

POR US-224 at SR-225

Safety Study
Final Report
PID 117158

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I. Executive Summary

A. Purpose

The purpose of this study is to analyze existing conditions of the study area and identify potential countermeasures to reduce crash frequency and severity. The study limits include the intersection of US-224 (Waterloo Road) & SR-225 (Alliance Yale North Road) & CR-125 (Alliance Road) and extend approximately 500' on each intersection approach. The study location is identified as #8 on the 2020 ODOT Highway Safety Improvement Program (HSIP) Rural Intersection list. The location is also ranked #1 (locally and overall) on the Akron Metropolitan Area Transportation Study (AMATS) High Crash Intersection by Community list (2018-2020).

B. Overview of Existing Conditions Analysis

Currently, northbound right turning trucks and eastbound left turning trucks overlap into oncoming lanes to make their movements. Therefore, trucks are often forced to wait longer for a gap in opposing traffic before making their turning movement. The capacity analysis results show acceptable level of service (LOS) during the AM peak in 2022, 2027, and 2047. However, the PM peak has LOS E with 2022 volumes, and continues to worsen to LOS F with 2027 and 2047 volumes. Additionally, due to the previously described truck over-tracking conflicts, it is expected actual operations are likely worse than the capacity analysis results being shown. Capacity issues could lead to an increase in crashes due to driver frustration leading to risky maneuvers. Furthermore, sight distance may be obstructed by utility poles present on the south side of the intersection, depending on stopping position.

C. Overview of Safety Issues

Cleaned crash data at the study intersection was provided by the District for 2011-2020. An average of about seven crashes occurred per year with 48.0% resulting in injury. The primary crash type was angle crashes (42.7%), followed by the secondary crash types of rear end crashes (25.3%), and left turn crashes (13.3%). All angle crashes were due to failure to yield, not failure to stop. The frequency of this crash type is likely due to sight distance obstructions on the stop-controlled approaches.

D. Countermeasures Considered but Dismissed

Below is a brief overview of the countermeasures but dismissed.

Short-term countermeasures:

- Add LED flashing stop signs
- Upgrade flashing red/yellow beacons to have backplates and/or mast arms
- Upgrade intersection warning signs (oversize and/or LED flashing signs)
- Install "Cross Traffic Does Not Stop" plaques

All short-term countermeasures were dismissed as they would not address failure to yield angle crashes, the most prevalent crash type.

Long-term countermeasures:

- Install eastbound and westbound left turn lanes
 - Turn lane warrant analysis results show a westbound left turn lane is warranted with 2022 volumes during both AM and PM peak hours.
 - *This countermeasure is not recommended as it would not mitigate the primary crash type and capacity issues would remain.*

- Install a traffic signal
 - A traffic signal is warranted using 70% volume thresholds and crash experience (Warrant 7).
 - *This countermeasure is not recommended as it would increase the total expected annual crashes. Also, compared to the roundabout, capacity improvements are not as favorable and there are no access management improvements with the installation of a traffic signal.*
- Convert intersection to all-way stop control (AWSC)
 - The minimum AWSC volume thresholds are met using 2022 data.
 - *This countermeasure is not recommended as it would not meet driver expectations and is expected to increase rear end crashes on the east/west approaches.*

E. Recommended Roundabout Countermeasure

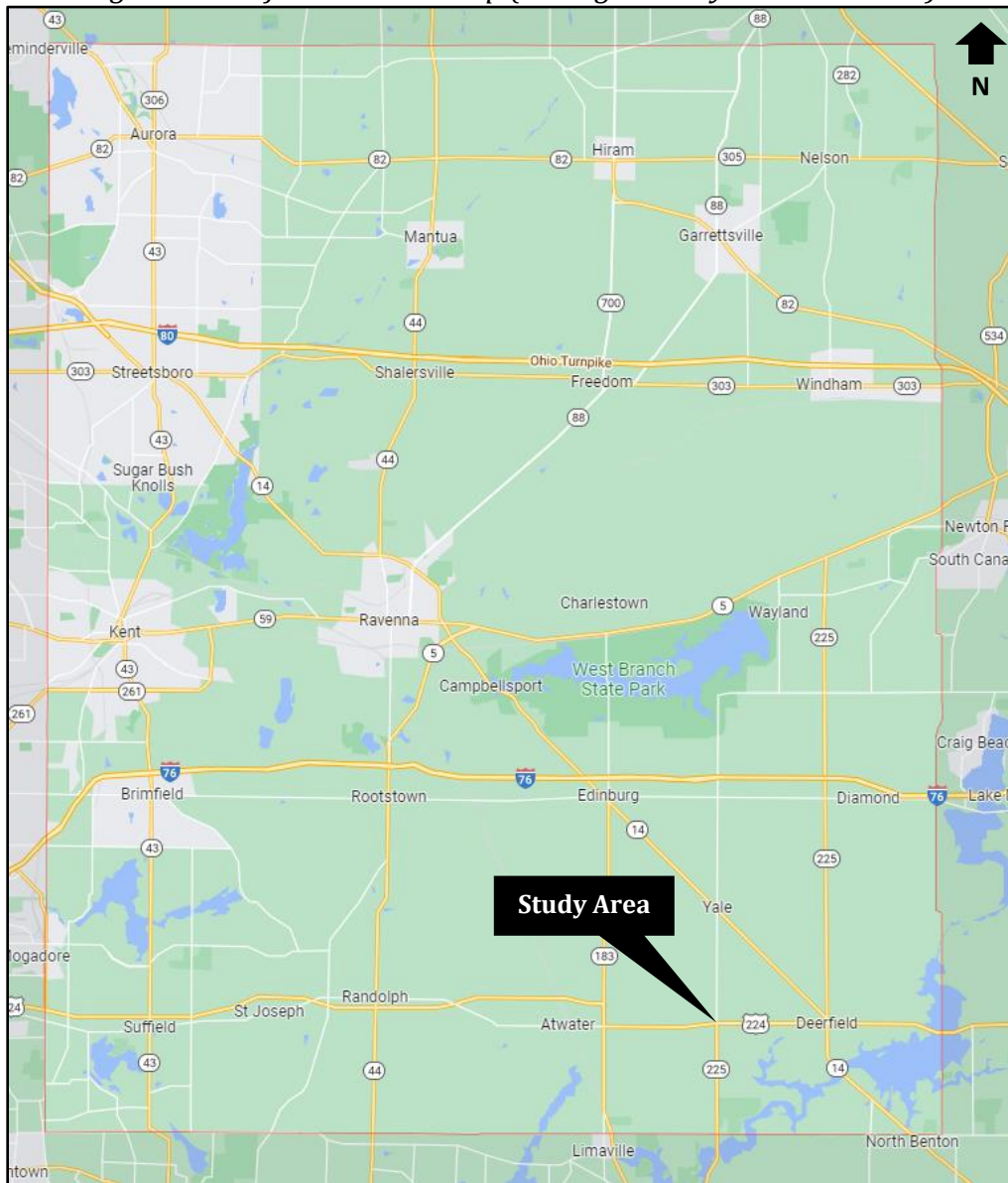
The installation of a single-lane roundabout with single-lane approaches is recommended. The roundabout would cost approximately \$4,678,400, is expected to reduce 3.029 crashes/year, and results in a benefit-cost ratio of 0.78. Even though the proposed roundabout is costly and results in an unfavorable benefit-cost ratio, it is recommended a roundabout be installed. Compared to other countermeasures considered for this intersection, a roundabout is the optimal countermeasure to reduce the failure to yield angle crashes, best improve capacity through the future, and best improve access management. *It is recommended formal safety funding be pursued for the installation of a roundabout.*

II. Purpose

The purpose of this study is to analyze existing conditions of the study area and identify potential countermeasures to reduce crash frequency and severity. The study limits include the intersection of US-224 (Waterloo Road) & SR-225 (Alliance Yale North Road) & CR-125 (Alliance Road)¹ and extend approximately 500' on each intersection approach.

The study location is identified as #8 on the 2020 ODOT HSIP Rural Intersection list. The location is also ranked #1 (locally and overall) on the AMATS High Crash Intersection by Community list (2018-2020). A project location map is provided in **Figure 1**. A study area map is provided in **Figure 2**.

Figure 1 - Project Location Map (Portage County outlined in red)



¹ Referred to as US-224 & SR-225 in this report

Figure 2 – Study Area Map



III. Existing Conditions

A. Land Use and Development

The study area is located in the southeast corner of Portage County. The intersection is on the border between Atwater and Deerfield townships. The study intersection includes a skating rink in the northeast corner of the intersection and a used school buses/parts yard (Paul's Equipment) in the northwest corner. The surrounding area includes single family homes and undeveloped, wooded or agricultural land. A brownfield is also present in the southeast corner of the intersection with a private fence running along the length of the property. A brownfield is a previously developed site that resulted in environmental contamination. An environmental screening was conducted by the District and is provided in **Appendix A**.

B. Roadway Conditions

SR-225

SR-225 generally serves as a north-south roadway connecting the City of Alliance to IR-76. SR-225 runs along the south and east legs of the study intersection, joining with US-224 for about 2.5 miles before branching back to the north. The roadway is classified as a Rural Minor Arterial, has a two-lane typical section, and has a posted speed limit of 55 MPH.

Each through lane is approximately 12' wide and shoulders range from 3-9' wide. The roadway generally has raised pavement markers (RPMs), edge line rumble stripes, and centerline rumble stripes (only on east leg). The roadway has guardrail on both sides of the south leg of the road, approximately 280' from the study intersection. The roadway has no curb, gutter, sidewalk, or lighting (only present at the study intersection).

US-224

US-224 serves as an east-east connector across the state, connecting cities such as Canfield, Akron, Willard, Tiffin, Findlay, and Van Wert. The roadway is classified as a Rural Minor Arterial, has a two-lane typical section, and a posted speed limit of 55 MPH. Each through lane is approximately 12' wide and shoulders range from 3-10' wide. The roadway generally has RPMs and edge line and centerline rumble stripes. The roadway has no curb, gutter, sidewalk, or lighting (only present at the study intersection).

CR-125

CR-125 serves as a north-south connector from US-224/SR-225 to SR-14 and IR-76. The roadway is classified as a Rural Local Road and has a two-lane typical section. CR-125 has an unposted speed limit of 55 MPH. Each through lane is approximately 11' wide and shoulders range from 0-3' wide. The roadway generally has no RPMs, guardrail, curb, gutter, rumble-stripes/strips, sidewalk, or lighting (only present at the study intersection).

C. Intersection Conditions

US-224 & SR-225 is a four-leg intersection with single-lane approaches. The intersection configuration can be seen in **Figure 2**.

The intersection currently operates as two-way stop control (TWSC), with the northbound and southbound approaches under stop-control. Each approach has stop signs with signpost reflectors on both sides of the road. The intersection has overhead flashing beacons with no backplates installed above the intersection on a span wire, as shown in **Figure 3**.

Figure 3 – Intersection Conditions



Stop ahead warning signs are posted on each approach in advance of the intersection as follows: one sign on the right side of the southbound approach approximately 630' from the intersection and signs on both sides of the northbound approach approximately 915' from the intersection. Intersection ahead and 40 MPH advisory signs are posted on both sides of the US-224 approaches approximately 1,000' west and 880' east of the intersection. Additional signage pertaining to the roadway route numbers are posted in the northeast and northwest corners of the intersection. An existing conditions diagram was provided by the District and can be found in **Appendix B**.

Utility poles are located in all corners of the intersection. Many overhead utility wires cross the intersection and legs of the intersection.

The following developments are located at the corners of the intersections with access details provided.

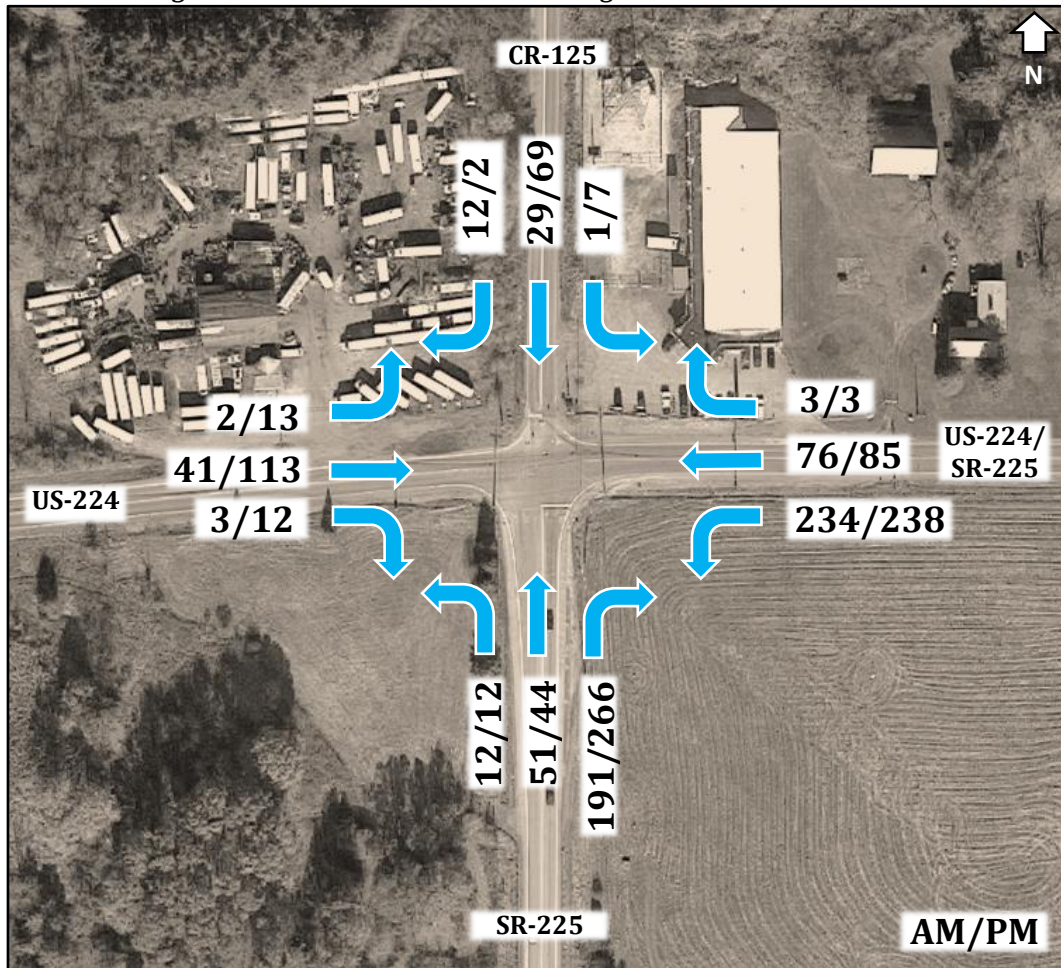
- The northeast corner of the intersection has a parcel that appears to have open access onto both roadways for the entirety of the parcel. It appears some access management has been applied, with the access from the north leg being roped off/closed and the east leg access having parking blocks installed to restrict the access to the easternmost point in the parking lot, approximately 165' from the intersection.
- The northwest corner of the intersection has a parcel with a single access point on US-224, approximately 140' from the study intersection, with a 30' runoff area/dirt shoulder the entire length of the parcel frontage.

Currently, northbound right turning trucks and eastbound left turning trucks overlap into oncoming lanes to make their movements. Therefore, trucks are often forced to wait longer for a gap in opposing traffic before making their turning movement. Truck turning movements are further described later in the report.

D. Data Collection

Turning movement counts collected at the study intersection from 6 AM to 7 PM on Wednesday, April 27, 2022 were provided by ODOT District 4. It was determined that the AM peak hour is from 6:30-7:30 and the PM peak hour is from 3:45-4:45. Peak hour data is summarized in **Figure 4**. Note, there is a relatively heavy volume of westbound left and northbound right turns, compared to other movements. Segment count data along US-224 west of the study intersection and SR-225 south of the study intersection from 2019 was obtained from the ODOT Transportation Data Management System (TDMS). All count data is provided in **Appendix C**.

Figure 4 – 2022 Peak Hour Turning Movement Count Data



E. Traffic Volume Development

The 2022 count data was compared to 2019 segment data to determine if adjustments were needed to account for impacts on traffic volumes caused by the COVID-19 pandemic. It was determined that the south leg of the intersection falls within the 15% range set by ODOT while the west leg falls outside of this range. However, when the two approaches are combined, the overall difference is within the 15% range. Since the west leg has significantly lower volumes than the south leg, no COVID adjustment factor was applied to the intersection.

AMATS provided a growth rate of 0% for the intersection. This was based on AMATS count data showing negative growth. However, growth rates obtained from the ODOT Transportation Forecasting Modeling System (TFMS) show varying growth rates for each leg broken down by P&A (passenger cars) and B&C (trucks). See the TFMS growth rate results below:

- West leg: P&A = 0%, B&C = 1.6%
- South leg: P&A = 1.2%, B&C = 0%
- East leg: P&A = 0.7%, B&C = 0.5%

Given the varying results of the TFMS data and the difference between the TFMS outputs and the recommendation from AMATS, a linear annual growth rate of 0.5% was utilized for all intersection approaches.

Peak hour to design hour factors were applied to the raw count data to produce 2022 design hour volumes for the AM and PM peak hours. The 0.5% linear annual growth rate was applied to the 2022 design hour volumes to develop Opening Year (2027) and Design Year (2047) AM, PM, and average daily traffic (ADT) volumes. The ODOT partial count factor form was utilized to extrapolate ADT data from the 12 hours of data provided. Volumes were provided to the District for review and comment prior to analysis being completed.

COVID adjustment factor calculations, peak hour to design hour factors, AMATS growth rate correspondence, TFMS growth rate outputs, partial count factor form, and volume calculations are provided in **Appendix C**.

F. Capacity Analysis

Highway Capacity Software (HCS) version 2022 was used to analyze capacity at the study intersection under existing conditions (TWSC). AM and PM design hour volumes for 2022 (Existing Year), 2027 (Opening Year), and 2047 (Design Year) were used for this analysis.

Existing conditions capacity analysis results for 2022, 2027, and 2047 are provided in **Tables 1 and 2**. Full capacity analysis results are provided in **Appendix D**.

Table 1 – Existing Conditions AM Peak Capacity Analysis Results

Approach/ Movement	2022 AM		2027 AM		2047 AM	
	Delay ^a	LOS	Delay ^a	LOS	Delay ^a	LOS
EBL	7.5	A	7.5	A	7.5	A
WBL	8.1	A	8.1	A	8.2	A
NB	19.7	C	20.4	C	34.5	D
SB	18.3	C	27.4	D	31.0	D

a – Average delay in seconds per vehicle

Table 2 – Existing Conditions PM Peak Capacity Analysis Results

Approach/ Movement	2022 PM		2027 PM		2047 PM	
	Delay ^a	LOS	Delay ^a	LOS	Delay ^a	LOS
EBL	7.4	A	7.5	A	7.5	A
WBL	8.5	A	8.5	A	8.7	A
NB	43.9	E	62.1	F	182.1	F
SB	44.8	E	67.3	F	141.6	F

a – Average delay in seconds per vehicle

The results show all approaches have acceptable LOS during the AM peak in 2022, 2027, and 2047. However, the PM peak has LOS E with 2022 volumes, and continues to worsen to LOS F with 2027 and 2047 volumes. Additionally, due to over-tracking conflicts, northbound right turning trucks must wait for a gap in both eastbound and westbound traffic to make their turn. Note, this movement also experiences the highest truck percentage. Therefore, it is expected actual operations are likely worse than the capacity analysis results being shown. Capacity issues could lead to an increase in crashes due to driver frustration leading to risky maneuvers.

G. Sight Distance Analysis

Sight distance analysis was provided by the District. Results were used to determine if visual obstructions are present and if mitigation should be considered. The minimum intersection sight distance (ISD) assuming a 60 MPH design speed and a passenger vehicle is 665 feet for turning left and 575 feet for turning right. For a combination truck, the minimum ISD is 1015 feet for turning left and 930 feet for turning right. The analysis shows set back the minimum 14.4 feet from the nearest edge line, drivers on the northbound and southbound approaches have over 800 feet of ISD looking left and right. However, set back the preferred 17.8 feet from the nearest edge line, drivers on the northbound approach only have ISD of 500 feet looking left and 650 feet looking right. Sight distance may be obstructed by utility poles present on the south side of the intersection, depending on stopping position. No other obstructions were noted. The District sight distance analysis results can be found in **Appendix E**.

H. Truck Turning Movement Analysis

Truck traffic is prevalent at the study intersection. Truck turning movements were simulated through the existing intersection configuration using AutoTurn. Truck turn exhibits are provided in **Appendix F**. It was determined that for many movements, trucks must over-track into opposing lanes and/or into the shoulder in order to complete their turns. As previously stated, this is expected to increase delays at the intersection as trucks must wait for a gap in many traffic movements in order to make their turn.

IV. Analysis

A. Turn Lane Warrant Analysis

A turn lane analysis was conducted according to the warrant graphs in the ODOT Location and Design (L&D) Manual. A design speed of 5 MPH above the posted speed limits, previously described, was utilized for turn lane calculations.

No turn lanes are present in the existing conditions. Design Year volumes for the AM and PM peaks were used to evaluate the need for left and right turn lanes on the US-224/SR-225 free flow approaches to the intersection in its current configuration. A summary of the results is provided in **Table 3**. Calculated turn lane lengths listed include a 50' diverging taper.

Table 3 - Turn Lane Warrant Summary

Turn Lane	Peak	Warrant Met
US-224 EB Left	AM	Not Met
	PM	Not Met
US-224 WB Left	AM	Met - 435'
	PM	Met - 435'
US-224 EB Right	AM	Not Met
	PM	Not Met
US-224 WB Right	AM	Not Met
	PM	Not Met

As shown in **Table 3**, a westbound left turn lane is warranted during both AM and PM peak hours in the Design Year. This turn lane is also warranted using 2022 volumes. No other turn lanes are warranted at the intersection of US-224/SR-225. Even though the eastbound left turn lane was not warranted, the calculated turn lane length is 345' (including a 50' diverging taper). Turn lane analysis can be found in **Appendix G**.

B. Signal Warrant Analysis

A signal warrant analysis was performed at the study intersection. Eight-hour, four-hour, peak hour, and crash experience (Warrants 1, 2, 3, and 7) signal warrant analyses were evaluated per the Ohio Manual of Uniform Traffic Control Devices (OMUTCD) and the Traffic Engineering Manual (TEM). Analyses were conducted using 2022 count data with right turn reductions (RTR).

The results of these analyses can be seen in **Table 4**. Additionally, the District requested analysis be completed utilizing passenger car equivalent (PCE) adjustments to determine the impact of trucks and farming equipment on the results. Per the TEM, Section 402-2, PCEs may be applied to count data if truck percentages meet or exceed 20%. Given the existing truck percentages (20.3% for the northbound approach and 19.0% for the westbound approach), the adjustments of 1.5 (applied to vehicle classes 4-7) and 2.0 (applied to vehicle classes of 8-13 or higher) were applied to the applicable classification volumes. Analysis with adjusted volumes was also conducted for adjusted 2022 volumes with RTR.

Table 4 – Signal Warrant Analysis Results

Analysis	8-Hour (Warrant 1)	4-Hour (Warrant 2)	Peak Hour (Warrant 3)
2022	Not Met	Not Met	Not Met
PCE Adjusted 2022	Met 70% Factor	Met 70% Factor	Not Met

Crash experience (Warrant 7) is met since five angle crashes occurred between 3/27/2021 and 2/1/2022. Overall, the results show a traffic signal is warranted using 70% volume thresholds. For new ODOT signals, TEM 402-3.2 permits using 70% volume thresholds when there are five or more angle crashes correctable by a traffic signal and the major street speed exceeds 40 MPH. This does not necessarily mean a traffic signal is recommended for this intersection, which is discussed later in this report. The full signal warrant analysis can be seen in **Appendix H**.

C. All-Way Stop-Control Warrant Analysis

AWSC analysis was performed at the study intersection per the OMUTCD methodologies. Five angle crashes occurred between 3/27/2021 and 2/1/2022 which are susceptible to correction by AWSC application. Since the 85th percentile approach speed of the major street traffic exceeds 40 MPH, 70% of the minimum volume thresholds can be utilized. Then the minimum volume thresholds are met using 2022 data. Therefore, the requirements for ASWC are satisfied. The AWSC warrant analysis can be seen in **Appendix H**.

V. Crash Data

A. Crash Data Summary

Cleaned crash data at the study intersection was provided by the District for 2011-2020. **Table 5** shows a summary of the 2011-2020 crash data. The crash diagram showing 2016-2020 data, also developed by the District, can be seen in **Figure 5**. Crash diagrams provided by the District dating back to 2004 can be seen in **Appendix I**.

Table 5 – 2011-2022 Crash Statistics

Crash Year	Number	Percent
2011	5	6.7%
2012	4	5.3%
2013	2	2.7%
2014	3	4.0%
2015	7	9.3%
2016	10	13.3%
2017	7	9.3%
2018	7	9.3%
2019	13	17.3%
2020	9	12.0%
2021	8	10.7%

Crash Severity	Number	Percent
Injury Crash	36	48.0%
Property Damage Crash	39	52.0%

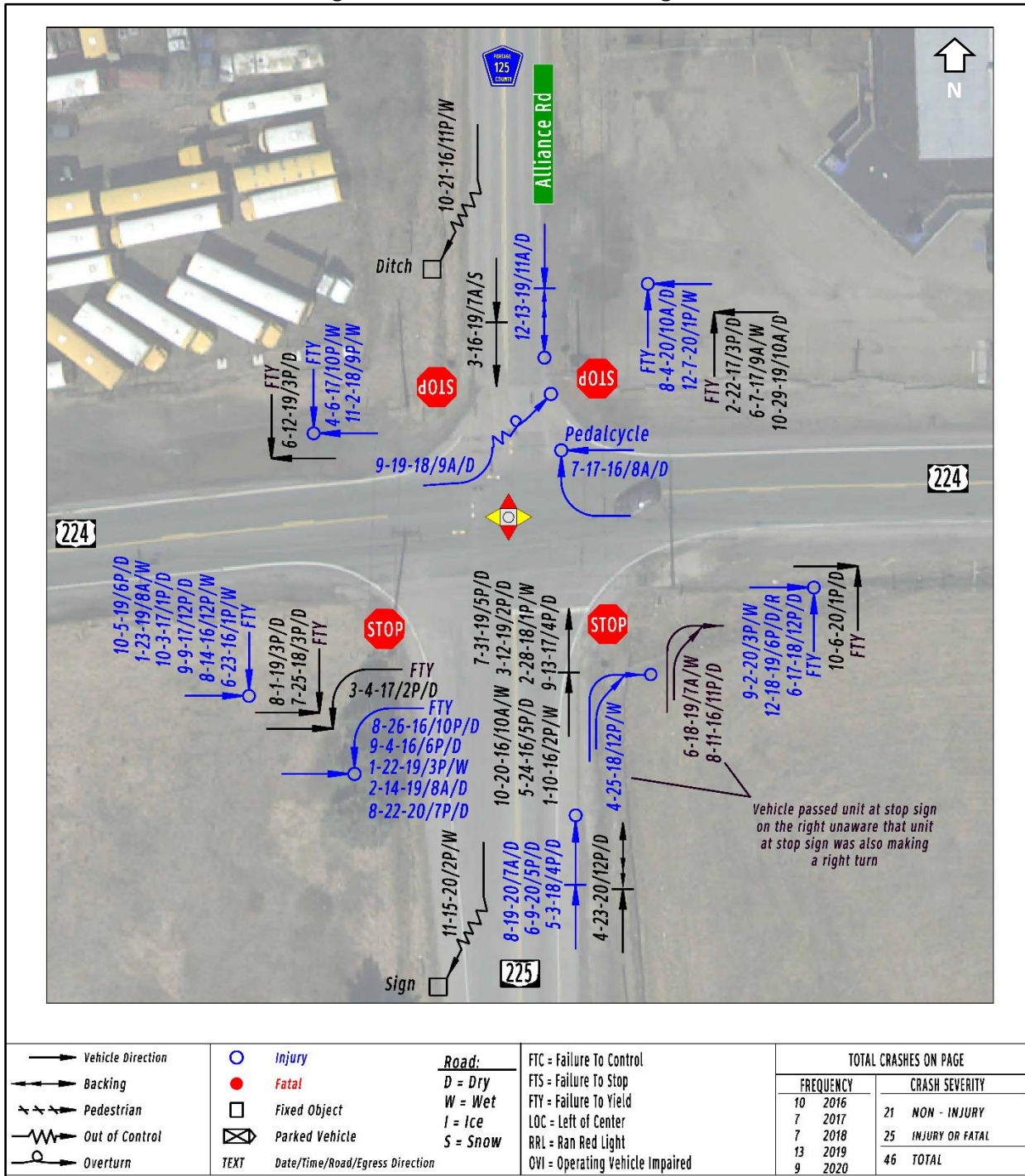
Crash Type	Number	Percent
Angle	32	42.7%
Rear End	19	25.3%
Left Turn	10	13.3%
Fixed Object	5	6.7%
Right Turn	3	4.0%
Backing	3	4.0%
Sideswipe - Passing	1	1.3%
Pedalcycles	1	1.3%
Overturning	1	1.3%

Road Condition	Number	Percent
Dry	53	70.7%
Wet	21	28.0%
Snow	1	1.3%

Hour of Day	Number	Percent
7:00 AM	3	4.0%
8:00 AM	5	6.7%
9:00 AM	3	4.0%
10:00 AM	5	6.7%
11:00 AM	4	5.3%
12:00 PM	8	10.7%
1:00 PM	5	6.7%
2:00 PM	5	6.7%
3:00 PM	11	14.7%
4:00 PM	8	10.7%
5:00 PM	7	9.3%
6:00 PM	4	5.3%
7:00 PM	2	2.7%
9:00 PM	1	1.3%
10:00 PM	2	2.7%
11:00 PM	2	2.7%

Day of Week	Number	Percent
Sunday	9	12.0%
Monday	6	8.0%
Tuesday	15	20.0%
Wednesday	14	18.7%
Thursday	14	18.7%
Friday	7	9.3%
Saturday	10	13.3%

Figure 5 – 2016-2020 Crash Diagram



B. Probable Causes

Noteworthy crash patterns in the study area from 2011-2021 are summarized with supporting details and probable causes as follows:

▪ **Angle Crashes**

Angle crashes are the most prevalent crash type at the study intersection. A total of 32 angle crashes were reported. Angle crashes represent 42.7% of the total crashes, higher than the statewide average of 29.6%. In general, the crashes are summarized as follows:

- 18 crashes with the at-fault vehicle on the southbound approach (15 striking an eastbound vehicle and three striking a westbound vehicle)
- 14 crashes with the at-fault vehicle on the northbound approach (nine striking a westbound vehicle, five striking an eastbound vehicle)

All angle crashes were due to failure to yield, not failure to stop. The frequency of this crash type is likely due to sight distance obstructions on the stop-controlled approaches.

▪ **Rear End Crashes**

Rear end crashes are the second most prevalent crash type at the study intersection. A total of 19 rear end crashes were reported. Rear end crashes represent 25.3% of the total crashes, higher than the statewide average of 12.8%. In general, the crashes are summarized as follows:

- 18 crashes on the northbound approach
- One crash on the southbound approach

The frequency of rear end crashes on the northbound approach is likely caused by many vehicles turning right. Drivers may think the car in front of them has an adequate gap to make their turning movement and preemptively advance, even if the car in front of them does not proceed.

▪ **Left Turn Crashes**

Left turn crashes are the third most prevalent crash type at the study intersection. A total of 10 left turn crashes were reported. Left turn crashes represent 13.3% of the total crashes, higher than the statewide average of 9.0%. All left turn crashes at the study intersection occurred when westbound left turning vehicles failed to yield to eastbound traveling vehicles. Note, this is also the highest volume movement at the intersection.

Note, annual crashes generally increased following 2014. From 2011-2014, annual crashes ranged from 2-5 crashes per year. From 2015-2021, annual crashes ranged from 7-13 crashes per year. The increase in crashes is expected to be due to a gradual increase in traffic volumes over the years.

C. Safety Analysis

The Highway Safety Manual (HSM) predictive method for rural arterial intersections was applied to the study area to determine the potential for safety improvement using the ODOT Economic Crash Analysis Tool (ECAT). See **Appendix J** for an overview of the HSM methodology. The results presented in **Table 6** show the expected crash frequency calculated using HSM predictive method with cleaned crash data and existing conditions

for the study area elements. Note, per the District, only cleaned crash data from the 2016-2020 data set was utilized. Additionally, the AADT for the minor street approaches was 3,870 which exceeds the maximum of 3,500. Therefore, an AADT for the minor street approaches of 3,500 was utilized.

Table 6 - HSM Results for Existing Conditions for All Crashes (shown in crashes/year)

Predicted Average Crash Frequency	4.4616
Expected Average Crash Frequency - Existing Conditions	5.9673
Expected Excess Crashes	1.5057
Potential for Improvement	Yes

The results conclude the expected crash frequency is greater than the predicted crash frequency for the study intersection. This suggests the intersection experiences more crashes per year than its peers and has a potential to reduce crashes based on HSM methodology. HSM output reports is provided in **Appendix J**.

VI. Countermeasures Considered

The following section addresses possible countermeasures to mitigate the prevalent crash types in the study area. The following countermeasures listed were considered but are ultimately not recommended for the reasons stated throughout this section.

A. Short-Term Countermeasures Considered

A recommended short-term countermeasure is not expected or intended to be the “big fix” that mitigates all crashes shown in the crash history. These countermeasures are low-cost, low-impact solutions to improve general safety in the study area.

Add LED flashing stop signs

The existing stop signs could be upgraded to LED flashing stop signs. See **Figure 6**.

Pros and cons of this countermeasure are as follows:

Pros:

- Increase stop sign visibility.
- Increase driver awareness of intersection and possible conflicts.
- Allows for the removal of the overhead flasher, could improve general safety in the study area.

Cons:

- Does not address failure to yield angle crashes, the most prevalent crash type.
- Does not address truck over-tracking issues.
- Does not address capacity issues.
- Per the ODOT TEM 201-3.3, this countermeasure is reserved for locations with a failure to stop crash pattern. This crash pattern is not present at this intersection.

For these reasons, this countermeasure was dismissed.

Figure 6 – LED Flashing Sign



Upgrade Flashing Red/Yellow Beacons to have Backplates and/or Mast Arms

Consider upgrading the existing flashing red/yellow beacons to have backplates and/or mast arms.

Pros and cons of this countermeasure are as follows:

Pros:

- Increase visibility of the flashing red/yellow beacons.
- Increase driver awareness of intersection and possible conflicts.

Cons:

- Does not address failure to yield angle crashes, the most prevalent crash type.
- Does not address truck over-tracking issues.
- Does not address capacity issues.

For these reasons, this countermeasure was dismissed.

Upgrade Intersection Warning Signs

Dual, standard-sized intersection warning signs (W2-1) are present on the eastbound and westbound approaches. Consider installing new, oversized, dual W2-1 signs. Additionally, these signs could also be considered for an upgrade to LED flashing signs.

Pros and cons of this countermeasure are as follows:

Pros:

- Increase driver awareness of intersection and possible conflicts

Cons:

- Does not address failure to yield angle crashes, the most prevalent crash type.
- Does not address truck over-tracking issues.
- Does not address capacity issues.

For these reasons, this countermeasure was dismissed.

Install “Cross Traffic Does Not Stop” Plaques

Install a “Cross Traffic Does Not Stop” plaque (W4-4P) below each existing stop sign. The OMUTCD states this may be used when engineering judgment indicates that conditions are present that are causing or could cause drivers to misinterpret the intersection as AWSC.

Pros and cons of this countermeasure are as follows:

Pros:

- Increase driver awareness of intersection and possible conflicts.
- Clearly indicates that the intersection is not operating under AWSC.

Cons:

- Does not address failure to yield angle crashes, the most prevalent crash type.
- Does not address truck over-tracking issues.
- Does not address capacity issues.
- It is unclear if drivers do currently incorrectly perceive the intersection as AWSC.

For these reasons, this countermeasure was dismissed.

B. Long-Term Countermeasures Considered

Install eastbound and westbound left turn lanes

The turn lane warrant analysis shows a westbound left turn lane is warranted with existing 2022 traffic volumes. Therefore, the installation of westbound and eastbound left turn lanes was considered.

Capacity analysis was conducted, using HCS with 2022 and 2047 traffic volumes, to assess capacity with the proposed left turn lane installation. LOS and vehicle delay results are summarized in **Table 7**. Detailed capacity analysis results are provided in **Appendix K**.

Table 7 – Considered Left Turn Lane Addition Capacity Analysis Compared to Existing Conditions

Approach/ Movement	2022 AM		2022 PM		2047 AM		2047 PM	
	Delay ^a	LOS	Delay ^a	LOS	Delay ^a	LOS	Delay ^a	LOS
Existing Conditions								
EBL	7.5	A	7.4	A	7.5	A	7.5	A
WBL	8.1	A	8.5	A	8.2	A	8.7	A
NB	19.7	C	43.9	E	34.5	D	182.1	F
SB	18.3	C	44.8	E	31.0	D	141.6	F
Considered Left Turn Lane Addition								
EBL	7.5	A	7.4	A	7.5	A	7.5	A
WBL	8.1	A	8.5	A	8.2	A	8.7	A
NB	19.4	C	42.3	E	33.2	D	168.5	F
SB	18.1	C	43.4	E	30.2	D	131.9	F

a – Average total delay in seconds per vehicle

Capacity analysis shows that turn lane installation at the intersection will slightly improve delays on the side street approaches compared to existing conditions. However, the PM peak has LOS E with 2022 volumes, and continues to worsen to LOS F with 2047 volumes.

A conceptual, planning-level layout of the proposed left turn lane installation using symmetric widening is provided in **Figure 7**. The radius of the southeast corner was also increased to accommodate turning trucks, so they no longer have to over-track in opposing traffic lanes. See **Appendix L** for truck turning movements through the intersection configuration considered.

Pros and cons of this countermeasure are as follows:

Pros:

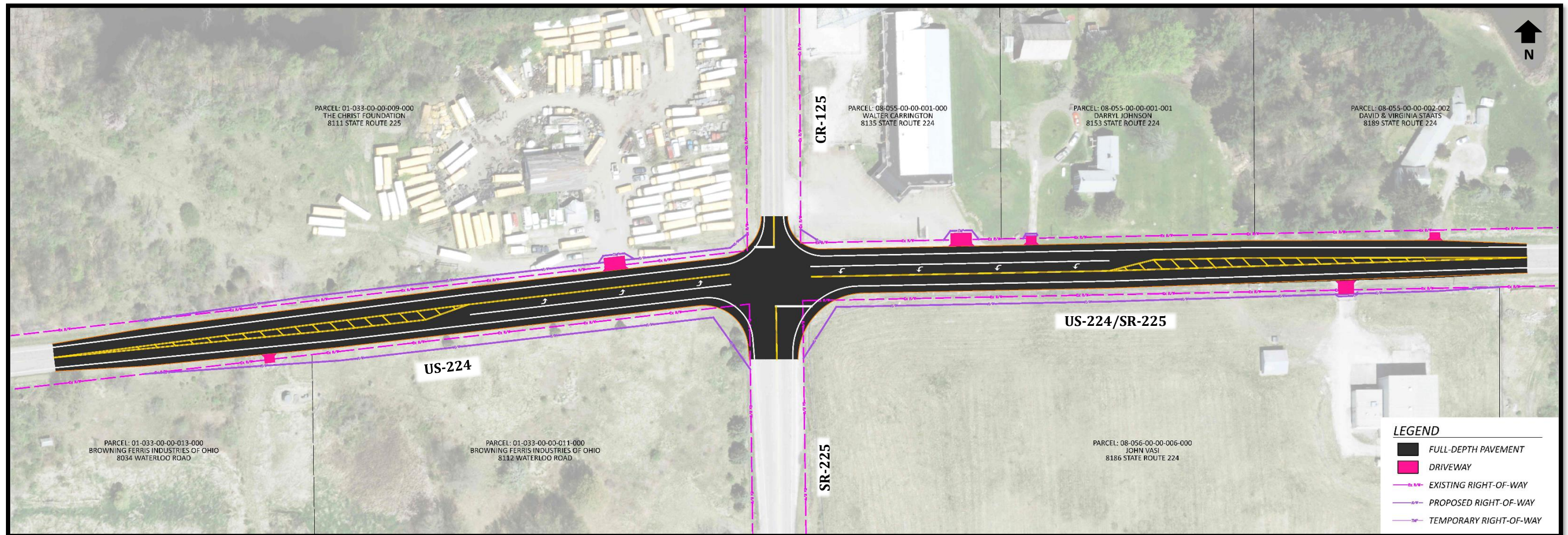
- Would mitigate rear end crashes attributed to left turning vehicles slowing on the eastbound and westbound approaches.

Cons:

- Does not address failure to yield angle crashes, the most prevalent crash type.
- Would make crossing intersection more difficult due to longer time gap required.
- Does not address capacity issues.
- Impactful and costly due to roadway widening needed.

For these reasons, this countermeasure was dismissed. Also see CAP-X analysis in Section IX.

Figure 7 – Conceptual Planning-Level Left Turn Lane Installation Considered



Install a traffic signal

The signal warrant analysis results show a traffic signal is warranted based on crash experience and using 70% volume thresholds. Therefore, the installation of a traffic signal was considered. However, while the installation of a traffic signal is expected to reduce the noted angle crashes, it could increase other crash types, as described later in this report.

Capacity analysis was conducted using HCS with 2022 and 2047 traffic volumes to assess the capacity of the traffic signal installation. Planning-level clearance intervals (per the ODOT Analysis and Traffic Simulation Manual) were used for the analysis. Cycle lengths and splits were optimized for each scenario. LOS and vehicle delay results are summarized in **Table 8**. Detailed capacity analysis results are provided in **Appendix K**.

Table 8 – Considered Signalized Capacity Analysis Compared to Existing Conditions

Approach/ Movement	2022 AM		2022 PM		2047 AM		2047 PM	
	Delay ^a	LOS	Delay ^a	LOS	Delay ^a	LOS	Delay ^a	LOS
Existing Conditions								
EBL	7.5	A	7.4	A	7.5	A	7.5	A
WBL	8.1	A	8.5	A	8.2	A	8.7	A
NB	19.7	C	43.9	E	34.5	D	182.1	F
SB	18.3	C	44.8	E	31.0	D	141.6	F
Considered Traffic Signal Installation								
EB	14.4	B	15.8	B	14.7	B	14.9	B
WB	21.3	C	24.6	C	24.3	C	28.4	C
NB	20.3	C	23.1	C	22.4	C	29.6	C
SB	15.6	B	15.9	B	15.8	B	17.5	B
Total	20.1	C	21.8	C	22.1	C	25.4	C

a – Average total delay in seconds per vehicle

Capacity analysis shows a traffic signal installation at the intersection will operate with acceptable LOS through 2047, an improvement compared to existing conditions. A conceptual, planning-level layout of the proposed traffic signal installation is provided in **Figure 8**. The intersection corner radii were increased to accommodate turning trucks, so they no longer have to over-track in opposing traffic lanes. See **Appendix L** for truck turning movements through the intersection configuration considered.

Pros and cons of this countermeasure are as follows:

Pros:

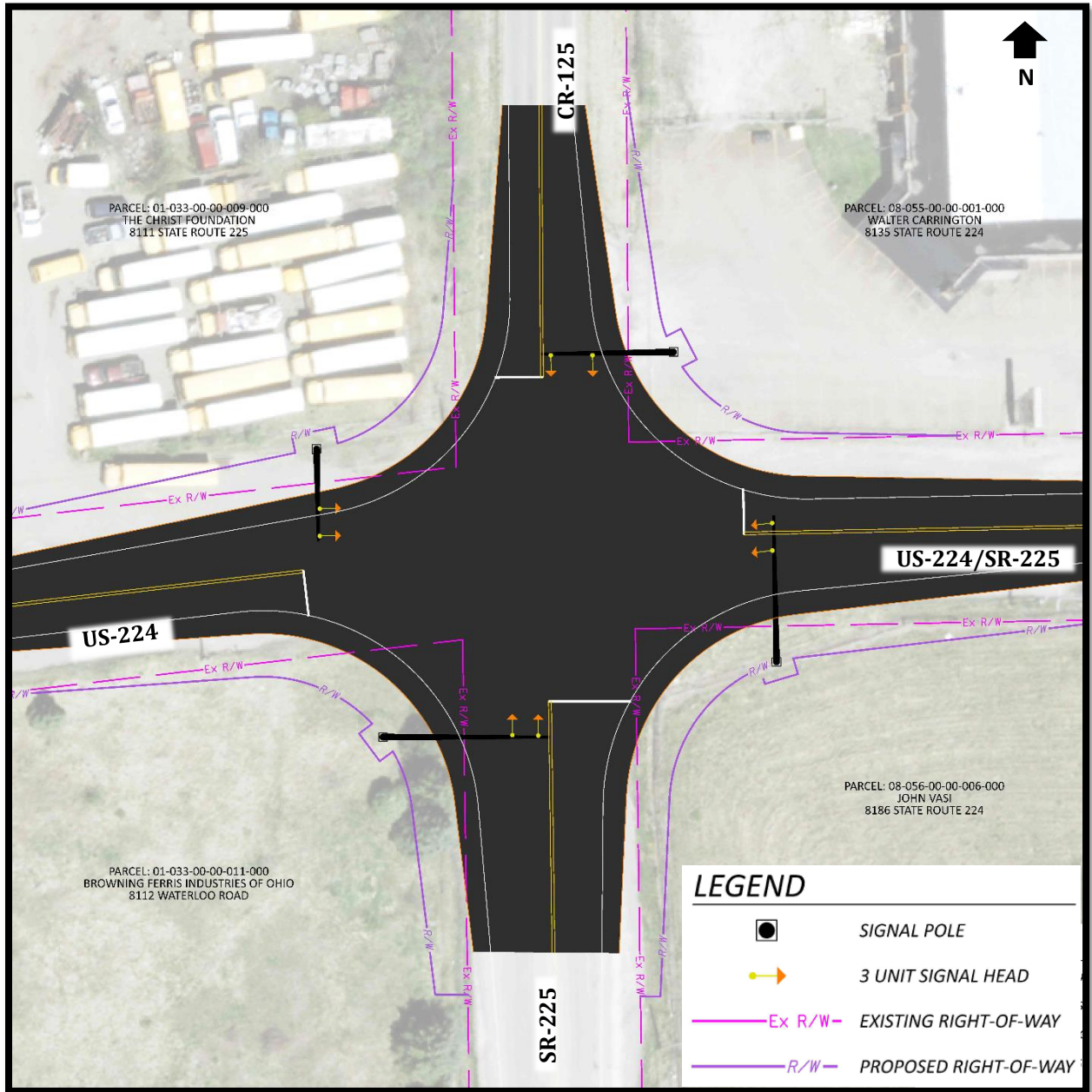
- Reduces expected fatal and angle crashes compared to existing conditions.
- Improves capacity compared to existing conditions.

Cons:

- Increases expected total crashes compared to existing conditions.
- Impactful and costly due to intersection widening needed.

For these reasons, this countermeasure was dismissed. Also see CAP-X analysis in Section IX.

Figure 8 –Conceptual Planning-Level Traffic Signal Installation Considered



Convert intersection to AWSC

The analysis showed the requirements for ASWC were satisfied. Therefore, converting the intersection to AWSC was considered.

Capacity analysis was conducted using HCS with 2022 and 2047 traffic volumes to assess the capacity of the AWSC conversion. LOS and vehicle delay results are summarized in **Table 9**. Detailed capacity analysis results are provided in **Appendix K**.

Table 9 – Considered AWSC Conversion Capacity Analysis Compared to Existing Conditions

Approach/ Movement	2022 AM		2022 PM		2047 AM		2047 PM	
	Delay ^a	LOS	Delay ^a	LOS	Delay ^a	LOS	Delay ^a	LOS
Existing Conditions								
EBL	7.5	A	7.4	A	7.5	A	7.5	A
WBL	8.1	A	8.5	A	8.2	A	8.7	A
NB	19.7	C	43.9	E	34.5	D	182.1	F
SB	18.3	C	44.8	E	31.0	D	141.6	F
Considered AWSC Conversion								
EB	9.2	A	12.5	B	10.1	B	15.8	C
WB	15.8	C	22.3	C	21.3	C	43.0	E
NB	12.3	B	18.6	C	15.4	C	31.5	D
SB	9.1	A	11.2	B	10.1	B	13.3	B
Total	13.5	B	18.3	C	17.2	C	31.3	D

a – Average total delay in seconds per vehicle

Capacity analysis shows a traffic signal installation at the intersection will operate with acceptable LOS through 2047, an improvement compared to existing conditions. A conceptual, planning-level layout of the AWSC conversion is provided in **Figure 9**. The intersection corner radii were increased to accommodate turning trucks, so they no longer have to over-track in opposing traffic lanes. See **Appendix L** for truck turning movements through the intersection configuration considered.

Pros and cons of this countermeasure are as follows:

Pros:

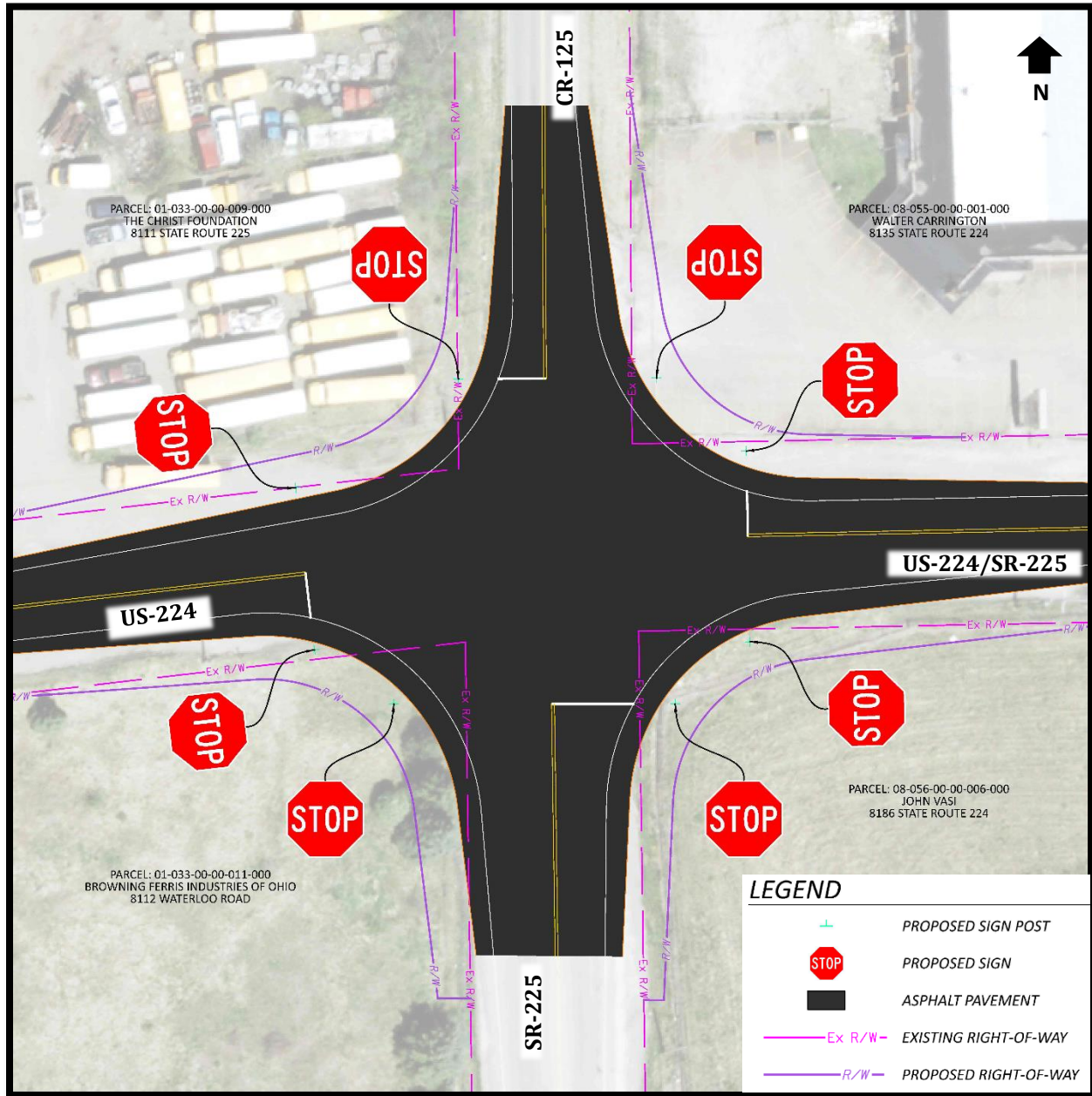
- Reduces expected fatal and angle crashes compared to existing conditions.
- Improves capacity compared to existing conditions.

Cons:

- Increases rear end crashes on the east/west approaches.
- Would not meet driver expectation on the east/west approaches.
- Impactful and costly due to intersection widening needed.

For these reasons, this countermeasure was dismissed. Also see CAP-X analysis in Section IX.

Figure 9 – Conceptual Planning-Level AWSC Conversion Considered



VII. Recommended Long-Term Countermeasure

Reconfigure intersection to be a roundabout

A roundabout is recommended for implementation at this intersection. The FHWA Office of Safety identified roundabouts as a Proven Safety Countermeasure because of their ability to greatly reduce the types of crashes that result in serious injury or fatality. By reducing the number and severity of conflict points at the intersection, and because of the lower speeds of vehicles moving through the intersection, roundabouts have been proven to be a safer intersection type. Roundabouts are generally becoming more common throughout Ohio. It is anticipated that traffic driving through the intersection will be familiar with roundabouts.

Capacity analysis was conducted using HCS with 2022 and 2047 design hour volumes to assess the capacity of the proposed roundabout installation. LOS and vehicle delay results are summarized in **Table 10**. Detailed capacity analysis results are provided in **Appendix K**.

Table 10 – Recommended Roundabout Capacity Analysis Compared to Existing Conditions

Approach/ Movement	2022 AM		2022 PM		2047 AM		2047 PM	
	Delay ^a	LOS	Delay ^a	LOS	Delay ^a	LOS	Delay ^a	LOS
Existing Conditions								
EBL	7.5	A	7.4	A	7.5	A	7.5	A
WBL	8.1	A	8.5	A	8.2	A	8.7	A
NB	19.7	C	43.9	E	34.5	D	182.1	F
SB	18.3	C	44.8	E	31.0	D	141.6	F
Recommended Roundabout								
EB	4.7	A	6.6	A	5.3	A	7.7	A
WB	7.0	A	6.7	A	7.9	A	7.6	A
NB	6.1	A	7.7	A	7.0	A	9.0	A
SB	5.1	A	5.4	A	5.7	A	6.2	A
Total	6.3	A	6.9	A	7.2	A	8.0	A

a – Average total delay in seconds per vehicle

Capacity analysis shows that a single circulating lane roundabout with single lane approaches will operate with acceptable LOS through 2047. A conceptual, planning-level layout of the proposed roundabout configuration is provided in **Figure 10**. The roundabout was placed to avoid taking the skating rink in the northeast quadrant. See **Appendix L** for truck turning movements through the roundabout. See **Appendix M** for roundabout dimensions and critical design parameters. Note, the design is conceptual and will be further refined during detailed design when survey data is available.

The roundabout and splitter islands also present an opportunity for improved access management in the intersection influence area. Movements into and out of access drives can be restricted, but access can still be accommodated via U-turn movements at the roundabout. The following access management is recommended as part of the roundabout implementation:

- Paul’s Equipment full movement access on the west leg of the intersection can remain, with a depressed or flush opening in the splitter island.
- One right-in/right-out (RIRO) access on the east leg and one RIRO access on the north leg of the intersection can be provided for the Deerfield Skating Center.

Pros and cons of this countermeasure are as follows:

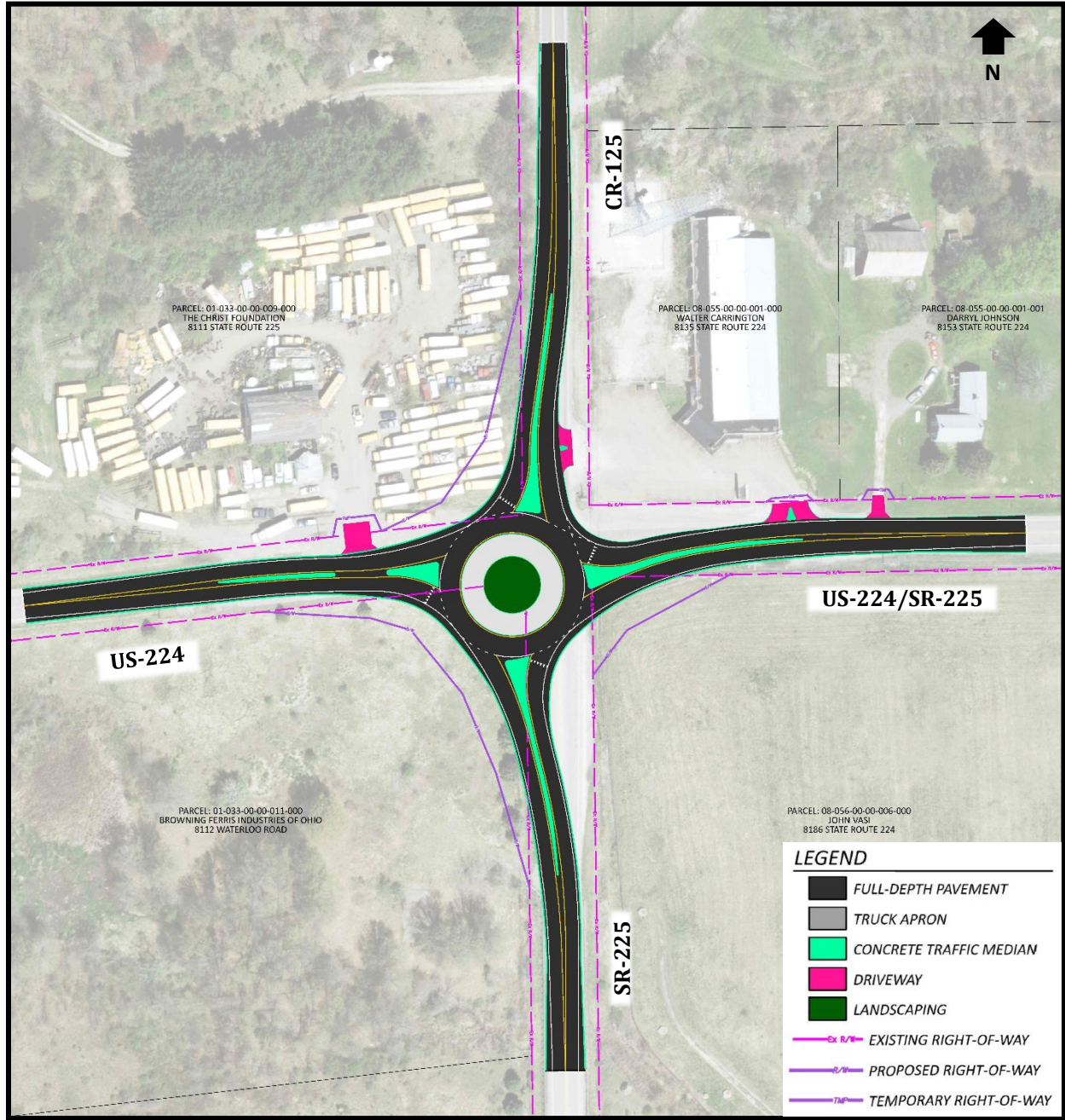
Pros:

- Mitigates the primary crash type of failure to yield angle crashes.
- Reduces all expected crash severities and total crashes.
- Improves capacity compared to existing conditions.

- Access management improvements.
- Cons:
- Impactful and costly due to intersection footprint, approach curvature, and splitter islands.

For these reasons, this countermeasure was recommended. Also see CAP-X analysis in Section IX.

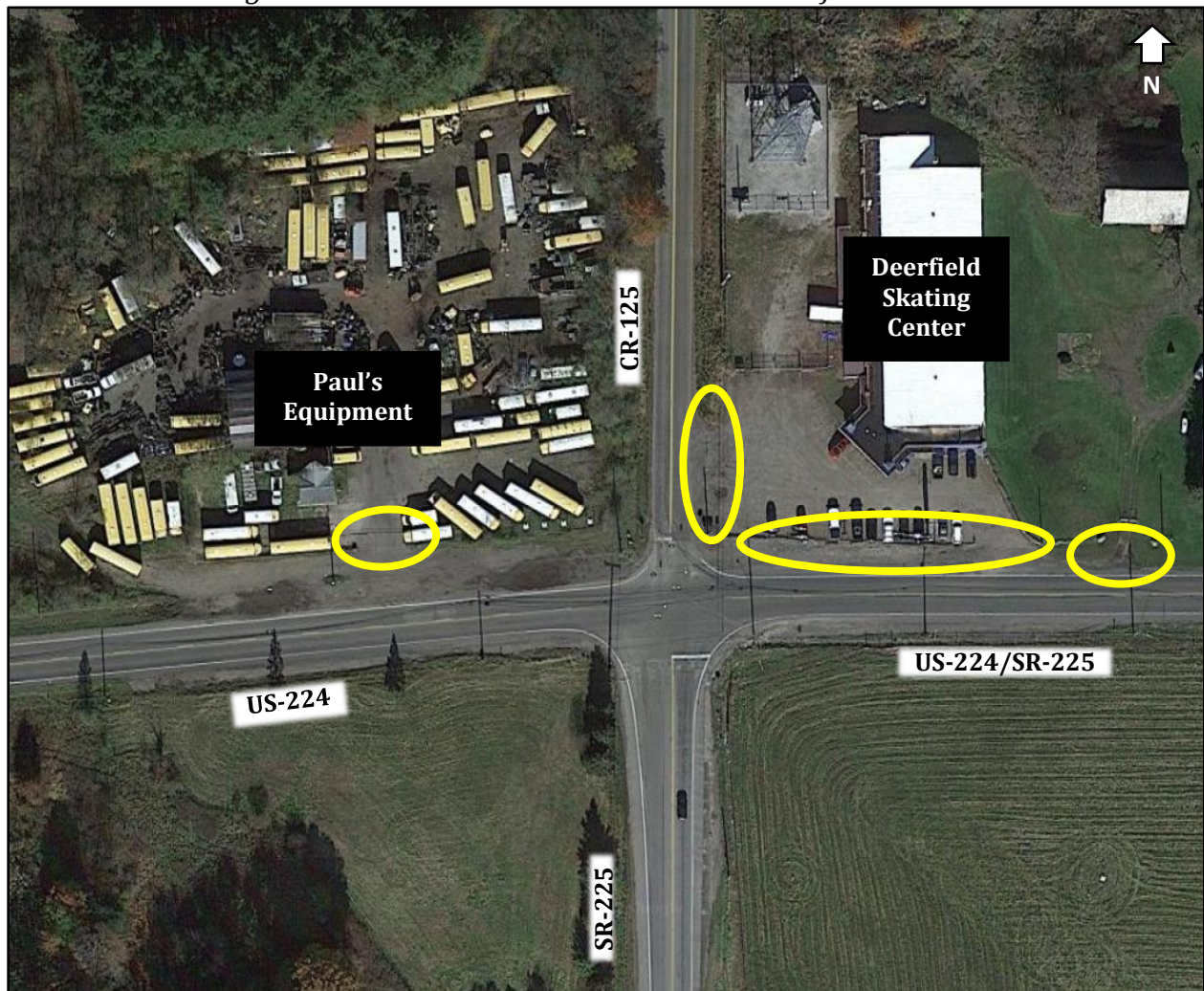
Figure 10 – Proposed Conceptual Planning-Level Roundabout Configuration



Access Management

Access drives surrounding intersections add many potential conflict points resulting in safety and operational issues in the area. The recommended access improvements provided in this report are based on the State Highway Access Management Manual (SHAMM) and can be used as a planning tool. As parcels in or surrounding this area develop or redevelop, consider these access management improvements where appropriate. Additionally, as described with the roundabout countermeasure, some of these access management improvements can be implemented with a long-term intersection improvement project. See **Figure 11** for access points within the intersection influence area for reference.

Figure 11 – Access Points within Intersection Influence Area



Specific access management improvement recommendations include:

- Remove the access drive on the north leg for the Deerfield Skating Center. This access is currently restricted using temporary means (metal poles and chain).

- Permanently restrict Deerfield Skating Center access to US-224/SR-225 to the easternmost point on the parcel. This is currently achieved using temporary parking blocks.
- The Paul’s Equipment access on US-224 currently meets the SHAMM minimum distance requirement as it relates to the study intersection. Further consideration should be given to restricting the width and length of the shoulder adjacent to the site access. The current configuration allows the shoulder to be used as an open parking lot, which should be restricted.

VIII. Cost Estimates and Right-of-Way Impacts

Cost estimates were prepared for all long-term countermeasures. The construction cost estimates assume the following:

- 15% engineering design
- 30% contingency
- 10% environmental, geotechnical, federal requirements
- 9.9% inflation rate for an estimated 2025 construction year²
- Right-of-way impacts
- Utility relocation costs are not included
- Disposal of excavated materials, assumed to be work involving hazardous waste

The estimated cost for each long-term countermeasure is summarized in **Table 11**. Detailed cost estimates are included in **Appendix N**.

Table 11 – Cost Estimates

Countermeasures	Total
Install eastbound and westbound left turn lanes	\$2,777,300
Install traffic signal	\$975,000
Convert intersection to AWSC	\$644,800
Reconfigure intersection to be a roundabout	\$4,678,400

Conceptual right-of-way impacts for each long-term countermeasure were also quantified. **Table 11** includes a summary of parcels with anticipated right-of-way impacts and total right-of-way costs expected for each long-term countermeasure. Detailed right-of-way impact estimates are included in **Appendix N**.

² Note, inflation rates have been irregularly high recently. If the proposed project is not immediately moved forward, this cost estimate will likely need revised as time passes.

Table 12 - Right-of-Way Impact Summary

Parcel	Countermeasures (acreage impact)			
	EBL/WBL	Traffic signal	AWSC	Roundabout
08-055-00-00-001-001	0.002	-	-	0.005
01-033-00-00-009-000	0.075	0.049	0.047	0.172
08-055-00-00-001-000	0.012	0.039	0.037	0.003
01-033-00-00-011-000	0.137	0.076	0.074	0.339
01-033-00-00-013-000	0.019	-	-	-
08-056-00-00-006-000	0.119	0.070	0.068	0.100
Total Acreage	0.364	0.234	0.226	0.619
Total Cost	\$115,600	\$80,600	\$80,000	\$97,900

IX. CAP-X Analysis

The Capacity Analysis for Planning of Junctions (CAP-X) Tool is used for planning-level traffic operations analysis and can be used to screen the number of feasible intersection control alternatives. Along with guidance from ODOT Central Office and District 4, CAP-X was used to evaluate the long-term countermeasures considered and narrow the alternatives down to the top two to proceed forward to benefit-cost analysis. ODOT Central Office developed the analysis, which is summarized in **Table 13**. Detailed analysis is provided in **Appendix O**.

Table 13 – CAP-X Analysis Summary

Countermeasures	Overall V/C Ratio	Ranking
Install eastbound and westbound left turn lanes	3.19	4
Install traffic signal	0.56	2
Convert intersection to AWSC	0.77	3
Reconfigure intersection to be a roundabout	0.43	1

The analysis showed the roundabout and traffic signal countermeasures were the top two alternatives. Therefore, these two countermeasures were carried forward to the benefit-cost analysis described in the next section, and the AWSC and turn lane installation countermeasures were officially dismissed.

X. Benefit-Cost Analysis

Benefit-cost analysis is a tool used to determine the financial benefits of a project by comparing the net present value (NPV) of a project to the NPV of the safety benefit provided by the project. Benefit-cost values greater than one indicate a positive return on the original investment. Preferred countermeasures are those having the highest NPV of safety benefits.

A benefit-cost analysis for the top two long-term countermeasures (roundabout and traffic signal) was prepared using the ODOT ECAT. Crash modification factors (CMF) were applied for the proposed improvements. This analysis does not account for all recommended improvements and only includes countermeasures that have CMF values.

The proposed improvements fundamentally change the conditions of the base safety performance function. For this reason, a separate HSM analysis was conducted for each proposed condition and compared to the existing conditions.

Table 14 summarizes the benefit-cost analysis results. Detailed reports from ECAT are included in **Appendix P**.

Table 14 - Benefit-Cost Analysis

	Countermeasures	
	Roundabout	Traffic signal
Expected Annual Crash Adjustment	-3.029	+3.614
NPV of Project	\$4,256,962.20	\$887,170.90
NPV of Safety Benefit	\$3,308,631.33	\$95,412.23
Benefit-Cost Ratio	0.78	0.11

The benefit-cost ratio for both the roundabout and traffic signal countermeasures is less than 1.0. While the proposed roundabout is the most expensive countermeasure, it has a higher benefit-cost ratio compared to the traffic signal. Most importantly, the roundabout is expected to reduce 3.092 crashes/year, whereas the traffic signal is expected to increase 3.614 crashes/year.

XI. Decision Matrix

Below in **Table 15** is a decision matrix to further summarize and compare the results of the previously described analyses of the top two long-term countermeasures.

Table 15 – Decision Matrix

	Countermeasures	
	Roundabout	Traffic signal
Safety Analysis	Reduces 3.029 crashes/year	Increases 3.614 crashes/year
Capacity Analysis	LOS A	LOS C
Access Management	Improved	No changes
Construction Cost	\$4,678,400	\$975,000
Right-of-Way Impacts	\$97,900	\$80,600
Benefit-Cost Ratio	0.78	0.11

XII. Recommendations

Even though the proposed roundabout is costly and results in an unfavorable benefit-cost ratio, it is recommended a roundabout be installed. The intersection experiences a high frequency of failure to yield angle crashes which result in injury. The implementation of a roundabout is expected to mitigate this primary crash type.

Additionally, the intersection was identified as #8 on the 2020 ODOT HSIP Rural Intersection list and #1 (locally and overall) on the AMATS High Crash Intersection by Community list (2018-2020). The existing overhead flasher has failed to reduce the angle crash pattern. The installation of eastbound and westbound left turn lanes is not recommended as it would not mitigate the primary crash type and capacity issues would remain. AWSC is not recommended as it would not meet driver expectations and is expected to increase rear end crashes on the east/west approaches.

The roundabout and traffic signal were identified as the top two countermeasure options. The traffic signal installation is not recommended as it would increase the total expected annual crashes. Compared to the roundabout, capacity improvements are not as favorable and there are no access management improvements with the installation of a traffic signal.

Therefore, compared to other countermeasures considered for this intersection, a roundabout is the optimal countermeasure to reduce the failure to yield angle crashes, best improve capacity through the future, and best improve access management. It is recommended formal safety funding be pursued for the installation of a roundabout.

Appendix A

Environmental Screening



Gina Balsamo

From: Brian.Peck@dot.ohio.gov
Sent: Tuesday, January 24, 2023 9:15 AM
To: David.Griffith@dot.ohio.gov
Cc: Edward.Deley@dot.ohio.gov; Juliet.Denniss@dot.ohio.gov
Subject: RE: POR-US224/SR225 Intersection Safety Project (No PID) -- RMR Screening Uploaded to PID 117688

Follow Up Flag: Follow up
Flag Status: Flagged

Dave,

In summary:

1. let's be sure to involve ODOT-OES RMR Unit, CO-Real Estate, Chief Legal, D4 Real Estate in the alternatives analysis review process. May also need to pull in Ohio EPA and USEPA early in the process.

We need to be sure ODOT can't be pulled in as an Owner/Operator. A site's legal operator can be held accountable for hazardous waste from past operations.

2. Often, regulatory agencies will require material excavated from former high-level contaminated sites (NPL/Superfund) to be disposed of regardless of analytical testing results. This action may greatly reduce ODOT's future liability.

The Safety Study Consultant should consider generating a planning level estimate for disposal of excavated materials in the NW, SW and SE quadrants. Conservatively, a planning level estimate could assume all material excavated in outside and/or below the existing road base in the NW, SW and SE quadrants cannot be reused and would have to be disposed of accordingly.

3. Once we have a preferred alternative, please allow a minimum of 10 months to process environmental and an additional 12 months for any right-of-way acquisition (18 months if total take/relocation) – minimum 22 months total for environmental and acquisition.

I believe we can improve safety at this location and shouldn't necessarily steer away from a larger footprint before we coordinate. However, any selected alternative will likely cost more than a typical project and take more time to process/clear.

Thank you.

Brian Peck

Environmental Specialist

ODOT District 4

2088 South Arlington Road, Akron, Ohio 44306-4243

330.786.4931 (office)

transportation.ohio.gov



The environmental review, consultation and other actions required by applicable Federal environmental laws for this project are being, or have been, carried-out by ODOT pursuant to 23 U.S.C. 327 and a Memorandum of Understanding, dated June 6, 2018, and executed by FHWA and ODOT.

From: Denniss, Juliet <Juliet.Denniss@dot.ohio.gov>
Sent: Monday, January 23, 2023 3:41 PM
To: Peck, Brian <Brian.Peck@dot.ohio.gov>
Cc: Griffith, David <David.Griffith@dot.ohio.gov>; Deley, Edward <Edward.Deley@dot.ohio.gov>
Subject: RE: POR-US224/SR225 Intersection Safety Project (No PID) -- RMR Screening Uploaded to PID 117688

Brian,

I've looked at the information provided in the report for this area. There are landfills located in 3 of the 4 quadrants. I've placed a snapshot below of the ORPS for the project and the nearby areas to show you the known landfills in the area. Only the northeast quadrant doesn't have a known landfill or signs of landfilling based on the historical aerials. However, it does have a known landfill to the north of it. The 2 properties in the northeast quadrant consists of a roller skating rink (RM-002) and a house (RM-030). Both have be on these sites have buildings that date back to at least 1940 according to the Portage County Auditors Office. If the entire roller rink property is acquired for the project, building will be acquired or it is an uneconomic remanent, the property will require an RMR Assessment prior to acquisition since it is a commercial property. The roller rink property also has a cell tower that may need to be replaced or moved. It should also be noted that both ORPS and the historical aerials show a landfill on the property immediately north of the roller rink property. If the project is within 300 feet of this landfill's extent, a 513 will be required to build the [project. The residential property (RM-003) east of the roller rink property will require not further RMR regardless of the amount taken since it is an exempt property.

The property in the northwest quadrant (RM-001) is designated as a landfill and the areas north of the bus garage/junkyard shows obvious signs of excavation is the historical aerials. The current building on the site was built in 1955 and the 1962 aerials appear to show a weigh station for the landfilling operation. In addition, the property appears to be a bus junkyard. Based on this information, acquisition of any land off this property will require an RMR Assessment to provide Innocent Landowner Defense under CERCLA. In addition, assume that an RMR Assessment will be required for the property to determine what issues are present and should be assumed to require an RMR Investigation. Both the RMR Investigation and the project construction will require an OEPA 513 Permit.

The property on the Southwest quadrant (RM-005) is currently owned by BFI, a waste disposal company. The 1951 historical shows a building present on the property with excavation on the immediate south side of the building and apparent fill material immediately east of the building and along SR 225. Acquisition of any real estate off this property will require an RMR Assessment for Innocent Landowner defense purposes. Also assume that an RMR Investigation will required for the property. Based on the historical, an OEPA 513 permit may be required for both the RMR Investigation and the construction of the property.

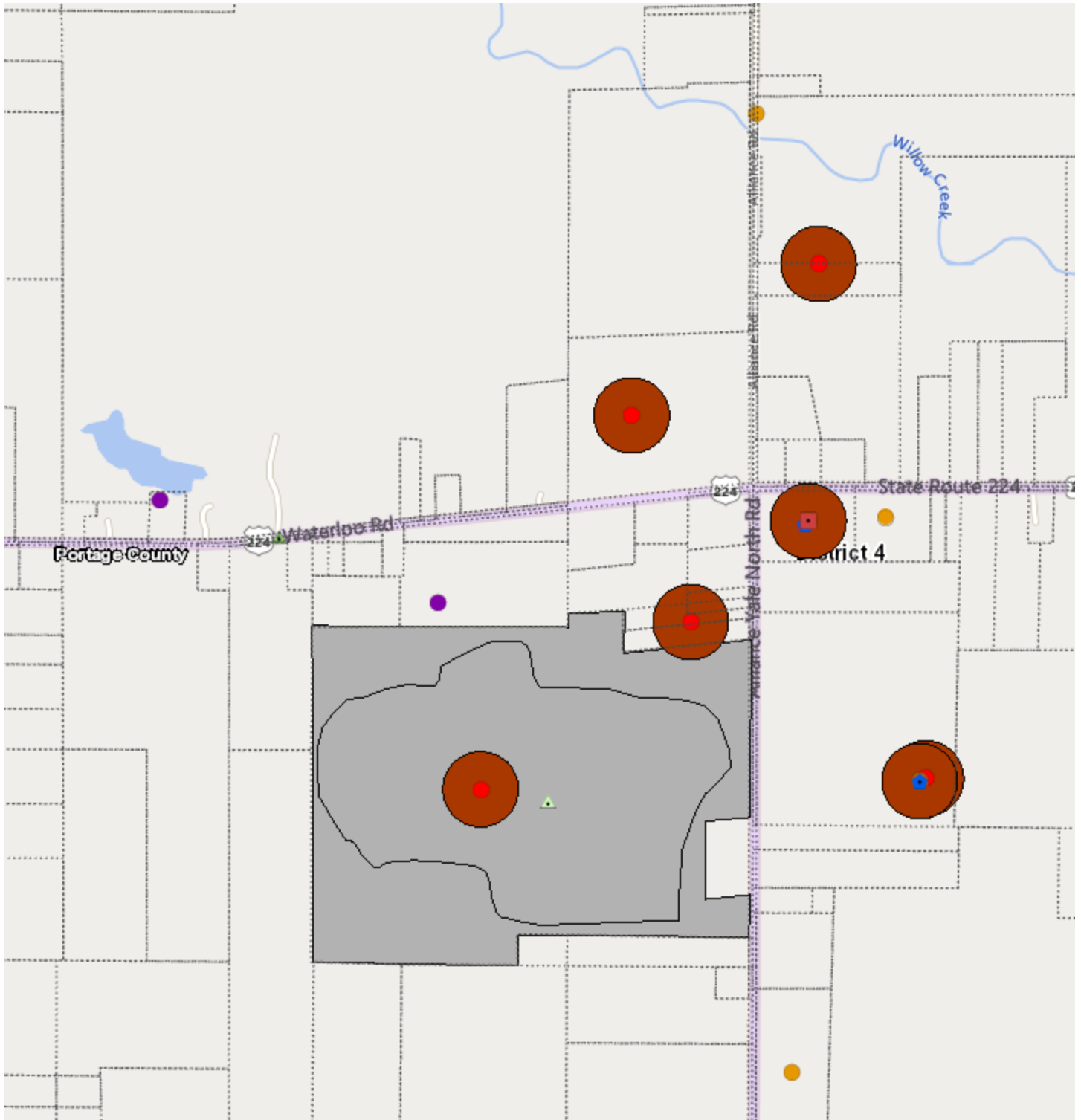
The property present on the Southeast quadrant of the intersection (RM-004) is a known Superfund site and an OEPA site. Assume that coordination with be required with both USEPA and Ohio EPA. In addition, an RMR Assessment will be required if any property will be acquired for Landowner Defense purposes and an RMR Investigation may also be warranted. If it has been determine an RMR Investigation will be required, an Ohio EPA 513 Permit will be required prior to carrying out any drilling. If the project includes this property, a 513 permit will also be required for the project's construction.

Please note that an OEPA 513 permit will be required for the disturbance of any of the landfills in the project. This disturbance includes any geotechnical investigations.

It is also recommended that the District follow RE 5320 since there will be acquisition of contaminated property. This will require a meeting between OES-RMR Unit, DEC, CO-Real Estate, Chief Legal, District Real Estate and potentially the AG's office.

If you have any questions or need additional information, please let me know.

Julie



Juliet Denniss

Environmental Specialist 3
ODOT Office of Environmental Services
1980 West Broad Street, Mail Stop 4170
Columbus, Ohio 43223
(614) 466-7942
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From: Peck, Brian <Brian.Peck@dot.ohio.gov>
Sent: Tuesday, December 27, 2022 8:56 AM
To: Denniss, Juliet <Juliet.Denniss@dot.ohio.gov>
Cc: Griffith, David <David.Griffith@dot.ohio.gov>; Deley, Edward <Edward.Deley@dot.ohio.gov>
Subject: POR-US224/SR225 Intersection Safety Project (No PID) -- RMR Screening Uploaded to PID 117688

Julie,

District 4 is utilizing a Central Office Task Order (Carpenter Marty Transportation) to prepare a safety study evaluating the US Route 224 and State 225 intersection location. Land use adjacent to the intersection is HIGH risk. An RMR Screening (with Agency File Reviews) has been uploaded to the D04 Gen. EnviroNet File Non-Let project (PID: 117688) project file.

While we don't have any alternative plan information yet, we (D4) would like your opinion regarding potential permanent right-of-way takes in all four quadrants (i.e., a roundabout option) at the US Route 224/State Route 225 intersection. Also we need insight on anticipated disposal requirements (PCS vs. Landfill or waste on-site vs. Haz Waste). We need just enough info/opinion to determine if right-of-way takes are feasible/prudent and to apply some generic disposal costs to the various options being developed by Carpenter Marty...

Thank you.

Brian Peck
Environmental Specialist
ODOT District 4
2088 South Arlington Road, Akron, Ohio 44306-4243
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The environmental review, consultation and other actions required by applicable Federal environmental laws for this project are being, or have been, carried-out by ODOT pursuant to 23 U.S.C. 327 and a Memorandum of Understanding, dated June 6, 2018, and executed by FHWA and ODOT.

From: Susan Daniels <sdaniels@lawhon-assoc.com>
Sent: Friday, December 23, 2022 2:19 PM
To: Peck, Brian <Brian.Peck@dot.ohio.gov>
Subject: RE: [External] D4/D11 Environ Tsk Ord FY 2020-21; Agreement No. 34086; PID No. 110226; Work Order Number 04-29E [POR-US224/SR225 Intersection Safety Project (No PID)]

The OEPA file review and the USEPA file review (in four parts) are uploaded to PID 117688. They are enormous, so maybe wait for a good wi-fi day before you look at those.



Susan S. Daniels, PE, AICP
Principal, Director of NEPA Planning
Lawhon & Associates, Inc.
P: 614.481.8600 Ext.134 | C: 614.571.3222
www.lawhon-assoc.com

From: Brian.Peck@dot.ohio.gov <Brian.Peck@dot.ohio.gov>

Sent: Friday, December 23, 2022 10:49 AM

To: Susan Daniels <sdaniels@lawhon-assoc.com>

Subject: RE: [External] D4/D11 Environ Tsk Ord FY 2020-21; Agreement No. 34086; PID No. 110226; Work Order Number 04-29E [POR-US224/SR225 Intersection Safety Project (No PID)]

Susan,

Thank you. We can use a District 4 catch-all EnviroNet project file – PID 117688. You and John Korth should have full access. Should I add others?

Happy Holidays!!

Brian Peck

Environmental Specialist

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The environmental review, consultation and other actions required by applicable Federal environmental laws for this project are being, or have been, carried-out by ODOT pursuant to 23 U.S.C. 327 and a Memorandum of Understanding, dated June 6, 2018, and executed by FHWA and ODOT.

From: Susan Daniels <sdaniels@lawhon-assoc.com>

Sent: Friday, December 23, 2022 10:23 AM

To: Peck, Brian <Brian.Peck@dot.ohio.gov>

Subject: RE: [External] D4/D11 Environ Tsk Ord FY 2020-21; Agreement No. 34086; PID No. 110226; Work Order Number 04-29E [POR-US224/SR225 Intersection Safety Project (No PID)]

Brian – Attached is the requested RMR Screening for the US224/SR 225 safety project. Hopefully this file is not too large. Please confirm that you've received it. Do you have a PID location in EnviroNet or FTP that we can temporarily use to transfer the file review part to you? It's enormous, so can't be broken up and emailed.

From: Brian.Peck@dot.ohio.gov <Brian.Peck@dot.ohio.gov>

Sent: Thursday, October 20, 2022 11:33 AM

To: David.James@dot.ohio.gov; Susan Daniels <sdaniels@lawhon-assoc.com>

Subject: RE: [External] D4/D11 Environ Tsk Ord FY 2020-21; Agreement No. 34086; PID No. 110226; Work Order Number 04-29E [POR-US224/SR225 Intersection Safety Project (No PID)]

Correct SW quadrant...its one of those days 😊

Brian Peck

Environmental Specialist

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330.786.4931 (office)

transportation.ohio.gov



The environmental review, consultation and other actions required by applicable Federal environmental laws for this project are being, or have been, carried-out by ODOT pursuant to 23 U.S.C. 327 and a Memorandum of Understanding, dated June 6, 2018, and executed by FHWA and ODOT.

From: Peck, Brian

Sent: Thursday, October 20, 2022 11:31 AM

To: James, David <David.James@dot.ohio.gov>; Susan Daniels <sdaniels@lawhon-assoc.com>

Subject: RE: D4/D11 Environ Tsk Ord FY 2020-21; Agreement No. 34086; PID No. 110226; Work Order Number 04-29E [POR-US224/SR225 Intersection Safety Project (No PID)]

Dave,

Thank you.

Susan,

Reading the highlighted comment I provided in the BFI (Landfill) parcel information, I now realize that comment was provided poorly worded and not clear. While our intent is evaluation of potential right-of-way takes and deep excavation at the intersection, BFI owns several parcels in the SE quadrant and the actual landfill is located well south (southeast) of the intersection. However, please factor in labor needed to evaluate in the landfill itself in case its determined to be upgradient of the project limits.

Parcel Number: 01-033-00-00-011-000 + additional parcels. **Our intent is evaluation of potential right-of-way take and deep excavation at the intersection. If multiple BFI parcels require evaluation, please factor that into the cost proposal.**

Location Address: 8112 WATERLOO RD, Atwater OH 44201

Land Use: Residential Unplated...Abutting Former BFI (Browning Ferris Industries) Landfill

Owner Address: BROWNING FERRIS

INDUSTRIES OF OHIO INC

8112 WATERLOO RD

ATWATER OH 44201

Thank you.

Brian Peck

Environmental Specialist

ODOT District 4

2088 South Arlington Road, Akron, Ohio 44306-4243

330.786.4931 (office)

transportation.ohio.gov



The environmental review, consultation and other actions required by applicable Federal environmental laws for this project are being, or have been, carried-out by ODOT pursuant to 23 U.S.C. 327 and a Memorandum of Understanding, dated June 6, 2018, and executed by FHWA and ODOT.

From: James, David <David.James@dot.ohio.gov>
Sent: Thursday, October 20, 2022 11:00 AM
To: Susan Daniels <sdaniels@lawhon-assoc.com>
Cc: Peck, Brian <Brian.Peck@dot.ohio.gov>; Griffith, David <David.Griffith@dot.ohio.gov>; Deley, Edward <Edward.Deley@dot.ohio.gov>
Subject: D4/D11 Environ Tsk Ord FY 2020-21; Agreement No. 34086; PID No. 110226; Work Order Number 04-29E [POR-US224/SR225 Intersection Safety Project (No PID)]

Susan,

Please provide a cost proposal for preparation of a Regulated Materials Review (RMR) Screening and regulatory file review for properties abutting the intersection of US Route 224 and State 225 at the Atwater/Deerfield Township Line in southern Portage County. District 4 is utilizing a Central Office Task Order (Carpenter Marty Transportation) to prepare a safety study evaluating the US Route 224 and State 225 intersection location. Adjacent land use information is needed to properly evaluate safety alternatives which may include construction of modern roundabout intersection, construction of additional turning lanes, traffic signal installation, etc.

NOTE – there is not yet a PID associated with this forthcoming project, however studies related to the project are being performed under **PID 117158** which will be used for reference for invoicing.

Labor Hours – HIGH

RMR Screening Submission: December 23, 2022

Parcels to be evaluated

Parcel Number: 01-033-00-00-009-000
Location Address: 8111 State Route 225, Atwater OH 44201
Land Use: Commercial garages; bus salvage operation
Owner Address: OGLINE MICHAEL A & LEWIS D YODER(CO-TRUSTEES)
1010 SUNNYSIDE ST
HARTVILLE OH 44632

Parcel Number: 08-055-00-00-001-000
Location Address: 8135 State Route 224, Deerfield OH 44411
Land Use: Other commercial structures
Owner Address: CARRINGTON WALTER H III
3453 WAYLAND RD
DIAMOND OH 44412

Parcel Number: 08-055-00-00-001-001
Location Address: 8153 State Route 224, Deerfield OH 44411
Land Use: Single family
Owner Address: JOHNSON DARRYL&CAROLE EAGLE JANET CROWLEY (J&S)
8153 ST RT 224

DEERFIELD OH 44411

Parcel Number: 08-056-00-00-006-000

Location Address: 8186 State Route 224, Deerfield OH 44411

Land Use: Other industrial structures.....SUPERFUND NPL SITE

Owner Address: VASI JOHN

8186 ST RT 224

P O BOX 217

DEERFIELD OH 44411

Parcel Number: 01-033-00-00-011-000 + additional parcels. **Our intent is evaluation of potential right-of-way take and deep excavation at the intersection. If multiple BFI parcels require evaluation, please factor that into the cost proposal.**

Location Address: 8112 WATERLOO RD, Atwater OH 44201

Land Use: Residential Unplated...Abutting Former BFI (Browning Ferris Industries) Landfill

Owner Address: BROWNING FERRIS

INDUSTRIES OF OHIO INC

8112 WATERLOO RD

ATWATER OH 44201

David James, P.E.

Consultant Contracts Manager

ODOT District 4

2088 South Arlington Rd., Akron, Ohio 44306

(p) 330.786.3192

transportation.ohio.gov



CAUTION: This is an external email and may not be safe. If the email looks suspicious, please do not click links or open attachments and forward the email to csc@ohio.gov or click the Phish Alert Button if available.

Gina Balsamo

From: David.Griffith@dot.ohio.gov
Sent: Friday, July 21, 2023 12:54 PM
To: Gina Balsamo
Cc: Chelsea Cousins; Leiana Yates
Subject: POR 224 at 225 Safety Study

Follow Up Flag: Flag for follow up
Flag Status: Completed

Gina,

Give me a call regarding the POR 224 at 225 intersection study. Of all the locations, I would like to expedite this study's schedule to be able to get it into the Fall Safety application round. I know it's tight (my fault, not asphalt) but, please give me a call to discuss if this would be possible.

Regarding the **planning level estimate for disposal of excavated materials**, ODOT's environmental section advised using the estimated costs found in the Regulated Materials Review Manual (link below in Brian's reply). For this planning level estimate, use the "Work Involving Hazardous Waste" cost.

It was also advised to shift the RAB to a placement that avoids taking the roller skating rink.

I will be here today until 4:00pm.
Monday, I'll be available after 9:00am.

Thank you,
Dave

David E. Griffith, P.E.

*District Traffic/Safety Manager &
Highway Safety Program Coordinator*
District 4, ODOT
2088 S. Arlington Rd., Akron, Ohio 44306
(330) 786-4941



From: Peck, Brian <Brian.Peck@dot.ohio.gov>
Sent: Friday, July 21, 2023 12:07 PM
To: Griffith, David <David.Griffith@dot.ohio.gov>
Subject: Disposal Cost

Dave,

[Regulated Materials Review Manual](#) Feb 2023

Page 48 --- Use an inflation multiplier..

7.15.3 Estimate Cost

Calculate the disposal cost. The **estimated** cost of waste transport and disposal is based on many factors. This includes the waste type, disposal method and type (e.g. landfill, recycle), landfill type (hazardous, solid waste, etc.), distance to the waste facility from the Project, and quantity to be disposed. Use the ODOT Construction **Estimated** Averages for Bids in the calculations which include these costs.

For the development of **estimated** disposal costs, the ODOT Construction bid **estimates** for contract years between 2015 and 2018 were used to determine average award bid costs for working with RM wastes:

Table 3 – Cost Estimate Average for Bid Let Years between 2016 – 2019		
ODOT CONSTRUCTION CATEGORY	AWARD BID	UNIT
Special – Work Involving Hazardous Waste	\$ 116	ton
Special – Work Involving PCS	\$ 95	ton
Special – Work Involving Solid Waste	\$ 81	ton
Special – Work Involving Non-regulated Material	\$ 45	ton
Special – Work Involving Regulated Water	\$ 7	gallon
Special – Work Involving Non-regulated Water	\$ 6	gallon
Special – Regulated UST Removal	\$ 5,400	each

Using the example above resulting in 15 tons of PCS, the **estimated** removal and disposal cost would be 15 tons x \$95 (**estimated** cost from Table 7.3.4) = \$1,425.

Thanks.

Brian Peck

Environmental Specialist

ODOT District 4

2088 South Arlington Road, Akron, Ohio 44306-4243

330.786.4931 (office)

transportation.ohio.gov



The environmental review, consultation and other actions required by applicable Federal environmental laws for this project are being, or have been, carried-out by ODOT pursuant to 23 U.S.C. 327 and a Memorandum of Understanding, dated June 6, 2018, and executed by FHWA and ODOT.

From: Gina Balsamo <gbalsamo@cmtran.com>

Sent: Tuesday, June 13, 2023 8:17 AM

To: Griffith, David <David.Griffith@dot.ohio.gov>

Cc: Chelsea Cousins <ccousins@cmtran.com>; Leiana Yates <lyates@cmtran.com>; 'Kristi Norfolk' <kristi@lanhamengineering.com>; David Addison <david@lanhamengineering.com>; Victoria Dang <victoria@lanhamengineering.com>; Dustin Gohs <dgohs@cmtran.com>

Subject: RE: D04 Safety Studies Touchbase

Dave,

Thanks for the updates!

We have downloaded the Navarre files.

For POR 224 at 225, I believe we had received the screening from Lawhon when it was completed, but not the email from the District environmental staff. This is very helpful! **Would the District environmental staff be able to provide us with a planning level estimate for disposal of excavated materials for each quadrant?** We can make some best guesses, but we figure the environmental staff knows best here.

We will await your comments for POR SR 43 at Trares & Randolph and the remaining liquid files for STA SR-627 at Shepler-Church (CR-257) and STA SR-173 at Paris (CR-44).

Thanks!

Gina Balsamo, PE, PTOE

Carpenter Marty Transportation
614.656.2429

From: David.Griffith@dot.ohio.gov <David.Griffith@dot.ohio.gov>

Sent: Monday, June 12, 2023 5:10 PM

To: Gina Balsamo <gbalsamo@cmtran.com>

Cc: Chelsea Cousins <ccousins@cmtran.com>; Leiana Yates <lyates@cmtran.com>; 'Kristi Norfolk' <kristi@lanhamengineering.com>; David Addison <david@lanhamengineering.com>; Victoria Dang <victoria@lanhamengineering.com>

Subject: RE: D04 Safety Studies Touchbase

Hi Gina –

Apologies for the delay. I'd thought at least the attached screening of POR 224 at 225 had been sent. Because of the sensitivity of RW impacts here, the study should include a comparative alt eval (Safety, Operation, Cost and Impact) between the RAB and signalized intersection with needed turn lanes. Call me to discuss if you think this may go beyond the study scope's effort. Note that the intersection is used by heavy %tage of large trucks and farming equipment. I'll confirm tomorrow but, the RAB's minimum inscribed circle should be 130-140 feet.

See comments **below** for other the material.

Thank you for your patience,
Dave

David E. Griffith, P.E.

*District Traffic/Safety Manager &
Highway Safety Program Coordinator*
District 4, ODOT
2088 S. Arlington Rd., Akron, Ohio 44306
(330) 786-4941



From: Gina Balsamo <gbalsamo@cmtran.com>

Sent: Monday, June 12, 2023 10:57 AM



POR-US224/SR225 Intersection

Regulated Materials Review

December 23, 2022



The environmental review, consultation, and other actions required by applicable Federal environmental laws for this project are being, or have been, carried-out by ODOT pursuant to 23 U.S.C. 327 and a Memorandum of Understanding dated December 14, 2020, and executed by FHWA and ODOT.


RMR SCREENING SUMMARY

July 2022

GENERAL INFORMATION

Project C-R-S / Name:	POR-US224/SR225 Intersection	PID:	N/A	District:	04
Brief Project Description:	<p>Safety study evaluating the US Route 224 and State 225 intersection location. Adjacent land use information is needed to properly evaluate safety alternatives which may include construction of modern roundabout intersection, construction of additional turning lanes, traffic signal installation, etc.</p> <p>The project is currently in a study phase and Stage 1 plans/preliminary ROW will not be available for this report. RMR screening is assuming ROW and/or deep excavation is possible at each parcel.</p>				
Report Author(s):	John Korth				
Affiliation:	Consultants - Lawhon & Associates, Inc.				

CERTIFICATION *(Must be acknowledged by Prequalified Individual)*

<input checked="" type="checkbox"/>	I certify that I have personally examined and am familiar with the information in this document and all attachments, and that the data collection was supervised by an individual(s) prequalified to conduct the RMR for ODOT or by trained ODOT Environmental staff. Based on my inquiry of those persons immediately responsible for obtaining the information contained herein, I believe that the information has been collected in accordance with the ODOT RMR Manual current at the time of this submittal, and is true, accurate, and complete.				
Name:	John Korth	Signature:			
Title:	Project Manager	Date:	2/23/2022		
Email:	jkorth@lawhon-assoc.com	Phone Number:	(614) 481-8600		

BLOCK 1

1a:	Does Permanent right-of-way (ROW) need to be obtained for the Project?	Unknown
1b:	Will the Project involve excavations greater than 6 feet deep (excluding projects which only include signal pole installation)?	Unknown
1c:	Is the Project on the 513 Exemption listed?	Choose yes/no/unknown.
1d:	Is the Project within 300-feet of a landfill?	Choose yes/no/unknown.
<ul style="list-style-type: none"> If answer to Questions 1a and/or 1b are Yes or UNKNOWN, skip Questions 1c and 1d and continue to Block 2. If answer to Questions 1a and 1b are NO and 1c is YES - Stop Here. Project is exempt from further evaluation. Complete through Block 1 as documentation of the RMR Screening and upload the RMR Screening Summary Sheet (this form). If answer to 1a, 1b and 1c are NO, conduct a Landfill Specific ORPS. If answer to 1d is NO, complete through Block 1 as documentation of the RMR Screening and upload the RMR Screening Summary Sheet (this form), Landfill Specific map and Summary ORPS to EnviroNet. Project is exempt from further evaluation. If answer to 1d is YES, complete through Block 1 as documentation of the RMR Screening and upload the RMR Screening Summary Sheet (this form) and Landfill Specific map and Summary ORPS to EnviroNet. Send Project to OES for Rule 513 determination. 		

BLOCK 2 - COMPLETE FULL ORPS AND PROPERTY INVENTORY

Complete Columns 1-6 of the "Property Inventory: Properties Within or Abutting" and (if applicable) Complete "Remote Property Inventory" tables.
--

BLOCK 3 - INITIATE PROJECT SCREENING

Are all Properties within the Project Limits Exempt OR have no Take and no Deep Excavation; AND Project is not with 300 feet of a Landfall and/or there are no Remote Properties identified in ORPS Listing?	No
If the answer is YES - Upload this Form and attachments to EnviroNet; the Project is considered Exempt from further evaluation for Regulated Materials. If the answer is No or Unknown - Complete the Property Inventory (Columns 7-10).	

PROPERTY INVENTORY: PROPERTIES WITHIN OR ABUTTING PROJECT LIMITS

Property Inventory: Properties Within or Abutting Project Limits														
Column 1			Column 2		Column 3	Column 4	Column 5	Column 6			Column 7		Column 8	Column 9
ODOT / RMR Property ID#	Tenant / Owner Name	Property Street Address	Current Land Use	Current or Past RM Concern Noted during Review?	Select RCRA ORPS Listing(s). (Check all that apply.)	Select ORPS Listing(s). (Check all that apply.)	What Is the determined Land Use Risk based on Columns 2, 3 and 4	Total or Partial Take?	Is There Demolition?	Is There Deep Excavation?	Is the Property Likely Impacted by RM?	Is Property RM Likely Encountered in Construction?	Action Result?	Comments
RM-001	Paul's Repair/ Michael Oglie & Lewis Yoder	8111 State Route 225	Automotive Repair/Shop/Oil Change/Body Shop	Yes Petroleum distillates	<input checked="" type="checkbox"/> No RCRA <input type="checkbox"/> CESGO/SQG <input type="checkbox"/> LQG <input type="checkbox"/> CORRACTS <input type="checkbox"/> Non-CORRACTS <input type="checkbox"/> Unspecified Universe <input type="checkbox"/> TSD <input type="checkbox"/> Non-Generator <input type="checkbox"/> Other (Specify in Comments)	<input type="checkbox"/> No ORPS <input type="checkbox"/> CERCLIS/NFRAP <input type="checkbox"/> I/E Control <input type="checkbox"/> UST/LUST <input type="checkbox"/> NPL <input type="checkbox"/> Ohio VAP <input type="checkbox"/> SPILLS <input type="checkbox"/> SWF <input type="checkbox"/> Town Gas <input type="checkbox"/> DERR Database <input checked="" type="checkbox"/> Other (Specify in Comments)	High	Unknown	Unknown	Unknown	Yes Petroleum distillates	Yes Petroleum distillates	RM Plan Note	Site has operated as a bus service and repair facility since at least 1951. Strip mining activities observed on north of the auto facility. ORPS lists an Historic Waste Facility called Horner Tire Site within the site boundaries.
RM-002	Deerfield Skating Center/ Walter Carrington	8135 State Route 224	Commerical (bank, office, store, lodging, care)	No	<input checked="" type="checkbox"/> No RCRA <input type="checkbox"/> CESGO/SQG <input type="checkbox"/> LQG <input type="checkbox"/> CORRACTS <input type="checkbox"/> Non-CORRACTS <input type="checkbox"/> Unspecified Universe <input type="checkbox"/> TSD <input type="checkbox"/> Non-Generator <input type="checkbox"/> Other (Specify in Comments)	<input checked="" type="checkbox"/> No ORPS <input type="checkbox"/> CERCLIS/NFRAP <input type="checkbox"/> I/E Control <input type="checkbox"/> UST/LUST <input type="checkbox"/> NPL <input type="checkbox"/> Ohio VAP <input type="checkbox"/> SPILLS <input type="checkbox"/> SWF <input type="checkbox"/> Town Gas <input type="checkbox"/> DERR Database <input type="checkbox"/> Other (Specify in Comments)	Low	Unknown	Unknown	Unknown	No	No	RMR Complete	Enter text here.
RM-003	Darryl Johnson, Carole Eagle, & Janet Crowley	8153 State Route 224	Residential	No	<input checked="" type="checkbox"/> No RCRA <input type="checkbox"/> CESGO/SQG <input type="checkbox"/> LQG <input type="checkbox"/> CORRACTS <input type="checkbox"/> Non-CORRACTS <input type="checkbox"/> Unspecified Universe <input type="checkbox"/> TSD <input type="checkbox"/> Non-Generator <input type="checkbox"/> Other (Specify in Comments)	<input checked="" type="checkbox"/> No ORPS <input type="checkbox"/> CERCLIS/NFRAP <input type="checkbox"/> I/E Control <input type="checkbox"/> UST/LUST <input type="checkbox"/> NPL <input type="checkbox"/> Ohio VAP <input type="checkbox"/> SPILLS <input type="checkbox"/> SWF <input type="checkbox"/> Town Gas <input type="checkbox"/> DERR Database <input type="checkbox"/> Other (Specify in Comments)	Exempt	Unknown	Unknown	Unknown	No	No	RMR Complete	Enter text here.



Property Inventory: Properties Within or Abutting Project Limits														
Column 1			Column 2		Column 3	Column 4	Column 5	Column 6			Column 7		Column 8	Column 9
ODOT / RMR Property ID#	Tenant / Owner Name	Property Street Address	Current Land Use	Current or Past RM Concern Noted during Review?	Select RCRA ORPS Listing(s). (Check all that apply.)	Select ORPS Listing(s). (Check all that apply.)	What Is the determined Land Use Risk based on Columns 2, 3 and 4	Total or Partial Take?	Is There Demolition?	Is There Deep Excavation?	Is the Property Likely Impacted by RM?	Is Property RM Likely Encountered in Construction?	Action Result?	Comments
RM-004	John Vasi	8186 State Route 224	Landfill/Junkyard/Scrapyard	Yes Strip mining, incinerator ash, landfilling	<input checked="" type="checkbox"/> No RCRA <input type="checkbox"/> CESQG/SQG <input type="checkbox"/> LOG <input type="checkbox"/> CORRACTS <input type="checkbox"/> Non-CORRACTS <input type="checkbox"/> Unspecified Universe <input type="checkbox"/> TSD <input type="checkbox"/> Non-Generator <input type="checkbox"/> Other (Specify in Comments)	<input type="checkbox"/> No ORPS <input type="checkbox"/> CERCLIS/NFRAP <input type="checkbox"/> I/E Control <input type="checkbox"/> UST/LUST <input checked="" type="checkbox"/> NPL <input type="checkbox"/> Ohio VAP <input type="checkbox"/> SPILLS <input type="checkbox"/> SWF <input type="checkbox"/> Town Gas <input checked="" type="checkbox"/> DERR Database <input type="checkbox"/> Other (Specify in Comments)	High	Unknown	Unknown	Unknown	Yes Groundwater contamination	Yes Groundwater contamination	RMR Investigation	Site listed on the Abandoned Landfills database. Site is a former coal strip mine until 1974 when it operated as a waste storage/recycle/disposal facility with two surface water ponds and an incinerator. Wastes were stored in drums, open pit, and bulk tanks until wastes were incinerated, buried, and disposed of on-site. Remedial activities such as removal of waste, impacted soils and surface water, regrading, permeable cap, French drains, groundwater treatment facility commenced in 1993. Review of most recent groundwater data indicates groundwater flows away (southeast) from the project area and chemicals of concern below applicable action levels in off-site wells. On August 17, 2022, EPA removed the land/soil portion of the Summit National site from the NPL after determining that the soil cleanup was complete, and no further action was necessary other than continued operation and maintenance, monitoring, and five-year reviews.
RM-005	Browning Ferris Industries of Ohio Inc.	8112 Waterloo Road	Vacant	No	<input checked="" type="checkbox"/> No RCRA <input type="checkbox"/> CESQG/SQG <input type="checkbox"/> LOG <input type="checkbox"/> CORRACTS <input type="checkbox"/> Non-CORRACTS <input type="checkbox"/> Unspecified Universe <input type="checkbox"/> TSD <input type="checkbox"/> Non-Generator <input type="checkbox"/> Other (Specify in Comments)	<input checked="" type="checkbox"/> No ORPS <input type="checkbox"/> CERCLIS/NFRAP <input type="checkbox"/> I/E Control <input type="checkbox"/> UST/LUST <input type="checkbox"/> NPL <input type="checkbox"/> Ohio VAP <input type="checkbox"/> SPILLS <input type="checkbox"/> SWF <input type="checkbox"/> Town Gas <input type="checkbox"/> DERR Database <input type="checkbox"/> Other (Specify in Comments)	Low	Unknown	Unknown	Unknown	No	No	RMR Complete	Enter text here.

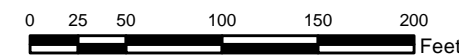
Map of Study Area



Site Location Map

Legend

-  Study Area
-  Parcel Lines



**POR-US224 SR225
Intersection**

Study Area



Lawhon & Associates, Inc.



Date: Dec. 2022	Approved by: JK	L&A No. 20-0076	Figure 1
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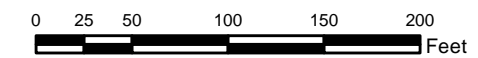
Aerial Photographs



Site Location Map

Legend

-  Study Area
-  Parcel Lines



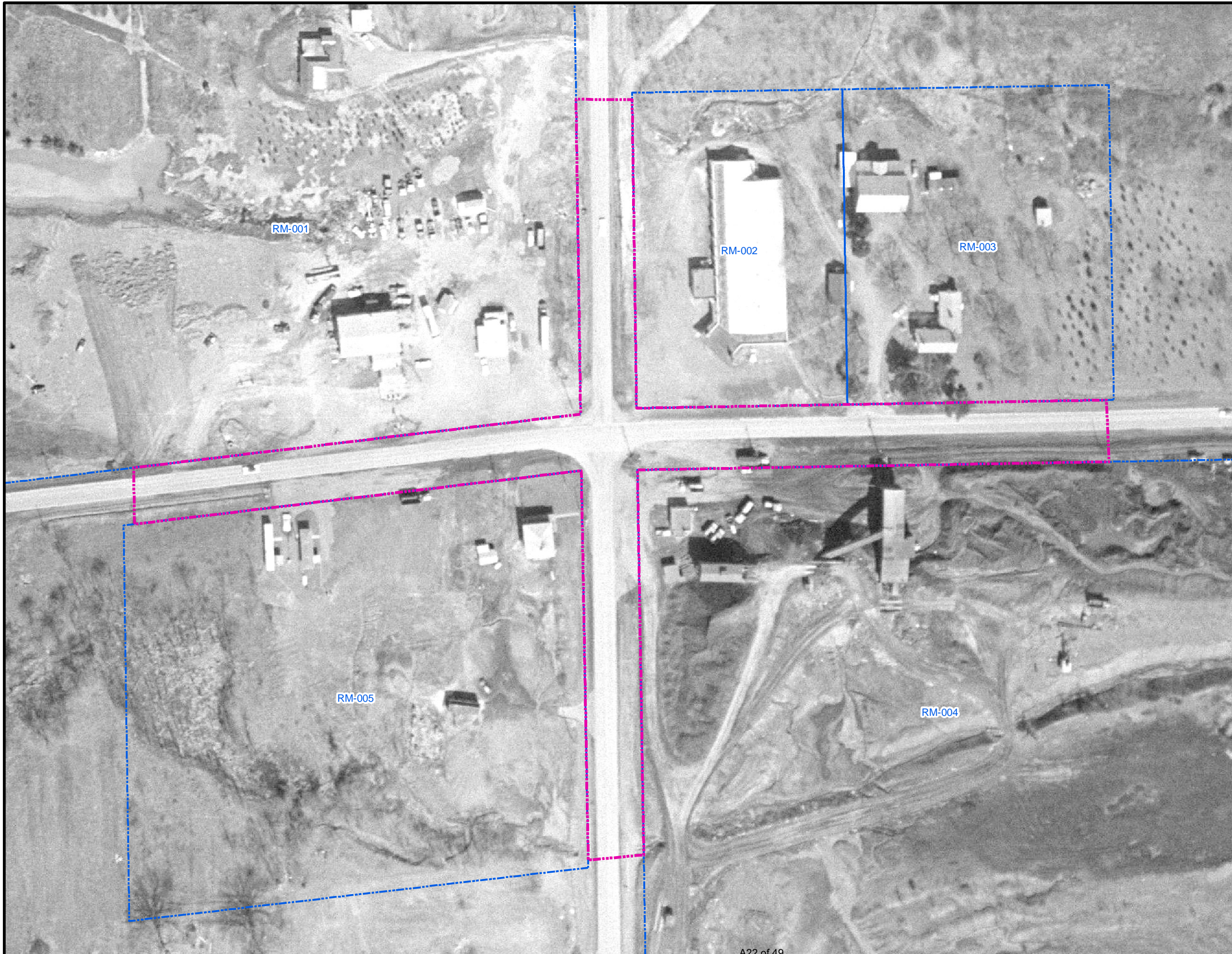
**POR-US224 SR225
Intersection**

1951 Aerial Imagery





Lawhon & Associates, Inc.

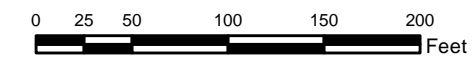
Date: Dec. 2022	Approved by: JK	L&A No. 20-0076	Figure 2
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Site Location Map

Legend

-  Study Area
-  Parcel Lines



**POR-US224 SR225
Intersection**

1962 Aerial Imagery



Lawhon & Associates, Inc.

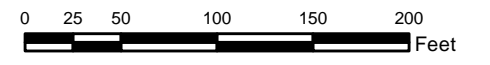
Date: Dec. 2022	Approved by: JK	L&A No. 20-0076	Figure 3
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Site Location Map

Legend

- Study Area
- Parcel Lines



**POR-US224 SR225
Intersection**

1970 Aerial Imagery





Lawhon & Associates, Inc.

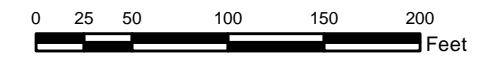
Date: Dec. 2022	Approved by: JK	L&A No. 20-0076	Figure 4
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Site Location Map

Legend

-  Study Area
-  Parcel Lines



**POR-US224 SR225
Intersection**

1975 Aerial Imagery





Lawhon & Associates, Inc.

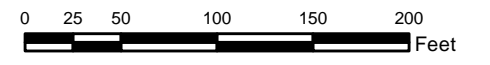
Date: Dec. 2022	Approved by: JK	L&A No. 20-0076	Figure 5
--------------------	--------------------	--------------------	-------------



Site Location Map

Legend

-  Study Area
-  Parcel Lines



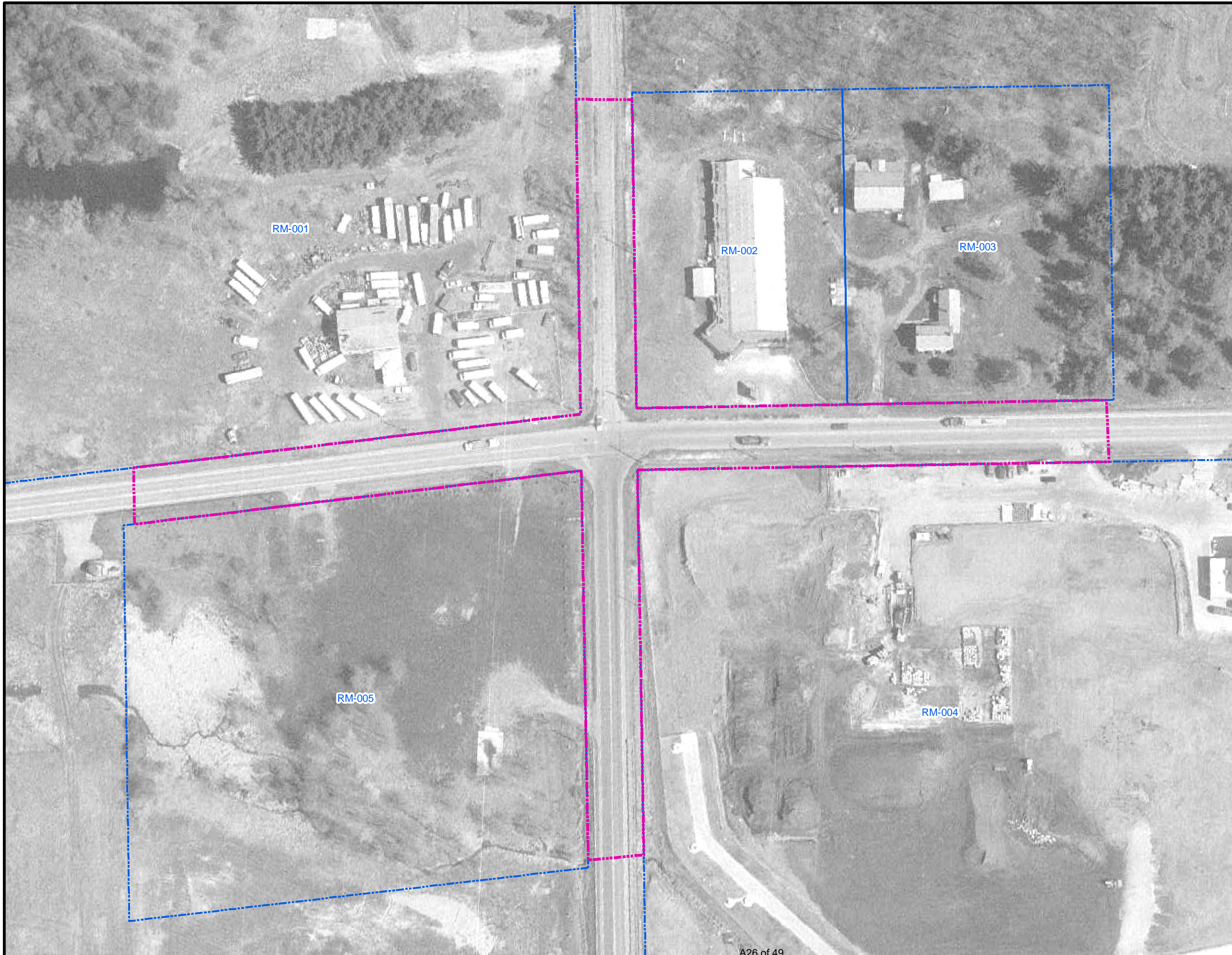
**POR-US224 SR225
Intersection**

1985 Aerial Imagery





Lawhon & Associates, Inc.

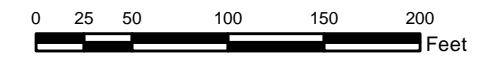
Date: Dec. 2022	Approved by: JK	L&A No. 20-0076	Figure 6
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Site Location Map

Legend

-  Study Area
-  Parcel Lines



**POR-US224 SR225
Intersection**

1995 Aerial Imagery



Lawhon & Associates, Inc.

Date: Dec. 2022	Approved by: JK	L&A No. 20-0076	Figure 7
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Map of Suspect Properties

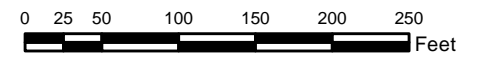


Site Location Map

Legend

- Study Area
- Parcel Lines
- Suspect Properties

N
↑



POR-US224 SR225 Intersection

Suspect Properties Map

Lawhon & Associates, Inc.

Date: Dec. 2022	Approved by: JK	L&A No. 20-0076	Figure 8
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ODOT Regulatory Property Search

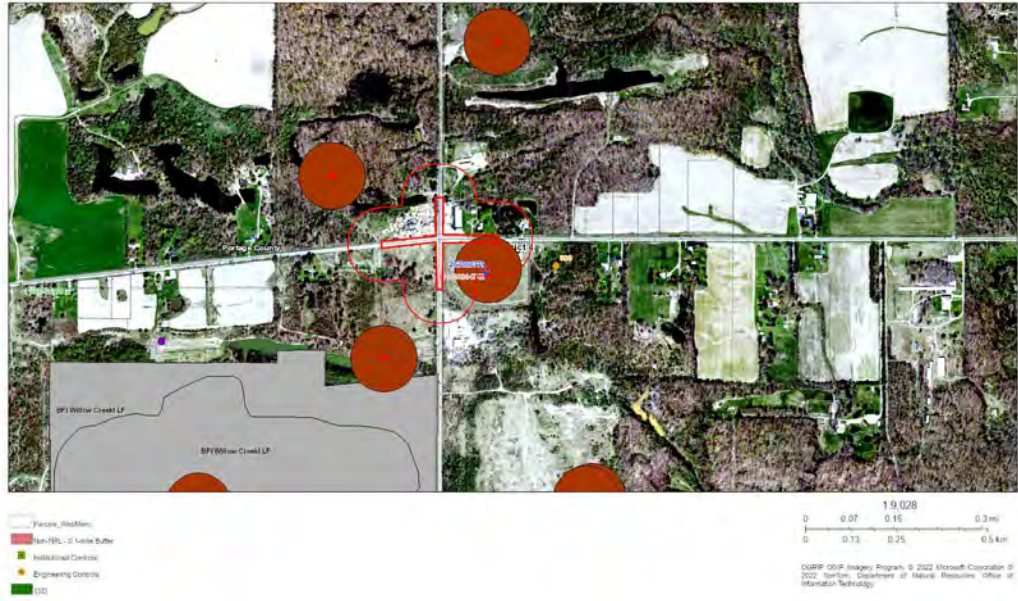


ORPS Summary Report - 300 foot buffer

Area of Interest (AOI) Information

Area : 33.22 acres

Dec 21 2022 11:43:40 Eastern Standard Time



Summary

Name	Count	Area(acres)	Length(ft)
SEMS - Non-NPL Sites w/buffer (US EPA)	0	0	N/A
SEMS - NPL Sites w/buffer (US EPA)	1	33.22	N/A
RCRA (US EPA)	0	N/A	N/A
RCRA - TSD Sites w/buffer (US EPA)	0	0	N/A
Federal Engineering Controls (US EPA)	0	N/A	N/A
Federal Institutional Controls (US EPA)	0	N/A	N/A
BUSTR - UST Locations (BUSTR/OGRIP)	0	N/A	N/A
BUSTR - LUST Locations (BUSTR/OGRIP)	0	N/A	N/A
Coal Gas Generators (OEPA-DERR)	0	N/A	N/A
DERR Database (OEPA-DERR)	1	N/A	N/A
Impoundment Sites (OEPA-DERR)	0	N/A	N/A
Landfills - Active Solid Waste Facilities w/buffer (OEPA-DMWM)	0	0	N/A
Landfills - Historic/Abandoned Facilities w/buffer (OEPA-DMWM/DERR)	1	4.53	N/A
Landfills - Solid Waste Facility Polygons (OEPA-DMWM)	0	0	N/A
Projects With Engineering Controls (OEPA-DERR)	0	N/A	N/A
Projects With Institutional Controls (OEPA-DERR)	0	N/A	N/A
Spills Database (OEPA)	0	N/A	N/A
VAP Sites (OEPA-DERR)	0	N/A	N/A
Potential Areas of Concern (ODOT-OES)	0	0	N/A

SEMS - NPL Sites w/buffer (US EPA)

#	REGISTRY_ID	PRIMARY_NAME	ADDRESS	CITY	STATE	ZIP	LAST_REPORTED_DATE	URL
1	110009304742	SUMMIT NATIONAL	1240 ALLIANCE ROAD	DEERFIELD	OH	44411	No Data	https://ofmpub.epa.gov/frs_public2/fil_query_detail_disp_program_facility?p_registry_id=110009304742

#	PGM_SYS_ID	PGM_SYS_ACRONYM	INTEREST_TYPE	REFERENCE_POINT_DESC	Area(acres)
1	OHD980609994	SEMS	SUPERFUND NPL	No Data	33.22

DERR Database (OEPA-DERR)

#	DERR_ID	NAME	ALIAS	ADDRESS	CITY	ZIP	CERCLIS_ID	ACTIVITY
1	267000779	Summit Natl Liquid Disposal Services, Deerfield	No Data	1240 Alliance Rd	Deerfield	44411	OHD980609994	RR

#	OEPA_DISTRICT	EDOCS_LINK	Count
1	NEDO	https://edocpub.epa.ohio.gov/ODOTService/api/DocPop/267000779	1

Landfills - Historic/Abandoned Facilities w/buffer (OEPA-DMWM/DERR)

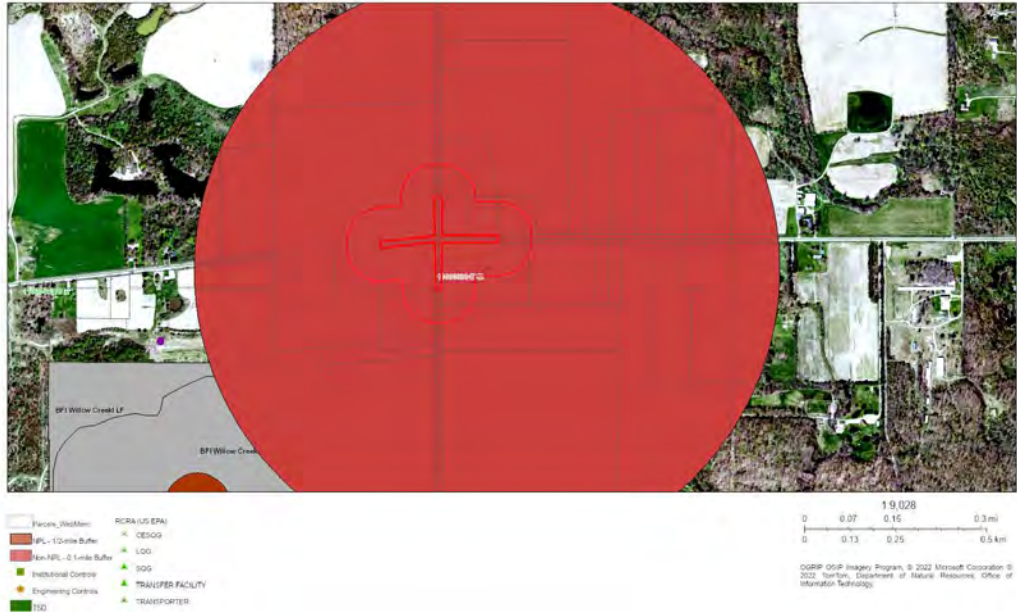
#	LATITUDE	LONGITUDE	SITE	ALT SITE NAME/LOCATION	COUNTY	WASTE_TYPE	YEAR_CLOSED	SECONDARY_ID
1	41.024	-81.0971	SUMMIT NATIONAL SERVICES	*CORNER OF S.R. 225 AND S.R. 224	PORTAGE	No Data	No Data	No Data

#	SWLF_ID	DATABASE	OEPA_DISTRICT	EDOCS_LINK	Area(acres)
1	No Data	Abandoned	NEDO	https://edocpub.epa.ohio.gov/ODOTService/api/DocPop/00	4.53

Area of Interest (AOI) Information

Area : 33.22 acres

Dec 21 2022 11:45:16 Eastern Standard Time



Summary

Name	Count	Area(acres)	Length(ft)
SEMS - Non-NPL Sites w/buffer (US EPA)	0	0	N/A
SEMS - NPL Sites w/buffer (US EPA)	1	33.22	N/A
RCRA (US EPA)	0	N/A	N/A
RCRA - TSD Sites w/buffer (US EPA)	0	0	N/A
Federal Engineering Controls (US EPA)	0	N/A	N/A
Federal Institutional Controls (US EPA)	0	N/A	N/A
BUSTR - UST Locations (BUSTR/OGRIIP)	0	N/A	N/A
BUSTR - LUST Locations (BUSTR/OGRIIP)	0	N/A	N/A
Coal Gas Generators (OEPA-DERR)	0	N/A	N/A
DERR Database (OEPA-DERR)	1	N/A	N/A
Impoundment Sites (OEPA-DERR)	0	N/A	N/A
Landfills - Active Solid Waste Facilities w/buffer (OEPA-DMWM)	0	0	N/A
Landfills - Historic/Abandoned Facilities w/buffer (OEPA-DMWM/DERR)	1	4.53	N/A
Landfills - Solid Waste Facility Polygons (OEPA-DMWM)	0	0	N/A
Projects With Engineering Controls (OEPA-DERR)	0	N/A	N/A
Projects With Institutional Controls (OEPA-DERR)	0	N/A	N/A
Spills Database (OEPA)	0	N/A	N/A
VAP Sites (OEPA-DERR)	0	N/A	N/A
Potential Areas of Concern (ODOT-OES)	0	0	N/A

SEMS - NPL Sites w/buffer (US EPA)

#	REGISTRY_ID	PRIMARY_NAME	ADDRESS	CITY	STATE	ZIP	LAST_REPORTED_DATE	URL
1	110009304742	SUMMIT NATIONAL	1240 ALLIANCE ROAD	DEERFIELD	OH	44411	No Data	https://ofmpub.epa.gov/frs_public2/fil_query_detail_disp_program_facility?p_registry_id=110009304742

#	PGM_SYS_ID	PGM_SYS_ACRONYM	INTEREST_TYPE	REFERENCE_POINT_DESC	Area(acres)
1	OHD980609994	SEMS	SUPERFUND NPL	No Data	33.22

DERR Database (OEPA-DERR)

#	DERR_ID	NAME	ALIAS	ADDRESS	CITY	ZIP	CERCLIS_ID	ACTIVITY
1	267000779	Summit Natl Liquid Disposal Services, Deerfield	No Data	1240 Alliance Rd	Deerfield	44411	OHD980609994	RR

#	OEPA_DISTRICT	EDOCS_LINK	Count
1	NEDO	https://edocpub.epa.ohio.gov/ODOTService/api/DocPop/267000779	1

Landfills - Historic/Abandoned Facilities w/buffer (OEPA-DMWM/DERR)

#	LATITUDE	LONGITUDE	SITE	ALT SITE NAME/LOCATION	COUNTY	WASTE_TYPE	YEAR_CLOSED	SECONDARY_ID
1	41.024	-81.0971	SUMMIT NATIONAL SERVICES	*CORNER OF S.R. 225 AND S.R. 224	PORTAGE	No Data	No Data	No Data

#	SWLF_ID	DATABASE	OEPA_DISTRICT	EDOCS_LINK	Area(acres)
1	No Data	Abandoned	NEDO	https://edocpub.epa.ohio.gov/ODOTService/api/DocPop/00	4.53

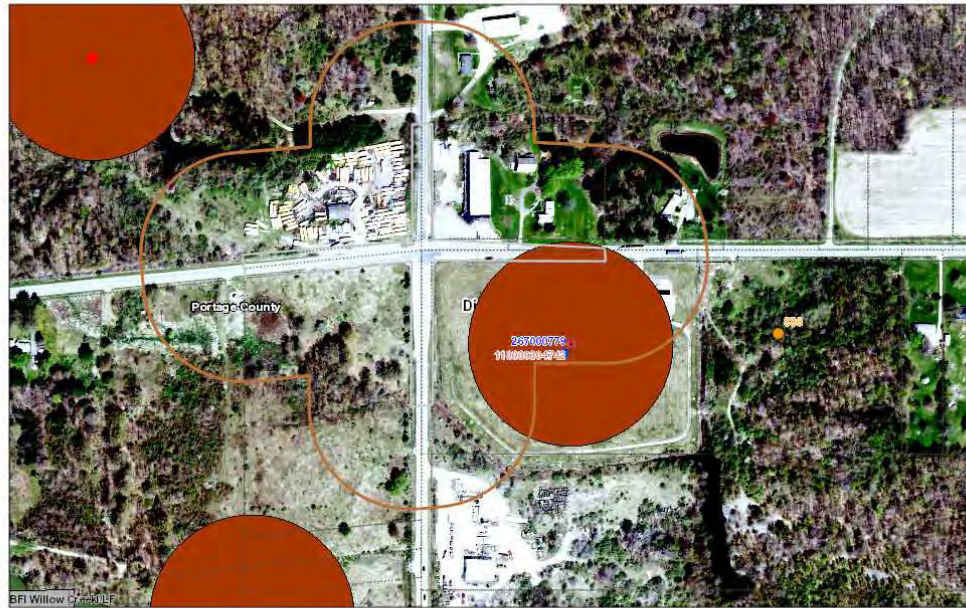


Landfill-specific ORPS Summary Report

Area of Interest (AOI) Information

Area : 33.21 acres

Dec 21 2022 8:51:58 Eastern Standard Time



Summary

Name	Count	Area(acres)	Length(ft)
Landfills - Active Solid Waste Facilities w/buffer (OEPA-DMWM)	0	0	N/A
Landfills - Historic/Abandoned Facilities w/buffer (OEPA-DMWM/DERR)	1	4.57	N/A
Landfills - Solid Waste Facility Polygons (OEPA-DMWM)	0	0	N/A

Landfills - Historic/Abandoned Facilities w/buffer (OEPA-DMWM/DERR)

#	LATITUDE	LONGITUDE	SITE	ALT SITE NAME/LOCATION	COUNTY	WASTE_TYPE	YEAR_CLOSED	SECONDARY_ID
1	41.024	-81.0971	SUMMIT NATIONAL SERVICES	*CORNER OF S.R. 225 AND S.R. 224	PORTAGE	No Data	No Data	No Data

#	SWLF_ID	DATABASE	OEPA_DISTRICT	EDOCS_LINK	Area(acres)
1	No Data	Abandoned	NEDO	https://edocpub.epa.ohio.gov/ODOTService/api/DocPop/00	4.57

Photolog



Photograph 1: Site -001. Viewing Paul's Equipment, looking northwest..



Photograph 2: Site RM-004. Viewing groundwater recover building, looking southwest.



Lawhon & Associates, Inc.
Cleveland – Columbus - Dayton
lawhon@lawhon-assoc.com
614.481.8600

POR-US224/SR225 Intersection
Deerfield, Ohio
L&A Project 20-0076
Photographs from Google Earth taken on 07/22

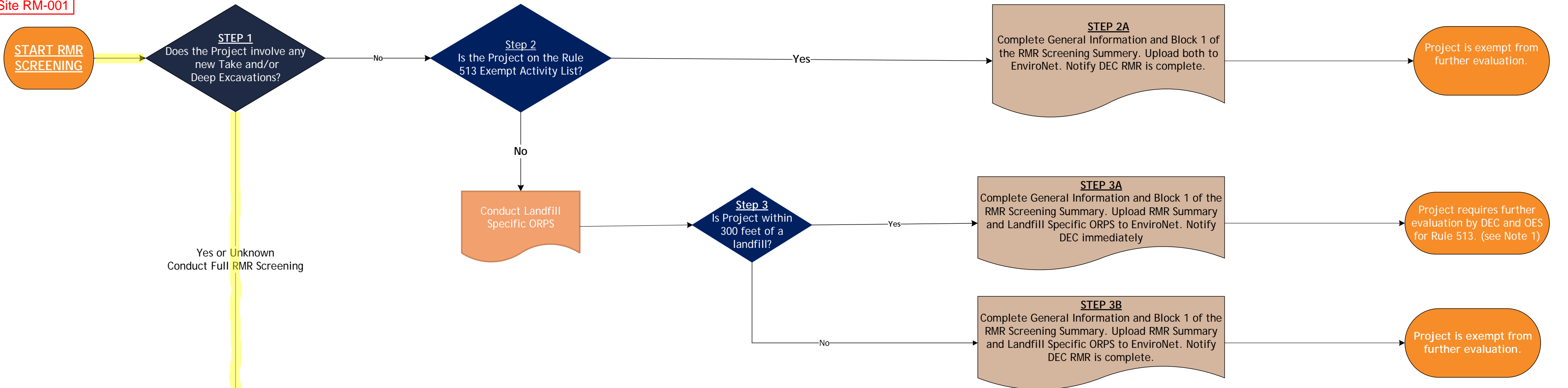
Flowcharts



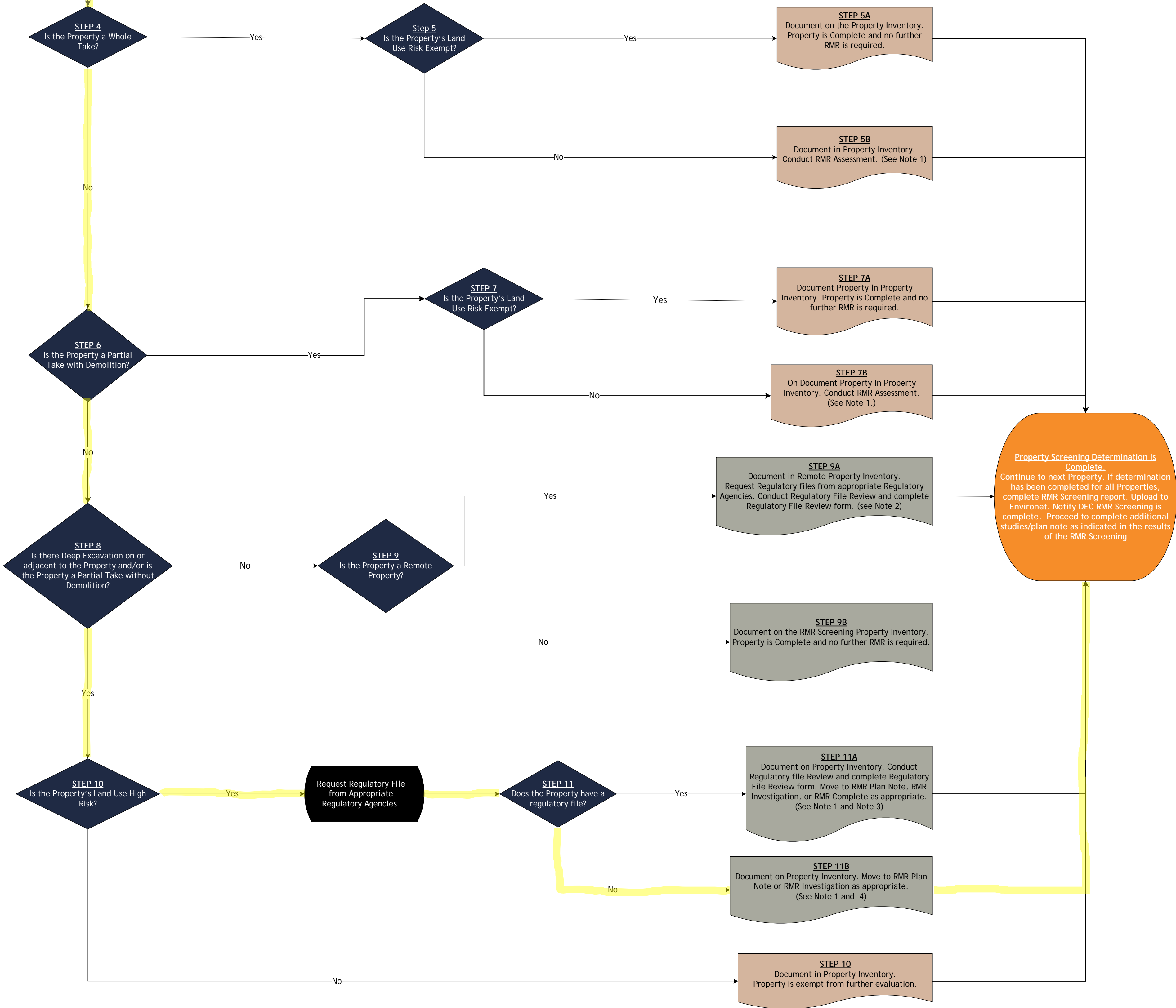
Purpose of the RMR Screening is to obtain a cursory understanding of the regulated material (RM) risks likely present on Properties within/abutting the Project Limits. Outcomes from this RMR Screening will be to provide the District Environmental Coordinator (DEC) and Office of Environmental Services (OES) sufficient information to understand the potential for RM tied to new permanent right-of-way (ROW)/Take or Deep Excavation.

JULY 2022

Site RM-001



Inventory all Properties Within and Abutting the Project Limits on the Property Inventory, Conduct Full ORPS, Obtain Historical Aerials and Most Recent Project Plans. Complete Column 1 through Column 6 of the Property Inventory. If the Full ORPS Shows a Remote Property, complete Remote Property Inventory. Starting at Step 4, Follow the Flowchart Using Answers from Columns 1 Through Column 5 for Each Property. Using Most Up to Date Construction Plans, Complete Column 6 and Column 7. Use Answers from Column 6 and Column 7, Following the Flowchart, Determine Property's Action Results and Document in Column 8.
IF ONE OR MORE PROPERTIES ARE ON THE NATIONAL PRIORITIES LIST (NPL), COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION, AND LIABILITY INFORMATION SYSTEM (CERCLIS) AND/OR WITHIN 300 FEET OF A LANDFILL CONTACT DEC IMMEDIATELY.



RMR Screening Report Content Requirements:

- RMR Screening Completed at **Step 2A** - 1) RMR Screening Summary with General Information and Block 1 completed
- RMR Screening Completed at **Step 3A/3B** - 1) Screening Summary with General Information and Block 1 completed, 2) Landfill ORPS
- Full RMR Screening - 1) Completed RMR Screening template, 2) full ORPS Mapping and Report, 3) Regulatory File Review Form, 4) Historical Aerials, 5) Project Mapping, 6) Regulatory Files, 6) Most Recent Project Plans, 7) DCSF (Upload to EnviroNet Separately)

NOTES

- Note 1: Properties that are on NPL, CERCLIS and/or within 300 feet of a Landfill, the RMR Screening will be submitted to OES by the DEC. OES and the DEC will work together to determine the best path forward for the Project.
- Note 2: Projects with one or more Remote Properties are to be submitted to OES by the DEC
- Note 3: Property with USTs and a BUSTR File, the Property Determination will be either an RMR Plan Note or RMR Complete based on the Regulatory File Review. Continue to RMR Assessment/Investigation/Plan Note Flowchart for next steps.
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RESOURCES

Refer to the RMR Manual for in depth details on conducting the RMR Screening

Acronym/Definition List (See Appendix A of the RMR Manual for a full list)

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- RM - Regulated Materials
- RMR - Regulated Materials Review
- Take - Act or process of acquiring a permanent right-of-way (ROW)

LAND USE RISK CATEGORIES

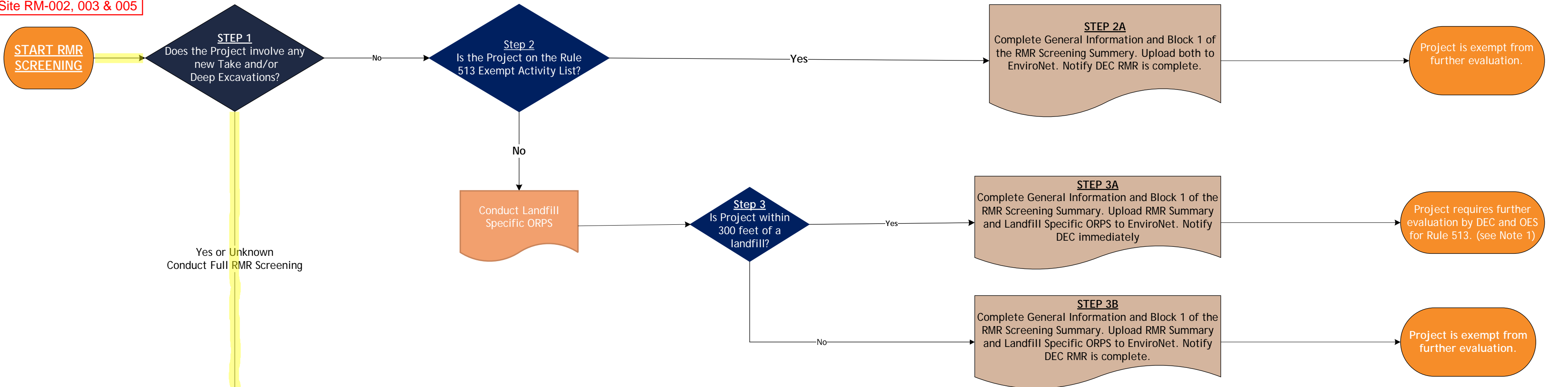
Exempt Category	Low-Risk Category	High-Risk Category
<ul style="list-style-type: none"> • Agricultural • Cemetery • Forested land • Parks • Recreation Areas • Residential • Undeveloped 	<ul style="list-style-type: none"> • Bank • Car Dealership (no Automotive Repair) • Commercial Office Space • Daycare • Florist/Landscaper • Government Office • Grocery • Lodging • Pharmacy • Physicians/Dentist Office • Restaurant • Retail Store • Railroad, Featureless Track • Hospitals 	<ul style="list-style-type: none"> • Automotive Repair/Service/Oil Change • Body Shop • Dry Cleaner • Electrical Substation • Gas Stations and Service Station • Government Maintenance Facilities • Grain Elevator • Junkyard/Scrapyard • Landfill • Property listed on regulatory databases • Manufacturing • Oil/Chemical Warehouse/Storage • Railroad Maintenance/Siding • ANY Industrial Use



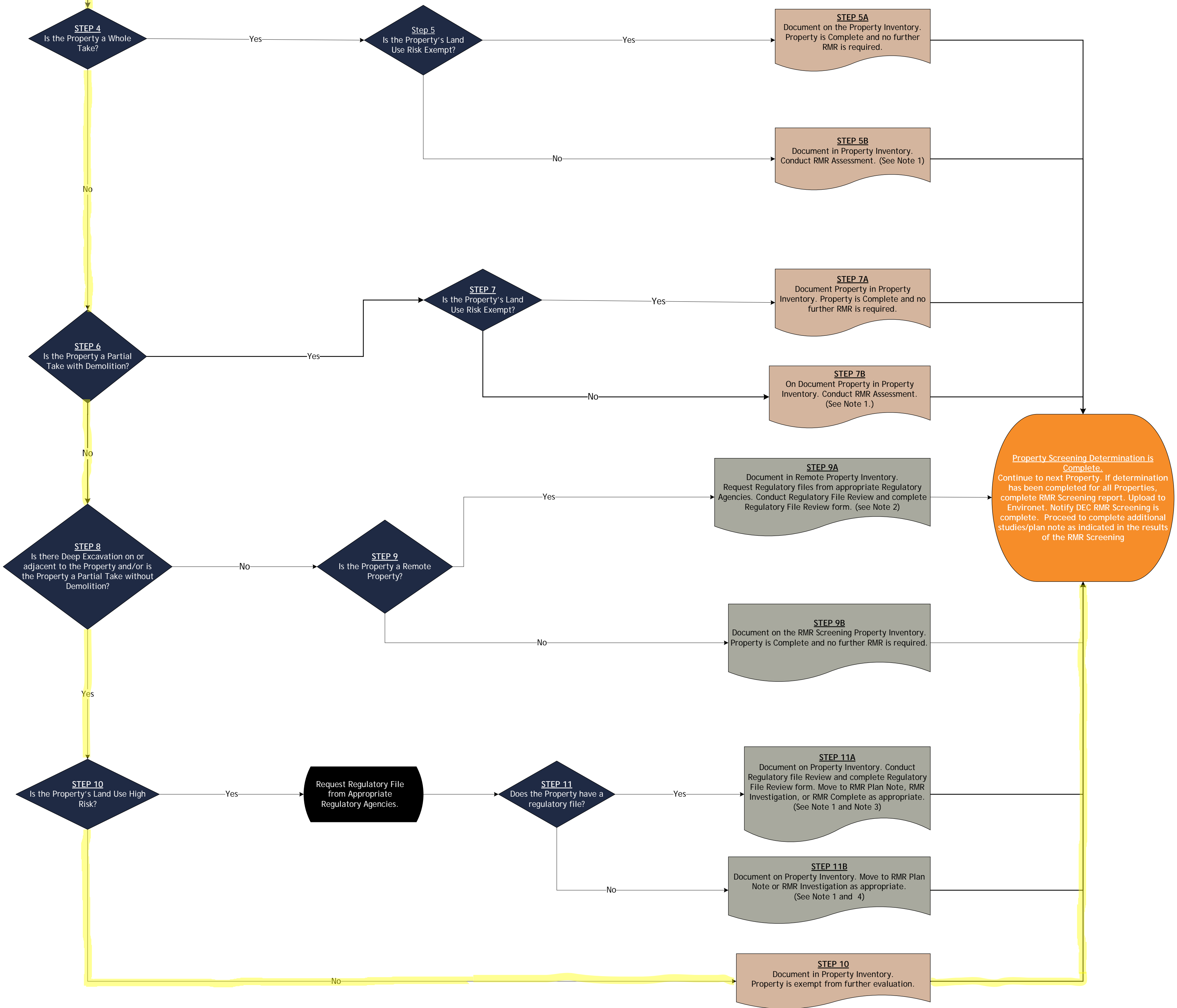
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JULY 2022

Site RM-002, 003 & 005



Inventory all Properties Within and Abutting the Project Limits on the Property Inventory, Conduct Full ORPS, Obtain Historical Aerials and Most Recent Project Plans. Complete Column 1 through Column 6 of the Property Inventory. If the Full ORPS Shows a Remote Property, complete Remote Property Inventory. Starting at Step 4, Follow the Flowchart Using Answers from Columns 1 Through Column 5 for Each Property. Using Most Up to Date Construction Plans, Complete Column 6 and Column 7. Use Answers from Column 6 and Column 7, Following the Flowchart, Determine Property's Action Results and Document in Column 8.
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- RMR - Regulated Materials Review
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LAND USE RISK CATEGORIES

Exempt Category	Low-Risk Category	High-Risk Category
<ul style="list-style-type: none"> • Agricultural • Cemetery • Forested land • Parks • Recreation Areas • Residential • Undeveloped 	<ul style="list-style-type: none"> • Bank • Car Dealership (no Automotive Repair) • Commercial Office Space • Daycare • Florist/Landscaper • Government Office • Grocery • Lodging • Pharmacy • Physicians/Dentist Office • Restaurant • Retail Store • Railroad, Featureless Track • Hospitals 	<ul style="list-style-type: none"> • Automotive Repair/Service/Oil Change • Body Shop • Dry Cleaner • Electrical Substation • Gas Stations and Service Station • Government Maintenance Facilities • Grain Elevator • Junkyard/Scrapyard • Landfill • Property listed on regulatory databases • Manufacturing • Oil/Chemical Warehouse/Storage • Railroad Maintenance/Siding • ANY Industrial Use

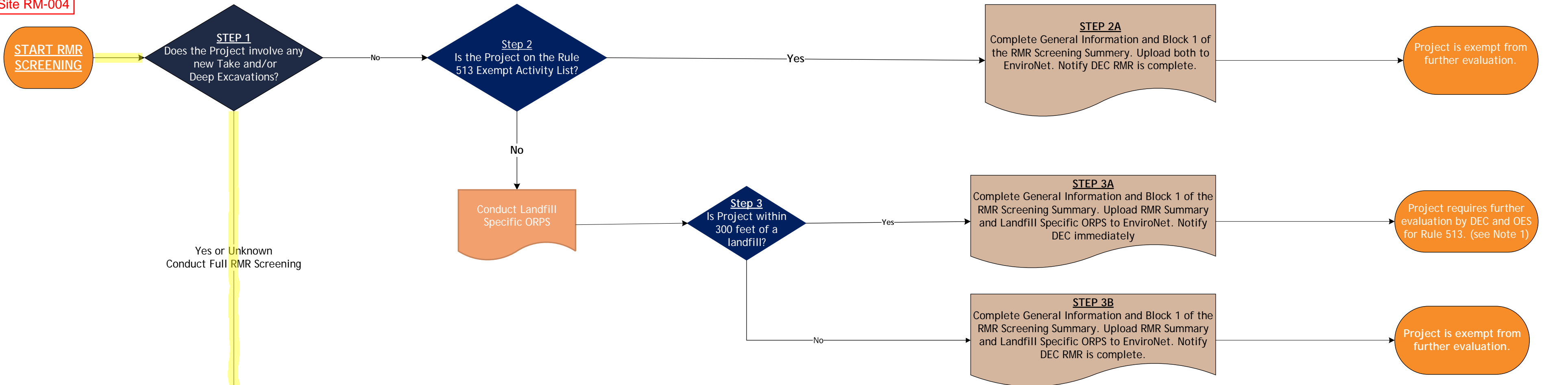


Purpose of the RMR Screening is to obtain a cursory understanding of the regulated material (RM) risks likely present on Properties within/abutting the Project Limits.

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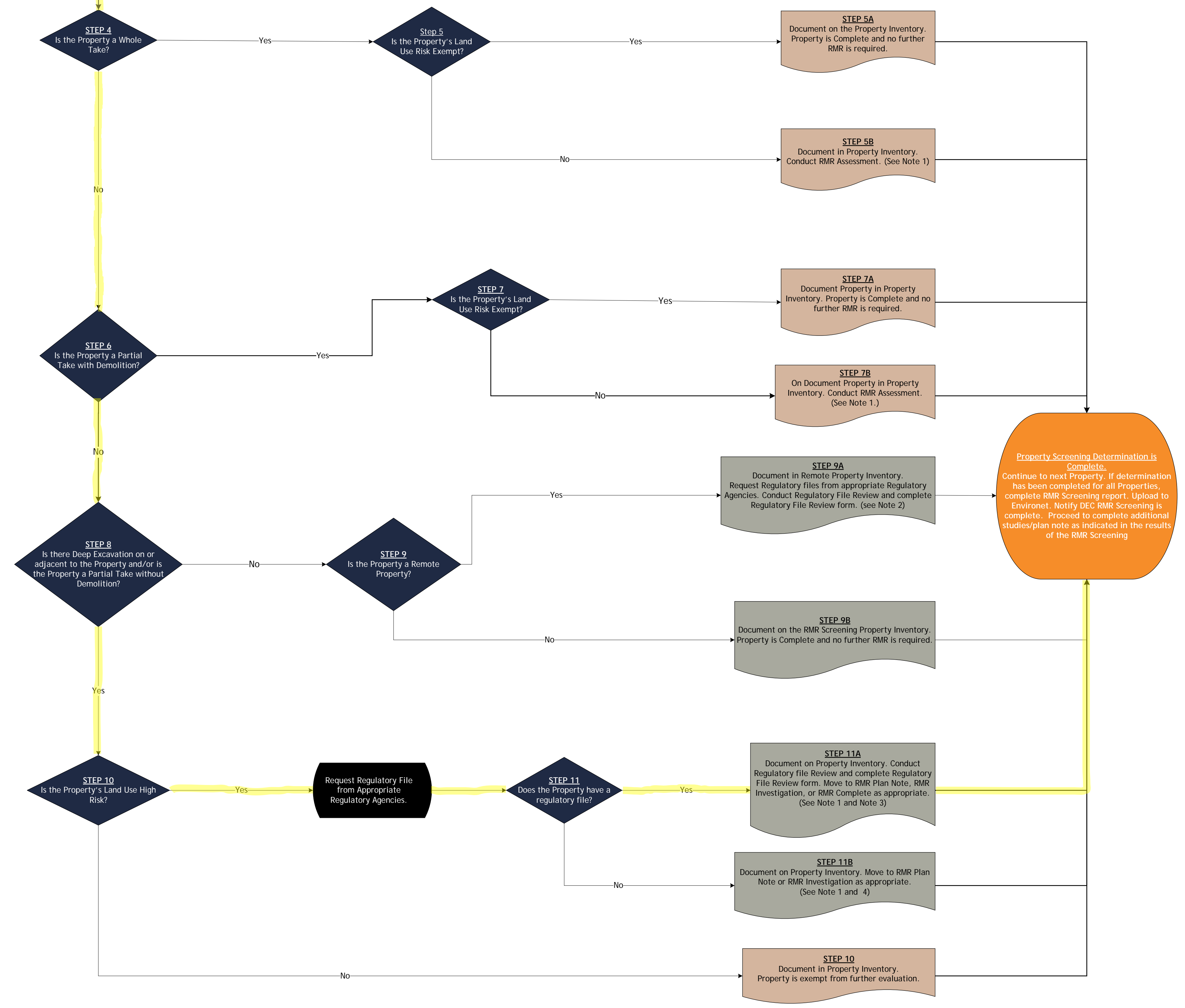
JULY 2022

Site RM-004



Inventory all Properties Within and Abutting the Project Limits on the Property Inventory, Conduct Full ORPS, Obtain Historical Aerials and Most Recent Project Plans. Complete Column 1 through Column 6 of the Property Inventory. If the Full ORPS Shows a Remote Property, complete Remote Property Inventory. Starting at Step 4, Follow the Flowchart Using Answers from Columns 1 Through Column 5 for Each Property. Using Most Up to Date Construction Plans, Complete Column 6 and Column 7. Use Answers from Column 6 and Column 7, Following the Flowchart, Determine Property's Action Results and Document in Column 8.

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- RM - Regulated Materials
- RMR - Regulated Materials Review
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LAND USE RISK CATEGORIES

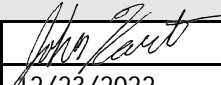
Exempt Category	Low-Risk Category	High-Risk Category
<ul style="list-style-type: none"> • Agricultural • Cemetery • Forested land • Parks • Recreation Areas • Residential • Undeveloped 	<ul style="list-style-type: none"> • Bank • Car Dealership (no Automotive Repair) • Commercial Office Space • Daycare • Florist/Landscaper • Government Office • Grocery • Lodging • Pharmacy • Physicians/Dentist Office • Restaurant • Retail Store • Railroad, Featureless Track • Hospitals 	<ul style="list-style-type: none"> • Automotive Repair/Service/Oil Change • Body Shop • Dry Cleaner • Electrical Substation • Gas Stations and Service Station • Government Maintenance Facilities • Grain Elevator • Junkyard/Scrapyard • Landfill • Property listed on regulatory databases • Manufacturing • Oil/Chemical Warehouse/Storage • Railroad Maintenance/Siding • ANY Industrial Use

RMR Regulatory File Review Form

RMR REGULATORY FILE REVIEW FORM

RM Number, Tenant/Address:	RM-004, 8186 State Route 224
Report Author(s):	John Korth
Affiliation:	Consultant - Lawhon & Associates, Inc.
Certification (Must be acknowledged by Prequalified Individual)	

I certify that I have personally examined and am familiar with the information in this document and all attachments, and that the data collection was supervised by an individual(s) prequalified to conduct the RMR for ODOT or by trained ODOT Environmental staff. Based on my inquiry of those persons immediately responsible for obtaining the information contained herein, I believe that the information has been collected in accordance with the ODOT RMR Manual current at the time of this submittal, and is true, accurate, and complete.

Name:	John Korth	Signature:	
Title:	Project Manager	Date:	12/23/2022
Email:	jkorth@lawhon-assoc.com	Phone:	(614) 481-8600

SECTION 1 - BUSTR

BUSTR 1:	Is this a BUSTR site? *	NO
*If answer to BUSTR 1 is NO, skip to Section 2.		
BUSTR 2:	Release investigation in progress on Property?	Choose response.
BUSTR 3:	Does Property have NFA(s)?	Choose response.
BUSTR 4:	Does Property have soils above BUSTR Re-use?	Choose response.
BUSTR 5:	Is Property in BUSTR Enforcement?	Choose response.
BUSTR 6:	Ohio Attorney General's Office involved on Property?	Choose response.
Summary:		

SECTION 2 - OEPA

OEPA 1:	Is this an OEPA site? *	YES
*If answer to OEPA 1 is NO, skip to Section 3.		
OEPA 2:	Does Property have OEPA records?	YES
OEPA 3:	Is Property undergoing OEPA directed actions?	YES
OEPA 4:	Does Property have soils above VAP Residential levels?	NO
OEPA 5:	Does Property have soils above VAP Commercial/Industrial levels?	NO

OEPA 6:	Does Property have NFA or Covenant Not to Sue?	YES
OEPA 7:	Does Property have deed restrictions?	YES
OEPA 8:	Is OEPA Office of Legal Services involved on Property?	YES
OEPA 9:	Is Ohio Attorney General's office involved on Property?	YES
<p>Summary: Site is a former coal strip mine until 1974 when it operated as a waste storage/ recycle/disposal facility with two surface water ponds and an incinerator. Wastes were stored in drums, open pit, and bulk tanks until wastes were incinerated, buried, and disposed of on-site. Remedial activities such as removal of waste, impacted soils and surface water, regrading, permeable cap, French drains, groundwater treatment facility commenced in 1993. Review of most recent groundwater data indicates groundwater flows away (southeast) from the project area and chemicals of concern below applicable action levels in off-site wells.</p>		

SECTION 3 - USEPA

USEPA 1:	Is this a USEPA site?	YES
*If answer to USEPA 1 is NO, skip remaining questions.		
USEPA 2:	Does Property have USEPA records?	YES
USEPA 3:	Is Property undergoing USEPA directed actions?	UNKNOWN
USEPA 4:	Does Property have NFRAP?	NO
USEPA 5:	Does Property have deed restrictions and/or contamination left in place?	YES
USEPA 6:	Is US Department of Justice involved on Property?	UNKNOWN
<p>Summary: On August 17, 2022, EPA removed the land/soil portion of the Summit National site from the NPL after determining that the soil cleanup was complete, and no further action was necessary other than continued operation and maintenance, monitoring, and five-year reviews. The groundwater portion of the site is undergoing a long-term cleanup and remains on the NPL along with the surface water and sediments that shallow groundwater may discharge to.</p>		

Project Plans

Not Available



POR-US224/SR225 Intersection
RMR Decision Summary Cost Form
December 23, 2022



The environmental review, consultation, and other actions required by applicable Federal environmental laws for this project are being, or have been, carried-out by ODOT pursuant to 23 U.S.C. 327 and a Memorandum of Understanding dated June 6, 2018, and executed by FHWA and ODOT.

RMR DECISION SUMMARY & COST FORM (DSCF)

SECTION 1: GENERAL INFORMATION

Project C-R-S / Name: POR-US224/SR225 Intersection		PID: N/A		District: 04	
RMR Screening Completion Date:				12/23/2022	
RMR Assessment Completion Date(s) <i>(Give range if multiple)</i>				Click or tap to enter a date. Click or tap to enter a date.	
RMR Investigation Completion Date(s) <i>(Give range if multiple)</i>				Click or tap to enter a date. Click or tap to enter a date.	
Individual Submitting RMR DSCF <i>(DSCF is used by multiple individuals)</i>					
Name: John Korth		Email: jkorth@lawhon-assoc.com			
Affiliation: Consultant – Lawhon & Associates, Inc.		Date: 12/22/2022			
Name:		Email:			
Affiliation:		Date: Click or tap to enter a date.			
Name:		Email:			
Affiliation:		Date: Click or tap to enter a date.			
Name:		Email:			
Affiliation:		Date: Click or tap to enter a date.			

SECTION 2 - COMPLETE DECISION SUMMARY & COST TABLE

Fill in the Columns of the DECISION SUMMARY & COST TABLE for each Property (see next page).

SECTION 3 - PLANS

Appropriate plan sheets (e.g. plan, profile, cross-section) to show RM area for each Property are attached?	<input type="checkbox"/> Yes <input type="checkbox"/> No
---	--

SECTION 4 -TOTAL RM COST IMPACT TO PROJECT

Are all Properties determined to be impacted by RM included in this cost estimate? If the answer is No , explain below.	<input type="checkbox"/> Yes <input type="checkbox"/> No
Calculate total cost for Project RM management based on all Project Property Decision Summary and Cost Tables.	
DEC contacts OES, District PM, and District Real Estate Administrator (DREA) if total cost is over \$100,000.	
Provide brief description of key factors that contributed to cost:	
RMR Screening completed. RMR Plan Note and Investigation to be performed to finalize DSCF.	

SECTION 5 - ODOT DEC FINAL REVIEW

Name:	Signature:	
Title:	Date:	Click or tap to enter a date.
Email:	Phone:	

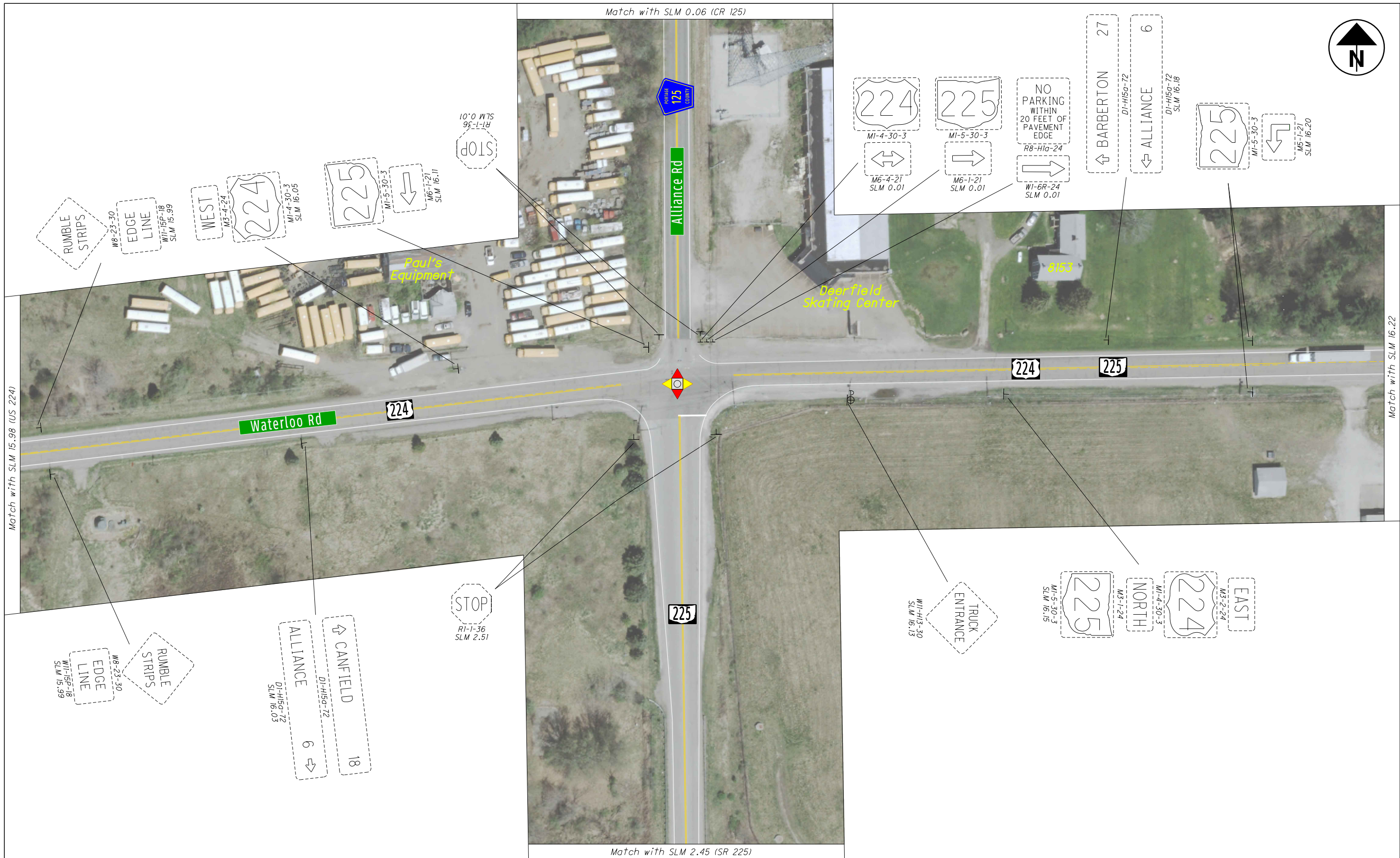
DECISION SUMMARY & COST TABLE

ITEM 1: ODOT PROPERTY ID:		RM-001
ADDRESS:		8111 State Route 225
Item 2	RMR Completion Stage (Status may change throughout the process.)	RMR Screening
Item 3a	Property Take (Permanent ROW) Type	Choose an item.
Item 3b	Property Deep Excavation?	Choose an item.
Item 3c	Structure Take?	<input type="checkbox"/> Yes <input type="checkbox"/> No
Item 4	Recommended RMR Action	RMR Plan Note
Item 5	What media has been or is potentially impacted by RM?	<input checked="" type="checkbox"/> Soil <input type="checkbox"/> Soil/Sediment & Water <input checked="" type="checkbox"/> Groundwater <input type="checkbox"/> Sediment
Item 6a	Excavation Volume (CY) to be Removed Offsite	
Item 6b	Estimated Tonnage to be Removed Offsite	
Item 6c	Estimated Gallons RM-Impacted Water Disposed Offsite	
Item 6d	Will Non-Aqueous Liquid Need to be Disposed Offsite?	Unknown
Item 6e	Removal of Underground Storage Tanks (USTs)?	No
Item 7	RM Media, Chemicals, and Concentration Range Anticipated for each (mg/kg or ug/L) (e.g.) Soil - Benzene: 2.5 to 8.0 mg/kg Water - Benzene: 1.2 to 2.2 ug/L	
Item 8	Regulatory Oversight Category	<input checked="" type="checkbox"/> BUSTR <input type="checkbox"/> CERCLA <input type="checkbox"/> Ohio VAP <input checked="" type="checkbox"/> RCRA <input type="checkbox"/> Not Categorized <input type="checkbox"/> Unknown <input type="checkbox"/> Other (Explain in Comments)
Item 9	Regulatory Action/ Engagement	No known active agency engagement.
Item 10	Waste Category(ies)	<input type="checkbox"/> Solid Waste (Nonhazardous) <input checked="" type="checkbox"/> PCS <input type="checkbox"/> Hazardous Waste <input checked="" type="checkbox"/> Regulated Water <input type="checkbox"/> Other (Explain in Comments)
Item 11a	Per Ton Disposal Cost Used	\$
Item 11b	Total Disposal Cost	\$
Item 11c	Per Gallon Disposal Cost Used	\$
Item 11d	Total Gallon Disposal Cost	\$
Item 11e	UST Removal Cost	\$
Item 11f	Total Estimated Cost (sum of lines 11b, 11d, 11e)	\$
Item 12	Comments: Site has operated as a bus service and repair facility since at least 1951. Strip mining activities observed on north of the auto facility. ORPS lists an Historic Waste Facility called Horner Tire Site within the site boundaries but ~1,000 feet from the intersection.	

ITEM 1: ODOT PROPERTY ID:		RM-004
ADDRESS:		8186 State Route 224
Item 2	RMR Completion Stage (Status may change throughout the process.)	RMR Screening
Item 3a	Property Take (Permanent ROW) Type	Choose an item.
Item 3b	Property Deep Excavation?	Choose an item.
Item 3c	Structure Take?	<input type="checkbox"/> Yes <input type="checkbox"/> No
Item 4	Recommended RMR Action	RMR Investigation
Item 5	What media has been or is potentially impacted by RM?	<input type="checkbox"/> Soil <input type="checkbox"/> Soil/Sediment & Water <input checked="" type="checkbox"/> Groundwater <input type="checkbox"/> Sediment
Item 6a	Excavation Volume (CY) to be Removed Offsite	
Item 6b	Estimated Tonnage to be Removed Offsite	
Item 6c	Estimated Gallons RM-Impacted Water Disposed Offsite	
Item 6d	Will Non-Aqueous Liquid Need to be Disposed Offsite?	Choose an item.
Item 6e	Removal of Underground Storage Tanks (USTs)?	No
Item 7	RM Media, Chemicals, and Concentration Range Anticipated for each (mg/kg or ug/L) (e.g.) Soil - Benzene: 2.5 to 8.0 mg/kg Water - Benzene: 1.2 to 2.2 ug/L	
Item 8	Regulatory Oversight Category	<input type="checkbox"/> BUSTR <input type="checkbox"/> CERCLA <input checked="" type="checkbox"/> Ohio VAP <input type="checkbox"/> RCRA <input type="checkbox"/> Not Categorized <input type="checkbox"/> Unknown <input checked="" type="checkbox"/> Other (Explain in Comments)
Item 9	Regulatory Action/ Engagement	Active regulatory action/oversight
Item 10	Waste Category(ies)	<input type="checkbox"/> Solid Waste (Nonhazardous) <input type="checkbox"/> PCS <input type="checkbox"/> Hazardous Waste <input checked="" type="checkbox"/> Regulated Water <input type="checkbox"/> Other (Explain in Comments)
Item 11a	Per Ton Disposal Cost Used	\$
Item 11b	Total Disposal Cost	\$
Item 11c	Per Gallon Disposal Cost Used	\$
Item 11d	Total Gallon Disposal Cost	\$
Item 11e	UST Removal Cost	\$
Item 11f	Total Estimated Cost (sum of lines 11b, 11d, 11e)	\$
Item 12	Comments: Site listed on the Abandoned Landfills database. Site is a former coal strip mine until 1974 when it operated as a waste storage/ recycle/disposal facility with two surface water ponds and an incinerator. Wastes were stored in drums, open pit, and bulk tanks until wastes were incinerated, buried, and disposed of on-site. Remedial activities such as removal of waste, impacted soils and surface water, regrading, permeable cap, French drains, groundwater treatment facility commenced in 1993. Review of most recent groundwater data indicates groundwater flows away (southeast) from the project area and chemicals of concern below applicable action levels in off-site wells. On August 17, 2022, EPA removed the land/soil portion of the Summit National site from the NPL after determining that the soil cleanup was complete, and no further action was necessary other than continued operation and maintenance, monitoring, and five-year reviews.	

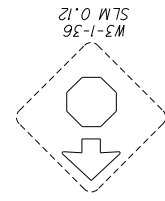
Appendix B

Existing Conditions Diagram





END SLM 0.16



Match with SLM 0.06 (CR 125)

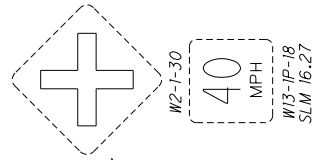
2
5

EXISTING CONDITIONS
AS OF JUNE 2022

POR US 224 AT SR 225 AND ALLIANCE RD (CR 125)

B3 of 6

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DEG



3
5

EXISTING CONDITIONS
AS OF JUNE 2022

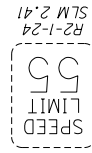
POR US 224 AT SR 225 AND ALLIANCE RD (CR 125)

B4 of 6

PREPARED BY
AFL
ISSUED BY
DEG



Match with SLM 2.45 (SR 225)



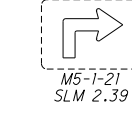
R2-1-24
SLM 2.41



M1-4-30-3
SLM 2.39



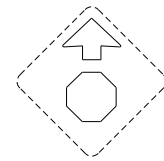
M1-5-30-3



M5-1-21
SLM 2.39

225

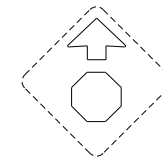
Portage
Septic
Tank



W3-1-36
SLM 2.35



W8-H15A-36
SLM 2.35



W3-1-36
SLM 2.35

END SLM 2.33

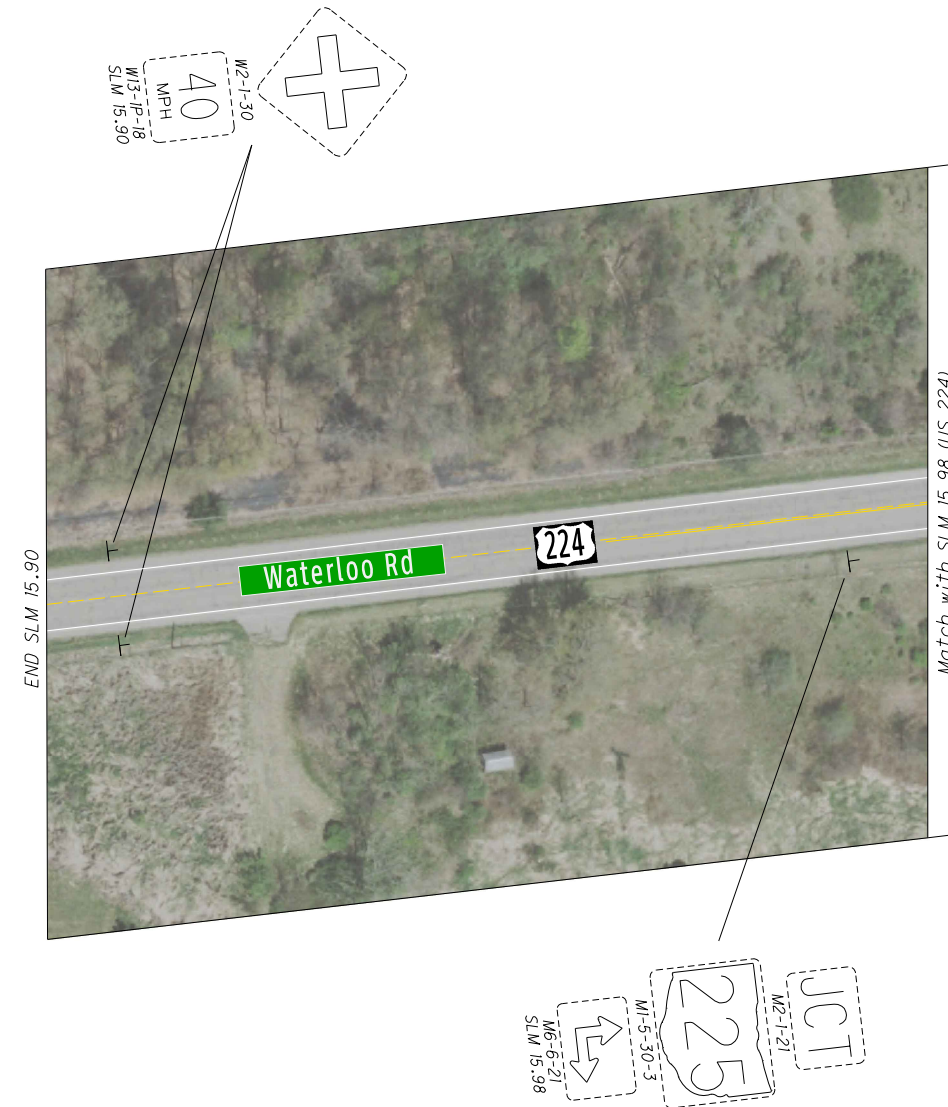
4
5

EXISTING CONDITIONS
AS OF JUNE 2022

POR US 224 AT SR 225 AND ALLIANCE RD (CR 125)

B5 of 6

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5
5

EXISTING CONDITIONS
AS OF JUNE 2022

POR US 224 AT SR 225 AND ALLIANCE RD (CR 125)

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Appendix C

Count Data, Growth Factors, and Volume Calculations



Ohio Department of Transportation

2088 S. Arlington Rd
Akron, OH 44306

File Name : POR-224-16.09_947452_04-27-2022

Site Code :

Start Date : 4/27/2022

Page No : 1

Groups Printed- Lights - Mediums - Articulated Trucks

Start Time	Alliance Rd Southbound				US-224 Westbound				SR-225 Northbound				US-224 Eastbound				Int. Total
	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
06:00 AM	2	5	0	0	0	18	34	0	52	10	3	0	3	10	0	0	137
06:15 AM	1	7	0	0	0	20	53	0	43	17	0	0	3	9	0	0	153
06:30 AM	3	7	1	0	0	24	70	0	41	15	2	0	0	11	0	0	174
06:45 AM	1	9	0	0	1	14	59	0	41	16	5	0	1	5	1	0	153
Total	7	28	1	0	1	76	216	0	177	58	10	0	7	35	1	0	617
07:00 AM	4	5	0	0	2	23	52	0	44	10	3	0	1	11	1	0	156
07:15 AM	4	8	0	0	0	15	53	0	65	10	2	0	1	14	0	0	172
07:30 AM	2	13	0	0	1	23	58	0	45	8	2	0	1	19	0	0	172
07:45 AM	1	8	1	0	1	20	49	0	40	11	2	0	1	9	0	0	143
Total	11	34	1	0	4	81	212	0	194	39	9	0	4	53	1	0	643
08:00 AM	1	11	1	0	0	13	47	0	45	12	1	0	0	22	1	0	154
08:15 AM	0	9	0	0	1	12	47	0	47	12	2	0	4	18	1	0	153
08:30 AM	0	14	0	0	2	12	62	0	46	9	2	0	4	11	1	0	163
08:45 AM	1	5	1	0	1	14	41	0	49	5	2	0	2	12	0	0	133
Total	2	39	2	0	4	51	197	0	187	38	7	0	10	63	3	0	603
09:00 AM	1	7	0	0	0	16	33	0	61	5	2	0	1	11	1	0	138
09:15 AM	1	10	0	0	0	15	57	0	47	5	1	0	2	23	1	0	162
09:30 AM	2	5	0	0	0	12	30	0	45	7	3	0	2	15	0	0	121
09:45 AM	0	14	0	0	0	14	35	0	43	11	1	0	0	8	1	0	127
Total	4	36	0	0	0	57	155	0	196	28	7	0	5	57	3	0	548
10:00 AM	1	4	0	0	0	14	52	0	45	4	3	0	1	11	0	0	135
10:15 AM	1	3	1	0	0	13	46	0	38	5	2	0	7	15	1	0	132
10:30 AM	0	8	1	0	0	10	45	0	45	8	4	0	3	15	0	0	139
10:45 AM	1	4	0	0	0	13	36	0	39	4	1	0	2	16	0	0	116
Total	3	19	2	0	0	50	179	0	167	21	10	0	13	57	1	0	522
11:00 AM	0	10	0	0	0	11	35	0	49	4	3	0	1	14	1	0	128
11:15 AM	2	9	0	0	3	17	40	0	36	8	1	0	2	16	0	0	134
11:30 AM	1	8	0	0	0	12	31	0	34	4	2	0	3	16	0	0	111
11:45 AM	1	7	1	0	1	10	29	0	31	2	4	0	3	8	0	0	97
Total	4	34	1	0	4	50	135	0	150	18	10	0	9	54	1	0	470
12:00 PM	1	4	1	0	1	9	46	0	37	3	2	0	3	24	0	0	131
12:15 PM	0	7	1	0	1	18	34	0	44	10	1	0	4	13	3	0	136
12:30 PM	0	7	2	0	0	12	34	0	41	10	2	0	4	16	1	0	129
12:45 PM	2	6	1	0	1	18	37	0	32	8	2	0	1	16	0	0	124
Total	3	24	5	0	3	57	151	0	154	31	7	0	12	69	4	0	520

Ohio Department of Transportation

2088 S. Arlington Rd
Akron, OH 44306

File Name : POR-224-16.09_947452_04-27-2022

Site Code :

Start Date : 4/27/2022

Page No : 2

Groups Printed- Lights - Mediums - Articulated Trucks

Start Time	Alliance Rd Southbound				US-224 Westbound				SR-225 Northbound				US-224 Eastbound				Int. Total
	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
01:00 PM	1	9	1	0	1	14	32	0	49	10	5	0	1	16	1	0	140
01:15 PM	2	5	2	0	1	16	43	0	34	7	4	0	3	18	4	0	139
01:30 PM	0	5	0	0	2	21	44	0	46	6	6	0	1	20	0	0	151
01:45 PM	0	5	0	0	1	15	48	0	44	5	1	0	2	12	1	0	134
Total	3	24	3	0	5	66	167	0	173	28	16	0	7	66	6	0	564
02:00 PM	1	7	1	0	0	22	33	0	43	10	1	0	4	24	3	0	149
02:15 PM	0	8	1	0	0	10	45	0	43	10	4	0	4	8	0	0	133
02:30 PM	1	8	0	0	1	20	54	0	49	5	4	0	4	13	2	0	161
02:45 PM	2	4	1	0	0	11	27	0	46	11	2	0	3	23	2	0	132
Total	4	27	3	0	1	63	159	0	181	36	11	0	15	68	7	0	575
03:00 PM	1	9	0	0	1	15	49	0	62	15	1	0	1	26	2	0	182
03:15 PM	2	11	1	0	0	11	48	0	56	13	3	0	6	38	4	0	193
03:30 PM	0	17	0	0	2	31	51	0	47	9	2	0	3	29	2	0	193
03:45 PM	2	20	0	0	3	19	69	0	65	6	8	0	8	29	3	0	232
Total	5	57	1	0	6	76	217	0	230	43	14	0	18	122	11	0	800
04:00 PM	0	12	0	0	2	14	62	0	60	14	1	0	2	25	3	0	195
04:15 PM	1	10	0	0	1	12	46	0	71	15	6	0	3	38	3	0	206
04:30 PM	0	23	4	0	1	19	73	0	67	8	0	0	3	32	4	0	234
04:45 PM	1	17	0	0	1	21	57	0	64	11	2	0	3	18	4	0	199
Total	2	62	4	0	5	66	238	0	262	48	9	0	11	113	14	0	834
05:00 PM	0	19	3	0	0	33	62	0	64	10	4	0	3	25	2	0	225
05:15 PM	1	9	1	0	1	17	62	0	53	10	3	0	3	31	3	0	194
05:30 PM	3	16	0	0	1	21	61	0	60	10	4	0	0	35	2	0	213
05:45 PM	1	10	0	0	2	21	49	0	54	9	2	0	4	22	2	0	176
Total	5	54	4	0	4	92	234	0	231	39	13	0	10	113	9	0	808
06:00 PM	1	12	1	0	1	14	27	0	45	14	0	0	3	25	0	0	143
06:15 PM	1	7	0	0	1	8	36	0	37	8	2	0	2	13	1	0	116
06:30 PM	2	7	0	0	3	18	34	0	40	5	2	0	2	16	3	0	132
06:45 PM	1	7	1	0	1	16	36	0	32	11	1	0	2	15	1	0	124
Total	5	33	2	0	6	56	133	0	154	38	5	0	9	69	5	0	515
Grand Total	58	471	29	0	43	841	2393	0	2456	465	128	0	130	939	66	0	8019
Apprch %	10.4	84.4	5.2	0	1.3	25.7	73	0	80.6	15.3	4.2	0	11.5	82.7	5.8	0	
Total %	0.7	5.9	0.4	0	0.5	10.5	29.8	0	30.6	5.8	1.6	0	1.6	11.7	0.8	0	
Lights	54	428	27	0	41	768	1938	0	1961	439	102	0	105	857	63	0	6783
% Lights	93.1	90.9	93.1	0	95.3	91.3	81	0	79.8	94.4	79.7	0	80.8	91.3	95.5	0	84.6
Mediums	4	24	1	0	1	49	119	0	120	11	6	0	8	52	3	0	398
% Mediums	6.9	5.1	3.4	0	2.3	5.8	5	0	4.9	2.4	4.7	0	6.2	5.5	4.5	0	5
Articulated Trucks	0	19	1	0	1	24	336	0	375	15	20	0	17	30	0	0	838
% Articulated Trucks	0	4	3.4	0	2.3	2.9	14	0	15.3	3.2	15.6	0	13.1	3.2	0	0	10.5

Ohio Department of Transportation

2088 S. Arlington Rd
Akron, OH 44306

File Name : POR-224-16.09_947452_04-27-2022

Site Code :

Start Date : 4/27/2022

Page No : 1

Groups Printed- Lights

Start Time	Alliance Rd Southbound				US-224 Westbound				SR-225 Northbound				US-224 Eastbound				Int. Total
	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
06:00 AM	2	5	0	0	0	18	30	0	44	10	3	0	3	8	0	0	123
06:15 AM	1	7	0	0	0	18	44	0	32	17	0	0	3	8	0	0	130
06:30 AM	3	6	1	0	0	22	61	0	32	15	2	0	0	10	0	0	152
06:45 AM	1	9	0	0	1	14	45	0	28	16	5	0	1	5	1	0	126
Total	7	27	1	0	1	72	180	0	136	58	10	0	7	31	1	0	531
07:00 AM	4	5	0	0	2	22	41	0	31	10	3	0	1	9	1	0	129
07:15 AM	3	7	0	0	0	15	44	0	53	9	1	0	1	14	0	0	147
07:30 AM	2	12	0	0	1	21	46	0	31	8	2	0	1	16	0	0	140
07:45 AM	1	8	1	0	1	19	40	0	32	10	1	0	1	9	0	0	123
Total	10	32	1	0	4	77	171	0	147	37	7	0	4	48	1	0	539
08:00 AM	1	8	1	0	0	13	39	0	32	11	1	0	0	19	1	0	126
08:15 AM	0	8	0	0	1	8	32	0	36	12	2	0	3	18	1	0	121
08:30 AM	0	13	0	0	2	11	54	0	40	8	2	0	4	7	1	0	142
08:45 AM	0	4	1	0	1	14	34	0	36	5	2	0	1	11	0	0	109
Total	1	33	2	0	4	46	159	0	144	36	7	0	8	55	3	0	498
09:00 AM	1	7	0	0	0	14	21	0	41	3	2	0	1	8	1	0	99
09:15 AM	1	8	0	0	0	13	42	0	33	4	1	0	2	18	1	0	123
09:30 AM	2	4	0	0	0	12	17	0	35	6	2	0	2	13	0	0	93
09:45 AM	0	13	0	0	0	14	26	0	28	9	1	0	0	8	1	0	100
Total	4	32	0	0	0	53	106	0	137	22	6	0	5	47	3	0	415
10:00 AM	1	2	0	0	0	11	36	0	31	4	2	0	1	11	0	0	99
10:15 AM	1	3	1	0	0	12	29	0	32	5	1	0	4	12	1	0	101
10:30 AM	0	7	1	0	0	8	28	0	30	7	3	0	1	13	0	0	98
10:45 AM	1	4	0	0	0	9	26	0	29	3	1	0	2	15	0	0	90
Total	3	16	2	0	0	40	119	0	122	19	7	0	8	51	1	0	388
11:00 AM	0	9	0	0	0	10	25	0	32	4	2	0	0	12	1	0	95
11:15 AM	2	7	0	0	2	13	30	0	29	8	0	0	1	12	0	0	104
11:30 AM	1	6	0	0	0	10	27	0	23	3	2	0	2	13	0	0	87
11:45 AM	0	6	1	0	0	9	23	0	24	2	3	0	2	8	0	0	78
Total	3	28	1	0	2	42	105	0	108	17	7	0	5	45	1	0	364
12:00 PM	1	4	0	0	1	8	31	0	27	3	0	0	2	23	0	0	100
12:15 PM	0	6	1	0	1	13	20	0	35	7	1	0	3	13	3	0	103
12:30 PM	0	6	2	0	0	9	26	0	33	10	2	0	2	12	1	0	103
12:45 PM	2	4	1	0	1	15	20	0	24	7	1	0	1	12	0	0	88
Total	3	20	4	0	3	45	97	0	119	27	4	0	8	60	4	0	394

Ohio Department of Transportation

2088 S. Arlington Rd
Akron, OH 44306

File Name : POR-224-16.09_947452_04-27-2022

Site Code :

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Page No : 2

Groups Printed- Lights

Start Time	Alliance Rd Southbound				US-224 Westbound				SR-225 Northbound				US-224 Eastbound				Int. Total
	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
01:00 PM	1	8	0	0	1	14	24	0	37	10	4	0	0	14	1	0	114
01:15 PM	2	4	2	0	1	16	32	0	24	5	3	0	2	18	4	0	113
01:30 PM	0	4	0	0	2	21	38	0	28	6	3	0	1	18	0	0	121
01:45 PM	0	5	0	0	1	13	37	0	29	5	0	0	1	11	1	0	103
Total	3	21	2	0	5	64	131	0	118	26	10	0	4	61	6	0	451
02:00 PM	1	7	1	0	0	19	27	0	35	10	0	0	3	19	2	0	124
02:15 PM	0	7	1	0	0	7	40	0	36	10	1	0	2	7	0	0	111
02:30 PM	1	7	0	0	1	19	47	0	37	5	3	0	3	13	2	0	138
02:45 PM	2	4	1	0	0	11	22	0	36	11	2	0	3	21	2	0	115
Total	4	25	3	0	1	56	136	0	144	36	6	0	11	60	6	0	488
03:00 PM	0	9	0	0	1	13	39	0	50	15	1	0	1	26	1	0	156
03:15 PM	2	11	1	0	0	10	35	0	47	13	3	0	6	35	4	0	167
03:30 PM	0	15	0	0	2	27	45	0	40	9	2	0	3	25	2	0	170
03:45 PM	2	18	0	0	3	19	59	0	56	5	8	0	7	28	3	0	208
Total	4	53	1	0	6	69	178	0	193	42	14	0	17	114	10	0	701
04:00 PM	0	12	0	0	2	13	56	0	54	12	1	0	2	25	2	0	179
04:15 PM	1	9	0	0	1	11	42	0	63	15	5	0	2	38	3	0	190
04:30 PM	0	23	4	0	1	19	65	0	62	8	0	0	3	31	4	0	220
04:45 PM	1	16	0	0	1	19	52	0	58	10	2	0	3	16	4	0	182
Total	2	60	4	0	5	62	215	0	237	45	8	0	10	110	13	0	771
05:00 PM	0	18	3	0	0	32	59	0	55	8	4	0	3	25	2	0	209
05:15 PM	1	9	1	0	1	17	56	0	48	10	2	0	3	28	3	0	179
05:30 PM	3	14	0	0	1	20	60	0	56	10	3	0	0	34	2	0	203
05:45 PM	1	9	0	0	2	18	45	0	51	8	2	0	3	22	2	0	163
Total	5	50	4	0	4	87	220	0	210	36	11	0	9	109	9	0	754
06:00 PM	1	11	1	0	1	13	23	0	43	14	0	0	3	25	0	0	135
06:15 PM	1	7	0	0	1	8	34	0	31	8	2	0	2	13	1	0	108
06:30 PM	2	7	0	0	3	18	31	0	40	5	2	0	2	13	3	0	126
06:45 PM	1	6	1	0	1	16	33	0	32	11	1	0	2	15	1	0	120
Total	5	31	2	0	6	55	121	0	146	38	5	0	9	66	5	0	489
Grand Total	54	428	27	0	41	768	1938	0	1961	439	102	0	105	857	63	0	6783
Apprch %	10.6	84.1	5.3	0	1.5	28	70.5	0	78.4	17.5	4.1	0	10.2	83.6	6.1	0	
Total %	0.8	6.3	0.4	0	0.6	11.3	28.6	0	28.9	6.5	1.5	0	1.5	12.6	0.9	0	

Ohio Department of Transportation

2088 S. Arlington Rd
Akron, OH 44306

File Name : POR-224-16.09_947452_04-27-2022

Site Code :

Start Date : 4/27/2022

Page No : 1

Groups Printed- Mediums

Start Time	Alliance Rd Southbound				US-224 Westbound				SR-225 Northbound				US-224 Eastbound				Int. Total
	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
06:00 AM	0	0	0	0	0	0	1	0	2	0	0	0	0	1	0	0	4
06:15 AM	0	0	0	0	0	1	3	0	6	0	0	0	0	0	0	0	10
06:30 AM	0	1	0	0	0	1	0	0	4	0	0	0	0	1	0	0	7
06:45 AM	0	0	0	0	0	0	3	0	3	0	0	0	0	0	0	0	6
Total	0	1	0	0	0	2	7	0	15	0	0	0	0	2	0	0	27
07:00 AM	0	0	0	0	0	1	3	0	7	0	0	0	0	1	0	0	12
07:15 AM	1	0	0	0	0	0	1	0	4	1	1	0	0	0	0	0	8
07:30 AM	0	0	0	0	0	1	4	0	4	0	0	0	0	1	0	0	10
07:45 AM	0	0	0	0	0	1	1	0	3	0	0	0	0	0	0	0	5
Total	1	0	0	0	0	3	9	0	18	1	1	0	0	2	0	0	35
08:00 AM	0	3	0	0	0	0	3	0	3	0	0	0	0	2	0	0	11
08:15 AM	0	1	0	0	0	3	2	0	7	0	0	0	1	0	0	0	14
08:30 AM	0	1	0	0	0	0	2	0	0	0	0	0	0	1	0	0	4
08:45 AM	1	0	0	0	0	0	3	0	1	0	0	0	0	1	0	0	6
Total	1	5	0	0	0	3	10	0	11	0	0	0	1	4	0	0	35
09:00 AM	0	0	0	0	0	2	2	0	6	0	0	0	0	1	0	0	11
09:15 AM	0	1	0	0	0	1	5	0	3	0	0	0	0	4	0	0	14
09:30 AM	0	0	0	0	0	0	4	0	0	1	1	0	0	1	0	0	7
09:45 AM	0	0	0	0	0	0	2	0	2	1	0	0	0	0	0	0	5
Total	0	1	0	0	0	3	13	0	11	2	1	0	0	6	0	0	37
10:00 AM	0	1	0	0	0	0	6	0	2	0	0	0	0	0	0	0	9
10:15 AM	0	0	0	0	0	0	6	0	1	0	0	0	0	1	0	0	8
10:30 AM	0	1	0	0	0	1	2	0	0	1	0	0	1	2	0	0	8
10:45 AM	0	0	0	0	0	3	3	0	3	1	0	0	0	1	0	0	11
Total	0	2	0	0	0	4	17	0	6	2	0	0	1	4	0	0	36
11:00 AM	0	0	0	0	0	1	1	0	6	0	0	0	0	0	0	0	8
11:15 AM	0	1	0	0	1	3	5	0	1	0	0	0	1	2	0	0	14
11:30 AM	0	2	0	0	0	0	1	0	2	1	0	0	0	3	0	0	9
11:45 AM	1	0	0	0	0	0	2	0	2	0	0	0	0	0	0	0	5
Total	1	3	0	0	1	4	9	0	11	1	0	0	1	5	0	0	36
12:00 PM	0	0	1	0	0	1	2	0	0	0	1	0	0	0	0	0	5
12:15 PM	0	1	0	0	0	5	2	0	2	0	0	0	0	0	0	0	10
12:30 PM	0	0	0	0	0	3	3	0	0	0	0	0	1	3	0	0	10
12:45 PM	0	1	0	0	0	2	4	0	2	1	0	0	0	3	0	0	13
Total	0	2	1	0	0	11	11	0	4	1	1	0	1	6	0	0	38

Ohio Department of Transportation

2088 S. Arlington Rd
Akron, OH 44306

File Name : POR-224-16.09_947452_04-27-2022

Site Code :

Start Date : 4/27/2022

Page No : 2

Groups Printed- Mediums

Start Time	Alliance Rd Southbound				US-224 Westbound				SR-225 Northbound				US-224 Eastbound				Int. Total
	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
01:00 PM	0	0	0	0	0	0	1	0	2	0	0	0	0	1	0	0	4
01:15 PM	0	1	0	0	0	0	2	0	4	0	0	0	0	0	0	0	7
01:30 PM	0	0	0	0	0	0	2	0	1	0	1	0	0	2	0	0	6
01:45 PM	0	0	0	0	0	2	3	0	5	0	0	0	0	1	0	0	11
Total	0	1	0	0	0	2	8	0	12	0	1	0	0	4	0	0	28
02:00 PM	0	0	0	0	0	2	0	0	3	0	1	0	0	4	1	0	11
02:15 PM	0	0	0	0	0	2	0	0	3	0	0	0	1	0	0	0	6
02:30 PM	0	1	0	0	0	1	2	0	3	0	0	0	1	0	0	0	8
02:45 PM	0	0	0	0	0	0	4	0	0	0	0	0	0	2	0	0	6
Total	0	1	0	0	0	5	6	0	9	0	1	0	2	6	1	0	31
03:00 PM	1	0	0	0	0	2	3	0	7	0	0	0	0	0	1	0	14
03:15 PM	0	0	0	0	0	1	4	0	3	0	0	0	0	2	0	0	10
03:30 PM	0	2	0	0	0	3	2	0	1	0	0	0	0	3	0	0	11
03:45 PM	0	0	0	0	0	0	4	0	1	0	0	0	1	1	0	0	7
Total	1	2	0	0	0	6	13	0	12	0	0	0	1	6	1	0	42
04:00 PM	0	0	0	0	0	1	3	0	2	2	0	0	0	0	1	0	9
04:15 PM	0	1	0	0	0	1	2	0	2	0	1	0	1	0	0	0	8
04:30 PM	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	2
04:45 PM	0	1	0	0	0	0	2	0	0	0	0	0	0	2	0	0	5
Total	0	2	0	0	0	2	9	0	4	2	1	0	1	2	1	0	24
05:00 PM	0	1	0	0	0	1	1	0	3	1	0	0	0	0	0	0	7
05:15 PM	0	0	0	0	0	0	4	0	1	0	0	0	0	1	0	0	6
05:30 PM	0	2	0	0	0	1	0	0	1	0	0	0	0	1	0	0	5
05:45 PM	0	0	0	0	0	2	0	0	1	1	0	0	0	0	0	0	4
Total	0	3	0	0	0	4	5	0	6	2	0	0	0	2	0	0	22
06:00 PM	0	1	0	0	0	0	2	0	0	0	0	0	0	0	0	0	3
06:15 PM	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
06:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	3
06:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	1	0	0	0	0	2	0	1	0	0	0	0	3	0	0	7
Grand Total	4	24	1	0	1	49	119	0	120	11	6	0	8	52	3	0	398
Apprch %	13.8	82.8	3.4	0	0.6	29	70.4	0	87.6	8	4.4	0	12.7	82.5	4.8	0	
Total %	1	6	0.3	0	0.3	12.3	29.9	0	30.2	2.8	1.5	0	2	13.1	0.8	0	

Ohio Department of Transportation

2088 S. Arlington Rd
Akron, OH 44306

File Name : POR-224-16.09_947452_04-27-2022

Site Code :

Start Date : 4/27/2022

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Groups Printed- Articulated Trucks

Start Time	Alliance Rd Southbound				US-224 Westbound				SR-225 Northbound				US-224 Eastbound				Int. Total
	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
06:00 AM	0	0	0	0	0	0	3	0	6	0	0	0	0	1	0	0	10
06:15 AM	0	0	0	0	0	1	6	0	5	0	0	0	0	1	0	0	13
06:30 AM	0	0	0	0	0	1	9	0	5	0	0	0	0	0	0	0	15
06:45 AM	0	0	0	0	0	0	11	0	10	0	0	0	0	0	0	0	21
Total	0	0	0	0	0	2	29	0	26	0	0	0	0	2	0	0	59
07:00 AM	0	0	0	0	0	0	8	0	6	0	0	0	0	1	0	0	15
07:15 AM	0	1	0	0	0	0	8	0	8	0	0	0	0	0	0	0	17
07:30 AM	0	1	0	0	0	1	8	0	10	0	0	0	0	2	0	0	22
07:45 AM	0	0	0	0	0	0	8	0	5	1	1	0	0	0	0	0	15
Total	0	2	0	0	0	1	32	0	29	1	1	0	0	3	0	0	69
08:00 AM	0	0	0	0	0	0	5	0	10	1	0	0	0	1	0	0	17
08:15 AM	0	0	0	0	0	1	13	0	4	0	0	0	0	0	0	0	18
08:30 AM	0	0	0	0	0	1	6	0	6	1	0	0	0	3	0	0	17
08:45 AM	0	1	0	0	0	0	4	0	12	0	0	0	1	0	0	0	18
Total	0	1	0	0	0	2	28	0	32	2	0	0	1	4	0	0	70
09:00 AM	0	0	0	0	0	0	10	0	14	2	0	0	0	2	0	0	28
09:15 AM	0	1	0	0	0	1	10	0	11	1	0	0	0	1	0	0	25
09:30 AM	0	1	0	0	0	0	9	0	10	0	0	0	0	1	0	0	21
09:45 AM	0	1	0	0	0	0	7	0	13	1	0	0	0	0	0	0	22
Total	0	3	0	0	0	1	36	0	48	4	0	0	0	4	0	0	96
10:00 AM	0	1	0	0	0	3	10	0	12	0	1	0	0	0	0	0	27
10:15 AM	0	0	0	0	0	1	11	0	5	0	1	0	3	2	0	0	23
10:30 AM	0	0	0	0	0	1	15	0	15	0	1	0	1	0	0	0	33
10:45 AM	0	0	0	0	0	1	7	0	7	0	0	0	0	0	0	0	15
Total	0	1	0	0	0	6	43	0	39	0	3	0	4	2	0	0	98
11:00 AM	0	1	0	0	0	0	9	0	11	0	1	0	1	2	0	0	25
11:15 AM	0	1	0	0	0	1	5	0	6	0	1	0	0	2	0	0	16
11:30 AM	0	0	0	0	0	2	3	0	9	0	0	0	1	0	0	0	15
11:45 AM	0	1	0	0	1	1	4	0	5	0	1	0	1	0	0	0	14
Total	0	3	0	0	1	4	21	0	31	0	3	0	3	4	0	0	70
12:00 PM	0	0	0	0	0	0	13	0	10	0	1	0	1	1	0	0	26
12:15 PM	0	0	0	0	0	0	12	0	7	3	0	0	1	0	0	0	23
12:30 PM	0	1	0	0	0	0	5	0	8	0	0	0	1	1	0	0	16
12:45 PM	0	1	0	0	0	1	13	0	6	0	1	0	0	1	0	0	23
Total	0	2	0	0	0	1	43	0	31	3	2	0	3	3	0	0	88

Ohio Department of Transportation

2088 S. Arlington Rd
Akron, OH 44306

File Name : POR-224-16.09_947452_04-27-2022

Site Code :

Start Date : 4/27/2022

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Groups Printed- Articulated Trucks

Start Time	Alliance Rd Southbound				US-224 Westbound				SR-225 Northbound				US-224 Eastbound				Int. Total
	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
01:00 PM	0	1	1	0	0	0	7	0	10	0	1	0	1	1	0	0	22
01:15 PM	0	0	0	0	0	0	9	0	6	2	1	0	1	0	0	0	19
01:30 PM	0	1	0	0	0	0	4	0	17	0	2	0	0	0	0	0	24
01:45 PM	0	0	0	0	0	0	8	0	10	0	1	0	1	0	0	0	20
Total	0	2	1	0	0	0	28	0	43	2	5	0	3	1	0	0	85
02:00 PM	0	0	0	0	0	1	6	0	5	0	0	0	1	1	0	0	14
02:15 PM	0	1	0	0	0	1	5	0	4	0	3	0	1	1	0	0	16
02:30 PM	0	0	0	0	0	0	5	0	9	0	1	0	0	0	0	0	15
02:45 PM	0	0	0	0	0	0	1	0	10	0	0	0	0	0	0	0	11
Total	0	1	0	0	0	2	17	0	28	0	4	0	2	2	0	0	56
03:00 PM	0	0	0	0	0	0	7	0	5	0	0	0	0	0	0	0	12
03:15 PM	0	0	0	0	0	0	9	0	6	0	0	0	0	1	0	0	16
03:30 PM	0	0	0	0	0	1	4	0	6	0	0	0	0	1	0	0	12
03:45 PM	0	2	0	0	0	0	6	0	8	1	0	0	0	0	0	0	17
Total	0	2	0	0	0	1	26	0	25	1	0	0	0	2	0	0	57
04:00 PM	0	0	0	0	0	0	3	0	4	0	0	0	0	0	0	0	7
04:15 PM	0	0	0	0	0	0	2	0	6	0	0	0	0	0	0	0	8
04:30 PM	0	0	0	0	0	0	6	0	5	0	0	0	0	1	0	0	12
04:45 PM	0	0	0	0	0	2	3	0	6	1	0	0	0	0	0	0	12
Total	0	0	0	0	0	2	14	0	21	1	0	0	0	1	0	0	39
05:00 PM	0	0	0	0	0	0	2	0	6	1	0	0	0	0	0	0	9
05:15 PM	0	0	0	0	0	0	2	0	4	0	1	0	0	2	0	0	9
05:30 PM	0	0	0	0	0	0	1	0	3	0	1	0	0	0	0	0	5
05:45 PM	0	1	0	0	0	1	4	0	2	0	0	0	1	0	0	0	9
Total	0	1	0	0	0	1	9	0	15	1	2	0	1	2	0	0	32
06:00 PM	0	0	0	0	0	1	2	0	2	0	0	0	0	0	0	0	5
06:15 PM	0	0	0	0	0	0	2	0	5	0	0	0	0	0	0	0	7
06:30 PM	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	3
06:45 PM	0	1	0	0	0	0	3	0	0	0	0	0	0	0	0	0	4
Total	0	1	0	0	0	1	10	0	7	0	0	0	0	0	0	0	19
Grand Total	0	19	1	0	1	24	336	0	375	15	20	0	17	30	0	0	838
Apprch %	0	95	5	0	0.3	6.6	93.1	0	91.5	3.7	4.9	0	36.2	63.8	0	0	
Total %	0	2.3	0.1	0	0.1	2.9	40.1	0	44.7	1.8	2.4	0	2	3.6	0	0	

Volume Count Report

LOCATION INFO	
Location ID	31567
Type	SPOT
Funct'l Class	4
Located On	SR-225
Loc On Alias	
Direction	2-WAY
County	Portage
Community	N OF MAH CO LINE
MPO ID	
HPMS ID	
Agency	ODOT

COUNT DATA INFO	
Count Status	Accepted
Start Date	Tue 8/20/2019
End Date	Wed 8/21/2019
Start Time	1:00:00 PM
End Time	1:00:00 PM
Direction	
Notes	
Station	
Study	
Speed Limit	
Description	
Sensor Type	Tube Class
Source	
Latitude,Longitude	

INTERVAL:15-MIN					
Time	15-min Interval				Hourly Count
	1st	2nd	3rd	4th	
0:00-1:00	12	13	9	9	43
1:00-2:00	10	8	7	5	30
2:00-3:00	15	11	11	11	48
3:00-4:00	8	7	14	9	38
4:00-5:00	9	16	31	26	82
5:00-6:00	35	44	56	79	214
6:00-7:00	73	132	116	86	407
7:00-8:00	140	131	131	132	534
8:00-9:00	102	127	94	98	421
9:00-10:00	96	76	99	96	367
10:00-11:00	85	98	92	77	352
11:00-12:00	111	111	79	97	398
12:00-13:00	89	105	90	104	388
13:00-14:00	0	37	79	93	209
14:00-15:00	114	107	111	129	461
15:00-16:00	149	154	126	156	585
16:00-17:00	134	143	126	162	565
17:00-18:00	141	181	129	137	588
18:00-19:00	116	99	83	75	373
19:00-20:00	75	58	73	66	272
20:00-21:00	54	60	57	54	225
21:00-22:00	59	42	44	39	184
22:00-23:00	28	29	28	21	106
23:00-24:00	10	19	11	17	57
Total					6,947
AADT					6,339
AM Peak					07:00-08:00 534
PM Peak					16:45-17:45 613

Volume Count Report

LOCATION INFO	
Location ID	12367
Type	SPOT
Funct'l Class	4
Located On	US-224
Direction	2-WAY
County	PORTAGE
Community	SE OF RAVENNA
MPO ID	
HPMS ID	
Agency	ODOT

COUNT DATA INFO	
Count Status	Accepted
Start Date	Tue 8/20/2019
End Date	Wed 8/21/2019
Start Time	12:00:00 PM
End Time	12:00:00 PM
Direction	
Notes	
Station	
Study	
Speed Limit	
Description	
Sensor Type	Tube Class
Source	
Latitude,Longitude	

INTERVAL:15-MIN						
Time	15-min Interval				Hourly Count	
	1st	2nd	3rd	4th		
0:00-1:00	1	5	4	2	12	
1:00-2:00	3	0	1	0	4	
2:00-3:00	1	1	2	2	6	
3:00-4:00	4	2	3	4	13	
4:00-5:00	10	25	14	7	56	
5:00-6:00	11	21	17	28	77	
6:00-7:00	26	39	33	40	138	
7:00-8:00	25	39	50	40	154	
8:00-9:00	35	39	41	39	154	
9:00-10:00	51	39	41	31	162	
10:00-11:00	30	33	45	34	142	
11:00-12:00	32	37	44	37	150	
12:00-13:00	50	38	51	45	184	
13:00-14:00	40	47	34	39	160	
14:00-15:00	47	46	57	50	200	
15:00-16:00	66	63	49	65	243	
16:00-17:00	90	75	74	82	321	
17:00-18:00	64	76	65	61	266	
18:00-19:00	59	44	68	32	203	
19:00-20:00	35	38	34	45	152	
20:00-21:00	33	29	37	19	118	
21:00-22:00	31	13	23	10	77	
22:00-23:00	17	18	17	13	65	
23:00-24:00	24	9	5	6	44	
Total					3,101	
AADT					2,847	
AM Peak	11:45-12:45				176	
PM Peak	16:00-17:00				321	

Leiana Yates

From: Prater, Amy <APrater@akronohio.gov>
Sent: Tuesday, July 26, 2022 2:26 PM
To: Gina Balsamo
Cc: Leiana Yates; Chelsea Cousins; David.Griffith@dot.ohio.gov; Michael.Craver@dot.ohio.gov; David Addison; Joy M. Lanham; 'Kristi Norfolk'; Pulay, Dave
Subject: RE: [External]D4 Safety Studies; Growth Rates

Gina,

After reviewing the locations listed below, I would say I would assume 0% growth at US 224/US 225/Alliance Rd intersection. It looks like counts in that area are actually decreasing in recent years.

On the other hand, Randolph & Trares could probably allow for up to 2% growth due to being a low volume road. I have volumes of 3,192 in 2019 and 3,070 in 2017 on Randolph Rd west of SR 43.

SR 43 volumes are all over the board. I would say this roadway could still have some growth, as long as the assumed rate wouldn't require capacity expansion of the roadway. I will list the volumes for SR 43 below for your reference.

Please know that I-77, as well as other Akron area freeways & ramps, have been under construction/closed over the last few years, so some of the recent increases could be diverted traffic avoiding Akron when possible. I personally use SR 43 currently to get to Kent and locations in Brimfield township from my home, due to I-77 construction and current ramp closures.

SR 43 south of Randolph Rd

<u>AADT</u>	<u>Year</u>
9,233	2022
7,916	2019
4,112	2016
5,966	2013
7,620	2010
7,700	2007
7,260	2004
7,870	2001
8,550	1998

Please let me know if you have any additional questions. Have a great day!

Amy Prater, P.E.
Transportation Engineer
Akron Metropolitan Area Transportation Study (AMATS)
330-375-2436 x 4633

From: Gina Balsamo <gbalsamo@cmtran.com>
Sent: Tuesday, July 26, 2022 1:23 PM
To: Prater, Amy <APrater@akronohio.gov>
Cc: Leiana Yates <lyates@cmtran.com>; Chelsea Cousins <ccousins@cmtran.com>; David.Griffith@dot.ohio.gov; Michael.Craver@dot.ohio.gov; David Addison <david@lanhamengineering.com>; Joy M. Lanham <joy@lanhamengineering.com>; 'Kristi Norfolk' <kristi@lanhamengineering.com>
Subject: [External]D4 Safety Studies; Growth Rates

Amy,

We would like to request growth rates for the following locations:

- POR US 224 at SR 225 [intersection of US-224/SR-225 (Waterloo Road) & SR-225/CR-125 (Alliance Road)]
- POR SR 43 at Trares & Randolph [two intersections of SR-43 (Cleveland Canton Road) with CR-10 (Randolph Road) and C/TR-25 (Trares Road)]

For your reference, attached is the count data ODOT provided for each study location.

We plan to project the count data to a 2047 Design Year for each location.

Please let me know if you need anything else from us.

Thanks!

Gina Balsamo, PE, PTOE

Project Manager



614.656.2429 | www.cmtran.com

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TFMS - Segment Forecast Report

Username	Email	Script Import Date	Script Version	Model Version
Chelsea.Cousins	ccousins@cmtran.com	4/14/2020 5:30:19 PM	2020.001	2022.1900

Forecast Summary

Project ID	Project Name	Opening Year	Design Year
117158	VAR-STW Safety Studies	2027	2047

Project Description

POR US 224 at SR 225

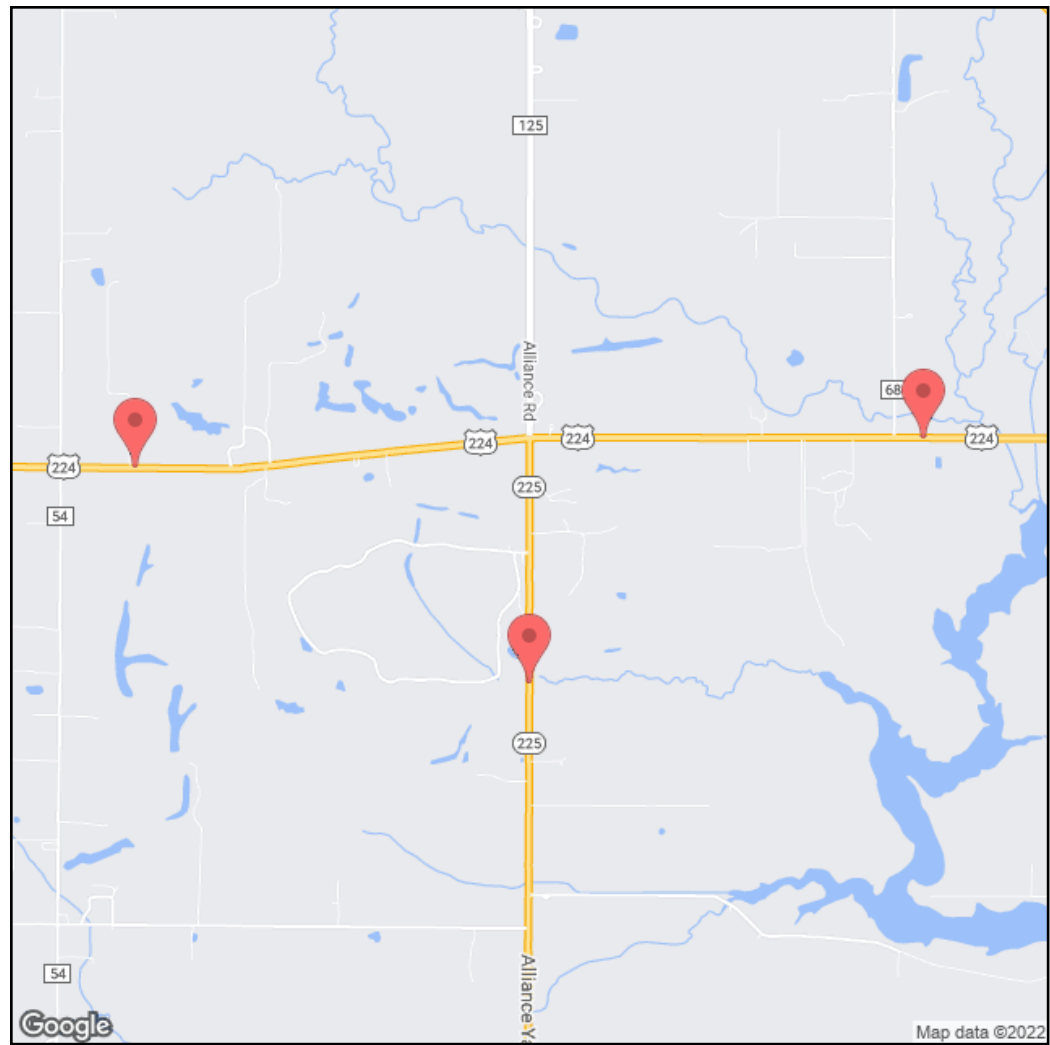
*Users of this data need to be aware that there are limitations to the forecasts generated by this product that make it suitable only for roadway design projects which are low risk.

Segment Information

Segment ID	LRS ID	BMP	EMP	Length	Latitude	Longitude
1527500	SPORUS00224**C	13.899	16.093	2.194	-81.1195898136585	41.0235470304339
1527503	SPORSR00225**C	1.179	2.530	1.351	-81.0986998688038	41.0149426186616
1527505	SPORUS00224**C	16.093	18.274	2.181	-81.0778192515955	41.0247463982154

Forecast Information

Segment ID	2027 AADT	2047 AADT	DHV-30	K%	D%	T24%	TD%
1527500	2,800	2,800	350	12.0	70.0	9	3
1527503	6,500	7,800	1,000	13.0	64.5	9	6
1527505	7,600	8,600	750	9.0	53.8	10	3



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
1527500	SPORUS00224**C	13.899	16.093

Forecast

Year	K %	T24 %	PA AADT	PA Method	PA Growth Rate %	PA Calculated Rate %
2050	12.0	9	2,600	Average	● -0.100	0.000
AADT	D %	TD %	BC AADT	BC Method	BC Growth Rate %	BC Calculated Rate %
2,860	70.0	3	260	Model	1.600	1.600

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

Regression

Method Number	PA AADT	BC AADT	AADT
2	2,745	4	2,749

95% Confidence Min/Max

PA Min	PA Max	BC Min	BC Max	Year
1422	4342	-600	1058	2050

Method Number	PA Growth %	BC Growth %	PA Drop Count	BC Drop Count	PA AADT	BC AADT	PA Adjustment	PA Adjustment
1	0.43	-1.34	0	0	2,951	150	2,906	108
2	0.21	-3.37	5	5	2,720	1	2,745	4
3	0.88	-2.12	0	0	3,336	105	3,246	68
4	0.64	-4.52	5	5	3,092	-67	3,070	-55
5	0.68	0.53	0	0	3,176	254	3,100	204
6	0.46	-1.83	5	5	2,942	85	2,933	83

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	-5,269	1,931	-1,580	509	-1.55	6.47
2	RAT	0.34	2,477	0.10	210	-0.43	0.64
3	MRAT	0.90	2,477	1.19	258	-0.49	1.58
4	RAF		2,204		383	-1.02	4.01

Adjust Method AADT	Adjust Method BC	Selected PA Growth Rate %	Selected BC Growth Rate %
Ratio	Model Ratio	-0.500	1.600

Method 1 - 4 Volume

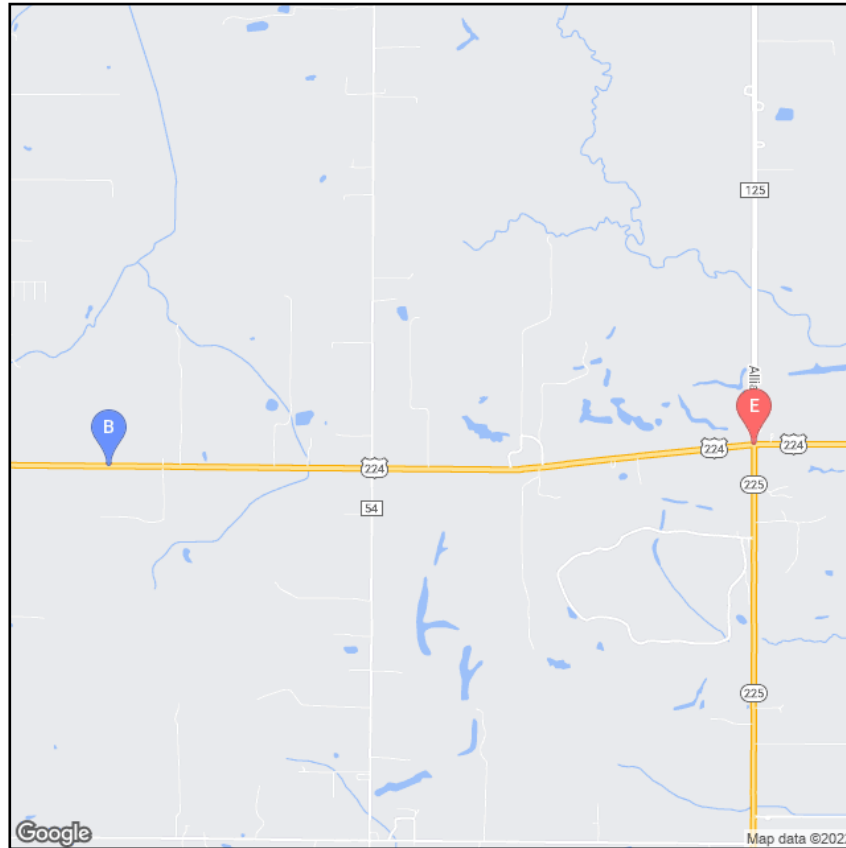
PA Min Volume	PA Max Volume	BC Min Volume	BC Max Volume	Total Min Volume	Total MaxVolume
1422	2267	210	509	1632	2776

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

Historical Count

Year	All	Cars	Trucks
2007	2,820	2,580	240
2010	2,680	2,400	280
2013	2,674	2,474	199
2015	2,766	2,559	206
2018	3,041	2,730	311
* 2021	2,764	2,587	177

* Pivot Point



Segment ID	LRS ID	BMP	EMP	Length	Yr 2027 AADT	Yr 2047 AADT	DHV30	K %	D %	T24 %	TD %
1527500	SPORUS00224**C	13.899	16.093	2.194	2,800	2,800	350	12.0	70.0	9	3

Forecast Segment ID	Route	BMP	EMP
1527503	SPORSR00225**C	1.179	2.530

Forecast

Year	K %	T24 %	PA AADT	PA Method	PA Growth Rate %	PA Calculated Rate %
2050	13.0	9	7,300	Average	1.200	1.200
AADT	D %	TD %	BC AADT	BC Method	BC Growth Rate %	BC Calculated Rate %
8,000	64.5	6	700	Average	● -5.000	0.000

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

Regression

Method Number	PA AADT	BC AADT	AADT
1	9,450	-1,418	8,032

95% Confidence Min/Max

PA Min	PA Max	BC Min	BC Max	Year
5057	11868	-3732	938	2050

Method Number	PA Growth %	BC Growth %	PA Drop Count	BC Drop Count	PA AADT	BC AADT	PA Adjustment	PA Adjustment
1	2.53	-10.39	0	0	9,406	-1,376	9,450	-1,418
2	-999999.00	-999999.00	0	0				
3	-999999.00	-999999.00	0	0				
4	-999999.00	-999999.00	0	0				
5	-999999.00	-999999.00	0	0				
6	-999999.00	-999999.00	0	0				

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	-2,246	5,847	205	790	-0.25	0.42
2	RAT	0.73	5,929	1.41	825	-0.22	0.59
3	MRAT	0.96	5,929	1.17	820	-0.22	0.57
4	RAF		5,888		805	-0.23	0.49

Adjust Method AADT	Adjust Method BC	Selected PA Growth Rate %	Selected BC Growth Rate %
Ratio	Average	-0.200	0.500

Method 1 - 4 Volume

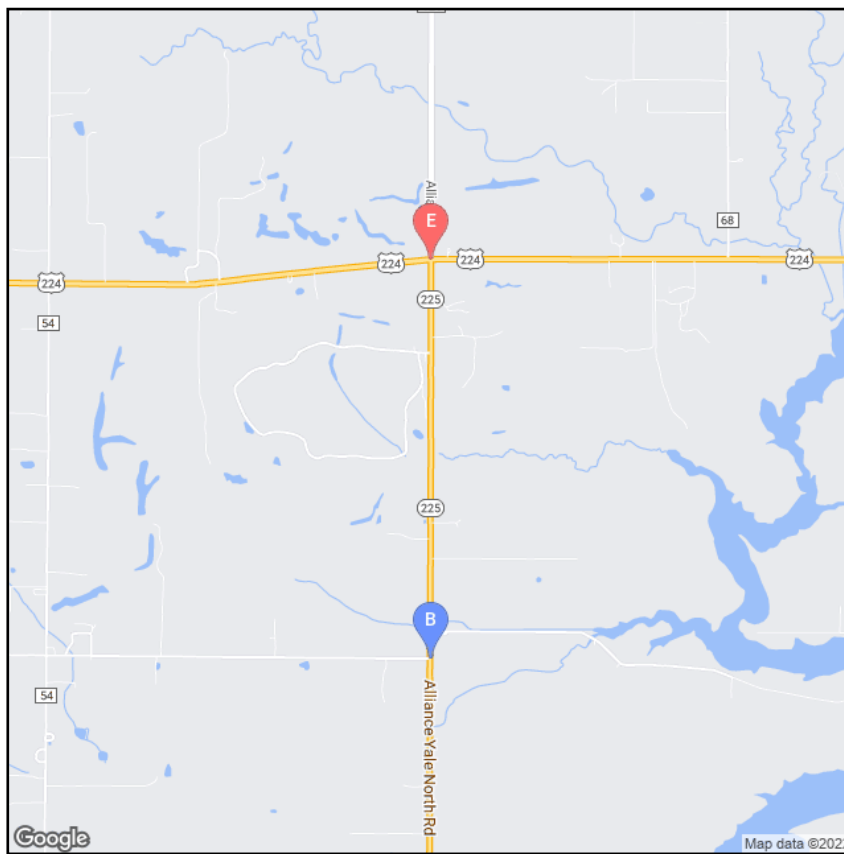
PA Min Volume	PA Max Volume	BC Min Volume	BC Max Volume	Total Min Volume	Total MaxVolume
5057	5124	790	825	5847	5949

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

Historical Count

Year	All	Cars	Trucks
2016	5,830	4,781	1,049
2018	5,952	4,881	1,071
* 2021	6,153	5,449	704

* Pivot Point



Segment ID	LRS ID	BMP	EMP	Length	Yr 2027 AADT	Yr 2047 AADT	DHV30	K %	D %	T24 %	TD %
1527503	SPORSR00225**C	1.179	2.530	1.351	6,500	7,800	1000	13.0	64.5	9	6

Forecast Segment ID	Route	BMP	EMP
1527505	SPORUS00224**C	16.093	18.274

Forecast

Year	K %	T24 %	PA AADT	PA Method	PA Growth Rate %	PA Calculated Rate %
2050	9.0	10	7,800	Average	0.700	0.700
AADT	D %	TD %	BC AADT	BC Method	BC Growth Rate %	BC Calculated Rate %
8,700	53.8	3	900	Model	0.500	0.500

Regression

Method Number	PA AADT	BC AADT	AADT
2	8,165	409	8,574

95% Confidence Min/Max

PA Min	PA Max	BC Min	BC Max	Year
6813	11224	-2512	4574	2050

Method Number	PA Growth %	BC Growth %	PA Drop Count	BC Drop Count	PA AADT	BC AADT	PA Adjustment	PA Adjustment
1	0.94	0.34	0	0	8,143	1,074	8,238	868
2	0.90	-1.67	3	5	8,108	418	8,165	409
3	1.23	0.62	0	0	8,766	1,149	8,788	934
4	1.10	-1.72	3	5	8,517	403	8,534	396
5	1.77	0.58	0	0	9,868	1,138	9,790	924
6	1.66	-1.67	5	5	9,583	417	9,586	409

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	-2,865	8,481	-1,283	1,027	0.52	1.03
2	RAT	0.72	8,136	0.38	881	0.42	0.39
3	MRAT	1.12	8,173	1.11	896	0.43	0.46
4	RAF		8,327		961	0.48	0.74

Adjust Method AADT	Adjust Method BC	Selected PA Growth Rate %	Selected BC Growth Rate %
Average	Model Ratio	0.500	0.500

Method 1 - 4 Volume

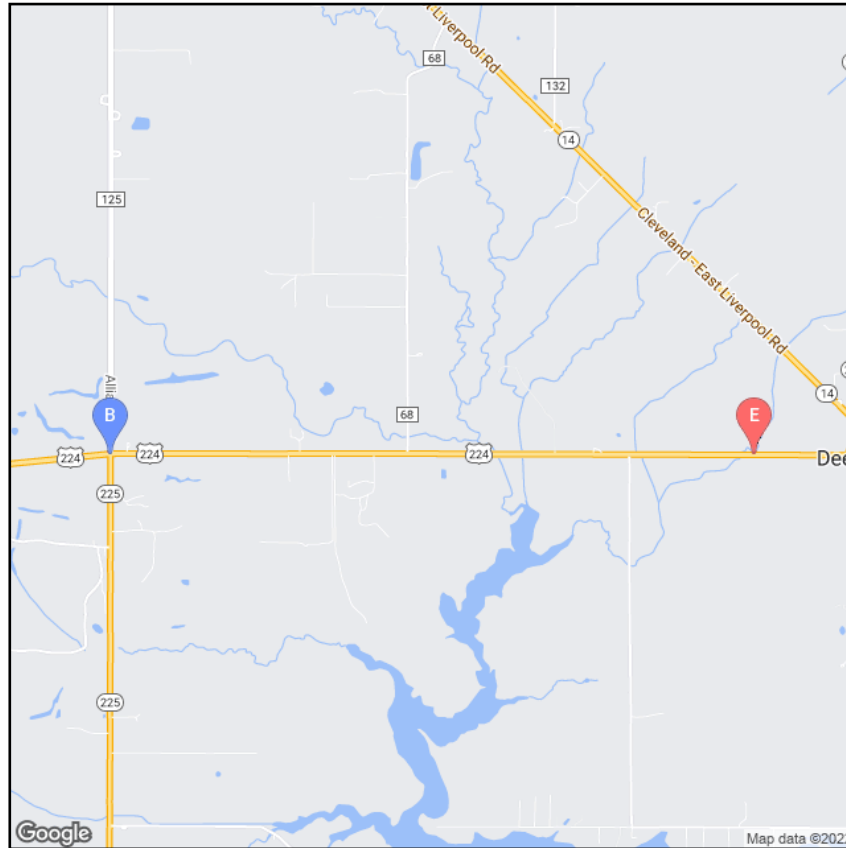
PA Min Volume	PA Max Volume	BC Min Volume	BC Max Volume	Total Min Volume	Total MaxVolume
7255	7454	881	1027	8136	8481

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

Historical Count

Year	All	Cars	Trucks
2007	6,670	5,690	980
2010	6,710	5,760	950
2013	6,500	5,619	880
2015	6,724	5,812	911
2018	7,714	6,353	1,361
* 2021	7,263	6,472	791

* Pivot Point



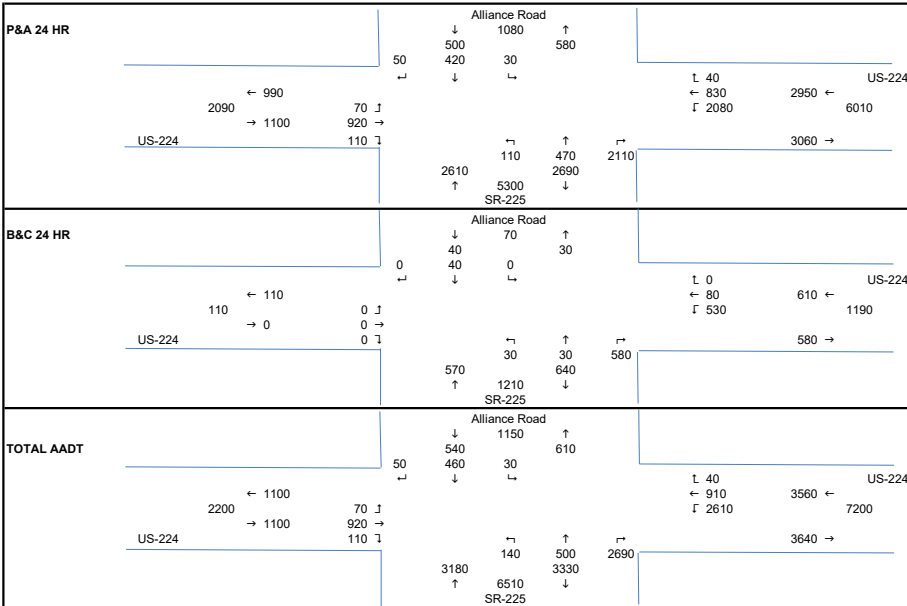
Segment ID	LRS ID	BMP	EMP	Length	Yr 2027 AADT	Yr 2047 AADT	DHV30	K %	D %	T24 %	TD %
1527505	SPORUS00224**C	16.093	18.274	2.181	7,600	8,600	750	9.0	53.8	10	3

For converting partial day turning movements counts to seasonally adjusted 24 hour (AADT) counts.
 Yellow boxes require user input. Scroll down for 24 hour diagrams. Use the Seasonal AdjustmFactors_YYYY spreadsheet to lookup seasonal factor.
 Use Avg TD by FC.xlsx to compute P&A B&C FACTORS.

Date of Count: 4/27/2022 4 Wednesd April

PART 1: INPUT PARTIAL DAY P&A VEHICLES												ROUTE US-224			
PARTIAL COUNT * FACTOR * SEASONAL FACTOR = 24 HR P&A															
SOUTH LEG			SR-225			FC = Rural minor arterial northbound			APPROACH		DEPART				
			FACTOR			LT THRU RT			TOTAL		TOTAL				
			LT THRU RT			102 439 1961			2502		2471				
P&A FACTOR			1.161 1.161 1.161			118.467 509.872 2277.58			2905.92		2849.44		120 510 2280 2910 2850		
SEASONAL FACTOR			0.925 0.925 0.925			109.582 471.632 2106.77			2687.98		2615.71		110 470 2110 2690 2610		
WEST LEG			US-224			FC = Rural minor arterial eastbound			APPROACH		DEPART				
			FACTOR			LT THRU RT			TOTAL		TOTAL				
			LT THRU RT			63 857 105			1025		924				
P&A FACTOR			1.161 1.161 1.161			73.1707 995.354 121.951			1190.48		1070.59		70 1000 120 1190 1070		
SEASONAL FACTOR			0.925 0.925 0.925			67.6829 920.703 112.805			1101.19		987.767		70 920 110 1100 990		
NORTH LEG			Alliance Road			FC = Rural Local Road southbound			APPROACH		DEPART				
			FACTOR			LT THRU RT			TOTAL		TOTAL				
			LT THRU RT			27 428 54			509		543				
P&A FACTOR			1.114 1.114 1.114			30.0668 476.615 60.1336			566.815		630.662		30 480 60 570 630		
SEASONAL FACTOR			0.883 0.883 0.883			26.549 420.851 53.098			500.498		583.362		30 420 50 500 580		
EAST LEG			US-224			FC = Rural minor arterial westbound			APPROACH		DEPART				
			FACTOR			LT THRU RT			TOTAL		TOTAL				
			LT THRU RT			1938 768 41			2747		2845				
P&A FACTOR			1.161 1.161 1.161			2250.87 891.986 47.619			3190.48		3303.01		2250 890 50 3190 3310		
SEASONAL FACTOR			0.925 0.925 0.925			2082.06 825.087 44.0476			2951.19		3054.02		2080 830 40 2950 3060		

PART 2: INPUT PARTIAL DAY B&C VEHICLES												ROUTE US-224			
PARTIAL COUNT * FACTOR * SEASONAL FACTOR = 24 HR B&C															
SOUTH LEG			SR-225			FC = Rural minor arterial northbound			APPROACH		DEPART				
			FACTOR			LT THRU RT			TOTAL		TOTAL				
			LT THRU RT			26 26 495			547		523				
B&C FACTOR			1.258 1.258 1.258			32.7044 32.7044 622.642			688.05		619.736		30 30 620 680 620		
SEASONAL FACTOR			0.925 0.925 0.925			30.2516 30.2516 575.943			636.447		571.265		30 30 580 640 570		
WEST LEG			US-224			FC = Rural minor arterial eastbound			APPROACH		DEPART				
			FACTOR			LT THRU RT			TOTAL		TOTAL				
			LT THRU RT			3 82 25			110		103				
B&C FACTOR			1.258 0.000 0.000			3.77358 0 0			3.77358		128.938		0 0 0 0 120		
SEASONAL FACTOR			0.925 0.925 0.925			3.49057 0 0			3.49057		88.8313		0 0 0 0 110		
NORTH LEG			Alliance Road			FC = Rural Local Road southbound			APPROACH		DEPART				
			FACTOR			LT THRU RT			TOTAL		TOTAL				
			LT THRU RT			2 43 4			49		31				
B&C FACTOR			1.103 1.103 1.103			2.20507 47.409 4.41014			54.0243		38.9937		0 50 0 50 30		
SEASONAL FACTOR			0.883 0.883 0.883			1.94708 41.8622 3.89416			47.7034		36.0692		0 40 0 40 30		
EAST LEG			US-224			FC = Rural minor arterial westbound			APPROACH		DEPART				
			FACTOR			LT THRU RT			TOTAL		TOTAL				
			LT THRU RT			455 73 2			530		579				
B&C FACTOR			1.258 1.258 1.258			572.327 91.8239 2.51572			666.667		624.847		570 90 0 660 620		
SEASONAL FACTOR			0.925 0.925 0.925			529.403 84.9371 2.32704			616.667		577.89		530 80 0 610 580		

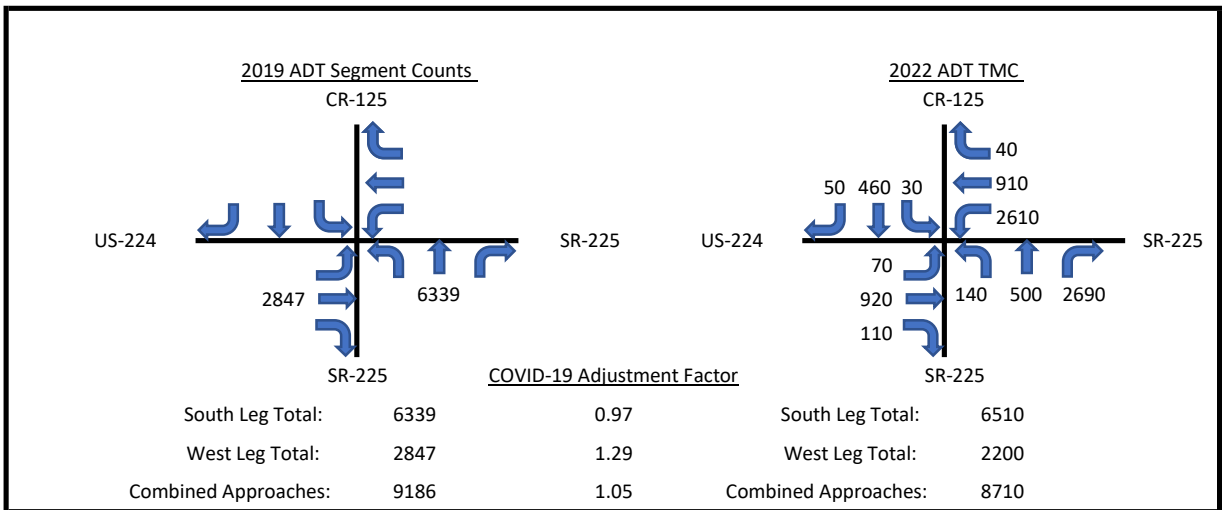
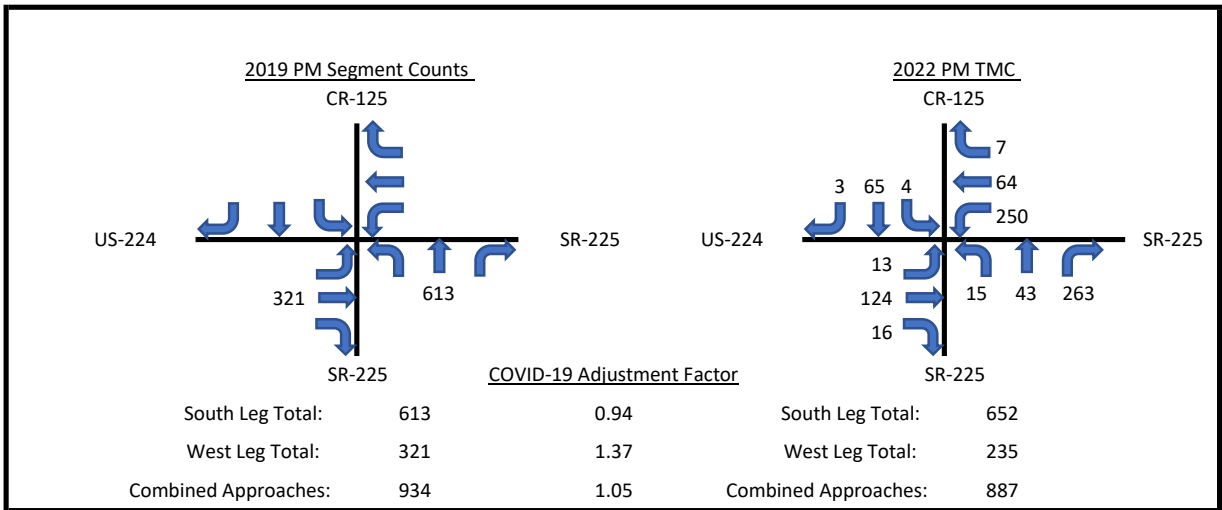
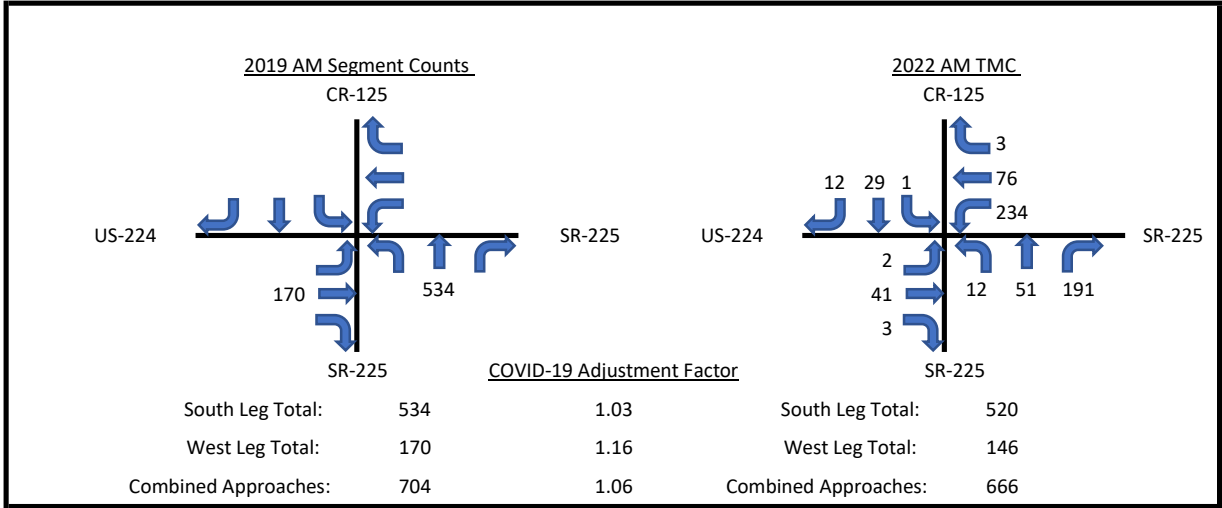


POR US 224 and SR 225 Safety Study
Traffic Volume Calculations



Year	Period	Scenario	Plate
		COVID Adjustment Calcs	

^
N



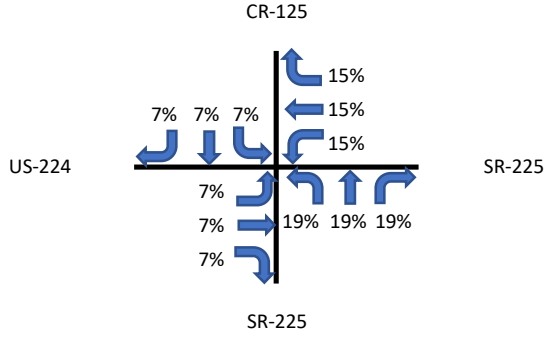
POR US 224 and SR 225 Safety Study
Traffic Volume Calculations



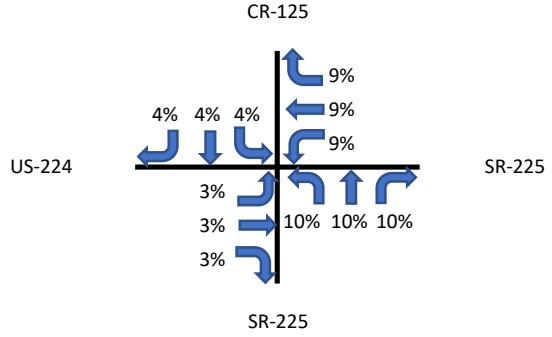
Year	Period	Scenario	Plate
		Truck Percentages and Peak Hour Factors	

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N

AM Peak Truck Percentages



PM Peak Truck Percentages



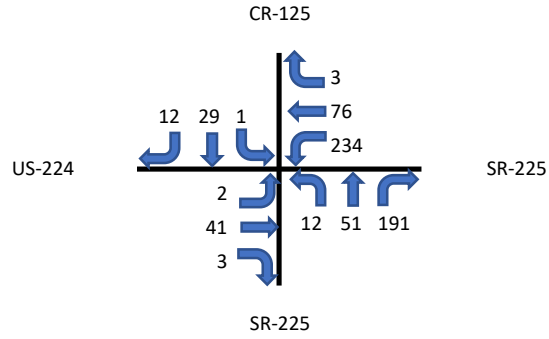
PHFs	
AM PHF	0.95
6:30-6:45	174
6:45-7:00	153
7:00-7:15	156
7:15-7:30	172
PM PHF	0.93
3:45-4:00	232
4:00-4:15	195
4:15-4:30	206
4:30-4:45	234

POR US 224 and SR 225 Safety Study
 Traffic Volume Calculations



Year	Period	Scenario	Plate
2022	AM	Count	

^
N



POR US 224 and SR 225 Safety Study
 Traffic Volume Calculations



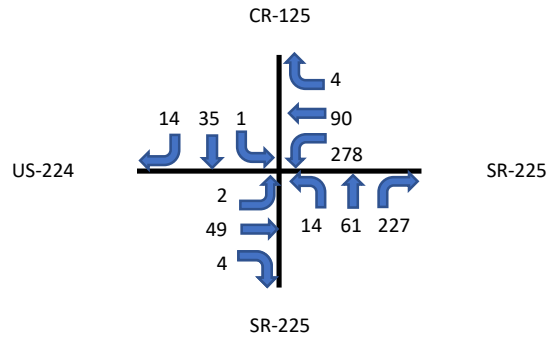
Year	Period	Scenario	Plate
2022	AM	Peak Hour to Design Hour Volume Calculation*	

^

N

Design Hour Factor 1.19

*The north leg of the intersection is classified as a Rural Local Road. However, no Peak Hour to Design Hour Factors exist for Rural Local Roads, so the factor used for the other legs of the intersection was applied to the north leg to be conservative.



POR US 224 and SR 225 Safety Study
Traffic Volume Calculations



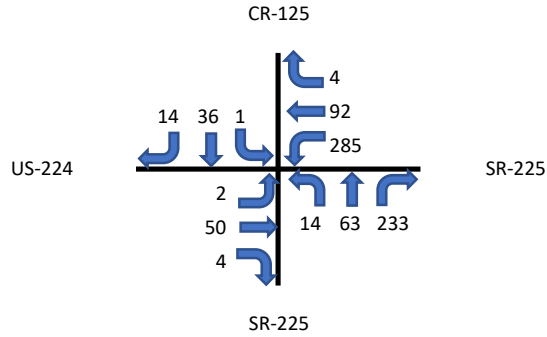
Year	Period	Scenario	Plate
2027	AM	Opening Year	

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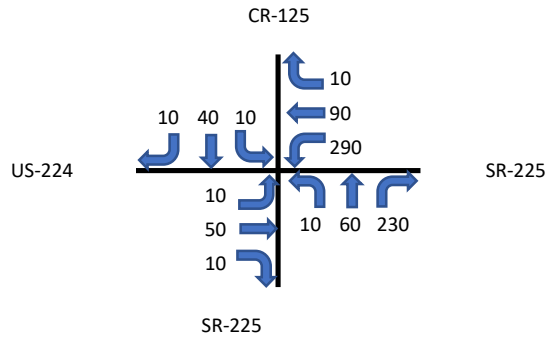
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Growth Rate: 0.5%

Unrounded



Rounded



POR US 224 and SR 225 Safety Study
Traffic Volume Calculations



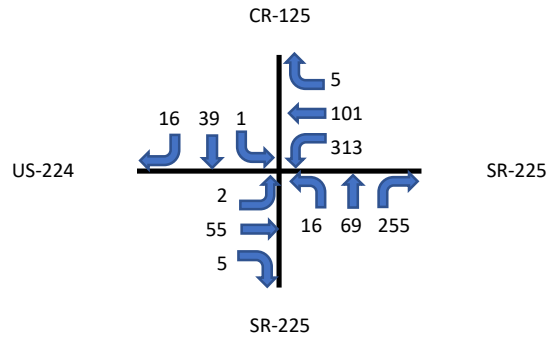
Year	Period	Scenario	Plate
2047	AM	Design Year	

^

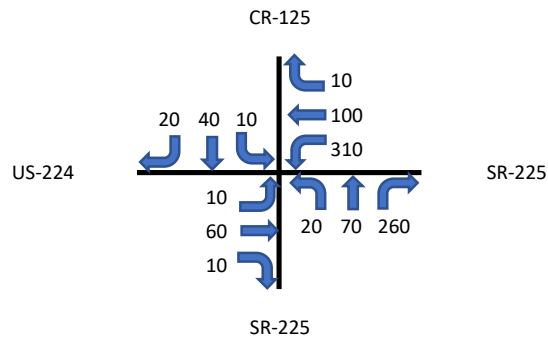
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Growth Rate: 0.5%

Unrounded



Rounded

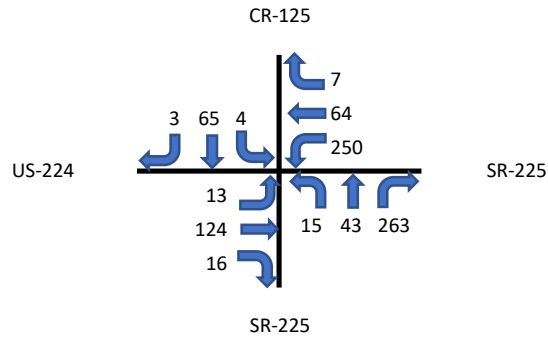


POR US 224 and SR 225 Safety Study
 Traffic Volume Calculations



Year	Period	Scenario	Plate
2022	PM	Count	

^
N



POR US 224 and SR 225 Safety Study
Traffic Volume Calculations



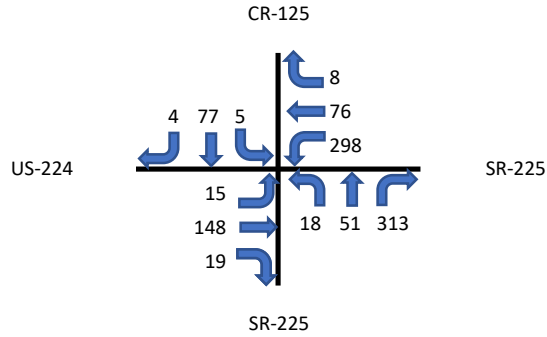
Year	Period	Scenario	Plate
2022	PM	Peak Hour to Design Hour Volume Calculation*	

^

N

Design Hour Factor 1.19

*The north leg of the intersection is classified as a Rural Local Road. However, no Peak Hour to Design Hour Factors exist for Rural Local Roads, so the factor used for the other legs of the intersection was applied to the north leg to be conservative.



POR US 224 and SR 225 Safety Study
Traffic Volume Calculations



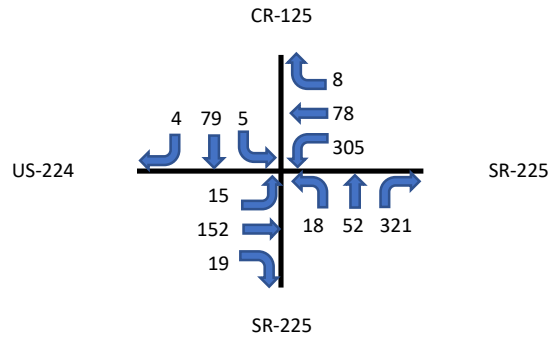
Year	Period	Scenario	Plate
2027	PM	Opening Year	

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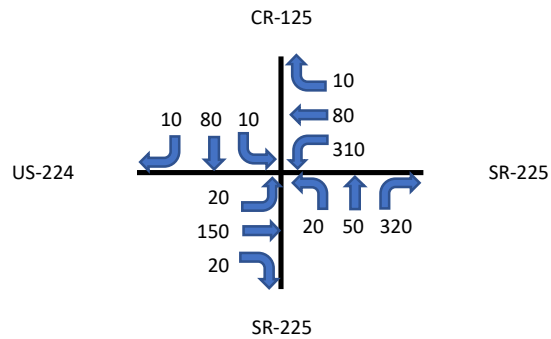
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Growth Rate: 0.5%

Unrounded



Rounded



POR US 224 and SR 225 Safety Study
Traffic Volume Calculations



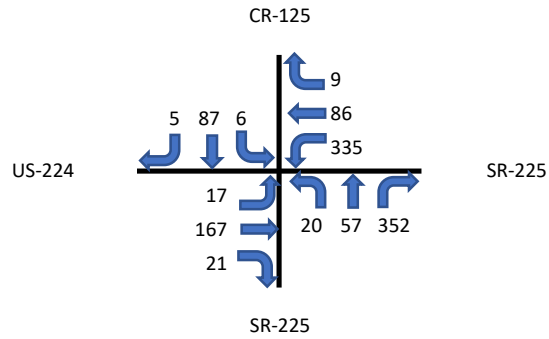
Year	Period	Scenario	Plate
2047	PM	Design Year	

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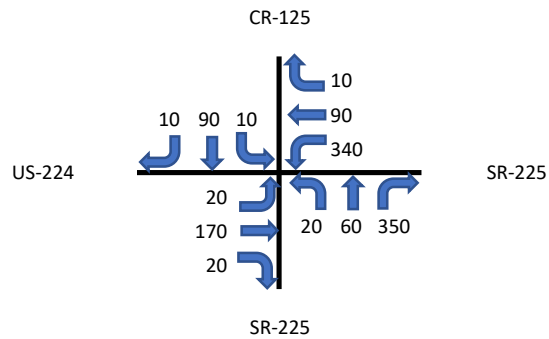
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Growth Rate: 0.5%

Unrounded



Rounded

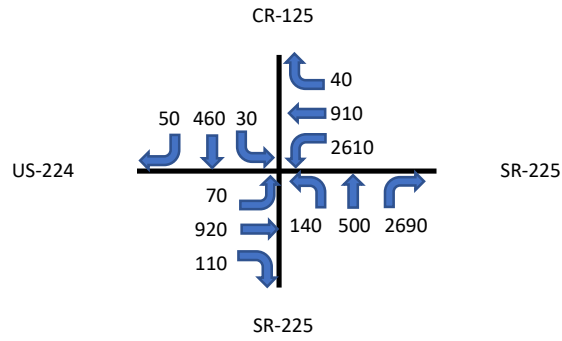


POR US 224 and SR 225 Safety Study
 Traffic Volume Calculations



Year	Period	Scenario	Plate
2022	ADT	Count	

^
N



POR US 224 and SR 225 Safety Study
Traffic Volume Calculations



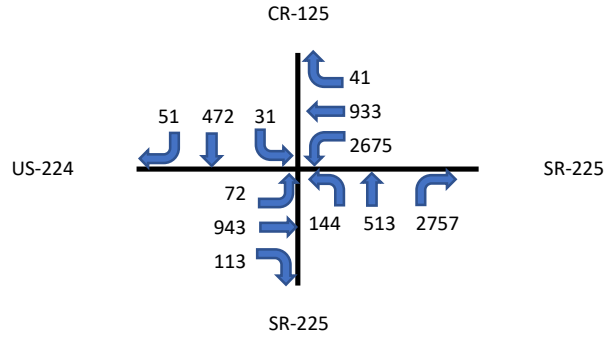
Year	Period	Scenario	Plate
2027	ADT	Opening Year	

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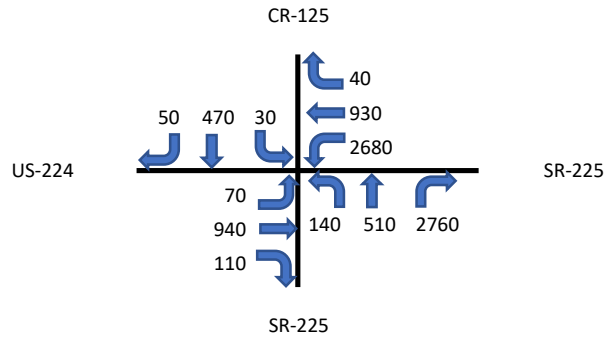
N

Growth Rate: 0.5%

Unrounded



Rounded



POR US 224 and SR 225 Safety Study
Traffic Volume Calculations



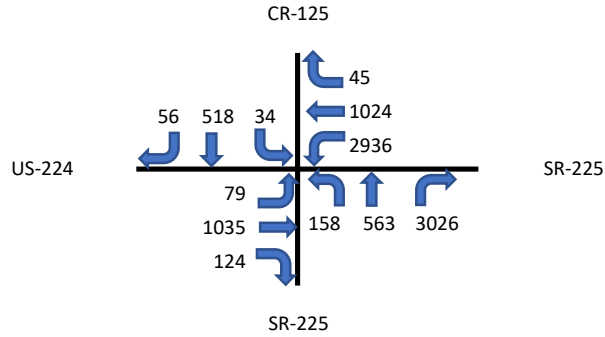
Year	Period	Scenario	Plate
2047	ADT	Design Year	

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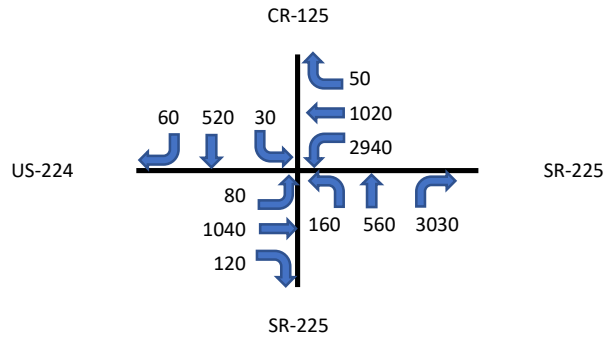
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Growth Rate: 0.5%

Unrounded



Rounded



Appendix D

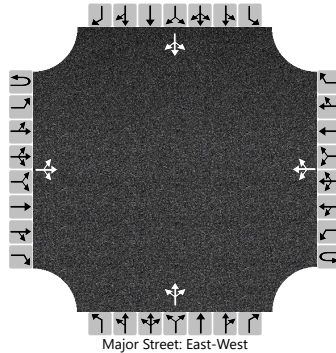
Existing Conditions Capacity Analysis



HCS Two-Way Stop-Control Report

General Information				Site Information			
Analyst	CMC			Intersection	US-224 & SR-225 & CR-125		
Agency/Co.	CMTran			Jurisdiction	ODOT D4		
Date Performed				East/West Street	US-224/SR-225		
Analysis Year	2022			North/South Street	SR-225/CR-125		
Time Analyzed	AM - Existing Conditions			Peak Hour Factor	0.95		
Intersection Orientation	East-West			Analysis Time Period (hrs)	0.25		
Project Description	POR US 224 and SR 225 Safety Study						

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Movement	1U	1	2	3	4U	4	5	6	7	8	9		10	11	12	
Priority																
Number of Lanes	0	0	1	0	0	0	1	0	0	1	0		0	1	0	
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		2	49	4		278	90	4		14	61	227		1	35	14
Percent Heavy Vehicles (%)		7				15				19	19	19		7	7	7
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized																
Median Type Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.17				4.25				7.29	6.69	6.39		7.17	6.57	6.27
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.26				2.34				3.67	4.17	3.47		3.56	4.06	3.36

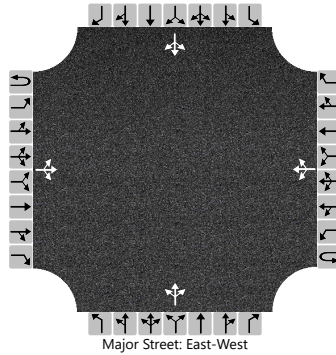
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		2				293				318				53		
Capacity, c (veh/h)		1463				1470				558				323		
v/c Ratio		0.00				0.20				0.57				0.16		
95% Queue Length, Q ₉₅ (veh)		0.0				0.7				3.6				0.6		
Control Delay (s/veh)		7.5	0.0	0.0		8.1	1.7	1.7		19.7				18.3		
Level of Service (LOS)		A	A	A		A	A	A		C				C		
Approach Delay (s/veh)	0.3				6.5				19.7				18.3			
Approach LOS	A				A				C				C			

HCS Two-Way Stop-Control Report

General Information				Site Information			
Analyst	CMC			Intersection	US-224 & SR-225 & CR-125		
Agency/Co.	CMTran			Jurisdiction	ODOT D4		
Date Performed				East/West Street	US-224/SR-225		
Analysis Year	2022			North/South Street	SR-225/CR-125		
Time Analyzed	PM - Existing Conditions			Peak Hour Factor	0.93		
Intersection Orientation	East-West			Analysis Time Period (hrs)	0.25		
Project Description	POR US 224 and SR 225 Safety Study						

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Movement	1U	1	2	3	4U	4	5	6	7	8	9		10	11	12	
Priority																
Number of Lanes	0	0	1	0	0	0	1	0	0	1	0		0	1	0	
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		15	148	19		298	76	8		18	51	313		5	77	4
Percent Heavy Vehicles (%)		3				9				10	10	10		4	4	4
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized																
Median Type Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.13				4.19				7.20	6.60	6.30		7.14	6.54	6.24
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.23				2.28				3.59	4.09	3.39		3.54	4.04	3.34

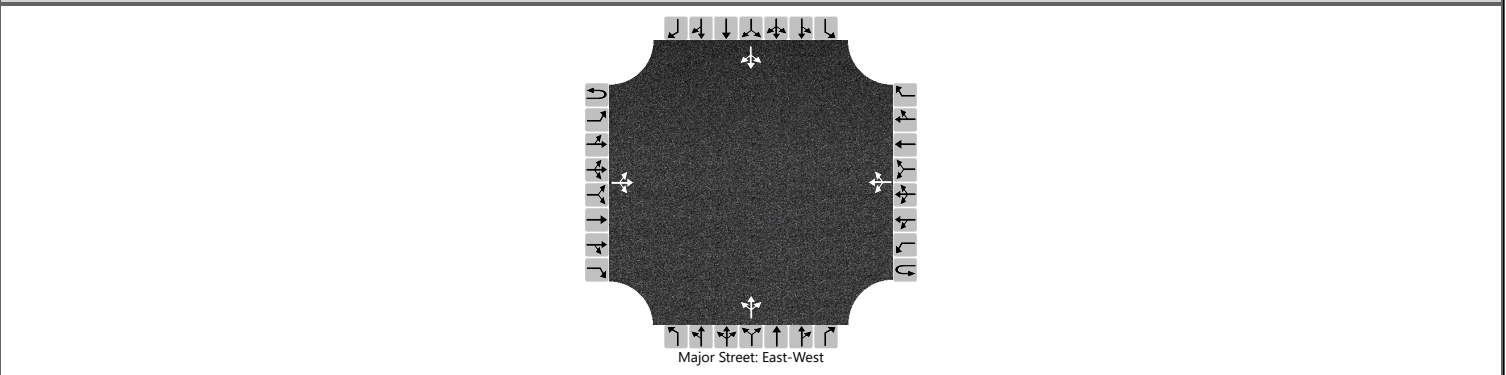
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		16				320				411				92		
Capacity, c (veh/h)		1499				1355				477				179		
v/c Ratio		0.01				0.24				0.86				0.52		
95% Queue Length, Q ₉₅ (veh)		0.0				0.9				9.0				2.6		
Control Delay (s/veh)		7.4	0.1	0.1		8.5	2.1	2.1		43.9				44.8		
Level of Service (LOS)		A	A	A		A	A	A		E				E		
Approach Delay (s/veh)	0.7				7.1				43.9				44.8			
Approach LOS	A				A				E				E			

HCS Two-Way Stop-Control Report

General Information				Site Information			
Analyst	CMC			Intersection	US-224 & SR-225 & CR-125		
Agency/Co.	CMTran			Jurisdiction	ODOT D4		
Date Performed				East/West Street	US-224/SR-225		
Analysis Year	2027			North/South Street	SR-225/CR-125		
Time Analyzed	AM - Existing Conditions			Peak Hour Factor	0.95		
Intersection Orientation	East-West			Analysis Time Period (hrs)	0.25		
Project Description	POR US 224 and SR 225 Safety Study						

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Movement	1U	1	2	3	4U	4	5	6	7	8	9		10	11	12	
Priority																
Number of Lanes	0	0	1	0	0	0	1	0	0	1	0		0	1	0	
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		10	50	10		290	90	10		10	60	230		10	40	10
Percent Heavy Vehicles (%)		7				15				19	19	19		7	7	7
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized																
Median Type Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.17				4.25				7.29	6.69	6.39		7.17	6.57	6.27
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.26				2.34				3.67	4.17	3.47		3.56	4.06	3.36

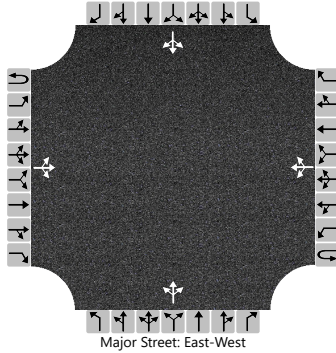
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		11				305				316				63		
Capacity, c (veh/h)		1455				1460				544				223		
v/c Ratio		0.01				0.21				0.58				0.28		
95% Queue Length, Q ₉₅ (veh)		0.0				0.8				3.7				1.1		
Control Delay (s/veh)		7.5	0.1	0.1		8.1	1.8	1.8		20.4				27.4		
Level of Service (LOS)		A	A	A		A	A	A		C				D		
Approach Delay (s/veh)	1.1				6.5				20.4				27.4			
Approach LOS	A				A				C				D			

HCS Two-Way Stop-Control Report

General Information		Site Information	
Analyst	CMC	Intersection	US-224 & SR-225 & CR-125
Agency/Co.	CMTran	Jurisdiction	ODOT D4
Date Performed		East/West Street	US-224/SR-225
Analysis Year	2027	North/South Street	SR-225/CR-125
Time Analyzed	PM - Existing Conditions	Peak Hour Factor	0.93
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	POR US 224 and SR 225 Safety Study		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound				
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R	
Movement	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12	
Priority																	
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	1	0	
Configuration			LTR				LTR				LTR				LTR		
Volume (veh/h)		20	150	20		310	80	10		20	50	320		10	80	10	
Percent Heavy Vehicles (%)		3				9				10	10	10		4	4	4	
Proportion Time Blocked																	
Percent Grade (%)										0				0			
Right Turn Channelized																	
Median Type Storage	Undivided																

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.13				4.19				7.20	6.60	6.30		7.14	6.54	6.24
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.23				2.28				3.59	4.09	3.39		3.54	4.04	3.34

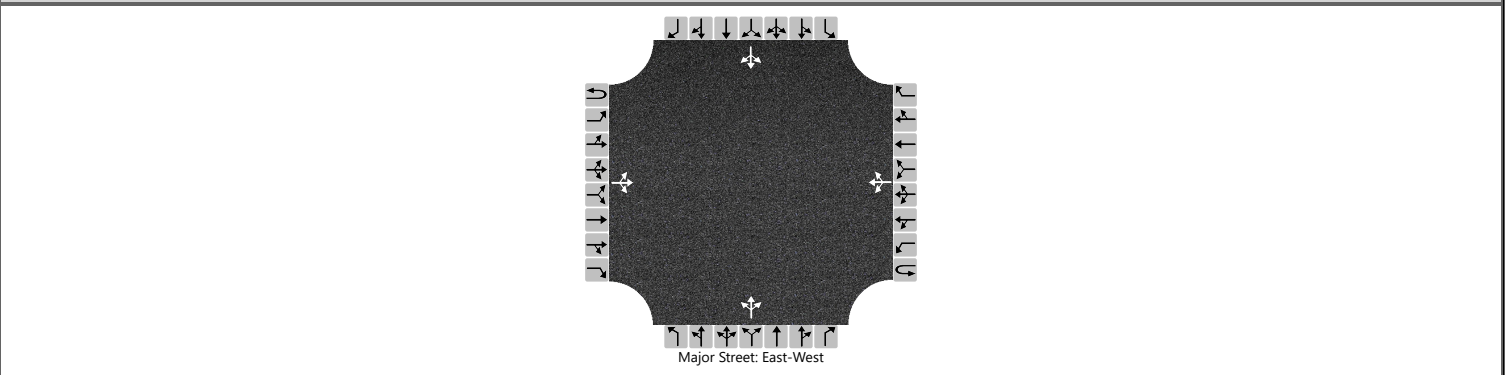
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		22				333					419					108	
Capacity, c (veh/h)		1490				1351					441					157	
v/c Ratio		0.01				0.25					0.95					0.69	
95% Queue Length, Q ₉₅ (veh)		0.0				1.0					11.2					4.0	
Control Delay (s/veh)		7.5	0.1	0.1		8.5	2.2	2.2			62.1					67.3	
Level of Service (LOS)		A	A	A		A	A	A			F					F	
Approach Delay (s/veh)		0.9				7.1				62.1				67.3			
Approach LOS		A				A				F				F			

HCS Two-Way Stop-Control Report

General Information				Site Information			
Analyst	CMC			Intersection	US-224 & SR-225 & CR-125		
Agency/Co.	CMTran			Jurisdiction	ODOT D4		
Date Performed				East/West Street	US-224/SR-225		
Analysis Year	2047			North/South Street	SR-225/CR-125		
Time Analyzed	AM - Existing Conditions			Peak Hour Factor	0.95		
Intersection Orientation	East-West			Analysis Time Period (hrs)	0.25		
Project Description	POR US 224 and SR 225 Safety Study						

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound				
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R	
Movement	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12	
Priority																	
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	1	0	
Configuration			LTR				LTR				LTR				LTR		
Volume (veh/h)		10	60	10		310	100	10		20	70	260		10	40	20	
Percent Heavy Vehicles (%)		7				15				19	19	19		7	7	7	
Proportion Time Blocked																	
Percent Grade (%)										0				0			
Right Turn Channelized																	
Median Type Storage	Undivided																

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.17				4.25				7.29	6.69	6.39		7.17	6.57	6.27
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.26				2.34				3.67	4.17	3.47		3.56	4.06	3.36

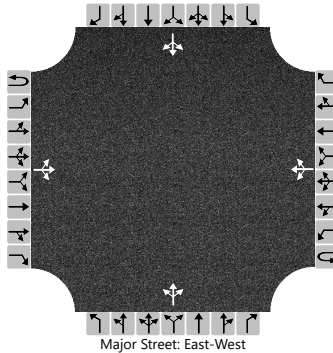
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		11				326					368					74
Capacity, c (veh/h)		1442				1447					473					211
v/c Ratio		0.01				0.23					0.78					0.35
95% Queue Length, Q ₉₅ (veh)		0.0				0.9					6.9					1.5
Control Delay (s/veh)		7.5	0.1	0.1		8.2	2.0	2.0			34.5					31.0
Level of Service (LOS)		A	A	A		A	A	A			D					D
Approach Delay (s/veh)		1.0				6.6				34.5				31.0		
Approach LOS		A				A				D				D		

HCS Two-Way Stop-Control Report

General Information		Site Information	
Analyst	CMC	Intersection	US-224 & SR-225 & CR-125
Agency/Co.	CMTran	Jurisdiction	ODOT D4
Date Performed		East/West Street	US-224/SR-225
Analysis Year	2047	North/South Street	SR-225/CR-125
Time Analyzed	PM - Existing Conditions	Peak Hour Factor	0.93
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	POR US 224 and SR 225 Safety Study		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Movement	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Priority																
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		20	170	20		340	90	10		20	60	350		10	90	10
Percent Heavy Vehicles (%)		3				9				10	10	10		4	4	4
Proportion Time Blocked																
Percent Grade (%)										0				0		
Right Turn Channelized																
Median Type Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.13				4.19				7.20	6.60	6.30		7.14	6.54	6.24
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.23				2.28				3.59	4.09	3.39		3.54	4.04	3.34

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		22				366					462					118
Capacity, c (veh/h)		1477				1327					358					122
v/c Ratio		0.01				0.28					1.29					0.97
95% Queue Length, Q ₉₅ (veh)		0.0				1.1					21.3					6.4
Control Delay (s/veh)		7.5	0.1	0.1		8.7	2.6	2.6			182.1					141.6
Level of Service (LOS)		A	A	A		A	A	A			F					F
Approach Delay (s/veh)		0.8				7.3				182.1				141.6		
Approach LOS		A				A				F				F		

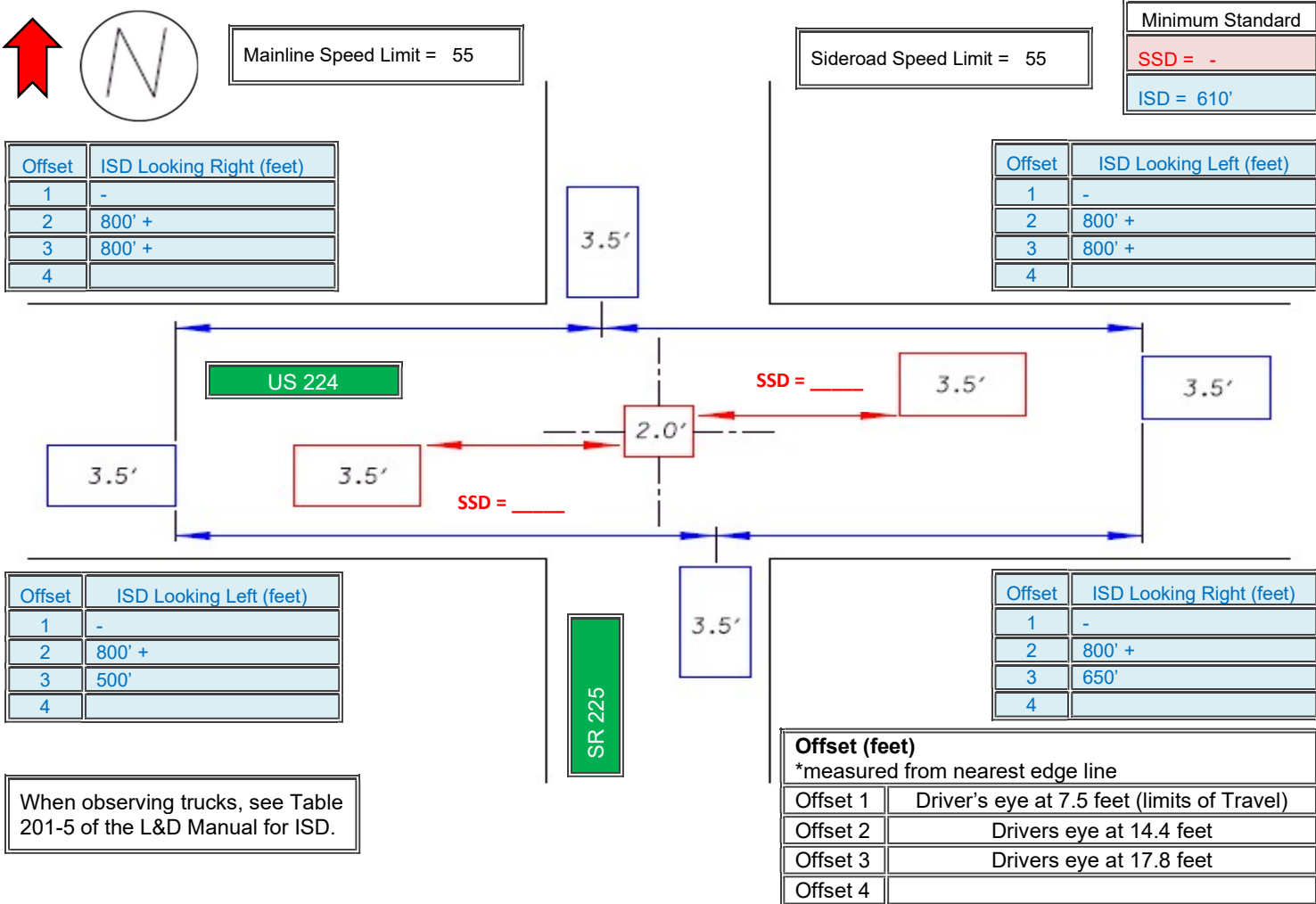
Appendix E

Sight Distance Analysis

OHIO DEPARTMENT OF TRANSPORTATION

Sight Distance Study

COUNTY:	POR	ROUTE:	US 224	SLM:	16.09	LOCATION:	Intersection of US 224 and SR 225
DATE:	7-6-22	DAY:	Wednesday	TIME:	8:45 AM	OBSERVER(S):	K. KUBUS, A. LONSINGER
REASON FOR ANALYSIS:		Analyzing sight distance due to telephone poles blocking sight distance					



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

Notes/Recommendations:

Many of the cars "stopping" along SR 225 and Alliance Rd. rolled through the stop sign and continued through the intersection.

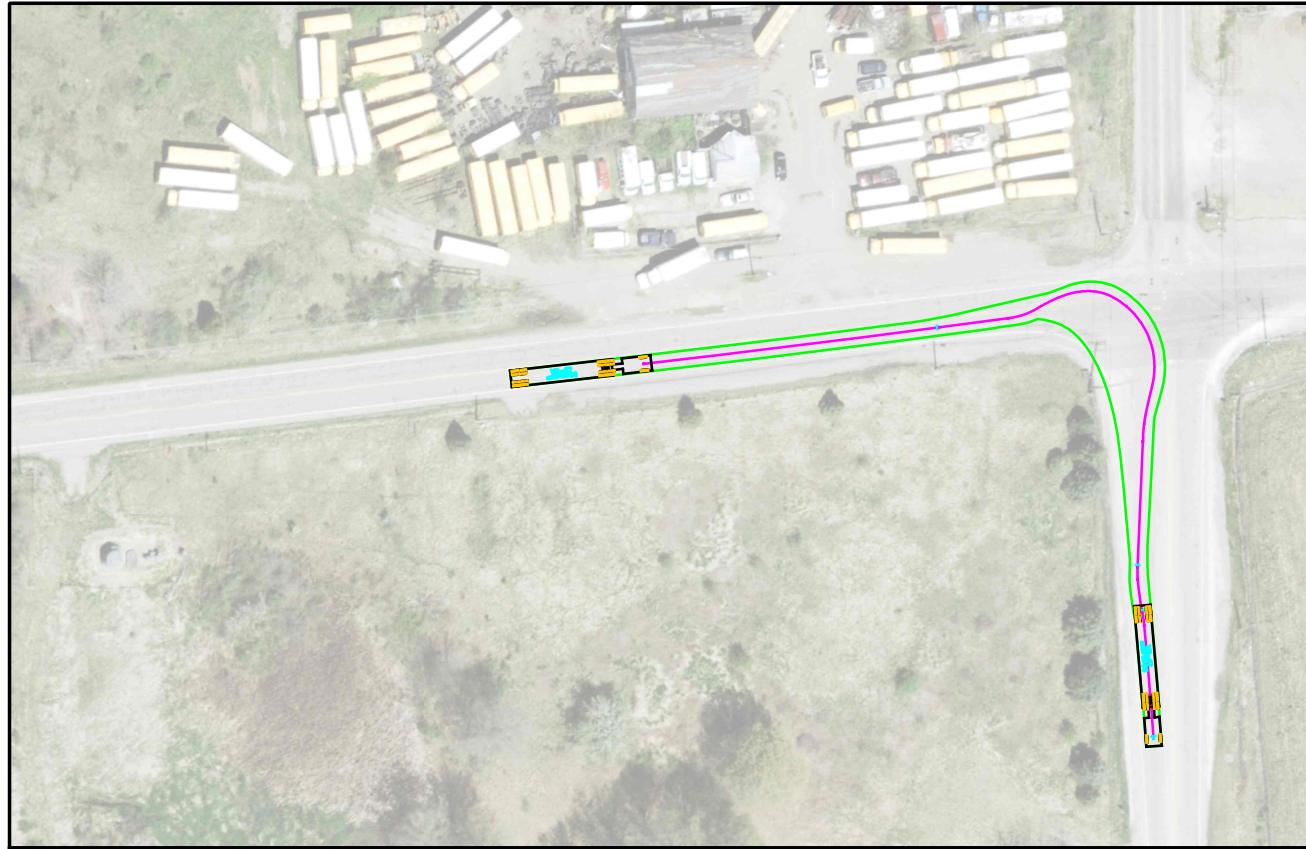
On the NB approach, the utility poles interfered with the view east and west dependent on stopped position.

Design standards from L & D Manual (Vol 1, Sect Rev July 2013)			
DESIGN SPEED (mph)	SSD (fig 201-1E)	ISD for passenger car turning left (Fig 201-5E)	ISD for passenger car turning right or crossing (Fig 201-5E)
20	115'	225'	195'
25	155'	280'	240'
30	200'	335'	290'
35	250'	390'	335'
40	305'	445'	385'
45	360'	500'	430'
50	425'	555'	480'
55	495'	610'	530'
60	570'	665'	575'

Appendix F

Existing Conditions

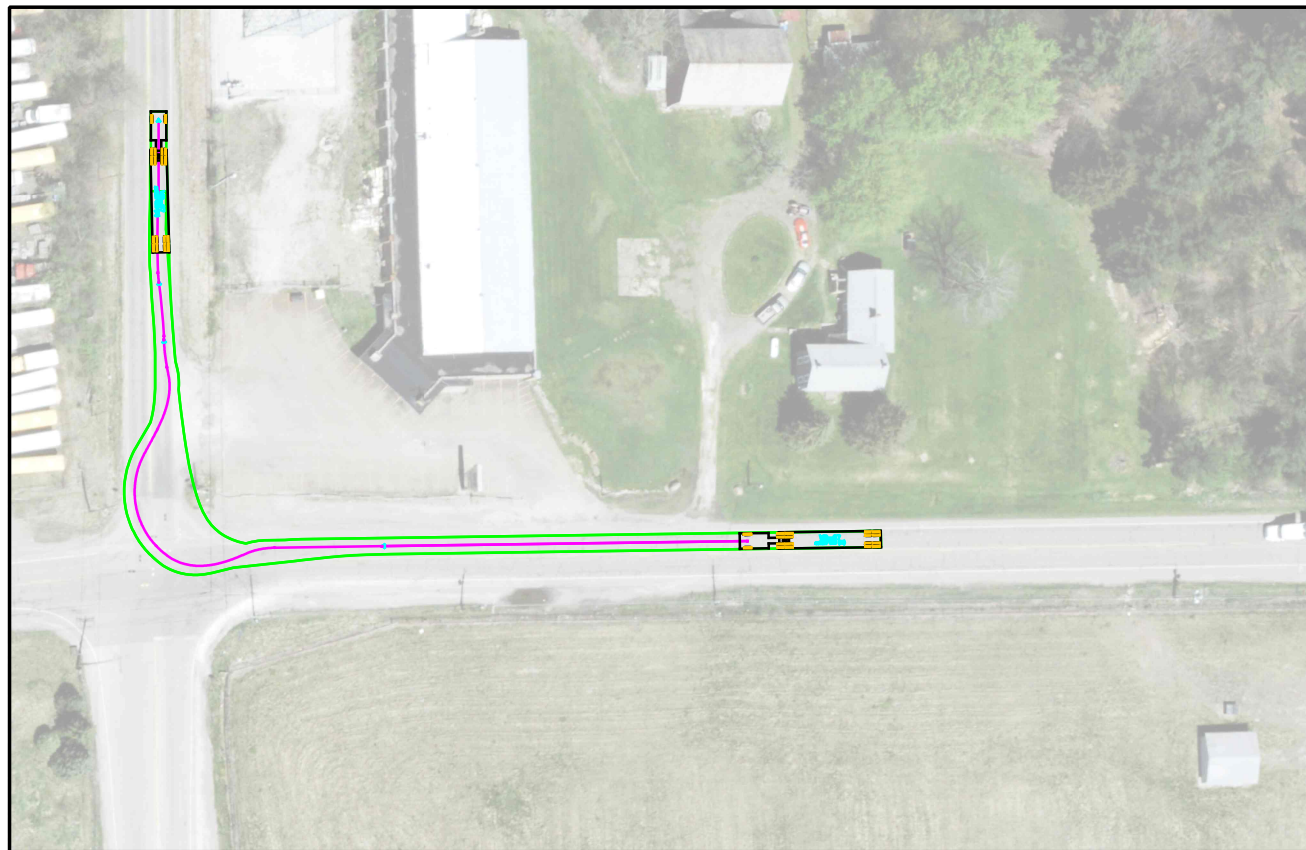
Truck Turning Movement Analysis



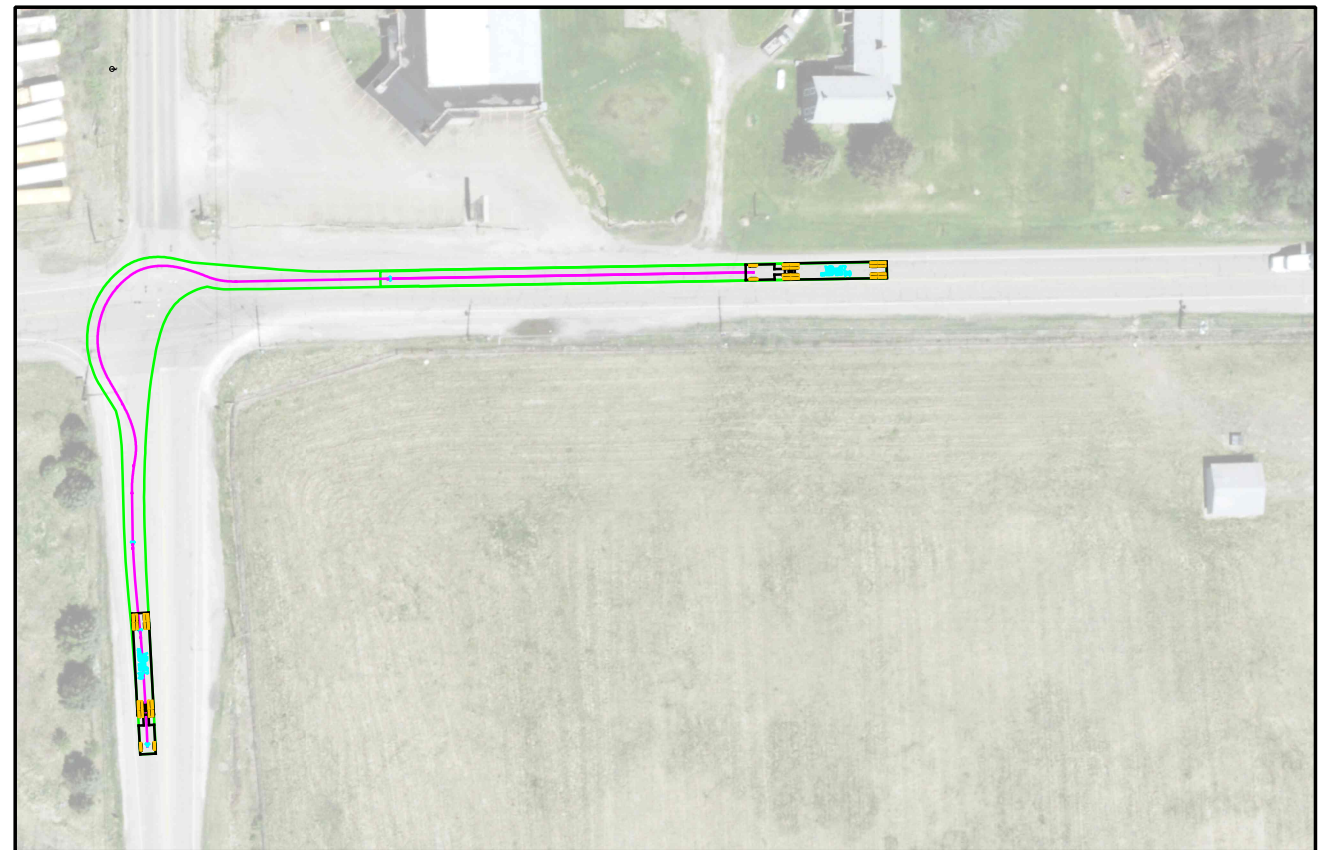
EASTBOUND US-224: RIGHT TURN MOVEMENT



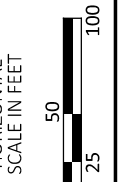
EASTBOUND US-224: LEFT TURN MOVEMENT



WESTBOUND US-224: RIGHT TURN MOVEMENT



WESTBOUND US-224: LEFT TURN MOVEMENT



US-224 & SR-225 EXISTING CONDITIONS
EASTBOUND AND WESTBOUND WB-67 TRUCK TURNING MOVEMENTS

DESIGN AGENCY



DESIGNER

CEF

REVIEWER

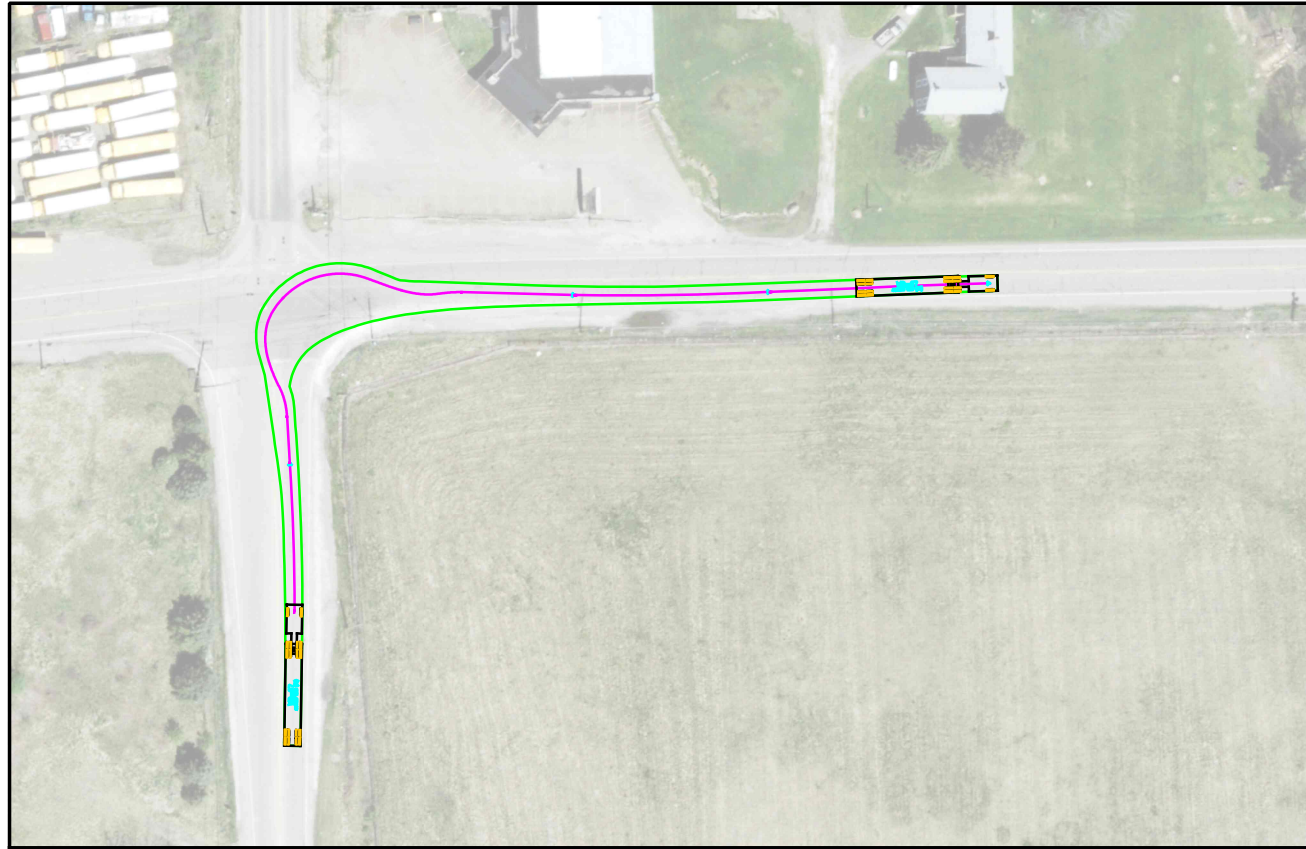
DMG 08-31-23

PROJECT ID

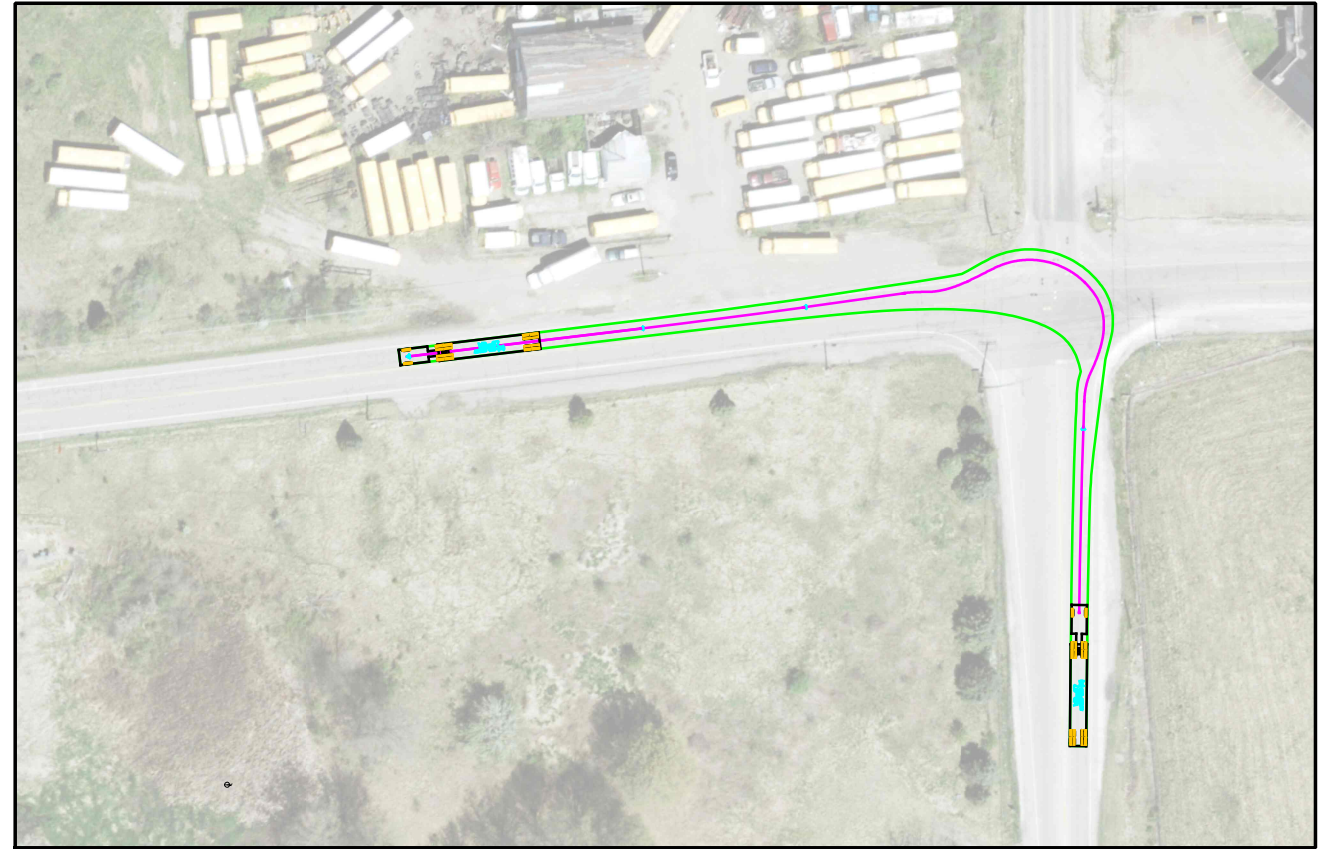
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SHEET TOTAL

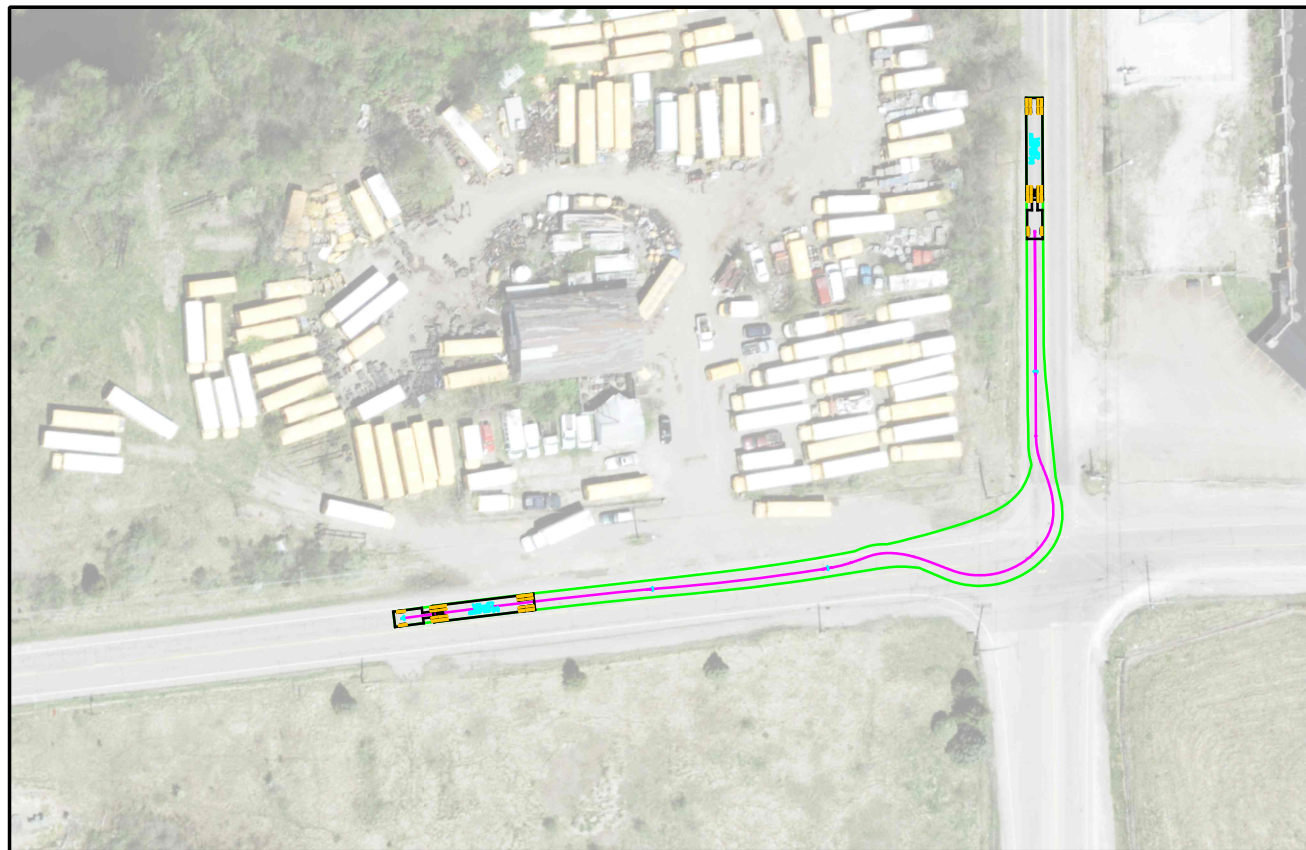
P.O 0



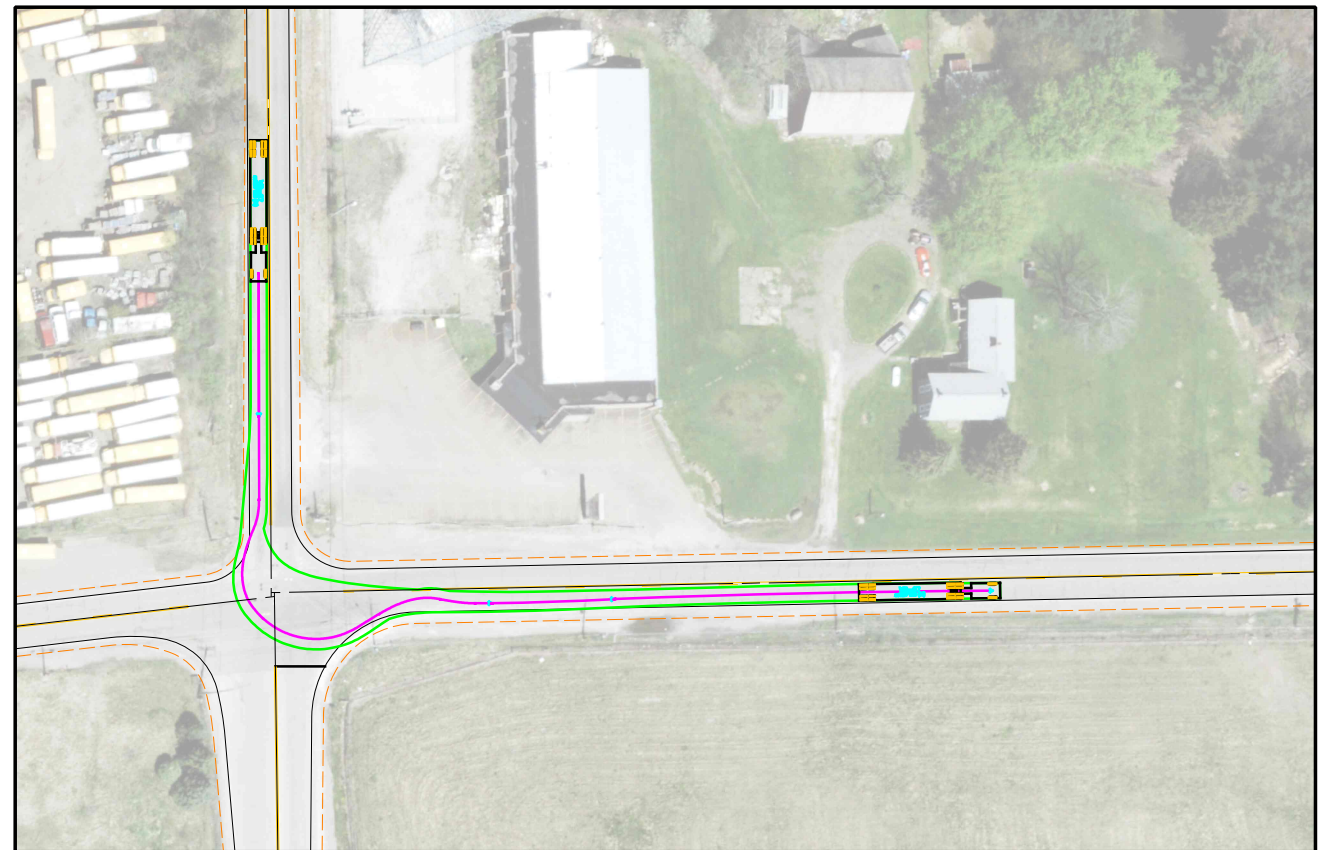
NORTHBOUND SR-225: RIGHT TURN MOVEMENT



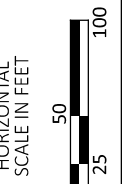
NORTHBOUND SR-225: LEFT TURN MOVEMENT



SOUTHBOUND SR-225: RIGHT TURN MOVEMENT



SOUTHBOUND SR-225: LEFT TURN MOVEMENT



US-224 & SR-225 EXISTING CONDITIONS
NORTHBOUND AND SOUTHBOUND WB-67 TRUCK TURNING MOVEMENTS

DESIGN AGENCY



DESIGNER

CEF

REVIEWER

DMG 08-31-23

PROJECT ID

0

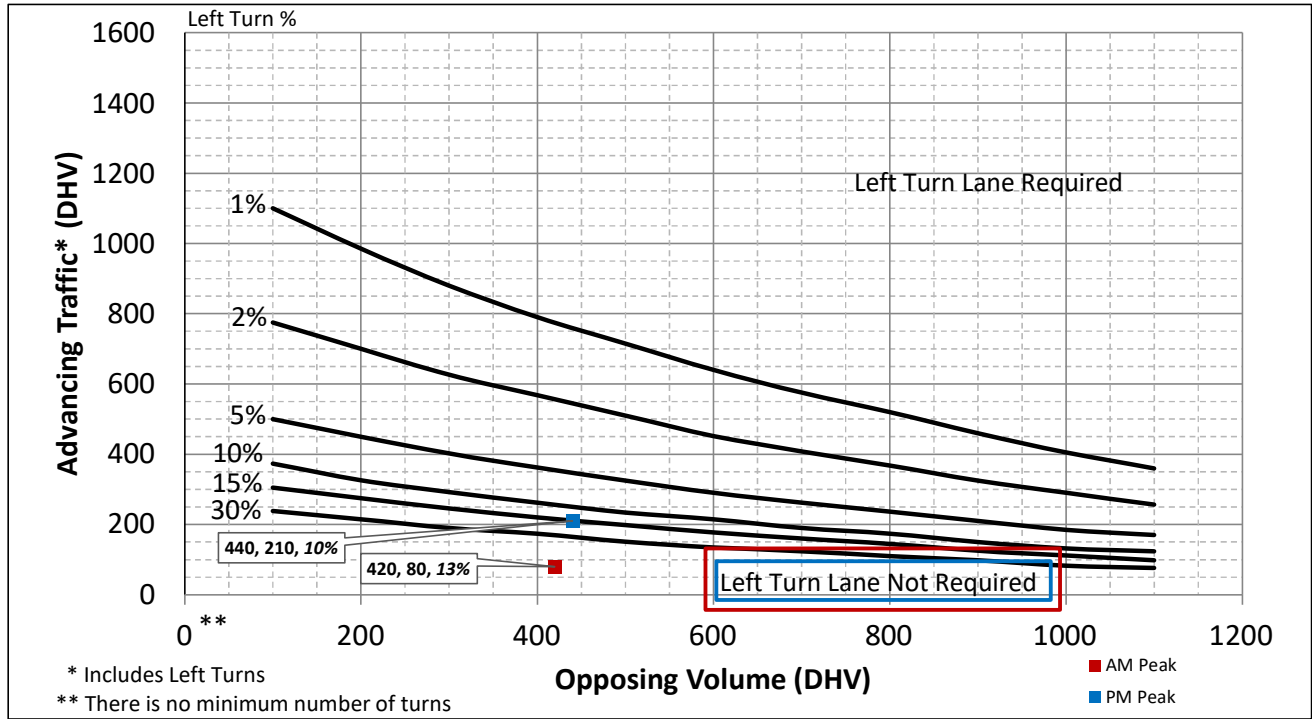
SHEET TOTAL

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Appendix G

Turn Lane Warrant Analysis

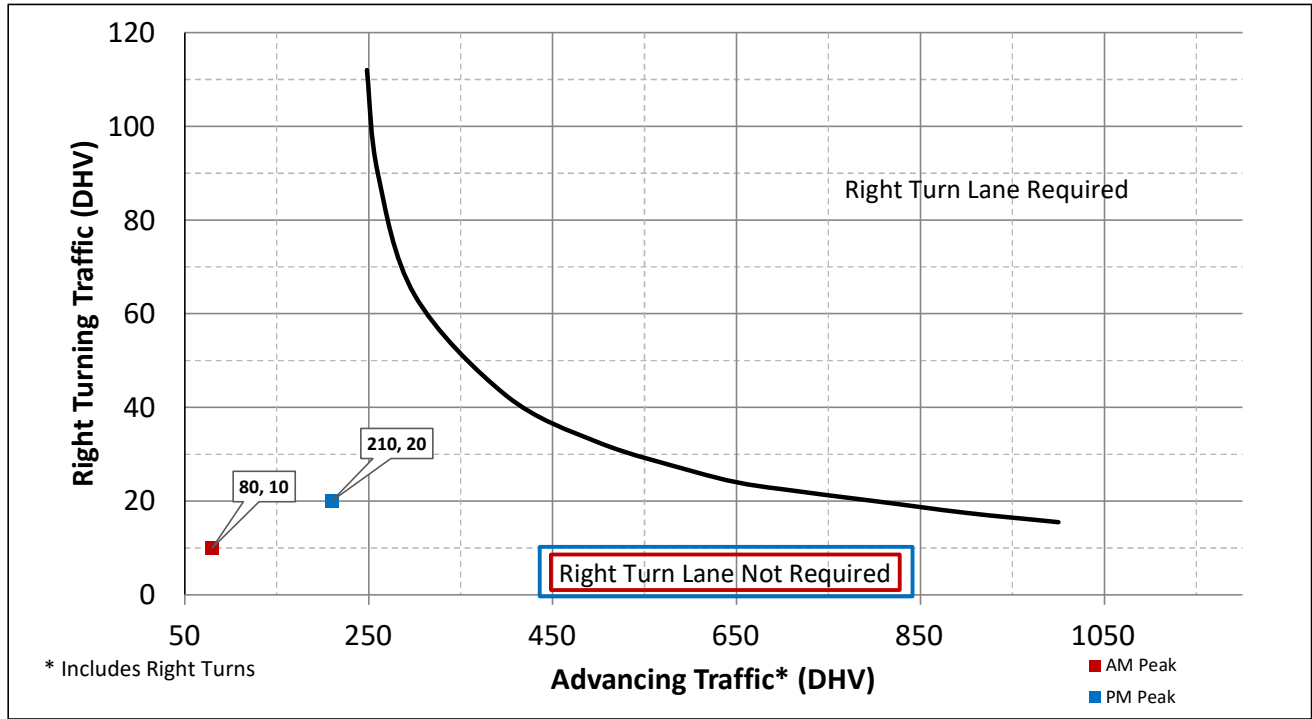
2-Lane Highway Left Turn Lane Warrant
(> 40 mph or 70 kph Posted Speed)



Turn Lane Length Calculations

AM Peak	Design Speed	60	mph	
	Traffic Control	Unsignalized		
	Cycle Length	Unsignalized		
	Cycles Per Hour	60	Assume 60	
	Turn Lane Volume	10	VPH	
	Advancing Traffic	80	VPH	
	Opposing Volume	420	VPH	
	Left Turn Percentage	13%		
	Location Type	Through Road		
	Condition	B or C		
	Vehicles/Cycle	1		
	Turn Lane Length	See Column to Right	345	* Turn Lane Length includes 50 ft diverging taper
	Approach Taper	720		
PM Peak	Design Speed	60	mph	
	Traffic Control	Unsignalized		
	Cycle Length	Unsignalized		
	Cycles Per Hour	60	Assume 60	
	Turn Lane Volume	20	VPH	
	Advancing Traffic	210	VPH	
	Opposing Volume	440	VPH	
	Left Turn Percentage	10%		
	Location Type	Through Road		
	Condition	B		
	Vehicles/Cycle	1		
	Turn Lane Length	345		* Turn Lane Length includes 50 ft diverging taper
	Approach Taper	720		
Is Left Turn Warrant Met		No	No Left Turn Lane Required	

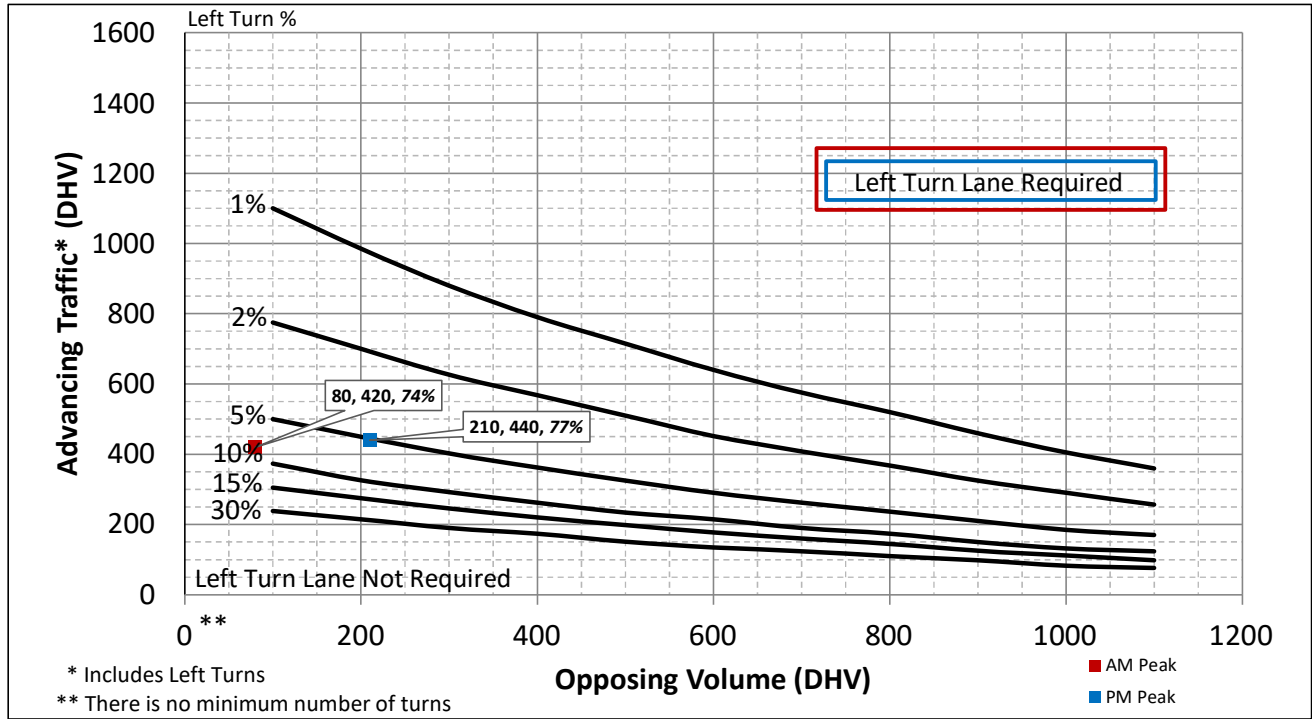
2-Lane Highway Right Turn Lane Warrant
(> 40 mph or 70 kph Posted Speed)



Turn Lane Length Calculations

AM Peak	Design Speed	60	mph	
	Traffic Control	Unsignalized		
	Cycle Length	Unsignalized		
	Cycles Per Hour	60	Assume 60	
	Turn Lane Volume	10	VPH	
	Advancing Traffic	80	VPH	
	Right Turn Percentage	13%		
	Location Type	Through Road		
	Condition	B or C		
	Vehicles/Cycle	1		
	Turn Lane Length	See Column to Right	345	* Turn Lane Length includes 50 ft diverging taper
PM Peak	Design Speed	60	mph	
	Traffic Control	Unsignalized		
	Cycle Length	Unsignalized		
	Cycles Per Hour	60	Assume 60	
	Turn Lane Volume	20	VPH	
	Advancing Traffic	210	VPH	
	Right Turn Percentage	10%		
	Location Type	Through Road		
	Condition	B		
	Vehicles/Cycle	1		
	Turn Lane Length	345		* Turn Lane Length includes 50 ft diverging taper
Is Right Turn Warrant Met		No	No Right Turn Lane Required	

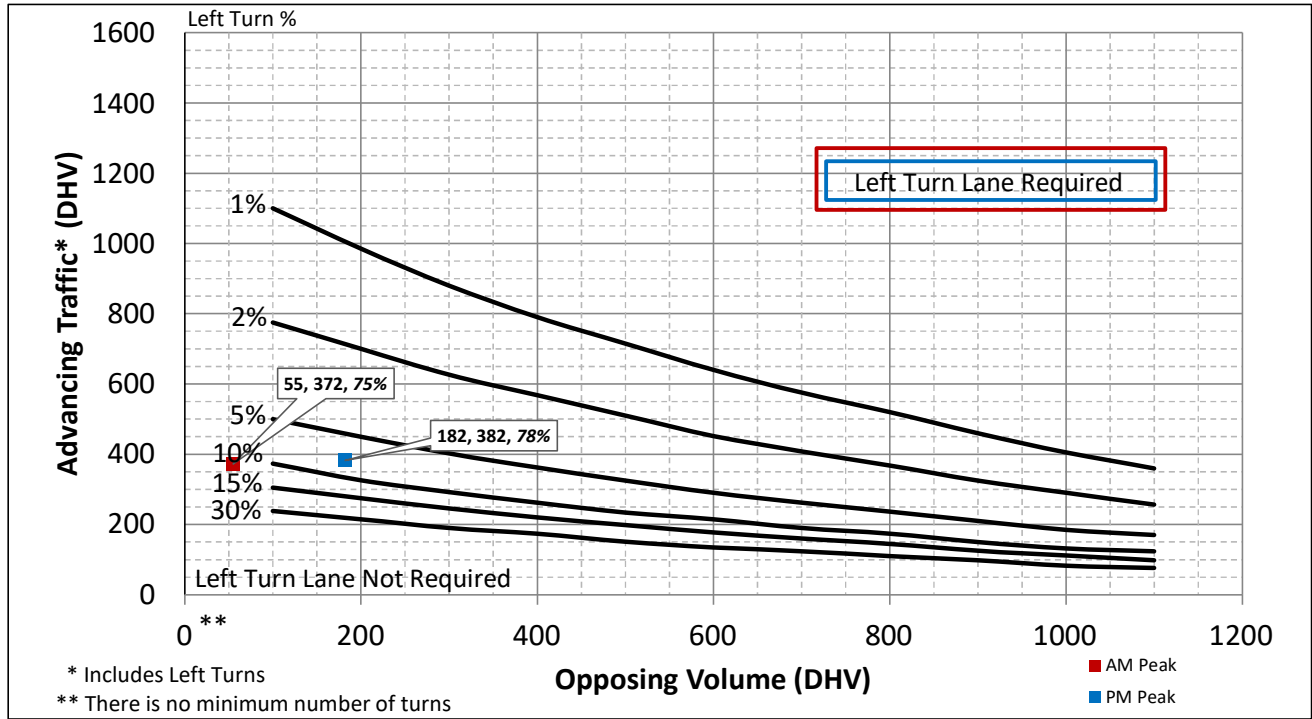
2-Lane Highway Left Turn Lane Warrant
(> 40 mph or 70 kph Posted Speed)



Turn Lane Length Calculations

AM Peak	Design Speed	60	mph	
	Traffic Control	Unsignalized		
	Cycle Length	Unsignalized		
	Cycles Per Hour	60	Assume 60	
	Turn Lane Volume	310	VPH	
	Advancing Traffic	420	VPH	
	Opposing Volume	80	VPH	
	Left Turn Percentage	74%		
	Location Type	Through Road		
	Condition	B or C		
	Vehicles/Cycle	6		
	Turn Lane Length	See Column to Right	435	* Turn Lane Length includes 50 ft diverging taper
	Approach Taper	720		
PM Peak	Design Speed	60	mph	
	Traffic Control	Unsignalized		
	Cycle Length	Unsignalized		
	Cycles Per Hour	60	Assume 60	
	Turn Lane Volume	340	VPH	
	Advancing Traffic	440	VPH	
	Opposing Volume	210	VPH	
	Left Turn Percentage	77%		
	Location Type	Through Road		
	Condition	B or C		
	Vehicles/Cycle	6		
	Turn Lane Length	See Column to Right	435	* Turn Lane Length includes 50 ft diverging taper
	Approach Taper	720		
Is Left Turn Warrant Met		Yes	See Above	

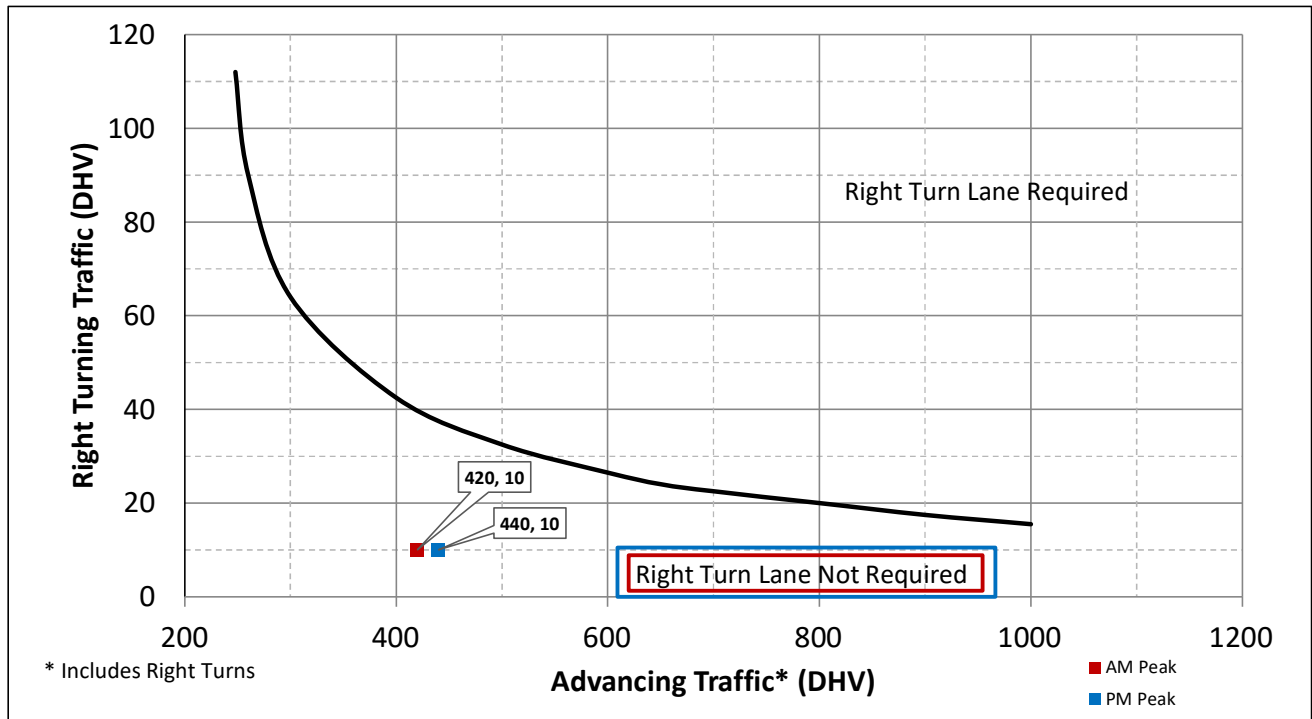
**2-Lane Highway Left Turn Lane Warrant
(> 40 mph or 70 kph Posted Speed)**



Turn Lane Length Calculations

AM Peak	Design Speed	60	mph	
	Traffic Control	Unsignalized		
	Cycle Length	Unsignalized		
	Cycles Per Hour	60	Assume 60	
	Turn Lane Volume	278	VPH	
	Advancing Traffic	372	VPH	
	Opposing Volume	55	VPH	
	Left Turn Percentage	75%		
	Location Type	Through Road		
	Condition	B or C		
	Vehicles/Cycle	5		
	Turn Lane Length	See Column to Right	385	* Turn Lane Length includes 50 ft diverging taper
	Approach Taper	720		
PM Peak	Design Speed	60	mph	
	Traffic Control	Unsignalized		
	Cycle Length	Unsignalized		
	Cycles Per Hour	60	Assume 60	
	Turn Lane Volume	298	VPH	
	Advancing Traffic	382	VPH	
	Opposing Volume	182	VPH	
	Left Turn Percentage	78%		
	Location Type	Through Road		
	Condition	B or C		
	Vehicles/Cycle	5		
	Turn Lane Length	See Column to Right	385	* Turn Lane Length includes 50 ft diverging taper
	Approach Taper	720		
Is Left Turn Warrant Met		Yes	See Above	

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



Turn Lane Length Calculations

AM Peak	Design Speed	60	mph	
	Traffic Control	Unsignalized		
	Cycle Length	Unsignalized		
	Cycles Per Hour	60	Assume 60	
	Turn Lane Volume	10	VPH	
	Advancing Traffic	420	VPH	
	Right Turn Percentage	2%		
	Location Type	Through Road		
	Condition	B		
	Vehicles/Cycle	1		
	Turn Lane Length	345		* Turn Lane Length includes 50 ft diverging taper
PM Peak	Design Speed	60	mph	
	Traffic Control	Unsignalized		
	Cycle Length	Unsignalized		
	Cycles Per Hour	60	Assume 60	
	Turn Lane Volume	10	VPH	
	Advancing Traffic	440	VPH	
	Right Turn Percentage	2%		
	Location Type	Through Road		
	Condition	B		
	Vehicles/Cycle	1		
	Turn Lane Length	345		* Turn Lane Length includes 50 ft diverging taper
Is Right Turn Warrant Met		No	No Right Turn Lane Required	includes 50 ft diverging taper

Appendix H

Signal and AWSC Warrant Analysis



STUDY AND ANALYSIS INFORMATION	TRAFFIC SIGNAL WARRANT ANALYSIS FINDINGS
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Municipality:		Traffic Volumes Obtained By:	ODOT
County:	Portage	Analysis Date:	
ODOT Engineering District:	4	Agency/ Company Name Performing Warrant Analysis:	CMTtran

Analysis Information

Data Collection Date:	4/27/2022
Day of the Week:	Wednesday
Is the intersection in a built-up area of an isolated community of <10,000 population?	No
Existing Traffic Signal at intersection:	No
Total Number of Approaches at Intersection:	4

Major Street Information

Major Street Name and Route Number:	US-224/SR-225
Major Street Approach Direction:	E-Bound W-Bound
Number of Thru Lanes on Each Major Street Approach:	1 LANE(S)
Speed Limit or 85th Percentile Speed on the Major Street*:	55 MPH
*Unknown assumes below 45 mph	

Minor Street Information

Minor Street Name and Route Number:	SR-225/CR-125
Minor Street Approach Configuration:	1 N-Bound 1 S-Bound

Number of Thru Lanes on Each Minor Street Approach:	1 LANE(S)
Apply Right Turn Lane Reduction*:	Yes

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

	Applicable?	Warrant Satisfied?	Notes and Comments:			
Warrant 1, Eight-Hour Vehicular Volume	Yes	No				
Warrant 2, Four-Hour Vehicular Volume	Yes	No				
Warrant 3, Peak Hour	Yes	No	Signals installed under Warrant 3 should be traffic actuated. <table border="1" style="float: right; font-size: x-small;"> <tr><td style="text-align: right;">Peak Hour</td></tr> <tr><td style="text-align: right;">3:45 PM</td></tr> <tr><td style="text-align: right;">4:45 PM</td></tr> </table>	Peak Hour	3:45 PM	4:45 PM
Peak Hour						
3:45 PM						
4:45 PM						
For Warrants 1-3, new ODOT signals must be based off of 100% volume thresholds (TEM 402-3.2)						
Warrant 4, Pedestrian Volume	No		If this warrant is met, and a traffic control signal is justified by an engineering study, the traffic control signal shall be equipped with pedestrian signal heads complying with the provisions set forth in Chapter 4E of the OMUTCD. <table border="1" style="float: right; font-size: x-small;"> <tr><td style="text-align: right;">Peak Hour</td></tr> <tr><td style="text-align: right;">4:30 PM</td></tr> <tr><td style="text-align: right;">5:30 PM</td></tr> </table>	Peak Hour	4:30 PM	5:30 PM
Peak Hour						
4:30 PM						
5:30 PM						
Warrant 5, School Crossing	No		N/A			
Warrant 6, Coordinated Signal System	No		(Shall not be used as the sole warrant in the analysis)			
Warrant 7, Crash Experience	Yes	Yes	If this is the sole warrant, signal must be semi-actuated with control devices which provide proper coordination if installed at an intersection within a coordinated system and normally should be fully traffic actuated if installed at an isolated intersection.			
Warrant 8, Roadway Network	No		(Shall not be used as the sole warrant in the analysis)			
Warrant 9, Intersection Near a Grade Crossing	No		Figure 4C-9			
Multi-Way Stop Warrant	Yes	Yes	May be used as an interim measure if traffic signal warrants are satisfied.			

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

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

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

Conclusion: **Do Not Install New Traffic Signal**

Notes: 2022 Raw Count Data with Right Turn Reductions

OMUTCD WARRANT 1, EIGHT-HOUR VEHICULAR VOLUME

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

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

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

Lanes Major/ Minor	Adjusted Volumes		Condition A				Condition B				Combination A/B*							
			100%		70%		100%		70%		Cond. A		Cond. B		Cond. A		Cond. B	
	Major	Minor	Maj.	Min.	Maj.	Min.	Maj.	Min.	Maj.	Min.	Maj.	Min.	Maj.	Min.	Maj.	Min.	Maj.	Min.
1 / 1	X		500	150	350	105	750	75	525	53	400	120	600	60	280	84	420	42
2+ / 1			600	150	420	105	900	75	630	53	480	120	720	60	336	84	504	42
2+ / 2+			600	200	420	140	900	100	630	70	480	160	720	80	336	112	504	56
1 / 2+			500	200	350	140	750	100	525	70	400	160	600	80	280	112	420	56
12:00 AM	0	0																
12:15 AM	0	0																
12:30 AM	0	0																
12:45 AM	0	0																
1:00 AM	0	0																
1:15 AM	0	0																
1:30 AM	0	0																
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4:15 AM	0	0																
4:30 AM	0	0																
4:45 AM	0	0																
5:00 AM	0	0																
5:15 AM	65	34																
5:30 AM	150	68																
5:45 AM	255	102																
6:00 AM	336	139												1	1			
6:15 AM	361	136			1	1												
6:30 AM	359	140																
6:45 AM	356	134																
7:00 AM	355	126												1	1			
7:15 AM	348	126																
7:30 AM	348	121																
7:45 AM	338	123																
8:00 AM	328	120												1	1			
8:15 AM	307	121																
8:30 AM	322	113																
8:45 AM	289	111																
9:00 AM	277	114																
9:15 AM	293	107												1	1			
9:30 AM	277	105																
9:45 AM	291	107																
10:00 AM	300	98																
10:15 AM	284	100												1	1			
10:30 AM	280	101																
10:45 AM	269	91																
11:00 AM	253	88																
11:15 AM	274	82																
11:30 AM	269	87																
11:45 AM	274	96																
12:00 PM	296	100												1	1			
12:15 PM	278	115																
12:30 PM	290	111																
12:45 PM	311	113																
1:00 PM	317	114												1	1			
1:15 PM	338	107																
1:30 PM	320	114																
1:45 PM	326	112																
2:00 PM	313	120												1	1			
2:15 PM	321	132																
2:30 PM	361	140			1	1												
2:45 PM	385	141																
3:00 PM	450	149								1	1			1	1	1	1	
3:15 PM	464	148																
3:30 PM	460	159			1	1												
3:45 PM	474	164																
4:00 PM	447	162								1	1			1	1	1	1	
4:15 PM	464	163																
4:30 PM	478	148			1	1												
4:45 PM	466	151																
5:00 PM	462	145								1	1			1	1	1	1	
5:15 PM	407	137																
5:30 PM	351	128			1	1												
5:45 PM	307	113																
6:00 PM	278	105																
6:15 PM	208	73																
6:30 PM	147	48																
6:45 PM	71	25																
7:00 PM	0	0																
7:15 PM	0	0																
7:30 PM	0	0																
7:45 PM	0	0																
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8:45 PM	0	0																
9:00 PM	0	0																
9:15 PM	0	0																
9:30 PM	0	0																
9:45 PM	0	0																
HOURS MET			0	0	5	5	0	0	0	0	3	3	0	0	11	11	3	3
WARRANT SATISFIED?			NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO

Warrant Met: **No**

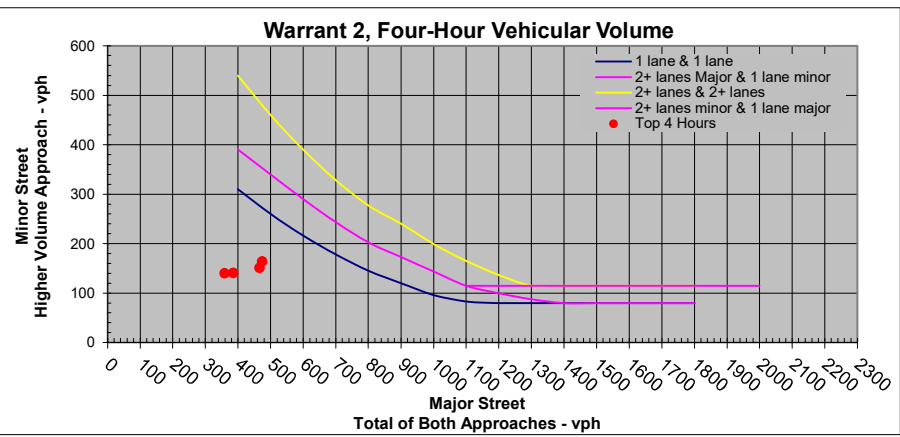
Notes:

OMUTCD WARRANT 2, FOUR-HOUR VEHICULAR VOLUME

Number of Lanes for Moving Traffic on Each Approach	Total Number of Unique Hours Met on Figure 4C-1	0
Major street: 1 Lane	Total Number of Unique Hours Met on Figure 4C-2 (70% Factor)	3
Minor Street: 1 Lane		

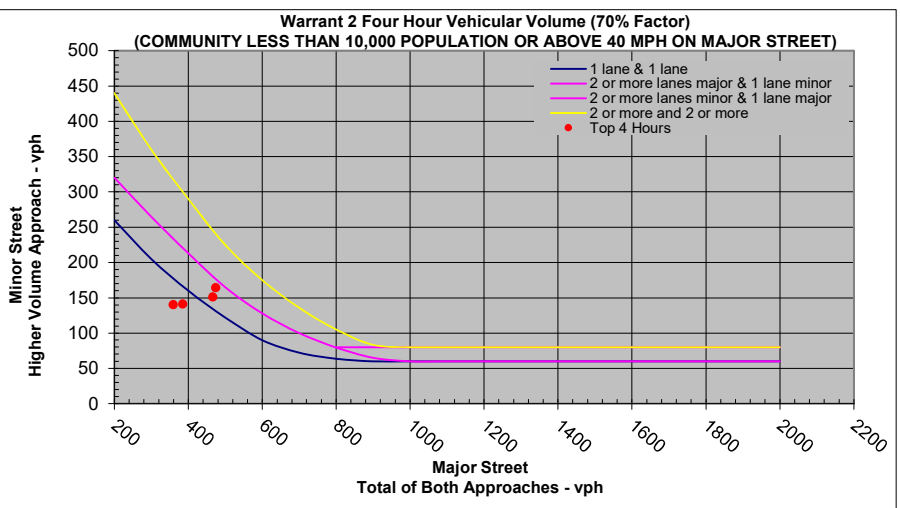
Built up Isolated Community with Less Than 10,000 Population or Above 40 MPH on Major Street? **Yes**

Hour Interval Beginning At	Raw Traffic Counts				Total Major Approach Volumes	Highest Actual Minor Street Approach Volumes	Hour Met?	Hour Met? (70% Factor)
	Minor - SR-225/CR-125		Major - US-224/SR-225					
	N-Bound	S-Bound	W-Bound	E-Bound				
6:00 AM	139	35	293	43	336	139		
6:15 AM	136	37	318	43	361	136		
6:30 AM	140	40	313	46	359	140		
6:45 AM	134	44	301	55	356	134		
7:00 AM	126	44	297	58	355	126		
7:15 AM	126	49	280	68	348	126		
7:30 AM	121	47	272	76	348	121		
7:45 AM	123	46	266	72	338	123		
8:00 AM	120	43	252	76	328	120		
8:15 AM	121	38	241	66	307	121		
8:30 AM	113	40	253	69	322	113		
8:45 AM	111	32	219	70	289	111		
9:00 AM	114	40	212	65	277	114		
9:15 AM	107	37	229	64	293	107		
9:30 AM	105	31	216	61	277	105		
9:45 AM	107	33	229	62	291	107		
10:00 AM	98	24	229	71	300	98		
10:15 AM	100	29	209	75	284	100		
10:30 AM	101	35	210	70	280	101		
10:45 AM	91	35	198	71	269	91		
11:00 AM	88	39	189	64	253	88		
11:15 AM	82	34	199	75	274	82		
11:30 AM	87	32	192	77	269	87		
11:45 AM	96	32	195	79	274	96		
12:00 PM	100	32	211	85	296	100		
12:15 PM	115	37	202	76	278	115		
12:30 PM	111	37	209	81	290	111		
12:45 PM	113	33	230	81	311	113		
1:00 PM	114	30	238	79	317	114		
1:15 PM	107	28	246	92	338	107		
1:30 PM	114	28	241	79	320	114		
1:45 PM	112	32	249	77	326	112		
2:00 PM	120	34	223	90	313	120		
2:15 PM	132	35	233	88	321	132		
2:30 PM	140	39	237	124	361	140		
2:45 PM	141	47	246	139	385	141		
3:00 PM	149	62	299	151	450	149	Met	
3:15 PM	148	65	312	152	464	148		
3:30 PM	159	62	312	148	460	159		
3:45 PM	164	72	321	153	474	164		
4:00 PM	162	68	309	138	447	162	Met	
4:15 PM	163	78	326	138	464	163	Met	
4:30 PM	148	78	347	131	478	148		
4:45 PM	151	69	337	129	466	151		
5:00 PM	145	62	330	132	462	145	Met	
5:15 PM	137	54	277	130	407	137		
5:30 PM	128	51	242	109	351	128		
5:45 PM	113	41	214	93	307	113		
6:00 PM	105	39	195	83	278	105		
6:15 PM	73	26	153	55	208	73		
6:30 PM	48	18	108	39	147	48		
6:45 PM	25	9	53	18	71	25		
7:00 PM	0	0	0	0	0	0		
7:15 PM	0	0	0	0	0	0		
7:30 PM	0	0	0	0	0	0		
7:45 PM	0	0	0	0	0	0		
8:00 PM	0	0	0	0	0	0		



Top Hours for Figure 4C-1					
Start Time	End Time	Major Street	Minor Street	Met?	Factor
Top Hour	3:45 PM	4:45 PM	474	164	
2nd Highest Hour	4:45 PM	5:45 PM	466	151	
3rd Highest Hour	2:45 PM	3:45 PM	385	141	
4th Highest Hour	6:30 AM	7:30 AM	359	140	

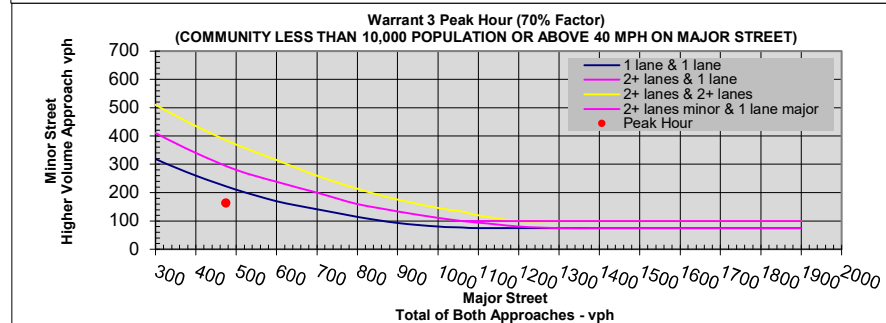
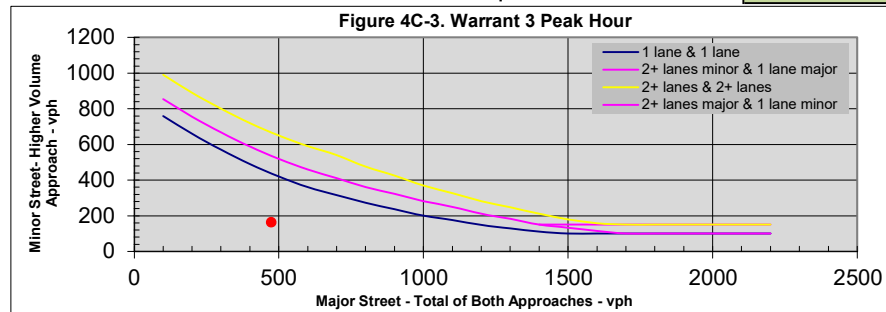
Top Hours for Figure 4C-2					
Start Time	End Time	Major Street	Minor Street	Met?	Factor
Top Hour	3:45 PM	4:45 PM	474	164	
2nd Highest Hour	4:45 PM	5:45 PM	466	151	
3rd Highest Hour	2:45 PM	3:45 PM	385	141	
4th Highest Hour	6:30 AM	7:30 AM	359	140	



Are the requirements for Warrant 2 met?: No

OMUTCD WARRANT 3, PEAK HOUR				Hour Vehicular Volume				
Number of Lanes for Moving Traffic on Each Approach		Peak Hour Start time	3:45 PM	Hour Interval Beginning At	Major Street Combined Vehicles Per Hour (VPH)	Highest Minor Street Approach Vehicles Per Hour (VPH)	Sum of Major Street and Highest Minor Street	Sum of Major Street and Combined Minor Street
Major Street:	1 Lane	Peak Hour End Time	4:45 PM	6:00 AM	336	139	475	510
Minor Street:	1 Lane			6:15 AM	361	136	497	534
Built up Isolated Community with Less Than 10,000 Population or Above 40 MPH on Major Street?			Yes	6:30 AM	359	140	499	539
Is this signal warrant being applied for an unusual case, such as office complexes, manufacturing plants, industrial complexes, or high-occupancy vehicle facilities that attract or discharge large numbers of vehicles over a short time?			No	6:45 AM	356	134	490	534
Indicate whether all three of the following conditions for the same 1 hour (any four consecutive 15-minute periods) of an average day are present*				7:00 AM	355	126	481	525
Does the total stopped time delay experienced by the traffic on one minor-street approach (one direction only) controlled by a STOP sign equal or exceed 4 vehicle-hours for a one-lane approach or 5 vehicle-hours for a two-lane approach?			Yes	7:15 AM	348	126	474	523
Does the volume on the same minor-street approach (one direction only) equal or exceed 100 vehicles per hour for one moving lane of traffic or 150 vehicles per hour for two moving lanes?			Yes	7:30 AM	348	121	469	516
Does the total entering volume serviced during the hour equal or exceed 650 vehicles per hour for intersection with three approaches or 800 vehicles per hour for intersections with four or more approaches?			No	7:45 AM	338	123	461	507
<i>*If applicable, attach all supporting calculations and documentation.</i>				8:00 AM	328	120	448	491
Are the requirements for Warrant 3 met?:				8:15 AM	307	121	428	466
				8:30 AM	322	113	435	475
				8:45 AM	289	111	400	432
				9:00 AM	277	114	391	431
				9:15 AM	293	107	400	437
				9:30 AM	277	105	382	413
				9:45 AM	291	107	398	431
				10:00 AM	300	98	398	422
				10:15 AM	284	100	384	413
				10:30 AM	280	101	381	416
				10:45 AM	269	91	360	395
				11:00 AM	253	88	341	380
				11:15 AM	274	82	356	390
				11:30 AM	269	87	356	388
				11:45 AM	274	96	370	402
				12:00 PM	296	100	396	428
				12:15 PM	278	115	393	430
				12:30 PM	290	111	401	438
				12:45 PM	311	113	424	457
				1:00 PM	317	114	431	461
				1:15 PM	338	107	445	473
				1:30 PM	320	114	434	462
				1:45 PM	326	112	438	470
				2:00 PM	313	120	433	467
				2:15 PM	321	132	453	488
				2:30 PM	361	140	501	540
				2:45 PM	385	141	526	573
				3:00 PM	450	149	599	661
				3:15 PM	464	148	612	677
				3:30 PM	460	159	619	681
				3:45 PM	474	164	638	710
				4:00 PM	447	162	609	677
				4:15 PM	464	163	627	705
				4:30 PM	478	148	626	704
				4:45 PM	466	151	617	686
				5:00 PM	462	145	607	669
				5:15 PM	407	137	544	598
				5:30 PM	351	128	479	530
				5:45 PM	307	113	420	461
				6:00 PM	278	105	383	422
				6:15 PM	208	73	281	307
				6:30 PM	147	48	195	213
				6:45 PM	71	25	96	105
				7:00 PM	0	0	0	0
				7:15 PM	0	0	0	0
				7:30 PM	0	0	0	0
				7:45 PM	0	0	0	0
				8:00 PM	0	0	0	0

Actual Peak Hour Major Traffic Volume	Actual Peak Hour Minor Traffic Volume	Required Peak Hour Minor Traffic Volume for Fig. 4C-3	Required Peak Hour Minor Traffic Volume for Fig. 4C-4
474	164	431.12336	221.92056



Start Time	Southbound Approach						Westbound Approach						Northbound Approach						Eastbound Approach						NOTES:
	Southbound						Westbound						Northbound						Eastbound						
	Right	Thru	Left	U-Turn	Peds	App Total	Right	Thru	Left	U-Turn	Peds	App Total	Right	Thru	Left	U-Turn	Peds	App Total	Right	Thru	Left	U-Turn	Peds	App Total	
12:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
12:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
12:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
12:45 AM	0	0	0	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	0	0	0	
1:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1:45 AM	0	0	0	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	0	0	0	
2:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
2:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
2:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
2:45 AM	0	0	0	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	0	0	0	
3:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
3:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
3:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
3:45 AM	0	0	0	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	0	0	0	
4:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
4:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
4:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
4:45 AM	0	0	0	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	0	0	0	
5:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
5:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
5:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
5:45 AM	0	0	0	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	0	0	0	
6:00 AM	2	5	0	0	0	7	0	18	34	0	52	52	10	3	0	65	3	10	0	0	0	0	0	13	
6:15 AM	1	7	0	0	0	8	0	20	53	0	73	43	17	0	60	3	9	0	0	0	0	0	0	12	
6:30 AM	3	7	1	0	0	11	0	24	70	0	94	41	15	2	58	0	11	0	0	0	0	0	0	11	
6:45 AM	1	9	0	0	0	10	1	14	59	0	74	41	16	5	62	1	5	1	0	0	0	0	0	7	
Hourly Total	7	28	1	0	0	36	2	76	216	0	293	177	58	10	0	245	7	35	1	0	0	0	0	43	
7:00 AM	4	5	0	0	0	9	2	23	52	0	77	44	10	3	57	1	11	1	0	0	0	0	0	13	
7:15 AM	4	8	0	0	0	12	0	15	53	0	68	65	10	2	77	1	14	0	0	0	0	0	0	15	
7:30 AM	2	13	0	0	0	15	1	23	58	0	82	45	8	2	55	1	19	0	0	0	0	0	0	20	
7:45 AM	1	8	1	0	0	10	0	20	49	0	70	40	11	2	53	1	9	0	0	0	0	0	0	10	
Hourly Total	11	34	1	0	0	46	4	81	212	0	297	194	39	9	0	242	4	53	1	0	0	0	0	58	
8:00 AM	1	11	1	0	0	13	0	13	47	0	60	45	12	1	58	0	22	1	0	0	0	0	0	23	
8:15 AM	0	9	0	0	0	9	1	12	47	0	61	40	12	2	61	4	16	1	0	0	0	0	0	23	
8:30 AM	0	14	0	0	0	14	2	12	62	0	76	46	8	2	57	4	11	1	0	0	0	0	0	16	
8:45 AM	1	5	1	0	0	7	1	14	41	0	56	49	5	2	56	2	12	0	0	0	0	0	0	14	
Hourly Total	2	39	2	0	0	43	4	51	197	0	252	187	38	7	0	232	10	63	3	0	0	0	0	76	
9:00 AM	1	7	0	0	0	8	0	16	33	0	49	31	5	2	49	1	11	1	0	0	0	0	0	13	
9:15 AM	1	10	0	0	0	11	0	15	57	0	72	47	5	1	53	2	23	1	0	0	0	0	0	16	
9:30 AM	2	5	0	0	0	7	0	12	30	0	42	45	7	3	55	2	15	0	0	0	0	0	0	17	
9:45 AM	0	14	0	0	0	14	0	14	38	0	48	43	11	1	55	0	8	1	0	0	0	0	0	9	
Hourly Total	4	36	0	0	0	46	0	57	155	0	212	196	28	7	0	231	5	57	3	0	0	0	0	65	
10:00 AM	1	4	0	0	0	5	0	14	52	0	66	45	4	3	52	1	11	0	0	0	0	0	0	12	
10:15 AM	1	3	1	0	0	5	0	13	46	0	59	38	5	2	45	7	15	1	0	0	0	0	0	23	
10:30 AM	0	8	0	0	0	8	0	10	45	0	55	45	8	4	57	3	15	0	0	0	0	0	0	18	
10:45 AM	1	4	0	0	0	5	0	13	36	0	49	39	4	1	44	2	16	0	0	0	0	0	0	18	
Hourly Total	3	19	2	0	0	24	0	50	179	0	229	167	21	10	0	198	13	57	1	0	0	0	0	71	
11:00 AM	0	10	0	0	0	10	0	11	35	0	46	49	4	3	56	1	14	1	0	0	0	0	0	16	
11:15 AM	2	9	0	0	0	11	3	13	40	0	55	45	8	1	45	2	16	0	0	0	0	0	0	18	
11:30 AM	1	8	0	0	0	9	0	12	31	0	43	34	4	2	40	3	16	0	0	0	0	0	0	19	
11:45 AM	1	7	1	0	0	9	1	10	29	0	40	31	2	4	37	3	8	0	0	0	0	0	0	14	
Hourly Total	4	34	1	0	0	39	4	50	135	0	189	150	18	10	0	178	9	54	1	0	0	0	0	27	
12:00 PM	1	4	1	0	0	6	1	9	46	0	56	37	3	2	42	3	24	0	0	0	0	0	0	21	
12:15 PM	0	7	1	0	0	8	0	18	34	0	53	44	10	1	55	4	13	3	0	0	0	0	0	20	
12:30 PM	0	7	2	0	0	9	0	12	34	0	46	41	10	2	53	4	16	1	0	0	0	0	0	21	
12:45 PM	2	6	1	0	0	9	1	18	37	0	42	32	8	2	42	1	16	0	0	0	0	0	0	17	
Hourly Total	3	24	5	0	0	32	3	57	151	0	211	154	31	7	0	192	12	69	4	0	0	0	0	85	
1:00 PM	1	9	1	0	0	11	1	14	32	0	47	49	10	5	64	1	16	1	0	0	0	0	0	18	
1:15 PM	2	5	2	0	0	9	1	16	43	0	60	34	7	4	47	3	18	4	0	0	0	0	0	48	
1:30 PM	0	5	0	0	0	5	0	21	44	0	67	49	6	6	58	1	20	0	0	0	0	0	0	34	
1:45 PM	0	5	0	0	0	5	1	15	48	0	64	44	5	1	50	2	12	1	0	0	0	0	0	15	
Hourly Total	3	24	3	0	0	30	5	66	167	0	238	173	28	16	0	217	7	66	6	0	0	0	0	79	
2:00 PM	1	7	1	0	0	9	0	22	33	0	55	43	10	1	54	4	24	3	0	0	0	0	0	21	
2:15 PM	0	8	1	0	0	9	0	10	45	0	55	43	10	4	57	4	8	0	0	0	0	0	0	12	
2:30 PM	1	8	0	0	0	9	1	20	54	0	75	49	5	4	58	4	13	2	0	0	0	0	0	19	
2:45 PM	2	4	1	0																					

Turning Movement Counts

	Southbound						Westbound						Northbound						Eastbound		
	Right	Thru	Left				Right	Thru	Left				Right	Thru	Left				Right	Thru	Left
0:00																					
12:15																					
12:30																					
12:45																					
1:00																					
1:15																					
1:30																					
1:45																					
2:00																					
2:15																					
2:30																					
2:45																					
3:00																					
3:15																					
3:30																					
3:45																					
4:00																					
4:15																					
4:30																					
4:45																					
5:00																					
5:15																					
5:30																					
5:45																					
6:00	2	5	0				0	18	34			52	10	3				3	10	0	
6:15	1	7	0				0	20	53			43	17	0				3	9	0	
6:30	3	7	1				0	24	70			41	15	2				0	11	0	
6:45	1	9	0				1	14	59			41	16	5				1	5	1	
7:00	4	5	0				2	23	52			44	10	3				1	11	1	
7:15	4	8	0				0	15	53			65	10	2				1	14	0	
7:30	2	13	0				1	23	58			45	8	2				1	19	0	
7:45	1	8	1				1	20	49			40	11	2				1	9	0	
8:00	1	11	1				0	13	47			45	12	1				0	22	1	
8:15	0	9	0				1	12	47			47	12	2				4	18	1	
8:30	0	14	0				2	12	62			46	9	2				4	11	1	
8:45	1	5	1				1	14	41			49	5	2				2	12	0	
9:00	1	7	0				0	16	33			61	5	2				1	11	1	
9:15	1	10	0				0	15	57			47	5	1				2	23	1	
9:30	2	5	0				0	12	30			45	7	3				2	15	0	
9:45	0	14	0				0	14	35			43	11	1				0	8	1	
10:00	1	4	0				0	14	52			45	4	3				1	11	0	
10:15	1	3	1				0	13	46			38	5	2				7	15	1	
10:30	0	8	1				0	10	45			45	8	4				3	15	0	
10:45	1	4	0				0	13	36			39	4	1				2	16	0	
11:00	0	10	0				0	11	35			49	4	3				1	14	1	
11:15	2	9	0				3	17	40			36	8	1				2	16	0	
11:30	1	8	0				0	12	31			34	4	2				3	16	0	
11:45	1	7	1				1	10	29			31	2	4				3	8	0	
12:00	1	4	1				1	9	46			37	3	2				3	24	0	
12:15	0	7	1				1	18	34			44	10	1				4	13	3	
12:30	0	7	2				0	12	34			41	10	2				4	16	1	
12:45	2	6	1				1	18	37			32	8	2				1	16	0	
1:00	1	9	1				1	14	32			49	10	5				1	16	1	
1:15	2	5	2				1	16	43			34	7	4				3	18	4	
1:30	0	5	0				2	21	44			46	6	6				1	20	0	
1:45	0	5	0				1	15	48			44	5	1				2	12	1	
2:00	1	7	1				0	22	33			43	10	1				4	24	3	
2:15	0	8	1				0	10	45			43	10	4				4	8	0	
2:30	1	8	0				1	20	54			49	5	4				4	13	2	
2:45	2	4	1				0	11	27			46	11	2				3	23	2	
3:00	1	9	0				1	15	49			62	15	1				1	26	2	
3:15	2	11	1				0	11	48			56	13	3				6	38	4	
3:30	0	17	0				2	31	51			47	9	2				3	29	2	
3:45	2	20	0				3	19	69			65	6	8				8	29	3	
4:00	0	12	0				2	14	62			60	14	1				2	25	3	
4:15	1	10	0				1	12	46			71	15	6				3	38	3	
4:30	0	23	4				1	19	73			67	8	0				3	32	4	
4:45	1	17	0				1	21	57			64	11	2				3	18	4	
5:00	0	19	3				0	33	62			64	10	4				3	25	2	
5:15	1	9	1				1	17	62			53	10	3				3	31	3	
5:30	3	16	0				1	21	61			60	10	4				0	35	2	
5:45	1	10	0				2	21	49			54	9	2				4	22	2	
6:00	1	12	1				1	14	27			45	14	0				3	25	0	
6:15	1	7	0				1	8	36			37	8	2				2	13	1	
6:30	2	7	0				3	18	34			40	5	2				2	16	3	
6:45	1	7	1				1	16	36			32	11	1				2	15	1	
7:00																					
7:15																					
7:30																					
7:45																					
8:00																					
8:15																					
8:30																					
8:45																					
9:00																					
9:15																					
9:30																					
9:45																					
10:00																					
10:15																					
10:30																					
10:45																					
11:00																					
11:15																					
11:30																					
11:45																					
	58	471	29	0	0	0	43	841	2393	0	0	0	2456	465	128	0	0	0	130	939	66

Multi-Way Stop Application

OMUTCD Section 2B.07

- A. Where traffic control signals are justified, the multi-way stop is an interim measure that can be installed quickly to control traffic while arrangements are being made for the installation of the traffic control signal. **Warranted ?**

- B. Five or more reported crashes in a 12-month period that are susceptible to correction by a multiway stop installation. Such crashes include right-turn and left-turn collisions as well as right-angle collisions.

- C. Minimum Volumes:
 - 1 The vehicular volume entering the intersection from the major street approaches (total of both approaches) averages at least 300 vehicles per hour for any 8 hours of an average day.

 - 2 The combined vehicular, pedestrian, and bicycle volume entering the intersection from the minor street approaches (total of both approaches) averages at least 200 units per hour for the same 8 hours, with an average delay to minor-street vehicular traffic of at least 30 seconds per vehicle during the highest hour.*
 *If this condition is satisfied, there must also be an average delay of at least 30 seconds per vehicle during the peak hour.

 - 3 If the 85th-percentile approach speed of the major-street traffic exceeds 40 mph, the minimum volume warrants are 70 percent of the values provided in Items 1 and 2.

- D. Where no single criterion is satisfied, but where Criteria B, C.1, and C.2 are all satisfied to 80 percent of the minimum values. Criterion C.3 is excluded from this condition.

- Other criteria that may be considered in an engineering study include:
 - A. The need to control left-turn conflicts;
 - B. The need to control vehicle/pedestrian conflicts near locations that generate high pedestrian volumes;
 - C. Locations where a road user, after stopping, cannot see conflicting traffic and is not able to negotiate the intersection unless conflicting cross traffic is also required to stop; and
 - D. An intersection of two residential neighborhood collector (through) streets of similar design and operating characteristics where multi-way stop control would improve traffic operational characteristics of the intersection.

Are the requirements for Multi-Way Stop Satisfied?:

Lanes Major/ Minor	ADJUSTED VOLUMES		Condition C.1		Condition C.2		Condition D	
	MAJOR	MINOR	100%		70%		80%	
			MAJ.	MIN.	MAJ.	MIN.	MAJ.	MIN.
Required Volumes								
			300	200	210	140	240	160
6:00 AM	336	336	1	1				
6:15 AM	361	361						
6:30 AM	359	359						
6:45 AM	356	356			1	1	1	1
7:00 AM	355	355	1	1				
7:15 AM	348	348						
7:30 AM	348	348						
7:45 AM	338	338			1	1	1	1
8:00 AM	328	328	1	1				
8:15 AM	307	307						
8:30 AM	322	322						
8:45 AM	289	289			1	1	1	1
9:00 AM	277	277						
9:15 AM	293	293						
9:30 AM	277	277						
9:45 AM	291	291			1	1	1	1
10:00 AM	300	300	1	1				
10:15 AM	284	284						
10:30 AM	280	280						
10:45 AM	269	269			1	1	1	1
11:00 AM	253	253						
11:15 AM	274	274						
11:30 AM	269	269						
11:45 AM	274	274			1	1	1	1
12:00 PM	296	296						
12:15 PM	278	278						
12:30 PM	290	290						
12:45 PM	311	311	1	1	1	1	1	1
1:00 PM	317	317						
1:15 PM	338	338						
1:30 PM	320	320						
1:45 PM	326	326	1	1	1	1	1	1
2:00 PM	313	313						
2:15 PM	321	321						
2:30 PM	361	361						
2:45 PM	385	385	1	1	1	1	1	1
3:00 PM	450	450						
3:15 PM	464	464						
3:30 PM	460	460						
3:45 PM	474	474	1	1	1	1	1	1
4:00 PM	447	447						
4:15 PM	464	464						
4:30 PM	478	478						
4:45 PM	466	466	1	1	1	1	1	1
5:00 PM	462	462						
5:15 PM	407	407						
5:30 PM	351	351						
5:45 PM	307	307	1	1	1	1	1	1
6:00 PM	278	278						
6:15 PM	208	208						
6:30 PM	147	147						
6:45 PM	71	71						
7:00 PM	0	0						
7:15 PM	0	0						
7:30 PM	0	0						
7:45 PM	0	0						
8:00 PM	0	0						
HOURS MET			10	10	13	13	13	13
WARRANT SATISFIED?			YES	YES	YES	YES	YES	YES

STUDY AND ANALYSIS INFORMATION	TRAFFIC SIGNAL WARRANT ANALYSIS FINDINGS
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Municipality:		Traffic Volumes Obtained By:	ODOT
County:	Portage	Analysis Date:	
ODOT Engineering District:	4	Agency/ Company Name Performing Warrant Analysis:	CMTtran

Analysis Information

Data Collection Date:	4/27/2022
Day of the Week:	Wednesday
Is the intersection in a built-up area of an isolated community of <10,000 population?	No
Existing Traffic Signal at intersection:	No
Total Number of Approaches at Intersection:	4

Major Street Information

Major Street Name and Route Number:	US-224/SR-225
Major Street Approach Direction:	E-Bound W-Bound
Number of Thru Lanes on Each Major Street Approach:	1 LANE(S)
Speed Limit or 85th Percentile Speed on the Major Street*:	55 MPH
*Unknown assumes below 45 mph	

Minor Street Information

Minor Street Name and Route Number:	SR-225/CR-125
Minor Street Approach Configuration:	1 N-Bound 1 S-Bound

Number of Thru Lanes on Each Minor Street Approach:	1 LANE(S)
Apply Right Turn Lane Reduction*:	Yes

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

	Applicable?	Warrant Satisfied?	Notes and Comments:			
Warrant 1, Eight-Hour Vehicular Volume	Yes	No	Condition A (70%) was met.			
Warrant 2, Four-Hour Vehicular Volume	Yes	No	Figure 4C-2 (70% Factor)			
Warrant 3, Peak Hour	Yes	No	Signals installed under Warrant 3 should be traffic actuated. <table border="1" style="float: right; font-size: x-small;"> <tr><td style="text-align: right;">Peak Hour</td></tr> <tr><td style="text-align: right;">3:45 PM</td></tr> <tr><td style="text-align: right;">4:45 PM</td></tr> </table>	Peak Hour	3:45 PM	4:45 PM
Peak Hour						
3:45 PM						
4:45 PM						
For Warrants 1-3, new ODOT signals must be based off of 100% volume thresholds (TEM 402-3.2)						
Warrant 4, Pedestrian Volume	No		If this warrant is met, and a traffic control signal is justified by an engineering study, the traffic control signal shall be equipped with pedestrian signal heads complying with the provisions set forth in Chapter 4E of the OMUTCD. <table border="1" style="float: right; font-size: x-small;"> <tr><td style="text-align: right;">Peak Hour</td></tr> <tr><td style="text-align: right;">3:15 PM</td></tr> <tr><td style="text-align: right;">4:15 PM</td></tr> </table>	Peak Hour	3:15 PM	4:15 PM
Peak Hour						
3:15 PM						
4:15 PM						
Warrant 5, School Crossing	No		N/A			
Warrant 6, Coordinated Signal System	No		(Shall not be used as the sole warrant in the analysis)			
Warrant 7, Crash Experience	Yes	Yes	If this is the sole warrant, signal must be semi-actuated with control devices which provide proper coordination if installed at an intersection within a coordinated system and normally should be fully traffic actuated if installed at an isolated intersection.			
Warrant 8, Roadway Network	No		(Shall not be used as the sole warrant in the analysis)			
Warrant 9, Intersection Near a Grade Crossing	No		Figure 4C-9			
Multi-Way Stop Warrant	Yes	Yes	May be used as an interim measure if traffic signal warrants are satisfied.			

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

If no warrants are satisfied, additional options may be considered:

1. An engineering study, performed by a firm prequalified by ODOT for signal design, if approved by the ODOT district, may be used to justify a new signal installation or retention of an existing signal that otherwise does not meet the published warrants. An example of such an instance is a traffic signal in proximity to a railroad crossing that serves to reduce queuing across the tracks.
2. According to TEM 402-2, if the actual turning movement counts fail to satisfy a signal warrant, it may be acceptable to use traffic volumes projected to the second year after project completion. The **Modeling and Forecasting Section** should provide the projected traffic volumes.
3. A pedestrian hybrid beacon may be considered for installation to facilitate pedestrian crossings at a location that does not meet traffic signal warrants (see Chapter 4C of TEM) or at a location that meets traffic signal warrants under Sections 4C.05 and/or 4C.06 but a decision is made to not install a traffic control signal. **Please fill inputs on PHB Score Sheet and submit to ODOT.**

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

Conclusion: **Inconclusive**

Notes: 2022 Count Data with PCE Adjustments with Right Turn Reductions

OMUTCD WARRANT 1, EIGHT-HOUR VEHICULAR VOLUME

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

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

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

Lanes Major/ Minor	Adjusted Volumes		Condition A				Condition B				Combination A/B*							
			100%		70%		100%		70%		Cond. A		Cond. B		Cond. A		Cond. B	
	Major	Minor	Maj.	Min.	Maj.	Min.	Maj.	Min.	Maj.	Min.	Maj.	Min.	Maj.	Min.	Maj.	Min.	Maj.	Min.
1 / 1	X		500	150	350	105	750	75	525	53	400	120	600	60	280	84	420	42
2+ / 1			600	150	420	105	900	75	630	53	480	120	720	60	336	84	504	42
2+ / 2+			600	200	420	140	900	100	630	70	480	160	720	80	336	112	504	56
1 / 2+			500	200	350	140	750	100	525	70	400	160	600	80	280	112	420	56
12:00 AM	0	0																
12:15 AM	0	0																
12:30 AM	0	0																
12:45 AM	0	0																
1:00 AM	0	0																
1:15 AM	0	0																
1:30 AM	0	0																
1:45 AM	0	0																
2:00 AM	0	0																
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4:15 AM	0	0																
4:30 AM	0	0																
4:45 AM	0	0																
5:00 AM	0	0																
5:15 AM	71	37																
5:30 AM	167	74																
5:45 AM	284	111												1	1			
6:00 AM	378	153			1	1												
6:15 AM	410	151								1	1							
6:30 AM	406	157																
6:45 AM	406	154												1	1			
7:00 AM	402	146			1	1												
7:15 AM	391	148																
7:30 AM	400	140								1	1							
7:45 AM	387	140																
8:00 AM	375	138			1	1								1	1			
8:15 AM	360	141																
8:30 AM	375	136																
8:45 AM	343	137												1	1			
9:00 AM	331	142																
9:15 AM	348	133																
9:30 AM	335	128																
9:45 AM	357	132			1	1								1	1			
10:00 AM	371	120																
10:15 AM	353	122																
10:30 AM	344	124																
10:45 AM	321	111												1	1			
11:00 AM	300	107																
11:15 AM	324	100																
11:30 AM	320	107																
11:45 AM	330	114												1	1			
12:00 PM	364	120			1	1												
12:15 PM	340	134																
12:30 PM	346	130																
12:45 PM	359	139												1	1			
1:00 PM	358	142			1	1												
1:15 PM	381	134																
1:30 PM	362	139																
1:45 PM	370	133												1	1			
2:00 PM	348	138																
2:15 PM	354	151			1	1												
2:30 PM	398	156																
2:45 PM	425	154								1	1			1	1	1	1	
3:00 PM	496	164																
3:15 PM	506	161	1	1	1	1												
3:30 PM	493	173																
3:45 PM	504	177								1	1			1	1	1	1	
4:00 PM	474	174																
4:15 PM	488	177			1	1												
4:30 PM	504	161	1	1														
4:45 PM	487	165								1	1			1	1	1	1	
5:00 PM	483	158																
5:15 PM	428	146			1	1												
5:30 PM	367	136																
5:45 PM	325	118												1	1			
6:00 PM	292	108																
6:15 PM	218	75																
6:30 PM	155	48																
6:45 PM	74	25																
7:00 PM	0	0																
7:15 PM	0	0																
7:30 PM	0	0																
7:45 PM	0	0																
8:00 PM	0	0																
8:15 PM	0	0																
8:30 PM	0	0																
8:45 PM	0	0																
9:00 PM	0	0																
9:15 PM	0	0																
9:30 PM	0	0																
9:45 PM	0	0																
HOURS MET			2	2	10	10	0	0	0	0	5	5	0	0	13	13	3	3
WARRANT SATISFIED?			NO	YES	NO	NO					NO			NO				

Warrant Met: No

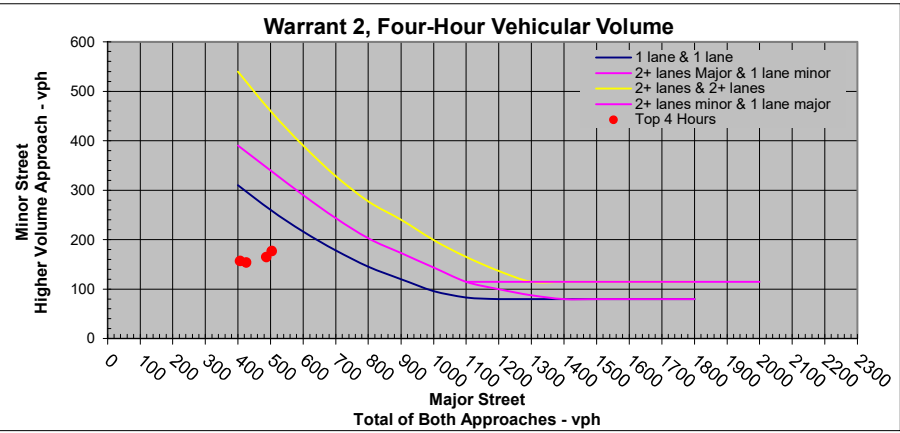
Notes: Condition A (70%) was met.

OMUTCD WARRANT 2, FOUR-HOUR VEHICULAR VOLUME

Number of Lanes for Moving Traffic on Each Approach	Total Number of Unique Hours Met on Figure 4C-1	0
Major street: 1 Lane	Total Number of Unique Hours Met on Figure 4C-2 (70% Factor)	4
Minor Street: 1 Lane		

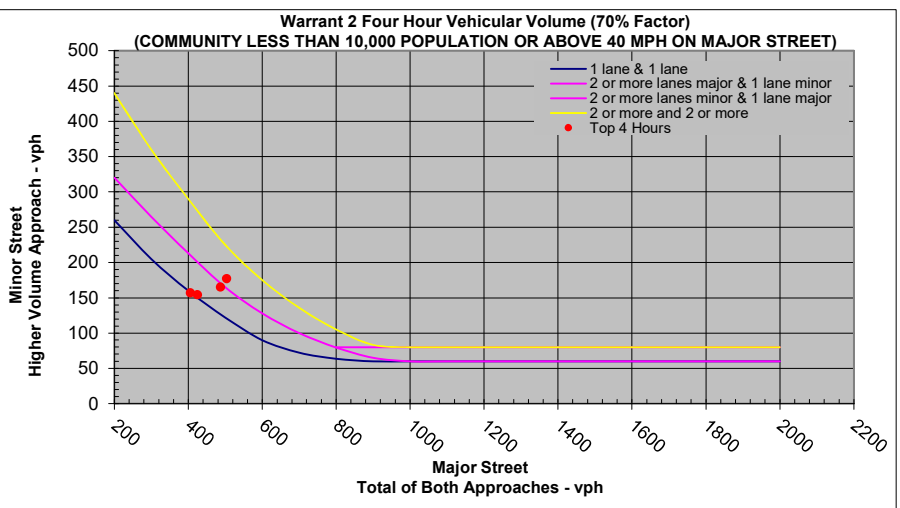
Built up Isolated Community with Less Than 10,000 Population or Above 40 MPH on Major Street? **Yes**

Hour Interval Beginning At	Raw Traffic Counts				Total Major Approach Volumes	Highest Actual Minor Street Approach Volumes	Hour Met?	Hour Met? (70% Factor)
	Minor - SR-225/CR-125		Major - US-224/SR-225					
	N-Bound	S-Bound	W-Bound	E-Bound				
6:00 AM	153	36	331	47	378	153		
6:15 AM	151	38	363	47	410	151	Met	
6:30 AM	157	43	357	49	406	157		
6:45 AM	154	47	346	60	406	154		
7:00 AM	146	47	339	63	402	146		
7:15 AM	148	54	318	73	391	148		
7:30 AM	140	51	318	82	400	140		
7:45 AM	140	50	308	79	387	140		
8:00 AM	138	49	290	85	375	138		
8:15 AM	141	42	284	76	360	141		
8:30 AM	136	45	294	81	375	136		
8:45 AM	137	37	263	80	343	137		
9:00 AM	142	44	258	73	331	142		
9:15 AM	133	43	279	69	348	133		
9:30 AM	128	35	266	69	335	128		
9:45 AM	132	37	286	71	357	132		
10:00 AM	120	27	290	81	371	120		
10:15 AM	122	31	265	88	353	122		
10:30 AM	124	39	263	81	344	124		
10:45 AM	111	39	239	82	321	111		
11:00 AM	107	44	225	75	300	107		
11:15 AM	100	40	239	85	324	100		
11:30 AM	107	37	236	84	320	107		
11:45 AM	114	37	242	88	330	114		
12:00 PM	120	37	268	96	364	120		
12:15 PM	134	43	252	88	340	134		
12:30 PM	130	43	253	93	346	130		
12:45 PM	139	39	270	89	359	139		
1:00 PM	142	34	272	86	358	142		
1:15 PM	134	30	280	101	381	134		
1:30 PM	139	30	272	90	362	139		
1:45 PM	133	34	282	88	370	133		
2:00 PM	138	36	248	100	348	138		
2:15 PM	151	37	260	94	354	151		
2:30 PM	156	41	269	129	398	156	Met	
2:45 PM	154	49	279	146	425	154		
3:00 PM	164	66	337	159	496	164		
3:15 PM	161	68	346	160	506	161		
3:30 PM	173	66	338	155	493	173	Met	
3:45 PM	177	75	346	158	504	177		
4:00 PM	174	70	332	142	474	174		
4:15 PM	177	81	347	141	488	177		
4:30 PM	161	80	368	136	504	161	Met	
4:45 PM	165	72	353	134	487	165		
5:00 PM	158	65	346	137	483	158		
5:15 PM	146	57	293	135	428	146		
5:30 PM	136	54	256	111	367	136		
5:45 PM	118	43	229	96	325	118		
6:00 PM	108	41	207	85	292	108		
6:15 PM	75	27	161	57	218	75		
6:30 PM	48	19	114	41	155	48		
6:45 PM	25	10	56	18	74	25		
7:00 PM	0	0	0	0	0	0		
7:15 PM	0	0	0	0	0	0		
7:30 PM	0	0	0	0	0	0		
7:45 PM	0	0	0	0	0	0		
8:00 PM	0	0	0	0	0	0		



Top Hours for Figure 4C-1					
Start Time	End Time	Major Street	Minor Street		
Top Hour	3:45 PM	4:45 PM	504	177	
2nd Highest Hour	4:45 PM	5:45 PM	487	165	
3rd Highest Hour	2:45 PM	3:45 PM	425	154	
4th Highest Hour	6:30 AM	7:30 AM	406	157	

Top Hours for Figure 4C-2					
Start Time	End Time	Major Street	Minor Street		
Top Hour	3:45 PM	4:45 PM	504	177	
2nd Highest Hour	4:45 PM	5:45 PM	487	165	
3rd Highest Hour	2:45 PM	3:45 PM	425	154	
4th Highest Hour	6:30 AM	7:30 AM	406	157	



Are the requirements for Warrant 2 met?: No

OMUTCD WARRANT 3, PEAK HOUR				Hour Vehicular Volume				
Number of Lanes for Moving Traffic on Each Approach		Peak Hour Start time	3:45 PM	Hour Interval Beginning At	Major Street Combined Vehicles Per Hour (VPH)	Highest Minor Street Approach Vehicles Per Hour (VPH)	Sum of Major Street and Highest Minor Street	Sum of Major Street and Combined Minor Street
Major Street:	1 Lane	Peak Hour End Time	4:45 PM	6:00 AM	378	153	531	567
Minor Street:	1 Lane			6:15 AM	410	151	561	599
				6:30 AM	406	157	563	606
				6:45 AM	406	154	560	607
				7:00 AM	402	146	548	595
				7:15 AM	391	148	539	593
				7:30 AM	400	140	540	591
				7:45 AM	387	140	527	577
				8:00 AM	375	138	513	562
				8:15 AM	360	141	501	543
				8:30 AM	375	136	511	556
				8:45 AM	343	137	480	517
				9:00 AM	331	142	473	517
				9:15 AM	348	133	481	524
				9:30 AM	335	128	463	498
				9:45 AM	357	132	489	526
				10:00 AM	371	120	491	518
				10:15 AM	353	122	475	506
				10:30 AM	344	124	468	507
				10:45 AM	321	111	432	471
				11:00 AM	300	107	407	451
				11:15 AM	324	100	424	464
				11:30 AM	320	107	427	464
				11:45 AM	330	114	444	481
				12:00 PM	364	120	484	521
				12:15 PM	340	134	474	517
				12:30 PM	346	130	476	519
				12:45 PM	359	139	498	537
				1:00 PM	358	142	500	534
				1:15 PM	381	134	515	545
				1:30 PM	362	139	501	531
				1:45 PM	370	133	503	537
				2:00 PM	348	138	486	522
				2:15 PM	354	151	505	542
				2:30 PM	398	156	554	595
				2:45 PM	425	154	579	628
				3:00 PM	496	164	660	726
				3:15 PM	506	161	667	735
				3:30 PM	493	173	666	732
				3:45 PM	504	177	681	756
				4:00 PM	474	174	648	718
				4:15 PM	488	177	665	746
				4:30 PM	504	161	665	745
				4:45 PM	487	165	652	724
				5:00 PM	483	158	641	706
				5:15 PM	428	146	574	631
				5:30 PM	367	136	503	557
				5:45 PM	325	118	443	486
				6:00 PM	292	108	400	441
				6:15 PM	218	75	293	320
				6:30 PM	155	48	203	222
				6:45 PM	74	25	99	109
				7:00 PM	0	0	0	0
				7:15 PM	0	0	0	0
				7:30 PM	0	0	0	0
				7:45 PM	0	0	0	0
				8:00 PM	0	0	0	0

Actual Peak Hour Major Traffic Volume	Actual Peak Hour Minor Traffic Volume	Required Peak Hour Minor Traffic Volume for Fig. 4C-3	Required Peak Hour Minor Traffic Volume for Fig. 4C-4
504	177	411.61559	208.20879

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

Indicate whether all three of the following conditions for the same 1 hour (any four consecutive 15-minute periods) of an average day are present*

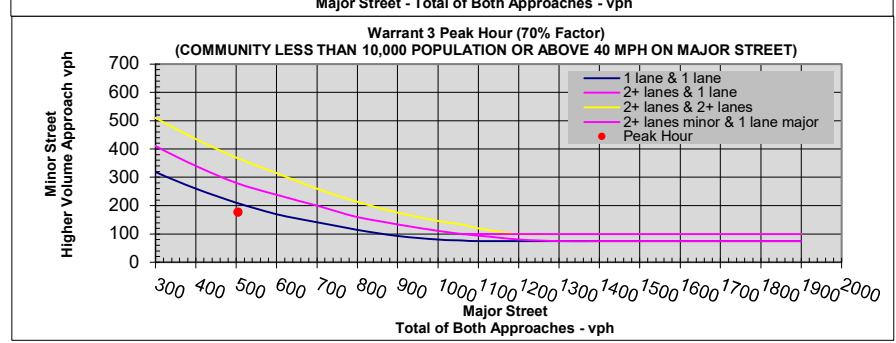
Does the total stopped time delay experienced by the traffic on one minor-street approach (one direction only) controlled by a STOP sign equal or exceed 4 vehicle-hours for a one-lane approach or 5 vehicle-hours for a two-lane approach? **Yes**

Does the volume on the same minor-street approach (one direction only) equal or exceed 100 vehicles per hour for one moving lane of traffic or 150 vehicles per hour for two moving lanes? **Yes**

Does the total entering volume serviced during the hour equal or exceed 650 vehicles per hour for intersection with three approaches or 800 vehicles per hour for intersections with four or more approaches? **No**

*If applicable, attach all supporting calculations and documentation.

Are the requirements for Warrant 3 met?: **No**



Start Time	Southbound Approach						Westbound Approach						Northbound Approach						Eastbound Approach						NOTES:
	Southbound						Westbound						Northbound						Eastbound						
	Right	Thru	Left	U-Turn	Peds	App Total	Right	Thru	Left	U-Turn	Peds	App Total	Right	Thru	Left	U-Turn	Peds	App Total	Right	Thru	Left	U-Turn	Peds	App Total	
12:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
12:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
12:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
12:45 AM	0	0	0	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	0	0	0	
1:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1:45 AM	0	0	0	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	0	0	0	
2:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
2:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
2:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
2:45 AM	0	0	0	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	0	0	0	
3:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
3:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
3:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
3:45 AM	0	0	0	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	0	0	0	
4:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
4:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
4:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
4:45 AM	0	0	0	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	0	0	0	
5:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
5:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
5:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
5:45 AM	0	0	0	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	0	0	0	
6:00 AM	2	5	0	0	0	7	0	18	38	56	59	10	3	72	3	12	0	15	13	13	15	15	15	15	
6:15 AM	1	7	0	0	0	8	0	22	61	77	51	17	0	68	3	10	0	8	8	13	13	13	13	13	
6:30 AM	3	8	1	0	0	12	0	28	79	105	48	15	2	65	0	12	0	12	12	15	15	15	15	15	
6:45 AM	1	9	0	0	0	10	1	14	72	87	53	16	5	74	1	5	1	7	7	15	15	15	15	15	
Hourly Total	7	29	1	0	0	37	1	83	250	331	211	58	10	279	7	39	1	44	44	85	85	85	85	85	
7:00 AM	4	5	0	0	0	9	2	24	62	88	54	10	3	67	1	13	1	17	17	24	24	24	24	24	
7:15 AM	5	9	0	0	0	14	0	15	62	77	75	11	3	89	1	14	0	15	15	24	24	24	24	24	
7:30 AM	2	14	0	0	0	16	1	25	68	94	57	8	2	67	1	22	0	23	23	24	24	24	24	24	
7:45 AM	1	8	1	0	0	10	0	21	58	80	47	12	3	62	1	9	0	10	10	15	15	15	15	15	
Hourly Total	12	36	1	0	0	49	4	85	250	0	339	233	41	11	0	285	4	58	1	0	63	63	63	63	
8:00 AM	1	13	1	0	0	15	0	13	54	67	57	13	1	71	0	24	1	24	24	24	24	24	24	24	
8:15 AM	0	10	0	0	0	10	1	15	61	77	15	2	2	89	5	16	1	24	24	24	24	24	24	24	
8:30 AM	0	15	0	0	0	15	2	13	69	84	52	10	2	64	4	15	1	20	20	24	24	24	24	24	
8:45 AM	2	6	1	0	0	9	1	14	47	62	62	5	2	69	3	13	0	16	16	24	24	24	24	24	
Hourly Total	3	44	2	0	0	49	4	55	231	0	290	226	40	7	0	273	12	70	3	0	81	81	81	81	
9:00 AM	1	7	0	0	0	8	4	11	44	61	7	2	4	67	1	14	1	16	16	24	24	24	24	24	
9:15 AM	1	12	0	0	0	13	0	17	70	87	60	6	1	67	2	26	1	29	29	24	24	24	24	24	
9:30 AM	2	6	0	0	0	8	0	12	41	53	55	8	4	67	2	17	0	19	19	24	24	24	24	24	
9:45 AM	0	15	0	0	0	15	0	14	43	57	57	13	1	71	0	8	1	9	9	24	24	24	24	24	
Hourly Total	4	40	0	0	0	44	4	60	198	0	238	250	34	8	0	292	5	65	3	0	73	73	73	73	
10:00 AM	1	6	0	0	0	7	0	17	65	82	58	4	4	66	1	11	0	12	12	24	24	24	24	24	
10:15 AM	1	3	1	0	0	5	0	14	60	74	44	5	3	52	10	18	1	29	29	24	24	24	24	24	
10:30 AM	0	9	1	0	0	10	0	12	61	73	60	9	5	74	13	16	0	21	21	24	24	24	24	24	
10:45 AM	1	4	0	0	0	5	0	16	45	61	48	5	1	54	2	17	0	19	19	24	24	24	24	24	
Hourly Total	3	22	2	0	0	27	0	59	231	0	290	210	23	13	0	246	18	62	1	0	81	81	81	81	
11:00 AM	0	11	0	0	0	11	0	12	45	57	63	4	4	71	2	16	1	19	19	24	24	24	24	24	
11:15 AM	2	11	0	0	0	13	4	23	48	72	2	2	2	65	3	19	0	22	22	24	24	24	24	24	
11:30 AM	1	9	0	0	0	10	0	14	35	49	4	5	2	51	4	18	0	22	22	24	24	24	24	24	
11:45 AM	2	8	1	0	0	11	2	11	34	47	37	2	5	44	4	8	0	12	12	24	24	24	24	24	
Hourly Total	5	39	1	0	0	45	6	57	162	0	225	187	19	13	0	250	13	61	1	0	75	75	75	75	
12:00 PM	1	4	2	0	0	7	1	10	60	71	47	3	4	54	4	25	0	29	29	24	24	24	24	24	
12:15 PM	0	8	1	0	0	9	1	21	47	69	52	13	1	66	5	13	3	21	21	24	24	24	24	24	
12:30 PM	0	8	2	0	0	10	0	14	41	55	49	10	2	61	6	19	1	26	26	24	24	24	24	24	
12:45 PM	2	8	1	0	0	11	1	20	52	63	59	9	3	51	1	19	0	20	20	24	24	24	24	24	
Hourly Total	3	28	6	0	0	37	3	65	200	0	268	187	35	10	0	232	16	76	4	0	96	96	96	96	
1:00 PM	1	10	2	0	0	13	1	14	40	55	60	10	6	76	2	18	1	21	21	24	24	24	24	24	
1:15 PM	2	6	2	0	0	10	1	16	53	70	42	9	5	56	4	18	4	26	26	24	24	24	24	24	
1:30 PM	0	8	0	0	0	8	0	21	49	72	64	9	9	79	1	21	0	22	22	24	24	24	24	24	
1:45 PM	0	5	0	0	0	5	1	16	58	75	57	5	2	64	3	13	1	17	17	24	24	24	24	24	
Hourly Total	3	27	4	0	0	34	5	67	200	0	272	223	30	22	0	275	10	70	6	0	86	86	86	86	
2:00 PM	1	7	1	0	0	9	0	24	39	63	50	10	2	62	5	27	4	36	36	24	24	24	24	24	
2:15 PM	0	9	1	0	0	10	0	12	50	62	49	10	7	66	6	9	0	15	1						

Turning Movement Counts - Lights

	Southbound					Westbound					Northbound					Eastbound		
	Right	Thru	Left			Right	Thru	Left			Right	Thru	Left			Right	Thru	Left
0:00																		
12:15																		
12:30																		
12:45																		
1:00																		
1:15																		
1:30																		
1:45																		
2:00																		
2:15																		
2:30																		
2:45																		
3:00																		
3:15																		
3:30																		
3:45																		
4:00																		
4:15																		
4:30																		
4:45																		
5:00																		
5:15																		
5:30																		
5:45																		
6:00	2	5	0			0	18	30			44	10	3			3	8	0
6:15	1	7	0			0	18	44			32	17	0			3	8	0
6:30	3	6	1			0	22	61			32	15	2			0	10	0
6:45	1	9	0			1	14	45			28	16	5			1	5	1
7:00	4	5	0			2	22	41			31	10	3			1	9	1
7:15	3	7	0			0	15	44			53	9	1			1	14	0
7:30	2	12	0			1	21	46			31	8	2			1	16	0
7:45	1	8	1			1	19	40			32	10	1			1	9	0
8:00	1	8	1			0	13	39			32	11	1			0	19	1
8:15	0	8	0			1	8	32			36	12	2			3	18	1
8:30	0	13	0			2	11	54			40	8	2			4	7	1
8:45	0	4	1			1	14	34			36	5	2			1	11	0
9:00	1	7	0			0	14	21			41	3	2			1	8	1
9:15	1	8	0			0	13	42			33	4	1			2	18	1
9:30	2	4	0			0	12	17			35	6	2			2	13	0
9:45	0	13	0			0	14	26			28	9	1			0	8	1
10:00	1	2	0			0	11	36			31	4	2			1	11	0
10:15	1	3	1			0	12	29			32	5	1			4	12	1
10:30	0	7	1			0	8	28			30	7	3			1	13	0
10:45	1	4	0			0	9	26			29	3	1			2	15	0
11:00	0	9	0			0	10	25			32	4	2			0	12	1
11:15	2	7	0			2	13	30			29	8	0			1	12	0
11:30	1	6	0			0	10	27			23	3	2			2	13	0
11:45	0	6	1			0	9	23			24	2	3			2	8	0
12:00	1	4	0			1	8	31			27	3	0			2	23	0
12:15	0	6	1			1	13	20			35	7	1			3	13	3
12:30	0	6	2			0	9	26			33	10	2			2	12	1
12:45	2	4	1			1	15	20			24	7	1			1	12	0
1:00	1	8	0			1	14	24			37	10	4			0	14	1
1:15	2	4	2			1	16	32			24	5	3			2	18	4
1:30	0	4	0			2	21	38			28	6	3			1	18	0
1:45	0	5	0			1	13	37			29	5	0			1	11	1
2:00	1	7	1			0	19	27			35	10	0			3	19	2
2:15	0	7	1			0	7	40			36	10	1			2	7	0
2:30	1	7	0			1	19	47			37	5	3			3	13	2
2:45	2	4	1			0	11	22			36	11	2			3	21	2
3:00	0	9	0			1	13	39			50	15	1			1	26	1
3:15	2	11	1			0	10	35			47	13	3			6	35	4
3:30	0	15	0			2	27	45			40	9	2			3	25	2
3:45	2	18	0			3	19	59			56	5	8			7	28	3
4:00	0	12	0			2	13	56			54	12	1			2	25	2
4:15	1	9	0			1	11	42			63	15	5			2	38	3
4:30	0	23	4			1	19	65			62	8	0			3	31	4
4:45	1	16	0			1	19	52			58	10	2			3	16	4
5:00	0	18	3			0	32	59			55	8	4			3	25	2
5:15	1	9	1			1	17	56			48	10	2			3	28	3
5:30	3	14	0			1	20	60			56	10	3			0	34	2
5:45	1	9	0			2	18	45			51	8	2			3	22	2
6:00	1	11	1			1	13	23			43	14	0			3	25	0
6:15	1	7	0			1	8	34			31	8	2			2	13	1
6:30	2	7	0			3	18	31			40	5	2			2	13	3
6:45	1	6	1			1	16	33			32	11	1			2	15	1
7:00																		
7:15																		
7:30																		
7:45																		
8:00																		
8:15																		
8:30																		
8:45																		
9:00																		
9:15																		
9:30																		
9:45																		
10:00																		
10:15																		
10:30																		
10:45																		
11:00																		
11:15																		
11:30																		
11:45																		

54 428 27 0 0 0 41 768 1938 0 0 0 1961 439 102 0 0 0 105 857 63

Turning Movement Counts - Mediums

	Southbound					Westbound					Northbound					Eastbound					
	Right	Thru	Left			Right	Thru	Left			Right	Thru	Left			Right	Thru	Left			
0:00																					
12:15																					
12:30																					
12:45																					
1:00																					
1:15																					
1:30																					
1:45																					
2:00																					
2:15																					
2:30																					
2:45																					
3:00																					
3:15																					
3:30																					
3:45																					
4:00																					
4:15																					
4:30																					
4:45																					
5:00																					
5:15																					
5:30																					
5:45																					
6:00	0	0	0			0	0	1			2	0	0			0	1	0			
6:15	0	0	0			0	1	3			6	0	0			0	0	0			
6:30	0	1	0			0	1	0			4	0	0			0	1	0			
6:45	0	0	0			0	0	3			3	0	0			0	0	0			
7:00	0	0	0			0	1	3			7	0	0			0	1	0			
7:15	1	0	0			0	0	1			4	1	1			0	0	0			
7:30	0	0	0			0	1	4			4	0	0			0	1	0			
7:45	0	0	0			0	1	1			3	0	0			0	0	0			
8:00	0	3	0			0	0	3			3	0	0			0	2	0			
8:15	0	1	0			0	3	2			7	0	0			1	0	0			
8:30	0	1	0			0	0	2			0	0	0			0	1	0			
8:45	1	0	0			0	0	3			1	0	0			0	1	0			
9:00	0	0	0			0	2	2			6	0	0			0	1	0			
9:15	0	1	0			0	1	5			3	0	0			0	4	0			
9:30	0	0	0			0	0	4			0	1	1			0	1	0			
9:45	0	0	0			0	0	2			2	1	0			0	0	0			
10:00	0	1	0			0	0	6			2	0	0			0	0	0			
10:15	0	0	0			0	0	6			1	0	0			0	1	0			
10:30	0	1	0			0	1	2			0	1	0			1	2	0			
10:45	0	0	0			0	3	3			3	1	0			0	1	0			
11:00	0	0	0			0	1	1			6	0	0			0	0	0			
11:15	0	1	0			1	3	5			1	0	0			1	2	0			
11:30	0	2	0			0	0	1			2	1	0			0	3	0			
11:45	1	0	0			0	0	2			2	0	0			0	0	0			
12:00	0	0	1			0	1	2			0	0	1			0	0	0			
12:15	0	1	0			0	5	2			2	0	0			0	0	0			
12:30	0	0	0			0	3	3			0	0	0			1	3	0			
12:45	0	1	0			0	2	4			2	1	0			0	3	0			
1:00	0	0	0			0	0	1			2	0	0			0	1	0			
1:15	0	1	0			0	0	2			4	0	0			0	0	0			
1:30	0	0	0			0	0	2			1	0	1			0	2	0			
1:45	0	0	0			0	2	3			5	0	0			0	1	0			
2:00	0	0	0			0	2	0			3	0	1			0	4	1			
2:15	0	0	0			0	2	0			3	0	0			1	0	0			
2:30	0	1	0			0	1	2			3	0	0			1	0	0			
2:45	0	0	0			0	0	4			0	0	0			0	2	0			
3:00	1	0	0			0	2	3			7	0	0			0	0	1			
3:15	0	0	0			0	1	4			3	0	0			0	2	0			
3:30	0	2	0			0	3	2			1	0	0			0	3	0			
3:45	0	0	0			0	0	4			1	0	0			1	1	0			
4:00	0	0	0			0	1	3			2	2	0			0	0	1			
4:15	0	1	0			0	1	2			2	0	1			1	0	0			
4:30	0	0	0			0	0	2			0	0	0			0	0	0			
4:45	0	1	0			0	0	2			0	0	0			0	2	0			
5:00	0	1	0			0	1	1			3	1	0			0	0	0			
5:15	0	0	0			0	0	4			1	0	0			0	1	0			
5:30	0	2	0			0	1	0			1	0	0			0	1	0			
5:45	0	0	0			0	2	0			1	1	0			0	0	0			
6:00	0	1	0			0	0	2			0	0	0			0	0	0			
6:15	0	0	0			0	0	0			1	0	0			0	0	0			
6:30	0	0	0			0	0	0			0	0	0			0	3	0			
6:45	0	0	0			0	0	0			0	0	0			0	0	0			
7:00																					
7:15																					
7:30																					
7:45																					
8:00																					
8:15																					
8:30																					
8:45																					
9:00																					
9:15																					
9:30																					
9:45																					
10:00																					
10:15																					
10:30																					
10:45																					
11:00																					
11:15																					
11:30																					
11:45																					
	4	24	1	0	0	0	1	49	119	0	0	0	120	11	6	0	0	0	8	52	3

Passenger Car Equivalent - Mediums

PCE Adjustment
Adjustment Factor 1.5

	Southbound				Westbound				Northbound				Eastbound		
	Right	Thru	Left		Right	Thru	Left		Right	Thru	Left		Right	Thru	Left
0:00	0	0	0		0	0	0		0	0	0		0	0	0
12:15	0	0	0		0	0	0		0	0	0		0	0	0
12:30	0	0	0		0	0	0		0	0	0		0	0	0
12:45	0	0	0		0	0	0		0	0	0		0	0	0
1:00	0	0	0		0	0	0		0	0	0		0	0	0
1:15	0	0	0		0	0	0		0	0	0		0	0	0
1:30	0	0	0		0	0	0		0	0	0		0	0	0
1:45	0	0	0		0	0	0		0	0	0		0	0	0
2:00	0	0	0		0	0	0		0	0	0		0	0	0
2:15	0	0	0		0	0	0		0	0	0		0	0	0
2:30	0	0	0		0	0	0		0	0	0		0	0	0
2:45	0	0	0		0	0	0		0	0	0		0	0	0
3:00	0	0	0		0	0	0		0	0	0		0	0	0
3:15	0	0	0		0	0	0		0	0	0		0	0	0
3:30	0	0	0		0	0	0		0	0	0		0	0	0
3:45	0	0	0		0	0	0		0	0	0		0	0	0
4:00	0	0	0		0	0	0		0	0	0		0	0	0
4:15	0	0	0		0	0	0		0	0	0		0	0	0
4:30	0	0	0		0	0	0		0	0	0		0	0	0
4:45	0	0	0		0	0	0		0	0	0		0	0	0
5:00	0	0	0		0	0	0		0	0	0		0	0	0
5:15	0	0	0		0	0	0		0	0	0		0	0	0
5:30	0	0	0		0	0	0		0	0	0		0	0	0
5:45	0	0	0		0	0	0		0	0	0		0	0	0
6:00	0	0	0		0	0	2		3	0	0		0	2	0
6:15	0	0	0		0	2	5		9	0	0		0	0	0
6:30	0	2	0		0	2	0		6	0	0		0	2	0
6:45	0	0	0		0	0	5		5	0	0		0	0	0
7:00	0	0	0		0	2	5		11	0	0		0	2	0
7:15	2	0	0		0	0	2		6	2	2		0	0	0
7:30	0	0	0		0	2	6		6	0	0		0	2	0
7:45	0	0	0		0	2	2		5	0	0		0	0	0
8:00	0	5	0		0	0	5		5	0	0		0	3	0
8:15	0	2	0		0	5	3		11	0	0		2	0	0
8:30	0	2	0		0	0	3		0	0	0		0	2	0
8:45	2	0	0		0	0	5		2	0	0		0	2	0
9:00	0	0	0		0	3	3		9	0	0		0	2	0
9:15	0	2	0		0	2	8		8	0	0		0	6	0
9:30	0	0	0		0	0	0		0	2	2		0	2	0
9:45	0	0	0		0	0	3		3	2	0		0	0	0
10:00	0	2	0		0	0	9		3	0	0		0	0	0
10:15	0	0	0		0	0	0		2	0	0		0	2	0
10:30	0	2	0		0	2	3		0	2	0		2	3	0
10:45	0	0	0		0	5	5		5	2	0		0	2	0
11:00	0	0	0		0	2	2		9	0	0		0	0	0
11:15	0	2	0		2	5	8		2	0	0		2	3	0
11:30	0	3	0		0	0	2		3	2	0		0	5	0
11:45	2	0	0		0	0	3		3	0	0		0	0	0
12:00	0	0	2		0	2	3		0	0	2		0	0	0
12:15	0	2	0		0	8	3		3	0	0		0	0	0
12:30	0	0	0		0	5	5		0	0	0		2	5	0
12:45	0	2	0		0	3	6		3	2	0		0	5	0
1:00	0	0	0		0	0	2		3	0	0		0	2	0
1:15	0	2	0		0	0	3		6	0	0		0	0	0
1:30	0	0	0		0	0	2		2	0	0		0	3	0
1:45	0	0	0		0	3	5		8	0	0		0	2	0
2:00	0	0	0		0	3	0		5	0	2		0	6	2
2:15	0	0	0		0	3	0		5	0	0		2	2	0
2:30	0	2	0		0	0	3		5	0	0		2	0	0
2:45	0	0	0		0	0	6		0	0	0		0	3	0
3:00	2	0	0		0	3	5		11	0	0		0	0	2
3:15	0	0	0		0	2	6		5	0	0		0	3	0
3:30	0	3	0		0	5	3		2	0	0		0	5	0
3:45	0	0	0		0	0	6		2	0	0		2	2	0
4:00	0	0	0		0	2	5		3	3	0		0	0	2
4:15	0	2	0		0	2	3		3	0	2		2	0	0
4:30	0	0	0		0	0	3		0	0	0		0	0	0
4:45	0	2	0		0	0	3		0	0	0		0	3	0
5:00	0	2	0		0	2	2		5	2	0		0	0	0
5:15	0	0	0		0	0	6		2	0	0		0	2	0
5:30	0	3	0		0	2	0		2	0	0		0	2	0
5:45	0	0	0		0	3	0		2	2	0		0	0	0
6:00	0	2	0		0	0	3		0	0	0		0	0	0
6:15	0	0	0		0	0	0		2	0	0		0	0	0
6:30	0	0	0		0	0	0		0	0	0		0	5	0
6:45	0	0	0		0	0	0		0	0	0		0	0	0
7:00	0	0	0		0	0	0		0	0	0		0	0	0
7:15	0	0	0		0	0	0		0	0	0		0	0	0
7:30	0	0	0		0	0	0		0	0	0		0	0	0
7:45	0	0	0		0	0	0		0	0	0		0	0	0
8:00	0	0	0		0	0	0		0	0	0		0	0	0
8:15	0	0	0		0	0	0		0	0	0		0	0	0
8:30	0	0	0		0	0	0		0	0	0		0	0	0
8:45	0	0	0		0	0	0		0	0	0		0	0	0
9:00	0	0	0		0	0	0		0	0	0		0	0	0
9:15	0	0	0		0	0	0		0	0	0		0	0	0
9:30	0	0	0		0	0	0		0	0	0		0	0	0
9:45	0	0	0		0	0	0		0	0	0		0	0	0
10:00	0	0	0		0	0	0		0	0	0		0	0	0
10:15	0	0	0		0	0	0		0	0	0		0	0	0
10:30	0	0	0		0	0	0		0	0	0		0	0	0
10:45	0	0	0		0	0	0		0	0	0		0	0	0
11:00	0	0	0		0	0	0		0	0	0		0	0	0
11:15	0	0	0		0	0	0		0	0	0		0	0	0
11:30	0	0	0		0	0	0		0	0	0		0	0	0
11:45	0	0	0		0	0	0		0	0	0		0	0	0

Turning Movement Counts - Articulated

	Southbound					Westbound					Northbound					Eastbound					
	Right	Thru	Left			Right	Thru	Left			Right	Thru	Left			Right	Thru	Left			
0:00																					
12:15																					
12:30																					
12:45																					
1:00																					
1:15																					
1:30																					
1:45																					
2:00																					
2:15																					
2:30																					
2:45																					
3:00																					
3:15																					
3:30																					
3:45																					
4:00																					
4:15																					
4:30																					
4:45																					
5:00																					
5:15																					
5:30																					
5:45																					
6:00	0	0	0			0	0	3			6	0	0			0	1	0			
6:15	0	0	0			0	1	6			5	0	0			0	1	0			
6:30	0	0	0			0	1	9			5	0	0			0	0	0			
6:45	0	0	0			0	0	11			10	0	0			0	0	0			
7:00	0	0	0			0	0	8			6	0	0			0	1	0			
7:15	0	1	0			0	0	8			8	0	0			0	0	0			
7:30	0	1	0			0	1	8			10	0	0			0	2	0			
7:45	0	0	0			0	0	8			5	1	1			0	0	0			
8:00	0	0	0			0	0	5			10	1	0			0	1	0			
8:15	0	0	0			0	1	13			4	0	0			0	0	0			
8:30	0	0	0			0	1	6			6	1	0			0	3	0			
8:45	0	1	0			0	0	4			12	0	0			1	0	0			
9:00	0	0	0			0	0	10			14	2	0			0	2	0			
9:15	0	1	0			0	1	10			11	1	0			0	1	0			
9:30	0	1	0			0	0	9			10	0	0			0	1	0			
9:45	0	1	0			0	0	7			13	1	0			0	0	0			
10:00	0	1	0			0	3	10			12	0	1			0	0	0			
10:15	0	0	0			0	1	11			5	0	1			3	2	0			
10:30	0	0	0			0	1	15			15	0	1			1	0	0			
10:45	0	0	0			0	1	7			7	0	0			0	0	0			
11:00	0	1	0			0	0	9			11	0	1			1	2	0			
11:15	0	1	0			0	1	5			6	0	1			0	2	0			
11:30	0	0	0			0	2	3			9	0	0			1	0	0			
11:45	0	1	0			1	1	4			5	0	1			1	0	0			
12:00	0	0	0			0	0	13			10	0	1			1	1	0			
12:15	0	0	0			0	0	12			7	3	0			1	0	0			
12:30	0	1	0			0	0	5			8	0	0			1	1	0			
12:45	0	1	0			0	1	13			6	0	1			0	1	0			
1:00	0	1	1			0	0	7			10	0	1			1	1	0			
1:15	0	0	0			0	0	9			6	2	1			1	0	0			
1:30	0	1	0			0	0	4			17	0	2			0	0	0			
1:45	0	0	0			0	0	8			10	0	1			1	0	0			
2:00	0	0	0			0	1	6			5	0	0			1	1	0			
2:15	0	1	0			0	1	5			4	0	3			1	1	0			
2:30	0	0	0			0	0	5			9	0	1			0	0	0			
2:45	0	0	0			0	0	1			10	0	0			0	0	0			
3:00	0	0	0			0	0	7			5	0	0			0	0	0			
3:15	0	0	0			0	0	9			6	0	0			0	1	0			
3:30	0	0	0			0	1	4			6	0	0			0	1	0			
3:45	0	2	0			0	0	6			8	1	0			0	0	0			
4:00	0	0	0			0	0	3			4	0	0			0	0	0			
4:15	0	0	0			0	0	2			6	0	0			0	0	0			
4:30	0	0	0			0	0	6			5	0	0			0	1	0			
4:45	0	0	0			0	2	3			6	1	0			0	0	0			
5:00	0	0	0			0	0	2			6	1	0			0	0	0			
5:15	0	0	0			0	0	2			4	0	1			0	2	0			
5:30	0	0	0			0	0	1			3	0	1			0	0	0			
5:45	0	1	0			0	1	4			2	0	0			1	0	0			
6:00	0	0	0			0	1	2			2	0	0			0	0	0			
6:15	0	0	0			0	0	2			5	0	0			0	0	0			
6:30	0	0	0			0	0	3			0	0	0			0	0	0			
6:45	0	1	0			0	0	3			0	0	0			0	0	0			
7:00																					
7:15																					
7:30																					
7:45																					
8:00																					
8:15																					
8:30																					
8:45																					
9:00																					
9:15																					
9:30																					
9:45																					
10:00																					
10:15																					
10:30																					
10:45																					
11:00																					
11:15																					
11:30																					
11:45																					
	0	19	1	0	0	0	1	24	336	0	0	0	375	15	20	0	0	0	17	30	0

Passenger Car Equivalent - Articulated

	Southbound			Westbound			Northbound			Eastbound		
	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left
0:00	0	0	0	0	0	0	0	0	0	0	0	0
12:15	0	0	0	0	0	0	0	0	0	0	0	0
12:30	0	0	0	0	0	0	0	0	0	0	0	0
12:45	0	0	0	0	0	0	0	0	0	0	0	0
1:00	0	0	0	0	0	0	0	0	0	0	0	0
1:15	0	0	0	0	0	0	0	0	0	0	0	0
1:30	0	0	0	0	0	0	0	0	0	0	0	0
1:45	0	0	0	0	0	0	0	0	0	0	0	0
2:00	0	0	0	0	0	0	0	0	0	0	0	0
2:15	0	0	0	0	0	0	0	0	0	0	0	0
2:30	0	0	0	0	0	0	0	0	0	0	0	0
2:45	0	0	0	0	0	0	0	0	0	0	0	0
3:00	0	0	0	0	0	0	0	0	0	0	0	0
3:15	0	0	0	0	0	0	0	0	0	0	0	0
3:30	0	0	0	0	0	0	0	0	0	0	0	0
3:45	0	0	0	0	0	0	0	0	0	0	0	0
4:00	0	0	0	0	0	0	0	0	0	0	0	0
4:15	0	0	0	0	0	0	0	0	0	0	0	0
4:30	0	0	0	0	0	0	0	0	0	0	0	0
4:45	0	0	0	0	0	0	0	0	0	0	0	0
5:00	0	0	0	0	0	0	0	0	0	0	0	0
5:15	0	0	0	0	0	0	0	0	0	0	0	0
5:30	0	0	0	0	0	0	0	0	0	0	0	0
5:45	0	0	0	0	0	0	0	0	0	0	0	0
6:00	0	0	0	0	0	6	12	0	0	0	2	0
6:15	0	0	0	0	2	12	10	0	0	0	2	0
6:30	0	0	0	0	2	18	10	0	0	0	0	0
6:45	0	0	0	0	0	22	20	0	0	0	0	0
7:00	0	0	0	0	0	16	12	0	0	0	2	0
7:15	0	2	0	0	0	16	16	0	0	0	0	0
7:30	0	2	0	0	2	16	20	0	0	0	4	0
7:45	0	0	0	0	0	16	10	2	2	0	0	0
8:00	0	0	0	0	0	10	20	2	0	0	2	0
8:15	0	0	0	0	2	26	8	0	0	0	0	0
8:30	0	0	0	0	2	12	12	2	0	0	0	0
8:45	0	2	0	0	0	8	24	0	0	0	2	0
9:00	0	0	0	0	0	20	28	4	0	0	4	0
9:15	0	2	0	0	0	20	22	2	0	0	2	0
9:30	0	2	0	0	0	18	20	0	0	0	2	0
9:45	0	2	0	0	0	14	26	2	0	0	0	0
10:00	0	2	0	0	0	20	24	0	2	0	0	0
10:15	0	0	0	0	2	22	10	0	2	0	4	0
10:30	0	0	0	0	2	30	30	0	2	0	0	0
10:45	0	0	0	0	2	14	14	0	0	0	0	0
11:00	0	2	0	0	0	18	22	0	2	0	4	0
11:15	0	2	0	0	2	10	12	0	2	0	4	0
11:30	0	0	0	0	4	6	18	0	0	0	2	0
11:45	0	2	0	0	2	8	10	0	2	0	2	0
12:00	0	0	0	0	0	26	20	0	2	0	2	0
12:15	0	0	0	0	0	24	14	6	0	0	2	0
12:30	0	2	0	0	0	10	16	0	0	0	2	0
12:45	0	2	0	0	2	26	12	0	2	0	2	0
1:00	0	2	2	0	0	14	20	0	2	0	2	0
1:15	0	0	0	0	0	18	12	4	2	0	0	0
1:30	0	2	0	0	0	16	24	0	4	0	0	0
1:45	0	0	0	0	0	16	20	0	2	0	0	0
2:00	0	0	0	0	2	12	10	0	0	0	2	0
2:15	0	2	0	0	0	10	8	0	0	0	2	0
2:30	0	0	0	0	0	10	18	0	2	0	0	0
2:45	0	0	0	0	0	2	20	0	0	0	0	0
3:00	0	0	0	0	0	14	10	0	0	0	0	0
3:15	0	0	0	0	0	18	12	0	0	0	2	0
3:30	0	0	0	0	2	8	12	0	0	0	2	0
3:45	0	4	0	0	0	12	16	2	0	0	0	0
4:00	0	0	0	0	0	6	8	0	0	0	0	0
4:15	0	0	0	0	0	4	12	0	0	0	0	0
4:30	0	0	0	0	0	12	10	0	0	0	2	0
4:45	0	0	0	0	4	6	12	2	0	0	0	0
5:00	0	0	0	0	0	4	12	2	0	0	0	0
5:15	0	0	0	0	0	4	8	0	2	0	4	0
5:30	0	0	0	0	0	2	6	0	2	0	0	0
5:45	0	2	0	0	0	8	4	0	0	0	2	0
6:00	0	0	0	0	2	4	4	0	0	0	0	0
6:15	0	0	0	0	0	4	10	0	0	0	0	0
6:30	0	0	0	0	0	8	0	0	0	0	0	0
6:45	0	2	0	0	0	6	0	0	0	0	0	0
7:00	0	0	0	0	0	0	0	0	0	0	0	0
7:15	0	0	0	0	0	0	0	0	0	0	0	0
7:30	0	0	0	0	0	0	0	0	0	0	0	0
7:45	0	0	0	0	0	0	0	0	0	0	0	0
8:00	0	0	0	0	0	0	0	0	0	0	0	0
8:15	0	0	0	0	0	0	0	0	0	0	0	0
8:30	0	0	0	0	0	0	0	0	0	0	0	0
8:45	0	0	0	0	0	0	0	0	0	0	0	0
9:00	0	0	0	0	0	0	0	0	0	0	0	0
9:15	0	0	0	0	0	0	0	0	0	0	0	0
9:30	0	0	0	0	0	0	0	0	0	0	0	0
9:45	0	0	0	0	0	0	0	0	0	0	0	0
10:00	0	0	0	0	0	0	0	0	0	0	0	0
10:15	0	0	0	0	0	0	0	0	0	0	0	0
10:30	0	0	0	0	0	0	0	0	0	0	0	0
10:45	0	0	0	0	0	0	0	0	0	0	0	0
11:00	0	0	0	0	0	0	0	0	0	0	0	0
11:15	0	0	0	0	0	0	0	0	0	0	0	0
11:30	0	0	0	0	0	0	0	0	0	0	0	0
11:45	0	0	0	0	0	0	0	0	0	0	0	0

Turning Movement Counts - Combined After PCE Adjustments

	Southbound					Westbound					Northbound					Eastbound					
	Right	Thru	Left			Right	Thru	Left			Right	Thru	Left			Right	Thru	Left			
0:00																					
12:15																					
12:30																					
12:45																					
1:00																					
1:15																					
1:30																					
1:45																					
2:00																					
2:15																					
2:30																					
2:45																					
3:00																					
3:15																					
3:30																					
3:45																					
4:00																					
4:15																					
4:30																					
4:45																					
5:00																					
5:15																					
5:30																					
5:45																					
6:00	2	5	0			0	18	38			59	10	3			3	12	0			
6:15	1	7	0			0	22	61			51	17	0			3	10	0			
6:30	3	8	1			0	26	79			48	15	2			0	12	0			
6:45	1	9	0			1	14	72			53	16	5			1	5	1			
7:00	4	5	0			2	24	62			54	10	3			1	13	1			
7:15	5	9	0			0	15	62			75	11	3			1	14	0			
7:30	2	14	0			1	25	68			57	8	2			1	22	0			
7:45	1	8	1			1	21	58			47	12	3			1	9	0			
8:00	1	13	1			0	13	54			57	13	1			0	24	1			
8:15	0	10	0			1	15	61			55	12	2			5	18	1			
8:30	0	15	0			2	13	69			52	10	2			4	15	1			
8:45	2	6	1			1	14	47			62	5	2			3	13	0			
9:00	1	7	0			0	17	44			78	7	2			1	14	1			
9:15	1	12	0			0	17	70			60	6	1			2	26	1			
9:30	2	6	0			0	12	41			55	8	4			2	17	0			
9:45	0	15	0			0	14	43			57	13	1			0	8	1			
10:00	1	6	0			0	17	65			58	4	4			1	11	0			
10:15	1	3	1			0	14	60			44	5	3			10	18	1			
10:30	0	9	1			0	12	61			60	9	5			5	16	0			
10:45	1	4	0			0	16	45			48	5	1			2	17	0			
11:00	0	11	0			0	12	45			63	4	4			2	16	1			
11:15	2	11	0			4	20	48			43	8	2			3	19	0			
11:30	1	9	0			0	14	35			44	5	2			4	18	0			
11:45	2	8	1			2	11	34			37	2	5			4	8	0			
12:00	1	4	2			1	10	60			47	3	4			4	25	0			
12:15	0	8	1			1	21	47			52	13	1			5	13	3			
12:30	0	8	2			0	14	41			49	10	2			6	19	1			
12:45	2	8	1			1	20	52			39	9	3			1	19	0			
1:00	1	10	2			1	14	40			60	10	6			2	18	1			
1:15	2	6	2			1	16	53			42	9	5			4	18	4			
1:30	0	6	0			2	21	49			64	6	9			1	21	0			
1:45	0	5	0			1	16	58			57	5	2			3	13	1			
2:00	1	7	1			0	24	39			50	10	2			5	27	4			
2:15	0	9	1			0	12	50			49	10	7			6	9	0			
2:30	1	9	0			1	21	60			60	5	5			5	13	2			
2:45	2	4	1			0	11	30			56	11	2			3	24	2			
3:00	2	9	0			1	16	58			71	15	1			1	26	3			
3:15	2	11	1			0	12	59			64	13	3			6	40	4			
3:30	0	18	0			2	34	56			54	9	2			3	32	2			
3:45	2	22	0			3	19	77			74	7	8			9	30	3			
4:00	0	12	0			2	15	67			65	15	1			2	25	4			
4:15	1	11	0			1	13	49			78	15	7			4	38	3			
4:30	0	23	4			1	19	80			72	8	0			3	33	4			
4:45	1	18	0			1	23	61			70	12	2			3	19	4			
5:00	0	20	3			0	34	65			72	12	4			3	25	2			
5:15	1	9	1			1	17	66			58	10	4			3	34	3			
5:30	3	17	0			1	22	62			64	10	5			0	36	2			
5:45	1	11	0			2	23	53			57	10	2			5	22	2			
6:00	1	13	1			1	15	30			47	14	0			3	25	0			
6:15	1	7	0			1	8	38			43	8	2			2	13	1			
6:30	2	7	0			3	18	37			40	5	2			2	18	3			
6:45	1	8	1			1	16	39			32	11	1			2	15	1			
7:00																					
7:15																					
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	62	510	31	0	0	0	45	900	2798	0	0	0	2903	490	154	0	0	0	155	1005	69

Multi-Way Stop Application

OMUTCD Section 2B.07

- A. Where traffic control signals are justified, the multi-way stop is an interim measure that can be installed quickly to control traffic while arrangements are being made for the installation of the traffic control signal. **Warranted ?**
- B. Five or more reported crashes in a 12-month period that are susceptible to correction by a multiway stop installation. Such crashes include right-turn and left-turn collisions as well as right-angle collisions.
- C. Minimum Volumes:
- 1 The vehicular volume entering the intersection from the major street approaches (total of both approaches) averages at least 300 vehicles per hour for any 8 hours of an average day.
 - 2 The combined vehicular, pedestrian, and bicycle volume entering the intersection from the minor street approaches (total of both approaches) averages at least 200 units per hour for the same 8 hours, with an average delay to minor-street vehicular traffic of at least 30 seconds per vehicle during the highest hour.*
*If this condition is satisfied, there must also be an average delay of at least 30 seconds per vehicle during the peak hour.
 - 3 If the 85th-percentile approach speed of the major-street traffic exceeds 40 mph, the minimum volume warrants are 70 percent of the values provided in Items 1 and 2.
- D. Where no single criterion is satisfied, but where Criteria B, C.1, and C.2 are all satisfied to 80 percent of the minimum values. Criterion C.3 is excluded from this condition.
- Other criteria that may be considered in an engineering study include:
- A. The need to control left-turn conflicts;
 - B. The need to control vehicle/pedestrian conflicts near locations that generate high pedestrian volumes;
 - C. Locations where a road user, after stopping, cannot see conflicting traffic and is not able to negotiate the intersection unless conflicting cross traffic is also required to stop; and
 - D. An intersection of two residential neighborhood collector (through) streets of similar design and operating characteristics where multi-way stop control would improve traffic operational characteristics of the intersection.

Are the requirements for Multi-Way Stop Satisfied?:

Lanes Major/ Minor	ADJUSTED VOLUMES		Condition C.1		Condition C.2		Condition D	
	MAJOR	MINOR	100%		70%		80%	
			MAJ.	MIN.	MAJ.	MIN.	MAJ.	MIN.
Required Volumes								
			300	200	210	140	240	160
6:00 AM	378	378	1	1				
6:15 AM	410	410						
6:30 AM	406	406						
6:45 AM	406	406			1	1	1	1
7:00 AM	402	402	1	1				
7:15 AM	391	391						
7:30 AM	400	400						
7:45 AM	387	387			1	1	1	1
8:00 AM	375	375	1	1				
8:15 AM	360	360						
8:30 AM	375	375						
8:45 AM	343	343			1	1	1	1
9:00 AM	331	331	1	1				
9:15 AM	348	348						
9:30 AM	335	335						
9:45 AM	357	357			1	1	1	1
10:00 AM	371	371	1	1				
10:15 AM	353	353						
10:30 AM	344	344						
10:45 AM	321	321			1	1	1	1
11:00 AM	300	300	1	1				
11:15 AM	324	324						
11:30 AM	320	320						
11:45 AM	330	330			1	1	1	1
12:00 PM	364	364	1	1				
12:15 PM	340	340						
12:30 PM	346	346						
12:45 PM	359	359			1	1	1	1
1:00 PM	358	358	1	1				
1:15 PM	381	381						
1:30 PM	362	362						
1:45 PM	370	370			1	1	1	1
2:00 PM	348	348	1	1				
2:15 PM	354	354						
2:30 PM	398	398						
2:45 PM	425	425			1	1	1	1
3:00 PM	496	496	1	1				
3:15 PM	506	506						
3:30 PM	493	493						
3:45 PM	504	504			1	1	1	1
4:00 PM	474	474	1	1				
4:15 PM	488	488						
4:30 PM	504	504						
4:45 PM	487	487			1	1	1	1
5:00 PM	483	483	1	1				
5:15 PM	428	428						
5:30 PM	367	367						
5:45 PM	325	325			1	1	1	1
6:00 PM	292	292						
6:15 PM	218	218						
6:30 PM	155	155						
6:45 PM	74	74						
7:00 PM	0	0						
7:15 PM	0	0						
7:30 PM	0	0						
7:45 PM	0	0						
8:00 PM	0	0						
HOURS MET			12	12	13	13	13	13
WARRANT SATISFIED?			YES	YES	YES	YES	YES	YES

Appendix I

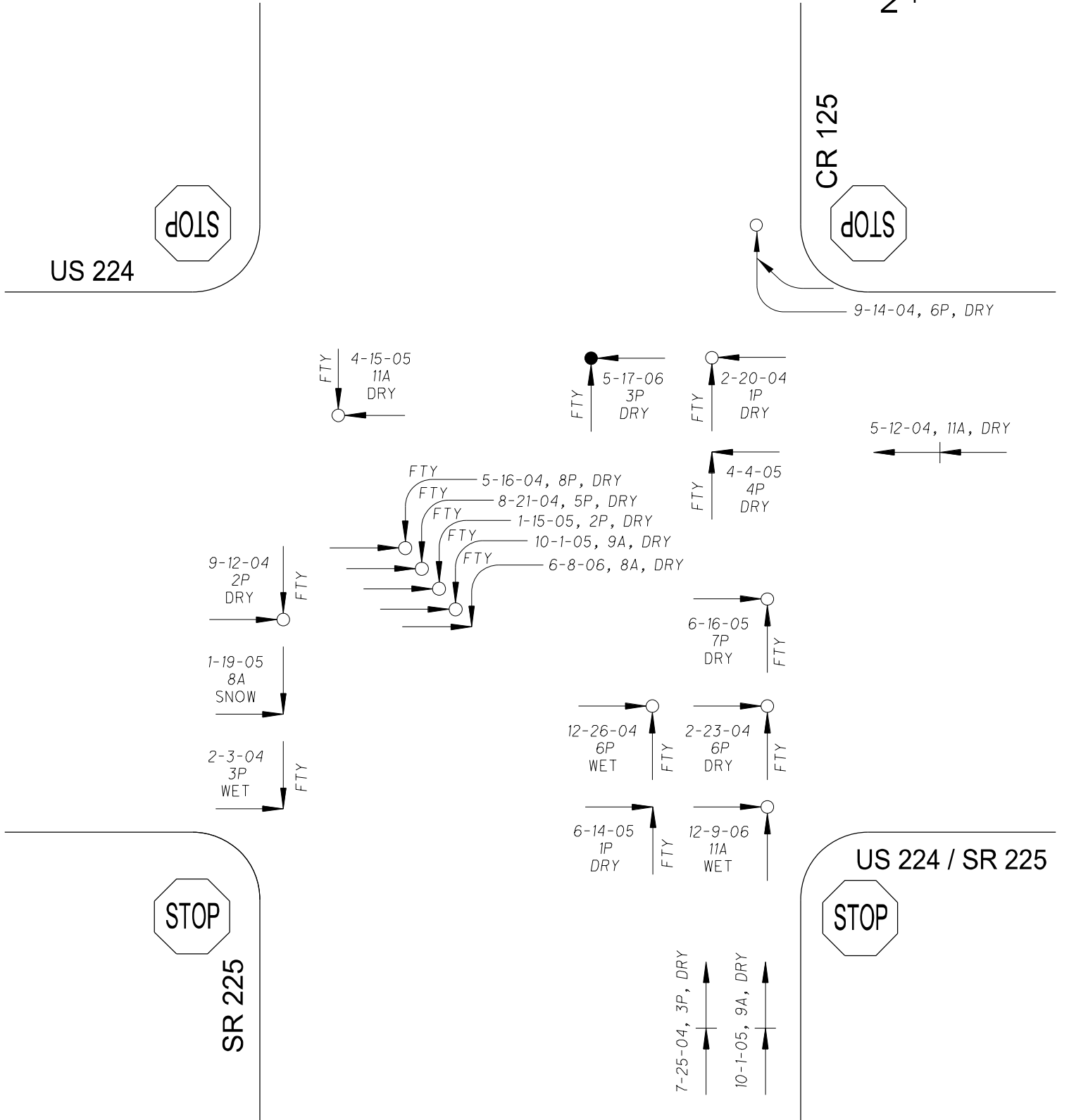
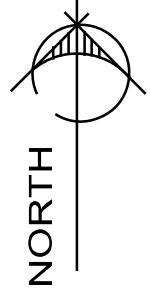
Crash Diagrams

COLLISION DIAGRAM

US 224 AT SR 225

SLM 16.10 / 2.53

2004-2006



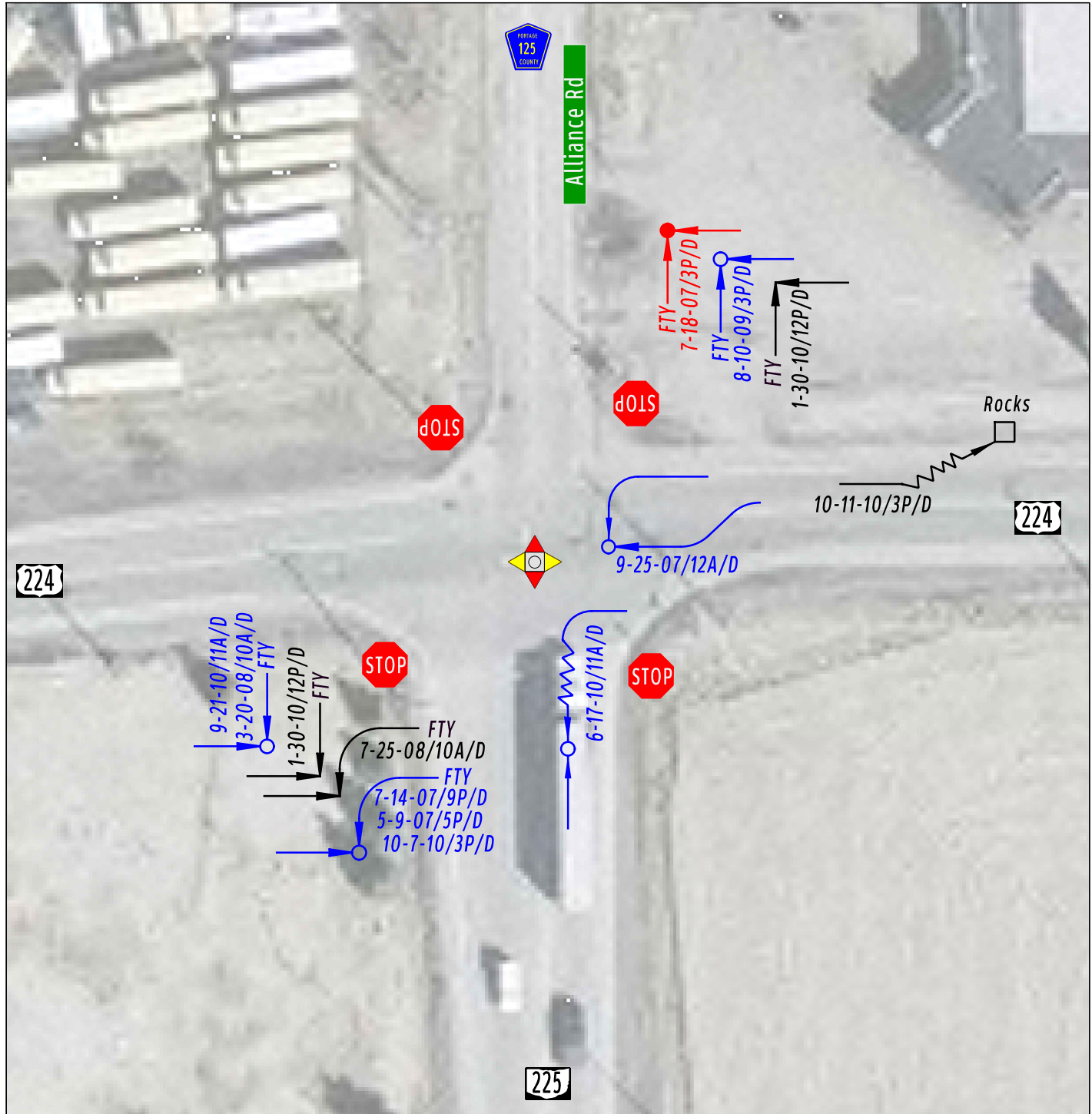


COLLISION DIAGRAM

POR US 224 at SR 225

SLM 16.09

2007-2010



Vehicle Direction Backing Pedestrian Out of Control Overturn	Injury Fatal Fixed Object Parked Vehicle TEXT Date/Time/Road/Egress Direction	Road: D = Dry W = Wet I = Ice S = Snow	FTC = Failure To Control FTS = Failure To Stop FTY = Failure To Yield LOC = Left of Center RRL = Ran Red Light OVI = Operating Vehicle Impaired	<table border="1"> <thead> <tr> <th colspan="2">TOTAL CRASHES ON PAGE</th> </tr> <tr> <th>FREQUENCY</th> <th>CRASH SEVERITY</th> </tr> </thead> <tbody> <tr> <td>4 2007</td> <td>4 NON - INJURY</td> </tr> <tr> <td>2 2008</td> <td>9 INJURY OR FATAL</td> </tr> <tr> <td>1 2009</td> <td>13 TOTAL</td> </tr> <tr> <td>6 2010</td> <td></td> </tr> </tbody> </table>	TOTAL CRASHES ON PAGE		FREQUENCY	CRASH SEVERITY	4 2007	4 NON - INJURY	2 2008	9 INJURY OR FATAL	1 2009	13 TOTAL	6 2010	
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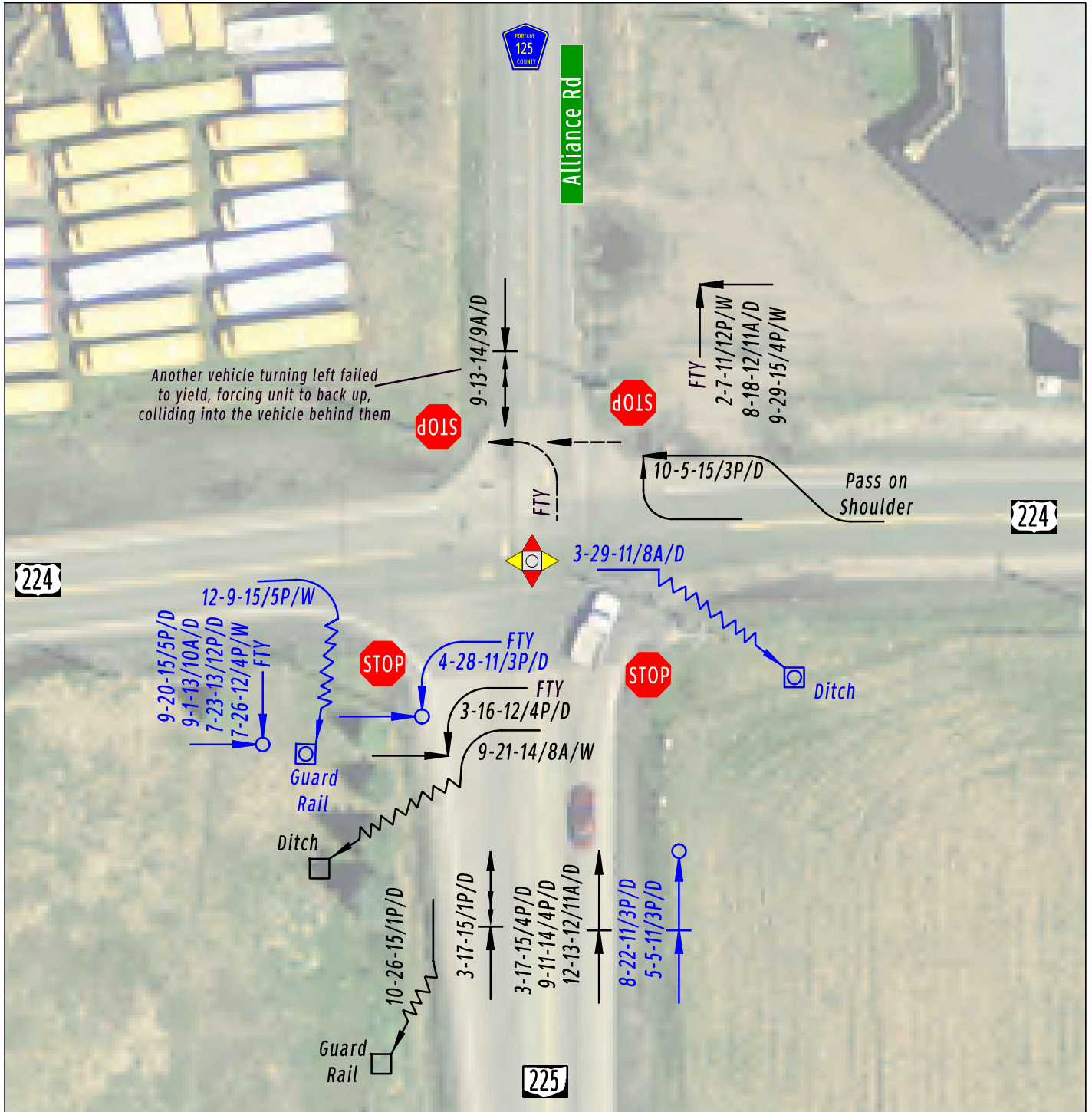
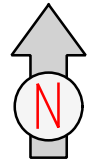


COLLISION DIAGRAM

POR US 224 at SR 225

SLM 16.09

2011-2015



<ul style="list-style-type: none"> → Vehicle Direction ←←← Backing ××× Pedestrian ~ Out of Control o Overturn 	<ul style="list-style-type: none"> o Injury ● Fatal □ Fixed Object ⊠ Parked Vehicle TEXT Date/Time/Road/Egress Direction 	<p>Road:</p> <p>D = Dry W = Wet I = Ice S = Snow</p>	<p>FTC = Failure To Control FTS = Failure To Stop FTY = Failure To Yield LOC = Left of Center RRL = Ran Red Light OVI = Operating Vehicle Impaired</p>	<p style="text-align: center;">TOTAL CRASHES ON PAGE</p> <table border="1" style="width: 100%;"> <thead> <tr> <th colspan="2">FREQUENCY</th> <th colspan="2">CRASH SEVERITY</th> </tr> </thead> <tbody> <tr> <td>5</td> <td>2011</td> <td>12</td> <td>NON - INJURY</td> </tr> <tr> <td>4</td> <td>2012</td> <td>9</td> <td>INJURY OR FATAL</td> </tr> <tr> <td>2</td> <td>2013</td> <td></td> <td></td> </tr> <tr> <td>3</td> <td>2014</td> <td>21</td> <td>TOTAL</td> </tr> <tr> <td>7</td> <td>2015</td> <td></td> <td></td> </tr> </tbody> </table>	FREQUENCY		CRASH SEVERITY		5	2011	12	NON - INJURY	4	2012	9	INJURY OR FATAL	2	2013			3	2014	21	TOTAL	7	2015		
FREQUENCY		CRASH SEVERITY																										
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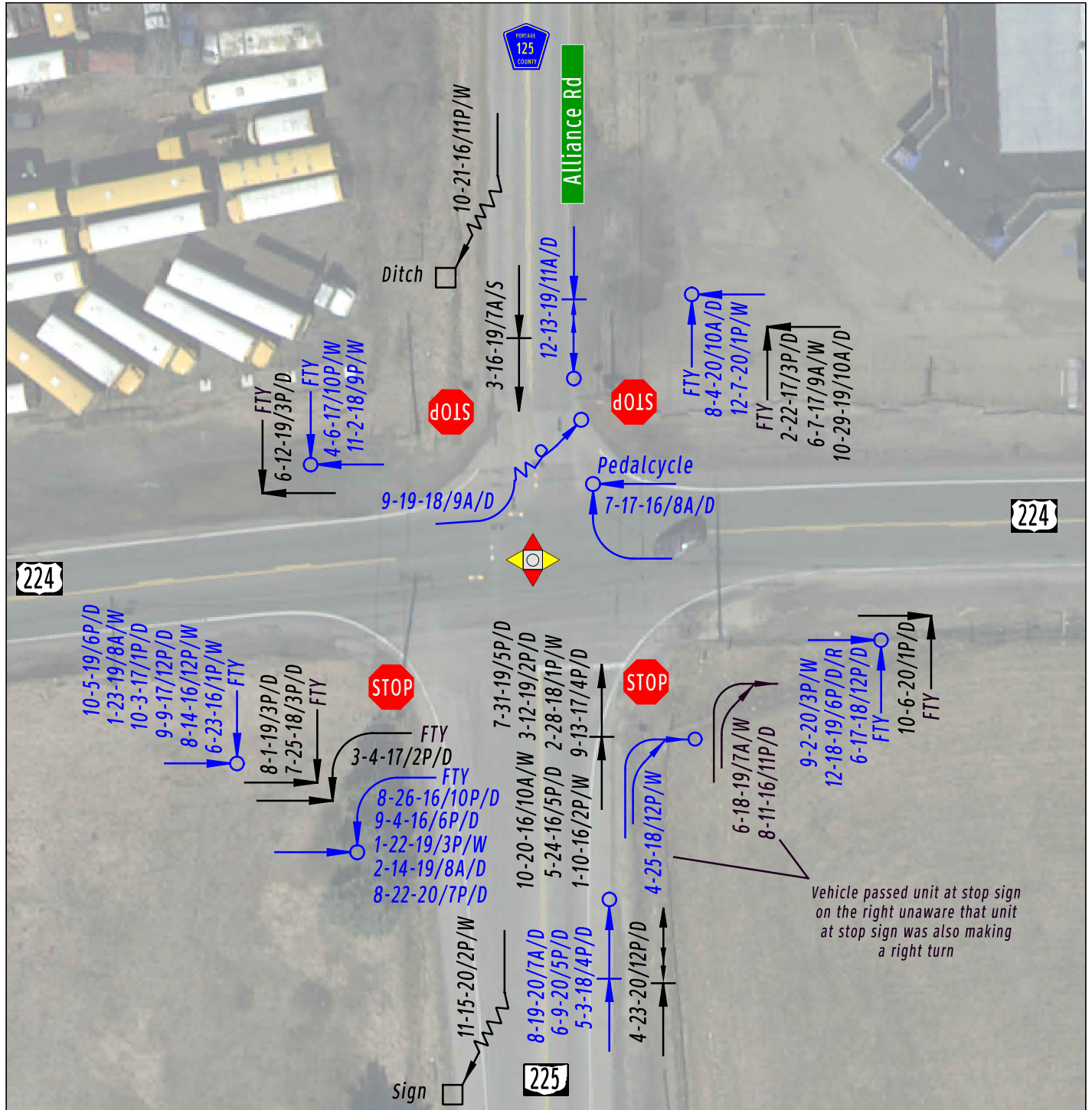
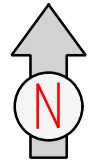


COLLISION DIAGRAM

POR US 224 at SR 225

SLM 16.09

2016-2020



<ul style="list-style-type: none"> Vehicle Direction Backing Pedestrian Out of Control Overturn 	<ul style="list-style-type: none"> Injury Fatal Fixed Object Parked Vehicle TEXT Date/Time/Road/Egress Direction 	<p><u>Road:</u></p> <p>D = Dry W = Wet I = Ice S = Snow</p>	<p>FTC = Failure To Control FTS = Failure To Stop FTY = Failure To Yield LOC = Left of Center RRL = Ran Red Light OVI = Operating Vehicle Impaired</p>	<table border="1"> <thead> <tr> <th colspan="2">TOTAL CRASHES ON PAGE</th> </tr> <tr> <th>FREQUENCY</th> <th>CRASH SEVERITY</th> </tr> </thead> <tbody> <tr> <td>10 2016</td> <td rowspan="2">21 NON - INJURY</td> </tr> <tr> <td>7 2017</td> </tr> <tr> <td>7 2018</td> <td rowspan="2">25 INJURY OR FATAL</td> </tr> <tr> <td>13 2019</td> </tr> <tr> <td>9 2020</td> <td>46 TOTAL</td> </tr> </tbody> </table>	TOTAL CRASHES ON PAGE		FREQUENCY	CRASH SEVERITY	10 2016	21 NON - INJURY	7 2017	7 2018	25 INJURY OR FATAL	13 2019	9 2020	46 TOTAL
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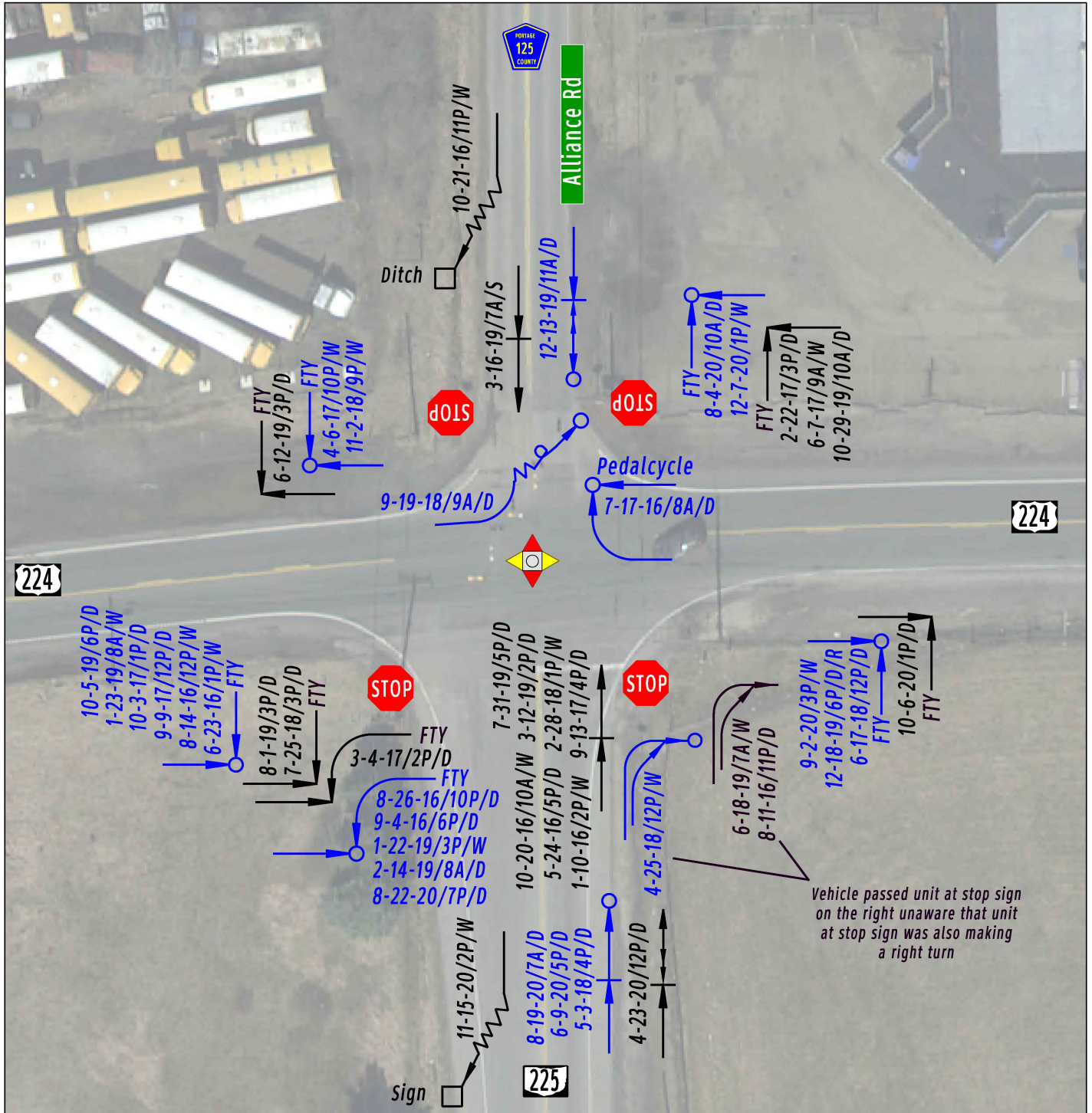
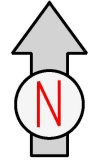


COLLISION DIAGRAM

POR US 224 at SR 225

SLM 16.09

2016-2020



<ul style="list-style-type: none"> → Vehicle Direction ↔ Backing ⚡ Pedestrian ⚡ Out of Control ⚡ Overturn 	<ul style="list-style-type: none"> ○ Injury ● Fatal □ Fixed Object ⊠ Parked Vehicle TEXT Date/Time/Road/Egress Direction 	<p><u>Road:</u></p> <p>D = Dry W = Wet I = Ice S = Snow</p>	<p>FTC = Failure To Control FTS = Failure To Stop FTY = Failure To Yield LOC = Left of Center RRL = Ran Red Light OVI = Operating Vehicle Impaired</p>	<table border="1"> <thead> <tr> <th colspan="2">TOTAL CRASHES ON PAGE</th> </tr> <tr> <th>FREQUENCY</th> <th>CRASH SEVERITY</th> </tr> </thead> <tbody> <tr> <td>10 2016</td> <td>21 NON - INJURY</td> </tr> <tr> <td>7 2017</td> <td>25 INJURY OR FATAL</td> </tr> <tr> <td>7 2018</td> <td>46 TOTAL</td> </tr> <tr> <td>13 2019</td> <td></td> </tr> <tr> <td>9 2020</td> <td></td> </tr> </tbody> </table>	TOTAL CRASHES ON PAGE		FREQUENCY	CRASH SEVERITY	10 2016	21 NON - INJURY	7 2017	25 INJURY OR FATAL	7 2018	46 TOTAL	13 2019		9 2020	
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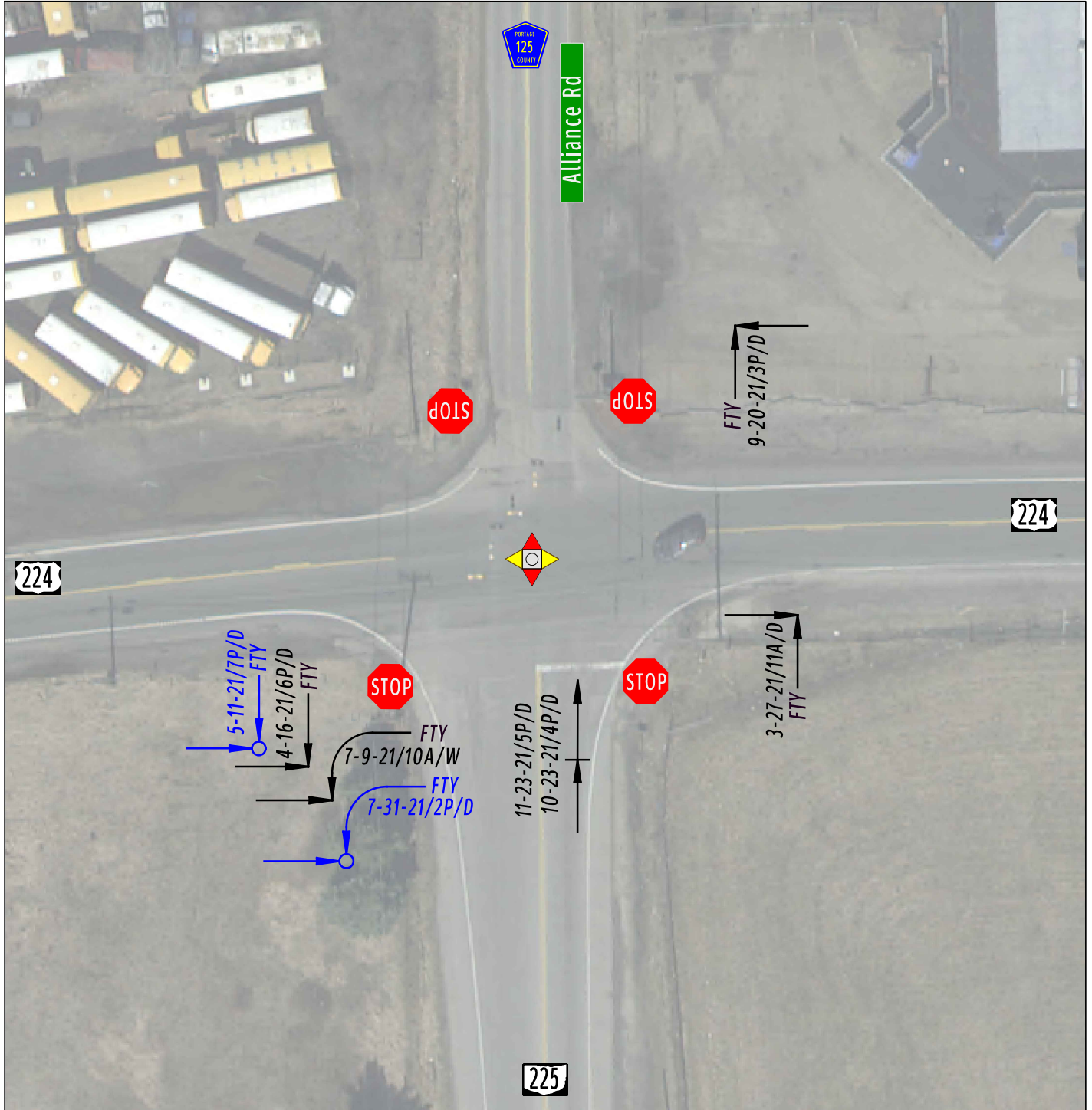
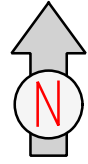


COLLISION DIAGRAM

POR US 224 at SR 225

SLM 16.09

2021 Available as of 4/1/2022 Query



<ul style="list-style-type: none"> → Vehicle Direction ← Backing ××× Pedestrian ~ Out of Control ⊖ Overturn 	<ul style="list-style-type: none"> ○ Injury ● Fatal □ Fixed Object ⊠ Parked Vehicle TEXT Date/Time/Road/Egress Direction 	<p><u>Road:</u></p> <ul style="list-style-type: none"> D = Dry W = Wet I = Ice S = Snow 	<ul style="list-style-type: none"> FTC = Failure To Control FTS = Failure To Stop FTY = Failure To Yield LOC = Left of Center RRL = Ran Red Light OVI = Operating Vehicle Impaired 	<p>TOTAL CRASHES ON PAGE</p> <table border="1"> <thead> <tr> <th colspan="2">FREQUENCY</th> <th colspan="2">CRASH SEVERITY</th> </tr> </thead> <tbody> <tr> <td>8</td> <td>2021</td> <td>6</td> <td>NON - INJURY</td> </tr> <tr> <td></td> <td></td> <td>2</td> <td>INJURY OR FATAL</td> </tr> <tr> <td></td> <td></td> <td>8</td> <td>TOTAL</td> </tr> </tbody> </table>	FREQUENCY		CRASH SEVERITY		8	2021	6	NON - INJURY			2	INJURY OR FATAL			8	TOTAL
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8	2021	6	NON - INJURY																	
		2	INJURY OR FATAL																	
		8	TOTAL																	

Appendix J

HSM Outputs and CMFs



Project Information

General Information

Project Name	VAR-STW Safety Studies	Contact Email	gbalsamo@cmtran.com
Project Description	POR US 224 and SR 225 Safety Study	Contact Phone	614-656-2429
Reference Number	117158	Date Performed	4/21/2023
Analyst	GMB	Analysis Year	2020
Agency/Company	Carpenter Marty Transportation		
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

Project Element ID (Must be Unique)	Site Type	Intersection Control Type	Location Information					
			NLFID	Begin Logpoint/ Intersection Midpoint	End Logpoint (Leave blank for Intersection)	Length (mi) OR Intersection Radius Buffer (mi)	Cross Route NLFID(s)	Common Name
US224; 16.094	Rural Two-Lane Two Way Intersection	Unsignalized	SPORUS00224**C	16.094		0.05	SPORSR0022	US-224 & SR-225 & CR-125

Traffic Volume Growth Rate Calculation For Benefit Cost Analysis			
	Year	AADT	
Present ADT (PADT)			veh / day
Future ADT (FADT)			veh / day
Annual Linear Growth Rate		0.0050	

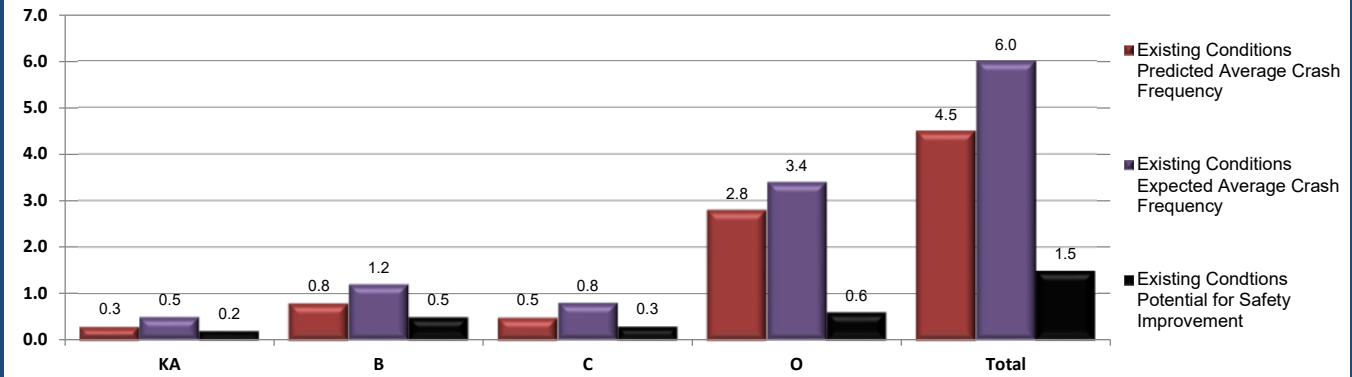


Project Safety Performance Report

General Information

Project Name	VAR-STW Safety Studies	Contact Email	gbalsamo@cmtran.com
Project Description	POR US 224 and SR 225 Safety Study	Contact Phone	614-656-2429
Reference Number	117158	Date Performed	4/21/2023
Analyst	GMB	Analysis Year	2020
Agency/Company	Carpenter Marty Transportation		

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	0.3255	0.7887	0.5250	2.8224	4.4616
N_{expected} - Existing Conditions	0.5137	1.2454	0.8293	3.3789	5.9673
N_{potential for improvement} - Existing Conditions	0.1882	0.4567	0.3043	0.5565	1.5057

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

Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
US224; 16.094	US-224 & SR-225 & CR-125	0.3255	0.7887	0.525	2.8224	4.4616

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

Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
US224; 16.094	US-224 & SR-225 & CR-125	0.5137	1.2454	0.8293	3.3789	5.9673

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
US224; 16.094	US-224 & SR-225 & CR-125	0.1882	0.4567	0.3043	0.5565	1.5057

Summary by Crash Type

Crash Type	Existing			Proposed
	Predicted Crash Frequency	Expected Crash Frequency	PSI	Expected Crash Frequency
Unknown	0.0175	0.0230	0.0055	
Head On	0.0384	0.0555	0.0171	
Rear End	0.9535	1.2546	0.3011	
Backing	0.1795	0.2183	0.0388	
Sideswipe - Meeting	0.1296	0.1752	0.0456	
Sideswipe - Passing	0.2017	0.2593	0.0576	
Angle	1.7025	2.3533	0.6508	
Parked Vehicle	0.1588	0.1965	0.0377	
Pedestrian	0.0218	0.0331	0.0113	
Animal	0.0000	0.0000	0.0000	
Train	0.0008	0.0011	0.0003	
Pedalcycles	0.0163	0.0243	0.0080	
Other Non-Vehicle	0.0003	0.0005	0.0002	
Fixed Object	0.7484	0.9777	0.2293	
Other Object	0.0260	0.0324	0.0064	
Overtuning	0.0451	0.0648	0.0197	
Other Non-Collision	0.0592	0.0745	0.0153	
Left Turn	0.1622	0.2232	0.0610	
Right Turn	0.0000	0.0000	0.0000	

Existing Conditions: General Information and Data for Rural Two-Lane Two-Way Intersection

General Information		Location Information				
Analyst	GMB	Route	US224			
Agency or Company	Carpenter Marty Transportation	Logpoint	16.094			
Date Performed	04/21/23	Common Name	US-224 & SR-225 & CR-125			
Intersection	US224; 16.094	Analysis Year	2020			
Signalized/Unsignalized	Unsignalized					
Input Data		Existing Conditions		HSM Base Conditions		
Intersection type (3ST, 4ST, 4SG)		4ST		--		
AADT _{major} (veh/day)	AADT _{MAX} = 14,700 (veh/day)	4,660		--		
AADT _{minor} (veh/day)	AADT _{MAX} = 3,500 (veh/day)	3,500		--		
Intersection skew angle (degrees)	Does skew differ for minor legs? Else, No.	Skew for Leg 1 (All):	0	Skew for Leg 2 (4ST only):	0	0
Skew Angle Help						
Number of uncontrolled approaches with a left-turn lane (0, 1, 2, 3, 4)		0		0		
Number of uncontrolled approaches with a right-turn lane (0, 1, 2, 3, 4)		0		0		
Intersection lighting (present/not present)		Present		Not Present		
Calibration Factor, C _i		1.01		1.00		
Locality:		State System				



Project Information

General Information

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Project Description	POR US 224 and SR 225 Safety Study	Contact Phone	614-656-2429
Reference Number	117158	Date Performed	4/21/2023
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Agency/Company	Carpenter Marty Transportation		
Perform Benefit Cost Analysis?	Yes		

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US224; 16.094	Roundabout	Unsignalized	SPORUS00224**C	16.094		0.05	SPORSR0022	US-224 & SR-225 & CR-125

Traffic Volume Growth Rate Calculation For Benefit Cost Analysis			
	Year	AADT	
Present ADT (PADT)			veh / day
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Annual Linear Growth Rate		0.0050	

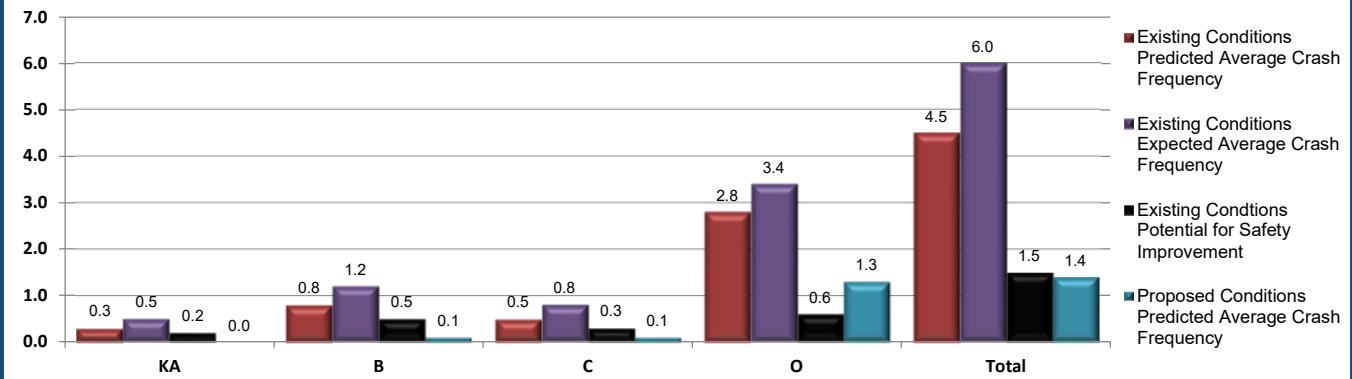


Project Safety Performance Report

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Project Description	POR US 224 and SR 225 Safety Study	Contact Phone	614-656-2429
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N_{expected} - Existing Conditions	0.5137	1.2454	0.8293	3.3789	5.9673
N_{potential for improvement} - Existing Conditions	0.1882	0.4567	0.3043	0.5565	1.5057
N_{expected} - Proposed Conditions	0.0060	0.0504	0.0622	1.3143	1.4329

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

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
US224: 16.094	US-224 & SR-225 & CR-125	0.3255	0.7887	0.525	2.8224	4.4616

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

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
US224: 16.094	US-224 & SR-225 & CR-125	0.5137	1.2454	0.8293	3.3789	5.9673

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	
US224: 16.094	US-224 & SR-225 & CR-125	0.1882	0.4567	0.3043	0.5565	1.5057

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

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
US224: 16.094	US-224 & SR-225 & CR-125	0.006	0.0504	0.0622	1.3143	1.4329



Project Safety Performance Report

General Information

Project Name	VAR-STW Safety Studies	Contact Email	gbalsamo@cmtran.com
Project Description	POR US 224 and SR 225 Safety Study	Contact Phone	614-656-2429
Reference Number	117158	Date Performed	4/21/2023
Analyst	GMB	Analysis Year	2020
Agency/Company	Carpenter Marty Transportation		

Summary by Crash Type

Crash Type	Existing			Proposed
	Predicted Crash Frequency	Expected Crash Frequency	PSI	Predicted Crash Frequency
Unknown	0.0175	0.0230	0.0055	0.0376
Head On	0.0384	0.0555	0.0171	0.0011
Rear End	0.9535	1.2546	0.3011	0.2008
Backing	0.1795	0.2183	0.0388	0.0122
Sideswipe - Meeting	0.1296	0.1752	0.0456	0.0000
Sideswipe - Passing	0.2017	0.2593	0.0576	0.4135
Angle	1.7025	2.3533	0.6508	0.3715
Parked Vehicle	0.1588	0.1965	0.0377	0.0000
Pedestrian	0.0218	0.0331	0.0113	0.0011
Animal	0.0000	0.0000	0.0000	0.0133
Train	0.0008	0.0011	0.0003	0.0000
Pedalcycles	0.0163	0.0243	0.0080	0.0011
Other Non-Vehicle	0.0003	0.0005	0.0002	0.0000
Fixed Object	0.7484	0.9777	0.2293	0.1331
Other Object	0.0260	0.0324	0.0064	0.0000
Overtuning	0.0451	0.0648	0.0197	0.0011
Other Non-Collision	0.0592	0.0745	0.0153	0.0255
Left Turn	0.1622	0.2232	0.0610	0.0288
Right Turn	0.0000	0.0000	0.0000	0.0897

Proposed Conditions: General Information and Data for Roundabout Intersection

General Information		Location Information		
Analyst	GMB	Route	US224	
Agency or Company	Carpenter Marty Transportation	Logpoint	16.094	
Date Performed	04/21/23	Common Name	US-224 & SR-225 & CR-125	
Intersection	US224; 16.094	Analysis Year	2020	
Signalized/Unsignalized	Unsignalized			
Input Data		Proposed Conditions	HSM Base Conditions	
Area Type (Rural, Urban)		Rural	--	
Number of Legs (3 or 4)		4	--	
Single-Lane or Multi-lane Roundabout		Single-Lane	--	
Total Entering AADT (veh/day)		8,530	--	
Presence of Outbound Only Leg (present/not present)		Not Present	Not Present	
Calibration Factor, C _i		Varies, See Below	1.00	
Locality:		State System	--	
Leg 1	Leg 1 Entering AADT (veh/day)	AADT _{MAX} = 19,733 (veh/day)	3,330	--
	Bypass lane (present/not present) - Leg 1		Not Present	--
	Number of driveways or unsignalized access points - Leg 1		0	--
	Entry width (feet) - Leg 1		24	16-25 ft
	Number of entering lanes (1 lane, 2 lanes) - Leg 1		1	--
Leg 2	Leg 2 Entering AADT (veh/day)	AADT _{MAX} = 19,733 (veh/day)	1,100	--
	Bypass lane (present/not present) - Leg 2		Not Present	--
	Number of driveways or unsignalized access points - Leg 2		1	--
	Entry width (feet) - Leg 2		25	16-25 ft
	Number of entering lanes (1 lane, 2 lanes) - Leg 2		1	--
Leg 3	Leg 3 Entering AADT (veh/day)	AADT _{MAX} = 19,733 (veh/day)	540	--
	Bypass lane (present/not present) - Leg 3		Not Present	--
	Number of driveways or unsignalized access points - Leg 3		0	--
	Entry width (feet) - Leg 3		25	16-25 ft
	Number of entering lanes (1 lane, 2 lanes) - Leg 3		1	--
Leg 4	Leg 4 Entering AADT (veh/day)	AADT _{MAX} = 19,733 (veh/day)	3,560	--
	Bypass lane (present/not present) - Leg 4		Not Present	--
	Number of driveways or unsignalized access points - Leg 4		2	--
	Entry width (feet) - Leg 4		25	16-25 ft
	Number of entering lanes (1 lane, 2 lanes) - Leg 4		1	--



Project Information

General Information

Project Name	VAR-STW Safety Studies	Contact Email	gbalsamo@cmtran.com
Project Description	POR US 224 and SR 225 Safety Study	Contact Phone	614-656-2429
Reference Number	117158	Date Performed	4/21/2023
Analyst	GMB	Analysis Year	2020
Agency/Company	Carpenter Marty Transportation		
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

Project Element ID (Must be Unique)	Site Type	Intersection Control Type	Location Information					
			NLFID	Begin Logpoint/ Intersection Midpoint	End Logpoint (Leave blank for Intersection)	Length (mi) OR Intersection Radius Buffer (mi)	Cross Route NLFID(s)	Common Name
US224; 16.094	Rural Two-Lane Two Way Intersection	Signalized	SPORUS00224**C	16.094		0.05	SPORSR0022	US-224 & SR-225 & CR-125

Traffic Volume Growth Rate Calculation For Benefit Cost Analysis			
	Year	AADT	
Present ADT (PADT)			veh / day
Future ADT (FADT)			veh / day
Annual Linear Growth Rate		0.0050	

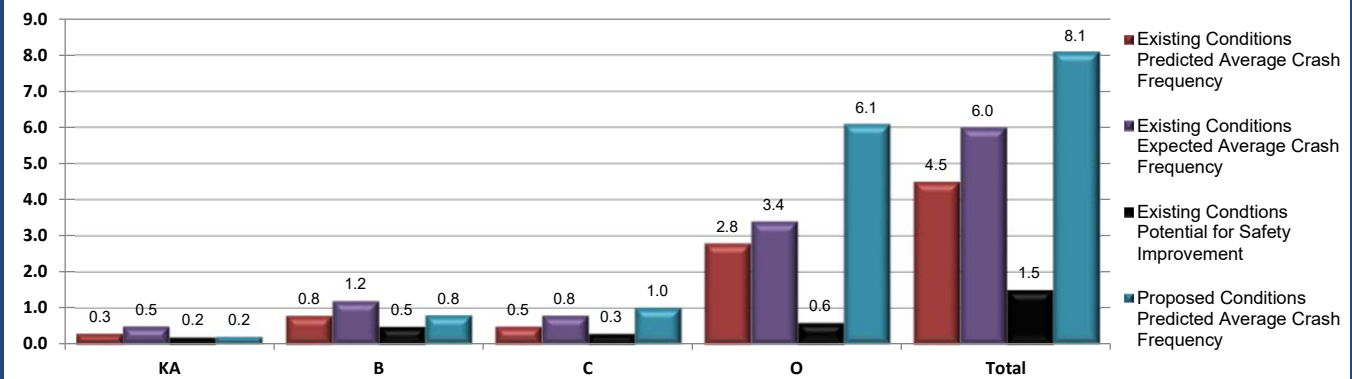


Project Safety Performance Report

General Information

Project Name	VAR-STW Safety Studies	Contact Email	gbalsamo@cmtran.com
Project Description	POR US 224 and SR 225 Safety Study	Contact Phone	614-656-2429
Reference Number	117158	Date Performed	4/21/2023
Analyst	GMB	Analysis Year	2020
Agency/Company	Carpenter Marty Transportation		

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	0.3255	0.7887	0.5250	2.8224	4.4616
N_{expected} - Existing Conditions	0.5137	1.2454	0.8293	3.3789	5.9673
N_{potential for improvement} - Existing Conditions	0.1882	0.4567	0.3043	0.5565	1.5057
N_{expected} - Proposed Conditions	0.1889	0.8031	1.0157	6.0682	8.0759

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

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
US224: 16.094	US-224 & SR-225 & CR-125	0.3255	0.7887	0.525	2.8224	4.4616

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

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
US224: 16.094	US-224 & SR-225 & CR-125	0.5137	1.2454	0.8293	3.3789	5.9673

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	
US224: 16.094	US-224 & SR-225 & CR-125	0.1882	0.4567	0.3043	0.5565	1.5057

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

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
US224: 16.094	US-224 & SR-225 & CR-125	0.1889	0.8031	1.0157	6.0682	8.0759



Project Safety Performance Report

General Information

Project Name	VAR-STW Safety Studies	Contact Email	gbalsamo@cmtran.com
Project Description	POR US 224 and SR 225 Safety Study	Contact Phone	614-656-2429
Reference Number	117158	Date Performed	4/21/2023
Analyst	GMB	Analysis Year	2020
Agency/Company	Carpenter Marty Transportation		

Summary by Crash Type

Crash Type	Existing			Proposed
	Predicted Crash Frequency	Expected Crash Frequency	PSI	Predicted Crash Frequency
Unknown	0.0175	0.0230	0.0055	0.0094
Head On	0.0384	0.0555	0.0171	0.0589
Rear End	0.9535	1.2546	0.3011	3.5575
Backing	0.1795	0.2183	0.0388	0.3846
Sideswipe - Meeting	0.1296	0.1752	0.0456	0.1634
Sideswipe - Passing	0.2017	0.2593	0.0576	0.5564
Angle	1.7025	2.3533	0.6508	1.6338
Parked Vehicle	0.1588	0.1965	0.0377	0.3012
Pedestrian	0.0218	0.0331	0.0113	0.0750
Animal	0.0000	0.0000	0.0000	0.0000
Train	0.0008	0.0011	0.0003	0.0000
Pedalcycles	0.0163	0.0243	0.0080	0.0497
Other Non-Vehicle	0.0003	0.0005	0.0002	0.0000
Fixed Object	0.7484	0.9777	0.2293	0.5137
Other Object	0.0260	0.0324	0.0064	0.0164
Overtuning	0.0451	0.0648	0.0197	0.0322
Other Non-Collision	0.0592	0.0745	0.0153	0.0460
Left Turn	0.1622	0.2232	0.0610	0.6777
Right Turn	0.0000	0.0000	0.0000	0.0000

Proposed Conditions: General Information and Data for Rural Two-Lane Two-Way Intersection

General Information		Location Information				
Analyst	GMB	Route	US224			
Agency or Company	Carpenter Marty Transportation	Logpoint	16.094			
Date Performed	04/21/23	Common Name	US-224 & SR-225 & CR-125			
Intersection	US224; 16.094	Analysis Year	2020			
Signalized/Unsignalized	Signalized					
Input Data		Proposed Conditions		HSM Base Conditions		
Intersection type (3ST, 4ST, 4SG)		4SG		--		
AADT _{major} (veh/day)	AADT _{MAX} = 25,200 (veh/day)	4,660		--		
AADT _{minor} (veh/day)	AADT _{MAX} = 12,500 (veh/day)	3,500		--		
Intersection skew angle (degrees)	Does skew differ for minor legs? Else, No.	Skew for Leg 1 (All):	0	Skew for Leg 2 (4ST only):	0	0
Skew Angle Help						
Number of signalized approaches with a left-turn lane (0, 1, 2, 3, 4)		0		0		
Number of signalized approaches with a right-turn lane (0, 1, 2, 3, 4)		0		0		
Intersection lighting (present/not present)		Present		Not Present		
Calibration Factor, C _i		1.68		1.00		
Locality:		State System				

Proposed Conditions: Crash Modification Factors (CMFs) for Rural Two-Lane Two-Way Intersection

(1)	(2)	(3)	(4)	(5)
CMF for Intersection Skew Angle CMF ₁₁ from Equations 10-22 or 10-23	CMF for Left-Turn Lanes CMF ₂₁ from Table 10-13	CMF for Right-Turn Lanes CMF ₃₁ from Table 10-14	CMF for Lighting CMF ₄₁ from Equation 10-24	Combined CMF CMF _{COMB} (1)*(2)*(3)*(4)
1.0000	1.0000	1.0000	0.9999	0.9999

Proposed Conditions: Predicted Crash Summary for Rural Two-Lane Two-Way Intersection

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	N _{spf 3ST, 4ST or 4SG}	Overdispersion Parameter, k	Crash Severity Distribution	N _{spf 3ST, 4ST or 4SG} by Severity Distribution	Combined CMFs	Calibration Factor, C _i	Predicted average crash frequency, N _{predicted int}
	from Equations 10-8, 10-9, or 10-10	from Section 10.6.2	from Table 10-5	(2) _{TOTAL} * (4)	from (5) of Worksheet 2B		(5)*(6)*(7)
Total	4,807	0.11	1,000	4,807	1.00	1.68	8,076
Fatal and Injury (FI)	--	--	0.249	1,195	1.00	1.68	2,008
Property Damage Only (PDO)	--	--	0.751	3,612	1.00	1.68	6,068

Appendix K

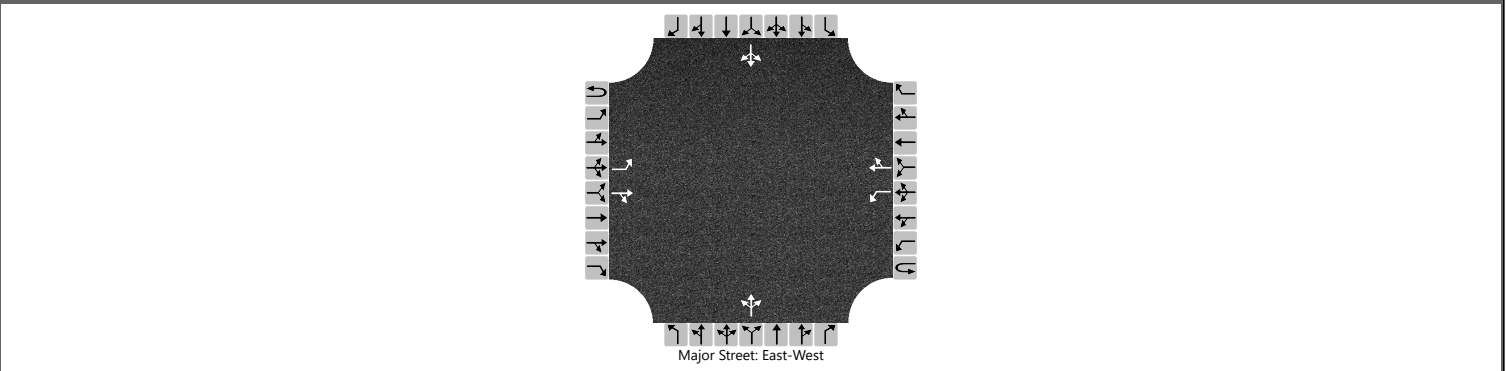
Countermeasures

Capacity Analysis

HCS Two-Way Stop-Control Report

General Information				Site Information			
Analyst	CMC			Intersection	US-224 & SR-225 & CR-125		
Agency/Co.	CMTran			Jurisdiction	ODOT D4		
Date Performed				East/West Street	US-224/SR-225		
Analysis Year	2022			North/South Street	SR-225/CR-125		
Time Analyzed	AM - EB & WB LT Lanes			Peak Hour Factor	0.95		
Intersection Orientation	East-West			Analysis Time Period (hrs)	0.25		
Project Description	POR US 224 and SR 225 Safety Study						

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Movement	1U	1	2	3	4U	4	5	6	7	8	9		10	11	12	
Priority																
Number of Lanes	0	1	1	0	0	1	1	0	0	1	0		0	1	0	
Configuration		L		TR		L		TR		LTR				LTR		
Volume (veh/h)		2	49	4		278	90	4		14	61	227		1	35	14
Percent Heavy Vehicles (%)		7				15				19	19	19		7	7	7
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized																
Median Type Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.17				4.25				7.29	6.69	6.39		7.17	6.57	6.27
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.26				2.34				3.67	4.17	3.47		3.56	4.06	3.36

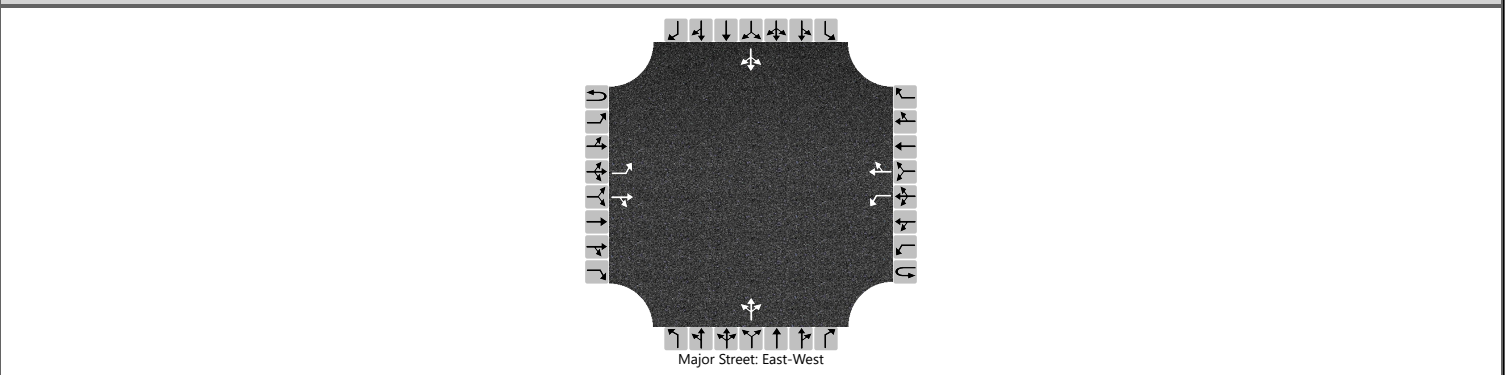
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		2				293				318				53		
Capacity, c (veh/h)		1463				1470				563				328		
v/c Ratio		0.00				0.20				0.57				0.16		
95% Queue Length, Q ₉₅ (veh)		0.0				0.7				3.5				0.6		
Control Delay (s/veh)		7.5				8.1				19.4				18.1		
Level of Service (LOS)		A				A				C				C		
Approach Delay (s/veh)	0.3				6.0				19.4				18.1			
Approach LOS	A				A				C				C			

HCS Two-Way Stop-Control Report

General Information				Site Information			
Analyst	CMC	Intersection	US-224 & SR-225 & CR-125				
Agency/Co.	CMTran	Jurisdiction	ODOT D4				
Date Performed		East/West Street	US-224/SR-225				
Analysis Year	2022	North/South Street	SR-225/CR-125				
Time Analyzed	AM - EB & WB LT Lanes	Peak Hour Factor	0.95				
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25				
Project Description	POR US 224 and SR 225 Safety Study						

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound				
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R	
Movement	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12	
Priority																	
Number of Lanes	0	1	1	0	0	1	1	0		0	1	0		0	1	0	
Configuration		L		TR		L		TR			LTR				LTR		
Volume (veh/h)		2	49	4		278	90	4		14	61	227		1	35	14	
Percent Heavy Vehicles (%)		7				15				19	19	19		7	7	7	
Proportion Time Blocked																	
Percent Grade (%)										0				0			
Right Turn Channelized																	
Median Type Storage	Undivided																

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.17				4.25				7.29	6.69	6.39		7.17	6.57	6.27
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.26				2.34				3.67	4.17	3.47		3.56	4.06	3.36

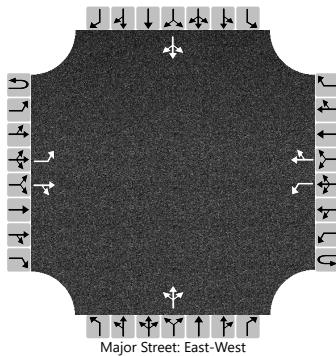
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		2				293					318					53	
Capacity, c (veh/h)		1463				1470					563					328	
v/c Ratio		0.00				0.20					0.57					0.16	
95% Queue Length, Q ₉₅ (veh)		0.0				0.7					3.5					0.6	
Control Delay (s/veh)		7.5				8.1					19.4					18.1	
Level of Service (LOS)		A				A					C					C	
Approach Delay (s/veh)		0.3				6.0				19.4				18.1			
Approach LOS		A				A				C				C			

HCS Two-Way Stop-Control Report

General Information				Site Information			
Analyst	CMC	Intersection	US-224 & SR-225 & CR-125				
Agency/Co.	CMTran	Jurisdiction	ODOT D4				
Date Performed		East/West Street	US-224/SR-225				
Analysis Year	2047	North/South Street	SR-225/CR-125				
Time Analyzed	AM - EB & WB LT Lanes	Peak Hour Factor	0.95				
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25				
Project Description	POR US 224 and SR 225 Safety Study						

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Movement	1U	1	2	3	4U	4	5	6	7	8	9		10	11	12	
Priority																
Number of Lanes	0	1	1	0	0	1	1	0	0	1	0		0	1	0	
Configuration		L		TR		L		TR		LTR				LTR		
Volume (veh/h)		10	60	10		310	100	10		20	70	260		10	40	20
Percent Heavy Vehicles (%)		7				15				19	19	19		7	7	7
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized																
Median Type Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.17				4.25				7.29	6.69	6.39		7.17	6.57	6.27
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.26				2.34				3.67	4.17	3.47		3.56	4.06	3.36

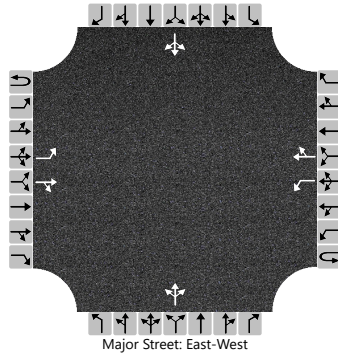
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		11				326					368				74		
Capacity, c (veh/h)		1442				1447					480				215		
v/c Ratio		0.01				0.23					0.77				0.34		
95% Queue Length, Q ₉₅ (veh)		0.0				0.9					6.7				1.4		
Control Delay (s/veh)		7.5				8.2					33.2				30.2		
Level of Service (LOS)		A				A					D				D		
Approach Delay (s/veh)		0.9				6.1				33.2				30.2			
Approach LOS		A				A				D				D			

HCS Two-Way Stop-Control Report

General Information				Site Information			
Analyst	CMC	Intersection	US-224 & SR-225 & CR-125				
Agency/Co.	CMTran	Jurisdiction	ODOT D4				
Date Performed		East/West Street	US-224/SR-225				
Analysis Year	2047	North/South Street	SR-225/CR-125				
Time Analyzed	PM - EB & WB LT Lanes	Peak Hour Factor	0.93				
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25				
Project Description	POR US 224 and SR 225 Safety Study						

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Movement	1U	1	2	3	4U	4	5	6	7	8	9		10	11	12	
Priority																
Number of Lanes	0	1	1	0	0	1	1	0	0	1	0		0	1	0	
Configuration		L		TR		L		TR		LTR				LTR		
Volume (veh/h)		20	170	20		340	90	10		20	60	350		10	90	10
Percent Heavy Vehicles (%)		3				9				10	10	10		4	4	4
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized																
Median Type Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.13				4.19				7.20	6.60	6.30		7.14	6.54	6.24
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.23				2.28				3.59	4.09	3.39		3.54	4.04	3.34

Delay, Queue Length, and Level of Service

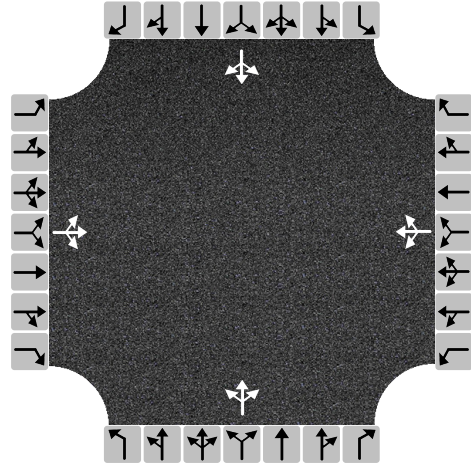
Flow Rate, v (veh/h)		22				366				462				118		
Capacity, c (veh/h)		1477				1327				367				125		
v/c Ratio		0.01				0.28				1.26				0.94		
95% Queue Length, Q ₉₅ (veh)		0.0				1.1				20.4				6.2		
Control Delay (s/veh)		7.5				8.7				168.5				131.9		
Level of Service (LOS)		A				A				F				F		
Approach Delay (s/veh)	0.7				6.8				168.5				131.9			
Approach LOS	A				A				F				F			

HCS All-Way Stop Control Report

General and Site Information

Analyst	CMC
Agency/Co.	CMTran
Date Performed	
Analysis Year	2022
Analysis Time Period (hrs)	0.25
Time Analyzed	AM
Project Description	POR US 224 and SR 225 Safety Study
Intersection	US-224 & SR-225 & CR-125
Jurisdiction	ODOT D4
East/West Street	US-224/SR-225
North/South Street	SR-225/CR-125
Peak Hour Factor	0.95

Lanes



Turning Movement Demand Volumes

Approach	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Movement												
Volume (veh/h)	2	49	4	278	90	4	14	61	227	1	35	14
% Thrus in Shared Lane												

Lane Flow Rate and Adjustments

Approach	Eastbound			Westbound			Northbound			Southbound		
	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Lane												
Configuration	LTR			LTR			LTR			LTR		
Flow Rate, v (veh/h)	58			392			318			53		
Percent Heavy Vehicles	7			15			19			7		
Initial Departure Headway, h _d (s)	3.20			3.20			3.20			3.20		
Initial Degree of Utilization, x	0.051			0.348			0.283			0.047		
Final Departure Headway, h _d (s)	5.61			5.40			5.13			5.63		
Final Degree of Utilization, x	0.090			0.587			0.453			0.082		
Move-Up Time, m (s)	2.0			2.0			2.0			2.0		
Service Time, t _s (s)	3.61			3.40			3.13			3.63		

Capacity, Delay and Level of Service

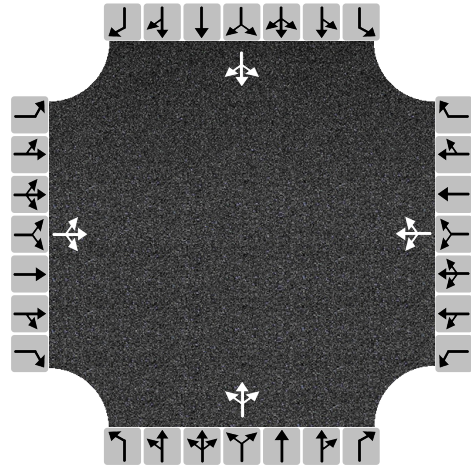
Approach	Eastbound			Westbound			Northbound			Southbound		
	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Lane												
Configuration	LTR			LTR			LTR			LTR		
Flow Rate, v (veh/h)	58			392			318			53		
Capacity (veh/h)	641			667			701			639		
95% Queue Length, Q ₉₅ (veh)	0.3			3.8			2.4			0.3		
Control Delay (s/veh)	9.2			15.8			12.3			9.1		
Level of Service, LOS	A			C			B			A		
Approach Delay (s/veh) LOS	9.2		A	15.8		C	12.3		B	9.1		A
Intersection Delay (s/veh) LOS	13.5						B					

HCS All-Way Stop Control Report

General and Site Information

Analyst	CMC
Agency/Co.	CMTran
Date Performed	
Analysis Year	2022
Analysis Time Period (hrs)	0.25
Time Analyzed	PM
Project Description	POR US 224 and SR 225 Safety Study
Intersection	US-224 & SR-225 & CR-125
Jurisdiction	ODOT D4
East/West Street	US-224/SR-225
North/South Street	SR-225/CR-125
Peak Hour Factor	0.93

Lanes



Turning Movement Demand Volumes

Approach	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Movement												
Volume (veh/h)	15	148	19	298	76	8	18	51	313	5	77	4
% Thrus in Shared Lane												

Lane Flow Rate and Adjustments

Approach	Eastbound			Westbound			Northbound			Southbound		
	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Lane												
Configuration	LTR			LTR			LTR			LTR		
Flow Rate, v (veh/h)	196			411			411			92		
Percent Heavy Vehicles	3			9			10			4		
Initial Departure Headway, h _d (s)	3.20			3.20			3.20			3.20		
Initial Degree of Utilization, x	0.174			0.365			0.365			0.082		
Final Departure Headway, h _d (s)	6.30			6.14			5.69			6.77		
Final Degree of Utilization, x	0.342			0.701			0.649			0.174		
Move-Up Time, m (s)	2.0			2.0			2.0			2.0		
Service Time, t _s (s)	4.30			4.14			3.69			4.77		

Capacity, Delay and Level of Service

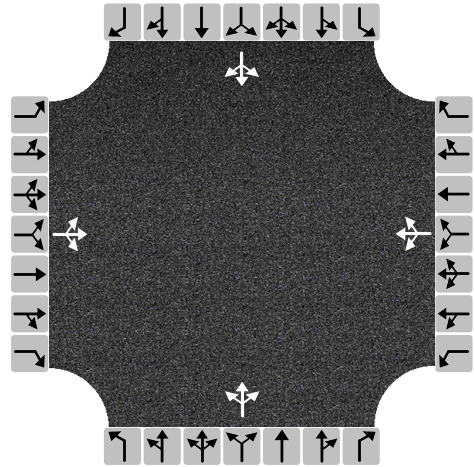
Approach	Eastbound			Westbound			Northbound			Southbound		
	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Lane												
Configuration	LTR			LTR			LTR			LTR		
Flow Rate, v (veh/h)	196			411			411			92		
Capacity (veh/h)	572			586			633			532		
95% Queue Length, Q ₉₅ (veh)	1.5			5.6			4.7			0.6		
Control Delay (s/veh)	12.5			22.3			18.6			11.2		
Level of Service, LOS	B			C			C			B		
Approach Delay (s/veh) LOS	12.5		B	22.3		C	18.6		C	11.2		B
Intersection Delay (s/veh) LOS	18.3						C					

HCS All-Way Stop Control Report

General and Site Information

Analyst	CMC
Agency/Co.	CMTran
Date Performed	
Analysis Year	2047
Analysis Time Period (hrs)	0.25
Time Analyzed	AM
Project Description	POR US 224 and SR 225 Safety Study
Intersection	US-224 & SR-225 & CR-125
Jurisdiction	ODOT D4
East/West Street	US-224/SR-225
North/South Street	SR-225/CR-125
Peak Hour Factor	0.95

Lanes



Turning Movement Demand Volumes

Approach	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Movement												
Volume (veh/h)	10	60	10	310	100	10	20	70	260	10	40	20
% Thrus in Shared Lane												

Lane Flow Rate and Adjustments

Approach	Eastbound			Westbound			Northbound			Southbound		
	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Lane												
Configuration	LTR			LTR			LTR			LTR		
Flow Rate, v (veh/h)	84			442			368			74		
Percent Heavy Vehicles	7			15			19			7		
Initial Departure Headway, h _d (s)	3.20			3.20			3.20			3.20		
Initial Degree of Utilization, x	0.075			0.393			0.327			0.065		
Final Departure Headway, h _d (s)	6.09			5.74			5.51			6.17		
Final Degree of Utilization, x	0.142			0.705			0.564			0.126		
Move-Up Time, m (s)	2.0			2.0			2.0			2.0		
Service Time, t _s (s)	4.09			3.74			3.51			4.17		

Capacity, Delay and Level of Service

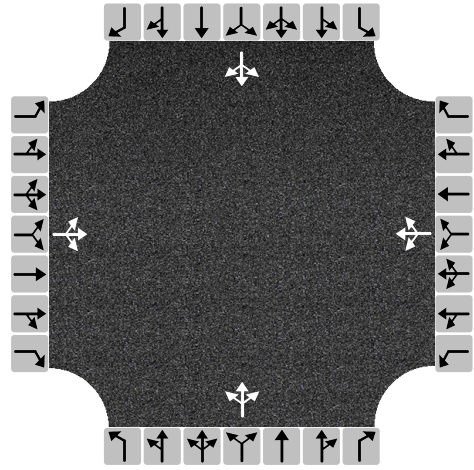
Approach	Eastbound			Westbound			Northbound			Southbound		
	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Lane												
Configuration	LTR			LTR			LTR			LTR		
Flow Rate, v (veh/h)	84			442			368			74		
Capacity (veh/h)	591			627			653			584		
95% Queue Length, Q ₉₅ (veh)	0.5			5.7			3.5			0.4		
Control Delay (s/veh)	10.1			21.3			15.4			10.1		
Level of Service, LOS	B			C			C			B		
Approach Delay (s/veh) LOS	10.1		B	21.3		C	15.4		C	10.1		B
Intersection Delay (s/veh) LOS	17.2						C					

HCS All-Way Stop Control Report

General and Site Information

Analyst	CMC
Agency/Co.	CMTran
Date Performed	
Analysis Year	2047
Analysis Time Period (hrs)	0.25
Time Analyzed	PM
Project Description	POR US 224 and SR 225 Safety Study
Intersection	US-224 & SR-225 & CR-125
Jurisdiction	ODOT D4
East/West Street	US-224/SR-225
North/South Street	SR-225/CR-125
Peak Hour Factor	0.93

Lanes



Turning Movement Demand Volumes

Approach	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Movement												
Volume (veh/h)	20	170	20	340	90	10	20	60	350	10	90	10
% Thrus in Shared Lane												

Lane Flow Rate and Adjustments

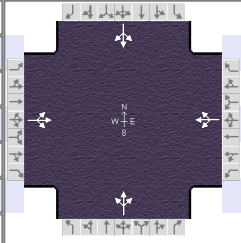
Approach	Eastbound			Westbound			Northbound			Southbound		
	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Lane												
Configuration	LTR			LTR			LTR			LTR		
Flow Rate, v (veh/h)	226			473			462			118		
Percent Heavy Vehicles	3			9			10			4		
Initial Departure Headway, h _d (s)	3.20			3.20			3.20			3.20		
Initial Degree of Utilization, x	0.201			0.421			0.411			0.105		
Final Departure Headway, h _d (s)	7.14			6.78			6.35			7.69		
Final Degree of Utilization, x	0.448			0.892			0.816			0.253		
Move-Up Time, m (s)	2.0			2.0			2.0			2.0		
Service Time, t _s (s)	5.14			4.78			4.35			5.69		

Capacity, Delay and Level of Service

Approach	Eastbound			Westbound			Northbound			Southbound		
	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Lane												
Configuration	LTR			LTR			LTR			LTR		
Flow Rate, v (veh/h)	226			473			462			118		
Capacity (veh/h)	504			531			567			468		
95% Queue Length, Q ₉₅ (veh)	2.3			10.2			8.2			1.0		
Control Delay (s/veh)	15.8			43.0			31.5			13.3		
Level of Service, LOS	C			E			D			B		
Approach Delay (s/veh) LOS	15.8		C	43.0		E	31.5		D	13.3		B
Intersection Delay (s/veh) LOS	31.3						D					

HCS Signalized Intersection Results Summary

General Information				Intersection Information			
Agency	CMTran			Duration, h	0.250		
Analyst	CMC	Analysis Date	Oct 4, 2022	Area Type	Other		
Jurisdiction	ODOT D4	Time Period	AM	PHF	0.95		
Urban Street	SR-225	Analysis Year	2022	Analysis Period	1 > 7:00		
Intersection	US-224 & SR-225 & CR...	File Name	2022 AM.xus				
Project Description	POR US 224 and SR 225 Safety Study						



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	2	49	4	278	90	4	14	61	227	1	35	14

Signal Information												
Cycle, s	90.0	Reference Phase	2									
Offset, s	0	Reference Point	End									
Uncoordinated	Yes	Simult. Gap E/W	On	Green	40.0	38.0	0.0	0.0	0.0	0.0		
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	4.0	4.0	0.0	0.0	0.0	0.0		
				Red	2.0	2.0	0.0	0.0	0.0	0.0		

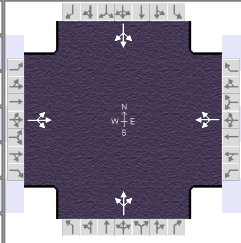
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2		6		8		4
Case Number		8.0		8.0		8.0		8.0
Phase Duration, s		46.0		46.0		44.0		44.0
Change Period, (Y+R _c), s		6.0		6.0		6.0		6.0
Max Allow Headway (MAH), s		2.9		2.9		3.1		3.1
Queue Clearance Time (g _s), s		3.8		24.1		18.6		3.8
Green Extension Time (g _e), s		0.7		0.7		0.7		0.7
Phase Call Probability		1.00		1.00		1.00		1.00
Max Out Probability		0.00		0.00		0.00		0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (v), veh/h	58			392			318			53		
Adjusted Saturation Flow Rate (s), veh/h/ln	1627			1277			1307			1572		
Queue Service Time (g _s), s	0.0			20.3			0.0			0.0		
Cycle Queue Clearance Time (g _c), s	1.8			22.1			16.6			1.8		
Green Ratio (g/C)	0.44			0.44			0.42			0.42		
Capacity (c), veh/h	765			638			594			704		
Volume-to-Capacity Ratio (X)	0.076			0.614			0.535			0.075		
Back of Queue (Q), ft/ln (95 th percentile)	28.4			266.4			228			27.1		
Back of Queue (Q), veh/ln (95 th percentile)	1.1			9.5			7.9			1.0		
Queue Storage Ratio (RQ) (95 th percentile)	0.00			0.05			0.03			0.00		
Uniform Delay (d ₁), s/veh	14.4			20.0			19.8			15.5		
Incremental Delay (d ₂), s/veh	0.0			1.3			0.5			0.0		
Initial Queue Delay (d ₃), s/veh	0.0			0.0			0.0			0.0		
Control Delay (d), s/veh	14.4			21.3			20.3			15.6		
Level of Service (LOS)	B			C			C			B		
Approach Delay, s/veh / LOS	14.4	B		21.3	C		20.3	C		15.6	B	
Intersection Delay, s/veh / LOS	20.1						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.68	B	1.68	B	1.68	B	1.68	B
Bicycle LOS Score / LOS	0.58	A	1.13	A	1.01	A	0.57	A

HCS Signalized Intersection Results Summary

General Information				Intersection Information			
Agency	CMTran			Duration, h	0.250		
Analyst	CMC	Analysis Date	Oct 4, 2022	Area Type	Other		
Jurisdiction	ODOT D4	Time Period	PM	PHF	0.93		
Urban Street	SR-225	Analysis Year	2022	Analysis Period	1 > 7:00		
Intersection	US-224 & SR-225 & CR...	File Name	2022 PM.xus				
Project Description	POR US 224 and SR 225 Safety Study						



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h	15	148	19	298	76	8	18	51	313	5	77	4

Signal Information													
Cycle, s	90.0	Reference Phase	2										
Offset, s	0	Reference Point	End										
Uncoordinated	Yes	Simult. Gap E/W	On	Green	40.0	38.0	0.0	0.0	0.0	0.0			
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	4.0	4.0	0.0	0.0	0.0	0.0			
				Red	2.0	2.0	0.0	0.0	0.0	0.0			

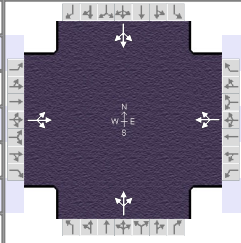
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2		6		8		4
Case Number		8.0		8.0		8.0		8.0
Phase Duration, s		46.0		46.0		44.0		44.0
Change Period, ($Y+R_c$), s		6.0		6.0		6.0		6.0
Max Allow Headway (MAH), s		3.1		3.1		3.1		3.1
Queue Clearance Time (g_s), s		8.6		29.2		23.5		5.0
Green Extension Time (g_e), s		1.2		1.0		0.9		1.0
Phase Call Probability		1.00		1.00		1.00		1.00
Max Out Probability		0.00		0.02		0.00		0.00

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (v), veh/h	196			411			411			92		
Adjusted Saturation Flow Rate (s), veh/h/ln	1661			1182			1398			1653		
Queue Service Time (g_s), s	0.0			20.6			1.4			0.0		
Cycle Queue Clearance Time (g_c), s	6.6			27.2			21.5			3.0		
Green Ratio (g/C)	0.44			0.44			0.42			0.42		
Capacity (c), veh/h	782			597			632			740		
Volume-to-Capacity Ratio (X)	0.250			0.689			0.650			0.125		
Back of Queue (Q), ft/ln (95 th percentile)	101.3			291.5			283.9			47.5		
Back of Queue (Q), veh/ln (95 th percentile)	4.0			10.9			10.5			1.8		
Queue Storage Ratio (RQ) (95 th percentile)	0.01			0.06			0.04			0.00		
Uniform Delay (d_1), s/veh	15.7			21.8			21.2			15.9		
Incremental Delay (d_2), s/veh	0.1			2.8			1.9			0.0		
Initial Queue Delay (d_3), s/veh	0.0			0.0			0.0			0.0		
Control Delay (d), s/veh	15.8			24.6			23.1			15.9		
Level of Service (LOS)	B			C			C			B		
Approach Delay, s/veh / LOS	15.8	B		24.6	C		23.1	C		15.9	B	
Intersection Delay, s/veh / LOS	21.8						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.68	B	1.68	B	1.68	B	1.68	B
Bicycle LOS Score / LOS	0.81	A	1.17	A	1.17	A	0.64	A

HCS Signalized Intersection Results Summary

General Information				Intersection Information			
Agency	CMTran			Duration, h	0.250		
Analyst	CMC	Analysis Date	Oct 4, 2022	Area Type	Other		
Jurisdiction	ODOT D4	Time Period	AM	PHF	0.95		
Urban Street	SR-225	Analysis Year	2047	Analysis Period	1 > 7:00		
Intersection	US-224 & SR-225 & CR...	File Name	2047 AM.xus				
Project Description	POR US 224 and SR 225 Safety Study						



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h	10	60	10	310	100	10	20	70	260	10	40	20

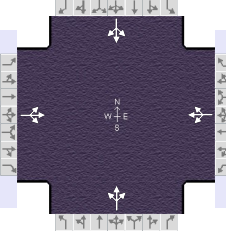
Signal Information													
Cycle, s	90.0	Reference Phase	2										
Offset, s	0	Reference Point	End										
Uncoordinated	Yes	Simult. Gap E/W	On	Green	40.0	38.0	0.0	0.0	0.0	0.0			
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	4.0	4.0	0.0	0.0	0.0	0.0			
				Red	2.0	2.0	0.0	0.0	0.0	0.0			

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2		6		8		4
Case Number		8.0		8.0		8.0		8.0
Phase Duration, s		46.0		46.0		44.0		44.0
Change Period, ($Y+R_c$), s		6.0		6.0		6.0		6.0
Max Allow Headway (MAH), s		3.0		3.0		3.1		3.1
Queue Clearance Time (g_s), s		4.7		29.0		22.3		4.6
Green Extension Time (g_e), s		0.9		0.8		0.8		0.8
Phase Call Probability		1.00		1.00		1.00		1.00
Max Out Probability		0.00		0.01		0.00		0.00

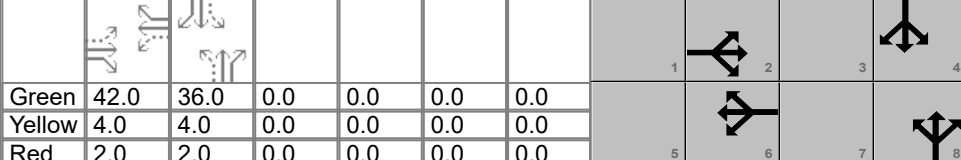
Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (v), veh/h	84			442			368			74		
Adjusted Saturation Flow Rate (s), veh/h/ln	1585			1262			1306			1468		
Queue Service Time (g_s), s	0.0			24.2			0.9			0.0		
Cycle Queue Clearance Time (g_c), s	2.7			27.0			20.3			2.6		
Green Ratio (g/C)	0.44			0.44			0.42			0.42		
Capacity (c), veh/h	749			630			594			666		
Volume-to-Capacity Ratio (X)	0.112			0.701			0.621			0.111		
Back of Queue (Q), ft/ln (95 th percentile)	41.8			316.2			272.6			38.7		
Back of Queue (Q), veh/ln (95 th percentile)	1.6			11.3			9.5			1.5		
Queue Storage Ratio (RQ) (95 th percentile)	0.01			0.06			0.04			0.00		
Uniform Delay (d_1), s/veh	14.7			21.4			20.9			15.8		
Incremental Delay (d_2), s/veh	0.0			3.0			1.5			0.0		
Initial Queue Delay (d_3), s/veh	0.0			0.0			0.0			0.0		
Control Delay (d), s/veh	14.7			24.3			22.4			15.8		
Level of Service (LOS)	B			C			C			B		
Approach Delay, s/veh / LOS	14.7	B		24.3	C		22.4	C		15.8	B	
Intersection Delay, s/veh / LOS	22.1						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.68	B	1.68	B	1.68	B	1.68	B
Bicycle LOS Score / LOS	0.63	A	1.22	A	1.10	A	0.61	A

HCS Signalized Intersection Results Summary

General Information				Intersection Information		
Agency	CMTran			Duration, h	0.250	
Analyst	CMC	Analysis Date	Oct 4, 2022	Area Type	Other	
Jurisdiction	ODOT D4	Time Period	PM	PHF	0.93	
Urban Street	SR-225	Analysis Year	2047	Analysis Period	1 > 7:00	
Intersection	US-224 & SR-225 & CR...	File Name	2047 PM.xus			
Project Description	POR US 224 and SR 225 Safety Study					

Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	20	170	20	340	90	10	20	60	350	10	90	10

Signal Information													
Cycle, s	90.0	Reference Phase	2	Green	42.0	36.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Offset, s	0	Reference Point	End	Yellow	4.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Uncoordinated	Yes	Simult. Gap E/W	On	Red	2.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Force Mode	Fixed	Simult. Gap N/S	On										

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2		6		8		4
Case Number		8.0		8.0		8.0		8.0
Phase Duration, s		48.0		48.0		42.0		42.0
Change Period, ($Y+R_c$), s		6.0		6.0		6.0		6.0
Max Allow Headway (MAH), s		3.1		3.1		3.1		3.1
Queue Clearance Time (g_s), s		9.5		36.2		28.6		6.1
Green Extension Time (g_e), s		1.4		0.9		0.8		1.2
Phase Call Probability		1.00		1.00		1.00		1.00
Max Out Probability		0.00		0.29		0.10		0.00

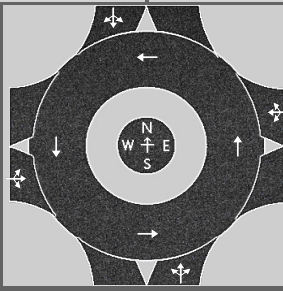
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (v), veh/h	226			473			462			118		
Adjusted Saturation Flow Rate (s), veh/h/ln	1660			1148			1398			1581		
Queue Service Time (g_s), s	0.0			26.7			8.5			0.0		
Cycle Queue Clearance Time (g_c), s	7.5			34.2			26.6			4.1		
Green Ratio (g/C)	0.47			0.47			0.40			0.40		
Capacity (c), veh/h	819			607			601			676		
Volume-to-Capacity Ratio (X)	0.276			0.780			0.769			0.175		
Back of Queue (Q), ft/ln (95 th percentile)	112.6			353.6			357.4			65.4		
Back of Queue (Q), veh/ln (95 th percentile)	4.4			13.2			13.2			2.5		
Queue Storage Ratio (RQ) (95 th percentile)	0.02			0.07			0.05			0.01		
Uniform Delay (d_1), s/veh	14.8			22.5			24.1			17.4		
Incremental Delay (d_2), s/veh	0.1			5.9			5.5			0.0		
Initial Queue Delay (d_3), s/veh	0.0			0.0			0.0			0.0		
Control Delay (d), s/veh	14.9			28.4			29.6			17.5		
Level of Service (LOS)	B			C			C			B		
Approach Delay, s/veh / LOS	14.9	B		28.4	C		29.6	C		17.5	B	
Intersection Delay, s/veh / LOS	25.4						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.67	B	1.67	B	1.68	B	1.68	B
Bicycle LOS Score / LOS	0.86	A	1.27	A	1.25	A	0.68	A

HCS Roundabouts Report

General Information

Analyst	CMC
Agency or Co.	CMTran
Date Performed	
Analysis Year	2022
Time Analyzed	AM
Project Description	POR US 224 and SR 225 Safety Study



Site Information

Intersection	US-224 & SR-225 & CR-125
E/W Street Name	US-224/SR-225
N/S Street Name	SR-225/CR-125
Analysis Time Period, hrs	0.25
Peak Hour Factor	0.95
Jurisdiction	ODOT D4

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	2	49	4	0	278	90	4	0	14	61	227	0	1	35	14
Percent Heavy Vehicles, %	7	7	7	7	15	15	15	15	19	19	19	19	7	7	7	7
Flow Rate (v _{pc}), pc/h	0	2	55	5	0	337	109	5	0	18	76	284	0	1	39	16
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		62			451			378			56	
Entry Volume, veh/h		58			392			318			52	
Circulating Flow (v _c), pc/h	377			96			58			464		
Exiting Flow (v _{ex}), pc/h	340			143			83			381		
Capacity (c _{pcd}), pc/h		939			1251			1301			860	
Capacity (c), veh/h		878			1088			1093			803	
v/c Ratio (x)		0.07			0.36			0.29			0.07	

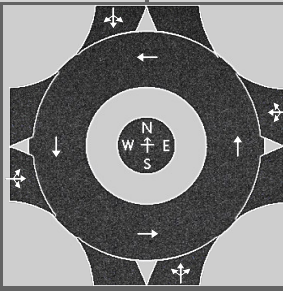
Delay and Level of Service

Approach	EB			WB			NB			SB		
	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		4.7			7.0			6.1			5.1	
Lane LOS		A			A			A			A	
95% Queue, veh		0.2			1.7			1.2			0.2	
Approach Delay, s/veh LOS	4.7		A	7.0		A	6.1		A	5.1		A
Intersection Delay, s/veh LOS	6.3									A		

HCS Roundabouts Report

General Information

Analyst	CMC
Agency or Co.	CMTran
Date Performed	
Analysis Year	2022
Time Analyzed	PM
Project Description	POR US 224 and SR 225 Safety Study



Site Information

Intersection	US-224 & SR-225 & CR-125
E/W Street Name	US-224/SR-225
N/S Street Name	SR-225/CR-125
Analysis Time Period, hrs	0.25
Peak Hour Factor	0.93
Jurisdiction	ODOT D4

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	15	148	19	0	298	76	8	0	18	51	313	0	5	77	4
Percent Heavy Vehicles, %	3	3	3	3	9	9	9	9	10	10	10	10	4	4	4	4
Flow Rate (v _{PCE}), pc/h	0	17	164	21	0	349	89	9	0	21	60	370	0	6	86	4
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		202			447			451			96	
Entry Volume, veh/h		196			410			410			92	
Circulating Flow (v _c), pc/h	441			98			187			459		
Exiting Flow (v _{ex}), pc/h	540			114			86			456		
Capacity (C _{PCE}), pc/h		880			1249			1140			864	
Capacity (c), veh/h		854			1146			1037			831	
v/c Ratio (x)		0.23			0.36			0.40			0.11	

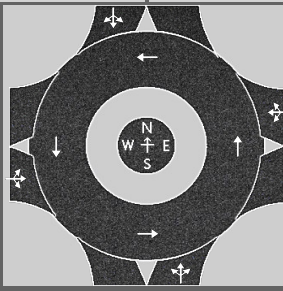
Delay and Level of Service

Approach	EB			WB			NB			SB		
	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		6.6			6.7			7.7			5.4	
Lane LOS		A			A			A			A	
95% Queue, veh		0.9			1.6			1.9			0.4	
Approach Delay, s/veh LOS	6.6	A		6.7	A		7.7	A		5.4	A	
Intersection Delay, s/veh LOS	6.9									A		

HCS Roundabouts Report

General Information

Analyst	CMC
Agency or Co.	CMTran
Date Performed	
Analysis Year	2047
Time Analyzed	AM
Project Description	POR US 224 and SR 225 Safety Study



Site Information

Intersection	US-224 & SR-225 & CR-125
E/W Street Name	US-224/SR-225
N/S Street Name	SR-225/CR-125
Analysis Time Period, hrs	0.25
Peak Hour Factor	0.95
Jurisdiction	ODOT D4

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	10	60	10	0	310	100	10	0	20	70	260	0	10	40	20
Percent Heavy Vehicles, %	7	7	7	7	15	15	15	15	19	19	19	19	7	7	7	7
Flow Rate (v _{pc}), pc/h	0	11	68	11	0	375	121	12	0	25	88	326	0	11	45	23
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		90			508			439			79	
Entry Volume, veh/h		84			442			369			74	
Circulating Flow (v _c), pc/h	431			124			90			521		
Exiting Flow (v _{ex}), pc/h	405			169			111			431		
Capacity (c _{pcd}), pc/h		889			1216			1259			811	
Capacity (c), veh/h		831			1057			1058			758	
v/c Ratio (x)		0.10			0.42			0.35			0.10	

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		5.3			7.9			7.0			5.7	
Lane LOS		A			A			A			A	
95% Queue, veh		0.3			2.1			1.6			0.3	
Approach Delay, s/veh LOS	5.3		A	7.9		A	7.0		A	5.7		A
Intersection Delay, s/veh LOS	7.2									A		

HCS Roundabouts Report

General Information

Site Information

Analyst	CMC		Intersection	US-224 & SR-225 & CR-125
Agency or Co.	CMTran		E/W Street Name	US-224/SR-225
Date Performed			N/S Street Name	SR-225/CR-125
Analysis Year	2047		Analysis Time Period, hrs	0.25
Time Analyzed	PM		Peak Hour Factor	0.93
Project Description	POR US 224 and SR 225 Safety Study		Jurisdiction	ODOT D4

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	20	170	20	0	340	90	10	0	20	60	350	0	10	90	10
Percent Heavy Vehicles, %	3	3	3	3	9	9	9	9	10	10	10	10	4	4	4	4
Flow Rate (v _{pc}), pc/h	0	22	188	22	0	398	105	12	0	24	71	414	0	11	101	11
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		232			515			509			123	
Entry Volume, veh/h		225			472			463			118	
Circulating Flow (v _c), pc/h	510			117			221			527		
Exiting Flow (v _{ex}), pc/h	613			140			105			521		
Capacity (c _{pcd}), pc/h		820			1225			1101			806	
Capacity (c), veh/h		796			1124			1001			775	
v/c Ratio (x)		0.28			0.42			0.46			0.15	

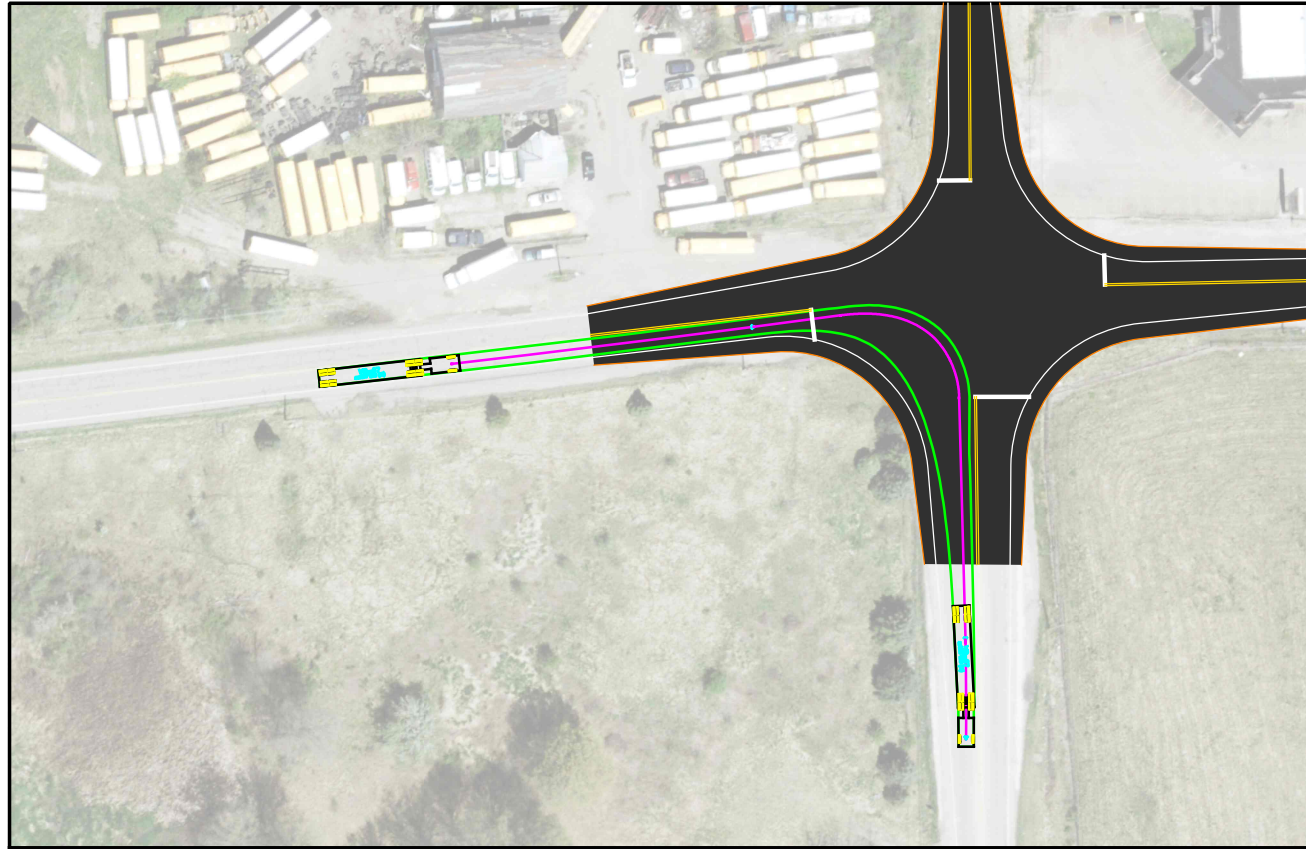
Delay and Level of Service

Approach	EB			WB			NB			SB		
	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		7.7			7.6			9.0			6.2	
Lane LOS		A			A			A			A	
95% Queue, veh		1.2			2.1			2.5			0.5	
Approach Delay, s/veh LOS	7.7	A		7.6	A		9.0	A		6.2	A	
Intersection Delay, s/veh LOS	8.0						A					

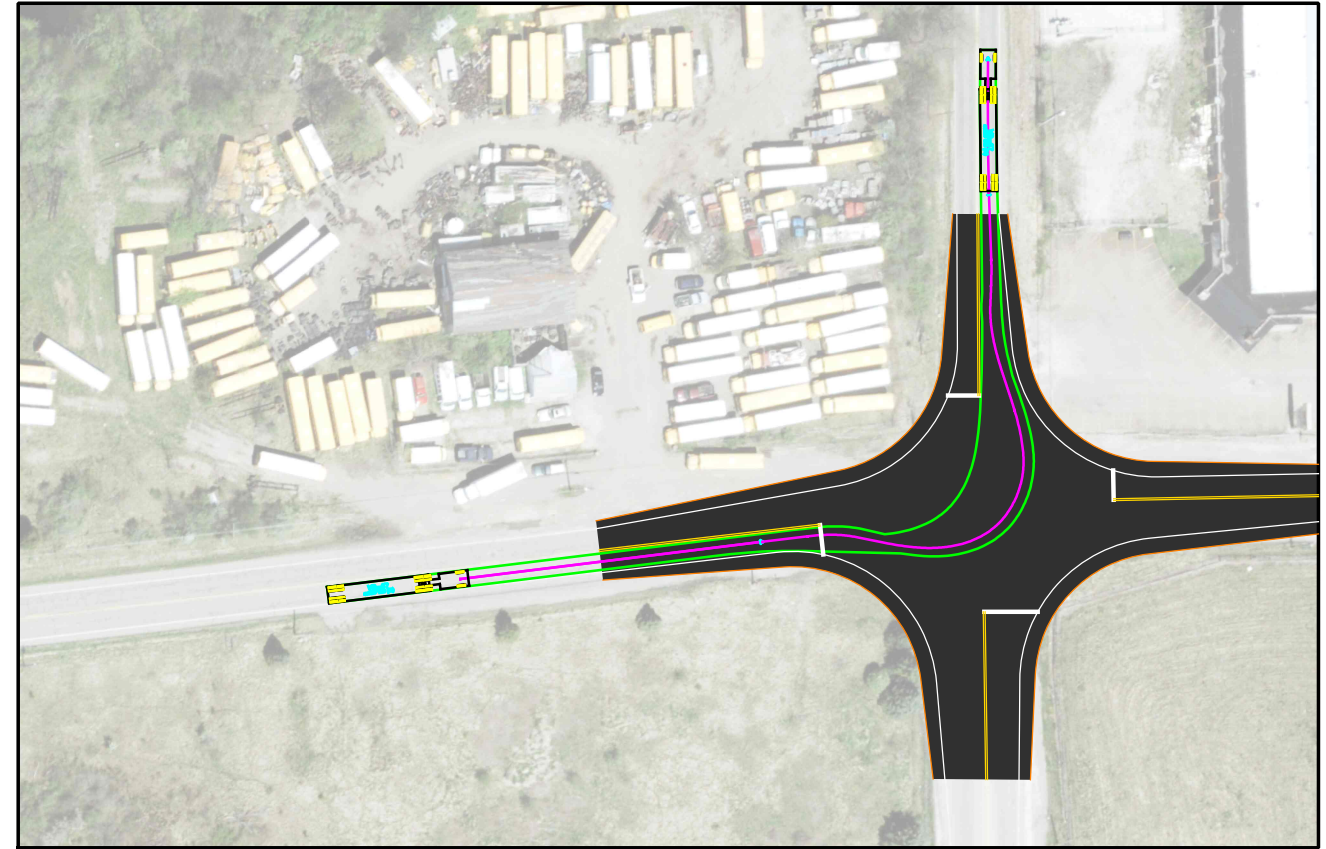
Appendix L

Countermeasures Truck Turning Movement Analysis

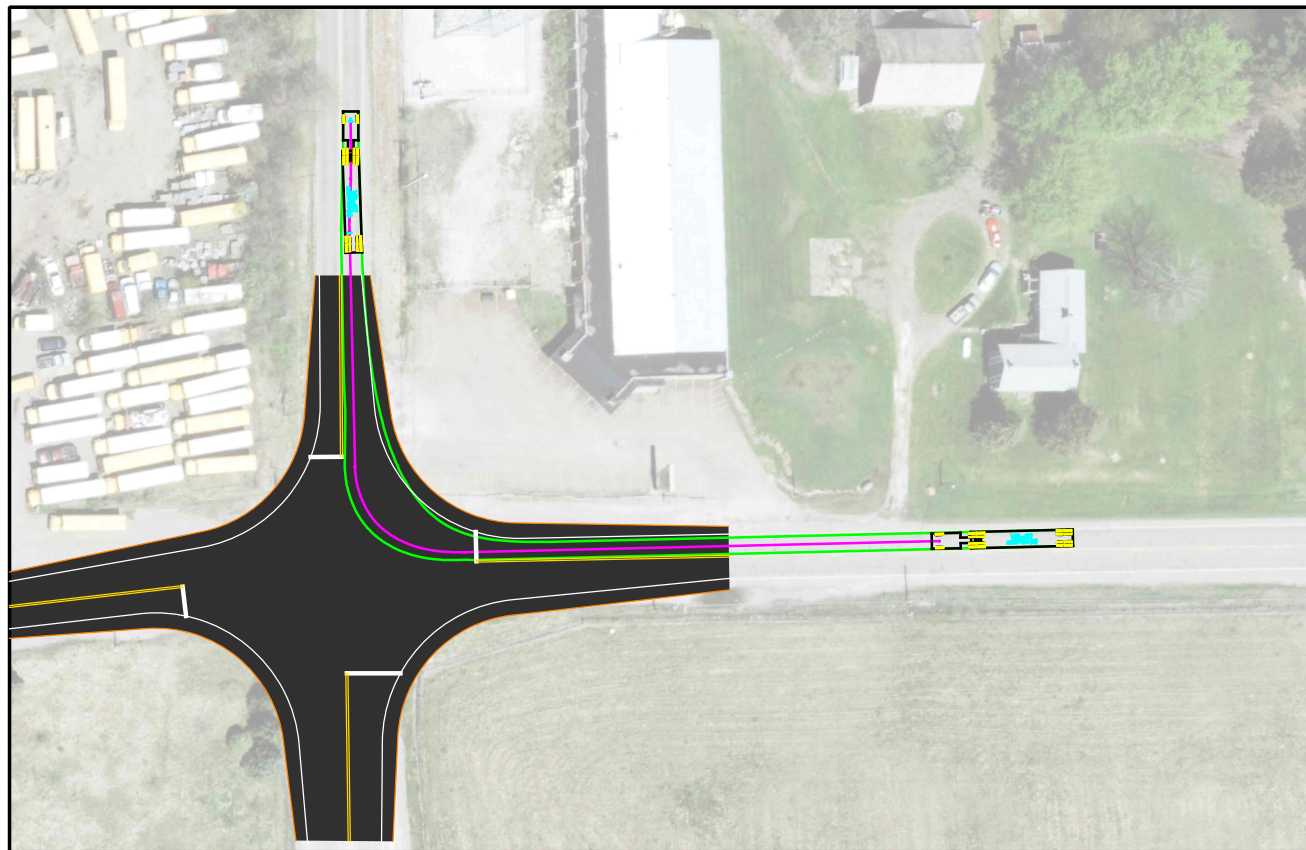




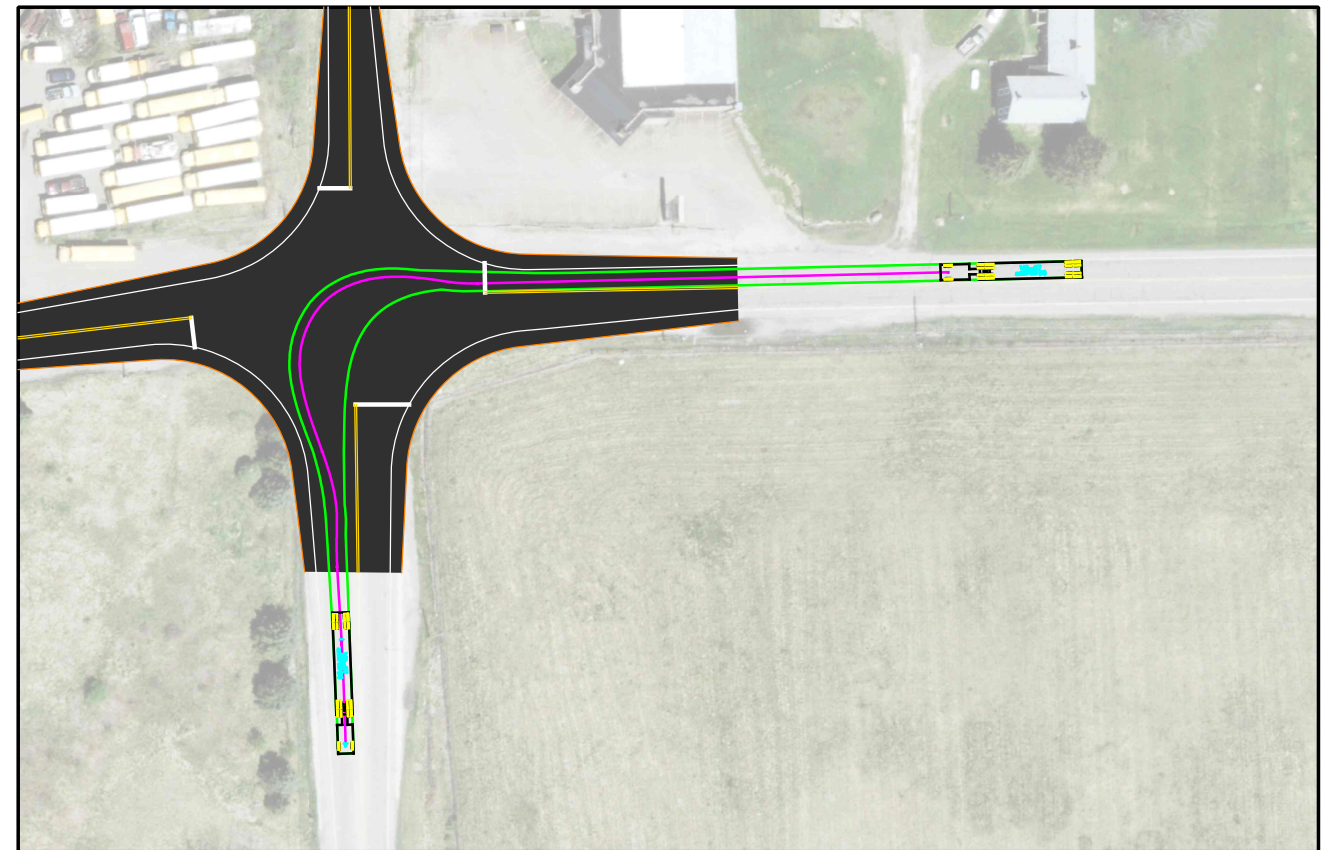
EASTBOUND US-224: RIGHT TURN MOVEMENT



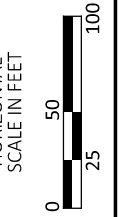
EASTBOUND US-224: LEFT TURN MOVEMENT



WESTBOUND US-224: RIGHT TURN MOVEMENT



WESTBOUND US-224: LEFT TURN MOVEMENT



US-224 & SR-225 STOP-CONTROLLED AND SIGNALIZED
EASTBOUND AND WESTBOUND WB-67 TRUCK TURNING MOVEMENTS

DESIGN AGENCY



DESIGNER

CEF

REVIEWER

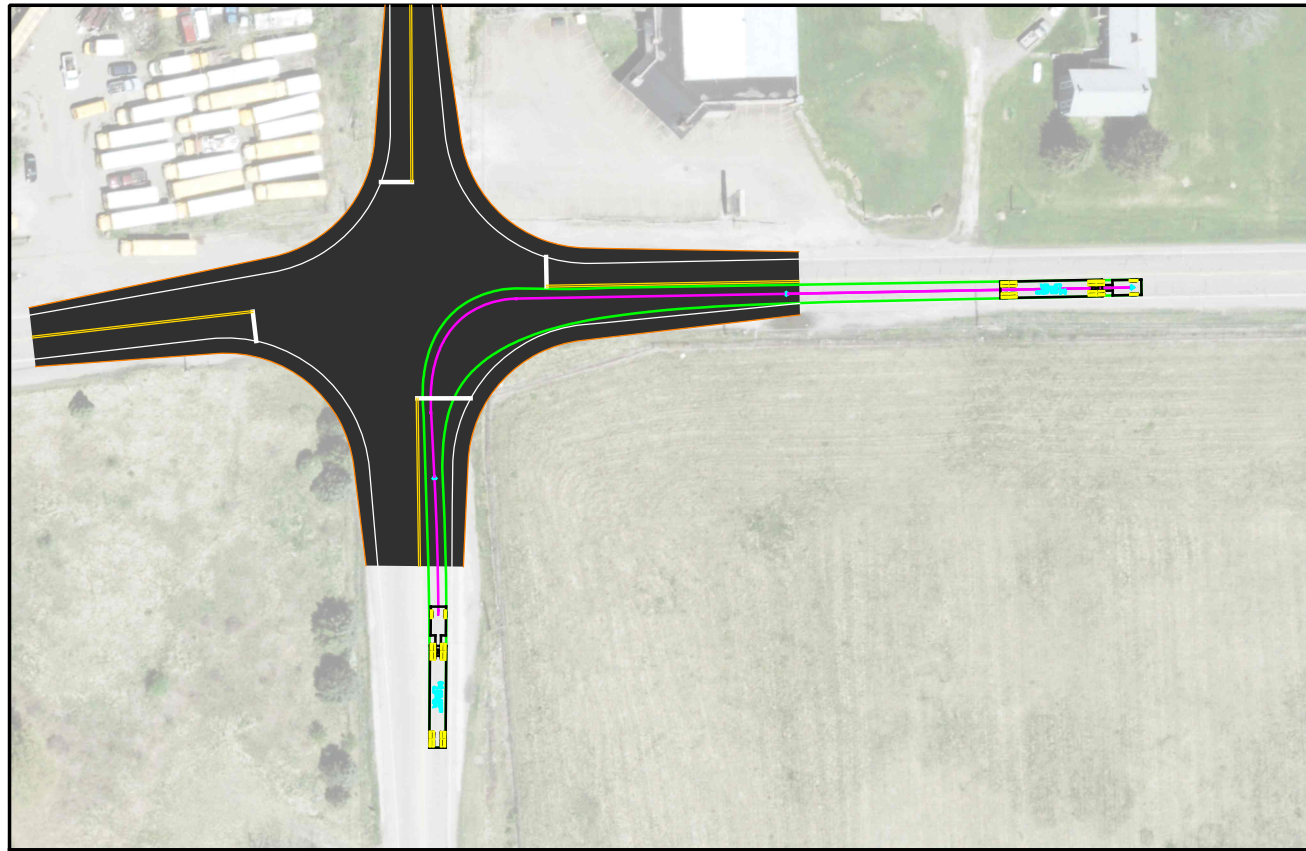
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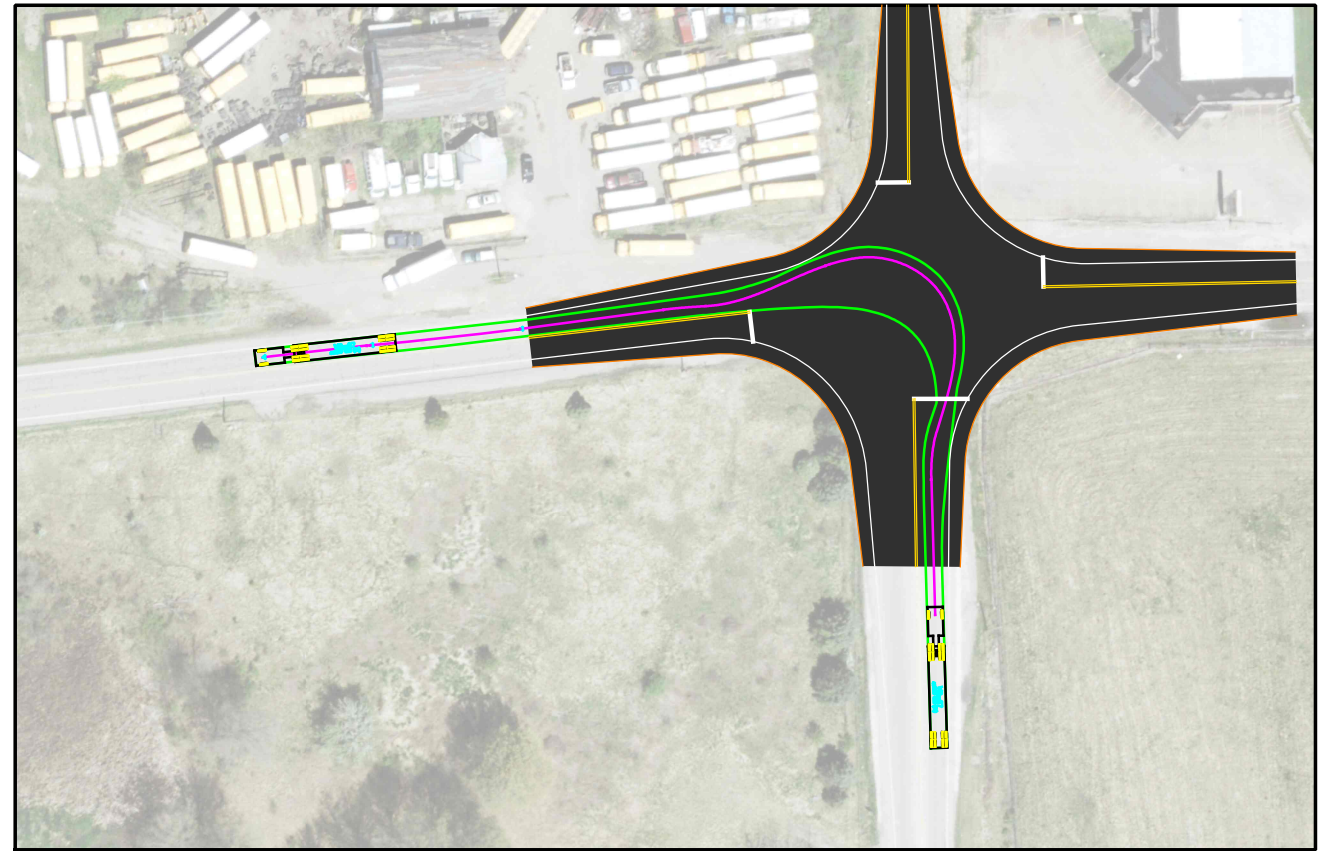
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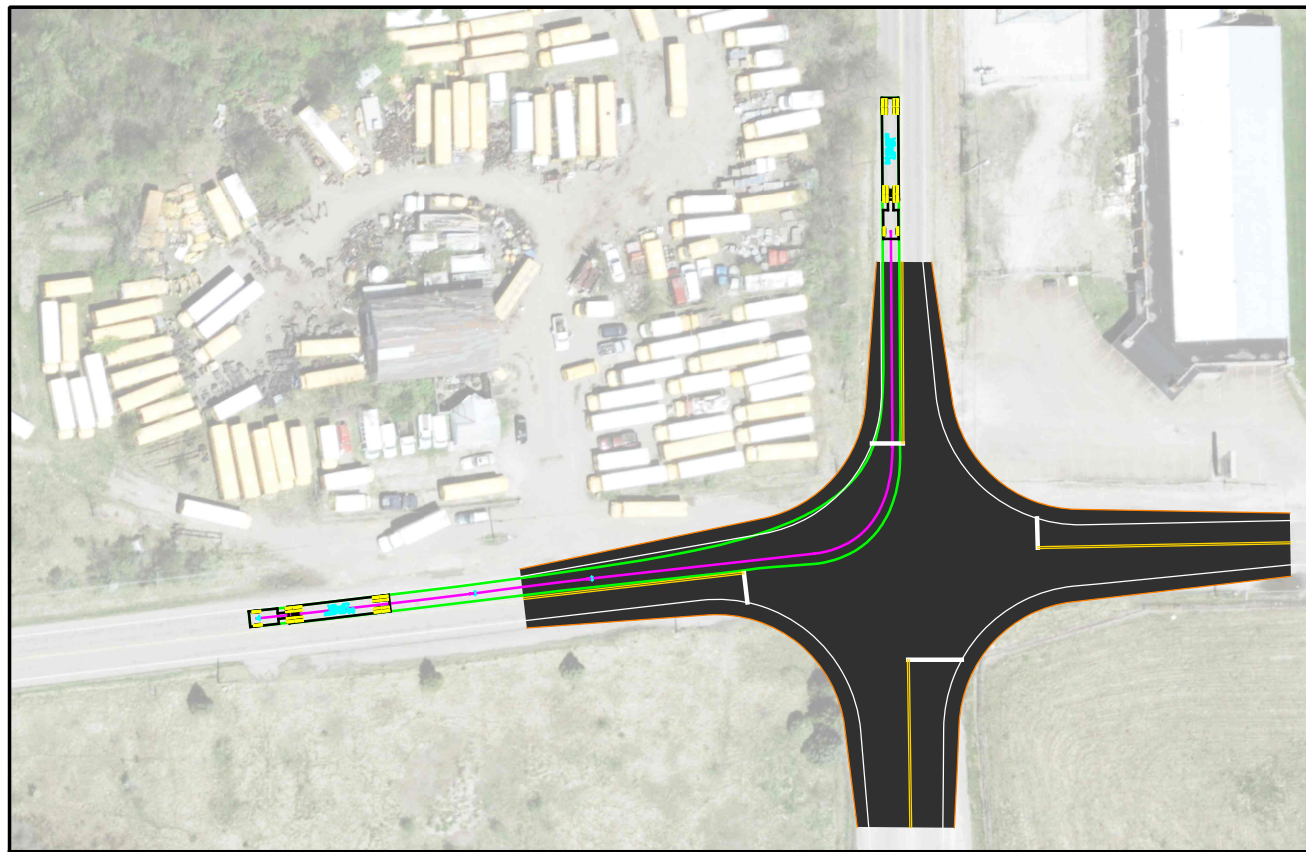
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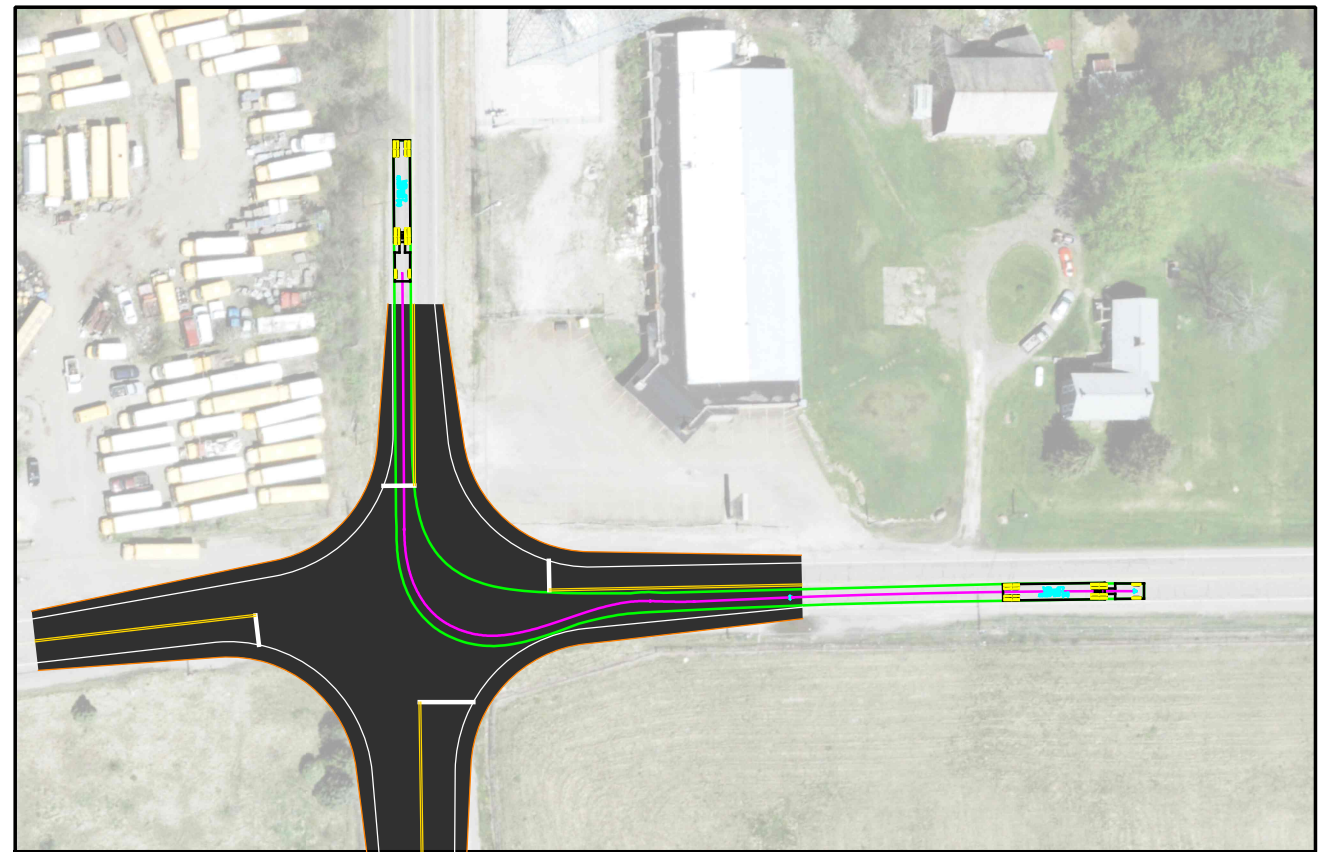
NORTHBOUND SR-225: RIGHT TURN MOVEMENT



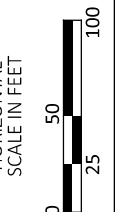
NORTHBOUND SR-225: LEFT TURN MOVEMENT



SOUTHBOUND SR-225: RIGHT TURN MOVEMENT



SOUTHBOUND SR-225: LEFT TURN MOVEMENT



US-224 & SR-225 STOP-CONTROLLED AND SIGNALIZED
NORTHBOUND AND SOUTHBOUND WB-67 TRUCK TURNING MOVEMENTS

DESIGN AGENCY

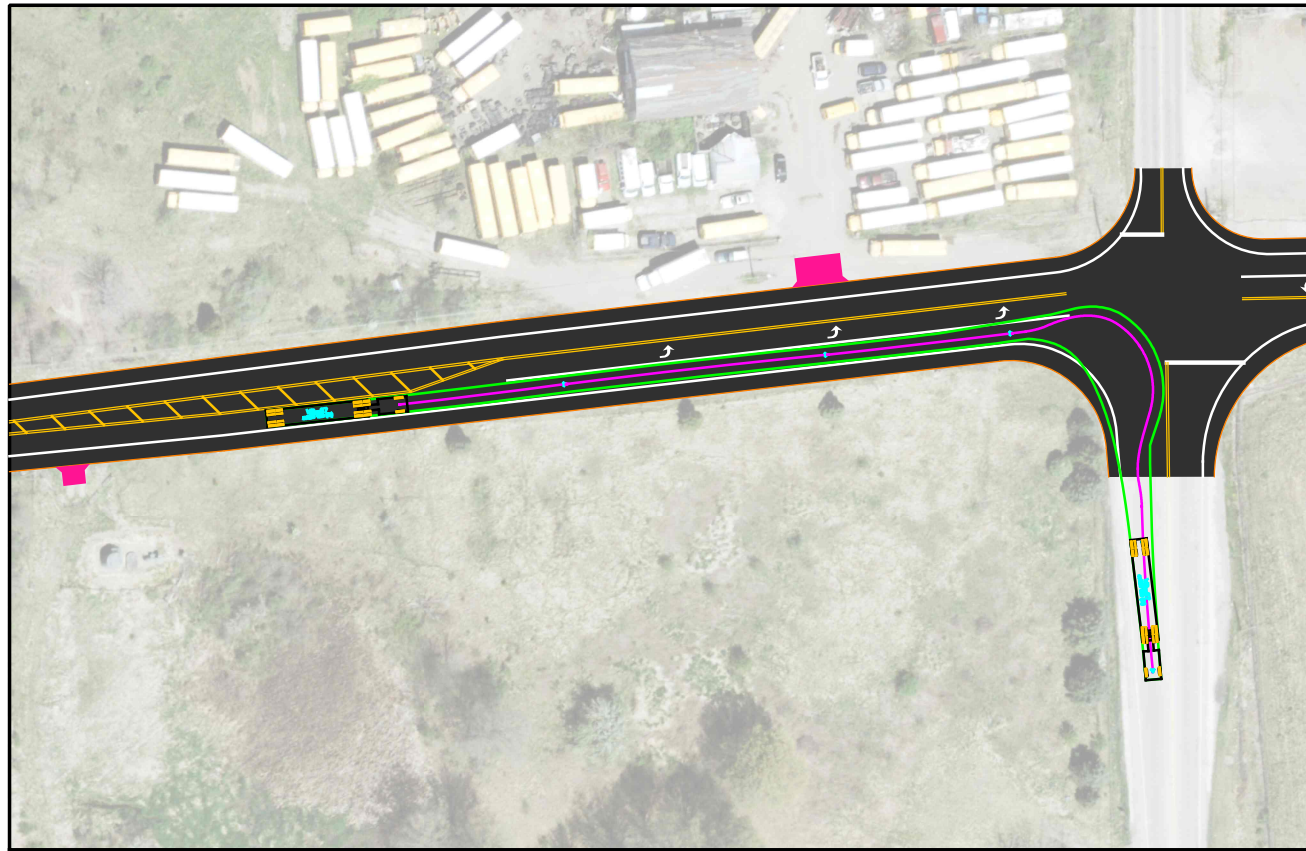


DESIGNER
CEF

REVIEWER
DMG 08-31-23

PROJECT ID
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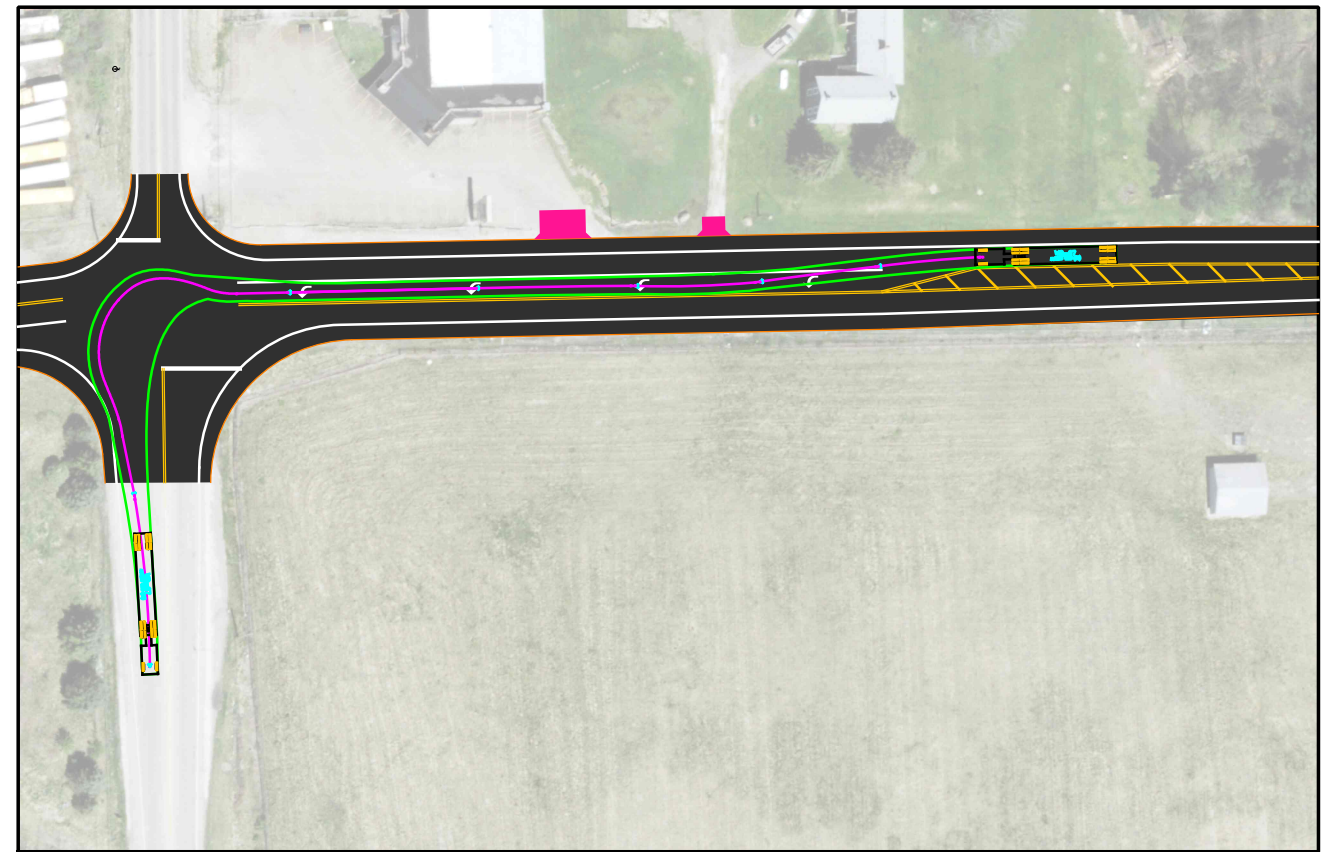
EASTBOUND US-224: RIGHT TURN MOVEMENT



EASTBOUND US-224: LEFT TURN MOVEMENT



WESTBOUND US-224: RIGHT TURN MOVEMENT



WESTBOUND US-224: LEFT TURN MOVEMENT



US-224 & SR-225 TURN LANES
EASTBOUND AND WESTBOUND WB-67 TRUCK TURNING MOVEMENTS

DESIGN AGENCY



DESIGNER

CEF

REVIEWER

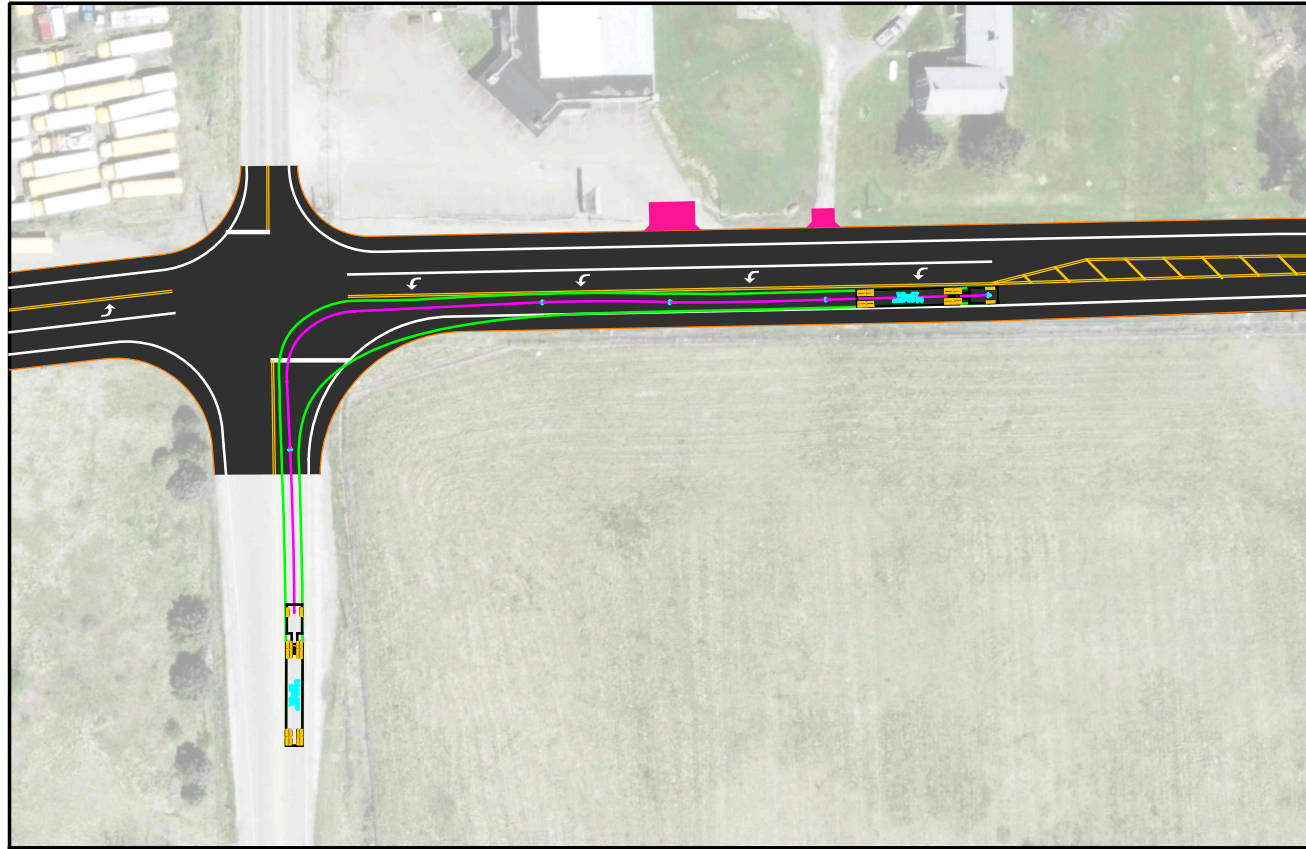
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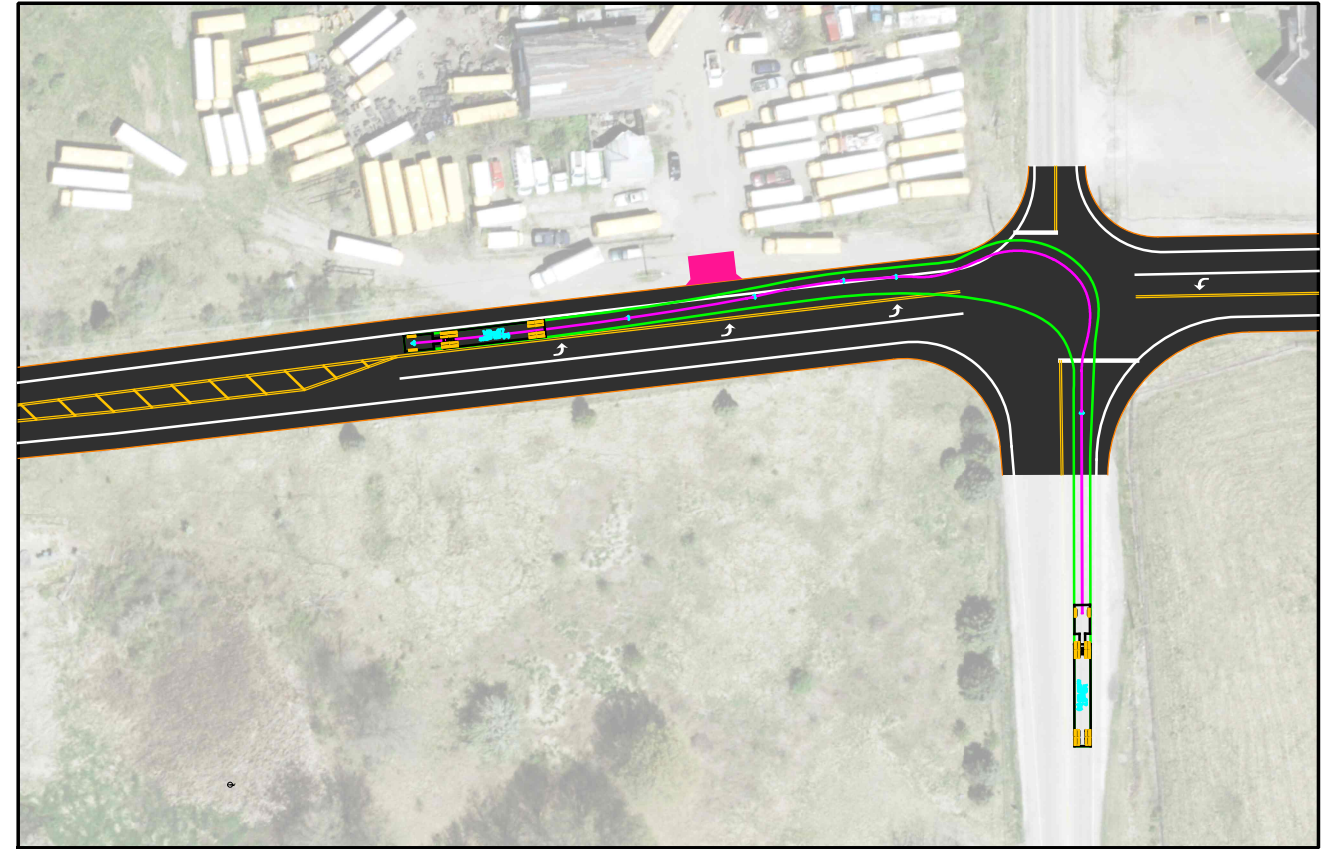
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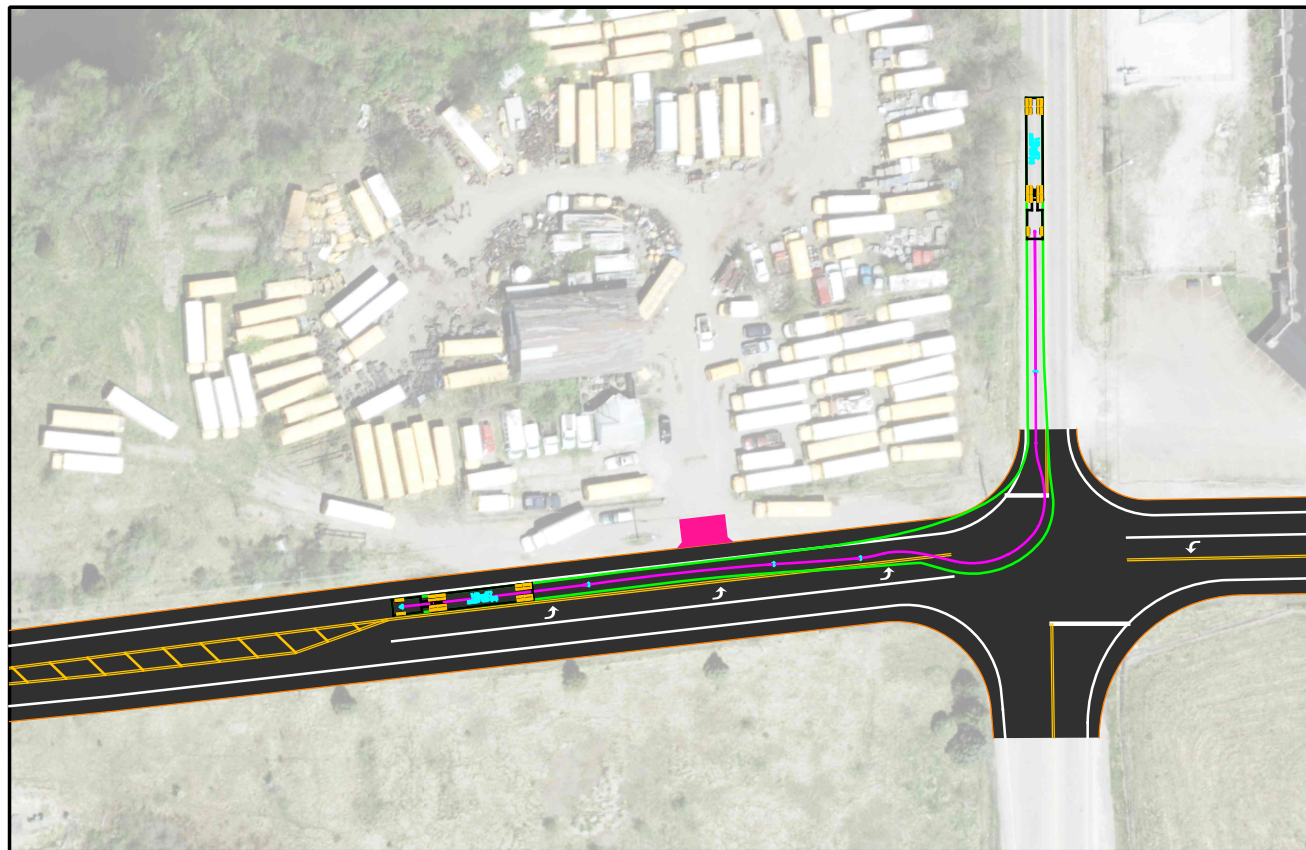
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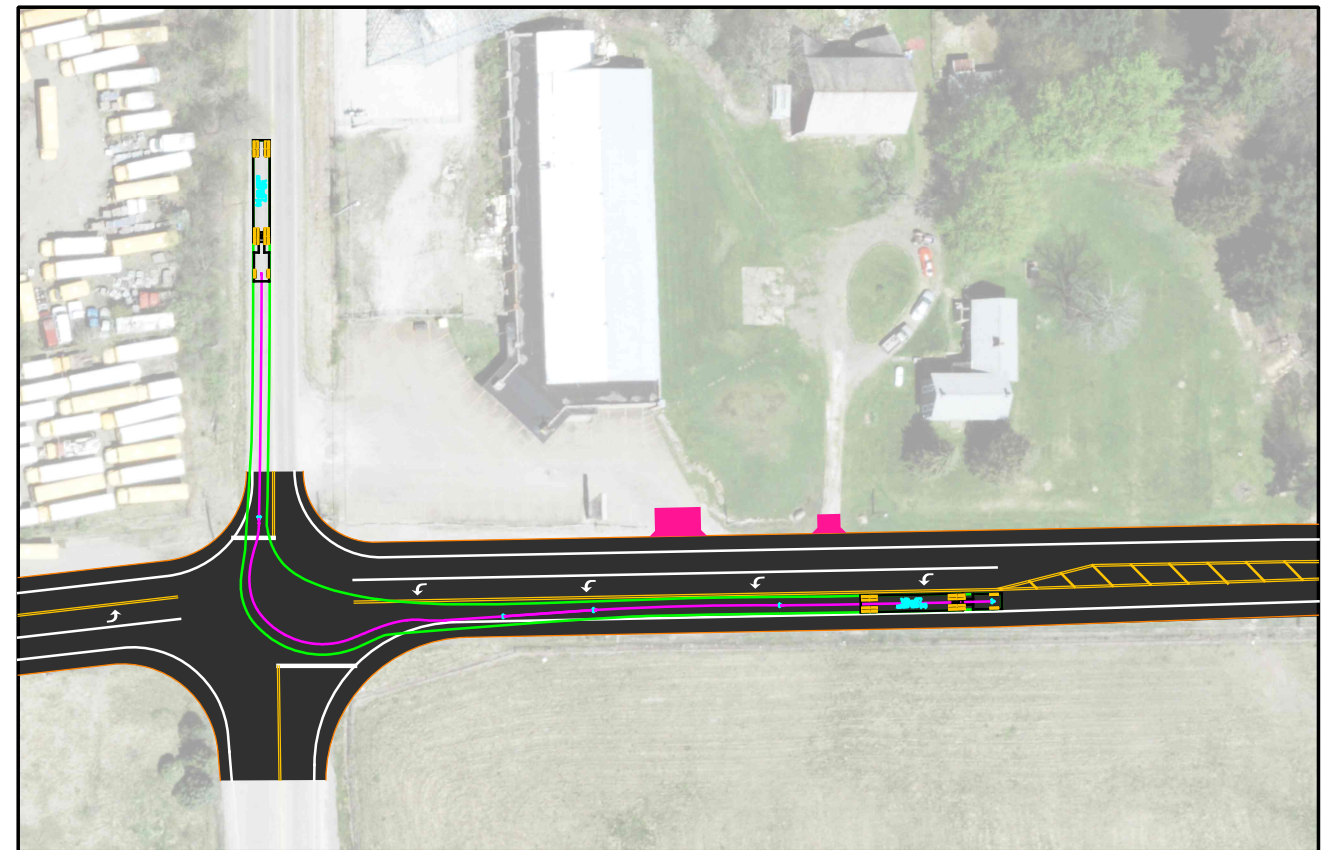
NORTHBOUND SR-225: RIGHT TURN MOVEMENT



NORTHBOUND SR-225: LEFT TURN MOVEMENT



SOUTHBOUND SR-225: RIGHT TURN MOVEMENT



SOUTHBOUND SR-225: LEFT TURN MOVEMENT



HORIZONTAL
SCALE IN FEET
0 25 50 100

US-224 & SR-225 TURN LANES
NORTHBOUND AND SOUTHBOUND WB-67 TRUCK TURNING MOVEMENTS

DESIGN AGENCY

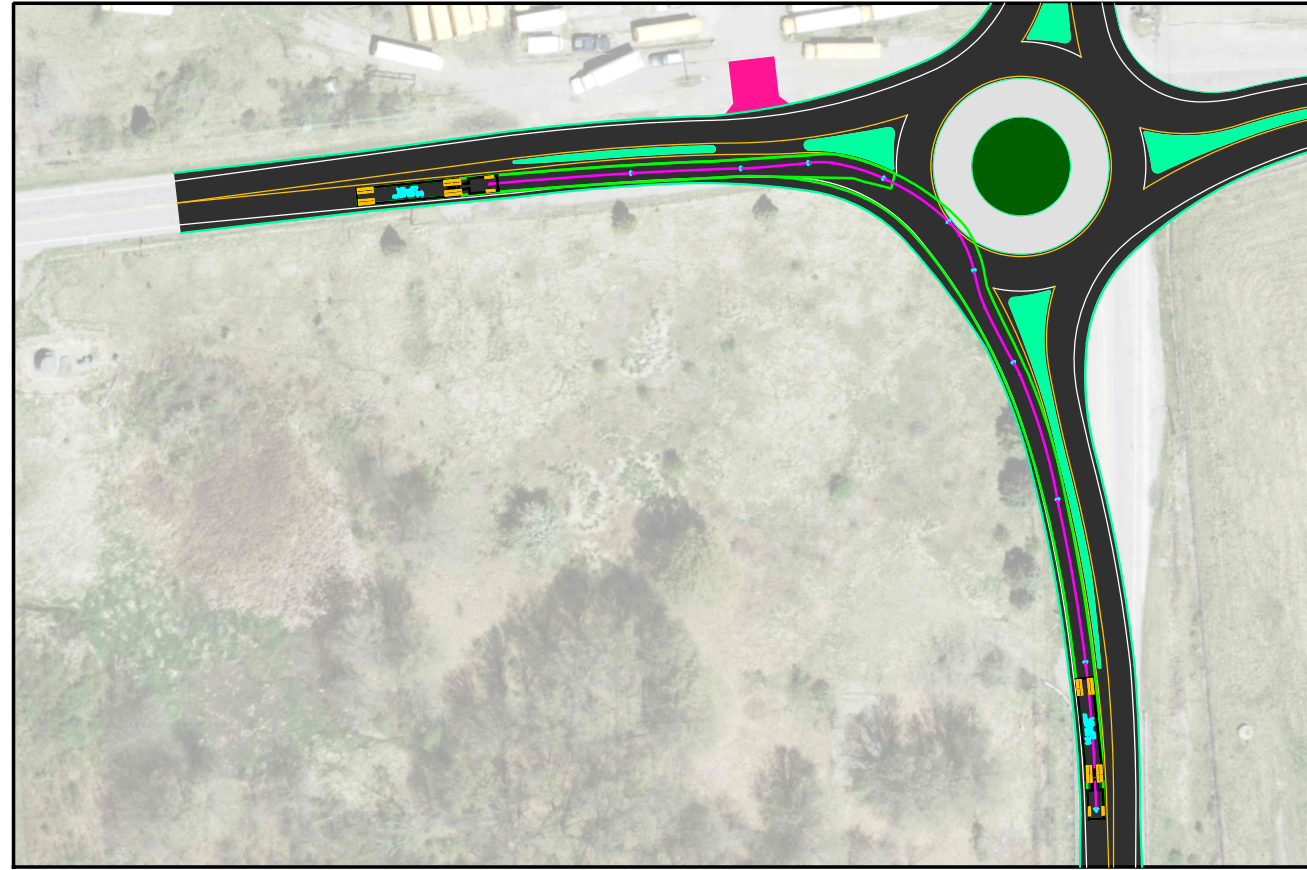


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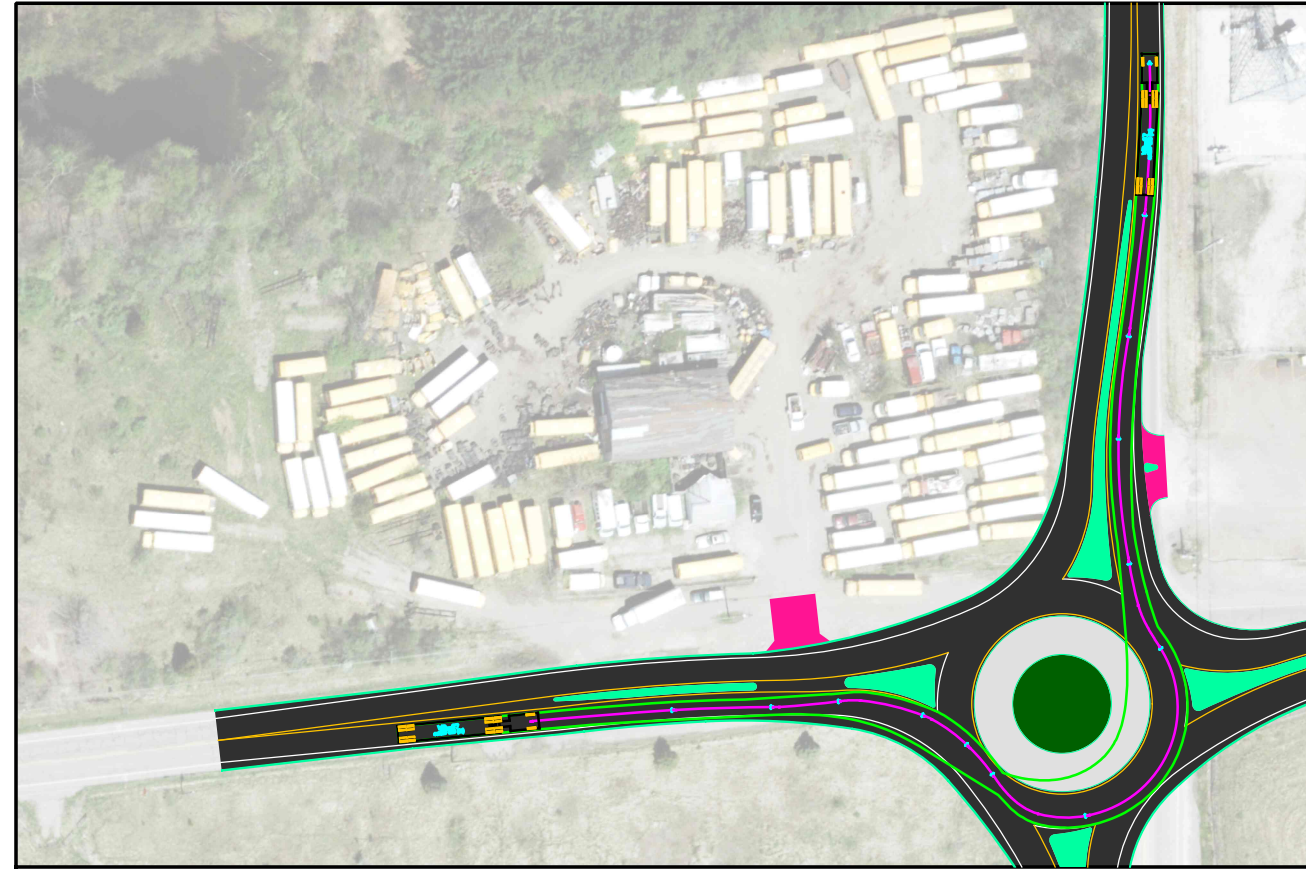
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DMG 08-31-23

PROJECT ID
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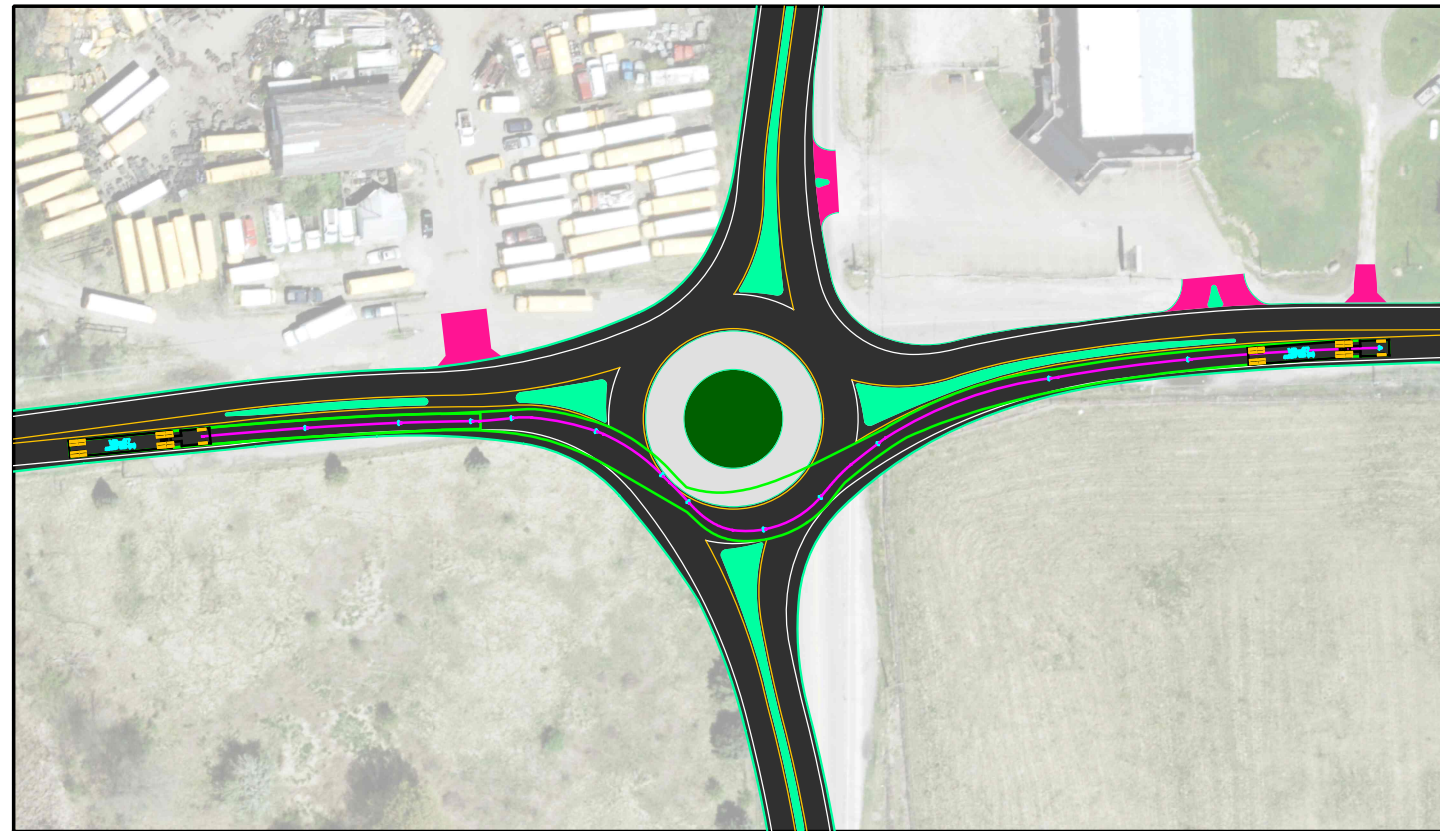
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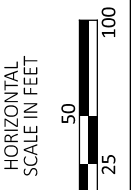
EASTBOUND US-224: RIGHT TURN MOVEMENT



EASTBOUND US-224: LEFT TURN MOVEMENT



EASTBOUND US-224: THROUGH MOVEMENT



US-224 & SR-225 ROUNDABOUT
EASTBOUND WB-67 TRUCK TURNING MOVEMENTS

DESIGN AGENCY



DESIGNER

CEF

REVIEWER

DMG 08-31-23

PROJECT ID

0

SHEET TOTAL

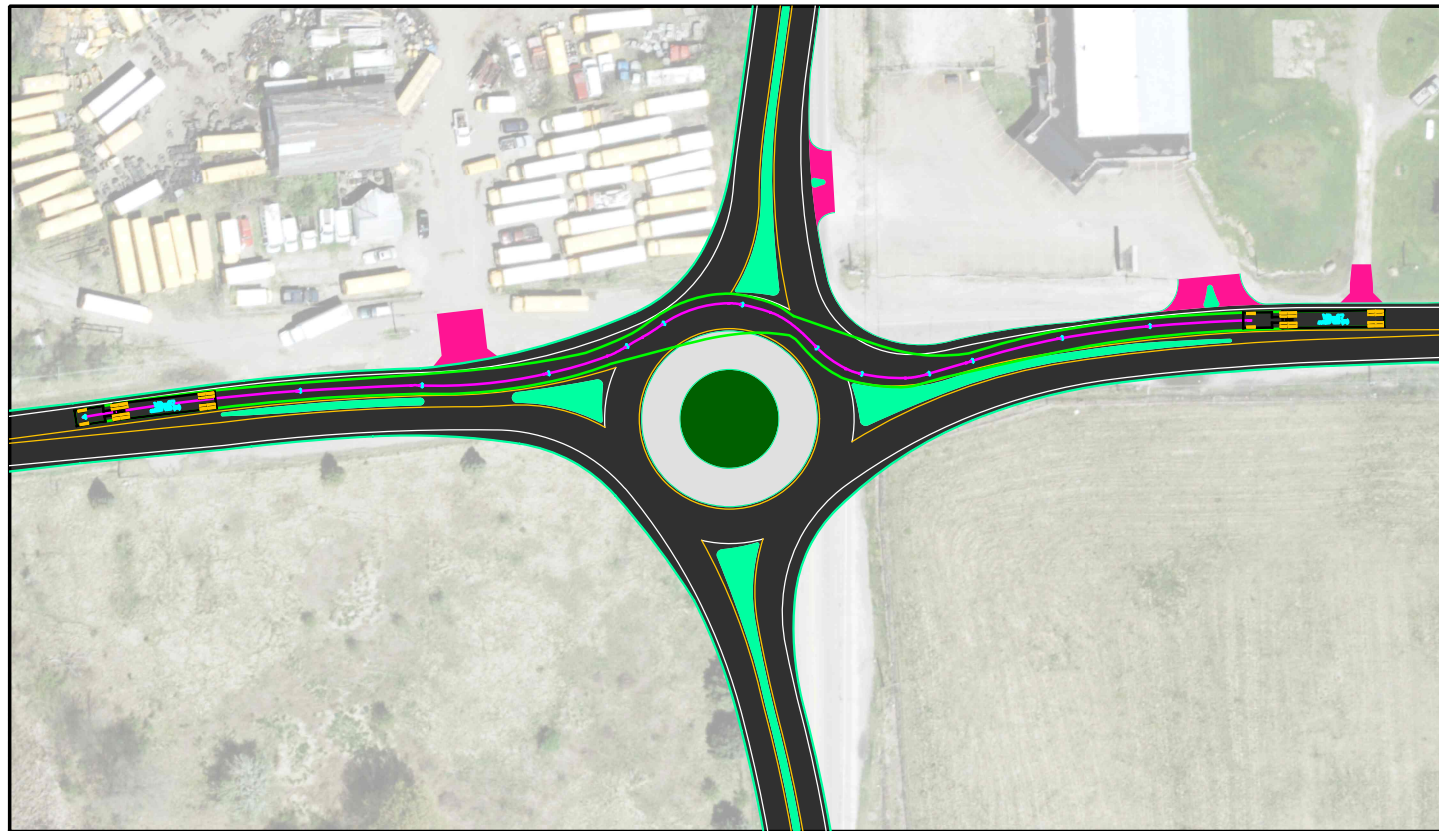
P.0 0



WESTBOUND US-224: RIGHT TURN MOVEMENT



WESTBOUND US-224: LEFT TURN MOVEMENT



WESTBOUND US-224: THROUGH MOVEMENT



HORIZONTAL
SCALE IN FEET
0 25 50 100

US-224 & SR-225 ROUNDABOUT
WESTBOUND WB-67 TRUCK TURNING MOVEMENTS

DESIGN AGENCY



DESIGNER

CEF

REVIEWER

DMG 08-31-23

PROJECT ID

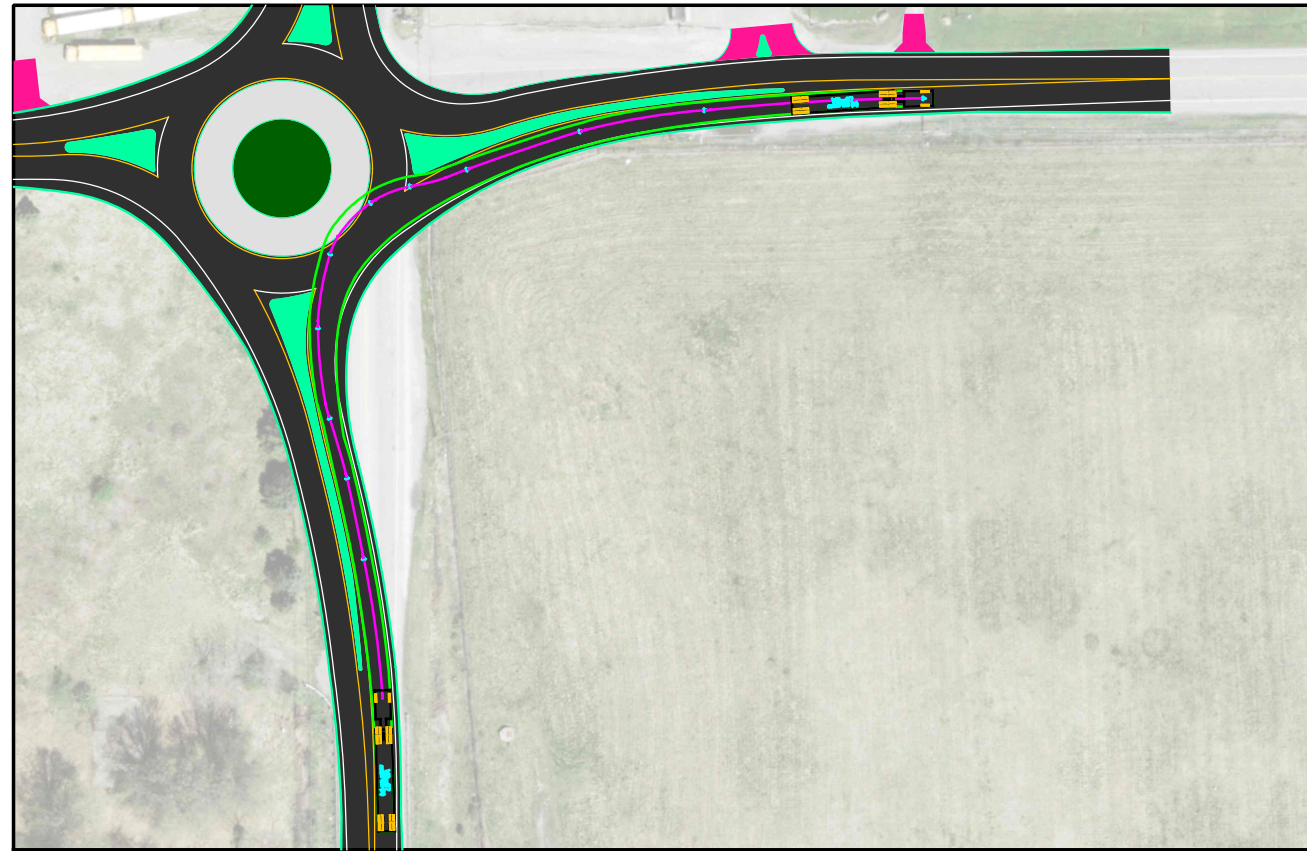
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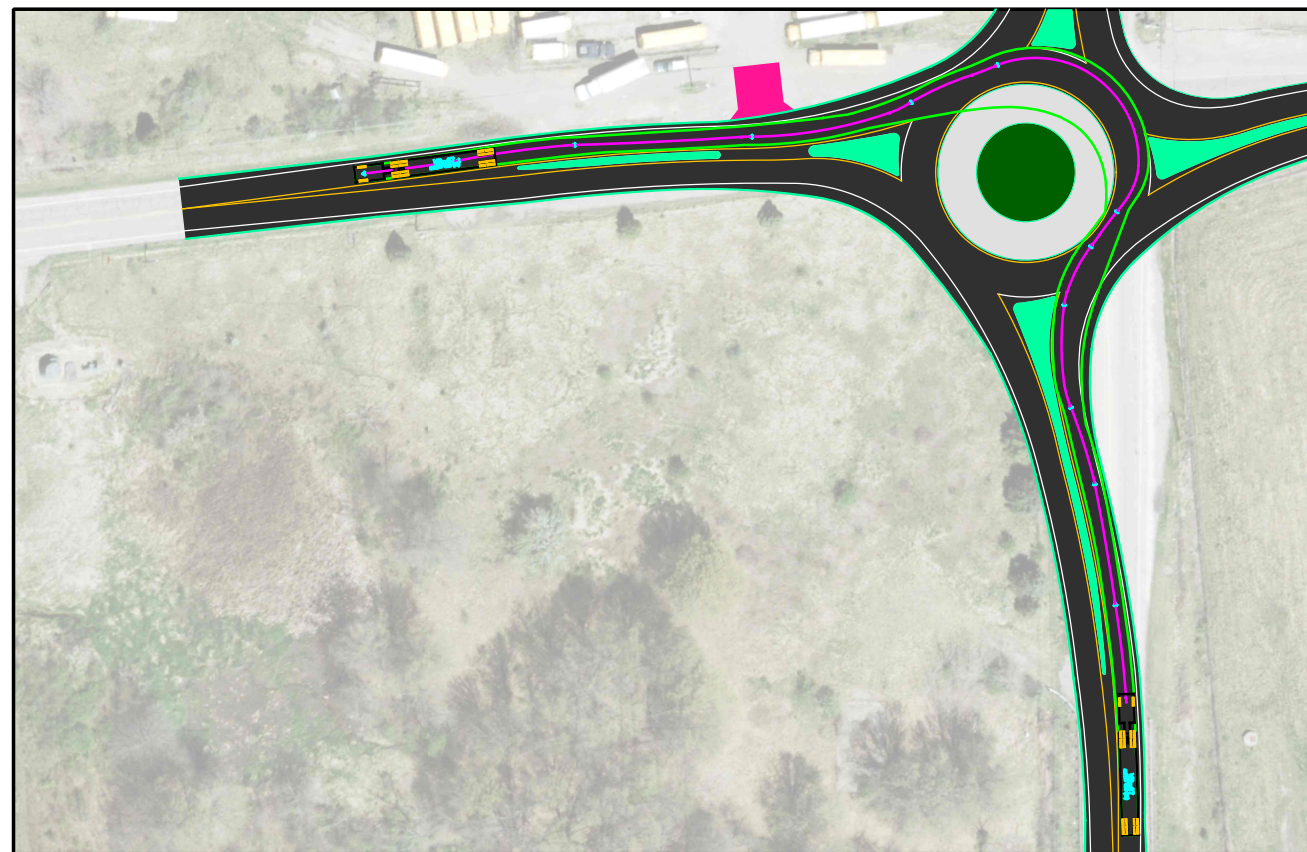
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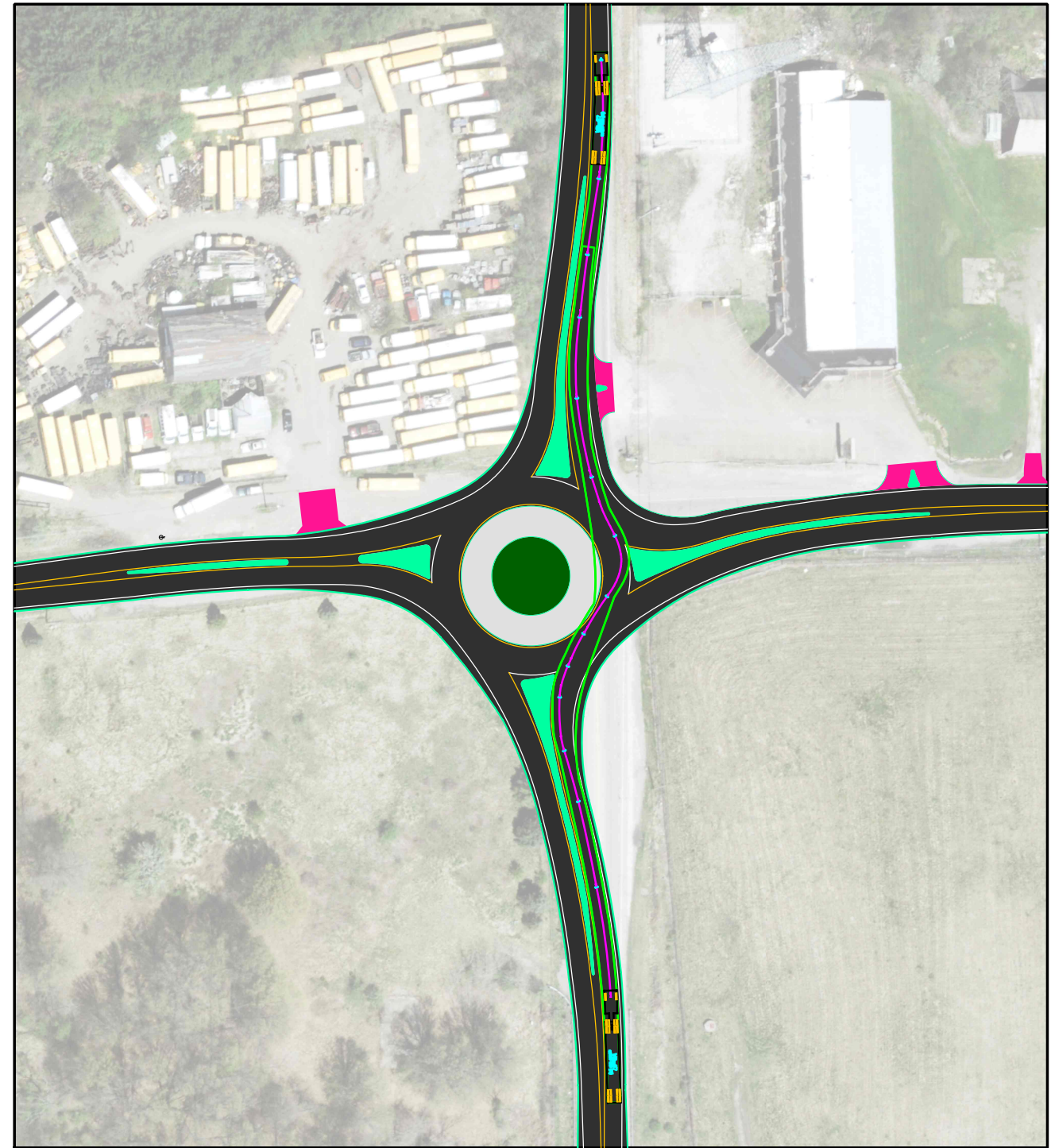
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NORTHBOUND SR-225: RIGHT TURN MOVEMENT



NORTHBOUND SR-225: LEFT TURN MOVEMENT



NORTHBOUND SR-225: THROUGH MOVEMENT



US-224 & SR-225 ROUNDABOUT
NORTHBOUND WB-67 TRUCK TURNING MOVEMENTS

DESIGN AGENCY

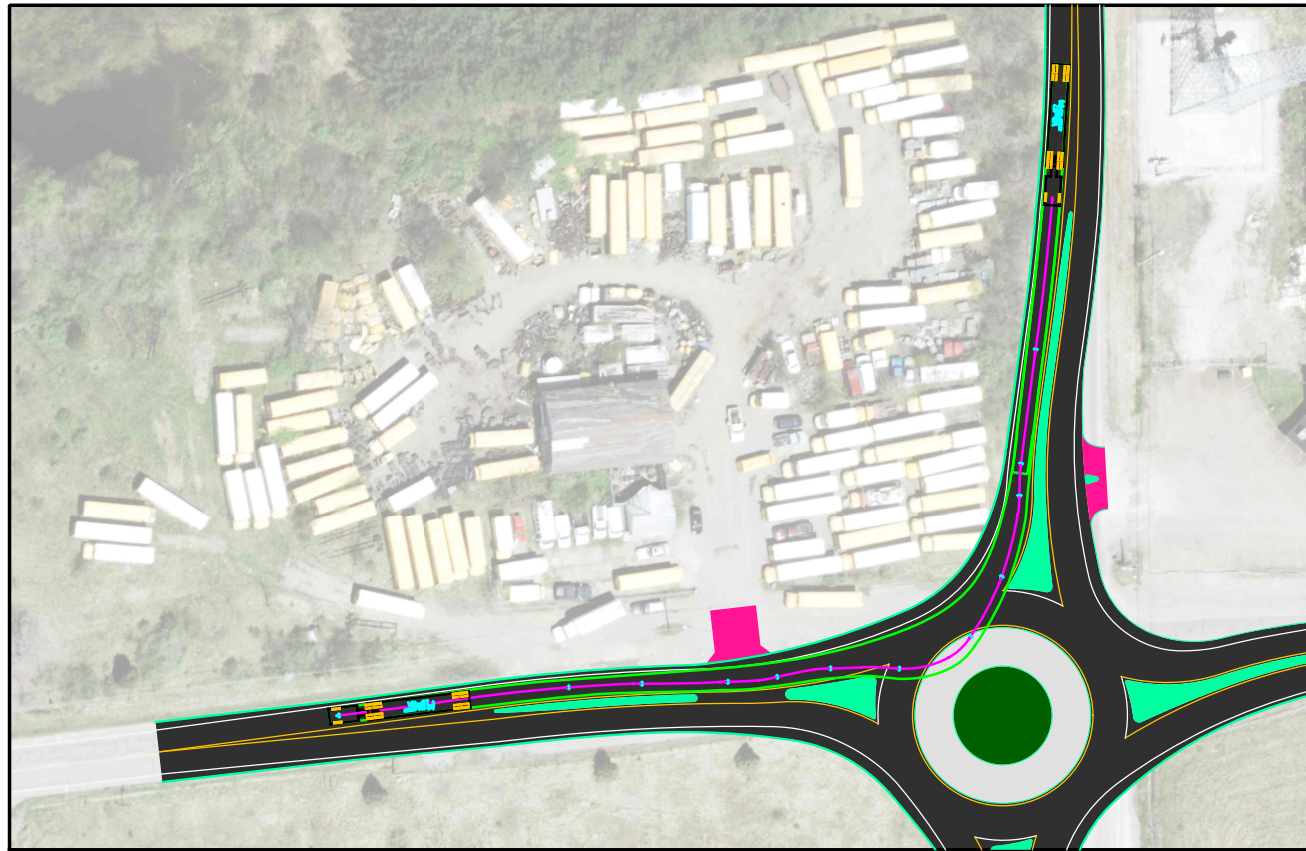


DESIGNER
CEF

REVIEWER
DMG 08-31-23

PROJECT ID
0

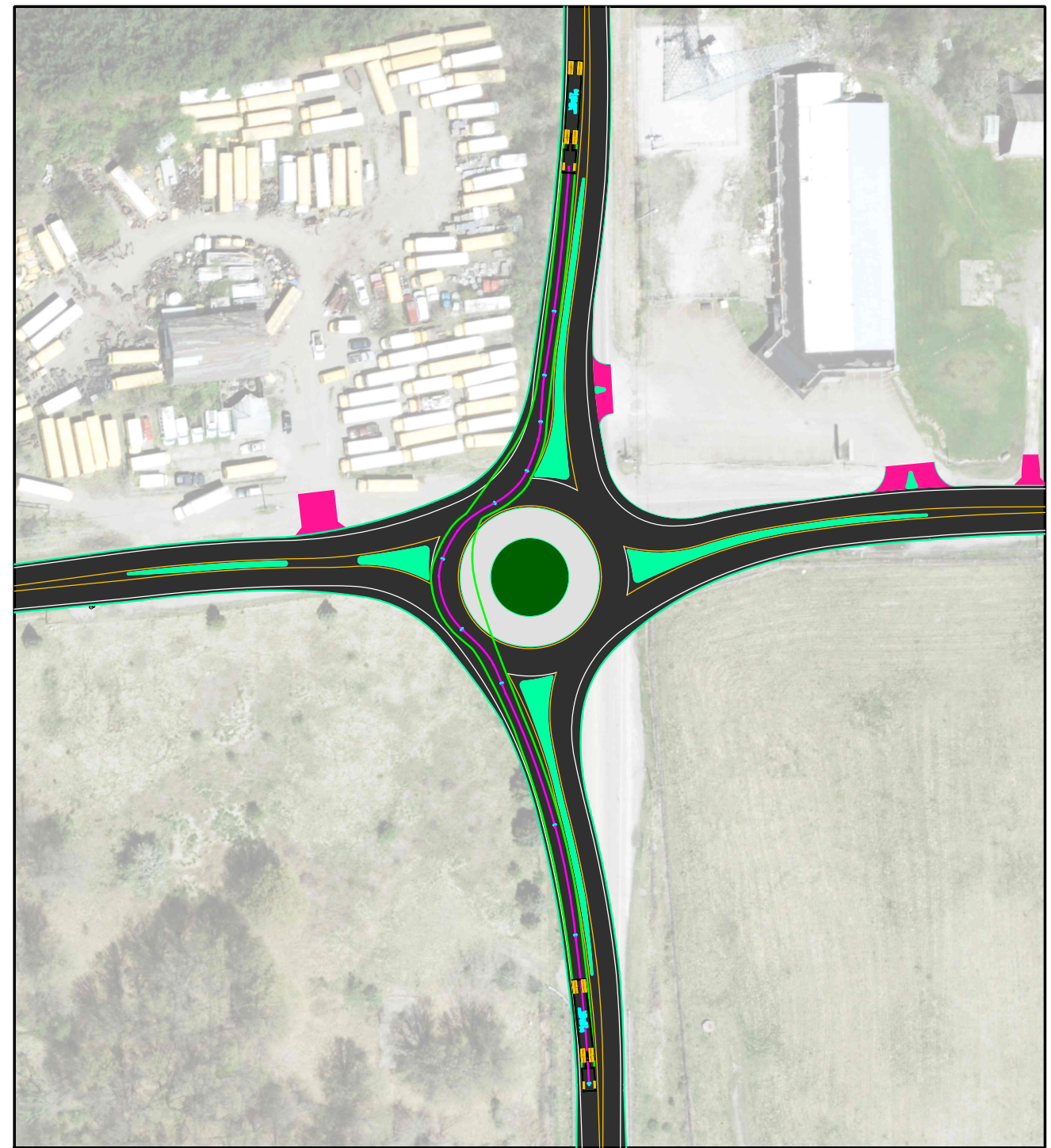
SHEET TOTAL
P.0 0



SOUTHBOUND SR-225: RIGHT TURN MOVEMENT



SOUTHBOUND SR-225: LEFT TURN MOVEMENT



SOUTHBOUND SR-225: THROUGH MOVEMENT



US-224 & SR-225 ROUNDABOUT
SOUTHBOUND WB-67 TRUCK TURNING MOVEMENTS

DESIGN AGENCY



DESIGNER
CEF

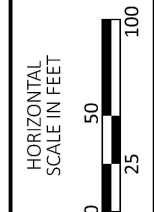
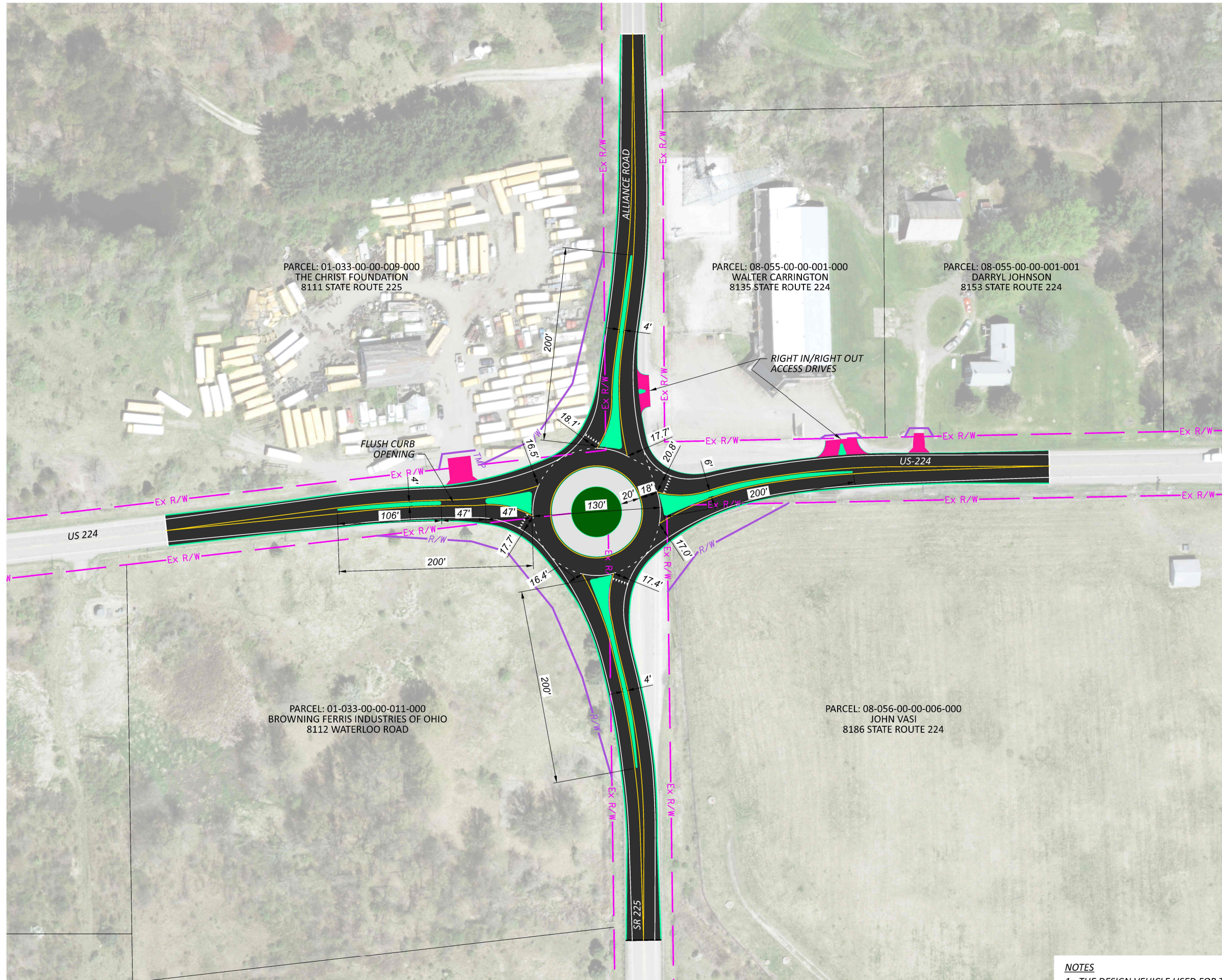
REVIEWER
DMG 08-31-23

PROJECT ID
0

SHEET TOTAL
P.0 0

Appendix M

Roundabout Dimensions and Critical Design Parameters



US-224 & SR-225 ROUNDABOUT
SCHEMATIC PLAN

DESIGN AGENCY



DESIGNER

CEF

REVIEWER

DMG 08-11-23

PROJECT ID

0

SHEET

P.0

TOTAL

0

NOTES

1. THE DESIGN VEHICLE USED FOR THE GEOMETRIC LAYOUT OF THE ROUNDABOUT IS A WB-67 TRUCK.

Roundabout Critical Design Parameters US-224 & SR-225

Design Parameters	Leg 1	Leg 2	Leg 3	Leg 4
	(North)	(West)	(South)	(East)
Inscribed Circle Diameter, FT	130			
Entry Width, FT	18.1	17.7	17.4	20.8
Entry Angle PHI ϕ , DEG	16	15	18	20
Exit Width, FT	17.7	16.5	16.5	17.0
Circulatory Roadway Width Upstream of Entry, FT	18	18	18	18

Fastest Path Speed	Leg 1	Leg 2	Leg 3	Leg 4
	(North)	(West)	(South)	(East)
R ₁ , Radius/Speed, FT/MPH	122.08	150.71	116.91	98.9
R ₁ , Speed, MPH	22.3	24.1	21.9	20.6
R ₂ , Radius/Speed, FT/MPH	69.16	69.84	103.4	105.53
R ₂ , Speed, MPH	17.0	17.1	19.8	19.9
R ₃ , Radius/Speed, FT/MPH	382.27	323.22	233.26	325.19
R ₃ , Speed, MPH	34.2	32.0	28.4	32.1
R ₄ , Radius/Speed, FT/MPH	51.01	51.01	51.01	51.01
R ₄ , Speed, MPH	15.1	15.1	15.1	15.1
R ₅ , Radius/Speed, FT/MPH	N/A	166.3	N/A	327.86
R ₅ , Speed, MPH	N/A	25.0	N/A	32.2
R ₅ , Bypass Radius/Speed, FT/MPH				

Minimum Sight Parameters	Leg 1	Leg 2	Leg 3	Leg 4
	(North)	(West)	(South)	(East)
Approach Design Speed, MPH	22.3	24.1	21.9	20.6
Approach Stopping Sight Distance, FT/MPH				
Circulatory Stopping Sight Distance, FT/MPH				
Exit (Crosswalk) Stopping Sight Distance, FT/MPH	N/A	N/A	N/A	N/A
Intersection Sight Distance, FT/MPH				

General	
Design Vehicle(s)	WB-67
Truck Apron Width, FT	20

Designer: Dustin Gohs

Signature:

Date: 8/28/2023

Appendix N

Cost Estimates



Roadway Improvements - Stop Controlled

Item	Description	Quantity	Units	Unit Cost	Total Cost
202	Pavement Removed	616	SY	\$ 17.00	\$ 10,472.00
202	Fence Removed	300	FT	\$ 6.00	\$ 1,800.00
203	Excavation (NW Quadrant)	190	CY	\$ 211.00	\$ 40,090.00
203	Excavation (NE Quadrant)	174	CY	\$ 37.50	\$ 6,525.00
203	Excavation (SE Quadrant)	149	CY	\$ 211.00	\$ 31,439.00
203	Excavation (SW Quadrant)	113	CY	\$ 211.00	\$ 23,843.00
203	Embankment (NW Quadrant)	125	CY	\$ 35.00	\$ 4,375.00
203	Embankment (NE Quadrant)	120	CY	\$ 35.00	\$ 4,200.00
203	Embankment (SE Quadrant)	113	CY	\$ 35.00	\$ 3,955.00
203	Embankment (SW Quadrant)	106	CY	\$ 35.00	\$ 3,710.00
204	Subgrade Compaction	180	SY	\$ 5.00	\$ 900.00
441	Asphalt Overlay	241	SY	\$ 46.00	\$ 11,086.00
441	Full-Depth Pavement (Asphalt)	173	SY	\$ 143.00	\$ 24,739.00
607	Fence	300	FT	\$ 30.00	\$ 9,000.00
625	Lighting	1	LUMP	\$ 25,000.00	\$ 25,000.00
630	Signage	1	LUMP	\$ 7,500.00	\$ 7,500.00
644	Centerline	0.10	MILE	\$ 8,600.00	\$ 860.00
644	Stop Line	75	FT	\$ 10.00	\$ 750.00
644	Edge Line	0.22	MILE	\$ 6,500.00	\$ 1,430.00
659	Seeding and Mulching	1	LUMP	\$ 5,000.00	\$ 5,000.00
832	Erosion Control	1	LUMP	\$ 5,000.00	\$ 5,000.00

Itemized Subtotal	\$ 221,680.00
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Incidentals					
614	Maintenance of Traffic	1	LUMP	\$ 35,000.00	\$ 35,000.00
623	Construction Layout Stakes	1	LUMP	\$ 5,000.00	\$ 5,000.00
624	Mobilization	1	LUMP	\$ 50,000.00	\$ 50,000.00

Incidentals Subtotal	\$ 90,000.00
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Contingency (30%) \$ 93,600.00

Construction Subtotal	\$ 405,280.00
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Engineering Design (15%)	\$ 60,800.00
Environmental, Geotechnical, Miscellaneous Federal Requirements (10%)	\$ 40,600.00
Right-of-Way* (Includes 30% Contingency)	\$ 80,000.00
Subtotal	\$ 586,700.00

Inflation* (9.9%) \$ 58,100.00

Total	\$ 644,800.00
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Note: Cost estimate does not include utility relocation costs.

*Inflation based on 2025 Construction. Note, inflation rates have been irregularly high recently. If the proposed project is not immediately moved forward, this cost estimate will likely need revised as time passes.

Acquisition	Parcel	Unit (Acreage)	Cost/Unit (\$\$/Acre)	Subtotal Land Value	Structure Value (If Taken)	Damages (Loss in Value to the Residue)	Subtotal Structures & Damages	Total Non-Labor Acquisition Costs	Parcel Count	Total Takes	Partial Takes	No. of Structures Impacted
Residential			\$0	\$0	\$0	\$0	\$0	\$0	0	0	0	0
Commercial	01-033-00-00-009-000	0.047	\$2,482	\$117	\$0	\$0	\$0	\$117	2	0	2	0
	08-055-00-00-001-000	0.037	\$72,807	\$2,694	\$0	\$0	\$0	\$2,694				
Industrial	01-033-00-00-011-000	0.074	\$2,482	\$184	\$0	\$0	\$0	\$184	2	0	2	0
	08-056-00-00-006-000	0.068	\$3,515	\$239	\$0	\$0	\$0	\$239	0	0	0	0
Agricultural				\$0	\$0	\$0	\$0	\$0				
Relocation	Unit (Displacement)		RHP/RSP	Move Cost	Re-establishment	0	0	0	Estimate amount of time necessary to relocate all RAP			
Residential									Estimated number of years until project wide R/W acquisition begins =3			
Owner Occupant	0		\$34,000	\$6,000			\$0					
Tenant	0		\$10,000	\$1750			\$0					
Commercial/Farm/NPO												
Owner	0			\$15,000	\$10,000		\$0					
Tenant	0			\$15,000	\$10,000		\$0					
Personal Property	0			\$1,000			\$0					
<small>(((total of acquisition cost) x 0.15] x 1.20] + (((total of</small>								Contingency	\$1,074	RHP - Replacement Housing Payment		
<small>Incidentals, Admin. Review, & Appropriation</small>								Total Non-Labor R/W Costs	\$4,308	RSP - Rent Supplemental Payment		
										NPO - Non-Profit Organization		
Labor (External)	Unit (Parcels)		Total Cost									
Titles	4		\$1,000	\$4,000								
Appraisals												
Simple	0		\$750	\$0								
Detailed	4		\$4,500	\$18,000								
			\$0									
Appraisal Review												
Simple	0		\$0	\$0								
Detailed	4		\$2,000	\$8,000								
			\$0									
Negotiations	4		\$1,800	\$7,200								
Relocations												
Personal Property	0		\$2,000	\$0								
Residential	0		\$8,000	\$0								
Commercial/Farm/NPO	0		\$6,000	\$0								
Closings	4		\$500	\$2,000								
Package Billing & Review	4		\$500	\$2,000								
Project Management	4		\$4,000	\$16,000								
Asbestos Testing & Abatement	0		\$5,000	\$0								
Total Labor Costs				\$57,200								
								Total Labor Costs		\$57,200		
								Total Non-Labor R/W Costs		\$4,308		
								Contingency		30%		
								TOTAL R/W COSTS		\$80,000		

Roadway Improvements - Traffic Signal

Item	Description	Quantity	Units	Unit Cost	Total Cost
202	Pavement Removed	616	SY	\$ 17.00	\$ 10,472.00
202	Fence Removed	300	FT	\$ 6.00	\$ 1,800.00
203	Excavation (NW Quadrant)	190	CY	\$ 211.00	\$ 40,090.00
203	Excavation (NE Quadrant)	174	CY	\$ 37.50	\$ 6,525.00
203	Excavation (SE Quadrant)	149	CY	\$ 211.00	\$ 31,439.00
203	Excavation (SW Quadrant)	113	CY	\$ 211.00	\$ 23,843.00
203	Embankment (NW Quadrant)	125	CY	\$ 35.00	\$ 4,375.00
203	Embankment (NE Quadrant)	120	CY	\$ 35.00	\$ 4,200.00
203	Embankment (SE Quadrant)	113	CY	\$ 35.00	\$ 3,955.00
203	Embankment (SW Quadrant)	106	CY	\$ 35.00	\$ 3,710.00
204	Subgrade Compaction	180	SY	\$ 5.00	\$ 900.00
441	Asphalt Overlay	241	SY	\$ 46.00	\$ 11,086.00
441	Full-Depth Pavement (Asphalt)	173	SY	\$ 143.00	\$ 24,739.00
607	Fence	100	FT	\$ 30.00	\$ 3,000.00
625	Lighting	1	LUMP	\$ 25,000.00	\$ 25,000.00
630	Signage	1	LUMP	\$ 5,000.00	\$ 5,000.00
632	Traffic Signal	1	LUMP	\$ 200,000.00	\$ 200,000.00
644	Centerline	0.10	MILE	\$ 8,600.00	\$ 860.00
644	Stop Line	75	FT	\$ 10.00	\$ 750.00
644	Edge Line	0.22	MILE	\$ 6,500.00	\$ 1,430.00
659	Seeding and Mulching	1	LUMP	\$ 1,500.00	\$ 1,500.00
832	Erosion Control	1	LUMP	\$ 1,500.00	\$ 1,500.00

Itemized Subtotal \$ 406,180.00

Incidentals					
614	Maintenance of Traffic	1	LUMP	\$ 35,000.00	\$ 35,000.00
623	Construction Layout Stakes	1	LUMP	\$ 5,000.00	\$ 5,000.00
624	Mobilization	1	LUMP	\$ 50,000.00	\$ 50,000.00

Incidentals Subtotal \$ 90,000.00

Contingency (30%) \$ 148,900.00

Construction Subtotal \$ 645,080.00

Engineering Design (15%) \$ 96,800.00
Environmental, Geotechnical, Miscellaneous Federal Requirements (10%) \$ 64,600.00
Right-of-Way* (Includes 30% Contingency) \$ 80,600.00

Subtotal \$ 887,100.00

Inflation* (9.9%) \$ 87,900.00

Total \$ 975,000.00

Note: Cost estimate does not include utility relocation costs.

*Inflation based on 2025 Construction. Note, inflation rates have been irregularly high recently. If the proposed project is not immediately moved forward, this cost estimate will likely need revised as time passes.

Acquisition	Parcel	Unit (Acreage)	Cost/Unit (\$\$/Acre)	Subtotal Land Value	Structure Value (If Taken)	Damages (Loss in Value to the Residue)	Subtotal Structures & Damages	Total Non-Labor Acquisition Costs	Parcel Count	Total Takes	Partial Takes	No. of Structures Impacted
Residential			\$0	\$0	\$0	\$0	\$0	\$0	0	0	0	0
Commercial	01-033-00-00-009-000	0.049	\$2,482	\$122	\$0	\$0	\$0	\$122	2	0	2	0
	08-055-00-00-001-000	0.039	\$72,807	\$2,839	\$0	\$0	\$0	\$2,839				
Industrial	01-033-00-00-011-000	0.076	\$5,060	\$385	\$0	\$0	\$0	\$385	2	0	2	0
	08-056-00-00-006-000	0.070	\$3,515	\$246	\$0	\$0	\$0	\$246				
Agricultural			\$0	\$0	\$0	\$0	\$0	\$0	0	0	0	0
Relocation	Unit (Displacement)		RHP/RSP		Move Cost		Re-establishment		Total Non-Labor RAP Costs		Estimate amount of time necessary to relocate all RAP	
Residential											Estimated number of years until project wide R/W acquisition begins =3	
Owner Occupant		0	\$34,000		\$6,000			\$0				
Tenant		0	\$10,000		\$1750			\$0				
Commercial/Farm/NPO												
Owner		0			\$15,000	\$10,000		\$0				
Tenant		0			\$15,000	\$10,000		\$0				
Personal Property		0			\$1,000			\$0				
$\frac{[(\text{total of acquisition cost}) \times 0.09] \times 0.025}{1} + \frac{[(\text{total of acquisition cost}) \times 0.15] \times 1.20}{1} + \frac{[(\text{total of acquisition cost}) \times 0.10] \times 1.50}{1} =$								Contingency		\$1,193		
								<i>(Incidentals, Admin. Review, & Appropriation)</i>		\$4,785		
								Total Non-Labor R/W Costs				
Labor (External)		Unit (Parcels)	Unit Price	Total Cost								
Titles		4	\$1,000	\$4,000								
Appraisals												
Simple		0	\$750	\$0								
Detailed		4	\$4,500	\$18,000								
Appraisal Review												
Simple		0	\$500	\$0								
Detailed		4	\$2,000	\$8,000								
Negotiations		4	\$1,800	\$7,200								
Relocations												
Personal Property		0	\$2,000	\$0								
Residential		0	\$8,000	\$0								
Commercial/Farm/NPO		0	\$6,000	\$0								
Closings		4	\$500	\$2,000								
Package Billing & Review		4	\$500	\$2,000								
Project Management		4	\$4,000	\$16,000								
Asbestos Testing & Abatement		0	\$5,000	\$0								
Total Labor Costs				\$57,200								
								Total Labor Costs		\$57,200		
								Total Non-Labor R/W Costs		\$4,785		
								Contingency		30%		
								TOTAL R/W COSTS		\$80,600		

This R/W Cost Estimate Prepared by	Date
Carpenter Marty Transportation	8/03/2023

Roadway Improvements - Turn Lanes

Item	Description	Quantity	Units	Unit Cost	Total Cost
202	Pavement Removed	1728	SY	\$ 12.00	\$ 20,736.00
202	Fence Removed	500	FT	\$ 6.00	\$ 3,000.00
203	Excavation (NW Quadrant)	684	CY	\$ 211.00	\$ 144,324.00
203	Excavation (NE Quadrant)	537	CY	\$ 37.50	\$ 20,137.50
203	Excavation (SE Quadrant)	412	CY	\$ 211.00	\$ 86,932.00
203	Excavation (SW Quadrant)	505	CY	\$ 211.00	\$ 106,555.00
203	Embankment (NW Quadrant)	39	CY	\$ 35.00	\$ 1,365.00
203	Embankment (NE Quadrant)	39	CY	\$ 35.00	\$ 1,365.00
203	Embankment (SE Quadrant)	40	CY	\$ 35.00	\$ 1,400.00
203	Embankment (SW Quadrant)	37	CY	\$ 35.00	\$ 1,295.00
204	Subgrade Compaction	4905	SY	\$ 4.00	\$ 19,620.00
441	Asphalt Overlay	4980	SY	\$ 27.00	\$ 134,460.00
441	Full-Depth Pavement (Asphalt)	4819	SY	\$ 113.00	\$ 544,547.00
452	Full-Depth Pavement (Concrete)	1394	SY	\$ 100.00	\$ 139,400.00
607	Fence	500	FT	\$ 20.00	\$ 10,000.00
625	Lighting	1	LUMP	\$ 25,000.00	\$ 25,000.00
630	Signage	1	LUMP	\$ 5,000.00	\$ 5,000.00
644	Centerline	0.49	MILE	\$ 8,600.00	\$ 4,210.00
644	Transverse Line	372	FT	\$ 7.50	\$ 2,790.00
644	Stop Line	49	FT	\$ 10.00	\$ 490.00
644	Edge Line	0.64	MILE	\$ 6,500.00	\$ 4,160.00
644	Channelizing Line	630	FT	\$ 2.00	\$ 1,260.00
644	Lane Arrow	7	EACH	\$ 115.00	\$ 810.00
659	Seeding and Mulching	1	LUMP	\$ 10,000.00	\$ 10,000.00
832	Erosion Control	1	LUMP	\$ 10,000.00	\$ 10,000.00

Itemized Subtotal \$ 1,298,860.00

Incidentals

614	Maintenance of Traffic	1	LUMP	\$ 75,000.00	\$ 75,000.00
623	Construction Layout Stakes	1	LUMP	\$ 10,000.00	\$ 10,000.00
624	Mobilization	1	LUMP	\$ 100,000.00	\$ 100,000.00

Incidentals Subtotal \$ 185,000.00

Contingency (30%) \$ 445,200.00

Construction Subtotal \$ 1,929,060.00

Engineering Design (15%) \$ 289,400.00
Environmental, Geotechnical, Miscellaneous Federal Requirements (10%) \$ 193,000.00
Right-of-Way* (Includes 30% Contingency) \$ 115,600.00

Subtotal \$ 2,527,100.00

Inflation* (9.9%) \$ 250,200.00

Total \$ 2,777,300.00

Note: Cost estimate does not include utility relocation costs.

*Inflation based on 2025 Construction. Note, inflation rates have been irregularly high recently. If the proposed project is not immediately moved forward, this cost estimate will likely need revised as time passes.

Acquisition	Parcel	Unit (Acreage)	Cost/Unit (\$\$/Acre)	Subtotal Land Value	Structure Value (If Taken)	Damages (Loss in Value to the Residue)	Subtotal Structures & Damages	Total Non-Labor Acquisition Costs	Parcel Count	Total Takes	Partial Takes	No. of Structures Impacted	
Residential	08-055-00-00-001-001	0.002	\$34,158	\$68	\$0	\$0	\$0	\$68	1	0	1	0	
Commercial	01-033-00-00-009-000	0.075	\$2,482	\$186	\$0	\$0	\$0	\$186	2	0	2	0	
	08-055-00-00-001-000	0.012	\$72,807	\$874	\$0	\$0	\$0	\$874					
Industrial	01-033-00-00-011-000	0.137	\$5,060	\$693	\$0	\$0	\$0	\$693	3	0	3	0	
	01-033-00-00-013-000	0.019	\$6,100	\$116	\$0	\$0	\$0	\$116					
	08-056-00-00-006-000	0.119	\$3,515	\$418	\$0	\$0	\$0	\$418					
Agricultural			\$0	\$0	\$0	\$0	\$0	\$0	0	0	0	0	
Relocation	Unit (Displacement)		RHP/RSP		Move Cost	Re-establishment		Total Non-Labor RAP Costs	Estimate amount of time necessary to relocate all RAP				
Residential									Estimated number of years until project wide R/W acquisition begins =3				
Owner Occupant	0		\$34,000		\$6,000			\$0					
Tenant	0		\$10,000		\$1750			\$0					
Commercial/Farm/NPO													
Owner	0				\$15,000	\$10,000		\$0					
Tenant	0				\$15,000	\$10,000		\$0					
Personal Property	0				\$1,000			\$0					
$(((\text{total of acquisition cost}) \times 0.09) \times 0.025) + (((\text{total of acquisition cost}) \times 0.15) \times 1.20) + (((\text{total of acquisition cost}) \times 0.10) \times 1.50) =$								Contingency	\$782	RHP - Replacement Housing Payment			
								(Incidentals, Admin. Review, & Appropriation)			RSP - Rent Supplemental Payment		
								Total Non-Labor R/W Costs	\$3,137	NPO - Non-Profit Organization			
Labor (External)	Unit (Parcels)		Unit Price	Total Cost									
Titles	6		\$1,000	\$6,000									
Appraisals													
Simple	0		\$750	\$0									
Detailed	6		\$4,500	\$27,000									
Appraisal Review													
Simple	0		\$500	\$0									
Detailed	6		\$2,000	\$12,000									
Negotiations	6		\$1,800	\$10,800									
Relocations													
Personal Property	0		\$2,000	\$0									
Residential	0		\$8,000	\$0									
Commercial/Farm/NPO	0		\$6,000	\$0									
Closings	6		\$500	\$3,000									
Package Billing & Review	6		\$500	\$3,000									
Project Management	6		\$4,000	\$24,000									
Asbestos Testing & Abatement	0		\$5,000	\$0									
Total Labor Costs				\$85,800									
								Total Labor Costs		\$85,800			
								Total Non-Labor R/W Costs		\$3,137			
								Contingency		30%			
								TOTAL R/W COSTS		\$115,600			

This R/W Cost Estimate Prepared by		Date
Carpenter Marty Transportation		8/03/2023

Roadway Improvements - Roundabout

Item	Description	Quantity	Units	Unit Cost	Total Cost
202	Pavement Removed	6903	SY	\$ 12.00	\$ 82,836.00
202	Fence Removed	125	FT	\$ 6.00	\$ 750.00
203	Excavation (NW Quadrant)	505	CY	\$ 211.00	\$ 106,555.00
203	Excavation (NE Quadrant)	79	CY	\$ 37.50	\$ 2,962.50
203	Excavation (SE Quadrant)	230	CY	\$ 211.00	\$ 48,530.00
203	Excavation (SW Quadrant)	697	CY	\$ 211.00	\$ 147,067.00
203	Embankment (NW Quadrant)	79	CY	\$ 35.00	\$ 2,765.00
203	Embankment (NE Quadrant)	127	CY	\$ 35.00	\$ 4,445.00
203	Embankment (SE Quadrant)	76	CY	\$ 35.00	\$ 2,660.00
203	Embankment (SW Quadrant)	73	CY	\$ 35.00	\$ 2,555.00
204	Subgrade Compaction	8521	SY	\$ 4.00	\$ 34,084.00
441	Full Depth Pavement (Asphalt)	7266	SY	\$ 113.00	\$ 821,058.00
452	Concrete Truck Apron	487	SY	\$ 150.00	\$ 73,050.00
452	Concrete Drive	204	SY	\$ 150.00	\$ 30,666.67
607	Fence	125	FT	\$ 20.00	\$ 2,500.00
609	Concrete Curb	7600	FT	\$ 35.00	\$ 266,000.00
609	Concrete Traffic Island	516	SY	\$ 135.00	\$ 69,720.00
611	Drainage	1	LUMP	\$ 400,000.00	\$ 400,000.00
625	Lighting	1	LUMP	\$ 120,000.00	\$ 120,000.00
630	Signage	1	LUMP	\$ 20,000.00	\$ 20,000.00
644	Pavement Markings	1	LUMP	\$ 11,000.00	\$ 11,000.00
659	Seeding and Mulching	1	LUMP	\$ 20,000.00	\$ 20,000.00
832	Erosion Control	1	LUMP	\$ 20,000.00	\$ 20,000.00

Itemized Subtotal \$ 2,289,210.00

Incidentals

614	Maintenance of Traffic	1	LUMP	\$ 150,000.00	\$ 150,000.00
623	Construction Layout Stakes	1	LUMP	\$ 20,000.00	\$ 20,000.00
624	Mobilization	1	LUMP	\$ 100,000.00	\$ 100,000.00

Incidentals Subtotal \$ 270,000.00

Contingency (30%) \$ 767,800.00

Construction Subtotal \$ 3,327,010.00

Engineering Design (15%) \$ 499,100.00
Environmental, Geotechnical, Miscellaneous Federal Requirements (10%) \$ 332,800.00
Right-of-Way* (Includes 30% Contingency) \$ 97,900.00

Subtotal \$ 4,256,900.00

Inflation* (9.9%) \$ 421,500.00

Total \$ 4,678,400.00

Note: Cost estimate does not include utility relocation costs.

*Inflation based on 2025 Construction. Note, inflation rates have been irregularly high recently. If the proposed project is not immediately moved forward, this cost estimate will likely need revised as time passes.

Acquisition	Parcel	Unit (Acreage)	Cost/Unit (\$\$/Acre)	Subtotal Land Value	Structure Value (If Taken)	Damages (Loss in Value to the Residue)	Subtotal Structures & Damages	Total Non-Labor Acquisition Costs	Parcel Count	Total Takes	Partial Takes	No. of Structures Impacted	
Residential	08-055-00-00-001-001	0.005	\$34,158	\$171	\$0	\$0	\$0	\$171	1	0	1	0	
Commercial	01-033-00-00-009-000	0.172	\$2,482	\$427	\$0	\$0	\$0	\$427	2	0	2	0	
	08-055-00-00-001-000	0.003	\$72,807	\$218	\$0	\$0	\$0	\$218					
Industrial	01-033-00-00-011-000	0.339	\$5,060	\$1,715	\$0	\$0	\$0	\$1,715	2	0	2	0	
	08-056-00-00-006-000	0.100	\$3,515	\$352	\$0	\$0	\$0	\$352					
Agricultural			\$0	\$0	\$0	\$0	\$0	\$0	0	0	0	0	
Relocation	Unit (Displacement)		RHP/RSP		Move Cost	Re-establishment		Total Non-Labor RAP Costs	Estimate amount of time necessary to relocate all RAP				
Residential									Estimated number of years until project wide R/W acquisition begins =3				
Owner Occupant	0		\$34,000		\$6,000			\$0					
Tenant	0		\$10,000		\$1750			\$0					
Commercial/Farm/NPO													
Owner	0				\$15,000	\$10,000		\$0					
Tenant	0				\$15,000	\$10,000		\$0					
Personal Property	0				\$1,000			\$0					
$(((\text{total of acquisition cost}) \times 0.09) \times 0.025) + (((\text{total of acquisition cost}) \times 0.15) \times 1.20) + (((\text{total of acquisition cost}) \times 0.10) \times 1.50) =$								Contingency <small>(Incidentals, Admin. Review, & Appropriation)</small>	\$958	RHP - Replacement Housing Payment RSP - Rent Supplemental Payment NPO - Non-Profit Organization			
								Total Non-Labor R/W Costs	\$3,841				
Labor (External)	Unit (Parcels)		Unit Price	Total Cost									
Titles	5		\$1,000	\$5,000									
Appraisals													
Simple	0		\$750	\$0									
Detailed	5		\$4,500	\$22,500									
Appraisal Review													
Simple	0		\$500	\$0									
Detailed	5		\$2,000	\$10,000									
Negotiations	5		\$1,800	\$9,000									
Relocations													
Personal Property	0		\$2,000	\$0									
Residential	0		\$8,000	\$0									
Commercial/Farm/NPO	0		\$6,000	\$0									
Closings	5		\$500	\$2,500									
Package Billing & Review	5		\$500	\$2,500									
Project Management	5		\$4,000	\$20,000									
Asbestos Testing & Abatement	0		\$5,000	\$0									
Total Labor Costs				\$71,500									
								Total Labor Costs				\$71,500	
								Total Non-Labor R/W Costs				\$3,841	
								Contingency				30%	
								TOTAL R/W COSTS				\$97,900	

This R/W Cost Estimate Prepared by	Date
Carpenter Marty Transportation	8/07/2023

Appendix 0





CAPX Analysis



Capacity Analysis for Planning of Junctions

Summary Report

Project Name:	POR-224 at 225
Project Number:	117158
Location:	POR 224 at 225
Date:	2047 PM
Number of Intersection Legs:	4
Major Street Direction:	East-West

Traffic Volume Demand						
	Volume (Veh/hr)				Percent (%)	
	U-Turn 	Left 	Thru 	Right 	Heavy Vehicles	Volume Growth
Eastbound	0	20	170	20	3.00%	0.00%
Westbound	0	340	90	10	9.00%	0.00%
Southbound	0	10	90	10	4.00%	0.00%
Northbound	0	20	60	350	10.00%	0.00%
Adjustment Factor	0.80	0.95		0.85		
Suggested	0.80	0.95		0.85		
Truck to PCE Factor				Suggested = 2.00	2.00	
Multimodal Activity Level		0				
E-W / Crossing East-West Legs		Low	Low	Low		
N-S / Crossing North-South Legs		Low	Low	Low		
Critical Lane Volume Threshold	2-phase signal	Suggested = 1800 (Urban), 1650 (Rural)			1800	
	3-phase signal	Suggested = 1750 (Urban), 1600 (Rural)			1750	
	4-phase signal	Suggested = 1700 (Urban), 1550 (Rural)			1700	

Capacity Analysis for Planning of Junctions

Summary Report

#####				
TYPE OF INTERSECTION	Overall v/c Ratio	V/C Ranking	Pedestrian Accommodations	Bicycle Accommodations
1 X 1 Roundabout	0.43	1	5.39	4.71
Traffic Signal	0.56	2	4.94	4.75
All-Way Stop Control	0.77	3	4.12	4.75
Two-Way Stop Control E-W	3.19	4	2.88	3.99
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Appendix P

Benefit-Cost Analysis



Safety Benefit - Cost Analysis

General Information

Project Name	VAR-STW Safety Studies	Contact Email	gbalsamo@cmtran.com
Project Description	POR US 224 and SR 225 Safety Study	Contact Phone	614-656-2429
Reference Number	117158	Date Performed	4/21/2023
Analyst	GMB	Analysis Year	2020
Agency/Company	Carpenter Marty Transportation		

Select Site Types to be used in Benefit-Cost Analysis: <input type="checkbox"/> All Sites	Comments:
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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
		\$0.00			\$0.00	\$0.00	3.614	\$95,412
		\$0.00			\$0.00	\$0.00		
		\$0.00			\$0.00	\$0.00		
Install Traffic Signal	20	\$887,170.90			\$887,170.90	\$887,170.90		
		\$0.00			\$0.00	\$0.00	0.000	\$0
		\$0.00			\$0.00	\$0.00	0.000	\$0
		\$0.00			\$0.00	\$0.00	0.000	\$0
		\$0.00			\$0.00	\$0.00	0.000	\$0
		\$0.00			\$0.00	\$0.00	0.000	\$0
		\$0.00			\$0.00	\$0.00	0.000	\$0
		\$0.00			\$0.00	\$0.00	0.000	\$0
		\$0.00			\$0.00	\$0.00	0.000	\$0
		\$0.00			\$0.00	\$0.00	0.000	\$0
		\$0.00			\$0.00	\$0.00	0.000	\$0
Totals		\$887,170.90	\$0.00	\$0.00	\$887,170.90	\$887,170.90	3.614	\$95,412

Benefit - Cost Calculator

Net Present Value of Project	\$887,170.90
Net Present Value of Safety Benefits	\$95,412.23
Net Benefit	(\$791,758.67)
Benefit / Cost Ratio	0.11

Expected Annual Crash Adjustment

Number of Fatal & Incapacitating Injury Crashes	-0.137
Number of Injury Crashes	0.369
Number of Total Crashes	3.614

Comments: