

Intersection												
Int Delay, s/veh	11.4											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↕			↕↔			↕↔	
Traffic Vol, veh/h	0	251	47	54	218	0	32	0	256	0	157	35
Future Vol, veh/h	0	251	47	54	218	0	32	0	256	0	157	35
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	0	4	0	2	1	0	0	0	1	0	2	10
Mvmt Flow	0	285	53	61	248	0	36	0	291	0	178	40



















Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	339	0	0	792	682	312	827	709	248
Stage 1	-	-	-	-	-	-	312	312	-	370	370	-
Stage 2	-	-	-	-	-	-	480	370	-	457	339	-
Critical Hdwy	-	-	-	4.12	-	-	7.1	6.5	6.21	7.1	6.52	6.3
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.52	-
Follow-up Hdwy	-	-	-	2.218	-	-	3.5	4	3.309	3.5	4.018	3.39
Pot Cap-1 Maneuver	0	-	-	1220	-	0	309	375	731	293	359	772
Stage 1	0	-	-	-	-	0	703	661	-	654	620	-
Stage 2	0	-	-	-	-	0	571	624	-	587	640	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	-	1220	-	-	164	353	731	169	338	772
Mov Cap-2 Maneuver	-	-	-	-	-	-	164	353	-	169	338	-
Stage 1	-	-	-	-	-	-	703	661	-	654	584	-
Stage 2	-	-	-	-	-	-	354	588	-	353	640	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	1.6	22.3	26.9
HCM LOS			C	D

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	SBLn1
Capacity (veh/h)	528	-	-	1220	-	377
HCM Lane V/C Ratio	0.62	-	-	0.05	-	0.579
HCM Control Delay (s)	22.3	-	-	8.1	0	26.9
HCM Lane LOS	C	-	-	A	A	D
HCM 95th %tile Q(veh)	4.2	-	-	0.2	-	3.5

HCM Signalized Intersection Capacity Analysis
11: Pines Rd & 16th Ave

2025 AM W- Proj IMP
01/12/2017




















												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	251	47	54	218	0	32	0	256	0	157	35
Future Volume (vph)	0	251	47	54	218	0	32	0	256	0	157	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0			4.5	4.5		4.5	4.5
Lane Util. Factor		0.95			1.00			0.95	0.95		1.00	1.00
Fr _t		0.98			1.00			0.88	0.85		1.00	0.85
Fl _t Protected		1.00			0.99			0.99	1.00		1.00	1.00
Satd. Flow (prot)		3410			1859			1565	1519		1863	1468
Fl _t Permitted		1.00			0.63			0.87	1.00		1.00	1.00
Satd. Flow (perm)		3410			1175			1379	1519		1863	1468
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	0	285	53	61	248	0	36	0	291	0	178	40
RTOR Reduction (vph)	0	15	0	0	0	0	0	144	148	0	0	34
Lane Group Flow (vph)	0	323	0	0	309	0	0	17	18	0	178	6
Heavy Vehicles (%)	0%	4%	0%	2%	1%	0%	0%	0%	1%	0%	2%	10%
Turn Type		NA		Perm	NA		Perm	NA	Perm		NA	Perm
Protected Phases		18			14 24			12			16	
Permitted Phases				14 24			12		12			16
Actuated Green, G (s)		20.3			44.2			8.4	8.4		12.0	12.0
Effective Green, g (s)		20.3			44.2			8.4	8.4		12.0	12.0
Actuated g/C Ratio		0.26			0.57			0.11	0.11		0.15	0.15
Clearance Time (s)		5.0						4.5	4.5		4.5	4.5
Vehicle Extension (s)		3.0						3.0	3.0		3.0	3.0
Lane Grp Cap (vph)		892			669			149	164		288	227
v/s Ratio Prot		0.09									c0.10	
v/s Ratio Perm					c0.26			c0.01	0.01			0.00
v/c Ratio		0.36			0.46			0.12	0.11		0.62	0.03
Uniform Delay, d ₁		23.4			9.8			31.3	31.2		30.7	27.8
Progression Factor		1.00			0.41			1.00	1.00		1.00	1.00
Incremental Delay, d ₂		0.3			0.2			0.4	0.3		3.9	0.0
Delay (s)		23.6			4.2			31.6	31.5		34.6	27.9
Level of Service		C			A			C	C		C	C
Approach Delay (s)		23.6			4.2			31.6			33.3	
Approach LOS		C			A			C			C	

Intersection Summary

HCM 2000 Control Delay	22.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	77.6	Sum of lost time (s)	19.0
Intersection Capacity Utilization	54.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

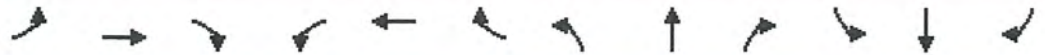
HCM 2010 Signalized Intersection Summary
12: SR 27 & 16th Ave

2025 AM W- Proj
01/06/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	237	243	27	6	212	76	60	503	20	44	124	1
Future Volume (veh/h)	237	243	27	6	212	76	60	503	20	44	124	1
Number	3	8	18	7	4	14	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1900	1881	1900	1900	1873	1900	1890	1873	1890	1910	1837	1910
Adj Flow Rate, veh/h	279	286	32	7	249	89	71	592	24	52	146	1
Adj No. of Lanes	0	1	1	0	1	0	1	2	0	1	2	0
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Percent Heavy Veh, %	1	1	0	2	2	2	0	1	1	0	4	4
Cap, veh/h	311	319	554	8	273	98	93	819	33	69	785	5
Arrive On Green	0.34	0.34	0.34	0.21	0.21	0.21	0.05	0.23	0.23	0.04	0.22	0.22
Sat Flow, veh/h	907	929	1615	36	1292	462	1800	3485	141	1819	3553	24
Grp Volume(v), veh/h	565	0	32	345	0	0	71	302	314	52	72	75
Grp Sat Flow(s), veh/h/ln	1836	0	1615	1790	0	0	1800	1779	1848	1819	1745	1832
Q Serve(g_s), s	33.8	0.0	1.5	21.8	0.0	0.0	4.5	18.1	18.1	3.3	3.9	3.9
Cycle Q Clear(g_c), s	33.8	0.0	1.5	21.8	0.0	0.0	4.5	18.1	18.1	3.3	3.9	3.9
Prop In Lane	0.49		1.00	0.02		0.26	1.00		0.08	1.00		0.01
Lane Grp Cap(c), veh/h	630	0	554	378	0	0	93	418	434	69	385	405
V/C Ratio(X)	0.90	0.00	0.06	0.91	0.00	0.00	0.76	0.72	0.72	0.76	0.19	0.19
Avail Cap(c_a), veh/h	793	0	698	464	0	0	467	461	479	472	452	475
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	36.1	0.0	25.5	44.6	0.0	0.0	54.1	40.8	40.8	55.1	36.6	36.6
Incr Delay (d2), s/veh	11.0	0.0	0.0	19.7	0.0	0.0	11.9	5.6	5.4	15.3	0.3	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	19.0	0.0	0.7	12.8	0.0	0.0	2.6	9.5	9.9	1.9	1.9	2.0
LnGrp Delay(d),s/veh	47.1	0.0	25.5	64.3	0.0	0.0	66.0	46.4	46.2	70.4	36.9	36.9
LnGrp LOS	D		C	E			E	D	D	E	D	D
Approach Vol, veh/h		597			345			687			199	
Approach Delay, s/veh		45.9			64.3			48.4			45.6	
Approach LOS		D			E			D			D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	11.0	30.6		29.4	9.4	32.2		44.7				
Change Period (Y+Rc), s	5.0	5.0		5.0	5.0	5.0		5.0				
Max Green Setting (Gmax), s	30.0	30.0		30.0	30.0	30.0		50.0				
Max Q Clear Time (g_c+I1), s	6.5	5.9		23.8	5.3	20.1		35.8				
Green Ext Time (p_c), s	0.2	14.3		0.7	0.1	7.0		3.9				
Intersection Summary												
HCM 2010 Ctrl Delay			50.3									
HCM 2010 LOS			D									

HCM Signalized Intersection Capacity Analysis
12: Hwy 27 & 16th Ave

2025 AM W- Proj IMP
01/11/2017



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	237	243	27	6	212	8	60	503	20	44	124	1
Future Volume (vph)	237	243	27	6	212	8	60	503	20	44	124	1
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		4.0	4.5		4.0	4.5	
Lane Util. Factor	0.95	0.95	1.00		1.00		1.00	0.95		1.00	0.95	
Frt	1.00	1.00	0.85		1.00		1.00	0.99		1.00	1.00	
Fit Protected	0.95	0.99	1.00		1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1698	1776	1615		1854		1805	3555		1805	3469	
Fit Permitted	0.51	0.93	1.00		0.99		0.00	1.00		0.28	1.00	
Satd. Flow (perm)	909	1669	1615		1834		0	3555		539	3469	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	279	286	32	7	249	9	71	592	24	52	146	1
RTOR Reduction (vph)	0	0	18	0	1	0	0	2	0	0	1	0
Lane Group Flow (vph)	237	328	14	0	264	0	71	614	0	52	146	0
Heavy Vehicles (%)	1%	1%	0%	0%	2%	0%	0%	1%	0%	0%	4%	0%
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		8 28			4		5!	2!		1!	6!	
Permitted Phases	8 28		8 28	4			2			6		
Actuated Green, G (s)	34.2	34.2	34.2		20.3		30.3	15.2		15.2	15.2	
Effective Green, g (s)	34.2	34.2	34.2		20.3		30.3	15.2		15.2	15.2	
Actuated g/C Ratio	0.44	0.44	0.44		0.26		0.39	0.20		0.20	0.20	
Clearance Time (s)					5.0		4.0	4.5		4.0	4.5	
Vehicle Extension (s)					1.9		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	400	735	711		479		704	696		123	679	
v/s Ratio Prot							c0.04	c0.17		c0.01	0.04	
v/s Ratio Perm	c0.26	0.20	0.01		0.14					c0.08		
v/c Ratio	0.59	0.45	0.02		0.55		0.10	0.88		0.42	0.22	
Uniform Delay, d1	16.4	15.1	12.2		24.7		15.0	30.3		29.9	26.2	
Progression Factor	0.53	0.49	1.00		1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.9	0.3	0.0		0.8		0.1	12.6		2.3	0.7	
Delay (s)	10.6	7.8	12.3		25.5		15.1	42.9		32.2	26.9	
Level of Service	B	A	B		C		B	D		C	C	
Approach Delay (s)		9.1			25.5			40.0			28.3	
Approach LOS		A			C			D			C	

Intersection Summary

HCM 2000 Control Delay	25.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	77.6	Sum of lost time (s)	19.0
Intersection Capacity Utilization	59.0%	ICU Level of Service	B
Analysis Period (min)	15		

Description: 1/28/15 count

! Phase conflict between lane groups.

c Critical Lane Group

HCM 2010 Signalized Intersection Summary
19: SR 27 & 32nd Avenue

2025 AM W- Proj
01/06/2017



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗		↖	↗		↖	↗	
Traffic Volume (veh/h)	154	289	71	72	234	85	145	323	158	28	98	82
Future Volume (veh/h)	154	289	71	72	234	85	145	323	158	28	98	82
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1765	1811	1872	1714	1752	1800	1748	1759	1800	1800	1700	1800
Adj Flow Rate, veh/h	166	311	76	77	252	91	156	347	170	30	105	88
Adj No. of Lanes	1	2	0	1	1	0	1	2	0	1	2	0
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	3	3	5	3	3	3	3	3	0	5	5
Cap, veh/h	203	833	201	98	298	108	192	869	418	49	540	415
Arrive On Green	0.12	0.30	0.30	0.06	0.24	0.24	0.12	0.40	0.40	0.03	0.31	0.31
Sat Flow, veh/h	1681	2751	662	1633	1230	444	1664	2190	1054	1714	1740	1338
Grp Volume(v), veh/h	166	193	194	77	0	343	156	263	254	30	97	96
Grp Sat Flow(s),veh/h/ln	1681	1720	1694	1633	0	1674	1664	1671	1573	1714	1615	1463
Q Serve(g_s), s	9.1	8.3	8.6	4.4	0.0	18.5	8.7	10.7	11.0	1.6	4.2	4.6
Cycle Q Clear(g_c), s	9.1	8.3	8.6	4.4	0.0	18.5	8.7	10.7	11.0	1.6	4.2	4.6
Prop In Lane	1.00		0.39	1.00		0.27	1.00		0.67	1.00		0.91
Lane Grp Cap(c), veh/h	203	521	513	98	0	405	192	663	624	49	501	454
V/C Ratio(X)	0.82	0.37	0.38	0.78	0.00	0.85	0.81	0.40	0.41	0.61	0.19	0.21
Avail Cap(c_a), veh/h	444	745	733	431	0	725	527	706	664	543	682	618
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	40.6	25.9	26.0	43.9	0.0	34.2	40.9	20.4	20.5	45.4	24.0	24.1
Incr Delay (d2), s/veh	7.8	0.4	0.5	12.7	0.0	4.9	7.9	1.0	1.1	11.4	0.5	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.7	4.0	4.1	2.3	0.0	9.1	4.4	5.1	4.9	0.9	1.9	1.9
LnGrp Delay(d),s/veh	48.5	26.4	26.5	56.6	0.0	39.1	48.8	21.4	21.6	56.9	24.5	24.7
LnGrp LOS	D	C	C	E		D	D	C	C	E	C	C
Approach Vol, veh/h		553			420			673			223	
Approach Delay, s/veh		33.0			42.3			27.8			28.9	
Approach LOS		C			D			C			C	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	8.2	43.1	10.2	33.2	16.4	34.9	15.9	27.4				
Change Period (Y+Rc), s	5.5	5.5	4.5	4.5	5.5	5.5	4.5	4.5				
Max Green Setting (Gmax), s	40.0	40.0	25.0	41.0	30.0	40.0	25.0	41.0				
Max Q Clear Time (g_c+I), s	13.0	13.0	6.4	10.6	10.7	6.6	11.1	20.5				
Green Ext Time (p_c), s	0.1	19.3	0.2	2.6	0.5	22.8	0.5	2.4				
Intersection Summary												
HCM 2010 Ctrl Delay											32.8	
HCM 2010 LOS											C	

Intersection

Int Delay, s/veh 54

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↕			↕			↕	
Traffic Vol, veh/h	0	350	58	81	163	0	26	0	202	0	256	115
Future Vol, veh/h	0	350	58	81	163	0	26	0	202	0	256	115
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	0	1	0	0	0	0	0	0	0	0	0	3
Mvmt Flow	0	376	62	87	175	0	28	0	217	0	275	124

Major/Minor	Major1	Major2	Minor1	Minor2
Conflicting Flow All	- 0 0	439 0 0	957 757 408	865 788 175
Stage 1	- - -	- - -	408 408 -	349 349 -
Stage 2	- - -	- - -	549 349 -	516 439 -
Critical Hdwy	- - -	4.1 - -	7.1 6.5 6.2	7.1 6.5 6.23
Critical Hdwy Stg 1	- - -	- - -	6.1 5.5 -	6.1 5.5 -
Critical Hdwy Stg 2	- - -	- - -	6.1 5.5 -	6.1 5.5 -
Follow-up Hdwy	- - -	2.2 - -	3.5 4 3.3	3.5 4 3.327
Pot Cap-1 Maneuver	0 - -	1132 - 0	239 339 648	276 326 866
Stage 1	0 - -	- - 0	624 600 -	671 637 -
Stage 2	0 - -	- - 0	524 637 -	546 582 -
Platoon blocked, %	- - -	- - -	- - -	- - -
Mov Cap-1 Maneuver	- - -	1132 - -	37 310 648	172 298 866
Mov Cap-2 Maneuver	- - -	- - -	37 310 -	172 298 -
Stage 1	- - -	- - -	624 600 -	671 583 -
Stage 2	- - -	- - -	217 583 -	363 582 -

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	2.8	132	99.2
HCM LOS			F	F

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	SBLn1
Capacity (veh/h)	225	-	-	1132	-	374
HCM Lane V/C Ratio	1.09	-	-	0.077	-	1.067
HCM Control Delay (s)	132	-	-	8.4	0	99.2
HCM Lane LOS	F	-	-	A	A	F
HCM 95th %tile Q(veh)	10.9	-	-	0.2	-	13.9

HCM Signalized Intersection Capacity Analysis
 11: Pines Rd & 16th Ave













2025 PM W- Proj IMP.
 01/11/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑			↑			↑	↑		↑	↑
Traffic Volume (vph)	0	350	58	81	163	0	26	0	202	0	256	115
Future Volume (vph)	0	350	58	81	163	0	26	0	202	0	256	115
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0			4.5	4.5		4.5	4.5
Lane Util. Factor		0.95			1.00			0.95	0.95		1.00	1.00
Fr't		0.98			1.00			0.89	0.85		1.00	0.85
Flt Protected		1.00			0.98			0.99	1.00		1.00	1.00
Satd. Flow (prot)		3503			1869			1579	1534		1900	1568
Flt Permitted		1.00			0.43			0.84	1.00		1.00	1.00
Satd. Flow (perm)		3503			812			1336	1534		1900	1568
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	0	376	62	87	175	0	28	0	217	0	275	124
RTOR Reduction (vph)	0	13	0	0	0	0	0	106	113	0	0	99
Lane Group Flow (vph)	0	425	0	0	262	0	0	13	13	0	275	25
Heavy Vehicles (%)	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
Turn Type		NA		Perm	NA		Perm	NA	Perm		NA	Perm
Protected Phases		18			14 24			12			16	
Permitted Phases				14 24			12		12			16
Actuated Green, G (s)		18.0			40.6			8.1	8.1		15.2	15.2
Effective Green, g (s)		18.0			40.6			8.1	8.1		15.2	15.2
Actuated g/C Ratio		0.23			0.53			0.11	0.11		0.20	0.20
Clearance Time (s)		5.0						4.5	4.5		4.5	4.5
Vehicle Extension (s)		3.0						3.0	3.0		3.0	3.0
Lane Grp Cap (vph)		819			428			140	161		375	309
v/s Ratio Prot		0.12									c0.14	
v/s Ratio Perm					c0.32			c0.01	0.01			0.02
v/c Ratio		0.52			0.61			0.09	0.08		0.73	0.08
Uniform Delay, d1		25.7			12.7			31.1	31.0		28.9	25.1
Progression Factor		1.00			1.12			1.00	1.00		1.00	1.00
Incremental Delay, d2		0.6			1.7			0.3	0.2		7.2	0.1
Delay (s)		26.2			15.9			31.3	31.3		36.2	25.3
Level of Service		C			B			C	C		D	C
Approach Delay (s)		26.2			15.9			31.3			32.8	
Approach LOS		C			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	27.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	76.9	Sum of lost time (s)	19.0
Intersection Capacity Utilization	59.5%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM 2010 Signalized Intersection Summary
12: SR 27 & 16th Ave

2025 PM W- Proj.
01/06/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗		↕		↖	↕		↖	↕	
Traffic Volume (veh/h)	194	294	64	15	218	7	26	305	10	91	380	0
Future Volume (veh/h)	194	294	64	15	218	7	26	305	10	91	380	0
Number	3	8	18	7	4	14	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1900	1870	1900	1900	1883	1900	1890	1853	1890	1910	1910	0
Adj Flow Rate, veh/h	216	327	71	17	242	8	29	339	11	101	422	0
Adj No. of Lanes	0	1	1	0	1	0	1	2	0	1	2	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	2	2	0	1	1	1	0	1	1	0	0	0
Cap, veh/h	250	378	553	20	281	9	50	764	25	132	960	0
Arrive On Green	0.34	0.34	0.34	0.17	0.17	0.17	0.03	0.22	0.22	0.07	0.26	0.00
Sat Flow, veh/h	729	1104	1615	119	1692	56	1800	3481	113	1819	3724	0
Grp Volume(v), veh/h	543	0	71	267	0	0	29	171	179	101	422	0
Grp Sat Flow(s),veh/h/ln	1834	0	1615	1867	0	0	1800	1761	1833	1819	1814	0
Q Serve(g_s), s	27.8	0.0	3.0	14.0	0.0	0.0	1.6	8.4	8.5	5.5	9.7	0.0
Cycle Q Clear(g_c), s	27.8	0.0	3.0	14.0	0.0	0.0	1.6	8.4	8.5	5.5	9.7	0.0
Prop In Lane	0.40		1.00	0.06		0.03	1.00		0.06	1.00		0.00
Lane Grp Cap(c), veh/h	628	0	553	310	0	0	50	387	403	132	960	0
V/C Ratio(X)	0.86	0.00	0.13	0.86	0.00	0.00	0.58	0.44	0.44	0.76	0.44	0.00
Avail Cap(c_a), veh/h	914	0	805	558	0	0	538	526	548	544	1085	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	30.8	0.0	22.7	40.7	0.0	0.0	48.2	33.8	33.9	45.7	30.7	0.0
Incr Delay (d2), s/veh	6.1	0.0	0.1	7.0	0.0	0.0	10.4	1.1	1.1	8.8	0.4	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	15.1	0.0	1.4	7.8	0.0	0.0	0.9	4.2	4.4	3.1	4.9	0.0
LnGrp Delay(d),s/veh	36.9	0.0	22.8	47.7	0.0	0.0	58.6	35.0	35.0	54.5	31.1	0.0
LnGrp LOS	D		C	D			E	C	C	D	C	
Approach Vol, veh/h		614			267			379			523	
Approach Delay, s/veh		35.3			47.7			36.8			35.6	
Approach LOS		D			D			D			D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	7.8	31.5		21.7	12.3	27.0		39.4				
Change Period (Y+Rc), s	5.0	5.0		5.0	5.0	5.0		5.0				
Max Green Setting (Gmax), s	30.0	30.0		30.0	30.0	30.0		50.0				
Max Q Clear Time (g_c+I1), s	3.6	11.7		16.0	7.5	10.5		29.8				
Green Ext Time (p_c), s	0.1	11.0		0.7	0.3	11.6		4.6				
Intersection Summary												
HCM 2010 Ctrl Delay			37.5									
HCM 2010 LOS			D									

HCM Signalized Intersection Capacity Analysis
12: Hwy 27 & 16th Ave

2025 PM W- Proj IMP.
01/11/2017



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗	↘		↔		↖	↗		↖	↗	
Traffic Volume (vph)	194	294	64	15	218	7	26	305	10	91	380	0
Future Volume (vph)	194	294	64	15	218	7	26	305	10	91	380	0
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		4.0	4.5		4.0	4.5	
Lane Util. Factor	0.95	0.95	1.00		1.00		1.00	0.95		1.00	0.95	
Fr't	1.00	1.00	0.85		1.00		1.00	1.00		1.00	1.00	
Flt Protected	0.95	1.00	1.00		1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1698	1765	1615		1869		1805	3522		1805	3610	
Flt Permitted	0.50	0.97	1.00		0.95		0.56	1.00		0.00	1.00	
Satd. Flow (perm)	885	1721	1615		1783		1056	3522		0	3610	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	216	327	71	17	242	8	29	339	11	101	422	0
RTOR Reduction (vph)	0	0	42	0	1	0	0	2	0	0	0	0
Lane Group Flow (vph)	194	349	29	0	266	0	29	348	0	101	422	0
Heavy Vehicles (%)	1%	2%	0%	0%	1%	0%	0%	1%	33%	0%	0%	0%
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		8 28			4		5!	2!		1!	6!	
Permitted Phases	8 28		8 28	4			2			6		
Actuated Green, G (s)	31.6	31.6	31.6		18.0		17.6	17.1		22.9	15.2	
Effective Green, g (s)	31.6	31.6	31.6		18.0		17.6	17.1		22.9	15.2	
Actuated g/C Ratio	0.41	0.41	0.41		0.23		0.23	0.22		0.30	0.20	
Clearance Time (s)					5.0		4.0	4.5		4.0	4.5	
Vehicle Extension (s)					1.9		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	363	707	663		417		342	783		537	713	
v/s Ratio Prot							0.01	c0.10		0.06	c0.12	
v/s Ratio Perm	c0.22	0.20	0.02		c0.15		0.01					
v/c Ratio	0.53	0.49	0.04		0.64		0.08	0.44		0.19	0.59	
Uniform Delay, d1	17.1	16.7	13.6		26.5		23.5	25.8		20.1	28.0	
Progression Factor	0.45	0.42	0.00		1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.2	0.4	0.0		2.4		0.1	0.4		0.2	3.6	
Delay (s)	8.8	7.5	0.0		28.9		23.6	26.2		20.3	31.6	
Level of Service	A	A	A		C		C	C		C	C	
Approach Delay (s)		7.0			28.9			26.0			29.4	
Approach LOS		A			C			C			C	

Intersection Summary

HCM 2000 Control Delay	20.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	76.9	Sum of lost time (s)	19.0
Intersection Capacity Utilization	58.3%	ICU Level of Service	B
Analysis Period (min)	15		

Description: 10/7/16 counts

! Phase conflict between lane groups.

c Critical Lane Group

HCM 2010 Signalized Intersection Summary
 19: SR 27 & 32nd Avenue

2025 PM W- Proj.
 01/06/2017



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↕		↔	↕		↔	↕		↔	↕	
Traffic Volume (veh/h)	92	358	213	182	385	51	149	194	120	56	260	77
Future Volume (veh/h)	92	358	213	182	385	51	149	194	120	56	260	77
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1800	1849	1872	1782	1784	1800	1800	1728	1800	1800	1786	1800
Adj Flow Rate, veh/h	108	421	251	214	453	60	175	228	141	66	306	91
Adj No. of Lanes	1	2	0	1	1	0	1	2	0	1	2	0
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Percent Heavy Veh, %	0	2	2	1	1	1	0	3	3	0	1	1
Cap, veh/h	136	550	325	246	501	66	209	726	431	86	763	223
Arrive On Green	0.08	0.26	0.26	0.14	0.32	0.32	0.12	0.37	0.37	0.05	0.29	0.29
Sat Flow, veh/h	1714	2123	1254	1697	1544	204	1714	1982	1179	1714	2592	758
Grp Volume(v), veh/h	108	348	324	214	0	513	175	187	182	66	198	199
Grp Sat Flow(s), veh/h/ln	1714	1756	1621	1697	0	1748	1714	1642	1519	1714	1697	1653
Q Serve(g_s), s	6.9	20.3	20.6	13.7	0.0	31.2	11.1	9.1	9.6	4.2	10.4	10.7
Cycle Q Clear(g_c), s	6.9	20.3	20.6	13.7	0.0	31.2	11.1	9.1	9.6	4.2	10.4	10.7
Prop In Lane	1.00		0.77	1.00		0.12	1.00		0.78	1.00		0.46
Lane Grp Cap(c), veh/h	136	455	420	246	0	568	209	601	556	86	499	486
V/C Ratio(X)	0.79	0.76	0.77	0.87	0.00	0.90	0.84	0.31	0.33	0.77	0.40	0.41
Avail Cap(c_a), veh/h	385	647	597	381	0	644	462	601	556	462	610	594
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	50.3	38.1	38.2	46.5	0.0	35.9	47.8	25.2	25.4	52.2	31.4	31.5
Incr Delay (d2), s/veh	9.9	3.4	4.0	12.5	0.0	15.1	8.6	0.7	0.8	13.4	1.4	1.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.6	10.3	9.7	7.3	0.0	17.5	5.7	4.2	4.2	2.3	5.0	5.1
LnGrp Delay(d),s/veh	60.2	41.4	42.1	59.1	0.0	51.0	56.4	26.0	26.2	65.6	32.8	33.0
LnGrp LOS	E	D	D	E		D	E	C	C	E	C	C
Approach Vol, veh/h		780			727			544			463	
Approach Delay, s/veh		44.3			53.3			35.8			37.6	
Approach LOS		D			D			D			D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	11.1	46.2	20.6	33.3	19.1	38.2	13.3	40.6				
Change Period (Y+Rc), s	5.5	5.5	4.5	4.5	5.5	5.5	4.5	4.5				
Max Green Setting (Gmax), s	40.0	40.0	25.0	41.0	30.0	40.0	25.0	41.0				
Max Q Clear Time (g_c+I), s	11.6	11.6	15.7	22.6	13.1	12.7	8.9	33.2				
Green Ext Time (p_c), s	0.2	21.4	0.4	4.3	0.5	20.0	0.3	2.9				
Intersection Summary												
HCM 2010 Ctrl Delay					43.9							
HCM 2010 LOS					D							

Intersection

Int Delay, s/veh 11.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↕			↕			↕	
Traffic Vol, veh/h	0	265	48	56	230	0	30	0	241	0	161	37
Future Vol, veh/h	0	265	48	56	230	0	30	0	241	0	161	37
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	0	4	0	2	1	0	0	0	1	0	2	10
Mvmt Flow	0	301	55	64	261	0	34	0	274	0	183	42

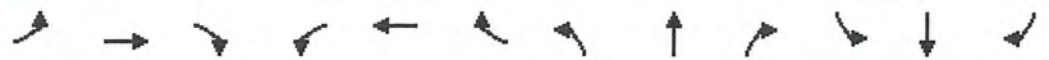
Major/Minor	Major1	Major2	Minor1	Minor2
Conflicting Flow All	- 0 0	356 0 0	829 717 328	854 745 261
Stage 1	- - -	- - -	328 328 -	389 389 -
Stage 2	- - -	- - -	501 389 -	465 356 -
Critical Hdwy	- - -	4.12 - -	7.1 6.5 6.21	7.1 6.52 6.3
Critical Hdwy Stg 1	- - -	- - -	6.1 5.5 -	6.1 5.52 -
Critical Hdwy Stg 2	- - -	- - -	6.1 5.5 -	6.1 5.52 -
Follow-up Hdwy	- - -	2.218 - -	3.5 4 3.309	3.5 4.018 3.39
Pot Cap-1 Maneuver	0 - -	1203 - 0	292 358 716	281 342 759
Stage 1	0 - -	- - 0	689 651 -	639 608 -
Stage 2	0 - -	- - 0	556 612 -	581 629 -
Platoon blocked, %	- - -	- - -	- - -	- - -
Mov Cap-1 Maneuver	- - -	1203 - -	145 336 716	165 321 759
Mov Cap-2 Maneuver	- - -	- - -	145 336 -	165 321 -
Stage 1	- - -	- - -	689 651 -	639 570 -
Stage 2	- - -	- - -	335 574 -	359 629 -

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	1.6	23.2	30.3
HCM LOS			C	D

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	SBLn1
Capacity (veh/h)	499	-	-	1203	-	360
HCM Lane V/C Ratio	0.617	-	-	0.053	-	0.625
HCM Control Delay (s)	23.2	-	-	8.2	0	30.3
HCM Lane LOS	C	-	-	A	A	D
HCM 95th %tile Q(veh)	4.1	-	-	0.2	-	4

HCM Signalized Intersection Capacity Analysis
11: Pines Rd & 16th Ave

2030 AM W-O Proj IMP
01/11/2017






















Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑			↑			↑↓	↑		↑	↑
Traffic Volume (vph)	0	265	48	56	230	0	30	0	241	0	161	37
Future Volume (vph)	0	265	48	56	230	0	30	0	241	0	161	37
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0			4.5	4.5		4.5	4.5
Lane Util. Factor		0.95			1.00			0.95	0.95		1.00	1.00
Frt		0.98			1.00			0.88	0.85		1.00	0.85
Flt Protected		1.00			0.99			0.99	1.00		1.00	1.00
Satd. Flow (prot)		3411			1859			1565	1519		1863	1468
Flt Permitted		1.00			0.61			0.87	1.00		1.00	1.00
Satd. Flow (perm)		3411			1141			1377	1519		1863	1468
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	0	301	55	64	261	0	34	0	274	0	183	42
RTOR Reduction (vph)	0	14	0	0	0	0	0	136	139	0	0	35
Lane Group Flow (vph)	0	342	0	0	325	0	0	16	17	0	183	7
Heavy Vehicles (%)	0%	4%	0%	2%	1%	0%	0%	0%	1%	0%	2%	10%
Turn Type		NA		Perm	NA		Perm	NA	Perm		NA	Perm
Protected Phases		18			14 24			12			16	
Permitted Phases				14 24			12		12			16
Actuated Green, G (s)		20.4			44.1			8.4	8.4		12.2	12.2
Effective Green, g (s)		20.4			44.1			8.4	8.4		12.2	12.2
Actuated g/C Ratio		0.26			0.57			0.11	0.11		0.16	0.16
Clearance Time (s)		5.0						4.5	4.5		4.5	4.5
Vehicle Extension (s)		3.0						3.0	3.0		3.0	3.0
Lane Grp Cap (vph)		895			647			148	164		292	230
v/s Ratio Prot		0.10									c0.10	
v/s Ratio Perm					c0.28			c0.01	0.01			0.00
v/c Ratio		0.38			0.50			0.11	0.10		0.63	0.03
Uniform Delay, d1		23.5			10.2			31.3	31.3		30.6	27.7
Progression Factor		1.00			0.49			1.00	1.00		1.00	1.00
Incremental Delay, d2		0.3			0.2			0.3	0.3		4.2	0.1
Delay (s)		23.8			5.2			31.6	31.5		34.8	27.8
Level of Service		C			A			C	C		C	C
Approach Delay (s)		23.8			5.2			31.6			33.5	
Approach LOS		C			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	22.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	77.7	Sum of lost time (s)	19.0
Intersection Capacity Utilization	55.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			





















HCM 2010 Signalized Intersection Summary
12: SR 27 & 16th Ave

2030 AM W-O Proj
01/06/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	233	245	28	6	223	80	63	514	21	46	129	1
Future Volume (veh/h)	233	245	28	6	223	80	63	514	21	46	129	1
Number	3	8	18	7	4	14	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1900	1881	1900	1900	1873	1900	1890	1873	1890	1910	1837	1910
Adj Flow Rate, veh/h	274	288	33	7	262	94	74	605	25	54	152	1
Adj No. of Lanes	0	1	1	0	1	0	1	2	0	1	2	0
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Percent Heavy Veh, %	1	1	0	2	2	2	0	1	1	0	4	4
Cap, veh/h	304	320	549	8	284	102	97	811	33	72	776	5
Arrive On Green	0.34	0.34	0.34	0.22	0.22	0.22	0.05	0.23	0.23	0.04	0.22	0.22
Sat Flow, veh/h	895	941	1615	35	1292	463	1800	3482	144	1819	3554	23
Grp Volume(v), veh/h	562	0	33	363	0	0	74	309	321	54	75	78
Grp Sat Flow(s),veh/h/ln	1836	0	1615	1789	0	0	1800	1779	1847	1819	1745	1832
Q Serve(g_s), s	34.6	0.0	1.6	23.6	0.0	0.0	4.8	19.2	19.2	3.5	4.1	4.2
Cycle Q Clear(g_c), s	34.6	0.0	1.6	23.6	0.0	0.0	4.8	19.2	19.2	3.5	4.1	4.2
Prop In Lane	0.49		1.00	0.02		0.26	1.00		0.08	1.00		0.01
Lane Grp Cap(c), veh/h	624	0	549	394	0	0	97	414	430	72	381	400
V/C Ratio(X)	0.90	0.00	0.06	0.92	0.00	0.00	0.76	0.75	0.75	0.76	0.20	0.20
Avail Cap(c_a), veh/h	773	0	679	452	0	0	454	449	466	459	440	463
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	37.3	0.0	26.5	45.4	0.0	0.0	55.5	42.3	42.3	56.5	37.9	37.9
Incr Delay (d2), s/veh	11.9	0.0	0.0	22.8	0.0	0.0	11.7	6.8	6.6	14.8	0.3	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	19.5	0.0	0.7	14.2	0.0	0.0	2.7	10.2	10.6	2.0	2.0	2.1
LnGrp Delay(d),s/veh	49.2	0.0	26.5	68.1	0.0	0.0	67.2	49.2	49.0	71.3	38.2	38.2
LnGrp LOS	D		C	E			E	D	D	E	D	D
Approach Vol, veh/h		595			363			704			207	
Approach Delay, s/veh		48.0			68.1			51.0			46.8	
Approach LOS		D			E			D			D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	11.4	30.9		31.1	9.7	32.7		45.4				
Change Period (Y+Rc), s	5.0	5.0		5.0	5.0	5.0		5.0				
Max Green Setting (Gmax), s	30.0	30.0		30.0	30.0	30.0		50.0				
Max Q Clear Time (g_c+I1), s	6.8	6.2		25.6	5.5	21.2		36.6				
Green Ext Time (p_c), s	0.2	14.5		0.5	0.1	6.5		3.8				
Intersection Summary												
HCM 2010 Ctrl Delay			52.9									
HCM 2010 LOS			D									

HCM Signalized Intersection Capacity Analysis
12: Hwy 27 & 16th Ave

2030 AM W-O Proj IMP
01/11/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	233	245	28	6	223	8	63	514	21	46	129	1
Future Volume (vph)	233	245	28	6	223	8	63	514	21	46	129	1
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		4.0	4.5		4.0	4.5	
Lane Util. Factor	0.95	0.95	1.00		1.00		1.00	0.95		1.00	0.95	
Fr _t	1.00	1.00	0.85		1.00		1.00	0.99		1.00	1.00	
Fl _t Protected	0.95	0.99	1.00		1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1698	1776	1615		1854		1805	3554		1805	3469	
Fl _t Permitted	0.49	0.93	1.00		0.99		0.00	1.00		0.28	1.00	
Satd. Flow (perm)	885	1669	1615		1836		0	3554		539	3469	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	274	288	33	7	262	9	74	605	25	54	152	1
RTOR Reduction (vph)	0	0	18	0	1	0	0	2	0	0	0	0
Lane Group Flow (vph)	233	329	15	0	277	0	74	628	0	54	153	0
Heavy Vehicles (%)	1%	1%	0%	0%	2%	0%	0%	1%	0%	0%	4%	0%
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		8 28			4		5!	2!		1!	6!	
Permitted Phases	8 28		8 28	4			2			6		
Actuated Green, G (s)	34.3	34.3	34.3		20.4		30.3	15.2		15.2	15.2	
Effective Green, g (s)	34.3	34.3	34.3		20.4		30.3	15.2		15.2	15.2	
Actuated g/C Ratio	0.44	0.44	0.44		0.26		0.39	0.20		0.20	0.20	
Clearance Time (s)					5.0		4.0	4.5		4.0	4.5	
Vehicle Extension (s)					1.9		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	390	736	712		482		703	695		123	678	
v/s Ratio Prot							c0.04	c0.18		c0.01	0.04	
v/s Ratio Perm	c0.26	0.20	0.01		0.15					c0.08		
v/c Ratio	0.60	0.45	0.02		0.57		0.11	0.90		0.44	0.23	
Uniform Delay, d1	16.5	15.1	12.2		24.9		15.1	30.5		30.2	26.3	
Progression Factor	0.51	0.48	1.00		1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.0	0.3	0.0		1.0		0.1	15.1		2.5	0.8	
Delay (s)	10.5	7.5	12.2		25.9		15.1	45.6		32.7	27.1	
Level of Service	B	A	B		C		B	D		C	C	
Approach Delay (s)		8.9			25.9			42.4			28.5	
Approach LOS		A			C			D			C	

Intersection Summary

HCM 2000 Control Delay	27.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	77.7	Sum of lost time (s)	19.0
Intersection Capacity Utilization	59.9%	ICU Level of Service	B
Analysis Period (min)	15		

Description: 1/28/15 count

! Phase conflict between lane groups.

c Critical Lane Group

HCM 2010 Signalized Intersection Summary
19: SR 27 & 32nd Avenue

2030 AM W-O Proj
01/06/2017



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗		↖	↗		↖	↗	
Traffic Volume (veh/h)	147	268	70	76	231	89	149	339	165	29	103	85
Future Volume (veh/h)	147	268	70	76	231	89	149	339	165	29	103	85
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1765	1810	1872	1714	1752	1800	1748	1759	1800	1800	1700	1800
Adj Flow Rate, veh/h	158	288	75	82	248	96	160	365	177	31	111	91
Adj No. of Lanes	1	2	0	1	1	0	1	2	0	1	2	0
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	3	3	5	3	3	3	3	3	0	5	5
Cap, veh/h	194	796	204	105	291	113	196	889	424	50	555	419
Arrive On Green	0.12	0.29	0.29	0.06	0.24	0.24	0.12	0.40	0.40	0.03	0.32	0.32
Sat Flow, veh/h	1681	2713	695	1633	1204	466	1664	2196	1048	1714	1756	1325
Grp Volume(v), veh/h	158	181	182	82	0	344	160	276	266	31	101	101
Grp Sat Flow(s), veh/h/ln	1681	1720	1688	1633	0	1670	1664	1671	1574	1714	1615	1466
Q Serve(g_s), s	8.8	8.0	8.2	4.7	0.0	18.9	9.0	11.3	11.6	1.7	4.4	4.8
Cycle Q Clear(g_c), s	8.8	8.0	8.2	4.7	0.0	18.9	9.0	11.3	11.6	1.7	4.4	4.8
Prop In Lane	1.00		0.41	1.00		0.28	1.00		0.67	1.00		0.90
Lane Grp Cap(c), veh/h	194	505	495	105	0	404	196	676	637	50	510	463
V/C Ratio(X)	0.81	0.36	0.37	0.78	0.00	0.85	0.81	0.41	0.42	0.62	0.20	0.22
Avail Cap(c_a), veh/h	438	735	722	426	0	714	521	697	656	536	674	611
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	41.4	26.8	26.8	44.2	0.0	34.7	41.3	20.4	20.4	46.0	23.9	24.1
Incr Delay (d2), s/veh	8.0	0.4	0.5	12.0	0.0	5.1	8.0	1.0	1.1	11.7	0.5	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.5	3.8	3.9	2.5	0.0	9.3	4.6	5.4	5.2	1.0	2.0	2.0
LnGrp Delay(d),s/veh	49.4	27.2	27.3	56.3	0.0	39.8	49.2	21.3	21.5	57.7	24.5	24.7
LnGrp LOS	D	C	C	E		D	D	C	C	E	C	C
Approach Vol, veh/h		521			426			702			233	
Approach Delay, s/veh		34.0			43.0			27.8			29.0	
Approach LOS		C			D			C			C	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	8.3	44.3	10.6	32.6	16.8	35.8	15.6	27.7				
Change Period (Y+Rc), s	5.5	5.5	4.5	4.5	5.5	5.5	4.5	4.5				
Max Green Setting (Gmax), s	40.0	40.0	25.0	41.0	30.0	40.0	25.0	41.0				
Max Q Clear Time (g_c+I), s	13.7	13.6	6.7	10.2	11.0	6.8	10.8	20.9				
Green Ext Time (p_c), s	0.1	19.6	0.2	2.5	0.5	23.5	0.4	2.3				
Intersection Summary												
HCM 2010 Ctrl Delay				33.1								
HCM 2010 LOS				C								

Intersection												
Int Delay, s/veh	49.8											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Vol, veh/h	0	369	58	80	172	0	25	0	197	0	244	121
Future Vol, veh/h	0	369	58	80	172	0	25	0	197	0	244	121
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	0	1	0	0	0	0	0	0	0	0	0	3
Mvmt Flow	0	397	62	86	185	0	27	0	212	0	262	130

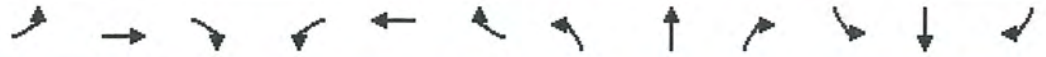
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	459	0	0	981	785	428	891	816	185
Stage 1	-	-	-	-	-	-	428	428	-	357	357	-
Stage 2	-	-	-	-	-	-	553	357	-	534	459	-
Critical Hdwy	-	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.23
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	-	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.327
Pot Cap-1 Maneuver	0	-	-	1113	-	0	231	327	631	265	314	855
Stage 1	0	-	-	-	-	0	609	588	-	665	632	-
Stage 2	0	-	-	-	-	0	521	632	-	534	570	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	-	1113	-	-	38	299	631	164	287	855
Mov Cap-2 Maneuver	-	-	-	-	-	-	38	299	-	164	287	-
Stage 1	-	-	-	-	-	-	609	588	-	665	578	-
Stage 2	-	-	-	-	-	-	220	578	-	355	570	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	2.7	116.7	99.9
HCM LOS			F	F

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	SBLn1
Capacity (veh/h)	229	-	-	1113	-	368
HCM Lane V/C Ratio	1.042	-	-	0.077	-	1.067
HCM Control Delay (s)	116.7	-	-	8.5	0	99.9
HCM Lane LOS	F	-	-	A	A	F
HCM 95th %tile Q(veh)	10.1	-	-	0.3	-	13.8

HCM Signalized Intersection Capacity Analysis
 11: Pines Rd & 16th Ave

2030 PM W-O Proj IMP.
 01/11/2017























Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑			↔			↕	↗		↑	↗
Traffic Volume (vph)	0	369	58	80	172	0	25	0	197	0	244	121
Future Volume (vph)	0	369	58	80	172	0	25	0	197	0	244	121
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0			4.5	4.5		4.5	4.5
Lane Util. Factor		0.95			1.00			0.95	0.95		1.00	1.00
Fr _t		0.98			1.00			0.88	0.85		1.00	0.85
Fl _t Protected		1.00			0.98			0.99	1.00		1.00	1.00
Satd. Flow (prot)		3507			1870			1579	1534		1900	1568
Fl _t Permitted		1.00			0.42			0.84	1.00		1.00	1.00
Satd. Flow (perm)		3507			806			1344	1534		1900	1568
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	0	397	62	86	185	0	27	0	212	0	262	130
RTOR Reduction (vph)	0	12	0	0	0	0	0	104	110	0	0	105
Lane Group Flow (vph)	0	447	0	0	271	0	0	12	13	0	262	25
Heavy Vehicles (%)	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
Turn Type		NA		Perm	NA		Perm	NA	Perm		NA	Perm
Protected Phases		18			14 24			12			16	
Permitted Phases				14 24			12		12			16
Actuated Green, G (s)		18.5			41.3			8.3	8.3		15.2	15.2
Effective Green, g (s)		18.5			41.3			8.3	8.3		15.2	15.2
Actuated g/C Ratio		0.24			0.53			0.11	0.11		0.20	0.20
Clearance Time (s)		5.0						4.5	4.5		4.5	4.5
Vehicle Extension (s)		3.0						3.0	3.0		3.0	3.0
Lane Grp Cap (vph)		833			427			143	163		371	306
v/s Ratio Prot		0.13									c0.14	
v/s Ratio Perm					c0.34			c0.01	0.01			0.02
v/c Ratio		0.54			0.63			0.09	0.08		0.71	0.08
Uniform Delay, d ₁		25.9			12.9			31.3	31.3		29.2	25.6
Progression Factor		1.00			1.13			1.00	1.00		1.00	1.00
Incremental Delay, d ₂		0.7			2.1			0.3	0.2		6.0	0.1
Delay (s)		26.6			16.7			31.6	31.5		35.2	25.7
Level of Service		C			B			C	C		D	C
Approach Delay (s)		26.6			16.7			31.6			32.1	
Approach LOS		C			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	27.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	77.8	Sum of lost time (s)	19.0
Intersection Capacity Utilization	59.6%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM 2010 Signalized Intersection Summary
12: SR 27 & 16th Ave

2030 PM W-O Proj.
01/06/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	197	301	67	15	224	7	28	316	11	97	391	0
Future Volume (veh/h)	197	301	67	15	224	7	28	316	11	97	391	0
Number	3	8	18	7	4	14	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1900	1870	1900	1900	1883	1900	1890	1852	1890	1910	1910	0
Adj Flow Rate, veh/h	219	334	74	17	249	8	31	351	12	108	434	0
Adj No. of Lanes	0	1	1	0	1	0	1	2	0	1	2	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	2	2	0	1	1	1	0	1	1	0	0	0
Cap, veh/h	251	382	558	20	287	9	51	756	26	140	966	0
Arrive On Green	0.35	0.35	0.35	0.17	0.17	0.17	0.03	0.22	0.22	0.08	0.27	0.00
Sat Flow, veh/h	726	1108	1615	116	1697	55	1800	3473	118	1819	3724	0
Grp Volume(v), veh/h	553	0	74	274	0	0	31	177	186	108	434	0
Grp Sat Flow(s), veh/h/ln	1834	0	1615	1867	0	0	1800	1760	1831	1819	1814	0
Q Serve(g_s), s	29.5	0.0	3.3	14.9	0.0	0.0	1.8	9.2	9.2	6.1	10.4	0.0
Cycle Q Clear(g_c), s	29.5	0.0	3.3	14.9	0.0	0.0	1.8	9.2	9.2	6.1	10.4	0.0
Prop In Lane	0.40		1.00	0.06		0.03	1.00		0.06	1.00		0.00
Lane Grp Cap(c), veh/h	633	0	558	315	0	0	51	383	399	140	966	0
V/C Ratio(X)	0.87	0.00	0.13	0.87	0.00	0.00	0.61	0.46	0.47	0.77	0.45	0.00
Avail Cap(c_a), veh/h	877	0	773	536	0	0	517	505	526	522	1041	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	32.1	0.0	23.5	42.3	0.0	0.0	50.2	35.6	35.6	47.4	32.0	0.0
Incr Delay (d2), s/veh	7.3	0.0	0.1	7.8	0.0	0.0	11.0	1.2	1.2	8.8	0.4	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	16.2	0.0	1.5	8.4	0.0	0.0	1.0	4.6	4.8	3.4	5.3	0.0
LnGrp Delay(d),s/veh	39.4	0.0	23.6	50.1	0.0	0.0	61.2	36.8	36.8	56.1	32.4	0.0
LnGrp LOS	D		C	D			E	D	D	E	C	
Approach Vol, veh/h		627			274			394			542	
Approach Delay, s/veh		37.5			50.1			38.7			37.1	
Approach LOS		D			D			D			D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	8.0	32.8		22.6	13.0	27.8		41.1				
Change Period (Y+Rc), s	5.0	5.0		5.0	5.0	5.0		5.0				
Max Green Setting (Gmax), s	30.0	30.0		30.0	30.0	30.0		50.0				
Max Q Clear Time (g_c+I1), s	3.8	12.4		16.9	8.1	11.2		31.5				
Green Ext Time (p_c), s	0.1	11.0		0.7	0.3	11.5		4.5				
Intersection Summary												
HCM 2010 Ctrl Delay			39.5									
HCM 2010 LOS			D									

HCM Signalized Intersection Capacity Analysis
12: Hwy 27 & 16th Ave

2030 PM W-O Proj IMP.
01/11/2017



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	197	301	67	15	224	7	28	316	11	97	391	0
Future Volume (vph)	197	301	67	15	224	7	28	316	11	97	391	0
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		4.0	4.5		4.0	4.5	
Lane Util. Factor	0.95	0.95	1.00		1.00		1.00	0.95		1.00	0.95	
Fr't	1.00	1.00	0.85		1.00		1.00	1.00		1.00	1.00	
Flt Protected	0.95	1.00	1.00		1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1698	1765	1615		1870		1805	3520		1805	3610	
Flt Permitted	0.49	0.97	1.00		0.95		0.54	1.00		0.00	1.00	
Satd. Flow (perm)	874	1721	1615		1779		1027	3520		0	3610	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	219	334	74	17	249	8	31	351	12	108	434	0
RTOR Reduction (vph)	0	0	43	0	1	0	0	2	0	0	0	0
Lane Group Flow (vph)	197	356	31	0	273	0	31	361	0	108	434	0
Heavy Vehicles (%)	1%	2%	0%	0%	1%	0%	0%	1%	33%	0%	0%	0%
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		8 28			4		5!	2!		1!	6!	
Permitted Phases	8 28		8 28	4			2			6		
Actuated Green, G (s)	32.3	32.3	32.3		18.5		17.8	17.3		23.1	15.2	
Effective Green, g (s)	32.3	32.3	32.3		18.5		17.8	17.3		23.1	15.2	
Actuated g/C Ratio	0.42	0.42	0.42		0.24		0.23	0.22		0.30	0.20	
Clearance Time (s)					5.0		4.0	4.5		4.0	4.5	
Vehicle Extension (s)					1.9		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	362	714	670		423		338	782		535	705	
v/s Ratio Prot							0.01	c0.10		0.06	c0.12	
v/s Ratio Perm	c0.23	0.21	0.02		c0.15		0.01					
v/c Ratio	0.54	0.50	0.05		0.65		0.09	0.46		0.20	0.62	
Uniform Delay, d1	17.2	16.8	13.6		26.7		23.9	26.2		20.5	28.6	
Progression Factor	0.44	0.40	0.00		1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.3	0.4	0.0		2.5		0.1	0.4		0.2	4.0	
Delay (s)	8.9	7.2	0.0		29.2		24.0	26.6		20.6	32.6	
Level of Service	A	A	A		C		C	C		C	C	
Approach Delay (s)		6.9			29.2			26.4			30.2	
Approach LOS		A			C			C			C	

Intersection Summary

HCM 2000 Control Delay	21.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	77.8	Sum of lost time (s)	19.0
Intersection Capacity Utilization	59.3%	ICU Level of Service	B
Analysis Period (min)	15		

Description: 10/7/16 counts

! Phase conflict between lane groups.

c Critical Lane Group

HCM 2010 Signalized Intersection Summary
19: SR 27 & 32nd Avenue

2030 PM W-O Proj.
01/06/2017



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗		↖	↗		↖	↗	
Traffic Volume (veh/h)	93	358	216	191	371	53	143	203	126	58	272	74
Future Volume (veh/h)	93	358	216	191	371	53	143	203	126	58	272	74
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1800	1849	1872	1782	1784	1800	1800	1728	1800	1800	1786	1800
Adj Flow Rate, veh/h	109	421	254	225	436	62	168	239	148	68	320	87
Adj No. of Lanes	1	2	0	1	1	0	1	2	0	1	2	0
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Percent Heavy Veh, %	0	2	2	1	1	1	0	3	3	0	1	1
Cap, veh/h	137	528	315	257	491	70	202	726	433	88	796	213
Arrive On Green	0.08	0.25	0.25	0.15	0.32	0.32	0.12	0.37	0.37	0.05	0.30	0.30
Sat Flow, veh/h	1714	2113	1262	1697	1528	217	1714	1980	1181	1714	2648	709
Grp Volume(v), veh/h	109	349	326	225	0	498	168	197	190	68	203	204
Grp Sat Flow(s), veh/h/ln	1714	1756	1619	1697	0	1746	1714	1642	1519	1714	1697	1661
Q Serve(g_s), s	6.9	20.6	20.9	14.4	0.0	30.0	10.6	9.6	10.1	4.3	10.5	10.8
Cycle Q Clear(g_c), s	6.9	20.6	20.9	14.4	0.0	30.0	10.6	9.6	10.1	4.3	10.5	10.8
Prop In Lane	1.00		0.78	1.00		0.12	1.00		0.78	1.00		0.43
Lane Grp Cap(c), veh/h	137	439	404	257	0	561	202	602	557	88	510	499
V/C Ratio(X)	0.79	0.80	0.81	0.87	0.00	0.89	0.83	0.33	0.34	0.77	0.40	0.41
Avail Cap(c_a), veh/h	387	650	599	383	0	646	464	602	557	464	612	600
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	50.1	38.9	39.0	46.0	0.0	35.7	47.8	25.3	25.4	51.9	30.8	30.9
Incr Delay (d2), s/veh	9.8	4.2	5.0	13.9	0.0	13.0	8.6	0.8	0.9	13.1	1.4	1.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.6	10.5	9.9	7.7	0.0	16.4	5.5	4.4	4.4	2.4	5.2	5.2
LnGrp Delay(d),s/veh	59.9	43.1	44.0	59.9	0.0	48.7	56.4	26.0	26.3	65.0	32.2	32.4
LnGrp LOS	E	D	D	E		D	E	C	C	E	C	C
Approach Vol, veh/h		784			723			555			475	
Approach Delay, s/veh		45.8			52.2			35.3			37.0	
Approach LOS		D			D			D			D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	41.2	46.1	21.3	32.2	18.5	38.8	13.4	40.1				
Change Period (Y+Rc), s	5.5	5.5	4.5	4.5	5.5	5.5	4.5	4.5				
Max Green Setting (Gmax), s	40.0	40.0	25.0	41.0	30.0	40.0	25.0	41.0				
Max Q Clear Time (g_c+I), s	11.3	12.1	16.4	22.9	12.6	12.8	8.9	32.0				
Green Ext Time (p_c), s	0.2	21.6	0.4	4.2	0.5	20.5	0.3	3.1				
Intersection Summary												
HCM 2010 Ctrl Delay											43.7	
HCM 2010 LOS											D	

Intersection													
Int Delay, s/veh	13.7												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations		↶			↷			↕				↕	
Traffic Vol, veh/h	0	265	49	57	230	0	33	0	268	0	166	37	
Future Vol, veh/h	0	265	49	57	230	0	33	0	268	0	166	37	
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0	
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop	
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None	
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-	
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-	
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-	
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88	
Heavy Vehicles, %	0	4	0	2	1	0	0	0	1	0	2	10	
Mvmt Flow	0	301	56	65	261	0	38	0	305	0	189	42	



















Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	357	0	0	835	720	329	872	748	261
Stage 1	-	-	-	-	-	-	329	329	-	391	391	-
Stage 2	-	-	-	-	-	-	506	391	-	481	357	-
Critical Hdwy	-	-	-	4.12	-	-	7.1	6.5	6.21	7.1	6.52	6.3
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.52	-
Follow-up Hdwy	-	-	-	2.218	-	-	3.5	4	3.309	3.5	4.018	3.39
Pot Cap-1 Maneuver	0	-	-	1202	-	0	289	356	715	273	341	759
Stage 1	0	-	-	-	-	0	688	650	-	637	607	-
Stage 2	0	-	-	-	-	0	552	611	-	570	628	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	-	1202	-	-	139	334	715	149	320	759
Mov Cap-2 Maneuver	-	-	-	-	-	-	139	334	-	149	320	-
Stage 1	-	-	-	-	-	-	688	650	-	637	569	-
Stage 2	-	-	-	-	-	-	327	573	-	327	628	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	1.6	27.4	31.6
HCM LOS			D	D

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	SBLn1
Capacity (veh/h)	492	-	-	1202	-	358
HCM Lane V/C Ratio	0.695	-	-	0.054	-	0.644
HCM Control Delay (s)	27.4	-	-	8.2	0	31.6
HCM Lane LOS	D	-	-	A	A	D
HCM 95th %tile Q(veh)	5.3	-	-	0.2	-	4.3

HCM Signalized Intersection Capacity Analysis
11: Pines Rd & 16th Ave




















2030 AM W- Proj IMP
01/11/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	265	49	57	230	0	33	0	268	0	166	37
Future Volume (vph)	0	265	49	57	230	0	33	0	268	0	166	37
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0			4.5	4.5		4.5	4.5
Lane Util. Factor		0.95			1.00			0.95	0.95		1.00	1.00
Fr _t		0.98			1.00			0.88	0.85		1.00	0.85
Fl _t Protected		1.00			0.99			0.99	1.00		1.00	1.00
Satd. Flow (prot)		3410			1859			1565	1519		1863	1468
Fl _t Permitted		1.00			0.61			0.87	1.00		1.00	1.00
Satd. Flow (perm)		3410			1144			1373	1519		1863	1468
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	0	301	56	65	261	0	38	0	305	0	189	42
RTOR Reduction (vph)	0	15	0	0	0	0	0	142	154	0	0	35
Lane Group Flow (vph)	0	342	0	0	326	0	0	27	20	0	189	7
Heavy Vehicles (%)	0%	4%	0%	2%	1%	0%	0%	0%	1%	0%	2%	10%
Turn Type		NA		Perm	NA		Perm	NA	Perm		NA	Perm
Protected Phases		18			14 24			12			16	
Permitted Phases				14 24			12		12			16
Actuated Green, G (s)		21.4			44.8			9.3	9.3		12.5	12.5
Effective Green, g (s)		21.4			44.8			9.3	9.3		12.5	12.5
Actuated g/C Ratio		0.27			0.56			0.12	0.12		0.16	0.16
Clearance Time (s)		5.0						4.5	4.5		4.5	4.5
Vehicle Extension (s)		3.0						3.0	3.0		3.0	3.0
Lane Grp Cap (vph)		916			643			160	177		292	230
v/s Ratio Prot		0.10									c0.10	
v/s Ratio Perm					c0.28			c0.02	0.01			0.00
v/c Ratio		0.37			0.51			0.17	0.11		0.65	0.03
Uniform Delay, d ₁		23.7			10.6			31.7	31.5		31.5	28.4
Progression Factor		1.00			0.49			1.00	1.00		1.00	1.00
Incremental Delay, d ₂		0.3			0.2			0.5	0.3		4.9	0.1
Delay (s)		23.9			5.5			32.2	31.8		36.4	28.5
Level of Service		C			A			C	C		D	C
Approach Delay (s)		23.9			5.5			32.0			34.9	
Approach LOS		C			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	23.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	79.6	Sum of lost time (s)	19.0
Intersection Capacity Utilization	56.0%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM 2010 Signalized Intersection Summary
12: SR 27 & 16th Ave

2030 AM W- Proj
01/06/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	249	256	28	6	224	80	63	529	21	46	131	1
Future Volume (veh/h)	249	256	28	6	224	80	63	529	21	46	131	1
Number	3	8	18	7	4	14	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1900	1881	1900	1900	1873	1900	1890	1872	1890	1910	1837	1910
Adj Flow Rate, veh/h	293	301	33	7	264	94	74	622	25	54	154	1
Adj No. of Lanes	0	1	1	0	1	0	1	2	0	1	2	0
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Percent Heavy Veh, %	1	1	0	2	2	2	0	1	1	0	4	4
Cap, veh/h	319	328	569	8	284	101	97	795	32	71	759	5
Arrive On Green	0.35	0.35	0.35	0.22	0.22	0.22	0.05	0.23	0.23	0.04	0.21	0.21
Sat Flow, veh/h	906	930	1615	34	1295	461	1800	3487	140	1819	3554	23
Grp Volume(v), veh/h	594	0	33	365	0	0	74	317	330	54	76	79
Grp Sat Flow(s),veh/h/ln	1836	0	1615	1790	0	0	1800	1779	1848	1819	1745	1832
Q Serve(g_s), s	38.5	0.0	1.7	24.8	0.0	0.0	5.0	20.8	20.8	3.7	4.4	4.4
Cycle Q Clear(g_c), s	38.5	0.0	1.7	24.8	0.0	0.0	5.0	20.8	20.8	3.7	4.4	4.4
Prop In Lane	0.49		1.00	0.02		0.26	1.00		0.08	1.00		0.01
Lane Grp Cap(c), veh/h	647	0	569	393	0	0	97	405	421	71	373	391
V/C Ratio(X)	0.92	0.00	0.06	0.93	0.00	0.00	0.77	0.78	0.78	0.76	0.20	0.20
Avail Cap(c_a), veh/h	739	0	650	432	0	0	435	430	446	439	422	443
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	38.5	0.0	26.6	47.5	0.0	0.0	58.0	45.0	45.0	59.0	40.1	40.1
Incr Delay (d2), s/veh	15.3	0.0	0.0	25.3	0.0	0.0	11.9	9.3	9.0	14.8	0.3	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	22.2	0.0	0.8	15.0	0.0	0.0	2.8	11.3	11.7	2.1	2.2	2.3
LnGrp Delay(d),s/veh	53.8	0.0	26.6	72.8	0.0	0.0	69.8	54.3	54.1	73.9	40.4	40.4
LnGrp LOS	D		C	E			E	D	D	E	D	D
Approach Vol, veh/h		627			365			721			209	
Approach Delay, s/veh		52.4			72.8			55.8			49.1	
Approach LOS		D			E			E			D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	11.7	31.5		32.2	9.9	33.3		48.7				
Change Period (Y+Rc), s	5.0	5.0		5.0	5.0	5.0		5.0				
Max Green Setting (Gmax), s	30.0	30.0		30.0	30.0	30.0		50.0				
Max Q Clear Time (g_c+11), s	7.0	6.4		26.8	5.7	22.8		40.5				
Green Ext Time (p_c), s	0.2	14.7		0.4	0.1	5.5		3.3				
Intersection Summary												
HCM 2010 Ctrl Delay			57.2									
HCM 2010 LOS			E									

HCM Signalized Intersection Capacity Analysis
12: Hwy 27 & 16th Ave

2030 AM W- Proj IMP
01/11/2017



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	249	256	28	6	224	8	63	529	21	46	131	1
Future Volume (vph)	249	256	28	6	224	8	63	529	21	46	131	1
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	4.5		4.5	4.5	
Lane Util. Factor	0.95	0.95	1.00		1.00		1.00	0.95		1.00	0.95	
Frt	1.00	1.00	0.85		1.00		1.00	0.99		1.00	1.00	
Flt Protected	0.95	1.00	1.00		1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1698	1779	1615		1854		1805	3555		1805	3469	
Flt Permitted	0.95	0.00	1.00		0.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1698	0	1615		0		1805	3555		1805	3469	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	293	301	33	7	264	9	74	622	25	54	154	1
RTOR Reduction (vph)	0	0	21	0	1	0	0	2	0	0	0	0
Lane Group Flow (vph)	264	330	12	0	279	0	74	645	0	54	155	0
Heavy Vehicles (%)	1%	1%	0%	0%	2%	0%	0%	1%	0%	0%	4%	0%
Turn Type	Prot	NA	custom	Prot	NA		Prot	NA		Prot	NA	
Protected Phases	3 16 15!	8 17 15!		3!	4!		5!	2!		1!	6!	
Permitted Phases			8 17									
Actuated Green, G (s)	45.7	45.7	45.7		30.0		5.0	32.5		38.3	38.3	
Effective Green, g (s)	45.7	45.7	45.7		30.0		5.0	32.5		38.3	38.3	
Actuated g/C Ratio	0.35	0.35	0.35		0.23		0.04	0.25		0.29	0.29	
Clearance Time (s)					5.0		5.0	4.5		4.5	4.5	
Vehicle Extension (s)					1.9		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	596	625	567		427		69	888		531	1022	
v/s Ratio Prot	0.16	c0.19			c0.15		0.04	c0.18		0.03	c0.04	
v/s Ratio Perm			0.01									
v/c Ratio	0.44	0.53	0.02		0.65		1.07	0.73		0.10	0.15	
Uniform Delay, d1	32.4	33.6	27.5		45.3		62.5	44.7		33.3	33.9	
Progression Factor	0.45	0.47	1.00		0.98		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.5	0.6	0.0		2.7		129.7	3.0		0.4	0.3	
Delay (s)	14.9	16.2	27.5		47.3		192.2	47.7		33.7	34.2	
Level of Service	B	B	C		D		F	D		C	C	
Approach Delay (s)		16.3			47.3			62.5			34.1	
Approach LOS		B			D			E			C	

Intersection Summary

HCM 2000 Control Delay	41.2	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	24.0
Intersection Capacity Utilization	61.5%	ICU Level of Service	B
Analysis Period (min)	15		

Description: 1/28/15 count

! Phase conflict between lane groups.

c Critical Lane Group

HCM 2010 Signalized Intersection Summary
 19: SR 27 & 32nd Avenue

2030 AM W- Proj
 01/06/2017



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↕		↔	↕		↔	↕		↔	↕	
Traffic Volume (veh/h)	162	302	75	76	246	89	152	339	165	29	103	87
Future Volume (veh/h)	162	302	75	76	246	89	152	339	165	29	103	87
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1765	1810	1872	1714	1752	1800	1748	1759	1800	1800	1699	1800
Adj Flow Rate, veh/h	174	325	81	82	265	96	163	365	177	31	111	94
Adj No. of Lanes	1	2	0	1	1	0	1	2	0	1	2	0
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	3	3	5	3	3	3	3	3	0	5	5
Cap, veh/h	210	854	210	104	309	112	198	869	415	49	528	411
Arrive On Green	0.12	0.31	0.31	0.06	0.25	0.25	0.12	0.40	0.40	0.03	0.31	0.31
Sat Flow, veh/h	1681	2739	673	1633	1229	445	1664	2196	1048	1714	1730	1346
Grp Volume(v), veh/h	174	202	204	82	0	361	163	276	266	31	103	102
Grp Sat Flow(s),veh/h/ln	1681	1720	1692	1633	0	1674	1664	1671	1574	1714	1614	1462
Q Serve(g_s), s	10.1	9.2	9.4	5.0	0.0	20.6	9.6	12.0	12.3	1.8	4.7	5.2
Cycle Q Clear(g_c), s	10.1	9.2	9.4	5.0	0.0	20.6	9.6	12.0	12.3	1.8	4.7	5.2
Prop In Lane	1.00		0.40	1.00		0.27	1.00		0.67	1.00		0.92
Lane Grp Cap(c), veh/h	210	537	528	104	0	420	198	661	622	49	493	446
V/C Ratio(X)	0.83	0.38	0.39	0.79	0.00	0.86	0.82	0.42	0.43	0.63	0.21	0.23
Avail Cap(c_a), veh/h	420	704	693	408	0	685	499	668	629	514	645	584
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	42.8	26.9	26.9	46.2	0.0	35.8	43.1	21.9	22.0	48.1	25.8	26.0
Incr Delay (d2), s/veh	8.2	0.4	0.5	12.1	0.0	6.1	8.2	1.0	1.2	12.3	0.6	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.2	4.4	4.5	2.6	0.0	10.2	4.8	5.7	5.5	1.0	2.2	2.2
LnGrp Delay(d),s/veh	51.0	27.3	27.4	58.3	0.0	41.9	51.3	23.0	23.2	60.4	26.4	26.7
LnGrp LOS	D	C	C	E		D	D	C	C	E	C	C
Approach Vol, veh/h		580			443			705			236	
Approach Delay, s/veh		34.4			45.0			29.6			31.0	
Approach LOS		C			D			C			C	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	8.4	45.1	10.9	35.7	17.4	36.1	17.0	29.6				
Change Period (Y+Rc), s	5.5	5.5	4.5	4.5	5.5	5.5	4.5	4.5				
Max Green Setting (Gmax), s	30.0	40.0	25.0	41.0	30.0	40.0	25.0	41.0				
Max Q Clear Time (g_c+I), s	13.8	14.3	7.0	11.4	11.6	7.2	12.1	22.6				
Green Ext Time (p_c), s	0.1	19.2	0.2	2.7	0.5	23.3	0.5	2.5				
Intersection Summary												
HCM 2010 Ctrl Delay			34.6									
HCM 2010 LOS			C									

Intersection

Int Delay, s/veh 42.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↶			↷			↶↷			↶↷	
Traffic Vol, veh/h	0	369	61	85	172	0	28	0	212	0	269	121
Future Vol, veh/h	0	369	61	85	172	0	28	0	212	0	269	121
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	0	1	0	0	0	0	0	0	0	0	0	3
Mvmt Flow	0	397	66	91	185	0	30	0	228	0	289	130

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	462	0	0	1007	798	430	912	830	185
Stage 1	-	-	-	-	-	-	430	430	-	368	368	-
Stage 2	-	-	-	-	-	-	577	368	-	544	462	-
Critical Hdwy	-	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.23
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	-	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.327
Pot Cap-1 Maneuver	0	-	-	1110	-	0	221	321	629	257	308	855
Stage 1	0	-	-	-	-	0	607	587	-	656	625	-
Stage 2	0	-	-	-	-	0	506	625	-	527	568	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	-	1110	-	-	-	292	629	152	~ 280	855
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	292	-	152	~ 280	-
Stage 1	-	-	-	-	-	-	607	587	-	656	568	-
Stage 2	-	-	-	-	-	-	191	568	-	336	568	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	2.8		141.2
HCM LOS			-	F

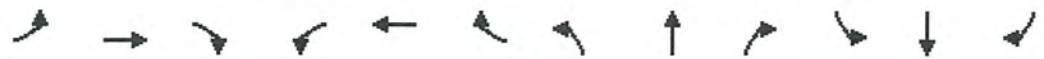
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	SBLn1
Capacity (veh/h)	-	-	-	1110	-	354
HCM Lane V/C Ratio	-	-	-	0.082	-	1.185
HCM Control Delay (s)	-	-	-	8.5	0	141.2
HCM Lane LOS	-	-	-	A	A	F
HCM 95th %tile Q(veh)	-	-	-	0.3	-	17.3

Notes

~: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

HCM Signalized Intersection Capacity Analysis
 11: Pines Rd & 16th Ave

2030 PM W- Proj IMP.
 01/11/2017



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑			↑			↑↓	↑		↑	↑
Traffic Volume (vph)	0	369	61	85	172	0	28	0	212	0	269	121
Future Volume (vph)	0	369	61	85	172	0	28	0	212	0	269	121
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0			4.5	4.5		4.5	4.5
Lane Util. Factor		0.95			1.00			0.95	0.95		1.00	1.00
Fr _t		0.98			1.00			0.89	0.85		1.00	0.85
Fl _t Protected		1.00			0.98			0.99	1.00		1.00	1.00
Satd. Flow (prot)		3503			1869			1581	1534		1900	1568
Fl _t Permitted		1.00			0.41			0.83	1.00		1.00	1.00
Satd. Flow (perm)		3503			773			1323	1534		1900	1568
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	0	397	66	91	185	0	30	0	228	0	289	130
RTOR Reduction (vph)	0	13	0	0	0	0	0	110	120	0	0	105
Lane Group Flow (vph)	0	450	0	0	276	0	0	13	15	0	289	25
Heavy Vehicles (%)	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
Turn Type		NA		Perm	NA		Perm	NA	Perm		NA	Perm
Protected Phases		18			14 24			12			16	
Permitted Phases				14 24			12		12			16
Actuated Green, G (s)		19.0			42.2			8.6	8.6		15.2	15.2
Effective Green, g (s)		19.0			42.2			8.6	8.6		15.2	15.2
Actuated g/C Ratio		0.24			0.53			0.11	0.11		0.19	0.19
Clearance Time (s)		5.0						4.5	4.5		4.5	4.5
Vehicle Extension (s)		3.0						3.0	3.0		3.0	3.0
Lane Grp Cap (vph)		842			412			144	166		365	301
v/s Ratio Prot		0.13									c0.15	
v/s Ratio Perm					c0.36			c0.01	0.01			0.02
v/c Ratio		0.53			0.67			0.09	0.09		0.79	0.08
Uniform Delay, d ₁		26.1			13.3			31.7	31.7		30.4	26.2
Progression Factor		1.00			1.18			1.00	1.00		1.00	1.00
Incremental Delay, d ₂		0.7			3.0			0.3	0.2		11.2	0.1
Delay (s)		26.8			18.8			32.0	31.9		41.6	26.3
Level of Service		C			B			C	C		D	C
Approach Delay (s)		26.8			18.8			31.9			36.8	
Approach LOS		C			B			C			D	

Intersection Summary			
HCM 2000 Control Delay	29.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	79.0	Sum of lost time (s)	19.0
Intersection Capacity Utilization	61.8%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			





















HCM 2010 Signalized Intersection Summary
12: SR 27 & 16th Ave

2030 PM W- Proj.
01/06/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	204	310	67	15	229	7	28	320	11	97	398	0
Future Volume (veh/h)	204	310	67	15	229	7	28	320	11	97	398	0
Number	3	8	18	7	4	14	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1900	1870	1900	1900	1883	1900	1890	1853	1890	1910	1910	0
Adj Flow Rate, veh/h	227	344	74	17	254	8	31	356	12	108	442	0
Adj No. of Lanes	0	1	1	0	1	0	1	2	0	1	2	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	2	2	0	1	1	1	0	1	1	0	0	0
Cap, veh/h	257	390	570	19	290	9	50	746	25	139	955	0
Arrive On Green	0.35	0.35	0.35	0.17	0.17	0.17	0.03	0.21	0.21	0.08	0.26	0.00
Sat Flow, veh/h	729	1105	1615	114	1700	54	1800	3475	117	1819	3724	0
Grp Volume(v), veh/h	571	0	74	279	0	0	31	180	188	108	442	0
Grp Sat Flow(s),veh/h/ln	1834	0	1615	1868	0	0	1800	1760	1832	1819	1814	0
Q Serve(g_s), s	31.6	0.0	3.4	15.7	0.0	0.0	1.8	9.6	9.7	6.3	11.0	0.0
Cycle Q Clear(g_c), s	31.6	0.0	3.4	15.7	0.0	0.0	1.8	9.6	9.7	6.3	11.0	0.0
Prop In Lane	0.40		1.00	0.06		0.03	1.00		0.06	1.00		0.00
Lane Grp Cap(c), veh/h	647	0	570	319	0	0	50	378	393	139	955	0
V/C Ratio(X)	0.88	0.00	0.13	0.88	0.00	0.00	0.61	0.48	0.48	0.78	0.46	0.00
Avail Cap(c_a), veh/h	850	0	748	519	0	0	501	489	509	506	1009	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	32.8	0.0	23.7	43.6	0.0	0.0	51.9	37.1	37.1	48.9	33.4	0.0
Incr Delay (d2), s/veh	8.7	0.0	0.1	9.3	0.0	0.0	11.5	1.3	1.3	8.9	0.4	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	17.6	0.0	1.5	9.0	0.0	0.0	1.1	4.8	5.1	3.5	5.6	0.0
LnGrp Delay(d),s/veh	41.6	0.0	23.8	52.9	0.0	0.0	63.3	38.4	38.4	57.8	33.8	0.0
LnGrp LOS	D		C	D			E	D	D	E	C	
Approach Vol, veh/h		645			279			399			550	
Approach Delay, s/veh		39.5			52.9			40.3			38.5	
Approach LOS		D			D			D			D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	8.0	33.4		23.4	13.2	28.2		43.1				
Change Period (Y+Rc), s	5.0	5.0		5.0	5.0	5.0		5.0				
Max Green Setting (Gmax), s	30.0	30.0		30.0	30.0	30.0		50.0				
Max Q Clear Time (g_c+I1), s	3.8	13.0		17.7	8.3	11.7		33.6				
Green Ext Time (p_c), s	0.1	10.8		0.7	0.3	11.5		4.5				
Intersection Summary												
HCM 2010 Ctrl Delay			41.4									
HCM 2010 LOS			D									

HCM Signalized Intersection Capacity Analysis
12: Hwy 27 & 16th Ave

2030 PM W- Proj IMP.
01/11/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	204	310	67	15	229	7	28	320	11	97	398	0
Future Volume (vph)	204	310	67	15	229	7	28	320	11	97	398	0
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		4.0	4.5		4.0	4.5	
Lane Util. Factor	0.95	0.95	1.00		1.00		1.00	0.95		1.00	0.95	
Fr _t	1.00	1.00	0.85		1.00		1.00	1.00		1.00	1.00	
Fl _t Protected	0.95	1.00	1.00		1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1698	1765	1615		1870		1805	3520		1805	3610	
Fl _t Permitted	0.48	0.97	1.00		0.93		0.51	1.00		0.00	1.00	
Satd. Flow (perm)	865	1719	1615		1750		974	3520		0	3610	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	227	344	74	17	254	8	31	356	12	108	442	0
RTOR Reduction (vph)	0	0	43	0	1	0	0	2	0	0	0	0
Lane Group Flow (vph)	204	367	31	0	278	0	31	366	0	108	442	0
Heavy Vehicles (%)	1%	2%	0%	0%	1%	0%	0%	1%	33%	0%	0%	0%
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		8 28			4		5!	2!		1!	6!	
Permitted Phases	8 28		8 28	4			2			6		
Actuated Green, G (s)	33.1	33.1	33.1		19.0		18.2	17.7		23.5	15.2	
Effective Green, g (s)	33.1	33.1	33.1		19.0		18.2	17.7		23.5	15.2	
Actuated g/C Ratio	0.42	0.42	0.42		0.24		0.23	0.22		0.30	0.19	
Clearance Time (s)					5.0		4.0	4.5		4.0	4.5	
Vehicle Extension (s)					1.9		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	362	720	676		420		333	788		536	694	
v/s Ratio Prot							0.01	c0.10		0.06	c0.12	
v/s Ratio Perm	c0.24	0.21	0.02		c0.16		0.01					
v/c Ratio	0.56	0.51	0.05		0.66		0.09	0.46		0.20	0.64	
Uniform Delay, d1	17.5	17.0	13.6		27.1		24.2	26.5		20.7	29.4	
Progression Factor	0.45	0.41	0.00		1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.6	0.4	0.0		3.0		0.1	0.4		0.2	4.4	
Delay (s)	9.4	7.4	0.0		30.1		24.3	27.0		20.9	33.8	
Level of Service	A	A	A		C		C	C		C	C	
Approach Delay (s)		7.2			30.1			26.8			31.3	
Approach LOS		A			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	21.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	79.0	Sum of lost time (s)	19.0
Intersection Capacity Utilization	60.2%	ICU Level of Service	B
Analysis Period (min)	15		
Description: 10/7/16 counts			
! Phase conflict between lane groups.			
c Critical Lane Group			

HCM 2010 Signalized Intersection Summary
19: SR 27 & 32nd Avenue

2030 PM W- Proj.
01/06/2017



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖↗		↖	↖↗		↖	↖↗		↖	↖↗	
Traffic Volume (veh/h)	97	377	224	191	405	53	156	203	126	58	272	81
Future Volume (veh/h)	97	377	224	191	405	53	156	203	126	58	272	81
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1800	1849	1872	1782	1784	1800	1800	1728	1800	1800	1786	1800
Adj Flow Rate, veh/h	114	444	264	225	476	62	184	239	148	68	320	95
Adj No. of Lanes	1	2	0	1	1	0	1	2	0	1	2	0
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Percent Heavy Veh, %	0	2	2	1	1	1	0	3	3	0	1	1
Cap, veh/h	142	563	332	256	515	67	217	712	425	88	738	216
Arrive On Green	0.08	0.27	0.27	0.15	0.33	0.33	0.13	0.36	0.36	0.05	0.28	0.28
Sat Flow, veh/h	1714	2124	1253	1697	1547	201	1714	1980	1181	1714	2592	757
Grp Volume(v), veh/h	114	367	341	225	0	538	184	197	190	68	208	207
Grp Sat Flow(s),veh/h/ln	1714	1756	1621	1697	0	1748	1714	1642	1519	1714	1697	1653
Q Serve(g_s), s	7.6	22.4	22.7	15.0	0.0	34.3	12.1	10.1	10.6	4.5	11.5	11.9
Cycle Q Clear(g_c), s	7.6	22.4	22.7	15.0	0.0	34.3	12.1	10.1	10.6	4.5	11.5	11.9
Prop In Lane	1.00		0.77	1.00		0.12	1.00		0.78	1.00		0.46
Lane Grp Cap(c), veh/h	142	466	430	256	0	582	217	591	546	88	483	470
V/C Ratio(X)	0.80	0.79	0.79	0.88	0.00	0.92	0.85	0.33	0.35	0.77	0.43	0.44
Avail Cap(c_a), veh/h	371	623	575	367	0	620	445	591	546	445	587	572
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	52.1	39.4	39.5	48.1	0.0	37.2	49.4	26.9	27.1	54.1	33.7	33.8
Incr Delay (d2), s/veh	9.9	4.8	5.5	15.7	0.0	19.2	8.9	0.8	0.9	13.2	1.7	1.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.0	11.5	10.8	8.2	0.0	19.7	6.3	4.7	4.6	2.5	5.6	5.6
LnGrp Delay(d),s/veh	62.0	44.3	45.1	63.8	0.0	56.4	58.3	27.7	28.0	67.3	35.4	35.6
LnGrp LOS	E	D	D	E		E	E	C	C	E	D	D
Approach Vol, veh/h		822			763			571			483	
Approach Delay, s/veh		47.1			58.6			37.7			40.0	
Approach LOS		D			E			D			D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	11.4	47.1	21.9	35.1	20.1	38.4	14.1	43.0				
Change Period (Y+Rc), s	5.5	5.5	4.5	4.5	5.5	5.5	4.5	4.5				
Max Green Setting (Gmax), s	30.0	40.0	25.0	41.0	30.0	40.0	25.0	41.0				
Max Q Clear Time (g_c+1), s	11.5	12.6	17.0	24.7	14.1	13.9	9.6	36.3				
Green Ext Time (p_c), s	0.2	21.4	0.4	4.4	0.5	19.0	0.3	2.2				
Intersection Summary												
HCM 2010 Ctrl Delay				47.1								
HCM 2010 LOS				D								

Queuing and Blocking Report
2025 PM W-O Proj.IMP

01/12/2017

Intersection: 11: Pines Rd & 16th Ave

Movement	EB	EB	WB	NB	NB	SB	SB
Directions Served	T	TR	LT	LTR	R	T	R
Maximum Queue (ft)	145	278	81	172	5	284	224
Average Queue (ft)	53	142	38	71	0	147	59
95th Queue (ft)	109	249	84	132	5	252	161
Link Distance (ft)	261	261	65	546	546	303	
Upstream Blk Time (%)		2	2			1	
Queuing Penalty (veh)		0	6			3	
Storage Bay Dist (ft)							200
Storage Blk Time (%)						5	0
Queuing Penalty (veh)						6	0

Intersection: 12: Hwy 27 & 16th Ave

Movement	EB	EB	EB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	LT	R	LTR	L	T	TR	L	T	TR
Maximum Queue (ft)	89	94	3	221	76	178	158	137	202	166
Average Queue (ft)	42	60	0	108	17	107	61	46	120	90
95th Queue (ft)	84	107	3	195	50	165	126	99	180	156
Link Distance (ft)	65	65	65	224		643	643		305	305
Upstream Blk Time (%)	2	9		1						
Queuing Penalty (veh)	4	17		2						
Storage Bay Dist (ft)					157			232		
Storage Blk Time (%)						1			0	
Queuing Penalty (veh)						0			0	

Zone Summary

Zone wide Queuing Penalty: 38