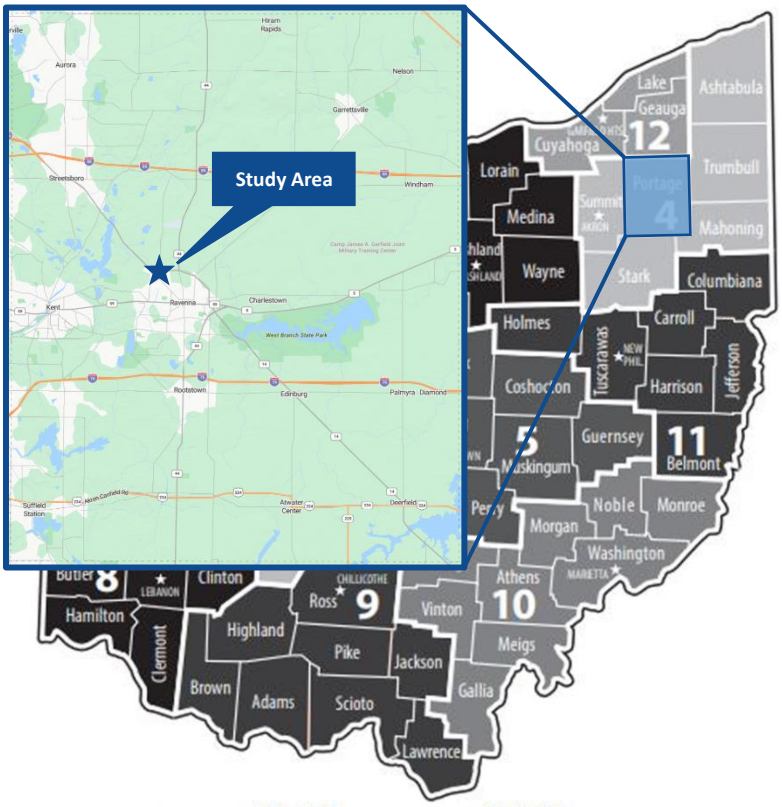
POR-14 AT CLEVELAND ROAD SAFETY STUDY

POR-14 at Cleveland Road, Infirmary Road, Lover's Lane

March 21st, 2025



Engineers, Surveyors, Planners, Scientists
5500 New Albany Rd., Columbus, OH 43054
p. 614.775.4500 f. 614.775.4800
emht.com

2021-1202 | WO 4-26-1

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1.0 EXECUTIVE SUMMARY

1.1 Background

A safety study was initiated in 2019 for the intersection of State Route (SR) 14 at Cleveland Road. From 2019 to 2023, the intersection experienced 26 crashes, with 13 being angle collisions involving vehicles traveling northwest on Cleveland Road turning onto SR 14, and colliding with vehicles traveling southeast on SR 14. Of these 13 collisions, 9 were coded as injury. There were 8 non-injury rear end collisions involving vehicles traveling northwest on Cleveland Road. ODOT District 4 proposed converting the intersection to a right-in only from SR 14 to Cleveland Road and installing a cul-de-sac for northbound Cleveland Road to mitigate the cause of nearly all the crashes. Due to the redistribution of traffic caused by the removal of turning movements, the adjacent intersections of SR 14/Infirmary Road and Infirmary Road/Lovers Lane were included in an updated Study Area for this study to determine if improvements were needed at either location.

1.2 Purpose and Need

The purpose of this study is to reduce the crash frequency/severity at SR 14/Cleveland Road and SR 14/Infirmary Road. The data, analysis, and recommendations in this study could be utilized to apply for Highway Safety Improvement (HSIP) funding to implement safety improvements in the study area. The SR 14 and Cleveland Road intersection ranked #83 on the 2018 Ohio Department of Transportation (ODOT) Highway Safety Improvement Program (HSIP) Priority List for suburban intersections. The intersection ranked #341 in 2020, #451 in 2021, and was unranked in 2024. The SR 14 and Infirmary Road intersection was unranked on the ODOT HSIP Priority List for suburban intersections in 2018. It appeared on the list ranked #260 in 2020, #498 in 2021, and #357 in 2024.

1.3 Overview of Safety Concerns

Crash data from 2019 to 2023 at SR 14 and Cleveland Road intersection, the SR 14 and Infirmary Road intersection, and the Infirmary Road and Lovers Lane intersection were provided by ODOT District 4. An average of 5.2 crashes per year were experienced at the SR 14 and Cleveland Road intersection, with 50% of these being angle crashes and 70% of these angle crashes resulting in injury. These crashes indicate that drivers are not selecting appropriate gaps in traffic when entering SR 14 from Cleveland Road, potentially due to the Cleveland Road intersecting SR 14 at an angle of 15 degrees in addition to the excessive delay experienced by drivers on Cleveland Road in the existing condition. An average of 11 crashes per year were experienced at the SR 14 and Infirmary Road intersection, with 65% of these being rear ends and 29% of these rear ends resulting in injury. The crash history indicates that drivers are not perceiving stopped traffic at the traffic signal at the intersection.

1.4 Recommended Countermeasures

Recommended countermeasures to mitigate crash patterns in the study area are as follows:

- Convert the SR 14 and Cleveland Road intersection to a right-only from SR 14 eastbound to southbound Cleveland Road, and install a cul-de-sac for northbound Cleveland Road.

- Change the SR 14 and Infirmary Road signalized intersection into a modern multi-lane roundabout.
- Install northbound and southbound turn lanes at the Infirmary Road and Lovers Lane intersection.

2.0 PURPOSE AND NEED

The intersection of SR 14 at Cleveland Road was ranked #83 on the 2018 Ohio Department of Transportation (ODOT) Highway Safety Improvement Program (HSIP) Priority List for suburban intersections. Since the inception of the study, the intersection has ranked as follows:

- #341 on the 2020 ODOT HSIP Priority List
- #451 on the 2021 ODOT HSIP Priority List
- Unranked on the 2024 ODOT HSIP Priority List

The intersection of SR 14 at Infirmary Road has appeared on the HSIP list as follows:

- Unranked on the 2018 ODOT HSIP Priority List
- #260 on the 2020 ODOT HSIP Priority List
- #498 on the 2021 ODOT HSIP Priority List
- #357 on the 2024 ODOT HSIP Priority List

The intersection of Infirmary Road/Lovers Lane is not ranked on the 2024 ODOT HSIP Priority List, experiencing only 6 crashes from 2019-2023. For the same period, the SR 14/Infirmary Road intersection experienced 55 crashes. Of the 55 crashes, 35 were rear ends collisions, with 10 coded as injury. Most of the rear ends involved vehicles traveling eastbound and westbound on SR 14. Eleven of the crashes were angle collisions, with 7 coded as injury.

The purpose of this study is to identify crash trends, develop and examine potential countermeasures, and evaluate countermeasures using Highway Safety Manual methodology and benefit-cost analyses. Methodology, results, and recommendations are included below.

3.0 EXISTING CONDITIONS

3.1 Roadway Information

The Study Area is located on SR 14, northwest of Ravenna in Portage County. SR 14 is a northwest-southeast route that runs through northeast Ohio. **Figure 1** and **Figure 2** show the general location of the Study Area, which includes SR 14/Cleveland Road, SR 14/Infirmary Road, and Infirmary Road/Lovers Lane. There are existing trailblazing signs present at the Cleveland Road/Infirmary Road intersection that guide vehicles to SR 14 via infirmary Road, instead of Cleveland Road, as seen in **Figure 3**.

Figure 1: Location Map

Figure 2: Study Area Intersections

Figure 3: Cleveland Road Looking Northwest at Infirmary Road

SR 14 is a two-lane roadway with a 55mph legal speed. Both vertical and horizontal curvature is present within the study area. The roadway is rural in character with access points to single-family residences present. The roadway is uncurbed through the study area with paved shoulders generally four feet wide.

Cleveland Road is a two-lane roadway with a 35mph posted speed limit. It is rural in character with narrow paved shoulders and one single-family residential access point in the vicinity of SR 14.

Infirmary Road is a two-lane roadway with 24 feet of pavement width, and 2-foot paved shoulders, and has similar characteristics to SR 14. The roadway runs generally north-south and has a posted speed limit of 45mph.

Lovers Lane is a two-lane roadway with 20 feet of pavement width, and 1-foot shoulders width. The roadway runs east and west and has a posted speed limit of 40 mph. An existing condition diagram showing roadway characteristics at the study is provided in **Appendix A**.

3.2 Intersection Geometry and Conditions

The SR 14/Cleveland Road intersection is stop-controlled on Cleveland Road. Cleveland Road approaches SR 14 at an angle of 15 degrees, resulting in atypical intersection geometry. Vehicles traveling southeast on SR 14 can turn right onto Cleveland Road with a slight deflection in alignment preventing a direct entry path. The roadway has a small radius curve to provide vehicles traveling northwest on Cleveland Road with a better approach angle and to accommodate left turns from SR 14. **Figure 4** shows the atypical SR 14/Cleveland Road intersection configuration.

Figure 4: SR 14 and Cleveland Road

The SR 14/Infirmary Road intersection is signal controlled. The eastbound and westbound approaches have dedicated left turn lanes, and a thru-right lanes. The eastbound left turn operates as permissive only, and the westbound left turn operates as protective-permissive. The northbound and southbound approaches are single lane approaches with no dedicated turn lanes. Infirmary Road intersects SR 14 at a right angle and minimal vertical curvature is present.

The Infirmary Road/Lovers Lane intersection is stop controlled for Lovers Lane, while Infirmary Road is free flow. Infirmary Road intersects Lovers Lane at a right angle approximately 350 feet south of SR 14.

4.0 TRAFFIC DATA AND PROJECTIONS

ODOT District 4 provided Opening Year 2023 and Design Year 2043 design hour volumes (DHV) for the Study Area, with no growth expected at this location during this time period. DHVs include existing condition volumes and volumes for the proposed restriction of turning movements at the SR 14/Cleveland Road intersection. The rerouted traffic volumes are referred to as "Detour" condition in the accompanying traffic plates. The raw traffic volumes, truck percentages, existing DHVs, and Detour condition DHVs provided by ODOT can be found in **Appendix B**.

5.0 CRASH DATA

5.1 Crash Data Summary

ODOT provided EMH&T with 2019 to 2023 crash data via a completed CAM Tool for all three Study Area intersections. ODOT also provided completed crash diagrams, and EMH&T referenced crash reports as needed to investigate crash trends. A total of 87 crashes were reported in the Study Area over the specified five-year period, with 32 injuries, and no fatalities. **Table 1** shows a

summary of the crash data at SR 14/Cleveland Road, **Table 2** shows a summary of the crash data at SR 14/Infirmary Road, and **Table 3** shows a summary of the crash data at Infirmary Road/Lovers Lane.

Table 1: SR 14/Cleveland Road Crash Summary

Year	Crashes	%
2019	6	23.08%
2020	6	23.08%
2021	2	7.69%
2022	7	26.92%
2023	5	19.23%
Grand Total	26	100.00%

Unit 1 Contributing Factor	Crashes	%
Failure to Yield	8	30.77%
Following Too Closely/ACDA	6	23.08%
Failure to Stop	4	15.38%
Failure to Control	3	11.54%
Improper Start From a Parked Position	2	7.69%
Left of Center	2	7.69%
Ran Stop Sign	1	3.85%
Grand Total	26	100.00%

Crash Type	Crashes	%
Angle	13	50.00%
Rear End	8	30.77%
Fixed Object	3	11.54%
Sideswipe - Meeting	1	3.85%
Head On	1	3.85%
Grand Total	26	100.00%

Crash Severity	Crashes	%
(3) Minor Injury Suspected	7	26.92%
(4) Injury Possible	3	11.54%
(5) PDO/No Injury	16	61.54%
Grand Total	26	100.00%

Table 1 shows 13 of the crashes at this intersection were left turn or angle collisions. These angle collisions were a result of a vehicle traveling northwest from Cleveland Road turning onto SR 14, and being struck by a vehicle traveling southeast on SR 14. Of the 13 crashes, 9 resulted in injury, all of which had a contributing factor of failure to yield or failure to stop.

Table 2: SR 14/Infirmary Road Crash Summary

Year	Crashes	%
2019	11	20.00%
2020	6	10.91%
2021	10	18.18%
2022	13	23.64%
2023	15	27.27%
Grand Total	55	100.00%

Unit 1 Contributing Factor	Crashes	%
Following Too Closely/ACDA	31	56.36%
Failure to Control	6	10.91%
Failure to Yield	6	10.91%
Improper Start From a Parked Position	4	7.27%
Ran Red Light	3	5.45%
Not Discernible	3	5.45%
Improper Backing	1	1.82%
None	1	1.82%
Grand Total	55	100.00%

Crash Type	Crashes	%
Rear End	35	63.64%
Angle	7	12.73%
Fixed Object	7	12.73%
Left Turn	4	7.27%
Sideswipe - Passing	1	1.82%
Backing	1	1.82%
Grand Total	55	100.00%

Crash Severity	Crashes	%
(3) Minor Injury Suspected	9	16.36%
(4) Injury Possible	10	18.18%
(5) PDO/No Injury	36	65.45%
Grand Total	55	100.00%

Table 2 shows 35 of the 55 crashes at SR 14/Infirmary Road intersection were rear end collisions. Of the 35 rear ends, 10 resulted in injury. Crash data for the intersection also shows that 11 of the

55 crashes were angle or left turn collisions. Of these 11 crashes, 7 resulted in injuries. Several fixed object crashes were also recorded at this intersection.

Table 3: Infirmary Road/Lovers Lane Crash Summary

Year	Crashes	%
2019	2	33.33%
2020	1	16.67%
2021	1	16.67%
2022	2	33.33%
Grand Total	6	100.00%

Unit 1 Contributing Factor	Crashes	%
Failure to Yield	2	33.33%
Failure to Stop	2	33.33%
Following Too Closely/ACDA	2	33.33%
Grand Total	6	100.00%

Crash Severity	Crashes	%
(3) Minor Injury Suspected	1	16.67%
(4) Injury Possible	2	33.33%
(5) PDO/No Injury	3	50.00%
Grand Total	6	100.00%

Crash Type	Crashes	%
Angle	4	66.67%
Rear End	2	33.33%
Grand Total	6	100.00%

Table 3 shows that of the 6 crashes that occurred from 2019 to 2023 at the Infirmary Road/Lovers Lane intersection, 4 were angle crashes. Half of these angles crashes resulted in injuries. 2 rear end collisions were recorded, with 1 injury. No crashes occurred at this intersection in 2023 based on the provided crash data.

Crash diagrams depicting crashes from 2019 to 2023 can be found in **Appendix C.** The full CAM Tool data analysis tables can be found in **Appendix D**.

5.2 Contributing Factors and Potential Countermeasures Suitability

5.2.1 SR 14 and Cleveland Road

Angle collisions accounted for 50% of the crashes at this intersection and all were a result of vehicles entering SR 14 from Cleveland Road and failing to gauge appropriate gaps on SR 14. Intersection geometry and delay on Cleveland Road is expected to be the main contributors to these crashes. The considered countermeasure is to convert the intersection to a right-only from SR 14 to Cleveland Road, and install a cul-de-sac for northbound Cleveland Road. This countermeasure is expected to eliminate the angles crashes for vehicles traveling northwest by removing this turning movement and eliminating the conflict points between these vehicles. Additionally, 8 rear end collisions occurred from the northwest queue on Cleveland Road. This change in access is an appropriate countermeasure to mitigate nearly all crash patterns occurring at the intersection.

5.2.2 SR 14 and Infirmary Road

Rear end collisions accounted for 64% of the crashes at the SR 14/Infirmary Road intersection. Of those rear ends, 46% occur for the eastbound approach on SR 14. The existing traffic signal is the largest contributor to these crashes, as the signal provides the only stop condition for 4 miles on SR 14. The considered countermeasure is to convert the signalized intersection into a modern multi-lane roundabout. This countermeasure is expected to reduce the number of rear-end crashes experienced at the intersection, and also reduce the number of left turn crashes. Roundabouts are designed to maximize safety and reduce traffic congestion. The installation of a roundabout would

reduce the frequency and severity of intersection crashes by reducing the number of conflict points. Roundabouts require more space than other intersection control alternatives and would require additional right-of-way. Installation of a roundabout would be an appropriate countermeasure to mitigate the crash patterns occurring at the intersection.

5.2.3 Infirmary Road and Lovers Lane

The Infirmary Road/Lovers Lane intersection experiences few crashes. Assuming that the SR 14/Cleveland Road intersection is improved to prohibit northbound Cleveland Road traffic to access SR 14, additional traffic will travel through the Infirmary Road/Lovers Lane intersection. With these increased volumes, the addition of turn lanes for northbound and southbound Infirmary Road are being considered. Northbound and southbound left turn lanes and a northbound right turn lane are expected to mitigate potential rear end collisions by providing space for vehicles to move out of through traffic in order to complete turns onto Lovers Lane.

6.0 TRAFFIC ANALYSIS

This study applied standard operational goals for locations inside an MPO per the ODOT Analysis & Traffic Simulation Manual (OATS Manual) §5.9. Therefore, operational goals for the overall intersection Level of Service (LOS) are LOS D with approach LOS E and LOS E in any individual movement. Volume-to-Capacity (v/c) ratio should be less than 1.0 (less than or equal to 0.93 is preferred). Queue-Storage ratio should be less than 1.0 for all movements. Capacity analysis is limited to weekday AM Design Hour, and weekday PM Design Hour.

Per the OATS Manual, LOS thresholds for signalized intersection and roundabouts differ. Roundabout criteria match criteria for all way stop control and two way stop controlled intersections. Consequently, direct comparison of LOS between the existing signalized intersection and any proposed roundabout is not an equal juxtaposition for performance. Instead, delay and queue length should be compared between these intersection types. See **Table 4** for the LOS for each type of intersection, and its associated control delay.

Table 4: LOS Standards Per Intersection Type

Signalized Intersections		Roundabout Intersections	
LOS	Control Delay per Vehicle (s/veh)	LOS	Control Delay per Vehicle (s/veh)
A	≤ 10	A	≤ 10
B	> 10 - 20	B	> 10 - 15
C	> 20 - 35	C	> 15 - 25
D	> 35 - 55	D	> 25 - 35
E	> 55 - 80	E	> 35 - 50
F	> 80	F	> 50

6.1 Capacity and Turn Lane Analysis

6.1.1 SR 14 and Cleveland Road

As mentioned in **4.0 Traffic Data and Projections**, the growth rate for the study area is 0%, meaning that the 2043 results presented in this section are identical to those for 2023. Capacity analysis results indicate the existing SR 14/Cleveland Road intersection does not meet operational goals. The northbound approach receives LOS F due to delay of 481.5 seconds in the AM peak, and 250.0 seconds in the PM peak. The northbound approach also receives volume to capacity ratios of 1.88 and 1.31 in the AM and PM peaks, respectively. Capacity analysis results are shown below in **Table 5**. Upon restricting the movements at the intersection with the proposed Build condition, no delay is experienced. Thus, no capacity results are reported.

Table 5: SR 14/Cleveland Road Capacity Results

2043 AM	No Build			
Movement	LOS/ Delay(s)	v/c	95th %ile Queue (ft)	Queue Storage Ratio
EBT	-	-	-	-
EBR				
EB Approach	-	-	-	-
WBL	A/9.3	0.01	0.0	0.01
WBT	A/0.2			
WB Approach	C/18.5	-	-	-
NBL	F/481.5	1.88	499.2	0.67
NBR				
NB Approach	F/481.5	-	-	-

2043 PM	No Build			
Movement	LOS/ Delay(s)	v/c	95th %ile Queue (ft)	Queue Storage Ratio
EBT	-	-	-	-
EBR				
EB Approach	-	-	-	-
WBL	B/11.0	0.02	2.6	0.01
WBT	A/0.3			
WB Approach	A/0.5	-	-	-
NBL	F/250.0	1.31	271.4	0.37
NBR				
NB Approach	F/250.2	-	-	-

Turn lane warrant analysis was completed for the SR 14/Cleveland Road intersection, using the detoured traffic volumes for the eastbound right turn on SR 14 to Cleveland Road. Per the Location and Design Manual §400, a right turn lane at this location is warranted using both the No Build volumes and the Detour volumes.

Turn lane length evaluation results indicate that the eastbound right turn lane should have a length of 440 feet, including a 50-foot diverging taper. Because of the geometry of this intersection, and the removal of the westbound left turn, it is recommended that an eastbound right turn lane be constructed with a length of 285 feet, which is the required deceleration length given the posted speed of 55 mph. Since the eastbound movement is free flow, storage is not needed.

6.1.2 SR 14 and Infirmary Road

Traffic signal and roundabout alternatives at SR 14/Infirmary Road were analyzed using existing no build scenario traffic volumes, and "Detour" condition traffic volumes. The Detour volumes were developed by ODOT to account for the restriction of turning movements at the SR 14/Cleveland Road intersection and the impact of the increased traffic at the SR 14/Infirmary Road intersection. The rerouted traffic volumes are referred to as the 'Detour' condition. Notably, the 'Detour' condition caused an increase in northbound left turns, rising from 120 to 350 during the AM peak hour and from 90 to 230 in the PM peak hour. The following scenarios were analyzed using Highway Capacity Software (HCS) 2023/2024 by ODOT and EMH&T at the Study Area intersections.

No Build: The existing signal, using existing volumes.

No Build Detour: The existing signal, using detoured volumes.

Built Alternative 1 Detour: The existing signal, with the addition of 1 northbound and 1 southbound left turn lane, using detoured volumes.

Build Alternative 2 Detour: The existing signal, with the addition of 2 northbound left turn lanes and 1 southbound left turn lane, using detoured volumes.

Build Alternative 3 Detour: The existing signal, with the addition of 2 northbound left turn lanes, 1 southbound left turn lane, 1 eastbound thru lane, and 1 westbound thru lane, using detoured volumes.

Build Alternative 4 Detour: Proposed modern roundabout with single lane approaches for eastbound and southbound, a thru-left lane and a right turn lane for the northbound approach, and a thru-left lane and an auxiliary thru-right lane for the westbound approach, using detoured volumes.

Traffic signal operations falling outside the LOS and delay criteria were mitigated in Build Alternatives 1, 2, and 3 with turn lane improvements. These Alternatives were advanced in order to bring the Queue Storage Ratio (QSR) for the northbound left turn into performance threshold, and to lower the volume to capacity ratio of the eastbound thru movement. Ultimately, the addition of turn lanes at the existing signal in Build Alternative 1, 2, and 3 were unable to get the intersection to meet operational goals. During the AM peak hour, Build Alternative 3 shows a QSR of 1.30 for the northbound left turn. This result indicates that the number of vehicles waiting to turn left exceeds the available storage capacity of the northbound left turn lane by 30%, which will block the through lane and reduce the signal's efficiency. All traffic signal alternatives were unable to meet operational goals.

Scenarios were coordinated and vetted by ODOT District 4, and the roundabout option of Build Alternative 4 Detour was carried forward. **Appendix E** includes the detailed capacity analysis results for each alternative analyzed. Build Alternative 2 and Build Alternative 3 do not meet operational and are not displayed below.

Table 6 and **Table 7** summarize the results of the capacity analysis for the No Build, No Build Detour, Build Alternative 1 Detour, and the Build Alternative 4 (Roundabout) Detour scenarios at the SR 14/Infirmary Road intersection in the 2043 AM and PM Design Hours, using HCS.

Table 6: SR 14/Infirmary Road AM Capacity Results

2043 AM	No Build Ex. Signal				No Build Detour Ex. Signal				Build Alternative 1 Detour Ex. Signal +NBL+SBL				Built Alt 4 Detour Proposed Roundabout			
Movement	LOS/ Delay(s)	v/c	95th %ile Queue (ft)	Queue Storage Ratio	LOS/ Delay(s)	v/c	95th %ile Queue (ft)	Queue Storage Ratio	LOS/ Delay(s)	v/c	95th %ile Queue (ft)	Queue Storage Ratio	LOS/ Delay(s)	v/c	95th %ile Queue (ft)	Queue Storage Ratio
EBL	-	-	-	-	-	-	-	-	-	-	-	-	B/12.1	0.590	106.8	0.05
EBT	C/27.1	0.888	379	0.00	E/56.1	0.938	692	0.00	C/34.3	0.933	440	0.00				
EBR																
EB Approach	C/27.1	-	-	-	E/56.1	-	-	-	C/34.3	-	-	-	B/12.1	-	-	-
WBL	B/18.5	0.511	65	0.40	D/35.9	0.746	143	0.87	C/22.4	0.580	81	0.49	D/28.9	0.860	281.2	0.06
WBT	B/18.3	0.802	389	0.00	D/49.5	0.921	850	0.00	C/26.9	0.845	492	0.00	-	-	-	-
WBR													A/6.7	0.210	21.5	0.08
WB Approach	B/18.3	-	-	-	D/47.1	-	-	-	C/26.1	-	-	-	C/24.4	-	-	-
NBL	C/25.3	0.673	250	0.83	E/62.4	0.963	651	2.17	D/35.9	0.805	317	2.11	B/15.0	0.620	116.1	0.46
NBT									C/21.2	0.423	167	0.56				
NBR													A/6.9	0.210	21.0	0.08
NB Approach	C/25.3	-	-	-	E/62.4	-	-	-	C/29.9	-	-	-	B/12.9	-	-	-
SBL	D/36.0	0.559	118	0.00	C/33.4	0.253	148	0.00	D/36.4	0.164	30	0.20	C/15.1	0.350	40.8	0.01
SBT									C/38.2	0.528	97	0.00				
SBR																
SB Approach	D/36.0	-	-	-	C/33.4	-	-	-	D/37.8	-	-	-	C/15.1	-	-	-
Intersection	C/23.4	-	-	-	D/52.9	-	-	-	C/30.0	-	-	-	C/17.4	-	-	-

Table 6 shows that during the AM peak hour, the No Build scenario with existing traffic volumes meets operational goals, with the southbound approach receiving LOS D. The No Build Detour scenario fails to meet operation goals, with the eastbound and northbound approaches receiving LOS E, and a QSR of 2.17 for the northbound approach. The increased volumes resulting from the detoured traffic in the Study Area causes the intersection to operate outside of established thresholds. Built Alternative 1 does not meet operational goals due to a northbound left turn QSR of 2.11.

Similarly, Build Alternative 2 and Build Alternative 3 do not meet operational goals in the AM Peak hour, due to a QSR value over 1.0 for the northbound left turn. Build Alternative 4, the roundabout option, meets operational goals, with the highest delay being 28.9 seconds for the westbound shared left/through lane and a solid QSR of 0.46 for the northbound through/left lane. Results for Build Alternative 2 and Build Alternative 3 are not shown in Table 6, and can be found in **Appendix E**.

Table 7 shows that during the PM peak hour, the existing condition No Build scenario fails to meet operational goals, with the eastbound thru-right lane having a volume to capacity (v/c) ratio over the preferred 0.93, and the northbound approach having a QSR above 1.0. This is due to the close proximity of the SR 14/Infirmary Road and Lovers Lane/Infirmary Road intersections. Similar to the AM Peak analysis in Table 6, the No Build Detour scenario fails to meet operation goals, with 3 of the 4 approaches receiving either LOS E or LOS F, the eastbound thru-right and northbound approach having a v/c ratio over 0.93, and the westbound left and northbound approach receive QSR over 2.0. Build Alternative 1 also does not meet operational goals, with a northbound left turn QSR of 1.42.

Build Alternative 2 and Build Alternative 3 meet operational goals in the PM Peak hour, but are not displayed below, due to not meeting operational goals in the AM Peak hour per the discussion above. Results for Build Alternative 2 and Build Alternative 3 can be found in **Appendix E**. The roundabout option, Build Alternative 4, meets operational goals, with all movements receiving LOS C or better.

Table 7: SR 14/Infirmary Road PM Capacity Results

2043 PM	No Build Ex. Signal				No Build Detour Ex. Signal				Build Alternative 1 Detour Ex. Signal +NBLT +SBLT				Built Alt 4 Detour Proposed Roundabout			
Movement	LOS/ Delay(s)	v/c	95th %ile Queue (ft)	Queue Storage Ratio	LOS/ Delay(s)	v/c	95th %ile Queue (ft)	Queue Storage Ratio	LOS/ Delay(s)	v/c	95th %ile Queue (ft)	Queue Storage Ratio	LOS/ Delay(s)	v/c	95th %ile Queue (ft)	Queue Storage Ratio
EBL	B/19.2	0.027	7	0.03	D/37.6	0.033	14	0.07	B/18.9	0.027	6	0.03	C/22.1	0.810	233.8	0.10
EBT	D/37.5	0.939	614	0.00	E/67.1	0.971	1094	0.00	C/30.0	0.950	554	0.00				
EBR																
EB Approach	D/37.2	-	-	-	E/66.7	-	-	-	C/29.9	-	-	-	C/22.1	-	-	-
WBL	C/23.8	0.751	90	0.54	F/84.1	0.904	375	2.27	C/32.6	0.754	116	0.70	B/12.4	0.610	111.1	0.03
WBT	B/13.4	0.537	273	0.00	C/23.6	0.573	526	0.00	B/13.2	0.539	266	0.00	-	-	-	-
WBR													A/5.2	0.015	13.0	0.05
WB Approach	B/16.0	-	-	-	D/40.7	-	-	-	B/18.1	-	-	-	B/11.0	-	-	-
NBL	D/36.7	0.770	347	1.16	F/82.7	0.974	745	2.48	C/33.3	0.661	213	1.42	B/14.2	0.540	81.3	0.33
NBT									C/29.6	0.595	242	0.81				
NBR													A/9.1	0.290	30.5	0.16
NB Approach	D/36.7	-	-	-	F/82.7	-	-	-	C/31.3	-	-	-	B/12.4	-	-	-
SBL	D/43.2	0.649	171	0.00	D/47.6	0.370	231	0.00	D/14.1	0.237	43	0.29	A/9.5	0.270	28.0	0.01
SBT									D/43.2	0.632	121	0.00				
SBR																
SB Approach	D/43.2	-	-	-	D/47.6	-	-	-	D/42.6	-	-	-	A/9.5	-	-	-
Intersection	C/29.9	-	-	-	E/60.6	-	-	-	C/27.2	-	-	-	B/15.0	-	-	-

For evaluation of the intersection as a roundabout, the westbound approach in the Build Alternative 4 Detour Scenario is assigned 80% of the thru traffic to the inside lane. This is due to that fact that west of the intersection, SR 14 is 1 lane in each direction, and the outside lane will be required to merge left downstream of the roundabout. Vehicles are predicted, and have been observed, to prefer lanes that do not require merging.

Results indicate that the roundabout intersection meets operational goals in both peak hours. The proposed roundabout has slightly lower overall intersection delays in the AM peak hour than the No Build signal, and significantly lower delays for the northbound and southbound approaches in the PM peak. Similarly, in both peak hours the proposed roundabout has lower queues for all approaches than the existing signal. The Build Alternative 4 roundabout demonstrates better performance with detoured traffic compared to the existing signalized intersection without detoured traffic, except for the westbound approach during the AM peak hour. In this case, there is only a slight increase in delay, rising from 18.3 seconds to 24.4 seconds.

95th percentile queue lengths indicate that for the proposed roundabout, the back of queue for the westbound left lane is 281.2 feet. Consequently, a right westbound lane would need to be 335 feet long, including a 50-foot taper, in order to mitigate any queue blocking from the left lane on the westbound approach.

6.1.3 Infirmary Road and Lovers Lane

The detoured traffic volumes for the Lovers Lane/Infirmary Road intersection were used to evaluate turn lane warrants for the northbound right turn, northbound left turn, and southbound left turn. The northbound right turn and southbound left turn meet warrant thresholds using both the No Build volumes and the Detour volumes. The northbound left turn lane does not meet warrant thresholds in either volume scenario, but a short 100' turn lane should be considered due to the pavement widening needed at the intersection in order to accommodate the southbound left turn lane.

Turn lane length evaluation results indicate that the northbound right turn lane should have a length of 265 feet, and the northbound left turn lane should have a length of 125 feet. All results include a 50-foot diverging taper.

The southbound left turn lane length analysis was performed using 30 miles per hour (mph) design speed, due to the lower speed of vehicles exiting the roundabout onto Infirmary Road. Using this speed, the calculated turn lane length is 100 feet. If the analysis is performed using 40 mph, the posted speed limit on Infirmary Road south of SR 14, the calculated turn lane length becomes 175 feet. A turn lane length of 125 feet, including a 50-foot taper is recommended. This distance allows for more than the 30-mph design speed to ensure southbound queues at the Lovers Lane/Infirmary Road intersection do not affect operations of the roundabout at the SR 14/Infirmary Road intersection. **Appendix F** includes all detailed turn lane warrant and turn lane length calculations.

Table 8 and **Table 9** below summarize the results of the capacity analysis for all scenarios at the Lovers Lane/Infirmary Road intersection in the 2048 AM and PM Design Hours, using HCS.

Table 8: Lovers Lane/Infirmary Road AM Capacity Results

2043 AM	No Build				Build Alternative 4 Detour			
Movement	LOS/ Delay(s)	v/c	95th %ile Queue (ft)	Queue Storage Ratio	LOS/ Delay(s)	v/c	95th %ile Queue (ft)	Queue Storage Ratio
EBL	C/20.5	0.12	10.2	0.01	D/28.3	0.17	15.4	0.01
EBT								
EBR								
EB Approach	C/20.5	-	-	-	D/28.3	-	-	-
WBL	C/18.5	0.14	12.8	0.01	C/23.6	0.18	17.9	0.01
WBT								
WBR								
WB Approach	C/18.5	-	-	-	C/23.6	-	-	-
NBL	A/7.8	0.01	0.0	0.0	A/7.8	0.01	0.0	0.0
NBT	A/0.5				-	-	-	
NBR	A/0.5				-	-	-	
NB Approach	A/0.3	-	-	-	A/0.1	-	-	-
SBL	A/8.6	0.05	0.0	0.0	A/9.5	0.06	5.1	0.07
SBT	A/0.5				-	-	-	-
SBR	A/0.5							
SB Approach	A/2.0	-	-	-	A/1.7	-	-	-

Table 9: Lovers Lane/Infirmary Road PM Capacity Results

2043 PM	No Build				Build Alternative 4 Detour			
Movement	LOS/ Delay(s)	v/c	95th %ile Queue (ft)	Queue Storage Ratio	LOS/ Delay(s)	v/c	95th %ile Queue (ft)	Queue Storage Ratio
EBL	C/17.4	0.07	5.1	0.01	C/20.9	0.09	7.70	0.01
EBT								
EBR								
EB Approach	C/17.4	-	-	-	C/20.9	-	-	-
WBL	C/18.8	0.33	35.8	0.01	C/23.4	0.40	48.6	0.01
WBT								
WBR								
WB Approach	C/18.8	-	-	-	C/23.4	-	-	-
NBL	A/7.9	0.01	0.0	0.0	A/7.9	0.01	0.0	0.0
NBT	A/0.1				-	-	-	
NBR	A/0.1				-	-	-	
NB Approach	A/0.3	-	-	-	A/0.1	-	-	-
SBL	A/8.2	0.01	0.0	0.0	A/8.6	0.01	0.0	0.0
SBT	A/0.1				-	-	-	-
SBR	A/0.1							
SB Approach	A/0.4	-	-	-	A/0.3	-	-	-

Table 4 and Table 5 shows that during the AM and PM peak hours, all movements and approaches meet operational goals. Southbound queues at the Lovers Lane/Infirmary Road intersection are

short. All proposed condition analysis in Table 4 and Table 5 include the turn lanes identified for installation, as described above.

7.0 SAFETY EVALUATION OF COUNTERMEASURES

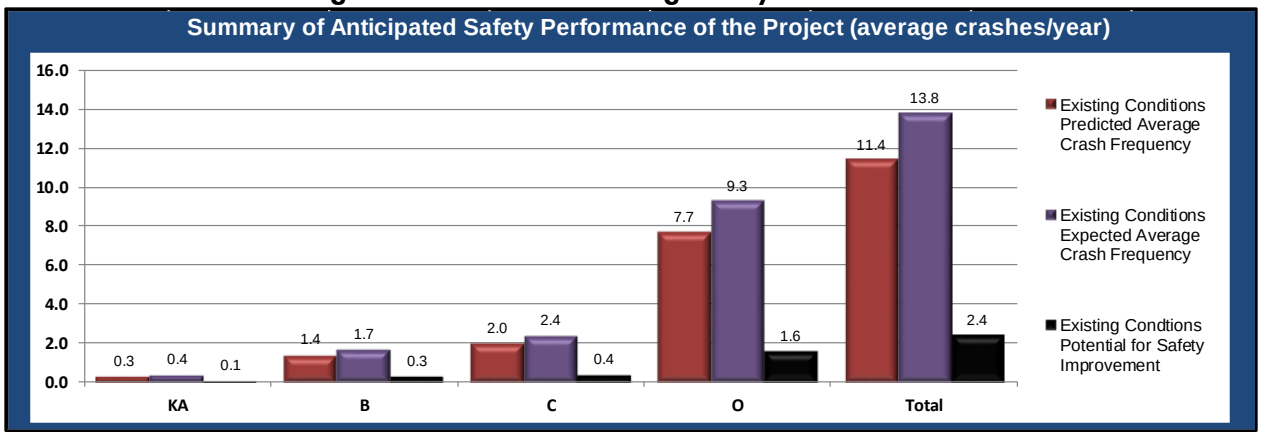
7.1 ECAT

The Highway Safety Manual (HSM) predictive method for intersections was applied to the Study Area to compare its safety performance to similar intersections. The Expected and Predicted Crash Frequencies, as well as the Potential for Safety Improvement at the intersection was determined using the ODOT Economic Crash Analysis Tool (ECAT).

The Predicted Average Crash Frequency is the estimate of long-term average crash frequency based on the average number of crashes of similar sites. The Expected Average Crash Frequency is the estimate of long-term average crash frequency based on the crash trends at the study intersection in a given period of years. The difference between Predicted Average Crash Frequency and the Expected Average Crash Frequency results in Potential for Safety Improvement. A positive Potential for Safety Improvement indicates that there is an excess crash frequency.

Parameters entered into ECAT included the estimated 2043 AADT, existing intersection characteristics, and CAM Tool crash data. **Figure 5** shows the existing safety performance of the Study Area. Expected crash frequency for the Study Area is higher than predicted, indicating a positive Potential for Safety Improvement of 2.4.

Figure 5: Combined Existing Safety Performance

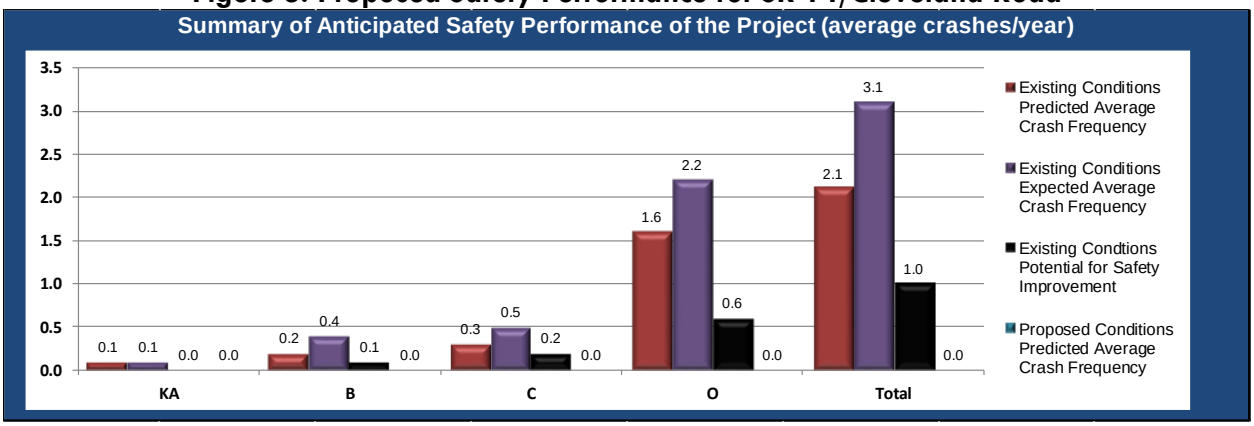


The considered countermeasures were evaluated on safety performance using ODOT's ECAT. The ECAT process involves calculating the predicted crash frequency of locations similar to the intersection and considers recent crash experience to utilize a mathematical modeling process as defined in the HSM. Crash modification factors (CMF) are used in ECAT to calculate the expected reduction in crashes for each countermeasure. The analysis assumed the same conditions as the existing intersection such as AADT, presence of turn lanes, and other intersection site specific characteristics. ECAT was then used to conduct a safety benefit to cost analysis for the considered countermeasures based on an estimated construction cost. A summary of the ECAT results for each considered countermeasure is discussed below. Full ECAT results can be found in **Appendix G.**

7.1.1 SR 14 and Cleveland Road

At the SR 14/Cleveland Road intersection, the considered countermeasure of changing the intersection from full access to right in only reduces the average total expected crashes per year from 3.1 to 0. **Figure 6** shows the predicted crash frequency by severity for this countermeasure. The zero expected crashes are attributed to vehicles being prohibited from accessing SR 14 from Cleveland Road, and westbound Cleveland Road traffic being prohibited from turning left on Cleveland Road.

Figure 6: Proposed Safety Performance for SR 14/Cleveland Road



To complete the benefit to cost analysis, an initial cost of $495,677 was estimated to convert the SR 14/Cleveland Road intersection to right in only. A detailed breakdown of this cost estimate is provided in **Appendix I.** The ECAT benefit to cost analysis results are shown in **Figure 7.** The cost estimates used in the ECAT analysis include estimated right-of-way costs which will be required as a result of the improvements, as well as contingency costs and inflation.

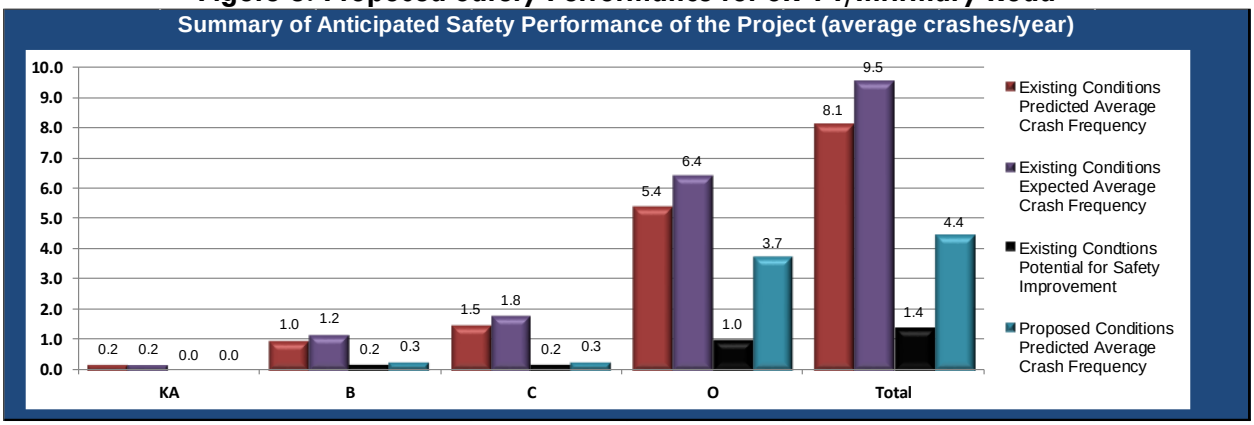
Figure 7: Benefit-Cost for SR 14/Cleveland Road

Benefit - Cost Calculator	
Net Present Value of Project	$495,677.00
Net Present Value of Safety Benefits	$786,165.87
Net Benefit	$290,488.87
Benefit / Cost Ratio	1.59

7.1.2 SR 14 and Infirmary Road

At the SR 14/Infirmary Road intersection, the considered countermeasure of changing the signalized intersection to a modern roundabout reduces the average total expected crashes per year from 9.5 to 4.4. Suspected Minor Injuries (B) and Possible Injuries (C) are the most reduced categories. **Figure 8** shows the predicted crash frequency by severity for this countermeasure.

Figure 8: Proposed Safety Performance for SR 14/Infirmary Road



An initial cost of $3,494,933 was estimated to convert the SR 14/Infirmary Road intersection to a modern roundabout. The ECAT benefit to cost analysis results are shown in **Figure 9.** The cost estimates used in the ECAT analysis include estimated right-of-way costs which will be required as a result of the improvements, as well as contingency costs and inflation.

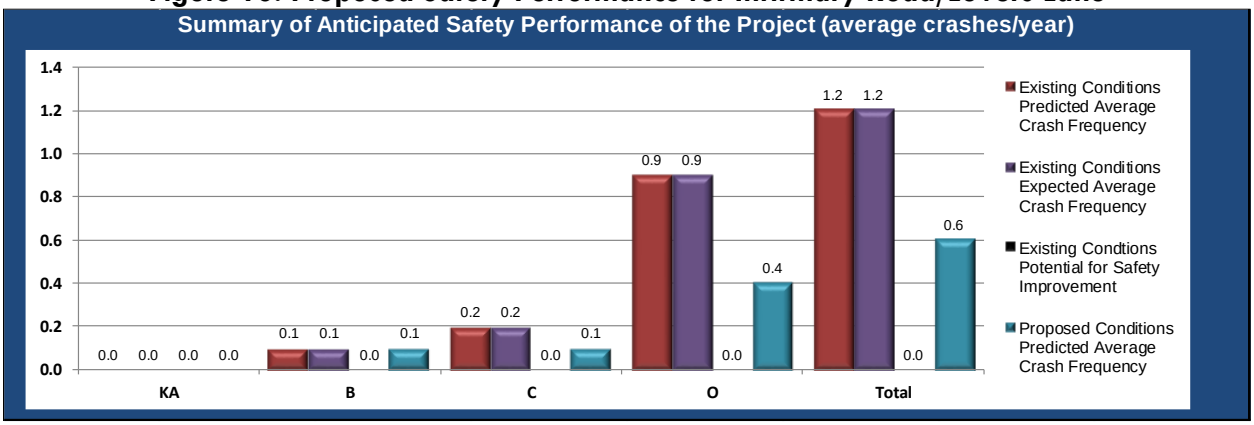
Figure 9: Benefit-Cost for SR 14/Infirmary Road

Benefit - Cost Calculator	
Net Present Value of Project	$3,494,933.00
Net Present Value of Safety Benefits	$2,752,451.75
Net Benefit	($742,481.25)
Benefit / Cost Ratio	0.79

7.1.3 Infirmary Road and Lovers Lane

At the Infirmary Road/Lovers Lane intersection, the considered countermeasure of adding turn lanes to the intersection reduces the average total expected crashes per year from 1.2 to 0.6. **Figure 10** shows the predicted crash frequency by severity for this countermeasure.

Figure 10: Proposed Safety Performance for Infirmary Road/Lovers Lane



An initial cost of $292,994 was estimated to install southbound left, northbound left, and northbound right turn lanes at the Infirmary Road/Lovers Lane intersection. The ECAT benefit to cost analysis results are shown in **Figure 11.**

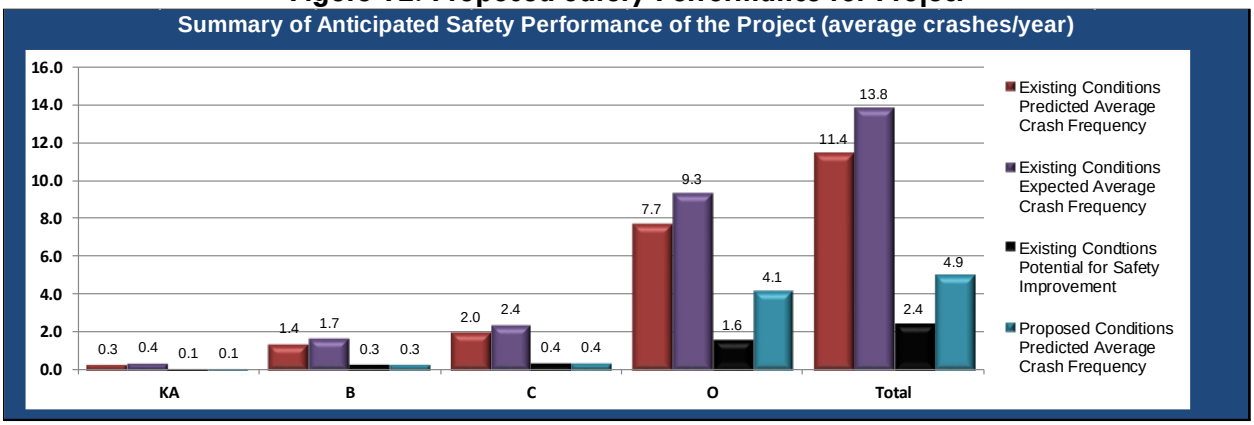
Figure 11: Benefit-Cost for Infirmary Road/Lovers Lane

Benefit - Cost Calculator	
Net Present Value of Project	$292,994.00
Net Present Value of Safety Benefits	$292,952.80
Net Benefit	($41.20)
Benefit / Cost Ratio	1.00

7.1.4 Project Summary

Combined, the considered countermeasures discussed above result in a reduction in average total expected crashes per year from 13.8 to 4.9. Significant reductions occur for Suspected Minor Injuries (B) and Possible Injuries (C), and Property Damage Only (O) categories. **Figure 12** shows the predicted crash frequency by severity for the project with all considered countermeasures.

Figure 12: Proposed Safety Performance for Project



To complete the benefit to cost analysis of the combined improvements for the project, the combined cost of $4,283,604 was estimated to convert the SR 14/Cleveland Road intersection to right in only, to convert the SR 14/Infirmary Road intersection from a traffic signal to roundabout, and to add turn lanes to the Infirmary Road/Lovers Lane intersection. A detailed breakdown of this cost estimate is provided in **Appendix I.** The ECAT benefit to cost analysis results are shown in **Figure 13.**

Figure 13: Benefit-Cost for All Improvements

Benefit - Cost Calculator	
Net Present Value of Project	$4,283,604.00
Net Present Value of Safety Benefits	$3,805,064.20
Net Benefit	($478,539.80)
Benefit / Cost Ratio	0.89

The Benefit-Cost ratios for the SR 14/Cleveland Road intersection, the SR 14/Infirmary Road intersection, and the Infirmary Road/Lovers Lane intersection are 1.59, 0.79, and 1.00 respectively. The Benefit-Cost ratio for all the considered countermeasures for the entire project is 0.89.

8.0 CONCLUSIONS AND RECOMMENDATIONS

The intersection of SR 14 and Cleveland Road in Portage County has experienced an average of 5.2 crashes per year over the past 5 calendar years (2019-2023). 50% of these crashes are angle crashes, with majority (70%) of these crashes resulting in injuries. Most angle crashes occurred from failure to yield at a stop sign for the northwest approach of Cleveland Road, with 4 crashes from failure to stop. The crash history indicates drivers are making poor decisions when selecting an appropriate gap in approaching traffic. The intersection was ranked #83 on the 2018 Ohio Department of Transportation (ODOT) Highway Safety Improvement Program (HSIP) Priority List for suburban intersections, and was ranked #341 on the 2020 ODOT HSIP Priority List, was ranked #451 on the 2021 ODOT HSIP Priority List, and is unranked on the 2024 ODOT HSIP Priority List.

The intersection of SR 14 and Infirmary Road in Portage County has experienced an average of 11 crashes per year over the past 5 calendar years (2019-2023). Majority of these crashes are rear ends at 64%, with 29% of these crashes resulting in injuries, and 20% of these crashes are left turn or angle crashes. The crash history indicates drivers are not perceiving stopped traffic occurring at the existing traffic signal. The intersection was unranked on the ODOT HSIP Priority List for suburban intersections in 2018. It appeared on the list ranked #260 in 2020, #498 in 2021, and #357 in 2024.

The countermeasures considered in order to mitigate the crash problems in the Study Area were altering the SR 14/Cleveland Road intersection from allowing all turning movements, to an eastbound right turn only from SR 14 onto Cleveland Road, converting the SR 14/Infirmary Road intersection from a traffic signal to a roundabout, and installing northbound right, northbound left, and southbound left turn lanes at the Infirmary Road/Lovers Lane intersection.

The elimination of all traffic from Cleveland Road to SR 14 is an appropriate solution to mitigate crash trends because the majority of the crashes involve vehicles turning left from the southern approach of Cleveland Road, while few crashes were recorded for eastbound SR 14. The described improvements at this intersection shows an anticipated crash reduction of 3.1 per year.

Installation of a roundabout at the SR 14/Infirmary Road intersection is an appropriate potential solution given the high number of rear end crashes, and left turn and angle crashes. A roundabout is also expected to reduce injury crashes, of which there were 35% at the intersection from 2019-2023. A roundabout at this intersection shows an anticipated crash reduction of 5.1.

Turn lane evaluation at the SR 14/Cleveland Road intersection indicates that a 285-foot eastbound right turn lane should be constructed, given the geometry of this turn, and the lack of need for storage for this turning movement. The cul-de-sac for northbound Cleveland Road, and the removal of the westbound left turn from SR 14 to Cleveland Road should also be implemented.

Capacity analysis results at the SR 14/Infirmary Road intersection showed that the considered roundabout, Build Alternative 4, performs better with the addition of detoured traffic than the existing signal does without detoured traffic. The roundabout at the SR 14/Infirmary Road intersection should be constructed with single lane approaches for eastbound and southbound, a thru-left lane and a right turn lane for the northbound approach, and a thru-left lane and a 335-foot auxiliary thru-right lane for the westbound approach.

Turn lane analysis at the Infirmary Road/Lovers Lane intersection indicate that a 265-foot northbound right turn lane, a 125-foot northbound left turn lane, and a 125-foot southbound left turn lane should be installed.

Installation of these proposed improvements is expected to have slightly higher present value of construction costs than the present value of safety benefits, represented in the overall cost to benefit ratio of 0.89. A conceptual plan showing the proposed improvements, including the proposed cul-de-sac configuration at the SR 14/Cleveland Road intersection, with the proposed roundabout countermeasure at SR 14/Infirmary Road, and proposed turn lanes at Infirmary Road/Lovers Lane is included in **Appendix H**.

EMH&T

Engineers, Surveyors, Planners, Scientists

APPENDIX A

Existing Conditions Diagram

CLEVELAND-EAST LIVERPOOL RD

14

45 MPH

STOP

CLEVELAND-EAST LIVERPOOL RD

14

RAVENNA

WEST

14

14

EAST

14

SCHOOL BUS STOP AHEAD

45 MPH

CHECK TURN SIGNAL

SPEED LIMIT 35

STOP

CLEVELAND RD

CLEVELAND-EAST LIVERPOOL RD

14

LOVERS LN

LOVERS LN

N

0 40 80 160

HORIZONTAL SCALE IN FEET

CALCULATED BDM

CHECKED NRB

SR 14 SAFETY STUDY

EXISTING CONDITIONS DIAGRAM

POR-14

1/2

SR 14 SAFETY STUDY
EXISTING CONDITIONS DIAGRAM

POR-14

2
2

CALCULATED BDM
CHECKED NRB

0 40 80 160
HORIZONTAL SCALE IN FEET

N

CLEVELAND-EAST LIVERPOOL RD
14
INFIRMARY RD
WEST
14
SPEED LIMIT 45
ONLY
INFIRMARY RD
INFIRMARY RD
ONLY
H
STOP
SPEED LIMIT 40
STOP
BUS STOP
SPEED LIMIT 40
CLEVELAND-EAST LIVERPOOL RD
14
EAST
14
STOP
STOP
DO NOT BLOCK INTERSECTION
BUS STOP
SPEED LIMIT 40

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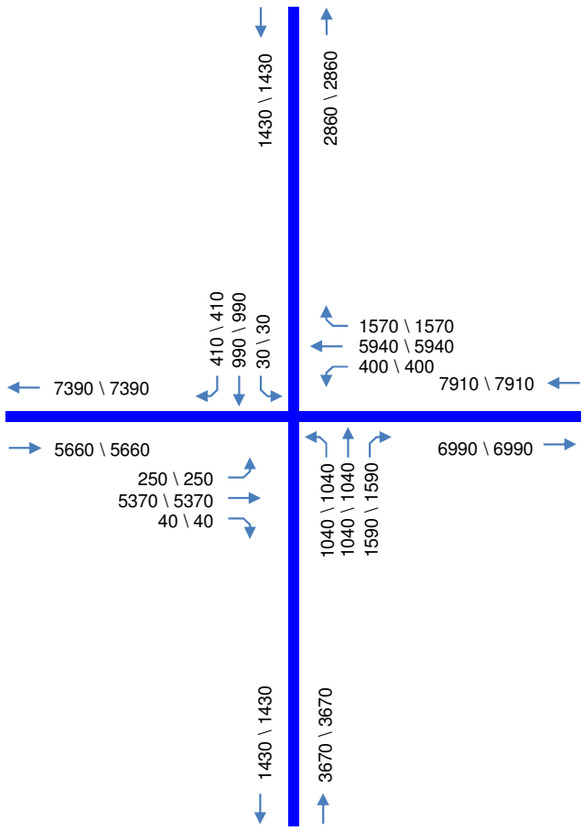
Engineers, Surveyors, Planners, Scientists

APPENDIX B

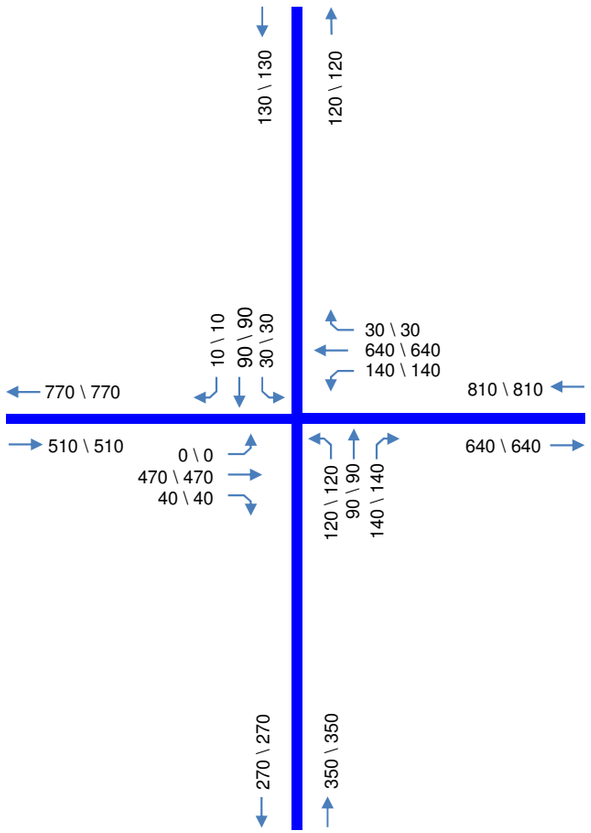
Traffic Volume Plates

POR-14 at
Infirmary
PLATE 1 of 1

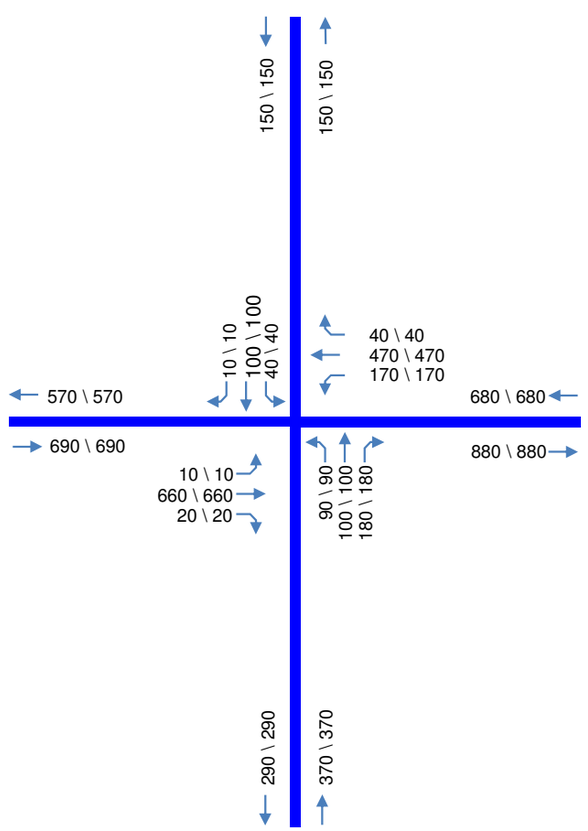
2023 \ 2043 24 Hr
Open Yr \ Design Yr
Total Turn Volumes



2023 \ 2043 AM
Open Yr \ Design Yr
Total Turn Volumes



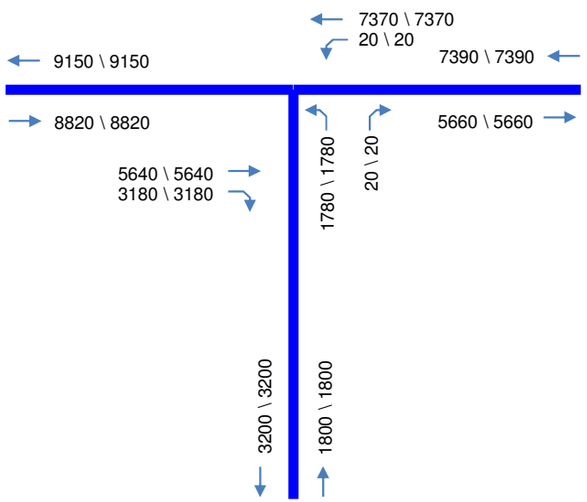
2023 \ 2043 PM
Open Yr \ Design Yr
Total Turn Volumes



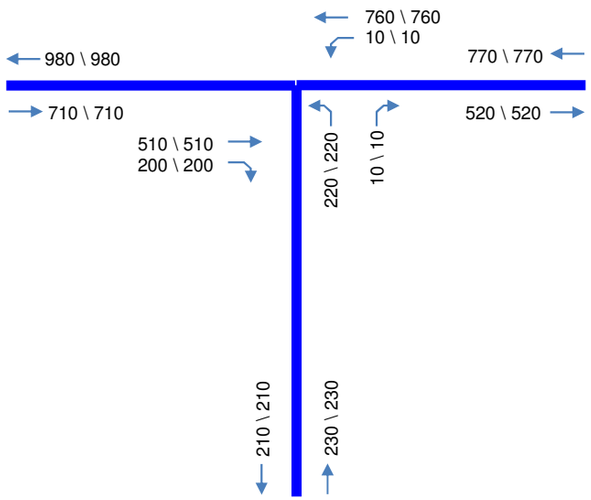
POR-14 at Infirmary	Existing Cond.
ADT, AM, PM DHV	
OHIO DEPARTMENT OF TRANSPORTATION	
7/27/2019	NOT TO SCALE

POR-14 at
Cleveland
PLATE 1 of 1

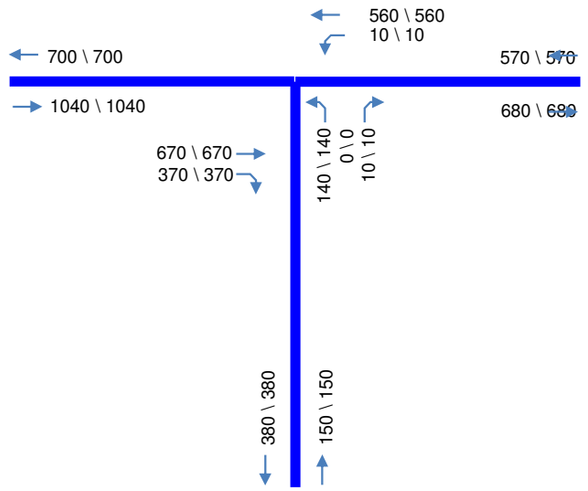
2023 \ 2043 24 Hr
Open Yr \ Design Yr
Total Turn Volumes



2023 \ 2043 AM
Open Yr \ Design Yr
Total Turn Volumes



2023 \ 2043 PM
Open Yr \ Design Yr
Total Turn Volumes

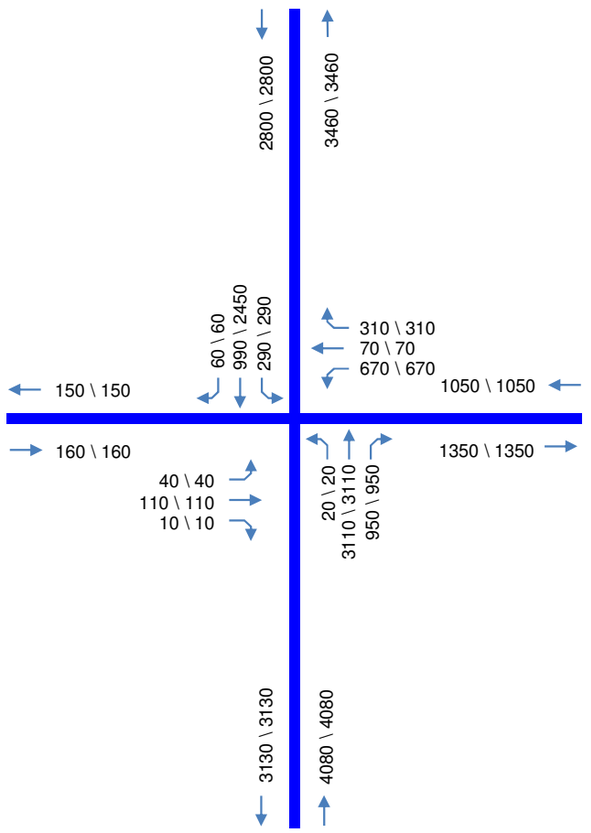


N

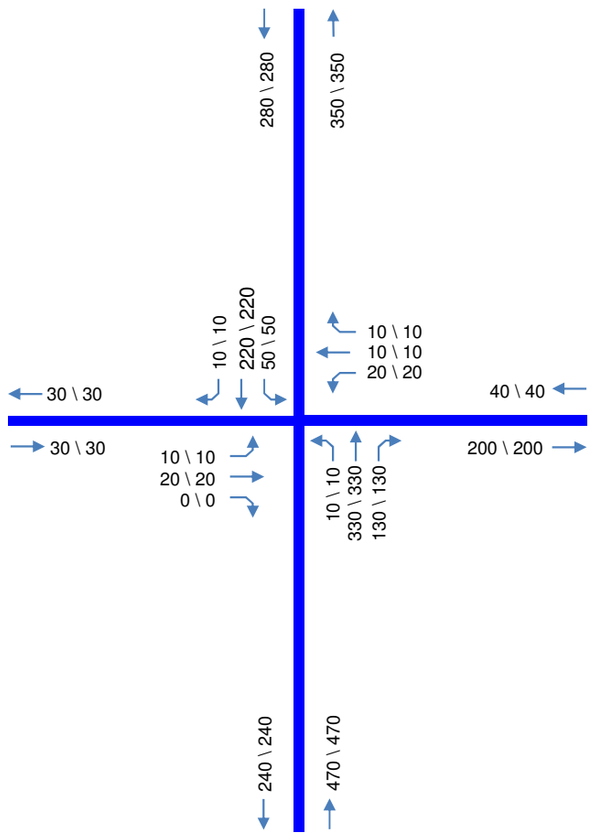
POR-14 at Cleveland	Existing Cond.
ADT, AM, PM DHV	
OHIO DEPARTMENT OF TRANSPORTATION	
7/27/2020	NOT TO SCALE

POR Infirmary
at Lovers Ln
PLATE 1 of 1

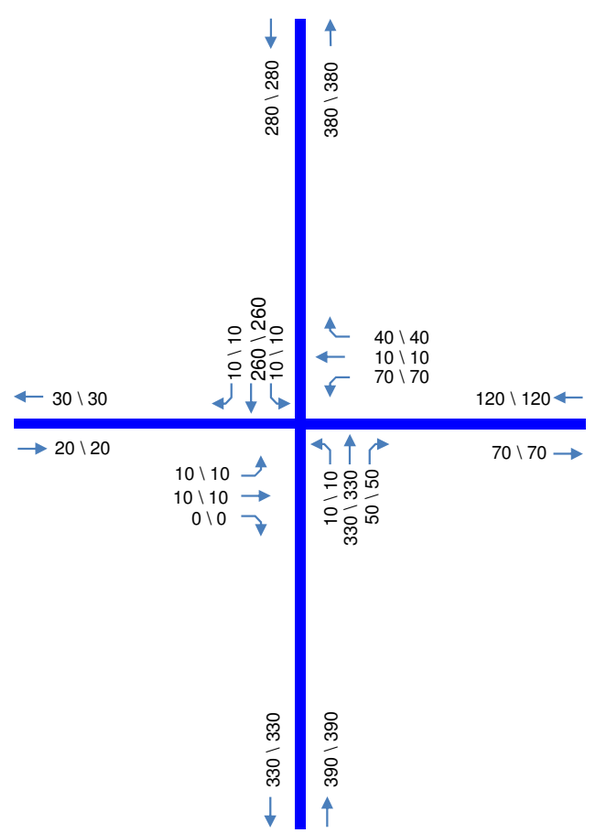
2023 \ 2043 24 Hr
Open Yr \ Design Yr
Total Turn Volumes



2023 \ 2043 AM
Open Yr \ Design Yr
Total Turn Volumes



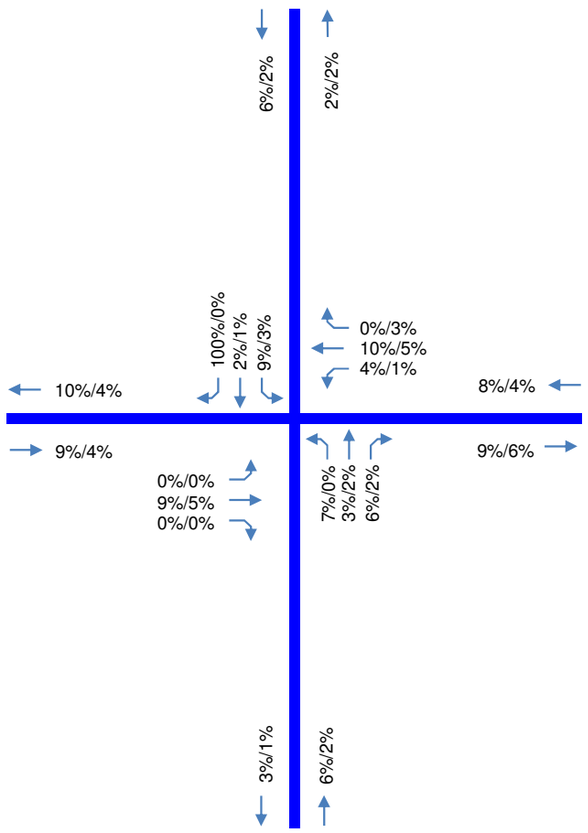
2023 \ 2043 PM
Open Yr \ Design Yr
Total Turn Volumes



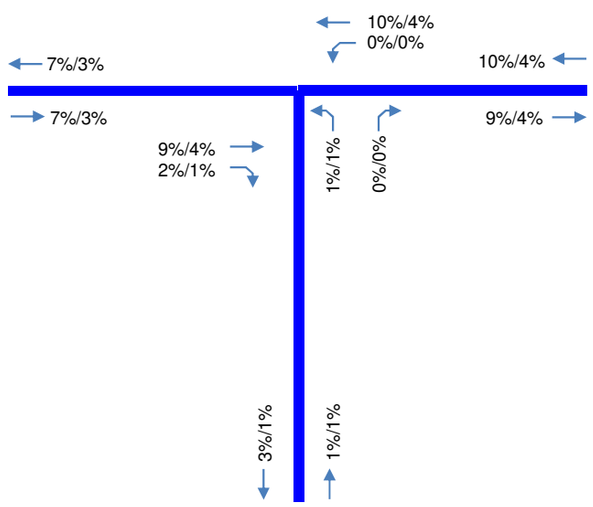
POR Infirmary at Lovers	Existing Cond.
ADT, AM, PM DHV	
OHIO DEPARTMENT OF TRANSPORTATION	
7/27/2020	NOT TO SCALE

POR Projects
Truck Percentages
PLATE 1 of 1

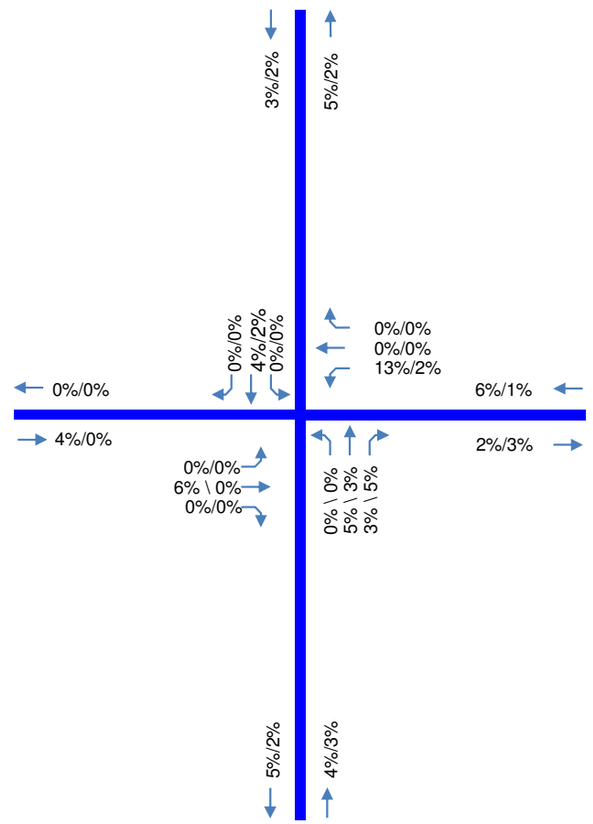
POR 14 at Infirmary Truck Percentages AM/PM



POR 14 at Cleveland Truck Percentages AM/PM



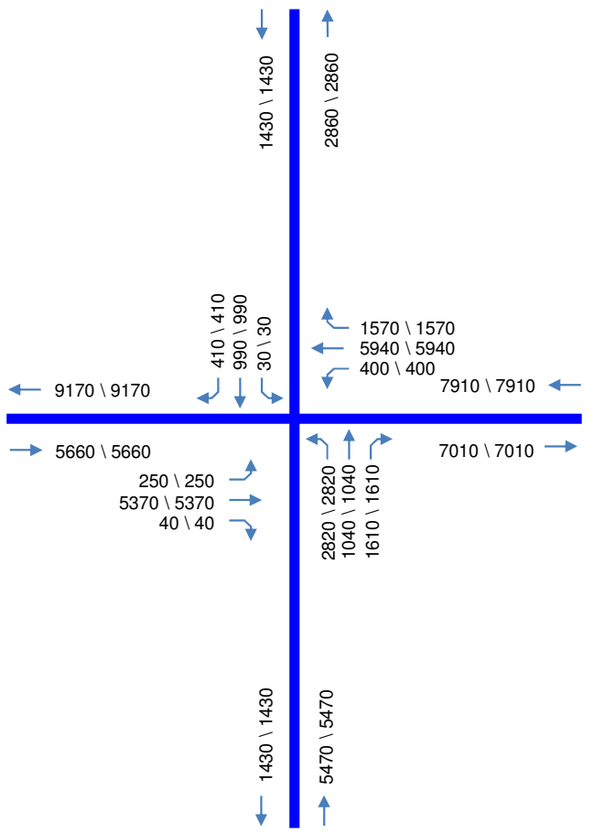
POR Infirmary at Lovers Ln Truck Percentages AM/PM



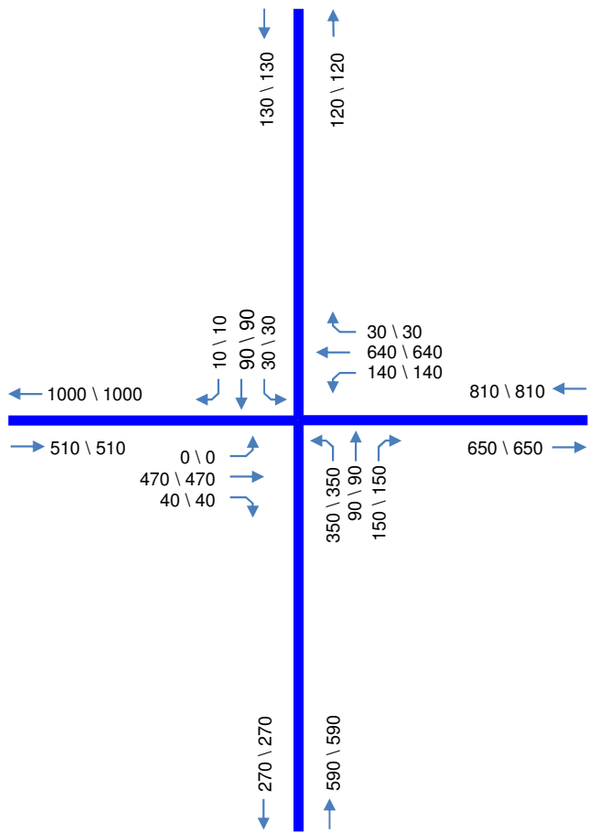
Truck Percentages	Existing Cond.
14 at Infirmary, 14 at Cleveland, Infirmary at Lovers	
OHIO DEPARTMENT OF TRANSPORTATION	
6/13/2019	NOT TO SCALE

POR-14 at
Infirmary
PLATE 1 of 1

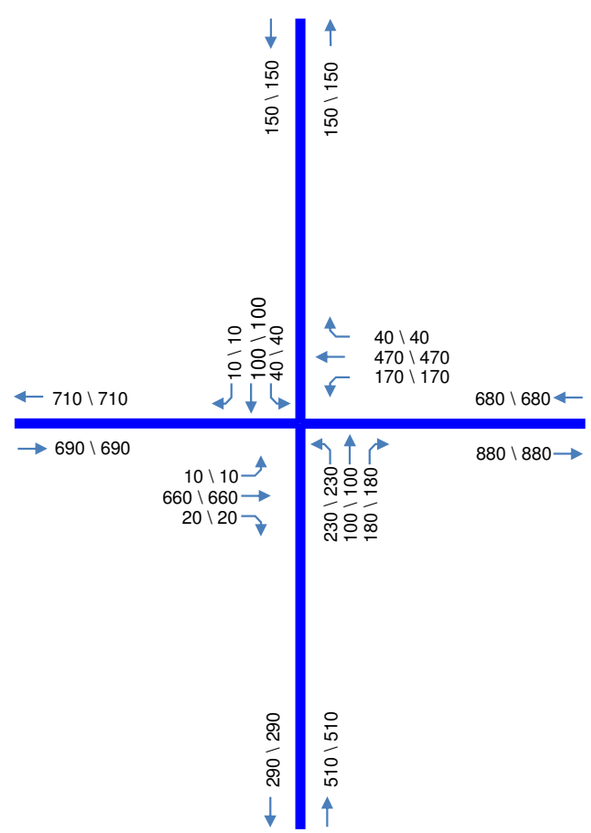
2023 \ 2043 24 Hr
Open Yr \ Design Yr
Total Turn Volumes



2023 \ 2043 AM
Open Yr \ Design Yr
Total Turn Volumes



2023 \ 2043 PM
Open Yr \ Design Yr
Total Turn Volumes

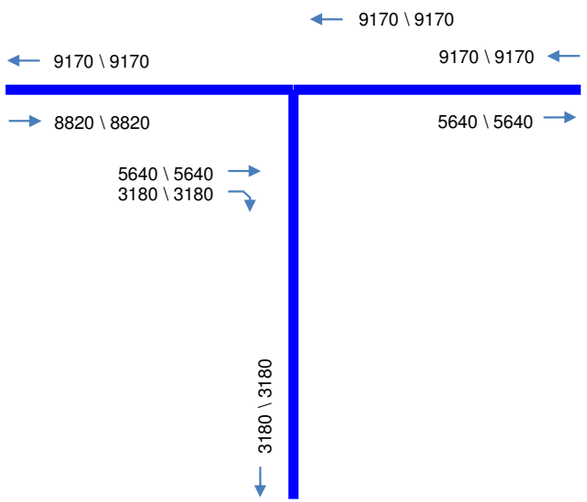


N

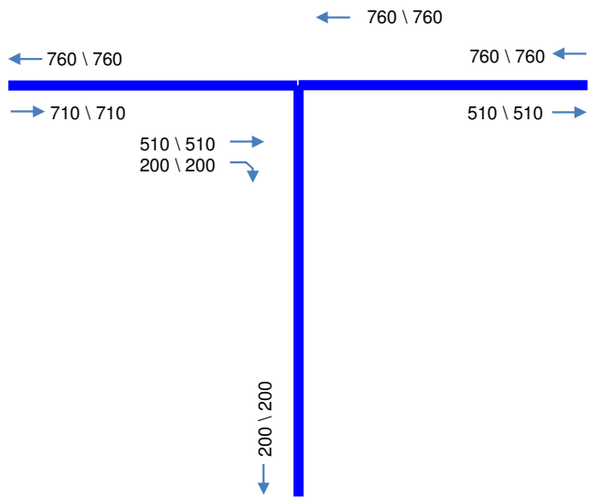
POR-14 at Infirmary	"Detour" Cond.
ADT, AM, PM DHV	
OHIO DEPARTMENT OF TRANSPORTATION	
7/27/2019	NOT TO SCALE

POR-14 at
Cleveland
PLATE 1 of 1

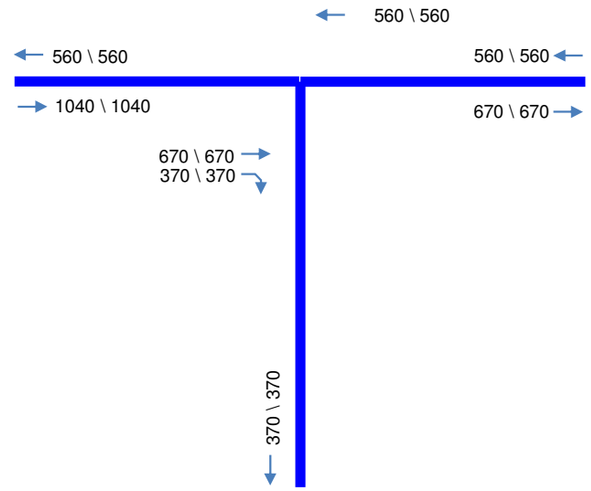
**2023 \ 2043 24 Hr
Open Yr \ Design Yr
Total Turn Volumes**



**2023 \ 2043 AM
Open Yr \ Design Yr
Total Turn Volumes**



**2023 \ 2043 PM
Open Yr \ Design Yr
Total Turn Volumes**

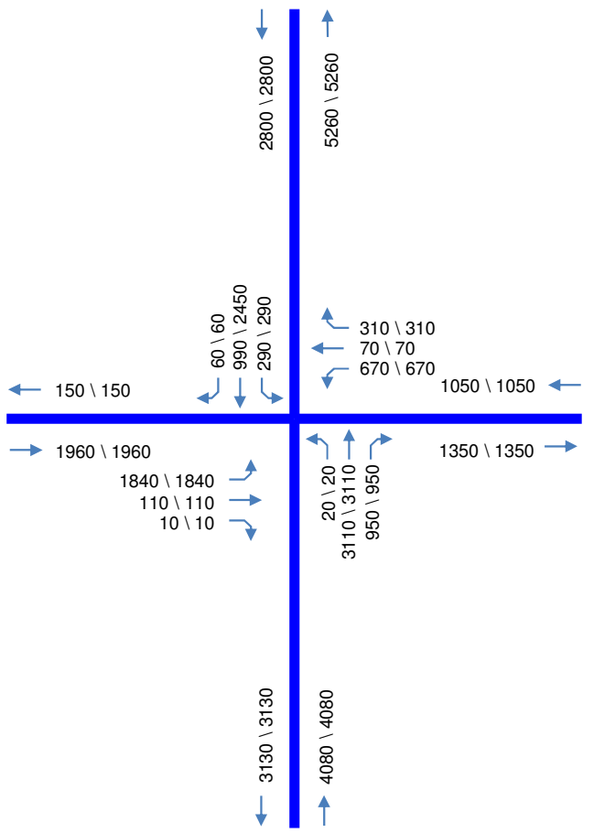


N

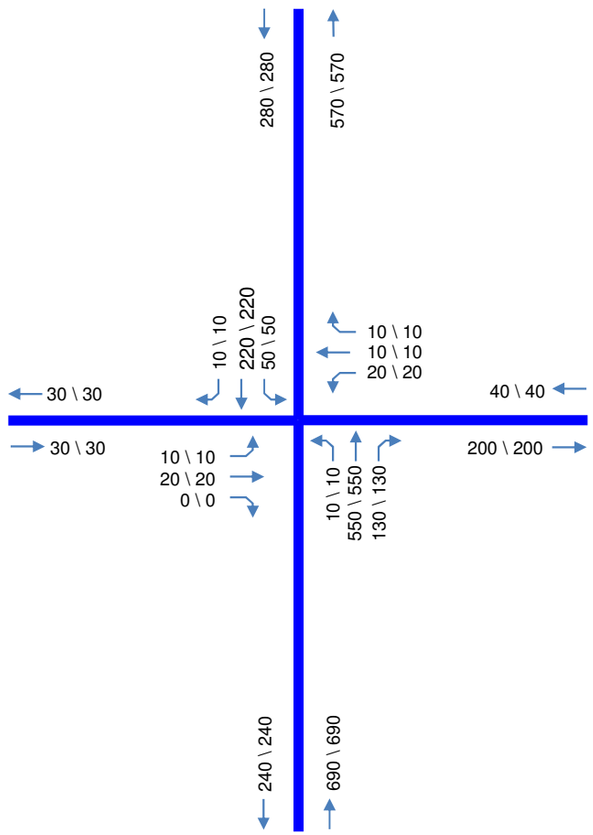
POR-14 at Cleveland	"Detour" Cond.
ADT, AM, PM DHV	
OHIO DEPARTMENT OF TRANSPORTATION	
7/27/2019	NOT TO SCALE

POR Infirmary
at Lovers Ln
PLATE 1 of 1

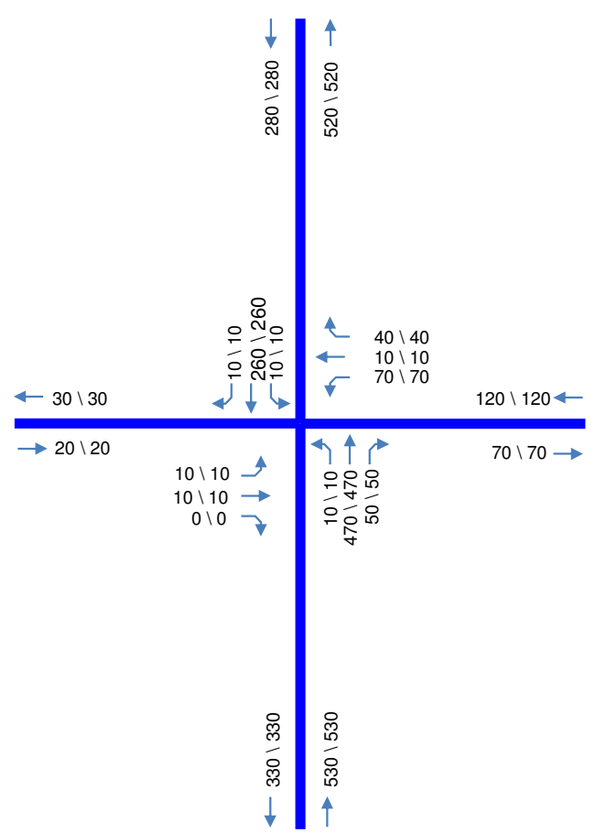
2023 \ 2043 24 Hr
Open Yr \ Design Yr
Total Turn Volumes



2023 \ 2043 AM
Open Yr \ Design Yr
Total Turn Volumes



2023 \ 2043 PM
Open Yr \ Design Yr
Total Turn Volumes

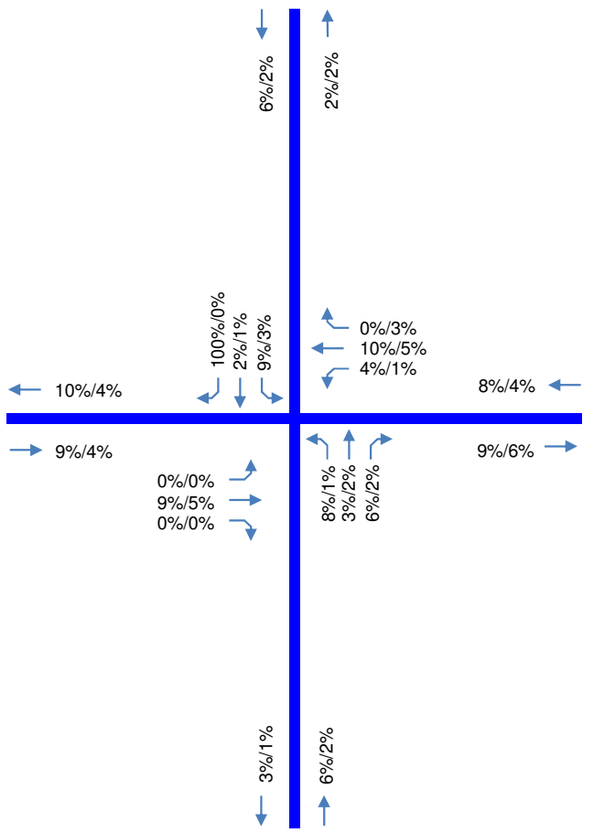


N

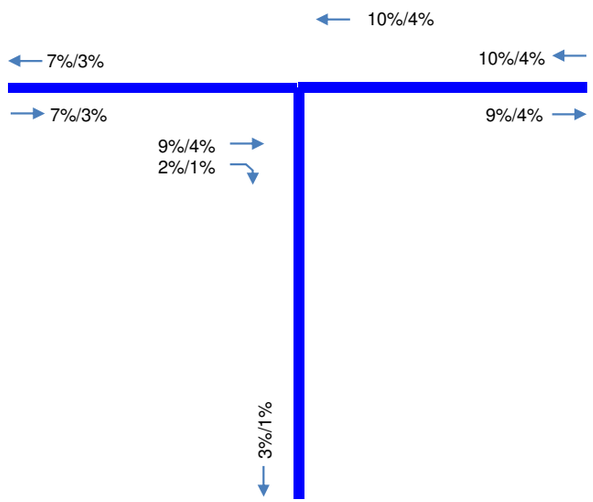
POR Infirmary at Lovers	"Detour" Cond.
ADT, AM, PM DHV	
OHIO DEPARTMENT OF TRANSPORTATION	
7/27/2019	NOT TO SCALE

POR Projects
Truck Percentages
PLATE 1 of 1

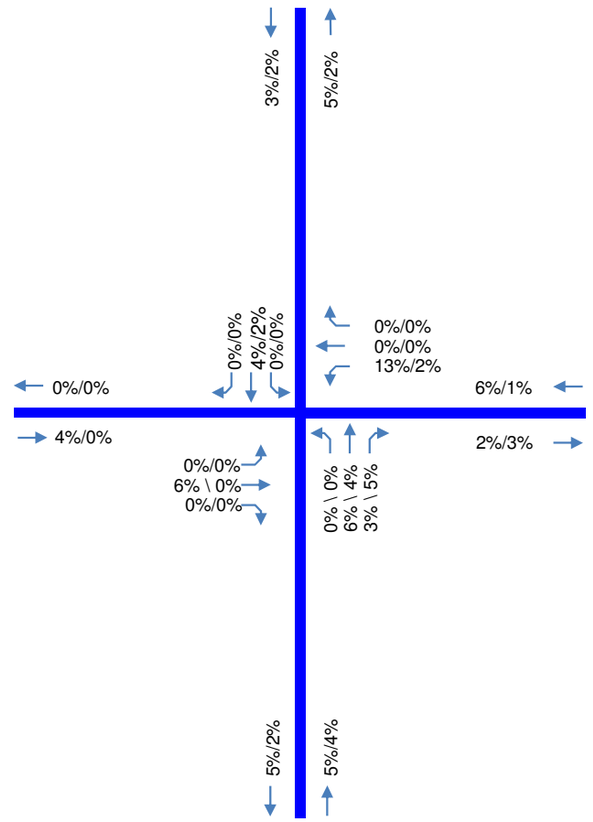
POR 14 at Infirmary Truck Percentages AM/PM



POR 14 at Cleveland Truck Percentages AM/PM



POR Infirmary at Lovers Ln Truck Percentages AM/PM



N

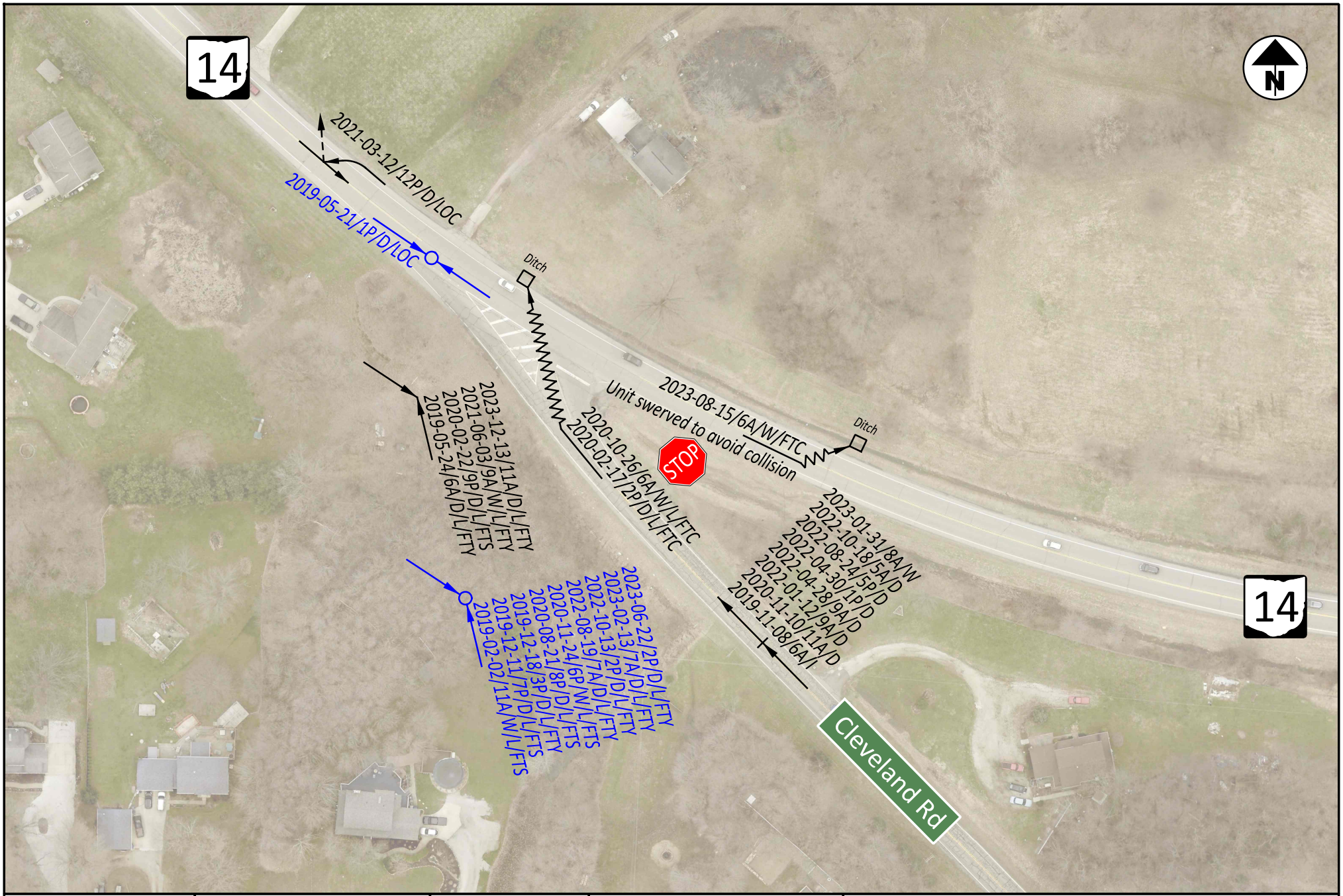
Truck Percentages	Detour Cond.
14 at Infirmary, 14 at Cleveland, Infirmary at Lovers	
OHIO DEPARTMENT OF TRANSPORTATION	
6/13/2019	NOT TO SCALE

EMH&T

Engineers, Surveyors, Planners, Scientists

APPENDIX C

Collision Diagrams



Vehicle Direction
Backing
Pedestrian
Out of Control
Overturn

Injury
Fatal
Fixed Object
Parked Vehicle
TEXT Collision Information

Road Condition:
D - Dry
W - Wet
S - Snow
I - Ice

FTY - Failure to Yield
FTS - Failure to Stop
FTC - Failure to Control
LOC - Left of Center
RRL - Ran Red Light
OVI - Operating Vehicle Impaired

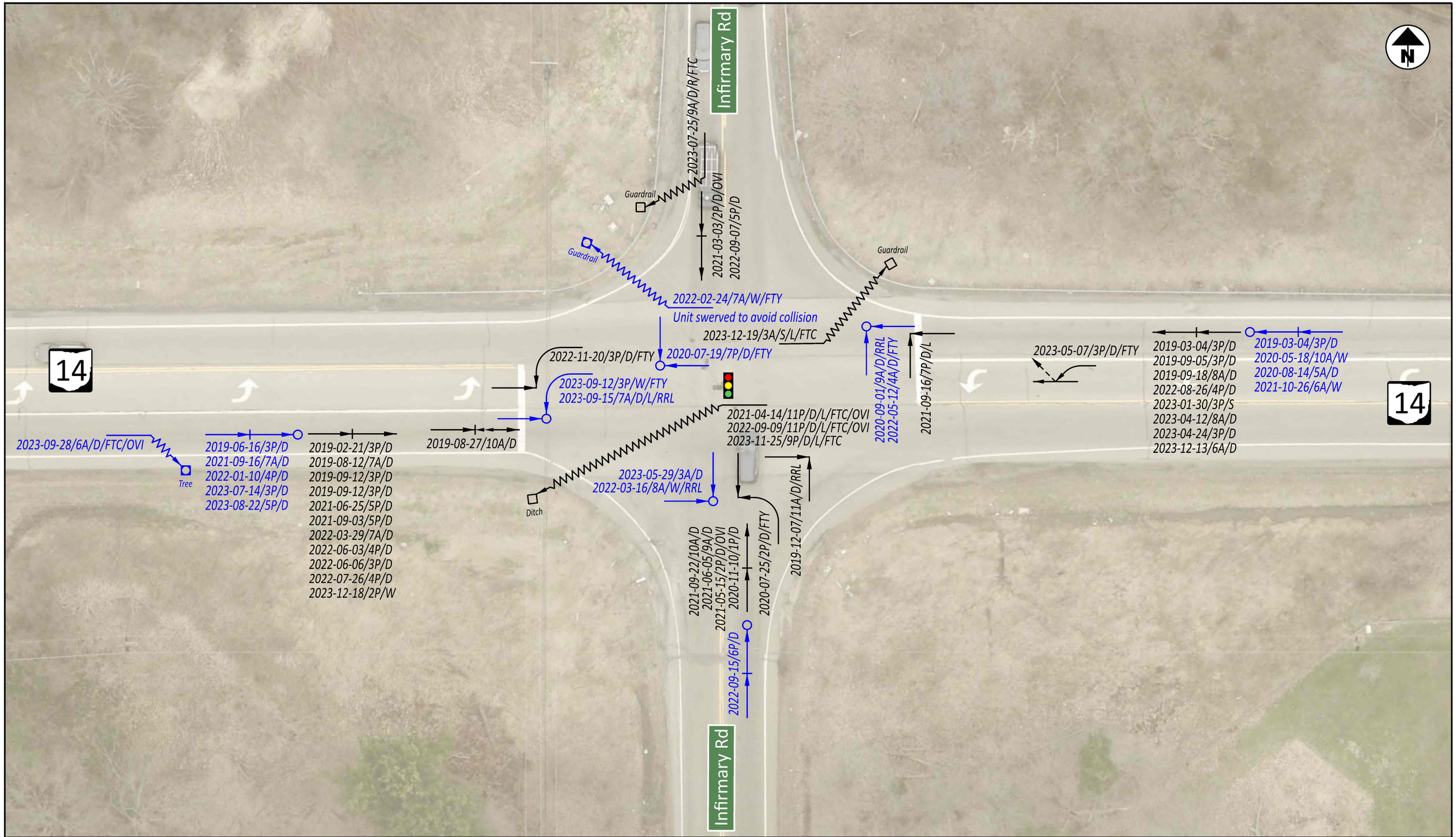
TOTAL CRASHES ON PAGE

FREQUENCY		SEVERITY	
6	2019	16	NON-INJURY
6	2020	10	INJURY/FATAL
2	2021		
7	2022	26	TOTAL
5	2023		

STATE OF OHIO DEPARTMENT OF TRANSPORTATION

COLLISION DIAGRAM

POR SR 14 AT CLEVELAND RD
SLM 8.89
2019-2023
AS OF 2024-01-05



Vehicle Direction
Backing
Pedestrian
Out of Control
Overturn

Injury
Fatal
Fixed Object
Parked Vehicle
TEXT Collision Information

Road Condition:
D - Dry
W - Wet
S - Snow
I - Ice

FTY - Failure to Yield
FTS - Failure to Stop
FTC - Failure to Control
LOC - Left of Center
RRL - Ran Red Light
OVI - Operating Vehicle Impaired

TOTAL CRASHES ON PAGE

FREQUENCY		SEVERITY	
11	2019	36	NON-INJURY
6	2020	19	INJURY/FATAL
10	2021		
13	2022	55	TOTAL
15	2023		

STATE OF OHIO DEPARTMENT OF TRANSPORTATION

COLLISION DIAGRAM

POR SR 14 AT INFIRMARY RD
SLM 9.35

2019-2023

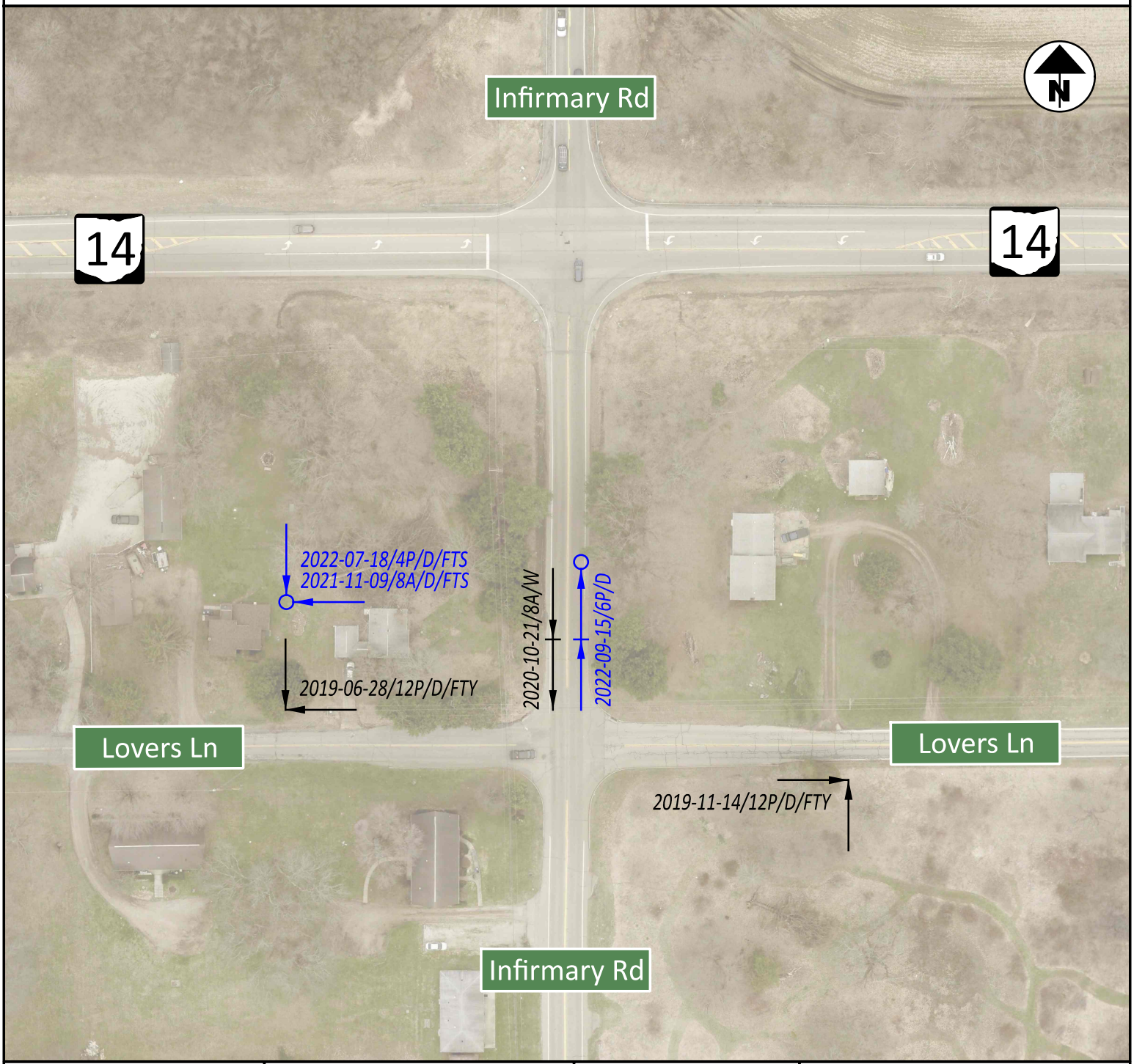
AS OF 2024-02-20

COLLISION DIAGRAM

POR INFIRMARY RD AT LOVERS LN

2019-2023

AS OF 2024-02-20



- Vehicle Direction
- Backing
- Pedestrian
- Out of Control
- Overturn

- Injury
- Fatal
- Fixed Object
- Parked Vehicle
- *TEXT* Collision Information

Road Condition:
D - Dry
W - Wet
S - Snow
I - Ice

FTY - Failure to Yield
FTS - Failure to Stop
FTC - Failure to Control
LOC - Left of Center
RRL - Ran Red Light
OVI - Operating Vehicle Impaired

TOTAL CRASHES ON PAGE

FREQUENCY		SEVERITY	
2	2019	3	NON-INJURY
1	2020	3	INJURY/FATAL
1	2021		
2	2022	6	TOTAL
0	2023		

EMH&T

Engineers, Surveyors, Planners, Scientists

APPENDIX D

CAM Tool Data Analysis Tables

SLM 8.89 POR SR 14 at Cleveland Rd CAMTool 2019-2023 Available

Crash Summary Sheet

Fatalities	0
Serious Injuries	0
Other Injuries	18

Crashes Per Year	5.20
Fatal and All Injury Crashes	10
Percent Injury	38.5%
Equivalent PDO Index Value	2.89

Crash Severity	Crashes	%
(3) Minor Injury Suspected	7	26.92%
(4) Injury Possible	3	11.54%
(5) PDO/No Injury	16	61.54%
Grand Total	26	100.00%

Year	Crashes	%
2019	6	23.08%
2020	6	23.08%
2021	2	7.69%
2022	7	26.92%
2023	5	19.23%
Grand Total	26	100.00%

Day of Week	Crashes	%
(2) Monday	3	11.54%
(3) Tuesday	6	23.08%
(4) Wednesday	5	19.23%
(5) Thursday	4	15.38%
(6) Friday	5	19.23%
(7) Saturday	3	11.54%
Grand Total	26	100.00%

Crash Type	Crashes	%
Angle	13	50.00%
Rear End	8	30.77%
Fixed Object	3	11.54%
Sideswipe - Meeting	1	3.85%
Head On	1	3.85%
Grand Total	26	100.00%

Hour of Day	Crashes	%
5	1	3.85%
6	4	15.38%
7	2	7.69%
8	1	3.85%
9	3	11.54%
11	3	11.54%
12	1	3.85%
13	2	7.69%
14	3	11.54%
15	1	3.85%
17	1	3.85%
18	1	3.85%
19	1	3.85%
20	1	3.85%
21	1	3.85%
Grand Total	26	100.00%

Month	Crashes	%
1	2	7.69%
2	4	15.38%
3	1	3.85%
4	2	7.69%
5	2	7.69%
6	2	7.69%
8	4	15.38%
10	3	11.54%
11	3	11.54%
12	3	11.54%
Grand Total	26	100.00%

SLM 8.89 POR SR 14 at Cleveland Rd CAMTool 2019-2023 Available

Crash Summary Sheet

Weather Condition	Crashes	%
Clear	15	57.69%
Cloudy	9	34.62%
Snow	1	3.85%
Rain	1	3.85%
Grand Total	26	100.00%

Road Condition	Crashes	%
Dry	19	73.08%
Wet	6	23.08%
Ice	1	3.85%
Grand Total	26	100.00%

Light Condition	Crashes	%
Daylight	18	69.23%
Dark - Roadway Not Lighted	4	15.38%
Dark - Lighted Roadway	3	11.54%
Dawn/Dusk	1	3.85%
Grand Total	26	100.00%

Number of Units	Crashes	%
2	23	88.46%
1	2	7.69%
3	1	3.85%
Grand Total	26	100.00%

ODOT Location	Crashes	%
T-Intersection	25	96.15%
Not An Intersection	1	3.85%
Grand Total	26	100.00%

Work Zone Related	Crashes	%
No	26	100.00%
Grand Total	26	100.00%

Alcohol Related	Crashes	%
No	26	100.00%
Grand Total	26	100.00%

Drug Related (Inc. Marijuana)	Crashes	%
No	26	100.00%
Grand Total	26	100.00%

Contour	Crashes	%
Curve Grade	3	11.54%
Curve Level	13	50.00%
Straight Grade	3	11.54%
Straight Level	7	26.92%
Grand Total	26	100.00%

Marijuana Related	Crashes	%
No	26	100.00%
Grand Total	26	100.00%

Roadway Departure	Crashes	%
No	20	76.92%
Yes	6	23.08%
Grand Total	26	100.00%

Older Driver (65+)	Crashes	%
No	19	73.08%
Yes	7	26.92%
Grand Total	26	100.00%

Intersection Related	Crashes	%
Yes	24	92.31%
No	2	7.69%
Grand Total	26	100.00%

Young Driver (15-25)	Crashes	%
No	15	57.69%
Yes	11	42.31%
Grand Total	26	100.00%

Speed Related	Crashes	%
No	25	96.15%
Yes	1	3.85%
Grand Total	26	100.00%

Motorcycle Involved	Crashes	%
No	25	96.15%
Yes	1	3.85%
Grand Total	26	100.00%

SLM 8.89 POR SR 14 at Cleveland Rd CAMTool 2019-2023 Available

Crash Summary Sheet

Unit 1 Summary

Unit 1 Pre-Crash Action	Crashes	%
Making Left Turn	13	50.00%
Straight Ahead	11	42.31%
Entering Traffic Lane	1	3.85%
Slowing or Stopped In Traffic	1	3.85%
Grand Total	26	100.00%

Unit 1 Contributing Factor	Crashes	%
Failure to Yield	8	30.77%
Following Too Closely/ACDA	6	23.08%
Failure to Stop	4	15.38%
Failure to Control	3	11.54%
Improper Start From a Parked Position	2	7.69%
Left of Center	2	7.69%
Ran Stop Sign	1	3.85%
Grand Total	26	100.00%

Unit 1 Object Struck	Crashes	%
Nothing Struck	23	88.46%
Ditch	2	7.69%
Embankment	1	3.85%
Grand Total	26	100.00%

Unit 1 Traffic Control	Crashes	%
Stop Sign	18	69.23%
No Control	8	30.77%
Grand Total	26	100.00%

Unit 1 Posted Speed	Crashes	%
0	1	3.85%
35	10	38.46%
45	3	11.54%
50	1	3.85%
55	11	42.31%
Grand Total	26	100.00%

Unit 1 Direction From	Crashes	%
South	22	84.62%
Southeast	2	7.69%
Northwest	2	7.69%
Grand Total	26	100.00%

Unit 1 Direction To	Crashes	%
Northwest	14	53.85%
North	8	30.77%
West	2	7.69%
Southeast	2	7.69%
Grand Total	26	100.00%

SLM 8.89 POR SR 14 at Cleveland Rd CAMTool 2019-2023 Available

Crash Summary Sheet

Unit 1 Summary

Unit 1 Type	Crashes	%
Passenger Car	15	57.69%
Sport Utility Vehicle	5	19.23%
Passenger Van (minivan)	3	11.54%
Cargo Van	2	7.69%
Pick up	1	3.85%
Grand Total	26	100.00%

Unit 1 Special Function	Crashes	%
None	26	100.00%
Grand Total	26	100.00%

SLM 8.89 POR SR 14 at Cleveland Rd CAMTool 2019-2023 Available
Crash Summary Sheet

Unit 2 Summary

Unit 2 Pre-Crash Action	Crashes	%
Straight Ahead	12	46.15%
Slowing or Stopped In Traffic	7	26.92%
Negotiating a Curve	3	11.54%
	2	7.69%
Making Left Turn	2	7.69%
Grand Total	26	100.00%

Unit 2 Contributing Factor	Crashes	%
None	22	84.62%
	2	7.69%
Failure to Yield	2	7.69%
Grand Total	26	100.00%

Unit 2 Direction From	Crashes	%
	2	7.69%
Northwest	11	42.31%
South	10	38.46%
West	3	11.54%
Grand Total	26	100.00%

Unit 2 Direction To	Crashes	%
	2	7.69%
East	3	11.54%
North	8	30.77%
Northwest	2	7.69%
Southeast	11	42.31%
Grand Total	26	100.00%

Unit 2 Type	Crashes	%
Passenger Car	12	46.15%
Sport Utility Vehicle	6	23.08%
Pick up	3	11.54%
	2	7.69%
Semi-Tractor	2	7.69%
Motorcycle 2 Wheeled	1	3.85%
Grand Total	26	100.00%

Unit 2 Special Function	Crashes	%
None	24	92.31%
	2	7.69%
Grand Total	26	100.00%

SLM 9.35 POR SR 14 at Infirmary Rd CAMTool 2019-2023

Crash Summary Sheet

Fatalities	0
Serious Injuries	0
Other Injuries	24

Crashes Per Year	11.00
Fatal and All Injury Crashes	19
Percent Injury	34.5%
Equivalent PDO Index Value	2.53

Crash Severity	Crashes	%
(3) Minor Injury Suspected	9	16.36%
(4) Injury Possible	10	18.18%
(5) PDO/No Injury	36	65.45%
Grand Total	55	100.00%

Year	Crashes	%
2019	11	20.00%
2020	6	10.91%
2021	10	18.18%
2022	13	23.64%
2023	15	27.27%
Grand Total	55	100.00%

Day of Week	Crashes	%
(1) Sunday	4	7.27%
(2) Monday	10	18.18%
(3) Tuesday	10	18.18%
(4) Wednesday	8	14.55%
(5) Thursday	9	16.36%
(6) Friday	9	16.36%
(7) Saturday	5	9.09%
Grand Total	55	100.00%

Crash Type	Crashes	%
Rear End	35	63.64%
Angle	7	12.73%
Fixed Object	7	12.73%
Left Turn	4	7.27%
Sideswipe - Passing	1	1.82%
Backing	1	1.82%
Grand Total	55	100.00%

Hour of Day	Crashes	%
3	2	3.64%
4	1	1.82%
5	1	1.82%
6	3	5.45%
7	6	10.91%
8	3	5.45%
9	3	5.45%
10	3	5.45%
11	1	1.82%
13	1	1.82%
14	4	7.27%
15	13	23.64%
16	4	7.27%
17	4	7.27%
18	1	1.82%
19	2	3.64%
21	1	1.82%
23	2	3.64%
Grand Total	55	100.00%

Month	Crashes	%
1	2	3.64%
2	2	3.64%
3	5	9.09%
4	3	5.45%
5	5	9.09%
6	5	9.09%
7	5	9.09%
8	5	9.09%
9	14	25.45%
10	1	1.82%
11	4	7.27%
12	4	7.27%
Grand Total	55	100.00%

SLM 9.35 POR SR 14 at Infirmary Rd CAMTool 2019-2023

Crash Summary Sheet

Weather Condition	Crashes	%
Clear	31	56.36%
Cloudy	19	34.55%
Snow	3	5.45%
Rain	2	3.64%
Grand Total	55	100.00%

Road Condition	Crashes	%
Dry	46	83.64%
Wet	7	12.73%
Snow	2	3.64%
Grand Total	55	100.00%

Light Condition	Crashes	%
Daylight	43	78.18%
Dark - Roadway Not Lighted	10	18.18%
Dark - Lighted Roadway	1	1.82%
Dawn/Dusk	1	1.82%
Grand Total	55	100.00%

Number of Units	Crashes	%
2	43	78.18%
1	6	10.91%
3	5	9.09%
4	1	1.82%
Grand Total	55	100.00%

ODOT Location	Crashes	%
Four-Way Intersection	55	100.00%
Grand Total	55	100.00%

Work Zone Related	Crashes	%
No	55	100.00%
Grand Total	55	100.00%

Alcohol Related	Crashes	%
No	51	92.73%
Yes	4	7.27%
Grand Total	55	100.00%

Drug Related (Inc. Marijuana)	Crashes	%
No	52	94.55%
Yes	3	5.45%
Grand Total	55	100.00%

Contour	Crashes	%
Straight Grade	16	29.09%
Straight Level	39	70.91%
Grand Total	55	100.00%

Marijuana Related	Crashes	%
No	54	98.18%
Yes	1	1.82%
Grand Total	55	100.00%

Roadway Departure	Crashes	%
No	47	85.45%
Yes	8	14.55%
Grand Total	55	100.00%

Older Driver (65+)	Crashes	%
No	44	80.00%
Yes	11	20.00%
Grand Total	55	100.00%

Intersection Related	Crashes	%
Yes	40	72.73%
No	15	27.27%
Grand Total	55	100.00%

Young Driver (15-25)	Crashes	%
No	34	61.82%
Yes	21	38.18%
Grand Total	55	100.00%

Speed Related	Crashes	%
No	55	100.00%
Grand Total	55	100.00%

Motorcycle Involved	Crashes	%
No	54	98.18%
Yes	1	1.82%
Grand Total	55	100.00%

SLM 9.35 POR SR 14 at Infirmary Rd CAMTool 2019-2023

Crash Summary Sheet

Unit 1 Summary

Unit 1 Pre-Crash Action	Crashes	%
Straight Ahead	41	74.55%
Making Left Turn	9	16.36%
Slowing or Stopped In Traffic	2	3.64%
Changing Lanes	1	1.82%
Backing	1	1.82%
Making Right Turn	1	1.82%
Grand Total	55	100.00%

Unit 1 Contributing Factor	Crashes	%
Following Too Closely/ACDA	31	56.36%
Failure to Control	6	10.91%
Failure to Yield	6	10.91%
Improper Start From a Parked Position	4	7.27%
Ran Red Light	3	5.45%
Not Discernible	3	5.45%
Improper Backing	1	1.82%
None	1	1.82%
Grand Total	55	100.00%

Unit 1 Object Struck	Crashes	%
Nothing Struck	47	85.45%
Guardrail Face	4	7.27%
Ditch	2	3.64%
Tree	1	1.82%
Culvert	1	1.82%
Grand Total	55	100.00%

Unit 1 Traffic Control	Crashes	%
Signal	39	70.91%
No Control	16	29.09%
Grand Total	55	100.00%

Unit 1 Posted Speed	Crashes	%
40	5	9.09%
45	10	18.18%
50	1	1.82%
55	39	70.91%
Grand Total	55	100.00%

Unit 1 Direction From	Crashes	%
East	22	40.00%
West	20	36.36%
South	10	18.18%
North	3	5.45%
Grand Total	55	100.00%

Unit 1 Direction To	Crashes	%
East	20	36.36%
West	20	36.36%
North	8	14.55%
South	7	12.73%
Grand Total	55	100.00%

SLM 9.35 POR SR 14 at Infirmary Rd CAMTool 2019-2023

Crash Summary Sheet

Unit 1 Summary

Unit 1 Type	Crashes	%
Passenger Car	23	41.82%
Sport Utility Vehicle	17	30.91%
Pick up	9	16.36%
Passenger Van (minivan)	3	5.45%
Single Unit Truck	1	1.82%
Motorcycle 2 Wheeled	1	1.82%
Semi-Tractor	1	1.82%
Grand Total	55	100.00%

Unit 1 Special Function	Crashes	%
None	55	100.00%
Grand Total	55	100.00%

SLM 9.35 POR SR 14 at Infirmary Rd CAMTool 2019-2023

Crash Summary Sheet

Unit 2 Summary

Unit 2 Pre-Crash Action	Crashes	%
Slowing or Stopped In Traffic	33	60.00%
Straight Ahead	15	27.27%
	6	10.91%
Making Left Turn	1	1.82%
Grand Total	55	100.00%

Unit 2 Contributing Factor	Crashes	%
None	42	76.36%
	6	10.91%
Not Discernible	4	7.27%
Ran Red Light	2	3.64%
Swerving to Avoid	1	1.82%
Grand Total	55	100.00%

Unit 2 Direction From	Crashes	%
	6	10.91%
East	17	30.91%
North	7	12.73%
South	4	7.27%
West	21	38.18%
Grand Total	55	100.00%

Unit 2 Direction To	Crashes	%
	6	10.91%
East	20	36.36%
North	4	7.27%
South	7	12.73%
West	18	32.73%
Grand Total	55	100.00%

Unit 2 Type	Crashes	%
Passenger Car	20	36.36%
Pick up	12	21.82%
Sport Utility Vehicle	11	20.00%
	6	10.91%
Passenger Van (minivan)	2	3.64%
Cargo Van	1	1.82%
Single Unit Truck	1	1.82%
Bus (16+ Passengers)	1	1.82%
Semi-Tractor	1	1.82%
Grand Total	55	100.00%

Unit 2 Special Function	Crashes	%
None	46	83.64%
	6	10.91%
Police	2	3.64%
Bus – Transit/Commuter	1	1.82%
Grand Total	55	100.00%

Infirmary Rd at Lovers Ln CAMTool 2019-2023 Available

Crash Summary Sheet

Fatalities	0
Serious Injuries	0
Other Injuries	5

Crashes Per Year	1.50
Fatal and All Injury Crashes	3
Percent Injury	50.0%
Equivalent PDO Index Value	3.07

Crash Severity	Crashes	%
(3) Minor Injury Suspected	1	16.67%
(4) Injury Possible	2	33.33%
(5) PDO/No Injury	3	50.00%
Grand Total	6	100.00%

Year	Crashes	%
2019	2	33.33%
2020	1	16.67%
2021	1	16.67%
2022	2	33.33%
Grand Total	6	100.00%

Day of Week	Crashes	%
(2) Monday	1	16.67%
(3) Tuesday	1	16.67%
(4) Wednesday	1	16.67%
(5) Thursday	2	33.33%
(6) Friday	1	16.67%
Grand Total	6	100.00%

Crash Type	Crashes	%
Angle	4	66.67%
Rear End	2	33.33%
Grand Total	6	100.00%

Hour of Day	Crashes	%
8	2	33.33%
12	2	33.33%
16	1	16.67%
18	1	16.67%
Grand Total	6	100.00%

Month	Crashes	%
6	1	16.67%
7	1	16.67%
9	1	16.67%
10	1	16.67%
11	2	33.33%
Grand Total	6	100.00%

Infirmary Rd at Lovers Ln CAMTool 2019-2023 Available

Crash Summary Sheet

Weather Condition	Crashes	%
Clear	5	83.33%
Rain	1	16.67%
Grand Total	6	100.00%

Road Condition	Crashes	%
Dry	5	83.33%
Wet	1	16.67%
Grand Total	6	100.00%

Light Condition	Crashes	%
Daylight	6	100.00%
Grand Total	6	100.00%

Number of Units	Crashes	%
2	5	83.33%
3	1	16.67%
Grand Total	6	100.00%

ODOT Location	Crashes	%
Four-Way Intersection	6	100.00%
Grand Total	6	100.00%

Work Zone Related	Crashes	%
No	6	100.00%
Grand Total	6	100.00%

Alcohol Related	Crashes	%
No	6	100.00%
Grand Total	6	100.00%

Drug Related (Inc. Marijuana)	Crashes	%
No	6	100.00%
Grand Total	6	100.00%

Contour	Crashes	%
Straight Grade	5	83.33%
Straight Level	1	16.67%
Grand Total	6	100.00%

Marijuana Related	Crashes	%
No	6	100.00%
Grand Total	6	100.00%

Roadway Departure	Crashes	%
No	6	100.00%
Grand Total	6	100.00%

Older Driver (65+)	Crashes	%
No	5	83.33%
Yes	1	16.67%
Grand Total	6	100.00%

Intersection Related	Crashes	%
Yes	6	100.00%
Grand Total	6	100.00%

Young Driver (15-25)	Crashes	%
No	5	83.33%
Yes	1	16.67%
Grand Total	6	100.00%

Speed Related	Crashes	%
No	6	100.00%
Grand Total	6	100.00%

Motorcycle Involved	Crashes	%
No	5	83.33%
Yes	1	16.67%
Grand Total	6	100.00%

Infirmary Rd at Lovers Ln CAMTool 2019-2023 Available

Crash Summary Sheet

Unit 1 Summary

Unit 1 Pre-Crash Action	Crashes	%
Straight Ahead	6	100.00%
Grand Total	6	100.00%

Unit 1 Contributing Factor	Crashes	%
Failure to Yield	2	33.33%
Failure to Stop	2	33.33%
Following Too Closely/ACDA	2	33.33%
Grand Total	6	100.00%

Unit 1 Object Struck	Crashes	%
Nothing Struck	6	100.00%
Grand Total	6	100.00%

Unit 1 Traffic Control	Crashes	%
Stop Sign	4	66.67%
No Control	1	16.67%
Signal	1	16.67%
Grand Total	6	100.00%

Unit 1 Posted Speed	Crashes	%
35	2	33.33%
40	3	50.00%
45	1	16.67%
Grand Total	6	100.00%

Unit 1 Direction From	Crashes	%
East	3	50.00%
South	1	16.67%
West	1	16.67%
North	1	16.67%
Grand Total	6	100.00%

Unit 1 Direction To	Crashes	%
West	3	50.00%
South	1	16.67%
East	1	16.67%
North	1	16.67%
Grand Total	6	100.00%

Infirmary Rd at Lovers Ln CAMTool 2019-2023 Available

Crash Summary Sheet

Unit 1 Summary

Unit 1 Type	Crashes	%
Sport Utility Vehicle	3	50.00%
Passenger Van (minivan)	1	16.67%
Motorcycle 2 Wheeled	1	16.67%
Passenger Car	1	16.67%
Grand Total	6	100.00%

Unit 1 Special Function	Crashes	%
None	6	100.00%
Grand Total	6	100.00%

Infirmary Rd at Lovers Ln CAMTool 2019-2023 Available
Crash Summary Sheet

Unit 2 Summary

Unit 2 Pre-Crash Action	Crashes	%
Straight Ahead	5	83.33%
Slowing or Stopped In Traffic	1	16.67%
Grand Total	6	100.00%

Unit 2 Contributing Factor	Crashes	%
None	6	100.00%
Grand Total	6	100.00%

Unit 2 Direction From	Crashes	%
North	5	83.33%
South	1	16.67%
Grand Total	6	100.00%

Unit 2 Direction To	Crashes	%
North	1	16.67%
South	5	83.33%
Grand Total	6	100.00%

Unit 2 Type	Crashes	%
Sport Utility Vehicle	2	33.33%
Passenger Van (minivan)	2	33.33%
Passenger Car	1	16.67%
Pick up	1	16.67%
Grand Total	6	100.00%

Unit 2 Special Function	Crashes	%
None	6	100.00%
Grand Total	6	100.00%

EMH&T

Engineers, Surveyors, Planners, Scientists

APPENDIX E

Capacity Analysis Results

POR-14 Safety Study
LOS Summary Tables

SR 14/Infirmary Road

2043 AM	No Build Ex. Signal				No Build Detour Ex. Signal				Build Alternative 1 Detour Ex. Signal +NBL+SBL				Build Alternative 2 Detour Ex. Signal +2NBL+SBL				Build Alternative 3 Detour Ex. Signal +2NBL+SBL+EBT+WBT				Built Alt 4 Detour Proposed Roundabout			
Movement	LOS/ Delay(s)	v/c	95th %ile Queue (ft)	Queue Storage Ratio	LOS/ Delay(s)	v/c	95th %ile Queue (ft)	Queue Storage Ratio	LOS/ Delay(s)	v/c	95th %ile Queue (ft)	Queue Storage Ratio	LOS/ Delay(s)	v/c	95th %ile Queue (ft)	Queue Storage Ratio	LOS/ Delay(s)	v/c	95th %ile Queue (ft)	Queue Storage Ratio	LOS/ Delay(s)	v/c	95th %ile Queue (ft)	Queue Storage Ratio
EBL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	B/12.1	0.590	106.8	0.05
EBT	C/27.1	0.888	379	0.00	E/56.1	0.938	692	0.00	C/34.3	0.933	440	0.00	D/44.9	0.937	490	0.00	C/22.8	0.473	192	0.00				
EBR																	C/22.8	0.475	175	0.00				
EB Approach	C/27.1	-	-	-	E/56.1	-	-	-	C/34.3	-	-	-	D/44.9	-	-	-	C/22.8	-	-	-	B/12.1	-	-	-
WBL	B/18.5	0.511	65	0.40	D/35.9	0.746	143	0.87	C/22.4	0.580	81	0.49	C/20.4	0.570	73	0.44	B/15.6	0.363	725	0.43	D/28.9	0.860	281.2	0.06
WBT	B/18.3	0.802	389	0.00	D/49.5	0.921	850	0.00	C/26.9	0.845	492	0.00	C/25.7	0.840	471	0.00	B/14.7	0.492	159	0.00	-	-	-	-
WBR																	B/14.6	0.493	200	0.00	A/6.7	0.210	21.5	0.08
WB Approach	B/18.3	-	-	-	D/47.1	-	-	-	C/26.1	-	-	-	C/24.8	-	-	-	B/14.8	-	-	-	C/24.4	-	-	-
NBL	C/25.3	0.673	250	0.83	E/62.4	0.963	651	2.17	D/35.9	0.805	317	2.11	D/44.2	0.870	198	1.32	D/43.6	0.869	195	1.30	B/15.0	0.620	116.1	0.46
NBT									C/21.2	0.423	167	0.56	C/21.0	0.431	163	0.54	D/20.8	0.429	160	0.53				
NBR																					A/6.9	0.210	21.0	0.08
NB Approach	C/25.3	-	-	-	E/62.4	-	-	-	C/29.9	-	-	-	C/34.8	-	-	-	C/34.3	-	-	-	B/12.9	-	-	-
SBL	D/36.0	0.559	118	0.00	C/33.4	0.253	148	0.00	D/36.4	0.164	30	0.20	D/35.3	0.161	28	0.19	C/35.0	0.160	28	0.19	C/15.1	0.350	40.8	0.01
SBT									C/38.2	0.528	97	0.00	D/37.0	0.524	94	0.00	D/36.6	0.520	92	0.00				
SBR																								
SB Approach	D/36.0	-	-	-	C/33.4	-	-	-	D/37.8	-	-	-	D/36.6	-	-	-	D/36.2	-	-	-	C/15.1	-	-	-
Intersection	C/23.4	-	-	-	D/52.9	-	-	-	C/30.0	-	-	-	C/33.5	-	-	-	C/23.8	-	-	-	C/17.4	-	-	-

2043 PM	No Build Ex. Signal				No Build Detour Ex. Signal				Build Alternative 1 Detour Ex. Signal +NBLT +SBLT				Build Alternative 2 Detour Ex. Signal +2 NBLT +SBLT				Build Alternative 3 Detour Ex. Signal +2 NBLT +SBLT +EBTH +				Built Alt 4 Detour Proposed Roundabout			
Movement	LOS/ Delay(s)	v/c	95th %ile Queue (ft)	Queue Storage Ratio	LOS/ Delay(s)	v/c	95th %ile Queue (ft)	Queue Storage Ratio	LOS/ Delay(s)	v/c	95th %ile Queue (ft)	Queue Storage Ratio	LOS/ Delay(s)	v/c	95th %ile Queue (ft)	Queue Storage Ratio	LOS/ Delay(s)	v/c	95th %ile Queue (ft)	Queue Storage Ratio	LOS/ Delay(s)	v/c	95th %ile Queue (ft)	Queue Storage Ratio
EBL	B/19.2	0.027	7	0.03	D/37.6	0.033	14	0.07	B/18.9	0.027	6	0.03	B/17.8	0.027	6	0.03	B/17.6	0.028	6	0.03	C/22.1	0.810	233.8	0.10
EBT	D/37.5	0.939	614	0.00	E/67.1	0.971	1094	0.00	C/30.0	0.950	554	0.00	D/44.4	0.955	634	0.00	C/25.1	0.567	251	0.00				
EBR																	C/25.2	0.567	239	0.00				
EB Approach	D/37.2	-	-	-	E/66.7	-	-	-	C/29.9	-	-	-	D/44.1	-	-	-	C/25.0	-	-	-	C/22.1	-	-	-
WBL	C/23.8	0.751	90	0.54	F/84.1	0.904	375	2.27	C/32.6	0.754	116	0.70	C/29.8	0.735	106	0.64	B/15.1	0.469	78	0.47	B/12.4	0.610	111.1	0.03
WBT	B/13.4	0.537	273	0.00	C/23.6	0.573	526	0.00	B/13.2	0.539	266	0.00	B/12.5	0.535	250	0.00	B/11.6	0.341	94	0.00	-	-	-	-
WBR																	B/11.6	0.343	124	0.00	A/5.2	0.015	13.0	0.05
WB Approach	B/16.0	-	-	-	D/40.7	-	-	-	B/18.1	-	-	-	B/16.8	-	-	-	B/12.5	-	-	-	B/11.0	-	-	-
NBL	D/36.7	0.770	347	1.16	F/82.7	0.974	745	2.48	C/33.3	0.661	213	1.42	D/40.7	0.759	120	0.80	D/38.2	0.681	109	0.73	B/14.2	0.540	81.3	0.33
NBT									C/29.6	0.595	242	0.81	C/29.9	0.613	238	0.79	C/23.5	0.547	198	0.66				
NBR																					A/9.1	0.290	30.5	0.16
NB Approach	D/36.7	-	-	-	F/82.7	-	-	-	C/31.3	-	-	-	C/34.7	-	-	-	C/30.1	-	-	-	B/12.4	-	-	-
SBL	D/43.2	0.649	171	0.00	D/47.6	0.370	231	0.00	D/14.1	0.237	43	0.29	D/39.3	0.232	41	0.27	C/34.2	0.206	35	0.23	A/9.5	0.270	28.0	0.01
SBT									D/43.2	0.632	121	0.00	D/41.1	0.627	115	0.00	D/26.5	0.555	101	0.00				
SBR																								
SB Approach	D/43.2	-	-	-	D/47.6	-	-	-	D/42.6	-	-	-	D/40.8	-	-	-	D/35.9	-	-	-	A/9.5	-	-	-
Intersection	C/29.9	-	-	-	E/60.6	-	-	-	C/27.2	-	-	-	C/23.3	-	-	-	C/22.9	-	-	-	B/15.0	-	-	-

SR 14 at Cleveland Road

2043 AM	No Build			
Movement	LOS/ Delay(s)	v/c	95th %ile Queue (ft)	Queue Storage Ratio
EBT	-	-	-	-
EBR				
EB Approach	-	-	-	-
WBL	A/9.3	0.01	0.0	0.01
WBT	A/0.2			
WB Approach	C/18.5	-	-	-
NBL	F/481.5	1.88	499.2	0.67
NBR				
NB Approach	F/481.5	-	-	-

2043 PM	No Build			
Movement	LOS/ Delay(s)	v/c	95th %ile Queue (ft)	Queue Storage Ratio
EBT	-	-	-	-
EBR				
EB Approach	-	-	-	-
WBL	B/11.0	0.02	2.6	0.01
WBT	A/0.3			
WB Approach	A/0.5	-	-	-
NBL	F/250.0	1.31	271.4	0.37
NBR				
NB Approach	F/250.2	-	-	-

Infirmary Road at Lovers Lane

2043 AM	No Build				Build Alternative 4 Detour			
Movement	LOS/ Delay(s)	v/c	95th %ile Queue (ft)	Queue Storage Ratio	LOS/ Delay(s)	v/c	95th %ile Queue (ft)	Queue Storage Ratio
EBL	C/20.5	0.12	10.2	0.01	D/28.3	0.17	15.4	0.01
EBT								
EBR								
EB Approach	C/20.5	-	-	-	D/28.3	-	-	-
WBL	C/18.5	0.14	12.8	0.01	C/23.6	0.18	17.9	0.01
WBT								
WBR								
WB Approach	C/18.5	-	-	-	C/23.6	-	-	-
NBL	A/7.8	0.01	0.0	0.0	A/7.8	0.01	0.0	0.0
NBT	A/0.5				-	-	-	
NBR	A/0.5				-	-	-	
NB Approach	A/0.3	-	-	-	A/0.1	-	-	-
SBL	A/8.6	0.05	0.0	0.0	A/9.5	0.06	5.1	0.07
SBT	A/0.5				-	-	-	-
SBR	A/0.5							
SB Approach	A/2.0	-	-	-	A/1.7	-	-	-

2043 PM	No Build				Build Alternative 4 Detour			
Movement	LOS/ Delay(s)	v/c	95th %ile Queue (ft)	Queue Storage Ratio	LOS/ Delay(s)	v/c	95th %ile Queue (ft)	Queue Storage Ratio
EBL	C/17.4	0.07	5.1	0.01	C/20.9	0.09	7.70	0.01
EBT								
EBR								
EB Approach	C/17.4	-	-	-	C/20.9	-	-	-
WBL	C/18.8	0.33	35.8	0.01	C/23.4	0.40	48.6	0.01
WBT								
WBR								
WB Approach	C/18.8	-	-	-	C/23.4	-	-	-
NBL	A/7.9	0.01	0.0	0.0	A/7.9	0.01	0.0	0.0
NBT	A/0.1				-	-	-	
NBR	A/0.1				-	-	-	
NB Approach	A/0.3	-	-	-	A/0.1	-	-	-
SBL	A/8.2	0.01	0.0	0.0	A/8.6	0.01	0.0	0.0
SBT	A/0.1				-	-	-	-
SBR	A/0.1							
SB Approach	A/0.4	-	-	-	A/0.3	-	-	-

HCS Two-Way Stop-Control Report

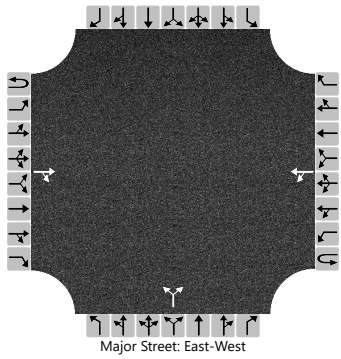
General Information

Analyst	RJI
Agency/Co.	ODOT
Date Performed	12/2/2024
Analysis Year	2043
Time Analyzed	AM Peak
Intersection Orientation	East-West
Project Description	No Build Conditions

Site Information

Intersection	SR 14 at Cleveland Rd
Jurisdiction	
East/West Street	SR 14
North/South Street	Cleveland Road
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	0	0
Configuration				TR		LT					LR					
Volume (veh/h)			510	200		10	760			220		10				
Percent Heavy Vehicles (%)						3				3		3				
Proportion Time Blocked																
Percent Grade (%)										0						
Right Turn Channelized																
Median Type | Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)						4.1				7.1		6.2				
Critical Headway (sec)						4.13				6.43		6.23				
Base Follow-Up Headway (sec)						2.2				3.5		3.3				
Follow-Up Headway (sec)						2.23				3.53		3.33				

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						11					250					
Capacity, c (veh/h)						839					133					
v/c Ratio						0.01					1.88					
95% Queue Length, Q_{95} (veh)						0.0					19.5					
95% Queue Length, Q_{95} (ft)						0.0					499.2					
Control Delay (s/veh)						9.3	0.2				481.5					
Level of Service (LOS)						A	A				F					
Approach Delay (s/veh)					0.3				481.5							
Approach LOS					A				F							

HCS Two-Way Stop-Control Report

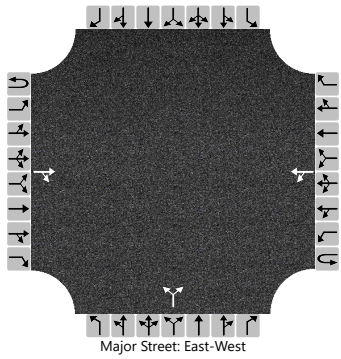
General Information

Analyst	RJI
Agency/Co.	ODOT
Date Performed	12/2/2024
Analysis Year	2043
Time Analyzed	PM Peak
Intersection Orientation	East-West
Project Description	No Build Conditions

Site Information

Intersection	SR 14 at Cleveland Rd
Jurisdiction	
East/West Street	SR 14
North/South Street	Cleveland Road
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	0	0
Configuration				TR		LT					LR					
Volume (veh/h)			670	370		10	560			140		10				
Percent Heavy Vehicles (%)						3				3		3				
Proportion Time Blocked																
Percent Grade (%)										0						
Right Turn Channelized																
Median Type | Storage						Undivided										

Critical and Follow-up Headways

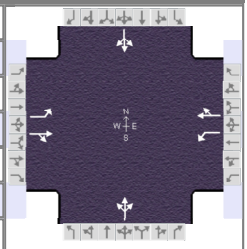
Base Critical Headway (sec)						4.1				7.1		6.2				
Critical Headway (sec)						4.13				6.43		6.23				
Base Follow-Up Headway (sec)						2.2				3.5		3.3				
Follow-Up Headway (sec)						2.23				3.53		3.33				

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						11					163					
Capacity, c (veh/h)						614					125					
v/c Ratio						0.02					1.31					
95% Queue Length, Q_{95} (veh)						0.1					10.6					
95% Queue Length, Q_{95} (ft)						2.6					271.4					
Control Delay (s/veh)						11.0	0.3				250.2					
Level of Service (LOS)						B	A				F					
Approach Delay (s/veh)						0.5				250.2						
Approach LOS						A				F						

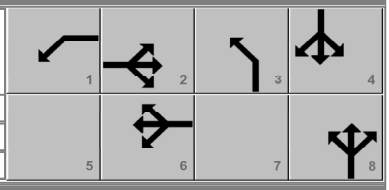
HCS Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	ODOT			Duration, h	0.250
Analyst	ARC	Analysis Date	Feb 22, 2024	Area Type	Other
Jurisdiction		Time Period	AM PEAK	PHF	0.92
Urban Street	SR 14	Analysis Year	2043	Analysis Period	1> 7:00
Intersection	Infirmary	File Name	AM Peak_No Build.xus		
Project Description	No Build				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	0	470	40	140	640	30	120	90	140	30	90	10

Signal Information												
Cycle, s	83.8	Reference Phase	2									
Offset, s	0	Reference Point	End									
Uncoordinated	Yes	Simult. Gap E/W	On									
Force Mode	Fixed	Simult. Gap N/S	On									
				Green	7.8	30.0	12.0	10.0	0.0	0.0		
				Yellow	4.0	4.0	4.0	4.0	0.0	0.0		
				Red	2.0	2.0	2.0	2.0	0.0	0.0		



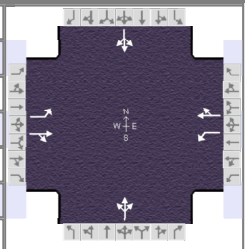
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2	1	6	3	8		4
Case Number		6.3	1.0	4.0	0.0	14.2		8.3
Phase Duration, s		36.0	13.8	49.8	18.0	34.0		16.0
Change Period, ($Y+R_c$), s		6.0	6.0	6.0	6.0	6.0		6.0
Max Allow Headway (*MAH*), s		2.9	2.9	2.9	0.0	3.1		3.1
Queue Clearance Time (g_s), s		27.1	6.2	30.9		19.1		8.7
Green Extension Time (g_e), s		2.4	0.1	2.3	0.0	0.9		0.9
Phase Call Probability		1.00	0.97	1.00		1.00		1.00
Max Out Probability		0.00	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	0	554		152	728			380			141	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	727	1742		1753	1738			1511			1674	
Queue Service Time (g_s), s	0.0	25.1		4.2	28.9			12.0			3.8	
Cycle Queue Clearance Time (g_c), s	0.0	25.1		4.2	28.9			17.1			6.7	
Green Ratio (*g/C*)	0.36	0.36		0.47	0.52			0.33			0.12	
Capacity (*c*), veh/h	86	624		298	908			565			253	
Volume-to-Capacity Ratio (*X*)	0.000	0.888		0.511	0.802			0.673			0.559	
Back of Queue (*Q*), ft/ln (95 th percentile)	0	379		65	389			250			118	
Back of Queue (*Q*), veh/ln (95 th percentile)	0.0	14.1		2.5	14.4			9.8			4.6	
Queue Storage Ratio (*RQ*) (95 th percentile)	0.00	0.00		0.40	0.00			0.83			0.00	
Uniform Delay (d_1), s/veh	0.0	25.3		18.0	16.4			24.0			35.3	
Incremental Delay (d_2), s/veh	0.0	1.8		0.5	1.9			1.3			0.7	
Initial Queue Delay (d_3), s/veh	0.0	0.0		0.0	0.0			0.0			0.0	
Control Delay (*d*), s/veh	0.0	27.1		18.5	18.3			25.3			36.0	
Level of Service (LOS)		C		B	B			C			D	
Approach Delay, s/veh / LOS	27.1	C		18.3	B		25.3	C		36.0	D	
Intersection Delay, s/veh / LOS	23.4						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

HCS Signalized Intersection Results Summary

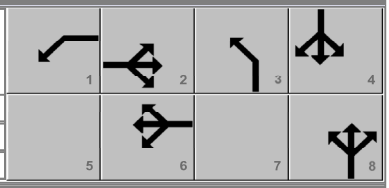
General Information				Intersection Information	
Agency	ODOT			Duration, h	0.250
Analyst	ARC	Analysis Date	Jun 24, 2024	Area Type	Other
Jurisdiction		Time Period	AM PEAK	PHF	0.92
Urban Street	SR 14	Analysis Year	2043	Analysis Period	1> 7:00
Intersection	Infirmary	File Name	AM Peak_No Build-Detour OPT.xus		
Project Description	No Build - Detour (OPT)				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	0	470	40	140	640	30	350	90	150	30	90	10

Signal Information			
Cycle, s	132.1	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	9.3	44.8	12.0	42.0	0.0	0.0
Yellow	4.0	4.0	4.0	4.0	0.0	0.0
Red	2.0	2.0	2.0	2.0	0.0	0.0



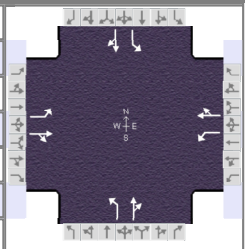
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2	1	6	3	8		4
Case Number		6.3	1.0	4.0	0.0	14.2		8.3
Phase Duration, s		50.8	15.3	66.1	18.0	66.0		48.0
Change Period, ($Y+R_c$), s		6.0	6.0	6.0	6.0	6.0		6.0
Max Allow Headway (*MAH*), s		2.9	2.9	2.9	0.0	3.1		3.1
Queue Clearance Time (g_s), s		42.7	9.2	53.9		62.0		9.6
Green Extension Time (g_e), s		1.5	0.1	1.6	0.0	0.0		1.6
Phase Call Probability		1.00	1.00	1.00		1.00		1.00
Max Out Probability		0.02	0.03	0.39		1.00		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	0	554		152	728			641			141	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	727	1742		1753	1738			1371			1651	
Queue Service Time (g_s), s	0.0	40.7		7.2	51.9			12.0			0.0	
Cycle Queue Clearance Time (g_c), s	0.0	40.7		7.2	51.9			60.0			7.6	
Green Ratio (*g/C*)	0.34	0.34		0.42	0.46			0.45			0.32	
Capacity (*c*), veh/h	54	591		204	791			666			558	
Volume-to-Capacity Ratio (*X*)	0.000	0.938		0.746	0.921			0.963			0.253	
Back of Queue (*Q*), ft/ln (95 th percentile)	0	692		143	850			651			148	
Back of Queue (*Q*), veh/ln (95 th percentile)	0.0	25.8		5.5	31.5			25.4			5.8	
Queue Storage Ratio (*RQ*) (95 th percentile)	0.00	0.00		0.87	0.00			2.17			0.00	
Uniform Delay (d_1), s/veh	0.0	42.3		31.9	33.8			36.7			33.3	
Incremental Delay (d_2), s/veh	0.0	13.8		4.1	15.7			25.7			0.1	
Initial Queue Delay (d_3), s/veh	0.0	0.0		0.0	0.0			0.0			0.0	
Control Delay (*d*), s/veh	0.0	56.1		35.9	49.5			62.4			33.4	
Level of Service (LOS)		E		D	D			E			C	
Approach Delay, s/veh / LOS	56.1	E		47.1	D		62.4	E		33.4	C	
Intersection Delay, s/veh / LOS	52.9						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

HCS Signalized Intersection Results Summary

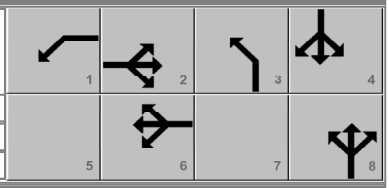
General Information				Intersection Information	
Agency	ODOT			Duration, h	0.250
Analyst	ARC	Analysis Date	Jun 24, 2024	Area Type	Other
Jurisdiction		Time Period	AM PEAK	PHF	0.92
Urban Street	SR 14	Analysis Year	2043	Analysis Period	1> 7:00
Intersection	Infirmary	File Name	AM Peak_Detour Build Alt 1.xus		
Project Description	Detour Build Alt 1(N/S Lt)				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	0	470	40	140	640	30	350	90	150	30	90	10

Signal Information			
Cycle, s	89.2	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	7.8	30.4	17.0	10.0	0.0	0.0
Yellow	4.0	4.0	4.0	4.0	0.0	0.0
Red	2.0	2.0	2.0	2.0	0.0	0.0



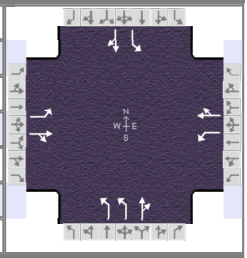
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2	1	6	3	8		4
Case Number		6.3	1.0	4.0	1.0	4.0		6.3
Phase Duration, s		36.4	13.8	50.2	23.0	39.0		16.0
Change Period, ($Y+R_c$), s		6.0	6.0	6.0	6.0	6.0		6.0
Max Allow Headway (*MAH*), s		2.9	2.9	2.9	2.9	3.1		3.1
Queue Clearance Time (g_s), s		29.5	6.7	34.5	19.0	12.4		7.0
Green Extension Time (g_e), s		1.0	0.0	0.0	0.0	0.7		0.1
Phase Call Probability		1.00	0.98	1.00	1.00	1.00		1.00
Max Out Probability		0.00	1.00	1.00	1.00	0.00		0.50

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	0	554		152	728		380	261		33	109	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	727	1742		1753	1738		1697	1668		1057	1837	
Queue Service Time (g_s), s	0.0	27.5		4.7	32.5		17.0	10.4		2.5	5.0	
Cycle Queue Clearance Time (g_c), s	0.0	27.5		4.7	32.5		17.0	10.4		2.5	5.0	
Green Ratio (*g/C*)	0.34	0.34		0.45	0.50		0.32	0.37		0.11	0.11	
Capacity (*c*), veh/h	81	594		262	861		473	617		199	206	
Volume-to-Capacity Ratio (*X*)	0.000	0.933		0.580	0.845		0.805	0.423		0.164	0.528	
Back of Queue (*Q*), ft/ln (95 th percentile)	0	440		81	492		317	167		30	97	
Back of Queue (*Q*), veh/ln (95 th percentile)	0.0	16.4		3.1	18.2		11.9	6.5		1.1	3.8	
Queue Storage Ratio (*RQ*) (95 th percentile)	0.00	0.00		0.49	0.00		2.11	0.56		0.20	0.00	
Uniform Delay (d_1), s/veh	0.0	28.4		20.3	19.5		26.8	21.0		36.3	37.4	
Incremental Delay (d_2), s/veh	0.0	5.9		2.0	7.4		9.1	0.2		0.1	0.8	
Initial Queue Delay (d_3), s/veh	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Control Delay (*d*), s/veh	0.0	34.3		22.4	26.9		35.9	21.2		36.4	38.2	
Level of Service (LOS)		C		C	C		D	C		D	D	
Approach Delay, s/veh / LOS	34.3	C		26.1	C		29.9	C		37.8	D	
Intersection Delay, s/veh / LOS	30.0						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

HCS Signalized Intersection Results Summary

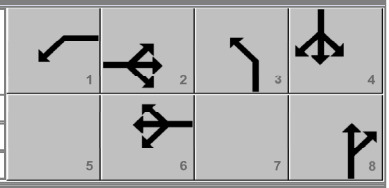
General Information				Intersection Information	
Agency	ODOT			Duration, h	0.250
Analyst	ARC	Analysis Date	Jun 24, 2024	Area Type	Other
Jurisdiction		Time Period	AM PEAK	PHF	0.92
Urban Street	SR 14	Analysis Year	2043	Analysis Period	1> 7:00
Intersection	Infirmary	File Name	AM Peak_Detour Build Alt 2.xus		
Project Description	Detour Build Alt 2 (NB Dual Lt & SB Lt)				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	0	470	40	140	640	30	350	90	150	30	90	10

Signal Information			
Cycle, s	86.6	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	7.8	29.4	15.6	9.8	0.0	0.0
Yellow	4.0	4.0	4.0	4.0	0.0	0.0
Red	2.0	2.0	2.0	2.0	0.0	0.0



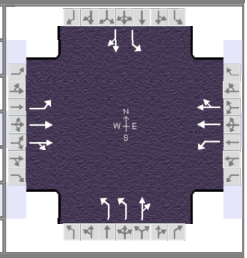
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2	1	6	3	8		4
Case Number		6.3	1.0	4.0	2.0	4.0		6.3
Phase Duration, s		35.4	13.8	49.2	21.6	37.4		15.8
Change Period, ($Y+R_c$), s		6.0	6.0	6.0	6.0	6.0		6.0
Max Allow Headway (*MAH*), s		2.9	2.9	2.9	2.9	3.1		3.1
Queue Clearance Time (g_s), s		28.7	6.5	33.3	15.2	12.2		6.8
Green Extension Time (g_e), s		0.7	0.1	0.0	0.4	0.0		0.1
Phase Call Probability		1.00	0.97	1.00	1.00	1.00		1.00
Max Out Probability		0.37	0.51	1.00	0.19	1.00		0.45

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	0	554		152	728		380	261		33	109	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	727	1742		1753	1738		1212	1668		1057	1837	
Queue Service Time (g_s), s	0.0	26.7		4.5	31.3		13.2	10.2		2.4	4.8	
Cycle Queue Clearance Time (g_c), s	0.0	26.7		4.5	31.3		13.2	10.2		2.5	4.8	
Green Ratio (*g/C*)	0.34	0.34		0.45	0.50		0.18	0.36		0.11	0.11	
Capacity (*c*), veh/h	83	591		267	867		437	605		202	207	
Volume-to-Capacity Ratio (*X*)	0.000	0.937		0.570	0.840		0.870	0.431		0.161	0.524	
Back of Queue (*Q*), ft/ln (95 th percentile)	0	490		73	471		198	163		28	94	
Back of Queue (*Q*), veh/ln (95 th percentile)	0.0	18.3		2.8	17.4		7.4	6.4		1.1	3.7	
Queue Storage Ratio (*RQ*) (95 th percentile)	0.00	0.00		0.44	0.00		1.32	0.54		0.19	0.00	
Uniform Delay (d_1), s/veh	0.0	27.7		19.7	18.7		34.5	20.9		35.2	36.2	
Incremental Delay (d_2), s/veh	0.0	17.2		0.7	7.0		9.7	0.2		0.1	0.8	
Initial Queue Delay (d_3), s/veh	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Control Delay (*d*), s/veh	0.0	44.9		20.4	25.7		44.2	21.0		35.3	37.0	
Level of Service (LOS)		D		C	C		D	C		D	D	
Approach Delay, s/veh / LOS	44.9	D		24.8	C		34.8	C		36.6	D	
Intersection Delay, s/veh / LOS	33.5						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

HCS Signalized Intersection Results Summary

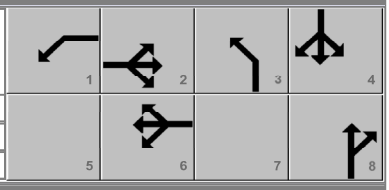
General Information				Intersection Information	
Agency	ODOT			Duration, h	0.250
Analyst	ARC	Analysis Date	Jun 24, 2024	Area Type	Other
Jurisdiction		Time Period	AM PEAK	PHF	0.92
Urban Street	SR 14	Analysis Year	2043	Analysis Period	1> 7:00
Intersection	Infirmary	File Name	AM Peak_Detour Build Alt 3.xus		
Project Description	Detour Build Alt 3 (NB dual Lt & SB Lt & E/W T)				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	0	470	40	140	640	30	350	90	150	30	90	10

Signal Information			
Cycle, s	85.9	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	7.8	28.8	15.5	9.8	0.0	0.0
Yellow	4.0	4.0	4.0	4.0	0.0	0.0
Red	2.0	2.0	2.0	2.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2	1	6	3	8		4
Case Number		6.3	1.0	4.0	2.0	4.0		6.3
Phase Duration, s		34.8	13.8	48.6	21.5	37.3		15.8
Change Period, ($Y+R_c$), s		6.0	6.0	6.0	6.0	6.0		6.0
Max Allow Headway (*MAH*), s		2.9	2.9	2.9	2.9	3.1		3.1
Queue Clearance Time (g_s), s		12.8	6.5	16.0	15.1	12.1		6.8
Green Extension Time (g_e), s		0.9	0.0	2.0	0.4	0.3		0.1
Phase Call Probability		1.00	0.97	1.00	1.00	1.00		1.00
Max Out Probability		0.01	1.00	0.03	0.17	1.00		0.44

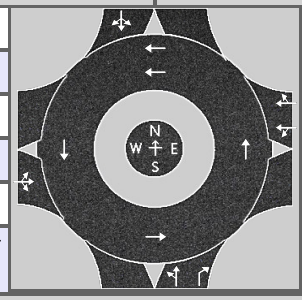
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h	0	280	274	152	306	423	380	261		33	109	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	727	1767	1718	1753	1251	1728	1212	1668		1057	1837	
Queue Service Time (g_s), s	0.0	10.8	10.8	4.5	14.0	14.0	13.1	10.1		2.4	4.8	
Cycle Queue Clearance Time (g_c), s	0.0	10.8	10.8	4.5	14.0	14.0	13.1	10.1		2.4	4.8	
Green Ratio (*g/C*)	0.34	0.34	0.34	0.45	0.50	0.50	0.18	0.36		0.11	0.11	
Capacity (*c*), veh/h	84	593	577	419	621	857	438	607		204	209	
Volume-to-Capacity Ratio (*X*)	0.000	0.473	0.475	0.363	0.492	0.493	0.869	0.429		0.160	0.520	
Back of Queue (*Q*), ft/ln (95 th percentile)	0	192	175	72	159	200	195	160		28	92	
Back of Queue (*Q*), veh/ln (95 th percentile)	0.0	7.2	7.0	2.8	5.9	8.0	7.3	6.3		1.1	3.6	
Queue Storage Ratio (*RQ*) (95 th percentile)	0.00	0.00	0.00	0.43	0.00	0.00	1.30	0.53		0.19	0.00	
Uniform Delay (d_1), s/veh	0.0	22.5	22.6	15.4	14.4	14.4	34.2	20.6		34.8	35.9	
Incremental Delay (d_2), s/veh	0.0	0.2	0.2	0.2	0.2	0.2	9.4	0.2		0.1	0.7	
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Control Delay (*d*), s/veh	0.0	22.8	22.8	15.6	14.7	14.6	43.6	20.8		35.0	36.6	
Level of Service (LOS)		C	C	B	B	B	D	C		C	D	
Approach Delay, s/veh / LOS	22.8	C		14.8	B		34.3	C		36.2	D	
Intersection Delay, s/veh / LOS	23.8						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

HCS Roundabouts Report

General Information

Analyst	ARC
Agency or Co.	ODOT
Date Performed	
Analysis Year	2043
Time Analyzed	AM PEAK
Project Description	Detour Build 4 Adjust - NB RT & WB TL-TR (80-20)



Site Information

Intersection	SR 14 at Infirmary Rd
E/W Street Name	SR 14
N/S Street Name	Infirmary Rd
Analysis Time Period, hrs	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	2	0	0	0	1	1	0	0	1	0
Lane Assignment			LTR		LT		TR		LT		R				LTR	
Volume (V), veh/h	0	0	470	40	0	140	640	30	0	350	90	150	0	30	90	10
Percent Heavy Vehicles, %	2	2	9	2	2	4	10	2	2	8	3	6	2	9	2	100
Flow Rate (v_{PCE}), pc/h	0	0	557	44	0	158	765	33	0	411	101	173	0	36	100	22
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				2			
Pedestrians Crossing, p/h	0				0				0				0			
Proportion of CAVs, %	0															

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway, s		4.9763		4.5436	4.5436		4.5436	4.5436			4.3276	
Follow-Up Headway, s		2.6087		2.5352	2.5352		2.5352	2.5352			2.5352	

Flow Computations, Capacity and v/c Ratios

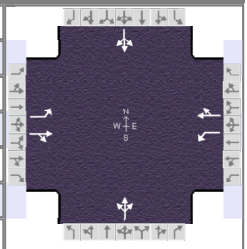
Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		601		765	191		512	173			158	
Entry Volume, veh/h		554		704	176		480	162			142	
Circulating Flow (v_c), pc/h	294			512			593			1334		
Exiting Flow (v_{ex}), pc/h	766			1198			134			302		
Capacity (c_{pce}), pc/h		1022		891	891		828	828			457	
Capacity (c), veh/h		943		820	820		776	776			411	
v/c Ratio (x)		0.59		0.86	0.21		0.62	0.21			0.35	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		12.1		28.9	6.7		15.0	6.9			15.1	
Lane LOS		B		D	A		B	A			C	
95% Queue Length, Q_{95} (veh)		4.0		10.5	0.8		4.4	0.8			1.5	
95% Queue Length, Q_{95} (ft)		106.8		281.2	21.5		116.1	21.0			40.8	
Approach Delay, s/veh | LOS	12.1	B		24.4	C		12.9	B		15.1	C	
Intersection Delay, s/veh | LOS	17.4						C					

HCS Signalized Intersection Results Summary

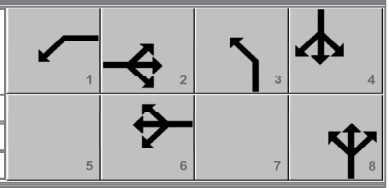
General Information				Intersection Information	
Agency	ODOT			Duration, h	0.250
Analyst	ARC	Analysis Date	Feb 22, 2024	Area Type	Other
Jurisdiction		Time Period	PM PEAK	PHF	0.92
Urban Street	SR 14	Analysis Year	2043	Analysis Period	1> 7:00
Intersection	Infirmary	File Name	PM Peak_No Build.xus		
Project Description	No Build				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	10	660	20	170	470	40	90	100	180	40	100	10

Signal Information			
Cycle, s	100.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	8.0	43.3	12.0	12.7	0.0	0.0
Yellow	4.0	4.0	4.0	4.0	0.0	0.0
Red	2.0	2.0	2.0	2.0	0.0	0.0



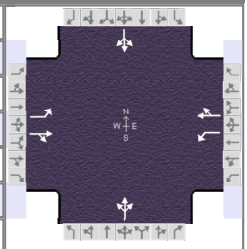
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2	1	6	3	8		4
Case Number		6.3	1.0	4.0	0.0	14.2		8.3
Phase Duration, s		49.3	14.0	63.3	18.0	36.7		18.7
Change Period, (*Y+R c*), s		6.0	6.0	6.0	6.0	6.0		6.0
Max Allow Headway (*MAH*), s		2.9	2.9	2.9	0.0	3.1		3.1
Queue Clearance Time (*g s*), s		40.9	7.4	21.0		25.9		11.6
Green Extension Time (*g e*), s		2.4	0.2	2.4	0.0	0.8		1.0
Phase Call Probability		1.00	0.99	1.00		1.00		1.00
Max Out Probability		0.01	0.01	0.00		0.06		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	11	739		185	554			402			163	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	854	1816		1781	1800			1543			1618	
Queue Service Time (*g s*), s	0.8	38.9		5.4	19.0			12.0			3.7	
Cycle Queue Clearance Time (*g c*), s	5.7	38.9		5.4	19.0			23.9			9.6	
Green Ratio (*g/C*)	0.43	0.43		0.53	0.57			0.31			0.13	
Capacity (*c*), veh/h	400	787		246	1032			522			251	
Volume-to-Capacity Ratio (*X*)	0.027	0.939		0.751	0.537			0.770			0.649	
Back of Queue (*Q*), ft/ln (95 th percentile)	7	614		90	273			347			171	
Back of Queue (*Q*), veh/ln (95 th percentile)	0.3	23.6		3.5	10.5			13.7			6.7	
Queue Storage Ratio (*RQ*) (95 th percentile)	0.03	0.00		0.54	0.00			1.16			0.00	
Uniform Delay (*d 1*), s/veh	19.2	27.1		22.1	13.2			31.7			42.1	
Incremental Delay (*d 2*), s/veh	0.0	10.4		1.7	0.2			5.0			1.1	
Initial Queue Delay (*d 3*), s/veh	0.0	0.0		0.0	0.0			0.0			0.0	
Control Delay (*d*), s/veh	19.2	37.5		23.8	13.4			36.7			43.2	
Level of Service (LOS)	B	D		C	B			D			D	
Approach Delay, s/veh / LOS	37.2	D		16.0	B		36.7	D		43.2	D	
Intersection Delay, s/veh / LOS	29.9						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

HCS Signalized Intersection Results Summary

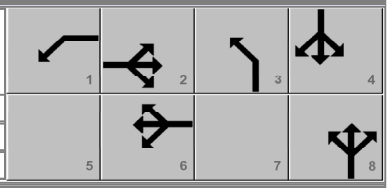
General Information				Intersection Information	
Agency	ODOT			Duration, h	0.250
Analyst	ARC	Analysis Date	Feb 22, 2024	Area Type	Other
Jurisdiction		Time Period	PM PEAK	PHF	0.92
Urban Street	SR 14	Analysis Year	2043	Analysis Period	1> 7:00
Intersection	Infirmary	File Name	PM Peak_Detour No Build.xus		
Project Description	Detour No Build				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	10	660	20	170	470	40	230	100	180	40	100	10

Signal Information			
Cycle, s	166.4	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	13.7	69.8	12.0	47.0	0.0	0.0
Yellow	4.0	4.0	4.0	4.0	0.0	0.0
Red	2.0	2.0	2.0	2.0	0.0	0.0



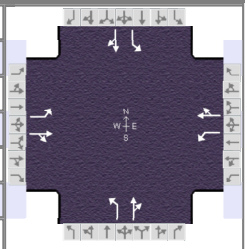
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2	1	6	3	8		4
Case Number		6.3	1.0	4.0	0.0	14.2		8.3
Phase Duration, s		75.8	19.7	95.4	18.0	71.0		53.0
Change Period, ($Y+R_c$), s		6.0	6.0	6.0	6.0	6.0		6.0
Max Allow Headway (*MAH*), s		2.9	2.9	2.9	0.0	3.1		3.1
Queue Clearance Time (g_s), s		68.4	13.7	36.3		67.0		15.7
Green Extension Time (g_e), s		1.4	0.0	0.0	0.0	0.0		0.0
Phase Call Probability		1.00	1.00	1.00		1.00		1.00
Max Out Probability		0.02	1.00	1.00		1.00		1.00

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	11	739		185	554			554			163	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	854	1816		1781	1800			1377			1464	
Queue Service Time (g_s), s	1.4	66.4		11.7	34.3			12.0			0.0	
Cycle Queue Clearance Time (g_c), s	16.0	66.4		11.7	34.3			65.0			13.7	
Green Ratio (*g/C*)	0.42	0.42		0.51	0.54			0.39			0.28	
Capacity (*c*), veh/h	327	761		205	968			569			441	
Volume-to-Capacity Ratio (*X*)	0.033	0.971		0.904	0.573			0.974			0.370	
Back of Queue (*Q*), ft/ln (95 th percentile)	14	1094		375	526			745			231	
Back of Queue (*Q*), veh/ln (95 th percentile)	0.5	42.1		14.8	20.2			29.3			9.1	
Queue Storage Ratio (*RQ*) (95 th percentile)	0.07	0.00		2.27	0.00			2.48			0.00	
Uniform Delay (d_1), s/veh	37.6	47.4		48.1	25.7			51.8			47.4	
Incremental Delay (d_2), s/veh	0.0	19.7		36.0	0.5			30.9			0.2	
Initial Queue Delay (d_3), s/veh	0.0	0.0		0.0	0.0			0.0			0.0	
Control Delay (*d*), s/veh	37.6	67.1		84.1	26.3			82.7			47.6	
Level of Service (LOS)	D	E		F	C			F			D	
Approach Delay, s/veh / LOS	66.7	E		40.7	D		82.7	F		47.6	D	
Intersection Delay, s/veh / LOS	60.6						E					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

HCS Signalized Intersection Results Summary

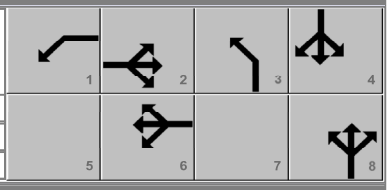
General Information				Intersection Information	
Agency	ODOT			Duration, h	0.250
Analyst	ARC	Analysis Date	Feb 22, 2024	Area Type	Other
Jurisdiction		Time Period	PM PEAK	PHF	0.92
Urban Street	SR 14	Analysis Year	2043	Analysis Period	1> 7:00
Intersection	Infirmary	File Name	PM Peak_Detour Build Alt 1.xus		
Project Description	Detour Build Alt 1 (N/S Lt)				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	10	660	20	170	470	40	230	100	180	40	100	10

Signal Information			
Cycle, s	97.3	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	7.9	41.6	13.7	10.0	0.0	0.0
Yellow	4.0	4.0	4.0	4.0	0.0	0.0
Red	2.0	2.0	2.0	2.0	0.0	0.0



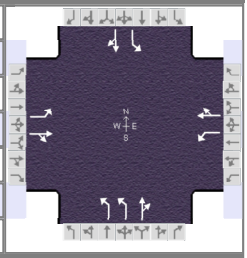
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2	1	6	3	8		4
Case Number		6.3	1.0	4.0	1.0	4.0		6.3
Phase Duration, s		47.6	13.9	61.6	19.7	35.7		16.0
Change Period, ($Y+R_c$), s		6.0	6.0	6.0	6.0	6.0		6.0
Max Allow Headway (*MAH*), s		2.9	2.9	2.9	2.9	3.1		3.1
Queue Clearance Time (g_s), s		40.2	7.3	20.6	13.6	17.0		8.1
Green Extension Time (g_e), s		1.4	0.0	2.0	0.1	0.8		0.5
Phase Call Probability		1.00	0.99	1.00	1.00	1.00		1.00
Max Out Probability		0.00	1.00	0.16	1.00	0.00		0.30

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	11	739		185	554		250	304		43	120	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	854	1816		1781	1800		1795	1676		1066	1840	
Queue Service Time (g_s), s	0.8	38.2		5.3	18.6		11.6	15.0		3.7	6.1	
Cycle Queue Clearance Time (g_c), s	5.4	38.2		5.3	18.6		11.6	15.0		3.7	6.1	
Green Ratio (*g/C*)	0.43	0.43		0.53	0.57		0.26	0.31		0.10	0.10	
Capacity (*c*), veh/h	399	778		245	1029		378	512		184	189	
Volume-to-Capacity Ratio (*X*)	0.027	0.950		0.754	0.539		0.661	0.595		0.237	0.632	
Back of Queue (*Q*), ft/ln (95 th percentile)	6	554		116	266		213	242		43	121	
Back of Queue (*Q*), veh/ln (95 th percentile)	0.3	21.3		4.6	10.2		8.5	9.5		1.7	4.8	
Queue Storage Ratio (*RQ*) (95 th percentile)	0.03	0.00		0.70	0.00		1.42	0.81		0.29	0.00	
Uniform Delay (d_1), s/veh	18.9	26.8		21.5	12.9		31.0	28.7		40.8	41.9	
Incremental Delay (d_2), s/veh	0.0	3.2		11.1	0.3		2.3	0.9		0.2	1.3	
Initial Queue Delay (d_3), s/veh	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Control Delay (*d*), s/veh	18.9	30.0		32.6	13.2		33.3	29.6		41.1	43.2	
Level of Service (LOS)	B	C		C	B		C	C		D	D	
Approach Delay, s/veh / LOS	29.9	C		18.1	B		31.3	C		42.6	D	
Intersection Delay, s/veh / LOS	27.2						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

HCS Signalized Intersection Results Summary

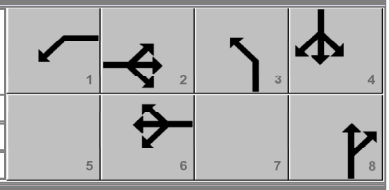
General Information				Intersection Information	
Agency	ODOT			Duration, h	0.250
Analyst	ARC	Analysis Date	Feb 22, 2024	Area Type	Other
Jurisdiction		Time Period	PM PEAK	PHF	0.92
Urban Street	SR 14	Analysis Year	2043	Analysis Period	1> 7:00
Intersection	Infirmary	File Name	PM Peak_Detour Build Alt 2.xus		
Project Description	Detour Build Alt 2 (N Dual Lt & S Lt)				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	10	660	20	170	470	40	230	100	180	40	100	10

Signal Information			
Cycle, s	93.4	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	7.9	39.8	12.0	9.7	0.0	0.0
Yellow	4.0	4.0	4.0	4.0	0.0	0.0
Red	2.0	2.0	2.0	2.0	0.0	0.0



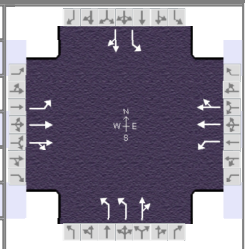
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2	1	6	3	8		4
Case Number		6.3	1.0	4.0	2.0	4.0		6.3
Phase Duration, s		45.8	13.9	59.7	18.0	33.7		15.7
Change Period, ($Y+R_c$), s		6.0	6.0	6.0	6.0	6.0		6.0
Max Allow Headway (*MAH*), s		2.9	2.9	2.9	2.9	3.1		3.1
Queue Clearance Time (g_s), s		38.8	7.1	19.6	10.8	16.6		7.8
Green Extension Time (g_e), s		1.0	0.0	2.1	0.3	0.0		0.2
Phase Call Probability		1.00	0.99	1.00	1.00	1.00		1.00
Max Out Probability		0.39	1.00	0.12	0.00	1.00		0.25

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	11	739		185	554		250	304		43	120	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	854	1816		1781	1800		1282	1676		1066	1840	
Queue Service Time (g_s), s	0.7	36.8		5.1	17.6		8.8	14.6		3.6	5.8	
Cycle Queue Clearance Time (g_c), s	4.5	36.8		5.1	17.6		8.8	14.6		3.6	5.8	
Green Ratio (*g/C*)	0.43	0.43		0.53	0.58		0.13	0.30		0.10	0.10	
Capacity (*c*), veh/h	407	774		252	1036		329	497		188	191	
Volume-to-Capacity Ratio (*X*)	0.027	0.955		0.735	0.535		0.759	0.613		0.232	0.627	
Back of Queue (*Q*), ft/ln (95 th percentile)	6	634		106	250		120	238		41	115	
Back of Queue (*Q*), veh/ln (95 th percentile)	0.2	24.4		4.2	9.6		4.7	9.4		1.6	4.5	
Queue Storage Ratio (*RQ*) (95 th percentile)	0.03	0.00		0.64	0.00		0.80	0.79		0.27	0.00	
Uniform Delay (d_1), s/veh	17.8	25.9		20.5	12.2		39.3	28.2		39.1	40.1	
Incremental Delay (d_2), s/veh	0.0	18.5		9.3	0.3		1.4	1.6		0.2	1.3	
Initial Queue Delay (d_3), s/veh	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Control Delay (*d*), s/veh	17.8	44.4		29.8	12.5		40.7	29.9		39.3	41.4	
Level of Service (LOS)	B	D		C	B		D	C		D	D	
Approach Delay, s/veh / LOS	44.1	D		16.8	B		34.7	C		40.8	D	
Intersection Delay, s/veh / LOS	32.3						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

HCS Signalized Intersection Results Summary

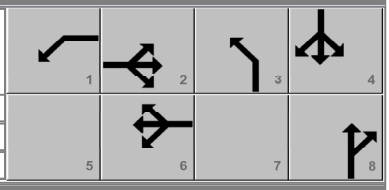
General Information				Intersection Information	
Agency	ODOT			Duration, h	0.250
Analyst	ARC	Analysis Date	Feb 22, 2024	Area Type	Other
Jurisdiction		Time Period	PM PEAK	PHF	0.92
Urban Street	SR 14	Analysis Year	2043	Analysis Period	1> 7:00
Intersection	Infirmary	File Name	PM Peak_Detour Build Alt 3.xus		
Project Description	Detour Build Alt 3 (N Dual Lt & S Lt & E/W T)				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	10	660	20	170	470	40	230	100	180	40	100	10

Signal Information			
Cycle, s	83.6	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	7.9	30.0	12.0	9.8	0.0	0.0
Yellow	4.0	4.0	4.0	4.0	0.0	0.0
Red	2.0	2.0	2.0	2.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2	1	6	3	8		4
Case Number		6.3	1.0	4.0	2.0	4.0		6.3
Phase Duration, s		36.0	13.9	49.9	18.0	33.8		15.8
Change Period, ($Y+R_c$), s		6.0	6.0	6.0	6.0	6.0		6.0
Max Allow Headway (*MAH*), s		2.9	2.9	2.9	2.9	3.1		3.1
Queue Clearance Time (g_s), s		15.7	7.1	10.7	9.7	14.4		7.1
Green Extension Time (g_e), s		2.0	0.0	2.1	0.1	0.0		0.1
Phase Call Probability		1.00	1.00	1.00	1.00	1.00		1.00
Max Out Probability		0.03	1.00	0.01	1.00	1.00		1.00

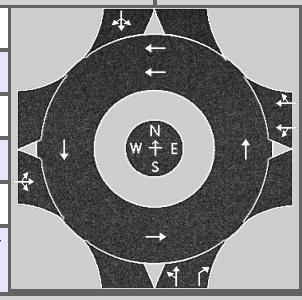
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h	11	371	368	185	234	321	250	304		43	120	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	854	1826	1807	1781	1304	1782	1282	1676		1066	1840	
Queue Service Time (g_s), s	0.7	13.7	13.7	5.1	8.7	8.7	7.7	12.4		3.1	5.1	
Cycle Queue Clearance Time (g_c), s	0.7	13.7	13.7	5.1	8.7	8.7	7.7	12.4		3.1	5.1	
Green Ratio (*g/C*)	0.36	0.36	0.36	0.48	0.52	0.52	0.14	0.33		0.12	0.12	
Capacity (*c*), veh/h	392	655	648	394	684	935	367	556		211	215	
Volume-to-Capacity Ratio (*X*)	0.028	0.567	0.567	0.469	0.341	0.343	0.681	0.547		0.206	0.555	
Back of Queue (*Q*), ft/ln (95 th percentile)	6	251	239	78	94	124	109	198		35	101	
Back of Queue (*Q*), veh/ln (95 th percentile)	0.2	9.6	9.6	3.1	3.6	5.0	4.3	7.8		1.4	4.0	
Queue Storage Ratio (*RQ*) (95 th percentile)	0.03	0.00	0.00	0.47	0.00	0.00	0.73	0.66		0.23	0.00	
Uniform Delay (d_1), s/veh	17.4	21.6	21.6	14.8	11.5	11.5	34.0	22.8		34.0	34.9	
Incremental Delay (d_2), s/veh	0.1	3.5	3.6	0.3	0.1	0.1	4.2	0.7		0.2	1.7	
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Control Delay (*d*), s/veh	17.6	25.1	25.2	15.1	11.6	11.6	38.2	23.5		34.2	36.5	
Level of Service (LOS)	B	C	C	B	B	B	D	C		C	D	
Approach Delay, s/veh / LOS	25.0	C		12.5	B		30.1	C		35.9	D	
Intersection Delay, s/veh / LOS	22.9						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS								
Bicycle LOS Score / LOS								

HCS Roundabouts Report

General Information

Analyst	ARC
Agency or Co.	ODOT
Date Performed	
Analysis Year	2043
Time Analyzed	PM PEAK
Project Description	Detour Build 4 Adjust - NB RT & WB TL-TR (80-20)



Site Information

Intersection	SR 14 at Infirmary Rd
E/W Street Name	SR 14
N/S Street Name	Infirmary Rd
Analysis Time Period, hrs	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	2	0	0	0	1	1	0	0	1	0
Lane Assignment			LTR		LT		TR		LT		R				LTR	
Volume (V), veh/h	0	10	660	20	0	170	470	40	0	230	100	180	0	40	100	10
Percent Heavy Vehicles, %	2	2	5	2	2	2	5	3	2	2	2	2	2	3	2	2
Flow Rate (v_{PCE}), pc/h	0	11	753	22	0	188	536	45	0	255	111	200	0	45	111	11
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				2			
Pedestrians Crossing, p/h	0				0				0				0			
Proportion of CAVs, %	0															

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway, s		4.9763		4.5436	4.5436		4.5436	4.5436			4.3276	
Follow-Up Headway, s		2.6087		2.5352	2.5352		2.5352	2.5352			2.5352	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		786		615	154		366	200			167	
Entry Volume, veh/h		749		591	148		359	196			163	
Circulating Flow (v_c), pc/h	344			377			809			979		
Exiting Flow (v_{ex}), pc/h	998			802			167			321		
Capacity (c_{pce}), pc/h		972		1008	1008		680	680			618	
Capacity (c), veh/h		926		968	968		667	667			604	
v/c Ratio (x)		0.81		0.61	0.15		0.54	0.29			0.27	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		22.1		12.4	5.2		14.2	9.1			9.5	
Lane LOS		C		B	A		B	A			A	
95% Queue Length, Q_{95} (veh)		9.0		4.3	0.5		3.2	1.2			1.1	
95% Queue Length, Q_{95} (ft)		233.8		111.1	13.0		81.3	30.5			28.0	
Approach Delay, s/veh | LOS	22.1	C		11.0	B		12.4	B		9.5	A	
Intersection Delay, s/veh | LOS	15.0						B					

HCS Two-Way Stop-Control Report

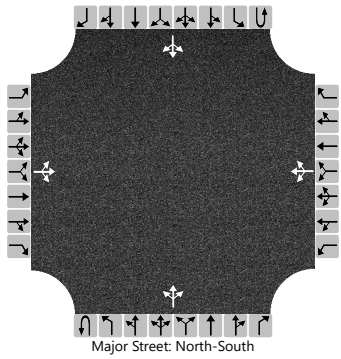
General Information

Analyst	RJI
Agency/Co.	ODOT
Date Performed	4/19/2024
Analysis Year	2043
Time Analyzed	AM Peak
Intersection Orientation	North-South
Project Description	No Build Condition

Site Information

Intersection	Lover's Lane at Infirmary
Jurisdiction	
East/West Street	Lover's Lane
North/South Street	Infirmary Road
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes


Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	0	1	0	0	0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		10	20	0		20	10	10		10	330	130		50	220	10
Percent Heavy Vehicles (%)		3	3	3		3	3	3		3				3		
Proportion Time Blocked																
Percent Grade (%)		0				0										
Right Turn Channelized																
Median Type | Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1		
Critical Headway (sec)		7.13	6.53	6.23		7.13	6.53	6.23		4.13				4.13		
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2		
Follow-Up Headway (sec)		3.53	4.03	3.33		3.53	4.03	3.33		2.23				2.23		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			33				43			11				54		
Capacity, c (veh/h)			264				309			1310				1059		
v/c Ratio			0.12				0.14			0.01				0.05		
95% Queue Length, Q_{95} (veh)			0.4				0.5			0.0				0.2		
95% Queue Length, Q_{95} (ft)			10.2				12.8									
Control Delay (s/veh)			20.5				18.5			7.8	0.1	0.1		8.6	0.5	0.5
Level of Service (LOS)			C				C			A	A	A		A	A	A
Approach Delay (s/veh)		20.5				18.5				0.3				2.0		
Approach LOS		C				C				A				A		

HCS Two-Way Stop-Control Report

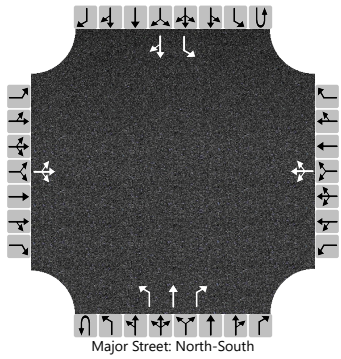
General Information

Analyst	RJI
Agency/Co.	ODOT
Date Performed	4/19/2024
Analysis Year	2043
Time Analyzed	AM Peak
Intersection Orientation	North-South
Project Description	Build Condition

Site Information

Intersection	Lover's Lane at Infirmary
Jurisdiction	
East/West Street	Lover's Lane
North/South Street	Infirmary Road
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes


Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	1	1	1	0	1	1	0
Configuration			LTR				LTR			L	T	R		L		TR
Volume (veh/h)		10	20	0		20	10	10		10	550	130		50	220	10
Percent Heavy Vehicles (%)		3	3	3		3	3	3		3				3		
Proportion Time Blocked																
Percent Grade (%)	0				0											
Right Turn Channelized									No							
Median Type | Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1		
Critical Headway (sec)		7.13	6.53	6.23		7.13	6.53	6.23		4.13				4.13		
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2		
Follow-Up Headway (sec)		3.53	4.03	3.33		3.53	4.03	3.33		2.23				2.23		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			33				43			11				54		
Capacity, c (veh/h)			187				236			1310				863		
v/c Ratio			0.17				0.18			0.01				0.06		
95% Queue Length, Q_{95} (veh)			0.6				0.7			0.0				0.2		
95% Queue Length, Q_{95} (ft)			15.4				17.9			0.0				5.1		
Control Delay (s/veh)			28.3				23.6			7.8				9.5		
Level of Service (LOS)			D				C			A				A		
Approach Delay (s/veh)	28.3				23.6				0.1				1.7			
Approach LOS	D				C				A				A			

HCS Two-Way Stop-Control Report

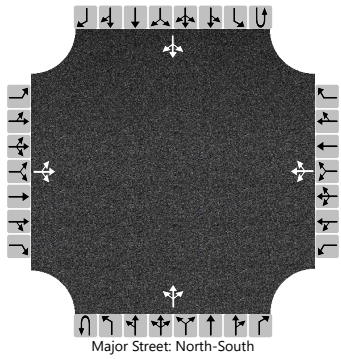
General Information

Analyst	RJI
Agency/Co.	ODOT
Date Performed	4/19/2024
Analysis Year	2043
Time Analyzed	PM Peak
Intersection Orientation	North-South
Project Description	No Build Condition

Site Information

Intersection	Lover's Lane at Infirmary
Jurisdiction	
East/West Street	Lover's Lane
North/South Street	Infirmary Road
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes


Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	0	1	0	0	0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		10	10	0		70	10	40		10	330	50		10	260	10
Percent Heavy Vehicles (%)		3	3	3		3	3	3		3				3		
Proportion Time Blocked																
Percent Grade (%)		0				0										
Right Turn Channelized																
Median Type | Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1		
Critical Headway (sec)		7.13	6.53	6.23		7.13	6.53	6.23		4.13				4.13		
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2		
Follow-Up Headway (sec)		3.53	4.03	3.33		3.53	4.03	3.33		2.23				2.23		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			22				130			11				11		
Capacity, c (veh/h)			311				391			1262				1140		
v/c Ratio			0.07				0.33			0.01				0.01		
95% Queue Length, Q_{95} (veh)			0.2				1.4			0.0				0.0		
95% Queue Length, Q_{95} (ft)			5.1				35.8									
Control Delay (s/veh)			17.4				18.8			7.9	0.1	0.1		8.2	0.1	0.1
Level of Service (LOS)			C				C			A	A	A		A	A	A
Approach Delay (s/veh)		17.4				18.8				0.3				0.4		
Approach LOS		C				C				A				A		

HCS Two-Way Stop-Control Report

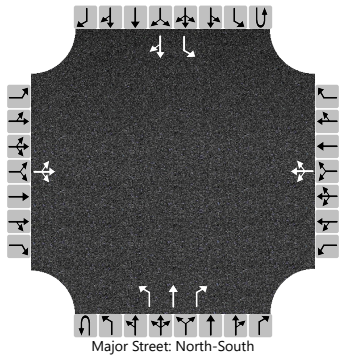
General Information

Analyst	RJI
Agency/Co.	ODOT
Date Performed	4/19/2024
Analysis Year	2043
Time Analyzed	PM Peak
Intersection Orientation	North-South
Project Description	Build Condition

Site Information

Intersection	Lover's Lane at Infirmary
Jurisdiction	
East/West Street	Lover's Lane
North/South Street	Infirmary Road
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes


Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	1	1	1	0	1	1	0
Configuration			LTR				LTR			L	T	R		L		TR
Volume (veh/h)		10	10	0		70	10	40		10	470	50		10	260	10
Percent Heavy Vehicles (%)		3	3	3		3	3	3		3				3		
Proportion Time Blocked																
Percent Grade (%)	0				0											
Right Turn Channelized									No							
Median Type | Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1		
Critical Headway (sec)		7.13	6.53	6.23		7.13	6.53	6.23		4.13				4.13		
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2		
Follow-Up Headway (sec)		3.53	4.03	3.33		3.53	4.03	3.33		2.23				2.23		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			22				130			11				11		
Capacity, c (veh/h)			247				324			1262				1002		
v/c Ratio			0.09				0.40			0.01				0.01		
95% Queue Length, Q_{95} (veh)			0.3				1.9			0.0				0.0		
95% Queue Length, Q_{95} (ft)			7.7				48.6			0.0				0.0		
Control Delay (s/veh)			20.9				23.4			7.9				8.6		
Level of Service (LOS)			C				C			A				A		
Approach Delay (s/veh)	20.9				23.4				0.1				0.3			
Approach LOS	C				C				A				A			

EMH&T

Engineers, Surveyors, Planners, Scientists

APPENDIX F

Turn Lane Analysis

Infirmary Road @ Lovers Lane Northbound Right
2-Lane Highway Right Turn Lane Warrant
=<40 mph or 70 kph Posted Speed

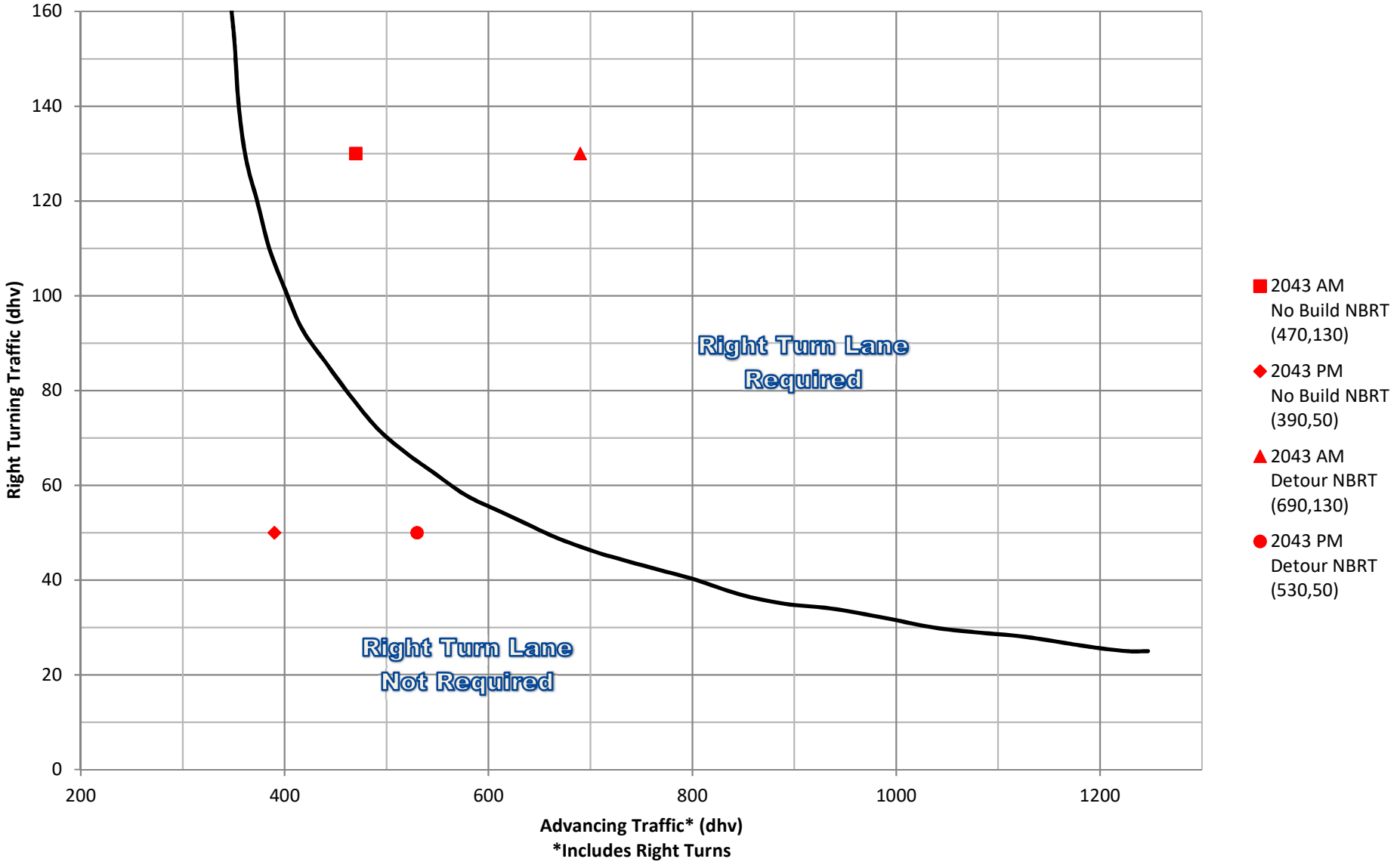
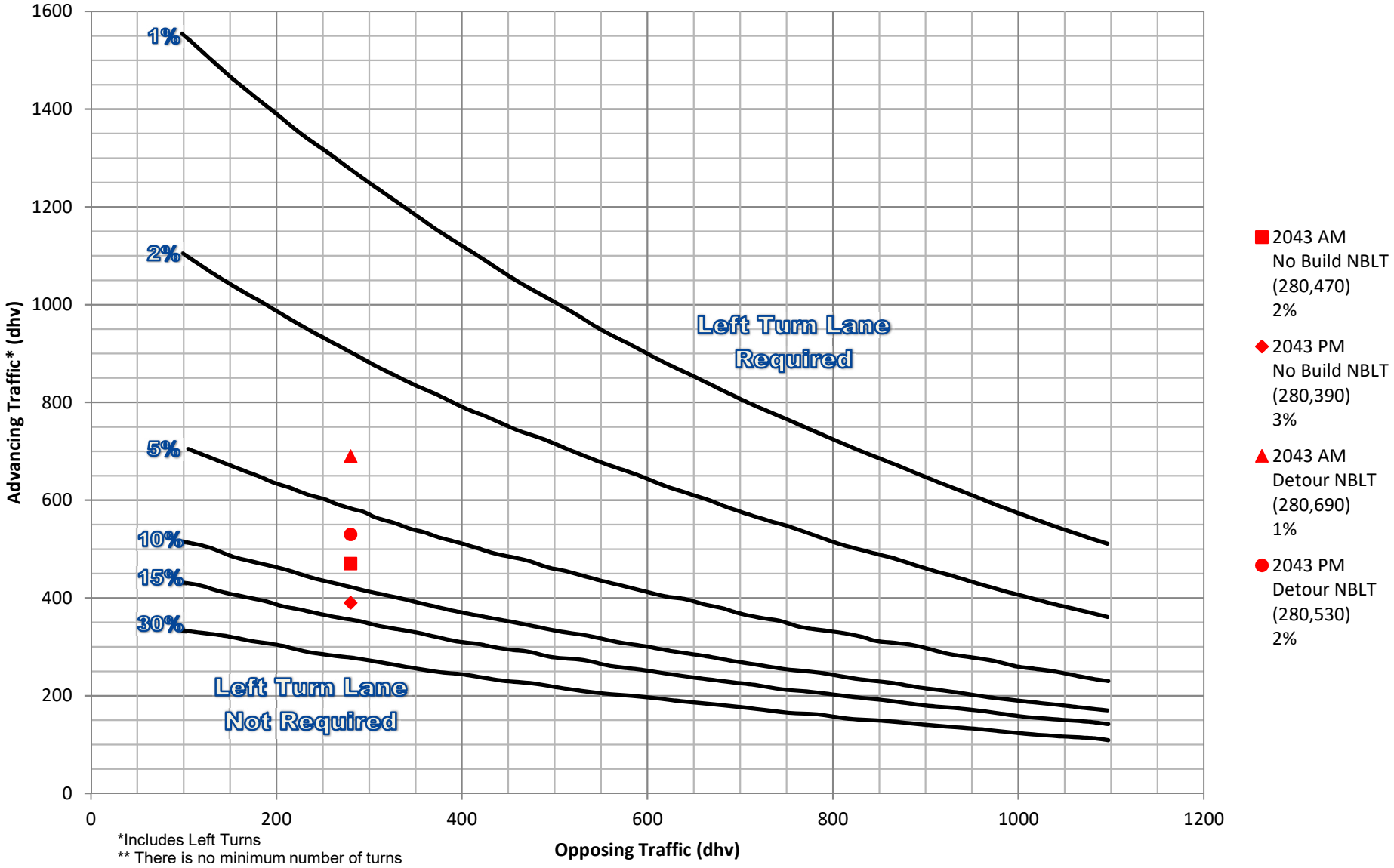


Fig. 401-6aE
ODOT Location and Design Manual, Volume One October 2004

Infirmary Road @ Lovers Lane Northbound Left
2-Lane Highway Left Turn Lane Warrant
=<40 mph or 70 kph Posted Speed



*Includes Left Turns
** There is no minimum number of turns

Fig. 401-5aE
ODOT Location and Design Manual, Volume One October 2004

Infirmary Road @ Lovers Lane Southbound Left
2-Lane Highway Left Turn Lane Warrant
>40 mph or 70 kph Posted Speed

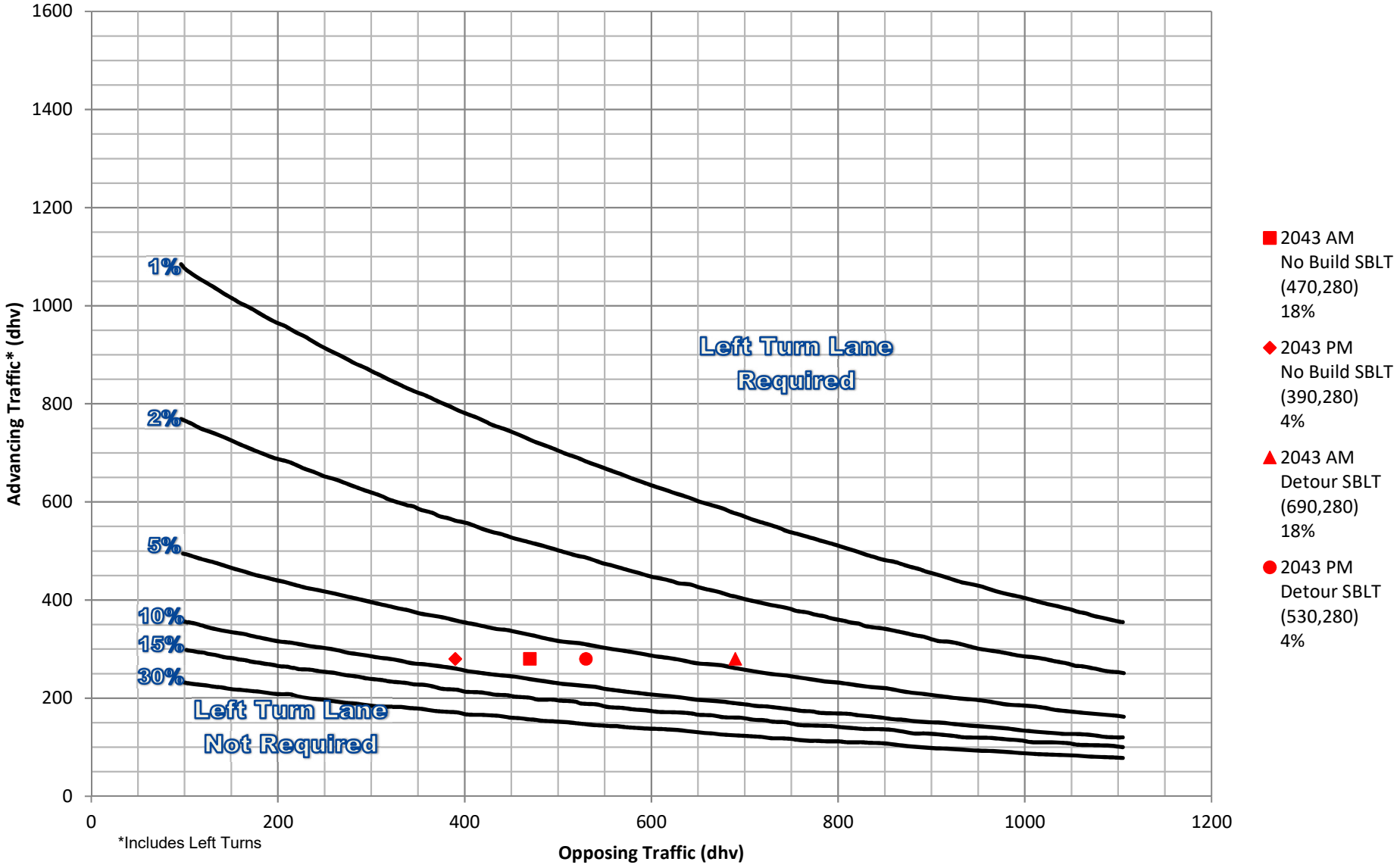


Fig. 401-5bE
ODOT Location and Design Manual, Volume One October 2004

SR 14 @ Cleveland Road Eastbound Right
2-Lane Highway Right Turn Lane Warrant
>40 mph or 70 kph Posted Speed

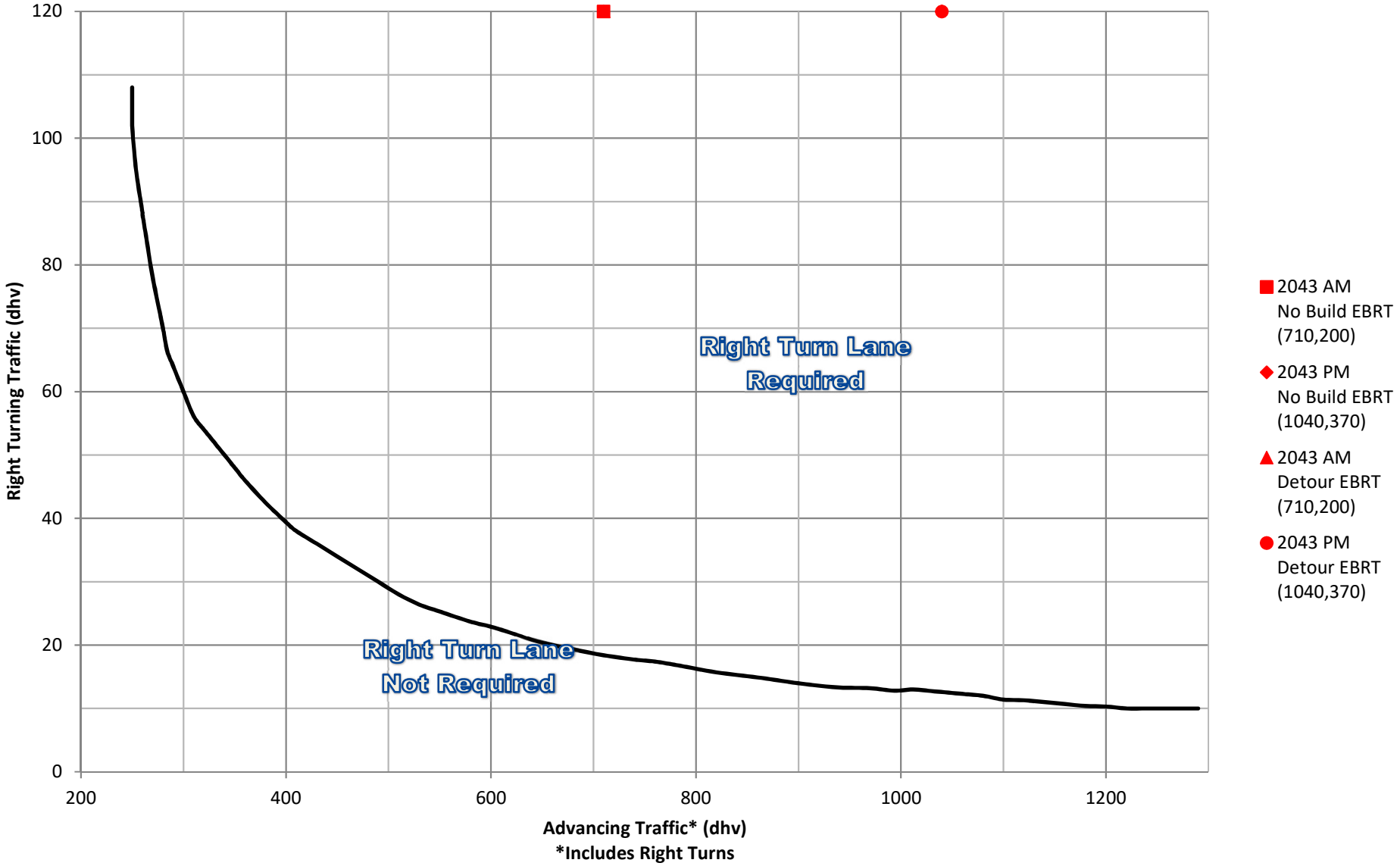


Fig. 401-6bE
ODOT Location and Design Manual, Volume One October 2004

POR-14 - Infirmary Road/Lovers Lane

Turn Lane Length Calculations

AM Peak Hour

2043

Infirmary Road/Lovers Lane		
Movement	**NBRT**	
Design Speed	40	mph
Cycle Length	60	seconds
Control (Stop or Signal)	Stop	
Through Volume	550	vph
Number of Through Lanes	1	
Turning Volume	130	vph
Number of Turning Lanes	1	
Turning Percentage	19%	
Vehicles Per Cycle	2.2	
Storage Length	150	feet
Calculated Turn Lane Length		
Storage Only (Condition A)	200	feet
Deceleration/Taper (Condition B)	125	feet
Decel & Storage (Condition C)	**265**	feet
No Block Distance		
No Block Distance	N.A.	feet
No Block Turn Lane Length	N.A.	feet

PM Peak Hour

2043

Infirmary Road/Lovers Lane		
Movement	**NBRT**	
Design Speed	40	mph
Cycle Length	60	seconds
Control (Stop or Signal)	Stop	
Through Volume	470	vph
Number of Through Lanes	1	
Turning Volume	50	vph
Number of Turning Lanes	1	
Turning Percentage	10%	
Vehicles Per Cycle	0.8	
Storage Length	50	feet
Calculated Turn Lane Length		
Storage Only (Condition A)	100	feet
Deceleration/Taper (Condition B)	125	feet
Decel & Storage (Condition C)	**165**	feet
No Block Distance		
No Block Distance	N.A.	feet
No Block Turn Lane Length	N.A.	feet

AM Peak Hour

2043

Infirmary Road/Lovers Lane		
Movement	**NBLT**	
Design Speed	40	mph
Cycle Length	60	seconds
Control (Stop or Signal)	Stop	
Through Volume	550	vph
Number of Through Lanes	1	
Turning Volume	10	vph
Number of Turning Lanes	1	
Turning Percentage	2%	
Vehicles Per Cycle	0.2	
Storage Length	50	feet
Calculated Turn Lane Length		
Storage Only (Condition A)	100	feet
Deceleration/Taper (Condition B)	**125**	feet
Decel & Storage (Condition C)	165	feet
No Block Distance		
No Block Distance	N.A.	feet
No Block Turn Lane Length	N.A.	feet

PM Peak Hour

2043

Infirmary Road/Lovers Lane		
Movement	**NBLT**	
Design Speed	40	mph
Cycle Length	60	seconds
Control (Stop or Signal)	Stop	
Through Volume	470	vph
Number of Through Lanes	1	
Turning Volume	10	vph
Number of Turning Lanes	1	
Turning Percentage	2%	
Vehicles Per Cycle	0.2	
Storage Length	50	feet
Calculated Turn Lane Length		
Storage Only (Condition A)	100	feet
Deceleration/Taper (Condition B)	**125**	feet
Decel & Storage (Condition C)	165	feet
No Block Distance		
No Block Distance	N.A.	feet
No Block Turn Lane Length	N.A.	feet

AM Peak Hour

2043

Infirmary Road/Lovers Lane		
Movement	**SBLT**	
Design Speed	30	mph
Cycle Length	60	seconds
Control (Stop or Signal)	Stop	
Through Volume	220	vph
Number of Through Lanes	1	
Turning Volume	50	vph
Number of Turning Lanes	1	
Turning Percentage	19%	
Vehicles Per Cycle	0.8	
Storage Length	50	feet
Calculated Turn Lane Length		
Storage Only (Condition A)	**100**	feet
Deceleration/Taper (Condition B)	N.A.	feet
Decel & Storage (Condition C)	N.A.	feet
No Block Distance		
No Block Distance	N.A.	feet
No Block Turn Lane Length	N.A.	feet

PM Peak Hour

2043

Infirmary Road/Lovers Lane		
Movement	**SBLT**	
Design Speed	30	mph
Cycle Length	60	seconds
Control (Stop or Signal)	Stop	
Through Volume	260	vph
Number of Through Lanes	1	
Turning Volume	10	vph
Number of Turning Lanes	1	
Turning Percentage	4%	
Vehicles Per Cycle	0.2	
Storage Length	50	feet
Calculated Turn Lane Length		
Storage Only (Condition A)	**100**	feet
Deceleration/Taper (Condition B)	N.A.	feet
Decel & Storage (Condition C)	N.A.	feet
No Block Distance		
No Block Distance	N.A.	feet
No Block Turn Lane Length	N.A.	feet

AM Peak Hour

2043

SR 14/Cleveland Road		
Movement	**EBRT**	
Design Speed	55	mph
Cycle Length	60	seconds
Control (Stop or Signal)	Stop	
Through Volume	510	vph
Number of Through Lanes	1	
Turning Volume	200	vph
Number of Turning Lanes	1	
Turning Percentage	28%	
Vehicles Per Cycle	3.3	
Storage Length	175	feet
Calculated Turn Lane Length		
Storage Only (Condition A)	225	feet
Deceleration/Taper (Condition B)	285	feet
Decel & Storage (Condition C)	**340**	feet
No Block Distance		
No Block Distance	N.A.	feet
No Block Turn Lane Length	N.A.	feet

PM Peak Hour

2043

SR 14/Cleveland Road		
Movement	**EBRT**	
Design Speed	55	mph
Cycle Length	60	seconds
Control (Stop or Signal)	Stop	
Through Volume	670	vph
Number of Through Lanes	1	
Turning Volume	370	vph
Number of Turning Lanes	1	
Turning Percentage	36%	
Vehicles Per Cycle	6.2	
Storage Length	275	feet
Calculated Turn Lane Length		
Storage Only (Condition A)	325	feet
Deceleration/Taper (Condition B)	285	feet
Decel & Storage (Condition C)	**440**	feet
No Block Distance		
No Block Distance	N.A.	feet
No Block Turn Lane Length	N.A.	feet

EMH&T

Engineers, Surveyors, Planners, Scientists

APPENDIX G

ECAT Results and Benefit-Cost Analysis

Project and Site Conditions Information

Project Information

General Information

Project Name	POR-14 at Infirmary and Cleveland Safety Improvements	Contact Email	michael.craver@dot.ohio.gov
Project Description	Install Roundabout, Turn Lanes and restrict movements	Contact Phone	330-786-4940
Reference Number	Existing Conditions	Date Performed	6/5/2024
Analyst	Michael Craver	Analysis Year	2025
Agency/Company	ODOT District 4		
Perform Benefit Cost Analysis?	No		

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
SR14; 8.894	Urban & Suburban Arterial Intersection	Unsignalized	SPORSR00014**C	8.894		0.05	CPORCR0017	POR 14 at Cleveland

Project Safety Performance Report

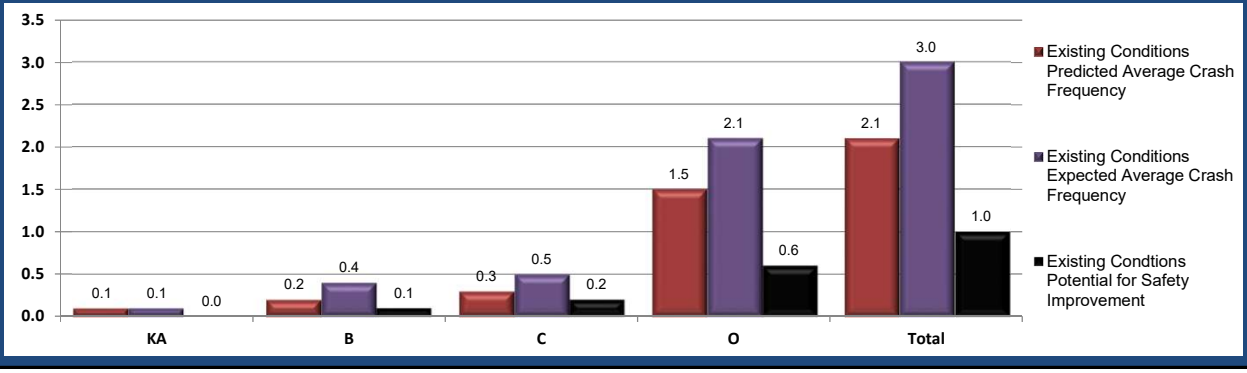
ECAT Economic Crash Analysis Tool

General Information

Project Name	POR-14 at Infirmary and Cleveland Safety	Contact Email	michael.craver@dot.ohio.gov
Project Description	Install Roundabout, Turn Lanes and restrict movements	Contact Phone	330-786-4940
Reference Number	Existing Conditions	Date Performed	6/5/2024
Analyst	Michael Craver	Analysis Year	2025
Agency/Company	ODOT District 4		

Project and Site Conditions Information

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	0.0532	0.2138	0.2823	1.5071	2.0564
$N_{expected}$ - Existing Conditions	0.0822	0.3520	0.4822	2.1148	3.0312
$N_{potential\ for\ improvement}$ - Existing Conditions	**0.0290**	**0.1382**	**0.1999**	**0.6077**	**0.9748**

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

Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
SR14: 8.894	POR 14 at Cleveland	0.0532	0.2138	0.2823	1.5071	2.0564

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

Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
SR14: 8.894	POR 14 at Cleveland	0.0822	0.352	0.4822	2.1148	3.0312

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
SR14: 8.894	POR 14 at Cleveland	**0.029**	**0.1382**	**0.1999**	**0.6077**	**0.9748**

Summary by Crash Type

Crash Type	Existing			Proposed
	Predicted Crash Frequency	Expected Crash Frequency	PSI	Expected Crash Frequency
Unknown	0.0021	0.0028	**0.0008**	
Head On	0.0415	0.0663	**0.0248**	
Rear End	0.7854	1.1650	**0.3795**	
Backing	0.0848	0.1178	**0.0330**	
Sideswipe - Meeting	0.0030	0.0046	**0.0016**	
Sideswipe - Passing	0.2888	0.4118	**0.1230**	
Angle	0.4159	0.6251	**0.2092**	
Parked Vehicle	0.0426	0.0594	**0.0168**	
Pedestrian	0.0237	0.0237	0.0000	
Animal	0.0000	0.0000	0.0000	
Train	0.0003	0.0004	**0.0001**	
Pedalcycles	0.0138	0.0138	0.0000	
Other Non-Vehicle	0.0001	0.0001	0.0000	
Fixed Object	0.1522	0.2005	**0.0482**	
Other Object	0.0041	0.0058	**0.0017**	
Overturning	0.0044	0.0049	**0.0006**	
Other Non-Collision	0.0094	0.0127	**0.0033**	
Left Turn	0.1560	0.2360	**0.0801**	
Right Turn	0.0986	0.1421	**0.0434**	

Project and Site Conditions Information

Project Information

General Information

Project Name	POR-14 at Infirmary and Cleveland Safety Improvements	Contact Email	michael.craver@dot.ohio.gov
Project Description	Install Roundabout, Turn Lanes and restrict movements	Contact Phone	330-786-4940
Reference Number	Infirmary Rd Existing Conditions	Date Performed	6/5/2024
Analyst	Michael Craver	Analysis Year	2025
Agency/Company	ODOT District 4		
Perform Benefit Cost Analysis?	No		

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
SR14; 9.347	Urban & Suburban Arterial Intersection	Signalized	SPORSR00014**C	9.347		0.05	CPORCR0016	SR-14 at Infirmary Rd

Project Safety Performance Report

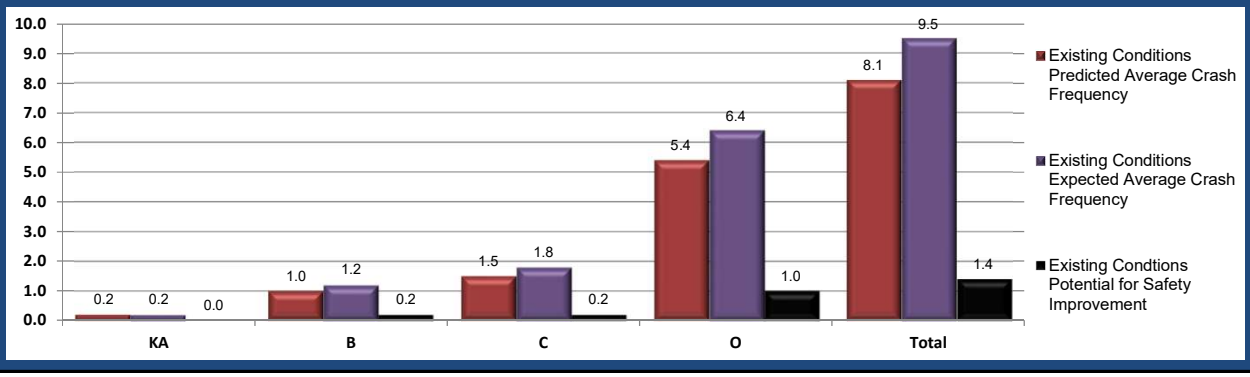
ECAT Economic Crash Analysis Tool

General Information

Project Name	POR-14 at Infirmary and Cleveland Safety	Contact Email	michael.craver@dot.ohio.gov
Project Description	Install Roundabout, Turn Lanes and restrict movements	Contact Phone	330-786-4940
Reference Number	Infirmary Rd Existing Conditions	Date Performed	6/5/2024
Analyst	Michael Craver	Analysis Year	2025
Agency/Company	ODOT District 4		

Project and Site Conditions Information

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	0.2142	1.0186	1.5261	5.3523	8.1112
$N_{expected}$ - Existing Conditions	0.2459	1.1705	1.7547	6.3722	9.5433
$N_{potential\ for\ improvement}$ - Existing Conditions	0.0317	0.1519	0.2286	1.0199	1.4321

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

Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
SR14: 9.347	SR-14 at Infirmary Rd	0.2142	1.0186	1.5261	5.3523	8.1112

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

Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
SR14: 9.347	SR-14 at Infirmary Rd	0.2459	1.1705	1.7547	6.3722	9.5433

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
SR14: 9.347	SR-14 at Infirmary Rd	0.0317	0.1519	0.2286	1.0199	1.4321

Summary by Crash Type

Crash Type	Existing			Proposed
	Predicted Crash Frequency	Expected Crash Frequency	PSI	Expected Crash Frequency
Unknown	0.0142	0.0183	0.0040	
Head On	0.1496	0.1736	0.0240	
Rear End	3.8016	4.4479	0.6463	
Backing	0.1524	0.1795	0.0271	
Sideswipe - Meeting	0.0059	0.0069	0.0010	
Sideswipe - Passing	0.7589	0.8915	0.1326	
Angle	1.3096	1.5260	0.2164	
Parked Vehicle	0.0605	0.0772	0.0167	
Pedestrian	0.0218	0.0218	0.0000	
Animal	0.0000	0.0000	0.0000	
Train	0.0011	0.0014	0.0003	
Pedalcycles	0.0057	0.0057	0.0000	
Other Non-Vehicle	0.0000	0.0000	0.0000	
Fixed Object	0.5211	0.6577	0.1365	
Other Object	0.0202	0.0260	0.0058	
Overturning	0.0302	0.0367	0.0064	
Other Non-Collision	0.0417	0.0530	0.0113	
Left Turn	0.8429	0.9817	0.1388	
Right Turn	0.3737	0.4386	0.0649	

Project and Site Conditions Information

Project Information

General Information

Project Name	POR-14 at Infirmary and Cleveland Safety Improvements	Contact Email	michael.craver@dot.ohio.gov
Project Description	Install Roundabout, Turn Lanes and restrict movements	Contact Phone	330-786-4940
Reference Number	Lovers Lane Existing Conditions	Date Performed	6/6/2024
Analyst	Michael Craver	Analysis Year	2025
Agency/Company	ODOT District 4		
Perform Benefit Cost Analysis?	No		

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
CR164; 0.336	Urban & Suburban Arterial Intersection	Unsignalized	CPORCR00164**C	0.336		0.05	CPORCR0016	Infirmary Rd at Lovers Lane

Project Safety Performance Report

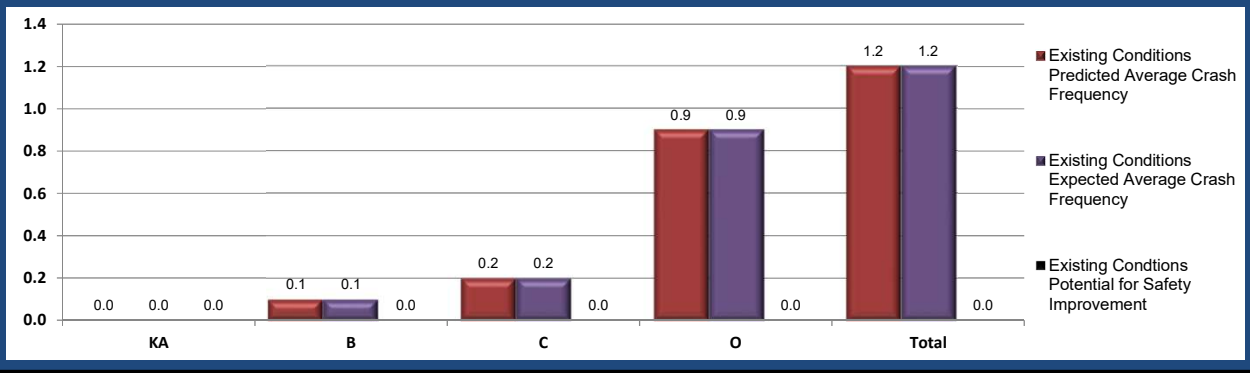
ECAT Economic Crash Analysis Tool

General Information

Project Name	POR-14 at Infirmary and Cleveland Safety	Contact Email	michael.craver@dot.ohio.gov
Project Description	Install Roundabout, Turn Lanes and restrict movements	Contact Phone	330-786-4940
Reference Number	Lovers Lane Existing Conditions	Date Performed	6/6/2024
Analyst	Michael Craver	Analysis Year	2025
Agency/Company	ODOT District 4		

Project and Site Conditions Information

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	0.0439	0.1360	0.1582	0.8697	1.2078
$N_{expected}$ - Existing Conditions	0.0469	0.1458	0.1708	0.8601	1.2236
$N_{potential\ for\ improvement}$ - Existing Conditions	0.0030	0.0098	0.0126	-0.0096	0.0158

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

Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
CR164; 0.336	Infirmary Rd at Lovers Lane	0.0439	0.136	0.1582	0.8697	1.2078

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

Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
CR164; 0.336	Infirmary Rd at Lovers Lane	0.0469	0.1458	0.1708	0.8601	1.2236

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
CR164; 0.336	Infirmary Rd at Lovers Lane	0.003	0.0098	0.0126	-0.0096	0.0158

Summary by Crash Type

Crash Type	Existing			Proposed
	Predicted Crash Frequency	Expected Crash Frequency	PSI	Expected Crash Frequency
Unknown	0.0020	0.0019	-0.0001	
Head On	0.0171	0.0177	0.0006	
Rear End	0.3236	0.3296	0.0060	
Backing	0.0566	0.0565	-0.0001	
Sideswipe - Meeting	0.0009	0.0009	0.0000	
Sideswipe - Passing	0.1337	0.1348	0.0011	
Angle	0.3767	0.3883	0.0116	
Parked Vehicle	0.0332	0.0316	-0.0016	
Pedestrian	0.0180	0.0180	0.0000	
Animal	0.0000	0.0000	0.0000	
Train	0.0001	0.0001	0.0000	
Pedalcycles	0.0103	0.0103	0.0000	
Other Non-Vehicle	0.0000	0.0000	0.0000	
Fixed Object	0.0934	0.0893	-0.0041	
Other Object	0.0030	0.0029	-0.0001	
Overturning	0.0035	0.0034	-0.0001	
Other Non-Collision	0.0055	0.0053	-0.0002	
Left Turn	0.0793	0.0817	0.0023	
Right Turn	0.0508	0.0514	0.0006	

Project and Site Conditions Information

Project Information

General Information

Project Name	POR-14 at Infirmary and Cleveland Safety Improvements	Contact Email	michael.craver@dot.ohio.gov
Project Description	Install Roundabout, Turn Lanes and restrict movements	Contact Phone	330-786-4940
Reference Number	Combined Existing Conditions	Date Performed	6/6/2024
Analyst	Michael Craver	Analysis Year	2025
Agency/Company	ODOT District 4		
Perform Benefit Cost Analysis?	No		

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

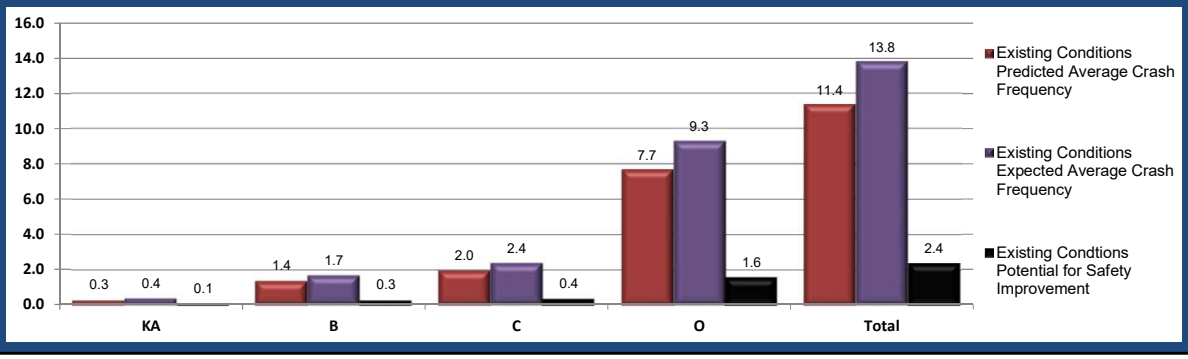
Project Element ID (Must be Unique)	Site Type	Intersection Control Type	Location Information					
			NLFID	Begin Logpoint/ Intersection Midpoint	End Logpoint *(Leave blank for Intersection)*	Length (mi) OR Intersection Radius Buffer (mi)	Cross Route NLFID(s)	Common Name
CR164; 0.336	Urban & Suburban Arterial Intersection	Unsignalized	CPORCR00164**C	0.336		0.05	CPORCR0016	Infirmary Rd at Lovers Lane
SR14; 8.894	Urban & Suburban Arterial Intersection	Unsignalized	SPORSR00014**C	8.894		0.05	CPORCR0017	POR 14 at Cleveland
SR14; 9.347	Urban & Suburban Arterial Intersection	Signalized	SPORSR00014**C	9.347		0.05	CPORCR0016	SR-14 at Infirmary Rd

Project Safety Performance Report

General Information

Project Name	POR-14 at Infirmary and Cleveland Safety	Contact Email	michael.craver@dot.ohio.gov
Project Description	Install Roundabout, Turn Lanes and restrict movements	Contact Phone	330-786-4940
Reference Number	Combined Existing Conditions	Date Performed	6/6/2024
Analyst	Michael Craver	Analysis Year	2025
Agency/Company	ODOT District 4		

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	0.3113	1.3684	1.9666	7.7291	11.3754
$N_{expected}$ - Existing Conditions	0.3737	1.6639	2.4020	9.3119	13.7515
$N_{potential\ for\ improvement}$ - Existing Conditions	0.0624	0.2955	0.4354	1.5828	2.3761

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

Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
CR164; 0.336	Infirmary Rd at Lovers Lane	0.0439	0.136	0.1582	0.8697	1.2078
SR14; 8.894	POR 14 at Cleveland	0.0532	0.2138	0.2823	1.5071	2.0564
SR14; 9.347	SR-14 at Infirmary Rd	0.2142	1.0186	1.5261	5.3523	8.1112

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

Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
CR164; 0.336	Infirmary Rd at Lovers Lane	0.0456	0.1414	0.1651	0.8249	1.177
SR14; 8.894	POR 14 at Cleveland	0.0822	0.352	0.4822	2.1148	3.0312
SR14; 9.347	SR-14 at Infirmary Rd	0.2459	1.1705	1.7547	6.3722	9.5433

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
CR164; 0.336	Infirmary Rd at Lovers Lane	0.0017	0.0054	0.0069	-0.0448	-0.0308
SR14; 8.894	POR 14 at Cleveland	0.029	0.1382	0.1999	0.6077	0.9748
SR14; 9.347	SR-14 at Infirmary Rd	0.0317	0.1519	0.2286	1.0199	1.4321

Summary by Crash Type

Crash Type	Existing			Proposed
	Predicted Crash Frequency	Expected Crash Frequency	PSI	Expected Crash Frequency
Unknown	0.0182	0.0230	0.0047	
Head On	0.2068	0.2554	0.0486	
Rear End	4.8847	5.9057	1.0210	
Backing	0.2910	0.3492	0.0582	
Sideswipe - Meeting	0.0097	0.0123	0.0026	
Sideswipe - Passing	1.1719	1.4247	0.2528	
Angle	2.0884	2.5104	0.4219	
Parked Vehicle	0.1349	0.1666	0.0317	
Pedestrian	0.0628	0.0628	0.0000	
Animal	0.0000	0.0000	0.0000	
Train	0.0015	0.0018	0.0004	
Pedalcycles	0.0294	0.0294	0.0000	
Other Non-Vehicle	0.0001	0.0001	0.0000	
Fixed Object	0.7617	0.9418	0.1801	
Other Object	0.0272	0.0344	0.0073	
Overturning	0.0380	0.0449	0.0069	
Other Non-Collision	0.0563	0.0706	0.0143	
Left Turn	1.0731	1.2912	0.2181	
Right Turn	0.5199	0.6272	0.1073	

Project and Site Conditions Information

Project and Site Conditions Information

Project Information

General Information

Project Name	POR-14 at Infirmary and Cleveland Safety Improvements	Contact Email	michael.craver@dot.ohio.gov
Project Description	Install Roundabout, Turn Lanes and restrict movements	Contact Phone	330-786-4940
Reference Number	Existing Conditions	Date Performed	6/5/2024
Analyst	Michael Craver	Analysis Year	2025
Agency/Company	ODOT District 4		
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
SR14; 8.894	Urban & Suburban Arterial Intersection	Unsignalized	SPORSR00014**C	8.894		0.05	CPORCR001	POR 14 at Cleveland

Traffic Volume Growth Rate Calculation For Benefit Cost Analysis

	Year	AADT	
Present ADT (PADT)	2024	22,000	veh / day
Future ADT (FADT)	2044	22,000	veh / day
Annual Linear Growth Rate		0.0000	

Proposed Conditions - Other CMF Selection

Select Other Non-Site Characteristic Based Countermeasures For Entire Project

CMF Nbr	Countermeasure	CMF KA Value	CMF B Value	CMF C Value	CMF O Value	CMF Valid for the Following Site Types
CMF 1	Convert intersection to Right in ONLY	0.00001	0.00001	0.00001	0.00001	7
CMF 2						
CMF 3						
CMF 4						
CMF 5						
CMF 6						
CMF 7						
CMF 8						
CMF 9						
CMF 10						

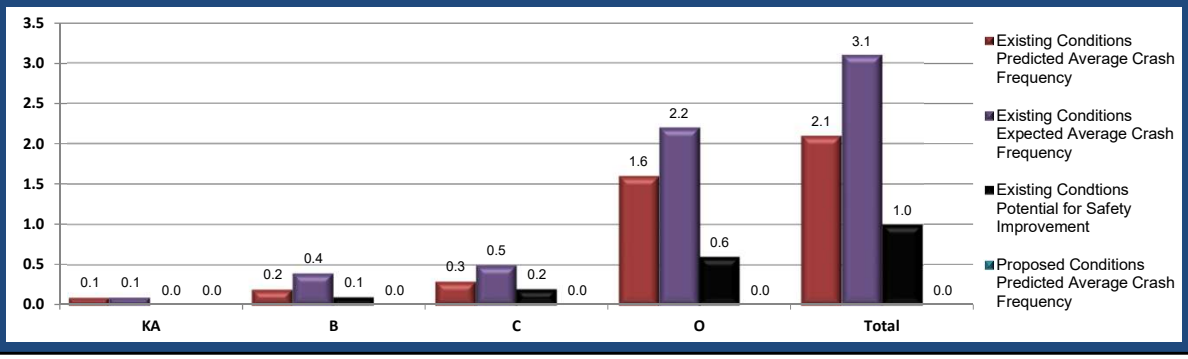
Project Safety Performance Report

General Information

Project Name	POR-14 at Infirmary and Cleveland Safety	Contact Email	michael.craver@dot.ohio.gov
Project Description	Install Roundabout, Turn Lanes and restrict movements	Contact Phone	330-786-4940
Reference Number	Existing Conditions	Date Performed	6/5/2024
Analyst	Michael Craver	Analysis Year	2025
Agency/Company	ODOT District 4		

Project and Site Conditions Information

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	0.0550	0.2211	0.2919	1.5587	2.1267
$N_{expected}$ - Existing Conditions	0.0844	0.3613	0.4948	2.1523	3.0928
$N_{potential\ for\ improvement}$ - Existing Conditions	**0.0294**	**0.1402**	**0.2029**	**0.5936**	**0.9661**
$N_{predicted}$ - Proposed Conditions	0.0000	0.0000	0.0000	0.0000	0.0000

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

Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
SR14; 8.894	POR 14 at Cleveland	0.055	0.2211	0.2919	1.5587	2.1267

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

Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
SR14; 8.894	POR 14 at Cleveland	0.0844	0.3613	0.4948	2.1523	3.0928

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
SR14; 8.894	POR 14 at Cleveland	**0.0294**	**0.1402**	**0.2029**	**0.5936**	**0.9661**

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

Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
SR14; 8.894	POR 14 at Cleveland	0	0	0	0	0

Summary by Crash Type

Crash Type	Existing			Proposed
	Predicted Crash Frequency	Expected Crash Frequency	PSI	Predicted Crash Frequency
Unknown	0.0021	0.0028	**0.0008**	0.0000
Head On	0.0415	0.0663	**0.0248**	0.0000
Rear End	0.7854	1.1650	**0.3795**	0.0000
Backing	0.0848	0.1178	**0.0330**	0.0000
Sideswipe - Meeting	0.0030	0.0046	**0.0016**	0.0000
Sideswipe - Passing	0.2888	0.4118	**0.1230**	0.0000
Angle	0.4159	0.6251	**0.2092**	0.0000
Parked Vehicle	0.0426	0.0594	**0.0168**	0.0000
Pedestrian	0.0237	0.0237	0.0000	0.0000
Animal	0.0000	0.0000	0.0000	0.0000
Train	0.0003	0.0004	**0.0001**	0.0000
Pedalcycles	0.0138	0.0138	0.0000	0.0000
Other Non-Vehicle	0.0001	0.0001	0.0000	0.0000
Fixed Object	0.1522	0.2005	**0.0482**	0.0000
Other Object	0.0041	0.0058	**0.0017**	0.0000
Overturning	0.0044	0.0049	**0.0006**	0.0000
Other Non-Collision	0.0094	0.0127	**0.0033**	0.0000
Left Turn	0.1560	0.2360	**0.0801**	0.0000
Right Turn	0.0986	0.1421	**0.0434**	0.0000

Project Cost Estimate

Project Name	POR-14 at Infirmary and Cleveland Safety Improvements	Contact Email	michael.craver@dot.ohio.gov
Project Description	Install Roundabout, Turn Lanes and restrict movements	Contact Phone	330-786-4940
Reference Number	Existing Conditions	Date Performed	6/5/2024
Analyst	Michael Craver	Analysis Year	2025
Agency/Company	ODOT District 4		

Engineering Design %	
Contingency %	30%

Countermeasures	Construction Costs	Right of Way Costs	Engineering Design Costs	Contingency Amount	Total Cost of Countermeasure	Annual Maintenance & Energy Costs	Salvage Value
CMF 1 - Convert intersection to Right in ONLY	$380,190.00	$1,100.00		$114,387.00	**$495,677.00**		
				$0.00	**$0.00**		
				$0.00	**$0.00**		
				$0.00	**$0.00**		
				$0.00	**$0.00**		
				$0.00	**$0.00**		
				$0.00	**$0.00**		
				$0.00	**$0.00**		
				$0.00	**$0.00**		
				$0.00	**$0.00**		
				$0.00	**$0.00**		
				$0.00	**$0.00**		
				$0.00	**$0.00**		
				$0.00	**$0.00**		
Totals	**$380,190.00**	**$1,100.00**	**$0.00**	**$114,387.00**	**$495,677.00**	**$0.00**	**$0.00**

Inflation %	19%

Final Costruction Cost:	**$591,342.66**

*Final construction cost should match the Project Cost Estimate

Safety Benefit - Cost Analysis

General Information

Project Name	POR-14 at Infirmary and Cleveland Safety Improvements	Contact Email	michael.craver@dot.ohio.gov
Project Description	Install Roundabout, Turn Lanes and restrict movements	Contact Phone	330-786-4940
Reference Number	Existing Conditions	Date Performed	6/5/2024
Analyst	Michael Craver	Analysis Year	2025
Agency/Company	ODOT District 4		

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

All Sites

Comments:

Countermeasure Service Lives, Costs, and Safety Benefits

Countermeasures	Service Life (Years)	Initial Cost of Countermeasure	Annual Maintenance & Energy Costs	Salvage Value	Net Present Cost of Countermeasure	Total Cost of Countermeasures	Summary of Annual Crash Modifications	Net Present Value of Safety Benefits
Site Characteristic Improvements (i.e. Lane widening)		$0.00			$0.00	$0.00	0.000	$0
Site Characteristic Improvements (i.e. Lighting)		$0.00			$0.00	$0.00		
Site Characteristic Improvements (i.e. Signal Phasing)		$0.00			$0.00	$0.00		
Site Characteristic Improvements (i.e. Added Right Turn Lane)		$0.00			$0.00	$0.00		
CMF 1 - Convert intersection to Right in ONLY	20	$495,677.00			$495,677.00	$495,677.00	-2.127	$786,166
		$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		**$495,677.00**	**$0.00**	**$0.00**	**$495,677.00**	**$495,677.00**	**-2.127**	**$786,166**

Safety Benefit - Cost Analysis

General Information

Project Name	POR-14 at Infirmary and Cleveland Safety Improvements	Contact Email	michael.craver@dot.ohio.gov
Project Description	Install Roundabout, Turn Lanes and restrict movements	Contact Phone	330-786-4940
Reference Number	Existing Conditions	Date Performed	6/5/2024
Analyst	Michael Craver	Analysis Year	2025
Agency/Company	ODOT District 4		

Benefit - Cost Calculator

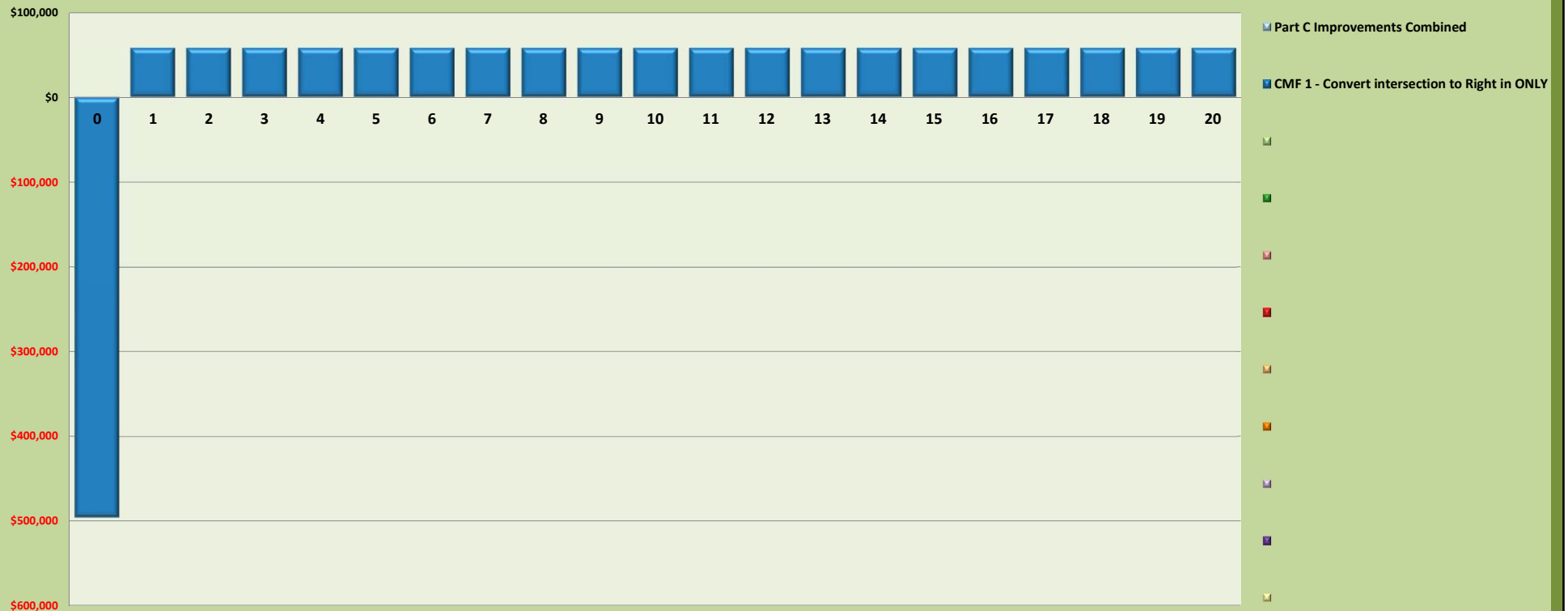
Net Present Value of Project	$495,677.00
Net Present Value of Safety Benefits	$786,165.87
Net Benefit	$290,488.87
Benefit / Cost Ratio	1.59

Expected Annual Crash Adjustment

Number of Fatal & Incapacitating Injury Crashes	-0.055
Number of Injury Crashes	-0.568
Number of Total Crashes	-2.127

Comments:

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

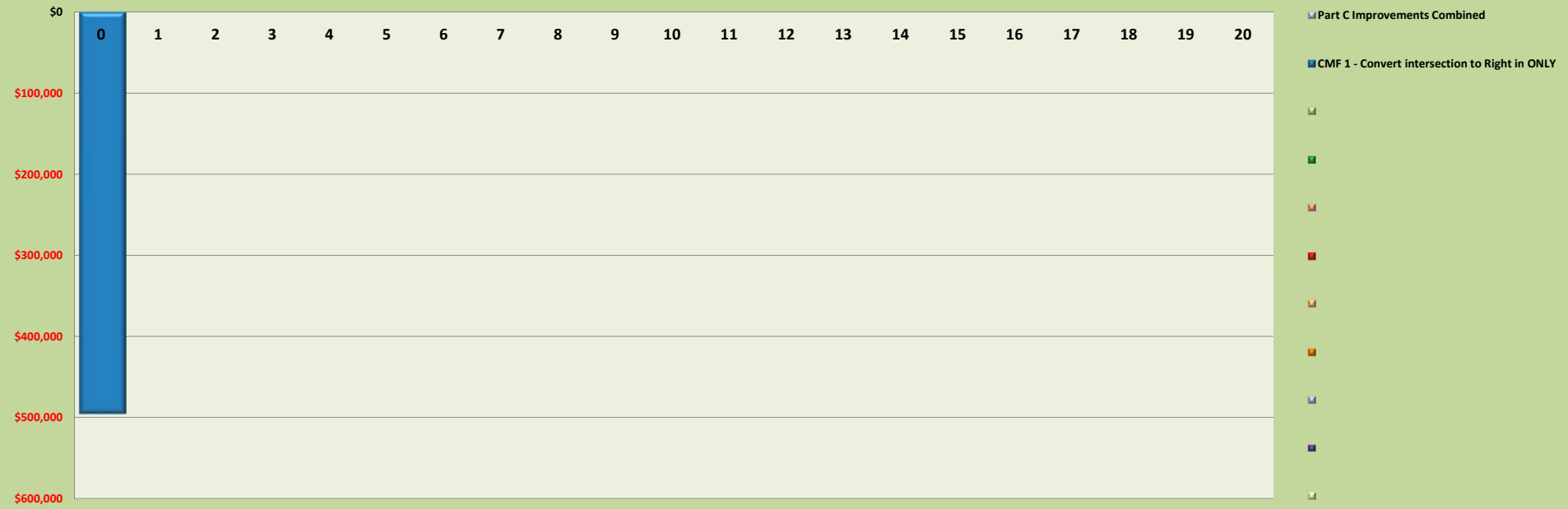


Safety Benefit - Cost Analysis

General Information

Project Name	POR-14 at Infirmary and Cleveland Safety Improvements	Contact Email	michael.craver@dot.ohio.gov
Project Description	Install Roundabout, Turn Lanes and restrict movements	Contact Phone	330-786-4940
Reference Number	Existing Conditions	Date Performed	6/5/2024
Analyst	Michael Craver	Analysis Year	2025
Agency/Company	ODOT District 4		

Project Costs Only Cash Flows By Countermeasure Per Year



Return on Investment (Safety Benefits and Project Investments)

First year to observe a positive return on investiment: 2034 (9 years)

Percentage of Service Life to observe a continuous Positive Return on Investment: 60.00%

Project Information

General Information

Project Name	POR-14 at Infirmary and Cleveland Safety Improvements	Contact Email	michael.craver@dot.ohio.gov
Project Description	Install Roundabout, Turn Lanes and restrict movements	Contact Phone	330-786-4940
Reference Number	SR-14 at Infirmary Proposed Conditions	Date Performed	6/6/2024
Analyst	Michael Craver	Analysis Year	2025
Agency/Company	ODOT District 4		
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
SR14; 9.347	Roundabout	Unsignalized	SPORSR00014**C	9.347		0.05	CPORCR001	SR-14 at Infirmary Rd

Traffic Volume Growth Rate Calculation For Benefit Cost Analysis

	Year	AADT	
Present ADT (PADT)	2025	20,470	veh / day
Future ADT (FADT)	2045	20,470	veh / day
Annual Linear Growth Rate		0.0000	

Select Other Non-Site Characteristic Based Countermeasures For Entire Project

CMF Nbr	Countermeasure	CMF KA Value	CMF B Value	CMF C Value	CMF O Value	CMF Valid for the Following Site Types
CMF 1	SR-14 at Infirmary Rd - Convert Signalized intersection to Roundabout	Add Value	Add Value	Add Value	Add Value	Unknown
CMF 2						
CMF 3						
CMF 4						
CMF 5						
CMF 6						
CMF 7						
CMF 8						
CMF 9						
CMF 10						

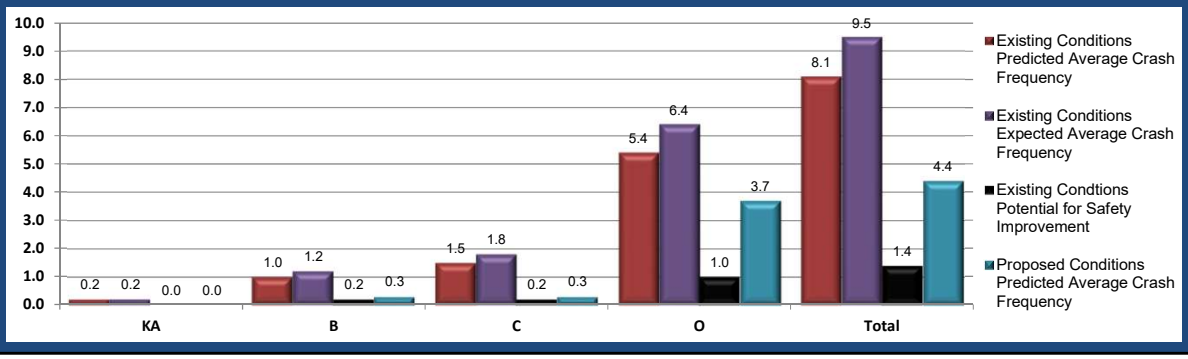
Project Safety Performance Report

General Information

Project Name	POR-14 at Infirmary and Cleveland Safety	Contact Email	michael.craver@dot.ohio.gov
Project Description	Install Roundabout, Turn Lanes and restrict movements	Contact Phone	330-786-4940
Reference Number	SR-14 at Infirmary Proposed Conditions	Date Performed	6/6/2024
Analyst	Michael Craver	Analysis Year	2025
Agency/Company	ODOT District 4		

Project and Site Conditions Information

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	0.2142	1.0186	1.5261	5.3523	8.1112
$N_{expected}$ - Existing Conditions	0.2459	1.1705	1.7547	6.3722	9.5433
$N_{potential\ for\ improvement}$ - Existing Conditions	**0.0317**	**0.1519**	**0.2286**	**1.0199**	**1.4321**
$N_{expected}$ - Proposed Conditions	0.0329	0.2761	0.3416	3.7293	4.3799

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

Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
SR14; 9.347	SR-14 at Infirmary Rd	0.2142	1.0186	1.5261	5.3523	8.1112

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

Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
SR14; 9.347	SR-14 at Infirmary Rd	0.2459	1.1705	1.7547	6.3722	9.5433

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
SR14; 9.347	SR-14 at Infirmary Rd	**0.0317**	**0.1519**	**0.2286**	**1.0199**	**1.4321**

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

Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
SR14; 9.347	SR-14 at Infirmary Rd	0.0329	0.2761	0.3416	3.7293	4.3799

Summary by Crash Type

Crash Type	Existing			Proposed
	Predicted Crash Frequency	Expected Crash Frequency	PSI	Predicted Crash Frequency
Unknown	0.0142	0.0183	**0.0040**	0.1196
Head On	0.1496	0.1736	**0.0240**	0.0066
Rear End	3.8016	4.4479	**0.6463**	0.7048
Backing	0.1524	0.1795	**0.0271**	0.0377
Sideswipe - Meeting	0.0059	0.0069	**0.0010**	0.0000
Sideswipe - Passing	0.7589	0.8915	**0.1326**	1.3434
Angle	1.3096	1.5260	**0.2164**	1.2322
Parked Vehicle	0.0605	0.0772	**0.0167**	0.0000
Pedestrian	0.0218	0.0218	0.0000	0.0066
Animal	0.0000	0.0000	0.0000	0.0443
Train	0.0011	0.0014	**0.0003**	0.0000
Pedalcycles	0.0057	0.0057	0.0000	0.0066
Other Non-Vehicle	0.0000	0.0000	0.0000	0.0000
Fixed Object	0.5211	0.6577	**0.1365**	0.4424
Other Object	0.0202	0.0260	**0.0058**	0.0000
Overturning	0.0302	0.0367	**0.0064**	0.0066
Other Non-Collision	0.0417	0.0530	**0.0113**	0.0819
Left Turn	0.8429	0.9817	**0.1388**	0.1016
Right Turn	0.3737	0.4386	**0.0649**	0.2899

Project Cost Estimate

Project Name	POR-14 at Infirmary and Cleveland Safety Improvements	Contact Email	michael.craver@dot.ohio.gov
Project Description	Install Roundabout, Turn Lanes and restrict movements	Contact Phone	330-786-4940
Reference Number	SR-14 at Infirmary Proposed Conditions	Date Performed	6/6/2024
Analyst	Michael Craver	Analysis Year	2025
Agency/Company	ODOT District 4		

Engineering Design %	
Contingency %	30%

Countermeasures	Construction Costs	Right of Way Costs	Engineering Design Costs	Contingency Amount	Total Cost of Countermeasure	Annual Maintenance & Energy Costs	Salvage Value
Convert Signalized intersection to Roundabout	$2,676,910.00	$11,500.00		$806,523.00	**$3,494,933.00**		
				$0.00	**$0.00**		
				$0.00	**$0.00**		
				$0.00	**$0.00**		
				$0.00	**$0.00**		
				$0.00	**$0.00**		
				$0.00	**$0.00**		
				$0.00	**$0.00**		
				$0.00	**$0.00**		
				$0.00	**$0.00**		
				$0.00	**$0.00**		
				$0.00	**$0.00**		
				$0.00	**$0.00**		
Totals	**$2,676,910.00**	**$11,500.00**	**$0.00**	**$806,523.00**	**$3,494,933.00**	**$0.00**	**$0.00**

Inflation %	19%

Final Costruction Cost:	**$4,169,455.07**

*Final construction cost should match the Project Cost Estimate

Safety Benefit - Cost Analysis

General Information

Project Name	POR-14 at Infirmary and Cleveland Safety Improvements	Contact Email	michael.craver@dot.ohio.gov
Project Description	Install Roundabout, Turn Lanes and restrict movements	Contact Phone	330-786-4940
Reference Number	SR-14 at Infirmary Proposed Conditions	Date Performed	6/6/2024
Analyst	Michael Craver	Analysis Year	2025
Agency/Company	ODOT District 4		

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

All Sites

Comments:

Countermeasure Service Lives, Costs, and Safety Benefits

Countermeasures	Service Life (Years)	Initial Cost of Countermeasure	Annual Maintenance & Energy Costs	Salvage Value	Net Present Cost of Countermeasure	Total Cost of Countermeasures	Summary of Annual Crash Modifications	Net Present Value of Safety Benefits
Convert Signalized intersection to Roundabout	20	$3,494,933.00			$3,494,933.00	$3,494,933.00	-3.731	$2,752,452
		$0.00			$0.00	$0.00		
		$0.00			$0.00	$0.00		
		$0.00			$0.00	$0.00		
		$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		**$3,494,933.00**	**$0.00**	**$0.00**	**$3,494,933.00**	**$3,494,933.00**	**-3.731**	**$2,752,452**

Safety Benefit - Cost Analysis

General Information

Project Name	POR-14 at Infirmary and Cleveland Safety Improvements	Contact Email	michael.craver@dot.ohio.gov
Project Description	Install Roundabout, Turn Lanes and restrict movements	Contact Phone	330-786-4940
Reference Number	SR-14 at Infirmary Proposed Conditions	Date Performed	6/6/2024
Analyst	Michael Craver	Analysis Year	2025
Agency/Company	ODOT District 4		

Benefit - Cost Calculator

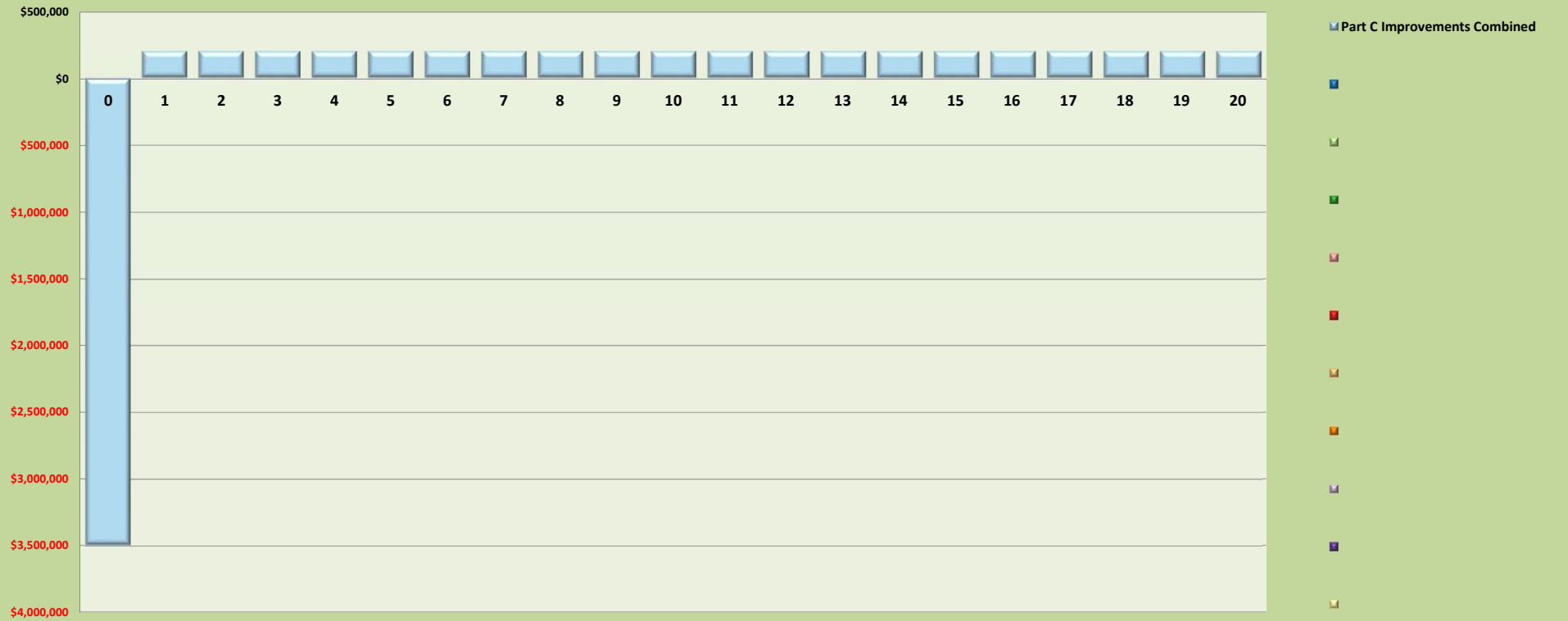
Net Present Value of Project	$3,494,933.00
Net Present Value of Safety Benefits	$2,752,451.75
Net Benefit	($742,481.25)
Benefit / Cost Ratio	0.79

Expected Annual Crash Adjustment

Number of Fatal & Incapacitating Injury Crashes	-0.181
Number of Injury Crashes	-2.108
Number of Total Crashes	-3.731

Comments:

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

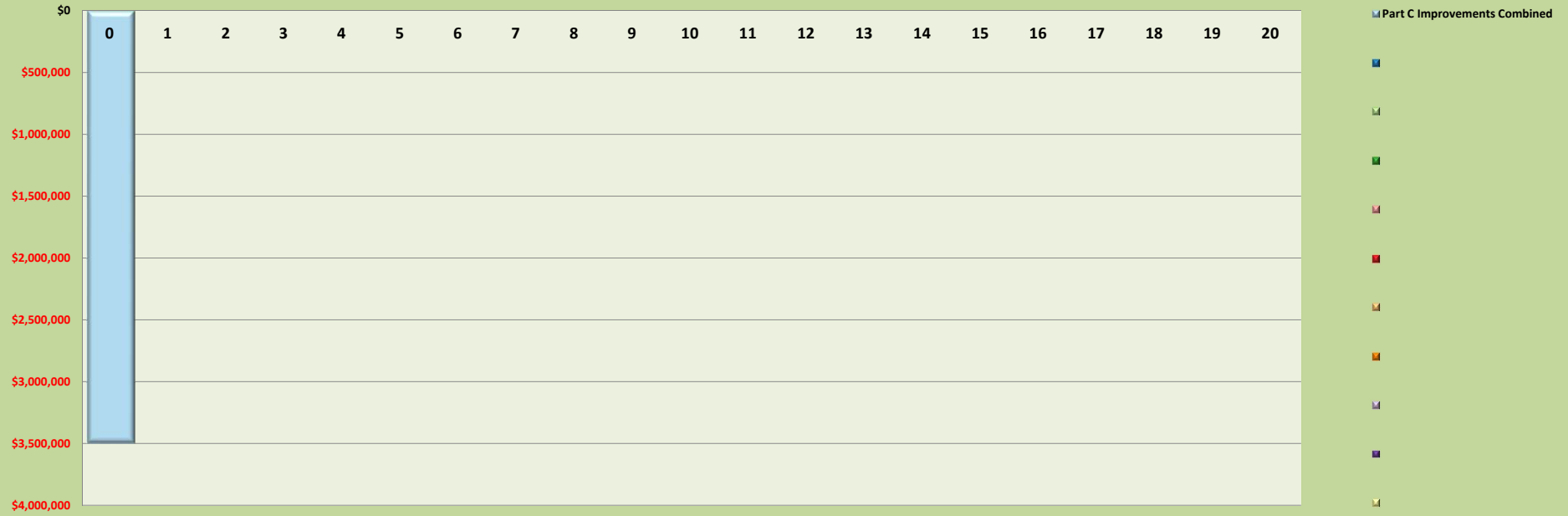


Safety Benefit - Cost Analysis

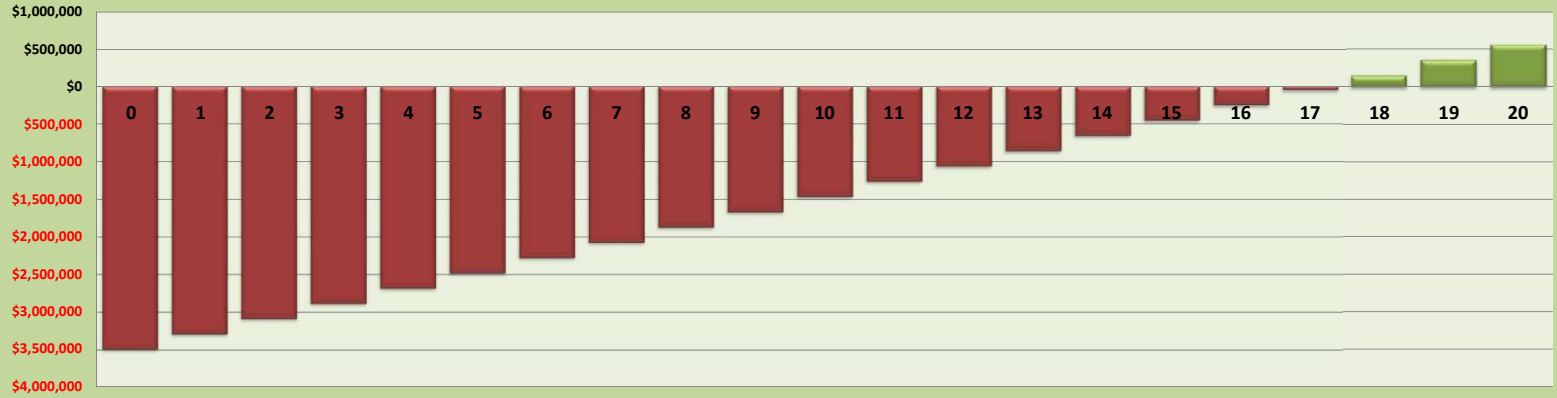
General Information

Project Name	POR-14 at Infirmary and Cleveland Safety Improvements	Contact Email	michael.craver@dot.ohio.gov
Project Description	Install Roundabout, Turn Lanes and restrict movements	Contact Phone	330-786-4940
Reference Number	SR-14 at Infirmary Proposed Conditions	Date Performed	6/6/2024
Analyst	Michael Craver	Analysis Year	2025
Agency/Company	ODOT District 4		

Project Costs Only Cash Flows By Countermeasure Per Year



Return on Investment (Safety Benefits and Project Investments)



First year to observe a positive return on investiment: 2043 (18 years)

Percentage of Service Life to observe a continuous Positive Return on Investment: 15.00%

Project Information

General Information

Project Name	POR-14 at Infirmary and Cleveland Safety Improvements	Contact Email	michael.craver@dot.ohio.gov
Project Description	Install Roundabout, Turn Lanes and restrict movements	Contact Phone	330-786-4940
Reference Number	Lovers Lane Existing Conditions	Date Performed	6/6/2024
Analyst	Michael Craver	Analysis Year	2025
Agency/Company	ODOT District 4		
Perform Benefit Cost Analysis?	Yes		

Project and Site Conditions Information

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
CR164; 0.336	Urban & Suburban Arterial Intersection	Unsignalized	CPORCR00164**C	0.336		0.05	CPORCR001	Infirmary Rd at Lovers Lane

Traffic Volume Growth Rate Calculation For Benefit Cost Analysis

	Year	AADT	
Present ADT (PADT)	2025	9,610	veh / day
Future ADT (FADT)	2045	9,610	veh / day
Annual Linear Growth Rate		0.0000	

Proposed Conditions - Other CMF Selection

Select Other Non-Site Characteristic Based Countermeasures For Entire Project

CMF Nbr	Countermeasure	CMF KA Value	CMF B Value	CMF C Value	CMF O Value	CMF Valid for the Following Site Types
CMF 1						
CMF 2						
CMF 3						
CMF 4						
CMF 5						
CMF 6						
CMF 7						
CMF 8						
CMF 9						
CMF 10						

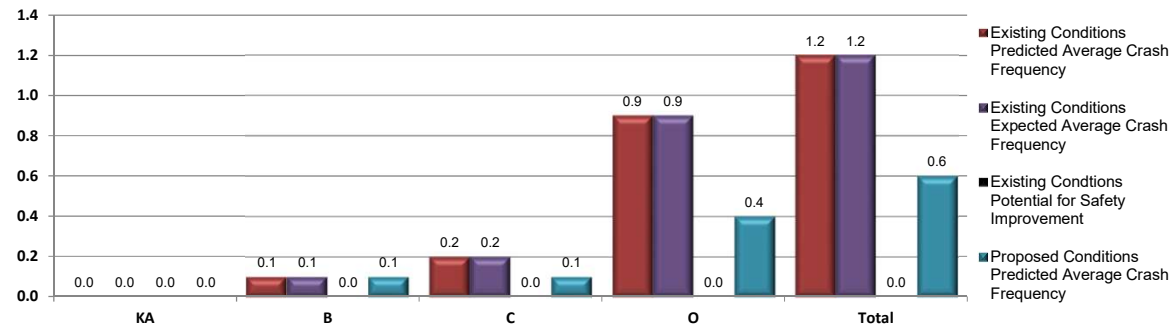
Project Safety Performance Report

General Information

Project Name	POR-14 at Infirmary and Cleveland Safety	Contact Email	michael.craver@dot.ohio.gov
Project Description	Install Roundabout, Turn Lanes and restrict movements	Contact Phone	330-786-4940
Reference Number	Lovers Lane Existing Conditions	Date Performed	6/6/2024
Analyst	Michael Craver	Analysis Year	2025
Agency/Company	ODOT District 4		

Project and Site Conditions Information

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	0.0439	0.1360	0.1582	0.8697	1.2078
$N_{expected}$ - Existing Conditions	0.0469	0.1458	0.1708	0.8601	1.2236
$N_{potential\ for\ improvement}$ - Existing Conditions	**0.0030**	**0.0098**	**0.0126**	-0.0096	**0.0158**
$N_{expected}$ - Proposed Conditions	0.0200	0.0620	0.0721	0.3964	0.5505

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

Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
CR164; 0.336	Infirmary Rd at Lovers Lane	0.0439	0.136	0.1582	0.8697	1.2078

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

Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
CR164; 0.336	Infirmary Rd at Lovers Lane	0.0469	0.1458	0.1708	0.8601	1.2236

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
CR164; 0.336	Infirmary Rd at Lovers Lane	**0.003**	**0.0098**	**0.0126**	-0.0096	**0.0158**

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

Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
CR164; 0.336	Infirmary Rd at Lovers Lane	0.02	0.062	0.0721	0.3964	0.5505

Summary by Crash Type

Crash Type	Existing			Proposed
	Predicted Crash Frequency	Expected Crash Frequency	PSI	Predicted Crash Frequency
Unknown	0.0020	0.0019	-0.0001	0.0009
Head On	0.0171	0.0177	**0.0006**	0.0078
Rear End	0.3236	0.3296	**0.0060**	0.1475
Backing	0.0566	0.0565	-0.0001	0.0258
Sideswipe - Meeting	0.0009	0.0009	0.0000	0.0004
Sideswipe - Passing	0.1337	0.1348	**0.0011**	0.0609
Angle	0.3767	0.3883	**0.0116**	0.1717
Parked Vehicle	0.0332	0.0316	-0.0016	0.0151
Pedestrian	0.0180	0.0180	0.0000	0.0082
Animal	0.0000	0.0000	0.0000	0.0000
Train	0.0001	0.0001	0.0000	0.0000
Pedalcycles	0.0103	0.0103	0.0000	0.0047
Other Non-Vehicle	0.0000	0.0000	0.0000	0.0000
Fixed Object	0.0934	0.0893	-0.0041	0.0426
Other Object	0.0030	0.0029	-0.0001	0.0014
Overturning	0.0035	0.0034	-0.0001	0.0016
Other Non-Collision	0.0055	0.0053	-0.0002	0.0025
Left Turn	0.0793	0.0817	**0.0023**	0.0362
Right Turn	0.0508	0.0514	**0.0006**	0.0232

Project Cost Estimate

Project Name	POR-14 at Infirmary and Cleveland Safety Improvements	Contact Email	michael.craver@dot.ohio.gov
Project Description	Install Roundabout, Turn Lanes and restrict movements	Contact Phone	330-786-4940
Reference Number	Lovers Lane Existing Conditions	Date Performed	6/6/2024
Analyst	Michael Craver	Analysis Year	2025
Agency/Company	ODOT District 4		

Engineering Design %	
Contingency %	30%

Countermeasures	Construction Costs	Right of Way Costs	Engineering Design Costs	Contingency Amount	Total Cost of Countermeasure	Annual Maintenance & Energy Costs	Salvage Value
Add a southbound left, northbound left and northbound right turn lane	$222,980.00	$2,400.00		$67,614.00	**$292,994.00**		
				$0.00	**$0.00**		
				$0.00	**$0.00**		
				$0.00	**$0.00**		
				$0.00	**$0.00**		
				$0.00	**$0.00**		
				$0.00	**$0.00**		
				$0.00	**$0.00**		
				$0.00	**$0.00**		
				$0.00	**$0.00**		
				$0.00	**$0.00**		
				$0.00	**$0.00**		
				$0.00	**$0.00**		
				$0.00	**$0.00**		
Totals	**$222,980.00**	**$2,400.00**	**$0.00**	**$67,614.00**	**$292,994.00**	**$0.00**	**$0.00**

Inflation %	19%

Final Costruction Cost:	**$349,541.84**

*Final construction cost should match the Project Cost Estimate

Safety Benefit - Cost Analysis

General Information

Project Name	POR-14 at Infirmary and Cleveland Safety Improvements	Contact Email	michael.craver@dot.ohio.gov
Project Description	Install Roundabout, Turn Lanes and restrict movements	Contact Phone	330-786-4940
Reference Number	Lovers Lane Existing Conditions	Date Performed	6/6/2024
Analyst	Michael Craver	Analysis Year	2025
Agency/Company	ODOT District 4		

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

All Sites

Comments:

Countermeasure Service Lives, Costs, and Safety Benefits

Countermeasures	Service Life (Years)	Initial Cost of Countermeasure	Annual Maintenance & Energy Costs	Salvage Value	Net Present Cost of Countermeasure	Total Cost of Countermeasures	Summary of Annual Crash Modifications	Net Present Value of Safety Benefits
Add a southbound left, northbound left and northbound right turn lane	20	$292,994.00			$292,994.00	$292,994.00	-0.657	$292,953
		$0.00			$0.00	$0.00		
		$0.00			$0.00	$0.00		
		$0.00			$0.00	$0.00		
		$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		**$292,994.00**	**$0.00**	**$0.00**	**$292,994.00**	**$292,994.00**	**-0.657**	**$292,953**

Safety Benefit - Cost Analysis

General Information

Project Name	POR-14 at Infirmary and Cleveland Safety Improvements	Contact Email	michael.craver@dot.ohio.gov
Project Description	Install Roundabout, Turn Lanes and restrict movements	Contact Phone	330-786-4940
Reference Number	Lovers Lane Existing Conditions	Date Performed	6/6/2024
Analyst	Michael Craver	Analysis Year	2025
Agency/Company	ODOT District 4		

Benefit - Cost Calculator

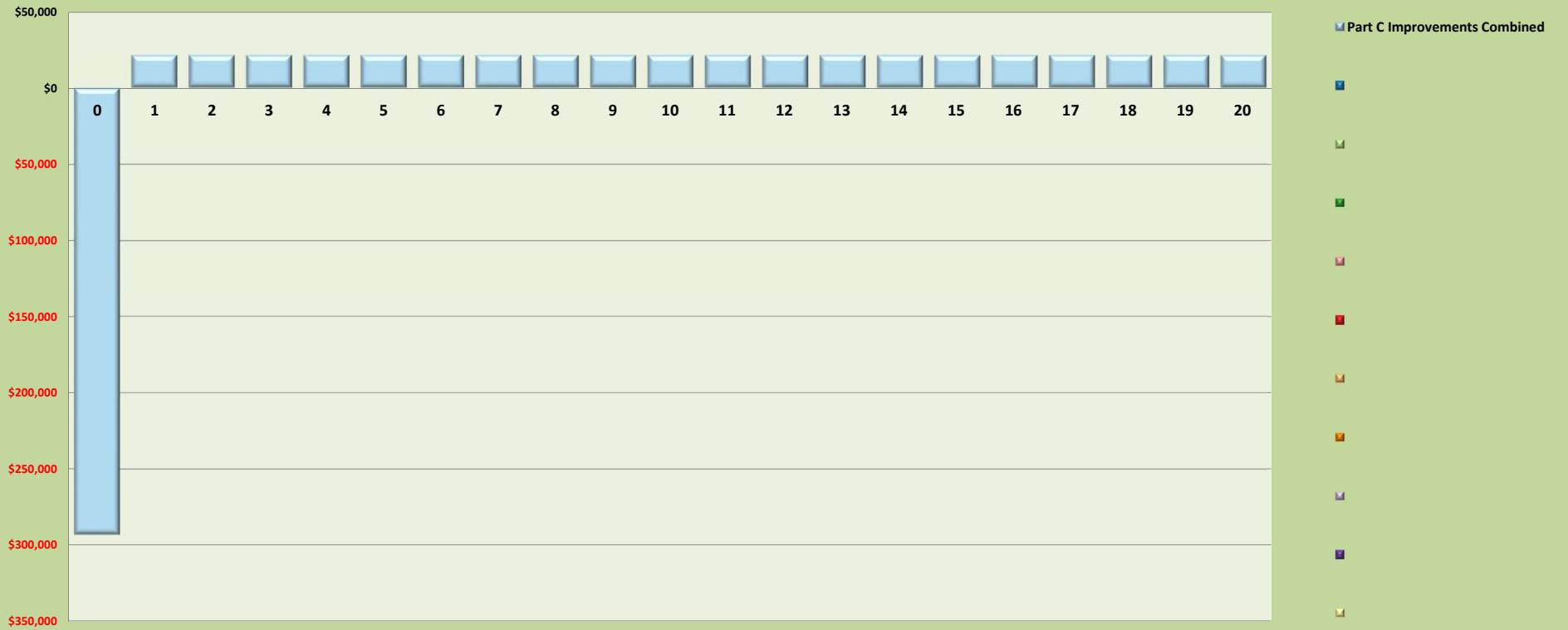
Net Present Value of Project	$292,994.00
Net Present Value of Safety Benefits	$292,952.80
Net Benefit	($41.20)
Benefit / Cost Ratio	1.00

Expected Annual Crash Adjustment

Number of Fatal & Incapacitating Injury Crashes	-0.024
Number of Injury Crashes	-0.184
Number of Total Crashes	-0.657

Comments:

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

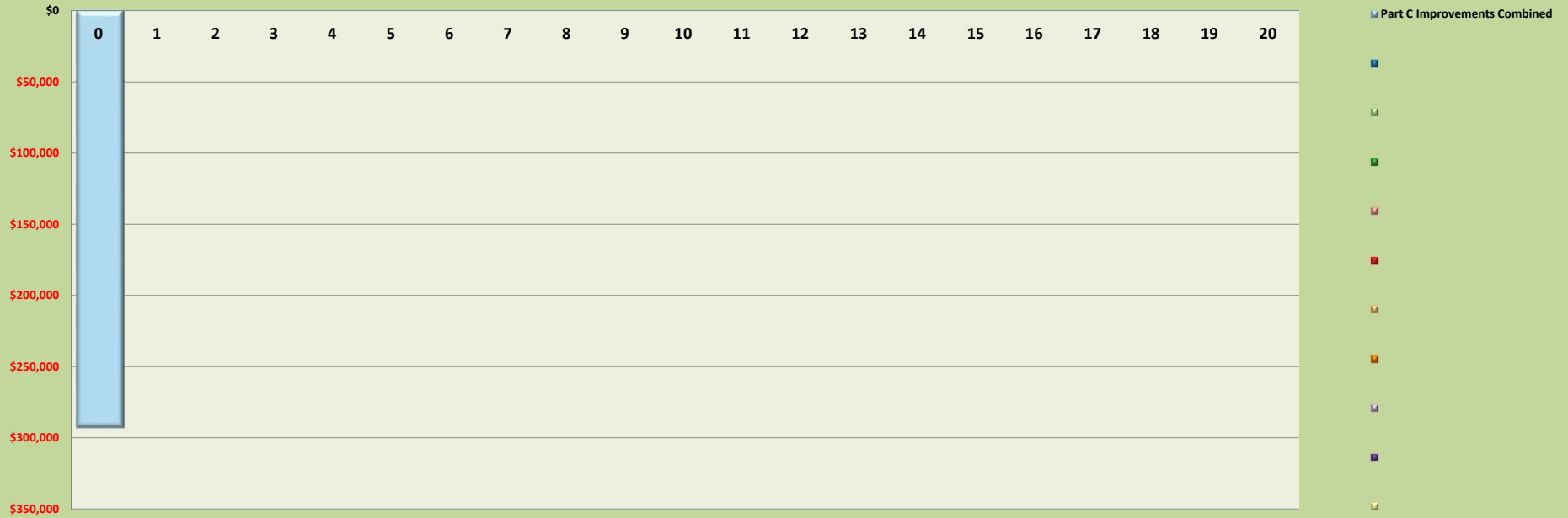


Safety Benefit - Cost Analysis

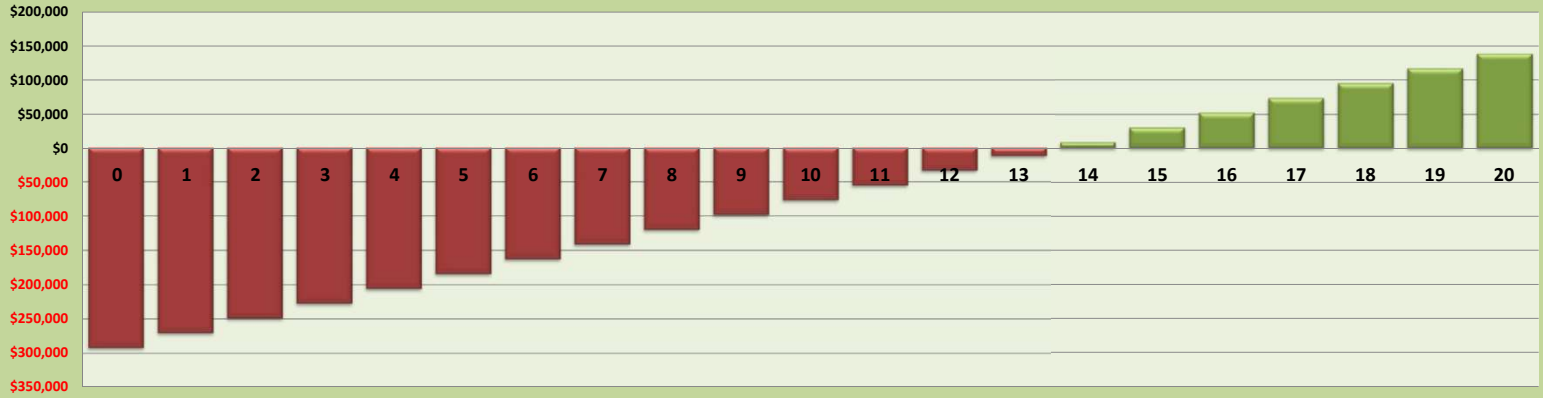
General Information

Project Name	POR-14 at Infirmary and Cleveland Safety Improvements	Contact Email	michael.craver@dot.ohio.gov
Project Description	Install Roundabout, Turn Lanes and restrict movements	Contact Phone	330-786-4940
Reference Number	Lovers Lane Existing Conditions	Date Performed	6/6/2024
Analyst	Michael Craver	Analysis Year	2025
Agency/Company	ODOT District 4		

Project Costs Only Cash Flows By Countermeasure Per Year



Return on Investment (Safety Benefits and Project Investments)



First year to observe a positive return on investiment: 2039 (14 years)

Percentage of Service Life to observe a continuous Positive Return on Investment: 35.00%

Project Information

General Information

Project Name	POR-14 at Infirmary and Cleveland Safety Improvements	Contact Email	michael.craver@dot.ohio.gov
Project Description	Install Roundabout, Turn Lanes and restrict movements	Contact Phone	330-786-4940
Reference Number	Combined Existing Conditions	Date Performed	6/6/2024
Analyst	Michael Craver	Analysis Year	2025
Agency/Company	ODOT District 4		
Perform Benefit Cost Analysis?	Yes		

Project and Site Conditions Information

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
CR164; 0.336	Urban & Suburban Arterial Intersection	Unsignalized	CPORCR00164**C	0.336		0.05	CPORCR001	Infirmary Rd at Lovers Lane
SR14; 8.894	Urban & Suburban Arterial Intersection	Unsignalized	SPORSR00014**C	8.894		0.05	CPORCR001	SR-14 at Cleveland
SR14; 9.347	Roundabout	Unsignalized	SPORSR00014**C	9.347		0.05	CPORCR001	SR-14 at Infirmary Rd

Traffic Volume Growth Rate Calculation For Benefit Cost Analysis

	Year	AADT	
Present ADT (PADT)	2024	31,030	veh / day
Future ADT (FADT)	2044	31,030	veh / day
Annual Linear Growth Rate		0.0000	

Proposed Conditions - Other CMF Selection

Select Other Non-Site Characteristic Based Countermeasures For Entire Project

CMF Nbr	Countermeasure	CMF KA Value	CMF B Value	CMF C Value	CMF O Value	CMF Valid for the Following Site Types
CMF 1	SR-14 at Cleveland Rd - Convert intersection to Right in ONLY (Eastbound Right)	0.00001	0.00001	0.00001	0.00001	7
CMF 2						
CMF 3						
CMF 4						
CMF 5						
CMF 6						
CMF 7						
CMF 8						
CMF 9						
CMF 10						

Project Safety Performance Report

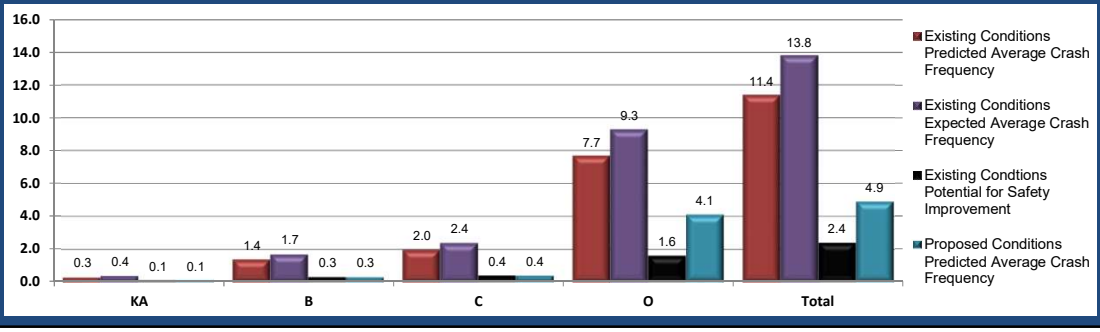
ECAT Economic Crash Analysis Tool

General Information

Project Name	POR-14 at Infirmary and Cleveland Safety	Contact Email	michael.craver@dot.ohio.gov
Project Description	Install Roundabout, Turn Lanes and restrict movements	Contact Phone	330-786-4940
Reference Number	Combined Existing Conditions	Date Performed	6/6/2024
Analyst	Michael Craver	Analysis Year	2025
Agency/Company	ODOT District 4		

Project and Site Conditions Information

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	0.3113	1.3684	1.9666	7.7291	11.3754
$N_{expected}$ - Existing Conditions	0.3737	1.6639	2.4020	9.3119	13.7515
$N_{potential\ for\ improvement}$ - Existing Conditions	0.0624	0.2955	0.4354	1.5828	2.3761
$N_{predicted}$ - Proposed Conditions	0.0530	0.3381	0.4137	4.1257	4.9305

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

Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
CR164; 0.336	Infirmary Rd at Lovers Lane	0.0439	0.136	0.1582	0.8697	1.2078
SR14; 8.894	POR 14 at Cleveland	0.0532	0.2138	0.2823	1.5071	2.0564
SR14; 9.347	SR-14 at Infirmary Rd	0.2142	1.0186	1.5261	5.3523	8.1112

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

Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
CR164; 0.336	Infirmary Rd at Lovers Lane	0.0456	0.1414	0.1651	0.8249	1.177
SR14; 8.894	POR 14 at Cleveland	0.0822	0.352	0.4822	2.1148	3.0312
SR14; 9.347	SR-14 at Infirmary Rd	0.2459	1.1705	1.7547	6.3722	9.5433

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
CR164; 0.336	Infirmary Rd at Lovers Lane	0.0017	0.0054	0.0069	-0.0448	-0.0308
SR14; 8.894	POR 14 at Cleveland	0.029	0.1382	0.1999	0.6077	0.9748
SR14; 9.347	SR-14 at Infirmary Rd	0.0317	0.1519	0.2286	1.0199	1.4321

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

Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
CR164; 0.336	Infirmary Rd at Lovers Lane	0.02	0.062	0.0721	0.3964	0.5505
SR14; 8.894	SR-14 at Cleveland	0.0001	0	0	0	0.0001
SR14; 9.347	SR-14 at Infirmary Rd	0.0329	0.2761	0.3416	3.7293	4.3799

Summary by Crash Type

Crash Type	Existing			Proposed
	Predicted Crash Frequency	Expected Crash Frequency	PSI	Predicted Crash Frequency
Unknown	0.0182	0.0230	0.0047	0.1205
Head On	0.2068	0.2554	0.0486	0.0144
Rear End	4.8847	5.9057	1.0210	0.8524
Backing	0.2910	0.3492	0.0582	0.0635
Sideswipe - Meeting	0.0097	0.0123	0.0026	0.0004
Sideswipe - Passing	1.1719	1.4247	0.2528	1.4044
Angle	2.0884	2.5104	0.4219	1.4040
Parked Vehicle	0.1349	0.1666	0.0317	0.0151
Pedestrian	0.0628	0.0628	0.0000	0.0148
Animal	0.0000	0.0000	0.0000	0.0443
Train	0.0015	0.0018	0.0004	0.0000
Pedalcycles	0.0294	0.0294	0.0000	0.0113
Other Non-Vehicle	0.0001	0.0001	0.0000	0.0000
Fixed Object	0.7617	0.9418	0.1801	0.4850
Other Object	0.0272	0.0344	0.0073	0.0014
Overturning	0.0380	0.0449	0.0069	0.0082
Other Non-Collision	0.0563	0.0706	0.0143	0.0844
Left Turn	1.0731	1.2912	0.2181	0.1378
Right Turn	0.5199	0.6272	0.1073	0.3131

Project Cost Estimate

Project Name	POR-14 at Infirmary and Cleveland Safety Improvements	Contact Email	michael.craver@dot.ohio.gov
Project Description	Install Roundabout, Turn Lanes and restrict movements	Contact Phone	330-786-4940
Reference Number	Combined Existing Conditions	Date Performed	6/6/2024
Analyst	Michael Craver	Analysis Year	2025
Agency/Company	ODOT District 4		

Engineering Design %	
Contingency %	30%

Countermeasures	Construction Costs	Right of Way Costs	Engineering Design Costs	Contingency Amount	Total Cost of Countermeasure	Annual Maintenance & Energy Costs	Salvage Value
Install a roundabout at SR-14 at Infirmary Rd	$2,676,910.00	$11,500.00		$806,523.00	**$3,494,933.00**		
				$0.00	**$0.00**		
Add a southbound left, northbound left and northbound right turn lane	$222,980.00	$2,400.00		$67,614.00	**$292,994.00**		
				$0.00	**$0.00**		
CMF 1 - SR-14 at Cleveland Rd - Convert intersection to Right in ONLY (Eastbound Right)	$380,190.00	$1,100.00		$114,387.00	**$495,677.00**		
				$0.00	**$0.00**		
				$0.00	**$0.00**		
				$0.00	**$0.00**		
				$0.00	**$0.00**		
				$0.00	**$0.00**		
				$0.00	**$0.00**		
				$0.00	**$0.00**		
				$0.00	**$0.00**		
				$0.00	**$0.00**		
Totals	**$3,280,080.00**	**$15,000.00**	**$0.00**	**$988,524.00**	**$4,283,604.00**	**$0.00**	**$0.00**

Inflation %	19%

Final Costruction Cost:	**$5,110,339.57**

*Final construction cost should match the Project Cost Estimate

Safety Benefit - Cost Analysis

General Information

Project Name	POR-14 at Infirmary and Cleveland Safety Improvements	Contact Email	michael.craver@dot.ohio.gov
Project Description	Install Roundabout, Turn Lanes and restrict movements	Contact Phone	330-786-4940
Reference Number	Combined Existing Conditions	Date Performed	6/6/2024
Analyst	Michael Craver	Analysis Year	2025
Agency/Company	ODOT District 4		

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

All Sites

Comments:

Countermeasure Service Lives, Costs, and Safety Benefits

Countermeasures	Service Life (Years)	Initial Cost of Countermeasure	Annual Maintenance & Energy Costs	Salvage Value	Net Present Cost of Countermeasure	Total Cost of Countermeasures	Summary of Annual Crash Modifications	Net Present Value of Safety Benefits
Install a roundabout at SR-14 at Infirmary Rd	20	$3,494,933.00			$3,494,933.00	$3,494,933.00	-4.389	$3,045,405
		$0.00			$0.00	$0.00		
Add a southbound left, northbound left and northbound right turn lane	20	$292,994.00			$292,994.00	$292,994.00		
		$0.00			$0.00	$0.00		
CMF 1 - Convert intersection to Right in Only	20	$495,677.00			$495,677.00	$495,677.00	-2.056	$759,660
		$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		**$4,283,604.00**	**$0.00**	**$0.00**	**$4,283,604.00**	**$4,283,604.00**	**-6.445**	**$3,805,064**

Safety Benefit - Cost Analysis

General Information

Project Name	POR-14 at Infirmary and Cleveland Safety Improvements	Contact Email	michael.craver@dot.ohio.gov
Project Description	Install Roundabout, Turn Lanes and restrict movements	Contact Phone	330-786-4940
Reference Number	Combined Existing Conditions	Date Performed	6/6/2024
Analyst	Michael Craver	Analysis Year	2025
Agency/Company	ODOT District 4		

Benefit - Cost Calculator

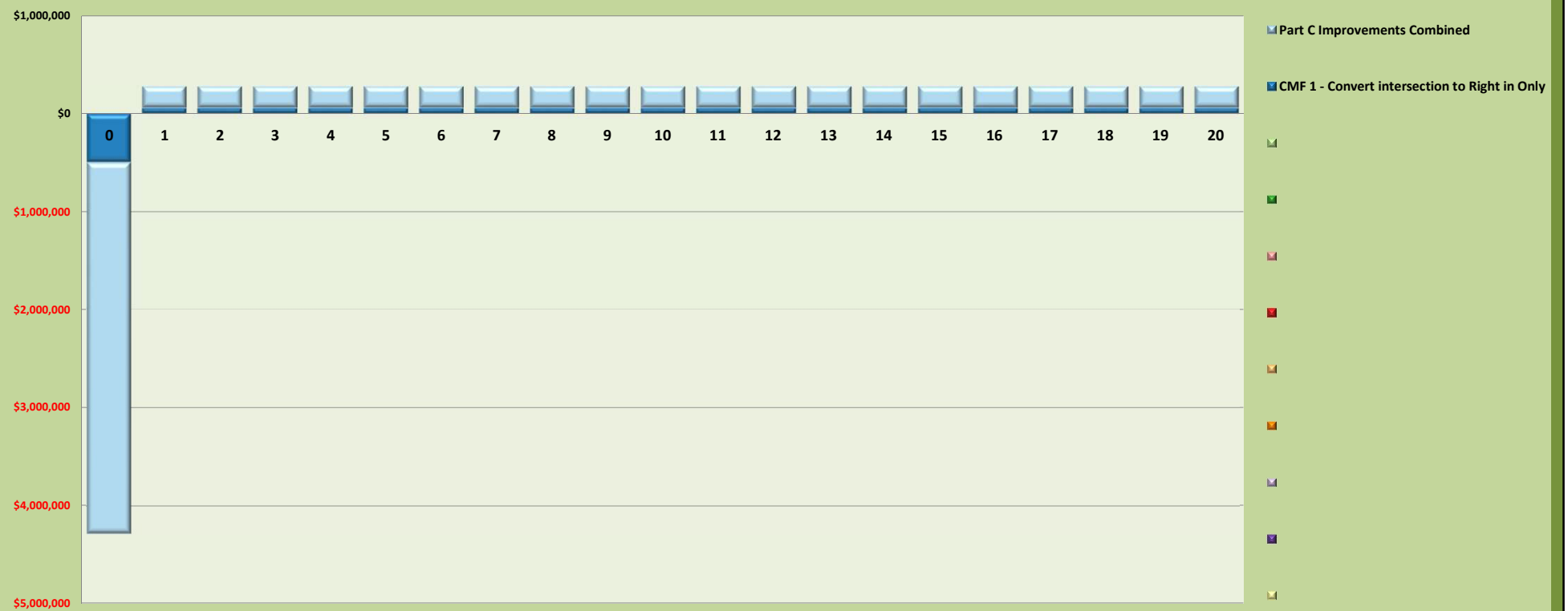
Net Present Value of Project	$4,283,604.00
Net Present Value of Safety Benefits	$3,805,064.20
Net Benefit	($478,539.80)
Benefit / Cost Ratio	0.89

Expected Annual Crash Adjustment

Number of Fatal & Incapacitating Injury Crashes	-0.258
Number of Injury Crashes	-2.842
Number of Total Crashes	-6.445

Comments:

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

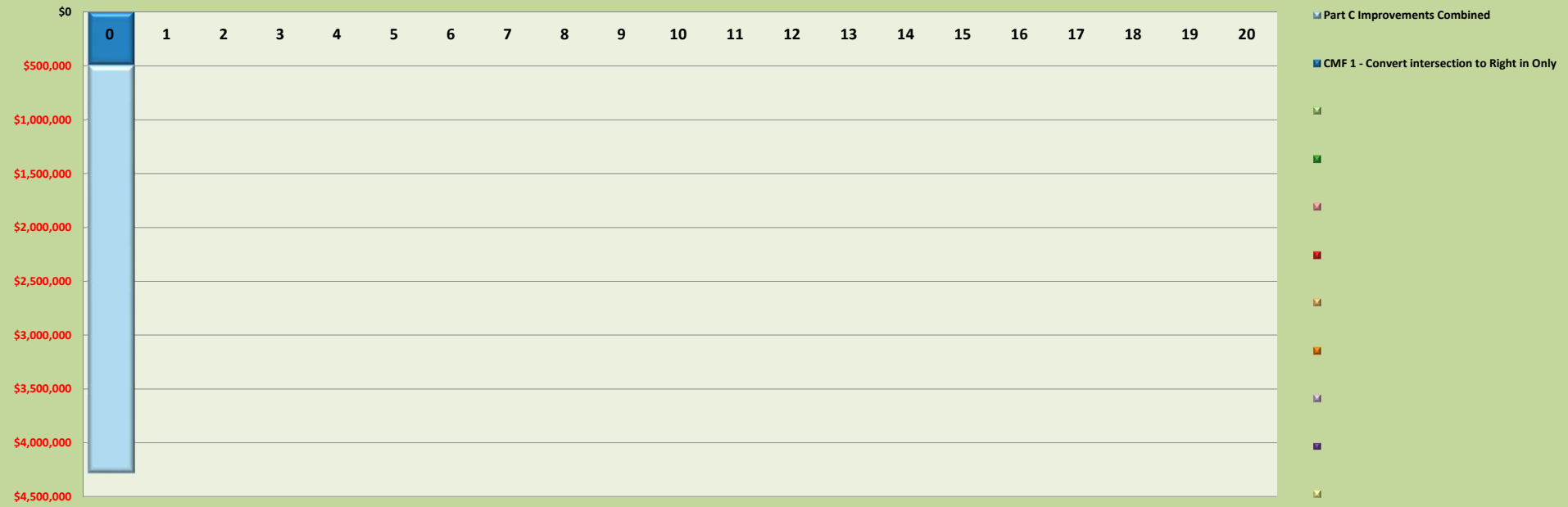


Safety Benefit - Cost Analysis

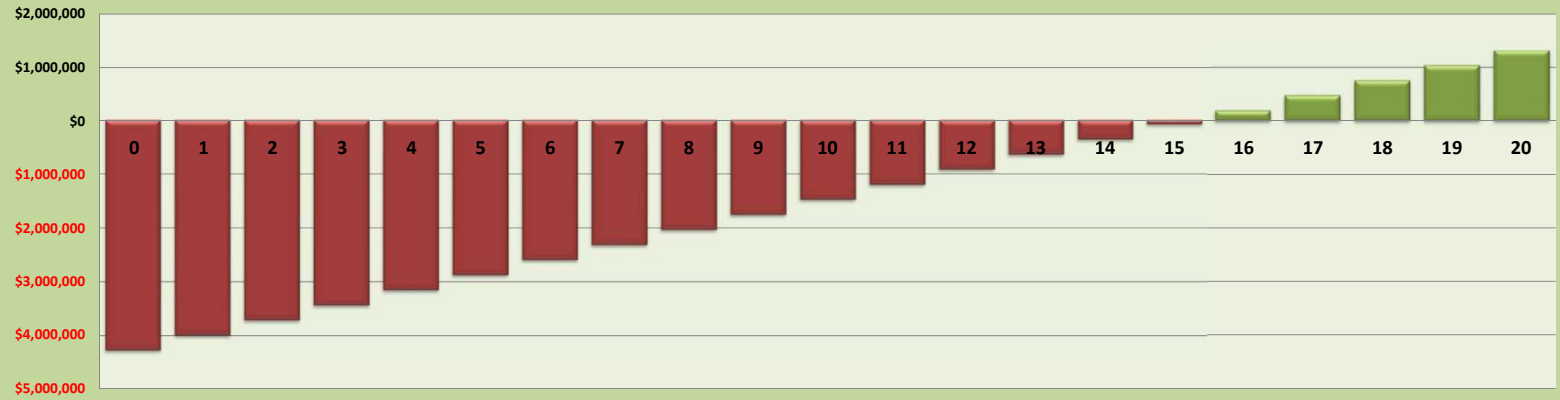
General Information

Project Name	POR-14 at Infirmary and Cleveland Safety Improvements	Contact Email	michael.craver@dot.ohio.gov
Project Description	Install Roundabout, Turn Lanes and restrict movements	Contact Phone	330-786-4940
Reference Number	Combined Existing Conditions	Date Performed	6/6/2024
Analyst	Michael Craver	Analysis Year	2025
Agency/Company	ODOT District 4		

Project Costs Only Cash Flows By Countermeasure Per Year



Return on Investment (Safety Benefits and Project Investments)



First year to observe a positive return on investiment: 2041 (16 years)

Percentage of Service Life to observe a continuous Positive Return on Investment: 25.00%

EMH&T

Engineers, Surveyors, Planners, Scientists

APPENDIX H

Conceptual Design of Improvements

PORTAGE 14

MODEL: West Loop - Sheet PAPERSIZE: 34x22 (in.) DATE: 3/18/2025 TIME: 3:06:26 PM USER: jkoebel
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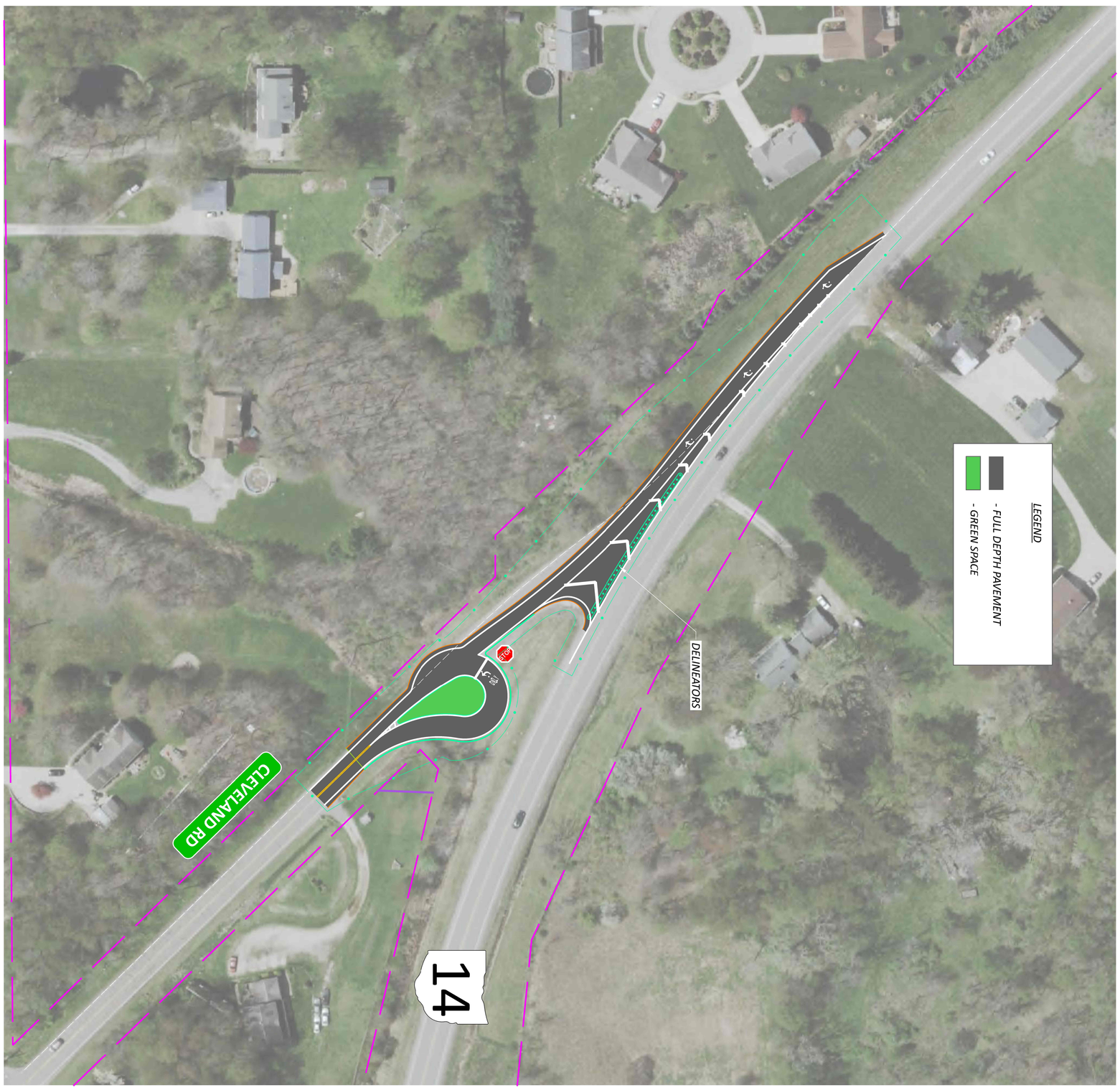

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HORIZONTAL SCALE IN FEET
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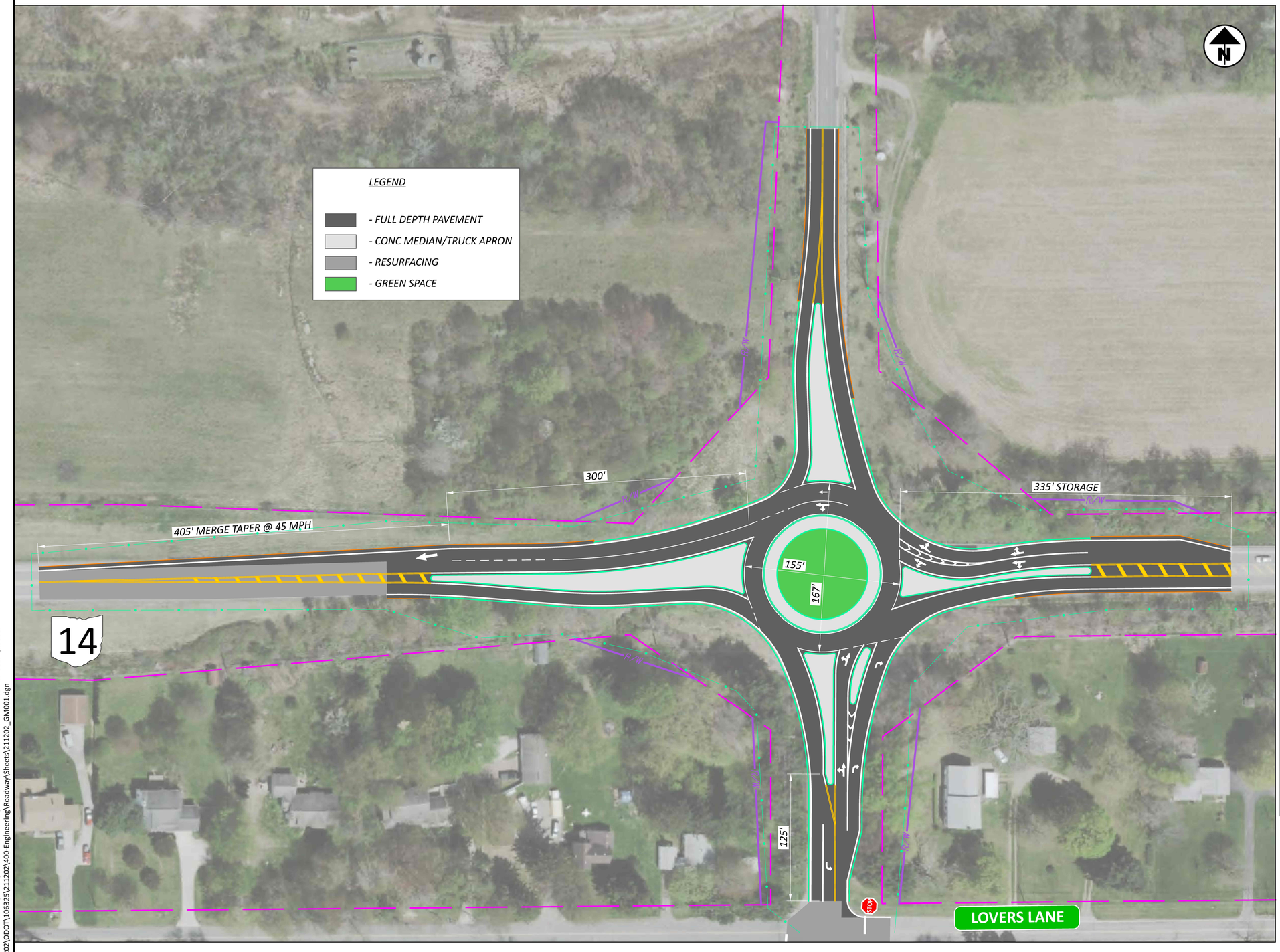
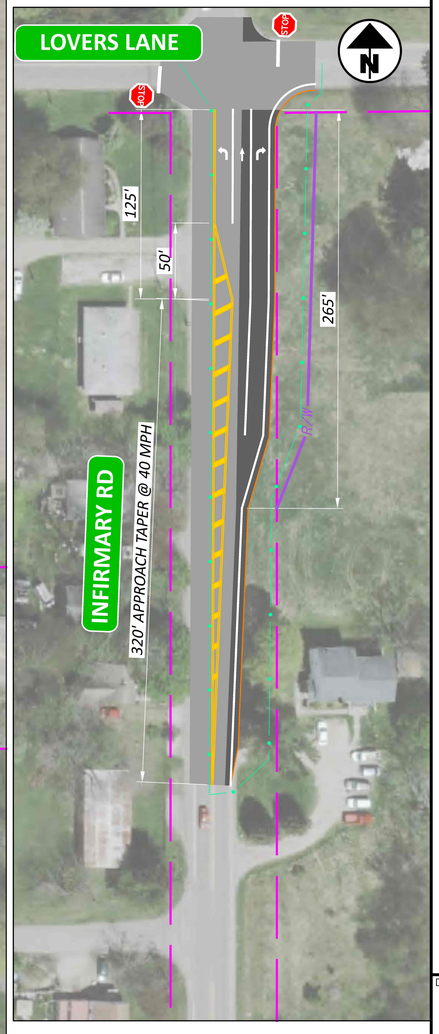
25 100

ROUNDABOUT VIEW



INFIRMARY RD SOUTH VIEW



HORIZONTAL SCALE IN FEET
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PRELIMINARY ROUNDABOUT EXHIBIT

PORTAGE 14

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DESIGN AGENCY
EMH&T

DESIGNER	XXX
REVIEWER	XXX MM-DD-YY
PROJECT ID	0
SHEET	P.0
TOTAL	0

PORTAGE 14

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SHEET	PROJECT ID	REVIEWER	DESIGNER	DESIGN AGENCY
P.0 / TOTAL 0	0	XXX MM-DD-YY	XXX	EMH&T

PRELIMINARY ROUNDABOUT EXHIBIT

HORIZONTAL SCALE IN FEET
0 100
50 200

EMH&T

Engineers, Surveyors, Planners, Scientists

APPENDIX I

Preliminary Opinion of Cost

POR-14

Preliminary Opinion of Construction Cost

March 14, 2025

Summary of Project Costs	Cul-de-sac	Roundabout	Turn Lane at Lovers Lane	POR-14 TOTALS
Roadway Subtotal	$ 109,580	$ 564,400	$ 83,360	$ 757,340
Sedimentation & Erosion Control Subtotal	$ 27,500	$ 140,000	$ 15,000	$ 182,500
Drainage Subtotal	$ 32,000	$ 268,000	$ 7,350	$ 307,350
Pavement Subtotal	$ 206,110	$ 1,163,110	$ 112,270	$ 1,481,490
Maintenance of Traffic Subtotal	$ -	$ 200,000	$ -	$ 200,000
Lighting Subtotal	$ -	$ 104,400	$ -	$ 104,400
Traffic Control Subtotal	$ 5,000	$ 50,000	$ 5,000	$ 60,000
Miscellaneous Subtotal		$ 187,000	$ -	$ 187,000
2025 Preliminary Opinion of Construction Cost Total	$380,190	$2,676,910	$222,980	$3,280,080
Contingency (30%)	$115,000	$804,000	$67,000	$986,000
Inflation, assuming mid 2029 Construction (19.3%)	$96,000	$672,000	$56,000	$824,000
Right-of-Way Subtotal	$1,100	$11,500	$2,400	$15,000
Right-of-Way Services				$45,000
Preliminary Opinion of Construction Cost including Contingency	**$592,290**	**$4,164,410**	**$348,380**	**$5,150,080**

Notes & Clarifications

Estimate does not include, Reimbursement to Private Utilities, Design, and Construction Engineering.

Estimate does not include irrigation.

Estimate does not include underground relocation of overhead private utilities.

ROW costs were provided by ODOT District 4

Pricing reflects probable construction costs obtainable in the project locality on the date of this opinion. Unit rates have been obtained from historical records and/or discussion with contractors. The unit rates reflect current bid costs in the area. This is an opinion of fair market value for the construction of this project. It is not a prediction of low bid. Pricing assumes competitive bidding for every portion of the construction work for all subcontractors and general contractors. Experience indicates that a fewer number of bidders may result in higher bids, conversely an increased number of bidders may result in more competitive bids.

Since EMH&T has no control over the cost of labor, material, equipment, or over the contractor's method of determining prices, or over the competitive bidding or market conditions at the time of bid, the cost opinon is based on industry practice, professional experience and qualifications, and represents EMH&T's best judgment as a consultant familiar with the construction industry. EMH&T does not guarantee that the proposals, bids, or the construction cost will not vary from opinions of probable cost prepared by them.