

HCM Signalized Intersection Capacity Analysis
5: Saint Laurent & Conroy

Johnston Road Land Use CTS
Existing Conditions - AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	2.4	3.6	3.6	2.4
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.91	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1289	1900	1615	1597	1881	1442	1805	5085	1372	1787	3343	1308
Flt Permitted	0.71	1.00	1.00	0.70	1.00	1.00	0.50	1.00	1.00	0.26	1.00	1.00
Satd. Flow (perm)	959	1900	1615	1170	1881	1442	943	5085	1372	492	3343	1308
Volume (vph)	5	75	63	71	72	76	136	945	200	105	406	46
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	5	82	68	77	78	83	148	1027	217	114	441	50
RTOR Reduction (vph)	0	0	0	0	0	72	0	0	16	0	0	6
Lane Group Flow (vph)	5	82	68	77	78	11	148	1027	201	114	441	44
Heavy Vehicles (%)	40%	0%	0%	13%	1%	12%	0%	2%	2%	1%	8%	7%
Turn Type	Perm	Free	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4	Free	8	8	2	6	6					
Actuated Green, G (s)	10.2	10.2	100.0	10.2	10.2	10.2	76.5	76.5	76.5	76.5	76.5	76.5
Effective Green, g (s)	13.1	13.1	100.0	13.1	13.1	13.1	78.9	78.9	78.9	78.9	78.9	78.9
Actuated g/C Ratio	0.13	0.13	1.00	0.13	0.13	0.13	0.79	0.79	0.79	0.79	0.79	0.79
Clearance Time (s)	6.9	6.9		6.9	6.9	6.9	6.4	6.4	6.4	6.4	6.4	6.4
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	126	249	1615	153	246	189	744	4012	1083	388	2638	1032
v/s Ratio Prot		0.04			0.04			0.20			0.13	
v/s Ratio Perm	0.01		0.04	c0.07		0.01	0.16		0.15	c0.23		0.03
v/c Ratio	0.04	0.33	0.04	0.50	0.32	0.06	0.20	0.26	0.19	0.29	0.17	0.04
Uniform Delay, d1	38.0	39.5	0.0	40.4	39.4	38.0	2.6	2.8	2.6	2.9	2.6	2.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.12	0.12	0.08	1.27	0.58	0.35
Incremental Delay, d2	0.1	0.8	0.0	2.6	0.7	0.1	0.5	0.1	0.3	1.8	0.1	0.1
Delay (s)	38.1	40.2	0.0	43.0	40.1	38.2	0.8	0.4	0.5	5.5	1.6	0.9
Level of Service	D	D	A	D	D	D	A	A	A	A	A	A
Approach Delay (s)		22.5			40.4			0.5			2.3	
Approach LOS		C			D			A			A	
Intersection Summary												
HCM Average Control Delay	6.3		HCM Level of Service				A					
HCM Volume to Capacity ratio	0.32											
Actuated Cycle Length (s)	100.0				Sum of lost time (s)				8.0			
Intersection Capacity Utilization	47.2%		ICU Level of Service		A							
Analysis Period (min)	15											
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
6: Walkley & Conroy

Johnston Road Land Use CTS
Existing Conditions - AM Peak Hour

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔	↔	↔	↔	↔	↔
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.95	1.00	0.97	0.95	0.97	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3406	1538	3303	3343	3367	1524
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	3406	1538	3303	3343	3367	1524
Volume (vph)	838	284	297	1040	869	438
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	911	309	323	1130	945	476
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	911	309	323	1130	945	476
Heavy Vehicles (%)	6%	5%	6%	8%	4%	6%
Turn Type	Free	Prot				Free
Protected Phases	2		1	6	8	
Permitted Phases	Free					Free
Actuated Green, G (s)	39.3	100.0	13.7	59.2	28.4	100.0
Effective Green, g (s)	41.3	100.0	15.9	61.2	30.8	100.0
Actuated g/C Ratio	0.41	1.00	0.16	0.61	0.31	1.00
Clearance Time (s)	6.0		6.2	6.0	6.4	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	1407	1538	525	2046	1037	1524
v/s Ratio Prot	c0.27		c0.10	0.34	c0.28	
v/s Ratio Perm		0.20				0.31
v/c Ratio	0.65	0.20	0.62	0.55	0.91	0.31
Uniform Delay, d1	23.5	0.0	39.2	11.4	33.3	0.0
Progression Factor	1.37	1.00	1.00	1.00	0.86	1.00
Incremental Delay, d2	2.2	0.3	2.1	1.1	11.7	0.5
Delay (s)	34.4	0.3	41.3	12.5	40.3	0.5
Level of Service	C	A	D	B	D	A
Approach Delay (s)	25.7			18.9	27.0	
Approach LOS	C			B	C	
Intersection Summary						
HCM Average Control Delay	23.7		HCM Level of Service		C	
HCM Volume to Capacity ratio	0.73					
Actuated Cycle Length (s)	100.0		Sum of lost time (s)		12.0	
Intersection Capacity Utilization	66.4%		ICU Level of Service		C	
Analysis Period (min)	15					
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis
7: Walkley & Heatherington

Johnston Road Land Use CTS
Existing Conditions - AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
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	4.0	4.0			4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00			1.00	1.00
Frt	1.00	0.98		1.00	1.00	0.85	1.00	0.87			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00			0.98	1.00
Satd. Flow (prot)	1752	3296		1719	3252	1615	1736	1601			1687	1553
Flt Permitted	0.46	1.00		0.47	1.00	1.00	0.74	1.00			0.87	1.00
Satd. Flow (perm)	842	3296		845	3252	1615	1359	1601			1498	1553
Volume (vph)	64	402	62	82	485	10	137	10	88	8	11	26
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	70	437	67	89	527	11	149	11	96	9	12	28
RTOR Reduction (vph)	0	13	0	0	0	0	0	76	0	0	0	22
Lane Group Flow (vph)	70	491	0	89	527	11	149	31	0	0	21	6
Heavy Vehicles (%)	3%	6%	16%	5%	11%	0%	4%	0%	3%	0%	18%	4%
Turn Type	Perm		Perm		Free		Perm		Perm			Perm
Protected Phases	2		6		6		8		4			4
Permitted Phases	2		6		Free		8		4			4
Actuated Green, G (s)	37.6	37.6	37.6		37.6	60.0	10.1	10.1	10.1			10.1
Effective Green, g (s)	39.7	39.7	39.7		39.7	60.0	12.3	12.3	12.3			12.3
Actuated g/C Ratio	0.66	0.66	0.66		0.66	1.00	0.20	0.20	0.20			0.20
Clearance Time (s)	6.1	6.1	6.1		6.1		6.2	6.2	6.2			6.2
Vehicle Extension (s)	3.0	3.0	3.0		3.0		3.0	3.0	3.0			3.0
Lane Grp Cap (vph)	557	2181	559		2152	1615	279	328	307			318
v/s Ratio Prot	0.08		0.11		c0.16		0.01		0.01			0.00
v/c Ratio	0.13	0.23	0.16		0.24	0.01	0.53	0.09	0.07			0.02
Uniform Delay, d1	3.7	4.0	3.8		4.1	0.0	21.3	19.3	19.2			19.0
Progression Factor	2.04	1.98	1.00		1.00	1.00	1.00	1.00	1.00			1.00
Incremental Delay, d2	0.5	0.2	0.6		0.3	0.0	2.0	0.1	0.1			0.0
Delay (s)	8.1	8.2	4.4		4.4	0.0	23.3	19.5	19.3			19.1
Level of Service	A	A	A		A	A	C	B	B			B
Approach Delay (s)	8.2		4.3				21.7			19.2		
Approach LOS	A		A				C			B		

Intersection Summary			
HCM Average Control Delay	9.2	HCM Level of Service	A
HCM Volume to Capacity ratio	0.31		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	46.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
8: Walkley & Albion N

Johnston Road Land Use CTS
Existing Conditions - AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
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	4.0	4.0			4.0	4.0
Lane Util. Factor	0.95	1.00	1.00	1.00	0.95	1.00	1.00	1.00			1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	1.00	1.00	0.85			1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00
Satd. Flow (prot)	3438	1495	1703	3471	3471	1530	1346				1530	1346
Flt Permitted	1.00	1.00	0.48	1.00	1.00	0.76	1.00				0.76	1.00
Satd. Flow (perm)	3438	1495	857	3471	3471	1219	1346				1219	1346
Volume (vph)	0	442	134	97	527	0	111	0	54	0	0	0
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	480	146	105	573	0	121	0	59	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	48	0	0	0	0
Lane Group Flow (vph)	0	480	146	105	573	0	121	11	0	0	0	0
Heavy Vehicles (%)	0%	5%	8%	6%	4%	0%	18%	0%	20%	0%	0%	0%
Turn Type	Perm		Free		Perm		Perm		Perm			Perm
Protected Phases	2		6		6		8		4			4
Permitted Phases	2		Free		6		8		4			4
Actuated Green, G (s)	38.8	60.0	38.8	38.8		9.8	9.8	11.3			11.3	
Effective Green, g (s)	40.7	60.0	40.7	40.7		11.3	11.3	11.3			11.3	
Actuated g/C Ratio	0.68	1.00	0.68	0.68		0.19	0.19	0.19			0.19	
Clearance Time (s)	5.9	5.9	5.9	5.9		5.5	5.5	5.5			5.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0		3.0	3.0	3.0			3.0	
Lane Grp Cap (vph)	2332	1495	581	2354		230	253	230			253	
v/s Ratio Prot	0.14		c0.17		0.01		0.01					
v/c Ratio	0.21	0.10	0.18	0.24		0.53	0.04					
Uniform Delay, d1	3.6	0.0	3.5	3.7		21.9	19.9					
Progression Factor	1.00	1.00	0.82	0.81		1.00	1.00					
Incremental Delay, d2	0.2	0.1	0.7	0.2		2.2	0.1					
Delay (s)	3.8	0.1	3.6	3.2		24.1	20.0					
Level of Service	A	A	A	A		C	C					
Approach Delay (s)	3.0		3.3		22.8			0.0				
Approach LOS	A		A		C			A				

Intersection Summary			
HCM Average Control Delay	5.5	HCM Level of Service	A
HCM Volume to Capacity ratio	0.31		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	41.2%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
15: Hunt Club & Albion

Johnston Road Land Use CTS
Existing Conditions - AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↕	↘	↔	↕	↘	↔	↕	↘	↔	↕	↘
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	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.90	1.00	0.92	1.00	0.92
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1656	3406	1538	1719	3374	1568	1467	1627	1752	1594		
Flt Permitted	0.22	1.00	1.00	0.26	1.00	1.00	0.39	1.00	0.22	1.00		
Satd. Flow (perm)	378	3406	1538	473	3374	1568	610	1627	398	1594		
Volume (vph)	75	832	22	188	1027	31	13	76	159	35	78	93
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	82	904	24	204	1116	34	14	83	173	38	85	101
RTOR Reduction (vph)	0	0	0	0	0	0	0	65	0	0	38	0
Lane Group Flow (vph)	82	904	24	204	1116	34	14	191	0	38	148	0
Heavy Vehicles (%)	9%	6%	5%	5%	7%	3%	23%	7%	4%	3%	3%	15%
Turn Type	pm+pt		Free	pm+pt	Free	Perm		Perm		Perm		
Protected Phases	5	2		1	6		8		8		4	
Permitted Phases	2		Free	6	Free	8		4		4		
Actuated Green, G (s)	82.5	76.9	120.0	88.3	79.8	120.0	17.5	17.5	17.5	17.5		
Effective Green, g (s)	85.4	78.4	120.0	91.2	81.3	120.0	19.7	19.7	19.7	19.7		
Actuated g/C Ratio	0.71	0.65	1.00	0.76	0.68	1.00	0.16	0.16	0.16	0.16		
Clearance Time (s)	5.4	5.5		5.4	5.5		6.2	6.2	6.2	6.2		
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0		
Lane Grp Cap (vph)	344	2225	1538	462	2286	1568	100	267	65	262		
v/s Ratio Prot	0.01	0.27		c0.04	c0.33			c0.12		0.09		
v/s Ratio Perm	0.16		0.02	0.30		0.02			0.10			
v/c Ratio	0.24	0.41	0.02	0.44	0.49	0.02	0.14	0.71	0.58	0.57		
Uniform Delay, d1	6.0	9.8	0.0	5.2	9.3	0.0	42.9	47.5	46.4	46.2		
Progression Factor	1.60	0.51	1.00	1.15	0.46	1.00	1.00	1.00	1.00	1.00		
Incremental Delay, d2	0.3	0.4	0.0	0.6	0.7	0.0	0.6	8.8	12.7	2.8		
Delay (s)	9.8	5.4	0.0	6.6	5.0	0.0	43.5	56.2	59.1	49.0		
Level of Service	A	A	A	A	A	A	D	E	E	D		
Approach Delay (s)		5.7			5.1			55.6		50.7		
Approach LOS		A			A			E		D		
Intersection Summary												
HCM Average Control Delay	13.6			HCM Level of Service			B					
HCM Volume to Capacity ratio	0.54											
Actuated Cycle Length (s)	120.0			Sum of lost time (s)			12.0					
Intersection Capacity Utilization	68.8%			ICU Level of Service			C					
Analysis Period (min)	15											
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
16: Hunt Club & Cahill

Johnston Road Land Use CTS
Existing Conditions - AM Peak Hour

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↔	↕	↕	↕	↔	↔
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1656	3343	3374	1302	1583	1615
Flt Permitted	0.21	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	367	3343	3374	1302	1583	1615
Volume (vph)	35	1003	1122	62	87	56
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	38	1090	1220	67	95	61
RTOR Reduction (vph)	0	0	0	12	0	54
Lane Group Flow (vph)	38	1090	1220	55	95	7
Heavy Vehicles (%)	9%	8%	7%	24%	14%	0%
Turn Type	Perm		Perm		Perm	
Protected Phases	2	6		4		
Permitted Phases	2		6	4		4
Actuated Green, G (s)	95.7	95.7	95.7	95.7	12.6	12.6
Effective Green, g (s)	97.7	97.7	97.7	97.7	14.3	14.3
Actuated g/C Ratio	0.81	0.81	0.81	0.81	0.12	0.12
Clearance Time (s)	6.0	6.0	6.0	6.0	5.7	5.7
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	299	2722	2747	1060	189	192
v/s Ratio Prot		0.33	c0.36		c0.06	
v/s Ratio Perm	0.10			0.04		0.00
v/c Ratio	0.13	0.40	0.44	0.05	0.50	0.04
Uniform Delay, d1	2.3	3.1	3.2	2.2	49.5	46.8
Progression Factor	1.66	2.72	1.05	1.15	1.00	1.00
Incremental Delay, d2	0.8	0.4	0.5	0.1	2.1	0.1
Delay (s)	4.6	8.8	3.9	2.6	51.6	46.8
Level of Service	A	A	A	A	D	D
Approach Delay (s)		8.6	3.8		49.8	
Approach LOS		A	A		D	
Intersection Summary						
HCM Average Control Delay	8.7		HCM Level of Service		A	
HCM Volume to Capacity ratio	0.45					
Actuated Cycle Length (s)	120.0		Sum of lost time (s)		8.0	
Intersection Capacity Utilization	46.0%		ICU Level of Service		A	
Analysis Period (min)	15					
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis
19: Walkley & Ryder

Johnston Road Land Use CTS
Existing Conditions - AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↕	↔	↔	↕	↔	↔	↕	↔	↔	↕	↔
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	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	0.97		1.00	0.98	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00		1.00	1.00	
Frt	1.00	0.97		1.00	0.99		1.00	0.85		1.00	0.92	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1769	3336		1699	3422		1636	1427		1768	1661	
Flt Permitted	0.10	1.00		0.19	1.00		0.71	1.00		0.72	1.00	
Satd. Flow (perm)	192	3336		348	3422		1229	1427		1344	1661	
Volume (vph)	45	936	235	34	1454	155	91	0	49	45	30	31
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	49	1017	255	37	1580	168	99	0	53	49	33	34
RTOR Reduction (vph)	0	12	0	0	4	0	0	46	0	0	27	0
Lane Group Flow (vph)	49	1260	0	37	1744	0	99	7	0	49	40	0
Confl. Peds. (#/hr)	2		10	10			2	13		1		13
Confl. Bikes (#/hr)			6			10			9			9
Heavy Vehicles (%)	2%	5%	1%	6%	4%	1%	9%	0%	10%	2%	0%	7%
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	76.9	76.9		76.9	76.9		11.3	11.3		11.3	11.3	
Effective Green, g (s)	78.7	78.7		78.7	78.7		13.3	13.3		13.3	13.3	
Actuated g/C Ratio	0.79	0.79		0.79	0.79		0.13	0.13		0.13	0.13	
Clearance Time (s)	5.8	5.8		5.8	5.8		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	151	2625		274	2693		163	190		179	221	
v/s Ratio Prot		0.38			c0.51			0.00			0.02	
v/s Ratio Perm	0.25			0.11			c0.08			0.04		
v/c Ratio	0.32	0.48		0.14	0.65		0.61	0.04		0.27	0.18	
Uniform Delay, d1	3.0	3.6		2.5	4.6		40.9	37.8		39.0	38.5	
Progression Factor	1.15	0.80		0.48	0.50		1.00	1.00		1.00	1.00	
Incremental Delay, d2	5.1	0.6		0.7	0.8		6.3	0.1		0.8	0.4	
Delay (s)	8.6	3.5		1.9	3.1		47.2	37.9		39.8	38.9	
Level of Service	A	A		A	A		D	D		D	D	
Approach Delay (s)		3.7			3.1			43.9			39.3	
Approach LOS		A			A			D			D	
Intersection Summary												
HCM Average Control Delay		6.4										
HCM Volume to Capacity ratio		0.64										
Actuated Cycle Length (s)		100.0			Sum of lost time (s)			8.0				
Intersection Capacity Utilization		66.5%			ICU Level of Service			C				
Analysis Period (min)		15										

HCM Signalized Intersection Capacity Analysis
20: Walkley & Heron

Johnston Road Land Use CTS
Existing Conditions - AM Peak Hour

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↔	↕	↕	↕	↕	↕
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0		
Lane Util. Factor	0.95	0.95	0.88	0.97		
Frpb, ped/bikes	1.00	1.00	0.98	1.00		
Flpb, ped/bikes	1.00	1.00	1.00	1.00		
Frt	1.00	1.00	0.85	0.99		
Flt Protected	1.00	1.00	1.00	0.95		
Satd. Flow (prot)	3374	3374	2671	3424		
Flt Permitted	1.00	1.00	1.00	0.95		
Satd. Flow (perm)	3374	3374	2671	3424		
Volume (vph)	0	499	616	947	722	36
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	542	670	1029	785	39
RTOR Reduction (vph)	0	0	0	0	3	0
Lane Group Flow (vph)	0	542	670	1029	821	0
Confl. Bikes (#/hr)			7			5
Heavy Vehicles (%)	0%	7%	7%	4%	2%	0%
Turn Type			Free			
Protected Phases		2	6		4	
Permitted Phases			Free			
Actuated Green, G (s)		48.0	48.0	100.0	40.0	
Effective Green, g (s)		50.0	50.0	100.0	42.0	
Actuated g/C Ratio		0.50	0.50	1.00	0.42	
Clearance Time (s)		6.0	6.0		6.0	
Lane Grp Cap (vph)		1687	1687	2671	1438	
v/s Ratio Prot		0.16	0.20		c0.24	
v/s Ratio Perm				c0.39		
v/c Ratio		0.32	0.40	0.39	0.57	
Uniform Delay, d1		14.9	15.6	0.0	22.1	
Progression Factor		1.00	1.13	1.00	1.00	
Incremental Delay, d2		0.5	0.6	0.3	1.6	
Delay (s)		15.4	18.2	0.3	23.8	
Level of Service		B	B	A	C	
Approach Delay (s)		15.4	7.4		23.8	
Approach LOS		B	A		C	
Intersection Summary						
HCM Average Control Delay		13.2		HCM Level of Service		B
HCM Volume to Capacity ratio		0.47				
Actuated Cycle Length (s)		100.0		Sum of lost time (s)		4.0
Intersection Capacity Utilization		45.4%		ICU Level of Service		A
Analysis Period (min)		15				

ALL-WAY STOP CONTROL ANALYSIS									
General Information					Site Information				
Analyst	J.Swan				Intersection	#9			
Agency/Co.	GENIVAR				Jurisdiction	City of Ottawa			
Date Performed	01/08/2008				Analysis Year	Existing Conditions			
Analysis Time Period	Morning Peak Hour								
Project ID Johnston Road Land Use - Community Transportation Study									
East/West Street: Johnston Road					North/South Street: Albion Road				
Volume Adjustments and Site Characteristics									
Approach		Eastbound			Westbound				
Movement	L	T	R	L	T	R	L	T	R
Volume (veh/h)	19	131	36	99	489	11			
%Thrus Left Lane									
Approach		Northbound			Southbound				
Movement	L	T	R	L	T	R	L	T	R
Volume (veh/h)	127	26	95	3	3	11			
%Thrus Left Lane									
		Eastbound		Westbound		Northbound		Southbound	
		L1	L2	L1	L2	L1	L2	L1	L2
Configuration	LTR		LTR		LTR		LTR		
PHF	1.00		1.00		1.00		1.00		
Flow Rate (veh/h)	186		599		248		17		
% Heavy Vehicles	16		3		2				
No. Lanes	1		1		1		1		
Geometry Group	1		1		1		1		
Duration, T	1.00								
Saturation Headway Adjustment Worksheet									
Prop. Left-Turns	0.1		0.2		0.5		0.2		
Prop. Right-Turns	0.2		0.0		0.4		0.6		
Prop. Heavy Vehicle	0.2		0.0		0.0		0.0		
hLT-adj	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
hRT-adj	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6
hHV-adj	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
hadj, computed	0.2		0.1		-0.1		-0.3		
Departure Headway and Service Time									
hd, initial value (s)	3.20		3.20		3.20		3.20		
x, initial	0.17		0.53		0.22		0.02		
hd, final value (s)	5.80		5.12		5.91		6.29		
x, final value	0.30		0.85		0.41		0.03		
Move-up time, m (s)	2.0		2.0		2.0		2.0		
Service Time, t _s (s)	3.8		3.1		3.9		4.3		
Capacity and Level of Service									
Approach		Eastbound		Westbound		Northbound		Southbound	
		L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)	436		696		498		267		
Delay (s/veh)	11.28		34.95		12.97		9.48		
LOS	B		D		B		A		
Approach: Delay (s/veh)	11.28		34.95		12.97		9.48		
LOS	B		D		B		A		
Intersection Delay (s/veh)	25.15								
Intersection LOS	D								

ALL-WAY STOP CONTROL ANALYSIS									
General Information					Site Information				
Analyst	J.Swan				Intersection	#10			
Agency/Co.	GENIVAR				Jurisdiction	City of Ottawa			
Date Performed	01/08/2008				Analysis Year	Existing Conditions			
Analysis Time Period	Morning Peak Hour								
Project ID Johnston Road Land Use - Community Transportation Study									
East/West Street: Cahill Road					North/South Street: Albion Road				
Volume Adjustments and Site Characteristics									
Approach		Eastbound			Westbound				
Movement	L	T	R	L	T	R	L	T	R
Volume (veh/h)	9	31	29	61	127	68			
%Thrus Left Lane									
Approach		Northbound			Southbound				
Movement	L	T	R	L	T	R	L	T	R
Volume (veh/h)	46	117	39	28	78	9			
%Thrus Left Lane									
		Eastbound		Westbound		Northbound		Southbound	
		L1	L2	L1	L2	L1	L2	L1	L2
Configuration	LTR		LTR		LTR		LTR		
PHF	1.00		1.00		1.00		1.00		
Flow Rate (veh/h)	69		256		202		115		
% Heavy Vehicles	22		21		7		0		
No. Lanes	1		1		1		1		
Geometry Group	1		1		1		1		
Duration, T	1.00								
Saturation Headway Adjustment Worksheet									
Prop. Left-Turns	0.1		0.2		0.2		0.2		
Prop. Right-Turns	0.4		0.3		0.2		0.1		
Prop. Heavy Vehicle	0.2		0.2		0.1		0.0		
hLT-adj	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
hRT-adj	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6
hHV-adj	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
hadj, computed	0.1		0.2		0.0		0.0		
Departure Headway and Service Time									
hd, initial value (s)	3.20		3.20		3.20		3.20		
x, initial	0.06		0.23		0.18		0.10		
hd, final value (s)	5.26		5.08		4.99		5.07		
x, final value	0.10		0.36		0.28		0.16		
Move-up time, m (s)	2.0		2.0		2.0		2.0		
Service Time, t _s (s)	3.3		3.1		3.0		3.1		
Capacity and Level of Service									
Approach		Eastbound		Westbound		Northbound		Southbound	
		L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)	319		506		452		365		
Delay (s/veh)	8.85		10.95		9.93		9.05		
LOS	A		B		A		A		
Approach: Delay (s/veh)	8.85		10.95		9.93		9.05		
LOS	A		B		A		A		
Intersection Delay (s/veh)	10.06								
Intersection LOS	B								

HCM Signalized Intersection Capacity Analysis
5: Saint Laurent & Conroy

Johnston Road Land Use CTS
Existing Conditions - PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↗	↘	↔	↗	↘	↔	↗	↘	↔	↗	↘
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	2.4	3.6	3.6	2.4
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.91	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1687	1900	1615	1787	1863	1599	1805	5085	1261	1703	3539	1346
Flt Permitted	0.72	1.00	1.00	0.52	1.00	1.00	0.18	1.00	1.00	0.37	1.00	1.00
Satd. Flow (perm)	1283	1900	1615	983	1863	1599	348	5085	1261	667	3539	1346
Volume (vph)	15	68	244	262	49	136	29	626	95	36	1085	23
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	16	74	265	285	53	148	32	680	103	39	1179	25
RTOR Reduction (vph)	0	0	0	0	0	83	0	0	14	0	0	1
Lane Group Flow (vph)	16	74	265	285	53	65	32	680	89	39	1179	24
Heavy Vehicles (%)	7%	0%	0%	1%	2%	1%	0%	2%	11%	6%	2%	4%
Turn Type	Perm	Free	pm+pt	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm
Protected Phases		4		3		8		2		6		6
Permitted Phases	4	Free	8	8	2	2	6	6	6	6	6	6
Actuated Green, G (s)	8.3	8.3	95.0	23.7	23.7	23.7	58.0	58.0	58.0	58.0	58.0	58.0
Effective Green, g (s)	11.2	11.2	95.0	26.6	26.6	26.6	60.4	60.4	60.4	60.4	60.4	60.4
Actuated g/C Ratio	0.12	0.12	1.00	0.28	0.28	0.28	0.64	0.64	0.64	0.64	0.64	0.64
Clearance Time (s)	6.9	6.9		5.7	6.9	6.9	6.4	6.4	6.4	6.4	6.4	6.4
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	151	224	1615	372	522	448	221	3233	802	424	2250	856
v/s Ratio Prot		0.04		c0.09	0.03			0.13			c0.33	
v/s Ratio Perm	0.01		0.16	c0.12		0.04	0.09		0.07	0.06		0.02
v/c Ratio	0.11	0.33	0.16	0.77	0.10	0.15	0.14	0.21	0.11	0.09	0.52	0.03
Uniform Delay, d1	37.4	38.5	0.0	29.9	25.3	25.7	6.9	7.3	6.8	6.7	9.4	6.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.72	0.56	0.48	1.00	1.00	1.00
Incremental Delay, d2	0.3	0.9	0.2	9.1	0.1	0.2	1.3	0.1	0.3	0.4	0.9	0.1
Delay (s)	37.7	39.3	0.2	39.0	25.4	25.8	6.3	4.2	3.6	7.1	10.3	6.5
Level of Service	D	D	A	D	C	C	A	A	A	A	B	A
Approach Delay (s)		10.1			33.5			4.2			10.1	
Approach LOS		B			C			A			B	
Intersection Summary												
HCM Average Control Delay	12.4		HCM Level of Service				B					
HCM Volume to Capacity ratio	0.59											
Actuated Cycle Length (s)	95.0				Sum of lost time (s)				8.0			
Intersection Capacity Utilization	57.8%		ICU Level of Service				B					
Analysis Period (min)	15											
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
6: Walkley & Conroy

Johnston Road Land Use CTS
Existing Conditions - PM Peak Hour

Movement	EBT	EBR	WBL	WBT	NBL	NBR	
Lane Configurations	↔	↗	↘	↔	↗	↘	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	0.95	1.00	0.97	0.95	0.97	1.00	
Frt	1.00	0.85	1.00	1.00	1.00	0.85	
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00	
Satd. Flow (prot)	3438	1583	3433	3505	3467	1553	
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00	
Satd. Flow (perm)	3438	1583	3433	3505	3467	1553	
Volume (vph)	1151	513	557	1140	543	234	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	1251	558	605	1239	590	254	
RTOR Reduction (vph)	0	0	0	0	0	0	
Lane Group Flow (vph)	1251	558	605	1239	590	254	
Heavy Vehicles (%)	5%	2%	2%	3%	1%	4%	
Turn Type	Free	Prot	Free	Prot	Free	Prot	
Protected Phases	2		1	6	8		
Permitted Phases	Free		Free		Free		
Actuated Green, G (s)	47.2	110.0	22.3	75.7	21.9	110.0	
Effective Green, g (s)	49.2	110.0	24.5	77.7	24.3	110.0	
Actuated g/C Ratio	0.45	1.00	0.22	0.71	0.22	1.00	
Clearance Time (s)	6.0		6.2	6.0	6.4		
Vehicle Extension (s)	3.0		3.0	3.0	3.0		
Lane Grp Cap (vph)	1538	1583	765	2476	766	1553	
v/s Ratio Prot	c0.36		c0.18	0.35	c0.17		
v/s Ratio Perm		0.35				0.16	
v/c Ratio	0.81	0.35	0.79	0.50	0.77	0.16	
Uniform Delay, d1	26.4	0.0	40.3	7.3	40.2	0.0	
Progression Factor	0.84	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	3.6	0.5	5.6	0.7	4.8	0.2	
Delay (s)	25.7	0.5	45.9	8.1	45.0	0.2	
Level of Service	C	A	D	A	D	A	
Approach Delay (s)	17.9			20.5	31.5		
Approach LOS	B			C	C		
Intersection Summary							
HCM Average Control Delay	21.5		HCM Level of Service			C	
HCM Volume to Capacity ratio	0.80						
Actuated Cycle Length (s)	110.0			Sum of lost time (s)			12.0
Intersection Capacity Utilization	73.2%		ICU Level of Service			D	
Analysis Period (min)	15						
c Critical Lane Group							

HCM Signalized Intersection Capacity Analysis
15: Hunt Club & Albion

Johnston Road Land Use CTS
Existing Conditions - PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↕	↔	↔	↕	↔	↔	↕	↔	↔	↕	↔
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	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.90		1.00	0.94	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1612	3438	1509	1787	3505	1568	1687	1680		1687	1723	
Flt Permitted	0.28	1.00	1.00	0.16	1.00	1.00	0.37	1.00		0.16	1.00	
Satd. Flow (perm)	479	3438	1509	296	3505	1568	660	1680		282	1723	
Volume (vph)	122	1028	15	291	847	34	15	102	211	31	134	78
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	133	1117	16	316	921	37	16	111	229	34	146	85
RTOR Reduction (vph)	0	0	0	0	0	0	0	66	0	0	19	0
Lane Group Flow (vph)	133	1117	16	316	921	37	16	274	0	34	212	0
Heavy Vehicles (%)	12%	5%	7%	1%	3%	3%	7%	1%	2%	7%	2%	8%
Turn Type	pm+pt		Free	pm+pt		Free	Perm			Perm		
Protected Phases	5	2		1	6		8	8			4	4
Permitted Phases	2		Free		6	Free	8			4		4
Actuated Green, G (s)	72.3	63.7	120.0	85.3	71.3	120.0	23.0	23.0		23.0	23.0	
Effective Green, g (s)	75.2	65.2	120.0	86.8	72.8	120.0	25.2	25.2		25.2	25.2	
Actuated g/C Ratio	0.63	0.54	1.00	0.72	0.61	1.00	0.21	0.21		0.21	0.21	
Clearance Time (s)	5.4	5.5		5.4	5.5		6.2	6.2		6.2	6.2	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	395	1868	1509	433	2126	1568	139	353		59	362	
v/s Ratio Prot	0.03	0.32		c0.11	0.26			c0.16			0.12	
v/s Ratio Perm	0.18		0.01	c0.42		0.02	0.02			0.12		
v/c Ratio	0.34	0.60	0.01	0.73	0.43	0.02	0.12	0.78		0.58	0.59	
Uniform Delay, d1	9.3	18.5	0.0	15.6	12.6	0.0	38.4	44.7		42.6	42.7	
Progression Factor	1.77	0.54	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.3	0.8	0.0	6.1	0.6	0.0	0.4	10.2		12.9	2.4	
Delay (s)	16.8	10.8	0.0	21.6	13.2	0.0	38.7	54.9		55.5	45.1	
Level of Service	B	B	A	C	B	A	D	D		E	D	
Approach Delay (s)		11.3			14.9			54.2			46.4	
Approach LOS		B			B			D			D	
Intersection Summary												
HCM Average Control Delay	20.5			HCM Level of Service			C					
HCM Volume to Capacity ratio	0.73											
Actuated Cycle Length (s)	120.0			Sum of lost time (s)			8.0					
Intersection Capacity Utilization	80.3%			ICU Level of Service			D					
Analysis Period (min)	15											
c Critical Lane Group												


HCM Signalized Intersection Capacity Analysis
16: Hunt Club & Cahill

Johnston Road Land Use CTS
Existing Conditions - PM Peak Hour

Movement	EBL	EBT	WBT	WBR	SBL	SBR	
Lane Configurations	↔	↕	↕	↕	↔	↔	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00	
Frt	1.00	1.00	1.00	0.85	1.00	0.85	
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1736	3406	3539	1524	1570	1568	
Flt Permitted	0.20	1.00	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	356	3406	3539	1524	1570	1568	
Volume (vph)	57	1241	1164	82	102	40	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	62	1349	1265	89	111	43	
RTOR Reduction (vph)	0	0	0	20	0	37	
Lane Group Flow (vph)	62	1349	1265	69	111	6	
Heavy Vehicles (%)	4%	6%	2%	6%	15%	3%	
Turn Type	Perm			Perm		Perm	
Protected Phases	2	2	6		4		
Permitted Phases	2			6		4	
Actuated Green, G (s)	63.6	63.6	63.6	63.6	9.7	9.7	
Effective Green, g (s)	65.6	65.6	65.6	65.6	11.4	11.4	
Actuated g/C Ratio	0.77	0.77	0.77	0.77	0.13	0.13	
Clearance Time (s)	6.0	6.0	6.0	6.0	5.7	5.7	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	275	2629	2731	1176	211	210	
v/s Ratio Prot		c0.40	0.36		c0.07		
v/s Ratio Perm	0.17			0.05		0.00	
v/c Ratio	0.23	0.51	0.46	0.06	0.53	0.03	
Uniform Delay, d1	2.7	3.7	3.4	2.3	34.3	32.0	
Progression Factor	1.00	1.00	0.51	0.58	1.00	1.00	
Incremental Delay, d2	1.9	0.7	0.5	0.1	2.4	0.1	
Delay (s)	4.6	4.4	2.2	1.4	36.6	32.0	
Level of Service	A	A	A	A	D	C	
Approach Delay (s)		4.4	2.2		35.4		
Approach LOS		A	A		D		
Intersection Summary							
HCM Average Control Delay	5.0			HCM Level of Service			A
HCM Volume to Capacity ratio	0.52						
Actuated Cycle Length (s)	85.0			Sum of lost time (s)			8.0
Intersection Capacity Utilization	58.8%			ICU Level of Service			B
Analysis Period (min)	15						
c Critical Lane Group							

HCM Signalized Intersection Capacity Analysis
 17: Hunt Club & Lorry Greenberg


Johnston Road Land Use CTS
 Existing Conditions - PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
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	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	1.00		1.00	0.90		1.00	0.87	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1703	3418		1703	3457		1805	1615		1719	1585	
Flt Permitted	0.16	1.00		0.29	1.00		0.44	1.00		0.73	1.00	
Satd. Flow (perm)	279	3418		524	3457		828	1615		1328	1585	
Volume (vph)	180	851	51	54	1046	32	10	12	21	38	23	147
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	196	925	55	59	1137	35	11	13	23	41	25	160
RTOR Reduction (vph)	0	2	0	0	2	0	0	19	0	0	135	0
Lane Group Flow (vph)	196	978	0	59	1170	0	11	17	0	41	50	0
Heavy Vehicles (%)	6%	5%	0%	6%	4%	3%	0%	0%	10%	5%	0%	5%
Turn Type	pm+pt		Perm			Perm			Perm			
Protected Phases	5	2		6		6		8		4		4
Permitted Phases	2		6			8			4			
Actuated Green, G (s)	61.6	61.6		46.7	46.7		10.5	10.5		10.5	10.5	
Effective Green, g (s)	63.8	63.8		48.9	48.9		13.2	13.2		13.2	13.2	
Actuated g/C Ratio	0.75	0.75		0.58	0.58		0.16	0.16		0.16	0.16	
Clearance Time (s)	6.0	6.2		6.2	6.2		6.7	6.7		6.7	6.7	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	392	2566		301	1989		129	251		206	246	
v/s Ratio Prot	c0.06	0.29		c0.34		0.01		0.01		c0.03		0.03
v/s Ratio Perm	0.31			0.11		0.01		0.03				
v/c Ratio	0.50	0.38		0.20	0.59		0.09	0.07		0.20	0.20	
Uniform Delay, d1	6.8	3.7		8.6	11.6		30.7	30.6		31.3	31.3	
Progression Factor	2.29	0.89		1.15	1.26		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.9	0.4		1.3	1.1		0.3	0.1		0.5	0.4	
Delay (s)	16.4	3.7		11.2	15.8		31.0	30.8		31.8	31.7	
Level of Service	B	A		B	B		C	C		C	C	
Approach Delay (s)	5.8		15.6			30.8			31.7			
Approach LOS	A		B			C			C			
Intersection Summary												
HCM Average Control Delay	12.9			HCM Level of Service			B					
HCM Volume to Capacity ratio	0.51											
Actuated Cycle Length (s)	85.0			Sum of lost time (s)			12.0					
Intersection Capacity Utilization	60.2%			ICU Level of Service			B					
Analysis Period (min)	15											
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
 18: Hunt Club & Pike

Johnston Road Land Use CTS
 Existing Conditions - PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
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	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	1.00		1.00	0.99		1.00	0.97		1.00	0.90	
Flt Protected	0.95	1.00		0.95	1.00		0.95	0.97		0.95	0.99	
Satd. Flow (prot)	1752	3401		1805	3487		1789	1688		1719	1585	
Flt Permitted	0.19	1.00		0.23	1.00		0.81	1.00		0.73	1.00	
Satd. Flow (perm)	359	3401		443	3487		1505	1567		1328	1585	
Volume (vph)	116	997	16	17	1105	39	9	2	3	35	1	104
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	126	1084	17	18	1201	42	10	2	3	38	1	113
RTOR Reduction (vph)	0	1	0	0	2	0	0	3	0	0	57	0
Lane Group Flow (vph)	126	1100	0	18	1241	0	0	12	0	0	95	0
Heavy Vehicles (%)	3%	6%	0%	0%	3%	3%	0%	0%	0%	0%	0%	0%
Turn Type	Perm		Perm			Perm			Perm			
Protected Phases	2	2		6	6		8		4		4	
Permitted Phases	2		6			8			4			
Actuated Green, G (s)	61.2	61.2		61.2	61.2		11.3		11.3		11.3	
Effective Green, g (s)	63.2	63.2		63.2	63.2		13.8		13.8		13.8	
Actuated g/C Ratio	0.74	0.74		0.74	0.74		0.16		0.16		0.16	
Clearance Time (s)	6.0	6.0		6.0	6.0		6.5		6.5		6.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0		3.0		3.0	
Lane Grp Cap (vph)	267	2529		329	2593		244		254		254	
v/s Ratio Prot	0.35	0.32		0.04	c0.36		0.01		c0.06		0.03	
v/s Ratio Perm	0.47	0.44		0.05	0.48		0.05		0.37		0.37	
v/c Ratio	0.47	0.44		0.05	0.48		0.05		0.37		0.37	
Uniform Delay, d1	4.3	4.1		2.9	4.3		30.1		31.7		31.7	
Progression Factor	1.67	1.50		1.00	1.00		1.00		1.00		1.00	
Incremental Delay, d2	5.7	0.5		0.3	0.6		0.1		0.9		0.9	
Delay (s)	12.9	6.7		3.2	5.0		30.2		32.7		32.7	
Level of Service	B	A		A	A		C		C		C	
Approach Delay (s)	7.3		5.0			30.2			32.7			
Approach LOS	A		A			C			C			
Intersection Summary												
HCM Average Control Delay	7.8			HCM Level of Service			A					
HCM Volume to Capacity ratio	0.46											
Actuated Cycle Length (s)	85.0			Sum of lost time (s)			8.0					
Intersection Capacity Utilization	58.5%			ICU Level of Service			B					
Analysis Period (min)	15											
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
19: Walkley & Ryder

Johnston Road Land Use CTS
Existing Conditions - PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑↑		↑↑		↑↑		↑↑		↑↑		↑↑	
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	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.99	1.00	1.00	1.00	0.99	1.00	0.98	1.00	0.99	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.99	1.00	0.99	1.00	0.86	1.00	0.86	1.00	0.95	1.00	0.95
Flt Protected	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1804	3412	1684	3477	1761	1500	1734	1735	1734	1735	1735	1735
Flt Permitted	0.14	1.00	0.08	1.00	0.56	1.00	0.70	1.00	0.70	1.00	1.00	1.00
Satd. Flow (perm)	261	3412	150	3477	1037	1500	1278	1735	1278	1735	1735	1735
Volume (vph)	51	1499	150	14	1299	64	137	3	71	69	82	45
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	55	1629	163	15	1412	70	149	3	77	75	89	49
RTOR Reduction (vph)	0	5	0	0	2	0	25	0	0	20	0	0
Lane Group Flow (vph)	55	1787	0	15	1480	0	149	55	0	75	118	0
Confl. Peds. (#/hr)	3		23	23		3	6		1	1		6
Confl. Bikes (#/hr)			5			6			10			12
Heavy Vehicles (%)	0%	4%	2%	7%	3%	2%	2%	0%	6%	4%	0%	7%
Turn Type	Perm		Perm		Perm		Perm		Perm		Perm	
Protected Phases	2		6		8		4		4		4	
Permitted Phases	2		6		8		4		4		4	
Actuated Green, G (s)	79.4	79.4	79.4	79.4	18.8	18.8	18.8	18.8	18.8	18.8	18.8	18.8
Effective Green, g (s)	81.2	81.2	81.2	81.2	20.8	20.8	20.8	20.8	20.8	20.8	20.8	20.8
Actuated g/C Ratio	0.74	0.74	0.74	0.74	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19
Clearance Time (s)	5.8	5.8	5.8	5.8	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	193	2519	111	2567	196	284	242	328	242	328	328	328
v/s Ratio Prot	c0.52		0.43		0.04		0.07		0.07		0.07	
v/s Ratio Perm	0.21		0.10		c0.14		0.06		0.06		0.06	
v/c Ratio	0.28	0.71	0.14	0.58	0.76	0.19	0.31	0.36	0.31	0.36	0.36	0.36
Uniform Delay, d1	4.8	7.9	4.2	6.6	42.2	37.5	38.4	38.8	38.4	38.8	38.8	38.8
Progression Factor	1.62	1.72	1.26	1.43	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.4	1.6	2.1	0.8	15.8	0.3	0.7	0.7	0.7	0.7	0.7	0.7
Delay (s)	11.1	15.2	7.3	10.2	58.1	37.9	39.2	39.5	39.2	39.5	39.5	39.5
Level of Service	B		A		E		D		D		D	
Approach Delay (s)	15.0		10.1		51.0		39.4		39.4		39.4	
Approach LOS	B		B		D		D		D		D	
Intersection Summary												
HCM Average Control Delay	16.6		HCM Level of Service		B		B		B		B	
HCM Volume to Capacity ratio	0.72		0.72		0.72		0.72		0.72		0.72	
Actuated Cycle Length (s)	110.0		Sum of lost time (s)		8.0		8.0		8.0		8.0	
Intersection Capacity Utilization	76.1%		ICU Level of Service		D		D		D		D	
Analysis Period (min)	15		15		15		15		15		15	
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
20: Walkley & Heron

Johnston Road Land Use CTS
Existing Conditions - PM Peak Hour

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↑↑		↑↑		↑↑	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.95	0.95	0.88	0.97	0.95	0.97
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	1.00
Flt Protected	1.00	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3471	3539	2724	3362	3471	3539
Flt Permitted	1.00	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3471	3539	2724	3362	3471	3539
Volume (vph)	0	697	628	700	757	13
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	758	683	761	823	14
RTOR Reduction (vph)	0	0	0	0	1	0
Lane Group Flow (vph)	0	758	683	761	836	0
Confl. Peds. (#/hr)					7	2
Confl. Bikes (#/hr)					7	2
Heavy Vehicles (%)	0%	4%	2%	2%	4%	15%
Turn Type	Free					
Protected Phases	2		6		4	
Permitted Phases	Free					
Actuated Green, G (s)	55.0	55.0	110.0	47.0	55.0	47.0
Effective Green, g (s)	55.0	55.0	110.0	47.0	55.0	47.0
Actuated g/C Ratio	0.50	0.50	1.00	0.43	0.50	0.43
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Grp Cap (vph)	1736	1770	2724	1436	1736	1770
v/s Ratio Prot	c0.22		0.19		c0.25	
v/s Ratio Perm	0.28					
v/c Ratio	0.44	0.39	0.28	0.58	0.44	0.39
Uniform Delay, d1	17.6	17.0	0.0	24.0	17.6	17.0
Progression Factor	1.00	1.16	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.8	0.5	0.2	1.7	0.8	0.5
Delay (s)	18.4	20.4	0.2	25.7	18.4	20.4
Level of Service	B		C		A	
Approach Delay (s)	18.4		9.7		25.7	
Approach LOS	B		A		C	
Intersection Summary						
HCM Average Control Delay	16.3		HCM Level of Service		B	
HCM Volume to Capacity ratio	0.50		0.50		0.50	
Actuated Cycle Length (s)	110.0		Sum of lost time (s)		8.0	
Intersection Capacity Utilization	47.9%		ICU Level of Service		A	
Analysis Period (min)	15		15		15	
c Critical Lane Group						

ALL-WAY STOP CONTROL ANALYSIS									
General Information					Site Information				
Analyst	J.Swan				Intersection	#9			
Agency/Co.	GENIVAR				Jurisdiction	City of Ottawa			
Date Performed	01/08/2008				Analysis Year	Existing Conditions			
Analysis Time Period	Afternoon Peak Hour								
Project ID Johnston Road Land Use - Community Transportation Study									
East/West Street: Johnston Road					North/South Street: Albion Road				
Volume Adjustments and Site Characteristics									
Approach		Eastbound			Westbound				
Movement	L	T	R	L	T	R			
Volume (veh/h)	11	485	106	110	252	10			
%Thrus Left Lane									
Approach		Northbound			Southbound				
Movement	L	T	R	L	T	R			
Volume (veh/h)	49	7	124	13	20	20			
%Thrus Left Lane									
		Eastbound		Westbound		Northbound		Southbound	
		L1	L2	L1	L2	L1	L2	L1	L2
Configuration	LTR		LTR		LTR		LTR		
PHF	1.00		1.00		1.00		1.00		
Flow Rate (veh/h)	602		372		180		53		
% Heavy Vehicles	27		1		4		0		
No. Lanes	1		1		1		1		
Geometry Group	1		1		1		1		
Duration, T	1.00								
Saturation Headway Adjustment Worksheet									
Prop. Left-Turns	0.0		0.3		0.3		0.2		
Prop. Right-Turns	0.2		0.0		0.7		0.4		
Prop. Heavy Vehicle	0.3		0.0		0.0		0.0		
hLT-adj	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	
hRT-adj	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	
hHV-adj	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	
hadj, computed	0.4		0.1		-0.3		-0.2		
Departure Headway and Service Time									
hd, initial value (s)	3.20		3.20		3.20		3.20		
x, initial	0.54		0.33		0.16		0.05		
hd, final value (s)	5.69		5.76		6.44		7.01		
x, final value	0.95		0.60		0.32		0.10		
Move-up time, m (s)	2.0		2.0		2.0		2.0		
Service Time, t _s (s)	3.7		3.8		4.4		5.0		
Capacity and Level of Service									
		Eastbound		Westbound		Northbound		Southbound	
		L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)	631		608		430		303		
Delay (s/veh)	72.73		17.14		12.49		10.81		
LOS	F		C		B		B		
Approach: Delay (s/veh)	72.73		17.14		12.49		10.81		
LOS	F		C		B		B		
Intersection Delay (s/veh)	43.90								
Intersection LOS	E								

ALL-WAY STOP CONTROL ANALYSIS									
General Information					Site Information				
Analyst	J.Swan				Intersection	#10			
Agency/Co.	GENIVAR				Jurisdiction	City of Ottawa			
Date Performed	01/08/2008				Analysis Year	Existing Conditions			
Analysis Time Period	Afternoon Peak Hour								
Project ID Johnston Road Land Use - Community Transportation Study									
East/West Street: Cahill Road					North/South Street: Albion Road				
Volume Adjustments and Site Characteristics									
Approach		Eastbound			Westbound				
Movement	L	T	R	L	T	R			
Volume (veh/h)	17	107	104	49	66	37			
%Thrus Left Lane									
Approach		Northbound			Southbound				
Movement	L	T	R	L	T	R			
Volume (veh/h)	55	125	59	71	155	10			
%Thrus Left Lane									
		Eastbound		Westbound		Northbound		Southbound	
		L1	L2	L1	L2	L1	L2	L1	L2
Configuration	LTR		LTR		LTR		LTR		
PHF	1.00		1.00		1.00		1.00		
Flow Rate (veh/h)	228		152		239		236		
% Heavy Vehicles	0		10		0		0		
No. Lanes	1		1		1		1		
Geometry Group	1		1		1		1		
Duration, T	1.00								
Saturation Headway Adjustment Worksheet									
Prop. Left-Turns	0.1		0.3		0.2		0.3		
Prop. Right-Turns	0.5		0.2		0.2		0.0		
Prop. Heavy Vehicle	0.0		0.1		0.0		0.0		
hLT-adj	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	
hRT-adj	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	
hHV-adj	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	
hadj, computed	-0.3		0.1		-0.1		0.0		
Departure Headway and Service Time									
hd, initial value (s)	3.20		3.20		3.20		3.20		
x, initial	0.20		0.14		0.21		0.21		
hd, final value (s)	5.22		5.69		5.26		5.39		
x, final value	0.33		0.24		0.35		0.35		
Move-up time, m (s)	2.0		2.0		2.0		2.0		
Service Time, t _s (s)	3.2		3.7		3.3		3.4		
Capacity and Level of Service									
		Eastbound		Westbound		Northbound		Southbound	
		L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)	478		402		489		486		
Delay (s/veh)	10.79		10.48		11.07		11.33		
LOS	B		B		B		B		
Approach: Delay (s/veh)	10.79		10.48		11.07		11.33		
LOS	B		B		B		B		
Intersection Delay (s/veh)	10.97								
Intersection LOS	B								