

WELLS + ASSOCIATES
MEMORANDUM



To: Patrick Mulhern
Town of Vienna

From: Michael R. Pinkoske, PTP
John A. Schick

Re: Flagship Carwash Redevelopment

Subject: Traffic Impact Analysis (April 6, 2016) Addendum

Date: April 19, 2016

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Introduction

This addendum provides an update to the operational analysis of the future conditions with development for the proposed Flagship Carwash redevelopment in the Town of Vienna, Virginia. It is based on the previously submitted Traffic Impact Analysis dated April 6, 2016 ("April 6th TIA") and reflects the removal of vehicular traffic from service drive in front of the building. It is noted that the service drive will remain to only serve as a loading zone prior to regular store hours. Vehicular traffic will not be permitted to use the drive aisle. All vehicular traffic exiting the drive-thru will only be permitted to turn right onto Maple Avenue.

Revised Traffic Forecasts. The updated traffic circulation plan for the proposed development without the service drive (for drive-thru traffic) results in modifications to Figure 10 (Restaurant Pass-By Trips), Figure 11 (Restaurant Primary Trips), and Figure 15 (2017 Future Peak Hour Traffic Forecasts) of the April 6th TIA. It should be noted that since the site's primary access is restricted to right-in right-out, it is assumed that a portion of the traffic destined to the south would leave the site traveling north and utilize the surrounding grid network to arrive at their final destination. This assumption is consistent with the original submission of the TIA (dated May 4, 2015). The updated figures are included herein for reference.

Updated 2017 Operational Analysis with Development

The level of service (LOS) and queuing analyses were updated for future conditions with development based on the removal of the service drive for vehicular traffic. The results are presented in Appendix A and summarized in Table 1.

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Levels of Service. Consistent with the April 6th TIA, in the future with the proposed development, the intersection of Maple Avenue and Nutley Street would operate at an overall LOS “E” during the AM and PM peak hours and LOS “D” during the Saturday peak hour. The overall delay per vehicle would increase by less than five (5) seconds per vehicle when compared to future conditions without redevelopment. When compared to the April 6th TIA the estimated overall delays per vehicle at the Maple Avenue and Nutley Street intersection varied by approximately 0.5 to 1.1 seconds.

Turning movements at other stop controlled study intersections would continue to operate at acceptable LOS “D” or better during peak periods with the exception of the westbound approach from the service drive onto Maple Avenue which would operate at LOS “E” or “F” during the peak periods. When compared to the April 6th TIA the estimated delay per vehicle to turn left at James Madison Drive from the service drive would be reduced by approximately 10 to 107 seconds per vehicle during peak periods. This occurs due to the removal of the service drive which would have allowed traffic from the drive-thru to turn left from the service at James Madison Drive.

All turning movements at each of the site driveways would continue to operate at acceptable levels of service during the AM, PM, and Saturday peak hours with LOS “C” or better.

Queuing. As shown in Table 1, the 50th and 95th percentile queues at study intersections are consistent with previous analyses and would result in marginal increases in peak hour queuing when compared to future conditions without development. The estimated peak hour queues from the site driveways are approximately two (2) to three (3) vehicles (55 feet or less).

The estimated future peak hour queue along the service drive with development at James Madison Drive is approximately two (2) to three (3) vehicles (70 feet or less). When compared to the April 6th TIA the estimated peak hour queues for vehicles turning left at James Madison Drive from the service would be reduced by of approximately 21 to 74 feet during peak periods with the removal of the service drive which would have allowed traffic from the drive-thru to turn left from the service at James Madison Drive.



Conclusion

Based on the updated analysis contained herein which assumes the removal of vehicular traffic on the service drive in front of the site, the proposed development would have a minor impact on the operations of mainline of Maple Avenue and the adjacent signalized intersection of Maple Avenue and Nutley Street, consistent with the findings of the April 6th TIA. The overall delay per vehicle at the Maple Avenue and Nutley Street intersection would increase by less than five (5) seconds per vehicle during peak periods when compared to future conditions without development.

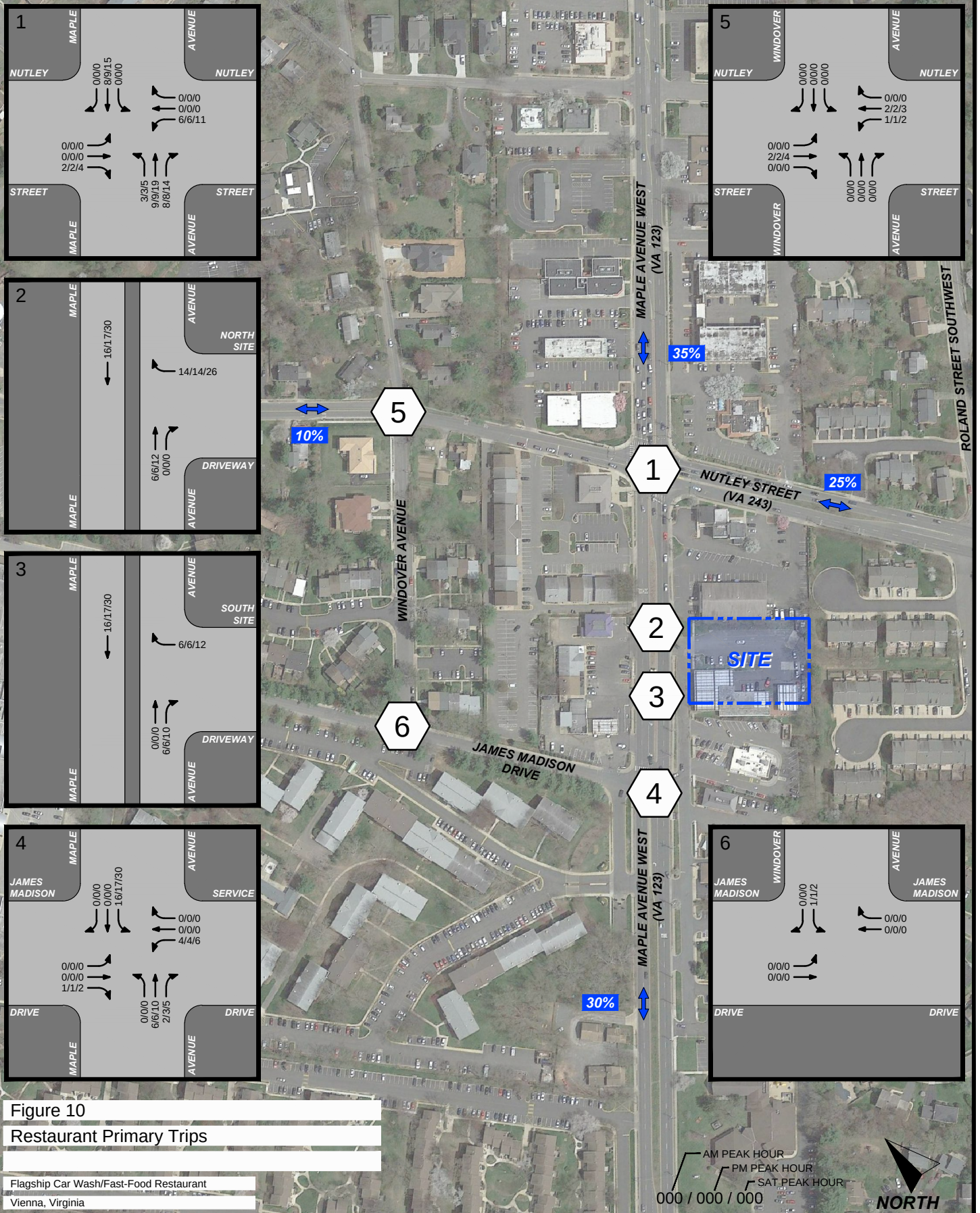
To address existing safety concerns and any potential increase in pedestrian traffic with the proposed redevelopment the Applicant proposes to install a new HAWK signal at the James Madison Drive/Maple Avenue intersection, subject to VDOT and Town approval, along with a new marked pedestrian crossing on the service drive in the vicinity of the site. The off-site pedestrian improvements, as proposed, would significantly improve pedestrian safety surrounding the site.

The removal of service drive (for drive-thru traffic) in front of the site, the off-site pedestrian improvements, and undergrounding of utilities will create a pedestrian friendly site consistent with the vision of the Maple Avenue Corridor guidelines.

Questions regarding this document should be directed to Wells + Associates.

JCP

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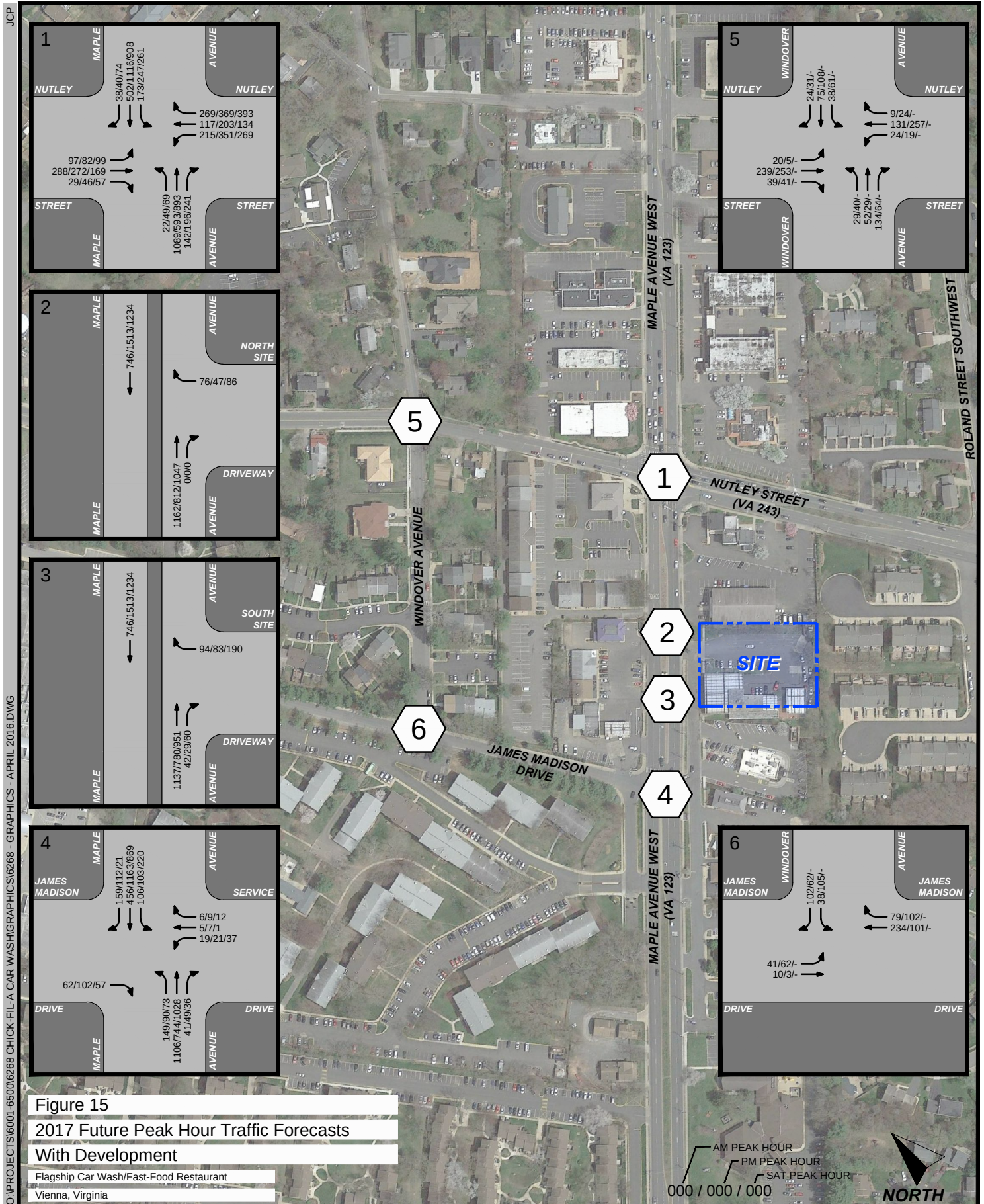


Table 1
Flagship Carwash & Restaurant
Intersection Level of Service Summary

Intersection	Intersection Control	Lane Group	Turn Lane Storage (feet) (1)	2014 Existing Conditions												2017 Without Development												2017 With Development											
				AM				PM				SAT				AM				PM				SAT				AM				PM				SAT			
				LOS	Delay	Queue	50th Queue	LOS	Delay	Queue	50th Queue	LOS	Delay	Queue	50th Queue	LOS	Delay	Queue	50th Queue	LOS	Delay	Queue	50th Queue	LOS	Delay	Queue	50th Queue	LOS	Delay	Queue	50th Queue	LOS	Delay	Queue	50th Queue	LOS	Delay	Queue	50th Queue
1. Nutley Street/ Maple Avenue	Signalized	EBL	215	E	64.2	82	137	E	63.8	78	132	E	55.5	80	132	E	50.4	64	116	D	54.6	69	121	E	55.3	83	137	D	51.8	85	145	D	54.8	80	137	E	55.3	93	152
		EBTR		F	96.1	395	#556	F	97.7	398	#566	F	69.0	209	297	F	119.1	~335	#535	F	97.9	352	#555	F	69.4	215	306	F	135.3	~351	#552	F	101.6	360	#571	F	70.5	222	316
		WBL		F	88.6	226	289	F	108.4	390	#545	F	102.5	212	#365	F	70.3	154	238	F	91.7	312	#490	F	99.5	209	#371	E	72.8	163	251	F	96.5	325	#517	F	114.3	224	#403
		WBT		E	87.7	72	297	F	109.3	409	#565	F	102.6	221	#374	D	69.5	161	246	D	92.4	327	#498	F	99.3	217	#381	E	71.5	167	256	F	92.7	332	#520	F	111.2	230	#410
		WBR		E	58.9	72	138	D	54.2	108	197	D	48.0	159	270	D	45.3	75	168	D	38.7	90	196	D	48.0	160	284	D	46.1	93	187	D	38.7	100	206	D	49.4	190	322
		NBL		C	25.8	8	21	C	36.8	27	51	C	21.4	23	47	C	24.7	6	17	D	41.6	25	49	C	21.8	24	48	C	23.5	10	26	C	45.0	29	56	C	22.0	31	58
		(Note: 2017 Conditions utilize future signal timings from Maple Avenue Corridor Study)		NBL	54.6	836	#972	D	47.0	428	503	D	39.5	481	601	E	57.2	608	#770	E	55.2	414	500	D	41.0	506	627	E	57.1	631	#801	E	57.1	427	513	D	44.5	561	685
2. North Site Drive/ Maple Avenue	STOP	NBLTR	285	F	92.9	188	#346	D	47.0	197	#281	E	60.6	185	#364	E	71.2	129	#294	E	61.3	190	#354	E	76.5	206	#400	E	72.4	122	#275	E	66.0	193	#355	F	91.8	220	#417
		SBL		C	26.4	212	287	D	37.3	723	806	D	26.8	358	468	C	23.8	146	230	D	42.5	630	732	C	22.3	377	485	E	24.7	188	238	D	51.4	642	746	C	29.8	398	511
		SBTR		E	60.5			E	62.3			D	47.8			E	58.6			E	61.3			D	49.2			E	61.0			E	63.5			D	53.7		
3. South Site Drive/ Maple Avenue	STOP	WBR		B	13.8	-	3	B	11.7	-	3	B	13.3	-	8	B	14.0	-	3	B	11.8	-	3	B	13.6	-	8	C	15.7	-	18	B	12.2	-	8	B	14.1	-	19
		NBTR		A	0.0	-	0	A	0.0	-	0	A	0.0	-	0	A	0.0	-	0	A	0.0	-	0	A	0.0	-	0	A	0.0	-	0	A	0.0	-	0	A	0.0	-	0
		SBTR		A	0.0	-	0	A	0.0	-	0	A	0.0	-	0	A	0.0	-	0	A	0.0	-	0	A	0.0	-	0	A	0.0	-	0	A	0.0	-	0	A	0.0	-	0
4. James Madison Drive/ Maple Avenue	STOP	WBLTR (EBR)	180	C	21.4	-	28	C	16.6	-	20	D	26.9	-	30	D	25.2	-	37	C	16.4	-	17	D	26.1	-	27	A	9.9	-	7	B	10.9	-	13	A	9.4	-	6
		NBLTR		D	31.4	-	10	D	29.6	-	13	D	34.7	-	19	E	37.9	-	11	D	28.4	-	12	E	35.1	-	18	F	66.3	-	36	E	37.8	-	25	F	92.7	-	70
		NBL		A	9.3	-	10	B	12.4	-	16	B	10.1	-	8	A	9.6	-	15	B	12.5	-	15	B	10.0	-	8	A	9.5	-	15	B	12.1	-	14	A	9.8	-	8
		NBTR		A	0.0	-	0	A	0.0	-	0	A	0.0	-	0	A	0.0	-	0	A	0.0	-	0	A	0.0	-	0	A	0.0	-	0	A	0.0	-	0	A	0.0	-	0
		(Note: Eastbound approach modified to right-turn only post HAWK signal installation)		SBL	11.8	-	7	B	10.0	-	5	B	12.6	-	24	B	11.9	-	7	A	9.8	-	5	B	12.8	-	24	B	13.2	-	19	B	10.4	-	13	C	15.1	-	48
5. Nutley Street/ Windover Avenue	STOP	SBTR	125	A	0.0	-	0	A	0.0	-	0	A	0.0	-	0	A	0.0	-	0	A	0.0	-	0	A	0.0	-	0	A	0.0	-	0	A	0.0	-	0	A	0.0	-	0
		EBLTR		B	13.4	-	35	B	13.9	-	20					B	12.6	-	30	B	13.6	-	20					B	13.0	-	42	B	14.0	-	23				
		WBLTR		B	10.8	-	68	B	14.3	-	68	B	10.4	-	68	B	10.4	-	60	B	13.6	-	68	B	10.7	-	70	B	10.7	-	10	B	14.1	-	70				
		NBLTR		B	11.2	-	28	B	10.9	-	68	B	10.6	-	68	B	10.6	-	25	B	10.6	-	68	B	11.2	-	70	B	11.2	-	28	B	10.9	-	70				
		SBLTR		B	10.7	-	25	B	12.8	-	40	B	10.2	-	40	B	10.2	-	23	B	12.2	-	40	B	10.4	-	40	B	10.4	-	23	B	12.4	-	40				
6. James Madison Drive/ Windover Avenue	STOP	EBLT		A	7.2	-	12	A	5.7	-	3					A	7.1	-	10	A	5.6	-	3					A	7.1	-	3	A	7.5	-	4				
		WBLTR		A	0.0	-	0	A	0.0	-	0	A	0.0	-	0	A	0.0	-	0	A	0.0	-	0	A	0.0	-	0	A	0.0	-	0	A	0.0	-	0	A	0.0	-	0
		SBLTR		C	15.8	-	35	B	11.7	-	25	B	14.7	-	29	B	14.7	-	29	B	11.4	-	24	B	13.3	-	25	B	13.3	-	26	B	11.7	-	25				

Notes:

1. Analysis performed using Synchro software, version 9.
2. North/South Street reported at intersection #5 were reported using HCM 2010 AWSC methodology)
3. 50th queue reported at signalized intersections only. (95th queues at intersection #5 were reported using HCM 2010 AWSC methodology)
4. Storage confirmed via Google Earth and field observations. Note: Synchro storage does not include taper.
5. ~, ~, ~ 50th percentile volume exceeds capacity, queue may be longer. ~# ~95th percentile volume exceeds capacity, queue may be longer.

Appendix A

Total Future Synchro Capacity Analyses

Queues

1: Maple Avenue & Nutley Street

Future AM Conditions with Development (No Service Drive)

	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	105	345	178	183	292	24	1338	188	587
v/c Ratio	0.35	1.09	0.77	0.76	0.60	0.06	0.96	0.88	0.35
Control Delay	54.8	129.8	79.2	78.0	23.2	17.2	57.9	71.3	24.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	54.8	129.8	79.2	78.0	23.2	17.2	57.9	71.3	24.3
Queue Length 50th (ft)	85	~351	163	167	93	10	631	122	188
Queue Length 95th (ft)	145	#552	251	256	187	26	#801	#275	238
Internal Link Dist (ft)		441		449			276		280
Turn Bay Length (ft)	250		215			60		285	
Base Capacity (vph)	303	316	264	273	508	394	1389	214	1696
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.35	1.09	0.67	0.67	0.57	0.06	0.96	0.88	0.35

Intersection Summary

~ 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.

HCM Signalized Intersection Capacity Analysis

1: Maple Avenue & Nutley Street

Future AM Conditions with Development (No Service Drive)

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	→	↱	↰	→	↱	↰	→	↱	↰	→	↱
Traffic Volume (vph)	97	288	29	215	117	269	22	1089	142	173	502	38
Future Volume (vph)	97	288	29	215	117	269	22	1089	142	173	502	38
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	7.0		7.0	7.0	7.0	7.0	7.0		7.0	7.0	
Lane Util. Factor	1.00	1.00		0.95	0.95	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.99	1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Flt	1.00	0.99		1.00	1.00	0.85	1.00	0.98		1.00	0.99	
Flt Protected	0.95	1.00		0.95	0.98	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1834		1681	1743	1566	1764	3464		1770	3492	
Flt Permitted	0.95	1.00		0.95	0.98	1.00	0.43	1.00		0.06	1.00	
Satd. Flow (perm)	1770	1834		1681	1743	1566	800	3464		118	3492	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	105	313	32	234	127	292	24	1184	154	188	546	41
RTOR Reduction (vph)	0	2	0	0	0	126	0	7	0	0	4	0
Lane Group Flow (vph)	105	343	0	178	183	166	24	1331	0	188	583	0
Confl. Peds. (#/hr)	2	1	1	2	6	3	3	3	3	3	6	7
Confl. Bikes (#/hr)				2				6				
Turn Type	Split	NA		Split	NA	pm+ov	pm+pt	NA		pm+pt	NA	
Protected Phases	4	4		8	8	1	5	2		1	6	
Permitted Phases						8	2			6		
Actuated Green, G (s)	24.0	24.0		19.3	19.3	32.1	59.5	55.9		75.7	65.1	
Effective Green, g (s)	24.0	24.0		19.3	19.3	32.1	59.5	55.9		75.7	65.1	
Actuated g/C Ratio	0.17	0.17		0.14	0.14	0.23	0.42	0.40		0.54	0.46	
Clearance Time (s)	7.0	7.0		7.0	7.0	7.0	7.0	7.0		7.0	7.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	303	314		231	240	437	364	1383		214	1623	
v/s Ratio Prot	0.06	c0.19		c0.11	0.10	0.03	0.00	c0.38		c0.08	0.17	
v/s Ratio Perm						0.07	0.03			0.39		
v/c Ratio	0.35	1.09		0.77	0.76	0.38	0.07	0.96		0.88	0.36	
Uniform Delay, d1	51.1	58.0		58.2	58.1	45.5	23.5	41.0		41.6	24.1	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.7	77.3		14.6	13.4	0.6	0.1	16.7		30.8	0.6	
Delay (s)	51.8	135.3		72.8	71.5	46.1	23.5	57.7		72.4	24.7	
Level of Service	D	F		E	E	D	C	E		E	C	
Approach Delay (s)		115.8			60.5			57.1			36.3	
Approach LOS		F			E			E			D	

Intersection Summary

HCM 2000 Control Delay

HCM 2000 Volume to Capacity ratio

Actuated Cycle Length (s)

Intersection Capacity Utilization

Analysis Period (min)

c Critical Lane Group

Flagship Carwash & Restaurant 4/3/2016 Future AM Conditions with Development (No Service Drive)
Wells + AssociatesSynchro 9 Report
Page 1Flagship Carwash & Restaurant 4/3/2016 Future AM Conditions with Development (No Service Drive)
Wells + AssociatesSynchro 9 Report
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HCM Unsignalized Intersection Capacity Analysis

2: Maple Avenue & Service Drive

Future AM Conditions with Development (No Service Drive)

	WBL	WBR	NBT	NBR	SBL	SBT
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱
Traffic Volume (veh/h)	0	76	1162	0	0	746
Future Volume (veh/h)	0	76	1162	0	0	746
Sign Control	Stop	Free	Free	Free	Free	Free
Grade	0%	0%	0%	0%	0%	0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	83	1263	0	0	811
Pedestrians	3					
Lane Width (ft)	12.0					
Walking Speed (ft/s)	4.0					
Percent Blockage	0					
Right turn flare (veh)						
Median type		Raised			Raised	
Median storage (veh)		1			1	
Upstream signal (ft)					356	
pX, platoon unblocked	0.90					
vC, conflicting volume	1672	634			1266	
vC1, stage 1 conf vol	1266				1266	
vC2, stage 2 conf vol	406				406	
vCu, unblocked vol	1521	634			1266	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)	5.8					
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	80			100	
cM capacity (veh/h)	190	420			543	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	83	842	421	406	406	
Volume Left	0	0	0	0	0	
Volume Right	83	0	0	0	0	
cSH	420	1700	1700	1700	1700	
Volume to Capacity	0.20	0.50	0.25	0.24	0.24	
Queue Length 95th (ft)	18	0	0	0	0	
Control Delay (s)	15.7	0.0	0.0	0.0	0.0	
Lane LOS	C					
Approach Delay (s)	15.7	0.0		0.0		
Approach LOS	C					

Intersection Summary

Average Delay

Intersection Capacity Utilization

Analysis Period (min)

0.6

43.5%

15

ICU Level of Service

A

HCM Unsignalized Intersection Capacity Analysis

3: Maple Avenue & Service Drive

Future AM Conditions with Development (No Service Drive)

	WBL	WBR	NBT	NBR	SBL	SBT
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱
Traffic Volume (veh/h)	0	94	1137	42	0	746
Future Volume (veh/h)	0	94	1137	42	0	746
Sign Control	Stop	Free	Free	Free	Free	Free
Grade	0%	0%	0%	0%	0%	0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	102	1236	46	0	811
Pedestrians	3					
Lane Width (ft)	12.0					
Walking Speed (ft/s)	4.0					
Percent Blockage	0					
Right turn flare (veh)						
Median type		Raised			Raised	
Median storage (veh)		1			1	
Upstream signal (ft)					447	
pX, platoon unblocked	0.90					
vC, conflicting volume	1668	644			1285	
vC1, stage 1 conf vol	1262				1262	
vC2, stage 2 conf vol	406				406	
vCu, unblocked vol	1519	644			1285	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)	5.8					
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	75			100	
cM capacity (veh/h)	191	414			534	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	102	824	458	406	406	
Volume Left	0	0	0	0	0	
Volume Right	102	0	46	0	0	
cSH	414	1700	1700	1700	1700	
Volume to Capacity	0.25	0.48	0.27	0.24	0.24	
Queue Length 95th (ft)	24	0	0	0	0	
Control Delay (s)	16.5	0.0	0.0	0.0	0.0	
Lane LOS	C					
Approach Delay (s)	16.5	0.0		0.0		
Approach LOS	C					

Intersection Summary

Average Delay

Intersection Capacity Utilization

Analysis Period (min)

0.8

45.3%

15

ICU Level of Service

A

Flagship Carwash & Restaurant 4/3/2016 Future AM Conditions with Development (No Service Drive)
Wells + AssociatesSynchro 9 Report
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HCM Unsignalized Intersection Capacity Analysis

4: Maple Avenue & James Madison Drive/Service Drive Future AM Conditions with Development (No Service Drive)

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	62	19	5	6	149	1106	41	106	456	159
Future Volume (Veh/h)	0	0	62	19	5	6	149	1106	41	106	456	159
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
Grade	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	67	21	5	7	162	1202	45	115	496	173
Pedestrians	23											
Lane Width (ft)	12.0											
Walking Speed (ft/s)	4.0											
Percent Blockage	2											
Right turn flare (veh)						1						
Median type								Raised			Raised	
Median storage veh								1			1	
Upstream signal (ft)											634	
pX, platoon unblocked	0.92	0.92	0.92	0.92	0.92		0.92					
vC, conflicting volume	1773	2410	360	2100	2474	636	692			1250		
vC1, stage 1 conf vol	836	836		1552	1552							
vC2, stage 2 conf vol	938	1574		548	922							
vCU, unblocked vol	1672	2361	142	2025	2430	636	501			1250		
tc, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tc, 2 stage (s)	6.5	5.5		6.5	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	92	71	93	98	83			79		
cM capacity (veh/h)	85	23	795	73	72	416	960			551		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3				
Volume Total	67	33	162	801	446	115	331	338				
Volume Left	0	21	162	0	0	115	0	0				
Volume Right	67	7	0	0	45	0	0	173				
cSH	795	90	960	1700	1700	551	1700	1700				
Volume to Capacity	0.08	0.37	0.17	0.47	0.26	0.21	0.19	0.20				
Queue Length 95th (ft)	7	36	15	0	0	19	0	0				
Control Delay (s)	9.9	66.3	9.5	0.0	0.0	13.2	0.0	0.0				
Lane LOS	A	F	A			B						
Approach Delay (s)	9.9	66.3	1.1			1.9						
Approach LOS	A	F										
Intersection Summary												
Average Delay				2.6								
Intersection Capacity Utilization			57.3%		ICU Level of Service			B				
Analysis Period (min)			15									

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HCM Unsignalized Intersection Capacity Analysis

5: Windover Avenue & Nutley Street Future AM Conditions with Development (No Service Drive)

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Volume (vph)	20	239	39	24	131	9	29	52	134	38	75	24
Future Volume (vph)	20	239	39	24	131	9	29	52	134	38	75	24
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	22	260	42	26	142	10	32	57	146	41	82	28
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	324	178	235	149								
Volume Left (vph)	22	26	32	41								
Volume Right (vph)	42	10	146	26								
Had (s)	0.00	0.04	-0.21	-0.02								
Departure Headway (s)	5.3	5.6	5.3	5.7								
Degree Utilization, x	0.48	0.28	0.35	0.24								
Capacity (veh/h)	639	589	610	563								
Control Delay (s)	13.0	10.7	11.2	10.4								
Approach Delay (s)	13.0	10.7	11.2	10.4								
Approach LOS	B	B	B	B								
Intersection Summary												
Delay				11.6								
Level of Service				B								
Intersection Capacity Utilization				39.1%	ICU Level of Service					A		
Analysis Period (min)				15								

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HCM Unsignalized Intersection Capacity Analysis

6: James Madison Drive & Windover Avenue Future AM Conditions with Development (No Service Drive)

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	41	10	234	79	38	102
Future Volume (Veh/h)	41	10	234	79	38	102
Sign Control	Free	Free	Free	Stop	Stop	Stop
Grade	0%	0%	0%	0%	0%	0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	45	11	254	86	41	111
Pedestrians					79	
Lane Width (ft)					12.0	
Walking Speed (ft/s)					4.0	
Percent Blockage					7	
Right turn flare (veh)						
Median type		None	None			
Median storage veh						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	419				477	376
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCU, unblocked vol	419				477	376
tc, single (s)	4.2				6.4	6.2
tc, 2 stage (s)						
tF (s)	2.3				3.5	3.3
p0 queue free %	96				92	82
cM capacity (veh/h)	1017				488	622
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	56	340	152			
Volume Left	45	0	41			
Volume Right	0	86	111			
cSH	1017	1700	579			
Volume to Capacity	0.04	0.20	0.26			
Queue Length 95th (ft)	3	0	26			
Control Delay (s)	7.1	0.0	13.4			
Lane LOS	A		B			
Approach Delay (s)	7.1	0.0	13.4			
Approach LOS	A		B			
Intersection Summary						
Average Delay			4.4			
Intersection Capacity Utilization			40.2%	ICU Level of Service		A
Analysis Period (min)			15			

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Queues

1: Maple Avenue & Nutley Street

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	89	346	230	305	401	53	850	260	1256
v/c Ratio	0.26	0.96	0.93	0.92	0.54	0.47	0.81	0.89	0.86
Control Delay	56.9	100.3	98.5	95.1	14.9	39.0	56.1	66.0	50.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	56.9	100.3	98.5	95.1	14.9	39.0	56.1	66.0	50.0
Queue Length 50th (ft)	80	360	325	332	100	29	427	193	642
Queue Length 95th (ft)	137	#571	#517	#520	206	56	513	#355	746
Internal Link Dist (ft)		441		449			276		280
Turn Bay Length (ft)	160		215			60		285	
Base Capacity (vph)	347	360	325	338	743	113	1068	307	1470
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.26	0.96	0.92	0.90	0.54	0.47	0.80	0.87	0.85
Intersection Summary									
# 95th percentile volume exceeds capacity, queue may be longer.									
Queue shown is maximum after two cycles.									

Flagship Carwash & Restaurant 4/4/2016 Future PM Conditions with Development (No Service Drive)
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HCM Signalized Intersection Capacity Analysis

1: Maple Avenue & Nutley Street

Future PM Conditions with Development (No Service Drive)

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↲	↰	↱	↲	↰	↱	↲	↰	↱	↲
Traffic Volume (vph)	82	272	46	351	203	369	49	593	196	247	1116	40
Future Volume (vph)	82	272	46	351	203	369	49	593	196	247	1116	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Lane Util. Factor	1.00	1.00		0.95	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.98		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flt	1.00	0.98		1.00	1.00		0.85	1.00		0.96	1.00	
Flt Protected	0.95	1.00		0.95	0.99		1.00	0.95		1.00	0.95	
Satd. Flow (prot)	1770	1814		1681	1746		1583	1770		3350	1770	
Flt Permitted	0.95	1.00		0.95	0.99		1.00	0.08		1.00	0.12	
Satd. Flow (perm)	1770	1814		1681	1746		1583	149		3350	216	
Peak-hour factor, PHF	0.92	0.92		0.92	0.92		0.92	0.92		0.92	0.92	
Adj. Flow (vph)	89	296		50	382		221	401		53	645	
RTOR Reduction (vph)	0	4		0	0		0	173		0	2	
Lane Group Flow (vph)	89	342		0	298		305	228		53	838	
Confl. Peds. (#/hr)	4			8			8	17		11		
Confl. Bikes (#/hr)				2			3			6		
Turn Type	Split	NA		Split	NA		pt+ov	pm+pt		NA	NA	
Protected Phases	4	4		8	8		8	1		2	1	
Permitted Phases												
Actuated Green, G (s)	31.4	31.4		30.5	30.5		57.7	54.7		49.9	77.1	
Effective Green, g (s)	31.4	31.4		30.5	30.5		57.7	54.7		49.9	77.1	
Actuated g/C Ratio	0.20	0.20		0.19	0.19		0.36	0.34		0.31	0.48	
Clearance Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	347	355		320	332		570	99		1044	300	
v/s Ratio Prot	0.05	c0.19		c0.18	0.17		0.14	0.02		0.25	c0.11	
v/s Ratio Perm							0.17	c0.32				
v/c Ratio	0.26	0.96		0.93	0.92		0.40	0.54		0.80	0.89	
Uniform Delay, d1	54.4	63.7		63.7	63.5		38.2	39.5		50.5	39.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.4	37.9		32.8	29.2		0.5	5.5		6.5	26.6	
Delay (s)	54.8	101.6		96.5	92.7		38.7	45.0		57.1	66.0	
Level of Service	D	F		F	F		D	E		E	D	
Approach Delay (s)		92.0			72.3			56.4			54.0	
Approach LOS		F			E			E			D	
Intersection Summary												
HCM 2000 Control Delay		63.5										
HCM 2000 Volume to Capacity ratio		0.95										
Actuated Cycle Length (s)		160.0								28.0		
Intersection Capacity Utilization		93.7%									F	
Analysis Period (min)		15										

c Critical Lane Group

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HCM Unsignalized Intersection Capacity Analysis

2: Maple Avenue & Service Drive

Future PM Conditions with Development (No Service Drive)

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations		↰	↱	↲	↰	↱
Traffic Volume (veh/h)	0	47	812	0	0	1513
Future Volume (veh/h)	0	47	812	0	0	1513
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	51	883	0	0	1645
Pedestrians	11					
Lane Width (ft)	12.0					
Walking Speed (ft/s)	4.0					
Percent Blockage	1					
Right turn flare (veh)						
Median type			Raised			Raised
Median storage (veh)			1			1
Upstream signal (ft)						356
pX, platoon unblocked	0.67					
vC, conflicting volume	1716	452			894	
vC1, stage 1 conf vol	894					
vC2, stage 2 conf vol	822					
vCu, unblocked vol	1080	452			894	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)	5.8					
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	91			100	
cM capacity (veh/h)	269	549			748	
Direction, Lane #						
Volume Total	WB 1	NB 1	NB 2	SB 1	SB 2	
Volume Left	51	569	294	822	822	
Volume Right	0	0	0	0	0	
cSH	549	1700	1700	1700	1700	
Volume to Capacity	0.09	0.35	0.17	0.48	0.48	
Queue Length 95th (ft)	8	0	0	0	0	
Control Delay (s)	12.2	0.0	0.0	0.0	0.0	
Lane LOS	B					
Approach Delay (s)	12.2	0.0		0.0		
Approach LOS	B					
Intersection Summary						
Average Delay		0.2				
Intersection Capacity Utilization		45.2%		ICU Level of Service		A
Analysis Period (min)		15				

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HCM Unsignalized Intersection Capacity Analysis

3: Maple Avenue & Service Drive

Future PM Conditions with Development (No Service Drive)

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations		↰	↱	↲	↰	↱
Traffic Volume (veh/h)	0	83	780	29	0	1513
Future Volume (veh/h)	0	83	780	29	0	1513
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	90	848	32	0	1645
Pedestrians	11					
Lane Width (ft)	12.0					
Walking Speed (ft/s)	4.0					
Percent Blockage	1					
Right turn flare (veh)						
Median type			Raised			Raised
Median storage (veh)			1			1
Upstream signal (ft)						447
pX, platoon unblocked	0.67					
vC, conflicting volume	1698	451			891	
vC1, stage 1 conf vol	875					
vC2, stage 2 conf vol	822					
vCu, unblocked vol	1050	451			891	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)	5.8					
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	84			100	
cM capacity (veh/h)	276	551			750	
Direction, Lane #						
Volume Total	WB 1	NB 1	NB 2	SB 1	SB 2	
Volume Left	90	565	315	822	822	
Volume Right	0	0	0	0	0	
cSH	551	1700	1700	1700	1700	
Volume to Capacity	0.16	0.33	0.19	0.48	0.48	
Queue Length 95th (ft)	15	0	0	0	0	
Control Delay (s)	12.8	0.0	0.0	0.0	0.0	
Lane LOS	B					
Approach Delay (s)	12.8	0.0		0.0		
Approach LOS	B					
Intersection Summary						
Average Delay		0.4				
Intersection Capacity Utilization		45.2%		ICU Level of Service		A
Analysis Period (min)		15				

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HCM Unsignalized Intersection Capacity Analysis

4: Maple Avenue & James Madison Drive/Service Drive

Future PM Conditions with Development (No Service Drive)

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	102	21	7	9	90	744	49	103	1163	112
Future Volume (veh/h)	0	0	102	21	7	9	90	744	49	103	1163	112
Sign Control	Stop			Stop			Free			Free		
Grade	0%			0%			0%			0%		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	111	23	8	10	98	809	53	112	1264	122
Pedestrians		30			2			1			9	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		3			0			0			1	
Right turn flare (veh)						1						
Median type								Raised			Raised	
Median storage (veh)								1			1	
Upstream signal (ft)											634	
pX, platoon unblocked	0.69	0.69	0.69	0.69	0.69		0.69					
vC, conflicting volume	2192	2639	724	2002	2674	442	1416			864		
vC1, stage 1 conf vol	1579	1579		1034	1034							
vC2, stage 2 conf vol	614	1060		968	1640							
vCu, unblocked vol	1822	2474	0	1544	2524	442	690			864		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)	6.5	5.5		6.5	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	85	83	87	98	84			86		
cM capacity (veh/h)	99	80	724	137	61	558	602			773		
Direction, Lane #												
Volume Total	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2	SB 3					
Volume Left	111	41	98	539	323	112	843	543				
Volume Right	0	23	98	0	0	112	0	0				
Volume Right	111	10	0	0	53	0	0	122				
cSH	724	156	602	1700	1700	773	1700	1700				
Volume to Capacity	0.15	0.26	0.16	0.32	0.19	0.14	0.50	0.32				
Queue Length 95th (ft)	13	25	14	0	0	13	0	0				
Control Delay (s)	10.9	37.8	12.1	0.0	0.0	10.4	0.0	0.0				
Lane LOS	B	E	B			B						
Approach Delay (s)	10.9	37.8	1.2			0.8						
Approach LOS	B	E										
Intersection Summary												
Average Delay	2.0											
Intersection Capacity Utilization	60.5% ICU Level of Service											
Analysis Period (min)	15											

HCM Unsignalized Intersection Capacity Analysis

5: Windover Avenue & Nutley Street

Future PM Conditions with Development (No Service Drive)

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	5	253	41	19	257	24	40	29	64	61	108	31
Future Volume (vph)	5	253	41	19	257	24	40	29	64	61	108	31
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	275	45	21	279	26	43	32	70	66	117	34
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	325	326	145	217								
Volume Left (vph)	5	21	43	66								
Volume Right (vph)	45	26	70	34								
Hadj (s)	-0.05	0.00	-0.20	0.00								
Departure Headway (s)	5.5	5.6	6.0	6.0								
Degree Utilization, x	0.50	0.51	0.24	0.36								
Capacity (veh/h)	607	605	510	534								
Control Delay (s)	14.0	14.1	10.9	12.4								
Approach Delay (s)	14.0	14.1	10.9	12.4								
Approach LOS	B	B	B	B								
Intersection Summary												
Delay				13.3								
Level of Service				B								
Intersection Capacity Utilization				46.9%								A
Analysis Period (min)				15								

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HCM Unsignalized Intersection Capacity Analysis

6: James Madison Drive & Windover Avenue

Future PM Conditions with Development (No Service Drive)

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		Stop	Stop		Stop	Stop
Traffic Volume (veh/h)	62	3	101	102	105	62
Future Volume (veh/h)	62	3	101	102	105	62
Sign Control		Free	Free		Stop	Stop
Grade		0%	0%		0%	0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	67	3	110	111	114	67
Pedestrians					2	
Lane Width (ft)					12.0	
Walking Speed (ft/s)					4.0	
Percent Blockage					0	
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	223				304	168
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vC4, unblocked vol	223				304	168
IC, single (s)	4.1				6.4	6.2
IC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	95				83	92
cM capacity (veh/h)	1344				652	875
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	70	221	181			
Volume Left	67	0	114			
Volume Right	0	111	67			
cSH	1344	1700	720			
Volume to Capacity	0.05	0.13	0.25			
Queue Length 95th (ft)	4	0	25			
Control Delay (s)	7.5	0.0	11.7			
Lane LOS	A		B			
Approach Delay (s)	7.5	0.0	11.7			
Approach LOS			B			
Intersection Summary						
Average Delay			5.6			
Intersection Capacity Utilization			35.0%			A
Analysis Period (min)			15			

Flagship Carwash & Restaurant 4/4/2016 Future PM Conditions with Development (No Service Drive)
Wells + Associates

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Queues

1: Maple Avenue & Nutley Street

Future Saturday Conditions with Development (No Service Drive)

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	108	246	216	222	427	75	1233	284	1067
v/c Ratio	0.35	0.78	0.96	0.96	0.75	0.28	0.84	0.97	0.62
Control Delay	56.9	73.5	115.1	112.5	32.1	17.4	44.6	86.4	30.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	56.9	73.5	115.1	112.5	32.1	17.4	44.6	86.4	30.8
Queue Length 50th (ft)	93	222	224	230	190	31	561	220	398
Queue Length 95th (ft)	152	316	#403	#410	322	58	685	#417	511
Internal Link Dist (ft)		441		449			276		280
Turn Bay Length (ft)			215			60		285	
Base Capacity (vph)	354	364	224	232	572	429	1464	294	1711
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.31	0.68	0.96	0.96	0.75	0.17	0.84	0.97	0.62
Intersection Summary									
# 95th percentile volume exceeds capacity, queue may be longer.									
Queue shown is maximum after two cycles.									

Flagship Carwash & Restaurant 4/3/2016 Future Saturday Conditions with Development (No Service Drive)
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HCM Signalized Intersection Capacity Analysis

1: Maple Avenue & Nutley Street

Future Saturday Conditions with Development (No Service Drive)

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Traffic Volume (vph)	99	169	57	269	134	393	69	893	241	261	908	74
Future Volume (vph)	99	169	57	269	134	393	69	893	241	261	908	74
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	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Frpb, ped/bikes	1.00	0.99	1.00	1.00	0.99	1.00	0.99	1.00	0.99	1.00	0.99	1.00
Rp/b, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flt	1.00	0.96	1.00	1.00	0.85	1.00	0.97	1.00	0.99	1.00	0.99	1.00
Flt Protected	0.95	1.00	0.95	0.98	1.00	0.95	1.00	0.95	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1781	1681	1740	1564	1768	3393	1770	3477	1770	3477	1770
Flt Permitted	0.95	1.00	0.95	0.98	1.00	0.18	1.00	0.07	1.00	0.07	1.00	1.00
Satd. Flow (perm)	1770	1781	1681	1740	1564	343	3393	126	3477	126	3477	126
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	108	184	62	292	146	427	75	971	262	284	987	80
RTOR Reduction (vph)	0	8	0	0	0	155	0	15	0	0	3	0
Lane Group Flow (vph)	108	238	0	216	222	72	75	1218	0	284	1064	0
Confl. Peds. (#/hr)	5	5	5	5	5	20	6	6	6	6	6	20
Confl. Bikes (#/hr)			2			3			6			7
Turn Type	Split	NA		Split	NA	pm+ov	pm+pt	NA		pm+pt	NA	
Protected Phases	4	4		8	8	1	5	2		1	6	
Permitted Phases				8	2							
Effective Green, G (s)	24.0	24.0		18.0	18.0	36.0	70.4	62.0		87.0	71.6	
Effective Green, g (s)	26.0	26.0		20.0	20.0	40.0	74.4	64.0		89.0	73.6	
Actuated g/C Ratio	0.17	0.17		0.13	0.13	0.27	0.50	0.43		0.59	0.49	
Clearance Time (s)	7.0	7.0		7.0	7.0	7.0	7.0	7.0		7.0	7.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	306	308		224	232	469	268	1447		293	1706	
v/s Ratio Prot	0.06	c0.13		c0.13	0.13	0.08	0.02	0.36		c0.13	0.31	
v/s Ratio Perm						0.10	0.12			c0.45		
v/c Ratio	0.35	0.77		0.96	0.96	0.58	0.28	0.84		0.97	0.62	
Uniform Delay, d1	54.6	59.2		64.6	64.6	47.7	21.5	38.5		48.1	28.0	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.7	11.4		49.7	46.6	1.7	0.6	6.1		43.6	1.7	
Delay (s)	55.3	70.5		114.3	111.2	49.4	22.0	44.5		91.8	29.8	
Level of Service	E	E		F	F	D	C	D		F	C	
Approach Delay (s)		65.9			81.5			43.3			42.8	
Approach LOS		E			F			D			D	
Intersection Summary												
HCM 2000 Control Delay				53.7							D	
HCM 2000 Volume to Capacity ratio				0.95								
Actuated Cycle Length (s)				150.0				20.0				
Intersection Capacity Utilization				89.3%							E	
Analysis Period (min)				15								
c Critical Lane Group												

Flagship Carwash & Restaurant 4/3/2016 Future Saturday Conditions with Development (No Service Drive)
Wells + Associates

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HCM Unsignalized Intersection Capacity Analysis

2: Maple Avenue & Service Drive

Future Saturday Conditions with Development (No Service Drive)

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations		↑	↑		↑	↑
Traffic Volume (veh/h)	0	86	1047	0	0	1234
Future Volume (veh/h)	0	86	1047	0	0	1234
Sign Control	Stop	Free	Free	Free	Free	Free
Grade	0%	0%	0%	0%	0%	0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	93	1138	0	0	1341
Pedestrians	6					
Lane Width (ft)	12.0					
Walking Speed (ft/s)	4.0					
Percent Blockage	1					
Right turn flare (veh)						
Median type			Raised		Raised	
Median storage veh			1		1	
Upstream signal (ft)					356	
pX, platoon unblocked	0.78					
vC, conflicting volume	1814	575			1144	
vC1, stage 1 conf vol	1144					
vC2, stage 2 conf vol	670					
vCu, unblocked vol	1476	575			1144	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)	5.8					
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	80			100	
cM capacity (veh/h)	210	459			603	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	93	759	379	670	670	
Volume Left	0	0	0	0	0	
Volume Right	93	0	0	0	0	
cSH	459	1700	1700	1700	1700	
Volume to Capacity	0.20	0.45	0.22	0.39	0.39	
Queue Length 95th (ft)	19	0	0	0	0	
Control Delay (s)	14.8	0.0	0.0	0.0	0.0	
Lane LOS	B					
Approach Delay (s)	14.8	0.0		0.0		
Approach LOS	B					
Intersection Summary						
Average Delay		0.5				
Intersection Capacity Utilization		40.9%		ICU Level of Service		A
Analysis Period (min)		15				

Flagship Carwash & Restaurant 4/3/2016 Future Saturday Conditions with Development (No Service Drive)
Wells + Associates

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HCM Unsignalized Intersection Capacity Analysis

3: Maple Avenue & Service Drive

Future Saturday Conditions with Development (No Service Drive)

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations		↑	↑		↑	↑
Traffic Volume (veh/h)	0	190	951	60	0	1234
Future Volume (veh/h)	0	190	951	60	0	1234
Sign Control	Stop	Free	Free	Free	Free	Free
Grade	0%	0%	0%	0%	0%	0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	207	1034	65	0	1341
Pedestrians	6					
Lane Width (ft)	12.0					
Walking Speed (ft/s)	4.0					
Percent Blockage	1					
Right turn flare (veh)						
Median type			Raised		Raised	
Median storage veh			1		1	
Upstream signal (ft)					447	
pX, platoon unblocked	0.78					
vC, conflicting volume	1743	556			1105	
vC1, stage 1 conf vol	1072					
vC2, stage 2 conf vol	670					
vCu, unblocked vol	1385	556			1105	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)	5.8					
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	56			100	
cM capacity (veh/h)	228	473			624	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	207	689	410	670	670	
Volume Left	0	0	0	0	0	
Volume Right	207	0	65	0	0	
cSH	473	1700	1700	1700	1700	
Volume to Capacity	0.44	0.41	0.24	0.39	0.39	
Queue Length 95th (ft)	55	0	0	0	0	
Control Delay (s)	18.4	0.0	0.0	0.0	0.0	
Lane LOS	C					
Approach Delay (s)	18.4	0.0		0.0		
Approach LOS	C					
Intersection Summary						
Average Delay		1.4				
Intersection Capacity Utilization		46.7%		ICU Level of Service		A
Analysis Period (min)		15				

Flagship Carwash & Restaurant 4/3/2016 Future Saturday Conditions with Development (No Service Drive)
Wells + Associates

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HCM Unsignalized Intersection Capacity Analysis

4: Maple Avenue & James Madison Drive/Service Drive

Future Saturday Conditions with Development (No Service Drive)

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations			↑		↑	↑		↑	↑	↑	↑	↑
Traffic Volume (veh/h)	0	0	57	37	1	12	73	1028	36	220	869	21
Future Volume (veh/h)	0	0	57	37	1	12	73	1028	36	220	869	21
Sign Control	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free	Free	Free
Grade	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	62	40	1	13	79	1117	39	239	945	23
Pedestrians	13											
Lane Width (ft)	12.0											
Walking Speed (ft/s)	4.0											
Percent Blockage	1											
Right turn flare (veh)												
Median type								Raised		Raised		
Median storage veh								1		1		
Upstream signal (ft)										634		
pX, platoon unblocked	0.82	0.82	0.82	0.82	0.82			0.82				
vC, conflicting volume	2174	2766	497	2312	2758	592	981			1161		
vC1, stage 1 conf vol	1448	1448		1300	1300							
vC2, stage 2 conf vol	726	1319		1012	1459							
vCu, unblocked vol	1997	2717	0	2165	2707	592	550			1161		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)	6.5	5.5										
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	93	43	98	97	90			60		
cM capacity (veh/h)	53	9	884	71	43	444	828			595		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2	SB 3					
Volume Total	62	54	79	745	411	239	630	338				
Volume Left	0	40	79	0	0	239	0	0				
Volume Right	62	13	0	0	39	0	0	23				
cSH	884	90	828	1700	1700	595	1700	1700				
Volume to Capacity	0.07	0.60	0.10	0.44	0.24	0.40	0.37	0.20				
Queue Length 95th (ft)	6	70	8	0	0	48	0	0				
Control Delay (s)	9.4	92.7	9.8	0.0	0.0	15.1	0.0	0.0				
Lane LOS	A	F	A			C						
Approach Delay (s)	9.4	92.7	0.6			3.0						
Approach LOS	A	F										
Intersection Summary												
Average Delay			3.9									
Intersection Capacity Utilization			57.7%		ICU Level of Service							B
Analysis Period (min)			15									

Flagship Carwash & Restaurant 4/3/2016 Future Saturday Conditions with Development (No Service Drive)
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HCM Unsignalized Intersection Capacity Analysis

5: Windover Avenue & Nutley Street

Future Saturday Conditions with Development (No Service Drive)

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations			↑		↑	↑		↑	↑	↑	↑	↑
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Volume (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Future Volume (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	0	0	0	0								
Volume Left (vph)	0	0	0	0								
Volume Right (vph)	0	0	0	0								
Had (s)	0.00	0.00	0.00	0.00								
Departure Headway (s)	3.9	3.9	3.9	3.9								
Degree Utilization, x	0.00	0.00	0.00	0.00								
Capacity (veh/h)	917	917	917	917								
Control Delay (s)	6.9	6.9	6.9	6.9								
Approach Delay (s)	0.0	0.0	0.0	0.0								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay			0.0									
Level of Service			A									
Intersection Capacity Utilization			8.7%		ICU Level of Service							A
Analysis Period (min)			15									

Flagship Carwash & Restaurant 4/3/2016 Future Saturday Conditions with Development (No Service Drive)
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HCM Unsignalized Intersection Capacity Analysis

6: James Madison Drive & Windover Avenue Future Saturday Conditions with Development (No Service Drive)

	EBL	EBT	WBT	WBR	SBL	SBR
Movement						
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	0	0	0
Future Volume (Veh/h)	0	0	0	0	0	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	0	0	0
Pedestrians					2	
Lane Width (ft)					12.0	
Walking Speed (ft/s)					4.0	
Percent Blockage					0	
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	2				2	2
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2				2	2
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	100
cM capacity (veh/h)	1618				1019	1080
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	0	0	0			
Volume Left	0	0	0			
Volume Right	0	0	0			
ESH	1700	1700	1700			
Volume to Capacity	0.00	0.00	0.00			
Queue Length 95th (ft)	0	0	0			
Control Delay (s)	0.0	0.0	0.0			
Lane LOS					A	
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS					A	
Intersection Summary						
Average Delay		0.0				
Intersection Capacity Utilization		7.3%		ICU Level of Service		A
Analysis Period (min)		15				