

**APPENDIX H**  
**ORANGE POLICY AREA**  
**FUTURE BACKGROUND CONDITIONS CAPACITY ANALYSES**

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

Background AM  
08/28/2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖↖↖		↖	↖↖↖		↖	↖		↖	↖	
Traffic Volume (vph)	69	1172	16	82	2055	107	35	10	9	173	13	91
Future Volume (vph)	69	1172	16	82	2055	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	5038		1766	4893		1681	1662		1647	1520	
Flt Permitted	0.95	1.00		0.18	1.00		0.68	1.00		0.74	1.00	
Satd. Flow (perm)	1770	5038		337	4893		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)	74	1260	17	88	2210	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)	74	1276	0	88	2322	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)	12.6	90.2		93.6	85.6		32.3	32.3		32.3	32.3	
Effective Green, g (s)	12.6	90.2		93.6	85.6		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)	148	3029		286	2792		258	357		277	327	
v/s Ratio Prot	c0.04	c0.25		0.02	c0.47			0.01			0.02	
v/s Ratio Perm				0.18			0.03			c0.14		
v/c Ratio	0.50	0.42		0.31	0.83		0.15	0.04		0.67	0.11	
Uniform Delay, d1	65.7	16.0		11.6	26.3		47.7	46.5		54.0	47.3	
Progression Factor	0.79	1.35		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.4	0.4		0.6	3.1		0.3	0.0		6.3	0.1	
Delay (s)	55.3	22.0		12.2	29.4		48.0	46.6		60.3	47.4	
Level of Service	E	C		B	C		D	D		E	D	
Approach Delay (s)		23.8			28.7			47.5			55.4	
Approach LOS		C			C			D			E	

Intersection Summary

HCM 2000 Control Delay	29.3	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	90.0%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

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

Background AM  
08/28/2023



Movement	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations		↗	↑↑↑↘			↑↑↑	
Traffic Volume (veh/h)	0	36	1224	20	0	2738	
Future Volume (Veh/h)	0	36	1224	20	0	2738	
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	40	1375	22	0	3076	
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	0.66						
vC, conflicting volume	2421	479			1407		
vC1, stage 1 conf vol	1396						
vC2, stage 2 conf vol	1025						
vCu, unblocked vol	1328	479			1407		
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	92			100		
cM capacity (veh/h)	163	527			476		
Direction, Lane #	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	40	550	550	297	1025	1025	1025
Volume Left	0	0	0	0	0	0	0
Volume Right	40	0	0	22	0	0	0
cSH	527	1700	1700	1700	1700	1700	1700
Volume to Capacity	0.08	0.32	0.32	0.17	0.60	0.60	0.60
Queue Length 95th (ft)	6	0	0	0	0	0	0
Control Delay (s)	12.4	0.0	0.0	0.0	0.0	0.0	0.0
Lane LOS	B						
Approach Delay (s)	12.4	0.0			0.0		
Approach LOS	B						
Intersection Summary							
Average Delay			0.1				
Intersection Capacity Utilization			56.2%		ICU Level of Service		B
Analysis Period (min)			15				

# HCM Signalized Intersection Capacity Analysis

## 9: Georgia Avenue & Commercial Driveway/Shorefield Road

Background 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	1104	21	57	2694	1	
Future Volume (vph)	14	3	4	93	0	56	1	1104	21	57	2694	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		5067		1769	5085		
Flt Permitted		0.79			0.74	1.00		0.94		0.20	1.00		
Satd. Flow (perm)		1418			1372	1532		4747		376	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	1162	22	60	2836	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	1184	0	60	2837	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		3471		351	4057		
v/s Ratio Prot										0.01	c0.56		
v/s Ratio Perm		0.01			c0.07	0.00		0.25		0.13			
v/c Ratio		0.10			0.56	0.04		0.34		0.17	0.70		
Uniform Delay, d1		57.7			61.3	57.2		7.2		3.8	6.9		
Progression Factor		1.00			1.00	1.00		2.33		1.00	1.00		
Incremental Delay, d2		0.2			6.4	0.2		0.3		0.2	1.0		
Delay (s)		57.9			67.7	57.4		17.1		4.0	7.9		
Level of Service		E			E	E		B		A	A		
Approach Delay (s)		57.9			63.8			17.1			7.9		
Approach LOS		E			E			B			A		
<b>Intersection Summary</b>													
HCM 2000 Control Delay			12.8		HCM 2000 Level of Service						B		
HCM 2000 Volume to Capacity ratio			0.70										
Actuated Cycle Length (s)			150.0		Sum of lost time (s)						15.5		
Intersection Capacity Utilization			73.1%		ICU Level of Service						D		
Analysis Period (min)			15										

c Critical Lane Group

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

Background 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	776	37	374	2403	19	
Future Volume (vph)	33	111	30	145	170	344	30	776	37	374	2403	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	5042		1769	5038		
Flt Permitted	0.64	1.00		0.37	1.00	1.00	0.05	1.00		0.25	1.00		
Satd. Flow (perm)	1194	1798		695	1863	1562	100	5042		469	5038		
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	834	40	402	2584	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	871	0	402	2604	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	78.5	74.4		101.6	92.5		
Effective Green, g (s)	19.1	19.1		35.9	35.9	35.9	78.5	74.4		101.6	92.5		
Actuated g/C Ratio	0.13	0.13		0.24	0.24	0.24	0.52	0.50		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	97	2500		510	3106		
v/s Ratio Prot		0.08		c0.05	0.10		0.01	0.17		c0.12	c0.52		
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	0.35		0.79	0.84		
Uniform Delay, d1	58.8	62.1		48.0	48.1	46.0	23.8	23.0		12.6	22.8		
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.21	0.74		
Incremental Delay, d2	1.6	7.7		4.8	1.3	0.7	2.0	0.4		5.9	2.1		
Delay (s)	60.5	69.8		52.8	49.4	46.7	25.8	23.4		21.3	18.9		
Level of Service	E	E		D	D	D	C	C		C	B		
Approach Delay (s)		68.1			48.7			23.5			19.2		
Approach LOS		E			D			C			B		
<b>Intersection Summary</b>													
HCM 2000 Control Delay			26.3	HCM 2000 Level of Service						C			
HCM 2000 Volume to Capacity ratio			0.82										
Actuated Cycle Length (s)			150.0	Sum of lost time (s)						22.5			
Intersection Capacity Utilization			86.4%	ICU Level of Service						E			
Analysis Period (min)			15										

c Critical Lane Group

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

Background AM  
 08/28/2023

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 			 			 	
Traffic Volume (veh/h)	17	1162	41	27	1989	72	11	2	12	16	4	9
Future Volume (Veh/h)	17	1162	41	27	1989	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	1263	45	29	2162	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	0.62			0.90			0.67	0.67	0.90	0.67	0.67	0.62
vC, conflicting volume	2240			1308			2130	3620	456	2743	3603	778
vC1, stage 1 conf vol							1322	1322		2259	2259	
vC2, stage 2 conf vol							809	2298		484	1344	
vCu, unblocked vol	845			953			0	2172	7	861	2148	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 %	96			96			98	98	99	90	97	98
cM capacity (veh/h)	487			645			605	114	954	166	119	659
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	505	505	298	29	865	865	510	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	487	1700	1700	1700	645	1700	1700	1700	530	205		
Volume to Capacity	0.04	0.30	0.30	0.18	0.04	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	10.8	0.0	0.0	0.0	12.2	25.7		
Lane LOS	B				B				B	D		
Approach Delay (s)	0.2				0.1				12.2	25.7		
Approach LOS									B	D		
Intersection Summary												
Average Delay				0.5								
Intersection Capacity Utilization			54.5%		ICU Level of Service				A			
Analysis Period (min)			15									

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

Background PM  
 08/28/2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↗	↑↑↑		↗	↑↑↑		↗	↑		↗	↑	
Traffic Volume (vph)	25	1819	30	35	1335	147	24	7	13	111	6	27
Future Volume (vph)	25	1819	30	35	1335	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	0.99		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	4958		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		156	4958		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	1875	31	36	1376	152	25	7	13	114	6	28
RTOR Reduction (vph)	0	1	0	0	6	0	0	11	0	0	24	0
Lane Group Flow (vph)	26	1905	0	36	1522	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		170	3460		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		0.21	0.44		0.14	0.04		0.62	0.05	
Uniform Delay, d1	70.3	10.7		7.3	9.9		57.5	56.7		61.5	56.8	
Progression Factor	0.98	0.92		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	4.1	0.5		0.6	0.4		0.4	0.1		6.5	0.1	
Delay (s)	73.2	10.3		7.9	10.3		57.8	56.8		68.0	56.9	
Level of Service	E	B		A	B		E	E		E	E	
Approach Delay (s)		11.2			10.2			57.4			65.4	
Approach LOS		B			B			E			E	

Intersection Summary		
HCM 2000 Control Delay	13.5	HCM 2000 Level of Service
HCM 2000 Volume to Capacity ratio	0.55	B
Actuated Cycle Length (s)	150.0	Sum of lost time (s)
Intersection Capacity Utilization	61.4%	19.5
Analysis Period (min)	15	ICU Level of Service
		B

c Critical Lane Group

# HCM Unsignalized Intersection Capacity Analysis

## 8: Georgia Avenue & Glenmont Circle

Background PM  
08/28/2023



Movement	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations		↗	↕↕↕			↕↕↕	
Traffic Volume (veh/h)	0	23	2121	39	0	1817	
Future Volume (Veh/h)	0	23	2121	39	0	1817	
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	28	2587	48	0	2216	
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	0.77						
vC, conflicting volume	3385	921			2670		
vC1, stage 1 conf vol	2646						
vC2, stage 2 conf vol	739						
vCu, unblocked vol	3052	921			2670		
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	89			100		
cM capacity (veh/h)	33	263			148		
Direction, Lane #	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	28	1035	1035	565	739	739	739
Volume Left	0	0	0	0	0	0	0
Volume Right	28	0	0	48	0	0	0
cSH	263	1700	1700	1700	1700	1700	1700
Volume to Capacity	0.11	0.61	0.61	0.33	0.43	0.43	0.43
Queue Length 95th (ft)	9	0	0	0	0	0	0
Control Delay (s)	20.3	0.0	0.0	0.0	0.0	0.0	0.0
Lane LOS	C						
Approach Delay (s)	20.3	0.0			0.0		
Approach LOS	C						
Intersection Summary							
Average Delay			0.1				
Intersection Capacity Utilization			51.9%		ICU Level of Service		A
Analysis Period (min)			15				



# HCM Signalized Intersection Capacity Analysis

## 9: Georgia Avenue & Commercial Driveway/Shorefield Road

Background 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	1992	53	132	1674	27
Future Volume (vph)	32	25	7	156	3	127	0	1992	53	132	1674	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		5053		1770	5071	
Flt Permitted		0.70			0.70	1.00		1.00		0.05	1.00	
Satd. Flow (perm)		1265			1296	1583		5053		92	5071	
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	2075	55	138	1744	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	2129	0	138	1771	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		3247		194	3789	
v/s Ratio Prot						0.01		0.42		c0.05	0.35	
v/s Ratio Perm		0.05			c0.13					c0.48		
v/c Ratio		0.28			0.72	0.08		0.66		0.71	0.47	
Uniform Delay, d1		53.2			57.9	51.3		16.5		35.2	7.4	
Progression Factor		1.00			1.00	1.00		1.21		1.00	1.00	
Incremental Delay, d2		0.7			12.3	0.3		0.7		11.6	0.4	
Delay (s)		53.8			70.2	51.5		20.7		46.9	7.8	
Level of Service		D			E	D		C		D	A	
Approach Delay (s)		53.8			62.0			20.7			10.6	
Approach LOS		D			E			C			B	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			19.6									B
HCM 2000 Volume to Capacity ratio			0.73									
Actuated Cycle Length (s)			150.0							15.5		
Intersection Capacity Utilization			105.0%									G
Analysis Period (min)			15									

c Critical Lane Group

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

Background 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	1729	67	237	1542	18
Future Volume (vph)	50	106	18	93	119	392	53	1729	67	237	1542	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	1769	5048		1770	5034	
Flt Permitted	0.67	1.00		0.41	1.00	1.00	0.12	1.00		0.05	1.00	
Satd. Flow (perm)	1236	1823		755	1863	1534	220	5048		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	1859	72	255	1658	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	1929	0	255	1677	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	84.5	78.3		103.8	92.6	
Effective Green, g (s)	17.8	17.8		33.7	33.7	33.7	84.5	78.3		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	187	2635		291	3107	
v/s Ratio Prot		0.07		0.03	0.07		0.01	0.38		c0.12	0.33	
v/s Ratio Perm	0.04			0.06		c0.12	0.16			c0.48		
v/c Ratio	0.37	0.60		0.41	0.31	0.54	0.30	0.73		0.88	0.54	
Uniform Delay, d1	60.9	62.7		48.1	48.4	51.3	15.2	27.7		48.9	16.5	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.20	0.78	
Incremental Delay, d2	3.3	6.5		1.1	0.9	3.0	0.9	1.8		22.3	0.6	
Delay (s)	64.2	69.2		49.2	49.3	54.3	16.1	29.6		81.0	13.4	
Level of Service	E	E		D	D	D	B	C		F	B	
Approach Delay (s)		67.8			52.5			29.2			22.3	
Approach LOS		E			D			C			C	

Intersection Summary		
HCM 2000 Control Delay	31.1	HCM 2000 Level of Service
HCM 2000 Volume to Capacity ratio	0.84	C
Actuated Cycle Length (s)	150.0	Sum of lost time (s)
Intersection Capacity Utilization	83.8%	22.5
Analysis Period (min)	15	ICU Level of Service
		E
c Critical Lane Group		

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

Background PM  
 08/28/2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	37	1900	31	25	1358	21	21	3	28	14	2	18
Future Volume (Veh/h)	37	1900	31	25	1358	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	1959	32	26	1400	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	0.89			0.80			0.86	0.86	0.80	0.86	0.86	0.89
vC, conflicting volume	1422			1996			2599	3530	681	2230	3535	482
vC1, stage 1 conf vol							2056	2056		1463	1463	
vC2, stage 2 conf vol							543	1474		766	2072	
vCu, unblocked vol	1042			1386			1424	2508	0	994	2514	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 %	94			93			76	96	97	92	97	98
cM capacity (veh/h)	590			392			91	86	862	171	79	962
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	784	784	424	26	560	560	302	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	590	1700	1700	1700	392	1700	1700	1700	174	276		
Volume to Capacity	0.06	0.46	0.46	0.25	0.07	0.33	0.33	0.18	0.31	0.13		
Queue Length 95th (ft)	5	0	0	0	5	0	0	0	31	11		
Control Delay (s)	11.5	0.0	0.0	0.0	14.8	0.0	0.0	0.0	34.7	19.9		
Lane LOS	B			B			D			C		
Approach Delay (s)	0.2			0.3			34.7			19.9		
Approach LOS							D			C		
Intersection Summary												
Average Delay	1.0											
Intersection Capacity Utilization	50.2%			ICU Level of Service			A					
Analysis Period (min)	15											

**6**

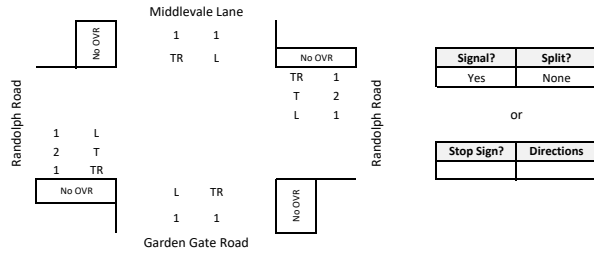
**Critical Lane Volume and Level of Service Calculations**

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

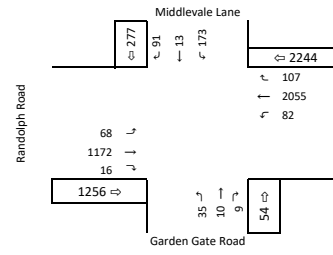
Jurisdiction: **Montgomery County, MD**  
 Scenario/Design Year: **Background Conditions**  
 Computed by: **W+A**



**Intersection Lane Use & Traffic Control**

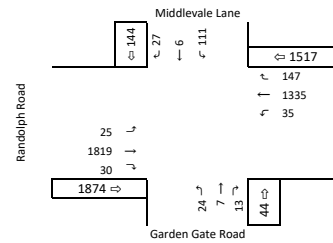


**AM Peak Hour Critical Lane Volume Analysis**



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	1188		0.37	440	82	1.00	82	522	
	L	68	0	1.00	68				150	
WB	TR	2162		0.37	800	68	1.00	68	868	*
	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	1284
Congestion Equiv.									v/c	0.803
										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	1849		0.37	684	35	1.00	35	719	*
	L	25	0	1.00	25				60	
WB	TR	1482		0.37	548	25	1.00	25	573	
	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	989
Congestion Equiv.									v/c	0.618
										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**

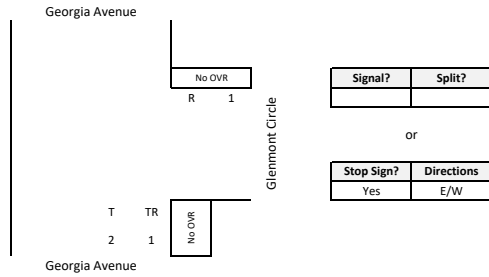
Number of Lanes	Lane Use Factors	
	Left Turn LUF	Through LUF
1	1	1.00
2	0.53	0.53
3	0.37	0.37
4	0.30	0.30
5	0.25	0.25

**8**  
**Critical Lane Volume  
and  
Level of Service Calculations**

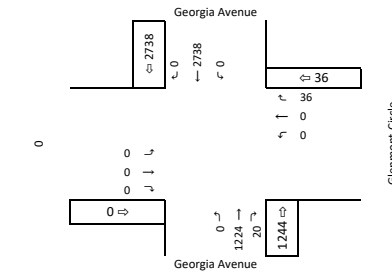
Intersection: **08. Georgia Avenue / Glenmont Circle**  
Jurisdiction: **Montgomery County, MD**  
Scenario/Design Year: **Background Conditions**  
Computed by: **W+A**



**Intersection Lane Use & Traffic Control**

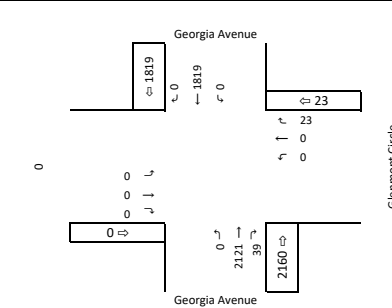


**AM Peak Hour Critical Lane Volume Analysis**



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	36	0	1.00	36	0		0	36	*
NB	TR	1244	0	0.37	460	0		0	460	*
SB			0		0	0		0	0	
Note:									CLV	496
Congestion Equiv.									v/c	0.276
										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	23	0	1.00	23	0		0	23	*
NB	TR	2160	0	0.37	799	0		0	799	*
SB			0		0	0		0	0	
Note:									CLV	822
Congestion Equiv.									v/c	0.457
										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	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	

9

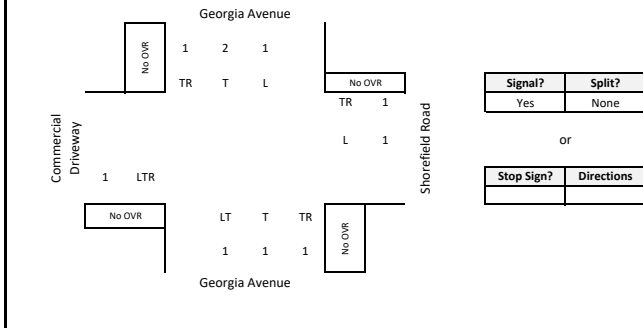
**Critical Lane Volume  
and  
Level of Service Calculations**

Intersection: 09. Georgia Avenue / Shorefield Road

Jurisdiction: Montgomery County, MD  
Scenario/Design Year: Background 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	*
					0				93	
WB	TR	56	0	1.00	56	14	1.00	14	70	
	L	93		1.00	93				107	
NB	LTR	1126	0	0.37	417	57	1.00	57	474	*
					0				57	
SB	TR	2695	0	0.37	997	1	1.00	1	998	*
	L	57		1.00	57				58	
Note:									CLV	1112
Congestion Equiv.									v/c	0.695
										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	*
					0				156	
WB	TR	130	0	1.00	130	32	1.00	32	162	
	L	156		1.00	156				188	
NB	LTR	2045	0	0.37	757	132	1.00	132	889	*
					0				132	
SB	TR	1701	0	0.37	629	0	1.00	0	629	
	L	132		1.00	132				132	
Note:									CLV	1109
Congestion Equiv.									v/c	0.693
										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**

	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

# 11

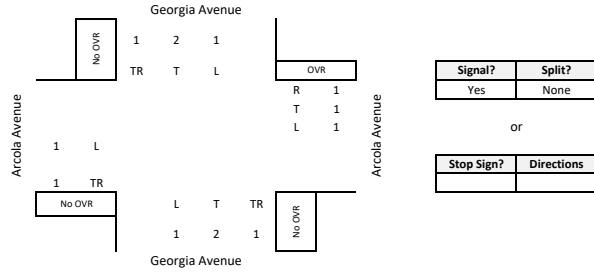
## Critical Lane Volume and Level of Service Calculations

Intersection: 11. Georgia Avenue / Arcola Avenue

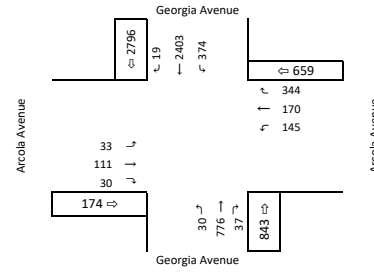
Jurisdiction: Montgomery County, MD  
 Scenario/Design Year: Background Conditions  
 Computed by: W+A



### Intersection Lane Use & Traffic Control

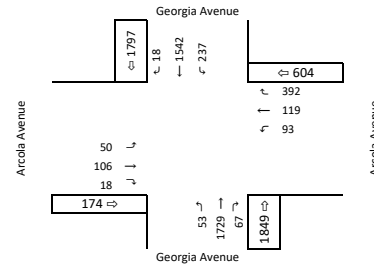


### AM Peak Hour Critical Lane Volume Analysis



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	141		1.00	141				286	*
	L	33	0	1.00	33	145	1.00	145	178	
WB	T	170		1.00	170				203	
	R	344	344	1.00	0	33	1.00	33	33	
NB	TR	813		0.37	301				675	
	L	30	0	1.00	30	374	1.00	374	404	
SB	TR	2422		0.37	896				926	*
	L	374	0	1.00	374	30	1.00	30	404	
Note:									CLV	1212
Congestion Equiv.									v/c	0.758
										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	124		1.00	124				217	
	L	50	0	1.00	50	93	1.00	93	143	
WB	T	119		1.00	119				169	*
	R	392	0	1.00	392	50	1.00	50	442	
NB	TR	1796		0.37	665				902	*
	L	53	0	1.00	53	237	1.00	237	290	
SB	TR	1560		0.37	577				630	
	L	237	0	1.00	237	53	1.00	53	290	
Note:									CLV	1344
Congestion Equiv.									v/c	0.840
										1600

### Right Turn Overlap

Approach	Exc. 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	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	0	0
Southbound	No	n/a	n/a		n/a	n/a		n/a	0	0

### Montgomery County LATR

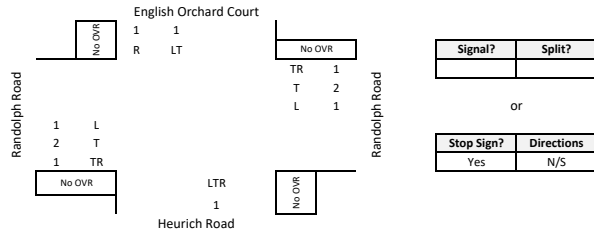
Number of Lanes	Lane Use Factors	
	Left Turn LUF	Through LUF
1	1	1.00
2	0.53	0.53
3	0.37	0.37
4		0.30
5		0.25

**13**  
Critical Lane Volume  
and  
Level of Service Calculations

Intersection: **13. Randolph Road / Heurich Road**  
Jurisdiction: **Montgomery County, MD**  
Scenario/Design Year: **Background 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	1203		0.37	445	27	1.00	27	472	
	L	17		1.00	17				44	
WB	TR	2061		0.37	763	17	1.00	17	780	*
	L	27		1.00	27				44	
NB	LTR	25		1.00	25	0	1.00	16	41	*
					0				16	
SB	LTR	29		1.00	29	11	1.00	11	40	
									11	
Note:									CLV	821
Congestion Equiv.									v/c	0.513
										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	1931		0.37	714	25	1.00	25	739	*
	L	37		1.00	37				62	
WB	TR	1379		0.37	510	37	1.00	37	547	
	L	25		1.00	25				62	
NB	LTR	52		1.00	52	0	1.00	14	66	*
					0				14	
SB	LTR	34		1.00	34	21	1.00	21	55	
									21	
Note:									CLV	805
Congestion Equiv.									v/c	0.503
										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**

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
5		0.25