



May 4, 2022

Patrick Butler
Upcounty Planning Chief
Montgomery County Planning Department
2425 Reddie Dr 14th Floor,
Wheaton, MD 20902

RE: Supplemental Analysis – Worldshine Assisted Living
Ruby Drive, Montgomery County, Maryland

Dear Mr. Butler:

Per the requirements of Zoning Hearing Examiner, Wells + Associates has conducted an access analysis for the Worldshine Assisted Living project for you and your staff's review. The analysis includes a review of intersection queues, and crash data at the intersections of West Old Baltimore Road/Ruby Drive and MD 355/West Old Baltimore Road. Though not required, intersection capacity analyses are also provided.

The subject site is located along the west side of Ruby Drive (the "Property") in the Clarksburg Policy Area of Montgomery County, Maryland. The Applicant proposes to redevelop the Property with up to a 90-bed assisted living project. Access to the site is proposed on Ruby Drive.

The proposed development will generate less than 50 person trips and therefore an LATR study is not required. The attached Table 1 shows the trip generation anticipated for an assisted living facility with up to 90 beds.

Queue Analysis

Counts were conducted at the Ruby Drive/W. Old Baltimore Road, and MD 355 (Frederick Road)/West Old Baltimore Road intersections on December 13, 2021, from 6:30 to 9:30 AM and 4:00 to 7:00 PM. The peak hours on Ruby Drive/W. Old Baltimore Road occurred from 7:30 to 8:30 AM and from 4:45 to 5:45 PM, and on MD 355 (Frederick Road)/W. Old Baltimore Road occurred from 7:15 to 8:15 AM and from 4:00 to 5:00 PM.

The site trip distribution assumed for this analysis is based on the MNCPPC trip distribution tables for the is as follows: 100 percent of site vehicles headed to/from the east via Ruby Drive to W. Old Baltimore Road, with 10 percent of vehicle trips to the north on MD 355 and 90 percent south on MD 355.

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HCM 2000 method in Synchro was used to calculate the queues. The Synchro analysis provides the calculation of queues as well as intersection capacity. Table 2 summarizes the results of the queue analysis.

Three queuing scenarios were analyzed: 1) existing conditions, 2) background conditions, and 3) future conditions (with the proposed development).

Under each of the study conditions, both study intersections are well within the MNCPPC capacity standards (51 seconds of delay or less) and no queue exceeds the available storage length. Copies of the intersection capacity analysis and queue reports for both intersections are attached to this letter in the Attachment A.

Crash Evaluation

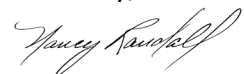
The crash history at both study intersections and the roadway link between the intersections was reviewed for a period of three years (January 1, 2019, through the end of 2021). Seven crashes were reported and all occurred at or near MD 355 (Frederick Road)/West Old Baltimore Road intersection. A summary of the crashes is shown in Table 2 and the detailed crash report for each is provided in Attachment B.

In 2019, the intersection of W. Old Baltimore Road/MD 355 was widened to provide turn lanes, channelization, and a new signal was installed. The majority of the crashes (5 of the 7) occurred in 2019-2020 before or during the construction which was completed in 2020. Since the completion of the intersection improvements, the number of accidents has declined to 1 accident per year. Based on the accident data, the intersection improvements have improved the safety at this intersection. No accidents were reported during the study period from 2019 through 2021 at the intersection of W. Old Baltimore Road and Ruby Drive or along W. Old Baltimore Road from Ruby Drive to MD 355.

Based on the analysis summarized in this letter and the attached documents, it is our opinion that the proposed development of Worldshine assisted living will not adversely impact the area road network.

If you have any questions regarding this analysis, please call me at (410) 353-7340 or email me at amrandall@wellsandassociates.com.

Sincerely,



Nancy Randall, AICP

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Table 1
Worldshine Ruby Drive
Site Trip Generation

Land Use	LU Code	Amount	Unit	AM Peak Hour			PM Peak Hour			AM Peak Hour					PM Peak Hour				
				In	Out	Total	In	Out	Total	Auto Driver (Vehicle Trips)	Auto Passenger	Transit Trips	Non-Motorized	Total Person Trips	Auto Driver (Vehicle Trips)	Auto Passenger	Transit Trips	Non-Motorized	Total Person Trips
Assisted Living	254	90	BEDS	10	6	16	9	13	22	16	7	1	1	25	22	9	1	2	34

Note: Trip Generation Rates based ITE 11th Generation, Mode Split is based on 2021 LATR Guidelines (Clarksburg Policy Area)



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Table 2
Summary of 95th Percentile Queues (in ft)

Lane Group	Storage Length (ft)	Existing Conditions		Background Conditions		Total Future Conditions	
		AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak
Ruby Drive/West Old Baltimore Road							
EB	760	0	0	0	0	0	0
WB	650	0	0	0	0	0	0
SB	475	0	0	1	0	2	3
MD 355 (Frederick Road)/West Old Baltimore Road							
EBL	1200	103	206	103	212	104	212
EBR	155	0	0	0	0	0	0
NBL	670	92	72	75	138	99	152
SBR	415	8	10	8	14	9	14

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Table 3
Summary of Reported Crashes (2019-2021)

Category	Subcategory	Number of Crashes	Number of Crashes	Number of Crashes	Number of Crashes
	Year	2019	2020	2021	Total of 3 Years
Light Condition	Daylight	2	1	1	4
	Dark Lights On	2	1	0	3
Surface Condition	Dry	4	1	1	6
	Wet	0	1	0	1
Severity	Property Damage	2	1	0	3
	Injury Crash	2	1	1	4
Driver Substance Abuse	None Detected	3	2	1	6
	Alcohol Present	1	0	0	1
	N/A	0	0	0	0
Collision Type	Single Vehicle	2	1	0	3
	Same Direction Rear End	2	1	0	3
	Head on Left Turn	0	0	1	1
Intersection Related	Yes	2	2	1	5
	No	2	0	0	2
Day of Week	Weekday	3	2	1	6
	Weekend	1	0	0	1
Time of Day	AM Peak (6:30-9:30 AM)	1	1	1	3
	PM Peak (4:00-7:00 PM)	1	0	0	1
	Other	2	1	0	3
Direction	NB	4	2	1	7
	SB	0	0	0	0

ATTACHMENT A
HCM REPORTS

HCM Unsignalized Intersection Capacity Analysis
 1: W Old Baltimore Rd & Ruby Dr

01/14/2022



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↔	↔		↔	
Traffic Volume (veh/h)	0	385	151	0	3	0
Future Volume (Veh/h)	0	385	151	0	3	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	418	164	0	3	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)	1194					
pX, platoon unblocked						
vC, conflicting volume	164			582	164	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	164			582	164	
tC, single (s)	4.1			6.4	6.2	
tC, 2 stage (s)						
tF (s)	2.2			3.5	3.3	
p0 queue free %	100			99	100	
cM capacity (veh/h)	1414			475	881	
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	418	164	3			
Volume Left	0	0	3			
Volume Right	0	0	0			
cSH	1414	1700	475			
Volume to Capacity	0.00	0.10	0.01			
Queue Length 95th (ft)	0	0	0			
Control Delay (s)	0.0	0.0	12.6			
Lane LOS			B			
Approach Delay (s)	0.0	0.0	12.6			
Approach LOS			B			
Intersection Summary						
Average Delay			0.1			
Intersection Capacity Utilization			30.3%	ICU Level of Service	A	
Analysis Period (min)			15			

Queues

2: MD 355 & W Old Baltimore Rd/Driveway

01/14/2022






















Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	59	315	130	532	1239	34
v/c Ratio	0.46	0.20	0.56	0.33	0.88	0.03
Control Delay	75.4	0.3	21.3	3.3	25.4	1.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	75.4	0.3	21.3	3.3	25.4	1.3
Queue Length 50th (ft)	56	0	17	94	854	0
Queue Length 95th (ft)	103	0	92	159	#1525	8
Internal Link Dist (ft)				485	1613	
Turn Bay Length (ft)		155				415
Base Capacity (vph)	423	1583	253	1611	1406	1206
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.14	0.20	0.51	0.33	0.88	0.03

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis
 2: MD 355 & W Old Baltimore Rd/Driveway

01/14/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	54	0	290	0	0	0	120	489	0	0	1140	31
Future Volume (vph)	54	0	290	0	0	0	120	489	0	0	1140	31
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0		4.0				4.5	5.5			5.5	5.5
Lane Util. Factor	1.00		1.00				1.00	1.00			1.00	1.00
Frt	1.00		0.85				1.00	1.00			1.00	0.85
Flt Protected	0.95		1.00				0.95	1.00			1.00	1.00
Satd. Flow (prot)	1770		1583				1770	1863			1863	1583
Flt Permitted	0.76		1.00				0.07	1.00			1.00	1.00
Satd. Flow (perm)	1410		1583				131	1863			1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	59	0	315	0	0	0	130	532	0	0	1239	34
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	9
Lane Group Flow (vph)	59	0	315	0	0	0	130	532	0	0	1239	25
Turn Type	Perm		Free				pm+pt	NA			NA	Perm
Protected Phases					8		5	2			6	
Permitted Phases	4		Free	8			2			6		6
Actuated Green, G (s)	11.9		150.0				127.6	127.6			112.2	112.2
Effective Green, g (s)	11.9		150.0				127.6	127.6			112.2	112.2
Actuated g/C Ratio	0.08		1.00				0.85	0.85			0.75	0.75
Clearance Time (s)	5.0						4.5	5.5			5.5	5.5
Vehicle Extension (s)	5.0						3.0	0.2			0.2	0.2
Lane Grp Cap (vph)	111		1583				230	1584			1393	1184
v/s Ratio Prot							c0.04	0.29			c0.67	
v/s Ratio Perm	c0.04		0.20				0.44					0.02
v/c Ratio	0.53		0.20				0.57	0.34			0.89	0.02
Uniform Delay, d1	66.4		0.0				33.8	2.3			14.2	4.8
Progression Factor	1.00		1.00				1.00	1.00			1.00	1.00
Incremental Delay, d2	8.7		0.3				3.2	0.6			8.8	0.0
Delay (s)	75.0		0.3				36.9	2.9			23.1	4.9
Level of Service	E		A				D	A			C	A
Approach Delay (s)		12.1			0.0			9.6			22.6	
Approach LOS		B			A			A			C	
Intersection Summary												
HCM 2000 Control Delay			17.2				HCM 2000 Level of Service				B	
HCM 2000 Volume to Capacity ratio			0.83									
Actuated Cycle Length (s)			150.0				Sum of lost time (s)			15.0		
Intersection Capacity Utilization			101.6%				ICU Level of Service			G		
Analysis Period (min)			15									

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
 1: W Old Baltimore Rd & Ruby Dr

01/14/2022



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↖	↗		↘	
Traffic Volume (veh/h)	0	187	312	3	2	0
Future Volume (Veh/h)	0	187	312	3	2	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	0	199	332	3	2	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)	1194					
pX, platoon unblocked						
vC, conflicting volume	335			532	334	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	335			532	334	
tC, single (s)	4.1			6.4	6.2	
tC, 2 stage (s)						
tF (s)	2.2			3.5	3.3	
p0 queue free %	100			100	100	
cM capacity (veh/h)	1224			508	708	
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	199	335	2			
Volume Left	0	0	2			
Volume Right	0	3	0			
cSH	1224	1700	508			
Volume to Capacity	0.00	0.20	0.00			
Queue Length 95th (ft)	0	0	0			
Control Delay (s)	0.0	0.0	12.1			
Lane LOS			B			
Approach Delay (s)	0.0	0.0	12.1			
Approach LOS			B			
Intersection Summary						
Average Delay			0.0			
Intersection Capacity Utilization			26.6%	ICU Level of Service	A	
Analysis Period (min)			15			

Queues

2: MD 355 & W Old Baltimore Rd/Driveway

01/14/2022






















Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	123	460	274	1141	837	37
v/c Ratio	0.75	0.29	0.60	0.75	0.64	0.03
Control Delay	90.2	0.5	8.7	11.1	15.7	1.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	90.2	0.5	8.7	11.1	15.7	1.7
Queue Length 50th (ft)	117	0	51	481	409	0
Queue Length 95th (ft)	#206	0	72	655	647	10
Internal Link Dist (ft)				485	1613	
Turn Bay Length (ft)		155				415
Base Capacity (vph)	178	1583	580	1514	1311	1127
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.69	0.29	0.47	0.75	0.64	0.03

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis
2: MD 355 & W Old Baltimore Rd/Driveway

01/14/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	113	0	423	0	0	0	252	1050	0	0	770	34
Future Volume (vph)	113	0	423	0	0	0	252	1050	0	0	770	34
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0		4.0				4.5	5.5			5.5	5.5
Lane Util. Factor	1.00		1.00				1.00	1.00			1.00	1.00
Frt	1.00		0.85				1.00	1.00			1.00	0.85
Flt Protected	0.95		1.00				0.95	1.00			1.00	1.00
Satd. Flow (prot)	1770		1583				1770	1863			1863	1583
Flt Permitted	0.76		1.00				0.23	1.00			1.00	1.00
Satd. Flow (perm)	1410		1583				430	1863			1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	123	0	460	0	0	0	274	1141	0	0	837	37
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	11
Lane Group Flow (vph)	123	0	460	0	0	0	274	1141	0	0	837	26
Turn Type	Perm		Free				pm+pt	NA			NA	Perm
Protected Phases					8		5	2			6	
Permitted Phases	4		Free	8			2			6		6
Actuated Green, G (s)	17.6		150.0				121.9	121.9			105.5	105.5
Effective Green, g (s)	17.6		150.0				121.9	121.9			105.5	105.5
Actuated g/C Ratio	0.12		1.00				0.81	0.81			0.70	0.70
Clearance Time (s)	5.0						4.5	5.5			5.5	5.5
Vehicle Extension (s)	5.0						3.0	0.2			0.2	0.2
Lane Grp Cap (vph)	165		1583				455	1513			1310	1113
v/s Ratio Prot							0.05	c0.61			0.45	
v/s Ratio Perm	c0.09		0.29				0.44					0.02
v/c Ratio	0.75		0.29				0.60	0.75			0.64	0.02
Uniform Delay, d1	64.0		0.0				11.3	6.8			12.0	6.7
Progression Factor	1.00		1.00				1.00	1.00			1.00	1.00
Incremental Delay, d2	19.6		0.5				2.2	3.5			2.4	0.0
Delay (s)	83.7		0.5				13.5	10.3			14.4	6.7
Level of Service	F		A				B	B			B	A
Approach Delay (s)		18.0			0.0			10.9			14.1	
Approach LOS		B			A			B			B	
Intersection Summary												
HCM 2000 Control Delay			13.3				HCM 2000 Level of Service				B	
HCM 2000 Volume to Capacity ratio			0.78									
Actuated Cycle Length (s)			150.0				Sum of lost time (s)				15.0	
Intersection Capacity Utilization			114.5%				ICU Level of Service				H	
Analysis Period (min)			15									

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
 1: W Old Baltimore Rd & Ruby Dr

01/14/2022



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	411	162	0	3	0
Future Volume (Veh/h)	0	411	162	0	3	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	447	176	0	3	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)	1194					
pX, platoon unblocked						
vC, conflicting volume	176			623	176	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	176			623	176	
tC, single (s)	4.1			6.4	6.2	
tC, 2 stage (s)						
tF (s)	2.2			3.5	3.3	
p0 queue free %	100			99	100	
cM capacity (veh/h)	1400			450	867	
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	447	176	3			
Volume Left	0	0	3			
Volume Right	0	0	0			
cSH	1400	1700	450			
Volume to Capacity	0.00	0.10	0.01			
Queue Length 95th (ft)	0	0	1			
Control Delay (s)	0.0	0.0	13.1			
Lane LOS			B			
Approach Delay (s)	0.0	0.0	13.1			
Approach LOS			B			
Intersection Summary						
Average Delay			0.1			
Intersection Capacity Utilization			31.6%	ICU Level of Service	A	
Analysis Period (min)			15			

Queues

2: MD 355 & W Old Baltimore Rd/Driveway

01/14/2022






















Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	59	358	146	504	1175	33
v/c Ratio	0.46	0.23	0.52	0.31	0.85	0.03
Control Delay	75.4	0.3	12.7	3.2	23.7	1.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	75.4	0.3	12.7	3.2	23.7	1.3
Queue Length 50th (ft)	56	0	19	87	776	0
Queue Length 95th (ft)	103	0	75	148	#1415	8
Internal Link Dist (ft)				485	1613	
Turn Bay Length (ft)		155				415
Base Capacity (vph)	423	1583	298	1611	1387	1190
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.14	0.23	0.49	0.31	0.85	0.03

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis
 2: MD 355 & W Old Baltimore Rd/Driveway

01/14/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	57	0	347	0	0	0	142	489	0	0	1140	32
Future Volume (vph)	57	0	347	0	0	0	142	489	0	0	1140	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0		4.0				4.5	5.5			5.5	5.5
Lane Util. Factor	1.00		1.00				1.00	1.00			1.00	1.00
Frt	1.00		0.85				1.00	1.00			1.00	0.85
Flt Protected	0.95		1.00				0.95	1.00			1.00	1.00
Satd. Flow (prot)	1770		1583				1770	1863			1863	1583
Flt Permitted	0.76		1.00				0.09	1.00			1.00	1.00
Satd. Flow (perm)	1410		1583				175	1863			1863	1583
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)	59	0	358	0	0	0	146	504	0	0	1175	33
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	9
Lane Group Flow (vph)	59	0	358	0	0	0	146	504	0	0	1175	24
Turn Type	Perm		Free				pm+pt	NA			NA	Perm
Protected Phases					8		5	2			6	
Permitted Phases	4		Free	8			2			6		6
Actuated Green, G (s)	11.9		150.0				127.6	127.6			110.7	110.7
Effective Green, g (s)	11.9		150.0				127.6	127.6			110.7	110.7
Actuated g/C Ratio	0.08		1.00				0.85	0.85			0.74	0.74
Clearance Time (s)	5.0						4.5	5.5			5.5	5.5
Vehicle Extension (s)	5.0						3.0	0.2			0.2	0.2
Lane Grp Cap (vph)	111		1583				280	1584			1374	1168
v/s Ratio Prot							c0.04	0.27			c0.63	
v/s Ratio Perm	c0.04		0.23				0.40					0.02
v/c Ratio	0.53		0.23				0.52	0.32			0.86	0.02
Uniform Delay, d1	66.4		0.0				27.4	2.3			14.0	5.2
Progression Factor	1.00		1.00				1.00	1.00			1.00	1.00
Incremental Delay, d2	8.7		0.3				1.8	0.5			7.0	0.0
Delay (s)	75.0		0.3				29.1	2.8			20.9	5.3
Level of Service	E		A				C	A			C	A
Approach Delay (s)		10.9			0.0			8.7			20.5	
Approach LOS		B			A			A			C	
Intersection Summary												
HCM 2000 Control Delay			15.4				HCM 2000 Level of Service				B	
HCM 2000 Volume to Capacity ratio			0.80									
Actuated Cycle Length (s)			150.0				Sum of lost time (s)			15.0		
Intersection Capacity Utilization			101.6%				ICU Level of Service			G		
Analysis Period (min)			15									

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
 1: W Old Baltimore Rd & Ruby Dr

01/14/2022



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↶	↷		↶	
Traffic Volume (veh/h)	0	208	344	3	2	0
Future Volume (Veh/h)	0	208	344	3	2	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	0	221	366	3	2	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)	1194					
pX, platoon unblocked						
vC, conflicting volume	369			588	368	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	369			588	368	
tC, single (s)	4.1			6.4	6.2	
tC, 2 stage (s)						
tF (s)	2.2			3.5	3.3	
p0 queue free %	100			100	100	
cM capacity (veh/h)	1190			471	678	
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	221	369	2			
Volume Left	0	0	2			
Volume Right	0	3	0			
cSH	1190	1700	471			
Volume to Capacity	0.00	0.22	0.00			
Queue Length 95th (ft)	0	0	0			
Control Delay (s)	0.0	0.0	12.7			
Lane LOS			B			
Approach Delay (s)	0.0	0.0	12.7			
Approach LOS			B			
Intersection Summary						
Average Delay			0.0			
Intersection Capacity Utilization			28.3%	ICU Level of Service	A	
Analysis Period (min)			15			

Queues

2: MD 355 & W Old Baltimore Rd/Driveway

01/14/2022



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	125	505	347	1141	837	41
v/c Ratio	0.75	0.32	0.73	0.75	0.67	0.04
Control Delay	90.8	0.5	15.1	11.1	19.4	2.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	90.8	0.5	15.1	11.1	19.4	2.6
Queue Length 50th (ft)	119	0	68	481	461	0
Queue Length 95th (ft)	#212	0	138	655	741	14
Internal Link Dist (ft)				485	1613	
Turn Bay Length (ft)		155				415
Base Capacity (vph)	178	1583	558	1512	1255	1081
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.70	0.32	0.62	0.75	0.67	0.04

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

2: MD 355 & W Old Baltimore Rd/Driveway

01/14/2022



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	115	0	465	0	0	0	319	1050	0	0	770	38
Future Volume (vph)	115	0	465	0	0	0	319	1050	0	0	770	38
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0		4.0				4.5	5.5			5.5	5.5
Lane Util. Factor	1.00		1.00				1.00	1.00			1.00	1.00
Frt	1.00		0.85				1.00	1.00			1.00	0.85
Flt Protected	0.95		1.00				0.95	1.00			1.00	1.00
Satd. Flow (prot)	1770		1583				1770	1863			1863	1583
Flt Permitted	0.76		1.00				0.21	1.00			1.00	1.00
Satd. Flow (perm)	1410		1583				396	1863			1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	125	0	505	0	0	0	347	1141	0	0	837	41
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	13
Lane Group Flow (vph)	125	0	505	0	0	0	347	1141	0	0	837	28
Turn Type	Perm		Free				pm+pt	NA			NA	Perm
Protected Phases					8		5	2			6	
Permitted Phases	4		Free	8			2			6		6
Actuated Green, G (s)	17.7		150.0				121.8	121.8			101.0	101.0
Effective Green, g (s)	17.7		150.0				121.8	121.8			101.0	101.0
Actuated g/C Ratio	0.12		1.00				0.81	0.81			0.67	0.67
Clearance Time (s)	5.0						4.5	5.5			5.5	5.5
Vehicle Extension (s)	5.0						3.0	0.2			0.2	0.2
Lane Grp Cap (vph)	166		1583				470	1512			1254	1065
v/s Ratio Prot							0.08	c0.61			0.45	
v/s Ratio Perm	c0.09		0.32				0.52					0.02
v/c Ratio	0.75		0.32				0.74	0.75			0.67	0.03
Uniform Delay, d1	64.0		0.0				15.6	6.8			14.5	8.1
Progression Factor	1.00		1.00				1.00	1.00			1.00	1.00
Incremental Delay, d2	20.4		0.5				6.0	3.5			2.8	0.0
Delay (s)	84.4		0.5				21.6	10.4			17.4	8.2
Level of Service	F		A				C	B			B	A
Approach Delay (s)		17.2			0.0			13.0			16.9	
Approach LOS		B			A			B			B	

Intersection Summary

HCM 2000 Control Delay	15.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	114.7%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
 1: W Old Baltimore Rd & Ruby Dr

01/14/2022



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↶	↷		↶	
Traffic Volume (veh/h)	0	411	162	10	9	0
Future Volume (Veh/h)	0	411	162	10	9	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	447	176	11	10	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)	1194					
pX, platoon unblocked						
vC, conflicting volume	187			628	182	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	187			628	182	
tC, single (s)	4.1			6.4	6.2	
tC, 2 stage (s)						
tF (s)	2.2			3.5	3.3	
p0 queue free %	100			98	100	
cM capacity (veh/h)	1387			446	861	
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	447	187	10			
Volume Left	0	0	10			
Volume Right	0	11	0			
cSH	1387	1700	446			
Volume to Capacity	0.00	0.11	0.02			
Queue Length 95th (ft)	0	0	2			
Control Delay (s)	0.0	0.0	13.2			
Lane LOS			B			
Approach Delay (s)	0.0	0.0	13.2			
Approach LOS			B			
Intersection Summary						
Average Delay			0.2			
Intersection Capacity Utilization			31.6%	ICU Level of Service	A	
Analysis Period (min)			15			

Queues

2: MD 355 & W Old Baltimore Rd/Driveway

01/14/2022



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	60	363	156	504	1175	34
v/c Ratio	0.47	0.23	0.55	0.31	0.86	0.03
Control Delay	75.5	0.3	17.3	3.3	25.2	1.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	75.5	0.3	17.3	3.3	25.2	1.5
Queue Length 50th (ft)	57	0	20	87	812	0
Queue Length 95th (ft)	104	0	99	149	#1431	9
Internal Link Dist (ft)				485	1613	
Turn Bay Length (ft)		155				415
Base Capacity (vph)	423	1583	294	1610	1371	1177
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.14	0.23	0.53	0.31	0.86	0.03

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

2: MD 355 & W Old Baltimore Rd/Driveway

01/14/2022

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	58	0	352	0	0	0	151	489	0	0	1140	33
Future Volume (vph)	58	0	352	0	0	0	151	489	0	0	1140	33
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0		4.0				4.5	5.5			5.5	5.5
Lane Util. Factor	1.00		1.00				1.00	1.00			1.00	1.00
Frt	1.00		0.85				1.00	1.00			1.00	0.85
Flt Protected	0.95		1.00				0.95	1.00			1.00	1.00
Satd. Flow (prot)	1770		1583				1770	1863			1863	1583
Flt Permitted	0.76		1.00				0.09	1.00			1.00	1.00
Satd. Flow (perm)	1410		1583				161	1863			1863	1583
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)	60	0	363	0	0	0	156	504	0	0	1175	34
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	9
Lane Group Flow (vph)	60	0	363	0	0	0	156	504	0	0	1175	25
Turn Type	Perm		Free				pm+pt	NA			NA	Perm
Protected Phases					8		5	2			6	
Permitted Phases	4		Free	8			2			6		6
Actuated Green, G (s)	12.0		150.0				127.5	127.5			109.4	109.4
Effective Green, g (s)	12.0		150.0				127.5	127.5			109.4	109.4
Actuated g/C Ratio	0.08		1.00				0.85	0.85			0.73	0.73
Clearance Time (s)	5.0						4.5	5.5			5.5	5.5
Vehicle Extension (s)	5.0						3.0	0.2			0.2	0.2
Lane Grp Cap (vph)	112		1583				282	1583			1358	1154
v/s Ratio Prot							c0.05	0.27			c0.63	
v/s Ratio Perm	c0.04		0.23				0.42					0.02
v/c Ratio	0.54		0.23				0.55	0.32			0.87	0.02
Uniform Delay, d1	66.3		0.0				30.0	2.3			14.9	5.6
Progression Factor	1.00		1.00				1.00	1.00			1.00	1.00
Incremental Delay, d2	8.7		0.3				2.3	0.5			7.6	0.0
Delay (s)	75.0		0.3				32.3	2.8			22.5	5.6
Level of Service	E		A				C	A			C	A
Approach Delay (s)		10.9			0.0			9.8			22.0	
Approach LOS		B			A			A			C	
Intersection Summary												
HCM 2000 Control Delay			16.4				HCM 2000 Level of Service				B	
HCM 2000 Volume to Capacity ratio			0.80									
Actuated Cycle Length (s)			150.0				Sum of lost time (s)			15.0		
Intersection Capacity Utilization			101.6%				ICU Level of Service			G		
Analysis Period (min)			15									

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
 1: W Old Baltimore Rd & Ruby Dr

01/14/2022



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↶	↷		↘	↙
Traffic Volume (veh/h)	0	208	344	12	15	0
Future Volume (Veh/h)	0	208	344	12	15	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	0	221	366	13	16	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)	1194					
pX, platoon unblocked						
vC, conflicting volume	379			594	372	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	379			594	372	
tC, single (s)	4.1			6.4	6.2	
tC, 2 stage (s)						
tF (s)	2.2			3.5	3.3	
p0 queue free %	100			97	100	
cM capacity (veh/h)	1179			468	673	
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	221	379	16			
Volume Left	0	0	16			
Volume Right	0	13	0			
cSH	1179	1700	468			
Volume to Capacity	0.00	0.22	0.03			
Queue Length 95th (ft)	0	0	3			
Control Delay (s)	0.0	0.0	13.0			
Lane LOS			B			
Approach Delay (s)	0.0	0.0	13.0			
Approach LOS			B			
Intersection Summary						
Average Delay			0.3			
Intersection Capacity Utilization			28.8%	ICU Level of Service	A	
Analysis Period (min)			15			

Queues

2: MD 355 & W Old Baltimore Rd/Driveway

01/14/2022



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	126	518	355	1141	837	42
v/c Ratio	0.76	0.33	0.75	0.75	0.67	0.04
Control Delay	91.2	0.6	16.5	11.2	19.8	2.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	91.2	0.6	16.5	11.2	19.8	2.7
Queue Length 50th (ft)	120	0	69	481	469	0
Queue Length 95th (ft)	#212	0	152	655	741	14
Internal Link Dist (ft)				485	1613	
Turn Bay Length (ft)		155				415
Base Capacity (vph)	178	1583	555	1512	1249	1076
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.71	0.33	0.64	0.75	0.67	0.04

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

2: MD 355 & W Old Baltimore Rd/Driveway

01/14/2022



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	116	0	477	0	0	0	327	1050	0	0	770	39
Future Volume (vph)	116	0	477	0	0	0	327	1050	0	0	770	39
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0		4.0				4.5	5.5			5.5	5.5
Lane Util. Factor	1.00		1.00				1.00	1.00			1.00	1.00
Frt	1.00		0.85				1.00	1.00			1.00	0.85
Flt Protected	0.95		1.00				0.95	1.00			1.00	1.00
Satd. Flow (prot)	1770		1583				1770	1863			1863	1583
Flt Permitted	0.76		1.00				0.21	1.00			1.00	1.00
Satd. Flow (perm)	1410		1583				393	1863			1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	126	0	518	0	0	0	355	1141	0	0	837	42
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	14
Lane Group Flow (vph)	126	0	518	0	0	0	355	1141	0	0	837	28
Turn Type	Perm		Free				pm+pt	NA			NA	Perm
Protected Phases					8		5	2			6	
Permitted Phases	4		Free	8			2			6		6
Actuated Green, G (s)	17.7		150.0				121.8	121.8			100.6	100.6
Effective Green, g (s)	17.7		150.0				121.8	121.8			100.6	100.6
Actuated g/C Ratio	0.12		1.00				0.81	0.81			0.67	0.67
Clearance Time (s)	5.0						4.5	5.5			5.5	5.5
Vehicle Extension (s)	5.0						3.0	0.2			0.2	0.2
Lane Grp Cap (vph)	166		1583				472	1512			1249	1061
v/s Ratio Prot							0.08	c0.61			0.45	
v/s Ratio Perm	c0.09		0.33				0.53					0.02
v/c Ratio	0.76		0.33				0.75	0.75			0.67	0.03
Uniform Delay, d1	64.1		0.0				16.1	6.8			14.8	8.3
Progression Factor	1.00		1.00				1.00	1.00			1.00	1.00
Incremental Delay, d2	20.9		0.6				6.7	3.5			2.9	0.0
Delay (s)	85.0		0.6				22.8	10.4			17.6	8.3
Level of Service	F		A				C	B			B	A
Approach Delay (s)		17.1			0.0			13.3			17.2	
Approach LOS		B			A			B			B	

Intersection Summary

HCM 2000 Control Delay	15.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	114.7%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Attachment B
Three Year Reported Accidents

Report Number	MCP2586004L	MCP11510097	MCP003600B0	MCP2898002Y	MCP3126001X	MCP102200F8	MCP263900D4
Local Case Number	190002579	190009279	190027056	190054218	200007413	200036564	210043056
Agency Name	Montgomery County Police	Montgomery County Police	Montgomery County Police	Montgomery County Police	Montgomery County Police	Montgomery County Police	Montgomery County Police
ACRS Report Type	Injury Crash	Property Damage Crash	Injury Crash	Property Damage Crash	Property Damage Crash	Injury Crash	Injury Crash
Crash Date/Time	1/16/2019 19:18	2/27/2019 8:00	6/6/2019 13:44	11/10/2019 17:30	2/13/2020 19:30	9/18/2020 7:16	10/26/2021 8:55
Hit/Run	No	No	No	No	No	No	No
Route Type	Maryland (State)	Maryland (State)	Maryland (State)	Maryland (State)	Maryland (State)	Maryland (State)	Maryland (State)
Mile Point	20.57	20.57	20.57	20.57	20.57	20.57	20.57
Mile Point Direction	North	North	North	North	North	North	North
Lane Direction	North	South	South	South	North	North	North
Lane Number	1	0	0	1	1	1	0
Lane Type		SHOULDER AREA	OFF ROAD				LEFT TURN LANE
Number of Lanes	1	2	2	2	1	2	3
Direction	South	North	South	North	North	South	North
Distance	500	0	0	40	0	20	0
Distance Unit	FEET	FEET	FEET	FEET	FEET	FEET	FEET
Road Grade	LEVEL	LEVEL	LEVEL	LEVEL	LEVEL	HILL UPHILL	LEVEL
NonTraffic	No	No	No	No	No	No	No
Road Name	FREDERICK RD	FREDERICK RD	FREDERICK RD	FREDERICK RD	FREDERICK RD	FREDERICK RD	FREDERICK RD
Cross-Street Name	WEST OLD BALTIMORE RD	WEST OLD BALTIMORE RD	WEST OLD BALTIMORE RD	WEST OLD BALTIMORE RD	WEST OLD BALTIMORE RD	WEST OLD BALTIMORE RD	WEST OLD BALTIMORE RD
Off-Road Description							
Municipality	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Related Non-Motorist							
At Fault	DRIVER	DRIVER	DRIVER	DRIVER	DRIVER	DRIVER	DRIVER
Weather	CLEAR	CLEAR	CLEAR	CLEAR	N/A	CLEAR	CLOUDY
Surface Condition	DRY	DRY	DRY	DRY	DRY	WET	DRY
Light	DARK LIGHTS ON	DAYLIGHT	DAYLIGHT	DARK LIGHTS ON	DARK LIGHTS ON	DAYLIGHT	DAYLIGHT
Traffic Control	TRAFFIC SIGNAL	TRAFFIC SIGNAL	NO CONTROLS	TRAFFIC SIGNAL	TRAFFIC SIGNAL	TRAFFIC SIGNAL	TRAFFIC SIGNAL
Driver Substance Abuse	NONE DETECTED	NONE DETECTED	NONE DETECTED	ALCOHOL PRESENT, N/A	NONE DETECTED	NONE DETECTED	NONE DETECTED
Non-Motorist Substance Abuse							
First Harmful Event	OTHER VEHICLE	FIXED OBJECT	FIXED OBJECT	OTHER VEHICLE	FIXED OBJECT	OTHER VEHICLE	OTHER VEHICLE
Second Harmful Event	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Fixed Oject Struck	N/A	DITCH	CONSTRUCTION BARRIER	N/A	GUARDRAIL OR BARRIER	N/A	N/A
Junction	NON INTERSECTION	INTERSECTION	INTERSECTION RELATED	NON INTERSECTION	INTERSECTION	INTERSECTION RELATED	INTERSECTION
Intersection Type	N/A	Y-INTERSECTION	T-INTERSECTION	N/A	T-INTERSECTION	Y-INTERSECTION	T-INTERSECTION
Intersection Area	N/A		N/A	N/A	N/A	N/A	
Road Alignment	STRAIGHT	STRAIGHT	STRAIGHT	STRAIGHT	STRAIGHT	STRAIGHT	STRAIGHT
Road Condition	NO DEFECTS	NO DEFECTS	NO DEFECTS	NO DEFECTS	HOLES RUTS ETC	NO DEFECTS	NO DEFECTS
Road Division	TWO-WAY, NOT DIVIDED	TWO-WAY, NOT DIVIDED	TWO-WAY, NOT DIVIDED	TWO-WAY, NOT DIVIDED	TWO-WAY, DIVIDED, UNPROTECTED	TWO-WAY, NOT DIVIDED	TWO-WAY, NOT DIVIDED
Latitude	39.21521603	39.215527	39.215515	39.21524167	39.21546364	39.21555333	39.21575833
Longitude	-77.25160234	-77.25282233	-77.25256667	-77.25177167	-77.25228169	-77.25214333	-77.252615
Location	(39.21521603, -77.25160234)	(39.215527, -77.25282233)	(39.215515, -77.25256667)	(39.21524167, -77.25177167)	(39.21546364, -77.25228169)	(39.21555333, -77.25214333)	(39.21575833, -77.252615)