

## **APPENDIX C**

### **Synchro 6.0 Analysis Reports: Future Year (2010) AM and PM Peak Hour Intersection Capacity Analyses**

1. Washington Street at Norman/New Derby Street
2. Washington Street at Canal Street/Mill Street
3. Margin Street at Mill Street
4. Essex Street at North/Summer Street
5. Derby Street at Congress Street/Hawthorne Boulevard
6. Essex Street at Hawthorne Boulevard/Washington Square West
7. Lafayette Street at Washington Street
8. Lafayette Street at Harbor Street
9. Lafayette Street at Derby Street
10. Bridge Street at Washington Street
11. Washington Street at Essex Street

Washington St @ Norman/New Derby St  
AM Peak Hour

Future w/o Improvements



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↑	↗		↕		↘	↑↑	↗	↘	↑	↗
Volume (vph)	32	282	326	49	232	88	224	612	172	132	229	169
Confl. Peds. (#/hr)	10		18	18		10	12		8	8		12
Confl. Bikes (#/hr)									1			
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
Growth Factor	106%	106%	106%	106%	106%	106%	106%	106%	106%	106%	106%	106%
Heavy Vehicles (%)	3%	3%	3%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												40
Mid-Block Traffic (%)		0%			0%			0%			0%	
Turn Type	Perm		Perm	pm+pt			Prot		Perm	Prot		Perm
Protected Phases		2		1	6		3	8		7	4	
Permitted Phases	2		2	6					8			4
Detector Phases	2	2	2	1	6		3	8	8	7	4	4
Minimum Initial (s)	4.0	4.0	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	21.0	9.0	21.0		9.5	21.0	21.0	9.0	21.0	21.0
Total Split (s)	35.0	35.0	35.0	20.0	55.0	0.0	35.0	44.0	44.0	24.0	33.0	33.0
Total Split (%)	23.3%	23.3%	23.3%	13.3%	36.7%	0.0%	23.3%	29.3%	29.3%	16.0%	22.0%	22.0%
Yellow Time (s)	5.0	5.0	5.0	3.0	5.0		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	1.0	1.0	1.0	1.0	1.0
Lead/Lag	Lag	Lag	Lag	Lead			Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?												
Recall Mode	None	None	None	None	None		None	None	None	None	None	None
Act Effct Green (s)	30.5	30.5	30.5		30.5		22.9	33.2	33.2	14.6	20.5	20.5
Actuated g/C Ratio	0.32	0.32	0.32		0.32		0.24	0.35	0.35	0.15	0.21	0.21
v/c Ratio	0.13	0.60	0.54		0.67		0.74	0.63	0.32	0.63	0.72	0.54
Control Delay	32.3	35.7	6.2		34.8		45.4	34.8	7.0	51.4	45.4	10.7
Queue Delay	0.0	0.0	0.0		0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	32.3	35.7	6.2		34.8		45.4	34.8	7.0	51.4	45.4	10.7
LOS	C	D	A		C		D	C	A	D	D	B
Approach Delay		20.5			34.8			32.4			35.8	
Approach LOS		C			C			C			D	

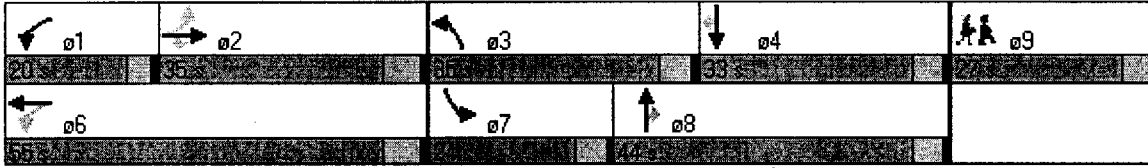
Intersection Summary

Cycle Length: 150  
 Actuated Cycle Length: 95.7  
 Natural Cycle: 100  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.74  
 Intersection Signal Delay: 30.5  
 Intersection Capacity Utilization 74.2%  
 Analysis Period (min) 15  
 Intersection LOS: C  
 ICU Level of Service D

Washington St @ Norman/New Derby St  
 AM Peak Hour

Future w/o Improvements

Splits and Phases: 1: Norman St & Washington St



Lane Group	09
Lane Configurations	
Volume (vph)	
Confl. Peds. (#/hr)	
Confl. Bikes (#/hr)	
Peak Hour Factor	
Growth Factor	
Heavy Vehicles (%)	
Bus Blockages (#/hr)	
Parking (#/hr)	
Mid-Block Traffic (%)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phases	
Minimum Initial (s)	4.0
Minimum Split (s)	27.0
Total Split (s)	27.0
Total Split (%)	18%
Yellow Time (s)	4.0
All-Red Time (s)	1.0
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	

Intersection Summary

Washington St. @ Norman/New Derby St.  
PM Peak Hour

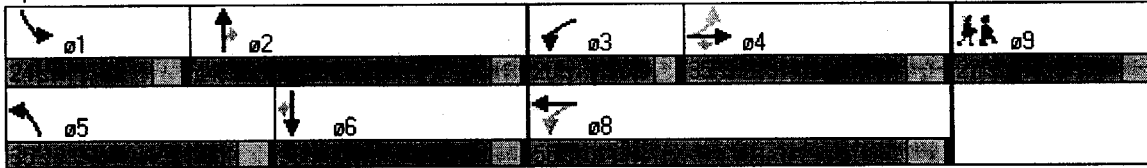
Future w/o Improvements



Lane Configurations	↖	↑	↗	↔	↖	↑↑	↗	↖	↑	↗		
Volume (vph)	39	237	436	59	335	135	242	503	208	136	260	158
Confl. Peds. (#/hr)	25		15	15		25	15		10	10		15
Confl. Bikes (#/hr)									1			
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	106%	106%	106%	106%	106%	106%	106%	106%	106%	106%	106%	106%
Heavy Vehicles (%)	2%	2%	2%	3%	3%	3%	1%	1%	1%	1%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												40
Mid-Block Traffic (%)		0%			0%			0%			0%	
Turn Type	Perm		Perm	pm+pt		Prot		Perm	Prot		Perm	
Protected Phases		4		3	8	5	2		1		6	
Permitted Phases	4		4	8				2				6
Detector Phases	4	4	4	3	8	5	2	2	1		6	6
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	22.0	22.0	22.0	10.0	22.5	10.0	21.0	21.0	10.0	21.0	21.0	21.0
Total Split (s)	35.0	35.0	35.0	20.0	55.0	0.0	35.0	44.0	44.0	24.0	33.0	33.0
Total Split (%)	23.3%	23.3%	23.3%	13.3%	36.7%	0.0%	23.3%	29.3%	29.3%	16.0%	22.0%	22.0%
Yellow Time (s)	5.0	5.0	5.0	3.0	5.0	4.0	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	1.0	1.0	1.0	1.0	1.0	1.0
Lead/Lag	Lag	Lag	Lag	Lead		Lead	Lag	Lag	Lead	Lag	Lag	Lag
Lead-Lag Optimize?												
Recall Mode	None	None	None	None	None	None	None	None	None	None	None	None
Act Effort Green (s)	38.5	38.5	38.5		38.5	26.3	39.7	39.7	15.9	24.5	24.5	
Actuated g/C Ratio	0.33	0.33	0.33		0.33	0.23	0.34	0.34	0.13	0.21	0.21	
v/c Ratio	0.19	0.48	0.62		0.88	0.83	0.51	0.37	0.70	0.81	0.51	
Control Delay	35.9	37.1	6.4		44.8	58.3	40.8	6.9	63.5	57.7	11.6	
Queue Delay	0.0	0.0	0.1		0.1	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	35.9	37.1	6.4		44.9	58.3	40.8	6.9	63.5	57.7	11.6	
LOS	D	D	A		D	E	D	A	E	E	B	
Approach Delay		18.3			44.9		37.9				46.0	
Approach LOS		B			D		D				D	

Cycle Length: 150  
 Actuated Cycle Length: 116.3  
 Natural Cycle: 100  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.88  
 Intersection Signal Delay: 35.8  
 Intersection LOS: D  
 Intersection Capacity Utilization 80.3%  
 ICU Level of Service D  
 Analysis Period (min) 15

Splits and Phases: 1: Norman St & Washington St



**Lane Configurations**

Volume (vph)

Conf. Peds. (#/hr)

Conf. Bikes (#/hr)

Peak Hour Factor

Growth Factor

Heavy Vehicles (%)

Bus Blockages (#/hr)

Parking (#/hr)

Mid-Block Traffic (%)

Turn Type

Protected Phases 9

Permitted Phases

Detector Phases

Minimum Initial (s) 4.0

Minimum Split (s) 27.0

Total Split (s) 27.0

Total Split (%) 18%

Yellow Time (s) 4.0

All-Red Time (s) 1.0

Lead/Lag

Lead-Lag Optimize?

Recall Mode None

Act Effect Green (s)

Actuated g/C Ratio

v/c Ratio

Control Delay

Queue Delay

Total Delay

LOS

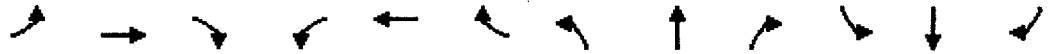
Approach Delay

Approach LOS

**Intersection Summary**

Washington St @ Canal/Mill St  
AM Peak Hour

Future w/o Improvements

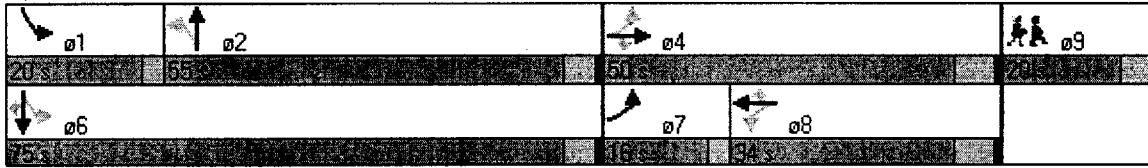


Lane Group	EB	EB1	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SB1	SE1	SBR
Lane Configurations	↘	↑	↗		↖	↗		↕		↘	↑	↗
Volume (vph)	158	252	230	12	188	334	198	546	42	208	362	34
Confl. Peds. (#/hr)	5		12	12		5	4		6	6		4
Confl. Bikes (#/hr)						2						1
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Growth Factor	106%	106%	106%	106%	106%	106%	106%	106%	106%	106%	106%	106%
Heavy Vehicles (%)	3%	3%	3%	2%	2%	2%	3%	3%	3%	3%	3%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)						0		0	0			
Mid-Block Traffic (%)		0%			0%			0%			0%	
Turn Type	pm+pt		Perm	Perm		Perm	Perm			pm+pt		Perm
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4		4	8		8	2			6		6
Detector Phases	7	4	4	8	8	8	2	2		1	6	6
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Minimum Split (s)	8.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0		8.0	20.0	20.0
Total Split (s)	16.0	50.0	50.0	34.0	34.0	34.0	55.0	55.0	0.0	20.0	75.0	75.0
Total Split (%)	11.0%	34.5%	34.5%	23.4%	23.4%	23.4%	37.9%	37.9%	0.0%	13.8%	51.7%	51.7%
Yellow Time (s)	3.0	5.0	5.0	5.0	5.0	5.0	4.0	4.0		3.0	4.0	4.0
All-Red Time (s)	0.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0		0.0	1.0	1.0
Lead/Lag	Lead			Lag	Lag	Lag	Lag	Lag		Lead		
Lead-Lag Optimize?	Yes			Yes	Yes	Yes	Yes	Yes		Yes		
Recall Mode	None	None	None	None	None	None	None	None		None	None	None
Act Effct Green (s)	38.7	38.7	38.7		23.1	23.1		51.5		71.7	71.7	71.7
Actuated g/C Ratio	0.32	0.32	0.32		0.19	0.19		0.42		0.59	0.59	0.59
v/c Ratio	0.67	0.54	0.43		0.74	0.69		1.09		0.86	0.42	0.05
Control Delay	46.0	38.0	5.8		54.3	10.1		94.1		59.7	17.6	5.1
Queue Delay	0.0	0.0	0.0		0.0	0.0		0.0		0.0	0.5	0.0
Total Delay	46.0	38.0	5.8		54.3	10.1		94.1		59.7	18.1	5.1
LOS	D	D	A		D	B		F		E	B	A
Approach Delay		28.4			26.7			94.1			31.7	
Approach LOS		C			C			F			C	

Intersection Summary

Cycle Length: 145  
 Actuated Cycle Length: 121.8  
 Natural Cycle: 140  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 1.09  
 Intersection Signal Delay: 48.9  
 Intersection Capacity Utilization 90.1%  
 Analysis Period (min) 15  
 Intersection LOS: D  
 ICU Level of Service E

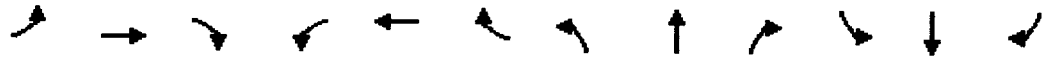
Splits and Phases: 2: Mill St & Washington St



Lane Group	
Lane Configurations	
Volume (vph)	
Confl. Peds. (#/hr)	
Confl. Bikes (#/hr)	
Peak Hour Factor	
Growth Factor	
Heavy Vehicles (%)	
Bus Blockages (#/hr)	
Parking (#/hr)	
Mid-Block Traffic (%)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phases	
Minimum Initial (s)	4.0
Minimum Split (s)	20.0
Total Split (s)	20.0
Total Split (%)	14%
Yellow Time (s)	4.0
All-Red Time (s)	1.0
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effect Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Intersection Summary	

Washington St. @ Canal St./Mill St.  
PM Peak Hour

Future w/o Improvements

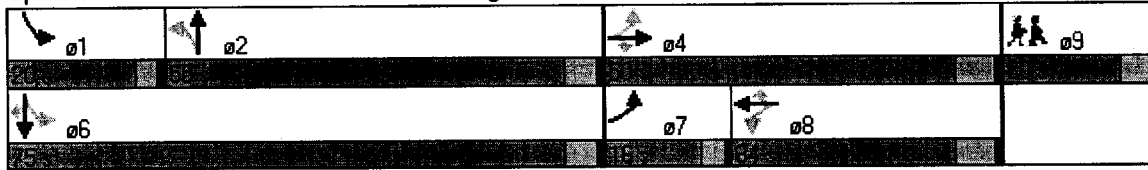


Lane Configurations	↖	↑	↗	↖	←	↖	↖	↕	↗	↑	↗	
Volume (vph)	164	219	382	11	185	306	168	526	45	228	465	72
Confl. Peds. (#/hr)	10		15	15		10	7		7	7		7
Confl. Bikes (#/hr)						2						1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	106%	106%	106%	106%	106%	106%	106%	106%	106%	106%	106%	106%
Heavy Vehicles (%)	1%	1%	1%	2%	2%	2%	1%	1%	1%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)						0		0	0			
Mid-Block Traffic (%)		0%			0%			0%				0%
Turn Type	pm+pt		Perm	Perm		Perm	Perm		pm+pt		Perm	
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4		4	8		8	2		6		6	
Detector Phases	7	4	4	8	8	8	2	2	1	6	6	
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	8.0	20.0	20.0	20.0	20.0	20.0	21.0	21.0	8.0	21.0	21.0	
Total Split (s)	16.0	50.0	50.0	34.0	34.0	34.0	55.0	55.0	0.0	20.0	75.0	75.0
Total Split (%)	11.0%	34.5%	34.5%	23.4%	23.4%	23.4%	37.9%	37.9%	0.0%	13.8%	51.7%	51.7%
Yellow Time (s)	3.0	5.0	5.0	5.0	5.0	5.0	4.0	4.0	3.0	4.0	4.0	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lead/Lag	Lead			Lag	Lag	Lag	Lag	Lag		Lead		
Lead-Lag Optimize?												
Recall Mode	None	None	None	None	None	None	None	None	None	None	None	None
Act Effct Green (s)	38.9	38.9	38.9		23.0	23.0		51.8		72.1	72.1	72.1
Actuated g/C Ratio	0.31	0.31	0.31		0.18	0.18		0.41		0.57	0.57	0.57
v/c Ratio	0.68	0.47	0.60		0.73	0.67		1.12		0.89	0.54	0.10
Control Delay	49.0	38.7	7.0		56.7	10.4		104.7		58.8	22.6	4.3
Queue Delay	0.0	0.0	0.0		0.0	0.0		0.0		0.0	1.1	0.0
Total Delay	49.0	38.7	7.0		56.7	10.4		104.7		58.8	23.8	4.3
LOS	D	D	A		E	B		F		E	C	A
Approach Delay		25.1			28.4			104.7			32.4	
Approach LOS		C			C			F			C	

Cycle Length: 145  
 Actuated Cycle Length: 126.1  
 Natural Cycle: 140  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 1.12  
 Intersection Signal Delay: 48.9  
 Intersection Capacity Utilization 92.8%  
 Analysis Period (min) 15  
 Intersection LOS: D  
 ICU Level of Service F



Splits and Phases: 2: Mill St & Washington St



**Lamp Configurations**

Volume (vph)

Confl. Peds. (#/hr)

Confl. Bikes (#/hr)

Peak Hour Factor

Growth Factor

Heavy Vehicles (%)

Bus Blockages (#/hr)

Parking (#/hr)

Mid-Block Traffic (%)

Turn Type

Protected Phases 9

Permitted Phases

Detector Phases

Minimum Initial (s) 4.0

Minimum Split (s) 20.0

Total Split (s) 20.0

Total Split (%) 14%

Yellow Time (s) 4.0

All-Red Time (s) 1.0

Lead/Lag

Lead-Lag Optimize?

Recall Mode None

Act Effct Green (s)

Actuated g/C Ratio

v/c Ratio

Control Delay

Queue Delay

Total Delay

LOS

Approach Delay

Approach LOS

**Intersection Summary**



Lane Configurations	↖				↗	↑
Sign Control	Stop		Free		Free	Free
Grade	0%		0%		0%	0%
Volume (veh/h)	420	0	0	0	330	306
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	474	0	0	0	372	345
Pedestrians	3					2
Lane Width (ft)	12.0					12.0
Walking Speed (ft/s)	4.0					4.0
Passive Blockage	0					0
Right turn flare (veh)						
Median type	None					
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1092	5			3	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1092	5			3	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
FC, (s)	3.5	3.3			2.2	
p0 queue free %	0	100			77	
Capacity (veh/h)	182	1074			1615	
Volume Total	474	372	345			
Volume Left	474	372	0			
Volume Right	0	0	0			
cSH	182	1615	1700			
Volume to Capacity	2.60	0.23	0.20			
Queue Length 95th (ft)	1020	22	0			
Control Delay (s)	775.3	7.9	0.0			
Lane LOS	F	A				
Approach Delay (s)	775.3	4.1				
Approach LOS	F					
Average Delay		310.8				
Intersection Capacity Utilization		80.2%			ICU Level of Service	D
Analysis Period (min)		15				



Lane Configurations	↖		↗		↑	
Sign Control	Stop		Free		Free	Free
Grade	0%		0%		0%	0%
Volume (veh/h)	425	0	0	0	363	345
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	474	0	0	0	405	385
Pedestrians	3					4
Lane Width (ft)	12.0					12.0
Walking Speed (ft/s)	4.0					4.0
Percent Blockage	0					0
Right turn flare (veh)						
Median type	None					
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1198	7			3	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1198	7			3	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	0	100			75	
cM capacity (veh/h)	153	1069			1622	

Volume Total	474	405	385
Volume Left	474	405	0
Volume Right	0	0	0
cSH	153	1622	1700
Volume to Capacity	3.09	0.25	0.23
Queue Length 95th (ft)	Err	25	0
Control Delay (s)	Err	8.0	0.0
Lane LOS	F	A	
Approach Delay (s)	Err	4.1	
Approach LOS	F		

Average Delay	3753.3		
Intersection Capacity Utilization	89.3%	ICU Level of Service	E
Analysis Period (min)	15		

North/Summer St @ Essex St  
AM Peak Hour

Future w/o Improvements



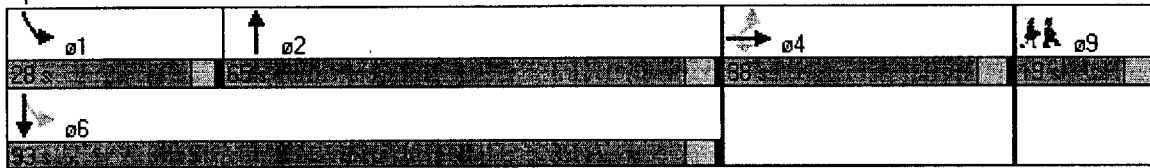
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBF
Lane Configurations		↕	↗					↖		↕	↖	
Volume (vph)	238	48	113	0	0	0	0	578	40	198	751	74
Confl. Peds. (#/hr)	20		28	28		20	5		12	12		5
Confl. Bikes (#/hr)												
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Growth Factor	106%	106%	106%	106%	106%	106%	106%	106%	106%	106%	106%	106%
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	2%	2%	2%	3%	3%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)	0	0	0						0			
Mid-Block Traffic (%)		0%			0%			0%			0%	
Turn Type	Perm		Perm							pm+pt		
Protected Phases		4						2		1	6	
Permitted Phases	4		4					2		6		
Detector Phases	4	4	4					2		1	6	
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		9.0	20.0	
Total Split (s)	38.0	38.0	38.0	0.0	0.0	0.0	0.0	65.0	0.0	28.0	93.0	0.0
Total Split (%)	25.3%	25.3%	25.3%	0.0%	0.0%	0.0%	0.0%	43.3%	0.0%	18.7%	62.0%	0.0%
Yellow Time (s)	4.0	4.0	4.0					4.0		3.0	4.0	
All-Red Time (s)	1.0	1.0	1.0					1.0		1.0	1.0	
Lead/Lag								Lag		Lead		
Lead-Lag Optimize?								Yes		Yes		
Recall Mode	None	None	None					None		None	None	
Act Effct Green (s)		34.3	34.3					61.7		83.8	83.8	
Actuated g/C Ratio		0.26	0.26					0.46		0.63	0.63	
v/c Ratio		0.88	0.37					0.90		0.84	0.90	
Control Delay		73.2	30.7					51.1		48.5	33.5	
Queue Delay		0.0	0.0					0.0		0.0	0.0	
Total Delay		73.2	30.7					51.1		48.5	33.5	
LOS		E	C					D		D	C	
Approach Delay		61.1						51.1			36.4	
Approach LOS		E						D			D	

**Intersection Summary**

Cycle Length: 150  
 Actuated Cycle Length: 132.9  
 Natural Cycle: 130  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.90  
 Intersection Signal Delay: 45.7  
 Intersection Capacity Utilization 86.8%  
 Analysis Period (min) 15

Intersection LOS: D  
 ICU Level of Service E

Splits and Phases: 14: Essex St & North St



Lane Group	09
Lane Configurations	
Volume (vph)	
Confl. Peds. (#/hr)	
Confl. Bikes (#/hr)	
Peak Hour Factor	
Growth Factor	
Heavy Vehicles (%)	
Bus Blockages (#/hr)	
Parking (#/hr)	
Mid-Block Traffic (%)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phases	
Minimum Initial (s)	4.0
Minimum Split (s)	19.0
Total Split (s)	19.0
Total Split (%)	13%
Yellow Time (s)	4.0
All-Red Time (s)	1.0
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	

**Intersection Summary**

North/Summer St. @ Essex St.  
PM Peak Hour

Future w/o Improvements



LANE GROUP	ESSEX ST											
Lane Configurations		4	4					4	4	4	4	4
Volume (vph)	233	66	93	0	0	0	0	602	63	192	786	60
Confl. Peds. (#/hr)	40		24	24		40	6		12	12		6
Confl. Bikes (#/hr)												
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	106%	106%	106%	106%	106%	106%	106%	106%	106%	106%	106%	106%
Heavy Vehicles (%)	0%	0%	0%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)	0	0	0						0			
Mid-Block Traffic (%)		0%						0%				0%
Turn Type	Perm		Perm							pm+pt		
Protected Phases		4						2		1	6	
Permitted Phases	4		4					2		6		
Detector Phases	4	4	4					2		1	6	
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		9.0	20.0	
Total Split (s)	38.0	38.0	38.0	0.0	0.0	0.0	0.0	65.0	0.0	28.0	93.0	0.0
Total Split (%)	25.3%	25.3%	25.3%	0.0%	0.0%	0.0%	0.0%	43.3%	0.0%	18.7%	62.0%	0.0%
Yellow Time (s)	4.0	4.0	4.0					4.0		3.0	4.0	
All-Red Time (s)	1.0	1.0	1.0					1.0		1.0	1.0	
Lead/Lag								Lag		Lead		
Lead-Lag Optimize?								Yes		Yes		
Recall Mode	None	None	None					None		None	None	
Act Effct Green (s)		34.4	34.4					61.8		83.0	83.0	
Actuated g/C Ratio		0.26	0.26					0.47		0.63	0.63	
v/c Ratio		0.93	0.30					0.95		0.82	0.90	
Control Delay		81.6	30.5					57.6		45.2	33.0	
Queue Delay		0.0	0.0					0.0		0.0	0.0	
Total Delay		81.6	30.5					57.6		45.2	33.0	
LOS		F	C					E		D	C	
Approach Delay		69.5						57.6			35.3	
Approach LOS		E						E			D	

Cycle Length: 150  
 Actuated Cycle Length: 132.2  
 Natural Cycle: 140  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.95  
 Intersection Signal Delay: 48.7  
 Intersection Capacity Utilization 90.4%  
 Analysis Period (min) 15  
 Intersection LOS: D  
 ICU Level of Service E

Splits and Phases: 14: Essex St & North St

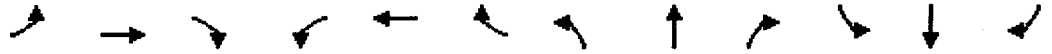


<b>Lane Configurations</b>	
<b>Volume (vph)</b>	
<b>Confl. Peds. (#/hr)</b>	
<b>Confl. Bikes (#/hr)</b>	
<b>Peak Hour Factor</b>	
<b>Growth Factor</b>	
<b>Heavy Vehicles (%)</b>	
<b>Bus Blockages (#/hr)</b>	
<b>Parking (#/hr)</b>	
<b>Mid-Block Traffic (%)</b>	
<b>Turn Type</b>	
<b>Protected Phases</b>	9
<b>Permitted Phases</b>	
<b>Detector Phases</b>	
<b>Minimum Initial (s)</b>	4.0
<b>Minimum Split (s)</b>	19.0
<b>Total Split (s)</b>	19.0
<b>Total Split (%)</b>	13%
<b>Yellow Time (s)</b>	4.0
<b>All-Red Time (s)</b>	1.0
<b>Lead/Lag</b>	
<b>Lead-Lag Optimize?</b>	
<b>Recall Mode</b>	None
<b>Act Effct Green (s)</b>	
<b>Actuated g/C Ratio</b>	
<b>v/c Ratio</b>	
<b>Control Delay</b>	
<b>Queue Delay</b>	
<b>Total Delay</b>	
<b>LOS</b>	
<b>Approach Delay</b>	
<b>Approach LOS</b>	

**Intersection Summary**

Derby St @ Congress St/Hawthorne Blvd  
AM Peak Hour

Future w/o Improvements



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SB	SBT	SBR
Lane Configurations	↖	↑			↙	↘	↑	↗	↖		↙	↘
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	398	236	115	78	63	15	40	102	90	12	239	570
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
Hourly flow rate (vph)	449	266	130	88	71	17	45	115	101	14	270	643

Direction/Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	S	SB 2
Volume Total (vph)	449	396	159	17	160	101	283	643
Volume Left (vph)	449	0	88	0	45	0	14	0
Volume Right (vph)	0	130	0	17	0	101	0	643
Hadj (s)	0.57	-0.16	0.29	-0.68	0.21	-0.63	0.07	-0.65
Departure Headway (s)	8.3	7.6	9.3	8.3	9.0	8.2	7.9	7.2
Degree Utilization, x	1.04	0.84	0.41	0.04	0.40	0.23	0.62	1.29
Capacity (veh/h)	436	467	370	416	382	427	448	506
Control Delay (s)	81.6	37.7	17.4	10.5	16.7	12.4	22.0	166.1
Approach Delay (s)	61.0		16.7		15.1		122.0	
Approach LOS	F		C		C		F	

Delay	77.6		
HCM Level of Service	F		
Intersection Capacity Utilization	74.9%	ICU Level of Service	D
Analysis Period (min)	15		



Derby St @ Congress St/Hawthorne Blvd  
PM Peak Hour

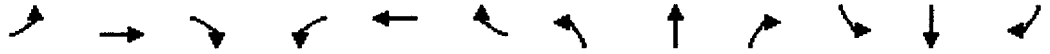
Future w/o Improvements



	EB	WB	NB	SB	EB	WB	NB	SB	EB	WB	NB	SB	
Lane Configurations	↖	↗	↖	↗	↖	↗	↖	↗	↖	↗	↖	↗	
Sign Control	Stop		Stop		Stop		Stop		Stop		Stop		
Volume (vph)	372	281	46	27	78	16	127	228	153	20	150	545	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	
Hourly flow rate (vph)	415	314	51	30	87	18	142	254	171	22	167	608	
Volume Total (vph)	415	365	117	18	396	171	190	608					
Volume Left (vph)	415	0	30	0	142	0	22	0					
Volume Right (vph)	0	51	0	18	0	171	0	608					
Hadj (s)	0.53	-0.06	0.15	-0.68	0.21	-0.67	0.09	-0.67					
Departure Headway (s)	8.7	8.2	9.8	9.0	8.8	7.9	8.5	7.7					
Degree Utilization, x	1.01	0.83	0.32	0.04	0.97	0.38	0.45	1.31					
Capacity (veh/h)	415	436	346	384	396	446	404	472					
Control Delay (s)	75.0	38.4	16.0	11.2	65.6	14.4	16.9	174.9					
Approach Delay (s)	57.9		15.4		50.2		137.3						
Approach LOS	F		C		F		F						
Delay	81.3												
HCM Level of Service	F												
Intersection Capacity Utilization	81.3%						ICU Level of Service						D
Analysis Period (min)	15												

Hawthorne Blvd @ Essex St  
AM Peak Hour

Future w/o Improvements



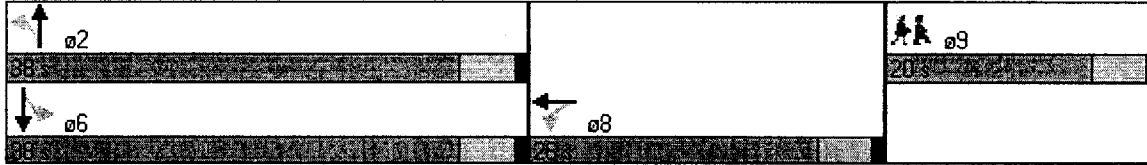
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	INB	NET	NBR	SBL	SEB	SBR
Lane Configurations					↕			↕			↕	
Volume (vph)	0	0	0	258	18	44	23	448	49	14	552	4
Confl. Peds. (#/hr)	30		10	10		30	8		7	7		8
Confl. Bikes (#/hr)									1			1
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Growth Factor	106%	106%	106%	106%	106%	106%	106%	106%	106%	106%	106%	106%
Heavy Vehicles (%)	0%	0%	0%	1%	1%	1%	3%	3%	3%	3%	3%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)				0	0	0	0	0	0	0	0	0
Mid-Block Traffic (%)		0%			0%			0%			0%	
Turn Type				Perm			Perm			Perm		
Protected Phases					8			2			6	
Permitted Phases				8			2	2		6	6	
Detector Phases				8	8		2	2		6	6	
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)	0.0	0.0	0.0	26.0	26.0	0.0	38.0	38.0	0.0	38.0	38.0	0.0
Total Split (%)	0.0%	0.0%	0.0%	31.0%	31.0%	0.0%	45.2%	45.2%	0.0%	45.2%	45.2%	0.0%
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	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode				None	None		None	None		None	None	
Act Effct Green (s)					21.9			34.4			34.4	
Actuated g/C Ratio					0.32			0.51			0.51	
v/c Ratio					0.79			0.81			0.86	
Control Delay					36.0			27.3			31.0	
Queue Delay					0.0			0.0			0.0	
Total Delay					36.0			27.3			31.0	
LOS					D			C			C	
Approach Delay					36.0			27.3			31.0	
Approach LOS					D			C			C	

**Intersection Summary**

Cycle Length: 84  
 Actuated Cycle Length: 67.7  
 Natural Cycle: 90  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.86  
 Intersection Signal Delay: 30.7  
 Intersection Capacity Utilization 79.3%  
 Analysis Period (min) 15

Intersection LOS: C  
 ICU Level of Service D

Splits and Phases: 11: Essex St & Washington Sq W



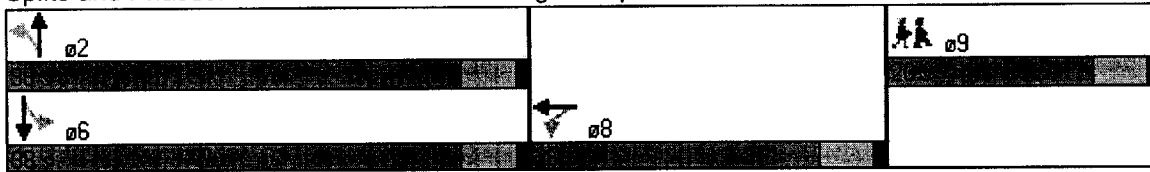
Lane Group	09
Lane Configurations	
Volume (vph)	
Confl. Peds. (#/hr)	
Confl. Bikes (#/hr)	
Peak Hour Factor	
Growth Factor	
Heavy Vehicles (%)	
Bus Blockages (#/hr)	
Parking (#/hr)	
Mid-Block Traffic (%)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phases	
Minimum Initial (s)	4.0
Minimum Split (s)	20.0
Total Split (s)	20.0
Total Split (%)	24%
Yellow Time (s)	4.0
All-Red Time (s)	1.0
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
<b>Intersection Summary</b>	



Lane Configurations					↕					↕					↕
Volume (vph)	0	0	0	167	14	41	21	535	69	30	524	16			
Confl. Peds. (#/hr)	54		24	24		54	9		7	7		9			
Confl. Bikes (#/hr)									1			1			
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95			
Growth Factor	106%	106%	106%	106%	106%	106%	106%	106%	106%	106%	106%	106%			
Heavy Vehicles (%)	0%	0%	0%	1%	0%	1%	0%	2%	2%	2%	2%	0%			
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0			
Parking (#/hr)				0	0	0	0	0	0	0	0	0			
Mid-Block Traffic (%)		0%			0%			0%				0%			
Turn Type					Perm					Perm					Perm
Protected Phases					8					2					6
Permitted Phases					8					2	2			6	6
Detector Phases					8	8			2	2			6	6	
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)	0.0	0.0	0.0	26.0	26.0	0.0	38.0	38.0	0.0	38.0	38.0	0.0			
Total Split (%)	0.0%	0.0%	0.0%	31.0%	31.0%	0.0%	45.2%	45.2%	0.0%	45.2%	45.2%	0.0%			
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	
Lead/Lag															
Lead-Lag Optimize?															
Recall Mode					None	None			None	None			None	None	
Act Effct Green (s)					17.0					35.7					35.7
Actuated g/C Ratio					0.24					0.50			0.50		
v/c Ratio					0.74					0.96			0.96		
Control Delay					32.8					50.5			42.0		
Queue Delay					0.0					0.0			0.0		
Total Delay					32.8					50.5			42.0		
LOS					C					D			D		
Approach Delay					32.8					50.5			42.0		
Approach LOS					C					D			D		

Cycle Length: 84  
 Actuated Cycle Length: 71.4  
 Natural Cycle: 90  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.96  
 Intersection Signal Delay: 44.3  
 Intersection LOS: D  
 Intersection Capacity Utilization 77.3%  
 ICU Level of Service D  
 Analysis Period (min) 15

Splits and Phases: 11: Essex St & Washington Sq W



Lane Configurations

Volume (vph)

Confl. Peds. (#/hr)

Confl. Bikes (#/hr)

Peak Hour Factor

Growth Factor

Heavy Vehicles (%)

Bus Blockages (#/hr)

Parking (#/hr)

Mid-Block Traffic (%)

Turn Type

Protected Phases 9

Permitted Phases

Detector Phases

Minimum Initial (s) 4.0

Minimum Split (s) 20.0

Total Split (s) 20.0

Total Split (%) 24%

Yellow Time (s) 4.0

All-Red Time (s) 1.0

Lead/Lag

Lead-Lag Optimize?

Recall Mode None

Act Effect Green (s)

Actuated g/C Ratio

v/c Ratio

Control Delay

Queue Delay

Total Delay

LOS

Approach Delay

Approach LOS

Intersection Summary

Lafayette St @ Washington St  
AM Peak Hour

Future w/o Improvements



Movement	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SEB
Lane Configurations			↔	↔		↔	↔				↔
Sign Control	Stop		Free			Free			Stop		
Grade	0%		0%			0%			0%		
Volume (veh/h)	0	0	421	509	45	26	495	0	6	6	350
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
Hourly flow rate (vph)	0	0	475	574	51	29	558	0	7	7	395
Pedestrians	19										
Lane Width (ft)	0.0										
Walking Speed (ft/s)	4.0										
Percent Blockage	0										
Right turn flare (veh)											
Median type	None					None					
Median storage (veh)											
Upstream signal (ft)						165					
pX, platoon unblocked	0.78	0.78	0.78				0.78	0.78	0.78		
vC, conflicting volume	2583	2185	558				644	2140	2210	558	
vC1, stage 1 conf vol											
vC2, stage 2 conf vol											
vCu, unblocked vol	3038	2526	431				644	2468	2558	431	
tC, single (s)	7.1	6.5	4.1				4.1	7.1	6.5	6.2	
tC, 2 stage (s)											
tF (s)	3.5	4.0	2.2				2.2	3.5	4.0	3.3	
p0 queue free %	100	100	46				97	25	27	19	
cM capacity (veh/h)	0	10	876				951	9	9	485	

Volume Total	475	625	29	558	14	395					
Volume Left	475	0	29	0	7	0					
Volume Right	0	51	0	0	0	395					
cSH	876	1700	951	1700	9	485					
Volume to Capacity	0.54	0.37	0.03	0.33	1.48	0.81					
Queue Length 95th (ft)	83	0	2	0	64	194					
Control Delay (s)	13.9	0.0	8.9	0.0	1028.6	37.5					
Lane LOS	B		A		F	E					
Approach Delay (s)	6.0		0.4		70.3						
Approach LOS					F						

Intersection Summary		
Average Delay	17.0	
Intersection Capacity Utilization	65.7%	ICU Level of Service C
Analysis Period (min)	15	

Lafayette St. @ Washington St.  
PM Peak Hour

Future w/o Improvements



Lane Configurations	←		↑		→		↘		↙		
Sign Control	Stop		Free		Free		Stop		Stop		
Grade	0%		0%		0%		0%		0%		
Volume (veh/h)	0	0	351	490	51	46	596	0	4	4	364
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	0	392	547	57	51	665	0	4	4	406
Pedestrians	38										
Lane Width (ft)	0.0										
Walking Speed (ft/s)	4.0										
Percent Blockage	0										
Right turn flare (veh)	0										
Median type	None										
Median storage veh	0										
Upstream signal (ft)	176										
pX, platoon unblocked	0.75	0.75	0.75					0.75	0.75	0.75	
vC, conflicting volume	2573	2164	665				642	2098	2193	665	
vC1, stage 1 conf vol											
vC2, stage 2 conf vol											
vCu, unblocked vol	3104	2558	552				642	2469	2596	552	
tC, single (s)	7.1	6.5	4.1				4.1	7.1	6.5	6.2	
tC, 2 stage (s)											
tF (s)	3.5	4.0	2.2				2.2	3.5	4.0	3.3	
p0 queue free %	0	100	49				95	50	49	0	
cM capacity (veh/h)	10	9	765				948	9	9	400	
Volume Total	392	604	51	665	9	406					
Volume Left	392	0	51	0	4	0					
Volume Right	0	57	0	0	0	406					
cSH	765	1700	948	1700	9	400					
Volume to Capacity	0.51	0.36	0.05	0.39	1.02	1.01					
Queue Length 95th (ft)	74	0	4	0	46	318					
Control Delay (s)	14.5	0.0	9.0	0.0	852.9	81.6					
Lane LOS	B		A		F		F				
Approach Delay (s)	5.7		0.6		98.1						
Approach LOS	B		A		F						
Average Delay	22.1										
Intersection Capacity Utilization	67.2%										
ICU Level of Service	C										
Analysis Period (min)	15										

Lafayette St @ Harbor St  
AM Peak Hour

Future w/o Improvements



Movement	EBL	EBT	EBR	WBL	WBT	WBS	NBL	NBT	NBS	SB	SPT	SBR
Lane Configurations	↕				↕		↖	↗			↖	↗
Sign Control	Stop				Stop		Free				Free	
Grade	0%				0%		0%				0%	
Volume (veh/h)	93	0	42	32	76	39	11	504	0	0	448	33
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
Hourly flow rate (vph)	105	0	47	36	86	44	12	568	0	0	505	37
Pedestrians	22				20		5				21	
Lane Width (ft)	12.0				12.0		12.0				12.0	
Walking Speed (ft/s)	4.0				4.0		4.0				4.0	
Percent Blockage	2				2		0				2	
Right turn flare (veh)												
Median type	None				None							
Median storage (veh)												
Upstream signal (ft)							253				670	
pX, platoon unblocked	0.81	0.81	0.95	0.81	0.81	0.78	0.95			0.78		
vC, conflicting volume	1247	1159	551	1189	1178	609	564			588		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1219	1110	529	1147	1133	500	543			474		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	100	91	70	45	90	99			100		
cM capacity (veh/h)	60	161	512	122	156	433	960			837		

Direction	EBL	WBL	NBL	SB	SPT
Volume Total	152	166	12	568	542
Volume Left	105	36	12	0	0
Volume Right	47	44	0	0	37
cSH	83	175	960	1700	1700
Volume to Capacity	1.84	0.95	0.01	0.33	0.32
Queue Length 95th (ft)	326	183	1	0	0
Control Delay (s)	503.4	107.5	8.8	0.0	0.0
Lane LOS	F	F	A		
Approach Delay (s)	503.4	107.5	0.2		0.0
Approach LOS	F	F			

Intersection Summary		
Average Delay	65.6	
Intersection Capacity Utilization	56.2%	ICU Level of Service B
Analysis Period (min)	15	



Lafayette St. @ Harbor St.  
PM Peak Hour

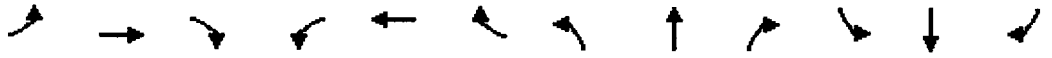
Future w/o Improvements



	EB		WB		NB		SB		SE		SW	
Lane Configurations	↕		↕		↗		↖		↖		↗	
Sign Control	Stop		Stop		Free		Free		Free		Free	
Grade	0%		0%		0%		0%		0%		0%	
Volume (veh/h)	84	0	22	51	96	67	10	484	0	0	573	57
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	94	0	25	57	107	75	11	540	0	0	639	64
Pedestrians	38		44		15		41		12.0		12.0	
Lane Width (ft)	12.0		12.0		12.0		12.0		4.0		4.0	
Walking Speed (ft/s)	4.0		4.0		4.0		4.0		3		3	
Percent Blockage	3		4		1		3					
Right turn flare (veh)	None		None									
Median type	None		None									
Median storage (veh)												
Upstream signal (ft)							253				670	
pX, platoon unblocked	0.90	0.90	0.88	0.90	0.90	0.84	0.88				0.84	
vC, conflicting volume	1441	1316	724	1317	1347	625	741				584	
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1297	1157	688	1159	1193	555	707				506	
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1				4.1	
tC, 2 stage (s)												
tF (s)	3.5	4.0	8.3	3.5	4.0	3.3	2.2				2.2	
p0 queue free %	0	100	94	56	31	82	99				100	
cM capacity (veh/h)	40	163	379	130	155	418	767				863	
Volume Total	118	239	11	540	703							
Volume Left	94	57	11	0	0							
Volume Right	25	75	0	0	64							
cSH	50	183	767	1700	1700							
Volume to Capacity	2.38	1.31	0.01	0.32	0.41							
Queue Length 95th (ft)	305	339	1	0	0							
Control Delay (s)	806.9	220.9	9.8	0.0	0.0							
Lane LOS	F	F	A									
Approach Delay (s)	806.9	220.9	0.2		0.0							
Approach LOS	F	F										
Average Delay			92.0									
Intersection Capacity Utilization			60.2%		ICU Level of Service						B	
Analysis Period (min)			15									

Lafayette St @ Derby St  
AM Peak Hour

Future w/o Improvements

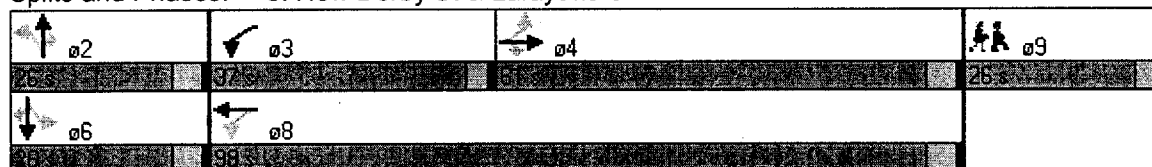


Lane Group:	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗	↖	↗			↕	↗		↕	↗
Volume (vph)	14	379	167	375	276	22	101	44	368	2	6	17
Confl. Peds. (#/hr)	3		14	14		3	6		16	16		6
Confl. Bikes (#/hr)			1									1
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Growth Factor	106%	106%	106%	106%	106%	106%	106%	106%	106%	106%	106%	106%
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)		0	0		0	0			30			0
Mid-Block Traffic (%)		0%			0%			0%			0%	
Turn Type	Perm		Perm	pm+pt			Perm		Perm	Perm		Perm
Protected Phases		4		3	8			2				6
Permitted Phases	4	4	4	8			2		2	6		6
Detector Phases	4	4	4	3	8		2	2	2	6	6	6
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	20.0	9.0	20.0		20.0	20.0	20.0	20.0	20.0	20.0
Total Split (s)	61.0	61.0	61.0	37.0	98.0	0.0	26.0	26.0	26.0	26.0	26.0	26.0
Total Split (%)	40.7%	40.7%	40.7%	24.7%	65.3%	0.0%	17.3%	17.3%	17.3%	17.3%	17.3%	17.3%
Yellow Time (s)	4.0	4.0	4.0	3.0	4.0		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	1.0	1.0	1.0	1.0	1.0
Lead/Lag	Lag	Lag	Lag	Lead								
Lead-Lag Optimize?	Yes	Yes	Yes	Yes								
Recall Mode	None	None	None	None	None		None	None	None	None	None	None
Act Effct Green (s)		30.9	30.9	54.1	54.1			18.0	18.0		18.0	18.0
Actuated g/C Ratio		0.37	0.37	0.64	0.64			0.21	0.21		0.21	0.21
v/c Ratio		0.83	0.34	0.81	0.36			0.59	0.74		0.03	0.07
Control Delay		30.3	5.4	17.7	8.7			43.4	11.4		41.2	19.6
Queue Delay		0.1	0.0	0.0	0.0			0.0	0.0		0.0	0.0
Total Delay		30.3	5.4	17.7	8.7			43.4	11.4		41.2	19.6
LOS		C	A	B	A			D	B		D	B
Approach Delay		22.9			13.7			20.4			26.5	
Approach LOS		C			B			C			C	

Intersection Summary

Cycle Length: 150  
 Actuated Cycle Length: 84.6  
 Natural Cycle: 110  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.83  
 Intersection Signal Delay: 18.7  
 Intersection Capacity Utilization 74.9%  
 Analysis Period (min) 15  
 Intersection LOS: B  
 ICU Level of Service D

Splits and Phases: 8: New Derby St & Lafayette St



Lane Group	09
Lane Configurations	
Volume (vph)	
Confl. Peds. (#/hr)	
Confl. Bikes (#/hr)	
Peak Hour Factor	
Growth Factor	
Heavy Vehicles (%)	
Bus Blockages (#/hr)	
Parking (#/hr)	
Mid-Block Traffic (%)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phases	
Minimum Initial (s)	4.0
Minimum Split (s)	26.0
Total Split (s)	26.0
Total Split (%)	17%
Yellow Time (s)	3.5
All-Red Time (s)	0.5
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
<b>Intersection Summary</b>	

Lafayette St. @ Derby St.  
PM Peak Hour

Future w/o Improvements



Lane Configurations		↕	↗	↖	↘			↕	↗	↖	↘	
Volume (vph)	10	367	182	372	354	23	158	55	327	5	22	25
Confl. Peds. (#/hr)	14		23	23		14	9		13	13		9
Confl. Bikes (#/hr)			1									1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	106%	106%	106%	106%	106%	106%	106%	106%	106%	106%	106%	106%
Heavy Vehicles (%)	1%	1%	1%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)		0	0		0	0			30			0
Mid-Block Traffic (%)		0%			0%			0%				0%
Turn Type	Perm		Perm pm+pt				Perm		Perm	Perm		Perm
Protected Phases		4		3	8			2				6
Permitted Phases	4	4	4	8			2		2	6		6
Detector Phases	4	4	4	3	8		2	2	2	6	6	6
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	20.0	9.0	20.0		20.0	20.0	20.0	20.0	20.0	20.0
Total Split (s)	61.0	61.0	61.0	37.0	98.0	0.0	26.0	26.0	26.0	26.0	26.0	26.0
Total Split (%)	40.7%	40.7%	40.7%	24.7%	65.3%	0.0%	17.3%	17.3%	17.3%	17.3%	17.3%	17.3%
Yellow Time (s)	4.0	4.0	4.0	3.0	4.0		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	1.0	1.0	1.0	1.0	1.0
Lead/Lag		Lag	Lag	Lag	Lead							
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes							
Recall Mode	None	None	None	None	None		None	None	None	None	None	None
Act Effct Green (s)		32.8	32.8	57.3	57.3			25.3	25.3			25.3
Actuated g/C Ratio		0.33	0.33	0.58	0.58			0.26	0.26			0.26
v/c Ratio		0.84	0.37	0.84	0.48			0.73	0.65			0.10
Control Delay		35.8	5.2	20.8	13.3			56.4	11.6			45.7
Queue Delay		0.1	0.0	0.0	0.0			0.0	0.0			0.0
Total Delay		35.9	5.2	20.8	13.3			56.4	11.6			45.7
LOS		D	A	C	B			E	B			D
Approach Delay		25.9			17.0			29.3				32.9
Approach LOS		C			B			C				C

Cycle Length: 150

Actuated Cycle Length: 98.7

Natural Cycle: 110

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.84

Intersection Signal Delay: 23.5

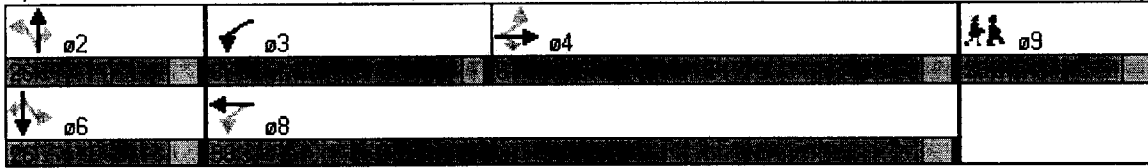
Intersection LOS: C

Intersection Capacity Utilization 78.1%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 8: New Derby St & Lafayette St



<b>Lamp Configurations</b>	
Volume (vph)	
Confl. Peds. (#/hr)	
Confl. Bikes (#/hr)	
Peak Hour Factor	
Growth Factor	
Heavy Vehicles (%)	
Bus Blockages (#/hr)	
Parking (#/hr)	
Mid-Block Traffic (%)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phases	
Minimum Initial (s)	4.0
Minimum Split (s)	26.0
Total Split (s)	26.0
Total Split (%)	17%
Yellow Time (s)	4.0
All-Red Time (s)	1.0
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	

**Intersection Summary**

Bridge St. @ Washington St.  
AM Peak Hour

Future Conditions



Lane Configurations	↑↑	↑	↑	↑↑	↑↑	↑
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Satd. Flow (prot)	3185	1425	1593	3185	3090	1425
Flt Permitted			0.150		0.950	
Satd. Flow (perm)	3185	1383	251	3185	2098	1271
Satd. Flow (RTOR)		589				186
Volume (vph)	695	505	105	745	355	165
Confl. Peds. (#/hr)		15	15		110	56
Confl. Bikes (#/hr)		5				
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Growth Factor	106%	106%	106%	106%	106%	106%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	784	569	118	840	400	186
Lane Group Flow (vph)	784	569	118	840	400	186
Turn Type		Perm	pm+pt			Perm
Protected Phases	4		3	8	2	9
Permitted Phases		4	8			2
Total Split (s)	37.0	37.0	18.0	55.0	22.0	22.0
Act Effct Green (s)	47.6	47.6	62.5	62.5	17.7	17.7
Actuated g/C Ratio	0.45	0.45	0.60	0.60	0.17	0.17
v/c Ratio	0.54	0.61	0.41	0.44	0.77	0.50
Control Delay	26.7	5.6	21.4	18.3	51.3	10.7
Queue Delay	2.8	1.0	0.0	0.0	0.0	0.0
Total Delay	29.5	6.5	21.4	18.3	51.3	10.7
LOS	C	A	C	B	D	B
Approach Delay	19.8			18.7	38.4	
Approach LOS	B			B	D	

Cycle Length: 105

Actuated Cycle Length: 105

Offset: 0 (0%), Referenced to phase 4-EBT and 8-WBTL, Start of Green, Master Intersection

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.77

Intersection Signal Delay: 23.2

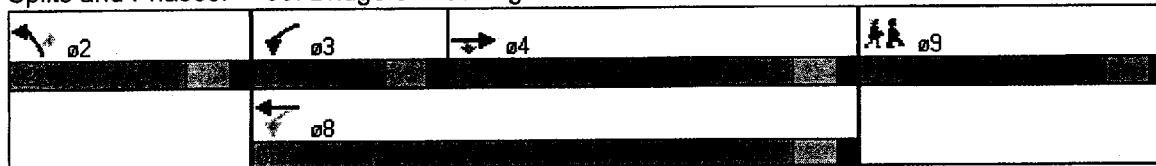
Intersection LOS: C

Intersection Capacity Utilization: 52.6%

ICU Level of Service: A

Analysis Period (min) 15

Splits and Phases: 30: Bridge & Washington St



Bridge St. @ Washington St.  
PM Peak Hour

Future Conditions



Lane Configurations	↑↑	↑	↑	↑↑	↑↑	↑	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	
Satd. Flow (prot)	3217	1439	1608	3217	3120	1439	
Flt Permitted			0.203		0.950		
Satd. Flow (perm)	3217	1394	342	3217	2028	1274	
Satd. Flow (RTOR)		446				173	
Volume (vph)	665	400	160	910	340	155	
Confl. Peds. (#/hr)		20	20		120	60	
Confl. Bikes (#/hr)							
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	
Growth Factor	106%	106%	106%	106%	106%	106%	
Heavy Vehicle %	1%	1%	1%	1%	1%	1%	
Bus Blockages (#/hr)	0	0	0	0	0	0	
Parking (#/hr)							
Mid-Block Traffic (%)	0%			0%	0%		
Adj. Flow (vph)	742	446	179	1015	379	173	
Lane Group Flow (vph)	742	446	179	1015	379	173	
Turn Type		Perm	pm+pt			Perm	
Protected Phases	4		3	8	2	9	
Permitted Phases		4	8			2	
Total Split (s)	36.0	36.0	19.0	55.0	22.0	22.0	28.0
Act Effn Green (s)	43.9	43.9	62.9	62.9	17.3	17.3	
Actuated g/C Ratio	0.42	0.42	0.60	0.60	0.16	0.16	
v/c Ratio	0.55	0.53	0.46	0.53	0.74	0.49	
Control Delay	28.6	5.3	21.6	12.4	49.6	10.7	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	28.6	5.3	21.6	12.4	49.6	10.7	
LOS	C	A	C	B	D	B	
Approach Delay	19.9			13.8	37.4		
Approach LOS	B			B	D		

Cycle Length: 105

Actuated Cycle Length: 105

Offset: 0 (0%) - Referenced to phase 4 EBT and 8 WBTL, Start of Green, Master Intersection

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.74

Intersection Signal Delay: 20.7

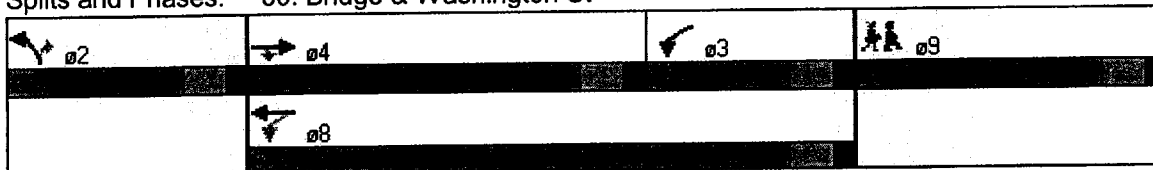
Intersection LOS: C

Intersection Capacity Utilization: 55.2%

ICU Level of Service: B

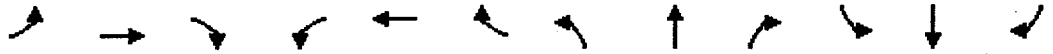
Analysis Period (min) 15

Splits and Phases: 30: Bridge & Washington St



Washington St @ Essex St  
AM Peak Hour

Future w/o Improvements



Movement	EB	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB
Lane Configurations	↖		↗		↖		↗		↖		↗
Sign Control	Stop		Stop		Free		Free		Free		Free
Grade	0%		0%		0%		0%		0%		0%
Volume (veh/h)	65	0	167	0	0	7	0	812	0	0	363
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
Hourly flow rate (vph)	73	0	188	0	0	8	0	916	0	0	409
Pedestrians	50						33				40
Lane Width (ft)	12.0						12.0				12.0
Walking Speed (ft/s)	4.0						4.0				4.0
Percent Blockage	4						3				3
Right turn flare (veh)			3								
Median type	None										None
Median storage (veh)											
Upstream signal (ft)							606				870
pX, platoon unblocked	0.71	0.71	0.71		0.71	0.71	0.71			0.71	
vC, conflicting volume	1423	1375	492	1452	1375	956	459			916	
vC1, stage 1 conf vol											
vC2, stage 2 conf vol											
vCu, unblocked vol	1592	1525	492	1633	1525	938	459			882	
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1	
tC, 2 stage (s)											
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2	
p0 queue free %	0	100	65	100	100	96	100			100	
cM capacity (veh/h)	53	81	537	35	81	221	1056			550	

Direction Lane #	EB	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB
Volume Total	262	8	916	409							
Volume Left	73	0	0	0							
Volume Right	188	8	0	0							
cSH	165	221	1700	1700							
Volume to Capacity	1.59	0.04	0.54	0.24							
Queue Length 95th (ft)	441	3	0	0							
Control Delay (s)	340.7	21.9	0.0	0.0							
Lane LOS	F	C									
Approach Delay (s)	340.7	21.9	0.0	0.0							
Approach LOS	F	C									

Intersection Summary	
Average Delay	56.0
Intersection Capacity Utilization	75.4%
ICU Level of Service	D
Analysis Period (min)	15



Washington St. @ Essex St.  
PM Peak Hour

Future w/o Improvements



	EB	WB	NB	SB
Lane Configurations	↖	↗	↖	↗
Sign Control	Stop	Stop	Free	Free
Grade	0%	0%	0%	0%
Volume (veh/h)	50	0	177	0
Peak Hour Factor	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	56	0	197	0
Pedestrians	65	150	78	110
Lane Width (ft)	12.0	12.0	12.0	12.0
Walking Speed (ft/s)	4.0	4.0	4.0	4.0
Percent Blockage	5	12	6	9
Right turn flare (veh)		3		
Median type	None	None		
Median storage (veh)				
Upstream signal (ft)			606	872
pX, platoon unblocked	0.80	0.80	0.80	0.80
vC, conflicting volume	1438	1469	552	1581
vC1, stage 1 conf vol				
vC2, stage 2 conf vol				
vCu, unblocked vol	1547	1586	552	1726
tC, single (s)	7.1	6.5	6.2	7.1
tC, 2 stage (s)				
tF (s)	3.5	4.0	3.3	3.5
p0 queue free %	0	100	58	100
cM capacity (veh/h)	53	72	473	23

Volume Total	253	9	845	409
Volume Left	56	0	0	0
Volume Right	197	9	0	0
cSH	212	158	1700	1700
Volume to Capacity	1.19	0.06	0.50	0.24
Queue Length 95th (ft)	317	4	0	0
Control Delay (s)	170.9	29.1	0.0	0.0
Lane LOS	F	D		
Approach Delay (s)	170.9	29.1	0.0	0.0
Approach LOS	F	D		

Average Delay	28.7
Intersection Capacity Utilization	73.4%
ICU Level of Service	D
Analysis Period (min)	15