

ATTACHMENT E | YEAR 2040 FUTURE NO-BUILD  
TRAFIFC OPERATIONS WORKSHEETS

HCM 6th AWSC  
1: Goerig St & Park Rd/Bozarth Ave

08/10/2020

Intersection	
Intersection Delay, s/veh	13.1
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Vol, veh/h	78	34	2	15	18	19	10	336	67	33	154	111
Future Vol, veh/h	78	34	2	15	18	19	10	336	67	33	154	111
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles, %	17	14	0	0	25	0	0	1	17	0	0	4
Mvmt Flow	86	37	2	16	20	21	11	369	74	36	169	122
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	11.1	9.6	15.1	11.8
HCM LOS	B	A	C	B

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %		2%	68%	29%
Vol Thru, %		81%	30%	35%
Vol Right, %		16%	2%	37%
Sign Control		Stop	Stop	Stop
Traffic Vol by Lane		413	114	52
LT Vol		10	78	15
Through Vol		336	34	18
RT Vol		67	2	19
Lane Flow Rate		454	125	57
Geometry Grp		1	1	1
Degree of Util (X)		0.61	0.219	0.094
Departure Headway (Hd)		4.835	6.303	5.903
Convergence, Y/N		Yes	Yes	Yes
Cap		749	569	606
Service Time		2.845	4.348	3.954
HCM Lane V/C Ratio		0.606	0.22	0.094
HCM Control Delay		15.1	11.1	9.6
HCM Lane LOS		C	B	A
HCM 95th-tile Q		4.2	0.8	0.3

HCM 6th TWSC  
2: Goerig St & Lakeshore Dr/Buckeye St

08/10/2020

Intersection												
Int Delay, s/veh	2.7											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	87	156	19	26	26	531	12	499	61	451	322	124
Future Vol, veh/h	87	156	19	26	26	531	12	499	61	451	322	124
Conflicting Peds, #/hr	0	0	2	2	0	0	3	0	1	1	0	3
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	2	0	0	0	25	4	0	4	0	20	3	22
Mvmt Flow	93	166	20	28	28	565	13	531	65	480	343	132

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	2258	1995	414	2055	2029	565	478	0	0	597	0	0
Stage 1	1372	1372	-	591	591	-	-	-	-	-	-	-
Stage 2	886	623	-	1464	1438	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.5	6.2	7.1	6.75	6.24	4.1	-	-	4.3	-	-
Critical Hdwy Stg 1	6.12	5.5	-	6.1	5.75	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.5	-	6.1	5.75	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4	3.3	3.5	4.225	3.336	2.2	-	-	2.38	-	-
Pot Cap-1 Maneuver	~ 29	~ 61	643	41	50	~ 521	1095	-	-	897	-	-
Stage 1	180	216	-	497	460	-	-	-	-	-	-	-
Stage 2	339	481	-	161	177	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	-	~ 15	640	-	~ 13	~ 521	1092	-	-	896	-	-
Mov Cap-2 Maneuver	-	~ 15	-	-	~ 13	-	-	-	-	-	-	-
Stage 1	176	~ 56	-	488	451	-	-	-	-	-	-	-
Stage 2	-	472	-	-	45	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s			0.2	6.8
HCM LOS	-	-		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1092	-	-	-	896	-	-
HCM Lane V/C Ratio	0.012	-	-	-	0.535	-	-
HCM Control Delay (s)	8.3	0	-	-	13.6	0	-
HCM Lane LOS	A	A	-	-	B	A	-
HCM 95th %tile Q(veh)	0	-	-	-	3.3	-	-

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

HCM 6th TWSC  
 3: Goerig St & Lewis River Rd

08/10/2020

Intersection						
Int Delay, s/veh	0.8					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↗		↖	↖	
Traffic Vol, veh/h	0	83	0	1137	804	0
Future Vol, veh/h	0	83	0	1137	804	0
Conflicting Peds, #/hr	3	0	2	0	0	2
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	0	15	0	4	5	0
Mvmt Flow	0	89	0	1223	865	0

Major/Minor	Minor2	Major1	Major2		
Conflicting Flow All	-	865	-	0	-
Stage 1	-	-	-	-	-
Stage 2	-	-	-	-	-
Critical Hdwy	-	6.35	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-
Follow-up Hdwy	-	3.435	-	-	-
Pot Cap-1 Maneuver	0	335	0	-	-
Stage 1	0	-	0	-	-
Stage 2	0	-	0	-	-
Platoon blocked, %				-	-
Mov Cap-1 Maneuver	-	335	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-
Stage 1	-	-	-	-	-
Stage 2	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	19.6	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBT EBLn1	SBT
Capacity (veh/h)	- 335	-
HCM Lane V/C Ratio	- 0.266	-
HCM Control Delay (s)	- 19.6	-
HCM Lane LOS	- C	-
HCM 95th %tile Q(veh)	- 1.1	-

HCM 6th TWSC  
4: Goerig St & Pacific Ave

08/10/2020

Intersection						
Int Delay, s/veh	0					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	0	2	275	719	80
Future Vol, veh/h	0	0	2	275	719	80
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	3	5	15
Mvmt Flow	0	0	2	299	782	87

Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	1129	826	869	0	-	0
Stage 1	826	-	-	-	-	-
Stage 2	303	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	228	375	784	-	-	-
Stage 1	433	-	-	-	-	-
Stage 2	754	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	227	375	784	-	-	-
Mov Cap-2 Maneuver	227	-	-	-	-	-
Stage 1	432	-	-	-	-	-
Stage 2	754	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	0	0.1	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	784	-	-	-	-
HCM Lane V/C Ratio	0.003	-	-	-	-
HCM Control Delay (s)	9.6	0	0	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	-	-	-

HCM 6th TWSC  
5: Pacific Ave & CC St

08/10/2020

Intersection						
Int Delay, s/veh	1.9					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	T			T		
Traffic Vol, veh/h	3	94	38	237	704	3
Future Vol, veh/h	3	94	38	237	704	3
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	4	0	4	5	0
Mvmt Flow	3	102	41	258	765	3

Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	1107	767	768	0	-	0
Stage 1	767	-	-	-	-	-
Stage 2	340	-	-	-	-	-
Critical Hdwy	6.4	6.24	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.336	2.2	-	-	-
Pot Cap-1 Maneuver	235	399	855	-	-	-
Stage 1	462	-	-	-	-	-
Stage 2	725	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	222	399	855	-	-	-
Mov Cap-2 Maneuver	222	-	-	-	-	-
Stage 1	436	-	-	-	-	-
Stage 2	725	-	-	-	-	-

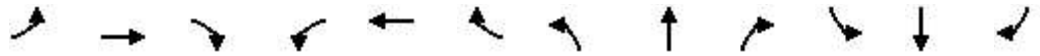
Approach	EB	NB	SB
HCM Control Delay, s	17.7	1.3	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	855	-	389	-	-
HCM Lane V/C Ratio	0.048	-	0.271	-	-
HCM Control Delay (s)	9.4	0	17.7	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	0.2	-	1.1	-	-

# HCM Signalized Intersection Capacity Analysis

## 6: I-5 SB On Ramp & Lewis River Rd

08/10/2020



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	57	731	329	378	814	222	0	0	0	468	247	0
Future Volume (vph)	57	731	329	378	814	222	0	0	0	468	247	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0				4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	1.00	1.00				1.00	1.00	
Frbp, ped/bikes	1.00	0.99		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	
Frt	1.00	0.95		1.00	1.00	0.85				1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00	1.00				0.95	1.00	
Satd. Flow (prot)	1805	3297		1703	1810	1534				1752	1792	
Flt Permitted	0.13	1.00		0.08	1.00	1.00				0.95	1.00	
Satd. Flow (perm)	247	3297		143	1810	1534				1752	1792	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	59	761	343	394	848	231	0	0	0	488	257	0
RTOR Reduction (vph)	0	35	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	59	1069	0	394	848	231	0	0	0	488	257	0
Confl. Peds. (#/hr)	3		1	1		3						
Heavy Vehicles (%)	0%	2%	7%	6%	5%	3%	0%	0%	0%	3%	6%	0%
Turn Type	D.P+P	NA		D.P+P	NA	Free				Split	NA	
Protected Phases	1	6		5	2					4	4	
Permitted Phases	2			6		Free						
Actuated Green, G (s)	93.3	59.0		93.3	87.2	153.0				47.7	47.7	
Effective Green, g (s)	93.3	59.0		93.3	87.2	153.0				47.7	47.7	
Actuated g/C Ratio	0.61	0.39		0.61	0.57	1.00				0.31	0.31	
Clearance Time (s)	4.0	4.0		4.0	4.0					4.0	4.0	
Vehicle Extension (s)	3.0	2.5		3.5	3.0					4.0	4.0	
Lane Grp Cap (vph)	212	1271		436	1031	1534				546	558	
v/s Ratio Prot	0.01	0.32		c0.20	0.47					c0.28	0.14	
v/s Ratio Perm	0.16			c0.35		0.15						
v/c Ratio	0.28	0.84		0.90	0.82	0.15				0.89	0.46	
Uniform Delay, d1	22.7	42.7		45.7	26.6	0.0				50.2	42.3	
Progression Factor	1.00	1.00		0.96	1.07	1.00				1.00	1.00	
Incremental Delay, d2	0.7	6.8		9.1	2.6	0.1				17.2	0.8	
Delay (s)	23.5	49.6		53.1	31.1	0.1				67.5	43.1	
Level of Service	C	D		D	C	A				E	D	
Approach Delay (s)		48.3			32.1			0.0			59.1	
Approach LOS		D			C			A			E	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			43.6									HCM 2000 Level of Service D
HCM 2000 Volume to Capacity ratio			0.90									
Actuated Cycle Length (s)			153.0							12.0		Sum of lost time (s)
Intersection Capacity Utilization			87.6%									ICU Level of Service E
Analysis Period (min)			15									

c Critical Lane Group

# HCM 6th Signalized Intersection Summary

## 6: I-5 SB On Ramp & Lewis River Rd

08/10/2020



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	57	731	329	378	814	222	0	0	0	468	247	0
Future Volume (veh/h)	57	731	329	378	814	222	0	0	0	468	247	0
Initial Q (Qb), veh	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
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Work Zone On Approach		No			No						No	
Adj Sat Flow, veh/h/ln	1900	1870	1796	1811	1826	1856				1856	1811	1900
Adj Flow Rate, veh/h	59	761	343	394	848	0				488	257	0
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96				0.96	0.96	0.96
Percent Heavy Veh, %	0	2	7	6	5	3				3	6	0
Cap, veh/h	505	1212	546	433	1151					474	485	0
Arrive On Green	0.02	0.51	0.51	0.29	1.00	0.00				0.27	0.27	0.00
Sat Flow, veh/h	1810	2380	1071	1725	1826	1572				1767	1811	0
Grp Volume(v), veh/h	59	568	536	394	848	0				488	257	0
Grp Sat Flow(s),veh/h/ln	1810	1777	1674	1725	1826	1572				1767	1811	0
Q Serve(g_s), s	1.8	35.3	35.4	18.5	0.0	0.0				41.0	18.5	0.0
Cycle Q Clear(g_c), s	1.8	35.3	35.4	18.5	0.0	0.0				41.0	18.5	0.0
Prop In Lane	1.00		0.64	1.00		1.00				1.00		0.00
Lane Grp Cap(c), veh/h	505	905	853	433	1151					474	485	0
V/C Ratio(X)	0.12	0.63	0.63	0.91	0.74					1.03	0.53	0.00
Avail Cap(c_a), veh/h	652	905	853	613	1151					474	485	0
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00				1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.28	0.28	0.00				1.00	1.00	0.00
Uniform Delay (d), s/veh	9.5	27.1	27.1	19.4	0.0	0.0				56.0	47.8	0.0
Incr Delay (d2), s/veh	0.1	3.3	3.5	4.9	1.2	0.0				49.4	1.4	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
%ile BackOfQ(95%),veh/ln	1.3	22.3	21.3	9.0	0.7	0.0				33.5	13.5	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	9.6	30.3	30.6	24.3	1.2	0.0				105.4	49.2	0.0
LnGrp LOS	A	C	C	C	A					F	D	A
Approach Vol, veh/h		1163			1242	A					745	
Approach Delay, s/veh		29.4			8.5						86.0	
Approach LOS		C			A						F	
Timer - Assigned Phs	1	2		4	5	6						
Phs Duration (G+Y+Rc), s	7.5	100.5		45.0	26.0	82.0						
Change Period (Y+Rc), s	4.0	4.0		4.0	4.0	4.0						
Max Green Setting (Gmax), s	16.0	84.0		41.0	38.0	62.0						
Max Q Clear Time (g_c+I1), s	3.8	2.0		43.0	20.5	37.4						
Green Ext Time (p_c), s	0.1	8.5		0.0	1.5	7.0						

### Intersection Summary

HCM 6th Ctrl Delay	34.6
HCM 6th LOS	C

### Notes

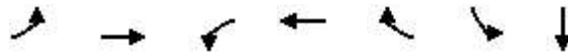
Unsignalized Delay for [WBR] is excluded from calculations of the approach delay and intersection delay.



Queues

6: I-5 SB On Ramp & Lewis River Rd

08/10/2020



Lane Group	EBL	EBT	WBL	WBT	WBR	SBL	SBT
Lane Group Flow (vph)	59	1104	394	848	231	488	257
v/c Ratio	0.26	0.85	0.90	0.81	0.15	0.89	0.46
Control Delay	12.5	47.7	51.7	30.9	0.1	70.1	47.0
Queue Delay	0.0	4.7	2.9	50.0	0.0	0.5	0.0
Total Delay	12.5	52.4	54.5	80.9	0.1	70.6	47.0
Queue Length 50th (ft)	21	512	361	584	0	469	208
Queue Length 95th (ft)	34	581	m382	m604	m0	#752	317
Internal Link Dist (ft)		147		400			78
Turn Bay Length (ft)	100		150				
Base Capacity (vph)	319	1369	476	1047	1534	546	558
Starvation Cap Reductn	0	0	30	330	0	0	0
Spillback Cap Reductn	0	201	0	0	0	4	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.18	0.95	0.88	1.18	0.15	0.90	0.46

Intersection Summary

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

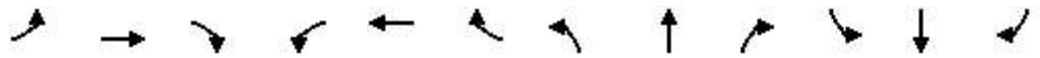
Queue shown is maximum after two cycles.

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

# HCM Signalized Intersection Capacity Analysis

## 7: I-5 NB Off Ramp & Lewis River Rd

08/10/2020



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↑↑			↑↑			↘	↗	↘		↗
Traffic Volume (vph)	457	743	0	0	682	213	381	98	596	87	0	352
Future Volume (vph)	457	743	0	0	682	213	381	98	596	87	0	352
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			6.5			4.0	4.0	4.0		4.0
Lane Util. Factor	1.00	0.95			0.95			1.00	1.00	1.00		1.00
Frbp, ped/bikes	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
Frt	1.00	1.00			0.96			1.00	0.85	1.00		0.85
Flt Protected	0.95	1.00			1.00			0.96	1.00	0.95		1.00
Satd. Flow (prot)	1752	3539			3228			1724	1553	1626		1568
Flt Permitted	0.16	1.00			1.00			0.96	1.00	0.95		1.00
Satd. Flow (perm)	301	3539			3228			1724	1553	1626		1568
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	481	782	0	0	718	224	401	103	627	92	0	371
RTOR Reduction (vph)	0	0	0	0	19	0	0	0	322	0	0	246
Lane Group Flow (vph)	481	782	0	0	923	0	0	504	305	92	0	125
Confl. Peds. (#/hr)	1		2	2		1	1					1
Heavy Vehicles (%)	3%	2%	0%	0%	7%	8%	5%	10%	4%	11%	0%	3%
Turn Type	custom	NA			NA		Split	NA	Prot	Prot		Prot
Protected Phases	1	6			2	8	3	3	3	4		4
Permitted Phases	2											
Actuated Green, G (s)	46.9	34.5			53.1			44.0	44.0	11.0		11.0
Effective Green, g (s)	46.9	34.5			53.1			44.0	44.0	11.0		11.0
Actuated g/C Ratio	0.31	0.23			0.35			0.29	0.29	0.07		0.07
Clearance Time (s)	4.0	4.0						4.0	4.0	4.0		4.0
Vehicle Extension (s)	2.5	3.0						2.5	2.5	3.5		3.5
Lane Grp Cap (vph)	304	798			1120			495	446	116		112
v/s Ratio Prot	c0.23	0.22			c0.29			c0.29	0.20	0.06		c0.08
v/s Ratio Perm	c0.25											
v/c Ratio	1.58	0.98			0.82			1.02	0.68	0.79		1.12
Uniform Delay, d1	46.3	58.9			45.7			54.5	48.3	69.9		71.0
Progression Factor	1.50	1.12			0.75			1.00	1.00	1.00		1.00
Incremental Delay, d2	270.2	18.8			0.5			45.1	3.9	30.7		119.8
Delay (s)	339.9	84.9			34.5			99.6	52.3	100.6		190.8
Level of Service	F	F			C			F	D	F		F
Approach Delay (s)		182.0			34.5			73.4			172.9	
Approach LOS		F			C			E			F	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			112.0				HCM 2000 Level of Service		F			
HCM 2000 Volume to Capacity ratio			1.18									
Actuated Cycle Length (s)			153.0				Sum of lost time (s)		22.5			
Intersection Capacity Utilization			96.0%				ICU Level of Service		F			
Analysis Period (min)			15									

c Critical Lane Group

Queues

7: I-5 NB Off Ramp & Lewis River Rd

08/10/2020



Lane Group	EBL	EBT	WBT	NBT	NBR	SBL	SBR
Lane Group Flow (vph)	481	782	942	504	627	92	371
v/c Ratio	1.55	0.98	0.87	1.02	0.82	0.79	1.04
Control Delay	297.7	82.8	22.4	98.0	23.3	110.5	76.1
Queue Delay	0.0	6.4	48.3	0.0	3.3	0.0	23.0
Total Delay	297.7	89.1	70.8	98.0	26.5	110.5	99.1
Queue Length 50th (ft)	~641	~432	131	~530	178	92	~136
Queue Length 95th (ft)	m#831	m#566	m90	#760	365	#194	#350
Internal Link Dist (ft)		400	67	136			
Turn Bay Length (ft)	150					50	
Base Capacity (vph)	310	800	1095	495	768	116	358
Starvation Cap Reductn	0	1	256	0	0	0	0
Spillback Cap Reductn	0	23	202	0	73	0	33
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	1.55	1.01	1.12	1.02	0.90	0.79	1.14























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

# HCM Signalized Intersection Capacity Analysis

## 8: E CC St & Lewis River Rd

08/10/2020

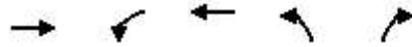
												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 		 	 		 		 			
Traffic Volume (vph)	0	1047	377	122	649	0	247	0	86	0	0	0
Future Volume (vph)	0	1047	377	122	649	0	247	0	86	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	6.5		4.0		4.0			
Lane Util. Factor		0.95		1.00	0.95		1.00		1.00			
Frbp, ped/bikes		0.99		1.00	1.00		1.00		1.00			
Flpb, ped/bikes		1.00		1.00	1.00		1.00		1.00			
Frt		0.96		1.00	1.00		1.00		0.85			
Flt Protected		1.00		0.95	1.00		0.95		1.00			
Satd. Flow (prot)		3336		1719	3406		1641		1553			
Flt Permitted		1.00		0.95	1.00		0.95		1.00			
Satd. Flow (perm)		3336		1719	3406		1641		1553			
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	1102	397	128	683	0	260	0	91	0	0	0
RTOR Reduction (vph)	0	23	0	0	0	0	0	0	74	0	0	0
Lane Group Flow (vph)	0	1476	0	128	683	0	260	0	17	0	0	0
Confl. Peds. (#/hr)			5	5								
Heavy Vehicles (%)	0%	3%	3%	5%	6%	0%	10%	0%	4%	0%	0%	0%
Turn Type		NA		Prot	NA		Prot		Prot			
Protected Phases		4 6 3		5	2		8		8			
Permitted Phases												
Actuated Green, G (s)		97.5		14.9	24.5		28.6		28.6			
Effective Green, g (s)		97.5		14.9	24.5		28.6		28.6			
Actuated g/C Ratio		0.64		0.10	0.16		0.19		0.19			
Clearance Time (s)				4.0	6.5		4.0		4.0			
Vehicle Extension (s)				2.5	3.8		1.5		1.5			
Lane Grp Cap (vph)		2125		167	545		306		290			
v/s Ratio Prot		c0.44		c0.07	c0.20		c0.16		0.01			
v/s Ratio Perm												
v/c Ratio		0.69		0.77	1.25		0.85		0.06			
Uniform Delay, d1		18.1		67.4	64.2		60.1		51.1			
Progression Factor		0.50		1.00	1.00		1.00		1.00			
Incremental Delay, d2		0.4		18.0	128.4		18.6		0.0			
Delay (s)		9.5		85.4	192.7		78.7		51.2			
Level of Service		A		F	F		E		D			
Approach Delay (s)		9.5			175.8			71.6			0.0	
Approach LOS		A			F			E			A	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			68.3				HCM 2000 Level of Service		E			
HCM 2000 Volume to Capacity ratio			0.86									
Actuated Cycle Length (s)			153.0				Sum of lost time (s)		22.5			
Intersection Capacity Utilization			71.6%				ICU Level of Service		C			
Analysis Period (min)			15									

c Critical Lane Group

Queues

8: E CC St & Lewis River Rd

08/10/2020



Lane Group	EBT	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	1499	128	683	260	91
v/c Ratio	0.70	0.77	1.25	0.85	0.23
Control Delay	9.7	95.2	178.9	84.5	2.5
Queue Delay	32.9	0.0	2.5	0.5	0.0
Total Delay	42.7	95.2	181.4	85.0	2.5
Queue Length 50th (ft)	630	126	~446	253	0
Queue Length 95th (ft)	m644	#208	#577	#403	9
Internal Link Dist (ft)	67		149		
Turn Bay Length (ft)		75		100	
Base Capacity (vph)	2149	191	545	311	407
Starvation Cap Reductn	738	0	0	0	0
Spillback Cap Reductn	0	0	137	3	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	1.06	0.67	1.67	0.84	0.22

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

HCM 6th TWSC  
9: Lewis River Rd & Millard St

08/10/2020

Intersection												
Int Delay, s/veh	2.9											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↗	↕		↗	↕	
Traffic Vol, veh/h	8	0	27	12	1	22	34	1090	9	25	732	12
Future Vol, veh/h	8	0	27	12	1	22	34	1090	9	25	732	12
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	50	-	-	50	-	-
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	0	11	0	100	5	6	2	11	4	6	0
Mvmt Flow	9	0	29	13	1	24	37	1172	10	27	787	13

Major/Minor	Minor2		Minor1		Major1			Major2				
Conflicting Flow All	1509	2104	794	2113	2105	591	800	0	0	1182	0	0
Stage 1	848	848	-	1251	1251	-	-	-	-	-	-	-
Stage 2	661	1256	-	862	854	-	-	-	-	-	-	-
Critical Hdwy	7.3	6.5	6.365	7.3	8	6.975	4.19	-	-	4.16	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.5	7	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.5	5.5	-	6.1	7	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4.3	4.045	3.5	4.95	3.3475	2.257	-	-	2.238	-	-
Pot Cap-1 Maneuver	92	52	369	33	21	445	799	-	-	580	-	-
Stage 1	359	380	-	186	134	-	-	-	-	-	-	-
Stage 2	423	245	-	353	235	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	78	47	369	28	19	445	799	-	-	580	-	-
Mov Cap-2 Maneuver	78	47	-	28	19	-	-	-	-	-	-	-
Stage 1	342	362	-	177	128	-	-	-	-	-	-	-
Stage 2	379	234	-	310	224	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	27.3		115.6		0.3		0.4	
HCM LOS	D		F					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	799	-	-	199	66	580	-	-
HCM Lane V/C Ratio	0.046	-	-	0.189	0.57	0.046	-	-
HCM Control Delay (s)	9.7	-	-	27.3	115.6	11.5	-	-
HCM Lane LOS	A	-	-	D	F	B	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.7	2.4	0.1	-	-