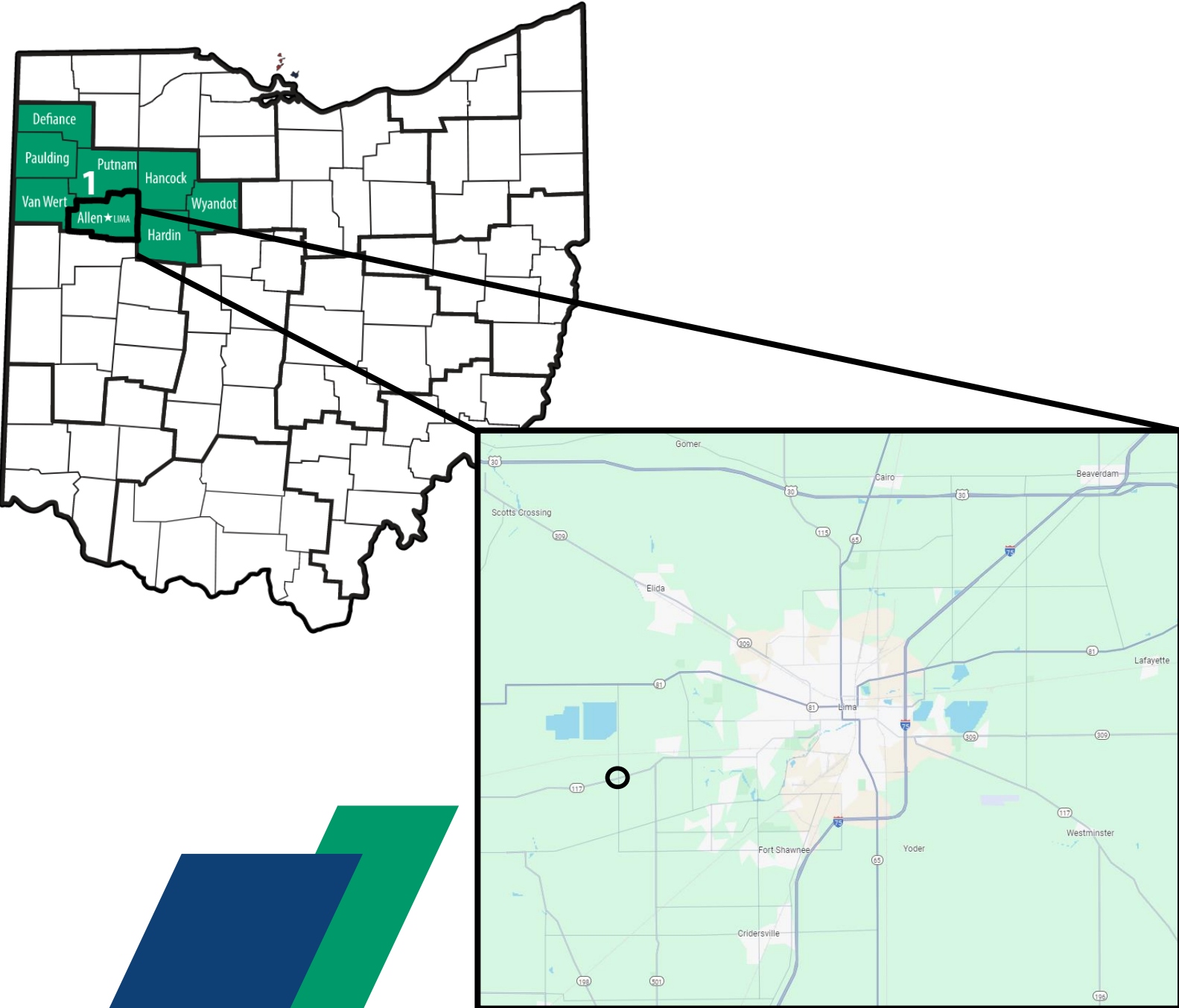


ALL-SR 117-9.71 | Safety Study Kemp Road Intersection



**Department of
Transportation**

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I. EXECUTIVE SUMMARY

Purpose and Need

The location under study is the intersection of State Route 117 (SR 117) and Kemp Road. This intersection is approximately 3 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 listed as the 46th highest priority intersection in the state on the 2021 Highway Safety Improvement Program (HSIP) Rural Intersection list.

History

This location has a history of prior work aimed at increasing the overall safety and operation of the intersection. SR 117 & Kemp Road was first discussed at a District Safety Review Team (DSRT) meeting in 2003 after a nearby resident submitted a request to have utility poles moved to improve sight. A study, completed in 2003, recommended staking the right of way and removing any encroachments as well as installing stop bars to guide motorists into an optimal stopping position. This work was completed in 2004 and involved removing a tree and two signs from the right of way and relocating a utility pole in the southeast quadrant. The stop signs were field reviewed in 2019 to ensure they were the proper height and not blocking the vision of drivers. SR 117 was resurfaced in 2022 under PID 107637. Safety studies were also conducted in 2020 and 2023 in response to the HSIP lists. At the time, the District had higher priority intersections so the recommendation was to continue to monitor and potentially submit a future safety application. This intersection continues to have multiple crashes per year at high injury rates.

II. EXISTING CONDITIONS

Background

State Route 117 is a two-lane, undivided, east-west roadway classified by ODOT as a Major Collector with a statutory speed limit of 55 miles per hour. Kemp Road is a two-lane, undivided, north-south roadway classified by ODOT as a Local Road with a statutory speed limit of 55 miles per hour. The land use is a mix of residential in the northwest and southeast quadrants and agricultural in the northeast and southwest quadrants. SR 117 intersects Kemp Road as a two-way stop-controlled intersection with stop control on Kemp Road. There are no exclusive turn lanes at the intersection.



Traffic Volumes

The following traffic data for the ALL - SR 117 - 9.71 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.

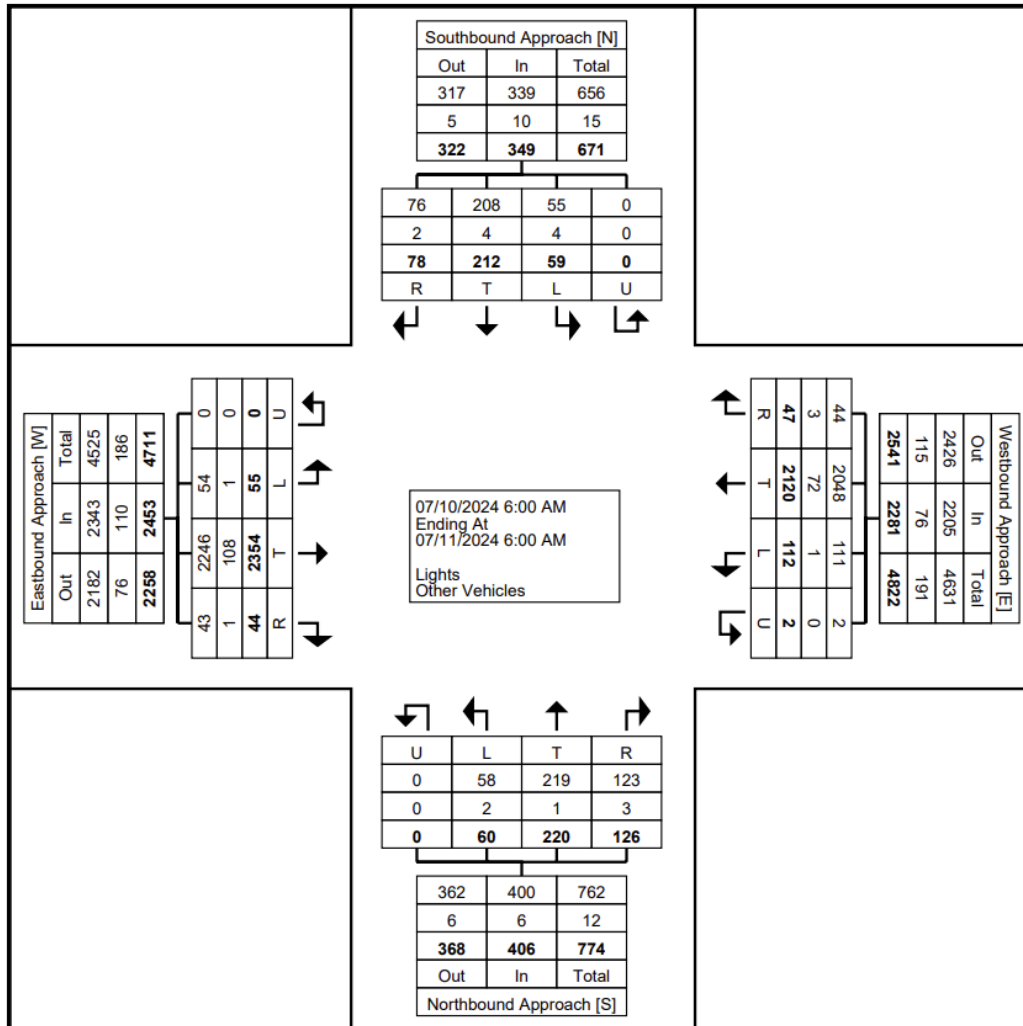


Figure 1: Turning Movement Data Plot

Table 1: SR 117 Historic Traffic Data

ALL - SR 117 Historic Traffic				
Year	AADT	% Change	Truck AADT	% Trucks
1990	3,840	-	170	4.4%
1994	4,030	4.7%	150	3.7%
1999	4,120	2.2%	150	3.6%
2005	4,020	-2.5%	140	3.5%
2011	4,760	15.5%	250	5.3%
2017	4,613	-3.2%	100	2.2%
2020	4,452	-6.9%	121	2.7%



Conditions Diagram

There are dual stop ahead signs located on the northbound and southbound approaches of Kemp 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 fronts of both stop signs on the driver’s side. There are dual intersection warning signs with the cross street name located on the eastbound and westbound approaches of SR 117. The locations of these signs are pictured in Figure 2, below.

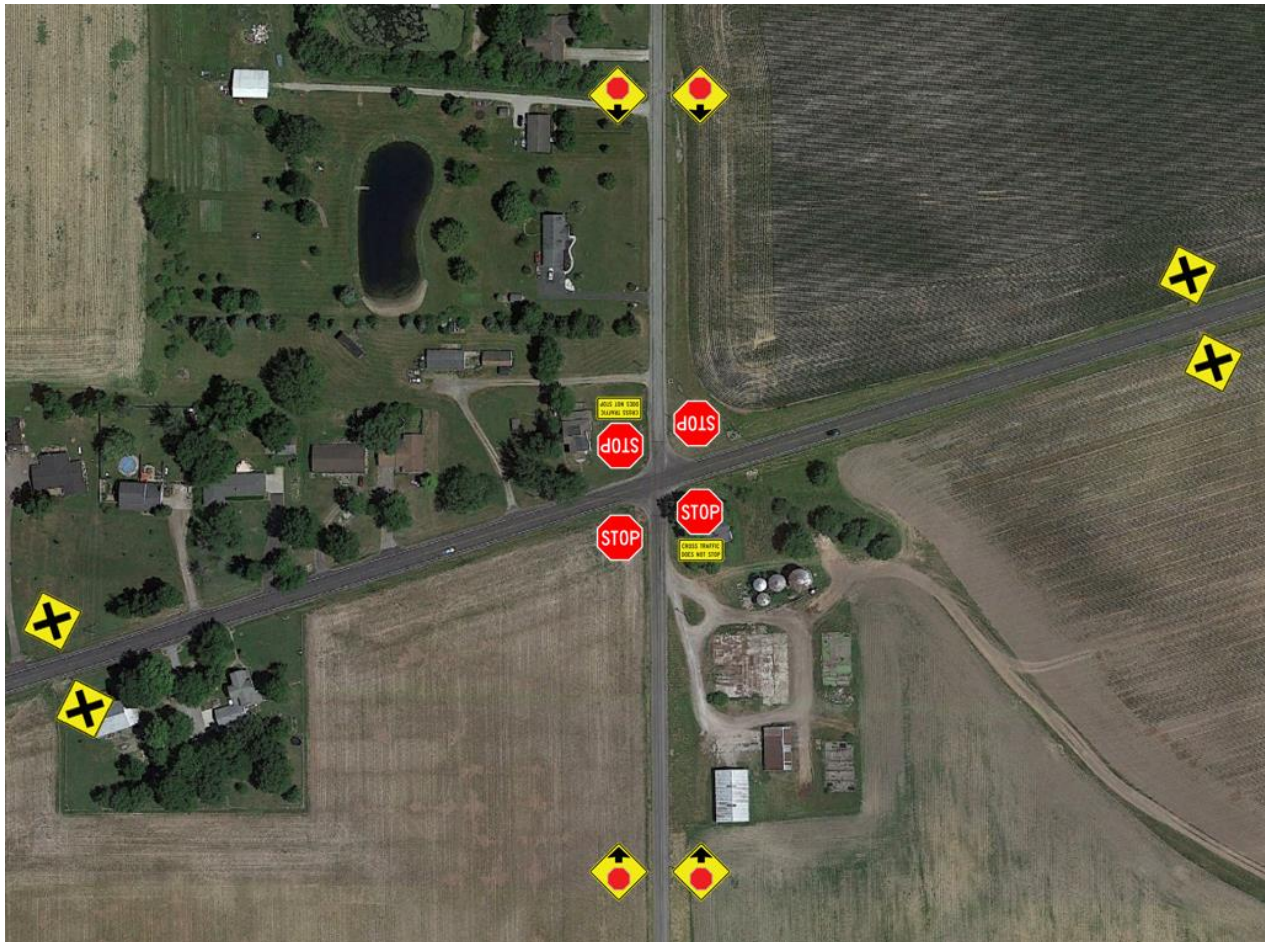


Figure 2: Conditions Diagram

SR 117 is approximately 26’ wide with 11’ eastbound and westbound travel lanes and 2’ paved shoulders. Kemp Road is approximately 20’ wide with 10’ northbound and southbound travel lanes. There is a stop bar painted even with the stop signs on each approach, perpendicular to Kemp Road. SR 117 intersects Kemp Road at approximately a 17-degree skew. There does not appear to be any sight obstructions after the project to remove encroachments. This intersection has little to no horizontal or vertical curvature.



Pictures of the Intersection



Figure 3: Southbound Kemp Road looking east at stop bar



Figure 4: Southbound Kemp Road looking west at stop bar



Figure 5: Southbound Kemp Road looking west beyond stop bar



Figure 6: Northbound Kemp Road looking west at stop bar



Figure 7: Northbound Kemp Road looking east at stop bar



Figure 8: Northbound Kemp Road looking east beyond stop bar



III. CRASH DATA

Crash Data Summaries

Crash data for a three-year period from January 1st, 2021 to December 31st, 2023 indicates a total of 11 crashes occurred at this intersection. This is an average of 3.7 crashes per year. Of the 11 crashes, 2 were coded as serious injury crashes, 5 were coded as other injury crashes, and 4 were coded as property damage only crashes. These 11 crashes resulted in a 64% injury rate. The most prominent crash type at this intersection was angle (64%). The angle crashes were a result of drivers failing to yield or failing to stop. Of the 7 angle crashes, 1 involved a driver failing to stop for the posted stop signs. The failure to yield and run the stop sign crashes were split almost evenly, 4 southbound and 3 northbound. So far in 2024, as of 7/22/2024, there have been 3 failure to yield, injury crashes at this intersection.

Most crashes occurred during the day (91%), on dry pavement (91%), 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 (10 A.M - 27%). During the week, crashes peak on Friday (36%) and Tuesday (27%). Otherwise, crashes are consistent throughout the day and week. Various crash stats are displayed below. For additional information, see Appendix A.

Road Condition	Crashes	%
Dry	10	90.91%
Wet	1	9.09%
Grand Total	11	100.00%

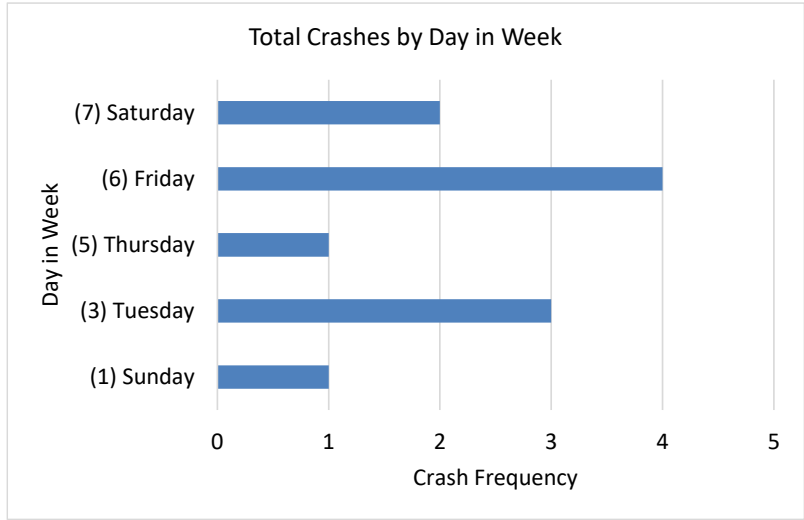
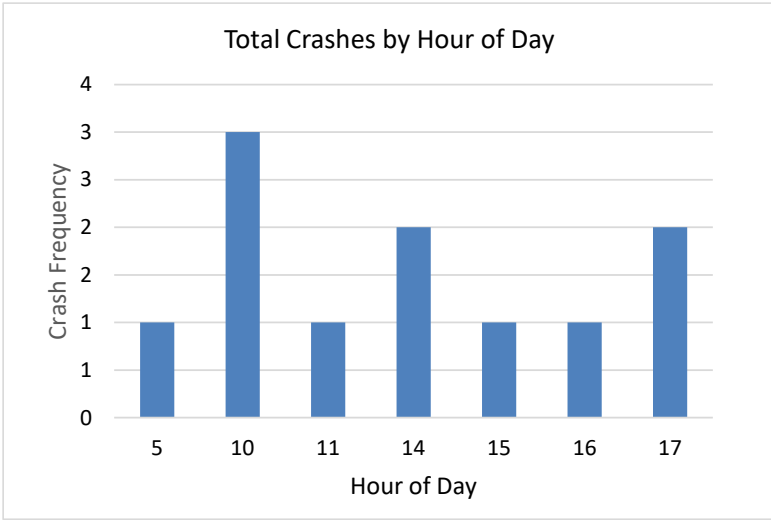
Light Condition	Crashes	%
Daylight	10	90.91%
Dark - Roadway Not Lighted	1	9.09%
Grand Total	11	100.00%

Crash Severity	Crashes	%
(2) Serious Injury Suspected	2	18.18%
(3) Minor Injury Suspected	3	27.27%
(4) Injury Possible	2	18.18%
(5) PDO/No Injury	4	36.36%
Grand Total	11	100.00%

Crash Type	Crashes	%
Angle	7	63.64%
Rear End	1	9.09%
Sideswipe - Passing	1	9.09%
Backing	1	9.09%
Left Turn	1	9.09%
Grand Total	11	100.00%

Year	Crashes	%
2021	5	45.45%
2022	4	36.36%
2023	2	18.18%
Grand Total	11	100.00%

Weather Condition	Crashes	%
Clear	8	72.73%
Cloudy	2	18.18%
Fog, Smog, Smoke	1	9.09%
Grand Total	11	100.00%



Crash Diagram

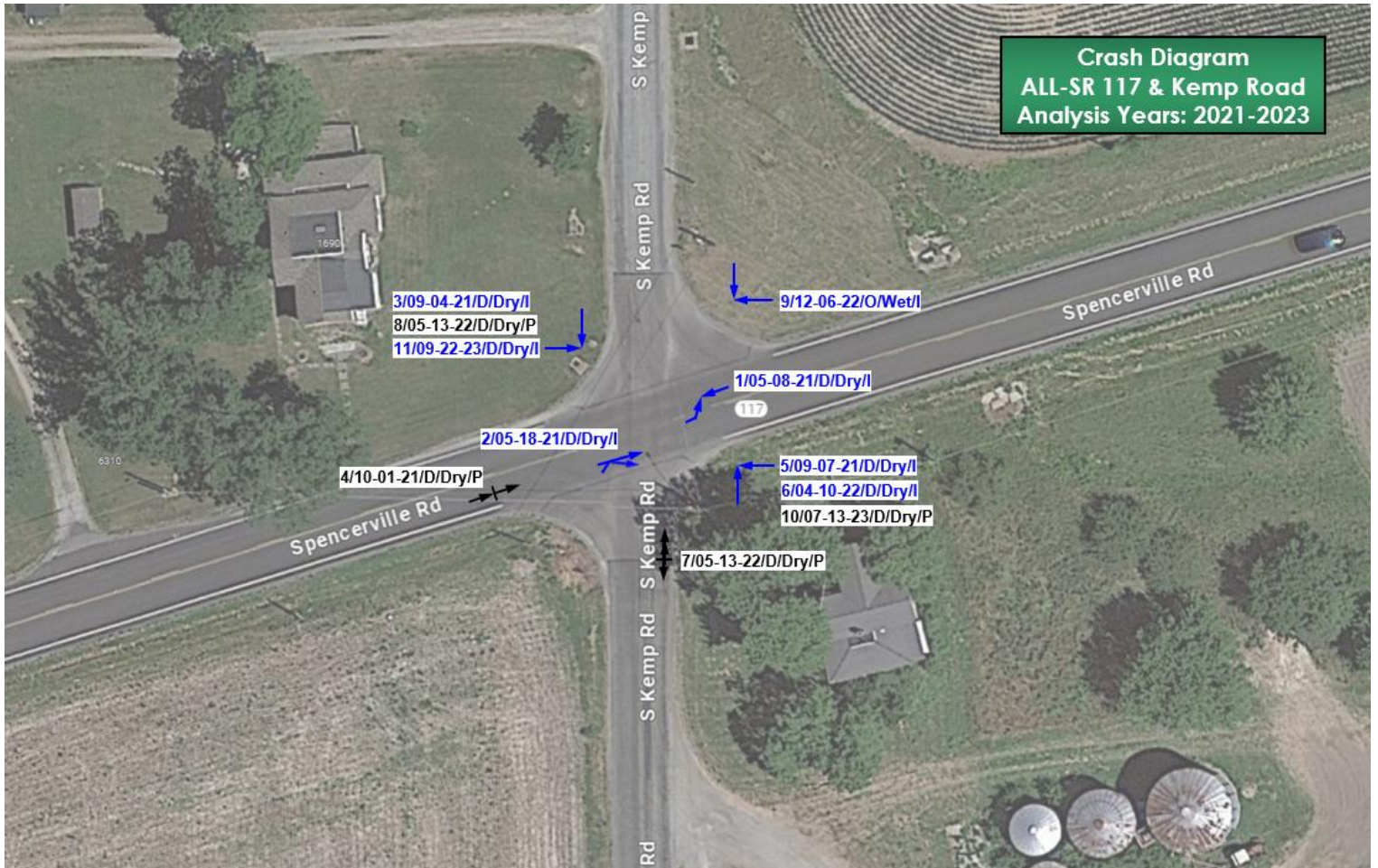


Figure 9: Crash Diagram



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 17-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 7 angle crashes, 6 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.

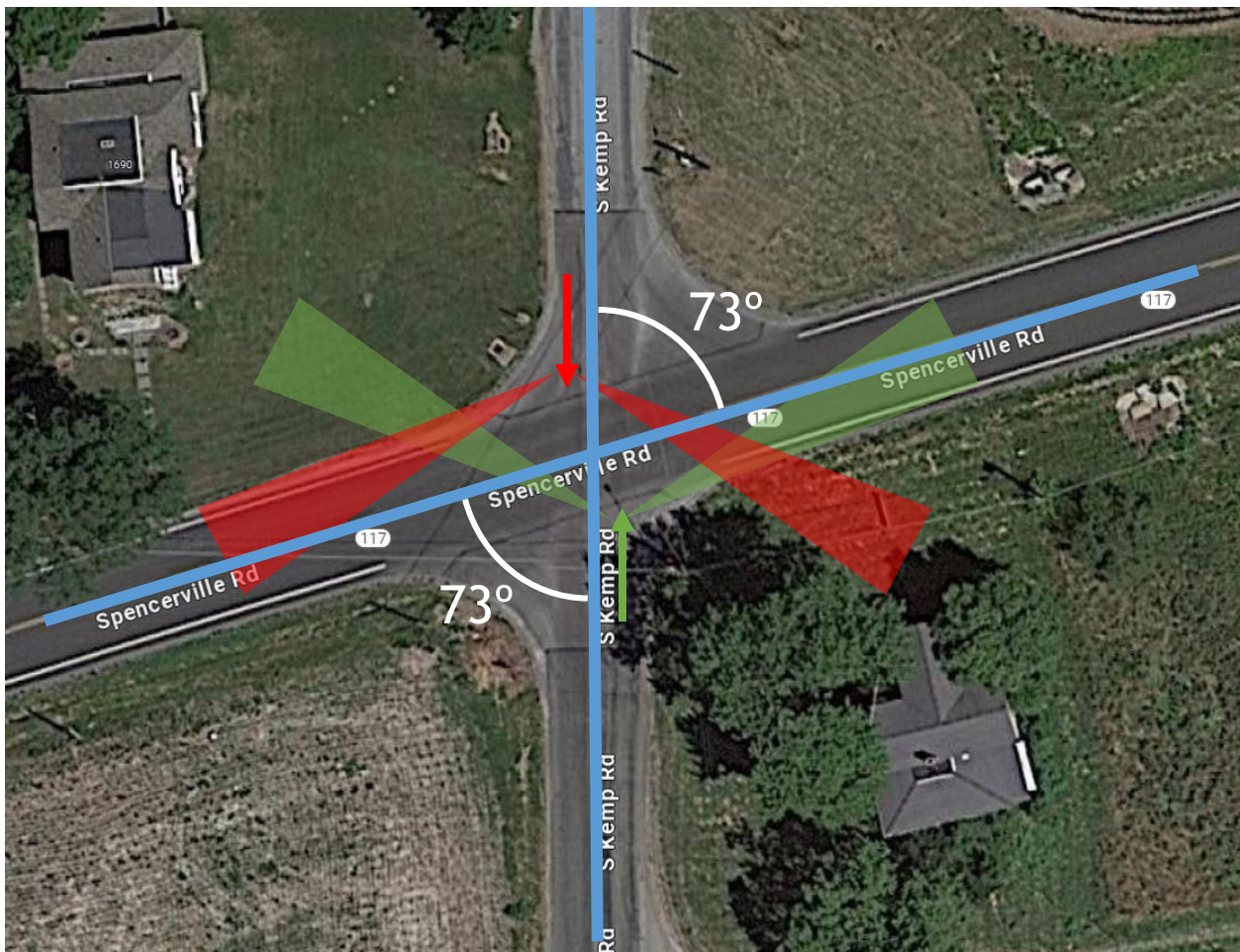


Figure 10: Intersection Skew and Blind Spots



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 little horizontal curvature. 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	Yes	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. A traffic signal, right turn lanes, and left turn lanes were all 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. The all-way stop warrant was met but not considered for further evaluation due to SR 117 being uncontrolled from Spencerville to Lima. Installing stop control on these approaches would likely result in stop sign running and increase the overall crashes and crash severity. 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 2.2 per year to 1.0 per year. This is a 55% 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	A	0.1	A	0.2	A	4.2	A	4.2
Westbound	A	0.2	A	0.5	A	3.6	A	4.4
Northbound	B	10.8	B	12.6	A	3.6	A	3.5
Southbound	B	11.2	B	12.4	A	3.1	A	3.6

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.

ALL-SR 117 & Kemp Road

Crash Summary Sheet

Fatalities	0
Serious Injuries	2
Other Injuries	15

Crash Severity	Crashes	%
(2) Serious Injury Suspected	2	18.18%
(3) Minor Injury Suspected	3	27.27%
(4) Injury Possible	2	18.18%
(5) PDO/No Injury	4	36.36%
Grand Total	11	100.00%

Day of Week	Crashes	%
(1) Sunday	1	9.09%
(3) Tuesday	3	27.27%
(5) Thursday	1	9.09%
(6) Friday	4	36.36%
(7) Saturday	2	18.18%
Grand Total	11	100.00%

Hour of Day	Crashes	%
5	1	9.09%
10	3	27.27%
11	1	9.09%
14	2	18.18%
15	1	9.09%
16	1	9.09%
17	2	18.18%
Grand Total	11	100.00%

Crashes Per Year	3.67
Fatal and All Injury Crashes	7
Percent Injury	63.6%
Equivalent PDO Index Value	11.26

Year	Crashes	%
2021	5	45.45%
2022	4	36.36%
2023	2	18.18%
Grand Total	11	100.00%

Crash Type	Crashes	%
Angle	7	63.64%
Rear End	1	9.09%
Sideswipe - Passing	1	9.09%
Backing	1	9.09%
Left Turn	1	9.09%
Grand Total	11	100.00%

Month	Crashes	%
4	1	9.09%
5	4	36.36%
7	1	9.09%
9	3	27.27%
10	1	9.09%
12	1	9.09%
Grand Total	11	100.00%

ALL-SR 117 & Kemp Road

Crash Summary Sheet

Weather Condition	Crashes	%
Clear	8	72.73%
Cloudy	2	18.18%
Fog, Smog, Smoke	1	9.09%
Grand Total	11	100.00%

Road Condition	Crashes	%
Dry	10	90.91%
Wet	1	9.09%
Grand Total	11	100.00%

Light Condition	Crashes	%
Daylight	10	90.91%
Dark - Roadway Not Lighted	1	9.09%
Grand Total	11	100.00%

Number of Units	Crashes	%
2	10	90.91%
3	1	9.09%
Grand Total	11	100.00%

ODOT Location	Crashes	%
Data Not Valid or Not Provided	6	54.55%
Four-Way Intersection	5	45.45%
Grand Total	11	100.00%

Work Zone Related	Crashes	%
No	11	100.00%
Grand Total	11	100.00%

Alcohol Related	Crashes	%
No	10	90.91%
Yes	1	9.09%
Grand Total	11	100.00%

Contour	Crashes	%
Straight Level	11	100.00%
Grand Total	11	100.00%

Drug Related (Inc. Marijuana)	Crashes	%
No	11	100.00%
Grand Total	11	100.00%

Marijuana Related	Crashes	%
No	11	100.00%
Grand Total	11	100.00%

Roadway Departure	Crashes	%
No	11	100.00%
Grand Total	11	100.00%

Older Driver (65+)	Crashes	%
No	7	63.64%
Yes	4	36.36%
Grand Total	11	100.00%

Intersection Related	Crashes	%
Yes	11	100.00%
Grand Total	11	100.00%

Young Driver (15-25)	Crashes	%
No	3	27.27%
Yes	8	72.73%
Grand Total	11	100.00%

Speed Related	Crashes	%
No	9	81.82%
Yes	2	18.18%
Grand Total	11	100.00%

Motorcycle Involved	Crashes	%
No	11	100.00%
Grand Total	11	100.00%

ALL-SR 117 & Kemp Road

Crash Summary Sheet

Unit 1 Summary

Unit 1 Pre-Crash Action	Crashes	%
Straight Ahead	8	72.73%
Overtaking/Passing	1	9.09%
Backing	1	9.09%
Making Left Turn	1	9.09%
Grand Total	11	100.00%

Unit 1 Contributing Factor	Crashes	%
Failure to Yield	7	63.64%
None	1	9.09%
Ran Stop Sign	1	9.09%
Improper Backing	1	9.09%
Improper Passing	1	9.09%
Grand Total	11	100.00%

Unit 1 Object Struck	Crashes	%
Nothing Struck	9	81.82%
Traffic Sign Post	1	9.09%
Other Post, Pole Or Support	1	9.09%
Grand Total	11	100.00%

Unit 1 Traffic Control	Crashes	%
Stop Sign	7	63.64%
No Control	4	36.36%
Grand Total	11	100.00%

Unit 1 Posted Speed	Crashes	%
45	1	9.09%
55	10	90.91%
Grand Total	11	100.00%

Unit 1 Direction From	Crashes	%
North	4	36.36%
South	4	36.36%
West	3	27.27%
Grand Total	11	100.00%

Unit 1 Direction To	Crashes	%
North	5	45.45%
South	4	36.36%
East	2	18.18%
Grand Total	11	100.00%

ALL-SR 117 & Kemp Road

Crash Summary Sheet

Unit 1 Summary

Unit 1 Type	Crashes	%
Passenger Car	5	45.45%
Sport Utility Vehicle	3	27.27%
Van (9-15 Seats)	1	9.09%
Passenger Van (minivan)	1	9.09%
Pick up	1	9.09%
Grand Total	11	100.00%

Unit 1 Special Function	Crashes	%
None	11	100.00%
Grand Total	11	100.00%

ALL-SR 117 & Kemp Road

Crash Summary Sheet

Unit 2 Summary

Unit 2 Pre-Crash Action	Crashes	%
Straight Ahead	9	81.82%
Making Left Turn	1	9.09%
Slowing or Stopped In Traffic	1	9.09%
Grand Total	11	100.00%

Unit 2 Contributing Factor	Crashes	%
None	11	100.00%
Grand Total	11	100.00%

Unit 2 Direction From	Crashes	%
East	6	54.55%
South	1	9.09%
West	4	36.36%
Grand Total	11	100.00%

Unit 2 Direction To	Crashes	%
East	3	27.27%
North	2	18.18%
West	6	54.55%
Grand Total	11	100.00%

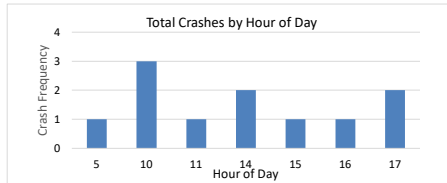
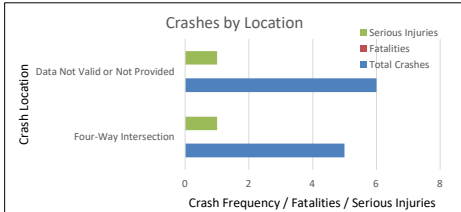
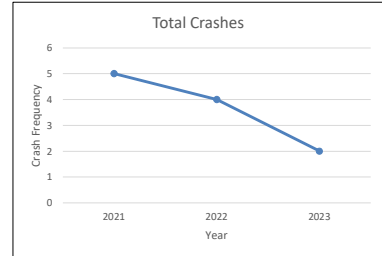
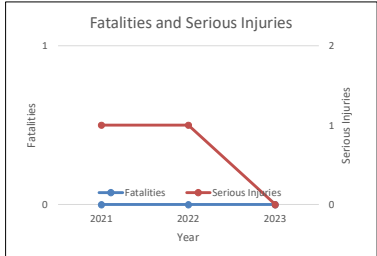
Unit 2 Type	Crashes	%
Passenger Car	8	72.73%
Sport Utility Vehicle	2	18.18%
Bus (16+ Passengers)	1	9.09%
Grand Total	11	100.00%

Unit 2 Special Function	Crashes	%
None	10	90.91%
Bus – Shuttle	1	9.09%
Grand Total	11	100.00%

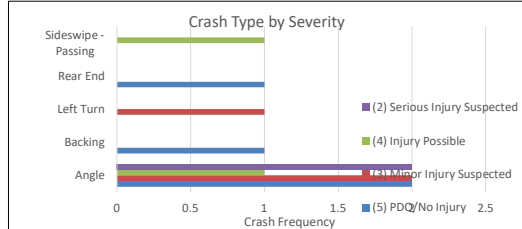
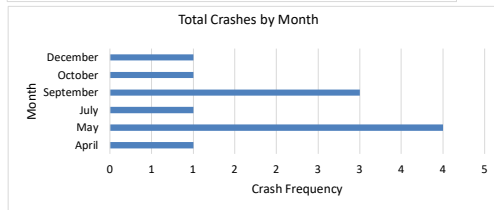
ALL-SR 117 & Kemp Road
Crash Summary Sheet

Crashes Per Year 3.67 Percent Injury 63.6% EPDO 11.26

Year	Total Crashes	Fatalities	Serious Injuries
2021	5	0	1
2022	4	0	1
2023	2	0	0
Grand Total	11	0	2



Crash Type	Injury Level	(2) Serious Inju	(3) Minor Injury	(4) Injury Possi	(5) PDO/No Inj	Grand Total
Angle		2	2	1	2	7
Rear End		0	0	0	1	1
Sideswipe - Passing		0	0	1	0	1
Backing		0	0	0	1	1
Left Turn		0	1	0	0	1
Grand Total		2	3	2	4	11



Road Condition	Total Crashes	Fatalities	Serious Injuries
Dry	10	0	2
Wet	1	0	0
Grand Total	11	0	2

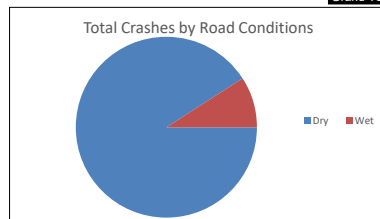
Hour of Day	Total Crashes
5	1
10	3
11	1
14	2
15	1
16	1
17	2
Grand Total	11

Month	Total Crashes
April	1
May	4
July	1
September	3
October	1
December	1
Grand Total	11

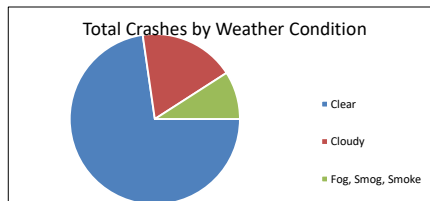
Weather	Total Crashes	Fatalities	Serious Injuries
Clear	8	0	1
Cloudy	2	0	1
Fog, Smog, Smoke	1	0	0
Grand Total	11	0	2

Day in Week	Total Crashes
(1) Sunday	1
(3) Tuesday	3
(5) Thursday	1
(6) Friday	4
(7) Saturday	2
Grand Total	11

Crash Location	Total Crashes	Fatalities	Serious Injuries
Four-Way Intersection	5	0	1
Data Not Valid or Not Provided	6	0	1
Grand Total	11	0	2



Roadway Contour	Total Crashes	Fatalities	Serious Injuries
Straight Level	11	0	2
Grand Total	11	0	2



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

Crash Severity	Site Average		Statewide Average
	Total (2021-2023)	Total (%)	Total (%)
Fatal Crash	0	0.00%	1.19%
Serious Injury Suspected Crash	2	18.18%	6.35%
Minor Injury Suspected Crash	3	27.27%	17.57%
Injury Possible Crash	2	18.18%	11.14%
Property-Damage-Only	4	36.36%	63.74%
Total	11		

Crashes by Crash Type				
Crash Type	Total (%)		Fatal & All Injury (%)	
	Site Average	Statewide Average	Site Average	Statewide Average
Unknown	0.00%	0.20%	0.00%	0.09%
Head On	0.00%	1.72%	0.00%	2.60%
Rear End	9.09%	12.77%	9.09%	12.93%
Backing	9.09%	3.15%	9.09%	0.50%
Sideswipe - Meeting	0.00%	1.09%	0.00%	0.82%
Sideswipe - Passing	9.09%	6.73%	9.09%	6.01%
Angle	63.64%	29.64%	63.64%	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	0.00%	1.09%	0.00%	1.89%
Other Non-Collision	0.00%	0.93%	0.00%	0.39%
Left Turn	9.09%	8.95%	9.09%	10.68%
Right Turn	0.00%	2.05%	0.00%	1.52%

Crashes by Light Conditions				
Light Conditions	Total (%)		Fatal & All Injury (%)	
	Site Average	Statewide Average	Site Average	Statewide Average
Daylight	90.91%	66.85%	90.91%	75.78%
Dawn/Dusk	0.00%	5.46%	0.00%	4.63%
Dark - Lighted Roadway	0.00%	3.93%	0.00%	3.05%
Dark - Roadway Not Lighted	9.09%	22.74%	9.09%	16.02%
Dark - Unknown Roadway Lighting	0.00%	0.34%	0.00%	0.17%
Other / Unknown	0.00%	0.68%	0.00%	0.35%

Crashes by Road Conditions				
Road Conditions	Total (%)		Fatal & All Injury (%)	
	Site Average	Statewide Average	Site Average	Statewide Average
Dry	83.33%	74.91%	83.33%	78.90%
Wet	8.33%	16.60%	8.33%	16.09%
Snow	0.00%	5.67%	0.00%	3.39%
Ice	0.00%	2.10%	0.00%	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	8.34%	0.31%	8.34%	0.15%

ROUNDBABOUT SIZING THRESHOLDS

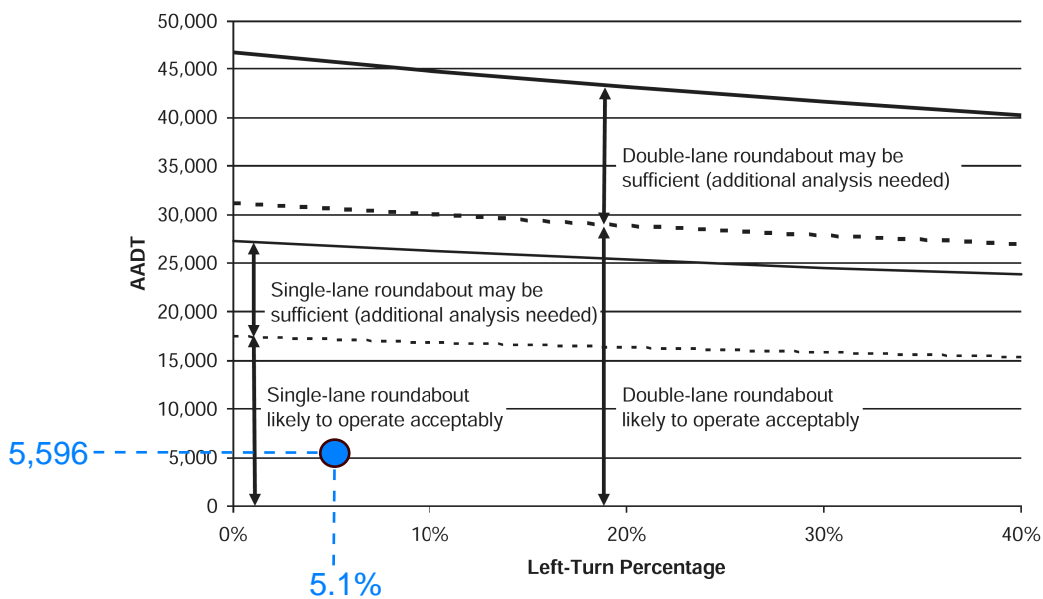
403-1

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	<ul style="list-style-type: none"> • Single-lane entry likely to be sufficient
1,000 - 1,300	<ul style="list-style-type: none"> • Two lane entry may be needed • Single-lane may be sufficient based upon more detailed analysis
1,300 - 1,800	<ul style="list-style-type: none"> • Two lane entry is likely to be sufficient
1,800+	<ul style="list-style-type: none"> • 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:	Allen County	Traffic Volumes Obtained By:	ODOT Distirct 1
County:	Allen	Analysis Date:	7/29/2024
ODOT Engineering District:	1	Agency/ Company Name Performing Warrant Analysis:	ODOT Distirct 1

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 117

Major Street Approach Direction: E-Bound
W-Bound

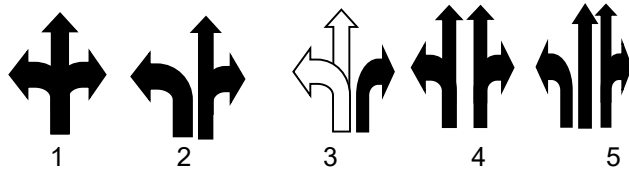
Number of Thru Lanes on Each Major Street Approach: 1 LANE(S)

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: Kemp Road

Minor Street Approach Configuration: 1 N-Bound
1 S-Bound



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

	Warrant		Notes and Comments:			
	Applicable?	Satisfied?				
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. <table border="1" style="float: right; margin-top: 10px;"> <tr><td style="text-align: center;">Peak Hour</td></tr> <tr><td style="text-align: center;">4:00 PM</td></tr> <tr><td style="text-align: center;">5:00 PM</td></tr> </table>	Peak Hour	4:00 PM	5:00 PM
Peak Hour						
4:00 PM						
5:00 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. <table border="1" style="float: right; margin-top: 10px;"> <tr><td style="text-align: center;">Peak Hour</td></tr> <tr><td style="text-align: center;">4:15 PM</td></tr> <tr><td style="text-align: center;">5:15 PM</td></tr> </table>	Peak Hour	4:15 PM	5:15 PM
Peak Hour						
4:15 PM						
5:15 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	Yes	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*							
			100%		70%		100%		70%		Cond. A		Cond. B		Cond. A		Cond. B	
	Major	Minor	80%		80%		56%		56%		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	21	1																
12:15 AM	16	1																
12:30 AM	16	1																
12:45 AM	12	1																
1:00 AM	8	1																
1:15 AM	8	1																
1:30 AM	6	1																
1:45 AM	8	1																
2:00 AM	11	1																
2:15 AM	10	1																
2:30 AM	12	1																
2:45 AM	17	1																
3:00 AM	18	1																
3:15 AM	28	0																
3:30 AM	40	3																
3:45 AM	43	8																
4:00 AM	56	10																
4:15 AM	66	11																
4:30 AM	73	9																
4:45 AM	97	6																
5:00 AM	116	9																
5:15 AM	137	9																
5:30 AM	176	17																
5:45 AM	221	26																
6:00 AM	250	30																
6:15 AM	276	35																
6:30 AM	298	31													1			
6:45 AM	305	26																
7:00 AM	312	25																
7:15 AM	301	24																
7:30 AM	276	27																
7:45 AM	255	22																
8:00 AM	242	21																
8:15 AM	242	21																
8:30 AM	244	18																
8:45 AM	238	17																
9:00 AM	240	15																

ALL-SR 117 & Kemp Rd ODOT Traffic Signal Warrant Spreadsheet

9:15 AM	239	16																
9:30 AM	238	14																
9:45 AM	237	17																
10:00 AM	230	18																
10:15 AM	253	14																
10:30 AM	249	17																
10:45 AM	252	17																
11:00 AM	281	23											1					
11:15 AM	258	29																
11:30 AM	291	25																
11:45 AM	297	27																
12:00 PM	284	24											1					
12:15 PM	293	22																
12:30 PM	288	19																
12:45 PM	293	20																
1:00 PM	307	21											1					
1:15 PM	314	19																
1:30 PM	306	20																
1:45 PM	315	26																
2:00 PM	320	24											1					
2:15 PM	331	31																
2:30 PM	327	34																
2:45 PM	345	36																
3:00 PM	359	39		1									1					
3:15 PM	389	38																
3:30 PM	425	36							1							1		
3:45 PM	430	38																
4:00 PM	434	38		1									1					
4:15 PM	442	29																
4:30 PM	439	30							1							1		
4:45 PM	430	25																
5:00 PM	384	26		1									1					
5:15 PM	335	29																
5:30 PM	296	26																
5:45 PM	258	27																
6:00 PM	249	21																
6:15 PM	228	24																
6:30 PM	229	21																
6:45 PM	214	17																
7:00 PM	202	18																
7:15 PM	195	18																
7:30 PM	176	26																
7:45 PM	164	28																
8:00 PM	165	29																
8:15 PM	152	32																
8:30 PM	141	27																
8:45 PM	156	22																
9:00 PM	140	18																
9:15 PM	136	11																
9:30 PM	112	12																
9:45 PM	78	9																
HOURS MET			0	0	3	0	0	0	0	0	2	0	0	0	8	0	2	0
WARRANT SATISFIED?			NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO

Warrant Met: **No**

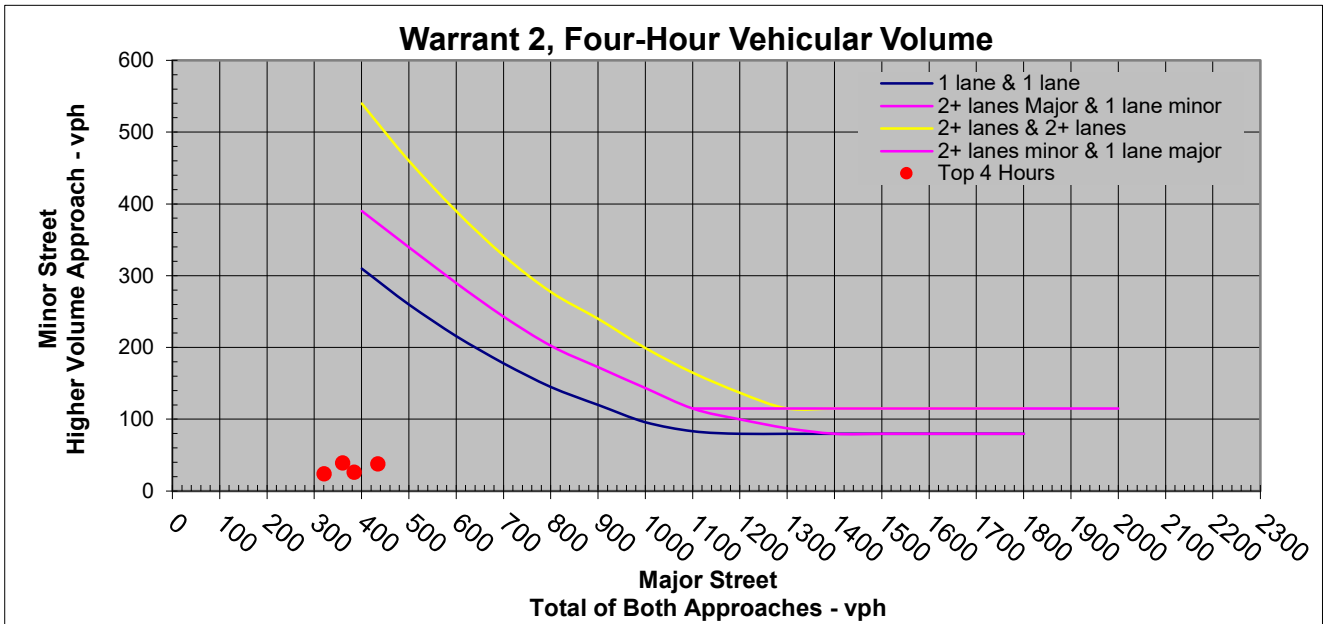
Notes:

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)	0
Minor Street: 1 Lane		

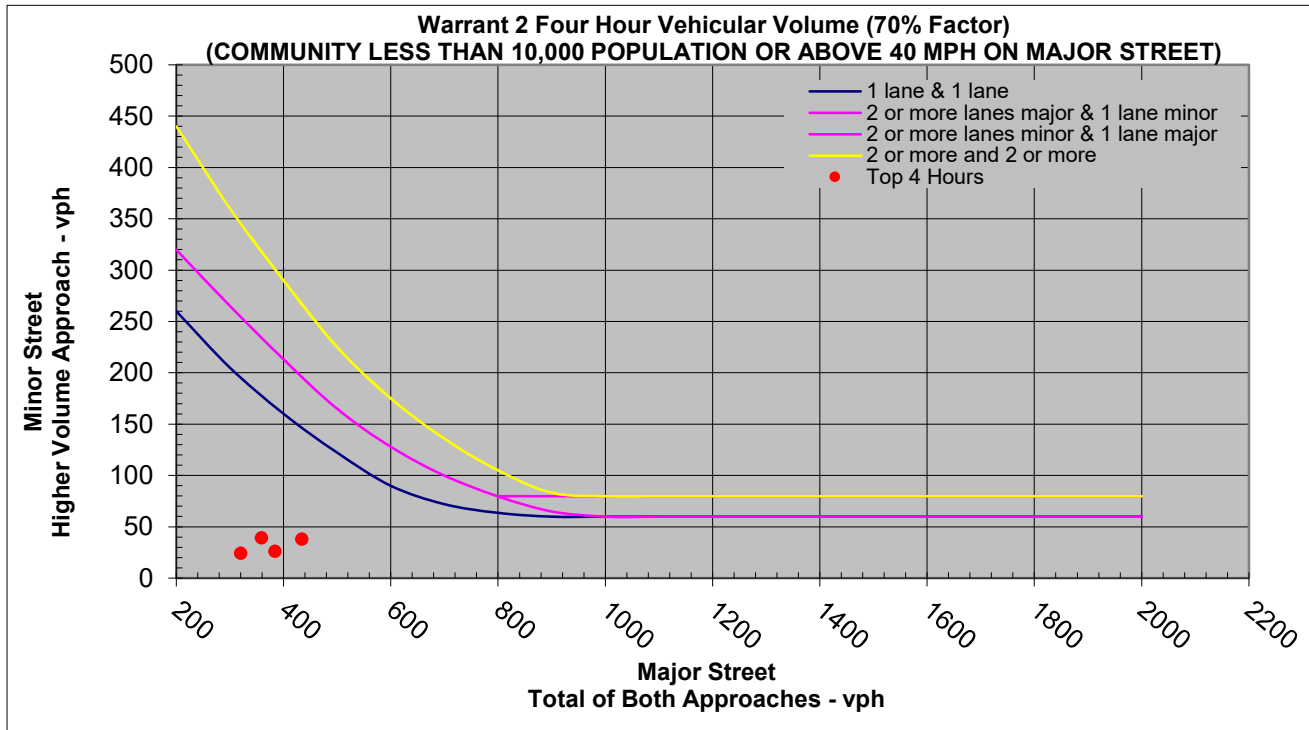
Built up Isolated Community with Less Than 10,000 Population or Above 40 MPH on Major Street? **Yes**

Hour Interval Beginning At	Raw Traffic Counts				Total Major Approach Volumes	Highest Actual Minor Street Approach Volumes	Hour Met?	Hour Met? (70% Factor)
	Minor - Kemp Road		Major - SR 117					
	N-Bound	S-Bound	W-Bound	E-Bound				
6:00 AM	10	30	79	171	250	30		
6:15 AM	15	35	82	194	276	35		
6:30 AM	15	31	90	208	298	31		
6:45 AM	21	26	91	214	305	26		
7:00 AM	25	23	93	219	312	25		
7:15 AM	24	22	98	203	301	24		
7:30 AM	27	24	91	185	276	27		
7:45 AM	22	22	83	172	255	22		
8:00 AM	18	21	73	169	242	21		
8:15 AM	20	21	69	173	242	21		
8:30 AM	17	18	72	172	244	18		
8:45 AM	17	17	81	157	238	17		
9:00 AM	14	15	89	151	240	15		
9:15 AM	16	14	95	144	239	16		
9:30 AM	14	12	102	136	238	14		
9:45 AM	14	17	94	143	237	17		
10:00 AM	18	14	91	139	230	18		
10:15 AM	14	13	109	144	253	14		
10:30 AM	14	17	101	148	249	17		
10:45 AM	13	17	112	140	252	17		
11:00 AM	15	23	127	154	281	23		
11:15 AM	18	29	109	149	258	29		
11:30 AM	25	22	134	157	291	25		
11:45 AM	27	21	127	170	297	27		
12:00 PM	23	24	132	152	284	24		
12:15 PM	22	20	146	147	293	22		
12:30 PM	18	19	144	144	288	19		
12:45 PM	20	15	151	142	293	20		
1:00 PM	21	14	153	154	307	21		
1:15 PM	19	13	165	149	314	19		
1:30 PM	19	20	164	142	306	20		
1:45 PM	21	26	181	134	315	26		
2:00 PM	21	24	191	129	320	24		
2:15 PM	31	25	190	141	331	31		
2:30 PM	34	23	188	139	327	34		
2:45 PM	36	20	194	151	345	36		
3:00 PM	39	22	197	162	359	39		
3:15 PM	38	18	216	173	389	38		
3:30 PM	36	19	242	183	425	36		
3:45 PM	38	20	233	197	430	38		
4:00 PM	38	19	233	201	434	38		
4:15 PM	29	21	245	197	442	29		
4:30 PM	30	23	249	190	439	30		
4:45 PM	22	25	265	165	430	25		
5:00 PM	23	26	238	146	384	26		
5:15 PM	25	29	203	132	335	29		
5:30 PM	23	26	170	126	296	26		
5:45 PM	27	21	140	118	258	27		
6:00 PM	21	21	136	113	249	21		
6:15 PM	24	13	121	107	228	24		
6:30 PM	21	9	129	100	229	21		
6:45 PM	17	11	123	91	214	17		
7:00 PM	18	12	122	80	202	18		
7:15 PM	18	14	121	74	195	18		
7:30 PM	26	15	111	65	176	26		
7:45 PM	28	16	104	60	164	28		
8:00 PM	29	15	101	64	165	29		



Top Hours for Figure 4C-1	Start Time	End Time	Major Street	Minor Street
Top Hour	4:00 PM	5:00 PM	434	38
2nd Highest Hour	5:00 PM	6:00 PM	384	26
3rd Highest Hour	3:00 PM	4:00 PM	359	39
4th Highest Hour	2:00 PM	3:00 PM	320	24

Top Hours for Figure 4C-2	Start Time	End Time	Major Street	Minor Street
Top Hour	4:00 PM	5:00 PM	434	38
2nd Highest Hour	3:00 PM	4:00 PM	359	39
3rd Highest Hour	5:00 PM	6:00 PM	384	26
4th Highest Hour	2:00 PM	3:00 PM	320	24



Are the requirements for Warrant 2 met?:

OMUTCD WARRANT 3, PEAK HOUR			
Number of Lanes for Moving Traffic on Each Approach		Peak Hour Start time	4:00 PM
Major Street:	1 Lane	Peak Hour End Time	5:00 PM
Minor Street:	1 Lane		

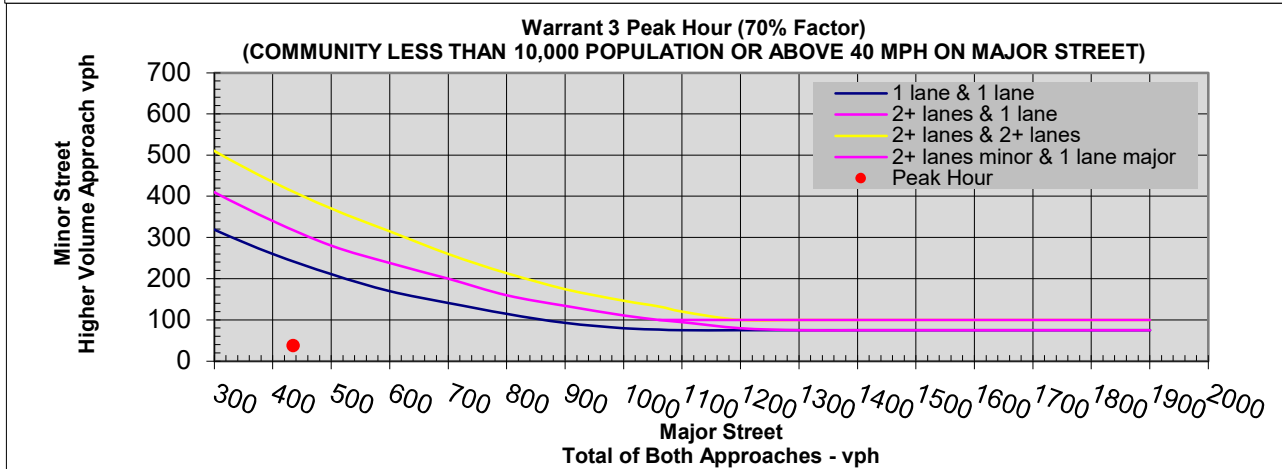
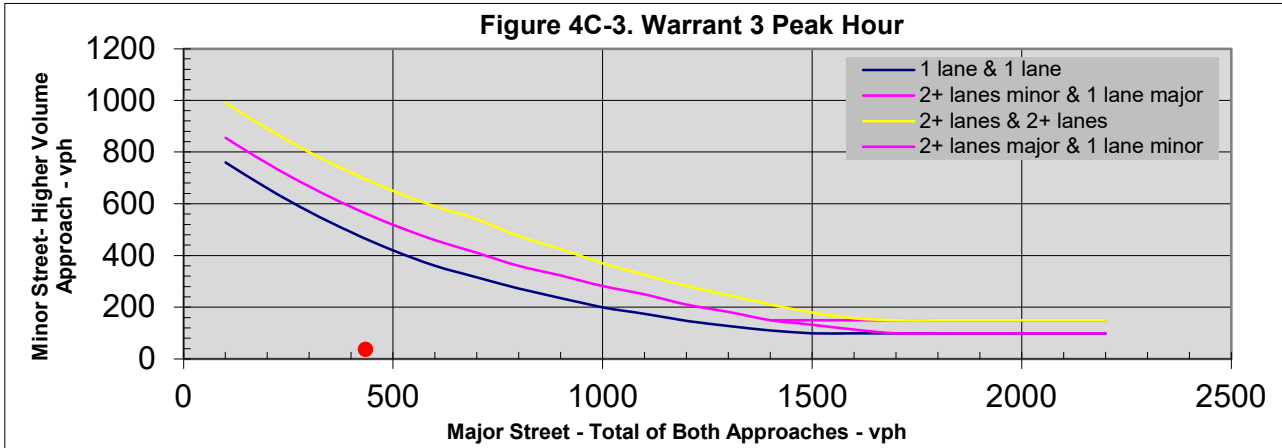
Built up Isolated Community with Less Than 10,000 Population or Above 40 MPH on Major Street?	Yes
---	-----

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?	No
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**



ALL-SR 117 & Kemp Rd ODOT Traffic Signal Warrant Spreadsheet

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	250	30	280	290
6:15 AM	276	35	311	326
6:30 AM	298	31	329	344
6:45 AM	305	26	331	352
7:00 AM	312	25	337	360
7:15 AM	301	24	325	347
7:30 AM	276	27	303	327
7:45 AM	255	22	277	299
8:00 AM	242	21	263	281
8:15 AM	242	21	263	283
8:30 AM	244	18	262	279
8:45 AM	238	17	255	272
9:00 AM	240	15	255	269
9:15 AM	239	16	255	269
9:30 AM	238	14	252	264
9:45 AM	237	17	254	268
10:00 AM	230	18	248	262
10:15 AM	253	14	267	280
10:30 AM	249	17	266	280
10:45 AM	252	17	269	282
11:00 AM	281	23	304	319
11:15 AM	258	29	287	305
11:30 AM	291	25	316	338
11:45 AM	297	27	324	345
12:00 PM	284	24	308	331
12:15 PM	293	22	315	335
12:30 PM	288	19	307	325
12:45 PM	293	20	313	328
1:00 PM	307	21	328	342
1:15 PM	314	19	333	346
1:30 PM	306	20	326	345
1:45 PM	315	26	341	362
2:00 PM	320	24	344	365
2:15 PM	331	31	362	387
2:30 PM	327	34	361	384
2:45 PM	345	36	381	401
3:00 PM	359	39	398	420
3:15 PM	389	38	427	445
3:30 PM	425	36	461	480
3:45 PM	430	38	468	488
4:00 PM	434	38	472	491
4:15 PM	442	29	471	492
4:30 PM	439	30	469	492
4:45 PM	430	25	455	477
5:00 PM	384	26	410	433
5:15 PM	335	29	364	389
5:30 PM	296	26	322	345
5:45 PM	258	27	285	306
6:00 PM	249	21	270	291
6:15 PM	228	24	252	265
6:30 PM	229	21	250	259
6:45 PM	214	17	231	242
7:00 PM	202	18	220	232
7:15 PM	195	18	213	227
7:30 PM	176	26	202	217
7:45 PM	164	28	192	208
8:00 PM	165	29	194	209

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
434	38	458.13835	241.48755

OMUTCD WARRANT 7, CRASH EXPERIENCE

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

Number of Lanes for Moving Traffic on Each Approach

Major Street:
 Minor Street:

Has adequate trial of alternative with satisfactory observance and enforcement failed to reduce the crash frequency?

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.*

**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.

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.

The volume of pedestrian traffic is not less than 80% of the requirements specified in Warrant 4, the Pedestrian Volume warrant.*
**If applicable, attach all supporting calculations and documentation*

Are the requirements for Warrant 7 met?:

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?:

Multi-Way Stop Application

OMUTCD Section 2B.07

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. Warranted ?
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.* Yes

*If this condition is satisfied, there must also be an average delay of at least 30 seconds per vehicle during the peak hour.

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?: Yes

ALL-SR 117 & Kemp Rd ODOT Traffic Signal Warrant Spreadsheet

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	250	250					1	1
6:15 AM	276	276						
6:30 AM	298	298						
6:45 AM	305	305	1	1	1	1		
7:00 AM	312	312					1	1
7:15 AM	301	301						
7:30 AM	276	276						
7:45 AM	255	255			1	1		
8:00 AM	242	242					1	1
8:15 AM	242	242						
8:30 AM	244	244						
8:45 AM	238	238			1	1		
9:00 AM	240	240					1	1
9:15 AM	239	239						
9:30 AM	238	238						
9:45 AM	237	237			1	1		
10:00 AM	230	230						
10:15 AM	253	253					1	1
10:30 AM	249	249						
10:45 AM	252	252			1	1		
11:00 AM	281	281						
11:15 AM	258	258					1	1
11:30 AM	291	291						
11:45 AM	297	297			1	1		
12:00 PM	284	284						
12:15 PM	293	293					1	1
12:30 PM	288	288						
12:45 PM	293	293			1	1		
1:00 PM	307	307	1	1				
1:15 PM	314	314					1	1
1:30 PM	306	306						
1:45 PM	315	315			1	1		
2:00 PM	320	320	1	1				
2:15 PM	331	331					1	1
2:30 PM	327	327						
2:45 PM	345	345			1	1		
3:00 PM	359	359	1	1				
3:15 PM	389	389					1	1
3:30 PM	425	425						
3:45 PM	430	430			1	1		
4:00 PM	434	434	1	1				
4:15 PM	442	442					1	1
4:30 PM	439	439						
4:45 PM	430	430			1	1		
5:00 PM	384	384	1	1				
5:15 PM	335	335					1	1
5:30 PM	296	296						
5:45 PM	258	258			1	1		
6:00 PM	249	249						
6:15 PM	228	228						
6:30 PM	229	229						
6:45 PM	214	214			1	1		
7:00 PM	202	202						
7:15 PM	195	195						
7:30 PM	176	176						
7:45 PM	164	164						
8:00 PM	165	165						
HOURS MET			6	6	14	14	12	12
WARRANT SATISFIED?			NO		YES		YES	

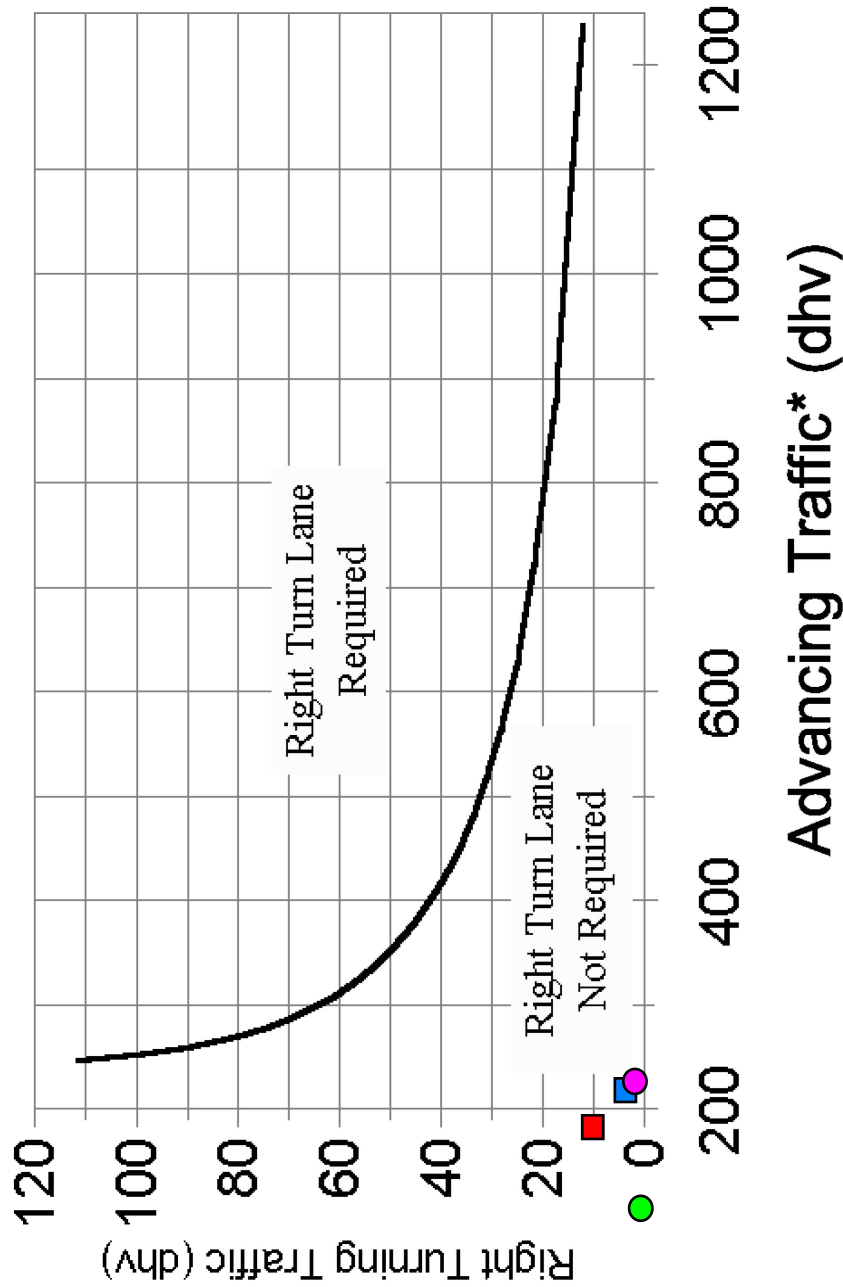
Multi-Way Stop

2-LANE RIGHT TURN LANE WARRANT (HIGH SPEED)

401-6b

REFERENCE SECTION
401.6.3

2-Lane Highway Right Turn Lane Warrant > 40 mph or 70 kph Posted Speed



*Includes Right Turns

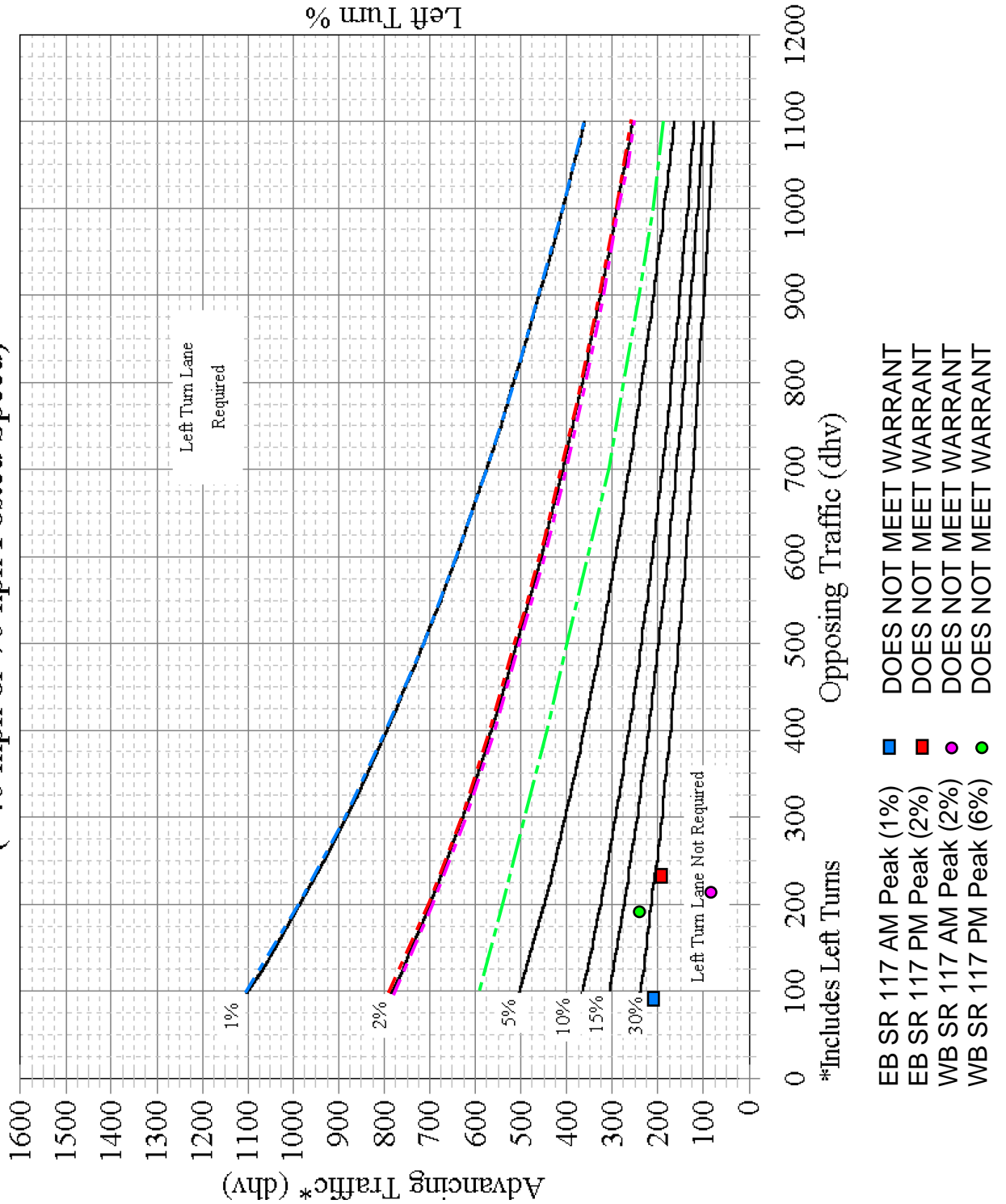
- EB SR 117 AM Peak ■ DOES NOT MEET WARRANT
- EB SR 117 PM Peak ■ DOES NOT MEET WARRANT
- WB SR 117 AM Peak ● DOES NOT MEET WARRANT
- WB SR 117 PM Peak ● DOES NOT MEET WARRANT

2-LANE LEFT TURN LANE WARRANT (HIGH SPEED)

401-5b

REFERENCE SECTION
401.6.1

2-Lane Highway Left Turn Lane Warrant (>40 mph or 70 kph Posted Speed)



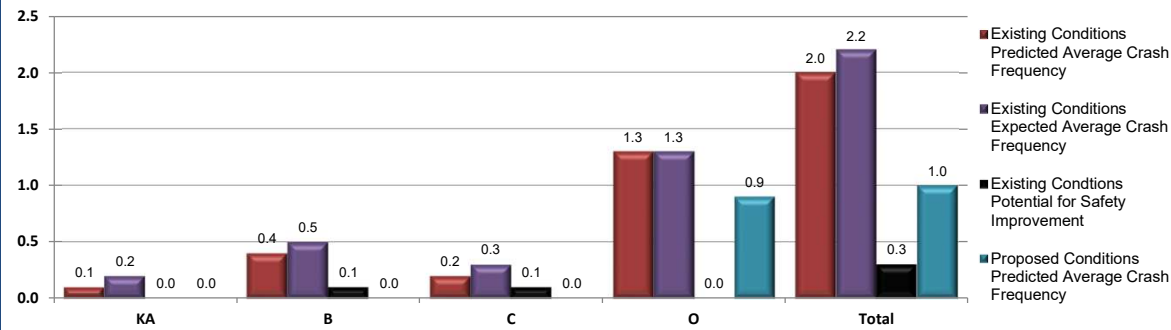


Project Safety Performance Report

General Information

Project Name	ALL-SR 117 & Kemp Proposed Roundabout	Contact Email	Hailey.Robey@dot.ohio.gov
Project Description	Safety Study	Contact Phone	419-999-6887
Reference Number		Date Performed	7/31/2024
Analyst	Hailey Robey	Analysis Year	2021-2023
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	0.1449	0.3513	0.2344	1.2579	1.9885
N_{expected} - Existing Conditions	0.1925	0.4665	0.3107	1.2752	2.2449
N_{potential for improvement} - Existing Conditions	0.0476	0.1152	0.0763	0.0173	0.2564
N_{expected} - Proposed Conditions	0.0040	0.0330	0.0407	0.9370	1.0147

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

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
SR117: 9.71	Kemp Road	0.1449	0.3513	0.2344	1.2579	1.9885

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

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
SR117: 9.71	Kemp Road	0.1925	0.4665	0.3107	1.2752	2.2449

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

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
SR117: 9.71	Kemp Road	0.0476	0.1152	0.0763	0.0173	0.2564

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

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
SR117: 9.71	Kemp Road	0.004	0.033	0.0407	0.937	1.0147

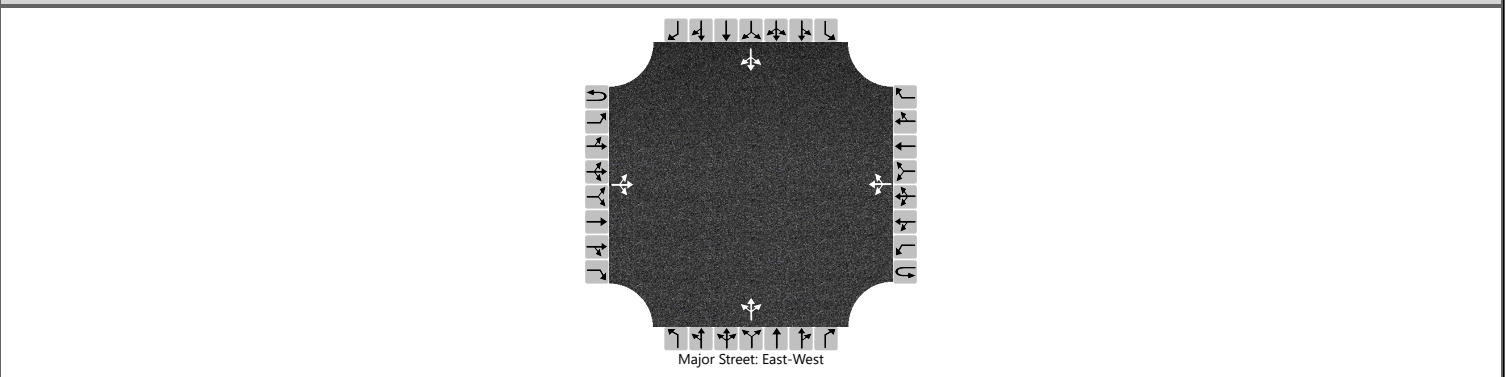
Summary by Crash Type

Crash Type	Existing		PSI	Proposed
	Predicted Crash Frequency	Expected Crash Frequency		Predicted Crash Frequency
Unknown	0.0083	0.0087	0.0004	0.0291
Head On	0.0171	0.0208	0.0037	0.0008
Rear End	0.4250	0.4723	0.0473	0.1536
Backing	0.0800	0.0823	0.0023	0.0095
Sideswipe - Meeting	0.0578	0.0658	0.0080	0.0000
Sideswipe - Passing	0.0898	0.0977	0.0079	0.3194
Angle	0.7588	0.8846	0.1258	0.2861
Parked Vehicle	0.0707	0.0741	0.0034	0.0000
Pedestrian	0.0097	0.0123	0.0026	0.0008
Animal	0.0000	0.0000	0.0000	0.0103
Train	0.0003	0.0004	0.0001	0.0000
Pedalcycles	0.0073	0.0091	0.0018	0.0008
Other Non-Vehicle	0.0001	0.0002	0.0001	0.0000
Fixed Object	0.3334	0.3680	0.0346	0.1025
Other Object	0.0116	0.0123	0.0007	0.0000
Overturning	0.0200	0.0244	0.0044	0.0008
Other Non-Collision	0.0263	0.0280	0.0017	0.0197
Left Turn	0.0723	0.0839	0.0116	0.0221
Right Turn	0.0000	0.0000	0.0000	0.0695

HCS7 Two-Way Stop-Control Report

General Information				Site Information			
Analyst	HNR			Intersection	ALL-SR 117 & Kemp Road		
Agency/Co.	ODOT District 1			Jurisdiction	Allen County		
Date Performed	8/2/2024			East/West Street	SR 117		
Analysis Year	2024			North/South Street	Kemp Road		
Time Analyzed	AM Peak (7:00-8:00)			Peak Hour Factor	0.92		
Intersection Orientation	East-West			Analysis Time Period (hrs)	0.25		
Project Description	Existing Conditions						

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Movement	1U	1	2	3	4U	4	5	6	7	8	9		10	11	12	
Priority																
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)		2	213	4		2	90	1		3	15	11		6	15	2
Percent Heavy Vehicles (%)		0				0				0	0	0		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)		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

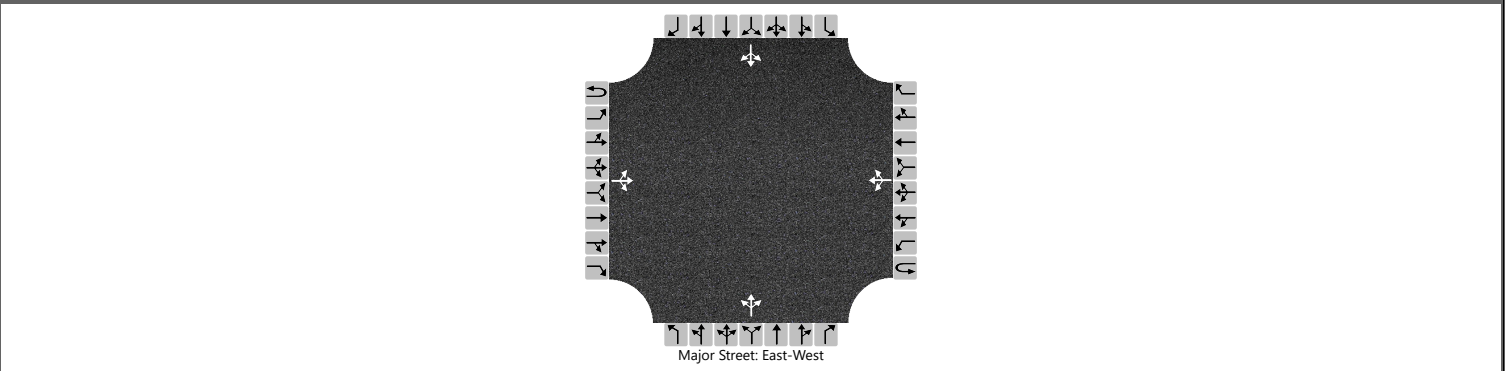
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		2				2				32				25		
Capacity, c (veh/h)		1507				1343				653				602		
v/c Ratio		0.00				0.00				0.05				0.04		
95% Queue Length, Q ₉₅ (veh)		0.0				0.0				0.2				0.1		
Control Delay (s/veh)		7.4				7.7				10.8				11.2		
Level of Service (LOS)		A				A				B				B		
Approach Delay (s/veh)	0.1				0.2				10.8				11.2			
Approach LOS									B				B			

HCS7 Two-Way Stop-Control Report

General Information				Site Information			
Analyst	HNR			Intersection	ALL-SR 117 & Kemp Road		
Agency/Co.	ODOT District 1			Jurisdiction	Allen County		
Date Performed	8/2/2024			East/West Street	SR 117		
Analysis Year	2024			North/South Street	Kemp Road		
Time Analyzed	PM Peak (4:15-5:15)			Peak Hour Factor	0.92		
Intersection Orientation	East-West			Analysis Time Period (hrs)	0.25		
Project Description	Existing Conditions						

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Movement	1U	1	2	3	4U	4	5	6	7	8	9		10	11	12	
Priority																
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)		4	188	5		14	228	3		5	20	5		4	13	5
Percent Heavy Vehicles (%)		0				0				0	0	0		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)		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

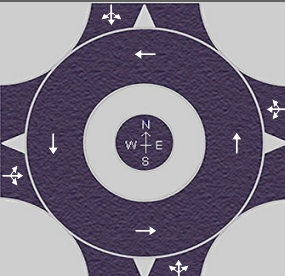
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		4				15				33				24		
Capacity, c (veh/h)		1326				1373				505				513		
v/c Ratio		0.00				0.01				0.06				0.05		
95% Queue Length, Q ₉₅ (veh)		0.0				0.0				0.2				0.1		
Control Delay (s/veh)		7.7				7.7				12.6				12.4		
Level of Service (LOS)		A				A				B				B		
Approach Delay (s/veh)	0.2				0.5				12.6				12.4			
Approach LOS									B				B			

HCS7 Roundabouts Report

General Information

Site Information

Analyst	HNR		Intersection	ALL-SR 117 & Kemp Road
Agency or Co.	ODOT District 1		E/W Street Name	SR 117
Date Performed	8/2/2024		N/S Street Name	Kemp
Analysis Year	2024		Analysis Time Period (hrs)	0.25
Time Analyzed	AM Peak (7:00-8:00)		Peak Hour Factor	0.92
Project Description	Roundabout		Jurisdiction	Allen County

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
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	2	213	4	0	2	90	1	0	3	15	11	0	6	15	2
Percent Heavy Vehicles, %	0	0	1	0	0	0	9	0	0	0	0	0	0	0	0	0
Flow Rate (v _{PCE}), pc/h	0	2	234	4	0	2	107	1	0	3	16	12	0	7	16	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		
	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		
	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v _e), pc/h		240			110			31			25	
Entry Volume, veh/h		238			101			31			25	
Circulating Flow (v _c), pc/h	25			21			243			112		
Exiting Flow (v _{ex}), pc/h	253			112			19			22		
Capacity (C _{PCE}), pc/h		1345			1351			1077			1231	
Capacity (c), veh/h		1332			1242			1077			1231	
v/c Ratio (x)		0.18			0.08			0.03			0.02	

Delay and Level of Service

Approach	EB			WB			NB			SB		
	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		4.2			3.6			3.6			3.1	
Lane LOS		A			A			A			A	
95% Queue, veh		0.6			0.3			0.1			0.1	
Approach Delay, s/veh	4.2			3.6			3.6			3.1		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh LOS	3.9						A					

HCS7 Roundabouts Report

General Information

Site Information

Analyst	HNR		Intersection	ALL-SR 117 & Kemp Road
Agency or Co.	ODOT District 1		E/W Street Name	SR 117
Date Performed	8/2/2024		N/S Street Name	Kemp
Analysis Year	2024		Analysis Time Period (hrs)	0.25
Time Analyzed	PM Peak (4:15-5:15)		Peak Hour Factor	0.92
Project Description	Roundabout		Jurisdiction	Allen County

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Movement																
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	4	188	5	0	14	228	3	0	5	20	5	0	4	13	5
Percent Heavy Vehicles, %	0	0	4	0	0	0	1	0	0	0	0	0	0	0	0	0
Flow Rate (v _{PCE}), pc/h	0	4	213	5	0	15	250	3	0	5	22	5	0	4	14	5
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		
	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		
	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v _e), pc/h		222			268			32			23	
Entry Volume, veh/h		214			266			32			23	
Circulating Flow (v _c), pc/h	33			31			221			270		
Exiting Flow (v _{ex}), pc/h	222			260			29			34		
Capacity (C _{PCE}), pc/h		1334			1337			1101			1048	
Capacity (c), veh/h		1285			1325			1101			1048	
v/c Ratio (x)		0.17			0.20			0.03			0.02	

Delay and Level of Service

Approach	EB			WB			NB			SB		
	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		4.2			4.4			3.5			3.6	
Lane LOS		A			A			A			A	
95% Queue, veh		0.6			0.7			0.1			0.1	
Approach Delay, s/veh	4.2			4.4			3.5			3.6		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh LOS	4.2						A					