Appendix B

Intersection Level of Service Calculations

Notes: The following calculations include "Existing Conditions," "Preferred Plan," and "Preferred Plan with Roundabouts"
"Preferred Plan" = Council Approved Plan Components
"Preferred Plan with Roundabouts" = Council Approved Plan Components plus the Deferred Plan Components

HCM Signalized Intersection Capacity Analysis
1: Bidwell Mansion/Memorial Way & Esplanade

11/18/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	14	72	30	68	13	179	0	597	45	0	560	36
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			3.5			3.5	4.0
Lane Util. Factor		1.00			1.00			0.95			0.95	1.00
Frpb, ped/bikes		0.99			0.98			1.00			1.00	0.96
Flpb, ped/bikes		1.00			1.00			1.00			1.00	1.00
Frt		0.97			0.91			0.99			1.00	0.85
Flt Protected		0.99			0.99			1.00			1.00	1.00
Satd. Flow (prot)		1773			1623			3494			3539	1515
Flt Permitted		0.94			0.88			1.00			1.00	1.00
Satd. Flow (perm)		1675			1440			3494			3539	1515
Peak-hour factor, PHF	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71
Adj. Flow (vph)	20	101	42	96	18	252	0	841	63	0	789	51
RTOR Reduction (vph)	0	27	0	0	64	0	0	12	0	0	0	27
Lane Group Flow (vph)	0	136	0	0	302	0	0	892	0	0	789	24
Confl. Peds. (#/hr)	28		16	16		28	19		11	11		19
Turn Type	Perm	NA		Perm	NA			NA			NA	Perm
Protected Phases		4			4			2			2	
Permitted Phases	4			4								2
Actuated Green, G (s)		16.0			16.0			21.0			21.0	21.0
Effective Green, g (s)		16.0			16.0			21.5			21.5	21.0
Actuated g/C Ratio		0.36			0.36			0.48			0.48	0.47
Clearance Time (s)		4.0			4.0			4.0			4.0	4.0
Lane Grp Cap (vph)		595			512			1669			1690	707
v/s Ratio Prot								c0.26			0.22	
v/s Ratio Perm		0.08			c0.21							0.02
v/c Ratio		0.23			0.59			0.53			0.47	0.03
Uniform Delay, d1		10.2			11.8			8.2			7.9	6.5
Progression Factor		1.00			1.00			1.00			0.49	0.18
Incremental Delay, d2		0.9			4.9			1.2			0.7	0.1
Delay (s)		11.1			16.8			9.5			4.6	1.2
Level of Service		B			B			A			A	A
Approach Delay (s)		11.1			16.8			9.5			4.4	
Approach LOS		B			B			A			A	

Intersection Summary				
HCM 2000 Control Delay	8.9	HCM 2000 Level of Service	A	
HCM 2000 Volume to Capacity ratio	0.56			
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	7.5	
Intersection Capacity Utilization	48.6%	ICU Level of Service	A	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Signalized Intersection Capacity Analysis
1: Bidwell Mansion/Memorial Way & Esplanade

11/18/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	16	42	17	45	7	171	0	931	50	0	605	26
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			3.5			3.5	4.0
Lane Util. Factor		1.00			1.00			0.95			0.95	1.00
Frpb, ped/bikes		0.99			0.97			1.00			1.00	0.95
Flpb, ped/bikes		1.00			0.99			1.00			1.00	1.00
Frt		0.97			0.90			0.99			1.00	0.85
Flt Protected		0.99			0.99			1.00			1.00	1.00
Satd. Flow (prot)		1762			1601			3506			3539	1497
Flt Permitted		0.93			0.94			1.00			1.00	1.00
Satd. Flow (perm)		1648			1512			3506			3539	1497
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	17	45	18	48	8	184	0	1001	54	0	651	28
RTOR Reduction (vph)	0	12	0	0	40	0	0	9	0	0	0	15
Lane Group Flow (vph)	0	68	0	0	200	0	0	1046	0	0	651	13
Confl. Peds. (#/hr)	25		47	47		25	28		11	11		28
Turn Type	Perm	NA		Perm	NA			NA			NA	Perm
Protected Phases		4			4			2			2	
Permitted Phases	4			4								2
Actuated Green, G (s)		16.0			16.0			21.0			21.0	21.0
Effective Green, g (s)		16.0			16.0			21.5			21.5	21.0
Actuated g/C Ratio		0.36			0.36			0.48			0.48	0.47
Clearance Time (s)		4.0			4.0			4.0			4.0	4.0
Lane Grp Cap (vph)		585			537			1675			1690	698
v/s Ratio Prot								c0.30			0.18	
v/s Ratio Perm		0.04			c0.13							0.01
v/c Ratio		0.12			0.37			0.62			0.39	0.02
Uniform Delay, d1		9.7			10.8			8.7			7.5	6.5
Progression Factor		1.00			1.00			1.00			0.38	0.20
Incremental Delay, d2		0.4			2.0			1.8			0.6	0.0
Delay (s)		10.2			12.7			10.5			3.4	1.3
Level of Service		B			B			B			A	A
Approach Delay (s)		10.2			12.7			10.5			3.3	
Approach LOS		B			B			B			A	

Intersection Summary				
HCM 2000 Control Delay	8.4	HCM 2000 Level of Service	A	
HCM 2000 Volume to Capacity ratio	0.52			
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	7.5	
Intersection Capacity Utilization	53.5%	ICU Level of Service	A	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Unsignalized Intersection Capacity Analysis
2: Esplanade & Francis Willard Ave

11/18/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	6	0	0	43	174	612	21	178	571	92
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71
Hourly flow rate (vph)	0	0	8	0	0	61	245	862	30	251	804	130
Pedestrians		37			23			2				
Lane Width (ft)		12.0			12.0			12.0				
Walking Speed (ft/s)		4.0			4.0			4.0				
Percent Blockage		3			2			0				
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								565			288	
pX, platoon unblocked	0.84	0.84	0.81	0.84	0.84	0.93	0.81			0.93		
vC, conflicting volume	2389	2812	506	2304	2862	469	971			915		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1915	2416	0	1814	2475	285	495			763		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	99	100	100	91	71			68		
cM capacity (veh/h)	17	12	850	23	11	651	836			773		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	8	61	245	575	317	251	536	398
Volume Left	0	0	245	0	0	251	0	0
Volume Right	8	61	0	0	30	0	0	130
cSH	850	651	836	1700	1700	773	1700	1700
Volume to Capacity	0.01	0.09	0.29	0.34	0.19	0.32	0.32	0.23
Queue Length 95th (ft)	1	8	31	0	0	35	0	0
Control Delay (s)	9.3	11.1	11.1	0.0	0.0	11.9	0.0	0.0
Lane LOS	A	B	B			B		
Approach Delay (s)	9.3	11.1	2.4			2.5		
Approach LOS	A	B						

Intersection Summary					
Average Delay	2.7				
Intersection Capacity Utilization	42.8%	ICU Level of Service	A		
Analysis Period (min)	15				

HCM Unsignalized Intersection Capacity Analysis
2: Esplanade & Francis Willard Ave

11/18/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	3	0	0	11	58	1052	4	200	640	74
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	0	0	3	0	0	12	62	1131	4	215	688	80
Pedestrians		46			7			1				
Lane Width (ft)		12.0			12.0			12.0				
Walking Speed (ft/s)		4.0			4.0			4.0				
Percent Blockage		4			1			0				
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								565			288	
pX, platoon unblocked	0.88	0.88	0.85	0.88	0.88	0.81	0.85			0.81		
vC, conflicting volume	1906	2471	431	2043	2509	575	814			1142		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1001	1641	0	1156	1684	0	431			700		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	100	100	99	93			70		
cM capacity (veh/h)	117	55	887	94	51	871	920			717		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	3	12	62	754	381	215	459	309
Volume Left	0	0	62	0	0	215	0	0
Volume Right	3	12	0	0	4	0	0	80
cSH	887	871	920	1700	1700	717	1700	1700
Volume to Capacity	0.00	0.01	0.07	0.44	0.22	0.30	0.27	0.18
Queue Length 95th (ft)	0	1	5	0	0	32	0	0
Control Delay (s)	9.1	9.2	9.2	0.0	0.0	12.2	0.0	0.0
Lane LOS	A	A	A			B		
Approach Delay (s)	9.1	9.2	0.5			2.7		
Approach LOS	A	A						

Intersection Summary					
Average Delay	1.5				
Intersection Capacity Utilization	54.0%	ICU Level of Service	A		
Analysis Period (min)	15				

HCM Signalized Intersection Capacity Analysis
3: Esplanade & Lincoln Ave 11/18/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	195	0	93	0	0	25	0	640	25	0	748	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0				4.0		4.0	4.0		4.0	
Lane Util. Factor		1.00				1.00		0.95	1.00		0.95	
Frpb, ped/bikes		0.97				1.00		1.00	0.96		1.00	
Flpb, ped/bikes		1.00				1.00		1.00	1.00		1.00	
Frt		0.96				0.86		1.00	0.85		1.00	
Flt Protected		0.97				1.00		1.00	1.00		1.00	
Satd. Flow (prot)		1667				1611		3539	1523		3539	
Flt Permitted		0.97				1.00		1.00	1.00		1.00	
Satd. Flow (perm)		1667				1611		3539	1523		3539	
Peak-hour factor, PHF	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71
Adj. Flow (vph)	275	0	131	0	0	35	0	901	35	0	1054	0
RTOR Reduction (vph)	0	19	0	0	0	23	0	0	19	0	0	0
Lane Group Flow (vph)	0	387	0	0	0	12	0	901	16	0	1054	0
Confl. Peds. (#/hr)			107	107			96		13	13		96
Turn Type	Perm	NA				Perm		NA	Perm		NA	
Protected Phases		4						2			2	
Permitted Phases	4					4			2			
Actuated Green, G (s)		16.0				16.0		21.0	21.0		21.0	
Effective Green, g (s)		16.0				16.0		21.0	21.0		21.0	
Actuated g/C Ratio		0.36				0.36		0.47	0.47		0.47	
Clearance Time (s)		4.0				4.0		4.0	4.0		4.0	
Lane Grp Cap (vph)		592				572		1651	710		1651	
v/s Ratio Prot								0.25			c0.30	
v/s Ratio Perm		0.23				0.01			0.01			
v/c Ratio		0.65				0.02		0.55	0.02		0.64	
Uniform Delay, d1		12.2				9.4		8.6	6.5		9.1	
Progression Factor		1.00				1.00		0.66	0.35		0.37	
Incremental Delay, d2		5.6				0.1		1.1	0.1		1.5	
Delay (s)		17.7				9.5		6.8	2.3		4.9	
Level of Service		B				A		A	A		A	
Approach Delay (s)		17.7			9.5			6.6			4.9	
Approach LOS		B			A			A			A	

Intersection Summary			
HCM 2000 Control Delay	7.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	49.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
3: Esplanade & Lincoln Ave 11/18/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	115	0	40	0	0	25	0	1038	25	0	860	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0				4.0		4.0	4.0		4.0	
Lane Util. Factor		1.00				1.00		0.95	1.00		0.95	
Frpb, ped/bikes		0.99				1.00		1.00	0.96		1.00	
Flpb, ped/bikes		1.00				1.00		1.00	1.00		1.00	
Frt		0.97				0.86		1.00	0.85		1.00	
Flt Protected		0.96				1.00		1.00	1.00		1.00	
Satd. Flow (prot)		1723				1611		3539	1521		3536	
Flt Permitted		0.96				1.00		1.00	1.00		1.00	
Satd. Flow (perm)		1723				1611		3539	1521		3536	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	124	0	43	0	0	27	0	1116	27	0	925	3
RTOR Reduction (vph)	0	28	0	0	0	17	0	0	14	0	1	0
Lane Group Flow (vph)	0	139	0	0	0	10	0	1116	13	0	927	0
Confl. Peds. (#/hr)			14	14			55		14	14		55
Turn Type	Perm	NA				Perm		NA	Perm		NA	
Protected Phases		4						2			2	
Permitted Phases	4					4			2			
Actuated Green, G (s)		16.0				16.0		21.0	21.0		21.0	
Effective Green, g (s)		16.0				16.0		21.0	21.0		21.0	
Actuated g/C Ratio		0.36				0.36		0.47	0.47		0.47	
Clearance Time (s)		4.0				4.0		4.0	4.0		4.0	
Lane Grp Cap (vph)		612				572		1651	709		1650	
v/s Ratio Prot								c0.32			0.26	
v/s Ratio Perm		0.08				0.01			0.01			
v/c Ratio		0.23				0.02		0.68	0.02		0.56	
Uniform Delay, d1		10.2				9.4		9.3	6.5		8.7	
Progression Factor		1.00				1.00		0.50	0.19		0.36	
Incremental Delay, d2		0.9				0.1		1.8	0.0		1.3	
Delay (s)		11.0				9.5		6.5	1.3		4.4	
Level of Service		B				A		A	A		A	
Approach Delay (s)		11.0			9.5			6.4			4.4	
Approach LOS		B			A			A			A	

Intersection Summary			
HCM 2000 Control Delay	5.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	55.4%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis
4: Esplanade & W Sacramento Ave

11/18/2015

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	118	205	665	630	281
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.71	0.71	0.71	0.71	0.71	0.71
Hourly flow rate (vph)	0	166	289	937	887	396
Pedestrians	57			17	1	
Lane Width (ft)	12.0			12.0	12.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	5			1	0	
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				601	437	
pX, platoon unblocked	0.75	0.71	0.71			
vC, conflicting volume	2189	716	1340			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1431	0	673			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	77	53			
cM capacity (veh/h)	48	726	621			

Direction, Lane #	EB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	166	289	468	468	592	692
Volume Left	0	289	0	0	0	0
Volume Right	166	0	0	0	0	396
cSH	726	621	1700	1700	1700	1700
Volume to Capacity	0.23	0.47	0.28	0.28	0.35	0.41
Queue Length 95th (ft)	22	62	0	0	0	0
Control Delay (s)	11.4	15.7	0.0	0.0	0.0	0.0
Lane LOS	B	C				
Approach Delay (s)	11.4	3.7			0.0	
Approach LOS	B					

Intersection Summary				
Average Delay		2.4		
Intersection Capacity Utilization		60.0%	ICU Level of Service	B
Analysis Period (min)		15		

HCM Unsignalized Intersection Capacity Analysis
4: Esplanade & W Sacramento Ave

11/18/2015

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	120	204	974	732	122
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	0	129	219	1047	787	131
Pedestrians	20			4		
Lane Width (ft)	12.0			12.0		
Walking Speed (ft/s)	4.0			4.0		
Percent Blockage	2			0		
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				601	437	
pX, platoon unblocked	0.88	0.86	0.86			
vC, conflicting volume	1835	483	938			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	975	84	612			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	84	73			
cM capacity (veh/h)	157	810	818			

Direction, Lane #	EB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	129	219	524	524	525	394
Volume Left	0	219	0	0	0	0
Volume Right	129	0	0	0	0	131
cSH	810	818	1700	1700	1700	1700
Volume to Capacity	0.16	0.27	0.31	0.31	0.31	0.23
Queue Length 95th (ft)	14	27	0	0	0	0
Control Delay (s)	10.3	11.0	0.0	0.0	0.0	0.0
Lane LOS	B	B				
Approach Delay (s)	10.3	1.9			0.0	
Approach LOS	B					

Intersection Summary				
Average Delay		1.6		
Intersection Capacity Utilization		54.2%	ICU Level of Service	A
Analysis Period (min)		15		

HCM Signalized Intersection Capacity Analysis
5: Esplanade & 1st Ave

11/18/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	65	342	39	67	347	62	0	610	70	0	813	89
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	3.5		3.5	3.5			3.5	3.5		3.5	
Lane Util. Factor	1.00	1.00		1.00	1.00			0.95	1.00		0.95	
Frpb, ped/bikes	1.00	1.00		1.00	1.00			1.00	0.97		0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00	1.00		1.00	
Frt	1.00	0.98		1.00	0.98			1.00	0.85		0.99	
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00		1.00	
Satd. Flow (prot)	1767	1832		1769	1816			3539	1534		3461	
Flt Permitted	0.24	1.00		0.24	1.00			1.00	1.00		1.00	
Satd. Flow (perm)	451	1832		451	1816			3539	1534		3461	
Peak-hour factor, PHF	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71
Adj. Flow (vph)	92	482	55	94	489	87	0	859	99	0	1145	125
RTOR Reduction (vph)	0	9	0	0	14	0	0	0	52	0	18	0
Lane Group Flow (vph)	92	528	0	94	562	0	0	859	47	0	1252	0
Confl. Peds. (#/hr)	6		2	2		6	40		8	8		40
Turn Type	Perm	NA		Perm	NA			NA	Perm		NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4					2			
Actuated Green, G (s)	16.0	16.0		16.0	16.0			21.0	21.0		21.0	
Effective Green, g (s)	16.5	16.5		16.5	16.5			21.5	21.5		21.5	
Actuated g/C Ratio	0.37	0.37		0.37	0.37			0.48	0.48		0.48	
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0	4.0		4.0	
Lane Grp Cap (vph)	165	671		165	665			1690	732		1653	
v/s Ratio Prot		0.29			c0.31			0.24			c0.36	
v/s Ratio Perm	0.20			0.21					0.03			
v/c Ratio	0.56	0.79		0.57	0.85			0.51	0.06		0.76	
Uniform Delay, d1	11.3	12.7		11.4	13.1			8.1	6.3		9.6	
Progression Factor	1.00	1.00		1.00	1.00			0.58	0.21		0.54	
Incremental Delay, d2	12.9	9.1		13.5	12.5			0.9	0.1		2.4	
Delay (s)	24.3	21.7		24.9	25.6			5.6	1.5		7.6	
Level of Service	C	C		C	C			A	A		A	
Approach Delay (s)		22.1			25.5			5.2			7.6	
Approach LOS		C			C			A			A	

Intersection Summary				
HCM 2000 Control Delay	12.9	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.79			
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	7.0	
Intersection Capacity Utilization	61.4%	ICU Level of Service	B	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Signalized Intersection Capacity Analysis
5: Esplanade & 1st Ave

11/18/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	75	357	39	93	423	115	0	890	85	0	715	64
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	3.5		3.5	3.5			3.5	3.5		3.5	
Lane Util. Factor	1.00	1.00		1.00	1.00			0.95	1.00		0.95	
Frpb, ped/bikes	1.00	1.00		1.00	1.00			1.00	0.97		1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00	1.00		1.00	
Frt	1.00	0.99		1.00	0.97			1.00	0.85		0.99	
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00		1.00	
Satd. Flow (prot)	1769	1832		1765	1798			3539	1539		3483	
Flt Permitted	0.24	1.00		0.35	1.00			1.00	1.00		1.00	
Satd. Flow (perm)	451	1832		646	1798			3539	1539		3483	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	81	384	42	100	455	124	0	957	91	0	769	69
RTOR Reduction (vph)	0	9	0	0	22	0	0	0	48	0	15	0
Lane Group Flow (vph)	81	417	0	100	557	0	0	957	43	0	823	0
Confl. Peds. (#/hr)	2		6	6		2	17		6	6		17
Turn Type	Perm	NA		Perm	NA			NA	Perm		NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4					2			
Actuated Green, G (s)	16.0	16.0		16.0	16.0			21.0	21.0		21.0	
Effective Green, g (s)	16.5	16.5		16.5	16.5			21.5	21.5		21.5	
Actuated g/C Ratio	0.37	0.37		0.37	0.37			0.48	0.48		0.48	
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0	4.0		4.0	
Lane Grp Cap (vph)	165	671		236	659			1690	735		1664	
v/s Ratio Prot		0.23			c0.31			c0.27			0.24	
v/s Ratio Perm	0.18			0.15					0.03			
v/c Ratio	0.49	0.62		0.42	0.85			0.57	0.06		0.49	
Uniform Delay, d1	11.0	11.7		10.7	13.1			8.4	6.3		8.0	
Progression Factor	1.00	1.00		1.00	1.00			0.22	0.02		0.51	
Incremental Delay, d2	10.1	4.3		5.5	12.7			1.1	0.1		0.9	
Delay (s)	21.1	16.0		16.2	25.8			2.9	0.3		5.1	
Level of Service	C	B		B	C			A	A		A	
Approach Delay (s)		16.8			24.3			2.7			5.1	
Approach LOS		B			C			A			A	

Intersection Summary				
HCM 2000 Control Delay	10.5	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.69			
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	7.0	
Intersection Capacity Utilization	68.1%	ICU Level of Service	C	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Unsignalized Intersection Capacity Analysis
6: Esplanade & 2nd Ave

11/18/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	3	1	19	1	1	18	51	700	5	36	866	48
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71
Hourly flow rate (vph)	4	1	27	1	1	25	72	986	7	51	1220	68
Pedestrians		13			10			3			1	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		1			1			0			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								437			452	
pX, platoon unblocked	0.78	0.78	0.71	0.78	0.78	0.85	0.71			0.85		
vC, conflicting volume	2032	2515	660	1885	2545	507	1300			1003		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	912	1532	0	723	1571	81	591			661		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	97	98	96	99	98	97	90			94		
cM capacity (veh/h)	145	74	755	198	70	814	684			782		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	32	28	72	657	336	51	813	474
Volume Left	4	1	72	0	0	51	0	0
Volume Right	27	25	0	0	7	0	0	68
cSH	387	483	684	1700	1700	782	1700	1700
Volume to Capacity	0.08	0.06	0.10	0.39	0.20	0.06	0.48	0.28
Queue Length 95th (ft)	7	5	9	0	0	5	0	0
Control Delay (s)	15.1	12.9	10.9	0.0	0.0	9.9	0.0	0.0
Lane LOS	C	B	B			A		
Approach Delay (s)	15.1	12.9	0.7			0.4		
Approach LOS	C	B						

Intersection Summary					
Average Delay	0.9				
Intersection Capacity Utilization	43.2%	ICU Level of Service	A		
Analysis Period (min)	15				

HCM Unsignalized Intersection Capacity Analysis
6: Esplanade & 2nd Ave

11/18/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	4	0	11	4	0	11	48	1010	16	62	750	17
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	4	0	12	4	0	12	52	1086	17	67	806	18
Pedestrians		14			3			1			2	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		1			0			0			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								437			452	
pX, platoon unblocked	0.89	0.89	0.86	0.89	0.89	0.82	0.86			0.82		
vC, conflicting volume	1623	2172	427	1750	2173	557	839			1106		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	738	1356	6	881	1357	14	485			686		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	98	100	99	98	100	99	94			91		
cM capacity (veh/h)	233	111	912	186	111	865	912			738		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	16	16	52	724	379	67	538	287
Volume Left	4	4	52	0	0	67	0	0
Volume Right	12	12	0	0	17	0	0	18
cSH	514	438	912	1700	1700	738	1700	1700
Volume to Capacity	0.03	0.04	0.06	0.43	0.22	0.09	0.32	0.17
Queue Length 95th (ft)	2	3	4	0	0	7	0	0
Control Delay (s)	12.2	13.5	9.2	0.0	0.0	10.4	0.0	0.0
Lane LOS	B	B	A			B		
Approach Delay (s)	12.2	13.5	0.4			0.8		
Approach LOS	B	B						

Intersection Summary					
Average Delay	0.8				
Intersection Capacity Utilization	45.8%	ICU Level of Service	A		
Analysis Period (min)	15				

HCM Signalized Intersection Capacity Analysis
7: Esplanade & 3rd Ave 11/18/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	73	64	24	46	56	32	0	719	18	0	882	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5			3.5			3.5	3.0		3.5	
Lane Util. Factor		1.00			1.00			0.95	1.00		0.95	
Frpb, ped/bikes		1.00			1.00			1.00	0.97		1.00	
Flpb, ped/bikes		1.00			1.00			1.00	1.00		1.00	
Frt		0.98			0.97			1.00	0.85		1.00	
Flt Protected		0.98			0.98			1.00	1.00		1.00	
Satd. Flow (prot)		1779			1766			3539	1532		3527	
Flt Permitted		0.80			0.85			1.00	1.00		1.00	
Satd. Flow (perm)		1457			1524			3539	1532		3527	
Peak-hour factor, PHF	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71
Adj. Flow (vph)	103	90	34	65	79	45	0	1013	25	0	1242	25
RTOR Reduction (vph)	0	14	0	0	25	0	0	0	13	0	3	0
Lane Group Flow (vph)	0	213	0	0	164	0	0	1013	12	0	1264	0
Confl. Peds. (#/hr)	3		2	2		3	8		9	9		8
Turn Type	Perm	NA		Perm	NA			NA	Perm		NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4					2			
Actuated Green, G (s)		16.5			16.5			21.5	21.5		21.5	
Effective Green, g (s)		16.5			16.5			21.5	22.0		21.5	
Actuated g/C Ratio		0.37			0.37			0.48	0.49		0.48	
Clearance Time (s)		3.5			3.5			3.5	3.5		3.5	
Lane Grp Cap (vph)		534			558			1690	748		1685	
v/s Ratio Prot								0.29			c0.36	
v/s Ratio Perm		c0.15			0.11				0.01			
v/c Ratio		0.40			0.29			0.60	0.02		0.75	
Uniform Delay, d1		10.6			10.1			8.6	5.9		9.6	
Progression Factor		1.00			1.00			0.51	0.15		0.44	
Incremental Delay, d2		2.2			1.3			1.4	0.0		2.4	
Delay (s)		12.8			11.5			5.8	0.9		6.5	
Level of Service		B			B			A	A		A	
Approach Delay (s)		12.8			11.5			5.7			6.5	
Approach LOS		B			B			A			A	

Intersection Summary				
HCM 2000 Control Delay	7.1	HCM 2000 Level of Service	A	
HCM 2000 Volume to Capacity ratio	0.60			
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	7.0	
Intersection Capacity Utilization	45.0%	ICU Level of Service	A	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Signalized Intersection Capacity Analysis
7: Esplanade & 3rd Ave 11/18/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	50	38	12	23	31	41	0	1005	16	0	790	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5			3.5			3.5	3.0		3.5	
Lane Util. Factor		1.00			1.00			0.95	1.00		0.95	
Frpb, ped/bikes		1.00			0.99			1.00	0.98		1.00	
Flpb, ped/bikes		1.00			1.00			1.00	1.00		1.00	
Frt		0.98			0.94			1.00	0.85		1.00	
Flt Protected		0.98			0.99			1.00	1.00		1.00	
Satd. Flow (prot)		1784			1722			3539	1545		3525	
Flt Permitted		0.85			0.94			1.00	1.00		1.00	
Satd. Flow (perm)		1558			1631			3539	1545		3525	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	54	41	13	25	33	44	0	1081	17	0	849	19
RTOR Reduction (vph)	0	8	0	0	28	0	0	0	9	0	4	0
Lane Group Flow (vph)	0	100	0	0	74	0	0	1081	8	0	864	0
Confl. Peds. (#/hr)	2		2	2		2	14		3	3		14
Turn Type	Perm	NA		Perm	NA			NA	Perm		NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4					2			
Actuated Green, G (s)		16.5			16.5			21.5	21.5		21.5	
Effective Green, g (s)		16.5			16.5			21.5	22.0		21.5	
Actuated g/C Ratio		0.37			0.37			0.48	0.49		0.48	
Clearance Time (s)		3.5			3.5			3.5	3.5		3.5	
Lane Grp Cap (vph)		571			598			1690	755		1684	
v/s Ratio Prot								c0.31			0.25	
v/s Ratio Perm		c0.06			0.05				0.01			
v/c Ratio		0.17			0.12			0.64	0.01		0.51	
Uniform Delay, d1		9.6			9.5			8.8	5.9		8.1	
Progression Factor		1.00			1.00			0.45	0.17		0.39	
Incremental Delay, d2		0.7			0.4			1.5	0.0		1.0	
Delay (s)		10.3			9.9			5.5	1.0		4.2	
Level of Service		B			A			A	A		A	
Approach Delay (s)		10.3			9.9			5.4			4.2	
Approach LOS		B			A			A			A	

Intersection Summary				
HCM 2000 Control Delay	5.4	HCM 2000 Level of Service	A	
HCM 2000 Volume to Capacity ratio	0.44			
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	7.0	
Intersection Capacity Utilization	47.8%	ICU Level of Service	A	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Unsignalized Intersection Capacity Analysis
8: Esplanade & 4th Ave 11/18/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	14	7	39	1	1	8	53	767	4	63	860	61
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71
Hourly flow rate (vph)	20	10	55	1	1	11	75	1080	6	89	1211	86
Pedestrians		8			11			3				
Lane Width (ft)		12.0			12.0			12.0				
Walking Speed (ft/s)		4.0			4.0			4.0				
Percent Blockage		1			1			0				
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								429			440	
pX, platoon unblocked	0.83	0.83	0.73	0.83	0.83	0.80	0.73			0.80		
vC, conflicting volume	2141	2686	660	2089	2726	554	1305			1097		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	896	1552	0	834	1601	0	683			629		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	87	86	93	99	98	99	89			88		
cM capacity (veh/h)	155	72	786	147	67	862	658			755		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	85	14	75	720	366	89	808	490
Volume Left	20	1	75	0	0	89	0	0
Volume Right	55	11	0	0	6	0	0	86
cSH	253	323	658	1700	1700	755	1700	1700
Volume to Capacity	0.33	0.04	0.11	0.42	0.22	0.12	0.48	0.29
Queue Length 95th (ft)	35	3	10	0	0	10	0	0
Control Delay (s)	26.2	16.7	11.2	0.0	0.0	10.4	0.0	0.0
Lane LOS	D	C	B			B		
Approach Delay (s)	26.2	16.7	0.7			0.7		
Approach LOS	D	C						

Intersection Summary					
Average Delay	1.6				
Intersection Capacity Utilization	46.6%	ICU Level of Service	A		
Analysis Period (min)	15				

HCM Unsignalized Intersection Capacity Analysis
8: Esplanade & 4th Ave 11/18/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	31	5	45	2	3	7	62	1022	12	63	763	42
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	33	5	48	2	3	8	67	1099	13	68	820	45
Pedestrians		6			11			3				
Lane Width (ft)		12.0			12.0			12.0				
Walking Speed (ft/s)		4.0			4.0			4.0				
Percent Blockage		1			1			0				
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								429			440	
pX, platoon unblocked	0.85	0.85	0.86	0.85	0.85	0.78	0.86			0.78		
vC, conflicting volume	1676	2241	442	1849	2257	567	872			1123		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	704	1371	34	908	1390	0	532			584		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	85	95	95	99	97	99	92			91		
cM capacity (veh/h)	229	102	883	152	99	835	885			759		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	87	13	67	733	379	68	547	319
Volume Left	33	2	67	0	0	68	0	0
Volume Right	48	8	0	0	13	0	0	45
cSH	344	232	885	1700	1700	759	1700	1700
Volume to Capacity	0.25	0.06	0.08	0.43	0.22	0.09	0.32	0.19
Queue Length 95th (ft)	25	4	6	0	0	7	0	0
Control Delay (s)	19.0	21.5	9.4	0.0	0.0	10.2	0.0	0.0
Lane LOS	C	C	A			B		
Approach Delay (s)	19.0	21.5	0.5			0.7		
Approach LOS	C	C						

Intersection Summary					
Average Delay	1.5				
Intersection Capacity Utilization	52.1%	ICU Level of Service	A		
Analysis Period (min)	15				

HCM Signalized Intersection Capacity Analysis
9: Esplanade & 5th Ave 11/18/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	38	79	18	113	66	104	0	747	44	0	837	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5			3.5	3.5		3.5	3.5		3.5	
Lane Util. Factor		1.00			1.00	1.00		0.95	1.00		0.95	
Frpb, ped/bikes		1.00			1.00	0.98		1.00	0.96		1.00	
Flpb, ped/bikes		1.00			1.00	1.00		1.00	1.00		1.00	
Frt		0.98			1.00	0.85		1.00	0.85		0.99	
Flt Protected		0.99			0.97	1.00		1.00	1.00		1.00	
Satd. Flow (prot)		1797			1804	1546		3539	1521		3511	
Flt Permitted		0.87			0.75	1.00		1.00	1.00		1.00	
Satd. Flow (perm)		1582			1404	1546		3539	1521		3511	
Peak-hour factor, PHF	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71
Adj. Flow (vph)	54	111	25	159	93	146	0	1052	62	0	1179	56
RTOR Reduction (vph)	0	12	0	0	0	34	0	0	32	0	7	0
Lane Group Flow (vph)	0	178	0	0	252	112	0	1052	30	0	1228	0
Confl. Peds. (#/hr)	14		2	2		14	4		14	14		4
Turn Type	Perm	NA		Perm	NA	Perm		NA	Perm		NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4		4			2			
Actuated Green, G (s)		16.0			16.0	16.0		21.0	21.0		21.0	
Effective Green, g (s)		16.5			16.5	16.5		21.5	21.5		21.5	
Actuated g/C Ratio		0.37			0.37	0.37		0.48	0.48		0.48	
Clearance Time (s)		4.0			4.0	4.0		4.0	4.0		4.0	
Lane Grp Cap (vph)		580			514	566		1690	726		1677	
v/s Ratio Prot								0.30			c0.35	
v/s Ratio Perm		0.11			c0.18	0.07			0.02			
v/c Ratio		0.31			0.49	0.20		0.62	0.04		0.73	
Uniform Delay, d1		10.2			11.0	9.7		8.7	6.3		9.4	
Progression Factor		1.00			1.00	1.00		0.70	0.24		0.44	
Incremental Delay, d2		1.4			3.3	0.8		1.5	0.1		1.9	
Delay (s)		11.5			14.3	10.5		7.6	1.6		6.1	
Level of Service		B			B	B		A	A		A	
Approach Delay (s)		11.5			12.9			7.3			6.1	
Approach LOS		B			B			A			A	

Intersection Summary				
HCM 2000 Control Delay	7.8	HCM 2000 Level of Service	A	
HCM 2000 Volume to Capacity ratio	0.63			
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	7.0	
Intersection Capacity Utilization	57.3%	ICU Level of Service	B	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Signalized Intersection Capacity Analysis
9: Esplanade & 5th Ave 11/18/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	39	90	13	76	69	106	0	980	71	0	774	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5			3.5	3.5		3.5	3.5		3.5	
Lane Util. Factor		1.00			1.00	1.00		0.95	1.00		0.95	
Frpb, ped/bikes		1.00			1.00	0.98		1.00	0.96		1.00	
Flpb, ped/bikes		1.00			1.00	1.00		1.00	1.00		1.00	
Frt		0.99			1.00	0.85		1.00	0.85		1.00	
Flt Protected		0.99			0.97	1.00		1.00	1.00		1.00	
Satd. Flow (prot)		1807			1809	1547		3539	1525		3521	
Flt Permitted		0.90			0.80	1.00		1.00	1.00		1.00	
Satd. Flow (perm)		1654			1489	1547		3539	1525		3521	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	42	97	14	82	74	114	0	1054	76	0	832	25
RTOR Reduction (vph)	0	8	0	0	0	34	0	0	40	0	5	0
Lane Group Flow (vph)	0	145	0	0	156	80	0	1054	36	0	852	0
Confl. Peds. (#/hr)	13		10	10		13	2		12	12		2
Turn Type	Perm	NA		Perm	NA	Perm		NA	Perm		NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4		4			2			
Actuated Green, G (s)		16.0			16.0	16.0		21.0	21.0		21.0	
Effective Green, g (s)		16.5			16.5	16.5		21.5	21.5		21.5	
Actuated g/C Ratio		0.37			0.37	0.37		0.48	0.48		0.48	
Clearance Time (s)		4.0			4.0	4.0		4.0	4.0		4.0	
Lane Grp Cap (vph)		606			545	567		1690	728		1682	
v/s Ratio Prot								c0.30			0.24	
v/s Ratio Perm		0.09			c0.10	0.05			0.02			
v/c Ratio		0.24			0.29	0.14		0.62	0.05		0.51	
Uniform Delay, d1		9.9			10.1	9.5		8.7	6.3		8.1	
Progression Factor		1.00			1.00	1.00		0.56	0.24		0.54	
Incremental Delay, d2		0.9			1.3	0.5		1.4	0.1		1.0	
Delay (s)		10.8			11.4	10.0		6.3	1.6		5.4	
Level of Service		B			B	B		A	A		A	
Approach Delay (s)		10.8			10.8			6.0			5.4	
Approach LOS		B			B			A			A	

Intersection Summary				
HCM 2000 Control Delay	6.6	HCM 2000 Level of Service	A	
HCM 2000 Volume to Capacity ratio	0.48			
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	7.0	
Intersection Capacity Utilization	63.8%	ICU Level of Service	B	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Unsignalized Intersection Capacity Analysis
10: Esplanade & 6th Ave

11/18/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	6	7	42	1	1	7	97	782	10	76	834	39
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71
Hourly flow rate (vph)	8	10	59	1	1	10	137	1101	14	107	1175	55
Pedestrians		14			12			9			6	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		1			1			1			1	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								442			438	
pX, platoon unblocked	0.80	0.80	0.70	0.80	0.80	0.80	0.70			0.80		
vC, conflicting volume	2271	2831	638	2268	2851	576	1244			1127		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	962	1666	0	959	1691	0	479			664		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	93	81	92	99	97	99	82			85		
cM capacity (veh/h)	120	52	741	99	50	856	743			731		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	77	13	137	734	381	107	783	446
Volume Left	8	1	137	0	0	107	0	0
Volume Right	59	10	0	0	14	0	0	55
cSH	228	235	743	1700	1700	731	1700	1700
Volume to Capacity	0.34	0.05	0.18	0.43	0.22	0.15	0.46	0.26
Queue Length 95th (ft)	36	4	17	0	0	13	0	0
Control Delay (s)	28.7	21.2	10.9	0.0	0.0	10.8	0.0	0.0
Lane LOS	D	C	B			B		
Approach Delay (s)	28.7	21.2	1.2			0.9		
Approach LOS	D	C						

Intersection Summary					
Average Delay	1.9				
Intersection Capacity Utilization	46.9%	ICU Level of Service		A	
Analysis Period (min)	15				

HCM Unsignalized Intersection Capacity Analysis
10: Esplanade & 6th Ave

11/18/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	12	4	56	7	1	20	44	1067	6	56	734	25
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	13	4	60	8	1	22	47	1147	6	60	789	27
Pedestrians		9			8			6			2	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		1			1			1			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								442			438	
pX, platoon unblocked	0.85	0.85	0.87	0.85	0.85	0.78	0.87			0.78		
vC, conflicting volume	1624	2189	423	1837	2199	587	825			1162		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	679	1342	27	928	1354	0	491			657		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	95	96	93	95	99	97	95			92		
cM capacity (veh/h)	245	110	892	151	108	844	920			722		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	77	30	47	765	389	60	526	290
Volume Left	13	8	47	0	0	60	0	0
Volume Right	60	22	0	0	6	0	0	27
cSH	486	353	920	1700	1700	722	1700	1700
Volume to Capacity	0.16	0.09	0.05	0.45	0.23	0.08	0.31	0.17
Queue Length 95th (ft)	14	7	4	0	0	7	0	0
Control Delay (s)	13.8	16.1	9.1	0.0	0.0	10.4	0.0	0.0
Lane LOS	B	C	A			B		
Approach Delay (s)	13.8	16.1	0.4			0.7		
Approach LOS	B	C						

Intersection Summary					
Average Delay	1.2				
Intersection Capacity Utilization	50.1%	ICU Level of Service		A	
Analysis Period (min)	15				

HCM Signalized Intersection Capacity Analysis
11: Esplanade & 7th Ave 11/18/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	58	58	30	13	41	40	0	773	21	0	905	37
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5			3.5			3.5	3.5		3.5	
Lane Util. Factor		1.00			1.00			0.95	1.00		0.95	
Frpb, ped/bikes		1.00			1.00			1.00	0.96		1.00	
Flpb, ped/bikes		1.00			1.00			1.00	1.00		1.00	
Frt		0.97			0.94			1.00	0.85		0.99	
Flt Protected		0.98			0.99			1.00	1.00		1.00	
Satd. Flow (prot)		1771			1744			3539	1523		3515	
Flt Permitted		0.85			0.95			1.00	1.00		1.00	
Satd. Flow (perm)		1532			1675			3539	1523		3515	
Peak-hour factor, PHF	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71
Adj. Flow (vph)	82	82	42	18	58	56	0	1089	30	0	1275	52
RTOR Reduction (vph)	0	18	0	0	30	0	0	0	16	0	6	0
Lane Group Flow (vph)	0	188	0	0	102	0	0	1089	14	0	1321	0
Confl. Peds. (#/hr)			4	4			3		13	13		3
Turn Type	Perm	NA		Perm	NA			NA	Perm		NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4					2			
Actuated Green, G (s)		16.0			16.0			21.0	21.0		21.0	
Effective Green, g (s)		16.5			16.5			21.5	21.5		21.5	
Actuated g/C Ratio		0.37			0.37			0.48	0.48		0.48	
Clearance Time (s)		4.0			4.0			4.0	4.0		4.0	
Lane Grp Cap (vph)		561			614			1690	727		1679	
v/s Ratio Prot								0.31			c0.38	
v/s Ratio Perm		c0.12			0.06				0.01			
v/c Ratio		0.33			0.17			0.64	0.02		0.79	
Uniform Delay, d1		10.3			9.6			8.9	6.2		9.8	
Progression Factor		1.00			1.00			0.45	0.16		0.46	
Incremental Delay, d2		1.6			0.6			1.6	0.0		3.1	
Delay (s)		11.9			10.2			5.6	1.0		7.7	
Level of Service		B			B			A	A		A	
Approach Delay (s)		11.9			10.2			5.4			7.7	
Approach LOS		B			B			A			A	

Intersection Summary			
HCM 2000 Control Delay	7.2	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	47.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
11: Esplanade & 7th Ave 11/18/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	76	50	30	21	26	43	0	1091	10	0	758	26
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5			3.5			3.5	3.5		3.5	
Lane Util. Factor		1.00			1.00			0.95	1.00		0.95	
Frpb, ped/bikes		1.00			0.99			1.00	0.97		1.00	
Flpb, ped/bikes		1.00			1.00			1.00	1.00		1.00	
Frt		0.97			0.94			1.00	0.85		1.00	
Flt Protected		0.98			0.99			1.00	1.00		1.00	
Satd. Flow (prot)		1765			1711			3539	1532		3517	
Flt Permitted		0.84			0.93			1.00	1.00		1.00	
Satd. Flow (perm)		1511			1604			3539	1532		3517	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	82	54	32	23	28	46	0	1173	11	0	815	28
RTOR Reduction (vph)	0	19	0	0	24	0	0	0	6	0	5	0
Lane Group Flow (vph)	0	149	0	0	73	0	0	1173	5	0	838	0
Confl. Peds. (#/hr)	1		6	6		1	17		9	9		17
Turn Type	Perm	NA		Perm	NA			NA	Perm		NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4					2			
Actuated Green, G (s)		16.0			16.0			21.0	21.0		21.0	
Effective Green, g (s)		16.5			16.5			21.5	21.5		21.5	
Actuated g/C Ratio		0.37			0.37			0.48	0.48		0.48	
Clearance Time (s)		4.0			4.0			4.0	4.0		4.0	
Lane Grp Cap (vph)		554			588			1690	731		1680	
v/s Ratio Prot								c0.33			0.24	
v/s Ratio Perm		c0.10			0.05				0.00			
v/c Ratio		0.27			0.12			0.69	0.01		0.50	
Uniform Delay, d1		10.0			9.5			9.2	6.2		8.1	
Progression Factor		1.00			1.00			0.42	0.05		0.37	
Incremental Delay, d2		1.2			0.4			2.0	0.0		1.0	
Delay (s)		11.2			9.9			5.8	0.3		3.9	
Level of Service		B			A			A	A		A	
Approach Delay (s)		11.2			9.9			5.8			3.9	
Approach LOS		B			A			A			A	

Intersection Summary			
HCM 2000 Control Delay	5.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	52.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis
12: Esplanade & 8th Ave

11/18/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	34	6	127	2	1	8	144	718	9	41	813	90
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71
Hourly flow rate (vph)	48	8	179	3	1	11	203	1011	13	58	1145	127
Pedestrians		5			7			3				
Lane Width (ft)		12.0			12.0			12.0				
Walking Speed (ft/s)		4.0			4.0			4.0				
Percent Blockage		0			1			0				
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								434			439	
pX, platoon unblocked	0.83	0.83	0.74	0.83	0.83	0.81	0.74			0.81		
vC, conflicting volume	2252	2766	644	2304	2823	519	1277			1031		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1048	1665	0	1111	1733	0	656			554		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	55	84	77	96	97	99	70			93		
cM capacity (veh/h)	105	51	792	67	47	868	679			810		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	235	15	203	674	350	58	763	508
Volume Left	48	3	203	0	0	58	0	0
Volume Right	179	11	0	0	13	0	0	127
cSH	279	182	679	1700	1700	810	1700	1700
Volume to Capacity	0.84	0.09	0.30	0.40	0.21	0.07	0.45	0.30
Queue Length 95th (ft)	177	7	31	0	0	6	0	0
Control Delay (s)	61.2	26.7	12.5	0.0	0.0	9.8	0.0	0.0
Lane LOS	F	D	B			A		
Approach Delay (s)	61.2	26.7	2.1			0.4		
Approach LOS	F	D						

Intersection Summary					
Average Delay	6.4				
Intersection Capacity Utilization	57.6%	ICU Level of Service	B		
Analysis Period (min)	15				

HCM Unsignalized Intersection Capacity Analysis
12: Esplanade & 8th Ave

11/18/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	30	7	99	1	1	25	225	967	18	38	684	117
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	32	8	106	1	1	27	242	1040	19	41	735	126
Pedestrians		12			8			4				
Lane Width (ft)		12.0			12.0			12.0				
Walking Speed (ft/s)		4.0			4.0			4.0				
Percent Blockage		1			1			0				
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								434			439	
pX, platoon unblocked	0.85	0.85	0.86	0.85	0.85	0.78	0.86			0.78		
vC, conflicting volume	1923	2443	447	2105	2496	538	873			1067		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	995	1605	30	1209	1668	0	526			529		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	73	87	88	98	98	97	73			95		
cM capacity (veh/h)	120	60	881	70	55	842	883			804		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	146	29	242	693	366	41	490	371
Volume Left	32	1	242	0	0	41	0	0
Volume Right	106	27	0	0	19	0	0	126
cSH	284	435	883	1700	1700	804	1700	1700
Volume to Capacity	0.51	0.07	0.27	0.41	0.22	0.05	0.29	0.22
Queue Length 95th (ft)	69	5	28	0	0	4	0	0
Control Delay (s)	30.3	13.9	10.6	0.0	0.0	9.7	0.0	0.0
Lane LOS	D	B	B			A		
Approach Delay (s)	30.3	13.9	2.0			0.4		
Approach LOS	D	B						

Intersection Summary					
Average Delay	3.3				
Intersection Capacity Utilization	60.4%	ICU Level of Service	B		
Analysis Period (min)	15				

HCM Signalized Intersection Capacity Analysis
13: Esplanade & 9th Ave 11/18/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	58	117	19	91	44	52	0	682	81	0	838	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5			3.5			3.5	3.5		3.5	
Lane Util. Factor		1.00			1.00			0.95	1.00		0.95	
Frpb, ped/bikes		1.00			1.00			1.00	0.97		1.00	
Flpb, ped/bikes		1.00			1.00			1.00	1.00		1.00	
Frt		0.99			0.96			1.00	0.85		1.00	
Flt Protected		0.99			0.98			1.00	1.00		1.00	
Satd. Flow (prot)		1808			1743			3539	1541		3532	
Flt Permitted		0.86			0.77			1.00	1.00		1.00	
Satd. Flow (perm)		1580			1367			3539	1541		3532	
Peak-hour factor, PHF	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71
Adj. Flow (vph)	82	165	27	128	62	73	0	961	114	0	1180	14
RTOR Reduction (vph)	0	9	0	0	31	0	0	0	60	0	2	0
Lane Group Flow (vph)	0	265	0	0	232	0	0	961	54	0	1192	0
Confl. Peds. (#/hr)	3		1	1		3	5		5	5		5
Turn Type	Perm	NA		Perm	NA			NA	Perm		NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4					2			
Actuated Green, G (s)		16.0			16.0			21.0	21.0		21.0	
Effective Green, g (s)		16.5			16.5			21.5	21.5		21.5	
Actuated g/C Ratio		0.37			0.37			0.48	0.48		0.48	
Clearance Time (s)		4.0			4.0			4.0	4.0		4.0	
Lane Grp Cap (vph)		579			501			1690	736		1687	
v/s Ratio Prot								0.27			c0.34	
v/s Ratio Perm		0.17			c0.17				0.04			
v/c Ratio		0.46			0.46			0.57	0.07		0.71	
Uniform Delay, d1		10.8			10.9			8.4	6.4		9.3	
Progression Factor		1.00			1.00			0.57	0.21		1.00	
Incremental Delay, d2		2.6			3.1			1.2	0.2		2.5	
Delay (s)		13.4			13.9			6.0	1.5		11.8	
Level of Service		B			B			A	A		B	
Approach Delay (s)		13.4			13.9			5.5			11.8	
Approach LOS		B			B			A			B	

Intersection Summary			
HCM 2000 Control Delay	9.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	47.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
13: Esplanade & 9th Ave 11/18/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	57	80	6	70	66	55	0	943	80	0	763	26
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5			3.5			3.5	3.5		3.5	
Lane Util. Factor		1.00			1.00			0.95	1.00		0.95	
Frpb, ped/bikes		1.00			1.00			1.00	0.97		1.00	
Flpb, ped/bikes		1.00			1.00			1.00	1.00		1.00	
Frt		0.99			0.96			1.00	0.85		1.00	
Flt Protected		0.98			0.98			1.00	1.00		1.00	
Satd. Flow (prot)		1817			1752			3539	1532		3517	
Flt Permitted		0.84			0.85			1.00	1.00		1.00	
Satd. Flow (perm)		1550			1525			3539	1532		3517	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	61	86	6	75	71	59	0	1014	86	0	820	28
RTOR Reduction (vph)	0	3	0	0	32	0	0	0	45	0	5	0
Lane Group Flow (vph)	0	150	0	0	173	0	0	1014	41	0	843	0
Confl. Peds. (#/hr)						1	16		9	9		16
Turn Type	Perm	NA		Perm	NA			NA	Perm		NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4					2			
Actuated Green, G (s)		16.0			16.0			21.0	21.0		21.0	
Effective Green, g (s)		16.5			16.5			21.5	21.5		21.5	
Actuated g/C Ratio		0.37			0.37			0.48	0.48		0.48	
Clearance Time (s)		4.0			4.0			4.0	4.0		4.0	
Lane Grp Cap (vph)		568			559			1690	731		1680	
v/s Ratio Prot								c0.29			0.24	
v/s Ratio Perm		0.10			c0.11				0.03			
v/c Ratio		0.26			0.31			0.60	0.06		0.50	
Uniform Delay, d1		10.0			10.2			8.6	6.3		8.1	
Progression Factor		1.00			1.00			0.51	0.17		1.00	
Incremental Delay, d2		1.1			1.4			1.3	0.1		1.1	
Delay (s)		11.1			11.6			5.7	1.2		9.1	
Level of Service		B			B			A	A		A	
Approach Delay (s)		11.1			11.6			5.3			9.1	
Approach LOS		B			B			A			A	

Intersection Summary			
HCM 2000 Control Delay	7.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	46.2%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis
14: Esplanade & 10th Ave 11/18/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	3	1	5	2	0	56	8	779	5	102	841	10
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71
Hourly flow rate (vph)	4	1	7	3	0	79	11	1097	7	144	1185	14
Pedestrians		8			5						1	
Lane Width (ft)		12.0			12.0						12.0	
Walking Speed (ft/s)		4.0			4.0						4.0	
Percent Blockage		1			0						0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								443			429	
pX, platoon unblocked	0.79	0.79	0.69	0.79	0.79	0.81	0.69			0.81		
vC, conflicting volume	2138	2619	607	2016	2622	558	1207			1109		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	804	1416	0	649	1421	0	400			661		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	97	98	99	99	100	91	99			81		
cM capacity (veh/h)	162	84	743	227	84	872	792			743		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	13	82	11	731	373	144	790	409
Volume Left	4	3	11	0	0	144	0	0
Volume Right	7	79	0	0	7	0	0	14
cSH	243	794	792	1700	1700	743	1700	1700
Volume to Capacity	0.05	0.10	0.01	0.43	0.22	0.19	0.46	0.24
Queue Length 95th (ft)	4	9	1	0	0	18	0	0
Control Delay (s)	20.7	10.1	9.6	0.0	0.0	11.0	0.0	0.0
Lane LOS	C	B	A			B		
Approach Delay (s)	20.7	10.1	0.1			1.2		
Approach LOS	C	B						

Intersection Summary					
Average Delay	1.1				
Intersection Capacity Utilization	41.4%	ICU Level of Service		A	
Analysis Period (min)	15				

HCM Unsignalized Intersection Capacity Analysis
14: Esplanade & 10th Ave 11/18/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	3	3	9	4	1	45	32	1015	8	69	785	9
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	3	3	10	4	1	48	34	1091	9	74	844	10
Pedestrians		19			8			1				
Lane Width (ft)		12.0			12.0			12.0				
Walking Speed (ft/s)		4.0			4.0			4.0				
Percent Blockage		2			1			0				
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								443			429	
pX, platoon unblocked	0.89	0.89	0.82	0.89	0.89	0.79	0.82			0.79		
vC, conflicting volume	1680	2193	447	1755	2194	558	873			1108		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	585	1165	0	671	1166	0	400			619		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	98	99	98	99	94	96			90		
cM capacity (veh/h)	285	145	872	259	145	856	930			756		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	16	54	34	728	372	74	563	291
Volume Left	3	4	34	0	0	74	0	0
Volume Right	10	48	0	0	9	0	0	10
cSH	361	667	930	1700	1700	756	1700	1700
Volume to Capacity	0.04	0.08	0.04	0.43	0.22	0.10	0.33	0.17
Queue Length 95th (ft)	3	7	3	0	0	8	0	0
Control Delay (s)	15.4	10.9	9.0	0.0	0.0	10.3	0.0	0.0
Lane LOS	C	B	A			B		
Approach Delay (s)	15.4	10.9	0.3			0.8		
Approach LOS	C	B						

Intersection Summary					
Average Delay	0.9				
Intersection Capacity Utilization	45.8%	ICU Level of Service		A	
Analysis Period (min)	15				

HCM Signalized Intersection Capacity Analysis
15: Esplanade & 11th Ave

11/18/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	185	0	150	0	0	7	76	752	3	0	803	79
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	10	12	12	10	11	12	12	12	12	12
Total Lost time (s)		3.5			3.5		3.5	3.5			3.5	
Lane Util. Factor		1.00			1.00		1.00	0.95			0.95	
Frpb, ped/bikes		0.99			1.00		1.00	1.00			1.00	
Flpb, ped/bikes		1.00			1.00		1.00	1.00			1.00	
Frt		0.94			0.86		1.00	1.00			0.99	
Flt Protected		0.97			1.00		0.95	1.00			1.00	
Satd. Flow (prot)		1690			1611		1711	3537			3485	
Flt Permitted		0.82			1.00		0.95	1.00			1.00	
Satd. Flow (perm)		1428			1611		1711	3537			3485	
Peak-hour factor, PHF	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71
Adj. Flow (vph)	261	0	211	0	0	10	107	1059	4	0	1131	111
RTOR Reduction (vph)	0	58	0	0	6	0	0	0	0	0	11	0
Lane Group Flow (vph)	0	414	0	0	4	0	107	1063	0	0	1231	0
Confl. Peds. (#/hr)			6	6			1		7	7		1
Confl. Bikes (#/hr)			3									
Turn Type	Perm	NA			NA		Prot	NA			NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8								
Actuated Green, G (s)		20.2			20.2		3.9	28.2			20.3	
Effective Green, g (s)		20.7			20.7		4.4	28.7			20.8	
Actuated g/C Ratio		0.37			0.37		0.08	0.51			0.37	
Clearance Time (s)		4.0			4.0		4.0	4.0			4.0	
Vehicle Extension (s)		4.0			2.0		0.5	4.0			4.0	
Lane Grp Cap (vph)		524			591		133	1799			1285	
v/s Ratio Prot					0.00		0.06	c0.30			c0.35	
v/s Ratio Perm		c0.29										
v/c Ratio		0.79			0.01		0.80	0.59			0.96	
Uniform Delay, d1		15.9			11.3		25.6	9.7			17.4	
Progression Factor		1.00			1.00		1.00	1.00			1.00	
Incremental Delay, d2		8.4			0.0		27.2	1.4			16.8	
Delay (s)		24.3			11.3		52.8	11.2			34.2	
Level of Service		C			B		D	B			C	
Approach Delay (s)		24.3			11.3			15.0			34.2	
Approach LOS		C			B			B			C	

Intersection Summary				
HCM 2000 Control Delay	24.7	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.88			
Actuated Cycle Length (s)	56.4	Sum of lost time (s)	10.5	
Intersection Capacity Utilization	65.3%	ICU Level of Service	C	
Analysis Period (min)	15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
15: Esplanade & 11th Ave

11/18/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	121	0	91	1	2	4	153	903	0	0	777	164
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	10	12	12	10	11	12	12	12	12	12
Total Lost time (s)		3.5			3.5		3.5	3.5			3.5	
Lane Util. Factor		1.00			1.00		1.00	0.95			0.95	
Frpb, ped/bikes		0.99			0.99		1.00	1.00			1.00	
Flpb, ped/bikes		1.00			1.00		1.00	1.00			1.00	
Frt		0.94			0.92		1.00	1.00			0.97	
Flt Protected		0.97			0.99		0.95	1.00			1.00	
Satd. Flow (prot)		1694			1694		1711	3539			3431	
Flt Permitted		0.82			0.96		0.95	1.00			1.00	
Satd. Flow (perm)		1431			1645		1711	3539			3431	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	130	0	98	1	2	4	165	971	0	0	835	176
RTOR Reduction (vph)	0	67	0	0	3	0	0	0	0	0	26	0
Lane Group Flow (vph)	0	161	0	0	4	0	165	971	0	0	985	0
Confl. Peds. (#/hr)	1		2	2		1	5		23	23		5
Confl. Bikes (#/hr)			3									
Turn Type	Perm	NA		Perm	NA		Prot	NA			NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8								
Actuated Green, G (s)		12.1			12.1		5.1	27.4			18.3	
Effective Green, g (s)		12.6			12.6		5.6	27.9			18.8	
Actuated g/C Ratio		0.27			0.27		0.12	0.59			0.40	
Clearance Time (s)		4.0			4.0		4.0	4.0			4.0	
Vehicle Extension (s)		4.0			2.0		0.5	4.0			4.0	
Lane Grp Cap (vph)		379			436		201	2078			1357	
v/s Ratio Prot							c0.10	0.27			c0.29	
v/s Ratio Perm		c0.11			0.00							
v/c Ratio		0.43			0.01		0.82	0.47			0.73	
Uniform Delay, d1		14.5			12.9		20.5	5.6			12.2	
Progression Factor		1.00			1.00		1.00	1.00			1.00	
Incremental Delay, d2		1.0			0.0		21.8	0.8			3.4	
Delay (s)		15.5			12.9		42.3	6.3			15.6	
Level of Service		B			B		D	A			B	
Approach Delay (s)		15.5			12.9			11.6			15.6	
Approach LOS		B			B			B			B	

Intersection Summary				
HCM 2000 Control Delay	13.6	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.64			
Actuated Cycle Length (s)	47.5	Sum of lost time (s)	10.5	
Intersection Capacity Utilization	64.4%	ICU Level of Service	C	
Analysis Period (min)	15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
1: Bidwell Mansion/Memorial Way & Esplanade

5/23/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	14	72	30	68	13	179	0	597	45	0	560	36
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.6			4.6			4.2			4.2	
Lane Util. Factor		1.00			1.00			0.95			0.95	
Frpb, ped/bikes		0.99			0.96			1.00			1.00	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.97			0.91			0.99			0.99	
Flt Protected		0.99			0.99			1.00			1.00	
Satd. Flow (prot)		1764			1601			3487			3492	
Flt Permitted		0.94			0.86			1.00			1.00	
Satd. Flow (perm)		1670			1399			3487			3492	
Peak-hour factor, PHF	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71
Adj. Flow (vph)	20	101	42	96	18	252	0	841	63	0	789	51
RTOR Reduction (vph)	0	19	0	0	56	0	0	5	0	0	4	0
Lane Group Flow (vph)	0	144	0	0	310	0	0	899	0	0	836	0
Confl. Peds. (#/hr)	28		16	16		28	19		11	11		19
Confl. Bikes (#/hr)			20			18			34			20
Turn Type	Perm	NA		Perm	NA			NA			NA	
Protected Phases		4			4			2			6	
Permitted Phases	4			4								
Actuated Green, G (s)		24.5			24.5			50.2			50.2	
Effective Green, g (s)		24.5			24.5			50.7			50.7	
Actuated g/C Ratio		0.29			0.29			0.60			0.60	
Clearance Time (s)		4.6			4.6			4.7			4.7	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		487			408			2104			2107	
v/s Ratio Prot								c0.26			0.24	
v/s Ratio Perm		0.09			c0.22							
v/c Ratio		0.30			0.76			0.43			0.40	
Uniform Delay, d1		23.1			27.1			8.9			8.7	
Progression Factor		1.00			1.00			1.00			0.34	
Incremental Delay, d2		0.3			7.9			0.6			0.5	
Delay (s)		23.4			35.0			9.5			3.4	
Level of Service		C			D			A			A	
Approach Delay (s)		23.4			35.0			9.5			3.4	
Approach LOS		C			D			A			A	

Intersection Summary				
HCM 2000 Control Delay	12.4	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.54			
Actuated Cycle Length (s)	84.0	Sum of lost time (s)	8.8	
Intersection Capacity Utilization	49.2%	ICU Level of Service	A	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Signalized Intersection Capacity Analysis
1: Bidwell Mansion/Memorial Way & Esplanade

5/23/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	16	42	17	45	7	171	0	931	50	0	605	26
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.6			4.6			4.2			4.2	
Lane Util. Factor		1.00			1.00			0.95			0.95	
Frpb, ped/bikes		0.98			0.96			1.00			1.00	
Flpb, ped/bikes		1.00			0.99			1.00			1.00	
Frt		0.97			0.90			0.99			0.99	
Flt Protected		0.99			0.99			1.00			1.00	
Satd. Flow (prot)		1750			1571			3501			3505	
Flt Permitted		0.91			0.92			1.00			1.00	
Satd. Flow (perm)		1616			1461			3501			3505	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	17	45	18	48	8	184	0	1001	54	0	651	28
RTOR Reduction (vph)	0	14	0	0	56	0	0	3	0	0	3	0
Lane Group Flow (vph)	0	66	0	0	184	0	0	1052	0	0	676	0
Confl. Peds. (#/hr)	25		47	47		25	28		11	11		28
Confl. Bikes (#/hr)			20			18			34			20
Turn Type	Perm	NA		Perm	NA			NA			NA	
Protected Phases		4			4			2			6	
Permitted Phases	4			4								
Actuated Green, G (s)		16.5			16.5			54.2			54.2	
Effective Green, g (s)		16.5			16.5			54.7			54.7	
Actuated g/C Ratio		0.21			0.21			0.68			0.68	
Clearance Time (s)		4.6			4.6			4.7			4.7	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		333			301			2393			2396	
v/s Ratio Prot								c0.30			0.19	
v/s Ratio Perm		0.04			c0.13							
v/c Ratio		0.20			0.61			0.44			0.28	
Uniform Delay, d1		26.3			28.8			5.7			5.0	
Progression Factor		1.00			1.00			1.00			1.24	
Incremental Delay, d2		0.3			3.7			0.6			0.3	
Delay (s)		26.6			32.5			6.3			6.4	
Level of Service		C			C			A			A	
Approach Delay (s)		26.6			32.5			6.3			6.4	
Approach LOS		C			C			A			A	

Intersection Summary				
HCM 2000 Control Delay	10.2	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.48			
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.8	
Intersection Capacity Utilization	54.5%	ICU Level of Service	A	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Unsignalized Intersection Capacity Analysis
2: Esplanade & Francis Willard Ave

5/23/2016

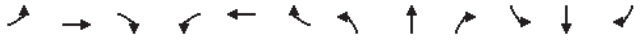
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	6	0	0	43	174	612	21	178	571	92
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71
Hourly flow rate (vph)	0	0	8	0	0	61	245	862	30	251	804	130
Pedestrians		37			23			2				
Lane Width (ft)		12.0			12.0			12.0				
Walking Speed (ft/s)		4.0			4.0			4.0				
Percent Blockage		3			2			0				
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								565			288	
pX, platoon unblocked	0.89	0.89	0.84	0.89	0.89	0.92	0.84			0.92		
vC, conflicting volume	2389	2812	506	2304	2862	469	971			915		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1895	2373	46	1799	2429	244	597			729		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	99	100	100	91	69			68		
cM capacity (veh/h)	19	14	828	24	13	682	798			784		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	8	61	245	575	317	251	536	398
Volume Left	0	0	245	0	0	251	0	0
Volume Right	8	61	0	0	30	0	0	130
cSH	828	682	798	1700	1700	784	1700	1700
Volume to Capacity	0.01	0.09	0.31	0.34	0.19	0.32	0.32	0.23
Queue Length 95th (ft)	1	7	33	0	0	35	0	0
Control Delay (s)	9.4	10.8	11.5	0.0	0.0	11.7	0.0	0.0
Lane LOS	A	B	B			B		
Approach Delay (s)	9.4	10.8	2.5			2.5		
Approach LOS	A	B						

Intersection Summary					
Average Delay		2.7			
Intersection Capacity Utilization	42.8%	ICU Level of Service		A	
Analysis Period (min)	15				

HCM Unsignalized Intersection Capacity Analysis
2: Esplanade & Francis Willard Ave

5/23/2016



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	3	0	0	11	58	1052	4	200	640	74
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	0	0	3	0	0	12	62	1131	4	215	688	80
Pedestrians		46			7			1				
Lane Width (ft)		12.0			12.0			12.0				
Walking Speed (ft/s)		4.0			4.0			4.0				
Percent Blockage		4			1			0				
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								565			288	
pX, platoon unblocked	0.93	0.93	0.90	0.93	0.93	0.88	0.90			0.88		
vC, conflicting volume	1906	2471	431	2043	2509	575	814			1142		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1351	1958	152	1498	1999	247	577			892		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	100	100	98	93			68		
cM capacity (veh/h)	66	35	751	53	33	659	861			662		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	3	12	62	754	381	215	459	309
Volume Left	0	0	62	0	0	215	0	0
Volume Right	3	12	0	0	4	0	0	80
cSH	751	659	861	1700	1700	662	1700	1700
Volume to Capacity	0.00	0.02	0.07	0.44	0.22	0.32	0.27	0.18
Queue Length 95th (ft)	0	1	6	0	0	35	0	0
Control Delay (s)	9.8	10.6	9.5	0.0	0.0	13.0	0.0	0.0
Lane LOS	A	B	A			B		
Approach Delay (s)	9.8	10.6	0.5			2.9		
Approach LOS	A	B						

Intersection Summary					
Average Delay		1.6			
Intersection Capacity Utilization	54.0%	ICU Level of Service		A	
Analysis Period (min)	15				

HCM Signalized Intersection Capacity Analysis
3: Esplanade & Lincoln Ave 5/23/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	195	0	93	0	0	25	0	640	25	0	748	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.6				4.6		4.7			4.7	
Lane Util. Factor		1.00				1.00		0.95			0.95	
Frpb, ped/bikes		0.96				1.00		1.00			1.00	
Flpb, ped/bikes		1.00				1.00		1.00			1.00	
Frt		0.96				0.86		0.99			1.00	
Flt Protected		0.97				1.00		1.00			1.00	
Satd. Flow (prot)		1653				1611		3510			3539	
Flt Permitted		0.97				1.00		1.00			1.00	
Satd. Flow (perm)		1653				1611		3510			3539	
Peak-hour factor, PHF	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71
Adj. Flow (vph)	275	0	131	0	0	35	0	901	35	0	1054	0
RTOR Reduction (vph)	0	23	0	0	0	24	0	2	0	0	0	0
Lane Group Flow (vph)	0	383	0	0	0	11	0	934	0	0	1054	0
Confl. Peds. (#/hr)			107	107			96		13	13		96
Confl. Bikes (#/hr)			6						34			57
Turn Type	Perm	NA				Perm		NA			NA	
Protected Phases		4						2			2	
Permitted Phases	4					4						
Actuated Green, G (s)		25.3				25.3		49.4			49.4	
Effective Green, g (s)		25.3				25.3		49.4			49.4	
Actuated g/C Ratio		0.30				0.30		0.59			0.59	
Clearance Time (s)		4.6				4.6		4.7			4.7	
Vehicle Extension (s)		3.0				3.0		3.0			3.0	
Lane Grp Cap (vph)		497				485		2064			2081	
v/s Ratio Prot								0.27			c0.30	
v/s Ratio Perm		0.23				0.01						
v/c Ratio		0.77				0.02		0.45			0.51	
Uniform Delay, d1		26.7				20.6		9.7			10.1	
Progression Factor		1.00				1.00		0.82			0.48	
Incremental Delay, d2		7.2				0.0		0.7			0.5	
Delay (s)		34.0				20.7		8.6			5.3	
Level of Service		C				C		A			A	
Approach Delay (s)		34.0			20.7			8.6			5.3	
Approach LOS		C			C			A			A	

Intersection Summary				
HCM 2000 Control Delay	11.6	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.60			
Actuated Cycle Length (s)	84.0	Sum of lost time (s)	9.3	
Intersection Capacity Utilization	53.4%	ICU Level of Service	A	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Signalized Intersection Capacity Analysis
3: Esplanade & Lincoln Ave 5/23/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	115	0	40	0	0	25	0	1038	25	0	860	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.6				4.6		4.7			4.7	
Lane Util. Factor		1.00				1.00		0.95			0.95	
Frpb, ped/bikes		0.99				1.00		1.00			1.00	
Flpb, ped/bikes		1.00				1.00		1.00			1.00	
Frt		0.97				0.86		1.00			1.00	
Flt Protected		0.96				1.00		1.00			1.00	
Satd. Flow (prot)		1720				1611		3521			3536	
Flt Permitted		0.96				1.00		1.00			1.00	
Satd. Flow (perm)		1720				1611		3521			3536	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	124	0	43	0	0	27	0	1116	27	0	925	3
RTOR Reduction (vph)	0	19	0	0	0	21	0	1	0	0	0	0
Lane Group Flow (vph)	0	148	0	0	0	6	0	1142	0	0	928	0
Confl. Peds. (#/hr)			14	14			55		14	14		55
Confl. Bikes (#/hr)			4						36			30
Turn Type	Perm	NA				Perm		NA			NA	
Protected Phases		4						2			2	
Permitted Phases	4					4						
Actuated Green, G (s)		17.8				17.8		52.9			52.9	
Effective Green, g (s)		17.8				17.8		52.9			52.9	
Actuated g/C Ratio		0.22				0.22		0.66			0.66	
Clearance Time (s)		4.6				4.6		4.7			4.7	
Vehicle Extension (s)		3.0				3.0		3.0			3.0	
Lane Grp Cap (vph)		382				358		2328			2338	
v/s Ratio Prot								c0.32			0.26	
v/s Ratio Perm		0.09				0.00						
v/c Ratio		0.39				0.02		0.49			0.40	
Uniform Delay, d1		26.5				24.3		6.8			6.2	
Progression Factor		1.00				1.00		0.70			0.32	
Incremental Delay, d2		0.7				0.0		0.7			0.4	
Delay (s)		27.1				24.3		5.4			2.4	
Level of Service		C				C		A			A	
Approach Delay (s)		27.1			24.3			5.4			2.4	
Approach LOS		C			C			A			A	

Intersection Summary				
HCM 2000 Control Delay	6.0	HCM 2000 Level of Service	A	
HCM 2000 Volume to Capacity ratio	0.46			
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	9.3	
Intersection Capacity Utilization	57.7%	ICU Level of Service	B	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Signalized Intersection Capacity Analysis
4: Esplanade & W Sacramento Ave

5/23/2016

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	0	118	205	665	630	281
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6		4.7	4.7	4.7	
Lane Util. Factor	1.00		1.00	0.95	0.95	
Frpb, ped/bikes	0.96		1.00	1.00	0.95	
Flpb, ped/bikes	1.00		1.00	1.00	1.00	
Frt	0.86		1.00	1.00	0.95	
Flt Protected	1.00		0.95	1.00	1.00	
Satd. Flow (prot)	1548		1770	3539	3194	
Flt Permitted	1.00		0.95	1.00	1.00	
Satd. Flow (perm)	1548		1770	3539	3194	
Peak-hour factor, PHF	0.71	0.71	0.71	0.71	0.71	0.71
Adj. Flow (vph)	0	166	289	937	887	396
RTOR Reduction (vph)	133	0	0	0	52	0
Lane Group Flow (vph)	33	0	289	937	1231	0
Confl. Peds. (#/hr)	1	17	57			57
Confl. Bikes (#/hr)		9				48
Turn Type	Prot		Prot	NA	NA	
Protected Phases	4		5	2	6	
Permitted Phases						
Actuated Green, G (s)	16.6		17.8	58.1	35.6	
Effective Green, g (s)	16.6		17.8	58.1	35.6	
Actuated g/C Ratio	0.20		0.21	0.69	0.42	
Clearance Time (s)	4.6		4.7	4.7	4.7	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	305		375	2447	1353	
v/s Ratio Prot	c0.02		c0.16	0.26	c0.39	
v/s Ratio Perm						
v/c Ratio	0.11		0.77	0.38	0.91	
Uniform Delay, d1	27.6		31.2	5.4	22.7	
Progression Factor	1.00		0.90	1.56	0.50	
Incremental Delay, d2	0.2		8.6	0.4	7.8	
Delay (s)	27.8		36.5	8.9	19.1	
Level of Service	C		D	A	B	
Approach Delay (s)	27.8			15.4	19.1	
Approach LOS	C			B	B	

Intersection Summary			
HCM 2000 Control Delay	17.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	84.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	64.5%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
4: Esplanade & W Sacramento Ave

5/23/2016

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	0	120	204	974	732	122
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6		4.7	4.7	4.7	
Lane Util. Factor	1.00		1.00	0.95	0.95	
Frpb, ped/bikes	0.93		1.00	1.00	0.99	
Flpb, ped/bikes	1.00		1.00	1.00	1.00	
Frt	0.86		1.00	1.00	0.98	
Flt Protected	1.00		0.95	1.00	1.00	
Satd. Flow (prot)	1494		1770	3539	3425	
Flt Permitted	1.00		0.95	1.00	1.00	
Satd. Flow (perm)	1494		1770	3539	3425	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	0	129	219	1047	787	131
RTOR Reduction (vph)	104	0	0	0	13	0
Lane Group Flow (vph)	25	0	219	1047	905	0
Confl. Peds. (#/hr)		4	20			20
Confl. Bikes (#/hr)		50				23
Turn Type	Prot		Prot	NA	NA	
Protected Phases	4		5	2	6	
Permitted Phases						
Actuated Green, G (s)	15.5		15.3	55.2	35.2	
Effective Green, g (s)	15.5		15.3	55.2	35.2	
Actuated g/C Ratio	0.19		0.19	0.69	0.44	
Clearance Time (s)	4.6		4.7	4.7	4.7	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	289		338	2441	1507	
v/s Ratio Prot	c0.02		c0.12	0.30	c0.26	
v/s Ratio Perm						
v/c Ratio	0.09		0.65	0.43	0.60	
Uniform Delay, d1	26.4		29.9	5.5	17.0	
Progression Factor	1.00		0.79	0.33	1.04	
Incremental Delay, d2	0.1		3.8	0.5	1.5	
Delay (s)	26.6		27.5	2.3	19.3	
Level of Service	C		C	A	B	
Approach Delay (s)	26.6			6.7	19.3	
Approach LOS	C			A	B	

Intersection Summary			
HCM 2000 Control Delay	12.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	56.7%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
5: Esplanade & 1st Ave

5/23/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	65	342	39	67	347	62	0	610	70	0	813	89
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	4.6		4.6	4.6			4.2			4.2	
Lane Util. Factor	1.00	1.00		1.00	1.00			0.95			0.95	
Frpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	0.98		1.00	0.98			0.98			0.99	
Flt Protected	0.95	1.00		0.95	1.00			1.00			1.00	
Satd. Flow (prot)	1767	1831		1768	1816			3470			3442	
Flt Permitted	0.18	1.00		0.22	1.00			1.00			1.00	
Satd. Flow (perm)	327	1831		402	1816			3470			3442	
Peak-hour factor, PHF	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71
Adj. Flow (vph)	92	482	55	94	489	87	0	859	99	0	1145	125
RTOR Reduction (vph)	0	5	0	0	8	0	0	10	0	0	9	0
Lane Group Flow (vph)	92	532	0	94	568	0	0	948	0	0	1261	0
Confl. Peds. (#/hr)	6		2	2		6	40		8	8		40
Confl. Bikes (#/hr)			2						4			43
Turn Type	Perm	NA		Perm	NA			NA			NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4								
Actuated Green, G (s)	31.9	31.9		31.9	31.9			42.3			42.3	
Effective Green, g (s)	32.4	32.4		32.4	32.4			42.8			42.8	
Actuated g/C Ratio	0.39	0.39		0.39	0.39			0.51			0.51	
Clearance Time (s)	5.1	5.1		5.1	5.1			4.7			4.7	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	126	706		155	700			1768			1753	
v/s Ratio Prot		0.29			c0.31			0.27			c0.37	
v/s Ratio Perm	0.28			0.23								
v/c Ratio	0.73	0.75		0.61	0.81			0.54			0.72	
Uniform Delay, d1	22.1	22.3		20.7	23.1			13.9			15.9	
Progression Factor	1.00	1.00		1.00	1.00			0.43			0.50	
Incremental Delay, d2	19.4	4.6		6.6	7.1			1.1			2.3	
Delay (s)	41.5	26.9		27.2	30.2			7.0			10.2	
Level of Service	D	C		C	C			A			B	
Approach Delay (s)		29.0			29.8			7.0			10.2	
Approach LOS		C			C			A			B	

Intersection Summary				
HCM 2000 Control Delay	16.4	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.76			
Actuated Cycle Length (s)	84.0	Sum of lost time (s)	8.8	
Intersection Capacity Utilization	62.5%	ICU Level of Service	B	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Signalized Intersection Capacity Analysis
5: Esplanade & 1st Ave

5/23/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	75	357	39	93	423	115	55	880	50	45	715	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	4.6		4.6	4.6			4.2			4.2	
Lane Util. Factor	1.00	1.00		1.00	1.00			0.95			0.95	
Frpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	0.99		1.00	0.97			0.99			1.00	
Flt Protected	0.95	1.00		0.95	1.00			1.00			1.00	
Satd. Flow (prot)	1769	1830		1765	1794			3491			3514	
Flt Permitted	0.17	1.00		0.33	1.00			0.85			0.82	
Satd. Flow (perm)	320	1830		621	1794			2992			2891	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	81	384	42	100	455	124	59	946	54	48	769	16
RTOR Reduction (vph)	0	5	0	0	13	0	0	4	0	0	1	0
Lane Group Flow (vph)	81	421	0	100	566	0	0	1055	0	0	832	0
Confl. Peds. (#/hr)	2		6	6		2	17		6	6		17
Confl. Bikes (#/hr)			17			16			33			20
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4			2			2		
Actuated Green, G (s)	30.1	30.1		30.1	30.1			40.1			40.1	
Effective Green, g (s)	30.6	30.6		30.6	30.6			40.6			40.6	
Actuated g/C Ratio	0.38	0.38		0.38	0.38			0.51			0.51	
Clearance Time (s)	5.1	5.1		5.1	5.1			4.7			4.7	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	122	699		237	686			1518			1467	
v/s Ratio Prot		0.23			c0.32							
v/s Ratio Perm	0.25			0.16				c0.35			0.29	
v/c Ratio	0.66	0.60		0.42	0.83			0.69			0.57	
Uniform Delay, d1	20.4	19.8		18.2	22.3			15.0			13.6	
Progression Factor	1.00	1.00		1.00	1.00			0.39			0.60	
Incremental Delay, d2	12.8	1.5		1.2	8.0			2.5			1.5	
Delay (s)	33.2	21.3		19.4	30.3			8.3			9.7	
Level of Service	C	C		B	C			A			A	
Approach Delay (s)		23.2			28.7			8.3			9.7	
Approach LOS		C			C			A			A	

Intersection Summary				
HCM 2000 Control Delay	15.6	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.75			
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.8	
Intersection Capacity Utilization	97.2%	ICU Level of Service	F	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Unsignalized Intersection Capacity Analysis
6: Esplanade & 2nd Ave 5/23/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	3	1	19	1	1	18	51	700	5	36	866	48
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71
Hourly flow rate (vph)	4	1	27	1	1	25	72	986	7	51	1220	68
Pedestrians		13			10			3			1	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		1			1			0			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								437			452	
pX, platoon unblocked	0.90	0.90	0.81	0.90	0.90	0.84	0.81			0.84		
vC, conflicting volume	2032	2515	660	1885	2545	507	1300			1003		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1090	1630	121	926	1663	16	909			609		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	97	98	96	99	98	97	88			94		
cM capacity (veh/h)	122	73	728	160	70	877	599			800		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	32	28	72	657	336	51	813	474
Volume Left	4	1	72	0	0	51	0	0
Volume Right	27	25	0	0	7	0	0	68
cSH	357	486	599	1700	1700	800	1700	1700
Volume to Capacity	0.09	0.06	0.12	0.39	0.20	0.06	0.48	0.28
Queue Length 95th (ft)	7	5	10	0	0	5	0	0
Control Delay (s)	16.1	12.9	11.8	0.0	0.0	9.8	0.0	0.0
Lane LOS	C	B	B			A		
Approach Delay (s)	16.1	12.9	0.8			0.4		
Approach LOS	C	B						

Intersection Summary					
Average Delay		0.9			
Intersection Capacity Utilization	43.2%	ICU Level of Service		A	
Analysis Period (min)	15				

HCM Unsignalized Intersection Capacity Analysis
6: Esplanade & 2nd Ave 5/23/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	4	0	11	4	0	11	48	1010	16	62	750	17
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	4	0	12	4	0	12	52	1086	17	67	806	18
Pedestrians		14			3			1			2	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		1			0			0			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								437			452	
pX, platoon unblocked	0.84	0.84	0.93	0.84	0.84	0.80	0.93			0.80		
vC, conflicting volume	1623	2172	427	1750	2173	557	839			1106		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	982	1636	233	1133	1637	0	675			644		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	97	100	98	96	100	99	94			91		
cM capacity (veh/h)	146	71	706	114	70	868	838			751		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	16	16	52	724	379	67	538	287
Volume Left	4	4	52	0	0	67	0	0
Volume Right	12	12	0	0	17	0	0	18
cSH	349	314	838	1700	1700	751	1700	1700
Volume to Capacity	0.05	0.05	0.06	0.43	0.22	0.09	0.32	0.17
Queue Length 95th (ft)	4	4	5	0	0	7	0	0
Control Delay (s)	15.8	17.1	9.6	0.0	0.0	10.3	0.0	0.0
Lane LOS	C	C	A			B		
Approach Delay (s)	15.8	17.1	0.4			0.8		
Approach LOS	C	C						

Intersection Summary					
Average Delay		0.8			
Intersection Capacity Utilization	45.8%	ICU Level of Service		A	
Analysis Period (min)	15				

HCM Signalized Intersection Capacity Analysis
7: Esplanade & 3rd Ave

5/23/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	73	64	24	46	56	32	0	719	18	0	882	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.6			4.6			4.7			4.7	
Lane Util. Factor		1.00			1.00			0.95			0.95	
Frpb, ped/bikes		1.00			0.99			1.00			1.00	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.98			0.97			1.00			1.00	
Flt Protected		0.98			0.98			1.00			1.00	
Satd. Flow (prot)		1779			1760			3523			3525	
Flt Permitted		0.71			0.79			1.00			1.00	
Satd. Flow (perm)		1300			1419			3523			3525	
Peak-hour factor, PHF	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71
Adj. Flow (vph)	103	90	34	65	79	45	0	1013	25	0	1242	25
RTOR Reduction (vph)	0	9	0	0	16	0	0	1	0	0	1	0
Lane Group Flow (vph)	0	218	0	0	173	0	0	1037	0	0	1266	0
Confl. Peds. (#/hr)	3		2	2		3	8		9	9		8
Confl. Bikes (#/hr)						13			11			30
Turn Type	Perm	NA		Perm	NA			NA			NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4								
Actuated Green, G (s)		18.5			18.5			56.2			56.2	
Effective Green, g (s)		18.5			18.5			56.2			56.2	
Actuated g/C Ratio		0.22			0.22			0.67			0.67	
Clearance Time (s)		4.6			4.6			4.7			4.7	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		286			312			2357			2358	
v/s Ratio Prot								0.29			c0.36	
v/s Ratio Perm		c0.17			0.12							
v/c Ratio		0.76			0.55			0.44			0.54	
Uniform Delay, d1		30.7			29.1			6.5			7.2	
Progression Factor		1.00			1.00			0.55			0.86	
Incremental Delay, d2		11.3			2.1			0.5			0.8	
Delay (s)		42.0			31.2			4.1			6.9	
Level of Service		D			C			A			A	
Approach Delay (s)		42.0			31.2			4.1			6.9	
Approach LOS		D			C			A			A	

Intersection Summary				
HCM 2000 Control Delay	10.5	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.59			
Actuated Cycle Length (s)	84.0	Sum of lost time (s)	9.3	
Intersection Capacity Utilization	46.3%	ICU Level of Service	A	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Signalized Intersection Capacity Analysis
7: Esplanade & 3rd Ave

5/23/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	50	38	12	23	31	41	0	1005	16	0	790	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.6			4.6			4.7			4.7	
Lane Util. Factor		1.00			1.00			0.95			0.95	
Frpb, ped/bikes		1.00			0.99			1.00			1.00	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.98			0.94			1.00			1.00	
Flt Protected		0.98			0.99			1.00			1.00	
Satd. Flow (prot)		1782			1718			3529			3524	
Flt Permitted		0.80			0.92			1.00			1.00	
Satd. Flow (perm)		1462			1606			3529			3524	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	54	41	13	25	33	44	0	1081	17	0	849	19
RTOR Reduction (vph)	0	8	0	0	37	0	0	1	0	0	1	0
Lane Group Flow (vph)	0	100	0	0	65	0	0	1097	0	0	867	0
Confl. Peds. (#/hr)	2		2	2		2	14		3	3		14
Confl. Bikes (#/hr)			5			4			31			10
Turn Type	Perm	NA		Perm	NA			NA			NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4								
Actuated Green, G (s)		12.3			12.3			58.4			58.4	
Effective Green, g (s)		12.3			12.3			58.4			58.4	
Actuated g/C Ratio		0.15			0.15			0.73			0.73	
Clearance Time (s)		4.6			4.6			4.7			4.7	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		224			246			2576			2572	
v/s Ratio Prot								c0.31			0.25	
v/s Ratio Perm		c0.07			0.04							
v/c Ratio		0.44			0.26			0.43			0.34	
Uniform Delay, d1		30.7			29.9			4.2			3.9	
Progression Factor		1.00			1.00			0.85			0.56	
Incremental Delay, d2		1.4			0.6			0.4			0.3	
Delay (s)		32.2			30.4			4.0			2.5	
Level of Service		C			C			A			A	
Approach Delay (s)		32.2			30.4			4.0			2.5	
Approach LOS		C			C			A			A	

Intersection Summary				
HCM 2000 Control Delay	6.0	HCM 2000 Level of Service	A	
HCM 2000 Volume to Capacity ratio	0.43			
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	9.3	
Intersection Capacity Utilization	47.2%	ICU Level of Service	A	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Unsignalized Intersection Capacity Analysis
8: Esplanade & 4th Ave

5/23/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	14	7	39	1	1	8	53	767	4	63	860	61
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71
Hourly flow rate (vph)	20	10	55	1	1	11	75	1080	6	89	1211	86
Pedestrians		8			11			3				
Lane Width (ft)		12.0			12.0			12.0				
Walking Speed (ft/s)		4.0			4.0			4.0				
Percent Blockage		1			1			0				
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								429			440	
pX, platoon unblocked	0.87	0.87	0.80	0.87	0.87	0.87	0.80			0.87		
vC, conflicting volume	2141	2686	660	2089	2726	554	1305			1097		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1336	1964	84	1277	2011	189	888			813		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	74	76	93	98	96	98	88			87		
cM capacity (veh/h)	75	41	763	65	38	708	605			698		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	85	14	75	720	366	89	808	490
Volume Left	20	1	75	0	0	89	0	0
Volume Right	55	11	0	0	6	0	0	86
cSH	146	189	605	1700	1700	698	1700	1700
Volume to Capacity	0.58	0.07	0.12	0.42	0.22	0.13	0.48	0.29
Queue Length 95th (ft)	74	6	10	0	0	11	0	0
Control Delay (s)	59.0	25.6	11.8	0.0	0.0	10.9	0.0	0.0
Lane LOS	F	D	B			B		
Approach Delay (s)	59.0	25.6	0.8			0.7		
Approach LOS	F	D						

Intersection Summary					
Average Delay	2.7				
Intersection Capacity Utilization	46.6%	ICU Level of Service		A	
Analysis Period (min)	15				

HCM Unsignalized Intersection Capacity Analysis
8: Esplanade & 4th Ave

5/23/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	31	5	45	2	3	7	62	1022	12	63	763	42
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	33	5	48	2	3	8	67	1099	13	68	820	45
Pedestrians		6			11			3				
Lane Width (ft)		12.0			12.0			12.0				
Walking Speed (ft/s)		4.0			4.0			4.0				
Percent Blockage		1			1			0				
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								429			440	
pX, platoon unblocked	0.92	0.92	0.92	0.92	0.92	0.88	0.92			0.88		
vC, conflicting volume	1676	2241	442	1849	2257	567	872			1123		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1184	1795	223	1371	1812	249	690			877		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	69	91	93	97	94	99	92			90		
cM capacity (veh/h)	108	60	713	72	58	658	826			671		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	87	13	67	733	379	68	547	319
Volume Left	33	2	67	0	0	68	0	0
Volume Right	48	8	0	0	13	0	0	45
cSH	187	133	826	1700	1700	671	1700	1700
Volume to Capacity	0.47	0.10	0.08	0.43	0.22	0.10	0.32	0.19
Queue Length 95th (ft)	56	8	7	0	0	8	0	0
Control Delay (s)	40.0	34.8	9.7	0.0	0.0	11.0	0.0	0.0
Lane LOS	E	D	A			B		
Approach Delay (s)	40.0	34.8	0.6			0.8		
Approach LOS	E	D						

Intersection Summary					
Average Delay	2.4				
Intersection Capacity Utilization	52.1%	ICU Level of Service		A	
Analysis Period (min)	15				

HCM Signalized Intersection Capacity Analysis
9: Esplanade & 5th Ave

5/23/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	38	79	18	113	66	104	0	747	44	0	837	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.2			4.2	4.2		4.2			4.2	
Lane Util. Factor		1.00			1.00	1.00		0.95			0.95	
Frpb, ped/bikes		1.00			1.00	0.96		1.00			1.00	
Flpb, ped/bikes		1.00			1.00	1.00		1.00			1.00	
Frt		0.98			1.00	0.85		0.99			0.99	
Flt Protected		0.99			0.97	1.00		1.00			1.00	
Satd. Flow (prot)		1793			1804	1518		3499			3510	
Flt Permitted		0.80			0.65	1.00		1.00			1.00	
Satd. Flow (perm)		1453			1215	1518		3499			3510	
Peak-hour factor, PHF	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71
Adj. Flow (vph)	54	111	25	159	93	146	0	1052	62	0	1179	56
RTOR Reduction (vph)	0	7	0	0	0	53	0	4	0	0	3	0
Lane Group Flow (vph)	0	183	0	0	252	93	0	1110	0	0	1232	0
Confl. Peds. (#/hr)	14		2	2		14	4		14	14		4
Confl. Bikes (#/hr)			14			19			9			9
Turn Type	Perm	NA		Perm	NA	Perm		NA			NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4		4						
Actuated Green, G (s)		22.8			22.8	22.8		51.8			51.8	
Effective Green, g (s)		23.3			23.3	23.3		52.3			52.3	
Actuated g/C Ratio		0.28			0.28	0.28		0.62			0.62	
Clearance Time (s)		4.7			4.7	4.7		4.7			4.7	
Vehicle Extension (s)		3.0			3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)		403			337	421		2178			2185	
v/s Ratio Prot								0.32			c0.35	
v/s Ratio Perm		0.13			c0.21	0.06						
v/c Ratio		0.45			0.75	0.22		0.51			0.56	
Uniform Delay, d1		25.1			27.7	23.4		8.8			9.2	
Progression Factor		1.00			1.00	1.00		0.99			0.31	
Incremental Delay, d2		0.8			8.8	0.3		0.8			0.9	
Delay (s)		25.9			36.4	23.6		9.5			3.8	
Level of Service		C			D	C		A			A	
Approach Delay (s)		25.9			31.7			9.5			3.8	
Approach LOS		C			C			A			A	

Intersection Summary				
HCM 2000 Control Delay	11.2	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.62			
Actuated Cycle Length (s)	84.0	Sum of lost time (s)	8.4	
Intersection Capacity Utilization	53.2%	ICU Level of Service	A	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Signalized Intersection Capacity Analysis
9: Esplanade & 5th Ave

5/23/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	39	90	13	76	69	106	0	980	71	0	774	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.2			4.2	4.2		4.2			4.2	
Lane Util. Factor		1.00			1.00	1.00		0.95			0.95	
Frpb, ped/bikes		1.00			1.00	0.95		1.00			1.00	
Flpb, ped/bikes		1.00			1.00	1.00		1.00			1.00	
Frt		0.99			1.00	0.85		0.99			1.00	
Flt Protected		0.99			0.97	1.00		1.00			1.00	
Satd. Flow (prot)		1804			1808	1510		3492			3521	
Flt Permitted		0.88			0.70	1.00		1.00			1.00	
Satd. Flow (perm)		1602			1305	1510		3492			3521	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	42	97	14	82	74	114	0	1054	76	0	832	25
RTOR Reduction (vph)	0	6	0	0	0	56	0	4	0	0	2	0
Lane Group Flow (vph)	0	147	0	0	156	58	0	1126	0	0	855	0
Confl. Peds. (#/hr)	13		10	10		13	2		12	12		2
Confl. Bikes (#/hr)			14			19			9			4
Turn Type	Perm	NA		Perm	NA	Perm		NA			NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4		4						
Actuated Green, G (s)		14.9			14.9	14.9		55.7			55.7	
Effective Green, g (s)		15.4			15.4	15.4		56.2			56.2	
Actuated g/C Ratio		0.19			0.19	0.19		0.70			0.70	
Clearance Time (s)		4.7			4.7	4.7		4.7			4.7	
Vehicle Extension (s)		3.0			3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)		308			251	290		2453			2473	
v/s Ratio Prot								c0.32			0.24	
v/s Ratio Perm		0.09			c0.12	0.04						
v/c Ratio		0.48			0.62	0.20		0.46			0.35	
Uniform Delay, d1		28.7			29.6	27.1		5.2			4.7	
Progression Factor		1.00			1.00	1.00		1.01			0.35	
Incremental Delay, d2		1.2			4.7	0.3		0.6			0.4	
Delay (s)		29.9			34.3	27.5		5.9			2.0	
Level of Service		C			C	C		A			A	
Approach Delay (s)		29.9			31.4			5.9			2.0	
Approach LOS		C			C			A			A	

Intersection Summary				
HCM 2000 Control Delay	8.9	HCM 2000 Level of Service	A	
HCM 2000 Volume to Capacity ratio	0.49			
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.4	
Intersection Capacity Utilization	63.3%	ICU Level of Service	B	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Unsignalized Intersection Capacity Analysis
10: Esplanade & 6th Ave 5/23/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	6	7	42	1	1	7	97	782	10	76	834	39
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71
Hourly flow rate (vph)	8	10	59	1	1	10	137	1101	14	107	1175	55
Pedestrians		14			12			9			6	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		1			1			1			1	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								442			438	
pX, platoon unblocked	0.91	0.91	0.83	0.91	0.91	0.84	0.83			0.84		
vC, conflicting volume	2271	2831	638	2268	2851	576	1244			1127		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1412	2031	142	1409	2053	123	875			778		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	86	70	92	97	96	99	78			85		
cM capacity (veh/h)	61	33	713	46	32	751	627			696		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	77	13	137	734	381	107	783	446
Volume Left	8	1	137	0	0	107	0	0
Volume Right	59	10	0	0	14	0	0	55
cSH	149	144	627	1700	1700	696	1700	1700
Volume to Capacity	0.52	0.09	0.22	0.43	0.22	0.15	0.46	0.26
Queue Length 95th (ft)	63	7	21	0	0	14	0	0
Control Delay (s)	52.7	32.3	12.3	0.0	0.0	11.1	0.0	0.0
Lane LOS	F	D	B			B		
Approach Delay (s)	52.7	32.3	1.3			0.9		
Approach LOS	F	D						

Intersection Summary					
Average Delay	2.7				
Intersection Capacity Utilization	46.9%	ICU Level of Service		A	
Analysis Period (min)	15				

HCM Unsignalized Intersection Capacity Analysis
10: Esplanade & 6th Ave 5/23/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	12	4	56	7	1	20	44	1067	6	56	734	25
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	13	4	60	8	1	22	47	1147	6	60	789	27
Pedestrians		9			8			6			2	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		1			1			1			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								442			438	
pX, platoon unblocked	0.91	0.91	0.93	0.91	0.91	0.87	0.93			0.87		
vC, conflicting volume	1624	2189	423	1837	2199	587	825			1162		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1116	1738	217	1350	1749	227	651			887		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	90	94	92	90	98	97	94			91		
cM capacity (veh/h)	123	66	720	75	65	670	856			656		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	77	30	47	765	389	60	526	290
Volume Left	13	8	47	0	0	60	0	0
Volume Right	60	22	0	0	6	0	0	27
cSH	305	202	856	1700	1700	656	1700	1700
Volume to Capacity	0.25	0.15	0.06	0.45	0.23	0.09	0.31	0.17
Queue Length 95th (ft)	25	13	4	0	0	8	0	0
Control Delay (s)	20.7	25.9	9.5	0.0	0.0	11.0	0.0	0.0
Lane LOS	C	D	A			B		
Approach Delay (s)	20.7	25.9	0.4			0.8		
Approach LOS	C	D						

Intersection Summary					
Average Delay	1.6				
Intersection Capacity Utilization	50.1%	ICU Level of Service		A	
Analysis Period (min)	15				

HCM Signalized Intersection Capacity Analysis
11: Esplanade & 7th Ave 5/23/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	58	58	30	13	41	40	0	773	21	0	905	37
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.1			4.1			4.2			4.2	
Lane Util. Factor		1.00			1.00			0.95			0.95	
Frpb, ped/bikes		1.00			0.99			1.00			1.00	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.97			0.94			1.00			0.99	
Flt Protected		0.98			0.99			1.00			1.00	
Satd. Flow (prot)		1769			1733			3520			3514	
Flt Permitted		0.78			0.95			1.00			1.00	
Satd. Flow (perm)		1406			1657			3520			3514	
Peak-hour factor, PHF	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71
Adj. Flow (vph)	82	82	42	18	58	56	0	1089	30	0	1275	52
RTOR Reduction (vph)	0	14	0	0	38	0	0	1	0	0	2	0
Lane Group Flow (vph)	0	192	0	0	94	0	0	1118	0	0	1325	0
Confl. Peds. (#/hr)			4	4			3		13	13		3
Confl. Bikes (#/hr)			2			2			13			8
Turn Type	Perm	NA		Perm	NA			NA			NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4								
Actuated Green, G (s)		16.2			16.2			58.5			58.5	
Effective Green, g (s)		16.7			16.7			59.0			59.0	
Actuated g/C Ratio		0.20			0.20			0.70			0.70	
Clearance Time (s)		4.6			4.6			4.7			4.7	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		279			329			2472			2468	
v/s Ratio Prot								0.32			c0.38	
v/s Ratio Perm		c0.14			0.06							
v/c Ratio		0.69			0.28			0.45			0.54	
Uniform Delay, d1		31.2			28.6			5.5			6.0	
Progression Factor		1.00			1.00			0.68			0.52	
Incremental Delay, d2		6.9			0.5			0.5			0.8	
Delay (s)		38.2			29.1			4.3			3.8	
Level of Service		D			C			A			A	
Approach Delay (s)		38.2			29.1			4.3			3.8	
Approach LOS		D			C			A			A	

Intersection Summary				
HCM 2000 Control Delay	7.7	HCM 2000 Level of Service	A	
HCM 2000 Volume to Capacity ratio	0.57			
Actuated Cycle Length (s)	84.0	Sum of lost time (s)	8.3	
Intersection Capacity Utilization	48.6%	ICU Level of Service	A	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Signalized Intersection Capacity Analysis
11: Esplanade & 7th Ave 5/23/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	76	50	30	21	26	43	0	1091	10	0	758	26
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.1			4.1			4.2			4.2	
Lane Util. Factor		1.00			1.00			0.95			0.95	
Frpb, ped/bikes		1.00			0.99			1.00			1.00	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.97			0.94			1.00			1.00	
Flt Protected		0.98			0.99			1.00			1.00	
Satd. Flow (prot)		1763			1709			3533			3515	
Flt Permitted		0.80			0.92			1.00			1.00	
Satd. Flow (perm)		1453			1591			3533			3515	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	82	54	32	23	28	46	0	1173	11	0	815	28
RTOR Reduction (vph)	0	14	0	0	37	0	0	1	0	0	2	0
Lane Group Flow (vph)	0	154	0	0	60	0	0	1183	0	0	841	0
Confl. Peds. (#/hr)	1		6	6		1	17		9	9		17
Confl. Bikes (#/hr)			5			2			22			8
Turn Type	Perm	NA		Perm	NA			NA			NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4								
Actuated Green, G (s)		14.5			14.5			56.2			56.2	
Effective Green, g (s)		15.0			15.0			56.7			56.7	
Actuated g/C Ratio		0.19			0.19			0.71			0.71	
Clearance Time (s)		4.6			4.6			4.7			4.7	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		272			298			2504			2491	
v/s Ratio Prot								c0.33			0.24	
v/s Ratio Perm		c0.11			0.04							
v/c Ratio		0.57			0.20			0.47			0.34	
Uniform Delay, d1		29.5			27.4			5.1			4.5	
Progression Factor		1.00			1.00			0.37			0.86	
Incremental Delay, d2		2.7			0.3			0.6			0.4	
Delay (s)		32.2			27.8			2.5			4.2	
Level of Service		C			C			A			A	
Approach Delay (s)		32.2			27.8			2.5			4.2	
Approach LOS		C			C			A			A	

Intersection Summary				
HCM 2000 Control Delay	6.4	HCM 2000 Level of Service	A	
HCM 2000 Volume to Capacity ratio	0.49			
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.3	
Intersection Capacity Utilization	53.7%	ICU Level of Service	A	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Unsignalized Intersection Capacity Analysis
12: Esplanade & 8th Ave 5/23/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	34	6	127	2	1	8	144	718	9	41	813	90
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71
Hourly flow rate (vph)	48	8	179	3	1	11	203	1011	13	58	1145	127
Pedestrians		5			7			3				
Lane Width (ft)		12.0			12.0			12.0				
Walking Speed (ft/s)		4.0			4.0			4.0				
Percent Blockage		0			1			0				
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								434			439	
pX, platoon unblocked	0.87	0.87	0.81	0.87	0.87	0.88	0.81			0.88		
vC, conflicting volume	2252	2766	644	2304	2823	519	1277			1031		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1545	2135	99	1605	2201	196	879			775		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	67	76	89	94	98	67			92		
cM capacity (veh/h)	44	26	756	25	24	714	619			736		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	235	15	203	674	350	58	763	508
Volume Left	48	3	203	0	0	58	0	0
Volume Right	179	11	0	0	13	0	0	127
cSH	143	82	619	1700	1700	736	1700	1700
Volume to Capacity	1.64	0.19	0.33	0.40	0.21	0.08	0.45	0.30
Queue Length 95th (ft)	418	16	36	0	0	6	0	0
Control Delay (s)	372.0	59.1	13.6	0.0	0.0	10.3	0.0	0.0
Lane LOS	F	F	B			B		
Approach Delay (s)	372.0	59.1	2.3			0.4		
Approach LOS	F	F						

Intersection Summary					
Average Delay		32.7			
Intersection Capacity Utilization	57.6%	ICU Level of Service		B	
Analysis Period (min)	15				

HCM Unsignalized Intersection Capacity Analysis
12: Esplanade & 8th Ave 5/23/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	30	7	99	1	1	25	225	967	18	38	684	117
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	32	8	106	1	1	27	242	1040	19	41	735	126
Pedestrians		12			8			4				
Lane Width (ft)		12.0			12.0			12.0				
Walking Speed (ft/s)		4.0			4.0			4.0				
Percent Blockage		1			1			0				
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								434			439	
pX, platoon unblocked	0.92	0.92	0.92	0.92	0.92	0.88	0.92			0.88		
vC, conflicting volume	1923	2443	447	2105	2496	538	873			1067		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1422	1988	215	1620	2046	195	681			798		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	46	79	85	97	97	96	71			94		
cM capacity (veh/h)	60	36	714	33	33	709	824			715		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	146	29	242	693	366	41	490	371
Volume Left	32	1	242	0	0	41	0	0
Volume Right	106	27	0	0	19	0	0	126
cSH	164	283	824	1700	1700	715	1700	1700
Volume to Capacity	0.89	0.10	0.29	0.41	0.22	0.06	0.29	0.22
Queue Length 95th (ft)	159	8	31	0	0	5	0	0
Control Delay (s)	99.5	19.2	11.2	0.0	0.0	10.3	0.0	0.0
Lane LOS	F	C	B			B		
Approach Delay (s)	99.5	19.2	2.1			0.5		
Approach LOS	F	C						

Intersection Summary					
Average Delay		7.7			
Intersection Capacity Utilization	60.4%	ICU Level of Service		B	
Analysis Period (min)	15				

HCM Signalized Intersection Capacity Analysis
13: Esplanade & 9th Ave

5/23/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	58	117	19	91	44	52	0	682	81	0	838	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.1			4.1			4.2			4.2	
Lane Util. Factor		1.00			1.00			0.95			0.95	
Frpb, ped/bikes		1.00			0.99			1.00			1.00	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.99			0.96			0.98			1.00	
Flt Protected		0.99			0.98			1.00			1.00	
Satd. Flow (prot)		1807			1741			3470			3531	
Flt Permitted		0.81			0.63			1.00			1.00	
Satd. Flow (perm)		1494			1119			3470			3531	
Peak-hour factor, PHF	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71
Adj. Flow (vph)	82	165	27	128	62	73	0	961	114	0	1180	14
RTOR Reduction (vph)	0	6	0	0	20	0	0	8	0	0	1	0
Lane Group Flow (vph)	0	268	0	0	243	0	0	1067	0	0	1193	0
Confl. Peds. (#/hr)	3		1	1		3	5		5	5		5
Confl. Bikes (#/hr)			4			5			9			24
Turn Type	Perm	NA		Perm	NA			NA			NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4								
Actuated Green, G (s)		22.1			22.1			52.6			52.6	
Effective Green, g (s)		22.6			22.6			53.1			53.1	
Actuated g/C Ratio		0.27			0.27			0.63			0.63	
Clearance Time (s)		4.6			4.6			4.7			4.7	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		401			301			2193			2232	
v/s Ratio Prot								0.31			c0.34	
v/s Ratio Perm		0.18			c0.22							
v/c Ratio		0.67			0.81			0.49			0.53	
Uniform Delay, d1		27.4			28.7			8.2			8.6	
Progression Factor		1.00			1.00			1.09			0.12	
Incremental Delay, d2		4.2			14.6			0.7			0.5	
Delay (s)		31.6			43.3			9.6			1.6	
Level of Service		C			D			A			A	
Approach Delay (s)		31.6			43.3			9.6			1.6	
Approach LOS		C			D			A			A	

Intersection Summary				
HCM 2000 Control Delay	11.5	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.62			
Actuated Cycle Length (s)	84.0	Sum of lost time (s)	8.3	
Intersection Capacity Utilization	48.2%	ICU Level of Service	A	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Signalized Intersection Capacity Analysis
13: Esplanade & 9th Ave

5/23/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	57	80	6	70	66	55	0	943	80	0	763	26
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.1			4.1			4.2			4.2	
Lane Util. Factor		1.00			1.00			0.95			0.95	
Frpb, ped/bikes		1.00			0.99			1.00			1.00	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.99			0.96			0.99			1.00	
Flt Protected		0.98			0.98			1.00			1.00	
Satd. Flow (prot)		1815			1749			3482			3514	
Flt Permitted		0.76			0.81			1.00			1.00	
Satd. Flow (perm)		1404			1439			3482			3514	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	61	86	6	75	71	59	0	1014	86	0	820	28
RTOR Reduction (vph)	0	2	0	0	23	0	0	5	0	0	2	0
Lane Group Flow (vph)	0	151	0	0	182	0	0	1095	0	0	846	0
Confl. Peds. (#/hr)						1	16		9	9		16
Confl. Bikes (#/hr)			7			5			37			28
Turn Type	Perm	NA		Perm	NA			NA			NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4								
Actuated Green, G (s)		15.6			15.6			55.1			55.1	
Effective Green, g (s)		16.1			16.1			55.6			55.6	
Actuated g/C Ratio		0.20			0.20			0.70			0.70	
Clearance Time (s)		4.6			4.6			4.7			4.7	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		282			289			2419			2442	
v/s Ratio Prot								c0.31			0.24	
v/s Ratio Perm		0.11			c0.13							
v/c Ratio		0.53			0.63			0.45			0.35	
Uniform Delay, d1		28.6			29.2			5.4			4.9	
Progression Factor		1.00			1.00			0.68			0.26	
Incremental Delay, d2		1.9			4.2			0.6			0.3	
Delay (s)		30.5			33.5			4.3			1.6	
Level of Service		C			C			A			A	
Approach Delay (s)		30.5			33.5			4.3			1.6	
Approach LOS		C			C			A			A	

Intersection Summary				
HCM 2000 Control Delay	7.6	HCM 2000 Level of Service	A	
HCM 2000 Volume to Capacity ratio	0.49			
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.3	
Intersection Capacity Utilization	49.3%	ICU Level of Service	A	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Unsignalized Intersection Capacity Analysis
14: Esplanade & 10th Ave 5/23/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	3	1	5	2	0	56	8	779	5	102	841	10
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71
Hourly flow rate (vph)	4	1	7	3	0	79	11	1097	7	144	1185	14
Pedestrians		8			5						1	
Lane Width (ft)		12.0			12.0						12.0	
Walking Speed (ft/s)		4.0			4.0						4.0	
Percent Blockage		1			0						0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								443			429	
pX, platoon unblocked	0.79	0.79	0.71	0.79	0.79	0.85	0.71			0.85		
vC, conflicting volume	2138	2619	607	2016	2622	558	1207			1109		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1034	1646	0	878	1651	122	473			771		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	96	98	99	98	100	90	99			80		
cM capacity (veh/h)	108	60	764	153	60	765	765			709		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	13	82	11	731	373	144	790	409
Volume Left	4	3	11	0	0	144	0	0
Volume Right	7	79	0	0	7	0	0	14
cSH	177	672	765	1700	1700	709	1700	1700
Volume to Capacity	0.07	0.12	0.01	0.43	0.22	0.20	0.46	0.24
Queue Length 95th (ft)	6	10	1	0	0	19	0	0
Control Delay (s)	27.0	11.1	9.8	0.0	0.0	11.4	0.0	0.0
Lane LOS	D	B	A			B		
Approach Delay (s)	27.0	11.1	0.1			1.2		
Approach LOS	D	B						

Intersection Summary					
Average Delay	1.2				
Intersection Capacity Utilization	41.4%	ICU Level of Service		A	
Analysis Period (min)	15				

HCM Unsignalized Intersection Capacity Analysis
14: Esplanade & 10th Ave 5/23/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	3	3	9	4	1	45	32	1015	8	69	785	9
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	3	3	10	4	1	48	34	1091	9	74	844	10
Pedestrians		19			8			1				
Lane Width (ft)		12.0			12.0			12.0				
Walking Speed (ft/s)		4.0			4.0			4.0				
Percent Blockage		2			1			0				
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								443			429	
pX, platoon unblocked	0.89	0.89	0.83	0.89	0.89	0.87	0.83			0.87		
vC, conflicting volume	1680	2193	447	1755	2194	558	873			1108		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	871	1447	0	956	1448	199	428			830		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	98	97	99	97	99	93	96			89		
cM capacity (veh/h)	174	98	882	159	97	701	918			691		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	16	54	34	728	372	74	563	291
Volume Left	3	4	34	0	0	74	0	0
Volume Right	10	48	0	0	9	0	0	10
cSH	258	502	918	1700	1700	691	1700	1700
Volume to Capacity	0.06	0.11	0.04	0.43	0.22	0.11	0.33	0.17
Queue Length 95th (ft)	5	9	3	0	0	9	0	0
Control Delay (s)	19.9	13.0	9.1	0.0	0.0	10.8	0.0	0.0
Lane LOS	C	B	A			B		
Approach Delay (s)	19.9	13.0	0.3			0.9		
Approach LOS	C	B						

Intersection Summary					
Average Delay	1.0				
Intersection Capacity Utilization	45.8%	ICU Level of Service		A	
Analysis Period (min)	15				

HCM Signalized Intersection Capacity Analysis
15: Esplanade & 11th Ave

5/23/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	185	0	150	0	0	7	76	752	3	0	803	79
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	10	12	12	10	11	12	12	12	12	12
Total Lost time (s)		4.1			4.1		4.2	4.2			4.2	
Lane Util. Factor		1.00			1.00		1.00	0.95			0.95	
Frpb, ped/bikes		0.99			0.99		1.00	1.00			1.00	
Flpb, ped/bikes		1.00			1.00		1.00	1.00			1.00	
Frt		0.94			0.86		1.00	1.00			0.99	
Flt Protected		0.97			1.00		0.95	1.00			1.00	
Satd. Flow (prot)		1685			1590		1711	3536			3479	
Flt Permitted		0.82			1.00		0.95	1.00			1.00	
Satd. Flow (perm)		1425			1590		1711	3536			3479	
Peak-hour factor, PHF	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71
Adj. Flow (vph)	261	0	211	0	0	10	107	1059	4	0	1131	111
RTOR Reduction (vph)	0	56	0	0	7	0	0	0	0	0	8	0
Lane Group Flow (vph)	0	416	0	0	3	0	107	1063	0	0	1234	0
Confl. Peds. (#/hr)			6	6			1		7	7		1
Confl. Bikes (#/hr)			8			2			34			25
Turn Type	Perm	NA			NA		Prot	NA			NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8								
Actuated Green, G (s)		27.3			27.3		6.5	47.4			36.2	
Effective Green, g (s)		27.8			27.8		7.0	47.9			36.7	
Actuated g/C Ratio		0.33			0.33		0.08	0.57			0.44	
Clearance Time (s)		4.6			4.6		4.7	4.7			4.7	
Vehicle Extension (s)		4.0			2.0		0.5	4.0			4.0	
Lane Grp Cap (vph)		471			526		142	2016			1519	
v/s Ratio Prot					0.00		c0.06	0.30			c0.35	
v/s Ratio Perm		c0.29										
v/c Ratio		0.88			0.01		0.75	0.53			0.81	
Uniform Delay, d1		26.6			18.8		37.7	11.1			20.6	
Progression Factor		1.00			1.00		0.82	0.79			1.00	
Incremental Delay, d2		18.0			0.0		16.5	0.9			4.8	
Delay (s)		44.6			18.8		47.3	9.6			25.5	
Level of Service		D			B		D	A			C	
Approach Delay (s)		44.6			18.8			13.1			25.5	
Approach LOS		D			B			B			C	

Intersection Summary				
HCM 2000 Control Delay	23.6	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.83			
Actuated Cycle Length (s)	84.0	Sum of lost time (s)	12.5	
Intersection Capacity Utilization	65.7%	ICU Level of Service	C	
Analysis Period (min)	15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
15: Esplanade & 11th Ave

5/23/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	121	0	91	1	2	4	153	903	0	0	777	164
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	10	12	12	10	11	12	12	12	12	12
Total Lost time (s)		4.1			4.1		4.2	4.2			4.2	
Lane Util. Factor		1.00			1.00		1.00	0.95			0.95	
Frpb, ped/bikes		0.99			0.99		1.00	1.00			0.99	
Flpb, ped/bikes		1.00			1.00		1.00	1.00			1.00	
Frt		0.94			0.92		1.00	1.00			0.97	
Flt Protected		0.97			0.99		0.95	1.00			1.00	
Satd. Flow (prot)		1688			1691		1711	3539			3412	
Flt Permitted		0.82			0.96		0.95	1.00			1.00	
Satd. Flow (perm)		1423			1642		1711	3539			3412	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	130	0	98	1	2	4	165	971	0	0	835	176
RTOR Reduction (vph)	0	70	0	0	3	0	0	0	0	0	18	0
Lane Group Flow (vph)	0	158	0	0	4	0	165	971	0	0	993	0
Confl. Peds. (#/hr)	1		2	2		1	5		23	23		5
Confl. Bikes (#/hr)			8			2			34			43
Turn Type	Perm	NA		Perm	NA		Prot	NA			NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8								
Actuated Green, G (s)		15.0			15.0		12.3	55.7			38.7	
Effective Green, g (s)		15.5			15.5		12.8	56.2			39.2	
Actuated g/C Ratio		0.19			0.19		0.16	0.70			0.49	
Clearance Time (s)		4.6			4.6		4.7	4.7			4.7	
Vehicle Extension (s)		4.0			2.0		0.5	4.0			4.0	
Lane Grp Cap (vph)		275			318		273	2486			1671	
v/s Ratio Prot							c0.10	0.27			c0.29	
v/s Ratio Perm		c0.11			0.00							
v/c Ratio		0.57			0.01		0.60	0.39			0.59	
Uniform Delay, d1		29.3			26.1		31.2	4.9			14.7	
Progression Factor		1.00			1.00		0.68	0.40			1.00	
Incremental Delay, d2		3.4			0.0		2.4	0.4			1.6	
Delay (s)		32.7			26.1		23.6	2.4			16.2	
Level of Service		C			C		C	A			B	
Approach Delay (s)		32.7			26.1			5.4			16.2	
Approach LOS		C			C			A			B	

Intersection Summary				
HCM 2000 Control Delay	12.7	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.59			
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.5	
Intersection Capacity Utilization	64.8%	ICU Level of Service	C	
Analysis Period (min)	15			

c Critical Lane Group

MOVEMENT SUMMARY

Site: AM Peak Hour - Memorial Way Existing Volumes

Esplanade Area Complete Streets Plan
Esplanade/Memorial Way Roundabout
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: NB Esplanade											
3	L2	53	1.0	0.331	6.5	LOS A	1.8	45.6	0.48	0.36	29.7
8	T1	628	2.0	0.331	6.5	LOS A	1.8	45.6	0.48	0.36	29.7
18	R2	47	1.0	0.331	6.5	LOS A	1.8	45.6	0.48	0.36	28.7
Approach		728	1.9	0.331	6.5	LOS A	1.8	45.6	0.48	0.36	29.6
East: WB Memorial Way											
1	L2	72	1.0	0.319	7.7	LOS A	1.5	37.8	0.67	0.67	28.1
6	T1	14	1.0	0.319	7.7	LOS A	1.5	37.8	0.67	0.67	28.0
16	R2	188	1.0	0.319	7.7	LOS A	1.5	37.8	0.67	0.67	26.8
Approach		274	1.0	0.319	7.7	LOS A	1.5	37.8	0.67	0.67	27.2
North: SB Esplanade											
7	L2	158	1.0	0.319	5.9	LOS A	1.8	45.9	0.36	0.21	29.2
4	T1	589	2.0	0.319	5.9	LOS A	1.8	45.9	0.36	0.21	29.9
14	R2	38	1.0	0.319	5.9	LOS A	1.8	45.9	0.36	0.21	29.1
Approach		785	1.8	0.319	5.9	LOS A	1.8	45.9	0.36	0.21	29.7
West: EB Bidwell Mansion											
5	L2	15	1.0	0.159	6.4	LOS A	0.7	16.7	0.64	0.64	29.7
2	T1	76	1.0	0.159	6.4	LOS A	0.7	16.7	0.64	0.64	29.7
12	R2	32	1.0	0.159	6.4	LOS A	0.7	16.7	0.64	0.64	28.3
Approach		122	1.0	0.159	6.4	LOS A	0.7	16.7	0.64	0.64	29.3
All Vehicles		1909	1.6	0.331	6.4	LOS A	1.8	45.9	0.47	0.36	29.3

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SIDRA INTERSECTION 6

MOVEMENT SUMMARY

Site: PM Peak Hour - Memorial Way Existing Volumes

Esplanade Area Complete Streets Plan
Esplanade/Memorial Way Roundabout
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: NB Esplanade											
3	L2	11	1.0	0.473	8.5	LOS A	3.0	76.3	0.56	0.43	28.7
8	T1	980	2.0	0.473	8.5	LOS A	3.0	76.3	0.56	0.43	28.5
18	R2	53	1.0	0.473	8.5	LOS A	3.0	76.3	0.56	0.43	27.4
Approach		1043	1.9	0.473	8.5	LOS A	3.0	76.3	0.56	0.43	28.4
East: WB Memorial Way											
1	L2	47	1.0	0.364	10.6	LOS B	1.7	42.9	0.74	0.77	26.4
6	T1	7	1.0	0.364	10.6	LOS B	1.7	42.9	0.74	0.77	26.4
16	R2	180	1.0	0.364	10.6	LOS B	1.7	42.9	0.74	0.77	25.3
Approach		235	1.0	0.364	10.6	LOS B	1.7	42.9	0.74	0.77	25.5
North: SB Esplanade											
7	L2	184	1.0	0.320	5.6	LOS A	1.9	48.1	0.24	0.11	29.3
4	T1	637	2.0	0.320	5.6	LOS A	1.9	48.1	0.24	0.11	30.1
14	R2	27	1.0	0.320	5.6	LOS A	1.9	48.0	0.24	0.11	29.4
Approach		848	1.8	0.320	5.6	LOS A	1.9	48.1	0.24	0.11	29.9
West: EB Bidwell Mansion											
5	L2	17	1.0	0.108	6.0	LOS A	0.4	10.9	0.63	0.62	29.6
2	T1	44	1.0	0.108	6.0	LOS A	0.4	10.9	0.63	0.62	29.6
12	R2	18	1.0	0.108	6.0	LOS A	0.4	10.9	0.63	0.62	28.2
Approach		79	1.0	0.108	6.0	LOS A	0.4	10.9	0.63	0.62	29.3
All Vehicles		2205	1.7	0.473	7.5	LOS A	3.0	76.3	0.46	0.35	28.7

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SIDRA INTERSECTION 6

HCM Unsignalized Intersection Capacity Analysis
2: Esplanade & Francis Willard Ave

4/26/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	6	0	0	43	124	612	21	28	721	92
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71
Hourly flow rate (vph)	0	0	8	0	0	61	175	862	30	39	1015	130
Pedestrians		37			23			2				
Lane Width (ft)		12.0			12.0			12.0				
Walking Speed (ft/s)		4.0			4.0			4.0				
Percent Blockage		3			2			0				
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											288	
pX, platoon unblocked	0.82	0.82	0.82	0.82	0.82		0.82					
vC, conflicting volume	2037	2460	612	1846	2510	469	1182			915		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1833	2345	105	1601	2406	469	796			915		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	99	100	100	89	73			95		
cM capacity (veh/h)	25	19	742	42	18	531	657			727		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	8	61	175	575	317	39	677	468
Volume Left	0	0	175	0	0	39	0	0
Volume Right	8	61	0	0	30	0	0	130
cSH	742	531	657	1700	1700	727	1700	1700
Volume to Capacity	0.01	0.11	0.27	0.34	0.19	0.05	0.40	0.28
Queue Length 95th (ft)	1	10	27	0	0	4	0	0
Control Delay (s)	9.9	12.7	12.5	0.0	0.0	10.2	0.0	0.0
Lane LOS	A	B	B			B		
Approach Delay (s)	9.9	12.7	2.0			0.3		
Approach LOS	A	B						

Intersection Summary					
Average Delay	1.5				
Intersection Capacity Utilization	44.1%	ICU Level of Service		A	
Analysis Period (min)	15				

HCM Unsignalized Intersection Capacity Analysis
2: Esplanade & Francis Willard Ave

4/26/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	3	0	0	11	48	1052	4	25	800	74
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	0	0	3	0	0	12	52	1131	4	27	860	80
Pedestrians		46			7			1				
Lane Width (ft)		12.0			12.0			12.0				
Walking Speed (ft/s)		4.0			4.0			4.0				
Percent Blockage		4			1			0				
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											288	
pX, platoon unblocked	0.88	0.88	0.88	0.88	0.88		0.88					
vC, conflicting volume	1680	2245	517	1732	2283	575	986			1142		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1503	2144	182	1561	2186	575	714			1142		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	100	100	97	93			96		
cM capacity (veh/h)	61	36	702	59	34	459	747			604		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	3	12	52	754	381	27	573	366
Volume Left	0	0	52	0	0	27	0	0
Volume Right	3	12	0	0	4	0	0	80
cSH	702	459	747	1700	1700	604	1700	1700
Volume to Capacity	0.00	0.03	0.07	0.44	0.22	0.04	0.34	0.22
Queue Length 95th (ft)	0	2	6	0	0	3	0	0
Control Delay (s)	10.2	13.1	10.2	0.0	0.0	11.2	0.0	0.0
Lane LOS	B	B	B			B		
Approach Delay (s)	10.2	13.1	0.4			0.3		
Approach LOS	B	B						

Intersection Summary					
Average Delay	0.5				
Intersection Capacity Utilization	46.2%	ICU Level of Service		A	
Analysis Period (min)	15				

HCM Signalized Intersection Capacity Analysis
3: Esplanade & Lincoln Ave

4/26/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	195	0	93	0	0	25	0	640	25	0	748	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.6				4.6		4.7			4.7	
Lane Util. Factor		1.00				1.00		0.95			0.95	
Frpb, ped/bikes		0.96				1.00		1.00			1.00	
Flpb, ped/bikes		1.00				1.00		1.00			1.00	
Frt		0.96				0.86		0.99			1.00	
Flt Protected		0.97				1.00		1.00			1.00	
Satd. Flow (prot)		1653				1611		3510			3539	
Flt Permitted		0.97				1.00		1.00			1.00	
Satd. Flow (perm)		1653				1611		3510			3539	
Peak-hour factor, PHF	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71
Adj. Flow (vph)	275	0	131	0	0	35	0	901	35	0	1054	0
RTOR Reduction (vph)	0	23	0	0	0	24	0	2	0	0	0	0
Lane Group Flow (vph)	0	383	0	0	0	11	0	934	0	0	1054	0
Confl. Peds. (#/hr)			107	107			96		13	13		96
Confl. Bikes (#/hr)			6						34			57
Turn Type	Perm	NA				Perm		NA			NA	
Protected Phases		4						2			2	
Permitted Phases	4					4						
Actuated Green, G (s)		25.3				25.3		49.4			49.4	
Effective Green, g (s)		25.3				25.3		49.4			49.4	
Actuated g/C Ratio		0.30				0.30		0.59			0.59	
Clearance Time (s)		4.6				4.6		4.7			4.7	
Vehicle Extension (s)		3.0				3.0		3.0			3.0	
Lane Grp Cap (vph)		497				485		2064			2081	
v/s Ratio Prot								0.27			c0.30	
v/s Ratio Perm		0.23				0.01						
v/c Ratio		0.77				0.02		0.45			0.51	
Uniform Delay, d1		26.7				20.6		9.7			10.1	
Progression Factor		1.00				1.00		1.00			0.16	
Incremental Delay, d2		7.2				0.0		0.7			0.6	
Delay (s)		34.0				20.7		10.4			2.2	
Level of Service		C				C		B			A	
Approach Delay (s)		34.0			20.7			10.4			2.2	
Approach LOS		C			C			B			A	

Intersection Summary				
HCM 2000 Control Delay	10.9	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.60			
Actuated Cycle Length (s)	84.0	Sum of lost time (s)	9.3	
Intersection Capacity Utilization	53.4%	ICU Level of Service	A	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Signalized Intersection Capacity Analysis
3: Esplanade & Lincoln Ave

4/26/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	115	0	40	0	0	25	0	1038	25	0	860	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.6				4.6		4.7			4.7	
Lane Util. Factor		1.00				1.00		0.95			0.95	
Frpb, ped/bikes		0.99				1.00		1.00			1.00	
Flpb, ped/bikes		1.00				1.00		1.00			1.00	
Frt		0.97				0.86		1.00			1.00	
Flt Protected		0.96				1.00		1.00			1.00	
Satd. Flow (prot)		1720				1611		3521			3536	
Flt Permitted		0.96				1.00		1.00			1.00	
Satd. Flow (perm)		1720				1611		3521			3536	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	124	0	43	0	0	27	0	1116	27	0	925	3
RTOR Reduction (vph)	0	19	0	0	0	21	0	1	0	0	0	0
Lane Group Flow (vph)	0	148	0	0	0	6	0	1142	0	0	928	0
Confl. Peds. (#/hr)			14	14			55		14	14		55
Confl. Bikes (#/hr)			4						36			30
Turn Type	Perm	NA				Perm		NA			NA	
Protected Phases		4						2			2	
Permitted Phases	4					4						
Actuated Green, G (s)		17.8				17.8		52.9			52.9	
Effective Green, g (s)		17.8				17.8		52.9			52.9	
Actuated g/C Ratio		0.22				0.22		0.66			0.66	
Clearance Time (s)		4.6				4.6		4.7			4.7	
Vehicle Extension (s)		3.0				3.0		3.0			3.0	
Lane Grp Cap (vph)		382				358		2328			2338	
v/s Ratio Prot								c0.32			0.26	
v/s Ratio Perm		0.09				0.00						
v/c Ratio		0.39				0.02		0.49			0.40	
Uniform Delay, d1		26.5				24.3		6.8			6.2	
Progression Factor		1.00				1.00		1.00			0.13	
Incremental Delay, d2		0.7				0.0		0.7			0.4	
Delay (s)		27.1				24.3		7.5			1.2	
Level of Service		C				C		A			A	
Approach Delay (s)		27.1			24.3			7.5			1.2	
Approach LOS		C			C			A			A	

Intersection Summary				
HCM 2000 Control Delay	6.6	HCM 2000 Level of Service	A	
HCM 2000 Volume to Capacity ratio	0.46			
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	9.3	
Intersection Capacity Utilization	57.7%	ICU Level of Service	B	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Signalized Intersection Capacity Analysis
4: Esplanade & W Sacramento Ave

4/26/2016

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	0	118	205	665	630	281
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6		4.7	4.7	4.7	
Lane Util. Factor	1.00		1.00	0.95	0.95	
Frpb, ped/bikes	0.96		1.00	1.00	0.95	
Flpb, ped/bikes	1.00		1.00	1.00	1.00	
Frt	0.86		1.00	1.00	0.95	
Flt Protected	1.00		0.95	1.00	1.00	
Satd. Flow (prot)	1548		1770	3539	3196	
Flt Permitted	1.00		0.95	1.00	1.00	
Satd. Flow (perm)	1548		1770	3539	3196	
Peak-hour factor, PHF	0.71	0.71	0.71	0.71	0.71	0.71
Adj. Flow (vph)	0	166	289	937	887	396
RTOR Reduction (vph)	133	0	0	0	49	0
Lane Group Flow (vph)	33	0	289	937	1234	0
Confl. Peds. (#/hr)	1	17	57			57
Confl. Bikes (#/hr)		9				48
Turn Type	Prot		Prot	NA	NA	
Protected Phases	4		5	2	6	
Permitted Phases						
Actuated Green, G (s)	16.6		15.3	58.1	38.1	
Effective Green, g (s)	16.6		15.3	58.1	38.1	
Actuated g/C Ratio	0.20		0.18	0.69	0.45	
Clearance Time (s)	4.6		4.7	4.7	4.7	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	305		322	2447	1449	
v/s Ratio Prot	c0.02		c0.16	0.26	c0.39	
v/s Ratio Perm						
v/c Ratio	0.11		0.90	0.38	0.85	
Uniform Delay, d1	27.6		33.6	5.4	20.4	
Progression Factor	1.00		0.87	0.57	1.00	
Incremental Delay, d2	0.2		23.9	0.4	6.5	
Delay (s)	27.8		53.2	3.5	26.9	
Level of Service	C		D	A	C	
Approach Delay (s)	27.8			15.2	26.9	
Approach LOS	C			B	C	

Intersection Summary				
HCM 2000 Control Delay	21.6	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.68			
Actuated Cycle Length (s)	84.0	Sum of lost time (s)	14.0	
Intersection Capacity Utilization	64.5%	ICU Level of Service	C	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Signalized Intersection Capacity Analysis
4: Esplanade & W Sacramento Ave

4/26/2016

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	0	120	204	974	732	122
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6		4.7	4.7	4.7	
Lane Util. Factor	1.00		1.00	0.95	0.95	
Frpb, ped/bikes	0.93		1.00	1.00	0.99	
Flpb, ped/bikes	1.00		1.00	1.00	1.00	
Frt	0.86		1.00	1.00	0.98	
Flt Protected	1.00		0.95	1.00	1.00	
Satd. Flow (prot)	1494		1770	3539	3425	
Flt Permitted	1.00		0.95	1.00	1.00	
Satd. Flow (perm)	1494		1770	3539	3425	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	0	129	219	1047	787	131
RTOR Reduction (vph)	104	0	0	0	13	0
Lane Group Flow (vph)	25	0	219	1047	905	0
Confl. Peds. (#/hr)		4	20			20
Confl. Bikes (#/hr)		50				23
Turn Type	Prot		Prot	NA	NA	
Protected Phases	4		5	2	6	
Permitted Phases						
Actuated Green, G (s)	15.5		15.3	55.2	35.2	
Effective Green, g (s)	15.5		15.3	55.2	35.2	
Actuated g/C Ratio	0.19		0.19	0.69	0.44	
Clearance Time (s)	4.6		4.7	4.7	4.7	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	289		338	2441	1507	
v/s Ratio Prot	c0.02		c0.12	0.30	c0.26	
v/s Ratio Perm						
v/c Ratio	0.09		0.65	0.43	0.60	
Uniform Delay, d1	26.4		29.9	5.5	17.0	
Progression Factor	1.00		0.80	0.44	1.00	
Incremental Delay, d2	0.1		3.8	0.5	1.8	
Delay (s)	26.6		27.8	2.9	18.8	
Level of Service	C		C	A	B	
Approach Delay (s)	26.6			7.2	18.8	
Approach LOS	C			A	B	

Intersection Summary				
HCM 2000 Control Delay	12.9	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.49			
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	14.0	
Intersection Capacity Utilization	56.7%	ICU Level of Service	B	
Analysis Period (min)	15			
c Critical Lane Group				

MOVEMENT SUMMARY

Site: AM Peak Hour - 1st Ave Existing Volumes

Esplanade Area Complete Streets Plan
Esplanade/First Avenue Roundabout
(assumes 30 left-turns on each direction of Esplanade)
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: NB Esplanade											
3	L2	32	1.0	0.421	9.1	LOS A	2.3	58.5	0.65	0.63	28.1
8	T1	642	2.0	0.421	9.1	LOS A	2.3	58.6	0.65	0.63	28.0
18	R2	74	1.0	0.421	9.1	LOS A	2.3	58.6	0.65	0.63	27.0
Approach		747	1.9	0.421	9.1	LOS A	2.3	58.6	0.65	0.63	27.9
East: WB First Avenue											
1	L2	71	1.0	0.609	14.0	LOS B	4.4	111.1	0.82	0.93	24.9
6	T1	365	1.0	0.609	14.0	LOS B	4.4	111.1	0.82	0.93	24.9
16	R2	65	1.0	0.609	14.0	LOS B	4.4	111.1	0.82	0.93	23.9
Approach		501	1.0	0.609	14.0	LOS B	4.4	111.1	0.82	0.93	24.8
North: SB Esplanade											
7	L2	32	1.0	0.556	11.9	LOS B	3.9	99.7	0.74	0.78	26.4
4	T1	856	2.0	0.556	11.9	LOS B	3.9	99.7	0.74	0.78	26.3
14	R2	94	1.0	0.556	11.9	LOS B	3.9	99.7	0.74	0.78	25.4
Approach		981	1.9	0.556	11.9	LOS B	3.9	99.7	0.74	0.78	26.2
West: EB First Avenue											
5	L2	68	1.0	0.696	20.1	LOS C	5.2	131.3	0.87	1.05	22.1
2	T1	360	1.0	0.696	20.1	LOS C	5.2	131.3	0.87	1.05	22.1
12	R2	41	1.0	0.696	20.1	LOS C	5.2	131.3	0.87	1.05	21.3
Approach		469	1.0	0.696	20.1	LOS C	5.2	131.3	0.87	1.05	22.0
All Vehicles		2699	1.6	0.696	12.9	LOS B	5.2	131.3	0.75	0.81	25.5

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SIDRA INTERSECTION 6

MOVEMENT SUMMARY

Site: PM Peak Hour - 1st Ave Existing Volumes

Esplanade Area Complete Streets Plan
Esplanade/First Avenue Roundabout
(assumes 30 left-turns on each direction of Esplanade)
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: NB Esplanade											
3	L2	32	1.0	0.612	13.6	LOS B	4.8	120.7	0.78	0.86	25.5
8	T1	937	2.0	0.612	13.5	LOS B	4.8	120.8	0.78	0.86	25.4
18	R2	89	1.0	0.612	13.5	LOS B	4.8	120.8	0.78	0.86	24.5
Approach		1058	1.9	0.612	13.5	LOS B	4.8	120.8	0.78	0.86	25.3
East: WB First Avenue											
1	L2	98	1.0	1.069	81.3	LOS F	28.6	720.6	1.00	2.33	10.3
6	T1	445	1.0	1.069	81.3	LOS F	28.6	720.6	1.00	2.33	10.3
16	R2	121	1.0	1.069	81.3	LOS F	28.6	720.6	1.00	2.33	10.1
Approach		664	1.0	1.069	81.3	LOS F	28.6	720.6	1.00	2.33	10.2
North: SB Esplanade											
7	L2	32	1.0	0.520	11.6	LOS B	3.3	84.6	0.74	0.79	26.5
4	T1	753	2.0	0.520	11.6	LOS B	3.3	84.7	0.74	0.79	26.4
14	R2	67	1.0	0.520	11.6	LOS B	3.3	84.7	0.74	0.79	25.5
Approach		852	1.9	0.520	11.6	LOS B	3.3	84.7	0.74	0.79	26.3
West: EB First Avenue											
5	L2	79	1.0	0.681	18.3	LOS B	5.2	131.1	0.87	1.03	22.8
2	T1	376	1.0	0.681	18.3	LOS B	5.2	131.1	0.87	1.03	22.8
12	R2	41	1.0	0.681	18.3	LOS B	5.2	131.1	0.87	1.03	22.0
Approach		496	1.0	0.681	18.3	LOS B	5.2	131.1	0.87	1.03	22.8
All Vehicles		3069	1.6	1.069	28.4	LOS C	28.6	720.6	0.83	1.19	19.1

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SIDRA INTERSECTION 6

HCM Unsignalized Intersection Capacity Analysis
6: Esplanade & 2nd Ave

4/26/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	3	1	19	1	1	18	51	700	5	36	866	48
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71
Hourly flow rate (vph)	4	1	27	1	1	25	72	986	7	51	1220	68
Pedestrians		13			10			3			1	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		1			1			0			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											452	
pX, platoon unblocked	0.81	0.81	0.81	0.81	0.81		0.81					
vC, conflicting volume	2032	2515	660	1885	2545	507	1300			1003		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1809	2403	121	1628	2440	507	909			1003		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	86	93	96	97	93	95	88			93		
cM capacity (veh/h)	30	21	728	42	20	506	599			680		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	32	28	72	657	336	51	813	474
Volume Left	4	1	72	0	0	51	0	0
Volume Right	27	25	0	0	7	0	0	68
cSH	133	183	599	1700	1700	680	1700	1700
Volume to Capacity	0.24	0.15	0.12	0.39	0.20	0.07	0.48	0.28
Queue Length 95th (ft)	22	13	10	0	0	6	0	0
Control Delay (s)	40.4	28.1	11.8	0.0	0.0	10.7	0.0	0.0
Lane LOS	E	D	B			B		
Approach Delay (s)	40.4	28.1	0.8			0.4		
Approach LOS	E	D						

Intersection Summary					
Average Delay	1.4				
Intersection Capacity Utilization	43.2%	ICU Level of Service	A		
Analysis Period (min)	15				

HCM Unsignalized Intersection Capacity Analysis
6: Esplanade & 2nd Ave

4/26/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	4	0	11	4	0	11	48	1010	16	62	750	17
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	4	0	12	4	0	12	52	1086	17	67	806	18
Pedestrians		14			3			1			2	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		1			0			0			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											452	
pX, platoon unblocked	0.93	0.93	0.93	0.93	0.93		0.93					
vC, conflicting volume	1623	2172	427	1750	2173	557	839			1106		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1519	2110	233	1656	2110	557	675			1106		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	93	100	98	92	100	97	94			89		
cM capacity (veh/h)	63	39	706	51	39	472	838			625		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	16	16	52	724	379	67	538	287
Volume Left	4	4	52	0	0	67	0	0
Volume Right	12	12	0	0	17	0	0	18
cSH	190	147	838	1700	1700	625	1700	1700
Volume to Capacity	0.08	0.11	0.06	0.43	0.22	0.11	0.32	0.17
Queue Length 95th (ft)	7	9	5	0	0	9	0	0
Control Delay (s)	25.7	32.5	9.6	0.0	0.0	11.4	0.0	0.0
Lane LOS	D	D	A			B		
Approach Delay (s)	25.7	32.5	0.4			0.9		
Approach LOS	D	D						

Intersection Summary					
Average Delay	1.1				
Intersection Capacity Utilization	45.8%	ICU Level of Service	A		
Analysis Period (min)	15				

HCM Signalized Intersection Capacity Analysis
7: Esplanade & 3rd Ave

4/26/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	73	64	24	46	56	32	0	719	18	0	882	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.6			4.6			4.7			4.7	
Lane Util. Factor		1.00			1.00			0.95			0.95	
Frpb, ped/bikes		1.00			0.99			1.00			1.00	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.98			0.97			1.00			1.00	
Flt Protected		0.98			0.98			1.00			1.00	
Satd. Flow (prot)		1779			1760			3523			3525	
Flt Permitted		0.71			0.79			1.00			1.00	
Satd. Flow (perm)		1300			1419			3523			3525	
Peak-hour factor, PHF	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71
Adj. Flow (vph)	103	90	34	65	79	45	0	1013	25	0	1242	25
RTOR Reduction (vph)	0	9	0	0	16	0	0	1	0	0	1	0
Lane Group Flow (vph)	0	218	0	0	173	0	0	1037	0	0	1266	0
Confl. Peds. (#/hr)	3		2	2		3	8		9	9		8
Confl. Bikes (#/hr)						13			11			30
Turn Type	Perm	NA		Perm	NA			NA			NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4								
Actuated Green, G (s)		18.5			18.5			56.2			56.2	
Effective Green, g (s)		18.5			18.5			56.2			56.2	
Actuated g/C Ratio		0.22			0.22			0.67			0.67	
Clearance Time (s)		4.6			4.6			4.7			4.7	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		286			312			2357			2358	
v/s Ratio Prot								0.29			c0.36	
v/s Ratio Perm		c0.17			0.12							
v/c Ratio		0.76			0.55			0.44			0.54	
Uniform Delay, d1		30.7			29.1			6.5			7.2	
Progression Factor		1.00			1.00			1.00			0.64	
Incremental Delay, d2		11.3			2.1			0.6			0.8	
Delay (s)		42.0			31.2			7.1			5.4	
Level of Service		D			C			A			A	
Approach Delay (s)		42.0			31.2			7.1			5.4	
Approach LOS		D			C			A			A	

Intersection Summary				
HCM 2000 Control Delay	10.9	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.59			
Actuated Cycle Length (s)	84.0	Sum of lost time (s)	9.3	
Intersection Capacity Utilization	46.3%	ICU Level of Service	A	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Signalized Intersection Capacity Analysis
7: Esplanade & 3rd Ave

4/26/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	50	38	12	23	31	41	0	1005	16	0	790	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.6			4.6			4.7			4.7	
Lane Util. Factor		1.00			1.00			0.95			0.95	
Frpb, ped/bikes		1.00			0.99			1.00			1.00	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.98			0.94			1.00			1.00	
Flt Protected		0.98			0.99			1.00			1.00	
Satd. Flow (prot)		1782			1718			3529			3524	
Flt Permitted		0.80			0.92			1.00			1.00	
Satd. Flow (perm)		1462			1606			3529			3524	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	54	41	13	25	33	44	0	1081	17	0	849	19
RTOR Reduction (vph)	0	8	0	0	37	0	0	1	0	0	1	0
Lane Group Flow (vph)	0	100	0	0	65	0	0	1097	0	0	867	0
Confl. Peds. (#/hr)	2		2	2		2	14		3	3		14
Confl. Bikes (#/hr)			5			4			31			10
Turn Type	Perm	NA		Perm	NA			NA			NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4								
Actuated Green, G (s)		12.3			12.3			58.4			58.4	
Effective Green, g (s)		12.3			12.3			58.4			58.4	
Actuated g/C Ratio		0.15			0.15			0.73			0.73	
Clearance Time (s)		4.6			4.6			4.7			4.7	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		224			246			2576			2572	
v/s Ratio Prot								c0.31			0.25	
v/s Ratio Perm		c0.07			0.04							
v/c Ratio		0.44			0.26			0.43			0.34	
Uniform Delay, d1		30.7			29.9			4.2			3.9	
Progression Factor		1.00			1.00			1.00			1.06	
Incremental Delay, d2		1.4			0.6			0.5			0.3	
Delay (s)		32.2			30.4			4.7			4.5	
Level of Service		C			C			A			A	
Approach Delay (s)		32.2			30.4			4.7			4.5	
Approach LOS		C			C			A			A	

Intersection Summary				
HCM 2000 Control Delay	7.2	HCM 2000 Level of Service	A	
HCM 2000 Volume to Capacity ratio	0.43			
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	9.3	
Intersection Capacity Utilization	47.2%	ICU Level of Service	A	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Unsignalized Intersection Capacity Analysis
8: Esplanade & 4th Ave 4/26/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	14	7	39	1	1	8	53	767	4	63	860	61
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71
Hourly flow rate (vph)	20	10	55	1	1	11	75	1080	6	89	1211	86
Pedestrians		8			11			3				
Lane Width (ft)		12.0			12.0			12.0				
Walking Speed (ft/s)		4.0			4.0			4.0				
Percent Blockage		1			1			0				
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								429			440	
pX, platoon unblocked	0.87	0.87	0.80	0.87	0.87	0.87	0.80			0.87		
vC, conflicting volume	2141	2686	660	2089	2726	554	1305			1097		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1336	1964	84	1277	2011	189	888			813		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	74	76	93	98	96	98	88			87		
cM capacity (veh/h)	75	41	763	65	38	708	605			698		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	85	14	75	720	366	89	808	490
Volume Left	20	1	75	0	0	89	0	0
Volume Right	55	11	0	0	6	0	0	86
cSH	146	189	605	1700	1700	698	1700	1700
Volume to Capacity	0.58	0.07	0.12	0.42	0.22	0.13	0.48	0.29
Queue Length 95th (ft)	74	6	10	0	0	11	0	0
Control Delay (s)	59.0	25.6	11.8	0.0	0.0	10.9	0.0	0.0
Lane LOS	F	D	B			B		
Approach Delay (s)	59.0	25.6	0.8			0.7		
Approach LOS	F	D						

Intersection Summary					
Average Delay	2.7				
Intersection Capacity Utilization	46.6%	ICU Level of Service		A	
Analysis Period (min)	15				

HCM Unsignalized Intersection Capacity Analysis
8: Esplanade & 4th Ave 4/26/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	31	5	45	2	3	7	62	1022	12	63	763	42
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	33	5	48	2	3	8	67	1099	13	68	820	45
Pedestrians		6			11			3				
Lane Width (ft)		12.0			12.0			12.0				
Walking Speed (ft/s)		4.0			4.0			4.0				
Percent Blockage		1			1			0				
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								429			440	
pX, platoon unblocked	0.92	0.92	0.92	0.92	0.92	0.88	0.92			0.88		
vC, conflicting volume	1676	2241	442	1849	2257	567	872			1123		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1184	1795	223	1371	1812	249	690			877		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	69	91	93	97	94	99	92			90		
cM capacity (veh/h)	108	60	713	72	58	658	826			671		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	87	13	67	733	379	68	547	319
Volume Left	33	2	67	0	0	68	0	0
Volume Right	48	8	0	0	13	0	0	45
cSH	187	133	826	1700	1700	671	1700	1700
Volume to Capacity	0.47	0.10	0.08	0.43	0.22	0.10	0.32	0.19
Queue Length 95th (ft)	56	8	7	0	0	8	0	0
Control Delay (s)	40.0	34.8	9.7	0.0	0.0	11.0	0.0	0.0
Lane LOS	E	D	A			B		
Approach Delay (s)	40.0	34.8	0.6			0.8		
Approach LOS	E	D						

Intersection Summary					
Average Delay	2.4				
Intersection Capacity Utilization	52.1%	ICU Level of Service		A	
Analysis Period (min)	15				

HCM Signalized Intersection Capacity Analysis
9: Esplanade & 5th Ave

4/26/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	38	79	18	113	66	104	0	747	44	0	837	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.2			4.2	4.2		4.2			4.2	
Lane Util. Factor		1.00			1.00	1.00		0.95			0.95	
Frpb, ped/bikes		1.00			1.00	0.96		1.00			1.00	
Flpb, ped/bikes		1.00			1.00	1.00		1.00			1.00	
Frt		0.98			1.00	0.85		0.99			0.99	
Flt Protected		0.99			0.97	1.00		1.00			1.00	
Satd. Flow (prot)		1793			1804	1518		3499			3510	
Flt Permitted		0.80			0.65	1.00		1.00			1.00	
Satd. Flow (perm)		1453			1215	1518		3499			3510	
Peak-hour factor, PHF	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71
Adj. Flow (vph)	54	111	25	159	93	146	0	1052	62	0	1179	56
RTOR Reduction (vph)	0	7	0	0	0	53	0	4	0	0	3	0
Lane Group Flow (vph)	0	183	0	0	252	93	0	1110	0	0	1232	0
Confl. Peds. (#/hr)	14		2	2		14	4		14	14		4
Confl. Bikes (#/hr)			14			19			9			9
Turn Type	Perm	NA		Perm	NA	Perm		NA			NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4		4						
Actuated Green, G (s)		22.8			22.8	22.8		51.8			51.8	
Effective Green, g (s)		23.3			23.3	23.3		52.3			52.3	
Actuated g/C Ratio		0.28			0.28	0.28		0.62			0.62	
Clearance Time (s)		4.7			4.7	4.7		4.7			4.7	
Vehicle Extension (s)		3.0			3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)		403			337	421		2178			2185	
v/s Ratio Prot								0.32			c0.35	
v/s Ratio Perm		0.13			c0.21	0.06						
v/c Ratio		0.45			0.75	0.22		0.51			0.56	
Uniform Delay, d1		25.1			27.7	23.4		8.8			9.2	
Progression Factor		1.00			1.00	1.00		0.76			0.21	
Incremental Delay, d2		0.8			8.8	0.3		0.8			0.9	
Delay (s)		25.9			36.4	23.6		7.4			2.9	
Level of Service		C			D	C		A			A	
Approach Delay (s)		25.9			31.7			7.4			2.9	
Approach LOS		C			C			A			A	

Intersection Summary				
HCM 2000 Control Delay	10.0	HCM 2000 Level of Service	A	
HCM 2000 Volume to Capacity ratio	0.62			
Actuated Cycle Length (s)	84.0	Sum of lost time (s)	8.4	
Intersection Capacity Utilization	53.2%	ICU Level of Service	A	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Signalized Intersection Capacity Analysis
9: Esplanade & 5th Ave

4/26/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	39	90	13	76	69	106	0	980	71	0	774	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.2			4.2	4.2		4.2			4.2	
Lane Util. Factor		1.00			1.00	1.00		0.95			0.95	
Frpb, ped/bikes		1.00			1.00	0.95		1.00			1.00	
Flpb, ped/bikes		1.00			1.00	1.00		1.00			1.00	
Frt		0.99			1.00	0.85		0.99			1.00	
Flt Protected		0.99			0.97	1.00		1.00			1.00	
Satd. Flow (prot)		1804			1808	1510		3492			3521	
Flt Permitted		0.88			0.70	1.00		1.00			1.00	
Satd. Flow (perm)		1602			1305	1510		3492			3521	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	42	97	14	82	74	114	0	1054	76	0	832	25
RTOR Reduction (vph)	0	6	0	0	0	56	0	4	0	0	2	0
Lane Group Flow (vph)	0	147	0	0	156	58	0	1126	0	0	855	0
Confl. Peds. (#/hr)	13		10	10		13	2		12	12		2
Confl. Bikes (#/hr)			14			19			9			4
Turn Type	Perm	NA		Perm	NA	Perm		NA			NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4		4						
Actuated Green, G (s)		14.9			14.9	14.9		55.7			55.7	
Effective Green, g (s)		15.4			15.4	15.4		56.2			56.2	
Actuated g/C Ratio		0.19			0.19	0.19		0.70			0.70	
Clearance Time (s)		4.7			4.7	4.7		4.7			4.7	
Vehicle Extension (s)		3.0			3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)		308			251	290		2453			2473	
v/s Ratio Prot								c0.32			0.24	
v/s Ratio Perm		0.09			c0.12	0.04						
v/c Ratio		0.48			0.62	0.20		0.46			0.35	
Uniform Delay, d1		28.7			29.6	27.1		5.2			4.7	
Progression Factor		1.00			1.00	1.00		0.42			0.53	
Incremental Delay, d2		1.2			4.7	0.3		0.6			0.4	
Delay (s)		29.9			34.3	27.5		2.8			2.9	
Level of Service		C			C	C		A			A	
Approach Delay (s)		29.9			31.4			2.8			2.9	
Approach LOS		C			C			A			A	

Intersection Summary				
HCM 2000 Control Delay	7.8	HCM 2000 Level of Service	A	
HCM 2000 Volume to Capacity ratio	0.49			
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.4	
Intersection Capacity Utilization	63.3%	ICU Level of Service	B	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Unsignalized Intersection Capacity Analysis
10: Esplanade & 6th Ave 4/26/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	6	7	42	1	1	7	97	782	10	76	834	39
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71
Hourly flow rate (vph)	8	10	59	1	1	10	137	1101	14	107	1175	55
Pedestrians		14			12			9			6	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		1			1			1			1	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								442			438	
pX, platoon unblocked	0.91	0.91	0.83	0.91	0.91	0.84	0.83			0.84		
vC, conflicting volume	2271	2831	638	2268	2851	576	1244			1127		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1412	2031	142	1409	2053	123	875			778		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	86	70	92	97	96	99	78			85		
cM capacity (veh/h)	61	33	713	46	32	751	627			696		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	77	13	137	734	381	107	783	446
Volume Left	8	1	137	0	0	107	0	0
Volume Right	59	10	0	0	14	0	0	55
cSH	149	144	627	1700	1700	696	1700	1700
Volume to Capacity	0.52	0.09	0.22	0.43	0.22	0.15	0.46	0.26
Queue Length 95th (ft)	63	7	21	0	0	14	0	0
Control Delay (s)	52.7	32.3	12.3	0.0	0.0	11.1	0.0	0.0
Lane LOS	F	D	B			B		
Approach Delay (s)	52.7	32.3	1.3			0.9		
Approach LOS	F	D						

Intersection Summary					
Average Delay	2.7				
Intersection Capacity Utilization	46.9%	ICU Level of Service		A	
Analysis Period (min)	15				

HCM Unsignalized Intersection Capacity Analysis
10: Esplanade & 6th Ave 4/26/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	12	4	56	7	1	20	44	1067	6	56	734	25
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	13	4	60	8	1	22	47	1147	6	60	789	27
Pedestrians		9			8			6			2	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		1			1			1			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								442			438	
pX, platoon unblocked	0.91	0.91	0.93	0.91	0.91	0.87	0.93			0.87		
vC, conflicting volume	1624	2189	423	1837	2199	587	825			1162		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1116	1738	217	1350	1749	227	651			887		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	90	94	92	90	98	97	94			91		
cM capacity (veh/h)	123	66	720	75	65	670	856			656		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	77	30	47	765	389	60	526	290
Volume Left	13	8	47	0	0	60	0	0
Volume Right	60	22	0	0	6	0	0	27
cSH	305	202	856	1700	1700	656	1700	1700
Volume to Capacity	0.25	0.15	0.06	0.45	0.23	0.09	0.31	0.17
Queue Length 95th (ft)	25	13	4	0	0	8	0	0
Control Delay (s)	20.7	25.9	9.5	0.0	0.0	11.0	0.0	0.0
Lane LOS	C	D	A			B		
Approach Delay (s)	20.7	25.9	0.4			0.8		
Approach LOS	C	D						

Intersection Summary					
Average Delay	1.6				
Intersection Capacity Utilization	50.1%	ICU Level of Service		A	
Analysis Period (min)	15				

HCM Signalized Intersection Capacity Analysis
11: Esplanade & 7th Ave 4/26/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	58	58	30	13	41	40	0	773	21	0	905	37
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.1			4.1			4.2			4.2	
Lane Util. Factor		1.00			1.00			0.95			0.95	
Frpb, ped/bikes		1.00			0.99			1.00			1.00	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.97			0.94			1.00			0.99	
Flt Protected		0.98			0.99			1.00			1.00	
Satd. Flow (prot)		1769			1733			3520			3514	
Flt Permitted		0.78			0.95			1.00			1.00	
Satd. Flow (perm)		1406			1657			3520			3514	
Peak-hour factor, PHF	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71
Adj. Flow (vph)	82	82	42	18	58	56	0	1089	30	0	1275	52
RTOR Reduction (vph)	0	14	0	0	38	0	0	1	0	0	2	0
Lane Group Flow (vph)	0	192	0	0	94	0	0	1118	0	0	1325	0
Confl. Peds. (#/hr)			4	4			3		13	13		3
Confl. Bikes (#/hr)			2			2			13			8
Turn Type	Perm	NA		Perm	NA			NA			NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4								
Actuated Green, G (s)		16.2			16.2			58.5			58.5	
Effective Green, g (s)		16.7			16.7			59.0			59.0	
Actuated g/C Ratio		0.20			0.20			0.70			0.70	
Clearance Time (s)		4.6			4.6			4.7			4.7	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		279			329			2472			2468	
v/s Ratio Prot								0.32			c0.38	
v/s Ratio Perm		c0.14			0.06							
v/c Ratio		0.69			0.28			0.45			0.54	
Uniform Delay, d1		31.2			28.6			5.5			6.0	
Progression Factor		1.00			1.00			1.45			0.29	
Incremental Delay, d2		6.9			0.5			0.5			0.8	
Delay (s)		38.2			29.1			8.4			2.5	
Level of Service		D			C			A			A	
Approach Delay (s)		38.2			29.1			8.4			2.5	
Approach LOS		D			C			A			A	

Intersection Summary				
HCM 2000 Control Delay	8.8	HCM 2000 Level of Service	A	
HCM 2000 Volume to Capacity ratio	0.57			
Actuated Cycle Length (s)	84.0	Sum of lost time (s)	8.3	
Intersection Capacity Utilization	48.6%	ICU Level of Service	A	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Signalized Intersection Capacity Analysis
11: Esplanade & 7th Ave 4/26/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	76	50	30	21	26	43	0	1091	10	0	758	26
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.1			4.1			4.2			4.2	
Lane Util. Factor		1.00			1.00			0.95			0.95	
Frpb, ped/bikes		1.00			0.99			1.00			1.00	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.97			0.94			1.00			1.00	
Flt Protected		0.98			0.99			1.00			1.00	
Satd. Flow (prot)		1763			1709			3533			3515	
Flt Permitted		0.80			0.92			1.00			1.00	
Satd. Flow (perm)		1453			1591			3533			3515	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	82	54	32	23	28	46	0	1173	11	0	815	28
RTOR Reduction (vph)	0	14	0	0	37	0	0	1	0	0	2	0
Lane Group Flow (vph)	0	154	0	0	60	0	0	1183	0	0	841	0
Confl. Peds. (#/hr)	1		6	6		1	17		9	9		17
Confl. Bikes (#/hr)			5			2			22			8
Turn Type	Perm	NA		Perm	NA			NA			NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4								
Actuated Green, G (s)		14.5			14.5			56.2			56.2	
Effective Green, g (s)		15.0			15.0			56.7			56.7	
Actuated g/C Ratio		0.19			0.19			0.71			0.71	
Clearance Time (s)		4.6			4.6			4.7			4.7	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		272			298			2504			2491	
v/s Ratio Prot								c0.33			0.24	
v/s Ratio Perm		c0.11			0.04							
v/c Ratio		0.57			0.20			0.47			0.34	
Uniform Delay, d1		29.5			27.4			5.1			4.5	
Progression Factor		1.00			1.00			0.51			1.38	
Incremental Delay, d2		2.7			0.3			0.6			0.4	
Delay (s)		32.2			27.8			3.2			6.5	
Level of Service		C			C			A			A	
Approach Delay (s)		32.2			27.8			3.2			6.5	
Approach LOS		C			C			A			A	

Intersection Summary				
HCM 2000 Control Delay	7.6	HCM 2000 Level of Service	A	
HCM 2000 Volume to Capacity ratio	0.49			
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.3	
Intersection Capacity Utilization	53.7%	ICU Level of Service	A	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Unsignalized Intersection Capacity Analysis
12: Esplanade & 8th Ave 4/26/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	34	6	127	2	1	8	144	718	9	41	813	90
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71
Hourly flow rate (vph)	48	8	179	3	1	11	203	1011	13	58	1145	127
Pedestrians		5			7			3				
Lane Width (ft)		12.0			12.0			12.0				
Walking Speed (ft/s)		4.0			4.0			4.0				
Percent Blockage		0			1			0				
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								434			439	
pX, platoon unblocked	0.87	0.87	0.81	0.87	0.87	0.88	0.81			0.88		
vC, conflicting volume	2252	2766	644	2304	2823	519	1277			1031		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1545	2135	99	1605	2201	196	879			775		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	67	76	89	94	98	67			92		
cM capacity (veh/h)	44	26	756	25	24	714	619			736		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	235	15	203	674	350	58	763	508
Volume Left	48	3	203	0	0	58	0	0
Volume Right	179	11	0	0	13	0	0	127
cSH	143	82	619	1700	1700	736	1700	1700
Volume to Capacity	1.64	0.19	0.33	0.40	0.21	0.08	0.45	0.30
Queue Length 95th (ft)	418	16	36	0	0	6	0	0
Control Delay (s)	372.0	59.1	13.6	0.0	0.0	10.3	0.0	0.0
Lane LOS	F	F	B			B		
Approach Delay (s)	372.0	59.1	2.3			0.4		
Approach LOS	F	F						

Intersection Summary					
Average Delay	32.7				
Intersection Capacity Utilization	57.6%	ICU Level of Service		B	
Analysis Period (min)	15				

HCM Unsignalized Intersection Capacity Analysis
12: Esplanade & 8th Ave 4/26/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	30	7	99	1	1	25	225	967	18	38	684	117
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	32	8	106	1	1	27	242	1040	19	41	735	126
Pedestrians		12			8			4				
Lane Width (ft)		12.0			12.0			12.0				
Walking Speed (ft/s)		4.0			4.0			4.0				
Percent Blockage		1			1			0				
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								434			439	
pX, platoon unblocked	0.92	0.92	0.92	0.92	0.92	0.88	0.92			0.88		
vC, conflicting volume	1923	2443	447	2105	2496	538	873			1067		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1422	1988	215	1620	2046	195	681			798		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	46	79	85	97	97	96	71			94		
cM capacity (veh/h)	60	36	714	33	33	709	824			715		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	146	29	242	693	366	41	490	371
Volume Left	32	1	242	0	0	41	0	0
Volume Right	106	27	0	0	19	0	0	126
cSH	164	283	824	1700	1700	715	1700	1700
Volume to Capacity	0.89	0.10	0.29	0.41	0.22	0.06	0.29	0.22
Queue Length 95th (ft)	159	8	31	0	0	5	0	0
Control Delay (s)	99.5	19.2	11.2	0.0	0.0	10.3	0.0	0.0
Lane LOS	F	C	B			B		
Approach Delay (s)	99.5	19.2	2.1			0.5		
Approach LOS	F	C						

Intersection Summary					
Average Delay	7.7				
Intersection Capacity Utilization	60.4%	ICU Level of Service		B	
Analysis Period (min)	15				

HCM Signalized Intersection Capacity Analysis
13: Esplanade & 9th Ave 4/26/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	58	117	19	91	44	52	0	682	81	0	838	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.1			4.1			4.2			4.2	
Lane Util. Factor		1.00			1.00			0.95			0.95	
Frpb, ped/bikes		1.00			0.99			1.00			1.00	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.99			0.96			0.98			1.00	
Flt Protected		0.99			0.98			1.00			1.00	
Satd. Flow (prot)		1807			1741			3470			3531	
Flt Permitted		0.81			0.63			1.00			1.00	
Satd. Flow (perm)		1494			1119			3470			3531	
Peak-hour factor, PHF	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71
Adj. Flow (vph)	82	165	27	128	62	73	0	961	114	0	1180	14
RTOR Reduction (vph)	0	6	0	0	20	0	0	8	0	0	1	0
Lane Group Flow (vph)	0	268	0	0	243	0	0	1067	0	0	1193	0
Confl. Peds. (#/hr)	3		1	1		3	5		5	5		5
Confl. Bikes (#/hr)			4			5			9			24
Turn Type	Perm	NA		Perm	NA			NA			NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4								
Actuated Green, G (s)		22.1			22.1			52.6			52.6	
Effective Green, g (s)		22.6			22.6			53.1			53.1	
Actuated g/C Ratio		0.27			0.27			0.63			0.63	
Clearance Time (s)		4.6			4.6			4.7			4.7	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		401			301			2193			2232	
v/s Ratio Prot								0.31			c0.34	
v/s Ratio Perm		0.18			c0.22							
v/c Ratio		0.67			0.81			0.49			0.53	
Uniform Delay, d1		27.4			28.7			8.2			8.6	
Progression Factor		1.00			1.00			0.82			0.17	
Incremental Delay, d2		4.2			14.6			0.7			0.5	
Delay (s)		31.6			43.3			7.4			2.0	
Level of Service		C			D			A			A	
Approach Delay (s)		31.6			43.3			7.4			2.0	
Approach LOS		C			D			A			A	

Intersection Summary				
HCM 2000 Control Delay	10.8	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.62			
Actuated Cycle Length (s)	84.0	Sum of lost time (s)	8.3	
Intersection Capacity Utilization	48.2%	ICU Level of Service	A	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Signalized Intersection Capacity Analysis
13: Esplanade & 9th Ave 4/26/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	57	80	6	70	66	55	0	943	80	0	763	26
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.1			4.1			4.2			4.2	
Lane Util. Factor		1.00			1.00			0.95			0.95	
Frpb, ped/bikes		1.00			0.99			1.00			1.00	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.99			0.96			0.99			1.00	
Flt Protected		0.98			0.98			1.00			1.00	
Satd. Flow (prot)		1815			1749			3482			3514	
Flt Permitted		0.76			0.81			1.00			1.00	
Satd. Flow (perm)		1404			1439			3482			3514	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	61	86	6	75	71	59	0	1014	86	0	820	28
RTOR Reduction (vph)	0	2	0	0	23	0	0	5	0	0	2	0
Lane Group Flow (vph)	0	151	0	0	182	0	0	1095	0	0	846	0
Confl. Peds. (#/hr)						1	16		9	9		16
Confl. Bikes (#/hr)			7			5			37			28
Turn Type	Perm	NA		Perm	NA			NA			NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4								
Actuated Green, G (s)		15.6			15.6			55.1			55.1	
Effective Green, g (s)		16.1			16.1			55.6			55.6	
Actuated g/C Ratio		0.20			0.20			0.70			0.70	
Clearance Time (s)		4.6			4.6			4.7			4.7	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		282			289			2419			2442	
v/s Ratio Prot								c0.31			0.24	
v/s Ratio Perm		0.11			c0.13							
v/c Ratio		0.53			0.63			0.45			0.35	
Uniform Delay, d1		28.6			29.2			5.4			4.9	
Progression Factor		1.00			1.00			0.33			0.60	
Incremental Delay, d2		1.9			4.2			0.6			0.3	
Delay (s)		30.5			33.5			2.4			3.2	
Level of Service		C			C			A			A	
Approach Delay (s)		30.5			33.5			2.4			3.2	
Approach LOS		C			C			A			A	

Intersection Summary				
HCM 2000 Control Delay	7.3	HCM 2000 Level of Service	A	
HCM 2000 Volume to Capacity ratio	0.49			
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.3	
Intersection Capacity Utilization	49.3%	ICU Level of Service	A	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Unsignalized Intersection Capacity Analysis
14: Esplanade & 10th Ave 4/26/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	3	1	5	2	0	56	8	779	5	102	841	10
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71
Hourly flow rate (vph)	4	1	7	3	0	79	11	1097	7	144	1185	14
Pedestrians		8			5						1	
Lane Width (ft)		12.0			12.0						12.0	
Walking Speed (ft/s)		4.0			4.0						4.0	
Percent Blockage		1			0						0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								443			429	
pX, platoon unblocked	0.79	0.79	0.71	0.79	0.79	0.85	0.71			0.85		
vC, conflicting volume	2138	2619	607	2016	2622	558	1207			1109		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1034	1646	0	878	1651	122	473			771		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	96	98	99	98	100	90	99			80		
cM capacity (veh/h)	108	60	764	153	60	765	765			709		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	13	82	11	731	373	144	790	409
Volume Left	4	3	11	0	0	144	0	0
Volume Right	7	79	0	0	7	0	0	14
cSH	177	672	765	1700	1700	709	1700	1700
Volume to Capacity	0.07	0.12	0.01	0.43	0.22	0.20	0.46	0.24
Queue Length 95th (ft)	6	10	1	0	0	19	0	0
Control Delay (s)	27.0	11.1	9.8	0.0	0.0	11.4	0.0	0.0
Lane LOS	D	B	A			B		
Approach Delay (s)	27.0	11.1	0.1			1.2		
Approach LOS	D	B						

Intersection Summary					
Average Delay	1.2				
Intersection Capacity Utilization	41.4%	ICU Level of Service		A	
Analysis Period (min)	15				

HCM Unsignalized Intersection Capacity Analysis
14: Esplanade & 10th Ave 4/26/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	3	3	9	4	1	45	32	1015	8	69	785	9
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	3	3	10	4	1	48	34	1091	9	74	844	10
Pedestrians		19			8			1				
Lane Width (ft)		12.0			12.0			12.0				
Walking Speed (ft/s)		4.0			4.0			4.0				
Percent Blockage		2			1			0				
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								443			429	
pX, platoon unblocked	0.89	0.89	0.83	0.89	0.89	0.87	0.83			0.87		
vC, conflicting volume	1680	2193	447	1755	2194	558	873			1108		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	871	1447	0	956	1448	199	428			830		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	98	97	99	97	99	93	96			89		
cM capacity (veh/h)	174	98	882	159	97	701	918			691		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	16	54	34	728	372	74	563	291
Volume Left	3	4	34	0	0	74	0	0
Volume Right	10	48	0	0	9	0	0	10
cSH	258	502	918	1700	1700	691	1700	1700
Volume to Capacity	0.06	0.11	0.04	0.43	0.22	0.11	0.33	0.17
Queue Length 95th (ft)	5	9	3	0	0	9	0	0
Control Delay (s)	19.9	13.0	9.1	0.0	0.0	10.8	0.0	0.0
Lane LOS	C	B	A			B		
Approach Delay (s)	19.9	13.0	0.3			0.9		
Approach LOS	C	B						

Intersection Summary					
Average Delay	1.0				
Intersection Capacity Utilization	45.8%	ICU Level of Service		A	
Analysis Period (min)	15				

HCM Signalized Intersection Capacity Analysis
15: Esplanade & 11th Ave

4/26/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	185	0	150	0	0	7	76	752	3	0	803	79
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	10	12	12	10	11	12	12	12	12	12
Total Lost time (s)		4.1			4.1		4.2	4.2			4.2	
Lane Util. Factor		1.00			1.00		1.00	0.95			0.95	
Frpb, ped/bikes		0.99			0.99		1.00	1.00			1.00	
Flpb, ped/bikes		1.00			1.00		1.00	1.00			1.00	
Frt		0.94			0.86		1.00	1.00			0.99	
Flt Protected		0.97			1.00		0.95	1.00			1.00	
Satd. Flow (prot)		1685			1590		1711	3536			3479	
Flt Permitted		0.82			1.00		0.95	1.00			1.00	
Satd. Flow (perm)		1425			1590		1711	3536			3479	
Peak-hour factor, PHF	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71
Adj. Flow (vph)	261	0	211	0	0	10	107	1059	4	0	1131	111
RTOR Reduction (vph)	0	56	0	0	7	0	0	0	0	0	8	0
Lane Group Flow (vph)	0	416	0	0	3	0	107	1063	0	0	1234	0
Confl. Peds. (#/hr)			6	6			1		7	7		1
Confl. Bikes (#/hr)			8			2			34			25
Turn Type	Perm	NA			NA		Prot	NA			NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8								
Actuated Green, G (s)		27.3			27.3		6.5	47.4			36.2	
Effective Green, g (s)		27.8			27.8		7.0	47.9			36.7	
Actuated g/C Ratio		0.33			0.33		0.08	0.57			0.44	
Clearance Time (s)		4.6			4.6		4.7	4.7			4.7	
Vehicle Extension (s)		4.0			2.0		0.5	4.0			4.0	
Lane Grp Cap (vph)		471			526		142	2016			1519	
v/s Ratio Prot					0.00		c0.06	0.30			c0.35	
v/s Ratio Perm		c0.29										
v/c Ratio		0.88			0.01		0.75	0.53			0.81	
Uniform Delay, d1		26.6			18.8		37.7	11.1			20.6	
Progression Factor		1.00			1.00		0.99	1.10			1.00	
Incremental Delay, d2		18.0			0.0		16.5	0.9			4.8	
Delay (s)		44.6			18.8		53.8	13.1			25.5	
Level of Service		D			B		D	B			C	
Approach Delay (s)		44.6			18.8			16.9			25.5	
Approach LOS		D			B			B			C	

Intersection Summary				
HCM 2000 Control Delay	25.1	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.83			
Actuated Cycle Length (s)	84.0	Sum of lost time (s)	12.5	
Intersection Capacity Utilization	65.7%	ICU Level of Service	C	
Analysis Period (min)	15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
15: Esplanade & 11th Ave

4/26/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	121	0	91	1	2	4	153	903	0	0	777	164
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	10	12	12	10	11	12	12	12	12	12
Total Lost time (s)		4.1			4.1		4.2	4.2			4.2	
Lane Util. Factor		1.00			1.00		1.00	0.95			0.95	
Frpb, ped/bikes		0.99			0.99		1.00	1.00			0.99	
Flpb, ped/bikes		1.00			1.00		1.00	1.00			1.00	
Frt		0.94			0.92		1.00	1.00			0.97	
Flt Protected		0.97			0.99		0.95	1.00			1.00	
Satd. Flow (prot)		1688			1691		1711	3539			3412	
Flt Permitted		0.82			0.96		0.95	1.00			1.00	
Satd. Flow (perm)		1423			1642		1711	3539			3412	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	130	0	98	1	2	4	165	971	0	0	835	176
RTOR Reduction (vph)	0	70	0	0	3	0	0	0	0	0	18	0
Lane Group Flow (vph)	0	158	0	0	4	0	165	971	0	0	993	0
Confl. Peds. (#/hr)	1		2	2		1	5		23	23		5
Confl. Bikes (#/hr)			8			2			34			43
Turn Type	Perm	NA		Perm	NA		Prot	NA			NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8								
Actuated Green, G (s)		15.0			15.0		12.3	55.7			38.7	
Effective Green, g (s)		15.5			15.5		12.8	56.2			39.2	
Actuated g/C Ratio		0.19			0.19		0.16	0.70			0.49	
Clearance Time (s)		4.6			4.6		4.7	4.7			4.7	
Vehicle Extension (s)		4.0			2.0		0.5	4.0			4.0	
Lane Grp Cap (vph)		275			318		273	2486			1671	
v/s Ratio Prot							c0.10	0.27			c0.29	
v/s Ratio Perm		c0.11			0.00							
v/c Ratio		0.57			0.01		0.60	0.39			0.59	
Uniform Delay, d1		29.3			26.1		31.2	4.9			14.7	
Progression Factor		1.00			1.00		0.80	0.56			1.00	
Incremental Delay, d2		3.4			0.0		2.4	0.4			1.6	
Delay (s)		32.7			26.1		27.3	3.1			16.2	
Level of Service		C			C		C	A			B	
Approach Delay (s)		32.7			26.1			6.6			16.2	
Approach LOS		C			C			A			B	

Intersection Summary				
HCM 2000 Control Delay	13.3	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.59			
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.5	
Intersection Capacity Utilization	64.8%	ICU Level of Service	C	
Analysis Period (min)	15			

c Critical Lane Group