Memorandum

To: BTC Mall Associates, LLC

Date: February 26, 2021

Project #: 57881.00

From: Jennifer Conley, PE, PTOE

Re: CityPlace Burlington
Response to Comments

VHB completed a Traffic Impact Study (TIS) dated January 2017 for the redevelopment of the Burlington Town Center Mall between St. Paul Street and Pine Street into the mixed use Burlington Town Center (2017 TIS)[1]. VHB completed an update to the 2017 TIS in March 2020 for a new building program for the redevelopment of the Burlington Town Center into the mixed use CityPlace Burlington (CPB) (2020 CPB TIS)[2]. The building program for the CPB site had since changes and VHB has completed a Supplemental Traffic Analysis (STA) for the proposed revision to the building program (October CPB STA).[3] VHB has received comments from the City's Transportation Peer Review Consultant, CHA on the TIS and STA. Responses to CHA's comments are below.

Response to Comments

Comment 1: *We agree with the trip generation assessment presented for the proposed development plan as described in the March 2020 TIS and for the revised development plan described in the October 2020 memo. This analysis shows that the current revised development plan will generate about 30% fewer new trips during the AM peak hour and 25% fewer new trips during the PM peak hour than what was proposed in the March 2020 study.*

Response 1: No response required.

Comment 2: *The March 2020 and October 2020 development concepts generate fewer site trips than the original development concept that was analyzed in the January 23, 2017 TIS.*

Response 2: No response required.

Comment 3: *The March 2020 study provided mode share and "internal capture" assessments of the site trips to estimate the amount of new vehicle traffic generated by the project during the peak hours. These calculations were not provided for the current revised development plan documented in the October 2020 Trip Gen Update. The change in the mix and density of land uses of the site may affect the amount of internal capture trips, and consequently affect how much vehicle traffic is generated onto the surrounding street network. The calculations of mode share and "internal capture" should be provided for the current development plan to document the estimated net new vehicle trips generated by the project.* ***A table should be provided comparing the current net vehicle trip generation of the current proposal to the net vehicle trip generation of the former development proposals from March 2020 and January 2017.***

Response 3: A comparison of the net vehicle trip generation of the current building program to the net vehicle trip generation for the former 2017 TIS and 2020 CPB TIS building programs can be found in **Table 1** and **Table 2** respectively below. As shown, the current development proposal is generating significantly fewer (250 to 450 fewer) peak hour vehicle trips than that proposed in the 2017 TIS and approximately 60 fewer peak hour vehicle trips than outlined in the 2020 CPB TIS.

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[1] Burlington Town Center Traffic Impact Study, VHB, January 2017.
[2] CityPlace Burlington Traffic Impact Study, VHB, March 2020.
[3] CityPlace Burlington Supplemental Traffic Analysis, VHB, October 2020.

Table 1: Trip Generation Comparison of October 2020 and January BTC 2017 TIS Building Programs

Current Building Program (City Place Block)

Peak Period	Total Peak Hour Site Generated Trips: Total New (a)	Transit (b)	Bike & Pedestria (c)	Internal Capture (d)	Net New Vehicle Trips = (a) - (b) - (c) - (d)
Weekday Morning		5%	25%	11%	
Enter	91	7	20	12	**52**
Exit	138	8	32	12	**86**
Total	229	16	51	24	**138**
Weekday Evening		5%	25%	30%	
Enter	206	11	37	57	**101**
Exit	176	9	30	57	**81**
Total	383	20	67	114	**182**

January BTC Building Program (Burlington Town Center)

Peak Period	Total Peak Hour Site Generated Trips: Total New (a)	Transit (b)	Bike & Pedestria (c)	Internal Capture (d)	Net New Vehicle Trips = (a) - (b) - (c) - (d)	Net Difference: Net New Vehicle Trips
Weekday Morning		5%	25%	9%		
Enter	440	20	110	40	**270**	-218
Exit	190	10	50	15	**115**	-29
Total	630	30	160	55	**385**	-247
Weekday Evening		5%	24%	16%		
Enter	470	25	115	75	**255**	-154
Exit	685	35	170	110	**370**	-289
Total	1,155	60	285	185	**625**	-443

Table 2: Trip Generation Comparison of October 2020 and March 2020 CPB TIS Building Programs

Current Building Program (City Place Block)

Peak Period	Total Peak Hour Site Generated Trips: Total New (a)	Transit (b)	Bike & Pedestria (c)	Internal Capture (d)	Net New Vehicle Trips = (a) - (b) - (c) - (d)
Weekday Morning		5%	25%	11%	
Enter	91	7	20	12	**52**
Exit	138	8	32	12	**86**
Total	229	16	51	24	**138**
Weekday Evening		5%	25%	30%	
Enter	206	11	37	57	**101**
Exit	176	9	30	57	**81**
Total	383	20	67	114	**182**

March CPB TIS Building Program (City Place Block)

Peak Period	Total Peak Hour Site Generated Trips: Total New (a)	Transit (b)	Bike & Pedestria (c)	Internal Capture (d)	Net New Vehicle Trips = (a) - (b) - (c) - (d)	Net Difference: Net New Vehicle Trips
Weekday Morning		5%	25%	13%		
Enter	154	7	33	21	**93**	-41
Exit	177	8	39	21	**110**	-23
Total	331	15	72	42	**202**	-64
Weekday Evening		5%	25%	33%		
Enter	276	10	48	83	**135**	-34
Exit	232	7	37	83	**105**	-24
Total	508	17	85	166	**240**	-58

Comment 4: *The March 2020 study used the same source traffic data as the previous January 2017 study. Most of this data was originally collected in 2016-2017, but some of the data is from 2013-2015. It is noted that the traffic volumes for the intersection of Main Street and Prospect Street were updated for the March 2020 study using 2017 counts. Although some of this data is more than five years old, it is acceptable to continue to use this data as the basis of the analysis since most of the data is less than five years old, the study is an update of a formerly approved study and the traffic flows have been adjusted and balanced through the study network to adjust for the different years of the counts.*

Response 4: No response required.

Comment 5: *The March 2020 study adjusted the base volumes to reflect 2021 and 2026 conditions. However, the 2021 No-Build volumes at some of the study intersections are lower than the 2019 No-Build condition volumes from the 2017 study even though the 2021 No-Build volumes include the previously permitted phase 1 City Place project traffic. At other locations, the 2021 No-Build volumes are significantly higher; for example, the 2021 No-Build volumes at the Pearl/Colchester/Prospect intersection are 28% higher than the 2019 No-Build volumes and are also higher than the previously projected volumes at this intersection for the 2024 Build condition with the former development concept.* ***Additional supporting documentation should be provided to validate and confirm these calculations of the No-Build and Build volumes. This documentation should include volume diagrams showing the 2021 and 2026 No-Build conditions without the other permitted developments to provide a basis of correlating the volumes from the March 2020 and January 2017 studies.***

Response 5: The variations in the 2021 conditions and the 2019 conditions are primarily due to the adjustment factors applied to reach DHV based on the Red Book data that was available at that time. A number of the DHV adjustment locations resulting in higher adjustments in 2017 than based on the Red Book available in 2020. For example, at ATR ID D096, the DHV adjustment in 2017 was found to be 1.24 and in 2020 it was only 1.14. Other locations resulted in the adjustment increasing significantly between 2017 and 2020. ATR ID D161 included a DHV adjustment of 1.21 in 2017 and 1.43 in 2020. In addition to the DHV adjustments, growth adjustments were also incorporated, but these were much closer for the two different years. The project related traffic added in each analysis year was minimal. The 2021 and 2026 Adjusted Traffic Volumes are provided attached and do not include any specific project developments.

Comment 6: ***The site traffic distribution calculations and volume assignments to the street network should be provided for the March 2020 development concept (since this is the basis of the detailed level-of-service analysis).***

Response 6: The trips were assigned based on the distribution provided in the 2020 CPB TIS and are illustrated on diagrams attached to this memorandum.

Comment 7: *The March 2020 analysis shows that two intersections will have operations at LOS E or LOS F during one or both peak hours in the Build condition.*

- *Pearl Street/Prospect/Colchester (LOS F: AM & PM)*
- *Main/Prospect (LOS E PM)*

This is a significant change in the LOS compared to the study of the former development concept. These intersections were shown in the 2017 study to operate at LOS D or better in the 2024 Build condition. ***Additional information should be provided explaining the factors contributing to the reduced LOS at these locations and to identify improvement strategies to mitigate for these conditions.***

Response 7: The operations for each of these locations was investigated in detail and the results are provided below.

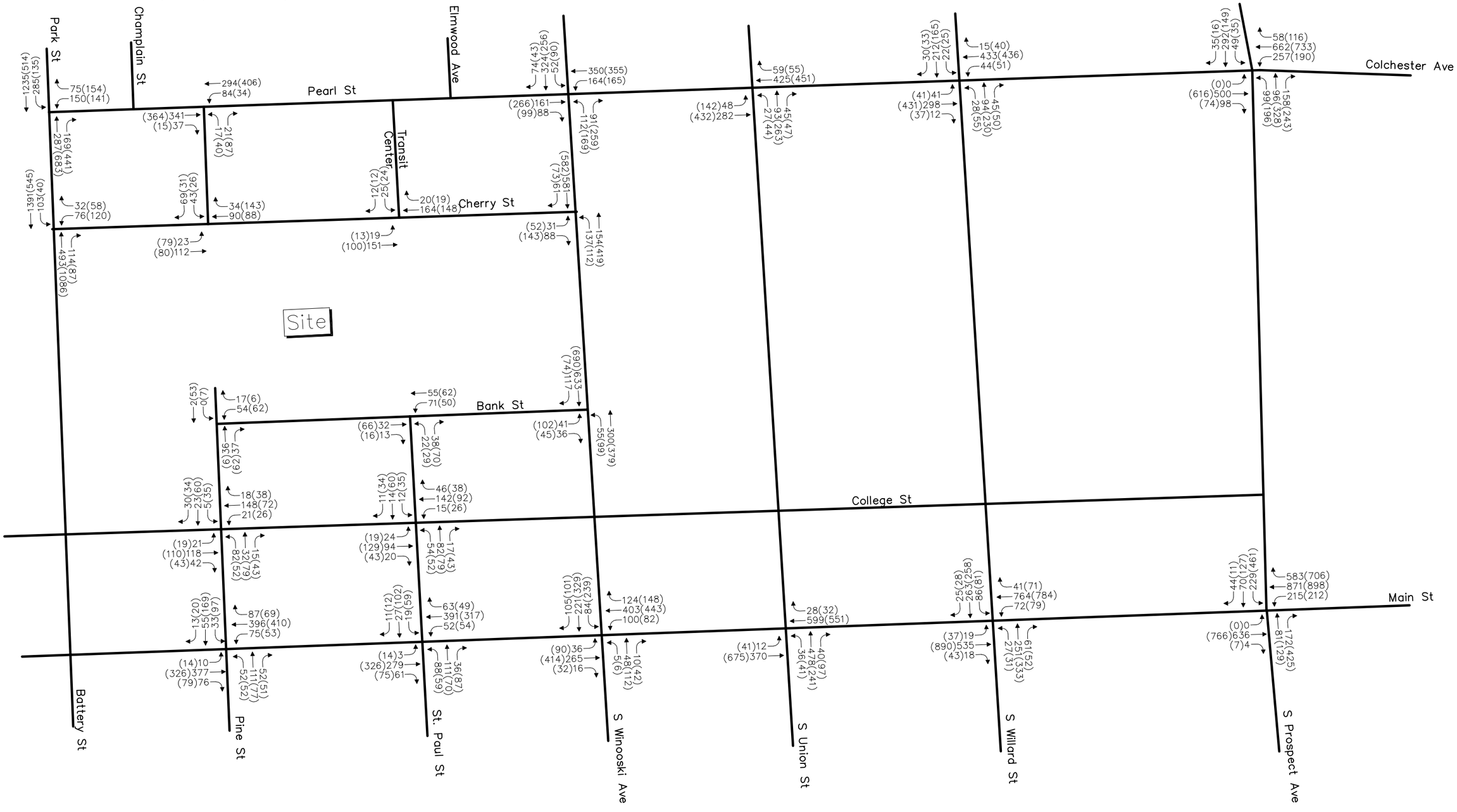
- *Pearl Street/Prospect/Colchester (LOS F: AM & PM): The 2013 scoping study for this intersection did report poor operations for this intersection. This intersection processes a significant volume of traffic during the peak hours (a portion as a result of a 1.51 DHV adjustment). For example, during the 2026 Build Condition PM peak hour, the westbound thru/right lane processes 906 vehicles. This approach is stopped for two phases, when the split phased northbound and southbound traffic are processed, each with a minimum split of 24 seconds, resulting in a LOS F condition. In addition to that red time, the 744 vehicles in the eastbound thru/right lane are also stopped at a red light when the westbound left turn phase receives green time, resulting in LOS F with even longer delays. The synchro analysis indicates that with the current phasing and minimum times, a much longer cycle length (140) would optimally process vehicles. That is not recommended, however, because of the added delay that would be experienced by pedestrians. Even an increase up to 120 seconds results in LOS E operation for vehicles at this volume level. The realignments contemplated in the 2013 Scoping Study would call for the removal of the split phasing and create more efficient operation for all users.*
- *Main/Prospect (LOS E PM): The delay experienced at this intersection can be reduced significantly by adjusting the intersection splits, however, the operation is still an LOS E with just over 55 seconds of delay. Similar to Pearl Street at Prospect and Colchester, the reduction in LOS at this location is primarily caused by the high traffic volumes being processed (967 vehicles in a single westbound thru lane leaves little capacity for other movements). Also similar is the slightly longer cycle length which allows for the splits to be evened out and results in an LOS D condition.*

Comment 8: *The capacity analysis of the intersections along S Winooski Avenue presented in the study are based on the former road configuration (four-lane undivided) of S Winooski Avenue. This analysis does not reflect the current Complete Streets Road Diet improvements that were implemented by the City in October 2020.* ***Additional documentation should be provided to confirm that the traffic volumes developed for the Road Diet project reflect the permitted volumes for the City Place project and to provide updated analysis of the study intersections along S Winooski Avenue for the 2021 and 2026 conditions.***

Response 8: VHB reviewed the operations of the 2026 Build condition traffic volumes with the geometric conditions resulting from the road diet. For the purposes of this analysis, no modifications were made to traffic signal timing or phasing. A quick review of the operations with the Road Diet yields the following LOS results:

1. South Winooski Avenue at Main Street – LOS D
2. South Winooski Avenue at Bank Street – LOS B
3. South Winooski at Cherry Street – LOS B
4. Winooski at Pearl Street - LOS B

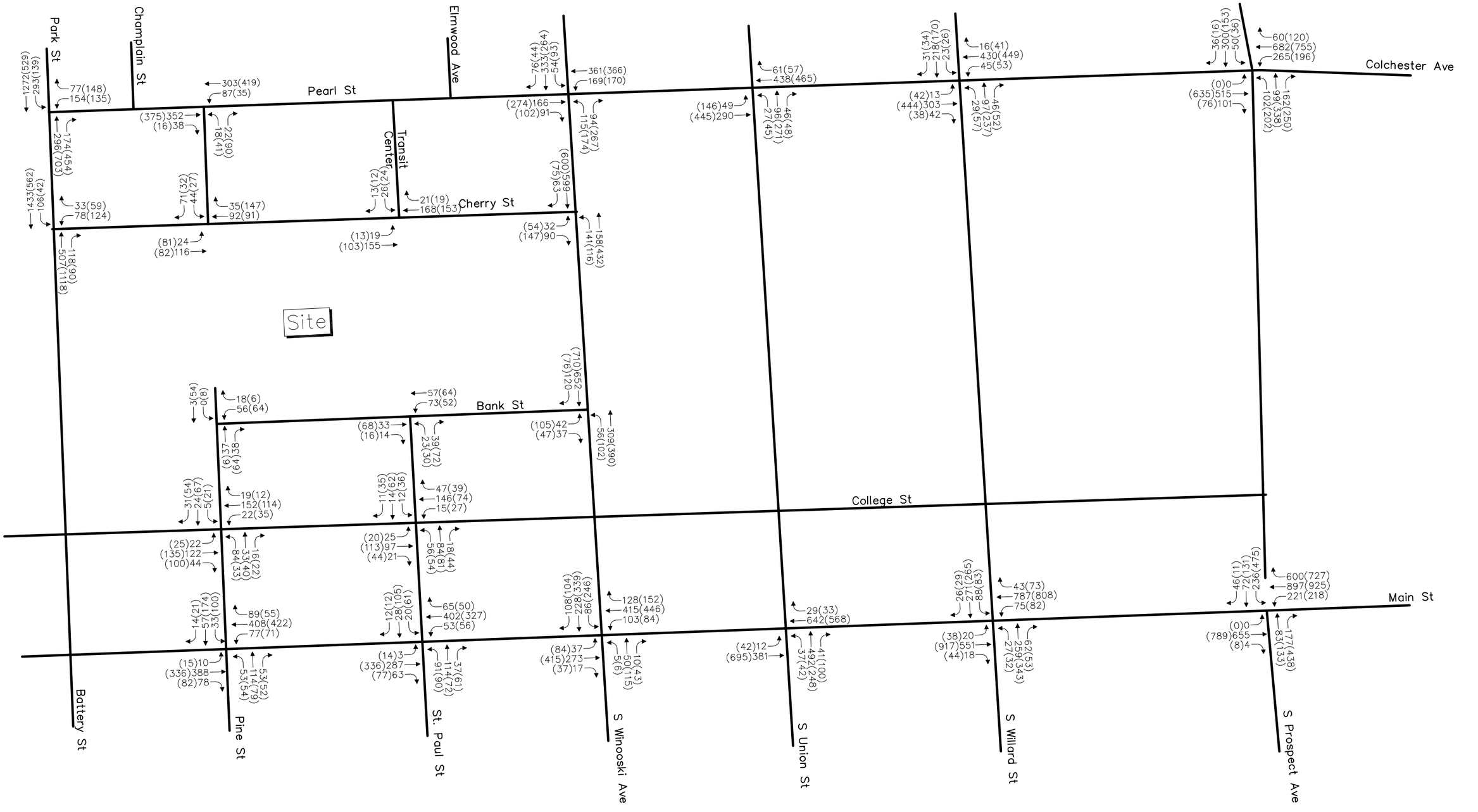
The analysis sheets are provided attached to this memorandum.



Not to Scale

Legend
AM Peak Hour Volume
(PM Peak Hour Volume)

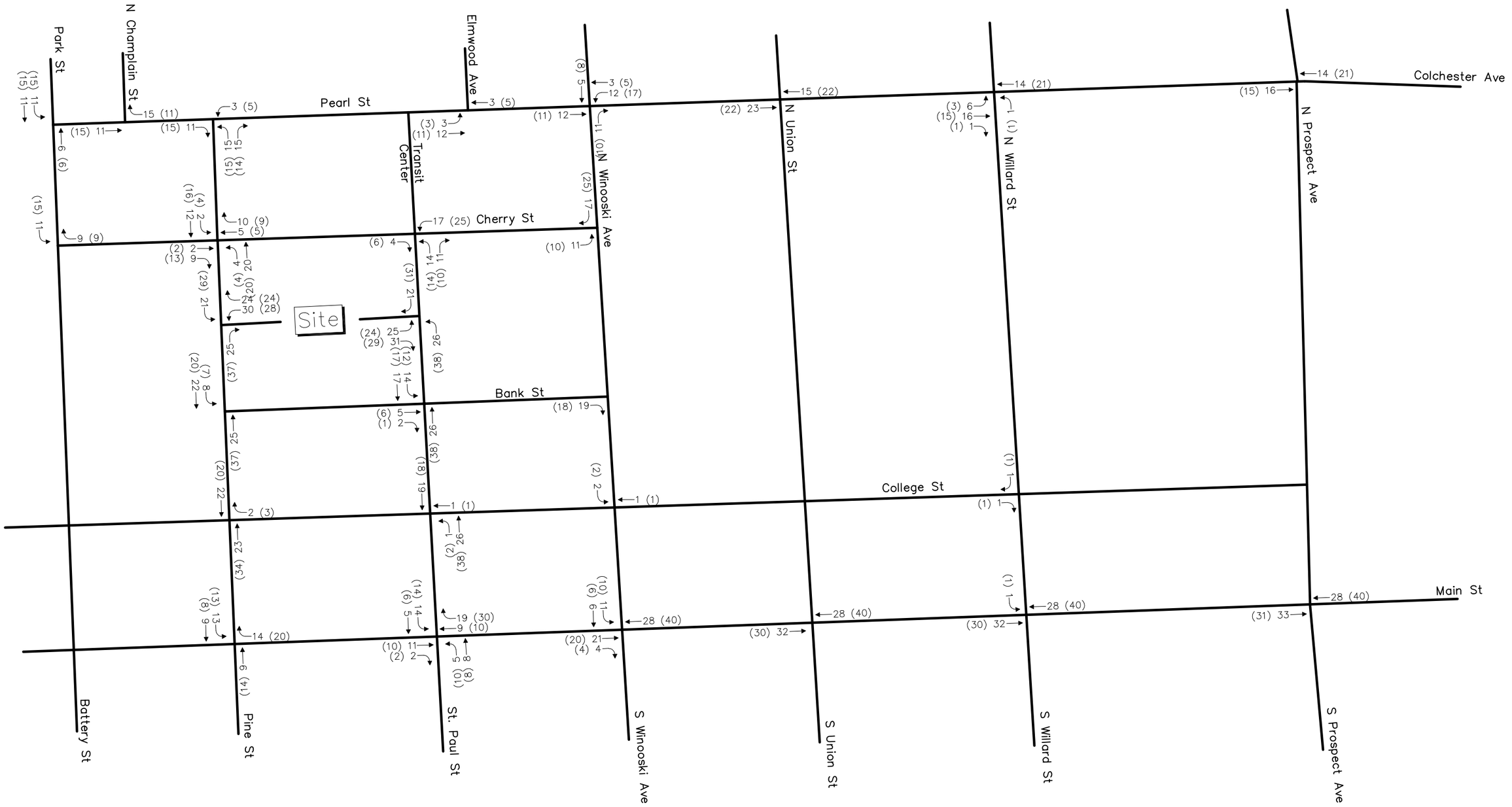
Figure 1
2021 Growth Traffic Volumes
Burlington City Place Block



Not to Scale

Legend
AM Peak Hour Volume
(PM Peak Hour Volume)

Figure 2
2026 Growth Traffic Volumes
Burlington City Place Block

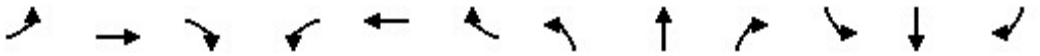


Not to Scale

Legend
AM Peak Hour Volume
(PM Peak Hour Volume)

Appendix
Site Generated Trips
Burlington City Place Block

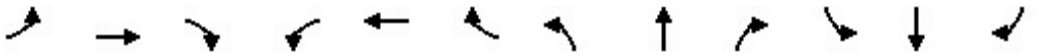
Intersection:	Int. 5 (Battery/Pearl/Park) & Int. 22 (Battery/Cherry)			Int. 10 (Prospect	Int. 15 (S. Winnoski/	Int. 17 (S. Willard/Main)			Pearl/S. Williams	Main/ Summit
ATR ID:	D096			D047	D411	D161			D162	D155
Report Year:	2021	2021	2017	2021	2021	2021	2017	2017	2017	2017
AADT:	17156	17156	17705	5104	4729	19161	14218	14218	16517	11300
DHV (Red Book):	1700	1700	1858	620	580	1900	1507	1492	1698	1198
Corr. Count:	1497	1411	1497	410	607	1330	1355	1232	1393	1042
DHV Adjust:	1.14	1.20	1.24	1.51	0.96	1.43	1.11	1.21	1.22	1.15
TMC YR adjust:	1.04	1.02	1.03	1.04	1.02	1.03	1.02	1.02	1.05	1.05
Total Adjust:	**1.18**	**1.23**	**1.28**	**1.57**	**1.00**	**1.47**	**1.13**	**1.24**	**1.28**	**1.21**



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	306	104	190	386	0	177	0	282	94	282	45
Future Volume (vph)	0	306	104	190	386	0	177	0	282	94	282	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0	6.0	6.0		6.0		6.0	6.0	6.0	
Lane Util. Factor		1.00	1.00	1.00	1.00		1.00		1.00	1.00	1.00	
Frt		1.00	0.85	1.00	1.00		1.00		0.85	1.00	0.98	
Flt Protected		1.00	1.00	0.95	1.00		0.95		1.00	0.95	1.00	
Satd. Flow (prot)		1801	1531	1711	1801		1711		1531	1711	1763	
Flt Permitted		1.00	1.00	0.57	1.00		0.56		1.00	0.95	1.00	
Satd. Flow (perm)		1801	1531	1021	1801		1003		1531	1711	1763	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	306	104	190	386	0	177	0	282	94	282	45
RTOR Reduction (vph)	0	0	68	0	0	0	0	0	171	0	0	0
Lane Group Flow (vph)	0	306	36	190	386	0	177	0	111	94	327	0
Turn Type		NA	Perm	Perm	NA		Perm		Perm	Perm	NA	
Protected Phases		4			8						6	
Permitted Phases			4	8			2		2	6		
Actuated Green, G (s)		15.9	15.9	15.9	15.9		18.2		18.2	18.2	18.2	
Effective Green, g (s)		15.9	15.9	15.9	15.9		18.2		18.2	18.2	18.2	
Actuated g/C Ratio		0.34	0.34	0.34	0.34		0.39		0.39	0.39	0.39	
Clearance Time (s)		6.0	6.0	6.0	6.0		6.0		6.0	6.0	6.0	
Vehicle Extension (s)		3.0	3.0	3.0	3.0		3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)		621	528	352	621		395		604	675	696	
v/s Ratio Prot		0.17			c0.21						c0.19	
v/s Ratio Perm			0.02	0.19			0.18		0.07	0.05		
v/c Ratio		0.49	0.07	0.54	0.62		0.45		0.18	0.14	0.47	
Uniform Delay, d1		11.9	10.1	12.2	12.6		10.3		9.1	8.9	10.4	
Progression Factor		1.00	1.00	1.00	1.00		1.00		1.00	1.00	1.00	
Incremental Delay, d2		0.6	0.1	1.6	1.9		3.6		0.7	0.4	2.3	
Delay (s)		12.5	10.2	13.7	14.5		13.9		9.8	9.4	12.6	
Level of Service		B	B	B	B		B		A	A	B	
Approach Delay (s)		11.9			14.3			11.4			11.9	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	12.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	46.1	Sum of lost time (s)	12.0
Intersection Capacity Utilization	72.3%	ICU Level of Service	C
Analysis Period (min)	15		

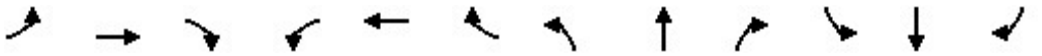
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	668	76	196	786	120	203	339	251	36	154	16
Future Volume (vph)	0	668	76	196	786	120	203	339	251	36	154	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0		6.0	6.0		6.0	6.0	6.0		6.0	
Lane Util. Factor		1.00		1.00	1.00		1.00	1.00	1.00		1.00	
Frt		0.99		1.00	0.98		1.00	1.00	0.85		0.99	
Flt Protected		1.00		0.95	1.00		0.95	1.00	1.00		0.99	
Satd. Flow (prot)		1776		1711	1765		1711	1801	1531		1766	
Flt Permitted		1.00		0.08	1.00		0.95	1.00	1.00		0.99	
Satd. Flow (perm)		1776		136	1765		1711	1801	1531		1766	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	668	76	196	786	120	203	339	251	36	154	16
RTOR Reduction (vph)	0	4	0	0	0	0	0	0	155	0	3	0
Lane Group Flow (vph)	0	740	0	196	906	0	203	339	96	0	203	0
Turn Type		NA		pm+pt	NA		Split	NA	Perm	Split	NA	
Protected Phases		4		3	8		2	2		6	6	
Permitted Phases	4			8					2			
Actuated Green, G (s)		47.0		62.0	62.0		22.0	22.0	22.0		16.6	
Effective Green, g (s)		47.0		62.0	62.0		22.0	22.0	22.0		16.6	
Actuated g/C Ratio		0.40		0.52	0.52		0.19	0.19	0.19		0.14	
Clearance Time (s)		6.0		6.0	6.0		6.0	6.0	6.0		6.0	
Vehicle Extension (s)		3.0		3.0	3.0		3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)		703		190	922		317	334	283		247	
v/s Ratio Prot		0.42		0.08	c0.51		0.12	c0.19			c0.12	
v/s Ratio Perm				c0.46					0.06			
v/c Ratio		1.05		1.03	0.98		0.64	1.01	0.34		0.82	
Uniform Delay, d1		35.8		49.4	27.8		44.6	48.3	42.0		49.6	
Progression Factor		1.00		1.00	1.00		1.00	1.00	1.00		1.00	
Incremental Delay, d2		48.8		73.8	25.7		4.4	53.1	0.7		19.5	
Delay (s)		84.6		123.2	53.5		49.0	101.4	42.7		69.0	
Level of Service		F		F	D		D	F	D		E	
Approach Delay (s)		84.6			65.9			69.4			69.0	
Approach LOS		F			E			E			E	

Intersection Summary			
HCM 2000 Control Delay	72.0	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.05		
Actuated Cycle Length (s)	118.6	Sum of lost time (s)	24.0
Intersection Capacity Utilization	137.3%	ICU Level of Service	H
Analysis Period (min)	15		

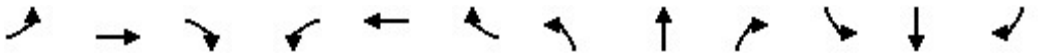
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	90	434	36	85	480	159	6	118	44	264	346	105
Future Volume (vph)	90	434	36	85	480	159	6	118	44	264	346	105
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0			5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.96			0.96		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00			1.00		0.95	1.00	
Satd. Flow (prot)	1711	1780		1711	1733			1734		1711	1738	
Flt Permitted	0.20	1.00		0.27	1.00			0.98		0.54	1.00	
Satd. Flow (perm)	360	1780		483	1733			1702		976	1738	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	90	434	36	85	480	159	6	118	44	264	346	105
RTOR Reduction (vph)	0	5	0	0	20	0	0	21	0	0	18	0
Lane Group Flow (vph)	90	465	0	85	619	0	0	147	0	264	433	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases		2			6			8		7	4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	19.0	19.0		19.0	19.0			18.0		29.0	29.0	
Effective Green, g (s)	20.0	20.0		20.0	20.0			19.0		30.0	30.0	
Actuated g/C Ratio	0.33	0.33		0.33	0.33			0.32		0.50	0.50	
Clearance Time (s)	6.0	6.0		6.0	6.0			6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0		3.0	3.0	
Lane Grp Cap (vph)	120	593		161	577			538		561	869	
v/s Ratio Prot		0.26			c0.36					0.05	c0.25	
v/s Ratio Perm	0.25			0.18				0.09		0.19		
v/c Ratio	0.75	0.78		0.53	1.07			0.27		0.47	0.50	
Uniform Delay, d1	17.8	18.1		16.2	20.0			15.3		9.4	10.0	
Progression Factor	1.00	1.00		1.00	1.00			1.00		1.00	1.00	
Incremental Delay, d2	34.5	10.0		11.8	58.5			1.3		0.6	2.0	
Delay (s)	52.2	28.1		28.0	78.5			16.6		10.0	12.0	
Level of Service	D	C		C	E			B		B	B	
Approach Delay (s)		32.0			72.6			16.6			11.3	
Approach LOS		C			E			B			B	

Intersection Summary			
HCM 2000 Control Delay	37.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	90.4%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	822	8	219	967	728	0	133	439	475	131	11
Future Volume (vph)	0	822	8	219	967	728	0	133	439	475	131	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0		6.0	6.0	6.0		6.0	6.0	6.0	6.0	
Lane Util. Factor		0.95		1.00	1.00	1.00		1.00	1.00	0.97	1.00	
Frt		1.00		1.00	1.00	0.85		1.00	0.85	1.00	0.99	
Flt Protected		1.00		0.95	1.00	1.00		1.00	1.00	0.95	1.00	
Satd. Flow (prot)		3416		1711	1801	1531		1801	1531	3319	1780	
Flt Permitted		1.00		0.95	1.00	1.00		1.00	1.00	0.95	1.00	
Satd. Flow (perm)		3416		1711	1801	1531		1801	1531	3319	1780	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	822	8	219	967	728	0	133	439	475	131	11
RTOR Reduction (vph)	0	1	0	0	0	0	0	0	267	0	0	0
Lane Group Flow (vph)	0	829	0	219	967	728	0	133	172	475	142	0
Turn Type		NA		Prot	NA	Prot		NA	Perm	Prot	NA	
Protected Phases		4		3	8	8		2		1	6	
Permitted Phases									2			
Actuated Green, G (s)		30.1		15.0	51.1	51.1		14.5	14.5	13.1	33.6	
Effective Green, g (s)		30.1		15.0	51.1	51.1		14.5	14.5	13.1	33.6	
Actuated g/C Ratio		0.31		0.16	0.53	0.53		0.15	0.15	0.14	0.35	
Clearance Time (s)		6.0		6.0	6.0	6.0		6.0	6.0	6.0	6.0	
Vehicle Extension (s)		3.0		3.0	3.0	3.0		3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		1063		265	951	809		270	229	449	618	
v/s Ratio Prot		0.24		0.13	c0.54	0.48		0.07		c0.14	0.08	
v/s Ratio Perm									c0.11			
v/c Ratio		0.78		0.83	1.02	0.90		0.49	0.75	1.06	0.23	
Uniform Delay, d1		30.3		39.6	22.8	20.5		37.7	39.4	41.8	22.4	
Progression Factor		1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	
Incremental Delay, d2		5.7		18.6	33.5	15.0		1.4	13.0	58.6	0.2	
Delay (s)		36.0		58.2	56.3	35.5		39.1	52.4	100.4	22.6	
Level of Service		D		E	E	D		D	D	F	C	
Approach Delay (s)		36.0			48.6			49.3			82.5	
Approach LOS		D			D			D			F	

Intersection Summary			
HCM 2000 Control Delay	51.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.05		
Actuated Cycle Length (s)	96.7	Sum of lost time (s)	24.0
Intersection Capacity Utilization	86.4%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	65	149	117	441	612	101
Future Volume (vph)	65	149	117	441	612	101
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0		6.0	6.0	6.0	
Lane Util. Factor	1.00		1.00	1.00	1.00	
Frt	0.91		1.00	1.00	0.98	
Flt Protected	0.99		0.95	1.00	1.00	
Satd. Flow (prot)	1607		1711	1801	1766	
Flt Permitted	0.99		0.28	1.00	1.00	
Satd. Flow (perm)	1607		500	1801	1766	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	65	149	117	441	612	101
RTOR Reduction (vph)	105	0	0	0	9	0
Lane Group Flow (vph)	109	0	117	441	704	0
Turn Type	Prot		Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases			2			
Actuated Green, G (s)	6.9		21.7	21.7	21.7	
Effective Green, g (s)	6.9		21.7	21.7	21.7	
Actuated g/C Ratio	0.17		0.53	0.53	0.53	
Clearance Time (s)	6.0		6.0	6.0	6.0	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	273		267	962	943	
v/s Ratio Prot	c0.07			0.24	c0.40	
v/s Ratio Perm			0.23			
v/c Ratio	0.40		0.44	0.46	0.75	
Uniform Delay, d1	15.0		5.7	5.8	7.3	
Progression Factor	1.00		1.00	1.00	1.00	
Incremental Delay, d2	1.0		5.2	1.6	5.4	
Delay (s)	16.0		10.9	7.4	12.7	
Level of Service	B		B	A	B	
Approach Delay (s)	16.0			8.1	12.7	
Approach LOS	B			A	B	

Intersection Summary			
HCM 2000 Control Delay	11.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	40.6	Sum of lost time (s)	12.0
Intersection Capacity Utilization	72.6%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBU	SBT	SBR
Lane Configurations							
Traffic Volume (vph)	106	65	103	397	5	723	77
Future Volume (vph)	106	65	103	397	5	723	77
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0	6.0	6.0	6.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.85	1.00	1.00	1.00	0.99	
Flt Protected	0.95	1.00	0.95	1.00	0.95	1.00	
Satd. Flow (prot)	1711	1531	1711	1801	1711	1775	
Flt Permitted	0.95	1.00	0.23	1.00	0.53	1.00	
Satd. Flow (perm)	1711	1531	409	1801	951	1775	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	106	65	103	397	5	723	77
RTOR Reduction (vph)	0	55	0	0	0	6	0
Lane Group Flow (vph)	106	10	103	397	5	794	0
Turn Type	Prot	Perm	Perm	NA	Perm	NA	
Protected Phases	4			2		6	
Permitted Phases		4	2		6		
Actuated Green, G (s)	6.8	6.8	24.1	24.1	24.1	24.1	
Effective Green, g (s)	6.8	6.8	24.1	24.1	24.1	24.1	
Actuated g/C Ratio	0.16	0.16	0.56	0.56	0.56	0.56	
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	271	242	229	1011	534	997	
v/s Ratio Prot	c0.06			0.22		c0.45	
v/s Ratio Perm		0.01	0.25		0.01		
v/c Ratio	0.39	0.04	0.45	0.39	0.01	0.80	
Uniform Delay, d1	16.2	15.3	5.5	5.3	4.1	7.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.9	0.1	6.3	1.1	0.0	6.6	
Delay (s)	17.1	15.4	11.8	6.4	4.2	14.1	
Level of Service	B	B	B	A	A	B	
Approach Delay (s)	16.5			7.5		14.0	
Approach LOS	B			A		B	

Intersection Summary			
HCM 2000 Control Delay	12.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	42.9	Sum of lost time (s)	12.0
Intersection Capacity Utilization	69.3%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group