



INNOVATIVE IDEAS
EXCEPTIONAL DESIGN
UNMATCHED CLIENT SERVICE

Croft Road Corridor Study
Analysis & Recommendations Report

Appendix 3: Synchro Capacity Analysis & SIDRA Capacity Analysis Results

Timings
8: SR 4 & Croft

6/4/2014

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	23	76	12	4	99	124	11	113	9	201	277	37
Satd. Flow (prot)	1736	1801	0	1770	1723	0	1656	3452	0	1770	3453	0
Flt Permitted	0.387			0.662			0.482			0.640		
Satd. Flow (perm)	707	1801	0	1233	1723	0	840	3452	0	1192	3453	0
Satd. Flow (RTOR)		13			66			18			29	
Lane Group Flow (vph)	43	149	0	10	432	0	19	177	0	294	472	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Total Split (s)	44.0	44.0		44.0	44.0		48.5	48.5		48.5	48.5	
Total Lost Time (s)	6.0	6.0		6.0	6.0		6.5	6.5		6.5	6.5	
Act Effct Green (s)	18.6	18.6		18.6	18.6		20.8	20.8		20.8	20.8	
Actuated g/C Ratio	0.35	0.35		0.35	0.35		0.39	0.39		0.39	0.39	
v/c Ratio	0.17	0.23		0.02	0.67		0.06	0.13		0.63	0.34	
Control Delay	15.9	13.6		13.6	19.0		11.8	10.0		20.6	11.6	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	15.9	13.6		13.6	19.0		11.8	10.0		20.6	11.6	
LOS	B	B		B	B		B	A		C	B	
Approach Delay		14.2			18.9			10.2			15.0	
Approach LOS		B			B			B			B	
Queue Length 50th (ft)	8	26		2	84		3	14		63	43	
Queue Length 95th (ft)	25	65		7	109		13	39		158	94	
Internal Link Dist (ft)		603			1124			1450			910	
Turn Bay Length (ft)				200			250			500		
Base Capacity (vph)	543	1387		948	1340		689	2835		978	2838	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.08	0.11		0.01	0.32		0.03	0.06		0.30	0.17	

Intersection Summary

Cycle Length: 92.5

Actuated Cycle Length: 53

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.67

Intersection Signal Delay: 15.4

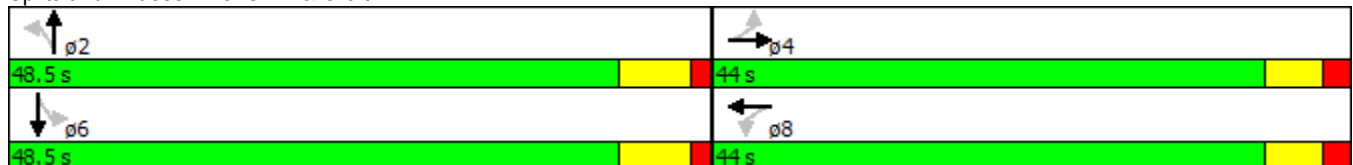
Intersection LOS: B

Intersection Capacity Utilization 62.1%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 8: SR 4 & Croft



Timings
8: SR 4 & Croft

6/4/2014



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗		↖	↕		↖	↗	
Volume (vph)	23	76	12	4	99	124	11	113	9	201	277	37
Satd. Flow (prot)	1736	1801	0	1770	1723	0	1656	3452	0	1770	3453	0
Flt Permitted	0.391			0.662			0.482			0.640		
Satd. Flow (perm)	714	1801	0	1233	1723	0	840	3452	0	1192	3453	0
Satd. Flow (RTOR)		14			71			17			27	
Lane Group Flow (vph)	43	149	0	10	432	0	19	177	0	294	472	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Total Split (s)	47.5	47.5		47.5	47.5		45.0	45.0		45.0	45.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0		6.5	6.5		6.5	6.5	
Act Effct Green (s)	18.6	18.6		18.6	18.6		20.4	20.4		20.4	20.4	
Actuated g/C Ratio	0.35	0.35		0.35	0.35		0.39	0.39		0.39	0.39	
v/c Ratio	0.17	0.23		0.02	0.66		0.06	0.13		0.64	0.35	
Control Delay	15.5	13.2		13.4	18.2		11.8	10.1		21.0	11.7	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	15.5	13.2		13.4	18.2		11.8	10.1		21.0	11.7	
LOS	B	B		B	B		B	B		C	B	
Approach Delay		13.8			18.1			10.3			15.3	
Approach LOS		B			B			B			B	
Queue Length 50th (ft)	8	26		2	82		3	14		64	43	
Queue Length 95th (ft)	24	63		7	106		13	39		157	93	
Internal Link Dist (ft)		603			1124			1450			910	
Turn Bay Length (ft)				200			250			500		
Base Capacity (vph)	585	1478		1010	1424		656	2701		931	2703	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.07	0.10		0.01	0.30		0.03	0.07		0.32	0.17	

Intersection Summary

Cycle Length: 92.5

Actuated Cycle Length: 52.5

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.66

Intersection Signal Delay: 15.3

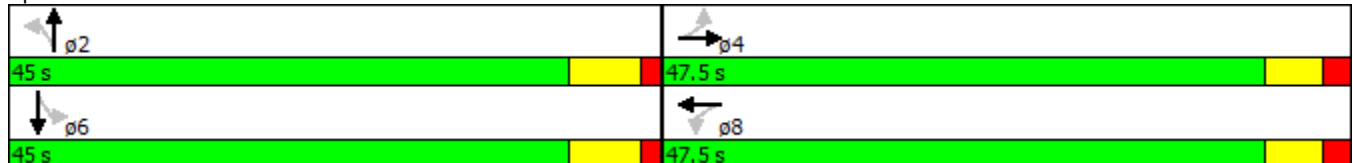
Intersection LOS: B

Intersection Capacity Utilization 62.1%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 8: SR 4 & Croft



Timings
8: SR 4 & Croft

6/4/2014



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗		↖	↕		↖	↗	
Volume (vph)	52	156	21	25	169	267	25	187	29	175	198	41
Satd. Flow (prot)	1770	1816	0	1770	1693	0	1736	3454	0	1770	3447	0
Flt Permitted	0.219			0.591			0.547			0.549		
Satd. Flow (perm)	408	1816	0	1101	1693	0	999	3454	0	1023	3447	0
Satd. Flow (RTOR)		13			102			30			34	
Lane Group Flow (vph)	96	263	0	48	621	0	38	337	0	259	341	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Total Split (s)	44.0	44.0		44.0	44.0		48.5	48.5		48.5	48.5	
Total Lost Time (s)	6.0	6.0		6.0	6.0		6.5	6.5		6.5	6.5	
Act Effct Green (s)	27.2	27.2		27.2	27.2		24.2	24.2		24.2	24.2	
Actuated g/C Ratio	0.42	0.42		0.42	0.42		0.37	0.37		0.37	0.37	
v/c Ratio	0.56	0.34		0.10	0.81		0.10	0.26		0.68	0.26	
Control Delay	32.5	14.9		14.3	24.9		15.6	14.0		28.9	13.9	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	32.5	14.9		14.3	24.9		15.6	14.0		28.9	13.9	
LOS	C	B		B	C		B	B		C	B	
Approach Delay		19.6			24.2			14.2			20.3	
Approach LOS		B			C			B			C	
Queue Length 50th (ft)	27	61		11	166		9	42		83	42	
Queue Length 95th (ft)	61	145		27	354		27	70		160	76	
Internal Link Dist (ft)		603			1124			1450			910	
Turn Bay Length (ft)				200			250			500		
Base Capacity (vph)	262	1172		708	1125		690	2395		706	2391	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.37	0.22		0.07	0.55		0.06	0.14		0.37	0.14	

Intersection Summary

Cycle Length: 92.5

Actuated Cycle Length: 65.2

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.81

Intersection Signal Delay: 20.3

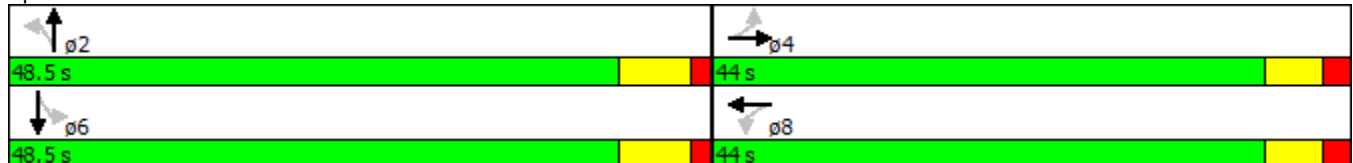
Intersection LOS: C

Intersection Capacity Utilization 82.8%

ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 8: SR 4 & Croft



Timings
8: SR 4 & Croft

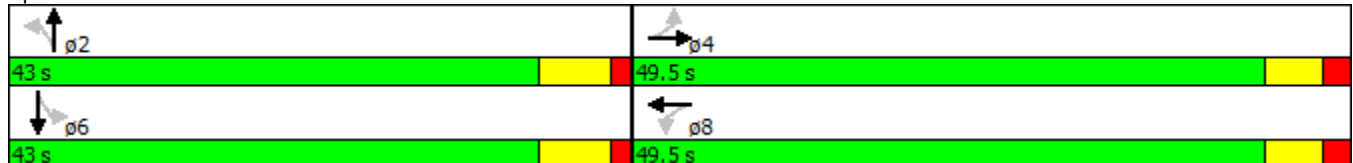
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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	52	156	21	25	169	267	25	187	29	175	198	41
Satd. Flow (prot)	1770	1816	0	1770	1693	0	1736	3454	0	1770	3447	0
Flt Permitted	0.226			0.594			0.547			0.549		
Satd. Flow (perm)	421	1816	0	1106	1693	0	999	3454	0	1023	3447	0
Satd. Flow (RTOR)		14			114			27			31	
Lane Group Flow (vph)	96	263	0	48	621	0	38	337	0	259	341	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Total Split (s)	49.5	49.5		49.5	49.5		43.0	43.0		43.0	43.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0		6.5	6.5		6.5	6.5	
Act Effct Green (s)	27.1	27.1		27.1	27.1		23.2	23.2		23.2	23.2	
Actuated g/C Ratio	0.42	0.42		0.42	0.42		0.36	0.36		0.36	0.36	
v/c Ratio	0.54	0.34		0.10	0.80		0.11	0.27		0.70	0.27	
Control Delay	28.7	13.8		13.0	22.3		17.0	15.0		31.2	14.8	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	28.7	13.8		13.0	22.3		17.0	15.0		31.2	14.8	
LOS	C	B		B	C		B	B		C	B	
Approach Delay		17.8			21.6			15.2			21.9	
Approach LOS		B			C			B			C	
Queue Length 50th (ft)	25	58		10	153		9	41		81	41	
Queue Length 95th (ft)	55	131		24	313		30	80		179	86	
Internal Link Dist (ft)		603			1124			1450			910	
Turn Bay Length (ft)				200			250			500		
Base Capacity (vph)	303	1312		796	1251		633	2199		648	2196	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.32	0.20		0.06	0.50		0.06	0.15		0.40	0.16	

Intersection Summary

Cycle Length: 92.5
 Actuated Cycle Length: 64.2
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.80
 Intersection Signal Delay: 19.8
 Intersection Capacity Utilization 82.8%
 Analysis Period (min) 15
 Intersection LOS: B
 ICU Level of Service E

Splits and Phases: 8: SR 4 & Croft



HCM Unsignalized Intersection Capacity Analysis

1: Old Columbus & Croft

6/4/2014



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↔	↔		↔	
Volume (veh/h)	43	32	63	108	114	70
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.83	0.73	0.72	0.90	0.81	0.65
Hourly flow rate (vph)	62	53	105	144	169	129
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	249				354	177
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	249				354	177
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	95				72	85
cM capacity (veh/h)	1317				614	863

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	115	249	298
Volume Left	62	0	169
Volume Right	0	144	129
cSH	1317	1700	702
Volume to Capacity	0.05	0.15	0.42
Queue Length 95th (ft)	4	0	53
Control Delay (s)	4.4	0.0	13.9
Lane LOS	A		B
Approach Delay (s)	4.4	0.0	13.9
Approach LOS			B

Intersection Summary			
Average Delay		7.0	
Intersection Capacity Utilization		39.5%	ICU Level of Service A
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis

1: Old Columbus & Croft

6/4/2014



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↖	↗		↘	↙
Volume (veh/h)	43	32	63	108	114	70
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.83	0.73	0.72	0.90	0.81	0.65
Hourly flow rate (vph)	62	53	105	144	169	129
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						6
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	249				354	177
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	249				354	177
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	95				72	85
cM capacity (veh/h)	1317				614	863

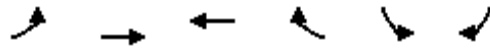
Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	115	249	298
Volume Left	62	0	169
Volume Right	0	144	129
cSH	1317	1700	1083
Volume to Capacity	0.05	0.15	0.28
Queue Length 95th (ft)	4	0	28
Control Delay (s)	4.4	0.0	11.7
Lane LOS	A		B
Approach Delay (s)	4.4	0.0	11.7
Approach LOS			B

Intersection Summary			
Average Delay		6.0	
Intersection Capacity Utilization		34.4%	ICU Level of Service A
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis

1: Old Columbus & Croft

6/4/2014



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↔	↔		↔	
Sign Control		Stop	Stop		Stop	
Volume (vph)	43	32	63	108	114	70
Peak Hour Factor	0.83	0.73	0.72	0.90	0.81	0.65
Hourly flow rate (vph)	62	53	105	144	169	129
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total (vph)	115	249	298			
Volume Left (vph)	62	0	169			
Volume Right (vph)	0	144	129			
Hadj (s)	0.20	-0.31	-0.11			
Departure Headway (s)	5.2	4.5	4.7			
Degree Utilization, x	0.16	0.31	0.39			
Capacity (veh/h)	647	751	731			
Control Delay (s)	9.2	9.5	10.6			
Approach Delay (s)	9.2	9.5	10.6			
Approach LOS	A	A	B			
Intersection Summary						
Delay			9.9			
Level of Service			A			
Intersection Capacity Utilization			39.5%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

1: Tuttle/Croft & Old Columbus

6/4/2014



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (veh/h)	45	26	5	50	72	26	10	145	30	86	135	45
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	59	34	7	65	94	34	13	189	39	112	176	59
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	745	684	205	688	694	209	235			228		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	745	684	205	688	694	209	235			228		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	75	90	99	79	72	96	99			92		
cM capacity (veh/h)	231	337	835	307	332	832	1333			1340		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	99	193	241	347
Volume Left	59	65	13	112
Volume Right	7	34	39	59
cSH	273	360	1333	1340
Volume to Capacity	0.36	0.54	0.01	0.08
Queue Length 95th (ft)	40	76	1	7
Control Delay (s)	25.5	25.9	0.5	3.1
Lane LOS	D	D	A	A
Approach Delay (s)	25.5	25.9	0.5	3.1
Approach LOS	D	D		

Intersection Summary			
Average Delay		9.9	
Intersection Capacity Utilization	49.8%		ICU Level of Service A
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis

1: Tuttle/Croft & Old Columbus

6/4/2014



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	45	26	5	50	72	26	10	77	20	32	95	71
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	59	34	7	65	94	34	13	100	26	42	124	93

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	99	193	140	258
Volume Left (vph)	59	65	13	42
Volume Right (vph)	7	34	26	93
Hadj (s)	0.11	0.00	-0.06	-0.15
Departure Headway (s)	5.3	5.0	5.0	4.7
Degree Utilization, x	0.15	0.27	0.19	0.34
Capacity (veh/h)	615	659	670	716
Control Delay (s)	9.2	9.9	9.1	10.1
Approach Delay (s)	9.2	9.9	9.1	10.1
Approach LOS	A	A	A	B

Intersection Summary			
Delay		9.7	
Level of Service		A	
Intersection Capacity Utilization	36.9%		ICU Level of Service A
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis

1: Old Columbus & Croft

6/4/2014



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↖	↗		↘	
Volume (veh/h)	102	91	58	183	178	90
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.82	0.84	0.69	0.83	0.84	0.83
Hourly flow rate (vph)	149	130	101	265	254	130
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	365				662	233
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	365				662	233
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	87				32	84
cM capacity (veh/h)	1193				374	806

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	279	365	384
Volume Left	149	0	254
Volume Right	0	265	130
cSH	1193	1700	456
Volume to Capacity	0.13	0.21	0.84
Queue Length 95th (ft)	11	0	208
Control Delay (s)	5.0	0.0	42.6
Lane LOS	A		E
Approach Delay (s)	5.0	0.0	42.6
Approach LOS			E

Intersection Summary			
Average Delay		17.3	
Intersection Capacity Utilization		58.1%	ICU Level of Service B
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis

1: Old Columbus & Croft

6/4/2014



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↖	↗		↘	↙
Volume (veh/h)	102	91	58	183	178	90
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.82	0.84	0.69	0.83	0.84	0.83
Hourly flow rate (vph)	149	130	101	265	254	130
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						6
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	365				662	233
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	365				662	233
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	87				32	84
cM capacity (veh/h)	1193				374	806

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	279	365	384
Volume Left	149	0	254
Volume Right	0	265	130
cSH	1193	1700	565
Volume to Capacity	0.13	0.21	0.68
Queue Length 95th (ft)	11	0	130
Control Delay (s)	5.0	0.0	25.2
Lane LOS	A		D
Approach Delay (s)	5.0	0.0	25.2
Approach LOS			D

Intersection Summary			
Average Delay		10.8	
Intersection Capacity Utilization		51.5%	ICU Level of Service A
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis

1: Old Columbus & Croft

6/4/2014



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↔	↔		↔	
Sign Control		Stop	Stop		Stop	
Volume (vph)	102	91	58	183	178	90
Peak Hour Factor	0.82	0.84	0.69	0.83	0.84	0.83
Hourly flow rate (vph)	149	130	101	265	254	130
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total (vph)	279	365	384			
Volume Left (vph)	149	0	254			
Volume Right (vph)	0	265	130			
Hadj (s)	0.15	-0.40	-0.04			
Departure Headway (s)	5.8	5.1	5.6			
Degree Utilization, x	0.45	0.52	0.59			
Capacity (veh/h)	586	663	610			
Control Delay (s)	13.4	13.6	16.4			
Approach Delay (s)	13.4	13.6	16.4			
Approach LOS	B	B	C			
Intersection Summary						
Delay			14.6			
Level of Service			B			
Intersection Capacity Utilization			58.1%	ICU Level of Service	B	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

1: Tuttle/Croft & Old Columbus

6/4/2014



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (veh/h)	95	58	15	40	66	48	10	145	30	86	135	45
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	124	76	20	52	86	63	13	189	39	112	176	59
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	770	684	205	722	694	209	235			228		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	770	684	205	722	694	209	235			228		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	43	78	98	80	74	92	99			92		
cM capacity (veh/h)	219	337	835	257	332	832	1333			1340		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	219	201	241	347
Volume Left	124	52	13	112
Volume Right	20	63	39	59
cSH	269	374	1333	1340
Volume to Capacity	0.81	0.54	0.01	0.08
Queue Length 95th (ft)	162	76	1	7
Control Delay (s)	58.1	25.2	0.5	3.1
Lane LOS	F	D	A	A
Approach Delay (s)	58.1	25.2	0.5	3.1
Approach LOS	F	D		

Intersection Summary			
Average Delay		18.8	
Intersection Capacity Utilization	61.5%		ICU Level of Service B
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis

1: Tuttle/Croft & Old Columbus

6/4/2014



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	95	58	15	40	66	48	10	145	30	86	135	45
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	124	76	20	52	86	63	13	189	39	112	176	59
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	219	201	241	347								
Volume Left (vph)	124	52	13	112								
Volume Right (vph)	20	63	39	59								
Hadj (s)	0.09	-0.10	-0.05	0.00								
Departure Headway (s)	6.1	6.0	5.8	5.6								
Degree Utilization, x	0.37	0.33	0.39	0.54								
Capacity (veh/h)	518	533	561	598								
Control Delay (s)	12.7	11.9	12.4	15.2								
Approach Delay (s)	12.7	11.9	12.4	15.2								
Approach LOS	B	B	B	C								
Intersection Summary												
Delay			13.3									
Level of Service			B									
Intersection Capacity Utilization			61.5%	ICU Level of Service	B							
Analysis Period (min)			15									

LANE SUMMARY

 **Site: Croft Rd/Columbus Ave - AM**

Three-Leg Roundabout
Clark County
Roundabout

Lane Use and Performance													
	Demand Flows			Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue		Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
	Total veh/h	HV %	Cap. veh/h					Veh	Dist ft				
East: WB Columbus Avenue													
Lane 1 ^d	233	3.0	1032	0.225	100	5.6	LOS A	0.9	23.7	Full	1600	0.0	0.0
Approach	233	3.0		0.225		5.6	LOS A	0.9	23.7				
North: SB Croft Road													
Lane 1 ^d	263	3.0	994	0.265	100	6.2	LOS A	1.1	28.7	Full	1600	0.0	0.0
Approach	263	3.0		0.265		6.2	LOS A	1.1	28.7				
West: EB Columbus Avenue													
Lane 1 ^d	101	3.0	922	0.110	100	4.9	LOS A	0.4	10.0	Full	1600	0.0	0.0
Approach	101	3.0		0.110		4.9	LOS A	0.4	10.0				
Intersection	597	3.0		0.265		5.8	LOS A	1.1	28.7				

Level of Service (LOS) Method: Delay & v/c (HCM 2010).

Roundabout LOS Method: Same as Sign Control.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if v/c > irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (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.

^d Dominant lane on roundabout approach

LANE SUMMARY

 **Site: Croft Rd/Columbus Ave - PM**

Three-Leg Roundabout
Clark County
Roundabout

Lane Use and Performance													
	Demand Flows			Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue		Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
	Total veh/h	HV %	Cap. veh/h					Veh	Dist ft				
East: WB Columbus Avenue													
Lane 1 ^d	343	3.0	963	0.357	100	7.6	LOS A	1.7	42.5	Full	1600	0.0	0.0
Approach	343	3.0		0.357		7.6	LOS A	1.7	42.5				
North: SB Croft Road													
Lane 1 ^d	353	3.0	1002	0.353	100	7.3	LOS A	1.7	42.7	Full	1600	0.0	0.0
Approach	353	3.0		0.353		7.3	LOS A	1.7	42.7				
West: EB Columbus Avenue													
Lane 1 ^d	223	3.0	858	0.260	100	7.0	LOS A	1.0	26.6	Full	1600	0.0	0.0
Approach	223	3.0		0.260		7.0	LOS A	1.0	26.6				
Intersection	920	3.0		0.357		7.3	LOS A	1.7	42.7				

Level of Service (LOS) Method: Delay & v/c (HCM 2010).

Roundabout LOS Method: Same as Sign Control.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if v/c > irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (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.

^d Dominant lane on roundabout approach

LANE SUMMARY

Site: Croft Rd/Tuttle Extension - AM

4-Leg Roundabout
Clark County
Roundabout

Lane Use and Performance													
	Demand Flows			Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue		Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
	Total veh/h	HV %	Cap. veh/h					Veh	Dist m				
South: NB Tuttle Extension													
Lane 1 ^d	137	3.0	973	0.141	100	5.0	LOS A	0.5	3.8	Full	500	0.0	0.0
Approach	137	3.0		0.141		5.0	LOS A	0.5	3.8				
East: WB Columbus Ave													
Lane 1 ^d	191	3.0	937	0.203	100	5.8	LOS A	0.8	5.8	Full	500	0.0	0.0
Approach	191	3.0		0.203		5.8	LOS A	0.8	5.8				
North: SB Croft Road													
Lane 1 ^d	255	3.0	937	0.272	100	6.6	LOS A	1.2	8.3	Full	500	0.0	0.0
Approach	255	3.0		0.272		6.6	LOS A	1.2	8.3				
West: EB Columbus Ave													
Lane 1 ^d	98	3.0	884	0.111	100	5.1	LOS A	0.4	2.8	Full	500	0.0	0.0
Approach	98	3.0		0.111		5.1	LOS A	0.4	2.8				
Intersection	680	3.0		0.272		5.9	LOS A	1.2	8.3				

Level of Service (LOS) Method: Delay & v/c (HCM 2010).

Roundabout LOS Method: Same as Sign Control.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if v/c > irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (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.

^d Dominant lane on roundabout approach

LANE SUMMARY

Site: Croft Rd/Tuttle Extension - PM

Clark County
4-Leg Roundabout
Roundabout

Lane Use and Performance													
	Demand Flows			Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue		Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
	Total veh/h	HV %	Cap. veh/h					Veh	Dist m				
South: NB Tuttle Extension													
Lane 1 ^d	238	3.0	860	0.277	100	7.2	LOS A	1.1	8.2	Full	500	0.0	0.0
Approach	238	3.0		0.277		7.2	LOS A	1.1	8.2				
East: WB Columbus Ave													
Lane 1 ^d	199	3.0	804	0.248	100	7.2	LOS A	1.0	7.0	Full	500	0.0	0.0
Approach	199	3.0		0.248		7.2	LOS A	1.0	7.0				
North: SB Croft Road													
Lane 1 ^d	342	3.0	957	0.358	100	7.6	LOS A	1.7	12.1	Full	500	0.0	0.0
Approach	342	3.0		0.358		7.6	LOS A	1.7	12.1				
West: EB Columbus Ave													
Lane 1 ^d	216	3.0	835	0.258	100	7.1	LOS A	1.0	7.5	Full	500	0.0	0.0
Approach	216	3.0		0.258		7.1	LOS A	1.0	7.5				
Intersection	995	3.0		0.358		7.3	LOS A	1.7	12.1				

Level of Service (LOS) Method: Delay & v/c (HCM 2010).

Roundabout LOS Method: Same as Sign Control.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if v/c > irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (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.

^d Dominant lane on roundabout approach