

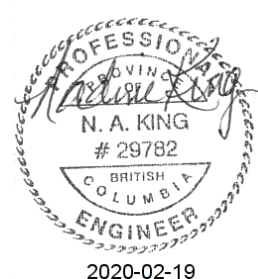


1150 COOK STREET

Transportation Impact Assessment

A handwritten signature in black ink, appearing to read 'Michael Lee'.

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2020-02-19

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Date: February 19, 2020

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1.0 INTRODUCTION

Watt Consulting Group was retained by Sakura Developments to undertake a transportation impact assessment (TIA) for the proposed development at 1150 Cook Street in Victoria. The proposed development is a mixed-use, 15-storey, residential building.

This report examines the existing and long-term conditions within the study area, highlights any potential operational issues, and recommends mitigation measures to ensure accommodation of development traffic. A review of the transit, pedestrian, and cycling accommodations is provided.

This study incorporates traffic from other future developments within the region that the City of Victoria's staff identified as potentially impacting the study area. Including the concurrent developments in the assessment ensures that the long-term transportation needs are taken into account.

1.1 Study Area

The site for the proposed development is located on the southwest corner of the View Street / Cook Street intersection. The access is proposed to connect to View Street on the north side of the site. The following intersections are included in the study area:

- Yates Street / Cook Street;
- View Street / Cook Street;
- Fort Street / Cook Street.

See **Figure 1** for the study area and site location.



Figure 1: Study Area

2.0 EXISTING CONDITIONS

2.1 Land Use

A restaurant currently occupies the development site. The site is currently zoned as Harris Green District (R-48). The surrounding land use is comprised of a mix of multi-family, central dwelling, commercial, and business.

2.2 Road Network

There are four roadways within the study area as described below:

- **Cook Street** is a two-way, arterial road that runs north / south within the study area. Cook Street has two northbound lanes, two southbound lanes, and auxiliary left turn lanes at the intersections. There is limited on-street parking available along this portion of the road.
- **Yates Street** is a one-way (westbound) secondary arterial road. Yates Street has a bike lane on the north side of the road and two travel lanes transitioning into three travel lanes between Vancouver Street and Cook Street. There is a mix of parallel parking and angled parking on the street.
- **Fort Street** is a one-way (eastbound) secondary arterial road. There are bicycle facilities on the north side of the street. Fort Street has a two-way cycle track west of Cook Street and eastbound bike lane(s) east of Cook Street. There are two travel lanes and parallel parking on both sides of the road.
- **View Street** is two-way, two-lane, local road that runs east / west. There is some parallel parking on both sides of the road.

The posted speed limit is 50 km/h for all roads and there are three intersections within the study area:

- **Yates Street / Cook Street** is a signalized intersection with three approaches. There is a northbound left lane and a westbound right lane.
- **View Street / Cook Street** is a four-leg, unsignalized intersection with stop control on the eastbound and westbound approaches. There are left turn lanes for the northbound and southbound approaches.
- **Fort Street / Cook Street** is a signalized intersection with three approaches. There is a southbound left turn lane with protected / permitted phasing. There is an eastbound right turn lane and an eastbound left turn lane with a protected phase.

2.3 Traffic Modelling – Background Information

Analysis of the traffic conditions at the study intersections was undertaken using Synchro Studio (version 10). Synchro / SimTraffic is a two-part traffic modelling software that provides analysis of the traffic conditions based on the Highway Capacity Manual (2010) evaluation methodology. A detailed description is provided in **Appendix A**.

For unsignalized (stop-controlled) intersections, the level of service (LOS) is based on the computed delay on each of the critical movements. LOS A represents minimal delays for minor street traffic movements, and LOS F represents a scenario with an insufficient number of gaps on the major street for minor street motorists to complete their movements without significant delays.

For signalized intersections, the methodology considers the intersection geometry, traffic volumes, the traffic signal phasing / timing plan, and pedestrian volumes. The average delay for each lane group is calculated, as well as the delay for the overall intersection.

2.4 Existing Traffic Conditions

Turning movement counts were provided for the study intersections by the City of Victoria staff. An additional PM peak hour count was conducted at the View Street / Cook Street intersection on January 7, 2020 between 4:00pm and 5:00pm. This study focuses on the weekday PM peak hour of travel which typically accounts for the highest traffic volumes throughout the day; however, a sensitivity analysis was conducted to ensure that the results of the study reflect other peak travel times of the day. See **Figure 2** and **Table 2** for the existing PM peak hour conditions.

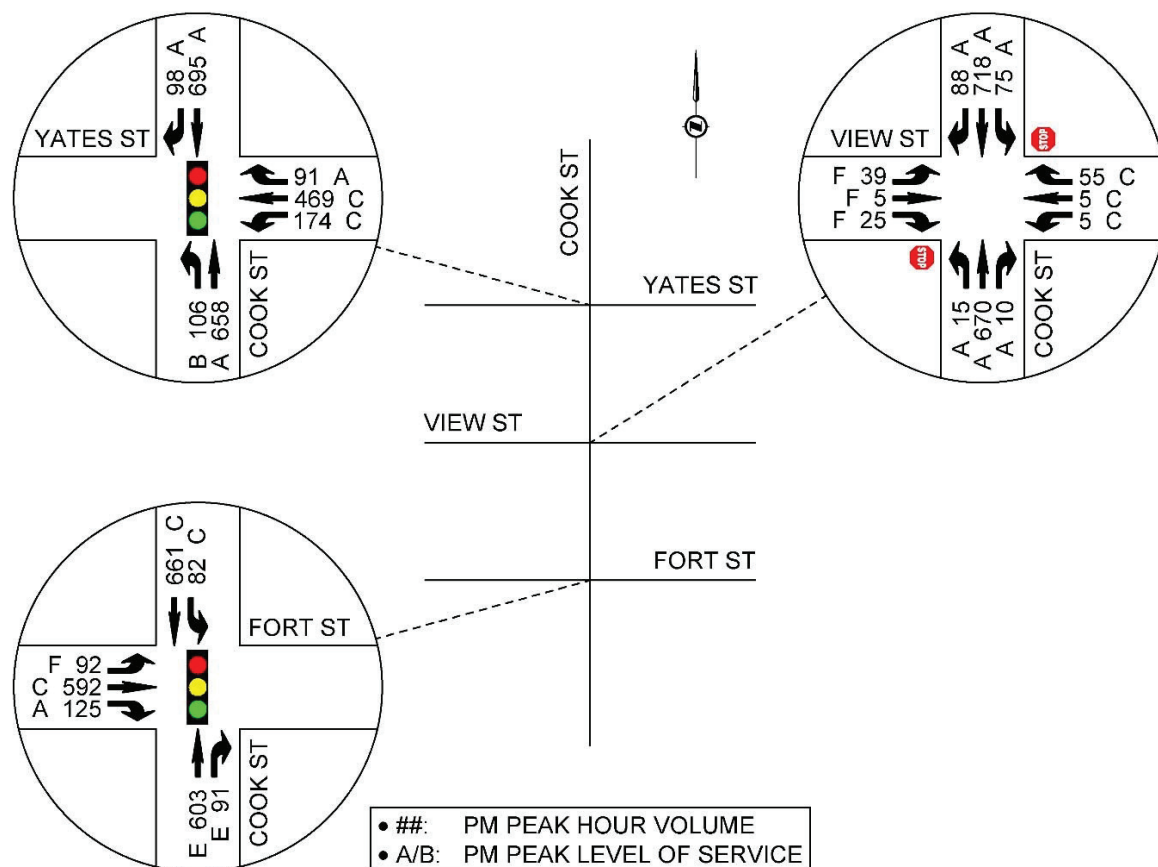


Figure 2: Existing 2019 PM Peak Hour Volumes / LOS

Table 1: 2019 Existing Conditions – PM

Intersection	Movement	LOS	Delay (s)	Queue (m) 95 th
Yates St / Cook St	WBL	C	28.0	42.9
	WBT	C	25.5	46.3
	WBR	A	6.1	4.0
	NBL	B	13.8	20.6
	NBT	A	8.0	34.1
	SB T/R	A	8.7	42.4
View St / Cook St (Stop-Controlled)	EB	F	104.2	32.9
	WB	C	22.2	8.4
	NBL	A	9.7	0.7
	NB T/R	A	0.0	0.0
	SBL	A	9.5	2.1
	SB T/R	A	0.0	0.0
Fort St / Cook St	EBL	F	106.3	37.5
	EBT	C	23.5	57.2
	EBR	A	7.9	9.3
	NB T/R	E	65.5	101.4
	SBL	C	23.3	17.5
	SBT	C	21.3	61.7

The existing traffic during the PM peak hour at Yates Street / Cook Street operates at LOS C or better. The recent implementation of the Fort Street cycle-track has changed some of the traffic operations at Fort Street / Cook Street. The eastbound left and the northbound through / right movements operate at LOS F and LOS E respectively while all other movements operate at LOS C. The stop-controlled View Street / Cook Street intersection operates at LOS F for the eastbound, LOS C for the westbound, and LOS A for the northbound / southbound.

3.0 CONCURRENT AREA DEVELOPMENTS

3.1 Concurrent Development Locations

The City staff identified future developments that would potentially impact the study area for this assessment. The concurrent developments have been included into the background traffic conditions analysis. See **Figure 3** for the locations of the concurrent developments and **Table 2** for the trip generation during the PM peak hour.

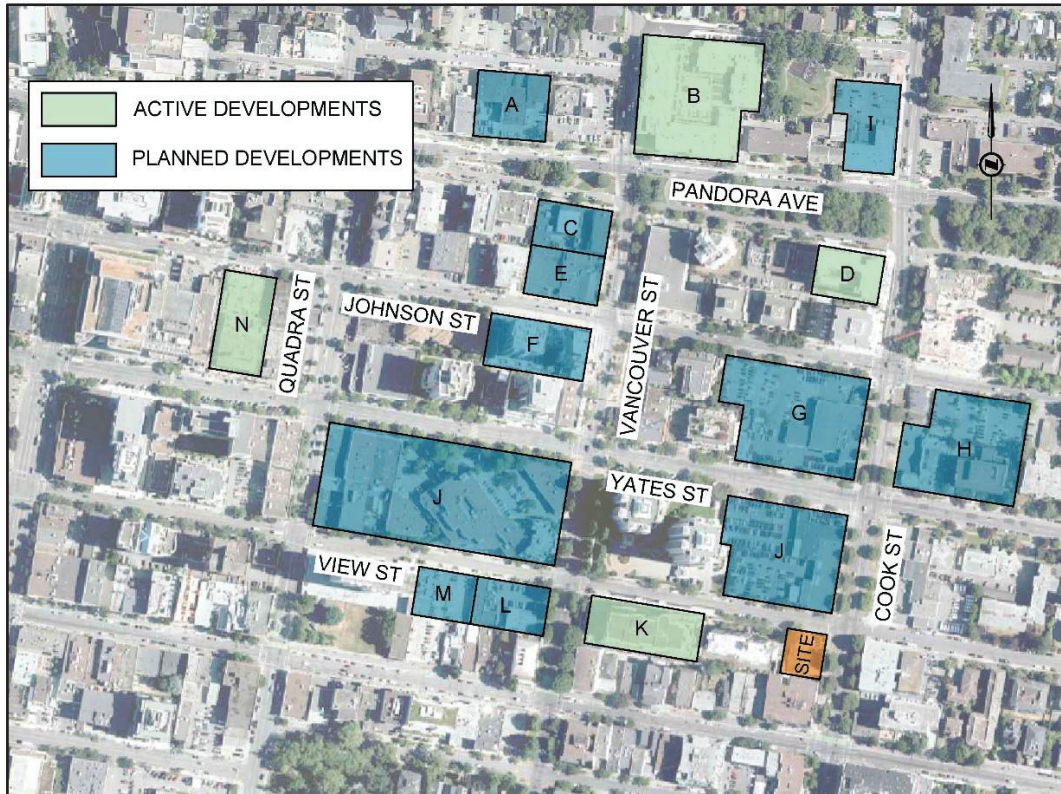


Figure 3: Concurrent Development Locations

3.2 Concurrent Development Trip Generation and Assignment

The concurrent trips were generated using the same methodology outline in **Section 4.3** using the Institute of Transportation Engineer's *Trip Generation Manual (10th Edition)*. The trip assignment was based on existing trip distributions for traffic in the area.

Table 2: Concurrent Development PM Peak Hour Background Net Trips

Development	Land Use	Units	Sq'	Trip Rate	In	Out
A	Proposed Condominium	145	-	0.44 / unit	39	25
	Proposed Retail	-	5700	2.71 / 1000 ft ²	7	8
	Existing Land Use - Empty	-	-	-	0	0
	Net Trips				46	33
B	Proposed Market Rental	195	-	0.44 / unit	52	34
	Proposed Supermarket	-	25000	9.24 / 1000 ft ²	118	113
	Proposed Retail	-	25000	2.71 / 1000 ft ²	30	38
	Existing Land Use- In Construction	-	-	-	0	0
	Net Trips	-	-	-	200	185
C	Proposed Market Rental	166	-	0.36 / unit	37	23
	Proposed Retail	-	3300	2.71 / 1000 ft ²	4	5
	Existing Land Use - Church	-	2400	0.49 / 1000 ft ²	0	1
	Existing Land Use - General Office	-	5400	1.15 / 1000 ft ²	1	5
	Net Trips	-	-	-	39	23
D	Proposed Market Rental	134	-	0.36 / unit	29	19
	Proposed Retail	-	6800	2.71 / 1000 ft ²	8	10
	Existing Land Use - In Construction	-	-	-	0	0
	Net Trips	-	-	-	37	29
E	Proposed Market Rental	93	-	0.36 / unit	20	13
	Proposed Retail	-	6500	2.71 / 1000 ft ²	8	10
	Existing Land Use - Empty	-	-	-	0	0
	Net Trips	-	-	-	28	23
F	Proposed Condominium	120	-	0.36 / unit	26	17
	Proposed Retail	-	9000	2.71 / 1000 ft ²	11	13
	Existing - Empty	-	-	-	0	0
	Net Trips	-	-	-	37	30
G	Proposed Market Rental	130	-	0.36 / unit	29	18
	Existing - New Car Dealership	-	16000	2.43 / 1000 ft ²	16	23
	Net Trips	-	-	-	13	-5
H	Proposed Condominium	202	-	0.36 / unit	45	28
	Proposed Retail	-	14400	2.71 / 1000 ft ²	17	22
	Existing - Restaurant (Quality)	-	775	7.80 / 1000 ft ²	4	2
	Existing - medical office to remain	-	-	-	0	0
	Net Trips	-	-	-	58	48
I	Multi-Family (Mid Rise)	103	-	0.44 / unit	27	18
	High Turnover Sit Down Restaurant	-	2000	9.77 / 1000 ft ²	12	8
	Specialty Retail	-	9900	2.71 / 1000 ft ²	12	15
	Existing Supermarket	-	10000	9.24 / 1000 ft ²	47	45
	Net Trips	-	-	-	5	-5
J	Proposed Apartment	500	-	0.44 / unit	135	86
	Proposed Apartment	1000	-	0.36 / unit	220	140
	Retail (trips reassigned to new accesses)	-	-	-	150	371
	Existing / Internal Capture Reduction	-	-	-	-122	-122
	Net Trips	-	-	-	383	475
K	Proposed Condominium	229	-	0.44 / unit	62	39
	Existing Land Use – Empty	-	-	-	0	0
L	Proposed Rental Apartment	154	-	0.44 / unit	41	27
	Existing – Restaurant	-	3500	7.80 / 1000 ft ²	18	9
	Net Trips	-	-	-	23	18
M	Proposed Rental Apartment	255	-	0.36 / unit	56	36
	Existing Land Use – Parking Lot	-	-	-	-	-
N	Proposed Affordable Housing Condominium	135	-	0.36 / unit	30	19
	Proposed Retail	-	5000	2.71 / 1000 ft ²	7	7
	Existing Land Use – Parking Lot	-	-	-	-	-
	Net Trips	-	-	-	37	26

4.0 POST DEVELOPMENT

4.1 Proposed Land Use and Site Access

The proposed development is a 15-storey, 129 unit, residential building with ground floor commercial (166.22m²). See **Figure 4** for the development site plan.

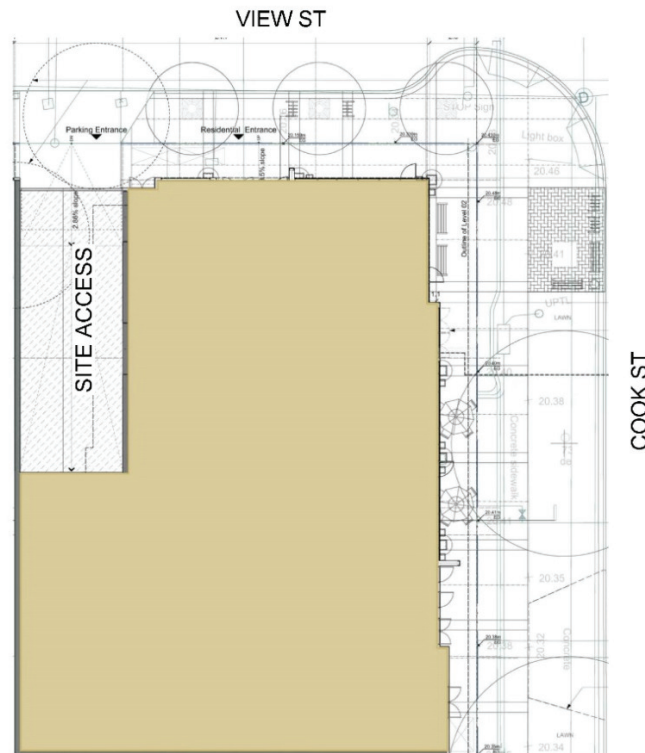


Figure 4: Site Plan.

The site access is located on View Street approximately 30m west of Cook Street. There are no sight distance deficiencies at the proposed access. There is over 150m of sight distance at the access exceeding the Transportation Association of Canada's (TAC) requirement of 105m for left turns and 95m for right turns / through movements.

The location of the access also meets the TAC minimum corner clearance requirements for local and collector roads of 15m and 20m respectively.

4.2 Trip Generation

Site trips were estimated from the Institute of Transportation Engineers' (ITE) *Trip Generation Manual* (10th Edition). The *Trip Generation Manual* provides trip rates for a wide variety of land uses gathered from actual sites across North America over the past 35 years.

The proposed developments will generate 54 trips during PM peak hour of travel (32 trips in and 22 trips out).

Table 3 summarizes the trip generation for the proposed development during the PM peak hour of travel.

Table 3: Commercial Trip Generation for the Peak Hour of Travel

ITE Code	Land Use	Trip Rate	Total Trips	Trips In	Trips Out
222	Multi-Family – High Rise	0.36 trips / unit	47	29	18
820	Shopping Centre	3.81 / 1000 ft ²	7	3	4
Total			54	32	22

4.3 Trip Assignment

The trip assignment was based on the existing trip distribution and popular destinations for traffic in the area. See **Figure 5** for the proposed development's PM peak hour trip assignment which are based on the following trip distribution pattern:

- 45% to / from the west;
- 30% to / from the east;
- 20% to / from the north;
- 5% to / from the south.

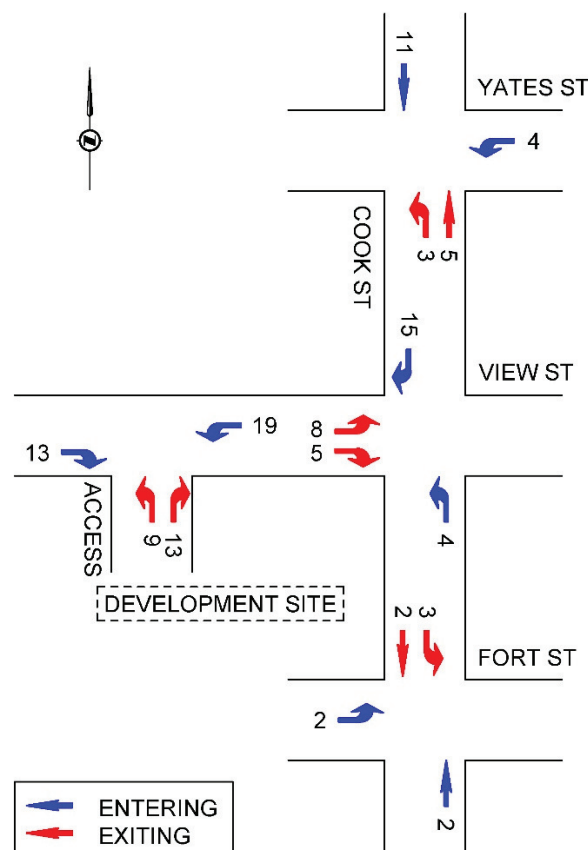


Figure 5: PM Trip Assignment

4.4 Post Development Analysis Results

4.4.1 Analysis Assumptions

No growth rate was applied to the background volumes as Victoria's traffic volumes have been static or had negative growth over the past decades. The concurrent development traffic has been included in the background traffic volumes. The existing land use traffic was maintained on the network for the background analysis. However, during the post development analysis the existing site's traffic was removed from the network.

After the completion of the Vancouver Street bike lane project traffic patterns will likely change in the area. Vehicle traffic travelling northbound and southbound on Vancouver Street will be discouraged / limited. Therefore, 75 percent of the Vancouver Street traffic was diverted to the adjacent north / south streets (Quadra Street and Cook Street) for the background analysis.

4.4.2 Background Analysis Results

The background traffic conditions were analyzed during the PM peak hour within the study area. **Figure 6** and **Table 4** show the background PM peak hour traffic conditions.

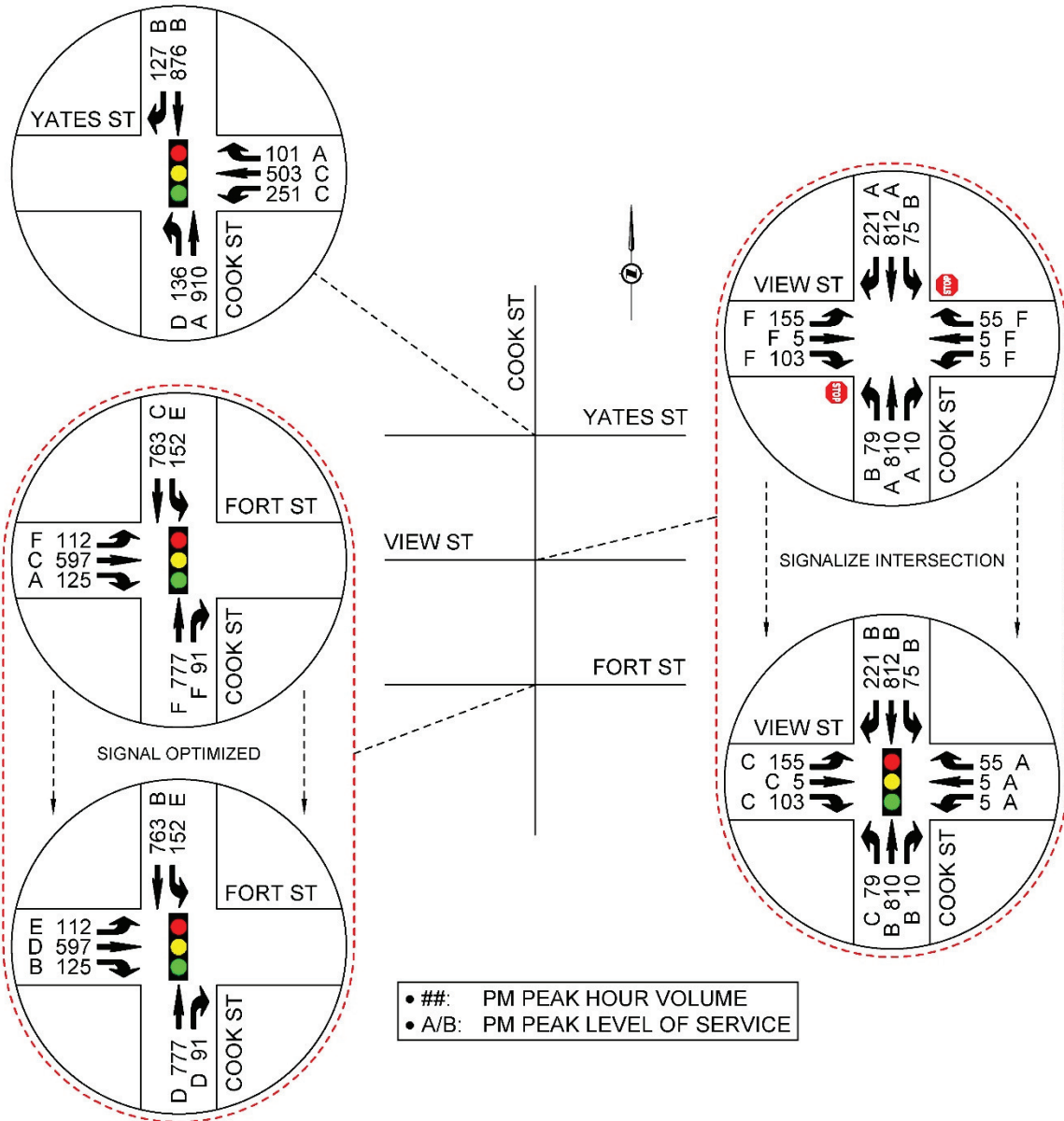


Figure 6: Background Traffic Conditions during the PM Peak Hour

Table 4: Background Traffic Conditions during the PM Peak Hour

Intersection	Movement	LOS	Delay (s)	Queue (m) 95 th
Yates St / Cook St	WBL	C	34.8	62.8
	WBT	C	26.1	49.8
	WBR	A	8.4	6.8
	NBL	D	41.8	46.2
	NBT	A	7.3	31.3
	SB T/R	B	10.6	59.1
View St / Cook St (Stop-Controlled)	EB	F	3178.4	297.5
	WB	E	72.2	25.2
	NBL	B	11.9	4.2
	NB T/R	A	0.0	0.0
	SBL	B	10.1	2.1
	SB T/R	A	0.0	0.0
View St / Cook St (Signalized)	EB	C	28.9	43.0
	WB	A	7.2	5.3
	NBL	C	29.9	19.6
	NB T/R	B	13.5	51.1
	SBL	B	13.9	16.7
	SB T/R	B	14.7	88.6
Fort St / Cook St	EBL	F	162.7	47.2
	EBT	C	23.6	57.7
	EBR	A	7.9	9.3
	NB T/R	F	147.2	135.7
	SBL	E	60.7	45.6
	SBT	C	27.3	74.0
Fort St / Cook St (Optimized)	EBL	E	74.7	39.6
	EBT	D	51.6	81.7
	EBR	B	13.2	11.4
	NB T/R	D	38.6	111.3
	SBL	E	57.3	45.9
	SBT	B	17.2	59.7

With the background and concurrent development traffic on the road network during the PM peak hour at Yates Street / Cook Street the northbound left drops to LOS D while all other movements operate at LOS C or better. With the existing signal timing the Fort Street / Cook Street intersection has three movements with failing levels of service: the eastbound left (LOS F), the northbound movements (LOS F), and the southbound left (LOS E). The signal timing is likely configured this way to promote eastbound traffic while limiting the number of turning movements that cross the cycle track; however, if the traffic signal is optimized the overall traffic operations could improve slightly. If the signal timing at Fort Street / Cook Street is optimized the left turn movements at the intersection will remain at LOS E; however, the other movements will operate at LOS D or better.

The increased traffic on View Street due to the Vancouver Street bike lanes and the concurrent developments further deteriorates the traffic operations at the stop-controlled View Street / Cook Street intersection. The eastbound and westbound movements operate at LOS F and LOS E

respectively. It is recommended that the City signalize the View Street / Cook Street intersection prior to the implementation of the Vancouver Street bicycle facilities. If View Street / Cook Street is signalized all movements will operate at LOS C or better.

4.4.3 Post Development Analysis Results

The post development traffic conditions were analyzed during the PM peak hour within the study area. **Figure 7** and **Table 5** show the post development PM peak hour traffic conditions.

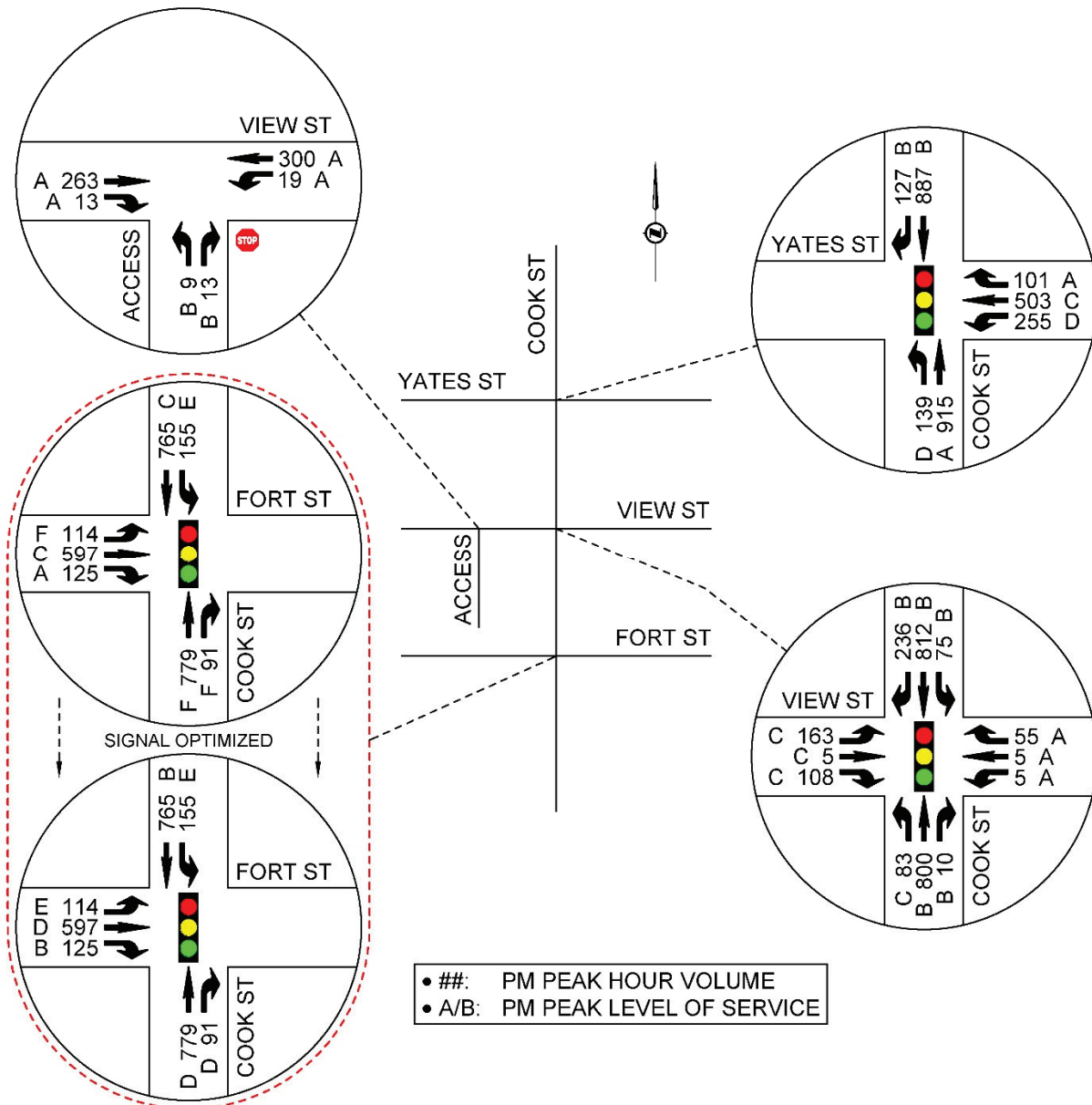


Figure 7: Post Development Conditions with Improvements – PM

Table 5: Post Development Conditions with Improvements – PM

Intersection	Movement	LOS	Delay (s)	Queue (m) 95 th
Yates St / Cook St	WBL	D	35.4	65.1
	WBT	C	26.1	49.8
	WBR	A	8.6	7.0
	NBL	D	46.2	48.1
	NBT	A	7.3	31.4
	SB T/R	B	10.8	59.8
View St / Cook St (Signalized)	EB	C	30.8	45.4
	WB	A	7.2	5.3
	NBL	C	34.8	21.7
	NB T/R	B	13.5	51.1
	SBL	B	13.9	16.6
	SB T/R	B	14.9	90.1
Fort St / Cook St	EBL	F	170.1	48.2
	EBT	C	23.6	57.7
	EBR	A	7.9	9.3
	NB T/R	F	148.2	136.0
	SBL	E	63.5	46.9
	SBT	C	27.5	74.3
Fort St / Cook St (Optimized)	EBL	E	77.5	40.6
	EBT	D	51.6	81.7
	EBR	B	13.2	11.4
	NB T/R	D	38.7	111.6
	SBL	E	60.2	47.2
	SBT	B	17.3	60.1
Site Access / View St	EB	A	0.0	0.0
	WB	A	8.1	0.7
	NB	B	13.3	1.4

During the PM peak hour at Yates Street / Cook Street with the proposed development would add 4.4 seconds of delay for the northbound left and under one second for all other movements at the intersection. With the signalization of View Street / Cook Street there would be no change in the level of service with the addition of the proposed development. The proposed development will add 4.9 seconds to the northbound left and approximately two seconds for all other movements at View Street / Cook Street, but will remain at LOS C or better.

At Fort Street / Cook Street with the existing signal timing there will be no change in the level of service with the inclusion of the proposed development; the eastbound left will have 7.4 seconds of additional delay while all other movements will have approximately four seconds of additional delay. If the signal timing is optimized at Fort Street Cook Street the eastbound left will have 2.8 seconds of additional delay and all other movements will have about three seconds of additional delay.

The site access will operate at LOS B or better at full build out.

5.0 SENSITIVITY ANALYSIS

On most roads the PM peak hour contains the largest traffic volumes for any given time throughout the day. There are some locations that can have larger traffic impacts outside of the PM peak hour such as near schools and employment centres with shift changes. Further investigation was conducted to determine if the PM peak hour reflected the worst-case scenario for this study. When looking at the surrounding road network the PM peak hour had 23.6 percent more traffic than the AM peak hour and 15.2 percent more traffic than the midday peak hour (or off-peak time).

The distribution of traffic volumes for specific movements at each intersection were also reviewed during the AM peak and midday peak timeframes. For example, a left turn movement that requires a protected phase during one timeframe due to higher volumes may not require the protected phase during another timeframe. Yates Street / Cook Street did not show significant variances beyond overall traffic volumes. View Street had a bit more variances for the AM peak hour compared to the midday and PM peak hours. During the AM peak hour the westbound volumes were higher than the eastbound volumes while during the midday and PM peak hours the eastbound volumes were higher than the westbound volumes. However, these variances do not have a significant impact on intersection operation. The only movement at Fort Street that has significant variation to the distribution is the eastbound left which has a protected phase 24 hours a day and therefore does not require addition of a left turn phase.

6.0 SUSTAINABLE TRANSPORTATION REVIEW

A sustainable transportation review was conducted to determine the pedestrian, cycling, electrical vehicle accommodation, and transit connection to the proposed development.

6.1 Pedestrian and Cycling Network

There are existing sidewalks on both sides of all roads in the study area. If the sidewalks are to be altered during this proposed redevelopment it is recommended that the pedestrian areas meet the current City of Victoria standards on both site frontages. Crosswalks at View Street / Cook Street are recommended for all approaches of the intersection if the City signalizes the intersection.

This development is well located to access the entire City of Victoria bicycle network with the existing Yates Street bike lane, the Fort Street cycle track, and the soon to be completed Vancouver Street bicycle facilities. No further on-street bicycle upgrades are recommended in the study area. Onsite bicycle storage should be considered a priority along with electrical charging capability.

6.2 Electrical Vehicle Parking

As the popularity of electrical vehicles increases the availability of electrical charging stations is becoming more and more important. While the City does not yet have a formal bylaw in place requiring electrical outlets at all parking stalls it is recommended that each residential parking stall onsite be equipped with the capability for electrical vehicles to charge. It is significantly less

expensive to proactively install the charging capabilities during design / construction rather than retrofit the infrastructure at a later time.

6.3 Transit Network

There are many transit options available in close proximity to the site. Yates Street provides multiple routes travelling west of the site. Cook Street provide routes travelling north or south. Fort Street provide bussing options travelling west of the site.

The closest bus stop on Yates Street is approximately 180m north of the site. The closest bus stops on Cook Street are about 30m and 85m south of the site. The closest Fort Street bus stop is located approximately 100m south of the site. No transit upgrades are recommended for this development.

7.0 CONCLUSIONS

The proposed development is located on the southwest corner of the View Street / Cook Street intersection. The site access is proposed to be located on View Street west of Cook Street. The City has bicycle facilities planned for Vancouver Street that will likely divert some traffic from Vancouver Street onto the surrounding road network. With the bicycle facilities on Vancouver Street and other concurrent developments there will be increased traffic on View Street. With this increase of traffic on View Street it is recommended that the City upgrade View Street / Cook Street from a stop-controlled intersection to a signalized intersection. The proposed development has minimal traffic impacts to the surrounding road network if the View Street / Cook Street intersection is signalized. No road upgrades are recommended due to this development.

Sidewalk along the site frontage is recommended to be maintained or reinstated after construction. If View Street / Cook Street is signalized all four approaches of the intersection should have crosswalks installed. No transit or bicycle upgrades are recommended for this development. As the number of electrical vehicles keeps increasing on-site residential electrical charging stations should be considered a priority for both vehicles and bicycles.

8.0 RECOMMENDATIONS

- For the City to signalize View Street / Cook Street, including crosswalks on all four approaches;
- Consider providing electrical charging capabilities for some residential vehicle parking stalls on-site;
- Consider providing electrical charging capabilities for some electrical bicycles on-site.

APPENDIX A: SYNCHRO BACKGROUND

SYNCHRO MODELLING SOFTWARE DESCRIPTION

The traffic analysis was completed using Synchro and SimTraffic traffic modelling software. Results were measured in delay, level of service (LOS), 95th percentile queue length and volume to capacity ratio. Synchro is based on the Highway Capacity Manual (HCM) methodology. SimTraffic integrates established driver behaviours and characteristics to simulate actual conditions by randomly “seeding” or positioning vehicles travelling throughout the network. The simulation is run ten times (ten different random seedings of vehicle types, behaviours and arrivals) to obtain statistical significance of the results.

Levels of Service

Traffic operations are typically described in terms of levels of service, which rates the amount of delay per vehicle for each movement and the entire intersection. Levels of service range from LOS A (representing best operations) to LOS E/F (LOS E being poor operations and LOS F being unpredictable/disruptive operations). LOS E/F are generally unacceptable levels of service under normal everyday conditions. A LOS C or better is considered acceptable operations, while D is considered to be on the threshold between acceptable and unacceptable operations. Highway operations will typically need to operate at LOS C or better for through movements and LOS E or better for other traffic movements with lower order roads.

The hierarchy of criteria for grading an intersection or movement not only includes delay times, but also takes into account traffic control type (stop signs or traffic signal). For example, if a vehicle is delayed for 19 seconds at an unsignalized intersection, it is considered to have an average operation, and would therefore be graded as an LOS C. However, at a signalized intersection, a 19 second delay would be considered a good operation and therefore it would be given an LOS B. The table below indicates the range of delay for LOS for signalized and unsignalized intersections.




















Table A1: LOS Criteria, by Intersection Traffic Control

Level of Service (LOS)	Unsignalized Intersection Average Vehicle Delay (sec/veh)	Signalized Intersection Average Vehicle Delay (sec/veh)
A	0 – 10	0 – 10
B	> 10 – 15	> 10 – 20
C	> 15 – 25	> 20 – 35
D	> 25 – 35	> 35 – 55
E	> 35 – 50	> 55 – 80
F	> 50	> 80

APPENDIX B: 2019 EXISTING PEAK HOUR TRAFFIC CONDITIONS













Lanes, Volumes, Timings
754: Cook St. & Yates St.

01/24/2020

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	174	469	91	106	658	0	0	695	98
Future Volume (vph)	0	0	0	174	469	91	106	658	0	0	695	98
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
Storage Length (m)	0.0		0.0	12.0		30.0	35.0		0.0	0.0		0.0
Storage Lanes	0		0	1		1	1		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.95
Ped Bike Factor				0.82		0.81	0.97				0.98	
Frt						0.850					0.981	
Flt Protected				0.950			0.950					
Satd. Flow (prot)	0	0	0	1770	3539	1583	1770	3539	0	0	3413	0
Flt Permitted				0.950			0.257					
Satd. Flow (perm)	0	0	0	1452	3539	1289	466	3539	0	0	3413	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						140						36
Link Speed (k/h)		40			45			40				40
Link Distance (m)		165.1			307.3			88.8				98.6
Travel Time (s)		14.9			24.6			8.0				8.9
Confl. Peds. (#/hr)				112		111	92					92
Peak Hour Factor	0.25	0.25	0.25	0.89	0.95	0.65	0.88	0.92	0.25	0.25	0.85	0.82
Adj. Flow (vph)	0	0	0	196	494	140	120	715	0	0	818	120
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	196	494	140	120	715	0	0	938	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type				Perm	NA	Perm	Perm	NA				NA
Protected Phases					8			2				6
Permitted Phases				8		8	2					
Minimum Split (s)				23.0	23.0	23.0	23.0	23.0			23.0	
Total Split (s)				27.0	27.0	27.0	53.0	53.0			53.0	
Total Split (%)				33.8%	33.8%	33.8%	66.3%	66.3%			66.3%	
Maximum Green (s)				22.0	22.0	22.0	48.0	48.0			48.0	
Yellow Time (s)				4.0	4.0	4.0	4.0	4.0			4.0	
All-Red Time (s)				1.0	1.0	1.0	1.0	1.0			1.0	
Lost Time Adjust (s)				-1.0	-1.0	-1.0	-1.0	-1.0			-1.0	
Total Lost Time (s)				4.0	4.0	4.0	4.0	4.0			4.0	
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)				7.0	7.0	7.0	7.0	7.0			7.0	
Flash Dont Walk (s)				8.0	8.0	8.0	11.0	11.0			11.0	
Pedestrian Calls (#/hr)				20	20	20	20	20			20	

Lanes, Volumes, Timings
754: Cook St. & Yates St.

01/24/2020

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Act Effect Green (s)				23.0	23.0	23.0	49.0	49.0			49.0	
Actuated g/C Ratio				0.29	0.29	0.29	0.61	0.61			0.61	
v/c Ratio				0.47	0.49	0.30	0.42	0.33			0.45	
Control Delay				28.0	25.5	6.1	13.8	8.0			8.7	
Queue Delay				0.0	0.0	0.0	0.0	0.0			0.0	
Total Delay				28.0	25.5	6.1	13.8	8.0			8.7	
LOS				C	C	A	B	A			A	
Approach Delay					22.8			8.9			8.7	
Approach LOS					C			A			A	
Queue Length 50th (m)				24.4	32.5	0.0	8.5	24.8			34.2	
Queue Length 95th (m)				42.9	46.3	4.0	20.6	34.1			42.4	
Internal Link Dist (m)		141.1			283.3			64.8			74.6	
Turn Bay Length (m)				12.0		30.0	35.0					
Base Capacity (vph)				417	1017	470	285	2167			2104	
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	0.49	0.30	0.42	0.33			0.45	

Intersection Summary

Area Type: Other

Cycle Length: 80

Actuated Cycle Length: 80

Offset: 56 (70%), Referenced to phase 2:NBTL, Start of Green

Natural Cycle: 55

Control Type: Pretimed

Maximum v/c Ratio: 0.49

Intersection Signal Delay: 13.3

Intersection LOS: B

Intersection Capacity Utilization 51.9%

ICU Level of Service A






















Analysis Period (min) 15

Splits and Phases: 754: Cook St. & Yates St.















Lanes, Volumes, Timings
756: Cook St. & Fort St.

01/24/2020

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 						 			 	
Traffic Volume (vph)	92	592	125	0	0	0	0	603	91	82	661	0
Future Volume (vph)	92	592	125	0	0	0	0	603	91	82	661	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.0	3.0	3.0	3.7	3.7	3.7	3.7	3.0	3.7	3.0	3.0	3.7
Storage Length (m)	20.0		20.0	0.0		0.0	0.0		0.0	22.0		0.0
Storage Lanes	1		1	0		0	0		0	1		0
Taper Length (m)	2.5			2.5			2.5			7.5		
Lane Util. Factor	1.00	0.95	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Ped Bike Factor	0.70		0.73					0.96				
Frt			0.850					0.975				
Flt Protected	0.950									0.950		
Satd. Flow (prot)	1516	3032	1357	0	0	0	0	2852	0	1516	3032	0
Flt Permitted	0.950									0.154		
Satd. Flow (perm)	1054	3032	995	0	0	0	0	2852	0	246	3032	0
Right Turn on Red			Yes			Yes			No			Yes
Satd. Flow (RTOR)			142									
Link Speed (k/h)		40			48			40			40	
Link Distance (m)		219.6			205.1			192.6			93.4	
Travel Time (s)		19.8			15.4			17.3			8.4	
Confl. Peds. (#/hr)	94		161						133	133		
Confl. Bikes (#/hr)			1									
Peak Hour Factor	0.74	0.93	0.73	0.25	0.25	0.25	0.25	0.88	0.65	0.89	0.89	0.25
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	124	637	171	0	0	0	0	685	140	92	743	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	124	637	171	0	0	0	0	825	0	92	743	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.0			3.0			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			4.8	
Two way Left Turn Lane												
Headway Factor	1.25	1.25	1.25	1.13	1.13	1.13	1.13	1.25	1.13	1.25	1.25	1.13
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type	Prot	NA	Perm					NA		pm+pt	NA	
Protected Phases	7	8						2		1	6	
Permitted Phases			8							6		
Minimum Split (s)	10.5	20.0	20.0					21.0		10.0	21.0	
Total Split (s)	10.5	33.0	33.0					27.0		10.0	37.0	
Total Split (%)	13.0%	41.0%	41.0%					33.5%		12.4%	46.0%	
Maximum Green (s)	6.0	28.0	28.0					22.0		6.0	32.0	
Yellow Time (s)	3.5	4.0	4.0					4.0		3.0	4.0	
All-Red Time (s)	1.0	1.0	1.0					1.0		1.0	1.0	
Lost Time Adjust (s)	-1.0	-1.0	-1.0					-1.0		0.0	-1.0	
Total Lost Time (s)	3.5	4.0	4.0					4.0		4.0	4.0	
Lead/Lag	Lag	Lead	Lead					Lag		Lead		
Lead-Lag Optimize?	Yes	Yes	Yes					Yes		Yes		
Walk Time (s)		7.0	7.0					7.0			7.0	

Lanes, Volumes, Timings
756: Cook St. & Fort St.

01/24/2020

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Flash Dont Walk (s)		8.0	8.0					9.0			9.0	
Pedestrian Calls (#/hr)		60	60					60			60	
Act Effect Green (s)	7.0	29.0	29.0					23.0		33.0	33.0	
Actuated g/C Ratio	0.09	0.36	0.36					0.29		0.41	0.41	
v/c Ratio	0.95	0.58	0.38					1.01		0.47	0.60	
Control Delay	106.3	23.5	7.9					65.5		23.3	21.0	
Queue Delay	0.0	0.0	0.0					0.0		0.0	0.0	
Total Delay	106.3	23.5	7.9					65.5		23.3	21.0	
LOS	F	C	A					E		C	C	
Approach Delay		31.6						65.5			21.3	
Approach LOS		C						E			C	
Queue Length 50th (m)	19.3	40.7	2.9					~67.6		8.6	45.4	
Queue Length 95th (m)	#37.5	57.2	9.3					#101.4		17.5	61.7	
Internal Link Dist (m)		195.6			181.1			168.6			69.4	
Turn Bay Length (m)	20.0		20.0							22.0		
Base Capacity (vph)	131	1092	449					814		195	1242	
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	0.95	0.58	0.38					1.01		0.47	0.60	

Intersection Summary

Area Type: CBD

Cycle Length: 80.5

Actuated Cycle Length: 80.5

Offset: 63 (78%), Referenced to phase 2:NBT, Start of Green

Natural Cycle: 70

Control Type: Pretimed

Maximum v/c Ratio: 1.01

Intersection Signal Delay: 39.1

Intersection LOS: D

Intersection Capacity Utilization 55.9%

ICU Level of Service B

Analysis Period (min) 15

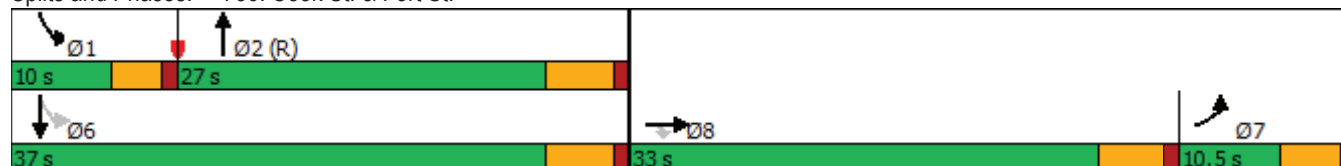
~ Volume exceeds capacity, queue is theoretically infinite.

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: 756: Cook St. & Fort St.



Intersection												
Int Delay, s/veh	7											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↙	↕		↙	↕	
Traffic Vol, veh/h	39	5	25	5	5	55	15	670	10	75	718	88
Future Vol, veh/h	39	5	25	5	5	55	15	670	10	75	718	88
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	150	-	-	150	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	75	65	70	65	65	75	70	96	70	85	97	85
Heavy Vehicles, %	0	0	0	0	0	0	2	2	2	2	2	2
Mvmt Flow	52	8	36	8	8	73	21	698	14	88	740	104

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	1363	1722	422	1297	1767	356	844	0	0	712	0	0
Stage 1	968	968	-	747	747	-	-	-	-	-	-	-
Stage 2	395	754	-	550	1020	-	-	-	-	-	-	-
Critical Hdwy	7.5	6.5	6.9	7.5	6.5	6.9	4.14	-	-	4.14	-	-
Critical Hdwy Stg 1	6.5	5.5	-	6.5	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.5	5.5	-	6.5	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.22	-	-	2.22	-	-
Pot Cap-1 Maneuver	109	90	586	121	85	646	788	-	-	884	-	-
Stage 1	276	335	-	376	423	-	-	-	-	-	-	-
Stage 2	607	420	-	492	317	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	81	79	586	95	74	646	788	-	-	884	-	-
Mov Cap-2 Maneuver	81	79	-	95	74	-	-	-	-	-	-	-
Stage 1	269	302	-	366	412	-	-	-	-	-	-	-
Stage 2	514	409	-	405	285	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	104.2		22.2		0.3		0.9	
HCM LOS	F		C					



















Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	788	-	-	119 297	884	-	-
HCM Lane V/C Ratio	0.027	-	-	0.802 0.299	0.1	-	-
HCM Control Delay (s)	9.7	-	-	104.2 22.2	9.5	-	-
HCM Lane LOS	A	-	-	F C	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	4.7 1.2	0.3	-	-

APPENDIX C: BACKGROUND PEAK HOUR TRAFFIC CONDITIONS

Intersection												
Int Delay, s/veh	446.9											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↙	↕↗		↙	↕↗	
Traffic Vol, veh/h	155	5	103	5	5	55	79	800	10	70	812	221
Future Vol, veh/h	155	5	103	5	5	55	79	800	10	70	812	221
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	150	-	-	150	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	75	65	70	65	65	75	70	96	70	85	97	85
Heavy Vehicles, %	0	0	0	0	0	0	2	2	2	2	2	2
Mvmt Flow	207	8	147	8	8	73	113	833	14	82	837	260
Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	1778	2204	549	1653	2327	424	1097	0	0	847	0	0
Stage 1	1131	1131	-	1066	1066	-	-	-	-	-	-	-
Stage 2	647	1073	-	587	1261	-	-	-	-	-	-	-
Critical Hdwy	7.5	6.5	6.9	7.5	6.5	6.9	4.14	-	-	4.14	-	-
Critical Hdwy Stg 1	6.5	5.5	-	6.5	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.5	5.5	-	6.5	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.22	-	-	2.22	-	-
Pot Cap-1 Maneuver	~ 53	45	485	66	38	584	632	-	-	786	-	-
Stage 1	220	281	-	241	301	-	-	-	-	-	-	-
Stage 2	431	299	-	468	244	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	~ 29	33	485	30	28	584	632	-	-	786	-	-
Mov Cap-2 Maneuver	~ 29	33	-	30	28	-	-	-	-	-	-	-
Stage 1	~ 181	252	-	198	247	-	-	-	-	-	-	-
Stage 2	300	245	-	283	219	-	-	-	-	-	-	-
Approach	EB		WB		NB		SB					
HCM Control Delay, \$	3178.4		72.2		1.4		0.7					
HCM LOS	F		F									
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR				
Capacity (veh/h)	632	-	-	47	135	786	-	-				
HCM Lane V/C Ratio	0.179	-	-	7.692	0.657	0.105	-	-				
HCM Control Delay (s)	11.9	-	-	\$ 3178.4	72.2	10.1	-	-				
HCM Lane LOS	B	-	-	F	F	B	-	-				
HCM 95th %tile Q(veh)	0.6	-	-	42.5	3.6	0.3	-	-				
Notes												
~: Volume exceeds capacity		\$: Delay exceeds 300s			+: Computation Not Defined				*: All major volume in platoon			













Lanes, Volumes, Timings
166: Cook St. & View St./View St

01/24/2020

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	155	5	103	5	5	55	79	800	10	70	812	221
Future Volume (vph)	155	5	103	5	5	55	79	800	10	70	812	221
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		0.0	15.0		0.0	15.0		0.0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (m)	2.5			2.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt		0.945			0.889			0.998			0.964	
Flt Protected		0.972			0.996		0.950			0.950		
Satd. Flow (prot)	0	1765	0	0	1701	0	1789	3571	0	1789	3450	0
Flt Permitted		0.788			0.964		0.185			0.278		
Satd. Flow (perm)	0	1431	0	0	1646	0	348	3571	0	524	3450	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		46			73			3			80	
Link Speed (k/h)		50			48			40			40	
Link Distance (m)		223.8			209.0			93.4			88.8	
Travel Time (s)		16.1			15.7			8.4			8.0	
Peak Hour Factor	0.75	0.65	0.70	0.65	0.65	0.75	0.70	0.96	0.70	0.85	0.97	0.85
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	207	8	147	8	8	73	113	833	14	82	837	260
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	362	0	0	89	0	113	847	0	82	1097	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Minimum Split (s)	23.0	23.0		23.0	23.0		23.0	23.0		23.0	23.0	
Total Split (s)	32.0	32.0		32.0	32.0		48.0	48.0		48.0	48.0	
Total Split (%)	40.0%	40.0%		40.0%	40.0%		60.0%	60.0%		60.0%	60.0%	
Maximum Green (s)	27.0	27.0		27.0	27.0		43.0	43.0		43.0	43.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		5.0			5.0		5.0	5.0		5.0	5.0	
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effect Green (s)		27.0			27.0		43.0	43.0		43.0	43.0	
Actuated g/C Ratio		0.34			0.34		0.54	0.54		0.54	0.54	

Lanes, Volumes, Timings
166: Cook St. & View St./View St

01/24/2020

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
v/c Ratio		0.71			0.15		0.60	0.44		0.29	0.58	
Control Delay		28.9			7.2		29.9	12.1		13.9	13.4	
Queue Delay		0.0			0.0		0.0	1.4		0.0	1.3	
Total Delay		28.9			7.2		29.9	13.5		13.9	14.7	
LOS		C			A		C	B		B	B	
Approach Delay		28.9			7.2			15.4			14.7	
Approach LOS		C			A			B			B	
Queue Length 50th (m)		41.2			1.6		10.9	38.1		8.4	64.6	
Queue Length 95th (m)		43.0			5.3		19.6	51.1		m16.7	88.6	
Internal Link Dist (m)		199.8			185.0			69.4			64.8	
Turn Bay Length (m)							15.0			15.0		
Base Capacity (vph)		513			603		187	1920		281	1891	
Starvation Cap Reductn		0			0		0	821		0	542	
Spillback Cap Reductn		0			0		0	0		0	0	
Storage Cap Reductn		0			0		0	0		0	0	
Reduced v/c Ratio		0.71			0.15		0.60	0.77		0.29	0.81	

Intersection Summary

Area Type: Other

Cycle Length: 80

Actuated Cycle Length: 80

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

Natural Cycle: 60

Control Type: Pretimed

Maximum v/c Ratio: 0.71

Intersection Signal Delay: 16.7

Intersection LOS: B

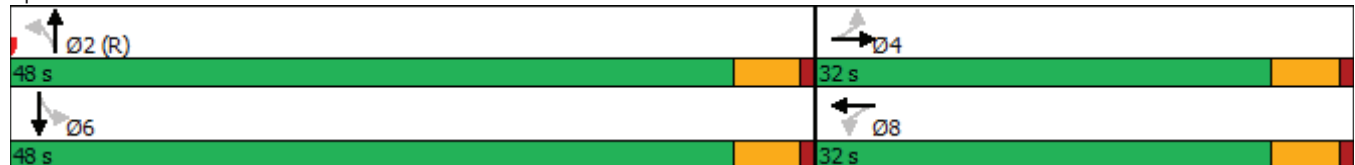
Intersection Capacity Utilization 68.2%

ICU Level of Service C

Analysis Period (min) 15




















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

Splits and Phases: 166: Cook St. & View St./View St















Lanes, Volumes, Timings
754: Cook St. & Yates St.

01/24/2020

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	251	503	101	136	910	0	0	876	127
Future Volume (vph)	0	0	0	251	503	101	136	910	0	0	876	127
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
Storage Length (m)	0.0		0.0	12.0		30.0	35.0		0.0	0.0		0.0
Storage Lanes	0		0	1		1	1		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.95
Ped Bike Factor				0.82		0.81	0.98				0.98	
Frt						0.850					0.980	
Flt Protected				0.950			0.950					
Satd. Flow (prot)	0	0	0	1770	3539	1583	1770	3539	0	0	3408	0
Flt Permitted				0.950			0.178					
Satd. Flow (perm)	0	0	0	1452	3539	1289	326	3539	0	0	3408	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						130					30	
Link Speed (k/h)		40			45			40			40	
Link Distance (m)		165.1			307.3			88.8			98.6	
Travel Time (s)		14.9			24.6			8.0			8.9	
Confl. Peds. (#/hr)				112		111	92					92
Peak Hour Factor	0.25	0.25	0.25	0.89	0.95	0.65	0.88	0.92	0.25	0.25	0.85	0.82
Adj. Flow (vph)	0	0	0	282	529	155	155	989	0	0	1031	155
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	282	529	155	155	989	0	0	1186	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type				Perm	NA	Perm	Perm	NA			NA	
Protected Phases					8			2				6
Permitted Phases				8		8	2					
Minimum Split (s)				23.0	23.0	23.0	23.0	23.0			23.0	
Total Split (s)				27.0	27.0	27.0	53.0	53.0			53.0	
Total Split (%)				33.8%	33.8%	33.8%	66.3%	66.3%			66.3%	
Maximum Green (s)				22.0	22.0	22.0	48.0	48.0			48.0	
Yellow Time (s)				4.0	4.0	4.0	4.0	4.0			4.0	
All-Red Time (s)				1.0	1.0	1.0	1.0	1.0			1.0	
Lost Time Adjust (s)				-1.0	-1.0	-1.0	-1.0	-1.0			-1.0	
Total Lost Time (s)				4.0	4.0	4.0	4.0	4.0			4.0	
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)				7.0	7.0	7.0	7.0	7.0			7.0	
Flash Dont Walk (s)				8.0	8.0	8.0	11.0	11.0			11.0	
Pedestrian Calls (#/hr)				20	20	20	20	20			20	

Lanes, Volumes, Timings
754: Cook St. & Yates St.

01/24/2020

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Act Effect Green (s)				23.0	23.0	23.0	49.0	49.0			49.0	
Actuated g/C Ratio				0.29	0.29	0.29	0.61	0.61			0.61	
v/c Ratio				0.68	0.52	0.33	0.78	0.46			0.57	
Control Delay				34.8	26.1	8.4	41.8	6.7			10.2	
Queue Delay				0.0	0.0	0.0	0.0	0.6			0.4	
Total Delay				34.8	26.1	8.4	41.8	7.3			10.6	
LOS				C	C	A	D	A			B	
Approach Delay					25.8			12.0			10.6	
Approach LOS					C			B			B	
Queue Length 50th (m)				37.7	35.3	2.8	12.2	25.5			49.0	
Queue Length 95th (m)				62.8	49.8	6.8	m#46.2	31.3			59.1	
Internal Link Dist (m)		141.1			283.3			64.8			74.6	
Turn Bay Length (m)				12.0		30.0	35.0					
Base Capacity (vph)				417	1017	463	199	2167			2099	
Starvation Cap Reductn				0	0	0	0	726			0	
Spillback Cap Reductn				0	0	0	0	0			406	
Storage Cap Reductn				0	0	0	0	0			0	
Reduced v/c Ratio				0.68	0.52	0.33	0.78	0.69			0.70	

Intersection Summary

Area Type: Other

Cycle Length: 80

Actuated Cycle Length: 80

Offset: 56 (70%), Referenced to phase 2:NBTL, Start of Green

Natural Cycle: 65

Control Type: Pretimed

Maximum v/c Ratio: 0.78

Intersection Signal Delay: 15.5

Intersection LOS: B

Intersection Capacity Utilization 60.4%

ICU Level of Service B

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.






















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

Splits and Phases: 754: Cook St. & Yates St.















Lanes, Volumes, Timings
756: Cook St. & Fort St.

01/24/2020

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 						 			 	
Traffic Volume (vph)	112	597	125	0	0	0	0	777	91	152	763	0
Future Volume (vph)	112	597	125	0	0	0	0	777	91	152	763	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.0	3.0	3.0	3.7	3.7	3.7	3.7	3.0	3.7	3.0	3.0	3.7
Storage Length (m)	20.0		20.0	0.0		0.0	0.0		0.0	22.0		0.0
Storage Lanes	1		1	0		0	0		0	1		0
Taper Length (m)	2.5			2.5			2.5			7.5		
Lane Util. Factor	1.00	0.95	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Ped Bike Factor	0.70		0.73					0.97				
Frt			0.850					0.979				
Flt Protected	0.950									0.950		
Satd. Flow (prot)	1516	3032	1357	0	0	0	0	2884	0	1516	3032	0
Flt Permitted	0.950									0.154		
Satd. Flow (perm)	1054	3032	995	0	0	0	0	2884	0	246	3032	0
Right Turn on Red			Yes			Yes			No			Yes
Satd. Flow (RTOR)			142									
Link Speed (k/h)		40			48			40			40	
Link Distance (m)		219.6			205.1			192.6			93.4	
Travel Time (s)		19.8			15.4			17.3			8.4	
Confl. Peds. (#/hr)	94		161						133	133		
Confl. Bikes (#/hr)			1									
Peak Hour Factor	0.74	0.93	0.73	0.25	0.25	0.25	0.25	0.88	0.65	0.89	0.89	0.25
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	151	642	171	0	0	0	0	883	140	171	857	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	151	642	171	0	0	0	0	1023	0	171	857	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.0			3.0			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			4.8	
Two way Left Turn Lane												
Headway Factor	1.25	1.25	1.25	1.13	1.13	1.13	1.13	1.25	1.13	1.25	1.25	1.13
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type	Prot	NA	Perm					NA		pm+pt	NA	
Protected Phases	7	8						2		1	6	
Permitted Phases			8							6		
Minimum Split (s)	10.5	22.5	22.5					22.5		10.0	22.5	
Total Split (s)	10.5	33.0	33.0					27.0		10.0	37.0	
Total Split (%)	13.0%	41.0%	41.0%					33.5%		12.4%	46.0%	
Maximum Green (s)	6.0	28.0	28.0					22.0		6.0	32.0	
Yellow Time (s)	3.5	4.0	4.0					4.0		3.0	4.0	
All-Red Time (s)	1.0	1.0	1.0					1.0		1.0	1.0	
Lost Time Adjust (s)	-1.0	-1.0	-1.0					-1.0		0.0	-1.0	
Total Lost Time (s)	3.5	4.0	4.0					4.0		4.0	4.0	
Lead/Lag	Lag	Lead	Lead					Lag		Lead		
Lead-Lag Optimize?	Yes	Yes	Yes					Yes		Yes		
Walk Time (s)		7.0	7.0					7.0			7.0	

Lanes, Volumes, Timings
756: Cook St. & Fort St.

01/24/2020

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Flash Dont Walk (s)		8.0	8.0					9.0			9.0	
Pedestrian Calls (#/hr)		60	60					60			60	
Act Effect Green (s)	7.0	29.0	29.0					23.0		33.0	33.0	
Actuated g/C Ratio	0.09	0.36	0.36					0.29		0.41	0.41	
v/c Ratio	1.15	0.59	0.38					1.24		0.88	0.69	
Control Delay	162.7	23.6	7.9					147.2		60.7	23.1	
Queue Delay	0.0	0.0	0.0					0.0		0.0	4.2	
Total Delay	162.7	23.6	7.9					147.2		60.7	27.3	
LOS	F	C	A					F		E	C	
Approach Delay		42.6						147.2			32.9	
Approach LOS		D						F			C	
Queue Length 50th (m)	~27.5	41.2	2.9					~103.9		16.9	55.1	
Queue Length 95th (m)	#47.2	57.7	9.3					#135.7		#45.6	74.0	
Internal Link Dist (m)		195.6			181.1			168.6			69.4	
Turn Bay Length (m)	20.0		20.0							22.0		
Base Capacity (vph)	131	1092	449					824		195	1242	
Starvation Cap Reductn	0	0	0					0		0	301	
Spillback Cap Reductn	0	0	0					0		0	0	
Storage Cap Reductn	0	0	0					0		0	0	
Reduced v/c Ratio	1.15	0.59	0.38					1.24		0.88	0.91	

Intersection Summary

Area Type: CBD

Cycle Length: 80.5

Actuated Cycle Length: 80.5

Offset: 28 (35%), Referenced to phase 2:NBT, Start of Green

Natural Cycle: 90

Control Type: Pretimed

Maximum v/c Ratio: 1.24

Intersection Signal Delay: 74.8

Intersection LOS: E

Intersection Capacity Utilization 65.5%

ICU Level of Service C

Analysis Period (min) 15

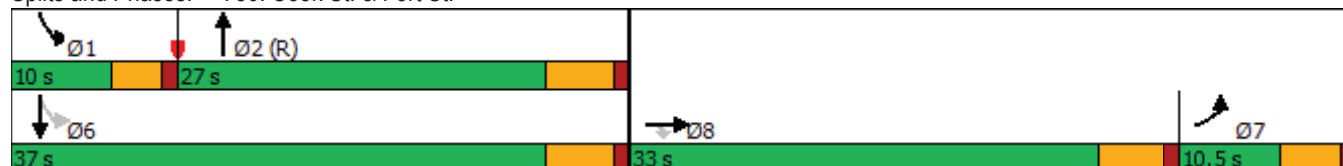
~ Volume exceeds capacity, queue is theoretically infinite.

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: 756: Cook St. & Fort St.















Lanes, Volumes, Timings
756: Cook St. & Fort St.

01/24/2020

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 						 			 	
Traffic Volume (vph)	112	597	125	0	0	0	0	777	91	152	763	0
Future Volume (vph)	112	597	125	0	0	0	0	777	91	152	763	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.0	3.0	3.0	3.7	3.7	3.7	3.7	3.0	3.7	3.0	3.0	3.7
Storage Length (m)	20.0		20.0	0.0		0.0	0.0		0.0	22.0		0.0
Storage Lanes	1		1	0		0	0		0	1		0
Taper Length (m)	2.5			2.5			2.5			7.5		
Lane Util. Factor	1.00	0.95	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Ped Bike Factor	0.76		0.73					0.97				
Frt			0.850					0.979				
Flt Protected	0.950									0.950		
Satd. Flow (prot)	1516	3032	1357	0	0	0	0	2884	0	1516	3032	0
Flt Permitted	0.950									0.118		
Satd. Flow (perm)	1154	3032	995	0	0	0	0	2884	0	188	3032	0
Right Turn on Red			Yes			Yes			No			Yes
Satd. Flow (RTOR)			142									
Link Speed (k/h)		40			48			40			40	
Link Distance (m)		219.6			205.1			192.6			93.4	
Travel Time (s)		19.8			15.4			17.3			8.4	
Confl. Peds. (#/hr)	94		161						133	133		
Confl. Bikes (#/hr)			1									
Peak Hour Factor	0.74	0.93	0.73	0.25	0.25	0.25	0.25	0.88	0.65	0.89	0.89	0.25
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	151	642	171	0	0	0	0	883	140	171	857	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	151	642	171	0	0	0	0	1023	0	171	857	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.0			3.0			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			4.8	
Two way Left Turn Lane												
Headway Factor	1.25	1.25	1.25	1.13	1.13	1.13	1.13	1.25	1.13	1.25	1.25	1.13
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type	Prot	NA	Perm					NA		pm+pt	NA	
Protected Phases	7	8						2		1	6	
Permitted Phases			8							6		
Minimum Split (s)	10.5	22.5	22.5					22.5		10.0	22.5	
Total Split (s)	13.0	22.5	22.5					35.0		10.0	45.0	
Total Split (%)	16.1%	28.0%	28.0%					43.5%		12.4%	55.9%	
Maximum Green (s)	8.5	17.5	17.5					30.0		6.0	40.0	
Yellow Time (s)	3.5	4.0	4.0					4.0		3.0	4.0	
All-Red Time (s)	1.0	1.0	1.0					1.0		1.0	1.0	
Lost Time Adjust (s)	-1.0	-1.0	-1.0					-1.0		0.0	-1.0	
Total Lost Time (s)	3.5	4.0	4.0					4.0		4.0	4.0	
Lead/Lag	Lag	Lead	Lead					Lag		Lead		
Lead-Lag Optimize?	Yes	Yes	Yes					Yes		Yes		
Walk Time (s)		7.0	7.0					7.0			7.0	

Lanes, Volumes, Timings
756: Cook St. & Fort St.

01/24/2020

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Flash Dont Walk (s)		8.0	8.0					9.0			9.0	
Pedestrian Calls (#/hr)		60	60					60			60	
Act Effect Green (s)	9.5	18.5	18.5					31.0		41.0	41.0	
Actuated g/C Ratio	0.12	0.23	0.23					0.39		0.51	0.51	
v/c Ratio	0.85	0.92	0.51					0.92		0.88	0.56	
Control Delay	74.7	51.6	13.2					38.6		57.3	15.2	
Queue Delay	0.0	0.0	0.0					0.0		0.0	2.0	
Total Delay	74.7	51.6	13.2					38.6		57.3	17.2	
LOS	E	D	B					D		E	B	
Approach Delay		48.4						38.6			23.9	
Approach LOS		D						D			C	
Queue Length 50th (m)	23.0	50.6	3.5					76.6		13.6	44.5	
Queue Length 95th (m)	#39.6	#81.7	11.4					#111.3		#45.9	59.7	
Internal Link Dist (m)		195.6			181.1			168.6			69.4	
Turn Bay Length (m)	20.0		20.0							22.0		
Base Capacity (vph)	178	696	338					1110		194	1544	
Starvation Cap Reductn	0	0	0					0		0	509	
Spillback Cap Reductn	0	0	0					0		0	0	
Storage Cap Reductn	0	0	0					0		0	0	
Reduced v/c Ratio	0.85	0.92	0.51					0.92		0.88	0.83	

Intersection Summary

Area Type: CBD

Cycle Length: 80.5

Actuated Cycle Length: 80.5

Offset: 28 (35%), Referenced to phase 2:NBT, Start of Green

Natural Cycle: 90

Control Type: Pretimed

Maximum v/c Ratio: 0.92

Intersection Signal Delay: 36.7

Intersection LOS: D

Intersection Capacity Utilization 65.5%

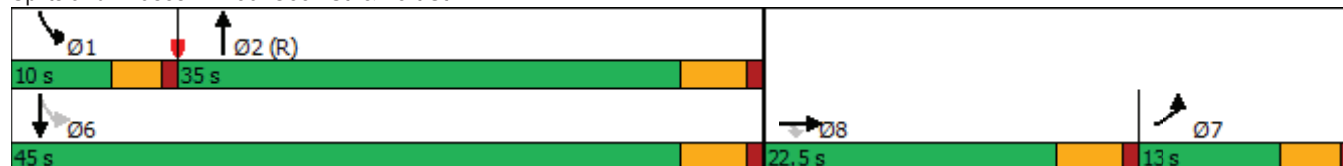
ICU Level of Service C

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.



















Splits and Phases: 756: Cook St. & Fort St.



APPENDIX D: POST DEVELOPMENT PEAK HOUR TRAFFIC CONDITIONS













Lanes, Volumes, Timings
166: Cook St. & View St./View St

01/24/2020

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	163	5	108	5	5	55	83	800	10	70	812	236
Future Volume (vph)	163	5	108	5	5	55	83	800	10	70	812	236
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		0.0	15.0		0.0	15.0		0.0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (m)	2.5			2.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt		0.945			0.889			0.998			0.963	
Flt Protected		0.972			0.996		0.950			0.950		
Satd. Flow (prot)	0	1765	0	0	1701	0	1789	3571	0	1789	3446	0
Flt Permitted		0.788			0.963		0.179			0.278		
Satd. Flow (perm)	0	1431	0	0	1645	0	337	3571	0	524	3446	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		46			73			3			88	
Link Speed (k/h)		50			48			40			40	
Link Distance (m)		57.0			209.0			93.4			88.8	
Travel Time (s)		4.1			15.7			8.4			8.0	
Peak Hour Factor	0.75	0.65	0.70	0.65	0.65	0.75	0.70	0.96	0.70	0.85	0.97	0.85
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	217	8	154	8	8	73	119	833	14	82	837	278
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	379	0	0	89	0	119	847	0	82	1115	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Minimum Split (s)	23.0	23.0		23.0	23.0		23.0	23.0		23.0	23.0	
Total Split (s)	32.0	32.0		32.0	32.0		48.0	48.0		48.0	48.0	
Total Split (%)	40.0%	40.0%		40.0%	40.0%		60.0%	60.0%		60.0%	60.0%	
Maximum Green (s)	27.0	27.0		27.0	27.0		43.0	43.0		43.0	43.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		5.0			5.0		5.0	5.0		5.0	5.0	
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effect Green (s)		27.0			27.0		43.0	43.0		43.0	43.0	
Actuated g/C Ratio		0.34			0.34		0.54	0.54		0.54	0.54	

Lanes, Volumes, Timings
166: Cook St. & View St./View St

01/24/2020

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
v/c Ratio		0.74			0.15		0.66	0.44		0.29	0.59	
Control Delay		30.8			7.2		34.8	12.1		13.9	13.5	
Queue Delay		0.0			0.0		0.0	1.4		0.0	1.4	
Total Delay		30.8			7.2		34.8	13.5		13.9	14.9	
LOS		C			A		C	B		B	B	
Approach Delay		30.8			7.2			16.1			14.8	
Approach LOS		C			A			B			B	
Queue Length 50th (m)		44.2			1.6		12.0	38.1		8.4	66.0	
Queue Length 95th (m)		45.4			5.3		21.7	51.1		m16.6	90.1	
Internal Link Dist (m)		33.0			185.0			69.4			64.8	
Turn Bay Length (m)							15.0			15.0		
Base Capacity (vph)		513			603		181	1920		281	1892	
Starvation Cap Reductn		0			0		0	821		0	538	
Spillback Cap Reductn		0			0		0	0		0	0	
Storage Cap Reductn		0			0		0	0		0	0	
Reduced v/c Ratio		0.74			0.15		0.66	0.77		0.29	0.82	

Intersection Summary

Area Type: Other

Cycle Length: 80

Actuated Cycle Length: 80

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

Natural Cycle: 60

Control Type: Pretimed

Maximum v/c Ratio: 0.74

Intersection Signal Delay: 17.3

Intersection LOS: B

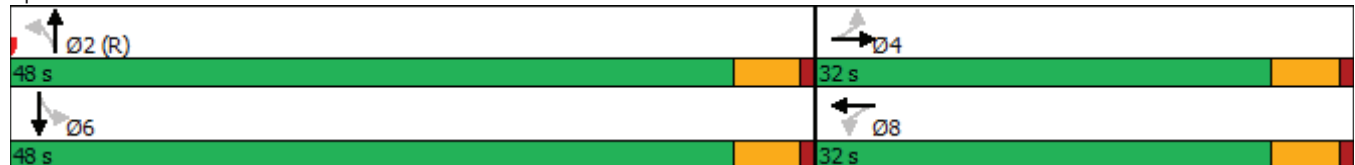
Intersection Capacity Utilization 69.6%

ICU Level of Service C

Analysis Period (min) 15




















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

Splits and Phases: 166: Cook St. & View St./View St















Lanes, Volumes, Timings
754: Cook St. & Yates St.

01/24/2020

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	255	503	101	139	915	0	0	887	127
Future Volume (vph)	0	0	0	255	503	101	139	915	0	0	887	127
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
Storage Length (m)	0.0		0.0	12.0		30.0	35.0		0.0	0.0		0.0
Storage Lanes	0		0	1		1	1		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.95
Ped Bike Factor				0.82		0.81	0.99				0.98	
Frt						0.850					0.981	
Flt Protected				0.950			0.950					
Satd. Flow (prot)	0	0	0	1770	3539	1583	1770	3539	0	0	3413	0
Flt Permitted				0.950			0.174					
Satd. Flow (perm)	0	0	0	1452	3539	1289	319	3539	0	0	3413	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						128					30	
Link Speed (k/h)		40			45			40			40	
Link Distance (m)		165.1			307.3			88.8			98.6	
Travel Time (s)		14.9			24.6			8.0			8.9	
Confl. Peds. (#/hr)				112		111	92					92
Peak Hour Factor	0.25	0.25	0.25	0.89	0.95	0.65	0.88	0.92	0.25	0.25	0.85	0.82
Adj. Flow (vph)	0	0	0	287	529	155	158	995	0	0	1044	155
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	287	529	155	158	995	0	0	1199	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type				Perm	NA	Perm	Perm	NA			NA	
Protected Phases					8			2				6
Permitted Phases				8		8	2					
Minimum Split (s)				23.0	23.0	23.0	23.0	23.0			23.0	
Total Split (s)				27.0	27.0	27.0	53.0	53.0			53.0	
Total Split (%)				33.8%	33.8%	33.8%	66.3%	66.3%			66.3%	
Maximum Green (s)				22.0	22.0	22.0	48.0	48.0			48.0	
Yellow Time (s)				4.0	4.0	4.0	4.0	4.0			4.0	
All-Red Time (s)				1.0	1.0	1.0	1.0	1.0			1.0	
Lost Time Adjust (s)				-1.0	-1.0	-1.0	-1.0	-1.0			-1.0	
Total Lost Time (s)				4.0	4.0	4.0	4.0	4.0			4.0	
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)				7.0	7.0	7.0	7.0	7.0			7.0	
Flash Dont Walk (s)				8.0	8.0	8.0	11.0	11.0			11.0	
Pedestrian Calls (#/hr)				20	20	20	20	20			20	

Lanes, Volumes, Timings
754: Cook St. & Yates St.

01/24/2020

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Act Effect Green (s)				23.0	23.0	23.0	49.0	49.0			49.0	
Actuated g/C Ratio				0.29	0.29	0.29	0.61	0.61			0.61	
v/c Ratio				0.69	0.52	0.34	0.81	0.46			0.57	
Control Delay				35.4	26.1	8.6	46.2	6.7			10.3	
Queue Delay				0.0	0.0	0.0	0.0	0.6			0.5	
Total Delay				35.4	26.1	8.6	46.2	7.3			10.8	
LOS				D	C	A	D	A			B	
Approach Delay					26.1			12.6			10.8	
Approach LOS					C			B			B	
Queue Length 50th (m)				38.6	35.3	3.0	13.4	25.2			49.7	
Queue Length 95th (m)				#65.1	49.8	7.0	m#48.1	31.4			59.8	
Internal Link Dist (m)		141.1			283.3			64.8			74.6	
Turn Bay Length (m)				12.0		30.0	35.0					
Base Capacity (vph)				417	1017	461	195	2167			2102	
Starvation Cap Reductn				0	0	0	0	728			0	
Spillback Cap Reductn				0	0	0	0	0			435	
Storage Cap Reductn				0	0	0	0	0			0	
Reduced v/c Ratio				0.69	0.52	0.34	0.81	0.69			0.72	

Intersection Summary

Area Type: Other

Cycle Length: 80

Actuated Cycle Length: 80

Offset: 56 (70%), Referenced to phase 2:NBTL, Start of Green

Natural Cycle: 70

Control Type: Pretimed

Maximum v/c Ratio: 0.81

Intersection Signal Delay: 15.9

Intersection LOS: B

Intersection Capacity Utilization 61.1%

ICU Level of Service B

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.






















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

Splits and Phases: 754: Cook St. & Yates St.















Lanes, Volumes, Timings
756: Cook St. & Fort St.

01/24/2020

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 						 			 	
Traffic Volume (vph)	114	597	125	0	0	0	0	779	91	155	765	0
Future Volume (vph)	114	597	125	0	0	0	0	779	91	155	765	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.0	3.0	3.0	3.7	3.7	3.7	3.7	3.0	3.7	3.0	3.0	3.7
Storage Length (m)	20.0		20.0	0.0		0.0	0.0		0.0	22.0		0.0
Storage Lanes	1		1	0		0	0		0	1		0
Taper Length (m)	2.5			2.5			2.5			7.5		
Lane Util. Factor	1.00	0.95	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Ped Bike Factor	0.70		0.73					0.97				
Frt			0.850					0.980				
Flt Protected	0.950									0.950		
Satd. Flow (prot)	1516	3032	1357	0	0	0	0	2887	0	1516	3032	0
Flt Permitted	0.950									0.154		
Satd. Flow (perm)	1054	3032	995	0	0	0	0	2887	0	246	3032	0
Right Turn on Red			Yes			Yes			No			Yes
Satd. Flow (RTOR)			142									
Link Speed (k/h)		40			48			40			40	
Link Distance (m)		219.6			205.1			192.6			93.4	
Travel Time (s)		19.8			15.4			17.3			8.4	
Confl. Peds. (#/hr)	94		161						133	133		
Confl. Bikes (#/hr)			1									
Peak Hour Factor	0.74	0.93	0.73	0.25	0.25	0.25	0.25	0.88	0.65	0.89	0.89	0.25
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	154	642	171	0	0	0	0	885	140	174	860	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	154	642	171	0	0	0	0	1025	0	174	860	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.0			3.0			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			4.8	
Two way Left Turn Lane												
Headway Factor	1.25	1.25	1.25	1.13	1.13	1.13	1.13	1.25	1.13	1.25	1.25	1.13
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type	Prot	NA	Perm					NA		pm+pt	NA	
Protected Phases	7	8						2		1	6	
Permitted Phases			8							6		
Minimum Split (s)	10.5	22.5	22.5					22.5		10.0	22.5	
Total Split (s)	10.5	33.0	33.0					27.0		10.0	37.0	
Total Split (%)	13.0%	41.0%	41.0%					33.5%		12.4%	46.0%	
Maximum Green (s)	6.0	28.0	28.0					22.0		6.0	32.0	
Yellow Time (s)	3.5	4.0	4.0					4.0		3.0	4.0	
All-Red Time (s)	1.0	1.0	1.0					1.0		1.0	1.0	
Lost Time Adjust (s)	-1.0	-1.0	-1.0					-1.0		0.0	-1.0	
Total Lost Time (s)	3.5	4.0	4.0					4.0		4.0	4.0	
Lead/Lag	Lag	Lead	Lead					Lag		Lead		
Lead-Lag Optimize?	Yes	Yes	Yes					Yes		Yes		
Walk Time (s)		7.0	7.0					7.0			7.0	

Lanes, Volumes, Timings
756: Cook St. & Fort St.

01/24/2020

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Flash Dont Walk (s)		8.0	8.0					9.0			9.0	
Pedestrian Calls (#/hr)		60	60					60			60	
Act Effect Green (s)	7.0	29.0	29.0					23.0		33.0	33.0	
Actuated g/C Ratio	0.09	0.36	0.36					0.29		0.41	0.41	
v/c Ratio	1.18	0.59	0.38					1.24		0.89	0.69	
Control Delay	170.1	23.6	7.9					148.2		63.5	23.2	
Queue Delay	0.0	0.0	0.0					0.0		0.0	4.3	
Total Delay	170.1	23.6	7.9					148.2		63.5	27.5	
LOS	F	C	A					F		E	C	
Approach Delay		44.1						148.2			33.6	
Approach LOS		D						F			C	
Queue Length 50th (m)	~28.5	41.2	2.9					~104.2		17.3	55.4	
Queue Length 95th (m)	#48.2	57.7	9.3					#136.0		#46.9	74.3	
Internal Link Dist (m)		195.6			181.1			168.6			69.4	
Turn Bay Length (m)	20.0		20.0							22.0		
Base Capacity (vph)	131	1092	449					824		195	1242	
Starvation Cap Reductn	0	0	0					0		0	300	
Spillback Cap Reductn	0	0	0					0		0	0	
Storage Cap Reductn	0	0	0					0		0	0	
Reduced v/c Ratio	1.18	0.59	0.38					1.24		0.89	0.91	

Intersection Summary

Area Type: CBD

Cycle Length: 80.5

Actuated Cycle Length: 80.5

Offset: 28 (35%), Referenced to phase 2:NBT, Start of Green

Natural Cycle: 90

Control Type: Pretimed

Maximum v/c Ratio: 1.24

Intersection Signal Delay: 75.8

Intersection LOS: E

Intersection Capacity Utilization 65.7%

ICU Level of Service C

Analysis Period (min) 15

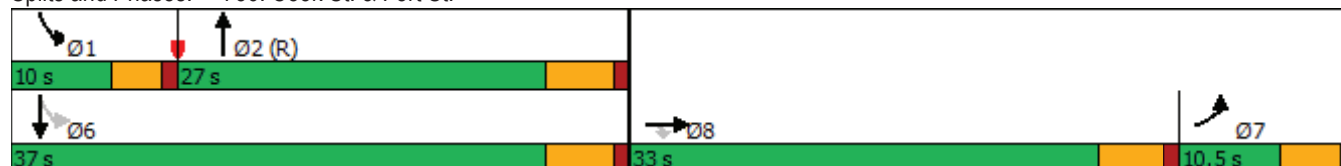
~ Volume exceeds capacity, queue is theoretically infinite.

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: 756: Cook St. & Fort St.
























HCM 2010 TWSC
5: Site Access & View St.

01/24/2020

Intersection						
Int Delay, s/veh	0.9					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	263	13	19	300	9	13
Future Vol, veh/h	263	13	19	300	9	13
Conflicting Peds, #/hr	0	30	30	0	30	30
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	85	70	70	85	70	70
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	309	19	27	353	13	19
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	358	0	786	379
Stage 1	-	-	-	-	349	-
Stage 2	-	-	-	-	437	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1212	-	364	672
Stage 1	-	-	-	-	719	-
Stage 2	-	-	-	-	655	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1177	-	333	634
Mov Cap-2 Maneuver	-	-	-	-	333	-
Stage 1	-	-	-	-	678	-
Stage 2	-	-	-	-	636	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		0.6		13.3	
HCM LOS					B	
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	463	-	-	1177	-	
HCM Lane V/C Ratio	0.068	-	-	0.023	-	
HCM Control Delay (s)	13.3	-	-	8.1	0	
HCM Lane LOS	B	-	-	A	A	
HCM 95th %tile Q(veh)	0.2	-	-	0.1	-	

Lanes, Volumes, Timings
756: Cook St. & Fort St.













01/24/2020

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 						 			 	
Traffic Volume (vph)	114	597	125	0	0	0	0	779	91	155	765	0
Future Volume (vph)	114	597	125	0	0	0	0	779	91	155	765	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.0	3.0	3.0	3.7	3.7	3.7	3.7	3.0	3.7	3.0	3.0	3.7
Storage Length (m)	20.0		20.0	0.0		0.0	0.0		0.0	22.0		0.0
Storage Lanes	1		1	0		0	0		0	1		0
Taper Length (m)	2.5			2.5			2.5			7.5		
Lane Util. Factor	1.00	0.95	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Ped Bike Factor	0.76		0.73					0.97				
Frt			0.850					0.980				
Flt Protected	0.950									0.950		
Satd. Flow (prot)	1516	3032	1357	0	0	0	0	2887	0	1516	3032	0
Flt Permitted	0.950									0.118		
Satd. Flow (perm)	1154	3032	995	0	0	0	0	2887	0	188	3032	0
Right Turn on Red			Yes			Yes			No			Yes
Satd. Flow (RTOR)			142									
Link Speed (k/h)		40			48			40			40	
Link Distance (m)		219.6			205.1			192.6			93.4	
Travel Time (s)		19.8			15.4			17.3			8.4	
Confl. Peds. (#/hr)	94		161						133	133		
Confl. Bikes (#/hr)			1									
Peak Hour Factor	0.74	0.93	0.73	0.25	0.25	0.25	0.25	0.88	0.65	0.89	0.89	0.25
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	154	642	171	0	0	0	0	885	140	174	860	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	154	642	171	0	0	0	0	1025	0	174	860	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.0			3.0			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			4.8	
Two way Left Turn Lane												
Headway Factor	1.25	1.25	1.25	1.13	1.13	1.13	1.13	1.25	1.13	1.25	1.25	1.13
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type	Prot	NA	Perm					NA		pm+pt	NA	
Protected Phases	7	8						2		1	6	
Permitted Phases			8							6		
Minimum Split (s)	10.5	22.5	22.5					22.5		10.0	22.5	
Total Split (s)	13.0	22.5	22.5					35.0		10.0	45.0	
Total Split (%)	16.1%	28.0%	28.0%					43.5%		12.4%	55.9%	
Maximum Green (s)	8.5	17.5	17.5					30.0		6.0	40.0	
Yellow Time (s)	3.5	4.0	4.0					4.0		3.0	4.0	
All-Red Time (s)	1.0	1.0	1.0					1.0		1.0	1.0	
Lost Time Adjust (s)	-1.0	-1.0	-1.0					-1.0		0.0	-1.0	
Total Lost Time (s)	3.5	4.0	4.0					4.0		4.0	4.0	
Lead/Lag	Lag	Lead	Lead					Lag		Lead		
Lead-Lag Optimize?	Yes	Yes	Yes					Yes		Yes		
Walk Time (s)		7.0	7.0					7.0			7.0	

Lanes, Volumes, Timings

756: Cook St. & Fort St.

01/24/2020

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Flash Dont Walk (s)		8.0	8.0					9.0			9.0	
Pedestrian Calls (#/hr)		60	60					60			60	
Act Effect Green (s)	9.5	18.5	18.5					31.0		41.0	41.0	
Actuated g/C Ratio	0.12	0.23	0.23					0.39		0.51	0.51	
v/c Ratio	0.87	0.92	0.51					0.92		0.90	0.56	
Control Delay	77.5	51.6	13.2					38.7		60.2	15.3	
Queue Delay	0.0	0.0	0.0					0.0		0.0	2.0	
Total Delay	77.5	51.6	13.2					38.7		60.2	17.3	
LOS	E	D	B					D		E	B	
Approach Delay		48.9						38.7			24.5	
Approach LOS		D						D			C	
Queue Length 50th (m)	23.5	50.6	3.5					76.8		13.9	44.7	
Queue Length 95th (m)	#40.6	#81.7	11.4					#111.6		#47.2	60.1	
Internal Link Dist (m)		195.6			181.1			168.6			69.4	
Turn Bay Length (m)	20.0		20.0							22.0		
Base Capacity (vph)	178	696	338					1111		194	1544	
Starvation Cap Reductn	0	0	0					0		0	508	
Spillback Cap Reductn	0	0	0					0		0	0	
Storage Cap Reductn	0	0	0					0		0	0	
Reduced v/c Ratio	0.87	0.92	0.51					0.92		0.90	0.83	

Intersection Summary

Area Type: CBD

Cycle Length: 80.5

Actuated Cycle Length: 80.5

Offset: 28 (35%), Referenced to phase 2:NBT, Start of Green

Natural Cycle: 90

Control Type: Pretimed

Maximum v/c Ratio: 0.92

Intersection Signal Delay: 37.1

Intersection LOS: D

Intersection Capacity Utilization 65.7%

ICU Level of Service C

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

Splits and Phases: 756: Cook St. & Fort St.

