g/C Ratio	0.28	0.28				0.28		0.42		0.60	0.60	
Clearance Time (s)	6.0	6.0				6.0		6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0				3.0		3.0		3.0	3.0	
Lane Grp Cap (vph)	932	481				446		1483		427	2140	
v/s Ratio Prot		c0.25						0.23		c0.09	0.19	
v/s Ratio Perm	0.24					0.04				c0.33		
v/c Ratio	0.86	0.87				0.14		0.54		0.71	0.32	
Uniform Delay, d1	34.0	34.2				26.9		21.5		12.2	10.0	
Progression Factor	1.00	1.00				1.00		1.00		1.00	1.00	
Incremental Delay, d2	7.9	16.1				0.1		1.4		5.6	0.4	
Delay (s)	41.9	50.3				27.0		22.9		17.8	10.4	
Level of Service	D	D				C		C		B	B	
Approach Delay (s)		45.0			27.0			22.9			12.7	
Approach LOS		D			C			C			B	
Intersection Summary												
HCM 2000 Control Delay		28.7				HCM 2000 Level of Service		C				
HCM 2000 Volume to Capacity ratio		0.79										
Actuated Cycle Length (s)		100.0				Sum of lost time (s)		16.0				
Intersection Capacity Utilization		75.8%				ICU Level of Service		D				
Analysis Period (min)		15										
c Critical Lane Group												

Queues

2: Bayfield St & Grove St

Rose Street Affordable Housing

TT (2028) - AM (No Dead End)



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	180	36	98	40	3	407	123	706
Future Volume (vph)	180	36	98	40	3	407	123	706
Lane Group Flow (vph)	196	60	107	219	3	501	134	822
Turn Type	pm+pt	NA	Perm	NA	Perm	NA	pm+pt	NA
Protected Phases	7	4		8		2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	7	4	8	8	2	2	1	6
Switch Phase								
Minimum Initial (s)	7.0	10.0	10.0	10.0	24.0	24.0	7.0	24.0
Minimum Split (s)	11.0	30.0	30.0	30.0	30.0	30.0	11.0	30.0
Total Split (s)	15.0	51.0	36.0	36.0	38.0	38.0	11.0	49.0
Total Split (%)	15.0%	51.0%	36.0%	36.0%	38.0%	38.0%	11.0%	49.0%
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0	4.0	3.0	4.0
All-Red Time (s)	1.0	2.0	2.0	2.0	2.0	2.0	1.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0	6.0	6.0	6.0	6.0	4.0	6.0
Lead/Lag	Lead		Lag	Lag	Lag	Lag	Lead	
Lead-Lag Optimize?	Yes		Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	None	None	None	Max	Max	None	Max
v/c Ratio	0.52	0.10	0.55	0.66	0.01	0.37	0.28	0.45
Control Delay	24.2	13.7	43.0	18.6	17.7	19.1	11.7	13.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.2	13.7	43.0	18.6	17.7	19.1	11.7	13.7
Queue Length 50th (m)	21.9	4.1	15.8	6.0	0.3	27.8	9.6	39.1
Queue Length 95th (m)	37.1	11.7	31.0	27.3	2.1	45.0	21.1	61.8
Internal Link Dist (m)		140.8		181.1		201.3		233.2
Turn Bay Length (m)	20.0		25.0		30.0		50.0	
Base Capacity (vph)	383	922	453	542	248	1354	478	1844
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.51	0.07	0.24	0.40	0.01	0.37	0.28	0.45

Intersection Summary

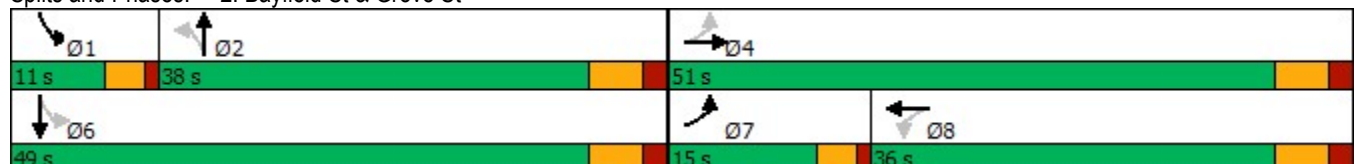
Cycle Length: 100

Actuated Cycle Length: 82.8

Natural Cycle: 85

Control Type: Semi Act-Uncoord

Splits and Phases: 2: Bayfield St & Grove St



HCM Signalized Intersection Capacity Analysis

2: Bayfield St & Grove St

Rose Street Affordable Housing

TT (2028) - AM (No Dead End)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	180	36	19	98	40	162	3	407	54	123	706	51
Future Volume (vph)	180	36	19	98	40	162	3	407	54	123	706	51
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		6.0	6.0		6.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.95		1.00	0.88		1.00	0.98		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1787	1678		1651	1185		1784	3476		1785	3536	
Flt Permitted	0.34	1.00		0.72	1.00		0.34	1.00		0.38	1.00	
Satd. Flow (perm)	646	1678		1248	1185		642	3476		716	3536	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	196	39	21	107	43	176	3	442	59	134	767	55
RTOR Reduction (vph)	0	14	0	0	148	0	0	9	0	0	4	0
Lane Group Flow (vph)	196	46	0	107	71	0	3	492	0	134	818	0
Confl. Peds. (#/hr)	5		5	5		5	5		10	10		5
Heavy Vehicles (%)	2%	4%	15%	10%	2%	50%	2%	2%	8%	2%	2%	2%
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	27.7	27.7		13.1	13.1		32.1	32.1		43.1	43.1	
Effective Green, g (s)	27.7	27.7		13.1	13.1		32.1	32.1		43.1	43.1	
Actuated g/C Ratio	0.33	0.33		0.16	0.16		0.39	0.39		0.52	0.52	
Clearance Time (s)	4.0	6.0		6.0	6.0		6.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	362	561		197	187		248	1347		463	1840	
v/s Ratio Prot	c0.07	0.03			0.06			0.14		0.02	c0.23	
v/s Ratio Perm	c0.11			0.09			0.00			0.13		
v/c Ratio	0.54	0.08		0.54	0.38		0.01	0.37		0.29	0.44	
Uniform Delay, d1	21.0	18.9		32.1	31.2		15.6	18.1		10.6	12.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.7	0.1		3.0	1.3		0.1	0.8		0.3	0.8	
Delay (s)	22.7	18.9		35.1	32.5		15.7	18.8		11.0	13.2	
Level of Service	C	B		D	C		B	B		B	B	
Approach Delay (s)		21.8			33.4			18.8			12.9	
Approach LOS		C			C			B			B	
Intersection Summary												
HCM 2000 Control Delay			18.7			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.54									
Actuated Cycle Length (s)			82.8			Sum of lost time (s)				20.0		
Intersection Capacity Utilization			83.1%			ICU Level of Service				E		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

3: Rose St & Hwy 400 NB On

Rose Street Affordable Housing
TT (2028) - AM (No Dead End)

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	207	110	273	276	0	0
Future Volume (Veh/h)	207	110	273	276	0	0
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	225	120	297	300	0	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (m)			246			
pX, platoon unblocked	0.94	0.94			0.94	
vC, conflicting volume	447	447			597	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	379	379			539	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	62	81			100	
cM capacity (veh/h)	585	627			967	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	345	597	0			
Volume Left	225	0	0			
Volume Right	120	300	0			
cSH	599	1700	1700			
Volume to Capacity	0.58	0.35	0.00			
Queue Length 95th (m)	27.8	0.0	0.0			
Control Delay (s)	18.8	0.0	0.0			
Lane LOS	C					
Approach Delay (s)	18.8	0.0	0.0			
Approach LOS	C					
Intersection Summary						
Average Delay		6.9				
Intersection Capacity Utilization		56.1%		ICU Level of Service		B
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis

4: Peel St & Grove St

Rose Street Affordable Housing

TT (2028) - AM (No Dead End)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	7	260	2	6	243	7	8	53	9	6	30	6
Future Volume (Veh/h)	7	260	2	6	243	7	8	53	9	6	30	6
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
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)	8	283	2	7	264	8	9	58	10	7	33	7
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None			None								
Median storage veh												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	272			285			606	586	284	621	583	268
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	272			285			606	586	284	621	583	268
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			98	86	99	98	92	99
cM capacity (veh/h)	1291			1277			378	417	755	349	419	771
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	293	279	77	47								
Volume Left	8	7	9	7								
Volume Right	2	8	10	7								
cSH	1291	1277	437	436								
Volume to Capacity	0.01	0.01	0.18	0.11								
Queue Length 95th (m)	0.1	0.1	4.8	2.7								
Control Delay (s)	0.3	0.2	15.0	14.3								
Lane LOS	A	A	B	B								
Approach Delay (s)	0.3	0.2	15.0	14.3								
Approach LOS			B	B								
Intersection Summary												
Average Delay		2.8										
Intersection Capacity Utilization		28.6%		ICU Level of Service					A			
Analysis Period (min)		15										

Queues
5: St. Vincent St & Rose St

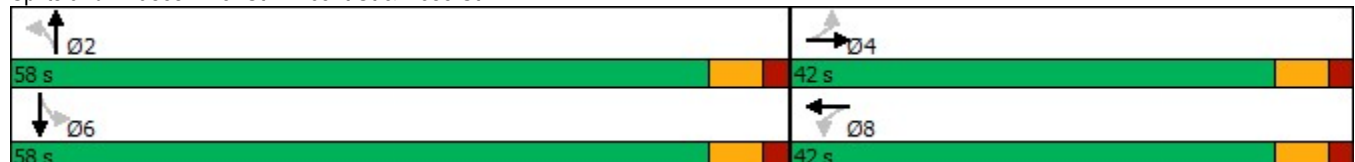
Rose Street Affordable Housing
TT (2028) - AM (No Dead End)

								
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	156	35	12	55	58	431	12	420
Future Volume (vph)	156	35	12	55	58	431	12	420
Lane Group Flow (vph)	0	233	0	100	63	478	13	561
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	24.0	24.0	24.0	24.0
Minimum Split (s)	33.0	33.0	33.0	33.0	30.0	30.0	30.0	30.0
Total Split (s)	42.0	42.0	42.0	42.0	58.0	58.0	58.0	58.0
Total Split (%)	42.0%	42.0%	42.0%	42.0%	58.0%	58.0%	58.0%	58.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		6.0		6.0	6.0	6.0	6.0	6.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	Max	Max	Max	Max
v/c Ratio		0.73		0.25	0.12	0.21	0.02	0.26
Control Delay		42.1		21.7	8.6	7.7	8.0	7.4
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0
Total Delay		42.1		21.7	8.6	7.7	8.0	7.4
Queue Length 50th (m)		33.1		10.2	3.6	15.1	0.7	16.8
Queue Length 95th (m)		56.1		21.9	11.2	28.8	3.4	32.3
Internal Link Dist (m)		114.8		126.2		135.5		109.5
Turn Bay Length (m)					25.0		25.0	
Base Capacity (vph)		606		748	516	2248	564	2188
Starvation Cap Reductn		0		0	0	0	0	0
Spillback Cap Reductn		0		0	0	0	0	0
Storage Cap Reductn		0		0	0	0	0	0
Reduced v/c Ratio		0.38		0.13	0.12	0.21	0.02	0.26

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 84
Natural Cycle: 65
Control Type: Semi Act-Uncoord

Splits and Phases: 5: St. Vincent St & Rose St



HCM Signalized Intersection Capacity Analysis

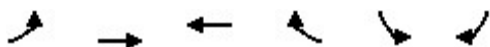
5: St. Vincent St & Rose St

Rose Street Affordable Housing
TT (2028) - AM (No Dead End)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↗	↕		↗	↕	
Traffic Volume (vph)	156	35	23	12	55	25	58	431	9	12	420	96
Future Volume (vph)	156	35	23	12	55	25	58	431	9	12	420	96
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00			1.00		1.00	1.00		1.00	0.99	
Flpb, ped/bikes		1.00			1.00		0.99	1.00		0.99	1.00	
Frt		0.99			0.96		1.00	1.00		1.00	0.97	
Flt Protected		0.96			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1768			1793		1769	3565		1778	3451	
Flt Permitted		0.76			0.95		0.44	1.00		0.48	1.00	
Satd. Flow (perm)		1399			1713		821	3565		896	3451	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	170	38	25	13	60	27	63	468	10	13	457	104
RTOR Reduction (vph)	0	5	0	0	16	0	0	1	0	0	15	0
Lane Group Flow (vph)	0	228	0	0	84	0	63	477	0	13	546	0
Confl. Peds. (#/hr)	5		10	10		5	10		5	5		10
Heavy Vehicles (%)	3%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		19.0			19.0		52.9	52.9		52.9	52.9	
Effective Green, g (s)		19.0			19.0		52.9	52.9		52.9	52.9	
Actuated g/C Ratio		0.23			0.23		0.63	0.63		0.63	0.63	
Clearance Time (s)		6.0			6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		316			387		517	2247		564	2175	
v/s Ratio Prot								0.13			c0.16	
v/s Ratio Perm		c0.16			0.05		0.08			0.01		
v/c Ratio		0.72			0.22		0.12	0.21		0.02	0.25	
Uniform Delay, d1		30.0			26.4		6.2	6.6		5.8	6.8	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		7.8			0.3		0.5	0.2		0.1	0.3	
Delay (s)		37.8			26.7		6.7	6.8		5.9	7.1	
Level of Service		D			C		A	A		A	A	
Approach Delay (s)		37.8			26.7			6.8			7.1	
Approach LOS		D			C			A			A	
Intersection Summary												
HCM 2000 Control Delay			13.3									HCM 2000 Level of Service B
HCM 2000 Volume to Capacity ratio			0.37									
Actuated Cycle Length (s)			83.9									Sum of lost time (s) 12.0
Intersection Capacity Utilization			74.0%									ICU Level of Service D
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis6: Rose St & West Access

Rose Street Affordable Housing
TT (2028) - AM (No Dead End)

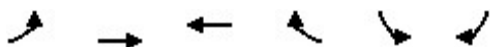


Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	29	247	299	30	20	18
Future Volume (Veh/h)	29	247	299	30	20	18
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	32	268	325	33	22	20
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	358				674	342
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	358				674	342
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	97				95	97
cM capacity (veh/h)	1201				409	701
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	300	358	42			
Volume Left	32	0	22			
Volume Right	0	33	20			
cSH	1201	1700	510			
Volume to Capacity	0.03	0.21	0.08			
Queue Length 95th (m)	0.6	0.0	2.0			
Control Delay (s)	1.1	0.0	12.7			
Lane LOS	A		B			
Approach Delay (s)	1.1	0.0	12.7			
Approach LOS			B			
Intersection Summary						
Average Delay			1.2			
Intersection Capacity Utilization			45.5%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

7: Rose St & East Access

Rose Street Affordable Housing
TT (2028) - AM (No Dead End)



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	41	226	301	63	43	28
Future Volume (Veh/h)	41	226	301	63	43	28
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	45	246	327	68	47	30
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	395				697	361
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	395				697	361
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	96				88	96
cM capacity (veh/h)	1164				391	684
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	291	395	77			
Volume Left	45	0	47			
Volume Right	0	68	30			
cSH	1164	1700	470			
Volume to Capacity	0.04	0.23	0.16			
Queue Length 95th (m)	0.9	0.0	4.4			
Control Delay (s)	1.6	0.0	14.2			
Lane LOS	A		B			
Approach Delay (s)	1.6	0.0	14.2			
Approach LOS			B			
Intersection Summary						
Average Delay			2.0			
Intersection Capacity Utilization			47.9%	ICU Level of Service		A
Analysis Period (min)			15			

Queues

1: Bayfield St & Hwy 400 NB Off/Rose St

Rose Street Affordable Housing

TT (2028) - PM (No Dead End)



Lane Group	EBL	EBT	WBR	NBT	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	1056	241	212	1001	313	680
Future Volume (vph)	1056	241	212	1001	313	680
Lane Group Flow (vph)	1148	604	230	1276	340	739
Turn Type	Perm	NA	Perm	NA	pm+pt	NA
Protected Phases		4		2	1	6
Permitted Phases	4		8		6	
Detector Phase	4	4	8	2	1	6
Switch Phase						
Minimum Initial (s)	12.0	12.0	12.0	24.0	7.0	24.0
Minimum Split (s)	30.0	30.0	30.0	30.0	11.5	30.0
Total Split (s)	58.0	58.0	58.0	64.0	28.0	92.0
Total Split (%)	38.7%	38.7%	38.7%	42.7%	18.7%	61.3%
Yellow Time (s)	4.0	4.0	4.0	4.0	3.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	4.0	6.0
Lead/Lag				Lag	Lead	
Lead-Lag Optimize?				Yes	Yes	
Recall Mode	None	None	None	C-Max	None	C-Max
v/c Ratio	0.96	0.97	0.30	0.94	0.99	0.36
Control Delay	65.8	73.1	1.0	57.2	92.7	17.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	65.8	73.1	1.0	57.2	92.7	17.8
Queue Length 50th (m)	172.2	166.1	0.0	189.6	85.4	59.8
Queue Length 95th (m)	#216.4	#243.7	0.0	#234.6	#150.0	72.9
Internal Link Dist (m)		579.4		233.2		180.4
Turn Bay Length (m)					120.0	
Base Capacity (vph)	1196	624	771	1361	342	2072
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.96	0.97	0.30	0.94	0.99	0.36

Intersection Summary

Cycle Length: 150

Actuated Cycle Length: 150

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

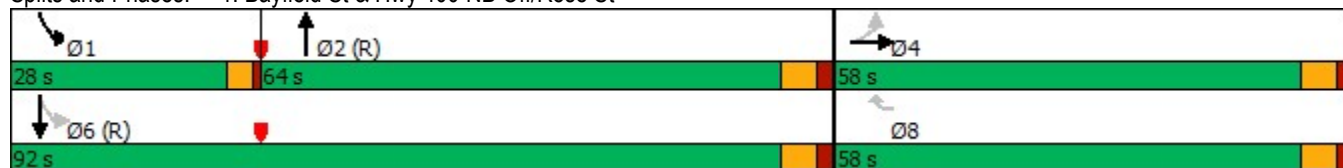
Natural Cycle: 90

Control Type: Actuated-Coordinated

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

Queue shown is maximum after two cycles.

Splits and Phases: 1: Bayfield St & Hwy 400 NB Off/Rose St



07/08/2024

JL

Synchro 11 Report

Page 1

HCM Signalized Intersection Capacity Analysis

1: Bayfield St & Hwy 400 NB Off/Rose St

Rose Street Affordable Housing

TT (2028) - PM (No Dead End)

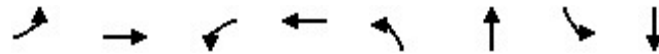
												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1056	241	315	0	0	212	0	1001	173	313	680	0
Future Volume (vph)	1056	241	315	0	0	212	0	1001	173	313	680	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0				6.0		6.0		4.0	6.0	
Lane Util. Factor	0.97	1.00				1.00		0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.98				0.98		0.99		1.00	1.00	
Flpb, ped/bikes	0.98	1.00				1.00		1.00		1.00	1.00	
Frt	1.00	0.92				0.86		0.98		1.00	1.00	
Flt Protected	0.95	1.00				1.00		1.00		0.95	1.00	
Satd. Flow (prot)	3451	1711				1595		3497		1807	3614	
Flt Permitted	0.95	1.00				1.00		1.00		0.06	1.00	
Satd. Flow (perm)	3451	1711				1595		3497		123	3614	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1148	262	342	0	0	230	0	1088	188	340	739	0
RTOR Reduction (vph)	0	31	0	0	0	150	0	9	0	0	0	0
Lane Group Flow (vph)	1148	573	0	0	0	80	0	1267	0	340	739	0
Confl. Peds. (#/hr)	5		10	10		5	20		10	10		20
Heavy Vehicles (%)	1%	1%	1%	0%	0%	2%	0%	1%	2%	1%	1%	0%
Turn Type	Perm	NA				Perm		NA		pm+pt	NA	
Protected Phases		4						2		1	6	
Permitted Phases	4					8				6		
Actuated Green, G (s)	52.0	52.0				52.0		58.0		86.0	86.0	
Effective Green, g (s)	52.0	52.0				52.0		58.0		86.0	86.0	
Actuated g/C Ratio	0.35	0.35				0.35		0.39		0.57	0.57	
Clearance Time (s)	6.0	6.0				6.0		6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0				3.0		3.0		3.0	3.0	
Lane Grp Cap (vph)	1196	593				552		1352		339	2072	
v/s Ratio Prot		c0.33						0.36		c0.16	0.20	
v/s Ratio Perm	0.33					0.05				c0.41		
v/c Ratio	0.96	0.97				0.14		0.94		1.00	0.36	
Uniform Delay, d1	48.0	48.1				33.7		44.2		50.9	17.2	
Progression Factor	1.00	1.00				1.00		1.00		1.00	1.00	
Incremental Delay, d2	17.0	28.3				0.1		13.4		49.6	0.5	
Delay (s)	65.0	76.4				33.8		57.7		100.5	17.6	
Level of Service	E	E				C		E		F	B	
Approach Delay (s)		68.9			33.8			57.7			43.8	
Approach LOS		E			C			E			D	
Intersection Summary												
HCM 2000 Control Delay		57.5				HCM 2000 Level of Service		E				
HCM 2000 Volume to Capacity ratio		1.01										
Actuated Cycle Length (s)		150.0				Sum of lost time (s)		16.0				
Intersection Capacity Utilization		96.6%				ICU Level of Service		F				
Analysis Period (min)		15										
c Critical Lane Group												

Queues

2: Bayfield St & Grove St

Rose Street Affordable Housing

TT (2028) - PM (No Dead End)



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	140	34	51	42	12	926	140	683
Future Volume (vph)	140	34	51	42	12	926	140	683
Lane Group Flow (vph)	152	46	55	146	13	1083	152	930
Turn Type	pm+pt	NA	Perm	NA	Perm	NA	pm+pt	NA
Protected Phases	7	4		8		2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	7	4	8	8	2	2	1	6
Switch Phase								
Minimum Initial (s)	7.0	10.0	10.0	10.0	24.0	24.0	7.0	24.0
Minimum Split (s)	11.0	30.0	30.0	30.0	30.0	30.0	11.0	30.0
Total Split (s)	11.0	45.0	34.0	34.0	44.0	44.0	11.0	55.0
Total Split (%)	11.0%	45.0%	34.0%	34.0%	44.0%	44.0%	11.0%	55.0%
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0	4.0	3.0	4.0
All-Red Time (s)	1.0	2.0	2.0	2.0	2.0	2.0	1.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0	6.0	6.0	6.0	6.0	4.0	6.0
Lead/Lag	Lead		Lag	Lag	Lag	Lag	Lead	
Lead-Lag Optimize?	Yes		Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	None	None	None	Max	Max	None	Max
v/c Ratio	0.47	0.10	0.34	0.49	0.05	0.67	0.51	0.45
Control Delay	28.3	20.1	38.9	18.6	13.5	19.8	13.0	9.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.3	20.1	38.9	18.6	13.5	19.8	13.0	9.8
Queue Length 50th (m)	18.6	4.4	8.0	6.6	1.1	65.4	8.8	36.0
Queue Length 95th (m)	33.4	12.0	18.8	22.8	4.4	91.4	17.5	53.0
Internal Link Dist (m)		140.8		181.1		201.3		233.2
Turn Bay Length (m)	20.0		25.0		30.0		50.0	
Base Capacity (vph)	326	852	433	629	264	1625	299	2060
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.47	0.05	0.13	0.23	0.05	0.67	0.51	0.45

Intersection Summary

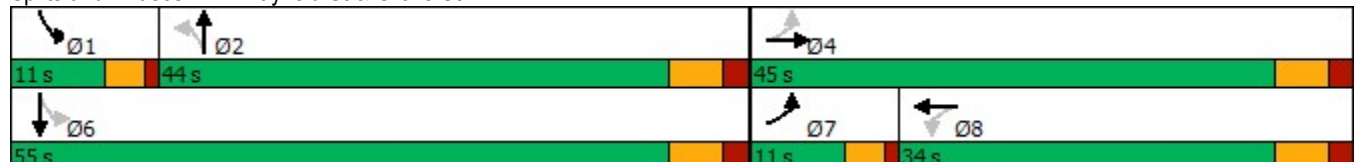
Cycle Length: 100

Actuated Cycle Length: 82.6

Natural Cycle: 85

Control Type: Semi Act-Uncoord

Splits and Phases: 2: Bayfield St & Grove St



HCM Signalized Intersection Capacity Analysis

2: Bayfield St & Grove St

Rose Street Affordable Housing

TT (2028) - PM (No Dead End)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	140	34	8	51	42	92	12	926	70	140	683	173
Future Volume (vph)	140	34	8	51	42	92	12	926	70	140	683	173
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		6.0	6.0		6.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	0.98		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		0.99	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.97		1.00	0.90		1.00	0.99		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1783	1796		1673	1664		1781	3527		1789	3444	
Flt Permitted	0.47	1.00		0.73	1.00		0.31	1.00		0.15	1.00	
Satd. Flow (perm)	875	1796		1281	1664		576	3527		276	3444	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	152	37	9	55	46	100	13	1007	76	152	742	188
RTOR Reduction (vph)	0	7	0	0	87	0	0	5	0	0	18	0
Lane Group Flow (vph)	152	39	0	55	59	0	13	1078	0	152	912	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	2%	2%	9%	8%	2%	2%	2%	2%	4%	2%	2%	2%
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	21.6	21.6		10.6	10.6		38.0	38.0		49.0	49.0	
Effective Green, g (s)	21.6	21.6		10.6	10.6		38.0	38.0		49.0	49.0	
Actuated g/C Ratio	0.26	0.26		0.13	0.13		0.46	0.46		0.59	0.59	
Clearance Time (s)	4.0	6.0		6.0	6.0		6.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	305	469		164	213		264	1622		291	2043	
v/s Ratio Prot	c0.04	0.02			0.04			c0.31		0.04	c0.26	
v/s Ratio Perm	c0.09			0.04			0.02			0.26		
v/c Ratio	0.50	0.08		0.34	0.28		0.05	0.66		0.52	0.45	
Uniform Delay, d1	24.8	23.0		32.8	32.5		12.3	17.3		10.5	9.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.3	0.1		1.2	0.7		0.4	2.2		1.7	0.7	
Delay (s)	26.0	23.1		34.0	33.2		12.7	19.5		12.2	10.0	
Level of Service	C	C		C	C		B	B		B	B	
Approach Delay (s)		25.4			33.5			19.4			10.3	
Approach LOS		C			C			B			B	
Intersection Summary												
HCM 2000 Control Delay			17.2			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.63									
Actuated Cycle Length (s)			82.6			Sum of lost time (s)			20.0			
Intersection Capacity Utilization			84.6%			ICU Level of Service			E			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis 3: Rose St & Hwy 400 NB On

Rose Street Affordable Housing
TT (2028) - PM (No Dead End)

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	212	104	383	344	0	0
Future Volume (Veh/h)	212	104	383	344	0	0
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	230	113	416	374	0	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (m)			246			
pX, platoon unblocked	0.90	0.90			0.90	
vC, conflicting volume	603	603			790	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	509	509			715	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	52	78			100	
cM capacity (veh/h)	474	511			801	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	343	790	0			
Volume Left	230	0	0			
Volume Right	113	374	0			
cSH	486	1700	1700			
Volume to Capacity	0.71	0.46	0.00			
Queue Length 95th (m)	41.9	0.0	0.0			
Control Delay (s)	28.3	0.0	0.0			
Lane LOS	D					
Approach Delay (s)	28.3	0.0	0.0			
Approach LOS	D					
Intersection Summary						
Average Delay		8.6				
Intersection Capacity Utilization		66.0%		ICU Level of Service		C
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis

4: Peel St & Grove St

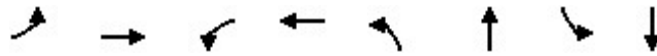
Rose Street Affordable Housing

TT (2028) - PM (No Dead End)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	7	212	18	8	173	4	8	43	3	0	50	8
Future Volume (Veh/h)	7	212	18	8	173	4	8	43	3	0	50	8
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
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)	8	230	20	9	188	4	9	47	3	0	54	9
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None			None								
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	192			250			500	466	240	490	474	190
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	192			250			500	466	240	490	474	190
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			98	90	100	100	89	99
cM capacity (veh/h)	1381			1316			431	488	799	446	483	852
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	258	201	59	63								
Volume Left	8	9	9	0								
Volume Right	20	4	3	9								
cSH	1381	1316	488	515								
Volume to Capacity	0.01	0.01	0.12	0.12								
Queue Length 95th (m)	0.1	0.2	3.1	3.2								
Control Delay (s)	0.3	0.4	13.4	13.0								
Lane LOS	A	A	B	B								
Approach Delay (s)	0.3	0.4	13.4	13.0								
Approach LOS			B	B								
Intersection Summary												
Average Delay			3.0									
Intersection Capacity Utilization			30.7%	ICU Level of Service						A		
Analysis Period (min)			15									

Queues
5: St. Vincent St & Rose St

Rose Street Affordable Housing
TT (2028) - PM (No Dead End)

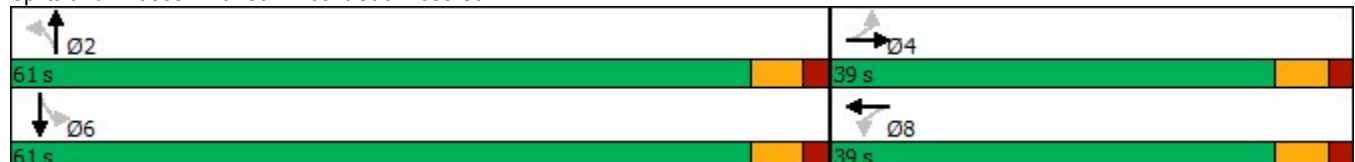


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations		↕		↕	↙	↕	↙	↕
Traffic Volume (vph)	196	42	6	35	33	565	46	599
Future Volume (vph)	196	42	6	35	33	565	46	599
Lane Group Flow (vph)	0	314	0	78	36	635	50	780
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	24.0	24.0	24.0	24.0
Minimum Split (s)	33.0	33.0	30.0	30.0	30.0	30.0	30.0	30.0
Total Split (s)	39.0	39.0	39.0	39.0	61.0	61.0	61.0	61.0
Total Split (%)	39.0%	39.0%	39.0%	39.0%	61.0%	61.0%	61.0%	61.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		6.0		6.0	6.0	6.0	6.0	6.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	Max	Max	Max	Max
v/c Ratio		0.84		0.16	0.11	0.30	0.11	0.38
Control Delay		50.9		16.4	10.9	10.3	10.7	10.5
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0
Total Delay		50.9		16.4	10.9	10.3	10.7	10.5
Queue Length 50th (m)		50.7		6.0	2.6	27.0	3.6	33.5
Queue Length 95th (m)		81.7		16.1	8.4	44.2	10.5	54.3
Internal Link Dist (m)		114.8		126.2		135.5		109.5
Turn Bay Length (m)					25.0		25.0	
Base Capacity (vph)		493		627	336	2130	436	2074
Starvation Cap Reductn		0		0	0	0	0	0
Spillback Cap Reductn		0		0	0	0	0	0
Storage Cap Reductn		0		0	0	0	0	0
Reduced v/c Ratio		0.64		0.12	0.11	0.30	0.11	0.38

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 92.2
Natural Cycle: 65
Control Type: Semi Act-Uncoord

Splits and Phases: 5: St. Vincent St & Rose St



HCM Signalized Intersection Capacity Analysis

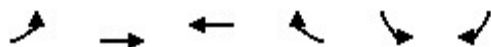
5: St. Vincent St & Rose St

Rose Street Affordable Housing
TT (2028) - PM (No Dead End)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	196	42	51	6	35	30	33	565	19	46	599	119
Future Volume (vph)	196	42	51	6	35	30	33	565	19	46	599	119
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		0.99			0.99		1.00	1.00		1.00	0.99	
Flpb, ped/bikes		0.99			1.00		0.99	1.00		0.98	1.00	
Frt		0.98			0.94		1.00	1.00		1.00	0.98	
Flt Protected		0.97			1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1748			1743		1640	3551		1761	3440	
Flt Permitted		0.75			0.96		0.32	1.00		0.39	1.00	
Satd. Flow (perm)		1353			1686		560	3551		728	3440	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	213	46	55	7	38	33	36	614	21	50	651	129
RTOR Reduction (vph)	0	8	0	0	24	0	0	2	0	0	15	0
Lane Group Flow (vph)	0	306	0	0	54	0	36	633	0	50	765	0
Confl. Peds. (#/hr)	15		15	15		15	15		25	15		25
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	10%	2%	2%	2%	2%	2%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		24.9			24.9		55.3	55.3		55.3	55.3	
Effective Green, g (s)		24.9			24.9		55.3	55.3		55.3	55.3	
Actuated g/C Ratio		0.27			0.27		0.60	0.60		0.60	0.60	
Clearance Time (s)		6.0			6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		365			455		335	2129		436	2063	
v/s Ratio Prot								0.18			c0.22	
v/s Ratio Perm		c0.23			0.03		0.06			0.07		
v/c Ratio		0.84			0.12		0.11	0.30		0.11	0.37	
Uniform Delay, d1		31.8			25.4		7.9	9.0		7.9	9.5	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		15.4			0.1		0.6	0.4		0.5	0.5	
Delay (s)		47.1			25.5		8.5	9.3		8.5	10.0	
Level of Service		D			C		A	A		A	B	
Approach Delay (s)		47.1			25.5			9.3			9.9	
Approach LOS		D			C			A			A	
Intersection Summary												
HCM 2000 Control Delay			16.5									B
HCM 2000 Volume to Capacity ratio			0.52									
Actuated Cycle Length (s)			92.2								12.0	
Intersection Capacity Utilization			71.3%								C	
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis6: Rose St & West Access

Rose Street Affordable Housing
TT (2028) - PM (No Dead End)

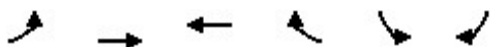


Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	18	328	286	20	31	31
Future Volume (Veh/h)	18	328	286	20	31	31
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	20	357	311	22	34	34
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	333				719	322
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	333				719	322
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	98				91	95
cM capacity (veh/h)	1226				389	719
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	377	333	68			
Volume Left	20	0	34			
Volume Right	0	22	34			
cSH	1226	1700	505			
Volume to Capacity	0.02	0.20	0.13			
Queue Length 95th (m)	0.4	0.0	3.5			
Control Delay (s)	0.6	0.0	13.2			
Lane LOS	A		B			
Approach Delay (s)	0.6	0.0	13.2			
Approach LOS			B			
Intersection Summary						
Average Delay			1.4			
Intersection Capacity Utilization			42.2%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

7: Rose St & East Access

Rose Street Affordable Housing
TT (2028) - PM (No Dead End)



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	25	332	262	39	65	44
Future Volume (Veh/h)	25	332	262	39	65	44
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	27	361	285	42	71	48
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	327				721	306
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	327				721	306
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	98				82	93
cM capacity (veh/h)	1233				386	734
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	388	327	119			
Volume Left	27	0	71			
Volume Right	0	42	48			
cSH	1233	1700	477			
Volume to Capacity	0.02	0.19	0.25			
Queue Length 95th (m)	0.5	0.0	7.4			
Control Delay (s)	0.8	0.0	15.0			
Lane LOS	A		C			
Approach Delay (s)	0.8	0.0	15.0			
Approach LOS			C			
Intersection Summary						
Average Delay			2.5			
Intersection Capacity Utilization		51.0%		ICU Level of Service		A
Analysis Period (min)		15				

Queues

1: Bayfield St & Hwy 400 NB Off/Rose St

Rose Street Affordable Housing

TT (2028) - AM (w. Dead End)



Lane Group	EBL	EBT	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	766	0	768	135	193	701
Future Volume (vph)	766	0	768	135	193	701
Lane Group Flow (vph)	833	378	835	147	210	762
Turn Type	Perm	NA	NA	Perm	pm+pt	NA
Protected Phases		4	2		1	6
Permitted Phases	4			2	6	
Detector Phase	4	4	2	2	1	6
Switch Phase						
Minimum Initial (s)	12.0	12.0	24.0	24.0	7.0	24.0
Minimum Split (s)	30.0	30.0	30.0	30.0	11.5	30.0
Total Split (s)	35.0	35.0	45.0	45.0	20.0	65.0
Total Split (%)	35.0%	35.0%	45.0%	45.0%	20.0%	65.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	3.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	4.0	6.0
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?			Yes	Yes	Yes	
Recall Mode	None	None	C-Max	C-Max	None	C-Max
v/c Ratio	0.86	0.65	0.36	0.19	0.47	0.25
Control Delay	44.0	21.2	19.1	3.8	12.2	9.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	44.0	21.2	19.1	3.8	12.2	9.9
Queue Length 50th (m)	77.7	31.2	38.2	0.0	16.6	24.2
Queue Length 95th (m)	#101.3	62.6	51.4	11.1	27.0	30.7
Internal Link Dist (m)		579.4	203.2			180.4
Turn Bay Length (m)				35.0	115.0	
Base Capacity (vph)	1000	589	2320	768	512	3075
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.83	0.64	0.36	0.19	0.41	0.25

Intersection Summary

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 20 (20%), Referenced to phase 2:NBT and 6:SBTL, Start of Green

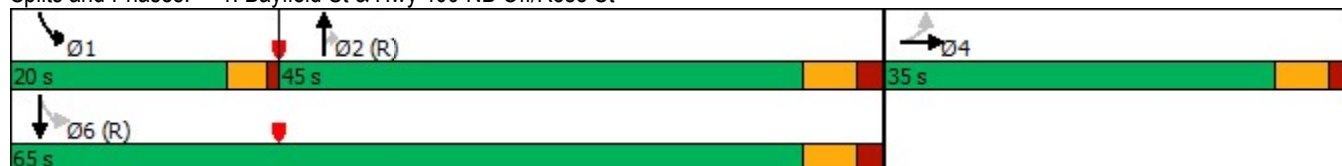
Natural Cycle: 75

Control Type: Actuated-Coordinated

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

Queue shown is maximum after two cycles.

Splits and Phases: 1: Bayfield St & Hwy 400 NB Off/Rose St



07/08/2024

JL

Synchro 10 Report

Page 1

HCM Signalized Intersection Capacity Analysis

1: Bayfield St & Hwy 400 NB Off/Rose St

Rose Street Affordable Housing

TT (2028) - AM (w. Dead End)

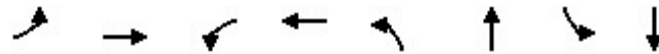
												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	 							  			  	
Traffic Volume (vph)	766	0	348	0	0	0	0	768	135	193	701	0
Future Volume (vph)	766	0	348	0	0	0	0	768	135	193	701	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0						6.0	6.0	4.0	6.0	
Lane Util. Factor	0.97	1.00						0.91	1.00	1.00	0.91	
Frpb, ped/bikes	1.00	0.98						1.00	0.95	1.00	1.00	
Flpb, ped/bikes	0.99	1.00						1.00	1.00	1.00	1.00	
Frt	1.00	0.85						1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00						1.00	1.00	0.95	1.00	
Satd. Flow (prot)	3449	1572						5142	1525	1787	5142	
Flt Permitted	0.95	1.00						1.00	1.00	0.26	1.00	
Satd. Flow (perm)	3449	1572						5142	1525	497	5142	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	833	0	378	0	0	0	0	835	147	210	762	0
RTOR Reduction (vph)	0	135	0	0	0	0	0	0	81	0	0	0
Lane Group Flow (vph)	833	243	0	0	0	0	0	835	66	210	762	0
Confl. Peds. (#/hr)	5		5	5		5	15		10	10		15
Turn Type	Perm	NA						NA	Perm	pm+pt	NA	
Protected Phases		4						2		1	6	
Permitted Phases	4								2	6		
Actuated Green, G (s)	28.2	28.2						45.1	45.1	59.8	59.8	
Effective Green, g (s)	28.2	28.2						45.1	45.1	59.8	59.8	
Actuated g/C Ratio	0.28	0.28						0.45	0.45	0.60	0.60	
Clearance Time (s)	6.0	6.0						6.0	6.0	4.0	6.0	
Vehicle Extension (s)	3.0	3.0						3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	972	443						2319	687	435	3074	
v/s Ratio Prot		0.15						0.16		c0.05	0.15	
v/s Ratio Perm	c0.24								0.04	c0.24		
v/c Ratio	0.86	0.55						0.36	0.10	0.48	0.25	
Uniform Delay, d1	34.0	30.5						18.0	15.8	9.8	9.5	
Progression Factor	1.00	1.00						1.00	1.00	1.00	1.00	
Incremental Delay, d2	7.5	1.4						0.4	0.3	0.8	0.2	
Delay (s)	41.5	31.9						18.4	16.0	10.7	9.7	
Level of Service	D	C						B	B	B	A	
Approach Delay (s)		38.5			0.0			18.1			9.9	
Approach LOS		D			A			B			A	
Intersection Summary												
HCM 2000 Control Delay		23.4			HCM 2000 Level of Service			C				
HCM 2000 Volume to Capacity ratio		0.62										
Actuated Cycle Length (s)		100.0			Sum of lost time (s)			16.0				
Intersection Capacity Utilization		66.1%			ICU Level of Service			C				
Analysis Period (min)		15										
c Critical Lane Group												

Queues

2: Bayfield St & Grove St

Rose Street Affordable Housing

TT (2028) - AM (w. Dead End)



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	180	36	98	40	3	420	256	732
Future Volume (vph)	180	36	98	40	3	420	256	732
Lane Group Flow (vph)	196	60	107	260	3	532	278	851
Turn Type	pm+pt	NA	Perm	NA	Perm	NA	pm+pt	NA
Protected Phases	7	4		8		2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	7	4	8	8	2	2	1	6
Switch Phase								
Minimum Initial (s)	7.0	10.0	10.0	10.0	24.0	24.0	7.0	24.0
Minimum Split (s)	11.0	30.0	30.0	30.0	30.0	30.0	11.0	30.0
Total Split (s)	15.0	51.0	36.0	36.0	38.0	38.0	11.0	49.0
Total Split (%)	15.0%	51.0%	36.0%	36.0%	38.0%	38.0%	11.0%	49.0%
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0	4.0	3.0	4.0
All-Red Time (s)	1.0	2.0	2.0	2.0	2.0	2.0	1.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0	6.0	6.0	6.0	6.0	4.0	6.0
Lead/Lag	Lead		Lag	Lag	Lag	Lag	Lead	
Lead-Lag Optimize?	Yes		Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	None	None	None	Max	Max	None	Max
v/c Ratio	0.59	0.10	0.52	0.60	0.01	0.39	0.60	0.46
Control Delay	26.7	13.8	41.9	14.0	17.3	18.9	17.2	13.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.7	13.8	41.9	14.0	17.3	18.9	17.2	13.6
Queue Length 50th (m)	21.9	4.1	15.7	6.0	0.3	29.2	21.4	40.2
Queue Length 95th (m)	37.3	11.8	30.6	26.7	2.0	46.2	40.6	62.2
Internal Link Dist (m)		140.8		181.1		201.3		203.2
Turn Bay Length (m)	20.0		25.0		30.0		200.0	
Base Capacity (vph)	340	981	491	731	243	1369	466	1857
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.58	0.06	0.22	0.36	0.01	0.39	0.60	0.46

Intersection Summary

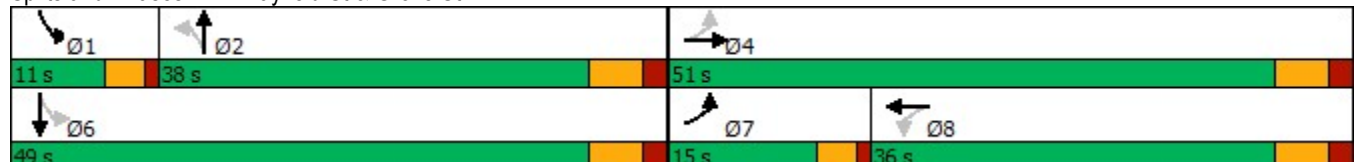
Cycle Length: 100

Actuated Cycle Length: 82.2

Natural Cycle: 85

Control Type: Semi Act-Uncoord

Splits and Phases: 2: Bayfield St & Grove St



HCM Signalized Intersection Capacity Analysis

2: Bayfield St & Grove St

Rose Street Affordable Housing

TT (2028) - AM (w. Dead End)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	180	36	19	98	40	200	3	420	69	256	732	51
Future Volume (vph)	180	36	19	98	40	200	3	420	69	256	732	51
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		6.0	6.0		6.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.95		1.00	0.87		1.00	0.98		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1788	1774		1781	1624		1785	3485		1785	3537	
Flt Permitted	0.24	1.00		0.72	1.00		0.33	1.00		0.36	1.00	
Satd. Flow (perm)	460	1774		1346	1624		624	3485		683	3537	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	196	39	21	107	43	217	3	457	75	278	796	55
RTOR Reduction (vph)	0	14	0	0	184	0	0	12	0	0	4	0
Lane Group Flow (vph)	196	46	0	107	76	0	3	520	0	278	847	0
Confl. Peds. (#/hr)	5		5	5		5	5		10	10		5
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	27.1	27.1		12.5	12.5		32.1	32.1		43.1	43.1	
Effective Green, g (s)	27.1	27.1		12.5	12.5		32.1	32.1		43.1	43.1	
Actuated g/C Ratio	0.33	0.33		0.15	0.15		0.39	0.39		0.52	0.52	
Clearance Time (s)	4.0	6.0		6.0	6.0		6.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	322	584		204	246		243	1360		451	1854	
v/s Ratio Prot	c0.08	0.03			0.05			0.15		c0.05	0.24	
v/s Ratio Perm	c0.12			0.08			0.00			c0.27		
v/c Ratio	0.61	0.08		0.52	0.31		0.01	0.38		0.62	0.46	
Uniform Delay, d1	21.4	19.0		32.1	31.0		15.3	18.0		11.6	12.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.2	0.1		2.4	0.7		0.1	0.8		2.5	0.8	
Delay (s)	24.7	19.0		34.5	31.7		15.4	18.8		14.1	13.0	
Level of Service	C	B		C	C		B	B		B	B	
Approach Delay (s)		23.4			32.5			18.7			13.3	
Approach LOS		C			C			B			B	
Intersection Summary												
HCM 2000 Control Delay			18.8			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.67									
Actuated Cycle Length (s)			82.2			Sum of lost time (s)			20.0			
Intersection Capacity Utilization			85.9%			ICU Level of Service			E			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

4: Peel St & Grove St

Rose Street Affordable Housing
TT (2028) - AM (w. Dead End)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	72	333	11	6	243	7	8	53	9	6	29	44
Future Volume (Veh/h)	72	333	11	6	243	7	8	53	9	6	29	44
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
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)	78	362	12	7	264	8	9	58	10	7	32	48
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	272			374			870	810	368	845	812	268
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	272			374			870	810	368	845	812	268
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	94			99			96	80	99	97	89	94
cM capacity (veh/h)	1291			1184			222	293	677	225	292	771
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	452	279	77	87								
Volume Left	78	7	9	7								
Volume Right	12	8	10	48								
cSH	1291	1184	304	429								
Volume to Capacity	0.06	0.01	0.25	0.20								
Queue Length 95th (m)	1.5	0.1	7.5	5.7								
Control Delay (s)	1.9	0.3	20.8	15.5								
Lane LOS	A	A	C	C								
Approach Delay (s)	1.9	0.3	20.8	15.5								
Approach LOS			C	C								
Intersection Summary												
Average Delay			4.3									
Intersection Capacity Utilization			51.3%		ICU Level of Service				A			
Analysis Period (min)			15									

Queues
5: St. Vincent St & Rose St

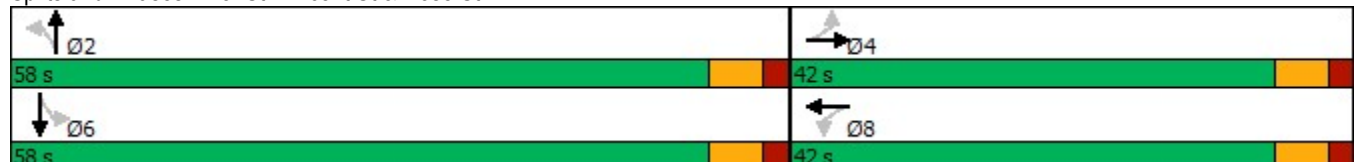
Rose Street Affordable Housing
TT (2028) - AM (w. Dead End)

								
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	192	35	12	55	58	458	12	441
Future Volume (vph)	192	35	12	55	58	458	12	441
Lane Group Flow (vph)	0	272	0	100	63	508	13	621
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	24.0	24.0	24.0	24.0
Minimum Split (s)	33.0	33.0	33.0	33.0	30.0	30.0	30.0	30.0
Total Split (s)	42.0	42.0	42.0	42.0	58.0	58.0	58.0	58.0
Total Split (%)	42.0%	42.0%	42.0%	42.0%	58.0%	58.0%	58.0%	58.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		6.0		6.0	6.0	6.0	6.0	6.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	Max	Max	Max	Max
v/c Ratio		0.76		0.22	0.14	0.23	0.02	0.30
Control Delay		43.3		20.6	10.3	9.0	9.4	8.7
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0
Total Delay		43.3		20.6	10.3	9.0	9.4	8.7
Queue Length 50th (m)		40.5		10.2	4.0	18.1	0.8	20.7
Queue Length 95th (m)		66.3		21.5	12.7	34.7	3.8	40.0
Internal Link Dist (m)		114.8		126.2		135.5		109.5
Turn Bay Length (m)					25.0		25.0	
Base Capacity (vph)		585		727	456	2165	527	2097
Starvation Cap Reductn		0		0	0	0	0	0
Spillback Cap Reductn		0		0	0	0	0	0
Storage Cap Reductn		0		0	0	0	0	0
Reduced v/c Ratio		0.46		0.14	0.14	0.23	0.02	0.30

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 86.4
Natural Cycle: 65
Control Type: Semi Act-Uncoord

Splits and Phases: 5: St. Vincent St & Rose St



HCM Signalized Intersection Capacity Analysis

5: St. Vincent St & Rose St

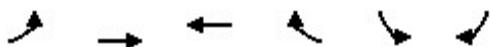
Rose Street Affordable Housing
TT (2028) - AM (w. Dead End)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	192	35	23	12	55	25	58	458	9	12	441	131
Future Volume (vph)	192	35	23	12	55	25	58	458	9	12	441	131
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00			1.00		1.00	1.00		1.00	0.99	
Flpb, ped/bikes		1.00			1.00		0.99	1.00		0.99	1.00	
Frt		0.99			0.96		1.00	1.00		1.00	0.97	
Flt Protected		0.96			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1781			1793		1771	3566		1778	3420	
Flt Permitted		0.75			0.95		0.40	1.00		0.47	1.00	
Satd. Flow (perm)		1388			1706		754	3566		870	3420	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	209	38	25	13	60	27	63	498	10	13	479	142
RTOR Reduction (vph)	0	4	0	0	16	0	0	1	0	0	23	0
Lane Group Flow (vph)	0	268	0	0	84	0	63	507	0	13	598	0
Confl. Peds. (#/hr)	5		10	10		5	10		5	5		10
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		21.9			21.9		52.4	52.4		52.4	52.4	
Effective Green, g (s)		21.9			21.9		52.4	52.4		52.4	52.4	
Actuated g/C Ratio		0.25			0.25		0.61	0.61		0.61	0.61	
Clearance Time (s)		6.0			6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		352			432		457	2165		528	2076	
v/s Ratio Prot								0.14				c0.17
v/s Ratio Perm		c0.19			0.05		0.08			0.01		
v/c Ratio		0.76			0.20		0.14	0.23		0.02	0.29	
Uniform Delay, d1		29.8			25.3		7.3	7.8		6.8	8.1	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		9.3			0.2		0.6	0.3		0.1	0.4	
Delay (s)		39.1			25.5		7.9	8.0		6.8	8.4	
Level of Service		D			C		A	A		A	A	
Approach Delay (s)		39.1			25.5			8.0			8.4	
Approach LOS		D			C			A			A	
Intersection Summary												
HCM 2000 Control Delay		14.6			HCM 2000 Level of Service			B				
HCM 2000 Volume to Capacity ratio		0.43										
Actuated Cycle Length (s)		86.3			Sum of lost time (s)			12.0				
Intersection Capacity Utilization		75.6%			ICU Level of Service			D				
Analysis Period (min)		15										
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

6: Rose St & West Access

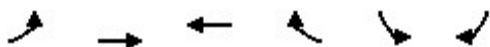
Rose Street Affordable Housing
TT (2028) - AM (w. Dead End)



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	17	6	49	33	0
Future Volume (Veh/h)	0	17	6	49	33	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	18	7	53	36	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	60				52	34
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	60				52	34
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				96	100
cM capacity (veh/h)	1544				957	1040
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	18	60	36			
Volume Left	0	0	36			
Volume Right	0	53	0			
cSH	1544	1700	957			
Volume to Capacity	0.00	0.04	0.04			
Queue Length 95th (m)	0.0	0.0	0.9			
Control Delay (s)	0.0	0.0	8.9			
Lane LOS			A			
Approach Delay (s)	0.0	0.0	8.9			
Approach LOS			A			
Intersection Summary						
Average Delay			2.8			
Intersection Capacity Utilization			13.3%		ICU Level of Service	
Analysis Period (min)			15			
			A			

HCM Unsignalized Intersection Capacity Analysis 7: Rose St & East Access

Rose Street Affordable Housing
TT (2028) - AM (w. Dead End)



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	50	55	114	76	0
Future Volume (Veh/h)	0	50	55	114	76	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	54	60	124	83	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	184				176	122
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	184				176	122
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				90	100
cM capacity (veh/h)	1391				814	929
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	54	184	83			
Volume Left	0	0	83			
Volume Right	0	124	0			
cSH	1391	1700	814			
Volume to Capacity	0.00	0.11	0.10			
Queue Length 95th (m)	0.0	0.0	2.6			
Control Delay (s)	0.0	0.0	9.9			
Lane LOS			A			
Approach Delay (s)	0.0	0.0	9.9			
Approach LOS			A			
Intersection Summary						
Average Delay			2.6			
Intersection Capacity Utilization			20.8%	ICU Level of Service		A
Analysis Period (min)			15			

Queues

1: Bayfield St & Hwy 400 NB Off/Rose St

Rose Street Affordable Housing

TT (2028) - PM (w. Dead End)



Lane Group	EBL	EBT	NBT	NBR	SBL	SBT
Lane Configurations	↰↰	↰	↰↰↰	↰	↰	↰↰↰
Traffic Volume (vph)	1101	0	1122	215	229	756
Future Volume (vph)	1101	0	1122	215	229	756
Lane Group Flow (vph)	1197	457	1220	234	249	822
Turn Type	Perm	NA	NA	Perm	pm+pt	NA
Protected Phases		4	2		1	6
Permitted Phases	4			2	6	
Detector Phase	4	4	2	2	1	6
Switch Phase						
Minimum Initial (s)	12.0	12.0	24.0	24.0	7.0	24.0
Minimum Split (s)	30.0	30.0	30.0	30.0	11.5	30.0
Total Split (s)	64.0	64.0	65.0	65.0	21.0	86.0
Total Split (%)	42.7%	42.7%	43.3%	43.3%	14.0%	57.3%
Yellow Time (s)	4.0	4.0	4.0	4.0	3.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	4.0	6.0
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?			Yes	Yes	Yes	
Recall Mode	None	None	C-Max	C-Max	None	C-Max
v/c Ratio	0.92	0.68	0.58	0.34	0.84	0.30
Control Delay	56.3	33.1	36.1	16.9	48.8	19.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	56.3	33.1	36.1	16.9	48.8	19.3
Queue Length 50th (m)	171.8	82.1	105.2	23.4	39.5	48.4
Queue Length 95th (m)	202.5	122.3	120.5	44.9	#81.5	57.5
Internal Link Dist (m)		579.4	203.2			180.4
Turn Bay Length (m)				35.0	115.0	
Base Capacity (vph)	1329	679	2106	684	308	2782
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.90	0.67	0.58	0.34	0.81	0.30

Intersection Summary

Cycle Length: 150

Actuated Cycle Length: 150

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

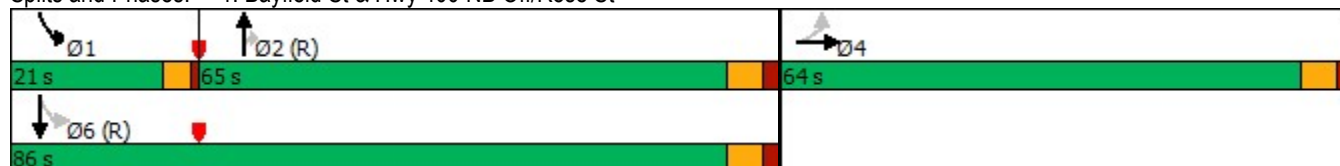
Natural Cycle: 80

Control Type: Actuated-Coordinated

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

Queue shown is maximum after two cycles.

Splits and Phases: 1: Bayfield St & Hwy 400 NB Off/Rose St



07/08/2024

JL

Synchro 11 Report

Page 1

HCM Signalized Intersection Capacity Analysis

1: Bayfield St & Hwy 400 NB Off/Rose St

Rose Street Affordable Housing

TT (2028) - PM (w. Dead End)

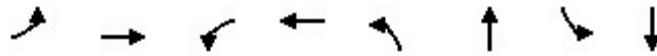
												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1101	0	420	0	0	0	0	1122	215	229	756	0
Future Volume (vph)	1101	0	420	0	0	0	0	1122	215	229	756	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0						6.0	6.0	4.0	6.0	
Lane Util. Factor	0.97	1.00						0.91	1.00	1.00	0.91	
Frpb, ped/bikes	1.00	0.97						1.00	0.94	1.00	1.00	
Flpb, ped/bikes	0.99	1.00						1.00	1.00	1.00	1.00	
Frt	1.00	0.85						1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00						1.00	1.00	0.95	1.00	
Satd. Flow (prot)	3439	1552						5142	1504	1789	5142	
Flt Permitted	0.95	1.00						1.00	1.00	0.13	1.00	
Satd. Flow (perm)	3439	1552						5142	1504	240	5142	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1197	0	457	0	0	0	0	1220	234	249	822	0
RTOR Reduction (vph)	0	80	0	0	0	0	0	0	68	0	0	0
Lane Group Flow (vph)	1197	377	0	0	0	0	0	1220	166	249	822	0
Confl. Peds. (#/hr)	5		10	10		5	20		10	10		20
Turn Type	Perm	NA						NA	Perm	pm+pt	NA	
Protected Phases		4						2		1	6	
Permitted Phases	4								2	6		
Actuated Green, G (s)	56.8	56.8						61.5	61.5	81.2	81.2	
Effective Green, g (s)	56.8	56.8						61.5	61.5	81.2	81.2	
Actuated g/C Ratio	0.38	0.38						0.41	0.41	0.54	0.54	
Clearance Time (s)	6.0	6.0						6.0	6.0	4.0	6.0	
Vehicle Extension (s)	3.0	3.0						3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	1302	587						2108	616	292	2783	
v/s Ratio Prot		0.24						0.24		c0.09	0.16	
v/s Ratio Perm	c0.35								0.11	c0.37		
v/c Ratio	0.92	0.64						0.58	0.27	0.85	0.30	
Uniform Delay, d1	44.4	38.3						34.2	29.3	25.9	18.8	
Progression Factor	1.00	1.00						1.00	1.00	1.00	1.00	
Incremental Delay, d2	10.5	2.4						1.2	1.1	20.7	0.3	
Delay (s)	54.9	40.7						35.4	30.4	46.5	19.1	
Level of Service	D	D						D	C	D	B	
Approach Delay (s)		51.0			0.0			34.6			25.4	
Approach LOS		D			A			C			C	
Intersection Summary												
HCM 2000 Control Delay		38.7			HCM 2000 Level of Service			D				
HCM 2000 Volume to Capacity ratio		0.90										
Actuated Cycle Length (s)		150.0			Sum of lost time (s)			16.0				
Intersection Capacity Utilization		79.1%			ICU Level of Service			D				
Analysis Period (min)		15										
c Critical Lane Group												

Queues

2: Bayfield St & Grove St

Rose Street Affordable Housing

TT (2028) - PM (w. Dead End)



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	140	34	51	42	12	931	285	720
Future Volume (vph)	140	34	51	42	12	931	285	720
Lane Group Flow (vph)	152	46	55	317	13	1113	310	971
Turn Type	pm+pt	NA	Perm	NA	Perm	NA	pm+pt	NA
Protected Phases	7	4		8		2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	7	4	8	8	2	2	1	6
Switch Phase								
Minimum Initial (s)	7.0	10.0	10.0	10.0	24.0	24.0	7.0	24.0
Minimum Split (s)	11.0	30.0	30.0	30.0	30.0	30.0	11.0	30.0
Total Split (s)	10.0	44.0	34.0	34.0	38.0	38.0	18.0	56.0
Total Split (%)	10.0%	44.0%	34.0%	34.0%	38.0%	38.0%	18.0%	56.0%
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0	4.0	3.0	4.0
All-Red Time (s)	1.0	2.0	2.0	2.0	2.0	2.0	1.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0	6.0	6.0	6.0	6.0	4.0	6.0
Lead/Lag	Lead		Lag	Lag	Lag	Lag	Lead	
Lead-Lag Optimize?	Yes		Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	None	None	None	Max	Max	None	Max
v/c Ratio	0.67	0.10	0.29	0.69	0.06	0.82	0.80	0.47
Control Delay	39.2	20.2	36.2	15.7	18.8	29.6	34.5	10.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	39.2	20.2	36.2	15.7	18.8	29.6	34.5	10.2
Queue Length 50th (m)	18.9	4.5	8.0	6.6	1.3	78.8	29.1	37.0
Queue Length 95th (m)	#35.3	12.0	18.2	30.6	5.4	#128.7	#78.0	62.4
Internal Link Dist (m)		140.8		181.1		201.3		203.2
Turn Bay Length (m)	20.0		25.0		30.0		200.0	
Base Capacity (vph)	228	831	453	718	212	1361	393	2076
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.67	0.06	0.12	0.44	0.06	0.82	0.79	0.47

Intersection Summary

Cycle Length: 100

Actuated Cycle Length: 83.8

Natural Cycle: 85

Control Type: Semi Act-Uncoord

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

Queue shown is maximum after two cycles.

Splits and Phases: 2: Bayfield St & Grove St



HCM Signalized Intersection Capacity Analysis

2: Bayfield St & Grove St

Rose Street Affordable Housing

TT (2028) - PM (w. Dead End)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	140	34	8	51	42	249	12	931	93	285	720	173
Future Volume (vph)	140	34	8	51	42	249	12	931	93	285	720	173
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		6.0	6.0		6.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	0.98		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		0.99	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.97		1.00	0.87		1.00	0.99		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1787	1820		1772	1611		1781	3518		1789	3450	
Flt Permitted	0.25	1.00		0.73	1.00		0.29	1.00		0.11	1.00	
Satd. Flow (perm)	479	1820		1356	1611		553	3518		208	3450	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	152	37	9	55	46	271	13	1012	101	310	783	188
RTOR Reduction (vph)	0	7	0	0	233	0	0	7	0	0	17	0
Lane Group Flow (vph)	152	39	0	55	84	0	13	1106	0	310	954	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases	7	4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	21.7	21.7		11.7	11.7		32.3	32.3		50.1	50.1	
Effective Green, g (s)	21.7	21.7		11.7	11.7		32.3	32.3		50.1	50.1	
Actuated g/C Ratio	0.26	0.26		0.14	0.14		0.39	0.39		0.60	0.60	
Clearance Time (s)	4.0	6.0		6.0	6.0		6.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	217	471		189	224		213	1355		384	2062	
v/s Ratio Prot	c0.05	0.02			0.05			0.31		c0.13	0.28	
v/s Ratio Perm	c0.13			0.04			0.02			c0.35		
v/c Ratio	0.70	0.08		0.29	0.37		0.06	0.82		0.81	0.46	
Uniform Delay, d1	26.0	23.5		32.3	32.7		16.2	23.1		20.1	9.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	9.8	0.1		0.9	1.1		0.5	5.5		11.8	0.7	
Delay (s)	35.8	23.6		33.2	33.8		16.8	28.6		31.9	10.1	
Level of Service	D	C		C	C		B	C		C	B	
Approach Delay (s)		33.0			33.7			28.5			15.4	
Approach LOS		C			C			C			B	
Intersection Summary												
HCM 2000 Control Delay			23.8			HCM 2000 Level of Service				C		
HCM 2000 Volume to Capacity ratio			0.84									
Actuated Cycle Length (s)			83.8			Sum of lost time (s)			20.0			
Intersection Capacity Utilization			90.6%			ICU Level of Service			E			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

4: Peel St & Grove St

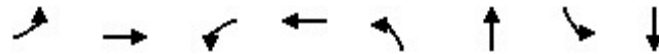
Rose Street Affordable Housing
TT (2028) - PM (w. Dead End)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	55	318	31	8	250	4	18	43	3	0	50	79
Future Volume (Veh/h)	55	318	31	8	250	4	18	43	3	0	50	79
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
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)	60	346	34	9	272	4	20	47	3	0	54	86
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None			None								
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	276			380			888	777	363	802	792	274
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	276			380			888	777	363	802	792	274
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	95			99			90	85	100	100	82	89
cM capacity (veh/h)	1287			1178			195	310	682	255	304	765
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	440	285	70	140								
Volume Left	60	9	20	0								
Volume Right	34	4	3	86								
cSH	1287	1178	271	483								
Volume to Capacity	0.05	0.01	0.26	0.29								
Queue Length 95th (m)	1.1	0.2	7.6	9.1								
Control Delay (s)	1.5	0.3	22.9	15.5								
Lane LOS	A	A	C	C								
Approach Delay (s)	1.5	0.3	22.9	15.5								
Approach LOS			C	C								
Intersection Summary												
Average Delay			4.8									
Intersection Capacity Utilization			59.8%		ICU Level of Service				B			
Analysis Period (min)			15									

Queues
5: St. Vincent St & Rose St

Rose Street Affordable Housing

TT (2028) - PM (w. Dead End)



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations		↕		↕	↙	↕	↙	↕
Traffic Volume (vph)	234	42	6	35	33	589	46	629
Future Volume (vph)	234	42	6	35	33	589	46	629
Lane Group Flow (vph)	0	355	0	78	36	661	50	855
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	24.0	24.0	24.0	24.0
Minimum Split (s)	33.0	33.0	30.0	30.0	30.0	30.0	30.0	30.0
Total Split (s)	39.0	39.0	39.0	39.0	61.0	61.0	61.0	61.0
Total Split (%)	39.0%	39.0%	39.0%	39.0%	61.0%	61.0%	61.0%	61.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		6.0		6.0	6.0	6.0	6.0	6.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	Max	Max	Max	Max
v/c Ratio		0.88		0.15	0.12	0.32	0.12	0.43
Control Delay		55.3		15.9	11.8	11.5	11.6	12.0
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0
Total Delay		55.3		15.9	11.8	11.5	11.6	12.0
Queue Length 50th (m)		60.4		6.0	3.1	33.3	4.2	44.0
Queue Length 95th (m)		#105.5		16.1	8.5	46.2	10.5	60.4
Internal Link Dist (m)		114.8		126.2		135.5		109.5
Turn Bay Length (m)					25.0		25.0	
Base Capacity (vph)		471		605	309	2056	401	1991
Starvation Cap Reductn		0		0	0	0	0	0
Spillback Cap Reductn		0		0	0	0	0	0
Storage Cap Reductn		0		0	0	0	0	0
Reduced v/c Ratio		0.75		0.13	0.12	0.32	0.12	0.43

Intersection Summary

Cycle Length: 100

Actuated Cycle Length: 95.4

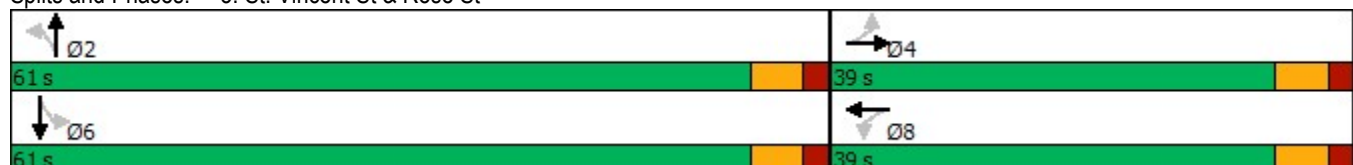
Natural Cycle: 65

Control Type: Semi Act-Uncoord

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

Queue shown is maximum after two cycles.

Splits and Phases: 5: St. Vincent St & Rose St



HCM Signalized Intersection Capacity Analysis

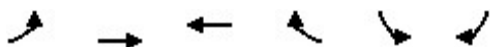
5: St. Vincent St & Rose St

Rose Street Affordable Housing
TT (2028) - PM (w. Dead End)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	234	42	51	6	35	30	33	589	19	46	629	157
Future Volume (vph)	234	42	51	6	35	30	33	589	19	46	629	157
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00			0.99		1.00	1.00		1.00	0.98	
Flpb, ped/bikes		0.99			1.00		0.99	1.00		0.98	1.00	
Frt		0.98			0.94		1.00	1.00		1.00	0.97	
Flt Protected		0.97			1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1749			1743		1771	3551		1762	3410	
Flt Permitted		0.74			0.96		0.29	1.00		0.37	1.00	
Satd. Flow (perm)		1338			1683		534	3551		694	3410	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	254	46	55	7	38	33	36	640	21	50	684	171
RTOR Reduction (vph)	0	7	0	0	23	0	0	2	0	0	21	0
Lane Group Flow (vph)	0	348	0	0	55	0	36	659	0	50	834	0
Confl. Peds. (#/hr)	15		15	15		15	15		25	15		25
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		28.2			28.2		55.2	55.2		55.2	55.2	
Effective Green, g (s)		28.2			28.2		55.2	55.2		55.2	55.2	
Actuated g/C Ratio		0.30			0.30		0.58	0.58		0.58	0.58	
Clearance Time (s)		6.0			6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		395			497		308	2054		401	1973	
v/s Ratio Prot								0.19			c0.24	
v/s Ratio Perm		c0.26			0.03		0.07			0.07		
v/c Ratio		0.88			0.11		0.12	0.32		0.12	0.42	
Uniform Delay, d1		32.0			24.5		9.1	10.4		9.1	11.2	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		19.9			0.1		0.8	0.4		0.6	0.7	
Delay (s)		51.9			24.6		9.9	10.8		9.8	11.9	
Level of Service		D			C		A	B		A	B	
Approach Delay (s)		51.9			24.6			10.8			11.8	
Approach LOS		D			C			B			B	
Intersection Summary												
HCM 2000 Control Delay			18.9									
HCM 2000 Volume to Capacity ratio			0.58									
Actuated Cycle Length (s)			95.4									
Intersection Capacity Utilization			73.4%									
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis6: Rose St & West Access

Rose Street Affordable Housing
TT (2028) - PM (w. Dead End)

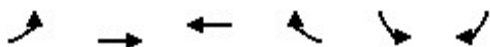


Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	10	18	31	51	0
Future Volume (Veh/h)	0	10	18	31	51	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	11	20	34	55	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	54				48	37
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	54				48	37
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				94	100
cM capacity (veh/h)	1551				962	1035
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	11	54	55			
Volume Left	0	0	55			
Volume Right	0	34	0			
cSH	1551	1700	962			
Volume to Capacity	0.00	0.03	0.06			
Queue Length 95th (m)	0.0	0.0	1.4			
Control Delay (s)	0.0	0.0	9.0			
Lane LOS			A			
Approach Delay (s)	0.0	0.0	9.0			
Approach LOS			A			
Intersection Summary						
Average Delay			4.1			
Intersection Capacity Utilization			13.3%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

7: Rose St & East Access

Rose Street Affordable Housing
TT (2028) - PM (w. Dead End)



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	61	49	71	120	0
Future Volume (Veh/h)	0	61	49	71	120	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	66	53	77	130	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	130				158	92
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	130				158	92
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				84	100
cM capacity (veh/h)	1455				834	966
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	66	130	130			
Volume Left	0	0	130			
Volume Right	0	77	0			
cSH	1455	1700	834			
Volume to Capacity	0.00	0.08	0.16			
Queue Length 95th (m)	0.0	0.0	4.2			
Control Delay (s)	0.0	0.0	10.1			
Lane LOS			B			
Approach Delay (s)	0.0	0.0	10.1			
Approach LOS			B			
Intersection Summary						
Average Delay			4.0			
Intersection Capacity Utilization			20.2%	ICU Level of Service		A
Analysis Period (min)			15			

Queues

1: Bayfield St & Hwy 400 NB Off/Rose St

Rose Street Affordable Housing

TT (2030) - AM (w. Dead End)



Lane Group	EBL	EBT	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	781	0	783	137	197	714
Future Volume (vph)	781	0	783	137	197	714
Lane Group Flow (vph)	849	386	851	149	214	776
Turn Type	Perm	NA	NA	Perm	pm+pt	NA
Protected Phases		4	2		1	6
Permitted Phases	4			2	6	
Detector Phase	4	4	2	2	1	6
Switch Phase						
Minimum Initial (s)	12.0	12.0	24.0	24.0	7.0	24.0
Minimum Split (s)	30.0	30.0	30.0	30.0	11.5	30.0
Total Split (s)	35.0	35.0	45.0	45.0	20.0	65.0
Total Split (%)	35.0%	35.0%	45.0%	45.0%	20.0%	65.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	3.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	4.0	6.0
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?			Yes	Yes	Yes	
Recall Mode	None	None	C-Max	C-Max	None	C-Max
v/c Ratio	0.87	0.67	0.37	0.19	0.49	0.25
Control Delay	45.0	22.6	19.3	3.8	12.5	9.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	45.0	22.6	19.3	3.8	12.5	9.9
Queue Length 50th (m)	79.6	34.1	39.1	0.0	16.9	24.7
Queue Length 95th (m)	#109.3	66.3	52.6	11.1	27.4	31.4
Internal Link Dist (m)		579.4	203.2			180.4
Turn Bay Length (m)				35.0	115.0	
Base Capacity (vph)	1000	585	2308	766	506	3070
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.85	0.66	0.37	0.19	0.42	0.25

Intersection Summary

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 20 (20%), Referenced to phase 2:NBT and 6:SBTL, Start of Green

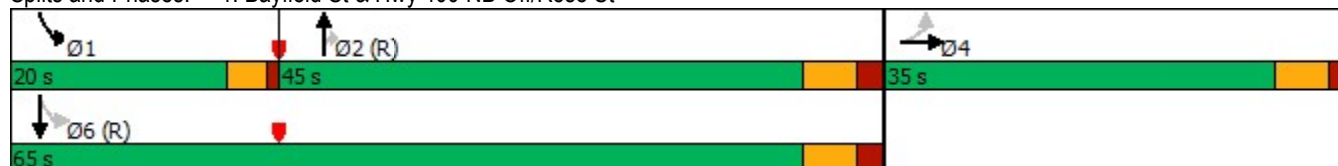
Natural Cycle: 75

Control Type: Actuated-Coordinated

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

Queue shown is maximum after two cycles.

Splits and Phases: 1: Bayfield St & Hwy 400 NB Off/Rose St



07/10/2024

JL

Synchro 11 Report

Page 1

HCM Signalized Intersection Capacity Analysis

1: Bayfield St & Hwy 400 NB Off/Rose St

Rose Street Affordable Housing

TT (2030) - AM (w. Dead End)

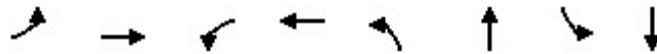
												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	781	0	355	0	0	0	0	783	137	197	714	0
Future Volume (vph)	781	0	355	0	0	0	0	783	137	197	714	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0						6.0	6.0	4.0	6.0	
Lane Util. Factor	0.97	1.00						0.91	1.00	1.00	0.91	
Frpb, ped/bikes	1.00	0.98						1.00	0.95	1.00	1.00	
Flpb, ped/bikes	0.99	1.00						1.00	1.00	1.00	1.00	
Frt	1.00	0.85						1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00						1.00	1.00	0.95	1.00	
Satd. Flow (prot)	3449	1572						5142	1525	1787	5142	
Flt Permitted	0.95	1.00						1.00	1.00	0.26	1.00	
Satd. Flow (perm)	3449	1572						5142	1525	485	5142	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	849	0	386	0	0	0	0	851	149	214	776	0
RTOR Reduction (vph)	0	130	0	0	0	0	0	0	82	0	0	0
Lane Group Flow (vph)	849	256	0	0	0	0	0	851	67	214	776	0
Confl. Peds. (#/hr)	5		5	5		5	15		10	10		15
Turn Type	Perm	NA						NA	Perm	pm+pt	NA	
Protected Phases		4						2		1	6	
Permitted Phases	4								2	6		
Actuated Green, G (s)	28.3	28.3						44.9	44.9	59.7	59.7	
Effective Green, g (s)	28.3	28.3						44.9	44.9	59.7	59.7	
Actuated g/C Ratio	0.28	0.28						0.45	0.45	0.60	0.60	
Clearance Time (s)	6.0	6.0						6.0	6.0	4.0	6.0	
Vehicle Extension (s)	3.0	3.0						3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	976	444						2308	684	430	3069	
v/s Ratio Prot		0.16						0.17		c0.05	0.15	
v/s Ratio Perm	c0.25								0.04	c0.24		
v/c Ratio	0.87	0.58						0.37	0.10	0.50	0.25	
Uniform Delay, d1	34.1	30.7						18.2	15.9	9.9	9.6	
Progression Factor	1.00	1.00						1.00	1.00	1.00	1.00	
Incremental Delay, d2	8.4	1.8						0.5	0.3	0.9	0.2	
Delay (s)	42.5	32.5						18.6	16.2	10.8	9.8	
Level of Service	D	C						B	B	B	A	
Approach Delay (s)		39.4			0.0			18.3			10.0	
Approach LOS		D			A			B			A	
Intersection Summary												
HCM 2000 Control Delay		23.8			HCM 2000 Level of Service			C				
HCM 2000 Volume to Capacity ratio		0.64										
Actuated Cycle Length (s)		100.0			Sum of lost time (s)			16.0				
Intersection Capacity Utilization		66.8%			ICU Level of Service			C				
Analysis Period (min)		15										
c Critical Lane Group												

Queues

2: Bayfield St & Grove St

Rose Street Affordable Housing

TT (2030) - AM (w. Dead End)



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	184	37	100	41	3	429	260	746
Future Volume (vph)	184	37	100	41	3	429	260	746
Lane Group Flow (vph)	200	61	109	266	3	542	283	868
Turn Type	pm+pt	NA	Perm	NA	Perm	NA	pm+pt	NA
Protected Phases	7	4		8		2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	7	4	8	8	2	2	1	6
Switch Phase								
Minimum Initial (s)	7.0	10.0	10.0	10.0	24.0	24.0	7.0	24.0
Minimum Split (s)	11.0	30.0	30.0	30.0	30.0	30.0	11.0	30.0
Total Split (s)	15.0	51.0	36.0	36.0	38.0	38.0	11.0	49.0
Total Split (%)	15.0%	51.0%	36.0%	36.0%	38.0%	38.0%	11.0%	49.0%
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0	4.0	3.0	4.0
All-Red Time (s)	1.0	2.0	2.0	2.0	2.0	2.0	1.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0	6.0	6.0	6.0	6.0	4.0	6.0
Lead/Lag	Lead		Lag	Lag	Lag	Lag	Lead	
Lead-Lag Optimize?	Yes		Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	None	None	None	Max	Max	None	Max
v/c Ratio	0.60	0.10	0.53	0.61	0.01	0.40	0.62	0.47
Control Delay	27.1	13.9	42.2	14.1	17.3	19.0	17.9	13.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.1	13.9	42.2	14.1	17.3	19.0	17.9	13.7
Queue Length 50th (m)	22.4	4.2	16.0	6.3	0.3	30.0	22.0	41.6
Queue Length 95th (m)	37.8	12.0	31.2	27.2	2.1	47.3	41.4	64.0
Internal Link Dist (m)		140.8		181.1		201.3		203.2
Turn Bay Length (m)	20.0		25.0		30.0		200.0	
Base Capacity (vph)	339	981	490	732	238	1368	460	1854
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.59	0.06	0.22	0.36	0.01	0.40	0.62	0.47

Intersection Summary

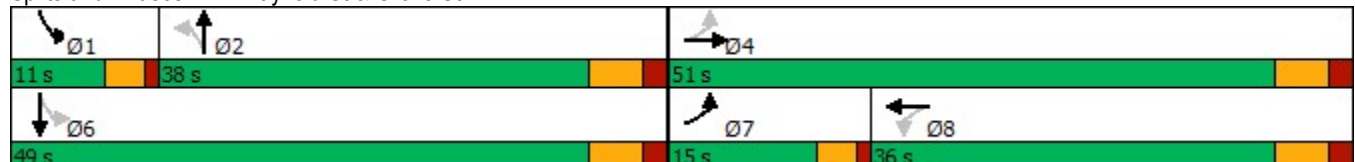
Cycle Length: 100

Actuated Cycle Length: 82.3

Natural Cycle: 85

Control Type: Semi Act-Uncoord

Splits and Phases: 2: Bayfield St & Grove St



HCM Signalized Intersection Capacity Analysis

2: Bayfield St & Grove St

Rose Street Affordable Housing

TT (2030) - AM (w. Dead End)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	184	37	19	100	41	203	3	429	70	260	746	52
Future Volume (vph)	184	37	19	100	41	203	3	429	70	260	746	52
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		6.0	6.0		6.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.95		1.00	0.88		1.00	0.98		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1788	1776		1781	1625		1785	3485		1785	3537	
Flt Permitted	0.24	1.00		0.72	1.00		0.33	1.00		0.36	1.00	
Satd. Flow (perm)	454	1776		1344	1625		614	3485		670	3537	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	200	40	21	109	45	221	3	466	76	283	811	57
RTOR Reduction (vph)	0	14	0	0	187	0	0	12	0	0	4	0
Lane Group Flow (vph)	200	47	0	109	79	0	3	530	0	283	864	0
Confl. Peds. (#/hr)	5		5	5		5	5		10	10		5
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases	7	4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	27.3	27.3		12.6	12.6		32.1	32.1		43.1	43.1	
Effective Green, g (s)	27.3	27.3		12.6	12.6		32.1	32.1		43.1	43.1	
Actuated g/C Ratio	0.33	0.33		0.15	0.15		0.39	0.39		0.52	0.52	
Clearance Time (s)	4.0	6.0		6.0	6.0		6.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	323	588		205	248		239	1357		445	1850	
v/s Ratio Prot	c0.08	0.03			0.05			0.15		c0.05	0.24	
v/s Ratio Perm	c0.12			0.08			0.00			c0.28		
v/c Ratio	0.62	0.08		0.53	0.32		0.01	0.39		0.64	0.47	
Uniform Delay, d1	21.5	18.9		32.2	31.1		15.4	18.1		11.9	12.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.5	0.1		2.6	0.7		0.1	0.8		3.0	0.8	
Delay (s)	25.0	19.0		34.8	31.8		15.5	19.0		14.9	13.2	
Level of Service	C	B		C	C		B	B		B	B	
Approach Delay (s)		23.6			32.7			18.9			13.7	
Approach LOS		C			C			B			B	
Intersection Summary												
HCM 2000 Control Delay			19.1			HCM 2000 Level of Service			B			
HCM 2000 Volume to Capacity ratio			0.69									
Actuated Cycle Length (s)			82.4			Sum of lost time (s)			20.0			
Intersection Capacity Utilization			86.7%			ICU Level of Service			E			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

4: Peel St & Grove St

Rose Street Affordable Housing

TT (2030) - AM (w. Dead End)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	72	340	11	6	248	7	8	53	9	6	29	44
Future Volume (Veh/h)	72	340	11	6	248	7	8	53	9	6	29	44
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
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)	78	370	12	7	270	8	9	58	10	7	32	48
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None				None							
Median storage veh												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	278			382			884	824	376	859	826	274
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	278			382			884	824	376	859	826	274
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	94			99			96	80	99	97	89	94
cM capacity (veh/h)	1285			1176			217	288	670	219	287	765
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	460	285	77	87								
Volume Left	78	7	9	7								
Volume Right	12	8	10	48								
cSH	1285	1176	298	422								
Volume to Capacity	0.06	0.01	0.26	0.21								
Queue Length 95th (m)	1.5	0.1	7.7	5.8								
Control Delay (s)	1.9	0.3	21.2	15.7								
Lane LOS	A	A	C	C								
Approach Delay (s)	1.9	0.3	21.2	15.7								
Approach LOS			C	C								
Intersection Summary												
Average Delay			4.3									
Intersection Capacity Utilization			51.9%	ICU Level of Service				A				
Analysis Period (min)			15									

Queues
5: St. Vincent St & Rose St

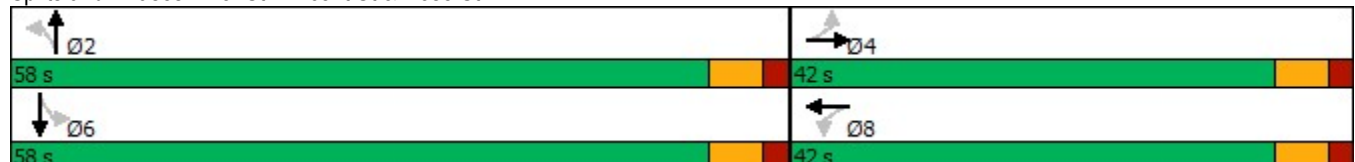
Rose Street Affordable Housing
TT (2030) - AM (w. Dead End)

								
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	195	35	12	56	59	467	12	449
Future Volume (vph)	195	35	12	56	59	467	12	449
Lane Group Flow (vph)	0	275	0	102	64	518	13	631
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	24.0	24.0	24.0	24.0
Minimum Split (s)	33.0	33.0	33.0	33.0	30.0	30.0	30.0	30.0
Total Split (s)	42.0	42.0	42.0	42.0	58.0	58.0	58.0	58.0
Total Split (%)	42.0%	42.0%	42.0%	42.0%	58.0%	58.0%	58.0%	58.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		6.0		6.0	6.0	6.0	6.0	6.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	Max	Max	Max	Max
v/c Ratio		0.77		0.23	0.14	0.24	0.03	0.30
Control Delay		43.6		20.6	10.5	9.2	9.6	8.8
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0
Total Delay		43.6		20.6	10.5	9.2	9.6	8.8
Queue Length 50th (m)		41.0		10.4	4.2	18.7	0.8	21.5
Queue Length 95th (m)		67.0		22.0	13.0	35.7	3.8	41.2
Internal Link Dist (m)		114.8		126.2		135.5		109.5
Turn Bay Length (m)					25.0		25.0	
Base Capacity (vph)		581		725	449	2157	520	2090
Starvation Cap Reductn		0		0	0	0	0	0
Spillback Cap Reductn		0		0	0	0	0	0
Storage Cap Reductn		0		0	0	0	0	0
Reduced v/c Ratio		0.47		0.14	0.14	0.24	0.03	0.30

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 86.6
Natural Cycle: 65
Control Type: Semi Act-Uncoord

Splits and Phases: 5: St. Vincent St & Rose St



HCM Signalized Intersection Capacity Analysis

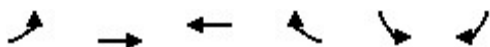
5: St. Vincent St & Rose St

Rose Street Affordable Housing
TT (2030) - AM (w. Dead End)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	195	35	23	12	56	26	59	467	9	12	449	132
Future Volume (vph)	195	35	23	12	56	26	59	467	9	12	449	132
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00			1.00		1.00	1.00		1.00	0.99	
Flpb, ped/bikes		1.00			1.00		0.99	1.00		0.99	1.00	
Frt		0.99			0.96		1.00	1.00		1.00	0.97	
Flt Protected		0.96			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1781			1792		1771	3566		1778	3422	
Flt Permitted		0.75			0.95		0.40	1.00		0.46	1.00	
Satd. Flow (perm)		1383			1706		743	3566		860	3422	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	212	38	25	13	61	28	64	508	10	13	488	143
RTOR Reduction (vph)	0	4	0	0	16	0	0	1	0	0	23	0
Lane Group Flow (vph)	0	271	0	0	86	0	64	517	0	13	608	0
Confl. Peds. (#/hr)	5		10	10		5	10		5	5		10
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		22.2			22.2		52.4	52.4		52.4	52.4	
Effective Green, g (s)		22.2			22.2		52.4	52.4		52.4	52.4	
Actuated g/C Ratio		0.26			0.26		0.61	0.61		0.61	0.61	
Clearance Time (s)		6.0			6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		354			437		449	2157		520	2070	
v/s Ratio Prot								0.14			c0.18	
v/s Ratio Perm		c0.20			0.05		0.09			0.02		
v/c Ratio		0.76			0.20		0.14	0.24		0.03	0.29	
Uniform Delay, d1		29.8			25.2		7.4	7.9		6.9	8.2	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		9.4			0.2		0.7	0.3		0.1	0.4	
Delay (s)		39.2			25.4		8.1	8.2		6.9	8.6	
Level of Service		D			C		A	A		A	A	
Approach Delay (s)		39.2			25.4			8.1			8.5	
Approach LOS		D			C			A			A	
Intersection Summary												
HCM 2000 Control Delay		14.7			HCM 2000 Level of Service			B				
HCM 2000 Volume to Capacity ratio		0.43										
Actuated Cycle Length (s)		86.6			Sum of lost time (s)			12.0				
Intersection Capacity Utilization		75.8%			ICU Level of Service			D				
Analysis Period (min)		15										
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis6: Rose St & West Access

Rose Street Affordable Housing
TT (2030) - AM (w. Dead End)

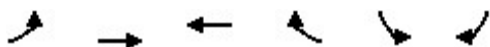


Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	17	6	49	33	0
Future Volume (Veh/h)	0	17	6	49	33	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	18	7	53	36	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	60				52	34
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	60				52	34
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				96	100
cM capacity (veh/h)	1544				957	1040
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	18	60	36			
Volume Left	0	0	36			
Volume Right	0	53	0			
cSH	1544	1700	957			
Volume to Capacity	0.00	0.04	0.04			
Queue Length 95th (m)	0.0	0.0	0.9			
Control Delay (s)	0.0	0.0	8.9			
Lane LOS			A			
Approach Delay (s)	0.0	0.0	8.9			
Approach LOS			A			
Intersection Summary						
Average Delay			2.8			
Intersection Capacity Utilization			13.3%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

7: Rose St & East Access

Rose Street Affordable Housing
TT (2030) - AM (w. Dead End)



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	50	55	114	76	0
Future Volume (Veh/h)	0	50	55	114	76	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	54	60	124	83	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	184				176	122
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	184				176	122
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				90	100
cM capacity (veh/h)	1391				814	929
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	54	184	83			
Volume Left	0	0	83			
Volume Right	0	124	0			
cSH	1391	1700	814			
Volume to Capacity	0.00	0.11	0.10			
Queue Length 95th (m)	0.0	0.0	2.6			
Control Delay (s)	0.0	0.0	9.9			
Lane LOS			A			
Approach Delay (s)	0.0	0.0	9.9			
Approach LOS			A			
Intersection Summary						
Average Delay			2.6			
Intersection Capacity Utilization			20.8%	ICU Level of Service	A	
Analysis Period (min)			15			

Queues

1: Bayfield St & Hwy 400 NB Off/Rose St

Rose Street Affordable Housing

TT (2030) - PM (w. Dead End)



Lane Group	EBL	EBT	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	1123	0	1144	219	233	771
Future Volume (vph)	1123	0	1144	219	233	771
Lane Group Flow (vph)	1221	466	1243	238	253	838
Turn Type	Perm	NA	NA	Perm	pm+pt	NA
Protected Phases		4	2		1	6
Permitted Phases	4			2	6	
Detector Phase	4	4	2	2	1	6
Switch Phase						
Minimum Initial (s)	12.0	12.0	24.0	24.0	7.0	24.0
Minimum Split (s)	30.0	30.0	30.0	30.0	11.5	30.0
Total Split (s)	64.0	64.0	65.0	65.0	21.0	86.0
Total Split (%)	42.7%	42.7%	43.3%	43.3%	14.0%	57.3%
Yellow Time (s)	4.0	4.0	4.0	4.0	3.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	4.0	6.0
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?			Yes	Yes	Yes	
Recall Mode	None	None	C-Max	C-Max	None	C-Max
v/c Ratio	0.93	0.70	0.60	0.35	0.87	0.30
Control Delay	57.6	34.3	36.9	17.3	53.7	19.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	57.6	34.3	36.9	17.3	53.7	19.6
Queue Length 50th (m)	177.1	86.6	107.8	24.3	42.9	49.5
Queue Length 95th (m)	#218.7	128.1	123.1	46.3	#88.2	58.7
Internal Link Dist (m)		579.4	203.2			180.4
Turn Bay Length (m)				35.0	115.0	
Base Capacity (vph)	1329	676	2081	677	301	2769
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.92	0.69	0.60	0.35	0.84	0.30

Intersection Summary

Cycle Length: 150

Actuated Cycle Length: 150

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

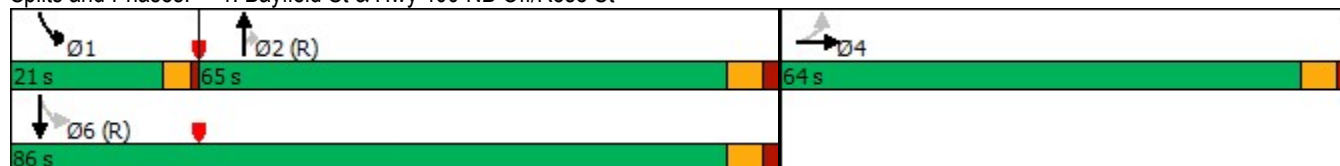
Natural Cycle: 80

Control Type: Actuated-Coordinated

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

Queue shown is maximum after two cycles.

Splits and Phases: 1: Bayfield St & Hwy 400 NB Off/Rose St



HCM Signalized Intersection Capacity Analysis

1: Bayfield St & Hwy 400 NB Off/Rose St

Rose Street Affordable Housing

TT (2030) - PM (w. Dead End)

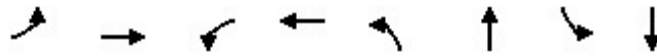
												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	 							  			  	
Traffic Volume (vph)	1123	0	429	0	0	0	0	1144	219	233	771	0
Future Volume (vph)	1123	0	429	0	0	0	0	1144	219	233	771	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0						6.0	6.0	4.0	6.0	
Lane Util. Factor	0.97	1.00						0.91	1.00	1.00	0.91	
Frpb, ped/bikes	1.00	0.97						1.00	0.94	1.00	1.00	
Flpb, ped/bikes	0.99	1.00						1.00	1.00	1.00	1.00	
Frt	1.00	0.85						1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00						1.00	1.00	0.95	1.00	
Satd. Flow (prot)	3439	1552						5142	1504	1789	5142	
Flt Permitted	0.95	1.00						1.00	1.00	0.12	1.00	
Satd. Flow (perm)	3439	1552						5142	1504	226	5142	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1221	0	466	0	0	0	0	1243	238	253	838	0
RTOR Reduction (vph)	0	77	0	0	0	0	0	0	69	0	0	0
Lane Group Flow (vph)	1221	389	0	0	0	0	0	1243	169	253	838	0
Confl. Peds. (#/hr)	5		10	10		5	20		10	10		20
Turn Type	Perm	NA						NA	Perm	pm+pt	NA	
Protected Phases		4						2		1	6	
Permitted Phases	4								2	6		
Actuated Green, G (s)	57.2	57.2						60.7	60.7	80.8	80.8	
Effective Green, g (s)	57.2	57.2						60.7	60.7	80.8	80.8	
Actuated g/C Ratio	0.38	0.38						0.40	0.40	0.54	0.54	
Clearance Time (s)	6.0	6.0						6.0	6.0	4.0	6.0	
Vehicle Extension (s)	3.0	3.0						3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	1311	591						2080	608	289	2769	
v/s Ratio Prot		0.25						0.24		c0.09	0.16	
v/s Ratio Perm	c0.36								0.11	c0.38		
v/c Ratio	0.93	0.66						0.60	0.28	0.88	0.30	
Uniform Delay, d1	44.5	38.3						35.1	29.9	29.3	19.1	
Progression Factor	1.00	1.00						1.00	1.00	1.00	1.00	
Incremental Delay, d2	11.9	2.7						1.3	1.1	24.2	0.3	
Delay (s)	56.4	41.0						36.3	31.1	53.5	19.4	
Level of Service	E	D						D	C	D	B	
Approach Delay (s)		52.2			0.0			35.5			27.3	
Approach LOS		D			A			D			C	
Intersection Summary												
HCM 2000 Control Delay		40.0			HCM 2000 Level of Service			D				
HCM 2000 Volume to Capacity ratio		0.92										
Actuated Cycle Length (s)		150.0			Sum of lost time (s)			16.0				
Intersection Capacity Utilization		80.4%			ICU Level of Service			D				
Analysis Period (min)		15										
c Critical Lane Group												

Queues

2: Bayfield St & Grove St

Rose Street Affordable Housing

TT (2030) - PM (w. Dead End)



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	143	35	52	43	12	950	290	734
Future Volume (vph)	143	35	52	43	12	950	290	734
Lane Group Flow (vph)	155	47	57	322	13	1135	315	989
Turn Type	pm+pt	NA	Perm	NA	Perm	NA	pm+pt	NA
Protected Phases	7	4		8		2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	7	4	8	8	2	2	1	6
Switch Phase								
Minimum Initial (s)	7.0	10.0	10.0	10.0	24.0	24.0	7.0	24.0
Minimum Split (s)	11.0	30.0	30.0	30.0	30.0	30.0	11.0	30.0
Total Split (s)	11.0	44.0	33.0	33.0	38.0	38.0	18.0	56.0
Total Split (%)	11.0%	44.0%	33.0%	33.0%	38.0%	38.0%	18.0%	56.0%
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0	4.0	3.0	4.0
All-Red Time (s)	1.0	2.0	2.0	2.0	2.0	2.0	1.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0	6.0	6.0	6.0	6.0	4.0	6.0
Lead/Lag	Lead		Lag	Lag	Lag	Lag	Lead	
Lead-Lag Optimize?	Yes		Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	None	None	None	Max	Max	None	Max
v/c Ratio	0.63	0.09	0.30	0.70	0.06	0.85	0.81	0.48
Control Delay	35.5	19.9	37.0	16.0	19.3	32.1	36.1	10.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.5	19.9	37.0	16.0	19.3	32.1	36.1	10.8
Queue Length 50th (m)	19.3	4.6	8.4	6.9	1.3	82.9	30.5	39.5
Queue Length 95th (m)	34.1	12.1	19.0	31.1	5.4	#136.5	#81.6	66.4
Internal Link Dist (m)		140.8		181.1		201.3		203.2
Turn Bay Length (m)	20.0		25.0		30.0		200.0	
Base Capacity (vph)	247	820	430	699	205	1335	389	2050
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.63	0.06	0.13	0.46	0.06	0.85	0.81	0.48

Intersection Summary

Cycle Length: 100

Actuated Cycle Length: 84.9

Natural Cycle: 85

Control Type: Semi Act-Uncoord

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

Queue shown is maximum after two cycles.

Splits and Phases: 2: Bayfield St & Grove St



HCM Signalized Intersection Capacity Analysis

2: Bayfield St & Grove St

Rose Street Affordable Housing

TT (2030) - PM (w. Dead End)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	143	35	8	52	43	253	12	950	94	290	734	176
Future Volume (vph)	143	35	8	52	43	253	12	950	94	290	734	176
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		6.0	6.0		6.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	0.98		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		0.99	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.97		1.00	0.87		1.00	0.99		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1787	1821		1771	1611		1781	3518		1789	3450	
Flt Permitted	0.25	1.00		0.73	1.00		0.29	1.00		0.11	1.00	
Satd. Flow (perm)	476	1821		1354	1611		543	3518		209	3450	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	155	38	9	57	47	275	13	1033	102	315	798	191
RTOR Reduction (vph)	0	7	0	0	237	0	0	7	0	0	17	0
Lane Group Flow (vph)	155	40	0	57	85	0	13	1128	0	315	972	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases	7	4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	22.8	22.8		11.8	11.8		32.1	32.1		50.1	50.1	
Effective Green, g (s)	22.8	22.8		11.8	11.8		32.1	32.1		50.1	50.1	
Actuated g/C Ratio	0.27	0.27		0.14	0.14		0.38	0.38		0.59	0.59	
Clearance Time (s)	4.0	6.0		6.0	6.0		6.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	235	489		188	223		205	1330		383	2035	
v/s Ratio Prot	c0.05	0.02			0.05			0.32		c0.14	0.28	
v/s Ratio Perm	c0.12			0.04			0.02			c0.35		
v/c Ratio	0.66	0.08		0.30	0.38		0.06	0.85		0.82	0.48	
Uniform Delay, d1	25.8	23.2		32.9	33.2		16.8	24.2		20.9	9.9	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	6.5	0.1		0.9	1.1		0.6	6.9		13.3	0.8	
Delay (s)	32.3	23.3		33.8	34.3		17.4	31.0		34.2	10.7	
Level of Service	C	C		C	C		B	C		C	B	
Approach Delay (s)		30.2			34.2			30.9			16.4	
Approach LOS		C			C			C			B	
Intersection Summary												
HCM 2000 Control Delay			25.0			HCM 2000 Level of Service			C			
HCM 2000 Volume to Capacity ratio			0.84									
Actuated Cycle Length (s)			84.9			Sum of lost time (s)			20.0			
Intersection Capacity Utilization			91.5%			ICU Level of Service			F			
Analysis Period (min)			15									
c Critical Lane Group												

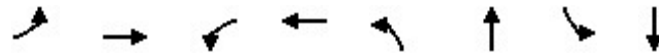
HCM Unsignalized Intersection Capacity Analysis4: Peel St & Grove St

Rose Street Affordable Housing
TT (2030) - PM (w. Dead End)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	56	324	32	8	255	4	18	43	3	0	50	79
Future Volume (Veh/h)	56	324	32	8	255	4	18	43	3	0	50	79
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
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)	61	352	35	9	277	4	20	47	3	0	54	86
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None			None								
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	281			387			902	790	370	815	806	279
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	281			387			902	790	370	815	806	279
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	95			99			89	85	100	100	82	89
cM capacity (veh/h)	1282			1171			190	304	676	249	298	760
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	448	290	70	140								
Volume Left	61	9	20	0								
Volume Right	35	4	3	86								
cSH	1282	1171	265	476								
Volume to Capacity	0.05	0.01	0.26	0.29								
Queue Length 95th (m)	1.1	0.2	7.9	9.2								
Control Delay (s)	1.5	0.3	23.4	15.7								
Lane LOS	A	A	C	C								
Approach Delay (s)	1.5	0.3	23.4	15.7								
Approach LOS			C	C								
Intersection Summary												
Average Delay			4.9									
Intersection Capacity Utilization			60.4%		ICU Level of Service				B			
Analysis Period (min)			15									

Queues
5: St. Vincent St & Rose St

Rose Street Affordable Housing
TT (2030) - PM (w. Dead End)



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations		↕		↕	↗	↕	↗	↕
Traffic Volume (vph)	238	42	6	35	34	601	47	642
Future Volume (vph)	238	42	6	35	34	601	47	642
Lane Group Flow (vph)	0	362	0	79	37	674	51	872
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	24.0	24.0	24.0	24.0
Minimum Split (s)	33.0	33.0	30.0	30.0	30.0	30.0	30.0	30.0
Total Split (s)	39.0	39.0	39.0	39.0	61.0	61.0	61.0	61.0
Total Split (%)	39.0%	39.0%	39.0%	39.0%	61.0%	61.0%	61.0%	61.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		6.0		6.0	6.0	6.0	6.0	6.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	Max	Max	Max	Max
v/c Ratio		0.89		0.15	0.12	0.33	0.13	0.44
Control Delay		56.3		15.7	12.1	11.8	11.8	12.3
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0
Total Delay		56.3		15.7	12.1	11.8	11.8	12.3
Queue Length 50th (m)		62.1		6.0	3.2	35.0	4.5	46.5
Queue Length 95th (m)		#109.0		16.1	8.6	47.2	10.7	62.0
Internal Link Dist (m)		114.8		126.2		135.5		109.5
Turn Bay Length (m)					25.0		25.0	
Base Capacity (vph)		467		602	299	2044	391	1981
Starvation Cap Reductn		0		0	0	0	0	0
Spillback Cap Reductn		0		0	0	0	0	0
Storage Cap Reductn		0		0	0	0	0	0
Reduced v/c Ratio		0.78		0.13	0.12	0.33	0.13	0.44

Intersection Summary

Cycle Length: 100

Actuated Cycle Length: 95.9

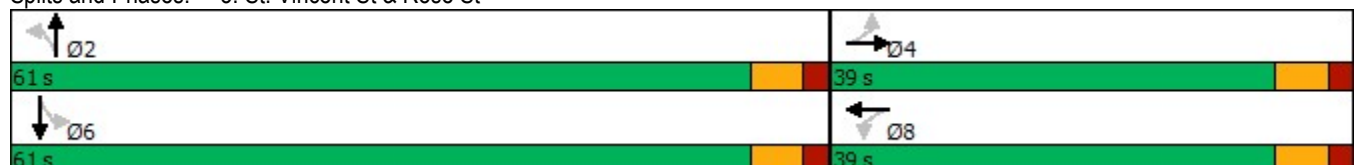
Natural Cycle: 65

Control Type: Semi Act-Uncoord

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

Queue shown is maximum after two cycles.

Splits and Phases: 5: St. Vincent St & Rose St



HCM Signalized Intersection Capacity Analysis

5: St. Vincent St & Rose St

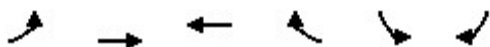
Rose Street Affordable Housing
TT (2030) - PM (w. Dead End)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	238	42	52	6	35	31	34	601	19	47	642	160
Future Volume (vph)	238	42	52	6	35	31	34	601	19	47	642	160
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00			0.99		1.00	1.00		1.00	0.98	
Flpb, ped/bikes		0.99			1.00		0.99	1.00		0.99	1.00	
Frt		0.98			0.94		1.00	1.00		1.00	0.97	
Flt Protected		0.97			1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1748			1741		1772	3552		1763	3410	
Flt Permitted		0.74			0.96		0.28	1.00		0.37	1.00	
Satd. Flow (perm)		1336			1682		520	3552		681	3410	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	259	46	57	7	38	34	37	653	21	51	698	174
RTOR Reduction (vph)	0	7	0	0	24	0	0	2	0	0	21	0
Lane Group Flow (vph)	0	355	0	0	55	0	37	672	0	51	851	0
Confl. Peds. (#/hr)	15		15	15		15	15		25	15		25
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		28.7			28.7		55.2	55.2		55.2	55.2	
Effective Green, g (s)		28.7			28.7		55.2	55.2		55.2	55.2	
Actuated g/C Ratio		0.30			0.30		0.58	0.58		0.58	0.58	
Clearance Time (s)		6.0			6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		399			503		299	2044		391	1962	
v/s Ratio Prot								0.19			c0.25	
v/s Ratio Perm		c0.27			0.03		0.07			0.07		
v/c Ratio		0.89			0.11		0.12	0.33		0.13	0.43	
Uniform Delay, d1		32.1			24.3		9.3	10.7		9.3	11.5	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		20.7			0.1		0.8	0.4		0.7	0.7	
Delay (s)		52.8			24.4		10.1	11.1		10.0	12.2	
Level of Service		D			C		B	B		B	B	
Approach Delay (s)		52.8			24.4			11.0			12.1	
Approach LOS		D			C			B			B	
Intersection Summary												
HCM 2000 Control Delay		19.3			HCM 2000 Level of Service			B				
HCM 2000 Volume to Capacity ratio		0.59										
Actuated Cycle Length (s)		95.9			Sum of lost time (s)			12.0				
Intersection Capacity Utilization		74.5%			ICU Level of Service			D				
Analysis Period (min)		15										
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

6: Rose St & West Access

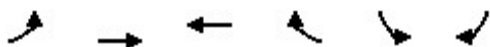
Rose Street Affordable Housing
TT (2030) - PM (w. Dead End)



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	10	18	31	51	0
Future Volume (Veh/h)	0	10	18	31	51	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	11	20	34	55	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	54				48	37
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	54				48	37
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				94	100
cM capacity (veh/h)	1551				962	1035
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	11	54	55			
Volume Left	0	0	55			
Volume Right	0	34	0			
cSH	1551	1700	962			
Volume to Capacity	0.00	0.03	0.06			
Queue Length 95th (m)	0.0	0.0	1.4			
Control Delay (s)	0.0	0.0	9.0			
Lane LOS			A			
Approach Delay (s)	0.0	0.0	9.0			
Approach LOS			A			
Intersection Summary						
Average Delay			4.1			
Intersection Capacity Utilization			13.3%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis 7: Rose St & East Access

Rose Street Affordable Housing
TT (2030) - PM (w. Dead End)



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	61	49	71	120	0
Future Volume (Veh/h)	0	61	49	71	120	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	66	53	77	130	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	130				158	92
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	130				158	92
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				84	100
cM capacity (veh/h)	1455				834	966
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	66	130	130			
Volume Left	0	0	130			
Volume Right	0	77	0			
cSH	1455	1700	834			
Volume to Capacity	0.00	0.08	0.16			
Queue Length 95th (m)	0.0	0.0	4.2			
Control Delay (s)	0.0	0.0	10.1			
Lane LOS			B			
Approach Delay (s)	0.0	0.0	10.1			
Approach LOS			B			
Intersection Summary						
Average Delay			4.0			
Intersection Capacity Utilization			20.2%	ICU Level of Service		A
Analysis Period (min)			15			

Queues

1: Bayfield St & Hwy 400 NB Off/Rose St

Rose Street Affordable Housing

TT (2035) - AM (w. Dead End)



Lane Group	EBL	EBT	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	821	0	821	143	207	749
Future Volume (vph)	821	0	821	143	207	749
Lane Group Flow (vph)	892	403	892	155	225	814
Turn Type	Perm	NA	NA	Perm	pm+pt	NA
Protected Phases		4	2		1	6
Permitted Phases	4			2	6	
Detector Phase	4	4	2	2	1	6
Switch Phase						
Minimum Initial (s)	12.0	12.0	24.0	24.0	7.0	24.0
Minimum Split (s)	30.0	30.0	30.0	30.0	11.5	30.0
Total Split (s)	35.0	35.0	45.0	45.0	20.0	65.0
Total Split (%)	35.0%	35.0%	45.0%	45.0%	20.0%	65.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	3.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	4.0	6.0
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?			Yes	Yes	Yes	
Recall Mode	None	None	C-Max	C-Max	None	C-Max
v/c Ratio	0.91	0.71	0.39	0.20	0.53	0.27
Control Delay	48.3	26.0	19.9	3.8	13.4	10.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	48.3	26.0	19.9	3.8	13.4	10.1
Queue Length 50th (m)	85.1	40.8	41.8	0.0	18.0	26.2
Queue Length 95th (m)	#118.7	75.1	55.8	11.5	28.9	33.0
Internal Link Dist (m)		579.4	203.2			180.4
Turn Bay Length (m)				35.0	115.0	
Base Capacity (vph)	1000	574	2275	761	491	3055
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.89	0.70	0.39	0.20	0.46	0.27

Intersection Summary

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 20 (20%), Referenced to phase 2:NBT and 6:SBTL, Start of Green

Natural Cycle: 75

Control Type: Actuated-Coordinated

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

Queue shown is maximum after two cycles.

Splits and Phases: 1: Bayfield St & Hwy 400 NB Off/Rose St



07/10/2024

JL

Synchro 11 Report

Page 1

HCM Signalized Intersection Capacity Analysis

1: Bayfield St & Hwy 400 NB Off/Rose St

Rose Street Affordable Housing

TT (2035) - AM (w. Dead End)

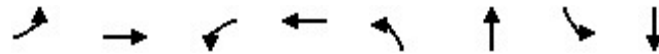
												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	 							  		 	  	
Traffic Volume (vph)	821	0	371	0	0	0	0	821	143	207	749	0
Future Volume (vph)	821	0	371	0	0	0	0	821	143	207	749	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0						6.0	6.0	4.0	6.0	
Lane Util. Factor	0.97	1.00						0.91	1.00	1.00	0.91	
Frpb, ped/bikes	1.00	0.98						1.00	0.95	1.00	1.00	
Flpb, ped/bikes	0.99	1.00						1.00	1.00	1.00	1.00	
Frt	1.00	0.85						1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00						1.00	1.00	0.95	1.00	
Satd. Flow (prot)	3449	1572						5142	1525	1787	5142	
Flt Permitted	0.95	1.00						1.00	1.00	0.24	1.00	
Satd. Flow (perm)	3449	1572						5142	1525	453	5142	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	892	0	403	0	0	0	0	892	155	225	814	0
RTOR Reduction (vph)	0	119	0	0	0	0	0	0	86	0	0	0
Lane Group Flow (vph)	892	284	0	0	0	0	0	892	69	225	814	0
Confl. Peds. (#/hr)	5		5	5		5	15		10	10		15
Turn Type	Perm	NA						NA	Perm	pm+pt	NA	
Protected Phases		4						2		1	6	
Permitted Phases	4								2	6		
Actuated Green, G (s)	28.6	28.6						44.2	44.2	59.4	59.4	
Effective Green, g (s)	28.6	28.6						44.2	44.2	59.4	59.4	
Actuated g/C Ratio	0.29	0.29						0.44	0.44	0.59	0.59	
Clearance Time (s)	6.0	6.0						6.0	6.0	4.0	6.0	
Vehicle Extension (s)	3.0	3.0						3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	986	449						2272	674	418	3054	
v/s Ratio Prot		0.18						0.17		c0.06	0.16	
v/s Ratio Perm	c0.26								0.04	c0.26		
v/c Ratio	0.90	0.63						0.39	0.10	0.54	0.27	
Uniform Delay, d1	34.4	31.1						18.8	16.3	10.3	9.8	
Progression Factor	1.00	1.00						1.00	1.00	1.00	1.00	
Incremental Delay, d2	11.5	2.9						0.5	0.3	1.3	0.2	
Delay (s)	45.9	34.0						19.3	16.6	11.6	10.0	
Level of Service	D	C						B	B	B	B	
Approach Delay (s)		42.2			0.0			18.9			10.4	
Approach LOS		D			A			B			B	
Intersection Summary												
HCM 2000 Control Delay		25.2			HCM 2000 Level of Service			C				
HCM 2000 Volume to Capacity ratio		0.68										
Actuated Cycle Length (s)		100.0			Sum of lost time (s)			16.0				
Intersection Capacity Utilization		68.3%			ICU Level of Service			C				
Analysis Period (min)		15										
c Critical Lane Group												

Queues

2: Bayfield St & Grove St

Rose Street Affordable Housing

TT (2035) - AM (w. Dead End)



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	193	39	105	43	3	450	270	784
Future Volume (vph)	193	39	105	43	3	450	270	784
Lane Group Flow (vph)	210	64	114	277	3	569	293	912
Turn Type	pm+pt	NA	Perm	NA	Perm	NA	pm+pt	NA
Protected Phases	7	4		8		2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	7	4	8	8	2	2	1	6
Switch Phase								
Minimum Initial (s)	7.0	10.0	10.0	10.0	24.0	24.0	7.0	24.0
Minimum Split (s)	11.0	30.0	30.0	30.0	30.0	30.0	11.0	30.0
Total Split (s)	15.0	51.0	36.0	36.0	38.0	38.0	11.0	49.0
Total Split (%)	15.0%	51.0%	36.0%	36.0%	38.0%	38.0%	11.0%	49.0%
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0	4.0	3.0	4.0
All-Red Time (s)	1.0	2.0	2.0	2.0	2.0	2.0	1.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0	6.0	6.0	6.0	6.0	4.0	6.0
Lead/Lag	Lead		Lag	Lag	Lag	Lag	Lead	
Lead-Lag Optimize?	Yes		Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	None	None	None	Max	Max	None	Max
v/c Ratio	0.63	0.11	0.55	0.62	0.01	0.42	0.66	0.49
Control Delay	28.2	13.8	42.7	14.1	17.7	19.5	20.2	14.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.2	13.8	42.7	14.1	17.7	19.5	20.2	14.2
Queue Length 50th (m)	23.6	4.5	16.8	6.6	0.3	32.1	23.1	44.8
Queue Length 95th (m)	39.7	12.3	32.3	28.0	2.1	50.4	#45.4	69.0
Internal Link Dist (m)		140.8		181.1		201.3		203.2
Turn Bay Length (m)	20.0		25.0		30.0		200.0	
Base Capacity (vph)	338	977	486	736	228	1362	444	1847
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.62	0.07	0.23	0.38	0.01	0.42	0.66	0.49

Intersection Summary

Cycle Length: 100

Actuated Cycle Length: 82.6

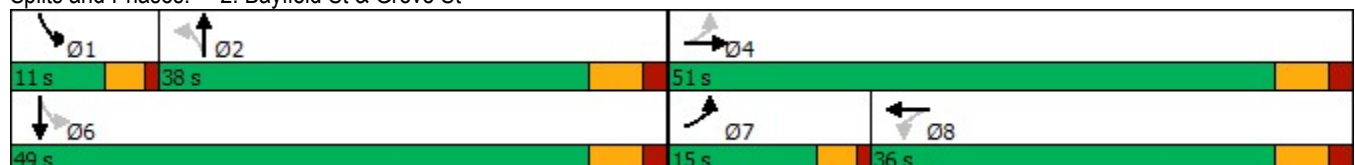
Natural Cycle: 85

Control Type: Semi Act-Uncoord

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

Queue shown is maximum after two cycles.

Splits and Phases: 2: Bayfield St & Grove St



HCM Signalized Intersection Capacity Analysis

2: Bayfield St & Grove St

Rose Street Affordable Housing

TT (2035) - AM (w. Dead End)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	193	39	20	105	43	212	3	450	74	270	784	55
Future Volume (vph)	193	39	20	105	43	212	3	450	74	270	784	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		6.0	6.0		6.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.95		1.00	0.88		1.00	0.98		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1788	1776		1781	1625		1785	3485		1786	3537	
Flt Permitted	0.24	1.00		0.72	1.00		0.31	1.00		0.34	1.00	
Satd. Flow (perm)	446	1776		1341	1625		588	3485		639	3537	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	210	42	22	114	47	230	3	489	80	293	852	60
RTOR Reduction (vph)	0	15	0	0	194	0	0	12	0	0	4	0
Lane Group Flow (vph)	210	49	0	114	83	0	3	557	0	293	908	0
Confl. Peds. (#/hr)	5		5	5		5	5		10	10		5
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	27.6	27.6		12.9	12.9		32.1	32.1		43.1	43.1	
Effective Green, g (s)	27.6	27.6		12.9	12.9		32.1	32.1		43.1	43.1	
Actuated g/C Ratio	0.33	0.33		0.16	0.16		0.39	0.39		0.52	0.52	
Clearance Time (s)	4.0	6.0		6.0	6.0		6.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	322	592		209	253		228	1352		430	1843	
v/s Ratio Prot	c0.08	0.03			0.05			0.16		c0.06	0.26	
v/s Ratio Perm	c0.13			0.09			0.01			c0.30		
v/c Ratio	0.65	0.08		0.55	0.33		0.01	0.41		0.68	0.49	
Uniform Delay, d1	21.6	18.9		32.2	31.0		15.6	18.4		12.6	12.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	4.7	0.1		2.9	0.8		0.1	0.9		4.4	0.9	
Delay (s)	26.3	18.9		35.1	31.8		15.7	19.4		17.0	13.7	
Level of Service	C	B		D	C		B	B		B	B	
Approach Delay (s)		24.6			32.8			19.3			14.5	
Approach LOS		C			C			B			B	
Intersection Summary												
HCM 2000 Control Delay			19.7			HCM 2000 Level of Service			B			
HCM 2000 Volume to Capacity ratio			0.73									
Actuated Cycle Length (s)			82.7			Sum of lost time (s)			20.0			
Intersection Capacity Utilization			88.9%			ICU Level of Service			E			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

4: Peel St & Grove St

Rose Street Affordable Housing
TT (2035) - AM (w. Dead End)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	73	357	12	6	261	8	9	54	10	6	29	44
Future Volume (Veh/h)	73	357	12	6	261	8	9	54	10	6	29	44
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
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)	79	388	13	7	284	9	10	59	11	7	32	48
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None			None								
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	293			401			919	860	394	896	862	288
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	293			401			919	860	394	896	862	288
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	94			99			95	78	98	97	88	94
cM capacity (veh/h)	1269			1158			204	274	655	204	273	751
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	480	300	80	87								
Volume Left	79	7	10	7								
Volume Right	13	9	11	48								
cSH	1269	1158	284	404								
Volume to Capacity	0.06	0.01	0.28	0.22								
Queue Length 95th (m)	1.5	0.1	8.6	6.1								
Control Delay (s)	1.9	0.2	22.5	16.4								
Lane LOS	A	A	C	C								
Approach Delay (s)	1.9	0.2	22.5	16.4								
Approach LOS			C	C								
Intersection Summary												
Average Delay			4.4									
Intersection Capacity Utilization			54.1%		ICU Level of Service				A			
Analysis Period (min)			15									

Queues
5: St. Vincent St & Rose St

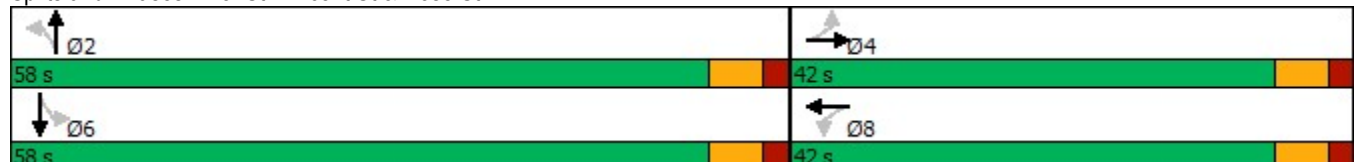
Rose Street Affordable Housing
TT (2035) - AM (w. Dead End)

								
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	204	36	13	57	62	491	13	472
Future Volume (vph)	204	36	13	57	62	491	13	472
Lane Group Flow (vph)	0	288	0	105	67	545	14	662
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	24.0	24.0	24.0	24.0
Minimum Split (s)	33.0	33.0	33.0	33.0	30.0	30.0	30.0	30.0
Total Split (s)	42.0	42.0	42.0	42.0	58.0	58.0	58.0	58.0
Total Split (%)	42.0%	42.0%	42.0%	42.0%	58.0%	58.0%	58.0%	58.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		6.0		6.0	6.0	6.0	6.0	6.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	Max	Max	Max	Max
v/c Ratio		0.78		0.23	0.16	0.26	0.03	0.32
Control Delay		44.2		20.4	11.3	9.8	10.1	9.5
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0
Total Delay		44.2		20.4	11.3	9.8	10.1	9.5
Queue Length 50th (m)		43.6		10.8	4.6	20.6	0.9	23.8
Queue Length 95th (m)		70.5		22.4	14.1	39.3	4.2	45.6
Internal Link Dist (m)		114.8		126.2		135.5		109.5
Turn Bay Length (m)					25.0		25.0	
Base Capacity (vph)		570		713	424	2128	494	2063
Starvation Cap Reductn		0		0	0	0	0	0
Spillback Cap Reductn		0		0	0	0	0	0
Storage Cap Reductn		0		0	0	0	0	0
Reduced v/c Ratio		0.51		0.15	0.16	0.26	0.03	0.32

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 87.7
Natural Cycle: 65
Control Type: Semi Act-Uncoord

Splits and Phases: 5: St. Vincent St & Rose St



HCM Signalized Intersection Capacity Analysis

5: St. Vincent St & Rose St

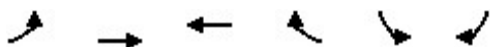
Rose Street Affordable Housing
TT (2035) - AM (w. Dead End)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	204	36	25	13	57	27	62	491	10	13	472	137
Future Volume (vph)	204	36	25	13	57	27	62	491	10	13	472	137
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00			1.00		1.00	1.00		1.00	0.99	
Flpb, ped/bikes		1.00			1.00		0.99	1.00		0.99	1.00	
Frt		0.99			0.96		1.00	1.00		1.00	0.97	
Flt Protected		0.96			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1780			1791		1772	3565		1779	3423	
Flt Permitted		0.74			0.94		0.38	1.00		0.44	1.00	
Satd. Flow (perm)		1374			1699		711	3565		829	3423	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	222	39	27	14	62	29	67	534	11	14	513	149
RTOR Reduction (vph)	0	4	0	0	15	0	0	1	0	0	23	0
Lane Group Flow (vph)	0	284	0	0	90	0	67	544	0	14	639	0
Confl. Peds. (#/hr)	5		10	10		5	10		5	5		10
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		23.3			23.3		52.3	52.3		52.3	52.3	
Effective Green, g (s)		23.3			23.3		52.3	52.3		52.3	52.3	
Actuated g/C Ratio		0.27			0.27		0.60	0.60		0.60	0.60	
Clearance Time (s)		6.0			6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		365			451		424	2128		494	2043	
v/s Ratio Prot								0.15				c0.19
v/s Ratio Perm		c0.21			0.05		0.09			0.02		
v/c Ratio		0.78			0.20		0.16	0.26		0.03	0.31	
Uniform Delay, d1		29.7			24.9		7.9	8.4		7.2	8.7	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		10.0			0.2		0.8	0.3		0.1	0.4	
Delay (s)		39.7			25.1		8.6	8.7		7.3	9.1	
Level of Service		D			C		A	A		A	A	
Approach Delay (s)		39.7			25.1			8.7			9.1	
Approach LOS		D			C			A			A	
Intersection Summary												
HCM 2000 Control Delay		15.2			HCM 2000 Level of Service			B				
HCM 2000 Volume to Capacity ratio		0.46										
Actuated Cycle Length (s)		87.6			Sum of lost time (s)			12.0				
Intersection Capacity Utilization		76.5%			ICU Level of Service			D				
Analysis Period (min)		15										
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

6: Rose St & West Access

Rose Street Affordable Housing
TT (2035) - AM (w. Dead End)

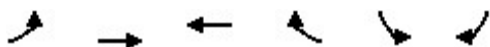


Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	17	6	49	33	0
Future Volume (Veh/h)	0	17	6	49	33	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	18	7	53	36	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	60				52	34
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	60				52	34
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				96	100
cM capacity (veh/h)	1544				957	1040
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	18	60	36			
Volume Left	0	0	36			
Volume Right	0	53	0			
cSH	1544	1700	957			
Volume to Capacity	0.00	0.04	0.04			
Queue Length 95th (m)	0.0	0.0	0.9			
Control Delay (s)	0.0	0.0	8.9			
Lane LOS			A			
Approach Delay (s)	0.0	0.0	8.9			
Approach LOS			A			
Intersection Summary						
Average Delay			2.8			
Intersection Capacity Utilization		13.3%		ICU Level of Service		A
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis

7: Rose St & East Access

Rose Street Affordable Housing
TT (2035) - AM (w. Dead End)



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	50	55	114	76	0
Future Volume (Veh/h)	0	50	55	114	76	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	54	60	124	83	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	184				176	122
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	184				176	122
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				90	100
cM capacity (veh/h)	1391				814	929
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	54	184	83			
Volume Left	0	0	83			
Volume Right	0	124	0			
cSH	1391	1700	814			
Volume to Capacity	0.00	0.11	0.10			
Queue Length 95th (m)	0.0	0.0	2.6			
Control Delay (s)	0.0	0.0	9.9			
Lane LOS			A			
Approach Delay (s)	0.0	0.0	9.9			
Approach LOS			A			
Intersection Summary						
Average Delay			2.6			
Intersection Capacity Utilization			20.8%	ICU Level of Service		A
Analysis Period (min)			15			

Queues

1: Bayfield St & Hwy 400 NB Off/Rose St

Rose Street Affordable Housing

TT (2035) - PM (w. Dead End)



Lane Group	EBL	EBT	NBT	NBR	SBL	SBT
Lane Configurations	←←	→	←←←	→	←	←←←
Traffic Volume (vph)	1181	0	1200	229	245	809
Future Volume (vph)	1181	0	1200	229	245	809
Lane Group Flow (vph)	1284	489	1304	249	266	879
Turn Type	Perm	NA	NA	Perm	pm+pt	NA
Protected Phases		4	2		1	6
Permitted Phases	4			2	6	
Detector Phase	4	4	2	2	1	6
Switch Phase						
Minimum Initial (s)	12.0	12.0	24.0	24.0	7.0	24.0
Minimum Split (s)	30.0	30.0	30.0	30.0	11.5	30.0
Total Split (s)	64.0	64.0	65.0	65.0	21.0	86.0
Total Split (%)	42.7%	42.7%	43.3%	43.3%	14.0%	57.3%
Yellow Time (s)	4.0	4.0	4.0	4.0	3.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	4.0	6.0
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?			Yes	Yes	Yes	
Recall Mode	None	None	C-Max	C-Max	None	C-Max
v/c Ratio	0.97	0.73	0.64	0.38	0.94	0.32
Control Delay	62.7	37.4	38.7	18.4	71.9	20.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	62.7	37.4	38.7	18.4	71.9	20.1
Queue Length 50th (m)	191.9	98.3	114.9	26.8	52.9	52.5
Queue Length 95th (m)	#238.7	142.5	130.9	49.5	#106.2	61.9
Internal Link Dist (m)		579.4	203.2			180.4
Turn Bay Length (m)				35.0	115.0	
Base Capacity (vph)	1329	668	2027	662	285	2742
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.97	0.73	0.64	0.38	0.93	0.32

Intersection Summary

Cycle Length: 150

Actuated Cycle Length: 150

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

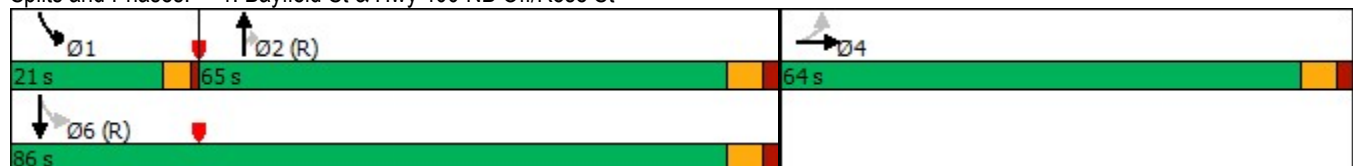
Natural Cycle: 90

Control Type: Actuated-Coordinated

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

Queue shown is maximum after two cycles.

Splits and Phases: 1: Bayfield St & Hwy 400 NB Off/Rose St



07/10/2024

JL

Synchro 11 Report

Page 1

HCM Signalized Intersection Capacity Analysis

1: Bayfield St & Hwy 400 NB Off/Rose St

Rose Street Affordable Housing

TT (2035) - PM (w. Dead End)

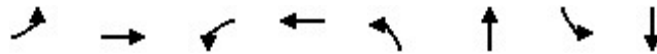
												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1181	0	450	0	0	0	0	1200	229	245	809	0
Future Volume (vph)	1181	0	450	0	0	0	0	1200	229	245	809	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0						6.0	6.0	4.0	6.0	
Lane Util. Factor	0.97	1.00						0.91	1.00	1.00	0.91	
Frpb, ped/bikes	1.00	0.97						1.00	0.94	1.00	1.00	
Flpb, ped/bikes	0.99	1.00						1.00	1.00	1.00	1.00	
Frt	1.00	0.85						1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00						1.00	1.00	0.95	1.00	
Satd. Flow (prot)	3439	1552						5142	1504	1789	5142	
Flt Permitted	0.95	1.00						1.00	1.00	0.10	1.00	
Satd. Flow (perm)	3439	1552						5142	1504	192	5142	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1284	0	489	0	0	0	0	1304	249	266	879	0
RTOR Reduction (vph)	0	68	0	0	0	0	0	0	70	0	0	0
Lane Group Flow (vph)	1284	421	0	0	0	0	0	1304	179	266	879	0
Confl. Peds. (#/hr)	5		10	10		5	20		10	10		20
Turn Type	Perm	NA						NA	Perm	pm+pt	NA	
Protected Phases		4						2		1	6	
Permitted Phases	4								2	6		
Actuated Green, G (s)	58.0	58.0						59.1	59.1	80.0	80.0	
Effective Green, g (s)	58.0	58.0						59.1	59.1	80.0	80.0	
Actuated g/C Ratio	0.39	0.39						0.39	0.39	0.53	0.53	
Clearance Time (s)	6.0	6.0						6.0	6.0	4.0	6.0	
Vehicle Extension (s)	3.0	3.0						3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	1329	600						2025	592	282	2742	
v/s Ratio Prot		0.27						0.25		c0.11	0.17	
v/s Ratio Perm	c0.37								0.12	c0.40		
v/c Ratio	0.97	0.70						0.64	0.30	0.94	0.32	
Uniform Delay, d1	45.0	38.7						36.9	31.3	37.3	19.7	
Progression Factor	1.00	1.00						1.00	1.00	1.00	1.00	
Incremental Delay, d2	17.1	3.7						1.6	1.3	38.3	0.3	
Delay (s)	62.1	42.4						38.5	32.6	75.7	20.0	
Level of Service	E	D						D	C	E	C	
Approach Delay (s)		56.7			0.0			37.5			32.9	
Approach LOS		E			A			D			C	
Intersection Summary												
HCM 2000 Control Delay		44.0			HCM 2000 Level of Service			D				
HCM 2000 Volume to Capacity ratio		0.97										
Actuated Cycle Length (s)		150.0			Sum of lost time (s)			16.0				
Intersection Capacity Utilization		83.8%			ICU Level of Service			E				
Analysis Period (min)		15										
c Critical Lane Group												

Queues

2: Bayfield St & Grove St

Rose Street Affordable Housing

TT (2035) - PM (w. Dead End)



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	150	36	55	45	13	999	303	772
Future Volume (vph)	150	36	55	45	13	999	303	772
Lane Group Flow (vph)	163	49	60	335	14	1194	329	1040
Turn Type	pm+pt	NA	Perm	NA	Perm	NA	pm+pt	NA
Protected Phases	7	4		8		2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	7	4	8	8	2	2	1	6
Switch Phase								
Minimum Initial (s)	7.0	10.0	10.0	10.0	24.0	24.0	7.0	24.0
Minimum Split (s)	11.0	30.0	30.0	30.0	30.0	30.0	11.0	30.0
Total Split (s)	11.0	44.0	33.0	33.0	38.0	38.0	18.0	56.0
Total Split (%)	11.0%	44.0%	33.0%	33.0%	38.0%	38.0%	18.0%	56.0%
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0	4.0	3.0	4.0
All-Red Time (s)	1.0	2.0	2.0	2.0	2.0	2.0	1.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0	6.0	6.0	6.0	6.0	4.0	6.0
Lead/Lag	Lead		Lag	Lag	Lag	Lag	Lead	
Lead-Lag Optimize?	Yes		Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	None	None	None	Max	Max	None	Max
v/c Ratio	0.66	0.10	0.32	0.71	0.07	0.90	0.85	0.51
Control Delay	37.6	19.7	37.2	16.1	19.8	35.8	40.5	11.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	37.6	19.7	37.2	16.1	19.8	35.8	40.5	11.2
Queue Length 50th (m)	20.5	4.7	8.9	7.2	1.4	89.4	33.1	42.5
Queue Length 95th (m)	#36.6	12.4	19.7	32.2	5.9	#150.0	#88.6	72.1
Internal Link Dist (m)		140.8		181.1		201.3		203.2
Turn Bay Length (m)	20.0		25.0		30.0		200.0	
Base Capacity (vph)	246	817	429	706	193	1331	388	2047
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.66	0.06	0.14	0.47	0.07	0.90	0.85	0.51

Intersection Summary

Cycle Length: 100

Actuated Cycle Length: 85

Natural Cycle: 95

Control Type: Semi Act-Uncoord

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

Queue shown is maximum after two cycles.

Splits and Phases: 2: Bayfield St & Grove St



HCM Signalized Intersection Capacity Analysis

2: Bayfield St & Grove St

Rose Street Affordable Housing

TT (2035) - PM (w. Dead End)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	150	36	9	55	45	263	13	999	99	303	772	185
Future Volume (vph)	150	36	9	55	45	263	13	999	99	303	772	185
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		6.0	6.0		6.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	0.98		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		0.99	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.97		1.00	0.87		1.00	0.99		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1788	1817		1771	1611		1782	3518		1789	3450	
Flt Permitted	0.25	1.00		0.73	1.00		0.28	1.00		0.11	1.00	
Satd. Flow (perm)	470	1817		1352	1611		517	3518		209	3450	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	163	39	10	60	49	286	14	1086	108	329	839	201
RTOR Reduction (vph)	0	7	0	0	246	0	0	7	0	0	17	0
Lane Group Flow (vph)	163	42	0	60	89	0	14	1187	0	329	1023	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	23.0	23.0		12.0	12.0		32.1	32.1		50.1	50.1	
Effective Green, g (s)	23.0	23.0		12.0	12.0		32.1	32.1		50.1	50.1	
Actuated g/C Ratio	0.27	0.27		0.14	0.14		0.38	0.38		0.59	0.59	
Clearance Time (s)	4.0	6.0		6.0	6.0		6.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	235	491		190	227		195	1327		382	2031	
v/s Ratio Prot	c0.06	0.02			0.06			0.34		c0.14	0.30	
v/s Ratio Perm	c0.13			0.04			0.03			c0.36		
v/c Ratio	0.69	0.08		0.32	0.39		0.07	0.89		0.86	0.50	
Uniform Delay, d1	25.9	23.2		32.9	33.2		17.0	24.9		22.1	10.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	8.6	0.1		1.0	1.1		0.7	9.6		17.7	0.9	
Delay (s)	34.4	23.3		33.8	34.4		17.7	34.5		39.7	11.1	
Level of Service	C	C		C	C		B	C		D	B	
Approach Delay (s)		31.8			34.3			34.3			18.0	
Approach LOS		C			C			C			B	
Intersection Summary												
HCM 2000 Control Delay			27.1			HCM 2000 Level of Service			C			
HCM 2000 Volume to Capacity ratio			0.88									
Actuated Cycle Length (s)			85.1			Sum of lost time (s)			20.0			
Intersection Capacity Utilization			93.7%			ICU Level of Service			F			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis4: Peel St & Grove St

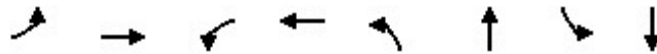
Rose Street Affordable Housing
TT (2035) - PM (w. Dead End)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	57	341	34	9	268	4	19	44	3	0	51	80
Future Volume (Veh/h)	57	341	34	9	268	4	19	44	3	0	51	80
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
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)	62	371	37	10	291	4	21	48	3	0	55	87
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None			None								
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	295			408			941	828	390	854	845	293
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	295			408			941	828	390	854	845	293
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	95			99			88	83	100	100	81	88
cM capacity (veh/h)	1266			1151			175	289	659	232	282	746
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	470	305	72	142								
Volume Left	62	10	21	0								
Volume Right	37	4	3	87								
cSH	1266	1151	248	456								
Volume to Capacity	0.05	0.01	0.29	0.31								
Queue Length 95th (m)	1.2	0.2	8.9	10.0								
Control Delay (s)	1.5	0.4	25.4	16.4								
Lane LOS	A	A	D	C								
Approach Delay (s)	1.5	0.4	25.4	16.4								
Approach LOS			D	C								
Intersection Summary												
Average Delay			5.0									
Intersection Capacity Utilization			62.5%	ICU Level of Service					B			
Analysis Period (min)			15									

Queues
5: St. Vincent St & Rose St

Rose Street Affordable Housing

TT (2035) - PM (w. Dead End)



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations		↕		↕	↙	↕	↙	↕
Traffic Volume (vph)	247	43	6	37	35	632	49	674
Future Volume (vph)	247	43	6	37	35	632	49	674
Lane Group Flow (vph)	0	375	0	82	38	709	53	913
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	24.0	24.0	24.0	24.0
Minimum Split (s)	33.0	33.0	30.0	30.0	30.0	30.0	30.0	30.0
Total Split (s)	39.0	39.0	39.0	39.0	61.0	61.0	61.0	61.0
Total Split (%)	39.0%	39.0%	39.0%	39.0%	61.0%	61.0%	61.0%	61.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		6.0		6.0	6.0	6.0	6.0	6.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	Max	Max	Max	Max
v/c Ratio		0.90		0.15	0.14	0.35	0.14	0.46
Control Delay		56.6		15.7	12.5	12.2	12.2	12.9
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0
Total Delay		56.6		15.7	12.5	12.2	12.2	12.9
Queue Length 50th (m)		65.0		6.2	3.4	38.0	4.8	50.7
Queue Length 95th (m)		#113.9		16.5	9.0	50.0	11.3	66.0
Internal Link Dist (m)		114.8		126.2		135.5		109.5
Turn Bay Length (m)					25.0		25.0	
Base Capacity (vph)		468		598	277	2026	368	1964
Starvation Cap Reductn		0		0	0	0	0	0
Spillback Cap Reductn		0		0	0	0	0	0
Storage Cap Reductn		0		0	0	0	0	0
Reduced v/c Ratio		0.80		0.14	0.14	0.35	0.14	0.46

Intersection Summary

Cycle Length: 100

Actuated Cycle Length: 96.7

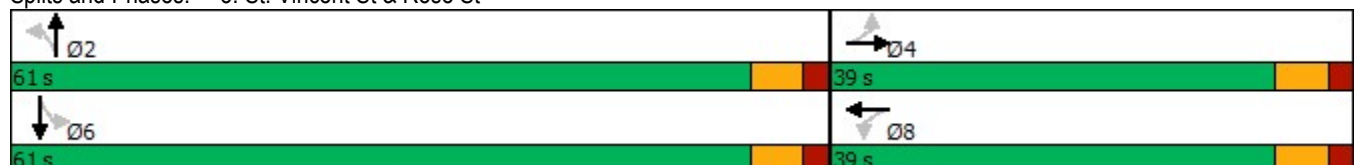
Natural Cycle: 65

Control Type: Semi Act-Uncoord

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

Queue shown is maximum after two cycles.

Splits and Phases: 5: St. Vincent St & Rose St



HCM Signalized Intersection Capacity Analysis

5: St. Vincent St & Rose St

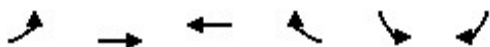
Rose Street Affordable Housing
TT (2035) - PM (w. Dead End)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	247	43	55	6	37	32	35	632	20	49	674	166
Future Volume (vph)	247	43	55	6	37	32	35	632	20	49	674	166
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00			0.99		1.00	1.00		1.00	0.98	
Flpb, ped/bikes		0.99			1.00		0.99	1.00		0.99	1.00	
Frt		0.98			0.94		1.00	1.00		1.00	0.97	
Flt Protected		0.97			1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1747			1742		1774	3552		1765	3411	
Flt Permitted		0.75			0.96		0.26	1.00		0.35	1.00	
Satd. Flow (perm)		1350			1684		487	3552		647	3411	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	268	47	60	7	40	35	38	687	22	53	733	180
RTOR Reduction (vph)	0	7	0	0	24	0	0	2	0	0	21	0
Lane Group Flow (vph)	0	368	0	0	58	0	38	707	0	53	892	0
Confl. Peds. (#/hr)	15		15	15		15	15		25	15		25
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		29.5			29.5		55.1	55.1		55.1	55.1	
Effective Green, g (s)		29.5			29.5		55.1	55.1		55.1	55.1	
Actuated g/C Ratio		0.31			0.31		0.57	0.57		0.57	0.57	
Clearance Time (s)		6.0			6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		412			514		277	2026		369	1945	
v/s Ratio Prot								0.20			c0.26	
v/s Ratio Perm		c0.27			0.03		0.08			0.08		
v/c Ratio		0.89			0.11		0.14	0.35		0.14	0.46	
Uniform Delay, d1		32.0			24.1		9.7	11.1		9.7	12.1	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		21.0			0.1		1.0	0.5		0.8	0.8	
Delay (s)		53.0			24.2		10.7	11.6		10.5	12.9	
Level of Service		D			C		B	B		B	B	
Approach Delay (s)		53.0			24.2			11.6			12.7	
Approach LOS		D			C			B			B	
Intersection Summary												
HCM 2000 Control Delay		19.7			HCM 2000 Level of Service			B				
HCM 2000 Volume to Capacity ratio		0.61										
Actuated Cycle Length (s)		96.6			Sum of lost time (s)			12.0				
Intersection Capacity Utilization		76.9%			ICU Level of Service			D				
Analysis Period (min)		15										
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

6: Rose St & West Access

Rose Street Affordable Housing
TT (2035) - PM (w. Dead End)

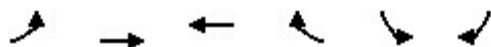


Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	10	18	31	51	0
Future Volume (Veh/h)	0	10	18	31	51	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	11	20	34	55	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	54				48	37
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	54				48	37
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				94	100
cM capacity (veh/h)	1551				962	1035
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	11	54	55			
Volume Left	0	0	55			
Volume Right	0	34	0			
cSH	1551	1700	962			
Volume to Capacity	0.00	0.03	0.06			
Queue Length 95th (m)	0.0	0.0	1.4			
Control Delay (s)	0.0	0.0	9.0			
Lane LOS			A			
Approach Delay (s)	0.0	0.0	9.0			
Approach LOS			A			
Intersection Summary						
Average Delay			4.1			
Intersection Capacity Utilization			13.3%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

7: Rose St & East Access

Rose Street Affordable Housing
TT (2035) - PM (w. Dead End)



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	61	49	71	120	0
Future Volume (Veh/h)	0	61	49	71	120	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	66	53	77	130	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	130				158	92
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	130				158	92
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				84	100
cM capacity (veh/h)	1455				834	966
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	66	130	130			
Volume Left	0	0	130			
Volume Right	0	77	0			
cSH	1455	1700	834			
Volume to Capacity	0.00	0.08	0.16			
Queue Length 95th (m)	0.0	0.0	4.2			
Control Delay (s)	0.0	0.0	10.1			
Lane LOS			B			
Approach Delay (s)	0.0	0.0	10.1			
Approach LOS			B			
Intersection Summary						
Average Delay			4.0			
Intersection Capacity Utilization			20.2%	ICU Level of Service		A
Analysis Period (min)			15			

Queues

1: Bayfield St & Hwy 400 NB Off/Rose St

Rose Street Affordable Housing

TT (2035) - AM (w. Dead End) (Alternate)



Lane Group	EBL	EBT	NBT	NBR	SBL	SBT
Lane Configurations	←←	→	←←←	→	←←	←←←
Traffic Volume (vph)	821	0	821	143	207	749
Future Volume (vph)	821	0	821	143	207	749
Lane Group Flow (vph)	892	403	892	155	225	814
Turn Type	Perm	NA	NA	Perm	Prot	NA
Protected Phases		4	2		1	6
Permitted Phases	4			2		
Detector Phase	4	4	2	2	1	6
Switch Phase						
Minimum Initial (s)	12.0	12.0	24.0	24.0	7.0	24.0
Minimum Split (s)	30.0	30.0	30.0	30.0	11.5	30.0
Total Split (s)	48.0	48.0	32.0	32.0	20.0	52.0
Total Split (%)	48.0%	48.0%	32.0%	32.0%	20.0%	52.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	3.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	4.0	6.0
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?			Yes	Yes	Yes	
Recall Mode	None	None	C-Max	C-Max	None	C-Max
v/c Ratio	0.75	0.67	0.46	0.23	0.55	0.30
Control Delay	32.8	25.9	26.0	8.0	46.5	14.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	32.8	25.9	26.0	8.0	46.5	14.0
Queue Length 50th (m)	77.8	50.5	46.9	3.1	21.5	30.3
Queue Length 95th (m)	87.5	72.8	69.8	18.6	32.0	45.3
Internal Link Dist (m)		579.4	203.2			180.4
Turn Bay Length (m)				35.0	115.0	
Base Capacity (vph)	1448	715	1939	667	555	2749
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.62	0.56	0.46	0.23	0.41	0.30

Intersection Summary

Cycle Length: 100

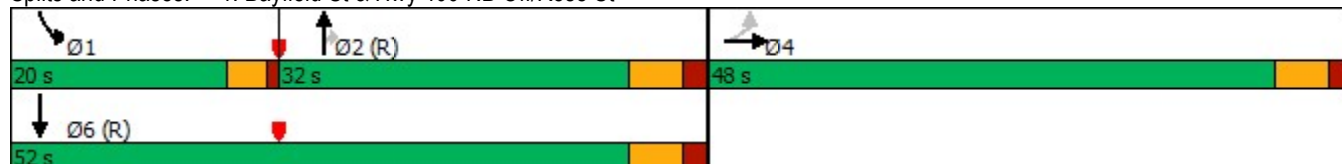
Actuated Cycle Length: 100

Offset: 20 (20%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Natural Cycle: 75

Control Type: Actuated-Coordinated

Splits and Phases: 1: Bayfield St & Hwy 400 NB Off/Rose St



HCM Signalized Intersection Capacity Analysis

1: Bayfield St & Hwy 400 NB Off/Rose St

Rose Street Affordable Housing

TT (2035) - AM (w. Dead End) (Alternate)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	821	0	371	0	0	0	0	821	143	207	749	0
Future Volume (vph)	821	0	371	0	0	0	0	821	143	207	749	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0						6.0	6.0	4.0	6.0	
Lane Util. Factor	0.97	1.00						0.91	1.00	0.97	0.91	
Frpb, ped/bikes	1.00	0.98						1.00	0.97	1.00	1.00	
Flpb, ped/bikes	0.99	1.00						1.00	1.00	1.00	1.00	
Frt	1.00	0.85						1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00						1.00	1.00	0.95	1.00	
Satd. Flow (prot)	3449	1572						5142	1556	3471	5142	
Flt Permitted	0.95	1.00						1.00	1.00	0.95	1.00	
Satd. Flow (perm)	3449	1572						5142	1556	3471	5142	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	892	0	403	0	0	0	0	892	155	225	814	0
RTOR Reduction (vph)	0	62	0	0	0	0	0	0	80	0	0	0
Lane Group Flow (vph)	892	341	0	0	0	0	0	892	75	225	814	0
Confl. Peds. (#/hr)	5		5	5		5	15		10	10		15
Turn Type	Perm	NA						NA	Perm	Prot	NA	
Protected Phases		4						2		1	6	
Permitted Phases	4								2			
Actuated Green, G (s)	34.5	34.5						37.7	37.7	11.8	53.5	
Effective Green, g (s)	34.5	34.5						37.7	37.7	11.8	53.5	
Actuated g/C Ratio	0.34	0.34						0.38	0.38	0.12	0.54	
Clearance Time (s)	6.0	6.0						6.0	6.0	4.0	6.0	
Vehicle Extension (s)	3.0	3.0						3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	1189	542						1938	586	409	2750	
v/s Ratio Prot		0.22						c0.17		c0.06	0.16	
v/s Ratio Perm	c0.26								0.05			
v/c Ratio	0.75	0.63						0.46	0.13	0.55	0.30	
Uniform Delay, d1	28.9	27.4						23.5	20.4	41.6	12.8	
Progression Factor	1.00	1.00						1.00	1.00	1.00	1.00	
Incremental Delay, d2	2.7	2.3						0.8	0.4	1.6	0.3	
Delay (s)	31.7	29.7						24.3	20.8	43.2	13.1	
Level of Service	C	C						C	C	D	B	
Approach Delay (s)		31.0			0.0			23.8			19.6	
Approach LOS		C			A			C			B	
Intersection Summary												
HCM 2000 Control Delay		25.3			HCM 2000 Level of Service			C				
HCM 2000 Volume to Capacity ratio		0.59										
Actuated Cycle Length (s)		100.0			Sum of lost time (s)			16.0				
Intersection Capacity Utilization		62.7%			ICU Level of Service			B				
Analysis Period (min)		15										
c Critical Lane Group												

Queues

1: Bayfield St & Hwy 400 NB Off/Rose St

Rose Street Affordable Housing

TT (2035) - PM (w. Dead End)



Lane Group	EBL	EBT	NBT	NBR	SBL	SBT
Lane Configurations	←←	→	←←←	→	←←	←←←
Traffic Volume (vph)	1181	0	1200	229	245	809
Future Volume (vph)	1181	0	1200	229	245	809
Lane Group Flow (vph)	1284	489	1304	249	266	879
Turn Type	Perm	NA	NA	Perm	Prot	NA
Protected Phases		4	2		1	6
Permitted Phases	4			2		
Detector Phase	4	4	2	2	1	6
Switch Phase						
Minimum Initial (s)	12.0	12.0	24.0	24.0	7.0	24.0
Minimum Split (s)	30.0	30.0	30.0	30.0	11.5	30.0
Total Split (s)	67.0	67.0	44.0	44.0	19.0	63.0
Total Split (%)	51.5%	51.5%	33.8%	33.8%	14.6%	48.5%
Yellow Time (s)	4.0	4.0	4.0	4.0	3.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	4.0	6.0
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?			Yes	Yes	Yes	
Recall Mode	None	None	C-Max	C-Max	None	C-Max
v/c Ratio	0.84	0.68	0.77	0.43	0.71	0.37
Control Delay	38.2	29.5	44.0	21.7	67.2	23.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	38.2	29.5	44.0	21.7	67.2	23.4
Queue Length 50th (m)	143.9	82.9	114.3	27.1	34.1	53.6
Queue Length 95th (m)	168.8	118.4	135.0	52.7	48.5	66.1
Internal Link Dist (m)		579.4	203.2			180.4
Turn Bay Length (m)				35.0	115.0	
Base Capacity (vph)	1615	765	1686	584	401	2396
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.80	0.64	0.77	0.43	0.66	0.37

Intersection Summary

Cycle Length: 130

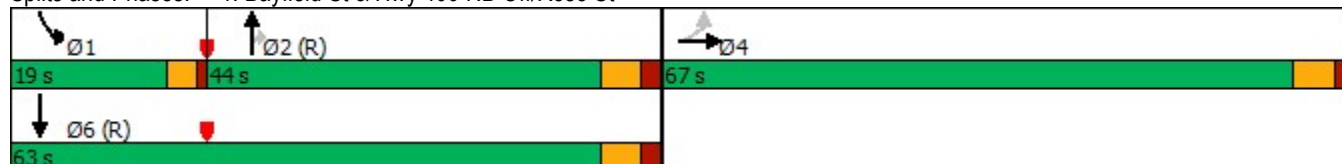
Actuated Cycle Length: 130

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

Natural Cycle: 80

Control Type: Actuated-Coordinated

Splits and Phases: 1: Bayfield St & Hwy 400 NB Off/Rose St



HCM Signalized Intersection Capacity Analysis

1: Bayfield St & Hwy 400 NB Off/Rose St

Rose Street Affordable Housing

TT (2035) - PM (w. Dead End)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1181	0	450	0	0	0	0	1200	229	245	809	0
Future Volume (vph)	1181	0	450	0	0	0	0	1200	229	245	809	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0						6.0	6.0	4.0	6.0	
Lane Util. Factor	0.97	1.00						0.91	1.00	0.97	0.91	
Frpb, ped/bikes	1.00	0.97						1.00	0.97	1.00	1.00	
Flpb, ped/bikes	0.99	1.00						1.00	1.00	1.00	1.00	
Frt	1.00	0.85						1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00						1.00	1.00	0.95	1.00	
Satd. Flow (prot)	3443	1556						5142	1548	3471	5142	
Flt Permitted	0.95	1.00						1.00	1.00	0.95	1.00	
Satd. Flow (perm)	3443	1556						5142	1548	3471	5142	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1284	0	489	0	0	0	0	1304	249	266	879	0
RTOR Reduction (vph)	0	37	0	0	0	0	0	0	77	0	0	0
Lane Group Flow (vph)	1284	452	0	0	0	0	0	1304	172	266	879	0
Confl. Peds. (#/hr)	5		10	10		5	20		10	10		20
Turn Type	Perm	NA						NA	Perm	Prot	NA	
Protected Phases		4						2		1	6	
Permitted Phases	4								2			
Actuated Green, G (s)	57.4	57.4						42.6	42.6	14.0	60.6	
Effective Green, g (s)	57.4	57.4						42.6	42.6	14.0	60.6	
Actuated g/C Ratio	0.44	0.44						0.33	0.33	0.11	0.47	
Clearance Time (s)	6.0	6.0						6.0	6.0	4.0	6.0	
Vehicle Extension (s)	3.0	3.0						3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	1520	687						1684	507	373	2396	
v/s Ratio Prot		0.29						c0.25		c0.08	0.17	
v/s Ratio Perm	c0.37								0.11			
v/c Ratio	0.84	0.66						0.77	0.34	0.71	0.37	
Uniform Delay, d1	32.3	28.6						39.4	33.1	56.1	22.3	
Progression Factor	1.00	1.00						1.00	1.00	1.00	1.00	
Incremental Delay, d2	4.5	2.3						3.5	1.8	6.3	0.4	
Delay (s)	36.8	30.9						42.9	34.9	62.4	22.8	
Level of Service	D	C						D	C	E	C	
Approach Delay (s)		35.2			0.0			41.6			32.0	
Approach LOS		D			A			D			C	
Intersection Summary												
HCM 2000 Control Delay		36.6			HCM 2000 Level of Service			D				
HCM 2000 Volume to Capacity ratio		0.80										
Actuated Cycle Length (s)		130.0			Sum of lost time (s)			16.0				
Intersection Capacity Utilization		77.2%			ICU Level of Service			D				
Analysis Period (min)		15										
c Critical Lane Group												

Appendix H – OTM Signal Justification Sheets

Justification No. 7 - Total (2035) Traffic

Grove Street / Peel Street

Justification	Description		Compliance			Signal Warrant	Underground Provisions Warrant	
			Rest. Flow	Sectional				Entire %
				Numerical	%			
1. Minimum Vehicular Volume	A. Vehicle volume, all approaches (average hour)	720	445	62%	43%	NO	NO	
	B. Vehicle volume, along minor streets (average hour)	170	88	52%		NO	NO	
2. Delay to cross traffic	A. Vehicle volume, major street (average hour)	720	343	48%	40%	NO	NO	
	B. Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	75	53	71%		NO	NO	

Justification No. 7 - Total (2035) Traffic

Rose Street / East Access

Justification	Description		Compliance			Signal Warrant	Underground Provisions Warrant
			Sectional		Entire %		
			Rest. Flow	Numerical			
1. Minimum Vehicular Volume	A. Vehicle volume, all approaches (average hour)	720	133	18%	12%	NO	NO
	B. Vehicle volume, along minor streets (average hour)	255	49	19%		NO	NO
2. Delay to cross traffic	A. Vehicle volume, major street (average hour)	720	54	7%	5%	NO	NO
	B. Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	75	49	65%		NO	NO

Justification No. 7 - Total (2035) Traffic

Rose Street / West Access

Justification	Description		Compliance			Signal Warrant	Underground Provisions Warrant
			Sectional		Entire %		
			Rest. Flow	Numerical			
1. Minimum Vehicular Volume	A. Vehicle volume, all approaches (average hour)	720	50	7%	5%	NO	NO
	B. Vehicle volume, along minor streets (average hour)	255	21	8%		NO	NO
2. Delay to cross traffic	A. Vehicle volume, major street (average hour)	720	13	2%	1%	NO	NO
	B. Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	75	21	28%		NO	NO

Appendix I – OTM Pedestrian Crossing Analysis

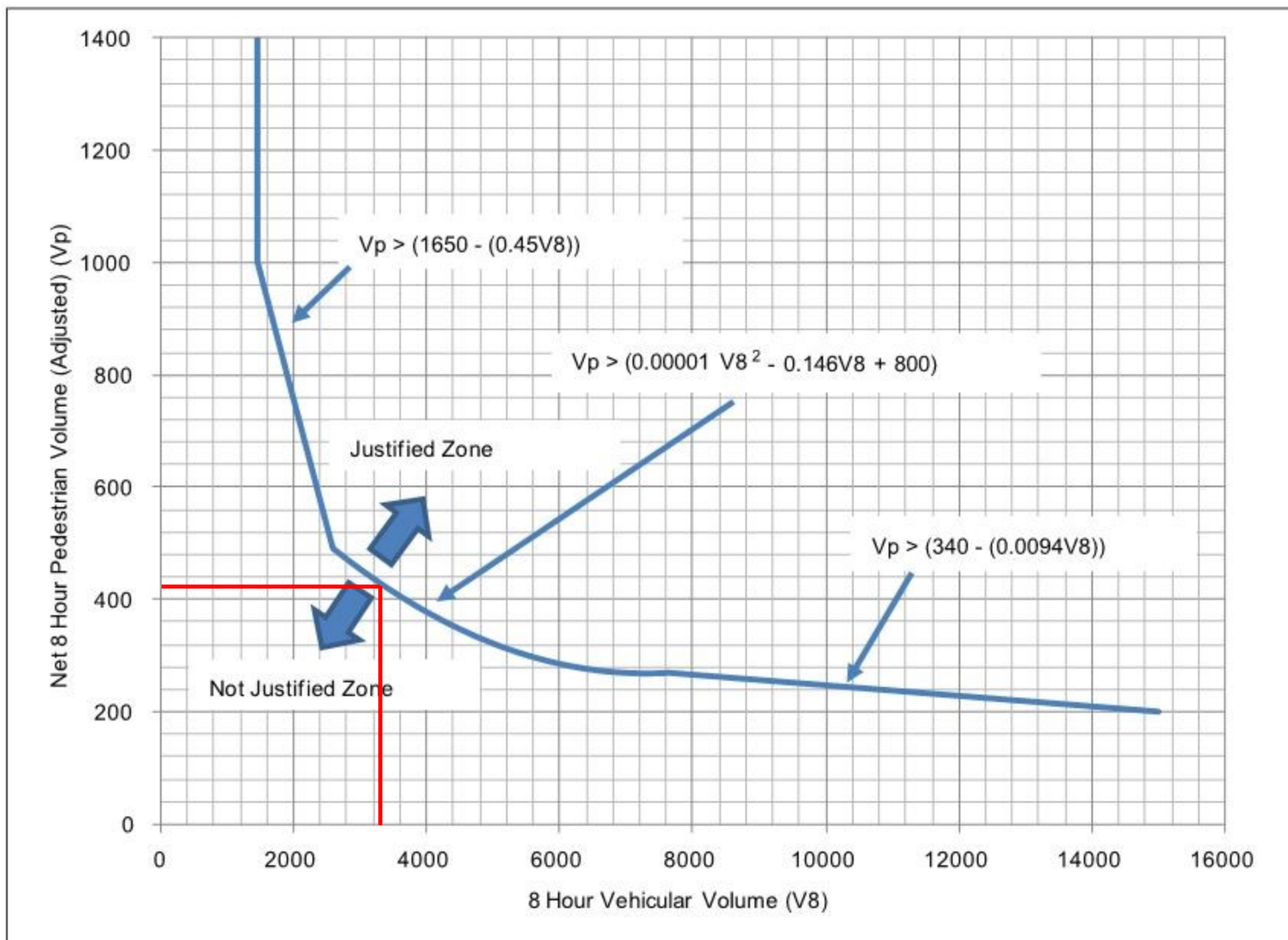


Figure 3: OTM Book 12 Justification 6 - Pedestrian Volume

Table 7: Pedestrian Crossover Selection Matrix

Two-way Vehicular Volume			Posted Speed Limit (km/h)	Total Number of Lanes for the Roadway Cross Section ¹			
Time Period	Lower Bound	Upper Bound		1 or 2 Lanes	3 lanes	4 lanes w/raised refuge	4 lanes w/o raised refuge
8 Hour	750	2,250	≤50	Level 2 Type D	Level 2 Type C ³	Level 2 Type D ²	Level 2 Type B
4 Hour	395	1,185					
8 Hour	750	2,250	60	Level 2 Type C	Level 2 Type B	Level 2 Type C ²	Level 2 Type B
4 Hour	395	1,185					
8 Hour	2,250	4,500	≤50	Level 2 Type D	Level 2 Type B	Level 2 Type D ²	Level 2 Type B
4 Hour	1,185	2,370					
8 Hour	2,250	4,500	60	Level 2 Type C	Level 2 Type B	Level 2 Type C ²	Level 2 Type B
4 Hour	1,185	2,370					
8 Hour	4,500	6,000	≤50	Level 2 Type C	Level 2 Type B	Level 2 Type C ²	Level 2 Type B
4 Hour	2,370	3,155					
8 Hour	4,500	6,000	60	Level 2 Type B	Level 2 Type B	Level 2 Type C ²	Level 2 Type B
4 Hour	2,370	3,155					
8 Hour	6,000	7,500	≤50	Level 2 Type B	Level 2 Type B	Level 2 Type C ²	Level 1 Type A
4 Hour	3,155	3,950					
8 Hour	6,000	7,500	60	Level 2 Type B	Level 2 Type B		
4 Hour	3,155	3,950					
8 Hour	7,500	17,500	≤50	Level 2 Type B	Level 2 Type B		
4 Hour	3,950	9,215					
8 Hour	7,500	17,500	60	Level 2 Type B			
4 Hour	3,950	9,215					

Type A
 Type B
 Type C
 Type D

Total 2028 (Pre-Improvement)

Total 2035 (Post- Improvement)

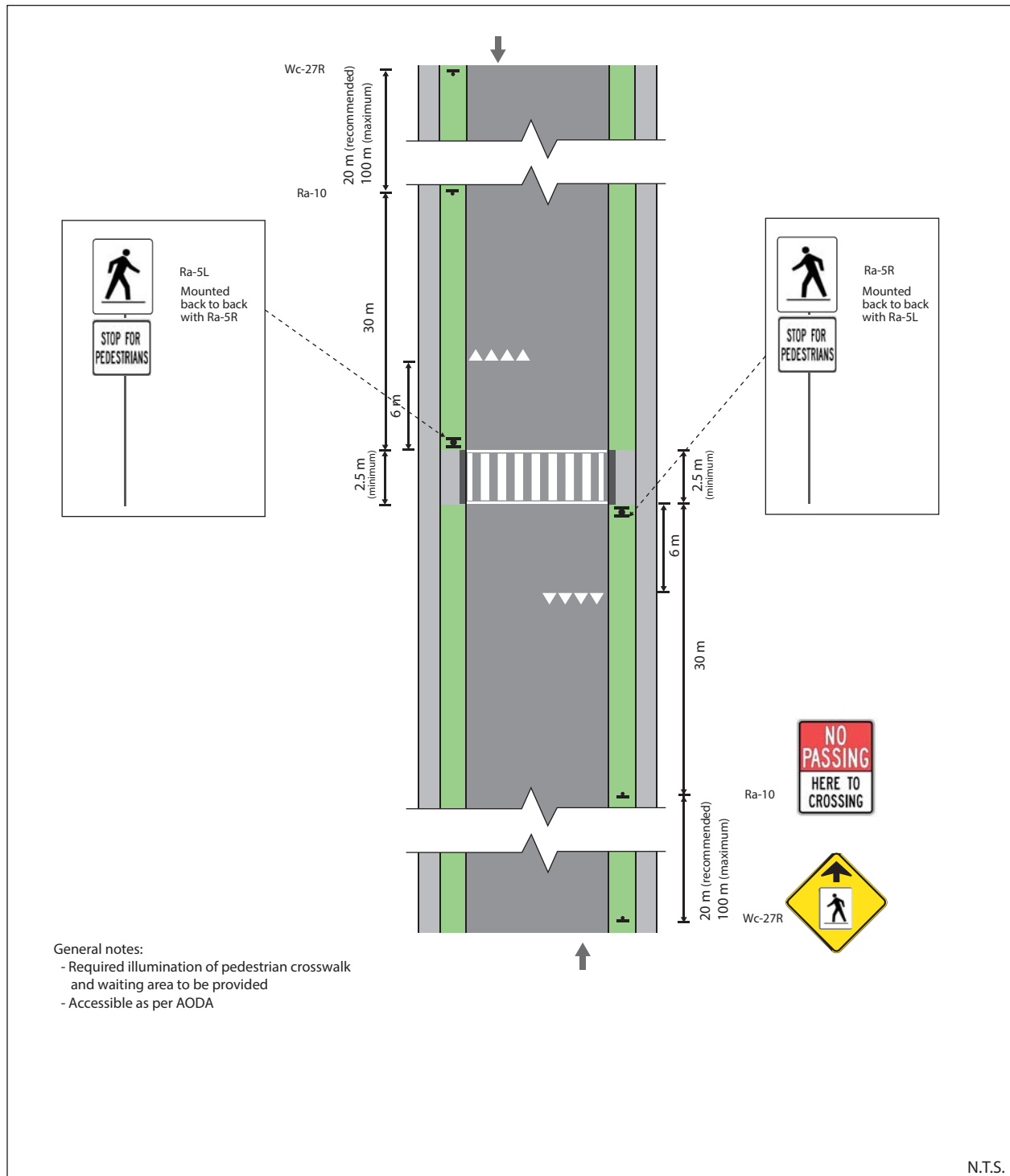
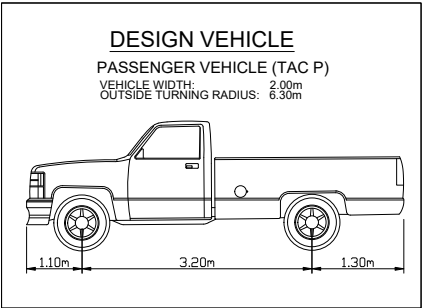
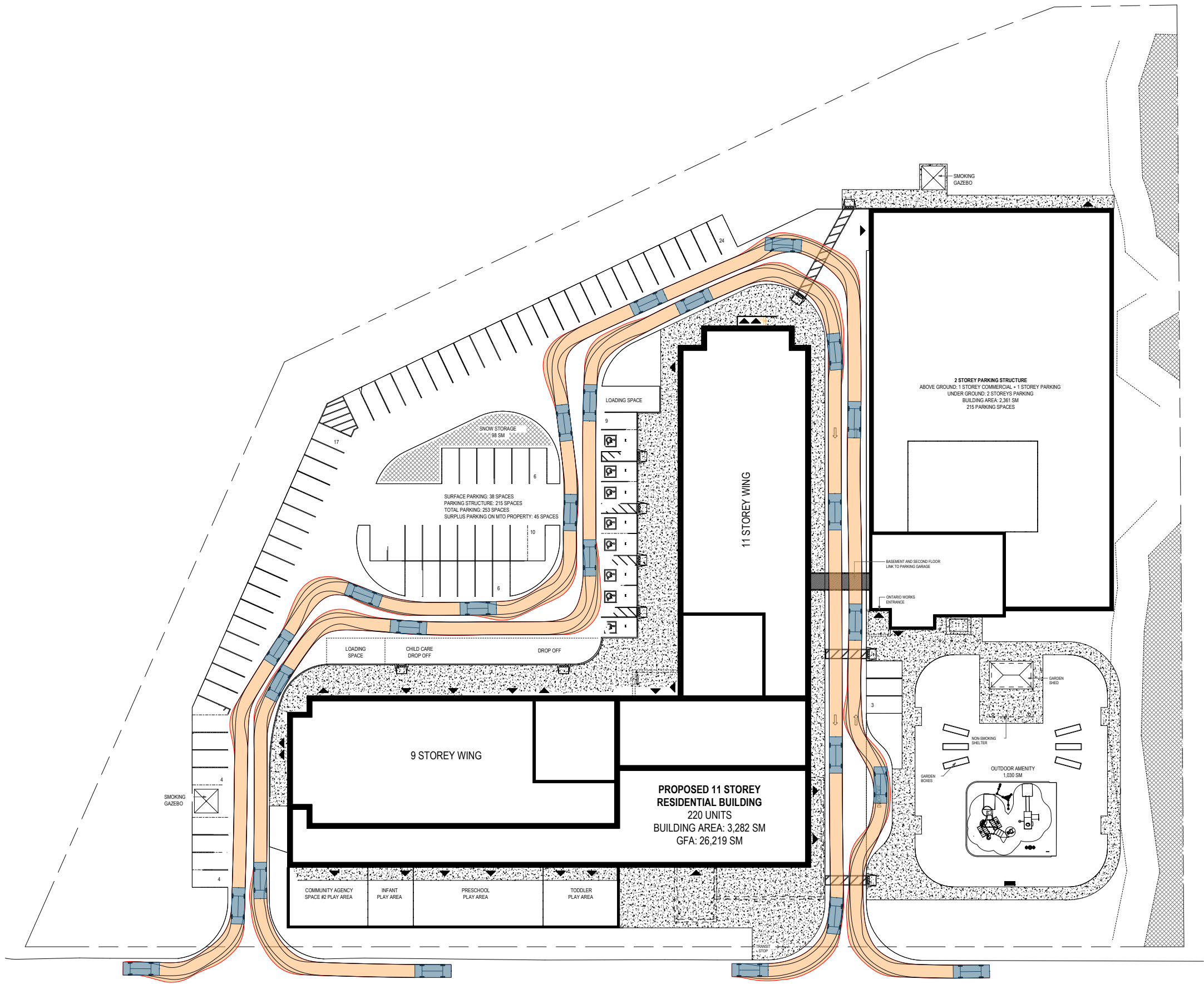
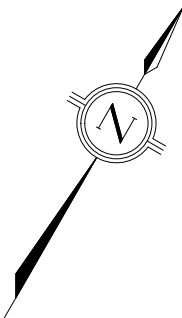


Figure 39: Pedestrian Crossover Level 2 Type D – Mid-block (2-lane, 2-way)

Appendix J – Swept Path Analysis



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2. DO NOT SCALE DRAWINGS.
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4. BASE DRAWING PROVIDED BY MCKNIGHT CHARRON LIMITED ARCHITECTS ON DATED NOVEMBER 21st, 2023.

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1.	DEC 2021	JN	FIRST SUBMISSION
NO.	DATE	APPROVED	REVISIONS



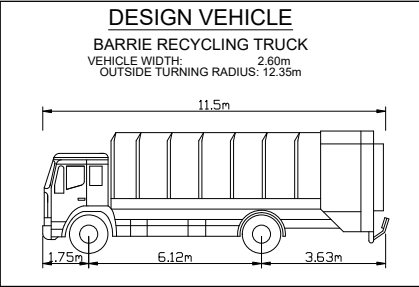
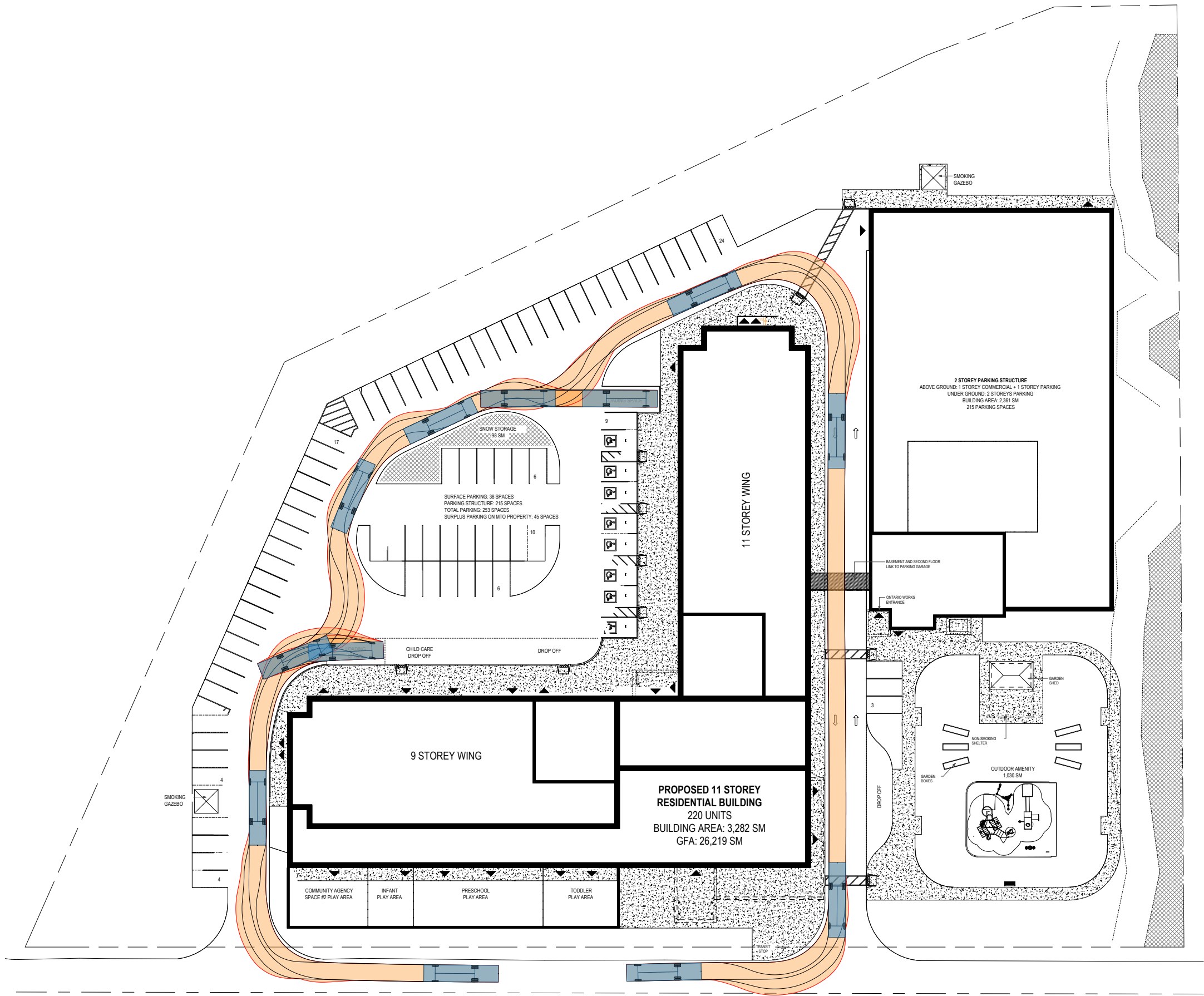
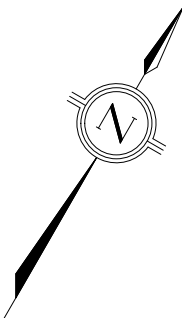
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DESIGN: JN	DATE: 12/21
DRAWN: JN	DATE: 12/21
REVIEWED: JN	DATE: 12/21
SCALE HOR: 1:200	SCALE VERT: N/A
SHEET NO. 20095 - TURN 1	



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1.	DEC 2021	JN	FIRST SUBMISSION
NO.	DATE	APPROVED	REVISIONS



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DRAWN: JN	DATE: 12/21
REVIEWED: JN	DATE: 12/21
SCALE HOR: 1:200	SCALE VERT: N/A
SHEET NO: 20095 - TURN 2	