

# final report

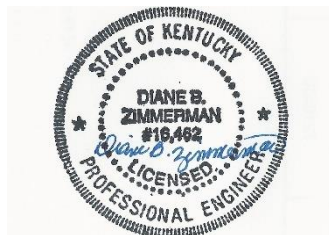
January 19, 2018  
Revised February 21, 2018  
Revised June 30, 2021

## Traffic Impact Study

*Aiken Road and Johnson Road Vicinity  
Louisville, KY*

Prepared for

Louisville Metro Planning Commission  
Kentucky Transportation Cabinet



**DIANE B. ZIMMERMAN**  
Traffic Engineering, LLC

12803 High Meadows Pike  
Prospect, KY 40059  
502.648.1858  
diane zim@att.net



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## INTRODUCTION

This update of the February 21, 2018 study will add the traffic from the proposed Aiken North subdivision to the previous study. Aiken North is proposed with 866 single-family lots. **Figure 1** displays a map of the vicinity. The purpose of this study is to examine the traffic impacts of these developments upon the adjacent highway system. For this study, the impact area was defined to be the intersections of Aiken Road with Johnson Road, N. Beckley Station Road, Arnold Palmer Drive and Bush Farm Road; the intersection of Johnson Road with Shelbyville Road; and the intersection of Bush Farm Road with Old Henry Road. See the separate traffic impact study analyzing the proposed entrances.

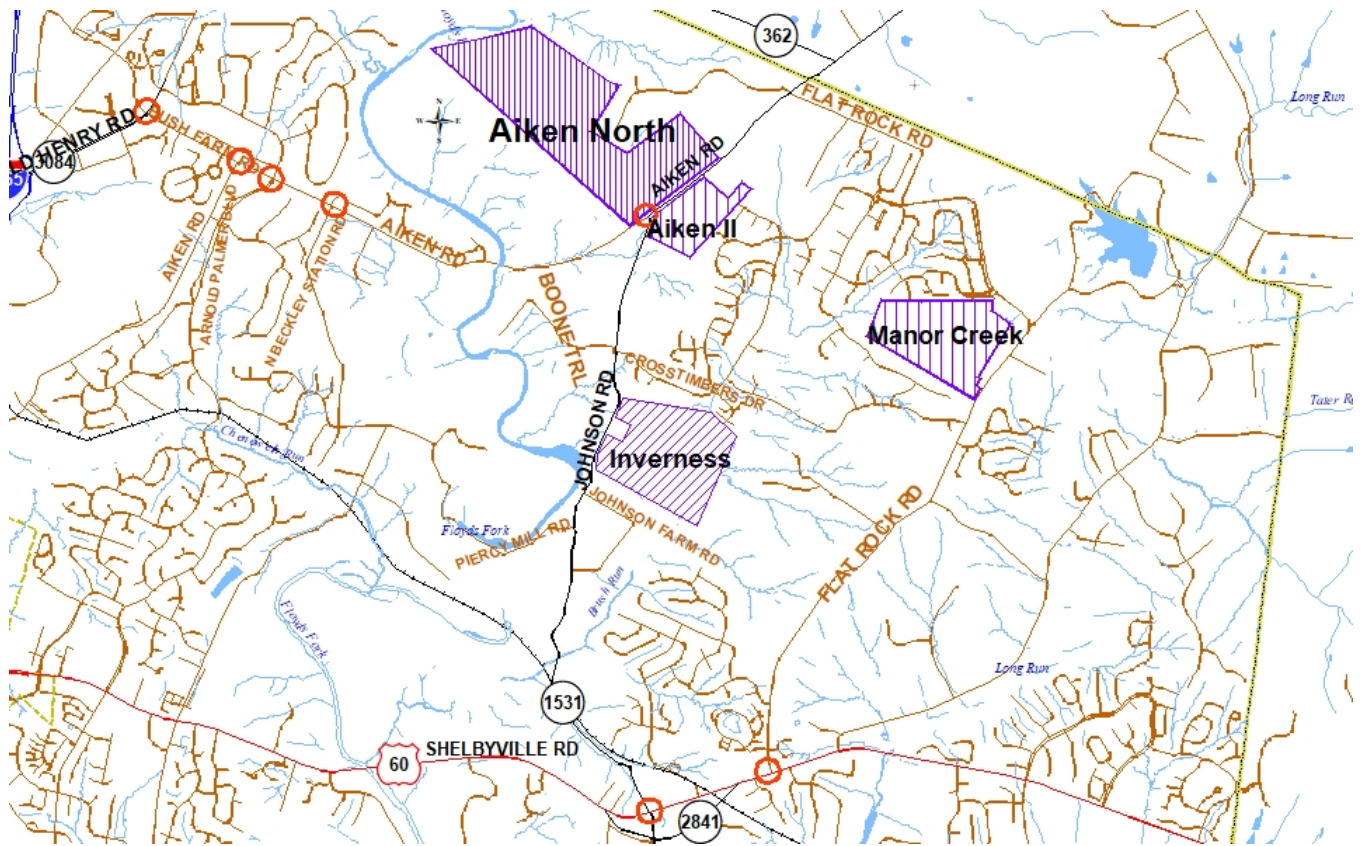


Figure 1. Site Map

## FUTURE CONDITIONS

The data for these intersections originates in the 1313 Johnson Road Traffic Impact Study, dated October 5, 2017. The 1313 Johnson Road Traffic Impact Study includes traffic specifically generated by the developments listed in **Table 1**. This analysis will use the Aiken Road and Johnson Road Vicinity, dated February 21, 2018, Figures 4 and 5 2025 Build volumes as the No-Build for this analysis. **Figures 2 and 3** are the 2025 No Build peak hour volumes.

**Table 1. Developments Included in No Build Volumes**

Development Current Name	Traffic Impact Study Name
Twin Lakes (137 lots)	Stapleton Ridge 15528 Aiken Road
Manor at Floyds Fork, Meadows at Floyds Fork, and Villas at Floyds Fork (237 lots)	Sutherland Pointe 15905 Aiken Road
Jefferson Development Group St. Joseph Property	
Ball Homes on Factory Lane (405 lots)	St. Joseph Orphanage Site
Old Henry Crossing Phases 2 and 3	
1313 Johnson Road (323 lots)	
Aiken II (178 lots)	
Manor Creek (204 lots)	

**Table 2. Peak Hour Trips Generated by Adjacent Subdivisions**

	A.M. Peak Hour			P.M. Peak Hour		
	Trips	In	Out	Trips	In	Out
Flat Rock Ridge by Ball Homes 116 lots	87	22	65	117	74	43
Inverness Homes 40 lots	33	8	25	42	27	15
Hills - Lake View 40 lots	33	8	25	42	27	15
Hills - Glen Lakes 41 lots	34	9	25	43	27	16
Bryant Farms by Ball Homes 102 lots	77	19	58	104	65	39
<b>Total 339 lots</b>	<b>264</b>	<b>66</b>	<b>198</b>	<b>348</b>	<b>220</b>	<b>128</b>

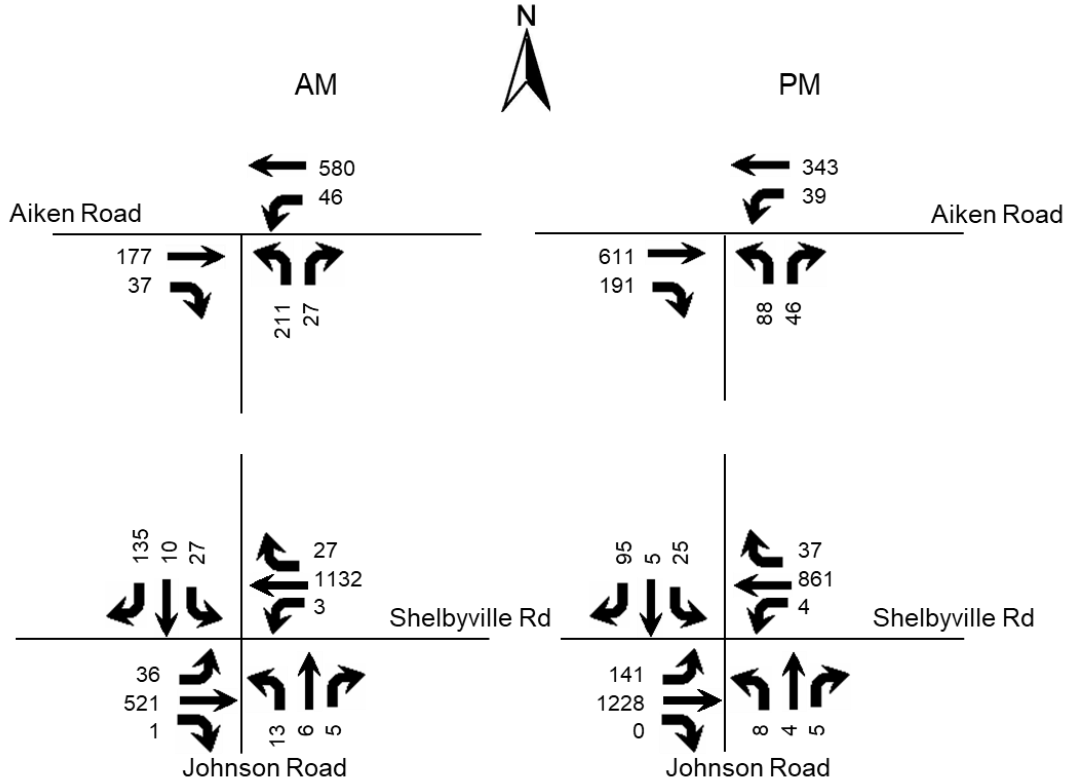


Figure 2. 2025 No Build Peak Hour Volumes Johnson Road

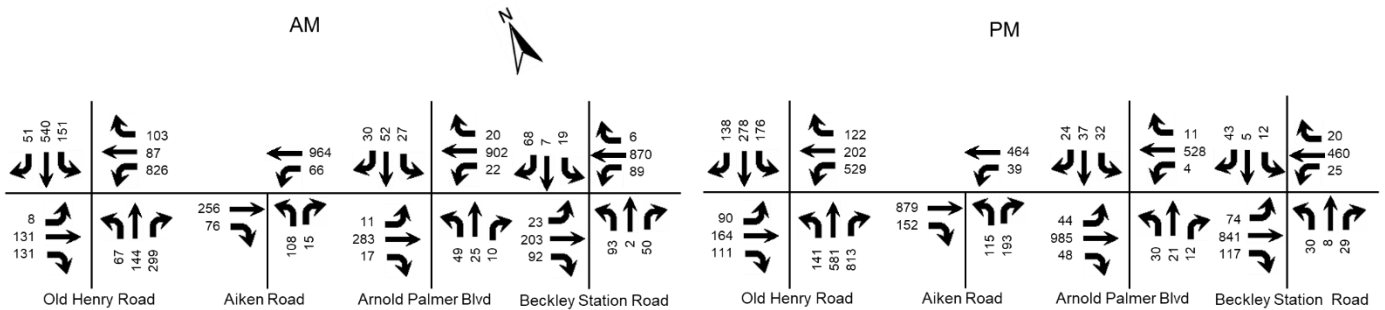


Figure 3. 2025 No Build Peak Hour Volumes Aiken Road

Table 3. Aiken North Trip Generation

Land Use	A.M. Peak Hour			P.M. Peak Hour		
	Trips	In	Out	Trips	In	Out
Single Family Detached (866 lots)	620	155	465	807	508	299

Figures 4 and 5 are the 2025 Build peak hour volumes. The Build volumes include the trips generated by Aiken North.

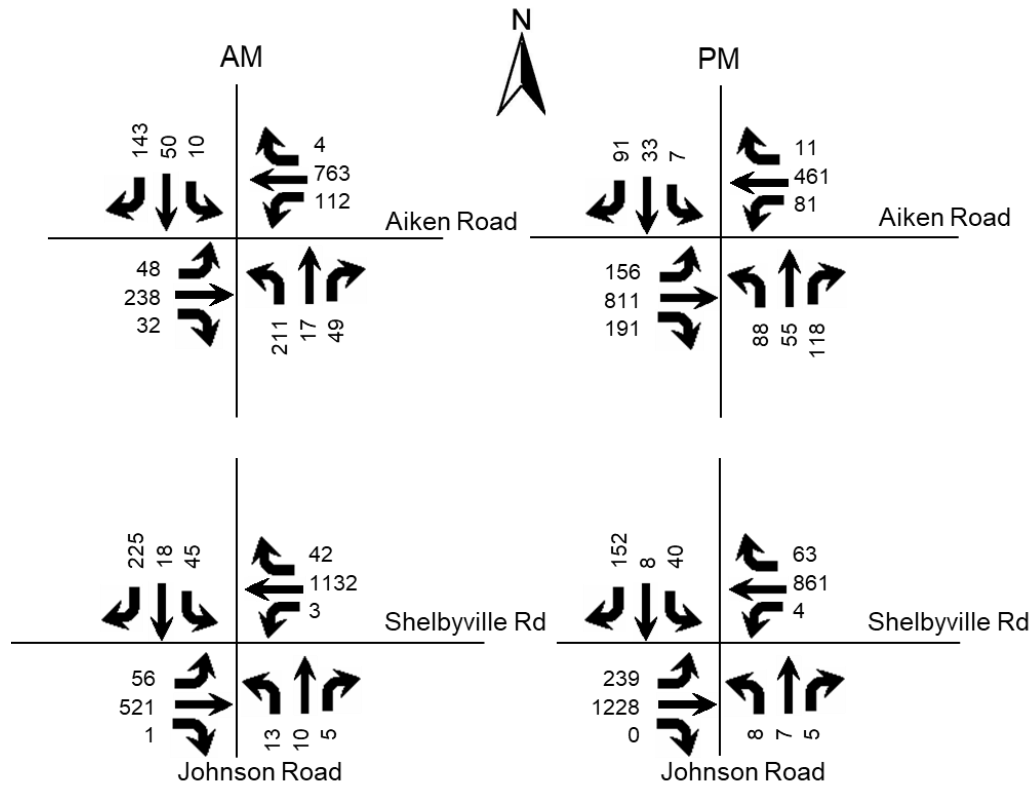


Figure 4. 2025 Build Peak Hour Volumes Johnson Road

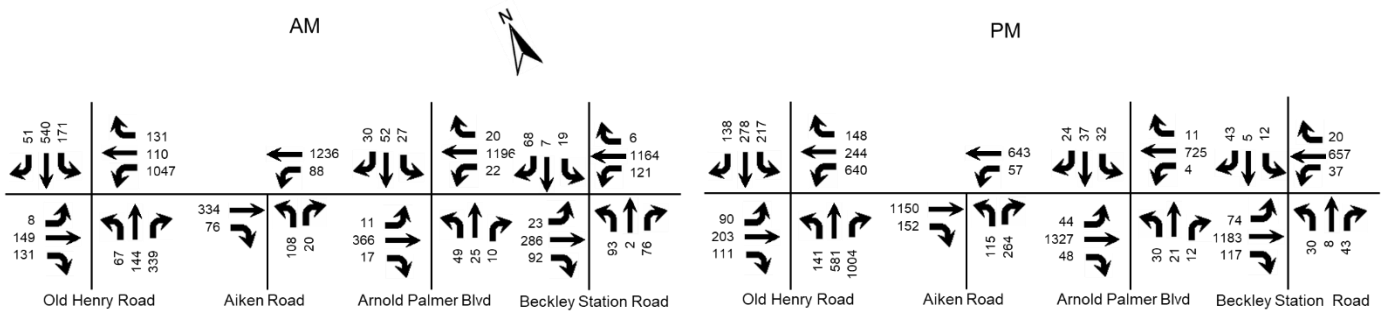


Figure 5. 2025 Build Peak Hour Volumes Aiken Road

## ANALYSIS

The qualitative measure of operation for a roadway facility or intersection is evaluated by assigning a “Level of Service”. Level of Service is a ranking scale from A through F, “A” is the best operating condition and “F” is the worst. Level of Service results depend upon the facility that is analyzed. In this case, the Level of Service is based upon the total delay experienced at an intersection.

To evaluate the impact of the proposed development, the vehicle delays at the intersections were determined using procedures detailed in the Highway Capacity Manual, 6<sup>th</sup> edition. Future delays and Level of Service were determined for the intersections using the HCS Streets (version 7.9.5) software. The delays and Level of Service are summarized in **Tables 4 and 5**. The 2025 Build includes the recently constructed improvements at the Shelbyville Road intersection with Johnson Road, and the northbound right turn lane on Aiken at Bush Farm. The 2025 Build includes the improvements shown on the Aiken North plan for the intersection of Aiken Road with Johnson Road. The appendix includes on the Build and Improved column results.

**Table 4. Peak Hour Level of Service Johnson Road**

Approach	A.M.				P.M.			
	2017 Existing	2025 No Build	2025 Build	2025 Improved	2017 Existing	2025 No Build	2025 Build	2025 Improved
<b>Aiken Road at Johnson Road</b>			<b>C 20.2</b>				<b>B 12.9</b>	
Aiken Road Eastbound			B 11.8				A 8.3	
Johnson Road Westbound (left)	A 7.4	A 7.8	B 18.6		A 8.5	A 9.9	A 7.2	
Johnson Road Northbound	B 13.6	D 27.7	C 30.8		B 12.0	B 14.3	D 35.1	
Subdivision Road Southbound			C 25.8				C 33.4	
<b>Shelbyville Road at Johnson Road</b>								
Shelbyville Road Eastbound (left)	B 10.6	B 11.9	B 12.3	B 12.3	A 9.7	B 11.3	B 13.0	B 13.0
Shelbyville Road Westbound (left)	A 9.5	A 9.8	A 9.8	A 9.8	B 10.8	B 11.8	B 11.8	B 11.8
Eastwood Fishersville Road Northbound	F 63.2	F 647.9	F ~	F ~	F 113.4	F ~	F 326.6	F 258.3
Johnson Road Southbound	D 31.6	F 338.1	F 459.2	F 258.4	F 59.3	F 6561	F 1713.8	F 488.0

Key: Level of Service, Delay in seconds per vehicle

**Table 5. Peak Hour Level of Service Aiken Road**

Approach	A.M.				P.M.			
	2017* Existing	2025 No Build	2025 Build	2025 Improved	2017* Existing	2025 No Build	2025 Build	2025 Improved
<b>Aiken Road at Beckley Station Road</b>								
Aiken Road Eastbound (left)		B 10.7	B 12.8			A 8.6	A 9.4	
Aiken Road Westbound (left)	A 7.8	A 8.3	A 8.7		A 8.6	B 10.4	B 12.6	
Beckley Station Road Northbound	C 20.4	F 237.1	F 2921		B 14.8	D 27.5	F 56.7	
Beckley Station Road Southbound		D 29.3	F 65.2			C 20.3	F 52.2	
<b>Aiken Road at Arnold Palmer Blvd</b>								
Aiken Road Eastbound (left)	A 8.6	B 10.3	B 12.1	B 12.1	A 7.9	A 8.7	A 9.5	A 9.5
Aiken Road Westbound (left)	A 7.6	A 8.0	A 8.2	A 8.2	A 8.6	B 10.6	B 12.6	B 12.6
Arnold Palmer Blvd Northbound	D 25.3	F 214.9	F 1871.4	F 922.8	C 24.9	F 297.4	F ~	F ~
Arnold Palmer Blvd Southbound	C 21.3	F 108.3	F 511.8	F 102.5	C 24.0	F 271.5	F 2478	F 580
<b>Aiken Road at Bush Farm Road</b>								
Aiken Road Eastbound (left)	A 7.8	A 8.2	A 8.6	A 8.6	A 8.9	B 11.1	B 13.4	B 13.4
Aiken Road Northbound	C 23.6	F 165.1	F 953	F 91.8	D 25.5	F 456.7	F 508.1	F 221.1
<b>Old Henry Road at Bush Farm Road</b>								
Old Henry Road Eastbound	B 15.2	D 48.2	D 49.7	E 66.1	B 13.6	F 112.7	F 169.1	E 73.4
Old Henry Road Westbound	B 17.8	D 41.6	D 40.1	D 50.4	B 14.9	C 28.3	C 29.9	C 29.1
Bush Farm Road Northbound	B 18.9	F 254.8	F 460.8	E 59.3	C 24.8	F 136.3	F 242.3	E 68.1
Bush Farm Road Southbound	A 10.0	B 16.5	B 18.3	E 73.7	B 17.5	E 64.0	E 72.3	E 70.7

\*Beckley Station Road, Arnold Palmer Boulevard and Aiken Road are 2015



## RECOMMENDATIONS

The cumulative impact of the approved residential developments has resulted in a need for additional improvements to Aiken Road and Shelbyville Road. The column in the table above labeled “2025 Improved” reflects the projects below. Funding for these projects needs to be identified. Note the intersection of Aiken Road at Beckley Station Road is being improved as part of the current development at this intersection and no additional improvements are recommended. The recommended projects are:

- Shelbyville Road at Johnson Road – The improvements included are the widening of Johnson Road to have a thru/left and a right turn lane on both north and southbound approaches. The only option to reduce delays on Johnson Road would be to install a signal at this intersection. Signal installation is not warranted with the volumes in Figure 4.
- Aiken Road at Arnold Palmer Boulevard – construct left turn lanes on Aiken Road at Arnold Palmer Boulevard.
- Aiken Road at Bush Farm Road – construct a left turn lane on all approaches. The volumes in Figure 4 indicate the warrants for installing a traffic signal could be met.
- Bush Farm Road at Old Henry Road – construct a dual left turn lane on the westbound approach of Bush Farm Road. The Old Henry Road construction project has been modified to include this improvement. Construction is anticipated in the fall of 2022.

## CONCLUSIONS

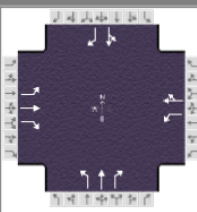
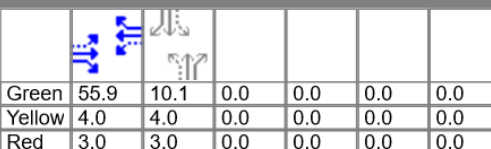

Based upon the volume of traffic forecasted for the year 2025, the projects identified in the Recommendations should be funded. The implementation of the roadway projects will improve the Level of Service. Traffic signals may be needed to reduce the delays experienced on the minor street approaches.

## **APPENDIX**

HCS Reports

HCS7 Signalized Intersection Results Summary																
<b>General Information</b>						<b>Intersection Information</b>										
Agency	Diane B. Zimmerman Traffic Engineering					Duration, h	0.250									
Analyst	DBZ	Analysis Date	Jul 1, 2021			Area Type	Other									
Jurisdiction		Time Period	AM			PHF	0.86									
Urban Street	Aiken Road		Analysis Year	2025 Build		Analysis Period	1> 7:15									
Intersection	Johnson Road		File Name	Johnson AM 25 B.xus												
Project Description	Aiken North															
<b>Demand Information</b>				EB			WB			NB			SB			
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R				
Demand ( v ), veh/h	48	238	32	112	763	4	211	17	49	10	50	143				
<b>Signal Information</b>																
Cycle, s	80.0	Reference Phase	2													
Offset, s	0	Reference Point	End													
Uncoordinated	No	Simult. Gap E/W	On		Green	46.7	19.3	0.0	0.0	0.0	0.0					
Force Mode	Fixed	Simult. Gap N/S	On		Yellow	4.0	4.0	0.0	0.0	0.0	0.0					
					Red	3.0	3.0	0.0	0.0	0.0	0.0					
<b>Timer Results</b>				EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT					
Assigned Phase					2		6		8		4					
Case Number					5.0		6.0		5.0		7.0					
Phase Duration, s					53.7		53.7		26.3		26.3					
Change Period, ( Y+R c ), s					7.0		7.0		7.0		7.0					
Max Allow Headway ( MAH ), s					0.0		0.0		4.2		4.2					
Queue Clearance Time ( g s ), s									18.3		9.1					
Green Extension Time ( g e ), s					0.0		0.0		1.0		1.8					
Phase Call Probability									1.00		1.00					
Max Out Probability									0.84		0.04					
<b>Movement Group Results</b>				EB			WB			NB			SB			
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R				
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14				
Adjusted Flow Rate ( v ), veh/h	56	277	37	130	892		245	20	57		70	166				
Adjusted Saturation Flow Rate ( s ), veh/h/ln	614	1885	1598	1102	1883		1356	1900	1598		1827	1598				
Queue Service Time ( g s ), s	6.3	5.7	0.8	5.2	29.9		13.9	0.6	2.2		0.0	7.1				
Cycle Queue Clearance Time ( g c ), s	36.3	5.7	0.8	11.0	29.9		16.3	0.6	2.2		2.3	7.1				
Green Ratio ( g/C )	0.58	0.58	0.58	0.58	0.58		0.24	0.24	0.24		0.24	0.24				
Capacity ( c ), veh/h	219	1101	933	655	1100		377	458	385		493	385				
Volume-to-Capacity Ratio ( X )	0.255	0.251	0.040	0.199	0.811		0.650	0.043	0.148		0.142	0.432				
Back of Queue ( Q ), ft/ln ( 95 th percentile)	47.8	90.9	10.7	54.8	433.9		204.3	12.6	37.8		46.1	119.6				
Back of Queue ( Q ), veh/ln ( 95 th percentile)	1.9	3.6	0.4	2.2	17.2		8.1	0.5	1.5		1.8	4.7				
Queue Storage Ratio ( RQ ) ( 95 th percentile)	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00		0.00	0.00				
Uniform Delay ( d 1 ), s/veh	27.5	8.1	7.1	10.8	13.1		30.3	23.3	23.9		23.9	25.7				
Incremental Delay ( d 2 ), s/veh	2.8	0.5	0.1	0.7	6.5		2.7	0.0	0.2		0.1	0.8				
Initial Queue Delay ( d 3 ), s/veh	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0				
Control Delay ( d ), s/veh	30.3	8.7	7.2	11.5	19.6		33.0	23.3	24.1		24.1	26.5				
Level of Service ( LOS )	C	A	A	B	B		C	C	C		C	C				
Approach Delay, s/veh / LOS	11.8	B		18.6	B		30.8	C		25.8	C					
Intersection Delay, s/veh / LOS	20.2						C									
<b>Multimodal Results</b>				EB			WB			NB			SB			
Pedestrian LOS Score / LOS	2.07	B		1.88	B		1.92	B		2.11	B					
Bicycle LOS Score / LOS	1.10	A		2.17	B		1.02	A		0.88	A					

Aiken Road and Johnson Road  
Vicinity Traffic Impact Study

HCS7 Signalized Intersection Results Summary															
<b>General Information</b>						<b>Intersection Information</b>									
Agency	Diane B. Zimmerman Traffic Engineering					Duration, h	0.250								
Analyst	DBZ	Analysis Date	Jul 1, 2021			Area Type	Other								
Jurisdiction		Time Period	PM			PHF	0.94								
Urban Street	Aiken Road		Analysis Year	2025 Build		Analysis Period	1> 4:45								
Intersection	Johnson Road		File Name	Johnson PM 25 B.xus											
Project Description	Aiken North														
<b>Demand Information</b>				EB			WB			NB			SB		
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R
Demand ( $v$ ), veh/h				156	811	191	81	461	11	88	55	118	7	33	91
<b>Signal Information</b>															
Cycle, s	80.0	Reference Phase	2												
Offset, s	0	Reference Point	End	Green	55.9	10.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Uncoordinated	No	Simult. Gap E/W	On	Yellow	4.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Force Mode	Fixed	Simult. Gap N/S	On	Red	3.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<b>Timer Results</b>				EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT				
Assigned Phase					2		6		8		4				
Case Number					5.0		6.0		5.0		7.0				
Phase Duration, s					62.9		62.9		17.1		17.1				
Change Period, ( $Y+R_c$ ), s					7.0		7.0		7.0		7.0				
Max Allow Headway ( $MAH$ ), s					0.0		0.0		4.2		4.2				
Queue Clearance Time ( $g_s$ ), s									8.8		6.5				
Green Extension Time ( $g_e$ ), s					0.0		0.0		1.3		1.4				
Phase Call Probability									1.00		1.00				
Max Out Probability									0.01		0.00				
<b>Movement Group Results</b>				EB			WB			NB			SB		
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement				5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate ( $v$ ), veh/h				166	863	203	86	502		94	59	126		43	97
Adjusted Saturation Flow Rate ( $s$ ), veh/h/ln				911	1900	1610	651	1892		1395	1900	1610		1849	1610
Queue Service Time ( $g_s$ ), s				7.3	20.0	3.5	6.7	8.7		5.1	2.2	5.9		0.0	4.5
Cycle Queue Clearance Time ( $g_c$ ), s				16.0	20.0	3.5	26.7	8.7		6.8	2.2	5.9		1.6	4.5
Green Ratio ( $g/C$ )				0.70	0.70	0.70	0.70	0.70		0.13	0.13	0.13		0.13	0.13
Capacity ( $c$ ), veh/h				628	1329	1126	383	1323		237	239	202		285	202
Volume-to-Capacity Ratio ( $X$ )				0.264	0.649	0.180	0.225	0.379		0.395	0.245	0.621		0.149	0.479
Back of Queue ( $Q$ ), ft/ln ( 95 th percentile)				58.7	245.4	37.5	45.3	109.8		78.9	45.9	107.8		32.8	80.1
Back of Queue ( $Q$ ), veh/ln ( 95 th percentile)				2.3	9.8	1.5	1.8	4.4		3.2	1.8	4.3		1.3	3.2
Queue Storage Ratio ( $RQ$ ) ( 95 th percentile)				0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00		0.00	0.00
Uniform Delay ( $d_1$ ), s/veh				8.2	6.6	4.1	14.0	4.9		34.3	31.6	33.2		31.3	32.5
Incremental Delay ( $d_2$ ), s/veh				1.0	2.5	0.4	1.4	0.8		1.1	0.5	3.1		0.2	1.8
Initial Queue Delay ( $d_3$ ), s/veh				0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0
Control Delay ( $d$ ), s/veh				9.2	9.1	4.5	15.3	5.8		35.4	32.1	36.3		31.5	34.3
Level of Service (LOS)				A	A	A	B	A		D	C	D		C	C
Approach Delay, s/veh / LOS				8.3		A	7.2		A	35.1		D	33.4		C
Intersection Delay, s/veh / LOS				12.9						B					
<b>Multimodal Results</b>				EB			WB			NB			SB		
Pedestrian LOS Score / LOS				2.04		B	1.85		B	1.93		B	2.13		B
Bicycle LOS Score / LOS				2.52		C	1.46		A	0.95		A	0.72		A

Aiken Road and Johnson Road  
Vicinity Traffic Impact Study

HCS7 Two-Way Stop-Control Report																		
General Information								Site Information										
Analyst	Diane Zimmerman							Intersection	Shelbyville at Johnson									
Agency/Co.	Diane B Zimmerman Traffic Engineering							Jurisdiction										
Date Performed	7/1/21							East/West Street	Shelbyville Rd									
Analysis Year	2025							North/South Street	Johnson Rd									
Time Analyzed	AM Peak Build							Peak Hour Factor	0.92									
Intersection Orientation	East-West							Analysis Time Period (hrs)	0.25									
Project Description	Aiken North																	
Lanes																		
<p style="text-align: center;">Major Street: East-West</p>																		
Vehicle Volumes and Adjustments																		
Approach	Eastbound				Westbound				Northbound				Southbound					
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R		
Priority	1U	1	2	3	4U	4	5	6			7	8	9		10	11	12	
Number of Lanes	0	1	1	0	0	1	1	0			0	1	0		0	1	0	
Configuration		L		TR		L		TR			LTR					LTR		
Volume (veh/h)		56	521	1		3	1132	42			13	10	5			45	18	225
Percent Heavy Vehicles (%)		0				66					10	0	0			0	0	0
Proportion Time Blocked																		
Percent Grade (%)											0					0		
Right Turn Channelized																		
Median Type   Storage					Left Only								1					
Critical and Follow-up Headways																		
Base Critical Headway (sec)		4.1				4.1					7.1	6.5	6.2			7.1	6.5	6.2
Critical Headway (sec)		4.10				4.76					7.20	6.50	6.20			7.10	6.50	6.20
Base Follow-Up Headway (sec)		2.2				2.2					3.5	4.0	3.3			3.5	4.0	3.3
Follow-Up Headway (sec)		2.20				2.79					3.59	4.00	3.30			3.50	4.00	3.30
Delay, Queue Length, and Level of Service																		
Flow Rate, v (veh/h)		61				3					30					313		
Capacity, c (veh/h)		551				753										168		
v/c Ratio		0.11				0.00										1.87		
95% Queue Length, Q <sub>95</sub> (veh)		0.4				0.0										23.2		
Control Delay (s/veh)		12.3				9.8										459.2		
Level of Service (LOS)		B				A										F		
Approach Delay (s/veh)		1.2				0.0										459.2		
Approach LOS																F		

Aiken Road and Johnson Road  
Vicinity Traffic Impact Study

HCS7 Two-Way Stop-Control Report																			
General Information								Site Information											
Analyst	Diane Zimmerman							Intersection	Shelbyville at Johnson										
Agency/Co.	Diane B Zimmerman Traffic Engineering							Jurisdiction											
Date Performed	7/1/21							East/West Street	Shelbyville Rd										
Analysis Year	2025							North/South Street	Johnson Rd										
Time Analyzed	AM Peak Build Improved							Peak Hour Factor	0.92										
Intersection Orientation	East-West							Analysis Time Period (hrs)	0.25										
Project Description	Aiken North																		
Lanes																			
<p>Major Street: East-West</p>																			
Vehicle Volumes and Adjustments																			
Approach	Eastbound				Westbound				Northbound				Southbound						
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R			
Priority	1U	1	2	3	4U	4	5	6					7	8	9		10	11	12
Number of Lanes	0	1	1	0	0	1	1	0					1	1	0		1	1	0
Configuration		L		TR		L		TR					L		TR		L		TR
Volume (veh/h)		56	521	1		3	1132	42					13	10	5		45	18	225
Percent Heavy Vehicles (%)		0				66							10	0	0		0	0	0
Proportion Time Blocked																			
Percent Grade (%)											0								0
Right Turn Channelized																			
Median Type   Storage					Left Only										1				
Critical and Follow-up Headways																			
Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2			
Critical Headway (sec)		4.10				4.76				7.20	6.50	6.20		7.10	6.50	6.20			
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3			
Follow-Up Headway (sec)		2.20				2.79				3.59	4.00	3.30		3.50	4.00	3.30			
Delay, Queue Length, and Level of Service																			
Flow Rate, v (veh/h)		61				3				14		16		49		264			
Capacity, c (veh/h)		551				753						80		130		177			
v/c Ratio		0.11				0.00						0.20		0.38		1.49			
95% Queue Length, Q <sub>95</sub> (veh)		0.4				0.0						0.7		1.6		16.8			
Control Delay (s/veh)		12.3				9.8						61.4		48.5		297.2			
Level of Service (LOS)		B				A						F		E		F			
Approach Delay (s/veh)		1.2				0.0								258.4					
Approach LOS		B				A								F					

Aiken Road and Johnson Road  
Vicinity Traffic Impact Study

HCS7 Two-Way Stop-Control Report																		
General Information								Site Information										
Analyst	Diane Zimmerman							Intersection	Shelbyville at Johnson									
Agency/Co.	Diane B Zimmerman Traffic Engineering							Jurisdiction										
Date Performed	7/1/21							East/West Street	Shelbyville Rd									
Analysis Year	2025							North/South Street	Johnson Rd									
Time Analyzed	PM Peak Build							Peak Hour Factor	0.93									
Intersection Orientation	East-West							Analysis Time Period (hrs)	0.25									
Project Description	Aiken North																	
Lanes																		
<p style="text-align: center;">Major Street: East-West</p>																		
Vehicle Volumes and Adjustments																		
Approach	Eastbound				Westbound				Northbound				Southbound					
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R		
Priority	1U	1	2	3	4U	4	5	6			7	8	9			10	11	12
Number of Lanes	0	1	1	0	0	1	1	0			0	1	0			0	1	0
Configuration		L		TR		L		TR			LTR					LTR		
Volume (veh/h)		239	1228	0		4	861	63			8	7	5			40	8	152
Percent Heavy Vehicles (%)		0				0					0	0	0			0	0	0
Proportion Time Blocked																		
Percent Grade (%)											0					0		
Right Turn Channelized																		
Median Type   Storage					Left Only									1				
Critical and Follow-up Headways																		
Base Critical Headway (sec)		4.1				4.1					7.1	6.5	6.2			7.1	6.5	6.2
Critical Headway (sec)		4.10				4.10					7.10	6.50	6.20			7.10	6.50	6.20
Base Follow-Up Headway (sec)		2.2				2.2					3.5	4.0	3.3			3.5	4.0	3.3
Follow-Up Headway (sec)		2.20				2.20					3.50	4.00	3.30			3.50	4.00	3.30
Delay, Queue Length, and Level of Service																		
Flow Rate, v (veh/h)		257				4					22							215
Capacity, c (veh/h)		704				530					26							49
v/c Ratio		0.36				0.01					0.81							4.43
95% Queue Length, Q <sub>95</sub> (veh)		1.7				0.0					2.5							24.2
Control Delay (s/veh)		13.0				11.8					326.6							1713.8
Level of Service (LOS)		B				B					F							F
Approach Delay (s/veh)		2.1				0.1					326.6					1713.8		
Approach LOS		B				B					F					F		

Aiken Road and Johnson Road  
Vicinity Traffic Impact Study

HCS7 Two-Way Stop-Control Report																			
General Information								Site Information											
Analyst	Diane Zimmerman							Intersection	Shelbyville at Johnson										
Agency/Co.	Diane B Zimmerman Traffic Engineering							Jurisdiction											
Date Performed	7/1/21							East/West Street	Shelbyville Rd										
Analysis Year	2025							North/South Street	Johnson Rd										
Time Analyzed	PM Peak Build							Peak Hour Factor	0.93										
Intersection Orientation	East-West							Analysis Time Period (hrs)	0.25										
Project Description	Aiken North																		
Lanes																			
<p>Major Street: East-West</p>																			
Vehicle Volumes and Adjustments																			
Approach	Eastbound				Westbound				Northbound				Southbound						
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R			
Priority	1U	1	2	3	4U	4	5	6					7	8	9		10	11	12
Number of Lanes	0	1	1	0	0	1	1	0					1	1	0		1	1	0
Configuration		L		TR		L		TR					L		TR		L		TR
Volume (veh/h)		239	1228	0		4	861	63					8	7	5		40	8	152
Percent Heavy Vehicles (%)		0				0							0	0	0		0	0	0
Proportion Time Blocked																			
Percent Grade (%)											0								0
Right Turn Channelized																			
Median Type   Storage					Left Only								1						
Critical and Follow-up Headways																			
Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2			
Critical Headway (sec)		4.10				4.10				7.10	6.50	6.20		7.10	6.50	6.20			
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3			
Follow-Up Headway (sec)		2.20				2.20				3.50	4.00	3.30		3.50	4.00	3.30			
Delay, Queue Length, and Level of Service																			
Flow Rate, v (veh/h)		257				4				9		13		43		172			
Capacity, c (veh/h)		704				530				78		18		14		137			
v/c Ratio		0.36				0.01				0.11		0.70		3.18		1.25			
95% Queue Length, Q <sub>95</sub> (veh)		1.7				0.0				0.4		1.9		6.3		10.5			
Control Delay (s/veh)		13.0				11.8				56.8		392.7		1548.2		223.0			
Level of Service (LOS)		B				B				F		F		F		F			
Approach Delay (s/veh)		2.1				0.1				258.3				488.0					
Approach LOS		B				B				F				F					



Aiken Road and Johnson Road  
Vicinity Traffic Impact Study

HCS7 Two-Way Stop-Control Report																		
General Information								Site Information										
Analyst	DBZ							Intersection	Aiken at Beckley Station									
Agency/Co.	DBZ							Jurisdiction										
Date Performed	7/1/21							East/West Street	Aiken Road									
Analysis Year	2025							North/South Street	Beckley Station/Entrance									
Time Analyzed	AM Peak Build							Peak Hour Factor	0.83									
Intersection Orientation	East-West							Analysis Time Period (hrs)	0.25									
Project Description	Aiken North																	
Lanes																		
<p>Major Street: East-West</p>																		
Vehicle Volumes and Adjustments																		
Approach	Eastbound				Westbound				Northbound				Southbound					
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R		
Priority	1U	1	2	3	4U	4	5	6			7	8	9		10	11	12	
Number of Lanes	0	1	1	1	0	1	1	0			1	1	0		0	1	1	
Configuration		L	T	R		L		TR			L		TR		LT		R	
Volume (veh/h)		23	286	92		121	1164	6			93	2	76		19	7	68	
Percent Heavy Vehicles (%)		1				1					1	3	1		1	1	1	
Proportion Time Blocked																		
Percent Grade (%)											0					0		
Right Turn Channelized		No													No			
Median Type   Storage		Left Only													1			
Critical and Follow-up Headways																		
Base Critical Headway (sec)		4.1				4.1					7.1	6.5	6.2		7.1	6.5	6.2	
Critical Headway (sec)		4.11				4.11					7.11	6.53	6.21		7.11	6.51	6.21	
Base Follow-Up Headway (sec)		2.2				2.2					3.5	4.0	3.3		3.5	4.0	3.3	
Follow-Up Headway (sec)		2.21				2.21					3.51	4.03	3.31		3.51	4.01	3.31	
Delay, Queue Length, and Level of Service																		
Flow Rate, v (veh/h)		28				146					112		94		31		82	
Capacity, c (veh/h)		487				1110					10		500		59		171	
v/c Ratio		0.06				0.13					11.27		0.19		0.53		0.48	
95% Queue Length, Q <sub>95</sub> (veh)		0.2				0.5					15.5		0.7		2.1		2.3	
Control Delay (s/veh)		12.8				8.7					5359.2		13.9		120.8		43.9	
Level of Service (LOS)		B				A					F		B		F		E	
Approach Delay (s/veh)		0.7				0.8					2921.0				65.2			
Approach LOS		B				A					F				F			

HCS7 Two-Way Stop-Control Report																
General Information								Site Information								
Analyst	DBZ							Intersection	Aiken at Beckley Station							
Agency/Co.	Diane B Zimmerman Traffic							Jurisdiction								
Date Performed	7/1/21							East/West Street	Aiken Road							
Analysis Year	2025							North/South Street	Beckley Station/Entrance							
Time Analyzed	PM Peak Build							Peak Hour Factor	0.96							
Intersection Orientation	East-West							Analysis Time Period (hrs)	0.25							
Project Description	Aiken North															
Lanes																
<p>Major Street: East-West</p>																
Vehicle Volumes and Adjustments																
Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	1	1	0	1	1	0		1	1	0		0	1	1
Configuration		L	T	R		L		TR		L		TR		LT		R
Volume (veh/h)		74	1183	117		37	657	20		30	8	43		12	5	43
Percent Heavy Vehicles (%)		1				1				1	3	1		1	1	1
Proportion Time Blocked																
Percent Grade (%)										0				0		
Right Turn Channelized		No												No		
Median Type   Storage		Left Only								1						
Critical and Follow-up Headways																
Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.11				4.11				7.11	6.53	6.21		7.11	6.51	6.21
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.21				2.21				3.51	4.03	3.31		3.51	4.01	3.31
Delay, Queue Length, and Level of Service																
Flow Rate, v (veh/h)		77				39				31		53		18		45
Capacity, c (veh/h)		897				511				91		127		41		444
v/c Ratio		0.09				0.08				0.34		0.42		0.43		0.10
95% Queue Length, Q <sub>95</sub> (veh)		0.3				0.2				1.3		1.8		1.5		0.3
Control Delay (s/veh)		9.4				12.6				64.2		52.4		148.6		14.0
Level of Service (LOS)		A				B				F		F		F		B
Approach Delay (s/veh)		0.5				0.7				56.7				52.2		
Approach LOS										F				F		

Aiken Road and Johnson Road  
Vicinity Traffic Impact Study

HCS7 Two-Way Stop-Control Report																
General Information								Site Information								
Analyst	DBZ							Intersection	Aiken at Arnold Palmer							
Agency/Co.	Diane B. Zimmerman Traffi							Jurisdiction								
Date Performed	7/1/21							East/West Street	Aiken Road							
Analysis Year	2025							North/South Street	Arnold Palmer Boulevard							
Time Analyzed	AM Peak Build							Peak Hour Factor	0.91							
Intersection Orientation	East-West							Analysis Time Period (hrs)	0.25							
Project Description	Aiken North															
Lanes																
<p>Major Street: East-West</p>																
Vehicle Volumes and Adjustments																
Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6	7	8	9		10	11	12	
Number of Lanes	0	0	1	0	0	0	1	0	0	1	0		0	1	0	
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		11	366	17		22	1196	20		49	25	10		27	52	30
Percent Heavy Vehicles (%)		1				1				1	1	1		1	1	1
Proportion Time Blocked																
Percent Grade (%)										0				0		
Right Turn Channelized																
Median Type   Storage	Undivided															
Critical and Follow-up Headways																
Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.11				4.11				7.11	6.51	6.21		7.11	6.51	6.21
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.21				2.21				3.51	4.01	3.31		3.51	4.01	3.31
Delay, Queue Length, and Level of Service																
Flow Rate, v (veh/h)		12				24				92				120		
Capacity, c (veh/h)		519				1143				21				67		
v/c Ratio		0.02				0.02				4.34				1.79		
95% Queue Length, Q <sub>95</sub> (veh)		0.1				0.1				11.8				10.8		
Control Delay (s/veh)		12.1				8.2				1871.4				511.8		
Level of Service (LOS)		B				A				F				F		
Approach Delay (s/veh)	0.7				0.8				1871.4				511.8			
Approach LOS	F				F				F				F			

Aiken Road and Johnson Road  
Vicinity Traffic Impact Study

HCS7 Two-Way Stop-Control Report																
General Information								Site Information								
Analyst	DBZ							Intersection	Aiken at Arnold Palmer							
Agency/Co.	Diane B. Zimmerman Traffi							Jurisdiction								
Date Performed	7/1/21							East/West Street	Aiken Road							
Analysis Year	2025							North/South Street	Arnold Palmer Boulevard							
Time Analyzed	AM Peak Build Improved							Peak Hour Factor	0.91							
Intersection Orientation	East-West							Analysis Time Period (hrs)	0.25							
Project Description	Aiken North															
Lanes																
<p>Major Street: East-West</p>																
Vehicle Volumes and Adjustments																
Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	1	0	0	1	1	0		1	1	0		1	1	0
Configuration		L		TR		L		TR		L		TR		L		TR
Volume (veh/h)		11	366	17		22	1196	20		49	25	10		27	52	30
Percent Heavy Vehicles (%)		1				1				1	1	1		1	1	1
Proportion Time Blocked																
Percent Grade (%)										0				0		
Right Turn Channelized																
Median Type   Storage					Left Only								1			
Critical and Follow-up Headways																
Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.11				4.11				7.11	6.51	6.21		7.11	6.51	6.21
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.21				2.21				3.51	4.01	3.31		3.51	4.01	3.31
Delay, Queue Length, and Level of Service																
Flow Rate, v (veh/h)		12				24				54		38		30		90
Capacity, c (veh/h)		519				1143				19		32		122		107
v/c Ratio		0.02				0.02				2.90		1.20		0.24		0.84
95% Queue Length, Q <sub>95</sub> (veh)		0.1				0.1				7.2		4.2		0.9		4.9
Control Delay (s/veh)		12.1				8.2				1285.2		415.3		43.9		121.8
Level of Service (LOS)		B				A				F		F		E		F
Approach Delay (s/veh)		0.3				0.1				922.8				102.5		
Approach LOS		B				A				F				F		

Aiken Road and Johnson Road  
Vicinity Traffic Impact Study

HCS7 Two-Way Stop-Control Report																
General Information								Site Information								
Analyst	DBZ							Intersection	Aiken at Arnold Palmer							
Agency/Co.	DBZ							Jurisdiction								
Date Performed	7/1/21							East/West Street	Aiken Road							
Analysis Year	2025							North/South Street	Arnold Palmer Boulevard							
Time Analyzed	PM Peak Build							Peak Hour Factor	0.96							
Intersection Orientation	East-West							Analysis Time Period (hrs)	0.25							
Project Description	Aiken North															
Lanes																
<p>Major Street: East-West</p>																
Vehicle Volumes and Adjustments																
Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		44	1327	48		4	725	11		30	21	12		32	37	24
Percent Heavy Vehicles (%)		1				1				1	1	1		1	1	1
Proportion Time Blocked																
Percent Grade (%)										0				0		
Right Turn Channelized																
Median Type   Storage							Undivided									
Critical and Follow-up Headways																
Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.11				4.11				7.11	6.51	6.21		7.11	6.51	6.21
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.21				2.21				3.51	4.01	3.31		3.51	4.01	3.31
Delay, Queue Length, and Level of Service																
Flow Rate, v (veh/h)		46				4					66					97
Capacity, c (veh/h)		851				477										17
v/c Ratio		0.05				0.01										5.54
95% Queue Length, Q <sub>95</sub> (veh)		0.2				0.0										12.8
Control Delay (s/veh)		9.5				12.6										2477.8
Level of Service (LOS)		A				B										F
Approach Delay (s/veh)		2.8				0.3					2477.8					
Approach LOS											F					

Aiken Road and Johnson Road  
Vicinity Traffic Impact Study

HCS7 Two-Way Stop-Control Report																	
General Information								Site Information									
Analyst	DBZ							Intersection	Aiken at Arnold Palmer								
Agency/Co.	DBZ							Jurisdiction									
Date Performed	7/1/21							East/West Street	Aiken Road								
Analysis Year	2025							North/South Street	Arnold Palmer Boulevard								
Time Analyzed	PM Peak Build Improved							Peak Hour Factor	0.96								
Intersection Orientation	East-West							Analysis Time Period (hrs)	0.25								
Project Description	Aiken North																
Lanes																	
<p>Major Street: East-West</p>																	
Vehicle Volumes and Adjustments																	
Approach	Eastbound				Westbound				Northbound				Southbound				
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R	
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12	
Number of Lanes	0	1	1	0	0	1	1	0		0	1	0		0	1	0	
Configuration		L		TR		L		TR			LTR				LTR		
Volume (veh/h)		44	1327	48		4	725	11		30	21	12		32	37	24	
Percent Heavy Vehicles (%)		1				1				1	1	1		1	1	1	
Proportion Time Blocked																	
Percent Grade (%)										0				0			
Right Turn Channelized																	
Median Type   Storage					Left Only								1				
Critical and Follow-up Headways																	
Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2	
Critical Headway (sec)		4.11				4.11				7.11	6.51	6.21		7.11	6.51	6.21	
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3	
Follow-Up Headway (sec)		2.21				2.21				3.51	4.01	3.31		3.51	4.01	3.31	
Delay, Queue Length, and Level of Service																	
Flow Rate, v (veh/h)		46				4					66					97	
Capacity, c (veh/h)		851				477										52	
v/c Ratio		0.05				0.01										1.87	
95% Queue Length, Q <sub>95</sub> (veh)		0.2				0.0										9.5	
Control Delay (s/veh)		9.5				12.6										580.0	
Level of Service (LOS)		A				B										F	
Approach Delay (s/veh)		0.3				0.1								580.0			
Approach LOS														F			

Aiken Road and Johnson Road  
Vicinity Traffic Impact Study

HCS7 Two-Way Stop-Control Report																
General Information								Site Information								
Analyst	DBZ							Intersection	Aiken at Bush Farm							
Agency/Co.	Diane B. Zimmerman Traffic							Jurisdiction								
Date Performed	7/1/21							East/West Street	Aiken Road/Bush Farm Road							
Analysis Year	2025							North/South Street	Aiken Road							
Time Analyzed	AM Peak Build							Peak Hour Factor	0.89							
Intersection Orientation	East-West							Analysis Time Period (hrs)	0.25							
Project Description	Aiken North															
Lanes																
<p>Major Street: East-West</p>																
Vehicle Volumes and Adjustments																
Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		1	0	1		0	0	0
Configuration				TR		LT				L		R				
Volume (veh/h)			334	76		88	1236			108		20				
Percent Heavy Vehicles (%)						1				1		1				
Proportion Time Blocked																
Percent Grade (%)										0						
Right Turn Channelized										No						
Median Type   Storage							Undivided									
Critical and Follow-up Headways																
Base Critical Headway (sec)						4.1				7.1		6.2				
Critical Headway (sec)						4.11				6.41		6.21				
Base Follow-Up Headway (sec)						2.2				3.5		3.3				
Follow-Up Headway (sec)						2.21				3.51		3.31				
Delay, Queue Length, and Level of Service																
Flow Rate, v (veh/h)						99				121		22				
Capacity, c (veh/h)						1105				40		637				
v/c Ratio						0.09				3.03		0.04				
95% Queue Length, Q <sub>95</sub> (veh)						0.3				13.5		0.1				
Control Delay (s/veh)						8.6				1127.4		10.9				
Level of Service (LOS)						A				F		B				
Approach Delay (s/veh)							3.7				953.0					
Approach LOS											F					

Aiken Road and Johnson Road  
Vicinity Traffic Impact Study

HCS7 Two-Way Stop-Control Report																
General Information								Site Information								
Analyst	DBZ							Intersection	Aiken at Bush Farm							
Agency/Co.	Diane B. Zimmerman Traffi							Jurisdiction								
Date Performed	7/1/21							East/West Street	Aiken Road/Bush Farm Road							
Analysis Year	2025							North/South Street	Aiken Road							
Time Analyzed	AM Peak Build Improved							Peak Hour Factor	0.89							
Intersection Orientation	East-West							Analysis Time Period (hrs)	0.25							
Project Description	Aiken North															
Lanes																
<p style="text-align: center;">Major Street: East-West</p>																
Vehicle Volumes and Adjustments																
Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	1	1	0		1	0	1		0	0	0
Configuration				TR		L	T			L		R				
Volume (veh/h)			334	76		88	1236			108		20				
Percent Heavy Vehicles (%)						1				1		1				
Proportion Time Blocked																
Percent Grade (%)										0						
Right Turn Channelized										No						
Median Type   Storage					Left Only								1			
Critical and Follow-up Headways																
Base Critical Headway (sec)						4.1				7.1		6.2				
Critical Headway (sec)						4.11				6.41		6.21				
Base Follow-Up Headway (sec)						2.2				3.5		3.3				
Follow-Up Headway (sec)						2.21				3.51		3.31				
Delay, Queue Length, and Level of Service																
Flow Rate, v (veh/h)						99				121		22				
Capacity, c (veh/h)						1105				139		637				
v/c Ratio						0.09				0.87		0.04				
95% Queue Length, Q <sub>95</sub> (veh)						0.3				5.7		0.1				
Control Delay (s/veh)						8.6				106.8		10.9				
Level of Service (LOS)						A				F		B				
Approach Delay (s/veh)						0.6					91.8					
Approach LOS											F					



Aiken Road and Johnson Road  
Vicinity Traffic Impact Study

HCS7 Two-Way Stop-Control Report																
General Information								Site Information								
Analyst	DBZ							Intersection	Aiken at Bush Farm							
Agency/Co.	Diane B. Zimmerman Traffi							Jurisdiction								
Date Performed	7/1/21							East/West Street	Aiken Road/Bush Farm Road							
Analysis Year	2025							North/South Street	Aiken Road							
Time Analyzed	PM Peak Build							Peak Hour Factor	0.93							
Intersection Orientation	East-West							Analysis Time Period (hrs)	0.25							
Project Description	Aiken North															
Lanes																
<p>Major Street: East-West</p>																
Vehicle Volumes and Adjustments																
Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6	7	8	9		10	11	12	
Number of Lanes	0	0	1	0	0	0	1	0	1	0	1		0	0	0	
Configuration				TR		LT				L		R				
Volume (veh/h)			1150	152		57	643			115		264				
Percent Heavy Vehicles (%)						1				1		1				
Proportion Time Blocked																
Percent Grade (%)										0						
Right Turn Channelized										No						
Median Type   Storage	Undivided															
Critical and Follow-up Headways																
Base Critical Headway (sec)						4.1				7.1		6.2				
Critical Headway (sec)						4.11				6.41		6.21				
Base Follow-Up Headway (sec)						2.2				3.5		3.3				
Follow-Up Headway (sec)						2.21				3.51		3.31				
Delay, Queue Length, and Level of Service																
Flow Rate, v (veh/h)						61				124		284				
Capacity, c (veh/h)						491				44		193				
v/c Ratio						0.12				2.84		1.47				
95% Queue Length, Q <sub>95</sub> (veh)						0.4				13.5		17.4				
Control Delay (s/veh)						13.4				1025.6		282.7				
Level of Service (LOS)						B				F		F				
Approach Delay (s/veh)					3.6				508.1							
Approach LOS									F							

Aiken Road and Johnson Road  
Vicinity Traffic Impact Study

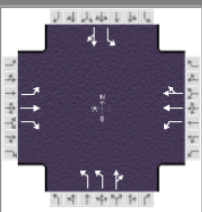
HCS7 Two-Way Stop-Control Report																	
General Information								Site Information									
Analyst	DBZ							Intersection	Aiken at Bush Farm								
Agency/Co.	Diane B. Zimmerman Traffi							Jurisdiction									
Date Performed	7/1/21							East/West Street	Aiken Road/Bush Farm Road								
Analysis Year	2025							North/South Street	Aiken Road								
Time Analyzed	PM Peak Build Improved							Peak Hour Factor	0.93								
Intersection Orientation	East-West							Analysis Time Period (hrs)	0.25								
Project Description	Aiken North																
Lanes																	
<p style="text-align: center;">Major Street: East-West</p>																	
Vehicle Volumes and Adjustments																	
Approach	Eastbound				Westbound				Northbound				Southbound				
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R	
Priority	1U	1	2	3	4U	4	5	6			7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	1	1	0			1	0	1		0	0	0
Configuration				TR		L	T				L		R				
Volume (veh/h)			1150	152		57	643				115		264				
Percent Heavy Vehicles (%)						1					1		1				
Proportion Time Blocked																	
Percent Grade (%)											0						
Right Turn Channelized											No						
Median Type   Storage					Left Only								1				
Critical and Follow-up Headways																	
Base Critical Headway (sec)						4.1					7.1		6.2				
Critical Headway (sec)						4.11					6.41		6.21				
Base Follow-Up Headway (sec)						2.2					3.5		3.3				
Follow-Up Headway (sec)						2.21					3.51		3.31				
Delay, Queue Length, and Level of Service																	
Flow Rate, v (veh/h)						61					124		284				
Capacity, c (veh/h)						491					159		193				
v/c Ratio						0.12					0.78		1.47				
95% Queue Length, Q <sub>95</sub> (veh)						0.4					4.9		17.4				
Control Delay (s/veh)						13.4					79.5		282.7				
Level of Service (LOS)						B					F		F				
Approach Delay (s/veh)					1.1						221.1						
Approach LOS											F						

### HCS7 Signalized Intersection Results Summary

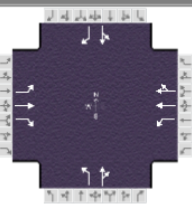
General Information				Intersection Information																									
Agency	Diane B. Zimmerman Traffic Engineering			Duration, h	0.250																								
Analyst	DBZ	Analysis Date	Jul 1, 2021	Area Type	Other																								
Jurisdiction		Time Period	AM Peak	PHF	0.92																								
Urban Street	Old Henry Road	Analysis Year	2025 Build	Analysis Period	1> 7:15																								
Intersection	Bush Farm Road	File Name	Old Henry AM 2025 B.xus																										
Project Description	Aiken North																												
Demand Information				EB			WB			NB			SB																
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R														
Demand ( v ), veh/h				67	144	339	171	540	51	1047	110	131	8	149	131														
Signal Information																													
Cycle, s	139.8	Reference Phase	2																										
Offset, s	0	Reference Point	End																										
Uncoordinated	Yes	Simult. Gap E/W	On	Green	5.8	1.4	34.8	75.0	0.0	0.0																			
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	4.0	4.0	3.6	4.3	0.0	0.0																			
				Red	1.3	1.3	3.0	1.3	0.0	0.0																			
Timer Results				EBL			EBT			WBL			WBT			NBL			NBT			SBL			SBT				
Assigned Phase				5	2	1	6					8																	
Case Number				1.1	3.0	1.1	4.0					6.0																	
Phase Duration, s				11.1	41.4	17.7	48.1					80.6																	
Change Period, ( Y+R <sub>c</sub> ), s				5.3	6.6	5.3	6.6					5.6																	
Max Allow Headway ( MAH ), s				3.1	3.2	3.1	3.2					3.7																	
Queue Clearance Time ( g <sub>s</sub> ), s				6.1	32.4	12.4	22.4					77.0																	
Green Extension Time ( g <sub>e</sub> ), s				0.1	2.4	0.1	2.4					0.0																	
Phase Call Probability				0.94	1.00	1.00	1.00					1.00																	
Max Out Probability				0.00	0.00	1.00	0.00					1.00																	
Movement Group Results				EB			WB			NB			SB																
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R														
Assigned Movement				5	2	12	1	6	16	3	8	18	7	4	14														
Adjusted Flow Rate ( v ), veh/h				72	154	362	186	326	317	1138	262		9	304															
Adjusted Saturation Flow Rate ( s ), veh/h/ln				1810	1900	1610	1810	1900	1842	1092	1731		1135	1752															
Queue Service Time ( g <sub>s</sub> ), s				4.1	9.2	30.4	10.4	20.3	20.4	61.4	11.6		0.6	13.6															
Cycle Queue Clearance Time ( g <sub>c</sub> ), s				4.1	9.2	30.4	10.4	20.3	20.4	75.0	11.6		12.1	13.6															
Green Ratio ( g/C )				0.29	0.25	0.25	0.35	0.30	0.30	0.54	0.54		0.54	0.54															
Capacity ( c ), veh/h				235	474	401	442	564	547	531	929		567	940															
Volume-to-Capacity Ratio ( X )				0.304	0.325	0.902	0.421	0.577	0.579	2.143	0.282		0.015	0.324															
Back of Queue ( Q ), ft/ln ( 90 th percentile)				82.5	171.3	420.6	183.1	338	330.2	3821.7	183.9		7.2	212.5															
Back of Queue ( Q ), veh/ln ( 90 th percentile)				3.3	6.9	16.8	7.3	13.5	13.2	152.9	7.4		0.3	8.5															
Queue Storage Ratio ( RQ ) ( 90 th percentile)				0.41	0.29	0.72	1.22	0.23	0.22	7.64	0.37		0.01	0.38															
Uniform Delay ( d <sub>1</sub> ), s/veh				37.6	42.9	50.8	33.2	41.7	41.7	42.2	17.7		21.0	18.2															
Incremental Delay ( d <sub>2</sub> ), s/veh				0.2	0.1	4.0	0.2	0.3	0.4	520.6	0.1		0.0	0.1															
Initial Queue Delay ( d <sub>3</sub> ), s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0															
Control Delay ( d ), s/veh				37.8	43.0	54.8	33.4	42.0	42.1	562.7	17.7		21.0	18.2															
Level of Service ( LOS )				D	D	D	C	D	D	F	B		C	B															
Approach Delay, s/veh / LOS				49.7		D	40.1		D	460.8		F		18.3		B													
Intersection Delay, s/veh / LOS							228.0									F													
Multimodal Results				EB			WB			NB			SB																
Pedestrian LOS Score / LOS				1.94		B	1.94		B	2.10		B	2.27		B														
Bicycle LOS Score / LOS				1.47		A	1.17		A	2.80		C	1.00		A														

Aiken Road and Johnson Road  
Vicinity Traffic Impact Study

### HCS7 Signalized Intersection Results Summary

General Information				Intersection Information																							
Agency	Diane B. Zimmerman Traffic Engineering			Duration, h	0.250																						
Analyst	DBZ	Analysis Date	Jul 1, 2021	Area Type	Other																						
Jurisdiction		Time Period	AM Peak	PHF	0.92																						
Urban Street	Old Henry Road	Analysis Year	2025 Build Imp	Analysis Period	1> 7:15																						
Intersection	Bush Farm Road	File Name	Old Henry AM 2025 B IMP.xus																								
Project Description	Aiken North																										
Demand Information				EB			WB			NB			SB														
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R												
Demand ( v ), veh/h				67	144	339	171	540	51	1047	110	131	8	149	131												
Signal Information																											
Cycle, s	172.6	Reference Phase	2																								
Offset, s	0	Reference Point	End																								
Uncoordinated	Yes	Simult. Gap E/W	On	Green	6.9	2.8	42.3	32.2	59.9	0.0																	
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	4.0	4.0	3.6	4.3	4.3	0.0																	
				Red	1.3	1.3	3.0	1.3	1.3	0.0																	
Timer Results				EBL			EBT			WBL			WBT			NBL			NBT			SBL			SBT		
Assigned Phase				5			2			1			6						8						4		
Case Number				1.1			3.0			1.1			4.0						10.0						10.0		
Phase Duration, s				12.2			48.9			20.3			57.0						65.5						37.8		
Change Period, ( Y+R c ), s				5.3			6.6			5.3			6.6						5.6						5.6		
Max Allow Headway ( MAH ), s				3.1			3.2			3.1			3.2						3.1						3.2		
Queue Clearance Time ( g s ), s				7.1			39.8			15.0			27.4						56.0						31.5		
Green Extension Time ( g e ), s				0.0			2.3			0.0			2.4						3.8						0.6		
Phase Call Probability				0.97			1.00			1.00			1.00						1.00						1.00		
Max Out Probability				0.00			0.01			1.00			0.00						0.02						0.00		
Movement Group Results				EB			WB			NB			SB														
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R												
Assigned Movement				5	2	12	1	6	16	3	8	18	7	4	14												
Adjusted Flow Rate ( v ), veh/h				72	154	362	186	326	317	1138	262		9	304													
Adjusted Saturation Flow Rate ( s ), veh/h/ln				1810	1900	1610	1810	1900	1842	1757	1731		1810	1752													
Queue Service Time ( g s ), s				5.1	11.5	37.8	13.0	25.3	25.4	54.0	20.1		0.7	29.5													
Cycle Queue Clearance Time ( g c ), s				5.1	11.5	37.8	13.0	25.3	25.4	54.0	20.1		0.7	29.5													
Green Ratio ( g/C )				0.29	0.25	0.25	0.34	0.29	0.29	0.35	0.35		0.19	0.19													
Capacity ( c ), veh/h				221	466	395	423	554	538	1221	601		338	328													
Volume-to-Capacity Ratio ( X )				0.324	0.330	0.917	0.439	0.587	0.589	0.932	0.436		0.026	0.929													
Back of Queue ( Q ), ft/ln ( 90 th percentile)				103.7	208.8	539.6	225.4	416.9	407.4	790.8	313.4		14.2	460.5													
Back of Queue ( Q ), veh/ln ( 90 th percentile)				4.1	8.4	21.6	9.0	16.7	16.3	31.6	12.5		0.6	18.4													
Queue Storage Ratio ( RQ ) ( 90 th percentile)				0.52	0.36	0.92	1.50	0.28	0.27	1.58	0.63		0.03	0.82													
Uniform Delay ( d 1 ), s/veh				47.2	53.6	63.5	42.1	52.3	52.4	54.4	43.4		57.4	69.1													
Incremental Delay ( d 2 ), s/veh				0.3	0.1	11.6	0.3	0.4	0.4	8.5	0.2		0.0	5.0													
Initial Queue Delay ( d 3 ), s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0													
Control Delay ( d ), s/veh				47.4	53.7	75.1	42.4	52.7	52.7	62.9	43.6		57.4	74.1													
Level of Service (LOS)				D	D	E	D	D	D	E	D		E	E													
Approach Delay, s/veh / LOS				66.1		E	50.4		D	59.3		E	73.7		E												
Intersection Delay, s/veh / LOS							59.6						E														
Multimodal Results				EB			WB			NB			SB														
Pedestrian LOS Score / LOS				2.14		B	1.95		B	2.17		B	2.30		B												
Bicycle LOS Score / LOS				1.47		A	1.17		A	2.80		C	1.00		A												

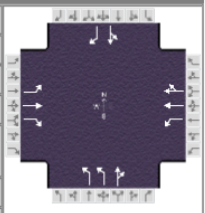
### HCS7 Signalized Intersection Results Summary

General Information				Intersection Information																							
Agency	Diane B. Zimmerman Traffic Engineering			Duration, h	0.250																						
Analyst	DBZ	Analysis Date	Jul 1, 2021	Area Type	Other																						
Jurisdiction		Time Period	PM Peak	PHF	0.93																						
Urban Street	Old Henry Road	Analysis Year	2025 Build	Analysis Period	1> 5:00																						
Intersection	Bush Farm Road	File Name	Old Henry PM 2025 B.xus																								
Project Description	Aiken North																										
Demand Information				EB			WB			NB			SB														
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R												
Demand ( v ), veh/h				141	581	1004	217	278	138	640	244	148	90	203	111												
Signal Information																											
Cycle, s	127.0	Reference Phase	2																								
Offset, s	0	Reference Point	End																								
Uncoordinated	Yes	Simult. Gap E/W	On	Green	7.0	0.0	42.0	23.0	30.0	0.0																	
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	4.0	4.0	4.0	4.0	4.0	0.0																	
				Red	1.0	1.0	1.0	1.0	1.0	0.0																	
Timer Results				EBL			EBT			WBL			WBT			NBL			NBT			SBL			SBT		
Assigned Phase				5			2			1			6						8						4		
Case Number				1.1			3.0			1.1			4.0						10.0						11.0		
Phase Duration, s				12.0			47.0			17.0			52.0						35.0						28.0		
Change Period, ( Y+R <sub>c</sub> ), s				5.0			5.0			5.0			5.0						5.0						5.0		
Max Allow Headway ( MAH ), s				3.1			3.2			3.1			3.2						3.1						3.1		
Queue Clearance Time ( g <sub>s</sub> ), s				7.1			44.0			12.5			13.6						32.0						23.1		
Green Extension Time ( g <sub>e</sub> ), s				0.1			0.0			0.0			4.4						0.0						0.0		
Phase Call Probability				0.98			1.00			1.00			1.00						1.00						1.00		
Max Out Probability				0.10			1.00			1.00			0.02						1.00						1.00		
Movement Group Results				EB			WB			NB			SB														
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R												
Assigned Movement				5	2	12	1	6	16	3	8	18	7	4	14												
Adjusted Flow Rate ( v ), veh/h				111	456	787	233	233	214	688	422			315	119												
Adjusted Saturation Flow Rate ( s ), veh/h/ln				1810	1900	1610	1810	1900	1689	1810	1779			1871	1610												
Queue Service Time ( g <sub>s</sub> ), s				5.1	26.8	42.0	10.5	11.2	11.6	30.0	30.0			21.1	8.3												
Cycle Queue Clearance Time ( g <sub>c</sub> ), s				5.1	26.8	42.0	10.5	11.2	11.6	30.0	30.0			21.1	8.3												
Green Ratio ( g/C )				0.39	0.33	0.33	0.44	0.37	0.37	0.24	0.24			0.18	0.18												
Capacity ( c ), veh/h				408	628	532	341	703	625	427	420			339	292												
Volume-to-Capacity Ratio ( X )				0.271	0.725	1.479	0.684	0.332	0.343	1.610	1.003			0.930	0.409												
Back of Queue ( Q ), ft/ln ( 90 th percentile)				91.9	406.1	1736.7	192.4	199.7	187	1728.5	596			430.6	142.3												
Back of Queue ( Q ), veh/ln ( 90 th percentile)				3.7	16.2	69.5	7.7	8.0	7.5	69.1	23.8			17.2	5.7												
Queue Storage Ratio ( RQ ) ( 90 th percentile)				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			0.00	0.00												
Uniform Delay ( d <sub>1</sub> ), s/veh				25.8	37.4	42.5	27.1	28.7	28.9	48.5	48.5			51.2	46.0												
Incremental Delay ( d <sub>2</sub> ), s/veh				0.1	2.3	221.6	4.6	0.1	0.1	285.2	44.6			30.9	0.3												
Initial Queue Delay ( d <sub>3</sub> ), s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0												
Control Delay ( d ), s/veh				25.9	39.7	264.1	31.7	28.8	29.0	333.7	93.1			82.1	46.3												
Level of Service ( LOS )				C	D	F	C	C	C	F	F			F	D												
Approach Delay, s/veh / LOS				169.1			F			29.9			C			242.3			F			72.3			E		
Intersection Delay, s/veh / LOS				153.6												F											
Multimodal Results				EB			WB			NB			SB														
Pedestrian LOS Score / LOS				1.93			B			1.93			B			2.16			B			2.30			B		
Bicycle LOS Score / LOS				3.55			D			1.05			A			2.32			B			1.20			A		

Aiken Road and Johnson Road  
Vicinity Traffic Impact Study

### HCS7 Signalized Intersection Results Summary

General Information				Intersection Information			
Agency	Diane B. Zimmerman Traffic Engineering			Duration, h	0.250		
Analyst	DBZ	Analysis Date	Jul 1, 2021	Area Type	Other		
Jurisdiction		Time Period	PM Peak	PHF	0.93		
Urban Street	Old Henry Road	Analysis Year	2025 Build Improved	Analysis Period	1> 5:00		
Intersection	Bush Farm Road	File Name	Old Henry PM 2025 B IMP.xus				
Project Description	Aiken North						



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand ( v ), veh/h	141	581	1004	217	278	138	640	244	148	90	203	111

Signal Information				Signal Timing (s)									
Cycle, s	127.0	Reference Phase	2	Green	6.7	0.3	42.0	23.0	30.0	0.0	0.0	0.0	0.0
Offset, s	0	Reference Point	End	Yellow	4.0	4.0	4.0	4.0	4.0	0.0	0.0	0.0	0.0
Uncoordinated	Yes	Simult. Gap E/W	On	Red	1.0	1.0	1.0	1.0	1.0	0.0	0.0	0.0	0.0
Force Mode	Fixed	Simult. Gap N/S	On										

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6		8		4
Case Number	1.1	3.0	1.1	4.0		10.0		11.0
Phase Duration, s	11.7	47.0	17.0	52.3		35.0		28.0
Change Period, ( Y+R <sub>c</sub> ), s	5.0	5.0	5.0	5.0		5.0		5.0
Max Allow Headway ( MAH ), s	3.1	3.2	3.1	3.2		3.1		3.1
Queue Clearance Time ( g <sub>s</sub> ), s	6.8	44.0	12.5	13.6		32.0		23.1
Green Extension Time ( g <sub>e</sub> ), s	0.1	0.0	0.0	3.4		0.0		0.0
Phase Call Probability	0.98	1.00	1.00	1.00		1.00		1.00
Max Out Probability	0.07	1.00	1.00	0.01		1.00		1.00

Movement Group Results	EB			WB			NB			SB														
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R												
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14												
Adjusted Flow Rate ( v ), veh/h	105	432	591	233	233	214	688	422			315	119												
Adjusted Saturation Flow Rate ( s ), veh/h/ln	1810	1900	1610	1810	1900	1689	1757	1779			1871	1610												
Queue Service Time ( g <sub>s</sub> ), s	4.8	25.0	42.0	10.5	11.1	11.6	23.6	30.0			21.1	7.8												
Cycle Queue Clearance Time ( g <sub>c</sub> ), s	4.8	25.0	42.0	10.5	11.1	11.6	23.6	30.0			21.1	7.8												
Green Ratio ( g/C )	0.38	0.33	0.33	0.44	0.37	0.37	0.24	0.24			0.18	0.23												
Capacity ( c ), veh/h	407	628	532	357	708	629	830	420			339	377												
Volume-to-Capacity Ratio ( X )	0.258	0.688	1.109	0.653	0.329	0.340	0.829	1.003			0.930	0.317												
Back of Queue ( Q ), ft/ln ( 90 th percentile)	88	379.1	830.6	189.2	199	186.6	379.8	596			430.6	133.8												
Back of Queue ( Q ), veh/ln ( 90 th percentile)	3.5	15.2	33.2	7.6	8.0	7.5	15.2	23.8			17.2	5.4												
Queue Storage Ratio ( RQ ) ( 90 th percentile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			0.00	0.00												
Uniform Delay ( d <sub>1</sub> ), s/veh	25.9	36.8	42.5	26.6	28.5	28.6	46.1	48.5			51.2	40.2												
Incremental Delay ( d <sub>2</sub> ), s/veh	0.1	1.6	64.9	3.3	0.1	0.1	6.6	44.6			30.9	0.2												
Initial Queue Delay ( d <sub>3</sub> ), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0												
Control Delay ( d ), s/veh	26.0	38.4	107.4	29.9	28.6	28.8	52.7	93.1			82.1	40.4												
Level of Service ( LOS )	C	D	F	C	C	C	D	F			F	D												
Approach Delay, s/veh / LOS	73.4			E			29.1			C			68.1			E			70.7			E		
Intersection Delay, s/veh / LOS	62.3												E											

Multimodal Results	EB			WB			NB			SB		
Pedestrian LOS Score / LOS	2.12	B		1.93	B		2.16	B		2.60	C	
Bicycle LOS Score / LOS	3.18	C		1.05	A		2.32	B		1.20	A	