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Caledonia Housing Redevelopment TRANSPORTATION STUDY

Prepared for
Capital Region Housing Corporation (CRHC)

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Appendix A. Synchro Traffic Model Reports

1.0 Introduction

Urban Systems Ltd was retained by the Capital Region Housing Corporation (“CRHC”) to complete a transportation study of the proposed redevelopment of the Caledonia Housing site at 1211 Gladstone Avenue in the Fernwood neighbourhood. The study is a comprehensive review of the potential transportation impacts on the surrounding community, with specific consideration of the following:

- Nearby intersection performance and potential impacts on the surrounding road network, including on nearby local streets;
- Neighbourhood traffic concerns, including traffic volumes on Chambers Street and neighbourhood short-cutting;
- The proposed parking supply and expected parking demand associated with the site redevelopment;
- On-street parking conditions and neighbourhood parking management; and
- Opportunities to limit road network and parking impacts through transportation demand management (“TDM”).

1.1 Location

The redevelopment site is located at 1211 Gladstone Avenue and includes associated properties south to Grant Street¹. See **Figure 1**.

¹ The redevelopment site includes the 1211 Gladstone Avenue (currently CRHC Caledonia townhouse site) property, as well as the 1219 Vining Street and 1215 / 1218 / 1219 / 1220 / 1226 North Park Street, and 1230 Grant Street properties

FIGURE 1. STUDY AREA



1.2 Context

1.2.1 Land Use

The subject site is within the Fernwood neighbourhood, immediately adjacent Victoria High School.

The Official Community Plan (“OCP”) identifies the site primarily as **Traditional Residential**. See **Figure 2**. The **North Park Village** (Large Urban Village) and **Fernwood Village** (Small Urban Village) are both within 300m of the subject site and include a range of retail, restaurant and service uses.

FIGURE 2. URBAN PLACE DESIGNATIONS, VICTORIA OCP²



² City of Victoria, Official Community Plan (OCP), Section 6: Land Management and Development, pg 37

1.2.2 Travel Options

The following is an overview of the transportation infrastructure / services in proximity to the site and the travel options available that would be available to site residents.

Walking The subject site is located at the centre of Fernwood approximately mid-way between the North Park Village and Fernwood Village identified in the OCP. Both Villages are no more than a 5-minute walk from the subject site (< 300m) and include restaurants and cafes, groceries, hardware and other retail uses, a theatre, and a variety of personal and professional services (i.e., medical, dental, fitness, etc).

Victoria High School is immediately adjacent the subject site, Central Middle School is a 10-minute walk (approx. 800m) and George Jay Elementary School is a 5-minutes walk (approx. 400m). The Crystal Pool site is a 5- to 10-minute walk (approx. 600m). Downtown Victoria is a 10- to 20-minute walk (approx. 800 to 1,600m).

The subject site's WalkScore is 93 ("Walker's Paradise, daily errands do not require a car")³, indicating a very high level of walkability.

Sidewalks are provided on the both sides of most streets in the vicinity of the site, with the exception of Caledonia Avenue and Vining Street east of Chambers Street.

Chambers Street (north-south), and Grant Street, Gladstone Avenue and Caledonia Avenue (east-west) are identified in the OCP as People Priority Greenways, meaning they are located on secondary and traffic-calmed streets and designed specifically for pedestrians, bicycles and other non-motorized rolling traffic⁴.

Cycling The subject site is approximately 1.0-km from downtown Victoria, 1.5-km from the Royal Jubilee Hospital, 3.0-km Camosun College (Lansdowne Campus) and 5.0-km from the University of Victoria. Each of these commuter destinations is well within comfortable cycling distance for most.

Cycling is primarily facilitated on low-volume local streets throughout the Fernwood neighbourhood. Cycling facilities are included on Vancouver Street (signed bike route), as well as many of the major streets on the eastern approach to downtown (Pandora Ave, Begbie St, Johnson St, Yates St, Fort St). Recent buffered and protected bicycle lane improvements on Fort Street, Pandora Avenue and Begbie Street facilitate cycling to/from

³ More information on the site's WalkScore is available online at: www.walkscore.com/score/1211-gladstone-ave-victoria-bc

⁴ City of Victoria, Official Community Plan, Section 7.1.5, pg 62. Available online: www.victoria.ca/assets/Departments/Planning-Development/Community-Planning/OCP/Replaced/OCP_Sec7_Jul2017_web.pdf

downtown Victoria. Upcoming cycling infrastructure improvements on Vancouver Street will provide an enhanced north-south route.

Public Transit

The No.24 – Cedar Hill / Admirals Walk and No.25 – Maplewood / Admirals Walk are local transit routes that are accessed from bus stops (100172, 100179) on Cook Street approximately 300m from the subject site. These routes provide service between Saanich (Cedar Hill / Shelbourne-McKenzie areas) and View Royal via downtown Victoria.

The No.22 – Vic General / Hillside Mall is a local transit route that is accessed from bus stops (100240, 100245) on Fernwood Road approximately 300m from the subject site and provides service to Hillside Mall, the Royal Jubilee and Victoria General Hospitals, and downtown Victoria.

Other transit routes that can be accessed within 500m of the subject site include the 27 – Gordon Head / Downtown and 28 – Majestic / Downtown (Frequent Services, 15-minutes or better) on Pandora Avenue and Johnson Street, as well as the 2 – James Bay / South Oak Bay / Willows and 10 – James Bay / Royal Jubilee routes.

Carshare

The most prevalent local two-way carshare service is Modo, with approximately 70 vehicles in the Capital Region (as of January 2019)⁵. Members can access any vehicle within the fleet and pay usage based on the length of time and distance of their trip.

Three vehicles are located within one-block of the subject site and may be conveniently accessed by site residents:

- Gladstone Avenue adjacent the Fernwood Community Centre (2 vehicles); and
- Yukon Street at Chambers Street (1 vehicle).

⁵ Count based on Modo “Car Map”, available online at: www.modo.coop/map

1.3 Proposed Redevelopment

1.3.1 Land Use

The site is currently occupied by a series of 18 townhouse units on the 1211 Gladstone Avenue property and a single multi-unit residential building on the 1209 Vining Street property. All other portions of the redevelopment site are currently undeveloped.

The redevelopment proposal is for 154 multi-family residential units. Units will be a mix of Deep Subsidy (19%), Rent-Geared-to-Income (49%), and Affordable (32%). The unit breakdown is identified in **Table 1**.

TABLE 1. SUMMARY OF PROPOSED LAND USE

Income Level	Number of Bedrooms					Total
	Studio	One	Two	Three	Four	
Deep Subsidy	2	8	16	3	1	30 19%
Rent Geared to Income	4	21	38	8	4	75 49%
Affordable	5	13	24	4	3	49 32%
Total	11 7%	42 27%	78 51%	15 10%	8 5%	

Deep subsidy and rent-geared-to-income (RGI) are considered subsidized units, and rents are subsidized by BC Housing and determined based on the income of tenants. Affordable units (32%) is near market rent units and we will be able to charge higher rents⁶.

1.3.2 Parking

The proposal includes a total of 120 parking spaces. The bicycle parking supply includes 190 long-term spaces and 30 short-term spaces.

1.3.3 Access

Site access is proposed via Caledonia Avenue and Grant Street, as these locations were considered to facilitate convenient, direct access and minimize impacts on the surrounding road network.

⁶ Description of housing types provided by Capital Region Housing Corporation by email, April 10 2019

2.0 Traffic + Road Network

Background and post-development intersection performance has been assessed for the Chambers Street / Caledonia Avenue, Cook Street / Caledonia Avenue, Grant Street / Fernwood Road and Chambers Street / Pandora Avenue intersections. The results are presented below.

2.1 Background Conditions

2.1.1 Road Network

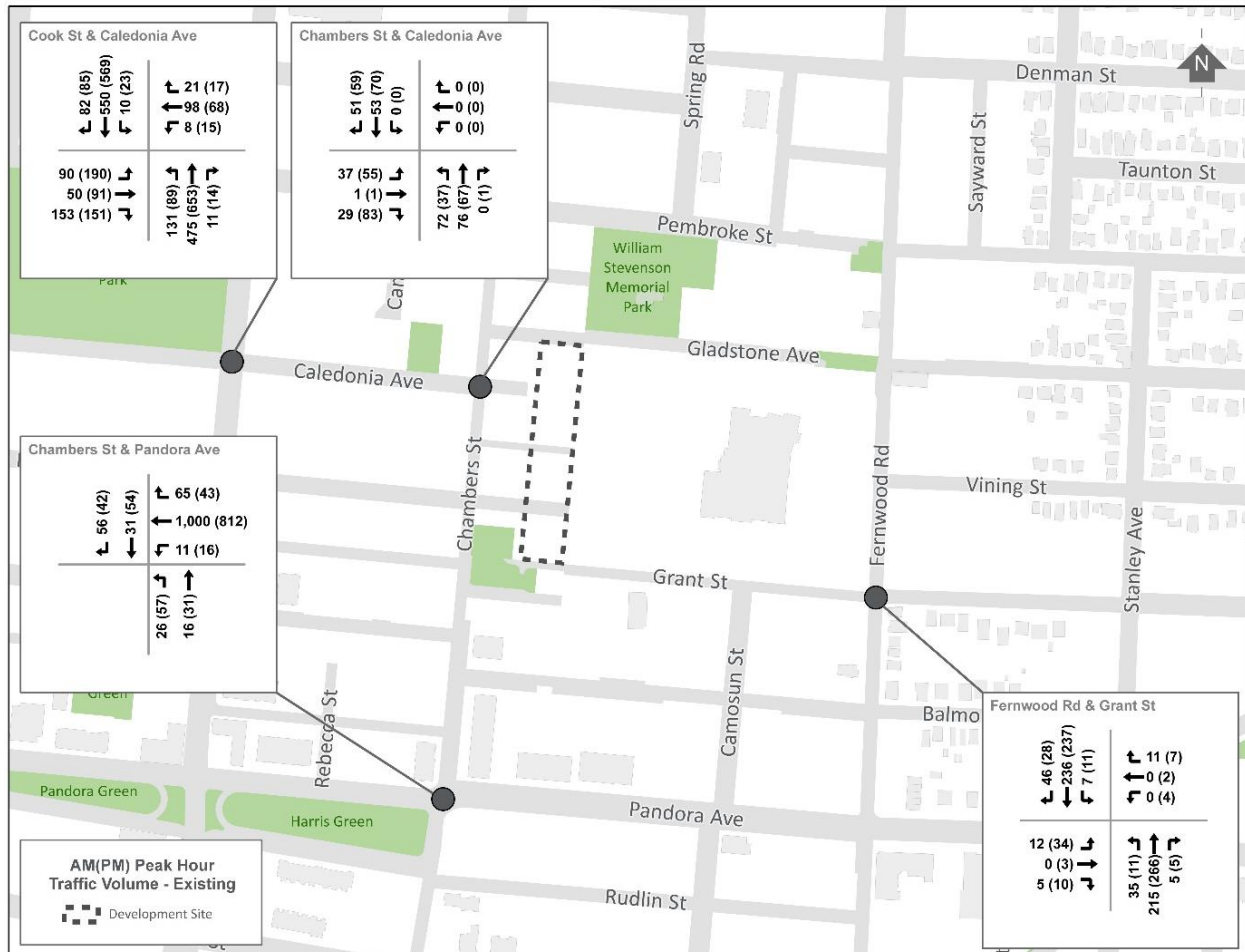
The road network is bounded by Cook Street, Pembroke Street, Fernwood Road and Pandora Avenue. All roads within this area are two-lane undivided local roads⁷, including Caledonia Avenue and Chambers Street. On-street parking is available along most of the roads in the vicinity of the site (refer to Section 4.0 for a detailed account of on-street parking). The nearest signalized intersection to the subject site is at Caledonia Avenue / Cook Street.

2.1.2 Traffic Volumes

Intersection turning movement counts were collected for the Chambers Street / Caledonia Avenue, Cook Street / Caledonia Avenue, and Grant Street / Fernwood Road intersections on Wednesday May 1, 2019 from 7:00 to 9:00am and 3:00 to 6:00pm. Traffic counts were also collected at the Pandora Avenue / Chambers Street intersection from 8:00 to 9:00am and 3:00 to 4:00pm on Tuesday May 7, 2019 (completed specifically for a short-cutting analysis, discussed in Section 2.4). **Figure 3** illustrates the background traffic volumes during the morning and afternoon peak hours.

⁷ Road Classification Map, <https://www.victoria.ca/EN/main/residents/transportation/transportation-reference-documents.html>

FIGURE 3. BACKGROUND AM (PM) PEAK HOUR TRAFFIC VOLUMES



A week of 24-hour traffic counts was also collected on Chambers Street south of Caledonia Avenue between April 30 to May 6, 2019. The two-way weekday traffic has two distinct peaks - 8:00am (just over 200 vehicles per hour) and 4:00pm (almost 250 vehicles per hour). See **Figure 4**. The average weekday traffic volume is approximately 2,500 vehicles per day⁸. The peak hour factor was estimated to be approximately 11% (average of AM and PM peak hour traffic represents approximately 11% of the average weekday traffic).

The two-way weekend traffic is generally lower than the weekday traffic and does not have distinct peaks throughout the day. See **Figure 5**.

⁸ 24-hour traffic counts were completed by the City of Victoria from May 01 to May 08 2019 on Chambers Street between Gladstone Avenue and Caledonia Avenue (one block north of the location used as the basis for this study). The City counts found the average weekday traffic volume to be approximately 2,800 vehicles per day, approximately 10% (300 vehicles per day) higher than the count completed one block south.

FIGURE 4. 24-HOUR TRAFFIC PROFILE ON CHAMBERS STREET (WEEKDAY)

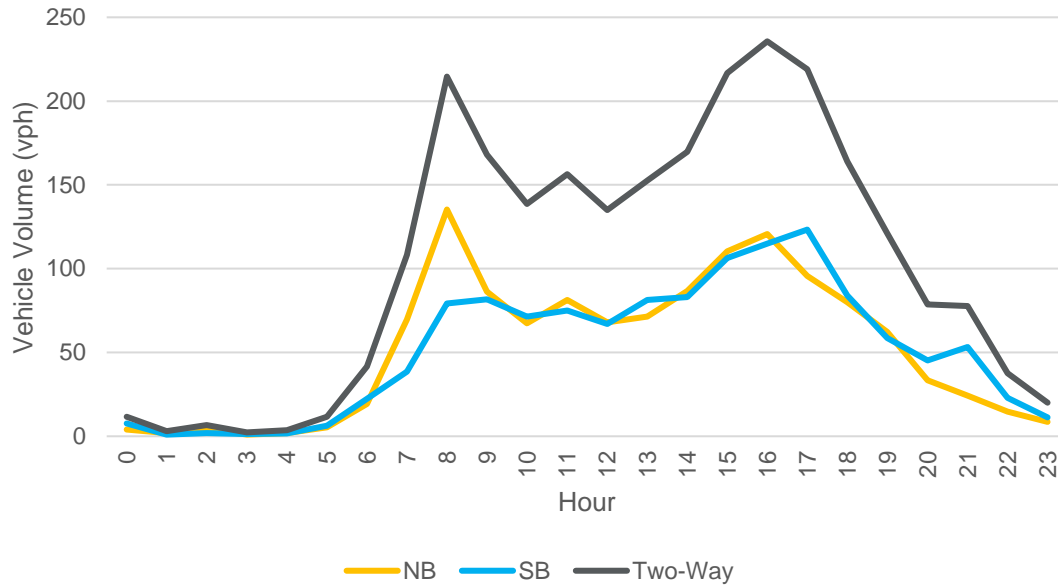
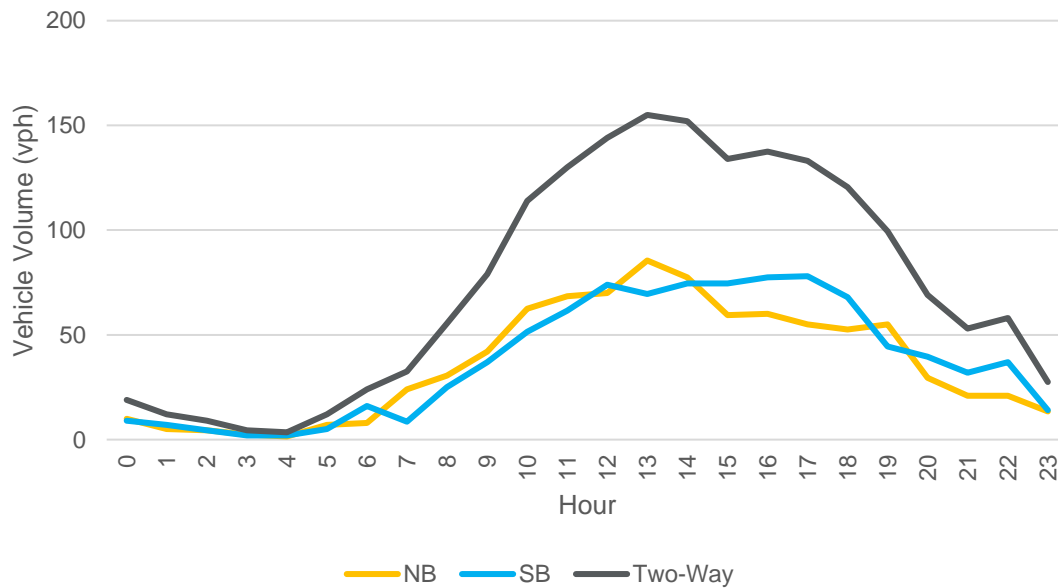


FIGURE 5. 24-HOUR TRAFFIC PROFILE ON CHAMBERS STREET (WEEKEND)



2.1.3 Historical Volume Review

Historical traffic volumes were reviewed to understand change in traffic volumes over time. The 1996 volumes of Caledonia Avenue and Cook Street from the *Fernwood Neighbourhood Transportation Management Study (1996)* indicate that the peak hour traffic volumes on Cook Street have decreased by approximately 20% to 25% (approximately 250 to 550 vehicle per hour less since 1996), and the traffic on Caledonia Street has increased by approximately 40% to 50% (approximately 60 to 70 vehicles per hour more since 1996).

A review of daily traffic on Chambers Street showed 2,020 and 1,900 vehicles per day in 1996 and 2011⁹, respectively, which are approximately 300 vehicles per hour less than current average daily traffic (approximately 2,300 vehicles per day) and 500 vehicles per hour less than current average weekday traffic (approximately 2,500 vehicle per day).

The comparison between the historical and current traffic volumes indicates that while the north-south major street, Cook Street, has experienced a decrease in traffic volumes, the north-south local street, Chambers Street, has experienced some notable increase in the past 25 years or so. The change in traffic volume on Caledonia Avenue is moderate.

2.1.4 Intersection Performance

Synchro v10.1 was used to evaluate the traffic operational performance under the existing condition. Key traffic measures including Level of Service (LOS), delay, volume-to-capacity (v/c), and queue length are summarized in **Table 2**. Detailed Synchro reports are provided in **Appendix A**.

The model results indicate that under the existing condition, all four intersections operate at LOS “A/B” at the intersection level. Individual movements all operate at LOS “C” or better with less than 30 seconds of delays. 95th percentile queue lengths at the signalized intersection (Cook Street & Caledonia Avenue) appear to be moderate and the queue lengths at the three unsignalized intersections appear to be minimal.

⁹ Email from the City dated on May 2, 2019.

TABLE 2. BACKGROUND AM (PM) SYNCHRO RESULTS (BACKGROUND)¹⁰

Road	Approach	Control Type	Movement	V/C	Delay (sec/veh)	LOS	95th% Queue (m)
Cook St & Caledonia Ave							
Caledonia Ave	EB	Signalized	L	0.36 (0.61)	19.4 (25.1)	B (C)	19.2 (38.9)
		Signalized	T,R	0.47 (0.48)	9.1 (11.2)	A (B)	18.5 (27.8)
	WB	Signalized	L	0.04 (0.06)	15.2 (15.3)	B (B)	3.5 (5.0)
		Signalized	T,R	0.31 (0.18)	15.3 (13.3)	B (B)	20.9 (15.3)
Cook St	NB	Signalized	L	0.53 (0.48)	16.4 (18.0)	B (B)	27.0 (18.8)
		Signalized	T,R	0.53 (0.79)	9.4 (17.3)	A (B)	58.8 (95.3)
	SB	Signalized	L	0.03 (0.13)	6.0 (9.0)	A (A)	2.5 (4.9)
		Signalized	T,R	0.70 (0.79)	12.8 (17.1)	B (B)	87.7 (92.5)
Overall Intersection					12.1 (17.0)	B (B)	-
Chambers St & Caledonia Ave							
Caledonia Ave	EB	Stop	L, T, R	0.12 (0.22)	11.9 (11.5)	B (B)	3.3 (6.4)
	WB	Stop	L, T, R	0.01 (0.01)	12.0 (11.5)	B (B)	0.1 (0.1)
Chambers St	NB	Free	L	0.06 (0.03)	0.5 (0.2)	A (A)	1.4 (0.7)
		Free	T,R	0.06 (0.03)	4.0 (2.9)	A (A)	1.4 (0.7)
	SB	Free	L	0.00 (0.00)	0.0 (0.0)	A (A)	0.0 (0.0)
		Free	T,R	0.00 (0.00)	0.1 (0.1)	A (A)	0.0 (0.0)
Overall Intersection					4.4 (5.2)	A (A)	-
Fernwood Rd & Grant St							
Grant St	EB	Stop	L, T, R	0.05 (0.15)	15.5 (17.6)	C (C)	1.3 (4.2)
	WB	Stop	L, T, R	0.02 (0.05)	11.1 (13.7)	B (B)	0.6 (0.8)
Fernwood Rd	NB	Free	L	0.03 (0.01)	0.3 (0.1)	A (A)	0.8 (0.2)
		Free	T,R	0.03 (0.01)	1.4 (0.4)	A (A)	0.8 (0.2)
	SB	Free	L	0.01 (0.01)	0.1 (0.1)	A (A)	0.2 (0.3)
		Free	T,R	0.01 (0.01)	0.3 (0.4)	A (A)	0.2 (0.3)
Overall Intersection					1.5 (2.0)	A (A)	-
Chambers St & Pandora Ave							
Pandora Ave	WB	Free	L	0.01 (0.01)	0.1 (0.1)	A (A)	0.2 (0.3)
		Free	T	0.36 (0.29)	0.1 (0.2)	A (A)	0.2 (0.3)
		Free	R	0.36 (0.29)	0.0 (0.0)	A (A)	0.0 (0.0)
Chambers St	NB	Stop	L, T	0.20 (0.33)	24.4 (23.7)	C (C)	5.6 (11.2)
	SB	Stop	T,R	0.31 (0.31)	21.6 (20.5)	C (C)	10.0 (10.3)
Overall Intersection					2.5 (4.0)	A (A)	-

¹⁰ For movement with zero volumes, assumption of 1 vehicle per hour was used in Synchro model to obtain model results.

2.2 Post-Development Conditions

2.2.1 Trip Generation

Trip generation refers to the number of new trips that will be generated by the proposed land use. Trip generation rates and directional split (% in/out) are based on the Institute of Transportation Engineers (ITE) *Trip Generation Manual, 10th Edition* and compared against a trip rate generated based on observation of a local site¹¹.

The trip generation rates used for the purpose of this study are 0.25 vehicles per unit (AM) and 0.30 vehicles per unit (PM). Refer to **Table 3**. These rates are mid-way between the local and ITE trip rates, and may represent a conservative estimate of traffic generated by the subject site.

TABLE 3. SUMMARY OF TRIP GENERATION RATES (VEHICLES PER HOUR)

Source	AM	PM
ITE Land Use 221: Multifamily (Mid-Rise)	0.36	0.44
Local Property: 105 Wilson Street	0.14	0.18
Rate used for Analysis	0.25	0.30

Using the customized trip rates and in / out splits from the ITE manual, the proposed development is anticipated to generate 39 trips (10 in and 29 out) in the AM peak hour and 46 trips (28 in and 18 out) in the PM peak hour. See **Table 4**.

TABLE 4. SUMMARY OF POST-DEVELOPMENT TRIP GENERATION (WEEKDAY)¹²

Peak	Trip Rate	Quantity	Unit	Total Trips	In%	Out%	Trips In	Trips Out
AM	0.25	155	DU	39	26%	74%	10	29
PM	0.30	155	DU	46	61%	39%	28	18

It should also be noted that traffic associated with the current site land use (18 townhouses) has not be removed from the network.

¹¹ The 105 Wilson Street site (in Vic West) was observed on Tuesday April 7, 2019 from 8:00 to 9:00am and 3:00 to 5:00pm. This site is an affordable housing site similar to the land uses proposed at the subject site, is in an urban neighbourhood at the fringe of downtown Victoria, and is similar in size/scale (159 units).

¹² Note: Trip generation based on preliminary unit count (155 units) rather than final unit count (154 unit), and therefore represents a conservative estimate of trips generated.

2.2.2 Trip Distribution + Assignment

The site trip distribution was developed using StreetLight Data, a data service that collects records based on Location-Based Service and Navigation-GPS data¹³. The following distribution assumptions were developed for each scenario based on 2018 StreetLight data. See **Table 5**.

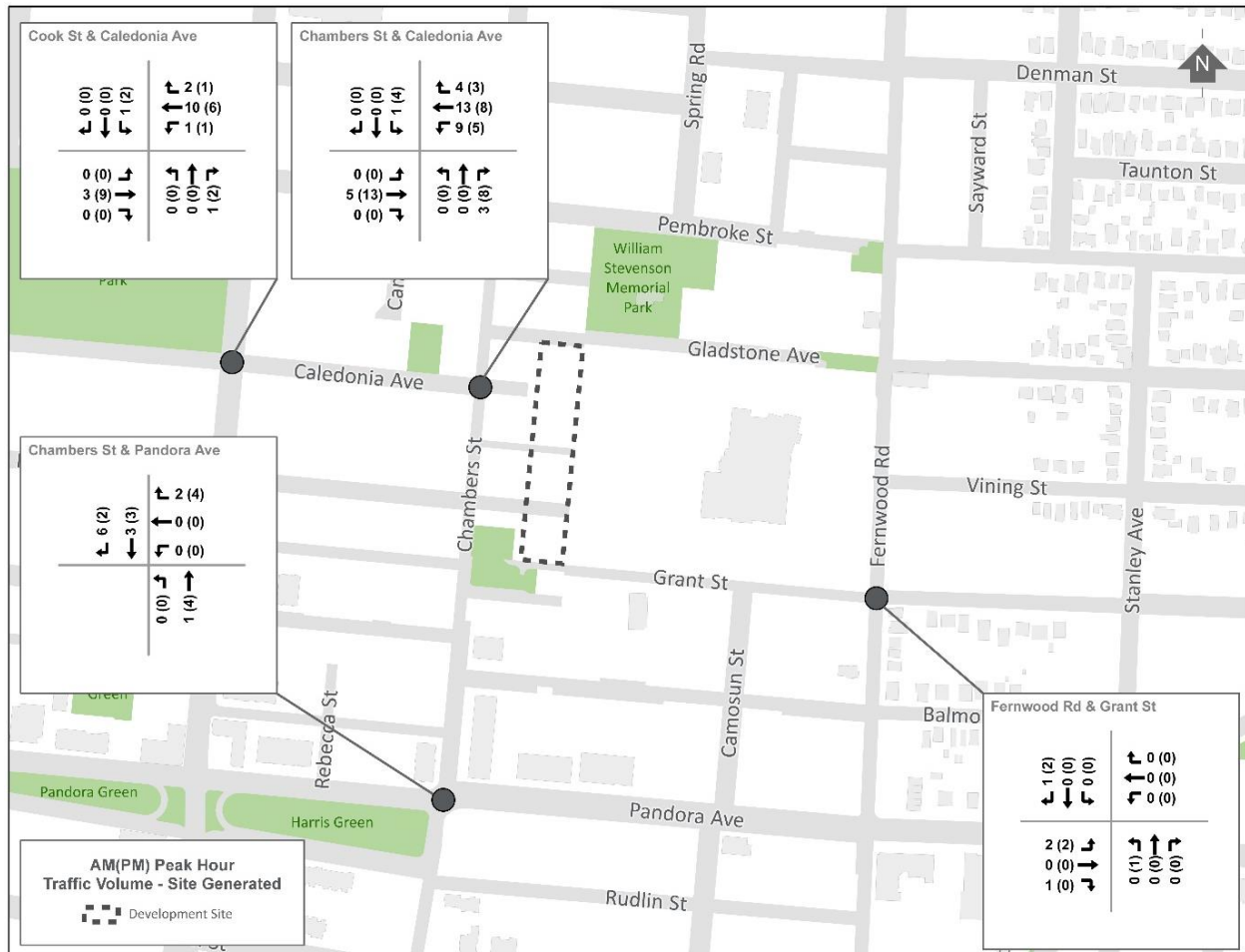
TABLE 5. TRIP DISTRIBUTION SUMMARY

From / To	Distribution %
North via Chambers Street	15%
South via Chambers Street	30%
East via Grant Avenue	10%
West via Caledonia Avenue	45%
Total	100%

Trip assignment at the movement level was based on the intersection counts at each intersection. **Figure 6** illustrates the site generated trips.

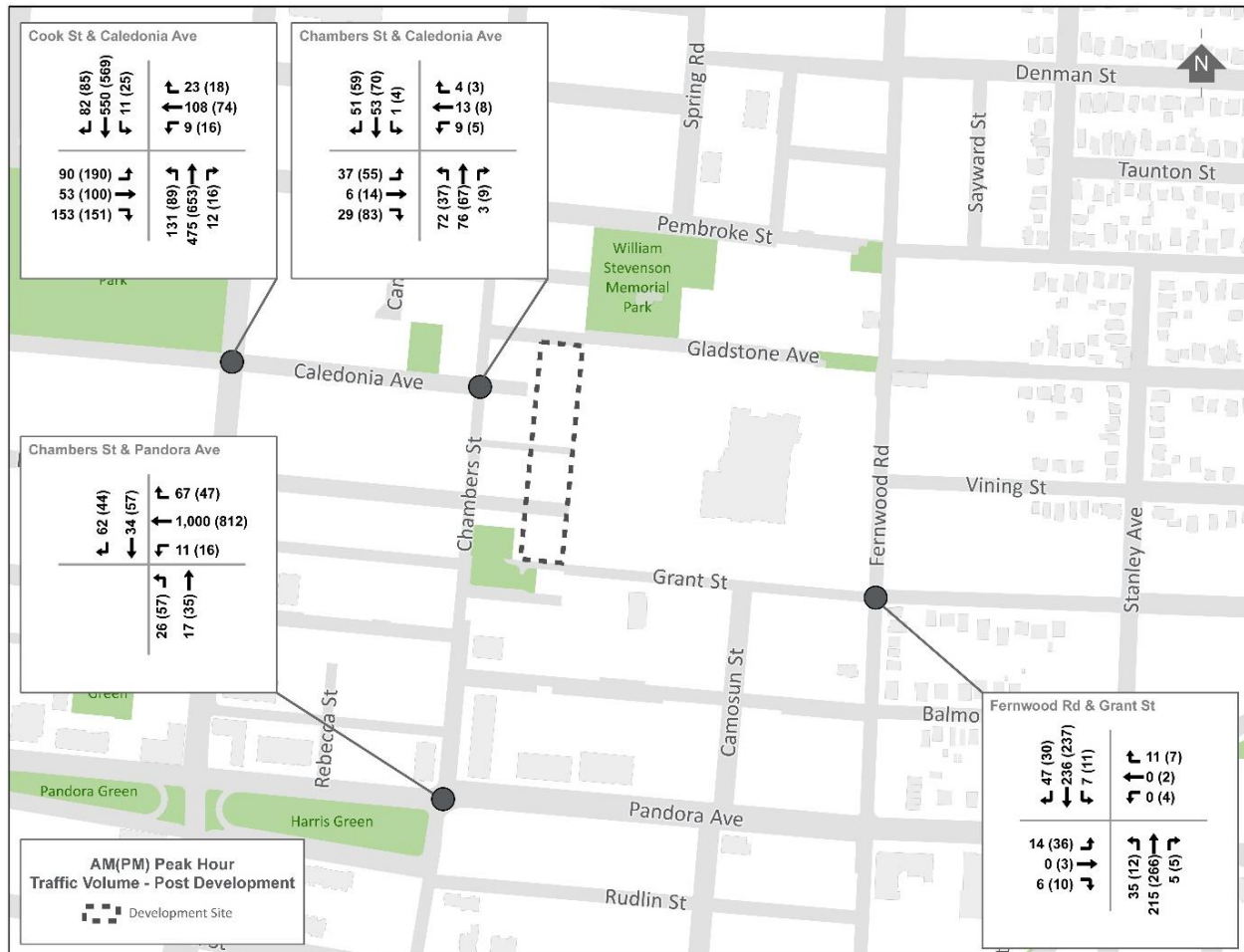
¹³ Streetlight processes over 60-billion new location records every month from Location-Based Service data and Navigation-GPS Data. Altogether, Streetlight's sample size represents 23% of travel activity in the US and Canada. Streetlight Data has been independently validated by Fehr and Peers. The consulting firm validated *StreetLight Insight* Origin/Destination Travel Metrics against data collected through a license plate scan and an origin-destination matrix derived from modeling and surveys. The results had a better than 95% correlation between data sets. Additionally, the BC Ministry of Transportation & Infrastructure has trialed Streetlight Data in the Enderby area. Streetlight data was found to closely mirror patterns collected by Bluetooth readers.

FIGURE 6. AM (PM) SITE GENERATED TRIPS



Total post development (background + site generated trips) are illustrated in **Figure 7**.

FIGURE 7. AM (PM) TOTAL TRIPS



2.2.3 Intersection Performance

A summary of post-development network conditions is provided in **Table 6**. The analysis indicates that with the additional site generated trips, the study intersections are expected to continue operate at acceptable conditions with moderate delays and queues.

The analysis concludes that the increase in traffic associated with the proposed development will not tangibly impact conditions at any of the four intersections. Since the study intersections operates at acceptable condition with no significant operational issues, intersection improvement is not required.

While only a small number of new trips are anticipated to/from Grant Street, it is acknowledged that Grant Street is underdeveloped and certain turn movements at the Grant Street / Fernwood intersection are challenging for larger vehicles (particularly the eastbound right-turn). Design improvements may be considered for Grant Street.

TABLE 6. POST-DEVELOPMENT AM (PM) SYNCHRO RESULTS¹⁴

Road	Approach	Control Type	Movement	V/C	Delay (sec/veh)	LOS	95th% Queue (m)
Cook St & Caledonia Ave							
Caledonia Ave	EB	Signalized	L	0.36 (0.61)	19.4 (25.4)	B (C)	19.3 (39.0)
		Signalized	T,R	0.47 (0.51)	9.2 (12.5)	A (B)	19.1 (31.0)
	WB	Signalized	L	0.04 (0.06)	15.2 (15.4)	B (B)	3.7 (5.4)
		Signalized	T,R	0.33 (0.20)	15.7 (13.4)	B (B)	22.6 (16.2)
Cook St	NB	Signalized	L	0.54 (0.48)	17.0 (17.9)	B (B)	27.2 (18.8)
		Signalized	T,R	0.54 (0.79)	9.6 (17.4)	A (B)	58.9 (96.0)
	SB	Signalized	L	0.03 (0.14)	6.0 (9.2)	A (A)	2.6 (5.2)
		Signalized	T,R	0.71 (0.78)	13.0 (17.1)	B (B)	87.7 (92.5)
Overall Intersection					12.4 (17.2)	B (B)	-
Chambers St & Caledonia Ave							
Caledonia Ave	EB	Stop	L, T, R	0.14 (0.25)	12.4 (12.1)	B (B)	3.8 (7.6)
	WB	Stop	L, T, R	0.06 (0.03)	13.2 (12.3)	B (B)	1.5 (0.8)
Chambers St	NB	Free	L	0.06 (0.03)	0.5 (0.2)	A (A)	1.4 (0.7)
		Free	T,R	0.06 (0.03)	3.9 (2.7)	A (A)	1.4 (0.7)
	SB	Free	L	0.00 (0.00)	0.0 (0.0)	A (A)	0.0 (0.1)
		Free	T,R	0.00 (0.00)	0.1 (0.2)	A (A)	0.0 (0.1)
Overall Intersection					5.2 (5.7)	A (A)	-
Fernwood Rd & Grant St							
Grant St	EB	Stop	L, T, R	0.06 (0.16)	15.4 (17.9)	C (C)	1.6 (4.4)
	WB	Stop	L, T, R	0.02 (0.03)	11.1 (13.7)	B (B)	0.6 (0.8)
Fernwood Rd	NB	Free	L	0.03 (0.01)	0.3 (0.1)	A (A)	0.8 (0.3)
		Free	T,R	0.03 (0.01)	1.4 (0.4)	A (A)	0.8 (0.3)
	SB	Free	L	0.01 (0.01)	0.1 (0.1)	A (A)	0.2 (0.3)
		Free	T,R	0.01 (0.01)	0.3 (0.4)	A (A)	0.2 (0.3)
Overall Intersection					1.5 (2.1)	A (A)	-
Chambers St & Pandora Ave							
Pandora Ave	WB	Free	L	0.01 (0.01)	0.1 (0.1)	A (A)	0.2 (0.3)
		Free	T	0.36 (0.29)	0.1 (0.2)	A (A)	0.2 (0.3)
		Free	R	0.36 (0.29)	0.0 (0.0)	A (A)	0.0 (0.0)
Chambers St	NB	Stop	L, T	0.21 (0.35)	25.3 (24.6)	D (C)	2.9 (12.2)
	SB	Stop	T,R	0.34 (0.33)	22.3 (20.9)	C (C)	11.3 (11.0)
Overall Intersection					2.7 (4.2)	A (A)	-

¹⁴ For movement with zero volumes, assumption of 1 vehicle per hour was used in Synchro model to obtain model results.

2.3 Neighbourhood Traffic Concerns

Discussion at the February 2019 Community and Land Use Community (CALUC) meeting identified pre-existing neighbourhood traffic concerns, specifically traffic volumes on Chambers Street and neighbourhood short-cutting via Chambers Street. Each is studied in the following sections.

2.3.1 Chambers Street Traffic Volumes

Chambers Street is identified as a Local Street, per the City's *Official Community Plan, Section 7*. The City's Road Classification Map¹⁵ indicates that a Local Street is intended to accommodate less than 1,000 vehicles per day. The average weekday traffic volume on Chambers Street was observed to be approximately 2,500 vehicles per day (as was described in Section 2.1.2), which exceeds the desired daily traffic volume for a Local Street and suggests that traffic management / traffic calming may be appropriate to reduce the number of vehicles on Chambers Street.

2.3.2 Short-Cutting Traffic Analysis

The recent traffic volume counts on Chambers Street (described above) represent an increase of approximately 25% in the average weekday traffic volume on Chambers Street since the 2011 count. The change in traffic control at the Pandora Avenue / Cook Street intersection in 2017 to restrict right-turns on red (associated with the Pandora Avenue cycling improvements) may have resulted in increased short-cutting via Chambers Street to avoid increased wait time making the westbound right-turn at the Pandora Avenue / Cook Street intersection. Analysis was undertaken to better understand the nature and magnitude of short-cutting.

The short-cutting traffic analysis was conducted using 2018 StreetLight data (refer to Section 2.2.2 for a description of the StreetLight data service), with the Pandora Avenue westbound right-turn to Chambers Street as the origin point (or "gate") and Chambers Street north of Caledonia Avenue as well as Balmoral Street, Grant Street, North Park Street and Caledonia immediately east of Cook Street as the destination points. See **Figure 8**.

The results indicated that approximately 30% of the traffic that turned right onto Chambers Street from Pandora Avenue continued northbound on Chambers Street to beyond Caledonia Avenue. These vehicles are assumed to be destined for the neighbourhood and are not short-cutting. The remaining 70% used Balmoral Road, Grant Street, North Park Street or Caledonia Avenue to access Cook Street or destinations west of Cook Street, and are considered to be short-cutting.

¹⁵ Available online at:
<https://www.victoria.ca/assets/Departments/Engineering~Public~Works/Documents/Road%20Classification%20Map%2011x17.pdf>

FIGURE 8. ORIGIN – DESTINATION GATES



The intersection turn movement counts at the Pandora Avenue / Chambers Street intersection were used to understand the magnitude of the potential short-cutting traffic. The traffic counts together with the StreetLight data, potential short-cutting traffic were estimated to be approximately 30 to 45 vehicles per hour in the peak hours, summarized in **Table 7**. Using the peak hour factor of 11 calculated in the previous section (Section 2.1.2), the daily short cutting traffic was estimated to be approximately 420 vehicles per day.

TABLE 7. SHORT-CUTTING TRAFFIC ESTIMATES

	Westbound Right-Turn (Pandora Ave / Chambers St)	Estimated Short-Cutting Traffic
AM	65	46
PM	43	30
All Day	594	416

Using the 24-hour traffic counts on Chambers Street, it was estimated that the short-cutting traffic generally makes up approximately 25 to 35% of the northbound traffic and 15% to 20% of the total two-way traffic. See **Table 8**.

TABLE 8. SUMMARY OF SHORT-CUTTING TRAFFIC ON CHAMBERS STREET

	Traffic Volume on Chambers Street		Short Cutting Traffic		
	Northbound	Two-Way	Volume (veh/hr)	% of Northbound	% of Two-way
AM	135	215	46	34%	21%
PM	121	236	30	25%	13%
All Day	1,254	2,494	416	33%	17%

3.0 Site Parking Demand

3.1 Parking Requirement

The required off-street parking supply is determined through the City's Zoning Bylaw no.80-159, Schedule C: Off-Street Parking Requirements¹⁶. The site parking requirement is estimated to be 114 spaces¹⁷, as shown in **Table 9**.

TABLE 9. SUMMMARY OF OFF-STREET PARKING REQUIREMENT

Land Use	Quantity	Minimum Parking Supply	
		Rate	Total
Affordable (less than 45m ²)	11 units	0.20 Per unit	2.2
Affordable (between 45m ² and 70m ²)	42 units	0.50 per unit	21.0
Affordable (greater than 70m ²)	101 units	0.75 per unit	75.8
Visitor	154 units	0.1 per unit	15.4
Total			114

¹⁶ Available online at:
<https://www.victoria.ca/assets/Departments/Planning-Development/Development-Services/Zoning/Bylaws/Schedule%20C.pdf>

¹⁷ Exact unit floor areas had not been determined at the time this study was undertaken. For the purposes of calculating the site's parking demand it was assumed that all studio units are less than 45m², all one-bedroom units are between 45m² and 70m² and all two-, three- and four-bedroom units are greater than 70m².

3.2 Parking Demand

The following section describes estimating residential parking demand using two methods - observations at representative sites and vehicle ownership data.

3.2.1 Residents, Parking Demand at Other CRHC Sites

Resident parking demand is estimated based on parking demand experienced at six CRHC sites in the City of Victoria (representing 278 units). CRHC study sites were selected that are in similar urban neighbourhoods as the subject site and with a similar ratio of one-, two-, three- and four-bedroom units.

The average parking demand rate among the study sites is 0.64 vehicles per unit. See **Table 10**. The average parking demand suggests resident parking demand will be 99 vehicles.

TABLE 10. PARKING DEMAND AT CRHC SITES¹⁸

Site	Area	Units					Vehicle Ownership Rate ¹⁹ (vehicles per unit)
		Total	1-bed	2-bed	3-bed	4-bed	
"Castanea" 2860 Quadra St	Quadra Village	59	54%	24%	19%	3%	0.49
"Harbour Lane" 324 Kingston St	James Bay	28	4%	68%	29%	-	0.86
"Kings Place" 1070 Kings Rd	Quadra Village	35	3%	63%	31%	3%	0.77
"Leblond Place" 390 Waterfront Cres	Gorge / Selkirk	53	72%	19%	2%	8%	0.43
"Michigan Square" 330-360 Michigan St	James Bay	62	39%	66%	5%	-	0.77
"Rotary House" 1855 Quadra St	Downtown	41	39%	61%	-	-	0.49
							0.64 vehicles per unit

¹⁸ Parking demand data provided by CRHC, current as of March 2019

¹⁹ Data provided by CRHC as % of units with a car

3.2.2 Residents, Vehicle Ownership Data

Anticipated resident parking demand is estimated below based on vehicle ownership data from representative sites in the City of Victoria. All referenced vehicle ownership data was provided by the Insurance Corporation of British Columbia (ICBC) through the *Vehicle Ownership Request* program, as contained in *Working Paper no.3* that was prepared in 2016 / 2017 as part of the City's review of off-street parking regulations²⁰.

Anticipated parking demand for the residential units is based on vehicle ownership data for affordable housing sites in areas classified as "Remainder" or "Village / Centre" as the site ("Traditional Residential") is located outside of downtown or town centre but is also adjacent to Large / Small Village Centre lands. The average vehicle ownership rate for the fifteen (one for "Village / Centre" and fourteen for "Remainder") sites surveyed (representing 548 units) is 0.56 vehicles per unit. See **Table 11**. Applied to the subject site, this suggests the resident parking demand will be approximately 86 vehicles, which is slightly lower than the parking demand estimate from CRHC data identified in Section 3.2.1 (above).

TABLE 11. VEHICLE OWNERSHIP AT REPRESENTATIVE MULTI-FAMILY RESIDENTIAL SITES²¹

Site	No. Units	Owned Vehicles	
		Total	Rate (vehicles / unit)
918 Collinson Street ^(a)	102	23	0.23
1025 North Park Street ^(a)	10	5	0.50
510 Dalton Street ^(a)	11	5	0.45
2105 Dowler Place ^(a)	68	17	0.25
3015 Jutland Rd ^(a)	30	18	0.60
35 Gorge Road E ^(a)	69	45	0.65
950 Humboldt Street ^(a)	45	15	0.33
1150 Yates Street ^(b)	8	7	0.88
1132 Johnson Street ^(b)	34	31	0.91
450 Superior Street ^(b)	32	25	0.78
2980 Jutland Road ^(b)	17	7	0.41
21 Gorge Road East ^(a)	52	42	0.81
1130 Fort Street ^(c)	21	10	0.48
1253 Johnson Street ^(c)	21	12	0.57
1134 Queens Avenue ^(c)	28	17	0.61
		Average	0.56

Note: Vehicle ownership data current as of March 31 2016 (a), April 30 2014 (b), and December 31 2013 (c)

²⁰ Review of Zoning Regulations Bylaw Off-Street Parking Requirements (Schedule C), Working Paper No.3: Parking Demand Assessment, prepared by Boulevard Transportation / Watt Consulting Group, September 2016.

²¹ Based on data from Review of Zoning Regulations Bylaw Off-Street Parking Requirements (Schedule C), Working Paper No.3: Parking Demand Assessment, prepared by Boulevard Transportation / Watt Consulting Group, September 2016, Appendix A.

Using the parking demand data from other CRHC sites (the higher of the two measures), the parking demand associated with residents is anticipated to be 99 vehicles.

3.2.3 Visitor Parking

Visitor parking demand rates have been demonstrated in the range of 0.05 to 0.07 vehicles per unit for multi-family residential uses²². More recent research completed as part of the City of Victoria review of off-street parking requirements found peak visitor parking rates to be 0.1 vehicles per unit at condominium sites²³. Applied to the subject site (154 units), this suggests visitor parking demand will be approximately 15 or 16 vehicles.

3.2.4 Summary

The analysis contained in the previous sections suggests that the site parking demand will be approximately 115 vehicles (99 residents and 16 visitors). This is 5 fewer vehicles than the proposed parking supply and suggests that site parking demand will be accommodated without impacting neighbourhood parking.

²² Based on observations of visitor parking from the 2012 Metro Vancouver *Apartment Parking Study* (Table 31, pg50) available at: www.metrovancouver.org/services/regionalplanning/PlanningPublications/Apartment_Parking_Study_TechnicalReport.pdf

²³ Based on data from Review of Zoning Regulations Bylaw Off-Street Parking Requirements (Schedule C), Working Paper No.3: Parking Demand Assessment, prepared by Boulevard Transportation / Watt Consulting Group, September 2016, Appendix E.

4.0 Off-Site Parking

Off-site parking conditions were reviewed to determine the availability of on-street parking nearby the subject site.

4.1.1 Neighbourhood Parking Inventory

An on-street parking inventory was developed for an approximately one-block radius surrounding the subject site. See **Figure 9**. The inventory includes a total of 220 on-street parking spaces. The majority of nearby on-street parking is Resident Parking Only (57%).

FIGURE 9. ON-STREET PARKING INVENTORY



4.1.2 Off-Site Parking Utilization

On-street parking utilization was assessed for the approximately one-block radius surrounding the subject site. Observations were completed on Monday, April 22 2019 at 8:30pm.

The review concluded that on-street parking in the area was approximately 50% occupied during nighttime. Short-term parking spaces (i.e., all spaces excluding resident parking only) were observed at approximately 40% occupied during the weekday nighttime observations.

The areas most immediately adjacent the subject site are Caledonia Avenue east of Chambers Street (33% occupied during nighttime) and Grant Street west of Camosun Street (25% occupied during nighttime). While Chambers Street between Grant Street and Caledonia Avenue fronting the subject site was approximately 85% occupied during the observation, most of the rest of nearby streets were observed no higher than 65% occupied in general in the weekday night time observations.

The full results are summarized in **Table 12**.

It should also be noted that the City has indicated that all parking spaces along the site frontages – presumably on Gladstone Avenue (approximately 5 spaces) – will be changed from their current Resident Parking Only restriction to time limited consistent with Council policy for residential development sites in urban neighbourhoods²⁴.

²⁴ Communicated by City staff at a meeting on April 15 2019

TABLE 12. SUMMARY OF ON-STREET PARKING UTILIZATION

Street Segment			Restriction	Parking Supply	Observed Vehicles	
					Mon, Apr 22 8:30pm	
Chambers St	Pembroke St to Stelly St	W	RPO	5	2	40%
		E	n/a	-	-	-
	Stelly St to Gladstone Ave	W	n/a	-	-	-
		E	RPO	6	4	67%
	Gladstone Ave to Caledonia Ave	W	n/a	-	-	-
		E		-	-	-
	Caledonia Ave to North Park St	W	RPO	4	4	100%
		E	RPO	3	3	100%
	North Park St to Grant St	W	n/a	-	-	-
		E	RPO	5	2	40%
	Grant St to Balmoral Rd	W	n/a	-	-	-
		E	n/a	-	-	-
Gladstone Ave	Chambers St to Fernwood Rd	N	RPO (W)	10	4	40%
			RPO (E)	13	8	62%
			Unrestricted	7	2	29%
		S	RPO	5	5	100%
			Unrestricted	13	3	23%
			1hr	9	4	44%
Caledonia Ave	Cook St to Chambers St	N	RPO	11	7	64%
		S		17	11	65%
	Chambers St to subject site	N	n/a	-	-	-
		S	RPO	6	2	33%
North Park St	Cook St to Chambers St	N	RPO	18	12	67%
		S		19	14	74%
	Chambers St to subject site	N	2hr	6	1	17%
		S	RPO	7	1	14%
Grant St	Cook St to Chambers St	N	RPO	15	4	27%
		S		19	5	26%
	Chambers Street to Camosun St	N	n/a	-	-	-
		S	RPO	8	2	25%
Yukon St	Chambers St to east	N	2hr	5	0	0%
		S	RPO	9	5	56%
Total				220	105	48%

Restriction Codes:
RPO – “Residential Parking Only”

1hr – 1 hr, 8am – 6pm, Mon – Fri

2hr – 2hr, 8am – 6pm, Mon – Sat

5.0 Transportation Demand Management

Transportation demand management (“TDM”) refers to the use of policies, programs, services and products to influence whether, why, when, where and how people travel²⁵. Most commonly TDM is employed to encourage walking, cycling, public transit and other sustainable travel modes to reduce parking demand and traffic congestion. The opportunities to reduce the site’s traffic and parking demand through TDM are considered in the following sections.

5.1 Carshare

The most prevalent local two-way carshare service is Modo, with approximately 70 vehicles in Greater Victoria (as of January 2019)²⁶. Members may access any vehicle within the fleet and pay based on the length of time and distance of their trip. Three vehicles are located within one-block of the subject site and may be conveniently accessed by site residents - Gladstone Avenue adjacent the Fernwood Community Centre (2 vehicles) and Yukon Street at Chambers Street (1 vehicle).

The applicant may consider purchasing non-refundable Modo memberships for residential units (up to 156 total memberships) to facilitate carsharing among site residents.

5.2 Bus Stops

The many transit routes and bus stops within walking distance of the subject site are introduced in *Section 1.2*. Consideration may be given to contributing to bus stop improvements in the vicinity of the site to support transit use among site residents and employees.

²⁵ Transport Canada, Transportation Demand Management for Canadian Communities: A Guide to Understanding, Planning and Delivering TDM Programs, March 2011.

Available online: http://publications.gc.ca/collections/collection_2011/tc/T22-206-2011-eng.pdf

²⁶ Count based on Modo “Car Map”, available online at: www.modocoop/map

6.0 Summary

The subject site is currently occupied by a series of 18 townhouse units on the 1211 Gladstone Avenue property and a single multi-unit residential building on the 1209 Vining Street property. All other portions of the redevelopment site are currently underdeveloped.

The proposed redevelopment fronting Chambers Street consists of 154 multi-family residential units with a mixture of Deep Subsidy, Rent-Geared-to-Income and Affordable housing units. The proposed redevelopment includes a total of 120 parking spaces.

Pre- and post-development traffic conditions were assessed for the Caledonia Avenue / Chambers Street, Caledonia Avenue / Cook Street, Grant Street / Fernwood Rd and Pandora Avenue / Chambers Street intersections. The results indicate that all intersections will continue to operate at a good level of service with the additional traffic generated by the proposed redevelopment. The traffic analysis does not indicate a need for operational improvements, although design improvements may be considered for Grant Street.

A review of neighbourhood traffic concerns concluded that traffic volumes on Chambers Street exceed the target threshold for a Local Street and that traffic management / calming may be appropriate. It was also determined that a number of vehicles use Chambers Street and other neighbourhood streets to short-cut between nearby major roads, with historical traffic data suggesting this may have increased as a result of operational changes to the Cook Street / Pandora Avenue intersection in 2017.

The site's expected parking demand was calculated based on data from other CRHC sites and vehicle ownership data from similar affordable housing sites. The analysis concluded an estimated parking demand of 115 vehicles (99 resident, 16 visitor), which is 5 fewer vehicles than the proposed parking supply. The proposed parking supply exceeds the required off-street parking supply.

Transportation demand management (TDM) options were identified for the applications consideration that would help reduce site traffic and parking demand. Options include a new carshare vehicle and Modo carshare memberships for each residential unit, as well as contributions to improve area bus stops.

6.1 Recommendations

1. The proposed redevelopment will not negatively impact nearby traffic conditions and no improvements are recommended;
2. The proposed parking supply is appropriate and will not negatively impact neighbourhood parking conditions; and
3. Given the traffic volumes on Chambers Street and the magnitude of neighbourhood short-cutting, it is recommended that the City consider initiating a neighbourhood traffic management process to address measured issues.

APPENDIX A.

Synchro Traffic Model Reports

Lanes, Volumes, Timings
100: Cook St & Caledonia Ave

Existing Base
AM Peak Hour

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	90	50	153	8	98	21	131	475	11	10	550	82
Traffic Volume (vph)	90	50	153	8	98	21	131	475	11	10	550	82
Future Volume (vph)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Ideal Flow (vphpl)	25.0	45.7	10.0	1900	1900	45.7	20.0	45.7	20.0	45.7	20.0	45.7
Storage Length (m)	1	0	1	7.6	7.6	0	1	7.6	0	1	7.6	0
Storage Lanes	1	0	1	7.6	7.6	0	1	7.6	0	1	7.6	0
Taper Length (m)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lane Util. Factor	0.94	0.90	0.92	0.98	0.97	1.00	0.97	1.00	0.95	0.98	0.95	0.98
Ped Bike Factor	0.887	0.887	0.973	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950
Flt Protected	1789	1501	0	1789	1804	0	1789	1871	0	1789	1814	0
Satd. Flow (prot)	0.674	0.621	0.621	0.621	0.621	0.621	0.621	0.621	0.621	0.621	0.621	0.621
Flt Permitted	1197	1501	0	1071	1804	0	505	1871	0	714	1814	0
Satd. Flow (perm)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Right Turn on Red	166	166	18	18	18	18	18	18	18	18	18	18
Satd. Flow (RTOR)	48	48	48	48	48	48	48	48	48	48	48	48
Link Distance (m)	88.9	220.3	220.3	220.3	220.3	220.3	220.3	220.3	220.3	220.3	220.3	220.3
Link Speed (k/h)	6.7	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.5
Travel Time (s)	41	70	70	70	70	70	70	70	70	70	70	70
Confl. Peds. (#/hr)	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Peak Hour Factor	98	54	166	9	107	23	142	516	12	11	598	89
Adj. Flow (vph)	98	54	166	9	107	23	142	516	12	11	598	89
Shared Lane Traffic (%)	98	220	0	9	130	0	142	528	0	11	687	0
Lane Group Flow (vph)	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Tune Type	4	4	4	4	4	4	4	4	4	4	4	4
Protected Phases	4	4	4	4	4	4	4	4	4	4	4	4
Permitted Phases	4	4	4	4	4	4	4	4	4	4	4	4
Detector Phase	4	4	4	4	4	4	4	4	4	4	4	4
Switch Phase	4	4	4	4	4	4	4	4	4	4	4	4
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0
Total Split (s)	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0
Total Split (%)	38.3%	38.3%	38.3%	38.3%	38.3%	38.3%	38.3%	38.3%	38.3%	38.3%	38.3%	38.3%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	None	None	None	None	None	None	None	None	None	None	None	None
Lead/Lag Optimize?	None	None	None	None	None	None	None	None	None	None	None	None
Recall Mode	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1
Act Effct Green (s)	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23
Actuated g/C Ratio	0.36	0.47	0.36	0.47	0.36	0.47	0.36	0.47	0.36	0.47	0.36	0.47
v/c Ratio	19.4	9.1	15.2	15.3	16.4	9.4	16.4	9.4	16.4	9.4	16.4	9.4
Control Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Queue Delay	19.4	9.1	15.2	15.3	16.4	9.4	16.4	9.4	16.4	9.4	16.4	9.4
Total Delay	B	A	B	B	B	B	B	B	B	B	B	B
LOS	B	A	B	B	B	B	B	B	B	B	B	B
Approach Delay	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3
Approach LOS	B	B	B	B	B	B	B	B	B	B	B	B

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Lanes, Volumes, Timings
100: Cook St & Caledonia Ave

Existing Base
AM Peak Hour

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (m)	5.5	2.9	0.5	6.1	5.5	20.5	5.5	20.5	0.3	29.6	0.3	29.6
Queue Length 95th (m)	19.2	18.5	3.5	20.9	27.0	58.8	27.0	58.8	2.5	87.7	2.5	87.7
Internal Link Dist (m)	64.9	64.9	10.0	196.3	196.3	75.5	196.3	75.5	10.0	71.2	10.0	71.2
Turn Bay Length (m)	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0
Base Capacity (vph)	513	739	459	784	384	1425	384	1425	543	1385	543	1385
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.19	0.30	0.02	0.17	0.37	0.37	0.37	0.37	0.02	0.50	0.02	0.50
Intersection Summary	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Area Type:	Other	Other	Other	Other	Other	Other	Other	Other	Other	Other	Other	Other
Cycle Length:	60	60	60	60	60	60	60	60	60	60	60	60
Actuated Cycle Length:	44.1	44.1	44.1	44.1	44.1	44.1	44.1	44.1	44.1	44.1	44.1	44.1
Natural Cycle:	60	60	60	60	60	60	60	60	60	60	60	60
Control Type:	Semi Act-Uncoordinated	Semi Act-Uncoordinated	Semi Act-Uncoordinated	Semi Act-Uncoordinated	Semi Act-Uncoordinated	Semi Act-Uncoordinated	Semi Act-Uncoordinated	Semi Act-Uncoordinated	Semi Act-Uncoordinated	Semi Act-Uncoordinated	Semi Act-Uncoordinated	Semi Act-Uncoordinated
Maximum v/c Ratio:	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70
Intersection Signal Delay:	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1
Intersection Capacity Utilization:	71.2%	71.2%	71.2%	71.2%	71.2%	71.2%	71.2%	71.2%	71.2%	71.2%	71.2%	71.2%
Analysis Period (min):	15	15	15	15	15	15	15	15	15	15	15	15

Splits and Phases: 100: Cook St & Caledonia Ave



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Syncho 10 Report
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HCM Unsignalized Intersection Capacity Analysis 200: Chambers St & Caledonia Ave

Existing Base
AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		←	←	←	←	←	←	←	←	←	←	←
Traffic Volume (veh/h)	37	1	29	1	1	1	72	76	1	1	53	51
Future Volume (Veh/h)	37	1	29	1	1	1	72	76	1	1	53	51
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
Grade	0%	0%	0%	0%	0%	0%	0%	0%	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)	40	1	32	1	1	1	78	83	1	1	58	55
Pedestrians	38			53			18				26	
Lane Width (m)	3.7			3.7			3.7				3.7	
Walking Speed (m/s)	1.2			1.2			1.2				1.2	
Percent Blockage	3			5			2				2	
Right turn flare (veh)												
Median type							None				None	
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	392	418	142	430	446	162	151				137	
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	392	418	142	430	446	162	151				137	
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1				4.1	
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2				2.2	
p0 queue free %	92	100	96	100	100	100	94				100	
cM capacity (veh/h)	482	458	863	436	442	823	1383				1381	
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	73	3	162	114								
Volume Left	40	1	78	1								
Volume Right	32	1	1	55								
GSH	597	520	1383	1381								
Volume to Capacity	0.12	0.01	0.06	0.00								
Queue Length 95th (m)	3.3	0.1	1.4	0.0								
Control Delay (s)	11.9	12.0	4.0	0.1								
Lane LOS	B	B	A	A								
Approach Delay (s)	11.9	12.0	4.0	0.1								
Approach LOS	B	B										
Intersection Summary												
Average Delay			4.4									
Intersection Capacity Utilization			31.4%								A	
Analysis Period (min)			15									

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HCM Unsignalized Intersection Capacity Analysis 300: Fernwood Rd & Grant St

Existing Base
AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		←	←	←	←	←	←	←	←	←	←	←
Traffic Volume (veh/h)	12	1	5	1	1	11	35	215	5	7	236	46
Future Volume (Veh/h)	12	1	5	1	1	11	35	215	5	7	236	46
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
Grade	0%	0%	0%	0%	0%	0%	0%	0%	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)	13	1	5	1	1	12	38	234	5	8	257	50
Pedestrians	35			29			2				38	
Lane Width (m)	3.7			3.7			3.7				3.7	
Walking Speed (m/s)	1.2			1.2			1.2				1.2	
Percent Blockage	3			2			0				3	
Right turn flare (veh)												
Median type							None				None	
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	696	677	319	647	700	304	342				268	
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	696	677	319	647	700	304	342				268	
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1				4.1	
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2				2.2	
p0 queue free %	96	100	99	100	100	98	97				99	
cM capacity (veh/h)	305	341	699	345	331	695	1181				1264	
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	19	14	277	315								
Volume Left	13	1	38	8								
Volume Right	5	12	5	50								
GSH	360	603	1181	1264								
Volume to Capacity	0.05	0.02	0.03	0.01								
Queue Length 95th (m)	1.3	0.6	0.8	0.2								
Control Delay (s)	15.5	11.1	1.4	0.3								
Lane LOS	C	B	A	A								
Approach Delay (s)	15.5	11.1	1.4	0.3								
Approach LOS	C	B										
Intersection Summary												
Average Delay			1.5									
Intersection Capacity Utilization			47.1%								A	
Analysis Period (min)			15									

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HCM Unsignalized Intersection Capacity Analysis 400: Chambers St & Pandora Ave

Existing Base
AM Peak Hour

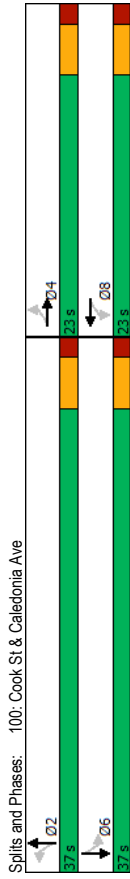
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					4T			4				
Traffic Volume (veh/h)	0	0	0	11	1000	65	26	16	0	0	31	56
Future Volume (Veh/h)	0	0	0	11	1000	65	26	16	0	0	31	56
Sign Control	Free			Free			Stop			Stop		
Grade	0%			0%			0%			0%		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	12	1087	71	28	17	0	0	34	61
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None											
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1158	0			646			1182	0	1155	1146	579
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1158	0			646			1182	0	1155	1146	579
tC, single (s)	4.1	4.1			7.5			6.5	6.9	7.5	6.5	6.9
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 %	100	99			90			91	100	100	83	87
cM capacity (veh/h)	599	1622			267			187	1084	141	196	458
Direction, Lane #	WB 1	WB 2	NB 1	SB 1								
Volume Total	556	614	45	95								
Volume Left	12	0	28	0								
Volume Right	0	71	0	61								
cSH	1622	1700	230	310								
Volume to Capacity	0.01	0.36	0.20	0.31								
Queue Length 95th (m)	0.2	0.0	5.6	10.0								
Control Delay (s)	0.2	0.0	24.4	21.6								
Lane LOS	A	C	C	C								
Approach Delay (s)	0.1	24.4	21.6									
Approach LOS		C	C									
Intersection Summary												
Average Delay				2.5								
Intersection Capacity Utilization				45.6%	ICU Level of Service			A				
Analysis Period (min)				15								

Lanes, Volumes, Timings
100: Cook St & Caledonia Ave

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	190	91	151	15	68	17	89	653	14	23	569	85
Traffic Volume (vph)	190	91	151	15	68	17	89	653	14	23	569	85
Future Volume (vph)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Ideal Flow (vphpl)	25.0	45.7	10.0	1900	1900	45.7	20.0	45.7	20.0	45.7	20.0	45.7
Storage Length (m)	1	0	1	7.6	0	1	7.6	0	1	7.6	0	1
Storage Lanes	1	0	1	7.6	0	1	7.6	0	1	7.6	0	1
Taper Length (m)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lane Util. Factor	0.93	0.93	0.94	0.98	0.98	0.98	0.98	0.98	0.97	0.97	0.99	0.99
Ped Bike Factor	0.906	0.906	0.906	0.971	0.971	0.971	0.971	0.971	0.971	0.971	0.981	0.981
Flt Protected	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950
Satd. Flow (prot)	1789	1590	0	1789	1795	0	1789	1872	0	1789	1821	0
Flt Permitted	0.997	0.997	0.997	0.997	0.997	0.997	0.997	0.997	0.997	0.997	0.997	0.997
Satd. Flow (perm)	1224	1590	0	1004	1795	0	412	1872	0	388	1821	0
Right Turn on Red	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Satd. Flow (RTOR)	142	142	18	18	18	18	18	18	18	18	18	18
Link Speed (k/h)	48	48	48	48	48	48	48	48	48	48	48	48
Link Distance (m)	88.9	88.9	220.3	220.3	220.3	220.3	220.3	220.3	220.3	220.3	220.3	220.3
Travel Time (s)	6.7	6.7	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.5
Confl. Peds. (#/hr)	46	55	55	46	57	46	57	78	78	78	78	78
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
Adj. Flow (vph)	207	99	164	16	74	18	97	710	15	25	618	92
Shared Lane Traffic (%)	207	263	0	16	92	0	97	725	0	25	710	0
Lane Group Flow (vph)	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases	4	4	8	8	8	8	8	8	8	8	8	8
Permitted Phases	4	4	8	8	8	8	8	8	8	8	8	8
Detector Phase	4	4	8	8	8	8	8	8	8	8	8	8
Switch Phase	4	4	8	8	8	8	8	8	8	8	8	8
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0
Total Split (s)	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0
Total Split (%)	38.3%	38.3%	38.3%	38.3%	38.3%	38.3%	38.3%	38.3%	38.3%	38.3%	38.3%	38.3%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	None	None	None	None	None	None	None	None	None	None	None	None
Lead/Lag Optimize?	None	None	None	None	None	None	None	None	None	None	None	None
Recall Mode	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0
Act Effct Green (s)	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28
Actuated g/C Ratio	0.61	0.48	0.06	0.18	0.48	0.18	0.48	0.79	0.13	0.79	0.13	0.79
v/c Ratio	25.1	11.2	15.3	13.3	18.0	17.3	9.0	17.1	9.0	17.1	9.0	17.1
Control Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Queue Delay	25.1	11.2	15.3	13.3	18.0	17.3	9.0	17.1	9.0	17.1	9.0	17.1
LOS	C	B	B	B	B	B	B	B	A	B	A	B
Approach Delay	17.3	17.3	13.6	13.6	17.4	17.4	17.4	17.4	16.8	16.8	16.8	16.8
Approach LOS	B	B	B	B	B	B	B	B	B	B	B	B

Lanes, Volumes, Timings
100: Cook St & Caledonia Ave

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (m)	15.0	7.9	1.0	4.7	4.8	44.6	1.0	42.4	4.9	92.5	71.2	20.0
Queue Length 95th (m)	38.9	27.8	5.0	15.3	18.8	95.3	5.0	92.5	4.9	92.5	71.2	20.0
Internal Link Dist (m)	64.9	64.9	196.3	196.3	196.3	196.3	196.3	196.3	196.3	196.3	196.3	196.3
Turn Bay Length (m)	25.0	10.0	10.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Base Capacity (vph)	508	743	417	756	295	1344	278	1312	278	1312	278	1312
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.41	0.35	0.04	0.12	0.33	0.54	0.09	0.54	0.09	0.54	0.09	0.54
Intersection Summary	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Area Type:	Other	Other	Other	Other	Other	Other	Other	Other	Other	Other	Other	Other
Cycle Length:	60	60	60	60	60	60	60	60	60	60	60	60
Actuated Cycle Length:	46.8	46.8	46.8	46.8	46.8	46.8	46.8	46.8	46.8	46.8	46.8	46.8
Natural Cycle:	60	60	60	60	60	60	60	60	60	60	60	60
Control Type:	Semi Act-Uncoordinated	Semi Act-Uncoordinated	Semi Act-Uncoordinated	Semi Act-Uncoordinated	Semi Act-Uncoordinated	Semi Act-Uncoordinated	Semi Act-Uncoordinated	Semi Act-Uncoordinated	Semi Act-Uncoordinated	Semi Act-Uncoordinated	Semi Act-Uncoordinated	Semi Act-Uncoordinated
Maximum v/c Ratio:	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79
Intersection Signal Delay:	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0
Intersection Capacity Utilization:	73.7%	73.7%	73.7%	73.7%	73.7%	73.7%	73.7%	73.7%	73.7%	73.7%	73.7%	73.7%
Analysis Period (min):	15	15	15	15	15	15	15	15	15	15	15	15



HCM Unsignalized Intersection Capacity Analysis200: Chambers St & Caledonia Ave

Existing Base
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		←	←	←	←	←	←	←	←	←	←	←
Traffic Volume (veh/h)	55	1	83	1	1	1	1	37	67	1	1	70
Future Volume (Veh/h)	55	1	83	1	1	1	1	37	67	1	1	70
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free
Grade												
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	1	90	1	1	1	1	40	73	1	1	76
Pedestrians			35			40			15			20
Lane Width (m)			3.7			3.7			3.7			3.7
Walking Speed (m/s)			1.2			1.2			1.2			1.2
Percent Blockage			3			3			1			2
Right turn flare (veh)												
Median type												
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume												
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol												
tC, single (s)												
tC, 2 stage (s)												
tF (s)												
p0 queue free %												
cM capacity (veh/h)												
Direction, Lane #	EB 1	WB 1	NB 1	SB 1	SB 1	SB 1	SB 1	SB 1	SB 1	SB 1	SB 1	SB 1
Volume Total	151	3	114	141	141	141	141	141	141	141	141	141
Volume Left	60	1	40	1	1	1	1	1	1	1	1	1
Volume Right	90	1	1	64	64	64	64	64	64	64	64	64
GSH	702	555	1359	1425	1425	1425	1425	1425	1425	1425	1425	1425
Volume to Capacity	0.22	0.01	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Queue Length 95th (m)	6.4	0.1	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (s)	11.5	11.5	2.9	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Lane LOS	B	B	A	A	A	A	A	A	A	A	A	A
Approach Delay (s)	11.5	11.5	2.9	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Approach LOS	B	B	A	A	A	A	A	A	A	A	A	A
Intersection Summary												
Average Delay			5.2									
Intersection Capacity Utilization			46.0%									
Analysis Period (min)			15									

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HCM Unsignalized Intersection Capacity Analysis300: Fernwood Rd & Grant St

Existing Base
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		←	←	←	←	←	←	←	←	←	←	←
Traffic Volume (veh/h)	34	3	10	4	2	7	11	266	5	11	237	28
Future Volume (Veh/h)	34	3	10	4	2	7	11	266	5	11	237	28
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free
Grade												
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)	37	3	11	4	2	8	12	289	5	12	258	30
Pedestrians			46			59			1			39
Lane Width (m)			3.7			3.7			3.7			3.7
Walking Speed (m/s)			1.2			1.2			1.2			1.2
Percent Blockage			4			5			0			3
Right turn flare (veh)												
Median type												
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume												
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol												
tC, single (s)												
tC, 2 stage (s)												
tF (s)												
p0 queue free %												
cM capacity (veh/h)												
Direction, Lane #	EB 1	WB 1	NB 1	SB 1	SB 1	SB 1	SB 1	SB 1	SB 1	SB 1	SB 1	SB 1
Volume Total	51	14	306	300	300	300	300	300	300	300	300	300
Volume Left	37	4	12	12	12	12	12	12	12	12	12	12
Volume Right	11	8	5	30	30	30	30	30	30	30	30	30
GSH	337	429	1177	1145	1145	1145	1145	1145	1145	1145	1145	1145
Volume to Capacity	0.15	0.03	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Queue Length 95th (m)	4.2	0.8	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Control Delay (s)	17.6	13.7	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Lane LOS	C	B	A	A	A	A	A	A	A	A	A	A
Approach Delay (s)	17.6	13.7	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Approach LOS	C	B	A	A	A	A	A	A	A	A	A	A
Intersection Summary												
Average Delay			2.0									
Intersection Capacity Utilization			36.1%									
Analysis Period (min)			15									

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HCM Unsignalized Intersection Capacity Analysis 400: Chambers St & Pandora Ave

Existing Base
PM Peak Hour

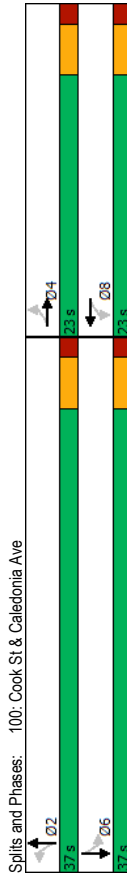
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					4T			4				
Traffic Volume (veh/h)	0	0	0	16	812	43	57	31	0	0	54	42
Future Volume (Veh/h)	0	0	0	16	812	43	57	31	0	0	54	42
Sign Control	Free			Free			Stop			Stop		
Grade	0%											
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	17	883	47	62	34	0	0	59	46
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None											
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	930	0			551			964	0	958	940	465
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	930	0			551			964	0	958	940	465
tC, single (s)	4.1	4.1			7.5			6.5	6.9	7.5	6.5	6.9
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 %	100	99			80			86	100	100	77	92
cM capacity (veh/h)	731	1622			313			251	1084	189	259	544
Direction, Lane #	WB 1	WB 2	NB 1	SB 1								
Volume Total	458	488	96	105								
Volume Left	17	0	62	0								
Volume Right	0	47	0	46								
cSH	1622	1700	288	336								
Volume to Capacity	0.01	0.29	0.33	0.31								
Queue Length 95th (m)	0.3	0.0	11.2	10.3								
Control Delay (s)	0.4	0.0	23.7	20.5								
Lane LOS	A	C	C	C								
Approach Delay (s)	0.2	23.7	20.5									
Approach LOS	C	C	C									
Intersection Summary												
Average Delay	4.0											
Intersection Capacity Utilization	42.4%										A	
Analysis Period (min)	15											

Lanes, Volumes, Timings
100: Cook St & Caledonia Ave

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	90	53	153	9	108	23	131	475	12	11	550	82
Traffic Volume (vph)	90	53	153	9	108	23	131	475	12	11	550	82
Future Volume (vph)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Ideal Flow (vphpl)	25.0	45.7	10.0	1900	1900	45.7	20.0	45.7	20.0	45.7	20.0	45.7
Storage Length (m)	1	0	1	0	1	0	1	0	1	0	1	0
Storage Lanes	7.6	1.00	1.00	7.6	1.00	1.00	7.6	1.00	1.00	7.6	1.00	1.00
Taper Length (m)	0.94	0.90	0.92	0.98	0.97	1.00	0.97	1.00	0.95	0.98	0.95	0.98
Ped Bike Factor	0.889	0.950	0.950	0.974	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950
Flt Protected	1789	1508	0	1789	1806	0	1789	1869	0	1789	1814	0
Satd. Flow (prot)	0.666	0.619	0.619	0.619	0.619	0.619	0.619	0.619	0.619	0.619	0.619	0.619
Flt Permitted	1184	1508	0	1069	1806	0	500	1869	0	710	1814	0
Satd. Flow (perm)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Right Turn on Red	166	18	18	18	18	18	18	18	18	18	18	18
Satd. Flow (RTOR)	48	48	48	48	48	48	48	48	48	48	48	48
Link Speed (k/h)	88.9	220.3	220.3	220.3	220.3	220.3	220.3	220.3	220.3	220.3	220.3	220.3
Travel Time (s)	6.7	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.5
Confl. Peds. (#/hr)	41	70	70	41	75	41	75	84	84	84	84	75
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
Adj. Flow (vph)	98	58	166	10	117	25	142	516	13	12	598	89
Shared Lane Traffic (%)	98	224	0	10	142	0	142	529	0	12	687	0
Lane Group Flow (vph)	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Tune Type	4	4	4	4	4	4	4	4	4	4	4	4
Protected Phases	4	4	4	4	4	4	4	4	4	4	4	4
Permitted Phases	4	4	4	4	4	4	4	4	4	4	4	4
Detector Phase	4	4	4	4	4	4	4	4	4	4	4	4
Switch Phase	4	4	4	4	4	4	4	4	4	4	4	4
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0
Total Split (s)	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0
Total Split (%)	38.3%	38.3%	38.3%	38.3%	38.3%	38.3%	38.3%	38.3%	38.3%	38.3%	38.3%	38.3%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	None	None	None	None	None	None	None	None	None	None	None	None
Lead/Lag Optimize?	None	None	None	None	None	None	None	None	None	None	None	None
Recall Mode	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1
Act Effct Green (s)	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23
Actuated g/C Ratio	0.36	0.47	0.36	0.47	0.36	0.47	0.36	0.47	0.36	0.47	0.36	0.47
v/c Ratio	19.4	9.2	15.2	15.2	15.2	15.2	15.2	15.2	15.2	15.2	15.2	15.2
Control Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Queue Delay	19.4	9.2	15.2	15.2	15.2	15.2	15.2	15.2	15.2	15.2	15.2	15.2
Total Delay	B	A	B	B	B	B	B	B	B	B	B	B
LOS	B	A	B	B	B	B	B	B	B	B	B	B
Approach Delay	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3
Approach LOS	B	B	B	B	B	B	B	B	B	B	B	B

Lanes, Volumes, Timings
100: Cook St & Caledonia Ave

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (m)	5.5	3.1	0.5	6.9	5.6	20.6	0.3	29.9	0.3	29.9	0.3	29.9
Queue Length 95th (m)	19.3	19.1	3.7	22.6	27.2	58.9	2.6	87.7	2.6	87.7	2.6	87.7
Internal Link Dist (m)	64.9	196.3	196.3	75.5	75.5	75.5	71.2	71.2	71.2	71.2	71.2	71.2
Turn Bay Length (m)	25.0	10.0	10.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Base Capacity (vph)	515	749	465	795	385	1442	547	1403	547	1403	547	1403
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.19	0.30	0.02	0.18	0.37	0.37	0.02	0.49	0.02	0.49	0.02	0.49
Intersection Summary	Other											
Area Type:	Other											
Cycle Length: 60	Actualized Cycle Length: 43.6											
Natural Cycle: 60	Control Type: Semi Act-Uncoordinated											
Maximum v/c Ratio: 0.71	Intersection LOS: B											
Intersection Signal Delay: 12.4	ICU Level of Service D											
Intersection Capacity Utilization 81.3%	Analysis Period (min) 15											



HCM Unsignalized Intersection Capacity Analysis 200: Chambers St & Caledonia Ave

Post Development
AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	37	6	29	9	13	4	72	76	3	1	53	51
Future Volume (Veh/h)	37	6	29	9	13	4	72	76	3	1	53	51
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
Grade	0%	0%	0%	0%	0%	0%	0%	0%	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)	40	7	32	10	14	4	78	83	3	1	58	55
Pedestrians	38				53			18			26	
Lane Width (m)	3.7				3.7			3.7			3.7	
Walking Speed (m/s)	1.2				1.2			1.2			1.2	
Percent Blockage	3				5			2			2	
Right turn flare (veh)												
Median type							None	None			None	
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	403	420	142	434	446	164	151				139	
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	403	420	142	434	446	164	151				139	
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1				4.1	
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2				2.2	
p0 queue free %	91	98	96	98	97	100	94				100	
cM capacity (veh/h)	462	456	863	429	441	822	1383				1379	
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	79	28	164	114								
Volume Left	40	10	78	1								
Volume Right	32	4	3	55								
GSH	568	467	1383	1379								
Volume to Capacity	0.14	0.06	0.06	0.00								
Queue Length 95th (m)	3.8	1.5	1.4	0.0								
Control Delay (s)	12.4	13.2	3.9	0.1								
Lane LOS	B	B	A	A								
Approach Delay (s)	12.4	13.2	3.9	0.1								
Approach LOS	B	B										
Intersection Summary												
Average Delay			5.2									
Intersection Capacity Utilization			31.5%								A	
Analysis Period (min)			15									

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Syncho 10 Report
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HCM Unsignalized Intersection Capacity Analysis 300: Fernwood Rd & Grant St

Post Development
AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	14	1	6	1	1	11	35	215	5	7	236	47
Future Volume (Veh/h)	14	1	6	1	1	11	35	215	5	7	236	47
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
Grade	0%	0%	0%	0%	0%	0%	0%	0%	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)	15	1	7	1	1	12	38	234	5	8	257	51
Pedestrians	35				29			2			38	
Lane Width (m)	3.7				3.7			3.7			3.7	
Walking Speed (m/s)	1.2				1.2			1.2			1.2	
Percent Blockage	3				2			0			3	
Right turn flare (veh)												
Median type							None	None			None	
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	696	678	320	650	700	304	343				268	
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	696	678	320	650	700	304	343				268	
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1				4.1	
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2				2.2	
p0 queue free %	95	100	99	100	100	98	97				99	
cM capacity (veh/h)	305	341	698	342	330	695	1180				1264	
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	23	14	277	316								
Volume Left	15	1	38	8								
Volume Right	7	12	5	51								
GSH	370	603	1180	1264								
Volume to Capacity	0.06	0.02	0.03	0.01								
Queue Length 95th (m)	1.6	0.6	0.8	0.2								
Control Delay (s)	15.4	11.1	1.4	0.3								
Lane LOS	C	B	A	A								
Approach Delay (s)	15.4	11.1	1.4	0.3								
Approach LOS	C	B										
Intersection Summary												
Average Delay			1.5									
Intersection Capacity Utilization			47.1%								A	
Analysis Period (min)			15									

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Syncho 10 Report
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HCM Unsignalized Intersection Capacity Analysis 400: Chambers St & Pandora Ave

Post Development
AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					4T			4			1	
Traffic Volume (veh/h)	0	0	0	11	1000	67	26	17	0	0	34	62
Future Volume (Veh/h)	0	0	0	11	1000	67	26	17	0	0	34	62
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)	0	0	0	12	1087	73	28	18	0	0	37	67
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None											
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1160	0			653			1184	0	1156	1148	580
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1160	0			653			1184	0	1156	1148	580
tC, single (s)	4.1	4.1			7.5			6.5	6.9	7.5	6.5	6.9
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 %	100	99			89			90	100	100	81	85
cM capacity (veh/h)	598	1622			256			186	1084	140	196	458
Direction, Lane #	WB 1	WB 2	NB 1	SB 1								
Volume Total	556	616	46	104								
Volume Left	12	0	28	0								
Volume Right	0	73	0	67								
cSH	1622	1700	223	310								
Volume to Capacity	0.01	0.36	0.21	0.34								
Queue Length 95th (m)	0.2	0.0	5.9	11.3								
Control Delay (s)	0.2	0.0	25.3	22.3								
Lane LOS	A	D	D	C								
Approach Delay (s)	0.1	25.3	22.3									
Approach LOS	D	D	C									
Intersection Summary												
Average Delay	2.7											
Intersection Capacity Utilization	45.8%										A	
Analysis Period (min)	15											

Lanes, Volumes, Timings
100: Cook St & Caledonia Ave

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group												
Lane Configurations	190	100	151	16	74	18	89	653	16	25	569	85
Traffic Volume (vph)	190	100	151	16	74	18	89	653	16	25	569	85
Future Volume (vph)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Ideal Flow (vphpl)	25.0	45.7	10.0	1900	1900	45.7	20.0	45.7	20.0	45.7	20.0	45.7
Storage Length (m)	1	0	1	7.6	7.6	0	1	7.6	7.6	0	1	7.6
Storage Lanes	1	0	1	1	1	0	1	1	1	0	1	1
Taper Length (m)	7.6	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lane Util. Factor	0.93	0.93	0.94	0.98	0.98	0.98	0.98	0.98	0.98	0.97	0.99	0.99
Ped Bike Factor	0.910	0.910	0.970	0.970	0.970	0.970	0.996	0.996	0.996	0.981	0.981	0.981
Flt Protected	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950
Satd. Flow (prot)	1789	1601	0	1789	1792	0	1789	1869	0	1789	1821	0
Flt Permitted	0.692	0.692	0.550	0.550	0.550	0.550	0.224	0.224	0.224	0.211	0.211	0.211
Satd. Flow (perm)	1216	1601	0	975	1792	0	412	1869	0	386	1821	0
Right Turn on Red	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Satd. Flow (RTOR)	129	129	20	20	20	20	3	3	3	19	19	19
Link Speed (k/h)	88.9	88.9	220.3	220.3	220.3	220.3	99.5	99.5	99.5	95.2	95.2	95.2
Travel Time (s)	6.7	6.7	16.5	16.5	16.5	16.5	7.5	7.5	7.5	7.1	7.1	7.1
Confl. Peds. (#/hr)	46	55	55	46	57	46	57	78	78	78	57	57
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
Adj. Flow (vph)	207	109	164	17	80	20	97	710	17	27	618	92
Shared Lane Traffic (%)	207	273	0	17	100	0	97	727	0	27	710	0
Lane Group Flow (vph)	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Tune Type	4	4	8	8	8	8	2	2	2	6	6	6
Protected Phases	4	4	8	8	8	8	2	2	2	6	6	6
Permitted Phases	4	4	8	8	8	8	2	2	2	6	6	6
Detector Phase	4	4	8	8	8	8	2	2	2	6	6	6
Switch Phase	4	4	8	8	8	8	2	2	2	6	6	6
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0
Total Split (s)	23.0	23.0	23.0	23.0	23.0	23.0	37.0	37.0	37.0	37.0	37.0	37.0
Total Split (%)	38.3%	38.3%	38.3%	38.3%	38.3%	38.3%	61.7%	61.7%	61.7%	61.7%	61.7%	61.7%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	None	None	None	None	None	None	None	None	None	None	None	None
Lead/Lag Optimize?	None	None	None	None	None	None	None	None	None	None	None	None
Recall Mode	13.0	13.0	13.0	13.0	13.0	13.0	23.1	23.1	23.1	23.1	23.1	23.1
Act Effct Green (s)	0.28	0.28	0.28	0.28	0.28	0.28	0.49	0.49	0.49	0.49	0.49	0.49
Actuated g/C Ratio	0.61	0.51	0.06	0.20	0.48	0.79	0.14	0.14	0.14	0.14	0.14	0.14
v/c Ratio	25.4	12.5	15.4	13.4	17.9	17.4	9.2	17.1	9.2	17.1	9.2	17.1
Control Delay	25.4	12.5	15.4	13.4	17.9	17.4	9.2	17.1	9.2	17.1	9.2	17.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LOS	C	B	B	B	B	B	B	B	B	A	B	B
Approach Delay	18.1	18.1	13.7	13.7	13.7	13.7	17.5	17.5	17.5	16.8	16.8	16.8
Approach LOS	B	B	B	B	B	B	B	B	B	B	B	B

Lanes, Volumes, Timings
100: Cook St & Caledonia Ave

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group												
Queue Length 50th (m)	15.1	9.6	1.1	5.1	4.8	44.9	1.1	4.8	44.9	1.1	42.6	42.6
Queue Length 95th (m)	39.0	31.0	5.4	16.2	18.8	96.0	5.2	18.8	96.0	5.2	92.5	92.5
Internal Link Dist (m)	25.0	64.9	10.0	196.3	75.5	75.5	20.0	20.0	20.0	20.0	71.2	71.2
Turn Bay Length (m)	504	739	404	754	295	1340	276	1310	276	1310	1310	1310
Base Capacity (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.41	0.37	0.04	0.13	0.33	0.54	0.10	0.54	0.10	0.54	0.54	0.54
Intersection Summary												
Area Type:	Other											
Cycle Length:	60											
Actuated Cycle Length:	46.9											
Natural Cycle:	60											
Control Type:	Semi Act-Uncoordinated											
Maximum v/c Ratio:	0.79											
Intersection Signal Delay:	17.2											
Intersection Capacity Utilization:	73.7%											
Analysis Period (min):	15											



HCM Unsignalized Intersection Capacity Analysis 200: Chambers St & Caledonia Ave

Post Development
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Volume (veh/h)	55	14	83	5	8	3	37	67	9	4	70	59
Future Volume (Veh/h)	55	14	83	5	8	3	37	67	9	4	70	59
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
Grade	0%	0%	0%	0%	0%	0%	0%	0%	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	15	90	5	9	3	40	73	10	4	76	64
Pedestrians	35	35	35	40	40	40	15	15	15	20	37	37
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
Walking Speed (m/s)	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Percent Blockage	3	3	3	3	3	3	1	1	1	2	2	2
Right turn flare (veh)							None	None	None	None	None	None
Median type							Median storage (veh)	Median storage (veh)	Median storage (veh)	Median storage (veh)	Median storage (veh)	Median storage (veh)
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	336	354	158	426	381	138	175	175	123	123	123	123
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	336	354	158	426	381	138	175	175	123	123	123	123
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1	4.1	4.1	4.1	4.1	4.1
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2	2.2	2.2	2.2	2.2	2.2
p0 queue free %	89	97	89	99	98	100	97	100	100	100	100	100
cM capacity (veh/h)	537	518	850	417	500	864	1359	1359	1414	1414	1414	1414
Direction, Lane #	EB 1	WB 1	NB 1	SB 1	SB 1	SB 1	SB 1	SB 1	SB 1	SB 1	SB 1	SB 1
Volume Total	165	17	123	144	144	144	144	144	144	144	144	144
Volume Left	60	5	40	4	4	4	4	4	4	4	4	4
Volume Right	90	3	10	64	64	64	64	64	64	64	64	64
GSH	669	508	1359	1414	1414	1414	1414	1414	1414	1414	1414	1414
Volume to Capacity	0.25	0.03	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Queue Length 95th (m)	7.6	0.8	0.7	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Control Delay (s)	12.1	12.3	2.7	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Lane LOS	B	B	A	A	A	A	A	A	A	A	A	A
Approach Delay (s)	12.1	12.3	2.7	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Approach LOS	B	B	A	A	A	A	A	A	A	A	A	A
Intersection Summary												
Average Delay				5.7								
Intersection Capacity Utilization				44.0%								
Analysis Period (min)				15								

HCM Unsignalized Intersection Capacity Analysis 300: Fernwood Rd & Grant St

Post Development
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Volume (veh/h)	36	3	10	4	2	7	12	266	5	11	237	30
Future Volume (Veh/h)	36	3	10	4	2	7	12	266	5	11	237	30
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
Grade	0%	0%	0%	0%	0%	0%	0%	0%	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)	39	3	11	4	2	8	13	289	5	12	258	33
Pedestrians	46	46	46	59	59	59	1	1	1	39	37	37
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
Walking Speed (m/s)	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Percent Blockage	4	4	4	5	5	5	0	0	0	3	3	3
Right turn flare (veh)							None	None	None	None	None	None
Median type							Median storage (veh)	Median storage (veh)	Median storage (veh)	Median storage (veh)	Median storage (veh)	Median storage (veh)
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	710	724	322	688	738	390	337	337	353	353	353	353
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	710	724	322	688	738	390	337	337	353	353	353	353
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1	4.1	4.1	4.1	4.1	4.1
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2	2.2	2.2	2.2	2.2	2.2
p0 queue free %	87	99	98	99	99	99	99	99	99	99	99	99
cM capacity (veh/h)	292	314	690	306	309	605	1174	1174	1145	1145	1145	1145
Direction, Lane #	EB 1	WB 1	NB 1	SB 1	SB 1	SB 1	SB 1	SB 1	SB 1	SB 1	SB 1	SB 1
Volume Total	53	14	307	303	303	303	303	303	303	303	303	303
Volume Left	39	4	13	12	12	12	12	12	12	12	12	12
Volume Right	11	8	5	33	33	33	33	33	33	33	33	33
GSH	333	427	1174	1145	1145	1145	1145	1145	1145	1145	1145	1145
Volume to Capacity	0.16	0.03	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Queue Length 95th (m)	4.4	0.8	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Control Delay (s)	17.9	13.7	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Lane LOS	C	B	A	A	A	A	A	A	A	A	A	A
Approach Delay (s)	17.9	13.7	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Approach LOS	C	B	A	A	A	A	A	A	A	A	A	A
Intersection Summary												
Average Delay				2.1								
Intersection Capacity Utilization				36.2%								
Analysis Period (min)				15								

HCM Unsignalized Intersection Capacity Analysis
400: Chambers St & Pandora Ave

Post Development
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					4T			4			1	
Traffic Volume (veh/h)	0	0	0	16	812	47	57	35	0	0	57	44
Future Volume (Veh/h)	0	0	0	16	812	47	57	35	0	0	57	44
Sign Control	Free			Free			Stop			Stop		
Grade	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)	0	0	0	17	883	51	62	38	0	0	62	48
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None											
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	934	0			554			968	0	962	942	467
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	934	0			554			968	0	962	942	467
tC, single (s)	4.1	4.1			7.5			6.5	6.9	7.5	6.5	6.9
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 %	100	99			80			85	100	100	76	91
cM capacity (veh/h)	729	1622			306			250	1084	185	259	542
Direction, Lane #	WB 1	WB 2	NB 1	SB 1								
Volume Total	458	492	100	110								
Volume Left	17	0	62	0								
Volume Right	0	51	0	48								
cSH	1622	1700	282	335								
Volume to Capacity	0.01	0.29	0.35	0.33								
Queue Length 95th (m)	0.3	0.0	12.2	11.0								
Control Delay (s)	0.4	0.0	24.6	20.9								
Lane LOS	A	C	C	C								
Approach Delay (s)	0.2	24.6	20.9									
Approach LOS	C	C	C									
Intersection Summary												
Average Delay	4.2											
Intersection Capacity Utilization	42.7%			ICU Level of Service			A					
Analysis Period (min)	15											