

**APPENDIX E**  
**ORANGE POLICY AREA**  
**EXISTING CONDITIONS CAPACITY ANALYSES**

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

Existing Conditions - AM Peak Hour  
08/28/2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↑↑↑		↖	↑↑↑		↖	↑		↖	↑	
Traffic Volume (vph)	68	1103	16	82	1996	107	35	10	9	173	13	91
Future Volume (vph)	68	1103	16	82	1996	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	5036		1764	4888		1681	1662		1647	1520	
Flt Permitted	0.95	1.00		0.20	1.00		0.68	1.00		0.74	1.00	
Satd. Flow (perm)	1770	5036		372	4888		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	1186	17	88	2146	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	1202	0	88	2258	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				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	3028		306	2792		258	357		277	327	
v/s Ratio Prot	c0.04	c0.24		0.02	c0.46			0.01				0.02
v/s Ratio Perm				0.16			0.03			c0.14		
v/c Ratio	0.50	0.40		0.29	0.81		0.15	0.04		0.67	0.11	
Uniform Delay, d1	65.7	15.7		11.4	25.6		47.7	46.5		54.0	47.3	
Progression Factor	0.78	1.40		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.4	0.4		0.5	2.6		0.3	0.0		6.3	0.1	
Delay (s)	54.6	22.3		11.9	28.3		48.0	46.6		60.3	47.4	
Level of Service	D	C		B	C		D	D		E	D	
Approach Delay (s)		24.2			27.7			47.5			55.4	
Approach LOS		C			C			D			E	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			28.9			HCM 2000 Level of Service				C		
HCM 2000 Volume to Capacity ratio			0.74									
Actuated Cycle Length (s)			150.0			Sum of lost time (s)			19.5			
Intersection Capacity Utilization			88.8%			ICU Level of Service				E		
Analysis Period (min)			15									
c Critical Lane Group												

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

Existing Conditions - AM Peak Hour  
08/28/2023



Movement	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations		↖	↕↕↕			↕↕↕	
Traffic Volume (veh/h)	0	36	1081	20	0	2522	
Future Volume (Veh/h)	0	36	1081	20	0	2522	
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	1215	22	0	2834	
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	0.70						
vC, conflicting volume	2181	426			1247		
vC1, stage 1 conf vol	1236						
vC2, stage 2 conf vol	945						
vCu, unblocked vol	1186	426			1247		
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	93			100		
cM capacity (veh/h)	199	571			549		
Direction, Lane #	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	40	486	486	265	945	945	945
Volume Left	0	0	0	0	0	0	0
Volume Right	40	0	0	22	0	0	0
cSH	571	1700	1700	1700	1700	1700	1700
Volume to Capacity	0.07	0.29	0.29	0.16	0.56	0.56	0.56
Queue Length 95th (ft)	6	0	0	0	0	0	0
Control Delay (s)	11.8	0.0	0.0	0.0	0.0	0.0	0.0
Lane LOS	B						
Approach Delay (s)	11.8	0.0			0.0		
Approach LOS	B						
Intersection Summary							
Average Delay			0.1				
Intersection Capacity Utilization			52.1%		ICU Level of Service		A
Analysis Period (min)			15				

# HCM Signalized Intersection Capacity Analysis

Existing Conditions - AM Peak Hour

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

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	961	21	57	2478	1
Future Volume (vph)	14	3	4	93	0	56	1	961	21	57	2478	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		5064		1768	5085	
Flt Permitted		0.79			0.74	1.00		0.94		0.24	1.00	
Satd. Flow (perm)		1418			1372	1532		4747		448	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	1012	22	60	2608	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	1034	0	60	2609	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		405	4057	
v/s Ratio Prot										0.01	c0.51	
v/s Ratio Perm		0.01			c0.07	0.00		0.22		0.11		
v/c Ratio		0.10			0.56	0.04		0.30		0.15	0.64	
Uniform Delay, d1		57.7			61.3	57.2		6.9		3.6	6.3	
Progression Factor		1.00			1.00	1.00		2.23		1.00	1.00	
Incremental Delay, d2		0.2			6.4	0.2		0.2		0.2	0.8	
Delay (s)		57.9			67.7	57.4		15.6		3.7	7.1	
Level of Service		E			E	E		B		A	A	
Approach Delay (s)		57.9			63.8			15.6			7.0	
Approach LOS		E			E			B			A	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			11.9									B
HCM 2000 Volume to Capacity ratio			0.65									
Actuated Cycle Length (s)			150.0							15.5		
Intersection Capacity Utilization			68.9%									C
Analysis Period (min)			15									

c Critical Lane Group

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

Existing Conditions - AM Peak Hour

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	633	37	374	2187	19
Future Volume (vph)	33	111	30	145	170	344	30	633	37	374	2187	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	5033		1768	5037	
Flt Permitted	0.64	1.00		0.37	1.00	1.00	0.05	1.00		0.31	1.00	
Satd. Flow (perm)	1194	1798		695	1863	1562	98	5033		584	5037	
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	681	40	402	2352	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	718	0	402	2372	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	80.5	76.4		101.6	92.5	
Effective Green, g (s)	19.1	19.1		35.9	35.9	35.9	80.5	76.4		101.6	92.5	
Actuated g/C Ratio	0.13	0.13		0.24	0.24	0.24	0.54	0.51		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	2563		555	3106	
v/s Ratio Prot		0.08		c0.05	0.10		0.01	0.14		c0.10	c0.47	
v/s Ratio Perm	0.03			c0.10		0.06	0.17			0.39		
v/c Ratio	0.23	0.63		0.62	0.41	0.24	0.33	0.28		0.72	0.76	
Uniform Delay, d1	58.8	62.1		48.0	48.1	46.0	20.5	21.1		11.2	20.8	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		0.86	0.75	
Incremental Delay, d2	1.6	7.7		4.8	1.3	0.7	1.9	0.3		3.7	1.5	
Delay (s)	60.5	69.8		52.8	49.4	46.7	22.5	21.3		13.3	17.1	
Level of Service	E	E		D	D	D	C	C		B	B	
Approach Delay (s)		68.1			48.7			21.4			16.5	
Approach LOS		E			D			C			B	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			24.7									C
HCM 2000 Volume to Capacity ratio			0.76									
Actuated Cycle Length (s)			150.0								22.5	
Intersection Capacity Utilization			82.2%									E
ICU Level of Service												
Analysis Period (min)			15									

c Critical Lane Group

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

Existing Conditions - AM Peak Hour

08/28/2023

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	17	1093	41	27	1930	72	11	2	12	16	4	9
Future Volume (Veh/h)	17	1093	41	27	1930	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	1188	45	29	2098	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	0.64			0.90			0.69	0.69	0.90	0.69	0.69	0.64
vC, conflicting volume	2176			1233			2034	3480	432	2654	3464	756
vC1, stage 1 conf vol							1246	1246		2195	2195	
vC2, stage 2 conf vol							787	2234		459	1269	
vCu, unblocked vol	868			888			0	2080	2	878	2056	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	99
cM capacity (veh/h)	494			686			626	120	966	167	126	682
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	475	475	283	29	839	839	498	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	494	1700	1700	1700	686	1700	1700	1700	548	209		
Volume to Capacity	0.04	0.28	0.28	0.17	0.04	0.49	0.49	0.29	0.05	0.15		
Queue Length 95th (ft)	3	0	0	0	3	0	0	0	4	13		
Control Delay (s)	12.6	0.0	0.0	0.0	10.5	0.0	0.0	0.0	11.9	25.2		
Lane LOS	B				B				B	D		
Approach Delay (s)	0.2				0.1				11.9	25.2		
Approach LOS									B	D		
Intersection Summary												
Average Delay				0.5								
Intersection Capacity Utilization			53.4%		ICU Level of Service				A			
Analysis Period (min)			15									

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

Existing PM  
08/28/2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↗	↑↑↑		↗	↑↑↑		↗	↑		↗	↑	
Traffic Volume (vph)	25	1686	30	35	1245	147	24	7	13	111	6	27
Future Volume (vph)	25	1686	30	35	1245	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	0.98		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	5043		1770	4951		1765	1665		1765	1613	
Flt Permitted	0.95	1.00		0.10	1.00		0.73	1.00		0.74	1.00	
Satd. Flow (perm)	1770	5043		188	4951		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	1738	31	36	1284	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	1768	0	36	1430	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	3543		192	3455		181	220		183	213	
v/s Ratio Prot	c0.01	c0.35		0.01	0.29			0.01			0.01	
v/s Ratio Perm				0.13			0.02			c0.08		
v/c Ratio	0.38	0.50		0.19	0.41		0.14	0.04		0.62	0.05	
Uniform Delay, d1	70.3	10.2		6.7	9.6		57.5	56.7		61.5	56.8	
Progression Factor	0.95	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	4.2	0.5		0.5	0.4		0.4	0.1		6.5	0.1	
Delay (s)	70.9	10.7		7.2	10.0		57.8	56.8		68.0	56.9	
Level of Service	E	B		A	A		E	E		E	E	
Approach Delay (s)		11.5			9.9			57.4			65.4	
Approach LOS		B			A			E			E	

Intersection Summary		
HCM 2000 Control Delay	13.8	HCM 2000 Level of Service
HCM 2000 Volume to Capacity ratio	0.51	B
Actuated Cycle Length (s)	150.0	Sum of lost time (s)
Intersection Capacity Utilization	58.8%	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

Existing PM  
08/28/2023



Movement	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations		↗	↕↕↕↕			↕↕↕	
Traffic Volume (veh/h)	0	23	1905	39	0	1484	
Future Volume (Veh/h)	0	23	1905	39	0	1484	
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	2323	48	0	1810	
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	0.85						
vC, conflicting volume	2985	833			2406		
vC1, stage 1 conf vol	2382						
vC2, stage 2 conf vol	603						
vCu, unblocked vol	2723	833			2406		
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	91			100		
cM capacity (veh/h)	47	301			189		
Direction, Lane #	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	28	929	929	513	603	603	603
Volume Left	0	0	0	0	0	0	0
Volume Right	28	0	0	48	0	0	0
cSH	301	1700	1700	1700	1700	1700	1700
Volume to Capacity	0.09	0.55	0.55	0.30	0.35	0.35	0.35
Queue Length 95th (ft)	8	0	0	0	0	0	0
Control Delay (s)	18.2	0.0	0.0	0.0	0.0	0.0	0.0
Lane LOS	C						
Approach Delay (s)	18.2	0.0			0.0		
Approach LOS	C						
Intersection Summary							
Average Delay			0.1				
Intersection Capacity Utilization			47.7%		ICU Level of Service		A
Analysis Period (min)			15				



# HCM Signalized Intersection Capacity Analysis

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

Existing 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	1776	53	132	1341	27	
Future Volume (vph)	32	25	7	156	3	127	0	1776	53	132	1341	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		5050		1770	5068		
Flt Permitted		0.70			0.70	1.00		1.00		0.07	1.00		
Satd. Flow (perm)		1265			1296	1583		5050		133	5068		
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	1850	55	138	1397	28	
RTOR Reduction (vph)	0	3	0	0	0	108	0	2	0	0	1	0	
Lane Group Flow (vph)	0	63	0	0	166	24	0	1903	0	138	1424	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		97.6		112.1	112.1		
Effective Green, g (s)		26.9			26.9	26.9		97.6		112.1	112.1		
Actuated g/C Ratio		0.18			0.18	0.18		0.65		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		3285		208	3787		
v/s Ratio Prot						0.01		0.38		c0.04	0.28		
v/s Ratio Perm		0.05			c0.13					c0.45			
v/c Ratio		0.28			0.72	0.08		0.58		0.66	0.38		
Uniform Delay, d1		53.2			57.9	51.3		14.7		18.2	6.7		
Progression Factor		1.00			1.00	1.00		1.14		1.00	1.00		
Incremental Delay, d2		0.7			12.3	0.3		0.6		7.7	0.3		
Delay (s)		53.8			70.2	51.5		17.3		25.9	6.9		
Level of Service		D			E	D		B		C	A		
Approach Delay (s)		53.8			62.0			17.3			8.6		
Approach LOS		D			E			B			A		
<b>Intersection Summary</b>													
HCM 2000 Control Delay			17.9		HCM 2000 Level of Service						B		
HCM 2000 Volume to Capacity ratio			0.69										
Actuated Cycle Length (s)			150.0		Sum of lost time (s)						15.5		
Intersection Capacity Utilization			94.4%		ICU Level of Service						F		
Analysis Period (min)			15										

c Critical Lane Group

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

Existing 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	1513	67	237	1209	18
Future Volume (vph)	50	106	18	93	119	392	53	1513	67	237	1209	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	5043		1770	5031	
Flt Permitted	0.67	1.00		0.40	1.00	1.00	0.20	1.00		0.07	1.00	
Satd. Flow (perm)	1236	1823		752	1863	1534	364	5043		136	5031	
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	1627	72	255	1300	19
RTOR Reduction (vph)	0	4	0	0	0	238	0	3	0	0	1	0
Lane Group Flow (vph)	54	129	0	100	128	184	57	1696	0	255	1318	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)	17.7	17.7		33.6	33.6	33.6	84.3	78.4		103.9	93.0	
Effective Green, g (s)	17.7	17.7		33.6	33.6	33.6	84.3	78.4		103.9	93.0	
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)	145	215		242	417	343	259	2635		317	3119	
v/s Ratio Prot		0.07		0.03	0.07		0.01	0.34		c0.11	0.26	
v/s Ratio Perm	0.04			0.06		c0.12	0.11			c0.45		
v/c Ratio	0.37	0.60		0.41	0.31	0.54	0.22	0.64		0.80	0.42	
Uniform Delay, d1	61.0	62.8		48.2	48.5	51.3	14.9	25.8		39.3	14.7	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.36	0.80	
Incremental Delay, d2	3.3	6.6		1.1	0.9	2.9	0.4	1.2		13.0	0.4	
Delay (s)	64.4	69.4		49.3	49.4	54.2	15.3	27.0		66.6	12.2	
Level of Service	E	E		D	D	D	B	C		E	B	
Approach Delay (s)		67.9			52.5			26.6			21.0	
Approach LOS		E			D			C			C	

Intersection Summary		
HCM 2000 Control Delay	30.4	HCM 2000 Level of Service
HCM 2000 Volume to Capacity ratio	0.78	C
Actuated Cycle Length (s)	150.0	Sum of lost time (s)
Intersection Capacity Utilization	79.6%	22.5
Analysis Period (min)	15	ICU Level of Service
		D
c Critical Lane Group		

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

Existing PM  
 08/28/2023

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	37	1767	31	25	1268	21	21	3	28	14	2	18
Future Volume (Veh/h)	37	1767	31	25	1268	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	1822	32	26	1307	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	0.90			0.82			0.87	0.87	0.82	0.87	0.87	0.90
vC, conflicting volume	1329			1859			2431	3300	635	2091	3305	451
vC1, stage 1 conf vol							1919	1919		1370	1370	
vC2, stage 2 conf vol							512	1381		721	1935	
vCu, unblocked vol	994			1280			1374	2375	0	982	2381	23
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			94			80	97	97	92	98	98
cM capacity (veh/h)	625			439			108	98	879	186	92	944
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	729	729	396	26	523	523	283	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	625	1700	1700	1700	439	1700	1700	1700	202	299		
Volume to Capacity	0.06	0.43	0.43	0.23	0.06	0.31	0.31	0.17	0.27	0.12		
Queue Length 95th (ft)	5	0	0	0	5	0	0	0	26	10		
Control Delay (s)	11.1	0.0	0.0	0.0	13.7	0.0	0.0	0.0	29.2	18.6		
Lane LOS	B				B				D	C		
Approach Delay (s)	0.2				0.3				29.2	18.6		
Approach LOS									D	C		
Intersection Summary												
Average Delay			0.9									
Intersection Capacity Utilization			47.7%		ICU Level of Service				A			
Analysis Period (min)			15									

**6**

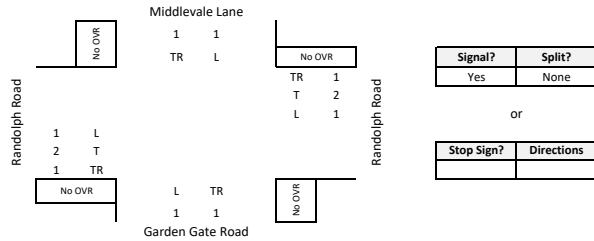
**Critical Lane Volume and Level of Service Calculations**

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

Jurisdiction: **Montgomery County, MD**  
 Scenario/Design Year: **Existing 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	1119	0	0.37	414	82	1.00	82	496	
	L	68	0	1.00	68				150	
WB	TR	2103	0	0.37	778	68	1.00	68	846	*
	L	82	0	1.00	82				150	
NB	TR	19	0	1.00	19	173	1.00	173	192	*
	L	35	0	1.00	35				208	
SB	TR	104	0	1.00	104	35	1.00	35	139	*
	L	173	0	1.00	173				208	
Note:									CLV	1262
Congestion Equiv.									v/c	0.789
										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	1716	0	0.37	635	35	1.00	35	670	*
	L	25	0	1.00	25				60	
WB	TR	1392	0	0.37	515	25	1.00	25	540	*
	L	35	0	1.00	35				60	
NB	TR	20	0	1.00	20	111	1.00	111	131	*
	L	24	0	1.00	24				135	
SB	TR	33	0	1.00	33	24	1.00	24	57	*
	L	111	0	1.00	111				135	
Note:									CLV	940
Congestion Equiv.									v/c	0.588
										1600

**Right Turn Overlap**

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

	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	

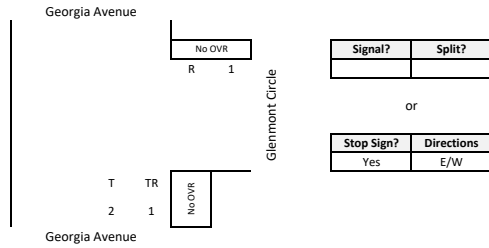
**8**  
Critical Lane Volume  
and  
Level of Service Calculations

Intersection: 08. Georgia Avenue / Glenmont Circle

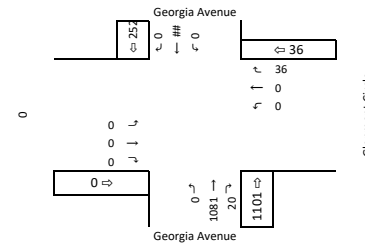
Jurisdiction: Montgomery County, MD  
Scenario/Design Year: Existing Conditions  
Computed by: W+A



**Intersection Lane Use & Traffic Control**

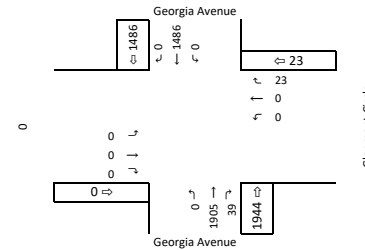


**AM Peak Hour Critical Lane Volume Analysis**



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			0		0	0		0	0	
WB	R	36	0	1.00	36	0		0	36	*
NB	TR	1101	0	0.37	407	0		0	407	*
SB			0		0	0		0	0	
Note:									CLV	443
Congestion Equiv.									v/c	0.246
										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)	Include in CLV
EB			0		0	0		0	0	
WB	R	23	0	1.00	23	0		0	23	*
NB	TR	1944	0	0.37	719	0		0	719	*
SB			0		0	0		0	0	
Note:									CLV	742
Congestion Equiv.									v/c	0.412
										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	

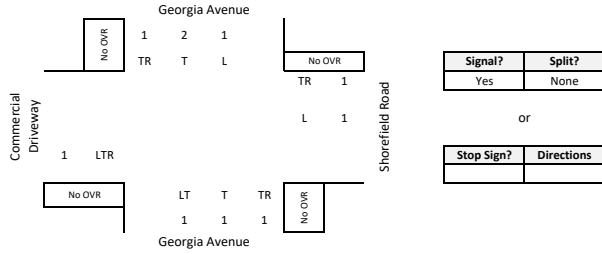
**9**  
**Critical Lane Volume**  
**and**  
**Level of Service Calculations**

Intersection: **09. Georgia Avenue / Shorefield Road**

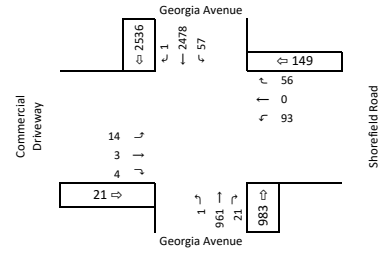
Jurisdiction: Montgomery County, MD  
 Scenario/Design Year: Existing Conditions  
 Computed by: W+A



**Intersection Lane Use & Traffic Control**

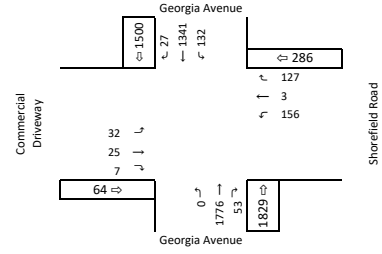


**AM Peak Hour Critical Lane Volume Analysis**



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 93	*
WB	TR	56	0	1.00	56	14	1.00	14	70 107	
WB	L	93	0	1.00	93	57	1.00	57	421 57	
NB	LTR	983	0	0.37	364	0	1.00	57	918 58	*
SB	TR	2479	0	0.37	917	1	1.00	1		
SB	L	57	0	1.00	57	0	1.00	0		
Note:									CLV	1032
Congestion Equiv.									v/c	0.645
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	220 156	*
WB	TR	130	0	1.00	130	32	1.00	32	162 188	
WB	L	156	0	1.00	156	132	1.00	132	809 132	*
NB	LTR	1829	0	0.37	677	0	1.00	132	506 132	*
SB	TR	1368	0	0.37	506	0	1.00	0		
SB	L	132	0	1.00	132	0	1.00	0		
Note:									CLV	1029
Congestion Equiv.									v/c	0.643
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	

# 11

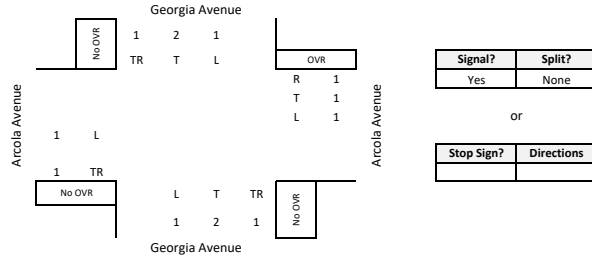
## Critical Lane Volume and Level of Service Calculations

Intersection: 11. Georgia Avenue / Arcola Avenue

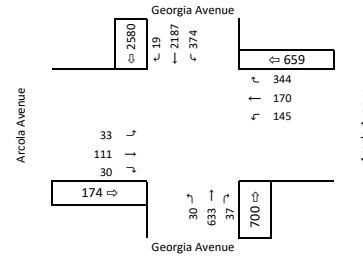
Jurisdiction: Montgomery County, MD  
 Scenario/Design Year: Existing Conditions  
 Computed by: W+A



### Intersection Lane Use & Traffic Control

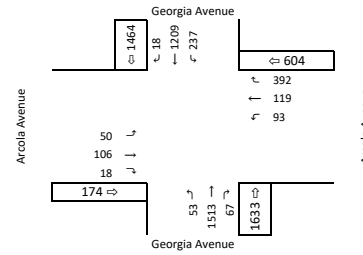


### AM Peak Hour Critical Lane Volume Analysis



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	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	670	0	0.37	248	374	1.00	374	622	*
	L	30	0	1.00	30	0	1.00	0	404	
SB	TR	2206	0	0.37	816	30	1.00	30	846	*
	L	374	0	1.00	374	0	1.00	0	404	
Note:									CLV	1132
Congestion Equiv.									v/c	0.708
										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	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	1580	0	0.37	585	237	1.00	237	822	*
	L	53	0	1.00	53	0	1.00	0	290	
SB	TR	1227	0	0.37	454	53	1.00	53	507	*
	L	237	0	1.00	237	0	1.00	0	290	
Note:									CLV	1264
Congestion Equiv.									v/c	0.790
										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

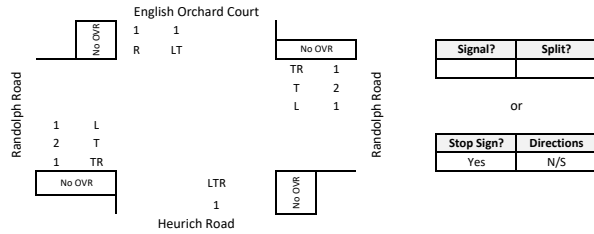
Number of Lanes	Lane Use Factors	
	Left Turn LUF	Through LUF
1	1	1.00
2	0.53	0.53
3	0.37	0.37
4		0.30
5		0.25

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

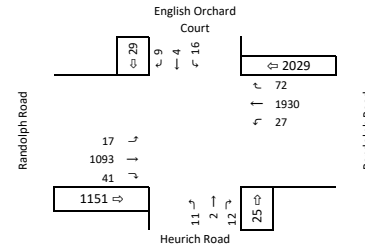
Intersection: **13. Randolph Road / Heurich Road**  
 Jurisdiction: Montgomery County, MD  
 Scenario/Design Year: Existing Conditions  
 Computed by: W+A



**Intersection Lane Use & Traffic Control**

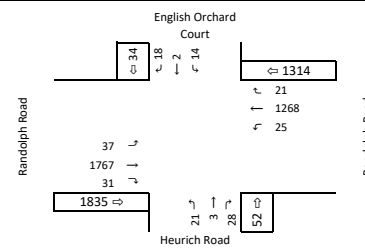


**AM Peak Hour Critical Lane Volume Analysis**



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	1134		0.37	420	27	1.00	27	447	
	L	17		1.00	17				44	
WB	TR	2002		0.37	741	17	1.00	17	758	*
	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	799
Congestion Equiv.									v/c	0.499
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	1798		0.37	665	25	1.00	25	690	*
	L	37		1.00	37				62	
WB	TR	1289		0.37	477	37	1.00	37	514	
	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	756
Congestion Equiv.									v/c	0.473
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		0	0
Westbound	No	n/a	n/a		n/a	n/a		n/a		0	0
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**

	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	