

APPENDIX I
ORANGE POLICY AREA
TOTAL FUTURE CONDITIONS CAPACITY ANALYSES

HCM Signalized Intersection Capacity Analysis
6: Garden Gate Road/Middlevale Lane & Randolph Road

Total Future AM
08/28/2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖↖↖		↖	↖↖↖		↖	↖		↖	↖	
Traffic Volume (vph)	68	1229	16	82	2072	107	35	10	9	173	13	91
Future Volume (vph)	68	1229	16	82	2072	107	35	10	9	173	13	91
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	6.5		5.5	6.5		7.5	7.5		7.5	7.5	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	1.00		1.00	1.00	
Frbp, ped/bikes	1.00	1.00		1.00	0.97		1.00	0.96		1.00	0.94	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.95	1.00		0.93	1.00	
Frt	1.00	1.00		1.00	0.99		1.00	0.93		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)	1770	5039		1767	4894		1681	1662		1647	1520	
Flt Permitted	0.95	1.00		0.17	1.00		0.68	1.00		0.74	1.00	
Satd. Flow (perm)	1770	5039		310	4894		1200	1662		1289	1520	
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)	73	1322	17	88	2228	115	38	11	10	186	14	98
RTOR Reduction (vph)	0	1	0	0	3	0	0	8	0	0	77	0
Lane Group Flow (vph)	73	1338	0	88	2340	0	38	13	0	186	35	0
Confl. Peds. (#/hr)	120		31	31		120	47		57	57		47
Bus Blockages (#/hr)	0	4	0	0	4	0	0	0	0	0	0	0
Turn Type	Prot	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	1	6		5	2		4	4		8	8	
Permitted Phases				2			4			8		
Actuated Green, G (s)	12.5	90.2		93.7	85.7		32.3	32.3		32.3	32.3	
Effective Green, g (s)	12.5	90.2		93.7	85.7		32.3	32.3		32.3	32.3	
Actuated g/C Ratio	0.08	0.60		0.62	0.57		0.22	0.22		0.22	0.22	
Clearance Time (s)	5.5	6.5		5.5	6.5		7.5	7.5		7.5	7.5	
Vehicle Extension (s)	4.0	0.2		3.0	0.2		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	147	3030		271	2796		258	357		277	327	
v/s Ratio Prot	c0.04	c0.27		0.02	c0.48			0.01			0.02	
v/s Ratio Perm				0.19			0.03			c0.14		
v/c Ratio	0.50	0.44		0.32	0.84		0.15	0.04		0.67	0.11	
Uniform Delay, d1	65.7	16.2		11.7	26.4		47.7	46.5		54.0	47.3	
Progression Factor	0.71	1.61		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.3	0.4		0.7	3.2		0.3	0.0		6.3	0.1	
Delay (s)	50.3	26.6		12.4	29.6		48.0	46.6		60.3	47.4	
Level of Service	D	C		B	C		D	D		E	D	
Approach Delay (s)		27.8			29.0			47.5			55.4	
Approach LOS		C			C			D			E	
Intersection Summary												
HCM 2000 Control Delay			30.7			HCM 2000 Level of Service				C		
HCM 2000 Volume to Capacity ratio			0.76									
Actuated Cycle Length (s)			150.0			Sum of lost time (s)			19.5			
Intersection Capacity Utilization			90.3%			ICU Level of Service				E		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

8: Georgia Avenue & Glenmont Circle

Total Future AM
08/28/2023



Movement	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations		↗	↕↕↕			↕↕↕	
Traffic Volume (veh/h)	0	180	1224	96	0	2996	
Future Volume (Veh/h)	0	180	1224	96	0	2996	
Sign Control	Stop		Free			Free	
Grade	0%		0%			0%	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	
Hourly flow rate (vph)	0	202	1375	108	0	3366	
Pedestrians	10						
Lane Width (ft)	12.0						
Walking Speed (ft/s)	3.5						
Percent Blockage	1						
Right turn flare (veh)							
Median type			Raised			Raised	
Median storage (veh)			1			1	
Upstream signal (ft)						534	
pX, platoon unblocked	0.68						
vC, conflicting volume	2561	522			1493		
vC1, stage 1 conf vol	1439						
vC2, stage 2 conf vol	1122						
vCu, unblocked vol	1629	522			1493		
tC, single (s)	6.8	6.9			4.1		
tC, 2 stage (s)	5.8						
tF (s)	3.5	3.3			2.2		
p0 queue free %	100	59			100		
cM capacity (veh/h)	149	494			441		
Direction, Lane #	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	202	550	550	383	1122	1122	1122
Volume Left	0	0	0	0	0	0	0
Volume Right	202	0	0	108	0	0	0
cSH	494	1700	1700	1700	1700	1700	1700
Volume to Capacity	0.41	0.32	0.32	0.23	0.66	0.66	0.66
Queue Length 95th (ft)	49	0	0	0	0	0	0
Control Delay (s)	17.2	0.0	0.0	0.0	0.0	0.0	0.0
Lane LOS	C						
Approach Delay (s)	17.2	0.0			0.0		
Approach LOS	C						
Intersection Summary							
Average Delay			0.7				
Intersection Capacity Utilization			61.2%		ICU Level of Service		B
Analysis Period (min)			15				

HCM Signalized Intersection Capacity Analysis
 9: Georgia Avenue & Commercial Driveway/Shorefield Road

Total Future AM
 08/28/2023


























Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕	↕		↕↕↕		↕	↕↕↕	
Traffic Volume (vph)	14	3	4	93	0	56	1	1180	21	57	2952	1
Future Volume (vph)	14	3	4	93	0	56	1	1180	21	57	2952	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0	6.0		5.0		4.5	5.0	
Lane Util. Factor		1.00			1.00	1.00		0.91		1.00	0.91	
Frbp, ped/bikes		1.00			1.00	0.97		1.00		1.00	1.00	
Flpb, ped/bikes		0.99			0.99	1.00		1.00		1.00	1.00	
Frt		0.98			1.00	0.85		1.00		1.00	1.00	
Flt Protected		0.97			0.95	1.00		1.00		0.95	1.00	
Satd. Flow (prot)		1730			1755	1532		5068		1769	5085	
Flt Permitted		0.79			0.74	1.00		0.94		0.18	1.00	
Satd. Flow (perm)		1418			1372	1532		4745		341	5085	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	15	3	4	98	0	59	1	1242	22	60	3107	1
RTOR Reduction (vph)	0	3	0	0	0	51	0	1	0	0	0	0
Lane Group Flow (vph)	0	19	0	0	98	8	0	1264	0	60	3108	0
Confl. Peds. (#/hr)	12		5	5		12	9		6	6		9
Confl. Bikes (#/hr)												1
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	
Protected Phases		4			8			6		5	2	
Permitted Phases	4			8		8	6			2		
Actuated Green, G (s)		19.3			19.3	19.3		109.7		119.7	119.7	
Effective Green, g (s)		19.3			19.3	19.3		109.7		119.7	119.7	
Actuated g/C Ratio		0.13			0.13	0.13		0.73		0.80	0.80	
Clearance Time (s)		6.0			6.0	6.0		5.0		4.5	5.0	
Vehicle Extension (s)		3.0			5.0	5.0		0.2		3.0	0.2	
Lane Grp Cap (vph)		182			176	197		3470		324	4057	
v/s Ratio Prot										0.01	c0.61	
v/s Ratio Perm		0.01			c0.07	0.00		0.27		0.14		
v/c Ratio		0.11			0.56	0.04		0.36		0.19	0.77	
Uniform Delay, d1		57.7			61.3	57.2		7.4		3.9	7.9	
Progression Factor		1.00			1.00	1.00		2.50		1.00	1.00	
Incremental Delay, d2		0.3			6.4	0.2		0.3		0.3	1.4	
Delay (s)		58.0			67.7	57.4		18.8		4.2	9.3	
Level of Service		E			E	E		B		A	A	
Approach Delay (s)		58.0			63.8			18.8			9.2	
Approach LOS		E			E			B			A	
Intersection Summary												
HCM 2000 Control Delay			13.9									B
HCM 2000 Volume to Capacity ratio			0.76									
Actuated Cycle Length (s)			150.0							15.5		
Intersection Capacity Utilization			78.1%									D
ICU Level of Service												
Analysis Period (min)			15									

c Critical Lane Group



















HCM Signalized Intersection Capacity Analysis
 11: Georgia Avenue & Arcola Avenue

Total Future AM
 08/28/2023

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	33	111	30	145	170	344	30	852	37	374	2661	19
Future Volume (vph)	33	111	30	145	170	344	30	852	37	374	2661	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5		5.0	6.5	6.5	5.0	6.0		5.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	0.91		1.00	0.91	
Frbp, ped/bikes	1.00	1.00		1.00	1.00	0.99	1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.97		1.00	1.00	0.85	1.00	0.99		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1767	1798		1768	1863	1562	1770	5046		1769	5039	
Flt Permitted	0.64	1.00		0.37	1.00	1.00	0.05	1.00		0.22	1.00	
Satd. Flow (perm)	1194	1798		695	1863	1562	102	5046		414	5039	
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)	35	119	32	156	183	370	32	916	40	402	2861	20
RTOR Reduction (vph)	0	7	0	0	0	281	0	3	0	0	0	0
Lane Group Flow (vph)	35	144	0	156	183	89	32	953	0	402	2881	0
Confl. Peds. (#/hr)	1		2	2		1	1		4	4		1
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	6	0
Turn Type	Perm	NA		pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases		4		3	8		1	6		5	2	
Permitted Phases	4			8		8	6			2		
Actuated Green, G (s)	19.1	19.1		35.9	35.9	35.9	77.2	73.1		101.6	92.5	
Effective Green, g (s)	19.1	19.1		35.9	35.9	35.9	77.2	73.1		101.6	92.5	
Actuated g/C Ratio	0.13	0.13		0.24	0.24	0.24	0.51	0.49		0.68	0.62	
Clearance Time (s)	6.5	6.5		5.0	6.5	6.5	5.0	6.0		5.0	6.0	
Vehicle Extension (s)	5.0	5.0		3.0	5.0	5.0	3.0	0.2		3.0	0.2	
Lane Grp Cap (vph)	152	228		250	445	373	98	2459		492	3107	
v/s Ratio Prot		0.08		c0.05	0.10		0.01	0.19		c0.13	c0.57	
v/s Ratio Perm	0.03			c0.10		0.06	0.16			0.42		
v/c Ratio	0.23	0.63		0.62	0.41	0.24	0.33	0.39		0.82	0.93	
Uniform Delay, d1	58.8	62.1		48.0	48.1	46.0	29.3	24.3		14.3	25.7	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.35	0.71	
Incremental Delay, d2	1.6	7.7		4.8	1.3	0.7	1.9	0.5		6.9	4.3	
Delay (s)	60.5	69.8		52.8	49.4	46.7	31.2	24.8		26.2	22.5	
Level of Service	E	E		D	D	D	C	C		C	C	
Approach Delay (s)		68.1			48.7			25.0			23.0	
Approach LOS		E			D			C			C	
Intersection Summary												
HCM 2000 Control Delay			28.5	HCM 2000 Level of Service				C				
HCM 2000 Volume to Capacity ratio			0.88									
Actuated Cycle Length (s)			150.0	Sum of lost time (s)				22.5				
Intersection Capacity Utilization			91.3%	ICU Level of Service				F				
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis
 13: Heurich Road & Randolph Road

Total Future AM
 08/28/2023

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	17	1219	41	27	2006	72	11	2	12	16	4	9
Future Volume (Veh/h)	17	1219	41	27	2006	72	11	2	12	16	4	9
Sign Control	Free			Free			Stop			Stop		
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)	18	1325	45	29	2180	78	12	2	13	17	4	10
Pedestrians	18			13								
Lane Width (ft)	12.0			12.0								
Walking Speed (ft/s)	3.5			3.5								
Percent Blockage	2			1								
Right turn flare (veh)												
Median type	Raised			Raised								
Median storage (veh)	1			1								
Upstream signal (ft)	1082			969								
pX, platoon unblocked	0.61			0.88			0.67			0.67		
vC, conflicting volume	2258			1370			2198			3700		
vC1, stage 1 conf vol							1384			1384		
vC2, stage 2 conf vol							815			2316		
vCu, unblocked vol	840			951			0			2121		
tC, single (s)	4.1			4.1			7.5			6.5		
tC, 2 stage (s)							6.5			5.5		
tF (s)	2.2			2.2			3.5			4.0		
p0 queue free %	96			95			98			98		
cM capacity (veh/h)	484			633			608			114		
Direction, Lane #	EB 1	EB 2	EB 3	EB 4	WB 1	WB 2	WB 3	WB 4	NB 1	SB 1		
Volume Total	18	530	530	310	29	872	872	514	27	31		
Volume Left	18	0	0	0	29	0	0	0	12	17		
Volume Right	0	0	0	45	0	0	0	78	13	10		
cSH	484	1700	1700	1700	633	1700	1700	1700	529	205		
Volume to Capacity	0.04	0.31	0.31	0.18	0.05	0.51	0.51	0.30	0.05	0.15		
Queue Length 95th (ft)	3	0	0	0	4	0	0	0	4	13		
Control Delay (s)	12.7	0.0	0.0	0.0	11.0	0.0	0.0	0.0	12.2	25.6		
Lane LOS	B			B			B			D		
Approach Delay (s)	0.2			0.1			12.2			25.6		
Approach LOS							B			D		
Intersection Summary												
Average Delay	0.4											
Intersection Capacity Utilization	54.9%			ICU Level of Service			A					
Analysis Period (min)	15											

HCM Signalized Intersection Capacity Analysis

6: Garden Gate Road/Middlevale Lane & Randolph Road

Total Future PM
08/28/2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↗	↑↑↑		↗	↑↑↑		↗	↑		↗	↑	
Traffic Volume (vph)	25	1842	30	35	1371	147	24	7	13	111	6	27
Future Volume (vph)	25	1842	30	35	1371	147	24	7	13	111	6	27
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	6.5		5.5	6.5		7.5	7.5		7.5	7.5	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	1.00		1.00	1.00	
Frbp, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00		1.00	0.99		1.00	0.90		1.00	0.88	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	5044		1770	4960		1765	1665		1765	1613	
Flt Permitted	0.95	1.00		0.08	1.00		0.73	1.00		0.74	1.00	
Satd. Flow (perm)	1770	5044		151	4960		1366	1665		1383	1613	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	26	1899	31	36	1413	152	25	7	13	114	6	28
RTOR Reduction (vph)	0	1	0	0	5	0	0	11	0	0	24	0
Lane Group Flow (vph)	26	1929	0	36	1560	0	25	9	0	114	10	0
Confl. Peds. (#/hr)	7		1	1		7	2		2	2		2
Bus Blockages (#/hr)	0	4	0	0	4	0	0	0	0	0	0	0
Turn Type	Prot	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	1	6		5	2		4	4		8	8	
Permitted Phases				2			4			8		
Actuated Green, G (s)	5.9	105.4		109.9	104.7		19.9	19.9		19.9	19.9	
Effective Green, g (s)	5.9	105.4		109.9	104.7		19.9	19.9		19.9	19.9	
Actuated g/C Ratio	0.04	0.70		0.73	0.70		0.13	0.13		0.13	0.13	
Clearance Time (s)	5.5	6.5		5.5	6.5		7.5	7.5		7.5	7.5	
Vehicle Extension (s)	4.0	0.2		3.0	0.2		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	69	3544		166	3462		181	220		183	213	
v/s Ratio Prot	c0.01	c0.38		0.01	0.31			0.01			0.01	
v/s Ratio Perm				0.15			0.02			c0.08		
v/c Ratio	0.38	0.54		0.22	0.45		0.14	0.04		0.62	0.05	
Uniform Delay, d1	70.3	10.7		7.4	10.0		57.5	56.7		61.5	56.8	
Progression Factor	0.96	1.02		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.8	0.5		0.7	0.4		0.4	0.1		6.5	0.1	
Delay (s)	71.5	11.5		8.1	10.4		57.8	56.8		68.0	56.9	
Level of Service	E	B		A	B		E	E		E	E	
Approach Delay (s)		12.3			10.4			57.4			65.4	
Approach LOS		B			B			E			E	

Intersection Summary

HCM 2000 Control Delay	14.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	19.5
Intersection Capacity Utilization	61.8%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
 8: Georgia Avenue & Glenmont Circle

Total Future PM
 08/28/2023



Movement	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations		↗	↕↕↕↕			↕↕↕	
Traffic Volume (veh/h)	0	83	2121	202	0	1924	
Future Volume (Veh/h)	0	83	2121	202	0	1924	
Sign Control	Stop		Free			Free	
Grade	0%		0%			0%	
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	
Hourly flow rate (vph)	0	101	2587	246	0	2346	
Pedestrians	35						
Lane Width (ft)	12.0						
Walking Speed (ft/s)	3.5						
Percent Blockage	3						
Right turn flare (veh)							
Median type			Raised			Raised	
Median storage (veh)			1			1	
Upstream signal (ft)						534	
pX, platoon unblocked	0.75						
vC, conflicting volume	3527	1020			2868		
vC1, stage 1 conf vol	2745						
vC2, stage 2 conf vol	782						
vCu, unblocked vol	3202	1020			2868		
tC, single (s)	6.8	6.9			4.1		
tC, 2 stage (s)	5.8						
tF (s)	3.5	3.3			2.2		
p0 queue free %	100	55			100		
cM capacity (veh/h)	29	226			124		
Direction, Lane #	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	101	1035	1035	763	782	782	782
Volume Left	0	0	0	0	0	0	0
Volume Right	101	0	0	246	0	0	0
cSH	226	1700	1700	1700	1700	1700	1700
Volume to Capacity	0.45	0.61	0.61	0.45	0.46	0.46	0.46
Queue Length 95th (ft)	53	0	0	0	0	0	0
Control Delay (s)	33.1	0.0	0.0	0.0	0.0	0.0	0.0
Lane LOS	D						
Approach Delay (s)	33.1	0.0			0.0		
Approach LOS	D						
Intersection Summary							
Average Delay			0.6				
Intersection Capacity Utilization			57.5%		ICU Level of Service		B
Analysis Period (min)			15				

HCM Signalized Intersection Capacity Analysis
 9: Georgia Avenue & Commercial Driveway/Shorefield Road

Total Future PM
 08/28/2023


























Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations		↕			↕	↗		↕↗↘		↗	↕↗↘		
Traffic Volume (vph)	32	25	7	156	3	127	0	2155	53	132	1781	27	
Future Volume (vph)	32	25	7	156	3	127	0	2155	53	132	1781	27	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)		6.0			6.0	6.0		5.0		4.5	5.0		
Lane Util. Factor		1.00			1.00	1.00		0.91		1.00	0.91		
Frbp, ped/bikes		1.00			1.00	1.00		1.00		1.00	1.00		
Flpb, ped/bikes		0.98			1.00	1.00		1.00		1.00	1.00		
Frt		0.99			1.00	0.85		1.00		1.00	1.00		
Flt Protected		0.98			0.95	1.00		1.00		0.95	1.00		
Satd. Flow (prot)		1761			1773	1583		5056		1770	5072		
Flt Permitted		0.70			0.70	1.00		1.00		0.04	1.00		
Satd. Flow (perm)		1265			1296	1583		5056		74	5072		
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	
Adj. Flow (vph)	33	26	7	162	3	132	0	2245	55	138	1855	28	
RTOR Reduction (vph)	0	3	0	0	0	108	0	1	0	0	1	0	
Lane Group Flow (vph)	0	63	0	0	166	24	0	2299	0	138	1882	0	
Confl. Peds. (#/hr)	26		1	1		26	11			17	17	11	
Confl. Bikes (#/hr)						1			1				
Turn Type	Perm	NA		Perm	NA	Prot		NA		pm+pt	NA		
Protected Phases		4			8	8		6		5	2		
Permitted Phases	4			8			6			2			
Actuated Green, G (s)		26.9			26.9	26.9		96.4		112.1	112.1		
Effective Green, g (s)		26.9			26.9	26.9		96.4		112.1	112.1		
Actuated g/C Ratio		0.18			0.18	0.18		0.64		0.75	0.75		
Clearance Time (s)		6.0			6.0	6.0		5.0		4.5	5.0		
Vehicle Extension (s)		3.0			5.0	5.0		0.2		3.0	0.2		
Lane Grp Cap (vph)		226			232	283		3249		181	3790		
v/s Ratio Prot						0.01		0.45		c0.06	0.37		
v/s Ratio Perm		0.05			c0.13					c0.51			
v/c Ratio		0.28			0.72	0.08		0.71		0.76	0.50		
Uniform Delay, d1		53.2			57.9	51.3		17.6		42.8	7.6		
Progression Factor		1.00			1.00	1.00		1.23		1.00	1.00		
Incremental Delay, d2		0.7			12.3	0.3		0.8		17.2	0.5		
Delay (s)		53.8			70.2	51.5		22.4		60.0	8.1		
Level of Service		D			E	D		C		E	A		
Approach Delay (s)		53.8			62.0			22.4			11.6		
Approach LOS		D			E			C			B		
Intersection Summary													
HCM 2000 Control Delay			20.7		HCM 2000 Level of Service						C		
HCM 2000 Volume to Capacity ratio			0.76										
Actuated Cycle Length (s)			150.0		Sum of lost time (s)						15.5		
Intersection Capacity Utilization			110.2%		ICU Level of Service						H		
Analysis Period (min)			15										

c Critical Lane Group























HCM Signalized Intersection Capacity Analysis
 11: Georgia Avenue & Arcola Avenue

Total Future PM
 08/28/2023

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	50	106	18	93	119	392	53	1892	67	237	1649	18	
Future Volume (vph)	50	106	18	93	119	392	53	1892	67	237	1649	18	
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	6.5	6.5		5.0	6.5	6.5	5.0	6.0		5.0	6.0		
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	0.91		1.00	0.91		
Frbp, ped/bikes	1.00	1.00		1.00	1.00	0.97	1.00	1.00		1.00	1.00		
Flpb, ped/bikes	0.98	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00		
Frt	1.00	0.98		1.00	1.00	0.85	1.00	0.99		1.00	1.00		
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00		
Satd. Flow (prot)	1740	1823		1770	1863	1534	1770	5051		1770	5034		
Flt Permitted	0.67	1.00		0.41	1.00	1.00	0.10	1.00		0.05	1.00		
Satd. Flow (perm)	1236	1823		755	1863	1534	185	5051		89	5034		
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	114	19	100	128	422	57	2034	72	255	1773	19	
RTOR Reduction (vph)	0	4	0	0	0	236	0	2	0	0	0	0	
Lane Group Flow (vph)	54	129	0	100	128	186	57	2104	0	255	1792	0	
Confl. Peds. (#/hr)	11					11	5		6	6		5	
Confl. Bikes (#/hr)									1				
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	6	0	
Turn Type	Perm	NA		pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA		
Protected Phases		4		3	8		1	6		5	2		
Permitted Phases	4			8		8	6			2			
Actuated Green, G (s)	17.8	17.8		33.7	33.7	33.7	84.6	78.4		103.8	92.6		
Effective Green, g (s)	17.8	17.8		33.7	33.7	33.7	84.6	78.4		103.8	92.6		
Actuated g/C Ratio	0.12	0.12		0.22	0.22	0.22	0.56	0.52		0.69	0.62		
Clearance Time (s)	6.5	6.5		5.0	6.5	6.5	5.0	6.0		5.0	6.0		
Vehicle Extension (s)	5.0	5.0		3.0	5.0	5.0	3.0	0.2		3.0	0.2		
Lane Grp Cap (vph)	146	216		243	418	344	169	2639		290	3107		
v/s Ratio Prot		0.07		0.03	0.07		0.01	0.42		c0.12	0.36		
v/s Ratio Perm	0.04			0.06		c0.12	0.18			c0.49			
v/c Ratio	0.37	0.60		0.41	0.31	0.54	0.34	0.80		0.88	0.58		
Uniform Delay, d1	60.9	62.7		48.1	48.4	51.3	15.5	29.3		49.7	17.1		
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.20	0.77		
Incremental Delay, d2	3.3	6.5		1.1	0.9	3.0	1.2	2.6		22.4	0.7		
Delay (s)	64.2	69.2		49.2	49.3	54.4	16.6	31.9		82.1	13.8		
Level of Service	E	E		D	D	D	B	C		F	B		
Approach Delay (s)		67.8			52.6			31.5			22.3		
Approach LOS		E			D			C			C		
Intersection Summary													
HCM 2000 Control Delay			31.8									HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.84										
Actuated Cycle Length (s)			150.0									Sum of lost time (s)	22.5
Intersection Capacity Utilization			86.9%									ICU Level of Service	E
Analysis Period (min)			15										
c	Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis
 13: Heurich Road & Randolph Road

Total Future PM
 08/28/2023

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 			 			 	
Traffic Volume (veh/h)	37	1924	31	25	1394	21	21	3	28	14	2	18
Future Volume (Veh/h)	37	1924	31	25	1394	21	21	3	28	14	2	18
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	38	1984	32	26	1437	22	22	3	29	14	2	19
Pedestrians		4			7			5				
Lane Width (ft)		12.0			12.0			12.0				
Walking Speed (ft/s)		3.5			3.5			3.5				
Percent Blockage		0			1			0				
Right turn flare (veh)												
Median type		Raised			Raised							
Median storage (veh)		1			1							
Upstream signal (ft)		1082			969							
pX, platoon unblocked	0.88			0.78			0.83	0.83	0.78	0.83	0.83	0.88
vC, conflicting volume	1459			2021			2636	3592	689	2275	3597	494
vC1, stage 1 conf vol							2081	2081		1500	1500	
vC2, stage 2 conf vol							555	1511		775	2097	
vCu, unblocked vol	1061			1309			1332	2477	0	899	2483	0
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)							6.5	5.5		6.5	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	93			94			78	97	97	92	98	98
cM capacity (veh/h)	577			405			98	87	833	168	81	955
Direction, Lane #	EB 1	EB 2	EB 3	EB 4	WB 1	WB 2	WB 3	WB 4	NB 1	SB 1		
Volume Total	38	794	794	429	26	575	575	309	54	35		
Volume Left	38	0	0	0	26	0	0	0	22	14		
Volume Right	0	0	0	32	0	0	0	22	29	19		
cSH	577	1700	1700	1700	405	1700	1700	1700	184	274		
Volume to Capacity	0.07	0.47	0.47	0.25	0.06	0.34	0.34	0.18	0.29	0.13		
Queue Length 95th (ft)	5	0	0	0	5	0	0	0	29	11		
Control Delay (s)	11.7	0.0	0.0	0.0	14.5	0.0	0.0	0.0	32.5	20.0		
Lane LOS	B				B				D	C		
Approach Delay (s)	0.2				0.3				32.5	20.0		
Approach LOS									D	C		
Intersection Summary												
Average Delay			0.9									
Intersection Capacity Utilization			50.7%	ICU Level of Service	A							
Analysis Period (min)			15									

6

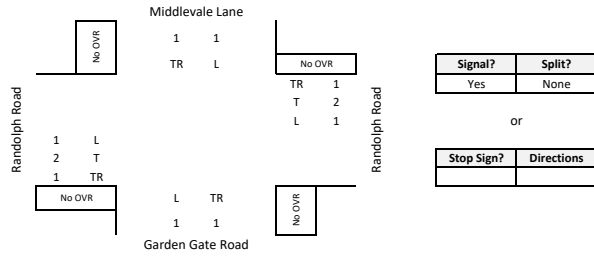
Critical Lane Volume and Level of Service Calculations

Intersection: **06. Randolph Road / Middlevale Lane / Garden Gate Road**

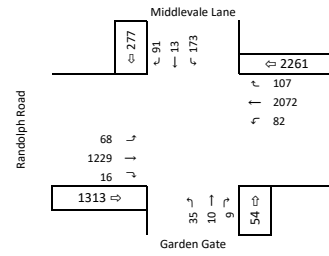
Jurisdiction: **Montgomery County, MD**
 Scenario/Design Year: **Total Future Conditions**
 Computed by: **W+A**



Intersection Lane Use & Traffic Control

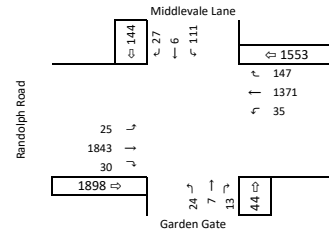


AM Peak Hour Critical Lane Volume Analysis



Direction	Lane Group	Lane Group Volume	Right Turn Overlap	Lane Use Factor (LUF)	Volume	Opposing Lefts	Lane Use Factor (LUF)	Opposing Volume	Critical Lane Volume (CLV)	Included in CLV
EB	TR	1245		0.37	461	82	1.00	82	543	
	L	68	0	1.00	68				150	
WB	TR	2179		0.37	806	68	1.00	68	874	*
	L	82	0	1.00	82				150	
NB	TR	19		1.00	19	173	1.00	173	192	*
	L	35	0	1.00	35				208	*
SB	TR	104		1.00	104	35	1.00	35	139	*
	L	173	0	1.00	173				208	*
Note:									CLV	1290
Congestion Equiv.									v/c	0.806
										1600

PM Peak Hour Critical Lane Volume Analysis



Direction	Lane Group	Lane Group Volume	Right Turn Overlap	Lane Use Factor (LUF)	Volume	Opposing Lefts	Lane Use Factor (LUF)	Opposing Volume	Critical Lane Volume (CLV)	Included in CLV
EB	TR	1873		0.37	693	35	1.00	35	728	*
	L	25	0	1.00	25				60	
WB	TR	1518		0.37	562	25	1.00	25	587	
	L	35	0	1.00	35				60	
NB	TR	20		1.00	20	111	1.00	111	131	*
	L	24	0	1.00	24				135	*
SB	TR	33		1.00	33	24	1.00	24	57	*
	L	111	0	1.00	111				135	*
Note:									CLV	998
Congestion Equiv.									v/c	0.624
										1600

Right Turn Overlap

Approach	Excl. Right	Right Vol.				Adjacent Overlap Vol.				Overlap	
		AM	PM		LUF	AM	PM		LUF	AM	PM
Eastbound	No	n/a	n/a		n/a	n/a		n/a	n/a	0	0
Westbound	No	n/a	n/a		n/a	n/a		n/a	n/a	0	0
Northbound	No	n/a	n/a		n/a	n/a		n/a	n/a	0	0
Southbound	No	n/a	n/a		n/a	n/a		n/a	n/a	0	0

Montgomery County LATR

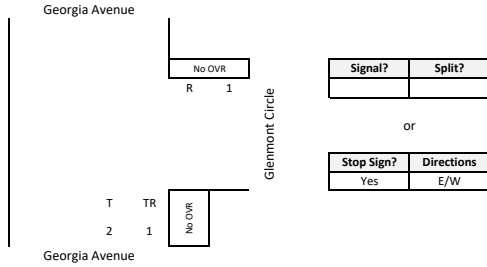
	Lane Use Factors		
	Number of Lanes	Left Turn LUF	Through LUF
1	1	1.00	
2	0.53	0.53	
3	0.37	0.37	
4		0.30	
5		0.25	

8
Critical Lane Volume
and
Level of Service Calculations

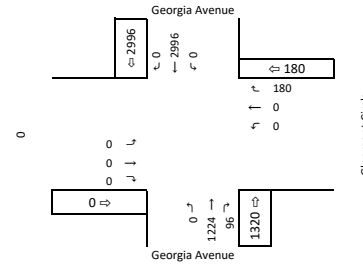
Intersection: **08. Georgia Avenue / Glenmont Circle**
 Jurisdiction: **Montgomery County, MD**
 Scenario/Design Year: **Total Future Conditions**
 Computed by: **W+A**



Intersection Lane Use & Traffic Control

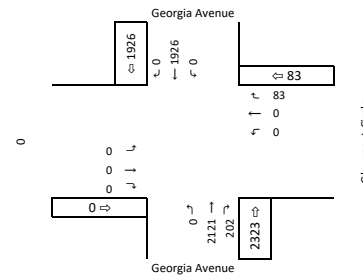


AM Peak Hour Critical Lane Volume Analysis



Direction	Lane Group	Lane Group Volume	Right Turn Overlap	Lane Use Factor (LUF)	Volume	Opposing Lefts	Lane Use Factor (LUF)	Opposing Volume	Critical Lane Volume (CLV)	Included in CLV
EB			0		0	0		0	0	
WB	R	180	0	1.00	180	0		0	180	*
NB	TR	1320	0	0.37	488	0		0	488	*
SB			0		0	0		0	0	
Note:									CLV	668
Congestion Equiv.									v/c	0.371
									1800	

PM Peak Hour Critical Lane Volume Analysis



Direction	Lane Group	Lane Group Volume	Right Turn Overlap	Lane Use Factor (LUF)	Volume	Opposing Lefts	Lane Use Factor (LUF)	Opposing Volume	Critical Lane Volume (CLV)	Included in CLV
EB			0		0	0		0	0	
WB	R	83	0	1.00	83	0		0	83	*
NB	TR	2323	0	0.37	860	0		0	860	*
SB			0		0	0		0	0	
Note:									CLV	943
Congestion Equiv.									v/c	0.524
									1800	

Right Turn Overlap

Approach	Excl. Right	Right Vol.			Adjacent Overlap Vol.			Overlap	
		AM	PM	LUF	AM	PM	LUF	AM	PM
Eastbound	No	n/a	n/a	n/a	n/a	n/a	n/a	0	0
Westbound	No	n/a	n/a	n/a	n/a	n/a	n/a	0	0
Northbound	No	n/a	n/a	n/a	n/a	n/a	n/a	0	0
Southbound	No	n/a	n/a	n/a	n/a	n/a	n/a	0	0

Montgomery County LATR

	Lane Use Factors	
	Number of Lanes	Through LUF
1	1	1.00
2	0.53	0.53
3	0.37	0.37
4		0.30
5		0.25

9

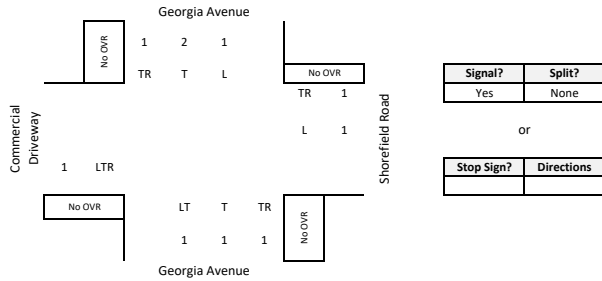
Critical Lane Volume and Level of Service Calculations

Intersection: 09. Georgia Avenue / Shorefield Road

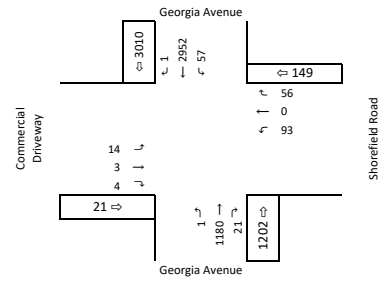
Jurisdiction: Montgomery County, MD
 Scenario/Design Year: Total Future Conditions
 Computed by: W+A



Intersection Lane Use & Traffic Control

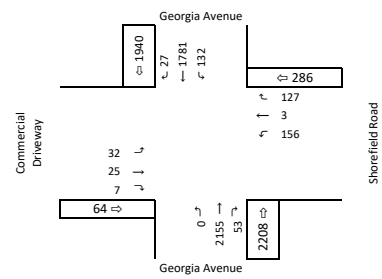


AM Peak Hour Critical Lane Volume Analysis



Direction	Lane Group	Lane Group Volume	Right Turn Overlap	Lane Use Factor (LUF)	Volume	Opposing Lefts	Lane Use Factor (LUF)	Opposing Volume	Critical Lane Volume (CLV)	Included in CLV
EB	LTR	21	0	1.00	21	93	1.00	93	114	*
WB	TR	56	0	1.00	56	14	1.00	14	70	
NB	LTR	1202	0	0.37	445	57	1.00	57	502	
SB	TR	2953	0	0.37	1093	1	1.00	1	1094	*
	L	57	0	1.00	57				58	
Note:									CLV	1208
Congestion Equiv.									v/c	0.755
										1600

PM Peak Hour Critical Lane Volume Analysis



Direction	Lane Group	Lane Group Volume	Right Turn Overlap	Lane Use Factor (LUF)	Volume	Opposing Lefts	Lane Use Factor (LUF)	Opposing Volume	Critical Lane Volume (CLV)	Included in CLV
EB	LTR	64	0	1.00	64	156	1.00	156	220	*
WB	TR	130	0	1.00	130	32	1.00	32	162	
NB	LTR	2208	0	0.37	817	132	1.00	132	949	*
SB	TR	1808	0	0.37	669	0	1.00	0	132	
	L	132	0	1.00	132				132	
Note:									CLV	1169
Congestion Equiv.									v/c	0.731
										1600

Right Turn Overlap

Approach	Excl. Right	Right Vol.				Adjacent Overlap Vol.				Overlap	
		AM	PM	LUF	AM	PM	LUF	AM	PM		
Eastbound	No	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0	0	
Westbound	No	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0	0	
Northbound	No	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0	0	
Southbound	No	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0	0	

Montgomery County LATR

Number of Lanes	Lane Use Factors	
	Left Turn LUF	Through LUF
1	1	1.00
2	0.53	0.53
3	0.37	0.37
4	0.30	0.30
5		0.25

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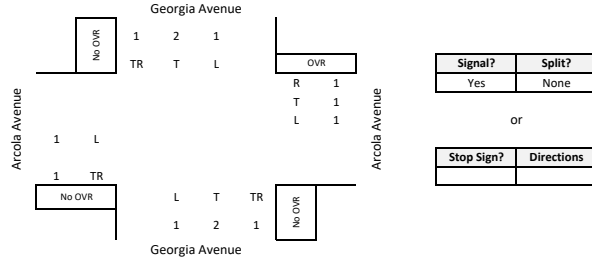
Critical Lane Volume and Level of Service Calculations

Intersection: 11. Georgia Avenue / Arcola Avenue

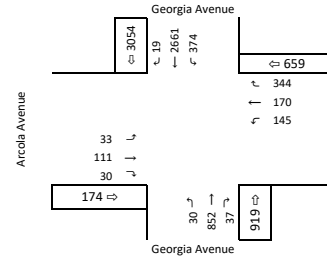
Jurisdiction: Montgomery County, MD
 Scenario/Design Year: Total Future Conditions
 Computed by: W+A



Intersection Lane Use & Traffic Control

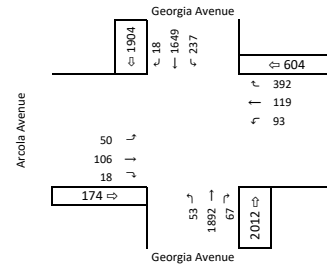


AM Peak Hour Critical Lane Volume Analysis



Direction	Lane Group	Lane Group Volume	Right Turn Overlap	Lane Use Factor (LUF)	Volume	Opposing Lefts	Lane Use Factor (LUF)	Opposing Volume	Critical Lane Volume (CLV)	Include in CLV
EB	TR	141	0	1.00	141	145	1.00	145	286	*
	L	33	0	1.00	33	0	1.00	0	178	
WB	T	170	0	1.00	170	33	1.00	33	203	
	R	344	344	1.00	0	0	1.00	0	33	
NB	TR	889	0	0.37	329	374	1.00	374	703	
	L	30	0	1.00	30	0	1.00	0	404	
SB	TR	2680	0	0.37	992	30	1.00	30	1022	*
	L	374	0	1.00	374	0	1.00	0	404	
Note:									CLV	1308
Congestion Equiv.									v/c	0.818
										1600

PM Peak Hour Critical Lane Volume Analysis



Direction	Lane Group	Lane Group Volume	Right Turn Overlap	Lane Use Factor (LUF)	Volume	Opposing Lefts	Lane Use Factor (LUF)	Opposing Volume	Critical Lane Volume (CLV)	Include in CLV
EB	TR	124	0	1.00	124	93	1.00	93	217	
	L	50	0	1.00	50	0	1.00	0	143	
WB	T	119	0	1.00	119	50	1.00	50	169	*
	R	392	0	1.00	392	0	1.00	0	442	
NB	TR	1959	0	0.37	725	237	1.00	237	962	*
	L	53	0	1.00	53	0	1.00	0	290	
SB	TR	1667	0	0.37	617	53	1.00	53	670	
	L	237	0	1.00	237	0	1.00	0	290	
Note:									CLV	1404
Congestion Equiv.									v/c	0.878
										1600

Right Turn Overlap

Approach	Excl. Right	Right Vol.			Adjacent Overlap Vol.			Overlap	
		AM	PM	LUF	AM	PM	LUF	AM	PM
Eastbound	No	n/a	n/a	n/a	n/a	n/a	n/a	0	0
Westbound	Yes	344	392	1.00	374	237	1.00	344	237
Northbound	No	n/a	n/a	n/a	n/a	n/a	n/a	0	0
Southbound	No	n/a	n/a	n/a	n/a	n/a	n/a	0	0

Montgomery County LATR

	Lane Use Factors		
	Number of Lanes	Left Turn LUF	Through LUF
1	1	1.00	
2	0.53	0.53	
3	0.37	0.37	
4		0.30	
5		0.25	

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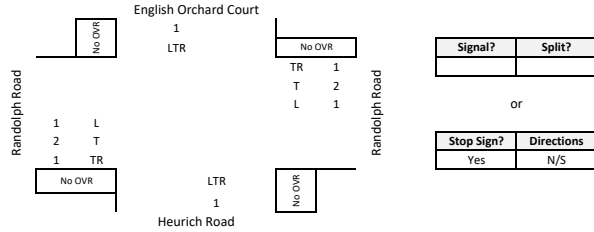
Critical Lane Volume and Level of Service Calculations

Intersection: 13. Randolph Road / Heurich Road

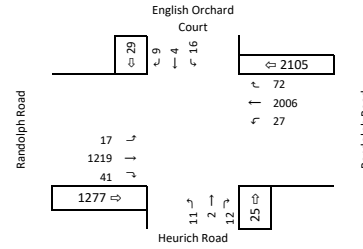
Jurisdiction: Montgomery County, MD
 Scenario/Design Year: Total Future Conditions
 Computed by: W+A



Intersection Lane Use & Traffic Control

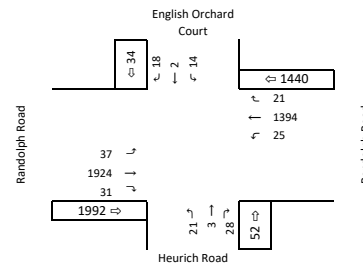


AM Peak Hour Critical Lane Volume Analysis



Direction	Lane Group	Lane Group Volume	Right Turn Overlap	Lane Use Factor (LUF)	Volume	Opposing Lefts	Lane Use Factor (LUF)	Opposing Volume	Critical Lane Volume (CLV)	Included in CLV
EB	TR	1260		0.37	466	27	1.00	27	493	
	L	17		1.00	17				44	
WB	TR	2078		0.37	769	17	1.00	17	786	*
	L	27		1.00	27				44	
NB	LTR	25		1.00	25	16	1.00	16	41	*
					0				16	
SB	LTR	29		1.00	29	11	1.00	11	40	
									11	
Note:									CLV	827
Congestion Equiv.									v/c	0.517
										1600

PM Peak Hour Critical Lane Volume Analysis



Direction	Lane Group	Lane Group Volume	Right Turn Overlap	Lane Use Factor (LUF)	Volume	Opposing Lefts	Lane Use Factor (LUF)	Opposing Volume	Critical Lane Volume (CLV)	Included in CLV
EB	TR	1955		0.37	723	25	1.00	25	748	*
	L	37		1.00	37				62	
WB	TR	1415		0.37	524	37	1.00	37	561	*
	L	25		1.00	25				62	
NB	LTR	52		1.00	52	14	1.00	14	66	*
					0				14	
SB	LTR	34		1.00	34	21	1.00	21	55	
									21	
Note:									CLV	814
Congestion Equiv.									v/c	0.509
										1600

Right Turn Overlap

Approach	Excl. Right	Right Vol.			Adjacent Overlap Vol.			Overlap	
		AM	PM	LUF	AM	PM	LUF	AM	PM
Eastbound	No	n/a	n/a	n/a	n/a	n/a	n/a	0	0
Westbound	No	n/a	n/a	n/a	n/a	n/a	n/a	0	0
Northbound	No	n/a	n/a	n/a	n/a	n/a	n/a	0	0
Southbound	No	n/a	n/a	n/a	n/a	n/a	n/a	0	0

Montgomery County LATR

	Lane Use Factors		
	Number of Lanes	Left Turn LUF	Through LUF
1	1	1.00	
2	0.53	0.53	
3	0.37	0.37	
4		0.30	
5		0.25	