MEMORANDUM

To: Ms. Nora Loughnane
Town Planner, Town of Westwood

Fr: Nancy B. Doherty, PE.
Jeffrey S. Dirk, PE, PTOE, FITE

Re: **University Station – Assessment of Alternative Configurations for the Canton Street/University Avenue Intersection**

Dt: February 22, 2013

Tetra Tech and Vanasse & Associates, Inc. (Tt/VAI) have completed an analysis of two alternative designs for the Canton Street/University Avenue intersection based on sketches provided by Beta Group on February 1, 2013. The two alternatives (options) include:

Option 1 – Provide a new connector road between Harvard Street and Canton Street along the alignment of the former Westwood Station Boulevard and realign Canton Street to intersect the connector road. A conceptual design of this option is shown on Figure 1.

Option 2 – Realign Dedham Street to continue as an extension of University Avenue to the north of Canton Street and situated in the northeast corner of the existing University Avenue/Canton Street intersection; extend the University Avenue south leg to intersect the realigned Dedham Street to form a "T"-type intersection under traffic signal control; and terminate Canton Street at a "T"-type intersection under traffic signal control at its present intersection with University Avenue. A conceptual design of this option is shown on Figure 2.

The purpose of these options was to evaluate alternative designs for the Canton Street/University Avenue intersection that would facilitate the flow of traffic between Dedham Street and University Avenue upon completion of the MassDOT Dedham Street corridor improvements inclusive of the construction of the I-95 northbound off-ramp to Dedham Street. It is further envisioned that provision of such a functional connection would also serve to discourage the use of Canton Street to travel between Dedham Street and I-95/Route 128 by way of the East Street Rotary. Based on a review of estimated traffic operations for the 2022 design-year condition, it would appear that either option, with refinement, could be designed to facilitate the flow of traffic between Dedham Street and University Avenue while discouraging the use of Canton Street by cut-through traffic, with Option 2 appearing to provide the most advantageous operating conditions for Dedham Street-University Avenue movement.

Both options need modification to provide adequate capacity and connections to the proposed MassDOT Dedham Street corridor project. Additionally, further evaluation is required to determine right of way requirements and wetland impacts.

One Grant Street
Framingham, MA 01701
Tel 508.903.2000 Fax 508.903.2001

The following details our assessment of the two alternative design options for the Canton Street/University Avenue intersection.

For the purpose of this analysis, the 2022 Build condition traffic volumes presented in the November 2012 Traffic Impact Study were used to evaluate the Canton Street/University Avenue intersection design options and are shown on the first row of Figure 3.

Option 1. Option 1 is expected to result in a redistribution of traffic at the University Avenue/Harvard Street intersection. For purposes of this analysis it was assumed that approximately 50 percent of the northbound University Avenue left turn volume at Harvard Street and 80 percent of the Harvard Street right turn volume reassigned would be redistributed to the Connector Road. Table 1 summarizes the assumed reassigned traffic at the Harvard Street/University Avenue and Canton Street/University Avenue intersections under Option 1. In addition, it is also expected that the Dedham Street westbound through volume and the University Avenue northbound left turn volumes would increase as a result of the connection between Canton Street and Harvard Street, with corresponding decreases in the Dedham Street westbound right turn volume and the University Avenue northbound through volume.

The estimated 2022 peak hour volumes for Option 1 are shown on the second row of Figure 3.

Table 1 Option 1 Peak Hour Traffic Volumes

	2022 AM Build			2022 PM Build			2022 SAT Build		
	Volume	Change	Adj. Volume	Volume	Change	Adj. Volume	Volume	Change	Adj. Volume
Harvard Street/University Avenue									
University Ave. NB LT	387	-210	177	190	-100	90	234	-115	119
Harvard St. RT	80	-65	15	391	-340	51	220	-178	42
Canton Street/University Avenue									
University Ave. NB LT	49	60	109	28	40	68	9	45	54
University Ave. NB TH	289	-60	229	398	-40	358	325	-45	280
University Ave. NB RT	184		184	598		598	108		108
Dedham St. WB LT	573		573	179		179	119		119
Dedham St. WB TH	595	150	745	200	60	260	105	70	175
Dedham St. WB RT	698	-150	548	591	-60	531	537	-70	467
University Ave. SB LT	271	-26	245	648	-200	448	429	-103	326
University Ave. SB TH	403	-39	364	456	-140	316	312	-75	237
University Ave. SB RT	156		156	176		176	168		168
Canton St. EB LT	114		114	231		231	167		167
Canton St. EB TH	179	26	205	661	200	861	146	103	249
Canton St. EB RT	44	39	83	25	140	165	13	75	88

Capacity analyses for the Canton Street intersections with University Avenue and the Connector Road were conducted with the lane arrangements as shown on Figure 1. The detailed analysis results are provided in Attachment A and summarized in Table 2.

Based on a review of Table 2, the most significant finding is that the increase in the through traffic volume in the westbound direction on Dedham Street during the morning peak hour is expected to result in a vehicle queue of approximately 600 feet which compare to a projected vehicle queue of less than 400 feet without the connector road. The intersection would operate at capacity conditions (LOS E) in the morning peak hour and at LOS D or better for the weekday afternoon and Saturday mid-day peak hours. The Canton Street/Connector Road intersection would operate at LOS B or better for all three peak hours.

Option 2. For Option 2, the peak hour traffic volumes are depicted on the third row of Figure 3 and reflect a logical re-assignment of the peak hour volumes shown on the first row. For instance, the 1,259 vehicles shown turning right from University Avenue onto Dedham Street during the weekday afternoon peak hour is comprised of the Canton Street eastbound through volume (661) and the University Avenue northbound right turn volume (598) volume that are shown in the first row.

Capacity analyses for the University Avenue intersections with Canton Street/Dedham Street and Canton Street (north leg) were conducted with the lane arrangements as shown on Figure 2. The detailed analysis results are provided in Attachment A and summarized in Table 3. Both intersections would be expected to operate at LOS D or better for the weekday morning and Saturday midday peak hours, and at LOS F conditions for the weekday afternoon peak hour; however, the Dedham Street to University Avenue north through movement was shown to operate at LOS B during the weekday morning and Saturday midday peak hours, with the corresponding University Avenue north to Dedham Street through movement operating at LOS E during the weekday morning peak-hour, at LOS D during the weekday afternoon peak-hour, and at LOS C during the Saturday midday peak-hour.

Attachments:

Figures
Attachment A – Capacity Analyses

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Table 2 2022 Build Condition Capacity Analyses Summary – Option 1

	AM					PM					SAT				
Location	**V/C[1]**	**DELAY[2]**	**LOS[3]**	**50th Q[4]**	**95th Q[5]**	**V/C[1]**	**DELAY[2]**	**LOS[3]**	**50th Q[4]**	**95th Q[5]**	**V/C[1]**	**DELAY[2]**	**LOS[3]**	**50th Q[4]**	**95th Q[5]**
University Avenue/Canton Street															
Canton St. EB L	0.61	39	D	40	#140	0.64	24	C	94	#243	0.50	20	C	48	#149
Canton St. EB TR	0.59	43	D	81	159	1.01	65	E	338	#684	0.52	27	C	59	138
Dedham St. WB L	1.05	75	E	301	#767	0.85	52	D	70	#264	0.39	20	B	33	105
Dedham St. WB T	1.28	170	F	~599	#1116	0.60	36	D	148	#306	0.58	29	C	68	#195
Dedham St. WB R	0.38	1	A	0	0	0.36	1	A	0	0	0.32	1	A	0	0
Univ. Ave. NB L	0.85	70	E	65	#219	0.43	34	C	37	105	0.32	23	C	19	69
Univ. Ave. NB T	0.49	31	C	122	261	0.83	48	D	217	#503	0.68	28	C	106	#308
Univ. Ave. NB R	0.14	11	B	0	20	0.70	33	C	112	#330	0.08	15	B	0	20
Univ. Ave. SB L	0.87	67	E	82	#202	0.95	69	E	150	#332	0.64	30	C	68	#175
Univ. Ave. SB TR	0.80	33	C	271	#643	0.71	27	C	232	#559	0.55	15	B	99	304
Intersection	**0.99**	**67**	**E**			**0.84**	**42**	**D**			**0.58**	**19**	**B**		
Connector Road/Canton Street															
Canton St. EB R	0.23	33	C	0	0	0.90	22	C	305	#658	0.22	3	A	0	0
Canton St. NB L	0.68	2	A	0	0	0.35	3	A	4	33	0.26	1	A	0	0
Canton St. NB T	0.12	0	A	0	0	0.06	0	A	0	0	0.07	0	A	0	0
Connector SB T	0.05	2	A	5	13	0.72	28	C	167	#272	0.44	7	A	16	52
Intersection	**0.68**	**9**	**A**			**0.85**	**17**	**B**			**0.32**	**3**	**A**		

[1] v/c = volume-to-capacity ratio [2] Delay = Average delay expressed in seconds per vehicle [3] LOS= Level of Service [4] 50th Percentile Queue in feet [5] 95th Percentile Queue in feet, # = 95th percentile volume exceeds capacity, queue may be longer, ~ = Volume exceeds capacity, queue is theoretically infinite"

Table 3 2022 Build Condition Capacity Analyses Summary – Option 2

	AM					PM					SAT				
Location	**V/C[1]**	**DELAY[2]**	**LOS[3]**	**50th Q[4]**	**95th Q[5]**	**V/C[1]**	**DELAY[2]**	**LOS[3]**	**50th Q[4]**	**95th Q[5]**	**V/C[1]**	**DELAY[2]**	**LOS[3]**	**50th Q[4]**	**95th Q[5]**
University Avenue/Canton Street															
Univ. Ave. SB/EB TR	0.86	56	E	211	#326	0.94	45	D	440	#852	0.70	27	C	177	#385
Dedham St. WB L	1.00	62	E	465	#900	1.45	277	F	~223	#326	0.53	38	D	65	#141
Dedham St. WB T	0.36	11	B	120	264	0.34	16	B	128	256	0.32	13	B	86	191
Canton St. NB L	1.02	92	F	~343	#558	1.11	93	F	~584	m399	0.92	43	D	202	#492
Canton St. NB R	0.25	10	A	0	27	1.51	261	F	~1290	m#716	0.17	12	B	10	42
Intersection	**0.97**	**49**	**D**			**1.24**	**135**	**F**			**0.76**	**27**	**C**		
Canton Street (North Leg) & University Ave.															
Canton St. EB L	0.66	26	C	103	#182	1.22	142	F	~922	#1173	0.46	21	C	137	214
Canton St. EB R	0.04	16	B	0	21	0.02	18	B	4	22	0.01	16	B	0	11
Univ. Ave. NB L	0.46	20	B	10	#58	0.21	21	C	13	36	0.03	11	B	3	11
Univ. Ave. NB T	0.50	9	A	97	163	1.20	132	F	~1015	#1270	0.48	15	B	161	242
Univ. Ave. SB T	0.96	30	C	322	#611	0.77	17	B	328	m103	0.48	23	C	235	367
Univ. Ave. SB R	0.51	2	A	0	0	0.26	0	A	11	m6	0.19	0	A	0	m1
Intersection	**0.86**	**17**	**B**			**1.21**	**92**	**F**			**0.47**	**16**	**B**		

[1] v/c = volume-to-capacity ratio [2] Delay = Average delay expressed in seconds per vehicle [3] LOS= Level of Service [4] 50th Percentile Queue in feet [5] 95th Percentile Queue in feet,
= 95th percentile volume exceeds capacity, queue may be longer, ~ = Volume exceeds capacity, queue is theoretically infinite"

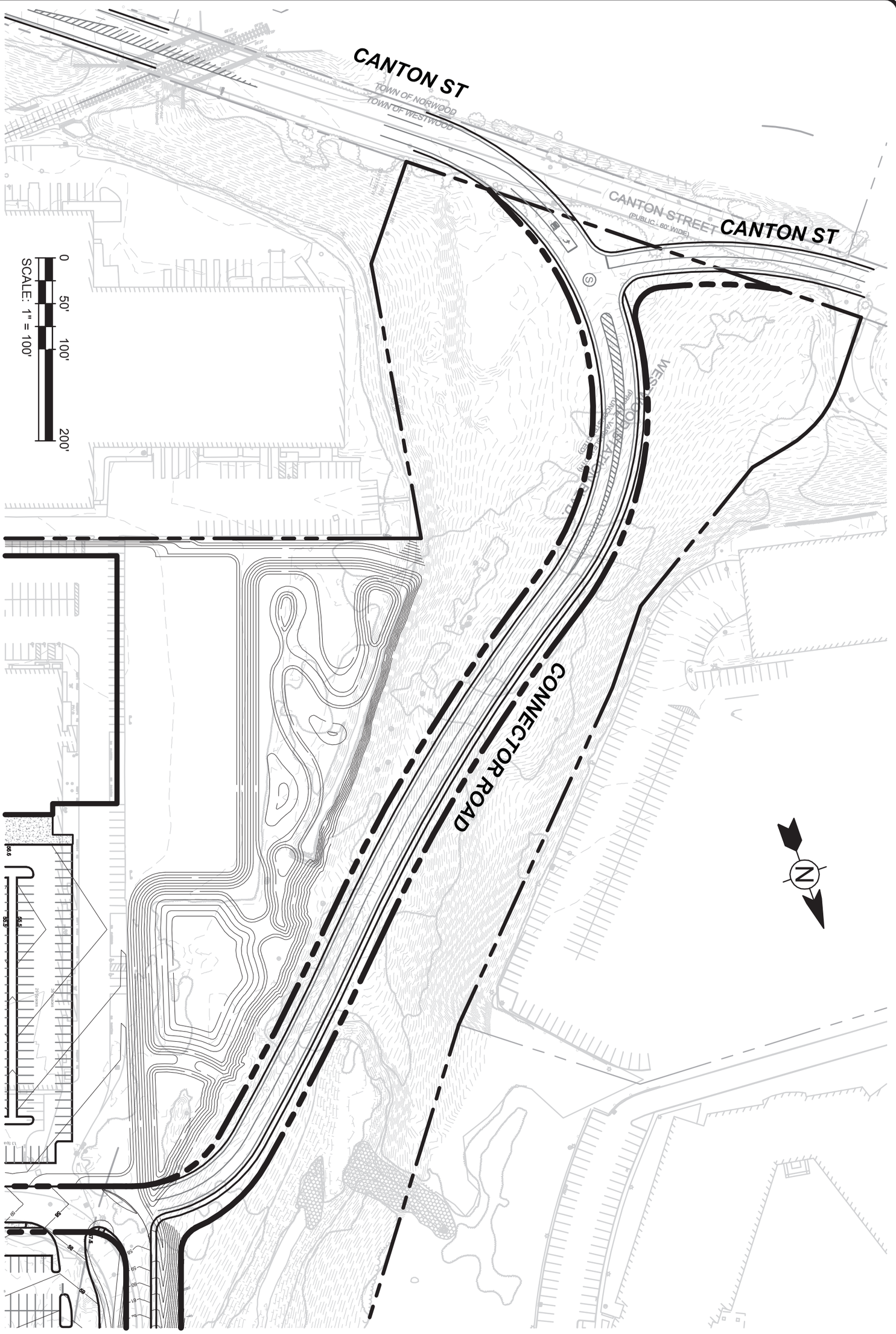


Figure 1

Bar Measures 1 inch

Project No:	127-3659-12003
Designed By:	N.H.C.
Drawn By:	J.V.B.
Checked By:	R.F.D.

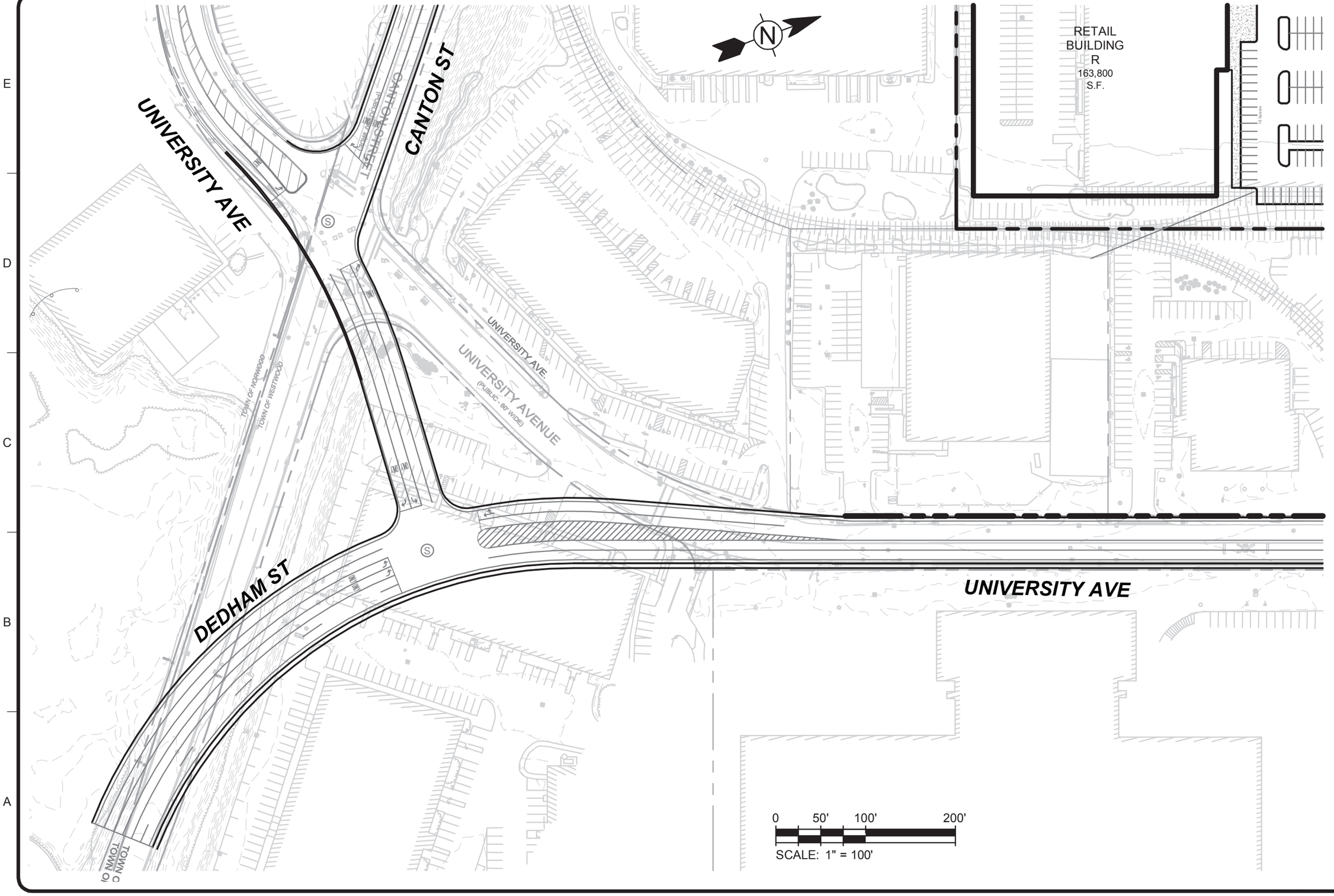
Westwood Marketplace Holdings LLC
University Ave, Westwood, MA

University Station - University Avenue Redevelopment

Harvard Street/Canton Street
Connector Road
Option 1

MARK	DATE	DESCRIPTION	BY
1	10/9/12	Preliminary Site Development Plans	N.H.C.
2	11/30/12	Revised Site Development Plans	N.H.C.

TETRA TECH
www.tetratech.com
One Grant Street
Framingham, MA 01701
PHONE: (508) 903-2000 FAX: (508) 903-2001



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MARK	DATE	DESCRIPTION	BY
1	10/9/12	Preliminary Site Development Plans	N.H.C.
2	11/30/12	Revised Site Development Plans	N.H.C.

Westwood Marketplace Holdings LLC
University Ave, Westwood, MA

University Station - University Avenue Redevelopment

University Ave/Canton Street Option 2

Project No.:	127-3659-12003
Designed By:	N.H.C.
Drawn By:	J.V.B.
Checked By:	R.F.D.

Figure 2

Bar Measures 1 inch

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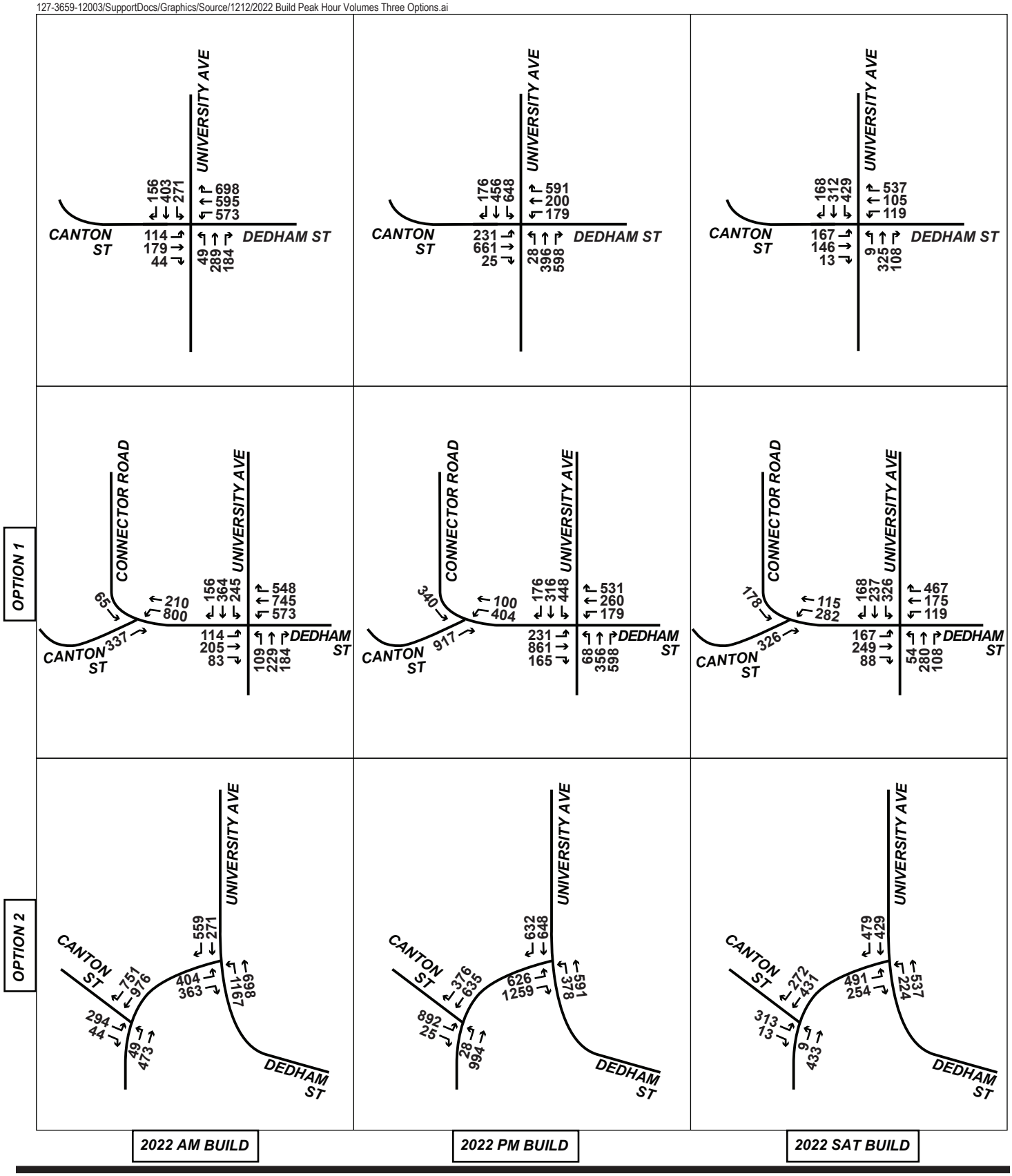


TETRATECH

Not To Scale

University Station
Westwood, Massachusetts

Figure 3
2022 Build Peak Hour Volumes
Three Options

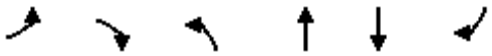
Attachment A

Capacity Analyses

Lane Group	EBR	NBL	NBT	SBT
Lane Configurations				
Volume (vph)	337	800	210	65
Lane Group Flow (vph)	366	870	228	71
Turn Type	Over	pm+pt		
Protected Phases	5	5	2	6
Permitted Phases		2		
Detector Phase	5	5	2	6
Switch Phase				
Minimum Initial (s)	4.0	4.0	4.0	4.0
Minimum Split (s)	8.0	8.0	20.0	20.0
Total Split (s)	56.0	56.0	80.0	24.0
Total Split (%)	70.0%	70.0%	100.0%	30.0%
Yellow Time (s)	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	3.0	3.0	3.0	3.0
Lead/Lag	Lead	Lead		Lag
Lead-Lag Optimize?	Yes	Yes		Yes
Recall Mode	None	None	Max	Max
Act Effct Green (s)	9.3	77.0	80.0	64.7
Actuated g/C Ratio	0.12	0.96	1.00	0.81
v/c Ratio	0.42	0.68	0.12	0.05
Control Delay	1.5	3.1	0.1	1.8
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	1.5	3.1	0.1	1.8
LOS	A	A	A	A
Approach Delay			2.5	1.8
Approach LOS			A	A
Queue Length 50th (ft)	0	0	0	5
Queue Length 95th (ft)	0	0	0	13
Internal Link Dist (ft)			1074	355
Turn Bay Length (ft)		200		
Base Capacity (vph)	1329	1552	1863	1507
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.28	0.56	0.12	0.05

Intersection Summary	
Cycle Length: 80	
Actuated Cycle Length: 80	
Natural Cycle: 40	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.68	
Intersection Signal Delay: 2.2	Intersection LOS: A
Intersection Capacity Utilization 54.3%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 207: Canton St. & Connector



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	0	337	800	210	65	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0	3.0	3.0	3.0	
Lane Util. Factor		1.00	1.00	1.00	1.00	
Frt		0.86	1.00	1.00	1.00	
Flt Protected		1.00	0.95	1.00	1.00	
Satd. Flow (prot)		1611	1770	1863	1863	
Flt Permitted		1.00	0.68	1.00	1.00	
Satd. Flow (perm)		1611	1265	1863	1863	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	366	870	228	71	0
RTOR Reduction (vph)	0	323	0	0	0	0
Lane Group Flow (vph)	0	43	870	228	71	0
Turn Type		Over	pm+pt			
Protected Phases		5	5	2	6	
Permitted Phases			2			
Actuated Green, G (s)		8.3	76.0	80.0	63.7	
Effective Green, g (s)		9.3	77.0	80.0	64.7	
Actuated g/C Ratio		0.12	0.96	1.00	0.81	
Clearance Time (s)		4.0	4.0	4.0	4.0	
Vehicle Extension (s)		3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		187	1276	1863	1507	
v/s Ratio Prot		0.03	c0.08	0.12	0.04	
v/s Ratio Perm			c0.58			
v/c Ratio		0.23	0.68	0.12	0.05	
Uniform Delay, d1		32.1	0.3	0.0	1.5	
Progression Factor		1.00	1.00	1.00	1.00	
Incremental Delay, d2		0.6	1.5	0.1	0.1	
Delay (s)		32.7	1.8	0.1	1.6	
Level of Service		C	A	A	A	
Approach Delay (s)	32.7			1.4	1.6	
Approach LOS	C			A	A	

Intersection Summary			
HCM Average Control Delay	8.9	HCM Level of Service	A
HCM Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	3.0
Intersection Capacity Utilization	54.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

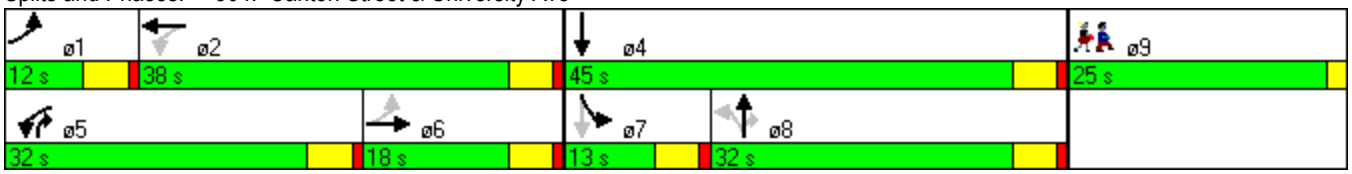
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	ø9
Lane Configurations											
Volume (vph)	114	205	573	745	548	109	229	184	245	364	
Lane Group Flow (vph)	124	313	623	810	596	118	249	200	266	566	
Turn Type	pm+pt		pm+pt		Free	Perm		pm+ov	Prot		
Protected Phases	1	6	5	2			8	5	7	4	9
Permitted Phases	6		2		Free	8		8		7	
Detector Phase	1	6	5	2		8	8	5	7	4	
Switch Phase											
Minimum Initial (s)	4.0	7.0	4.0	7.0		3.0	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	12.0	12.0	25.0
Total Split (s)	12.0	18.0	32.0	38.0	0.0	32.0	32.0	32.0	13.0	45.0	25.0
Total Split (%)	10.0%	15.0%	26.7%	31.7%	0.0%	26.7%	26.7%	26.7%	10.8%	37.5%	21%
Yellow Time (s)	4.0	4.0	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	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	-1.0	-1.0	
Total Lost Time (s)	4.0	4.0	4.0	4.0	3.0	4.0	4.0	4.0	4.0	4.0	
Lead/Lag	Lead	Lag	Lead	Lag		Lag	Lag	Lead	Lead		
Lead-Lag Optimize?											
Recall Mode	None	None	None	None		None	None	None	None	None	None
Act Effct Green (s)	22.2	14.1	46.4	34.3	100.0	28.2	28.2	59.9	9.1	41.4	
Actuated g/C Ratio	0.22	0.14	0.46	0.34	1.00	0.28	0.28	0.60	0.09	0.41	
v/c Ratio	0.60	0.61	1.03	1.26	0.38	0.84	0.49	0.22	0.86	0.79	
Control Delay	35.7	42.0	70.8	158.0	0.7	79.8	35.4	1.8	71.0	35.4	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	35.7	42.0	70.8	158.0	0.7	79.8	35.4	1.8	71.0	35.4	
LOS	D	D	E	F	A	E	D	A	E	D	
Approach Delay		40.2		85.0			32.8			46.8	
Approach LOS		D		F			C			D	
Queue Length 50th (ft)	40	81	301	~599	0	65	122	0	82	271	
Queue Length 95th (ft)	#140	159	#767	#1116	0	#219	261	20	#202	#643	
Internal Link Dist (ft)		1074		114			1633			620	
Turn Bay Length (ft)	150				350	50		260	350		
Base Capacity (vph)	206	510	604	645	1553	141	511	920	311	719	
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.60	0.61	1.03	1.26	0.38	0.84	0.49	0.22	0.86	0.79	

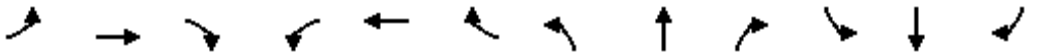
Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 100	
Natural Cycle: 150	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.26	
Intersection Signal Delay: 64.1	Intersection LOS: E
Intersection Capacity Utilization 93.6%	ICU Level of Service F
Analysis Period (min) 15	

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

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	205	83	573	745	548	109	229	184	245	364	156
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	4.0	3.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	1.00	1.00	1.00	1.00	1.00	0.97	1.00	
Frt	1.00	0.96		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1678	3361		1787	1881	1553	1671	1810	1404	3433	1708	
Flt Permitted	0.28	1.00		0.29	1.00	1.00	0.28	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	497	3361		545	1881	1553	500	1810	1404	3433	1708	
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	223	90	623	810	596	118	249	200	266	396	170
RTOR Reduction (vph)	0	35	0	0	0	0	0	0	89	0	12	0
Lane Group Flow (vph)	124	278	0	623	810	596	118	249	111	266	554	0
Heavy Vehicles (%)	4%	3%	26%	1%	1%	4%	8%	5%	15%	2%	3%	2%
Turn Type	pm+pt			pm+pt		Free	Perm		pm+ov	Prot		
Protected Phases	1	6		5	2			8	5	7	4	
Permitted Phases	6			2		Free	8		8		7	
Actuated Green, G (s)	20.3	13.2		45.4	33.3	101.6	27.3	27.3	54.5	8.1	40.4	
Effective Green, g (s)	22.3	14.2		46.4	34.3	101.6	28.3	28.3	56.5	9.1	41.4	
Actuated g/C Ratio	0.22	0.14		0.46	0.34	1.00	0.28	0.28	0.56	0.09	0.41	
Clearance Time (s)	5.0	5.0		5.0	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	3.0	3.0	3.0	
Lane Grp Cap (vph)	203	470		594	635	1553	139	504	781	307	696	
v/s Ratio Prot	0.05	0.08		c0.29	c0.43			0.14	0.04	0.08	c0.32	
v/s Ratio Perm	0.09			0.19		c0.38	0.24		0.04			
v/c Ratio	0.61	0.59		1.05	1.28	0.38	0.85	0.49	0.14	0.87	0.80	
Uniform Delay, d1	34.0	41.0		24.5	33.6	0.0	34.6	30.7	10.9	45.7	26.4	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	5.3	2.0		50.4	136.0	0.7	35.5	0.8	0.1	21.7	6.3	
Delay (s)	39.3	43.0		74.9	169.6	0.7	70.2	31.4	11.0	67.3	32.7	
Level of Service	D	D		E	F	A	E	C	B	E	C	
Approach Delay (s)		41.9			90.9			32.3			43.8	
Approach LOS		D			F			C			D	

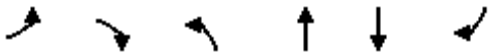
Intersection Summary			
HCM Average Control Delay	66.6	HCM Level of Service	E
HCM Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	101.6	Sum of lost time (s)	12.0
Intersection Capacity Utilization	93.6%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBR	NBL	NBT	SBT
Lane Configurations				
Volume (vph)	917	404	100	340
Lane Group Flow (vph)	997	439	109	370
Turn Type	Over	pm+pt		
Protected Phases	5	5	2	6
Permitted Phases		2		
Detector Phase	5	5	2	6
Switch Phase				
Minimum Initial (s)	4.0	4.0	4.0	4.0
Minimum Split (s)	8.0	8.0	20.0	20.0
Total Split (s)	55.0	55.0	80.0	25.0
Total Split (%)	68.8%	68.8%	100.0%	31.3%
Yellow Time (s)	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	3.0	3.0	3.0	3.0
Lead/Lag	Lead	Lead		Lag
Lead-Lag Optimize?	Yes	Yes		Yes
Recall Mode	None	None	None	None
Act Effct Green (s)	44.9	67.0	70.2	19.0
Actuated g/C Ratio	0.64	0.95	1.00	0.27
v/c Ratio	0.91	0.35	0.06	0.73
Control Delay	23.1	1.8	0.1	35.0
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	23.1	1.8	0.1	35.0
LOS	C	A	A	C
Approach Delay			1.4	35.0
Approach LOS			A	C
Queue Length 50th (ft)	305	4	0	167
Queue Length 95th (ft)	#658	33	0	#272
Internal Link Dist (ft)			1067	487
Turn Bay Length (ft)		200		
Base Capacity (vph)	1254	1416	1863	613
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.80	0.31	0.06	0.60

Intersection Summary	
Cycle Length: 80	
Actuated Cycle Length: 70.2	
Natural Cycle: 60	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.91	
Intersection Signal Delay: 19.2	Intersection LOS: B
Intersection Capacity Utilization 81.3%	ICU Level of Service D
Analysis Period (min) 15	

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 207: Canton St. & Connector



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	0	917	404	100	340	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0	3.0	3.0	3.0	
Lane Util. Factor		1.00	1.00	1.00	1.00	
Frt		0.86	1.00	1.00	1.00	
Flt Protected		1.00	0.95	1.00	1.00	
Satd. Flow (prot)		1611	1770	1863	1863	
Flt Permitted		1.00	0.22	1.00	1.00	
Satd. Flow (perm)		1611	411	1863	1863	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	997	439	109	370	0
RTOR Reduction (vph)	0	67	0	0	0	0
Lane Group Flow (vph)	0	930	439	109	370	0
Turn Type		Over	pm+pt			
Protected Phases		5	5	2	6	
Permitted Phases			2			
Actuated Green, G (s)		43.8	66.0	70.0	18.2	
Effective Green, g (s)		44.8	67.0	70.0	19.2	
Actuated g/C Ratio		0.64	0.96	1.00	0.27	
Clearance Time (s)		4.0	4.0	4.0	4.0	
Vehicle Extension (s)		3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		1031	1263	1863	511	
v/s Ratio Prot		c0.58	0.22	0.06	c0.20	
v/s Ratio Perm			0.11			
v/c Ratio		0.90	0.35	0.06	0.72	
Uniform Delay, d1		10.7	2.3	0.0	23.0	
Progression Factor		1.00	1.00	1.00	1.00	
Incremental Delay, d2		10.8	0.2	0.0	5.0	
Delay (s)		21.5	2.5	0.0	28.0	
Level of Service		C	A	A	C	
Approach Delay (s)	21.5			2.0	28.0	
Approach LOS	C			A	C	

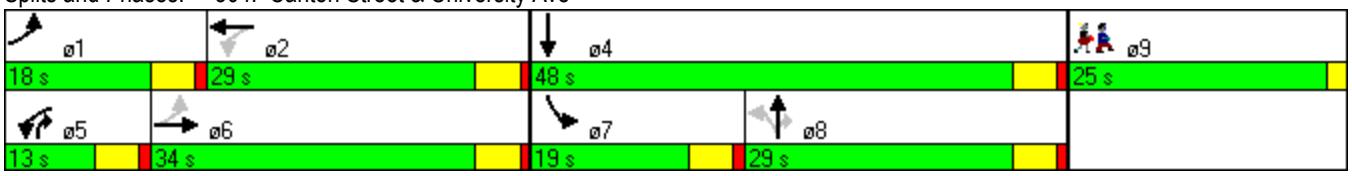
Intersection Summary			
HCM Average Control Delay	17.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	81.3%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

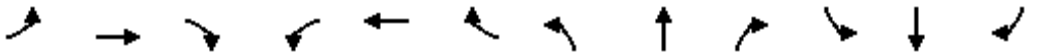
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	ø9
Lane Configurations											
Volume (vph)	231	861	179	260	531	68	356	598	448	316	
Lane Group Flow (vph)	251	1115	195	283	577	74	387	650	487	534	
Turn Type	pm+pt		pm+pt		Free	Perm		pm+ov	Prot		
Protected Phases	1	6	5	2			8	5	7	4	9
Permitted Phases	6		2		Free	8		8			
Detector Phase	1	6	5	2		8	8	5	7	4	
Switch Phase											
Minimum Initial (s)	4.0	7.0	4.0	7.0		3.0	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	12.0	12.0	25.0
Total Split (s)	18.0	34.0	13.0	29.0	0.0	29.0	29.0	13.0	19.0	48.0	25.0
Total Split (%)	15.0%	28.3%	10.8%	24.2%	0.0%	24.2%	24.2%	10.8%	15.8%	40.0%	21%
Yellow Time (s)	4.0	4.0	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	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	-1.0	-1.0	
Total Lost Time (s)	4.0	4.0	4.0	4.0	3.0	4.0	4.0	4.0	4.0	4.0	
Lead/Lag	Lead	Lag	Lead	Lag		Lag	Lag	Lead	Lead		
Lead-Lag Optimize?											
Recall Mode	None	None	None	None		None	None	None	None	None	None
Act Effct Green (s)	43.3	30.3	34.6	25.5	100.0	25.2	25.2	37.7	15.1	44.4	
Actuated g/C Ratio	0.43	0.30	0.35	0.26	1.00	0.25	0.25	0.38	0.15	0.44	
v/c Ratio	0.63	0.99	0.84	0.59	0.36	0.42	0.82	0.76	0.93	0.71	
Control Delay	29.3	60.3	53.7	40.3	0.6	42.9	51.5	15.7	68.3	29.4	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	29.3	60.3	53.7	40.3	0.6	42.9	51.5	15.7	68.3	29.4	
LOS	C	E	D	D	A	D	D	B	E	C	
Approach Delay		54.6		21.1			30.0			48.0	
Approach LOS		D		C			C			D	
Queue Length 50th (ft)	94	338	70	148	0	37	217	112	150	232	
Queue Length 95th (ft)	#243	#684	#264	#306	0	105	#503	#330	#332	#559	
Internal Link Dist (ft)		1067		114			1633			620	
Turn Bay Length (ft)	150				350	50		260	350		
Base Capacity (vph)	402	1124	233	480	1599	175	474	855	524	753	
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.62	0.99	0.84	0.59	0.36	0.42	0.82	0.76	0.93	0.71	

Intersection Summary		
Cycle Length: 120		
Actuated Cycle Length: 100		
Natural Cycle: 140		
Control Type: Actuated-Uncoordinated		
Maximum v/c Ratio: 0.99		
Intersection Signal Delay: 39.3	Intersection LOS: D	
Intersection Capacity Utilization 88.9%	ICU Level of Service E	
Analysis Period (min) 15		

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	861	165	179	260	531	68	356	598	448	316	176
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	4.0	3.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	1.00	1.00	1.00	1.00	1.00	0.97	1.00	
Frt	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1711	3672		1752	1881	1599	1480	1881	1583	3467	1666	
Flt Permitted	0.31	1.00		0.16	1.00	1.00	0.45	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	550	3672		288	1881	1599	695	1881	1583	3467	1666	
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	936	179	195	283	577	74	387	650	487	343	191
RTOR Reduction (vph)	0	13	0	0	0	0	0	0	274	0	15	0
Lane Group Flow (vph)	251	1102	0	195	283	577	74	387	376	487	519	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	pm+pt			pm+pt		Free	Perm		pm+ov	Prot		
Protected Phases	1	6		5	2			8	5	7	4	
Permitted Phases	6			2		Free	8		8			
Actuated Green, G (s)	42.1	29.3		32.7	24.6	101.6	24.3	24.3	32.4	14.1	43.4	
Effective Green, g (s)	43.4	30.3		34.7	25.6	101.6	25.3	25.3	34.4	15.1	44.4	
Actuated g/C Ratio	0.43	0.30		0.34	0.25	1.00	0.25	0.25	0.34	0.15	0.44	
Clearance Time (s)	5.0	5.0		5.0	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	3.0	3.0	3.0	
Lane Grp Cap (vph)	393	1095		229	474	1599	173	468	536	515	728	
v/s Ratio Prot	c0.09	c0.30		c0.08	0.15			c0.21	0.06	c0.14	0.31	
v/s Ratio Perm	0.19			0.21		c0.36	0.11		0.17			
v/c Ratio	0.64	1.01		0.85	0.60	0.36	0.43	0.83	0.70	0.95	0.71	
Uniform Delay, d1	20.8	35.6		27.4	33.5	0.0	32.1	36.1	29.1	42.8	23.4	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	3.4	28.8		24.9	2.0	0.6	1.7	11.4	4.1	26.4	3.3	
Delay (s)	24.2	64.5		52.3	35.5	0.6	33.8	47.5	33.3	69.3	26.7	
Level of Service	C	E		D	D	A	C	D	C	E	C	
Approach Delay (s)		57.1			19.5			38.2			47.0	
Approach LOS		E			B			D			D	

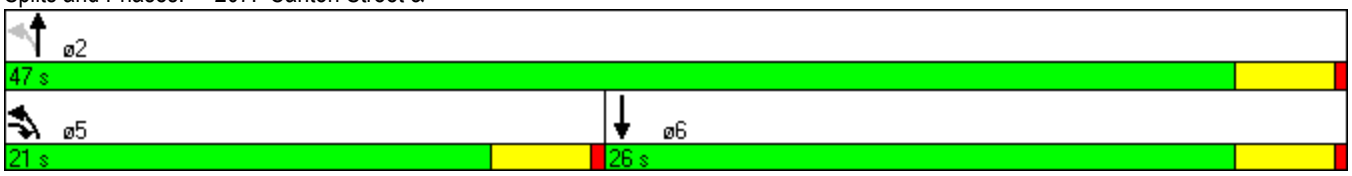
Intersection Summary			
HCM Average Control Delay	41.5	HCM Level of Service	D
HCM Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	101.6	Sum of lost time (s)	12.0
Intersection Capacity Utilization	88.9%	ICU Level of Service	E
Analysis Period (min)	15		

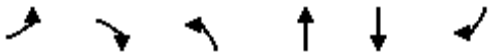
c Critical Lane Group

Lane Group	EBR	NBL	NBT	SBT
Lane Configurations				
Volume (vph)	326	282	115	178
Lane Group Flow (vph)	354	307	125	193
Turn Type	Over	pm+pt		
Protected Phases	5	5	2	6
Permitted Phases		2		
Detector Phase	5	5	2	6
Switch Phase				
Minimum Initial (s)	4.0	4.0	4.0	4.0
Minimum Split (s)	8.0	8.0	20.0	20.0
Total Split (s)	21.0	21.0	47.0	26.0
Total Split (%)	44.7%	44.7%	100.0%	55.3%
Yellow Time (s)	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	3.0	3.0	3.0	3.0
Lead/Lag	Lead	Lead		Lag
Lead-Lag Optimize?	Yes	Yes		Yes
Recall Mode	None	None	None	None
Act Effct Green (s)	13.3	19.0	20.1	9.7
Actuated g/C Ratio	0.61	0.87	0.92	0.44
v/c Ratio	0.29	0.23	0.07	0.23
Control Delay	0.6	0.6	0.1	7.6
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	0.6	0.6	0.1	7.6
LOS	A	A	A	A
Approach Delay			0.5	7.6
Approach LOS			A	A
Queue Length 50th (ft)	0	0	0	16
Queue Length 95th (ft)	0	0	0	52
Internal Link Dist (ft)			1086	521
Turn Bay Length (ft)		200		
Base Capacity (vph)	1403	1531	1863	1653
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.25	0.20	0.07	0.12

Intersection Summary	
Cycle Length: 47	
Actuated Cycle Length: 21.8	
Natural Cycle: 40	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.29	
Intersection Signal Delay: 1.9	Intersection LOS: A
Intersection Capacity Utilization 36.2%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 207: Canton Street &





Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	0	326	282	115	178	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0	3.0	3.0	3.0	
Lane Util. Factor		1.00	1.00	1.00	1.00	
Frt		0.86	1.00	1.00	1.00	
Flt Protected		1.00	0.95	1.00	1.00	
Satd. Flow (prot)		1611	1770	1863	1863	
Flt Permitted		1.00	0.51	1.00	1.00	
Satd. Flow (perm)		1611	955	1863	1863	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	354	307	125	193	0
RTOR Reduction (vph)	0	188	0	0	0	0
Lane Group Flow (vph)	0	166	307	125	193	0
Turn Type		Over	pm+pt			
Protected Phases		5	5	2	6	
Permitted Phases			2			
Actuated Green, G (s)		8.5	16.3	20.3	3.8	
Effective Green, g (s)		9.5	17.3	20.3	4.8	
Actuated g/C Ratio		0.47	0.85	1.00	0.24	
Clearance Time (s)		4.0	4.0	4.0	4.0	
Vehicle Extension (s)		3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		754	1195	1863	441	
v/s Ratio Prot		0.10	c0.12	0.07	c0.10	
v/s Ratio Perm			0.10			
v/c Ratio		0.22	0.26	0.07	0.44	
Uniform Delay, d1		3.2	0.5	0.0	6.6	
Progression Factor		1.00	1.00	1.00	1.00	
Incremental Delay, d2		0.1	0.1	0.0	0.7	
Delay (s)		3.3	0.7	0.0	7.3	
Level of Service		A	A	A	A	
Approach Delay (s)	3.3			0.5	7.3	
Approach LOS	A			A	A	

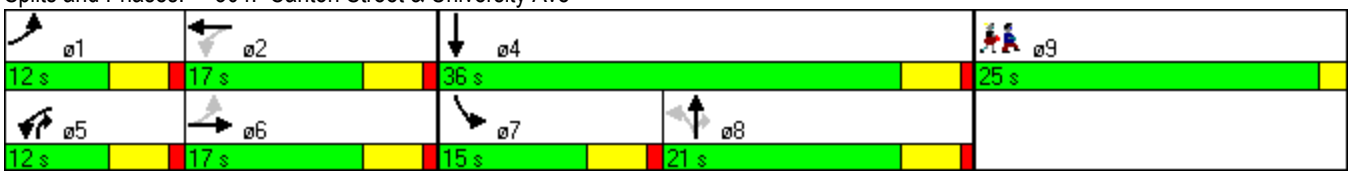
Intersection Summary			
HCM Average Control Delay	2.9	HCM Level of Service	A
HCM Volume to Capacity ratio	0.32		
Actuated Cycle Length (s)	20.3	Sum of lost time (s)	6.0
Intersection Capacity Utilization	36.2%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	ø9
Lane Configurations											
Volume (vph)	167	249	119	175	467	54	280	108	326	237	
Lane Group Flow (vph)	182	367	129	190	508	59	304	117	354	441	
Turn Type	pm+pt		pm+pt		Free	Perm		pm+ov	Prot		
Protected Phases	1	6	5	2			8	5	7	4	9
Permitted Phases	6		2		Free	8		8			
Detector Phase	1	6	5	2		8	8	5	7	4	
Switch Phase											
Minimum Initial (s)	4.0	7.0	4.0	7.0		3.0	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	12.0	12.0	25.0
Total Split (s)	12.0	17.0	12.0	17.0	0.0	21.0	21.0	12.0	15.0	36.0	25.0
Total Split (%)	13.3%	18.9%	13.3%	18.9%	0.0%	23.3%	23.3%	13.3%	16.7%	40.0%	28%
Yellow Time (s)	4.0	4.0	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	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	-1.0	-1.0	
Total Lost Time (s)	4.0	4.0	4.0	4.0	3.0	4.0	4.0	4.0	4.0	4.0	
Lead/Lag	Lead	Lag	Lead	Lag		Lag	Lag	Lead	Lead		
Lead-Lag Optimize?											
Recall Mode	None	None	None	None		None	None	None	None	None	None
Act Effct Green (s)	20.4	12.2	20.1	12.0	67.7	16.1	16.1	27.6	11.2	31.4	
Actuated g/C Ratio	0.30	0.18	0.30	0.18	1.00	0.24	0.24	0.41	0.17	0.46	
v/c Ratio	0.49	0.54	0.38	0.56	0.32	0.31	0.67	0.17	0.63	0.55	
Control Delay	24.3	26.9	21.7	35.3	0.5	30.0	34.6	3.3	34.7	17.1	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	24.3	26.9	21.7	35.3	0.5	30.0	34.6	3.3	34.7	17.1	
LOS	C	C	C	D	A	C	C	A	C	B	
Approach Delay		26.0		11.8			26.4			24.9	
Approach LOS		C		B			C			C	
Queue Length 50th (ft)	48	59	33	68	0	19	106	0	68	99	
Queue Length 95th (ft)	#149	138	105	#195	0	69	#308	20	#175	304	
Internal Link Dist (ft)		1086		114			1635			620	
Turn Bay Length (ft)	150				350	50		260	350		
Base Capacity (vph)	369	736	346	374	1599	204	490	701	572	835	
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.49	0.50	0.37	0.51	0.32	0.29	0.62	0.17	0.62	0.53	

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 67.7	
Natural Cycle: 80	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.67	
Intersection Signal Delay: 21.3	Intersection LOS: C
Intersection Capacity Utilization 57.9%	ICU Level of Service B
Analysis Period (min) 15	

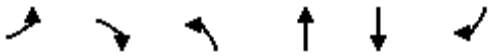
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

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	249	88	119	175	467	54	280	108	326	237	168
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	4.0	3.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	1.00	1.00	1.00	1.00	1.00	0.97	1.00	
Frt	1.00	0.96		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.94	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1728	3547		1736	1900	1599	1480	1900	1538	3433	1675	
Flt Permitted	0.48	1.00		0.42	1.00	1.00	0.51	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	882	3547		761	1900	1599	790	1900	1538	3433	1675	
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	271	96	129	190	508	59	304	117	354	258	183
RTOR Reduction (vph)	0	38	0	0	0	0	0	0	76	0	24	0
Lane Group Flow (vph)	182	329	0	129	190	508	59	304	41	354	417	0
Heavy Vehicles (%)	1%	3%	8%	4%	0%	1%	22%	0%	5%	2%	2%	4%
Turn Type	pm+pt			pm+pt		Free	Perm		pm+ov	Prot		
Protected Phases	1	6		5	2			8	5	7	4	
Permitted Phases	6			2		Free	8		8			
Actuated Green, G (s)	18.4	11.2		18.0	11.0	69.0	15.2	15.2	22.2	10.1	30.3	
Effective Green, g (s)	20.4	12.2		20.0	12.0	69.0	16.2	16.2	24.2	11.1	31.3	
Actuated g/C Ratio	0.30	0.18		0.29	0.17	1.00	0.23	0.23	0.35	0.16	0.45	
Clearance Time (s)	5.0	5.0		5.0	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	3.0	3.0	3.0	
Lane Grp Cap (vph)	361	627		334	330	1599	185	446	539	552	760	
v/s Ratio Prot	c0.06	0.09		0.04	c0.10			c0.16	0.01	c0.10	0.25	
v/s Ratio Perm	0.09			0.07		c0.32	0.07		0.02			
v/c Ratio	0.50	0.52		0.39	0.58	0.32	0.32	0.68	0.08	0.64	0.55	
Uniform Delay, d1	19.2	25.8		18.9	26.2	0.0	21.8	24.1	14.9	27.1	13.7	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.1	0.8		0.7	2.4	0.5	1.0	4.3	0.1	2.5	0.8	
Delay (s)	20.3	26.6		19.6	28.6	0.5	22.8	28.3	15.0	29.6	14.5	
Level of Service	C	C		B	C	A	C	C	B	C	B	
Approach Delay (s)		24.5			9.9			24.4			21.3	
Approach LOS		C			A			C			C	

Intersection Summary			
HCM Average Control Delay	19.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	69.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	57.9%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

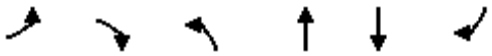


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	294	44	49	473	976	751
Lane Group Flow (vph)	320	48	53	514	1061	816
Turn Type		Perm	Perm			pm+ov
Protected Phases	6			4	8	6
Permitted Phases		6	4			8
Detector Phase	6	6	4	4	8	6
Switch Phase						
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	21.0	21.0	21.0	21.0	21.0	21.0
Total Split (s)	21.0	21.0	40.0	40.0	40.0	21.0
Total Split (%)	34.4%	34.4%	65.6%	65.6%	65.6%	34.4%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	Max	Max	C-Max	C-Max	C-Max	Max
Act Effct Green (s)	17.0	17.0	36.0	36.0	36.0	61.0
Actuated g/C Ratio	0.28	0.28	0.59	0.59	0.59	1.00
v/c Ratio	0.66	0.12	0.46	0.50	0.96	0.51
Control Delay	27.0	6.8	24.2	9.5	32.8	1.2
Queue Delay	0.0	0.0	0.0	0.0	26.4	0.0
Total Delay	27.0	6.8	24.2	9.5	59.2	1.2
LOS	C	A	C	A	E	A
Approach Delay	24.4			10.8	34.0	
Approach LOS	C			B	C	
Queue Length 50th (ft)	103	0	10	97	322	0
Queue Length 95th (ft)	#182	21	#58	163	#611	0
Internal Link Dist (ft)	408			338	352	
Turn Bay Length (ft)						
Base Capacity (vph)	488	392	115	1019	1110	1599
Starvation Cap Reductn	0	0	0	0	108	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.66	0.12	0.46	0.50	1.06	0.51

Intersection Summary	
Cycle Length: 61	
Actuated Cycle Length: 61	
Offset: 19 (31%), Referenced to phase 4:NBTL and 8:SBT, Start of Green	
Natural Cycle: 65	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.96	
Intersection Signal Delay: 28.1	Intersection LOS: C
Intersection Capacity Utilization 74.3%	ICU Level of Service D
Analysis Period (min) 15	
# 95th percentile volume exceeds capacity, queue may be longer.	

Queue shown is maximum after two cycles.

Splits and Phases: 207: Canton St. (North) & University Ave.



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	294	44	49	473	976	751
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1752	1282	1671	1727	1881	1599
Flt Permitted	0.95	1.00	0.11	1.00	1.00	1.00
Satd. Flow (perm)	1752	1282	195	1727	1881	1599
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	320	48	53	514	1061	816
RTOR Reduction (vph)	0	35	0	0	0	0
Lane Group Flow (vph)	320	13	53	514	1061	816
Heavy Vehicles (%)	3%	26%	8%	10%	1%	1%
Turn Type		Perm	Perm			pm+ov
Protected Phases	6			4	8	6
Permitted Phases		6	4			8
Actuated Green, G (s)	16.0	16.0	35.0	35.0	35.0	51.0
Effective Green, g (s)	17.0	17.0	36.0	36.0	36.0	53.0
Actuated g/C Ratio	0.28	0.28	0.59	0.59	0.59	0.87
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)	488	357	115	1019	1110	1599
v/s Ratio Prot	c0.18			0.30	c0.56	0.14
v/s Ratio Perm		0.01	0.27			0.37
v/c Ratio	0.66	0.04	0.46	0.50	0.96	0.51
Uniform Delay, d1	19.4	16.0	7.0	7.3	11.8	0.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	6.7	0.2	12.7	1.8	18.3	1.2
Delay (s)	26.2	16.2	19.8	9.1	30.0	2.1
Level of Service	C	B	B	A	C	A
Approach Delay (s)	24.9			10.1	17.9	
Approach LOS	C			B	B	

Intersection Summary			
HCM Average Control Delay	17.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	61.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	74.3%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	WBL	WBT	NBL	NBR	ø9
Lane Configurations						
Volume (vph)	271	1167	698	404	363	
Lane Group Flow (vph)	903	1268	759	439	395	
Turn Type		Prot			pt+ov	
Protected Phases	6	5	2	4	4 5	9
Permitted Phases						
Detector Phase	6	5	2	4	4 5	
Switch Phase						
Minimum Initial (s)	4.0	4.0	4.0	4.0		4.0
Minimum Split (s)	20.0	9.0	20.0	20.0		25.0
Total Split (s)	31.0	28.0	59.0	36.0	64.0	25.0
Total Split (%)	25.8%	23.3%	49.2%	30.0%	53.3%	21%
Yellow Time (s)	4.0	4.0	4.0	4.0		2.0
All-Red Time (s)	1.0	1.0	1.0	1.0		0.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	
Lead/Lag	Lag	Lead				
Lead-Lag Optimize?	Yes	Yes				
Recall Mode	None	None	None	C-Max		None
Act Effct Green (s)	25.9	44.0	73.9	33.1	80.3	
Actuated g/C Ratio	0.22	0.37	0.62	0.28	0.67	
v/c Ratio	0.90	1.00	0.36	0.97	0.33	
Control Delay	38.3	62.4	13.2	79.4	1.6	
Queue Delay	0.0	0.0	0.0	5.5	0.3	
Total Delay	38.3	62.4	13.2	84.9	1.9	
LOS	D	E	B	F	A	
Approach Delay	38.3		44.0	45.6		
Approach LOS	D		D	D		
Queue Length 50th (ft)	211	465	120	~343	0	
Queue Length 95th (ft)	#326	#900	264	#558	27	
Internal Link Dist (ft)	649		762	352		
Turn Bay Length (ft)						
Base Capacity (vph)	1025	1271	2138	453	1201	
Starvation Cap Reductn	0	0	0	12	359	
Spillback Cap Reductn	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	
Reduced v/c Ratio	0.88	1.00	0.36	1.00	0.47	

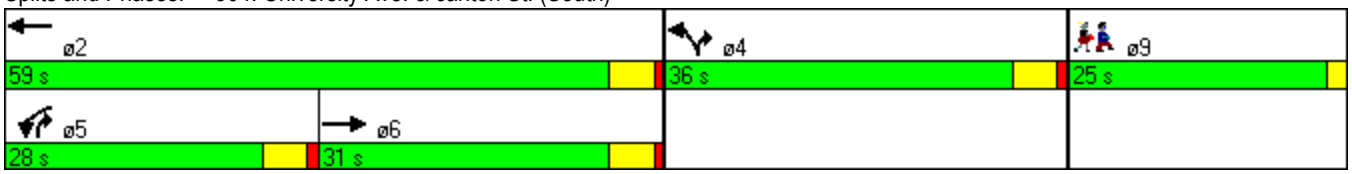
Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 0 (0%), Referenced to phase 4:NBL, Start of Green, Master Intersection	
Natural Cycle: 150	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.00	
Intersection Signal Delay: 43.0	Intersection LOS: D
Intersection Capacity Utilization 91.2%	ICU Level of Service F
Analysis Period (min) 15	
~ Volume exceeds capacity, queue is theoretically infinite.	

Queue shown is maximum after two cycles.

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

Queue shown is maximum after two cycles.

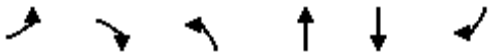
Splits and Phases: 304: University Ave. & canton St. (South)



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	271	559	1167	698	404	363
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0	4.0	4.0
Lane Util. Factor	0.95		0.97	0.95	1.00	1.00
Frt	0.90		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	3182		3467	3471	1641	1599
Flt Permitted	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	3182		3467	3471	1641	1599
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	295	608	1268	759	439	395
RTOR Reduction (vph)	313	0	0	0	0	146
Lane Group Flow (vph)	590	0	1268	759	439	249
Heavy Vehicles (%)	2%	2%	1%	4%	10%	1%
Turn Type			Prot			pt+ov
Protected Phases	6		5	2	4	4 5
Permitted Phases						
Actuated Green, G (s)	24.9		43.0	72.9	30.5	73.5
Effective Green, g (s)	25.9		44.0	73.9	31.5	75.5
Actuated g/C Ratio	0.22		0.37	0.62	0.26	0.63
Clearance Time (s)	5.0		5.0	5.0	5.0	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	687		1271	2138	431	1006
v/s Ratio Prot	c0.19		c0.37	0.22	c0.27	0.16
v/s Ratio Perm						
v/c Ratio	0.86		1.00	0.36	1.02	0.25
Uniform Delay, d1	45.3		37.9	11.3	44.2	9.8
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	10.4		24.5	0.1	48.1	0.1
Delay (s)	55.7		62.4	11.4	92.4	9.9
Level of Service	E		E	B	F	A
Approach Delay (s)	55.7			43.3	53.3	
Approach LOS	E			D	D	

Intersection Summary			
HCM Average Control Delay	48.5	HCM Level of Service	D
HCM Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	18.6
Intersection Capacity Utilization	91.2%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	892	25	28	994	635	376
Lane Group Flow (vph)	970	27	30	1080	690	409
Turn Type		Perm	Perm			pm+ov
Protected Phases	6			4	8	6
Permitted Phases		6	4			8
Detector Phase	6	6	4	4	8	6
Switch Phase						
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	21.0	21.0	21.0	21.0	21.0	21.0
Total Split (s)	58.0	58.0	62.0	62.0	62.0	58.0
Total Split (%)	48.3%	48.3%	51.7%	51.7%	51.7%	48.3%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	Max	Max	C-Max	C-Max	C-Max	Max
Act Effct Green (s)	54.0	54.0	58.0	58.0	58.0	120.0
Actuated g/C Ratio	0.45	0.45	0.48	0.48	0.48	1.00
v/c Ratio	1.22	0.04	0.20	1.20	0.77	0.26
Control Delay	140.1	10.5	22.3	130.6	17.9	0.6
Queue Delay	14.5	0.0	0.0	93.4	9.1	0.0
Total Delay	154.7	10.5	22.3	224.0	27.0	0.6
LOS	F	B	C	F	C	A
Approach Delay	150.8			218.5	17.2	
Approach LOS	F			F	B	
Queue Length 50th (ft)	~922	4	13	~1015	328	11
Queue Length 95th (ft)	#1173	22	36	#1270	m103	m6
Internal Link Dist (ft)	408			338	352	
Turn Bay Length (ft)						
Base Capacity (vph)	797	722	147	900	892	1568
Starvation Cap Reductn	0	0	0	0	173	0
Spillback Cap Reductn	21	0	0	134	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	1.25	0.04	0.20	1.41	0.96	0.26

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 68 (57%), Referenced to phase 4:NBTL and 8:SBT, Start of Green	
Natural Cycle: 130	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.22	
Intersection Signal Delay: 128.4	Intersection LOS: F
Intersection Capacity Utilization 108.4%	ICU Level of Service G
Analysis Period (min) 15	
~ Volume exceeds capacity, queue is theoretically infinite.	

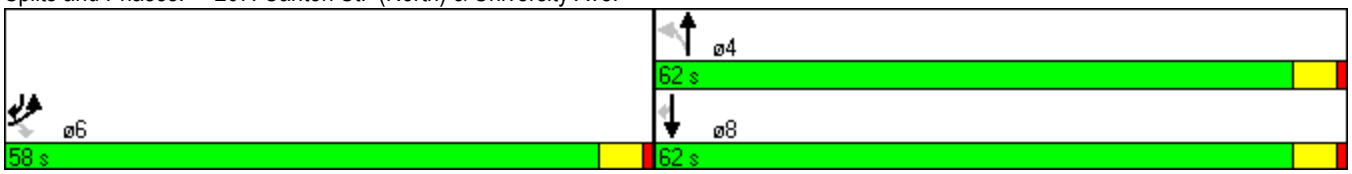
Queue shown is maximum after two cycles.

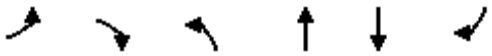
95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

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

Splits and Phases: 207: Canton St. (North) & University Ave.





Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	892	25	28	994	635	376
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1770	1583	1770	1863	1845	1568
Flt Permitted	0.95	1.00	0.16	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	303	1863	1845	1568
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	970	27	30	1080	690	409
RTOR Reduction (vph)	0	9	0	0	0	0
Lane Group Flow (vph)	970	18	30	1080	690	409
Heavy Vehicles (%)	2%	2%	2%	2%	3%	3%
Turn Type		Perm	Perm			pm+ov
Protected Phases	6			4	8	6
Permitted Phases		6	4			8
Actuated Green, G (s)	53.0	53.0	57.0	57.0	57.0	110.0
Effective Green, g (s)	54.0	54.0	58.0	58.0	58.0	112.0
Actuated g/C Ratio	0.45	0.45	0.48	0.48	0.48	0.93
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)	797	712	146	900	892	1568
v/s Ratio Prot	c0.55			c0.58	0.37	0.12
v/s Ratio Perm		0.01	0.10			0.14
v/c Ratio	1.22	0.02	0.21	1.20	0.77	0.26
Uniform Delay, d1	33.0	18.4	17.8	31.0	25.6	0.4
Progression Factor	1.00	1.00	1.00	1.00	0.65	1.00
Incremental Delay, d2	109.0	0.1	3.2	100.7	0.6	0.0
Delay (s)	142.0	18.4	20.9	131.7	17.4	0.4
Level of Service	F	B	C	F	B	A
Approach Delay (s)	138.7			128.7	11.0	
Approach LOS	F			F	B	

Intersection Summary			
HCM Average Control Delay	91.5	HCM Level of Service	F
HCM Volume to Capacity ratio	1.21		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	108.4%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	WBL	WBT	NBL	NBR	ø9
Lane Configurations						
Volume (vph)	648	378	591	626	1259	
Lane Group Flow (vph)	1391	411	642	680	1368	
Turn Type		Prot			pt+ov	
Protected Phases	6	5	2	4	4 5	9
Permitted Phases						
Detector Phase	6	5	2	4	4 5	
Switch Phase						
Minimum Initial (s)	4.0	4.0	4.0	4.0		4.0
Minimum Split (s)	20.0	9.0	20.0	20.0		25.0
Total Split (s)	34.0	14.0	48.0	47.0	61.0	25.0
Total Split (%)	28.3%	11.7%	40.0%	39.2%	50.8%	21%
Yellow Time (s)	4.0	4.0	4.0	4.0		2.0
All-Red Time (s)	1.0	1.0	1.0	1.0		0.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	
Lead/Lag	Lead	Lag				
Lead-Lag Optimize?	Yes	Yes				
Recall Mode	None	None	None	C-Max		None
Act Effct Green (s)	50.0	10.0	64.0	43.0	57.0	
Actuated g/C Ratio	0.42	0.08	0.53	0.36	0.48	
v/c Ratio	0.94	1.45	0.34	1.07	1.35	
Control Delay	42.0	261.2	18.2	73.7	179.4	
Queue Delay	3.5	0.0	0.0	133.5	83.9	
Total Delay	45.5	261.2	18.2	207.2	263.2	
LOS	D	F	B	F	F	
Approach Delay	45.5		113.0	244.6		
Approach LOS	D		F	F		
Queue Length 50th (ft)	440	~223	128	~585	~1290	
Queue Length 95th (ft)	#852	#326	256	m401	m#731	
Internal Link Dist (ft)	649		762	352		
Turn Bay Length (ft)						
Base Capacity (vph)	1481	283	1906	634	1012	
Starvation Cap Reductn	0	0	0	142	123	
Spillback Cap Reductn	53	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	
Reduced v/c Ratio	0.97	1.45	0.34	1.38	1.54	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 0 (0%), Referenced to phase 4:NBL, Start of Green, Master Intersection	
Natural Cycle: 150	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.45	
Intersection Signal Delay: 152.1	Intersection LOS: F
Intersection Capacity Utilization 122.8%	ICU Level of Service H
Analysis Period (min) 15	
~ Volume exceeds capacity, queue is theoretically infinite.	

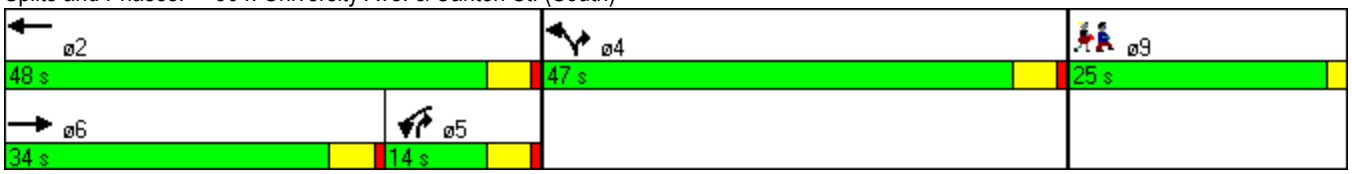
Queue shown is maximum after two cycles.

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

Queue shown is maximum after two cycles.

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

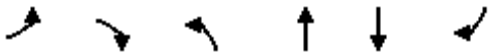
Splits and Phases: 304: University Ave. & Canton St. (South)



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	648	632	378	591	626	1259
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0	4.0	4.0
Lane Util. Factor	0.95		0.97	0.95	1.00	1.00
Frt	0.93		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	3277		3400	3574	1770	1583
Flt Permitted	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	3277		3400	3574	1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	704	687	411	642	680	1368
RTOR Reduction (vph)	114	0	0	0	0	267
Lane Group Flow (vph)	1277	0	411	642	680	1101
Heavy Vehicles (%)	1%	3%	3%	1%	2%	2%
Turn Type			Prot			pt+ov
Protected Phases	6		5	2	4	4 5
Permitted Phases						
Actuated Green, G (s)	49.0		9.0	63.0	40.4	54.4
Effective Green, g (s)	50.0		10.0	64.0	41.4	55.4
Actuated g/C Ratio	0.42		0.08	0.53	0.34	0.46
Clearance Time (s)	5.0		5.0	5.0	5.0	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	1365		283	1906	611	731
v/s Ratio Prot	c0.39		0.12	0.18	0.38	c0.70
v/s Ratio Perm						
v/c Ratio	0.94		1.45	0.34	1.11	1.51
Uniform Delay, d1	33.5		55.0	15.9	39.3	32.3
Progression Factor	1.00		1.00	1.00	1.01	1.01
Incremental Delay, d2	12.0		222.2	0.1	53.3	228.4
Delay (s)	45.4		277.2	16.0	92.9	261.2
Level of Service	D		F	B	F	F
Approach Delay (s)	45.4			118.0	205.3	
Approach LOS	D			F	F	

Intersection Summary			
HCM Average Control Delay	135.3	HCM Level of Service	F
HCM Volume to Capacity ratio	1.24		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	14.6
Intersection Capacity Utilization	122.8%	ICU Level of Service	H
Analysis Period (min)	15		

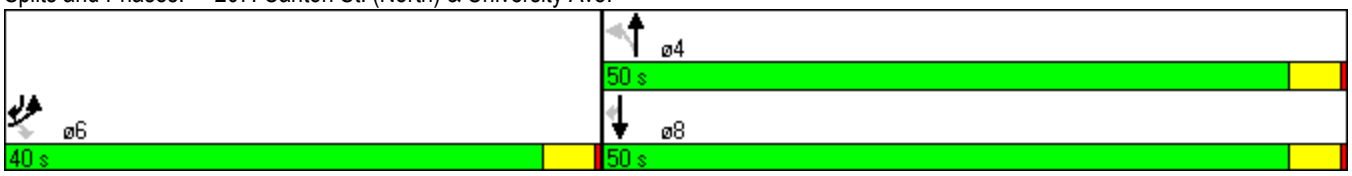
c Critical Lane Group

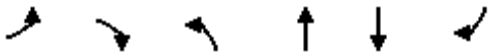


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	313	13	9	433	431	272
Lane Group Flow (vph)	340	14	10	471	468	296
Turn Type		Perm	Perm			pm+ov
Protected Phases	6			4	8	6
Permitted Phases		6	4			8
Detector Phase	6	6	4	4	8	6
Switch Phase						
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	20.0
Total Split (s)	40.0	40.0	50.0	50.0	50.0	40.0
Total Split (%)	44.4%	44.4%	55.6%	55.6%	55.6%	44.4%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	Max	Max	C-Max	C-Max	C-Max	Max
Act Effct Green (s)	37.0	37.0	47.0	47.0	47.0	90.0
Actuated g/C Ratio	0.41	0.41	0.52	0.52	0.52	1.00
v/c Ratio	0.46	0.02	0.03	0.48	0.48	0.19
Control Delay	21.9	7.8	10.8	15.8	23.2	0.2
Queue Delay	0.0	0.0	0.0	0.0	2.1	0.0
Total Delay	21.9	7.8	10.8	15.8	25.3	0.2
LOS	C	A	B	B	C	A
Approach Delay	21.3			15.7	15.6	
Approach LOS	C			B	B	
Queue Length 50th (ft)	137	0	3	161	235	0
Queue Length 95th (ft)	214	11	11	242	367	m1
Internal Link Dist (ft)	408			338	352	
Turn Bay Length (ft)						
Base Capacity (vph)	735	666	360	982	982	1599
Starvation Cap Reductn	0	0	0	0	363	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.46	0.02	0.03	0.48	0.76	0.19

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 90	
Offset: 0 (0%), Referenced to phase 4:NBTL and 8:SBT, Start of Green	
Natural Cycle: 40	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.48	
Intersection Signal Delay: 16.9	Intersection LOS: B
Intersection Capacity Utilization 46.8%	ICU Level of Service A
Analysis Period (min) 15	
m Volume for 95th percentile queue is metered by upstream signal.	

Splits and Phases: 207: Canton St. (North) & University Ave.





Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	313	13	9	433	431	272
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1787	1599	1787	1881	1881	1599
Flt Permitted	0.95	1.00	0.37	1.00	1.00	1.00
Satd. Flow (perm)	1787	1599	691	1881	1881	1599
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	340	14	10	471	468	296
RTOR Reduction (vph)	0	8	0	0	0	0
Lane Group Flow (vph)	340	6	10	471	468	296
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Turn Type		Perm	Perm			pm+ov
Protected Phases	6			4	8	6
Permitted Phases		6	4			8
Actuated Green, G (s)	36.0	36.0	46.0	46.0	46.0	82.0
Effective Green, g (s)	37.0	37.0	47.0	47.0	47.0	84.0
Actuated g/C Ratio	0.41	0.41	0.52	0.52	0.52	0.93
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	735	657	361	982	982	1599
v/s Ratio Prot	c0.19			c0.25	0.25	0.08
v/s Ratio Perm		0.00	0.01			0.11
v/c Ratio	0.46	0.01	0.03	0.48	0.48	0.19
Uniform Delay, d1	19.3	15.7	10.4	13.7	13.7	0.2
Progression Factor	1.00	1.00	1.00	1.00	1.56	1.00
Incremental Delay, d2	2.1	0.0	0.1	1.7	1.2	0.2
Delay (s)	21.4	15.7	10.6	15.4	22.6	0.4
Level of Service	C	B	B	B	C	A
Approach Delay (s)	21.1			15.3	14.0	
Approach LOS	C			B	B	

Intersection Summary			
HCM Average Control Delay	16.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	46.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	WBL	WBT	NBL	NBR	ø9
Lane Configurations						
Volume (vph)	429	224	537	491	254	
Lane Group Flow (vph)	987	243	584	534	276	
Turn Type		Prot			pt+ov	
Protected Phases	6	5	2	4	4 5	9
Permitted Phases						
Detector Phase	6	5	2	4	4 5	
Switch Phase						
Minimum Initial (s)	4.0	4.0	4.0	4.0		4.0
Minimum Split (s)	20.0	8.0	20.0	20.0		25.0
Total Split (s)	23.0	10.0	33.0	32.0	42.0	25.0
Total Split (%)	25.6%	11.1%	36.7%	35.6%	46.7%	28%
Yellow Time (s)	4.0	3.5	4.0	4.0		2.0
All-Red Time (s)	1.0	0.5	1.0	1.0		0.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	
Total Lost Time (s)	4.0	3.0	4.0	4.0	4.0	
Lead/Lag	Lead	Lag				
Lead-Lag Optimize?	Yes	Yes				
Recall Mode	None	None	None	C-Max		None
Act Effct Green (s)	31.3	11.8	46.1	30.9	45.7	
Actuated g/C Ratio	0.35	0.13	0.51	0.34	0.51	
v/c Ratio	0.74	0.53	0.32	0.87	0.29	
Control Delay	23.8	42.8	15.0	38.2	2.3	
Queue Delay	0.0	0.0	0.0	1.2	0.0	
Total Delay	23.9	42.8	15.0	39.5	2.3	
LOS	C	D	B	D	A	
Approach Delay	23.9		23.2	26.8		
Approach LOS	C		C	C		
Queue Length 50th (ft)	177	65	86	202	10	
Queue Length 95th (ft)	#385	#141	191	#492	42	
Internal Link Dist (ft)	649		762	352		
Turn Bay Length (ft)						
Base Capacity (vph)	1329	455	1830	614	948	
Starvation Cap Reductn	0	0	0	16	0	
Spillback Cap Reductn	11	4	0	0	0	
Storage Cap Reductn	0	0	0	0	0	
Reduced v/c Ratio	0.75	0.54	0.32	0.89	0.29	

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 90	
Offset: 0 (0%), Referenced to phase 4:NBL, Start of Green, Master Intersection	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.87	
Intersection Signal Delay: 24.6	Intersection LOS: C
Intersection Capacity Utilization 70.8%	ICU Level of Service C
Analysis Period (min) 15	
# 95th percentile volume exceeds capacity, queue may be longer.	

Queue shown is maximum after two cycles.

Splits and Phases: 304: University Ave. & Canton St. (South)

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	429	479	224	537	491	254
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		3.0	4.0	4.0	4.0
Lane Util. Factor	0.95		0.97	0.95	1.00	1.00
Frt	0.92		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	3291		3467	3574	1787	1599
Flt Permitted	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	3291		3467	3574	1787	1599
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	466	521	243	584	534	276
RTOR Reduction (vph)	185	0	0	0	0	150
Lane Group Flow (vph)	802	0	243	584	534	126
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Turn Type			Prot			pt+ov
Protected Phases	6		5	2	4	4 5
Permitted Phases						
Actuated Green, G (s)	30.3		10.8	45.1	28.3	43.1
Effective Green, g (s)	31.3		11.8	46.1	29.3	41.1
Actuated g/C Ratio	0.35		0.13	0.51	0.33	0.46
Clearance Time (s)	5.0		4.0	5.0	5.0	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	1145		455	1831	582	730
v/s Ratio Prot	c0.24		c0.07	0.16	c0.30	0.08
v/s Ratio Perm						
v/c Ratio	0.70		0.53	0.32	0.92	0.17
Uniform Delay, d1	25.3		36.5	12.8	29.2	14.4
Progression Factor	1.00		1.00	1.00	0.78	0.81
Incremental Delay, d2	2.0		1.2	0.1	20.0	0.1
Delay (s)	27.3		37.7	12.9	42.7	11.7
Level of Service	C		D	B	D	B
Approach Delay (s)	27.3			20.2	32.1	
Approach LOS	C			C	C	

Intersection Summary			
HCM Average Control Delay	26.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	17.6
Intersection Capacity Utilization	70.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group