



ROADWAY SAFETY STUDY
MOUNT VERNON, KNOX COUNTY, OHIO

NORTH SANDUSKY STREET (SR 13)

PREPARED BY GPD GROUP FOR: CITY OF MOUNT VERNON.
APRIL 2026



ROADWAY SAFETY STUDY

North Sandusky Street (SR 13)

City of Mount Vernon, Knox County, Ohio

Prepared For:

City of Mount Vernon
40 Public Square
Mount Vernon, Ohio 43050

Prepared By:

GPD Group
520 South Main Street, Suite 2531
Akron, Ohio 44311

April 2026
Engineer's Seal

Prepared by:

Judith M. Bennett, P.E., PTOE, RSP₁
Registration No. 64654
PTOE Certification No. 4173
RSP₁ Certification No. 247

Prepared
Under The Responsible
Charge of:



Michael A. Hobbs, P.E., PTOE
Registration No. 68713
Certification No. 1346

April 28, 2026
Date



TABLE OF CONTENTS

I. Executive Summary 1
 Project Background 1
 Purpose & Need 1
 Brief Overview of Possible Causes 2
 Recommended Countermeasures and Related Costs 2

II. Introduction 3

III. Existing Conditions 3

IV. Project Traffic Volumes 7
 'No-Build' Traffic Volumes 7
 'Build' Traffic Volumes..... 8

V. Crash Data and Analysis 8
 Crash Data Summary 8
 Crash Analysis 9

VI. Identification of Potential Countermeasures 10
 Short-Term Countermeasures 10
 Long-Term Countermeasures..... 11

VII. Supplemental Analyses 12
 Intersection Approach Photos 12
 Sight Distance Evaluation 15
 Intersection Capacity Analysis 17

VIII. Proposed Countermeasure Evaluation 20

IX. Conclusions and Recommendations 23

LIST OF APPENDICES

- Appendix A: Traffic Counts
- Appendix B: HCS Intersection Capacity Analysis
- Appendix C: Growth Rate Information
- Appendix D: Collision Data Summary & Charts
- Appendix E: Sight Distance Evaluation
- Appendix F: ECAT Analysis
- Appendix G: Planning Level Cost Estimates

LIST OF TABLES

- Table 1: HCS Intersection Capacity Analysis Summary – Year 2025 Existing Conditions
- Table 2: HCS Intersection Capacity Analysis Summary – Opening Year 2030 and Design Year 2050 ‘No-Build’ Conditions
- Table 3: HCS Intersection Capacity Analysis Summary – Opening Year 2030 and Design Year 2050 ‘Long-Term Build Option 1’ Conditions
- Table 4: HCS Intersection Capacity Analysis Summary – Opening Year 2030 and Design Year 2050 ‘Long-Term Build Option 2 Conditions’
- Table 5: Evaluation Matrix of Potential Improvements

LIST OF FIGURES

- Figure 1: Aerial Photograph
- Figure 2: Existing Conditions Diagram
- Figure 3: Existing Year 2025 Peak Hour Traffic Volumes
- Figure 4: Opening Year 2030 ‘No-Build’ Traffic Volumes
- Figure 5: Design Year 2050 ‘No-Build’ Traffic Volumes
- Figure 6: Opening Year 2030 ‘Build’ Traffic Volumes
- Figure 7: Design Year 2050 ‘Build’ Traffic Volumes
- Figure 8: Collision Diagram
- Figure 9: ‘Build Option 1: Intersection Realignment’ Layout
- Figure 10: ‘Build Option 2: Roundabout’ Layout

I. Executive Summary

Project Background

At the request of the City of Mount Vernon, Ohio, GPD Group was tasked with performing a safety study for the North Sandusky Street (SR 13) / Upper Fredericktown Road / Crestview Avenue intersection, including the adjacent intersection at Buena Vista Avenue. This study will determine if any operational or safety deficiencies exist in the study area and what improvements could be implemented to correct any deficiencies that are identified.

The study area is in the northwest corner of the City of Mount Vernon, with part of the North Sandusky Street (SR 13) corridor currently outside the corporation limits. The speed limit and roadway characteristics transition from urban to rural traveling north through the study section. The intersection of North Sandusky Street (SR 13) / Upper Fredericktown Road / Crestview Avenue has a complex geometry, with a horizontal curve and skewed intersection approaches that result in nontypical traffic movements.

Purpose & Need

North Sandusky Street (SR 13) is a state route, Upper Fredericktown Road is a county road, and Crestview Avenue is a township road. However, the portions of these roadways that are within the jurisdiction of the City of Mount Vernon are under local control. The statewide crash ranking system does not contain information for the intersection since the highway safety priority list only includes state-maintained roadways and this section varies between City and State control. ODOT does maintain a separate, less statistical system for local roadways by County, providing a map of priority locations based on reported data. MORPC (Mid-Ohio Regional Planning Commission) and CORPO (Central Ohio Rural Planning Organization) also maintain a regional database for areas they serve. The study area was identified as a FSI (Fatal and Serious Injury) crash location and a crash hotspot within Knox County in the CORPO 2024 Safety Action Plan.

In the three-year period from 2022-2024, there were 13 reported crashes in the study area, including 6 crashes at the intersection of North Sandusky Street (SR 13) with Upper Fredericktown Road / Crestview Avenue, 3 crashes at Buena Vista Avenue, and 4 crashes in the curve at the north end of the project. These comprise a variety of rear-end and angle or turning crashes, including the fatal crash in the curve north of the Upper Fredericktown Road intersection.

ECAT analysis of the existing conditions for the calendar years 2022-2024 indicates that the predicted average crash frequency is 2.3 crashes per year and the expected average crash frequency is 2.4 crashes per year. This results in a potential for safety improvement of 0.1 crashes per year. In other words,

for the base conditions, this study area of North Sandusky Street (SR 13) operates slightly worse than peer locations.

Brief Overview of Possible Causes

A review of the crash patterns indicates that inconsistent speed limits through the corridor, inadequate sight distance at intersections, and the skewed intersection at Upper Fredericktown Road are contributing factors to crashes in the study area.

The crash types, existing geometry, and visibility issues indicate that an engineering solution can be constructed that has the potential to reduce the crashes at the intersection.

Recommended Countermeasures and Related Costs

This study has identified both short and long-term improvements to address the safety concerns along North Sandusky Street (SR 13) and at intersections within the corridor.

Potential short-term improvements include:

1. Update speed limit signs throughout the corridor to comply with the existing journalized 35 mph speed limit.
2. Install a 'Reduced Speed Ahead' sign (W3-5) approximately 200 feet north of the 35 mph zone.

The short-term improvements can be implemented by the City at any time for low-cost. No economic analysis was carried out for these improvements and construction cost estimates were not prepared.

Potential long-term improvements include:

1. 'Build Option 1: Intersection Realignment': Realign Upper Fredericktown Road to intersect with North Sandusky Street (SR 13) at 90 degrees, separating it from Crestview Avenue.
2. 'Build Option 2: Roundabout': Construct a single-lane roundabout at the intersection of North Sandusky Street (SR 13) / Upper Fredericktown Road / Crestview Avenue.

Both of the long-term improvements include a cul-de-sac on Buena Vista Avenue, with traffic redirected to Crestview Avenue, as well as the short-term countermeasures to normalize speed limits in the study area. Note that construction of any of these countermeasures will require the City to either annex property so that the entire study area is within the corporation limits or to coordinate with ODOT and Knox County for improvements on their roadways.

II. Introduction

At the request of the City of Mount Vernon, GPD Group was tasked with performing a safety study for the North Sandusky Street (SR 13) / Upper Fredericktown Road / Crestview Avenue intersection, including the intersection at Buena Vista Avenue immediately to the south. There has been a history of crashes in the study area and this study is being undertaken to attempt to identify the causes and contributing factors, identify if the site experiences abnormal crash activity as compared to similar locations, and identify potential engineering solutions to the safety issues.

North Sandusky Street is a state route, and within the City of Mount Vernon it is maintained by ODOT. Similarly, Upper Fredericktown Road is a county road and Crestview Avenue is a township road, but they are under local jurisdiction within the City. ODOT maintains a statewide crash ranking system, however the highway safety priority list only includes locations maintained by ODOT. MORPC and CORPO also maintain a regional database for areas they serve. The study area was identified as a FSI (Fatal and Serious Injury) crash location and a crash hotspot within Knox County in the CORPO 2024 Safety Action Plan.

III. Existing Conditions

The study area is primarily surrounded by residential properties that are located north, south, and east of the study intersection. There are some commercial properties located to the west of the study intersection, which includes a storage facility and a small strip retail plaza. Farmland is located north and west of the study area beyond the commercial properties. See **Figure 1** for an aerial photograph of the study area. The Mount Vernon corporation limit encompasses portions of the study area, with other portions outside the City limits and theoretically under ODOT jurisdiction. It appears that the City maintains North Sandusky Street (SR 13) up to and including the intersection with Upper Fredericktown Road / Crestview Avenue for consistency, but it is unclear whether there is any kind of agreement with ODOT regarding this. As the urbanized area has expanded, various properties have been annexed into the City and it is possible that this may continue if property owners request annexation.

The main area of concern is the North Sandusky Street (SR 13) / Upper Fredericktown Road / Crestview Avenue intersection, which is an unsignalized intersection. This intersection has a history of angle crashes, with one crash resulting in two fatalities (see **Section V. Crash Data and Analysis**, for more information). The corridor between Stump Street and Crestview Avenue has also experienced crashes.

North Sandusky Street (SR 13) is a two-lane asphalt roadway with one travel lane in each direction. The posted speed limit for northbound vehicles is 45

mph, while the posted speed for southbound vehicles is 35 mph. Note that the posted speed limit for southbound vehicles is 45 mph immediately north of the North Sandusky Street (SR 13) / Upper Fredericktown Road / Crestview Avenue intersection, with both directions of travel having a speed limit of 55 mph north of the reverse curve. According to information obtained from ODOT, North Sandusky Street (SR 13) is classified as an Urban Principal Arterial Other. North Sandusky Street (SR 13) primarily runs north-south with a reverse curve from the Upper Fredericktown Road / Crestview Avenue intersection northward. Reverse curve signs with advisory speed plaques are provided for North Sandusky Street (SR 13) motorists.

Upper Fredericktown Road is a two-lane asphalt roadway with one travel lane in each direction. Upper Fredericktown Road runs north-south with a posted speed limit of 35 mph. According to information obtained from ODOT's TIMS, Upper Fredericktown Road is classified as an Urban Major Collector.

Crestview Avenue is a two-lane east-west asphalt roadway with one travel lane in each direction and a posted speed limit of 25 mph. According to information obtained from ODOT, Crestview Avenue is classified as an Urban Local road.

The existing roadway geometry for the study intersections is detailed below. Refer to **Figure 2** for the existing conditions diagram. Although there are additional intersections in the southern portion of the study area, only the Buena Vista Avenue and Upper Fredericktown Road / Crestview Avenue intersections were evaluated individually.

North Sandusky Street (SR 13) / Buena Vista Avenue



This is an unsignalized intersection with Buena Vista Avenue under stop control. The intersection has three approaches with Buena Vista Avenue intersecting North Sandusky Street (SR 13) from the east. There are no turn lanes at this intersection or pedestrian facilities. There is a crest vertical curve south of the intersection. There is a single streetlight on the northeast corner of the intersection.

North Sandusky Street (SR 13) / Upper Fredericktown Road / Crestview Avenue



This intersection is currently unsignalized with the Upper Fredericktown Road and Crestview Avenue approaches operating under stop control. There are four approaches to this intersection, with Upper Fredericktown Road intersecting North Sandusky Street (SR 13) from the north and Crestview Avenue intersecting from the east. The northern driveway for M&M Storage is located on the west side of North Sandusky Street within the intersection area. There are no pedestrian facilities provided. The posted speed limit for southeastbound motorists changes from 45 mph to 35 mph immediately northwest of this intersection. The intersection is located in the middle of a horizontal curve; and a second reverse horizontal curve is located to the northwest along North Sandusky Street. There is a hill located on Upper Fredericktown Road north of the intersection and a Stop Sign Ahead (W3-1) sign is present for southbound Upper Fredericktown Road motorists. Intersection lighting is provided via one cobra head luminaire located on the northeast quadrant between the Crestview Avenue and Upper Fredericktown Road approaches.

For this study, Tri-State Traffic Data, Inc. performed turning movement counts on Thursday, May 29, 2025, from 6:00 AM – 9:00 AM and 3:00 PM – 6:00 PM at the study intersections. From the count data, the AM peak hour of the study area was determined to be from 7:15 AM – 8:15 AM while the PM peak hour was found to be from 3:30 PM – 4:30 PM. See **Appendix A** for the turning movement counts.

Design hour volumes (DHV) were developed for the study area using the peak hour to design hour factors that are published by the ODOT Office of Statewide Planning and Research. The design hour factors utilized to develop the DHVs are dependent upon the roadway's functional classification as well as the day of the week and month the count was performed. These factors were then applied to the raw turning movement counts to convert the existing volumes to design hour volumes. For this study, a design hour factor of 1.07 was applied to all traffic volumes since the traffic counts occurred on a Thursday in March.

Intersection capacity analyses were performed using the Existing Year 2025 traffic volumes. It should be noted that only standard intersection configurations can be modelled in HCS. As such, the Crestview Avenue approach was analyzed as the 'eastbound' approach, and the Upper Fredericktown Road approach was analyzed as the 'westbound' approach. In order to accurately reflect existing vehicular delays, traffic volumes for motorists turning onto Crestview Avenue were added to movements that

reflected existing conditions. As a result, traffic turning onto Crestview Avenue from southbound North Sandusky Street (SR 13) was added to the southbound left-turn movement in HCS. Vehicles that were counted as bear left vehicles for the southbound Upper Fredericktown Road approach in the traffic counts were added to that approach's left-turn volumes and entered into HCS as westbound left-turn vehicles. Vehicles counted as bear right vehicles for the northbound North Sandusky Street (SR 13) approach in the traffic counts were added to that approach's right-turn volumes. **Figure 3** shows the existing peak hour volumes and a sketch of how volumes were applied for the analysis.

The analysis was performed utilizing the computer program HCS 2025 which is developed by McTrans Corporation and based on the Highway Capacity Manual, 7th Edition. Based on criteria established by ODOT, Highway Capacity Software (HCS) is used to determine the required number of lanes and the lane assignments at intersections (i.e. the needed intersection capacity). The existing peak hour factors and heavy vehicle percentages were utilized for the capacity analysis.

The quality of the operating conditions experienced by an intersection is measured in terms of Level-of-Service (LOS). Levels-of-Service can range from LOS A to LOS F. Level-of-Service A, B, C and D are considered acceptable for movements and approaches while the overall intersection must operate at LOS D or better. Level-of-Service E and F are considered unacceptable with significant levels of delay experienced by vehicles. The thresholds related to average control delay for unsignalized intersections are as follows:

<i>Level-of- Service</i>	<i>Delay Threshold – Unsignalized (Sec)</i>
A	< 10
B	> 10 – 15
C	> 15 – 25
D	> 25 – 35
E	> 35 – 50
F	> 50

The quantity of vehicles that a turning movement or approach has sufficient capacity for is measured with the volume to capacity ratio (v/c). A v/c < 1.0 is considered acceptable with a v/c < 0.93 preferred. An intersection is considered over capacity when signal timings or other intersection control cannot be adjusted to allow all turning movements to have a v/c < 1.0.

Table 1, below, summarizes the capacity analysis for the existing conditions of the study intersections. See **Appendix B** for the HCS intersection capacity analysis printouts.

Table 1: HCS Intersection Capacity Analysis Summary - Year 2025 Existing Conditions

Movement	AM Peak Hour				PM Peak Hour			
	LOS	Delay (sec)	V/C Ratio	95 th % Queue (ft)	LOS	Delay (sec)	V/C Ratio	95 th % Queue (ft)
N. Sandusky Street (SR 13) / Buena Vista Avenue								
Westbound Approach	B	10.6	0.01	0	C	16.9	0.03	3
Southbound Left	A	8.3	0.00	-	A	9.6	0.02	3
Southbound Thru	A	0.0	-	0	A	0.3	-	0
Southbound Approach	A	0.1	-	-	A	0.5	-	-
N. Sandusky Street (SR 13) / Upper Fredericktown Road / Crestview Avenue								
Crestview Ave Approach	B	14.3	0.04	3	C	17.8	0.09	8
Upper Fredericktown Rd Approach	E	38.3	0.59	86	F	193.0	1.14	214
Northbound Thru-Right	A	8.5	0.00	-	A	8.5	0.00	0
Northbound Approach	A	0.0	-	-	A	0.0	-	-
Southbound Left	A	8.3	0.01	0	A	9.7	0.03	3
Southbound Thru	A	0.1	-	-	A	0.4	-	-
Southbound Approach	A	0.2	-	-	A	0.7	-	-

Note: Yellow highlighted cells indicate a Level-of-Service D
 Orange highlighted cells indicate a Level-of-Service E
 Red highlighted cells indicate a Level-of-Service F or v/c > 1

As shown in Table 1, most movements and approaches currently operate at acceptable LOS C or better during the AM and PM peak hours. However, the Upper Fredericktown Road approach at the North Sandusky Street (SR 13) / Upper Fredericktown Road / Crestview Avenue intersection operates at unacceptable LOS E during the AM peak hour and LOS F during the PM peak hour under existing traffic conditions. Additionally, this approach also has v/c greater than 1.0 during the PM peak hour. These results indicate that the Upper Fredericktown Road approach is over capacity and experiences significant vehicular delays.

IV. Project Traffic Volumes

'No-Build' Traffic Volumes

The existing DHV were projected to future years to ensure that any proposed improvements are adequate for potential growth. If any roadway improvements are implemented, construction is anticipated to be completed in the year 2030, which will serve as the 'Opening Year' for the study, while the 'Design Year' will be 2050 (20-year design criteria). According to ODOT's Traffic Forecast Modeling System (TFMS), the study area is expected to experience +0.75% annual growth in traffic over the next 25 years. This growth factor was used to calculate the future traffic volumes within the study area. **Figure 4** shows the Opening Year 2030 'No-Build' peak hour traffic

volumes and **Figure 5** shows the Design Year 2050 'No-Build' peak hour traffic volumes. See **Appendix C** for the TFMS report growth rate information.

'Build' Traffic Volumes

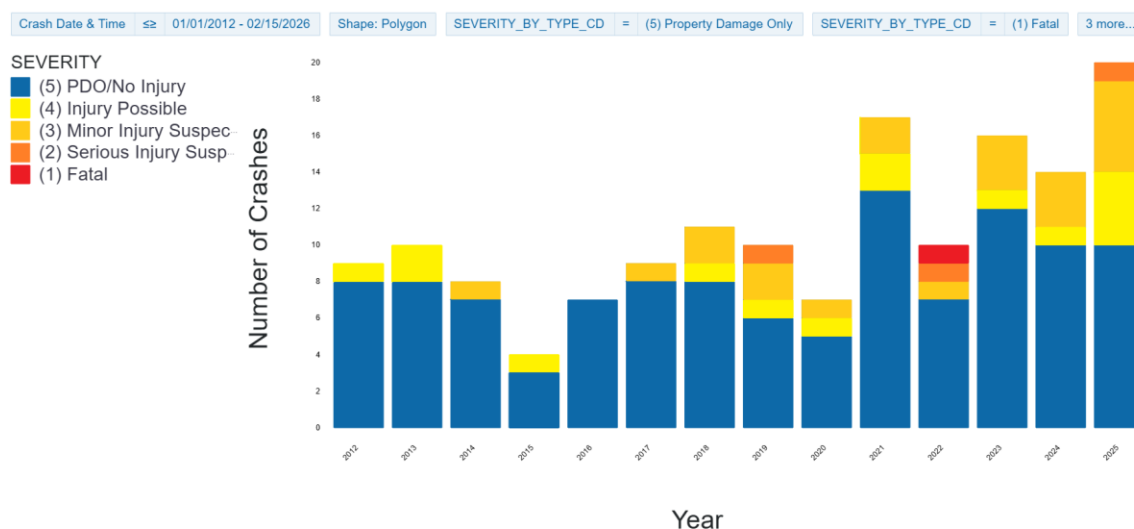
Any roadway improvements are expected to include cutting off the Buena Vista Avenue approach at the North Sandusky Street (SR 13) intersection to reduce access points and address concerns with sight distance on Buena Vista Avenue. As such, all traffic turning to and from this approach was applied to the appropriate movements at Crestview Avenue. These adjustments are represented in the 'Build' traffic volumes. **Figure 6** and **Figure 7** show the Opening Year 2030 'Build' and Design Year 2050 'Build' peak hour volumes, respectively.

V. Crash Data and Analysis

Crash Data Summary

The City of Mount Vernon has tracked crashes in the study area for several years and there has been an increasing trend of crashes from 2012 – 2026. Additionally, there has been an observed increase in risk taking and near misses at the intersection. The graph below shows the historical trend in crash frequency as noted by the City.

North Sandusky Street Crashes - January 2012 - February 2026



Crash data was obtained from the AASHTOWare Safety online database for calendar years 2022 – 2024 for the North Sandusky Street (SR 13) corridor

from Buena Vista Avenue to approximately 650' north of the Upper Fredericktown Road / Crestview Avenue intersection. See **Appendix D** for collision data summary tables and charts. A total of 13 crashes were reported in the study area during the three-year period. A summary of crashes for specific intersections and segments is provided below. A collision diagram for the entire study area is shown on **Figure 8**.

North Sandusky Street (SR 13) / Buena Vista Avenue Intersection

There were 3 reported crashes during the analysis period at this intersection. There were 2 rear-end crashes and 1 left-turn crash, with 2 crashes resulting in minor injuries and 1 property damage only crash. All crashes occurred with dry road conditions during the day. There are no apparent patterns to the crashes but the hill south of the intersection may be a contributing factor.

North Sandusky Street (SR 13) / Upper Fredericktown Road / Crestview Avenue Intersection

During the analysis period, 6 crashes occurred, including 4 left-turn crashes, 1 rear-end, and 1 right-turn crash. There were 4 crashes involving minor injuries and 2 with property damage only. All crashes were on dry roads, with 4 during daylight hours, 1 at night, and 1 coded as "dusk". Southbound vehicles turning left in front of oncoming northbound traffic were the cause of 2 left-turn crashes, while 2 involved motorists on Upper Fredericktown Road turning in front of traffic on North Sandusky Street. There are no discernible patterns to the crashes at this intersection, but the unconventional geometry of the side street approaches and curve on North Sandusky Street appear to be contributing factors in motorists having difficulty in safely traversing the intersection.

North Sandusky Street (SR 13) Roadway Segment

There were 4 crashes that occurred on the curve near the Upper Fredericktown Road / Crestview Avenue intersection, including the fatal angle collision when the at-fault motorist went left of center. The reverse curve north of the Upper Fredericktown Road / Crestview Avenue intersection appears to be a contributing factor in crashes at the north end of the study area.

Crash Analysis

Based on the crash reports, there is a pattern of crashes occurring at the North Sandusky Street (SR 13) / Upper Fredericktown Road / Crestview Avenue intersection involving left-turning traffic on both North Sandusky Street and Upper Fredericktown Road failing to yield to oncoming or opposing traffic. There are several contributing factors related to the intersection's complex geometry and location on a horizontal curve. One possibility is that motorists may be interpreting the turn onto Upper Fredericktown Road as a thru

movement rather than a right turn. Therefore, southbound motorists think that northbound traffic is turning onto Upper Fredericktown Road, when they are actually continuing along North Sandusky Street (SR 13). Another possibility is that Upper Fredericktown Road motorists have difficulty seeing North Sandusky Street (SR 13) vehicles. Due to the crest of the hill, it is difficult to see if there are trailing vehicles behind the first northbound vehicle. Therefore, motorists may start turning onto North Sandusky Street (SR 13) thinking that there is no more oncoming traffic or that they have a large enough gap to safely complete the turn. At least one crash report mentions that the crash occurred because the Upper Fredericktown Road motorist pulled into the travel way and was hit by a trailing northbound motorist. Additionally, the skew of the intersection makes it difficult for drivers on Upper Fredericktown Road to see southbound traffic on North Sandusky Street (SR 13).

An additional crash pattern is North Sandusky Street (SR 13) motorists having difficulty navigating the horizontal curve. Multiple crash reports mention motorists either leaving their travel lane or losing control on the curve. The fatal crash, which resulted in the death of a mother and young child, was due to the driver crossing the center line, being struck by a northbound vehicle, then striking a utility pole. The change in speed limit from 55 mph to 45 mph, then immediately to 35 mph, along with the transition from a rural roadway to more urban character, may result in driver confusion and the need to process a lot of information in a short period of time. Additionally, northbound North Sandusky Road (SR 13) has a posted speed limit of 45 mph beginning near Clarence Court, resulting in different traveling speeds for the two directions of traffic.

VI. Identification of Potential Countermeasures

This safety study has identified both short- and long-term improvements to be considered for the North Sandusky Street (SR 13) corridor. The short-term improvements can be implemented at low cost with City forces, are expected to provide some measure of safety improvement, and do not preclude later implementation of long-term improvements.

Short-Term Countermeasures

As noted previously, the posted speed limits through the study area are inconsistent between the northbound and southbound directions. Additionally, there are closely spaced speed limit reductions for southbound traffic at the north end of the study area from 55 mph to 45 mph to 35 mph. A review of speed zones on ODOT's TIMS website indicates that the journalized speed limit for both directions of North Sandusky Street (SR 13) is 35 mph from 0.11 mile south of James Street to 0.27 mile north of James Street (just north of the Upper Fredericktown Road / Crestview Avenue intersection). From that point northward there is no journalized speed zone, with North Sandusky Street

(SR 13) reverting to 55 mph, which is per the Ohio Revised Code for state routes outside of a municipality.

A short-term countermeasure would be to update the speed limit signs to reflect 35 mph in both directions along North Sandusky Street (SR 13), along with a “Reduced Speed Ahead” sign for southbound traffic, located approximately 200’ north of the beginning of the 35-mph zone.

Long-Term Countermeasures

This study has identified and evaluated two long-term improvements to address the crashes at the intersection of North Sandusky Street (SR 13) / Upper Fredericktown Road / Crestview Avenue.

'Build Option 1: Intersection Realignment'

This option would realign Upper Fredericktown Road to intersect North Sandusky Street (SR 13) at a 90-degree angle. The Upper Fredericktown Road approach would continue operating under stop conditions with the North Sandusky Street (SR 13) approaches in free-flow operation. The Crestview Avenue approach would remain essentially in its current location and continue operating under stop control, resulting in two closely-spaced intersections. This alternative would potentially decrease driver confusion as to what is considered the northbound thru movement for North Sandusky Street (SR 13). Additionally, Buena Vista Avenue will be terminated with a cul-de-sac at North Sandusky Street (SR 13) with traffic rerouted to Crestview Avenue. A preliminary layout of 'Build Option 1' is shown on **Figure 9**. This is not a detailed design but follows current design criteria. The layout has been developed to a level appropriate for identifying impacts and a planning level cost estimate.

'Build Option 2: Roundabout'

This option would convert the existing unsignalized intersection at Upper Fredericktown Road / Crestview Avenue into a roundabout. This should decrease crash severity since crashes would be occurring at lower speeds. Additionally, roundabouts have fewer conflict points and have been identified as a proven safety countermeasure. This alternative would also include terminating Buena Vista Avenue as a cul-de-sac with traffic rerouted to Crestview Avenue. A preliminary layout of 'Build Option 2' is shown on **Figure 10**. This is not a detailed design but satisfies current design standards and accommodates trucks. The layout has been developed to a level appropriate for identifying impacts and a planning level cost estimate. Detailed design and analysis could modify the geometry.

VII. Supplemental Analyses

Intersection Approach Photos

GPD staff conducted a site visit on August 5, 2025, during the PM peak hour to document existing conditions and observe driving behavior at the North Sandusky Street (SR 13) / Upper Fredericktown Road / Crestview Avenue intersection. The photos below show driver viewpoints throughout the corridor and on various intersection approaches.



Picture 1: Looking SB on North Sandusky Street (SR 13) toward intersection with Upper Fredericktown Road / Crestview Avenue



Picture 2: Speed Limit sign for SB North Sandusky Street (SR 13) motorists near Upper Fredericktown Road / Crestview Avenue intersection

Pictures 1 and 2 show the southbound approach of the North Sandusky Street (SR 13) / Upper Fredericktown Road / Crestview Avenue intersection. The horizontal curve within the intersection makes it difficult to see traffic approaching from the side streets. Additionally, the speed limit reduction from 45 mph to 35 mph an hour has no advance warning and may result in traffic not reaching the lower speed before entering the intersection.



Picture 3: Looking NB on North Sandusky Street (SR 13) south of Clarence Court



Picture 4: Looking NB on North Sandusky Street (SR 13) north of Clarence Court

As shown in **Pictures 3 and 4**, motorists on northbound North Sandusky Street (SR 13) are unable to see the intersection of Upper Fredericktown Road / Crestview Avenue until they are north of Clarence Court due to the

crest vertical curve. North Sandusky Street (SR 13) motorists may not see side-street traffic entering the intersection with enough time to stop.



Picture 5: Looking SB on Upper Fredericktown Road approximately 500' north of North Sandusky Street (SR 13)



Picture 6: Looking SB on Upper Fredericktown Road approximately 325' north of North Sandusky Street (SR 13)

Pictures 5 & 6 show that motorists on Upper Fredericktown Road cannot see the North Sandusky Street (SR 13) / Upper Fredericktown Road / Crestview Avenue intersection until they are approximately 325' north of the intersection, near Kimberly Avenue.



Picture 7: Southbound Upper Fredericktown Road at the Intersection with North Sandusky Street (SR 13)

As shown in **Picture 7**, Upper Fredericktown Road motorists are unable to see approaching traffic on northbound North Sandusky Street (SR 13) until those vehicles crest the hill south of the intersection.

During the site visit, driver behavior was observed at the North Sandusky Street (SR 13) / Upper Fredericktown Road / Crestview Avenue intersection. There appeared to be confusion among Upper Fredericktown Road and North Sandusky Street (SR 13) left-turning motorists on whether it was safe to conduct their turning movements. Motorists were witnessed checking multiple times for conflicting traffic before turning, and motorists appeared to have been waiting for larger gaps between in northbound traffic before conducting their turning movement. Conversely, some motorists were observed turning with shorter gaps. Some North Sandusky Street motorists who are turning right onto Upper Fredericktown Road fail to use a signal, treating it as a thru maneuver, adding to the confusion. An additional observation was that some Upper Fredericktown Road motorists ran the stop sign.

Sight Distance Evaluation

Intersections generally have a higher potential for vehicular crashes than a continuous section of roadway due to a higher frequency of conflicting traffic movements. By providing adequate vertical and horizontal sight distance at an intersection, the likelihood of these crashes is greatly reduced. GPD Group personnel performed site visits on Friday, October 17, 2025, and on Thursday, January 15, 2026, to measure the available sight distance at intersections in the study area in accordance with Figures 201-1, 201-4, and 201-5 of ODOT's *Location and Design (L&D) Manual, Volume 1*.

Intersection Sight Distance (ISD) is the distance for which a motorist must have an unobstructed view of the entire intersection in order to anticipate and avoid potential collisions. Moreover, drivers in a stopped position should be able to observe traffic at a distance that will allow them to safely make the desired movement. Sight distance evaluations are based on the design speed of the roadway, which is either the posted speed limit (for 35 mph or lower and in urban areas for 40-45 mph) or 5 mph above the posted speed limit (for 50 mph or higher and 40-45 mph where travel speeds may be higher).

For this safety study, ISD was evaluated at the Buena Vista Avenue, Crestview Avenue, and Upper Fredericktown Road approaches to North Sandusky Street (SR 13). The posted speed limit changes within the corridor and varies between the northbound and southbound directions of travel, so the controlling speed and required sight distance also vary for each intersection. In locations with an approaching speed limit of 35 mph, the required ISD is 390'. In locations with an approaching speed limit of 45 mph, the required ISD for design speed of 50 mph is 555'.

At Buena Vista Avenue, looking left the provided sight distance is 335', which is not adequate for 50 mph. Looking right from Buena Vista Avenue, there is at least 390' of ISD, which is satisfactory for a design speed of 35 mph. The Crestview Avenue approach provides 555' of ISD looking left (meeting requirements for 50 mph) and 555' or more looking right. The Upper Fredericktown Road approach provides 555' of ISD to both the left and right, satisfying the requirements for 50 mph.

Due to inadequate ISD at Buena Vista Avenue, the stopping sight distance along North Sandusky Street (SR 13) was also evaluated. Stopping sight distance (SSD) is the distance traversed by a vehicle from the instant the driver sights an object necessitating a stop to the instant the brakes are applied and the actual distance needed to stop the vehicle after the initial brake application begins. It is critical to ensure vehicles are provided enough time to stop when approaching an intersection if they may encounter a vehicle exiting the side street. Similar to intersection sight distance, stopping sight distance is also correlated to the design speed of the roadway segment. The required SSD for 50 mph is 425'.

The SSD for northbound traffic on North Sandusky Street (SR 13) approaching Buena Vista Avenue is 410', which satisfies 48 mph but not 50 mph. As Buena Vista Avenue will be removed under both long-term Build Options, it is not considered critical for that intersection to satisfy sight distance requirements. The sight distance evaluation photos for both ISD and SSD and summary report are provided in **Appendix E**.

Intersection Capacity Analysis

Table 2 summarizes the capacity analysis for the study intersections under the Opening Year 2030 and Design Year 2050 'No-Build' traffic conditions (see **Section IV. Project Traffic Volumes**). Note that certain turning movements were adjusted to analyze standard intersection configurations. See **Appendix B** for the HCS intersection capacity analysis printouts.

Table 2: HCS Intersection Capacity Analysis Summary - Opening Year 2030 and Design Year 2050 'No-Build' Conditions								
Movement	Opening Year 2030				Design Year 2050			
	LOS	Delay (sec)	V/C Ratio	95 th % Queue (ft)	LOS	Delay (sec)	V/C Ratio	95 th % Queue (ft)
AM Peak Hour								
N. Sandusky Street (SR 13) / Buena Vista Avenue								
Westbound Approach	B	10.8	0.01	0	B	11.3	0.01	0
Southbound Left	A	8.3	0.00	-	A	8.5	0.00	-
Southbound Thru	A	0.0	-	0	A	0.0	-	0
Southbound Approach	A	0.0	-	-	A	0.1	-	-
N. Sandusky Street (SR 13) / Upper Fredericktown Road / Crestview Avenue								
Crestview Avenue Approach	B	14.9	0.04	3	C	16.7	0.05	5
Upper Fredericktown Road Approach	E	46.1	0.65	102	F	106.2	0.95	191
Northbound Thru	A	8.6	0.00	-	A	8.9	0.00	-
Northbound Approach	A	0.0	-	-	A	0.0	-	-
Southbound Left	A	8.4	0.01	-	A	8.6	0.01	-
Southbound Thru	A	0.1	-	-	A	0.1	-	-
Southbound Approach	A	0.2	-	-	A	0.2	-	-
PM Peak Hour								
N. Sandusky Street (SR 13) / Buena Vista Avenue								
Westbound Approach	C	17.6	0.04	3	C	20.2	0.05	5
Southbound Left	A	9.8	0.02	3	B	10.4	0.02	3
Southbound Approach	A	0.3	-	-	A	0.4	-	-
N. Sandusky Street (SR 13) / Upper Fredericktown Road / Crestview Avenue								
Crestview Avenue Approach	C	18.4	0.09	8	C	22.8	0.14	13
Upper Fredericktown Road Approach	F	257.4	1.30	250	F	647.3	2.16	389
Northbound Thru	A	8.6	0.00	-	A	8.8	0.00	-
Northbound Approach	A	0.0	-	-	A	0.0	-	-
Southbound Left	A	9.9	0.03	-	B	10.5	0.04	-
Southbound Thru	A	0.4	-	-	A	0.6	-	-
Southbound Approach	A	0.8	-	-	A	1.0	-	-

Note: Yellow highlighted cells indicate a Level-of-Service D
 Orange highlighted cells indicate a Level-of-Service E
 Red highlighted cells indicate a Level-of-Service F of v/c > 1

As shown in **Table 2**, most movements and approaches are expected to operate at acceptable LOS C or better during the AM and PM peak hours under Opening Year 2030 and Design Year 2050 'No-Build' conditions. However, the Upper Fredericktown Road approach at the North Sandusky Street (SR 13) / Upper Fredericktown Road / Crestview Avenue intersection is anticipated to operate at unacceptable LOS E or F during the AM and PM peak hours under Opening Year 2030 and Design Year 2050 'No-Build' traffic conditions. Additionally, this approach is also expected to have a v/c > 1.0 during the PM peak hour. These results indicate that the Upper Fredericktown Road approach is expected to be over capacity and experience significant vehicular delays. Long delays for side street traffic can lead to drivers attempting turns under unsafe conditions (with inadequate gaps) leading to the potential for increased crashes as volumes increase.

'Build Option 1: Intersection Realignment' Capacity Analysis

Table 3 summarizes the results of the capacity analysis for the study intersections under the Opening Year 2030 and Design Year 2050 'Build Option 1' traffic conditions. As previously mentioned, this scenario consists of realigning the Upper Fredericktown Road approach at North Sandusky Street (SR 13), separating it from Crestview Avenue and creating two adjacent intersections. Traffic to and from Buena Vista Avenue was redirected to appropriate movements on Crestview Avenue. See **Appendix B** for the HCS Intersection Capacity Analysis printouts.

Table 3: HCS Intersection Capacity Analysis Summary - Opening Year 2030 and Design Year 2050 'Build Option 1' Conditions								
Movement	Opening Year 2030				Design Year 2050			
	LOS	Delay (sec)	V/C Ratio	95 th % Queue (ft)	LOS	Delay (sec)	V/C Ratio	95 th % Queue (ft)
AM Peak Hour								
N. Sandusky Street (SR 13) / Crestview Avenue								
Westbound Approach	B	11.5	0.03	3	B	12.2	0.04	3
Southbound Left	A	8.3	0.01	0	A	8.6	0.01	0
Southbound Thru	A	0.1	-	-	A	0.1	-	-
Southbound Approach	A	0.2	-	-	A	0.2	-	-
N. Sandusky Street (SR 13) / Upper Fredericktown Road								
Westbound Approach	D	30.4	0.52	71	F	51.9	0.72	125
Southbound Left	A	8.4	0.00	0	A	8.6	0.01	0
Southbound Thru	A	0.0	-	-	A	0.1	-	-
Southbound Approach	A	0.1	-	-	A	0.1	-	-

Table 3: HCS Intersection Capacity Analysis Summary - Opening Year 2030 and Design Year 2050 'Build Option 1' Conditions (cont.)								
Opening Year 2030					Design Year 2050			
Movement	LOS	Delay (sec)	V/C Ratio	95th % Queue (ft)	LOS	Delay (sec)	V/C Ratio	95th % Queue (ft)
PM Peak Hour								
N. Sandusky Street (SR 13) / Crestview Avenue								
<i>Westbound Approach</i>	C	17.2	0.11	10	C	20.1	0.16	13
Southbound Left	A	10.0	0.05	5	B	10.4	0.03	3
Southbound Thru	A	0.8	-	-	A	0.5	-	-
<i>Southbound Approach</i>	A	1.2	-	-	A	0.7	-	-
N. Sandusky Street (SR 13) / Upper Fredericktown Road								
<i>Westbound Approach</i>	F	93.6	0.87	156	F	251.6	1.32	275
Southbound Left	A	9.9	0.01	0	B	10.5	0.01	0
Southbound Thru	A	0.1	-	-	A	0.2	-	-
<i>Southbound Approach</i>	A	0.2	-	-	A	0.3	-	-

As indicated in **Table 3**, 'Build Option 1' is anticipated to operate adequately for most approaches. However, poor LOS, lengthy delays, and long queues are expected on the realigned Upper Fredericktown Road approach during the Opening Year PM peak and both the AM and PM peak hours of the Design Year. While there is a reduction in delay versus 'No-Build', it is still unacceptable.

'Build Option 2: Roundabout' Capacity Analysis

Table 4 summarizes the results of the capacity analysis for the North Sandusky Street (SR 13) / Upper Fredericktown Road / Crestview Avenue intersection under the Opening Year 2030 and Design Year 2050 'Build Option 2' traffic conditions. This intersection was analyzed as a roundabout, with traffic volumes to and from Buena Vista Avenue redirected to Crestview Avenue. See **Appendix B** for the HCS Intersection Capacity Analysis printouts.

**Table 4: HCS Intersection Capacity Analysis Summary -
Opening Year 2030 and Design Year 2050 'Build Option 2' Conditions**

Movement	Opening Year 2030				Design Year 2050			
	LOS	Delay (sec)	V/C Ratio	95 th % Queue (ft)	LOS	Delay (sec)	V/C Ratio	95 th % Queue (ft)
AM Peak Hour								
N. Sandusky Street (SR 13) / Upper Fredericktown Road / Crestview Avenue								
Eastbound Approach	A	6.0	0.03	3	A	6.8	0.04	3
Westbound Approach	A	5.6	0.16	16	A	6.2	0.20	18
Northbound Approach	A	6.3	0.35	44	A	7.0	0.41	54
Southbound Approach	A	9.4	0.51	82	B	11.5	0.60	115
Overall Approach	A	7.7	-	-	A	9.0	-	-
PM Peak Hour								
N. Sandusky Street (SR 13) / Upper Fredericktown Road / Crestview Avenue								
Eastbound Approach	A	6.5	0.06	6	A	7.5	0.08	8
Westbound Approach	A	7.5	0.21	21	A	8.9	0.26	26
Northbound Approach	B	12.4	0.69	155	C	17.0	0.80	238
Southbound Approach	A	9.0	0.51	78	B	10.9	0.60	107
Overall Approach	B	10.6	-	-	B	13.9	-	-

As shown in **Table 4**, the North Sandusky Street (SR 13) / Upper Fredericktown Road / Crestview Avenue intersection is anticipated to operate at acceptable LOS B or better during the AM and PM peak hours under Opening Year 2030 and Design Year 2050 'Build Option 2' traffic conditions. All approaches are expected to have sufficient capacity. Therefore, converting the existing unsignalized two-way stop intersection into a single-lane roundabout is expected to improve the intersection's operations as compared to the 'No-Build' conditions.

VIII. Proposed Countermeasure Evaluation

The proposed long-term countermeasures have been evaluated to identify the potential for reducing crashes at the North Sandusky Street (SR 13) / Upper Fredericktown Road / Crestview Avenue intersection. The two options for long-term countermeasures were evaluated using ODOT's Economic Crash Analysis Tool (ECAT), which is a spreadsheet application used to calculate predicted crash frequencies for existing conditions, predict crash frequencies for proposed conditions, conduct alternatives analysis, and perform benefit-cost analysis (for feasible alternatives). ECAT is based on Highway Safety manual (HSM) predictive analysis and uses Crash Modification Factors (CMF) to evaluate countermeasures for specific site conditions, with a goal to identify the most appropriate strategy to address safety needs. Predictive analysis uses national safety performance functions to predict crashes by severity for specific facility types and base conditions. CMFs are used to estimate the potential

effects of countermeasures or changes from the base conditions. ODOT's spreadsheet includes calibrations to Ohio specific conditions. The ECAT analysis reports are provided in **Appendix F**.

The existing conditions, including roadway geometric characteristics, traffic control, and observed crashes were first evaluated in ECAT. This spreadsheet develops a baseline of current conditions and identifies the predicted average crash frequency for similar sites, expected average crash frequency for the particular site (based on observed crashes), and potential for safety improvement (the difference between predicted and expected crash frequency). This intersection has an expected average crash frequency of 2.4 crashes per year and a predicted average crash frequency of 2.3 crashes per year, indicating that the intersection is operating slightly worse than peer locations with a potential for safety improvement of 0.1 crashes per year.

'Build Option 1: Intersection Realignment'

'Build Option 1', involves realigning Upper Fredericktown Road to intersect North Sandusky Street (SR 13) at a 90-degree angle, separating it from the Crestview Avenue approach. Lighting was assumed to be present at the intersection. The proposed improvements are difficult to accurately evaluate in ECAT because Crash Modification Factors (CMF) for modifying the intersection angle only applies to rural site types. Although the study area is located at the edge of the municipal limits, it is within the urbanized area, therefore all site elements are characterized as urban. The Crestview Avenue and Upper Fredericktown Road approaches were analyzed as 3-legged intersections rather than one 4-legged intersection. The Buena Vista Avenue intersection was removed from the study elements since that approach will be eliminated. CMF ID 201: Convert four-leg intersection into two three-leg intersections was applied to all injury severity level crashes. This has a CMF of 0.75 for injury crashes, indicating a crash reduction of 25%.

The proposed conditions ECAT report indicates a predicted average crash frequency of 1.4 crashes per year. This is a reduction of 1.0 crashes per year from the existing conditions expected average crash frequency and 0.9 crashes per year from the existing conditions predicted average crash frequency.

Currently, motorists on Upper Fredericktown Road have a difficult time seeing southbound traffic on North Sandusky Street due to the skewed intersection, so the realignment would be expected to improve both driver comfort and safety. However, the realignment also creates two closely-spaced intersections by separating Upper Fredericktown Road from Crestview Avenue, which could lead to confusion for where motorists on North Sandusky are turning. There is also the possibility of a motorist on either Crestview Avenue or Upper Fredericktown thinking they have an adequate gap in traffic on North Sandusky Street and then encounter a vehicle that has just turned from the adjacent intersection.

A planning level cost estimate was developed for the improvements, which includes anticipated costs for construction, design, right of way, construction inspection, and inflation. The costs were based on recent unit prices for similar projects. With an estimated construction cost of \$1,318,876 and a service life of 20 years, the net present value of the project is \$1,070,516. This countermeasure has a net present value of safety benefits of \$584,509, yielding a net benefit of -\$486,007 and a benefit-cost ratio of 0.55 for realigning the Upper Fredericktown Road approach and creating a cul-de-sac on Buena Vista Avenue. This indicates that the cost to implement this countermeasure is greater than the expected safety benefits. The planning level cost estimate is provided in **Appendix G**.

'Build Option 2: Roundabout'

Converting the intersection from two-way stop control to a single-lane roundabout yields a predicted average crash frequency of 1.0 crashes per year, a reduction of 1.4 crashes per year compared to the existing conditions expected average crash frequency and a reduction of 1.3 crashes per year compared to the existing conditions predicted average crash frequency.

The site type for the element was changed to "roundabout" and CMF ID 206 from the FHWA CMF Clearinghouse was applied. The CMF for all crash types and severities is 0.28, reflecting an expected crash reduction of 72%.

The planning level cost estimate developed for 'Build Option 2' is \$3,920,748 with a service life of 20 years. The net present value of the project is \$2,273,160 and the net present value of safety benefits of \$668,961, yielding a net benefit of -\$1,604,199 and a benefit-cost ratio of 0.29 for constructing a single-lane roundabout at the intersection of North Sandusky Street (SR 13) / Upper Fredericktown Road / Crestview Avenue and creating a cul-de-sac on Buena Vista Avenue. This indicates that while crashes will be reduced, the cost to implement this countermeasure is greater than the expected safety benefits. The cost estimate is provided in **Appendix G**.

Comparison of Alternatives:

In order to identify a preferred alternative, the long-term options were evaluated qualitatively with regard to safety improvement, benefit to cost ratios, impacts to private property, impacts to vehicular travel, as well as relative cost. **Table 5** provides an evaluation matrix of the alternatives.

Table 5: Evaluation Matrix of Alternatives

Improvement	Predicted Average Crash Frequency	Benefit to Cost Ratio	R/W Impacts	Traffic Impacts	Cost	Recommended?
Existing Conditions	2.3	N/A	N/A	N/A	N/A	N/A
'Build Option 1: Intersection Realignment'	1.4	0.55	3 minor permanent takes	Reduces delay but still failing LOS	High	No
'Build Option 2: Roundabout'	1.0	0.29	7 minor permanent takes, 1 major permanent take	Improved LOS and delay	Very High	Yes

Based on a review of the evaluation matrix, 'Build Option 2: Roundabout' is the recommended alternative for implementation based upon the following reasoning:

- Predicted Crash Frequency – 'Build Option 2' results in a greater reduction in predicted crash frequency compared to the existing conditions.
- Anticipated Crash Reduction – 'Build Option 2' has a higher CMF, with an anticipated crash reduction of 72%.
- Traffic Impacts – 'Build Option 2' provides improved traffic operations with reduced delays and better LOS.

While the roundabout is the preferred option for the reasons listed above, the cost compared to the safety benefits will require a multi-faceted funding plan rather than applying for HSIP funds to cover the bulk of the project cost.

IX. Conclusions and Recommendations

At the request of the City of Mt. Vernon, GPD Group was tasked with completing as Safety Study for North Sandusky Street (SR 13) from Buena Vista Avenue through the Upper Fredericktown Road / Crestview Avenue intersection and the curve immediately north of that intersection.

The following conclusions and recommendations have resulted from this study.

1. The study area is in the northwest corner of the City of Mt. Vernon, with portions of North Sandusky Street (SR 13) technically under ODOT jurisdiction, although possibly maintained by the City. Upper Fredericktown Road is under Knox County jurisdiction. Any improvements to the roadways will require either coordination between agencies or annexation of property by the City.

2. The North Sandusky Street (SR 13) / Upper Fredericktown Road / Crestview Avenue intersection has a complex geometry that creates difficulties for motorists to safely negotiate turns due to confusion over whether northbound traffic is continuing on North Sandusky Street (SR 13) or turning onto Upper Fredericktown Road.
3. The Upper Fredericktown Road approach to the intersection currently operates at LOS E in the AM peak and LOS F in the PM peak, with lengthy delays.
4. The study area was identified as a FSI (Fatal and Serious Injury) crash location and a crash hotspot within Knox County in the CORPO 2024 Safety Action Plan. Review of crash data from 2022-2024 indicates a total of 13 crashes in the study area, including a fatal collision that killed two people in the curve at the north end of the study area.
5. There were 6 crashes at the intersection of North Sandusky Street (SR 13) / Upper Fredericktown Road / Crestview Avenue. These were primarily angle and left-turn crashes.
6. There were 3 crashes at the intersection of North Sandusky Street (SR 13) and Buena Vista Avenue.
7. The posted speed limit changes between 35 mph and 45 mph throughout the study area, including different posted speeds in each direction and inadequate advance signing of speed limit changes. The journalized speed limit is 35 mph throughout the study area.
8. There is inadequate intersection sight distance looking south along North Sandusky Street (SR 13) from Buena Vista Avenue. The provided sight distance satisfies a design speed of 30 mph.
9. There is adequate intersection sight distance at both the Upper Fredericktown Road and Crestview Avenue approaches to North Sandusky Street (SR 13) for a design speed of 50 mph.
10. ECAT analysis of the existing conditions indicates that the study area experiences slightly higher predicted average crash frequency (2.4 crashes per year) than the expected average crash frequency (2.3 crashes per year) for peer locations. This indicates a potential for safety improvement of 0.1 crashes per year.
11. Short-term countermeasures that can be implemented at low cost include normalizing the speed limit through the study area to match the journalized speed and installing a "Reduced Speed Ahead" sign on the southbound approach of North Sandusky Street (SR 13).

12. 'Build Option 1: Realign Intersection' is a long-term countermeasure that would create a perpendicular intersection of Upper Fredericktown Road with North Sandusky Street and separate it from Crestview Avenue. This alternative is anticipated to reduce angle and left-turn crashes by creating a more standard intersection and reducing confusion about the intention of northbound motorists on North Sandusky Street (SR 13). However, two closely spaced intersections could lead to motorists on Upper Fredericktown Road and Crestview Avenue not anticipating traffic entering from the other approach.
13. Under 'Build Option 1' the Upper Fredericktown Road approach is anticipated to have reduced delays compared to the existing conditions but will still operate at LOS F in the PM peak of the Opening Year 2030 and in both the AM and PM peaks of the Design Year 2050.
14. 'Build Option 1' has a predicted average crash frequency of 1.4 crashes per year, a reduction of 0.9 crashes per year compared to existing conditions.
15. 'Build Option 2: Roundabout' is a long-term countermeasure that would construct a single-lane roundabout at the intersection of North Sandusky Street (SR 13) / Upper Fredericktown Road / Crestview Avenue. This alternative is anticipated to reduce all types of crashes at the intersection and resolve confusion about motorists' intent.
16. 'Build Option 2' is expected to provide adequate operations to the intersection in both Opening Year 2030 and Design Year 2050, with all approaches operating at LOS C or better.
17. 'Build Option 2' has a predicted average crash frequency of 1.0 crashes per year, a reduction of 1.4 crashes per year compared to existing conditions.
18. Under both long-term options, a cul-de-sac would be constructed on Buena Vista Avenue with traffic diverted to Crestview Avenue.

Based on the results of the analysis contained in this report, GPD Group recommends the following:

1. The City of Mt. Vernon, at their earliest convenience, should pursue the Short-Term Recommendations as outlined in this report. These improvements will address speed differentials between the two directions on North Sandusky Street (SR 13). Reduced speeds will provide longer gaps in traffic for side-street traffic to enter the roadway and increase sight distance. Coordination with ODOT may be needed.

2. The City of Mt. Vernon should also pursue 'Build Option 2: Roundabout' to construct a single-lane roundabout at the intersection of North Sandusky Street (SR 13) / Upper Fredericktown Road / Crestview Avenue. A cul-de-sac should be constructed on Buena Vista to redirect traffic to Crestview Avenue. This improvement is expected to reduce crashes by 72%, will improve traffic operations, and reduce the complex geometry of the intersection.
3. The roundabout option has a total project cost of \$3.9M and an anticipated safety benefit of \$670,000, indicating that safety funding may only cover a portion of the total cost and a funding plan will be needed. In addition, improvements will need to be coordinated with ODOT and Knox County.

FIGURES

C:\D:\PUBLIC\CA\PROJECTS\2025\20250401 N SANDUSKY_UPPER FREDERICKTOWN\400-ENGINEERING\TRAFFIC\STUDY\FIGURES\FIGURE 1_AERIAL PHOTOGRAPH.DWG
DATE: 4/8/2026 TIME: 12:43:45 PM
TECHNICIAN: DDOMBROSKY



FIGURE 1

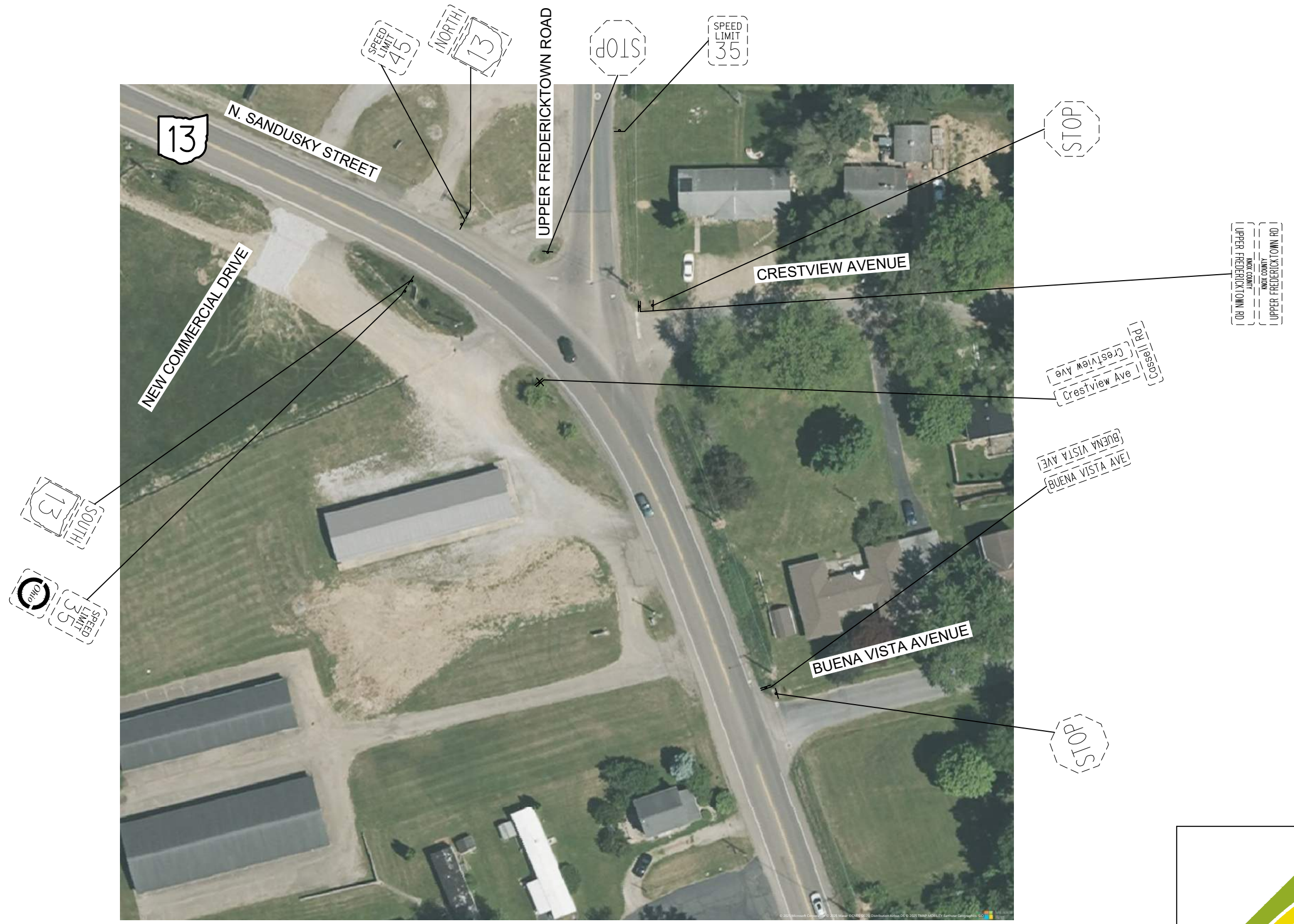
AERIAL PHOTOGRAPH

APRIL 2026



N.T.S.





N.T.S.

LEGEND	
	EXISTING SIGN POST/SUPPORT
	EXISTING SIGN

FIGURE 2	
EXISTING CONDITIONS DIAGRAM	
APRIL 2026	

CAD FILE: \\GPOCO.COM\DATA\PUBLIC\CH\MOUNTVERNON\2025\2025349.01 N SANDUSKY_UPPER FREDERICKTOWN\400-ENGINEERING\TRAFFIC\STUDY\FIGURES\FIGURE 3_REASSIGNED VOLUMES FOR HCS ANALYSIS.DWG
 DATE: 4/23/2026 TIME: 9:44:43 AM
 TECHNICIAN: YOLINE

N. SANDUSKY STREET
(S.R. 13)

(509) (6)
 (14) 4
 484 3

← 625 (620)
 ↘ 2 (13)

N. SANDUSKY STREET
(S.R. 13)
 (783) 391 →
 (12) 3 →

UPPER FREDERICKTOWN ROAD

↖ 2 (6)
 ↗ 134 (122)
 ↘ 2 (7)

↖ 9 (19)
 ↗ 4 (6)
 ↘ 1 (0)

(575) 322 →
 (220) 73 →
 (1) 1 →

↖ 4 (9)
 ↘ 1 (1)

CRESTVIEW AVENUE

BUENA VISTA AVENUE

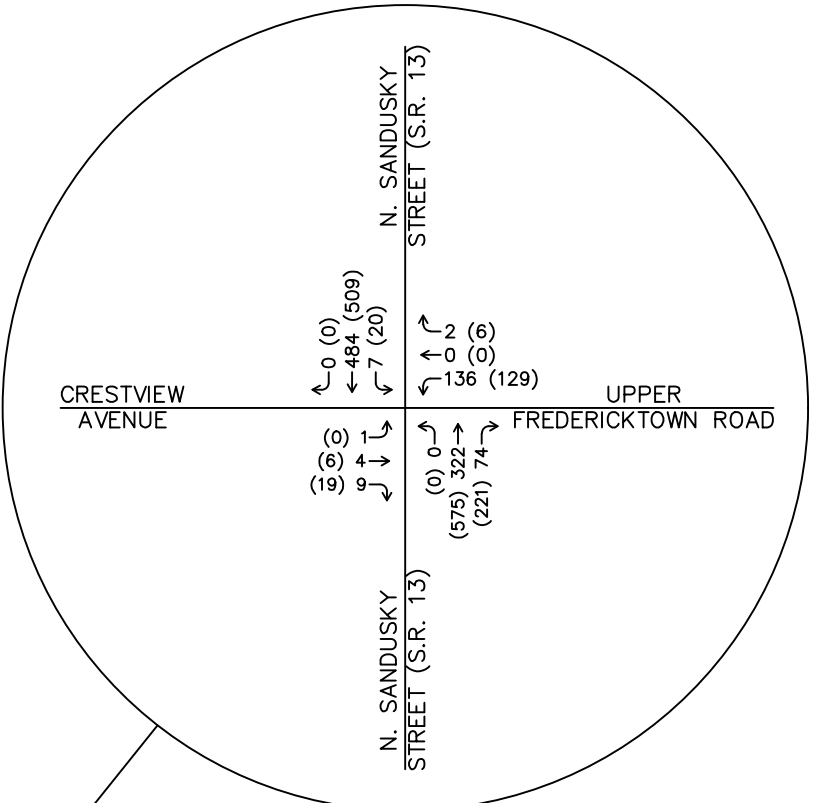


FIGURE 3

EXISTING YEAR 2025
 PEAK HOUR TRAFFIC VOLUMES

APRIL 2026

LEGEND
 ## - AM PEAK HOUR
 (##) - PM PEAK HOUR



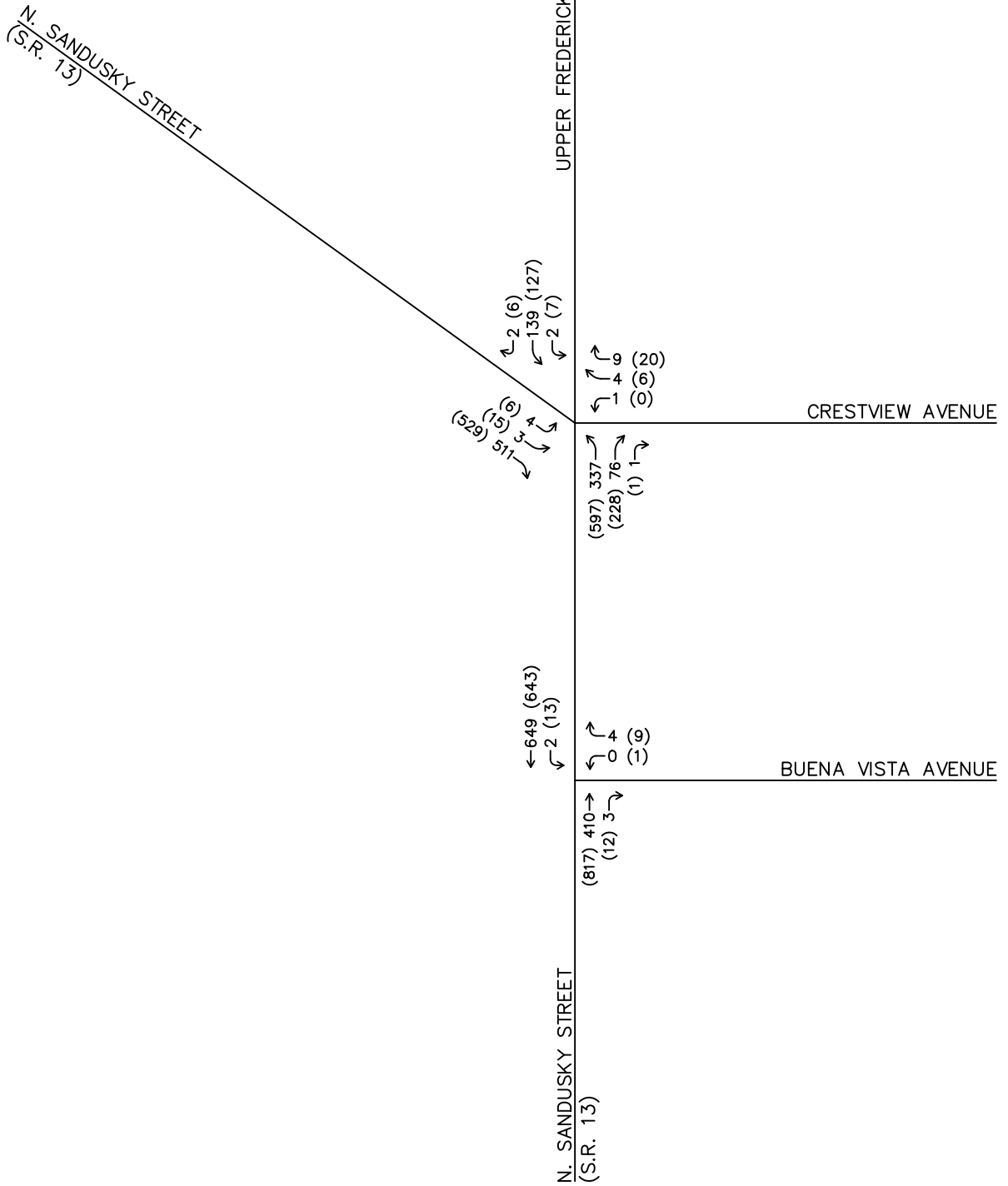
CAD FILE: G:\PUBLIC\CA\PROJECTS\2025\2025\48.01 N SANDUSKY_UPPER FREDERICKTOWN\400-ENGINEERING\TRAFFIC\STUDY\FIGURES\FIGURE 4_OY 2030 'NO-BUILD' PEAK HOUR TRAFFIC VOLUMES.DWG
 DATE: 4/8/2026 TIME: 12:43:58 PM
 TECHNICIAN: DDOMBROSKY



FIGURE 4
 DESIGN YEAR 2030
 'NO-BUILD'
 PEAK HOUR TRAFFIC VOLUMES
 APRIL 2026



LEGEND
 ## - AM PEAK HOUR
 (##) - PM PEAK HOUR



CAD FILE: G:\PUBLIC\CA\PROJECTS\2025\2025\48.01 N SANDUSKY UPPER FREDERICKTOWN\400-ENGINEERING\TRAFFIC\STUDY\FIGURES\FIGURE 5.DY 2050 'NO-BUILD' PEAK HOUR TRAFFIC VOLUMES.DWG
 DATE: 4/8/2026 TIME: 12:44:01 PM
 TECHNICIAN: DDOMBROSKY



FIGURE 5
 DESIGN YEAR 2050
 'NO-BUILD'
 PEAK HOUR TRAFFIC VOLUMES
 APRIL 2026



LEGEND
 ## - AM PEAK HOUR
 (##) - PM PEAK HOUR

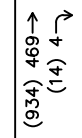
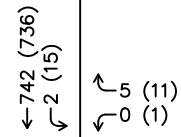
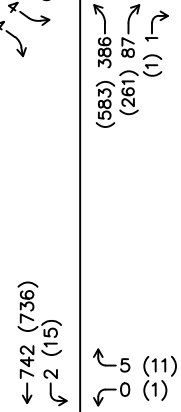
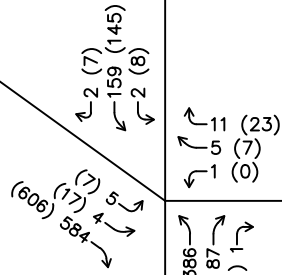
N. SANDUSKY STREET
 (S.R. 13)

UPPER FREDERICKTOWN ROAD

CRESTVIEW AVENUE

BUENA VISTA AVENUE

N. SANDUSKY STREET
 (S.R. 13)



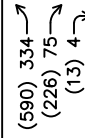
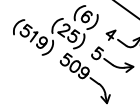
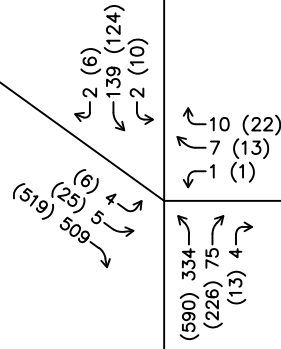
N. SANDUSKY STREET
 (S.R. 13)

UPPER FREDERICKTOWN ROAD

CRESTVIEW AVENUE

BUENA VISTA AVENUE
 (CLOSED)

N. SANDUSKY STREET
 (S.R. 13)



← 649 (644)

(829) 413 →

LEGEND
 ## - AM PEAK HOUR
 (##) - PM PEAK HOUR



FIGURE 6
 OPENING YEAR 2030
 'BUILD'
 PEAK HOUR TRAFFIC VOLUMES
 APRIL 2026



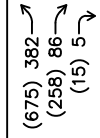
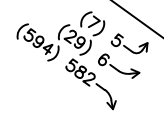
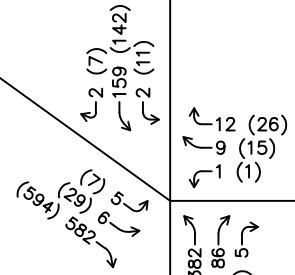
N. SANDUSKY STREET
 (S.R. 13)

UPPER FREDERICKTOWN ROAD

CRESTVIEW AVENUE

BUENA VISTA AVENUE
 (CLOSED)

N. SANDUSKY STREET
 (S.R. 13)



← 742 (737)

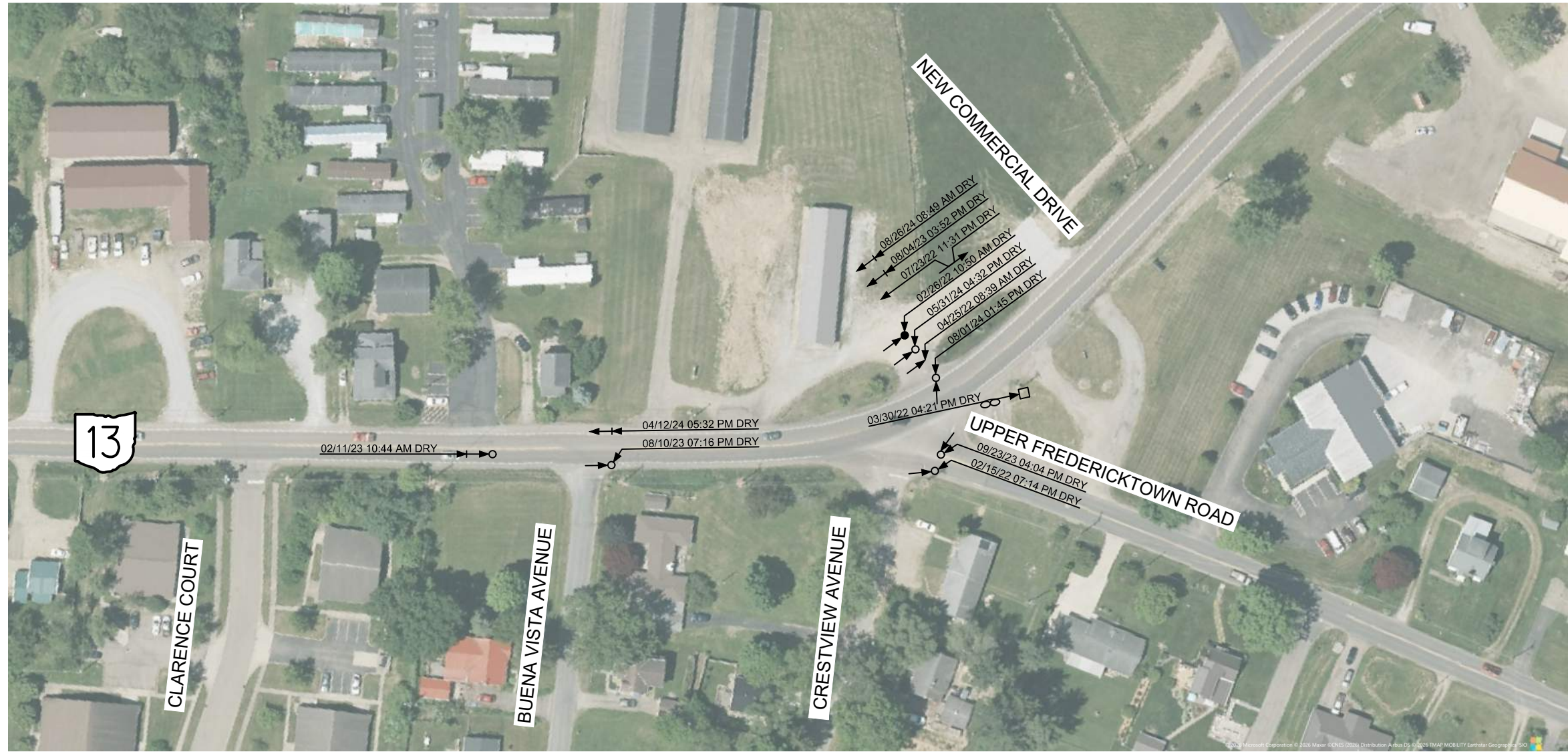
(948) 473 →

LEGEND
 ## - AM PEAK HOUR
 (##) - PM PEAK HOUR



FIGURE 7
 DESIGN YEAR 2050
 'BUILD'
 PEAK HOUR TRAFFIC VOLUMES
 APRIL 2026





LEGEND			
←	MOVING VEHICLE	↔	REAR END
←	BACKING VEHICLE	↔	HEAD ON
🚲	BICYCLIST	↔	OUT OF CONTROL
🚶	PEDESTRIANS	↔	LEFT TURN
🚗	PARKED VEHICLE	↔	SIDESWIPE
□	FIXED OBJECT	↔	ANGLE
●	FATAL CRASH	↔	NO FAULT CRASHES
○	INJURY CRASH	↔	NO FAULT CRASHES

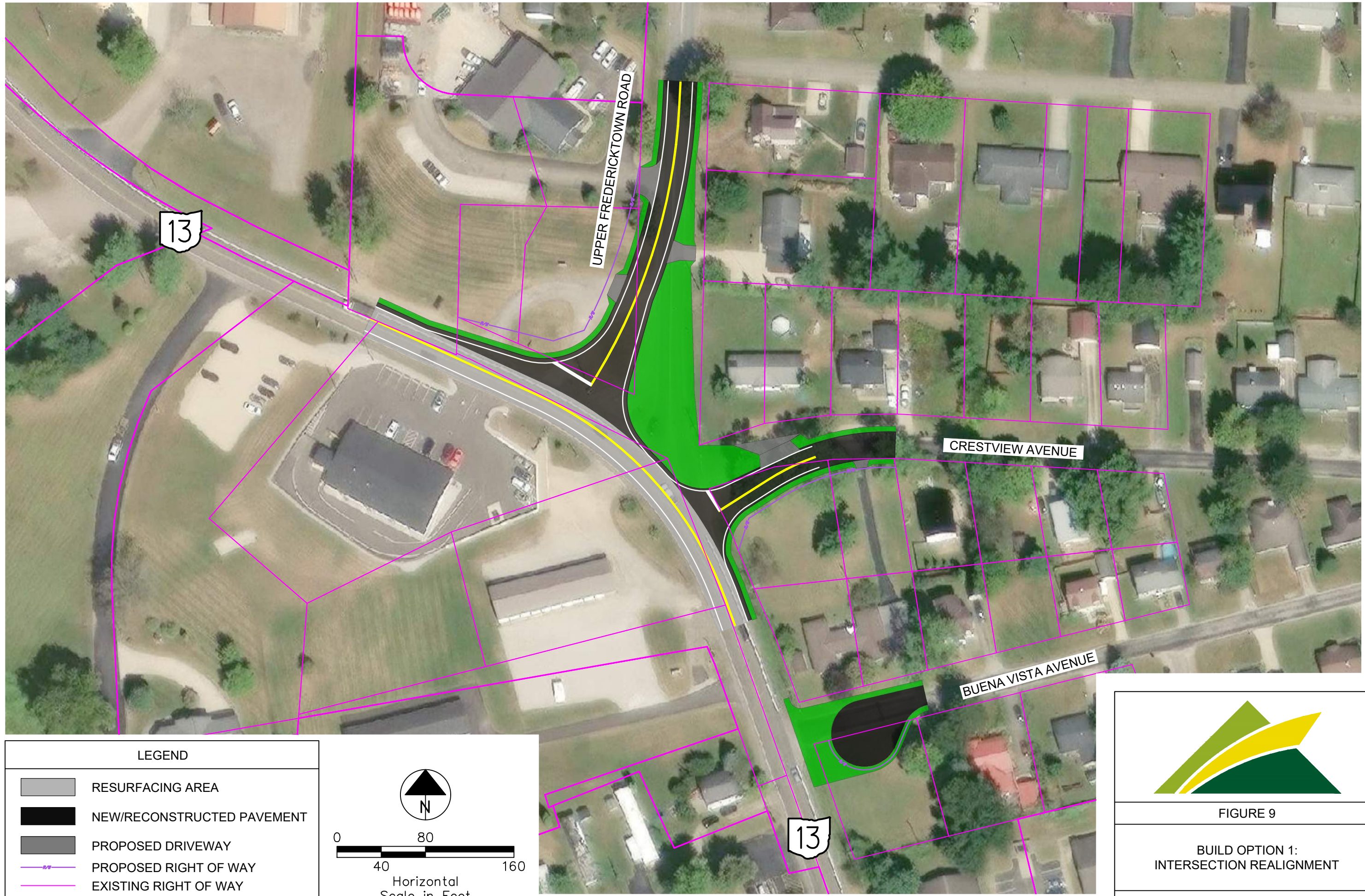


FIGURE 8





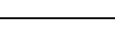
COLLISION DIAGRAM

APRIL 2026

Drawing File: C:\Public\OH\MountVernon\2025\0225246.01 N Sandusky_Upper Fredericktown\Traffic\Planning\N Sandusky_Upper Fredericktown_Intersection Realignment.dwg Layout: Layout1
Date: Apr 16, 2026 Time: 1:10 pm Page: 0
Technician: ddombrosky



LEGEND

-  RESURFACING AREA
-  NEW/RECONSTRUCTED PAVEMENT
-  PROPOSED DRIVEWAY
-  PROPOSED RIGHT OF WAY
-  EXISTING RIGHT OF WAY

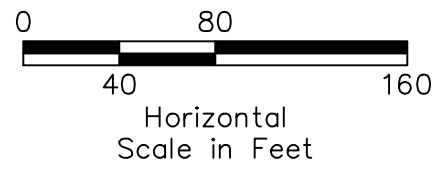
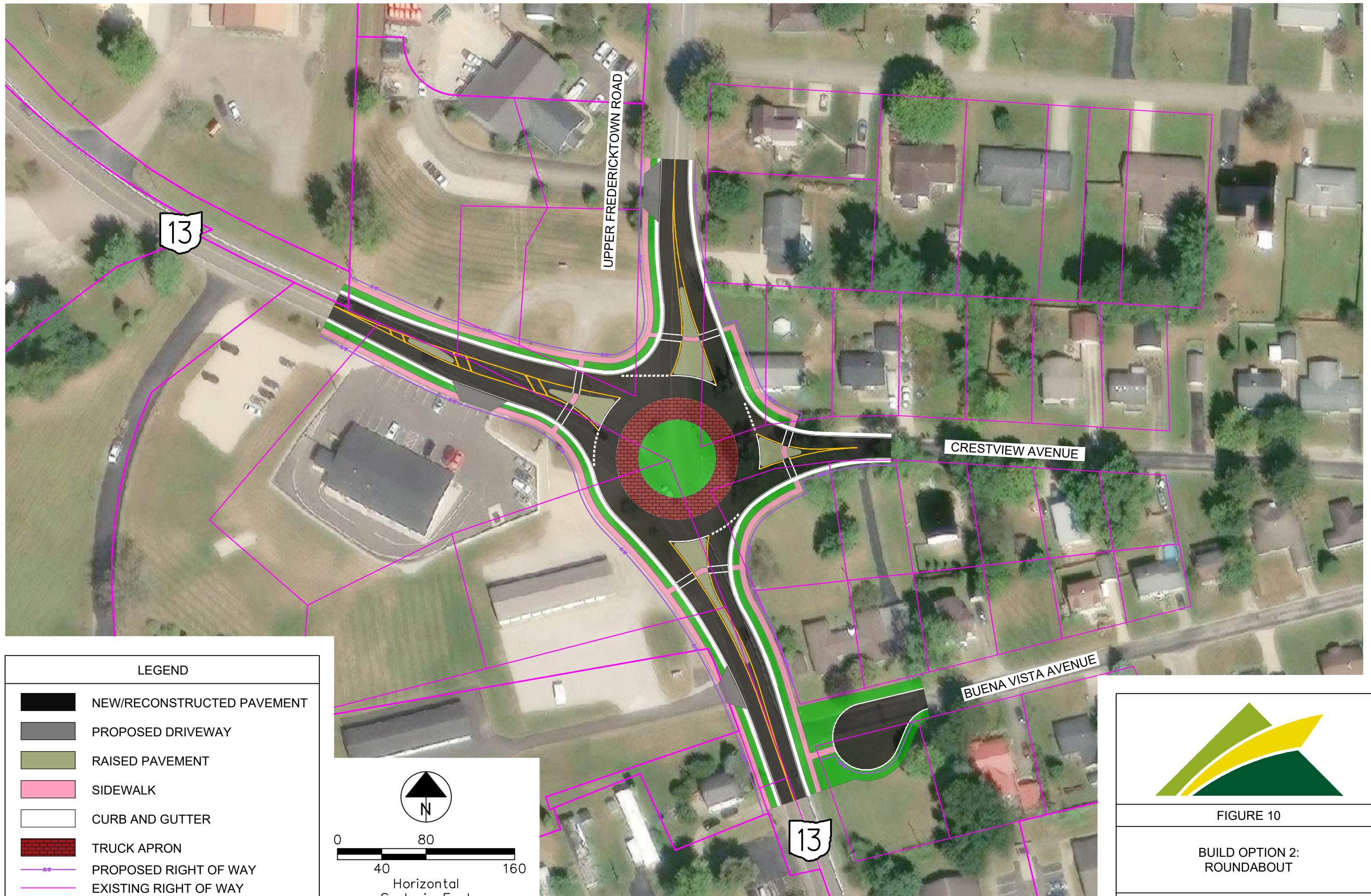


FIGURE 9








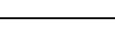
BUILD OPTION 1:
INTERSECTION REALIGNMENT

APRIL 2026

Drawing File: C:\Public\01\Mount Vernon\2025\0225246.01 N Sandusky_Upper Fredericktown\Traffic\Planning\N Sandusky_Upper Fredericktown_Roundabout_Update3.dwg
 Date: 2/27/25 Time: 2:40 pm User: d
 Technician: ddombrosky



LEGEND

-  NEW/RECONSTRUCTED PAVEMENT
-  PROPOSED DRIVEWAY
-  RAISED PAVEMENT
-  SIDEWALK
-  CURB AND GUTTER
-  TRUCK APRON
-  PROPOSED RIGHT OF WAY
-  EXISTING RIGHT OF WAY

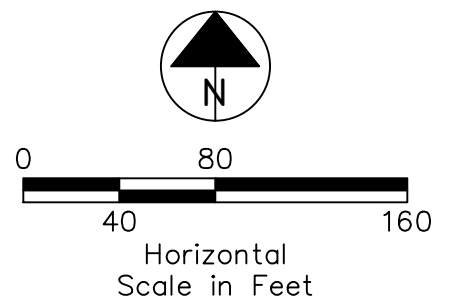


FIGURE 10

BUILD OPTION 2:
 ROUNDABOUT

APRIL 2026

**APPENDIX A
TURNING MOVEMENT COUNTS**

SR 13 & Buena Vista Ave - TMC

Thu May 29, 2025

Full Length (6 AM-9 AM, 3 PM-6 PM)

All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses, Pedestrians, Bicycles on Crosswalk)

All Movements

ID: 1304746, Location: 40.409986, -82.494894



Provided by: Tri-State Traffic Data, Inc.
48 Greensburg Street, Suite 397,
Delmont, PA, 15626-9998, US

Leg Direction	Buena Vista Ave Westbound					SR 13 Northbound					SR 13 Southbound					Int
	L	R	U	App	Ped*	T	R	U	App	Ped*	L	T	U	App	Ped*	
Time																
2025-05-29 6:00AM	1	0	0	1	0	45	0	0	45	0	0	93	0	93	0	139
6:15AM	1	0	0	1	0	66	0	0	66	0	0	99	0	99	0	166
6:30AM	0	3	0	3	0	60	0	0	60	0	0	157	0	157	0	220
6:45AM	0	1	0	1	0	84	1	0	85	0	2	121	0	123	0	209
Hourly Total	2	4	0	6	0	255	1	0	256	0	2	470	0	472	0	734
7:00AM	2	1	0	3	0	93	0	0	93	0	2	111	0	113	0	209
7:15AM	0	1	0	1	0	97	0	0	97	0	0	151	0	151	0	249
7:30AM	0	1	0	1	0	84	1	0	85	1	0	157	0	157	0	243
7:45AM	0	1	0	1	0	95	1	0	96	0	1	153	0	154	0	251
Hourly Total	2	4	0	6	0	369	2	0	371	1	3	572	0	575	0	952
8:00AM	0	1	0	1	0	89	1	0	90	0	1	123	0	124	0	215
8:15AM	3	1	0	4	0	90	2	0	92	0	0	136	0	136	0	232
8:30AM	2	0	0	2	0	70	2	0	72	0	2	133	0	135	0	209
8:45AM	0	0	0	0	0	103	0	0	103	0	1	135	0	136	0	239
Hourly Total	5	2	0	7	0	352	5	0	357	0	4	527	0	531	0	895
9:00AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:00PM	0	3	0	3	0	145	1	0	146	0	2	110	0	112	0	261
3:15PM	1	2	0	3	0	167	0	0	167	0	1	120	0	121	0	291
3:30PM	0	2	0	2	0	179	4	0	183	0	6	161	0	167	0	352
3:45PM	1	1	0	2	0	205	3	0	208	0	2	133	0	135	0	345
Hourly Total	2	8	0	10	0	696	8	0	704	0	11	524	0	535	0	1249
4:00PM	0	2	0	2	0	176	2	0	178	0	3	147	0	150	0	330
4:15PM	0	3	0	3	0	172	2	0	174	0	1	138	0	139	0	316
4:30PM	1	0	0	1	0	167	0	0	167	0	1	143	0	144	0	312
4:45PM	0	1	0	1	0	174	2	0	176	0	2	142	0	144	0	321
Hourly Total	1	6	0	7	0	689	6	0	695	0	7	570	0	577	0	1279
5:00PM	0	3	0	3	0	192	1	0	193	0	0	149	0	149	0	345
5:15PM	0	2	0	2	0	188	2	0	190	0	1	143	0	144	0	336
5:30PM	1	1	0	2	0	138	1	0	139	0	0	147	0	147	0	288
5:45PM	0	5	0	5	0	111	2	0	113	0	0	109	0	109	0	227
Hourly Total	1	11	0	12	0	629	6	0	635	0	1	548	0	549	0	1196
6:00PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	13	35	0	48	0	2990	28	0	3018	1	28	3211	0	3239	0	6305
% Approach	27.1%	72.9%	0%	-	-	99.1%	0.9%	0%	-	-	0.9%	99.1%	0%	-	-	-
% Total	0.2%	0.6%	0%	0.8%	-	47.4%	0.4%	0%	47.9%	-	0.4%	50.9%	0%	51.4%	-	-
Lights	11	35	0	46	-	2801	26	0	2827	-	28	3002	0	3030	-	5903
% Lights	84.6%	100%	0%	95.8%	-	93.7%	92.9%	0%	93.7%	-	100%	93.5%	0%	93.5%	-	93.6%
Articulated Trucks and Single-Unit Trucks	2	0	0	2	-	179	0	0	179	-	0	200	0	200	-	381
% Articulated Trucks and Single-Unit Trucks	15.4%	0%	0%	4.2%	-	6.0%	0%	0%	5.9%	-	0%	6.2%	0%	6.2%	-	6.0%
Buses	0	0	0	0	-	10	2	0	12	-	0	9	0	9	-	21
% Buses	0%	0%	0%	0%	-	0.3%	7.1%	0%	0.4%	-	0%	0.3%	0%	0.3%	-	0.3%
Pedestrians	-	-	-	-	0	-	-	-	-	1	-	-	-	-	0	-
% Pedestrians	-	-	-	-	-	-	-	-	-	100%	-	-	-	-	-	-
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	0%	-	-	-	-	-	-

* Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

SR 13 & Buena Vista Ave - TMC

Thu May 29, 2025

Full Length (6 AM-9 AM, 3 PM-6 PM)

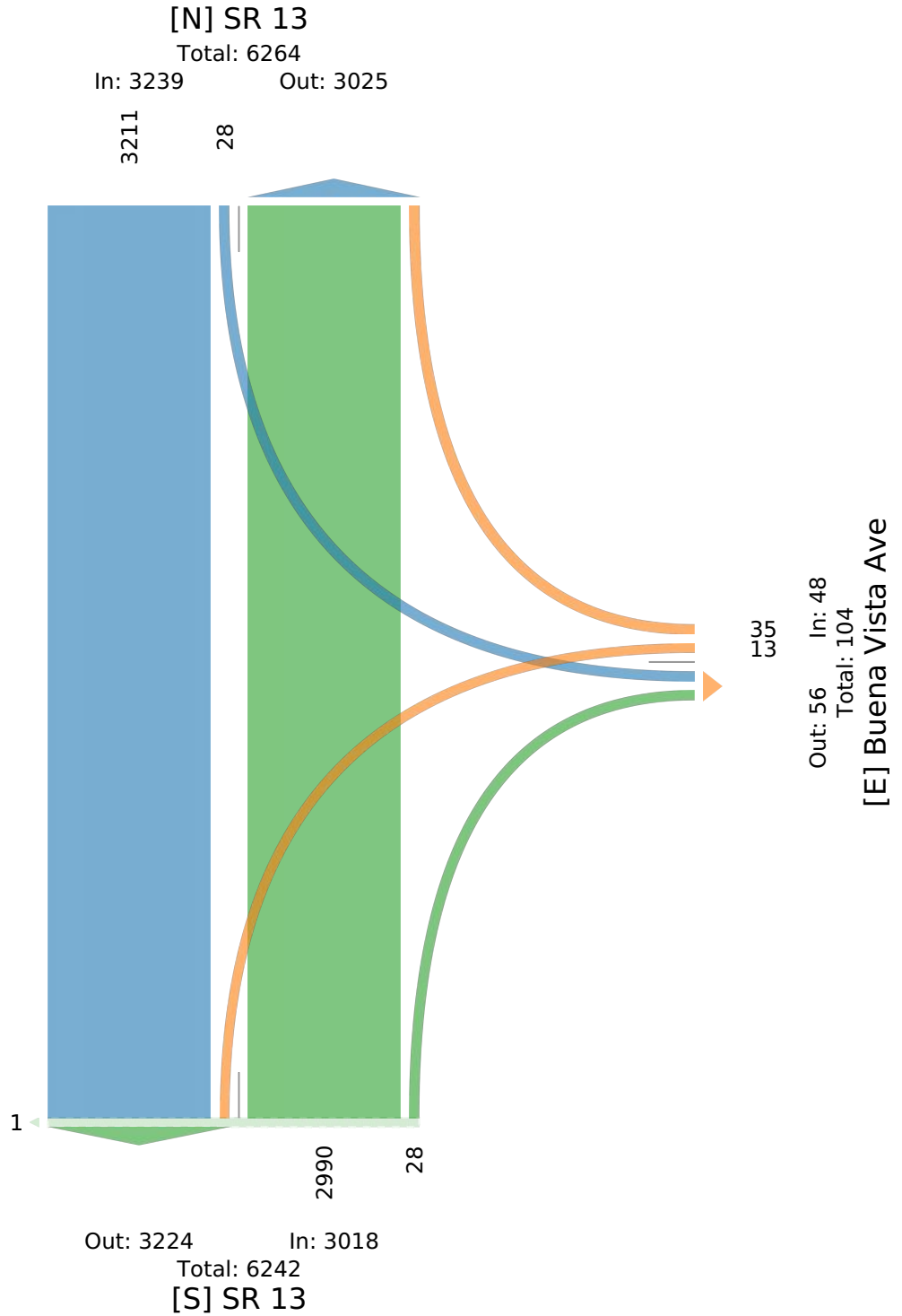
All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses, Pedestrians, Bicycles on Crosswalk)

All Movements

ID: 1304746, Location: 40.409986, -82.494894



Provided by: Tri-State Traffic Data, Inc.
48 Greensburg Street, Suite 397,
Delmont, PA, 15626-9998, US



SR 13 & Buena Vista Ave - TMC

Thu May 29, 2025

AM Peak (7:15 AM - 8:15 AM)

All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses, Pedestrians, Bicycles on Crosswalk)

All Movements

ID: 1304746, Location: 40.409986, -82.494894



Provided by: Tri-State Traffic Data, Inc.
48 Greensburg Street, Suite 397,
Delmont, PA, 15626-9998, US

Leg Direction	Buena Vista Ave Westbound					SR 13 Northbound					SR 13 Southbound					Int
	L	R	U	App	Ped*	T	R	U	App	Ped*	L	T	U	App	Ped*	
2025-05-29 7:15AM	0	1	0	1	0	97	0	0	97	0	0	151	0	151	0	249
7:30AM	0	1	0	1	0	84	1	0	85	1	0	157	0	157	0	243
7:45AM	0	1	0	1	0	95	1	0	96	0	1	153	0	154	0	251
8:00AM	0	1	0	1	0	89	1	0	90	0	1	123	0	124	0	215
Total	0	4	0	4	0	365	3	0	368	1	2	584	0	586	0	958
% Approach	0%	100%	0%	-	-	99.2%	0.8%	0%	-	-	0.3%	99.7%	0%	-	-	-
% Total	0%	0.4%	0%	0.4%	-	38.1%	0.3%	0%	38.4%	-	0.2%	61.0%	0%	61.2%	-	-
PHF	-	1.000	-	1.000	-	0.941	0.750	-	0.948	-	0.500	0.930	-	0.933	-	0.954
Lights	0	4	0	4	-	328	2	0	330	-	2	533	0	535	-	869
% Lights	0%	100%	0%	100%	-	89.9%	66.7%	0%	89.7%	-	100%	91.3%	0%	91.3%	-	90.7%
Articulated Trucks and Single-Unit Trucks	0	0	0	0	-	35	0	0	35	-	0	50	0	50	-	85
% Articulated Trucks and Single-Unit Trucks	0%	0%	0%	0%	-	9.6%	0%	0%	9.5%	-	0%	8.6%	0%	8.5%	-	8.9%
Buses	0	0	0	0	-	2	1	0	3	-	0	1	0	1	-	4
% Buses	0%	0%	0%	0%	-	0.5%	33.3%	0%	0.8%	-	0%	0.2%	0%	0.2%	-	0.4%
Pedestrians	-	-	-	-	0	-	-	-	-	1	-	-	-	-	0	-
% Pedestrians	-	-	-	-	-	-	-	-	-	100%	-	-	-	-	-	-
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	0%	-	-	-	-	-	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

SR 13 & Buena Vista Ave - TMC

Thu May 29, 2025

AM Peak (7:15 AM - 8:15 AM)

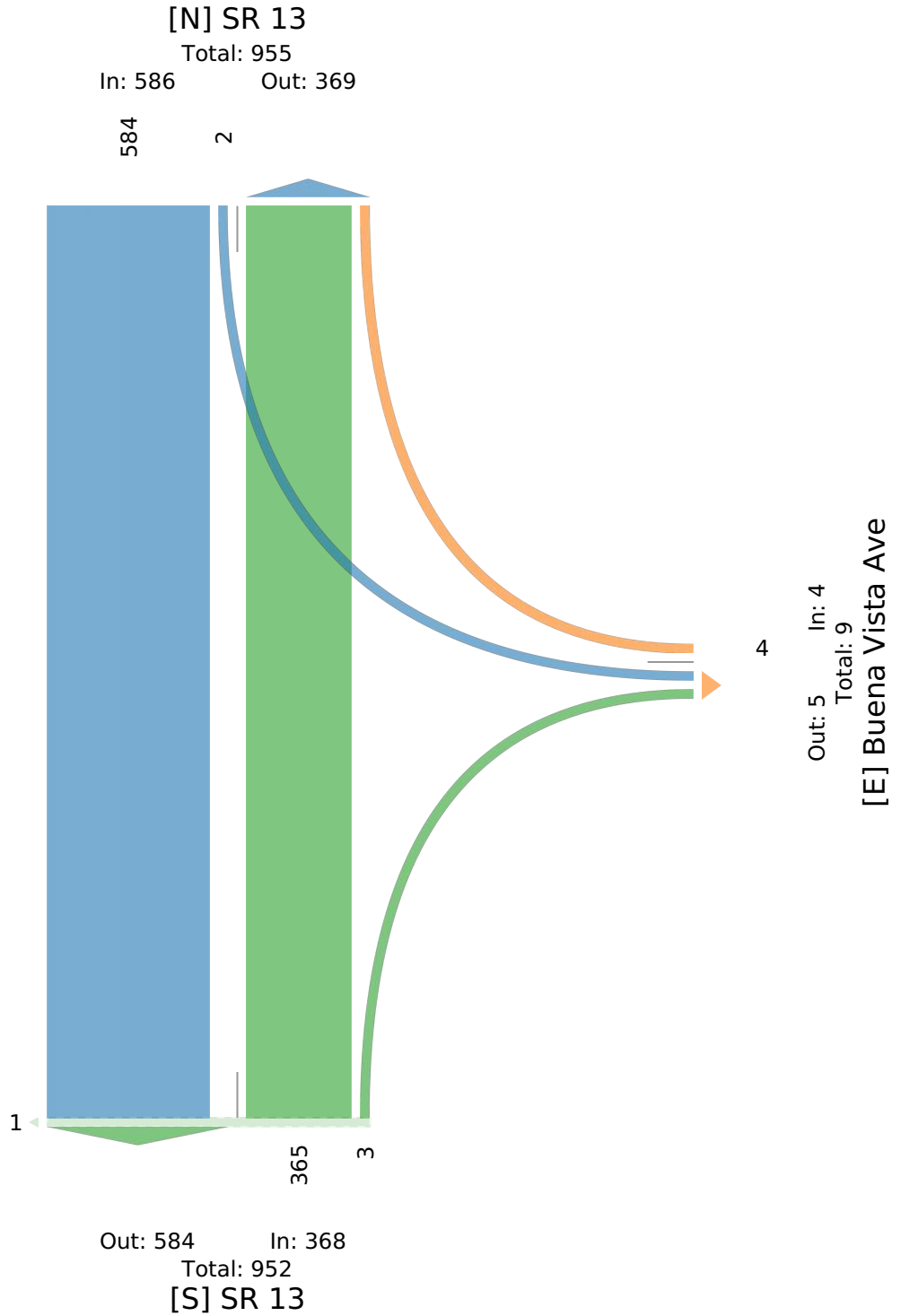
All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses, Pedestrians, Bicycles on Crosswalk)

All Movements

ID: 1304746, Location: 40.409986, -82.494894



Provided by: Tri-State Traffic Data, Inc.
48 Greensburg Street, Suite 397,
Delmont, PA, 15626-9998, US



SR 13 & Buena Vista Ave - TMC

Thu May 29, 2025

PM Peak (3:30 PM - 4:30 PM) - Overall Peak Hour

All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses, Pedestrians, Bicycles on Crosswalk)

All Movements

ID: 1304746, Location: 40.409986, -82.494894



Provided by: Tri-State Traffic Data, Inc.
48 Greensburg Street, Suite 397,
Delmont, PA, 15626-9998, US

Leg Direction	Buena Vista Ave Westbound					SR 13 Northbound					SR 13 Southbound					Int
	L	R	U	App	Ped*	T	R	U	App	Ped*	L	T	U	App	Ped*	
Time																
2025-05-29 3:30PM	0	2	0	2	0	179	4	0	183	0	6	161	0	167	0	352
3:45PM	1	1	0	2	0	205	3	0	208	0	2	133	0	135	0	345
4:00PM	0	2	0	2	0	176	2	0	178	0	3	147	0	150	0	330
4:15PM	0	3	0	3	0	172	2	0	174	0	1	138	0	139	0	316
Total	1	8	0	9	0	732	11	0	743	0	12	579	0	591	0	1343
% Approach	11.1%	88.9%	0%	-	-	98.5%	1.5%	0%	-	-	2.0%	98.0%	0%	-	-	-
% Total	0.1%	0.6%	0%	0.7%	-	54.5%	0.8%	0%	55.3%	-	0.9%	43.1%	0%	44.0%	-	-
PHF	0.250	0.667	-	0.750	-	0.893	0.688	-	0.893	-	0.500	0.899	-	0.885	-	0.954
Lights	1	8	0	9	-	702	10	0	712	-	12	556	0	568	-	1289
% Lights	100%	100%	0%	100%	-	95.9%	90.9%	0%	95.8%	-	100%	96.0%	0%	96.1%	-	96.0%
Articulated Trucks and Single-Unit Trucks	0	0	0	0	-	28	0	0	28	-	0	23	0	23	-	51
% Articulated Trucks and Single-Unit Trucks	0%	0%	0%	0%	-	3.8%	0%	0%	3.8%	-	0%	4.0%	0%	3.9%	-	3.8%
Buses	0	0	0	0	-	2	1	0	3	-	0	0	0	0	-	3
% Buses	0%	0%	0%	0%	-	0.3%	9.1%	0%	0.4%	-	0%	0%	0%	0%	-	0.2%
Pedestrians	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

SR 13 & Buena Vista Ave - TMC

Thu May 29, 2025

PM Peak (3:30 PM - 4:30 PM) - Overall Peak Hour

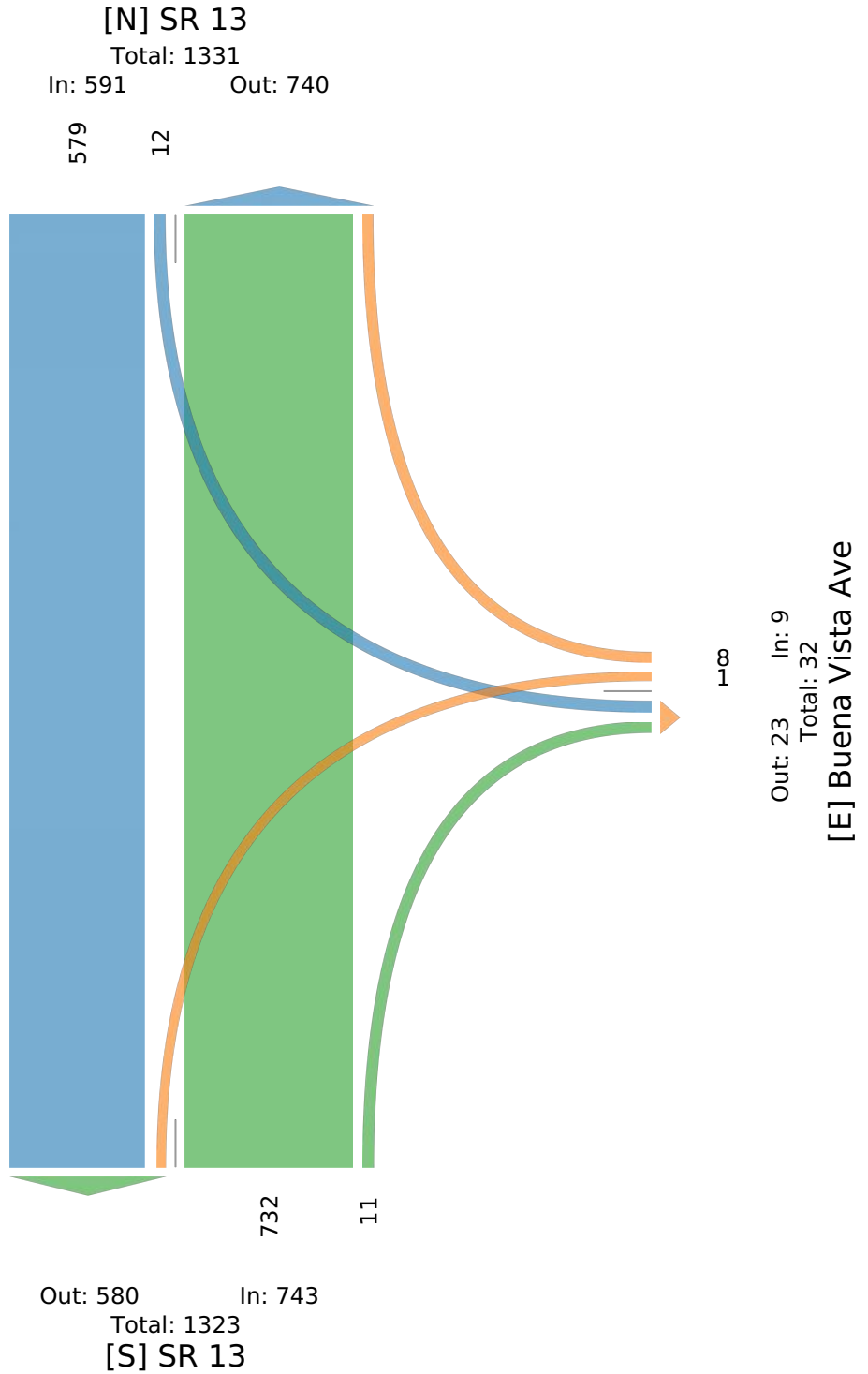
All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses, Pedestrians, Bicycles on Crosswalk)

All Movements

ID: 1304746, Location: 40.409986, -82.494894



Provided by: Tri-State Traffic Data, Inc.
48 Greensburg Street, Suite 397,
Delmont, PA, 15626-9998, US



SR 13 & Upper Fredricktown Rd/Crestview Dr/D... - TMC

Thu May 29, 2025

Full Length (6 AM-9 AM, 3 PM-6 PM)

All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses, Pedestrians, Bicycles on Crosswalk)

All Movements

ID: 1304745, Location: 40.410637, -82.49532



Provided by: Tri-State Traffic Data, Inc.
48 Greensburg Street, Suite 397,
Delmont, PA, 15626-9998, US

Leg Direction	SR 13 Eastbound							Crestview Dr Westbound							Driveway Northbound						
	L	T	BR	R	U	App	Ped*	HL	L	T	R	U	App	Ped*	L	T	R	HR	U	App	Ped*
2025-05-29 6:00AM	1	2	61	0	0	64	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:15AM	2	1	74	0	0	77	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0
6:30AM	1	0	116	0	0	117	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45AM	0	1	87	0	0	88	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0
Hourly Total	4	4	338	0	0	346	0	0	0	1	1	0	2	0	0	0	0	0	0	0	0
7:00AM	3	1	90	0	0	94	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15AM	2	2	110	0	0	114	0	1	0	1	1	0	3	0	0	0	0	0	0	0	0
7:30AM	0	0	129	0	0	129	0	0	0	0	4	0	4	0	0	0	0	0	0	0	0
7:45AM	2	1	118	0	0	121	0	0	0	1	2	0	3	0	0	0	0	0	0	0	0
Hourly Total	7	4	447	0	0	458	0	1	0	2	7	0	10	0	0	0	0	0	0	0	0
8:00AM	0	0	95	0	0	95	0	0	0	2	1	0	3	0	0	0	0	0	0	0	0
8:15AM	4	3	106	0	0	113	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:30AM	1	0	99	0	0	100	0	0	0	0	0	0	0	0	0	0	0	2	0	2	0
8:45AM	3	0	109	0	0	112	0	0	0	1	1	0	2	0	0	0	0	0	0	0	0
Hourly Total	8	3	409	0	0	420	0	0	0	3	2	0	5	0	0	0	0	2	0	2	0
9:00AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:00PM	1	3	91	0	0	95	0	0	0	0	4	0	4	1	0	0	0	0	0	0	0
3:15PM	1	3	91	0	0	95	0	0	0	2	1	0	3	0	0	0	0	0	0	0	0
3:30PM	1	7	139	0	0	147	0	0	0	2	3	0	5	0	0	0	0	0	0	0	0
3:45PM	2	1	107	0	0	110	0	0	0	1	5	0	6	0	0	0	0	0	0	0	0
Hourly Total	5	14	428	0	0	447	0	0	0	5	13	0	18	1	0	0	0	0	0	0	0
4:00PM	2	3	117	0	0	122	0	0	0	1	5	0	6	0	0	0	0	0	0	0	0
4:15PM	1	2	113	0	0	116	0	0	0	2	5	0	7	0	0	0	0	0	0	0	0
4:30PM	1	2	107	0	0	110	0	0	0	3	6	0	9	0	0	0	0	0	0	0	0
4:45PM	1	1	118	0	0	120	0	0	0	2	7	0	9	0	0	0	0	0	0	0	0
Hourly Total	5	8	455	0	0	468	0	0	0	8	23	0	31	0	0	0	0	0	0	0	0
5:00PM	2	0	123	0	0	125	0	0	0	2	2	0	4	0	0	0	0	0	0	0	0
5:15PM	0	5	105	0	0	110	0	0	0	1	2	0	3	0	0	0	0	0	0	0	0
5:30PM	0	4	116	0	0	120	0	0	0	3	4	0	7	0	0	0	0	0	0	0	0
5:45PM	0	0	75	0	0	75	0	2	0	2	2	0	6	0	0	0	0	0	0	0	0
Hourly Total	2	9	419	0	0	430	0	2	0	8	10	0	20	0	0	0	0	0	0	0	0
6:00PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	31	42	2496	0	0	2569	0	3	0	27	56	0	86	1	0	0	0	2	0	2	0
% Approach	1.2%	1.6%	97.2%	0%	0%	-	-	3.5%	0%	31.4%	65.1%	0%	-	-	0%	0%	0%	100%	0%	-	-
% Total	0.5%	0.6%	38.5%	0%	0%	39.6%	-	0%	0%	0.4%	0.9%	0%	1.3%	-	0%	0%	0%	0%	0%	0%	-
Lights	29	42	2301	0	0	2372	-	3	0	27	55	0	85	-	0	0	0	2	0	2	-
% Lights	93.5%	100%	92.2%	0%	0%	92.3%	-	100%	0%	100%	98.2%	0%	98.8%	-	0%	0%	0%	100%	0%	100%	-
Articulated Trucks and Single-Unit Trucks	2	0	192	0	0	194	-	0	0	0	1	0	1	-	0	0	0	0	0	0	-
% Articulated Trucks and Single-Unit Trucks	6.5%	0%	7.7%	0%	0%	7.6%	-	0%	0%	0%	1.8%	0%	1.2%	-	0%	0%	0%	0%	0%	0%	-
Buses	0	0	3	0	0	3	-	0	0	0	0	0	0	-	0	0	0	0	0	0	-
% Buses	0%	0%	0.1%	0%	0%	0.1%	-	0%	0%	0%	0%	0%	0%	-	0%	0%	0%	0%	0%	0%	-
Pedestrians	-	-	-	-	-	-	0	-	-	-	-	-	-	1	-	-	-	-	-	-	0
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	100%	-	-	-	-	-	-	-
Bicycles on Crosswalk	-	-	-	-	-	-	0	-	-	-	-	-	-	0	-	-	-	-	-	-	0
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	0%	-	-	-	-	-	-	-

* Pedestrians and Bicycles on Crosswalk. BL: Bear left, BR: Bear right, HL: Hard left, HR: Hard right, L: Left, R: Right, T: Thru, U: U-Turn

SR 13 & Upper Fredricktown Rd/Crestview Dr/D... - TMC

Thu May 29, 2025

Full Length (6 AM-9 AM, 3 PM-6 PM)

All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses, Pedestrians, Bicycles on Crosswalk)

All Movements

ID: 1304745, Location: 40.410637, -82.49532



Provided by: Tri-State Traffic Data, Inc.
48 Greensburg Street, Suite 397,
Delmont, PA, 15626-9998, US

Leg Direction	Upper Fredricktown Rd Southbound								SR 13 Northwestbound								
Time	L	BL	T	R	U	App	Ped*	HL	BL	BR	HR	U	App	Ped*	Int		
2025-05-29 6:00AM	0	32	0	2	0	34	0	0	38	7	0	0	45	0	143		
6:15AM	0	26	0	1	0	27	0	0	48	15	0	0	63	0	168		
6:30AM	1	39	0	5	0	45	0	0	59	7	0	0	66	0	228		
6:45AM	0	38	0	0	0	38	0	0	75	10	0	0	85	0	212		
Hourly Total	1	135	0	8	0	144	0	0	220	39	0	0	259	0	751		
7:00AM	0	24	0	0	0	24	0	0	83	11	1	0	95	0	213		
7:15AM	0	34	0	0	0	34	0	0	83	14	0	0	97	0	248		
7:30AM	0	27	0	0	0	27	0	0	64	22	0	0	86	0	246		
7:45AM	1	36	0	0	0	37	0	0	81	15	0	0	96	0	257		
Hourly Total	1	121	0	0	0	122	0	0	311	62	1	0	374	0	964		
8:00AM	1	28	0	2	0	31	0	0	73	17	1	0	91	0	220		
8:15AM	2	29	0	2	0	33	0	0	75	15	1	0	91	0	237		
8:30AM	4	36	0	1	0	41	0	0	57	13	0	0	70	0	213		
8:45AM	4	27	0	0	0	31	0	0	80	23	1	0	104	0	249		
Hourly Total	11	120	0	5	0	136	0	0	285	68	3	0	356	0	919		
9:00AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Hourly Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
3:00PM	1	22	0	4	0	27	0	0	112	34	1	0	147	0	273		
3:15PM	1	30	0	1	0	32	0	0	108	59	2	0	169	0	299		
3:30PM	3	28	0	1	0	32	0	0	130	51	0	0	181	0	365		
3:45PM	0	27	0	2	0	29	0	0	157	53	0	0	210	0	355		
Hourly Total	5	107	0	8	0	120	0	0	507	197	3	0	707	0	1292		
4:00PM	3	31	0	0	0	34	0	0	119	58	1	0	178	0	340		
4:15PM	1	28	0	3	0	32	0	0	131	44	0	0	175	0	330		
4:30PM	2	30	0	4	0	36	0	0	117	52	0	0	169	0	324		
4:45PM	1	30	0	0	0	31	0	0	121	52	0	0	173	0	333		
Hourly Total	7	119	0	7	0	133	0	0	488	206	1	0	695	0	1327		
5:00PM	2	25	0	5	0	32	0	0	146	52	0	0	198	0	359		
5:15PM	0	38	0	2	0	40	0	0	131	52	0	0	183	0	336		
5:30PM	2	29	0	3	0	34	0	0	110	33	0	0	143	0	304		
5:45PM	1	29	0	1	0	31	0	0	85	30	1	0	116	0	228		
Hourly Total	5	121	0	11	0	137	0	0	472	167	1	0	640	0	1227		
6:00PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Hourly Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Total	30	723	0	39	0	792	0	0	2283	739	9	0	3031	0	6480		
% Approach	3.8%	91.3%	0%	4.9%	0%	-	-	0%	75.3%	24.4%	0.3%	0%	-	-	-		
% Total	0.5%	11.2%	0%	0.6%	0%	12.2%	-	0%	35.2%	11.4%	0.1%	0%	46.8%	-	-		
Lights	30	711	0	38	0	779	-	0	2109	724	8	0	2841	-	6079		
% Lights	100%	98.3%	0%	97.4%	0%	98.4%	-	0%	92.4%	98.0%	88.9%	0%	93.7%	-	93.8%		
Articulated Trucks and Single-Unit Trucks	0	7	0	0	0	7	-	0	171	8	1	0	180	-	382		
% Articulated Trucks and Single-Unit Trucks	0%	1.0%	0%	0%	0%	0.9%	-	0%	7.5%	1.1%	11.1%	0%	5.9%	-	5.9%		
Buses	0	5	0	1	0	6	-	0	3	7	0	0	10	-	19		
% Buses	0%	0.7%	0%	2.6%	0%	0.8%	-	0%	0.1%	0.9%	0%	0%	0.3%	-	0.3%		
Pedestrians	-	-	-	-	-	-	0	-	-	-	-	-	-	-	0		
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Bicycles on Crosswalk	-	-	-	-	-	-	0	-	-	-	-	-	-	-	0		
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		

* Pedestrians and Bicycles on Crosswalk. BL: Bear left, BR: Bear right, HL: Hard left, HR: Hard right, L: Left, R: Right, T: Thru, U: U-Turn

SR 13 & Upper Fredricktown Rd/Crestview Dr/D... - TMC

Thu May 29, 2025

Full Length (6 AM-9 AM, 3 PM-6 PM)

All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses, Pedestrians, Bicycles on Crosswalk)

All Movements

ID: 1304745, Location: 40.410637, -82.49532



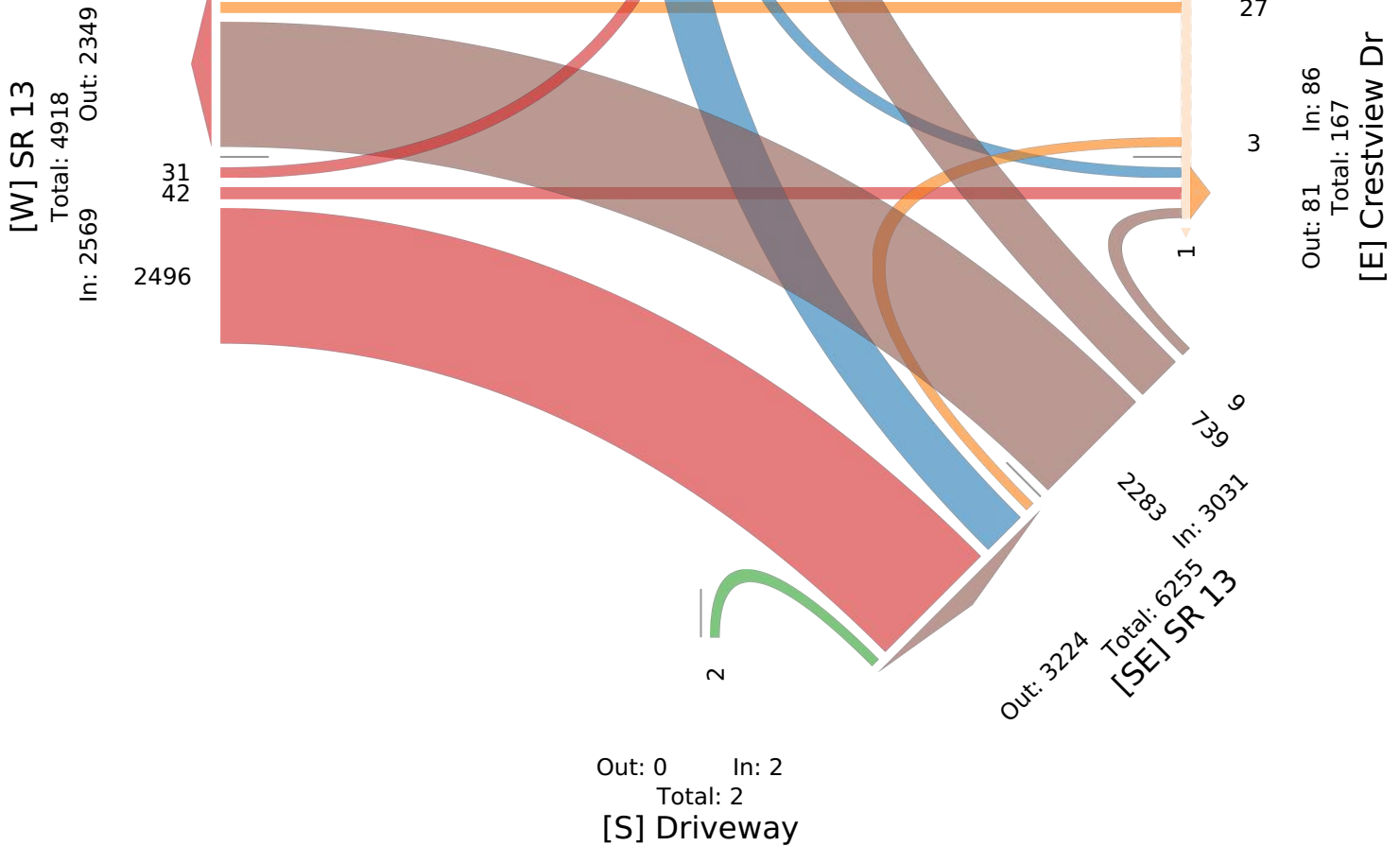
Provided by: Tri-State Traffic Data, Inc.
48 Greensburg Street, Suite 397,
Delmont, PA, 15626-9998, US

[N] Upper Fredricktown Rd

Total: 1618

In: 792 Out: 826

39 723 30



SR 13 & Upper Fredricktown Rd/Crestview Dr/D... - TMC

Thu May 29, 2025

AM Peak (7:15 AM - 8:15 AM)

All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses, Pedestrians, Bicycles on Crosswalk)

All Movements

ID: 1304745, Location: 40.410637, -82.49532



Provided by: Tri-State Traffic Data, Inc.
48 Greensburg Street, Suite 397,
Delmont, PA, 15626-9998, US

Leg Direction	SR 13 Eastbound								Crestview Dr Westbound								Driveway Northbound							
	L	T	BR	R	U	App	Ped*	HL	L	T	R	U	App	Ped*	L	T	R	HR	U	App	Ped*			
Time																								
2025-05-29 7:15AM	2	2	110	0	0	114	0	1	0	1	1	0	3	0	0	0	0	0	0	0	0			
7:30AM	0	0	129	0	0	129	0	0	0	0	4	0	4	0	0	0	0	0	0	0	0			
7:45AM	2	1	118	0	0	121	0	0	0	1	2	0	3	0	0	0	0	0	0	0	0			
8:00AM	0	0	95	0	0	95	0	0	0	2	1	0	3	0	0	0	0	0	0	0	0			
Total	4	3	452	0	0	459	0	1	0	4	8	0	13	0	0	0	0	0	0	0	0			
% Approach	0.9%	0.7%	98.5%	0%	0%	-	-	7.7%	0%	30.8%	61.5%	0%	-	-	0%	0%	0%	0%	0%	0%	-			
% Total	0.4%	0.3%	46.5%	0%	0%	47.3%	-	0.1%	0%	0.4%	0.8%	0%	1.3%	-	0%	0%	0%	0%	0%	0%	0%			
PHF	0.500	0.375	0.876	-	-	0.890	-	0.250	-	0.500	0.500	-	0.813	-	-	-	-	-	-	-	-			
Lights	4	3	404	0	0	411	-	1	0	4	8	0	13	-	0	0	0	0	0	0	0			
% Lights	100%	100%	89.4%	0%	0%	89.5%	-	100%	0%	100%	100%	0%	100%	-	0%	0%	0%	0%	0%	0%	-			
Articulated Trucks and Single-Unit Trucks	0	0	48	0	0	48	-	0	0	0	0	0	0	-	0	0	0	0	0	0	0			
% Articulated Trucks and Single-Unit Trucks	0%	0%	10.6%	0%	0%	10.5%	-	0%	0%	0%	0%	0%	0%	-	0%	0%	0%	0%	0%	0%	-			
Buses	0	0	0	0	0	0	-	0	0	0	0	0	0	-	0	0	0	0	0	0	0			
% Buses	0%	0%	0%	0%	0%	0%	-	0%	0%	0%	0%	0%	0%	-	0%	0%	0%	0%	0%	0%	-			
Pedestrians	-	-	-	-	-	-	0	-	-	-	-	-	-	0	-	-	-	-	-	-	0			
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
Bicycles on Crosswalk	-	-	-	-	-	-	0	-	-	-	-	-	-	0	-	-	-	-	-	-	0			
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			

*Pedestrians and Bicycles on Crosswalk. BL: Bear left, BR: Bear right, HL: Hard left, HR: Hard right, L: Left, R: Right, T: Thru, U: U-Turn

SR 13 & Upper Fredricktown Rd/Crestview Dr/D... - TMC

Thu May 29, 2025

AM Peak (7:15 AM - 8:15 AM)

All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses, Pedestrians, Bicycles on Crosswalk)

All Movements

ID: 1304745, Location: 40.410637, -82.49532



Provided by: Tri-State Traffic Data, Inc.
48 Greensburg Street, Suite 397,
Delmont, PA, 15626-9998, US

Leg Direction	Upper Fredricktown Rd Southbound								SR 13 Northwestbound								Int
	L	BL	T	R	U	App	Ped*	HL	BL	BR	HR	U	App	Ped*			
Time																	
2025-05-29 7:15AM	0	34	0	0	0	34	0	0	83	14	0	0	97	0	248		
7:30AM	0	27	0	0	0	27	0	0	64	22	0	0	86	0	246		
7:45AM	1	36	0	0	0	37	0	0	81	15	0	0	96	0	257		
8:00AM	1	28	0	2	0	31	0	0	73	17	1	0	91	0	220		
Total	2	125	0	2	0	129	0	0	301	68	1	0	370	0	971		
% Approach	1.6%	96.9%	0%	1.6%	0%	-	-	0%	81.4%	18.4%	0.3%	0%	-	-	-		
% Total	0.2%	12.9%	0%	0.2%	0%	13.3%	-	0%	31.0%	7.0%	0.1%	0%	38.1%	-	-		
PHF	0.500	0.868	-	0.250	-	0.872	-	-	0.907	0.773	0.250	-	0.954	-	0.945		
Lights	2	123	0	2	0	127	-	0	266	65	1	0	332	-	883		
% Lights	100%	98.4%	0%	100%	0%	98.4%	-	0%	88.4%	95.6%	100%	0%	89.7%	-	90.9%		
Articulated Trucks and Single-Unit Trucks	0	1	0	0	0	1	-	0	35	1	0	0	36	-	85		
% Articulated Trucks and Single-Unit Trucks	0%	0.8%	0%	0%	0%	0.8%	-	0%	11.6%	1.5%	0%	0%	9.7%	-	8.8%		
Buses	0	1	0	0	0	1	-	0	0	2	0	0	2	-	3		
% Buses	0%	0.8%	0%	0%	0%	0.8%	-	0%	0%	2.9%	0%	0%	0.5%	-	0.3%		
Pedestrians	-	-	-	-	-	-	0	-	-	-	-	-	-	0	-		
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Bicycles on Crosswalk	-	-	-	-	-	-	0	-	-	-	-	-	-	0	-		
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		

*Pedestrians and Bicycles on Crosswalk. BL: Bear left, BR: Bear right, HL: Hard left, HR: Hard right, L: Left, R: Right, T: Thru, U: U-Turn

SR 13 & Upper Fredricktown Rd/Crestview Dr/D... - TMC

Thu May 29, 2025

AM Peak (7:15 AM - 8:15 AM)

All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses, Pedestrians, Bicycles on Crosswalk)

All Movements

ID: 1304745, Location: 40.410637, -82.49532



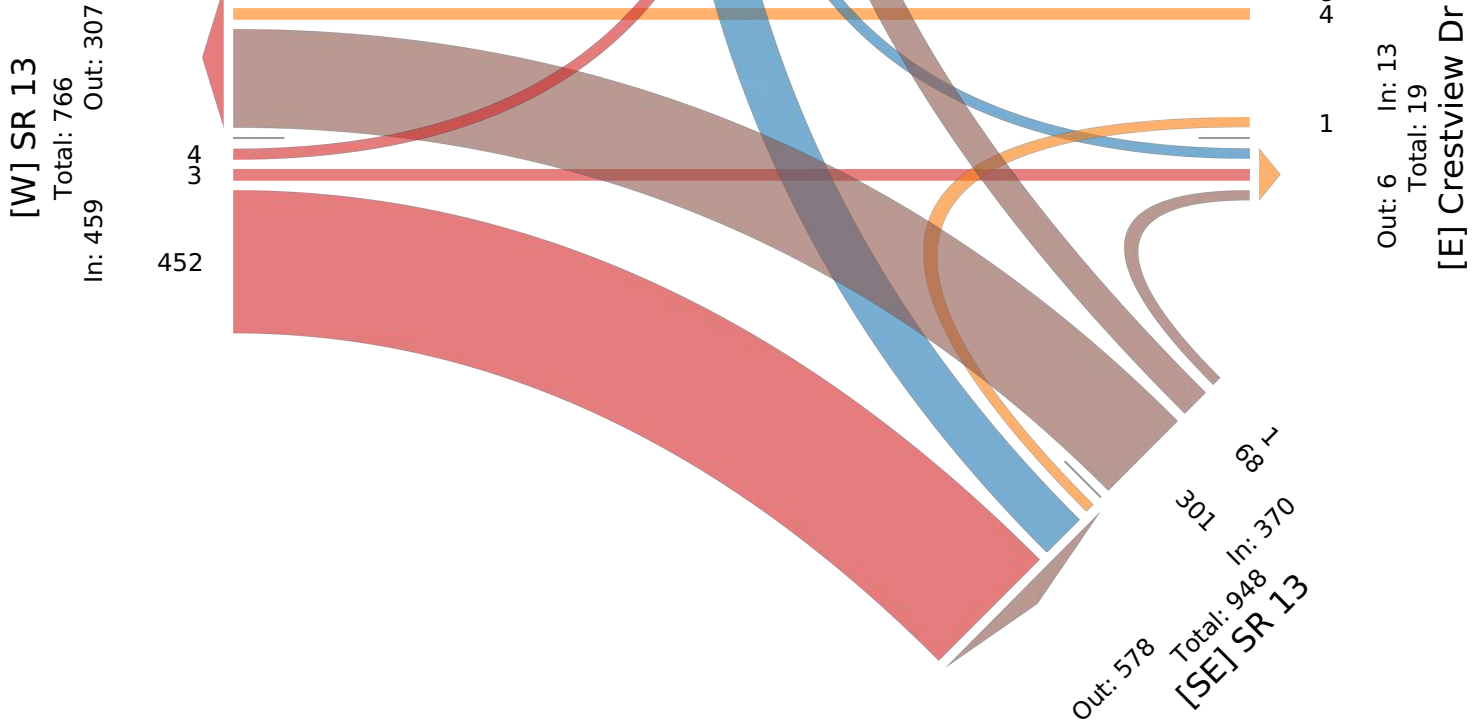
Provided by: Tri-State Traffic Data, Inc.
48 Greensburg Street, Suite 397,
Delmont, PA, 15626-9998, US

[N] Upper Fredricktown Rd

Total: 209

In: 129 Out: 80

2 125 2



SR 13 & Upper Fredricktown Rd/Crestview Dr/D... - TMC

Thu May 29, 2025

PM Peak (3:30 PM - 4:30 PM) - Overall Peak Hour

All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses, Pedestrians, Bicycles on Crosswalk)

All Movements

ID: 1304745, Location: 40.410637, -82.49532



Provided by: Tri-State Traffic Data, Inc.
48 Greensburg Street, Suite 397,
Delmont, PA, 15626-9998, US

Leg Direction	SR 13 Eastbound								Crestview Dr Westbound								Driveway Northbound							
	L	T	BR	R	U	App	Ped*	HL	L	T	R	U	App	Ped*	L	T	R	HR	U	App	Ped*			
Time																								
2025-05-29 3:30PM	1	7	139	0	0	147	0	0	0	2	3	0	5	0	0	0	0	0	0	0	0			
3:45PM	2	1	107	0	0	110	0	0	0	1	5	0	6	0	0	0	0	0	0	0	0			
4:00PM	2	3	117	0	0	122	0	0	0	1	5	0	6	0	0	0	0	0	0	0	0			
4:15PM	1	2	113	0	0	116	0	0	0	2	5	0	7	0	0	0	0	0	0	0	0			
Total	6	13	476	0	0	495	0	0	0	6	18	0	24	0	0	0	0	0	0	0	0			
% Approach	1.2%	2.6%	96.2%	0%	0%	-	-	0%	0%	25.0%	75.0%	0%	-	-	0%	0%	0%	0%	0%	0%	-			
% Total	0.4%	0.9%	34.2%	0%	0%	35.6%	-	0%	0%	0.4%	1.3%	0%	1.7%	-	0%	0%	0%	0%	0%	0%	0%			
PHF	0.750	0.464	0.856	-	-	0.842	-	-	-	0.750	0.900	-	0.857	-	-	-	-	-	-	-	-			
Lights	6	13	453	0	0	472	-	0	0	6	17	0	23	-	0	0	0	0	0	0	0			
% Lights	100%	100%	95.2%	0%	0%	95.4%	-	0%	0%	100%	94.4%	0%	95.8%	-	0%	0%	0%	0%	0%	0%	-			
Articulated Trucks and Single-Unit Trucks	0	0	23	0	0	23	-	0	0	0	1	0	1	-	0	0	0	0	0	0	0			
% Articulated Trucks and Single-Unit Trucks	0%	0%	4.8%	0%	0%	4.6%	-	0%	0%	0%	5.6%	0%	4.2%	-	0%	0%	0%	0%	0%	0%	-			
Buses	0	0	0	0	0	0	-	0	0	0	0	0	0	-	0	0	0	0	0	0	0			
% Buses	0%	0%	0%	0%	0%	0%	-	0%	0%	0%	0%	0%	0%	-	0%	0%	0%	0%	0%	0%	-			
Pedestrians	-	-	-	-	-	-	0	-	-	-	-	-	-	0	-	-	-	-	-	-	0			
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
Bicycles on Crosswalk	-	-	-	-	-	-	0	-	-	-	-	-	-	0	-	-	-	-	-	-	0			
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			

*Pedestrians and Bicycles on Crosswalk. BL: Bear left, BR: Bear right, HL: Hard left, HR: Hard right, L: Left, R: Right, T: Thru, U: U-Turn

SR 13 & Upper Fredricktown Rd/Crestview Dr/D... - TMC

Thu May 29, 2025

PM Peak (3:30 PM - 4:30 PM) - Overall Peak Hour

All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses, Pedestrians, Bicycles on Crosswalk)

All Movements

ID: 1304745, Location: 40.410637, -82.49532



Provided by: Tri-State Traffic Data, Inc.
48 Greensburg Street, Suite 397,
Delmont, PA, 15626-9998, US

Leg Direction	Upper Fredricktown Rd Southbound								SR 13 Northwestbound								Int
	L	BL	T	R	U	App	Ped*	HL	BL	BR	HR	U	App	Ped*			
Time																	
2025-05-29 3:30PM	3	28	0	1	0	32	0	0	130	51	0	0	181	0	365		
3:45PM	0	27	0	2	0	29	0	0	157	53	0	0	210	0	355		
4:00PM	3	31	0	0	0	34	0	0	119	58	1	0	178	0	340		
4:15PM	1	28	0	3	0	32	0	0	131	44	0	0	175	0	330		
Total	7	114	0	6	0	127	0	0	537	206	1	0	744	0	1390		
% Approach	5.5%	89.8%	0%	4.7%	0%	-	-	0%	72.2%	27.7%	0.1%	0%	-	-	-		
% Total	0.5%	8.2%	0%	0.4%	0%	9.1%	-	0%	38.6%	14.8%	0.1%	0%	53.5%	-	-		
PHF	0.583	0.919	-	0.500	-	0.934	-	-	0.855	0.888	0.250	-	0.886	-	0.952		
Lights	7	113	0	6	0	126	-	0	506	206	1	0	713	-	1334		
% Lights	100%	99.1%	0%	100%	0%	99.2%	-	0%	94.2%	100%	100%	0%	95.8%	-	96.0%		
Articulated Trucks and Single-Unit Trucks	0	1	0	0	0	1	-	0	29	0	0	0	29	-	54		
% Articulated Trucks and Single-Unit Trucks	0%	0.9%	0%	0%	0%	0.8%	-	0%	5.4%	0%	0%	0%	3.9%	-	3.9%		
Buses	0	0	0	0	0	0	-	0	2	0	0	0	2	-	2		
% Buses	0%	0%	0%	0%	0%	0%	-	0%	0.4%	0%	0%	0%	0.3%	-	0.1%		
Pedestrians	-	-	-	-	-	-	0	-	-	-	-	-	-	0	-		
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Bicycles on Crosswalk	-	-	-	-	-	-	0	-	-	-	-	-	-	0	-		
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		

*Pedestrians and Bicycles on Crosswalk. BL: Bear left, BR: Bear right, HL: Hard left, HR: Hard right, L: Left, R: Right, T: Thru, U: U-Turn

SR 13 & Upper Fredricktown Rd/Crestview Dr/D... - TMC

Thu May 29, 2025

PM Peak (3:30 PM - 4:30 PM) - Overall Peak Hour

All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses, Pedestrians, Bicycles on Crosswalk)

All Movements

ID: 1304745, Location: 40.410637, -82.49532

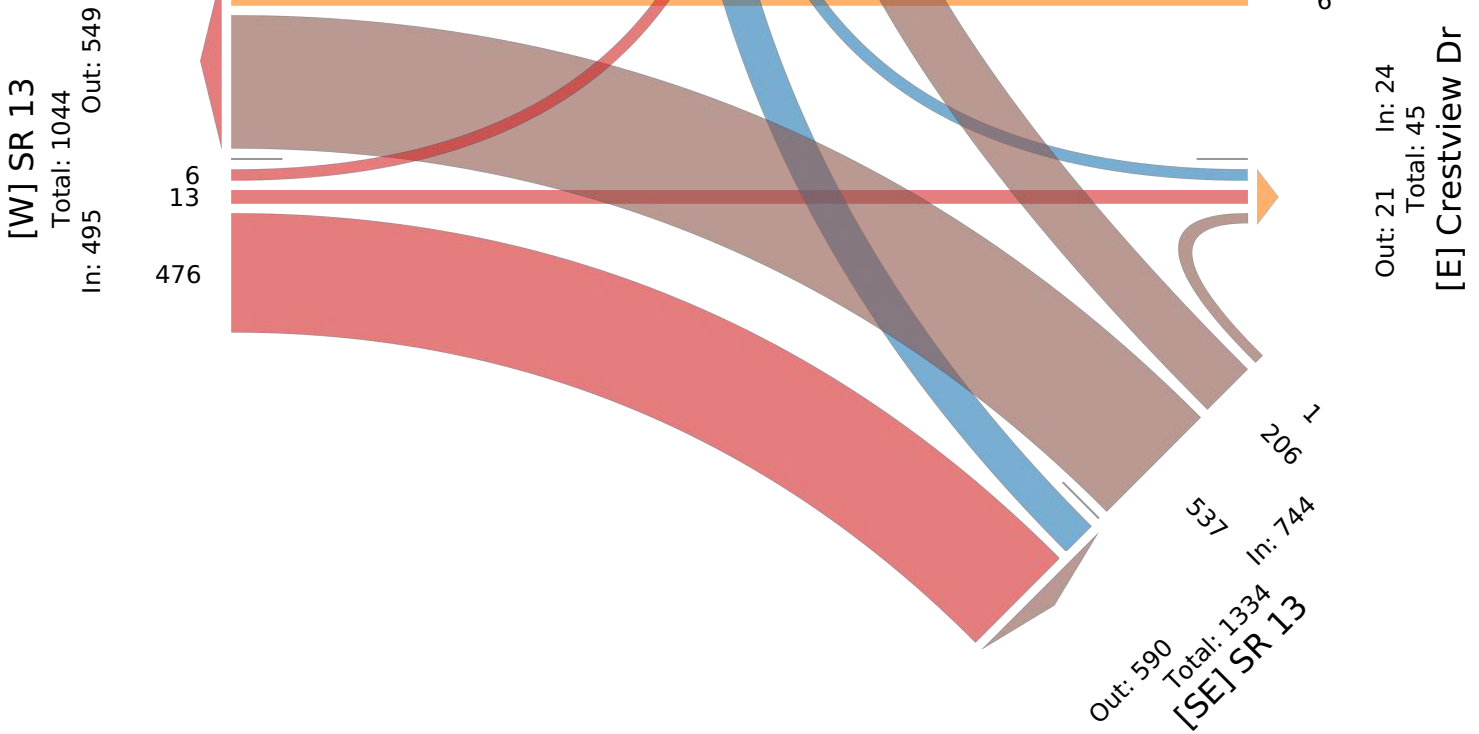


Provided by: Tri-State Traffic Data, Inc.
48 Greensburg Street, Suite 397,
Delmont, PA, 15626-9998, US

[N] Upper Fredricktown Rd

Total: 357
In: 127 Out: 230

6
114
7



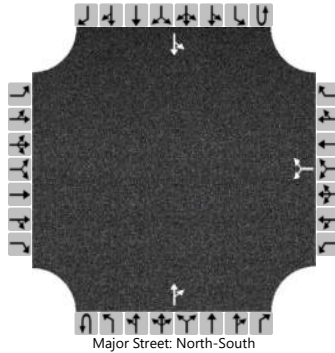
APPENDIX B
INTERSECTION CAPACITY ANALYSIS

EXISTING YEAR 2025 CONDITIONS
HCS PRINTOUTS

HCS Two-Way Stop-Control Report

General Information		Site Information	
Analyst	Judy Bennett	Intersection	N. Sandusky St. (SR 13) / Buena Vista Ave.
Agency/Co.	GPD Group	Jurisdiction	City of Mount Vernon
Date Performed	10/2/25	East/West Street	Buena Vista Avenue
Analysis Year	2025	North/South Street	N. Sandusky Street (SR 13)
Time Analyzed	Exist Conditions AM Peak	Peak Hour Factor	0.95
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	Mt. Vernon - N. Sandusky St. / Upper Fredericktown		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		0	1	0	0	0	1	0	0	0	1	0
Configuration							LR					TR		LT		
Volume (veh/h)						0		4			391	3		2	625	
Percent Heavy Vehicles (%)						0		0						9		
Proportion Time Blocked																
Percent Grade (%)					0											
Right Turn Channelized																
Median Type Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)						7.1		6.2							4.1	
Critical Headway (sec)						6.40		6.20							4.19	
Base Follow-Up Headway (sec)						3.5		3.3							2.2	
Follow-Up Headway (sec)						3.50		3.30							2.28	

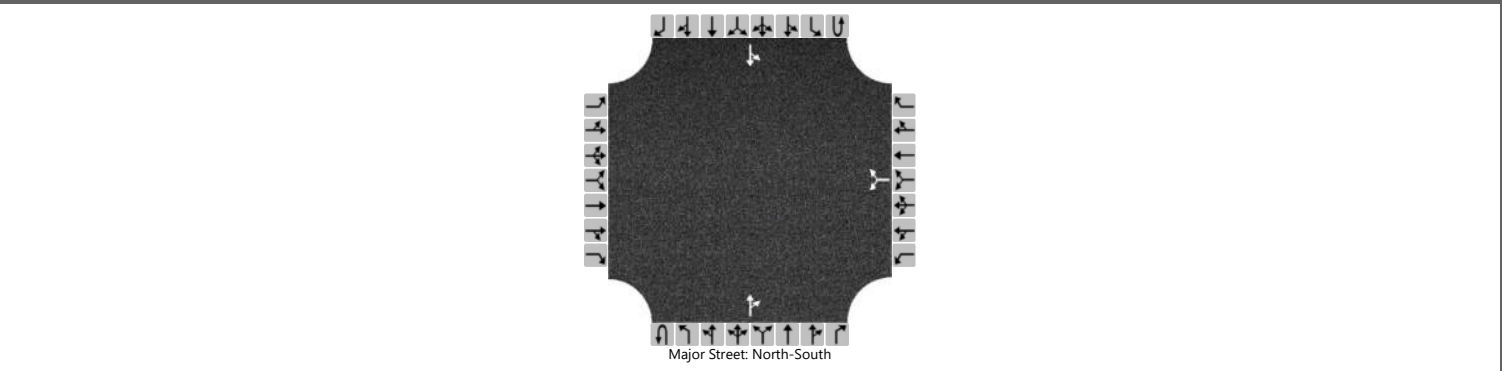
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						4									2	
Capacity, c (veh/h)						643									1108	
v/c Ratio						0.01									0.00	
95% Queue Length, Q ₉₅ (veh)						0.0									0.0	
95% Queue Length, Q ₉₅ (ft)						0.0									0.0	
Control Delay (s/veh)						10.6									8.3	0.0
Level of Service (LOS)						B									A	A
Approach Delay (s/veh)					10.6								0.1			
Approach LOS					B								A			

HCS Two-Way Stop-Control Report

General Information				Site Information			
Analyst	Judy Bennett	Intersection	N. Sandusky St. (SR 13) / Buena Vista Ave.				
Agency/Co.	GPD Group	Jurisdiction	City of Mount Vernon				
Date Performed	10/2/25	East/West Street	Buena Vista Avenue				
Analysis Year	2025	North/South Street	N. Sandusky Street (SR 13)				
Time Analyzed	Exist Conditions PM Peak	Peak Hour Factor	0.95				
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25				
Project Description	Mt. Vernon - N. Sandusky St. / Upper Fredericktown						

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Movement																
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		0	1	0		0	1	0		0	1	0
Configuration							LR					TR		LT		
Volume (veh/h)						1		9			783	12		13	620	
Percent Heavy Vehicles (%)						0		0						4		
Proportion Time Blocked																
Percent Grade (%)					0											
Right Turn Channelized																
Median Type Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)						7.1		6.2						4.1		
Critical Headway (sec)						6.40		6.20						4.14		
Base Follow-Up Headway (sec)						3.5		3.3						2.2		
Follow-Up Headway (sec)						3.50		3.30						2.24		

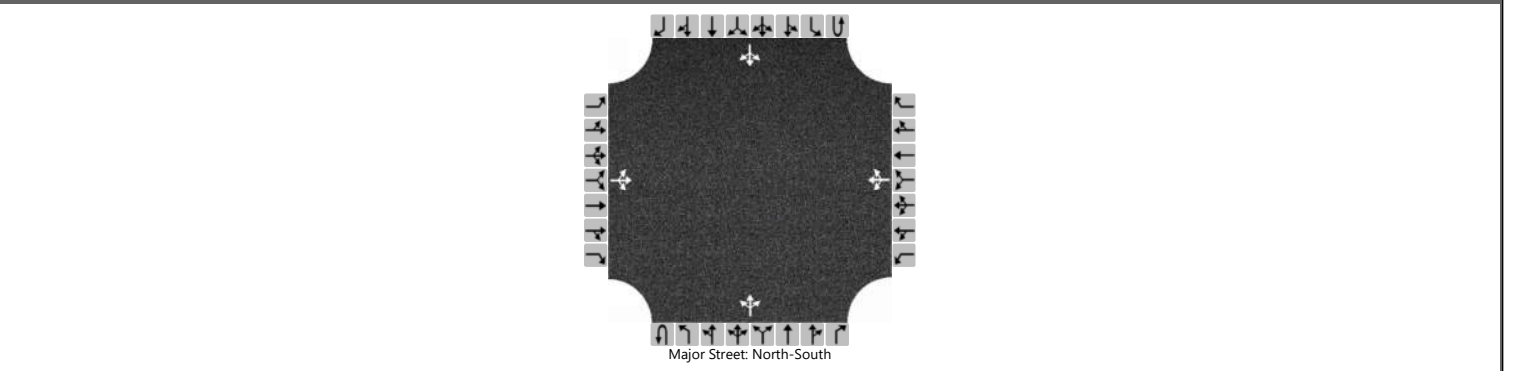
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						11								14		
Capacity, c (veh/h)						314								789		
v/c Ratio						0.03								0.02		
95% Queue Length, Q ₉₅ (veh)						0.1								0.1		
95% Queue Length, Q ₉₅ (ft)						2.5								2.6		
Control Delay (s/veh)						16.9								9.6	0.3	
Level of Service (LOS)						C								A	A	
Approach Delay (s/veh)					16.9								0.5			
Approach LOS					C								A			

HCS Two-Way Stop-Control Report

General Information				Site Information			
Analyst	Judy Bennett			Intersection	N. Sandusky St. (SR 13) / Upper Fredericktow...		
Agency/Co.	GPD Group			Jurisdiction	City of Mount Vernon		
Date Performed	10/2/25			East/West Street	Upper Fredericktown Road / Crestview Avenue		
Analysis Year	2025			North/South Street	N. Sandusky Street (SR 13)		
Time Analyzed	Exist Conditions AM Peak			Peak Hour Factor	0.95		
Intersection Orientation	North-South			Analysis Time Period (hrs)	0.25		
Project Description	Mt. Vernon - N. Sandusky St. / Upper Fredericktown						

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	0	1	0	0	0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		1	4	9		136	0	2		0	322	74		7	484	0
Percent Heavy Vehicles (%)		0	0	0		2	2	2		10				11		
Proportion Time Blocked																
Percent Grade (%)	0				0											
Right Turn Channelized																
Median Type Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1		
Critical Headway (sec)		7.10	6.50	6.20		7.12	6.52	6.22		4.20				4.21		
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2		
Follow-Up Headway (sec)		3.50	4.00	3.30		3.52	4.02	3.32		2.29				2.30		

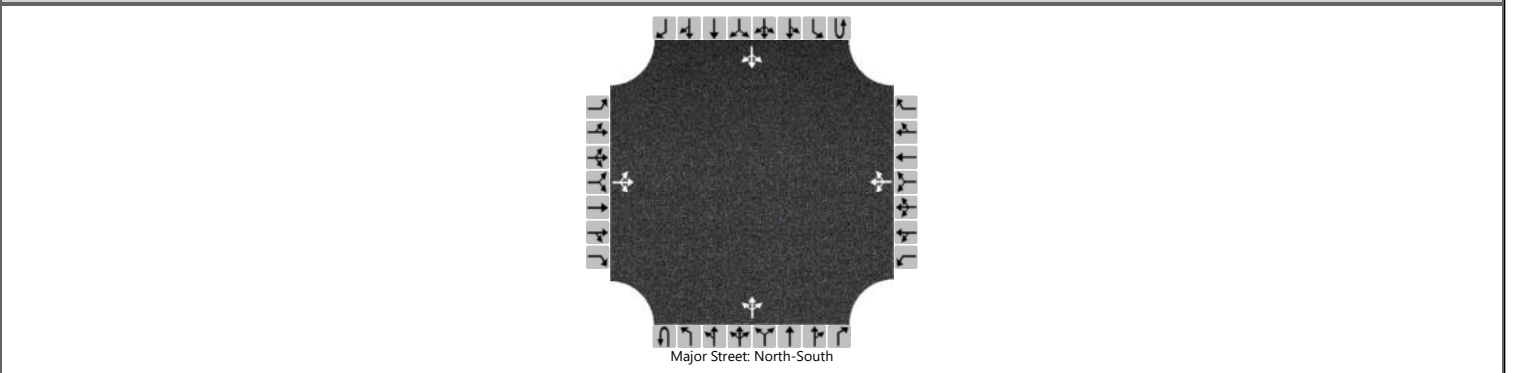
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			15				145			0				7		
Capacity, c (veh/h)			400				248			1016				1095		
v/c Ratio			0.04				0.59			0.00				0.01		
95% Queue Length, Q ₉₅ (veh)			0.1				3.4			0.0				0.0		
95% Queue Length, Q ₉₅ (ft)			2.5				86.4			0.0				0.0		
Control Delay (s/veh)			14.3				38.3			8.5	0.0	0.0		8.3	0.1	0.1
Level of Service (LOS)			B				E			A	A	A		A	A	A
Approach Delay (s/veh)	14.3				38.3				0.0				0.2			
Approach LOS	B				E				A				A			

HCS Two-Way Stop-Control Report

General Information				Site Information			
Analyst	Judy Bennett			Intersection	N. Sandusky St. (SR 13) / Upper Fredericktow...		
Agency/Co.	GPD Group			Jurisdiction	City of Mount Vernon		
Date Performed	10/2/25			East/West Street	Upper Fredericktown Road / Crestview Avenue		
Analysis Year	2025			North/South Street	N. Sandusky Street (SR 13)		
Time Analyzed	Exist Conditions PM Peak			Peak Hour Factor	0.95		
Intersection Orientation	North-South			Analysis Time Period (hrs)	0.25		
Project Description	Mt. Vernon - N. Sandusky St. / Upper Fredericktown						

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound				
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R	
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6	
Number of Lanes		0	1	0		0	1	0	0	0	1	0	0	0	1	0	
Configuration			LTR				LTR				LTR				LTR		
Volume (veh/h)		0	6	19		129	0	6		0	575	221		20	509	0	
Percent Heavy Vehicles (%)		4	4	4		1	1	1		4				5			
Proportion Time Blocked																	
Percent Grade (%)		0				0											
Right Turn Channelized																	
Median Type Storage		Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1		
Critical Headway (sec)		7.14	6.54	6.24		7.11	6.51	6.21		4.14				4.15		
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2		
Follow-Up Headway (sec)		3.54	4.04	3.34		3.51	4.01	3.31		2.24				2.25		

Delay, Queue Length, and Level of Service

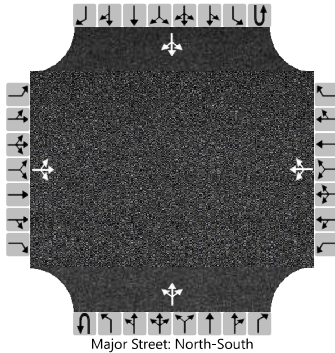
Flow Rate, v (veh/h)			26			142				0				21			
Capacity, c (veh/h)			309			124				1022				784			
v/c Ratio			0.09			1.14				0.00				0.03			
95% Queue Length, Q ₉₅ (veh)			0.3			8.5				0.0				0.1			
95% Queue Length, Q ₉₅ (ft)			7.7			214.2				0.0				2.5			
Control Delay (s/veh)			17.8			193.0				8.5	0.0	0.0		9.7	0.4	0.4	
Level of Service (LOS)			C			F				A	A	A		A	A	A	
Approach Delay (s/veh)		17.8				193.0				0.0				0.7			
Approach LOS		C				F				A				A			

OPENING YEAR 2030 AND DESIGN YEAR 2050
'NO-BUILD' CONDITIONS

HCS Two-Way Stop-Control Report

General Information				Site Information			
Analyst	Brandon Tondra			Intersection	N. Sandusky St. (SR 13) / Upper Fredericktow...		
Agency/Co.	GPD Group			Jurisdiction	City of Mount Vernon		
Date Performed	7/31/2025			East/West Street	Upper Fredericktown Road / Crestview Avenue		
Analysis Year	2030			North/South Street	N. Sandusky Street (SR 13)		
Time Analyzed	'No-Build' AM Peak			Peak Hour Factor	0.95		
Intersection Orientation	North-South			Analysis Time Period (hrs)	0.25		
Project Description	Mt. Vernon - N. Sandusky St. / Upper Fredericktown						

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Movement																
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0		0	1	0		0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		1	4	9		141	0	2		0	337	77		7	511	0
Percent Heavy Vehicles (%)		0	0	0		2	2	2		10				11		
Proportion Time Blocked																
Percent Grade (%)	0				0											
Right Turn Channelized																
Median Type Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1		
Critical Headway (sec)		7.10	6.50	6.20		7.12	6.52	6.22		4.20				4.21		
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2		
Follow-Up Headway (sec)		3.50	4.00	3.30		3.52	4.02	3.32		2.29				2.30		

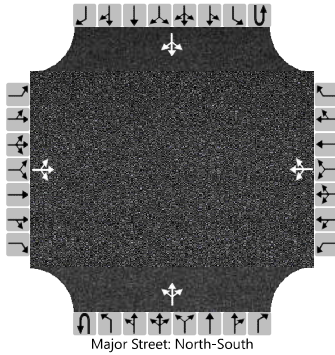
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			15				151				0				7	
Capacity, c (veh/h)			380				230				991				1078	
v/c Ratio			0.04				0.65				0.00				0.01	
95% Queue Length, Q ₉₅ (veh)			0.1				4.0				0.0				0.0	
95% Queue Length, Q ₉₅ (ft)			2.5				101.6									
Control Delay (s/veh)			14.9				46.1			8.6	0.0	0.0		8.4	0.1	0.1
Level of Service (LOS)			B				E			A	A	A		A	A	A
Approach Delay (s/veh)	14.9				46.1				0.0				0.2			
Approach LOS	B				E				A				A			

HCS Two-Way Stop-Control Report

General Information				Site Information			
Analyst	Brandon Tondra			Intersection	N. Sandusky St. (SR 13) / Upper Fredericktow...		
Agency/Co.	GPD Group			Jurisdiction	City of Mount Vernon		
Date Performed	7/31/2025			East/West Street	Upper Fredericktown Road / Crestview Avenue		
Analysis Year	2050			North/South Street	N. Sandusky Street (SR 13)		
Time Analyzed	'No-Build' AM Peak			Peak Hour Factor	0.95		
Intersection Orientation	North-South			Analysis Time Period (hrs)	0.25		
Project Description	Mt. Vernon - N. Sandusky St. / Upper Fredericktown						

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Movement																
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0		0	1	0		0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		1	5	11		161	0	2		0	386	88		9	584	0
Percent Heavy Vehicles (%)		0	0	0		2	2	2		10				11		
Proportion Time Blocked																
Percent Grade (%)	0				0											
Right Turn Channelized																
Median Type Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1		
Critical Headway (sec)		7.10	6.50	6.20		7.12	6.52	6.22		4.20				4.21		
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2		
Follow-Up Headway (sec)		3.50	4.00	3.30		3.52	4.02	3.32		2.29				2.30		

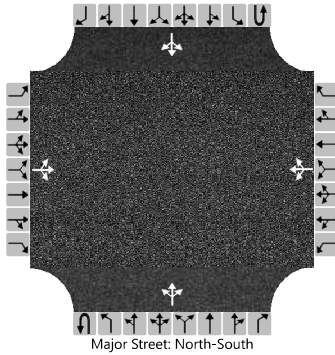
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			18				172				0				9	
Capacity, c (veh/h)			326				181				927				1020	
v/c Ratio			0.05				0.95				0.00				0.01	
95% Queue Length, Q ₉₅ (veh)			0.2				7.5				0.0				0.0	
95% Queue Length, Q ₉₅ (ft)			5.0				190.5									
Control Delay (s/veh)			16.7				106.2			8.9	0.0	0.0		8.6	0.1	0.1
Level of Service (LOS)			C				F			A	A	A		A	A	A
Approach Delay (s/veh)	16.7				106.2				0.0				0.2			
Approach LOS	C				F				A				A			

HCS Two-Way Stop-Control Report

General Information				Site Information			
Analyst	Brandon Tondra			Intersection	N. Sandusky St. (SR 13) / Upper Fredericktow...		
Agency/Co.	GPD Group			Jurisdiction	City of Mount Vernon		
Date Performed	7/31/2025			East/West Street	Upper Fredericktown Road / Crestview Avenue		
Analysis Year	2030			North/South Street	N. Sandusky Street (SR 13)		
Time Analyzed	'No-Build' PM Peak			Peak Hour Factor	0.95		
Intersection Orientation	North-South			Analysis Time Period (hrs)	0.25		
Project Description	Mt. Vernon - N. Sandusky St. / Upper Fredericktown						

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Movement																
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	0	1	0	0	0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		0	6	20		134	0	6		0	597	229		21	529	0
Percent Heavy Vehicles (%)		4	4	4		1	1	1		4				5		
Proportion Time Blocked																
Percent Grade (%)	0				0											
Right Turn Channelized																
Median Type Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1		
Critical Headway (sec)		7.14	6.54	6.24		7.11	6.51	6.21		4.14				4.15		
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2		
Follow-Up Headway (sec)		3.54	4.04	3.34		3.51	4.01	3.31		2.24				2.25		

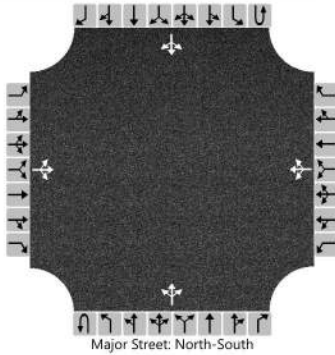
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			27				147			0				22		
Capacity, c (veh/h)			296				113			1004				762		
v/c Ratio			0.09				1.30			0.00				0.03		
95% Queue Length, Q ₉₅ (veh)			0.3				9.9			0.0				0.1		
95% Queue Length, Q ₉₅ (ft)			7.7				249.5									
Control Delay (s/veh)			18.4				257.4			8.6	0.0	0.0		9.9	0.4	0.4
Level of Service (LOS)			C				F			A	A	A		A	A	A
Approach Delay (s/veh)	18.4				257.4				0.0				0.8			
Approach LOS	C				F				A				A			

HCS Two-Way Stop-Control Report

General Information				Site Information			
Analyst	Brandon Tondra			Intersection	N. Sandusky St. (SR 13) / Upper Fredericktown...		
Agency/Co.	GPD Group			Jurisdiction	City of Mount Vernon		
Date Performed	7/31/2025			East/West Street	Upper Fredericktown Road / Crestview Avenue		
Analysis Year	2050			North/South Street	N. Sandusky Street (SR 13)		
Time Analyzed	'No-Build' PM Peak			Peak Hour Factor	0.95		
Intersection Orientation	North-South			Analysis Time Period (hrs)	0.25		
Project Description	Mt. Vernon - N. Sandusky St. / Upper Fredericktown						

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Movement																
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	0	1	0	0	0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		0	7	23		153	0	7		0	683	262		24	606	0
Percent Heavy Vehicles (%)		4	4	4		1	1	1		4				5		
Proportion Time Blocked																
Percent Grade (%)	0				0											
Right Turn Channelized																
Median Type Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1		
Critical Headway (sec)		7.14	6.54	6.24		7.11	6.51	6.21		4.14				4.15		
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2		
Follow-Up Headway (sec)		3.54	4.04	3.34		3.51	4.01	3.31		2.24				2.25		

Delay, Queue Length, and Level of Service

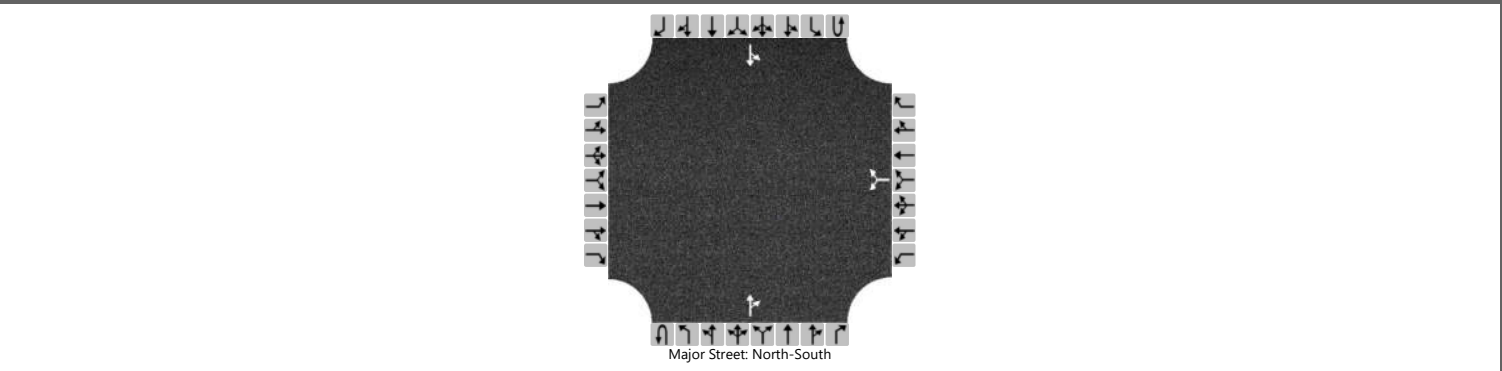
Flow Rate, v (veh/h)			32				168			0				25		
Capacity, c (veh/h)			234				78			936				684		
v/c Ratio			0.14				2.16			0.00				0.04		
95% Queue Length, Q ₉₅ (veh)			0.5				15.4			0.0				0.1		
95% Queue Length, Q ₉₅ (ft)			12.9				388.1									
Control Delay (s/veh)			22.8				647.3			8.8	0.0	0.0		10.5	0.6	0.6
Level of Service (LOS)			C				F			A	A	A		B	A	A
Approach Delay (s/veh)	22.8				647.3				0.0				1.0			
Approach LOS	C				F				A				A			

OPENING YEAR 2030 AND DESIGN YEAR 2050
LONG-TERM BUILD OPTION 1 CONDITIONS

HCS Two-Way Stop-Control Report

General Information				Site Information			
Analyst	Brandon Tondra			Intersection	N. Sandusky St. (SR 13) / Crestview Ave.		
Agency/Co.	GPD Group			Jurisdiction	City of Mount Vernon		
Date Performed	7/31/2025			East/West Street	Crestview Avenue		
Analysis Year	2030			North/South Street	N. Sandusky Street (SR 13)		
Time Analyzed	'Build Option 1' AM Peak			Peak Hour Factor	0.95		
Intersection Orientation	North-South			Analysis Time Period (hrs)	0.25		
Project Description	Mt. Vernon - N. Sandusky St. / Crestview Ave.						

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		0	1	0	0	0	1	0	0	0	1	0
Configuration							LR					TR		LT		
Volume (veh/h)						1		17			409	4		7	648	
Percent Heavy Vehicles (%)						1		1						5		
Proportion Time Blocked																
Percent Grade (%)						0										
Right Turn Channelized																
Median Type Storage						Undivided										

Critical and Follow-up Headways

Base Critical Headway (sec)						7.1		6.2							4.1	
Critical Headway (sec)						6.41		6.21							4.15	
Base Follow-Up Headway (sec)						3.5		3.3							2.2	
Follow-Up Headway (sec)						3.51		3.31							2.25	

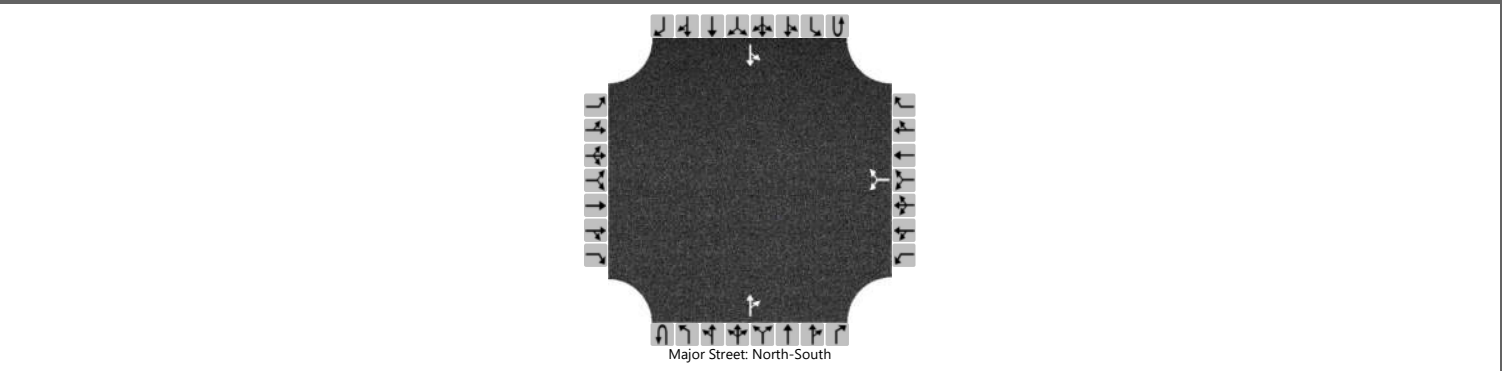
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						19									7	
Capacity, c (veh/h)						569									1109	
v/c Ratio						0.03									0.01	
95% Queue Length, Q ₉₅ (veh)						0.1									0.0	
95% Queue Length, Q ₉₅ (ft)						2.5									0.0	
Control Delay (s/veh)						11.5									8.3	0.1
Level of Service (LOS)						B									A	A
Approach Delay (s/veh)						11.5								0.2		
Approach LOS						B								A		

HCS Two-Way Stop-Control Report

General Information				Site Information			
Analyst	Brandon Tondra			Intersection	N. Sandusky St. (SR 13) / Crestview Ave.		
Agency/Co.	GPD Group			Jurisdiction	City of Mount Vernon		
Date Performed	7/31/2025			East/West Street	Crestview Avenue		
Analysis Year	2050			North/South Street	N. Sandusky Street (SR 13)		
Time Analyzed	'Build Option 1' AM Peak			Peak Hour Factor	0.95		
Intersection Orientation	North-South			Analysis Time Period (hrs)	0.25		
Project Description	Mt. Vernon - N. Sandusky St. / Crestview Ave.						

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		0	1	0	0	0	1	0	0	0	1	0
Configuration							LR					TR		LT		
Volume (veh/h)						1		21			468	5		8	741	
Percent Heavy Vehicles (%)						2		2						11		
Proportion Time Blocked																
Percent Grade (%)						0										
Right Turn Channelized																
Median Type Storage						Undivided										

Critical and Follow-up Headways

Base Critical Headway (sec)						7.1		6.2							4.1	
Critical Headway (sec)						6.42		6.22							4.21	
Base Follow-Up Headway (sec)						3.5		3.3							2.2	
Follow-Up Headway (sec)						3.52		3.32							2.30	

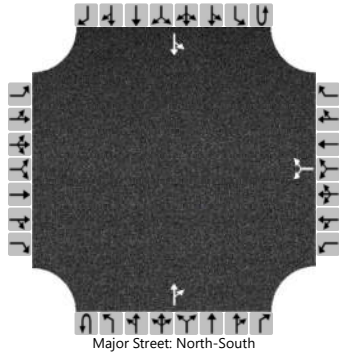
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						23								8		
Capacity, c (veh/h)						521								1021		
v/c Ratio						0.04								0.01		
95% Queue Length, Q ₉₅ (veh)						0.1								0.0		
95% Queue Length, Q ₉₅ (ft)						2.5								0.0		
Control Delay (s/veh)						12.2								8.6	0.1	
Level of Service (LOS)						B								A	A	
Approach Delay (s/veh)						12.2								0.2		
Approach LOS						B								A		

HCS Two-Way Stop-Control Report

General Information		Site Information	
Analyst	Judith Bennett	Intersection	N. Sandusky St. (SR 13) / Upper Fredericktow...
Agency/Co.	GPD Group	Jurisdiction	City of Mount Vernon
Date Performed	12/12/25	East/West Street	Upper Fredericktown Road
Analysis Year	2030	North/South Street	N. Sandusky Street (SR 13)
Time Analyzed	'Build 1' AM Peak	Peak Hour Factor	0.95
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	Mt. Vernon - N. Sandusky St. / Upper Fredericktown		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		0	1	0	0	0	1	0	0	0	1	0
Configuration							LR					TR		LT		
Volume (veh/h)						141		2			341	85		4	514	
Percent Heavy Vehicles (%)						2		2						11		
Proportion Time Blocked																
Percent Grade (%)						0										
Right Turn Channelized																
Median Type Storage						Undivided										

Critical and Follow-up Headways

Base Critical Headway (sec)						7.1		6.2						4.1		
Critical Headway (sec)						6.42		6.22						4.21		
Base Follow-Up Headway (sec)						3.5		3.3						2.2		
Follow-Up Headway (sec)						3.52		3.32						2.30		

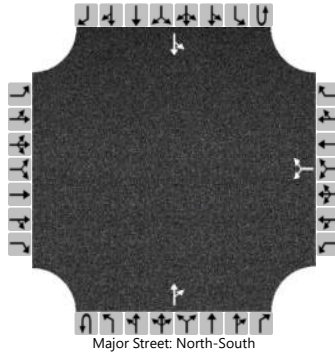
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						151								4		
Capacity, c (veh/h)						288								1066		
v/c Ratio						0.52								0.00		
95% Queue Length, Q ₉₅ (veh)						2.8								0.0		
95% Queue Length, Q ₉₅ (ft)						71.1								0.0		
Control Delay (s/veh)						30.4								8.4	0.0	
Level of Service (LOS)						D								A	A	
Approach Delay (s/veh)						30.4								0.1		
Approach LOS						D								A		

HCS Two-Way Stop-Control Report

General Information		Site Information	
Analyst	Judith Bennett	Intersection	N. Sandusky St. (SR 13) / Upper Fredericktow...
Agency/Co.	GPD Group	Jurisdiction	City of Mount Vernon
Date Performed	12/12/25	East/West Street	Upper Fredericktown Road
Analysis Year	2050	North/South Street	N. Sandusky Street (SR 13)
Time Analyzed	'Build 1' AM Peak	Peak Hour Factor	0.95
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	Mt. Vernon - N. Sandusky St. / Upper Fredericktown		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Movement																
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		0	1	0		0	1	0		0	1	0
Configuration							LR					TR		LT		
Volume (veh/h)						161		2			391	98		5	588	
Percent Heavy Vehicles (%)						2		2						11		
Proportion Time Blocked																
Percent Grade (%)					0											
Right Turn Channelized																
Median Type Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)						7.1		6.2						4.1		
Critical Headway (sec)						6.42		6.22						4.21		
Base Follow-Up Headway (sec)						3.5		3.3						2.2		
Follow-Up Headway (sec)						3.52		3.32						2.30		

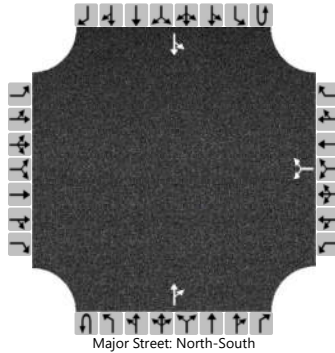
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						172								5		
Capacity, c (veh/h)						237								1006		
v/c Ratio						0.72								0.01		
95% Queue Length, Q ₉₅ (veh)						4.9								0.0		
95% Queue Length, Q ₉₅ (ft)						124.5								0.0		
Control Delay (s/veh)						51.9								8.6	0.1	
Level of Service (LOS)						F								A	A	
Approach Delay (s/veh)					51.9								0.1			
Approach LOS					F								A			

HCS Two-Way Stop-Control Report

General Information				Site Information			
Analyst	Brandon Tondra	Intersection	N. Sandusky St. (SR 13) / Crestview Ave.				
Agency/Co.	GPD Group	Jurisdiction	City of Mount Vernon				
Date Performed	7/31/2025	East/West Street	Crestview Avenue				
Analysis Year	2030	North/South Street	N. Sandusky Street (SR 13)				
Time Analyzed	'Build Option 1' PM Peak	Peak Hour Factor	0.95				
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25				
Project Description	Mt. Vernon - N. Sandusky St. / Crestview Ave.						

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes	0	0	0		0	1	0		0	0	1	0	0	0	1	0
Configuration							LR					TR		LT		
Volume (veh/h)						1		35			816	13		35	643	
Percent Heavy Vehicles (%)						1		1						5		
Proportion Time Blocked																
Percent Grade (%)					0											
Right Turn Channelized																
Median Type Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)						7.1		6.2						4.1		
Critical Headway (sec)						6.41		6.21						4.15		
Base Follow-Up Headway (sec)						3.5		3.3						2.2		
Follow-Up Headway (sec)						3.51		3.31						2.25		

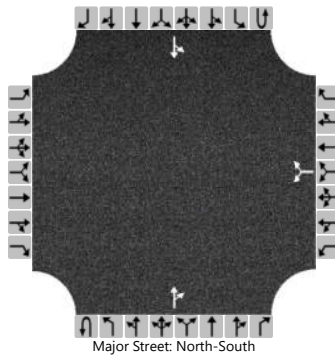
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						38								37		
Capacity, c (veh/h)						333								760		
v/c Ratio						0.11								0.05		
95% Queue Length, Q ₉₅ (veh)						0.4								0.2		
95% Queue Length, Q ₉₅ (ft)						10.1								5.2		
Control Delay (s/veh)						17.2								10.0	0.8	
Level of Service (LOS)						C								A	A	
Approach Delay (s/veh)					17.2								1.2			
Approach LOS					C								A			

HCS Two-Way Stop-Control Report

General Information				Site Information			
Analyst	Brandon Tondra			Intersection	N. Sandusky St. (SR 13) / Crestview Ave.		
Agency/Co.	GPD Group			Jurisdiction	City of Mount Vernon		
Date Performed	7/31/2025			East/West Street	Crestview Avenue		
Analysis Year	2050			North/South Street	N. Sandusky Street (SR 13)		
Time Analyzed	'Build Option 1' PM Peak			Peak Hour Factor	0.95		
Intersection Orientation	North-South			Analysis Time Period (hrs)	0.25		
Project Description	Mt. Vernon - N. Sandusky St. / Crestview Ave.						

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		0	1	0	0	0	1	0	0	0	1	0
Configuration							LR					TR		LT		
Volume (veh/h)						1		41			933	15		17	736	
Percent Heavy Vehicles (%)						1		1						5		
Proportion Time Blocked																
Percent Grade (%)						0										
Right Turn Channelized																
Median Type Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)						7.1		6.2							4.1	
Critical Headway (sec)						6.41		6.21							4.15	
Base Follow-Up Headway (sec)						3.5		3.3							2.2	
Follow-Up Headway (sec)						3.51		3.31							2.25	

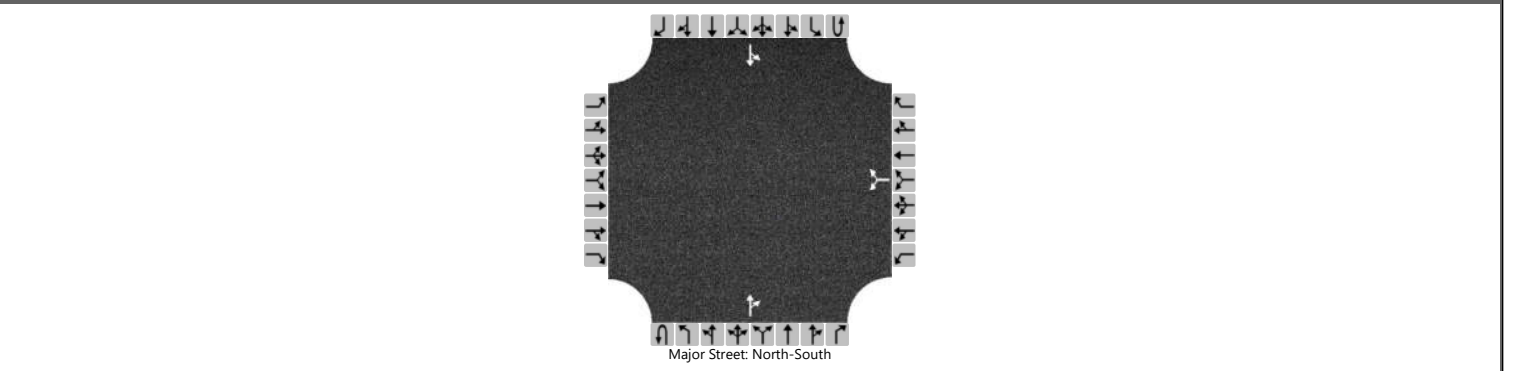
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						44									18	
Capacity, c (veh/h)						283									682	
v/c Ratio						0.16									0.03	
95% Queue Length, Q ₉₅ (veh)						0.5									0.1	
95% Queue Length, Q ₉₅ (ft)						12.6									2.6	
Control Delay (s/veh)						20.1									10.4	0.5
Level of Service (LOS)						C									B	A
Approach Delay (s/veh)		20.1										0.7				
Approach LOS		C										A				

HCS Two-Way Stop-Control Report

General Information				Site Information			
Analyst	Judith Bennett			Intersection	N. Sandusky St. (SR 13) / Upper Fredericktow...		
Agency/Co.	GPD Group			Jurisdiction	City of Mount Vernon		
Date Performed	12/12/25			East/West Street	Upper Fredericktown Road		
Analysis Year	2030			North/South Street	N. Sandusky Street (SR 13)		
Time Analyzed	'Build 1' PM Peak			Peak Hour Factor	0.95		
Intersection Orientation	North-South			Analysis Time Period (hrs)	0.25		
Project Description	Mt. Vernon - N. Sandusky St. / Upper Fredericktown						

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		0	1	0	0	0	1	0	0	0	1	0
Configuration							LR					TR		LT		
Volume (veh/h)						134		6			603	248		6	544	
Percent Heavy Vehicles (%)						1		1						5		
Proportion Time Blocked																
Percent Grade (%)						0										
Right Turn Channelized																
Median Type Storage						Undivided										

Critical and Follow-up Headways

Base Critical Headway (sec)						7.1		6.2							4.1	
Critical Headway (sec)						6.41		6.21							4.15	
Base Follow-Up Headway (sec)						3.5		3.3							2.2	
Follow-Up Headway (sec)						3.51		3.31							2.25	

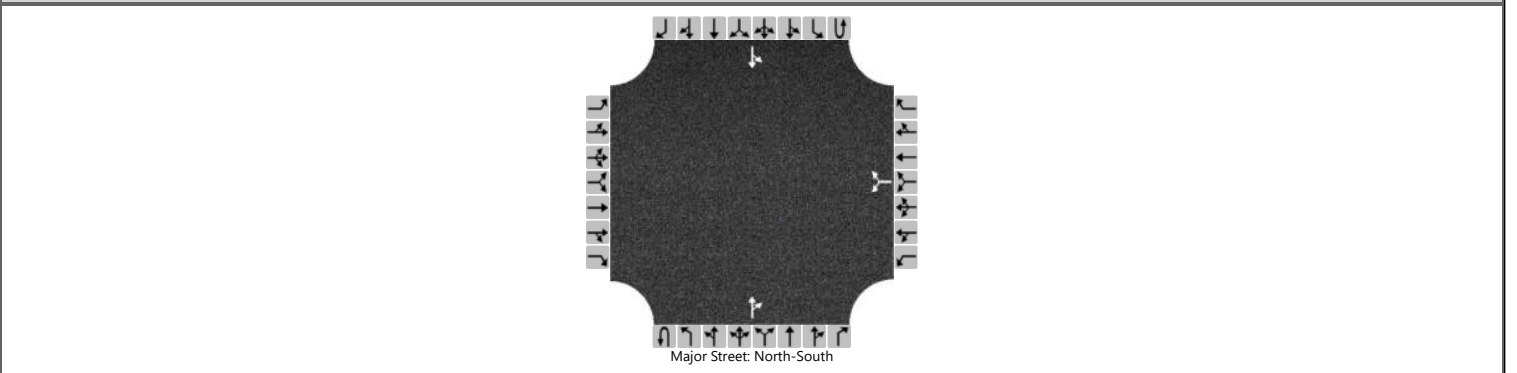
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						147								6		
Capacity, c (veh/h)						169								745		
v/c Ratio						0.87								0.01		
95% Queue Length, Q ₉₅ (veh)						6.2								0.0		
95% Queue Length, Q ₉₅ (ft)						156.2								0.0		
Control Delay (s/veh)						93.6								9.9	0.1	
Level of Service (LOS)						F								A	A	
Approach Delay (s/veh)						93.6								0.2		
Approach LOS						F								A		

HCS Two-Way Stop-Control Report

General Information		Site Information	
Analyst	Judith Bennett	Intersection	N. Sandusky St. (SR 13) / Upper Fredericktow...
Agency/Co.	GPD Group	Jurisdiction	City of Mount Vernon
Date Performed	12/12/25	East/West Street	Upper Fredericktown Road
Analysis Year	2050	North/South Street	N. Sandusky Street (SR 13)
Time Analyzed	'Build 1' PM Peak	Peak Hour Factor	0.95
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	Mt. Vernon - N. Sandusky St. / Upper Fredericktown		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		0	1	0	0	0	1	0	0	0	1	0
Configuration							LR					TR		LT		
Volume (veh/h)						153		7			690	284		7	623	
Percent Heavy Vehicles (%)						1		1						5		
Proportion Time Blocked																
Percent Grade (%)						0										
Right Turn Channelized																
Median Type Storage						Undivided										

Critical and Follow-up Headways

Base Critical Headway (sec)						7.1		6.2						4.1		
Critical Headway (sec)						6.41		6.21						4.15		
Base Follow-Up Headway (sec)						3.5		3.3						2.2		
Follow-Up Headway (sec)						3.51		3.31						2.25		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						168								7		
Capacity, c (veh/h)						128								666		
v/c Ratio						1.32								0.01		
95% Queue Length, Q ₉₅ (veh)						10.9								0.0		
95% Queue Length, Q ₉₅ (ft)						274.7								0.0		
Control Delay (s/veh)						251.6								10.5	0.2	
Level of Service (LOS)						F								B	A	
Approach Delay (s/veh)						251.6								0.3		
Approach LOS						F								A		

OPENING YEAR 2030 AND DESIGN YEAR 2050
LONG-TERM BUILD OPTION 2 CONDITIONS

HCS Roundabouts Report

General Information

Site Information

Analyst	Brandon Tondra		Intersection	N. Sandusky St. (SR 13) / Up...
Agency or Co.	GPD Group		E/W Street Name	Upper Fredericktown Road /...
Date Performed	7/31/2025		N/S Street Name	N. Sandusky Street (SR 13)
Analysis Year	2030		Analysis Time Period, hrs	0.25
Time Analyzed	'Build Option 2' AM Peak		Peak Hour Factor	0.95
Project Description	Mt. Vernon - N. Sandusky St. / Upper Fredericktown		Jurisdiction	City of Mount Vernon

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Movement																
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment	LTR				LTR				LTR				LTR			
Volume (V), veh/h	0	1	7	10	0	141	0	2	0	0	334	79	0	9	509	0
Percent Heavy Vehicles, %	0	0	0	0	2	2	2	2	10	10	10	10	11	11	11	11
Flow Rate (V _{PCE}), pc/h	0	1	7	11	0	151	0	2	0	0	387	91	0	11	595	0
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		
	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway, s		4.9763			4.9763			4.9763			4.9763	
Follow-Up Headway, s		2.6087			2.6087			2.6087			2.6087	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v _e), pc/h		19			153			478			606	
Entry Volume, veh/h		19			150			435			546	
Circulating Flow (v _c), pc/h	757			388			19			151		
Exiting Flow (v _{ex}), pc/h	109			0			390			757		
Capacity (C _{pce}), pc/h		638			929			1354			1183	
Capacity (c), veh/h		638			911			1230			1066	
v/c Ratio (x)		0.03			0.16			0.35			0.51	

Delay and Level of Service

Approach	EB			WB			NB			SB		
	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		6.0			5.6			6.3			9.4	
Lane LOS		A			A			A			A	
95% Queue Length, Q ₉₅ (veh)		0.1			0.6			1.6			3.0	
95% Queue Length, Q ₉₅ (ft)		2.5			15.2			43.2			81.6	
Approach Delay, s/veh LOS	6.0		A	5.6		A	6.3		A	9.4		A
Intersection Delay, s/veh LOS	7.7						A					

HCS Roundabouts Report

General Information

Site Information

Analyst	Brandon Tondra		Intersection	N. Sandusky St. (SR 13) / Up...
Agency or Co.	GPD Group		E/W Street Name	Upper Fredericktown Road /...
Date Performed	7/31/2025		N/S Street Name	N. Sandusky Street (SR 13)
Analysis Year	2050		Analysis Time Period, hrs	0.25
Time Analyzed	'Build Option 2' AM Peak		Peak Hour Factor	0.95
Project Description	Mt. Vernon - N. Sandusky St. / Upper Fredericktown		Jurisdiction	City of Mount Vernon

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Movement																
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment	LTR				LTR				LTR				LTR			
Volume (V), veh/h	0	1	9	12	0	161	0	2	0	0	382	91	0	11	582	0
Percent Heavy Vehicles, %	0	0	0	0	2	2	2	2	10	10	10	10	11	11	11	11
Flow Rate (V _{PCE}), pc/h	0	1	9	13	0	173	0	2	0	0	442	105	0	13	680	0
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		
	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway, s		4.9763			4.9763			4.9763			4.9763	
Follow-Up Headway, s		2.6087			2.6087			2.6087			2.6087	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v _e), pc/h		23			175			547			693	
Entry Volume, veh/h		23			172			497			624	
Circulating Flow (v _c), pc/h	866			443			23			173		
Exiting Flow (v _{ex}), pc/h	127			0			445			866		
Capacity (C _{PCE}), pc/h		571			878			1348			1157	
Capacity (c), veh/h		571			861			1225			1042	
v/c Ratio (x)		0.04			0.20			0.41			0.60	

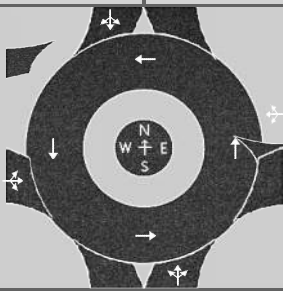
Delay and Level of Service

Approach	EB			WB			NB			SB		
	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		6.8			6.2			7.0			11.5	
Lane LOS		A			A			A			B	
95% Queue Length, Q ₉₅ (veh)		0.1			0.7			2.0			4.2	
95% Queue Length, Q ₉₅ (ft)		2.5			17.8			54.0			114.2	
Approach Delay, s/veh LOS	6.8		A	6.2		A	7.0		A	11.5		B
Intersection Delay, s/veh LOS	9.0						A					

HCS Roundabouts Report

General Information

Analyst	Brandon Tondra
Agency or Co.	GPD Group
Date Performed	7/31/2025
Analysis Year	2030
Time Analyzed	'Build Option 2' PM Peak
Project Description	Mt. Vernon - N. Sandusky St. / Upper Fredericktown



Site Information

Intersection	N. Sandusky St. (SR 13) / Up...
E/W Street Name	Upper Fredericktown Road / ...
N/S Street Name	N. Sandusky Street (SR 13)
Analysis Time Period, hrs	0.25
Peak Hour Factor	0.95
Jurisdiction	City of Mount Vernon

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Movement																
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment	LTR				LTR				LTR				LTR			
Volume (V), veh/h	0	1	13	22	0	134	0	6	0	0	590	239	0	31	519	0
Percent Heavy Vehicles, %	4	4	4	4	1	1	1	1	4	4	4	4	5	5	5	5
Flow Rate (V _{PCE}), pc/h	0	1	14	24	0	142	0	6	0	0	646	262	0	34	574	0
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		
	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway, s		4.9763			4.9763			4.9763			4.9763	
Follow-Up Headway, s		2.6087			2.6087			2.6087			2.6087	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v _e), pc/h		39			148			908			608	
Entry Volume, veh/h		38			147			873			579	
Circulating Flow (v _c), pc/h	750			647			49			142		
Exiting Flow (v _{ex}), pc/h	310			0			653			740		
Capacity (C _{pce}), pc/h		642			713			1313			1194	
Capacity (c), veh/h		617			706			1262			1137	
v/c Ratio (x)		0.06			0.21			0.69			0.51	

Delay and Level of Service

Approach	EB			WB			NB			SB		
	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		6.5			7.5			12.4			9.0	
Lane LOS		A			A			B			A	
95% Queue Length, Q ₉₅ (veh)		0.2			0.8			6.0			3.0	
95% Queue Length, Q ₉₅ (ft)		5.2			20.2			154.8			78.0	
Approach Delay, s/veh LOS	6.5		A	7.5		A	12.4		B	9.0		A
Intersection Delay, s/veh LOS	10.6						B					

HCS Roundabouts Report

General Information

Site Information

Analyst	Brandon Tondra		Intersection	N. Sandusky St. (SR 13) / Up...
Agency or Co.	GPD Group		E/W Street Name	Upper Fredericktown Road /...
Date Performed	7/31/2025		N/S Street Name	N. Sandusky Street (SR 13)
Analysis Year	2050		Analysis Time Period, hrs	0.25
Time Analyzed	'Build Option 2' PM Peak		Peak Hour Factor	0.95
Project Description	Mt. Vernon - N. Sandusky St. / Upper Fredericktown		Jurisdiction	City of Mount Vernon

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Movement																
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment	LTR				LTR				LTR				LTR			
Volume (V), veh/h	0	1	15	26	0	153	0	7	0	0	675	273	0	36	594	0
Percent Heavy Vehicles, %	4	4	4	4	1	1	1	1	4	4	4	4	5	5	5	5
Flow Rate (v _{PCE}), pc/h	0	1	16	28	0	163	0	7	0	0	739	299	0	40	657	0
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		
	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway, s		4.9763			4.9763			4.9763			4.9763	
Follow-Up Headway, s		2.6087			2.6087			2.6087			2.6087	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v _e), pc/h		45			170			1038			697	
Entry Volume, veh/h		43			168			998			664	
Circulating Flow (v _c), pc/h	860			740			57			163		
Exiting Flow (v _{ex}), pc/h	355			0			747			848		
Capacity (c _{pce}), pc/h		574			649			1302			1169	
Capacity (c), veh/h		552			642			1252			1113	
v/c Ratio (x)		0.08			0.26			0.80			0.60	

Delay and Level of Service

Approach	EB			WB			NB			SB		
	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		7.5			8.9			17.0			10.9	
Lane LOS		A			A			C			B	
95% Queue Length, Q ₉₅ (veh)		0.3			1.0			9.2			4.1	
95% Queue Length, Q ₉₅ (ft)		7.7			25.2			237.4			106.6	
Approach Delay, s/veh LOS	7.5	A		8.9	A		17.0	C		10.9	B	
Intersection Delay, s/veh LOS	13.9						B					

APPENDIX C
GROWTH RATE INFORMATION

TFMS - Segment Forecast Report

Username	Email	Script Import Date	Script Version	Model Version
Kevin.Westbrooks	kwestbrooks@gpdgroup.com	5/15/2025 10:30:27 AM	Initial	2025.1900

Forecast Summary

Project ID	Project Name	Opening Year	Design Year
	Mt. Vernon - N. Sandusky Street Safety Study	2030	2050

Project Description

--

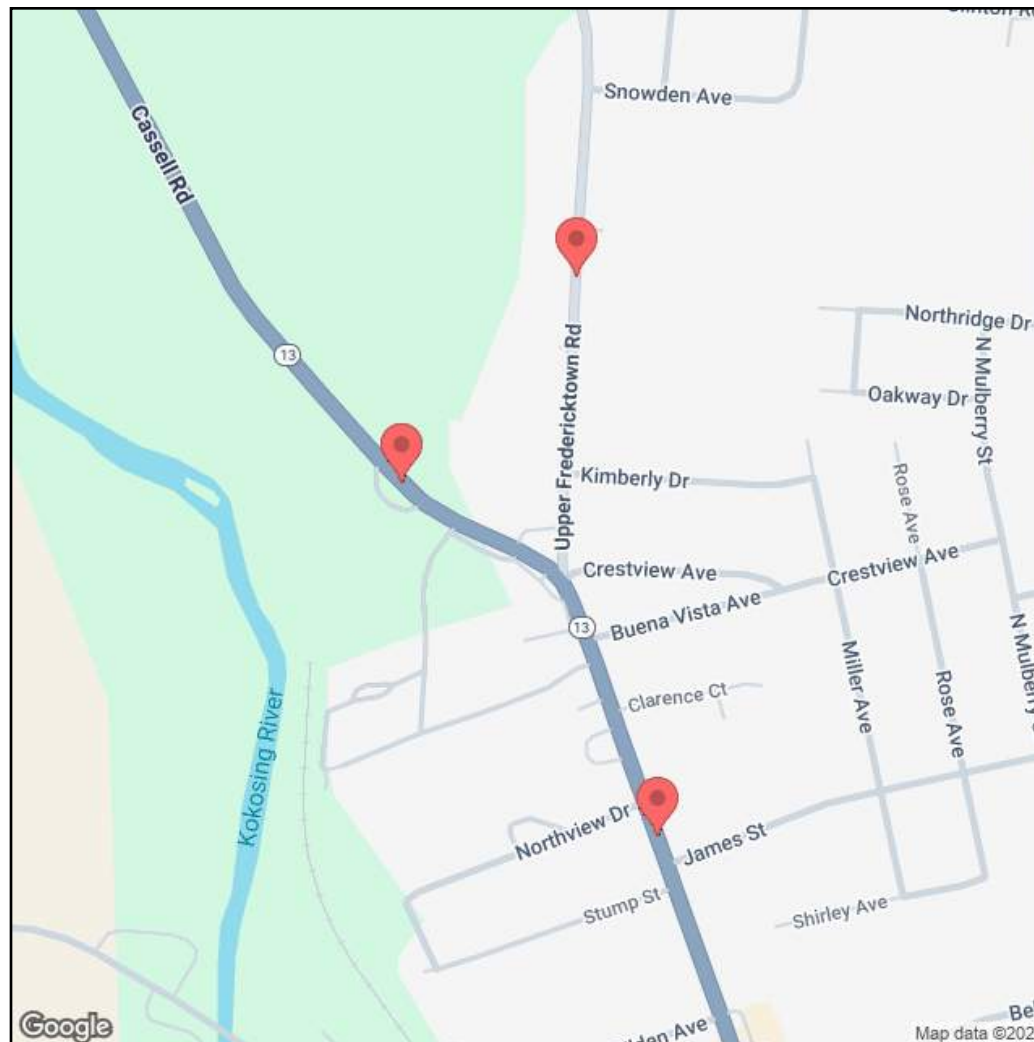
*Users of this data need to be aware that there are limitations to the forecasts generated by this product that make it suitable only for roadway design projects which are low risk.

Segment Information

Segment ID	LRS ID	BMP	EMP	Length	Latitude	Longitude
2274877	SKNOSR00013**C	11.761	12.146	0.385	-82.4939984498753	40.4079682061786
2274885	SKNOSR00013**C	12.146	12.407	0.261	-82.497392592499	40.4115307811733
2324367	CKNOCR00006**C	0.000	0.424	0.424	-82.4950722903177	40.4136127236318

Forecast Information

Segment ID	2030 AADT	2050 AADT	DHV-30	K%	D%	T24%	TD%
2274877	10,000	11,500	1,300	11.5	52.9	6	5
2274885	10,000	11,500	1,300	11.5	52.9	6	5
2324367	2,500	3,100	300	10.0	51.4	0	0



Definitions:

- o AADT – Annual Average Daily Traffic
- o DHV30 – Design Hour Volume for 30th highest hour of the year
- o $DHV30 = K * AADT$
- o K % – Design Hour Factor
- o D % – Peak Direction Factor
- o T24 % – Percent Daily Trucks
- o TD % – Percent Design Hour Trucks

Forecast Segment ID	Route	BMP	EMP
2274877	SKNOSR00013**C	11.761	12.146

Forecast

Year	K%	T24 % (Existing)	PA AADT	PA Method	PA Growth Rate %	PA Calculated Rate %
2050	◆ 11.5	7	11,000	Model	0.700	0.700
AADT	D%	TD % (Existing)	BC AADT	BC Method	BC Growth Rate %	BC Calculated Rate %
11,700	◆ 52.9	6	700	Average	● -1.400	0.000

● Warning: The growth rate was negative and was capped.

◆ K/D factors from TCDS were used.

Regression

Method Number	PA AADT	BC AADT	AADT
2	10,919	-352	10,567

95% Confidence Min/Max

PA Min	PA Max	BC Min	BC Max	Year
-4832	16163	-1418	1528	2050

Method Number	PA Growth %	BC Growth %	PA Drop Count	BC Drop Count	PA AADT	BC AADT	PA Adjustment	BC Adjustment
1	-1.56	-2.25	0	0	4,048	324	5,300	292
2	0.86	-5.77	1	1	10,506	-416	10,919	-352
3	0.86	-5.77	0	0	10,506	-416	10,919	-352
4	1.23	-5.11	5	5	11,745	-241	11,780	-231
5	0.94	-6.33	0	0	10,709	-530	11,103	-455
6	1.29	-5.70	5	5	11,887	-361	11,909	-339

Adjustment Info

ID	Adjustment Methods Name	Model vs Count AADT	Adjusted AADT	Model vs Count BC	Adjusted BC	PA Growth Rate %	BC Growth Rate %
1	DIF	-8,669	12,456	-815	1,528	0.87	4.50
2	RAT	0.53	11,112	0.46	1,086	0.48	2.09
3	MRAT	1.15	11,293	1.54	1,242	0.49	2.94
4	RAF		11,874		1,385	0.68	3.72

Adjust Method AADT	Adjust Method BC	Selected PA Growth Rate %	Selected BC Growth Rate %
Average	Model Ratio	0.700	2.900

Method 1 - 4 Volume

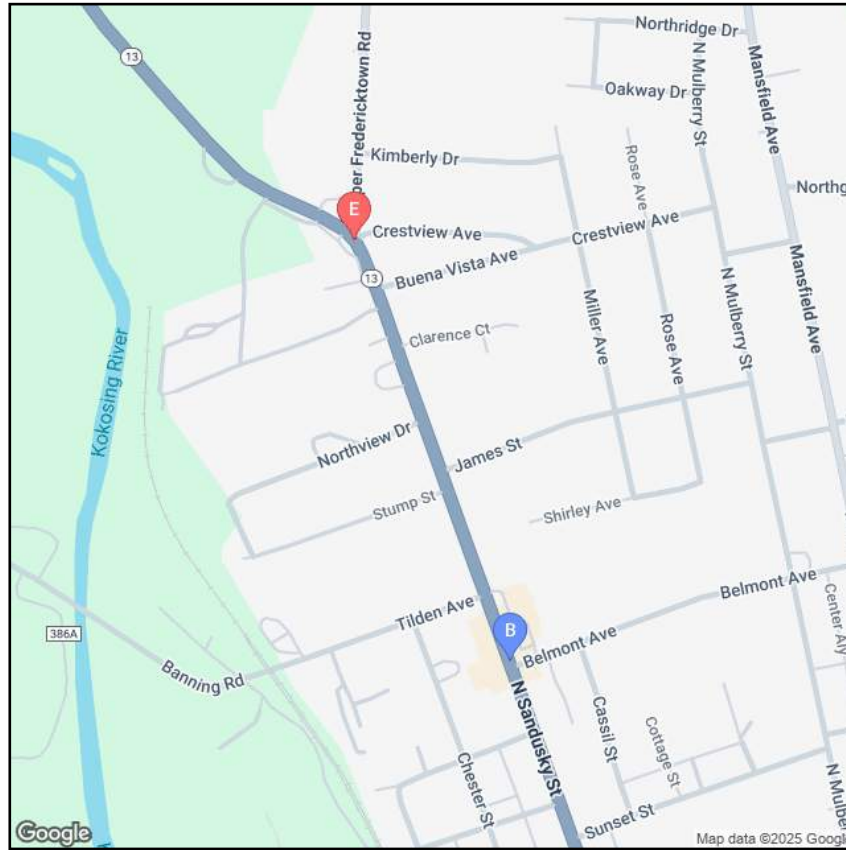
PA Min Volume	PA Max Volume	BC Min Volume	BC Max Volume	Total Min Volume	Total MaxVolume
10026	10928	1086	1528	11112	12456

Process Flag:	Adjusted model to counts with process per ODOT 255 spreadsheet
Comment:	No Comment

Historical Count

Year	All	Cars	Trucks
2010	12,410	11,690	720
2013	8,766	7,705	1,060
2015	8,991	7,903	1,087
2018	8,998	8,139	859
2021	8,290	7,620	670
* 2024	9,621	8,917	704

* Pivot Point



Segment ID	LRS ID	BMP	EMP	Length	Yr 2030 AADT	Yr 2050 AADT	DHV30	K %	D %	T24 %	TD %
2274877	SKNOSR00013**C	11.761	12.146	0.385	10,000	11,500	1300	11.5	52.9	6	5

Forecast Segment ID	Route	BMP	EMP
2274885	SKNOSR00013**C	12.146	12.407

Forecast

Year	K%	T24 % (Existing)	PA AADT	PA Method	PA Growth Rate %	PA Calculated Rate %
2050	◆ 11.5	7	11,000	Model	0.800	0.800
AADT	D%	TD % (Existing)	BC AADT	BC Method	BC Growth Rate %	BC Calculated Rate %
11,700	◆ 52.9	6	700	Average	● -1.400	0.000

● Warning: The growth rate was negative and was capped.

◆ K/D factors from TCDS were used.

Regression

Method Number	PA AADT	BC AADT	AADT
2	10,919	-352	10,567

95% Confidence Min/Max

PA Min	PA Max	BC Min	BC Max	Year
-4832	16163	-1418	1539	2050

Method Number	PA Growth %	BC Growth %	PA Drop Count	BC Drop Count	PA AADT	BC AADT	PA Adjustment	BC Adjustment
1	-1.56	-2.25	0	0	4,048	324	5,300	292
2	0.86	-5.77	1	1	10,506	-416	10,919	-352
3	0.86	-5.77	0	0	10,506	-416	10,919	-352
4	1.23	-5.11	5	5	11,745	-241	11,780	-231
5	0.94	-6.33	0	0	10,709	-530	11,103	-455
6	1.29	-5.70	5	5	11,887	-361	11,909	-339

Adjustment Info

ID	Adjustment Methods Name	Model vs Count AADT	Adjusted AADT	Model vs Count BC	Adjusted BC	PA Growth Rate %	BC Growth Rate %
1	DIF	-7,649	12,527	-847	1,539	0.89	4.56
2	RAT	0.56	11,240	0.45	1,083	0.53	2.07
3	MRAT	1.17	11,425	1.54	1,243	0.55	2.94
4	RAF		11,976		1,391	0.72	3.75

Adjust Method AADT	Adjust Method BC	Selected PA Growth Rate %	Selected BC Growth Rate %
Average	Model Ratio	0.800	2.900

Method 1 - 4 Volume

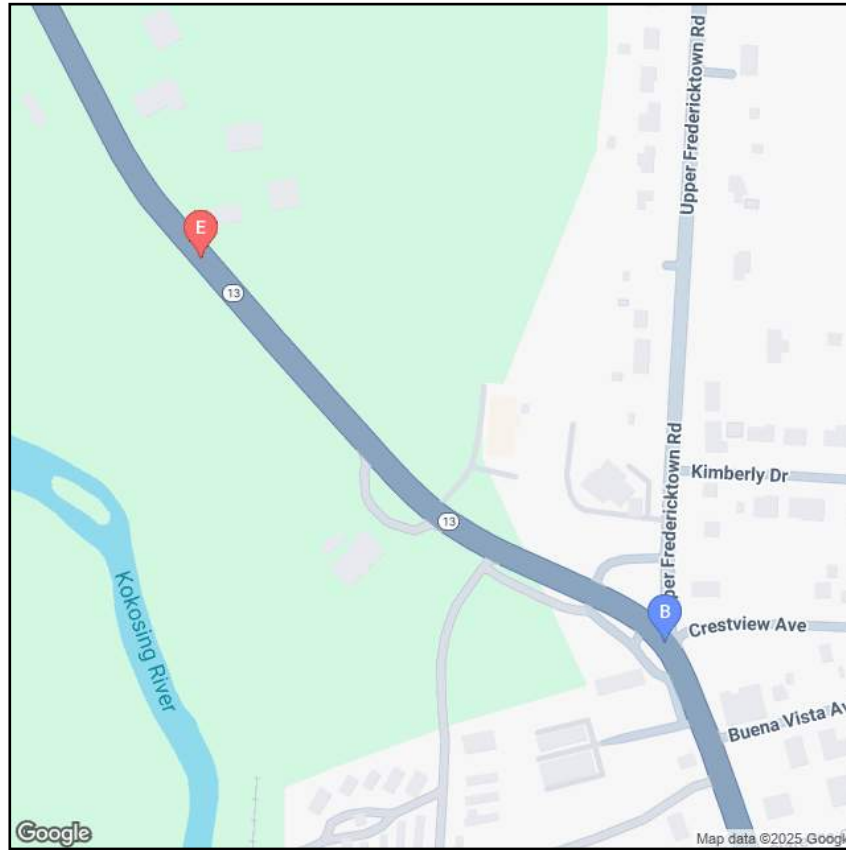
PA Min Volume	PA Max Volume	BC Min Volume	BC Max Volume	Total Min Volume	Total MaxVolume
10157	10988	1083	1539	11240	12527

Process Flag:	Adjusted model to counts with process per ODOT 255 spreadsheet
Comment:	No Comment

Historical Count

Year	All	Cars	Trucks
2010	12,410	11,690	720
2013	8,766	7,705	1,060
2015	8,991	7,903	1,087
2018	8,998	8,139	859
2021	8,290	7,620	670
* 2024	9,621	8,917	704

* Pivot Point



Segment ID	LRS ID	BMP	EMP	Length	Yr 2030 AADT	Yr 2050 AADT	DHV30	K %	D %	T24 %	TD %
2274885	SKNOSR00013**C	12.146	12.407	0.261	10,000	11,500	1300	11.5	52.9	6	5

Forecast Segment ID	Route	BMP	EMP
2324367	CKNOCR00006**C	0.000	0.424

Forecast

Year	K%	T24 % (Existing)	PA AADT	PA Method	PA Growth Rate %	PA Calculated Rate %
2050	10.0	0	3,100	Average	1.300	1.300
AADT	D%	TD % (Existing)	BC AADT	BC Method	BC Growth Rate %	BC Calculated Rate %
3,100	51.4	0	! 0	Model	● -999999.000	0.000

● Warning: The growth rate was negative and was capped.

! Warning: FORECAST TRUCKS ZERO BECAUSE NO TRUCK COUNTS ON SEGMENT

Regression

Method Number	PA AADT	BC AADT	AADT
1	4,303		4,303

95% Confidence Min/Max

PA Min	PA Max	BC Min	BC Max	Year
236	8302	0	15	2050

Method Number	PA Growth %	BC Growth %	PA Drop Count	BC Drop Count	PA AADT	BC AADT	PA Adjustment	BC Adjustment
1	3.44	0.00	0	0	4,550		4,303	
2	3.23	0.00	4	0	4,302		4,180	
3	3.92	0.00	0	0	4,876		4,587	
4	3.98	0.00	4	0	4,805		4,625	
5	3.18	0.00	0	0	4,390		4,148	
6	4.05	0.00	4	0	4,848		4,665	

Adjustment Info

ID	Adjustment Methods Name	Model vs Count AADT	Adjusted AADT	Model vs Count BC	Adjusted BC	PA Growth Rate %	BC Growth Rate %
1	DIF	66	1,833	-34	15	-0.77	0.00
2	RAT	1.03	1,820	0.00		-0.77	0.00
3	MRAT	0.80	1,820	1.43	4	-0.77	0.00
4	RAF		1,827		10	-0.77	0.00

Adjust Method AADT	Adjust Method BC	Selected PA Growth Rate %	Selected BC Growth Rate %
Average	Model Ratio	-0.800	0.000

Method 1 - 4 Volume

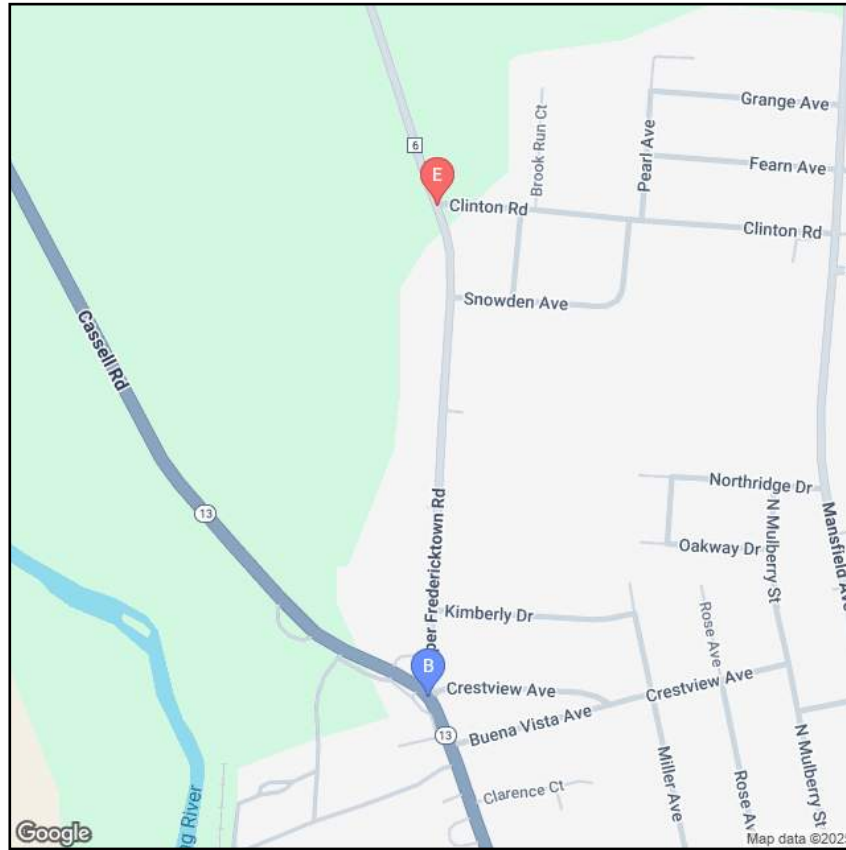
PA Min Volume	PA Max Volume	BC Min Volume	BC Max Volume	Total Min Volume	Total MaxVolume
1816	1823	0	15	1816	1838

Process Flag:	Adjusted model to counts with process per ODOT 255 spreadsheet
Comment:	No Comment

Historical Count

Year	All	Cars	Trucks
2010	1,530	1,530	
2013	1,465	1,465	
2015	1,535	1,535	
2018	2,499	2,499	
2021	2,453	2,453	
* 2024	2,272	2,272	

* Pivot Point



Segment ID	LRS ID	BMP	EMP	Length	Yr 2030 AADT	Yr 2050 AADT	DHV30	K %	D %	T24 %	TD %
2324367	CKNOCR00006**C	0.000	0.424	0.424	2,500	3,100	300	10.0	51.4	0	0

APPENDIX D
COLLISION DATA SUMMARY & CHARTS

North Sandusky St (SR 13)

	Number
Total	13

CRASH_SEVERITY	Number	%
Fatal Crash	1	7.7%
Injury Crash	7	53.8%
Property Damage Crash	5	38.5%
Grand Total	13	100.0%

TRAFFIC_CRASH_YEAR	Number	%
2022	5	38.5%
2023	4	30.8%
2024	4	30.8%
Grand Total	13	100.0%

DAY_OF_WEEK	Number	%
(7) Saturday	4	30.8%
(6) Friday	3	23.1%
(2) Monday	2	15.4%
(5) Thursday	2	15.4%
(4) Wednesday	1	7.7%
(3) Tuesday	1	7.7%
Grand Total	13	100.0%

TYPE_OF_CRASH	Number	%
Left Turn	5	38.5%
Rear End	4	30.8%
Sideswipe - Opposite	1	7.7%
Overtuning	1	7.7%
Right Turn	1	7.7%
Angle	1	7.7%
Grand Total	13	100.0%

HOUR_OF_DAY	Number	%
8	2	15.4%
10	2	15.4%
13	1	7.7%
15	1	7.7%
16	3	23.1%
17	1	7.7%
19	2	15.4%
23	1	7.7%
Grand Total	13	100.0%

ROAD_CONDITION	Number	%
Dry	13	100.0%
Grand Total	13	100.0%

WEATHER_CONDITION	Number	%
Clear	9	69.2%
Cloudy	4	30.8%
Grand Total	13	100.0%

LIGHT_CONDITION	Number	%
Daylight	10	76.9%
Dawn/Dusk	1	7.7%
Dark - Roadway Not Lighted	1	7.7%
Dark - Lighted Roadway	1	7.7%
Grand Total	13	100.0%

LOCATION	Number	%
Four-Way Intersection	4	30.8%
Data Not Valid or Not Provided	4	30.8%
Not An Intersection	4	30.8%
T-Intersection	1	7.7%
Grand Total	13	100.0%

NUMBER_OF_VEHICLES	Number	%
1	1	7.7%
2	11	84.6%
3	1	7.7%
Grand Total	13	100.0%

ROAD_CONTOUR	Number	%
Curve Grade	6	46.2%
Straight Grade	4	30.8%
Curve Level	3	23.1%
Grand Total	13	100.0%

North Sandusky St (SR 13)

SPECIAL_AREA	Number	%
(blank)	13	100.0%
Grand Total	13	100.0%

ANIMAL_TYPE	Number	%
(blank)	13	100.0%
Grand Total	13	100.0%

ACTION1	Number	%
Straight Ahead	6	46.2%
Negotiating a Curve	3	23.1%
Making Left Turn	3	23.1%
Making Right Turn	1	7.7%
Grand Total	13	100.0%

DRIVER_ALCOHOL1	Number	%
No	13	100.0%
Grand Total	13	100.0%

DIRECTION_FROM1	Number	%
North	8	61.5%
Northwest	2	15.4%
Southeast	1	7.7%
South	1	7.7%
East	1	7.7%
Grand Total	13	100.0%

POSTED_SPEED1	Number	%
45	6	46.2%
35	5	38.5%
40	1	7.7%
55	1	7.7%
Grand Total	13	100.0%

VEHICLE_TYPE1	Number	%
Passenger Van (minivan)	4	30.8%
Passenger Car	3	23.1%
Pick up	3	23.1%
Sport Utility Vehicle	2	15.4%
Motorcycle 2 Wheeled	1	7.7%
Grand Total	13	100.0%

CRASH_MONTH_NBR	Number	%
2	3	23.1%
3	1	7.7%
4	2	15.4%
5	1	7.7%
7	1	7.7%
8	4	30.8%
9	1	7.7%
Grand Total	13	100.0%

CONTRIBUTING_FACTOR1	Number	%
Failure to Yield	5	38.5%
Following Too Closely/ACDA	4	30.8%
Left of Center	2	15.4%
Operating Defective Equipment	1	7.7%
Ran Stop Sign	1	7.7%
Grand Total	13	100.0%

TRAFFIC_CONTROL1	Number	%
No Control	9	69.2%
Stop Sign	4	30.8%
Grand Total	13	100.0%

DRIVER_DRUGS1	Number	%
No	13	100.0%
Grand Total	13	100.0%

DIRECTION_TO1	Number	%
South	7	53.8%
East	2	15.4%
Northwest	2	15.4%
North	2	15.4%
Grand Total	13	100.0%

ESTIMATED_SPEED1	Number	%
35	4	30.8%
45	3	23.1%
0	2	15.4%
15	2	15.4%
26	1	7.7%
20	1	7.7%
Grand Total	13	100.0%

VEHICLE_TYPE2	Number	%
Passenger Car	6	46.2%
Pick up	4	30.8%
Sport Utility Vehicle	2	15.4%
	1	7.7%
Grand Total	13	100.0%

North Sandusky St (SR 13)

ACTION2	Number	%
Slowing or Stopped In Traffic	8	38.1%
Straight Ahead	8	38.1%
Negotiating a Curve	1	4.8%
Making Left Turn	1	4.8%
Parked	1	4.8%
Making Right Turn	1	4.8%
Grand Total	21	100.0%

DIRECTION_FROM2	Number	%
South	7	53.8%
North	3	23.1%
Northwest	2	15.4%
	1	7.7%
Grand Total	13	100.0%

DRIVER_ALCOHOL2	Number	%
(blank)	21	100.0%
Grand Total	21	100.0%

CONTRIBUTING_FACTOR2	Number	%
None	19	90.5%
Following Too Closely/ACDA	1	4.8%
	1	4.8%
Grand Total	21	100.0%

DIRECTION_TO2	Number	%
North	10	47.6%
South	6	28.6%
West	2	9.5%
	1	4.8%
Southeast	1	4.8%
East	1	4.8%
Grand Total	21	100.0%

DRIVER_DRUGS2	Number	%
(blank)	21	100.0%
Grand Total	21	100.0%

APPENDIX E
SIGHT DISTANCE EVALUATION

Roadway Safety Study – North Sandusky Street (SR-13)

Location Map of Intersection Sight Distance (ISD) and Stopping Sight Distance (SSD) Photographs

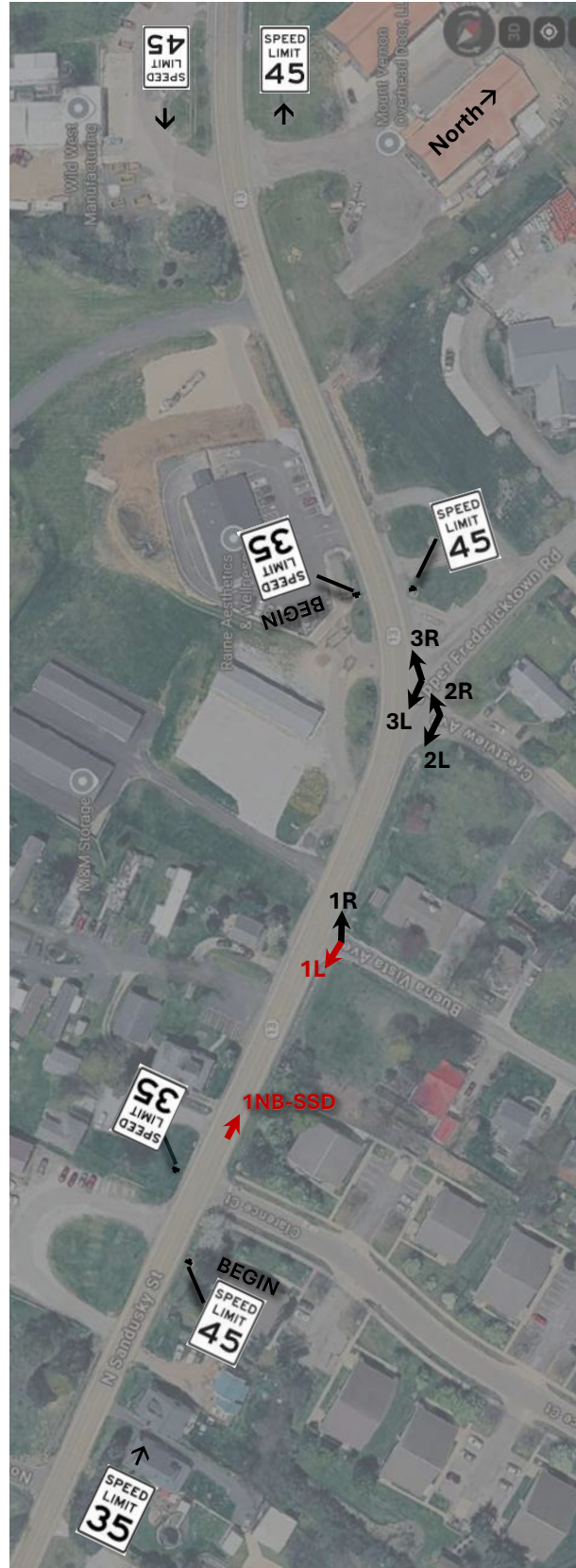
An overview image of the corridor is provided at right, with the intersections numbered from south to north:

- 1 - Buena Vista Avenue
- 2 - Crestview Avenue
- 3 - Upper Fredericktown Road

ISD photographs are shown with arrows and are labeled by intersection number and the direction the driver is looking. Black arrows and labels indicate ISD was satisfied. Red arrows and labels indicate ISD was not satisfied.

When ISD was not satisfied, stopping sight distance (SSD) from that direction was evaluated and documented.

For ISD, photographs are taken from the driver's eye 3.5 feet above the pavement surface, looking toward objects at least 3.5 feet tall approaching the intersection. The person photographed is approximately 5.5 feet tall and the bottom of their vest is approximately 3.5 feet above the ground. For SSD, photographs are also taken from the driver's eye on approach to the intersection, looking for an object at least 2 feet tall and is satisfied at the point that the person is visible approximately from the knee up. All distances and information are based on the ODOT *Location & Design Manual, Volume 1*, Section 2 and associated figures.



Roadway Safety Study – North Sandusky Street (SR-13)

Intersection 1 — Buena Vista Avenue

Speed Limits: Northbound (from left): 45 MPH.
Southbound (from right): 35 MPH.

Required ISD: 390 feet at 35 MPH. 555 feet at 50 MPH, including a 5 MPH safety factor applied for speeds 45+ MPH.

Required SSD: 250 feet at 35 MPH. 425 feet at 50 MPH, including a 5 MPH safety factor applied for speeds 45+ MPH.

Photo 1L - Looking left at approaching northbound traffic

ISD Not Met at 50 MPH. Photo 1L below shows a person at 335 feet, satisfying ISD for 30 MPH. ISD required for 50 MPH is 555 feet.

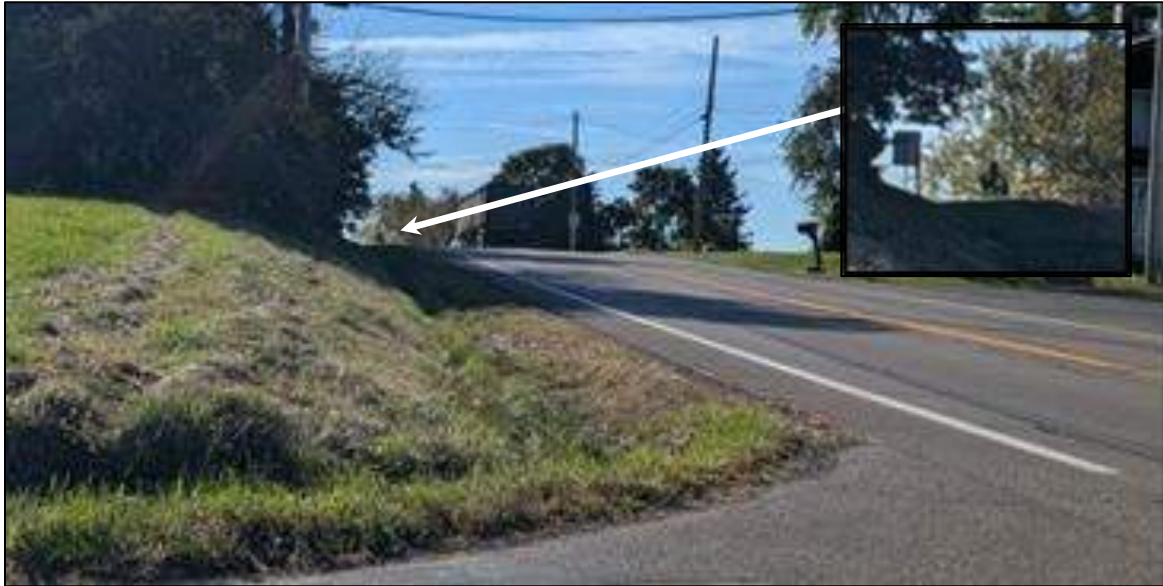


Photo 1R - Looking right at approaching southbound traffic

ISD met. Photo 1R shows a person standing at the required distance, 390 feet. Portions of the vision triangle are partially obscured by trees within the required 390 feet.



Roadway Safety Study – North Sandusky Street (SR-13)

Intersection 1 — Buena Vista Avenue (Continued)

Speed Limits: Northbound (from left): 45 MPH.
Southbound (from right): 35 MPH.

Required ISD: 390 feet at 35 MPH. 555 feet at 50 MPH, including a 5 MPH safety factor applied for speeds 45+ MPH.

Required SSD: 250 feet at 35 MPH. 425 feet at 50 MPH, including a 5 MPH safety factor applied for speeds 45+ MPH.

Photo 1NB-SSD – Northbound traffic looking toward intersection

Stopping sight distance (SSD) is not satisfied. Stopping sight distance criteria is only met starting at approximately 410 feet from Buena Vista Avenue. This satisfies criteria for 48 MPH (400 feet) but not 50 MPH (425 feet).



Roadway Safety Study – North Sandusky Street (SR-13)

Intersection 2 — Crestview Avenue

Speed Limits: Northbound (from left): 45 MPH.
Southbound (from right): 45 MPH until the 35 MPH zone starts, 100 feet north of this intersection.

Required ISD: 390 feet at 35 MPH. 555 feet at 50 MPH, including a 5 MPH safety factor applied for speeds 45+ MPH.

Photo 2L - Looking left at approaching northbound traffic

ISD is met at 50 MPH. Photo 2L, below, shows a person visible from the waist up (3.5 feet) at 555 feet. This distance satisfies ISD for 50 MPH.



Photo 2R - Looking right at approaching southbound traffic

Photo 2R, shows a person standing and fully unobscured at 555 feet, the required ISD for 50 MPH, and far exceeding the ISD required for 35 MPH (390 Feet).



Roadway Safety Study – North Sandusky Street (SR-13)

Intersection 3 — Upper Fredericktown Road

Speed Limits: Northbound (from left): 45 MPH.
Southbound (from right): 45 MPH until the 35 MPH zone starts, 75 feet north of this intersection.

Required ISD: 390 feet at 35 MPH. 555 feet at 50 MPH, including a 5 MPH safety factor applied for speeds 45+ MPH.

Photo 3L - Looking left at approaching northbound traffic

Below, a person is nearly fully visible at 555 feet, satisfying the required distance for 50 MPH.



Photo 3R - Looking right at approaching southbound traffic

Below, a person stands at 555 feet away and unobscured, satisfying the minimum required distance for 50 MPH.



**APPENDIX F
ECAT ANALYSIS**

EXISTING CONDITIONS

Project Information

General Information

Project Name	Mt. Vernon - N. Sandusky / Upper Fredericktown Safety Study	Contact Email	jmbennett@gpdgroup.com
Project Description	Existing Conditions	Contact Phone	216-927-8654
Reference Number		Date Performed	4/13/2026
Analyst	Judith Bennett	Analysis Year	2022-2024
Agency/Company	GPD Group		
Perform Benefit Cost Analysis?	Yes		

Do the proposed improvements fundamentally change the conditions of the base safety performance function (SPF), Or is crash data unavailable for the analysis condition, Or is only predicted (and not expected) analysis needed for the existing or proposed condition? **Yes**

(Examples: unsignalized to signalized, undivided to divided, increase or decrease in the number of lanes, change the number of approaches to an intersection, significant realignment of the roadway)

If Yes, are you analyzing the existing or proposed conditions? **Existing**

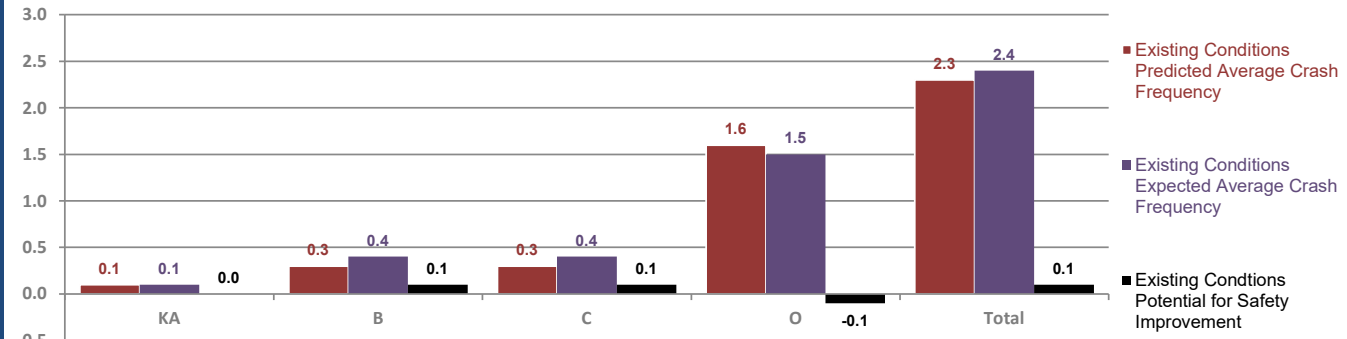
Project Elements Description Table									
Location Information									
Project Element ID (Must be Unique)	Site Type	Intersection Control Type	NLFID	Begin Logpoint/ Intersection Midpoint	End Logpoint (Leave blank for Intersection)	Length (mi) OR Intersection Radius Buffer (mi)	Cross Route NLFID(s)	Common Name	
SR13; 12.145-12.284	Urban & Suburban Arterial Segment		SKNOSR00013**C	12.145	12.284	0.139		Upper Fred to Reverse Curve	
SR13; 12.099	Urban & Suburban Arterial Intersection	Unsignalized	SKNOSR00013**C	12.099		0.05	TKNOTR0044	Buena Vista Ave Intersection	
SR13; 12.145	Urban & Suburban Arterial Intersection	Unsignalized	SKNOSR00013**C	12.145		0.05	CKNOCR0000	Upper Fredericktown Rd Intersection	

Traffic Volume Growth Rate Calculation For Benefit Cost Analysis			
	Year	AADT	
Present ADT (PADT)	2025	9,621	veh / day
Future ADT (FADT)	2050	11,425	veh / day
Annual Linear Growth Rate		0.0075	

General Information

Project Name	Mt. Vernon - N. Sandusky / Upper	Contact Email	jmbennett@gpdgroup.com
Project Description	Existing Conditions	Contact Phone	216-927-8654
Reference Number		Date Performed	4/13/2026
Analyst	Judith Bennett	Analysis Year	2022-2024
Agency/Company	GPD Group		

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	0.0940	0.2819	0.3373	1.6005	2.3137
N_{expected} - Existing Conditions	0.1164	0.3600	0.4433	1.4886	2.4083
N_{potential for improvement} - Existing Conditions	0.0224	0.0781	0.1060	-0.1119	0.0946

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

Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
SR13: 12.145-12.284	Upper Fred to Reverse Curve	0.0295	0.0727	0.086	0.4107	0.5989
SR13: 12.099	Buena Vista Ave Intersection	0.0085	0.0356	0.0482	0.1177	0.21
SR13: 12.145	Upper Fredericktown Rd Intersection	0.056	0.1736	0.2031	1.0721	1.5048

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

Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
SR13: 12.145-12.284	Upper Fred to Reverse Curve	0.0327	0.0842	0.1056	0.3701	0.5926
SR13: 12.099	Buena Vista Ave Intersection	0.011	0.0473	0.065	0.1341	0.2574
SR13: 12.145	Upper Fredericktown Rd Intersection	0.0727	0.2285	0.2727	0.9844	1.5583

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
SR13: 12.145-12.284	Upper Fred to Reverse Curve	0.0032	0.0115	0.0196	-0.0406	-0.0063
SR13: 12.099	Buena Vista Ave Intersection	0.0025	0.0117	0.0168	0.0164	0.0474
SR13: 12.145	Upper Fredericktown Rd Intersection	0.0167	0.0549	0.0696	-0.0877	0.0535



Project Safety Performance Report

General Information

Project Name	Mt. Vernon - N. Sandusky / Upper	Contact Email	jmbennett@gpdgroup.com
Project Description	Existing Conditions	Contact Phone	216-927-8654
Reference Number		Date Performed	4/13/2026
Analyst	Judith Bennett	Analysis Year	2022-2024
Agency/Company	GPD Group		

Summary by Crash Type

Crash Type	Existing		PSI	Proposed
	Predicted Crash Frequency	Expected Crash Frequency		Expected Crash Frequency
Unknown	0.0041	0.0039	-0.0002	
Head On	0.0311	0.0363	0.0052	
Rear End	0.7075	0.7430	0.0355	
Backing	0.0895	0.0844	-0.0051	
Sideswipe - Meeting	0.0225	0.0245	0.0019	
Sideswipe - Passing	0.2370	0.2363	-0.0007	
Angle	0.5474	0.6034	0.0561	
Parked Vehicle	0.1077	0.1042	-0.0035	
Pedestrian	0.0488	0.0482	-0.0006	
Animal	0.1904	0.1862	-0.0043	
Train	0.0001	0.0001	0.0000	
Pedalcycles	0.0208	0.0207	-0.0001	
Other Non-Vehicle	0.0000	0.0000	0.0000	
Fixed Object	0.2643	0.2557	-0.0086	
Other Object	0.0112	0.0108	-0.0003	
Overturning	0.0080	0.0077	-0.0002	
Other Non-Collision	0.0177	0.0171	-0.0006	
Left Turn	0.1231	0.1368	0.0137	
Right Turn	0.0727	0.0749	0.0021	

Existing Conditions: General Information and Data for Urban And Suburban Arterial Intersection

General Information		Location Information	
Analyst	Judith Bennett	Route	SR13
Agency or Company	GPD Group	Logpoint	12.099
Date Performed	04/13/26	Common Name	Buena Vista Ave Intersection
Intersection	SR13; 12.099	Analysis Year	2022-2024
Signalized/Unsignalized	Unsignalized		
Input Data			
Intersection type (3ST, 3SG, 4ST, 4SG, 3STT, 3aST, 4aST, 3ST (HS), 3SG (HS), 4ST (HS), 4SG (HS), 5SG)		Existing Conditions	
		3ST	
AADT major (veh/day) (total entering on major approaches)	AADT _{MAX} = 45,700 (veh/day)	9,621	--
AADT minor (veh/day) (total entering on minor approaches)	AADT _{MAX} = 9,300 (veh/day)	89	--
	AADT _{MAX} = N/A (veh/day)		--
Intersection lighting (present/not present)		Present	Not Present
Calibration factor, C _i		Varies, See Below	1.00
<u>Data for unsignalized intersections only:</u>			
Number of major-road approaches with left-turn lanes		0	0
Number of major-road approaches with right-turn lanes		0	0
			--
			--
<u>Data for signalized intersections only:</u>			
Number of approaches with left-turn lanes			0
Number of approaches with right-turn lanes			0
Number of approaches with left-turn signal phasing			--
Type of left-turn signal phasing for Leg #1			Permissive
Type of left-turn signal phasing for Leg #2			--
Type of left-turn signal phasing for Leg #3			--
Not Applicable			--
Number of approaches with right-turn-on-red prohibited			0
Intersection red light cameras (present/not present)			Not Present
Sum of all pedestrian crossing volumes (PedVol)			--
Maximum number of lanes crossed by a pedestrian (n _{lanesx})			--
Number of bus stops within 300 m (1,000 ft) of the intersection			0
Schools within 300 m (1,000 ft) of the intersection (present/not present)			Not Present
Number of alcohol sales establishments within 300 m (1,000 ft) of the intersection			0
Locality:		Local System	

Existing Conditions: Crash Modification Factors (CMFs) for Urban And Suburban Arterial Intersection

(1)	(2)	(3)	(4)	(5)	(6)	(7)
CMF for Left-Turn Lanes	CMF for Left-Turn Signal Phasing	CMF for Right-Turn Lanes	CMF for Right Turn on Red	CMF for Lighting	CMF for Red Light Cameras	Combined CMF
CMF 1 _i	CMF 2 _i	CMF 3 _i	CMF 4 _i	CMF 5 _i	CMF 6 _i	CMF _{COMB}
from Table 12-24	from Table 12-25	from Table 12-26	from Equation 12-35	from Equation 12-36	from Equation 12-37	(1)*(2)*(3)*(4)*(5)*(6)
1.0000	1.0000	1.0000	1.0000	0.9669	1.0000	0.9669

Existing Conditions: Multiple-Vehicle Crash Summary for Urban And Suburban Arterial Intersection													
(1)	(2)				(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(8)*(9)*(10)
Crash Severity Level	SPF Coefficients				Over-dispersion Parameter, k	Initial N_{bimv} from Equation 12-21	Curve CMF (3STT only)	Initial N_{bimv} Adj for Curve	Proportion of Total Crashes	Adjusted N_{bimv} (4) _{TOTAL} *(5)	Combined CMFs (7) from Worksheet 2B	Calibration Factor, C_i	Predicted N_{bimv}
	a	b	c	d									
Total	-13.36	1.11	0.41	--	0.80	0.26	1.00	0.26	1.000	0.26	0.97	0.76	0.19
Fatal and Injury (FI)	-14.01	1.16	0.30	--	0.69	0.13	1.00	0.13	$(4)_{FI} / ((4)_{FI} + (4)_{PDO})$ 0.515	0.14	0.97	0.62	0.08
Property Damage Only (PDO)	-15.38	1.20	0.51	--	0.77	0.12	1.00	0.12	$(5)_{TOTAL} - (5)_{FI}$ 0.485	0.13	0.97	0.82	0.10

Existing Conditions: Single-Vehicle Crash Summary for Urban And Suburban Arterial Intersection													
(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(8)*(9)*(10)	
Crash Severity Level	SPF Coefficients			Over-dispersion Parameter, k	Initial N_{bisv} from Eqn. 12-24; (FI) from Eqn. 12-24 or 12-27	Curve CMF (3STT only)	Initial N_{bisv} Adj for Curve	Proportion of Total Crashes	Adjusted N_{bisv} (4) _{TOTAL} *(5)	Combined CMFs (7) from Worksheet 2B	Calibration Factor, C_i	Predicted N_{bisv}	
	a	b	c										
Total	-6.81	0.16	0.51	1.14	0.047	1.00	0.05	1.000	0.047	0.97	0.54	0.02	
Fatal and Injury (FI)	--	--	--	--	0.015	1.00	0.01	$(4)_{FI} / ((4)_{FI} + (4)_{PDO})$ 0.348	0.016	0.97	0.47	0.01	
Property Damage Only (PDO)	-8.36	0.25	0.55	1.29	0.027	1.00	0.03	$(5)_{TOTAL} - (5)_{FI}$ 0.652	0.031	0.97	0.57	0.02	

Existing Conditions: Vehicle-Pedestrian Crash Summary at Urban And Suburban Arterial Intersections (3ST, 3ST (HS), 3aST, 3STT, 3SG (HS), 4ST, 4ST (HS), 4aST, 4SG (HS), and 5SG)						
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	Predicted N_{bimv}	Predicted N_{bisv}	Predicted N_{bi}	f_{pedi}	Calibration factor, C_i	Predicted N_{pedi}
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16		(4)*(5)*(6)
Total	0.193	0.025	0.217	0.010	1.11	0.002
Fatal and injury (FI)	--	--	--	--	1.11	0.002

Existing Conditions: CMFs for Vehicle-Pedestrian Crash Summary for Urban And Suburban Arterial Signalized Intersections (3SG and 4SG)			
(1)	(2)	(3)	(4)
CMF for Bus Stops CMF_{fp} from Table 12-28	CMF for Schools CMF_{zp} from Table 12-29	CMF for Alcohol Sales Establishments CMF_{sp} from Table 12-30	Combined CMF (1)*(2)*(3)
--	--	--	--

Existing Conditions: Vehicle-Pedestrian Crash Summary at Urban And Suburban Arterial Signalized Intersections (3SG and 4SG)										
(1)	(2)					(3)	(4)	(5)	(6)	(7)
Crash Severity Level	SPF Coefficients from Table 12-14					Overdispersion Parameter, k	$N_{pedbase}$ from Equation 12-29	Combined CMF (4) from Worksheet 2H	Calibration factor, C_i	Predicted N_{pedi} (4)*(5)*(6)
	a	b	c	d	e					
Total	--	--	--	--	--	--	--	--	--	0.00
Fatal and Injury (FI)	--	--	--	--	--	--	--	--	--	0.00

Existing Conditions: Vehicle-Bicycle Crash Summary for Urban And Suburban Arterial Intersection						
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	Predicted N_{bimv}	Predicted N_{bisv}	Predicted N_{bi}	f_{bikei}	Calibration factor, C_i	Predicted N_{bikei}
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17		(4)*(5)*(6)
Total	0.193	0.025	0.217	0.0057	1.16	0.001
Fatal and injury (FI)	--	--	--	--	1.16	0.001

Existing Conditions: General Information and Data for Urban And Suburban Arterial Intersection

General Information		Location Information	
Analyst	Judith Bennett	Route	SR13
Agency or Company	GPD Group	Logpoint	12.145
Date Performed	04/13/26	Common Name	Upper Fredericktown Rd Intersection
Intersection	SR13; 12.145	Analysis Year	2022-2024
Signalized/Unsignalized	Unsignalized		
Input Data		Existing Conditions	HSM Base Conditions
Intersection type (3ST, 3SG, 4ST, 4SG, 3STT, 3aST, 4aST, 3ST (HS), 3SG (HS), 4ST (HS), 4SG (HS), 5SG)		4ST	--
AADT major (veh/day) (total entering on major approaches)	AADT _{MAX} = 46,800 (veh/day)	9,621	--
AADT minor (veh/day) (total entering on minor approaches)	AADT _{MAX} = 5,900 (veh/day)	2,432	--
	AADT _{MAX} = N/A (veh/day)		--
Intersection lighting (present/not present)		Present	Not Present
Calibration factor, C _i		Varies, See Below	1.00
Data for unsignalized intersections only:			
Number of major-road approaches with left-turn lanes		0	0
Number of major-road approaches with right-turn lanes		0	0
			--
			--
Data for signalized intersections only:			
Number of approaches with left-turn lanes			0
Number of approaches with right-turn lanes			0
Number of approaches with left-turn signal phasing			--
Type of left-turn signal phasing for Leg #1			Permissive
Type of left-turn signal phasing for Leg #2			--
Type of left-turn signal phasing for Leg #3			--
Type of left-turn signal phasing for Leg #4			--
Number of approaches with right-turn-on-red prohibited			0
Intersection red light cameras (present/not present)			Not Present
Sum of all pedestrian crossing volumes (PedVol)			--
Maximum number of lanes crossed by a pedestrian (n _{lanesx})			--
Number of bus stops within 300 m (1,000 ft) of the intersection			0
Schools within 300 m (1,000 ft) of the intersection (present/not present)			Not Present
Number of alcohol sales establishments within 300 m (1,000 ft) of the intersection			0
Locality:		Local System	

Existing Conditions: Crash Modification Factors (CMFs) for Urban And Suburban Arterial Intersection

(1)	(2)	(3)	(4)	(5)	(6)	(7)
CMF for Left-Turn Lanes	CMF for Left-Turn Signal Phasing	CMF for Right-Turn Lanes	CMF for Right Turn on Red	CMF for Lighting	CMF for Red Light Cameras	Combined CMF
CMF 1 _i	CMF 2 _i	CMF 3 _i	CMF 4 _i	CMF 5 _i	CMF 6 _i	CMF _{COMB}
from Table 12-24	from Table 12-25	from Table 12-26	from Equation 12-35	from Equation 12-36	from Equation 12-37	(1)*(2)*(3)*(4)*(5)*(6)
1.0000	1.0000	1.0000	1.0000	0.9680	1.0000	0.9680

Existing Conditions: Multiple-Vehicle Crash Summary for Urban And Suburban Arterial Intersection														
(1)	(2)				(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(8)*(9)*(10)	
Crash Severity Level	SPF Coefficients				Over-dispersion Parameter, k	Initial N_{bimv} from Equation 12-21	Curve CMF (3STT only)	Initial N_{bimv} Adj for Curve	Proportion of Total Crashes	Adjusted N_{bimv} (4) _{TOTAL} *(5)	Combined CMFs (7) from Worksheet 2B	Calibration Factor, C_i	Predicted N_{bimv}	
	a	b	c	d									(4) _{F/I} /((4) _{F/I} +(4) _{PDO})	(5) _{TOTAL} *(5) _{F/I}
Total	-8.90	0.82	0.25	--	0.40	1.77	1.00	1.77	1.000	1.77	0.97	0.76	1.30	
Fatal and Injury (FI)	-11.13	0.93	0.28	--	0.48	0.66	1.00	0.66	0.370	0.65	0.97	0.56	0.35	
Property Damage Only (PDO)	-8.74	0.77	0.23	--	0.40	1.12	1.00	1.12	0.630	1.11	0.97	0.89	0.96	

Existing Conditions: Single-Vehicle Crash Summary for Urban And Suburban Arterial Intersection													
(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(8)*(9)*(10)	
Crash Severity Level	SPF Coefficients			Over-dispersion Parameter, k	Initial N_{bisv} from Eqn. 12-24; (FI) from Eqn. 12-24 or 12-27	Curve CMF (3STT only)	Initial N_{bisv} Adj for Curve	Proportion of Total Crashes	Adjusted N_{bisv} (4) _{TOTAL} *(5)	Combined CMFs (7) from Worksheet 2B	Calibration Factor, C_i	Predicted N_{bisv}	
	a	b	c									(4) _{F/I} /((4) _{F/I} +(4) _{PDO})	(5) _{TOTAL} *(5) _{F/I}
Total	-5.33	0.33	0.12	0.65	0.255	1.00	0.25	1.000	0.255	0.97	0.63	0.16	
Fatal and Injury (FI)	--	--	--	--	0.071	1.00	0.07	0.299	0.076	0.97	0.58	0.04	
Property Damage Only (PDO)	-7.04	0.36	0.25	0.54	0.167	1.00	0.17	0.701	0.179	0.97	0.65	0.11	

Existing Conditions: Vehicle-Pedestrian Crash Summary at Urban And Suburban Arterial Intersections (3ST, 3ST (HS), 3aST, 3STT, 3SG (HS), 4ST, 4ST (HS), 4aST, 4SG (HS), and 5SG)						
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	Predicted N_{bimv}	Predicted N_{bisv}	Predicted N_{bi}	f_{pedi}	Calibration factor, C_i	Predicted N_{pedi}
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16		(4)*(5)*(6)
Total	1.301	0.155	1.456	0.012	1.28	0.023
Fatal and injury (FI)	--	--	--	--	1.28	0.023

Existing Conditions: CMFs for Vehicle-Pedestrian Crash Summary for Urban And Suburban Arterial Signalized Intersections (3SG and 4SG)			
(1)	(2)	(3)	(4)
CMF for Bus Stops CMF_{ip} from Table 12-28	CMF for Schools CMF_{sp} from Table 12-29	CMF for Alcohol Sales Establishments CMF_{sp} from Table 12-30	Combined CMF (1)*(2)*(3)
--	--	--	--

Existing Conditions: Vehicle-Pedestrian Crash Summary at Urban And Suburban Arterial Signalized Intersections (3SG and 4SG)										
(1)	(2)					(3)	(4)	(5)	(6)	(7)
Crash Severity Level	SPF Coefficients from Table 12-14					Overdispersion Parameter, k	$N_{pedbase}$ from Equation 12-29	Combined CMF (4) from Worksheet 2H	Calibration factor, C_i	Predicted N_{pedi} (4)*(5)*(6)
	a	b	c	d	e					
Total	--	--	--	--	--	--	--	--	--	0.00
Fatal and Injury (FI)	--	--	--	--	--	--	--	--	--	0.00

Existing Conditions: Vehicle-Bicycle Crash Summary for Urban And Suburban Arterial Intersection						
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	Predicted N_{bimv}	Predicted N_{bisv}	Predicted N_{bi}	f_{bikei}	Calibration factor, C_i	Predicted N_{bikei}
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17		(4)*(5)*(6)
Total	1.301	0.155	1.456	0.0077	1.15	0.013
Fatal and injury (FI)	--	--	--	--	1.15	0.013

Existing Conditions: General Information and Data for Urban And Suburban Roadway Segment

General Information					Location Information			
Analyst	Judith Bennett				Route	SR13		
Agency or Company	GPD Group				Logpoints	12.145 to 12.284		
Date Performed	04/13/26				Common Name	Upper Fred to Reverse Curve		
Segment for Analysis	SR13; 12.145-12.284				Analysis Year	2022-2024		
Input Data					Existing Conditions			HSM Base Conditions
Roadway type (2U, 3T, 4U, 4D, 5T)					2U			--
Length of segment, L (mi)					0.139			--
AADT (veh/day)	is within range	AADT _{MAX} =	32,600	(veh/day)	9,621			--
Type of on-street parking (none/parallel/angle)					None			None
Proportion of curb length with on-street parking					0			--
Median width (ft) - for divided only					Not Present			15
Lighting (present / not present)					Not Present			Not Present
Auto speed enforcement (present / not present)					Not Present			Not Present
Major commercial driveways (number)					0			--
Minor commercial driveways (number)					1			--
Major industrial / institutional driveways (number)					0			--
Minor industrial / institutional driveways (number)					0			--
Major residential driveways (number)					0			--
Minor residential driveways (number)					0			--
Other driveways (number)					0			--
Speed Category					Posted Speed Greater than 30 mph			--
Roadside fixed object density (fixed objects / mi)					194			0
Offset to roadside fixed objects (ft) [If greater than 30 or Not Present, input 30]					6			30
Calibration Factor, Cr					Varies, See Below			1.00
Locality:					Local System			

Existing Conditions: Crash Modification Factors (CMFs) for Urban And Suburban Roadway Segment

(1)	(2)	(3)	(4)	(5)	(6)
CMF for On-Street Parking	CMF for Roadside Fixed Objects	CMF for Median Width	CMF for Lighting	CMF for Automated Speed Enforcement	Combined CMF
<i>CMF 1r</i>	<i>CMF 2r</i>	<i>CMF 3r</i>	<i>CMF 4r</i>	<i>CMF 5r</i>	<i>CMF comb</i>
from Equation 12-32	from Equation 12-33	from Table 12-22	from Equation 12-34	from Section 12.7.1	(1)*(2)*(3)*(4)*(5)
1.00	3.15	1.00	1.00	1.00	3.15

Existing Conditions: Multiple-Vehicle Nondriveway Crash Summary for Urban And Suburban Roadway Segment

(1) Crash Severity Level	(2) SPF Coefficients		(3) Overdispersion Parameter, k	(4) Initial N_{brmv}	(5) Proportion of Total Crashes	(6) Adjusted N_{brmv}	(7) Combined CMFs	(8) Calibration Factor, Cr	(9) Predicted N_{brmv}
	from Table 12-3		from Table 12-3	from Equation 12-10		(4) _{TOTAL} *(5)	(6) from Worksheet 1B	(8)	(6)*(7)*(8)
	a	b							
Total	-15.22	1.68	0.84	0.168	1.000	0.168	3.15	0.62	0.328
Fatal and Injury (FI)	-16.22	1.66	0.65	0.051	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.294	0.049	3.15	0.69	0.107
Property Damage Only (PDO)	-15.62	1.69	0.87	0.123	$(5)_{TOTAL}-(5)_{FI}$ 0.706	0.118	3.15	0.60	0.224

Existing Conditions: Single-Vehicle Crash Summary for Urban And Suburban Roadway Segment

(1) Crash Severity Level	(2) SPF Coefficients		(3) Overdispersion Parameter, k	(4) Initial N_{brsv}	(5) Proportion of Total Crashes	(6) Adjusted N_{brsv}	(7) Combined CMFs	(8) Calibration Factor, Cr	(9) Predicted N_{brsv}
	from Table 12-5		from Table 12-5	from Equation 12-13		(4) _{TOTAL} *(5)	(6) from Worksheet 1B	(8)	(6)*(7)*(8)
	a	b							
Total	-5.47	0.56	0.81	0.100	1.000	0.100	3.15	1.34	0.420
Fatal and Injury (FI)	-3.96	0.23	0.50	0.022	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.230	0.023	3.15	0.79	0.057
Property Damage Only (PDO)	-6.51	0.64	0.87	0.073	$(5)_{TOTAL}-(5)_{FI}$ 0.770	0.077	3.15	1.52	0.367

Multiple-Vehicle Driveway-Related Collisions By Driveway Type for Urban And Suburban Roadway Segment

(1) Driveway Type	(2) Number of driveways, n_j	(3) Crashes per driveway per year, N_j	(4) Coefficient for traffic adjustment, t	(5) Initial N_{brdwy}	(6) Overdispersion parameter, k	
		from Table 12-7	from Table 12-7	Equation 12-16	from Table 12-7	
				$n_j * N_j * (AADT/15,000)^t$		
Major commercial	0	0.158	1.000	0.000	--	
Minor commercial	1	0.050	1.000	0.032		
Major industrial/institutional	0	0.172	1.000	0.000		
Minor industrial/institutional	0	0.023	1.000	0.000		
Major residential	0	0.083	1.000	0.000		
Minor residential	0	0.016	1.000	0.000		
Other	0	0.025	1.000	0.000		
Total	--	--	--	0.032		0.81

Existing Conditions: Multiple-Vehicle Crash Summary by Driveway Type for Urban And Suburban Roadway Segment

(1) Crash Severity Level	(2) Initial N_{brdwy}	(3) Proportion of total crashes (f_{dwy})	(4) Adjusted N_{brdwy}	(5) Combined CMFs	(6) Calibration factor, C_r	(7) Predicted N_{brdwy}
	(5) _{TOTAL} from Worksheet 1G	from Table 12-7	(2) _{TOTAL} * (3)	(6) from Worksheet 1B		(4)*(5)*(6)
Total	0.032	1.000	0.032	3.15	0.20	0.020
Fatal and injury (FI)	--	0.042	0.001	3.15	0.22	0.001
Property damage only (PDO)	--	0.146	0.005	3.15	0.19	0.003

Existing Conditions: Vehicle-Pedestrian Crash Summary for Urban And Suburban Roadway Segment

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{prmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{pedr}	Calibration factor, C_r	Predicted N_{pedr}
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-8		(5)*(6)*(7)
Total	0.328	0.420	0.020	0.768	0.0051	6.07	0.024
Fatal and injury (FI)	--	--	--	--	--	6.07	0.024

Existing Conditions: Vehicle-Bicycle Crash Summary for Urban And Suburban Roadway Segment

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{prmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{biker}	Calibration factor, C_r	Predicted N_{biker}
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-9		(5)*(6)*(7)
Total	0.328	0.420	0.020	0.768	0.0033	2.56	0.006
Fatal and injury (FI)	--	--	--	--	--	2.56	0.006

LONG-TERM BUILD OPTION 1:
INTERSECTION REALIGNMENT



CMF / CRF Details

CMF ID: 201

CMF Name: Convert four-leg intersection into two three-leg intersections

Description:

Prior Condition: No Prior Condition(s)

Category: Intersection geometry

Study ID: [Handbook of Road Safety Measures, Elvik, R. and Vaa, T. 2004](#)

Star Quality Rating	
Star Quality Rating:	3 Stars

Crash Modification Factor (CMF)	
Value:	0.75
Adjusted Standard Error:	0.08
Unadjusted Standard Error:	0.05

Crash Reduction Factor	
Value:	25
Adjusted Standard Error:	8
Unadjusted Standard Error:	5

Applicability	
Crash Type:	All
Crash Severity:	A (serious injury),B (minor injury),C (possible injury)
Roadway Types:	Not Specified
Minimum Number of Lanes:	
Maximum Number of Lanes:	
Number of Lanes Direction:	
Number of Lanes Comment:	
Road Division Type:	
Minimum Speed Limit:	
Maximum Speed Limit:	
Speed Unit:	
Speed Limit Comment:	
Area Type:	Urban
Traffic Volume:	
Average Traffic Volume:	
Time of Day:	
<i>If countermeasure is intersection-based.</i>	
Intersection Type:	Roadway/roadway (not interchange related)
Intersection Geometry:	4-leg
Traffic Control:	Not Specified
Major Road Traffic Volume:	
Minor Road Traffic Volume:	Minimum of 15% of total entering to Maximum of 30% of total entering Unit Unknown

Average Major Road Volume:	
Average Minor Road Volume:	

Development Details	
Date Range of Data Used:	
Municipality:	
State:	
Country:	
Type of Methodology Used:	Meta-analysis

Other Details	
Included in HSM:	Yes. HSM lists this CMF in font to indicate that it has the highest
Date Added to Clearinghouse:	Dec 01, 2009
Comments:	Countermeasure name changed to match HSM

This site is funded by the U.S. Department of Transportation Federal Highway Administration and maintained by the University of North Carolina Highway Safety Research Center

The information contained in the Crash Modification Factors (CMF) Clearinghouse is disseminated under the sponsorship of the U.S. Department of Transportation in the interest of information exchange. The U.S. Government assumes no liability for the use of the information contained in the CMF Clearinghouse. The information contained in the CMF Clearinghouse does not constitute a standard, specification, or regulation, nor is it a substitute for sound engineering judgment.

Project Information

General Information

Project Name	Mt. Vernon - N. Sandusky / Upper Fredericktown Safety Study	Contact Email	jmbennett@gpdgroup.com
Project Description	Build Option 1: Intersection Realignment	Contact Phone	216-927-8654
Reference Number		Date Performed	4/13/2026
Analyst	Judith Bennett	Analysis Year	2022-2024
Agency/Company	GPD Group		
Perform Benefit Cost Analysis?	Yes		

Do the proposed improvements fundamentally change the conditions of the base safety performance function (SPF),
Or is crash data unavailable for the analysis condition,
Or is only predicted (and not expected) analysis needed for the existing or proposed condition?

Yes

(Examples: unsignalized to signalized, undivided to divided, increase or decrease in the number of lanes, change the number of approaches to an intersection, significant realignment of the roadway)

If Yes, are you analyzing the existing or proposed conditions?

Proposed

Project Elements Description Table									
Location Information									
Project Element ID (Must be Unique)	Site Type	Intersection Control Type	NLFID	Begin Logpoint/ Intersection Midpoint	End Logpoint (Leave blank for Intersection)	Length (mi) OR Intersection Radius Buffer (mi)	Cross Route NLFID(s)	Common Name	
SR13; 12.177-12.284	Urban & Suburban Arterial Segment		SKNOSR00013**C	12.177	12.284	0.107		Upper Fred to Reverse Curve	
SR13; 12.145	Urban & Suburban Arterial Intersection	Unsignalized	SKNOSR00013**C	12.145		0.05	TKNOTR0044	Crestview Ave Intersection	
SR13; 12.177	Urban & Suburban Arterial Intersection	Unsignalized	SKNOSR00013**C	12.177		0.05	CKNOCR0000	Upper Fredericktown Rd Intersection	

Traffic Volume Growth Rate Calculation For Benefit Cost Analysis

	Year	AADT	
Present ADT (PADT)	2025	9,621	veh / day
Future ADT (FADT)	2050	11,425	veh / day
Annual Linear Growth Rate		0.0075	

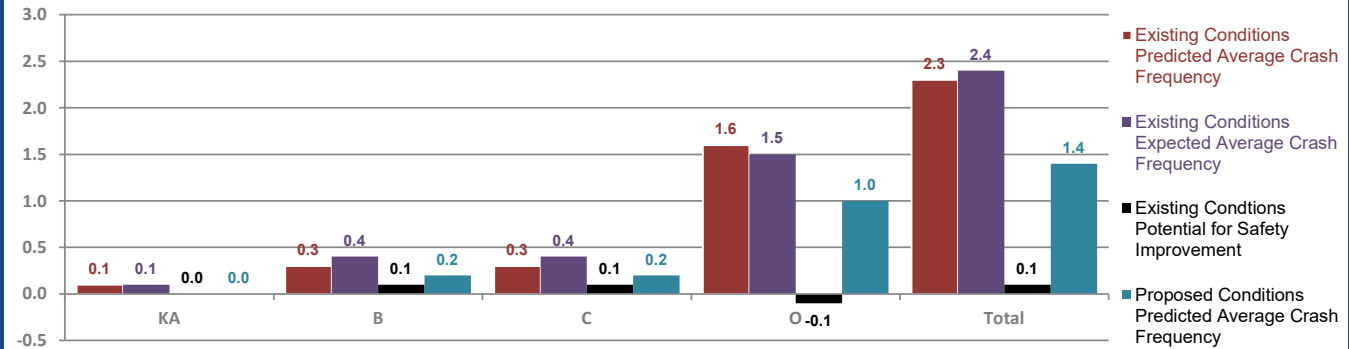
Project Elements Description Table								
			Location Information					
Project Element ID (Must be Unique)	Site Type	Intersection Control Type	NLFID	Begin Logpoint/ Intersection Midpoint	End Logpoint (Leave blank for Intersection)	Length (mi) OR Intersection Radius Buffer (mi)	Cross Route NLFID(s)	Common Name

Select Other Non-Site Characteristic Based Countermeasures For Entire Project						
CMF Nbr	Countermeasure	CMF KA Value	CMF B Value	CMF C Value	CMF O Value	CMF Valid for the Following Site Types
CMF 1	CMF ID 201: Convert 4-leg intersection to two 3-leg intersections	0.75	0.75	0.75	0	7
CMF 2						
CMF 3						
CMF 4						
CMF 5						
CMF 6						
CMF 7						
CMF 8						
CMF 9						
CMF 10						

General Information

Project Name	Mt. Vernon - N. Sandusky / Upper	Contact Email	jmbennett@gpdgroup.com
Project Description	Build Option 1: Intersection Realignment	Contact Phone	216-927-8654
Reference Number		Date Performed	4/13/2026
Analyst	Judith Bennett	Analysis Year	2022-2024
Agency/Company	GPD Group		

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	0.0940	0.2819	0.3373	1.6005	2.3137
N_{expected} - Existing Conditions	0.1164	0.3600	0.4433	1.4886	2.4083
N_{potential for improvement} - Existing Conditions	0.0224	0.0781	0.1060	-0.1119	0.0946
N_{predicted} - Proposed Conditions	0.0460	0.1560	0.1991	1.0359	1.4370

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

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
SR13: 12.145-12.284	Upper Fred to Reverse Curve	0.0295	0.0727	0.086	0.4107	0.5989
SR13: 12.099	Buena Vista Ave Intersection	0.0085	0.0356	0.0482	0.1177	0.21
SR13: 12.145	Upper Fredericktown Rd Intersection	0.056	0.1736	0.2031	1.0721	1.5048

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

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
SR13: 12.145-12.284	Upper Fred to Reverse Curve	0.0327	0.0842	0.1056	0.3701	0.5926
SR13: 12.099	Buena Vista Ave Intersection	0.011	0.0473	0.065	0.1341	0.2574
SR13: 12.145	Upper Fredericktown Rd Intersection	0.0727	0.2285	0.2727	0.9844	1.5583

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

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
SR13: 12.145-12.284	Upper Fred to Reverse Curve	0.0032	0.0115	0.0196	-0.0406	-0.0063
SR13: 12.099	Buena Vista Ave Intersection	0.0025	0.0117	0.0168	0.0164	0.0474
SR13: 12.145	Upper Fredericktown Rd Intersection	0.0167	0.0549	0.0696	-0.0877	0.0535



Project Safety Performance Report

General Information

Project Name	Mt. Vernon - N. Sandusky / Upper	Contact Email	jmbennett@gpdgroup.com
Project Description	Build Option 1: Intersection Realignment	Contact Phone	216-927-8654
Reference Number		Date Performed	4/13/2026
Analyst	Judith Bennett	Analysis Year	2022-2024
Agency/Company	GPD Group		

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

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
SR13: 12.177-12.284	Upper Fred to Reverse Curve	0.0185	0.0455	0.0538	0.257	0.3748
SR13: 12.145	Crestview Ave Intersection	0.0083	0.0346	0.0464	0.1763	0.2656
SR13: 12.177	Upper Fredericktown Rd Intersection	0.0192	0.0759	0.0989	0.6026	0.7966

Summary by Crash Type

Crash Type	Existing			Proposed
	Predicted Crash Frequency	Expected Crash Frequency	PSI	Predicted Crash Frequency
Unknown	0.0041	0.0039	-0.0002	0.0026
Head On	0.0311	0.0363	0.0052	0.0263
Rear End	0.7075	0.7430	0.0355	0.5475
Backing	0.0895	0.0844	-0.0051	0.0484
Sideswipe - Meeting	0.0225	0.0245	0.0019	0.0148
Sideswipe - Passing	0.2370	0.2363	-0.0007	0.1710
Angle	0.5474	0.6034	0.0561	0.2366
Parked Vehicle	0.1077	0.1042	-0.0035	0.0737
Pedestrian	0.0488	0.0482	-0.0006	0.0281
Animal	0.1904	0.1862	-0.0043	0.1190
Train	0.0001	0.0001	0.0000	0.0002
Pedalcycles	0.0208	0.0207	-0.0001	0.0117
Other Non-Vehicle	0.0000	0.0000	0.0000	0.0000
Fixed Object	0.2643	0.2557	-0.0086	0.2068
Other Object	0.0112	0.0108	-0.0003	0.0077
Overtuning	0.0080	0.0077	-0.0002	0.0057
Other Non-Collision	0.0177	0.0171	-0.0006	0.0138
Left Turn	0.1231	0.1368	0.0137	0.0870
Right Turn	0.0727	0.0749	0.0021	0.0495

Proposed Conditions: General Information and Data for Urban And Suburban Arterial Intersection

General Information				Location Information			
Analyst	Judith Bennett			Route	SR13		
Agency or Company	GPD Group			Logpoint	12.145		
Date Performed	04/13/26			Common Name	Crestview Ave Intersection		
Intersection	SR13; 12.145			Analysis Year	2022-2024		
Signalized/Unsignalized	Unsignalized						
Input Data				Proposed Conditions		HSM Base Conditions	
Intersection type (3ST, 3SG, 4ST, 4SG, 3STT, 3aST, 4aST, 3ST (HS), 3SG (HS), 4ST (HS), 4SG (HS), 5SG)				3ST		--	
AADT major (veh/day) (total entering on major approaches)		AADT _{MAX} =	45,700 (veh/day)	9,621		--	
AADT minor (veh/day) (total entering on minor approaches)		AADT _{MAX} =	9,300 (veh/day)	195		--	
		AADT _{MAX} =	N/A (veh/day)			--	
Intersection lighting (present/not present)				Present		Not Present	
Calibration factor, C _i				Varies, See Below		1.00	
<u>Data for unsignalized intersections only:</u>							
Number of major-road approaches with left-turn lanes				0		0	
Number of major-road approaches with right-turn lanes				0		0	
						--	
						--	
<u>Data for signalized intersections only:</u>							
Number of approaches with left-turn lanes						0	
Number of approaches with right-turn lanes						0	
Number of approaches with left-turn signal phasing						--	
Type of left-turn signal phasing for Leg #1						Permissive	
Type of left-turn signal phasing for Leg #2						--	
Type of left-turn signal phasing for Leg #3						--	
Not Applicable						--	
Number of approaches with right-turn-on-red prohibited						0	
Intersection red light cameras (present/not present)						Not Present	
Sum of all pedestrian crossing volumes (PedVol)						--	
Maximum number of lanes crossed by a pedestrian (n _{lanesx})						--	
Number of bus stops within 300 m (1,000 ft) of the intersection						0	
Schools within 300 m (1,000 ft) of the intersection (present/not present)						Not Present	
Number of alcohol sales establishments within 300 m (1,000 ft) of the intersection						0	
Locality:				Local System			

Proposed Conditions: Crash Modification Factors (CMFs) for Urban And Suburban Arterial Intersection

(1)	(2)	(3)	(4)	(5)	(6)	(7)
CMF for Left-Turn Lanes	CMF for Left-Turn Signal Phasing	CMF for Right-Turn Lanes	CMF for Right Turn on Red	CMF for Lighting	CMF for Red Light Cameras	Combined CMF
CMF 1 _i	CMF 2 _i	CMF 3 _i	CMF 4 _i	CMF 5 _i	CMF 6 _i	CMF _{COMB}
from Table 12-24	from Table 12-25	from Table 12-26	from Equation 12-35	from Equation 12-36	from Equation 12-37	(1)*(2)*(3)*(4)*(5)*(6)
1.0000	1.0000	1.0000	1.0000	0.9669	1.0000	0.9669

Proposed Conditions: Multiple-Vehicle Crash Summary for Urban And Suburban Arterial Intersection													
(1)	(2)				(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(8)*(9)*(10)
Crash Severity Level	SPF Coefficients				Over-dispersion Parameter, k	Initial N_{bimv} from Equation 12-21	Curve CMF (3STT only)	Initial N_{bimv} Adj for Curve	Proportion of Total Crashes	Adjusted N_{bimv} (4) _{TOTAL} *(5)	Combined CMFs (7) from Worksheet 2B	Calibration Factor, C_i	Predicted N_{bimv}
	a	b	c	d									
Total	-13.36	1.11	0.41	--	0.80	0.36	1.00	0.36	1.000	0.36	0.97	0.76	0.27
Fatal and Injury (FI)	-14.01	1.16	0.30	--	0.69	0.17	1.00	0.17	$(4)_{FI} / ((4)_{FI} + (4)_{PDO})$ 0.474	0.17	0.97	0.62	0.10
Property Damage Only (PDO)	-15.38	1.20	0.51	--	0.77	0.19	1.00	0.19	$(5)_{TOTAL} - (5)_{FI}$ 0.526	0.19	0.97	0.82	0.15

Proposed Conditions: Single-Vehicle Crash Summary for Urban And Suburban Arterial Intersection												
(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(8)*(9)*(10)
Crash Severity Level	SPF Coefficients			Over-dispersion Parameter, k	Initial N_{bisv} from Eqn. 12-24; (FI) from Eqn. 12-24 or 12-27	Curve CMF (3STT only)	Initial N_{bisv} Adj for Curve	Proportion of Total Crashes	Adjusted N_{bisv} (4) _{TOTAL} *(5)	Combined CMFs (7) from Worksheet 2B	Calibration Factor, C_i	Predicted N_{bisv}
	a	b	c									
Total	-6.81	0.16	0.51	1.14	0.070	1.00	0.07	1.000	0.070	0.97	0.54	0.04
Fatal and Injury (FI)	--	--	--	--	0.022	1.00	0.02	$(4)_{FI} / ((4)_{FI} + (4)_{PDO})$ 0.341	0.024	0.97	0.47	0.01
Property Damage Only (PDO)	-8.36	0.25	0.55	1.29	0.042	1.00	0.04	$(5)_{TOTAL} - (5)_{FI}$ 0.659	0.046	0.97	0.57	0.03

Proposed Conditions: Vehicle-Pedestrian Crash Summary at Urban And Suburban Arterial Intersections (3ST, 3ST (HS), 3aST, 3STT, 3SG (HS), 4ST, 4ST (HS), 4aST, 4SG (HS), and 5SG)						
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	Predicted N_{bimv}	Predicted N_{bisv}	Predicted N_{bi}	f_{pedi}	Calibration factor, C_i	Predicted N_{pedi}
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16		(4)*(5)*(6)
Total	0.266	0.037	0.302	0.010	1.11	0.003
Fatal and injury (FI)	--	--	--	--	1.11	0.003

Proposed Conditions: CMFs for Vehicle-Pedestrian Crash Summary for Urban And Suburban Arterial Signalized Intersections (3SG and 4SG)			
(1)	(2)	(3)	(4)
CMF for Bus Stops CMF_{fp} from Table 12-28	CMF for Schools CMF_{zp} from Table 12-29	CMF for Alcohol Sales Establishments CMF_{sp} from Table 12-30	Combined CMF (1)*(2)*(3)
--	--	--	--

Proposed Conditions: Vehicle-Pedestrian Crash Summary at Urban And Suburban Arterial Signalized Intersections (3SG and 4SG)										
(1)	(2)					(3)	(4)	(5)	(6)	(7)
Crash Severity Level	SPF Coefficients from Table 12-14					Overdispersion Parameter, k	$N_{pedbase}$ from Equation 12-29	Combined CMF (4) from Worksheet 2H	Calibration factor, C_i	Predicted N_{pedi} (4)*(5)*(6)
	a	b	c	d	e					
Total	--	--	--	--	--	--	--	--	--	0.00
Fatal and Injury (FI)	--	--	--	--	--	--	--	--	--	0.00

Proposed Conditions: Vehicle-Bicycle Crash Summary for Urban And Suburban Arterial Intersection						
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	Predicted N_{bimv}	Predicted N_{bisv}	Predicted N_{bi}	f_{bikei}	Calibration factor, C_i	Predicted N_{bikei}
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17		(4)*(5)*(6)
Total	0.266	0.037	0.302	0.0057	1.16	0.002
Fatal and injury (FI)	--	--	--	--	1.16	0.002

Proposed Conditions: Predicted Number of Crashes by Severity Level and Collision Type					
Collision Type	N _{predicted} (KABCO) (crashes/mi/year)	N _{predicted} (KA) (crashes/mi/year)	N _{predicted} (B) (crashes/mi/year)	N _{predicted} (C) (crashes/mi/year)	N _{predicted} (O) (crashes/mi/year)
Total	0.2954	0.0111	0.0461	0.0619	0.1763

Proposed Conditions: Select Other CMFs that Apply to the Project			
CMF Nbr	Countermeasure	Validity	Apply
CMF 1	CMF ID 201: Convert 4-leg intersection to two 3-leg intersections	User to Validate	X

Indicate that a Part D CMF should be apply to the project element by placing an "X" in the Apply column. The "X" indicates that the research behind the Part D countermeasure is similar to the proposed conditions, and therefore, applicable.

The analysis prohibits the use of more than four (4) CMFs for a single project element. The first four (4) CMFs indicated for will be used.

The true safety benefits of combining multiple CMFs is unclear. For further information, click here.

Proposed Conditions: General Information and Data for Urban And Suburban Arterial Intersection

General Information				Location Information			
Analyst	Judith Bennett			Route	SR13		
Agency or Company	GPD Group			Logpoint	12.177		
Date Performed	04/13/26			Common Name	Upper Fredericktown Rd Intersection		
Intersection	SR13; 12.177			Analysis Year	2022-2024		
Signalized/Unsignalized	Unsignalized						
Input Data				Proposed Conditions		HSM Base Conditions	
Intersection type (3ST, 3SG, 4ST, 4SG, 3STT, 3aST, 4aST, 3ST (HS), 3SG (HS), 4ST (HS), 4SG (HS), 5SG)				3ST		--	
AADT major (veh/day) (total entering on major approaches)		AADT _{MAX} =	45,700 (veh/day)	9,624		--	
AADT minor (veh/day) (total entering on minor approaches)		AADT _{MAX} =	9,300 (veh/day)	2,272		--	
		AADT _{MAX} =	N/A (veh/day)			--	
Intersection lighting (present/not present)				Present		Not Present	
Calibration factor, C _i				Varies, See Below		1.00	
<u>Data for unsignalized intersections only:</u>							
Number of major-road approaches with left-turn lanes				0		0	
Number of major-road approaches with right-turn lanes				0		0	
						--	
						--	
<u>Data for signalized intersections only:</u>							
Number of approaches with left-turn lanes						0	
Number of approaches with right-turn lanes						0	
Number of approaches with left-turn signal phasing						--	
Type of left-turn signal phasing for Leg #1						Permissive	
Type of left-turn signal phasing for Leg #2						--	
Type of left-turn signal phasing for Leg #3						--	
Not Applicable						--	
Number of approaches with right-turn-on-red prohibited						0	
Intersection red light cameras (present/not present)						Not Present	
Sum of all pedestrian crossing volumes (PedVol)						--	
Maximum number of lanes crossed by a pedestrian (n _{lanesx})						--	
Number of bus stops within 300 m (1,000 ft) of the intersection						0	
Schools within 300 m (1,000 ft) of the intersection (present/not present)						Not Present	
Number of alcohol sales establishments within 300 m (1,000 ft) of the intersection						0	
Locality:				Local System			

Proposed Conditions: Crash Modification Factors (CMFs) for Urban And Suburban Arterial Intersection

(1)	(2)	(3)	(4)	(5)	(6)	(7)
CMF for Left-Turn Lanes	CMF for Left-Turn Signal Phasing	CMF for Right-Turn Lanes	CMF for Right Turn on Red	CMF for Lighting	CMF for Red Light Cameras	Combined CMF
CMF _{1i}	CMF _{2i}	CMF _{3i}	CMF _{4i}	CMF _{5i}	CMF _{6i}	CMF _{COMB}
from Table 12-24	from Table 12-25	from Table 12-26	from Equation 12-35	from Equation 12-36	from Equation 12-37	(1)*(2)*(3)*(4)*(5)*(6)
1.0000	1.0000	1.0000	1.0000	0.9669	1.0000	0.9669

Proposed Conditions: Multiple-Vehicle Crash Summary for Urban And Suburban Arterial Intersection													
(1)	(2)				(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(8)*(9)*(10)
Crash Severity Level	SPF Coefficients				Over-dispersion Parameter, k	Initial N_{bimv} from Equation 12-21	Curve CMF (3STT only)	Initial N_{bimv} Adj for Curve	Proportion of Total Crashes	Adjusted N_{bimv} (4) _{TOTAL} *(5)	Combined CMFs (7) from Worksheet 2B	Calibration Factor, C_i	Predicted N_{bimv}
	a	b	c	d									
Total	-13.36	1.11	0.41	--	0.80	0.99	1.00	0.99	1.000	0.99	0.97	0.76	0.73
Fatal and Injury (FI)	-14.01	1.16	0.30	--	0.69	0.35	1.00	0.35	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.350	0.35	0.97	0.62	0.21
Property Damage Only (PDO)	-15.38	1.20	0.51	--	0.77	0.65	1.00	0.65	$(5)_{TOTAL}*(5)_{FI}$ 0.650	0.64	0.97	0.82	0.51

Proposed Conditions: Single-Vehicle Crash Summary for Urban And Suburban Arterial Intersection												
(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(8)*(9)*(10)
Crash Severity Level	SPF Coefficients			Over-dispersion Parameter, k	Initial N_{bisv} from Eqn. 12-24; (FI) from Eqn. 12-24 or 12-27	Curve CMF (3STT only)	Initial N_{bisv} Adj for Curve	Proportion of Total Crashes	Adjusted N_{bisv} (4) _{TOTAL} *(5)	Combined CMFs (7) from Worksheet 2B	Calibration Factor, C_i	Predicted N_{bisv}
	a	b	c									
Total	-6.81	0.16	0.51	1.14	0.246	1.00	0.25	1.000	0.246	0.97	0.54	0.13
Fatal and Injury (FI)	--	--	--	--	0.076	1.00	0.08	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.320	0.079	0.97	0.47	0.04
Property Damage Only (PDO)	-8.36	0.25	0.55	1.29	0.163	1.00	0.16	$(5)_{TOTAL}*(5)_{FI}$ 0.680	0.168	0.97	0.57	0.09

Proposed Conditions: Vehicle-Pedestrian Crash Summary at Urban And Suburban Arterial Intersections (3ST, 3ST (HS), 3aST, 3STT, 3SG (HS), 4ST, 4ST (HS), 4aST, 4SG (HS), and 5SG)						
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	Predicted N_{bimv}	Predicted N_{bisv}	Predicted N_{bi}	f_{pedi}	Calibration factor, C_i	Predicted N_{pedi}
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16		(4)*(5)*(6)
Total	0.727	0.129	0.856	0.010	1.11	0.010
Fatal and injury (FI)	--	--	--	--	1.11	0.010

Proposed Conditions: CMFs for Vehicle-Pedestrian Crash Summary for Urban And Suburban Arterial Signalized Intersections (3SG and 4SG)			
(1)	(2)	(3)	(4)
CMF for Bus Stops CMF_{fp}	CMF for Schools CMF_{sp}	CMF for Alcohol Sales Establishments CMF_{sp}	Combined CMF
from Table 12-28	from Table 12-29	from Table 12-30	
--	--	--	(1)*(2)*(3) --

Proposed Conditions: Vehicle-Pedestrian Crash Summary at Urban And Suburban Arterial Signalized Intersections (3SG and 4SG)										
(1)	(2)					(3)	(4)	(5)	(6)	(7)
Crash Severity Level	SPF Coefficients from Table 12-14					Overdispersion Parameter, k	$N_{pedbase}$ from Equation 12-29	Combined CMF (4) from Worksheet 2H	Calibration factor, C_i	Predicted N_{pedi} (4)*(5)*(6)
	a	b	c	d	e					
Total	--	--	--	--	--	--	--	--	--	0.00
Fatal and Injury (FI)	--	--	--	--	--	--	--	--	--	0.00

Proposed Conditions: Vehicle-Bicycle Crash Summary for Urban And Suburban Arterial Intersection						
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	Predicted N_{bimv}	Predicted N_{bisv}	Predicted N_{bi}	f_{bikei}	Calibration factor, C_i	Predicted N_{bikei}
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17		(4)*(5)*(6)
Total	0.727	0.129	0.856	0.0057	1.16	0.006
Fatal and injury (FI)	--	--	--	--	1.16	0.006

Proposed Conditions: General Information and Data for Urban And Suburban Roadway Segment

General Information					Location Information			
Analyst	Judith Bennett				Route	SR13		
Agency or Company	GPD Group				Logpoints	12.177 to 12.284		
Date Performed	04/13/26				Common Name	Upper Fred to Reverse Curve		
Segment for Analysis	SR13; 12.177-12.284				Analysis Year	2022-2024		
Input Data					Proposed Conditions			HSM Base Conditions
Roadway type (2U, 3T, 4U, 4D, 5T)					2U			--
Length of segment, L (mi)					0.107			--
AADT (veh/day)	is within range	AADT _{MAX} =	32,600	(veh/day)	9,621			--
Type of on-street parking (none/parallel/angle)					None			None
Proportion of curb length with on-street parking								--
Median width (ft) - for divided only								15
Lighting (present / not present)					Present			Not Present
Auto speed enforcement (present / not present)					Not Present			Not Present
Major commercial driveways (number)					0			--
Minor commercial driveways (number)					1			--
Major industrial / institutional driveways (number)					0			--
Minor industrial / institutional driveways (number)					0			--
Major residential driveways (number)					0			--
Minor residential driveways (number)					0			--
Other driveways (number)					0			--
Speed Category					Posted Speed Greater than 30 mph			--
Roadside fixed object density (fixed objects / mi)					175			0
Offset to roadside fixed objects (ft) [If greater than 30 or Not Present, input 30]					6			30
Calibration Factor, Cr					Varies, See Below			1.00
Locality:					Local System			

Proposed Conditions: Crash Modification Factors (CMFs) for Urban And Suburban Roadway Segment

(1)	(2)	(3)	(4)	(5)	(6)
CMF for On-Street Parking	CMF for Roadside Fixed Objects	CMF for Median Width	CMF for Lighting	CMF for Automated Speed Enforcement	Combined CMF
<i>CMF 1r</i>	<i>CMF 2r</i>	<i>CMF 3r</i>	<i>CMF 4r</i>	<i>CMF 5r</i>	<i>CMF comb</i>
from Equation 12-32	from Equation 12-33	from Table 12-22	from Equation 12-34	from Section 12.7.1	(1)*(2)*(3)*(4)*(5)
1.00	2.93	1.00	0.87	1.00	2.56

Proposed Conditions: Multiple-Vehicle Nondriveway Crash Summary for Urban And Suburban Roadway Segment

(1) Crash Severity Level	(2) SPF Coefficients		(3) Overdispersion Parameter, k	(4) Initial N_{brmv}	(5) Proportion of Total Crashes	(6) Adjusted N_{brmv}	(7) Combined CMFs	(8) Calibration Factor, Cr	(9) Predicted N_{brmv}
	from Table 12-3		from Table 12-3	from Equation 12-10		(4) _{TOTAL} *(5)	(6) from Worksheet 1B	(8)	(9) (6)*(7)*(8)
	a	b							
Total	-15.22	1.68	0.84	0.129	1.000	0.129	2.56	0.62	0.205
Fatal and Injury (FI)	-16.22	1.66	0.65	0.040	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.294	0.038	2.56	0.69	0.067
Property Damage Only (PDO)	-15.62	1.69	0.87	0.095	$(5)_{TOTAL}-(5)_{FI}$ 0.706	0.091	2.56	0.60	0.140

Proposed Conditions: Single-Vehicle Crash Summary for Urban And Suburban Roadway Segment

(1) Crash Severity Level	(2) SPF Coefficients		(3) Overdispersion Parameter, k	(4) Initial N_{brsv}	(5) Proportion of Total Crashes	(6) Adjusted N_{brsv}	(7) Combined CMFs	(8) Calibration Factor, Cr	(9) Predicted N_{brsv}
	from Table 12-5		from Table 12-5	from Equation 12-13		(4) _{TOTAL} *(5)	(6) from Worksheet 1B	(8)	(9) (6)*(7)*(8)
	a	b							
Total	-5.47	0.56	0.81	0.077	1.000	0.077	2.56	1.34	0.262
Fatal and Injury (FI)	-3.96	0.23	0.50	0.017	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.230	0.018	2.56	0.79	0.036
Property Damage Only (PDO)	-6.51	0.64	0.87	0.056	$(5)_{TOTAL}-(5)_{FI}$ 0.770	0.059	2.56	1.52	0.229

Multiple-Vehicle Driveway-Related Collisions By Driveway Type for Urban And Suburban Roadway Segment

(1) Driveway Type	(2) Number of driveways, n_j	(3) Crashes per driveway per year, N_j	(4) Coefficient for traffic adjustment, t	(5) Initial N_{brdwy}	(6) Overdispersion parameter, k	
		from Table 12-7	from Table 12-7	Equation 12-16	from Table 12-7	
				$n_j * N_j * (AADT/15,000)^t$		
Major commercial	0	0.158	1.000	0.000	--	
Minor commercial	1	0.050	1.000	0.032		
Major industrial/institutional	0	0.172	1.000	0.000		
Minor industrial/institutional	0	0.023	1.000	0.000		
Major residential	0	0.083	1.000	0.000		
Minor residential	0	0.016	1.000	0.000		
Other	0	0.025	1.000	0.000		
Total	--	--	--	0.032		0.81

Proposed Conditions: Multiple-Vehicle Crash Summary by Driveway Type for Urban And Suburban Roadway Segment

(1) Crash Severity Level	(2) Initial N_{brdwy}	(3) Proportion of total crashes (f_{dwy})	(4) Adjusted N_{brdwy}	(5) Combined CMFs	(6) Calibration factor, C_r	(7) Predicted N_{brdwy}
	(5) _{TOTAL} from Worksheet 1G	from Table 12-7	(2) _{TOTAL} * (3)	(6) from Worksheet 1B		(4)*(5)*(6)
Total	0.032	1.000	0.032	2.56	0.20	0.016
Fatal and injury (FI)	--	0.042	0.001	2.56	0.22	0.001
Property damage only (PDO)	--	0.146	0.005	2.56	0.19	0.002

Proposed Conditions: Vehicle-Pedestrian Crash Summary for Urban And Suburban Roadway Segment

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{pedr}	Calibration factor, C_r	Predicted N_{pedr}
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-8		(5)*(6)*(7)
Total	0.205	0.262	0.016	0.484	0.0051	6.07	0.015
Fatal and injury (FI)	--	--	--	--	--	6.07	0.015

Proposed Conditions: Vehicle-Bicycle Crash Summary for Urban And Suburban Roadway Segment

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{biker}	Calibration factor, C_r	Predicted N_{biker}
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-9		(5)*(6)*(7)
Total	0.205	0.262	0.016	0.484	0.0033	2.56	0.004
Fatal and injury (FI)	--	--	--	--	--	2.56	0.004

Safety Benefit - Cost Analysis

General Information

Project Name	Mt. Vernon - N. Sandusky / Upper Fredericktown Safety Study	Contact Email	jmbennett@gpdgroup.com
Project Description	Build Option 1: Intersection Realignment	Contact Phone	216-927-8654
Reference Number		Date Performed	4/13/2026
Analyst	Judith Bennett	Analysis Year	2022-2024
Agency/Company	GPD Group		

Select Site Types to be used in Benefit-Cost Analysis:

All Sites

Comments:

Costs below include anticipated construction, right of way, design, and contingency. Inflation and construction inspection are not included.

Countermeasure Service Lives, Costs, and Safety Benefits

Countermeasures	Service Life (Years)	Initial Cost of Countermeasure	Annual Maintenance & Energy Costs	Salvage Value	Net Present Cost of Countermeasure	Total Cost of Countermeasures	Summary of Annual Crash Modifications	Net Present Value of Safety Benefits
Site Characteristic Improvements (Please add description about improvements i.e. Lighting)					\$0.00	\$0.00	-0.782	\$442,663
Site Characteristic Improvements (Please add description about improvements i.e. Lighting)					\$0.00	\$0.00		
Site Characteristic Improvements (Please add description about improvements i.e. Signal Phasing)					\$0.00	\$0.00		
Site Characteristic Improvements (Please add description about improvements i.e. Added Right Turn Lane)					\$0.00	\$0.00		
CMF 1 - CMF ID 201: Convert 4-leg intersection to two 3-leg intersections	20	\$1,070,516.00			\$1,070,516.00	\$1,070,516.00	-0.095	\$141,845
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
Totals		\$1,070,516.00	\$0.00	\$0.00	\$1,070,516.00	\$1,070,516.00	-0.877	\$584,509

Safety Benefit - Cost Analysis

General Information

Project Name	Mt. Vernon - N. Sandusky / Upper Fredericktown Safety Study	Contact Email	jmbennett@gpdgroup.com
Project Description	Build Option 1: Intersection Realignment	Contact Phone	216-927-8654
Reference Number		Date Performed	4/13/2026
Analyst	Judith Bennett	Analysis Year	2022-2024
Agency/Company	GPD Group		

Benefit - Cost Calculator

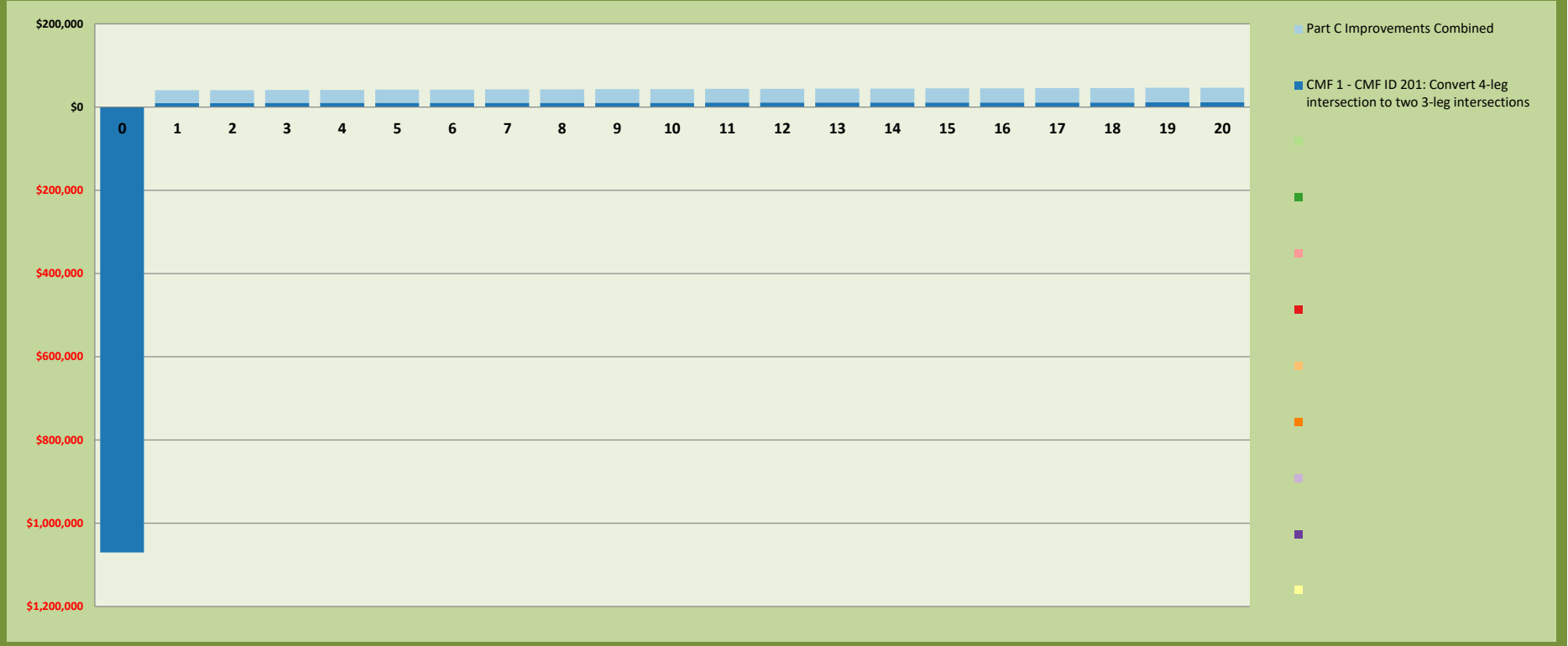
Net Present Value of Project	\$1,070,516.00
Net Present Value of Safety Benefits	\$584,508.65
Net Benefit	(\$486,007.35)
Benefit / Cost Ratio	0.55

Expected Annual Crash Adjustment

Number of Fatal & Incapacitating Injury Crashes	-0.048
Number of Injury Crashes	-0.312
Number of Total Crashes	-0.877

Comments:

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



Safety Benefit - Cost Analysis

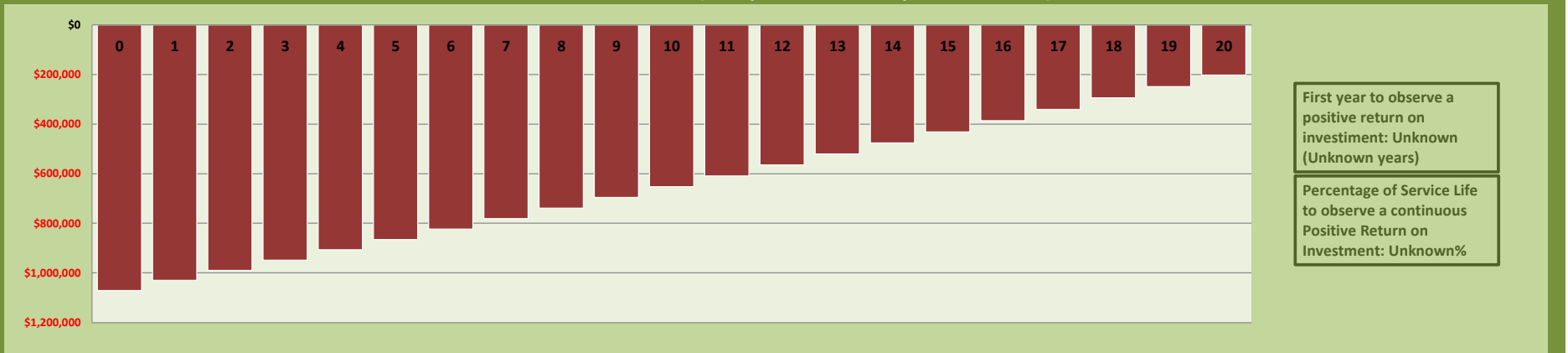
General Information

Project Name	Mt. Vernon - N. Sandusky / Upper Fredericktown Safety Study	Contact Email	jmbennett@gpdgroup.com
Project Description	Build Option 1: Intersection Realignment	Contact Phone	216-927-8654
Reference Number		Date Performed	4/13/2026
Analyst	Judith Bennett	Analysis Year	2022-2024
Agency/Company	GPD Group		

Project Costs Only Cash Flows By Countermeasure Per Year



Return on Investment (Safety Benefits and Project Investments)



LONG-TERM BUILD OPTION 2:
ROUNDBOUT

CMF / CRF Details

CMF ID: 206

CMF Name: Conversion of stop-controlled intersection into single-lane roundabout

Description:

Prior Condition: No Prior Condition(s)

Category: Intersection geometry

Study ID: [Observational Before-After Study of the Safety Effect of U.S. Roundabout Conversions Using the Empirical Bayes Method, Persaud et al. 2001](#)

Star Quality Rating	
Star Quality Rating:	4 Stars

Crash Modification Factor (CMF)	
Value:	0.28
Adjusted Standard Error:	0.11
Unadjusted Standard Error:	0.06

Crash Reduction Factor	
Value:	72
Adjusted Standard Error:	11
Unadjusted Standard Error:	6

Applicability

Crash Type:	All
Crash Severity:	All
Roadway Types:	Not specified
Minimum Number of Lanes:	
Maximum Number of Lanes:	
Number of Lanes Direction:	
Number of Lanes Comment:	
Road Division Type:	
Minimum Speed Limit:	
Maximum Speed Limit:	
Speed Unit:	
Speed Limit Comment:	
Area Type:	Urban
Traffic Volume:	
Average Traffic Volume:	
Time of Day:	
	<i>If countermeasure is intersection-based.</i>
Intersection Type:	Roadway/roadway (not interchange related)
Intersection Geometry:	Not specified
Traffic Control:	Stop-controlled
Major Road Traffic Volume:	
Minor Road Traffic Volume:	

Average Major Road Volume:	
Average Minor Road Volume:	

Development Details	
Date Range of Data Used:	
Municipality:	
State:	
Country:	
Type of Methodology Used:	Before/after using empirical Bayes or full Bayes

Other Details	
Included in HSM:	No
Date Added to Clearinghouse:	Dec 01, 2009
Comments:	

This site is funded by the U.S. Department of Transportation Federal Highway Administration and maintained by the University of North Carolina Highway Safety Research Center

The information contained in the Crash Modification Factors (CMF) Clearinghouse is disseminated under the sponsorship of the U.S. Department of Transportation in the interest of information exchange. The U.S. Government assumes no liability for the use of the information contained in the CMF Clearinghouse. The information contained in the CMF Clearinghouse does not constitute a standard, specification, or regulation, nor is it a substitute for sound engineering judgment.

Project Information

General Information

Project Name	Mt. Vernon - N. Sandusky / Upper Fredericktown Safety Study	Contact Email	jmbennett@gpdgroup.com
Project Description	Existing Conditions	Contact Phone	216-927-8654
Reference Number		Date Performed	4/13/2026
Analyst	Judith Bennett	Analysis Year	2022-2024
Agency/Company	GPD Group		
Perform Benefit Cost Analysis?	Yes		

Do the proposed improvements fundamentally change the conditions of the base safety performance function (SPF), Or is crash data unavailable for the analysis condition, Or is only predicted (and not expected) analysis needed for the existing or proposed condition?	Yes
---	------------

(Examples: unsignalized to signalized, undivided to divided, increase or decrease in the number of lanes, change the number of approaches to an intersection, significant realignment of the roadway)

If Yes, are you analyzing the existing or proposed conditions?	Proposed
---	-----------------

Project Elements Description Table									
Location Information									
Project Element ID (Must be Unique)	Site Type	Intersection Control Type	NLFID	Begin Logpoint/ Intersection Midpoint	End Logpoint (Leave blank for Intersection)	Length (mi) OR Intersection Radius Buffer (mi)	Cross Route NLFID(s)	Common Name	
SR13; 12.145-12.284	Urban & Suburban Arterial Segment		SKNOSR00013**C	12.145	12.284	0.139		Upper Fred to Reverse Curve	
SR13; 12.145	Roundabout	Unsignalized	SKNOSR00013**C	12.145		0.05	CKNOCR0000	Upper Fredericktown Rd Intersection	

Traffic Volume Growth Rate Calculation For Benefit Cost Analysis			
	Year	AADT	
Present ADT (PADT)	2025	9,621	veh / day
Future ADT (FADT)	2050	11,425	veh / day
Annual Linear Growth Rate		0.0075	

Project Elements Description Table								
			Location Information					
Project Element ID (Must be Unique)	Site Type	Intersection Control Type	NLFID	Begin Logpoint/ Intersection Midpoint	End Logpoint (Leave blank for Intersection)	Length (mi) OR Intersection Radius Buffer (mi)	Cross Route NLFID(s)	Common Name

Select Other Non-Site Characteristic Based Countermeasures For Entire Project						
CMF Nbr	Countermeasure	CMF KA Value	CMF B Value	CMF C Value	CMF O Value	CMF Valid for the Following Site Types
CMF 1	Convert stop-controlled intersection to a single-lane roundabout	0.28	0.28	0.28	0.28	7
CMF 2						
CMF 3						
CMF 4						
CMF 5						
CMF 6						
CMF 7						
CMF 8						
CMF 9						
CMF 10						

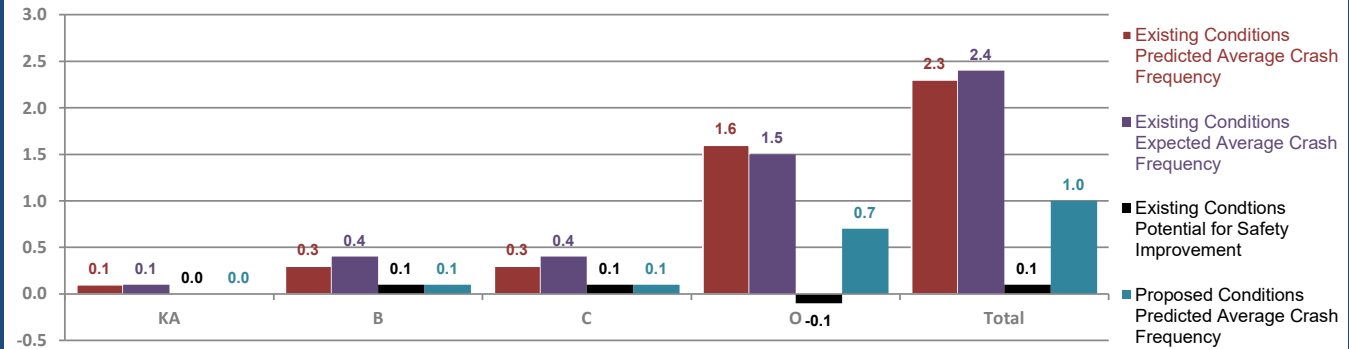


Project Safety Performance Report

General Information

Project Name	Mt. Vernon - N. Sandusky / Upper	Contact Email	jmbennett@gpdgroup.com
Project Description	Existing Conditions	Contact Phone	216-927-8654
Reference Number		Date Performed	4/13/2026
Analyst	Judith Bennett	Analysis Year	2022-2024
Agency/Company	GPD Group		

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	0.0940	0.2819	0.3373	1.6005	2.3137
N_{expected} - Existing Conditions	0.1164	0.3600	0.4433	1.4886	2.4083
N_{potential for improvement} - Existing Conditions	0.0224	0.0781	0.1060	-0.1119	0.0946
N_{predicted} - Proposed Conditions	0.0452	0.1213	0.1429	0.7109	1.0203

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

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
SR13: 12.145-12.284	Upper Fred to Reverse Curve	0.0295	0.0727	0.086	0.4107	0.5989
SR13: 12.099	Buena Vista Ave Intersection	0.0085	0.0356	0.0482	0.1177	0.21
SR13: 12.145	Upper Fredericktown Rd Intersection	0.056	0.1736	0.2031	1.0721	1.5048

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

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
SR13: 12.145-12.284	Upper Fred to Reverse Curve	0.0327	0.0842	0.1056	0.3701	0.5926
SR13: 12.099	Buena Vista Ave Intersection	0.011	0.0473	0.065	0.1341	0.2574
SR13: 12.145	Upper Fredericktown Rd Intersection	0.0727	0.2285	0.2727	0.9844	1.5583

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

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
SR13: 12.145-12.284	Upper Fred to Reverse Curve	0.0032	0.0115	0.0196	-0.0406	-0.0063
SR13: 12.099	Buena Vista Ave Intersection	0.0025	0.0117	0.0168	0.0164	0.0474
SR13: 12.145	Upper Fredericktown Rd Intersection	0.0167	0.0549	0.0696	-0.0877	0.0535



Project Safety Performance Report

General Information

Economic Crash Analysis Tool

Project Name	Mt. Vernon - N. Sandusky / Upper	Contact Email	jmbennett@gpdgroup.com
Project Description	Existing Conditions	Contact Phone	216-927-8654
Reference Number		Date Performed	4/13/2026
Analyst	Judith Bennett	Analysis Year	2022-2024
Agency/Company	GPD Group		

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

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
SR13: 12.145-12.284	Upper Fred to Reverse Curve	0.0295	0.0727	0.086	0.4107	0.5989
SR13: 12.145	Upper Fredericktown Rd Intersection	0.0157	0.0486	0.0569	0.3002	0.4214

Summary by Crash Type

Crash Type	Existing			Proposed
	Predicted Crash Frequency	Expected Crash Frequency	PSI	Predicted Crash Frequency
Unknown	0.0041	0.0039	-0.0002	0.0038
Head On	0.0311	0.0363	0.0052	0.0259
Rear End	0.7075	0.7430	0.0355	0.6303
Backing	0.0895	0.0844	-0.0051	0.0830
Sideswipe - Meeting	0.0225	0.0245	0.0019	0.0222
Sideswipe - Passing	0.2370	0.2363	-0.0007	0.2125
Angle	0.5474	0.6034	0.0561	0.5045
Parked Vehicle	0.1077	0.1042	-0.0035	0.1030
Pedestrian	0.0488	0.0482	-0.0006	0.0463
Animal	0.1904	0.1862	-0.0043	0.1904
Train	0.0001	0.0001	0.0000	0.0001
Pedalcycles	0.0208	0.0207	-0.0001	0.0194
Other Non-Vehicle	0.0000	0.0000	0.0000	0.0000
Fixed Object	0.2643	0.2557	-0.0086	0.2470
Other Object	0.0112	0.0108	-0.0003	0.0107
Overturning	0.0080	0.0077	-0.0002	0.0074
Other Non-Collision	0.0177	0.0171	-0.0006	0.0166
Left Turn	0.1231	0.1368	0.0137	0.1066
Right Turn	0.0727	0.0749	0.0021	0.0640

Proposed Conditions: General Information and Data for Urban And Suburban Arterial Intersection

General Information				Location Information			
Analyst	Judith Bennett			Route	SR13		
Agency or Company	GPD Group			Logpoint	12.145		
Date Performed	04/13/26			Common Name	Upper Fredericktown Rd Intersection		
Intersection	SR13; 12.145			Analysis Year	2022-2024		
Signalized/Unsignalized	Unsignalized						
Input Data				Proposed Conditions		HSM Base Conditions	
Intersection type (3ST, 3SG, 4ST, 4SG, 3STT, 3aST, 4aST, 3ST (HS), 3SG (HS), 4ST (HS), 4SG (HS), 5SG)				4ST		--	
AADT major (veh/day) (total entering on major approaches)		AADT _{MAX} =	46,800	(veh/day)	9,621	--	
AADT minor (veh/day) (total entering on minor approaches)		AADT _{MAX} =	5,900	(veh/day)	2,432	--	
		AADT _{MAX} =	N/A	(veh/day)		--	
Intersection lighting (present/not present)				Present		Not Present	
Calibration factor, C _i				Varies, See Below		1.00	
<u>Data for unsignalized intersections only:</u>							
Number of major-road approaches with left-turn lanes				0		0	
Number of major-road approaches with right-turn lanes				0		0	
						--	
						--	
<u>Data for signalized intersections only:</u>							
Number of approaches with left-turn lanes						0	
Number of approaches with right-turn lanes						0	
Number of approaches with left-turn signal phasing						--	
Type of left-turn signal phasing for Leg #1						Permissive	
Type of left-turn signal phasing for Leg #2						--	
Type of left-turn signal phasing for Leg #3						--	
Type of left-turn signal phasing for Leg #4						--	
Number of approaches with right-turn-on-red prohibited						0	
Intersection red light cameras (present/not present)						Not Present	
Sum of all pedestrian crossing volumes (PedVol)						--	
Maximum number of lanes crossed by a pedestrian (n _{lanesx})						--	
Number of bus stops within 300 m (1,000 ft) of the intersection						0	
Schools within 300 m (1,000 ft) of the intersection (present/not present)						Not Present	
Number of alcohol sales establishments within 300 m (1,000 ft) of the intersection						0	
Locality:				Local System			

Proposed Conditions: Crash Modification Factors (CMFs) for Urban And Suburban Arterial Intersection

(1)	(2)	(3)	(4)	(5)	(6)	(7)
CMF for Left-Turn Lanes	CMF for Left-Turn Signal Phasing	CMF for Right-Turn Lanes	CMF for Right Turn on Red	CMF for Lighting	CMF for Red Light Cameras	Combined CMF
CMF _{1i}	CMF _{2i}	CMF _{3i}	CMF _{4i}	CMF _{5i}	CMF _{6i}	CMF _{COMB}
from Table 12-24	from Table 12-25	from Table 12-26	from Equation 12-35	from Equation 12-36	from Equation 12-37	(1)*(2)*(3)*(4)*(5)*(6)
1.0000	1.0000	1.0000	1.0000	0.9680	1.0000	0.9680

Proposed Conditions: Multiple-Vehicle Crash Summary for Urban And Suburban Arterial Intersection													
(1)	(2)				(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(8)*(9)*(10)
Crash Severity Level	SPF Coefficients				Over-dispersion Parameter, k	Initial N_{bimv} from Equation 12-21	Curve CMF (3STT only)	Initial N_{bimv} Adj for Curve	Proportion of Total Crashes	Adjusted N_{bimv} (4) _{TOTAL} *(5)	Combined CMFs (7) from Worksheet 2B	Calibration Factor, C_i	Predicted N_{bimv}
	a	b	c	d									
Total	-8.90	0.82	0.25	--	0.40	1.77	1.00	1.77	1.000	1.77	0.97	0.76	1.30
Fatal and Injury (FI)	-11.13	0.93	0.28	--	0.48	0.66	1.00	0.66	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.370	0.65	0.97	0.56	0.35
Property Damage Only (PDO)	-8.74	0.77	0.23	--	0.40	1.12	1.00	1.12	$(5)_{TOTAL}*(5)_{FI}$ 0.630	1.11	0.97	0.89	0.96

Proposed Conditions: Single-Vehicle Crash Summary for Urban And Suburban Arterial Intersection													
(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(8)*(9)*(10)	
Crash Severity Level	SPF Coefficients			Over-dispersion Parameter, k	Initial N_{bisv} from Eqn. 12-24; (FI) from Eqn. 12-24 or 12-27	Curve CMF (3STT only)	Initial N_{bisv} Adj for Curve	Proportion of Total Crashes	Adjusted N_{bisv} (4) _{TOTAL} *(5)	Combined CMFs (7) from Worksheet 2B	Calibration Factor, C_i	Predicted N_{bisv}	
	a	b	c										
Total	-5.33	0.33	0.12	0.65	0.255	1.00	0.25	1.000	0.255	0.97	0.63	0.16	
Fatal and Injury (FI)	--	--	--	--	0.071	1.00	0.07	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.299	0.076	0.97	0.58	0.04	
Property Damage Only (PDO)	-7.04	0.36	0.25	0.54	0.167	1.00	0.17	$(5)_{TOTAL}*(5)_{FI}$ 0.701	0.179	0.97	0.65	0.11	

Proposed Conditions: Vehicle-Pedestrian Crash Summary at Urban And Suburban Arterial Intersections (3ST, 3ST (HS), 3aST, 3STT, 3SG (HS), 4ST, 4ST (HS), 4aST, 4SG (HS), and 5SG)						
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	Predicted N_{bimv}	Predicted N_{bisv}	Predicted N_{bi}	f_{pedi}	Calibration factor, C_i	Predicted N_{pedi}
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16		(4)*(5)*(6)
Total	1.301	0.155	1.456	0.012	1.28	0.023
Fatal and injury (FI)	--	--	--	--	1.28	0.023

Proposed Conditions: CMFs for Vehicle-Pedestrian Crash Summary for Urban And Suburban Arterial Signalized Intersections (3SG and 4SG)			
(1)	(2)	(3)	(4)
CMF for Bus Stops CMF_{fp} from Table 12-28	CMF for Schools CMF_{zp} from Table 12-29	CMF for Alcohol Sales Establishments CMF_{sp} from Table 12-30	Combined CMF (1)*(2)*(3)
--	--	--	--

Proposed Conditions: Vehicle-Pedestrian Crash Summary at Urban And Suburban Arterial Signalized Intersections (3SG and 4SG)										
(1)	(2)					(3)	(4)	(5)	(6)	(7)
Crash Severity Level	SPF Coefficients from Table 12-14					Overdispersion Parameter, k	$N_{pedbase}$ from Equation 12-29	Combined CMF (4) from Worksheet 2H	Calibration factor, C_i	Predicted N_{pedi} (4)*(5)*(6)
	a	b	c	d	e					
Total	--	--	--	--	--	--	--	--	--	0.00
Fatal and Injury (FI)	--	--	--	--	--	--	--	--	--	0.00

Proposed Conditions: Vehicle-Bicycle Crash Summary for Urban And Suburban Arterial Intersection						
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	Predicted N_{bimv}	Predicted N_{bisv}	Predicted N_{bi}	f_{bikei}	Calibration factor, C_i	Predicted N_{bikei}
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17		(4)*(5)*(6)
Total	1.301	0.155	1.456	0.0077	1.15	0.013
Fatal and injury (FI)	--	--	--	--	1.15	0.013

Proposed Conditions: Predicted Number of Crashes by Severity Level and Collision Type					
Collision Type	N _{predicted} (KABCO) (crashes/mi/year)	N _{predicted} (KA) (crashes/mi/year)	N _{predicted} (B) (crashes/mi/year)	N _{predicted} (C) (crashes/mi/year)	N _{predicted} (O) (crashes/mi/year)
Total	1.5048	0.0560	0.1736	0.2031	1.0721

Proposed Conditions: Select Other CMFs that Apply to the Project			
CMF Nbr	Countermeasure	Validity	Apply
CMF 1	Convert stop-controlled intersection to a single-lane roundabout	User to Validate	X

Indicate that a Part D CMF should be apply to the project element by placing an "X" in the Apply column. The "X" indicates that the research behind the Part D countermeasure is similar to the proposed conditions, and therefore, applicable.

The analysis prohibits the use of more than four (4) CMFs for a single project element. The first four (4) CMFs indicated for will be used.

The true safety benefits of combining multiple CMFs is unclear. For further information, click here.

Proposed Conditions: General Information and Data for Urban And Suburban Roadway Segment

General Information					Location Information			
Analyst	Judith Bennett				Route	SR13		
Agency or Company	GPD Group				Logpoints	12.145 to 12.284		
Date Performed	04/13/26				Common Name	Upper Fred to Reverse Curve		
Segment for Analysis	SR13; 12.145-12.284				Analysis Year	2022-2024		
Input Data					Proposed Conditions			HSM Base Conditions
Roadway type (2U, 3T, 4U, 4D, 5T)					2U			--
Length of segment, L (mi)					0.139			--
AADT (veh/day)	is within range	AADT _{MAX} =	32,600	(veh/day)	9,621			--
Type of on-street parking (none/parallel/angle)					None			None
Proportion of curb length with on-street parking					0			--
Median width (ft) - for divided only					Not Present			15
Lighting (present / not present)					Not Present			Not Present
Auto speed enforcement (present / not present)					Not Present			Not Present
Major commercial driveways (number)					0			--
Minor commercial driveways (number)					1			--
Major industrial / institutional driveways (number)					0			--
Minor industrial / institutional driveways (number)					0			--
Major residential driveways (number)					0			--
Minor residential driveways (number)					0			--
Other driveways (number)					0			--
Speed Category					Posted Speed Greater than 30 mph			--
Roadside fixed object density (fixed objects / mi)					194			0
Offset to roadside fixed objects (ft) [If greater than 30 or Not Present, input 30]					6			30
Calibration Factor, Cr					Varies, See Below			1.00
Locality:					Local System			

Proposed Conditions: Crash Modification Factors (CMFs) for Urban And Suburban Roadway Segment

(1)	(2)	(3)	(4)	(5)	(6)
CMF for On-Street Parking	CMF for Roadside Fixed Objects	CMF for Median Width	CMF for Lighting	CMF for Automated Speed Enforcement	Combined CMF
<i>CMF 1r</i>	<i>CMF 2r</i>	<i>CMF 3r</i>	<i>CMF 4r</i>	<i>CMF 5r</i>	<i>CMF comb</i>
from Equation 12-32	from Equation 12-33	from Table 12-22	from Equation 12-34	from Section 12.7.1	(1)*(2)*(3)*(4)*(5)
1.00	3.15	1.00	1.00	1.00	3.15

Proposed Conditions: Multiple-Vehicle Nondriveway Crash Summary for Urban And Suburban Roadway Segment

(1) Crash Severity Level	(2) SPF Coefficients		(3) Overdispersion Parameter, k	(4) Initial N_{brmv}	(5) Proportion of Total Crashes	(6) Adjusted N_{brmv}	(7) Combined CMFs	(8) Calibration Factor, Cr	(9) Predicted N_{brmv}
	from Table 12-3		from Table 12-3	from Equation 12-10		(4) _{TOTAL} *(5)	(6) from Worksheet 1B	(8)	(6)*(7)*(8)
	a	b							
Total	-15.22	1.68	0.84	0.168	1.000	0.168	3.15	0.62	0.328
Fatal and Injury (FI)	-16.22	1.66	0.65	0.051	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.294	0.049	3.15	0.69	0.107
Property Damage Only (PDO)	-15.62	1.69	0.87	0.123	$(5)_{TOTAL}-(5)_{FI}$ 0.706	0.118	3.15	0.60	0.224

Proposed Conditions: Single-Vehicle Crash Summary for Urban And Suburban Roadway Segment

(1) Crash Severity Level	(2) SPF Coefficients		(3) Overdispersion Parameter, k	(4) Initial N_{brsv}	(5) Proportion of Total Crashes	(6) Adjusted N_{brsv}	(7) Combined CMFs	(8) Calibration Factor, Cr	(9) Predicted N_{brsv}
	from Table 12-5		from Table 12-5	from Equation 12-13		(4) _{TOTAL} *(5)	(6) from Worksheet 1B	(8)	(6)*(7)*(8)
	a	b							
Total	-5.47	0.56	0.81	0.100	1.000	0.100	3.15	1.34	0.420
Fatal and Injury (FI)	-3.96	0.23	0.50	0.022	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.230	0.023	3.15	0.79	0.057
Property Damage Only (PDO)	-6.51	0.64	0.87	0.073	$(5)_{TOTAL}-(5)_{FI}$ 0.770	0.077	3.15	1.52	0.367

Multiple-Vehicle Driveway-Related Collisions By Driveway Type for Urban And Suburban Roadway Segment

(1) Driveway Type	(2) Number of driveways, n_j	(3) Crashes per driveway per year, N_j	(4) Coefficient for traffic adjustment, t	(5) Initial N_{brdwy}	(6) Overdispersion parameter, k	
		from Table 12-7	from Table 12-7	Equation 12-16	from Table 12-7	
				$n_j * N_j * (AADT/15,000)^t$		
Major commercial	0	0.158	1.000	0.000	--	
Minor commercial	1	0.050	1.000	0.032		
Major industrial/institutional	0	0.172	1.000	0.000		
Minor industrial/institutional	0	0.023	1.000	0.000		
Major residential	0	0.083	1.000	0.000		
Minor residential	0	0.016	1.000	0.000		
Other	0	0.025	1.000	0.000		
Total	--	--	--	0.032		0.81

Proposed Conditions: Multiple-Vehicle Crash Summary by Driveway Type for Urban And Suburban Roadway Segment

(1) Crash Severity Level	(2) Initial N_{brdwy}	(3) Proportion of total crashes (f_{dwy})	(4) Adjusted N_{brdwy}	(5) Combined CMFs	(6) Calibration factor, C_r	(7) Predicted N_{brdwy}
	(5) _{TOTAL} from Worksheet 1G	from Table 12-7	(2) _{TOTAL} * (3)	(6) from Worksheet 1B		(4)*(5)*(6)
Total	0.032	1.000	0.032	3.15	0.20	0.020
Fatal and injury (FI)	--	0.042	0.001	3.15	0.22	0.001
Property damage only (PDO)	--	0.146	0.005	3.15	0.19	0.003

Proposed Conditions: Vehicle-Pedestrian Crash Summary for Urban And Suburban Roadway Segment

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{pedr}	Calibration factor, C_r	Predicted N_{pedr}
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-8		(5)*(6)*(7)
Total	0.328	0.420	0.020	0.768	0.0051	6.07	0.024
Fatal and injury (FI)	--	--	--	--	--	6.07	0.024

Proposed Conditions: Vehicle-Bicycle Crash Summary for Urban And Suburban Roadway Segment

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{biker}	Calibration factor, C_r	Predicted N_{biker}
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-9		(5)*(6)*(7)
Total	0.328	0.420	0.020	0.768	0.0033	2.56	0.006
Fatal and injury (FI)	--	--	--	--	--	2.56	0.006

Safety Benefit - Cost Analysis

General Information

Project Name	Mt. Vernon - N. Sandusky / Upper Fredericktown Safety Study	Contact Email	jmbennett@gpdgroup.com
Project Description	Build Option 2: Roundabout	Contact Phone	216-927-8654
Reference Number		Date Performed	4/13/2026
Analyst	Judith Bennett	Analysis Year	2022-2024
Agency/Company	GPD Group		

Select Site Types to be used in Benefit-Cost Analysis:

All Sites

Comments:

Countermeasure Service Lives, Costs, and Safety Benefits

Countermeasures	Service Life (Years)	Initial Cost of Countermeasure	Annual Maintenance & Energy Costs	Salvage Value	Net Present Cost of Countermeasure	Total Cost of Countermeasures	Summary of Annual Crash Modifications	Net Present Value of Safety Benefits
Site Characteristic Improvements (Please add description about improvements i.e. Lane widening)					\$0.00	\$0.00	-0.210	\$135,265
Site Characteristic Improvements (Please add description about improvements i.e. Lighting)					\$0.00	\$0.00		
Site Characteristic Improvements (Please add description about improvements i.e. Signal Phasing)					\$0.00	\$0.00		
Site Characteristic Improvements (Please add description about improvements i.e. Added Right Turn Lane)					\$0.00	\$0.00		
CMF 1 - Convert stop-controlled intersection to a single-lane roundabout	20	\$2,273,160.00			\$2,273,160.00	\$2,273,160.00	-1.083	\$533,696
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
Totals		\$2,273,160.00	\$0.00	\$0.00	\$2,273,160.00	\$2,273,160.00	-1.293	\$668,961



Economic Crash Analysis Tool

Safety Benefit - Cost Analysis

General Information

Project Name	Mt. Vernon - N. Sandusky / Upper Fredericktown Safety Study	Contact Email	jmbennett@gpdgroup.com
Project Description	Build Option 2: Roundabout	Contact Phone	216-927-8654
Reference Number		Date Performed	4/13/2026
Analyst	Judith Bennett	Analysis Year	2022-2024
Agency/Company	GPD Group		

Benefit - Cost Calculator

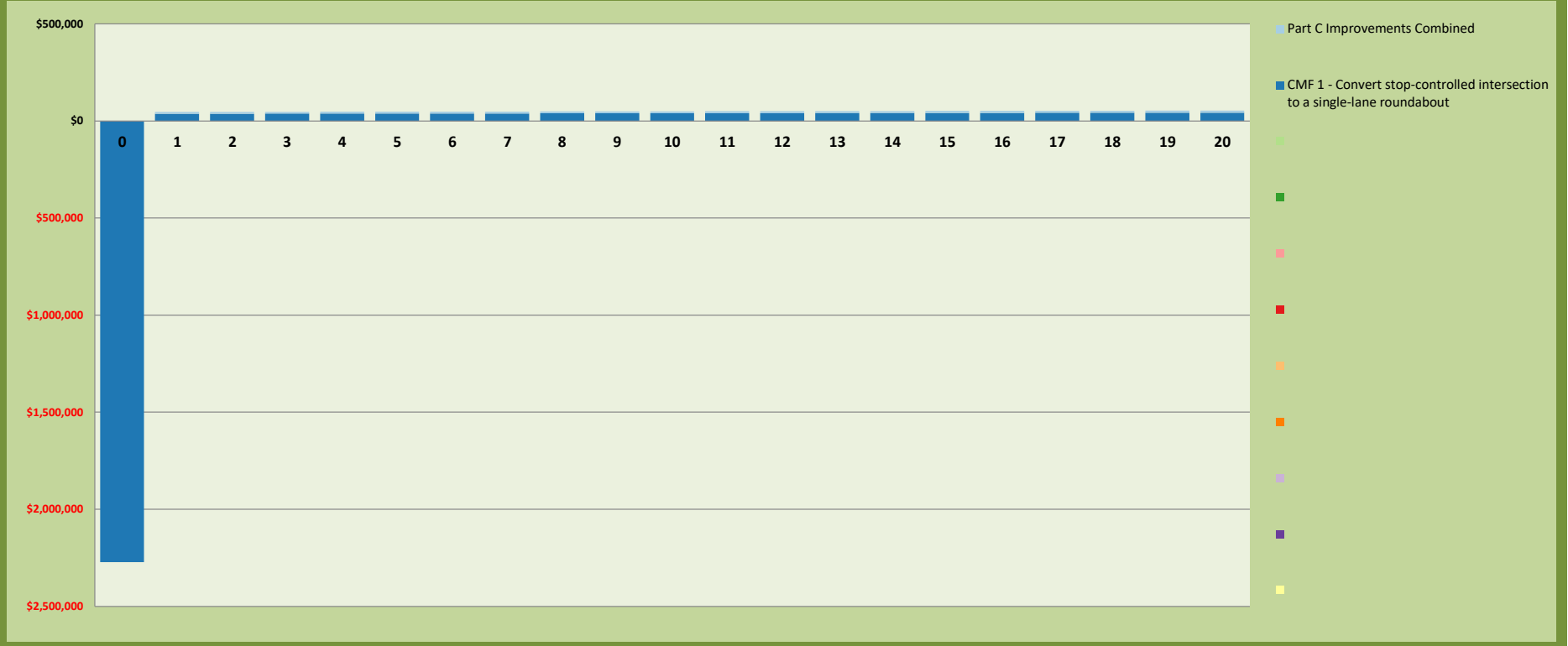
Net Present Value of Project	\$2,273,160.00
Net Present Value of Safety Benefits	\$668,960.59
Net Benefit	(\$1,604,199.41)
Benefit / Cost Ratio	0.29

Expected Annual Crash Adjustment

Number of Fatal & Incapacitating Injury Crashes	-0.049
Number of Injury Crashes	-0.404
Number of Total Crashes	-1.293

Comments:

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



Safety Benefit - Cost Analysis

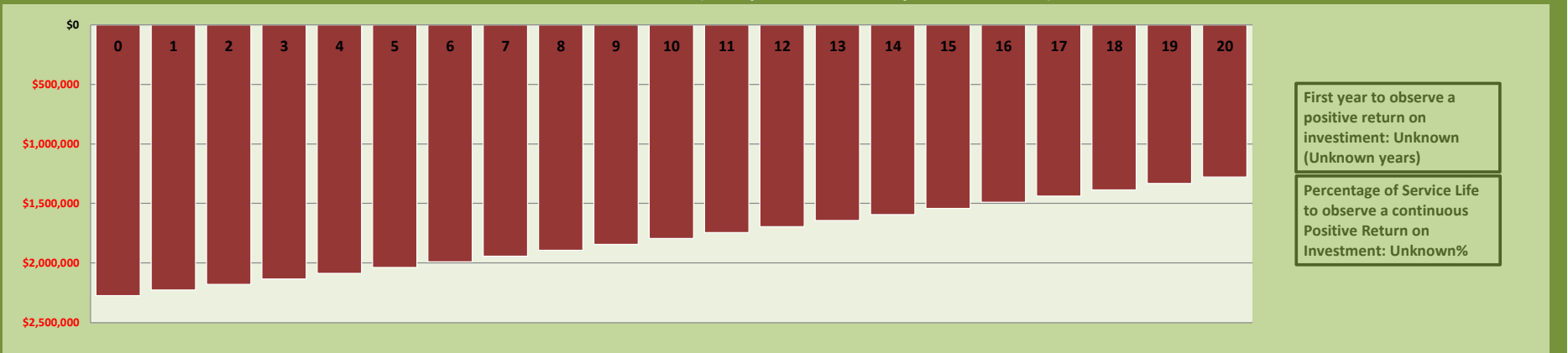
General Information

Project Name	Mt. Vernon - N. Sandusky / Upper Fredericktown Safety Study	Contact Email	jmbennett@gpdgroup.com
Project Description	Build Option 2: Roundabout	Contact Phone	216-927-8654
Reference Number		Date Performed	4/13/2026
Analyst	Judith Bennett	Analysis Year	2022-2024
Agency/Company	GPD Group		

Project Costs Only Cash Flows By Countermeasure Per Year



Return on Investment (Safety Benefits and Project Investments)



APPENDIX G
PLANNING LEVEL COST ESTIMATES

LONG-TERM BUILD OPTION 1:
INTERSECTION REALIGNMENT

Preliminary Opinion of Probable Cost

ITEM	DESCRIPTION	TOTAL QUANTITY	UNIT	ESTIMATED PRICE	TOTAL COST
ROADWAY					
201	CLEARING AND GRUBBING	1	LS	\$10,000	\$10,000
202	PAVEMENT REMOVED	2,540	SY	\$15	\$38,100
202	REMOVAL MISC.: 4'X19' CONCRETE FOUNDATION	1	EACH	\$3,000	\$3,000
203	EXCAVATION/EMBANKMENT	1,370	CY	\$35	\$47,950
204	SUBGRADE COMPACTION	3,010	SY	\$4	\$12,040
ROADWAY SUBTOTAL:					\$111,090
EROSION CONTROL					
659	TOPSOIL, AS PER PLAN	240	CY	\$60	\$14,400
659	SEEDING AND MULCHING, CLASS 1	2,200	SY	\$3	\$6,600
832	STORM WATER POLLUTION PREVENTION PLAN	1	LS	\$5,000	\$5,000
832	EROSION CONTROL	15,000	EACH	\$1	\$15,000
ROADWAY SUBTOTAL:					\$41,000
DRAINAGE					
	DRAINAGE	1	LS	\$95,000	\$95,000
DRAINAGE SUBTOTAL:					\$95,000
PAVEMENT					
254	PAVEMENT PLANING, ASPHALT CONCRETE (T=1.25")	1,395	SY	\$8	\$11,160
301	ASPHALT CONCRETE BASE, PG64-22, (449)	450	CY	\$240	\$108,000
304	AGGREGATE BASE	495	CY	\$100	\$49,500
407	NON-TRACKING TACK COAT	415	GAL	\$5	\$2,075
441	ASPHALT CONCRETE SURFACE COURSE, TYPE 1, (449), PG64-22	140	CY	\$340	\$47,600
441	ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE 2, (449)	125	CY	\$310	\$38,750
441	ASPHALT CONCRETE SURFACE COURSE, TYPE 1, (449), (DRIVEWAYS)	6	CY	\$700	\$4,340
441	ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE 2, (449), (DRIVEWAYS)	4	CY	\$500	\$2,150
452	6" NON-REINFORCED CONCRETE PAVEMENT, CLASS QC MS	39	SY	\$140	\$5,488
PAVEMENT SUBTOTAL:					\$269,063
LIGHTING					
	LIGHTING	1	LS	\$10,000	\$10,000
LIGHTING SUBTOTAL:					\$10,000
WATER WORKS					
	WATER WORKS	1	LS	\$30,000	\$30,000
WATER WORKS SUBTOTAL:					\$30,000

Preliminary Opinion of Probable Cost

ITEM	DESCRIPTION	TOTAL QUANTITY	UNIT	ESTIMATED PRICE	TOTAL COST
TRAFFIC CONTROL					
	SIGNING	1	LS	\$5,000	\$5,000
	STRIPING	1	LS	\$5,000	\$5,000
TRAFFIC CONTROL SUBTOTAL:					\$10,000
MAINTENANCE OF TRAFFIC					
	MAINTENANCE OF TRAFFIC	1	LS	\$60,000	\$60,000
MAINTENANCE OF TRAFFIC SUBTOTAL:					\$60,000
MISCELLANEOUS					
614	MAINTAINING TRAFFIC	1	LS	\$25,000	\$25,000
619	FIELD OFFICE	6	MON	\$2,000	\$12,000
623	CONSTRUCTION LAYOUT STAKES	1	LS	\$10,000	\$10,000
624	MOBILIZATION	1	LS	\$40,000	\$40,000
MISCELLANEOUS SUBTOTAL:					\$87,000
RIGHT OF WAY					
	PERMANENT R/W TAKE - MINOR - RESIDENTIAL	2	EACH	\$12,000	\$24,000
	PERMANENT R/W TAKE - MINOR - COMMERCIAL	1	EACH	\$8,000	\$8,000
	ACQUISITION SERVICES	3	EACH	\$6,000	\$18,000
	APPRAISAL REVIEW SERVICES	3	EACH	\$500	\$1,500
RIGHT OF WAY SUBTOTAL:					\$51,500
TOTAL CONSTRUCTION AND RIGHT OF WAY COST:					\$764,653
DESIGN ENGINEERING COST:		(15% OF CONSTR. & R/W COST)			\$114,698
GEOTECHNICAL ENGINEERING COST:		(1% OF CONSTR. & R/W COST)			\$7,647
ENVIRONMENTAL COST:		(1% OF CONSTR. & R/W COST)			\$7,647
SUBSURFACE UTILITY ENGINEERING (SUE):		(3% OF CONSTR. & R/W COST)			\$22,940
DESIGN CONTINGENCY COSTS		(20% OF CONSTR. & R/W COST)			\$152,931
PROJECT SUBTOTAL:					\$1,070,516
3% INFLATION CONTINGENCY OVER 4 YEARS (12%):					\$128,462
PROJECT TOTAL WITHOUT CONSTRUCTION INSPECTION					\$1,198,978
CONSTRUCTION INSPECTION COST:		(10% OF PROJECT TOTAL)			\$119,898
TOTAL:					\$1,318,876

LONG-TERM BUILD OPTION 2:
ROUNDBOUT

Preliminary Opinion of Probable Cost

ITEM	DESCRIPTION	TOTAL QUANTITY	UNIT	ESTIMATED PRICE	TOTAL COST
ROADWAY					
201	CLEARING AND GRUBBING	1	LS	\$20,000	\$20,000
202	PAVEMENT REMOVED	4,680	SY	\$15	\$70,200
202	CATCH BASIN REMOVED	3	EACH	\$500	\$1,500
202	REMOVAL MISC.: 4'X19' CONCRETE FOUNDATION	1	EACH	\$3,000	\$3,000
202	BUILDING DEMOLISHED	1	EACH	\$50,000	\$50,000
203	EXCAVATION/EMBANKMENT	4,715	CY	\$30	\$141,450
204	SUBGRADE COMPACTION	6,165	SY	\$4	\$24,660
608	4" CONCRETE WALK	6,970	SF	\$10	\$69,700
608	CURB RAMP	960	SF	\$25	\$24,000
ROADWAY SUBTOTAL:					\$404,510
EROSION CONTROL					
659	TOPSOIL, AS PER PLAN	280	CY	\$60	\$16,800
659	SEEDING AND MULCHING, CLASS 1	2,500	SY	\$3	\$7,500
832	STORM WATER POLLUTION PREVENTION PLAN	1	LS	\$10,000	\$10,000
832	EROSION CONTROL	25,000	EACH	\$1	\$25,000
ROADWAY SUBTOTAL:					\$59,300
DRAINAGE					
	DRAINAGE	1	LS	\$265,000	\$265,000
DRAINAGE SUBTOTAL:					\$265,000
PAVEMENT					
301	ASPHALT CONCRETE BASE, PG64-22, (449)	790	CY	\$225	\$177,750
304	AGGREGATE BASE	1,005	CY	\$90	\$90,450
407	NON-TRACKING TACK COAT	520	GAL	\$5	\$2,600
441	ASPHALT CONCRETE SURFACE COURSE, TYPE 1, (449), PG64-22	165	CY	\$330	\$54,450
441	ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE 2, (449)	230	CY	\$285	\$65,550
452	6" NON-REINFORCED CONCRETE PAVEMENT, CLASS QC MS	15	SY	\$140	\$2,100
452	8" NON-REINFORCED CONCRETE PAVEMENT, CLASS QC MS	125	SY	\$150	\$18,750
452	4" NON-REINFORCED CONCRETE PAVEMENT, CLASS QC 1P, AS PER PLAN	405	SY	\$110	\$44,550
452	11" NON-REINFORCED CONCRETE PAVEMENT, CLASS QC 1P, AS PER PLAN	630	SY	\$175	\$110,250
609	COMBINATION CURB AND GUTTER, TYPE 2	1,880	FT	\$35	\$65,800
609	COMBINATION CURB AND GUTTER, TYPE 9	350	FT	\$45	\$15,750
609	CURB, TYPE 6	1,345	FT	\$30	\$40,350
PAVEMENT SUBTOTAL:					\$688,350
LIGHTING					
	LIGHTING	1	LS	\$190,000	\$190,000
LIGHTING SUBTOTAL:					\$190,000
WATER WORKS					
	WATER WORKS	1	LS	\$30,000	\$30,000
WATER WORKS SUBTOTAL:					\$30,000

Preliminary Opinion of Probable Cost

ITEM	DESCRIPTION	TOTAL QUANTITY	UNIT	ESTIMATED PRICE	TOTAL COST
TRAFFIC CONTROL					
	SIGNING	1	LS	\$25,000	\$25,000
	STRIPING	1	LS	\$25,000	\$25,000
	TRAFFIC CONTROL SUBTOTAL:				\$50,000
LANDSCAPING					
	LANDSCAPING	1	LS	\$40,000	\$40,000
	LANDSCAPING SUBTOTAL:				\$40,000
MAINTENANCE OF TRAFFIC					
	MAINTENANCE OF TRAFFIC	1	LS	\$40,000	\$40,000
	MAINTENANCE OF TRAFFIC SUBTOTAL:				\$40,000
MISCELLANEOUS					
614	MAINTAINING TRAFFIC	1	LS	\$25,000	\$25,000
619	FIELD OFFICE	6	MON	\$2,000	\$12,000
623	CONSTRUCTION LAYOUT STAKES	1	LS	\$15,000	\$15,000
624	MOBILIZATION	1	LS	\$100,000	\$100,000
	MISCELLANEOUS SUBTOTAL:				\$152,000
RIGHT OF WAY					
	PERMANENT R/W TAKE - MINOR - RESIDENTIAL	3	EACH	\$8,000	\$24,000
	PERMANENT R/W TAKE - MAJOR- RESIDENTIAL	1	EACH	\$250,000	\$250,000
	PERMANENT R/W TAKE - MINOR - COMMERCIAL	4	EACH	\$7,000	\$28,000
	ACQUISITION SERVICES	8	EACH	\$6,000	\$48,000
	APPRAISAL REVIEW SERVICES	8	EACH	\$500	\$4,000
	RIGHT OF WAY SUBTOTAL:				\$354,000
	TOTAL CONSTRUCTION AND RIGHT OF WAY COST:				\$2,273,160
	DESIGN ENGINEERING COST:		(15% OF CONSTR. & R/W COST)		\$340,974
	GEOTECHNICAL ENGINEERING COST:		(1% OF CONSTR. & R/W COST)		\$22,732
	ENVIRONMENTAL COST:		(1% OF CONSTR. & R/W COST)		\$22,732
	SUBSURFACE UTILITY ENGINEERING (SUE):		(3% OF CONSTR. & R/W COST)		\$68,195
	DESIGN CONTINGENCY COSTS		(20% OF CONSTR. & R/W COST)		\$454,632
	PROJECT SUBTOTAL:				\$3,182,425
	3% INFLATION CONTINGENCY OVER 4 YEARS (12%):				\$381,891
	PROJECT TOTAL WITHOUT CONSTRUCTION INSPECTION				\$3,564,316
	CONSTRUCTION INSPECTION COST:		(10% OF PROJECT TOTAL)		\$356,432
	TOTAL:				\$3,920,748