

HCM 6th Signalized Intersection Summary

3: St Joseph & Coors

03/18/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	704	238	387	166	36	134	408	1680	241	329	2811	355
Future Volume (veh/h)	704	238	387	166	36	134	408	1680	241	329	2811	355
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	765	259	421	180	39	146	443	1826	0	358	3055	386
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	530	307	424	171	190	169	357	2563		408	2638	1062
Arrive On Green	0.15	0.16	0.16	0.10	0.11	0.11	0.10	0.50	0.00	0.12	0.52	0.52
Sat Flow, veh/h	3456	1870	1585	1781	1777	1585	3456	5106	1585	3456	5106	1585
Grp Volume(v), veh/h	765	259	421	180	39	146	443	1826	0	358	3055	386
Grp Sat Flow(s),veh/h/ln	1728	1870	1585	1781	1777	1585	1728	1702	1585	1728	1702	1585
Q Serve(g_s), s	23.0	20.2	24.6	14.4	3.0	13.6	15.5	41.6	0.0	15.3	77.5	6.4
Cycle Q Clear(g_c), s	23.0	20.2	24.6	14.4	3.0	13.6	15.5	41.6	0.0	15.3	77.5	6.4
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	530	307	424	171	190	169	357	2563		408	2638	1062
V/C Ratio(X)	1.44	0.84	0.99	1.05	0.21	0.86	1.24	0.71		0.88	1.16	0.36
Avail Cap(c_a), veh/h	530	307	424	171	243	217	357	2563		475	2638	1062
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	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	63.5	60.8	54.8	67.8	61.2	65.9	67.3	29.0	0.0	65.1	36.2	3.6
Incr Delay (d2), s/veh	210.1	18.9	41.9	83.4	0.5	23.8	129.9	1.7	0.0	15.2	75.8	1.0
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(95%),veh/ln	39.4	16.7	28.2	16.2	2.5	10.9	20.9	24.2	0.0	12.1	68.8	4.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	273.6	79.8	96.8	151.2	61.7	89.7	197.2	30.7	0.0	80.2	112.0	4.6
LnGrp LOS	F	E	F	F	E	F	F	C		F	F	A
Approach Vol, veh/h		1445			365			2269			3799	
Approach Delay, s/veh		187.4			117.1			63.2			98.1	
Approach LOS		F			F			E			F	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	22.2	79.8	18.9	29.1	20.0	82.0	27.5	20.5				
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	20.6	72.4	14.4	24.6	15.5	77.5	18.5	20.5				
Max Q Clear Time (g_c+I1), s	17.3	43.6	16.4	26.6	17.5	79.5	25.0	15.6				
Green Ext Time (p_c), s	0.4	17.4	0.0	0.0	0.0	0.0	0.0	0.4				

Intersection Summary

HCM 6th Ctrl Delay 105.3

HCM 6th LOS F

Notes

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

HCM 6th Signalized Intersection Summary

3: St Joseph & Coors

03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	704	238	387	166	36	134	408	1680	241	329	2811	355
Future Volume (veh/h)	704	238	387	166	36	134	408	1680	241	329	2811	355
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
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	765	259	421	180	39	146	443	1826	0	358	3055	386
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	530	307	424	171	190	169	357	2067		383	2638	1062
Arrive On Green	0.15	0.16	0.16	0.10	0.11	0.11	0.10	0.40	0.00	0.22	0.52	0.52
Sat Flow, veh/h	3456	1870	1585	1781	1777	1585	3456	5106	1585	1781	5106	1585
Grp Volume(v), veh/h	765	259	421	180	39	146	443	1826	0	358	3055	386
Grp Sat Flow(s),veh/h/ln	1728	1870	1585	1781	1777	1585	1728	1702	1585	1781	1702	1585
Q Serve(g_s), s	23.0	20.2	24.6	14.4	3.0	13.6	15.5	49.7	0.0	29.6	77.5	6.4
Cycle Q Clear(g_c), s	23.0	20.2	24.6	14.4	3.0	13.6	15.5	49.7	0.0	29.6	77.5	6.4
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	530	307	424	171	190	169	357	2067		383	2638	1062
V/C Ratio(X)	1.44	0.84	0.99	1.05	0.21	0.86	1.24	0.88		0.93	1.16	0.36
Avail Cap(c_a), veh/h	530	307	424	171	243	217	357	2067		457	2638	1062
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	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	63.5	60.8	54.8	67.8	61.2	65.9	67.3	41.4	0.0	57.8	36.2	3.6
Incr Delay (d2), s/veh	210.1	18.9	41.9	83.4	0.5	23.8	129.9	5.9	0.0	24.2	75.8	1.0
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(95%),veh/ln	39.4	16.7	28.2	16.2	2.5	10.9	20.9	29.6	0.0	22.5	68.8	4.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	273.6	79.8	96.8	151.2	61.7	89.7	197.2	47.3	0.0	82.0	112.0	4.6
LnGrp LOS	F	E	F	F	E	F	F	D		F	F	A
Approach Vol, veh/h	1445			365			2269			3799		
Approach Delay, s/veh	187.4			117.1			76.5			98.3		
Approach LOS	F			F			E			F		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	36.8	65.2	18.9	29.1	20.0	82.0	27.5	20.5				
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	38.5	54.5	14.4	24.6	15.5	77.5	18.5	20.5				
Max Q Clear Time (g_c+I1), s	31.6	51.7	16.4	26.6	17.5	79.5	25.0	15.6				
Green Ext Time (p_c), s	0.7	2.5	0.0	0.0	0.0	0.0	0.0	0.4				

Intersection Summary

HCM 6th Ctrl Delay 109.2

HCM 6th LOS F

Notes

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

SimTraffic Simulation Summary

Baseline Dual SBL & Dual EBL (Original Timing)

03/14/2024

Summary of All Intervals

Start Time	7:57
End Time	8:10
Total Time (min)	13
Time Recorded (min)	10
# of Intervals	2
# of Recorded Intervals	1
Vehs Entered	1173
Vehs Exited	1118
Starting Vehs	298
Ending Vehs	353
Travel Distance (mi)	947
Travel Time (hr)	62.2
Total Delay (hr)	29.9
Total Stops	1372
Fuel Used (gal)	36.1

Interval #0 Information Seeding

Start Time	7:57
End Time	8:00
Total Time (min)	3
Volumes adjusted by Growth Factors.	
No data recorded this interval.	

Interval #1 Information Recording

Start Time	8:00
End Time	8:10
Total Time (min)	10
Volumes adjusted by Growth Factors.	
Vehs Entered	1173
Vehs Exited	1118
Starting Vehs	298
Ending Vehs	353
Travel Distance (mi)	947
Travel Time (hr)	62.2
Total Delay (hr)	29.9
Total Stops	1372
Fuel Used (gal)	36.1

3: Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.0	0.0	0.0	3.3	0.1	0.3	0.9	0.2	0.4	1.3	0.5	0.9
Total Del/Veh (s)	177.2	78.3	50.7	63.2	56.2	22.2	90.0	24.2	10.8	63.8	70.3	59.2

3: Performance by movement

Movement	All
Denied Del/Veh (s)	0.5
Total Del/Veh (s)	64.5

6: Performance by movement

Movement	EBT	WBT	All
Denied Del/Veh (s)	16.5	0.0	10.4
Total Del/Veh (s)	28.0	1.4	16.8

Total Network Performance

Denied Del/Veh (s)	3.4
Total Del/Veh (s)	70.3

Queuing and Blocking Report

Baseline

03/14/2024

Intersection: 3:

Movement	EB	EB	EB	EB	WB	WB	WB	NB	NB	NB	NB	NB
Directions Served	L	L	T	R	L	T	TR	L	L	T	T	T
Maximum Queue (ft)	205	855	847	308	173	245	186	224	244	380	397	464
Average Queue (ft)	201	812	591	215	145	76	109	196	214	286	296	324
95th Queue (ft)	212	935	1088	326	191	219	183	244	267	396	419	479
Link Distance (ft)		840	840			1243	1243			2721	2721	2721
Upstream Blk Time (%)		38	7									
Queuing Penalty (veh)		251	50									
Storage Bay Dist (ft)	180			400	150			500	500			
Storage Blk Time (%)	41	81			13							15
Queuing Penalty (veh)	143	286			2							37

Intersection: 3:

Movement	NB	SB	SB	SB	SB	SB	SB
Directions Served	R	L	L	T	T	T	R
Maximum Queue (ft)	275	124	680	1070	1107	1089	275
Average Queue (ft)	218	83	217	995	1008	1008	225
95th Queue (ft)	398	134	600	1195	1209	1159	385
Link Distance (ft)				2041	2041	2041	
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)	250	580	580				250
Storage Blk Time (%)	0			41		43	0
Queuing Penalty (veh)	0			133		153	4

Intersection: 6:

Movement	EB	EB
Directions Served	T	T
Maximum Queue (ft)	398	398
Average Queue (ft)	214	183
95th Queue (ft)	471	472
Link Distance (ft)	364	364
Upstream Blk Time (%)	33	28
Queuing Penalty (veh)	0	0
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 1060

Actuated Signals, Observed Splits
Baseline

03/14/2024

Intersection: 3:

Phase	1	2	3	4	5	6	7	8
Movement(s) Served	SBL	NBT	WBL	EBT	NBL	SBT	EBL	WBT
Maximum Green (s)	20.6	72.4	14.4	24.6	15.5	77.5	18.5	20.5
Minimum Green (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Recall	None	C-Max	None	None	None	C-Max	None	None
Avg. Green (s)	18.4	76.8	13.7	22.5	18.3	77.5	18.5	17.7
g/C Ratio	0.10	0.51	0.09	0.15	0.12	0.52	0.12	0.12
Cycles Skipped (%)	20	0	0	0	0	0	0	0
Cycles @ Minimum (%)	0	0	0	0	0	0	0	0
Cycles Maxed Out (%)	20	100	75	75	100	100	100	75
Cycles with Peds (%)	0	0	0	0	0	0	0	0

Controller Summary

Average Cycle Length (s): 150.0

Number of Complete Cycles : 3

SimTraffic Simulation Summary

Baseline Dual SBL & Dual EBL with lagging phase

03/14/2024

Summary of All Intervals

Start Time	7:57
End Time	8:10
Total Time (min)	13
Time Recorded (min)	10
# of Intervals	2
# of Recorded Intervals	1
Vehs Entered	1231
Vehs Exited	1199
Starting Vehs	306
Ending Vehs	338
Travel Distance (mi)	1006
Travel Time (hr)	56.6
Total Delay (hr)	22.1
Total Stops	1115
Fuel Used (gal)	35.8

Interval #0 Information Seeding

Start Time	7:57
End Time	8:00
Total Time (min)	3
Volumes adjusted by Growth Factors.	
No data recorded this interval.	

Interval #1 Information Recording

Start Time	8:00
End Time	8:10
Total Time (min)	10
Volumes adjusted by Growth Factors.	
Vehs Entered	1231
Vehs Exited	1199
Starting Vehs	306
Ending Vehs	338
Travel Distance (mi)	1006
Travel Time (hr)	56.6
Total Delay (hr)	22.1
Total Stops	1115
Fuel Used (gal)	35.8

3: Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.0	0.0	0.0	3.6	0.1	0.2	0.9	0.2	0.3	1.1	0.4	1.0
Total Del/Veh (s)	62.3	68.1	47.5	78.8	49.2	23.3	106.5	22.6	9.5	68.7	54.8	39.0

3: Performance by movement

Movement	All
Denied Del/Veh (s)	0.4
Total Del/Veh (s)	48.6

6: Performance by movement

Movement	EBT	WBT	All
Denied Del/Veh (s)	0.3	0.0	0.2
Total Del/Veh (s)	0.3	1.3	0.7

Total Network Performance

Denied Del/Veh (s)	0.5
Total Del/Veh (s)	51.3

Queuing and Blocking Report

Baseline

03/14/2024

Intersection: 3:

Movement	EB	EB	EB	EB	WB	WB	WB	NB	NB	NB	NB	NB
Directions Served	L	L	T	R	L	T	TR	L	L	T	T	T
Maximum Queue (ft)	422	405	261	365	174	216	114	268	311	329	388	364
Average Queue (ft)	320	294	204	243	149	75	82	235	246	270	316	294
95th Queue (ft)	438	411	272	351	188	198	115	291	317	339	403	388
Link Distance (ft)	840	840	840			1243	1243			2720	2720	2720
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)				400	150			500	500			
Storage Blk Time (%)					20							12
Queuing Penalty (veh)					4							29

Intersection: 3:

Movement	NB	SB	SB	SB	SB	SB	SB
Directions Served	R	L	L	T	T	T	R
Maximum Queue (ft)	275	224	680	917	928	917	275
Average Queue (ft)	217	119	257	767	744	759	219
95th Queue (ft)	397	250	618	947	922	919	400
Link Distance (ft)				2041	2041	2041	
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)	250	580	580				250
Storage Blk Time (%)	0			31		40	0
Queuing Penalty (veh)	0			102		142	2

Intersection: 6:

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Network Summary

Network wide Queuing Penalty: 279

Actuated Signals, Observed Splits
Baseline

03/14/2024

Intersection: 3:

Phase	1	2	3	4	5	6	7	8
Movement(s) Served	SBL	NBT	WBL	EBT	NBL	SBT	EBL	WBT
Maximum Green (s)	20.6	72.4	14.4	24.6	15.5	77.5	18.5	20.5
Minimum Green (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Recall	None	C-Max	None	None	None	C-Max	None	None
Avg. Green (s)	17.9	76.0	14.4	24.6	15.5	77.5	31.8	11.1
g/C Ratio	0.10	0.51	0.10	0.16	0.10	0.52	0.21	0.07
Cycles Skipped (%)	20	0	0	0	0	0	0	0
Cycles @ Minimum (%)	0	0	0	0	0	0	0	0
Cycles Maxed Out (%)	40	100	100	100	100	100	100	0
Cycles with Peds (%)	0	0	0	0	0	0	0	0

Controller Summary

Average Cycle Length (s): 150.0

Number of Complete Cycles : 3

SimTraffic Simulation Summary

Baseline Dual SBL & Tripple EBL (Original Timing)

03/14/2024

Summary of All Intervals

Start Time	7:57
End Time	8:10
Total Time (min)	13
Time Recorded (min)	10
# of Intervals	2
# of Recorded Intervals	1
Vehs Entered	1240
Vehs Exited	1182
Starting Vehs	280
Ending Vehs	338
Travel Distance (mi)	993
Travel Time (hr)	56.9
Total Delay (hr)	22.9
Total Stops	1199
Fuel Used (gal)	35.7

Interval #0 Information Seeding

Start Time	7:57
End Time	8:00
Total Time (min)	3
Volumes adjusted by Growth Factors.	
No data recorded this interval.	

Interval #1 Information Recording

Start Time	8:00
End Time	8:10
Total Time (min)	10
Volumes adjusted by Growth Factors.	
Vehs Entered	1240
Vehs Exited	1182
Starting Vehs	280
Ending Vehs	338
Travel Distance (mi)	993
Travel Time (hr)	56.9
Total Delay (hr)	22.9
Total Stops	1199
Fuel Used (gal)	35.7

3: Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.0	0.0	0.0	3.5	0.2	0.2	0.8	0.3	0.4	1.2	0.7	1.1
Total Del/Veh (s)	82.1	59.4	31.8	59.1	33.8	18.6	76.4	28.7	14.6	57.8	58.8	41.9

3: Performance by movement

Movement	All
Denied Del/Veh (s)	0.6
Total Del/Veh (s)	50.7

6: Performance by movement

Movement	EBT	WBT	All
Denied Del/Veh (s)	0.3	0.0	0.2
Total Del/Veh (s)	0.2	1.2	0.6

Total Network Performance

Denied Del/Veh (s)	0.6
Total Del/Veh (s)	53.8

Queuing and Blocking Report

Baseline

03/14/2024

Intersection: 3:

Movement	EB	EB	EB	EB	EB	WB	WB	WB	NB	NB	NB	NB
Directions Served	L	L	L	T	R	L	T	TR	L	L	T	T
Maximum Queue (ft)	204	409	307	259	212	171	31	74	202	247	420	415
Average Queue (ft)	185	332	237	159	166	123	16	53	174	192	314	329
95th Queue (ft)	242	404	325	300	237	207	38	75	212	243	448	444
Link Distance (ft)		840	840	840			1243	1243			2714	2714
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	180				400	150			500	500		
Storage Blk Time (%)	4	34				12						
Queuing Penalty (veh)	9	80				2						

Intersection: 3:

Movement	NB	NB	SB	SB	SB	SB	SB	SB
Directions Served	T	R	L	L	T	T	T	R
Maximum Queue (ft)	477	275	156	680	1099	1089	1045	275
Average Queue (ft)	348	165	133	579	853	870	880	180
95th Queue (ft)	515	387	168	909	1154	1161	1184	371
Link Distance (ft)	2714				2035	2035	2035	
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)		250	580	580				250
Storage Blk Time (%)	20				34		37	0
Queuing Penalty (veh)	48				112		133	0

Intersection: 6:

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Network Summary

Network wide Queuing Penalty: 384

Actuated Signals, Observed Splits
Baseline

03/14/2024

Intersection: 3:

Phase	1	2	3	4	5	6	7	8
Movement(s) Served	SBL	NBT	WBL	EBT	NBL	SBT	EBL	WBT
Maximum Green (s)	20.6	72.4	14.4	24.6	15.5	77.5	18.5	20.5
Minimum Green (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Recall	None	C-Max	None	None	None	C-Max	None	None
Avg. Green (s)	19.8	74.8	12.6	22.1	19.8	77.5	18.5	16.3
g/C Ratio	0.11	0.50	0.08	0.15	0.13	0.52	0.12	0.11
Cycles Skipped (%)	20	0	0	0	0	0	0	0
Cycles @ Minimum (%)	0	0	0	0	0	0	0	0
Cycles Maxed Out (%)	20	100	75	25	100	100	100	25
Cycles with Peds (%)	0	0	0	0	0	0	0	0

Controller Summary

Average Cycle Length (s): 150.0

Number of Complete Cycles : 3