final report

April 26, 2021

Traffic Impact Study

Garrett Bridwell
Old Heady Road
Louisville, KY

Prepared for

Louisville Metro Planning Commission

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Table of Contents

INTRODUCTION

The site plan for the proposed subdivision shows 119 single-family lots and 30 multi-family units on Old Heady Road in Louisville, KY. **Figure 1** displays a map of the site. Access from Old Heady Road to the site will be from an entrance opposite Chenoweth Run Road. The subdivision also connects to Saratoga Springs at Saddle Bend Way. The purpose of this study is to examine the traffic impacts of the development upon the adjacent highway system. For this study, the impact area was defined to be the intersection of Old Heady Road with Chenoweth Run Road.

Figure 1. Site Map

EXISTING CONDITIONS

Old Heady Road is a maintained by Louisville Metro with an estimated 2021 ADT of 900 vehicles per day south of Knoll Wind Way, as estimated from the turning movement count. The road is a two-lane highway with ten-foot lanes with three-foot stabilized shoulders. The speed limit is 35 mph. There are no sidewalks. The intersection with Chenoweth Run Road is controlled with a stop sign.

Peak hour traffic count for the intersections was obtained on Tuesday, April 13, 2021. The a.m. peak hour occurred between 8:00 to 9:00 a.m. and the p.m. peak hour occurred between 5:00 and 6:00. **Figure 2** illustrates the existing a.m. and p.m. peak hour traffic volumes. The Appendix contains the full count data.

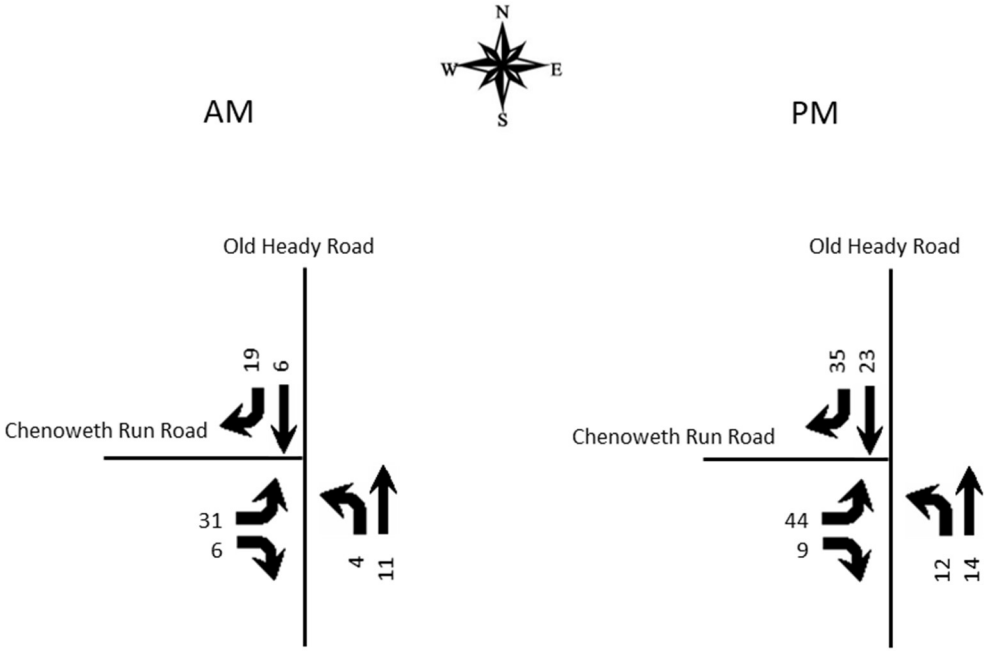


Figure 2. Existing Peak Hour Volumes

FUTURE CONDITIONS

The project completion date is 2025. An annual growth rate of 2 percent was applied to the 2021 volumes. **Figure 3** displays the 2025 No Build peak hour volumes.

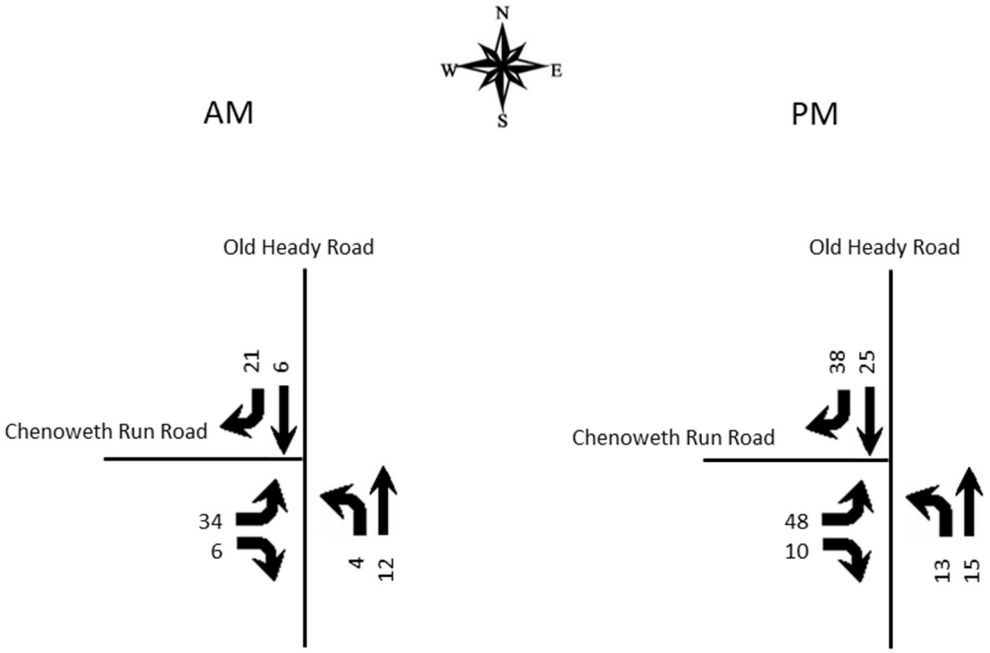


Figure 3. 2025 No Build Peak Hour Volumes

TRIP GENERATION

The Institute of Transportation Engineers Trip Generation Manual, 10th Edition contains trip generation rates for a wide range of developments. The land use of "Single-Family Detached (210)" was reviewed and determined to be the best match. The trip generation results are listed in **Table 1**. The trips were assigned to the highway network with the percentages shown in **Figure 4**. **Figure 5** shows the trips generated by this development and distributed throughout the road network during the peak hours. **Figure 6** displays the individual turning movements for the peak hours when the development is completed.

Table 1. Peak Hour Trips Generated by Site

	A.M. Peak Hour			P.M. Peak Hour		
Land Use	**Trips**	**In**	**Out**	**Trips**	**In**	**Out**
Single-Family (119 units)	89	22	67	120	76	44
Multi-Family (30 units)	15	3	12	20	13	7
TOTAL	104	25	79	140	89	51

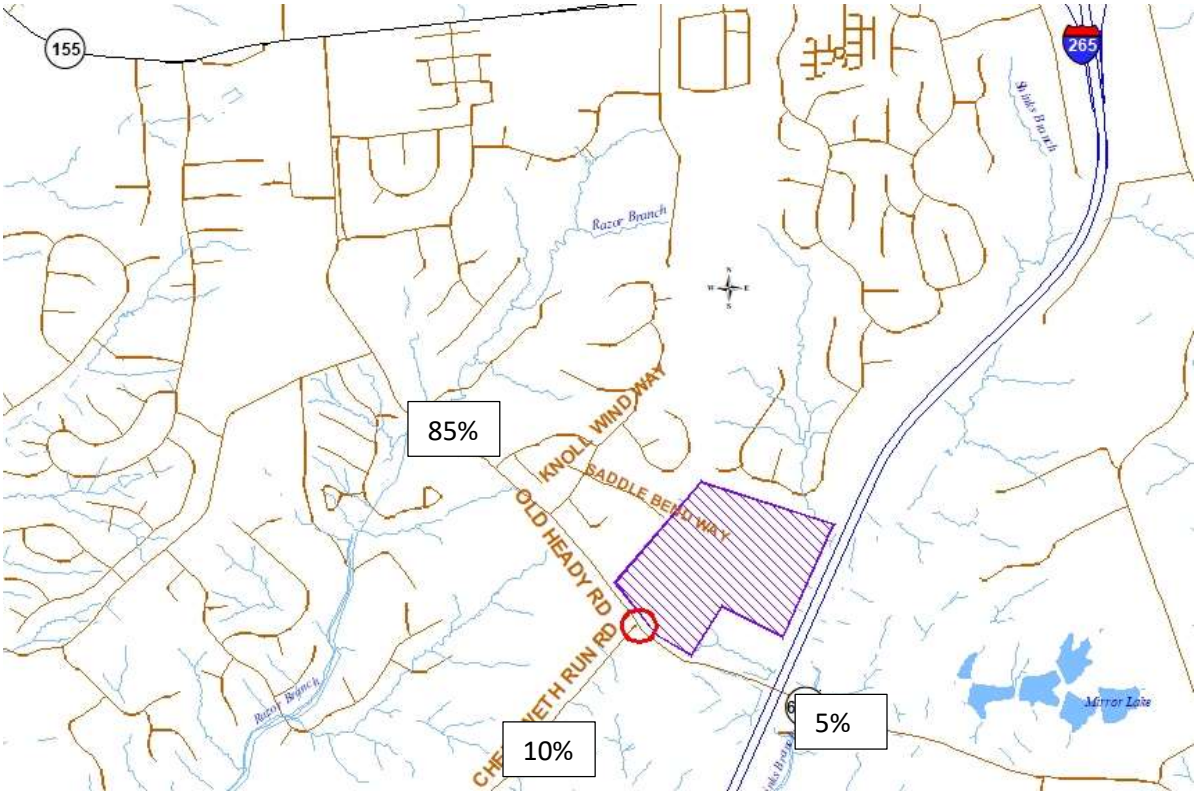


Figure 4. Trip Distribution Percentages

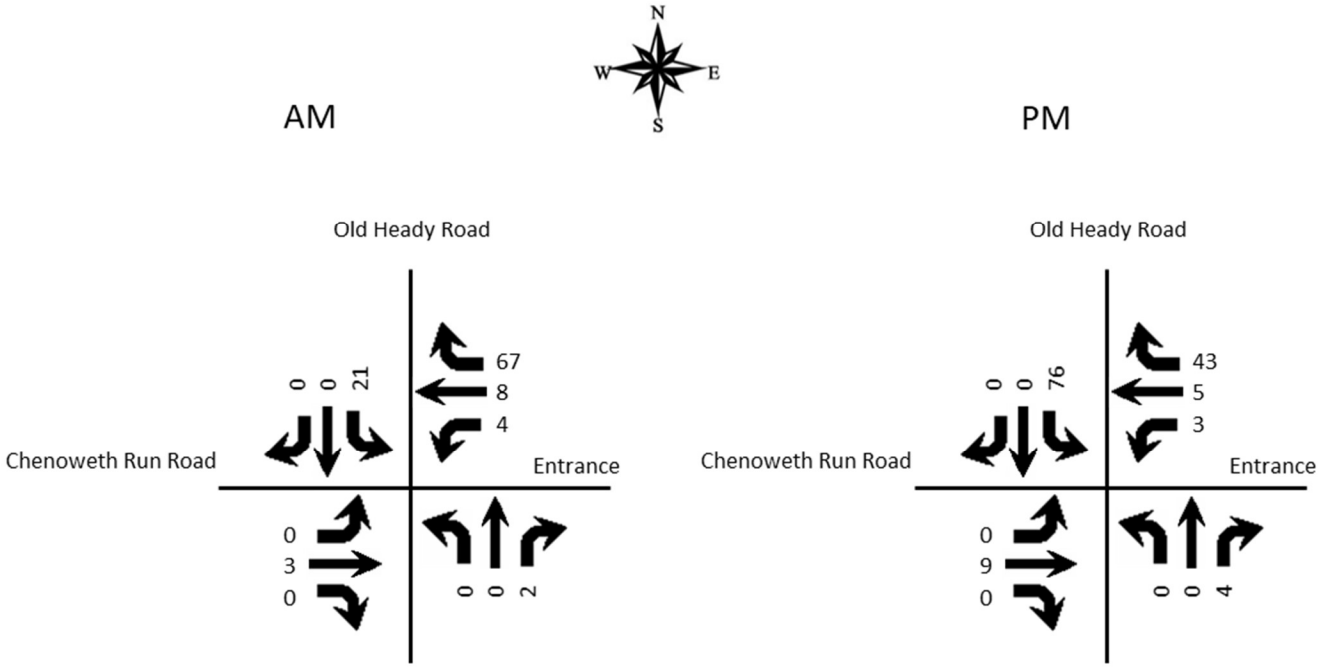


Figure 5. Peak Hour Trips Generated by Site

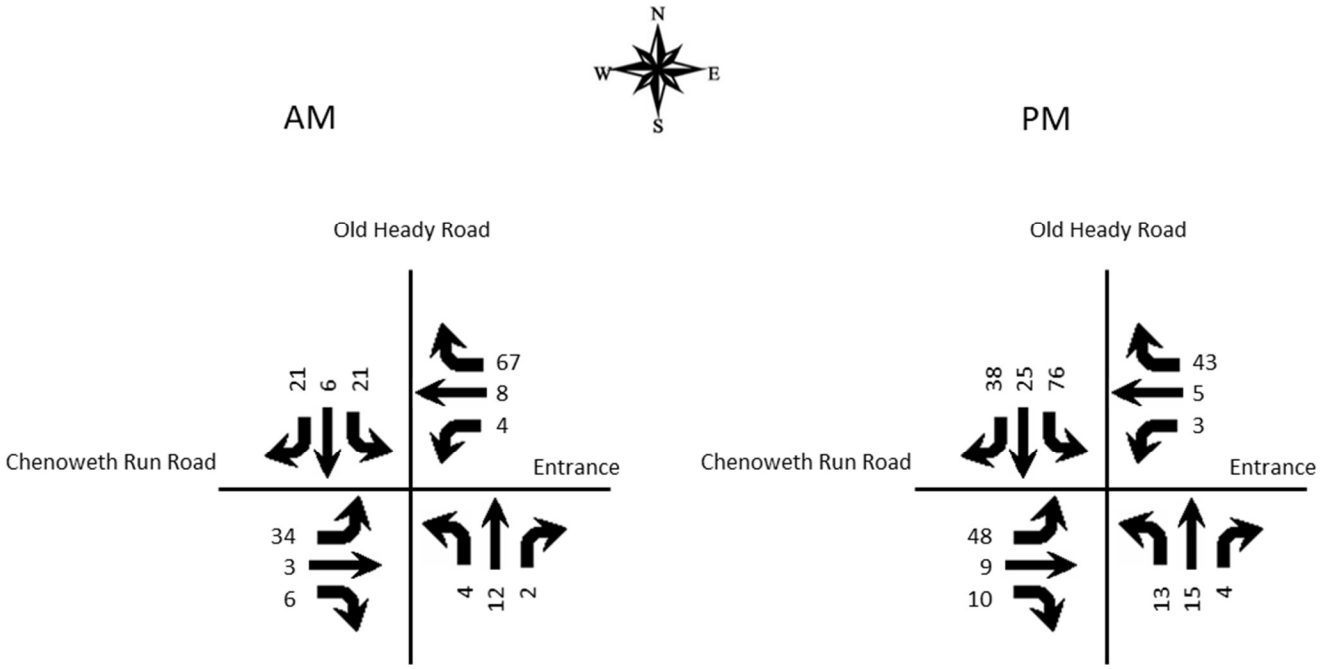


Figure 6. 2025 Build Peak Hour Volumes

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 for lanes at stop-controlled intersections.

To evaluate the impact of the proposed development, the vehicle delays at the intersections were determined using procedures detailed in the Highway Capacity Manual, 6th edition. Future delays and Level of Service were determined for the intersections using the HCS Streets (version 7.9) software. The delays and Level of Service are summarized in **Table 2**.

Table 2. Peak Hour Level of Service

	A.M.			P.M.		
Approach	2021 Existing	2025 No Build	2025 Build	2020 Existing	2025 No Build	2025 Build
Old Heady Road at Chenoweth Run Road						
Chenoweth Run Road Eastbound	A 9.0	A 9.1	B 10.9	A 9.4	A 9.5	B 12.8
Entrance Westbound			A 9.2			A 9.3
Old Heady Road Northbound (left)	A 7.3	A 7.3	A 7.3	A 7.4	A 7.4	A 7.4
Old Heady Road Southbound (left)			A 7.3			A 7.4

Key: Level of Service, Delay in seconds per vehicle

The entrances were evaluated for turn lanes using the Kentucky Transportation Cabinet Highway Design Guidance Manual dated July, 2020. Using the volumes in Figure 6, a southbound left-turn lane will not be required at the entrance.

CONCLUSIONS

Based upon the volume of traffic generated by the development and the amount of traffic forecasted for the year 2025, there will be a slight impact to the existing highway network. A left-turn lane will not be required at the entrance. No other improvements are required.

APPENDIX

Traffic Counts

Classified Turn Movement Count || All vehicles

Marr Traffic DATA COLLECTION
www.marrtraffic.com

Old Heady Road, KY

Site 2 of 2
Old Heady Rd (South)
Old Heady Rd (North)
Chenoweth Run Rd

Date
Tuesday, April 13, 2021

Weather
Cloudy
61°F

Lat/Long
38.169725°, -85.524743°

0700 - 0900 (Weekday 2h Session) (13-04-2021)
All vehicles

	Northbound				Southbound				Eastbound				
	Old Heady Rd (South)				Old Heady Rd (North)				Chenoweth Run Rd				
TIME	Left 2.1	Thru 2.2	U-Turn 2.3	App Total	Thru 2.4	Right 2.5	U-Turn 2.6	App Total	Left 2.7	Right 2.8	U-Turn 2.9	App Total	Int Total
0700 - 0715	0	1	0	1	0	5	0	5	1	4	0	5	11
0715 - 0730	0	2	0	2	0	10	0	10	5	1	0	6	18
0730 - 0745	0	1	0	1	0	7	0	7	4	1	0	5	13
0745 - 0800	0	2	0	2	1	1	0	2	3	0	0	3	7
Hourly Total	0	6	0	**6**	1	23	0	**24**	13	6	0	**19**	**49**
0800 - 0815	2	2	0	4	0	9	0	9	19	2	0	21	34
0815 - 0830	1	3	0	4	2	3	0	5	7	1	0	8	17
0830 - 0845	0	2	0	2	1	2	0	3	3	2	0	5	10
0845 - 0900	1	4	0	5	3	5	0	8	2	1	0	3	16
Hourly Total	4	11	0	**15**	6	19	0	**25**	31	6	0	**37**	**77**
Grand Total	4	17	0	**21**	7	42	0	**49**	44	12	0	**56**	**126**
Approach %	19.05	80.95	0.00	-	14.29	85.71	0.00	-	78.57	21.43	0.00	-	
Intersection %	3.17	13.49	0.00	16.67	5.56	33.33	0.00	38.89	34.92	9.52	0.00	44.44	
PHF	0.50	0.69	0.00	**0.75**	0.50	0.53	0.00	**0.69**	0.41	0.75	0.00	**0.44**	**0.57**

1600 - 1800 (Weekday 2h Session) (13-04-2021)
All vehicles

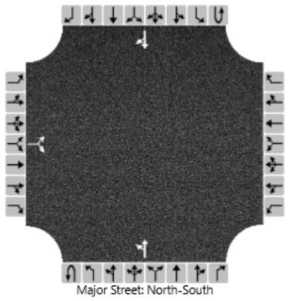
	Northbound				Southbound				Eastbound				
	Old Heady Rd (South)				Old Heady Rd (North)				Chenoweth Run Rd				
TIME	Left 2.1	Thru 2.2	U-Turn 2.3	App Total	Thru 2.4	Right 2.5	U-Turn 2.6	App Total	Left 2.7	Right 2.8	U-Turn 2.9	App Total	Int Total
1600 - 1615	3	7	0	10	9	9	0	18	8	2	0	10	38
1615 - 1630	2	2	0	4	4	10	0	14	12	1	0	13	31
1630 - 1645	6	2	0	8	7	9	0	16	20	4	0	24	48
1645 - 1700	1	3	0	4	3	7	0	10	4	2	0	6	20
Hourly Total	12	14	0	**26**	23	35	0	**58**	44	9	0	**53**	**137**
1700 - 1715	4	3	0	7	6	7	0	13	4	1	0	5	25
1715 - 1730	5	5	0	10	6	6	0	12	6	2	0	8	30
1730 - 1745	1	3	0	4	3	5	0	8	3	3	0	6	18
1745 - 1800	2	3	0	5	7	1	0	8	4	3	0	7	20
Hourly Total	12	14	0	**26**	22	19	0	**41**	17	9	0	**26**	**93**
Grand Total	24	28	0	**52**	45	54	0	**99**	61	18	0	**79**	**230**
Approach %	46.15	53.85	0.00	-	45.45	54.55	0.00	-	77.22	22.78	0.00	-	
Intersection %	10.43	12.17	0.00	22.61	19.57	23.48	0.00	43.04	26.52	7.83	0.00	34.35	
PHF	0.50	0.50	0.00	**0.65**	0.64	0.88	0.00	**0.81**	0.55	0.56	0.00	**0.55**	**0.71**

HCS Reports

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	DBZ	Intersection	Old Heady at Chenoweth Ru
Agency/Co.	Diane B Zimmerman Traffic Engineering	Jurisdiction	
Date Performed	4/27/2021	East/West Street	Chenoweth Run Road
Analysis Year	2021	North/South Street	Old Heady Road
Time Analyzed	AM Peak	Peak Hour Factor	0.57
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	Old Heady		

Lanes



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		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	0	0	0	0	1	0	0	0	1	0
Configuration			LR							LT						TR
Volume (veh/h)		31		6						4	11				6	19
Percent Heavy Vehicles (%)		3		0						0						
Proportion Time Blocked																
Percent Grade (%)		0														
Right Turn Channelized																
Median Type | Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1		6.2						4.1						
Critical Headway (sec)		6.43		6.20						4.10						
Base Follow-Up Headway (sec)		3.5		3.3						2.2						
Follow-Up Headway (sec)		3.53		3.30						2.20						

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			65							7						
Capacity, c (veh/h)			956							1578						
v/c Ratio			0.07							0.00						
95% Queue Length, Q_{95} (veh)			0.2							0.0						
Control Delay (s/veh)			9.0							7.3						
Level of Service (LOS)			A							A						
Approach Delay (s/veh)		9.0								2.0						
Approach LOS		A														

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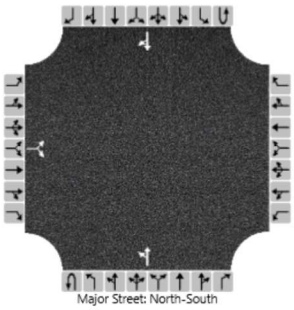
HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	DBZ	Intersection	Old Heady at Chenoweth Ru
Agency/Co.	Diane B Zimmerman Traffic Engineering	Jurisdiction	
Date Performed	4/27/2021	East/West Street	Chenoweth Run Road
Analysis Year	2025	North/South Street	Old Heady Road
Time Analyzed	AM Peak No Build	Peak Hour Factor	0.57
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	Old Heady		

Lanes



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		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	0	0	0	0	1	0	0	0	1	0
Configuration			LR							LT						TR
Volume (veh/h)		34		6						4	12				6	21
Percent Heavy Vehicles (%)		3		0						0						
Proportion Time Blocked																
Percent Grade (%)		0														
Right Turn Channelized																
Median Type | Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1		6.2						4.1						
Critical Headway (sec)		6.43		6.20						4.10						
Base Follow-Up Headway (sec)		3.5		3.3						2.2						
Follow-Up Headway (sec)		3.53		3.30						2.20						

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			70							7						
Capacity, c (veh/h)			951							1573						
v/c Ratio			0.07							0.00						
95% Queue Length, Q_{95} (veh)			0.2							0.0						
Control Delay (s/veh)			9.1							7.3						
Level of Service (LOS)			A							A						
Approach Delay (s/veh)		9.1								1.8						
Approach LOS		A														

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HCS7 Two-Way Stop-Control Report

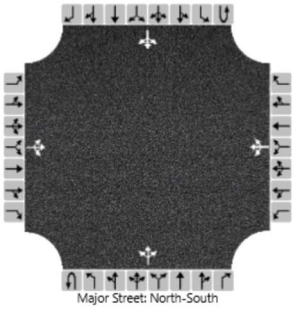
General Information

Analyst	DBZ
Agency/Co.	Diane B Zimmerman Traffic Engineering
Date Performed	4/27/2021
Analysis Year	2025
Time Analyzed	AM Peak Build
Intersection Orientation	North-South
Project Description	Old Heady

Site Information

Intersection	Old Heady at Chenoweth Ru
Jurisdiction	
East/West Street	Chenoweth Run Road
North/South Street	Old Heady Road
Peak Hour Factor	0.57
Analysis Time Period (hrs)	0.25

Lanes


Major Street: North-South

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		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	0	1	0	0	0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		34	3	6		4	8	67		4	12	2		21	6	21
Percent Heavy Vehicles (%)		3	0	0		3	3	3		0				5		
Proportion Time Blocked																
Percent Grade (%)	0				0											
Right Turn Channelized																
Median Type | Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1		
Critical Headway (sec)		7.13	6.50	6.20		7.13	6.53	6.23		4.10				4.15		
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2		
Follow-Up Headway (sec)		3.53	4.00	3.30		3.53	4.03	3.33		2.20				2.25		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			75				139			7				37		
Capacity, c (veh/h)			685				987			1573				1571		
v/c Ratio			0.11				0.14			0.00				0.02		
95% Queue Length, Q_{95} (veh)			0.4				0.5			0.0				0.1		
Control Delay (s/veh)			10.9				9.2			7.3				7.3		
Level of Service (LOS)			B				A			A				A		
Approach Delay (s/veh)	10.9				9.2				1.6				3.3			
Approach LOS	B				A											

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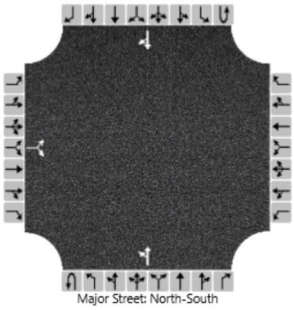
General Information		Site Information	
Analyst	DBZ	Intersection	Old Heady at Chenoweth Ru
Agency/Co.	Diane B Zimmerman Traffic Engineering	Jurisdiction	
Date Performed	4/27/2021	East/West Street	Chenoweth Run Road
Analysis Year	2021	North/South Street	Old Heady Road
Time Analyzed	PM Peak	Peak Hour Factor	0.71
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	Old Heady		

Lanes



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		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	0	0	0	0	1	0	0	0	1	0
Configuration			LR							LT						TR
Volume (veh/h)		44		9						12	14				23	35
Percent Heavy Vehicles (%)		3		0						0						
Proportion Time Blocked																
Percent Grade (%)		0														
Right Turn Channelized																
Median Type | Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1		6.2						4.1						
Critical Headway (sec)		6.43		6.20						4.10						
Base Follow-Up Headway (sec)		3.5		3.3						2.2						
Follow-Up Headway (sec)		3.53		3.30						2.20						

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			75							17						
Capacity, c (veh/h)			895							1529						
v/c Ratio			0.08							0.01						
95% Queue Length, Q_{95} (veh)			0.3							0.0						
Control Delay (s/veh)			9.4							7.4						
Level of Service (LOS)			A							A						
Approach Delay (s/veh)		9.4								3.5						
Approach LOS		A														

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HCS7 Two-Way Stop-Control Report

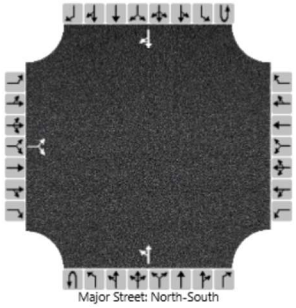
General Information

Analyst	DBZ
Agency/Co.	Diane B Zimmerman Traffic Engineering
Date Performed	4/27/2021
Analysis Year	2025
Time Analyzed	PM Peak No Build
Intersection Orientation	North-South
Project Description	Old Heady

Site Information

Intersection	Old Heady at Chenoweth Ru
Jurisdiction	
East/West Street	Chenoweth Run Road
North/South Street	Old Heady Road
Peak Hour Factor	0.71
Analysis Time Period (hrs)	0.25

Lanes



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		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	0	0	0	0	1	0	0	0	1	0
Configuration			LR							LT						TR
Volume (veh/h)		48		10						13	15				25	38
Percent Heavy Vehicles (%)		3		0						0						
Proportion Time Blocked																
Percent Grade (%)		0														
Right Turn Channelized																
Median Type | Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1		6.2						4.1						
Critical Headway (sec)		6.43		6.20						4.10						
Base Follow-Up Headway (sec)		3.5		3.3						2.2						
Follow-Up Headway (sec)		3.53		3.30						2.20						

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			82							18						
Capacity, c (veh/h)			885							1520						
v/c Ratio			0.09							0.01						
95% Queue Length, Q_{95} (veh)			0.3							0.0						
Control Delay (s/veh)			9.5							7.4						
Level of Service (LOS)			A							A						
Approach Delay (s/veh)		9.5								3.5						
Approach LOS		A														

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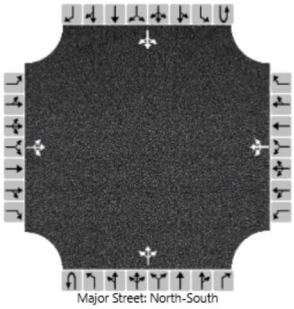
General Information

Analyst	DBZ
Agency/Co.	Diane B Zimmerman Traffic Engineering
Date Performed	4/27/2021
Analysis Year	2025
Time Analyzed	PM Peak Build
Intersection Orientation	North-South
Project Description	Old Heady

Site Information

Intersection	Old Heady at Chenoweth Ru
Jurisdiction	
East/West Street	Chenoweth Run Road
North/South Street	Old Heady Road
Peak Hour Factor	0.71
Analysis Time Period (hrs)	0.25

Lanes


Major Street: North-South

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		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	0	1	0	0	0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		48	9	10		3	5	43		13	15	4		76	25	38
Percent Heavy Vehicles (%)		3	0	0		0	0	3		0				3		
Proportion Time Blocked																
Percent Grade (%)		0				0										
Right Turn Channelized																
Median Type | Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1		
Critical Headway (sec)		7.13	6.50	6.20		7.10	6.50	6.23		4.10				4.13		
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2		
Follow-Up Headway (sec)		3.53	4.00	3.30		3.50	4.00	3.33		2.20				2.23		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			94				72			18				107		
Capacity, c (veh/h)			555				911			1520				1581		
v/c Ratio			0.17				0.08			0.01				0.07		
95% Queue Length, Q_{95} (veh)			0.6				0.3			0.0				0.2		
Control Delay (s/veh)			12.8				9.3			7.4				7.4		
Level of Service (LOS)			B				A			A				A		
Approach Delay (s/veh)		12.8				9.3				3.1				4.3		
Approach LOS		B				A										

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