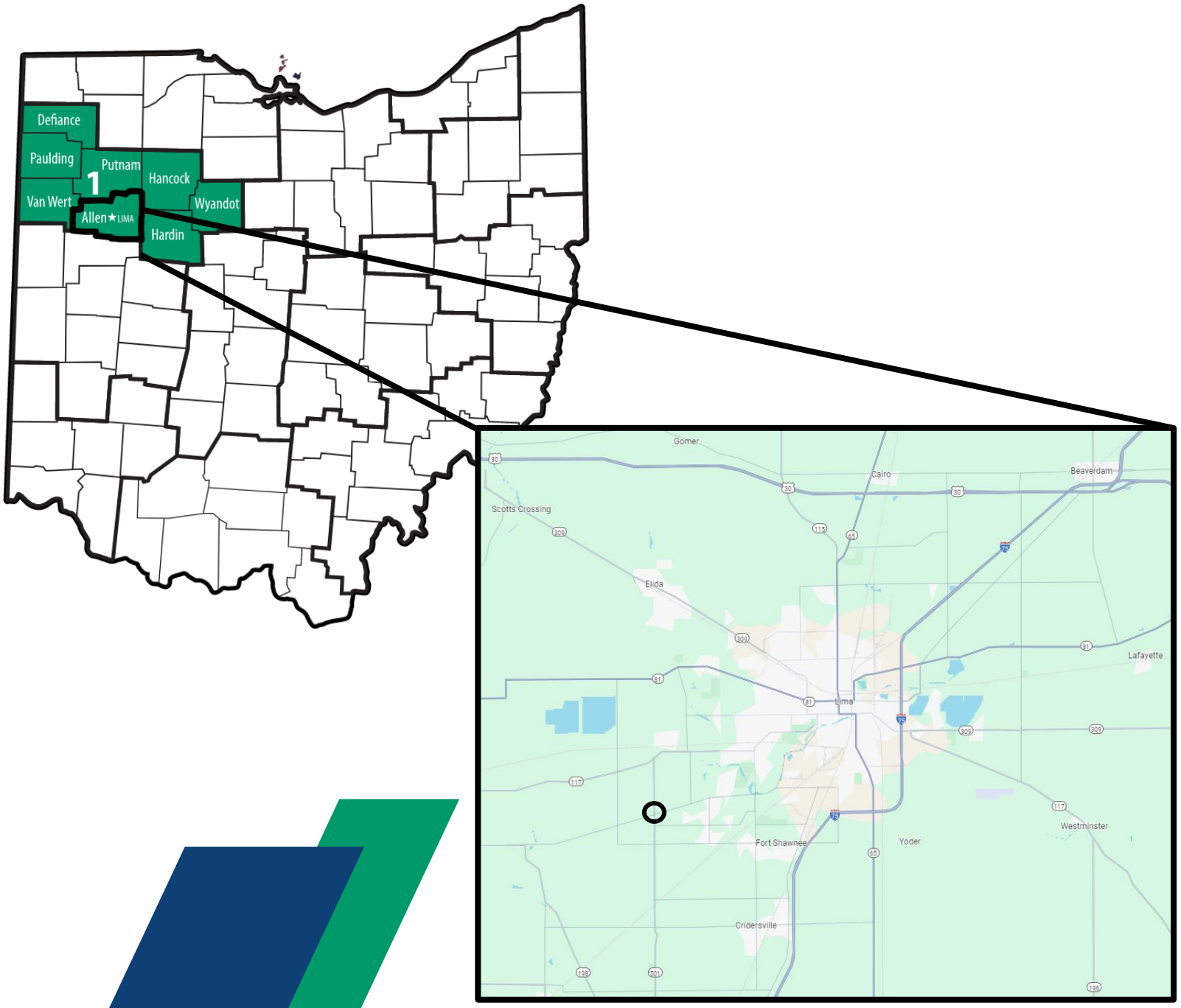
July 2024

ALL-SR 501-2.81 | Safety Study
Fort Amanda Road Intersection



Department of Transportation

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I. EXECUTIVE SUMMARY

Purpose and Need

The location under study is the intersection of State Route 501 and Fort Amanda Road. This intersection is approximately 4 miles west of the City of Lima, located in Allen County (District 1). The purpose of this study is to evaluate this location and analyze the crashes to identify potential countermeasures to mitigate safety or congestion issues. This location was first discussed at a District Safety Review Team (DSRT) meeting in 2001 after being listed as the 49th highest priority intersection in the state on the 1999 Highway Safety Program High Crash Location Identification System. This intersection has been a reoccurring topic of discussion at DSRT meetings over the years and frequently receives complaints from the public.

History

This location has a history of prior work aimed at increasing the overall safety and operation of the intersection. Triangular sections of right of way were purchased in all four corners to improve sight distance (1997). The overhead flasher and support poles were removed (2020). The stop ahead signs and intersection warning signs were upgraded with LED enhancement (2020). The right of way was staked, and any encroaching trees were removed (2020). A District wide pavement marking project (PID 101005) upgraded the striping through the intersection (2021).

II. EXISTING CONDITIONS

Background

State Route 501 (SR 501) is a two-lane, undivided, north-south roadway classified by ODOT as a Major Collector with a statutory speed limit of 55 miles per hour. Fort Amanda Road is a two-lane, undivided, east-west roadway classified by ODOT as a Minor Collector with a posted speed limit of 45 miles per hour. The land use is primarily agricultural with a mix of residential on the southeast side of the intersection. SR 501 intersects Fort Amanda Road as a two-way stop-controlled intersection with stop control on Fort Amanda Road. There are no exclusive turn lanes at the intersection.

Traffic Volumes

The following traffic data for the ALL – SR 501 – 2.81 intersection was obtained by turning movement counts collected from 6:00 A.M. 7/10/2024 to 6:00 A.M 7/11/2024. A plot of

these counts is shown in Figure 1, below. Historic traffic data and truck percentages are also shown in Table 1, below.

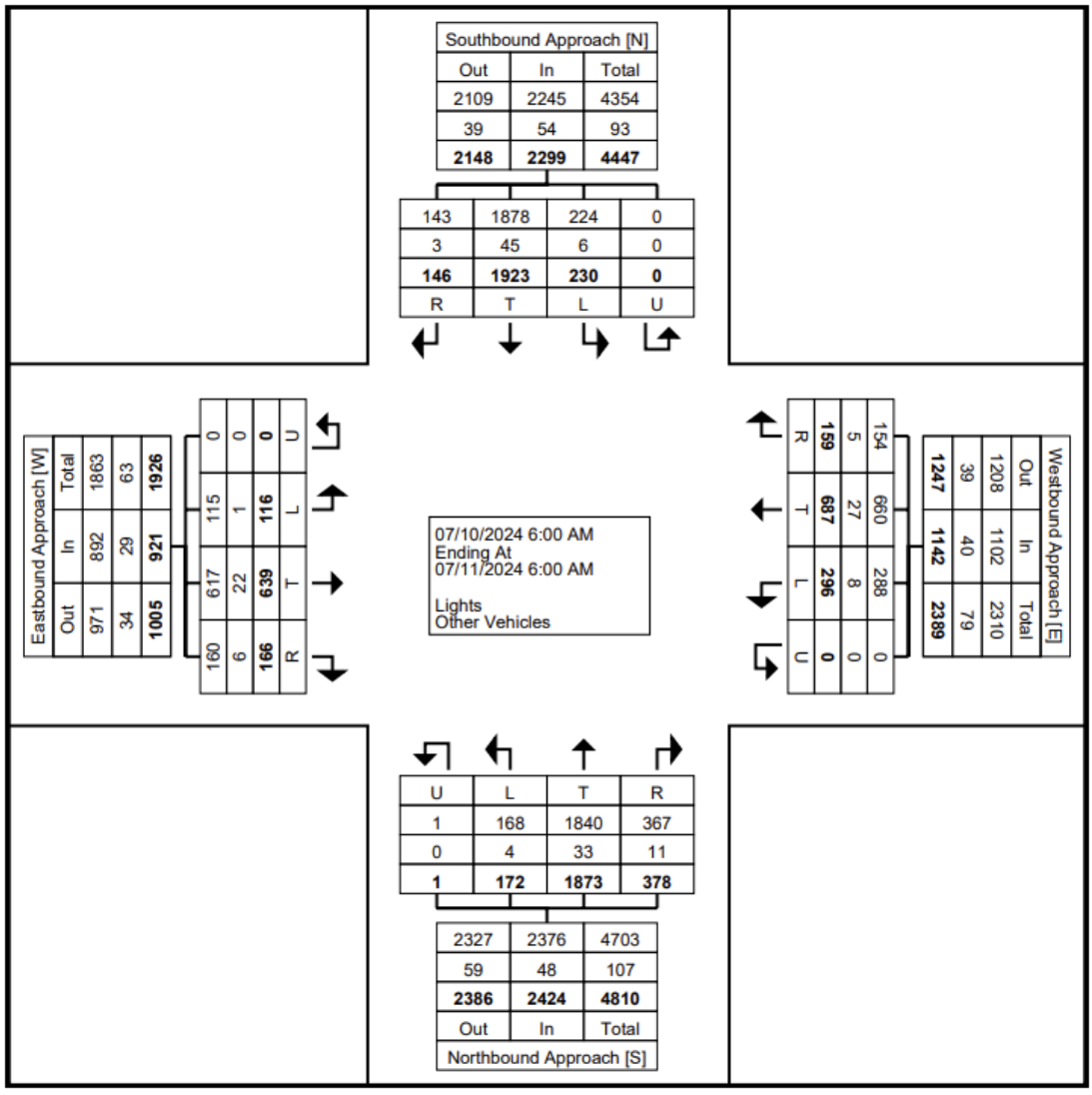


Figure 1: Turning Movement Data Plot

Table 1: SR 501 Historic Traffic Data

ALL - SR 501 Historic Traffic				
Year	AADT	% Change	Truck AADT	% Trucks
1990	2,850	-	110	3.9%
1994	3,600	20.8%	100	2.8%
1999	3,240	-11.1%	120	3.7%
2005	3,390	4.4%	90	2.7%
2011	3,160	-7.3%	60	1.9%
2014	3,632	13.0%	68	1.9%
2020	3,507	9.9%	62	1.8%

Conditions Diagram

There are dual, LED enhanced stop ahead signs located on the eastbound and westbound approaches of Fort Amanda Road in advance of the two-way stop controlled intersection. The stop signs are dualled in each direction with "Cross Traffic Does Not Stop" plaques on the back of all four stop signs and one of the fronts of both stop signs on the driver's side. There are dual, LED enhanced intersection warning signs with the cross street name located on the northbound and southbound approaches of SR 501. The locations of these signs are pictured in Figure 2, below.

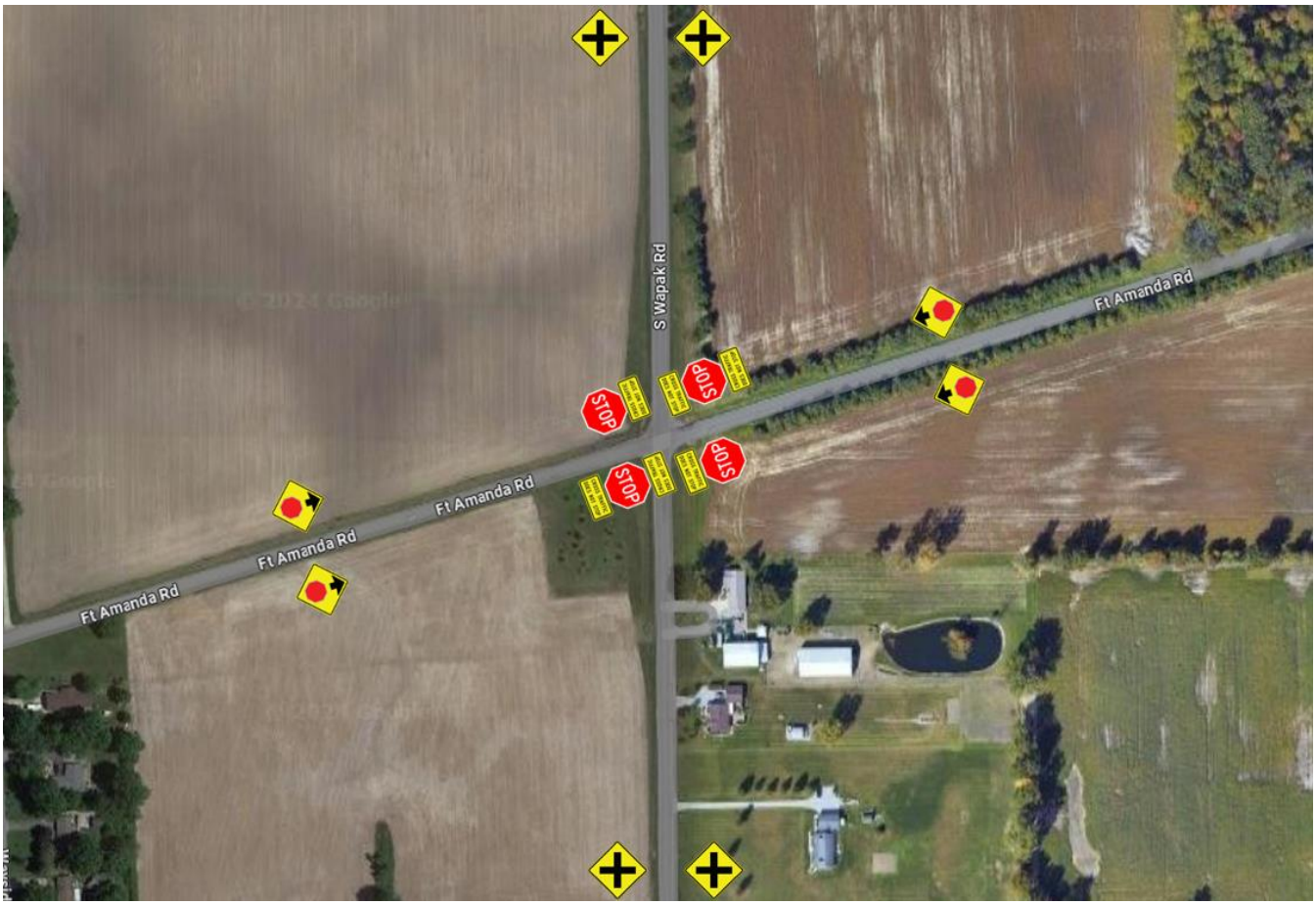


Figure 2: Conditions Diagram

SR 501 is approximately 28' wide with 12' northbound and southbound travel lanes and 2' paved shoulders. Fort Amanda Road is approximately 22' wide with 11' eastbound and westbound travel lanes. There is a stop bar painted even with the stop signs on each approach, perpendicular to Fort Amanda Road. Fort Amanda Road intersects SR 501 at approximately an 18-degree skew. The only obstructions observed to be in the lines of sight are a utility pole and a street name sign, otherwise the intersection is wide open.

Pictures of the Intersection

Figure 3: Northbound SR 501 – Dual, LED Enhanced Intersection Warning Signs

Figure 4: Westbound Ft Amanda Rd – Dual, LED Enhanced Stop Ahead Signs

Figure 5: Eastbound Ft Amanda Rd looking North

Figure 6: Eastbound Ft Amanda Rd looking South

Figure 7: Westbound Ft Amanda Rd looking North

Figure 8: Westbound Ft Amanda Rd looking South

III. CRASH DATA

Crash Data Summaries

Crash data for a five-year period from January 1st, 2019 to December 31st, 2023 indicates a total of 17 crashes occurred at this intersection. This is an average of 3.4 crashes per year. Of the 17 crashes, 1 was coded as a fatal crash, 6 were coded as injury crashes, and 10 were coded as property damage only crashes. These 17 crashes resulted in a 41% injury rate. The most prominent crash type at this intersection was angle (59%), followed by rear end (18%) and sideswipe (12%). The angle crashes were a result of drivers failing to yield or failing to stop. Of the 10 angle crashes, 3 involved drivers failing to stop for the posted stop signs. The failure to yield and run the stop sign crashes were split almost evenly, 4 eastbound and 6 westbound.

Most crashes occurred during the day (82%), on dry pavement (82%), under no adverse weather conditions, so weather, pavement condition, and lighting do not appear to be a factor in the crashes. The crashes are mostly staggered throughout the day with a morning peak (6 A.M.-7 A.M – 24%), afternoon peak (1 P.M. – 18%), and evening peak (5 P.M. - 24%). During the week, crashes peak on Tuesday (24%) and then fall off by Sunday. Various crash stats are displayed below. For additional information, see Appendix A.

Road Condition	Crashes	%
Dry	14	82.35%
Wet	2	11.76%
Ice	1	5.88%
Grand Total	17	100.00%

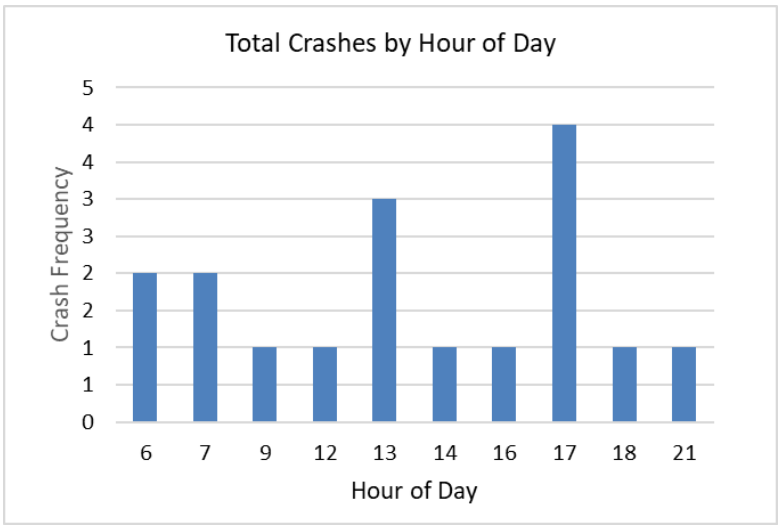
Light Condition	Crashes	%
Daylight	14	82.35%
Dawn/Dusk	2	11.76%
Dark - Roadway Not Lighted	1	5.88%
Grand Total	17	100.00%

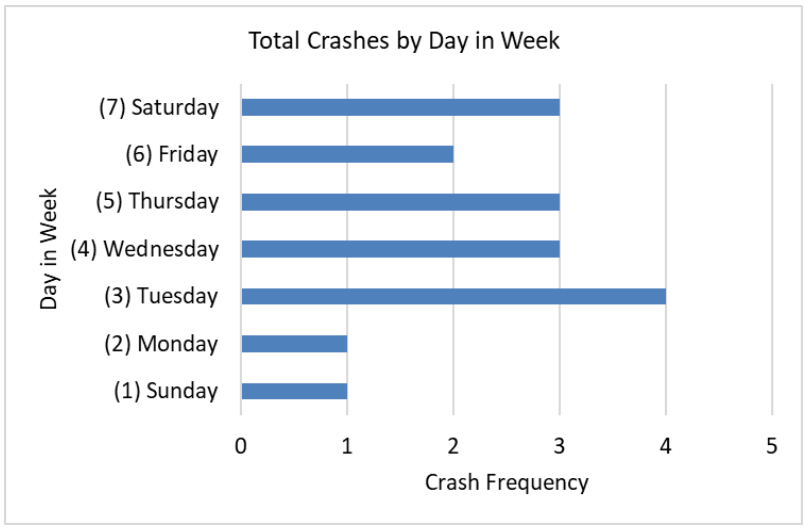
Year	Crashes	%
2019	4	23.53%
2020	2	11.76%
2021	4	23.53%
2022	4	23.53%
2023	3	17.65%
Grand Total	17	100.00%

Crash Type	Crashes	%
Angle	10	58.82%
Rear End	3	17.65%
Sideswipe - Passing	2	11.76%
Left Turn	1	5.88%
Overturning	1	5.88%
Grand Total	17	100.00%

Crash Severity	Crashes	%
(1) Fatal	1	5.88%
(2) Serious Injury Suspected	3	17.65%
(3) Minor Injury Suspected	3	17.65%
(5) PDO/No Injury	10	58.82%
Grand Total	17	100.00%

Weather Condition	Crashes	%
Clear	12	70.59%
Cloudy	5	29.41%
Grand Total	17	100.00%





Crash Diagram

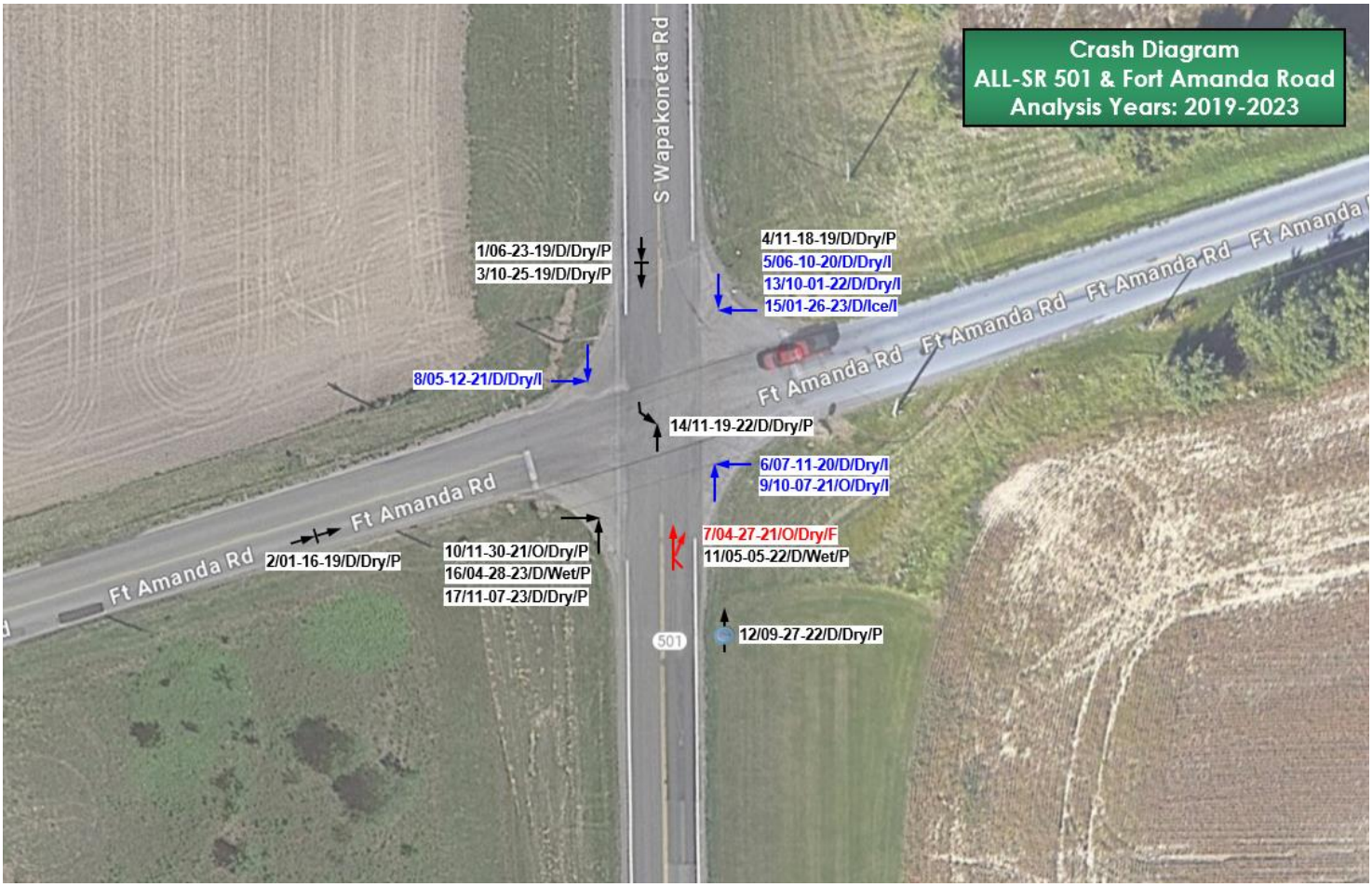


Figure 9: Crash Diagram

Overview of Possible Causes

The probable causes or deficiencies at the intersection were identified through a detailed analysis of the crash patterns, roadway conditions, existing traffic control, traffic volumes, and traffic speeds. With a majority of the crash types being angle, this may be attributed to the intersection skew. According to Section 401.3 of ODOT's Location & Design Manual (L&D) Volume 1, the maximum skew angle for new or relocated highways is 20 degrees. The intersection just meets guidance with an approximate 18-degree skew. The orientation of this intersection causes a driver's vision of oncoming traffic from the right to be blocked by his or her own vehicle. The crashes are consistent with this theory. Of the 10 angle crashes, 7 occurred with a vehicle entering the intersection from the right. An estimation of blind spots created by the A-pillars of a vehicle is shown in Figure 10, below. This is assuming vehicles are stopping at the stop bars.

Figure 10: Intersection Skew and Blind Spots

The majority of angle crashes being failure to yield rather than run the stop sign crashes suggest that drivers acknowledge the stop condition. Any additional upgrades to stop signs, stop ahead signs, or any other warning signs are unlikely to eliminate these crashes. Other than vehicles blocking their own line of sight, there are no other observed sight issues. The intersection is relatively flat with some vertical curvature to the south. Other than the intersection skew causing vehicles to block sight at the intersection, another possible cause is driver inattention or distraction.

Identification of Potential Countermeasures

Countermeasures considered as part of this study include a roundabout, traffic signal, all-way stop control, right turn lanes, and left turn lanes. All applicable warrants were evaluated for each countermeasure. A summary is shown in Table 2, below.

Table 2: Potential Countermeasures

Countermeasure	Warrant Met	Considered for Evaluation
Roundabout	Yes - Single Lane sufficient	Yes
Traffic Signal	No	No
All-Way Stop	No	No
Right Turn Lane	No	No
Left Turn Lane	No	No

Turning movement count data collected on 7/10/2024 through 7/11/2024 was used to evaluate each of the warrants. All countermeasures, except roundabout, were dismissed after not meeting warrants due to traffic volumes being too low to pass minimum thresholds. For the traffic signal, warrants 1, 2, 3, and 7 were evaluated. Full warrants can be found in Appendix B.

IV. PROPOSED COUNTERMEASURE EVALUATION

ECAT Results

According to Highway Safety Manual (HSM) calculations programmed into ODOT's Economic Crash Analysis Tool (ECAT), converting the existing two-way stop-controlled intersection to a single-lane roundabout would reduce crashes from 3.8 per year to 1.2 per year. This is a 68% reduction in crashes per year. Full ECAT results can be found in Appendix C. A single-lane roundabout would reduce the speeds of entering vehicles, thus reducing the severity of any potential crashes. Likewise, roundabouts typically reduce

angle crashes which is the main crash type at the existing intersection. The geometrics of the roundabout would also improve the skew and sight at the intersection.

HCS Analysis

Capacity analyses were performed to assess the Level of Service (LOS) and delay at the intersection during the 2024 AM and PM peak hours for existing and proposed conditions. These values were calculated using the latest version of the Highway Capacity Software (HCS). A summary is shown in Table 3, below. Full results can be found in Appendix D.

Table 3: Intersection LOS and Delay

	2024 (Existing)				2024 (Roundabout)			
	AM		PM		AM		PM	
Approach	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
Eastbound	B	12.1	B	13.5	A	3.8	A	4.0
Westbound	B	12.4	C	16.9	A	3.5	A	4.4
Northbound	A	0.3	A	1.1	A	4.2	A	4.3
Southbound	A	1.8	A	0.6	A	3.8	A	5.1

V. CONCLUSION

Based on the analyses discussed above, it is recommended to convert the existing two-way stop-controlled intersection to a single-lane roundabout.

Appendix A - Crash Analysis Module (CAM) Tool

ALL-SR 501 & Fort Amanda Road (2019-2023)

Crash Summary Sheet

Fatalities	1
Serious Injuries	6
Other Injuries	5

Crashes Per Year	3.40
Fatal and All Injury Crashes	7
Percent Injury	41.2%
Equivalent PDO Index Value	12.49

Crash Severity	Crashes	%
(1) Fatal	1	5.88%
(2) Serious Injury Suspected	3	17.65%
(3) Minor Injury Suspected	3	17.65%
(5) PDO/No Injury	10	58.82%
Grand Total	17	100.00%

Year	Crashes	%
2019	4	23.53%
2020	2	11.76%
2021	4	23.53%
2022	4	23.53%
2023	3	17.65%
Grand Total	17	100.00%

Day of Week	Crashes	%
(1) Sunday	1	5.88%
(2) Monday	1	5.88%
(3) Tuesday	4	23.53%
(4) Wednesday	3	17.65%
(5) Thursday	3	17.65%
(6) Friday	2	11.76%
(7) Saturday	3	17.65%
Grand Total	17	100.00%

Crash Type	Crashes	%
Angle	10	58.82%
Rear End	3	17.65%
Sideswipe - Passing	2	11.76%
Left Turn	1	5.88%
Overturning	1	5.88%
Grand Total	17	100.00%

Hour of Day	Crashes	%
6	2	11.76%
7	2	11.76%
9	1	5.88%
12	1	5.88%
13	3	17.65%
14	1	5.88%
16	1	5.88%
17	4	23.53%
18	1	5.88%
21	1	5.88%
Grand Total	17	100.00%

Month	Crashes	%
1	2	11.76%
4	2	11.76%
5	2	11.76%
6	2	11.76%
7	1	5.88%
9	1	5.88%
10	3	17.65%
11	4	23.53%
Grand Total	17	100.00%

ALL-SR 501 & Fort Amanda Road (2019-2023)

Crash Summary Sheet

Weather Condition	Crashes	%
Clear	12	70.59%
Cloudy	5	29.41%
Grand Total	17	100.00%

Road Condition	Crashes	%
Dry	14	82.35%
Wet	2	11.76%
Ice	1	5.88%
Grand Total	17	100.00%

Light Condition	Crashes	%
Daylight	14	82.35%
Dawn/Dusk	2	11.76%
Dark - Roadway Not Lighted	1	5.88%
Grand Total	17	100.00%

Number of Units	Crashes	%
2	15	88.24%
3	1	5.88%
1	1	5.88%
Grand Total	17	100.00%

ODOT Location	Crashes	%
Four-Way Intersection	10	58.82%
Data Not Valid or Not Provided	7	41.18%
Grand Total	17	100.00%

Work Zone Related	Crashes	%
No	17	100.00%
Grand Total	17	100.00%

Alcohol Related	Crashes	%
No	17	100.00%
Grand Total	17	100.00%

Drug Related (Inc. Marijuana)	Crashes	%
No	17	100.00%
Grand Total	17	100.00%

Contour	Crashes	%
Straight Level	17	100.00%
Grand Total	17	100.00%

Marijuana Related	Crashes	%
No	17	100.00%
Grand Total	17	100.00%

Roadway Departure	Crashes	%
No	14	82.35%
Yes	3	17.65%
Grand Total	17	100.00%

Older Driver (65+)	Crashes	%
No	14	82.35%
Yes	3	17.65%
Grand Total	17	100.00%

Intersection Related	Crashes	%
Yes	17	100.00%
Grand Total	17	100.00%

Young Driver (15-25)	Crashes	%
No	9	52.94%
Yes	8	47.06%
Grand Total	17	100.00%

Speed Related	Crashes	%
No	16	94.12%
Yes	1	5.88%
Grand Total	17	100.00%

Motorcycle Involved	Crashes	%
No	16	94.12%
Yes	1	5.88%
Grand Total	17	100.00%

ALL-SR 501 & Fort Amanda Road (2019-2023)

Crash Summary Sheet

Unit 1 Summary

Unit 1 Pre-Crash Action	Crashes	%
Straight Ahead	15	88.24%
Making Left Turn	1	5.88%
Slowing or Stopped In Traffic	1	5.88%
Grand Total	17	100.00%

Unit 1 Contributing Factor	Crashes	%
Failure to Yield	7	41.18%
Following Too Closely/ACDA	5	29.41%
Ran Stop Sign	4	23.53%
Swerving to Avoid	1	5.88%
Grand Total	17	100.00%

Unit 1 Object Struck	Crashes	%
Nothing Struck	15	88.24%
Ditch	2	11.76%
Grand Total	17	100.00%

Unit 1 Traffic Control	Crashes	%
Stop Sign	9	52.94%
Flasher	3	17.65%
No Control	3	17.65%
Signal	2	11.76%
Grand Total	17	100.00%

Unit 1 Posted Speed	Crashes	%
45	10	58.82%
55	7	41.18%
Grand Total	17	100.00%

Unit 1 Direction From	Crashes	%
East	6	35.29%
West	5	29.41%
South	3	17.65%
North	3	17.65%
Grand Total	17	100.00%

Unit 1 Direction To	Crashes	%
East	6	35.29%
West	6	35.29%
North	3	17.65%
South	2	11.76%
Grand Total	17	100.00%

ALL-SR 501 & Fort Amanda Road (2019-2023)

Crash Summary Sheet

Unit 1 Summary

Unit 1 Type	Crashes	%
Sport Utility Vehicle	7	41.18%
Passenger Car	3	17.65%
Pick up	2	11.76%
Passenger Van (minivan)	2	11.76%
Motorcycle 2 Wheeled	1	5.88%
Cargo Van	1	5.88%
Single Unit Truck	1	5.88%
Grand Total	17	100.00%

Unit 1 Special Function	Crashes	%
None	16	94.12%
Other / Unknown	1	5.88%
Grand Total	17	100.00%

ALL-SR 501 & Fort Amanda Road (2019-2023)
Crash Summary Sheet

Unit 2 Summary

Unit 2 Pre-Crash Action	Crashes	%
Straight Ahead	11	64.71%
Slowing or Stopped In Traffic	5	29.41%
	1	5.88%
Grand Total	17	100.00%

Unit 2 Contributing Factor	Crashes	%
None	16	94.12%
	1	5.88%
Grand Total	17	100.00%

Unit 2 Direction From	Crashes	%
	1	5.88%
North	7	41.18%
South	8	47.06%
West	1	5.88%
Grand Total	17	100.00%

Unit 2 Direction To	Crashes	%
	1	5.88%
East	1	5.88%
North	8	47.06%
South	7	41.18%
Grand Total	17	100.00%

Unit 2 Type	Crashes	%
Passenger Car	6	35.29%
Pick up	3	17.65%
Sport Utility Vehicle	3	17.65%
Passenger Van (minivan)	2	11.76%
Motorcycle 2 Wheeled	1	5.88%
	1	5.88%
Semi-Tractor	1	5.88%
Grand Total	17	100.00%

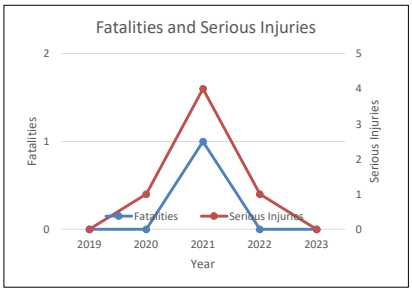
Unit 2 Special Function	Crashes	%
None	16	94.12%
	1	5.88%
Grand Total	17	100.00%

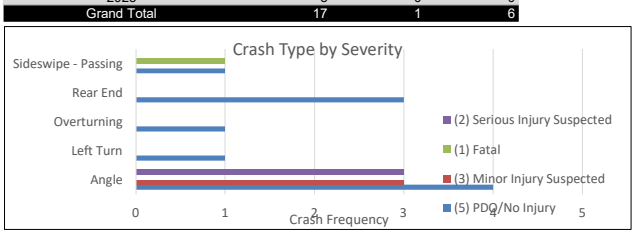
ALL-SR 501 & Fort Amanda Road (2019-2023)

Crash Summary Sheet

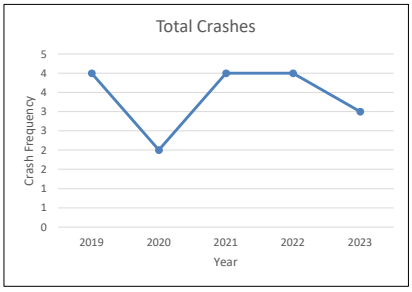
Crashes Per Year	3.40	Percent Injury	41.2%	EPDO	12.49

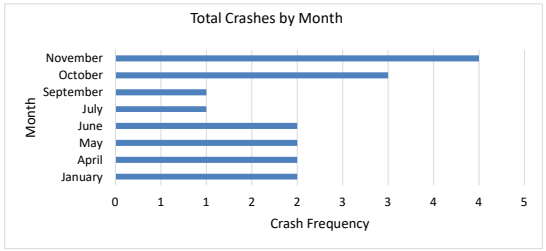
Year	Total Crashes	Fatalities	Serious Injuries
2019	4	0	0
2020	2	0	1
2021	4	1	4
2022	4	0	1
2023	3	0	0
Grand Total	17	1	6





Total Crashes Crash Type	Injury Level (1) Fatal	(2) Serious Inju	(3) Minor Injury	(5) PDO/No Inj	Grand Total
Angle	0	3	3	4	10
Rear End	0	0	0	3	3
Sideswipe - Passing	1	0	0	1	2
Left Turn	0	0	0	1	1
Overturning	0	0	0	1	1
Grand Total	1	3	3	10	17





Road Condition	Total Crashes	Fatalities	Serious Injuries
Dry	14	1	6
Ice	1	0	0
Wet	2	0	0
Grand Total	17	1	6

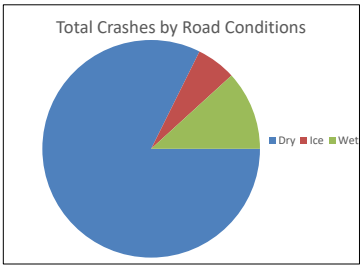
Hour of Day	Total Crashes
6	2
7	2
9	1
12	1
13	3
14	1
16	1
17	4
18	1
21	1
Grand Total	17

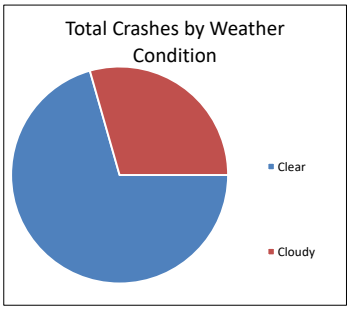
Month	Total Crashes
January	2
April	2
May	2
June	2
July	1
September	1
October	3
November	4
Grand Total	17

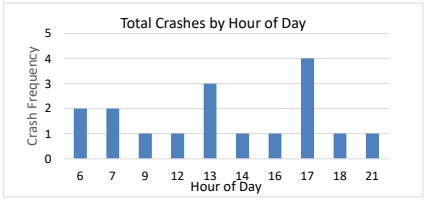
Weather	Total Crashes	Fatalities	Serious Injuries
Clear	12	1	6
Cloudy	5	0	0
Grand Total	17	1	6

Day in Week	Total Crashes
(1) Sunday	1
(2) Monday	1
(3) Tuesday	4
(4) Wednesday	3
(5) Thursday	3
(6) Friday	2
(7) Saturday	3
Grand Total	17

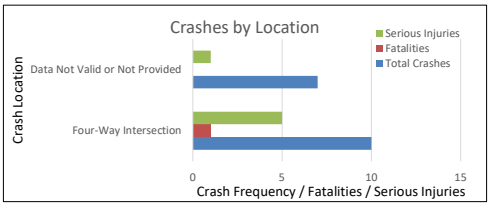
Crash Location	Total Crashes	Fatalities	Serious Injuries
Four-Way Intersection	10	1	5
Data Not Valid or Not Provided	7	0	1
Grand Total	17	1	6







Roadway Contour	Total Crashes	Fatalities	Serious Injuries
Straight Level	17	1	6
Grand Total	17	1	6



Select Site Type	Int/Rur; 4-leg minor-rd STOP

Crash Severity	Site Average		Statewide Average
	Total (2019-2023)	Total (%)	Total (%)
Fatal Crash	1	5.88%	1.19%
Serious Injury Suspected Crash	3	17.65%	6.35%
Minor Injury Suspected Crash	3	17.65%	17.57%
Injury Possible Crash	0	0.00%	11.14%
Property-Damage-Only	10	58.82%	63.74%
Total	**17**		

Crashes by Crash Type				
	Total (%)		Fatal & All Injury (%)	
Crash Type	Site Average	Statewide Average	Site Average	Statewide Average
Unknown	0.01%	0.20%	0.01%	0.09%
Head On	0.00%	1.72%	0.00%	2.60%
Rear End	17.65%	12.77%	17.65%	12.93%
Backing	0.00%	3.15%	0.00%	0.50%
Sideswipe - Meeting	0.00%	1.09%	0.00%	0.82%
Sideswipe - Passing	11.76%	6.73%	11.76%	6.01%
Angle	58.82%	29.64%	58.82%	47.25%
Parked Vehicle	0.00%	1.41%	0.00%	0.61%
Pedestrian	0.00%	0.27%	0.00%	0.70%
Animal	0.00%	12.69%	0.00%	1.11%
Train	0.00%	0.02%	0.00%	0.03%
Pedalcycles	0.00%	0.21%	0.00%	0.47%
Other Non-Vehicle	0.00%	0.01%	0.00%	0.02%
Fixed Object	0.00%	16.62%	0.00%	12.26%
Other Object	0.00%	0.45%	0.00%	0.11%
Falling From Or In Vehicle	0.00%	0.00%	0.00%	0.01%
Overturning	5.88%	1.09%	5.88%	1.89%
Other Non-Collision	0.00%	0.93%	0.00%	0.39%
Left Turn	5.88%	8.95%	5.88%	10.68%
Right Turn	0.00%	2.05%	0.00%	1.52%

Crashes by Light Conditions				
	Total (%)		Fatal & All Injury (%)	
Light Conditions	Site Average	Statewide Average	Site Average	Statewide Average
Daylight	82.35%	66.85%	82.35%	75.78%
Dawn/Dusk	11.76%	5.46%	11.76%	4.63%
Dark - Lighted Roadway	0.00%	3.93%	0.00%	3.05%
Dark - Roadway Not Lighted	5.88%	22.74%	5.88%	16.02%
Dark - Unknown Roadway Lighting	0.00%	0.34%	0.00%	0.17%
Other / Unknown	0.01%	0.68%	0.01%	0.35%

Crashes by Road Conditions				
	Total (%)		Fatal & All Injury (%)	
Road Conditions	Site Average	Statewide Average	Site Average	Statewide Average
Dry	77.78%	74.91%	77.78%	78.90%
Wet	11.11%	16.60%	11.11%	16.09%
Snow	0.00%	5.67%	0.00%	3.39%
Ice	5.56%	2.10%	5.56%	1.14%

Sand, Mud, Dirt, Oil, Gravel	0.00%	0.09%	0.00%	0.09%
Water (Standing, Moving)	0.00%	0.06%	0.00%	0.02%
Slush	0.00%	0.26%	0.00%	0.22%
Other / Unknown	5.55%	0.31%	5.55%	0.15%

ROUNDABOUT SIZING THRESHOLDS

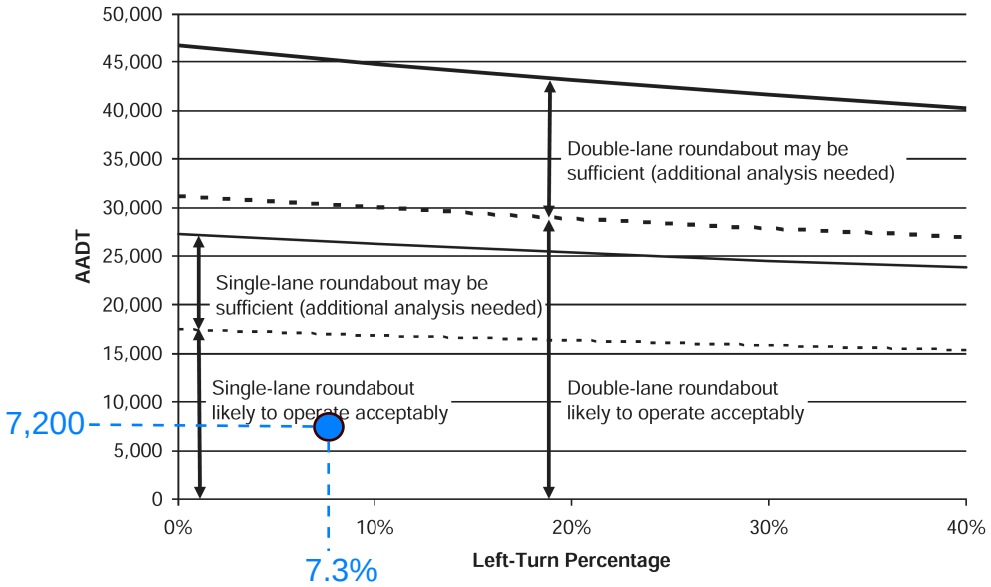
403-1

REFERENCE SECTION
403.3

NHRP Report 672 - Exhibit 3-14
Volume Thresholds for Determining the Number of Entry Lanes Required (Planning Level)

Volume Range Entry + Circulating (veh/hr)	Number of Lanes Required
0 - 1,000	• Single-lane entry likely to be sufficient
1,000 - 1,300	• Two lane entry may be needed • Single-lane may be sufficient based upon more detailed anaylsis
1,300 - 1,800	• Two lane entry is likely to be sufficient
1,800+	• More than two entry lanes may be required • A more detailed capacity evaluation should be conducted to verify lane number and arrangements

NHRP Report 672 - Exhibit 3-12
Planning-Level Daily Intersection Volumes



STUDY AND ANALYSIS INFORMATION

Municipality:	ALL-SR 501 & Ft Amanda Rd	**Traffic Volumes Obtained By:**	ODOT D1
County:	Allen	**Analysis Date:**	7/22/2024
ODOT Engineering District:	1	**Agency/ Company Name Performing Warrant Analysis:**	ODOT D1

Analysis Information

Data Collection Date: 7/10/2024

Day of the Week: Wednesday

Is the intersection in a built-up area of an isolated community of <10,000 population? No

Existing Traffic Signal at intersection: No

Total Number of Approaches at Intersection: 4

Major Street Information

Major Street Name and Route Number: SR 501 (S Wapak Rd)

Major Street Approach Direction: N-Bound / S-Bound

Number of Thru Lanes on Each Major Street Approach: 1 **LANE(S)**

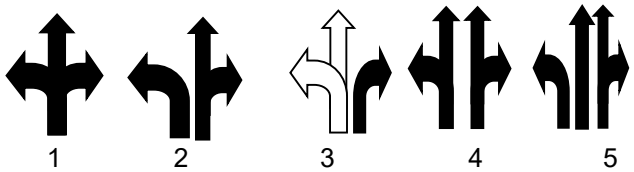
Speed Limit or 85th Percentile Speed on the Major Street*: 55 **MPH**

*Unknown assumes below 45 mph

Minor Street Information

Minor Street Name and Route Number: Ft Amanda Rd

Minor Street Approach Configuration: 1 E-Bound / 1 W-Bound



1 2 3 4 5

Number of Thru Lanes on Each Minor Street Approach: 1 **LANE(S)**

Apply Right Turn Lane Reduction*: Yes

*Right Turn Lane Reduction Shall be used for Warrants 1, 2, & 3 for New ODOT Signals. Please refer to TEM 402-3.2 for clarification and criteria under which Right Turn Reduction is not required.

TRAFFIC SIGNAL WARRANT ANALYSIS FINDINGS

	Applicable?	Warrant Satisfied?	Notes and Comments:	
Warrant 1, Eight-Hour Vehicular Volume	Yes	**No**		
Warrant 2, Four-Hour Vehicular Volume	Yes	**No**		
Warrant 3, Peak Hour	Yes	**No**	Signals installed under Warrant 3 should be traffic actuated.	**Peak Hour** 4:30 PM 5:30 PM
For Warrants 1-3, new ODOT signals must be based off of 100% volume thresholds (TEM 402-3.2)				
Warrant 4, Pedestrian Volume	No		If this warrant is met, and a traffic control signal is justified by an engineering study, the traffic control signal shall be equipped with pedestrian signal heads complying with the provisions set forth in Chapter 4E of the OMUTCD.	**Peak Hour** 4:30 PM 5:30 PM
Warrant 5, School Crossing	No		N/A	
Warrant 6, Coordinated Signal System	No		(Shall not be used as the sole warrant in the analysis)	
Warrant 7, Crash Experience	Yes	**No**	If this is the sole warrant, signal must be semi-actuated with control devices which provide proper coordination if installed at an intersection within a coordinated system and normally should be fully traffic actuated if installed at an isolated intersection.	
Warrant 8, Roadway Network	No		(Shall not be used as the sole warrant in the analysis)	
Warrant 9, Intersection Near a Grade Crossing	No		Figure 4C-9	
Multi-Way Stop Warrant	Yes	**No**	May be used as an interim measure if traffic signal warrants are satisfied.	

The satisfaction of a traffic signal warrant or warrants shall not in itself require the installation of a traffic control signal.

If no warrants are satisfied, additional options may be considered:
1. An engineering study, performed by a firm prequalified by ODOT for signal design, if approved by the ODOT district, may be used to justify a new signal installation or retention of an existing signal that otherwise does not meet the published warrants. An example of such an instance is a traffic signal in proximity to a railroad crossing that serves to reduce queuing across the tracks.
2. According to TEM 402-2, If the actual turning movement counts fail to satisfy a signal warrant, it may be acceptable to use traffic volumes projected to the second year after project completion. The **Modeling and Forecasting Section** should provide the projected traffic volumes.
3. A pedestrian hybrid beacon may be considered for installation to facilitate pedestrian crossings at a location that does not meet traffic signal warrants (see Chapter 4C of TEM) or at a location that meets traffic signal warrants under Sections 4C.05 and/or 4C.06 but a decision is made to not install a traffic control signal. **Please fill inputs on PHB Score Sheet and submit to ODOT.**

Considerations such as geometrics and lack of sight distance generally have not been accepted in lieu of satisfying signal warrants. These considerations may allow an otherwise unwarranted traffic signal to be retained at **100 percent** local cost. Please review TEM 402-4 for details.

Conclusion: Do Not Install New Traffic Signal

Notes:

OMUTCD WARRANT 1, EIGHT-HOUR VEHICULAR VOLUME

Number of Lanes for Moving Traffic on Each Approach	
Major Street:	1 Lane
Minor Street:	1 Lane

Built up Isolated Community with Less Than 10,000 Population or Above 40 MPH on Major Street? Yes

**Only applicable after an adequate trial of other alternatives (See section 4C.02.06 of the 2012 OMUTCD)*

Lanes Major/ Minor	Adjusted Volumes		Condition A				Condition B				Combination A/B*							
											Cond. A		Cond. B		Cond. A		Cond. B	
	Major	Minor	100%		70%		100%		70%		80%		80%		56%		56%	
			Maj.	Min.	Maj.	Min.	Maj.	Min.	Maj.	Min.	Maj.	Min.	Maj.	Min.	Maj.	Min.	Maj.	Min.
1 / 1	X		500	150	350	105	750	75	525	53	400	120	600	60	280	84	420	42
2+ / 1			600	150	420	105	900	75	630	53	480	120	720	60	336	84	504	42
2+ / 2+			600	200	420	140	900	100	630	70	480	160	720	80	336	112	504	56
1 / 2+			500	200	350	140	750	100	525	70	400	160	600	80	280	112	420	56
12:00 AM	18	6																
12:15 AM	14	8																
12:30 AM	8	6																
12:45 AM	8	6																
1:00 AM	8	4																
1:15 AM	10	4																
1:30 AM	12	3																
1:45 AM	11	2																
2:00 AM	13	2																
2:15 AM	11	5																
2:30 AM	14	7																
2:45 AM	17	7																
3:00 AM	16	9																
3:15 AM	24	5																
3:30 AM	25	5																
3:45 AM	29	8																
4:00 AM	38	12																
4:15 AM	48	16																
4:30 AM	62	24																
4:45 AM	83	31																
5:00 AM	96	34																
5:15 AM	104	43																
5:30 AM	126	58																
5:45 AM	162	78																
6:00 AM	190	91																
6:15 AM	213	95																
6:30 AM	245	84																
6:45 AM	272	70																
7:00 AM	311	75													1			
7:15 AM	321	71																
7:30 AM	312	78																
7:45 AM	290	73																
8:00 AM	273	58																
8:15 AM	291	65													1			
8:30 AM	284	58																
8:45 AM	274	61																
9:00 AM	275	59																

9:15 AM	268	61													1			
9:30 AM	287	60																
9:45 AM	284	54																
10:00 AM	277	56																
10:15 AM	267	61																
10:30 AM	267	60																
10:45 AM	277	58																
11:00 AM	281	63													1			
11:15 AM	283	62																
11:30 AM	282	66																
11:45 AM	290	68																
12:00 PM	285	59													1			
12:15 PM	280	61																
12:30 PM	271	62																
12:45 PM	252	61																
1:00 PM	259	64																
1:15 PM	272	68																
1:30 PM	284	61													1			
1:45 PM	312	62																
2:00 PM	321	73																
2:15 PM	325	83																
2:30 PM	336	95													1	1		
2:45 PM	359	107			1	1												
3:00 PM	360	129																
3:15 PM	392	128																
3:30 PM	398	128													1	1		
3:45 PM	407	129			1	1					1	1						
4:00 PM	430	131															1	1
4:15 PM	433	134																
4:30 PM	464	132													1	1		
4:45 PM	446	131			1	1					1	1						
5:00 PM	435	102															1	1
5:15 PM	406	95																
5:30 PM	355	84													1	1		
5:45 PM	317	71																
6:00 PM	277	64																
6:15 PM	238	53																
6:30 PM	200	55																
6:45 PM	195	48																
7:00 PM	185	49																
7:15 PM	178	50																
7:30 PM	183	50																
7:45 PM	169	52																
8:00 PM	154	51																
8:15 PM	148	44																
8:30 PM	139	45																
8:45 PM	122	43																
9:00 PM	119	41																
9:15 PM	111	39																
9:30 PM	90	33																
9:45 PM	82	27																
HOURS MET			**0**	**0**	**3**	**3**	**0**	**0**	**0**	**0**	**2**	**2**	**0**	**0**	**10**	**4**	**2**	**2**
WARRANT SATISFIED?			**NO**		**NO**		**NO**		**NO**		**NO**				**NO**			

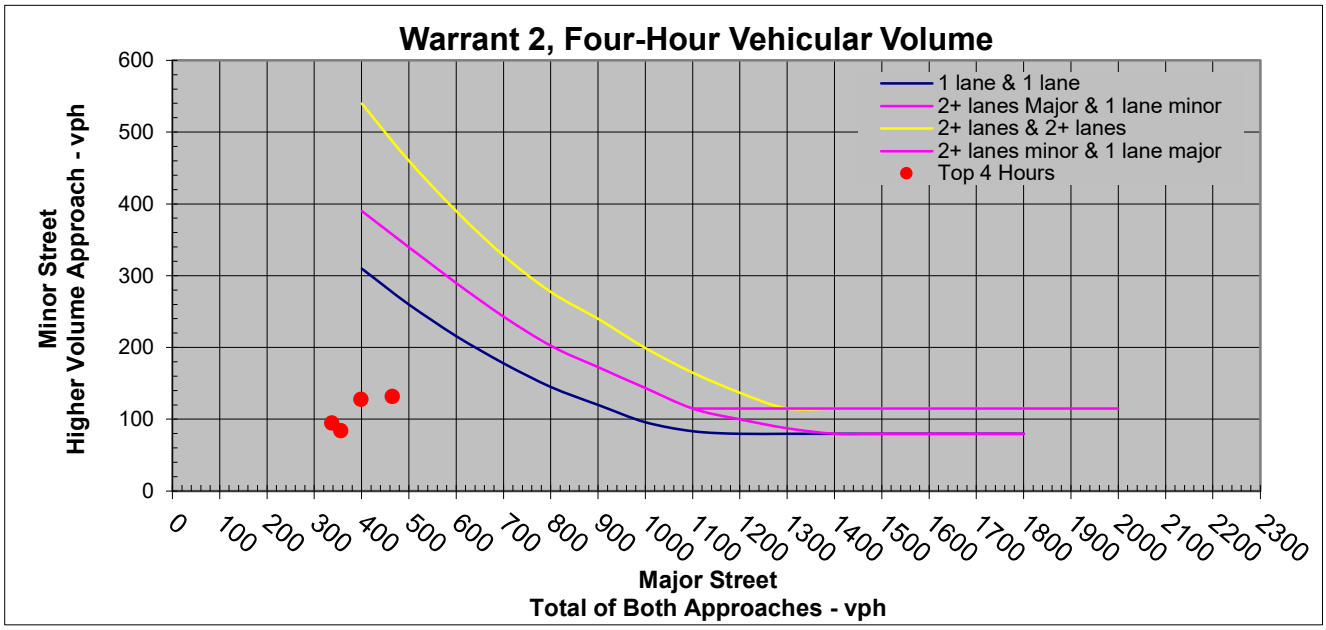
Warrant Met: **No**

Notes:

OMUTCD WARRANT 2, FOUR-HOUR VEHICULAR VOLUME

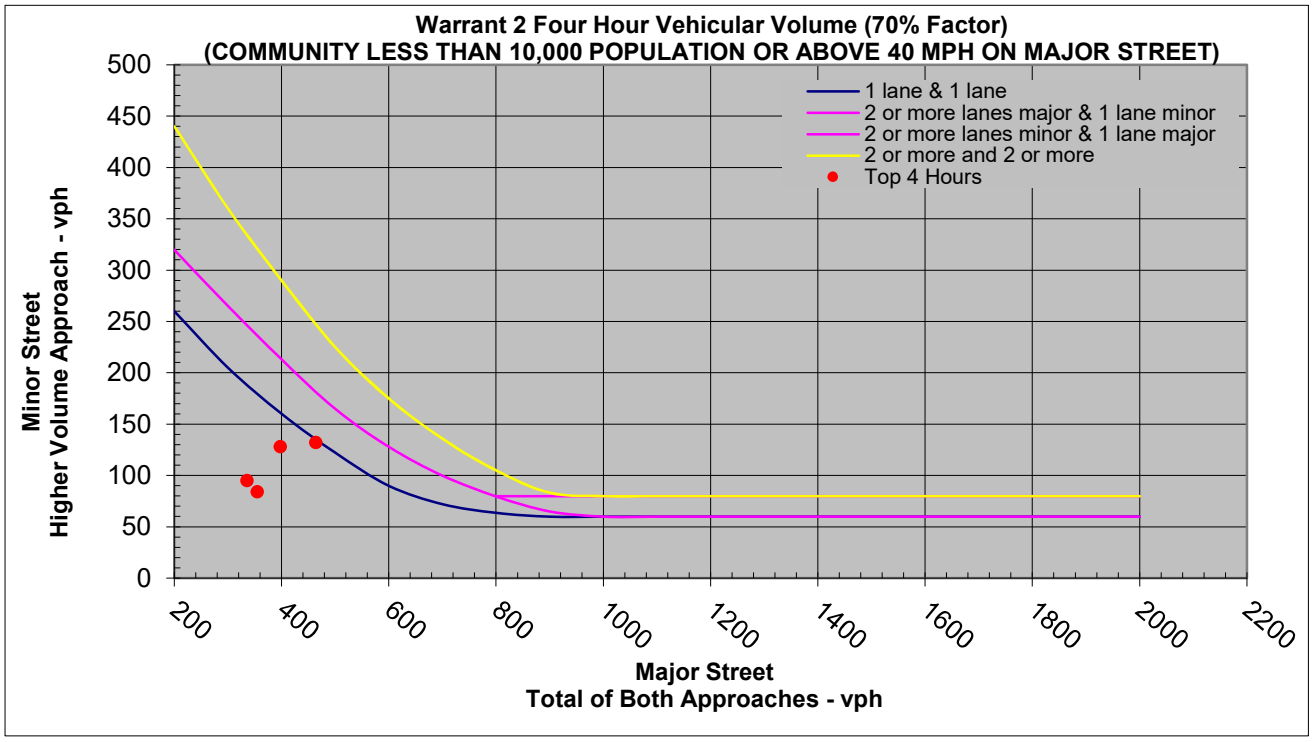
Number of Lanes for Moving Traffic on Each Approach		Total Number of Unique Hours Met on Figure 4C-1	0
Major street:	1 Lane	Total Number of Unique Hours Met on Figure 4C-2 (70% Factor)	1
Minor Street:	1 Lane		
Built up Isolated Community with Less Than 10,000 Population or Above 40 MPH on Major Street?			Yes

Hour Interval Beginning At	Raw Traffic Counts				Total Major Approach Volumes	Highest Actual Minor Street Approach Volumes	Hour Met?	Hour Met? (70% Factor)
	Major - SR 501 (S Wapak Rd)		Minor - Ft Amanda Rd					
	N-Bound	S-Bound	W-Bound	E-Bound				
6:00 AM	104	86	21	91	190	91		
6:15 AM	120	93	26	95	213	95		
6:30 AM	141	104	30	84	245	84		
6:45 AM	150	122	39	70	272	70		
7:00 AM	169	142	45	75	311	75		
7:15 AM	177	144	45	71	321	71		
7:30 AM	176	136	43	78	312	78		
7:45 AM	156	134	39	73	290	73		
8:00 AM	153	120	40	58	273	58		
8:15 AM	162	129	40	65	291	65		
8:30 AM	155	129	41	58	284	58		
8:45 AM	157	117	58	61	274	61		
9:00 AM	148	127	59	56	275	59		
9:15 AM	148	120	61	49	268	61		
9:30 AM	158	129	60	49	287	60		
9:45 AM	156	128	54	49	284	54		
10:00 AM	155	122	53	56	277	56		
10:15 AM	149	118	57	61	267	61		
10:30 AM	155	112	60	54	267	60		
10:45 AM	158	119	58	47	277	58		
11:00 AM	165	116	63	43	281	63		
11:15 AM	160	123	62	33	283	62		
11:30 AM	150	132	66	34	282	66		
11:45 AM	160	130	68	42	290	68		
12:00 PM	144	141	59	45	285	59		
12:15 PM	145	135	61	55	280	61		
12:30 PM	141	130	62	55	271	62		
12:45 PM	123	129	61	47	252	61		
1:00 PM	131	128	64	48	259	64		
1:15 PM	132	140	68	41	272	68		
1:30 PM	145	139	61	42	284	61		
1:45 PM	162	150	62	50	312	62		
2:00 PM	158	163	73	59	321	73		
2:15 PM	163	162	83	56	325	83		
2:30 PM	174	162	95	56	336	95		
2:45 PM	187	172	107	54	359	107		
3:00 PM	195	165	129	40	360	129		
3:15 PM	200	192	128	40	392	128		
3:30 PM	190	208	128	38	398	128		
3:45 PM	185	222	129	38	407	129		
4:00 PM	199	231	131	46	430	131		
4:15 PM	206	227	134	49	433	134		
4:30 PM	216	248	132	48	464	132		Met
4:45 PM	210	236	131	50	446	131		
5:00 PM	206	229	102	46	435	102		
5:15 PM	197	209	95	50	406	95		
5:30 PM	185	170	84	58	355	84		
5:45 PM	171	146	71	56	317	71		
6:00 PM	147	130	64	55	277	64		
6:15 PM	124	114	53	46	238	53		
6:30 PM	93	107	55	35	200	55		
6:45 PM	84	111	48	31	195	48		
7:00 PM	83	102	49	30	185	49		
7:15 PM	80	98	50	30	178	50		
7:30 PM	89	94	50	34	183	50		
7:45 PM	82	87	52	32	169	52		
8:00 PM	72	82	51	34	154	51		



Top Hours for Figure 4C-1	Start Time	End Time	Major Street	Minor Street
Top Hour	4:30 PM	5:30 PM	464	132
2nd Highest Hour	3:30 PM	4:30 PM	398	128
3rd Highest Hour	5:30 PM	6:30 PM	355	84
4th Highest Hour	2:30 PM	3:30 PM	336	95

Top Hours for Figure 4C-2	Start Time	End Time	Major Street	Minor Street
Top Hour	4:30 PM	5:30 PM	464	132
2nd Highest Hour	3:30 PM	4:30 PM	398	128
3rd Highest Hour	2:30 PM	3:30 PM	336	95
4th Highest Hour	5:30 PM	6:30 PM	355	84



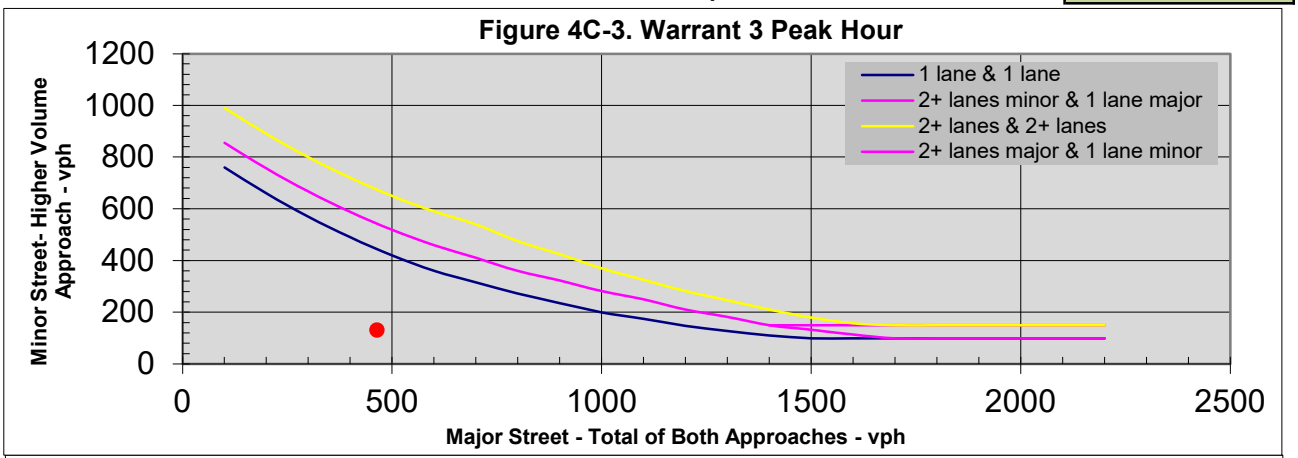
Are the requirements for Warrant 2 met?: No

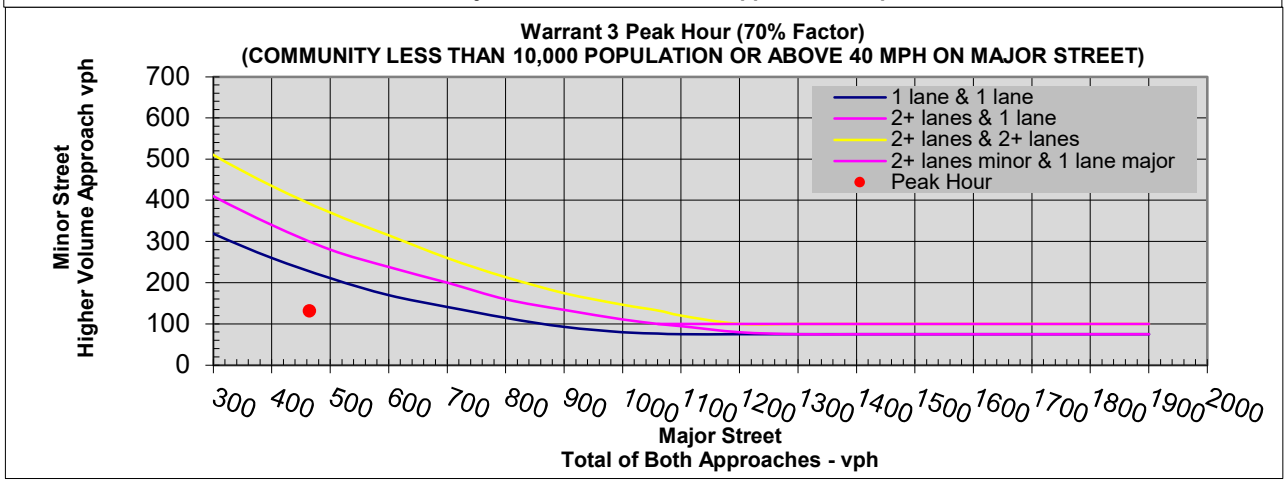
OMUTCD WARRANT 3, PEAK HOUR			
Number of Lanes for Moving Traffic on Each Approach		Peak Hour Start time	4:30 PM
Major Street:	1 Lane	Peak Hour End Time	5:30 PM
Minor Street:	1 Lane		

Built up Isolated Community with Less Than 10,000 Population or Above 40 MPH on Major Street?	Yes

Is this signal warrant being applied for an unusual case, such as office complexes, manufacturing plants, industrial complexes, or high-occupancy vehicle facilities that attract or discharge large numbers of vehicles over a short time?	No

Indicate whether all three of the following conditions for the same 1 hour (any four consecutive 15-minute periods) of an average day are present*	
Does the total stopped time delay experienced by the traffic on one minor-street approach (one direction only) controlled by a STOP sign equal or exceed 4 vehicle-hours for a one-lane approach or 5 vehicle-hours for a two-lane approach?	No
Does the volume on the same minor-street approach (one direction only) equal or exceed 100 vehicles per hour for one moving lane of traffic or 150 vehicles per hour for two moving lanes?	Yes
Does the total entering volume serviced during the hour equal or exceed 650 vehicles per hour for intersection with three approaches or 800 vehicles per hour for intersections with four or more approaches?	No
**If applicable, attach all supporting calculations and documentation.*	
Are the requirements for Warrant 3 met?:	**No**





Hour Vehicular Volume				
Hour Interval Beginning At	Major Street Combined Vehicles Per Hour (VPH)	Highest Minor Street Approach Vehicles Per Hour (VPH)	Sum of Major Street and Highest Minor Street	Sum of Major Street and Combined Minor Street
6:00 AM	190	91	281	302
6:15 AM	213	95	308	334
6:30 AM	245	84	329	359
6:45 AM	272	70	342	381
7:00 AM	311	75	386	431
7:15 AM	321	71	392	437
7:30 AM	312	78	390	433
7:45 AM	290	73	363	402
8:00 AM	273	58	331	371
8:15 AM	291	65	356	396
8:30 AM	284	58	342	383
8:45 AM	274	61	335	393
9:00 AM	275	59	334	390
9:15 AM	268	61	329	378
9:30 AM	287	60	347	396
9:45 AM	284	54	338	387
10:00 AM	277	56	333	386
10:15 AM	267	61	328	385
10:30 AM	267	60	327	381
10:45 AM	277	58	335	382
11:00 AM	281	63	344	387
11:15 AM	283	62	345	378
11:30 AM	282	66	348	382
11:45 AM	290	68	358	400
12:00 PM	285	59	344	389
12:15 PM	280	61	341	396
12:30 PM	271	62	333	388
12:45 PM	252	61	313	360
1:00 PM	259	64	323	371
1:15 PM	272	68	340	381
1:30 PM	284	61	345	387
1:45 PM	312	62	374	424
2:00 PM	321	73	394	453
2:15 PM	325	83	408	464
2:30 PM	336	95	431	487
2:45 PM	359	107	466	520
3:00 PM	360	129	489	529
3:15 PM	392	128	520	560
3:30 PM	398	128	526	564
3:45 PM	407	129	536	574
4:00 PM	430	131	561	607
4:15 PM	433	134	567	616
4:30 PM	464	132	596	644
4:45 PM	446	131	577	627
5:00 PM	435	102	537	583
5:15 PM	406	95	501	551
5:30 PM	355	84	439	497
5:45 PM	317	71	388	444
6:00 PM	277	64	341	396
6:15 PM	238	53	291	337
6:30 PM	200	55	255	290
6:45 PM	195	48	243	274
7:00 PM	185	49	234	264
7:15 PM	178	50	228	258
7:30 PM	183	50	233	267
7:45 PM	169	52	221	253
8:00 PM	154	51	205	239

Actual Peak Hour Major Traffic Volume	Actual Peak Hour Minor Traffic Volume	Required Peak Hour Minor Traffic Volume for Fig. 4C-3	Required Peak Hour Minor Traffic Volume for Fig. 4C-4
464	132	437.76827	226.67347

OMUTCD WARRANT 7, CRASH EXPERIENCE

Built-up Isolated Community With Less Than 10,000 Population or Above 40 mph on Major Street?: Yes

Number of Lanes for Moving Traffic on Each Approach
Major Street: 1 Lane
Minor Street: 1 Lane

Has adequate trial of alternative with satisfactory observance and enforcement failed to reduce the crash frequency? No

Five or more reportable and/ or non-reportable crashes, of types susceptible to correction by a traffic control signal have occurred within a 12-month period during the most recent 3 years of available crash data.* No

**If applicable attach a summary of the crash data analysis used for this criterion*

For each of any 8 hours of an average day, the vehicles per hour given in both the 80% columns of Condition A in Table 4C-1 exists on the major-street and the higher-volume minor-street approach, respectively, to the intersection, if in a built-up isolated community with less than 10,000 population or above 40 mph on major street, the 56% columns may be used. No

For each of any 8 hours of an average day, the vehicles per hour given in both the 80% columns of Condition B in Table 4C-1 exists on the major-street and the higher-volume minor-street approach, respectively, to the intersection, if in a built-up isolated community with less than 10,000 population or above 40 mph on major street, the 56% columns may be used. No

The volume of pedestrian traffic is not less than 80% of the requirements specified in Warrant 4, the Pedestrian Volume warrant.* No

**If applicable, attach all supporting calculations and documentation*

Are the requirements for Warrant 7 met?: No

OMUTCD WARRANT 8, ROADWAY NETWORK*

Does the intersection have a total existing, or immediately projected, entering volume of at least 1,000 vehicles per hour during the peak hour of a typical weekday and has 5-year projected traffic volumes, based on an engineering study, that meet one or more of Warrants 1, 2, and 3, during the average weekday?

Does the intersection have a total existing or immediately projected entering volume of at least 1,000 vehicles per hour for each of any 5 hours of a non-normal business day (Saturday or Sunday)?

Is the major street part of the street or highway system that serves as the principal roadway network for through traffic flow?

Does the major street include rural or suburban highways outside, entering, or traversing a city?

Does the major street appear as a major route on an official plan, such as a major street plan in an urban area traffic and transportation study?

**Refer to Section 4.3 of ODOT Publication 46 (Traffic Engineering Manual) for additional Department documentation requirements to justify the installation of a signal under Warrant 8. Attach all supplementary documentation and calculations, especially those relating to traffic volume projections and subsequent Warrant analyses.*

Are the requirements for Warrant 8 met?: No

Multi-Way Stop Application

OMUTCD Section 2B.07

	Warranted ?
A. Where traffic control signals are justified, the multi-way stop is an interim measure that can be installed quickly to control traffic while arrangements are being made for the installation of the traffic control signal.	No
B. Five or more reported crashes in a 12-month period that are susceptible to correction by a multiway stop installation. Such crashes include right-turn and left-turn collisions as well as right-angle collisions.	No
C. Minimum Volumes:	
1 The vehicular volume entering the intersection from the major street approaches (total of both approaches) averages at least 300 vehicles per hour for any 8 hours of an average day.	Yes
2 The combined vehicular, pedestrian, and bicycle volume entering the intersection from the minor street approaches (total of both approaches) averages at least 200 units per hour for the same 8 hours, with an average delay to minor-street vehicular traffic of at least 30 seconds per vehicle during the highest hour.* *If this condition is satisfied, there must also be an average delay of at least 30 seconds per vehicle during the peak hour.	No
3 If the 85th-percentile approach speed of the major-street traffic exceeds 40 mph, the minimum volume warrants are 70 percent of the values provided in Items 1 and 2.	Yes
D. Where no single criterion is satisfied, but where Criteria B, C.1, and C.2 are all satisfied to 80 percent of the minimum values. Criterion C.3 is excluded from this condition.	No

Other criteria that may be considered in an engineering study include:

A. The need to control left-turn conflicts;	No
B. The need to control vehicle/pedestrian conflicts near locations that generate high pedestrian volumes;	No
C. Locations where a road user, after stopping, cannot see conflicting traffic and is not able to negotiate the intersection unless conflicting cross traffic is also required to stop; and	No
D. An intersection of two residential neighborhood collector (through) streets of similar design and operating characteristics where multi-way stop control would improve traffic operational characteristics of the intersection.	No

Are the requirements for Multi-Way Stop Satisfied?: No

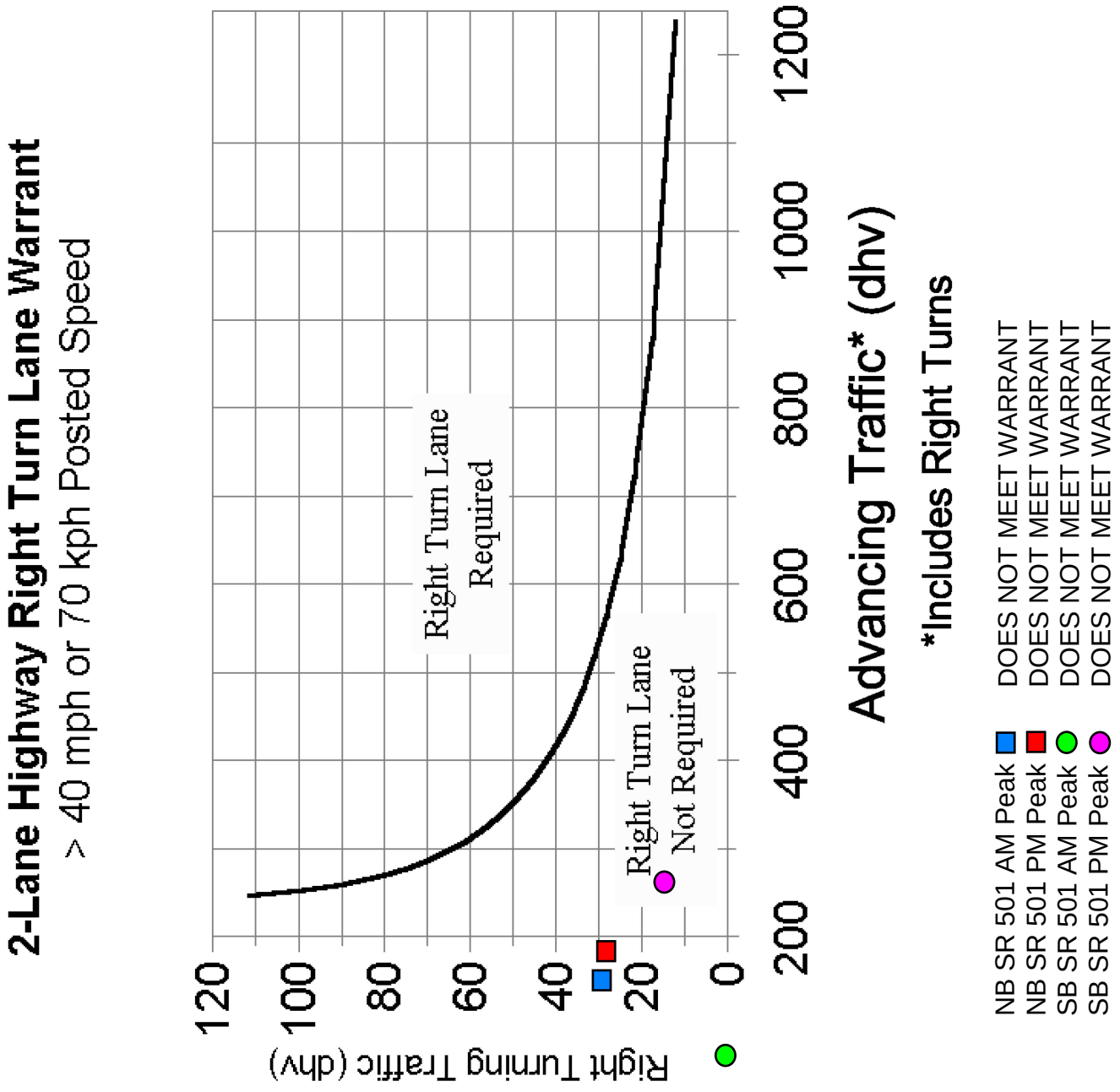
Lanes Major/ Minor	ADJUSTED VOLUMES		Condition C.1		Condition C.2		Condition D	
	MAJOR	MINOR	100%		70%		80%	
			MAJ.	MIN.	MAJ.	MIN.	MAJ.	MIN.
Required Volumes			300	200	210	140	240	160
6:00 AM	190	112						
6:15 AM	213	121			1			
6:30 AM	245	114					1	
6:45 AM	272	109						
7:00 AM	311	120	1					
7:15 AM	321	116			1			
7:30 AM	312	121					1	
7:45 AM	290	112						
8:00 AM	273	98						
8:15 AM	291	105			1			
8:30 AM	284	99					1	
8:45 AM	274	119						
9:00 AM	275	115						
9:15 AM	268	110			1			
9:30 AM	287	109					1	
9:45 AM	284	103						
10:00 AM	277	109						
10:15 AM	267	118			1			
10:30 AM	267	114					1	
10:45 AM	277	105						
11:00 AM	281	106						
11:15 AM	283	95			1			
11:30 AM	282	100					1	
11:45 AM	290	110						
12:00 PM	285	104						
12:15 PM	280	116			1			
12:30 PM	271	117					1	
12:45 PM	252	108						
1:00 PM	259	112						
1:15 PM	272	109			1			
1:30 PM	284	103					1	
1:45 PM	312	112	1					
2:00 PM	321	132						
2:15 PM	325	139			1			
2:30 PM	336	151					1	
2:45 PM	359	161	1					
3:00 PM	360	169						
3:15 PM	392	168			1	1		
3:30 PM	398	166					1	1
3:45 PM	407	167	1					
4:00 PM	430	177						
4:15 PM	433	183			1	1		
4:30 PM	464	180					1	1
4:45 PM	446	181	1					
5:00 PM	435	148						
5:15 PM	406	145			1	1		
5:30 PM	355	142					1	
5:45 PM	317	127	1					
6:00 PM	277	119						
6:15 PM	238	99			1			
6:30 PM	200	90						
6:45 PM	195	79						
7:00 PM	185	79						
7:15 PM	178	80						
7:30 PM	183	84						
7:45 PM	169	84						
8:00 PM	154	85						
HOURS MET			**6**	**0**	**13**	**3**	**12**	**2**
WARRANT SATISFIED?			**NO**		**NO**		**NO**	

Multi-Way Stop

2-LANE RIGHT TURN LANE WARRANT (HIGH SPEED)

401-6b

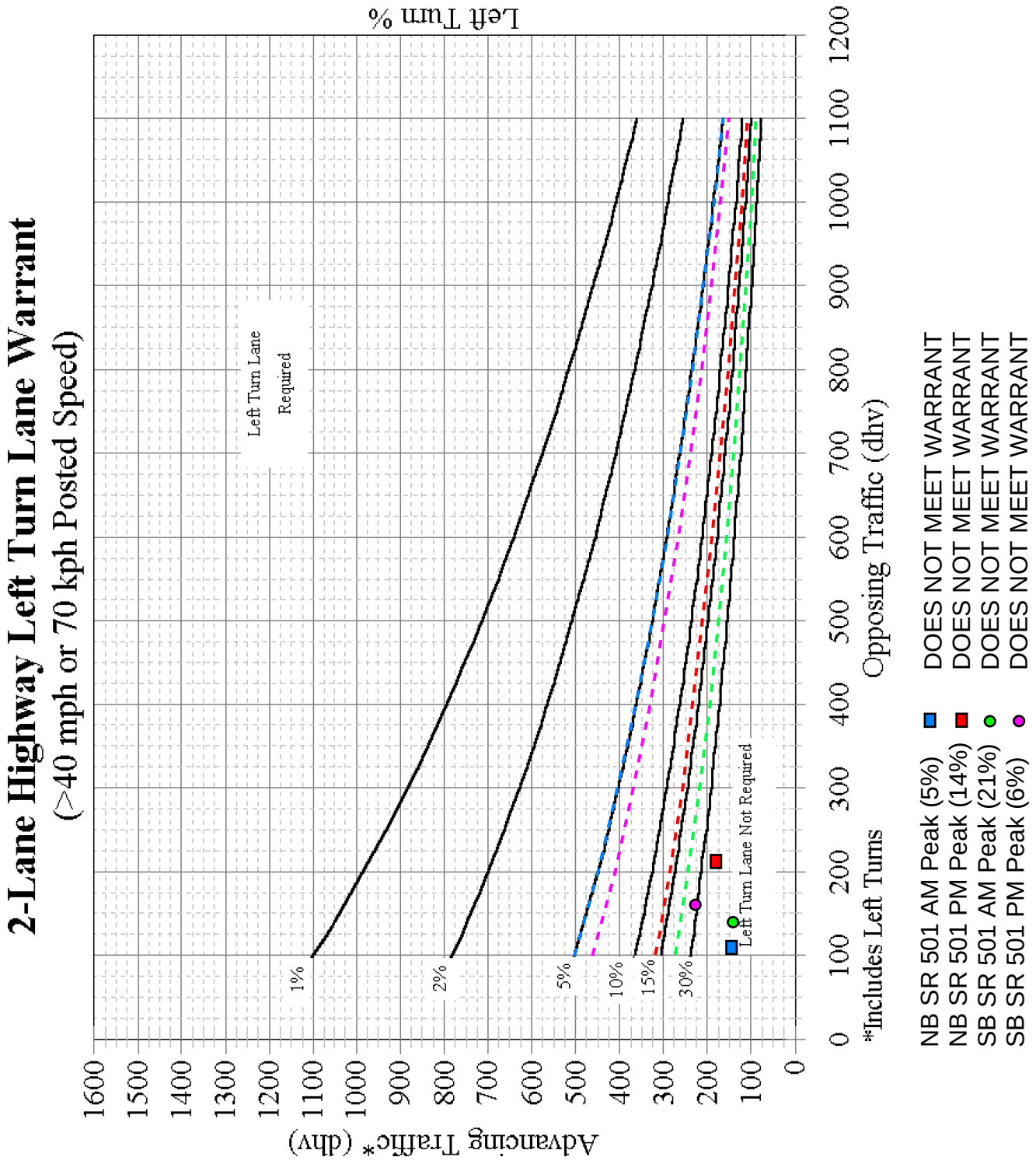
REFERENCE SECTION
401.6.3



2-LANE LEFT TURN LANE WARRANT (HIGH SPEED)

401-5b

REFERENCE SECTION
401.6.1



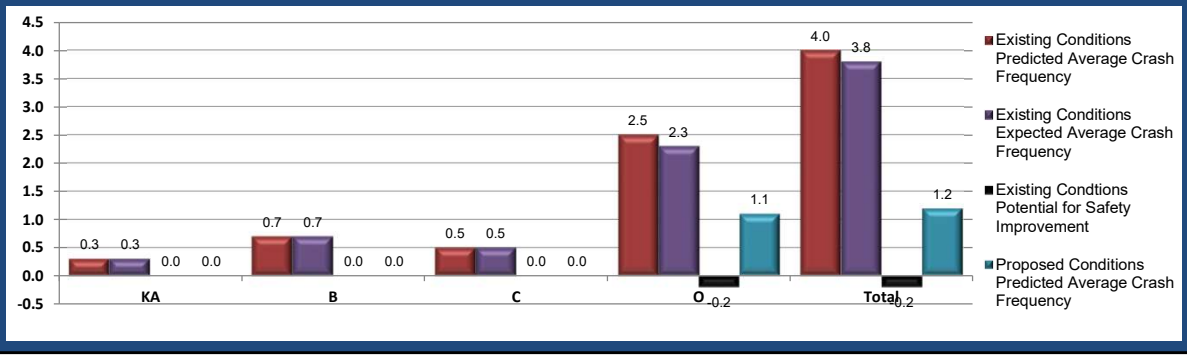
Appendix C - Economic Crash Analysis Tool (ECAT)

Project Safety Performance Report

General Information

Project Name	ALL-SR 501 & Fort Amanda Road-Proposed	Contact Email	Hailey.Robey@dot.ohio.gov
Project Description	Safety Study	Contact Phone	419-999-6887
Reference Number		Date Performed	7/22/2024
Analyst	Hailey Robey	Analysis Year	2019-2023
Agency/Company	ODOT District 1		

Summary of Anticipated Safety Performance of the Project (average crashes/year)



Project Summary Results (Without Animal Crashes)

	KA	B	C	O	Total
$N_{predicted}$ - Existing Conditions	0.2927	0.7093	0.4724	2.5387	4.0131
$N_{expected}$ - Existing Conditions	0.2887	0.7000	0.4662	2.3347	3.7896
$N_{potential\ for\ improvement}$ - Existing Conditions	-0.0040	-0.0093	-0.0062	-0.2040	-0.2235
$N_{expected}$ - Proposed Conditions	0.0046	0.0390	0.0485	1.0603	1.1524

Existing Conditions Project Element Predicted Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
SR501; 2.81	Fort Amanda Road	0.2927	0.7093	0.4724	2.5387	4.0131

Existing Conditions Project Element Expected Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
SR501; 2.81	Fort Amanda Road	0.2887	0.7	0.4662	2.3347	3.7896

Existing Conditions Project Element Potential for Safety Improvement Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
SR501; 2.81	Fort Amanda Road	-0.004	-0.0093	-0.0062	-0.204	-0.2235

Proposed Conditions Project Element Predicted Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
SR501; 2.81	Fort Amanda Road	0.0046	0.039	0.0485	1.0603	1.1524

Summary by Crash Type

Crash Type	Existing			Proposed
	Predicted Crash Frequency	Expected Crash Frequency	PSI	Predicted Crash Frequency
Unknown	0.0161	0.0149	-0.0012	0.0331
Head On	0.0345	0.0332	-0.0013	0.0009
Rear End	0.8577	0.8067	-0.0510	0.1751
Backing	0.1614	0.1490	-0.0124	0.0107
Sideswipe - Meeting	0.1166	0.1105	-0.0061	0.0000
Sideswipe - Passing	0.1814	0.1696	-0.0118	0.3622
Angle	1.5313	1.4582	-0.0731	0.3250
Parked Vehicle	0.1427	0.1323	-0.0104	0.0000
Pedestrian	0.0195	0.0190	-0.0005	0.0009
Animal	0.0000	0.0000	0.0000	0.0116
Train	0.0007	0.0006	-0.0001	0.0000
Pedalcycles	0.0147	0.0143	-0.0004	0.0009
Other Non-Vehicle	0.0003	0.0003	0.0000	0.0000
Fixed Object	0.6731	0.6320	-0.0411	0.1165
Other Object	0.0234	0.0217	-0.0017	0.0000
Overturning	0.0406	0.0391	-0.0015	0.0009
Other Non-Collision	0.0533	0.0495	-0.0038	0.0223
Left Turn	0.1458	0.1387	-0.0071	0.0251
Right Turn	0.0000	0.0000	0.0000	0.0788

HCS7 Two-Way Stop-Control Report

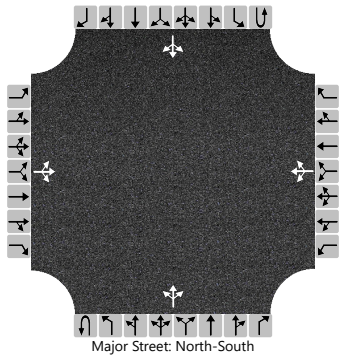
General Information

Analyst	HNR
Agency/Co.	ODOT District 1
Date Performed	7/25/2024
Analysis Year	2024
Time Analyzed	AM Peak (7:15-8:15)
Intersection Orientation	North-South
Project Description	Existing Conditions

Site Information

Intersection	ALL-SR 501 & Ft Amanda Rd
Jurisdiction	Allen County
East/West Street	Ft Amanda Rd
North/South Street	SR 501
Peak Hour Factor	0.92
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)		9	48	17		15	27	3		7	139	31		30	112	2
Percent Heavy Vehicles (%)		0	4	0		0	4	0		14				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)		7.10	6.54	6.20		7.10	6.54	6.20		4.24				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)		3.50	4.04	3.30		3.50	4.04	3.30		2.33				2.23		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			80				49			8				33		
Capacity, c (veh/h)			587				536			1392				1384		
v/c Ratio			0.14				0.09			0.01				0.02		
95% Queue Length, Q_{95} (veh)			0.5				0.3			0.0				0.1		
Control Delay (s/veh)			12.1				12.4			7.6				7.7		
Level of Service (LOS)			B				B			A				A		
Approach Delay (s/veh)	12.1				12.4				0.3				1.8			
Approach LOS	B				B											

HCS7 Two-Way Stop-Control Report

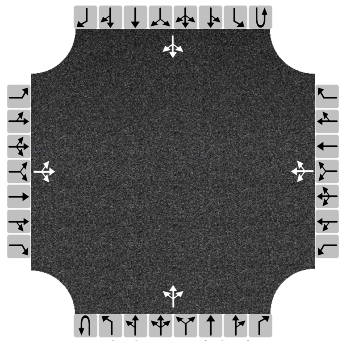
General Information

Analyst	HNR
Agency/Co.	ODOT District 1
Date Performed	7/25/2024
Analysis Year	2024
Time Analyzed	PM Peak (4:30-5:30)
Intersection Orientation	North-South
Project Description	Existing Conditions

Site Information

Intersection	ALL-SR 501 & Ft Amanda Rd
Jurisdiction	Allen County
East/West Street	Ft Amanda Rd
North/South Street	SR 501
Peak Hour Factor	0.92
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	1	0	0	0	1	0	0	0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		6	30	14		35	86	13		27	160	29		15	218	15
Percent Heavy Vehicles (%)		0	0	0		3	1	0		0				0		
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)		7.10	6.50	6.20		7.13	6.51	6.20		4.10				4.10		
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)		3.50	4.00	3.30		3.53	4.01	3.30		2.20				2.20		

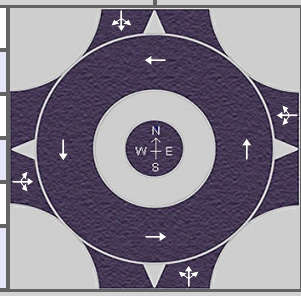
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			54				146			29				16		
Capacity, c (veh/h)			479				446			1324				1378		
v/c Ratio			0.11				0.33			0.02				0.01		
95% Queue Length, Q_{95} (veh)			0.4				1.4			0.1				0.0		
Control Delay (s/veh)			13.5				16.9			7.8				7.6		
Level of Service (LOS)			B				C			A				A		
Approach Delay (s/veh)		13.5				16.9				1.1				0.6		
Approach LOS		B				C										

HCS7 Roundabouts Report

General Information

Analyst	HNR
Agency or Co.	ODOT District 1
Date Performed	7/25/2024
Analysis Year	2024
Time Analyzed	AM Peak (7:15-8:15)
Project Description	Roundabout



Site Information

Intersection	ALL-SR 501 & Ft Amanda Rd
E/W Street Name	Ft Amanda Rd
N/S Street Name	SR 501
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	Allen County

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	9	48	17	0	15	27	3	0	7	139	31	0	30	112	2
Percent Heavy Vehicles, %	0	0	4	0	0	0	4	0	0	14	0	0	0	3	0	0
Flow Rate (v_{PCE}), pc/h	0	10	54	18	0	16	31	3	0	9	151	34	0	34	122	2
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		4.9763			4.9763			4.9763			4.9763	
Follow-Up Headway (s)		2.6087			2.6087			2.6087			2.6087	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		82			50			194			158	
Entry Volume, veh/h		80			49			193			157	
Circulating Flow (v_c), pc/h	172			170			98			56		
Exiting Flow (v_{ex}), pc/h	122			42			164			156		
Capacity (c_{pce}), pc/h		1158			1160			1249			1303	
Capacity (c), veh/h		1129			1133			1242			1295	
v/c Ratio (x)		0.07			0.04			0.16			0.12	

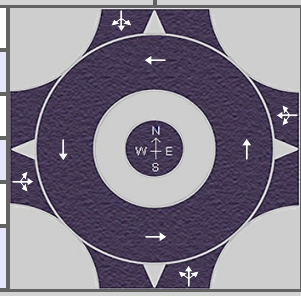
Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		3.8			3.5			4.2			3.8	
Lane LOS		A			A			A			A	
95% Queue, veh		0.2			0.1			0.5			0.4	
Approach Delay, s/veh	3.8			3.5			4.2			3.8		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh | LOS	3.9						A					

HCS7 Roundabouts Report

General Information

Analyst	HNR
Agency or Co.	ODOT District 1
Date Performed	7/25/2024
Analysis Year	2024
Time Analyzed	PM Peak (4:30-5:30)
Project Description	Roundabout



Site Information

Intersection	ALL-SR 501 & Ft Amanda Rd
E/W Street Name	Ft Amanda Rd
N/S Street Name	SR 501
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	Allen County

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	6	30	14	0	35	86	13	0	27	160	29	0	15	218	15
Percent Heavy Vehicles, %	0	0	0	0	0	3	1	0	0	0	0	0	0	0	0	0
Flow Rate (v_{PCE}), pc/h	0	7	33	15	0	39	94	14	0	29	174	32	0	16	237	16
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		4.9763			4.9763			4.9763			4.9763	
Follow-Up Headway (s)		2.6087			2.6087			2.6087			2.6087	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		55			147			235			269	
Entry Volume, veh/h		55			145			235			269	
Circulating Flow (v_c), pc/h	292			210			56			162		
Exiting Flow (v_{ex}), pc/h	81			139			195			291		
Capacity (c_{pce}), pc/h		1025			1114			1303			1170	
Capacity (c), veh/h		1025			1098			1303			1170	
v/c Ratio (x)		0.05			0.13			0.18			0.23	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		4.0			4.4			4.3			5.1	
Lane LOS		A			A			A			A	
95% Queue, veh		0.2			0.5			0.7			0.9	
Approach Delay, s/veh	4.0			4.4			4.3			5.1		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh | LOS	4.6						A					