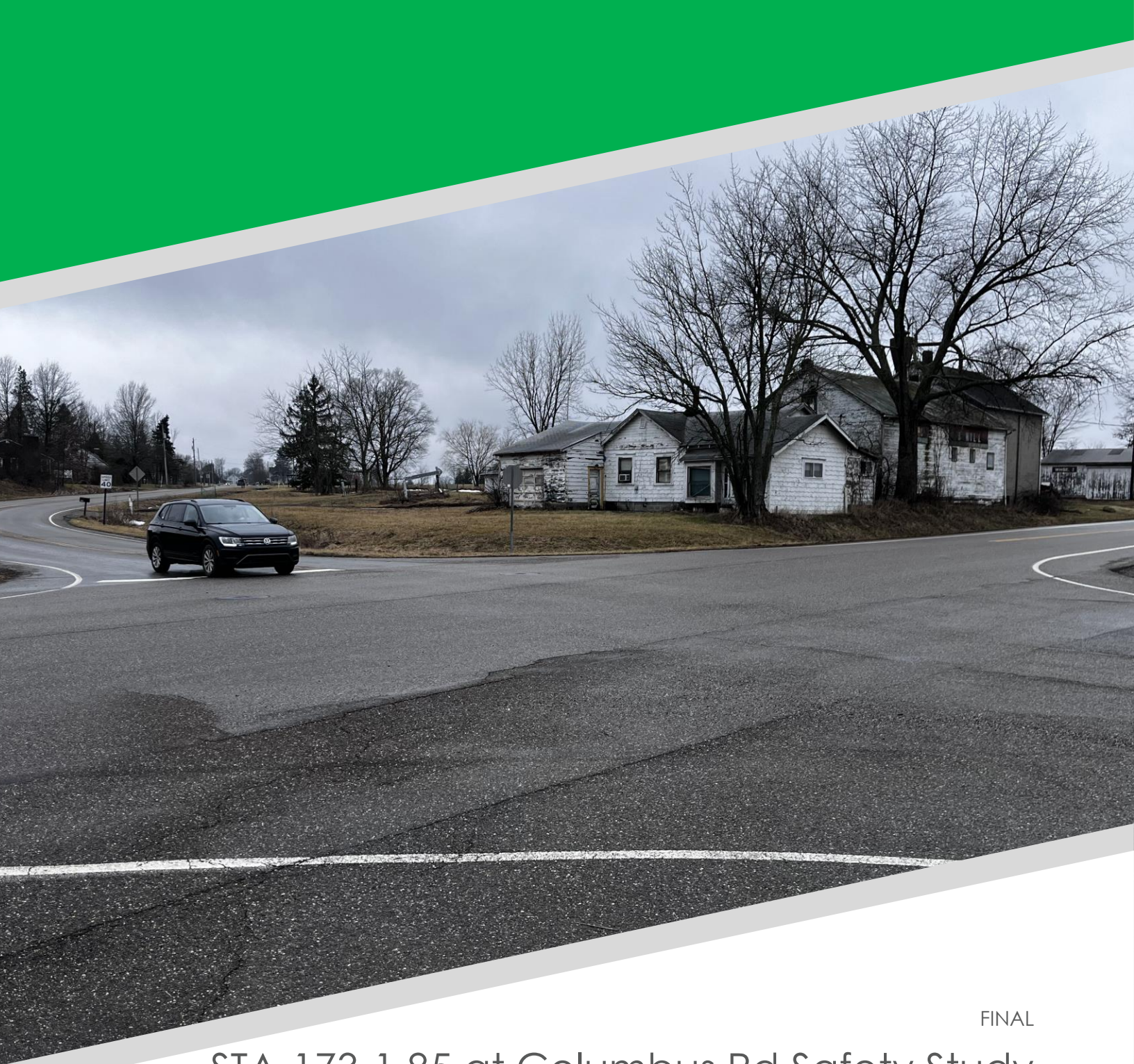




FINAL

STA-173-1.85 at Columbus Rd Safety Study

#186 Rural Intersection | 2025 ODOT HSIP Priority List

#115 Rural Intersection | 2024 ODOT HSIP Priority List

Ohio Department of Transportation District 4

July 25, 2025



Department of
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July 25, 2025

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**Department of
Transportation**





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1 Executive Summary

1.1 Background

The Ohio Department of Transportation (ODOT) retained Woolpert to conduct a formal safety study at the intersection of State Route 173 (SR 173, also known as State St) and Columbus Rd in Stark County on the border of Nimishillen and Marlboro Townships. The study intersection is a two-way stop controlled (TWSC) intersection with minor road stop control on Columbus Rd.

From 2019 through 2023 there were 18 crashes at the intersection, including nine injury crashes. There were no fatalities during the crash data period, but there were three serious injuries. The crash pattern is reflective of a high-speed rural intersection where drivers are incorrectly judging available gaps when joining or crossing SR 173 from Columbus Rd.

1.2 Purpose and Need

The study intersection ranked as the #115 Rural Intersection (2024) and #186 Rural Intersection (2025) on ODOT's Highway Safety Improvement Program priority list. Given the high proportion of injury crashes at this intersection, the purpose of this study is to analyze existing conditions, evaluate possible causes behind the crash pattern, and recommend countermeasures to address safety and movement through the intersection.

1.3 Overview of Possible Causes

The observed crash pattern is primarily Failure to Yield, with vehicles from Columbus Rd incorrectly judging gaps when entering or crossing SR 173 and being struck by vehicles on SR 173. There was no evidence of environmental or roadway condition factors in the crash data, nor was there a significant number of single vehicle crashes or crashes caused by driver inebriation or distraction.

1.4 Recommended Countermeasures & Related Costs

Woolpert evaluated short-, medium-, and long-term countermeasures to address safety and movement through the study intersection. Based on this analysis, Woolpert recommends the following:

Short-Term Countermeasures

- Replace existing intersection signage with new signage in-kind
- Remove existing pavement in the southeast quadrant to deter cut-through movements from northbound Columbus Rd to eastbound SR 173
- Mitigate vegetation growth on the north leg/southbound approach to maintain good approach sight distance

Long Term Countermeasures

- Convert existing TWSC intersection to 1x1 roundabout with 140 ft ICD

2 Existing Conditions Analysis

The study area (Figure 1) includes the intersection of State Route 173 (SR 173, also known as State St) and Columbus Rd in Stark County situated on the border of Nimishillen and Marlboro Townships. The study intersection is currently two-way stop controlled (TWSC) with stop control for the Columbus Rd approaches.



Figure 1 - Study Area

2.1 Corridor Characteristics

The study area is generally rural/agricultural in land use. Residential and agricultural structures are present in the southwest and southeast quadrants of the intersection, and an equipment auction facility is present in the northeast quadrant of the intersection. The northwest quadrant of the intersection is currently open field land. SR 173 is a two-lane Major Collector that runs primarily east/west through study area. No speed limit signs are present at or in the vicinity of the intersection, however the statutory speed limit for highways outside of municipal corporations is 55 MPH. SR 173 lane widths are approximately 12 ft in each direction with paved shoulders varying between 4 and 6 ft.

The Marlinton Local School District, which covers students north of SR 173 has a campus located at the intersection of Beeson St (CR 41) and Moulin Ave NE (TR 27), approximately 2.5 miles northeast of the study intersection. South of SR 173, students attend the Louisville City School District.

Columbus Rd is a two-lane Minor Collector that approaches the intersection on a northeast/southwest alignment but crosses SR 173 at nearly 90 degrees. South of the study intersection, signs are posted for a 40 MPH speed limit, but no speed limit signs exist north of the intersection. ODOT's Transportation Information Mapping System (TIMS) platform indicates a 40 MPH posted speed limit on both approaches of Columbus Rd. There are no turn lanes on any approach to the intersection, however a mixed dirt/gravel area is present in the southeast quadrant (Figure 2) with some evidence of use as a right turn bypass lane and/or driveway access. The gravel area is occasionally utilized for overflow parking and pedestrian access to the auction facility in the northeast quadrant. Columbus Rd lane widths are approximately 12 ft in each direction with paved shoulders varying between 2 and 6 ft.



Figure 2 - Southeast Quadrant Gravel Area

2.2 Utilities and Topography

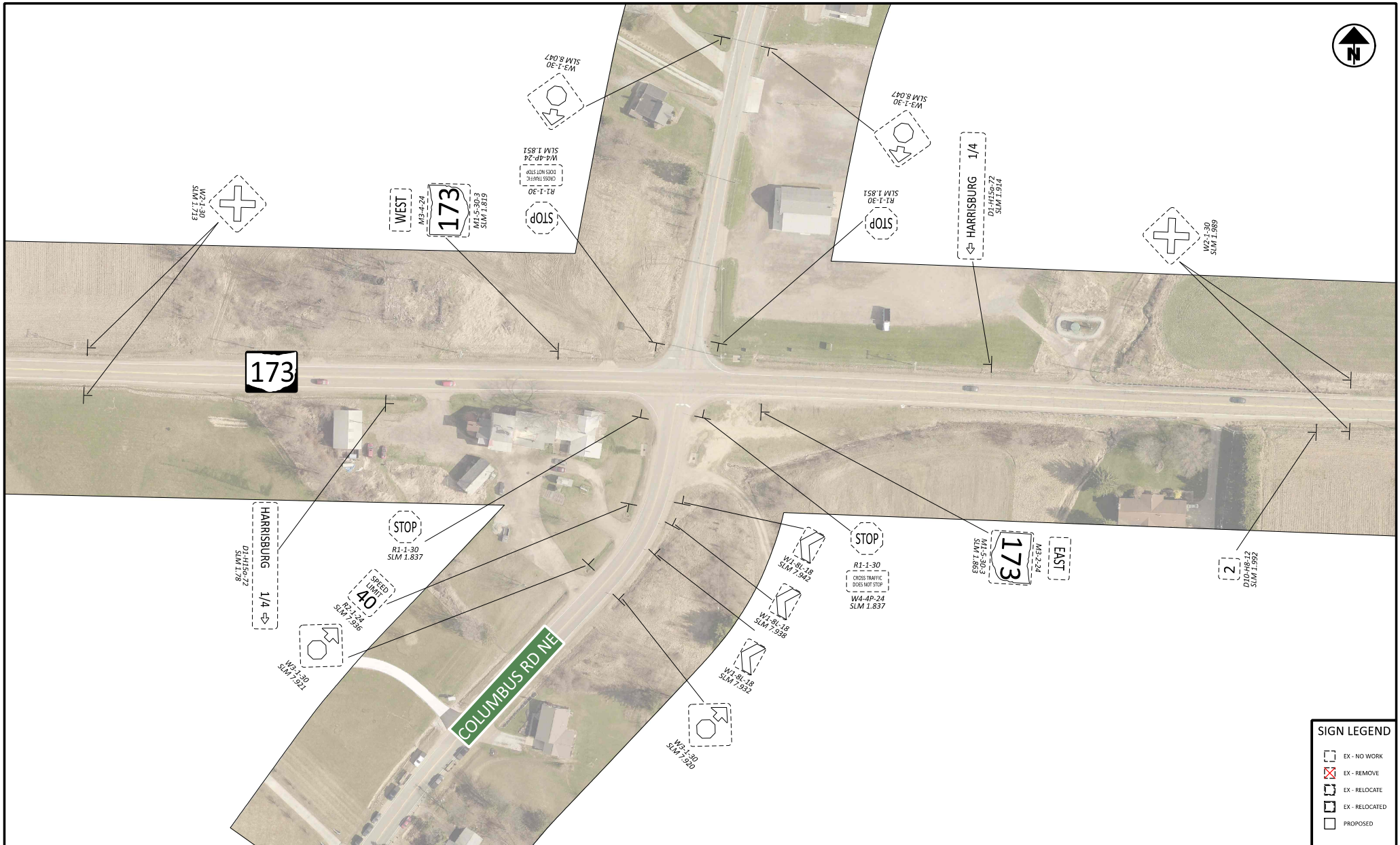
Field Observations, conducted on Thursday February 6, 2025 revealed buried fiber optic cable in the northeast quadrant along with a telecom pull box. Visual inspection also revealed underground drainage facilities, including large catch basins and underground drainage piping in all four quadrants of the intersection. Roadway drainage on the approach mainlines is carried in ditches.

A pole line exists on the north side of SR 173 proceeding east/west through the study area. The pole line carries electric and telecom utilities and services structures on both sides of SR 173. North of the intersection, a pole line carrying telecom utilities runs on the west side of Columbus Rd, and an additional pole line carrying electric and telecom utilities runs on the east side of the road. There are no overhead utilities south of the intersection within the study area. Lighting is not present at the intersection.

The intersection is situated on sloping terrain with SR 173 on a tangent grade rising from east to west. Columbus Rd through the intersection forms a sag vertical curve with the low point approximately at the center of the intersection.

2.3 Signing and Marking

Dual W2-1 Intersection Ahead warning signage is posted on both the eastbound and westbound SR 173 approaches to the study intersection. Dual W3-1 Stop Ahead warning signage is placed approximately 250 ft from the intersection on the northbound approach of Columbus Rd, and 385 ft from the intersection on the southbound approach (see Existing Condition Diagram on the following page).



SIGN LEGEND

- EX - NO WORK
- EX - REMOVE
- EX - RELOCATE
- EX - RELOCATED
- PROPOSED



The current placement distances do not conform to the Ohio Manual on Uniform Traffic Control Devices (OMUTCD), which recommends an advance placement distance for W3-1 signs of 125 ft from the stop bar for 40 MPH posted speeds (OMUTCD Table 2C-4).

Current guidance in the 11th Edition of the Manual on Uniform Traffic Control Devices (MUTCD Table 2C-3) recommends an advance placement distance for W3-1 signs of 305 ft from the stop bar for 40 MPH posted speeds. Based on either manual, existing W3-1 signs are not placed in accordance with the recommended advance placement distance per the posted speed limits. The 11th Edition of the MUTCD is effective as of January 2024, ODOT plans to fully transition to the federal MUTCD with an Ohio supplement by January of 2026.

Three W1-8 Chevron warning signs are present for the northbound direction only in the horizontal curvature located approximately 200 ft south of the intersection. All intersection warning and regulatory signs have reflective strips of the appropriate color attached to their posts. The near side Stop signs at the intersection both have W4-4P “Cross Traffic Does Not Stop” plaques installed.

Woolpert could not fully determine the age of existing signage as markings for installed dates were either not present or worn beyond recognition. Stickers on several existing signs date back to an original installation date in the year 2004, corresponding with the 2004 intersection realignment (ODOT PID 22417). Overall, during clear conditions, existing signs were visible with legends and sign colors in good condition.

Existing markings consist of double-yellow centerline markings on all four approaches and stop bar markings on the Columbus Rd approaches at the intersection. Both Columbus Rd stop bars are located beyond the Stop signs by approximately 5-10 feet. White edge lines are present for all lanes of travel and applied appropriately.

2.4 Sight Distance

ODOT District 4 conducted a sight distance survey of the intersection on Wednesday February 26, 2025 to evaluate stopping sight distance (SSD) and intersection sight distance (ISD) at the study intersection. ODOT Location and Design Manual (L&D) Volume 1 Figure 201-5 sets a minimum standard for SSD and ISD at intersections by design speed. Design speed for the study intersection is 60 MPH, based on a mainline speed limit of 55 MPH. The minimum standard SSD for 60 MPH design speed conditions is 570 ft, and the minimum standard ISD is 665 ft for left turns from a stop and 575 ft for right turns from a stop or crossover maneuvers.

ODOT measured an SSD of 1,050 ft for the eastbound approach on SR 173 and 1,320 ft for the westbound approach on SR 173. The minimum left turn ISD was 630 ft, on the northbound approach of Columbus Rd for a driver offset 18 ft from the westbound edge line, roughly representing a vehicle stopped at the northbound stop bar. The minimum right turn/crossover ISD was 1,060 ft on the southbound approach of Columbus Rd for a driver offset 18 ft from the eastbound edge line. Improved sight distance values were achieved at smaller offsets, representing a vehicle getting closer to the intersection relative to the stop bar without entering opposing traffic.

There is existing vegetation along the east side of Columbus Rd on the north leg (southbound approach) that can obscure parts of the approaching intersection. There were no crash patterns associated with the vegetation growth, but future efforts to mitigate vegetation growth are warranted to maintain appropriate sight distance on all approaches to the intersection.

Overall, all approaches meet minimum standards for both SSD and ISD. The complete sight distance report is presented in **Appendix A** along with an Existing Conditions Diagram.

2.5 Traffic Counts

ODOT District 4 collected 13-hour turning movement counts at the study intersection on Wednesday September 11, 2024. The AM peak period occurred between 7:00 AM and 8:00 AM with a total of 594 vehicles passing through the intersection. The PM peak period occurred between 4:15 PM and 5:15 PM with a total of 679 vehicles passing through the intersection. The combined medium and heavy vehicle percentage was 3.9% over the entire data collection period, with peak period percentages of 2% (AM peak) and 3% (PM peak). ODOT applied a Design Hour Factor of 1.12 to develop Design Hourly Volumes (DHV) by approach for each peak period.



Woolpert used these volumes to develop design year 2049 volumes by converting 2024 design hourly volumes to 2029 Opening Year Volumes and 2049 Design Year volumes using a linear 0.5% growth rate, as provided by ODOT District 4. 2024, 2029, and 2049 volume plates are presented in **Appendix B**. The 0.5% growth rate is equivalent to the one used at the SR 173/Paris Rd intersection where a roundabout project is currently in development.

2.6 Existing Condition Capacity Analysis

Woolpert conducted Capacity Analysis for the existing TWSC condition using Highway Capacity Software (HCS) 2024 Version 8.3 following ODOT Analysis & Traffic Simulation (OATS) Manual guidance. The existing condition is defined as existing geometry and lane use and Design Hourly Volumes (DHV) based on 13-hour counts collected by ODOT District 4 on September 11, 2024.

HCS Two-Way Stop Control module was used for both the 2024 Existing AM and 2024 Existing PM analysis. HCS presents results corresponding to Highway Capacity Manual definitions for Level of Service (LOS), as shown in Table 1:

Table 1 - HCM LOS Definitions

Level of Service	Signalized (sec./veh.)	Unsignalized (sec./veh.)
A	≤ 10 sec.	≤ 10 sec.
B	10-20 sec.	10-15 sec.
C	20-35 sec.	15-25 sec.
D	35-55 sec.	25-35 sec.
E	55-80 sec.	35-50 sec.
F	> 80 sec.	> 50 sec.

Table 2 presents HCS LOS and Delay results for the existing condition. Delay is not reported for the SR 173 mainline as there is no stop control for these movements, and therefore no significant control delay.

Table 2 - 2024 Existing HCS TWSC LOS Results

SR 173 at Columbus Rd Movement	2024 Existing AM Peak		2024 Existing PM Peak	
	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)
NB	B	14.0	C	16.9
SB	C	15.4	C	18.5

The existing intersection operates at an acceptable LOS during both the 2024 Existing AM and PM peak periods. Field observations did not note any significant capacity or operational concerns for any movement at the intersection. A notable movement pair is present between the northbound right and westbound left movements, but this does not significantly impact overall operations at the intersection.

2.7 Special Events

A large auction facility occupies the northeast quadrant of the intersection. Woolpert did not observe activity at this facility during a weekday field review, but a review of available historic aerial imagery identified an event in 2012 showing a large attendance at an auction event (Figure 3). Adjacent fields (not owned by the auction facility), and the shoulders of both Columbus Rd and SR 173 were used as parking areas for this event with apparent heavy pedestrian use as well. This is likely a larger than normal event but shows how the auction facility may impact usage of the intersection and adjacent properties. Web research indicates that the auction facility hosts monthly auctions of construction, agricultural, and personal vehicles typically on Fridays or Saturdays throughout the year.



Figure 3 - Large Scale Event at Auction Facility (Google Earth, 2012 Imagery)

3 Summary of Previous Studies

The intersection was last studied by ODOT in 1998 as HSP #140 when Columbus Rd (CR 67) formed a horizontal curve through the intersection (Figure 4), favoring the NB to EB/WB to SB paired movement. A stop-controlled intersection was present immediately adjacent to this curvature. Eastbound SR 173 jogged through the previous alignment, requiring a left turn in the curvature to continue eastbound on SR 173. The study recommended realigning the roadway to its current configuration which was constructed in 2004 as STA-173-1.85 (ODOT PID 22417). The proposed 2004 geometry required design exceptions for Stopping Sight Distance, Superelevation, and Horizontal Alignment. An existing condition diagram and list of design exceptions from the 1998 HSP study is included in **Appendix A**.

Based on historical imagery review, between 2011-2015, a worn-in section of the southeast quadrant of the intersection appeared as an apparent cut-through or shortcut for the northbound right turn movement. This cut-through (reference the southeast quadrant in Figure 1), loosely matches the original alignment of the roadway circa 2003 (below).

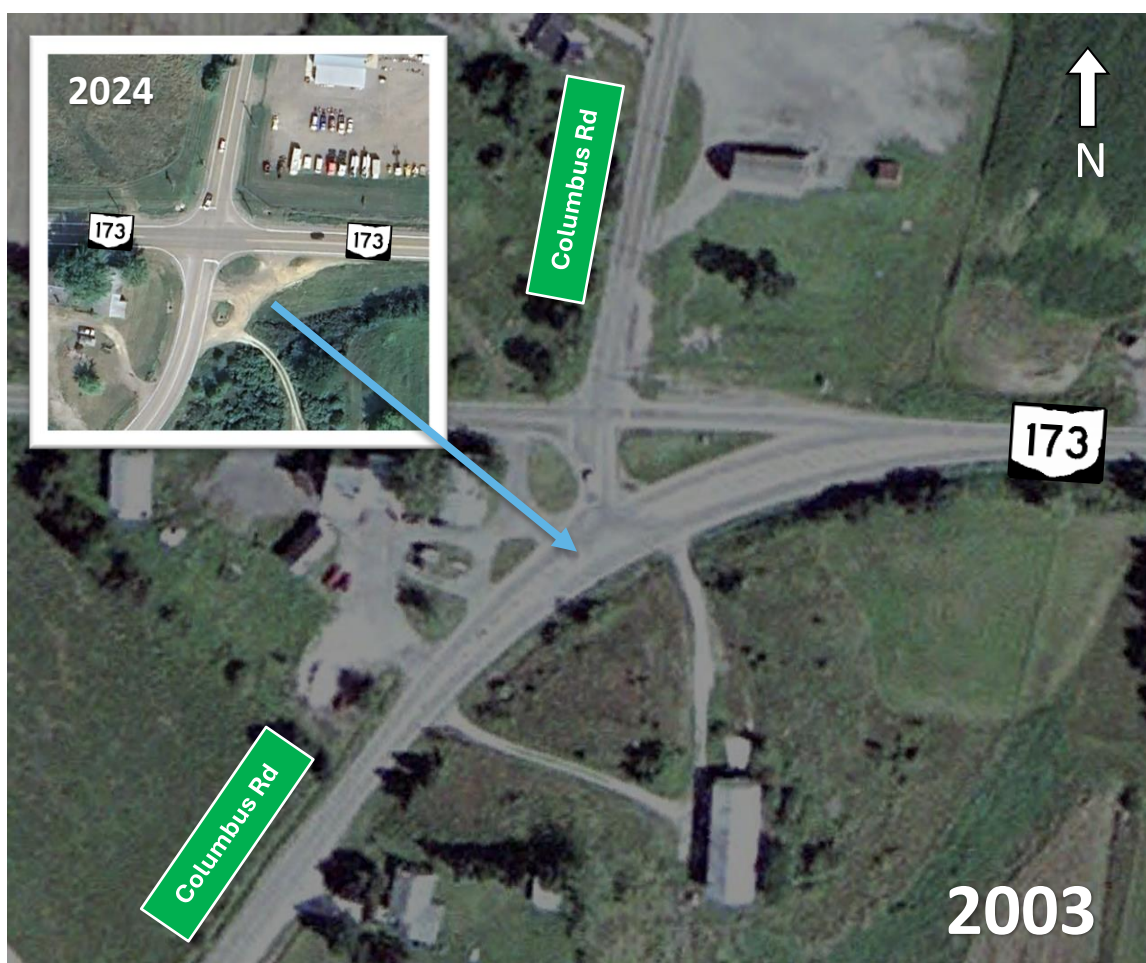


Figure 4 - Previous Geometry at Study Intersection, c.2003 (Google Earth Historical Imagery)

4 Crash Data Analysis

Woolpert obtained crash data and a collision diagram of the intersection from ODOT District 4 for the 2019-2023 crash years. There were 18 crashes at the intersection during the crash data collection period, including nine injury crashes (all of the “angle” crash type) resulting in three serious injuries. There were no fatal crashes during the crash data period, with the last known fatal crash occurring in 2017 involving a northbound motorist hitting a fixed object on the north side of the intersection at high speed. Crash frequency has increased over the data collection period, from an average of two crashes per year from 2019-2021 to six crashes per year from 2022-2023.

Table 3 and Figure 5 presents an overview of the intersection crash data and important crash data trends. Complete crash data is presented in **Appendix C**, a collision diagram is shown on the following page and in **Appendix D**. Historical crash diagrams are also shown in **Appendix D**, which shows a continued pattern of angle crashes despite the previous roadway alignment improvement and recent short-term, low-cost improvements.

Table 3 - Crash Data Summary

Crash Type	Frequency	%
Angle	12	66.67%
Rear End	4	22.22%
Fixed Object	2	11.11%
Grand Total	18	100.00%

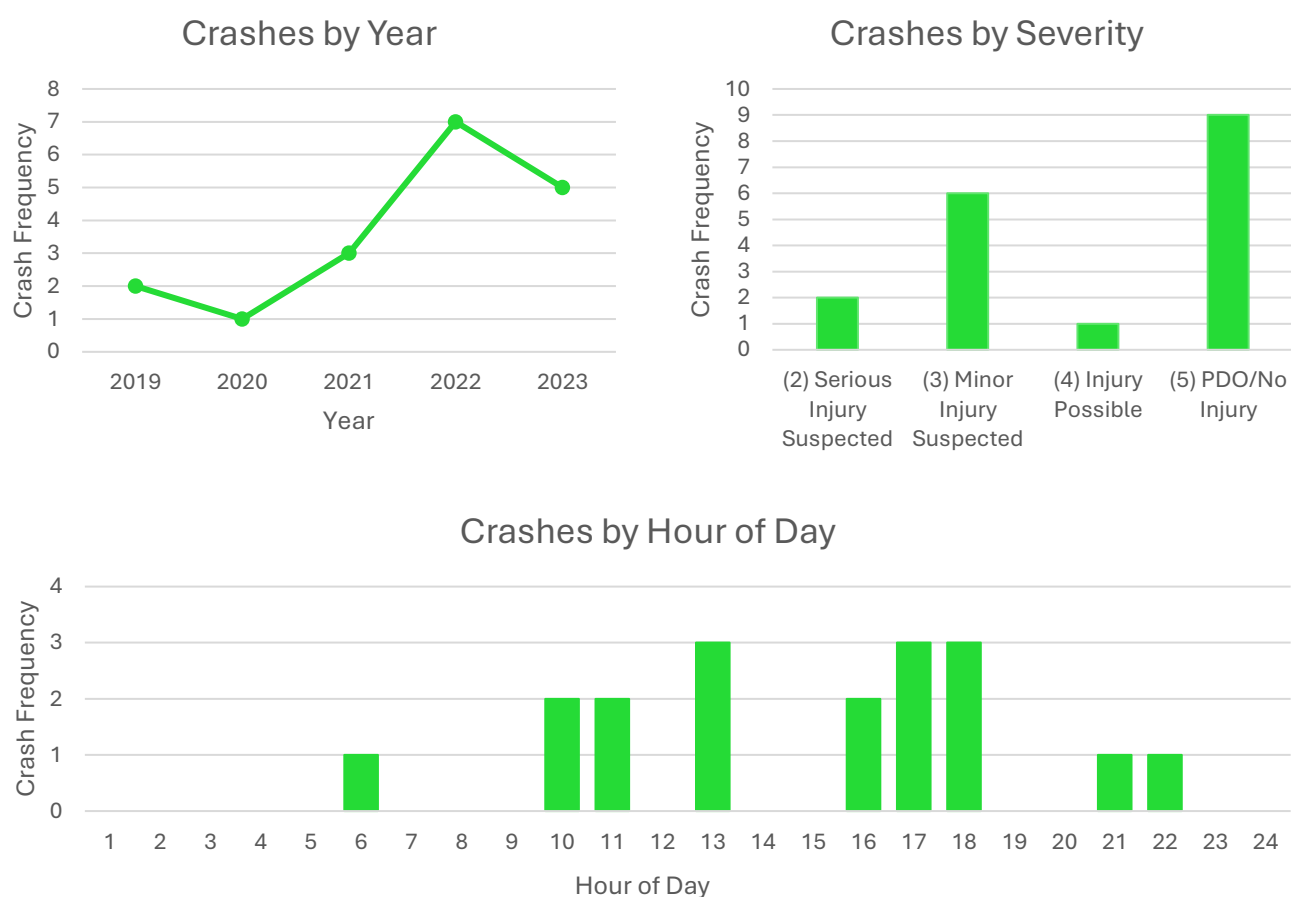
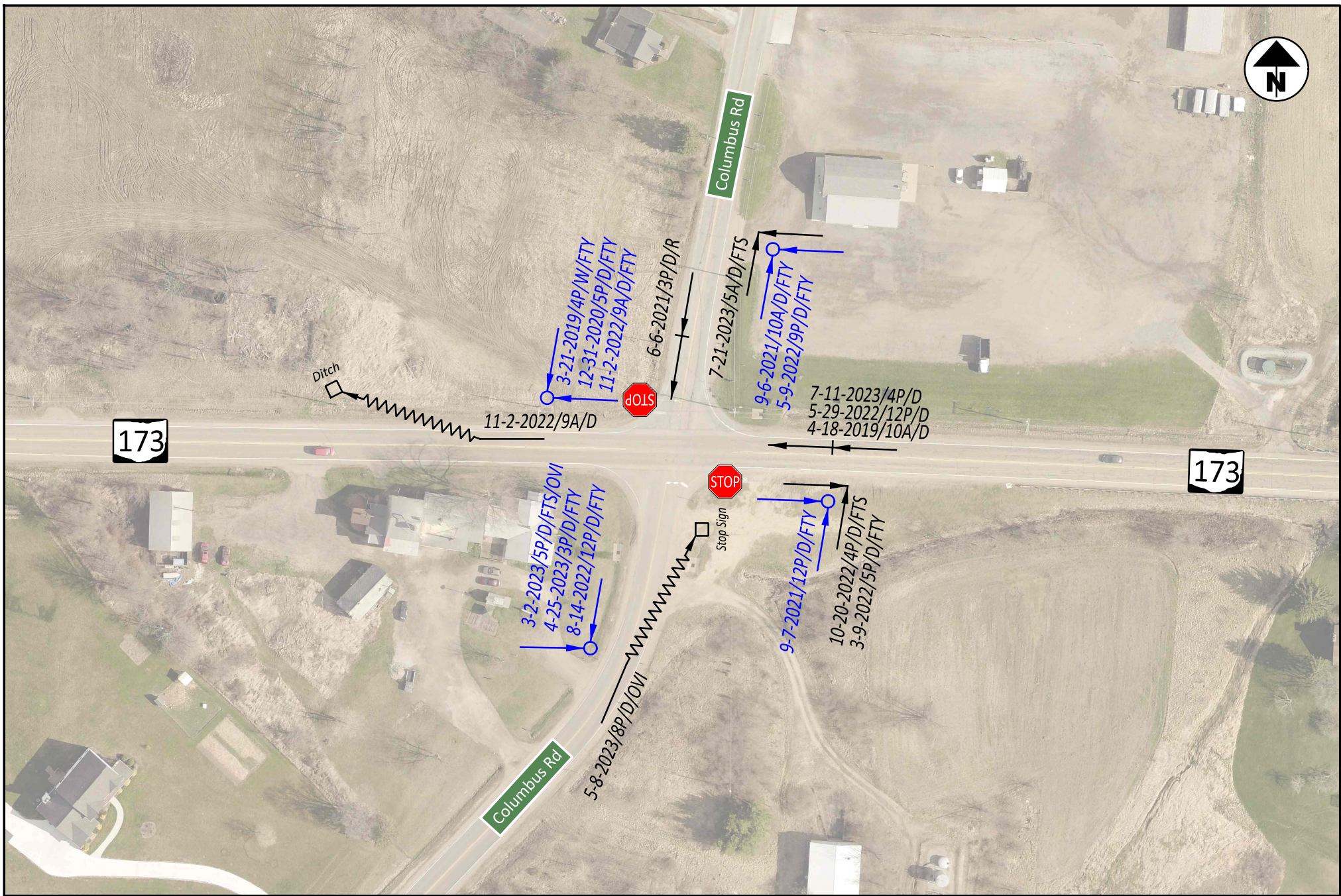


Figure 5 - Crash Data Summary



→ Vehicle Direction ↔ Backing *** Pedestrian ~ Out of Control o Overturn	○ Injury ● Fatal □ Fixed Object ⊠ Parked Vehicle TEXT Collision Information	Road Condition: D - Dry W - Wet S - Snow I - Ice	FTY - Failure to Yield FTS - Failure to Stop FTC - Failure to Control LOC - Left of Center RRL - Ran Red Light OVI - Operating Vehicle Impaired	TOTAL CRASHES ON PAGE <table border="1" style="width: 100%;"> <tr> <th>FREQUENCY</th> <th>SEVERITY</th> </tr> <tr> <td>2 2019</td> <td>9 NON-INJURY</td> </tr> <tr> <td>1 2020</td> <td>9 INJURY/FATAL</td> </tr> <tr> <td>3 2021</td> <td></td> </tr> <tr> <td>7 2022</td> <td></td> </tr> <tr> <td>5 2023</td> <td>18 TOTAL</td> </tr> </table>	FREQUENCY	SEVERITY	2 2019	9 NON-INJURY	1 2020	9 INJURY/FATAL	3 2021		7 2022		5 2023	18 TOTAL		COLLISION DIAGRAM STA SR173 AT Columbus (CR67A) SLM 1.85 2019-2023
FREQUENCY	SEVERITY																	
2 2019	9 NON-INJURY																	
1 2020	9 INJURY/FATAL																	
3 2021																		
7 2022																		
5 2023	18 TOTAL																	



4.1 Summary of Crash Patterns

Angle crashes are the predominant crash type (66.67%) at the study intersection by a significant margin and accounted for all nine injury crashes from 2019-2023. For Angle crashes, Failure to Yield (eight crashes) was the predominant contributing factor followed by Ran Stop Sign (two crashes). Rear End crashes accounted for four of the 18 crashes during the crash data period, with three of the four occurring on the westbound approach to the intersection, with Failure to Assure Clear Distance Ahead as the primary contributing factor in these crashes.

The overwhelming majority of crashes occurred in clear or cloudy conditions (88.89%) on dry pavements (94.4%). While roadway lighting is not present at the intersection, only two crashes (11.11%) occurred in dark conditions, including one angle crash and one run off road crash (drug/alcohol related). Overall, environmental conditions did not play a major factor in the overall crash pattern at the study intersection.

The overall crash pattern is reflective of a rural TWSC intersection where drivers are misjudging the gaps available for movements from Columbus Rd either across SR 173 or onto SR 173. The high frequency of injury crashes at the intersection (50% of the total) is reflective of the high-speed nature of both roadways.

A review of historical crash data trends indicate that the previous realignment project did not significantly reduce the frequency or severity of the angle crash pattern at the study intersection.

4.1.1 Vulnerable Driver Populations

ODOT prioritizes safety improvements targeting younger and older driver populations as part of its Strategic Highway Safety Plan (SHSP). Both younger (ages 15-25) and older (ages 65+) drivers are more susceptible to becoming involved in a crash where higher approach speeds and changes in vertical or horizontal geometry at intersections impact their perception of gaps in oncoming traffic. Younger drivers were involved in 44.4% of all crashes (8 of 18 from 2019 to 2023), and older drivers were involved in 38.9% of all crashes (7 of 18 from 2019 to 2023). Overall, 10 of the 12 angle crashes at the study intersection from 2019 to 2023 involved either a younger driver, and older driver, or both.

4.1.2 Vehicle Speed Study

ODOT District 4 conducted a Speed Study on SR 173 at the study intersection on June 11, 2025 from 9:30 AM to 10:30 AM. The study observed 100 vehicles in both the eastbound and westbound directions, including eight trucks in both directions. Table 4 presents high level results from the Speed Study with detailed results presented in **Appendix A**.

Table 4 - High Level Speed Study Results (June 2025)

Study Result	Eastbound SR 173	Westbound SR 173
85th Percentile Speed	58 MPH	60 MPH
10 MPH Pace	47 – 56 MPH	51 – 60 MPH
Range of Speeds	34 – 70 MPH	44 – 62 MPH
Median Speed	51.9 MPH	54.0 MPH

A crest vertical curve is present west of the intersection which may help explain the slightly lower speeds observed for eastbound traffic vs. westbound traffic.

4.2 Potential for Safety Improvement

Compared to similar rural four-leg TWSC intersections in Ohio, the frequency of injury crashes at the study intersection (50%) exceeds the statewide average (36.25%), and the frequency of angle crashes also significantly exceeds the statewide average for rural four-leg TWSC intersections. Woolpert conducted an Economic Crash Analysis Tool (ECAT) analysis of the existing condition to determine the potential for safety improvement at the study intersection using Highway Safety Manual (HSM) methodology.

The ECAT analysis indicates that the study location has a higher expected average crash frequency than the predicted average crash frequency, indicating that compared to sites of similar physical geometric characteristics, the study intersection sees more crashes than would be predicted by geometry alone. The difference between expected and predicted is known as the potential for safety improvement. Figure 6 presents ECAT analysis results including potential for safety improvement at the study intersection.

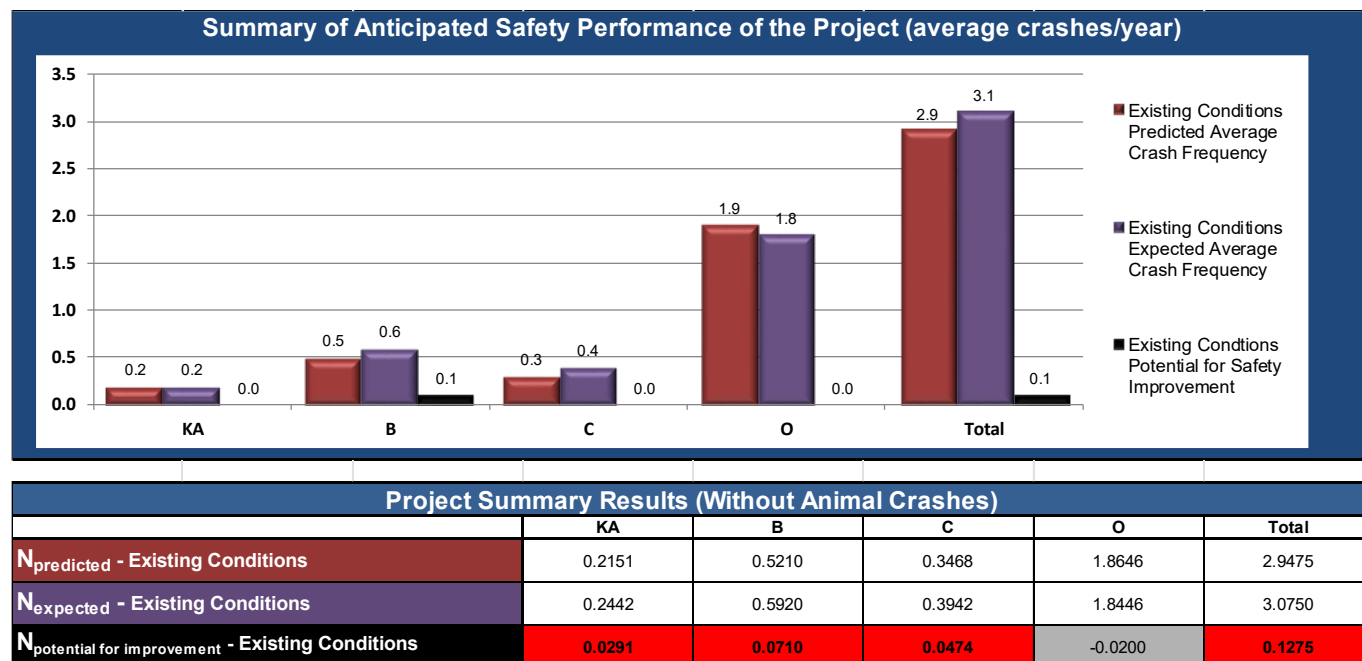


Figure 6 - ECAT Existing Analysis and Potential for Safety Improvement

4.3 Discussion of Potential Countermeasures

Given a positive potential for safety improvement, and a high proportion of injury crashes at the study intersection, safety focused countermeasures are warranted. Safety countermeasures come in short-, medium-, and long-term varieties, generally increasing in cost and project complexity, from simple improvements like signs to physical improvements like intersection reconstructions.

The crash pattern indicates that gap awareness is a primary contributing factor in nearly all the high-speed, high-severity angle crashes. Table 5 presents a series of short-, medium-, and long-term countermeasures that address the existing crash pattern and that warrant further analysis.



Table 5 - Discussion of Potential Countermeasures

Countermeasure	Timeline	Benefits	Drawbacks	Applicability
Intersection Ahead Signage (Major + Minor Roadway)	Short	Increased driver awareness and visibility of intersection	Potential for sign clutter	Signage already exists, improvement would only replace existing with new
LED Enhanced STOP signs on Minor Roadway	Short	Increased visibility of STOP signage on Columbus Rd	Maintenance, requires solar energy and can be impacted by clouds/snow	Typically used where stop sign running is common
Intersection Conflict Warning System (ICWS)	Medium	Increases major roadway awareness of vehicles that may potentially enter the roadway	Limited driver familiarity with ICWS in Ohio	Typical at high speed, rural intersections in other States (such as MN)
Partial/Full Side Street Closure with Traffic Redirection	Medium	Reduces angle crashes by restricting the number of vehicles accessing mainline SR 173 from Columbus Rd	Significant property access impacts Significant property acquisition impacts where cul-de-sacs are employed for turnarounds Requires traffic redistribution onto adjacent local streets which would likely intersection improvements elsewhere	Typically applied on rural freeway lookalike sections
All Way Stop Control (AWCS)	Medium	Improves safety by requiring all vehicles approaching the intersection to stop	Decreased efficiency for the state route approaches that are currently free flow	Typically at rural intersections with high angle crash frequencies and lower volumes
Signalization	Medium	Explicitly defined right of way assignment for approaching motorists	Can be inefficient if unwarranted	Typical for busy rural intersections where a roundabout may be less favorable
Signalization with Turn Lanes	Long	Explicitly defined right of way assignment for approaching motorists Turn lanes mitigate turning vehicles blocking through vehicle movements	Turn lanes increase intersection footprint and may cause utility/property impacts	Typical in suburban/exurban applications
Single Lane Roundabout	Long	Uses geometry to slow all approaching vehicles down to acceptable circulatory speed which improves intersection safety Roundabouts provide traffic calming effects by reducing approach speeds	Larger footprint than signalized intersections Public acceptance and driver familiarity can be a challenge when few adjacent roundabouts are present	Typical for lower volume rural intersections with high frequencies of angle crashes
Alternative Intersection Configurations	Planning Level	Alternative geometries including right-in, right-out only (RIRO) access from Columbus Rd would reduce the number of angle crashes involving left turns or thru movements from Columbus Rd	Requires traffic redistribution onto adjacent local streets RIRO would be significantly impactful for existing WB to SB movement.	RIRO is typically employed at commercial driveways or lower volume rural side streets with very high angle crash frequencies

5 Countermeasure Evaluation

5.1 Short/Medium-Term Countermeasure Evaluation

Signing and Marking

The study area is signed and marked appropriately for the existing condition. Dual W3-1 Stop Ahead signage is installed on both Columbus Rd approaches and meets OMUTCD standards in effect when the signs were installed. Dual W2-1 Intersection Ahead signage is present on both SR 173 approaches clearly indicating the presence of an approaching intersection.

The placement and reflective qualities of the signing and marking did not factor into the crash pattern observed at the study intersection, where most crashes occurred in daylight conditions in clear or cloudy weather, and where the primary contributing factor was failure to yield due to misjudged gap spacing. That said, field observations indicated that several of the signs had exceeded their ten-year service life by a significant margin.

In the short-term, supplementing existing R1-1 STOP signs and W2-1 intersection ahead signage with solar powered LEDs may increase the visibility of these signs and increase driver awareness of the approaching intersection and the need to proceed with caution through the intersection. However, given that most crashes occurred due to a vehicle on Columbus Rd coming to a stop and then failing to yield to an approaching vehicle, LED enhanced stop signs may not significantly reduce crashes caused by this condition. In addition, the study intersection does not meet the minimum installation criteria for LED enhanced stop signs per TEM 201-3.3, which requires a minimum of nine or more “Ran Stop Sign” crashes over a three-year period. Only three crashes were coded by responding law enforcement officers as “Ran Stop Sign” during the five-year crash data period.

Intersection Conflict Warning System

An intersection conflict warning system (ICWS) uses detection technology to present information to drivers on both the major and minor approaches to a TWSC intersection relating to potential vehicle/vehicle conflicts. Several states across the country use these systems to alert vehicles on the major street that a vehicle is stopped at or approaching the intersection on the minor street approached, and conversely, to alert vehicles on the minor street that a vehicle on the major street is approaching. An ICWS is not a signal in the traditional sense but provides a dynamic message to vehicles at and approaching TWSC intersections and emphasizes the need for caution when traversing high-speed intersections.

ICWS have been used in Ohio, but are not common, and have not typically yielded results in line with more successful deployments in other states such as Minnesota and Missouri. In several cases, ICWS that have been installed in Ohio were shortly thereafter replaced with other long term treatments such as traditional signalization.

Partial Closure with Traffic Redistribution

Closing one or both Columbus Rd approaches to the study intersection would reduce crashes by physically restricting vehicles from entering the intersection in a manner that could result in an angle or left turn crash. Closure of either approach would include a cul-de-sac, and redirection of traffic via adjacent streets back to SR 173. Vehicles using Columbus Rd northbound to shortcut between SR 44 and SR 173 would either need to stay on SR 44 for points north or bypass the study area entirely using Beech St NE to US 62 or other local east/west roads to access points northeast. For a southbound closure, traffic would be redirected using a variety of adjacent east/west and north/south local roadways.

In both cases, closing one or both approaches places additional traffic onto the local network initially, and further east onto the four-lane US 62 via at-grade intersections. While outside the scope of this study, these redistributions would result in both operational and maintenance impacts to both locally maintained and ODOT maintained facilities which may warrant future study. Additionally, a partial closure of the north leg would negatively impact the Marlinton Local School District by cutting off a primary access route to their facility. A north leg closure would likely also introduce significant right of way and property access impacts. A south leg closure could potentially fit within existing right of way but would negatively impact a major existing westbound to southbound and northbound to eastbound turning movement pair.

5.2 Planning Level Countermeasure Analysis

Alternative Intersection Configurations

Right-In, Right-Out (RIRO) is an alternative that would partially address existing angle crash patterns by eliminating left turn and thru movements from Columbus Rd. RIRO is less impactful than a full or partial closure but would also require traffic to be redistributed via local and state-maintained facilities adjacent to the study area. RIRO maintains the northbound to eastbound movement pair but physically restricts the westbound to southbound movement which is paired with the northbound to eastbound movement.

If maintaining all movements is preferred, but RIRO is deemed necessary, loons/bulbs for U-Turn movements could be installed alongside RIRO to create a partial or full intersection that resembles a restricted crossing U-Turn (RCUT) that is more commonly found on four lane/two lane rural intersections, but the existing vertical geometrics are not favorable for good loon/U-Turn placement. Typical design principles for RCUT style intersections calls for U-Turn movements to be placed between 600-800 ft from the main intersection. Using these dimensions, U-Turn loons/bulbs would be placed within crest vertical curvature (west leg) and sag vertical curvature (east leg).

Given that two-lane RCUT style intersections are uncommon, further planning level evaluation is warranted to evaluate the specific geometrics of this alternative, should other conventional intersection treatments be deemed infeasible.

5.3 CAP-X Evaluation

Woolpert used ODOT's Capacity Analysis for Planning of Junctions (CAP-X) Tool to evaluate proposed control for the study intersection. The following intersection configurations and control schemes were evaluated:

- All Way Stop Control (AWSC)
- Signalized Intersection with No Turn Lanes
- 1x1 Roundabout

Woolpert evaluated each configuration using design year 2049 PM volumes as the controlling volumes for all future condition capacity analysis. The CAP-X Tool uses input volumes and proposed lanes, and lane use to evaluate the volume to capacity (V/C) ratio of proposed intersection configuration and control schemes. The CAP-X tool provides a solid estimate of future condition performance to assist decision makers in the selection of long-term countermeasures for detailed analysis. Table 6 presents CAP-X Tool analysis results for the study intersection based on the controlling Design Year 2049 PM peak period volumes:

Table 6 - CAP-X 2049 PM Peak Analysis Results

Intersection Type	2049 PM Peak V/C Ratio
Traffic Signal	0.29
1x1 Roundabout	0.31
All Way Stop Control	0.80

CAP-X analysis indicates that both a traffic signal and 1x1 roundabout are effective solutions for future condition volumes from a planning level.

5.4 All Way Stop Control

All Way Stop Control (AWSC) provides the benefit of stopping all approaches to the intersection, requiring all vehicles to slow to a stop, verify whether they have the right of way to proceed, and to proceed with caution through the intersection. This reduces angle type crashes, and overall crash severity by virtue of lower speeds. The primary drawback to this alternative comes in the form of increased vehicle delays, especially for the State Route approaches, which are commonly free flow at rural intersections.



OMUTCD 2B.07 Paragraph 4 provides criteria for consideration when evaluating whether AWSC is a warranted countermeasure. Table 7 presents the criteria and how it applies to the study intersection:

Table 7 - OMUTCD AWSC Criteria Analysis

AWSC Criteria	Criteria Met?	Remarks
Criteria A: Interim measure for a warranted traffic signal	No	See Section 5.5
Criteria B: 5 or more correctable crashes in a 12-month period	Yes	
Criteria C1: 300 vehicles per hour on Major Street Approaches	No	5 of 8 Hours Met
Criteria C2: 200 or more vehicles/pedestrians/bicycles on Minor Street Approaches	No	0 of 8 Hours Met
Criteria C3: 70% Values of C1/C2 where 85th Percentile Speed is > 40 MPH	No	C1 Met at 70% (8 of 8 Hours) C2 Not Met at 70% (2 of 8 Hours)
Criteria D: 80% threshold of volumes and crash experience	No	Condition B Met Condition C2 Not Met at 80%

The only criteria satisfied is crash experience. The study area averaged 5 or more correctable crashes over a 12-month period multiple times, from September 2021 to September 2022 (5 crashes), March 2022 to March 2023 (6 Crashes), and July 2022 to July 2023 (5 crashes). OMUTCD 2B.07 notes that AWSC is typically used where the volume on all intersecting roads is “approximately equal”. At the study intersection, total volume on Columbus Rd is approximately 1/3 of the volume on SR 173, which suggests that AWSC may introduce operational concerns that could impact overall intersection safety.

Woolpert’s CAP-X analysis indicated that AWSC would increase delay at the intersection compared to less restrictive alternatives. Woolpert evaluated the 2049 AM and PM peak conditions using Highway Capacity Software (HCS2024) to validate the CAP-X analysis and to determine whether AWSC is or is not a viable alternative for the intersection from a capacity perspective. Woolpert used a 2049 analysis as it is the most conservative. Table 8 presents HCS capacity analysis results for the AWSC condition in the 2049 AM and PM peak period.

Table 8 - AWSC 2049 HCS Analysis LOS Results

SR 173 at Columbus Rd Movement	2049 AM Peak			2049 PM Peak		
	LOS	Delay (sec/veh)	95 th Queue (ft)	LOS	Delay (sec/veh)	95 th Queue (ft)
Eastbound	B	11.8	53.8	C	15.4	92.2
Westbound	B	13.7	81.9	C	15.4	92.2
Northbound	A	10.0	17.9	B	11.1	23.0
Southbound	A	10.0	15.4	B	11.0	23.0
Overall	B	12.1		B	14.3	

While the intersection operates at an acceptable LOS in both 2049 peak periods, delays are increased on the State Route approaches beyond that of the minor road approaches. The results are in line with the CAP-X analysis which suggested that alternatives such as signalization or a roundabout would produce better capacity outcomes alongside safety benefits when compared to AWSC. HCS analysis results for the AWSC condition are presented in **Appendix E**.

5.5 Signal Warrant Analysis

With signalization and conversion to a roundabout as the most favorable long-term countermeasures, Woolpert evaluated whether existing 2024 volumes warrant a traffic signal using the 8-Hour, 4-Hour, and Peak Hour traffic signal warrants as described in the OMUTCD. ODOT does not allow the use of future condition volumes in the determination of signal warrants (ODOT Traffic Engineering Manual (TEM) 402-2) and requires the use of a “right turn reduction factor” when evaluating existing intersection for new construction signal (ODOT TEM 402-5).

Woolpert used ODOT’s Traffic Signal Warrant Spreadsheet, and 13-hour traffic counts provided by ODOT District 4 in the evaluation of signal warrants. Following input of existing volumes, existing lane use, corridor speeds, and application of right turn reduction factors the warrant analysis produced the following results:

Table 9 - Signal Warrant Analysis Results

Warrant	Condition	Hours Met?	Satisfied?
Warrant 1 - Eight Hour	100%	0 of 8	No
Warrant 1 - Eight Hour	70%	0 of 8	No
Warrant 2 - Four Hour	100%	0 of 4	No
Warrant 2 - Four Hour	70%	0 of 4	No
Warrant 3 - Peak Hour	70%	N/A	No

The intersection does not meet warrants for a new construction traffic signal at the 100% condition (Warrant 1, 2) or 70% condition (Warrant 3 for Major Street Speed > 40 MPH) based on existing volumes. The intersection also fails to meet warrants for the 70% condition on Warrant 1 and 2, indicating that the intersection is not close to meeting any of the warrants required for new signal construction. While the intersection meets the crash frequency requirement of Warrant 7 (five or more crashes that could be corrected by signal control), the failure of the signal to meet the 70% warrants for Warrant 1 or 2 eliminates Warrant 7 as sufficient for signal installation, per current ODOT standards on the installation of new ODOT maintained signals. Complete signal warrant information is presented in **Appendix F**.

5.6 Access Management

The ODOT State Highway Access Management Manual (SHAMM) defines SR 173 as a Category 3 facility. The SHAMM recommends driveway spacing of approximately 495 ft for 55 MPH posted speed facilities, and to place drives as far from an intersection as physically possible. At corner properties, the manual recommends locating driveways serving these properties onto the minor street whenever possible, and to avoid placing drives on higher volume, higher speed facilities if possible.

5.7 Roundabout Capacity Analysis

Given that AWSC is unfavorable, and signalization is unwarranted, Woolpert evaluated a 1x1 roundabout as a capacity and safety solution that promotes efficient traffic movement and directly addresses high-speed, high-severity angle crashes occurring at the intersection.

Woolpert used the HCS 2024 roundabout module to evaluate 2049 AM and PM peak period capacity performance for a 1x1 roundabout without bypass lanes. While the northbound right movement is a significant portion of northbound approach volume in both peak periods, a bypass lane for this movement is not favorable geometrically as the roundabout itself is in the southeast quadrant of the intersection where the addition of a bypass lane may increase right-of-way (R/W) needs, along with impacts to existing properties. Additionally, the need to provide driveway access for the property in the southeast quadrant constrains the geometry of the roundabout.



Table 10 presents HCS 2024 capacity analysis results for a 1x1 roundabout with bypass lanes in the 2049 AM and PM peak period. LOS results are based on the unsignalized HCM values presented previously in Table 1.

Table 10 - HCS Roundabout Analysis 2049 LOS Results

SR 173 at Columbus Rd Movement	2049 AM Peak			2049 PM Peak		
	LOS	Delay (sec/veh)	95 th Queue (ft)	LOS	Delay (sec/veh)	95 th Queue (ft)
Eastbound	A	5.4	25.6	A	6.4	38.4
Westbound	A	5.8	33.3	A	6.3	38.5
Northbound	A	4.8	10.2	A	5.6	15.4
Southbound	A	5.2	10.2	A	5.4	12.8
Overall	A	5.4		A	6.1	

Given the low entry and circulatory volumes, a 1x1 roundabout operates very efficiently during the 2049 Design Year period, with very good LOS on all approaches, low 95th percentile queue lengths, and V/C ratios below 0.4 on all approaches in both design year peak periods. With no operational concern on the northbound approach, a right turn bypass lane is unwarranted based on volumes. Complete HCS analysis results for the existing and proposed condition are presented in **Appendix G**.

5.8 Roundabout Geometric Evaluation

From updated turning movements, this can be reduced even more than previous comments. No need to change now but let's keep that in mind for detail design.

Woolpert placed the roundabout in the southeast quadrant of the intersection, to minimize impacts to existing right of way, and to optimize approach geometry. Woolpert selected a 140 ft inscribed circle diameter (ICD), 18 ft circulatory lanes, and an 18 ft truck apron to accommodate a WB-67 design vehicle on SR 173 and a WB-62 on Columbus Rd design. Accommodation for Oversize/Overweight (OSOW) vehicles is provided through a 20 ft linear path through the middle of the roundabout. During non-OSOW operations, this area is restricted to traffic through removable chain rope barriers, bollards, and/or signage. Due to the existing vertical and horizontal curvature of the intersection, carrying OSOW vehicles on the circular roadway would require the roundabout to be placed in such a way where excessive right of way impacts would occur. OSOW accommodations like these have been successfully utilized on roundabout projects, including at the Ft. Amanda /Shawnee roundabout in Shawnee Township, Allen County, Ohio.

For WB-67 and WB-62 movements, The proposed geometry requires the use entry and circulatory roadway truck aprons, but the 140 ft ICD is maintained to minimize overall roundabout impact. Avoiding the use of the truck apron would require enlarging the roundabout diameter, which would likely increase right of way, utility, and drainage impacts for the project. A preliminary layout of the roundabout is shown on the following page and in **Appendix H**. Table 11 presents ODOT L&D Figure 403-2 data.

Roughly 200 ft long splitter islands on SR 173 and 100 ft long splitter islands on Columbus Rd are used to bring approaching vehicles down to a roundabout design speed of 25 MPH. Access to the southwest quadrant property is maintained with a drive on Columbus Rd south of the splitter island and removal of access on SR 173 and the north drive on Columbus Rd. Access to the southeast quadrant property is redirected to Columbus Rd, to align with a driveway access that was previously present to this property as verified by historical satellite imagery. The existing south drive at the auction facility is maintained with modification, and a field drive is provided on Columbus Rd for the property in the northwest quadrant.

Given existing vertical geometry through the intersection area, drainage will be a key factor in roundabout design. Existing drainage structures exist on all four approaches, including a large ditch on the north side of SR 173 through the study area. The placement of the roundabout in this southeastern quadrant will allow the low point of the intersection to occur just before the roundabout begins on the southern portion of Columbus Road where the ditch drainage structures are shown. The deep ditch in the southeastern portion can be salvaged and used as an outlet as it does currently.

LEGEND



FULL DEPTH PAVEMENT



6" RAISED CONC. MEDIAN



MOUNTABLE TRUCK APRON



GREEN SPACE

Ex R/W

EXISTING RIGHT-OF-WAY FROM GIS

R/W

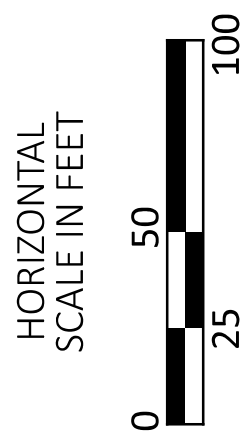
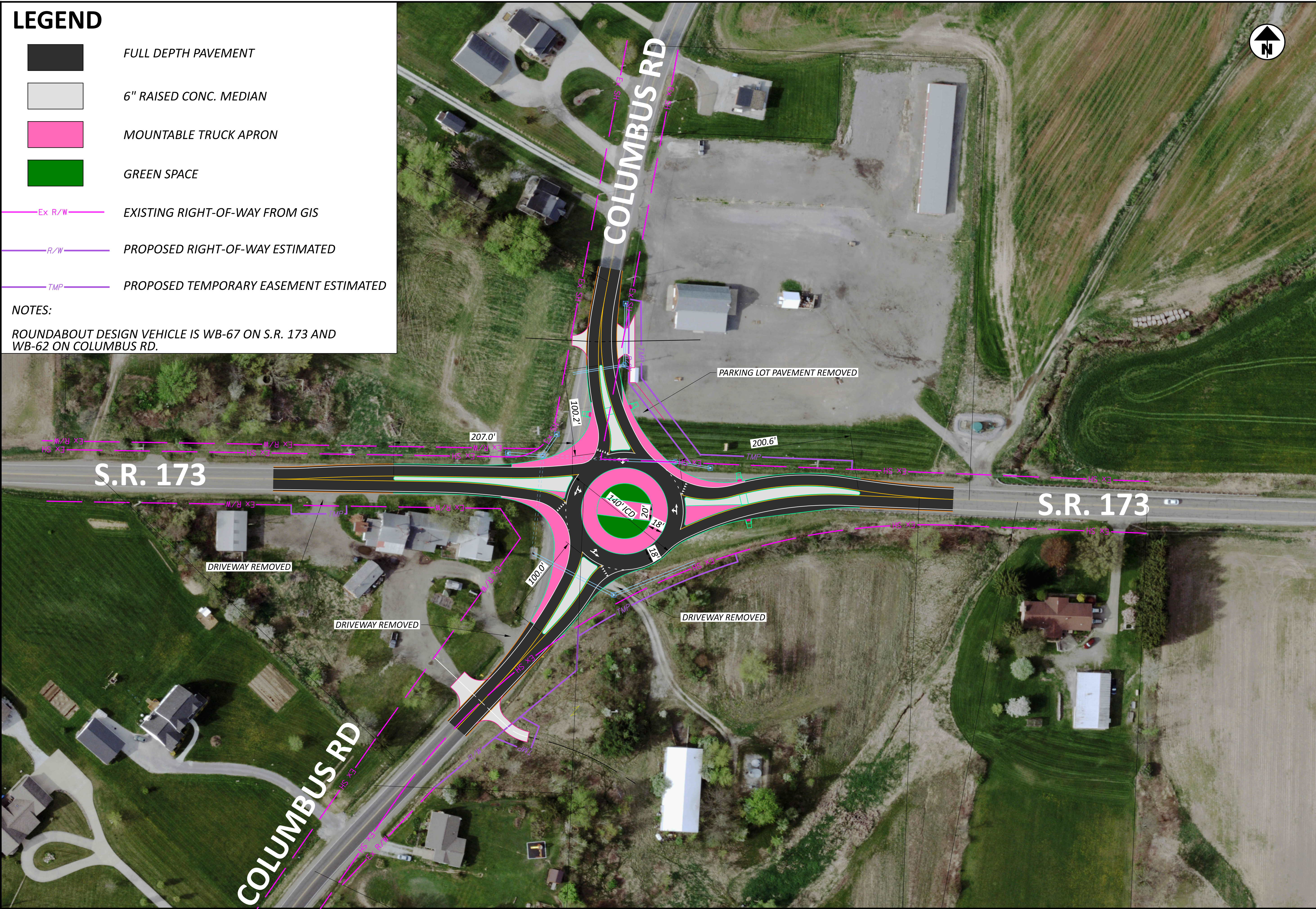
PROPOSED RIGHT-OF-WAY ESTIMATED

TMP

PROPOSED TEMPORARY EASEMENT ESTIMATED

NOTES:

ROUNDABOUT DESIGN VEHICLE IS WB-67 ON S.R. 173 AND
WB-62 ON COLUMBUS RD.



STA-173-1.85 ROUNDABOUT LAYOUT

DESIGN AGENCY



DESIGNER

AKA

REVIEWER

AC 05-09-25

PROJECT ID

0

SUBSET

0

TOTAL

0

SHEET

P.1

TOTAL

P.2



Though some drainage structures will need to be replaced, shifting the low point off the roundabout will be beneficial for spreads and easier for maintenance. Additionally, keeping the legs of the roundabout relatively centered on the current alignments will aid in reducing EDA and BMP requirements since more pavement can be salvaged.

Table 11 - ODOT L&D Figure 403-2 (Circular Roundabout)

CIRCLE ROUNDABOUT	COLUMBUS RD NB	SR 173 WB	COLUMBUS RD SB	SR 173 EB
Design Parameters	Leg 1	Leg 2	Leg 3	Leg 4
Inscribed Circle Diameter, FT	140			
Entry Width, FT	14.7	15.9	15.1	15.8
Entry Angle PHI ϕ , DEG	42.4	34.1	41.2	41.4
Exit Width, FT	14.8	12.1	12.2	12
Circulatory Roadway Width, FT	18'	18'	18'	18'
Fastest Path Speed	Leg 1	Leg 2	Leg 3	Leg 4
R ₁ , Radius/Speed, FT/MPH	86.8/19.3	119.0/21.8	77.0/18.4	71.7/17.9
R ₂ , Radius/Speed, FT/MPH	57.4/15.3	81.6/17.4	91.2/18.2	61.7/15.7
R ₃ , Radius/Speed, FT/MPH	191.9/26.2	347.7/27.3*	144.9/23.5	339/29.4*
R ₄ , Radius/Speed, FT/MPH	53.1/14.9	55.8/15.2	57.3/15.3	58.5/15.4
R ₅ , Radius/Speed, FT/MPH	267.6/29.8	119.9/21.9	37.1/13.9	55.0/16.2
R ₅ , Bypass Radius/Speed, FT/MPH	N/A	N/A	N/A	N/A
* = Acceleration Controlled				
Minimum Sight Parameters	Leg 1	Leg 2	Leg 3	Leg 4
Approach Design Speed, MPH	60	40	60	40
Approach Stopping Sight Distance, FT/MPH	155/25	155/25	155/25	155/25
Circulatory Stopping Sight Distance, FT/MPH	155/25	155/25	155/25	155/25
Exit (Crosswalk) Stopping Sight Distance, FT/MPH	N/A	N/A	N/A	N/A
Intersection Sight Distance, FT/MPH	155/25	155/25	155/25	155/25
General				
Design Vehicle(s)	WB-67 : SR 173 , WB-62 : COLUMBUS RD			
Truck Apron Width, FT	18'			

Environmental Considerations

ODOT District 4 conducted a preliminary environmental evaluation of the proposed roundabout and identified that the previous intersection reconfiguration project (ODOT PID 22417) removed several underground storage tanks from a former gas station that occupied the northeast quadrant of the intersection several decades ago. A feed mill occupies the southwest quadrant of the intersection. Along with the previously known regulated material presence in the study area, ODOT District 4 anticipates a minimum 12-month environmental clearance process that would occur following a Stage 1 submission. A preliminary cost for environmental work associated with the proposed roundabout is estimated at \$60k, which will be incorporated into the project contingency budget.

6 Conclusions

6.1 Cost Estimating

Woolpert developed conceptual cost estimates for the 1x1 roundabout using ODOT bid tabs, summary of contracts awarded, and item master to establish current day construction costs. Woolpert used ODOT's FY25-29 Business Plan Inflation Calculator to add inflation costs to the construction cost estimates for a midpoint of construction on July 1, 2030. Major cost drivers, including pavement removal and construction, lighting, traffic control, and erosion control are included in each cost estimate. Costs for drainage including culverts, catch basins, and manholes are included along with basic cut/fill quantities based on a constant depth across the construction limit area.

Right of way costs were estimated as a function of a total impact multiplied by a unit cost per acre of land. As part of the preliminary design process, Woolpert designed a roundabout with the minimum right of way impacts in mind. A smaller circle may further reduce right of way impacts but must be balanced against the users of the roundabout, including large trucks and farm vehicles. Based on current day construction costs, inflation to construction year 2030, a 35% contingency and 25% design cost, the preliminary 2030 cost estimate for the 1x1 roundabout improvement is \$4,239,234. A detailed cost estimate is provided in **Appendix I**.

6.2 Economic Analysis

Woolpert conducted an Economic Crash Analysis Tool (ECAT) study of the recommended 1x1 roundabout alternative and its associated estimated construction cost. The ECAT tool computes the predicted average crash frequency of proposed geometric improvements and compares that to the predicted average crash frequency of the existing geometric condition to determine an average annual crash modification and convert that into a net present value of safety benefit. This net present value of safety benefit represents a monetary value of crashes prevented by the proposed condition as a basis for determining a benefit/cost (B/C) ratio for a given improvement.

Based on a conceptual cost of approximately \$4.2 Million, an ECAT calculated average annual crash reduction of 2.0 crashes/year, and a \$2.2 Million net present value of safety benefit, the 1x1 roundabout has an ECAT benefit/cost (B/C) ratio of 0.53. Figure 7 presents the ECAT safety analysis results, with full results presented in **Appendix J**.

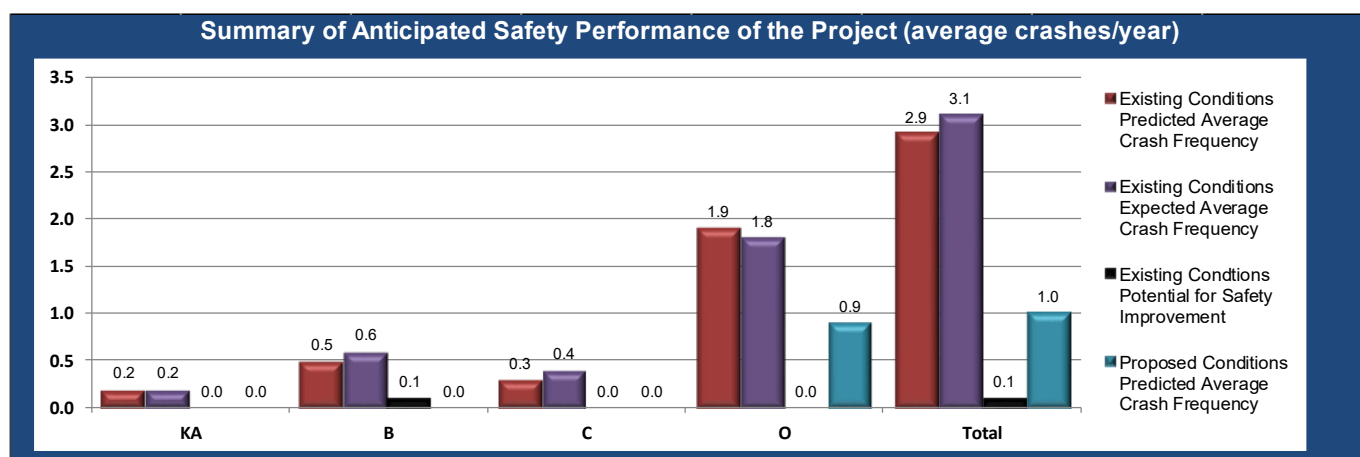


Figure 7 - ECAT Analysis Results



6.3 Recommendations

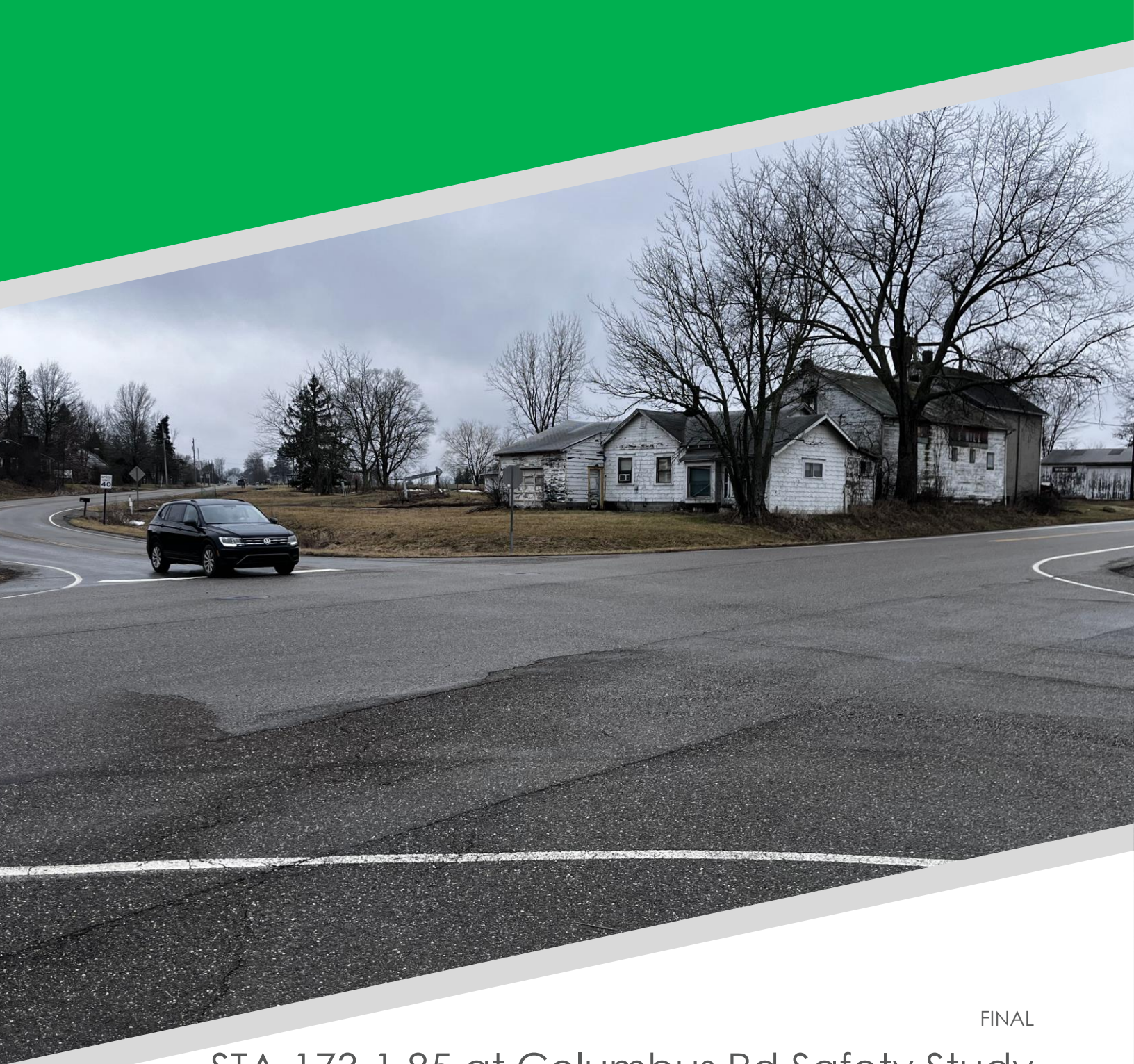
Woolpert evaluated short-, medium-, and long-term countermeasures to address safety and movement through the study intersection. Based on this analysis, Woolpert recommends the following:

Short-Term Countermeasures

- Replace existing intersection signage with new signage in-kind
- Remove existing pavement in the southeast quadrant to deter cut-through movements from northbound Columbus Rd to eastbound SR 173
- Mitigate vegetation growth on the north leg/southbound approach to maintain good approach sight distance

Long Term Countermeasures

- Convert existing TWSC intersection to 1x1 roundabout with 140 ft ICD



FINAL

STA-173-1.85 at Columbus Rd Safety Study

#186 Rural Intersection | 2025 ODOT HSIP Priority List

#115 Rural Intersection | 2024 ODOT HSIP Priority List

Ohio Department of Transportation District 4

July 25, 2025



Department of
Transportation



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Appendix A – Sight Distance Report and Existing Condition Diagram

OHIO DEPARTMENT OF TRANSPORTATION

Sight Distance Study

COUNTY:	STA	ROUTE:	SR 173	SLM:	1.85	LOCATION:		SR 173 at Columbus Rd		
DATE:	2/26/2025		DAY:	Wednesday		TIME:	8:15 AM	OBSERVER(S):	M. Craver	
REASON FOR ANALYSIS:			2024 HSIP Safety Study							

Mainline Speed Limit = 55

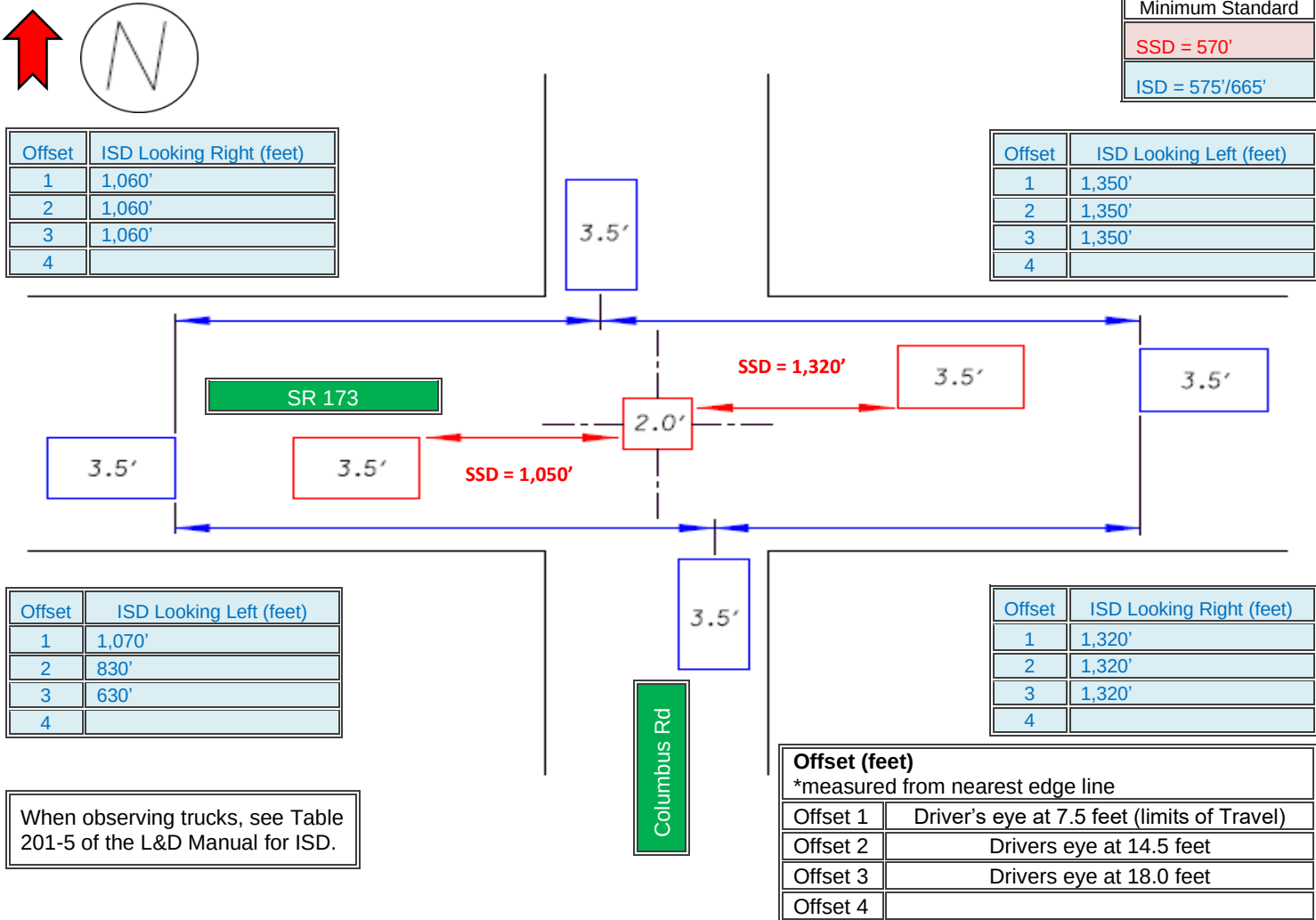
Mainline 85th %tile Speed = 60

Design Speed = 60

Minimum Standard

SSD = 570'

ISD = 575'/665'



*Label road names and draw north arrow. Draw in neighboring drives with distances if necessary. Describe what is blocking the sight distance such as vegetation, pavement on hill crest, etc.

Notes/Recommendations:

-NB looking left is limited by the house on the SW corner and hillcrest that is 1,000' west of the intersection.

-There are no sight restrictions from the NB approach when looking to the right.

-SB looking to the right is limited by the hill crest, but there is still adequate sight distance.

-The view from the SB approach when looking left can be limited by the fence on the NE corner if the driver stops at the stop line. If the driver pulls ahead of the stop line, there is sufficient sight distance and they can see to the top of the hillcrest that is 1,350' east of the intersection.

Design standards from L & D Manual (Vol 1, Sect 200. Rev January 2024)			
DESIGN SPEED (mph)	SSD (Fig. 201-1)	ISD for passenger car turning left (Fig. 201-5)	ISD for passenger car turning right or crossing (Fig. 201.5)
20	115'	225'	195'
25	155'	280'	240'
30	200'	335'	290'
35	250'	390'	335'
40	305'	445'	385'
45	360'	500'	430'
50	425'	555'	480'
55	495'	610'	530'
60	570'	665'	575'

OHIO DEPARTMENT OF TRANSPORTATION

Sight Distance Study



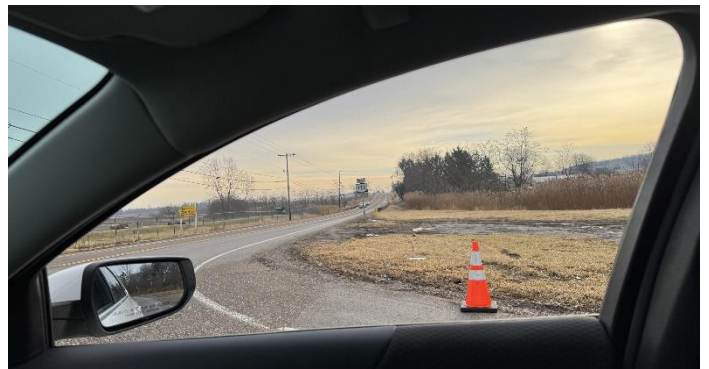
Columbus Rd Northbound looking left at 18.0'



Columbus Rd Northbound looking right at 18.0'



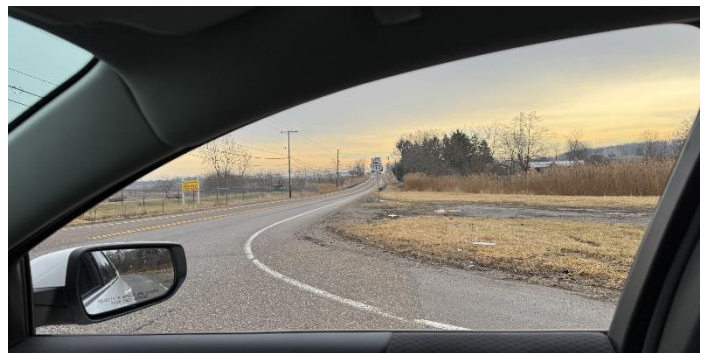
Columbus Rd Northbound looking left at 14.5'



Columbus Rd Northbound looking right at 14.5'



Columbus Rd Northbound looking left at 7.5'



Columbus Rd Northbound looking right at 7.5'

OHIO DEPARTMENT OF TRANSPORTATION

Sight Distance Study



Columbus Rd Southbound looking left at 18.0'



Columbus Rd Southbound looking right at 18.0'



Columbus Rd Southbound looking left at 14.5'



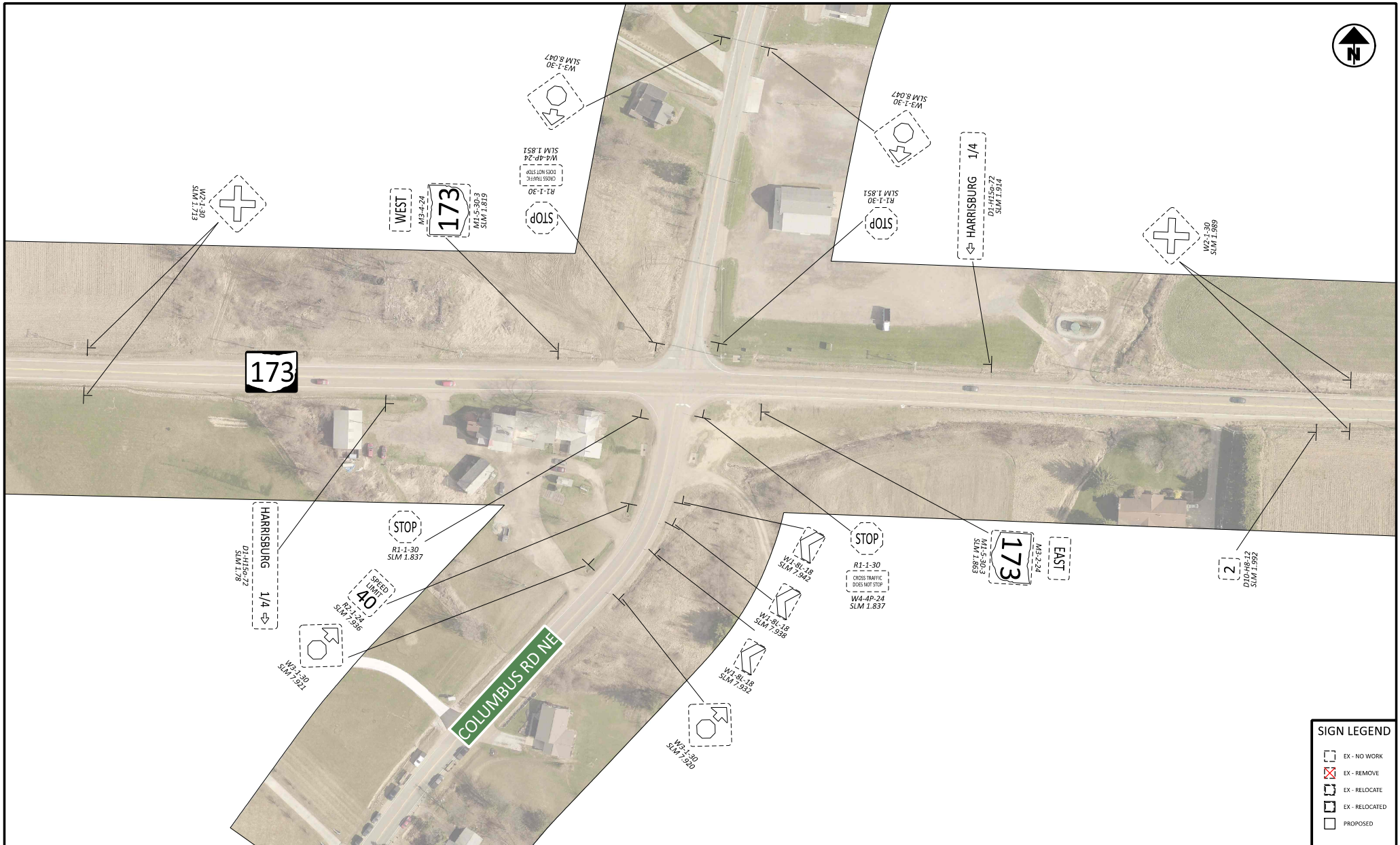
Columbus Rd Southbound looking right at 14.5'



Columbus Rd Southbound looking left at 7.5'



Columbus Rd Southbound looking right at 7.5'



Radar Observations Graphs

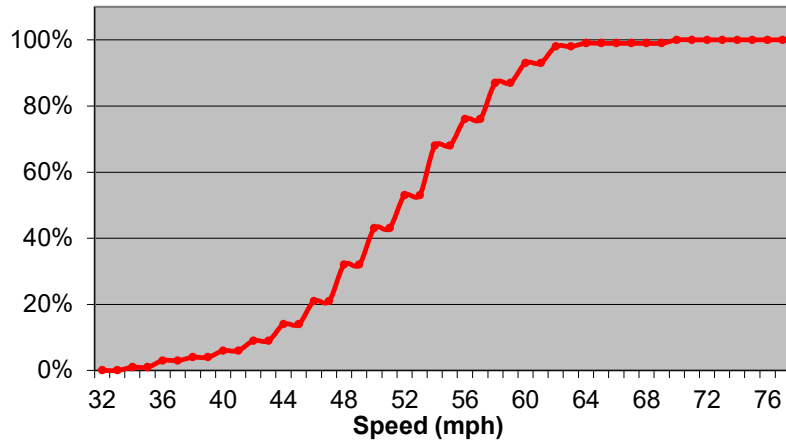
SR 173 and Columbus Rd

Observed by Hayden Warmouth and Pujan Bhattarai

June 11, 2025

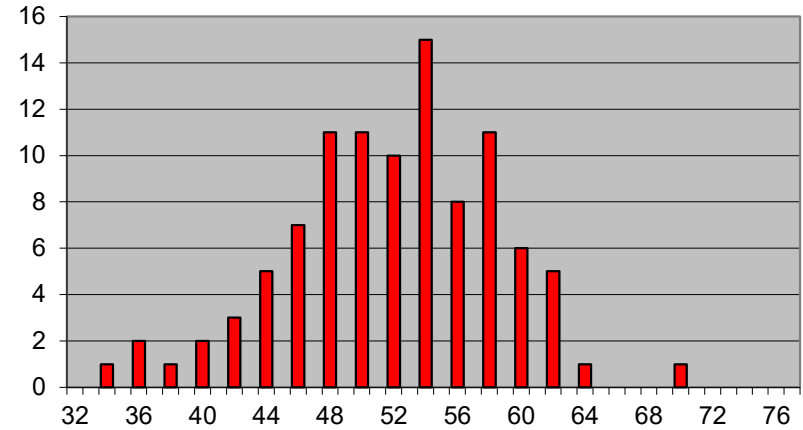
Cumulative Percentages

Eastbound



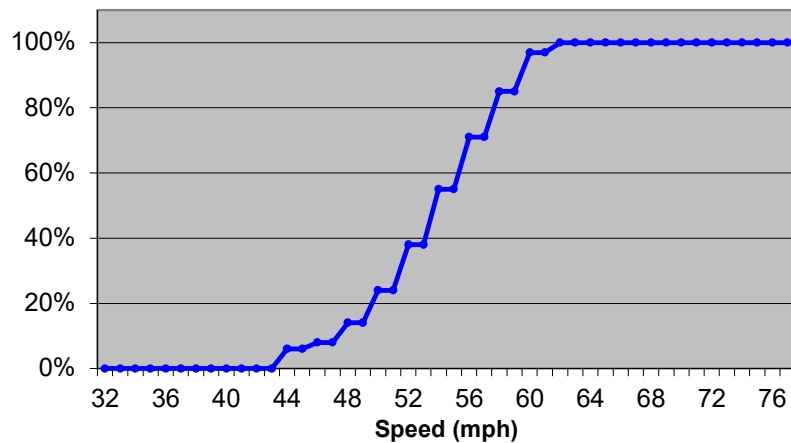
Cumulative Percentages

Eastbound



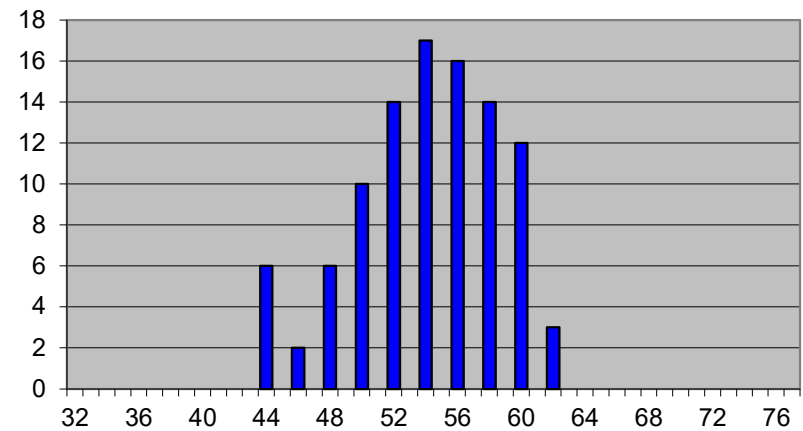
Cumulative Percentages

Westbound



Cumulative Percentages

Westbound



Radar Observations

SR 173 and Columbus Rd
Observed by Hayden Warmouth and Pujan Bhattarai
June 11, 2025

Eastbound					Westbound						
Start Time: 9:30 AM		End Time: 10:30 AM				Start Time: 9:30 AM		End Time: 10:30 AM			
Cumulative %	Cumulative Total	Line Total	Type of Vehicle		MPH	Type of Vehicle		Line Total	Cumulative Total	Cumulative %	
			Passenger	Commercial		Passenger	Commercial				
0.00%	0	0			32			0	0	0.00%	
0.00%	0	0			33			0	0	0.00%	
1.00%	1	1	1		34			0	0	0.00%	
1.00%	1	0			35			0	0	0.00%	
3.00%	3	2	2		36			0	0	0.00%	
3.00%	3	0			37			0	0	0.00%	
4.00%	4	1	1		38			0	0	0.00%	
4.00%	4	0			39			0	0	0.00%	
6.00%	6	2	2		40			0	0	0.00%	
6.00%	6	0			41			0	0	0.00%	
9.00%	9	3	3		42			0	0	0.00%	
9.00%	9	0			43			0	0	0.00%	
14.00%	14	5	5		44	5	1	6	6	6.00%	
14.00%	14	0			45			0	6	6.00%	
21.00%	21	7	5	2	46	1	1	2	8	8.00%	
21.00%	21	0			47			0	8	8.00%	
32.00%	32	11	10	1	48	4	2	6	14	14.00%	
32.00%	32	0			49			0	14	14.00%	
43.00%	43	11	7	4	50	10		10	24	24.00%	
43.00%	43	0			51			0	24	24.00%	
53.00%	53	10	10		52	14		14	38	38.00%	
53.00%	53	0			53			0	38	38.00%	
68.00%	68	15	15		54	15	2	17	55	55.00%	
68.00%	68	0			55			0	55	55.00%	
76.00%	76	8	8		56	15	1	16	71	71.00%	
76.00%	76	0			57			0	71	71.00%	
87.00%	87	11	10	1	58	13	1	14	85	85.00%	
87.00%	87	0			59			0	85	85.00%	
93.00%	93	6	6		60	12		12	97	97.00%	
93.00%	93	0			61			0	97	97.00%	
98.00%	98	5	5		62	3		3	100	100.00%	
98.00%	98	0			63			0	100	100.00%	
99.00%	99	1	1		64			0	100	100.00%	
99.00%	99	0			65			0	100	100.00%	
99.00%	99	0			66			0	100	100.00%	
99.00%	99	0			67			0	100	100.00%	
99.00%	99	0			68			0	100	100.00%	
99.00%	99	0			69			0	100	100.00%	
100.00%	100	1	1		70			0	100	100.00%	
100.00%	100	0			71			0	100	100.00%	
100.00%	100	0			72			0	100	100.00%	
100.00%	100	0			73			0	100	100.00%	
100.00%	100	0			74			0	100	100.00%	
100.00%	100	0			75			0	100	100.00%	
100.00%	100	0			76			0	100	100.00%	
100.00%	100	0			77			0	100	100.00%	
Totals:		100	92	8		92	8	100			

Summary of Observations

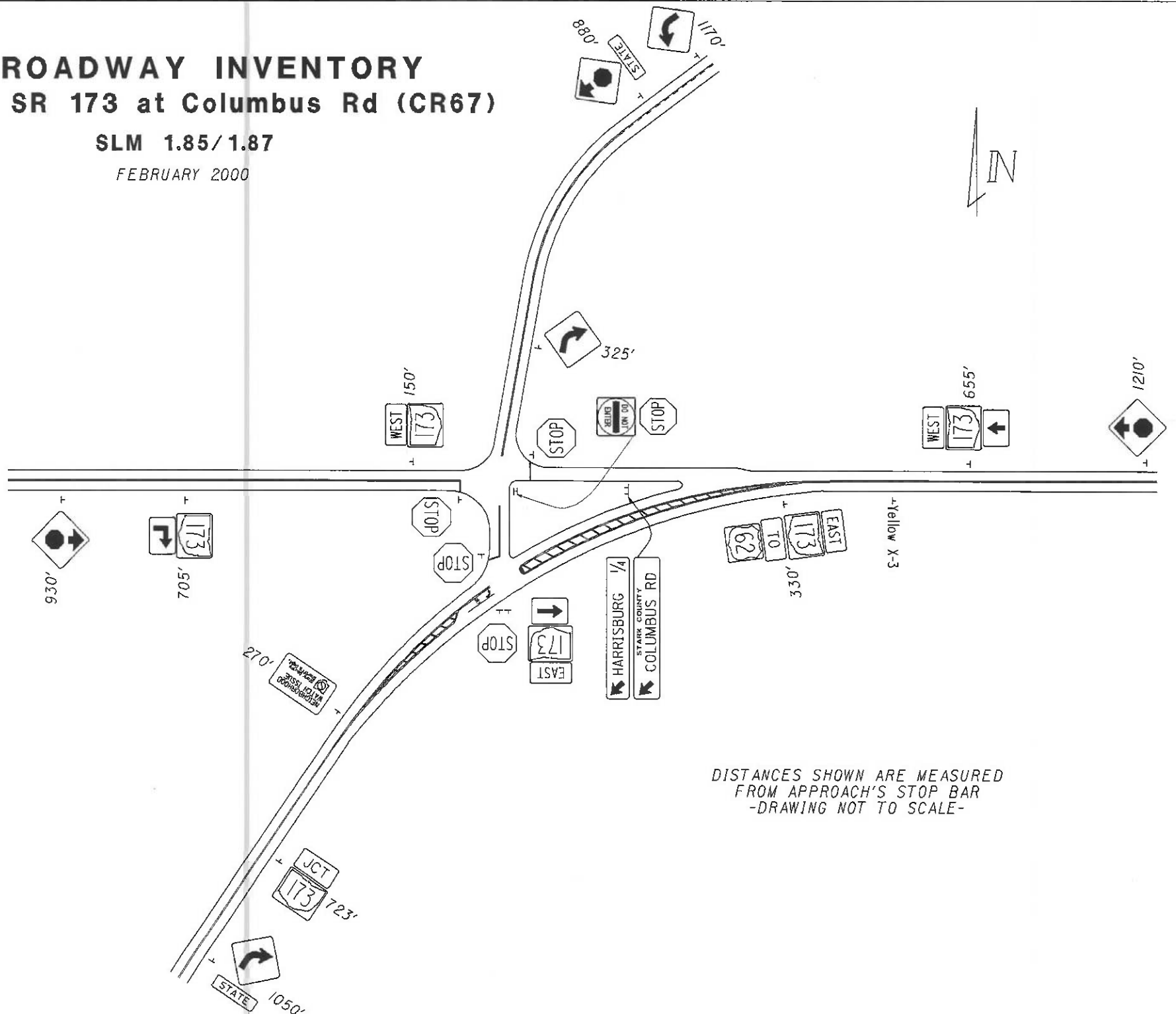
Eastbound				Westbound			
50th Percentile Speed:	52			54	50th Percentile Speed:		
85th Percentile Speed:	58			60	85th Percentile Speed:		
10 MPH Pace Speed:	47	through	56	51	through	60	10 MPH Pace Speed:
Percent in Pace Speed:	55.00%			73.00%			Percent in Pace Speed:
Percent Over Pace Speed:	24.00%			3.00%			Percent Over Pace Speed:
Range of Speeds:	34	through	70	44	through	62	Range of Speeds:
Vehicles Observed:	100			100	Vehicles Observed:		
Median Speed:	51.9			54.0	Median Speed:		

ROADWAY INVENTORY

STA SR 173 at Columbus Rd (CR67)

SLM 1.85/1.87

FEBRUARY 2000



DISTANCES SHOWN ARE MEASURED
FROM APPROACH'S STOP BAR
-DRAWING NOT TO SCALE-

Pr. S. R. 173 Curve 1
P.I. Sta = 565+49.74
 $\Delta = 1^\circ 20' 47''$ (LT)
 $Dc = 0^\circ 30' 00''$
 $R = 11,459.16'$
 $T = 134.63'$
 $L = 269.25'$
 $E = 0.79'$

PROPOSED $\odot$ SURVEY AND
CONST. S. R. 173

Pr. S. R. 173 Curve 2
P.I. Sta = 568+57.83
 $\Delta = 0^\circ 57' 46''$ (RT)
 $Dc = 0^\circ 30' 00''$
 $R = 11,459.16'$
 $T = 96.27'$
 $L = 192.53'$
 $E = 0.40'$

PROPOSED $\odot$ SURVEY
AND CONST.
C. R. 67 NORTH

STA. 570+31.81 PROPOSED $\odot$ SURVEY &
CONSTRUCTION S. R. 173 =
STA. 253+46.82 PROPOSED $\odot$ SURVEY &
CONSTRUCTION CO. RD. 67 NORTH =
STA. 1654+36.93 PROPOSED $\odot$ SURVEY &
CONSTRUCTION CO. RD. 67 SOUTH

Pr. S. R. 173 Curve 3
P.I. Sta = 572+07.82
 $\Delta = 1^\circ 36' 49''$ (RT)
 $Dc = 0^\circ 30' 00''$
 $R = 11,459.16'$
 $T = 161.38'$
 $L = 322.74'$
 $E = 1.14'$

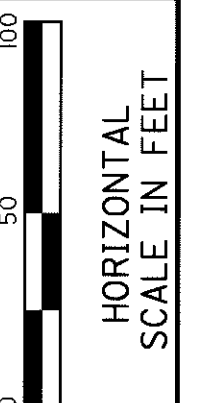
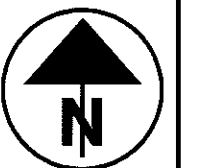
Pr. Co. Rd. 67A Curve 2
P.I. Sta = 1652+60.34
 $\Delta = 32^\circ 59' 53''$ (LT)
 $Dc = 23^\circ 00' 00''$
 $R = 249.11'$
 $T = 73.79'$
 $L = 143.47'$
 $E = 10.70'$

Ex. Co. Rd. 67A
P.I. Sta = 1654+22.51
 $\Delta = 56^\circ 40' 49''$ (RT)
 $Dc = 8^\circ 00' 00''$
 $R = 716.20'$
 $Ls = 150.00'$
 $Theta = 6^\circ 00' 00''$
 $LT = 100.06'$
 $ST = 50.05'$
 $x = 149.84'$
 $y = 5.23'$
 $k = 74.97'$
 $p = 1.31'$
 $Dc = 44^\circ 40' 50''$ (RT)
 $Lc = 558.51'$
 $Ts = 461.96'$
 $Es = 99.02'$

Pr. Co. Rd. 67A Curve 1
P.I. Sta = 1648+44.97
 $\Delta = 8^\circ 14' 22''$ (RT)
 $Dc = 6^\circ 00' 00''$
 $R = 954.93'$
 $T = 68.78'$
 $L = 137.33'$
 $E = 2.47'$

BENCHMARKS

- BM#1**
SE CORNER OF CONC. PORCH, 1 1/2 STY. BRICK
HOUSE (#9471 COLUMBUS ROAD) (CR 67 NORTH)
ELEV.=1245.16 = PROPOSED $\odot$ STA. 570+44.77,
SR 173, 593.18' LT.
- BM#2**
CHISELED SQUARE ON S.E. CORNER OF CONCRETE
HEADWALL, STA. 1643+33.34, 26.66' LT.,
 $\odot$ COLUMBUS ROAD
(CR 67 SOUTH) ELEV.=1255.60
- BM#3**
RR SPIKE 1' UP EAST SIDE OF TWIN 12" CHERRIES
STA. 557+26.78, 87.24' RT. $\odot$ SR 173
ELEV.=1255.06
- BM#4**
TIMBER SPIKE 1' UP NORTH SIDE OF 30" MAPLE
STA. 568+89.25, 30.80' RT. $\odot$ SR 173
ELEV.=1243.08 = PROPOSED $\odot$ STA. 568+88.94,
SR 173, 38.19' RT.
- BM#5**
CHISELED SQUARE IN STONE AT EAST OF DRIVE
STA. 584+09.53, 28.90' RT. $\odot$ SR 173
ELEV.=1238.41
- BM#6**
COUNTY DISK FOUND IN CENTER OF CONCRETE
HEADWALL, STA. 575+48.66, 17.35' RT. $\odot$ SR 173
ELEV.=1225.71 = PROPOSED $\odot$ STA. 575+49.06,
SR 173, 18.27' RT.



HORIZONTAL
SCALE IN FEET

SCHEMATIC PLAN

STA-173-1.85

In ter-Office Communication

Office of Roadway Engineering Services

ices

Date: January 8, 2004

To: L. F. Sutherland, P.E., Deputy Director, Roadway Engineering Services

From: Kathleen King, P.E., Geometrics Engineer, Roadway Engineering Services

Subject: Design Exceptions

Project: <u>STA-173-</u>	PID: <u>22417</u>
<u>1.85</u>	
Federal Funding: Yes <u>X</u> No <u> </u>	NHS : Yes <u> </u> No <u>X</u>
Functional Classification: <u>Local Road</u>	
Urban <u> </u>	Rural <u>X</u>

This office has reviewed the design features of the above project and hereby request ions to the minimum standards for the following design elements: except

Lane Width	<u> </u>	Grades	<u> </u>
Shoulder Width	<u> </u>	Stopping Sight Distance	<u>X</u>
Bridge Width	<u> </u>	Cross Slopes	<u> </u>
Structural Capacity	<u> </u>	Superelevation	<u>X</u>
Horizontal Alignment	<u>X</u>	Horizontal Clearance	<u> </u>
Vertical Alignment	<u> </u>	Vertical Clearance	<u> </u>
Bridge Parapet/Curb Configuration	<u> </u>		

We have attached the required justification material. Your approval of this request is recommended.

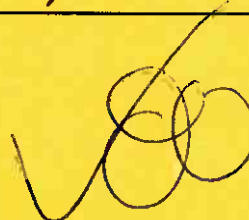
LFS:kak
Attachment

☒ Approved	☐ Disapproved
Signature <u>L. F. Sutherland</u>	
Date <u>January 8, 2004</u>	

Original: Design Exception File

Copies: Production Administrator - District 4Local Public Agency - Stark Cty. Eng.

MAILED
KAK 1-9-04



DESIGN EXCEPTION TO THE MINIMUM DESIGN STANDARDS

COUNTY: STARK

PID: 22417

PROJECT: STA-173-1.85

FEDERAL NO: TE21

ROUTE: S. R. 173

STATE JOB NO: 444760

FACILITY: Co. Rd. 67

FUNCTIONAL CLASSIFICATION: Rural Local

County Engineer Approval

Michael J. Relfin

Date 7/29/03

Production Administrator Approval

Jack R. Noble

Date 4/14/2003

May 22, 2002

Prepared by

District 5 Production Dept.

Project Engineer: David E. Slatzer

Existing Facility:

The existing horizontal alignment of County Road 67 in this area consists of a 461 foot tangent which leads into a spiral-curve-spiral combination with 150' entrance and exit spirals and an 8° 00' 00" circular curve. Superelevation on the existing curve varies with a maximum rate of approximately 0.039. The existing pavement on County Road 67 in this area is 24 feet wide with 2 foot paved shoulders.

The existing horizontal alignment of State Route 173 is tangent in this area. The intersection of State Route 173 and County Road 67 is currently a four-way stop. All traffic approaching this intersection except those eastbound on State Route 173 is currently forced to use a 65 foot slip ramp at the intersection before continuing on.

Proposed Facility:

The proposed facility would eliminate the slip ramp at the intersection of State Route 173 and County Road 67. The proposed horizontal realignment of County Road 67 would consist of a 380.77 foot tangent leading into a 137.32 foot long 6° 00' 00" circular curve with a maximum superelevation rate of 0.083. This curve will be followed by a 273.04 foot tangent leading into a 143.47 foot long 23° 00' 00" circular curve in the opposite direction with a maximum superelevation rate of 0.035.

The proposed vertical alignment of County Road 67 consists of a 100 foot vertical tangent leading into a 400 foot crest curve (SSD = 479') followed by a 300 foot tangent that leads into a 100' vertical curve (K = 21) which terminates near the intersection with State Route 173.

The legal speed limit for this section of the facility is 55 mph. Opening day ADT (2005) for County Road 67 is 2350, with a design year ADT (2025) of 2670.

Enhanced Safety:

This area has a history of angle accidents resulting from vehicles entering or exiting the slip ramp. The proposed realignment of County Road 67 would enhance safety by eliminating the slip ramp connecting County Road 67 with State Route 173 and creating a basic four-legged intersection with two-way stop control on County Road 67.

Controlling Criteria:

Lane Width	_____	Grades	_____
Shoulder Width	_____	SSD	<u> X </u>
Bridge Width	_____	Cross Slopes	_____
Horizontal Alignment	<u> X </u>	Superelevations	<u> X </u>
Vertical Alignment	_____	Horizontal Clearance	_____
Structural Capacity	_____	Vertical Clearance	_____

Detailed Analysis:

A.) Description of Deviation:

The legal speed limit for this section of the facility is 55 miles per hour. Normal Design Criteria for this speed requires a spiral-curve-spiral combination with a $6^{\circ} 00' 00''$ circular curve and a superelevation rate of 0.083. ODOT L & D Manual Volume 1 also states that 50 to 70 percent of the maximum superelevation rate shall be present at the PC and PT of the horizontal curve.

The proposed horizontal alignment utilizes two reverse curves to realign the intersection approach and eliminate the slip ramp. The first curve is a $6^{\circ} 00' 00''$ circular curve without spirals. The second curve is a $23^{\circ} 00' 00''$ circular curve also without spirals. Due to the short length of the first curve, the required superelevation position could not be attained. Therefore, the curve was divided into thirds with only the middle section being fully superelevated. The subsequent transition resulted in a superelevation rate of 0.065 or 78% of the maximum rate at the PC and PT of this curve. The superelevation rate on the second curve was determined in a similar manner. A G-rate of 160:1 was used to attain a superelevation rate of 0.035 on this second curve. The required superelevation on this curve is 0.083.

The required K-value for a sag curve at this design speed is 103. The K-value provided for the 100 foot sag vertical curve is 21. The required Stopping Sight Distance is 450 feet. The Stopping Sight Distance provided for this vertical curve is 143 feet.

B.) Accident Data:

There were 14 reported accidents within the 0.5 mile range of the intersection of State Route 173 and County Road 67 within the past 3 years. Of these, 10 were angle accidents, 1 resulted from a vehicle backing into another, 1 involved a vehicle leaving the road and going into a ditch, 1 was animal related, and the other accident type was not stated. Four of the accidents resulted in injury, while the other 10 involved property damage only.

C.) Future Traffic Safety:

Ten of the 14 accidents reported over the last 3 years have occurred as a result of vehicles being struck while entering or exiting the slip ramp at this intersection. The proposed elimination of this slip ramp will significantly reduce the potential for angle accidents in this area. The elimination of the slip ramp, along with the other intersection improvements, should greatly enhance future traffic safety in this area.

D.) Impact on Adjacent Properties:

In order to provide the required geometric conditions for this road, the approach work would have to be extended at least an additional 1000 feet. This would allow for the alignment to include $6^{\circ} 00' 00''$ reverse curves. Proper superelevation transition between

these two curves would require a minimum transition length of 250 foot be provided. This geometric combination would require the acquisition and destruction of 2 houses, as well as additional right of way on the west side of County Road 67. The proposed deviations allow for the elimination of the slip ramp at the intersection while minimizing the impact on adjacent properties.

E.) Proposed Mitigation:

Curve warning signs with an advisory speed plate of 35 MPH will placed in accordance with the OMUTCD in advance of the second curve.

G.) Support for Deviation:

It is clear from the accident data that the existing slip ramp creates a conflict problem for vehicles using this intersection. The deviations proposed allow the slip ramp to be eliminated while minimizing impacts on adjacent properties. It should be noted that the proposed horizontal alignment is consistent with that recommended in Section 401.3 and Figure 401-1 of Volume 1 of ODOT's Location and Design Manual. The deviation in stopping sight distance along the sag curve, as well as the 23° 00' 00" horizontal curve with 0.035 a superelevation rate should have a minimal impact on traffic, since it occurs in an area near the intersection where traffic will be approaching a stop.

Summary:

The proposed deviations will allow for the elimination of the slip ramp at this intersection. This will greatly reduce the potential for angle accidents in this area. The proposed deviations allow for significant improvements to be made at this intersection while minimizing the impacts to adjacent properties.

Appendix B – Traffic Plates and Existing Condition Capacity Analysis

Count Year	2024
Year	2024
Growth	0.500%
Total	1.000



Count Year	2024
Year	2024
Growth	0.500%
Total	1.000



Count Year	2024
Year	2029
Growth	0.500%
Total	1.025



Count Year	2024
Year	2029
Growth	0.500%
Total	1.025



Count Year	2024
Year	2049
Growth	0.500%
Total	1.133



Count Year	2024
Year	2049
Growth	0.500%
Total	1.133





Ohio Department of Transportation

Volume by Approach

County STARK Intersection SR 173 at Columbus Rd TMC Date 9/11/2024 Classification Summary Time Interval 15 Min. Count By bridget.richard

Start Time	Columbus Rd (CR-67) Northbound						SR 173 (State St) Eastbound						Columbus Rd (CR-67) Southbound						SR 173 (State St) Westbound						Total
	Left	Thru	Right	U-Turn	Ped	NB Total	Left	Thru	Right	U-Turn	Ped	EB Total	Left	Thru	Right	U-Turn	Ped	SB Total	Left	Thru	Right	U-Turn	Ped	WB Total	
7:00AM	0	8	7	0	0	15	3	31	0	0	0	34	2	8	4	0	0	14	6	43	1	0	0	50	113
7:15AM	0	5	11	0	0	16	2	50	0	0	0	52	0	14	4	0	0	18	8	56	4	0	0	68	154
7:30AM	2	5	9	0	0	16	1	42	0	0	0	43	3	8	9	0	0	20	13	69	6	0	0	88	167
7:45AM	1	11	13	0	0	25	1	57	1	0	0	59	8	10	4	0	0	22	7	46	1	0	0	54	160
Hour Total	3	29	40	0	0	72	7	180	1	0	0	188	13	40	21	0	0	74	34	214	12	0	0	260	594
8:00AM	0	6	4	0	0	10	2	28	0	0	0	30	3	10	5	0	0	18	10	33	1	0	0	44	102
8:15AM	0	4	4	0	0	8	1	41	0	0	0	42	1	5	3	0	0	9	7	27	3	0	0	37	96
8:30AM	0	5	10	0	0	15	3	26	0	0	0	29	1	8	6	0	0	15	8	24	1	0	0	33	92
8:45AM	1	10	3	0	0	14	2	34	0	0	0	36	1	7	5	0	0	13	6	32	0	0	0	38	101
Hour Total	1	25	21	0	0	47	8	129	0	0	0	137	6	30	19	0	0	55	31	116	5	0	0	152	391
9:00AM	0	5	8	0	0	13	2	28	0	0	0	30	3	5	6	0	0	14	5	36	1	0	0	42	99
9:15AM	0	4	6	0	0	10	4	20	1	0	0	25	3	4	3	0	0	10	7	23	0	0	0	30	75
9:30AM	0	5	11	0	0	16	0	27	0	0	0	27	2	4	4	0	0	10	10	27	4	0	0	41	94
9:45AM	0	2	9	0	0	11	1	31	0	0	0	32	3	2	1	0	0	6	5	23	3	0	0	31	80
Hour Total	0	16	34	0	0	50	7	106	1	0	0	114	11	15	14	0	0	40	27	109	8	0	0	144	348
10:00AM	0	9	7	0	0	16	1	22	0	0	0	23	3	4	1	0	0	8	3	23	1	0	0	27	74
10:15AM	0	3	6	0	0	9	1	32	1	0	0	34	3	7	3	0	0	13	2	18	1	0	0	21	77
10:30AM	0	1	6	0	0	7	0	37	0	0	0	37	1	4	1	0	0	6	5	27	5	0	0	37	87
10:45AM	0	5	3	0	0	8	3	29	1	0	0	33	0	2	2	0	0	4	10	29	1	0	0	40	85
Hour Total	0	18	22	0	0	40	5	120	2	0	0	127	7	17	7	0	0	31	20	97	8	0	0	125	323
11:00AM	0	3	8	0	0	11	1	16	0	0	0	17	1	5	5	0	0	11	4	24	4	0	0	32	71
11:15AM	1	4	9	0	0	14	0	23	0	0	0	23	4	4	0	0	0	8	6	28	3	0	0	37	82
11:30AM	0	4	5	0	0	9	5	25	0	0	0	30	3	3	1	0	0	7	6	29	2	0	0	37	83
11:45AM	0	11	9	0	0	20	1	25	0	0	0	26	2	8	3	0	0	13	4	17	3	0	0	24	83
Hour Total	1	22	31	0	0	54	7	89	0	0	0	96	10	20	9	0	0	39	20	98	12	0	0	130	319
12:00PM	0	8	6	0	0	14	1	26	0	0	0	27	2	3	7	0	0	12	6	22	2	0	0	30	83
12:15PM	0	6	12	0	0	18	2	18	0	0	0	20	4	4	1	0	0	9	7	38	1	0	0	46	93
12:30PM	0	5	8	0	0	13	1	26	1	0	0	28	2	6	1	0	0	9	7	27	2	0	0	36	86
12:45PM	0	8	5	0	0	13	4	31	0	0	0	35	1	6	1	0	0	8	3	24	5	0	0	32	88
Hour Total	0	27	31	0	0	58	8	101	1	0	0	110	9	19	10	0	0	38	23	111	10	0	0	144	350
1:00PM	0	6	11	0	0	17	3	36	1	0	0	40	3	4	3	0	0	10	12	23	3	0	0	38	105
1:15PM	0	3	11	0	0	14	1	36	1	0	0	38	6	6	3	0	0	15	8	24	5	0	0	37	104
1:30PM	0	8	6	0	0	14	1	28	0	0	0	29	4	8	5	0	0	17	8	22	3	0	0	33	93
1:45PM	0	7	3	0	0	10	1	24	0	0	0	25	2	6	2	0	0	10	7	38	3	0	0	48	93
Hour Total	0	24	31	0	0	55	6	124	2	0	0	132	15	24	13	0	0	52	35	107	14	0	0	156	395
2:00PM	0	13	9	0	0	22	2	30	0	0	0	32	2	3	2	0	0	7	12	41	1	0	0	54	115
2:15PM	3	8	10	0	0	21	4	34	0	0	0	38	0	9	4	0	0	13	6	39	4	0	0	49	121
2:30PM	0	5	7	0	0	12	2	24	0	0	0	26	1	9	12	0	0	22	14	35	7	0	0	56	116
2:45PM	2	11	7	0	0	20	2	28	0	0	0	30	2	9	3	0	0	14	9	49	1	0	0	59	123
Hour Total	5	37	33	0	0	75	10	116	0	0	0	126	5	30	21	0	0	56	41	164	13	0	0	218	475



Ohio Department of Transportation

Volume by Approach

County STARK Intersection SR 173 at Columbus Rd TMC Date 9/11/2024 Classification Summary Time Interval 15 Min. Count By bridget.richard

Start Time	Columbus Rd (CR-67) Northbound						SR 173 (State St) Eastbound						Columbus Rd (CR-67) Southbound						SR 173 (State St) Westbound						Total
	Left	Thru	Right	U-Turn	Ped	NB Total	Left	Thru	Right	U-Turn	Ped	EB Total	Left	Thru	Right	U-Turn	Ped	SB Total	Left	Thru	Right	U-Turn	Ped	WB Total	
3:00PM	0	8	10	0	0	18	6	34	0	0	0	40	2	6	8	0	0	16	11	38	5	0	0	54	128
3:15PM	1	16	8	0	0	25	6	52	0	0	0	58	1	8	4	0	0	13	9	41	5	0	0	55	151
3:30PM	0	12	5	0	0	17	11	38	1	0	0	50	1	12	9	0	0	22	13	39	2	0	0	54	143
3:45PM	0	16	11	0	0	27	7	57	2	0	0	66	2	12	5	0	0	19	7	40	4	0	0	51	163
Hour Total	1	52	34	0	0	87	30	181	3	0	0	214	6	38	26	0	0	70	40	158	16	0	0	214	585
4:00PM	0	22	13	0	0	35	6	37	0	0	0	43	2	9	3	0	0	14	8	48	3	0	0	59	151
4:15PM	0	25	5	0	0	30	7	62	0	0	0	69	1	9	4	0	0	14	11	43	5	0	0	59	172
4:30PM	1	15	11	0	0	27	3	50	0	0	0	53	6	16	5	0	0	27	9	58	0	0	0	67	174
4:45PM	2	10	5	0	0	17	11	70	1	0	0	82	4	7	2	0	0	13	10	56	1	0	0	67	179
Hour Total	3	72	34	0	0	109	27	219	1	0	0	247	13	41	14	0	0	68	38	205	9	0	0	252	676
5:00PM	0	7	8	0	0	15	8	45	1	0	0	54	3	14	4	0	0	21	9	53	2	0	0	64	154
5:15PM	0	7	5	0	0	12	8	60	0	0	0	68	0	11	3	0	0	14	17	50	5	0	0	72	166
5:30PM	1	13	7	0	0	21	7	61	0	0	0	68	1	8	6	0	0	15	9	47	5	0	0	61	165
5:45PM	3	11	3	0	0	17	6	42	3	0	0	51	2	5	4	0	0	11	7	37	2	0	0	46	125
Hour Total	4	38	23	0	0	65	29	208	4	0	0	241	6	38	17	0	0	61	42	187	14	0	0	243	610
6:00PM	1	7	7	0	0	15	3	31	1	0	0	35	3	8	4	0	0	15	12	32	3	0	0	47	112
6:15PM	0	12	10	0	0	22	4	40	1	0	0	45	4	7	1	0	0	12	16	33	3	0	0	52	131
6:30PM	3	10	22	0	0	35	3	27	0	0	0	30	0	8	0	0	0	8	9	31	4	0	0	44	117
6:45PM	1	5	7	0	0	13	1	35	0	0	0	36	3	8	2	0	0	13	9	25	3	0	0	37	99
Hour Total	5	34	46	0	0	85	11	133	2	0	0	146	10	31	7	0	0	48	46	121	13	0	0	180	459
App Total	23	394	380	0	0	797	155	1,706	17	0	0	1,878	111	343	178	0	0	632	397	1,687	134	0	0	2,218	5,525
App %	2.9%	49.4%	47.7%	0.0%	-	100.0%	8.3%	90.8%	0.9%	0.0%	-	100.0%	17.6%	54.3%	28.2%	0.0%	-	100.0%	17.9%	76.1%	6.0%	0.0%	-	100.0%	100.0%
Total %	0.4%	7.1%	6.9%	0.0%	-	14.4%	2.8%	30.9%	0.3%	0.0%	-	34.0%	2.0%	6.2%	3.2%	0.0%	-	11.4%	7.2%	30.5%	2.4%	0.0%	-	40.1%	100.0%
Passenger Vehicle	20	378	366	0	0	764	147	1639	14	0	0	1800	105	331	169	0	0	605	390	1622	129	0	0	2141	5310
Passenger Vehicle %	2.5%	47.4%	45.9%	0.0%	-	95.9%	7.8%	87.3%	0.7%	0.0%	-	95.8%	16.6%	52.4%	26.7%	0.0%	-	95.7%	17.6%	73.1%	5.8%	0.0%	-	96.5%	96.1%
Medium	3	11	10	0	0	24	6	39	3	0	0	48	6	9	6	0	0	21	5	37	5	0	0	47	140
Medium %	0.4%	1.4%	1.3%	0.0%	-	3.0%	0.3%	2.1%	0.2%	0.0%	-	2.6%	0.9%	1.4%	0.9%	0.0%	-	3.3%	0.2%	1.7%	0.2%	0.0%	-	2.1%	2.5%
Heavy	0	5	4	0	0	9	2	28	0	0	0	30	0	3	3	0	0	6	2	28	0	0	0	30	75
Heavy %	0.0%	0.6%	0.5%	0.0%	-	1.1%	0.1%	1.5%	0.0%	0.0%	-	1.6%	0.0%	0.5%	0.5%	0.0%	-	0.9%	0.1%	1.3%	0.0%	0.0%	-	1.4%	1.4%



Ohio Department of Transportation

Volume by Approach

County STARK Intersection SR 173 at Columbus Rd TMC Date 9/11/2024 Classification Passenger Time Interval 15 Min. Count By bridget.richard

Start Time	Columbus Rd (CR-67) Northbound						SR 173 (State St) Eastbound						Columbus Rd (CR-67) Southbound						SR 173 (State St) Westbound						Total
	Left	Thru	Right	U-Turn	Ped	NB Total	Left	Thru	Right	U-Turn	Ped	EB Total	Left	Thru	Right	U-Turn	Ped	SB Total	Left	Thru	Right	U-Turn	Ped	WB Total	
7:00AM	0	7	7	0	0	14	3	31	0	0	0	34	2	8	4	0	0	14	6	43	1	0	0	50	112
7:15AM	0	5	11	0	0	16	2	47	0	0	0	49	0	14	3	0	0	17	8	55	4	0	0	67	149
7:30AM	0	5	7	0	0	12	1	40	0	0	0	41	2	8	9	0	0	19	13	69	6	0	0	88	160
7:45AM	1	10	13	0	0	24	1	56	0	0	0	57	7	10	3	0	0	20	7	43	1	0	0	51	152
Hour Total	1	27	38	0	0	66	7	174	0	0	0	181	11	40	19	0	0	70	34	210	12	0	0	256	573
8:00AM	0	6	2	0	0	8	2	27	0	0	0	29	3	10	5	0	0	18	10	29	1	0	0	40	95
8:15AM	0	3	4	0	0	7	1	41	0	0	0	42	1	5	3	0	0	9	7	27	3	0	0	37	95
8:30AM	0	5	10	0	0	15	3	25	0	0	0	28	1	7	6	0	0	14	8	24	1	0	0	33	90
8:45AM	1	10	2	0	0	13	2	34	0	0	0	36	1	6	5	0	0	12	6	29	0	0	0	35	96
Hour Total	1	24	18	0	0	43	8	127	0	0	0	135	6	28	19	0	0	53	31	109	5	0	0	145	376
9:00AM	0	4	8	0	0	12	1	27	0	0	0	28	3	4	6	0	0	13	4	31	1	0	0	36	89
9:15AM	0	4	6	0	0	10	3	20	1	0	0	24	3	4	3	0	0	10	7	23	0	0	0	30	74
9:30AM	0	5	11	0	0	16	0	21	0	0	0	21	1	4	4	0	0	9	9	26	2	0	0	37	83
9:45AM	0	2	8	0	0	10	1	28	0	0	0	29	2	2	0	0	0	4	5	22	3	0	0	30	73
Hour Total	0	15	33	0	0	48	5	96	1	0	0	102	9	14	13	0	0	36	25	102	6	0	0	133	319
10:00AM	0	8	7	0	0	15	0	20	0	0	0	20	3	4	1	0	0	8	3	22	1	0	0	26	69
10:15AM	0	3	4	0	0	7	1	31	1	0	0	33	2	7	3	0	0	12	2	16	1	0	0	19	71
10:30AM	0	1	6	0	0	7	0	35	0	0	0	35	1	3	1	0	0	5	4	22	5	0	0	31	78
10:45AM	0	5	3	0	0	8	3	21	0	0	0	24	0	2	2	0	0	4	10	28	1	0	0	39	75
Hour Total	0	17	20	0	0	37	4	107	1	0	0	112	6	16	7	0	0	29	19	88	8	0	0	115	293
11:00AM	0	2	8	0	0	10	1	16	0	0	0	17	1	5	5	0	0	11	4	23	4	0	0	31	69
11:15AM	1	4	9	0	0	14	0	22	0	0	0	22	4	4	0	0	0	8	5	28	2	0	0	35	79
11:30AM	0	3	5	0	0	8	5	22	0	0	0	27	3	2	1	0	0	6	6	28	2	0	0	36	77
11:45AM	0	10	8	0	0	18	1	24	0	0	0	25	2	7	3	0	0	12	4	13	3	0	0	20	75
Hour Total	1	19	30	0	0	50	7	84	0	0	0	91	10	18	9	0	0	37	19	92	11	0	0	122	300
12:00PM	0	8	6	0	0	14	0	25	0	0	0	25	2	3	7	0	0	12	6	21	2	0	0	29	80
12:15PM	0	6	12	0	0	18	2	17	0	0	0	19	4	4	1	0	0	9	6	34	1	0	0	41	87
12:30PM	0	4	7	0	0	11	1	24	1	0	0	26	1	6	1	0	0	8	7	26	2	0	0	35	80
12:45PM	0	5	5	0	0	10	4	28	0	0	0	32	1	4	1	0	0	6	3	22	5	0	0	30	78
Hour Total	0	23	30	0	0	53	7	94	1	0	0	102	8	17	10	0	0	35	22	103	10	0	0	135	325
1:00PM	0	6	11	0	0	17	2	36	1	0	0	39	3	4	3	0	0	10	12	22	3	0	0	37	103
1:15PM	0	3	11	0	0	14	1	33	1	0	0	35	6	6	3	0	0	15	8	23	5	0	0	36	100
1:30PM	0	8	6	0	0	14	1	24	0	0	0	25	4	7	5	0	0	16	8	21	3	0	0	32	87
1:45PM	0	7	3	0	0	10	0	23	0	0	0	23	2	6	2	0	0	10	7	35	3	0	0	45	88
Hour Total	0	24	31	0	0	55	4	116	2	0	0	122	15	23	13	0	0	51	35	101	14	0	0	150	378
2:00PM	0	13	9	0	0	22	2	29	0	0	0	31	2	2	2	0	0	6	12	40	1	0	0	53	112



Ohio Department of Transportation

Volume by Approach

County STARK Intersection SR 173 at Columbus Rd TMC Date 9/11/2024 Classification Passenger Time Interval 15 Min. Count By bridget.richard

Start Time	Columbus Rd (CR-67) Northbound						SR 173 (State St) Eastbound						Columbus Rd (CR-67) Southbound						SR 173 (State St) Westbound						Total
	Left	Thru	Right	U-Turn	Ped	NB Total	Left	Thru	Right	U-Turn	Ped	EB Total	Left	Thru	Right	U-Turn	Ped	SB Total	Left	Thru	Right	U-Turn	Ped	WB Total	
2:15PM	3	8	10	0	0	21	4	33	0	0	0	37	0	8	3	0	0	11	6	37	4	0	0	47	116
2:30PM	0	4	7	0	0	11	2	23	0	0	0	25	1	9	10	0	0	20	14	33	7	0	0	54	110
2:45PM	1	11	6	0	0	18	2	27	0	0	0	29	2	9	3	0	0	14	9	47	1	0	0	57	118
Hour Total	4	36	32	0	0	72	10	112	0	0	0	122	5	28	18	0	0	51	41	157	13	0	0	211	456
3:00PM	0	8	9	0	0	17	5	34	0	0	0	39	2	6	8	0	0	16	11	38	5	0	0	54	126
3:15PM	1	16	8	0	0	25	6	49	0	0	0	55	1	8	4	0	0	13	9	41	4	0	0	54	147
3:30PM	0	11	5	0	0	16	11	37	0	0	0	48	1	12	9	0	0	22	13	38	2	0	0	53	139
3:45PM	0	16	11	0	0	27	6	57	2	0	0	65	2	12	5	0	0	19	7	38	4	0	0	49	160
Hour Total	1	51	33	0	0	85	28	177	2	0	0	207	6	38	26	0	0	70	40	155	15	0	0	210	572
4:00PM	0	20	13	0	0	33	6	37	0	0	0	43	2	9	3	0	0	14	7	47	3	0	0	57	147
4:15PM	0	25	5	0	0	30	7	60	0	0	0	67	1	9	2	0	0	12	10	41	4	0	0	55	164
4:30PM	1	15	11	0	0	27	3	50	0	0	0	53	6	16	4	0	0	26	9	57	0	0	0	66	172
4:45PM	2	10	5	0	0	17	11	68	1	0	0	80	4	7	2	0	0	13	10	55	1	0	0	66	176
Hour Total	3	70	34	0	0	107	27	215	1	0	0	243	13	41	11	0	0	65	36	200	8	0	0	244	659
5:00PM	0	7	8	0	0	15	8	44	1	0	0	53	3	14	4	0	0	21	9	52	2	0	0	63	152
5:15PM	0	7	5	0	0	12	8	60	0	0	0	68	0	11	3	0	0	14	17	49	5	0	0	71	165
5:30PM	1	13	7	0	0	21	7	61	0	0	0	68	1	8	6	0	0	15	9	46	5	0	0	60	164
5:45PM	3	11	3	0	0	17	6	41	3	0	0	50	2	5	4	0	0	11	7	37	2	0	0	46	124
Hour Total	4	38	23	0	0	65	29	206	4	0	0	239	6	38	17	0	0	61	42	184	14	0	0	240	605
6:00PM	1	7	7	0	0	15	3	31	1	0	0	35	3	8	4	0	0	15	12	32	3	0	0	47	112
6:15PM	0	12	10	0	0	22	4	40	1	0	0	45	4	6	1	0	0	11	16	33	3	0	0	52	130
6:30PM	3	10	22	0	0	35	3	27	0	0	0	30	0	8	0	0	0	8	9	31	4	0	0	44	117
6:45PM	1	5	5	0	0	11	1	33	0	0	0	34	3	8	2	0	0	13	9	25	3	0	0	37	95
Hour Total	5	34	44	0	0	83	11	131	2	0	0	144	10	30	7	0	0	47	46	121	13	0	0	180	454
App Total	20	378	366	0	0	764	147	1,639	14	0	0	1,800	105	331	169	0	0	605	390	1,622	129	0	0	2,141	5,310
App %	2.6%	49.5%	47.9%	0.0%	-	100.0%	8.2%	91.1%	0.8%	0.0%	-	100.0%	17.4%	54.7%	27.9%	0.0%	-	100.0%	18.2%	75.8%	6.0%	0.0%	-	100.0%	100.0%
Total %	0.4%	7.1%	6.9%	0.0%	-	14.4%	2.8%	30.9%	0.3%	0.0%	-	33.9%	2.0%	6.2%	3.2%	0.0%	-	11.4%	7.3%	30.5%	2.4%	0.0%	-	40.3%	100.0%



Ohio Department of Transportation

Volume by Approach

County STARK Intersection SR 173 at Columbus Rd TMC Date 9/11/2024 Classification Medium Time Interval 15 Min. Count By bridget.richard

Start Time	Columbus Rd (CR-67) Northbound						SR 173 (State St) Eastbound						Columbus Rd (CR-67) Southbound						SR 173 (State St) Westbound						Total
	Left	Thru	Right	U-Turn	Ped	NB Total	Left	Thru	Right	U-Turn	Ped	EB Total	Left	Thru	Right	U-Turn	Ped	SB Total	Left	Thru	Right	U-Turn	Ped	WB Total	
7:00AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15AM	0	0	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	0	0	1	0	0	0	1	3
7:30AM	2	0	2	0	0	4	0	2	0	0	0	2	1	0	0	0	0	1	0	0	0	0	0	0	7
7:45AM	0	0	0	0	0	0	0	1	1	0	0	2	1	0	1	0	0	2	0	3	0	0	0	3	7
Hour Total	2	0	2	0	0	4	0	5	1	0	0	6	2	0	1	0	0	3	0	4	0	0	0	4	17
8:00AM	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	3
8:15AM	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
8:30AM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	1
8:45AM	0	0	1	0	0	1	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	2
Hour Total	0	1	2	0	0	3	0	0	0	0	0	0	0	2	0	0	0	2	0	2	0	0	0	2	7
9:00AM	0	1	0	0	0	1	1	0	0	0	0	1	0	1	0	0	0	1	1	3	0	0	0	4	7
9:15AM	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
9:30AM	0	0	0	0	0	0	0	4	0	0	0	4	1	0	0	0	0	1	0	1	2	0	0	3	8
9:45AM	0	0	1	0	0	1	0	1	0	0	0	1	1	0	1	0	0	2	0	1	0	0	0	1	5
Hour Total	0	1	1	0	0	2	2	5	0	0	0	7	2	1	1	0	0	4	1	5	2	0	0	8	21
10:00AM	0	1	0	0	0	1	1	2	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	4
10:15AM	0	0	2	0	0	2	0	1	0	0	0	1	1	0	0	0	0	1	0	1	0	0	0	1	5
10:30AM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1	3	0	0	0	4	5
10:45AM	0	0	0	0	0	0	0	6	1	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	7
Hour Total	0	1	2	0	0	3	1	9	1	0	0	11	1	1	0	0	0	2	1	4	0	0	0	5	21
11:00AM	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	2
11:15AM	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	1	0	1	0	0	2	3
11:30AM	0	0	0	0	0	0	0	2	0	0	0	2	0	1	0	0	0	1	0	1	0	0	0	1	4
11:45AM	0	1	0	0	0	1	0	1	0	0	0	1	0	0	0	0	0	0	0	3	0	0	0	3	5
Hour Total	0	2	0	0	0	2	0	4	0	0	0	4	0	1	0	0	0	1	1	5	1	0	0	7	14
12:00PM	0	0	0	0	0	0	1	1	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2
12:15PM	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	1	1	0	0	0	2	3
12:30PM	0	1	1	0	0	2	0	1	0	0	0	1	1	0	0	0	0	1	0	0	0	0	0	0	4
12:45PM	0	3	0	0	0	3	0	2	0	0	0	2	0	2	0	0	0	2	0	1	0	0	0	1	8
Hour Total	0	4	1	0	0	5	1	5	0	0	0	6	1	2	0	0	0	3	1	2	0	0	0	3	17
1:00PM	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	1	2
1:15PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1:30PM	0	0	0	0	0	0	0	3	0	0	0	3	0	1	0	0	0	1	0	1	0	0	0	1	5
1:45PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	3	3
Hour Total	0	0	0	0	0	0	1	3	0	0	0	4	0	1	0	0	0	1	0	5	0	0	0	5	10
2:00PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



Ohio Department of Transportation

Volume by Approach

County STARK Intersection SR 173 at Columbus Rd TMC Date 9/11/2024 Classification Medium Time Interval 15 Min. Count By bridget.richard

Start Time	Columbus Rd (CR-67)						SR 173 (State St)						Columbus Rd (CR-67)						SR 173 (State St)						Total
	Northbound						Eastbound						Southbound						Westbound						
	Left	Thru	Right	U-Turn	Ped	NB Total	Left	Thru	Right	U-Turn	Ped	EB Total	Left	Thru	Right	U-Turn	Ped	SB Total	Left	Thru	Right	U-Turn	Ped	WB Total	
2:15PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	1	0	0	0	1	2
2:30PM	0	1	0	0	0	1	0	1	0	0	0	1	0	0	0	0	0	0	0	2	0	0	0	2	4
2:45PM	1	0	0	0	0	1	0	1	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	1	3
Hour Total	1	1	0	0	0	2	0	2	0	0	0	2	0	0	1	0	0	1	0	4	0	0	0	4	9
3:00PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:15PM	0	0	0	0	0	0	0	3	0	0	0	3	0	0	0	0	0	0	0	0	1	0	0	1	4
3:30PM	0	0	0	0	0	0	0	1	1	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2
3:45PM	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	1	2
Hour Total	0	0	0	0	0	0	1	4	1	0	0	6	0	0	0	0	0	0	0	1	1	0	0	2	8
4:00PM	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	2	3
4:15PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	0	1	1	0	0	2	4
4:30PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1
4:45PM	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	1	2
Hour Total	0	1	0	0	0	1	0	1	0	0	0	1	0	0	3	0	0	3	1	3	1	0	0	5	10
5:00PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
5:30PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
5:45PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hour Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	2
6:00PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:15PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	1
6:30PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45PM	0	0	2	0	0	2	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	3
Hour Total	0	0	2	0	0	2	0	1	0	0	0	1	0	1	0	0	0	1	0	0	0	0	0	0	4
App Total	3	11	10	0	0	24	6	39	3	0	0	48	6	9	6	0	0	21	5	37	5	0	0	47	140
App %	12.5%	45.8%	41.7%	0.0%	-	100.0%	12.5%	81.3%	6.3%	0.0%	-	100.0%	28.6%	42.9%	28.6%	0.0%	-	100.0%	10.6%	78.7%	10.6%	0.0%	-	100.0%	100.0%
Total %	2.1%	7.9%	7.1%	0.0%	-	17.1%	4.3%	27.9%	2.1%	0.0%	-	34.3%	4.3%	6.4%	4.3%	0.0%	-	15.0%	3.6%	26.4%	3.6%	0.0%	-	33.6%	100.0%



Ohio Department of Transportation

Volume by Approach

County STARK Intersection SR 173 at Columbus Rd TMC Date 9/11/2024 Classification Heavy Time Interval 15 Min. Count By bridget.richard

Start Time	Columbus Rd (CR-67) Northbound						SR 173 (State St) Eastbound						Columbus Rd (CR-67) Southbound						SR 173 (State St) Westbound						Total
	Left	Thru	Right	U-Turn	Ped	NB Total	Left	Thru	Right	U-Turn	Ped	EB Total	Left	Thru	Right	U-Turn	Ped	SB Total	Left	Thru	Right	U-Turn	Ped	WB Total	
7:00AM	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
7:15AM	0	0	0	0	0	0	0	1	0	0	0	1	0	0	1	0	0	1	0	0	0	0	0	0	2
7:30AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45AM	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Hour Total	0	2	0	0	0	2	0	1	0	0	0	1	0	0	1	0	0	1	0	0	0	0	0	0	4
8:00AM	0	0	1	0	0	1	0	1	0	0	0	1	0	0	0	0	0	0	0	2	0	0	0	2	4
8:15AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:30AM	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
8:45AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	3	3
Hour Total	0	0	1	0	0	1	0	2	0	0	0	2	0	0	0	0	0	0	0	5	0	0	0	5	8
9:00AM	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	2	0	0	0	2	3
9:15AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:30AM	0	0	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	0	1	0	0	0	0	1	3
9:45AM	0	0	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2
Hour Total	0	0	0	0	0	0	0	5	0	0	0	5	0	0	0	0	0	0	1	2	0	0	0	3	8
10:00AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
10:15AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
10:30AM	0	0	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	0	0	2	0	0	0	2	4
10:45AM	0	0	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	0	0	1	0	0	0	1	3
Hour Total	0	0	0	0	0	0	0	4	0	0	0	4	0	0	0	0	0	0	0	5	0	0	0	5	9
11:00AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:15AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:30AM	0	1	0	0	0	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	2
11:45AM	0	0	1	0	0	1	0	0	0	0	0	0	0	1	0	0	0	1	0	1	0	0	0	1	3
Hour Total	0	1	1	0	0	2	0	1	0	0	0	1	0	1	0	0	0	1	0	1	0	0	0	1	5
12:00PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
12:15PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	3	3
12:30PM	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	1	2
12:45PM	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	1	2
Hour Total	0	0	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	0	0	6	0	0	0	6	8
1:00PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1:15PM	0	0	0	0	0	0	0	3	0	0	0	3	0	0	0	0	0	0	0	1	0	0	0	1	4
1:30PM	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
1:45PM	0	0	0	0	0	0	1	1	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2
Hour Total	0	0	0	0	0	0	1	5	0	0	0	6	0	0	0	0	0	0	0	1	0	0	0	1	7
2:00PM	0	0	0	0	0	0	0	1	0	0	0	1	0	1	0	0	0	1	0	1	0	0	0	1	3



Ohio Department of Transportation

Volume by Approach

County STARK Intersection SR 173 at Columbus Rd TMC Date 9/11/2024 Classification Heavy Time Interval 15 Min. Count By bridget.richard

Start Time	Columbus Rd (CR-67)						SR 173 (State St)						Columbus Rd (CR-67)						SR 173 (State St)						Total
	Northbound						Eastbound						Southbound						Westbound						
	Left	Thru	Right	U-Turn	Ped	NB Total	Left	Thru	Right	U-Turn	Ped	EB Total	Left	Thru	Right	U-Turn	Ped	SB Total	Left	Thru	Right	U-Turn	Ped	WB Total	
2:15PM	0	0	0	0	0	0	0	1	0	0	0	1	0	1	0	0	0	1	0	1	0	0	0	1	3
2:30PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	2
2:45PM	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	2
Hour Total	0	0	1	0	0	1	0	2	0	0	0	2	0	2	2	0	0	4	0	3	0	0	0	3	10
3:00PM	0	0	1	0	0	1	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	2
3:15PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:30PM	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	2
3:45PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
Hour Total	0	1	1	0	0	2	1	0	0	0	0	1	0	0	0	0	0	0	0	2	0	0	0	2	5
4:00PM	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
4:15PM	0	0	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	0	1	1	0	0	0	2	4
4:30PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
4:45PM	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
Hour Total	0	1	0	0	0	1	0	3	0	0	0	3	0	0	0	0	0	0	1	2	0	0	0	3	7
5:00PM	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	1	2
5:15PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45PM	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
Hour Total	0	0	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	0	0	1	0	0	0	1	3
6:00PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:15PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45PM	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
Hour Total	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
App Total	0	5	4	0	0	9	2	28	0	0	0	30	0	3	3	0	0	6	2	28	0	0	0	30	75
App %	0.0%	55.6%	44.4%	0.0%	-	100.0%	6.7%	93.3%	0.0%	0.0%	-	100.0%	0.0%	50.0%	50.0%	0.0%	-	100.0%	6.7%	93.3%	0.0%	0.0%	-	100.0%	100.0%
Total %	0.0%	6.7%	5.3%	0.0%	-	12.0%	2.7%	37.3%	0.0%	0.0%	-	40.0%	0.0%	4.0%	4.0%	0.0%	-	8.0%	2.7%	37.3%	0.0%	0.0%	-	40.0%	100.0%



Ohio Department of Transportation
Peak Hour Volume

County
Intersection
Count Date
Type

Stark
SR 173 at Columbus Rd
9/11/2024 (Wednesday)
Peak Hour Volume

AM Peak Hour (7:00 - 8:00)

Start Time	Columbus Rd (CR-67)				SR 173 (State St)				Columbus Rd (CR-67)				SR 173 (State St)				Total
	Northbound				Eastbound				Southbound				Westbound				
	Left	Thru	Right	Total	Left	Thru	Right	Total	Left	Thru	Right	Total	Left	Thru	Right	Total	
7:00 AM	0	8	7	15	3	31	0	34	2	8	4	14	6	43	1	50	113
7:15 AM	0	5	11	16	2	50	0	52	0	14	4	18	8	56	4	68	154
7:30 AM	2	5	9	16	1	42	0	43	3	8	9	20	13	69	6	88	167
7:45 AM	1	11	13	25	1	57	1	59	8	10	4	22	7	46	1	54	160
Total	3	29	40	72	7	180	1	188	13	40	21	74	34	214	12	260	594
App %	4%	40%	56%	0%	4%	96%	1%	0%	18%	54%	28%	0%	13%	82%	5%	0%	
PHF	0.38	0.66	0.77	0.72	0.58	0.79	0.25	0.80	0.41	0.71	0.58	0.84	0.65	0.78	0.50	0.74	
HV %	67%	7%	5%	8%	0%	3%	100%	4%	15%	0%	10%	5%	0%	2%	0%	2%	
Total %	1%	5%	7%	12%	1%	30%	0%	32%	2%	7%	4%	12%	6%	36%	2%	44%	

Total AM Peak **594**
Total AM PHF **0.89**

PM Peak Hour (4:15-5:15)

Start Time	Columbus Rd (CR-67)				SR 173 (State St)				Columbus Rd (CR-67)				SR 173 (State St)				Total
	Northbound				Eastbound				Southbound				Westbound				
	Left	Thru	Right	Total	Left	Thru	Right	Total	Left	Thru	Right	Total	Left	Thru	Right	Total	
4:15 PM	0	25	5	30	7	62	0	69	1	9	4	14	11	43	5	59	172
4:30 PM	1	15	11	27	3	50	0	53	6	16	5	27	9	58	0	67	174
4:45 PM	2	10	5	17	11	70	1	82	4	7	2	13	10	56	1	67	179
5:00 PM	0	7	8	15	8	45	1	54	3	14	4	21	9	53	2	64	154
Total	3	57	29	89	29	227	2	258	14	46	15	75	39	210	8	257	679
App %	3%	64%	33%	0%	11%	88%	1%	0%	19%	61%	20%	0%	15%	82%	3%	0%	
PHF	0.38	0.57	0.66	0.74	0.66	0.81	0.50	0.79	0.58	0.72	0.75	0.69	0.89	0.91	0.40	0.96	
HV %	0%	0%	0%	0%	0%	2%	0%	2%	0%	0%	20%	4%	3%	2%	13%	3%	
Total %	0%	8%	4%	13%	4%	33%	0%	38%	2%	7%	2%	11%	6%	31%	1%	38%	

Total PM Peak **679**
Total PM PHF **0.95**



Ohio Department of Transportation
Design Hour Volume

County
Intersection
Count Date
Type

Stark
SR 173 at Columbus Rd
9/11/2024 (Wednesday)
Design Hour Volume

AM Peak Hour (7:00 - 8:00)

Description	Columbus Rd (CR-67)				SR 173 (State St)				Columbus Rd (CR-67)				SR 173 (State St)				Total
	Northbound				Eastbound				Southbound				Westbound				
	Left	Thru	Right	Total	Left	Thru	Right	Total	Left	Thru	Right	Total	Left	Thru	Right	Total	
Volume (Vph)	3	29	40	72	7	180	1	188	13	40	21	74	34	214	12	260	594
Functional Class	Rural Minor Collector (06r)				Rural Major Collector (05r)				Rural Minor Collector (06r)				Rural Major Collector (05r)				
Design Hour Factor (DHF)	1.12				1.12				1.12				1.12				
Design Hour Volumes (DHV)	10	30	40	80	10	200	10	220	10	40	20	70	40	240	10	290	660

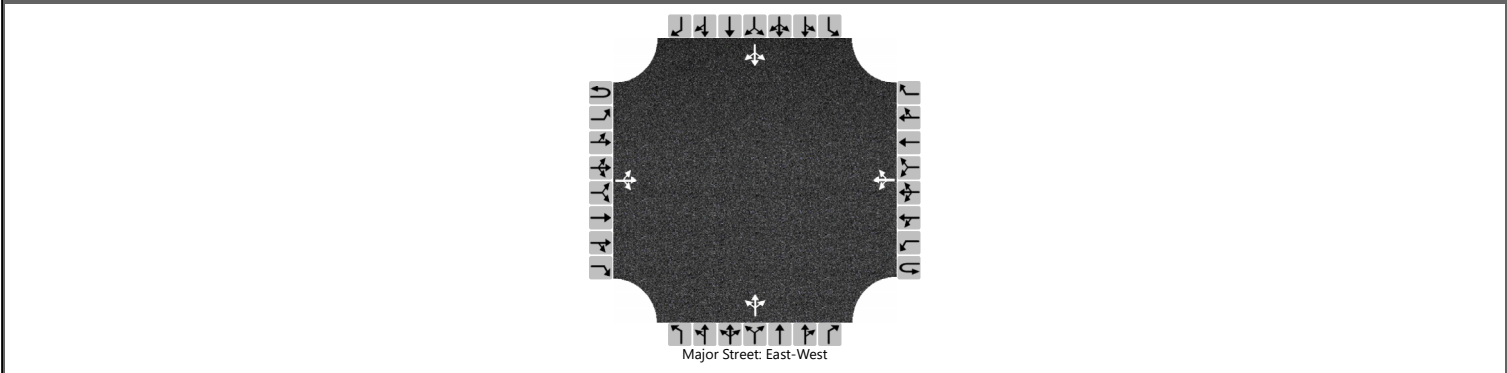
PM Peak Hour (4:15-5:15)

Description	Columbus Rd (CR-67)				SR 173 (State St)				Columbus Rd (CR-67)				SR 173 (State St)				Total
	Northbound				Eastbound				Southbound				Westbound				
	Left	Thru	Right	Total	Left	Thru	Right	Total	Left	Thru	Right	Total	Left	Thru	Right	Total	
Volume (Vph)	3	57	29	89	29	227	2	258	14	46	15	75	39	210	8	257	679
Functional Class	Rural Minor Collector (06r)				Rural Major Collector (05r)				Rural Minor Collector (06r)				Rural Major Collector (05r)				
Design Hour Factor (DHF)	1.12				1.12				1.12				1.12				
Design Hour Volumes (DHV)	10	60	30	100	30	250	10	290	20	50	20	90	40	240	10	290	770

HCS Two-Way Stop-Control Report

General Information		Site Information	
Analyst	AC	Intersection	SR 173 at Columbus Rd
Agency/Co.	Woolpert	Jurisdiction	Stark County
Date Performed	2/19/2025	East/West Street	SR 173
Analysis Year	2025	North/South Street	Columbus Rd
Time Analyzed	2024 Existing AM	Peak Hour Factor	0.89
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	STA-173-1.85 Existing Condition		

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	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		10	200	10		40	240	10		10	30	40		10	40	20
Percent Heavy Vehicles (%)		0				0				8	8	8		5	5	5
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				7.18	6.58	6.28		7.15	6.55	6.25
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				3.57	4.07	3.37		3.55	4.05	3.35

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		11				45					90				79	
Capacity, c (veh/h)		1293				1343					490				425	
v/c Ratio		0.01				0.03					0.18				0.19	
95% Queue Length, Q ₉₅ (veh)		0.0				0.1					0.7				0.7	
95% Queue Length, Q ₉₅ (ft)											18.6				18.2	
Control Delay (s/veh)		7.8	0.1	0.1		7.8	0.3	0.3			14.0				15.4	
Level of Service (LOS)		A	A	A		A	A	A			B				C	
Approach Delay (s/veh)	0.4				1.3				14.0				15.4			
Approach LOS	A				A				B				C			

HCS Two-Way Stop-Control Report

General Information

Analyst

AC

Agency/Co.

Woolpert

Date Performed

2/19/2025

Analysis Year

2025

Time Analyzed

2024 Existing PM

Intersection Orientation

East-West

Project Description

STA-173-1.85 Existing Condition

Site Information

Intersection

SR 173 at Columbus Rd

Jurisdiction

Stark County

East/West Street

SR 173

North/South Street

Columbus Rd

Peak Hour Factor

0.95

Analysis Time Period (hrs)

0.25

Lanes

Major Street: East-West

Vehicle Volumes and Adjustments																								
Approach	Eastbound				Westbound				Northbound				Southbound											
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R								
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12								
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	1	0								
Configuration			LTR				LTR				LTR				LTR									
Volume (veh/h)		30	250	10		40	240	10		10	60	30		20	50	20								
Percent Heavy Vehicles (%)		0				0				0	0	0		4	4	4								
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		7.14	6.54	6.24								
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		3.54	4.04	3.34								
Delay, Queue Length, and Level of Service																								
Flow Rate, v (veh/h)		32				42					105				95									
Capacity, c (veh/h)		1313				1301					407				362									
v/c Ratio		0.02				0.03					0.26				0.26									
95% Queue Length, Q ₉₅ (veh)		0.1				0.1					1.0				1.0									
95% Queue Length, Q ₉₅ (ft)											25.0				25.8									
Control Delay (s/veh)		7.8	0.2	0.2		7.9	0.3	0.3			16.9				18.5									
Level of Service (LOS)		A	A	A		A	A	A			C				C									
Approach Delay (s/veh)	1.0				1.3				16.9				18.5											
Approach LOS	A				A				C				C											

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HCS™ TWSC Version 2024
2024 Existing PM.xtw

Generated: 5/15/2025 11:03:42 AM

Appendix C – Crash Data

1.85 STA SR 173 at Columbus (CR67A) CAMTool 2019-2023

Crash Summary Sheet

Fatalities	0
Serious Injuries	3
Other Injuries	25

Crash Severity	Crashes	%
(2) Serious Injury Suspected	2	11.11%
(3) Minor Injury Suspected	6	33.33%
(4) Injury Possible	1	5.56%
(5) PDO/No Injury	9	50.00%
Grand Total	18	100.00%

Day of Week	Crashes	%
(1) Sunday	3	16.67%
(2) Monday	3	16.67%
(3) Tuesday	3	16.67%
(4) Wednesday	3	16.67%
(5) Thursday	5	27.78%
(6) Friday	1	5.56%
Grand Total	18	100.00%

Hour of Day	Crashes	%
5	1	5.56%
9	2	11.11%
10	2	11.11%
12	3	16.67%
15	2	11.11%
16	3	16.67%
17	3	16.67%
20	1	5.56%
21	1	5.56%
Grand Total	18	100.00%

Crashes Per Year	3.60
Fatal and All Injury Crashes	9
Percent Injury	50.0%
Equivalent PDO Index Value	8.01

Year	Crashes	%
2019	2	11.11%
2020	1	5.56%
2021	3	16.67%
2022	7	38.89%
2023	5	27.78%
Grand Total	18	100.00%

Crash Type	Crashes	%
Angle	12	66.67%
Rear End	4	22.22%
Fixed Object	2	11.11%
Grand Total	18	100.00%

Month	Crashes	%
3	3	16.67%
4	2	11.11%
5	3	16.67%
6	1	5.56%
7	2	11.11%
8	1	5.56%
9	2	11.11%
10	1	5.56%
11	2	11.11%
12	1	5.56%
Grand Total	18	100.00%

1.85 STA SR 173 at Columbus (CR67A) CAMTool 2019-2023

Crash Summary Sheet

Weather Condition	Crashes	%
Clear	13	72.22%
Cloudy	3	16.67%
Fog, Smog, Smoke	2	11.11%
Grand Total	18	100.00%

Road Condition	Crashes	%
Dry	17	94.44%
Wet	1	5.56%
Grand Total	18	100.00%

Light Condition	Crashes	%
Daylight	13	72.22%
Dawn/Dusk	3	16.67%
Dark - Roadway Not Lighted	2	11.11%
Grand Total	18	100.00%

Number of Units	Crashes	%
2	14	77.78%
3	2	11.11%
1	2	11.11%
Grand Total	18	100.00%

ODOT Location	Crashes	%
Four-Way Intersection	17	94.44%
Not An Intersection	1	5.56%
Grand Total	18	100.00%

Work Zone Related	Crashes	%
No	18	100.00%
Grand Total	18	100.00%

Alcohol Related	Crashes	%
No	16	88.89%
Yes	2	11.11%
Grand Total	18	100.00%

Drug Related (Inc. Marijuana)	Crashes	%
No	17	94.44%
Yes	1	5.56%
Grand Total	18	100.00%

Marijuana Related	Crashes	%
No	17	94.44%
Yes	1	5.56%
Grand Total	18	100.00%

Older Driver (65+)	Crashes	%
No	11	61.11%
Yes	7	38.89%
Grand Total	18	100.00%

Young Driver (15-25)	Crashes	%
No	10	55.56%
Yes	8	44.44%
Grand Total	18	100.00%

Motorcycle Involved	Crashes	%
No	18	100.00%
Grand Total	18	100.00%

Contour	Crashes	%
Straight Grade	5	27.78%
Straight Level	13	72.22%
Grand Total	18	100.00%

Roadway Departure	Crashes	%
No	16	88.89%
Yes	2	11.11%
Grand Total	18	100.00%

Intersection Related	Crashes	%
Yes	15	83.33%
No	3	16.67%
Grand Total	18	100.00%

Speed Related	Crashes	%
No	17	94.44%
Yes	1	5.56%
Grand Total	18	100.00%

1.85 STA SR 173 at Columbus (CR67A) CAMTool 2019-2023

Crash Summary Sheet

Unit 1 Summary

Unit 1 Pre-Crash Action	Crashes	%
Straight Ahead	14	77.78%
Entering Traffic Lane	2	11.11%
Slowing or Stopped In Traffic	1	5.56%
Making Right Turn	1	5.56%
Grand Total	18	100.00%

Unit 1 Contributing Factor	Crashes	%
Failure to Yield	8	44.44%
Ran Stop Sign	3	16.67%
Following Too Closely/ACDA	3	16.67%
None	2	11.11%
Drove off Road	1	5.56%
Vision Obstruction	1	5.56%
Grand Total	18	100.00%

Unit 1 Object Struck	Crashes	%
Nothing Struck	13	72.22%
Ditch	2	11.11%
Traffic Sign Post	1	5.56%
Building	1	5.56%
Embankment	1	5.56%
Grand Total	18	100.00%

Unit 1 Traffic Control	Crashes	%
Stop Sign	12	66.67%
No Control	6	33.33%
Grand Total	18	100.00%

Unit 1 Posted Speed	Crashes	%
45	2	11.11%
50	1	5.56%
55	15	83.33%
Grand Total	18	100.00%

Unit 1 Direction From	Crashes	%
South	7	38.89%
North	5	27.78%
East	4	22.22%
West	2	11.11%
Grand Total	18	100.00%

Unit 1 Direction To	Crashes	%
North	7	38.89%
South	6	33.33%
West	4	22.22%
East	1	5.56%
Grand Total	18	100.00%

1.85 STA SR 173 at Columbus (CR67A) CAMTool 2019-2023

Crash Summary Sheet

Unit 1 Summary

Unit 1 Type	Crashes	%
Passenger Car	7	38.89%
Passenger Van (minivan)	3	16.67%
Pick up	3	16.67%
Sport Utility Vehicle	2	11.11%
Van (9-15 Seats)	1	5.56%
Cargo Van	1	5.56%
Single Unit Truck	1	5.56%
Grand Total	18	100.00%

Unit 1 Special Function	Crashes	%
None	16	88.89%
Towing	1	5.56%
Other / Unknown	1	5.56%
Grand Total	18	100.00%

1.85 STA SR 173 at Columbus (CR67A) CAMTool 2019-2023

Crash Summary Sheet

Unit 2 Summary

Unit 2 Pre-Crash Action	Crashes	%
Straight Ahead	13	72.22%
	2	11.11%
Making Left Turn	2	11.11%
Making Right Turn	1	5.56%
Grand Total	18	100.00%

Unit 2 Contributing Factor	Crashes	%
None	15	83.33%
	2	11.11%
Failure to Yield	1	5.56%
Grand Total	18	100.00%

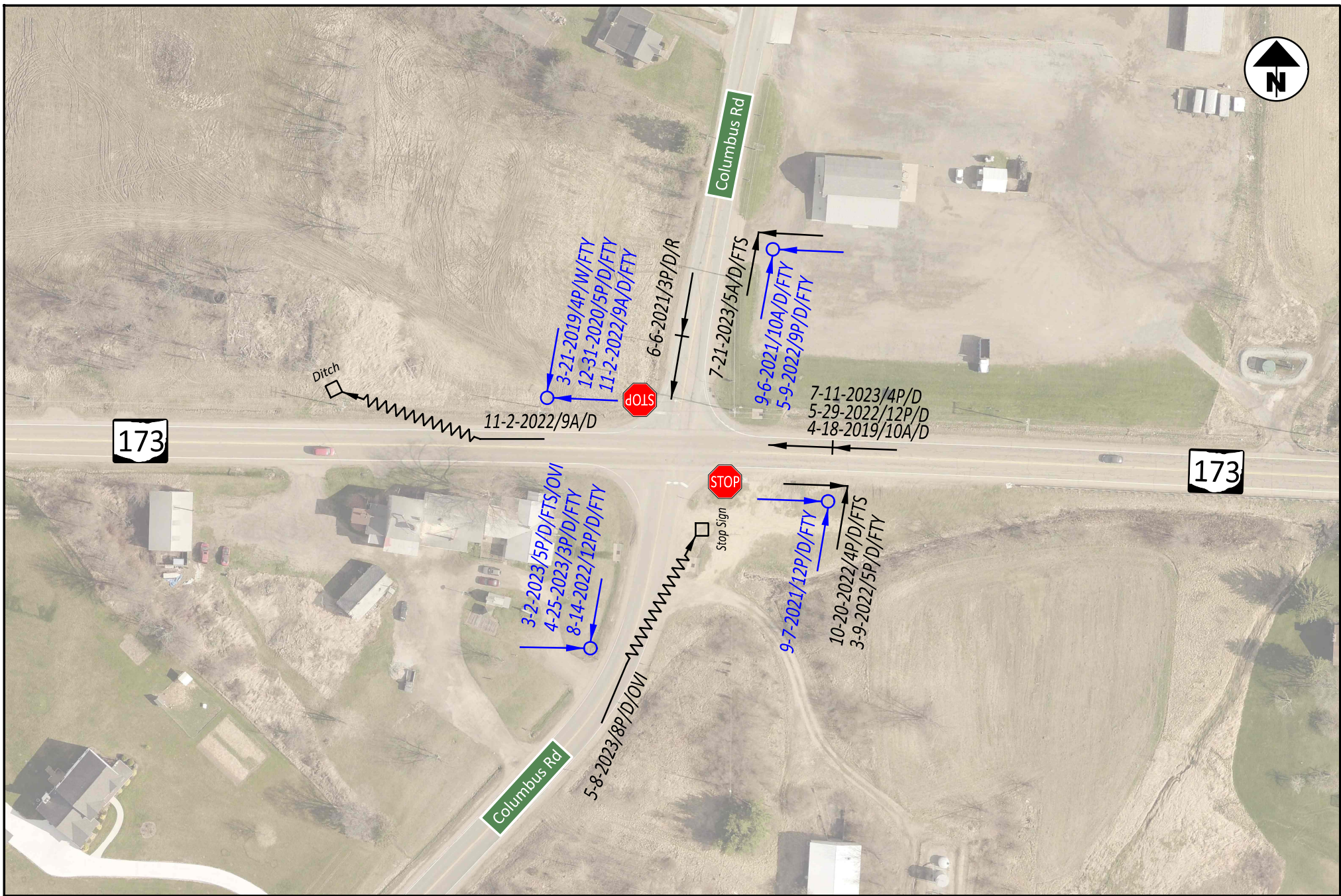
Unit 2 Direction From	Crashes	%
	2	11.11%
East	9	50.00%
North	1	5.56%
West	6	33.33%
Grand Total	18	100.00%

Unit 2 Direction To	Crashes	%
	2	11.11%
East	6	33.33%
North	1	5.56%
South	3	16.67%
West	6	33.33%
Grand Total	18	100.00%

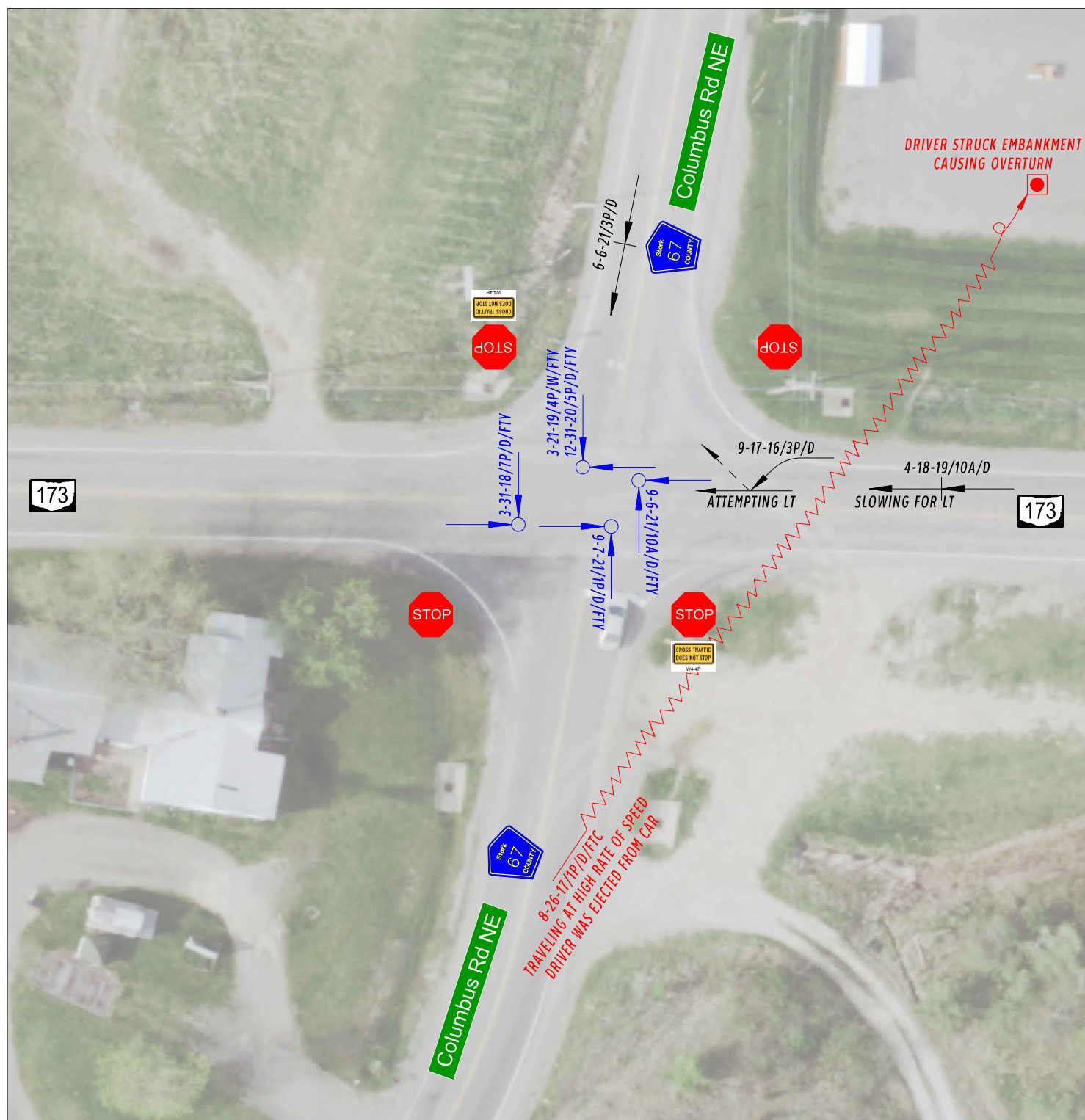
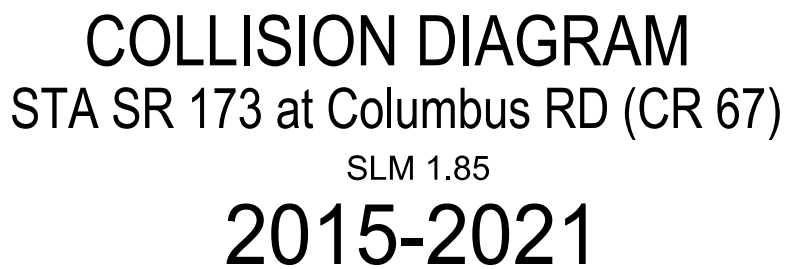
Unit 2 Type	Crashes	%
Pick up	6	33.33%
Passenger Car	5	27.78%
Sport Utility Vehicle	4	22.22%
	2	11.11%
Passenger Van (minivan)	1	5.56%
Grand Total	18	100.00%

Unit 2 Special Function	Crashes	%
None	16	88.89%
	2	11.11%
Grand Total	18	100.00%

Appendix D – Crash Diagrams



Vehicle Direction Backing Pedestrian Out of Control Overturn	Injury Fatal Fixed Object Parked Vehicle Collision Information Road Condition: D - Dry W - Wet S - Snow I - Ice	FTY - Failure to Yield FTS - Failure to Stop FTC - Failure to Control LOC - Left of Center RRL - Ran Red Light OVI - Operating Vehicle Impaired	TOTAL CRASHES ON PAGE FREQUENCY 2 2019 1 2020 3 2021 7 2022 5 2023 SEVERITY 9 NON-INJURY 9 INJURY/FATAL 18 TOTAL	STATE OF OHIO DEPARTMENT OF TRANSPORTATION	COLLISION DIAGRAM STA SR173 AT Columbus (CR67A) SLM 1.85 2019-2023
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 Vehicle Direction  Backing  Pedestrian  Out of Control  Overturn	 Injury  Fatal  Fixed Object  Parked Vehicle TEXT Date/Time/Road/Egress Direction	Road: D = Dry W = Wet I = Ice S = Snow	FTC = Failure To Control FTS = Failure To Stop FTY = Failure To Yield LOC = Left of Center RRL = Ran Red Light OVI = Operating Vehicle Impaired	<table><tr><th colspan="4">TOTAL CRASHES ON PAGE</th></tr><tr><th colspan="2">FREQUENCY</th><th colspan="2">CRASH SEVERITY</th></tr><tr><td>0</td><td>2015</td><td>2</td><td>2019</td></tr><tr><td>1</td><td>2016</td><td>1</td><td>2020</td></tr><tr><td>1</td><td>2017</td><td>3</td><td>2021</td></tr><tr><td>1</td><td>2018</td><td></td><td></td></tr></table> 3 NON - INJURY 6 INJURY OR FATAL 9 TOTAL	TOTAL CRASHES ON PAGE				FREQUENCY		CRASH SEVERITY		0	2015	2	2019	1	2016	1	2020	1	2017	3	2021	1	2018		
TOTAL CRASHES ON PAGE																												
FREQUENCY		CRASH SEVERITY																										
0	2015	2	2019																									
1	2016	1	2020																									
1	2017	3	2021																									
1	2018																											

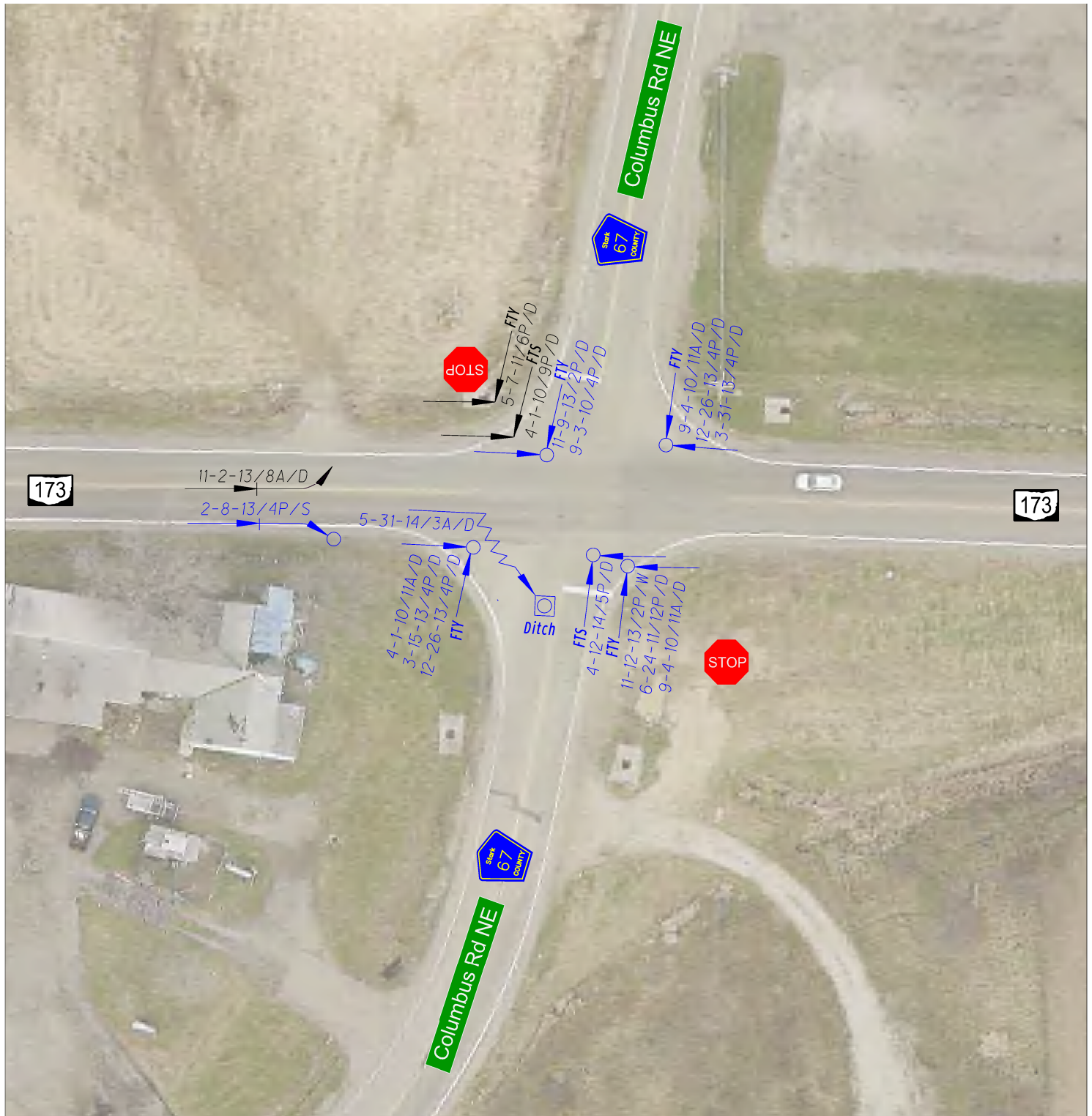
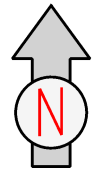


COLLISION DIAGRAM

STA SR 173 at Columbus Rd (CR 67)

SLM 1.85

2010-2014



 	 	TEXT Date/Time/Road/Egress Direction	Road: D = Dry W = Wet I = Ice S = Snow	FTC = Failure To Control FTS = Failure To Stop FTV = Failure To Yield LOC = Left of Center RRL = Ran Red Light OVI = Operating Vehicle Impaired	TOTAL CRASHES ON PAGE	
					FREQUENCY	CRASH SEVERITY
					4 2010 7 2013 2 2011 2 2014 0 2012	3 NON - INJURY 12 INJURY OR FATAL 15 TOTAL

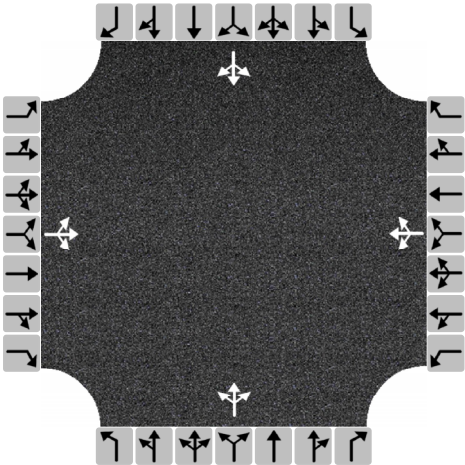
Appendix E – AWSC Capacity Analysis Results

HCS All-Way Stop Control Report

General and Site Information

Analyst	AC
Agency/Co.	Woolpert
Date Performed	5/15/2025
Analysis Year	2049
Analysis Time Period (hrs)	0.25
Time Analyzed	2049 AM Peak
Project Description	STA-173-1.85 AWSC
Intersection	SR 173 at Columbus Rd
Jurisdiction	Stark County
East/West Street	SR 173
North/South Street	Columbus Rd
Peak Hour Factor	0.92

Lanes



Turning Movement Demand Volumes

Approach	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
Volume (veh/h)	20	230	20	50	280	20	20	40	50	20	50	30
% Thrus in Shared Lane												

Lane Flow Rate and Adjustments

Approach	Eastbound			Westbound			Northbound			Southbound		
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration	LTR			LTR			LTR			LTR		
Flow Rate, v (veh/h)	293			380			120			109		
Percent Heavy Vehicles	3			3			3			3		
Initial Departure Headway, h_d (s)	3.20			3.20			3.20			3.20		
Initial Degree of Utilization, x	0.261			0.338			0.106			0.097		
Final Departure Headway, h_d (s)	5.14			5.05			5.66			5.78		
Final Degree of Utilization, x	0.419			0.533			0.188			0.174		
Move-Up Time, m (s)	2.0			2.0			2.0			2.0		
Service Time, t_s (s)	3.14			3.05			3.66			3.78		

Capacity, Delay and Level of Service

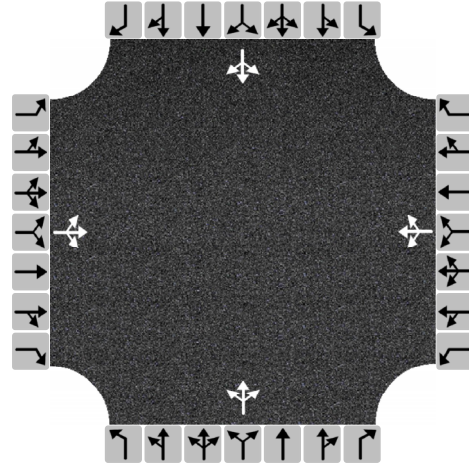
Approach	Eastbound			Westbound			Northbound			Southbound		
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration	LTR			LTR			LTR			LTR		
Flow Rate, v (veh/h)	293			380			120			109		
Capacity (veh/h)	701			713			636			623		
95% Queue Length, Q ₉₅ (veh)	2.1			3.2			0.7			0.6		
95% Queue Length, Q ₉₅ (ft)	53.8			81.9			17.9			15.4		
Control Delay (s/veh)	11.8			13.7			10.0			10.0		
Level of Service, LOS	B			B			A			A		
Approach Delay (s/veh) LOS	11.8		B	13.7		B	10.0		A	10.0		A
Intersection Delay (s/veh) LOS	12.1						B					

HCS All-Way Stop Control Report

General and Site Information

Analyst	AC
Agency/Co.	Woolpert
Date Performed	5/15/2025
Analysis Year	2049
Analysis Time Period (hrs)	0.25
Time Analyzed	2049 PM Peak
Project Description	STA-173-1.85 AWSC
Intersection	SR 173 at Columbus Rd
Jurisdiction	Stark County
East/West Street	SR 173
North/South Street	Columbus Rd
Peak Hour Factor	0.92

Lanes



Turning Movement Demand Volumes

Approach	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
Volume (veh/h)	40	290	20	50	280	20	20	70	40	30	60	30
% Thrus in Shared Lane												

Lane Flow Rate and Adjustments

Approach	Eastbound			Westbound			Northbound			Southbound		
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration	LTR			LTR			LTR			LTR		
Flow Rate, v (veh/h)	380			380			141			130		
Percent Heavy Vehicles	3			3			3			3		
Initial Departure Headway, h_d (s)	3.20			3.20			3.20			3.20		
Initial Degree of Utilization, x	0.338			0.338			0.126			0.116		
Final Departure Headway, h_d (s)	5.41			5.42			6.15			6.23		
Final Degree of Utilization, x	0.572			0.573			0.241			0.226		
Move-Up Time, m (s)	2.0			2.0			2.0			2.0		
Service Time, t_s (s)	3.41			3.42			4.15			4.23		

Capacity, Delay and Level of Service

Approach	Eastbound			Westbound			Northbound			Southbound						
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3				
Configuration	LTR			LTR			LTR			LTR						
Flow Rate, v (veh/h)	380			380			141			130						
Capacity (veh/h)	665			664			586			578						
95% Queue Length, Q ₉₅ (veh)	3.6			3.6			0.9			0.9						
95% Queue Length, Q ₉₅ (ft)	92.2			92.2			23.0			23.0						
Control Delay (s/veh)	15.4			15.4			11.1			11.0						
Level of Service, LOS	C			C			B			B						
Approach Delay (s/veh) LOS	15.4		C		15.4		C		11.1		B		11.0		B	
Intersection Delay (s/veh) LOS	14.3						B									

Appendix F – Signal Warrant Analysis

STUDY AND ANALYSIS INFORMATION

Municipality:	Stark County	Traffic Volumes Obtained By:	ODOT District 4
County:	Stark	Analysis Date:	2/18/2025
ODOT Engineering District:	4	Agency/ Company Name Performing Warrant Analysis:	Woolpert
Google map link:	Map		

Analysis Information

Data Collection Date: 9/11/2024
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 173

Major Street Approach Direction: E-Bound
W-Bound

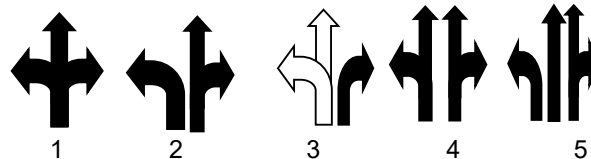
Number of Thru Lanes on Each Major Street Approach: 1 LANE(S)

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: Columbus Rd

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

	Applicable?	100% Warrant Satisfied?	Notes and Comments:
			*Known error: if Speed Limit < 45mph, it may not state that it passes at 70%.
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 4:00 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. Peak Hour 4:45 PM 5:45 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	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	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*							
			100%		70%		100%		70%		Cond. A		Cond. B		Cond. A		Cond. B	
	Major	Minor	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	0	0																
12:15 AM	0	0																
12:30 AM	0	0																
12:45 AM	0	0																
1:00 AM	0	0																
1:15 AM	0	0																
1:30 AM	0	0																
1:45 AM	0	0																
2:00 AM	0	0																
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5:15 AM	0	0																
5:30 AM	0	0																
5:45 AM	0	0																
6:00 AM	0	0																
6:15 AM	84	15																
6:30 AM	204	32																
6:45 AM	335	51													1			
7:00 AM	448	72			1						1						1	1
7:15 AM	438	76																
7:30 AM	397	66																
7:45 AM	328	62													1			
8:00 AM	289	54																
8:15 AM	287	50																
8:30 AM	263	52																
8:45 AM	269	53																
9:00 AM	258	50																
9:15 AM	236	53																
9:30 AM	236	52																
9:45 AM	242	43																
10:00 AM	252	40																
10:15 AM	251	35																
10:30 AM	256	40																
10:45 AM	249	42																
11:00 AM	226	54																
11:15 AM	234	57																
11:30 AM	240	61																
11:45 AM	237	65																
12:00 PM	254	58																
12:15 PM	275	61																
12:30 PM	284	57													1			
12:45 PM	282	58																
1:00 PM	288	55																
1:15 PM	296	60																
1:30 PM	308	67													1			
1:45 PM	328	65																
2:00 PM	344	74																
2:15 PM	352	70			1													
2:30 PM	378	75													1			
2:45 PM	400	80									1							
3:00 PM	428	87															1	1
3:15 PM	436	104			1													
3:30 PM	451	109													1	1		
3:45 PM	467	119									1							

4:00 PM	499	109															1	1
4:15 PM	515	89	1		1													
4:30 PM	527	73						1	1					1				
4:45 PM	536	65								1								
5:00 PM	484	65															1	1
5:15 PM	448	64			1													
5:30 PM	405	74												1				
5:45 PM	350	88																
6:00 PM	326	84																
6:15 PM	244	70																
6:30 PM	147	48																
6:45 PM	73	13																
7:00 PM	0	0																
7:15 PM	0	0																
7:30 PM	0	0																
7:45 PM	0	0																
8:00 PM	0	0																
8:15 PM	0	0																
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9:30 PM	0	0																
9:45 PM	0	0																
10:00 PM	0	0																
10:15 PM	0	0																
10:30 PM	0	0																
10:45 PM	0	0																
11:00 PM	0	0																
11:15 PM	0	0																
11:30 PM	0	0																
11:45 PM	0	0																
HOURS MET			1	0	5	0	0	0	1	1	4	0	0	0	8	1	4	4
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)	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	Required Minimum Minor Street For 4C-1	Required Minimum Minor Street For 4C-2	Highest Actual Minor Street Approach Volumes	Hour Met?	Hour Met? (70% Factor)
	Minor - Columbus Rd		Major - SR 173							
	N-Bound	S-Bound	W-Bound	E-Bound						
12:00 AM	0	0	0	0	0	550	377	0		
12:15 AM	0	0	0	0	0	550	377	0		
12:30 AM	0	0	0	0	0	550	377	0		
12:45 AM	0	0	0	0	0	550	377	0		
1:00 AM	0	0	0	0	0	550	377	0		
1:15 AM	0	0	0	0	0	550	377	0		
1:30 AM	0	0	0	0	0	550	377	0		
1:45 AM	0	0	0	0	0	550	377	0		
2:00 AM	0	0	0	0	0	550	377	0		
2:15 AM	0	0	0	0	0	550	377	0		
2:30 AM	0	0	0	0	0	550	377	0		
2:45 AM	0	0	0	0	0	550	377	0		
3:00 AM	0	0	0	0	0	550	377	0		
3:15 AM	0	0	0	0	0	550	377	0		
3:30 AM	0	0	0	0	0	550	377	0		
3:45 AM	0	0	0	0	0	550	377	0		
4:00 AM	0	0	0	0	0	550	377	0		
4:15 AM	0	0	0	0	0	550	377	0		
4:30 AM	0	0	0	0	0	550	377	0		
4:45 AM	0	0	0	0	0	550	377	0		
5:00 AM	0	0	0	0	0	550	377	0		
5:15 AM	0	0	0	0	0	550	377	0		
5:30 AM	0	0	0	0	0	550	377	0		
5:45 AM	0	0	0	0	0	550	377	0		
6:00 AM	0	0	0	0	0	550	377	0		
6:15 AM	15	14	50	34	84	493	323	15		
6:30 AM	31	32	118	86	204	418	253	32		
6:45 AM	47	51	206	129	335	343	189	51		
7:00 AM	72	72	260	188	448	286	143	72		
7:15 AM	67	76	254	184	438	291	147	76		
7:30 AM	59	66	223	174	397	311	163	66		
7:45 AM	58	62	168	160	328	347	192	62		
8:00 AM	47	54	152	137	289	369	210	54		
8:15 AM	50	50	150	137	287	370	211	50		
8:30 AM	52	51	143	120	263	383	223	52		
8:45 AM	53	46	151	118	269	380	220	53		
9:00 AM	50	38	144	114	258	386	225	50		
9:15 AM	53	32	129	107	236	399	236	53		
9:30 AM	52	35	120	116	236	399	236	52		
9:45 AM	43	31	116	126	242	395	233	43		
10:00 AM	40	30	125	127	252	390	228	40		
10:15 AM	35	33	130	121	251	390	229	35		
10:30 AM	40	28	146	110	256	387	226	40		
10:45 AM	42	29	146	103	249	391	230	42		
11:00 AM	54	37	130	96	226	405	242	54		
11:15 AM	57	38	128	106	234	400	237	57		
11:30 AM	61	39	137	103	240	396	234	61		
11:45 AM	65	41	136	101	237	398	236	65		
12:00 PM	58	37	144	110	254	388	227	58		
12:15 PM	61	34	152	123	275	376	217	61		
12:30 PM	57	40	143	141	284	371	213	57		

12:45 PM	58	48	140	142	282	373	213	58		
1:00 PM	55	49	156	132	288	369	211	55		
1:15 PM	60	47	172	124	296	365	207	60		
1:30 PM	67	46	184	124	308	358	201	67		
1:45 PM	65	51	207	121	328	347	192	65		
2:00 PM	74	55	218	126	344	339	185	74		
2:15 PM	70	64	218	134	352	334	181	70		
2:30 PM	75	64	224	154	378	321	170	75		
2:45 PM	80	64	222	178	400	310	162	80		
3:00 PM	87	69	214	214	428	296	151	87		
3:15 PM	104	67	219	217	436	292	148	104		
3:30 PM	109	68	223	228	451	285	142	109		
3:45 PM	119	72	236	231	467	277	136	119		
4:00 PM	109	66	252	247	499	262	125	109		
4:15 PM	89	73	257	258	515	255	120	89		
4:30 PM	71	73	270	257	527	250	116	73		
4:45 PM	65	62	264	272	536	246	114	65		
5:00 PM	65	60	243	241	484	269	130	65		
5:15 PM	64	54	226	222	448	286	143	64		
5:30 PM	74	51	206	199	405	307	160	74		
5:45 PM	88	45	189	161	350	336	182	88		
6:00 PM	84	46	180	146	326	348	193	84		
6:15 PM	70	32	133	111	244	394	232	70		
6:30 PM	48	21	81	66	147	453	285	48		
6:45 PM	13	13	37	36	73	500	330	13		
7:00 PM	0	0	0	0	0	550	377	0		
7:15 PM	0	0	0	0	0	550	377	0		
7:30 PM	0	0	0	0	0	550	377	0		
7:45 PM	0	0	0	0	0	550	377	0		
8:00 PM	0	0	0	0	0	550	377	0		
8:15 PM	0	0	0	0	0	550	377	0		
8:30 PM	0	0	0	0	0	550	377	0		
8:45 PM	0	0	0	0	0	550	377	0		
9:00 PM	0	0	0	0	0	550	377	0		
9:15 PM	0	0	0	0	0	550	377	0		
9:30 PM	0	0	0	0	0	550	377	0		
9:45 PM	0	0	0	0	0	550	377	0		
10:00 PM	0	0	0	0	0	550	377	0		
10:15 PM	0	0	0	0	0	550	377	0		
10:30 PM	0	0	0	0	0	550	377	0		
10:45 PM	0	0	0	0	0	550	377	0		
11:00 PM	0	0	0	0	0	550	377	0		
11:15 PM	0	0	0	0	0	550	377	0		
11:30 PM	0	0	0	0	0	550	377	0		
11:45 PM	0	0	0	0	0	550	377	0		

OMUTCD WARRANT 3, PEAK HOUR				Hour Vehicular Volume				
Number of Lanes for Moving Traffic on Each Approach		Peak Hour Start time	4:00 PM	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
Major Street:	1 Lane	Peak Hour End Time	5:00 PM					
Minor Street:	1 Lane							
				12:00 AM	0	0	0	0
				12:15 AM	0	0	0	0
				12:30 AM	0	0	0	0
				12:45 AM	0	0	0	0
				1:00 AM	0	0	0	0
				1:15 AM	0	0	0	0
				1:30 AM	0	0	0	0
				1:45 AM	0	0	0	0
				2:00 AM	0	0	0	0
				2:15 AM	0	0	0	0
				2:30 AM	0	0	0	0
				2:45 AM	0	0	0	0
				3:00 AM	0	0	0	0
				3:15 AM	0	0	0	0
				3:30 AM	0	0	0	0
				3:45 AM	0	0	0	0
				4:00 AM	0	0	0	0
				4:15 AM	0	0	0	0
				4:30 AM	0	0	0	0
				4:45 AM	0	0	0	0
				5:00 AM	0	0	0	0
				5:15 AM	0	0	0	0
				5:30 AM	0	0	0	0
				5:45 AM	0	0	0	0
				6:00 AM	0	0	0	0
				6:15 AM	84	15	99	113
				6:30 AM	204	32	236	267
				6:45 AM	335	51	386	433
				7:00 AM	448	72	520	592
				7:15 AM	438	76	514	581
				7:30 AM	397	66	463	522
				7:45 AM	328	62	390	448
				8:00 AM	289	54	343	390
				8:15 AM	287	50	337	387
				8:30 AM	263	52	315	366
				8:45 AM	269	53	322	368
				9:00 AM	258	50	308	346
				9:15 AM	236	53	289	321
				9:30 AM	236	52	288	323
				9:45 AM	242	43	285	316
				10:00 AM	252	40	292	322
				10:15 AM	251	35	286	319
				10:30 AM	256	40	296	324
				10:45 AM	249	42	291	320
				11:00 AM	226	54	280	317
				11:15 AM	234	57	291	329
				11:30 AM	240	61	301	340
				11:45 AM	237	65	302	343
				12:00 PM	254	58	312	349
				12:15 PM	275	61	336	370
				12:30 PM	284	57	341	381
				12:45 PM	282	58	340	388
				1:00 PM	288	55	343	392
				1:15 PM	296	60	356	403
				1:30 PM	308	67	375	421
				1:45 PM	328	65	393	444
				2:00 PM	344	74	418	473
				2:15 PM	352	70	422	486
				2:30 PM	378	75	453	517
				2:45 PM	400	80	480	544
				3:00 PM	428	87	515	584
				3:15 PM	436	104	540	607
				3:30 PM	451	109	560	628
				3:45 PM	467	119	586	658
				4:00 PM	499	109	608	674
				4:15 PM	515	89	604	677
				4:30 PM	527	73	600	671
				4:45 PM	536	65	601	663
				5:00 PM	484	65	549	609
				5:15 PM	448	64	512	566
				5:30 PM	405	74	479	530
				5:45 PM	350	88	438	483
				6:00 PM	326	84	410	456
				6:15 PM	244	70	314	346
				6:30 PM	147	48	195	216
				6:45 PM	73	13	86	99
				7:00 PM	0	0	0	0
				7:15 PM	0	0	0	0
				7:30 PM	0	0	0	0
				7:45 PM	0	0	0	0
				8:00 PM	0	0	0	0
				8:15 PM	0	0	0	0
				8:30 PM	0	0	0	0
				8:45 PM	0	0	0	0
				9:00 PM	0	0	0	0
				9:15 PM	0	0	0	0
				9:30 PM	0	0	0	0
				9:45 PM	0	0	0	0
				10:00 PM	0	0	0	0
				10:15 PM	0	0	0	0
				10:30 PM	0	0	0	0
				10:45 PM	0	0	0	0
				11:00 PM	0	0	0	0
				11:15 PM	0	0	0	0
				11:30 PM	0	0	0	0
				11:45 PM	0	0	0	0

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
--	----

Figure 4C-3. Warrant 3 Peak Hour

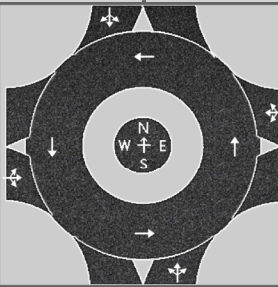
Warrant 3 Peak Hour (70% Factor)
(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)

Appendix G – Roundabout Capacity Analysis

HCS Roundabouts Report

General Information

Analyst	AC
Agency or Co.	Woolpert
Date Performed	2/20/2025
Analysis Year	2049
Time Analyzed	2049 AM Peak
Project Description	STA-173-1.85 Roundabout



Site Information

Intersection	SR 173 at Columbus Rd
E/W Street Name	SR 173
N/S Street Name	Columbus Rd
Analysis Time Period, hrs	0.25
Peak Hour Factor	0.92
Jurisdiction	Stark 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	20	230	20	0	50	280	20	0	20	40	50	0	20	50	30
Percent Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Flow Rate (v _{PCE}), pc/h	0	22	258	22	0	56	313	22	0	22	45	56	0	22	56	34
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			
Proportion of CAVs, %	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		302			391			123			112	
Entry Volume, veh/h		293			380			119			109	
Circulating Flow (v_c), pc/h	134			89			302			391		
Exiting Flow (v_{ex}), pc/h	336			369			89			134		
Capacity (C_{pce}), pc/h		1204			1260			1014			926	
Capacity (c), veh/h		1169			1224			985			899	
v/c Ratio (x)		0.25			0.31			0.12			0.12	

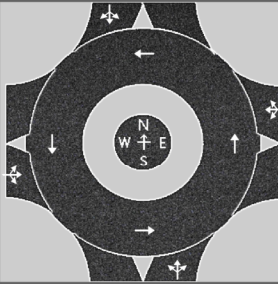
Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		5.4			5.8			4.8			5.2	
Lane LOS		A			A			A			A	
95% Queue Length, Q_{95} (veh)		1.0			1.3			0.4			0.4	
95% Queue Length, Q_{95} (ft)		25.6			33.3			10.2			10.2	
Approach Delay, s/veh LOS	5.4	A		5.8	A		4.8	A		5.2	A	
Intersection Delay, s/veh LOS	5.4						A					

HCS Roundabouts Report

General Information

Analyst	AC
Agency or Co.	Woolpert
Date Performed	2/20/2025
Analysis Year	2049
Time Analyzed	2049 PM Peak
Project Description	STA-173-1.85 Roundabout



Site Information

Intersection	SR 173 at Columbus Rd
E/W Street Name	SR 173
N/S Street Name	Columbus Rd
Analysis Time Period, hrs	0.25
Peak Hour Factor	0.92
Jurisdiction	Stark 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	40	290	20	0	50	280	20	0	20	70	40	0	30	60	30
Percent Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Flow Rate (v _{PCE}), pc/h	0	45	325	22	0	56	313	22	0	22	78	45	0	34	67	34
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			
Proportion of CAVs, %	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		392			391			145			135	
Entry Volume, veh/h		381			380			141			131	
Circulating Flow (v_c), pc/h	157			145			404			391		
Exiting Flow (v_{ex}), pc/h	404			369			145			145		
Capacity (C_{pce}), pc/h		1176			1190			914			926	
Capacity (c), veh/h		1142			1156			887			899	
v/c Ratio (x)		0.33			0.33			0.16			0.15	

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		6.4			6.3			5.6			5.4	
Lane LOS		A			A			A			A	
95% Queue Length, Q_{95} (veh)		1.5			1.4			0.6			0.5	
95% Queue Length, Q_{95} (ft)		38.4			35.8			15.4			12.8	
Approach Delay, s/veh LOS	6.4	A		6.3	A		5.6	A		5.4	A	
Intersection Delay, s/veh LOS	6.1						A					

Appendix H – Proposed Roundabout Geometrics

LEGEND



FULL DEPTH PAVEMENT



6" RAISED CONC. MEDIAN



MOUNTABLE TRUCK APRON



GREEN SPACE



EXISTING RIGHT-OF-WAY FROM GIS



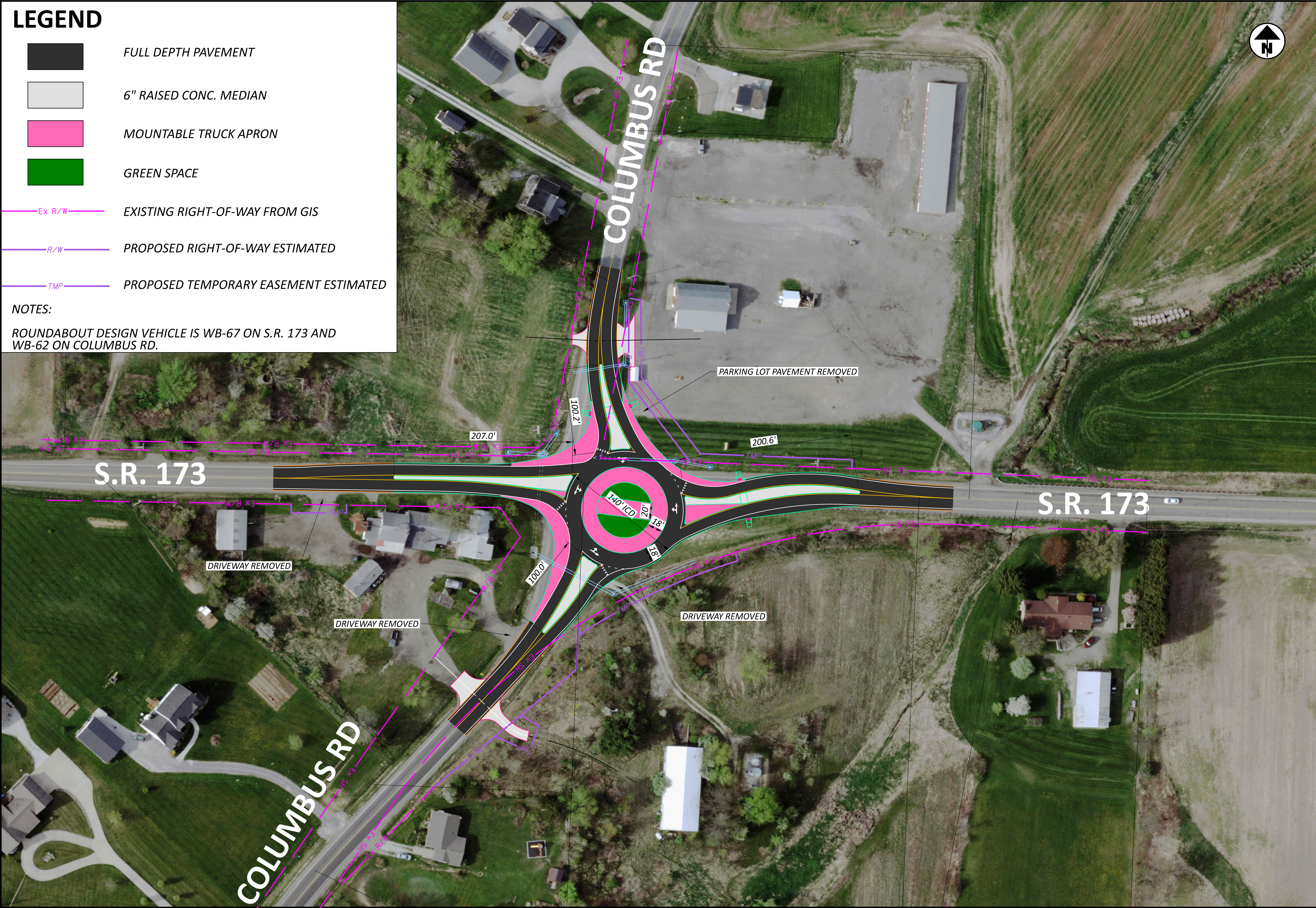
PROPOSED RIGHT-OF-WAY ESTIMATED

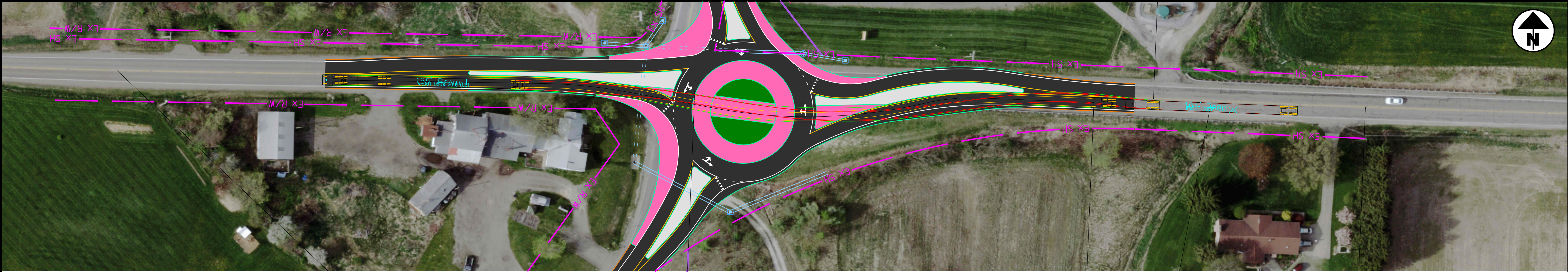


PROPOSED TEMPORARY EASEMENT ESTIMATED

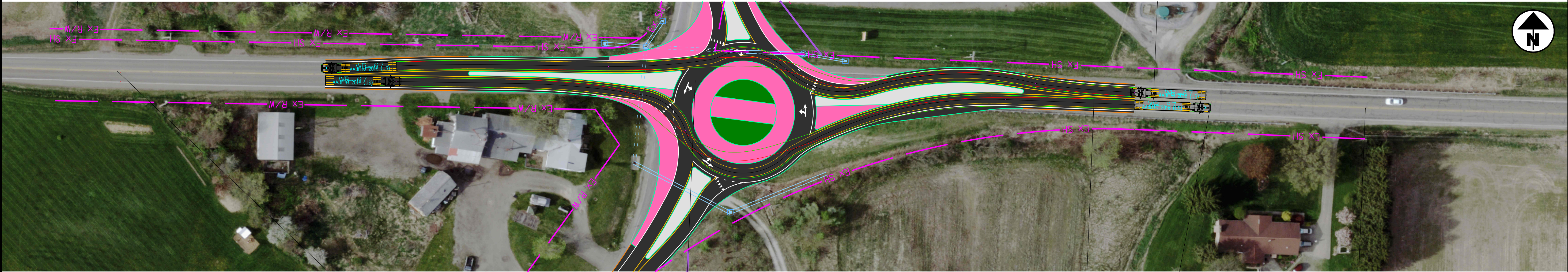
NOTES:

ROUNDABOUT DESIGN VEHICLE IS WB-67 ON S.R. 173 AND
WB-62 ON COLUMBUS RD.

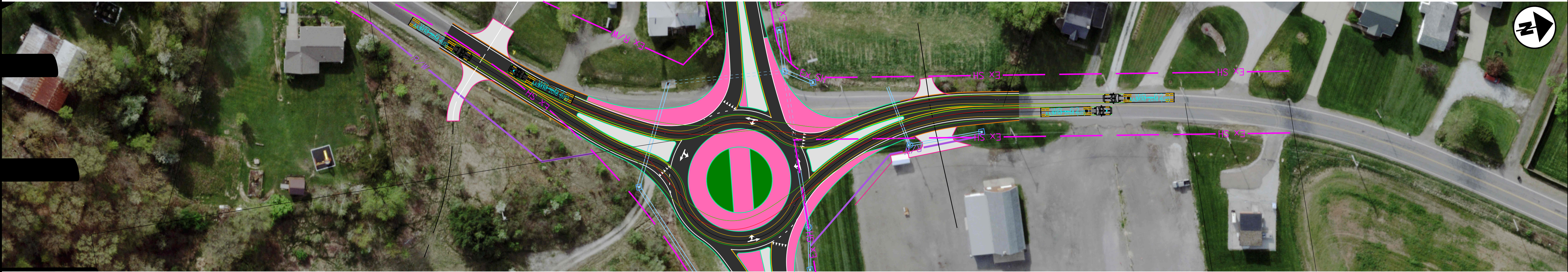




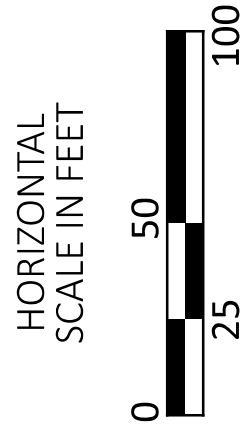
S.R. 173 - SUPERLOAD



S.R. 173 - THRU



COLUMBUS RD - THRU



STA-173-1.85
TRUCK TURNS

DESIGN AGENCY



DESIGNER

AKA

REVIEWER

AC 05-09-25

PROJECT ID

0

SUBSET

0

TOTAL

0

SHEET

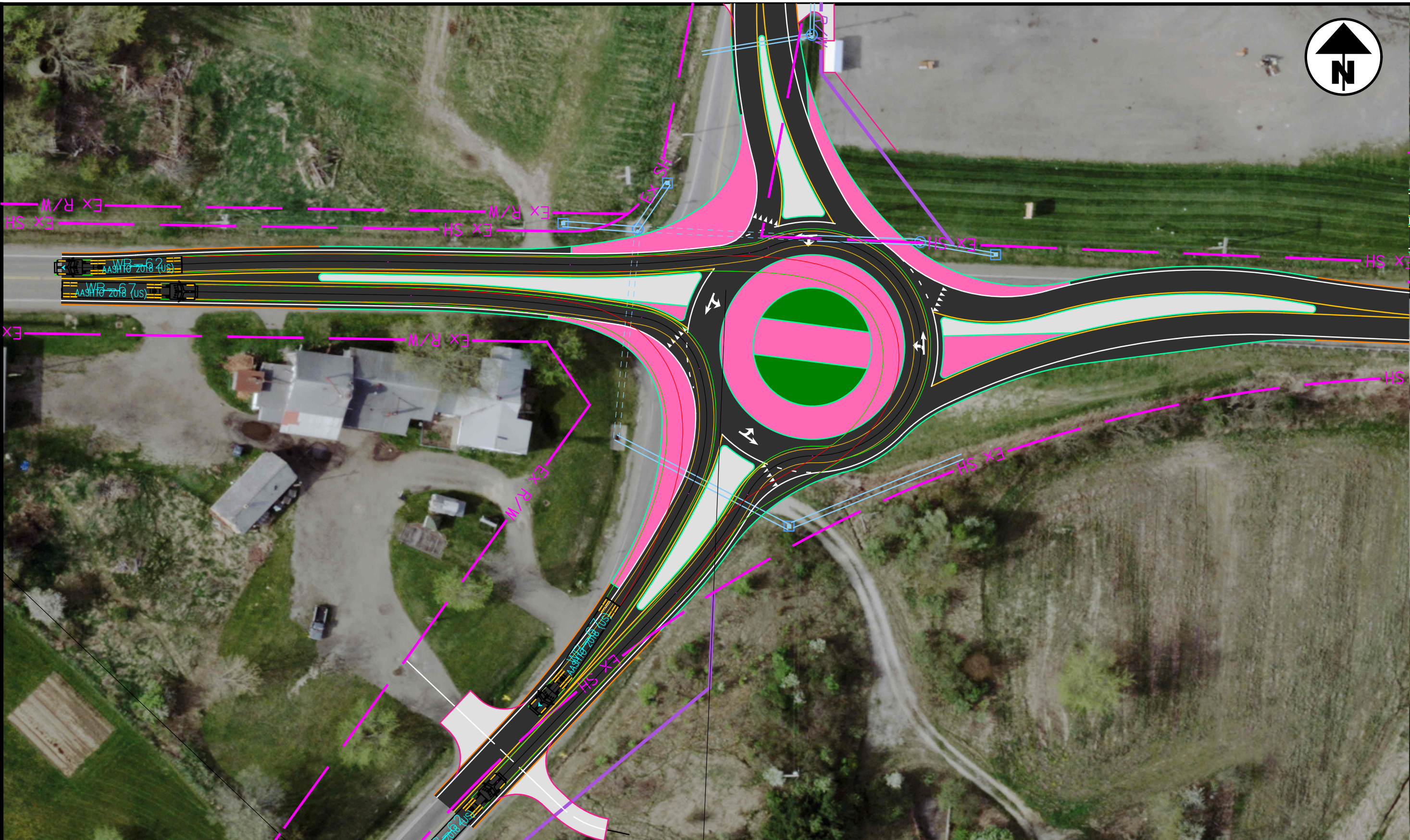
P.2

TOTAL

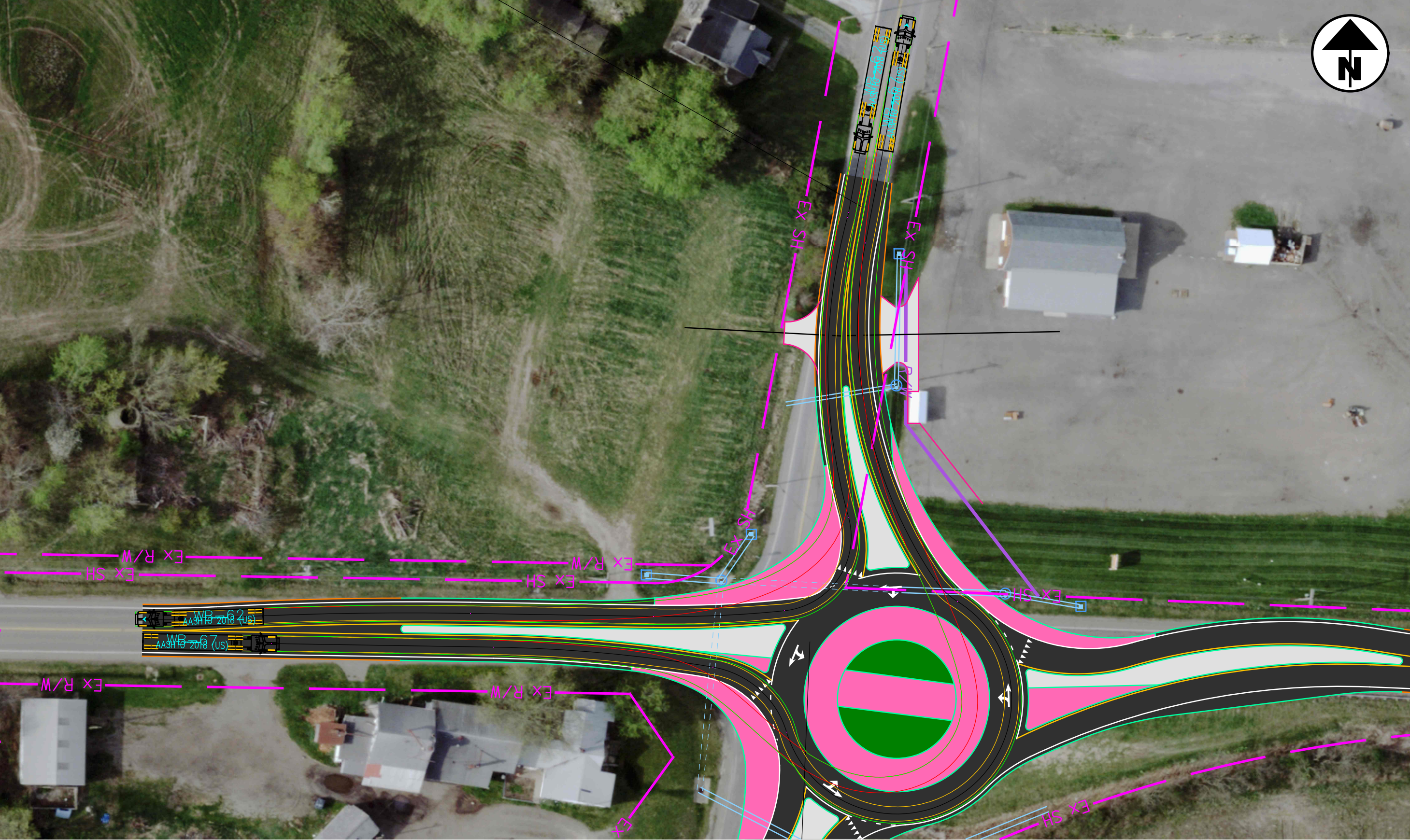
P.3



SB COLUMBUS TO EB S.R. 173 - LEFT
WB S.R. 173 TO NB COLUMBUS - RIGHT



NB COLUMBUS TO WB S.R. 173 - LEFT
EB S.R. 173 TO SB COLUMBUS - RIGHT



EB S.R. 173 TO NB COLUMBUS- LEFT
SB COLUMBUS TO WB S.R. 173 - RIGHT



WB S.R. 173 TO SB COLUMBUS- LEFT
NB COLUMBUS TO EB S.R. 173 - RIGHT

DESIGN AGENCY



DESIGNER

AKA

REVIEWER

AC 05-09-25

PROJECT ID

0

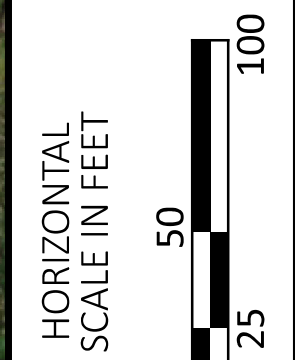
SUBSET TOTAL

0 0

SHEET TOTAL

P.3 P.3

STA-173-1.85
TRUCK TURNS



Roundabout Critical Design Parameters
Project - County Route Section
STA-173-1.85

CIRCLE ROUNDABOUT	COLUMBUS RD NB	SR 173 WB	COLUMBUS RD SB	SR 173 EB
Design Parameters	Leg 1	Leg 2	Leg 3	Leg 4
Inscribed Circle Diameter, FT	140			
Entry Width, FT	14.7	15.9	15.1	15.8
Entry Angle PHI ϕ , DEG	42.4	34.1	41.2	41.4
Exit Width, FT	14.8	12.1	12.2	12
Circulatory Roadway Width, FT	18'	18'	18'	18'

Fastest Path Speed	Leg 1	Leg 2	Leg 3	Leg 4
R ₁ , Radius/Speed, FT/MPH	86.8/19.3	119.0/21.8	77.0/18.4	71.7/17.9
R ₂ , Radius/Speed, FT/MPH	57.4/15.3	81.6/17.4	91.2/18.2	61.7/15.7
R ₃ , Radius/Speed, FT/MPH	191.9/26.2	347.7/27.3*	144.9/23.5	339/29.4*
R ₄ , Radius/Speed, FT/MPH	53.1/14.9	55.8/15.2	57.3/15.3	58.5/15.4
R ₅ , Radius/Speed, FT/MPH	267.6/29.8	119.9/21.9	37.1/13.9	55.0/16.2
R ₅ , Bypass Radius/Speed, FT/MPH	N/A	N/A	N/A	N/A
* = Acceleration Controlled				

Minimum Sight Parameters	Leg 1	Leg 2	Leg 3	Leg 4
Approach Design Speed, MPH	60	40	60	40
Approach Stopping Sight Distance, FT/MPH	155/25	155/25	155/25	155/25
Circulatory Stopping Sight Distance, FT/MPH	155/25	155/25	155/25	155/25
Exit (Crosswalk) Stopping Sight Distance, FT/MPH	N/A	N/A	N/A	N/A
Intersection Sight Distance, FT/MPH	155/25	155/25	155/25	155/25

General	
Design Vehicle(s)	WB-67 : SR 173 , WB-62 : COLUMBUS RD
Truck Apron Width, FT	18'

Designer: AKA

Signature:

Date:

Appendix I – Cost Estimate



Engineer's Estimate of Probable Construction Costs

WOOLPERT
DESIGN | GEOSPATIAL | INFRASTRUCTURE
4454 Idea Center Blvd
Dayton, OH 45430
Phone: 937.461.5660

Project: STA-173-1.85
Location: Stark County, OH
Description: Circle Roundabout

Date: July 18, 2025
Calc. By: AKA
Checked By: AC
Project No:

STA-173 Roundabout

ITEM	GRAND TOTAL	UNIT	DESCRIPTION	UNIT COST	ESTIMATED COST
ROADWAY					
201	1	LS	CLEARING & GRUBBING	\$25,000.00	\$25,000.00
202	5,757	SY	PAVEMENT REMOVED	\$15.38	\$88,549.50
202	150	FT	PIPE REMOVED, OVER 24"	\$50.00	\$7,500.00
202	5	EA	CATCH BASIN REMOVED	\$500.00	\$2,500.00
203	5,863	CY	EXCAVATION	\$25.00	\$146,576.39
203	6,254	CY	EMBANKMENT	\$20.00	\$125,078.52
204	7,011	SY	SUBGRADE COMPACTION	\$2.35	\$16,476.63
204	7,011	SY	STABILIZE SUBGRADE	\$35.00	\$245,396.67
609	1,386	FT	COMBINATION CURB AND GUTTER, TYPE 2 (OUTER CURBING)	\$50.00	\$69,300.00
609	2,313	FT	CURB TYPE 6 (SPLITTER ISLANDS & INNER CENTRAL APRON)	\$35.00	\$80,955.00
609	430	FT	CURB TYPE 10 (MOUNTABLE)	\$30.00	\$12,900.00
EROSION CONTROL					
659	2	EACH	SOIL ANALYSIS TEST	\$154.22	\$308.44
659	523	CY	TOPSOIL	\$37.95	\$19,860.77
659	4,715	SY	SEEDING AND MULCHING	\$1.80	\$8,486.60
659	0.64	TON	COMMERCIAL FERTILIZER	\$920.13	\$585.66
659	0.97	MGAL	WATER	\$5.38	\$5.24
659	25	ACRE	LIME	\$100.00	\$2,545.98
PAVEMENT					
MULTI	4,751	SY	ASPHALT PAVEMENT INSTALLATION	\$100.00	\$475,122.22
MULTI	611	SY	SPLITTER ISLAND INSTALLATION (4" OF 452, 4" OF 304)	\$60.00	\$36,673.33
452	289	SY	6" NON-REINFORCED CONCRETE PAVEMENT FOR DRIVES	\$83.39	\$24,108.98
452	1,360	SY	9" NON-REINFORCED CONCRETE PAVEMENT FOR TRUCK APRON	\$109.22	\$148,514.93
DRAINAGE					
605	2,839	FT	6" BASE PIPE UNDERDRAINS	\$15.00	\$42,585.00
611	5	EA	CATCH BASIN NO. 2-4	\$4,500.00	\$22,500.00
611	7	EA	CATCH BASIN, NO. 3A	\$3,500.00	\$24,500.00
611	4	EA	CATCH BASIN, NO. 3	\$4,200.00	\$16,800.00
611	6	EA	MANHOLE, NO. 3	\$5,000.00	\$30,000.00
611	425	FT	12" CONDUIT, TYPE B	\$130.00	\$55,250.00
611	106	FT	18" CONDUIT, TYPE B	\$145.00	\$15,406.25
611	505	FT	36" CONDUIT, TYPE B	\$380.00	\$191,900.00
TRAFFIC CONTROL					
630	1	LS	SIGN REMOVAL/INSTALLATION	\$10,000.00	\$10,000.00
644	1	LS	PAVEMENT MARKINGS	\$10,000.00	\$10,000.00
SIGNAL					
632	1	LS	ROUNDBOUT LIGHTING	\$150,000.00	\$150,000.00
MAINTENANCE OF TRAFFIC					
614	1	LS	MAINTAINING TRAFFIC	\$25,000.00	\$25,000.00
614	1	LS	DETOUR SIGNING	\$10,000.00	\$10,000.00
INCIDENTALS					
619	12	MNTH	FIELD OFFICE, TYPE A	\$2,500.00	\$30,000.00
623	1	LS	CONSTRUCTION LAYOUT STAKES AND SURVEYING	\$10,000.00	\$10,000.00
624	1	LS	MOBILIZATION (5 % OF CONSTRUCTION COST)	\$109,019.30	\$109,019.30
SUBTOTAL					\$2,289,405
INFLATION - BASED ON ESTIMATION START DATE OF 7/3/2025, CONSTRUCTION MID-POINT OF 7/1/2030 (21.3%)					\$487,643
DESIGN (25%)					\$572,351
CONTINGENCY (35%)					\$801,292
PRELIMINARY RIGHT OF WAY					
	0.220	ACRES	3309637, RESIDENTIAL	\$20,000.00	\$4,409.55
	0.138	ACRES	3104722, COMMERCIAL	\$30,000.00	\$4,132.92
	1	LS	AQUISITION SERVICES	\$30,000.00	\$30,000.00
PRELIMINARY UTILITY IMPACTS					
	1	LS	RELOCATE UTILITIES	\$50,000.00	\$50,000.00
PRELIMINARY RIGHT OF WAY AND UTILITIES TOTAL					\$88,542
TOTAL					\$4,239,234

Appendix J – ECAT Analysis Results



ECAT

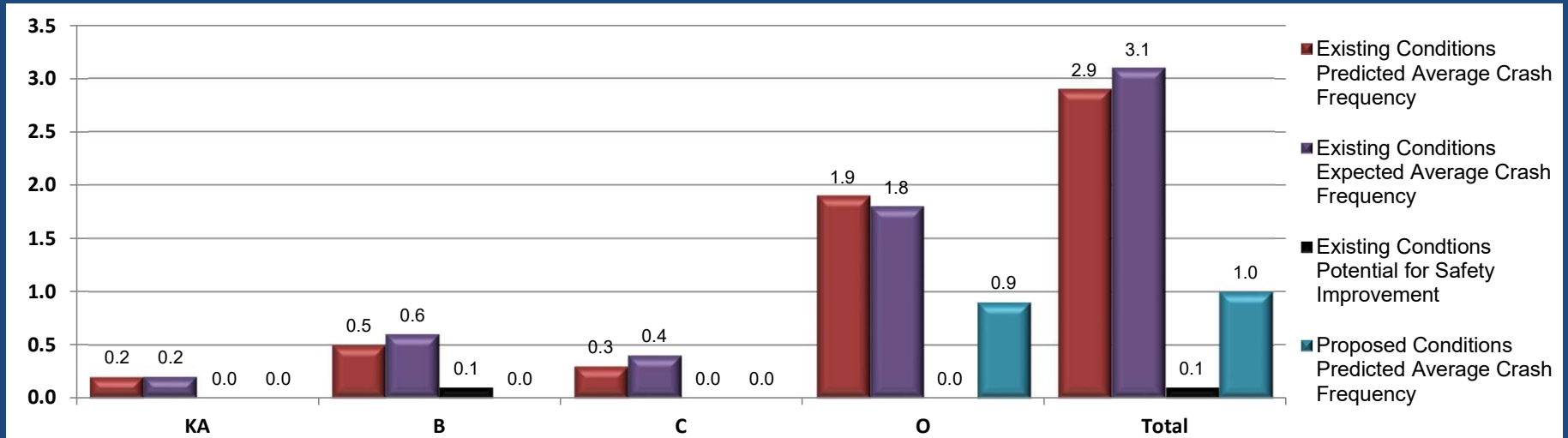
Economic Crash Analysis Tool

Project Safety Performance Report

General Information

Project Name	STA-173-1.85 Safety Study	Contact Email	alejandro.chock@woolpert.com
Project Description	Proposed Roundabout Condition ECAT	Contact Phone	216-416-1512
Reference Number	10018798	Date Performed	7/24/2025
Analyst	AC	Analysis Year	2025
Agency/Company	Woolpert		

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	0.2151	0.5210	0.3468	1.8646	2.9475
N_{expected} - Existing Conditions	0.2442	0.5920	0.3942	1.8446	3.0750
N_{potential for improvement} - Existing Conditions	0.0291	0.0710	0.0474	-0.0200	0.1275
N_{expected} - Proposed Conditions	0.0036	0.0311	0.0388	0.9015	0.9750



Project Safety Performance Report

General Information

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Project Description	Proposed Roundabout Condition ECAT	Contact Phone	216-416-1512
Reference Number	10018798	Date Performed	7/24/2025
Analyst	AC	Analysis Year	2025
Agency/Company	Woolpert		

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

Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
SR73: 1.85	SR 173 at Columbus Rd	0.2151	0.521	0.3468	1.8646	2.9475

**ECAT**

Economic Crash Analysis Tool

Project Safety Performance Report

General Information

Project Name	STA-173-1.85 Safety Study	Contact Email	alejandro.chock@woolpert.com
Project Description	Proposed Roundabout Condition ECAT	Contact Phone	216-416-1512
Reference Number	10018798	Date Performed	7/24/2025
Analyst	AC	Analysis Year	2025
Agency/Company	Woolpert		

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

Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
SR73: 1.85	SR 173 at Columbus Rd	0.2442	0.592	0.3942	1.8446	3.075



Project Safety Performance Report

General Information

Project Name	STA-173-1.85 Safety Study	Contact Email	alejandro.chock@woolpert.com
Project Description	Proposed Roundabout Condition ECAT	Contact Phone	216-416-1512
Reference Number	10018798	Date Performed	7/24/2025
Analyst	AC	Analysis Year	2025
Agency/Company	Woolpert		

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
SR73: 1.85	SR 173 at Columbus Rd	0.0291	0.071	0.0474	-0.02	0.1275



Project Safety Performance Report

General Information

Project Name	STA-173-1.85 Safety Study	Contact Email	alejandro.chock@woolpert.com
Project Description	Proposed Roundabout Condition ECAT	Contact Phone	216-416-1512
Reference Number	10018798	Date Performed	7/24/2025
Analyst	AC	Analysis Year	2025
Agency/Company	Woolpert		

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

Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
SR73: 1.85	SR 173 at Columbus Rd	0.0036	0.0311	0.0388	0.9015	0.975

**ECAT**

Economic Crash Analysis Tool

Project Safety Performance Report

General Information

Project Name	STA-173-1.85 Safety Study	Contact Email	alejandro.chock@woolpert.com
Project Description	Proposed Roundabout Condition ECAT	Contact Phone	216-416-1512
Reference Number	10018798	Date Performed	7/24/2025
Analyst	AC	Analysis Year	2025
Agency/Company	Woolpert		

Summary by Crash Type

Crash Type	Existing			Proposed
	Predicted Crash Frequency	Expected Crash Frequency	PSI	Predicted Crash Frequency
Unknown	0.0115	0.0120	0.0005	0.0280
Head On	0.0253	0.0275	0.0022	0.0007
Rear End	0.6299	0.6519	0.0220	0.1477
Backing	0.1186	0.1181	-0.0005	0.0091
Sideswipe - Meeting	0.0857	0.0897	0.0040	0.0000
Sideswipe - Passing	0.1332	0.1363	0.0031	0.3071
Angle	1.1246	1.1929	0.0683	0.2751
Parked Vehicle	0.1049	0.1054	0.0005	0.0000
Pedestrian	0.0144	0.0160	0.0016	0.0007
Animal	0.0000	0.0000	0.0000	0.0098
Train	0.0005	0.0006	0.0001	0.0000
Pedalcycles	0.0109	0.0119	0.0010	0.0007
Other Non-Vehicle	0.0002	0.0002	0.0000	0.0000
Fixed Object	0.4945	0.5100	0.0155	0.0985
Other Object	0.0172	0.0173	0.0001	0.0000
Overturning	0.0299	0.0322	0.0023	0.0007
Other Non-Collision	0.0391	0.0396	0.0005	0.0189
Left Turn	0.1071	0.1134	0.0063	0.0211
Right Turn	0.0000	0.0000	0.0000	0.0667



Project Name	STA-173-1.85 Safety Study	Contact Email	alejandro.chock@woolpert.com
Project Description	Proposed Roundabout Condition ECAT	Contact Phone	216-416-1512
Reference Number	10018798	Date Performed	7/24/2025
Analyst	AC	Analysis Year	2025
Agency/Company	Woolpert		

Comments:

Countermeasure Service Lives, Costs, and Safety Benefits

Created by the Office of Systems Planning and Program Management



Safety Benefit - Cost Analysis

General Information

Project Name	STA-173-1.85 Safety Study	Contact Email	alejandro.chock@woolpert.com
Project Description	Proposed Roundabout Condition ECAT	Contact Phone	216-416-1512
Reference Number	10018798	Date Performed	7/24/2025
Analyst	AC	Analysis Year	2025
Agency/Company	Woolpert		

Benefit - Cost Calculator

Net Present Value of Project **\$4,239,234.00**

Net Present Value of Safety Benefits **\$2,230,531.19**

Net Benefit **(\$2,008,702.81)**

Benefit / Cost Ratio **0.53**

Expected Annual Crash Adjustment

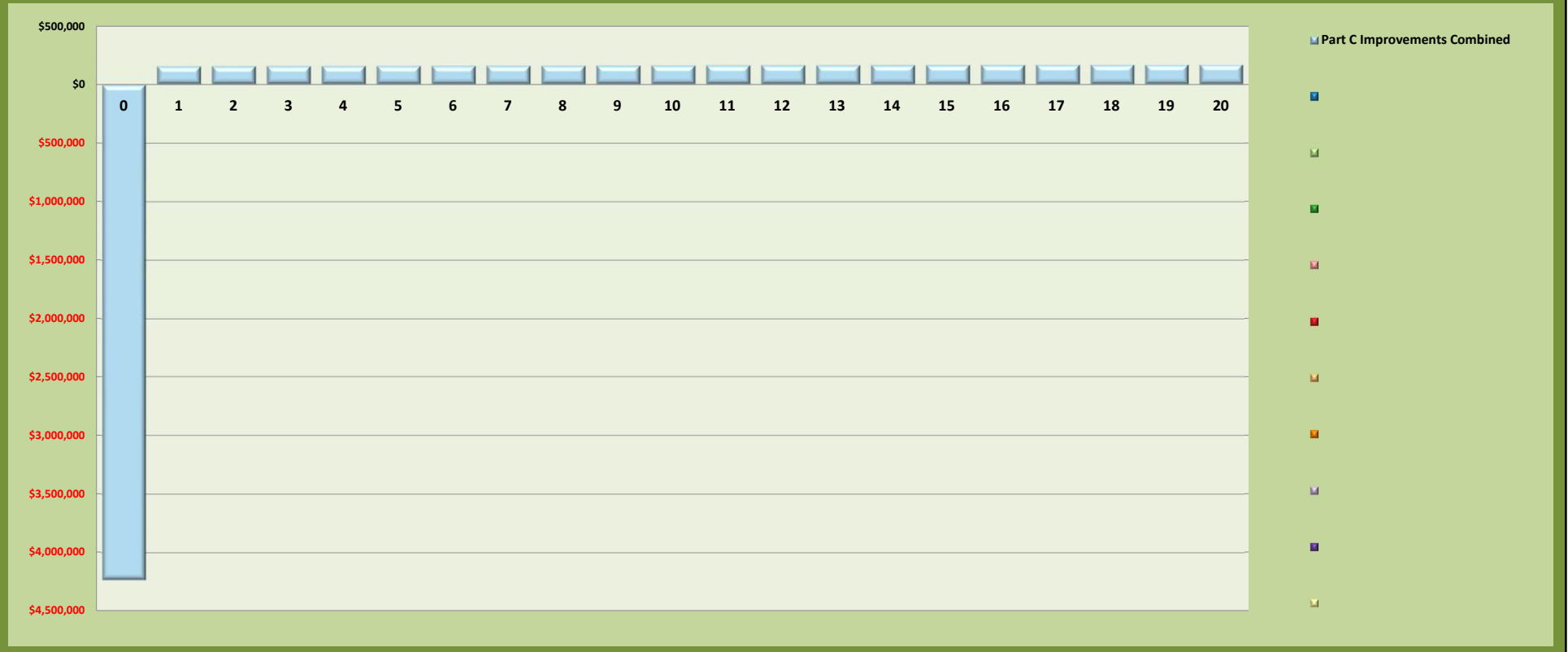
Number of Fatal & Incapacitating Injury Crashes **-0.212**

Number of Injury Crashes **-1.009**

Number of Total Crashes **-1.973**

Comments:

Safety Benefits and Project Costs Combined Cash Flows By Countermeasure Per Year



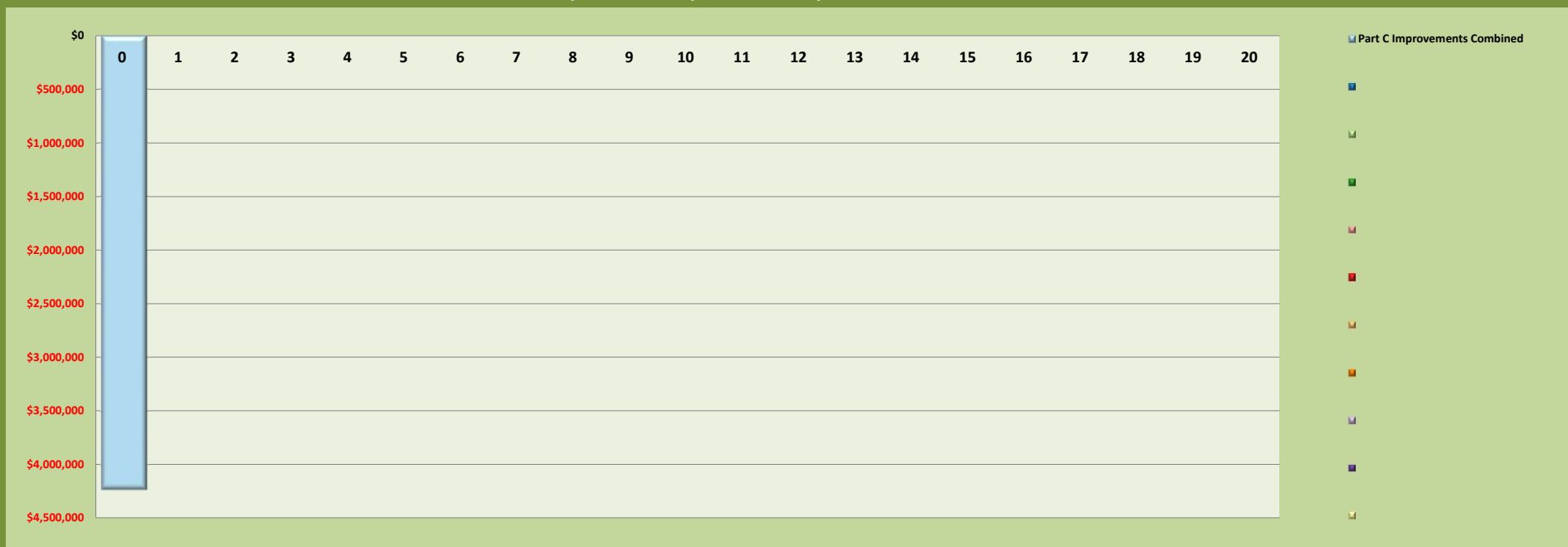


Safety Benefit - Cost Analysis

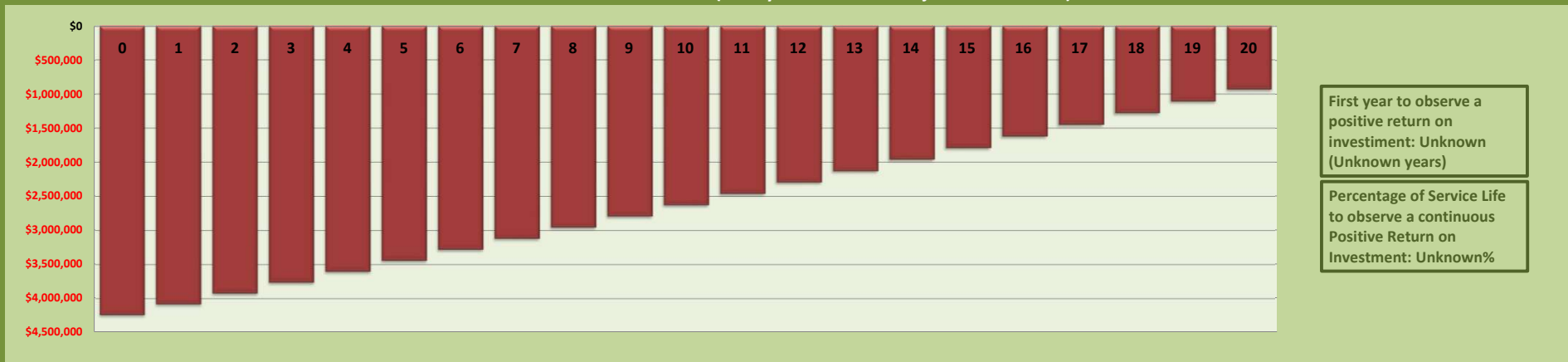
General Information

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Project Description	Proposed Roundabout Condition ECAT	Contact Phone	216-416-1512
Reference Number	10018798	Date Performed	7/24/2025
Analyst	AC	Analysis Year	2025
Agency/Company	Woolpert		

Project Costs Only Cash Flows By Countermeasure Per Year



Return on Investment (Safety Benefits and Project Investments)



Proposed Conditions: General Information and Data for Roundabout Intersection				
General Information			Location Information	
Analyst	AC	Route	SR73	
Agency or Company	Woolpert	Logpoint	1.85	
Date Performed	07/24/25	Common Name	SR 173 at Columbus Rd	
Intersection	SR73; 1.85	Analysis Year	2025	
Signalized/Unsignalized	Unsignalized			
Input Data		Proposed Conditions		HSM Base Conditions
Area Type (Rural, Urban)		Rural		--
Number of Legs (3 or 4)		4		--
Single-Lane or Multi-lane Roundabout		Single-Lane		--
Total Entering AADT (veh/day)		5,280		--
				0
Presence of Outbound Only Leg (present/not present)		Not Present		Not Present
Calibration Factor, C _i		Varies, See Below		1.00
Locality:		State System		--
Leg 1	Leg 1 Entering AADT (veh/day)	AADT _{MAX} = 19,733 (veh/day)	2,000	--
	Bypass lane (present/not present) - Leg 1	Not Present		--
	Number of driveways or unsignalized access points - Leg 1	0		--
	Entry width (feet) - Leg 1	23		16-25 ft
	Number of entering lanes (1 lane, 2 lanes) - Leg 1	1		--
Leg 2	Leg 2 Entering AADT (veh/day)	AADT _{MAX} = 19,733 (veh/day)	2,000	--
	Bypass lane (present/not present) - Leg 2	Not Present		--
	Number of driveways or unsignalized access points - Leg 2	0		--
	Entry width (feet) - Leg 2	25		16-25 ft
	Number of entering lanes (1 lane, 2 lanes) - Leg 2	1		--
Leg 3	Leg 3 Entering AADT (veh/day)	AADT _{MAX} = 19,733 (veh/day)	640	--
	Bypass lane (present/not present) - Leg 3	Not Present		--
	Number of driveways or unsignalized access points - Leg 3	1		--
	Entry width (feet) - Leg 3	25		16-25 ft
	Number of entering lanes (1 lane, 2 lanes) - Leg 3	1		--
Leg 4	Leg 4 Entering AADT (veh/day)	AADT _{MAX} = 19,733 (veh/day)	640	--
	Bypass lane (present/not present) - Leg 4	Not Present		--
	Number of driveways or unsignalized access points - Leg 4	3		--
	Entry width (feet) - Leg 4	20		16-25 ft
	Number of entering lanes (1 lane, 2 lanes) - Leg 4	1		--

Proposed Conditions: Crash Modification Factors (CMFs) for Roundabout Intersection								
Crash Severity Level	Inscribed Circle CMF	Outbound Only Leg CMF	Leg CMFs					Combined CMF
			Leg 1 CMF	Leg 2 CMF	Leg 3 CMF	Leg 4 CMF	Total CMF Legs	
Fatal and Injury (FI)	1.00	0.43	1.00	1.00	1.07	1.22	1.03	0.44
Property Damage Only (PDO)	1.00	1.00	1.00	1.00	1.09	1.29	1.05	1.05

Proposed Conditions: Predicted Crash Summary for Roundabout Intersection								
(1)	(2)			(3)	(4)	(5)	(6)	(7)
Crash Severity Level	SPF Coefficients			N _{spf int}	Overdispersion Parameter, k	Combined CMFs	Calibration Factor, C _i	Predicted average crash frequency
	from Table 11-7 or 11-8					from (6) of Worksheet 2B		N _{predicted int}
	a	b	c	from Equation 11-11 or 11-12	from Table 11-7 or 11-8			(3)*(5)*(6)
Total	--	--	--	--	--	--	--	0.985
Fatal and Injury (FI)	-3.503	0.915	0.206	0.170	0.33	0.44	1.00	0.075
Property Damage Only (PDO)	-1.475	0.702	0.168	0.87	0.80	1.05	1.00	0.911