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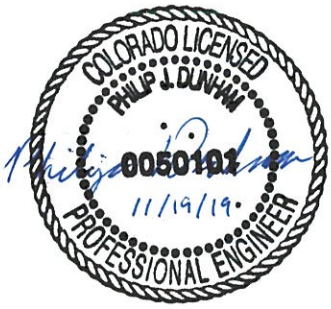


MEMORANDUM

TO: Pat Horn, Martin & Martin

FROM: Christopher J. Fasching PE, PTOE, Principal
Philip J. Dunham PE

DATE: November 19th, 2019

SUBJECT: **64th Avenue ISP Traffic Analysis**
FHU Project Numbers 119161 and 118573

This memorandum provides traffic projection information for a 1.4-mile length of 64th Avenue east of E-470 to help inform the roadway's design in support of an Infrastructure Site Plan. The exact segment extends from E-470 to Jackson Gap Street, and year 2040 peak hour traffic projections have been "blended" from several traffic impact studies covering the 1.4-mile stretch. Intersection operational analyses were conducted using the methodology outlined in the 6th Edition of the Highway Capacity Manual. Levels of Service (LOS) and 95th percentile queuing analyses were referenced to provide lane geometry recommendations. The recommendations are presented graphically near the end of the memorandum.

2040 Traffic Projections

There were several studies that were referenced in developing the forecasts shown in this memorandum. One of the foundation studies used in this analysis is the city's NEATS Refresh study that presented the results of travel demand modeling for the region. Also critical were traffic impact studies prepared specifically to consider the impacts of a maximum build out scenario for individual Framework Development Plans (FDP) including:

- Harvest Mile - Fulenwider
- High Point
- Porteos

There are five 64th Avenue intersections being analyzed in this memorandum including:

- Gun Club Road just east of E-470 (analyzed in the High Point FDP traffic study)
- Denali Street (analyzed in both the High Point and Harvest Mile - Fulenwider FDP)
- Fulenwider PA-9/PA-10 Access (analyzed in the Harvest Mile - Fulenwider FDP traffic study)
- Harvest Road (analyzed in the Harvest Mile - Fulenwider FDP traffic study)
- Jackson Gap Street (analyzed in the Porteos Groot Distribution Center TIS)

The Harvest Mile - Fulenwider and High Point FDP traffic studies are very recent, and each study's background traffic was based on the NEATS Refresh effort. The study area for these two efforts overlap, specifically in the analysis of the 64th Avenue/Denali Street intersection. The peak hour turning movements at this intersection between these two studies differ since each study considers a maximum build out scenario for its subject FDP, but it makes use of NEATS Refresh for the remainder of the area, including the other FDP. The NEATS Refresh traffic generation for the other FDP in both studies is much less than

that analyzed under a maximum buildout condition. To reconcile these differences, the greater traffic flows of the two were incorporated into this effort.

The projections at the first intersection east of E-470 (Gun Club Road) were extracted directly from the High Point study. The Denali Street intersection considered both High Point and Harvest Mile - Fulenwider traffic studies and made use of the more conservative (higher) movement projections. The Harvest Road study made exclusive use of the Harvest Mile - Fulenwider traffic study.

The Jackson Gap Street intersection traffic projections shown here are based, in part, on the long-term projections shown in the Porteos Groot Distribution Center TIS. That particular traffic study was based on the master Porteos traffic study that was completed several years prior to the NEATS Refresh. The NEATS Refresh shows significantly less traffic volume along 64th Avenue in this area for the 2040 timeframe, suggesting that the traffic volume projections presented in the Porteos Master Plan Study (and the Porteos Groot Distribution Center TIS) may be high, especially considering that that study assesses the maximum buildout of the entire Porteos FDP. As a means of correction, the total peak hour turning movements shown in the Porteos Groot Distribution Center TIS were factored downward so as to approximately balance with the turning movement counts shown at the Harvest Road/64th Avenue intersection.

Figure 1 presents the final set of 2040 traffic projections used to inform the design. The peak hour traffic forecasts are indicative of daily forecasts that are greater than the NEATS Refresh 2040 traffic volumes and slightly less than the NEATS Buildout traffic volumes.

2040 Traffic Analysis

Using the peak hour projections shown in **Figure 1**, intersection LOS were calculated to help identify appropriate lane geometry. In addition, city criteria of using the State Highway Access Code was referenced to determine the need for left- and right-turn lanes along 64th Avenue. LOS results also report the 95th percentile queue lengths. The 95th percentile queue lengths were used to inform storage length recommendations for study area intersections. There is also a fundamental assumption to assess the corridor with 64th Avenue providing four through-lanes The city has recognizes that providing four-through lanes along 64th Avenue might works acceptable in the long-term planning horizon, and as such the City is open to an initial construction in which only four through-lanes being built. However, the city does not want to preclude the possibility of a six-lane road in the distant future. As such, the right-of-way dedication will meet the city's requirement for a six-lane arterial roadway, but only four through-lanes will be built initially.

Figure 1 also includes the LOS results as are the lane geometrics (analysis worksheets are shown in the appendix). Each intersection will require signalization. Major patterns include:

- Gun Club Road just east of E-470
  - Eastbound left (AM) and southbound right (PM)
- Denali Street
  - Eastbound right (AM) and northbound left (PM)
- Harvest Road
  - Eastbound left (AM) and southbound right (PM)
  - Eastbound right (AM) and northbound left (PM)
- Jackson Gap Street
  - Southbound left and westbound right

Dual left turn lanes will be needed at:

- Gun Club Road (eastbound approach, northbound approach, and southbound approach)
- Denali Street (northbound approach)
- Jackson Gap Street (southbound approach)
- Harvest Road (eastbound approach, northbound approach)

Exclusive right turn lanes will be needed at nearly all of the intersection approaches as well. The top half of **Figure 1** shows the recommended turn lane lengths needed along each approach at each intersection. Analysis worksheets are attached. These analyses were conducted assuming left-turn/right-turn overlap phasing where appropriate. Cycle lengths vary in this analysis from the original FDP traffic studies given that the signal "system" is different, and the intersection signals were analyzed assuming an uncoordinated system with the notion that progression along 64th Avenue will break at Harvest Road since Harvest Road will be a more dominant corridor relative to signal timing and progression.

The results of this analysis are indicative of providing four lanes for through traffic along 64th Avenue. A four-lane cross-section should function adequately provided that the turn lanes depicted in **Figure 1** are provided. The one segment in which the volume will exceed that of regular four-lane arterial is between E--470 and the first intersection to its east. This segment will require auxiliary lanes beyond the four through lanes between the interchange and the first intersection to the east to properly function. The right-turn auxiliary lanes should be continuous between the E-470 east ramp intersection and the first intersection to the east.

64th Avenue Weave Analysis

Per the city's request, a weave analysis was conducted for the segment between E-470 and Gun Club Road to assess functionality of this wider section. The traditional freeway weaving analysis is not applicable to this situation since 64th Avenue is not a freeway. But research revealed a modification of the procedure, which is attached at the end. The procedure estimates weaving and non-weaving traffic speeds that are then converted into a Level of Service. This is a deterministic procedure that estimates the Level of Service based on speed.

Year 2040 AM and PM peak hour traffic was analyzed for both directions of 64th Avenue. Movements at the eastern ramp intersection were extracted from the High Point FDP Traffic study. The results of the analysis yielded a level of service of no worse than LOS C, which resulted along the westbound direction given 2040 PM peak hour traffic. This suggests that weaving traffic will not problematic, and there is still the option of disallowing right turn movements on red, which could further mitigate weaving challenges in the even if they surfaced in the future.

Queueing Analysis

Table 1 displays 2040 peak hour 95th percentile queue lengths and recommended storage lengths based on both the estimated vehicle queues and guidance contained in the *CDOT SHAC* using an NR-B classification. Heavy vehicle percentage at the intersections is conservatively assumed to be 15 percent for the purposes of determining queue length (which is more conservative than that used in the FDP traffic studies). The recommended storage lengths were developed to contain the maximum anticipated peak hour vehicle queues.

Table 1. 64th Avenue Turning Movement Queuing Results

Intersection	Approach	Movement	95th Percentile Queue Length (ft) [1]		Recommended Storage Length	SHAC Recommended Storage Length[2]
			AM	PM		
Gun Club Road/ 64th Avenue	Eastbound	Left-Turn*	65	283	300	375
		Through	138	255	Continuous	Continuous
		Right-Turn	25	155	Continuous	Continuous
	Westbound	Left-Turn	20	118	125	150
		Through	125	855	Continuous	Continuous
		Right-Turn	65	88	100	200
	Northbound	Left-Turn*	15	178	200	200
		Through/Right Turn	18	230	Continuous	Continuous
	Southbound	Left-Turn*	18	148	150	150
		Through/Right Turn	0	0	Continuous	Continuous
		Right Turn	35	415	425	675
Denali Street/ 64th Avenue	Eastbound	Left-Turn	78	105	125	300
		Through	198	270	Continuous	Continuous
		Right-Turn	133	158	175	375
	Westbound	Left-Turn	53	73	100	200
		Through	138	383	Continuous	Continuous
		Right-Turn	23	18	50	75
	Northbound	Left-Turn*	35	145	150	225
		Through	68	120	Continuous	Continuous
		Right-Turn	63	105	125	200
	Southbound	Left-Turn	13	103	125	150
		Through	103	135	Continuous	Continuous
		Right-Turn	38	205	225	250

Intersection	Approach	Movement	95th Percentile Queue Length (ft) [1]		Recommended Storage Length	SHAC Recommended Storage Length[2]
			AM	PM		
Fulenwider PA-9 and PA-10 Access/64th Avenue	Eastbound	Left-Turn	18	20	50	100
		Through	133	193	Continuous	Continuous
		Right-Turn	20	30	50	100
	Westbound	Left-Turn	8	10	50	50
		Through	113	208	Continuous	Continuous
		Right-Turn	30	28	50	150
	Northbound	Left-Turn	20	60	75	150
		Through/Right Turn	18	73	Continuous	Continuous
	Southbound	Left-Turn	33	48	50	125
		Through/Right Turn	30	48	Continuous	Continuous
Harvest Road/ 64th Avenue	Eastbound	Left-Turn*	218	223	225	300
		Through	168	218	Continuous	Continuous
		Right-Turn	198	235	250	275
	Westbound	Left-Turn	198	178	200	250
		Through	143	210	Continuous	Continuous
		Right-Turn	138	143	150	175
	Northbound	Left-Turn*	60	105	125	150
		Through	543	438	Continuous	Continuous
		Right-Turn	63	105	125	250
	Southbound	Left-Turn	63	70	75	150
		Through	363	780	Continuous	Continuous
		Right-Turn	195	278	300	600

Intersection	Approach	Movement	95th Percentile Queue Length (ft) [1]		Recommended Storage Length	SHAC Recommended Storage Length[2]
			AM	PM		
Jackson Gap Street/ 64th Avenue	Eastbound	Left-Turn	58	63	100	150
		Through	90	118	Continuous	Continuous
		Right-Turn	103	183	200	275
	Westbound	Left-Turn	70	143	150	300
		Through	95	120	Continuous	Continuous
		Right-Turn	138	318	325	500
	Northbound	Left-Turn	65	110	125	225
		Through	140	225	Continuous	Continuous
		Right-Turn	133	160	175	275
	Southbound	Left-Turn*	73	100	100	225
		Through	115	215	Continuous	Continuous
		Right-Turn	48	93	100	150

Notes:

*Dual Left-Turn queues and storage are per lane.

[1] Calculations based on HCM methodology using a heavy vehicle percentage of 15 percent.

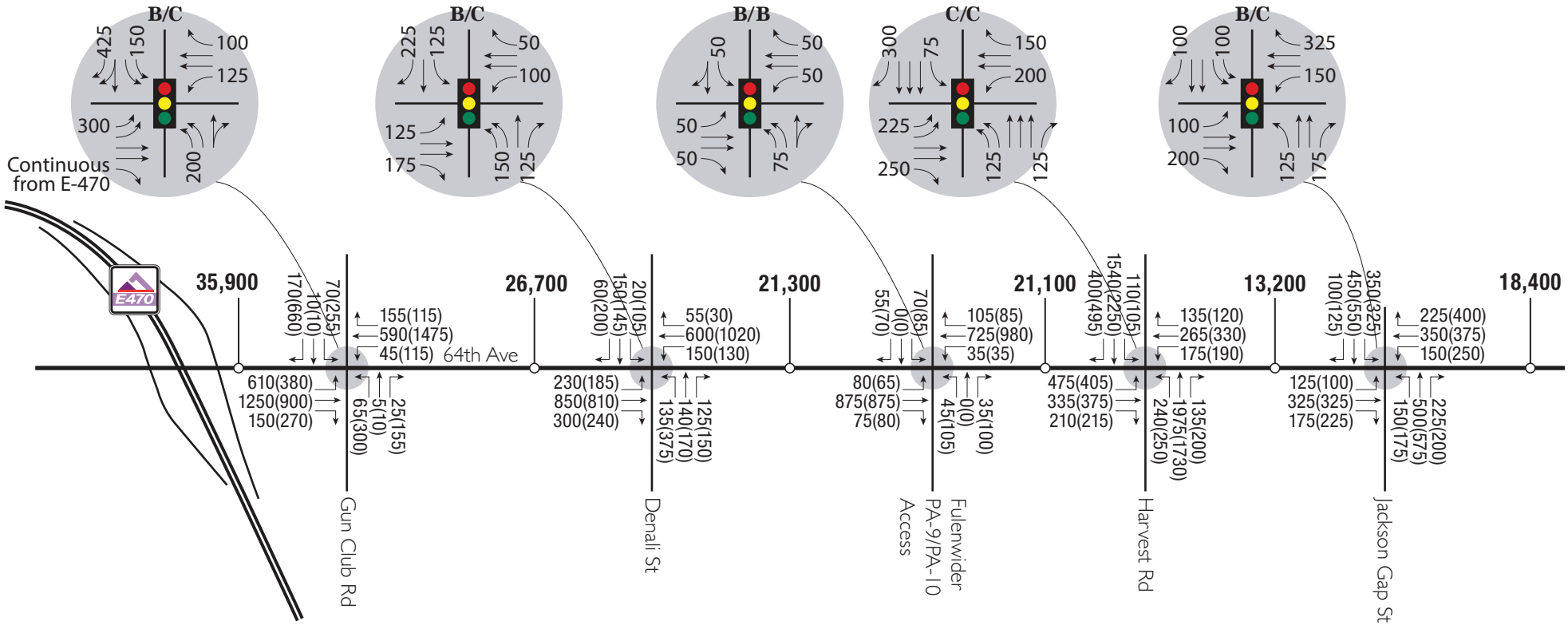
[2] Number shown is based on volume adjustments of 3 PCE per heavy vehicle

Signalization

City of Aurora staff have asked for an estimation as to when signalization at each location along 64th would be necessary. Rough estimations have been made assuming linear growth between 2020 and 2040. Gun Club Road and Denali Street are likely to need signalization between 2025 and 2030, Fulenwider PA-9/PA-10 Access is likely to need signalization between 2035 and 2040, and Harvest Road and Jackson Gap are projected to need signalization between 2020 and 2025. It should be noted that signalization needs assume uniform development in the area and uniform growth along the regional roadway network. These projected years can be greatly affected if significant development happens at or near any of the individual intersections. Developers are liable for signal escrow of 25% per quadrant of each intersection.

Recommendation

City of Aurora *Traffic Impact Study Guidelines* indicate that the CDOT SHAC be used to determine storage and taper lengths. These values yield overly conservative results and provide storage well in excess of 95th percentile queues (which already incorporate a heavy vehicle percentage), often by a factor of two to three. The SHAC procedures do not account for other conditions in the intersection such as low opposing through movements if a left turn movement is in question. Rather, our recommendation is that the values in **Table 1** corresponding to the 95th percentile lengths be used for storage lengths plus tapers along 64th Avenue should be 144 feet (to provide the required 12:1 taper ratio for 12-foot lanes on streets with a posted speed 40 MPH and an NR-B classification as identified in the CDOT SHAC). Tapers at locations where dual lefts are present should be doubled to 288 feet. Longer tapers will be needed at locations were the median placement requires additional lane shifts and should hold to the above mentioned 12:1 taper ratio.



LEGEND

XXX(XXX)	=	AM(PM) Peak Hour Traffic Volumes
X/X	=	AM/PM Peak Hour Signalized Intersection Level of Service
XXX	=	Recommended Turn Lane Storage Length in Feet (does no include taper)
XXXX	=	Daily Traffic Volumes
	=	Traffic Signal

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Year 2040 64th Avenue Traffic Projections Level of Service and Lane Recommendations

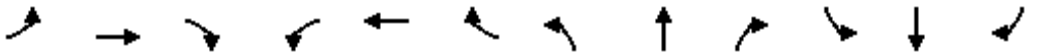
FIGURE 1

64th Avenue ISP Traffic Study 18-572/19-161 01/15/19

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	610	1250	150	45	590	155	65	5	70	10	170
Future Volume (vph)	610	1250	150	45	590	155	65	5	70	10	170
Turn Type	pm+pt	NA	Perm	Perm	NA	Perm	pm+pt	NA	pm+pt	NA	pm+ov
Protected Phases	5	2			6		3	8	7	4	5
Permitted Phases	2		2	6		6	8		4		4
Detector Phase	5	2	2	6	6	6	3	8	7	4	5
Switch Phase											
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	22.5	22.5	22.5	22.5	9.5	22.5	9.5	22.5	9.5
Total Split (s)	29.0	75.0	75.0	46.0	46.0	46.0	15.0	30.0	15.0	30.0	29.0
Total Split (%)	24.2%	62.5%	62.5%	38.3%	38.3%	38.3%	12.5%	25.0%	12.5%	25.0%	24.2%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead			Lag	Lag	Lag	Lead	Lag	Lead	Lag	Lead
Lead-Lag Optimize?	Yes			Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	Min	Min	Min	Min	Min	None	None	None	None	None
Act Effct Green (s)	45.3	47.3	47.3	21.6	21.6	21.6	10.4	7.5	15.0	7.7	27.2
Actuated g/C Ratio	0.67	0.70	0.70	0.32	0.32	0.32	0.15	0.11	0.22	0.11	0.40
v/c Ratio	0.56	0.59	0.15	0.45	0.61	0.31	0.14	0.17	0.12	0.41	0.16
Control Delay	8.7	9.5	3.1	36.9	24.2	9.8	27.2	19.1	24.2	16.8	4.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	8.7	9.5	3.1	36.9	24.2	9.8	27.2	19.1	24.2	16.8	4.5
LOS	A	A	A	D	C	A	C	B	C	B	A
Approach Delay		8.8			22.1			24.7		14.4	
Approach LOS		A			C			C		B	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 67.6	
Natural Cycle: 70	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.61	
Intersection Signal Delay: 13.0	Intersection LOS: B
Intersection Capacity Utilization 58.6%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 1: Gun Club Road & 64th Avenue



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	610	1250	150	45	590	155	65	5	25	70	10	170
Future Volume (veh/h)	610	1250	150	45	590	155	65	5	25	70	10	170
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	1752	1752	1752	1752	1752	1752	1752	1752	1752	1752	1752	1752
Adj Flow Rate, veh/h	663	1359	163	49	641	168	71	5	27	76	0	192
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, %	10	10	10	10	10	10	10	10	10	10	10	10
Cap, veh/h	1083	1975	881	233	1050	468	667	23	122	670	0	867
Arrive On Green	0.19	0.59	0.59	0.32	0.32	0.32	0.06	0.09	0.09	0.06	0.00	0.10
Sat Flow, veh/h	3237	3328	1485	321	3328	1485	3237	238	1283	3337	0	2969
Grp Volume(v), veh/h	663	1359	163	49	641	168	71	0	32	76	0	192
Grp Sat Flow(s),veh/h/ln	1618	1664	1485	321	1664	1485	1618	0	1521	1668	0	1485
Q Serve(g_s), s	6.3	15.2	2.7	6.7	8.9	4.7	1.0	0.0	1.1	1.1	0.0	2.7
Cycle Q Clear(g_c), s	6.3	15.2	2.7	6.9	8.9	4.7	1.0	0.0	1.1	1.1	0.0	2.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.84	1.00		1.00
Lane Grp Cap(c), veh/h	1083	1975	881	233	1050	468	667	0	144	670	0	867
V/C Ratio(X)	0.61	0.69	0.19	0.21	0.61	0.36	0.11	0.00	0.22	0.11	0.00	0.22
Avail Cap(c_a), veh/h	1915	4328	1931	378	2548	1136	1098	0	715	1106	0	1975
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	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	9.2	7.6	5.0	15.1	15.7	14.3	19.8	0.0	22.7	19.7	0.0	14.5
Incr Delay (d2), s/veh	0.6	0.4	0.1	0.4	0.6	0.5	0.1	0.0	0.8	0.1	0.0	0.1
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	2.6	5.5	1.0	0.8	5.0	2.6	0.6	0.0	0.7	0.7	0.0	1.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	9.8	8.0	5.1	15.6	16.3	14.8	19.8	0.0	23.5	19.8	0.0	14.7
LnGrp LOS	A	A	A	B	B	B	B	A	C	B	A	B
Approach Vol, veh/h		2185			858			103			268	
Approach Delay, s/veh		8.3			16.0			21.0			16.1	
Approach LOS		A			B			C			B	

Timer - Assigned Phs	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	36.7	7.8	9.8	15.1	21.6	7.9	9.6
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	70.5	10.5	25.5	24.5	41.5	10.5	25.5
Max Q Clear Time (g_c+I1), s	17.2	3.0	4.7	8.3	10.9	3.1	3.1
Green Ext Time (p_c), s	14.5	0.1	0.7	2.2	6.3	0.1	0.1

Intersection Summary	
HCM 6th Ctrl Delay	11.2
HCM 6th LOS	B

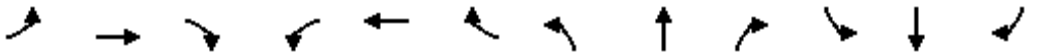
Notes

User approved volume balancing among the lanes for turning movement.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	230	850	300	150	600	55	135	140	125	20	150	60
Future Volume (vph)	230	850	300	150	600	55	135	140	125	20	150	60
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6		3	8			4	
Permitted Phases	2		2	6		6	8		8	4		4
Detector Phase	5	2	2	1	6	6	3	8	8	4	4	4
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	22.5	9.5	22.5	22.5	9.5	22.5	22.5	22.5	22.5	22.5
Total Split (s)	12.0	61.0	61.0	12.0	61.0	61.0	12.0	47.0	47.0	35.0	35.0	35.0
Total Split (%)	10.0%	50.8%	50.8%	10.0%	50.8%	50.8%	10.0%	39.2%	39.2%	29.2%	29.2%	29.2%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead			Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes			Yes	Yes	Yes
Recall Mode	None	Min	Min	None	Min	Min	None	None	None	None	None	None
Act Effct Green (s)	39.0	31.3	31.3	38.6	31.1	31.1	25.2	25.2	25.2	13.2	13.2	13.2
Actuated g/C Ratio	0.50	0.40	0.40	0.50	0.40	0.40	0.32	0.32	0.32	0.17	0.17	0.17
v/c Ratio	0.65	0.70	0.42	0.57	0.50	0.09	0.24	0.27	0.24	0.11	0.56	0.20
Control Delay	19.7	22.7	3.6	17.5	18.9	1.5	21.4	22.9	5.5	31.6	39.3	4.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.7	22.7	3.6	17.5	18.9	1.5	21.4	22.9	5.5	31.6	39.3	4.5
LOS	B	C	A	B	B	A	C	C	A	C	D	A
Approach Delay		18.0			17.4			17.0			29.6	
Approach LOS		B			B			B			C	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 77.9	
Natural Cycle: 70	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.70	
Intersection Signal Delay: 18.6	Intersection LOS: B
Intersection Capacity Utilization 58.9%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 2: 64th Avenue & Denali Street



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	230	850	300	150	600	55	135	140	125	20	150	60
Future Volume (veh/h)	230	850	300	150	600	55	135	140	125	20	150	60
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	1752	1752	1752	1752	1752	1752	1752	1752	1752	1752	1752	1752
Adj Flow Rate, veh/h	250	924	326	163	652	60	147	152	136	22	163	65
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, %	10	10	10	10	10	10	10	10	10	10	10	10
Cap, veh/h	471	1360	606	336	1248	557	580	501	425	259	243	206
Arrive On Green	0.12	0.41	0.41	0.09	0.37	0.37	0.07	0.29	0.29	0.14	0.14	0.14
Sat Flow, veh/h	1668	3328	1485	1668	3328	1485	3237	1752	1485	1022	1752	1485
Grp Volume(v), veh/h	250	924	326	163	652	60	147	152	136	22	163	65
Grp Sat Flow(s),veh/h/ln	1668	1664	1485	1668	1664	1485	1618	1752	1485	1022	1752	1485
Q Serve(g_s), s	5.5	14.0	10.3	3.6	9.4	1.6	2.2	4.2	4.4	1.2	5.4	2.4
Cycle Q Clear(g_c), s	5.5	14.0	10.3	3.6	9.4	1.6	2.2	4.2	4.4	1.2	5.4	2.4
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	471	1360	606	336	1248	557	580	501	425	259	243	206
V/C Ratio(X)	0.53	0.68	0.54	0.48	0.52	0.11	0.25	0.30	0.32	0.09	0.67	0.32
Avail Cap(c_a), veh/h	474	3050	1361	395	3050	1361	733	1208	1023	622	867	734
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	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	10.4	14.9	13.8	11.8	15.0	12.5	18.9	17.2	17.3	23.4	25.2	23.9
Incr Delay (d2), s/veh	1.1	0.6	0.7	1.1	0.3	0.1	0.2	0.3	0.4	0.1	3.2	0.9
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	3.1	7.9	5.3	2.1	5.5	0.9	1.4	2.7	2.5	0.5	4.1	1.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	11.5	15.5	14.6	12.9	15.3	12.6	19.1	17.5	17.7	23.5	28.4	24.8
LnGrp LOS	B	B	B	B	B	B	B	B	B	C	C	C
Approach Vol, veh/h		1500			875			435			250	
Approach Delay, s/veh		14.7			14.7			18.1			27.0	
Approach LOS		B			B			B			C	

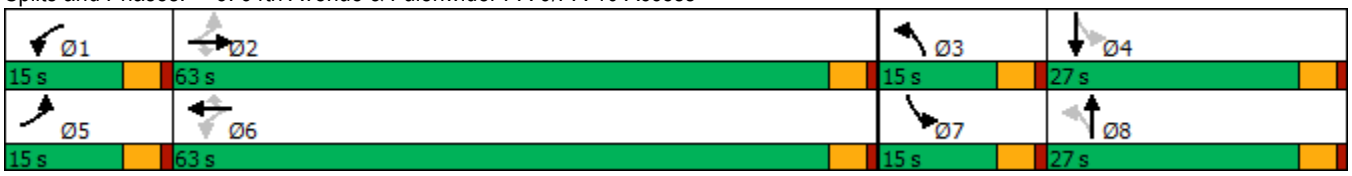
Timer - Assigned Phs	1	2	3	4	5	6		8				
Phs Duration (G+Y+Rc), s	9.8	29.7	9.1	13.0	11.9	27.6		22.1				
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5		4.5				
Max Green Setting (Gmax), s	7.5	56.5	7.5	30.5	7.5	56.5		42.5				
Max Q Clear Time (g_c+I1), s	5.6	16.0	4.2	7.4	7.5	11.4		6.4				
Green Ext Time (p_c), s	0.1	9.2	0.1	1.1	0.0	5.0		1.3				

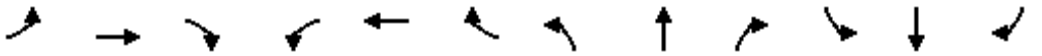
Intersection Summary	
HCM 6th Ctrl Delay	16.2
HCM 6th LOS	B

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations										
Traffic Volume (vph)	80	875	75	35	725	105	45	0	70	0
Future Volume (vph)	80	875	75	35	725	105	45	0	70	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	pm+pt	NA
Protected Phases	5	2		1	6		3	8	7	4
Permitted Phases	2		2	6		6	8		4	
Detector Phase	5	2	2	1	6	6	3	8	7	4
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	22.5	9.5	22.5	22.5	9.5	22.5	9.5	22.5
Total Split (s)	15.0	63.0	63.0	15.0	63.0	63.0	15.0	27.0	15.0	27.0
Total Split (%)	12.5%	52.5%	52.5%	12.5%	52.5%	52.5%	12.5%	22.5%	12.5%	22.5%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	Min	Min	None	Min	Min	None	None	None	None
Act Effct Green (s)	37.2	36.3	36.3	33.5	30.3	30.3	10.4	6.4	12.1	7.1
Actuated g/C Ratio	0.68	0.66	0.66	0.61	0.55	0.55	0.19	0.12	0.22	0.13
v/c Ratio	0.18	0.44	0.08	0.09	0.44	0.13	0.16	0.09	0.21	0.12
Control Delay	6.5	12.3	2.7	6.5	13.7	3.6	20.8	0.4	20.9	0.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	6.5	12.3	2.7	6.5	13.7	3.6	20.8	0.4	20.9	0.5
LOS	A	B	A	A	B	A	C	A	C	A
Approach Delay		11.2			12.2			11.9		11.9
Approach LOS		B			B			B		B

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 54.9	
Natural Cycle: 70	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.44	
Intersection Signal Delay: 11.7	Intersection LOS: B
Intersection Capacity Utilization 50.1%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 3: 64th Avenue & Fulenwider PA-9/PA-10 Access





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	80	875	75	35	725	105	45	0	35	70	0	55
Future Volume (veh/h)	80	875	75	35	725	105	45	0	35	70	0	55
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	1752	1752	1752	1752	1752	1752	1752	1752	1752	1752	1752	1752
Adj Flow Rate, veh/h	87	951	82	38	788	114	49	0	38	76	0	60
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, %	10	10	10	10	10	10	10	10	10	10	10	10
Cap, veh/h	394	1450	647	324	1351	603	315	0	131	340	0	155
Arrive On Green	0.07	0.44	0.44	0.04	0.41	0.41	0.05	0.00	0.09	0.07	0.00	0.10
Sat Flow, veh/h	1668	3328	1485	1668	3328	1485	1668	0	1485	1668	0	1485
Grp Volume(v), veh/h	87	951	82	38	788	114	49	0	38	76	0	60
Grp Sat Flow(s),veh/h/ln	1668	1664	1485	1668	1664	1485	1668	0	1485	1668	0	1485
Q Serve(g_s), s	1.4	11.0	1.6	0.6	9.0	2.4	1.3	0.0	1.2	2.0	0.0	1.8
Cycle Q Clear(g_c), s	1.4	11.0	1.6	0.6	9.0	2.4	1.3	0.0	1.2	2.0	0.0	1.8
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	394	1450	647	324	1351	603	315	0	131	340	0	155
V/C Ratio(X)	0.22	0.66	0.13	0.12	0.58	0.19	0.16	0.00	0.29	0.22	0.00	0.39
Avail Cap(c_a), veh/h	635	3988	1779	614	3988	1779	590	0	684	589	0	684
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	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	8.0	10.9	8.2	8.6	11.3	9.3	18.7	0.0	20.8	18.3	0.0	20.4
Incr Delay (d2), s/veh	0.3	0.5	0.1	0.2	0.4	0.2	0.2	0.0	1.2	0.3	0.0	1.6
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(95%),veh/ln	0.7	5.3	0.8	0.3	4.5	1.2	0.8	0.0	0.7	1.3	0.0	1.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	8.3	11.4	8.3	8.8	11.7	9.5	18.9	0.0	22.0	18.6	0.0	22.0
LnGrp LOS	A	B	A	A	B	A	B	A	C	B	A	C
Approach Vol, veh/h		1120			940			87			136	
Approach Delay, s/veh		10.9			11.3			20.3			20.1	
Approach LOS		B			B			C			C	

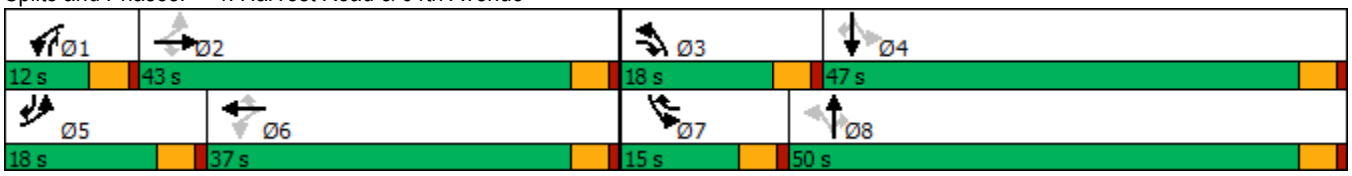
Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	6.5	25.8	6.9	9.6	8.0	24.3	7.7	8.8
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	10.5	58.5	10.5	22.5	10.5	58.5	10.5	22.5
Max Q Clear Time (g_c+I1), s	2.6	13.0	3.3	3.8	3.4	11.0	4.0	3.2
Green Ext Time (p_c), s	0.0	8.3	0.0	0.2	0.1	6.6	0.1	0.1

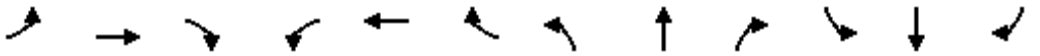
Intersection Summary	
HCM 6th Ctrl Delay	12.0
HCM 6th LOS	B

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	475	335	210	175	265	135	240	1975	135	110	1540	400
Future Volume (vph)	475	335	210	175	265	135	240	1975	135	110	1540	400
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA	pm+ov	pm+pt	NA	pm+ov	pm+pt	NA	pm+ov
Protected Phases	5	2	3	1	6	7	3	8	1	7	4	5
Permitted Phases	2		2	6		6	8		8	4		4
Detector Phase	5	2	3	1	6	7	3	8	1	7	4	5
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	9.5	9.5	22.5	9.5	9.5	22.5	9.5	9.5	22.5	9.5
Total Split (s)	18.0	43.0	18.0	12.0	37.0	15.0	18.0	50.0	12.0	15.0	47.0	18.0
Total Split (%)	15.0%	35.8%	15.0%	10.0%	30.8%	12.5%	15.0%	41.7%	10.0%	12.5%	39.2%	15.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	Min	None	None	Min	None
Act Effct Green (s)	32.0	20.0	34.1	21.5	14.0	27.3	55.2	45.6	57.6	53.6	44.7	62.8
Actuated g/C Ratio	0.32	0.20	0.34	0.22	0.14	0.27	0.55	0.46	0.58	0.54	0.45	0.63
v/c Ratio	0.81	0.55	0.42	0.75	0.63	0.31	0.59	1.00	0.17	0.56	0.79	0.43
Control Delay	39.6	39.6	21.1	49.4	47.1	13.0	19.5	47.4	5.0	26.0	27.9	6.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	39.6	39.6	21.1	49.4	47.1	13.0	19.5	47.4	5.0	26.0	27.9	6.1
LOS	D	D	C	D	D	B	B	D	A	C	C	A
Approach Delay		35.8			39.8			42.1			23.5	
Approach LOS		D			D			D			C	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 99.9	
Natural Cycle: 90	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.00	
Intersection Signal Delay: 34.4	Intersection LOS: C
Intersection Capacity Utilization 80.1%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 4: Harvest Road & 64th Avenue





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	475	335	210	175	265	135	240	1975	135	110	1540	400
Future Volume (veh/h)	475	335	210	175	265	135	240	1975	135	110	1540	400
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	1752	1752	1752	1752	1752	1752	1752	1752	1752	1752	1752	1752
Adj Flow Rate, veh/h	516	364	228	190	288	147	261	2147	147	120	1674	435
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, %	10	10	10	10	10	10	10	10	10	10	10	10
Cap, veh/h	702	654	392	284	443	282	433	2284	827	178	2233	905
Arrive On Green	0.14	0.20	0.20	0.08	0.13	0.13	0.07	0.48	0.48	0.06	0.47	0.47
Sat Flow, veh/h	3237	3328	1485	1668	3328	1485	3237	4782	1485	1668	4782	1485
Grp Volume(v), veh/h	516	364	228	190	288	147	261	2147	147	120	1674	435
Grp Sat Flow(s),veh/h/ln	1618	1664	1485	1668	1664	1485	1618	1594	1485	1668	1594	1485
Q Serve(g_s), s	12.6	9.3	12.7	7.5	7.8	8.4	3.9	40.3	4.6	3.5	27.2	15.3
Cycle Q Clear(g_c), s	12.6	9.3	12.7	7.5	7.8	8.4	3.9	40.3	4.6	3.5	27.2	15.3
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	702	654	392	284	443	282	433	2284	827	178	2233	905
V/C Ratio(X)	0.74	0.56	0.58	0.67	0.65	0.52	0.60	0.94	0.18	0.67	0.75	0.48
Avail Cap(c_a), veh/h	702	1353	703	284	1142	594	677	2297	831	269	2233	905
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	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	28.6	34.3	30.3	34.3	39.0	34.5	19.4	23.4	10.3	21.7	20.7	10.2
Incr Delay (d2), s/veh	4.0	0.7	1.4	6.0	1.6	1.5	1.3	8.4	0.1	4.3	1.4	0.4
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	8.7	6.7	7.9	7.9	5.7	5.5	2.4	21.7	2.5	2.5	14.5	7.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	32.6	35.1	31.7	40.2	40.6	36.0	20.8	31.9	10.4	26.1	22.1	10.6
LnGrp LOS	C	D	C	D	D	D	C	C	B	C	C	B
Approach Vol, veh/h		1108			625			2555			2229	
Approach Delay, s/veh		33.2			39.4			29.5			20.1	
Approach LOS		C			D			C			C	

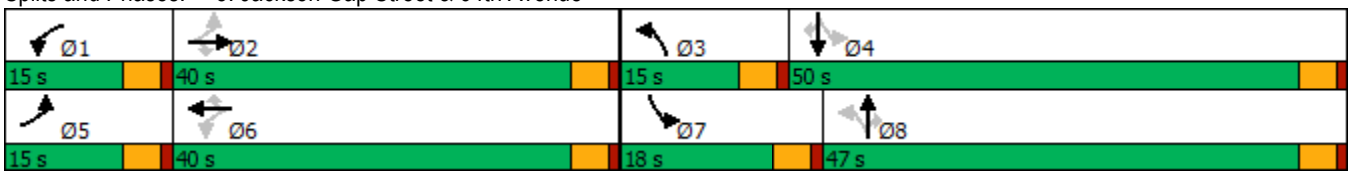
Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	12.0	23.1	10.9	48.7	18.0	17.1	9.9	49.7
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	7.5	38.5	13.5	42.5	13.5	32.5	10.5	45.5
Max Q Clear Time (g_c+I1), s	9.5	14.7	5.9	29.2	14.6	10.4	5.5	42.3
Green Ext Time (p_c), s	0.0	3.0	0.5	9.9	0.0	2.2	0.1	2.9

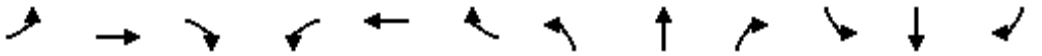
Intersection Summary	
HCM 6th Ctrl Delay	27.9
HCM 6th LOS	C

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	125	325	175	150	350	225	150	500	225	350	450	100
Future Volume (vph)	125	325	175	150	350	225	150	500	225	350	450	100
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2		2	6		6	8		8	4		4
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	22.5	9.5	22.5	22.5	9.5	22.5	22.5	9.5	22.5	22.5
Total Split (s)	15.0	40.0	40.0	15.0	40.0	40.0	15.0	47.0	47.0	18.0	50.0	50.0
Total Split (%)	12.5%	33.3%	33.3%	12.5%	33.3%	33.3%	12.5%	39.2%	39.2%	15.0%	41.7%	41.7%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	Min	Min	None	Min	Min
Act Effct Green (s)	24.1	14.7	14.7	24.6	15.0	15.0	28.5	19.3	19.3	33.6	21.9	21.9
Actuated g/C Ratio	0.33	0.20	0.20	0.33	0.20	0.20	0.39	0.26	0.26	0.45	0.30	0.30
v/c Ratio	0.38	0.54	0.43	0.44	0.57	0.50	0.41	0.64	0.44	0.49	0.50	0.21
Control Delay	19.9	31.0	8.0	20.7	31.4	8.0	15.4	28.6	6.1	14.0	24.1	5.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.9	31.0	8.0	20.7	31.4	8.0	15.4	28.6	6.1	14.0	24.1	5.8
LOS	B	C	A	C	C	A	B	C	A	B	C	A
Approach Delay		22.3			21.9			20.5			18.1	
Approach LOS		C			C			C			B	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 74	
Natural Cycle: 65	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.64	
Intersection Signal Delay: 20.5	Intersection LOS: C
Intersection Capacity Utilization 56.1%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 5: Jackson Gap Street & 64th Avenue





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	125	325	175	150	350	225	150	500	225	350	450	100
Future Volume (veh/h)	125	325	175	150	350	225	150	500	225	350	450	100
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	1752	1752	1752	1752	1752	1752	1752	1752	1752	1752	1752	1752
Adj Flow Rate, veh/h	136	353	190	163	380	245	163	543	245	380	489	109
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, %	10	10	10	10	10	10	10	10	10	10	10	10
Cap, veh/h	366	737	329	391	787	351	406	851	380	785	946	422
Arrive On Green	0.09	0.22	0.22	0.10	0.24	0.24	0.10	0.26	0.26	0.13	0.28	0.28
Sat Flow, veh/h	1668	3328	1485	1668	3328	1485	1668	3328	1485	3237	3328	1485
Grp Volume(v), veh/h	136	353	190	163	380	245	163	543	245	380	489	109
Grp Sat Flow(s),veh/h/ln	1668	1664	1485	1668	1664	1485	1668	1664	1485	1618	1664	1485
Q Serve(g_s), s	3.8	5.7	7.0	4.5	6.0	9.2	4.3	8.9	9.0	5.0	7.5	3.5
Cycle Q Clear(g_c), s	3.8	5.7	7.0	4.5	6.0	9.2	4.3	8.9	9.0	5.0	7.5	3.5
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	366	737	329	391	787	351	406	851	380	785	946	422
V/C Ratio(X)	0.37	0.48	0.58	0.42	0.48	0.70	0.40	0.64	0.65	0.48	0.52	0.26
Avail Cap(c_a), veh/h	507	1931	861	508	1931	861	528	2312	1031	1088	2475	1104
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	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	16.2	20.7	21.3	15.9	20.1	21.4	14.5	20.2	20.3	14.1	18.4	16.9
Incr Delay (d2), s/veh	0.6	0.5	1.6	0.7	0.5	2.5	0.6	0.8	1.8	0.5	0.4	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(95%),veh/ln	2.3	3.6	4.1	2.8	3.8	5.5	2.6	5.6	5.3	2.9	4.6	1.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	16.8	21.2	22.9	16.6	20.6	23.9	15.1	21.0	22.1	14.6	18.8	17.2
LnGrp LOS	B	C	C	B	C	C	B	C	C	B	B	B
Approach Vol, veh/h		679			788			951			978	
Approach Delay, s/veh		20.8			20.8			20.3			17.0	
Approach LOS		C			C			C			B	

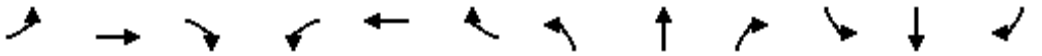
Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	10.7	18.0	10.5	21.9	9.8	19.0	12.3	20.2
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	10.5	35.5	10.5	45.5	10.5	35.5	13.5	42.5
Max Q Clear Time (g_c+I1), s	6.5	9.0	6.3	9.5	5.8	11.2	7.0	11.0
Green Ext Time (p_c), s	0.1	2.9	0.1	3.7	0.1	3.2	0.8	4.7

Intersection Summary	
HCM 6th Ctrl Delay	19.6
HCM 6th LOS	B

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	380	900	270	115	1475	115	300	10	255	10	660
Future Volume (vph)	380	900	270	115	1475	115	300	10	255	10	660
Turn Type	pm+pt	NA	Perm	Perm	NA	Perm	pm+pt	NA	pm+pt	NA	pm+ov
Protected Phases	5	2			6		3	8	7	4	5
Permitted Phases	2		2	6		6	8		4		4
Detector Phase	5	2	2	6	6	6	3	8	7	4	5
Switch Phase											
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	22.5	22.5	22.5	22.5	9.5	22.5	9.5	22.5	9.5
Total Split (s)	18.0	80.0	80.0	62.0	62.0	62.0	15.0	25.0	15.0	25.0	18.0
Total Split (%)	15.0%	66.7%	66.7%	51.7%	51.7%	51.7%	12.5%	20.8%	12.5%	20.8%	15.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead			Lag	Lag	Lag	Lead	Lag	Lead	Lag	Lead
Lead-Lag Optimize?	Yes			Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	Min	Min	Min	Min	Min	None	None	None	None	None
Act Effct Green (s)	75.5	75.5	75.5	57.5	57.5	57.5	29.5	19.0	29.2	18.9	36.9
Actuated g/C Ratio	0.64	0.64	0.64	0.49	0.49	0.49	0.25	0.16	0.25	0.16	0.31
v/c Ratio	0.87	0.47	0.29	0.51	1.01	0.16	0.82	0.51	0.55	0.94	0.78
Control Delay	49.6	12.2	3.1	30.6	55.0	6.1	52.5	18.0	37.6	56.3	43.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	49.6	12.2	3.1	30.6	55.0	6.1	52.5	18.0	37.6	56.3	43.7
LOS	D	B	A	C	D	A	D	B	D	E	D
Approach Delay		19.8			50.0			40.3		46.6	
Approach LOS		B			D			D		D	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 118.4	
Natural Cycle: 110	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.01	
Intersection Signal Delay: 38.3	Intersection LOS: D
Intersection Capacity Utilization 89.3%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 1: Gun Club Road & 64th Avenue



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	380	900	270	115	1475	115	300	10	155	255	10	660
Future Volume (veh/h)	380	900	270	115	1475	115	300	10	155	255	10	660
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	1752	1752	1752	1752	1752	1752	1752	1752	1752	1752	1752	1752
Adj Flow Rate, veh/h	413	978	293	125	1603	125	326	11	168	277	0	724
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, %	10	10	10	10	10	10	10	10	10	10	10	10
Cap, veh/h	465	2085	930	253	1607	717	634	16	247	547	0	825
Arrive On Green	0.11	0.63	0.63	0.48	0.48	0.48	0.09	0.18	0.18	0.08	0.00	0.17
Sat Flow, veh/h	3237	3328	1485	408	3328	1485	3237	92	1407	3337	0	2969
Grp Volume(v), veh/h	413	978	293	125	1603	125	326	0	179	277	0	724
Grp Sat Flow(s),veh/h/ln	1618	1664	1485	408	1664	1485	1618	0	1499	1668	0	1485
Q Serve(g_s), s	10.4	18.5	10.9	27.8	57.2	5.7	9.9	0.0	13.3	8.0	0.0	20.5
Cycle Q Clear(g_c), s	10.4	18.5	10.9	29.2	57.2	5.7	9.9	0.0	13.3	8.0	0.0	20.5
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.94	1.00		1.00
Lane Grp Cap(c), veh/h	465	2085	930	253	1607	717	634	0	263	547	0	825
V/C Ratio(X)	0.89	0.47	0.32	0.49	1.00	0.17	0.51	0.00	0.68	0.51	0.00	0.88
Avail Cap(c_a), veh/h	489	2110	941	253	1607	717	634	0	263	559	0	825
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	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	36.9	11.8	10.4	24.0	30.7	17.4	36.2	0.0	46.0	36.7	0.0	41.1
Incr Delay (d2), s/veh	17.4	0.2	0.2	1.5	21.9	0.1	0.7	0.0	6.9	0.7	0.0	10.5
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(95%),veh/ln	11.3	10.2	6.2	4.7	34.2	3.5	7.1	0.0	9.2	5.9	0.0	16.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	54.2	11.9	10.5	25.5	52.6	17.5	37.0	0.0	52.8	37.4	0.0	51.6
LnGrp LOS	D	B	B	C	D	B	D	A	D	D	A	D
Approach Vol, veh/h		1684			1853			505			1001	
Approach Delay, s/veh		22.1			48.4			42.6			47.7	
Approach LOS		C			D			D			D	

Timer - Assigned Phs	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	79.1	15.0	25.0	17.1	62.0	14.6	25.4
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	75.5	10.5	20.5	13.5	57.5	10.5	20.5
Max Q Clear Time (g_c+I1), s	20.5	11.9	22.5	12.4	59.2	10.0	15.3
Green Ext Time (p_c), s	9.5	0.0	0.0	0.2	0.0	0.1	0.4

Intersection Summary	
HCM 6th Ctrl Delay	38.9
HCM 6th LOS	D

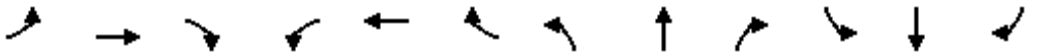
Notes

User approved volume balancing among the lanes for turning movement.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	185	810	240	130	1020	30	375	170	150	105	145	200
Future Volume (vph)	185	810	240	130	1020	30	375	170	150	105	145	200
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6		3	8			4	
Permitted Phases	2		2	6		6	8		8	4		4
Detector Phase	5	2	2	1	6	6	3	8	8	4	4	4
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	22.5	9.5	22.5	22.5	9.5	22.5	22.5	22.5	22.5	22.5
Total Split (s)	21.0	55.0	55.0	15.0	49.0	49.0	15.0	50.0	50.0	35.0	35.0	35.0
Total Split (%)	17.5%	45.8%	45.8%	12.5%	40.8%	40.8%	12.5%	41.7%	41.7%	29.2%	29.2%	29.2%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead			Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes			Yes	Yes	Yes
Recall Mode	None	Min	Min	None	Min	Min	None	None	None	None	None	None
Act Effct Green (s)	57.5	44.4	44.4	48.3	39.4	39.4	31.5	31.5	31.5	16.3	16.3	16.3
Actuated g/C Ratio	0.58	0.45	0.45	0.49	0.40	0.40	0.32	0.32	0.32	0.16	0.16	0.16
v/c Ratio	0.67	0.60	0.33	0.44	0.85	0.05	0.65	0.34	0.28	0.63	0.56	0.51
Control Delay	31.7	23.0	3.6	15.3	35.2	0.1	32.8	28.9	5.4	55.9	47.1	9.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.7	23.0	3.6	15.3	35.2	0.1	32.8	28.9	5.4	55.9	47.1	9.8
LOS	C	C	A	B	D	A	C	C	A	E	D	A
Approach Delay		20.5			32.1			25.9			32.6	
Approach LOS		C			C			C			C	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 98.8	
Natural Cycle: 80	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.85	
Intersection Signal Delay: 27.0	Intersection LOS: C
Intersection Capacity Utilization 71.8%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 2: 64th Avenue & Denali Street



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	185	810	240	130	1020	30	375	170	150	105	145	200
Future Volume (veh/h)	185	810	240	130	1020	30	375	170	150	105	145	200
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	1752	1752	1752	1752	1752	1752	1752	1752	1752	1752	1752	1752
Adj Flow Rate, veh/h	201	880	261	141	1109	33	408	185	163	114	158	217
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, %	10	10	10	10	10	10	10	10	10	10	10	10
Cap, veh/h	286	1414	631	299	1333	595	733	618	524	259	322	273
Arrive On Green	0.09	0.42	0.42	0.07	0.40	0.40	0.12	0.35	0.35	0.18	0.18	0.18
Sat Flow, veh/h	1668	3328	1485	1668	3328	1485	3237	1752	1485	967	1752	1485
Grp Volume(v), veh/h	201	880	261	141	1109	33	408	185	163	114	158	217
Grp Sat Flow(s),veh/h/ln	1668	1664	1485	1668	1664	1485	1618	1752	1485	967	1752	1485
Q Serve(g_s), s	6.1	18.4	10.9	4.3	26.6	1.2	8.7	6.8	7.1	9.7	7.2	12.4
Cycle Q Clear(g_c), s	6.1	18.4	10.9	4.3	26.6	1.2	8.7	6.8	7.1	9.7	7.2	12.4
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	286	1414	631	299	1333	595	733	618	524	259	322	273
V/C Ratio(X)	0.70	0.62	0.41	0.47	0.83	0.06	0.56	0.30	0.31	0.44	0.49	0.79
Avail Cap(c_a), veh/h	438	1892	844	379	1667	744	733	897	760	413	601	510
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	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	19.0	20.0	17.8	15.7	23.9	16.3	23.8	20.8	20.9	33.5	32.5	34.6
Incr Delay (d2), s/veh	3.2	0.5	0.4	1.2	3.1	0.0	0.9	0.3	0.3	1.2	1.2	5.2
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	4.2	10.8	6.3	2.9	15.3	0.7	5.8	4.8	4.2	4.1	5.4	8.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	22.1	20.4	18.3	16.9	27.0	16.4	24.7	21.1	21.2	34.7	33.7	39.9
LnGrp LOS	C	C	B	B	C	B	C	C	C	C	C	D
Approach Vol, veh/h		1342			1283			756			489	
Approach Delay, s/veh		20.3			25.6			23.1			36.7	
Approach LOS		C			C			C			D	

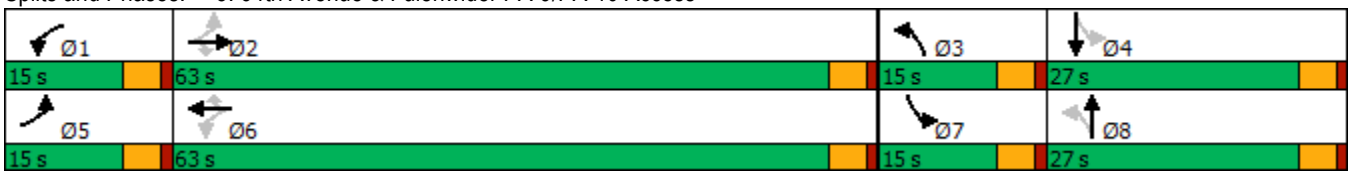
Timer - Assigned Phs	1	2	3	4	5	6		8				
Phs Duration (G+Y+Rc), s	10.8	42.2	15.0	20.8	12.9	40.1		35.8				
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5		4.5				
Max Green Setting (Gmax), s	10.5	50.5	10.5	30.5	16.5	44.5		45.5				
Max Q Clear Time (g_c+I1), s	6.3	20.4	10.7	14.4	8.1	28.6		9.1				
Green Ext Time (p_c), s	0.1	7.8	0.0	1.9	0.3	7.0		1.6				

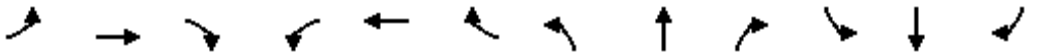
Intersection Summary												
HCM 6th Ctrl Delay			24.7									
HCM 6th LOS			C									

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations										
Traffic Volume (vph)	65	875	80	35	980	85	105	0	85	0
Future Volume (vph)	65	875	80	35	980	85	105	0	85	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	pm+pt	NA
Protected Phases	5	2		1	6		3	8	7	4
Permitted Phases	2		2	6		6	8		4	
Detector Phase	5	2	2	1	6	6	3	8	7	4
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	22.5	9.5	22.5	22.5	9.5	22.5	9.5	22.5
Total Split (s)	15.0	63.0	63.0	15.0	63.0	63.0	15.0	27.0	15.0	27.0
Total Split (%)	12.5%	52.5%	52.5%	12.5%	52.5%	52.5%	12.5%	22.5%	12.5%	22.5%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	Min	None	Min
Act Effct Green (s)	39.0	34.7	34.7	35.8	31.3	31.3	13.4	6.3	13.3	6.3
Actuated g/C Ratio	0.58	0.52	0.52	0.54	0.47	0.47	0.20	0.09	0.20	0.09
v/c Ratio	0.22	0.56	0.11	0.11	0.69	0.12	0.38	0.27	0.31	0.20
Control Delay	7.3	13.8	2.6	6.5	18.3	3.2	27.9	1.7	26.7	1.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	7.3	13.8	2.6	6.5	18.3	3.2	27.9	1.7	26.7	1.2
LOS	A	B	A	A	B	A	C	A	C	A
Approach Delay		12.5			16.8			15.1		15.2
Approach LOS		B			B			B		B

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 66.8	
Natural Cycle: 70	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.69	
Intersection Signal Delay: 14.7	Intersection LOS: B
Intersection Capacity Utilization 55.0%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 3: 64th Avenue & Fulenwider PA-9/PA-10 Access





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	65	875	80	35	980	85	105	0	100	85	0	70
Future Volume (veh/h)	65	875	80	35	980	85	105	0	100	85	0	70
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	1752	1752	1752	1752	1752	1752	1752	1752	1752	1752	1752	1752
Adj Flow Rate, veh/h	71	951	87	38	1065	92	114	0	109	92	0	76
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, %	10	10	10	10	10	10	10	10	10	10	10	10
Cap, veh/h	303	1416	632	357	1500	669	334	0	166	306	0	168
Arrive On Green	0.06	0.43	0.43	0.08	0.45	0.45	0.08	0.00	0.11	0.08	0.00	0.11
Sat Flow, veh/h	1668	3328	1485	1668	3328	1485	1668	0	1485	1668	0	1485
Grp Volume(v), veh/h	71	951	87	38	1065	92	114	0	109	92	0	76
Grp Sat Flow(s),veh/h/ln	1668	1664	1485	1668	1664	1485	1668	0	1485	1668	0	1485
Q Serve(g_s), s	1.4	13.9	2.2	0.7	15.6	2.2	3.6	0.0	4.3	2.8	0.0	2.9
Cycle Q Clear(g_c), s	1.4	13.9	2.2	0.7	15.6	2.2	3.6	0.0	4.3	2.8	0.0	2.9
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	303	1416	632	357	1500	669	334	0	166	306	0	168
V/C Ratio(X)	0.23	0.67	0.14	0.11	0.71	0.14	0.34	0.00	0.66	0.30	0.00	0.45
Avail Cap(c_a), veh/h	497	3225	1439	509	3225	1439	491	0	553	459	0	553
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	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	10.4	14.0	10.6	9.2	13.4	9.7	21.2	0.0	25.7	20.9	0.0	25.0
Incr Delay (d2), s/veh	0.4	0.6	0.1	0.1	0.6	0.1	0.6	0.0	4.4	0.5	0.0	1.9
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	0.8	7.7	1.2	0.4	8.3	1.1	2.4	0.0	2.9	1.9	0.0	1.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	10.8	14.5	10.7	9.3	14.0	9.8	21.8	0.0	30.1	21.5	0.0	26.9
LnGrp LOS	B	B	B	A	B	A	C	A	C	C	A	C
Approach Vol, veh/h		1109			1195			223			168	
Approach Delay, s/veh		14.0			13.6			25.9			23.9	
Approach LOS		B			B			C			C	

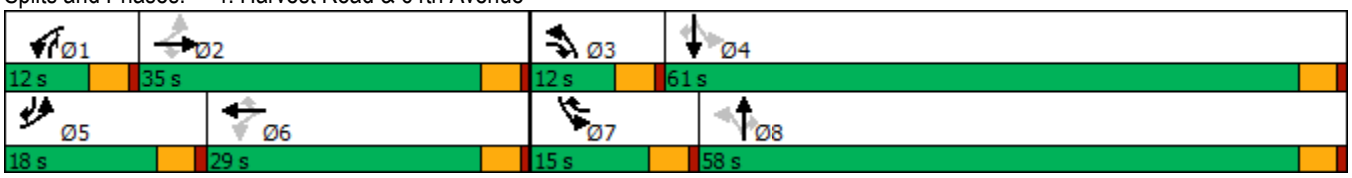
Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.5	30.2	9.3	11.3	8.0	31.7	9.5	11.2
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	10.5	58.5	10.5	22.5	10.5	58.5	10.5	22.5
Max Q Clear Time (g_c+I1), s	2.7	15.9	5.6	4.9	3.4	17.6	4.8	6.3
Green Ext Time (p_c), s	0.0	8.2	0.1	0.3	0.1	9.6	0.1	0.5

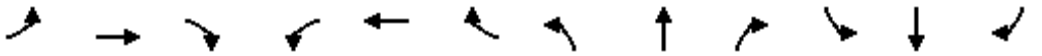
Intersection Summary	
HCM 6th Ctrl Delay	15.4
HCM 6th LOS	B

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	405	375	215	190	330	120	250	1730	200	105	2250	495
Future Volume (vph)	405	375	215	190	330	120	250	1730	200	105	2250	495
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA	pm+ov	pm+pt	NA	pm+ov	pm+pt	NA	pm+ov
Protected Phases	5	2	3	1	6	7	3	8	1	7	4	5
Permitted Phases	2		2	6		6	8		8	4		4
Detector Phase	5	2	3	1	6	7	3	8	1	7	4	5
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	9.5	9.5	22.5	9.5	9.5	22.5	9.5	9.5	22.5	9.5
Total Split (s)	18.0	35.0	12.0	12.0	29.0	15.0	12.0	58.0	12.0	15.0	61.0	18.0
Total Split (%)	15.0%	29.2%	10.0%	10.0%	24.2%	12.5%	10.0%	48.3%	10.0%	12.5%	50.8%	15.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	Min	None	None	Min	None
Act Effct Green (s)	35.5	23.5	35.5	25.0	17.5	30.8	62.8	55.3	67.3	65.3	56.6	74.6
Actuated g/C Ratio	0.31	0.21	0.31	0.22	0.15	0.27	0.56	0.49	0.60	0.58	0.50	0.66
v/c Ratio	0.80	0.60	0.47	0.89	0.71	0.28	0.83	0.82	0.24	0.61	1.04	0.54
Control Delay	43.0	44.3	26.7	73.0	53.4	11.7	43.2	29.0	6.8	31.3	57.9	11.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	43.0	44.3	26.7	73.0	53.4	11.7	43.2	29.0	6.8	31.3	57.9	11.2
LOS	D	D	C	E	D	B	D	C	A	C	E	B
Approach Delay		40.0			51.4			28.6			48.8	
Approach LOS		D			D			C			D	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 113.1	
Natural Cycle: 110	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.04	
Intersection Signal Delay: 41.1	Intersection LOS: D
Intersection Capacity Utilization 86.5%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 4: Harvest Road & 64th Avenue





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	405	375	215	190	330	120	250	1730	200	105	2250	495
Future Volume (veh/h)	405	375	215	190	330	120	250	1730	200	105	2250	495
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	1752	1752	1752	1752	1752	1752	1752	1752	1752	1752	1752	1752
Adj Flow Rate, veh/h	440	408	234	207	359	130	272	1880	217	114	2446	538
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, %	10	10	10	10	10	10	10	10	10	10	10	10
Cap, veh/h	587	647	379	239	466	282	328	2508	880	188	2454	944
Arrive On Green	0.12	0.19	0.19	0.07	0.14	0.14	0.06	0.52	0.52	0.05	0.51	0.51
Sat Flow, veh/h	3237	3328	1485	1668	3328	1485	3237	4782	1485	1668	4782	1485
Grp Volume(v), veh/h	440	408	234	207	359	130	272	1880	217	114	2446	538
Grp Sat Flow(s),veh/h/ln	1618	1664	1485	1668	1664	1485	1618	1594	1485	1668	1594	1485
Q Serve(g_s), s	12.5	12.4	15.3	7.5	11.4	8.6	4.6	33.9	7.7	3.5	56.1	22.8
Cycle Q Clear(g_c), s	12.5	12.4	15.3	7.5	11.4	8.6	4.6	33.9	7.7	3.5	56.1	22.8
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	587	647	379	239	466	282	328	2508	880	188	2454	944
V/C Ratio(X)	0.75	0.63	0.62	0.86	0.77	0.46	0.83	0.75	0.25	0.61	1.00	0.57
Avail Cap(c_a), veh/h	587	922	502	239	740	404	352	2508	880	264	2454	944
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	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	34.1	40.7	36.2	43.2	45.6	39.6	27.0	20.5	10.7	21.7	26.7	11.5
Incr Delay (d2), s/veh	5.3	1.0	1.6	26.3	2.7	1.2	14.4	1.3	0.1	3.1	17.4	0.8
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(95%),veh/ln	8.9	8.7	9.4	7.1	8.4	5.7	4.2	17.5	4.2	2.8	31.2	11.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	39.4	41.7	37.9	69.6	48.4	40.8	41.4	21.8	10.9	24.8	44.1	12.3
LnGrp LOS	D	D	D	E	D	D	D	C	B	C	D	B
Approach Vol, veh/h		1082			696			2369			3098	
Approach Delay, s/veh		39.9			53.3			23.1			37.9	
Approach LOS		D			D			C			D	

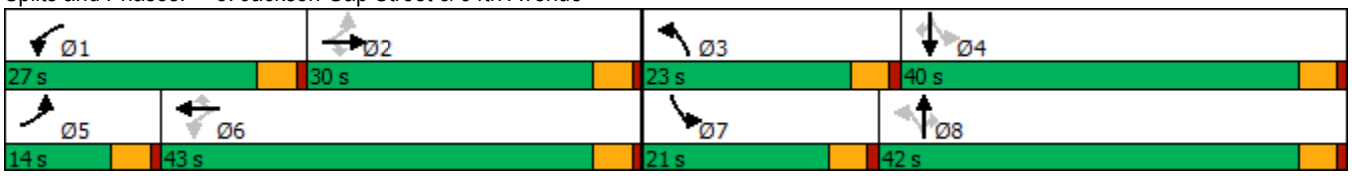
Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	12.0	25.9	11.2	61.0	18.0	19.9	10.0	62.2
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	7.5	30.5	7.5	56.5	13.5	24.5	10.5	53.5
Max Q Clear Time (g_c+I1), s	9.5	17.3	6.6	58.1	14.5	13.4	5.5	35.9
Green Ext Time (p_c), s	0.0	2.8	0.1	0.0	0.0	2.0	0.1	12.7

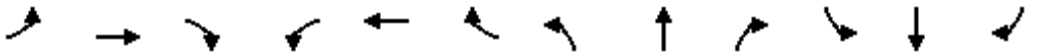
Intersection Summary	
HCM 6th Ctrl Delay	34.8
HCM 6th LOS	C

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	100	325	225	250	375	400	175	575	200	325	550	125
Future Volume (vph)	100	325	225	250	375	400	175	575	200	325	550	125
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2		2	6		6	8		8	4		4
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	22.5	9.5	22.5	22.5	9.5	22.5	22.5	9.5	22.5	22.5
Total Split (s)	14.0	30.0	30.0	27.0	43.0	43.0	23.0	42.0	42.0	21.0	40.0	40.0
Total Split (%)	11.7%	25.0%	25.0%	22.5%	35.8%	35.8%	19.2%	35.0%	35.0%	17.5%	33.3%	33.3%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	Min	Min	None	Min	Min
Act Effct Green (s)	24.8	16.0	16.0	36.7	26.2	26.2	36.2	24.4	24.4	37.7	25.1	25.1
Actuated g/C Ratio	0.28	0.18	0.18	0.42	0.30	0.30	0.41	0.28	0.28	0.43	0.29	0.29
v/c Ratio	0.34	0.59	0.52	0.63	0.42	0.60	0.53	0.69	0.38	0.51	0.64	0.26
Control Delay	21.7	39.3	9.5	26.0	28.4	7.4	20.9	33.6	6.2	17.5	32.3	6.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	21.7	39.3	9.5	26.0	28.4	7.4	20.9	33.6	6.2	17.5	32.3	6.7
LOS	C	D	A	C	C	A	C	C	A	B	C	A
Approach Delay		26.2			19.6			25.5			24.3	
Approach LOS		C			B			C			C	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 87.8	
Natural Cycle: 65	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.69	
Intersection Signal Delay: 23.6	Intersection LOS: C
Intersection Capacity Utilization 63.0%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 5: Jackson Gap Street & 64th Avenue





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	100	325	225	250	375	400	175	575	200	325	550	125
Future Volume (veh/h)	100	325	225	250	375	400	175	575	200	325	550	125
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	1752	1752	1752	1752	1752	1752	1752	1752	1752	1752	1752	1752
Adj Flow Rate, veh/h	109	353	245	272	408	435	190	625	217	353	598	136
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, %	10	10	10	10	10	10	10	10	10	10	10	10
Cap, veh/h	353	886	395	464	1140	508	337	853	381	641	863	385
Arrive On Green	0.07	0.27	0.27	0.14	0.34	0.34	0.11	0.26	0.26	0.11	0.26	0.26
Sat Flow, veh/h	1668	3328	1485	1668	3328	1485	1668	3328	1485	3237	3328	1485
Grp Volume(v), veh/h	109	353	245	272	408	435	190	625	217	353	598	136
Grp Sat Flow(s),veh/h/ln	1668	1664	1485	1668	1664	1485	1668	1664	1485	1618	1664	1485
Q Serve(g_s), s	3.8	7.0	11.7	8.9	7.4	22.0	6.6	13.9	10.3	6.2	13.1	6.0
Cycle Q Clear(g_c), s	3.8	7.0	11.7	8.9	7.4	22.0	6.6	13.9	10.3	6.2	13.1	6.0
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	353	886	395	464	1140	508	337	853	381	641	863	385
V/C Ratio(X)	0.31	0.40	0.62	0.59	0.36	0.86	0.56	0.73	0.57	0.55	0.69	0.35
Avail Cap(c_a), veh/h	439	1052	469	692	1588	708	537	1547	690	940	1464	653
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	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	19.3	24.3	26.0	16.3	19.9	24.7	19.8	27.5	26.1	19.8	27.0	24.4
Incr Delay (d2), s/veh	0.5	0.3	1.8	1.2	0.2	7.4	1.5	1.2	1.3	0.7	1.0	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(95%),veh/ln	2.5	4.7	7.3	5.7	4.8	12.7	4.4	9.0	6.4	4.0	8.6	3.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	19.7	24.6	27.9	17.4	20.1	32.1	21.2	28.7	27.5	20.5	28.0	24.9
LnGrp LOS	B	C	C	B	C	C	C	C	C	C	C	C
Approach Vol, veh/h		707			1115			1032			1087	
Approach Delay, s/veh		25.0			24.1			27.1			25.2	
Approach LOS		C			C			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	16.0	26.0	13.3	25.4	9.8	32.1	13.5	25.2
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	22.5	25.5	18.5	35.5	9.5	38.5	16.5	37.5
Max Q Clear Time (g_c+I1), s	10.9	13.7	8.6	15.1	5.8	24.0	8.2	15.9
Green Ext Time (p_c), s	0.6	2.4	0.3	4.2	0.1	3.6	0.8	4.8

Intersection Summary	
HCM 6th Ctrl Delay	25.3
HCM 6th LOS	C

64th Avenue Traffic Weave Analysis – E-470 to Gun Club Road

Both directions of 64th Avenue are analyzed using 2040 projected peak hour traffic. The analysis extends from E-470 to Gun Club Road. The Highway Capacity Manual's weave analysis is calibrated to freeway conditions; that procedure is not applicable to an arterial road. Other technical papers have been published to help assess arterial weave sections, one of which is being used here. This analysis uses a modified HCM weave analysis as outlined in Operation of Weaving Areas Under Non-Freeway Conditions prepared by Ahmad Sadegh, Louis J. Pignataro, Athanassios Bladikas, and Muhammad Shahid Iabal of New Jersey Institute of Technology (TRB Paper 920551).

The NJIT equations are:

Weaving Speed:

$$S_W = 15 + \frac{35}{1 + 3.6\,x\,10^{-4}\,(1+VR)^{0.176} * \frac{\left(\frac{V}{N}\right)^{1.67}}{L^{0.6}}}$$

Non-weaving Speed:

$$S_{NW} = 15 + \frac{35}{1 + 0.003(1+\,VR)^{6.22} * \frac{\left(\frac{V}{N}\right)^{1.79}}{W^{2.86}}}$$

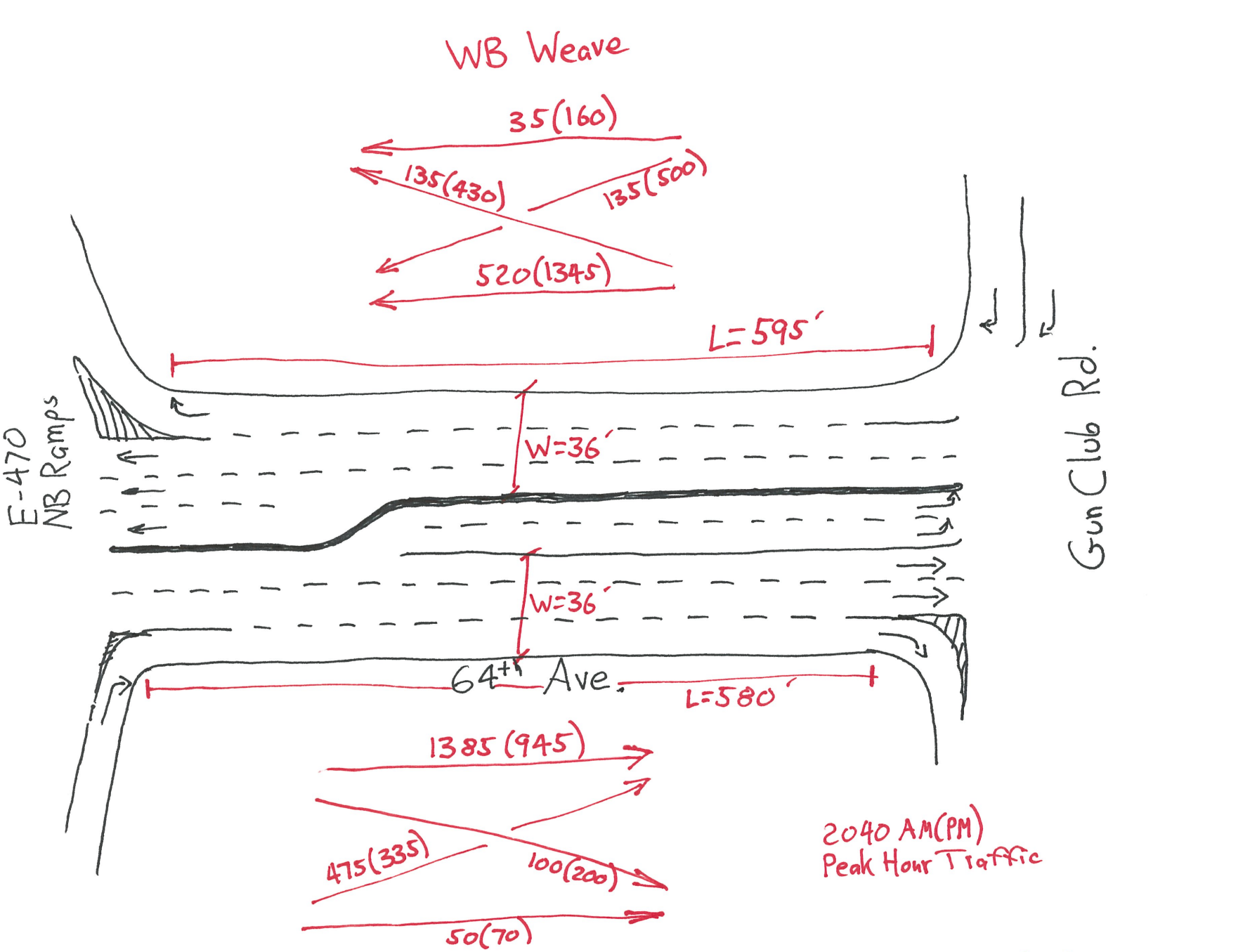
Where:

S_W	=	Weaving speed (MPH)
S_{NW}	=	Non-weaving speed (MPH)
V	=	Total volume
N	=	Number of lanes
VR	=	(Weaving Volume) / (Total Volume)
W	=	Width of weaving section (feet)
L	=	Length of weaving section (feet)

Equations are based on free-flow speed of 50 MPH whereas HCM equations based on free-flow speed of 65 MPH. For LOS purposes, speeds are proportioned accordingly

LOS	S_W (MPH)	S_{NW} (MPH)
A	42.3	46.2
B	38.5	41.5
C	34.6	36.9
D	30.8	32.3
E	26.9	26.9

The above was applied to the segment of 64th Avenue between E-470 and Gun Club Road. Traffic flow demands and the physical characteristics are presented on the next page with calculation results being shown thereafter.


WB Weave
35(160)
135(430)
135(500)
520(1345)
L=595'
E-470
NB Ramps
W=36'
W=36'
Gun Club Rd.
64th Ave.
L=580'
1385(945)
475(335)
100(200)
50(70)
2040 AM(PM)
Peak Hour Traffic
EB Weave
64th Ave. 2040
Weave Data

Eastbound 64th Avenue, 2040 AM Peak Hour

VR	=	0.286				
V	=	2010	S_W	=	39.4 MPH	→ LOS B
N	=	3	S_{NW}	=	48 mph	→ LOS A
L	=	580 feet				
W	=	36 feet				

Westbound 64th Avenue, 2040 AM Peak Hour

VR	=	0.327				
V	=	825	S_W	=	47 MPH	→ LOS A
N	=	3	S_{NW}	=	49.5 mph	→ LOS A
L	=	595 feet				
W	=	36 feet				

Eastbound 64th Avenue, 2040 PM Peak hour

VR	=	0.345				
V	=	1550	S_W	=	42.3 MPH	→ LOS A
N	=	3	S_{NW}	=	48.4 mph	→ LOS A
L	=	580 feet				
W	=	36 feet				

Westbound 64th Avenue, PM Peak Hour

VR	=	0.382				
V	=	2435	S_W	=	37 MPH	→ LOS C
N	=	3	S_{NW}	=	46.1 mph	→ LOS B
L	=	595 feet				
W	=	36 feet				