Attachment C

University Avenue/Canton Street
Capacity Analyses with One-Way Restriction

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Volume (veh/h)	0	340	10	0	86	341
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	370	11	0	93	371
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)			921			
pX, platoon unblocked						
vC, conflicting volume	11				380	11
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	11				380	11
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				85	65
cM capacity (veh/h)	1608				622	1070

Direction, Lane #	SE 1	NW 1	SW 1
Volume Total	370	11	464
Volume Left	0	0	93
Volume Right	0	0	371
cSH	1700	1700	934
Volume to Capacity	0.22	0.01	0.50
Queue Length 95th (ft)	0	0	71
Control Delay (s)	0.0	0.0	12.6
Lane LOS			B
Approach Delay (s)	0.0	0.0	12.6
Approach LOS			B

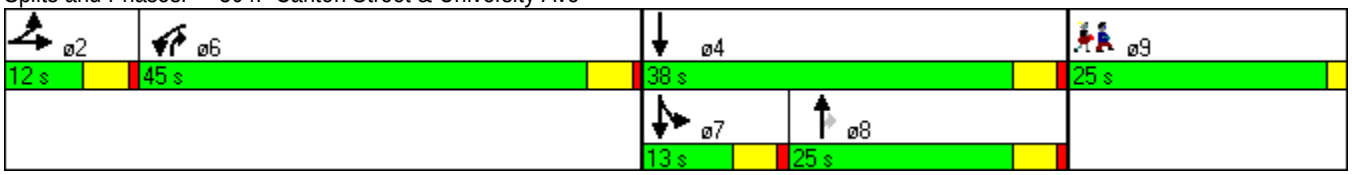
Intersection Summary			
Average Delay		6.9	
Intersection Capacity Utilization		50.4%	ICU Level of Service A
Analysis Period (min)		15	

304: Canton Street & University Ave

Lane Group	EBL	EBT	WBL	WBR	NBT	NBR	SBL	SBT	ø4	ø9
Lane Configurations										
Volume (vph)	114	179	609	1193	330	184	271	403		
Lane Group Flow (vph)	124	243	662	1297	359	200	295	438		
Turn Type	Split		Prot	Free		pm+ov	Prot			
Protected Phases	2	2	6		8	6	7	4 7	4	9
Permitted Phases				Free		8				
Detector Phase	2	2	6		8	6	7	4 7		
Switch Phase										
Minimum Initial (s)	7.0	7.0	7.0		3.0	7.0	4.0		3.0	4.0
Minimum Split (s)	12.0	12.0	12.0		12.0	12.0	12.0		12.0	25.0
Total Split (s)	12.0	12.0	45.0	0.0	25.0	45.0	13.0	51.0	38.0	25.0
Total Split (%)	10.0%	10.0%	37.5%	0.0%	20.8%	37.5%	10.8%	42.5%	32%	21%
Yellow Time (s)	4.0	4.0	4.0		4.0	4.0	4.0		4.0	2.0
All-Red Time (s)	1.0	1.0	1.0		1.0	1.0	1.0		1.0	0.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0		
Total Lost Time (s)	4.0	4.0	4.0	3.0	4.0	4.0	4.0	4.0		
Lead/Lag					Lag		Lead			
Lead-Lag Optimize?										
Recall Mode	None	None	None		None	None	None		None	None
v/c Ratio	0.92	0.82	0.90	0.47	0.94	0.21	0.95	0.72		
Control Delay	106.1	64.5	45.0	0.6	73.0	1.5	86.0	38.0		
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Total Delay	106.1	64.5	45.0	0.6	73.0	1.5	86.0	38.0		
Queue Length 50th (ft)	75	71	351	0	212	0	92	222		
Queue Length 95th (ft)	#235	#180	#806	0	#514	25	#229	#502		
Internal Link Dist (ft)		336			1633			620		
Turn Bay Length (ft)	150			350		260	350			
Base Capacity (vph)	135	298	739	2733	383	953	311	611		
Starvation Cap Reductn	0	0	0	0	0	0	0	0		
Spillback Cap Reductn	0	0	0	0	0	0	0	0		
Storage Cap Reductn	0	0	0	0	0	0	0	0		
Reduced v/c Ratio	0.92	0.82	0.90	0.47	0.94	0.21	0.95	0.72		

Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 100
Natural Cycle: 140
Control Type: Actuated-Uncoordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 304: Canton Street & University Ave



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	114	179	44	609	0	1193	0	330	184	271	403	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	14	12	12	12	12	12	12	12	12	11	12
Total Lost time (s)	4.0	4.0		4.0		3.0		4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00		0.88		1.00	1.00	0.97	1.00	
Frt	1.00	0.97		1.00		0.85		1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00		0.95		1.00		1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1678	3474		1787		2733		1810	1404	3433	1783	
Flt Permitted	0.95	1.00		0.95		1.00		1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1678	3474		1787		2733		1810	1404	3433	1783	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	124	195	48	662	0	1297	0	359	200	295	438	0
RTOR Reduction (vph)	0	17	0	0	0	0	0	0	77	0	0	0
Lane Group Flow (vph)	124	226	0	662	0	1297	0	359	123	295	438	0
Heavy Vehicles (%)	4%	3%	26%	1%	1%	4%	8%	5%	15%	2%	3%	2%
Turn Type	Split			Prot		Free			pm+ov	Prot		
Protected Phases	2	2		6				8	6	7	4 7	
Permitted Phases						Free			8			
Actuated Green, G (s)	7.1	7.1		40.4		101.6		20.2	60.6	8.1	33.3	
Effective Green, g (s)	8.1	8.1		41.4		101.6		21.2	62.6	9.1	34.3	
Actuated g/C Ratio	0.08	0.08		0.41		1.00		0.21	0.62	0.09	0.34	
Clearance Time (s)	5.0	5.0		5.0				5.0	5.0	5.0		
Vehicle Extension (s)	3.0	3.0		3.0				3.0	3.0	3.0		
Lane Grp Cap (vph)	134	277		728		2733		378	865	307	602	
v/s Ratio Prot	c0.07	0.06		c0.37				c0.20	0.06	c0.09	0.25	
v/s Ratio Perm						c0.47			0.03			
v/c Ratio	0.93	0.81		0.91		0.47		0.95	0.14	0.96	0.73	
Uniform Delay, d1	46.4	46.0		28.3		0.0		39.7	8.2	46.1	29.5	
Progression Factor	1.00	1.00		1.00		1.00		1.00	1.00	1.00	1.00	
Incremental Delay, d2	55.0	16.5		15.2		0.6		33.0	0.1	40.7	4.4	
Delay (s)	101.5	62.5		43.5		0.6		72.7	8.3	86.8	33.9	
Level of Service	F	E		D		A		E	A	F	C	
Approach Delay (s)		75.7			15.1			49.7			55.2	
Approach LOS		E			B			D			E	

Intersection Summary			
HCM Average Control Delay	34.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	101.6	Sum of lost time (s)	16.0
Intersection Capacity Utilization	78.5%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

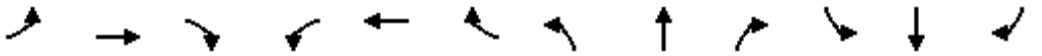
306: Harvard St. & University Ave

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Volume (vph)	25	0	67	1	0	659	899	6	615
Lane Group Flow (vph)	0	27	73	0	2	716	982	0	849
Turn Type	Perm		pm+ov	Perm		pm+pt		Perm	
Protected Phases		4	5		8	5	2		6
Permitted Phases	4		4	8		2		6	
Detector Phase	4	4	5	8	8	5	2	6	6
Switch Phase									
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	21.0	21.0	12.0	21.0	21.0	12.0	21.0	21.0	21.0
Total Split (s)	21.0	21.0	16.0	21.0	21.0	16.0	39.0	23.0	23.0
Total Split (%)	35.0%	35.0%	26.7%	35.0%	35.0%	26.7%	65.0%	38.3%	38.3%
Yellow Time (s)	4.0	4.0	3.5	4.0	4.0	3.5	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0	0.5	1.0	1.0	0.5	1.0	1.0	1.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	4.0	4.0	3.0	4.0	4.0	3.0	4.0	4.0	4.0
Lead/Lag			Lead			Lead		Lag	Lag
Lead-Lag Optimize?									
Recall Mode	None	None	None	None	None	None	Max	Min	Min
v/c Ratio		0.09	0.10		0.01	0.97	0.34		0.60
Control Delay		17.1	2.8		14.5	43.6	3.5		14.1
Queue Delay		0.0	0.0		0.0	0.0	0.0		0.0
Total Delay		17.1	2.8		14.5	43.6	3.5		14.1
Queue Length 50th (ft)		5	1		0	61	0		54
Queue Length 95th (ft)		23	15		4	#478	137		#226
Internal Link Dist (ft)		673			220		177		692
Turn Bay Length (ft)									
Base Capacity (vph)		598	703		379	735	2852		1410
Starvation Cap Reductn		0	0		0	0	0		0
Spillback Cap Reductn		0	0		0	0	0		0
Storage Cap Reductn		0	0		0	0	0		0
Reduced v/c Ratio		0.05	0.10		0.01	0.97	0.34		0.60

Intersection Summary

Cycle Length: 60
Actuated Cycle Length: 45.6
Natural Cycle: 80
Control Type: Actuated-Uncoordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 306: Harvard St. & University Ave



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	25	0	67	1	0	1	659	899	5	6	615	160
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	3.0		4.0		3.0	4.0			4.0	
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95			0.95	
Frt		1.00	0.85		0.93		1.00	1.00			0.97	
Flt Protected		0.95	1.00		0.98		0.95	1.00			1.00	
Satd. Flow (prot)		1736	1615		1160		1805	3341			3387	
Flt Permitted		0.85	1.00		0.83		0.21	1.00			0.95	
Satd. Flow (perm)		1555	1615		985		393	3341			3204	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	27	0	73	1	0	1	716	977	5	7	668	174
RTOR Reduction (vph)	0	0	41	0	1	0	0	0	0	0	33	0
Lane Group Flow (vph)	0	27	32	0	1	0	716	982	0	0	816	0
Heavy Vehicles (%)	4%	0%	0%	0%	0%	98%	0%	8%	0%	16%	4%	0%
Turn Type	Perm		pm+ov	Perm			pm+pt			Perm		
Protected Phases		4	5		8		5	2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)		3.7	16.1		3.7		35.1	35.1			18.7	
Effective Green, g (s)		4.7	18.1		4.7		36.1	36.1			19.7	
Actuated g/C Ratio		0.10	0.37		0.10		0.74	0.74			0.40	
Clearance Time (s)		5.0	4.0		5.0		4.0	5.0			5.0	
Vehicle Extension (s)		3.0	3.0		3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)		150	599		95		678	2472			1293	
v/s Ratio Prot			0.01				c0.29	0.29				
v/s Ratio Perm		c0.02	0.01		0.00		c0.49				0.25	
v/c Ratio		0.18	0.05		0.01		1.06	0.40			0.63	
Uniform Delay, d1		20.3	9.9		19.9		10.6	2.3			11.6	
Progression Factor		1.00	1.00		1.00		1.00	1.00			1.00	
Incremental Delay, d2		0.6	0.0		0.0		50.3	0.5			1.0	
Delay (s)		20.9	9.9		20.0		60.9	2.8			12.7	
Level of Service		C	A		B		E	A			B	
Approach Delay (s)		12.9			20.0			27.3			12.7	
Approach LOS		B			B			C			B	

Intersection Summary			
HCM Average Control Delay	22.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	48.8	Sum of lost time (s)	7.0
Intersection Capacity Utilization	72.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Volume (veh/h)	0	920	100	0	5	239
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	1000	109	0	5	260
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)			921			
pX, platoon unblocked						
vC, conflicting volume	109				1109	109
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	109				1109	109
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				98	73
cM capacity (veh/h)	1482				232	945

Direction, Lane #	SE 1	NW 1	SW 1
Volume Total	1000	109	265
Volume Left	0	0	5
Volume Right	0	0	260
cSH	1700	1700	889
Volume to Capacity	0.59	0.06	0.30
Queue Length 95th (ft)	0	0	31
Control Delay (s)	0.0	0.0	10.8
Lane LOS			B
Approach Delay (s)	0.0	0.0	10.8
Approach LOS			B

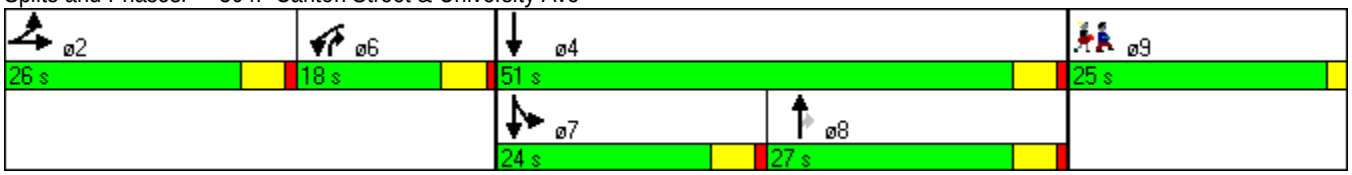
Intersection Summary			
Average Delay	2.1		
Intersection Capacity Utilization	70.2%	ICU Level of Service	C
Analysis Period (min)	15		

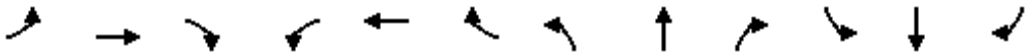
Lane Group	EBL	EBT	WBL	WBR	NBT	NBR	SBL	SBT	ø4	ø9
Lane Configurations										
Volume (vph)	231	661	230	739	409	598	648	456		
Lane Group Flow (vph)	251	745	250	803	445	650	704	496		
Turn Type	Split		Prot	Free		pm+ov	Prot			
Protected Phases	2	2	6		8	6	7	4 7	4	9
Permitted Phases				Free		8				
Detector Phase	2	2	6		8	6	7	4 7		
Switch Phase										
Minimum Initial (s)	7.0	7.0	4.0		3.0	4.0	4.0		3.0	4.0
Minimum Split (s)	12.0	12.0	12.0		12.0	12.0	12.0		12.0	25.0
Total Split (s)	26.0	26.0	18.0	0.0	27.0	18.0	24.0	75.0	51.0	25.0
Total Split (%)	21.7%	21.7%	15.0%	0.0%	22.5%	15.0%	20.0%	62.5%	43%	21%
Yellow Time (s)	4.0	4.0	4.0		4.0	4.0	4.0		4.0	2.0
All-Red Time (s)	1.0	1.0	1.0		1.0	1.0	1.0		1.0	0.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0		
Total Lost Time (s)	4.0	4.0	4.0	3.0	4.0	4.0	4.0	4.0		
Lead/Lag					Lag		Lead			
Lead-Lag Optimize?										
Recall Mode	None	None	None		None	None	None		None	None
v/c Ratio	0.66	0.89	1.01	0.29	1.02	0.77	1.01	0.59		
Control Delay	46.6	52.0	104.7	0.3	87.8	14.3	76.5	24.6		
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Total Delay	46.6	52.0	104.7	0.3	87.8	14.3	76.5	24.6		
Queue Length 50th (ft)	137	226	152	0	268	49	218	201		
Queue Length 95th (ft)	#319	#463	#404	0	#631	#278	#465	452		
Internal Link Dist (ft)		336			1633			620		
Turn Bay Length (ft)	150			350		260	350			
Base Capacity (vph)	380	841	247	2814	436	842	700	838		
Starvation Cap Reductn	0	0	0	0	0	0	0	0		
Spillback Cap Reductn	0	0	0	0	0	0	0	0		
Storage Cap Reductn	0	0	0	0	0	0	0	0		
Reduced v/c Ratio	0.66	0.89	1.01	0.29	1.02	0.77	1.01	0.59		

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 100
Natural Cycle: 150
Control Type: Actuated-Uncoordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 304: Canton Street & University Ave





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	231	661	25	230	0	739	0	409	598	648	456	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	14	12	12	12	12	12	12	12	12	11	12
Total Lost time (s)	4.0	4.0		4.0		3.0		4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00		0.88		1.00	1.00	0.97	1.00	
Frt	1.00	0.99		1.00		0.85		1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00		0.95		1.00		1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1711	3775		1752		2814		1881	1583	3467	1766	
Flt Permitted	0.95	1.00		0.95		1.00		1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1711	3775		1752		2814		1881	1583	3467	1766	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	251	718	27	250	0	803	0	445	650	704	496	0
RTOR Reduction (vph)	0	2	0	0	0	0	0	0	254	0	0	0
Lane Group Flow (vph)	251	743	0	250	0	803	0	445	396	704	496	0
Heavy Vehicles (%)	2%	1%	8%	3%	1%	1%	22%	1%	2%	1%	4%	5%
Bus Blockages (#/hr)	0	1	0	0	0	0	0	0	0	0	0	0
Turn Type	Split			Prot		Free			pm+ov	Prot		
Protected Phases	2	2		6				8	6	7	4 7	
Permitted Phases						Free			8			
Actuated Green, G (s)	21.2	21.2		13.1		101.5		22.2	35.3	19.2	46.4	
Effective Green, g (s)	22.2	22.2		14.1		101.5		23.2	37.3	20.2	47.4	
Actuated g/C Ratio	0.22	0.22		0.14		1.00		0.23	0.37	0.20	0.47	
Clearance Time (s)	5.0	5.0		5.0				5.0	5.0	5.0		
Vehicle Extension (s)	3.0	3.0		3.0				3.0	3.0	3.0		
Lane Grp Cap (vph)	374	826		243		2814		430	582	690	825	
v/s Ratio Prot	0.15	c0.20		c0.14				c0.24	0.09	c0.20	0.28	
v/s Ratio Perm						c0.29			0.16			
v/c Ratio	0.67	0.90		1.03		0.29		1.03	0.68	1.02	0.60	
Uniform Delay, d1	36.3	38.6		43.7		0.0		39.1	27.1	40.6	20.0	
Progression Factor	1.00	1.00		1.00		1.00		1.00	1.00	1.00	1.00	
Incremental Delay, d2	4.7	12.5		65.4		0.3		52.7	3.3	39.5	1.2	
Delay (s)	41.0	51.1		109.1		0.3		91.8	30.4	80.1	21.3	
Level of Service	D	D		F		A		F	C	F	C	
Approach Delay (s)		48.6			26.1			55.3			55.8	
Approach LOS		D			C			E			E	

Intersection Summary			
HCM Average Control Delay	46.8	HCM Level of Service	D
HCM Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	101.5	Sum of lost time (s)	16.0
Intersection Capacity Utilization	85.2%	ICU Level of Service	E
Analysis Period (min)	15		

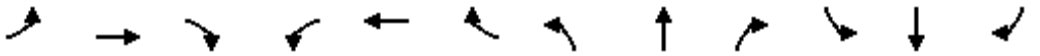
c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Volume (vph)	107	0	332	8	0	259	1124	1	756
Lane Group Flow (vph)	0	116	361	0	27	282	1222	0	981
Turn Type	Perm		pm+ov	Perm		pm+pt		Perm	
Protected Phases		4	5		8	5	2		6
Permitted Phases	4		4	8		2		6	
Detector Phase	4	4	5	8	8	5	2	6	6
Switch Phase									
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	21.0	21.0	12.0	12.0	12.0	12.0	21.0	21.0	21.0
Total Split (s)	39.0	39.0	25.0	39.0	39.0	25.0	81.0	56.0	56.0
Total Split (%)	32.5%	32.5%	20.8%	32.5%	32.5%	20.8%	67.5%	46.7%	46.7%
Yellow Time (s)	4.0	4.0	3.5	4.0	4.0	3.5	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0	0.5	1.0	1.0	0.5	1.0	1.0	1.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	4.0	4.0	3.0	4.0	4.0	3.0	4.0	4.0	4.0
Lead/Lag			Lead			Lead		Lag	Lag
Lead-Lag Optimize?									
Recall Mode	None	None	None	None	None	None	Max	Min	Min
v/c Ratio		0.57	0.64		0.12	0.56	0.45		0.48
Control Delay		50.7	26.5		21.1	7.7	4.8		12.5
Queue Delay		0.0	0.0		0.0	0.0	0.0		0.0
Total Delay		50.7	26.5		21.1	7.7	4.8		12.5
Queue Length 50th (ft)		69	153		5	36	112		149
Queue Length 95th (ft)		126	213		29	77	190		292
Internal Link Dist (ft)		673			220		177		692
Turn Bay Length (ft)									
Base Capacity (vph)		495	709		540	631	2742		2033
Starvation Cap Reductn		0	0		0	0	0		0
Spillback Cap Reductn		0	0		0	0	0		0
Storage Cap Reductn		0	0		0	0	0		0
Reduced v/c Ratio		0.23	0.51		0.05	0.45	0.45		0.48

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 99.5
Natural Cycle: 60
Control Type: Actuated-Uncoordinated

Splits and Phases: 306: Harvard St. & University Ave



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	107	0	332	8	0	17	259	1124	0	1	756	145
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	3.0		4.0		3.0	4.0			4.0	
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95			0.95	
Frt		1.00	0.85		0.91		1.00	1.00			0.98	
Flt Protected		0.95	1.00		0.98		0.95	1.00			1.00	
Satd. Flow (prot)		1805	1615		1635		1770	3539			3428	
Flt Permitted		0.74	1.00		0.90		0.23	1.00			0.95	
Satd. Flow (perm)		1405	1615		1499		424	3539			3271	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	116	0	361	9	0	18	282	1222	0	1	822	158
RTOR Reduction (vph)	0	0	64	0	15	0	0	0	0	0	9	0
Lane Group Flow (vph)	0	116	297	0	12	0	282	1222	0	0	972	0
Heavy Vehicles (%)	0%	0%	0%	12%	0%	0%	2%	2%	0%	98%	3%	1%
Turn Type	Perm		pm+ov	Perm			pm+pt			Perm		
Protected Phases		4	5		8		5	2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)		13.4	24.9		13.4		76.1	76.1			60.6	
Effective Green, g (s)		14.4	26.9		14.4		77.1	77.1			61.6	
Actuated g/C Ratio		0.14	0.27		0.14		0.77	0.77			0.62	
Clearance Time (s)		5.0	4.0		5.0		4.0	5.0			5.0	
Vehicle Extension (s)		3.0	3.0		3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)		203	437		217		498	2742			2025	
v/s Ratio Prot			c0.09				0.07	0.35				
v/s Ratio Perm		0.08	0.10		0.01		c0.37				0.30	
v/c Ratio		0.57	0.68		0.05		0.57	0.45			0.48	
Uniform Delay, d1		39.7	32.4		36.7		5.1	3.9			10.3	
Progression Factor		1.00	1.00		1.00		1.00	1.00			1.00	
Incremental Delay, d2		3.8	4.2		0.1		1.5	0.5			0.2	
Delay (s)		43.5	36.6		36.8		6.6	4.4			10.5	
Level of Service		D	D		D		A	A			B	
Approach Delay (s)		38.3			36.8			4.8			10.5	
Approach LOS		D			D			A			B	

Intersection Summary			
HCM Average Control Delay	12.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	99.5	Sum of lost time (s)	6.0
Intersection Capacity Utilization	79.2%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Volume (veh/h)	0	325	10	0	5	228
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	353	11	0	5	248
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)			921			
pX, platoon unblocked						
vC, conflicting volume	11				364	11
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	11				364	11
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				99	77
cM capacity (veh/h)	1608				635	1070

Direction, Lane #	SE 1	NW 1	SW 1
Volume Total	353	11	253
Volume Left	0	0	5
Volume Right	0	0	248
cSH	1700	1700	1055
Volume to Capacity	0.21	0.01	0.24
Queue Length 95th (ft)	0	0	23
Control Delay (s)	0.0	0.0	9.5
Lane LOS			A
Approach Delay (s)	0.0	0.0	9.5
Approach LOS			A

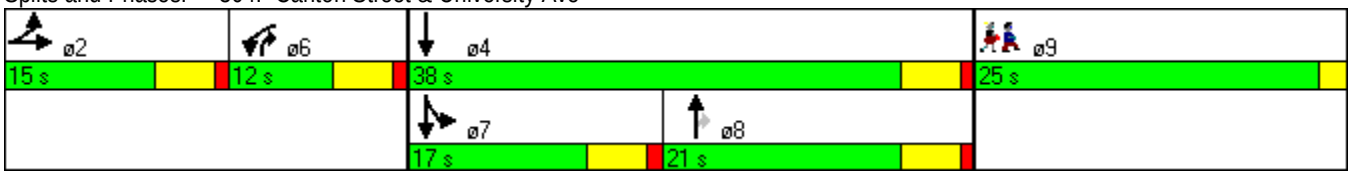
Intersection Summary			
Average Delay	3.9		
Intersection Capacity Utilization	38.2%	ICU Level of Service	A
Analysis Period (min)	15		

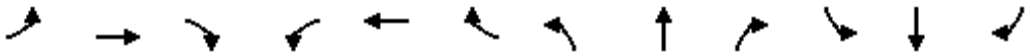
304: Canton Street & University Ave

Lane Group	EBL	EBT	WBL	WBR	NBT	NBR	SBL	SBT	ø4	ø9
Lane Configurations										
Volume (vph)	167	146	132	629	326	108	429	312		
Lane Group Flow (vph)	182	173	143	684	354	117	466	339		
Turn Type	Split		Prot	Free		pm+ov	Prot			
Protected Phases	2	2	6		8	6	7	4 7	4	9
Permitted Phases				Free		8				
Detector Phase	2	2	6		8	6	7	4 7		
Switch Phase										
Minimum Initial (s)	7.0	7.0	4.0		3.0	4.0	4.0		3.0	4.0
Minimum Split (s)	12.0	12.0	12.0		12.0	12.0	12.0		12.0	25.0
Total Split (s)	15.0	15.0	12.0	0.0	21.0	12.0	17.0	55.0	38.0	25.0
Total Split (%)	16.7%	16.7%	13.3%	0.0%	23.3%	13.3%	18.9%	61.1%	42%	28%
Yellow Time (s)	4.0	4.0	4.0		4.0	4.0	4.0		4.0	2.0
All-Red Time (s)	1.0	1.0	1.0		1.0	1.0	1.0		1.0	0.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0		
Total Lost Time (s)	4.0	4.0	4.0	3.0	4.0	4.0	4.0	4.0		
Lead/Lag					Lag		Lead			
Lead-Lag Optimize?										
Recall Mode	None	None	None		None	None	None		None	None
v/c Ratio	0.66	0.29	0.71	0.24	0.75	0.18	0.72	0.38		
Control Delay	43.5	28.1	53.2	0.2	38.6	3.3	36.0	14.6		
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Total Delay	43.5	28.1	53.2	0.2	38.6	3.3	36.0	14.6		
Queue Length 50th (ft)	68	30	55	0	127	0	88	72		
Queue Length 95th (ft)	#220	77	#195	0	#377	25	#230	226		
Internal Link Dist (ft)		336			1635			620		
Turn Bay Length (ft)	150			350		260	350			
Base Capacity (vph)	276	595	202	2814	470	634	649	890		
Starvation Cap Reductn	0	0	0	0	0	0	0	0		
Spillback Cap Reductn	0	0	0	0	0	0	0	0		
Storage Cap Reductn	0	0	0	0	0	0	0	0		
Reduced v/c Ratio	0.66	0.29	0.71	0.24	0.75	0.18	0.72	0.38		

Intersection Summary
Cycle Length: 90
Actuated Cycle Length: 70
Natural Cycle: 90
Control Type: Actuated-Uncoordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 304: Canton Street & University Ave





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	167	146	13	132	0	629	0	326	108	429	312	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	14	12	12	12	12	12	12	12	12	11	12
Total Lost time (s)	4.0	4.0		4.0		3.0		4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00		0.88		1.00	1.00	0.97	1.00	
Frt	1.00	0.99		1.00		0.85		1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00		0.95		1.00		1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1728	3679		1736		2814		1900	1538	3433	1801	
Flt Permitted	0.95	1.00		0.95		1.00		1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1728	3679		1736		2814		1900	1538	3433	1801	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	182	159	14	143	0	684	0	354	117	466	339	0
RTOR Reduction (vph)	0	7	0	0	0	0	0	0	75	0	0	0
Lane Group Flow (vph)	182	166	0	143	0	684	0	354	42	466	339	0
Heavy Vehicles (%)	1%	3%	8%	4%	0%	1%	22%	0%	5%	2%	2%	4%
Turn Type	Split			Prot		Free			pm+ov	Prot		
Protected Phases	2	2		6				8	6	7	4 7	
Permitted Phases						Free			8			
Actuated Green, G (s)	10.1	10.1		7.1		71.4		16.4	23.5	12.2	33.6	
Effective Green, g (s)	11.1	11.1		8.1		71.4		17.4	25.5	13.2	34.6	
Actuated g/C Ratio	0.16	0.16		0.11		1.00		0.24	0.36	0.18	0.48	
Clearance Time (s)	5.0	5.0		5.0				5.0	5.0	5.0		
Vehicle Extension (s)	3.0	3.0		3.0				3.0	3.0	3.0		
Lane Grp Cap (vph)	269	572		197		2814		463	549	635	873	
v/s Ratio Prot	c0.11	0.05		c0.08				c0.19	0.01	c0.14	0.19	
v/s Ratio Perm						c0.24			0.02			
v/c Ratio	0.68	0.29		0.73		0.24		0.76	0.08	0.73	0.39	
Uniform Delay, d1	28.5	26.7		30.6		0.0		25.1	15.2	27.4	11.7	
Progression Factor	1.00	1.00		1.00		1.00		1.00	1.00	1.00	1.00	
Incremental Delay, d2	6.6	0.3		12.5		0.2		7.4	0.1	4.4	0.3	
Delay (s)	35.0	27.0		43.1		0.2		32.5	15.2	31.8	12.0	
Level of Service	D	C		D		A		C	B	C	B	
Approach Delay (s)		31.1			7.6			28.2			23.5	
Approach LOS		C			A			C			C	

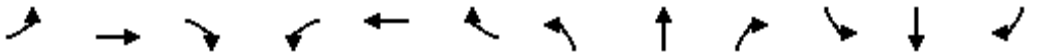
Intersection Summary			
HCM Average Control Delay	20.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	71.4	Sum of lost time (s)	16.0
Intersection Capacity Utilization	55.9%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

306: Harvard St. & University Ave

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBT
Lane Configurations								
Volume (vph)	96	0	220	1	0	234	785	657
Lane Group Flow (vph)	0	104	239	0	2	254	853	829
Turn Type	Perm		pm+ov	Perm		pm+pt		
Protected Phases		4	5		8	5	2	6
Permitted Phases	4		4	8		2		
Detector Phase	4	4	5	8	8	5	2	6
Switch Phase								
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	21.0	21.0	12.0	21.0	21.0	12.0	21.0	21.0
Total Split (s)	25.0	25.0	23.0	25.0	25.0	23.0	65.0	42.0
Total Split (%)	27.8%	27.8%	25.6%	27.8%	27.8%	25.6%	72.2%	46.7%
Yellow Time (s)	4.0	4.0	3.5	4.0	4.0	3.5	4.0	4.0
All-Red Time (s)	1.0	1.0	0.5	1.0	1.0	0.5	1.0	1.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	4.0	4.0	3.0	4.0	4.0	3.0	4.0	4.0
Lead/Lag			Lead			Lead		Lag
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	None	None	Max	Min
v/c Ratio		0.49	0.46		0.01	0.45	0.30	0.38
Control Delay		39.3	13.0		24.5	5.6	3.8	9.9
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0
Total Delay		39.3	13.0		24.5	5.6	3.8	9.9
Queue Length 50th (ft)		49	46		0	27	58	103
Queue Length 95th (ft)		97	95		6	64	106	190
Internal Link Dist (ft)		673			220		177	692
Turn Bay Length (ft)								
Base Capacity (vph)		370	703		421	731	2826	2163
Starvation Cap Reductn		0	0		0	0	0	0
Spillback Cap Reductn		0	0		0	0	0	0
Storage Cap Reductn		0	0		0	0	0	0
Reduced v/c Ratio		0.28	0.34		0.00	0.35	0.30	0.38

Intersection Summary
Cycle Length: 90
Actuated Cycle Length: 79.3
Natural Cycle: 55
Control Type: Actuated-Uncoordinated

Splits and Phases: 306: Harvard St. & University Ave



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	96	0	220	1	0	1	234	785	0	0	657	106
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	3.0		4.0		3.0	4.0			4.0	
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95			0.95	
Frt		1.00	0.85		0.93		1.00	1.00			0.98	
Flt Protected		0.95	1.00		0.98		0.95	1.00			1.00	
Satd. Flow (prot)		1736	1495		1729		1770	3574			3505	
Flt Permitted		0.76	1.00		0.89		0.28	1.00			1.00	
Satd. Flow (perm)		1382	1495		1571		521	3574			3505	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	104	0	239	1	0	1	254	853	0	0	714	115
RTOR Reduction (vph)	0	0	87	0	1	0	0	0	0	0	10	0
Lane Group Flow (vph)	0	104	152	0	1	0	254	853	0	0	819	0
Heavy Vehicles (%)	4%	0%	8%	0%	0%	0%	2%	1%	0%	0%	1%	0%
Turn Type	Perm		pm+ov	Perm			pm+pt			Perm		
Protected Phases		4	5		8		5	2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)		9.7	18.6		9.7		60.7	60.7			47.8	
Effective Green, g (s)		10.7	20.6		10.7		61.7	61.7			48.8	
Actuated g/C Ratio		0.13	0.26		0.13		0.77	0.77			0.61	
Clearance Time (s)		5.0	4.0		5.0		4.0	5.0			5.0	
Vehicle Extension (s)		3.0	3.0		3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)		184	383		209		554	2743			2127	
v/s Ratio Prot			0.05				c0.06	0.24			0.23	
v/s Ratio Perm		c0.08	0.05		0.00		c0.30					
v/c Ratio		0.57	0.40		0.01		0.46	0.31			0.39	
Uniform Delay, d1		32.7	24.8		30.2		3.4	2.9			8.1	
Progression Factor		1.00	1.00		1.00		1.00	1.00			1.00	
Incremental Delay, d2		3.9	0.7		0.0		0.6	0.3			0.1	
Delay (s)		36.6	25.4		30.2		4.0	3.2			8.2	
Level of Service		D	C		C		A	A			A	
Approach Delay (s)		28.8			30.2			3.3			8.2	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM Average Control Delay	9.0	HCM Level of Service	A
HCM Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	80.4	Sum of lost time (s)	7.0
Intersection Capacity Utilization	62.6%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group