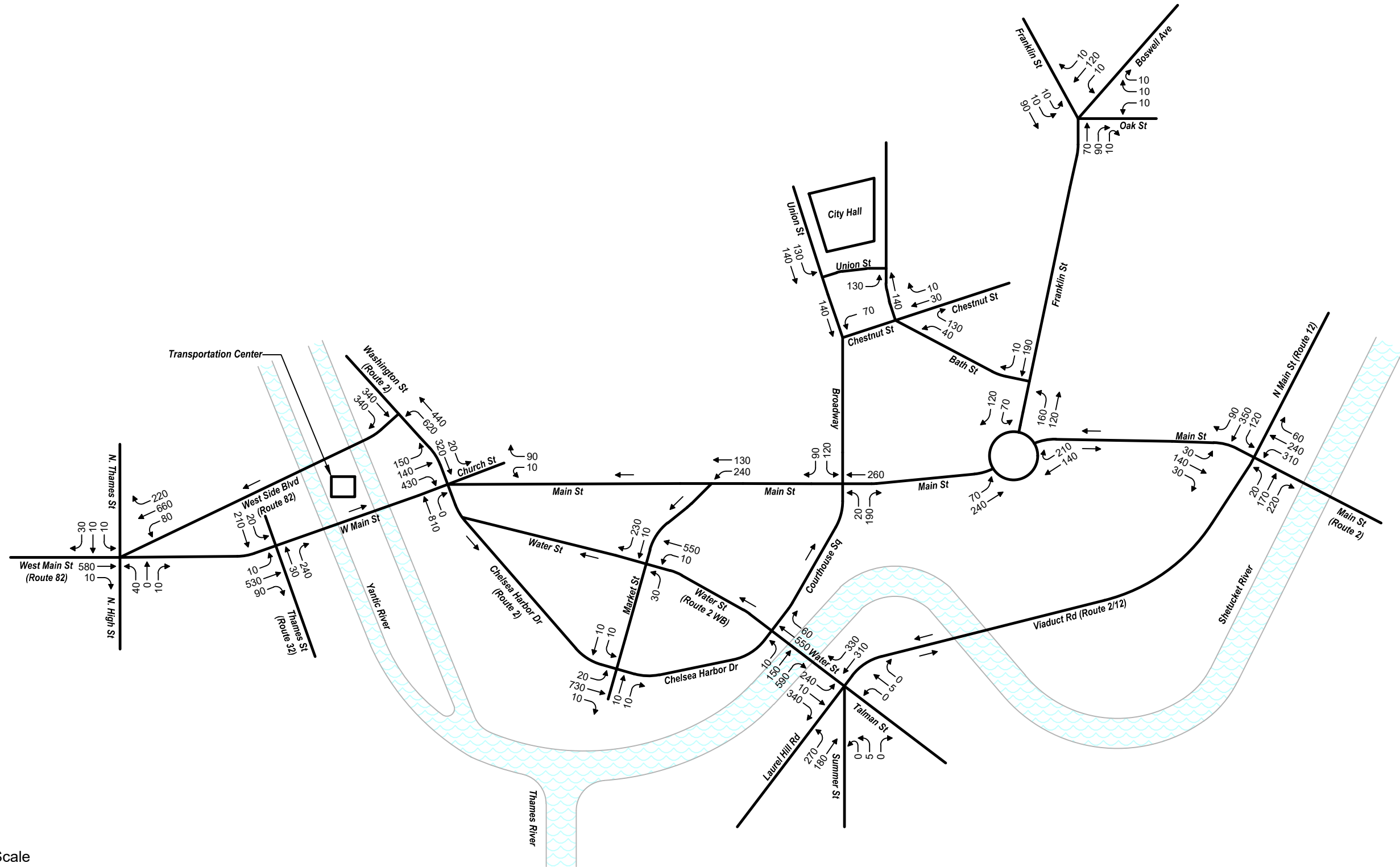


Appendix

- A 2043 No-Build Network Figures
- B 2043 No-Build Intersection Capacity Analysis Worksheets

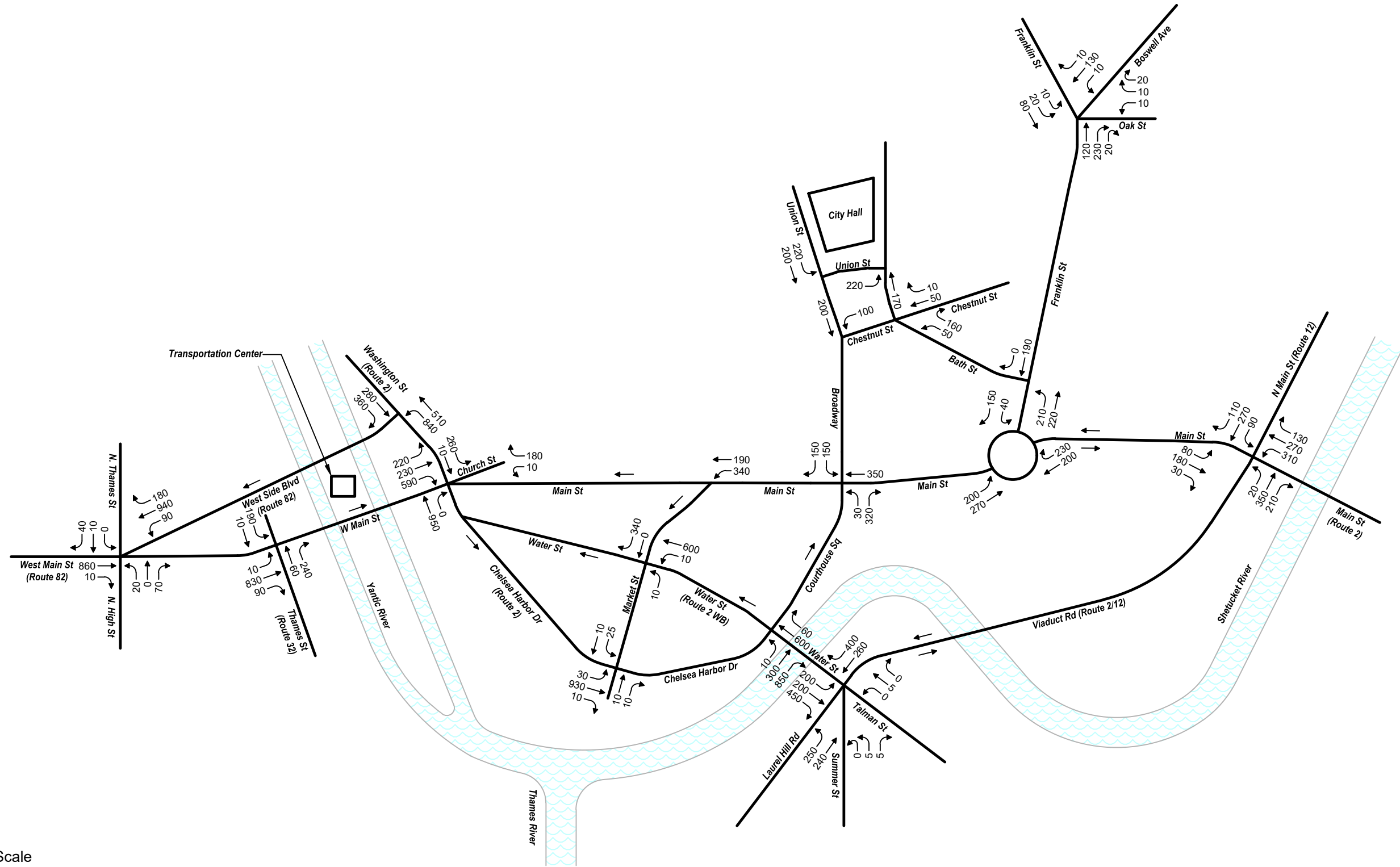
A 2043 No-Build Network Figures

Figure 1: 2043 AM Peak Traffic Volumes
Chelsea Harbor/Downtown Mobility Study | Norwich, CT



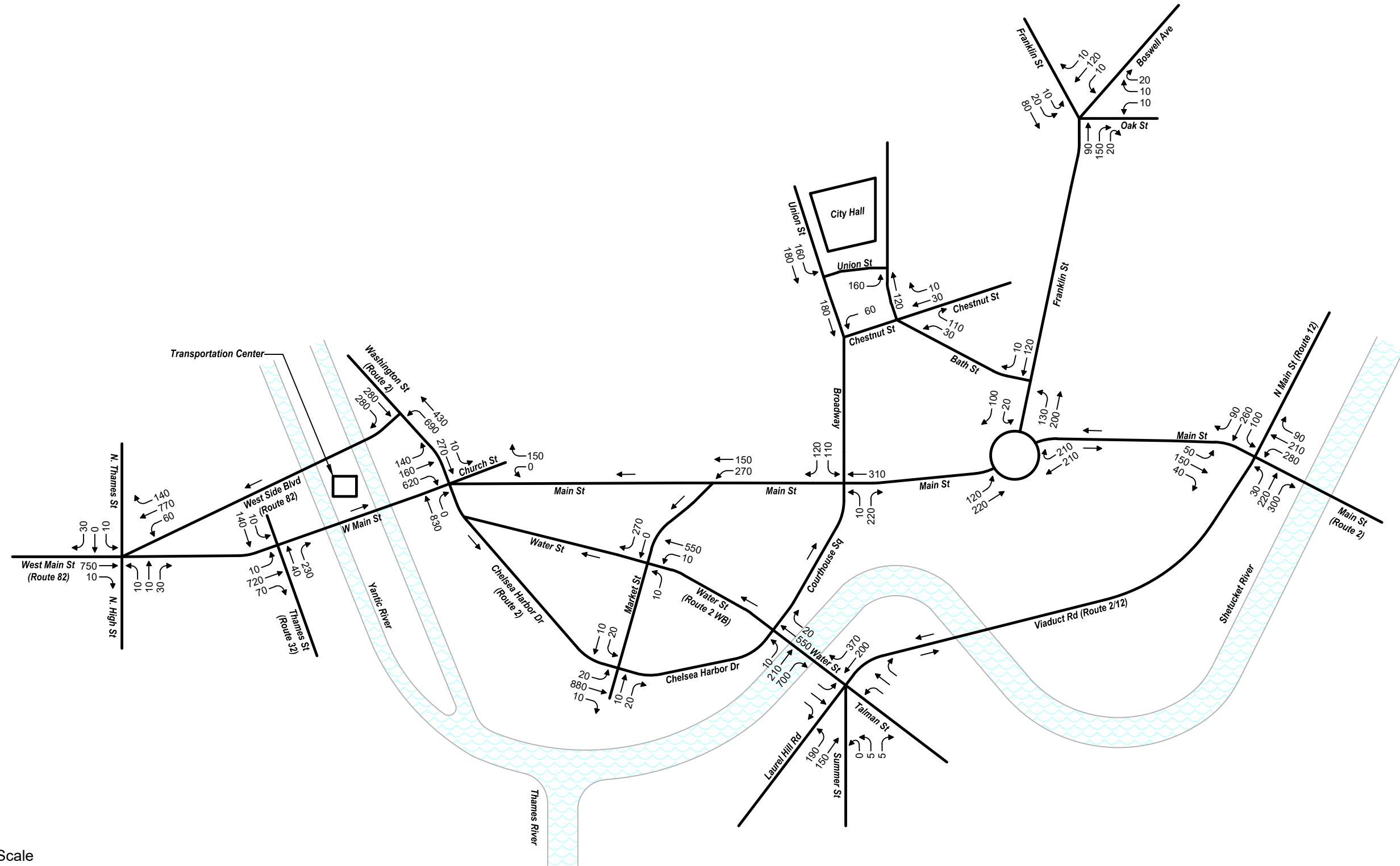
Not to Scale

Figure 2: 2043 PM Peak Traffic Volumes
 Chelsea Harbor/Downtown Mobility Study | Norwich, CT



Not to Scale

Figure 3: 2043 Saturday Peak Traffic Volumes
 Chelsea Harbor/Downtown Mobility Study | Norwich, CT



Not to Scale

B **2043 No-Build Intersection Capacity Analysis Worksheets**

Queues

2043 AM

1: Thames St/N. Thames St & Route 82/W Main St

01/15/2024

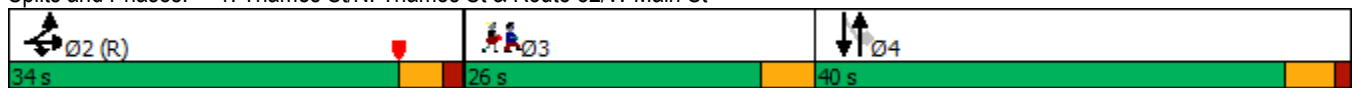


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕↕	↗					↕	↗	↘	↕	
Traffic Volume (vph)	10	530	90	0	0	0	0	30	240	20	210	0
Future Volume (vph)	10	530	90	0	0	0	0	30	240	20	210	0
Peak Hour Factor	0.98	0.98	0.98	0.25	0.25	0.25	0.81	0.81	0.81	0.92	0.92	0.92
Heavy Vehicles (%)	3%	3%	3%	0%	0%	0%	2%	2%	2%	5%	5%	5%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	551	92	0	0	0	0	37	296	22	228	0
Turn Type	Split	NA	Prot					NA	Perm	Perm	NA	
Protected Phases	2	2	2					4			4	
Permitted Phases									4	4		
Detector Phase	2	2	2					4	4	4	4	
Switch Phase												
Minimum Initial (s)	15.0	15.0	15.0					9.0	9.0	9.0	9.0	
Minimum Split (s)	20.0	20.0	20.0					14.1	14.1	14.1	14.1	
Total Split (s)	34.0	34.0	34.0					40.0	40.0	40.0	40.0	
Total Split (%)	34.0%	34.0%	34.0%					40.0%	40.0%	40.0%	40.0%	
Yellow Time (s)	3.3	3.3	3.3					3.7	3.7	3.7	3.7	
All-Red Time (s)	1.7	1.7	1.7					1.4	1.4	1.4	1.4	
Lost Time Adjust (s)		0.0	0.0					0.0	0.0	0.0	0.0	
Total Lost Time (s)		5.0	5.0					5.1	5.1	5.1	5.1	
Lead/Lag								Lag	Lag	Lag	Lag	
Lead-Lag Optimize?								Yes	Yes	Yes	Yes	
Recall Mode	C-Max	C-Max	C-Max					None	None	None	None	
v/c Ratio		0.26	0.09					0.10	0.52	0.08	0.67	
Control Delay		12.8	7.3					29.5	6.9	29.2	45.4	
Queue Delay		0.0	0.0					0.0	0.0	0.0	0.0	
Total Delay		12.8	7.3					29.5	6.9	29.2	45.4	
Queue Length 50th (ft)		39	0					19	0	11	136	
Queue Length 95th (ft)		138	37					37	38	29	192	
Internal Link Dist (ft)		534			251			219			154	
Turn Bay Length (ft)			275						290	130		
Base Capacity (vph)		2142	1025					643	758	449	571	
Starvation Cap Reductn		0	0					0	0	0	0	
Spillback Cap Reductn		0	0					0	0	0	0	
Storage Cap Reductn		0	0					0	0	0	0	
Reduced v/c Ratio		0.26	0.09					0.06	0.39	0.05	0.40	

Intersection Summary

Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Yellow
 Natural Cycle: 65
 Control Type: Actuated-Coordinated

Splits and Phases: 1: Thames St/N. Thames St & Route 82/W Main St



Queues

2043 AM

1: Thames St/N. Thames St & Route 82/W Main St

01/15/2024

Lane Group	Ø3
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Peak Hour Factor	
Heavy Vehicles (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	3
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	1.0
Minimum Split (s)	26.0
Total Split (s)	26.0
Total Split (%)	26%
Yellow Time (s)	4.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	Lead
Lead-Lag Optimize?	Yes
Recall Mode	None
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	
Intersection Summary	

HCM Signalized Intersection Capacity Analysis
 1: Thames St/N. Thames St & Route 82/W Main St

2043 AM
 01/15/2024



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations		↔↔	↗					↑	↗	↘	↑		
Traffic Volume (vph)	10	530	90	0	0	0	0	30	240	20	210	0	
Future Volume (vph)	10	530	90	0	0	0	0	30	240	20	210	0	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Lane Width	12	11	12	12	12	12	12	12	13	12	10	12	
Grade (%)		2%			0%			2%			6%		
Total Lost time (s)		5.0	5.0					5.1	5.1	5.1	5.1		
Lane Util. Factor		0.95	1.00					1.00	1.00	1.00	1.00		
Frt		1.00	0.85					1.00	0.85	1.00	1.00		
Flt Protected		1.00	1.00					1.00	1.00	0.95	1.00		
Satd. Flow (prot)		3351	1552					1844	1620	1667	1638		
Flt Permitted		1.00	1.00					1.00	1.00	0.73	1.00		
Satd. Flow (perm)		3351	1552					1844	1620	1287	1638		
Peak-hour factor, PHF	0.98	0.98	0.98	0.25	0.25	0.25	0.81	0.81	0.81	0.92	0.92	0.92	
Adj. Flow (vph)	10	541	92	0	0	0	0	37	296	22	228	0	
RTOR Reduction (vph)	0	0	36	0	0	0	0	0	234	0	0	0	
Lane Group Flow (vph)	0	551	56	0	0	0	0	37	62	22	228	0	
Heavy Vehicles (%)	3%	3%	3%	0%	0%	0%	2%	2%	2%	5%	5%	5%	
Turn Type	Split	NA	Prot					NA	Perm	Perm	NA		
Protected Phases	2	2	2					4			4		
Permitted Phases									4	4			
Actuated Green, G (s)		60.7	60.7					20.8	20.8	20.8	20.8		
Effective Green, g (s)		60.7	60.7					20.8	20.8	20.8	20.8		
Actuated g/C Ratio		0.61	0.61					0.21	0.21	0.21	0.21		
Clearance Time (s)		5.0	5.0					5.1	5.1	5.1	5.1		
Vehicle Extension (s)		0.2	0.2					3.0	3.0	3.0	3.0		
Lane Grp Cap (vph)		2034	942					383	336	267	340		
v/s Ratio Prot		c0.16	0.04					0.02			c0.14		
v/s Ratio Perm									0.04	0.02			
v/c Ratio		0.27	0.06					0.10	0.18	0.08	0.67		
Uniform Delay, d1		9.2	8.0					32.0	32.6	31.9	36.4		
Progression Factor		1.12	1.76					1.00	1.00	1.00	1.00		
Incremental Delay, d2		0.3	0.1					0.1	0.3	0.1	5.1		
Delay (s)		10.6	14.2					32.1	32.9	32.0	41.6		
Level of Service		B	B					C	C	C	D		
Approach Delay (s)		11.1			0.0			32.8			40.7		
Approach LOS		B			A			C			D		
Intersection Summary													
HCM 2000 Control Delay			23.0									HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.35										
Actuated Cycle Length (s)			100.0									Sum of lost time (s)	14.1
Intersection Capacity Utilization			50.0%									ICU Level of Service	A
Analysis Period (min)			15										
c Critical Lane Group													

Queues

2043 AM

3: N High St/N Thames St & Route 82 & West Side Blvd

01/15/2024

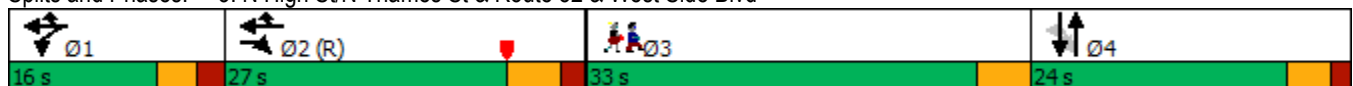


Lane Group	EBR	EBR2	WBL	WBT	WBR	NBL	NBT	NBR2	SBL	SBT	SBR	Ø3
Lane Configurations												
Traffic Volume (vph)	580	10	80	660	220	10	0	40	10	10	30	
Future Volume (vph)	580	10	80	660	220	10	0	40	10	10	30	
Peak Hour Factor	0.82	0.82	0.84	0.84	0.84	0.79	0.79	0.79	0.81	0.81	0.81	
Heavy Vehicles (%)	4%	4%	5%	5%	5%	6%	6%	6%	3%	3%	3%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	719	0	95	786	262	0	64	0	0	61	0	
Turn Type	Prot		Prot	NA	Prot	Perm	NA		Perm	NA		
Protected Phases	2		1	1 2	1 2		4			4		3
Permitted Phases						4			4			
Detector Phase	2		1	1 2	1 2	4	4		4	4		
Switch Phase												
Minimum Initial (s)	15.0		3.0			9.0	9.0		9.0	9.0		1.0
Minimum Split (s)	21.0		8.0			13.9	13.9		13.9	13.9		33.0
Total Split (s)	27.0		16.0			24.0	24.0		24.0	24.0		33.0
Total Split (%)	27.0%		16.0%			24.0%	24.0%		24.0%	24.0%		33%
Yellow Time (s)	4.1		3.0			3.3	3.3		3.3	3.3		4.0
All-Red Time (s)	1.9		2.0			1.6	1.6		1.6	1.6		0.0
Lost Time Adjust (s)	0.0		0.0				0.0			0.0		
Total Lost Time (s)	6.0		5.0				4.9			4.9		
Lead/Lag	Lag		Lead			Lag	Lag		Lag	Lag		Lead
Lead-Lag Optimize?	Yes		Yes			Yes	Yes		Yes	Yes		Yes
Recall Mode	C-Max		Max			None	None		None	None		None
v/c Ratio	0.43		0.49	0.31	0.22		0.24			0.32		
Control Delay	16.9		51.0	10.0	2.4		2.1			26.3		
Queue Delay	0.0		0.0	0.0	0.0		0.0			0.0		
Total Delay	16.9		51.0	10.0	2.4		2.1			26.3		
Queue Length 50th (ft)	89		58	47	0		0			14		
Queue Length 95th (ft)	230		101	201	31		0			46		
Internal Link Dist (ft)				1164			138			182		
Turn Bay Length (ft)			130									
Base Capacity (vph)	1672		195	2545	1176		417			366		
Starvation Cap Reductn	0		0	0	0		0			0		
Spillback Cap Reductn	0		0	0	0		0			0		
Storage Cap Reductn	0		0	0	0		0			0		
Reduced v/c Ratio	0.43		0.49	0.31	0.22		0.15			0.17		

Intersection Summary

Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 0 (0%), Referenced to phase 2:WBT, Start of Yellow
 Natural Cycle: 80
 Control Type: Actuated-Coordinated

Splits and Phases: 3: N High St/N Thames St & Route 82 & West Side Blvd



HCM Signalized Intersection Capacity Analysis
 3: N High St/N Thames St & Route 82 & West Side Blvd

2043 AM
 01/15/2024



Movement	EBR	EBR2	WBL	WBT	WBR	NBL	NBT	NBR2	SBL	SBT	SBR
Lane Configurations	↔↔		↖	↗↗	↗		↗			↔↔	
Traffic Volume (vph)	580	10	80	660	220	10	0	40	10	10	30
Future Volume (vph)	580	10	80	660	220	10	0	40	10	10	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	13	13	13	12	8	15	8	8	16	8
Grade (%)				0%			2%			4%	
Total Lost time (s)	6.0		5.0	5.0	5.0		4.9			4.9	
Lane Util. Factor	0.88		1.00	0.95	1.00		1.00			1.00	
Frt	1.00		1.00	1.00	0.85		0.89			0.92	
Flt Protected	1.00		0.95	1.00	1.00		0.99			0.99	
Satd. Flow (prot)	3015		1776	3553	1538		1724			1863	
Flt Permitted	1.00		0.95	1.00	1.00		0.94			0.94	
Satd. Flow (perm)	3015		1776	3553	1538		1634			1761	
Peak-hour factor, PHF	0.82	0.82	0.84	0.84	0.84	0.79	0.79	0.79	0.81	0.81	0.81
Adj. Flow (vph)	707	12	95	786	262	13	0	51	12	12	37
RTOR Reduction (vph)	59	0	0	0	88	0	59	0	0	34	0
Lane Group Flow (vph)	660	0	95	786	174	0	5	0	0	27	0
Heavy Vehicles (%)	4%	4%	5%	5%	5%	6%	6%	6%	3%	3%	3%
Turn Type	Prot		Prot	NA	Prot	Perm	NA		Perm	NA	
Protected Phases	2		1	1 2	1 2		4			4	
Permitted Phases											
Actuated Green, G (s)	50.3		11.0	66.3	66.3		7.2			7.2	
Effective Green, g (s)	50.3		11.0	66.3	66.3		7.2			7.2	
Actuated g/C Ratio	0.50		0.11	0.66	0.66		0.07			0.07	
Clearance Time (s)	6.0		5.0				4.9			4.9	
Vehicle Extension (s)	0.2		3.0				2.0			2.0	
Lane Grp Cap (vph)	1516		195	2355	1019		117			126	
v/s Ratio Prot	c0.22		c0.05	0.22	0.11						
v/s Ratio Perm							0.00			c0.02	
v/c Ratio	0.44		0.49	0.33	0.17		0.04			0.21	
Uniform Delay, d1	15.8		41.8	7.3	6.4		43.2			43.7	
Progression Factor	1.00		1.00	1.00	1.00		1.00			1.00	
Incremental Delay, d2	0.9		8.5	0.4	0.4		0.1			0.3	
Delay (s)	16.7		50.3	7.7	6.8		43.2			44.0	
Level of Service	B		D	A	A		D			D	
Approach Delay (s)				11.0			43.2			44.0	
Approach LOS				B			D			D	
Intersection Summary											
HCM 2000 Control Delay			15.1				HCM 2000 Level of Service			B	
HCM 2000 Volume to Capacity ratio			0.36								
Actuated Cycle Length (s)			100.0				Sum of lost time (s)			19.9	
Intersection Capacity Utilization			45.8%				ICU Level of Service			A	
Analysis Period (min)			15								
c Critical Lane Group											

Queues

2043 AM

5: W Main St/Church St & Water St/Route 2 & Main St

01/15/2024



Lane Group	WBL2	WBL	WBR	NBT	SBL2	SBT	NEL	NET	NER2	Ø3
Lane Configurations										
Traffic Volume (vph)	10	0	90	810	20	320	150	140	430	
Future Volume (vph)	10	0	90	810	20	320	150	140	430	
Peak Hour Factor	0.79	0.79	0.79	0.89	0.70	0.70	0.92	0.92	0.92	
Heavy Vehicles (%)	0%	0%	0%	4%	8%	8%	6%	6%	6%	
Shared Lane Traffic (%)			45%							36%
Lane Group Flow (vph)	0	64	63	910	0	486	163	320	299	
Turn Type	Prot	Prot	Prot	NA	Perm	NA	Split	NA	Prot	
Protected Phases	5	5	5	2		2	4	4	4	3
Permitted Phases					2					
Detector Phase	5	5	5	2	2	2	4	4	4	
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	15.0	15.0	15.0	5.0	5.0	5.0	1.0
Minimum Split (s)	10.3	10.3	10.3	20.4	20.4	20.4	10.3	10.3	10.3	29.0
Total Split (s)	14.3	14.3	14.3	25.4	25.4	25.4	24.3	24.3	24.3	29.0
Total Split (%)	15.4%	15.4%	15.4%	27.3%	27.3%	27.3%	26.1%	26.1%	26.1%	31%
Yellow Time (s)	3.2	3.2	3.2	4.1	4.1	4.1	3.3	3.3	3.3	4.0
All-Red Time (s)	2.1	2.1	2.1	1.3	1.3	1.3	2.0	2.0	2.0	0.0
Lost Time Adjust (s)		0.0	0.0	0.0		0.0	0.0	0.0	0.0	
Total Lost Time (s)		5.3	5.3	5.4		5.4	5.3	5.3	5.3	
Lead/Lag							Lag	Lag	Lag	Lead
Lead-Lag Optimize?										Yes
Recall Mode	None	None	None	Min	Min	Min	Max	Max	Max	None
v/c Ratio		0.40	0.43	0.59		0.54	0.33	0.58	0.48	
Control Delay		39.4	40.9	23.3		24.3	24.1	19.0	6.6	
Queue Delay		0.0	0.0	0.0		0.0	0.0	0.0	0.0	
Total Delay		39.4	40.9	23.3		24.3	24.1	19.0	6.6	
Queue Length 50th (ft)		23	23	97		73	44	53	0	
Queue Length 95th (ft)		67	70	#256		147	150	#249	74	
Internal Link Dist (ft)		737		133		359		434		
Turn Bay Length (ft)		90	90				270			
Base Capacity (vph)		250	232	1576		922	495	550	627	
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		0.26	0.27	0.58		0.53	0.33	0.58	0.48	

Intersection Summary

Cycle Length: 93

Actuated Cycle Length: 64.3

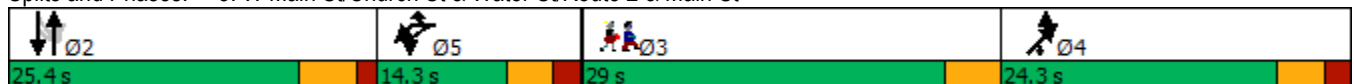
Natural Cycle: 80

Control Type: Actuated-Uncoordinated

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

Queue shown is maximum after two cycles.

Splits and Phases: 5: W Main St/Church St & Water St/Route 2 & Main St



HCM Signalized Intersection Capacity Analysis
 5: W Main St/Church St & Water St/Route 2 & Main St

2043 AM
 01/15/2024



Movement	WBL2	WBL	WBR	NBT	SBL2	SBT	NEL	NET	NER2
Lane Configurations		↔	↔	↑↑↑		↔	↔	↔	↔
Traffic Volume (vph)	10	0	90	810	20	320	150	140	430
Future Volume (vph)	10	0	90	810	20	320	150	140	430
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	14	14	12	12	12	12	12	12
Grade (%)		6%		6%		2%		12%	
Total Lost time (s)		5.3	5.3	5.4		5.4	5.3	5.3	5.3
Lane Util. Factor		1.00	0.95	0.91		0.95	1.00	0.95	0.95
Frt		0.88	0.85	1.00		1.00	1.00	0.92	0.85
Flt Protected		0.99	1.00	1.00		1.00	0.95	1.00	1.00
Satd. Flow (prot)		1713	1587	4838		3299	1601	1475	1361
Flt Permitted		0.99	1.00	1.00		0.86	0.95	1.00	1.00
Satd. Flow (perm)		1713	1587	4838		2829	1601	1475	1361
Peak-hour factor, PHF	0.79	0.79	0.79	0.89	0.70	0.70	0.92	0.92	0.92
Adj. Flow (vph)	13	0	114	910	29	457	163	152	467
RTOR Reduction (vph)	0	0	0	0	0	0	0	97	212
Lane Group Flow (vph)	0	64	63	910	0	486	163	223	87
Heavy Vehicles (%)	0%	0%	0%	4%	8%	8%	6%	6%	6%
Turn Type	Prot	Prot	Prot	NA	Perm	NA	Split	NA	Prot
Protected Phases	5	5	5	2		2	4	4	4
Permitted Phases					2				
Actuated Green, G (s)		4.7	4.7	20.4		20.4	19.9	19.9	19.9
Effective Green, g (s)		4.7	4.7	20.4		20.4	19.9	19.9	19.9
Actuated g/C Ratio		0.07	0.07	0.30		0.30	0.29	0.29	0.29
Clearance Time (s)		5.3	5.3	5.4		5.4	5.3	5.3	5.3
Vehicle Extension (s)		0.2	0.2	2.5		2.5	2.0	2.0	2.0
Lane Grp Cap (vph)		117	108	1440		842	465	428	395
v/s Ratio Prot		0.04	c0.04	c0.19			0.10	c0.15	0.06
v/s Ratio Perm						0.17			
v/c Ratio		0.55	0.58	0.63		0.58	0.35	0.52	0.22
Uniform Delay, d1		30.9	30.9	20.8		20.4	19.2	20.3	18.4
Progression Factor		1.00	1.00	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2		2.8	5.1	0.8		0.8	2.1	4.5	1.3
Delay (s)		33.7	36.0	21.6		21.2	21.3	24.8	19.7
Level of Service		C	D	C		C	C	C	B
Approach Delay (s)		34.8		21.6		21.2		22.1	
Approach LOS		C		C		C		C	

Intersection Summary

HCM 2000 Control Delay	22.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	68.5	Sum of lost time (s)	20.0
Intersection Capacity Utilization	57.5%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Queues
8: West Side Blvd & Route 2

2043 AM
01/15/2024



Lane Group	SET	SER	NWL	NWT	NEL	NER	Ø3
Lane Configurations	↑↑		↖↖	↑			
Traffic Volume (vph)	340	340	620	440	0	0	
Future Volume (vph)	340	340	620	440	0	0	
Peak Hour Factor	0.89	0.89	0.96	0.96	0.25	0.25	
Heavy Vehicles (%)	3%	3%	5%	5%	0%	0%	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	764	0	646	458	0	0	
Turn Type	NA		Prot	NA			
Protected Phases	4		2	2 4			3
Permitted Phases							
Detector Phase	4		2	2 4			
Switch Phase							
Minimum Initial (s)	5.0		24.0				7.0
Minimum Split (s)	11.2		30.0				25.0
Total Split (s)	25.0		30.0				25.0
Total Split (%)	31.3%		37.5%				31%
Yellow Time (s)	3.7		3.7				4.0
All-Red Time (s)	2.5		2.3				0.0
Lost Time Adjust (s)	0.0		0.0				
Total Lost Time (s)	6.2		6.0				
Lead/Lag	Lag						Lead
Lead-Lag Optimize?	Yes						Yes
Recall Mode	Max		C-Max				None
v/c Ratio	0.78		0.35	0.27			
Control Delay	23.6		13.0	3.0			
Queue Delay	0.0		0.0	0.0			
Total Delay	23.6		13.0	3.0			
Queue Length 50th (ft)	115		71	0			
Queue Length 95th (ft)	178		198	166			
Internal Link Dist (ft)	304			359	1164		
Turn Bay Length (ft)							
Base Capacity (vph)	984		1834	1670			
Starvation Cap Reductn	0		0	103			
Spillback Cap Reductn	0		0	0			
Storage Cap Reductn	0		0	0			
Reduced v/c Ratio	0.78		0.35	0.29			

Intersection Summary

Cycle Length: 80
 Actuated Cycle Length: 80
 Offset: 35 (44%), Referenced to phase 2:NWTL, Start of Yellow
 Natural Cycle: 75
 Control Type: Actuated-Coordinated

Splits and Phases: 8: West Side Blvd & Route 2



HCM Signalized Intersection Capacity Analysis

8: West Side Blvd & Route 2

2043 AM
01/15/2024



Movement	SET	SER	NWL	NWT	NEL	NER
Lane Configurations	↑↑		↖↗	↑		
Traffic Volume (vph)	340	340	620	440	0	0
Future Volume (vph)	340	340	620	440	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	1%			0%	0%	
Total Lost time (s)	6.2		6.0	6.0		
Lane Util. Factor	0.95		0.97	1.00		
Frt	0.93		1.00	1.00		
Flt Protected	1.00		0.95	1.00		
Satd. Flow (prot)	3226		3335	1810		
Flt Permitted	1.00		0.95	1.00		
Satd. Flow (perm)	3226		3335	1810		
Peak-hour factor, PHF	0.89	0.89	0.96	0.96	0.25	0.25
Adj. Flow (vph)	382	382	646	458	0	0
RTOR Reduction (vph)	226	0	0	0	0	0
Lane Group Flow (vph)	538	0	646	458	0	0
Heavy Vehicles (%)	3%	3%	5%	5%	0%	0%
Turn Type	NA		Prot	NA		
Protected Phases	4		2	2		
Permitted Phases						
Actuated Green, G (s)	18.8		40.8	65.8		
Effective Green, g (s)	18.8		40.8	59.6		
Actuated g/C Ratio	0.24		0.51	0.75		
Clearance Time (s)	6.2		6.0			
Vehicle Extension (s)	3.0		3.0			
Lane Grp Cap (vph)	758		1700	1348		
v/s Ratio Prot	c0.17		c0.19	0.25		
v/s Ratio Perm						
v/c Ratio	0.71		0.38	0.34		
Uniform Delay, d1	28.1		11.9	3.5		
Progression Factor	1.00		1.00	1.00		
Incremental Delay, d2	5.6		0.6	0.7		
Delay (s)	33.6		12.6	4.2		
Level of Service	C		B	A		
Approach Delay (s)	33.6			9.1	0.0	
Approach LOS	C			A	A	

Intersection Summary

HCM 2000 Control Delay	19.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	16.2
Intersection Capacity Utilization	50.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Queues
11: Chelsea Harbor Dr & Market St

2043 AM
01/15/2024



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕↕↕						↕			↕	
Traffic Volume (vph)	20	730	10	0	0	0	0	10	10	10	10	0
Future Volume (vph)	20	730	10	0	0	0	0	10	10	10	10	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	826	0	0	0	0	0	22	0	0	22	0
Turn Type	Perm	NA						NA		Perm	NA	
Protected Phases		2						4			4	
Permitted Phases	2									4		
Detector Phase	2	2						4		4	4	
Switch Phase												
Minimum Initial (s)	55.0	55.0						5.0		5.0	5.0	
Minimum Split (s)	59.5	59.5						9.4		9.4	9.4	
Total Split (s)	61.0	61.0						19.0		19.0	19.0	
Total Split (%)	76.3%	76.3%						23.8%		23.8%	23.8%	
Yellow Time (s)	3.5	3.5						3.0		3.0	3.0	
All-Red Time (s)	1.0	1.0						1.4		1.4	1.4	
Lost Time Adjust (s)		0.0						0.0			0.0	
Total Lost Time (s)		4.5						4.4			4.4	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	C-Max	C-Max						None		None	None	
v/c Ratio		0.19						0.14			0.17	
Control Delay		1.5						25.4			36.7	
Queue Delay		0.0						0.0			0.0	
Total Delay		1.5						25.4			36.7	
Queue Length 50th (ft)		23						5			10	
Queue Length 95th (ft)		36						26			32	
Internal Link Dist (ft)		510				398		25			129	
Turn Bay Length (ft)												
Base Capacity (vph)		4452						325			279	
Starvation Cap Reductn		0						0			0	
Spillback Cap Reductn		0						0			0	
Storage Cap Reductn		0						0			0	
Reduced v/c Ratio		0.19						0.07			0.08	

Intersection Summary
















Cycle Length: 80
 Actuated Cycle Length: 80
 Offset: 25 (31%), Referenced to phase 2:EBTL, Start of Yellow
 Natural Cycle: 70
 Control Type: Actuated-Coordinated

Splits and Phases: 11: Chelsea Harbor Dr & Market St



HCM Signalized Intersection Capacity Analysis
 11: Chelsea Harbor Dr & Market St

2043 AM
 01/15/2024

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	20	730	10	0	0	0	0	10	10	10	10	0	
Future Volume (vph)	20	730	10	0	0	0	0	10	10	10	10	0	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Lane Width	12	12	12	12	12	12	12	12	12	14	12	12	
Grade (%)		0%			0%			0%			2%		
Total Lost time (s)		4.5						4.4			4.4		
Lane Util. Factor		0.91						1.00			1.00		
Frt		1.00						0.93			1.00		
Flt Protected		1.00						1.00			0.98		
Satd. Flow (prot)		5068						1737			1799		
Flt Permitted		1.00						1.00			0.83		
Satd. Flow (perm)		5068						1737			1532		
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)	22	793	11	0	0	0	0	11	11	11	11	0	
RTOR Reduction (vph)	0	1	0	0	0	0	0	10	0	0	0	0	
Lane Group Flow (vph)	0	825	0	0	0	0	0	12	0	0	22	0	
Turn Type	Perm	NA						NA		Perm	NA		
Protected Phases		2						4			4		
Permitted Phases	2									4			
Actuated Green, G (s)		66.7						4.4			4.4		
Effective Green, g (s)		66.7						4.4			4.4		
Actuated g/C Ratio		0.83						0.06			0.06		
Clearance Time (s)		4.5						4.4			4.4		
Vehicle Extension (s)		3.0						3.0			3.0		
Lane Grp Cap (vph)		4225						95			84		
v/s Ratio Prot								0.01					
v/s Ratio Perm		0.16									c0.01		
v/c Ratio		0.20						0.12			0.26		
Uniform Delay, d1		1.3						36.0			36.2		
Progression Factor		1.00						1.00			1.00		
Incremental Delay, d2		0.1						0.6			1.7		
Delay (s)		1.4						36.5			37.9		
Level of Service		A						D			D		
Approach Delay (s)		1.4			0.0			36.5			37.9		
Approach LOS		A			A			D			D		
Intersection Summary													
HCM 2000 Control Delay			3.2									HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.20										
Actuated Cycle Length (s)			80.0									Sum of lost time (s)	8.9
Intersection Capacity Utilization			61.0%									ICU Level of Service	B
Analysis Period (min)			15										
c Critical Lane Group													

Queues

2043 AM

15: Viaduct Rd/N Main St & Main St

01/15/2024



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	30	140	30	310	240	60	20	170	220	120	350	90
Future Volume (vph)	30	140	30	310	240	60	20	170	220	120	350	90
Peak Hour Factor	0.78	0.78	0.78	0.85	0.85	0.85	0.88	0.88	0.88	0.84	0.84	0.84
Heavy Vehicles (%)	5%	5%	5%	1%	1%	1%	0%	0%	0%	1%	1%	1%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	38	217	0	365	353	0	0	466	0	143	524	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		pm+pt	NA	
Protected Phases	1	6		5	2			8		4	4 8	
Permitted Phases	6			2			8			4 8		
Detector Phase	1	6		5	2		8	8		4	4 8	
Switch Phase												
Minimum Initial (s)	5.0	15.0		5.0	15.0		7.0	7.0		5.0		
Minimum Split (s)	9.5	20.9		9.5	22.5		22.5	22.5		10.0		
Total Split (s)	15.0	25.9		15.0	25.9		31.6	31.6		16.0		
Total Split (%)	12.1%	21.0%		12.1%	21.0%		25.6%	25.6%		13.0%		
Yellow Time (s)	3.0	3.6		3.0	3.6		3.6	3.6		4.0		
All-Red Time (s)	1.0	2.3		1.0	2.3		3.0	3.0		1.0		
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0		0.0		
Total Lost Time (s)	4.0	5.9		4.0	5.9			6.6		5.0		
Lead/Lag	Lead	Lag		Lead	Lag		Lag	Lag		Lead		
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes		
Recall Mode	None	Min		None	Min		None	None		None		
v/c Ratio	0.14	0.68		0.92	0.67			1.00		0.43	0.61	
Control Delay	24.1	47.4		57.5	39.5			74.6		22.2	24.7	
Queue Delay	0.0	0.0		0.0	0.0			0.0		0.0	0.0	
Total Delay	24.1	47.4		57.5	39.5			74.6		22.2	24.7	
Queue Length 50th (ft)	12	104		145	169			223		39	181	
Queue Length 95th (ft)	43	212		#388	#453			#646		124	471	
Internal Link Dist (ft)		404			410			155			275	
Turn Bay Length (ft)	275			345						115		
Base Capacity (vph)	358	382		395	524			466		336	856	
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	0.11	0.57		0.92	0.67			1.00		0.43	0.61	

Intersection Summary

Cycle Length: 123.5

Actuated Cycle Length: 92.5

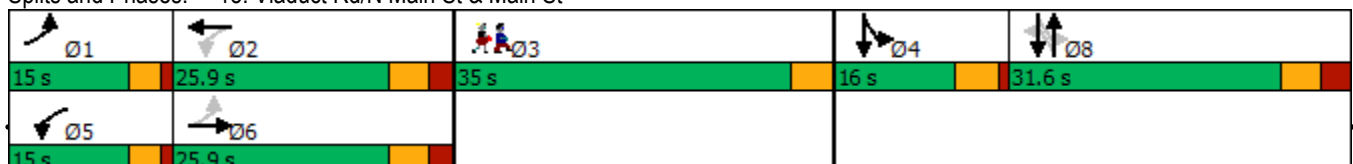
Natural Cycle: 140

Control Type: Actuated-Uncoordinated

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

Queue shown is maximum after two cycles.

Splits and Phases: 15: Viaduct Rd/N Main St & Main St



Lane Group	Ø3
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Peak Hour Factor	
Heavy Vehicles (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	3
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	7.0
Minimum Split (s)	35.0
Total Split (s)	35.0
Total Split (%)	28%
Yellow Time (s)	4.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	
Intersection Summary	

HCM Signalized Intersection Capacity Analysis
15: Viaduct Rd/N Main St & Main St

2043 AM
01/15/2024



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	30	140	30	310	240	60	20	170	220	120	350	90
Future Volume (vph)	30	140	30	310	240	60	20	170	220	120	350	90
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	12	12	12	12	8	11	8	11	12	8
Grade (%)		0%			0%			6%			2%	
Total Lost time (s)	4.0	5.9		4.0	5.9			6.6		5.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00		1.00	1.00	
Frt	1.00	0.97		1.00	0.97			0.93		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00			1.00		0.95	1.00	
Satd. Flow (prot)	1662	1703		1787	1824			1648		1710	1805	
Flt Permitted	0.43	1.00		0.38	1.00			0.95		0.24	1.00	
Satd. Flow (perm)	758	1703		719	1824			1577		435	1805	
Peak-hour factor, PHF	0.78	0.78	0.78	0.85	0.85	0.85	0.88	0.88	0.88	0.84	0.84	0.84
Adj. Flow (vph)	38	179	38	365	282	71	23	193	250	143	417	107
RTOR Reduction (vph)	0	6	0	0	7	0	0	31	0	0	6	0
Lane Group Flow (vph)	38	211	0	365	346	0	0	435	0	143	518	0
Heavy Vehicles (%)	5%	5%	5%	1%	1%	1%	0%	0%	0%	1%	1%	1%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		pm+pt	NA	
Protected Phases	1	6		5	2			8		4	4	8
Permitted Phases	6			2			8			4	8	
Actuated Green, G (s)	22.8	18.9		34.2	26.3			25.6		36.9	41.9	
Effective Green, g (s)	22.8	18.9		34.2	26.3			25.6		36.9	41.9	
Actuated g/C Ratio	0.23	0.19		0.35	0.27			0.26		0.38	0.43	
Clearance Time (s)	4.0	5.9		4.0	5.9			6.6		5.0		
Vehicle Extension (s)	2.0	3.0		2.0	3.0			2.0		2.0		
Lane Grp Cap (vph)	214	331		377	493			415		313	778	
v/s Ratio Prot	0.01	0.12		c0.11	0.19					0.05	c0.29	
v/s Ratio Perm	0.03			c0.23				c0.28		0.12		
v/c Ratio	0.18	0.64		0.97	0.70			1.05		0.46	0.67	
Uniform Delay, d1	29.2	36.0		29.1	31.9			35.8		22.3	22.1	
Progression Factor	1.00	1.00		1.00	1.00			1.00		1.00	1.00	
Incremental Delay, d2	0.1	4.0		37.4	4.5			57.4		0.4	1.7	
Delay (s)	29.4	40.0		66.5	36.4			93.2		22.6	23.7	
Level of Service	C	D		E	D			F		C	C	
Approach Delay (s)		38.4			51.7			93.2			23.5	
Approach LOS		D			D			F			C	

Intersection Summary

HCM 2000 Control Delay	50.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	97.2	Sum of lost time (s)	25.5
Intersection Capacity Utilization	95.0%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Queues
23: Courthouse Square/Broadway & Main St

2043 AM
01/15/2024



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↑		↖		↗	↖		↗
Traffic Volume (vph)	0	0	0	0	260	0	20	0	190	120	0	90
Future Volume (vph)	0	0	0	0	260	0	20	0	190	120	0	90
Peak Hour Factor	0.25	0.25	0.25	0.78	0.78	0.78	0.91	0.91	0.91	0.85	0.85	0.85
Heavy Vehicles (%)	0%	0%	0%	4%	4%	4%	5%	5%	5%	3%	3%	3%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	333	0	22	0	209	141	0	106
Turn Type					NA		Prot		custom	Prot		Prot
Protected Phases					2		1		12	4		4
Permitted Phases												
Detector Phase					2		1		12	4		4
Switch Phase												
Minimum Initial (s)					12.0		5.0			5.0		5.0
Minimum Split (s)					17.0		9.0			10.0		10.0
Total Split (s)					18.0		13.0			30.0		30.0
Total Split (%)					22.5%		16.3%			37.5%		37.5%
Yellow Time (s)					3.0		3.0			3.0		3.0
All-Red Time (s)					2.0		1.0			2.0		2.0
Lost Time Adjust (s)					0.0		0.0			0.0		0.0
Total Lost Time (s)					5.0		4.0			5.0		5.0
Lead/Lag					Lag		Lead			Lag		Lag
Lead-Lag Optimize?					Yes		Yes			Yes		Yes
Recall Mode					C-Min		None			None		None
v/c Ratio					0.42		0.03		0.19	0.51		0.43
Control Delay					22.0		0.1		2.6	36.7		34.9
Queue Delay					0.0		0.0		0.2	0.0		0.0
Total Delay					22.0		0.1		2.8	36.7		34.9
Queue Length 50th (ft)					128		0		0	65		48
Queue Length 95th (ft)					201		0		36	105		84
Internal Link Dist (ft)		293			210			202			413	
Turn Bay Length (ft)												
Base Capacity (vph)					800		803		1089	542		485
Starvation Cap Reductn					0		0		394	0		0
Spillback Cap Reductn					0		0		0	0		0
Storage Cap Reductn					0		0		0	0		0
Reduced v/c Ratio					0.42		0.03		0.30	0.26		0.22

Intersection Summary

Cycle Length: 80
 Actuated Cycle Length: 80
 Offset: 47 (59%), Referenced to phase 2:WBT, Start of Yellow
 Natural Cycle: 60
 Control Type: Actuated-Coordinated

Splits and Phases: 23: Courthouse Square/Broadway & Main St



Lane Group	Ø3
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Peak Hour Factor	
Heavy Vehicles (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	3
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	1.0
Minimum Split (s)	19.0
Total Split (s)	19.0
Total Split (%)	24%
Yellow Time (s)	4.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	Lead
Lead-Lag Optimize?	Yes
Recall Mode	None
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	
Intersection Summary	

HCM Signalized Intersection Capacity Analysis
23: Courthouse Square/Broadway & Main St

2043 AM
01/15/2024



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations					↑		↗		↗	↗	↗	↗	
Traffic Volume (vph)	0	0	0	0	260	0	20	0	190	120	0	90	
Future Volume (vph)	0	0	0	0	260	0	20	0	190	120	0	90	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Lane Width	12	12	12	12	12	12	16	12	16	12	12	12	
Grade (%)		0%			2%			1%			2%		
Total Lost time (s)					5.0		4.0		4.0	5.0		5.0	
Lane Util. Factor					1.00		1.00		1.00	1.00		1.00	
Frt					1.00		1.00		0.85	1.00		0.85	
Flt Protected					1.00		0.95		1.00	0.95		1.00	
Satd. Flow (prot)					1809		1939		1734	1735		1552	
Flt Permitted					1.00		0.95		1.00	0.95		1.00	
Satd. Flow (perm)					1809		1939		1734	1735		1552	
Peak-hour factor, PHF	0.25	0.25	0.25	0.78	0.78	0.78	0.91	0.91	0.91	0.85	0.85	0.85	
Adj. Flow (vph)	0	0	0	0	333	0	22	0	209	141	0	106	
RTOR Reduction (vph)	0	0	0	0	0	0	20	0	93	0	0	0	
Lane Group Flow (vph)	0	0	0	0	333	0	2	0	116	141	0	106	
Heavy Vehicles (%)	0%	0%	0%	4%	4%	4%	5%	5%	5%	3%	3%	3%	
Turn Type					NA		Prot		custom	Prot		Prot	
Protected Phases					2		1		12	4		4	
Permitted Phases													
Actuated Green, G (s)					33.8		6.5		44.3	12.7		12.7	
Effective Green, g (s)					33.8		6.5		44.3	12.7		12.7	
Actuated g/C Ratio					0.42		0.08		0.55	0.16		0.16	
Clearance Time (s)					5.0		4.0			5.0		5.0	
Vehicle Extension (s)					0.2		3.0			4.0		4.0	
Lane Grp Cap (vph)					764		157		960	275		246	
v/s Ratio Prot					c0.18		0.00		c0.07	c0.08		0.07	
v/s Ratio Perm													
v/c Ratio					0.44		0.01		0.12	0.51		0.43	
Uniform Delay, d1					16.4		33.8		8.5	30.8		30.4	
Progression Factor					1.00		1.00		1.00	1.00		1.00	
Incremental Delay, d2					1.8		0.0		0.1	2.1		1.7	
Delay (s)					18.2		33.8		8.6	33.0		32.0	
Level of Service					B		C		A	C		C	
Approach Delay (s)		0.0			18.2			11.0			32.6		
Approach LOS		A			B			B			C		
Intersection Summary													
HCM 2000 Control Delay			20.5		HCM 2000 Level of Service					C			
HCM 2000 Volume to Capacity ratio			0.36										
Actuated Cycle Length (s)			80.0		Sum of lost time (s)					18.0			
Intersection Capacity Utilization			34.3%		ICU Level of Service					A			
Analysis Period (min)			15										
c Critical Lane Group													

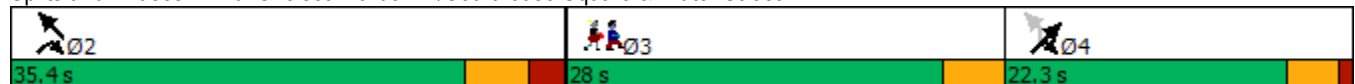


Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations					↑↑			↑↑	↑			
Traffic Volume (vph)	0	0	0	0	550	60	10	150	590	0	0	0
Future Volume (vph)	0	0	0	0	550	60	10	150	590	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.90	0.90	0.90	0.85	0.85	0.85	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	3%	3%	3%	2%	2%	2%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	678	0	0	188	694	0	0	0
Turn Type					NA		Perm	NA	custom			
Protected Phases					2			4	2 4			
Permitted Phases							4					
Detector Phase					2		4	4	2 4			
Switch Phase												
Minimum Initial (s)					29.0		5.0	5.0				
Minimum Split (s)					35.4		9.3	9.3				
Total Split (s)					35.4		22.3	22.3				
Total Split (%)					41.3%		26.0%	26.0%				
Yellow Time (s)					4.0		3.3	3.3				
All-Red Time (s)					2.4		1.0	1.0				
Lost Time Adjust (s)					0.0			0.0				
Total Lost Time (s)					6.4			4.3				
Lead/Lag							Lag	Lag				
Lead-Lag Optimize?							Yes	Yes				
Recall Mode					Max		Min	Min				
v/c Ratio					0.34			0.34	0.47			
Control Delay					10.0			13.9	1.7			
Queue Delay					0.2			0.0	0.0			
Total Delay					10.1			13.9	1.7			
Queue Length 50th (ft)					32			12	0			
Queue Length 95th (ft)					211			45	30			
Internal Link Dist (ft)		212			237			398			202	
Turn Bay Length (ft)												
Base Capacity (vph)					1966			1295	1457			
Starvation Cap Reductn					485			0	38			
Spillback Cap Reductn					0			0	0			
Storage Cap Reductn					0			0	0			
Reduced v/c Ratio					0.46			0.15	0.49			

Intersection Summary

Cycle Length: 85.7
 Actuated Cycle Length: 53.2
 Natural Cycle: 75
 Control Type: Actuated-Uncoordinated

Splits and Phases: 26: Chelsea Harbor Dr/Courthouse Square & Water Street



Lane Group	Ø3
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Peak Hour Factor	
Heavy Vehicles (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	3
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	1.0
Minimum Split (s)	28.0
Total Split (s)	28.0
Total Split (%)	33%
Yellow Time (s)	4.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	Lead
Lead-Lag Optimize?	Yes
Recall Mode	None
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	
Intersection Summary	

HCM Signalized Intersection Capacity Analysis
 26: Chelsea Harbor Dr/Courthouse Square & Water Street

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Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations					↑↑			↑↑	↑			
Traffic Volume (vph)	0	0	0	0	550	60	10	150	590	0	0	0
Future Volume (vph)	0	0	0	0	550	60	10	150	590	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%			6%			4%			0%	
Total Lost time (s)					6.4			4.3	6.4			
Lane Util. Factor					0.95			0.95	1.00			
Fr _t					0.99			1.00	0.85			
Fl _t Protected					1.00			1.00	1.00			
Satd. Flow (prot)					3382			3424	1537			
Fl _t Permitted					1.00			1.00	1.00			
Satd. Flow (perm)					3382			3424	1537			
Peak-hour factor, PHF	0.92	0.92	0.92	0.90	0.90	0.90	0.85	0.85	0.85	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	611	67	12	176	694	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	82	219	0	0	0
Lane Group Flow (vph)	0	0	0	0	678	0	0	106	475	0	0	0
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	3%	3%	3%	2%	2%	2%
Turn Type					NA		Perm	NA	custom			
Protected Phases					2			4	2 4			
Permitted Phases							4					
Actuated Green, G (s)					30.9			7.4	42.6			
Effective Green, g (s)					30.9			7.4	38.3			
Actuated g/C Ratio					0.55			0.13	0.68			
Clearance Time (s)					6.4			4.3				
Vehicle Extension (s)					0.2			1.0				
Lane Grp Cap (vph)					1866			452	1051			
v/s Ratio Prot					0.20				c0.31			
v/s Ratio Perm								0.03				
v/c Ratio					0.36			0.24	0.45			
Uniform Delay, d1					7.0			21.8	4.0			
Progression Factor					1.00			1.00	1.00			
Incremental Delay, d2					0.5			0.1	0.1			
Delay (s)					7.6			21.9	4.2			
Level of Service					A			C	A			
Approach Delay (s)		0.0			7.6			7.9			0.0	
Approach LOS		A			A			A			A	

Intersection Summary

HCM 2000 Control Delay	7.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	56.0	Sum of lost time (s)	14.7
Intersection Capacity Utilization	41.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Queues
35: Franklin St & Oak St & Boswell Ave

2043 AM
01/15/2024

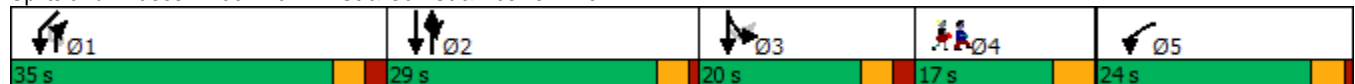


Lane Group	WBL	WBR	WBR2	NBT	NBR	NBR2	SBL2	SBL	SBT	SWL2	SWL	SWR
Lane Configurations												
Traffic Volume (vph)	10	10	10	70	90	10	10	10	90	10	120	10
Future Volume (vph)	10	10	10	70	90	10	10	10	90	10	120	10
Peak Hour Factor	0.81	0.81	0.81	0.72	0.72	0.72	0.83	0.83	0.83	0.73	0.73	0.73
Heavy Vehicles (%)	3%	3%	3%	8%	8%	8%	10%	10%	10%	11%	11%	11%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	36	0	0	97	139	0	0	24	108	0	192	0
Turn Type	Prot			NA	pt+ov		custom	Prot	NA	D.Pm	Prot	
Protected Phases	5			2	12			3	23		1	
Permitted Phases							3			1		
Detector Phase	5			2	12		3	3	23	1	1	
Switch Phase												
Minimum Initial (s)	5.0			6.0			1.0	1.0		6.0	6.0	
Minimum Split (s)	9.0			10.0			6.0	6.0		11.0	11.0	
Total Split (s)	24.0			29.0			20.0	20.0		35.0	35.0	
Total Split (%)	19.2%			23.2%			16.0%	16.0%		28.0%	28.0%	
Yellow Time (s)	3.0			3.0			3.0	3.0		3.0	3.0	
All-Red Time (s)	1.0			1.0			2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0			0.0				0.0			0.0	
Total Lost Time (s)	4.0			4.0				5.0			5.0	
Lead/Lag				Lag			Lead	Lead		Lead	Lead	
Lead-Lag Optimize?				Yes			Yes	Yes		Yes	Yes	
Recall Mode	None			Min			None	None		None	None	
v/c Ratio	0.14			0.22	0.13			0.15	0.15		0.44	
Control Delay	28.6			24.8	9.3			31.6	15.4		23.1	
Queue Delay	0.0			0.0	0.0			0.0	0.0		0.0	
Total Delay	28.6			24.8	9.3			31.6	15.4		23.1	
Queue Length 50th (ft)	7			17	9			5	12		32	
Queue Length 95th (ft)	43			74	65			34	78		125	
Internal Link Dist (ft)	134			127					438		438	
Turn Bay Length (ft)												
Base Capacity (vph)	798			1170	1437			508	1063		1104	
Starvation Cap Reductn	0			0	0			0	0		0	
Spillback Cap Reductn	0			0	0			0	0		0	
Storage Cap Reductn	0			0	0			0	0		0	
Reduced v/c Ratio	0.05			0.08	0.10			0.05	0.10		0.17	

Intersection Summary

Cycle Length: 125
 Actuated Cycle Length: 50
 Natural Cycle: 60
 Control Type: Actuated-Uncoordinated

Splits and Phases: 35: Franklin St & Oak St & Boswell Ave



Lane Group	Ø4
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Peak Hour Factor	
Heavy Vehicles (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	4
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	1.0
Minimum Split (s)	17.0
Total Split (s)	17.0
Total Split (%)	14%
Yellow Time (s)	4.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	Lag
Lead-Lag Optimize?	Yes
Recall Mode	None
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	
Intersection Summary	

HCM Signalized Intersection Capacity Analysis
35: Franklin St & Oak St & Boswell Ave

2043 AM
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Movement	WBL	WBR	WBR2	NBT	NBR	NBR2	SBL2	SBL	SBT	SWL2	SWL	SWR
Lane Configurations												
Traffic Volume (vph)	10	10	10	70	90	10	10	10	90	10	120	10
Future Volume (vph)	10	10	10	70	90	10	10	10	90	10	120	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	14	12	12	16	16	12	12	9	9	12	12	12
Grade (%)	11%			4%					0%			8%
Total Lost time (s)	4.0			4.0	5.0			5.0	4.0			5.0
Lane Util. Factor	1.00			1.00	1.00			1.00	1.00			1.00
Frt	0.91			1.00	0.85			1.00	1.00			0.99
Flt Protected	0.98			1.00	1.00			0.95	1.00			0.96
Satd. Flow (prot)	1664			1954	1661			1477	1555			1555
Flt Permitted	0.98			1.00	1.00			0.91	1.00			0.97
Satd. Flow (perm)	1664			1954	1661			1413	1555			1584
Peak-hour factor, PHF	0.81	0.81	0.81	0.72	0.72	0.72	0.83	0.83	0.83	0.73	0.73	0.73
Adj. Flow (vph)	12	12	12	97	125	14	12	12	108	14	164	14
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	36	0	0	97	139	0	0	24	108	0	192	0
Heavy Vehicles (%)	3%	3%	3%	8%	8%	8%	10%	10%	10%	11%	11%	11%
Turn Type	Prot			NA	pt+ov		custom	Prot	NA	D.Pm		Prot
Protected Phases	5			2	1 2			3	2 3			1
Permitted Phases							3			1		
Actuated Green, G (s)	2.4			11.5	30.3			4.4	19.9			13.8
Effective Green, g (s)	2.4			11.5	30.3			4.4	19.9			13.8
Actuated g/C Ratio	0.04			0.21	0.55			0.08	0.36			0.25
Clearance Time (s)	4.0			4.0				5.0				5.0
Vehicle Extension (s)	3.0			3.0				1.0				3.0
Lane Grp Cap (vph)	71			404	906			112	557			393
v/s Ratio Prot	c0.02			c0.05	0.08				c0.07			
v/s Ratio Perm								0.02				c0.12
v/c Ratio	0.51			0.24	0.15			0.21	0.19			0.49
Uniform Delay, d1	26.0			18.4	6.2			23.9	12.3			17.8
Progression Factor	1.00			1.00	1.00			1.00	1.00			1.00
Incremental Delay, d2	5.6			0.3	0.1			0.4	0.2			1.0
Delay (s)	31.6			18.7	6.3			24.3	12.4			18.8
Level of Service	C			B	A			C	B			B
Approach Delay (s)	31.6			11.4					14.6			18.8
Approach LOS	C			B					B			B

Intersection Summary

HCM 2000 Control Delay	15.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.36		
Actuated Cycle Length (s)	55.5	Sum of lost time (s)	22.0
Intersection Capacity Utilization	30.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Lane Group	WBL	WBR	NBL	SEL	SET	SER2	NWT	NEL	NER
Lane Configurations									
Traffic Volume (vph)	310	330	5	340	10	240	5	270	180
Future Volume (vph)	310	330	5	340	10	240	5	270	180
Peak Hour Factor	0.83	0.83	0.50	0.80	0.80	0.80	0.25	0.73	0.73
Shared Lane Traffic (%)									
Lane Group Flow (vph)	373	398	10	0	438	300	20	617	0
Turn Type	Prot	pt+ov	Prot	Split	NA	pt+ov	NA	Prot	
Protected Phases	5	2 5	7	2	2	2 4	6	4	
Permitted Phases									
Detector Phase	5	2 5	7	2	2	2 4	6	4	
Switch Phase									
Minimum Initial (s)	5.0		5.0	10.0	10.0		5.0	5.0	
Minimum Split (s)	11.8		11.2	15.8	15.8		10.8	12.4	
Total Split (s)	22.0		12.0	17.0	17.0		11.0	18.0	
Total Split (%)	27.5%		15.0%	21.3%	21.3%		13.8%	22.5%	
Yellow Time (s)	3.7		4.3	3.8	3.8		3.3	3.4	
All-Red Time (s)	3.1		1.9	2.0	2.0		2.5	4.0	
Lost Time Adjust (s)	0.0		0.0		0.0		0.0	0.0	
Total Lost Time (s)	6.8		6.2		5.8		5.8	7.4	
Lead/Lag	Lead						Lag		
Lead-Lag Optimize?	Yes						Yes		
Recall Mode	None		None	C-Max	C-Max		None	None	
v/c Ratio	1.17	0.44	0.09		0.74	0.34	0.17	1.58	
Control Delay	138.4	11.0	36.8		37.2	13.5	38.8	300.0	
Queue Delay	0.0	0.0	0.0		0.0	1.1	0.0	0.0	
Total Delay	138.4	11.0	36.8		37.2	14.6	38.8	300.0	
Queue Length 50th (ft)	~226	66	5		162	57	10	~229	
Queue Length 95th (ft)	#345	122	11		#438	164	8	#247	
Internal Link Dist (ft)	1347		266		237		336	287	
Turn Bay Length (ft)		465						200	
Base Capacity (vph)	318	913	118		590	871	121	391	
Starvation Cap Reductn	0	0	0		0	357	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	1.17	0.44	0.08		0.74	0.58	0.17	1.58	

Intersection Summary

Cycle Length: 80

Actuated Cycle Length: 80

Offset: 33 (41%), Referenced to phase 2:SETL, Start of Yellow

Natural Cycle: 140

Control Type: Actuated-Coordinated

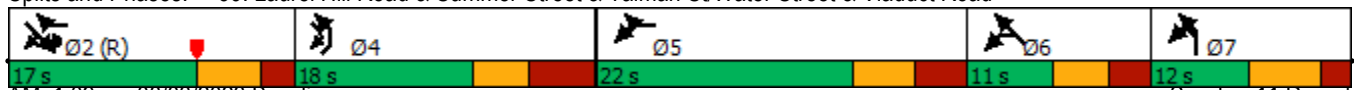
~ Volume exceeds capacity, queue is theoretically infinite.

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: 39: Laurel Hill Road & Summer Street & Talman St/Water Street & Viaduct Road



HCM Signalized Intersection Capacity Analysis

2043 AM

39: Laurel Hill Road & Summer Street & Talman St/Water Street & Viaduct Road

01/15/2024



Movement	WBL	WBR	NBL	SEL	SET	SER2	NWT	NEL	NER
Lane Configurations									
Traffic Volume (vph)	310	330	5	340	10	240	5	270	180
Future Volume (vph)	310	330	5	340	10	240	5	270	180
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	12	12	12	12	12	12	10	12
Grade (%)	4%		15%		6%		0%	8%	
Total Lost time (s)	6.8	5.8	6.2		5.8	5.8	5.8	7.4	
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00	1.00	0.97	
Frt	1.00	0.85	1.00		1.00	0.85	1.00	0.94	
Flt Protected	0.95	1.00	0.95		0.95	1.00	1.00	0.97	
Satd. Flow (prot)	1676	1552	1637		1723	1536	1863	2955	
Flt Permitted	0.95	1.00	0.95		0.95	1.00	1.00	0.97	
Satd. Flow (perm)	1676	1552	1637		1723	1536	1863	2955	
Peak-hour factor, PHF	0.83	0.83	0.50	0.80	0.80	0.80	0.25	0.73	0.73
Adj. Flow (vph)	373	398	10	425	12	300	20	370	247
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	373	398	10	0	438	300	20	617	0
Turn Type	Prot	pt+ov	Prot	Split	NA	pt+ov	NA	Prot	
Protected Phases	5	2 5	7	2	2	2 4	6	4	
Permitted Phases									
Actuated Green, G (s)	15.2	34.1	1.2		18.9	35.3	2.1	10.6	
Effective Green, g (s)	15.2	34.1	1.2		18.9	35.3	2.1	10.6	
Actuated g/C Ratio	0.19	0.43	0.01		0.24	0.44	0.03	0.13	
Clearance Time (s)	6.8		6.2		5.8		5.8	7.4	
Vehicle Extension (s)	3.0		2.0		3.0		2.0	3.0	
Lane Grp Cap (vph)	318	661	24		407	677	48	391	
v/s Ratio Prot	c0.22	0.26	c0.01		c0.25	0.20	c0.01	c0.21	
v/s Ratio Perm									
v/c Ratio	1.17	0.60	0.42		1.08	0.44	0.42	1.58	
Uniform Delay, d1	32.4	17.7	39.1		30.6	15.5	38.3	34.7	
Progression Factor	1.00	1.00	1.00		1.00	1.00	1.00	1.00	
Incremental Delay, d2	106.0	1.6	4.2		66.5	0.5	2.1	272.1	
Delay (s)	138.4	19.3	43.3		97.0	16.0	40.5	306.8	
Level of Service	F	B	D		F	B	D	F	
Approach Delay (s)	76.9		43.3		64.1		40.5	306.8	
Approach LOS	E		D		E		D	F	

Intersection Summary

HCM 2000 Control Delay	137.8	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.17		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	32.0
Intersection Capacity Utilization	82.6%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Queues

2043 Mid

1: Thames St/N. Thames St & Route 82/W Main St

01/15/2024



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕↕	↗					↑	↗	↘	↑	
Traffic Volume (vph)	10	720	70	0	0	0	0	40	230	10	140	0
Future Volume (vph)	10	720	70	0	0	0	0	40	230	10	140	0
Peak Hour Factor	0.93	0.93	0.93	0.25	0.25	0.25	0.87	0.87	0.87	0.76	0.76	0.76
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	5%	5%	5%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	785	75	0	0	0	0	46	264	13	184	0
Turn Type	Split	NA	Prot					NA	Perm	Perm	NA	
Protected Phases	2	2	2					4			4	
Permitted Phases									4	4		
Detector Phase	2	2	2					4	4	4	4	
Switch Phase												
Minimum Initial (s)	15.0	15.0	15.0					9.0	9.0	9.0	9.0	
Minimum Split (s)	20.0	20.0	20.0					14.1	14.1	14.1	14.1	
Total Split (s)	34.0	34.0	34.0					40.0	40.0	40.0	40.0	
Total Split (%)	34.0%	34.0%	34.0%					40.0%	40.0%	40.0%	40.0%	
Yellow Time (s)	3.3	3.3	3.3					3.7	3.7	3.7	3.7	
All-Red Time (s)	1.7	1.7	1.7					1.4	1.4	1.4	1.4	
Lost Time Adjust (s)		0.0	0.0					0.0	0.0	0.0	0.0	
Total Lost Time (s)		5.0	5.0					5.1	5.1	5.1	5.1	
Lead/Lag								Lag	Lag	Lag	Lag	
Lead-Lag Optimize?								Yes	Yes	Yes	Yes	
Recall Mode	C-Max	C-Max	C-Max					None	None	None	None	
v/c Ratio		0.34	0.07					0.14	0.52	0.06	0.64	
Control Delay		12.7	8.4					33.0	7.9	31.3	47.4	
Queue Delay		0.0	0.0					0.0	0.0	0.0	0.0	
Total Delay		12.7	8.4					33.0	7.9	31.3	47.4	
Queue Length 50th (ft)		53	0					25	0	7	110	
Queue Length 95th (ft)		195	32					49	53	18	135	
Internal Link Dist (ft)		534			251			219			154	
Turn Bay Length (ft)			275						290	130		
Base Capacity (vph)		2314	1097					656	748	445	571	
Starvation Cap Reductn		0	0					0	0	0	0	
Spillback Cap Reductn		0	0					0	0	0	0	
Storage Cap Reductn		0	0					0	0	0	0	
Reduced v/c Ratio		0.34	0.07					0.07	0.35	0.03	0.32	

Intersection Summary

Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Yellow
 Natural Cycle: 65
 Control Type: Actuated-Coordinated

Splits and Phases: 1: Thames St/N. Thames St & Route 82/W Main St



Queues

2043 Mid

1: Thames St/N. Thames St & Route 82/W Main St

01/15/2024

Lane Group	Ø3
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Peak Hour Factor	
Heavy Vehicles (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	3
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	1.0
Minimum Split (s)	26.0
Total Split (s)	26.0
Total Split (%)	26%
Yellow Time (s)	4.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	Lead
Lead-Lag Optimize?	Yes
Recall Mode	None
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	
Intersection Summary	

HCM Signalized Intersection Capacity Analysis
 1: Thames St/N. Thames St & Route 82/W Main St

2043 Mid
 01/15/2024



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕↕	↗					↕	↗	↘	↕	
Traffic Volume (vph)	10	720	70	0	0	0	0	40	230	10	140	0
Future Volume (vph)	10	720	70	0	0	0	0	40	230	10	140	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	11	12	12	12	12	12	12	13	12	10	12
Grade (%)		2%			0%			2%			6%	
Total Lost time (s)		5.0	5.0					5.1	5.1	5.1	5.1	
Lane Util. Factor		0.95	1.00					1.00	1.00	1.00	1.00	
Frt		1.00	0.85					1.00	0.85	1.00	1.00	
Flt Protected		1.00	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)		3452	1599					1881	1652	1667	1638	
Flt Permitted		1.00	1.00					1.00	1.00	0.73	1.00	
Satd. Flow (perm)		3452	1599					1881	1652	1276	1638	
Peak-hour factor, PHF	0.93	0.93	0.93	0.25	0.25	0.25	0.87	0.87	0.87	0.76	0.76	0.76
Adj. Flow (vph)	11	774	75	0	0	0	0	46	264	13	184	0
RTOR Reduction (vph)	0	0	27	0	0	0	0	0	218	0	0	0
Lane Group Flow (vph)	0	785	48	0	0	0	0	46	46	13	184	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	5%	5%	5%
Turn Type	Split	NA	Prot					NA	Perm	Perm	NA	
Protected Phases	2	2	2					4			4	
Permitted Phases									4	4		
Actuated Green, G (s)		63.9	63.9					17.6	17.6	17.6	17.6	
Effective Green, g (s)		63.9	63.9					17.6	17.6	17.6	17.6	
Actuated g/C Ratio		0.64	0.64					0.18	0.18	0.18	0.18	
Clearance Time (s)		5.0	5.0					5.1	5.1	5.1	5.1	
Vehicle Extension (s)		0.2	0.2					3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		2205	1021					331	290	224	288	
v/s Ratio Prot		c0.23	0.03					0.02			c0.11	
v/s Ratio Perm									0.03	0.01		
v/c Ratio		0.36	0.05					0.14	0.16	0.06	0.64	
Uniform Delay, d1		8.4	6.7					34.8	34.9	34.3	38.2	
Progression Factor		1.21	2.12					1.00	1.00	1.00	1.00	
Incremental Delay, d2		0.4	0.1					0.2	0.3	0.1	4.6	
Delay (s)		10.6	14.4					35.0	35.2	34.4	42.9	
Level of Service		B	B					C	D	C	D	
Approach Delay (s)		10.9			0.0			35.2			42.3	
Approach LOS		B			A			D			D	
Intersection Summary												
HCM 2000 Control Delay			21.0		HCM 2000 Level of Service					C		
HCM 2000 Volume to Capacity ratio			0.40									
Actuated Cycle Length (s)			100.0		Sum of lost time (s)				14.1			
Intersection Capacity Utilization			54.6%		ICU Level of Service				A			
Analysis Period (min)			15									
c Critical Lane Group												

Queues
3: N High St/N Thames St & Route 82 & West Side Blvd

2043 Mid
01/15/2024

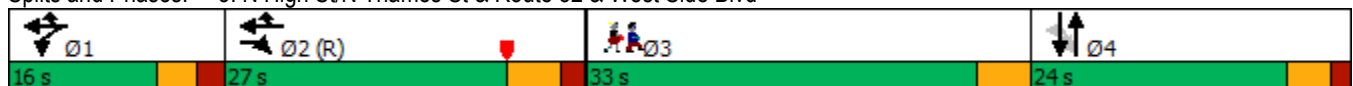


Lane Group	EBR	EBR2	WBL	WBT	WBR	NBL	NBT	NBR2	SBL	SBT	SBR	Ø3
Lane Configurations												
Traffic Volume (vph)	750	10	60	770	140	10	10	30	10	0	30	
Future Volume (vph)	750	10	60	770	140	10	10	30	10	0	30	
Peak Hour Factor	0.93	0.93	0.94	0.94	0.94	0.80	0.80	0.80	0.75	0.75	0.75	
Heavy Vehicles (%)	1%	1%	2%	2%	2%	1%	1%	1%	0%	0%	0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	817	0	64	819	149	0	64	0	0	53	0	
Turn Type	Prot		Prot	NA	Prot	Perm	NA		Perm	NA		
Protected Phases	2		1	12	12		4			4		3
Permitted Phases						4			4			
Detector Phase	2		1	12	12	4	4		4	4		
Switch Phase												
Minimum Initial (s)	15.0		3.0			9.0	9.0		9.0	9.0		1.0
Minimum Split (s)	21.0		8.0			13.9	13.9		13.9	13.9		33.0
Total Split (s)	27.0		16.0			24.0	24.0		24.0	24.0		33.0
Total Split (%)	27.0%		16.0%			24.0%	24.0%		24.0%	24.0%		33%
Yellow Time (s)	4.1		3.0			3.3	3.3		3.3	3.3		4.0
All-Red Time (s)	1.9		2.0			1.6	1.6		1.6	1.6		0.0
Lost Time Adjust (s)	0.0		0.0				0.0			0.0		
Total Lost Time (s)	6.0		5.0				4.9			4.9		
Lead/Lag	Lag		Lead			Lag	Lag		Lag	Lag		Lead
Lead-Lag Optimize?	Yes		Yes			Yes	Yes		Yes	Yes		Yes
Recall Mode	C-Max		Max			None	None		None	None		None
v/c Ratio	0.47		0.32	0.31	0.13		0.23			0.19		
Control Delay	17.8		45.8	9.9	2.7		1.9			1.6		
Queue Delay	0.0		0.0	0.0	0.0		0.0			0.0		
Total Delay	17.8		45.8	9.9	2.7		1.9			1.6		
Queue Length 50th (ft)	107		38	50	0		0			0		
Queue Length 95th (ft)	313		80	227	32		0			0		
Internal Link Dist (ft)				1164			138			182		
Turn Bay Length (ft)			130									
Base Capacity (vph)	1722		201	2621	1176		445			439		
Starvation Cap Reductn	0		0	0	0		0			0		
Spillback Cap Reductn	0		0	0	0		0			0		
Storage Cap Reductn	0		0	0	0		0			0		
Reduced v/c Ratio	0.47		0.32	0.31	0.13		0.14			0.12		

Intersection Summary

Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 0 (0%), Referenced to phase 2:WBT, Start of Yellow
 Natural Cycle: 80
 Control Type: Actuated-Coordinated

Splits and Phases: 3: N High St/N Thames St & Route 82 & West Side Blvd



HCM Signalized Intersection Capacity Analysis

3: N High St/N Thames St & Route 82 & West Side Blvd

2043 Mid
01/15/2024



Movement	EBR	EBR2	WBL	WBT	WBR	NBL	NBT	NBR2	SBL	SBT	SBR
Lane Configurations	↔↔		↖	↕↕	↗		↕			↔↔	
Traffic Volume (vph)	750	10	60	770	140	10	10	30	10	0	30
Future Volume (vph)	750	10	60	770	140	10	10	30	10	0	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	13	13	13	12	8	15	8	8	16	8
Grade (%)				0%			2%			4%	
Total Lost time (s)	6.0		5.0	5.0	5.0		4.9			4.9	
Lane Util. Factor	0.88		1.00	0.95	1.00		1.00			1.00	
Frt	1.00		1.00	1.00	0.85		0.92			0.90	
Flt Protected	1.00		0.95	1.00	1.00		0.99			0.99	
Satd. Flow (prot)	3105		1829	3657	1583		1865			1872	
Flt Permitted	1.00		0.95	1.00	1.00		0.94			0.92	
Satd. Flow (perm)	3105		1829	3657	1583		1777			1747	
Peak-hour factor, PHF	0.93	0.93	0.94	0.94	0.94	0.80	0.80	0.80	0.75	0.75	0.75
Adj. Flow (vph)	806	11	64	819	149	12	12	38	13	0	40
RTOR Reduction (vph)	59	0	0	0	50	0	59	0	0	49	0
Lane Group Flow (vph)	758	0	64	819	99	0	5	0	0	4	0
Heavy Vehicles (%)	1%	1%	2%	2%	2%	1%	1%	1%	0%	0%	0%
Turn Type	Prot		Prot	NA	Prot	Perm	NA		Perm	NA	
Protected Phases	2		1	1 2	1 2		4			4	
Permitted Phases											
Actuated Green, G (s)	50.3		11.0	66.3	66.3		7.2			7.2	
Effective Green, g (s)	50.3		11.0	66.3	66.3		7.2			7.2	
Actuated g/C Ratio	0.50		0.11	0.66	0.66		0.07			0.07	
Clearance Time (s)	6.0		5.0				4.9			4.9	
Vehicle Extension (s)	0.2		3.0				2.0			2.0	
Lane Grp Cap (vph)	1561		201	2424	1049		127			125	
v/s Ratio Prot	c0.24		0.03	c0.22	0.06						
v/s Ratio Perm							c0.00			0.00	
v/c Ratio	0.49		0.32	0.34	0.09		0.04			0.03	
Uniform Delay, d1	16.3		41.0	7.3	6.1		43.2			43.2	
Progression Factor	1.00		1.00	1.00	1.00		1.00			1.00	
Incremental Delay, d2	1.1		4.1	0.4	0.2		0.0			0.0	
Delay (s)	17.4		45.2	7.7	6.2		43.2			43.2	
Level of Service	B		D	A	A		D			D	
Approach Delay (s)				9.8			43.2			43.2	
Approach LOS				A			D			D	
Intersection Summary											
HCM 2000 Control Delay			15.0				HCM 2000 Level of Service			B	
HCM 2000 Volume to Capacity ratio			0.36								
Actuated Cycle Length (s)			100.0				Sum of lost time (s)			19.9	
Intersection Capacity Utilization			50.7%				ICU Level of Service			A	
Analysis Period (min)			15								
c Critical Lane Group											



Lane Group	WBL	WBR	NBT	SBL2	SBT	NEL	NET	NER2	Ø3
Lane Configurations									
Traffic Volume (vph)	0	150	830	10	270	140	160	620	
Future Volume (vph)	0	150	830	10	270	140	160	620	
Peak Hour Factor	0.89	0.89	0.91	0.91	0.91	0.87	0.87	0.87	
Heavy Vehicles (%)	0%	0%	1%	1%	1%	1%	1%	1%	
Shared Lane Traffic (%)		50%						39%	
Lane Group Flow (vph)	85	84	912	0	308	161	462	435	
Turn Type	Prot	Prot	NA	Perm	NA	Split	NA	Prot	
Protected Phases	5	5	2		2	4	4	4	3
Permitted Phases				2					
Detector Phase	5	5	2	2	2	4	4	4	
Switch Phase									
Minimum Initial (s)	5.0	5.0	15.0	15.0	15.0	5.0	5.0	5.0	1.0
Minimum Split (s)	10.3	10.3	20.4	20.4	20.4	10.3	10.3	10.3	29.0
Total Split (s)	14.3	14.3	25.4	25.4	25.4	24.3	24.3	24.3	29.0
Total Split (%)	15.4%	15.4%	27.3%	27.3%	27.3%	26.1%	26.1%	26.1%	31%
Yellow Time (s)	3.2	3.2	4.1	4.1	4.1	3.3	3.3	3.3	4.0
All-Red Time (s)	2.1	2.1	1.3	1.3	1.3	2.0	2.0	2.0	0.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.3	5.3	5.4		5.4	5.3	5.3	5.3	
Lead/Lag						Lag	Lag	Lag	Lead
Lead-Lag Optimize?						Yes	Yes	Yes	Yes
Recall Mode	None	None	Min	Min	Min	Max	Max	Max	None
v/c Ratio	0.41	0.42	0.61		0.32	0.31	0.82	0.59	
Control Delay	37.4	38.4	24.4		22.1	24.8	32.3	6.9	
Queue Delay	0.0	0.0	0.0		0.0	0.0	0.0	0.0	
Total Delay	37.4	38.4	24.4		22.1	24.8	32.3	6.9	
Queue Length 50th (ft)	30	31	106		46	48	123	0	
Queue Length 95th (ft)	95	#105	#255		124	141	#428	74	
Internal Link Dist (ft)	737		133		359		434		
Turn Bay Length (ft)	90	90				270			
Base Capacity (vph)	242	230	1606		1035	514	563	739	
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	0.35	0.37	0.57		0.30	0.31	0.82	0.59	

Intersection Summary

Cycle Length: 93

Actuated Cycle Length: 65.5

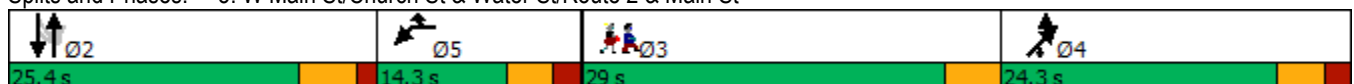
Natural Cycle: 90

Control Type: Actuated-Uncoordinated

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

Queue shown is maximum after two cycles.

Splits and Phases: 5: W Main St/Church St & Water St/Route 2 & Main St



HCM Signalized Intersection Capacity Analysis
 5: W Main St/Church St & Water St/Route 2 & Main St

2043 Mid
 01/15/2024



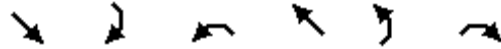
Movement	WBL	WBR	NBT	SBL2	SBT	NEL	NET	NER2
Lane Configurations								
Traffic Volume (vph)	0	150	830	10	270	140	160	620
Future Volume (vph)	0	150	830	10	270	140	160	620
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	14	14	12	12	12	12	12	12
Grade (%)	6%		6%		2%		12%	
Total Lost time (s)	5.3	5.3	5.4		5.4	5.3	5.3	5.3
Lane Util. Factor	1.00	0.95	0.91		0.95	1.00	0.95	0.95
Frt	0.85	0.85	1.00		1.00	1.00	0.91	0.85
Flt Protected	1.00	1.00	1.00		1.00	0.95	1.00	1.00
Satd. Flow (prot)	1671	1587	4982		3532	1680	1528	1428
Flt Permitted	1.00	1.00	1.00		0.91	0.95	1.00	1.00
Satd. Flow (perm)	1671	1587	4982		3213	1680	1528	1428
Peak-hour factor, PHF	0.89	0.89	0.91	0.91	0.91	0.87	0.87	0.87
Adj. Flow (vph)	0	169	912	11	297	161	184	713
RTOR Reduction (vph)	0	0	0	0	0	0	98	310
Lane Group Flow (vph)	85	84	912	0	308	161	364	125
Heavy Vehicles (%)	0%	0%	1%	1%	1%	1%	1%	1%
Turn Type	Prot	Prot	NA	Perm	NA	Split	NA	Prot
Protected Phases	5	5	2		2	4	4	4
Permitted Phases				2				
Actuated Green, G (s)	6.5	6.5	19.5		19.5	20.0	20.0	20.0
Effective Green, g (s)	6.5	6.5	19.5		19.5	20.0	20.0	20.0
Actuated g/C Ratio	0.09	0.09	0.28		0.28	0.29	0.29	0.29
Clearance Time (s)	5.3	5.3	5.4		5.4	5.3	5.3	5.3
Vehicle Extension (s)	3.0	3.0	2.5		2.5	2.0	2.0	2.0
Lane Grp Cap (vph)	156	148	1397		901	483	439	410
v/s Ratio Prot	0.05	c0.05	c0.18			0.10	c0.24	0.09
v/s Ratio Perm					0.10			
v/c Ratio	0.54	0.57	0.65		0.34	0.33	0.83	0.31
Uniform Delay, d1	30.1	30.2	22.0		19.9	19.5	23.2	19.3
Progression Factor	1.00	1.00	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	3.9	4.9	1.0		0.2	1.9	16.5	1.9
Delay (s)	33.9	35.1	23.0		20.1	21.3	39.6	21.2
Level of Service	C	D	C		C	C	D	C
Approach Delay (s)	34.5		23.0		20.1		29.3	
Approach LOS	C		C		C		C	

Intersection Summary

HCM 2000 Control Delay	26.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	69.5	Sum of lost time (s)	20.0
Intersection Capacity Utilization	56.6%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Queues
8: West Side Blvd & Route 2

2043 Mid
01/15/2024



Lane Group	SET	SER	NWL	NWT	NEL	NER	Ø3
Lane Configurations	↑↑		↖↖	↑			
Traffic Volume (vph)	280	280	690	430	0	0	
Future Volume (vph)	280	280	690	430	0	0	
Peak Hour Factor	0.90	0.90	0.91	0.91	0.25	0.25	
Heavy Vehicles (%)	1%	1%	1%	1%	0%	0%	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	622	0	758	473	0	0	
Turn Type	NA		Prot	NA			
Protected Phases	4		2	2 4			3
Permitted Phases							
Detector Phase	4		2	2 4			
Switch Phase							
Minimum Initial (s)	5.0		24.0				7.0
Minimum Split (s)	11.2		30.0				25.0
Total Split (s)	25.0		30.0				25.0
Total Split (%)	31.3%		37.5%				31%
Yellow Time (s)	3.7		3.7				4.0
All-Red Time (s)	2.5		2.3				0.0
Lost Time Adjust (s)	0.0		0.0				
Total Lost Time (s)	6.2		6.0				
Lead/Lag	Lag						Lead
Lead-Lag Optimize?	Yes						Yes
Recall Mode	Max		C-Max				None
v/c Ratio	0.62		0.40	0.27			
Control Delay	17.1		13.4	3.0			
Queue Delay	0.0		0.0	0.0			
Total Delay	17.1		13.4	3.0			
Queue Length 50th (ft)	73		87	0			
Queue Length 95th (ft)	128		236	169			
Internal Link Dist (ft)	304			359	1164		
Turn Bay Length (ft)							
Base Capacity (vph)	998		1906	1735			
Starvation Cap Reductn	0		0	112			
Spillback Cap Reductn	0		0	0			
Storage Cap Reductn	0		0	0			
Reduced v/c Ratio	0.62		0.40	0.29			

Intersection Summary

Cycle Length: 80
 Actuated Cycle Length: 80
 Offset: 35 (44%), Referenced to phase 2:NWTL, Start of Yellow
 Natural Cycle: 70
 Control Type: Actuated-Coordinated

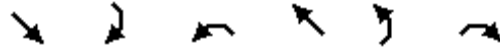
Splits and Phases: 8: West Side Blvd & Route 2



HCM Signalized Intersection Capacity Analysis

8: West Side Blvd & Route 2

2043 Mid
01/15/2024



Movement	SET	SER	NWL	NWT	NEL	NER
Lane Configurations	↑↑		↖↗	↑		
Traffic Volume (vph)	280	280	690	430	0	0
Future Volume (vph)	280	280	690	430	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	1%			0%	0%	
Total Lost time (s)	6.2		6.0	6.0		
Lane Util. Factor	0.95		0.97	1.00		
Frt	0.93		1.00	1.00		
Flt Protected	1.00		0.95	1.00		
Satd. Flow (prot)	3290		3467	1881		
Flt Permitted	1.00		0.95	1.00		
Satd. Flow (perm)	3290		3467	1881		
Peak-hour factor, PHF	0.90	0.90	0.91	0.91	0.25	0.25
Adj. Flow (vph)	311	311	758	473	0	0
RTOR Reduction (vph)	226	0	0	0	0	0
Lane Group Flow (vph)	396	0	758	473	0	0
Heavy Vehicles (%)	1%	1%	1%	1%	0%	0%
Turn Type	NA		Prot	NA		
Protected Phases	4		2	2		
Permitted Phases						
Actuated Green, G (s)	18.8		40.8	65.8		
Effective Green, g (s)	18.8		40.8	59.6		
Actuated g/C Ratio	0.24		0.51	0.75		
Clearance Time (s)	6.2		6.0			
Vehicle Extension (s)	3.0		3.0			
Lane Grp Cap (vph)	773		1768	1401		
v/s Ratio Prot	c0.12		c0.22	0.25		
v/s Ratio Perm						
v/c Ratio	0.51		0.43	0.34		
Uniform Delay, d1	26.6		12.3	3.5		
Progression Factor	1.00		1.00	1.00		
Incremental Delay, d2	2.4		0.8	0.7		
Delay (s)	29.0		13.1	4.1		
Level of Service	C		B	A		
Approach Delay (s)	29.0			9.6	0.0	
Approach LOS	C			A	A	

Intersection Summary

HCM 2000 Control Delay	16.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	16.2
Intersection Capacity Utilization	46.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Queues
11: Chelsea Harbor Dr & Market St

2043 Mid
01/15/2024



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑						↑			↑	
Traffic Volume (vph)	20	880	10	0	0	0	0	10	20	20	10	0
Future Volume (vph)	20	880	10	0	0	0	0	10	20	20	10	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	990	0	0	0	0	0	33	0	0	33	0
Turn Type	Perm	NA						NA		Perm	NA	
Protected Phases		2						4			4	
Permitted Phases	2									4		
Detector Phase	2	2						4		4	4	
Switch Phase												
Minimum Initial (s)	55.0	55.0						5.0		5.0	5.0	
Minimum Split (s)	60.2	60.2						9.4		9.4	9.4	
Total Split (s)	61.0	61.0						19.0		19.0	19.0	
Total Split (%)	76.3%	76.3%						23.8%		23.8%	23.8%	
Yellow Time (s)	3.8	3.8						3.0		3.0	3.0	
All-Red Time (s)	1.4	1.4						1.4		1.4	1.4	
Lost Time Adjust (s)		0.0						0.0			0.0	
Total Lost Time (s)		5.2						4.4			4.4	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	C-Max	C-Max						None		None	None	
v/c Ratio		0.23						0.19			0.25	
Control Delay		1.9						20.8			38.1	
Queue Delay		0.0						0.0			0.0	
Total Delay		1.9						20.8			38.1	
Queue Length 50th (ft)		33						5			16	
Queue Length 95th (ft)		52						30			41	
Internal Link Dist (ft)		510			398			25			129	
Turn Bay Length (ft)												
Base Capacity (vph)		4392						327			262	
Starvation Cap Reductn		0						0			0	
Spillback Cap Reductn		0						0			0	
Storage Cap Reductn		0						0			0	
Reduced v/c Ratio		0.23						0.10			0.13	

Intersection Summary



















Cycle Length: 80
 Actuated Cycle Length: 80
 Offset: 25 (31%), Referenced to phase 2:EBTL, Start of Yellow
 Natural Cycle: 70
 Control Type: Actuated-Coordinated

Splits and Phases: 11: Chelsea Harbor Dr & Market St



HCM Signalized Intersection Capacity Analysis
 11: Chelsea Harbor Dr & Market St

2043 Mid
 01/15/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		  						 				
Traffic Volume (vph)	20	880	10	0	0	0	0	10	20	20	10	0
Future Volume (vph)	20	880	10	0	0	0	0	10	20	20	10	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	14	12	12
Grade (%)		0%			0%			0%			2%	
Total Lost time (s)		5.2						4.4			4.4	
Lane Util. Factor		0.91						1.00			1.00	
Frt		1.00						0.91			1.00	
Flt Protected		1.00						1.00			0.97	
Satd. Flow (prot)		5071						1695			1785	
Flt Permitted		1.00						1.00			0.78	
Satd. Flow (perm)		5071						1695			1437	
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)	22	957	11	0	0	0	0	11	22	22	11	0
RTOR Reduction (vph)	0	1	0	0	0	0	0	21	0	0	0	0
Lane Group Flow (vph)	0	989	0	0	0	0	0	12	0	0	33	0
Turn Type	Perm	NA						NA		Perm	NA	
Protected Phases		2						4			4	
Permitted Phases	2									4		
Actuated Green, G (s)		65.5						4.9			4.9	
Effective Green, g (s)		65.5						4.9			4.9	
Actuated g/C Ratio		0.82						0.06			0.06	
Clearance Time (s)		5.2						4.4			4.4	
Vehicle Extension (s)		3.0						3.0			3.0	
Lane Grp Cap (vph)		4151						103			88	
v/s Ratio Prot								0.01				
v/s Ratio Perm		0.20									c0.02	
v/c Ratio		0.24						0.12			0.38	
Uniform Delay, d1		1.6						35.5			36.1	
Progression Factor		1.00						1.00			1.00	
Incremental Delay, d2		0.1						0.5			2.7	
Delay (s)		1.8						36.0			38.8	
Level of Service		A						D			D	
Approach Delay (s)		1.8			0.0			36.0			38.8	
Approach LOS		A			A			D			D	
Intersection Summary												
HCM 2000 Control Delay			4.0					HCM 2000 Level of Service			A	
HCM 2000 Volume to Capacity ratio			0.25									
Actuated Cycle Length (s)			80.0					Sum of lost time (s)			9.6	
Intersection Capacity Utilization			62.1%					ICU Level of Service			B	
Analysis Period (min)			15									
c Critical Lane Group												

Queues

2043 Mid

15: Viaduct Rd/N Main St & Main St

01/15/2024



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	50	150	40	280	210	90	30	220	300	100	260	90
Future Volume (vph)	50	150	40	280	210	90	30	220	300	100	260	90
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.82	0.82	0.82	0.89	0.89	0.89
Heavy Vehicles (%)	2%	2%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	56	214	0	315	337	0	0	671	0	112	393	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		pm+pt	NA	
Protected Phases	1	6		5	2			8		4	4 8	
Permitted Phases	6			2			8			4 8		
Detector Phase	1	6		5	2		8	8		4	4 8	
Switch Phase												
Minimum Initial (s)	5.0	15.0		5.0	15.0		7.0	7.0		5.0		
Minimum Split (s)	9.5	20.9		9.5	22.5		22.5	22.5		10.0		
Total Split (s)	15.0	25.9		15.0	25.9		31.6	31.6		16.0		
Total Split (%)	12.1%	21.0%		12.1%	21.0%		25.6%	25.6%		13.0%		
Yellow Time (s)	3.0	3.6		3.0	3.6		3.6	3.6		4.0		
All-Red Time (s)	1.0	2.3		1.0	2.3		3.0	3.0		1.0		
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0		0.0		
Total Lost Time (s)	4.0	5.9		4.0	5.9			6.6		5.0		
Lead/Lag	Lead	Lag		Lead	Lag		Lag	Lag		Lead		
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes		
Recall Mode	None	Min		None	Min		None	None		None		
v/c Ratio	0.21	0.66		0.80	0.72			1.43		0.38	0.46	
Control Delay	24.7	46.2		42.5	42.8			233.1		21.5	20.7	
Queue Delay	0.0	0.0		0.0	0.0			0.0		0.0	0.0	
Total Delay	24.7	46.2		42.5	42.8			233.1		21.5	20.7	
Queue Length 50th (ft)	18	101		121	158			~455		29	118	
Queue Length 95th (ft)	65	#262		#346	#469			#914		106	354	
Internal Link Dist (ft)		404			410			155			275	
Turn Bay Length (ft)	275			345						115		
Base Capacity (vph)	354	394		393	470			469		295	842	
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	0.16	0.54		0.80	0.72			1.43		0.38	0.47	

Intersection Summary

Cycle Length: 123.5

Actuated Cycle Length: 92.1

Natural Cycle: 150

Control Type: Actuated-Uncoordinated

~ 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: 15: Viaduct Rd/N Main St & Main St

Ø1 15 s	Ø2 25.9 s	Ø3 35 s	Ø4 16 s	Ø8 31.6 s
Ø5 15 s	Ø6 25.9 s			

Lane Group	Ø3
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Peak Hour Factor	
Heavy Vehicles (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	3
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	7.0
Minimum Split (s)	35.0
Total Split (s)	35.0
Total Split (%)	28%
Yellow Time (s)	4.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	
Intersection Summary	

HCM Signalized Intersection Capacity Analysis
 15: Viaduct Rd/N Main St & Main St

2043 Mid
 01/15/2024

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	50	150	40	280	210	90	30	220	300	100	260	90
Future Volume (vph)	50	150	40	280	210	90	30	220	300	100	260	90
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	12	12	12	12	8	11	8	11	12	8
Grade (%)		0%			0%			6%			2%	
Total Lost time (s)	4.0	5.9		4.0	5.9			6.6		5.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00		1.00	1.00	
Frt	1.00	0.97		1.00	0.96			0.93		1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00			1.00		0.95	1.00	
Satd. Flow (prot)	1711	1744		1805	1815			1646		1727	1808	
Flt Permitted	0.40	1.00		0.38	1.00			0.95		0.16	1.00	
Satd. Flow (perm)	715	1744		713	1815			1574		284	1808	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.82	0.82	0.82	0.89	0.89	0.89
Adj. Flow (vph)	56	169	45	315	236	101	37	268	366	112	292	101
RTOR Reduction (vph)	0	7	0	0	11	0	0	32	0	0	8	0
Lane Group Flow (vph)	56	207	0	315	326	0	0	639	0	112	385	0
Heavy Vehicles (%)	2%	2%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		pm+pt	NA	
Protected Phases	1	6		5	2			8		4	4	8
Permitted Phases	6			2			8			4	8	
Actuated Green, G (s)	23.3	17.7		33.0	23.4			25.6		36.8	41.8	
Effective Green, g (s)	23.3	17.7		33.0	23.4			25.6		36.8	41.8	
Actuated g/C Ratio	0.24	0.18		0.34	0.24			0.27		0.38	0.44	
Clearance Time (s)	4.0	5.9		4.0	5.9			6.6		5.0		
Vehicle Extension (s)	2.0	3.0		2.0	3.0			2.0		2.0		
Lane Grp Cap (vph)	231	321		374	442			420		277	788	
v/s Ratio Prot	0.01	0.12		c0.10	0.18					0.05	c0.21	
v/s Ratio Perm	0.04			c0.19				c0.41		0.11		
v/c Ratio	0.24	0.64		0.84	0.74			1.52		0.40	0.49	
Uniform Delay, d1	28.6	36.2		26.8	33.4			35.2		22.1	19.4	
Progression Factor	1.00	1.00		1.00	1.00			1.00		1.00	1.00	
Incremental Delay, d2	0.2	4.4		15.1	6.3			246.3		0.4	0.2	
Delay (s)	28.8	40.6		41.8	39.7			281.4		22.4	19.6	
Level of Service	C	D		D	D			F		C	B	
Approach Delay (s)		38.1			40.7			281.4			20.2	
Approach LOS		D			D			F			C	
Intersection Summary												
HCM 2000 Control Delay			112.4			HCM 2000 Level of Service				F		
HCM 2000 Volume to Capacity ratio			1.03									
Actuated Cycle Length (s)			95.9			Sum of lost time (s)			25.5			
Intersection Capacity Utilization			96.7%			ICU Level of Service				F		
Analysis Period (min)			15									
c	Critical Lane Group											

Queues
23: Courthouse Square/Broadway & Main St

2043 Mid
01/15/2024



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↑		↖		↖	↖	↖	↖
Traffic Volume (vph)	0	0	0	0	310	0	10	0	220	110	0	120
Future Volume (vph)	0	0	0	0	310	0	10	0	220	110	0	120
Peak Hour Factor	0.25	0.25	0.25	0.87	0.87	0.87	0.89	0.89	0.89	0.86	0.86	0.86
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	2%	2%	2%	1%	1%	1%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	356	0	11	0	247	128	0	140
Turn Type					NA		Prot		custom	Prot		Prot
Protected Phases					2		1		12	4		4
Permitted Phases												
Detector Phase					2		1		12	4		4
Switch Phase												
Minimum Initial (s)					12.0		5.0			5.0		5.0
Minimum Split (s)					17.0		9.0			10.0		10.0
Total Split (s)					18.0		13.0			30.0		30.0
Total Split (%)					22.5%		16.3%			37.5%		37.5%
Yellow Time (s)					3.0		3.0			3.0		3.0
All-Red Time (s)					2.0		1.0			2.0		2.0
Lost Time Adjust (s)					0.0		0.0			0.0		0.0
Total Lost Time (s)					5.0		4.0			5.0		5.0
Lead/Lag					Lag		Lead			Lag		Lag
Lead-Lag Optimize?					Yes		Yes			Yes		Yes
Recall Mode					C-Min		None			None		None
v/c Ratio					0.44		0.02		0.22	0.44		0.53
Control Delay					23.1		0.0		2.6	33.6		37.2
Queue Delay					0.0		0.0		0.2	0.0		0.0
Total Delay					23.1		0.0		2.8	33.6		37.2
Queue Length 50th (ft)					140		0		0	58		65
Queue Length 95th (ft)					#274		0		38	96		106
Internal Link Dist (ft)		293			210			202			413	
Turn Bay Length (ft)												
Base Capacity (vph)					818		768		1123	552		494
Starvation Cap Reductn					0		0		392	0		0
Spillback Cap Reductn					0		0		0	0		0
Storage Cap Reductn					0		0		0	0		0
Reduced v/c Ratio					0.44		0.01		0.34	0.23		0.28

Intersection Summary

Cycle Length: 80
 Actuated Cycle Length: 80
 Offset: 47 (59%), Referenced to phase 2:WBT, Start of Yellow
 Natural Cycle: 60
 Control Type: Actuated-Coordinated
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 23: Courthouse Square/Broadway & Main St



Lane Group	Ø3
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Peak Hour Factor	
Heavy Vehicles (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	3
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	1.0
Minimum Split (s)	19.0
Total Split (s)	19.0
Total Split (%)	24%
Yellow Time (s)	4.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	Lead
Lead-Lag Optimize?	Yes
Recall Mode	None
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	
Intersection Summary	

HCM Signalized Intersection Capacity Analysis
23: Courthouse Square/Broadway & Main St

2043 Mid
01/15/2024



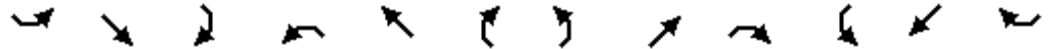
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↑		↖		↗	↖	↗	↖
Traffic Volume (vph)	0	0	0	0	310	0	10	0	220	110	0	120
Future Volume (vph)	0	0	0	0	310	0	10	0	220	110	0	120
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	16	12	16	12	12	12
Grade (%)		0%			2%			1%			2%	
Total Lost time (s)					5.0		4.0		4.0	5.0		5.0
Lane Util. Factor					1.00		1.00		1.00	1.00		1.00
Frt					1.00		1.00		0.85	1.00		0.85
Flt Protected					1.00		0.95		1.00	0.95		1.00
Satd. Flow (prot)					1881		1996		1785	1769		1583
Flt Permitted					1.00		0.95		1.00	0.95		1.00
Satd. Flow (perm)					1881		1996		1785	1769		1583
Peak-hour factor, PHF	0.25	0.25	0.25	0.87	0.87	0.87	0.89	0.89	0.89	0.86	0.86	0.86
Adj. Flow (vph)	0	0	0	0	356	0	11	0	247	128	0	140
RTOR Reduction (vph)	0	0	0	0	0	0	10	0	112	0	0	0
Lane Group Flow (vph)	0	0	0	0	356	0	1	0	135	128	0	140
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	2%	2%	2%	1%	1%	1%
Turn Type					NA		Prot		custom	Prot		Prot
Protected Phases					2		1		12	4		4
Permitted Phases												
Actuated Green, G (s)					33.2		6.5		43.7	13.3		13.3
Effective Green, g (s)					33.2		6.5		43.7	13.3		13.3
Actuated g/C Ratio					0.42		0.08		0.55	0.17		0.17
Clearance Time (s)					5.0		4.0			5.0		5.0
Vehicle Extension (s)					0.2		3.0			4.0		4.0
Lane Grp Cap (vph)					780		162		975	294		263
v/s Ratio Prot					c0.19		0.00		c0.08	0.07		c0.09
v/s Ratio Perm												
v/c Ratio					0.46		0.01		0.14	0.44		0.53
Uniform Delay, d1					16.9		33.8		8.9	30.0		30.5
Progression Factor					1.00		1.00		1.00	1.00		1.00
Incremental Delay, d2					1.9		0.0		0.1	1.4		2.6
Delay (s)					18.8		33.8		9.0	31.4		33.1
Level of Service					B		C		A	C		C
Approach Delay (s)		0.0			18.8			10.0			32.3	
Approach LOS		A			B			B			C	
Intersection Summary												
HCM 2000 Control Delay			20.3		HCM 2000 Level of Service					C		
HCM 2000 Volume to Capacity ratio			0.38									
Actuated Cycle Length (s)			80.0		Sum of lost time (s)				18.0			
Intersection Capacity Utilization			38.7%		ICU Level of Service				A			
Analysis Period (min)			15									
c Critical Lane Group												

Queues

2043 Mid

26: Chelsea Harbor Dr/Courthouse Square & Water Street

01/15/2024

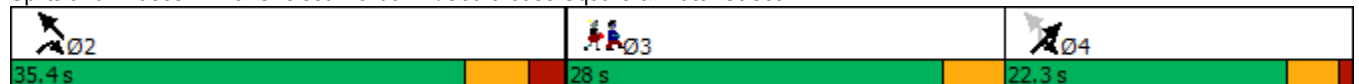


Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations					↑↑			↑↑	↑			
Traffic Volume (vph)	0	0	0	0	550	20	10	210	700	0	0	0
Future Volume (vph)	0	0	0	0	550	20	10	210	700	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.78	0.78	0.78	0.91	0.91	0.91	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	1%	1%	1%	1%	1%	1%	2%	2%	2%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	731	0	0	242	769	0	0	0
Turn Type					NA		Perm	NA	custom			
Protected Phases					2			4	2 4			
Permitted Phases							4					
Detector Phase					2		4	4	2 4			
Switch Phase												
Minimum Initial (s)					29.0		5.0	5.0				
Minimum Split (s)					35.4		9.3	9.3				
Total Split (s)					35.4		22.3	22.3				
Total Split (%)					41.3%		26.0%	26.0%				
Yellow Time (s)					4.0		3.3	3.3				
All-Red Time (s)					2.4		1.0	1.0				
Lost Time Adjust (s)					0.0			0.0				
Total Lost Time (s)					6.4			4.3				
Lead/Lag							Lag	Lag				
Lead-Lag Optimize?							Yes	Yes				
Recall Mode					Max		Min	Min				
v/c Ratio					0.37			0.40	0.51			
Control Delay					10.5			15.7	1.8			
Queue Delay					0.2			0.0	0.0			
Total Delay					10.7			15.7	1.9			
Queue Length 50th (ft)					37			18	0			
Queue Length 95th (ft)					191			66	43			
Internal Link Dist (ft)		212			237			398			202	
Turn Bay Length (ft)												
Base Capacity (vph)					1974			1302	1503			
Starvation Cap Reductn					500			0	37			
Spillback Cap Reductn					0			0	0			
Storage Cap Reductn					0			0	0			
Reduced v/c Ratio					0.50			0.19	0.52			

Intersection Summary

Cycle Length: 85.7
 Actuated Cycle Length: 53.9
 Natural Cycle: 75
 Control Type: Actuated-Uncoordinated

Splits and Phases: 26: Chelsea Harbor Dr/Courthouse Square & Water Street



Lane Group	Ø3
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Peak Hour Factor	
Heavy Vehicles (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	3
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	1.0
Minimum Split (s)	28.0
Total Split (s)	28.0
Total Split (%)	33%
Yellow Time (s)	4.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	Lead
Lead-Lag Optimize?	Yes
Recall Mode	None
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	
Intersection Summary	

HCM Signalized Intersection Capacity Analysis
 26: Chelsea Harbor Dr/Courthouse Square & Water Street

2043 Mid
 01/15/2024



Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations					↑↑			↑↑	↑			
Traffic Volume (vph)	0	0	0	0	550	20	10	210	700	0	0	0
Future Volume (vph)	0	0	0	0	550	20	10	210	700	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%			6%			4%			0%	
Total Lost time (s)					6.4			4.3	6.4			
Lane Util. Factor					0.95			0.95	1.00			
Flt					0.99			1.00	0.85			
Flt Protected					1.00			1.00	1.00			
Satd. Flow (prot)					3449			3495	1567			
Flt Permitted					1.00			1.00	1.00			
Satd. Flow (perm)					3449			3495	1567			
Peak-hour factor, PHF	0.92	0.92	0.92	0.78	0.78	0.78	0.91	0.91	0.91	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	705	26	11	231	769	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	80	240	0	0	0
Lane Group Flow (vph)	0	0	0	0	731	0	0	162	529	0	0	0
Heavy Vehicles (%)	2%	2%	2%	1%	1%	1%	1%	1%	1%	2%	2%	2%
Turn Type					NA		Perm	NA	custom			
Protected Phases					2			4	2 4			
Permitted Phases							4					
Actuated Green, G (s)					30.9			8.2	43.4			
Effective Green, g (s)					30.9			8.2	39.1			
Actuated g/C Ratio					0.54			0.14	0.69			
Clearance Time (s)					6.4			4.3				
Vehicle Extension (s)					0.2			1.0				
Lane Grp Cap (vph)					1876			504	1078			
v/s Ratio Prot					0.21				c0.34			
v/s Ratio Perm								0.05				
v/c Ratio					0.39			0.32	0.49			
Uniform Delay, d1					7.5			21.8	4.2			
Progression Factor					1.00			1.00	1.00			
Incremental Delay, d2					0.6			0.1	0.1			
Delay (s)					8.1			21.9	4.3			
Level of Service					A			C	A			
Approach Delay (s)		0.0			8.1			8.5			0.0	
Approach LOS		A			A			A			A	

Intersection Summary			
HCM 2000 Control Delay	8.3	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	56.8	Sum of lost time (s)	14.7
Intersection Capacity Utilization	48.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Queues
35: Franklin St & Oak St & Boswell Ave

2043 Mid
01/15/2024

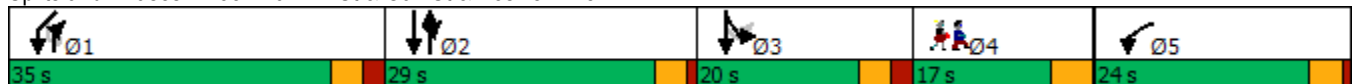


Lane Group	WBL	WBR	WBR2	NBT	NBR	NBR2	SBL2	SBL	SBT	SWL2	SWL	SWR
Lane Configurations												
Traffic Volume (vph)	10	10	20	90	150	20	10	20	80	10	120	10
Future Volume (vph)	10	10	20	90	150	20	10	20	80	10	120	10
Peak Hour Factor	0.69	0.69	0.69	0.90	0.90	0.90	0.93	0.93	0.93	0.81	0.81	0.81
Heavy Vehicles (%)	0%	0%	0%	1%	1%	1%	0%	0%	0%	1%	1%	1%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	57	0	0	100	189	0	0	33	86	0	172	0
Turn Type	Prot			NA	pt+ov		custom	Prot	NA	D.Pm	Prot	
Protected Phases	5			2	12			3	23		1	
Permitted Phases							3			1		
Detector Phase	5			2	12		3	3	23	1	1	
Switch Phase												
Minimum Initial (s)	5.0			6.0			1.0	1.0		6.0	6.0	
Minimum Split (s)	9.0			10.0			6.0	6.0		11.0	11.0	
Total Split (s)	24.0			29.0			20.0	20.0		35.0	35.0	
Total Split (%)	19.2%			23.2%			16.0%	16.0%		28.0%	28.0%	
Yellow Time (s)	3.0			3.0			3.0	3.0		3.0	3.0	
All-Red Time (s)	1.0			1.0			2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0			0.0				0.0			0.0	
Total Lost Time (s)	4.0			4.0				5.0			5.0	
Lead/Lag				Lag			Lead	Lead		Lead	Lead	
Lead-Lag Optimize?				Yes			Yes	Yes		Yes	Yes	
Recall Mode	None			None			None	None		Min	Min	
v/c Ratio	0.23			0.28	0.18			0.23	0.13		0.33	
Control Delay	32.1			29.3	13.3			36.6	18.2		26.5	
Queue Delay	0.0			0.0	0.0			0.0	0.0		0.0	
Total Delay	32.1			29.3	13.3			36.6	18.2		26.5	
Queue Length 50th (ft)	16			28	32			10	17		46	
Queue Length 95th (ft)	50			97	114			46	69		131	
Internal Link Dist (ft)	134			127					438		438	
Turn Bay Length (ft)												
Base Capacity (vph)	674			1036	1380			415	971		1039	
Starvation Cap Reductn	0			0	0			0	0		0	
Spillback Cap Reductn	0			0	0			0	0		0	
Storage Cap Reductn	0			0	0			0	0		0	
Reduced v/c Ratio	0.08			0.10	0.14			0.08	0.09		0.17	

Intersection Summary

Cycle Length: 125
 Actuated Cycle Length: 58.3
 Natural Cycle: 60
 Control Type: Actuated-Uncoordinated

Splits and Phases: 35: Franklin St & Oak St & Boswell Ave



Lane Group	Ø4
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Peak Hour Factor	
Heavy Vehicles (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	4
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	1.0
Minimum Split (s)	17.0
Total Split (s)	17.0
Total Split (%)	14%
Yellow Time (s)	4.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	Lag
Lead-Lag Optimize?	Yes
Recall Mode	None
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	
Intersection Summary	

HCM Signalized Intersection Capacity Analysis
35: Franklin St & Oak St & Boswell Ave

2043 Mid
01/15/2024



Movement	WBL	WBR	WBR2	NBT	NBR	NBR2	SBL2	SBL	SBT	SWL2	SWL	SWR
Lane Configurations												
Traffic Volume (vph)	10	10	20	90	150	20	10	20	80	10	120	10
Future Volume (vph)	10	10	20	90	150	20	10	20	80	10	120	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	14	12	12	16	16	12	12	9	9	12	12	12
Grade (%)	11%			4%					0%			8%
Total Lost time (s)	4.0			4.0	5.0			5.0	4.0			5.0
Lane Util. Factor	1.00			1.00	1.00			1.00	1.00			1.00
Frt	0.90			1.00	0.85			1.00	1.00			0.99
Flt Protected	0.99			1.00	1.00			0.95	1.00			0.96
Satd. Flow (prot)	1699			2089	1776			1624	1710			1709
Flt Permitted	0.99			1.00	1.00			0.82	1.00			0.97
Satd. Flow (perm)	1699			2089	1776			1396	1710			1743
Peak-hour factor, PHF	0.69	0.69	0.69	0.90	0.90	0.90	0.93	0.93	0.93	0.81	0.81	0.81
Adj. Flow (vph)	14	14	29	100	167	22	11	22	86	12	148	12
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	57	0	0	100	189	0	0	33	86	0	172	0
Heavy Vehicles (%)	0%	0%	0%	1%	1%	1%	0%	0%	0%	1%	1%	1%
Turn Type	Prot			NA	pt+ov		custom	Prot	NA	D.Pm		Prot
Protected Phases	5			2	1 2			3	2 3			1
Permitted Phases							3			1		
Actuated Green, G (s)	4.6			10.0	32.4			4.9	18.9			17.4
Effective Green, g (s)	4.6			10.0	32.4			4.9	18.9			17.4
Actuated g/C Ratio	0.07			0.16	0.52			0.08	0.30			0.28
Clearance Time (s)	4.0			4.0				5.0				5.0
Vehicle Extension (s)	3.0			3.0				1.0				3.0
Lane Grp Cap (vph)	125			334	920			109	517			485
v/s Ratio Prot	c0.03			c0.05	0.11				0.05			
v/s Ratio Perm								c0.02				c0.10
v/c Ratio	0.46			0.30	0.21			0.30	0.17			0.35
Uniform Delay, d1	27.8			23.2	8.1			27.2	16.0			18.1
Progression Factor	1.00			1.00	1.00			1.00	1.00			1.00
Incremental Delay, d2	2.6			0.5	0.1			0.6	0.2			0.4
Delay (s)	30.4			23.7	8.2			27.8	16.2			18.5
Level of Service	C			C	A			C	B			B
Approach Delay (s)	30.4			13.6					19.4			18.5
Approach LOS	C			B					B			B

Intersection Summary

HCM 2000 Control Delay	17.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.31		
Actuated Cycle Length (s)	62.5	Sum of lost time (s)	22.0
Intersection Capacity Utilization	31.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Queues

2043 Mid

39: Laurel Hill Road & Summer Street & Talman St/Water Street & Viaduct Road

01/15/2024



Lane Group	WBL	WBR	NBL	NBR	SEL	SET	SER2	NWT	NEL	NER
Lane Configurations										
Traffic Volume (vph)	200	370	5	5	510	40	140	5	190	150
Future Volume (vph)	200	370	5	5	510	40	140	5	190	150
Peak Hour Factor	0.82	0.82	0.44	0.44	0.92	0.92	0.92	0.75	0.89	0.89
Shared Lane Traffic (%)										
Lane Group Flow (vph)	244	451	22	0	0	597	152	7	382	0
Turn Type	Prot	pt+ov	Prot		Split	NA	pt+ov	NA	Prot	
Protected Phases	5	2 5	7		2	2	2 4	6	4	
Permitted Phases										
Detector Phase	5	2 5	7		2	2	2 4	6	4	
Switch Phase										
Minimum Initial (s)	5.0		5.0		10.0	10.0		5.0	5.0	
Minimum Split (s)	11.8		11.2		15.8	15.8		10.8	12.4	
Total Split (s)	22.0		12.0		17.0	17.0		11.0	18.0	
Total Split (%)	27.5%		15.0%		21.3%	21.3%		13.8%	22.5%	
Yellow Time (s)	3.7		4.3		3.8	3.8		3.3	3.4	
All-Red Time (s)	3.1		1.9		2.0	2.0		2.5	4.0	
Lost Time Adjust (s)	0.0		0.0					0.0	0.0	
Total Lost Time (s)	6.8		6.2			5.8		5.8	7.4	
Lead/Lag	Lead							Lag		
Lead-Lag Optimize?	Yes							Yes		
Recall Mode	None		None		C-Max	C-Max		None	None	
v/c Ratio	0.79	0.50	0.21			1.00	0.17	0.06	0.98	
Control Delay	51.6	12.8	39.9			68.2	12.0	36.4	78.5	
Queue Delay	0.0	0.0	0.0			0.0	0.0	0.0	0.0	
Total Delay	51.6	12.8	39.9			68.2	12.0	36.4	78.5	
Queue Length 50th (ft)	117	79	11			252	26	3	99	
Queue Length 95th (ft)	#192	#188	16			#696	97	13	#183	
Internal Link Dist (ft)	1347		266			237		336	287	
Turn Bay Length (ft)		465							200	
Base Capacity (vph)	318	897	113			598	878	121	389	
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	0.77	0.50	0.19			1.00	0.17	0.06	0.98	

Intersection Summary

Cycle Length: 80

Actuated Cycle Length: 80

Offset: 33 (41%), Referenced to phase 2:SETL, Start of Yellow

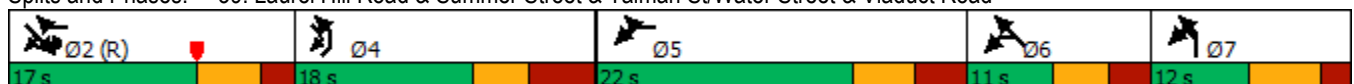
Natural Cycle: 110

Control Type: Actuated-Coordinated

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

Queue shown is maximum after two cycles.

Splits and Phases: 39: Laurel Hill Road & Summer Street & Talman St/Water Street & Viaduct Road



HCM Signalized Intersection Capacity Analysis

2043 Mid

39: Laurel Hill Road & Summer Street & Talman St/Water Street & Viaduct Road

01/15/2024



Movement	WBL	WBR	NBL	NBR	SEL	SET	SER2	NWT	NEL	NER
Lane Configurations										
Traffic Volume (vph)	200	370	5	5	510	40	140	5	190	150
Future Volume (vph)	200	370	5	5	510	40	140	5	190	150
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	12	12	12	12	12	12	12	10	12
Grade (%)	4%		15%			6%		0%	8%	
Total Lost time (s)	6.8	5.8	6.2			5.8	5.8	5.8	7.4	
Lane Util. Factor	1.00	1.00	1.00			1.00	1.00	1.00	0.97	
Frt	1.00	0.85	0.93			1.00	0.85	1.00	0.93	
Flt Protected	0.95	1.00	0.98			0.96	1.00	1.00	0.97	
Satd. Flow (prot)	1676	1552	1568			1727	1536	1863	2941	
Flt Permitted	0.95	1.00	0.98			0.96	1.00	1.00	0.97	
Satd. Flow (perm)	1676	1552	1568			1727	1536	1863	2941	
Peak-hour factor, PHF	0.82	0.82	0.44	0.44	0.92	0.92	0.92	0.75	0.89	0.89
Adj. Flow (vph)	244	451	11	11	554	43	152	7	213	169
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	244	451	22	0	0	597	152	7	382	0
Turn Type	Prot	pt+ov	Prot		Split	NA	pt+ov	NA	Prot	
Protected Phases	5	2 5	7		2	2	2 4	6	4	
Permitted Phases										
Actuated Green, G (s)	14.7	34.1	2.3			19.4	35.8	1.0	10.6	
Effective Green, g (s)	14.7	34.1	2.3			19.4	35.8	1.0	10.6	
Actuated g/C Ratio	0.18	0.43	0.03			0.24	0.45	0.01	0.13	
Clearance Time (s)	6.8		6.2			5.8		5.8	7.4	
Vehicle Extension (s)	3.0		2.0			3.0		2.0	3.0	
Lane Grp Cap (vph)	307	661	45			418	687	23	389	
v/s Ratio Prot	c0.15	0.29	c0.01			c0.35	0.10	c0.00	c0.13	
v/s Ratio Perm										
v/c Ratio	0.79	0.68	0.49			1.43	0.22	0.30	0.98	
Uniform Delay, d1	31.2	18.6	38.3			30.3	13.6	39.2	34.6	
Progression Factor	1.00	1.00	1.00			1.00	1.00	1.00	1.00	
Incremental Delay, d2	13.2	2.9	3.0			206.1	0.2	2.7	40.6	
Delay (s)	44.4	21.5	41.3			236.4	13.7	41.9	75.2	
Level of Service	D	C	D			F	B	D	E	
Approach Delay (s)	29.5		41.3			191.2		41.9	75.2	
Approach LOS	C		D			F		D	E	

Intersection Summary

HCM 2000 Control Delay	104.4	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.06		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	32.0
Intersection Capacity Utilization	84.3%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Queues

2043 PM

1: Thames St/N. Thames St & Route 82/W Main St

01/15/2024

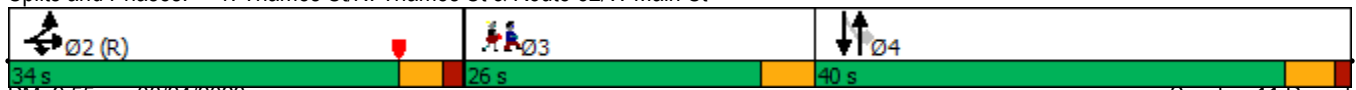


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕↕	↗					↑	↗	↘	↑	
Traffic Volume (vph)	10	830	90	0	0	0	0	60	240	10	190	0
Future Volume (vph)	10	830	90	0	0	0	0	60	240	10	190	0
Peak Hour Factor	0.90	0.90	0.90	0.25	0.25	0.25	0.94	0.94	0.94	0.69	0.69	0.69
Heavy Vehicles (%)	3%	3%	3%	0%	0%	0%	2%	2%	2%	6%	6%	6%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	933	100	0	0	0	0	64	255	14	275	0
Turn Type	Split	NA	Prot					NA	Perm	Perm	NA	
Protected Phases	2	2	2					4			4	
Permitted Phases									4	4		
Detector Phase	2	2	2					4	4	4	4	
Switch Phase												
Minimum Initial (s)	15.0	15.0	15.0					9.0	9.0	9.0	9.0	
Minimum Split (s)	20.0	20.0	20.0					14.1	14.1	14.1	14.1	
Total Split (s)	34.0	34.0	34.0					40.0	40.0	40.0	40.0	
Total Split (%)	34.0%	34.0%	34.0%					40.0%	40.0%	40.0%	40.0%	
Yellow Time (s)	3.3	3.3	3.3					3.7	3.7	3.7	3.7	
All-Red Time (s)	1.7	1.7	1.7					1.4	1.4	1.4	1.4	
Lost Time Adjust (s)		0.0	0.0					0.0	0.0	0.0	0.0	
Total Lost Time (s)		5.0	5.0					5.1	5.1	5.1	5.1	
Lead/Lag								Lag	Lag	Lag	Lag	
Lead-Lag Optimize?								Yes	Yes	Yes	Yes	
Recall Mode	C-Max	C-Max	C-Max					None	None	None	None	
v/c Ratio		0.50	0.11					0.15	0.44	0.05	0.71	
Control Delay		20.4	9.8					27.8	5.8	25.6	44.1	
Queue Delay		0.0	0.0					0.0	0.0	0.0	0.0	
Total Delay		20.4	9.8					27.8	5.8	25.6	44.1	
Queue Length 50th (ft)		67	0					32	0	7	161	
Queue Length 95th (ft)		#395	m34					58	53	15	156	
Internal Link Dist (ft)		534			251			219			154	
Turn Bay Length (ft)			275						290	130		
Base Capacity (vph)		1861	906					643	731	433	566	
Starvation Cap Reductn		0	0					0	0	0	0	
Spillback Cap Reductn		0	0					0	0	0	0	
Storage Cap Reductn		0	0					0	0	0	0	
Reduced v/c Ratio		0.50	0.11					0.10	0.35	0.03	0.49	

Intersection Summary

Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Yellow
 Natural Cycle: 75
 Control Type: Actuated-Coordinated
 # 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: 1: Thames St/N. Thames St & Route 82/W Main St



Queues

2043 PM

1: Thames St/N. Thames St & Route 82/W Main St

01/15/2024

Lane Group	Ø3
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Peak Hour Factor	
Heavy Vehicles (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	3
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	1.0
Minimum Split (s)	26.0
Total Split (s)	26.0
Total Split (%)	26%
Yellow Time (s)	4.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	Lead
Lead-Lag Optimize?	Yes
Recall Mode	None
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	
Intersection Summary	

HCM Signalized Intersection Capacity Analysis
 1: Thames St/N. Thames St & Route 82/W Main St

2043 PM
 01/15/2024



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR		
Lane Configurations		↕↕	↗					↕	↗	↘	↕			
Traffic Volume (vph)	10	830	90	0	0	0	0	60	240	10	190	0		
Future Volume (vph)	10	830	90	0	0	0	0	60	240	10	190	0		
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900		
Lane Width	12	11	12	12	12	12	12	12	13	12	10	12		
Grade (%)		2%			0%			2%				6%		
Total Lost time (s)		5.0	5.0					5.1	5.1	5.1	5.1			
Lane Util. Factor		0.95	1.00					1.00	1.00	1.00	1.00			
Frt		1.00	0.85					1.00	0.85	1.00	1.00			
Flt Protected		1.00	1.00					1.00	1.00	0.95	1.00			
Satd. Flow (prot)		3352	1552					1844	1620	1652	1623			
Flt Permitted		1.00	1.00					1.00	1.00	0.72	1.00			
Satd. Flow (perm)		3352	1552					1844	1620	1244	1623			
Peak-hour factor, PHF	0.90	0.90	0.90	0.25	0.25	0.25	0.94	0.94	0.94	0.69	0.69	0.69		
Adj. Flow (vph)	11	922	100	0	0	0	0	64	255	14	275	0		
RTOR Reduction (vph)	0	0	47	0	0	0	0	0	194	0	0	0		
Lane Group Flow (vph)	0	933	53	0	0	0	0	64	61	14	275	0		
Heavy Vehicles (%)	3%	3%	3%	0%	0%	0%	2%	2%	2%	6%	6%	6%		
Turn Type	Split	NA	Prot					NA	Perm	Perm	NA			
Protected Phases	2	2	2					4			4			
Permitted Phases									4	4				
Actuated Green, G (s)		53.1	53.1					24.0	24.0	24.0	24.0			
Effective Green, g (s)		53.1	53.1					24.0	24.0	24.0	24.0			
Actuated g/C Ratio		0.53	0.53					0.24	0.24	0.24	0.24			
Clearance Time (s)		5.0	5.0					5.1	5.1	5.1	5.1			
Vehicle Extension (s)		0.2	0.2					3.0	3.0	3.0	3.0			
Lane Grp Cap (vph)		1779	824					442	388	298	389			
v/s Ratio Prot		c0.28	0.03					0.03			c0.17			
v/s Ratio Perm									0.04	0.01				
v/c Ratio		0.52	0.06					0.14	0.16	0.05	0.71			
Uniform Delay, d1		15.2	11.4					29.9	30.0	29.2	34.8			
Progression Factor		1.02	1.83					1.00	1.00	1.00	1.00			
Incremental Delay, d2		0.9	0.1					0.2	0.2	0.1	5.8			
Delay (s)		16.4	21.0					30.1	30.2	29.3	40.6			
Level of Service		B	C					C	C	C	D			
Approach Delay (s)		16.8			0.0			30.2			40.0			
Approach LOS		B			A			C			D			
Intersection Summary														
HCM 2000 Control Delay			23.5									HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio			0.52											
Actuated Cycle Length (s)			100.0								14.1		Sum of lost time (s)	
Intersection Capacity Utilization			58.3%										ICU Level of Service	B
Analysis Period (min)			15											
c Critical Lane Group														

Queues

2043 PM

3: N High St/N Thames St & Route 82 & West Side Blvd

01/15/2024

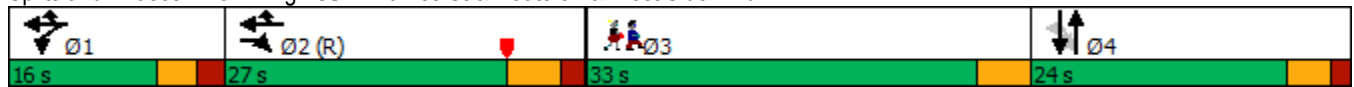


Lane Group	EBR	EBR2	WBL	WBT	WBR	NBL	NBT	NBR2	SBT	SBR	Ø3
Lane Configurations											
Traffic Volume (vph)	860	10	90	940	180	20	0	70	10	40	
Future Volume (vph)	860	10	90	940	180	20	0	70	10	40	
Peak Hour Factor	0.86	0.86	0.77	0.77	0.77	0.80	0.80	0.80	0.61	0.61	
Heavy Vehicles (%)	1%	1%	2%	2%	2%	3%	3%	3%	2%	2%	
Shared Lane Traffic (%)											
Lane Group Flow (vph)	1012	0	117	1221	234	0	113	0	82	0	
Turn Type	Prot		Prot	NA	Prot	Perm	NA		NA		
Protected Phases	2		1	1 2	1 2		4		4		3
Permitted Phases						4					
Detector Phase	2		1	1 2	1 2	4	4		4		
Switch Phase											
Minimum Initial (s)	15.0		3.0			9.0	9.0		9.0		1.0
Minimum Split (s)	21.0		8.0			13.9	13.9		13.9		33.0
Total Split (s)	27.0		16.0			24.0	24.0		24.0		33.0
Total Split (%)	27.0%		16.0%			24.0%	24.0%		24.0%		33%
Yellow Time (s)	4.1		3.0			3.3	3.3		3.3		4.0
All-Red Time (s)	1.9		2.0			1.6	1.6		1.6		0.0
Lost Time Adjust (s)	0.0		0.0				0.0		0.0		
Total Lost Time (s)	6.0		5.0				4.9		4.9		
Lead/Lag	Lag		Lead			Lag	Lag		Lag		Lead
Lead-Lag Optimize?	Yes		Yes			Yes	Yes		Yes		Yes
Recall Mode	C-Max		None			None	None		None		None
v/c Ratio	0.62		0.58	0.49	0.20		0.43		0.36		
Control Delay	21.7		54.8	12.3	2.5		11.0		19.8		
Queue Delay	0.0		0.0	0.0	0.0		0.0		0.0		
Total Delay	21.7		54.8	12.3	2.5		11.0		19.8		
Queue Length 50th (ft)	152		72	86	0		0		10		
Queue Length 95th (ft)	#438		110	303	21		26		23		
Internal Link Dist (ft)				1164			138		182		
Turn Bay Length (ft)			130								
Base Capacity (vph)	1637		201	2481	1148		415		405		
Starvation Cap Reductn	0		0	0	0		0		0		
Spillback Cap Reductn	0		0	0	0		0		0		
Storage Cap Reductn	0		0	0	0		0		0		
Reduced v/c Ratio	0.62		0.58	0.49	0.20		0.27		0.20		

Intersection Summary

Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 0 (0%), Referenced to phase 2:WBT, Start of Yellow
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 3: N High St/N Thames St & Route 82 & West Side Blvd



HCM Signalized Intersection Capacity Analysis

3: N High St/N Thames St & Route 82 & West Side Blvd

2043 PM
01/15/2024



Movement	EBR	EBR2	WBL	WBT	WBR	NBL	NBT	NBR2	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	860	10	90	940	180	20	0	70	10	40
Future Volume (vph)	860	10	90	940	180	20	0	70	10	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	13	13	13	12	8	15	8	16	8
Grade (%)				0%			2%		4%	
Total Lost time (s)	6.0		5.0	5.0	5.0		4.9		4.9	
Lane Util. Factor	0.88		1.00	0.95	1.00		1.00		1.00	
Frt	1.00		1.00	1.00	0.85		0.89		0.89	
Flt Protected	1.00		0.95	1.00	1.00		0.99		1.00	
Satd. Flow (prot)	3105		1829	3657	1583		1778		1844	
Flt Permitted	1.00		0.95	1.00	1.00		0.90		1.00	
Satd. Flow (perm)	3105		1829	3657	1583		1618		1844	
Peak-hour factor, PHF	0.86	0.86	0.77	0.77	0.77	0.80	0.80	0.80	0.61	0.61
Adj. Flow (vph)	1000	12	117	1221	234	25	0	88	16	66
RTOR Reduction (vph)	61	0	0	0	82	0	103	0	60	0
Lane Group Flow (vph)	951	0	117	1221	152	0	10	0	22	0
Heavy Vehicles (%)	1%	1%	2%	2%	2%	3%	3%	3%	2%	2%
Turn Type	Prot		Prot	NA	Prot	Perm	NA		NA	
Protected Phases	2		1	1 2	1 2		4		4	
Permitted Phases						4				
Actuated Green, G (s)	48.5		11.0	64.5	64.5		9.0		9.0	
Effective Green, g (s)	48.5		11.0	64.5	64.5		9.0		9.0	
Actuated g/C Ratio	0.48		0.11	0.64	0.64		0.09		0.09	
Clearance Time (s)	6.0		5.0				4.9		4.9	
Vehicle Extension (s)	0.2		3.0				2.0		2.0	
Lane Grp Cap (vph)	1505		201	2358	1021		145		165	
v/s Ratio Prot	c0.31		0.06	c0.33	0.10				c0.01	
v/s Ratio Perm							0.01			
v/c Ratio	0.63		0.58	0.52	0.15		0.07		0.13	
Uniform Delay, d1	19.1		42.3	9.5	7.0		41.7		41.9	
Progression Factor	1.00		1.00	1.00	1.00		1.00		1.00	
Incremental Delay, d2	2.0		4.2	0.2	0.1		0.1		0.1	
Delay (s)	21.1		46.6	9.7	7.0		41.7		42.0	
Level of Service	C		D	A	A		D		D	
Approach Delay (s)				12.0			41.7		42.0	
Approach LOS				B			D		D	
Intersection Summary										
HCM 2000 Control Delay			17.4				HCM 2000 Level of Service		B	
HCM 2000 Volume to Capacity ratio			0.48							
Actuated Cycle Length (s)			100.0				Sum of lost time (s)		19.9	
Intersection Capacity Utilization			60.8%				ICU Level of Service		B	
Analysis Period (min)			15							
c Critical Lane Group										

Queues

2043 PM

5: W Main St/Church St & Water St/Route 2 & Main St

01/15/2024



Lane Group	WBL2	WBL	WBR	NBT	SBL2	SBT	NEL	NET	NER2	Ø3
Lane Configurations										
Traffic Volume (vph)	10	0	180	870	10	260	220	230	590	
Future Volume (vph)	10	0	180	870	10	260	220	230	590	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.89	0.89	0.95	0.95	0.95	
Heavy Vehicles (%)	0%	0%	0%	3%	1%	1%	2%	2%	2%	
Shared Lane Traffic (%)			48%						33%	
Lane Group Flow (vph)	0	99	97	897	0	303	232	447	416	
Turn Type	Prot	Prot	Prot	NA	Perm	NA	Split	NA	Prot	
Protected Phases	5	5	5	2		2	4	4	4	3
Permitted Phases					2					
Detector Phase	5	5	5	2	2	2	4	4	4	
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	15.0	15.0	15.0	5.0	5.0	5.0	1.0
Minimum Split (s)	10.3	10.3	10.3	20.4	20.4	20.4	10.3	10.3	10.3	30.0
Total Split (s)	14.3	14.3	14.3	25.4	25.4	25.4	24.3	24.3	24.3	30.0
Total Split (%)	15.2%	15.2%	15.2%	27.0%	27.0%	27.0%	25.9%	25.9%	25.9%	32%
Yellow Time (s)	3.2	3.2	3.2	4.1	4.1	4.1	3.3	3.3	3.3	4.0
All-Red Time (s)	2.1	2.1	2.1	1.3	1.3	1.3	2.0	2.0	2.0	1.0
Lost Time Adjust (s)		0.0	0.0	0.0		0.0	0.0	0.0	0.0	
Total Lost Time (s)		5.3	5.3	5.4		5.4	5.3	5.3	5.3	
Lead/Lag							Lag	Lag	Lag	Lead
Lead-Lag Optimize?							Yes	Yes	Yes	Yes
Recall Mode	None	None	None	Min	Min	Min	Max	Max	Max	None
v/c Ratio		0.60	0.63	0.68		0.35	0.51	0.84	0.60	
Control Delay		52.7	55.9	29.9		26.3	32.1	36.7	7.8	
Queue Delay		0.0	0.0	0.0		0.0	0.0	0.0	0.0	
Total Delay		52.7	55.9	29.9		26.3	32.1	36.7	7.8	
Queue Length 50th (ft)		36	36	100		43	69	104	0	
Queue Length 95th (ft)		#124	#132	#257		122	#225	#425	92	
Internal Link Dist (ft)		737		133		359		434		
Turn Bay Length (ft)		90	90				270			
Base Capacity (vph)		220	206	1413		928	457	532	690	
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		0.45	0.47	0.63		0.33	0.51	0.84	0.60	

Intersection Summary

Cycle Length: 94

Actuated Cycle Length: 72.9

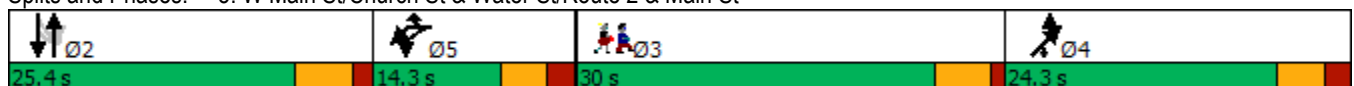
Natural Cycle: 90

Control Type: Actuated-Uncoordinated

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

Queue shown is maximum after two cycles.

Splits and Phases: 5: W Main St/Church St & Water St/Route 2 & Main St



HCM Signalized Intersection Capacity Analysis
 5: W Main St/Church St & Water St/Route 2 & Main St

2043 PM
 01/15/2024



Movement	WBL2	WBL	WBR	NBT	SBL2	SBT	NEL	NET	NER2
Lane Configurations		↔	↔	↑↑↑		↔	↔	↔	↔
Traffic Volume (vph)	10	0	180	870	10	260	220	230	590
Future Volume (vph)	10	0	180	870	10	260	220	230	590
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	14	14	12	12	12	12	12	12
Grade (%)		6%		6%		2%		12%	
Total Lost time (s)		5.3	5.3	5.4		5.4	5.3	5.3	5.3
Lane Util. Factor		1.00	0.95	0.91		0.95	1.00	0.95	0.95
Frt		0.87	0.85	1.00		1.00	1.00	0.93	0.85
Flt Protected		0.99	1.00	1.00		1.00	0.95	1.00	1.00
Satd. Flow (prot)		1692	1587	4885		3532	1663	1549	1414
Flt Permitted		0.99	1.00	1.00		0.91	0.95	1.00	1.00
Satd. Flow (perm)		1692	1587	4885		3210	1663	1549	1414
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.89	0.89	0.95	0.95	0.95
Adj. Flow (vph)	10	0	186	897	11	292	232	242	621
RTOR Reduction (vph)	0	0	0	0	0	0	0	108	306
Lane Group Flow (vph)	0	99	97	897	0	303	232	339	110
Heavy Vehicles (%)	0%	0%	0%	3%	1%	1%	2%	2%	2%
Turn Type	Prot	Prot	Prot	NA	Perm	NA	Split	NA	Prot
Protected Phases	5	5	5	2		2	4	4	4
Permitted Phases					2				
Actuated Green, G (s)		7.1	7.1	19.6		19.6	20.0	20.0	20.0
Effective Green, g (s)		7.1	7.1	19.6		19.6	20.0	20.0	20.0
Actuated g/C Ratio		0.09	0.09	0.26		0.26	0.26	0.26	0.26
Clearance Time (s)		5.3	5.3	5.4		5.4	5.3	5.3	5.3
Vehicle Extension (s)		0.2	0.2	2.5		2.5	2.0	2.0	2.0
Lane Grp Cap (vph)		159	149	1268		833	440	410	374
v/s Ratio Prot		0.06	c0.06	c0.18			0.14	c0.22	0.08
v/s Ratio Perm					0.09				
v/c Ratio		0.62	0.65	0.71		0.36	0.53	0.83	0.29
Uniform Delay, d1		32.9	33.0	25.3		22.9	23.7	26.1	22.1
Progression Factor		1.00	1.00	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2		5.4	7.5	1.7		0.2	4.5	17.2	2.0
Delay (s)		38.3	40.5	27.0		23.0	28.2	43.3	24.1
Level of Service		D	D	C		C	C	D	C
Approach Delay (s)		39.4		27.0		23.0		32.8	
Approach LOS		D		C		C		C	

Intersection Summary

HCM 2000 Control Delay	30.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	75.5	Sum of lost time (s)	21.0
Intersection Capacity Utilization	61.7%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Queues
8: West Side Blvd & Route 2

2043 PM
01/15/2024



Lane Group	SET	SER	NWL	NWT	NEL	NER	Ø3
Lane Configurations	↑↑		↖↗	↑			
Traffic Volume (vph)	280	360	840	510	0	0	
Future Volume (vph)	280	360	840	510	0	0	
Peak Hour Factor	0.84	0.84	0.88	0.88	0.25	0.25	
Heavy Vehicles (%)	1%	1%	1%	1%	0%	0%	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	762	0	955	580	0	0	
Turn Type	NA		Prot	NA			
Protected Phases	4		2	2 4			3
Permitted Phases							
Detector Phase	4		2	2 4			
Switch Phase							
Minimum Initial (s)	5.0		24.0				7.0
Minimum Split (s)	11.2		30.0				25.0
Total Split (s)	25.0		30.0				25.0
Total Split (%)	31.3%		37.5%				31%
Yellow Time (s)	3.7		3.7				4.0
All-Red Time (s)	2.5		2.3				0.0
Lost Time Adjust (s)	0.0		0.0				
Total Lost Time (s)	6.2		6.0				
Lead/Lag	Lag						Lead
Lead-Lag Optimize?	Yes						Yes
Recall Mode	Max		C-Max				None
v/c Ratio	0.72		0.50	0.33			
Control Delay	18.1		15.4	3.3			
Queue Delay	0.0		0.0	0.0			
Total Delay	18.1		15.4	3.3			
Queue Length 50th (ft)	89		118	0			
Queue Length 95th (ft)	131		#337	214			
Internal Link Dist (ft)	304			359	1164		
Turn Bay Length (ft)							
Base Capacity (vph)	1057		1906	1735			
Starvation Cap Reductn	0		0	101			
Spillback Cap Reductn	0		0	0			
Storage Cap Reductn	0		0	0			
Reduced v/c Ratio	0.72		0.50	0.35			

Intersection Summary

Cycle Length: 80
 Actuated Cycle Length: 80
 Offset: 35 (44%), Referenced to phase 2:NWTL, Start of Yellow
 Natural Cycle: 75
 Control Type: Actuated-Coordinated
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 8: West Side Blvd & Route 2



HCM Signalized Intersection Capacity Analysis
8: West Side Blvd & Route 2

2043 PM
01/15/2024



Movement	SET	SER	NWL	NWT	NEL	NER
Lane Configurations	↑↑		↖↗	↑		
Traffic Volume (vph)	280	360	840	510	0	0
Future Volume (vph)	280	360	840	510	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	1%			0%	0%	
Total Lost time (s)	6.2		6.0	6.0		
Lane Util. Factor	0.95		0.97	1.00		
Frt	0.92		1.00	1.00		
Flt Protected	1.00		0.95	1.00		
Satd. Flow (prot)	3256		3467	1881		
Flt Permitted	1.00		0.95	1.00		
Satd. Flow (perm)	3256		3467	1881		
Peak-hour factor, PHF	0.84	0.84	0.88	0.88	0.25	0.25
Adj. Flow (vph)	333	429	955	580	0	0
RTOR Reduction (vph)	292	0	0	0	0	0
Lane Group Flow (vph)	470	0	955	580	0	0
Heavy Vehicles (%)	1%	1%	1%	1%	0%	0%
Turn Type	NA		Prot	NA		
Protected Phases	4		2	2		
Permitted Phases						
Actuated Green, G (s)	18.8		40.8	65.8		
Effective Green, g (s)	18.8		40.8	59.6		
Actuated g/C Ratio	0.24		0.51	0.75		
Clearance Time (s)	6.2		6.0			
Vehicle Extension (s)	3.0		3.0			
Lane Grp Cap (vph)	765		1768	1401		
v/s Ratio Prot	c0.14		c0.28	0.31		
v/s Ratio Perm						
v/c Ratio	0.61		0.54	0.41		
Uniform Delay, d1	27.4		13.3	3.8		
Progression Factor	1.00		1.00	1.00		
Incremental Delay, d2	3.7		1.2	0.9		
Delay (s)	31.0		14.4	4.7		
Level of Service	C		B	A		
Approach Delay (s)	31.0			10.7	0.0	
Approach LOS	C			B	A	

Intersection Summary			
HCM 2000 Control Delay	17.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	16.2
Intersection Capacity Utilization	53.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Queues
11: Chelsea Harbor Dr & Market St

2043 PM
01/15/2024



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔↕↔						↕↔			↕↔	
Traffic Volume (vph)	30	930	10	0	0	0	0	10	10	25	10	0
Future Volume (vph)	30	930	10	0	0	0	0	10	10	25	10	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	1055	0	0	0	0	0	22	0	0	38	0
Turn Type	Perm	NA						NA		Perm	NA	
Protected Phases		2						4			4	
Permitted Phases	2									4		
Detector Phase	2	2						4		4	4	
Switch Phase												
Minimum Initial (s)	55.0	55.0						5.0		5.0	5.0	
Minimum Split (s)	60.2	60.2						9.4		9.4	9.4	
Total Split (s)	61.0	61.0						19.0		19.0	19.0	
Total Split (%)	76.3%	76.3%						23.8%		23.8%	23.8%	
Yellow Time (s)	3.8	3.8						3.0		3.0	3.0	
All-Red Time (s)	1.4	1.4						1.4		1.4	1.4	
Lost Time Adjust (s)		0.0						0.0		0.0	0.0	
Total Lost Time (s)		5.2						4.4		4.4	4.4	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	C-Max	C-Max						None		None	None	
v/c Ratio		0.24						0.13			0.28	
Control Delay		2.0						23.9			38.3	
Queue Delay		0.0						0.0			0.0	
Total Delay		2.0						23.9			38.3	
Queue Length 50th (ft)		37						5			18	
Queue Length 95th (ft)		58						26			45	
Internal Link Dist (ft)		510			398			25			129	
Turn Bay Length (ft)												
Base Capacity (vph)		4371						325			260	
Starvation Cap Reductn		0						0			0	
Spillback Cap Reductn		0						0			0	
Storage Cap Reductn		0						0			0	
Reduced v/c Ratio		0.24						0.07			0.15	

Intersection Summary

Cycle Length: 80
 Actuated Cycle Length: 80
 Offset: 25 (31%), Referenced to phase 2:EBTL, Start of Yellow
 Natural Cycle: 70
 Control Type: Actuated-Coordinated

Splits and Phases: 11: Chelsea Harbor Dr & Market St



HCM Signalized Intersection Capacity Analysis
 11: Chelsea Harbor Dr & Market St

2043 PM
 01/15/2024



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔↔↔						↔			↔	
Traffic Volume (vph)	30	930	10	0	0	0	0	10	10	25	10	0
Future Volume (vph)	30	930	10	0	0	0	0	10	10	25	10	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	14	12	12
Grade (%)		0%			0%			0%			2%	
Total Lost time (s)		5.2						4.4			4.4	
Lane Util. Factor		0.91						1.00			1.00	
Frt		1.00						0.93			1.00	
Flt Protected		1.00						1.00			0.97	
Satd. Flow (prot)		5069						1737			1781	
Flt Permitted		1.00						1.00			0.78	
Satd. Flow (perm)		5069						1737			1430	
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)	33	1011	11	0	0	0	0	11	11	27	11	0
RTOR Reduction (vph)	0	1	0	0	0	0	0	10	0	0	0	0
Lane Group Flow (vph)	0	1054	0	0	0	0	0	12	0	0	38	0
Turn Type	Perm	NA						NA		Perm	NA	
Protected Phases		2						4			4	
Permitted Phases	2									4		
Actuated Green, G (s)		65.2						5.2			5.2	
Effective Green, g (s)		65.2						5.2			5.2	
Actuated g/C Ratio		0.82						0.07			0.07	
Clearance Time (s)		5.2						4.4			4.4	
Vehicle Extension (s)		3.0						3.0			3.0	
Lane Grp Cap (vph)		4131						112			92	
v/s Ratio Prot								0.01				
v/s Ratio Perm		0.21									c0.03	
v/c Ratio		0.26						0.10			0.41	
Uniform Delay, d1		1.7						35.2			35.9	
Progression Factor		1.00						1.00			1.00	
Incremental Delay, d2		0.1						0.4			3.0	
Delay (s)		1.9						35.6			38.9	
Level of Service		A						D			D	
Approach Delay (s)		1.9			0.0			35.6			38.9	
Approach LOS		A			A			D			D	

Intersection Summary			
HCM 2000 Control Delay	3.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.27		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	9.6
Intersection Capacity Utilization	62.4%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Queues

2043 PM

15: Viaduct Rd/N Main St & Main St

01/15/2024



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	80	180	30	310	270	130	20	350	210	90	270	110
Future Volume (vph)	80	180	30	310	270	130	20	350	210	90	270	110
Peak Hour Factor	0.88	0.88	0.88	0.84	0.84	0.84	0.91	0.91	0.91	0.81	0.81	0.81
Heavy Vehicles (%)	3%	3%	3%	1%	1%	1%	0%	0%	0%	0%	0%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	91	239	0	369	476	0	0	638	0	111	469	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		pm+pt	NA	
Protected Phases	1	6		5	2			8		4	4 8	
Permitted Phases	6			2			8			4 8		
Detector Phase	1	6		5	2		8	8		4	4 8	
Switch Phase												
Minimum Initial (s)	5.0	15.0		5.0	15.0		7.0	7.0		5.0		
Minimum Split (s)	9.5	20.9		9.5	22.5		22.5	22.5		10.0		
Total Split (s)	15.0	25.9		15.0	25.9		31.6	31.6		16.0		
Total Split (%)	12.1%	21.0%		12.1%	21.0%		25.6%	25.6%		13.0%		
Yellow Time (s)	3.0	3.6		3.0	3.6		3.6	3.6		4.0		
All-Red Time (s)	1.0	2.3		1.0	2.3		3.0	3.0		1.0		
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0		0.0		
Total Lost Time (s)	4.0	5.9		4.0	5.9			6.6		5.0		
Lead/Lag	Lead	Lag		Lead	Lag		Lag	Lag		Lead		
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes		
Recall Mode	None	Min		None	Min		None	None		None		
v/c Ratio	0.42	0.70		0.99	1.02			1.37		0.38	0.55	
Control Delay	28.4	48.4		72.5	84.1			208.7		22.1	23.2	
Queue Delay	0.0	0.0		0.0	0.0			0.0		0.0	0.0	
Total Delay	28.4	48.4		72.5	84.1			208.7		22.1	23.2	
Queue Length 50th (ft)	31	117		148	~276			~445		31	159	
Queue Length 95th (ft)	96	#308		#429	#677			#995		96	382	
Internal Link Dist (ft)		404			410			155			275	
Turn Bay Length (ft)	275			345						115		
Base Capacity (vph)	285	387		373	465			466		291	850	
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	0.32	0.62		0.99	1.02			1.37		0.38	0.55	

Intersection Summary

Cycle Length: 123.5

Actuated Cycle Length: 93.2

Natural Cycle: 150

Control Type: Actuated-Uncoordinated

~ 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: 15: Viaduct Rd/N Main St & Main St

Ø1 15 s	Ø2 25.9 s	Ø3 35 s	Ø4 16 s	Ø8 31.6 s
Ø5 15 s	Ø6 25.9 s			

Lane Group	Ø3
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Peak Hour Factor	
Heavy Vehicles (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	3
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	7.0
Minimum Split (s)	35.0
Total Split (s)	35.0
Total Split (%)	28%
Yellow Time (s)	4.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	
Intersection Summary	

HCM Signalized Intersection Capacity Analysis
 15: Viaduct Rd/N Main St & Main St

2043 PM
 01/15/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	80	180	30	310	270	130	20	350	210	90	270	110
Future Volume (vph)	80	180	30	310	270	130	20	350	210	90	270	110
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	12	12	12	12	8	11	8	11	12	8
Grade (%)		0%			0%			6%			2%	
Total Lost time (s)	4.0	5.9		4.0	5.9			6.6		5.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00		1.00	1.00	
Frt	1.00	0.98		1.00	0.95			0.95		1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00			1.00		0.95	1.00	
Satd. Flow (prot)	1694	1745		1787	1789			1692		1727	1799	
Flt Permitted	0.21	1.00		0.34	1.00			0.97		0.16	1.00	
Satd. Flow (perm)	379	1745		641	1789			1645		284	1799	
Peak-hour factor, PHF	0.88	0.88	0.88	0.84	0.84	0.84	0.91	0.91	0.91	0.81	0.81	0.81
Adj. Flow (vph)	91	205	34	369	321	155	22	385	231	111	333	136
RTOR Reduction (vph)	0	5	0	0	13	0	0	15	0	0	10	0
Lane Group Flow (vph)	91	234	0	369	463	0	0	623	0	111	459	0
Heavy Vehicles (%)	3%	3%	3%	1%	1%	1%	0%	0%	0%	0%	0%	0%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		pm+pt	NA	
Protected Phases	1	6		5	2			8		4	4	8
Permitted Phases	6			2			8			4	8	
Actuated Green, G (s)	25.2	18.8		34.0	23.6			25.6		36.8	41.8	
Effective Green, g (s)	25.2	18.8		34.0	23.6			25.6		36.8	41.8	
Actuated g/C Ratio	0.26	0.19		0.35	0.24			0.26		0.38	0.43	
Clearance Time (s)	4.0	5.9		4.0	5.9			6.6		5.0		
Vehicle Extension (s)	2.0	3.0		2.0	3.0			2.0		2.0		
Lane Grp Cap (vph)	185	338		357	435			434		274	775	
v/s Ratio Prot	0.03	0.13		c0.12	c0.26					0.05	c0.25	
v/s Ratio Perm	0.10			0.24				c0.38		0.11		
v/c Ratio	0.49	0.69		1.03	1.06			1.43		0.41	0.59	
Uniform Delay, d1	29.3	36.4		29.4	36.7			35.7		22.5	21.1	
Progression Factor	1.00	1.00		1.00	1.00			1.00		1.00	1.00	
Incremental Delay, d2	0.8	6.0		56.6	61.4			208.3		0.4	0.8	
Delay (s)	30.0	42.4		86.0	98.1			244.0		22.9	21.9	
Level of Service	C	D		F	F			F		C	C	
Approach Delay (s)		39.0			92.8			244.0			22.1	
Approach LOS		D			F			F			C	
Intersection Summary												
HCM 2000 Control Delay			108.6			HCM 2000 Level of Service				F		
HCM 2000 Volume to Capacity ratio			1.11									
Actuated Cycle Length (s)			97.0			Sum of lost time (s)			25.5			
Intersection Capacity Utilization			91.7%			ICU Level of Service			F			
Analysis Period (min)			15									
c	Critical Lane Group											

Queues
23: Courthouse Square/Broadway & Main St

2043 PM
01/15/2024



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↑		↗		↗	↗	↗	↗
Traffic Volume (vph)	0	0	0	0	320	0	30	0	320	150	0	150
Future Volume (vph)	0	0	0	0	320	0	30	0	320	150	0	150
Peak Hour Factor	0.25	0.25	0.25	0.95	0.95	0.95	0.81	0.81	0.81	0.95	0.95	0.95
Heavy Vehicles (%)	0%	0%	0%	1%	1%	1%	3%	3%	3%	1%	1%	1%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	337	0	37	0	395	158	0	158
Turn Type					NA		Prot		custom	Prot		Prot
Protected Phases					2		1		12	4		4
Permitted Phases												
Detector Phase					2		1		12	4		4
Switch Phase												
Minimum Initial (s)					12.0		5.0			5.0		5.0
Minimum Split (s)					17.0		9.0			10.0		10.0
Total Split (s)					18.0		13.0			30.0		30.0
Total Split (%)					22.5%		16.3%			37.5%		37.5%
Yellow Time (s)					3.0		3.0			3.0		3.0
All-Red Time (s)					2.0		1.0			2.0		2.0
Lost Time Adjust (s)					0.0		0.0			0.0		0.0
Total Lost Time (s)					5.0		4.0			5.0		5.0
Lead/Lag					Lag		Lead			Lag		Lag
Lead-Lag Optimize?					Yes		Yes			Yes		Yes
Recall Mode					C-Min		None			None		None
v/c Ratio					0.43		0.05		0.34	0.50		0.56
Control Delay					24.1		0.1		2.6	34.5		37.2
Queue Delay					0.0		0.0		0.3	0.0		0.0
Total Delay					24.1		0.1		3.0	34.5		37.2
Queue Length 50th (ft)					134		0		0	72		73
Queue Length 95th (ft)					#286		0		31	119		122
Internal Link Dist (ft)		293			210			202			413	
Turn Bay Length (ft)												
Base Capacity (vph)					785		750		1159	552		494
Starvation Cap Reductn					0		0		327	0		0
Spillback Cap Reductn					0		0		0	0		0
Storage Cap Reductn					0		0		0	0		0
Reduced v/c Ratio					0.43		0.05		0.47	0.29		0.32

Intersection Summary

Cycle Length: 80
 Actuated Cycle Length: 80
 Offset: 47 (59%), Referenced to phase 2:WBT, Start of Yellow
 Natural Cycle: 60
 Control Type: Actuated-Coordinated
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 23: Courthouse Square/Broadway & Main St



Lane Group	Ø3
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Peak Hour Factor	
Heavy Vehicles (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	3
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	1.0
Minimum Split (s)	19.0
Total Split (s)	19.0
Total Split (%)	24%
Yellow Time (s)	4.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	Lead
Lead-Lag Optimize?	Yes
Recall Mode	None
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	
Intersection Summary	

HCM Signalized Intersection Capacity Analysis
 23: Courthouse Square/Broadway & Main St

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↑		↖		↗	↖	↗	↖
Traffic Volume (vph)	0	0	0	0	320	0	30	0	320	150	0	150
Future Volume (vph)	0	0	0	0	320	0	30	0	320	150	0	150
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	16	12	16	12	12	12
Grade (%)		0%			2%			1%			2%	
Total Lost time (s)					5.0		4.0		4.0	5.0		5.0
Lane Util. Factor					1.00		1.00		1.00	1.00		1.00
Frt					1.00		1.00		0.85	1.00		0.85
Flt Protected					1.00		0.95		1.00	0.95		1.00
Satd. Flow (prot)					1862		1976		1768	1769		1583
Flt Permitted					1.00		0.95		1.00	0.95		1.00
Satd. Flow (perm)					1862		1976		1768	1769		1583
Peak-hour factor, PHF	0.25	0.25	0.25	0.95	0.95	0.95	0.81	0.81	0.81	0.95	0.95	0.95
Adj. Flow (vph)	0	0	0	0	337	0	37	0	395	158	0	158
RTOR Reduction (vph)	0	0	0	0	0	0	34	0	184	0	0	0
Lane Group Flow (vph)	0	0	0	0	337	0	3	0	211	158	0	158
Heavy Vehicles (%)	0%	0%	0%	1%	1%	1%	3%	3%	3%	1%	1%	1%
Turn Type					NA		Prot		custom	Prot		Prot
Protected Phases					2		1		12	4		4
Permitted Phases												
Actuated Green, G (s)					32.1		6.7		42.8	14.2		14.2
Effective Green, g (s)					32.1		6.7		42.8	14.2		14.2
Actuated g/C Ratio					0.40		0.08		0.53	0.18		0.18
Clearance Time (s)					5.0		4.0			5.0		5.0
Vehicle Extension (s)					0.2		3.0			4.0		4.0
Lane Grp Cap (vph)					747		165		945	313		280
v/s Ratio Prot					c0.18		0.00		c0.12	0.09		c0.10
v/s Ratio Perm												
v/c Ratio					0.45		0.02		0.22	0.50		0.56
Uniform Delay, d1					17.5		33.6		9.8	29.7		30.1
Progression Factor					1.00		1.00		1.00	1.00		1.00
Incremental Delay, d2					2.0		0.0		0.1	1.7		3.1
Delay (s)					19.5		33.7		9.9	31.5		33.2
Level of Service					B		C		A	C		C
Approach Delay (s)		0.0			19.5			12.0			32.3	
Approach LOS		A			B			B			C	
Intersection Summary												
HCM 2000 Control Delay			20.2		HCM 2000 Level of Service				C			
HCM 2000 Volume to Capacity ratio			0.39									
Actuated Cycle Length (s)			80.0		Sum of lost time (s)				18.0			
Intersection Capacity Utilization			41.1%		ICU Level of Service			A				
Analysis Period (min)			15									
c Critical Lane Group												

Queues

2043 PM

26: Chelsea Harbor Dr/Courthouse Square & Water Street

01/15/2024

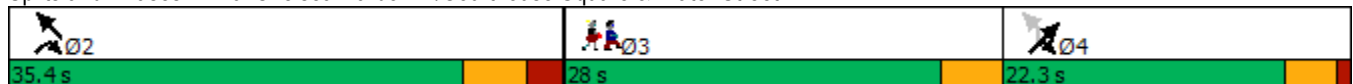


Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations					↑↑			↑↑	↑			
Traffic Volume (vph)	0	0	0	0	600	60	10	300	850	0	0	0
Future Volume (vph)	0	0	0	0	600	60	10	300	850	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.86	0.86	0.86	0.82	0.82	0.82	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	1%	1%	1%	1%	1%	1%	2%	2%	2%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	768	0	0	378	1037	0	0	0
Turn Type					NA		Perm	NA	custom			
Protected Phases					2			4	2 4			
Permitted Phases							4					
Detector Phase					2		4	4	2 4			
Switch Phase												
Minimum Initial (s)					29.0		5.0	5.0				
Minimum Split (s)					35.4		9.3	9.3				
Total Split (s)					35.4		22.3	22.3				
Total Split (%)					41.3%		26.0%	26.0%				
Yellow Time (s)					4.0		3.3	3.3				
All-Red Time (s)					2.4		1.0	1.0				
Lost Time Adjust (s)					0.0			0.0				
Total Lost Time (s)					6.4			4.3				
Lead/Lag							Lag	Lag				
Lead-Lag Optimize?							Yes	Yes				
Recall Mode					Max		Min	Min				
v/c Ratio					0.41			0.51	0.68			
Control Delay					11.7			18.5	3.2			
Queue Delay					0.3			0.0	0.0			
Total Delay					12.0			18.5	3.2			
Queue Length 50th (ft)					54			38	0			
Queue Length 95th (ft)					231			98	20			
Internal Link Dist (ft)		212			237			398			202	
Turn Bay Length (ft)												
Base Capacity (vph)					1855			1240	1523			
Starvation Cap Reductn					447			0	17			
Spillback Cap Reductn					0			0	0			
Storage Cap Reductn					0			0	0			
Reduced v/c Ratio					0.55			0.30	0.69			

Intersection Summary

Cycle Length: 85.7
 Actuated Cycle Length: 56.3
 Natural Cycle: 75
 Control Type: Actuated-Uncoordinated

Splits and Phases: 26: Chelsea Harbor Dr/Courthouse Square & Water Street



Lane Group	Ø3
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Peak Hour Factor	
Heavy Vehicles (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	3
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	1.0
Minimum Split (s)	28.0
Total Split (s)	28.0
Total Split (%)	33%
Yellow Time (s)	4.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	Lead
Lead-Lag Optimize?	Yes
Recall Mode	None
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	
Intersection Summary	

HCM Signalized Intersection Capacity Analysis
 26: Chelsea Harbor Dr/Courthouse Square & Water Street

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Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations					↑↑			↑↑	↑			
Traffic Volume (vph)	0	0	0	0	600	60	10	300	850	0	0	0
Future Volume (vph)	0	0	0	0	600	60	10	300	850	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%			6%			4%			0%	
Total Lost time (s)					6.4			4.3	6.4			
Lane Util. Factor					0.95			0.95	1.00			
Fr _t					0.99			1.00	0.85			
Fl _t Protected					1.00			1.00	1.00			
Satd. Flow (prot)					3420			3497	1567			
Fl _t Permitted					1.00			1.00	1.00			
Satd. Flow (perm)					3420			3497	1567			
Peak-hour factor, PHF	0.92	0.92	0.92	0.86	0.86	0.86	0.82	0.82	0.82	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	698	70	12	366	1037	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	77	313	0	0	0
Lane Group Flow (vph)	0	0	0	0	768	0	0	301	724	0	0	0
Heavy Vehicles (%)	2%	2%	2%	1%	1%	1%	1%	1%	1%	2%	2%	2%
Turn Type					NA		Perm	NA	custom			
Protected Phases					2			4	2 4			
Permitted Phases							4					
Actuated Green, G (s)					30.6			10.8	45.7			
Effective Green, g (s)					30.6			10.8	41.4			
Actuated g/C Ratio					0.52			0.18	0.70			
Clearance Time (s)					6.4			4.3				
Vehicle Extension (s)					0.2			1.0				
Lane Grp Cap (vph)					1764			636	1093			
v/s Ratio Prot					0.22				c0.46			
v/s Ratio Perm								0.09				
v/c Ratio					0.44			0.47	0.66			
Uniform Delay, d1					9.0			21.7	5.0			
Progression Factor					1.00			1.00	1.00			
Incremental Delay, d2					0.8			0.2	1.2			
Delay (s)					9.7			21.9	6.2			
Level of Service					A			C	A			
Approach Delay (s)		0.0			9.7			10.4			0.0	
Approach LOS		A			A			B			A	

Intersection Summary

HCM 2000 Control Delay	10.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	59.3	Sum of lost time (s)	14.7
Intersection Capacity Utilization	58.0%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Queues
35: Franklin St & Oak St & Boswell Ave

2043 PM
01/15/2024

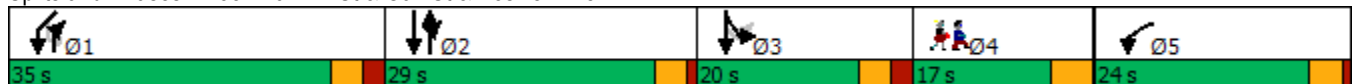


Lane Group	WBL	WBR	WBR2	NBT	NBR	NBR2	SBL2	SBL	SBT	SWL2	SWL	SWR
Lane Configurations												
Traffic Volume (vph)	10	10	20	120	230	20	10	20	80	10	130	10
Future Volume (vph)	10	10	20	120	230	20	10	20	80	10	130	10
Peak Hour Factor	0.82	0.82	0.82	0.87	0.87	0.87	0.85	0.85	0.85	0.81	0.81	0.81
Heavy Vehicles (%)	4%	4%	4%	3%	3%	3%	4%	4%	4%	4%	4%	4%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	48	0	0	138	287	0	0	36	94	0	184	0
Turn Type	Prot			NA	pt+ov		custom	Prot	NA	D.Pm	Prot	
Protected Phases	5			2	12			3	23		1	
Permitted Phases							3			1		
Detector Phase	5			2	12		3	3	23	1	1	
Switch Phase												
Minimum Initial (s)	5.0			6.0			1.0	1.0		6.0	6.0	
Minimum Split (s)	9.0			10.0			6.0	6.0		11.0	11.0	
Total Split (s)	24.0			29.0			20.0	20.0		35.0	35.0	
Total Split (%)	19.2%			23.2%			16.0%	16.0%		28.0%	28.0%	
Yellow Time (s)	3.0			3.0			3.0	3.0		3.0	3.0	
All-Red Time (s)	1.0			1.0			2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0			0.0				0.0			0.0	
Total Lost Time (s)	4.0			4.0				5.0			5.0	
Lead/Lag				Lag			Lead	Lead		Lead	Lead	
Lead-Lag Optimize?				Yes			Yes	Yes		Yes	Yes	
Recall Mode	None			Min			None	None		None	None	
v/c Ratio	0.19			0.32	0.28			0.21	0.12		0.45	
Control Delay	36.3			30.9	14.1			37.7	17.7		30.6	
Queue Delay	0.0			0.0	0.0			0.0	0.0		0.0	
Total Delay	36.3			30.9	14.1			37.7	17.7		30.6	
Queue Length 50th (ft)	14			40	54			11	18		54	
Queue Length 95th (ft)	58			130	174			50	72		152	
Internal Link Dist (ft)	134			127					438		438	
Turn Bay Length (ft)												
Base Capacity (vph)	713			1078	1320			360	1009		994	
Starvation Cap Reductn	0			0	0			0	0		0	
Spillback Cap Reductn	0			0	0			0	0		0	
Storage Cap Reductn	0			0	0			0	0		0	
Reduced v/c Ratio	0.07			0.13	0.22			0.10	0.09		0.19	

Intersection Summary

Cycle Length: 125
 Actuated Cycle Length: 60.9
 Natural Cycle: 60
 Control Type: Actuated-Uncoordinated

Splits and Phases: 35: Franklin St & Oak St & Boswell Ave



Lane Group	Ø4
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Peak Hour Factor	
Heavy Vehicles (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	4
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	1.0
Minimum Split (s)	17.0
Total Split (s)	17.0
Total Split (%)	14%
Yellow Time (s)	4.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	Lag
Lead-Lag Optimize?	Yes
Recall Mode	None
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	
Intersection Summary	

HCM Signalized Intersection Capacity Analysis
35: Franklin St & Oak St & Boswell Ave

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Movement	WBL	WBR	WBR2	NBT	NBR	NBR2	SBL2	SBL	SBT	SWL2	SWL	SWR
Lane Configurations												
Traffic Volume (vph)	10	10	20	120	230	20	10	20	80	10	130	10
Future Volume (vph)	10	10	20	120	230	20	10	20	80	10	130	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	14	12	12	16	16	12	12	9	9	12	12	12
Grade (%)	11%			4%					0%			8%
Total Lost time (s)	4.0			4.0	5.0			5.0	4.0		5.0	
Lane Util. Factor	1.00			1.00	1.00			1.00	1.00		1.00	
Frt	0.90			1.00	0.85			1.00	1.00		0.99	
Flt Protected	0.99			1.00	1.00			0.95	1.00		0.96	
Satd. Flow (prot)	1635			2049	1741			1562	1644		1661	
Flt Permitted	0.99			1.00	1.00			0.67	1.00		0.97	
Satd. Flow (perm)	1635			2049	1741			1100	1644		1682	
Peak-hour factor, PHF	0.82	0.82	0.82	0.87	0.87	0.87	0.85	0.85	0.85	0.81	0.81	0.81
Adj. Flow (vph)	12	12	24	138	264	23	12	24	94	12	160	12
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	48	0	0	138	287	0	0	36	94	0	184	0
Heavy Vehicles (%)	4%	4%	4%	3%	3%	3%	4%	4%	4%	4%	4%	4%
Turn Type	Prot			NA	pt+ov		custom	Prot	NA	D.Pm	Prot	
Protected Phases	5			2	1 2			3	2 3		1	
Permitted Phases							3			1		
Actuated Green, G (s)	4.3			12.8	32.8			6.6	23.4		15.0	
Effective Green, g (s)	4.3			12.8	32.8			6.6	23.4		15.0	
Actuated g/C Ratio	0.07			0.20	0.51			0.10	0.37		0.23	
Clearance Time (s)	4.0			4.0				5.0			5.0	
Vehicle Extension (s)	3.0			3.0				3.0			3.0	
Lane Grp Cap (vph)	109			409	890			113	600		393	
v/s Ratio Prot	c0.03			0.07	c0.16				0.06			
v/s Ratio Perm								c0.03			c0.11	
v/c Ratio	0.44			0.34	0.32			0.32	0.16		0.47	
Uniform Delay, d1	28.7			22.0	9.2			26.7	13.7		21.1	
Progression Factor	1.00			1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2	2.8			0.5	0.2			1.6	0.1		0.9	
Delay (s)	31.6			22.5	9.4			28.3	13.8		22.0	
Level of Service	C			C	A			C	B		C	
Approach Delay (s)	31.6			13.6					17.8		22.0	
Approach LOS	C			B					B		C	

Intersection Summary

HCM 2000 Control Delay	17.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.38		
Actuated Cycle Length (s)	64.1	Sum of lost time (s)	22.0
Intersection Capacity Utilization	31.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Lane Group	WBL	WBR	NBL	NBR	SEL	SET	SER2	NWT	NEL	NER
Lane Configurations										
Traffic Volume (vph)	260	400	5	5	450	200	200	5	250	240
Future Volume (vph)	260	400	5	5	450	200	200	5	250	240
Peak Hour Factor	0.95	0.95	0.69	0.69	0.87	0.87	0.87	0.42	0.94	0.94
Shared Lane Traffic (%)										
Lane Group Flow (vph)	274	421	14	0	0	747	230	12	521	0
Turn Type	Prot	pt+ov	Prot		Split	NA	pt+ov	NA	Prot	
Protected Phases	5	2 5	7		2	2	2 4	6	4	
Permitted Phases										
Detector Phase	5	2 5	7		2	2	2 4	6	4	
Switch Phase										
Minimum Initial (s)	5.0		5.0		10.0	10.0		5.0	5.0	
Minimum Split (s)	11.8		11.2		15.8	15.8		10.8	12.4	
Total Split (s)	22.0		12.0		17.0	17.0		11.0	18.0	
Total Split (%)	27.5%		15.0%		21.3%	21.3%		13.8%	22.5%	
Yellow Time (s)	3.7		4.3		3.8	3.8		3.3	3.4	
All-Red Time (s)	3.1		1.9		2.0	2.0		2.5	4.0	
Lost Time Adjust (s)	0.0		0.0					0.0	0.0	
Total Lost Time (s)	6.8		6.2			5.8		5.8	7.4	
Lead/Lag	Lead							Lag		
Lead-Lag Optimize?	Yes							Yes		
Recall Mode	None		None		C-Max	C-Max		None	None	
v/c Ratio	0.88	0.43	0.13			1.14	0.25	0.10	1.35	
Control Delay	62.4	10.9	38.0			108.3	11.1	37.2	203.1	
Queue Delay	0.0	0.0	0.0			0.0	0.5	0.0	0.0	
Total Delay	62.4	10.9	38.0			108.3	11.6	37.2	203.1	
Queue Length 50th (ft)	134	71	7			~361	41	6	~178	
Queue Length 95th (ft)	#266	#208	19			#835	139	10	#273	
Internal Link Dist (ft)	1347		266			237		336	287	
Turn Bay Length (ft)		465							200	
Base Capacity (vph)	318	963	113			654	921	121	387	
Starvation Cap Reductn	0	0	0			0	378	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	0.86	0.44	0.12			1.14	0.42	0.10	1.35	

Intersection Summary

Cycle Length: 80

Actuated Cycle Length: 80

Offset: 33 (41%), Referenced to phase 2:SETL, Start of Yellow

Natural Cycle: 150

Control Type: Actuated-Coordinated

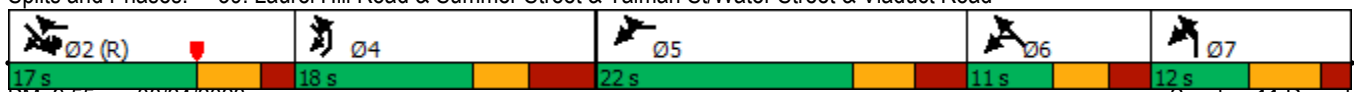
~ Volume exceeds capacity, queue is theoretically infinite.

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: 39: Laurel Hill Road & Summer Street & Talman St/Water Street & Viaduct Road



HCM Signalized Intersection Capacity Analysis

2043 PM

39: Laurel Hill Road & Summer Street & Talman St/Water Street & Viaduct Road

01/15/2024



Movement	WBL	WBR	NBL	NBR	SEL	SET	SER2	NWT	NEL	NER
Lane Configurations										
Traffic Volume (vph)	260	400	5	5	450	200	200	5	250	240
Future Volume (vph)	260	400	5	5	450	200	200	5	250	240
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	12	12	12	12	12	12	12	10	12
Grade (%)	4%		15%			6%		0%	8%	
Total Lost time (s)	6.8	5.8	6.2			5.8	5.8	5.8	7.4	
Lane Util. Factor	1.00	1.00	1.00			1.00	1.00	1.00	0.97	
Frt	1.00	0.85	0.93			1.00	0.85	1.00	0.93	
Flt Protected	0.95	1.00	0.98			0.97	1.00	1.00	0.98	
Satd. Flow (prot)	1676	1552	1568			1746	1536	1863	2926	
Flt Permitted	0.95	1.00	0.98			0.97	1.00	1.00	0.98	
Satd. Flow (perm)	1676	1552	1568			1746	1536	1863	2926	
Peak-hour factor, PHF	0.95	0.95	0.69	0.69	0.87	0.87	0.87	0.42	0.94	0.94
Adj. Flow (vph)	274	421	7	7	517	230	230	12	266	255
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	274	421	14	0	0	747	230	12	521	0
Turn Type	Prot	pt+ov	Prot		Split	NA	pt+ov	NA	Prot	
Protected Phases	5	2 5	7		2	2	2 4	6	4	
Permitted Phases										
Actuated Green, G (s)	14.8	35.2	1.2			20.4	36.8	1.0	10.6	
Effective Green, g (s)	14.8	35.2	1.2			20.4	36.8	1.0	10.6	
Actuated g/C Ratio	0.19	0.44	0.01			0.25	0.46	0.01	0.13	
Clearance Time (s)	6.8		6.2			5.8		5.8	7.4	
Vehicle Extension (s)	3.0		2.0			3.0		2.0	3.0	
Lane Grp Cap (vph)	310	682	23			445	706	23	387	
v/s Ratio Prot	c0.16	0.27	c0.01			c0.43	0.15	c0.01	c0.18	
v/s Ratio Perm										
v/c Ratio	0.88	0.62	0.61			1.68	0.33	0.52	1.35	
Uniform Delay, d1	31.8	17.2	39.2			29.8	13.7	39.3	34.7	
Progression Factor	1.00	1.00	1.00			1.00	1.00	1.00	1.00	
Incremental Delay, d2	24.4	1.7	27.4			315.1	0.3	9.5	172.2	
Delay (s)	56.1	18.9	66.6			344.9	14.0	48.7	206.9	
Level of Service	E	B	E			F	B	D	F	
Approach Delay (s)	33.6		66.6			267.0		48.7	206.9	
Approach LOS	C		E			F		D	F	

Intersection Summary

HCM 2000 Control Delay	177.3	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.31		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	32.0
Intersection Capacity Utilization	97.2%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group