

# **APPENDIX H**

## *Traffic Count and Intersection Data*

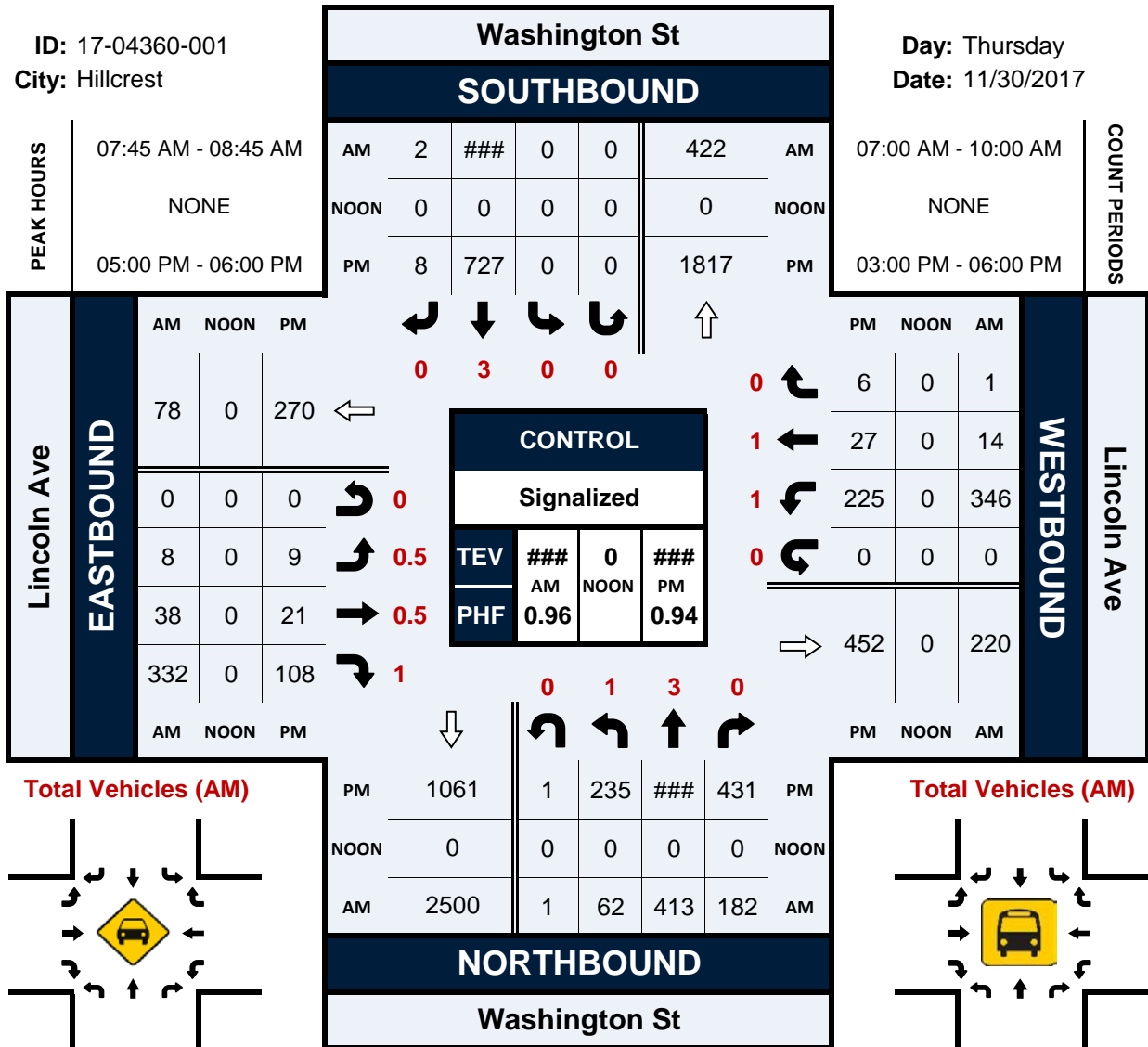


# Washington St & Lincoln Ave

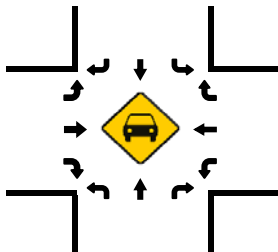
## Peak Hour Turning Movement Count

ID: 17-04360-001  
City: Hillcrest

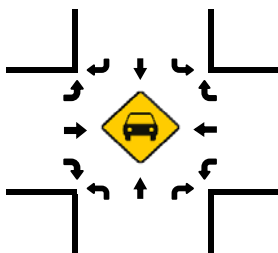
Day: Thursday  
Date: 11/30/2017



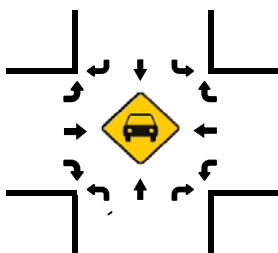
Total Vehicles (AM)



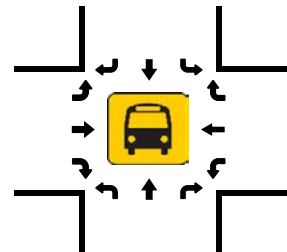
Total Vehicles (NOON)



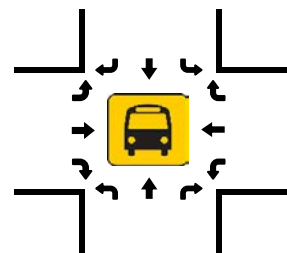
Total Vehicles (PM)



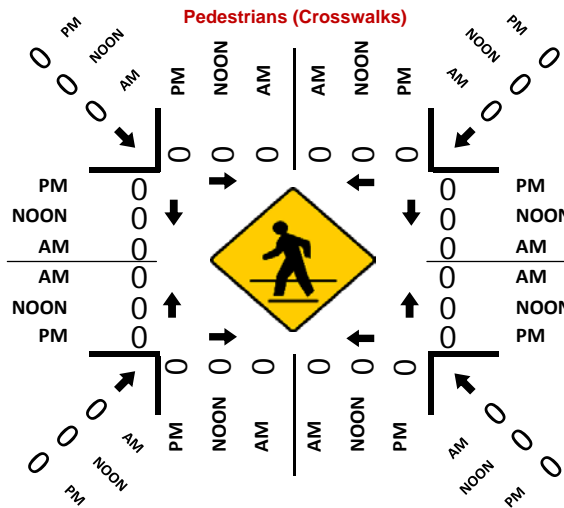
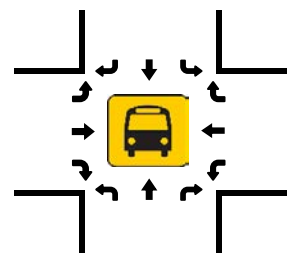
Total Vehicles (AM)



Total Vehicles (NOON)



Total Vehicles (PM)

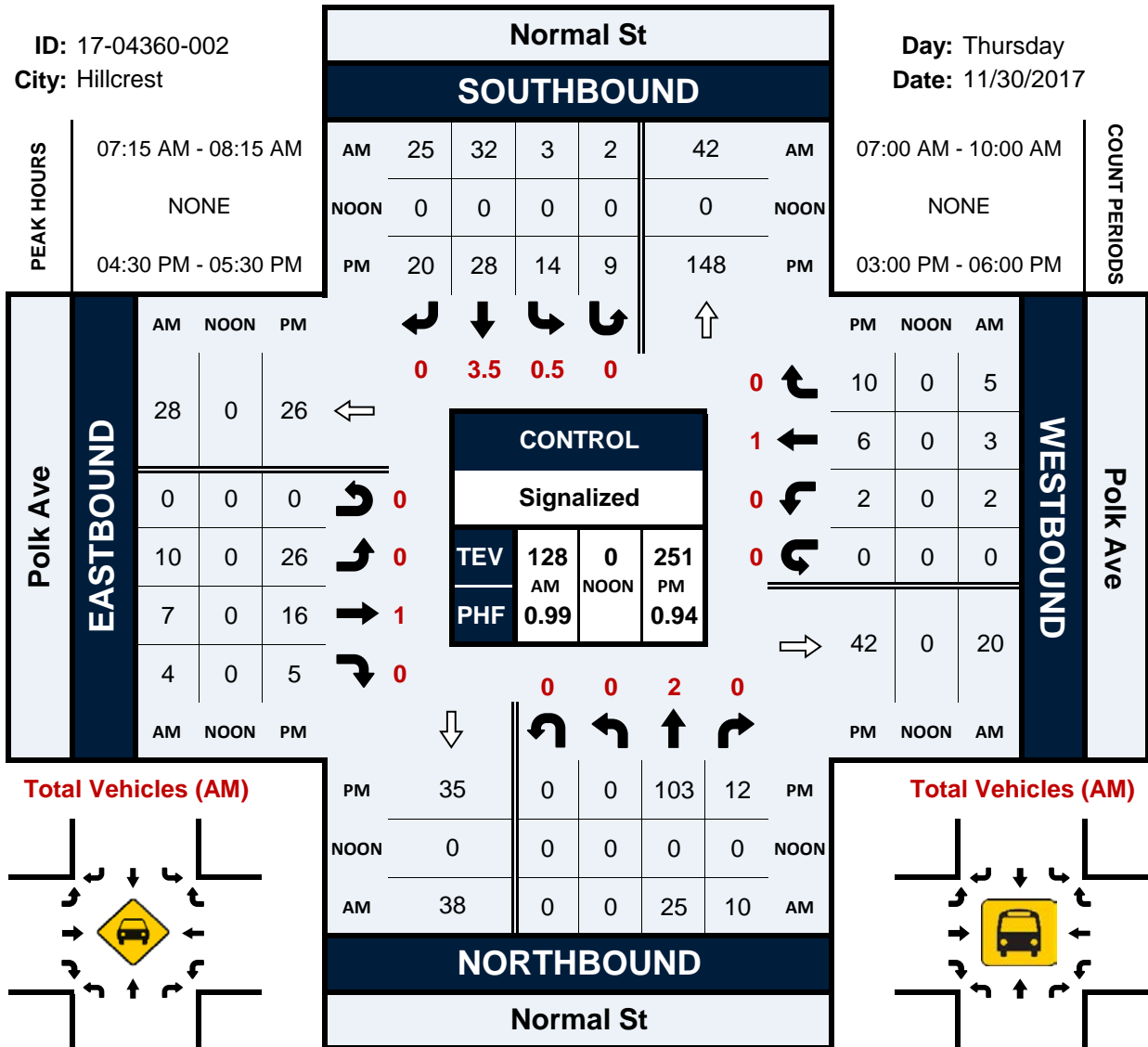


# Washington St/Normal St & Polk Ave

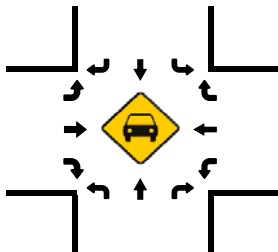
## Peak Hour Turning Movement Count

ID: 17-04360-002  
City: Hillcrest

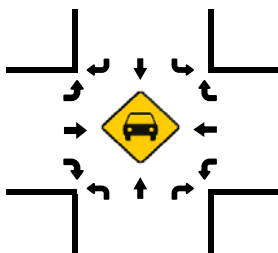
Day: Thursday  
Date: 11/30/2017



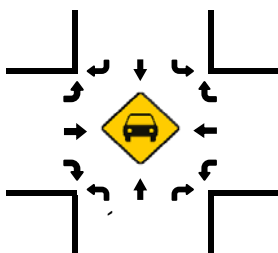
Total Vehicles (AM)



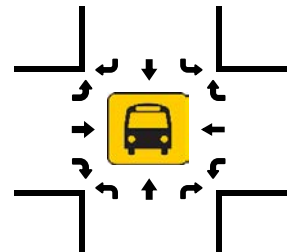
Total Vehicles (NOON)



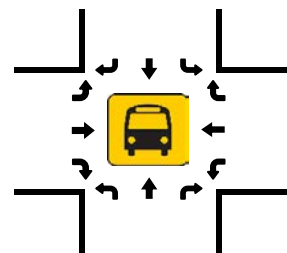
Total Vehicles (PM)



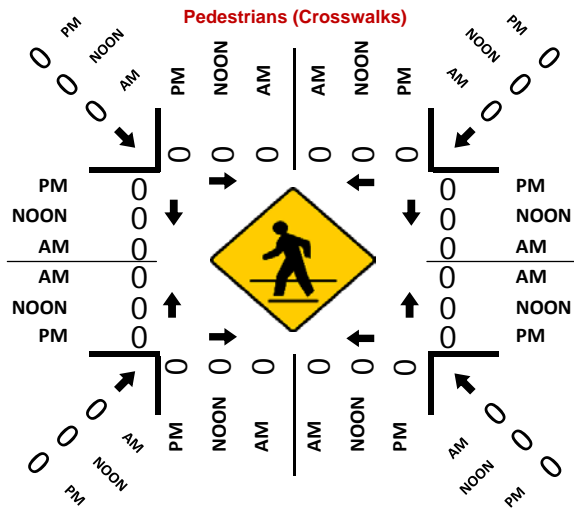
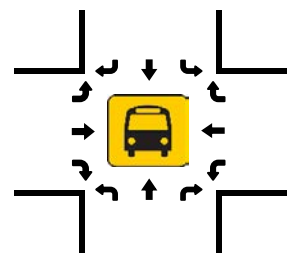
Total Vehicles (AM)



Total Vehicles (NOON)



Total Vehicles (PM)

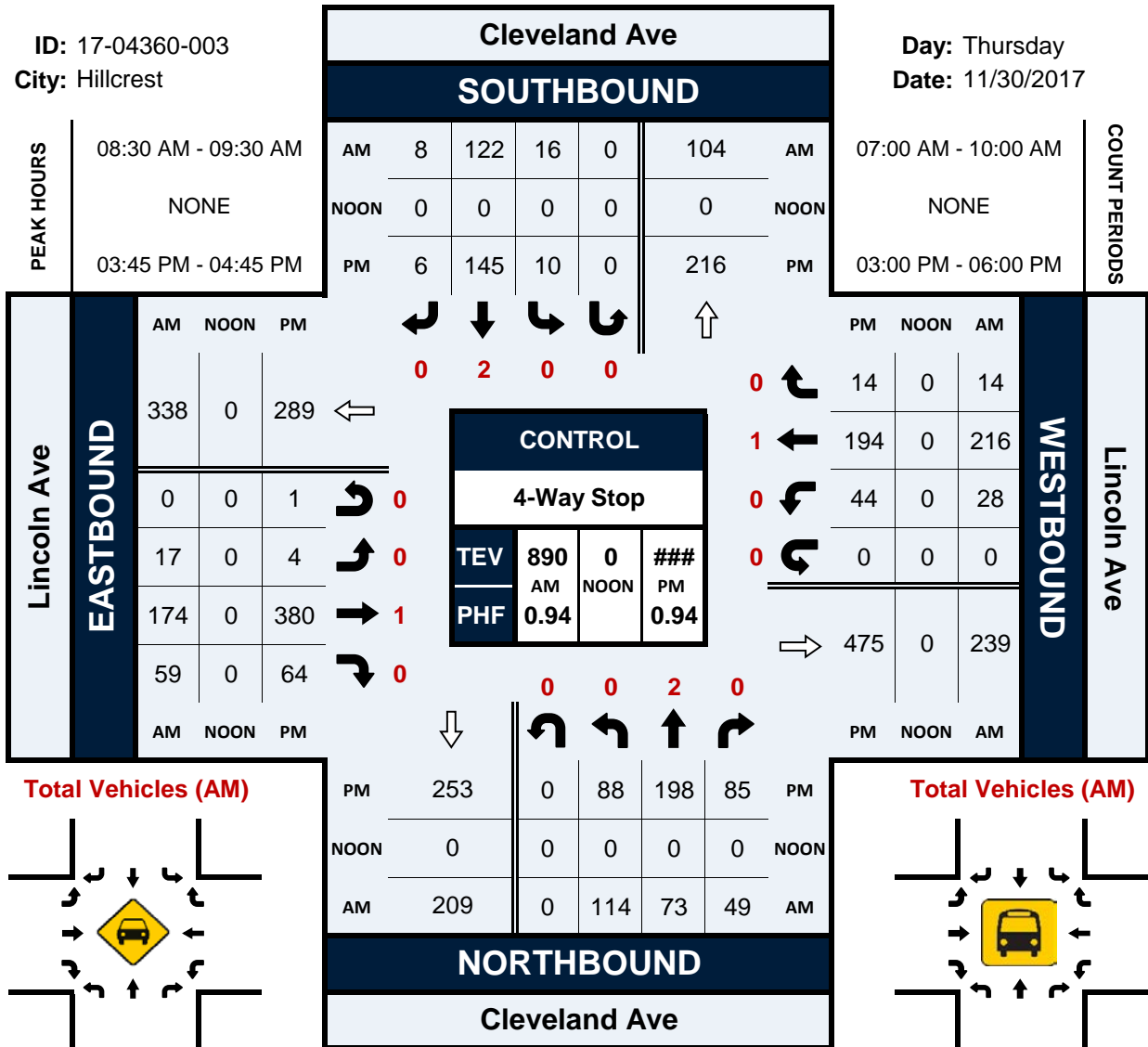


# Cleveland Ave & Lincoln Ave

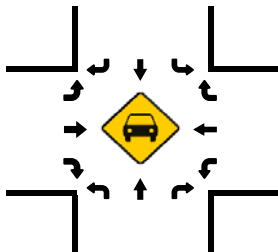
## Peak Hour Turning Movement Count

ID: 17-04360-003  
City: Hillcrest

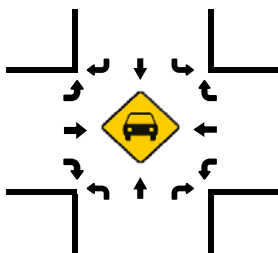
Day: Thursday  
Date: 11/30/2017



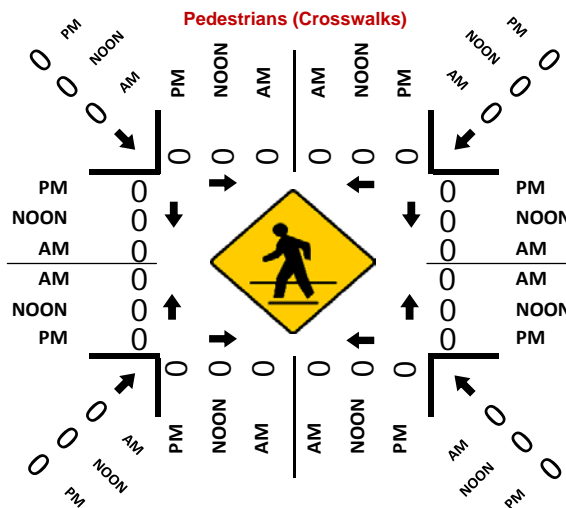
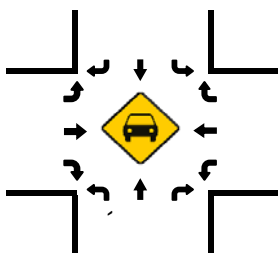
Total Vehicles (AM)



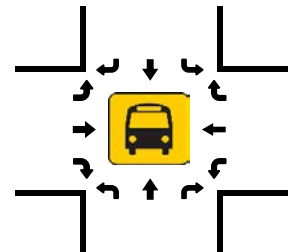
Total Vehicles (NOON)



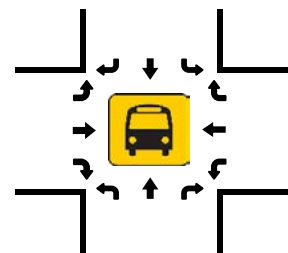
Total Vehicles (PM)



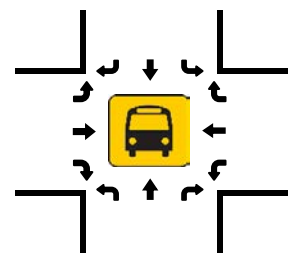
Total Vehicles (AM)



Total Vehicles (NOON)



Total Vehicles (PM)

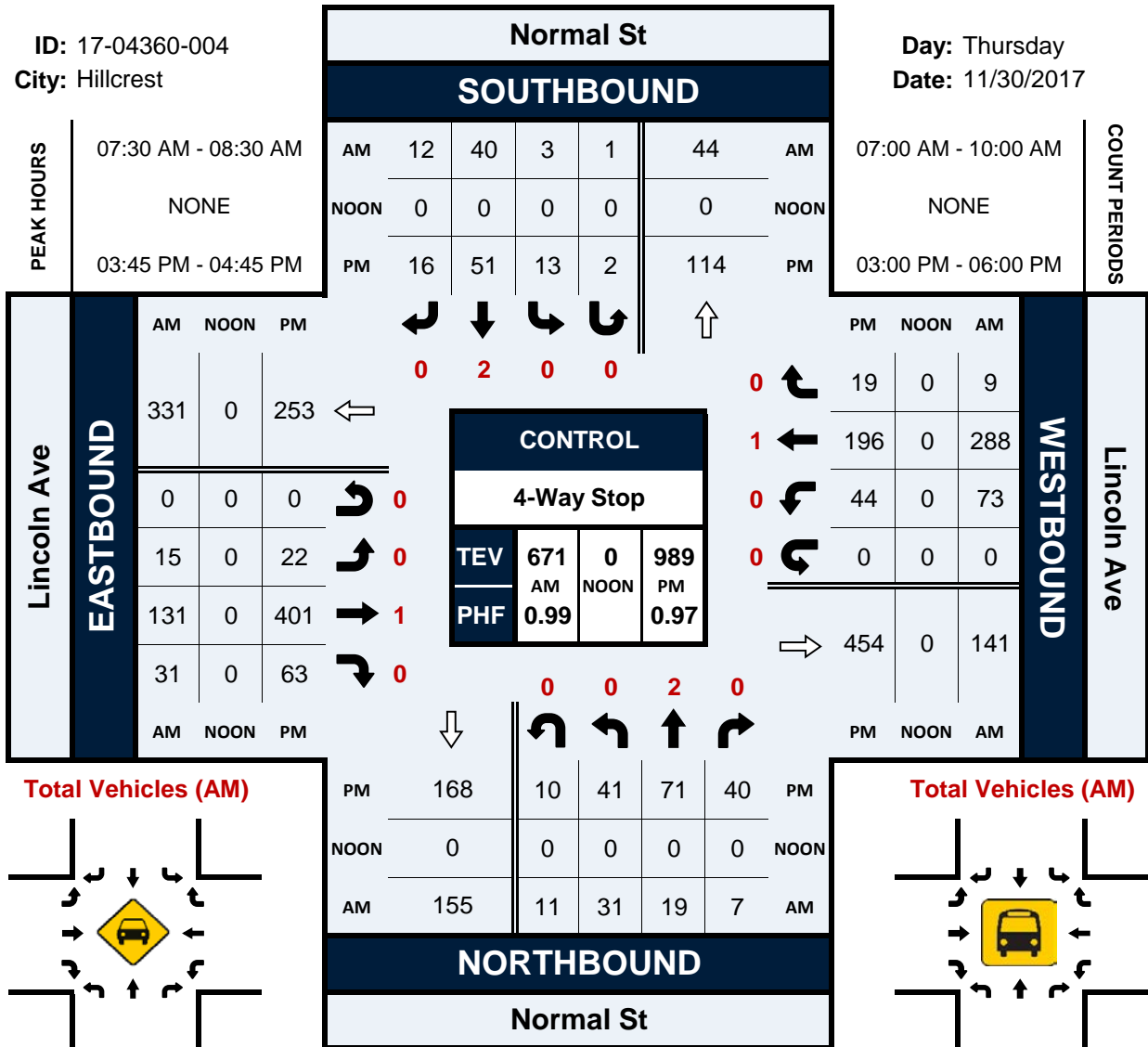


# Normal St & Lincoln Ave

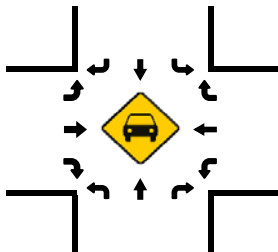
## Peak Hour Turning Movement Count

ID: 17-04360-004  
City: Hillcrest

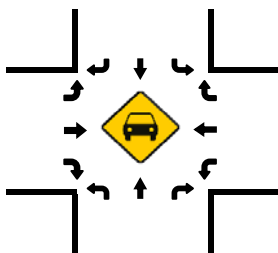
Day: Thursday  
Date: 11/30/2017



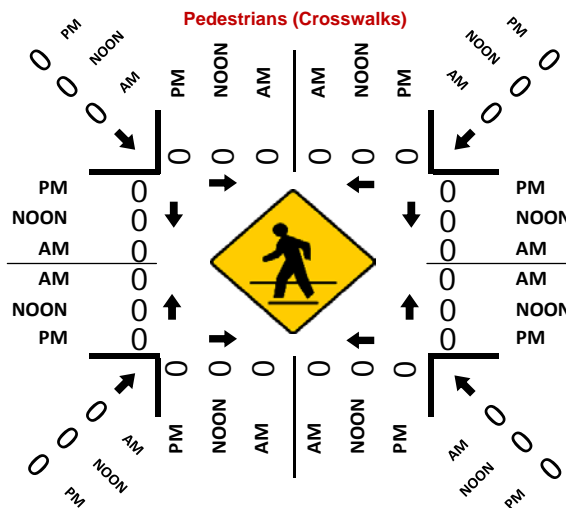
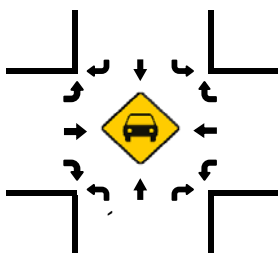
Total Vehicles (AM)



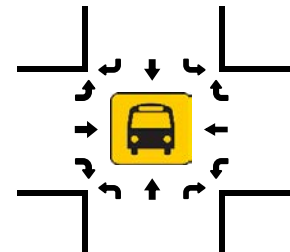
Total Vehicles (NOON)



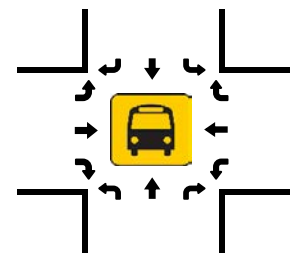
Total Vehicles (PM)



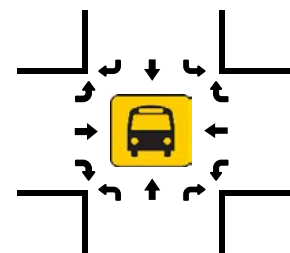
Total Vehicles (AM)



Total Vehicles (NOON)



Total Vehicles (PM)

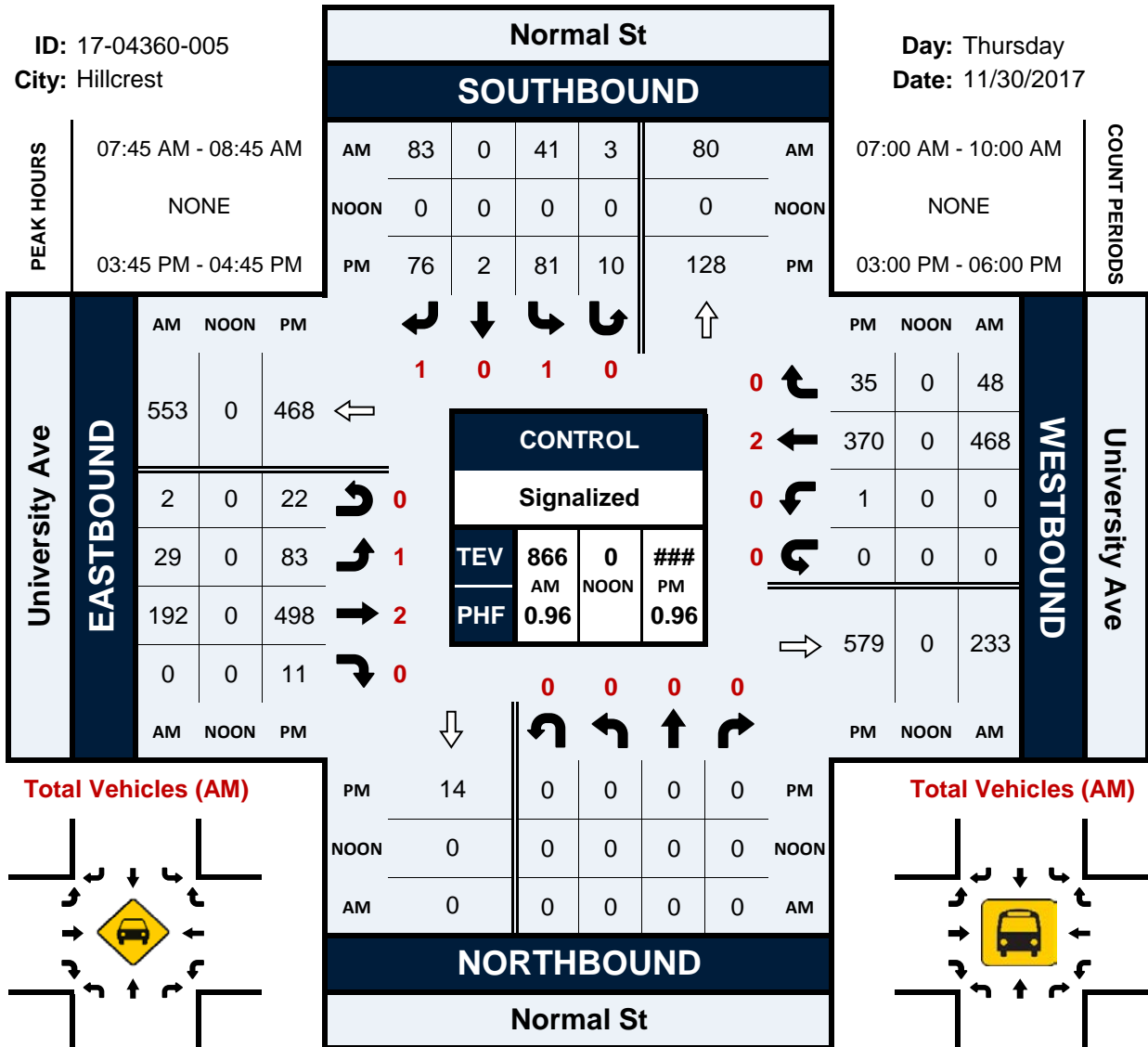


# Normal St & University Ave

## Peak Hour Turning Movement Count

ID: 17-04360-005  
City: Hillcrest

Day: Thursday  
Date: 11/30/2017



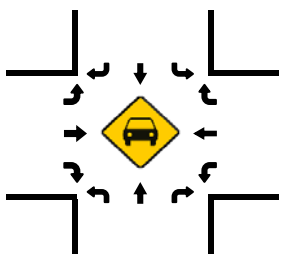
PEAK HOURS

07:45 AM - 08:45 AM  
NONE  
03:45 PM - 04:45 PM

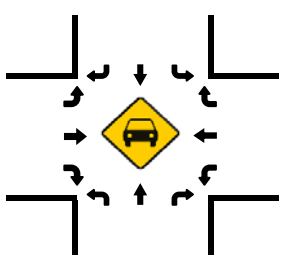
COUNT PERIODS

07:00 AM - 10:00 AM  
NONE  
03:00 PM - 06:00 PM

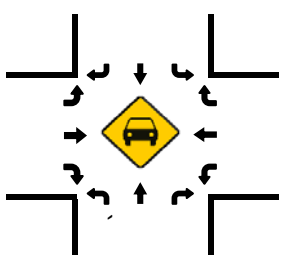
Total Vehicles (AM)



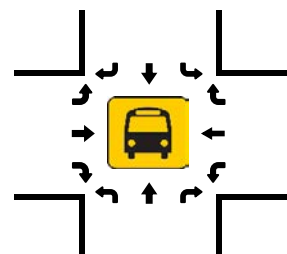
Total Vehicles (NOON)



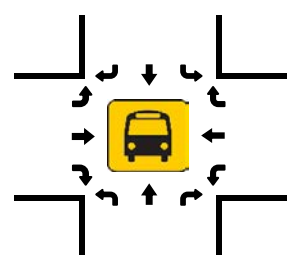
Total Vehicles (PM)



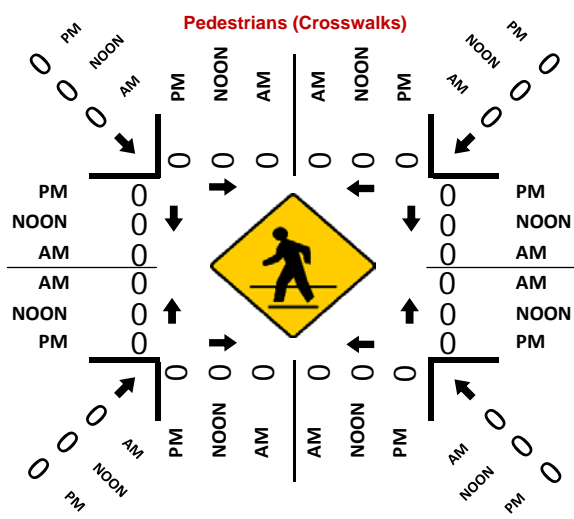
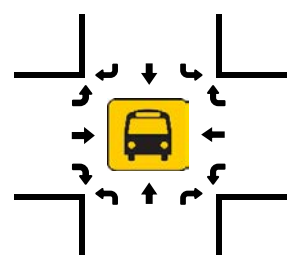
Total Vehicles (AM)



Total Vehicles (NOON)























Total Vehicles (PM)



HCM 2010 Signalized Intersection Summary  
1: Washington St & Lincoln Ave

Existing AM

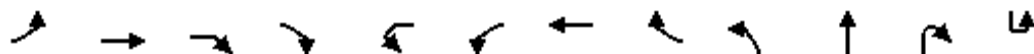
												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	8	38	332	346	14	1	62	413	182	0	1821	2
Future Volume (veh/h)	8	38	332	346	14	1	62	413	182	0	1821	2
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1863	1863	1863	1863	1900	1863	1863	1900	0	1863	1900
Adj Flow Rate, veh/h	8	40	346	360	15	1	65	430	190	0	1897	2
Adj No. of Lanes	0	1	1	1	1	0	1	3	0	0	3	0
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	0	2	2
Cap, veh/h	158	658	633	542	691	46	174	1404	593	0	2099	2
Arrive On Green	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.00	0.40	0.40
Sat Flow, veh/h	162	1646	1583	993	1727	115	237	3510	1481	0	5414	6
Grp Volume(v), veh/h	48	0	346	360	0	16	65	415	205	0	1226	673
Grp Sat Flow(s),veh/h/ln	1808	0	1583	993	0	1842	237	1695	1601	0	1695	1862
Q Serve(g_s), s	0.0	0.0	7.6	15.8	0.0	0.2	2.7	3.8	4.0	0.0	15.3	15.3
Cycle Q Clear(g_c), s	0.7	0.0	7.6	16.5	0.0	0.2	18.0	3.8	4.0	0.0	15.3	15.3
Prop In Lane	0.17		1.00	1.00		0.06	1.00		0.93	0.00		0.00
Lane Grp Cap(c), veh/h	816	0	633	542	0	737	174	1356	641	0	1356	745
V/C Ratio(X)	0.06	0.00	0.55	0.66	0.00	0.02	0.37	0.31	0.32	0.00	0.90	0.90
Avail Cap(c_a), veh/h	816	0	633	542	0	737	174	1356	641	0	1356	745
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	8.3	0.0	10.4	13.4	0.0	8.2	22.2	9.2	9.3	0.0	12.7	12.7
Incr Delay (d2), s/veh	0.1	0.0	3.4	6.3	0.0	0.1	6.0	0.6	1.3	0.0	10.1	16.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	0.0	3.9	5.3	0.0	0.1	1.1	1.8	1.9	0.0	8.9	11.1
LnGrp Delay(d),s/veh	8.5	0.0	13.7	19.7	0.0	8.2	28.2	9.8	10.6	0.0	22.8	29.2
LnGrp LOS	A		B	B		A	C	A	B		C	C
Approach Vol, veh/h		394			376			685			1899	
Approach Delay, s/veh		13.1			19.2			11.8			25.1	
Approach LOS		B			B			B			C	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		22.5		22.5		22.5		22.5				
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5				
Max Green Setting (Gmax), s		18.0		18.0		18.0		18.0				
Max Q Clear Time (g_c+I1), s		20.0		9.6		17.3		18.5				
Green Ext Time (p_c), s		0.0		2.4		0.7		0.0				
<b>Intersection Summary</b>												
HCM 2010 Ctrl Delay			20.3									
HCM 2010 LOS			C									



# HCM Signalized Intersection Capacity Analysis

## 2: Washington St & Normal St & Campus Ave/Polk Ave

Existing AM



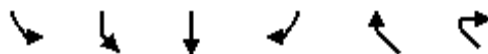
Movement	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NBL	NBT	NBR2	SBU
Lane Configurations		↕					↕		↕	↑↑↑		
Traffic Volume (vph)	10	7	4	73	2	78	3	5	64	295	24	2
Future Volume (vph)	10	7	4	73	2	78	3	5	64	295	24	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5					4.5		4.5	4.5		
Lane Util. Factor		1.00					1.00		1.00	0.91		
Frt		0.89					0.99		1.00	0.99		
Flt Protected		0.99					0.96		0.95	1.00		
Satd. Flow (prot)		1648					1768		1770	5028		
Flt Permitted		0.98					0.72		0.95	1.00		
Satd. Flow (perm)		1616					1329		1770	5028		
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	10	7	4	74	2	79	3	5	65	298	24	2
RTOR Reduction (vph)	0	50	0	0	0	0	3	0	0	80	0	0
Lane Group Flow (vph)	0	45	0	0	0	0	86	0	65	242	0	0
Turn Type	Perm	NA			Perm	Perm	NA		Prot	NA		Perm
Protected Phases		6					2		7	4		
Permitted Phases	6				2	2						8
Actuated Green, G (s)		18.0					18.0		5.0	18.0		
Effective Green, g (s)		18.0					18.0		5.0	18.0		
Actuated g/C Ratio		0.33					0.33		0.09	0.33		
Clearance Time (s)		4.5					4.5		4.5	4.5		
Lane Grp Cap (vph)		533					438		162	1660		
v/s Ratio Prot									c0.04	0.05		
v/s Ratio Perm		0.03					c0.06					
v/c Ratio		0.09					0.20		0.40	0.15		
Uniform Delay, d1		12.6					13.1		23.3	12.8		
Progression Factor		1.00					1.00		1.00	1.00		
Incremental Delay, d2		0.3					1.0		7.3	0.2		
Delay (s)		12.9					14.1		30.6	13.0		
Level of Service		B					B		C	B		
Approach Delay (s)		12.9					14.1			16.0		
Approach LOS		B					B			B		

### Intersection Summary

HCM 2000 Control Delay	21.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	54.5	Sum of lost time (s)	13.5
Intersection Capacity Utilization	55.9%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis  
 2: Washington St & Normal St & Campus Ave/Polk Ave

Existing AM



Movement	SBL2	SBL	SBT	SBR	NWR	NWR2
Lane Configurations		3	↑↑↑		↑↑	
Traffic Volume (vph)	3	32	1467	25	25	10
Future Volume (vph)	3	32	1467	25	25	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5		4.5	
Lane Util. Factor		1.00	0.91		0.88	
Frt		1.00	1.00		0.85	
Flt Protected		0.95	1.00		1.00	
Satd. Flow (prot)		1770	5073		2787	
Flt Permitted		0.55	1.00		1.00	
Satd. Flow (perm)		1023	5073		2787	
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	3	32	1482	25	25	10
RTOR Reduction (vph)	0	0	3	0	32	0
Lane Group Flow (vph)	0	37	1504	0	3	0
Turn Type	Perm	Perm	NA		Prot	
Protected Phases			8		3	
Permitted Phases	8	8				
Actuated Green, G (s)		18.0	18.0		5.0	
Effective Green, g (s)		18.0	18.0		5.0	
Actuated g/C Ratio		0.33	0.33		0.09	
Clearance Time (s)		4.5	4.5		4.5	
Lane Grp Cap (vph)		337	1675		255	
v/s Ratio Prot			c0.30		0.00	
v/s Ratio Perm		0.04				
v/c Ratio		0.11	0.90		0.01	
Uniform Delay, d1		12.7	17.4		22.5	
Progression Factor		1.00	1.00		1.00	
Incremental Delay, d2		0.7	8.0		0.1	
Delay (s)		13.3	25.4		22.6	
Level of Service		B	C		C	
Approach Delay (s)			25.1			
Approach LOS			C			
<b>Intersection Summary</b>						

Intersection	
Intersection Delay, s/veh	12.2
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	17	174	59	28	216	14	114	73	49	16	122	8
Future Vol, veh/h	17	174	59	28	216	14	114	73	49	16	122	8
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	18	185	63	30	230	15	121	78	52	17	130	9
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	12.2	12.7	12.5	11
HCM LOS	B	B	B	B

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	48%	7%	11%	11%
Vol Thru, %	31%	70%	84%	84%
Vol Right, %	21%	24%	5%	5%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	236	250	258	146
LT Vol	114	17	28	16
Through Vol	73	174	216	122
RT Vol	49	59	14	8
Lane Flow Rate	251	266	274	155
Geometry Grp	1	1	1	1
Degree of Util (X)	0.397	0.404	0.424	0.254
Departure Headway (Hd)	5.693	5.463	5.56	5.896
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	630	654	645	606
Service Time	3.756	3.525	3.62	3.967
HCM Lane V/C Ratio	0.398	0.407	0.425	0.256
HCM Control Delay	12.5	12.2	12.7	11
HCM Lane LOS	B	B	B	B
HCM 95th-tile Q	1.9	2	2.1	1

Intersection	
Intersection Delay, s/veh	10.4
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
Lane Configurations		↕			↕				↕			
Traffic Vol, veh/h	15	131	31	73	288	9	11	31	19	7	1	3
Future Vol, veh/h	15	131	31	73	288	9	11	31	19	7	1	3
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	15	132	31	74	291	9	11	31	19	7	1	3
Number of Lanes	0	1	0	0	1	0	0	0	2	0	0	0
Approach	EB			WB			NB			SB		
Opposing Approach	WB			EB			SB			NB		
Opposing Lanes	1			1			2			2		
Conflicting Approach Left	SB			NB			EB			WB		
Conflicting Lanes Left	2			2			1			1		
Conflicting Approach Right	NB			SB			WB			EB		
Conflicting Lanes Right	2			2			1			1		
HCM Control Delay	9			11.5			9.4			8.8		
HCM LOS	A			B			A			A		

Lane	NBLn1	NBLn2	EBLn1	WBLn1	SBLn1	SBLn2
Vol Left, %	77%	0%	8%	20%	13%	0%
Vol Thru, %	23%	58%	74%	78%	87%	62%
Vol Right, %	0%	42%	18%	2%	0%	38%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	52	17	177	370	24	32
LT Vol	40	0	15	73	3	0
Through Vol	12	10	131	288	21	20
RT Vol	0	7	31	9	0	12
Lane Flow Rate	52	17	179	374	24	32
Geometry Grp	7	7	2	2	7	7
Degree of Util (X)	0.09	0.026	0.229	0.469	0.04	0.051
Departure Headway (Hd)	6.259	5.57	4.619	4.518	5.962	5.629
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	570	639	774	796	597	632
Service Time	4.03	3.34	2.666	2.555	3.734	3.401
HCM Lane V/C Ratio	0.091	0.027	0.231	0.47	0.04	0.051
HCM Control Delay	9.7	8.5	9	11.5	9	8.7
HCM Lane LOS	A	A	A	B	A	A
HCM 95th-tile Q	0.3	0.1	0.9	2.5	0.1	0.2

Intersection

Intersection Delay, s/veh  
 Intersection LOS

Movement	SBT	SBR
Lane Configurations	←↑↑	
Traffic Vol, veh/h	40	12
Future Vol, veh/h	40	12
Peak Hour Factor	0.99	0.99
Heavy Vehicles, %	2	2
Mvmt Flow	40	12
Number of Lanes	2	0

Approach

Opposing Approach  
 Opposing Lanes  
 Conflicting Approach Left  
 Conflicting Lanes Left  
 Conflicting Approach Right  
 Conflicting Lanes Right  
 HCM Control Delay  
 HCM LOS

HCM 2010 Signalized Intersection Summary  
5: University Ave & Normal St





















Existing AM



Movement	EBL	EBT	WBT	WBR	SBL	SBR		
Lane Configurations	↩	↕	↩		↩	↕		
Traffic Volume (veh/h)	29	192	468	48	41	83		
Future Volume (veh/h)	29	192	468	48	41	83		
Number	7	4	8	18	1	16		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1863	1863	1863	1900	1863	1863		
Adj Flow Rate, veh/h	30	200	488	50	43	86		
Adj No. of Lanes	1	2	2	0	1	1		
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96		
Percent Heavy Veh, %	2	2	2	2	2	2		
Cap, veh/h	413	1416	1297	132	710	633		
Arrive On Green	0.40	0.40	0.40	0.40	0.40	0.40		
Sat Flow, veh/h	864	3632	3336	331	1774	1583		
Grp Volume(v), veh/h	30	200	266	272	43	86		
Grp Sat Flow(s),veh/h/ln	864	1770	1770	1804	1774	1583		
Q Serve(g_s), s	1.1	1.6	4.8	4.8	0.7	1.6		
Cycle Q Clear(g_c), s	5.9	1.6	4.8	4.8	0.7	1.6		
Prop In Lane	1.00			0.18	1.00	1.00		
Lane Grp Cap(c), veh/h	413	1416	708	722	710	633		
V/C Ratio(X)	0.07	0.14	0.38	0.38	0.06	0.14		
Avail Cap(c_a), veh/h	413	1416	708	722	710	633		
HCM Platoon Ratio	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		
Uniform Delay (d), s/veh	11.6	8.6	9.5	9.5	8.3	8.6		
Incr Delay (d2), s/veh	0.3	0.2	1.5	1.5	0.2	0.4		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	0.3	0.8	2.6	2.6	0.4	0.7		
LnGrp Delay(d),s/veh	12.0	8.8	11.0	11.0	8.5	9.0		
LnGrp LOS	B	A	B	B	A	A		
Approach Vol, veh/h		230	538		129			
Approach Delay, s/veh		9.2	11.0		8.8			
Approach LOS		A	B		A			
Timer	1	2	3	4	5	6	7	8
Assigned Phs				4		6		8
Phs Duration (G+Y+Rc), s				22.5		22.5		22.5
Change Period (Y+Rc), s				4.5		4.5		4.5
Max Green Setting (Gmax), s				18.0		18.0		18.0
Max Q Clear Time (g_c+I1), s				7.9		3.6		6.8
Green Ext Time (p_c), s				3.4		0.3		3.6
<b>Intersection Summary</b>								
HCM 2010 Ctrl Delay			10.3					
HCM 2010 LOS			B					

HCM 2010 Signalized Intersection Summary  
 1: Washington St & Lincoln Ave

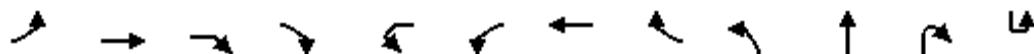
Existing PM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	9	21	108	225	27	6	235	1802	431	0	727	8
Future Volume (veh/h)	9	21	108	225	27	6	235	1802	431	0	727	8
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1863	1863	1863	1863	1900	1863	1863	1900	0	1863	1900
Adj Flow Rate, veh/h	10	22	115	239	29	6	250	1917	459	0	773	9
Adj No. of Lanes	0	1	1	1	1	0	1	3	0	0	3	0
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	0	2	2
Cap, veh/h	265	527	633	646	599	124	363	1650	383	0	2073	24
Arrive On Green	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.00	0.40	0.40
Sat Flow, veh/h	400	1319	1583	1247	1498	310	688	4125	959	0	5350	60
Grp Volume(v), veh/h	32	0	115	239	0	35	250	1565	811	0	505	277
Grp Sat Flow(s),veh/h/ln	1718	0	1583	1247	0	1808	688	1695	1694	0	1695	1852
Q Serve(g_s), s	0.0	0.0	2.1	6.5	0.0	0.5	13.3	18.0	18.0	0.0	4.7	4.7
Cycle Q Clear(g_c), s	0.5	0.0	2.1	7.0	0.0	0.5	18.0	18.0	18.0	0.0	4.7	4.7
Prop In Lane	0.31		1.00	1.00		0.17	1.00		0.57	0.00		0.03
Lane Grp Cap(c), veh/h	792	0	633	646	0	723	363	1356	677	0	1356	741
V/C Ratio(X)	0.04	0.00	0.18	0.37	0.00	0.05	0.69	1.15	1.20	0.00	0.37	0.37
Avail Cap(c_a), veh/h	792	0	633	646	0	723	363	1356	677	0	1356	741
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	8.2	0.0	8.7	10.4	0.0	8.3	17.1	13.5	13.5	0.0	9.5	9.5
Incr Delay (d2), s/veh	0.1	0.0	0.6	1.6	0.0	0.1	10.2	78.2	102.6	0.0	0.8	1.4
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(50%),veh/ln	0.3	0.0	1.0	2.5	0.0	0.3	4.1	23.0	27.6	0.0	2.3	2.7
LnGrp Delay(d),s/veh	8.3	0.0	9.4	12.0	0.0	8.4	27.4	91.7	116.1	0.0	10.3	11.0
LnGrp LOS	A		A	B		A	C	F	F		B	B
Approach Vol, veh/h		147			274			2626			782	
Approach Delay, s/veh		9.1			11.5			93.1			10.5	
Approach LOS		A			B			F			B	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		22.5		22.5		22.5		22.5				
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5				
Max Green Setting (Gmax), s		18.0		18.0		18.0		18.0				
Max Q Clear Time (g_c+I1), s		20.0		4.1		6.7		9.0				
Green Ext Time (p_c), s		0.0		1.4		10.9		1.1				
<b>Intersection Summary</b>												
HCM 2010 Ctrl Delay			67.2									
HCM 2010 LOS			E									

# HCM Signalized Intersection Capacity Analysis

## 2: Washington St & Normal St & Campus Ave/Polk Ave

Existing PM  
05/11/2018



Movement	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NBL	NBT	NBR2	SBU
Lane Configurations		↕					↕		↕	↕↕↕		
Traffic Volume (vph)	26	16	5	112	2	32	6	10	62	1568	93	9
Future Volume (vph)	26	16	5	112	2	32	6	10	62	1568	93	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5					4.5		4.5	4.5		
Lane Util. Factor		1.00					1.00		1.00	0.91		
Frt		0.90					0.97		1.00	0.99		
Flt Protected		0.99					0.97		0.95	1.00		
Satd. Flow (prot)		1664					1751		1770	5043		
Flt Permitted		0.95					0.79		0.95	1.00		
Satd. Flow (perm)		1602					1428		1770	5043		
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	28	17	5	119	2	34	6	11	66	1668	99	10
RTOR Reduction (vph)	0	80	0	0	0	0	7	0	0	80	0	0
Lane Group Flow (vph)	0	89	0	0	0	0	46	0	66	1687	0	0
Turn Type	Perm	NA			Perm	Perm	NA		Prot	NA		Perm
Protected Phases		6					2		7	4		
Permitted Phases	6				2	2						8
Actuated Green, G (s)		18.0					18.0		5.0	18.0		
Effective Green, g (s)		18.0					18.0		5.0	18.0		
Actuated g/C Ratio		0.33					0.33		0.09	0.33		
Clearance Time (s)		4.5					4.5		4.5	4.5		
Lane Grp Cap (vph)		529					471		162	1665		
v/s Ratio Prot									0.04	c0.33		
v/s Ratio Perm		c0.06					0.03					
v/c Ratio		0.17					0.10		0.41	1.01		
Uniform Delay, d1		12.9					12.6		23.4	18.2		
Progression Factor		1.00					1.00		1.00	1.00		
Incremental Delay, d2		0.7					0.4		7.4	25.3		
Delay (s)		13.6					13.0		30.8	43.6		
Level of Service		B					B		C	D		
Approach Delay (s)		13.6					13.0			43.1		
Approach LOS		B					B			D		

### Intersection Summary

HCM 2000 Control Delay	32.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	54.5	Sum of lost time (s)	13.5
Intersection Capacity Utilization	65.0%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



HCM Signalized Intersection Capacity Analysis  
 2: Washington St & Normal St & Campus Ave/Polk Ave

Existing PM  
 05/11/2018



Movement	SBL2	SBL	SBT	SBR	NWR	NWR2
Lane Configurations		3	↑↑↑		↑↑	
Traffic Volume (vph)	14	28	526	20	103	12
Future Volume (vph)	14	28	526	20	103	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5		4.5	
Lane Util. Factor		1.00	0.91		0.88	
Frt		1.00	0.99		0.85	
Flt Protected		0.95	1.00		1.00	
Satd. Flow (prot)		1770	5058		2787	
Flt Permitted		0.22	1.00		1.00	
Satd. Flow (perm)		414	5058		2787	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	15	30	560	21	110	13
RTOR Reduction (vph)	0	0	7	0	112	0
Lane Group Flow (vph)	0	55	574	0	11	0
Turn Type	Perm	Perm	NA		Prot	
Protected Phases			8		3	
Permitted Phases	8	8				
Actuated Green, G (s)		18.0	18.0		5.0	
Effective Green, g (s)		18.0	18.0		5.0	
Actuated g/C Ratio		0.33	0.33		0.09	
Clearance Time (s)		4.5	4.5		4.5	
Lane Grp Cap (vph)		136	1670		255	
v/s Ratio Prot			0.11		0.00	
v/s Ratio Perm		c0.13				
v/c Ratio		0.40	0.34		0.04	
Uniform Delay, d1		14.1	13.8		22.6	
Progression Factor		1.00	1.00		1.00	
Incremental Delay, d2		8.7	0.6		0.3	
Delay (s)		22.8	14.3		22.9	
Level of Service		C	B		C	
Approach Delay (s)			15.1			
Approach LOS			B			
<b>Intersection Summary</b>						

Intersection	
Intersection Delay, s/veh	30
Intersection LOS	D

Movement	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations			↕			↕			↕			↕
Traffic Vol, veh/h	1	4	380	64	44	194	14	88	198	85	10	145
Future Vol, veh/h	1	4	380	64	44	194	14	88	198	85	10	145
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	1	4	404	68	47	206	15	94	211	90	11	154
Number of Lanes	0	0	1	0	0	1	0	0	1	0	0	1

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	42.1	18.8	29.2	15.4
HCM LOS	E	C	D	C

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	24%	1%	17%	6%
Vol Thru, %	53%	85%	77%	90%
Vol Right, %	23%	14%	6%	4%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	371	449	252	161
LT Vol	88	4	44	10
Through Vol	198	381	194	145
RT Vol	85	64	14	6
Lane Flow Rate	395	478	268	171
Geometry Grp	1	1	1	1
Degree of Util (X)	0.763	0.887	0.544	0.37
Departure Headway (Hd)	6.962	6.684	7.305	7.778
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	517	540	491	461
Service Time	5.024	4.744	5.38	5.861
HCM Lane V/C Ratio	0.764	0.885	0.546	0.371
HCM Control Delay	29.2	42.1	18.8	15.4
HCM Lane LOS	D	E	C	C
HCM 95th-tile Q	6.7	10.1	3.2	1.7

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Intersection

Intersection Delay, s/veh  
Intersection LOS

Movement SBR

Lane Configurations

Traffic Vol, veh/h	6
Future Vol, veh/h	6
Peak Hour Factor	0.94
Heavy Vehicles, %	2
Mvmt Flow	6
Number of Lanes	0

Approach

Opposing Approach  
Opposing Lanes  
Conflicting Approach Left  
Conflicting Lanes Left  
Conflicting Approach Right  
Conflicting Lanes Right  
HCM Control Delay  
HCM LOS

Intersection	
Intersection Delay, s/veh	15.3
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
Lane Configurations		↕			↕				↕			
Traffic Vol, veh/h	22	401	63	44	196	19	10	41	71	40	2	13
Future Vol, veh/h	22	401	63	44	196	19	10	41	71	40	2	13
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	23	413	65	45	202	20	10	42	73	41	2	13
Number of Lanes	0	1	0	0	1	0	0	0	2	0	0	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	2	1	1
HCM Control Delay	19.4	12.2	10.7	10.2
HCM LOS	C	B	B	B

Lane	NBLn1	NBLn2	EBLn1	WBLn1	SBLn1	SBLn2
Vol Left, %	54%	0%	5%	17%	34%	0%
Vol Thru, %	46%	47%	83%	76%	66%	61%
Vol Right, %	0%	53%	13%	7%	0%	39%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	87	76	486	259	41	42
LT Vol	47	0	22	44	14	0
Through Vol	40	36	401	196	27	26
RT Vol	0	40	63	19	0	16
Lane Flow Rate	89	78	501	267	42	43
Geometry Grp	7	7	2	2	7	7
Degree of Util (X)	0.173	0.137	0.706	0.404	0.082	0.079
Departure Headway (Hd)	6.976	6.322	5.076	5.452	7.059	6.609
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	514	566	711	660	506	540
Service Time	4.733	4.079	3.117	3.502	4.823	4.373
HCM Lane V/C Ratio	0.173	0.138	0.705	0.405	0.083	0.08
HCM Control Delay	11.2	10.1	19.4	12.2	10.5	9.9
HCM Lane LOS	B	B	C	B	B	A
HCM 95th-tile Q	0.6	0.5	5.9	2	0.3	0.3

Intersection

Intersection Delay, s/veh  
 Intersection LOS

Movement	SBT	SBR
Lane Configurations	↔↔	
Traffic Vol, veh/h	51	16
Future Vol, veh/h	51	16
Peak Hour Factor	0.97	0.97
Heavy Vehicles, %	2	2
Mvmt Flow	53	16
Number of Lanes	2	0

Approach

Opposing Approach  
 Opposing Lanes  
 Conflicting Approach Left  
 Conflicting Lanes Left  
 Conflicting Approach Right  
 Conflicting Lanes Right  
 HCM Control Delay  
 HCM LOS

HCM 2010 Signalized Intersection Summary  
5: University Ave & Normal St

Existing PM  
05/11/2018



Movement	EBL	EBT	WBT	WBR	SBL	SBR		
Lane Configurations								
Traffic Volume (veh/h)	83	498	370	35	81	76		
Future Volume (veh/h)	83	498	370	35	81	76		
Number	7	4	8	18	1	16		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1863	1863	1863	1900	1863	1863		
Adj Flow Rate, veh/h	86	519	385	36	84	79		
Adj No. of Lanes	1	2	2	0	1	1		
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96		
Percent Heavy Veh, %	2	2	2	2	2	2		
Cap, veh/h	467	1416	1310	122	710	633		
Arrive On Green	0.40	0.40	0.40	0.40	0.40	0.40		
Sat Flow, veh/h	962	3632	3367	305	1774	1583		
Grp Volume(v), veh/h	86	519	207	214	84	79		
Grp Sat Flow(s),veh/h/ln	962	1770	1770	1809	1774	1583		
Q Serve(g_s), s	3.0	4.6	3.6	3.6	1.3	1.4		
Cycle Q Clear(g_c), s	6.6	4.6	3.6	3.6	1.3	1.4		
Prop In Lane	1.00			0.17	1.00	1.00		
Lane Grp Cap(c), veh/h	467	1416	708	724	710	633		
V/C Ratio(X)	0.18	0.37	0.29	0.30	0.12	0.12		
Avail Cap(c_a), veh/h	467	1416	708	724	710	633		
HCM Platoon Ratio	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		
Uniform Delay (d), s/veh	11.4	9.5	9.2	9.2	8.5	8.5		
Incr Delay (d2), s/veh	0.9	0.7	1.0	1.0	0.3	0.4		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	0.9	2.4	1.9	2.0	0.7	0.7		
LnGrp Delay(d),s/veh	12.3	10.2	10.2	10.2	8.8	8.9		
LnGrp LOS	B	B	B	B	A	A		
Approach Vol, veh/h		605	421		163			
Approach Delay, s/veh		10.5	10.2		8.9			
Approach LOS		B	B		A			
Timer	1	2	3	4	5	6	7	8
Assigned Phs				4		6		8
Phs Duration (G+Y+Rc), s				22.5		22.5		22.5
Change Period (Y+Rc), s				4.5		4.5		4.5
Max Green Setting (Gmax), s				18.0		18.0		18.0
Max Q Clear Time (g_c+I1), s				8.6		3.4		5.6
Green Ext Time (p_c), s				4.3		0.4		5.2
<b>Intersection Summary</b>								
HCM 2010 Ctrl Delay			10.2					
HCM 2010 LOS			B					