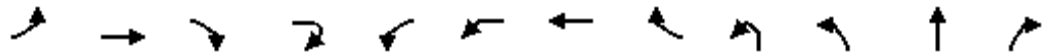


## Attachment E- Short-term Solution Operational Analysis

Lanes, Volumes, Timings  
17: Diagonal & 2nd St & Bridge

4/14/2014



Lane Group	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NBL2	NBL	NBT	NBR
Lane Configurations												
Volume (vph)	2	449	2	7	20	290	459	3	2	12	16	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	125		0			0		150		0		0
Storage Lanes	1		0			2		1		0		0
Taper Length (ft)	25					25				25		
Lane Util. Factor	1.00	0.95	0.95	0.95	1.00	0.97	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.997					0.999				0.944	
Flt Protected	0.950					0.950					0.987	
Satd. Flow (prot)	1770	3529	0	0	0	3433	1861	0	0	0	1736	0
Flt Permitted	0.245					0.475					0.920	
Satd. Flow (perm)	456	3529	0	0	0	1717	1861	0	0	0	1618	0
Right Turn on Red				Yes				Yes				Yes
Satd. Flow (RTOR)		1									23	
Link Speed (mph)		30					30				30	
Link Distance (ft)		1012					313				335	
Travel Time (s)		23.0					7.1				7.6	
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
Adj. Flow (vph)	2	478	2	7	21	309	488	3	2	13	17	23
Shared Lane Traffic (%)												
Lane Group Flow (vph)	2	487	0	0	0	330	491	0	0	0	55	0
Turn Type	Perm	NA			custom	Prot	NA		Perm	Perm	NA	
Protected Phases		2				1	6				8	
Permitted Phases	2				1				8	8		
Detector Phase	2	2			1	1	6		8	8	8	
Switch Phase												
Minimum Initial (s)	8.0	8.0			8.0	8.0	8.0		8.0	8.0	8.0	
Minimum Split (s)	14.2	14.2			29.2	29.2	26.2		39.2	39.2	39.2	
Total Split (s)	41.2	41.2			41.2	41.2	51.2		39.2	39.2	39.2	
Total Split (%)	28.9%	28.9%			28.9%	28.9%	35.9%		27.5%	27.5%	27.5%	
Maximum Green (s)	35.0	35.0			35.0	35.0	45.0		33.0	33.0	33.0	
Yellow Time (s)	3.2	3.2			3.2	3.2	3.2		3.2	3.2	3.2	
All-Red Time (s)	3.0	3.0			3.0	3.0	3.0		3.0	3.0	3.0	
Lost Time Adjust (s)	0.0	0.0				0.0	0.0				0.0	
Total Lost Time (s)	6.2	6.2				6.2	6.2				6.2	
Lead/Lag	Lead	Lead			Lag	Lag						
Lead-Lag Optimize?	Yes	Yes			Yes	Yes						
Vehicle Extension (s)	2.5	2.5			2.5	2.5	2.5		1.5	1.5	1.5	
Recall Mode	None	None			None	None	Max		None	None	None	
Walk Time (s)					8.0	8.0	10.0					
Flash Dont Walk (s)					15.0	15.0	10.0					
Pedestrian Calls (#/hr)					0	0	0					
Act Effct Green (s)	18.6	18.6				28.3	53.5				21.3	
Actuated g/C Ratio	0.21	0.21				0.32	0.60				0.24	
v/c Ratio	0.02	0.67				0.61	0.44				0.14	
Control Delay	35.5	39.1				35.8	13.5				20.8	
Queue Delay	0.0	0.0				0.0	0.0				0.0	
Total Delay	35.5	39.1				35.8	13.5				20.8	
LOS	D	D				D	B				C	

Lanes, Volumes, Timings  
17: Diagonal & 2nd St & Bridge

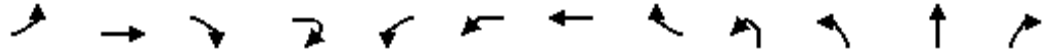
4/14/2014



Lane Group	SBL	SBT	SBR2	NEL	NER	NER2
Lane Configurations		↕		↕	↕	
Volume (vph)	296	16	4	8	343	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0			150	0	
Storage Lanes	0			1	2	
Taper Length (ft)	25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	0.88	1.00
Frt		0.998			0.850	
Flt Protected		0.955		0.950		
Satd. Flow (prot)	0	1775	0	1770	2787	0
Flt Permitted		0.699		0.950		
Satd. Flow (perm)	0	1299	0	1770	2787	0
Right Turn on Red			Yes			Yes
Satd. Flow (RTOR)		119			119	
Link Speed (mph)		25		30		
Link Distance (ft)		387		480		
Travel Time (s)		10.6		10.9		
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	315	17	4	9	365	4
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	336	0	9	369	0
Turn Type	Perm	NA		Prot	Over	
Protected Phases		4		9	1	
Permitted Phases	4					
Detector Phase	4	4		9	1	
Switch Phase						
Minimum Initial (s)	8.0	8.0		8.0	8.0	
Minimum Split (s)	39.2	39.2		14.2	29.2	
Total Split (s)	39.2	39.2		21.2	41.2	
Total Split (%)	27.5%	27.5%		14.8%	28.9%	
Maximum Green (s)	33.0	33.0		15.0	35.0	
Yellow Time (s)	3.2	3.2		3.2	3.2	
All-Red Time (s)	3.0	3.0		3.0	3.0	
Lost Time Adjust (s)		0.0		0.0	0.0	
Total Lost Time (s)		6.2		6.2	6.2	
Lead/Lag					Lag	
Lead-Lag Optimize?					Yes	
Vehicle Extension (s)	1.5	1.5		1.0	2.5	
Recall Mode	None	None		None	None	
Walk Time (s)	8.0	8.0			8.0	
Flash Dont Walk (s)	25.0	25.0			15.0	
Pedestrian Calls (#/hr)	0	0			0	
Act Effct Green (s)		21.3		8.4	28.3	
Actuated g/C Ratio		0.24		0.09	0.32	
v/c Ratio		0.84		0.05	0.38	
Control Delay		41.8		49.0	20.0	
Queue Delay		0.0		0.0	0.0	
Total Delay		41.8		49.0	20.0	
LOS		D		D	B	

Lanes, Volumes, Timings  
 17: Diagonal & 2nd St & Bridge

4/14/2014



Lane Group	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NBL2	NBL	NBT	NBR
Approach Delay		39.0					22.5					20.8
Approach LOS		D					C					C
Queue Length 50th (ft)	1	117				76	129					12
Queue Length 95th (ft)	9	255				186	342					55
Internal Link Dist (ft)		932					233					255
Turn Bay Length (ft)	125											
Base Capacity (vph)	187	1449				705	1606					640
Starvation Cap Reductn	0	0				0	0					0
Spillback Cap Reductn	0	0				0	0					0
Storage Cap Reductn	0	0				0	0					0
Reduced v/c Ratio	0.01	0.34				0.47	0.31					0.09

Intersection Summary

Area Type:	Other
Cycle Length:	142.8
Actuated Cycle Length:	89.8
Natural Cycle:	100
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.84
Intersection Signal Delay:	29.1
Intersection LOS:	C
Intersection Capacity Utilization:	82.5%
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: 17: Diagonal & 2nd St & Bridge

$\phi 2$	$\phi 1$	$\phi 4$	$\phi 9$
41.2 s	41.2 s	39.2 s	21.2 s
$\phi 6$		$\phi 8$	
51.2 s		39.2 s	

Lanes, Volumes, Timings  
 17: Diagonal & 2nd St & Bridge

4/14/2014



Lane Group	SBL	SBT	SBR2	NEL	NER	NER2
Approach Delay		41.8		20.7		
Approach LOS		D		C		
Queue Length 50th (ft)		102		4	56	
Queue Length 95th (ft)		#331		26	149	
Internal Link Dist (ft)		307		400		
Turn Bay Length (ft)				150		
Base Capacity (vph)		575		311	1214	
Starvation Cap Reductn		0		0	0	
Spillback Cap Reductn		0		0	0	
Storage Cap Reductn		0		0	0	
Reduced v/c Ratio		0.58		0.03	0.30	
<b>Intersection Summary</b>						

**Intersection**

Int Delay, s/veh 3.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	0	0	270	0	0	37	0	387	73
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	0	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	281	0	0	39	0	403	76

Major/Minor	Minor2			Minor1			Major1		
Conflicting Flow All	730	768	289	730	731	441	290	0	0
Stage 1	289	289	-	441	441	-	-	-	-
Stage 2	441	479	-	289	290	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-
Pot Cap-1 Maneuver	338	332	750	338	349	616	1272	-	-
Stage 1	719	673	-	595	577	-	-	-	-
Stage 2	595	555	-	719	672	-	-	-	-
Platoon blocked, %									
Mov Cap-1 Maneuver	317	332	750	211	349	616	1272	-	-
Mov Cap-2 Maneuver	317	332	-	211	349	-	-	-	-
Stage 1	719	673	-	595	577	-	-	-	-
Stage 2	558	555	-	449	672	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	12.7	11.2	0
HCM LOS	B	B	

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1272	-	-	750	616	1083	-	-
HCM Lane V/C Ratio	-	-	-	0.375	0.063	-	-	-
HCM Control Delay (s)	0	-	-	12.7	11.2	0	-	-
HCM Lane LOS	A	-	-	B	B	A	-	-
HCM 95th %tile Q(veh)	0	-	-	1.7	0.2	0	-	-

**Intersection**

Int Delay, s/veh

Movement	SBL	SBT	SBR
Vol, veh/h	0	277	1
Conflicting Peds, #/hr	0	0	0
Sign Control	Free	Free	Free
RT Channelized	-	-	None
Storage Length	-	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	96	96	96
Heavy Vehicles, %	2	2	2
Mvmt Flow	0	289	1

**Major/Minor Major2**

Conflicting Flow All	479	0	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.12	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.218	-	-
Pot Cap-1 Maneuver	1083	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	1083	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

**Approach SB**

HCM Control Delay, s 0  
 HCM LOS

**Minor Lane/Major Mvmt**

Lanes, Volumes, Timings  
17: Diagonal/2nd St & Bridge

4/14/2014



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	2	449	9	310	459	3	12	24	365	296	16	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	125		0	0		150	0		0	0		0
Storage Lanes	1		0	2		1	0		1	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.997			0.999				0.850			0.998
Flt Protected	0.950			0.950				0.984				0.955
Satd. Flow (prot)	1770	1857	0	3433	1861	0	0	1833	1583	0	1775	0
Flt Permitted	0.337			0.950				0.866				0.711
Satd. Flow (perm)	628	1857	0	3433	1861	0	0	1613	1583	0	1322	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1			1				388			1
Link Speed (mph)		30			30			30				25
Link Distance (ft)		997			325			100				379
Travel Time (s)		22.7			7.4			2.3				10.3
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
Adj. Flow (vph)	2	478	10	330	488	3	13	26	388	315	17	4
Shared Lane Traffic (%)												
Lane Group Flow (vph)	2	488	0	330	491	0	0	39	388	0	336	0
Turn Type	Perm	NA		Prot	NA		Perm	NA	Perm	pm+pt	NA	
Protected Phases		2		1	6			8		7	4	
Permitted Phases	2						8		8	4		
Detector Phase	2	2		1	6		8	8	8	7	4	
Switch Phase												
Minimum Initial (s)	8.0	8.0		5.0	8.0		8.0	8.0	8.0	3.0	8.0	
Minimum Split (s)	25.1	25.1		10.2	21.7		24.0	24.0	24.0	8.2	22.2	
Total Split (s)	28.8	28.8		14.0	42.8		24.0	24.0	24.0	8.2	32.2	
Total Split (%)	38.4%	38.4%		18.7%	57.1%		32.0%	32.0%	32.0%	10.9%	42.9%	
Maximum Green (s)	23.6	23.6		8.8	37.6		18.8	18.8	18.8	3.0	27.0	
Yellow Time (s)	3.2	3.2		3.2	3.2		3.2	3.2	3.2	3.2	3.2	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0	0.0		0.0	
Total Lost Time (s)	5.2	5.2		5.2	5.2			5.2	5.2		5.2	
Lead/Lag	Lead	Lead		Lag			Lead	Lead	Lead		Lag	
Lead-Lag Optimize?	Yes	Yes		Yes			Yes	Yes	Yes		Yes	
Vehicle Extension (s)	2.5	2.5		2.5	2.5		1.5	1.5	1.5		3.0	1.5
Recall Mode	None	None		None	Max		None	None	None		None	None
Walk Time (s)	5.0	5.0			5.0		5.0	5.0	5.0			5.0
Flash Dont Walk (s)	14.9	14.9			11.5		13.8	13.8	13.8			12.0
Pedestrian Calls (#/hr)	0	0			0		0	0	0			0
Act Effct Green (s)	20.7	20.7		11.9	37.9			20.2	20.2			20.2
Actuated g/C Ratio	0.30	0.30		0.17	0.55			0.29	0.29			0.29
v/c Ratio	0.01	0.87		0.55	0.48			0.08	0.52			0.86
Control Delay	17.5	40.9		33.9	12.6			16.8	4.9			44.6
Queue Delay	0.0	0.0		0.0	0.0			0.0	0.0			0.0
Total Delay	17.5	40.9		33.9	12.6			16.8	4.9			44.6
LOS	B	D		C	B			B	A			D



Lanes, Volumes, Timings  
 17: Diagonal/2nd St & Bridge

4/14/2014



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		40.8			21.1			6.0				44.6
Approach LOS		D			C			A				D
Queue Length 50th (ft)	1	183		70	119			12	0			131
Queue Length 95th (ft)	5	#370		#143	228			31	53			#250
Internal Link Dist (ft)		917			245			20				299
Turn Bay Length (ft)	125											
Base Capacity (vph)	217	644		596	1028			523	776			525
Starvation Cap Reductn	0	0		0	0			0	0			0
Spillback Cap Reductn	0	0		0	0			0	0			0
Storage Cap Reductn	0	0		0	0			0	0			0
Reduced v/c Ratio	0.01	0.76		0.55	0.48			0.07	0.50			0.64

Intersection Summary

Area Type:	Other
Cycle Length:	75
Actuated Cycle Length:	68.6
Natural Cycle:	75
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.87
Intersection Signal Delay:	26.5
Intersection LOS:	C
Intersection Capacity Utilization:	77.3%
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: 17: Diagonal/2nd St & Bridge

