



DRAFT

TMACOG Region Roundabout Report

July 2023

Prepared by:

TOLEDO METROPOLITAN AREA COUNCIL OF GOVERNMENTS

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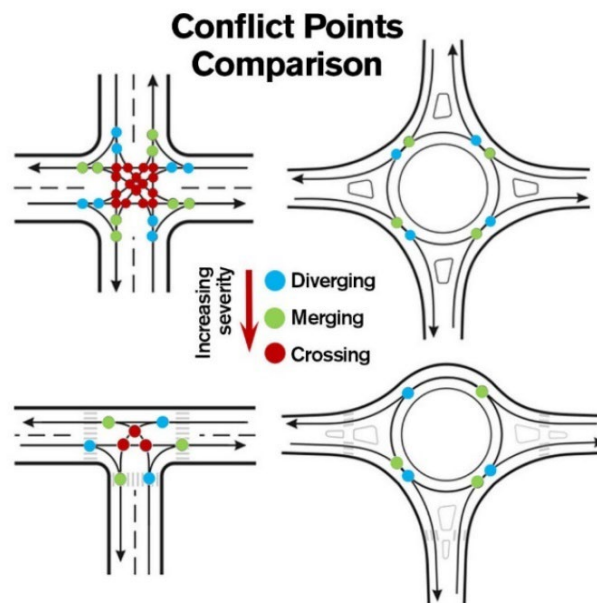
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Appendix A: Supporting Data for All Roundabout Locations

INTRODUCTION

The area for this report is the TMACOG metropolitan planning area. That includes all of Lucas and Wood counties in northwest Ohio and the three southernmost townships in Monroe County, Michigan. In the past 20 years, roundabouts have become increasingly popular in the TMACOG region. There are currently 55 constructed roundabouts. In the next few years, at least another 20 are planned for construction. This report evaluates the pre- and post-construction statistics of those 55 roundabouts. **Map 1** shows the locations of all the currently constructed and planned roundabouts. **Appendix A** shows a list of the supporting data for all roundabout locations.

Roundabouts have many benefits, including improved traffic flow, reduced vehicle emissions, traffic calming, less fuel consumption, and improved safety for drivers and pedestrians. This report will focus mostly on the safety improvements of roundabouts. Keep in mind that not all studied roundabouts were constructed strictly for an increased safety benefit. The metrics studied in this report are crash frequency, crash severity, injury percentage (percent of crashes at a location that involved an injury or fatality), and cost of crashes (a measurement that assigns a dollar value to each of the five crash severities). Many studies have proven that roundabouts are nearly always a safer option. Generally, when most roundabouts are built, the severity of crashes that happen at that intersection are reduced. However, the number of crashes sometimes remain the same or may even go up. The graphic below shows the conflict points of a normal intersection (32 possible conflicts) versus what happens at a roundabout (8 possible conflicts).



This report will demonstrate that sometimes crash frequency may go up, especially in the years directly after being constructed. One downside of roundabouts is that they take some time to get used to. Driver uncertainty and confusion about roundabout rules often cause crashes at newly installed roundabouts. In subsequent years the number of crashes usually subsides, and the crash severity will also continue to decrease.

METRICS USED

The first metric used to analyze the crash data was total crashes and crashes per year. This shows how frequently crashes occur at a location.

The second metric used in this report was severity or EPDO (Equivalent Property Damage Only). The EPDO rate is a measure that is based upon the cost ratio of fatal and injury crashes as compared to property damage only (PDO) crashes. ODOT provides calculations for these ratios that they use each year. The listed ratios used for this report are:

- 1.0 for each PDO crash
- 4.44 for each possibly injury crash
- 6.55 for each non-incapacitating injury crash
- 17.41 for each incapacitating injury crash
- 194.63 for each incapacitating fatal crash

The EPDO is calculated by taking the number of PDO crashes and multiplying them by 1.0; then multiplying any possible injury crashes by 4.44; then multiplying the number of non-incapacitating injury crashes by 6.55; then multiplying the number of incapacitating injury crashes by 17.41; and finally multiplying the number of fatal crashes by 194.63. Then sum up all these values and divide them by the number of crashes at the location. So, the higher the number the worse the severity is at a location.

The third metric used in this report was injury percent. This data is determined by summing all the different types of injury crashes as well as fatal crashes and then dividing them by the total number of crashes. Injury percent is one of the metrics that is often used by ODOT to determine if a location should be studied for possible improvements.

The fourth and final metric used to analyze the crash data in this report was the annual cost of crashes. For this report, the total cost of each type of crash severity was assigned based on a Federal Highway Administration report. These figures were added together to come up with an annual cost of crashes at a location. For this report, the cost used for each crash are:

- \$12,614 for each PDO crash
- \$133,136 for each possibly injury crash
- \$210,410 for each non-incapacitating injury crash
- \$694,300 for each incapacitating injury crash
- \$11,973,124 for each incapacitating fatal crash

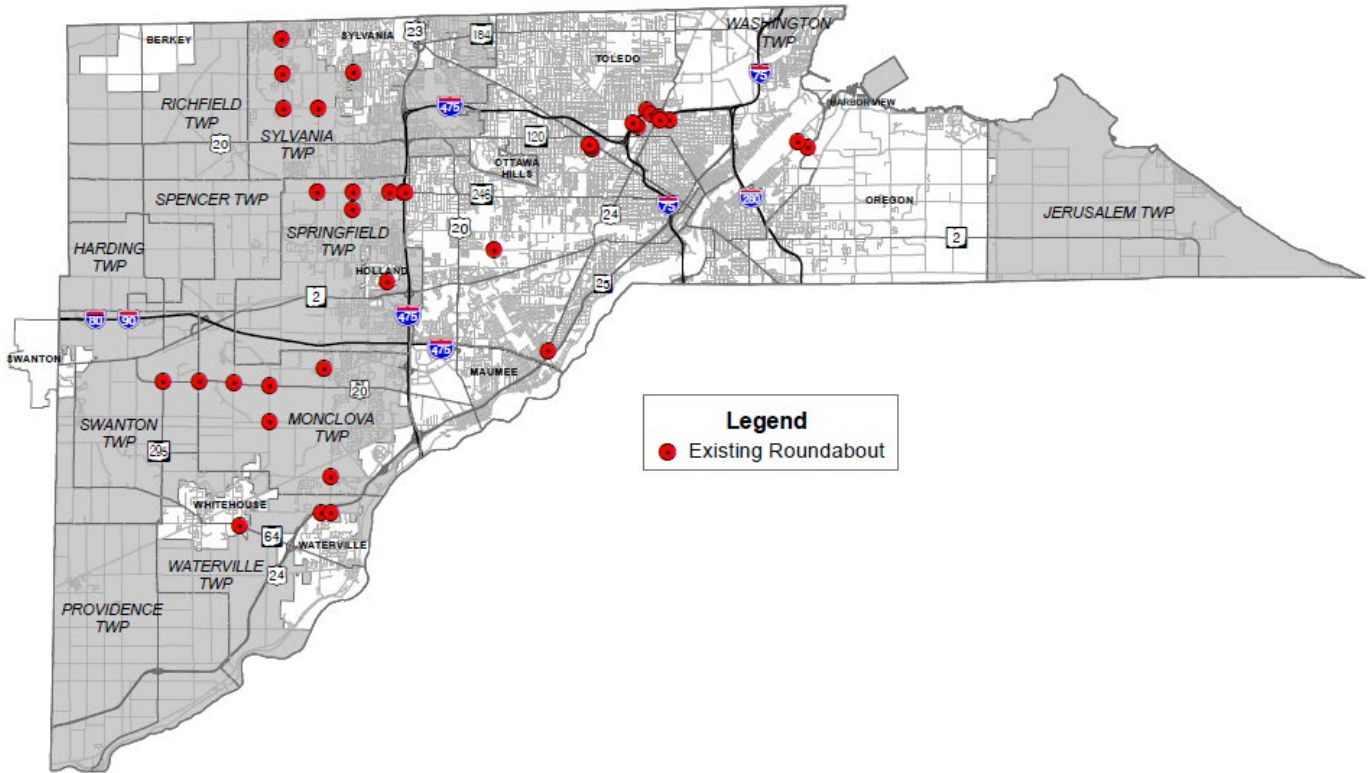
LOCATION COMPARISONS

All 55 roundabouts are grouped by region. Within each region, they are in order from the oldest roundabout constructed to the most recent. For each roundabout a brief analysis was written of the pre- and post-construction time frames. There will be data missing for some of the locations due to either being too new or being a completely new intersection. Pre- and post-construction photos are also included when available. Each location is concluded with a comparison table listing the construction metrics of interest used as well as what kind of crashes happened before and after.

Map 1: Roundabouts in the TMACOG Region

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LUCAS COUNTY

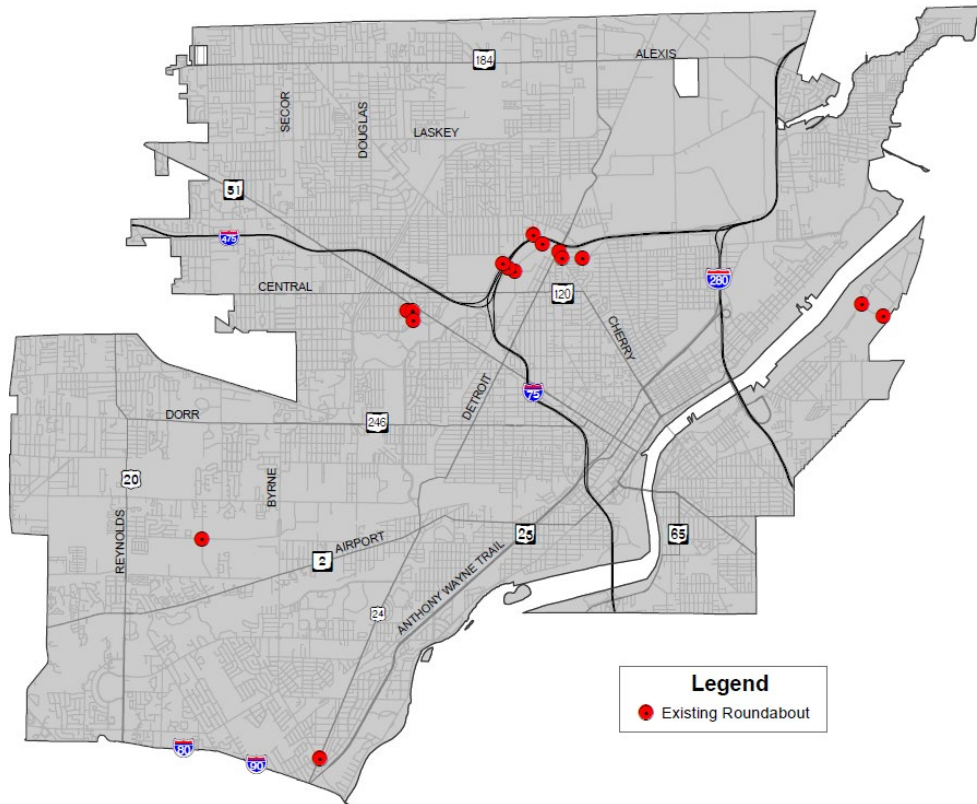


There are a total of 38 roundabouts in Lucas County. Within Lucas County there are 10 jurisdictions that have at least 1 roundabout. In the followings pages of this report there is a map of each of the jurisdictions and a synopsis of the roundabouts that are in each jurisdiction as well as before and after data for each.

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CITY OF TOLEDO

Roundabout Locations in the City of Toledo



Currently in the City of Toledo, there are 15 roundabouts and at least one planned roundabout. The first two roundabouts in the city were completed in 2015 with the last one being constructed in 2019.

Most of the roundabouts within the city are grouped together. This helps to make the drive through some non-typical intersections smoother. Not all of these were built with safety as the main factor.

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BERDAN AVE. @ CHERRY ST. @ DETROIT AVE. (US 24)

City of Toledo – Constructed in 2015

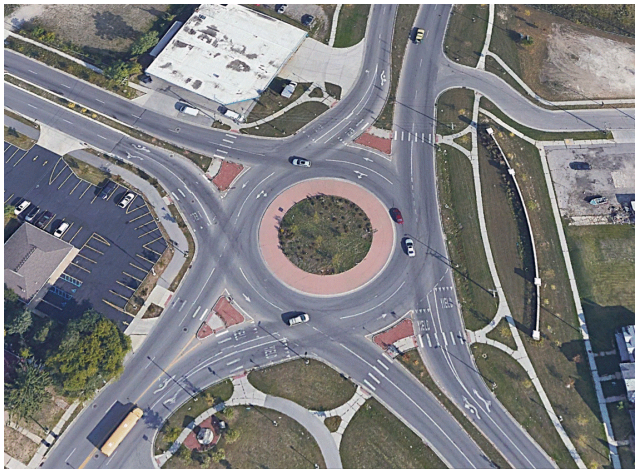


Pre-Construction



Prior to roundabout construction, this location was an urban abnormal 4-way stop-light controlled intersection and another 3-way stop light-controlled intersection. For the 3-year period from 2011 to 2013, there were a total of 30 crashes. During this time, 30% of the crash types were injury crashes. The crash severity rating for this time was 3.04. The annual cost of crashes per year at this location was \$913,331.

Post-Construction



This roundabout opened in 2015. For the 3-year period from 2016 to 2018, there has been an abnormal increase in crashes, totaling 258. Although the crashes have gone up significantly, the severity has decreased by 44.4% and the percent injury has gone down 14.9%. The annual cost of crashes per year at this location is now \$3,257,521 which is a 257% increase.

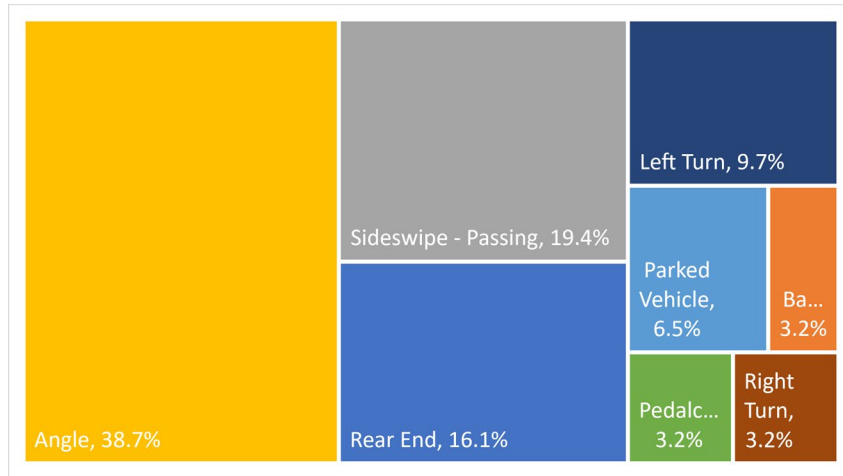
Summary

The data shows that the total number of crashes has drastically increased. This may be because it is a 2-lane roundabout as well as being a part of a larger network of five roundabouts. While the total number is very high, it is to be noted that the severity and percent injury numbers have gone down. Since this roundabout was performing poorly, the City of Toledo has made some modifications to alleviate the high number of crashes happening post-construction.

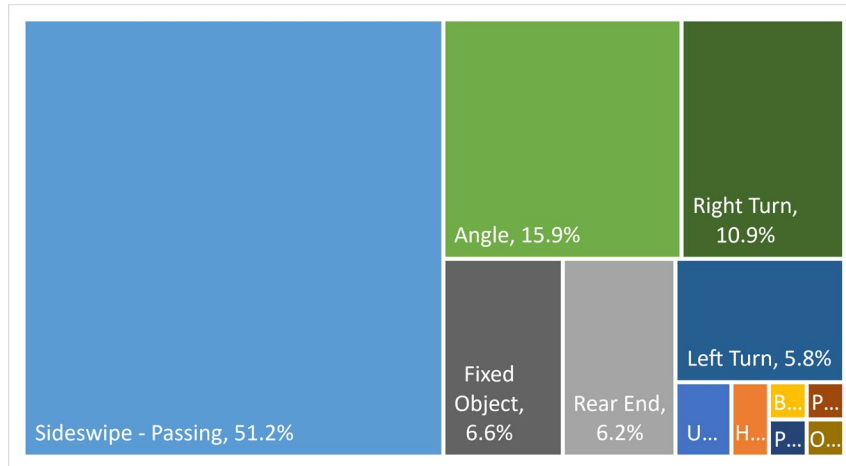
Berdan Ave. @ Cherry St. @ Detroit Ave. – Annual Crash Statistics

<i>Data</i>	<i>3 Years Pre-Construction</i>	<i>3 Years Post-Construction</i>	<i>% Change</i>	<i>All Years Post-Construction</i>
Dates	2011-2013	2016-2018	N/A	2016-2022
Configuration	Two Stop Light Intersections	4-Leg Roundabout	N/A	4-Leg Roundabout
Total Crashes	30	258	760.0%	502
Crashes Per Year	10	86	760.0%	71.71
Fatal Crashes	0	0	0.0%	0
Serious Injury Crashes	2	2	0.0%	3
Minor Injury Crashes	2	9	350.0%	24
Possible Injury Crashes	5	28	460.0%	48
PDO Crashes	21	219	942.9%	427
Severity	3.04	1.69	-44.4%	1.69
Percent Injury	30.0%	15.1%	-14.9%	14.9%

Berdan Ave. @ Cherry St. @ Detroit Ave. – Crash Types for 3 Years Pre-Construction

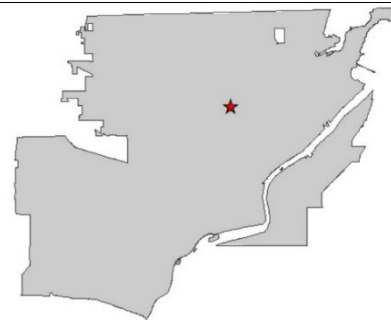


Berdan Ave. @ Cherry St. @ Detroit Ave. – Crash Types for 3 Years Post-Construction



CHERRY ST. @ MANHATTAN BLVD.

City of Toledo – Constructed in 2015



Pre-Construction



Prior to roundabout construction, this location was an urban abnormal 4-way intersection with stop light controls. For the 3-year period from 2017 to 2019, there were a total of 36 crashes with a severity rating of 3.35. During this time, 38.9% of the crash types were injury crashes. The annual cost of crashes per year at this location was \$1,216,703.

Post-Construction



This roundabout opened in 2015. For the 3-year period from 2016 to 2018, there were a total of 31 crashes. The amount of angle crashes has decreased. Although the total number of crashes at this location has increased, the crash severity has decreased by 25.1%. The injury percent has gone down 11% also. The annual cost of crashes per year at this location is now \$978,733 which is a 20% reduction.

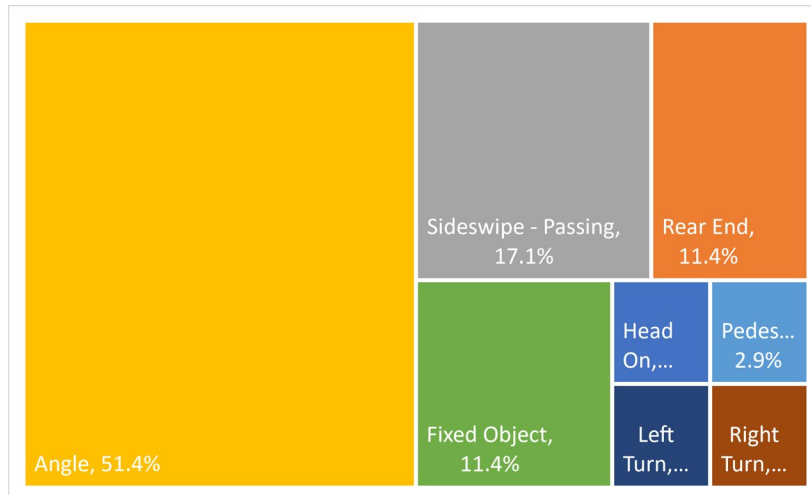
Summary

While the total number of crashes for this location did go up post-construction, much of that increase may be attributed to the newness of the roundabout as well as the relative closeness to many other roundabouts. Also, 2-lane roundabouts tend to have a higher crash rate right after construction. Going three years beyond post-construction, the severity and percent injury have continued to decrease.

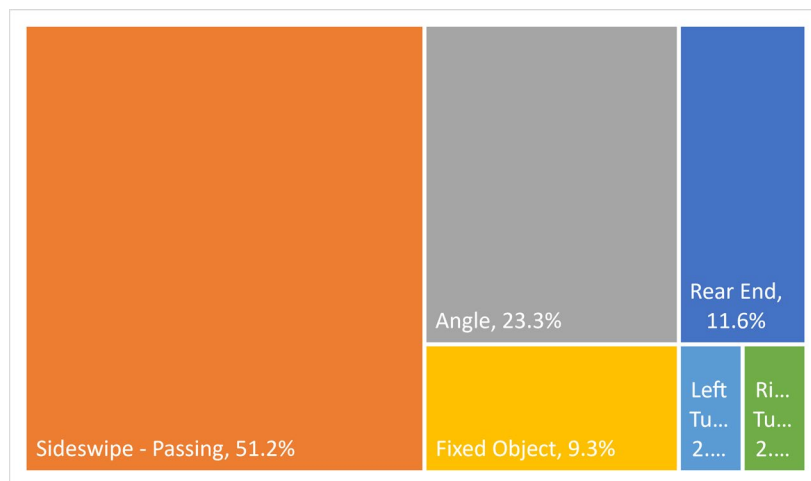
Cherry St. @ Manhattan Blvd. – Annual Crash Statistics

<i>Data</i>	<i>3 Years Pre-Construction</i>	<i>3 Years Post-Construction</i>	<i>% Change</i>	<i>All Years Post-Construction</i>
Dates	2011-2013	2016-2018	N/A	2016-2022
Configuration	No Stop Intersection	3-Leg Roundabout	N/A	3-Leg Roundabout
Total Crashes	36	43	19.4%	132
Crashes Per Year	12	14.33	19.4%	18.86
Fatal Crashes	0	0	0.0%	0
Serious Injury Crashes	2	1	-50.0%	2
Minor Injury Crashes	5	5	0.0%	10
Possible Injury Crashes	7	6	-14.3%	19
PDO Crashes	22	31	40.9%	101
Severity	3.35	2.51	-25.1%	2.16
Percent Injury	38.9%	27.9%	-11.0%	23.5%

Cherry St. @ Manhattan Blvd. – Crash Types for 3 Years Pre-Construction



Cherry St. @ Manhattan Blvd. – Crash Types for 3 Years Post-Construction



PROMEDICA PKWY. @ TOLEDO HOSPITAL

City of Toledo – Constructed in 2016



Pre-Construction

No Image Available

Prior to roundabout construction, this intersection did not exist. There is no previous crash data to compare to.

Post-Construction



This roundabout opened in 2016. For the 3-year period from 2017 to 2019, there has been one crash. The severity for this location is 1.0 and the injury percent is 0%. The annual cost of crashes per year at this location is \$4,205.

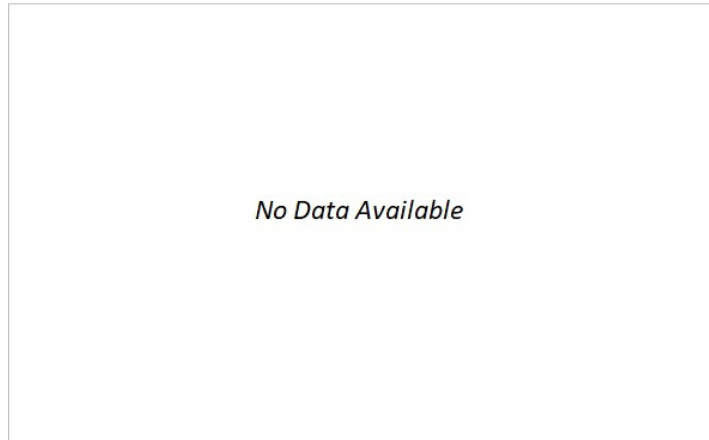
Summary

This roundabout was constructed to improve traffic flow around the updated Toledo Hospital campus. The data shows that there has been very few crashes at this location in the three years post-construction. In fact, in the seven years since construction was completed, there has only been one crash.

ProMedica Pkwy. @ Toledo Hospital – Annual Crash Statistics

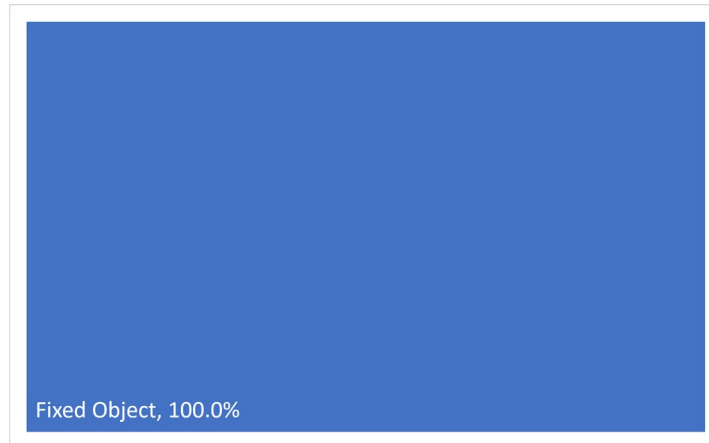
<i>Data</i>	<i>3 Years Pre-Construction</i>	<i>3 Years Post-Construction</i>	<i>% Change</i>	<i>All Years Post-Construction</i>
<i>Dates</i>	<i>N/A</i>	<i>2017-2019</i>	<i>N/A</i>	<i>2017-2022</i>
<i>Configuration</i>	<i>N/A</i>	<i>3-Leg Roundabout</i>	<i>N/A</i>	<i>3-Leg Roundabout</i>
<i>Total Crashes</i>	<i>N/A</i>	<i>1</i>	<i>N/A</i>	<i>1</i>
<i>Crashes Per Year</i>	<i>N/A</i>	<i>0.33</i>	<i>N/A</i>	<i>0.17</i>
<i>Fatal Crashes</i>	<i>N/A</i>	<i>0</i>	<i>N/A</i>	<i>0</i>
<i>Serious Injury Crashes</i>	<i>N/A</i>	<i>0</i>	<i>N/A</i>	<i>0</i>
<i>Minor Injury Crashes</i>	<i>N/A</i>	<i>0</i>	<i>N/A</i>	<i>0</i>
<i>Possible Injury Crashes</i>	<i>N/A</i>	<i>0</i>	<i>N/A</i>	<i>0</i>
<i>PDO Crashes</i>	<i>N/A</i>	<i>1</i>	<i>N/A</i>	<i>1</i>
<i>Severity</i>	<i>N/A</i>	<i>1.00</i>	<i>N/A</i>	<i>1.00</i>
<i>Percent Injury</i>	<i>N/A</i>	<i>0.0%</i>	<i>N/A</i>	<i>0.0%</i>

ProMedica Pkwy. @ Toledo Hospital – Crash Types for 3 Years Pre-Construction



This is new construction, no prior data available.

ProMedica Pkwy. @ Toledo Hospital – Crash Types for 3 Years Post-Construction



TOLEDO HOSPITAL ENTRANCE B

City of Toledo – Constructed in 2016



Pre-Construction



Prior to roundabout construction this location was an urban 3-leg 1-stop intersection. For the 3-year period from 2013 to 2015 there were no crashes and thus the severity rating was 0.0. Since there were no crashes during this time the annual cost of crashes per year for the crashes at this location was \$0.

Post-Construction



This roundabout opened in 2016. For the 3-year period from 2017 to 2019 there was a total of 1 crash. There were no injury crashes, so the severity rating is 1.0. The annual cost of crashes per year for the crashes at this location is now \$4,205 which.

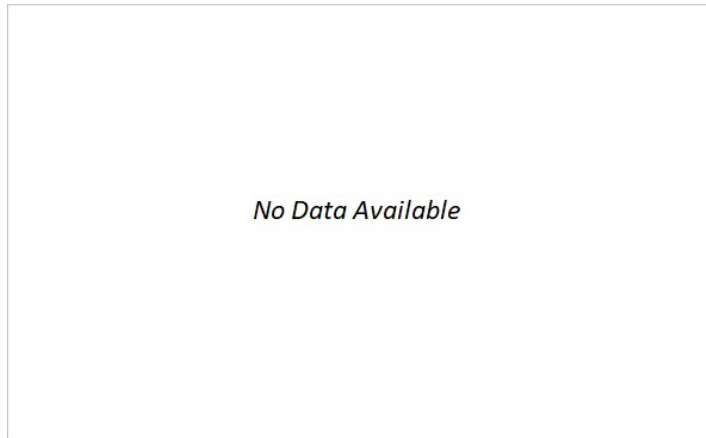
Summary

This roundabout was constructed to improve traffic flow around the updated Toledo Hospital campus as well as easier pedestrian use. Prior to roundabout construction this roadway had a much different design and no crashes. The addition of the roundabout has continued to result in no crashes.

Toledo Hospital Entrance B – Annual Crash Statistics

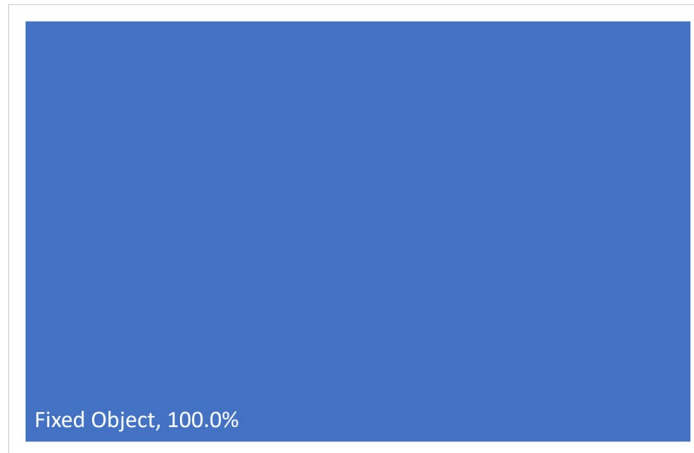
<i>Data</i>	<i>3 Years Pre-Construction</i>	<i>3 Years Post-Construction</i>	<i>% Change</i>	<i>All Years Post-Construction</i>
Dates	2013-2015	2017-2019	N/A	2017-2022
Configuration	3-Leg 1-Stop Intersection	4-Leg Roundabout	N/A	4-Leg Roundabout
Total Crashes	0	0	0.0%	0
Crashes Per Year	0	0	0.0%	0
Fatal Crashes	0	0	0.0%	0
Serious Injury Crashes	0	0	0.0%	0
Minor Injury Crashes	0	0	0.0%	0
Possible Injury Crashes	0	0	N/A	0
PDO Crashes	0	0	0.0%	0
Severity	0.00	0.00	N/A	0.00
Percent Injury	0.0%	0.0%	0.0%	0.0%

Toledo Hospital Entrance B – Crash Types for 3 Years Pre-Construction*



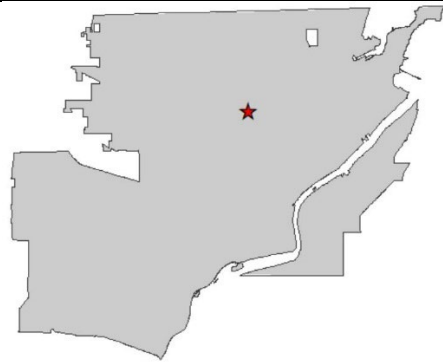
*There were no crashes for the 3 years prior to construction.

Figure 9: Toledo Hospital Entrance B – Crash Types for 3 Years Post-Construction



BERDAN AVE. @ JEEP PKWY.

City of Toledo – Constructed in 2017



Pre-Construction



Prior to roundabout construction this location an urban stop-light controlled T-intersection. For the 3-year period from 2014 to 2016 there were a total of 24 crashes. During this time period nearly 17% of the crashes were an injury crash. The crash severity rating for this time period was 1.57 and the annual cost of crashes per year for the crashes at this location was \$261,608.

Post-Construction



This roundabout opened in 2019. For the 3-year period from 2020 to 2022 there have been a total of 31 crashes. The severity rating at this location has gone up to 1.88, however the injury percentage has gone down to 11.4%. The annual cost of crashes per year for the crashes at this location is now \$564,430 which is a 109% increase.

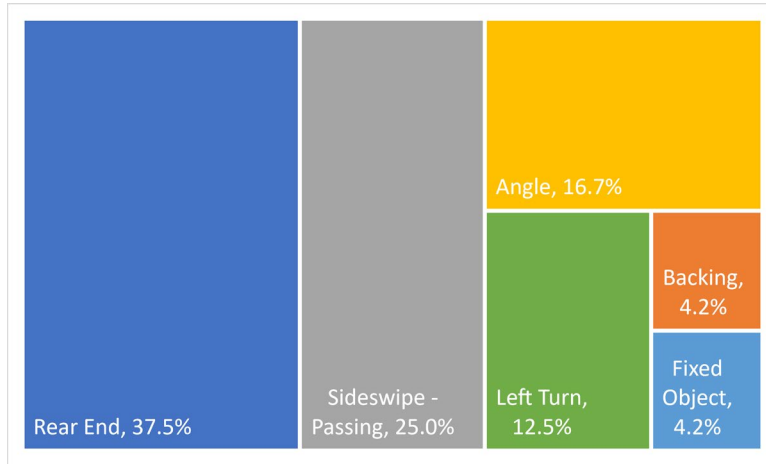
Summary

While some of the numbers for this location did go up post-construction, much of that increase may be attributed to the newness of the roundabout as well as the relative closeness to many other roundabouts. Also 2-lane roundabouts tend to have a higher crash rate right after construction. Going beyond the 3-years post-construction the severity has slightly increased.

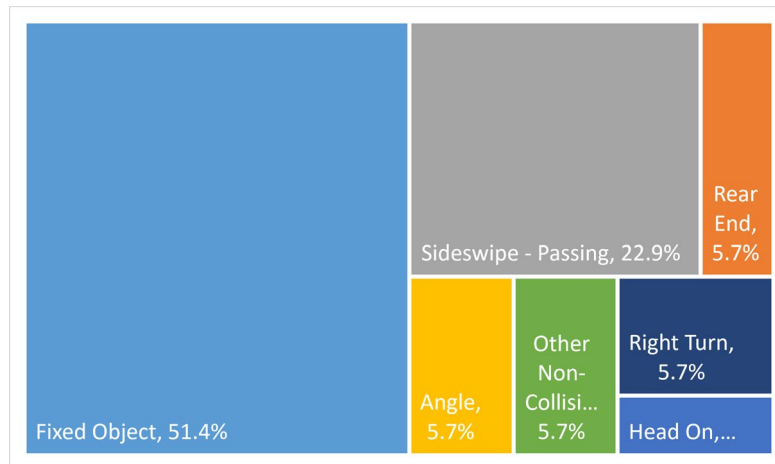
Berdan Ave. @ Jeep Pkwy. – Annual Crash Statistics

<i>Data</i>	<i>3 Years Pre-Construction</i>	<i>3 Years Post-Construction</i>	<i>% Change</i>	<i>All Years Post-Construction</i>
Dates	2014-2016	2018-2020	N/A	2018-2022
Configuration	3-way Stop Light	3-Leg Roundabout	N/A	3-Leg Roundabout
Total Crashes	24	35	45.8%	56
Crashes Per Year	8	11.67	45.9%	11.2
Fatal Crashes	0	0	0.0%	0
Serious Injury Crashes	0	1	N/A	1
Minor Injury Crashes	0	2	N/A	5
Possible Injury Crashes	4	1	-75.0%	2
PDO Crashes	20	31	55.0%	48
Severity	1.57	1.88	19.7%	1.91
Percent Injury	16.7%	11.4%	-5.3%	14.3%

Berdan Ave. @ Jeep Pkwy. – Crash Types for 3 Years Pre-Construction



Berdan Ave. @ Jeep Pkwy. – Crash Types for 3 Years Post-Construction



NORTH COVE BLVD. @ PROMEDICA PKWY.

City of Toledo – Constructed in 2017



Pre-Construction



Prior to roundabout construction this location was an urban 3-leg intersection with one stop sign. For the 3-year period from 2014 to 2016 there were a total of 6 crashes. During this time period 23.7% of the crashes were an injury crash. The crash severity rating for this time period was 2.5 and the annual cost of crashes per year for the crashes at this location was \$131,334.

Post-Construction



This roundabout opened in 2019. For the 3-year period from 2018 to 2020 there have been a total of 6 crashes. The severity rating has decreased 37.2%. The injury percent has decreased by 7% and the annual cost of crashes per year for the crashes at this location is now \$65,402 which is a 50% reduction.

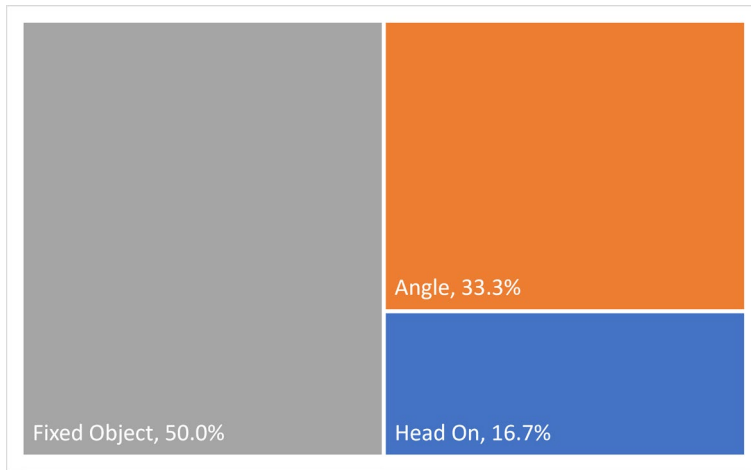
Summary

As shown from the crash data on the following page, the number of crashes has remained the same post-construction. However, the severity and percent injury has decreased. In the 2 additional years of crash data the severity has gone up a tick due to one crash that had an improper U-turn in the middle of the road.

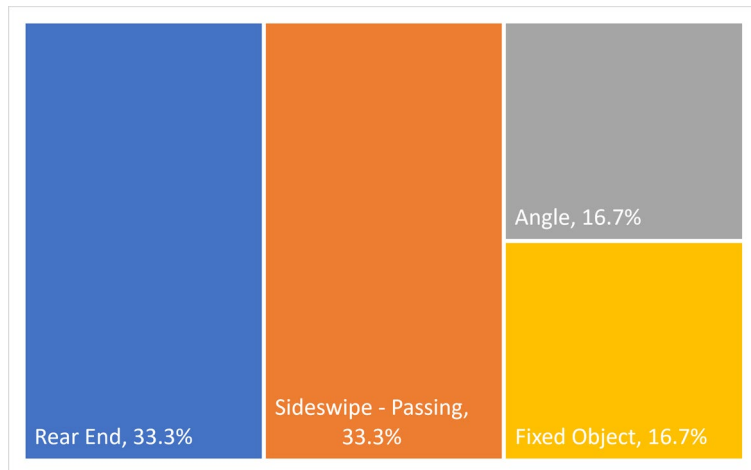
North Cove Blvd. @ ProMedica Pkwy. – Annual Crash Statistics

<i>Data</i>	<i>3 Years Pre-Construction</i>	<i>3 Years Post-Construction</i>	<i>% Change</i>	<i>All Years Post-Construction</i>
Dates	2014-2016	2018-2020	N/A	2018-2022
Configuration	3-Leg 1-Stop Intersection	3-Leg Roundabout	N/A	3-Leg Roundabout
Total Crashes	6	6	0.0%	9
Crashes Per Year	2	2	0.0%	1.8
Fatal Crashes	0	0	0.0%	0
Serious Injury Crashes	0	0	0.0%	0
Minor Injury Crashes	1	0	N/A	1
Possible Injury Crashes	1	1	0.0%	1
PDO Crashes	4	5	25.0%	7
Severity	2.50	1.57	-37.2%	2.00
Percent Injury	23.7%	16.7%	-7.0%	22.2%

North Cove Blvd. @ ProMedica Pkwy. – Crash Types for 3 Years Pre-Construction

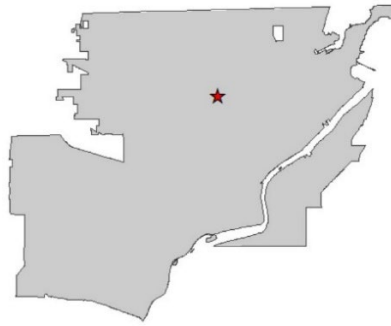


North Cove Blvd. @ ProMedica Pkwy. – Crash Types for 3 Years Post-Construction



BERDAN AVE. @ HAVERHILL DR.

City of Toledo – Constructed in 2018



Pre-Construction



Prior to roundabout construction this location was an abnormal 4-Way stop-light controlled intersection. For the 3-year period from 2015 to 2017 there were a total of 17 crashes. The majority of these crashes were rear end crashes. During this time period the injury percent at this location was 5.9%. The crash severity rating for this time period was 1.33 and the annual cost of crashes per year for the crashes at this location was \$137,411.

Post-Construction



This roundabout opened in 2018. For the 3-year period from 2019 to 2021 there were a total of 28 crashes. With the complexity of this roundabout and other roundabouts in the area, crashes and severity have increased for this location. The annual cost of crashes per year for the crashes at this location is now \$487,565 which is a 255% increase.

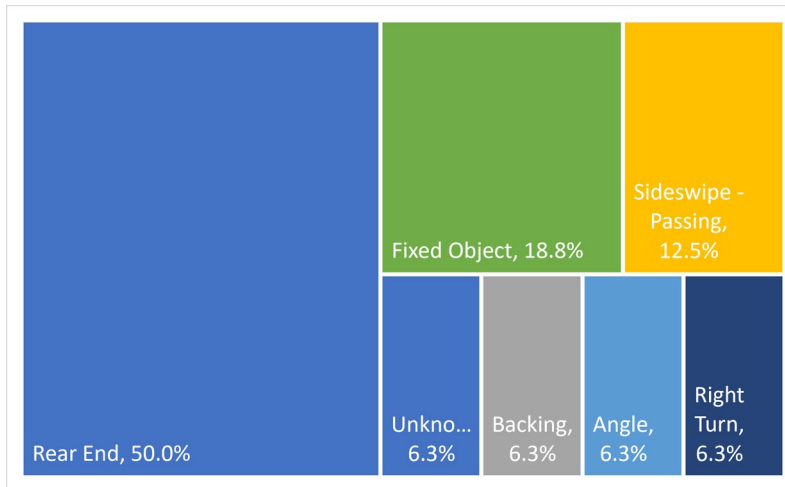
Summary

While the numbers for this location did increase post-construction, much of that increase may be attributed to the newness of the roundabout as well as the relative closeness to many other roundabouts. Also 2-lane roundabouts tend to have a higher crash rate right after construction. Going beyond the 3-years post-construction the severity and percent injury has decreased.

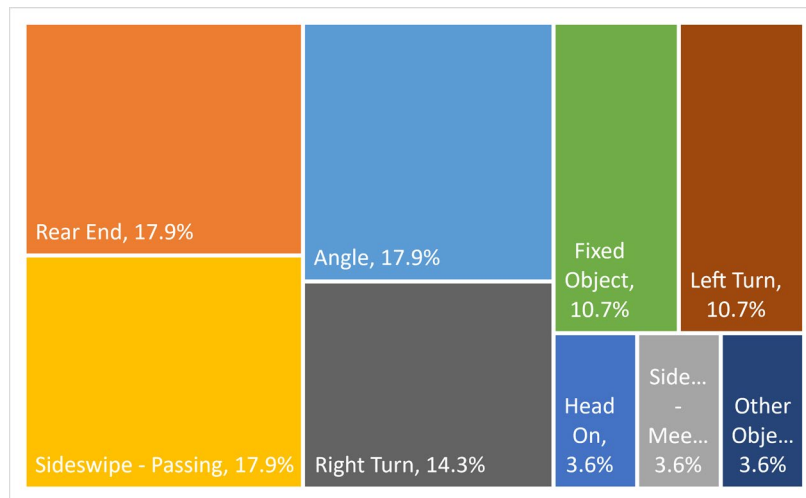
Berdan Ave. @ Haverhill Dr. – Annual Crash Statistics

<i>Data</i>	<i>3 Years Pre-Construction</i>	<i>3 Years Post-Construction</i>	<i>% Change</i>	<i>All Years Post-Construction</i>
Dates	2015-2017	2019-2021	N/A	2019-2022
Configuration	<i>Skewed 4-way Stop Light</i>	<i>3-Leg Roundabout</i>	N/A	<i>3-Leg Roundabout</i>
Total Crashes	17	28	64.7%	34
Crashes Per Year	5.67	9.33	64.6%	8.5
Fatal Crashes	0	0	0.0%	0
Serious Injury Crashes	0	0	0.0%	0
Minor Injury Crashes	1	5	400.0%	5
Possible Injury Crashes	0	1	N/A	1
PDO Crashes	16	22	37.5%	28
Severity	1.33	2.11	58.6%	1.92
Percent Injury	5.9%	21.4%	15.5%	17.6%

Berdan Ave. @ Haverhill Dr. – Crash Types for 3 Years Pre-Construction

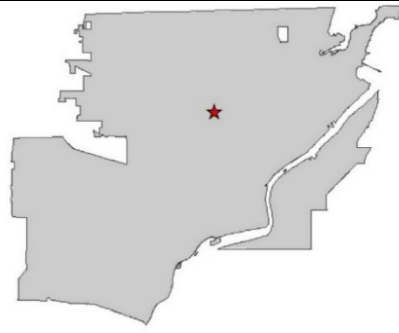


Berdan Ave. @ Haverhill Dr. – Crash Types for 3 Years Post-Construction



I-75 NB RAMPS @ WILLYS PKWY.

City of Toledo – Constructed in 2018



Pre-Construction



This intersection was right next to the former Jeep plant and had a much different design and was closed in the 3-year period prior to its opening and thus there is no pre-construction data.

Post-Construction



This roundabout opened in 2018. For the 3-year period from 2019 to 2021 there was a total of 3 crashes. The severity rating for this location was 2.85 and the injury percentage was 33.3%. The annual cost of crashes per year for the crashes at this location is \$161,297.

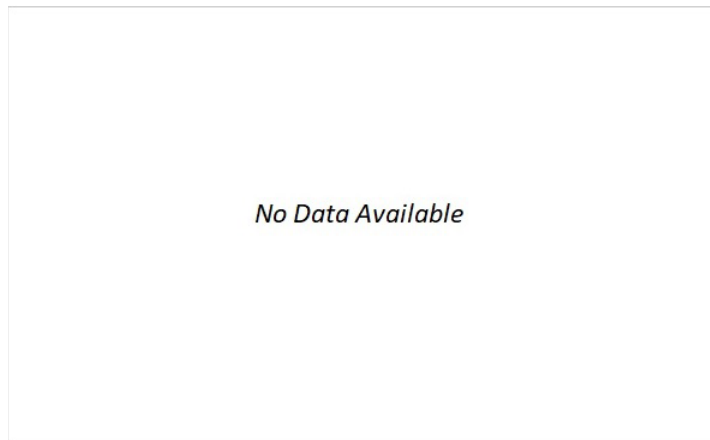
Summary

This roundabout is a location where the design was much different prior to construction and was closed for a nearly 4 years. Post-construction there have been only a few crashes and only one minor injury crash.

I-75 NB Ramps @ Willys Pkwy. – Annual Crash Statistics

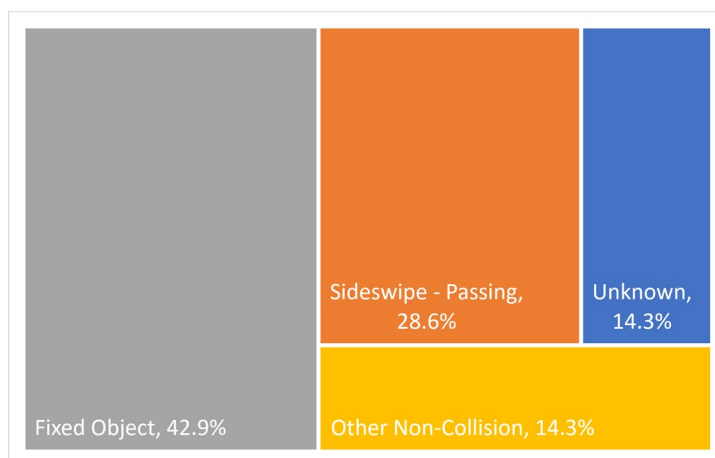
<i>Data</i>	<i>3 Years Pre-Construction</i>	<i>3 Years Post-Construction</i>	<i>% Change</i>	<i>All Years Post-Construction</i>
<i>Dates</i>	<i>N/A</i>	<i>2019-2021</i>	<i>N/A</i>	<i>2019-2022</i>
<i>Configuration</i>	<i>N/A</i>	<i>4-Leg Roundabout</i>	<i>N/A</i>	<i>4-Leg Roundabout</i>
<i>Total Crashes</i>	<i>N/A</i>	<i>3</i>	<i>N/A</i>	<i>3</i>
<i>Crashes Per Year</i>	<i>N/A</i>	<i>1</i>	<i>N/A</i>	<i>0.75</i>
<i>Fatal Crashes</i>	<i>N/A</i>	<i>0</i>	<i>N/A</i>	<i>0</i>
<i>Serious Injury Crashes</i>	<i>N/A</i>	<i>0</i>	<i>N/A</i>	<i>0</i>
<i>Minor Injury Crashes</i>	<i>N/A</i>	<i>1</i>	<i>N/A</i>	<i>1</i>
<i>Possible Injury Crashes</i>	<i>N/A</i>	<i>0</i>	<i>N/A</i>	<i>0</i>
<i>PDO Crashes</i>	<i>N/A</i>	<i>2</i>	<i>N/A</i>	<i>2</i>
<i>Severity</i>	<i>N/A</i>	<i>2.85</i>	<i>N/A</i>	<i>2.85</i>
<i>Percent Injury</i>	<i>N/A</i>	<i>33.3%</i>	<i>N/A</i>	<i>33.3%</i>

I-75 NB Ramps @ Willys Pkwy. – Crash Types for 3 Years Pre-Construction



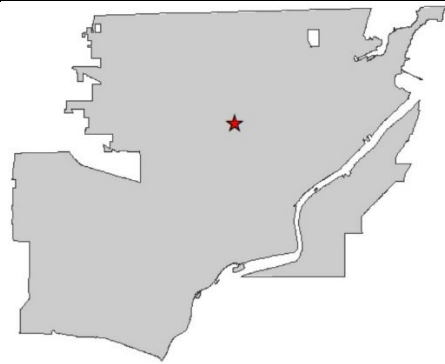
This intersection was a completely new intersection and thus there is no pre-construction data.

I-75 NB Ramps @ Willys Pkwy. – Crash Types for 3 Years Post-Construction

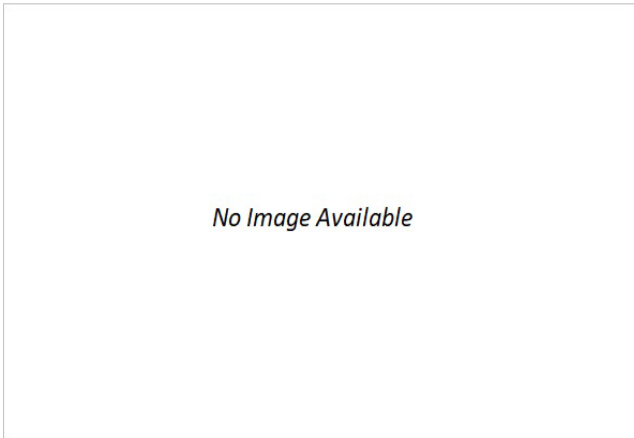


I-75 SB RAMPS @ WILLYS PKWY

City of Toledo – Constructed in 2018



Pre-Construction



This intersection was a completely new intersection and thus there is no pre-construction data.

Post-Construction



This roundabout opened in 2018. For the 3-year period from 2019 to 2021 there was a total of 7 crashes. The severity rating for this location was 2.59 and the injury percentage was 33.3%. The annual cost of crashes per year for the crashes at this location is \$78,546.

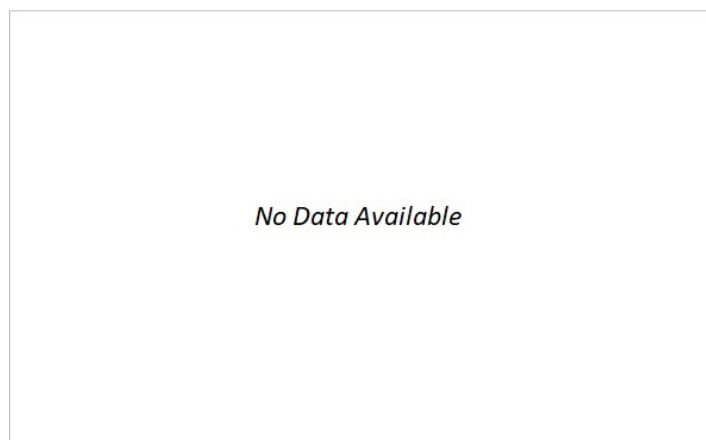
Summary

This roundabout location is new just like the previous location at I-75 NB Ramps and Willys Pkwy. The number of crashes is a bit higher here and may be due to the newness of a roundabout just off I-75. However, the number of crashes is still quite low at this location.

I-75 SB Ramps @ Willys Pkwy. – Annual Crash Statistics

<i>Data</i>	<i>3 Years Pre-Construction</i>	<i>3 Years Post-Construction</i>	<i>% Change</i>	<i>All Years Post-Construction</i>
Dates	2015-2017	2019-2021	N/A	2019-2022
Configuration	N/A	4-Leg Roundabout	N/A	4-Leg Roundabout
Total Crashes	N/A	7	N/A	7
Crashes Per Year	N/A	2.33	N/A	1.75
Fatal Crashes	N/A	0	N/A	0
Serious Injury Crashes	N/A	0	N/A	0
Minor Injury Crashes	N/A	2	N/A	2
Possible Injury Crashes	N/A	0	N/A	0
PDO Crashes	N/A	5	N/A	5
Severity	N/A	2.59	N/A	2.59
Percent Injury	N/A	28.6%	N/A	28.6%

I-75 SB Ramps @ Willys Pkwy. – Crash Types for 3 Years Pre-Construction



This intersection was a completely new intersection and thus there is no pre-construction data.

I-75 SB Ramps @ Willys Pkwy. – Crash Types for 3 Years Post-Construction



JEEP PKWY. @ WILLYS PKWY. @ WRANGLER DR.

City of Toledo – Constructed in 2018



Pre-Construction

No Image Available

Prior to roundabout construction this intersection did not exist and thus there is no previous crash data to compare to.

Post-Construction



This roundabout opened in 2018. For the 3-year period from 2019 to 2021 there have been a total of 12 crashes. The severity rating is 1.75 and the percent injury is 16.7%. The annual cost of crashes per year for the crashes at this location is \$156,562.

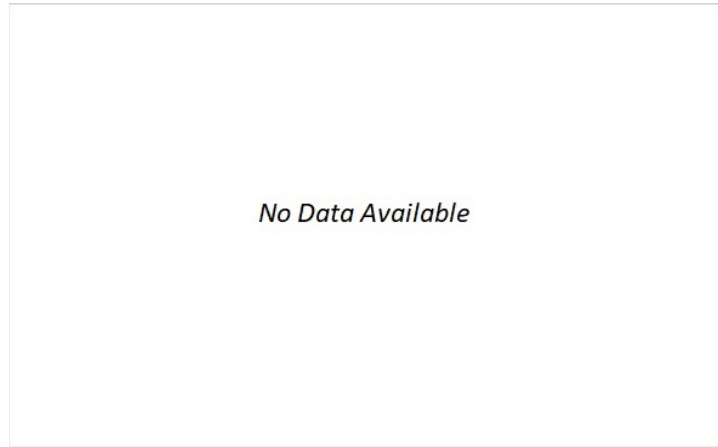
Summary

The location of this intersection did not exist before the construction of this roundabout. Post-construction has shown some crashes, but the severity and percent injury are low and these numbers continue to decrease beyond the 3 post-construction years.

Jeep Pkwy. @ Willys Pkwy. @ Wrangler Dr. – Annual Crash Statistics

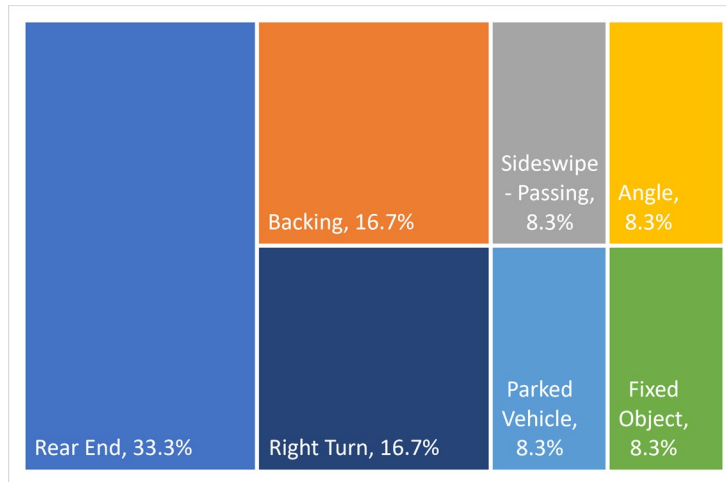
<i>Data</i>	<i>3 Years Pre-Construction</i>	<i>3 Years Post-Construction</i>	<i>% Change</i>	<i>All Years Post-Construction</i>
<i>Dates</i>	<i>N/A</i>	<i>2019-2021</i>	<i>N/A</i>	<i>2019-2022</i>
<i>Configuration</i>	<i>N/A</i>	<i>4-Leg Roundabout</i>	<i>N/A</i>	<i>4-Leg Roundabout</i>
<i>Total Crashes</i>	<i>N/A</i>	<i>12</i>	<i>N/A</i>	<i>15</i>
<i>Crashes Per Year</i>	<i>N/A</i>	<i>4</i>	<i>N/A</i>	<i>3.75</i>
<i>Fatal Crashes</i>	<i>N/A</i>	<i>0</i>	<i>N/A</i>	<i>0</i>
<i>Serious Injury Crashes</i>	<i>N/A</i>	<i>0</i>	<i>N/A</i>	<i>0</i>
<i>Minor Injury Crashes</i>	<i>N/A</i>	<i>1</i>	<i>N/A</i>	<i>1</i>
<i>Possible Injury Crashes</i>	<i>N/A</i>	<i>1</i>	<i>N/A</i>	<i>1</i>
<i>PDO Crashes</i>	<i>N/A</i>	<i>10</i>	<i>N/A</i>	<i>13</i>
<i>Severity</i>	<i>N/A</i>	<i>1.75</i>	<i>N/A</i>	<i>1.60</i>
<i>Percent Injury</i>	<i>N/A</i>	<i>16.7%</i>	<i>N/A</i>	<i>13.3%</i>

Jeep Pkwy. @ Willys Pkwy. @ Wrangler Dr. – Crash Types for 3 Years Pre-Construction



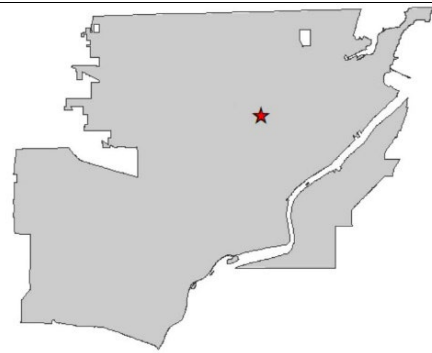
This road was a completely new road and thus there is no before data.

Jeep Pkwy. @ Willys Pkwy. @ Wrangler Dr. – Crash Types for 3 Years Post-Construction

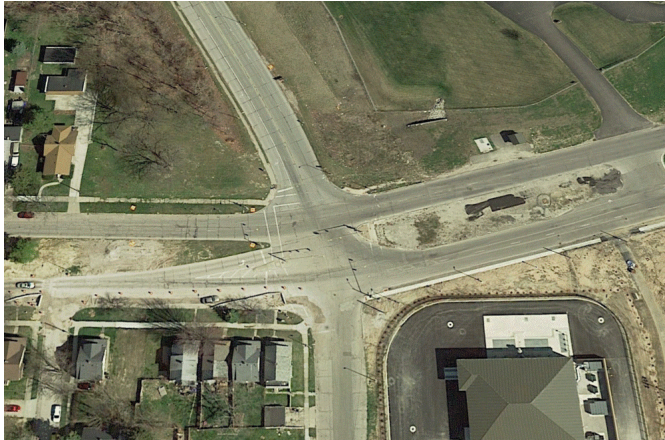


MANHATTAN BLVD. @ PHILLIPS AVE.

City of Toledo – Constructed in 2018



Pre-Construction



Prior to roundabout construction this location was an urban 4-leg stop-light controlled intersection. For the 3-year period from 2015 to 2017 there were a total of 17 crashes. More than half of these crashes were angle crashes that tend to be more severe in nature. During this time period 52.9% of the crashes were an injury crash. The crash severity rating for this time period was 3.96 and the annual cost of crashes per year for the crashes at this location was \$697,374.

Post-Construction



This roundabout opened in 2018. For the 3-year period from 2019 to 2021 there have been a total of 15 crashes. Angle crashes have been greatly reduced at this location and the severity rating has gone down 44.4%. The injury percent has also gone down 26.2% and the annual cost of crashes per year for the crashes at this location is now \$275,282 which is a 61% reduction.

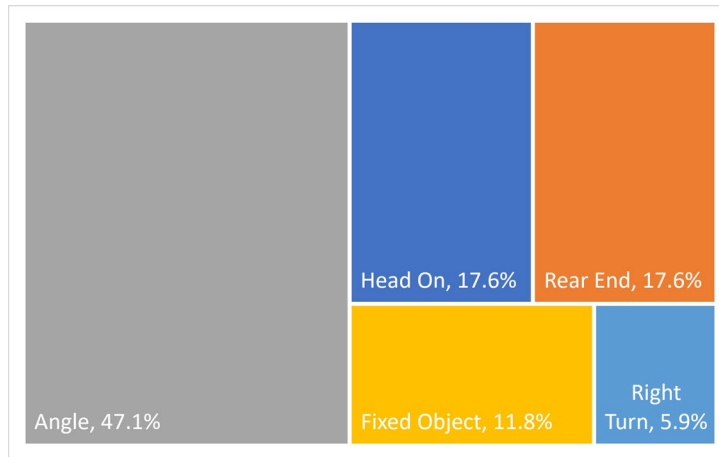
Summary

The number of pre-construction and post-construction crashes are pretty similar at this location. However, the severity and percent injury have decreased dramatically, and this has remained fairly consistent beyond the 3-years post-construction.

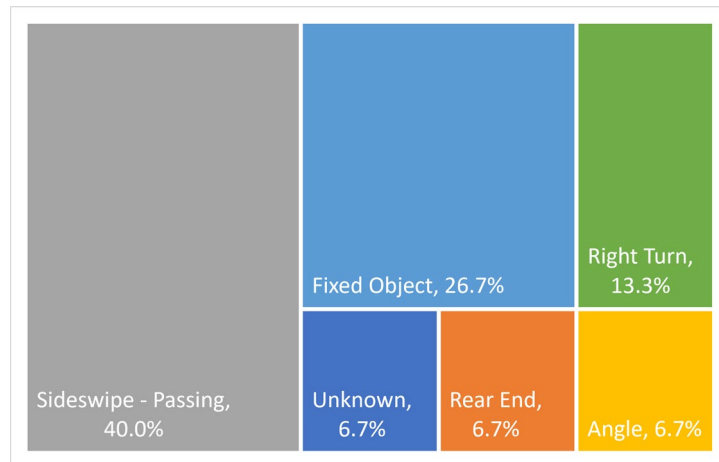
Manhattan Blvd. @ Phillips Ave. – Annual Crash Statistics

<i>Data</i>	<i>3 Years Pre-Construction</i>	<i>3 Years Post-Construction</i>	<i>% Change</i>	<i>All Years Post-Construction</i>
Dates	2015-2017	2019-2021	N/A	2019-2022
Configuration	4-Way Stop Light Intersection	4-Leg Roundabout	N/A	4-Leg Roundabout
Total Crashes	17	15	-11.8%	18
Crashes Per Year	5.67	5	-11.8%	4.5
Fatal Crashes	0	0	0.0%	0
Serious Injury Crashes	1	0	0.0%	0
Minor Injury Crashes	3	2	-33.3%	3
Possible Injury Crashes	5	2	-60.0%	3
PDO Crashes	8	11	37.5%	12
Severity	3.96	2.20	-44.4%	2.50
Percent Injury	52.9%	26.7%	-26.2%	33.3%

Manhattan Blvd. @ Phillips Ave. – Crash Types for 3 Years Pre-Construction

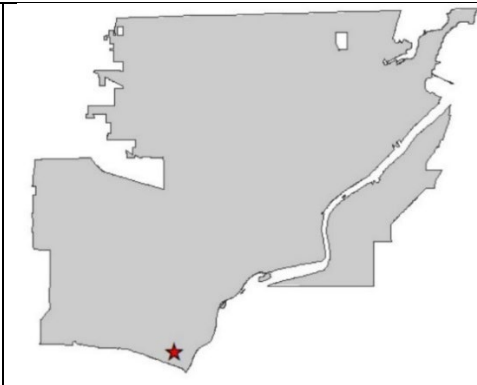


Manhattan Blvd. @ Phillips Ave. – Crash Types for 3 Years Post-Construction

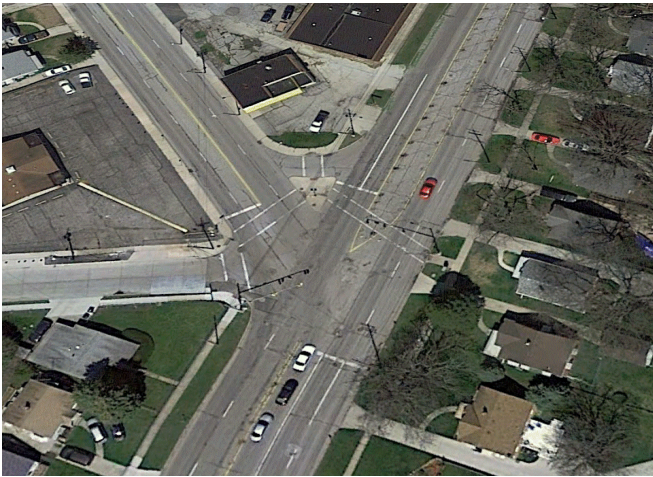


BYRNE RD. @ DETROIT AVE. (US 24)

City of Toledo – Constructed in 2019



Pre-Construction



Prior to roundabout construction this location was a skewed urban 4-way stop-light controlled intersection. For the 3-year period from 2016 to 2018 there were a total of 7 crashes. During this time period 28.6% of the crashes were an injury crash. The crash severity rating for this time period was 2.28 and the annual cost of crashes per year for the crashes at this location was \$135,539.

Post-Construction



This roundabout opened in 2019. For the 3-year period from 2020 to 2022 there have been a total of 18 crashes. The severity rating has decreased 15.4% and the injury percent has decreased 11.9%. However, the annual cost of crashes per year for the crashes at this location is now \$273,480 which is a 102% increase.

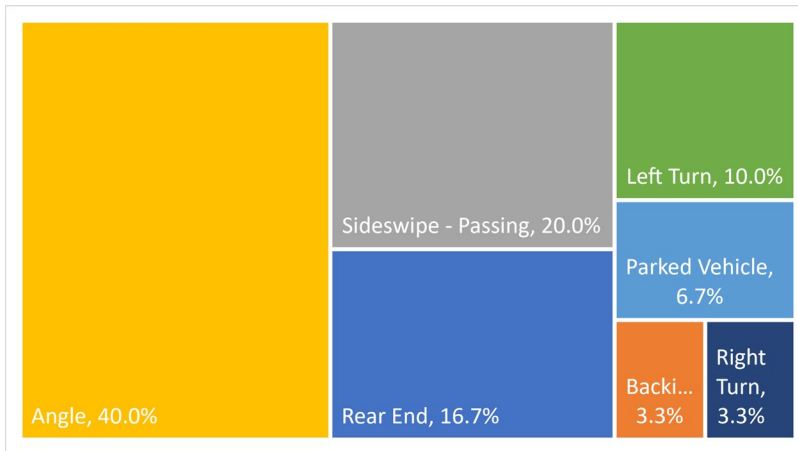
Summary

While the total number of crashes for this location did go up post-construction, much of that increase may be attributed to the newness of the roundabout and more than half of the crashes happening at this location have failure to yield as a contributing factor. It should be noted that the severity and percent injury has decreased post-construction.

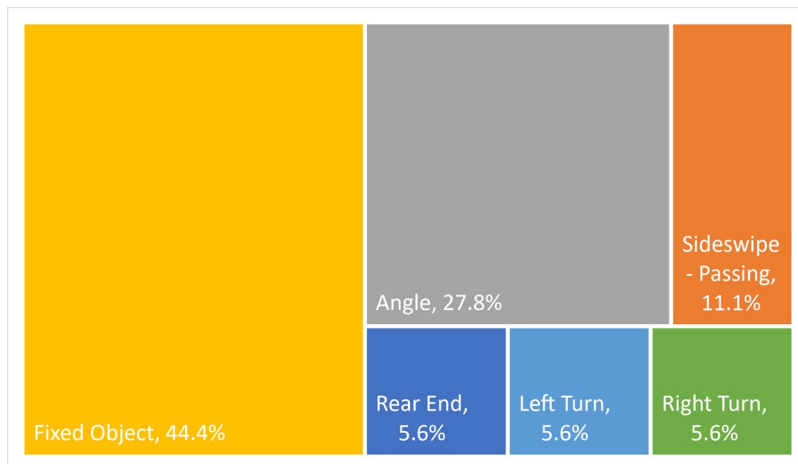
Byrne Rd. @ Detroit Ave. – Annual Crash Statistics

<i>Data</i>	<i>3 Years Pre-Construction</i>	<i>3 Years Post-Construction</i>	<i>% Change</i>
Dates	2016-2018	2020-2022	N/A
Configuration	Skewed 4-Way Stop Light	4-Leg Roundabout	N/A
Total Crashes	7	18	157.1%
Crashes Per Year	2.3	6	157.5%
Fatal Crashes	0	0	0.0%
Serious Injury Crashes	0	0	0.0%
Minor Injury Crashes	1	3	200.0%
Possible Injury Crashes	1	0	-100.0%
PDO Crashes	5	15	200.0%
Severity	2.28	1.93	-15.4%
Percent Injury	28.6%	16.7%	-11.9%

Byrne Rd. @ Detroit Ave. – Crash Types for 3Years Pre-Construction

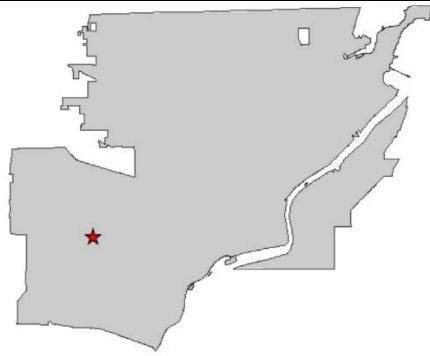


Byrne Rd. @ Detroit Ave. – Crash Types for 3 Years Post-Construction

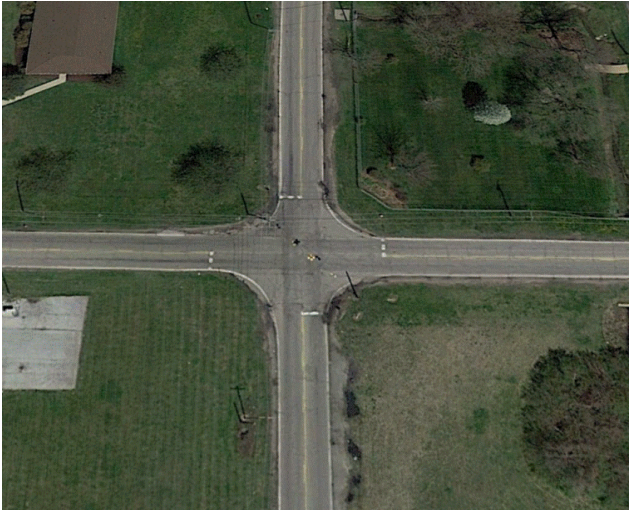


SOUTH AVE. @ WENZ RD.

City of Toledo – Constructed in 2019



Pre-Construction



Prior to roundabout construction this location was an urban 4-way stop intersection. For the 3-year period from 2017 to 2019 there were a total of 8 crashes. During this time period 62.5% of the crashes were an injury crash. The crash severity rating for this time period was 3.41 and the annual cost of crashes per year for the crashes at this location was \$260,265.

Post-Construction



This roundabout opened in 2019. For the 3-year period from 2020 to 2022 there have been a total of 5 crashes. None of these crashes have been injury crashes and thus the severity rating has decreased 70.7%. The annual cost of crashes per year for the crashes at this location is now \$21,023 which is a 92% decrease.

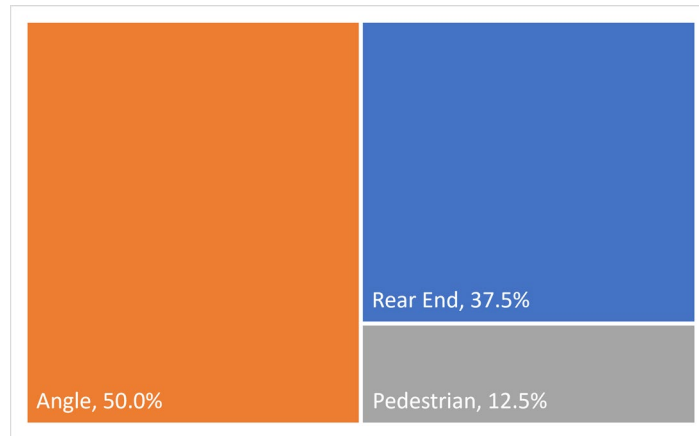
Summary

The number of pre-construction and post-construction crashes are quite similar at this location. However, the severity and percent injury have decreased dramatically as there have been no injury crashes at this location so far.

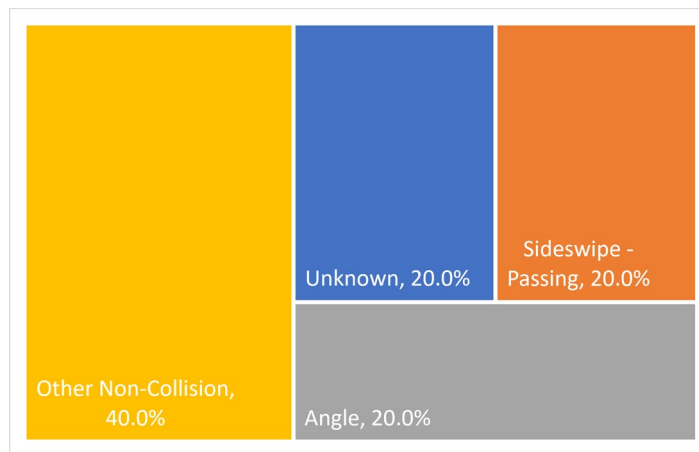
South Ave. @ Wenz Rd. – Annual Crash Statistics

<i>Data</i>	<i>3 Years Pre-Construction</i>	<i>3 Years Post-Construction</i>	<i>% Change</i>
Dates	2016-2018	2020-2022	N/A
Configuration	4-Way Stop Light	4-Leg Roundabout	N/A
Total Crashes	8	5	-37.5%
Crashes Per Year	2.67	1.67	-37.5%
Fatal Crashes	0	0	0.0%
Serious Injury Crashes	0	0	0.0%
Minor Injury Crashes	1	0	0.0%
Possible Injury Crashes	4	0	0.0%
PDO Crashes	3	5	66.7%
Severity	3.41	1.00	-70.7%
Percent Injury	62.5%	0.0%	-62.5%

South Ave. @ Wenz Rd. – Crash Types for 3 Years Pre-Construction



South Ave. @ Wenz Rd. – Crash Types for 3 Years Post-Construction



FRONT ST. @ MILLARD AVE.

City of Toledo – Constructed in 2020



Pre-Construction



Prior to roundabout construction this location was a 3-way stop-light controlled intersection. For the 3-year period from 2016 to 2018 there were a total of 2 crashes. During this time period there were no injury crashes and thus the severity is 1.0. The annual cost of crashes per year for the crashes at this location was \$8,409.

Post-Construction



This roundabout opened in 2020. For the 2-year period from 2021 to 2022 there have been a total of 2 crashes. The severity rating is still 1.0 and the annual cost of crashes per year for the crashes at this location is now \$12,614 which is a 50% increase.

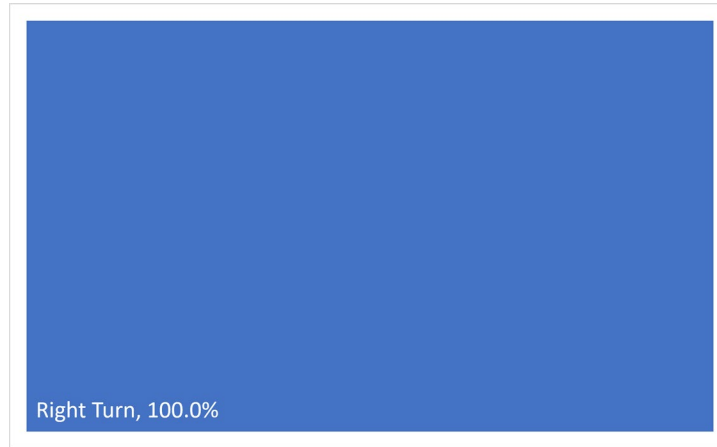
Summary

This roundabout was constructed to improve traffic flow, especially for trucks coming in and going out of the port of Toledo. The data shows that there were very few crashes at this location pre-construction and this has continued to be the case post-construction.

Front St. @ Millard Ave. – Annual Crash Statistics

<i>Data</i>	<i>3 Years Pre-Construction</i>	<i>2 Years Post-Construction</i>	<i>% Change</i>
<i>Dates</i>	<i>2016-2018</i>	<i>2021-2022</i>	<i>N/A</i>
<i>Configuration</i>	<i>3-Leg 1-Way stop</i>	<i>3-Leg Roundabout</i>	<i>N/A</i>
<i>Total Crashes</i>	<i>2</i>	<i>2</i>	<i>0.0%</i>
<i>Crashes Per Year</i>	<i>0.7</i>	<i>1</i>	<i>49.3%</i>
<i>Fatal Crashes</i>	<i>0</i>	<i>0</i>	<i>0.0%</i>
<i>Serious Injury Crashes</i>	<i>0</i>	<i>0</i>	<i>0.0%</i>
<i>Minor Injury Crashes</i>	<i>0</i>	<i>0</i>	<i>0.0%</i>
<i>Possible Injury Crashes</i>	<i>0</i>	<i>0</i>	<i>0.0%</i>
<i>PDO Crashes</i>	<i>2</i>	<i>2</i>	<i>0.0%</i>
<i>Severity</i>	<i>1.00</i>	<i>1.00</i>	<i>0.0%</i>
<i>Percent Injury</i>	<i>0.0%</i>	<i>0.0%</i>	<i>0.0%</i>

Front St. @ Millard Ave. – Crash Types for 3 Years Pre-Construction



Front St. @ Millard Ave. – Crash Types for 3 Years Post-Construction



MILLARD AVE. @ TIFFIN ST.

City of Toledo – Constructed in 2020



Pre-Construction



Prior to roundabout construction this location was an urban 1-way stop T-intersection. For the 3-year period from 2016 to 2018 there were a total of 3 crashes. During this time period 33.3% of the crashes were an injury crash. The crash severity rating for this time period was 2.85 and the annual cost of crashes per year for the crashes at this location was \$78,546.

Post-Construction



This roundabout opened in 2020. For the 2-year period from 2011 to 2022 there have not been any crashes and thus the severity rating is 0.0. The annual cost of crashes per year for the crashes at this location is now \$0 which is a 100% reduction.

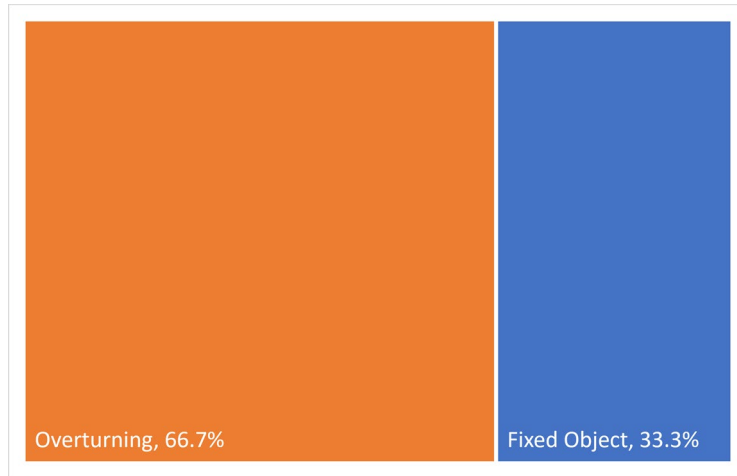
Summary

This roundabout was constructed to improve traffic flow, especially for trucks coming in and going out of the port of Toledo. The data shows that there were very few crashes at this location pre-construction and this has continued to be the case post-construction.

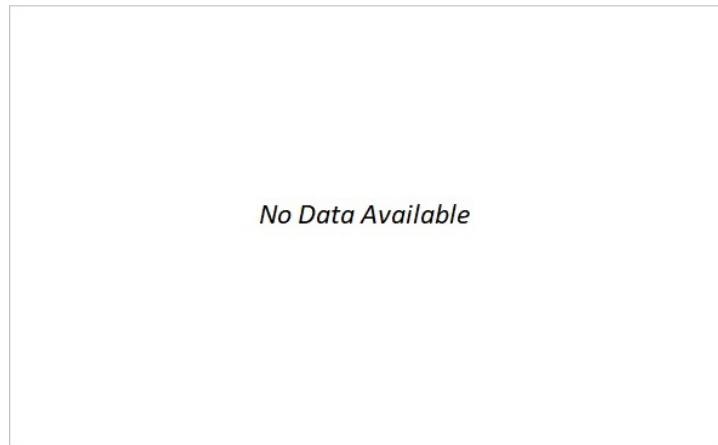
Millard Ave. @ Tiffin St. – Annual Crash Statistics

<i>Data</i>	<i>3 Years Pre-Construction</i>	<i>2 Years Post-Construction</i>	<i>% Change</i>
Dates	2016-2018	2021-2022	N/A
Configuration	3-leg 1-Stop Intersection	3-Leg Roundabout	N/A
Total Crashes	3	0	-100.0%
Crashes Per Year	1.0	0	-100.0%
Fatal Crashes	0	0	0.0%
Serious Injury Crashes	0	0	0.0%
Minor Injury Crashes	1	0	0.0%
Possible Injury Crashes	0	0	0.0%
PDO Crashes	2	0	-100.0%
Severity	2.85	0.00	-100.0%
Percent Injury	33.3%	0.0%	-33.3%

Millard Ave. @ Tiffin St. – Crash Types for 3 Years Pre-Construction



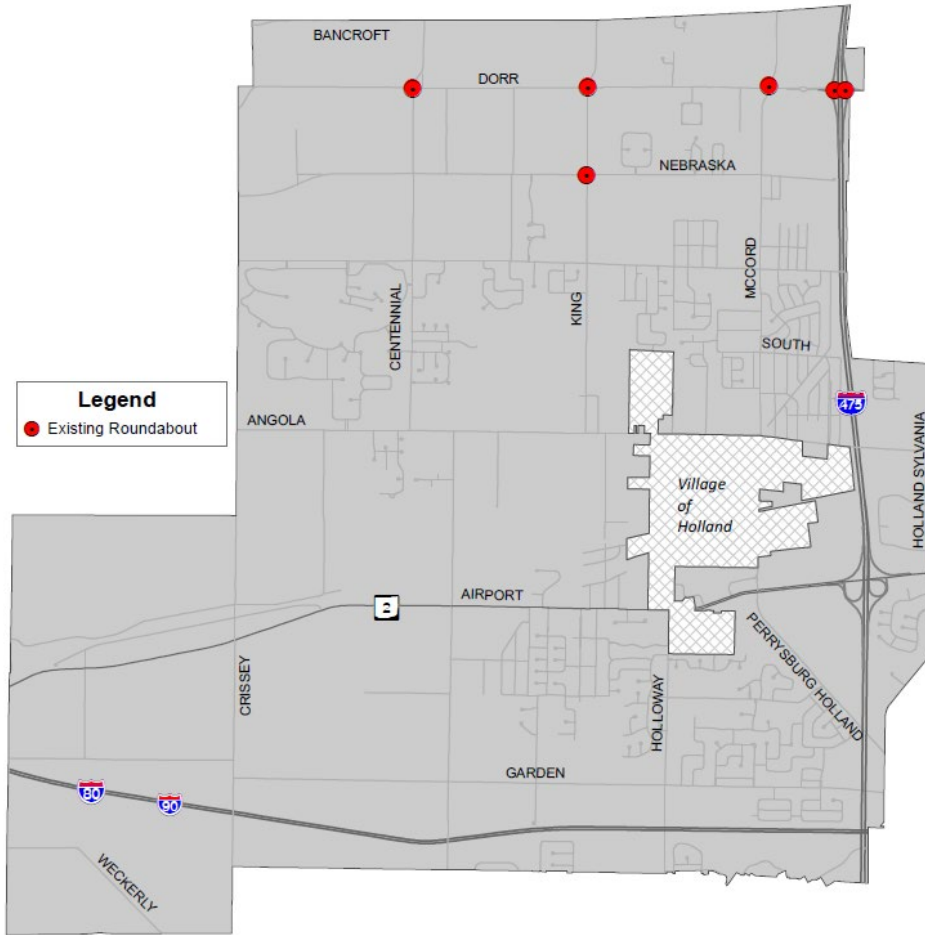
Millard Ave. @ Tiffin St. – Crash Types for 3 Years Post-Construction



There were no crashes to report for the 2 years following construction.

SPRINGFIELD TOWNSHIP

Map 3: Roundabout Locations in Springfield Township

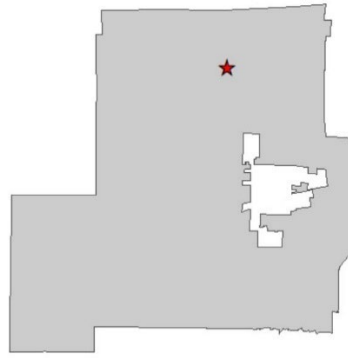


Currently in Springfield Township there are 7 roundabouts and at least 6 planned roundabouts. The first roundabout in this area was constructed in 2009 and the last was constructed in 2021.

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KING RD. @ NEBRASKA AVE.

Springfield Township – Constructed in 2009



Pre-Construction

No Image Available

Prior to roundabout construction this location was a rural 4-way stop intersection. For the 3-year period from 2006 to 2008 there were a total of 2 crashes. During this time period 50% of the crashes were an injury crash. The crash severity rating for this time period was 2.72 and the annual cost of crashes per year for the crashes at this location was \$48,583.

Post-Construction



This roundabout opened in 2009. For the 3-year period from 2010 to 2012 there was a total of 5 crashes. The severity and percent injury both increased post-construction. The annual cost of crashes per year for the crashes at this location is now \$167,03 which is a 244% increase.

Summary

This was one of the first roundabouts constructed in the TMACOG region. This may explain why there was an uptick in crashes after construction. Crashes per year have remained pretty consistent throughout the 13 years it has been in use. One fatality, where high speeds and alcohol were involved, has also skewed the severity statistics after construction.

Table 16: King Rd. @ Nebraska Ave. – Annual Crash Statistics

<i>Data</i>	<i>3 Years Pre-Construction</i>	<i>3 Years Post-Construction</i>	<i>% Change</i>	<i>All Years Post-Construction</i>
Dates	2006-2008	2010-2012	N/A	2010-2022
Configuration	Rural 4-Way Stop	4-Leg Roundabout	N/A	4-Leg Roundabout
Total Crashes	2	5	150.0%	21
Crashes Per Year	0.67	1.7	148.8%	1.6
Fatal Crashes	0	0	0.0%	1
Serious Injury Crashes	0	0	0.0%	0
Minor Injury Crashes	0	1	0.0%	4
Possible Injury Crashes	1	2	100.0%	5
PDO Crashes	1	2	100.0%	11
Severity	2.72	3.49	28.3%	12.10
Percent Injury	50.0%	60.0%	20.0%	47.6%

Figure 32: King Rd. @ Nebraska Ave. – Crash Types for 3 Years Pre-Construction

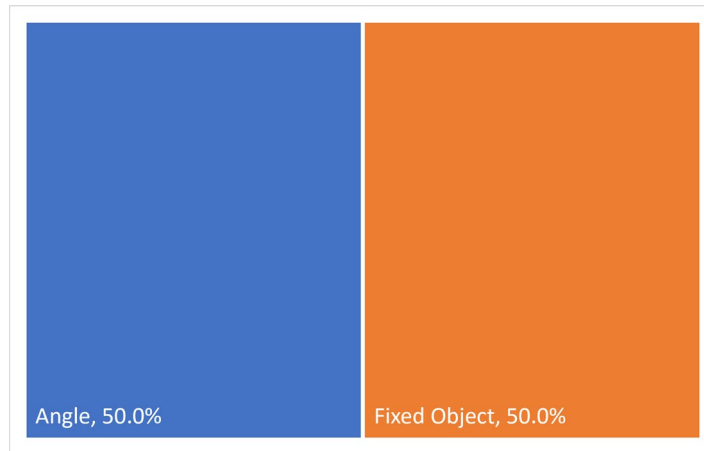
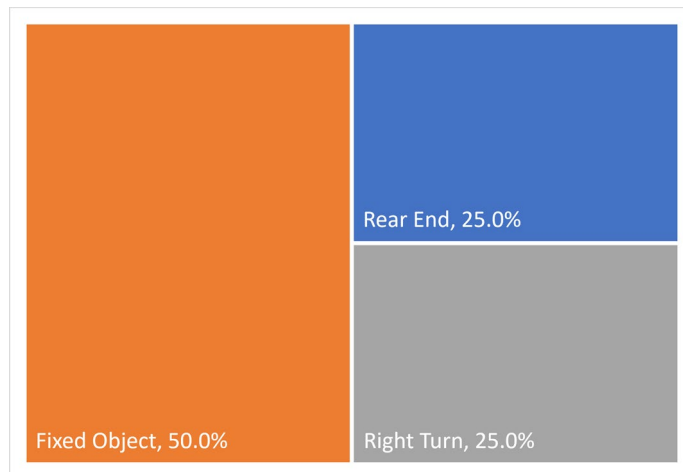
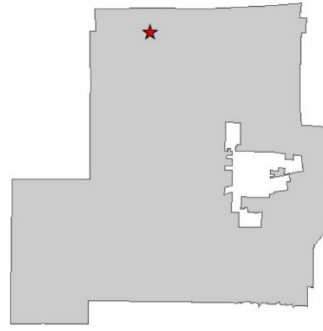


Figure 33: King Rd. @ Nebraska Ave. – Crash Types for 3 Years Post-Construction



CENTENNIAL RD. @ DORR ST.

Springfield Township – Constructed in 2014



Pre-Construction



Prior to roundabout construction this location was a rural 4-way stop intersection. For the 3-year period from 2011 to 2013 there were a total of 4 crashes. During this time period 25% of the crashes were an injury crash. The crash severity rating for this time period was 2.39 and the annual cost of crashes per year for the crashes at this location was \$82,751.

Post-Construction



This roundabout opened in 2016. For the 3-year period from 2015 to 2017 there have been a total of 10 crashes. The severity rating has decreased 34.7% and the injury percent decreased 15%. The annual cost of crashes per year for the crashes at this location is now \$107,979 which is a 30% increase.

Summary

Crashes at this location have increased post-construction but, in the 3 years post-construction the severity and injury percent decreased like up would expect. Crashes that have happened beyond the 3 years post-construction have increased again as well as the severity and percent injury.

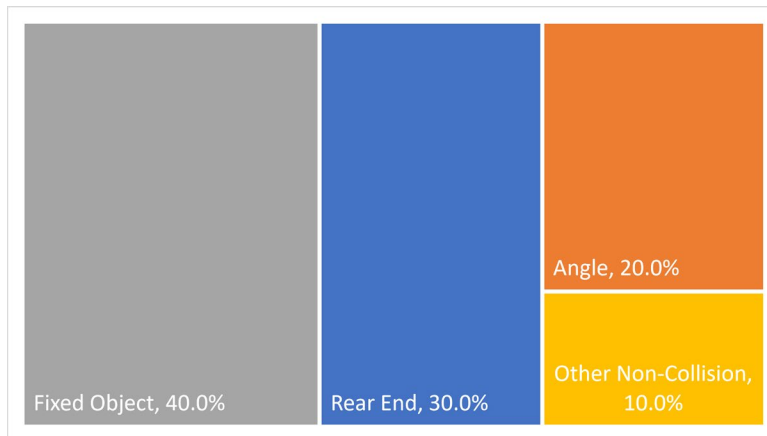
Table 17: Centennial Rd. @ Dorr. St. – Annual Crash Statistics

<i>Data</i>	<i>3 Years Pre-Construction</i>	<i>3 Years Post-Construction</i>	<i>% Change</i>	<i>All Years Post-Construction</i>
Dates	2011-2013	2015-2017	N/A	2015-2022
Configuration	4-Way Stop	4-Leg Roundabout	N/A	4-Leg Roundabout
Total Crashes	4	10	150.0%	27
Crashes Per Year	1.33	3.33	150.4%	3.86
Fatal Crashes	0	0	0.0%	0
Serious Injury Crashes	0	0	0.0%	0
Minor Injury Crashes	1	1	0.0%	3
Possible Injury Crashes	0	0	0.0%	4
PDO Crashes	3	9	200.0%	20
Severity	2.39	1.56	-34.7%	2.13
Percent Injury	25.0%	10.0%	-15.0%	25.9%

Figure 34: Centennial Rd. @ Dorr. St. – Crash Types for 3 Years Pre-Construction



Figure 35: Centennial Rd. @ Dorr. St. – Crash Types for 3 Years Post-Construction



DORR ST. @ KING RD.

Springfield Township – Constructed in 2015



Pre-Construction



Prior to roundabout construction this location was a rural offset 2-way stop intersection. For the 3-year period from 2012 to 2016 there were a total of 8 crashes. During this time period 37.5% of the crashes were an injury crash. The crash severity rating for this time period was 3.08 and the annual cost of crashes per year for the crashes at this location was \$231,433.

Post-Construction



This roundabout opened in 2015. For the 3-year period from 2016 to 2018 there have been a total of 9 crashes. The severity rating is now 2.62 and has decreased 14.9%. The injury percent has decreased by 4.2% and the annual cost of crashes per year for the crashes at this location is now \$209,880 which is a 9% reduction.

Summary

The number of pre-construction and post-construction crashes are quite similar at this location. The severity and percent injury are slightly better in the 3 post-construction years. Beyond the 3 post-construction years the severity and percent injury continue to reduce.

Table 18: Dorr. St. @ King Rd. – Annual Crash Statistics

<i>Data</i>	<i>3 Years Pre-Construction</i>	<i>3 Years Post-Construction</i>	<i>% Change</i>	<i>All Years Post-Construction</i>
Dates	2012-2014	2016-2018	N/A	2016-2022
Configuration	Offset 2-Way Stop	4-Leg Roundabout	N/A	4-Leg Roundabout
Total Crashes	8	9	12.5%	17
Crashes Per Year	2.67	3	12.4%	2.43
Fatal Crashes	0	0	0.0%	0
Serious Injury Crashes	0	0	0.0%	0
Minor Injury Crashes	3	2	-33.3%	4
Possible Injury Crashes	0	1	N/A	1
PDO Crashes	5	6	20.0%	12
Severity	3.08	2.62	-14.9%	2.51
Percent Injury	37.5%	33.3%	-4.2%	29.4%

Figure 36: Dorr. St. @ King Rd. – Crash Types for 3 Years Pre-Construction

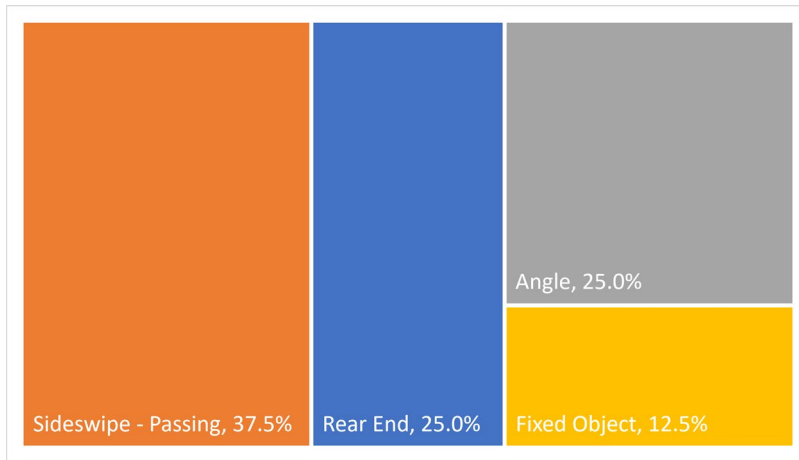
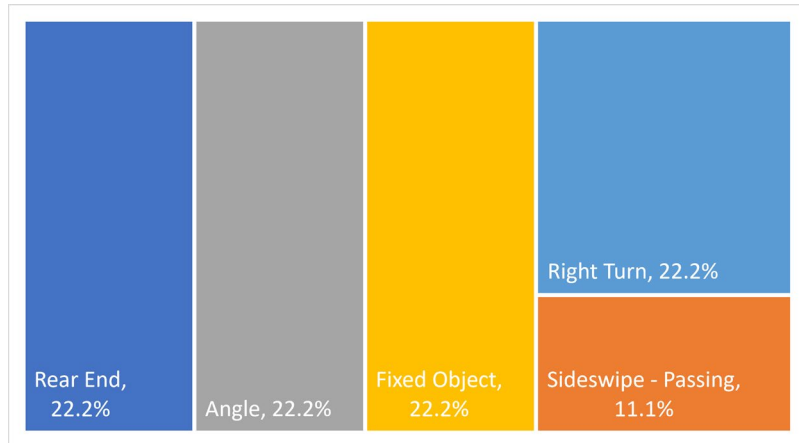


Figure 37: Dorr. St. @ King Rd. – Crash Types for 3 Years Post-Construction

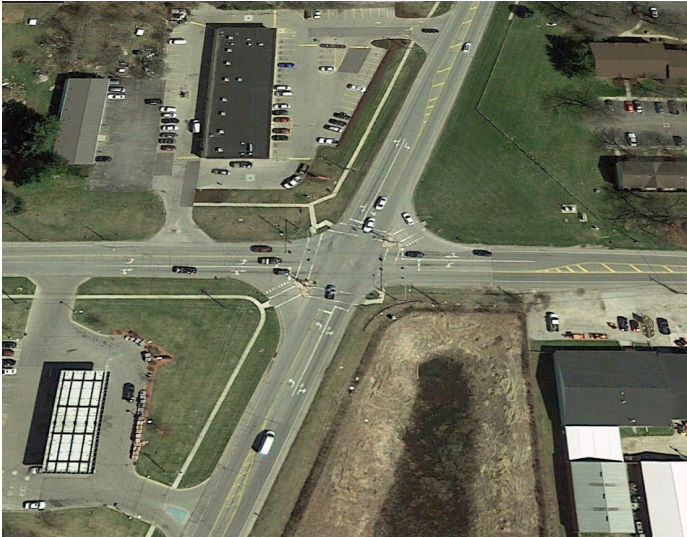


DORR ST. @ MCCORD RD.

Springfield Township – Constructed in 2020



Pre-Construction



Prior to roundabout construction this location was rural 4-way stoplight-controlled intersection. For the 3 year period from 2017 to 2019 there were a total of 45 crashes. A majority of these crashes were rear end crashes. During this time period 37.8% of the crashes were an injury crash. The crash severity rating for this time period was 3.25 and the annual cost of crashes per year for the crashes at this location was \$1,452,341.

Post-Construction



This roundabout opened in 2020. For the 2-year period from 2021 to 2022 there have been a total of 16 crashes. Rear end crashes have decreased significantly at this location and the severity rating has gone down 13.2% and the injury percent has decreased by 0.8%. The annual cost of crashes per year for the crashes at this location is now \$617,026 which is a 58% reduction.

Summary

Crashes at this location, post-construction, have decreased dramatically. The severity has improved by a large margin. However, the percent injury has virtually remained the same.

Table 19: Dorr St. @ McCord Rd. – Annual Crash Statistics

<i>Data</i>	<i>3 Years Pre-Construction</i>	<i>2 Years Post-Construction</i>	<i>% Change</i>
<i>Dates</i>	2017-2019	2021-2022	N/A
<i>Configuration</i>	4-Way Stop Light	4-Leg Roundabout	N/A
<i>Total Crashes</i>	45	16	-64.4%
<i>Crashes Per Year</i>	15.0	8	-46.7%
<i>Fatal Crashes</i>	0	0	0.0%
<i>Serious Injury Crashes</i>	2	0	-100.0%
<i>Minor Injury Crashes</i>	8	4	-50.0%
<i>Possible Injury Crashes</i>	7	2	-71.4%
<i>PDO Crashes</i>	28	10	-64.3%
<i>Severity</i>	3.25	2.82	-13.2%
<i>Percent Injury</i>	37.8%	37.5%	-0.8%

Figure 38: Dorr St. @ McCord Rd. – Crash Types for 3 Years Pre-Construction

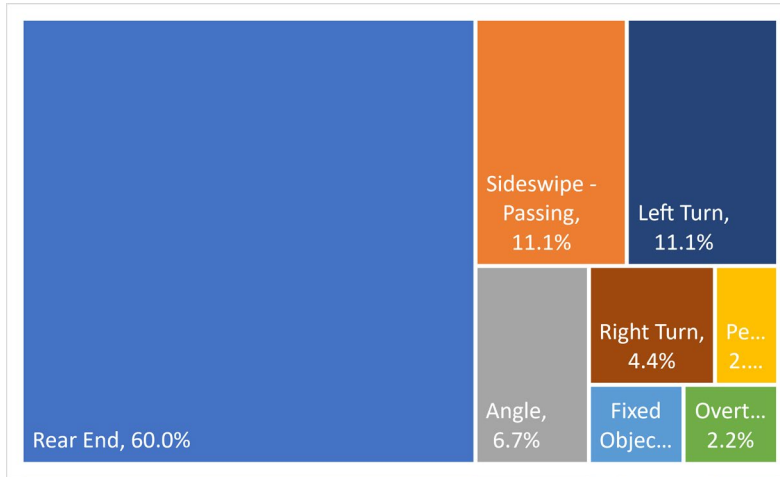
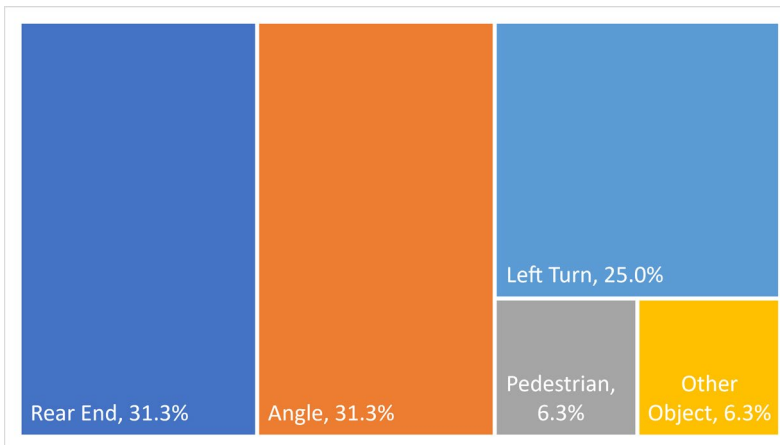
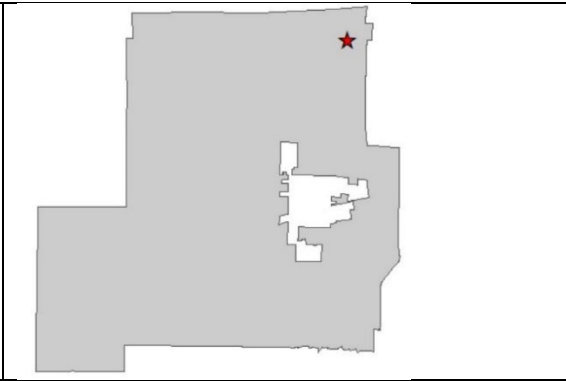


Figure 39: Dorr St. @ McCord Rd. – Crash Types for 3 Years Post-Construction



DORR ST. @ SPRINGFIELD CROSSING

Springfield Township – Constructed in 2020



Pre-Construction



Prior to roundabout construction this location was suburban 1-stop T-intersection. This intersection was a tenth of a mile further east than where it is located now. For the 3 year period from 2017 to 2019 there were a total of 2 crashes. During this time period there were no injury crashes, and thus the crash severity rating for this time period was 1.0. The annual cost of crashes per year for the crashes at this location was \$8,409.

Post-Construction



This roundabout opened in 2020. For the 2-year period from 2021 to 2022 there have been a total of 8 crashes. Crash severity has gone up 182% and the injury percent is now 37.5%. The annual cost of crashes per year for the crashes at this location is now \$308,513 which is a 3569% increase.

Summary

Due to the relative newness, the 2 lanes and the larger volume on this road, the crashes at this location have increased. Since there were very few crashes before construction, this looks like a large increase. We should expect these numbers to decrease as people get more accustomed to driving through this roundabout.

Table 20: Dorr St. @ Springfield Crossing – Annual Crash Statistics

<i>Data</i>	<i>3 Years Pre-Construction</i>	<i>2 Years Post-Construction</i>	<i>% Change</i>
<i>Dates</i>	<i>2017-2019</i>	<i>2021-2022</i>	<i>N/A</i>
<i>Configuration</i>	<i>1-Stop Intersection</i>	<i>4-Leg Roundabout</i>	<i>N/A</i>
<i>Total Crashes</i>	<i>2</i>	<i>8</i>	<i>300.0%</i>
<i>Crashes Per Year</i>	<i>0.7</i>	<i>4</i>	<i>497.0%</i>
<i>Fatal Crashes</i>	<i>0</i>	<i>0</i>	<i>0.0%</i>
<i>Serious Injury Crashes</i>	<i>0</i>	<i>0</i>	<i>0.0%</i>
<i>Minor Injury Crashes</i>	<i>0</i>	<i>2</i>	<i>N/A</i>
<i>Possible Injury Crashes</i>	<i>0</i>	<i>1</i>	<i>N/A</i>
<i>PDO Crashes</i>	<i>2</i>	<i>5</i>	<i>150.0%</i>
<i>Severity</i>	<i>1.00</i>	<i>2.82</i>	<i>182.0%</i>
<i>Percent Injury</i>	<i>0.0%</i>	<i>37.5%</i>	<i>37.5%</i>

Figure 40: Dorr St. @ Springfield Crossing – Crash Types for 3 Years Pre-Construction

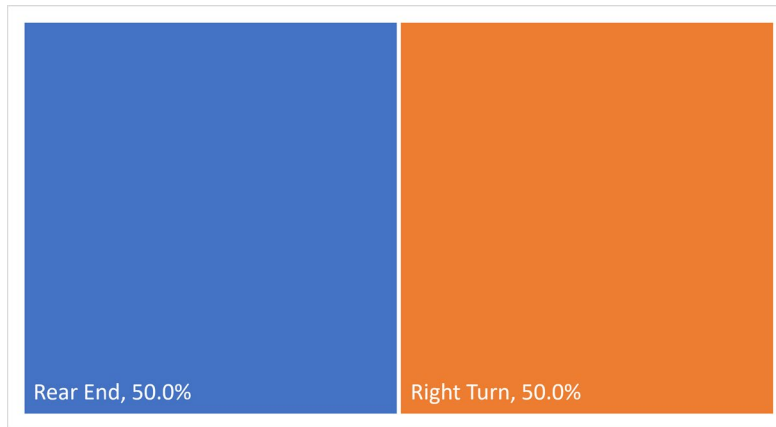
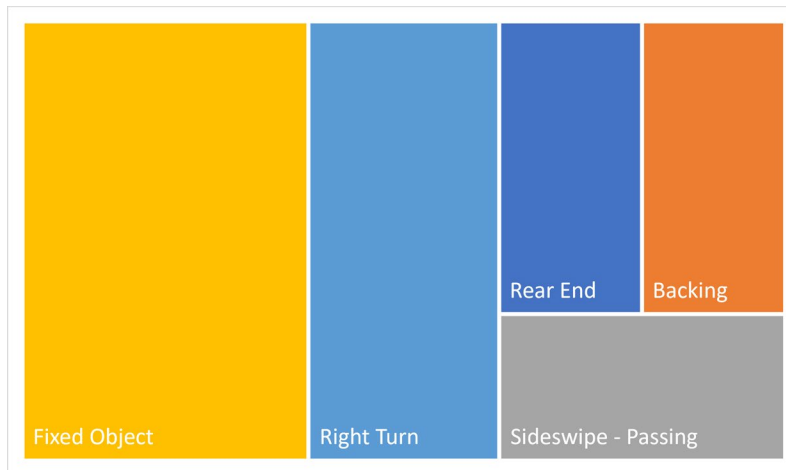
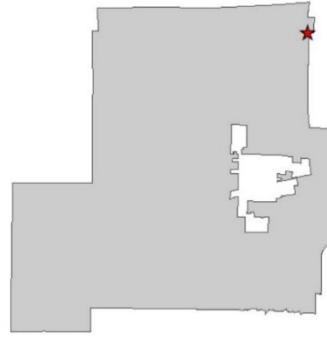


Figure 41: Dorr St. @ Springfield Crossing – Crash Types for 3 Years Post-Construction



DORR ST. @ I-475 NB RAMPS

Springfield Township – Constructed in 2021



Pre-Construction

No Image Available

Prior to roundabout construction this intersection did not exist thus there is no previous crash data to compare to.

Post-Construction



This roundabout opened in 2021. For the 1-year period of 2022 there have been a total of 2 crashes, both fixed object crashes. The severity rating is 1.0 for 2022 and the annual cost of crashes per year for the crashes at this location is \$25,228.

Summary

This is a completely new intersection that only recently opened. So far, the crash numbers are very low and there are no severe crashes.

Table 21: Dorr St. @ I-475 NB Ramps – Annual Crash Statistics

<i>Data</i>	<i>3 Years Pre-Construction</i>	<i>1 Year Post-Construction</i>	<i>% Change</i>
<i>Dates</i>	<i>N/A</i>	<i>2022</i>	<i>N/A</i>
<i>Configuration</i>	<i>N/A</i>	<i>4-Leg Roundabout</i>	<i>N/A</i>
<i>Total Crashes</i>	<i>N/A</i>	<i>2</i>	<i>N/A</i>
<i>Crashes Per Year</i>	<i>N/A</i>	<i>2</i>	<i>N/A</i>
<i>Fatal Crashes</i>	<i>N/A</i>	<i>0</i>	<i>N/A</i>
<i>Serious Injury Crashes</i>	<i>N/A</i>	<i>0</i>	<i>N/A</i>
<i>Minor Injury Crashes</i>	<i>N/A</i>	<i>0</i>	<i>N/A</i>
<i>Possible Injury Crashes</i>	<i>N/A</i>	<i>0</i>	<i>N/A</i>
<i>PDO Crashes</i>	<i>N/A</i>	<i>2</i>	<i>N/A</i>
<i>Severity</i>	<i>N/A</i>	<i>1.00</i>	<i>N/A</i>
<i>Percent Injury</i>	<i>N/A</i>	<i>0.0%</i>	<i>N/A</i>

Figure 42: Dorr St. @ I-475 NB Ramps – Crash Types for 3 Years Pre-Construction

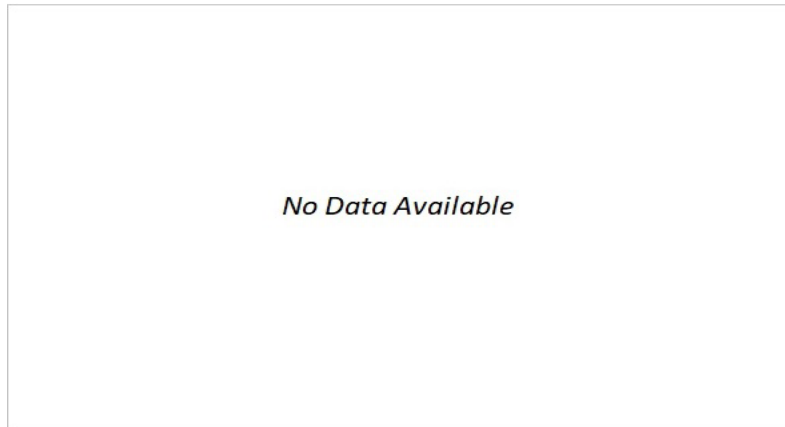
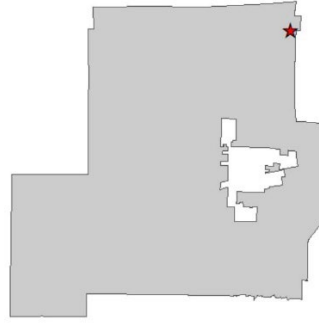


Figure 43: Dorr St. @ I-475 NB Ramps – Crash Types for 3 Years Post-Construction

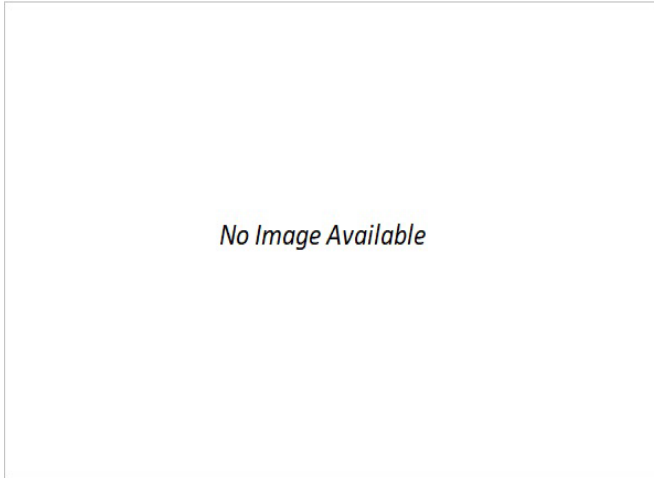


DORR ST @I-475 SB RAMPS

Springfield Township – Constructed in 2021



Pre-Construction



Prior to roundabout construction this intersection did not exist thus there is no previous crash data to compare to.

Post-Construction



This roundabout opened in 2021. For the 1-year period of 2022 there have been a total of 2 crashes, both fixed object crashes. The severity rating is 1.0 for 2022 and the annual cost of crashes per year for the crashes at this location is \$25,228.

Summary

This is a completely new intersection that only recently opened. So far, the crash numbers are very low and there are no severe crashes.

Table 22: Dorr St. @ I-475 SB Ramps – Annual Crash Statistics

<i>Data</i>	<i>3 Years Pre-Construction</i>	<i>1 Year Post-Construction</i>	<i>% Change</i>
<i>Dates</i>	<i>N/A</i>	<i>2022</i>	<i>N/A</i>
<i>Configuration</i>	<i>N/A</i>	<i>4-Leg Roundabout</i>	<i>N/A</i>
<i>Total Crashes</i>	<i>N/A</i>	<i>2</i>	<i>N/A</i>
<i>Crashes Per Year</i>	<i>N/A</i>	<i>2</i>	<i>N/A</i>
<i>Fatal Crashes</i>	<i>N/A</i>	<i>0</i>	<i>N/A</i>
<i>Serious Injury Crashes</i>	<i>N/A</i>	<i>0</i>	<i>N/A</i>
<i>Minor Injury Crashes</i>	<i>N/A</i>	<i>0</i>	<i>N/A</i>
<i>Possible Injury Crashes</i>	<i>N/A</i>	<i>0</i>	<i>N/A</i>
<i>PDO Crashes</i>	<i>N/A</i>	<i>2</i>	<i>N/A</i>
<i>Severity</i>	<i>N/A</i>	<i>1.00</i>	<i>N/A</i>
<i>Percent Injury</i>	<i>N/A</i>	<i>0.0%</i>	<i>N/A</i>

Figure 44: Dorr St. @ I-475 SB Ramps – Crash Types for 3 Years Pre-Construction

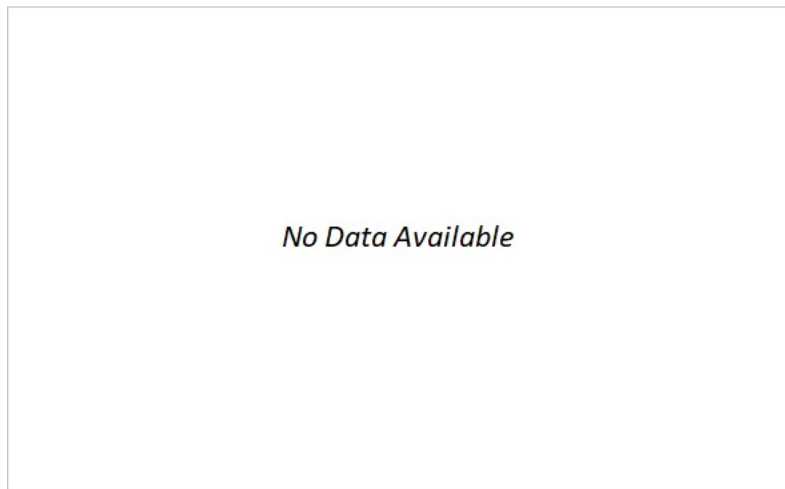
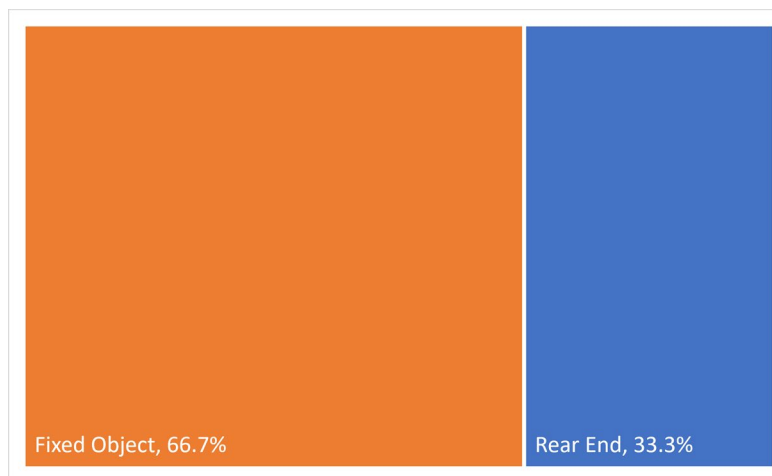
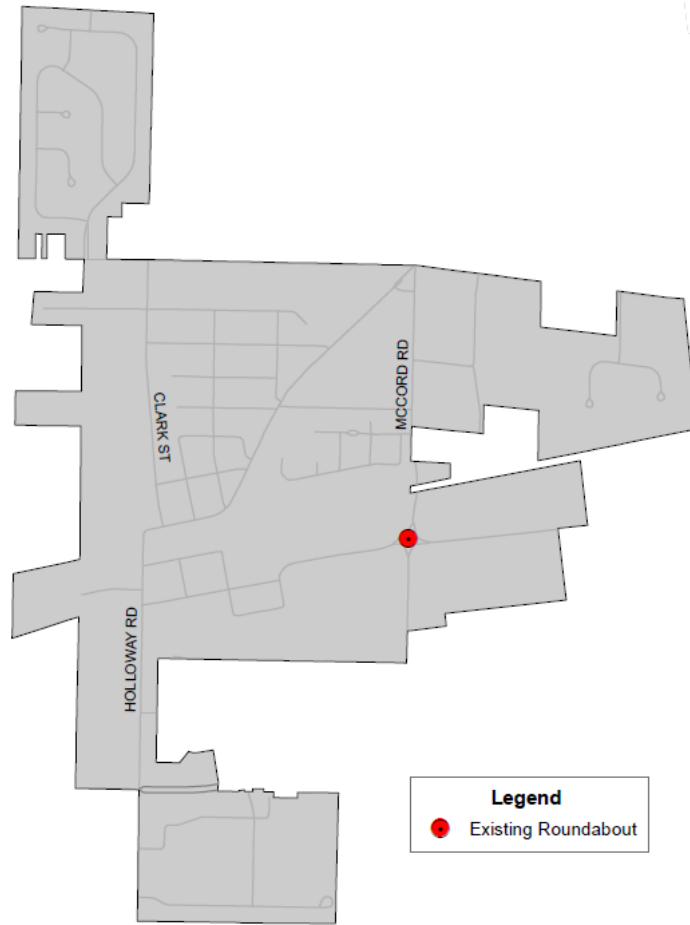


Figure 45: Dorr St. @ I-475 SB Ramps – Crash Types for 3 Years Post-Construction



THE VILLAGE OF HOLLAND

Map 3: Roundabout Locations in the Village of Holland



Currently in the Village of Holland there is 1 roundabout. This is a 2-lane roundabout that was constructed in 2015.

Intentionally

MALL DR. @ MCCORD RD.

Village of Holland – Constructed in 2015

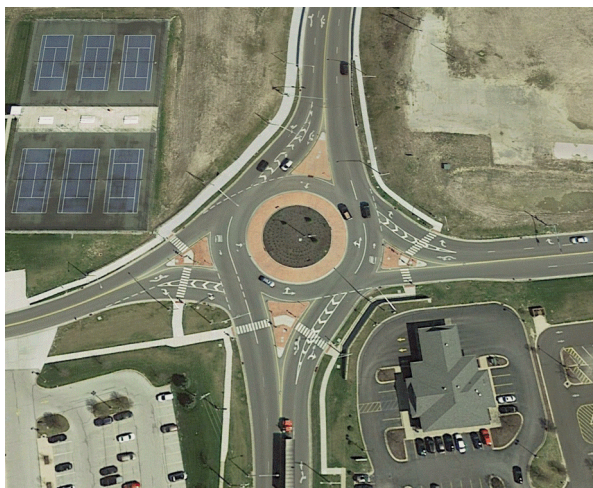


Pre-Construction



Prior to roundabout construction this location was a suburban 4-way stop-light controlled intersection. For the 3 year period from 2012 to 2014 there were a total of 38 crashes, with a large majority of them being rear end crashes. During this time period 23.7% of the crashes were an injury crash. The crash severity rating for this time period was 2.21 and the annual cost of crashes per year for the crashes at this location was \$820,334.

Post-Construction



This roundabout opened in 2015. For the 3-year period from 2016 to 2018 there have been a total of 90 crashes. Crashes have increased dramatically at this location, but the severity rating has gone down 35.7%. The injury percent has decreased by 11.55%. Despite the dramatic increase in crashes the annual cost of crashes per year for the crashes at this location is now \$820,334 which is only a 12% increase.

Summary

The data on the following page a shows dramatic increase in crashes after the construction of this roundabout. This is most likely due to the 2-lane roundabout configuration as well as the large volume of vehicles that travel through this location. On the positive side, the severity and percent injury did go down and seems to be consistent beyond the 3-years post construction.

Table 23: Mall Dr. @ McCord Rd. – Annual Crash Statistics

<i>Data</i>	<i>3 Years Pre-Construction</i>	<i>3 Years Post-Construction</i>	<i>% Change</i>	<i>All Years Post-Construction</i>
Dates	2012-2014	2016-2018	N/A	2016-2022
Configuration	4-Way Stop Light	4-Leg Roundabout	N/A	4-Leg Roundabout
Total Crashes	38	90	136.8%	190
Crashes Per Year	12.67	30	136.8%	27.4
Fatal Crashes	0	0	0.0%	0
Serious Injury Crashes	1	0	N/A	0
Minor Injury Crashes	1	0	N/A	7
Possible Injury Crashes	7	11	57.1%	21
PDO Crashes	29	79	172.4%	162
Severity	2.21	1.42	-35.7%	1.58
Percent Injury	23.7%	12.2%	-11.5%	14.7%

Figure 46: Mall Dr. @ McCord Rd. – Crash Types for 3 Years Pre-Construction

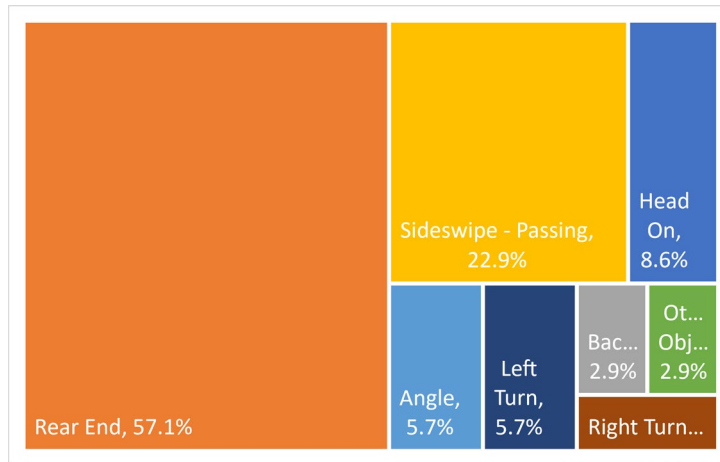
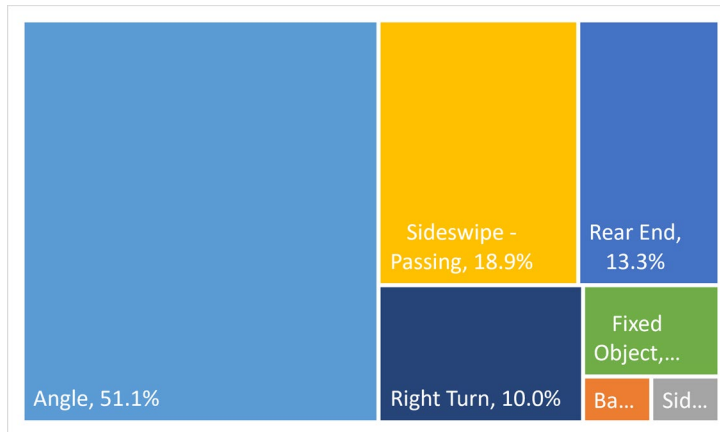
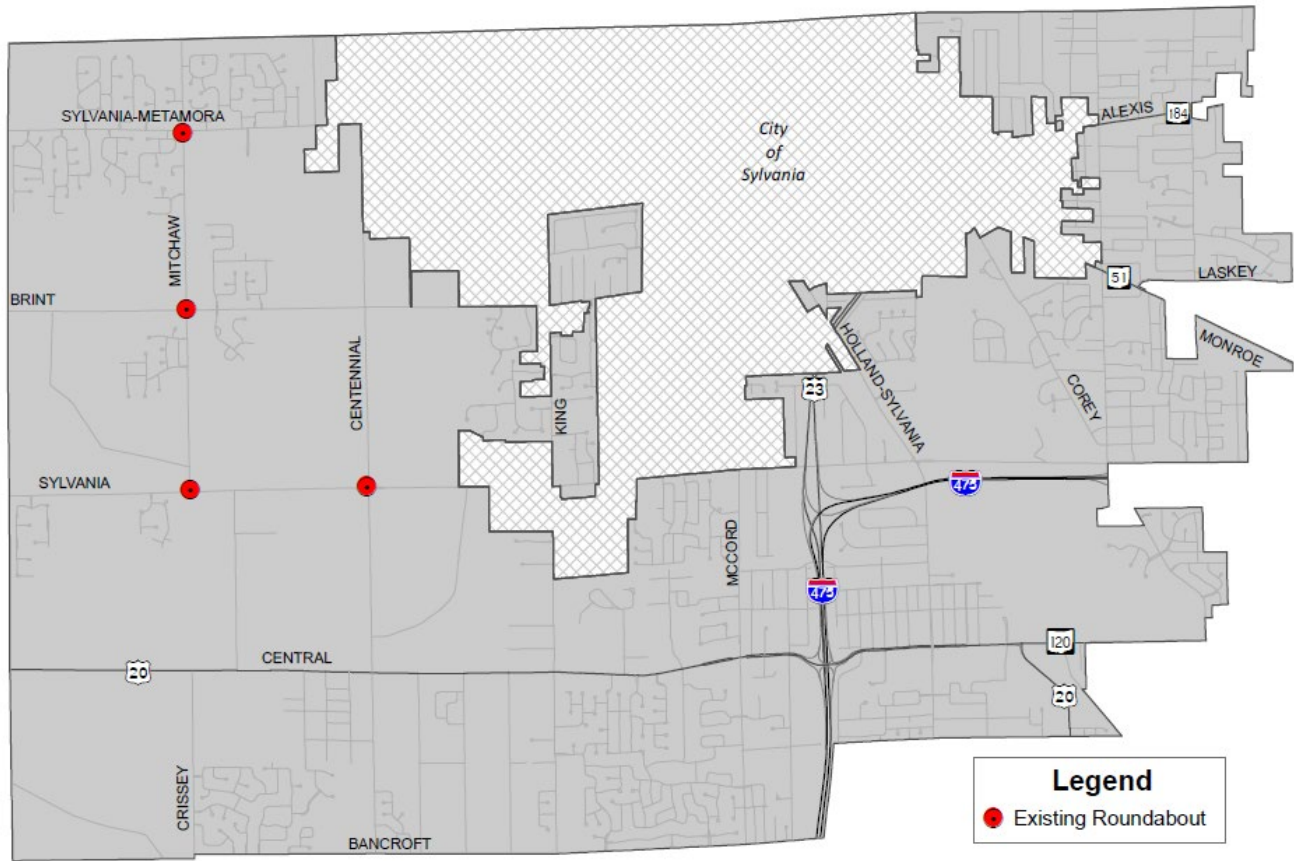


Figure 47: Mall Dr. @ McCord Rd. – Crash Types for 3 Years Post-Construction



SYLVANIA TOWNSHIP

Map 4: Roundabout Locations in Sylvania Township

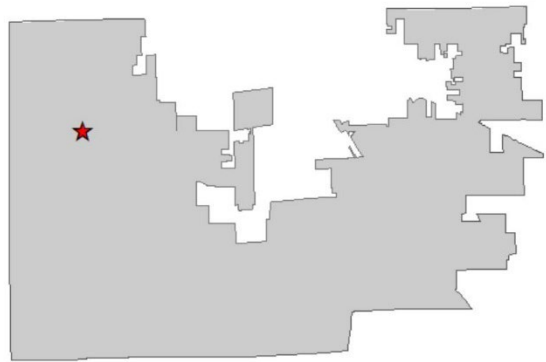


Currently in Sylvania Township there are 4 roundabouts and at least 1 planned roundabout. The first roundabout in this area was constructed in 2010 and the last one was constructed in 2016.

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BRINT RD. @ MITCHAW RD.

Sylvania Township – Constructed in 2010



Pre-Construction

No Image Available

Prior to roundabout construction this location was rural 4-way stop intersection. For the 3-year period from 2007 to 2009 there were a total of 6 crashes. During this time period 50% of the crashes were an injury crash. The crash severity rating for this time period was approximately 2.72 and the annual cost of crashes per year for the crashes at this location was \$223,024.

Post-Construction



This roundabout opened in 2011. For the 3-year period from 2011 to 2022 there have been a total of 6 crashes. The severity rating went up in the 3 years post-construction by 58.5% but the percent injury did go down by 16.7%. The annual cost of crashes per year for the crashes at this location is now \$292,631 which is a 31% increase.

Summary

This was one of the first roundabouts constructed in the TMACOG region. The uptick in severity right after construction could be attributed to the newness of the concept at the time. The severity percent injury has since decreased in the years following.

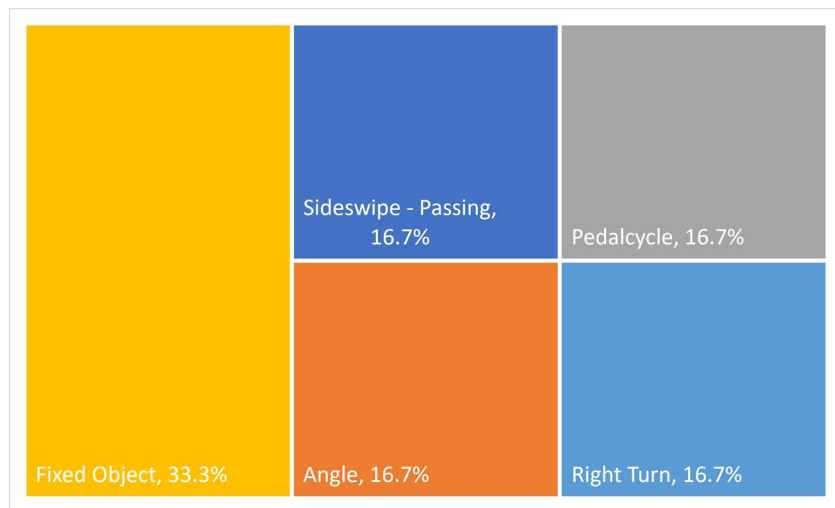
Table 24: Brint Rd. @ Mitchaw Rd. – Annual Crash Statistics

<i>Data</i>	<i>3 Years Pre-Construction</i>	<i>3 Years Post-Construction</i>	<i>% Change</i>	<i>All Years Post-Construction</i>
Dates	2007-2009	2011-2013	N/A	2011-2022
Configuration	Rural 2-Way Stop	4-Leg Roundabout	N/A	4-Leg Roundabout
Total Crashes	6	6	0.0%	22
Crashes Per Year	2	2	0.0%	2.2
Fatal Crashes	0	0	N/A	0
Serious Injury Crashes	N/A	1	0.0%	2
Minor Injury Crashes	N/A	0	N/A	1
Possible Injury Crashes	N/A (3)	1	N/A	1
PDO Crashes	3	4	33.3%	18
Severity	2.72	4.31	58.5%	2.90
Percent Injury	50.0%	33.3%	-16.7%	18.2%

Figure 48: Brint Rd. @ Mitchaw Rd. – Crash Types for 3 Years Pre-Construction



Figure 49: Brint Rd. @ Mitchaw Rd. – Crash Types for 3 Years Post-Construction



MITCHAW RD. @ SYLVANIA AVE.

Sylvania Township – Constructed in 2014

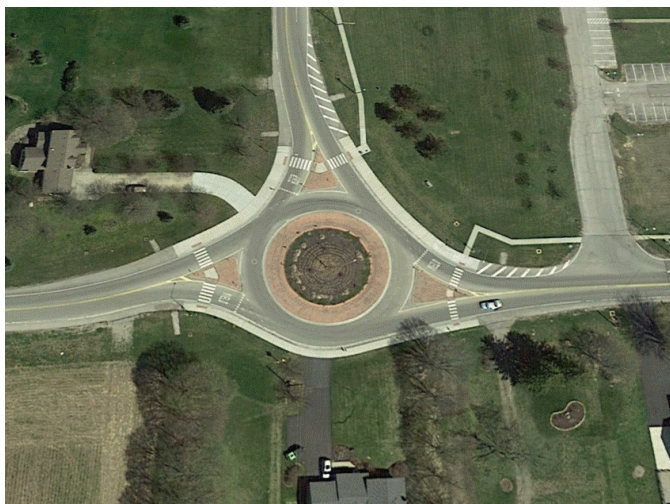


Pre-Construction



Prior to roundabout construction this location was rural 3-leg 1-way stop intersection. For the 3-year period from 2011 to 2013 there were a total of 3 crashes. During this time period there were no injury crashes and thus the crash severity rating for this time period was 1.0. The annual cost of crashes per year for the crashes at this location was \$37,842.

Post-Construction



This roundabout opened in 2014. For the 3-year period from 2015 to 2017 there were no crashes. The severity rating was 0% since there were no crashes. The annual cost of crashes per year for the crashes at this location was \$0 which was a 100% decrease.

Summary

This roundabout was constructed to improve traffic flow. There were only a few crashes in the 3 years before construction and none that were severe. In the seven years post-construction there has only been 2 total crashes and there continues to be no severe crashes.

Table 25: Mitchaw Rd. @ Sylvania Ave. – Annual Crash Statistics

<i>Data</i>	<i>3 Years Pre-Construction</i>	<i>3 Years Post-Construction</i>	<i>% Change</i>	<i>All Years Post-Construction</i>
Dates	2011-2013	2015-2017	N/A	2015-2022
Configuration	3-Leg 1-Stop Intersection	3-Leg Roundabout	N/A	3-Leg Roundabout
Total Crashes	3	0	0.0%	2
Crashes Per Year	1	0	0.0%	0.25
Fatal Crashes	0	0	0.0%	0
Serious Injury Crashes	0	0	0.0%	0
Minor Injury Crashes	0	0	0.0%	0
Possible Injury Crashes	0	0	0.0%	0
PDO Crashes	3	0	-100.0%	2
Severity	1.00	0.00	-100.0%	1.00
Percent Injury	0.0%	0.0%	0.0%	0.0%

Figure 50: Mitchaw Rd. @ Sylvania Ave. – Crash Types for 3 Years Pre-Construction

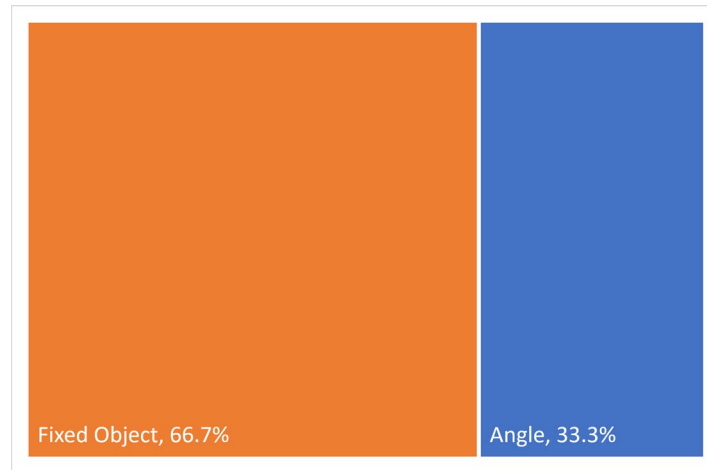
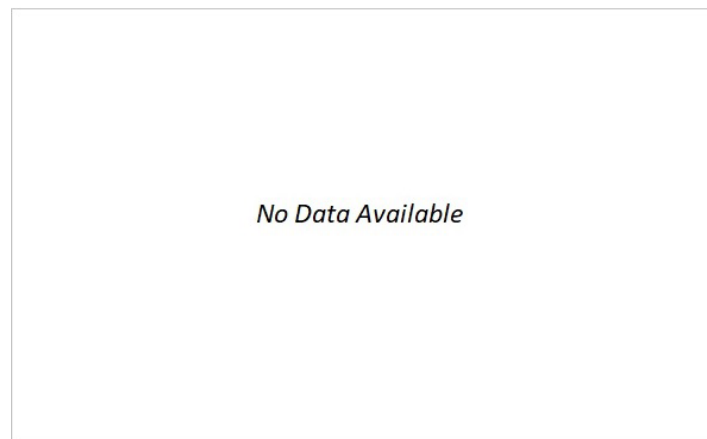


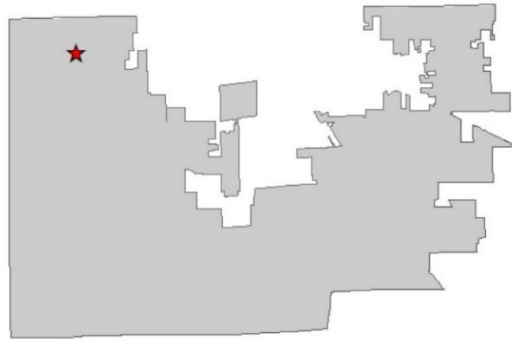
Figure 51: Mitchaw Rd. @ Sylvania Ave. – Crash Types for 3 Years Post-Construction



There were no crashes for the 3 years following construction.

MITCHAW RD. @ SYLVANIA-METAMORA RD.

Sylvania Township – Constructed in 2014



Pre-Construction



Prior to roundabout construction this location was rural 4-leg 2-way stop intersection. For the 3-year period from 2011 to 2013 there were a total of 9 crashes. During this time period 33.3% of the crashes were an injury crash. The crash severity rating for this time period was 3.82 and the annual cost of crashes per year for the crashes at this location was \$1,113,530.

Post-Construction



This roundabout opened in 2014. For the 3-year period from 2015 to 2017 there was still a total of 9 crashes. However, the severity rating has decreased 47.6% and the injury percent has decreased 11.1%. The annual cost of crashes per year for the crashes at this location is now \$143,948 which is an 87% decrease.

Summary

This roundabout has remained consistent with the number of crashes per year in the pre and post construction years. However the severity and percent injury has consistently decreased in the 8 years post-construction.

Table 26: Mitchaw Rd. @ Sylvania-Metamora Rd. – Annual Crash Statistics

<i>Data</i>	<i>3 Years Pre-Construction</i>	<i>3 Years Post-Construction</i>	<i>% Change</i>	<i>All Years Post-Construction</i>
Dates	2011-2013	2015-2017	N/A	2015-2022
Configuration	4-Leg 2-Stop Intersection	4-Leg Roundabout	N/A	4-Leg Roundabout
Total Crashes	9	9	0.0%	25
Crashes Per Year	3	3	0.0%	3.13
Fatal Crashes	0	0	0.0%	0
Serious Injury Crashes	1	0	0.0%	0
Minor Injury Crashes	1	1	0.0%	1
Possible Injury Crashes	1	1	0.0%	3
PDO Crashes	6	7	16.7%	21
Severity	3.82	2.00	-47.6%	1.63
Percent Injury	33.3%	22.2%	-11.1%	16.0%

Figure 52: Mitchaw Rd. @ Sylvania-Metamora Rd. – Crash Types for 3 Years Pre-Construction

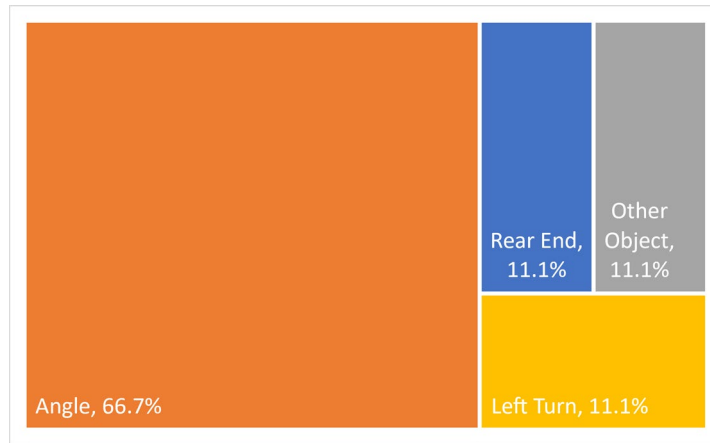
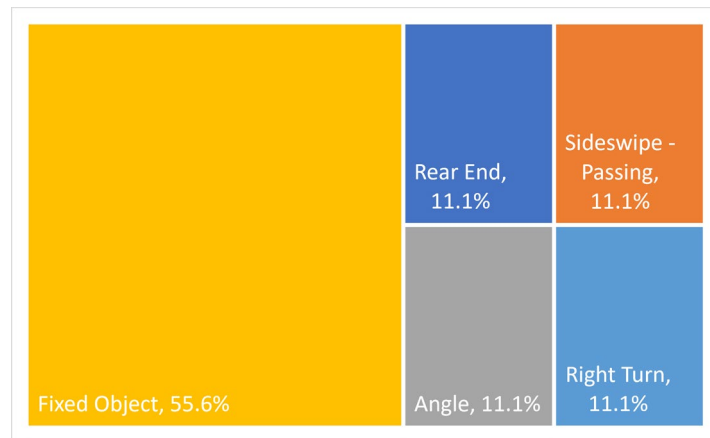
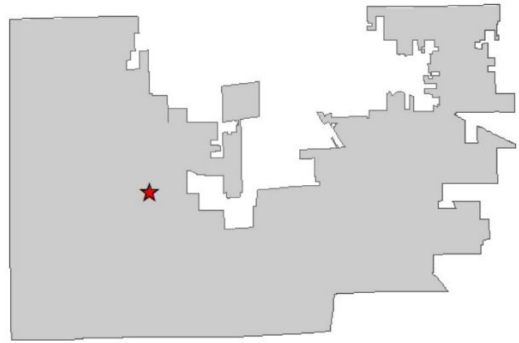


Figure 53: Mitchaw Rd. @ Sylvania-Metamora Rd. – Crash Types for 3 Years Post-Construction



CENTENNIAL RD. @ SYLVANIA RD.

Sylvania Township – Constructed in 2016



Pre-Construction



Prior to roundabout construction this location was a rural 4-way stop intersection. For the 3-year period from 2013 to 2015 there were a total of 18 crashes. A large majority of these crashes were rear end crashes. During this time period 33.3% of the crashes were an injury crash. The crash severity rating for this time period was 2.62 and the annual cost of crashes per year for the crashes at this location was \$1,259,280.

Post-Construction



This roundabout opened in 2016. For the 3-year period from 2017 to 2019 there were a total of 11 crashes. Rear end crashes have drastically reduced this location and the severity rating has decreased 42.7%. The injury percent has also decreased by 24.2% and the annual cost of crashes per year for the crashes at this location is now \$112,183 which is a 91% reduction.

Summary

At this location the number of crashes has consistently decreased in the 3 years after construction and even in the 3 years beyond that. The severity and percent injury decreased significantly as well in the 3 years after construction. The severity and percent injury have increased a bit in the following.

Table 27: Centennial Rd. @ Sylvania Rd. – Annual Crash Statistics

<i>Data</i>	<i>3 Years Pre-Construction</i>	<i>3 Years Post-Construction</i>	<i>% Change</i>	<i>All Years Post-Construction</i>
Dates	2013-2015	2017-2019	N/A	2017-2022
Configuration	4-Way Stop	4-Leg Roundabout	N/A	4-Leg Roundabout
Total Crashes	18	11	-38.9%	19
Crashes Per Year	6	3.67	-38.8%	3.17
Fatal Crashes	0	0	0.0%	0
Serious Injury Crashes	0	0	0.0%	0
Minor Injury Crashes	4	1	-75.0%	1
Possible Injury Crashes	2	0	-100.0%	3
PDO Crashes	12	10	-16.7%	15
Severity	2.62	1.50	-42.7%	1.84
Percent Injury	33.3%	9.1%	-24.2%	21.1%

Figure 54: Centennial Rd. @ Sylvania Rd. – Crash Types for 3 Years Pre-Construction

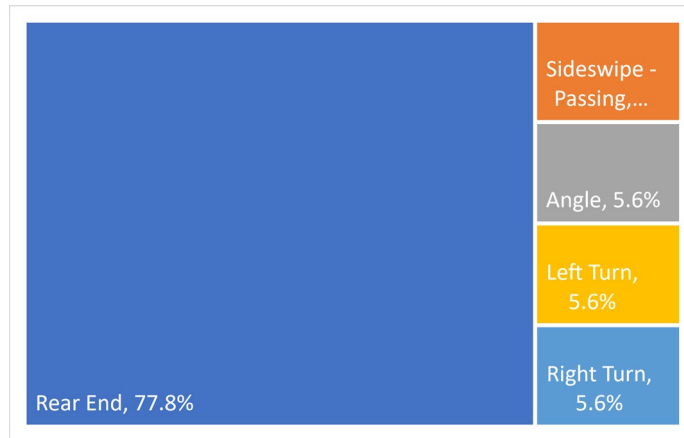
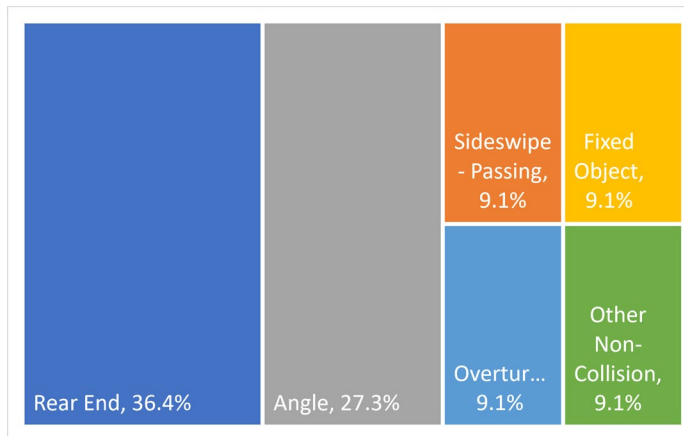
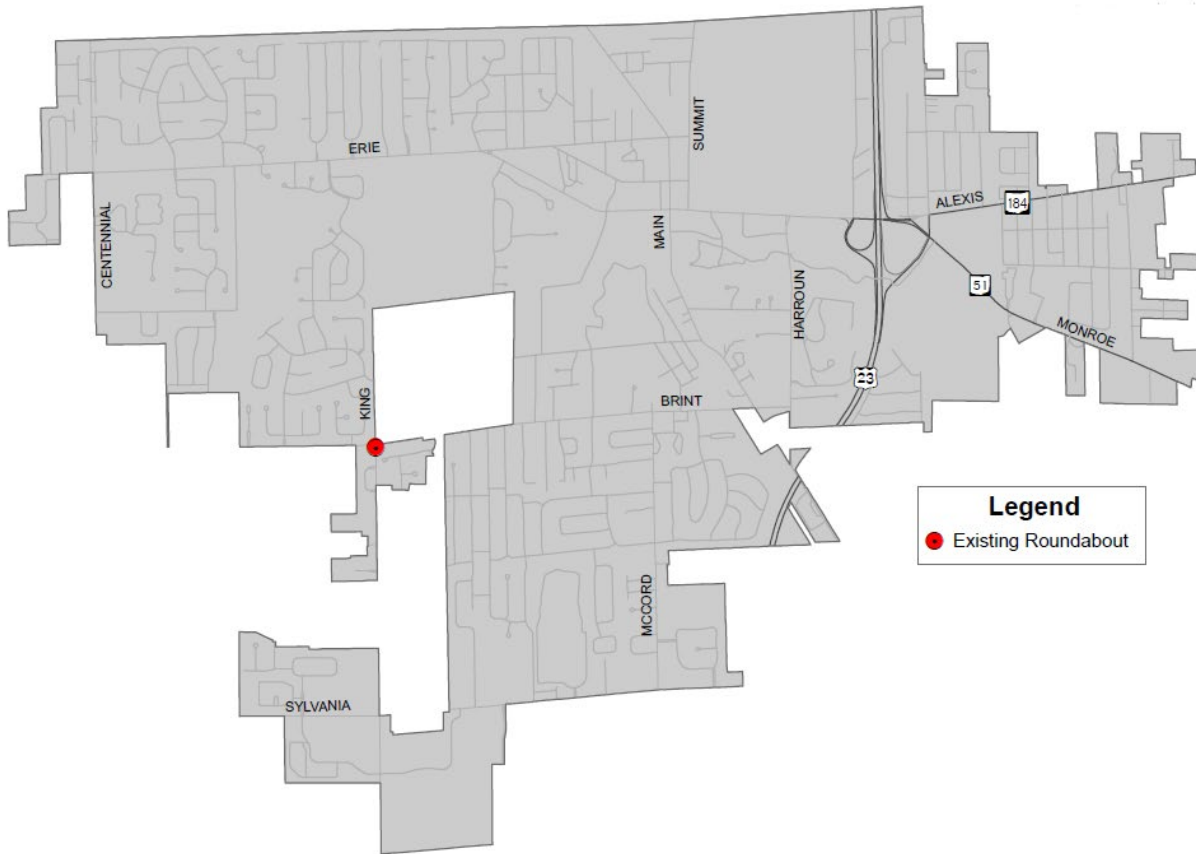


Figure 55: Centennial Rd. @ Sylvania Rd. – Crash Types for 3 Years Post-Construction



CITY OF SYLVANIA

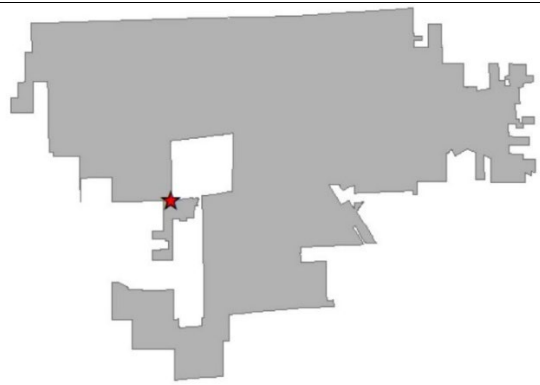
Map 4: Roundabout Locations in the City of Sylvania



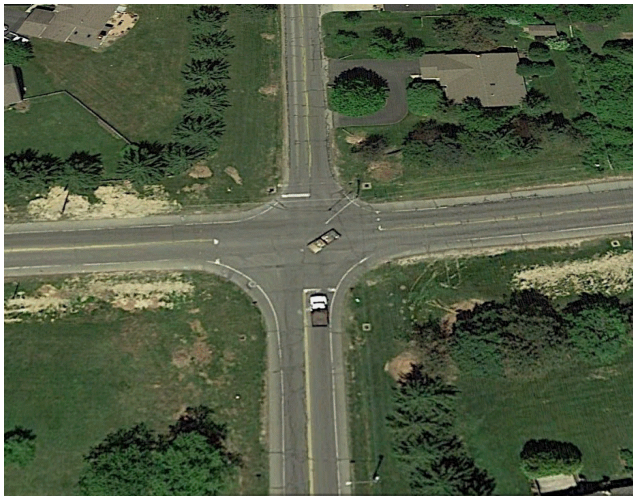
Currently in Sylvania Township there is 1 roundabout and at least 1 planned roundabout. This roundabout was constructed in 2014.

BRINT RD. @ KING RD.

City of Sylvania – Constructed in 2014



Pre-Construction



Prior to roundabout construction this location was a rural 4-way stop intersection. For the 3-year period from 2011 to 2013 there were a total of 10 crashes. All 5 of these crashes were angle crashes. During this time period 40% of the crashes were an injury or fatal crash. The crash severity rating for this time period was 21.61 and the annual cost of crashes per year for the crashes at this location was \$4,175,163.

Post-Construction



This roundabout opened in 2016. For the 3-year period from 2017 to 2019 there have been a total of 10 crashes. Of these 10 crashes none of them are injury crashes which bring the crash severity to 1.00 which is a 95.4% decrease and the percent injury to 0% which is a 40% decrease. The annual cost of crashes per year for the crashes at this location is now \$42,047 which is a 99% reduction.

Summary

This roundabout has remained consistent with the number of crashes per year in the pre and post construction years. However the severity and percent injury has decreased significantly post-construction resulting in a much safer intersection.

Table 28: Brint Rd. @ King Rd. – Annual Crash Statistics

<i>Data</i>	<i>3 Years Pre-Construction</i>	<i>3 Years Post-Construction</i>	<i>% Change</i>	<i>All Years Post-Construction</i>
Dates	2011-2013	2015-2017	N/A	2015-2022
Configuration	4-way stop	4-Leg Roundabout	N/A	4-Leg Roundabout
Total Crashes	10	10	0.0%	23
Crashes Per Year	3.33	3.33	0.0%	2.88
Fatal Crashes	1	0	-100.0%	0
Serious Injury Crashes	0	0	0.0%	0
Minor Injury Crashes	1	0	-100.0%	0
Possible Injury Crashes	2	0	-100.0%	1
PDO Crashes	6	10	66.7%	22
Severity	21.61	1.00	-95.4%	1.15
Percent Injury	40.0%	0.0%	-40.0%	4.3%

Figure 56: Brint Rd. @ King Rd. – Crash Types for 3 Years Pre-Construction

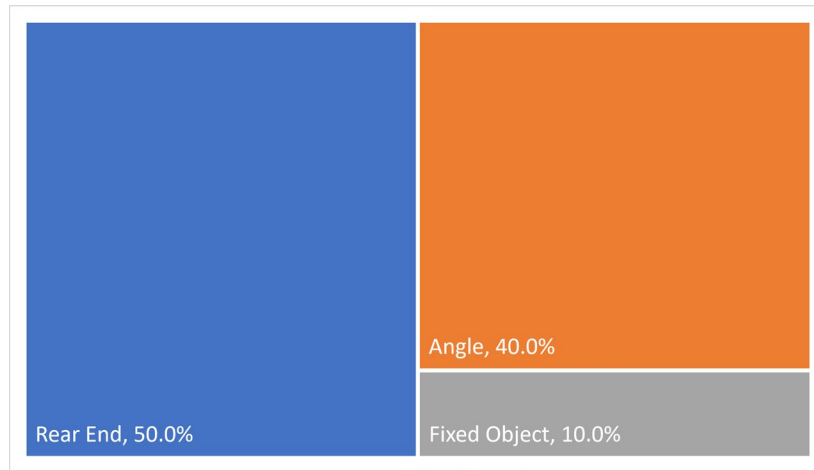
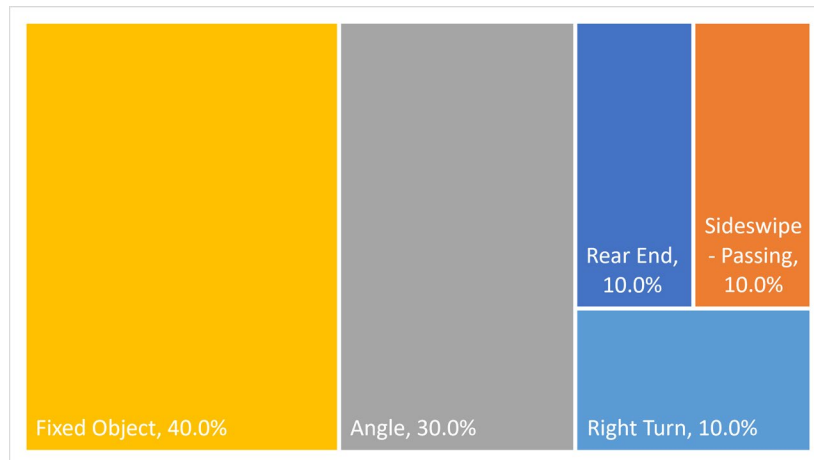
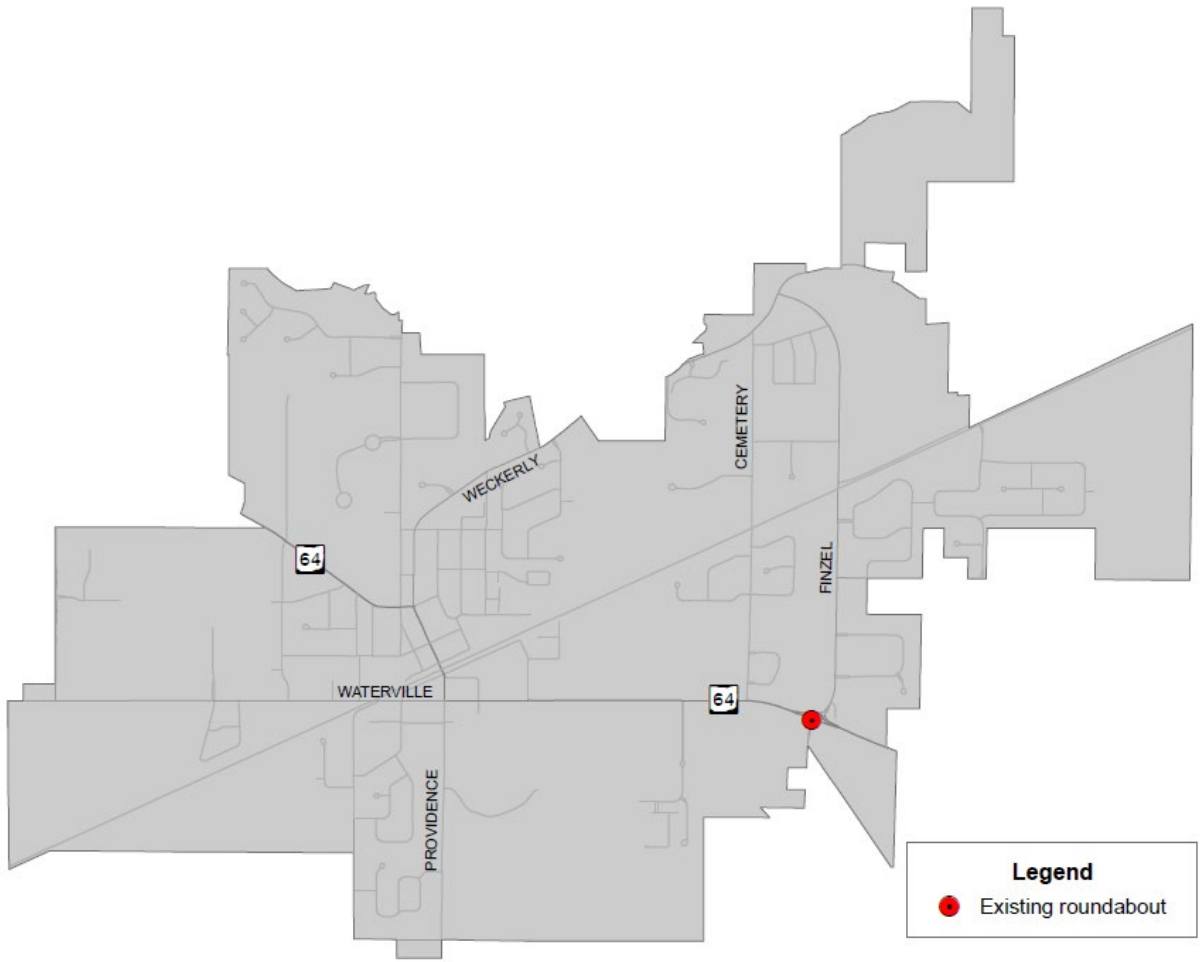


Figure 57: Brint Rd. @ King Rd. – Crash Types for 3 Years Post-Construction



VILLAGE OF WHITEHOUSE

Map 7: Roundabout Locations in the Village of Whitehouse



Currently in the Village of Waterville there is 1 roundabout. This roundabout was constructed in 2015.

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FINZEL RD. @ WATERVILLE-SWANTON RD.

Village of Whitehouse – Constructed in 2015



Pre-Construction



Prior to roundabout construction this location was a rural offset 2-way stop intersection. For the 3-year period from 2012 to 2014 there were a total of 19 crashes. A majority of these crashes were rear end crashes. During this time period 42.1% of the crashes were an injury crash. The crash severity rating for this time period was 2.89 and the annual cost of crashes per year for the crashes at this location was \$504,313.

Post-Construction



This roundabout opened in 2015. For the 3-year period from 2016 to 2018 and there have been a total of 16 crashes. Rear end crashes have been greatly reduced from this location and the severity rating has decreased 26.6%. The injury percent has reduced 17.1% and the annual cost of crashes per year for the crashes at this location is now \$279,487 which is a 45% reduction.

Summary

Crashes per year are about the same in the 3 years following construction. However in the 4 years beyond that the crashes per year have decreased. The severity and percent injury decreased post construction and remain consistent beyond the 3 years.

Table 31: Finzel Rd. @ Waterville-Swanton Rd. – Annual Crash Statistics

<i>Data</i>	<i>3 Years Pre-Construction</i>	<i>3 Years Post-Construction</i>	<i>% Change</i>	<i>All Years Post-Construction</i>
<i>Dates</i>	2012-2014	2016-2018	N/A	2016-2022
<i>Configuration</i>	Off-Set 2-Way Stop	4-Leg Roundabout	N/A	4-Leg Roundabout
<i>Total Crashes</i>	19	16	-15.8%	24
<i>Crashes Per Year</i>	6.33	5.33	-15.8%	3.43
<i>Fatal Crashes</i>	0	0	0.0%	0
<i>Serious Injury Crashes</i>	0	0	0.0%	0
<i>Minor Injury Crashes</i>	4	2	-50.0%	4
<i>Possible Injury Crashes</i>	4	2	-50.0%	3
<i>PDO Crashes</i>	11	12	9.1%	17
<i>Severity</i>	2.89	2.12	-26.6%	2.36
<i>Percent Injury</i>	42.1%	25.0%	-17.1%	29.2%

Figure 62: Finzel Rd. @ Waterville-Swanton Rd. – Crash Types for 3 Years Pre-Construction

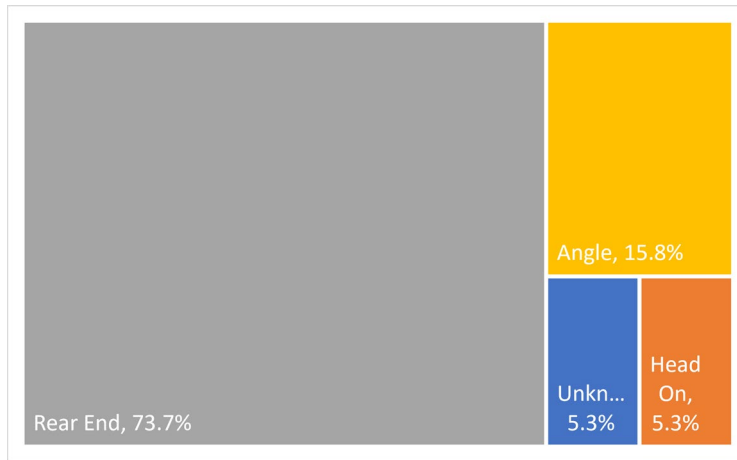
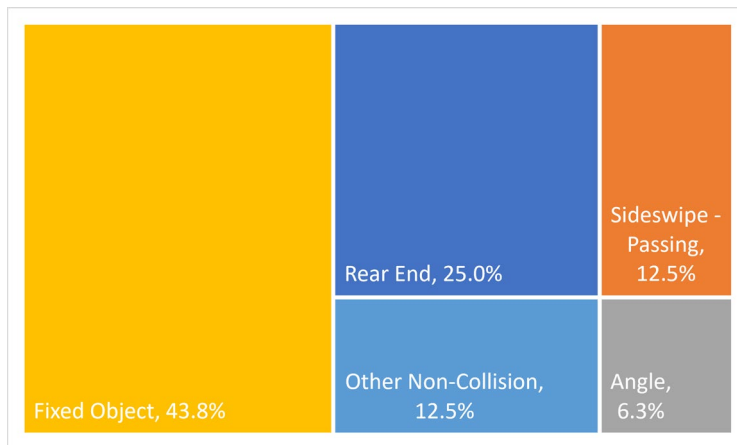
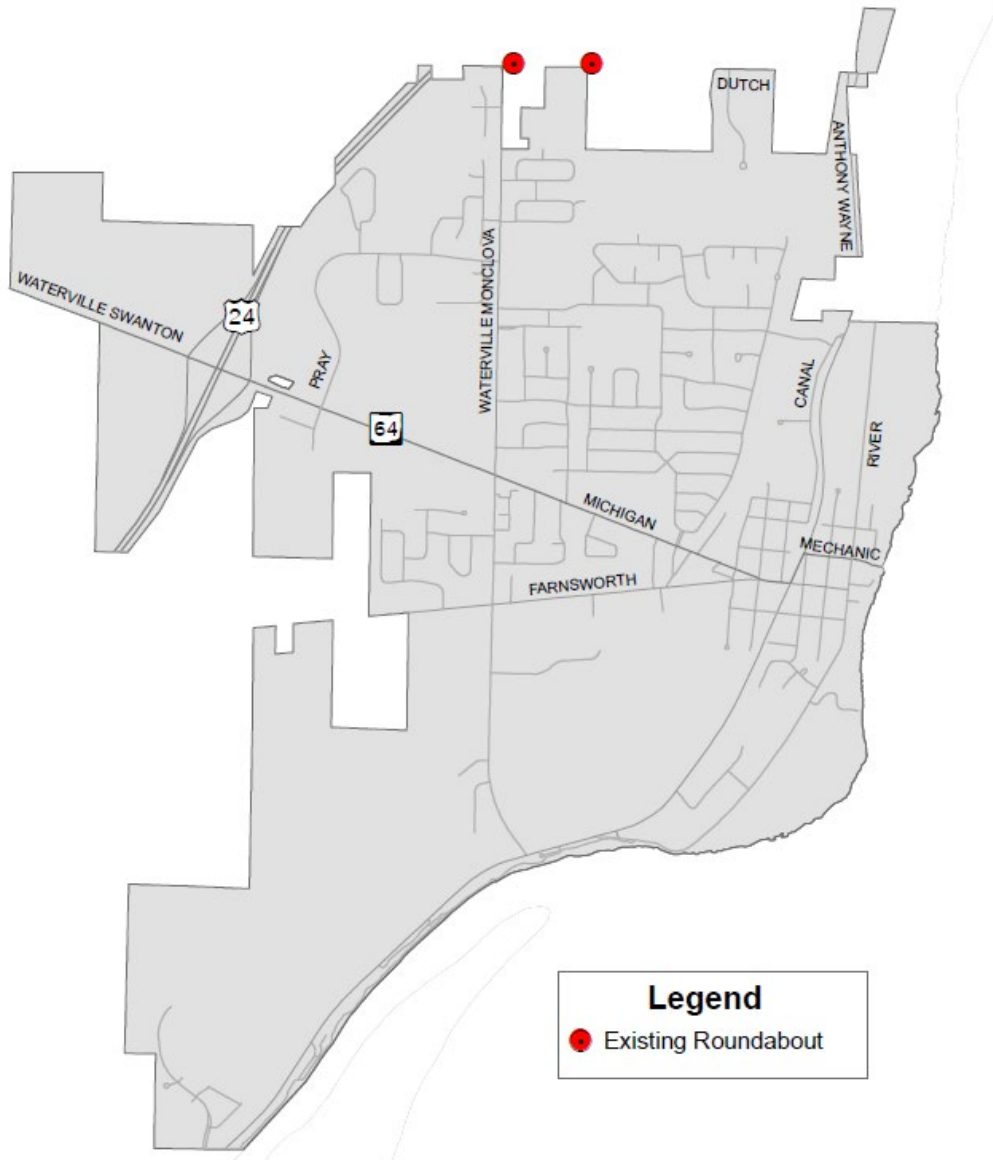


Figure 63: Finzel Rd. @ Waterville-Swanton Rd. – Crash Types for 3 Years Post-Construction



CITY OF WATERVILLE

Map 7: Roundabout Locations in the City of Waterville



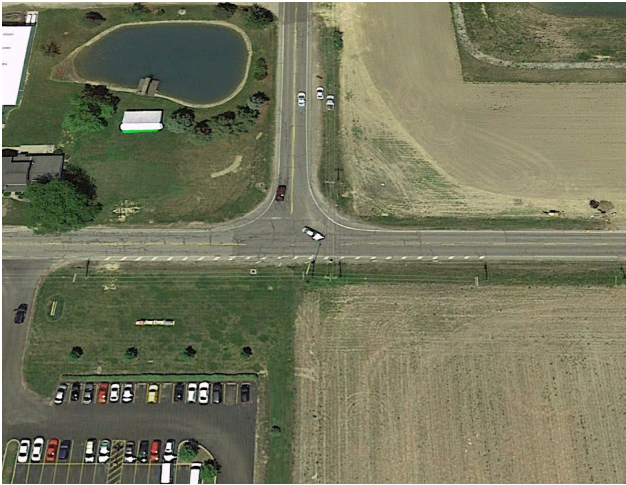
Currently in the City of Waterville there are 2 roundabouts. Both of these roundabouts were constructed at the same time in 2014.

DUTCH RD. @ WATERVILLE-MONCLOVA RD. NORTH

City of Waterville – Constructed in 2014



Pre-Construction



Prior to roundabout construction this location was rural 3-leg 1-way stop intersection. For the 3-year period from 2011 to 2013 there were a total of 11 crashes. During this time period 36.4% of the crashes were an injury crash. The crash severity rating for this time period was 3.81 and the annual cost of crashes per year for the crashes at this location was \$445,518.

Post-Construction



This roundabout opened in 2014. For the 3-year period from 2015 to 2017 there were a total of 3 crashes. The severity rating is now 2.15 which is a 43.6% decrease. The annual cost of crashes per year for the crashes at this location is now \$52,788 which is an 88% decrease.

Summary

This roundabout combined with the other roundabout at Waterville-Monclova South have performed well after construction. Severity, percent injury, and crashes per year have all decreased. The one fatality that happened post-construction was alcohol related.

Table 32: Dutch Rd. @ Waterville-Monclova Rd. North – Annual Crash Statistics

<i>Data</i>	<i>3 Years Pre-Construction</i>	<i>3 Years Post-Construction</i>	<i>% Change</i>	<i>All Years Post-Construction</i>
Dates	2011-2013	2015-2017	N/A	2015-2022
Configuration	3-Leg 1-Stop Intersection	4-Leg Roundabout	N/A	4-Leg Roundabout
Total Crashes	11	3	-72.7%	17
Crashes Per Year	3.67	1	-72.8%	2.13
Fatal Crashes	0	0	0.0%	1
Serious Injury Crashes	1	0	-100.0%	0
Minor Injury Crashes	2	0	-100.0%	0
Possible Injury Crashes	1	1	0.0%	2
PDO Crashes	7	2	-71.4%	14
Severity	3.81	2.15	-43.6%	12.79
Percent Injury	36.4%	33.3%	-3.1%	17.6%

Figure 64: Dutch Rd. @ Waterville-Monclova Rd. North – Crash Types for 3 Years Pre-Construction

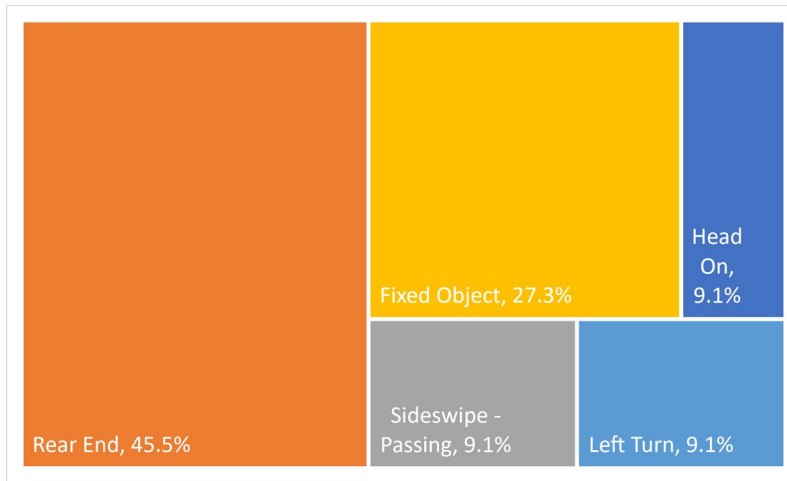


Figure 65: Dutch Rd. @ Waterville-Monclova Rd. North – Crash Types for 3 Years Post-Construction



DUTCH RD. @ WATERVILLE- MONCLOVA RD. SOUTH

City of Waterville – Constructed in 2014



Pre-Construction



Prior to roundabout construction this location was rural 3-leg 1-way stop intersection. For the 3-year period from 2017 to 2019 there were a total of 11 crashes. During this time period 54.5% of the crashes were an injury crash. The crash severity rating for this time period was 20.93 and the annual cost of crashes per year for the crashes at this location was \$4,336,990.

Post-Construction



This roundabout opened in 2014. For the 3-year period from 2015 to 2017 there were a total of 2 crashes. The severity rating at this location is now 9.21 and the injury percent is now 50%. The annual cost of crashes per year for the crashes at this location is now \$235,638 which is a 95% decrease.

Summary

Nearly all the metrics decreased post-construction for this roundabout. In fact there has been only 1 injury crash at this location in the 8 years after construction.

Table 33: Dutch Rd. @ Waterville-Monclova Rd. South – Annual Crash Statistics

<i>Data</i>	<i>3 Years Pre-Construction</i>	<i>3 Years Post-Construction</i>	<i>% Change</i>	<i>All Years Post-Construction</i>
Dates	2011-2013	2015-2017	N/A	2015-2022
Configuration	3-Leg 1-Stop Intersection	3-Leg Roundabout	N/A	3-Leg Roundabout
Total Crashes	11	2	-81.8%	6
Crashes Per Year	2.67	0.67	-74.9%	0.75
Fatal Crashes	1	0	-100.0%	0
Serious Injury Crashes	0	1	N/A	1
Minor Injury Crashes	4	0	-100.0%	0
Possible Injury Crashes	1	0	-100.0%	0
PDO Crashes	5	1	-80.0%	5
Severity	20.93	9.21	-56.0%	3.74
Percent Injury	54.5%	50.0%	-4.5%	16.7%

Figure 66: Dutch Rd. @ Waterville-Monclova Rd. South – Crash Types for 3 Years Pre-Construction

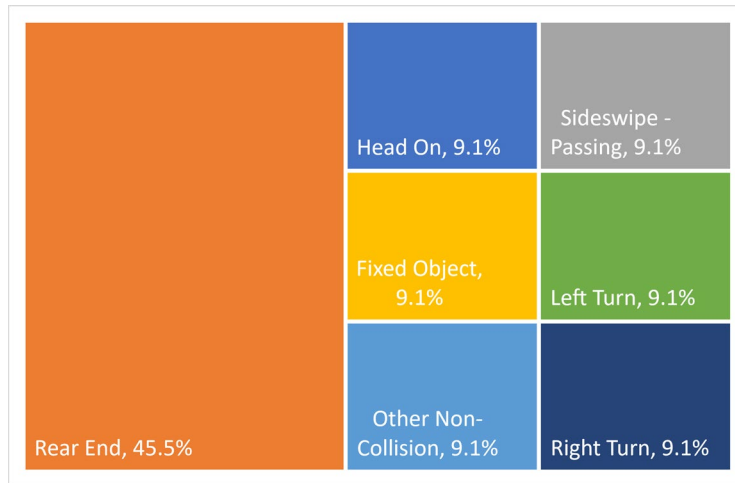
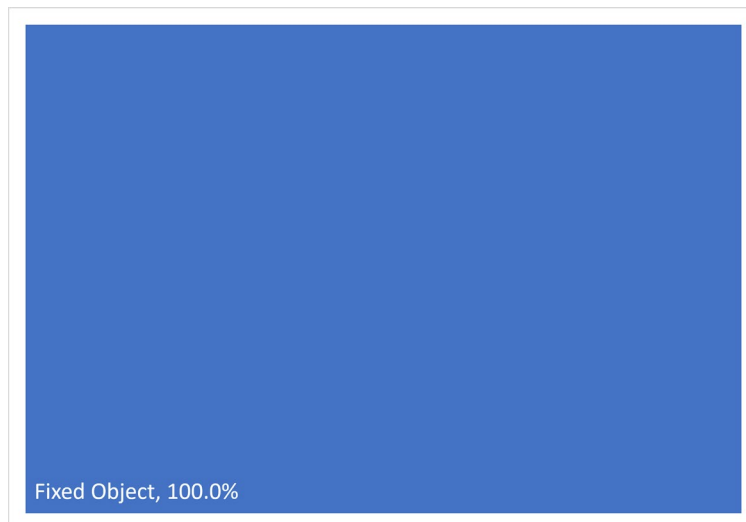
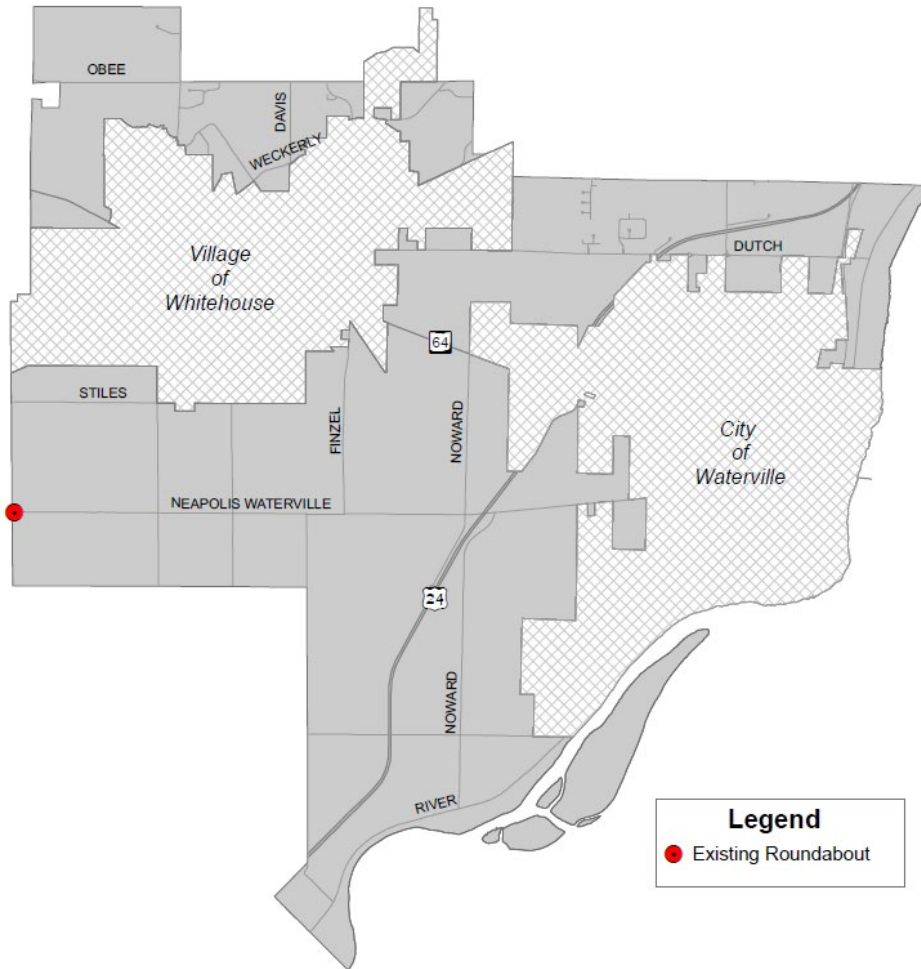


Figure 67: Dutch Rd. @ Waterville-Monclova Rd. South – Crash Types for 3 Years Post-Construction



WATERVILLE TOWNSHIP

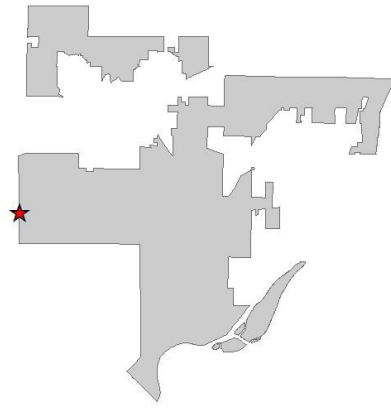
Map 7: Roundabout Locations in Waterville Township



Currently in Waterville Township there is 1 roundabout. This roundabout just finished construction last year in 2022.

BERKEY-SOUTHERN RD. @ NEAPOLIS-WATERVILLE RD.

Waterville Township – Constructed in 2022

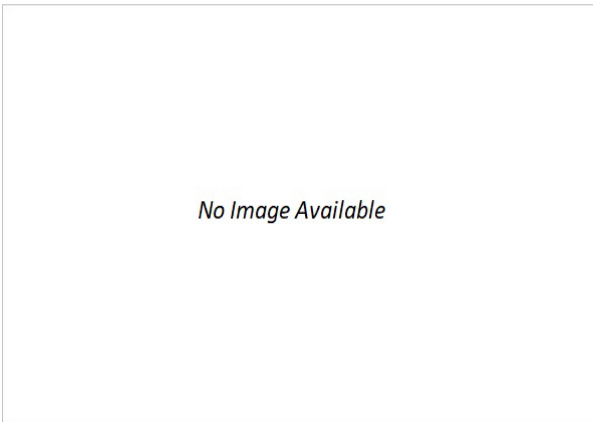


Pre-Construction



Prior to roundabout construction this location was a rural 4-leg 2-way stop intersection. For the 3-year period from 2019 to 2021 there were a total of 9 crashes. All 5 of these crashes were angle crashes. A majority of these crashes were angle crashes that tend to be more severe in nature. During this time period 44.4% of the crashes were an injury crash. The crash severity rating for this time period was 3.47 and the annual cost of crashes per year for the crashes at this location was \$301,570.

Post-Construction



This roundabout opened in late 2022 and thus there is no post-construction data yet.

Summary

Prior to construction there was an abnormally high number of crashes per year happening at this rural location and the percent injury was nearly 50%. This roundabout has been open less than a year so there is no post construction data, but this roundabout should help to alleviate the injury crashes.

Table 34: Berkey-Southern Rd. @ Neapolis-Waterville Rd. – Annual Crash Statistics

<i>Data</i>	<i>3 Years Pre-Construction</i>	<i>No Post-Construction Data</i>	<i>% Change</i>
<i>Dates</i>	2019-2021	N/A	N/A
<i>Configuration</i>	4-Leg 2-Way Sop Intersection	N/A	N/A
<i>Total Crashes</i>	9	N/A	N/A
<i>Crashes Per Year</i>	3.00	N/A	N/A
<i>Fatal Crashes</i>	0	N/A	N/A
<i>Serious Injury Crashes</i>	0	N/A	N/A
<i>Minor Injury Crashes</i>	4	N/A	N/A
<i>Possible Injury Crashes</i>	0	N/A	N/A
<i>PDO Crashes</i>	5	N/A	N/A
<i>Severity</i>	3.47	N/A	N/A
<i>Percent Injury</i>	44.4%	N/A	N/A

Figure 68: Berkey-Southern Rd. @ Neapolis-Waterville Rd. – Crash Types for 3 Years Pre-Construction

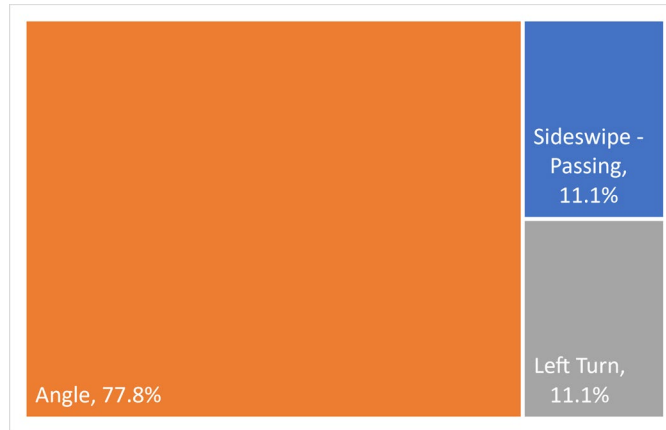
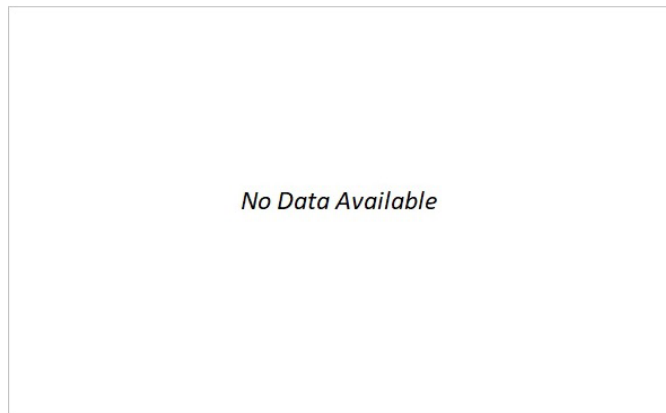


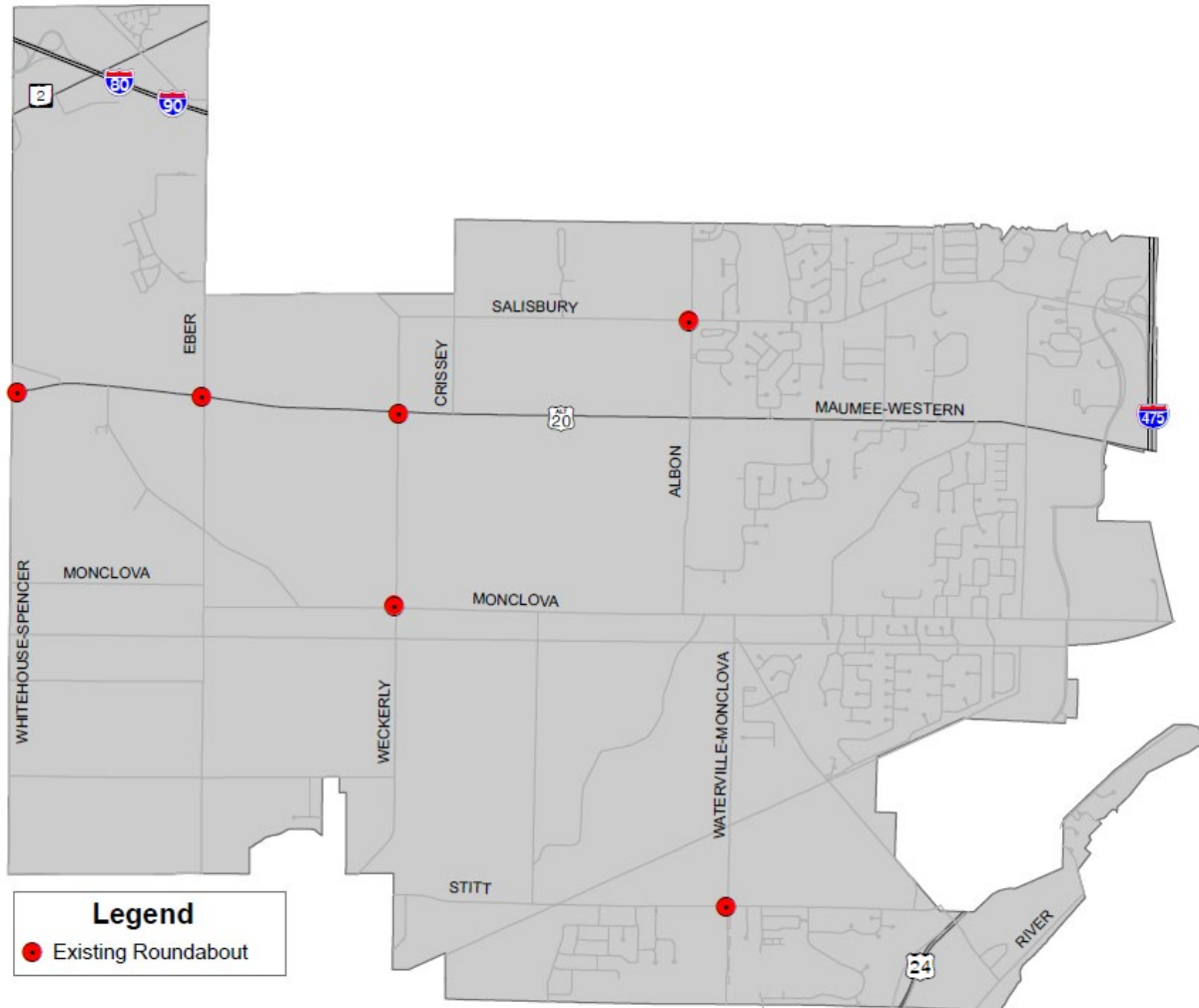
Figure 69: Berkey-Southern Rd. @ Neapolis-Waterville Rd. – Crash Types for 3 Years Pre-Construction



Roundabout was just completed in 2022 so there is no post-construction crash data.

MONCLOVA TOWNSHIP

Map 9: Roundabout Locations in Monclova Township

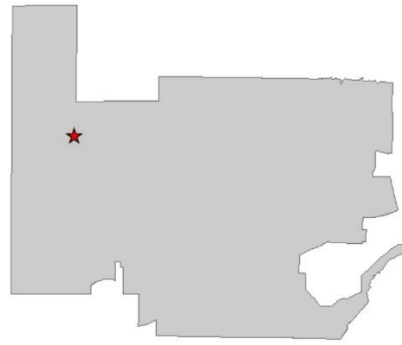


Currently in Monclova Township there are 6 roundabouts. There are also at least 3 planned roundabouts in the township. The first 2 roundabouts in the township were constructed in 2015 and the last one was constructed just last year (2022).

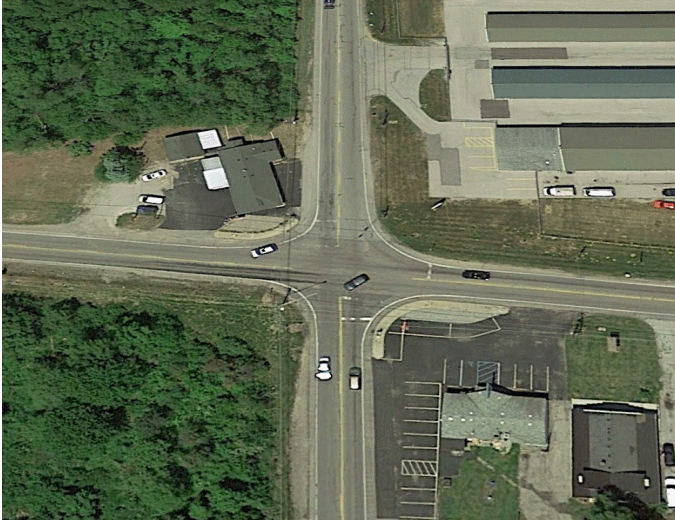
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EBER RD. @ MAUMEE-WESTERN RD. (US 20A)

Monclova Township – Constructed in 2015



Pre-Construction



Prior to roundabout construction this location was a rural 4-way stop intersection. For the 3-year period from 2012 to 2014 there were a total of 6 crashes. During this time period 33.3% of the crashes were an injury crash. The crash severity rating for this time period was 4.26 and the annual cost of crashes per year for the crashes at this location was \$318,389.

Post-Construction



This roundabout opened in 2015. For the 3-year period from 2016 to 2018 there was a total of 10 crashes. The severity rating is now 2.80 which has decreased 39.9%. The injury percent has increased 6.7%, but the annual cost of crashes per year for the crashes at this location is now \$254,259 which is a 20% reduction.

Summary

This roundabout is part of a series of 4 roundabouts designed to improve traffic flow along the US 20A corridor. Crash per year have largely remained the same except for severity which has improved greatly.

Table 44: Eber Rd. @ Maumee-Western Rd. – Annual Crash Statistics

<i>Data</i>	<i>3 Years Pre-Construction</i>	<i>3 Years Post-Construction</i>	<i>% Change</i>	<i>All Years Post-Construction</i>
Dates	2012-2014	2016-2018	N/A	2016-2022
Configuration	4-Way Stop	4-Leg Roundabout	N/A	4-Leg Roundabout
Total Crashes	6	10	66.7%	18
Crashes Per Year	2	2.8	40.0%	2.57
Fatal Crashes	0	0	0.0%	0
Serious Injury Crashes	1	0	N/A	0
Minor Injury Crashes	1	2	100.0%	5
Possible Injury Crashes	0	2	N/A	2
PDO Crashes	4	6	50.0%	11
Severity	4.66	2.80	-39.9%	2.92
Percent Injury	33.3%	40.0%	6.7%	38.9%

Figure 88: Eber Rd. @ Maumee-Western Rd. – Crash Types for 3 Years Pre-Construction

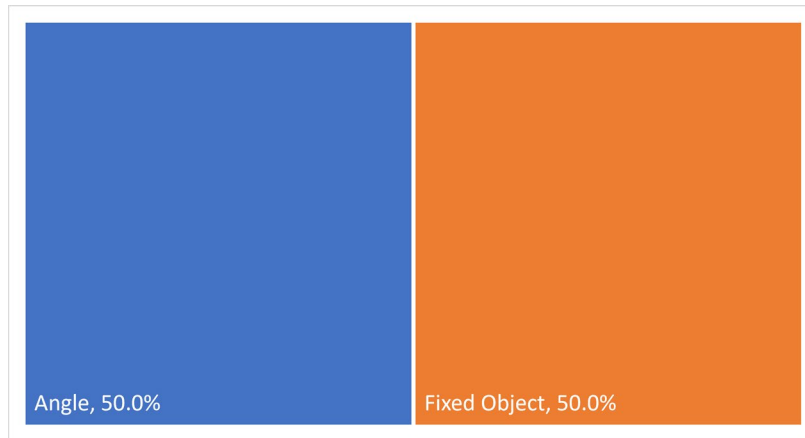
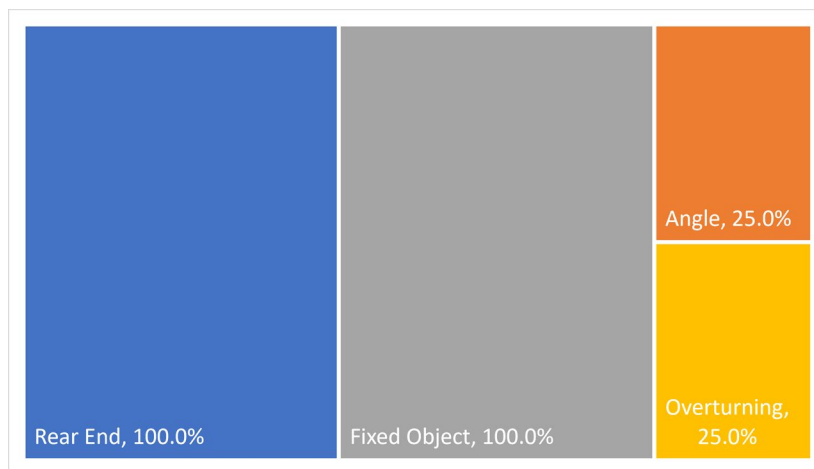
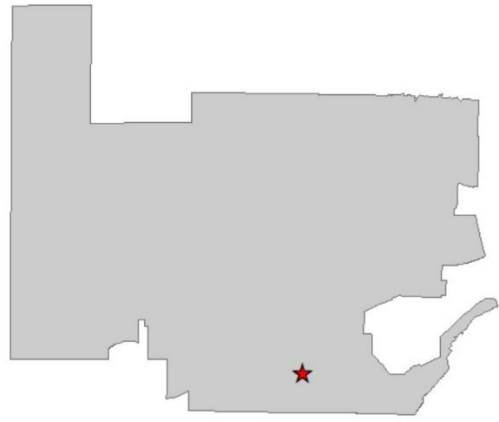


Figure 89: Eber Rd. @ Maumee-Western Rd. – Crash Types for 3 Years Post-Construction

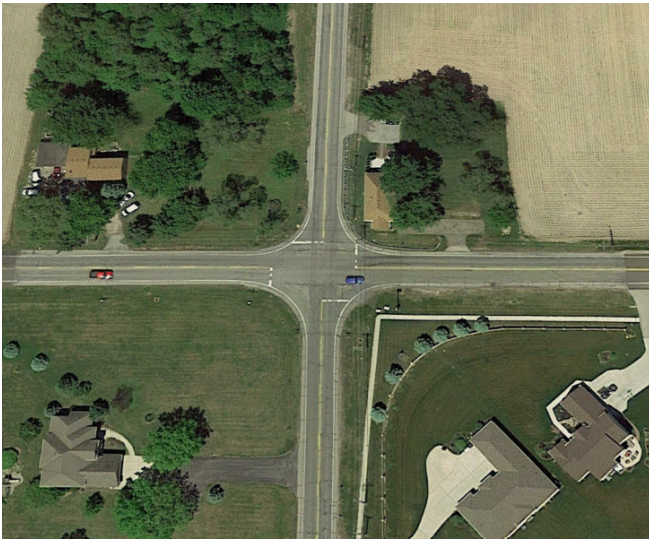


STITT RD. @ WATERVILLE-MONCLOVA RD.

Monclova Township – Constructed in 2015



Pre-Construction



Prior to roundabout construction this location was a rural 4-way stop intersection. For the 3-year period from 2012 to 2014 there were a total of 6 crashes. During this time period 33.3% of the crashes were an injury crash. The crash severity rating for this time period was 2.50 and the annual cost of crashes per year for the crashes at this location was \$131,334.

Post-Construction



This roundabout opened in 2015. For the 3-year period from 2016 to 2018 there were a total of 2 crashes. The severity rating has decreased 60% and the injury percent has decreased 33.3%. The annual cost of crashes per year for the crashes at this location is now \$8,409 which is a 94% decrease.

Summary

Prior to construction there was 2 crashes per year at this location and there were injury crashes that occurred. Post-construction the crashes per year has decreased by more than half and there are no longer any injury crashes happening.

Table 45: Stitt Rd. @ Waterville-Monclova Rd. – Annual Crash Statistics

<i>Data</i>	<i>3 Years Pre-Construction</i>	<i>3 Years Post-Construction</i>	<i>% Change</i>	<i>All Years Post-Construction</i>
Dates	2012-2014	2016-2018	N/A	2016-2022
Configuration	4-Way Stop	4-Leg Roundabout	N/A	4-Leg Roundabout
Total Crashes	6	2	-66.7%	15
Crashes Per Year	2	0.67	-66.5%	2.14
Fatal Crashes	0	0	0.0%	0
Serious Injury Crashes	0	0	0.0%	0
Minor Injury Crashes	1	0	-100.0%	2
Possible Injury Crashes	1	0	-100.0%	0
PDO Crashes	4	2	-50.0%	13
Severity	2.50	1.00	-60.0%	1.74
Percent Injury	33.3%	0.0%	-33.3%	13.3%

Figure 90: Stitt Rd. @ Waterville-Monclova Rd. – Crash Types for 3 Years Pre-Construction

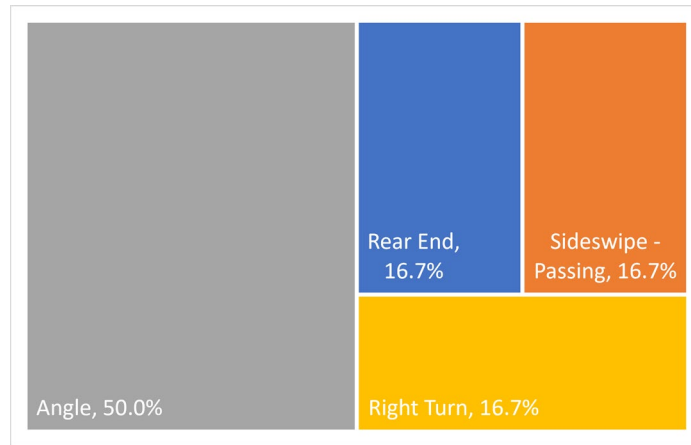
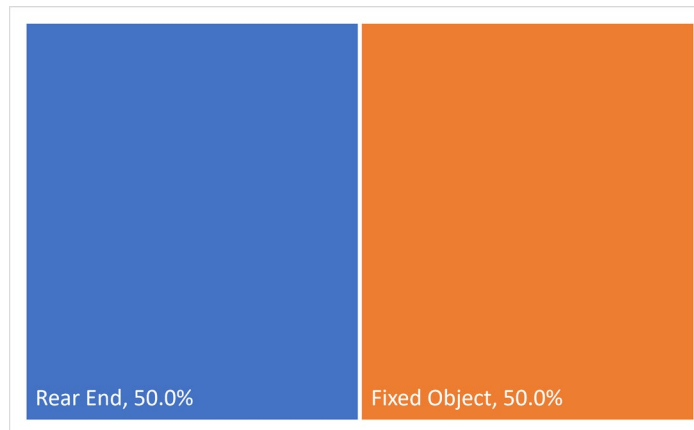


Figure 91: Stitt Rd. @ Waterville-Monclova Rd. – Crash Types for 3 Years Post-Construction



MAUMEE-WESTERN RD. (US 20A) @ WECKERLY RD.

Monclova Township – Constructed in 2020



Pre-Construction



Prior to roundabout construction this location was rural 4-leg 2-way stop intersection. For the 3-year period from 2017 to 2019 there were a total of 10 crashes. A Majority of these crashes were angle crashes that tend to be more severe in nature. During this time period 70% of the crashes were an injury crash. The crash severity rating for this time period was 6.85 and the annual cost of crashes per year for the crashes at this location was \$800,406.

Post-Construction



This roundabout opened in 2020. For the 2-year period from 2021 to 2022 there have been 0 crashes. Since crashes have been eliminated so far the severity rating is 0.0 and the annual cost of crashes per year for the crashes at this location is \$0 which is 100% decrease.

Summary

This roundabout is part of a series of 4 roundabouts designed to improve traffic flow along the US 20A corridor. Prior to construction the percent injury and severity were quite high. There has been only 2 years post-construction, but so far there has been no crashes at all at this location.

Table 47: Maumee-Western Rd. (US 20A) @ Weckerly Rd. – Annual Crash Statistics

<i>Data</i>	<i>3 Years Pre-Construction</i>	<i>2 Years Post-Construction</i>	<i>% Change</i>
Dates	2017-2019	2021-2022	N/A
Configuration	Rural 4-Way 2-Stop Intersection	Rural 4-Leg Roundabout	N/A
Total Crashes	10	0	-100.0%
Crashes Per Year	3.33	0	-100.0%
Fatal Crashes	0	0	0.0%
Serious Injury Crashes	2	0	0.0%
Minor Injury Crashes	4	0	0.0%
Possible Injury Crashes	1	0	0.0%
PDO Crashes	3	0	-100.0%
Severity	6.85	0.00	-100.0%
Percent Injury	70.0%	0.0%	-70.0%

Figure 94: Maumee-Western Rd. (US 20A) @ Weckerly Rd. – Crash Types for 3 Years Pre-Construction

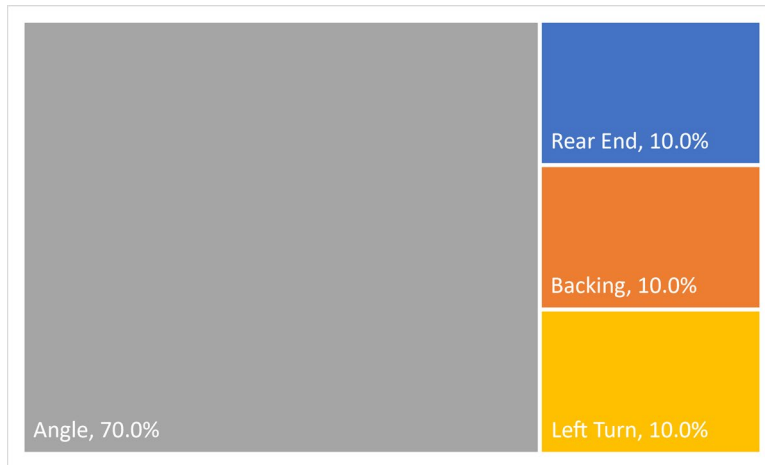
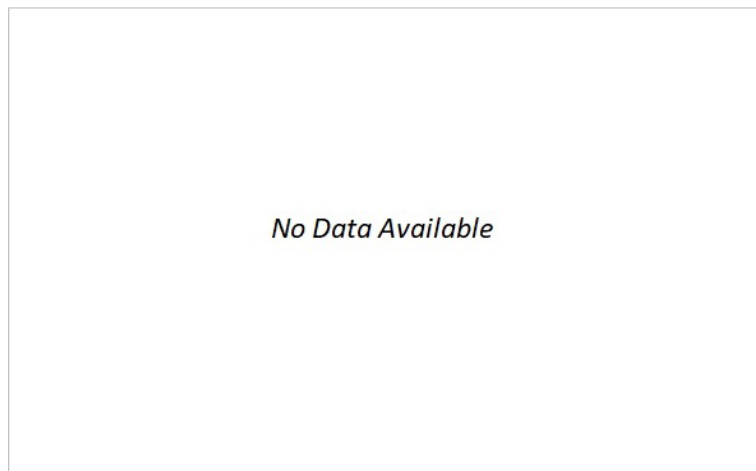


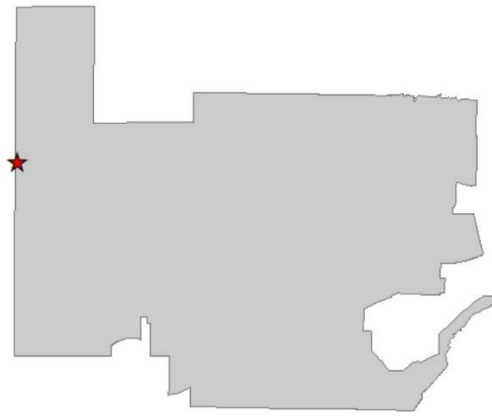
Figure 95: Maumee-Western Rd. (US 20A) @ Weckerly Rd. – Crash Types for 2-Years Post-Construction



There have been no crashes for the 2 years following construction.

MAUMEE-WESTERN RD. @ WHITEHOUSE-SPENCER RD.

Monclova Township – Constructed in 2020



Pre-Construction



Prior to roundabout construction this location was a rural 4-leg 2-way stop intersection. For the 3-year period from 2017 to 2019 there were a total of 2 crashes. During this time period 50% of the crashes were an injury crash. The crash severity rating for this time period was 3.78 and the annual cost of crashes per year for the crashes at this location was \$74,341.

Post-Construction



This roundabout opened in 2020. For the 2-year period from 2021 to 2022 there have been a total of 4 crashes. The severity rating is now 3.25 which is a 14% decrease. The annual cost of crashes per year for the crashes at this location is now \$122,925 which is a 65% increase.

Summary

This roundabout is part of a series of 4 roundabouts designed to improve traffic flow along the US 20A corridor. Prior to construction there were very few crashes happening here and that trend has mostly continued post construction with a slight improvement in severity.

Table 48: Maumee-Western Rd. @ Whitehouse-Spencer Rd. – Annual Crash Statistics

<i>Data</i>	<i>3 Years Pre-Construction</i>	<i>2 Years Post-Construction</i>	<i>% Change</i>
Dates	2017-2019	2021-2022	N/A
Configuration	4-Way 2-Stop Intersection	4-Leg Roundabout	N/A
Total Crashes	2	4	100.0%
Crashes Per Year	0.67	1.33	98.5%
Fatal Crashes	0	0	0.0%
Serious Injury Crashes	0	0	0.0%
Minor Injury Crashes	1	1	0.0%
Possible Injury Crashes	0	1	0.0%
PDO Crashes	1	2	100.0%
Severity	3.78	3.25	-14.0%
Percent Injury	50.0%	50.0%	0.0%

Figure 96: Maumee-Western Rd. @ Whitehouse-Spencer Rd. – Crash Types for 3 Years Pre-Construction

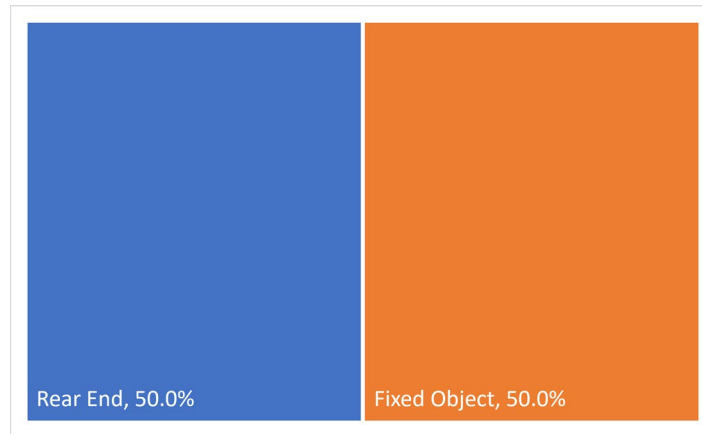
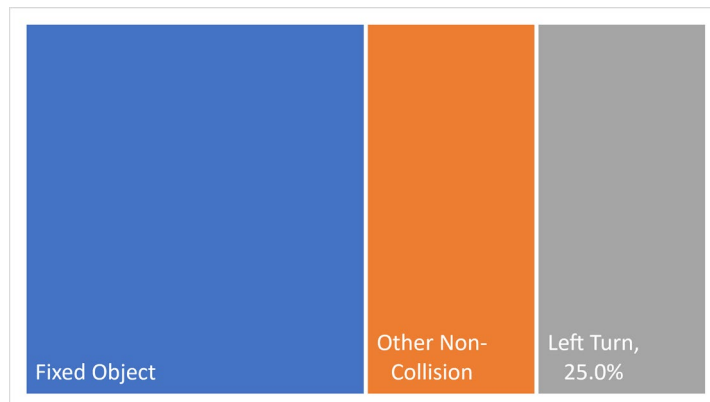
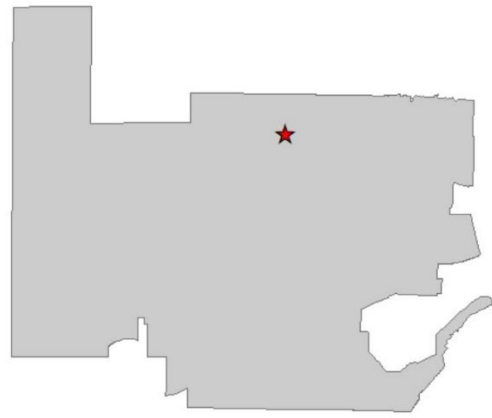


Figure 97: Maumee-Western Rd. @ Whitehouse-Spencer Rd. – Crash Types for 2-Years Post-Construction



ALBON RD. @ SALISBURY RD.

Monclova Township – Constructed in 2020



Pre-Construction



Prior to roundabout construction this location was a rural 4-way stop intersection. For the 3-year period from 2017 to 2019 there were a total of 5 crashes. All 5 of these crashes were angle crashes, which tend to be more severe in nature. During this time period 60% of the crashes were an injury crash. The crash severity rating for this time period was 3.49 and the annual cost of crashes per year for the crashes at this location was \$167,303.

Post-Construction



This roundabout opened in 2020. For the 2-year period from 2021 to 2022 there have been a total of 4 crashes. Angle crashes have been eliminated from this location and the severity rating has gone down 47%. The annual cost of crashes per year for the crashes at this location is now \$85,489 which is a 49% reduction.

Summary

This roundabout was constructed to ease traffic flow long Salisbury. Crashes were low prior to construction and continue to be after. The severity and percent injury have greatly reduced.

Table 49: Albon Rd. @ Salisbury Rd. – Annual Crash Statistics

<i>Data</i>	<i>3 Years Pre-Construction</i>	<i>2 Years Post-Construction</i>	<i>% Change</i>
Dates	2017-2019	2021-2022	N/A
Configuration	4-Way Stop Intersection	4-Leg Roundabout	N/A
Total Crashes	5	4	-20.0%
Crashes Per Year	1.67	2	19.8%
Fatal Crashes	0	0	0.0%
Serious Injury Crashes	0	0	0.0%
Minor Injury Crashes	1	0	0.0%
Possible Injury Crashes	2	1	0.0%
PDO Crashes	2	3	50.0%
Severity	3.49	1.86	-46.7%
Percent Injury	60.0%	25.0%	-35.0%

Figure 98: Albon Rd. @ Salisbury Rd. – Crash Types for 3 Years Pre-Construction

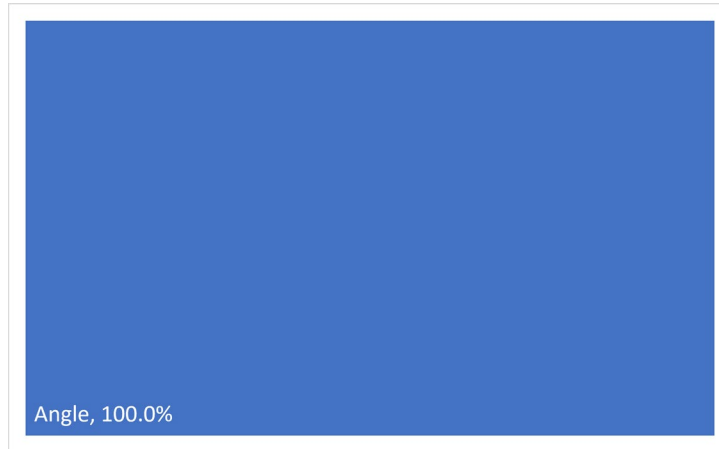
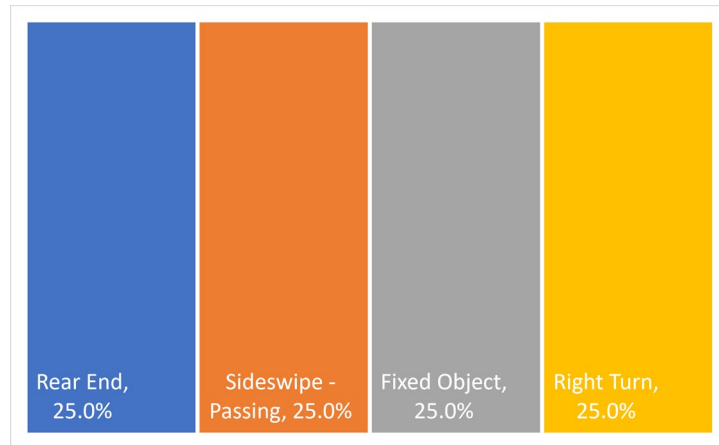


Figure 99: Albon Rd. @ Salisbury Rd. – Crash Types for 3 Years Post-Construction

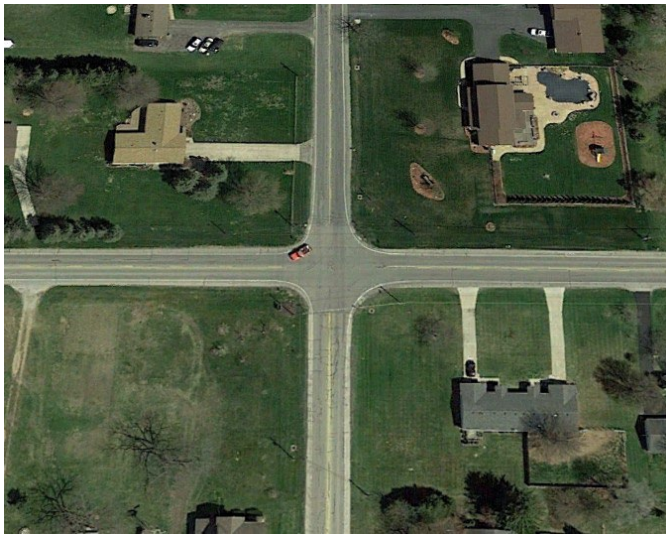


MONCLOVA RD. @ WECKERLY RD.

Monclova Township – Constructed in 2022



Pre-Construction



Prior to roundabout construction this location was a rural 2-way stop intersection. For the 3-year period from 2019 to 2021 there were a total of 3 crashes. During this time period 66.7% of the crashes were an injury crash. The crash severity rating for this time period was 4.0 and the annual cost of crashes per year for the crashes at this location was \$118,720.

Post-Construction

No Image Available

This roundabout finished construction towards the end of 2022 and thus there is no crash data for it yet.

Summary

This roundabout is part of a series of 4 roundabouts designed to improve traffic flow along the US 20A corridor. This roundabout was finished just last year so there is no post-construction data to supply. From an improved traffic flow perspective and driver observation this roundabout seems to be performing well.

Table 50: Monclova Rd. @ Weckerly Rd. – Annual Crash Statistics

<i>Data</i>	<i>3 Years Pre-Construction</i>	<i>No Post-Construction Data</i>	<i>% Change</i>
<i>Dates</i>	2019-2021	N/A	N/A
<i>Configuration</i>	4-Way 2-Stop Intersection	4-Leg Roundabout	N/A
<i>Total Crashes</i>	3	N/A	N/A
<i>Crashes Per Year</i>	1.0	N/A	N/A
<i>Fatal Crashes</i>	0	N/A	N/A
<i>Serious Injury Crashes</i>	0	N/A	N/A
<i>Minor Injury Crashes</i>	1	N/A	N/A
<i>Possible Injury Crashes</i>	1	N/A	N/A
<i>PDO Crashes</i>	1	N/A	N/A
<i>Severity</i>	4.00	N/A	N/A
<i>Percent Injury</i>	66.7%	N/A	N/A

Figure 100: Monclova Rd. @ Weckerly Rd. – Crash Types for 3 Years Pre-Construction

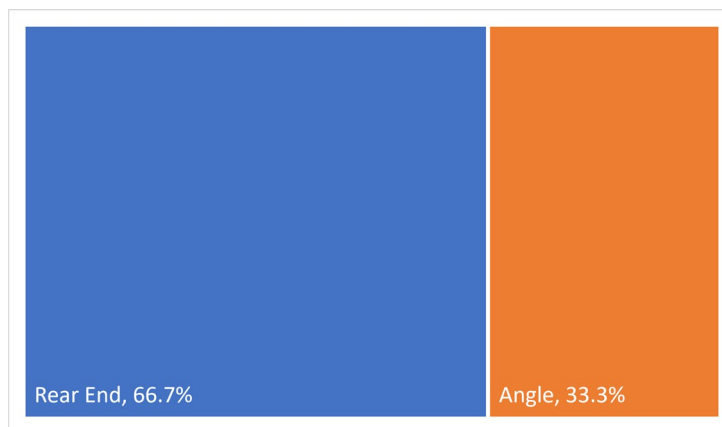
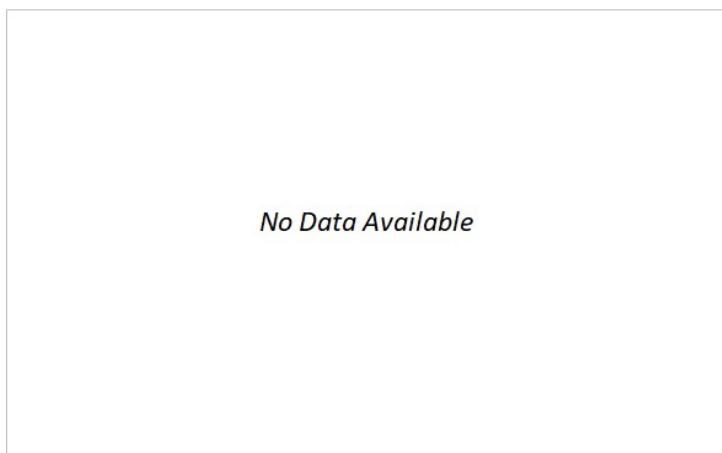


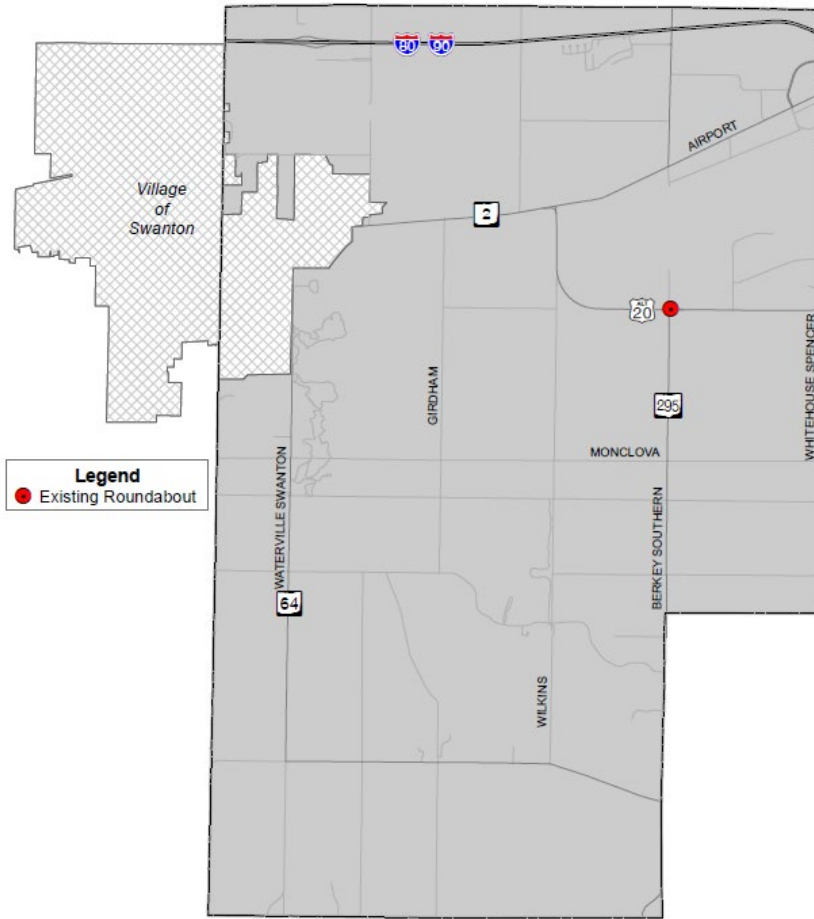
Figure 101: Monclova Rd. @ Weckerly Rd. – Crash Types for 3 Years Post-Construction



This roundabout finished construction towards the end of 2022 and thus there is no crash data for it yet.

SWANTON TOWNSHIP

Map 9: Roundabout Locations in Swanton Township



Currently in Swanton Township there is 1 roundabout. This roundabout was constructed in 2020

**BERKEY-SOUTHERN RD. (SR 295) @
MAUMEE-WESTERN RD. (US 20A)**

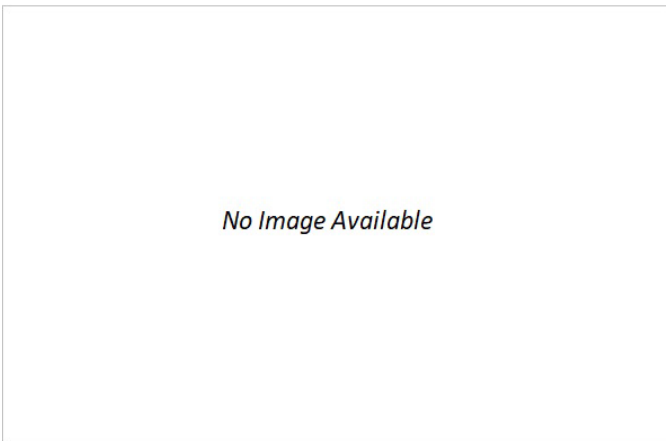
Swanton Township –Constructed in 2020

Pre-Construction



Prior to roundabout construction this location was a rural 4-leg 2-way stop intersection. For the 3-year period from 2017 to 2019 there were a total of 4 crashes and no injury crashes. Since there were no injury crashes the severity for this location was zero and the annual cost of crashes per year for the crashes at this location was \$16,819.

Post-Construction



This roundabout opened in 2020. For the 2-year period from 2021 to 2022 there has been 0 crashes. Since there have been no crashes so far, the severity rating for this roundabout is 0 and the annual cost of crashes is also \$0.

Summary

This roundabout is part of a series of 4 roundabouts designed to improve traffic flow along the US 20A corridor. Prior to construction there were a few crashes happening at this location. There has been only 2 years post-construction, but so far there has been no crashes at all at this location.

Table 46: Berkey-Southern Rd. @ Maumee-Western Rd. – Annual Crash Statistics

<i>Data</i>	<i>Pre-Construction</i>	<i>Post-Construction</i>	<i>% Change</i>
<i>Dates</i>	2017-2019	2021-2022	N/A
<i>Configuration</i>	4-Way 2-Stop Intersection	4-Leg Roundabout	N/A
<i>Total Crashes</i>	4	0	-100.0%
<i>Crashes Per Year</i>	1.33	0	-100.0%
<i>Fatal Crashes</i>	0	0	0.0%
<i>Serious Injury Crashes</i>	0	0	0.0%
<i>Minor Injury Crashes</i>	0	0	0.0%
<i>Possible Injury Crashes</i>	0	0	0.0%
<i>PDO Crashes</i>	4	0	-100.0%
<i>Severity</i>	1.00	0.00	-100.0%
<i>Percent Injury</i>	0.0%	0.0%	0.0%

Figure 92: Berkey-Southern Rd. @ Maumee-Western Rd. – Crash Types for 3 Years Pre-Construction

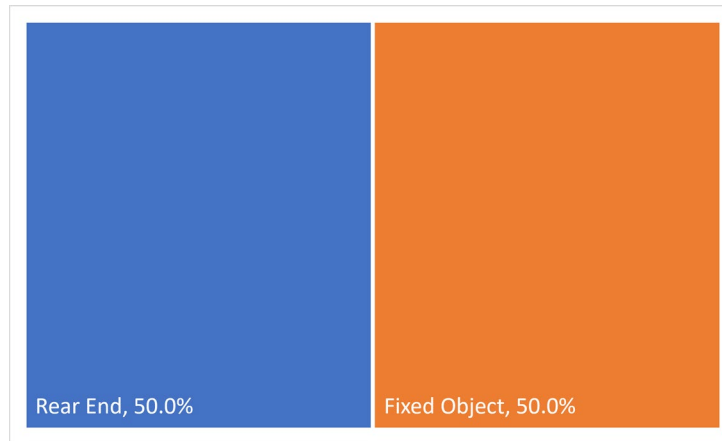
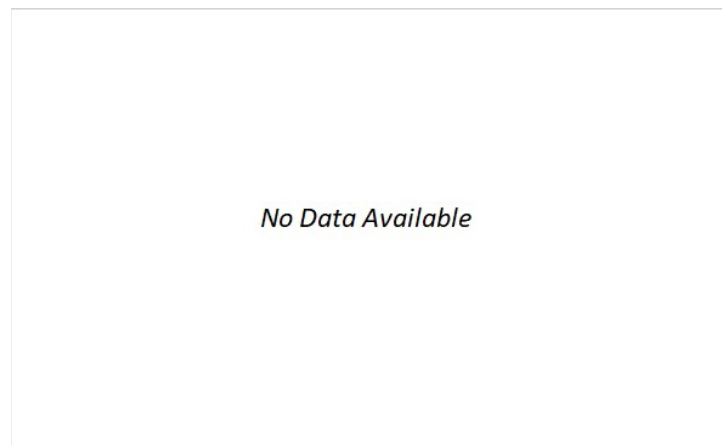
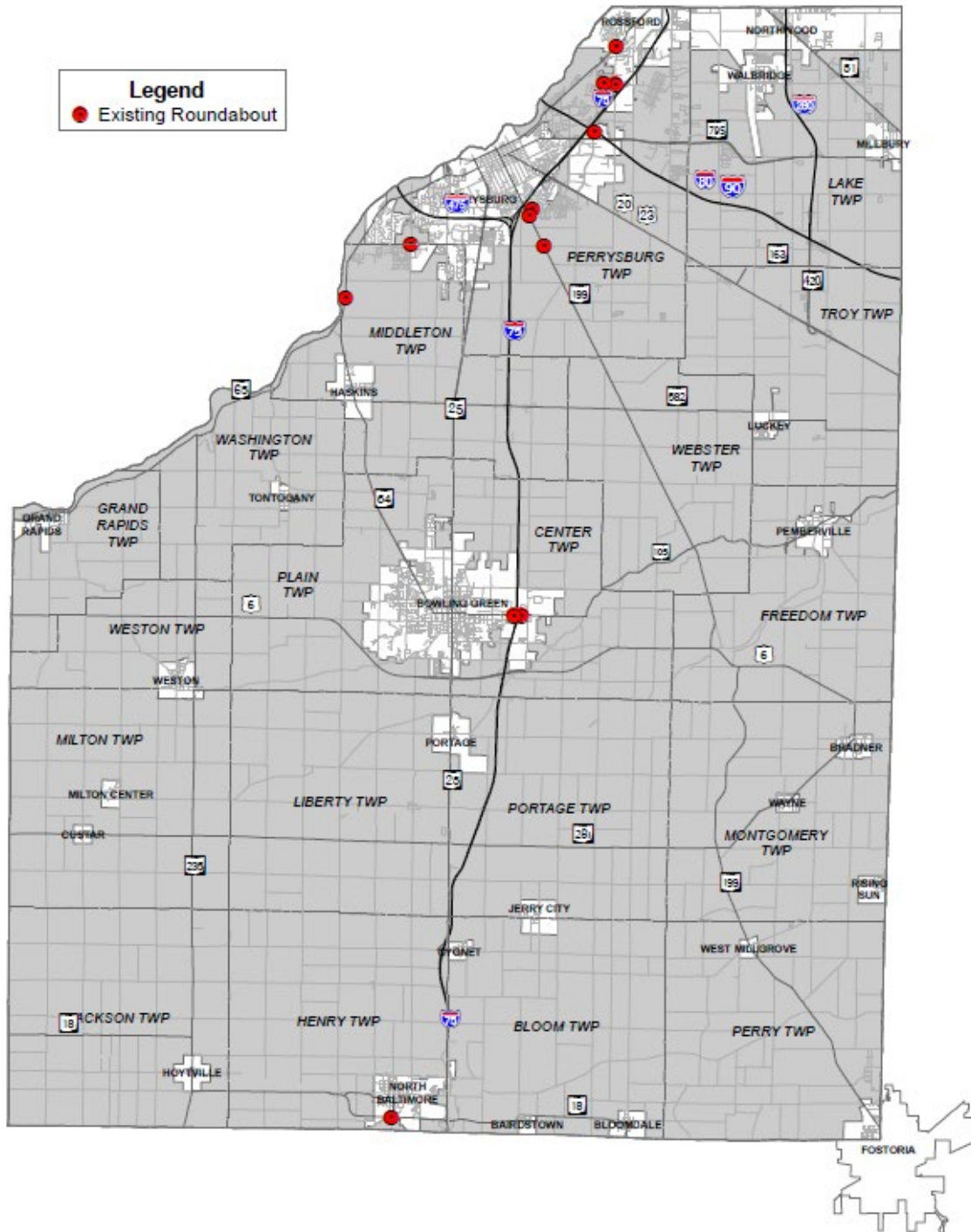


Figure 93: Berkey-Southern Rd. @ Maumee-Western Rd. – Crash Types for 2-Years Post-Construction



There have been no crashes for the 2 years following construction.

WOOD COUNTY



There are a total of 13 roundabouts in Wood County. Within Wood County there are 7 jurisdictions that have at least 1 roundabout. In the followings pages of this report there is a map of each of the jurisdictions and a synopsis of the roundabouts that are in each jurisdiction as well as before and after data for each.

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CITY OF PERRYSBURG

Map 8: Roundabout Locations in the City of Perrysburg

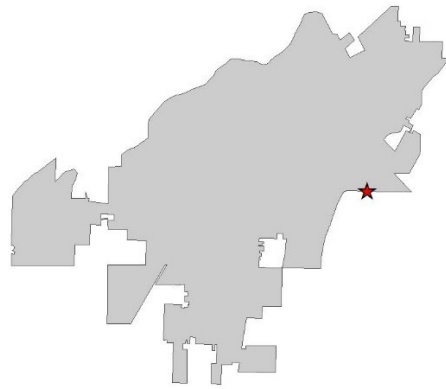


Currently in the city of Perrysburg there are 2 roundabouts. These two roundabouts were constructed in 2016 and 2017.

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CARRONADE DR. @ ECKEL JUNCTION RD.

City of Perrysburg – Constructed in 2016



Pre-Construction



Prior to roundabout construction this location was a rural 2-way stop intersection. For the 3-year period from 2013 to 2015 there were a total of 4 crashes. All 4 of these crashes were left turn crashes that tend to be more severe in nature. During this time period 50% of the crashes were an injury crash. The crash severity rating for this time period was 2.72 and the annual cost of crashes per year for the crashes at this location was \$97,167.

Post-Construction



This roundabout opened in 2016. For the 3-year period from 2017 to 2019 there have been a total of 3 crashes. Left turn crashes have been eliminated from this location and the severity rating has decreased 63.2% and injury percent has decreased 50%. The annual cost of crashes per year for the crashes at this location is now \$12,14 which is an 87% reduction.

Summary

This roundabout was constructed mainly to increase traffic flow through a residential area. Crashes were minimal prior to construction and continue to be post-construction. However, after construction there has been only one injury crash in 6 years.

Table 35: Carronade Dr. @ Eckel Junction Rd. – Annual Crash Statistics

<i>Data</i>	<i>3 Years Pre-Construction</i>	<i>3 Years Post-Construction</i>	<i>% Change</i>	<i>All Years Post-Construction</i>
<i>Dates</i>	2013-2015	2017-2019	N/A	2017-2022
<i>Configuration</i>	2-Way Stop	4-Leg Roundabout	N/A	4-Leg Roundabout
<i>Total Crashes</i>	4	3	-25.0%	10
<i>Crashes Per Year</i>	1.33	1	-24.8%	1.67
<i>Fatal Crashes</i>	0	0	0.0%	0
<i>Serious Injury Crashes</i>	0	0	0.0%	0
<i>Minor Injury Crashes</i>	0	0	0.0%	0
<i>Possible Injury Crashes</i>	2	0	-100.0%	1
<i>PDO Crashes</i>	2	3	50.0%	9
<i>Severity</i>	2.72	1.00	-63.2%	1.34
<i>Percent Injury</i>	50.0%	0.0%	-50.0%	10.0%

Figure 70: Carronade Dr. @ Eckel Junction Rd. – Crash Types for 3 Years Pre-Construction

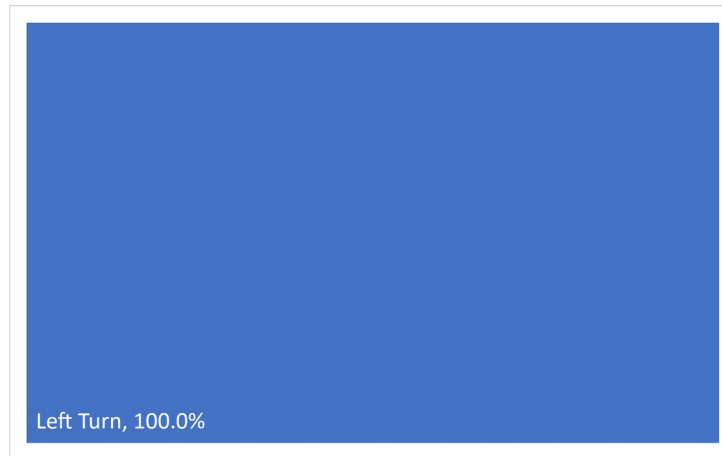
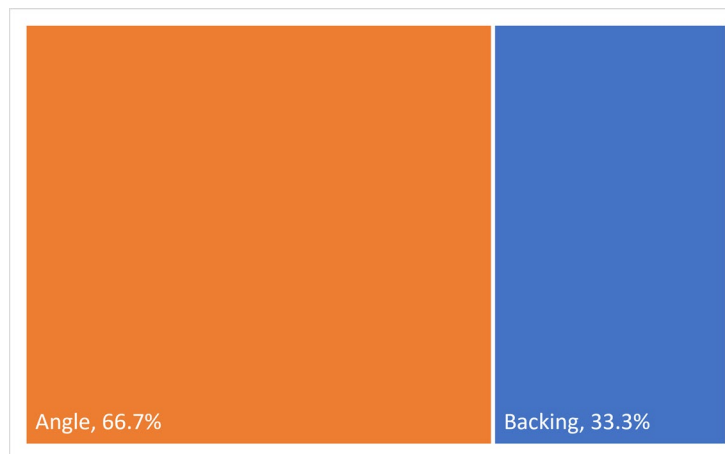
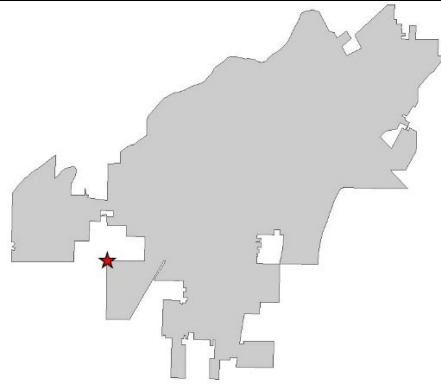


Figure 71: Carronade Dr. @ Eckel Junction Rd. – Crash Types for 3 Years Post-Construction

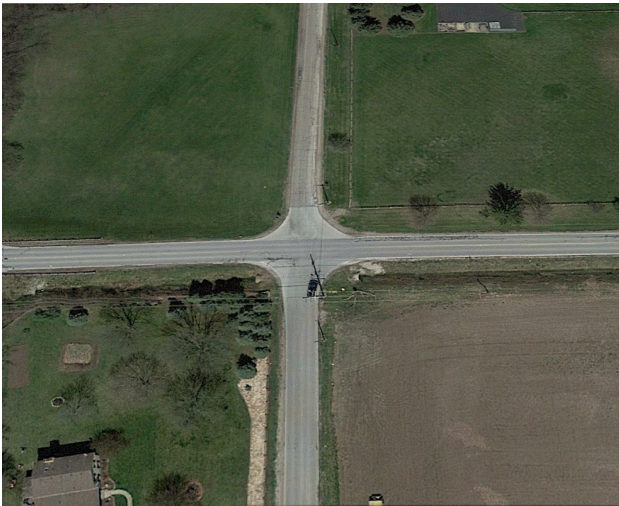


HULL PRAIRIE RD. @ ROACHTON RD.

City of Perrysburg – Constructed in 2017

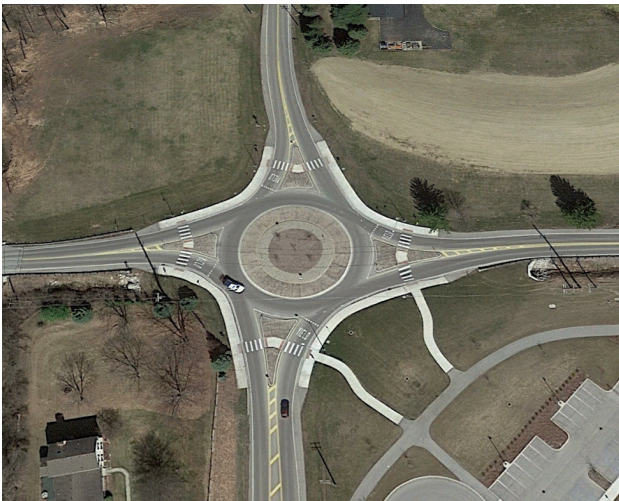


Pre-Construction



Prior to roundabout construction this location was a rural 2-way stop intersection. For the 3-year period from 2014 to 2016 there were a total of 9 crashes. During this time period 44.4% of the crashes were an injury crash. The crash severity rating for this time period was 5.65 and the annual cost of crashes per year for the crashes at this location was \$598,405.

Post-Construction



This roundabout opened in 2017. For the 3-year period from 2018 to 2020 there have been a total of 10 crashes. The severity rating is now 3.88 and has gone down 31.3%. The injury percent has also gone down 4.4% and the annual cost of crashes per year for the crashes at this location is now \$415,555 which is a 31% reduction.

Summary

This roundabout has eased traffic flow through a rural school zone. Crashes per year have remained consistent prior to and after construction, but the severity and percent injury has decreased and continues to go down past the 3 years post-construction.

Table 36: Hull Prairie Rd. @ Roachton Rd. – Annual Crash Statistics

<i>Data</i>	<i>3 Years Pre-Construction</i>	<i>3 Years Post-Construction</i>	<i>% Change</i>	<i>All Years Post-Construction</i>
<i>Dates</i>	2014-2016	2018-2020	N/A	2018-2022
<i>Configuration</i>	4-Leg 2-Way Stop	4-Leg Roundabout	N/A	4-Leg Roundabout
<i>Total Crashes</i>	9	10	11.1%	15
<i>Crashes Per Year</i>	3	3.33	11.0%	3
<i>Fatal Crashes</i>	0	0	0.0%	0
<i>Serious Injury Crashes</i>	2	1	-50.0%	1
<i>Minor Injury Crashes</i>	1	1	0.0%	1
<i>Possible Injury Crashes</i>	1	2	100.0%	2
<i>PDO Crashes</i>	5	6	20.0%	11
<i>Severity</i>	5.65	3.88	-31.3%	2.92
<i>Percent Injury</i>	44.4%	40.0%	-4.4%	26.7%

Figure 72: Hull Prairie Rd. @ Roachton Rd. – Crash Types for 3 Years Pre-Construction

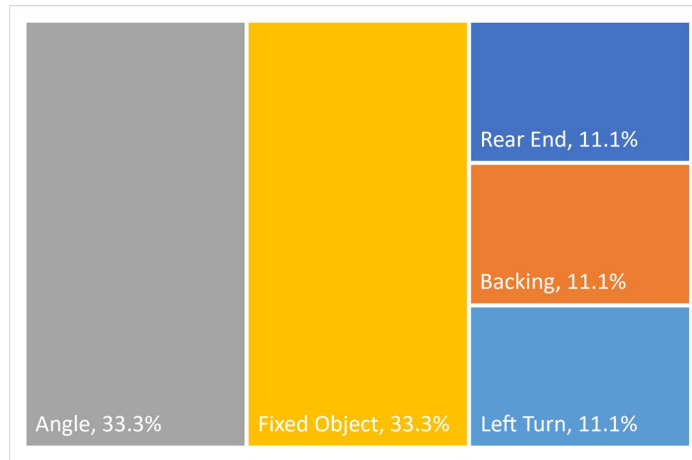
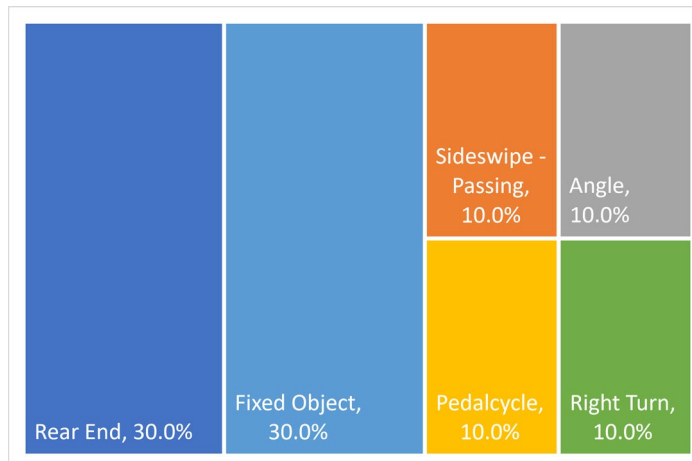
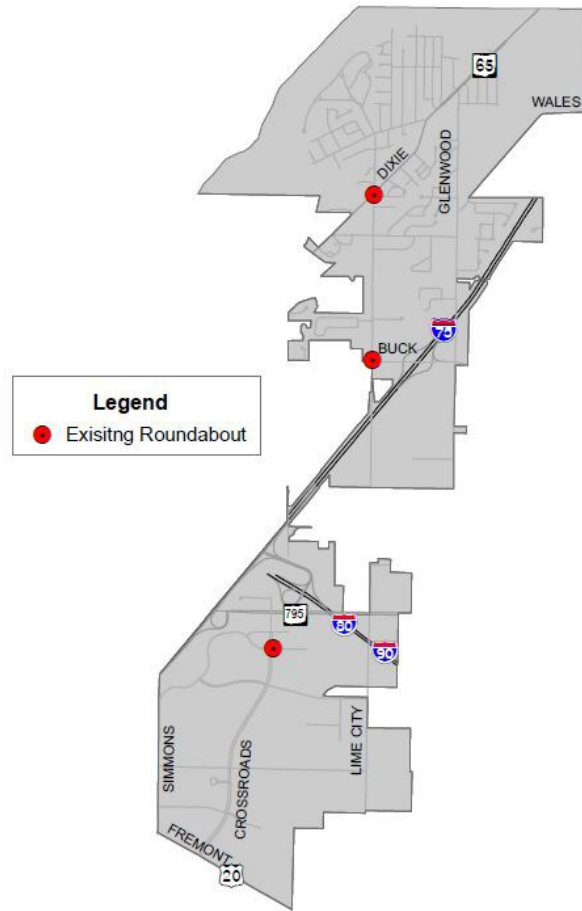


Figure 73: Hull Prairie Rd. @ Roachton Rd. – Crash Types for 3 Years Post-Construction



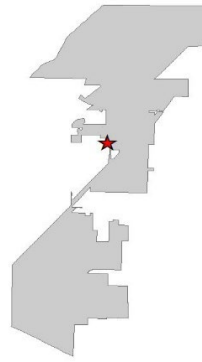
CITY OF ROSSFORD



Currently in the city of Rossford there are 3 roundabouts. The first roundabout was constructed in 2019 and the last one was constructed in 2022.

BUCK RD. @ LIME CITY RD.

City of Rossford – Constructed in 2019



Pre-Construction



Prior to roundabout construction this location was suburban 4-way stop-light controlled intersection. For the 3-year period from 2016 to 2018 there were a total of 23 crashes. A large majority of these crashes were angle crashes that tend to be more severe in nature. During this time period 8.7% of the crashes were an injury crash. The crash severity rating for this time period was 1.30 and the annual cost of crashes per year for the crashes at this location was \$177,055.

Post-Construction



This roundabout opened in 2019. For the 3-year period from 2020 to 2022 there has been a total of 11 crashes. Many of the angle crashes have been eliminated from this location and the severity rating has gone down nearly 1%. The annual cost of crashes per year for the crashes at this location is now \$90,630 which is a 49% reduction.

Summary

After construction of this roundabout crashes have decreased and traffic flow has improved greatly. Severity has remained the same post construction mainly because the severe crashes have been minimal prior to and after construction.

Table 37: Buck Rd. @ Lime City Rd. – Annual Crash Statistics

<i>Data</i>	<i>3 Years Pre-Construction</i>	<i>3 Years Post-Construction</i>	<i>% Change</i>
Dates	2016-2018	2020-2022	N/A
Configuration	4-Way Stop	4-Leg Roundabout	N/A
Total Crashes	23	12	-47.8%
Crashes Per Year	7.7	4	-47.8%
Fatal Crashes	0	0	0.0%
Serious Injury Crashes	0	0	0.0%
Minor Injury Crashes	0	0	0.0%
Possible Injury Crashes	2	1	-50.0%
PDO Crashes	21	11	-47.6%
Severity	1.30	1.29	-0.8%
Percent Injury	8.7%	8.3%	-0.4%

Figure 74: Buck Rd. @ Lime City Rd. – Crash Types for 3 Years Pre-Construction

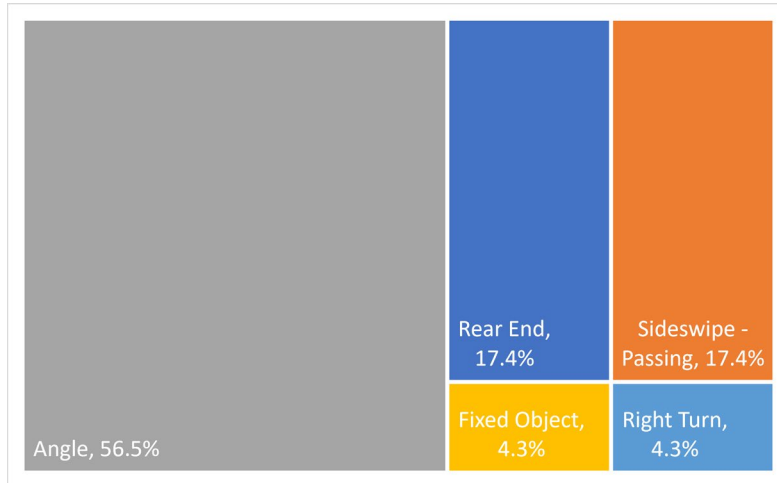
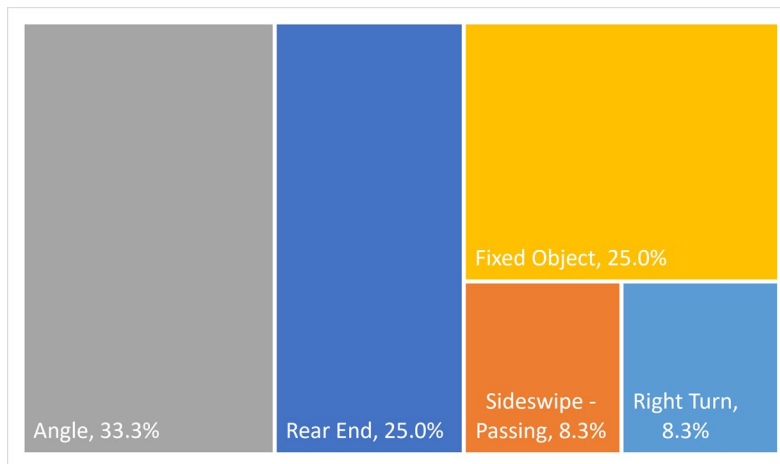


Figure 75: Buck Rd. @ Lime City Rd. – Crash Types for 3 Years Post-Construction



COLONY RD. @ DIXIE HWY. (SR 65) @ LIME CITY RD.

City of Rossford – Constructed in 2021

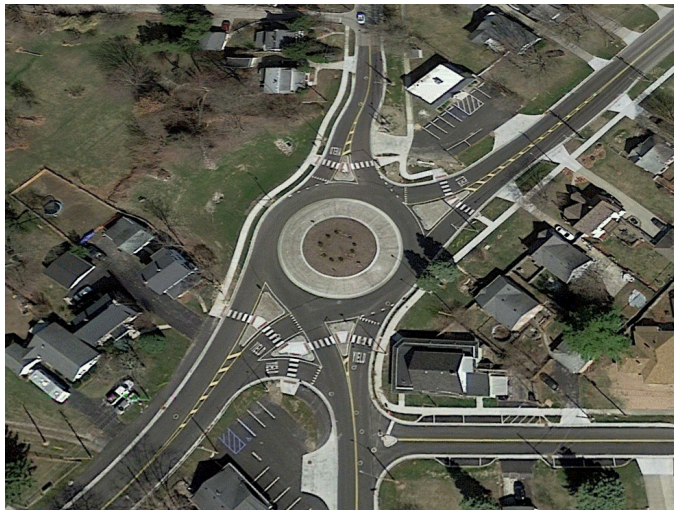


Pre-Construction



Prior to roundabout construction this location was a skewed suburban 4-way stop-light controlled intersection. For the 3-year period from 2017 to 2019 there were a total of 11 crashes. During this time period 27.3% of the crashes were an injury crash. The crash severity rating for this time period was 2.32 and the annual cost of crashes per year for the crashes at this location was \$327,434.

Post-Construction



This roundabout opened in 2021. For the year 2022 there were a total of 3 crashes. The severity rating has decreased 56.9% and the injury percent decreased 27.3%. The annual cost of crashes per year for the crashes at this location is now \$37,842 which is an 88% decrease.

Summary

This roundabout has only been in use for a little over a year post construction. So far after construction the crashes per year has remained the same to pre-construction. However there have been no injury crashes post construction.

Table 38: Colony Rd. @ Dixie Hwy. (SR 65) @ Lime City Rd. – Annual Crash Statistics

<i>Data</i>	<i>3 Years Pre-Construction</i>	<i>1 Year Post-Construction</i>	<i>% Change</i>
<i>Dates</i>	2017-2019	2022	N/A
<i>Configuration</i>	4-Way Stop Light	4-Leg Roundabout	N/A
<i>Total Crashes</i>	11	3	-72.7%
<i>Crashes Per Year</i>	3.67	3	-18.3%
<i>Fatal Crashes</i>	0	0	0.0%
<i>Serious Injury Crashes</i>	0	0	0.0%
<i>Minor Injury Crashes</i>	2	0	-100.0%
<i>Possible Injury Crashes</i>	1	0	-100.0%
<i>PDO Crashes</i>	8	3	-62.5%
<i>Severity</i>	2.32	1.00	-56.9%
<i>Percent Injury</i>	27.3%	0.0%	-27.3%

Figure 76: Colony Rd. @ Dixie Hwy. (SR 65) @ Lime City Rd. – Crash Types for 3 Years Pre-Construction

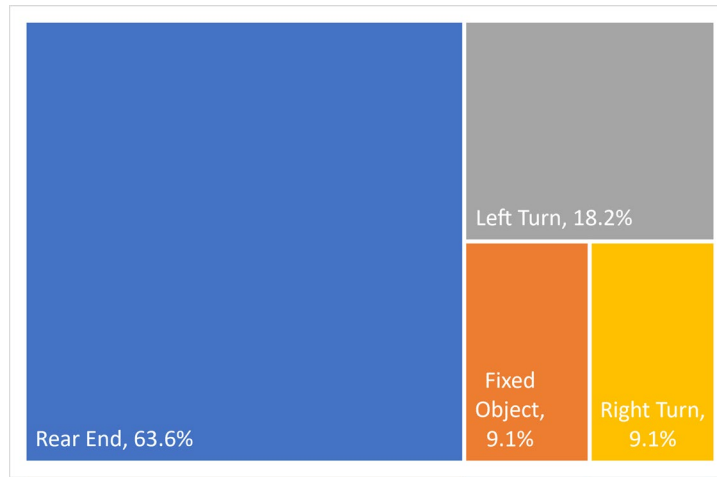
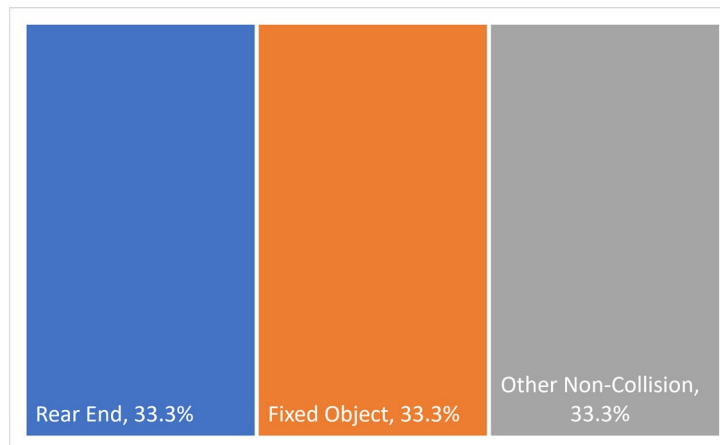


Figure 77: Colony Rd. @ Dixie Hwy. (SR 65) @ Lime City Rd. – Crash Types for 3 Years Post-Construction



CROSSROADS PKWY. @ SPORTSMAN'S DR.

City of Rossford – Constructed in 2022

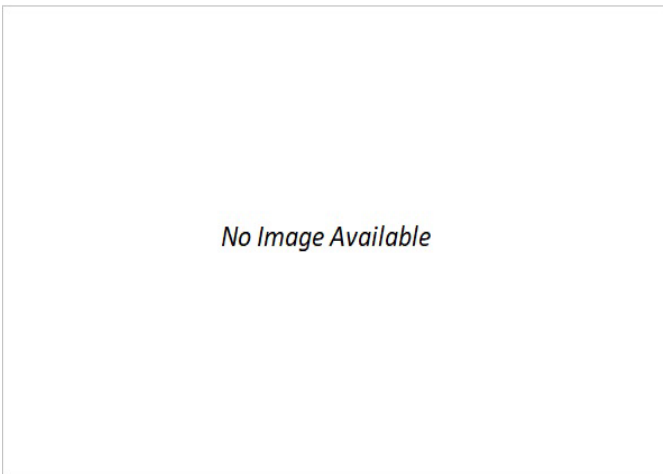


Pre-Construction



Prior to roundabout construction this location was a skewed suburban 3-way stop-light controlled intersection. For the 3-year period from 2019 to 2021 there were a total of 9 crashes. During this time period 44.4% of the crashes were an injury crash. The crash severity rating for this time period was 3.47 and the annual cost of crashes per year for the crashes at this location was \$301,570.

Post-Construction



This roundabout opened in late 2022 and thus there is no post-construction data yet.

Summary

This roundabout was constructed to help ease traffic through the Crossroads Pkwy corridor in response to recent development in the area that includes an Amazon distribution center. Prior to construction there was a recent uptick in crashes that may be attributed to recent higher traffic. This roundabout should assist in reducing injury crashes.

Table 39: Crossroads Pkwy. @ Sportsman’s Dr. – Annual Crash Statistics

<i>Data</i>	<i>3 Years Pre-Construction</i>	<i>No Post-Construction Data</i>	<i>% Change</i>
<i>Dates</i>	2019-2021	N/A	N/A
<i>Configuration</i>	3-Leg 1-Way Stop	3-Leg Roundabout	N/A
<i>Total Crashes</i>	9	N/A	N/A
<i>Crashes Per Year</i>	3	N/A	N/A
<i>Fatal Crashes</i>	0	N/A	N/A
<i>Serious Injury Crashes</i>	0	N/A	N/A
<i>Minor Injury Crashes</i>	4	N/A	N/A
<i>Possible Injury Crashes</i>	0	N/A	N/A
<i>PDO Crashes</i>	5	N/A	N/A
<i>Severity</i>	3.47	N/A	N/A
<i>Percent Injury</i>	44.4%	N/A	N/A

Figure 78: Crossroads Pkwy. @ Sportsman’s Dr. – Crash Types for 3 Years Pre-Construction

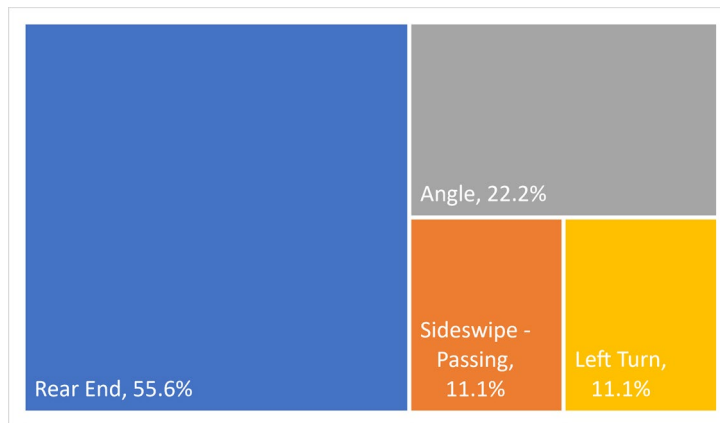
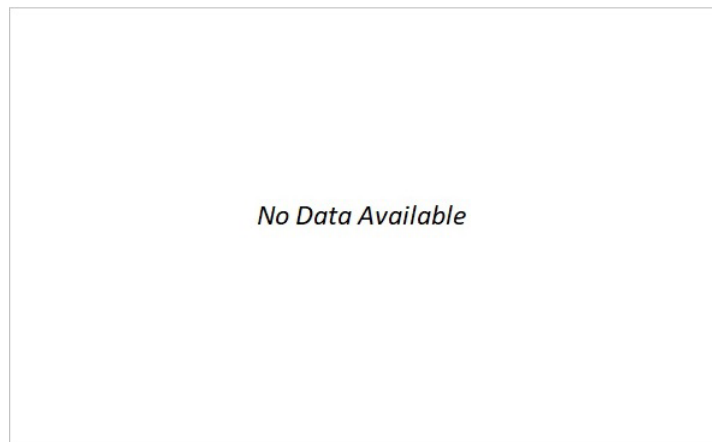
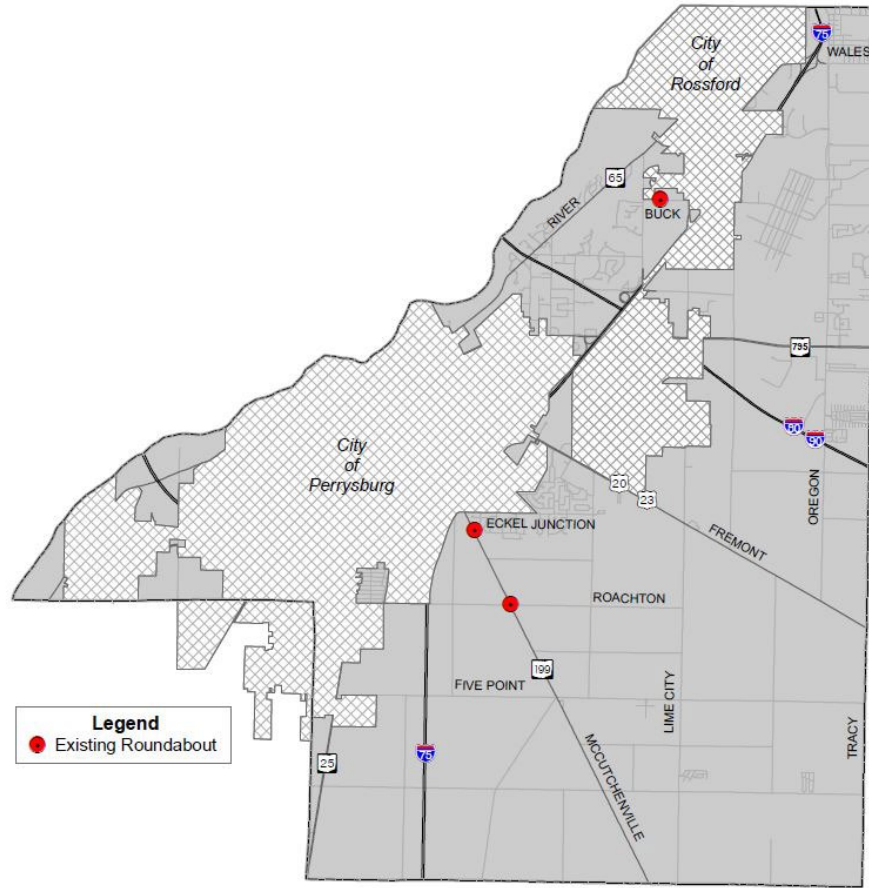


Figure 79: Crossroads Pkwy. @ Sportsman’s Dr. – Crash Types for Post-Construction



Roundabout was just completed in 2022 so there is no post-construction crash data.

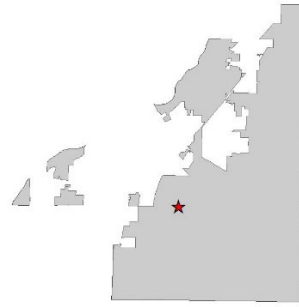
PERRYSBURG TOWNSHIP



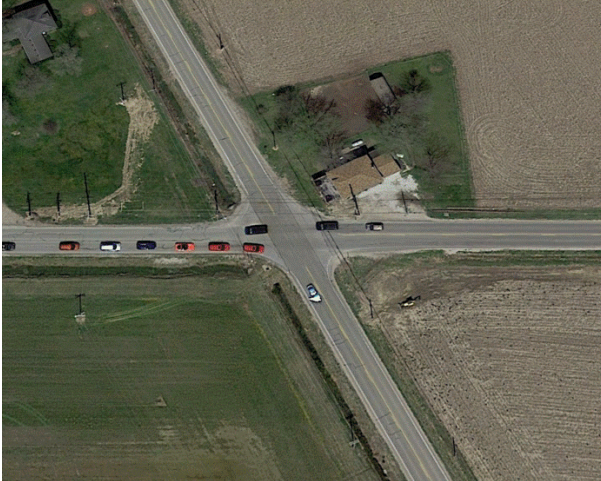
Currently in Perrysburg Township there are 3 roundabouts. The first roundabout was constructed in 2016 and the last one was constructed in 2019.

MCCUTCHEVILLE RD. @ ROACHTON RD.

Perrysburg Township – Constructed in 2016



Pre-Construction



Prior to roundabout construction this location was a rural 4-leg 2-way stop intersection. For the 3-year period from 2013 to 2015 there were a total of 23 crashes. During this time period 52.2% of the crashes were an injury crash. The crash severity rating for this time period was 5.60 and the annual cost of crashes per year for the crashes at this location was \$2,222,686.

Post-Construction



This roundabout opened in 2016. For the 3-year period from 2017 to 2019 there were a total of 14 crashes. The severity rating is now 1.25 which is a decrease of 77.7%. The injury percent has also decreased by 45.1% and the annual cost of crashes per year for the crashes at this location is now \$148,559 which is a 93% decrease.

Summary

Prior to construction this location had an abnormally high severity rate and percent injury . In the 3 years after construction of this roundabout all crash metrics have been reduced. Beyond those 3 years the numbers continue to be better, but one seious inury of a motorcycle rider has resulted in a small severity uptick.

Table 40: McCutchenville Rd. @ Roachton Rd. – Annual Crash Statistics

<i>Data</i>	<i>3 Years Pre-Construction</i>	<i>3 Years Post-Construction</i>	<i>% Change</i>	<i>All Years Post-Construction</i>
Dates	2013-2015	2017-2019	N/A	2017-2022
Configuration	4-Leg 2-Stop Intersection	4-Leg Roundabout	N/A	4-Leg Roundabout
Total Crashes	23	14	-39.1%	26
Crashes Per Year	7.67	4.67	-39.1%	3.18
Fatal Crashes	0	0	0.0%	0
Serious Injury Crashes	4	0	-100.0%	1
Minor Injury Crashes	6	0	-100.0%	1
Possible Injury Crashes	2	1	-50.0%	2
PDO Crashes	11	13	18.2%	26
Severity	5.60	1.25	-77.7%	1.96
Percent Injury	52.2%	7.1%	-45.1%	13.3%

Figure 80: McCutchenville Rd. @ Roachton Rd. – Crash Types for 3 Years Pre-Construction

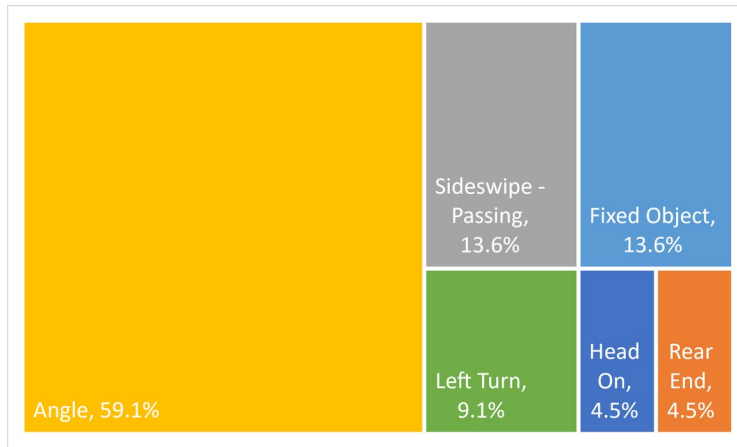
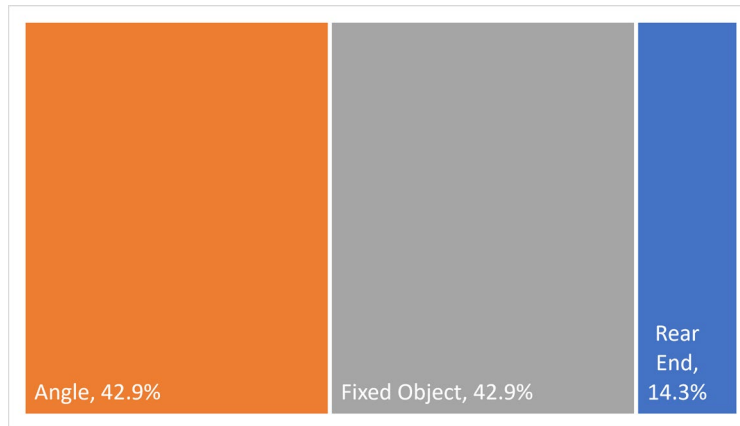
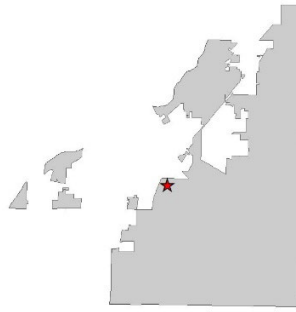


Figure 81: McCutchenville Rd. @ Roachton Rd. – Crash Types for 3 Years Post-Construction



CARRONADE DR. @ MCCUTCHENVILLE RD.

Perrysburg Township – Constructed in 2017



Pre-Construction



Prior to roundabout construction this location was a rural 4-leg 2-way stop intersection. For the 3-year period from 2014 to 2016 there were a total of 34 crashes. During this time period 20.6% of the crashes were an injury crash. The crash severity rating for this time period was 1.77 and the annual cost of crashes per year for the crashes at this location was \$674,902.

Post-Construction



This roundabout opened in 2017. For the 3-year period from 2018 to 2020 there have been a total of 12 crashes. The severity rating has gone down 17.5%. The injury percent has decreased by 12.3 and the annual cost of crashes per year for the crashes at this location is now \$174,582 which is a 74% decrease.

Summary

This roundabout was constructed mainly to reduce many crashes that were happening at a busy T-intersection. Post-construction all of the crash metrics have decreased.

Table 41: Carronade Dr. @ McCutchenville Rd. – Annual Crash Statistics

<i>Data</i>	<i>3 Years Pre-Construction</i>	<i>3 Years Post-Construction</i>	<i>% Change</i>	<i>All Years Post-Construction</i>
Dates	2014-2016	2018-2020	N/A	2018-2022
Configuration	4-Leg 2-Stop Intersection	3-Leg Roundabout	N/A	3-Leg Roundabout
Total Crashes	34	12	-64.7%	19
Crashes Per Year	11.33	4	-64.7%	3.8
Fatal Crashes	0	0	0.0%	0
Serious Injury Crashes	0	0	0.0%	0
Minor Injury Crashes	1	1	0.0%	1
Possible Injury Crashes	6	0	-100.0%	1
PDO Crashes	27	11	-59.3%	17
Severity	1.77	1.46	-17.5%	1.47
Percent Injury	20.6%	8.3%	-12.3%	10.5%

Figure 82: Carronade Dr. @ McCutchenville Rd. – Crash Types for 3 Years Pre-Construction

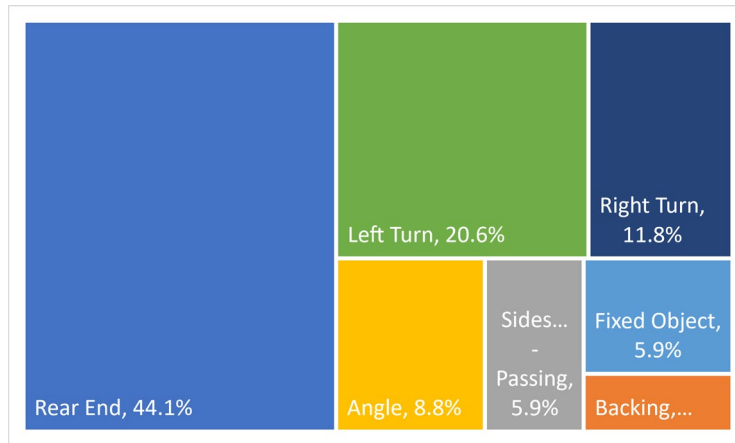
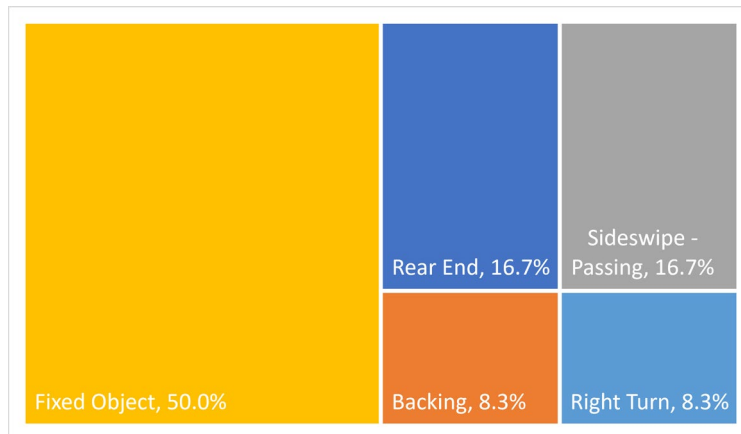
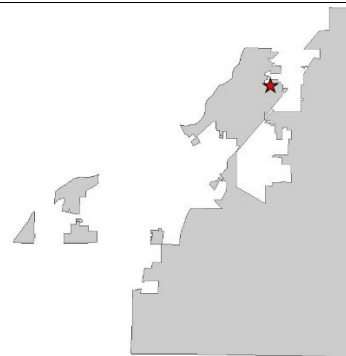


Figure 83: Carronade Dr. @ McCutchenville Rd. – Crash Types for 3 Years Post-Construction



BUCK RD. @ PENTA CAREER CENTER

Perrysburg Township – Constructed in 2019



Pre-Construction



Prior to roundabout construction this location had a stop sign at the end of the Penta Driveway. For the 3-year period from 2016 to 2018 there were a total of 3 crashes. During this time period 33.3% of the crashes were an injury crash. The crash severity rating for this time period was 2.15 and the annual cost of crashes per year for the crashes at this location was \$52,788.

Post-Construction



This roundabout opened in 2019. For the 3-year period from 2020 to 2022 there have been a total of 4 crashes. The severity rating for this location is now 5.10, due to one serious injury crash that has happened since construction. The annual cost of crashes per year for the crashes at this location is now \$244, 047 which is a 362% increase.

Summary

This roundabout was constructed mainly to ease morning and afternoon school congestion. Crashes were minimal pre-construction as well as post-construction. The severity is a bit high after construction due to one serious injury crash where the driver drove through median.

Table 42: Buck Rd. @ Penta Career Center – Annual Crash Statistics

<i>Data</i>	<i>3 Years Pre-Construction</i>	<i>3 Years Post-Construction</i>	<i>% Change</i>
<i>Dates</i>	2016-2018	2020-2022	N/A
<i>Configuration</i>	3-Leg 1-Way Stop	3-Leg Roundabout	N/A
<i>Total Crashes</i>	3	4	33.3%
<i>Crashes Per Year</i>	1	1.33	33.0%
<i>Fatal Crashes</i>	0	0	0.0%
<i>Serious Injury Crashes</i>	0	1	N/A
<i>Minor Injury Crashes</i>	0	0	0.0%
<i>Possible Injury Crashes</i>	1	0	-100.0%
<i>PDO Crashes</i>	2	3	50.0%
<i>Severity</i>	2.15	5.10	137.2%
<i>Percent Injury</i>	33.3%	25.0%	-8.3%

Figure 84: Buck Rd. @ Penta Career Center – Crash Types for 3 Years Pre-Construction

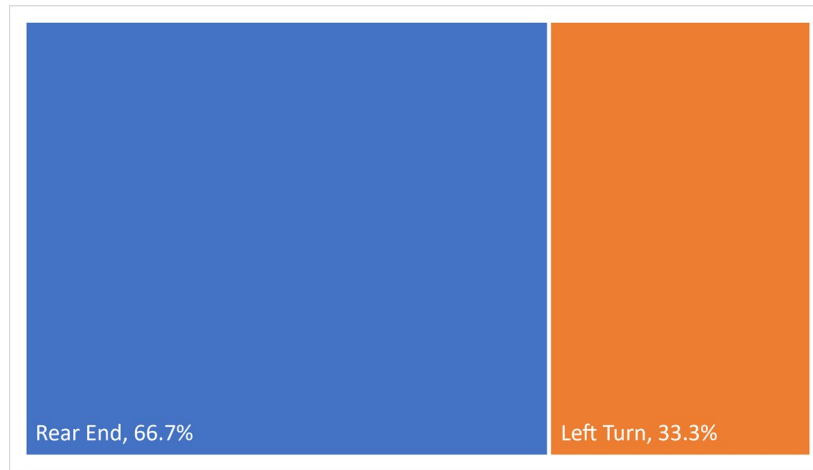
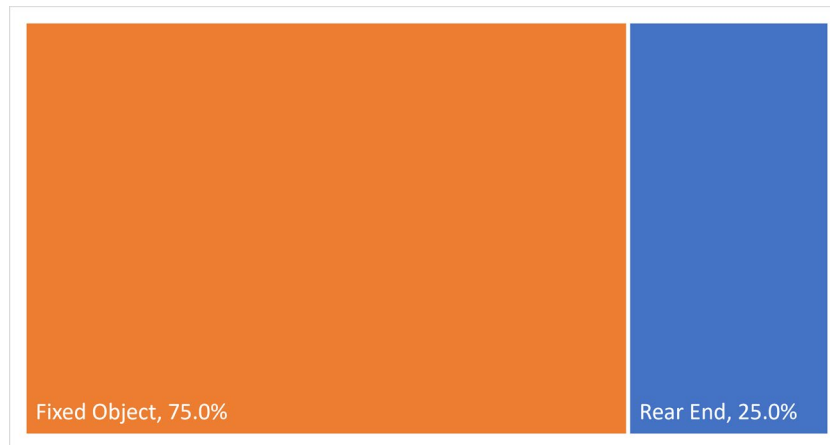
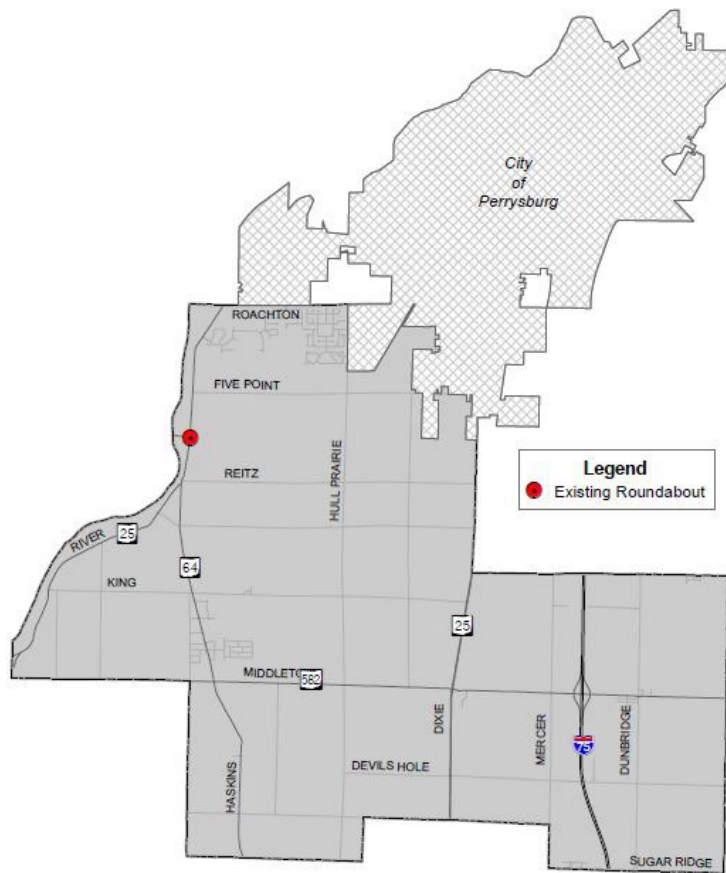


Figure 85: Buck Rd. @ Penta Career Center – Crash Types for 3 Years Post-Construction



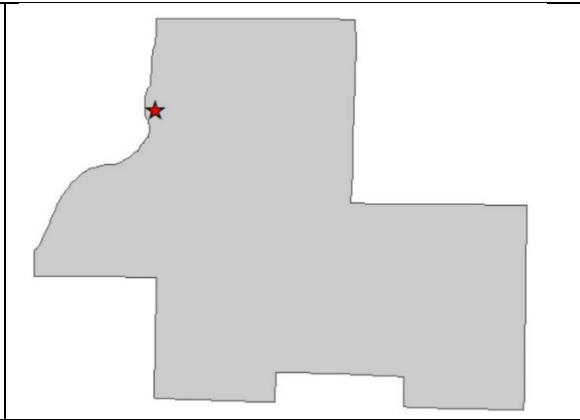
MIDDELTON TOWNSHIP



Currently in Middleton Township there is 1 roundabout. This roundabout was constructed in 2018.

RIVER RD. @ WATERVILLE-SWANTON RD.

Middleton Township – Constructed in 2018



Pre-Construction



Prior to roundabout construction this location was a rural 3-way stop intersection. For the 3-year period from 2015 to 2017 there were a total of 5 crashes. During this time period 60% of the crashes were no injury crashes. The crash severity rating for this time period was 1.0 and the annual cost of crashes per year for the crashes at this location was \$31,535.

Post-Construction



This roundabout opened in 2018. For the 3-year period from 2019 to 2021 there have been a total of 11 crashes. The severity rating has increased 132%. And the injury percent has increased 27.3%. The annual cost of crashes per year for the crashes at this location is now \$327,434 which is a 938% increase.

Summary

This roundabout was constructed mainly to reduce some major congestion crossing the bridge at peak hours of the day. Crashes and severity have increased a bit post-construction, but the congestion is mostly non-existent.

Table 43: River Rd. @ Waterville-Swanton Rd. – Annual Crash Statistics

<i>Data</i>	<i>3 Years Pre-Construction</i>	<i>3 Years Post-Construction</i>	<i>% Change</i>	<i>All Years Post-Construction</i>
Dates	2015-2017	2019-2021	N/A	2019-2022
Configuration	3-Way Stop	3-Leg Roundabout	N/A	3-Leg Roundabout
Total Crashes	5	11	120.0%	13
Crashes Per Year	1.67	3.67	119.8%	3.25
Fatal Crashes	0	0	0.0%	0
Serious Injury Crashes	0	0	0.0%	0
Minor Injury Crashes	0	2	N/A	2
Possible Injury Crashes	0	1	N/A	1
PDO Crashes	5	8	60.0%	10
Severity	1.00	2.32	132.0%	2.12
Percent Injury	0.0%	27.3%	27.3%	23.1%

Figure 86: River Rd. @ Waterville-Swanton Rd. – Crash Types for 3 Years Pre-Construction

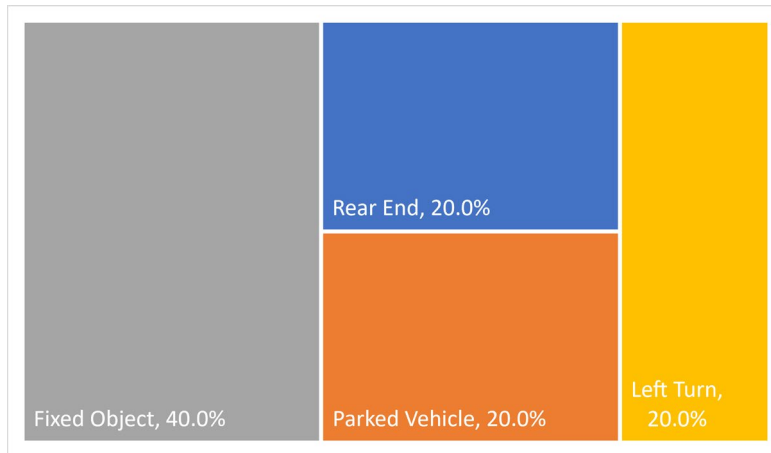
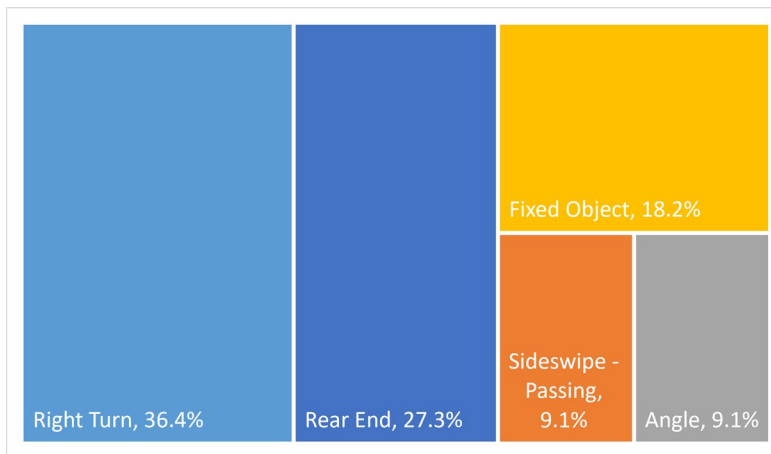
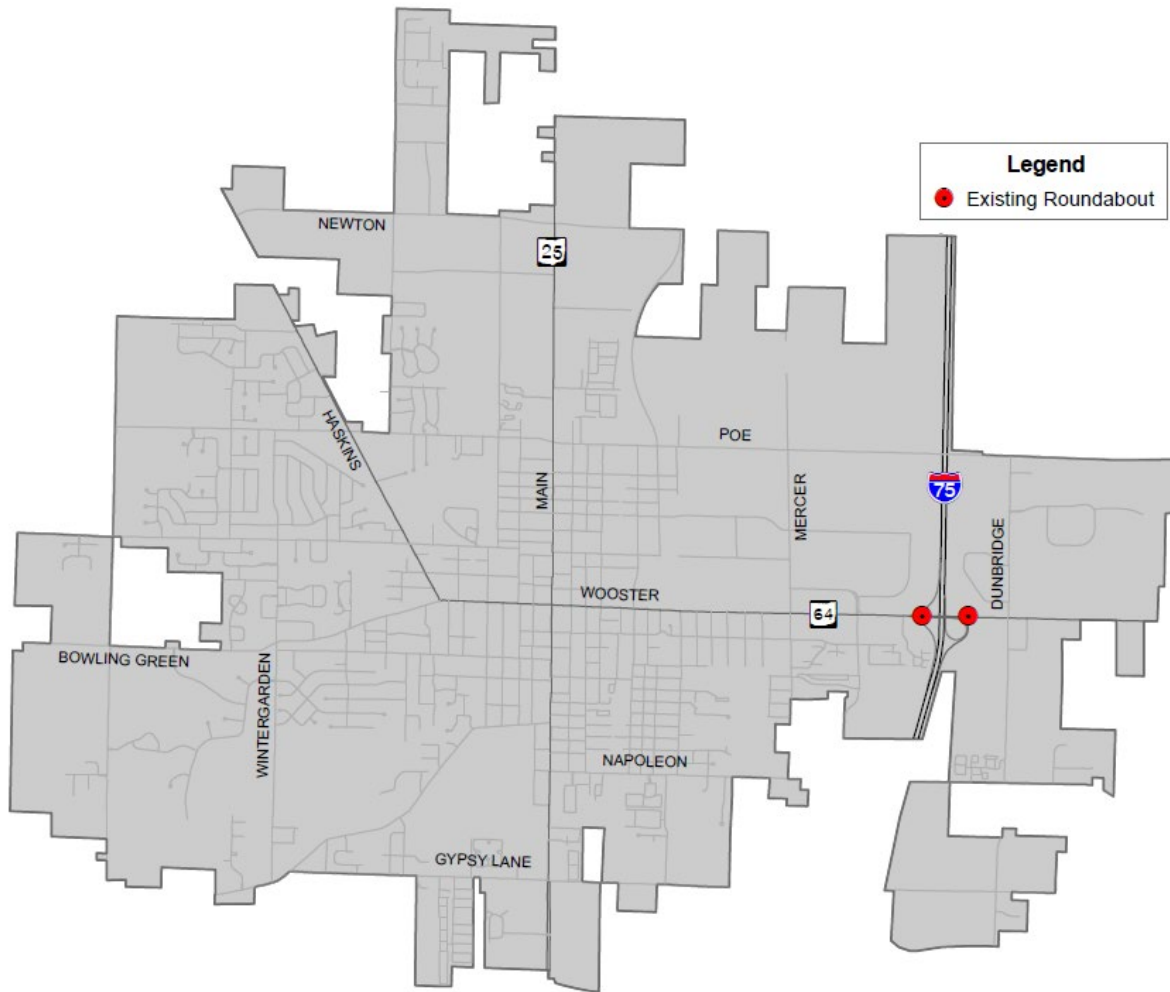


Figure 87: River Rd. @ Waterville-Swanton Rd. – Crash Types for 3 Years Post-Construction



CITY OF BOWLING GREEN

Map 10: Roundabout Locations in the City of Bowling Green

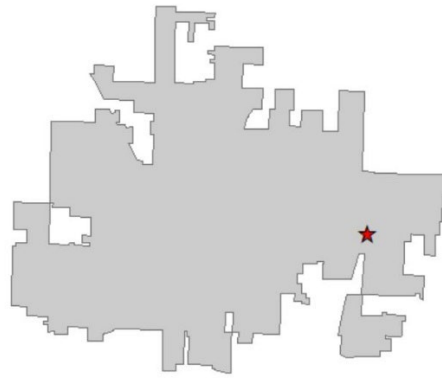


Currently in the City of Bowling Green there are 2 roundabouts and at least 1 planned roundabout. The 2 roundabouts in the City of Bowling Green were constructed mostly to ease traffic flow through the I-75/Wooster St. interchange and were finished in 2019. Bowling Green has just started construction on another roundabout along the Wooster St. corridor to help ease traffic flow through the BGSU campus.

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I-75 NB RAMPS @ WOOSTER ST. (SR 64)

City of Bowling Green – Constructed in 2019

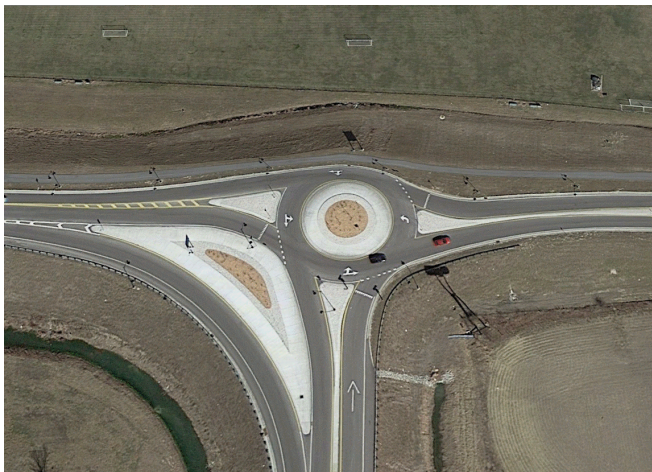


Pre-Construction



Prior to roundabout construction this location was suburban 3-leg 3-way stop-light controlled intersection. For the 3-year period from 2015 to 2017 there were a total of 16 crashes. During this time period 6.3% of the crashes were injury crashes. The crash severity rating for this time period was 1.22 and the annual cost of crashes per year for the crashes at this location was \$107,449.

Post-Construction



This roundabout opened in 2019. For the 3-year period from 2020 to 2022 there was a total of 12 crashes. The severity rating is now 1.57 which is a 28.7% increase. The annual cost of crashes per year for the crashes at this location is now \$130,804 which is a 22% increase.

Summary

This roundabout was constructed to ease traffic flow coming off I-75 coming into Bowling Green. Crashes have reduced a bit post construction and injury crashes have remained consistent to pre-construction.

Table 51: I-75 NB Ramps @ Wooster St. (SR 64) – Annual Crash Statistics

<i>Data</i>	<i>3 Years Pre-Construction</i>	<i>3 Years Post-Construction</i>	<i>% Change</i>
Dates	2015-2017	2020-2022	N/A
Configuration	4-Way Stop Light	4-Leg Roundabout	N/A
Total Crashes	16	12	-25.0%
Crashes Per Year	5.33	4	-25.0%
Fatal Crashes	0	0	0.0%
Serious Injury Crashes	0	0	0.0%
Minor Injury Crashes	0	0	0.0%
Possible Injury Crashes	1	2	100.0%
PDO Crashes	15	10	-33.3%
Severity	1.22	1.57	28.7%
Percent Injury	6.3%	16.7%	10.4%

Figure 102: I-75 NB Ramps @ Wooster St. (SR 64) – Crash Types for 3 Years Pre-Construction

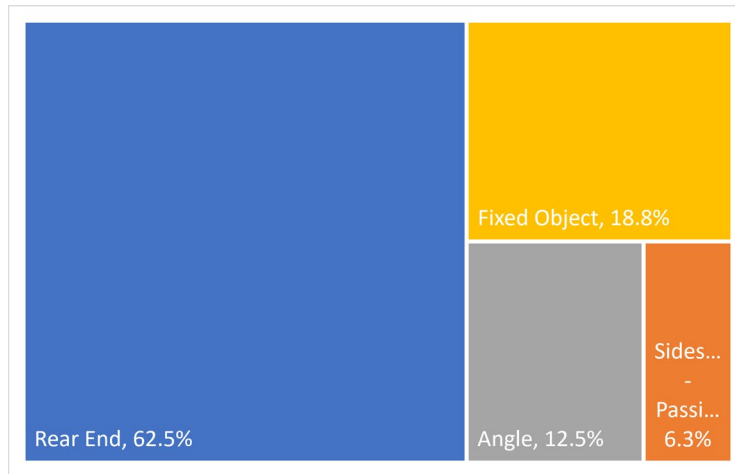
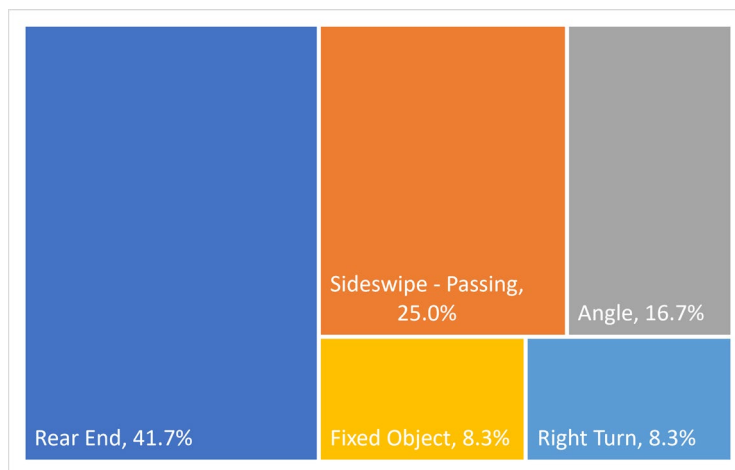
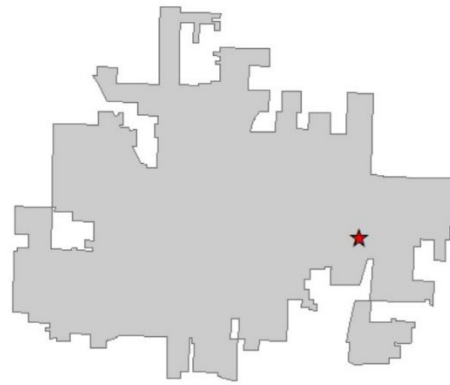


Figure 103: I-75 NB Ramps @ Wooster St. (SR 64) – Crash Types for 3 Years Post-Construction



I-75 SB RAMPS @ WOOSTER ST. (SR 64)

City of Bowling Green – Constructed in 2019

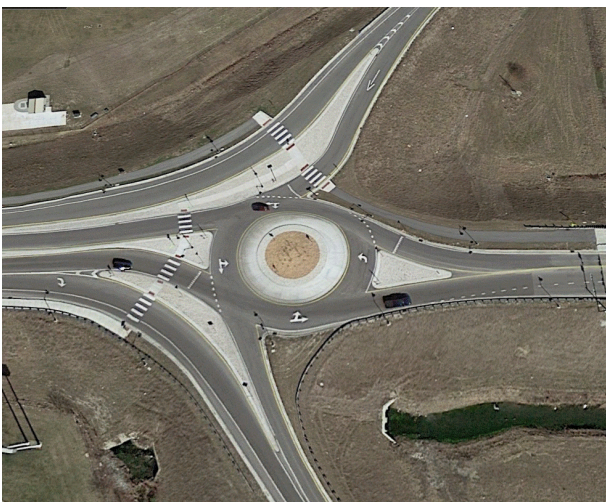


Pre-Construction



Prior to roundabout construction this location was suburban 4-way stoplight-controlled intersection. For the 3-year period from 2015 to 2017 there were a total of 3 crashes. During this time period 66.7% of the crashes were an injury crash. The crash severity rating for this time period was 66.69 and the annual cost of crashes per year for the crashes at this location was \$4,039,625.

Post-Construction



This roundabout opened in 2019. For the 3-year period from 2020 to 2022 there was a total of 14 crashes. The severity rating is now 1.64 and has decreased 97.5%. The annual cost of crashes per year for the crashes at this location is now \$164,971 which is a 96% decrease.

Summary

This roundabout was constructed to ease traffic flow coming off I-75 coming into Bowling Green. Post-construction crashes have increased quite a bit, but the severity and percent injury is much lower.

Table 52: I-75 SB Ramps @ Wooster St. – Annual Crash Statistics

<i>Data</i>	<i>3 Years Pre-Construction</i>	<i>3 Years Post-Construction</i>	<i>% Change</i>
<i>Dates</i>	2015-2017	2020-2022	N/A
<i>Configuration</i>	4-Way Stop Light	4-Leg Roundabout	N/A
<i>Total Crashes</i>	3	14	366.7%
<i>Crashes Per Year</i>	1.00	4.67	367.0%
<i>Fatal Crashes</i>	1	0	0.0%
<i>Serious Injury Crashes</i>	0	0	0.0%
<i>Minor Injury Crashes</i>	0	1	N/A
<i>Possible Injury Crashes</i>	1	1	0.0%
<i>PDO Crashes</i>	1	12	1100.0%
<i>Severity</i>	66.69	1.64	-97.5%
<i>Percent Injury</i>	66.7%	14.3%	-52.4%

Figure 104: I-75 SB Ramps @ Wooster St. – Crash Types for 3 Years Pre-Construction

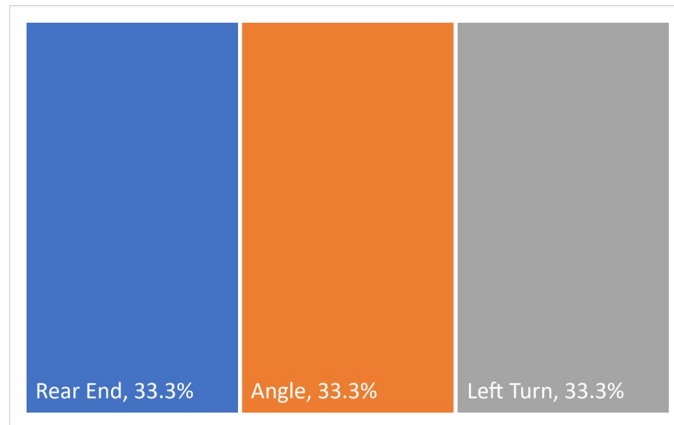
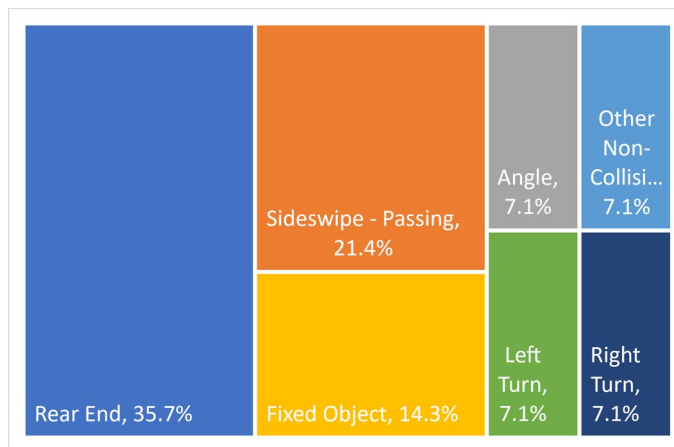
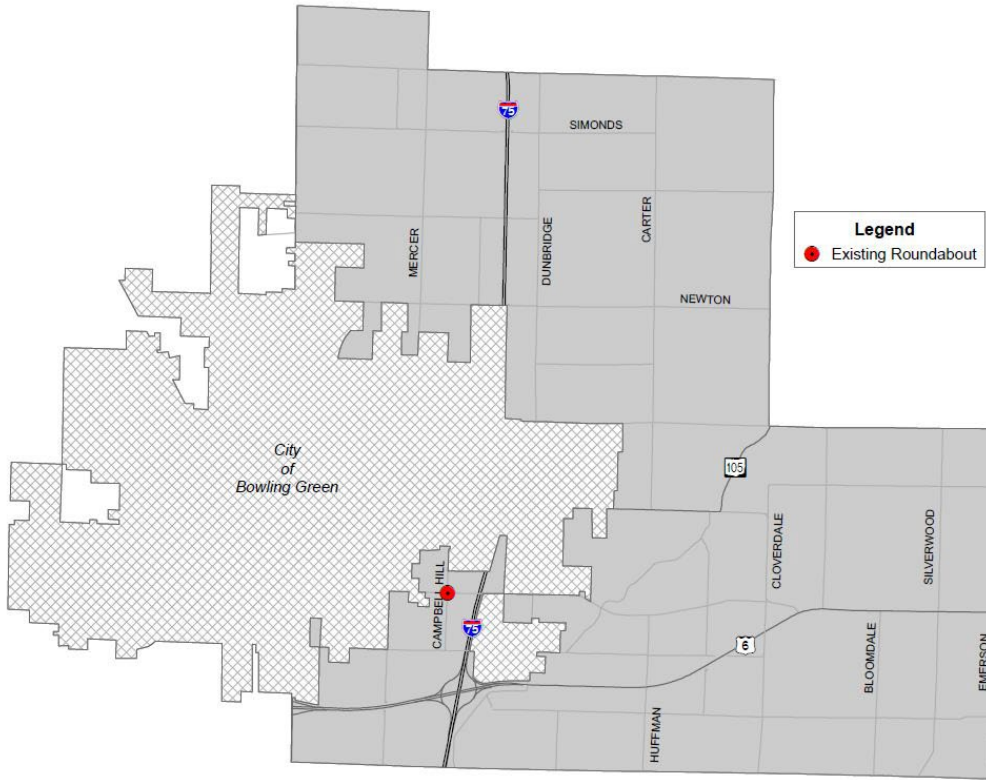


Figure 105: I-75 SB Ramps @ Wooster St. – Crash Types for 3 Years Post-Construction



CENTER TOWNSHIP

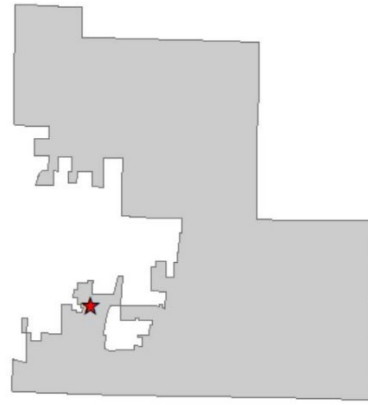
Map 10: Roundabout Locations in Center Township



Currently in the Center Twp there is 1 roundabout This roundabout was constructed in 2022.

CAMPBELL HILL RD. @ NAPOLEON RD.

Center Township – Constructed in 2022

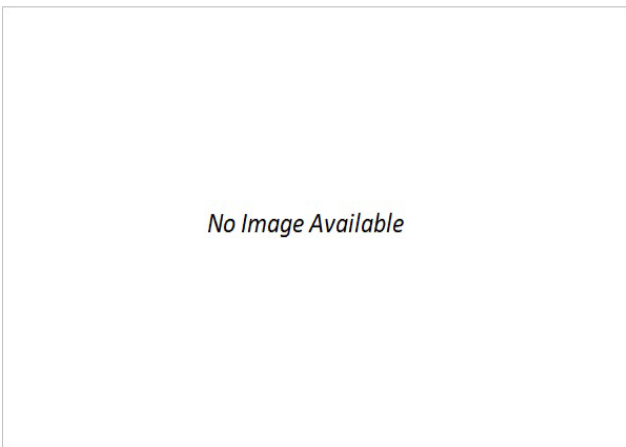


Pre-Construction



Prior to roundabout construction this location was a rural 4-leg 2-way stop intersection. For the 3-year period from 2017 to 2019 there were a total of 23 crashes. A majority of these were angle crashes that tend to be more severe in nature. During this time period 52.2% of the crashes were an injury crash. The crash severity rating for this time period was 4.56 and the annual cost of crashes per year for the crashes at this location was \$1,133,211.

Post-Construction



This roundabout finished construction towards the end of 2022 and thus there is no crash data for it yet.

Summary

Prior to construction this roundabout had an abnormal number of crashes and a large amount of injury crashes for the amount of traffic that flowed through it. This roundabout was constructed to alleviate those crashes. It has been less than a year since it was constructed so there is no post-construction data yet, but this should solve the high rate of injury crashes happening at this location.

Table 53: Campbell Hill Rd. @ Napoleon Rd. – Annual Crash Statistics

<i>Data</i>	<i>3 Years Pre-Construction</i>	<i>No Post-Construction Data</i>	<i>% Change</i>
Dates	2019-2021	N/A	N/A
Configuration	4-Leg 2-Stop Intersection	4-Leg Roundabout	N/A
Total Crashes	23	N/A	N/A
Crashes Per Year	7.7	N/A	N/A
Fatal Crashes	0	N/A	N/A
Serious Injury Crashes	2	N/A	N/A
Minor Injury Crashes	7	N/A	N/A
Possible Injury Crashes	3	N/A	N/A
PDO Crashes	11	N/A	N/A
Severity	4.56	N/A	N/A
Percent Injury	52.2%	N/A	N/A

Figure 106: Campbell Hill Rd. @ Napoleon Rd. – Crash Types for 3 Years Pre-Construction

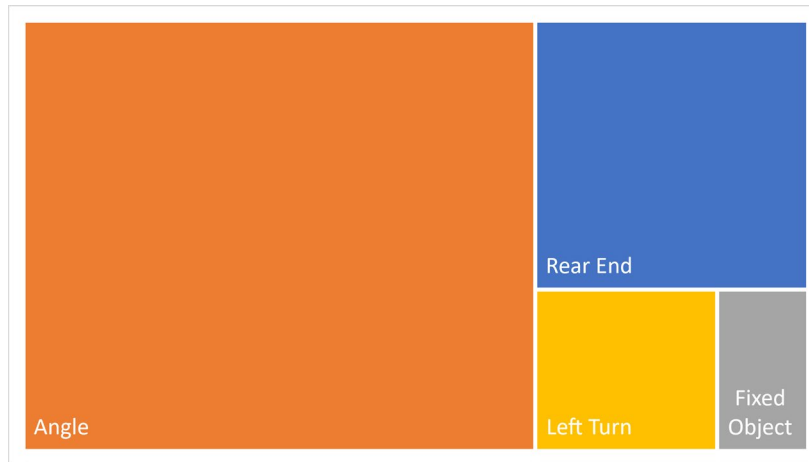
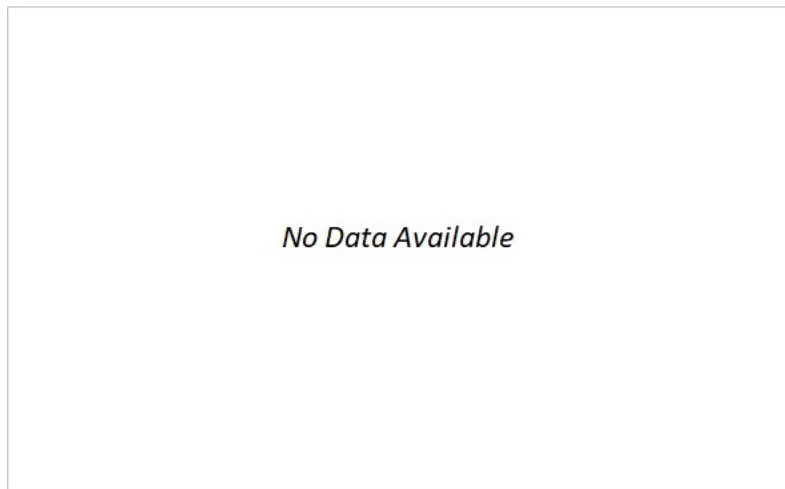


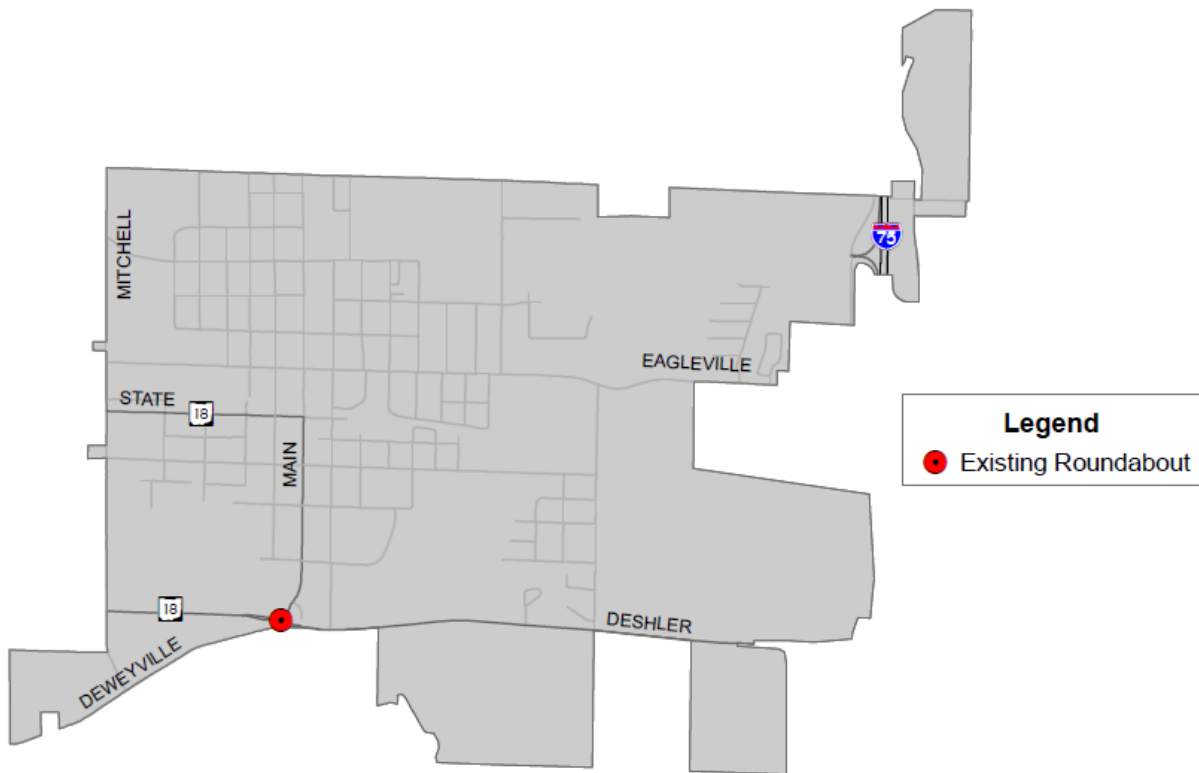
Figure 107: Campbell Hill Rd. @ Napoleon Rd. – Crash Types for 3 Years Post-Construction



This roundabout finished construction towards the end of 2022 and thus there is no crash data for it yet.

VILLAGE OF NORTH BALTIMORE

Map 11: Roundabout Locations in the Village of North Baltimore

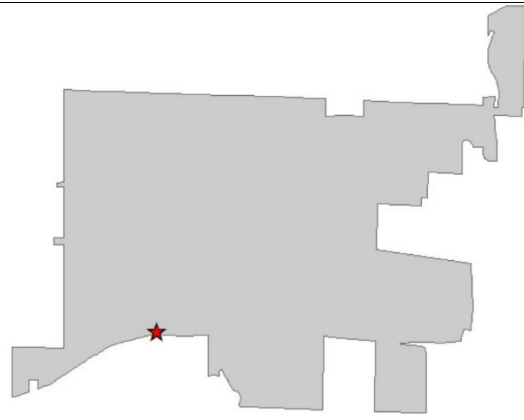


Currently in the Village of North Baltimore there is 1 roundabout and no planned roundabouts. This roundabout was built to help ease traffic, especially truck traffic coming from the CSX terminal, through North Baltimore. This roundabout was constructed in 2012.

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BRIAR HILL RD. @ DESHLER DR. (SR 18) @ MAIN ST.

Village of North Baltimore – Constructed in 2012



Pre-Construction



Prior to roundabout construction this location was rural 3-leg 1-way stop intersection that was further east. In addition the SR 18 bypass didn't exist before this. For the 3-year period from 2009 to 2011 there were a total of 12 crashes. During this time period 8.3% of the crashes were an injury crash. The crash severity rating for this time period was 17.14 due mainly to a fatal crash that happened. The annual cost of crashes per year for the crashes at this location was \$6,055,939.

Post-Construction



This roundabout opened in 2012. For the 3-year period from 2013 to 2015 there have been a total of 4 crashes. The severity rating has gone down to 1.0 which is a 94.2% reduction. The annual cost of crashes per year for the crashes at this location is now \$25,228 which is nearly a 100% reduction.

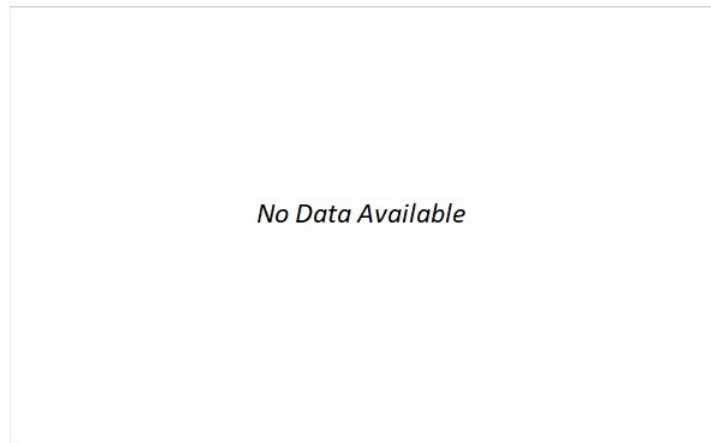
Summary

This roundabout was constructed as part of a new bypass around the village of North Baltimore. The previous configuration had a t-intersection coming in right at a curve which may have caused the high amount of crashes pre-construction. Post-construction crashes have reduced greatly and there have been no injury crashes at all in the last 10 years.

Table 54: Briar Hill Rd. @ Deshler Dr. (SR 18) @ Main St. – Annual Crash Statistics

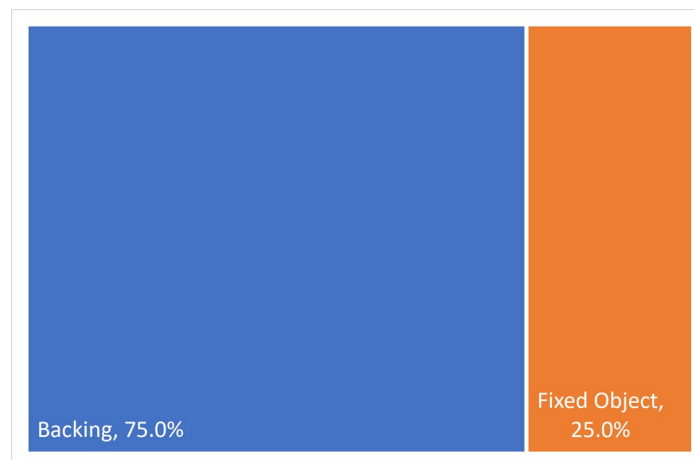
<i>Data</i>	<i>3 Years Pre-Construction</i>	<i>3 Years Post-Construction</i>	<i>% Change</i>	<i>All Years Post-Construction</i>
<i>Dates</i>	2009-2011	2013-2015	N/A	2013-2022
<i>Configuration</i>	3-Leg 1-Stop Intersection	3-Leg Roundabout	N/A	3-Leg Roundabout
<i>Total Crashes</i>	12	4	-66.7%	17
<i>Crashes Per Year</i>	4	1.33	-66.8%	1.7
<i>Fatal Crashes</i>	1	0	-100.0%	0
<i>Serious Injury Crashes</i>	0	0	0.0%	0
<i>Minor Injury Crashes</i>	0	0	0.0%	0
<i>Possible Injury Crashes</i>	0	0	0.0%	0
<i>PDO Crashes</i>	11	4	-63.6%	17
<i>Severity</i>	17.14	1.00	-94.2%	1.00
<i>Percent Injury</i>	8.3%	0.0%	-8.3%	0.0%

Figure 108: Briar Hill Rd. @ Deshler Dr. (SR 18) @ Main St. – Crash Types for 3 Years Pre-Construction

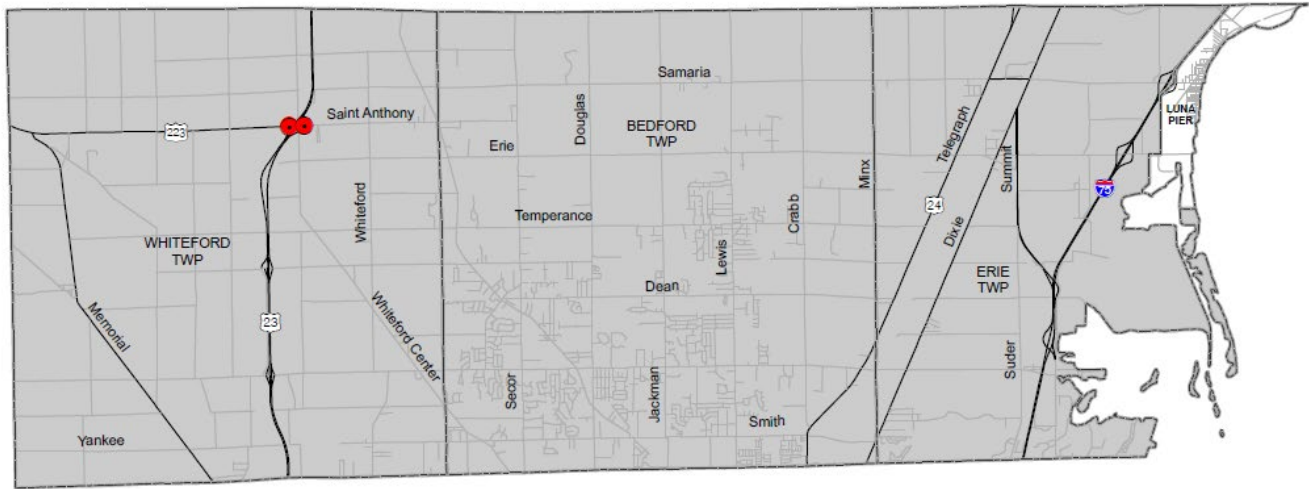


This road was a completely new road and thus there is no before data.

Figure 109: Briar Hill Rd. @ Deshler Dr. (SR 18) @ Main St. – Crash Types for 3 Years Post-Construction



3 SOUTHERN TOWNSHIPS OF MONROE COUNTY

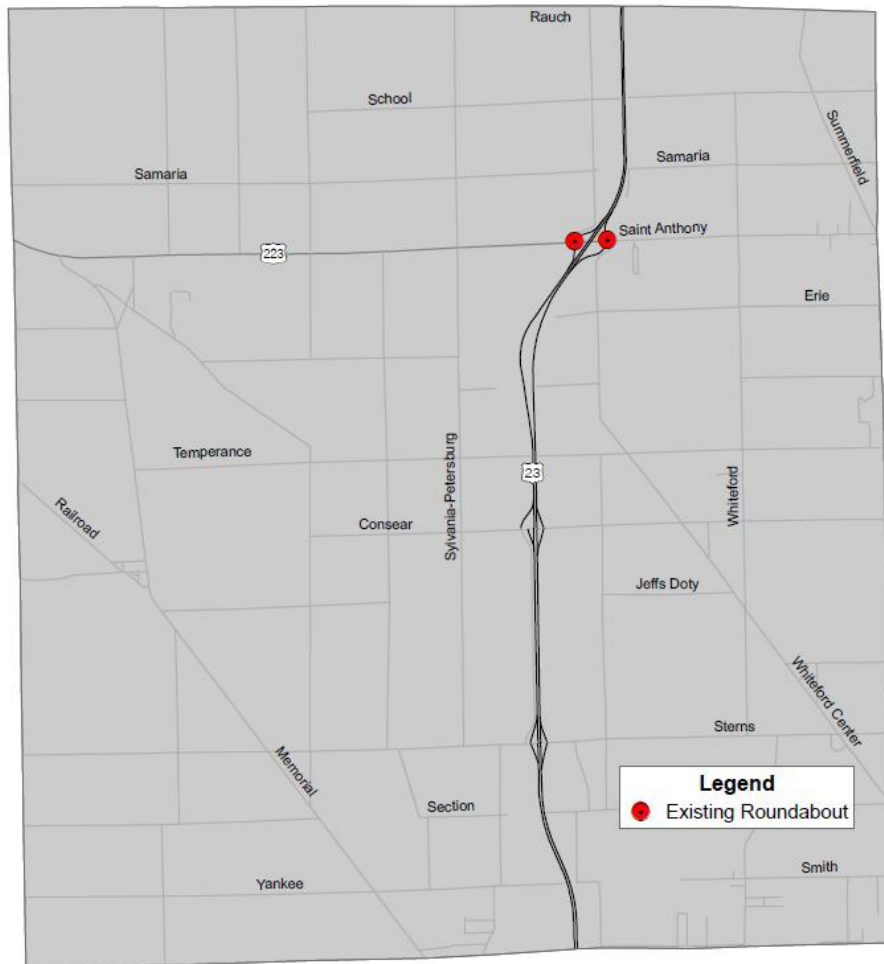


There are a total of 2 roundabouts in the 3 southern townships of Monroe County. Whiteford Township is the only one of the three townships that currently has roundabouts. In the followings pages of this report there is a map of the Whiteford Township locations and a synopsis of the roundabouts that are in each jurisdiction as well as before and after data for each.

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WHITEFORD TOWNSHIP

Map 6: Roundabout Locations in Whiteford Township

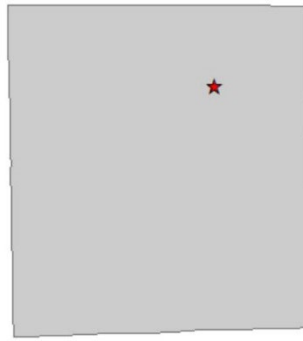


Currently in Whiteford Township there are 2 roundabouts and no planned roundabouts. Both roundabouts were built in 2013 to ease traffic flow through the busy US 23/US 223 interchange.

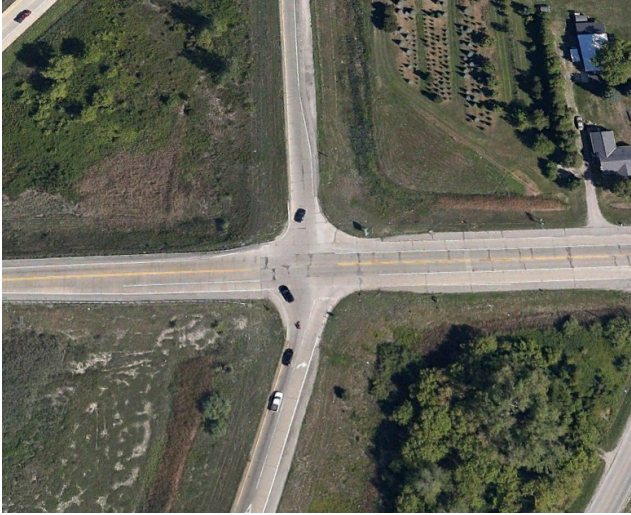
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US 23 NB RAMPS @ US 223

Whiteford Township – Constructed in 2013



Pre-Construction



Prior to roundabout construction this location was a rural 4-leg 2-way stop intersection at an interchange. For the 3-year period from 2010 to 2012 there were a total of 11 crashes. During this time period the severity rating was 3.12 and the injury percent was 27.3%. The annual cost of crashes per year for the crashes at this location was \$353,828.

Post-Construction



This roundabout opened in 2013. For the 3-year period from 2014 to 2016 there was a total of 10 crashes. The crash severity is now 4.44 which is a 42.4% increase. The annual cost of crashes per year for the crashes at this location is now \$481,487 which is a 36% increase.

Summary

In the 3 years right after construction the number of crashes remained about the same as pre-construction. However, the severity went up a tick. In the 6 years beyond the crashes per year have decreased by nearly half. Two serious injury crashes that happened in that span have kept the severity higher.

Table 29: US 23 NB Ramps @ US 223 – Annual Crash Statistics

<i>Data</i>	<i>3 Years Pre-Construction</i>	<i>3 Years Post-Construction</i>	<i>% Change</i>	<i>All Years Post-Construction</i>
Dates	2010-2012	2014-2016	N/A	2014-2022
Configuration	4-Leg 2-Stop Intersection	4-Leg Roundabout	N/A	4-Leg Roundabout
Total Crashes	11	10	-9.1%	13
Crashes Per Year	3.67	3.33	-9.3%	1.86
Fatal Crashes	0	0	0.0%	0
Serious Injury Crashes	1	1	0.0%	2
Minor Injury Crashes	0	2	N/A	0
Possible Injury Crashes	2	2	0.0%	2
PDO Crashes	8	5	-37.5%	9
Severity	3.12	4.44	42.4%	4.05
Percent Injury	27.3%	50.0%	83.2%	30.8%

Figure 58: US 23 NB Ramps @ US 223 – Crash Types for 3 Years Pre-Construction

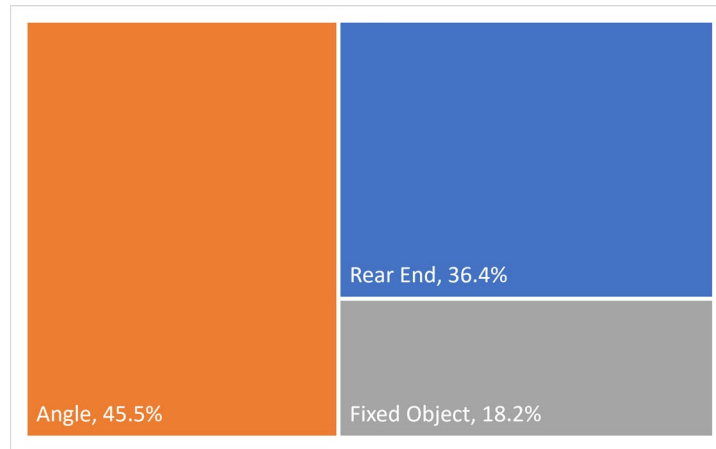
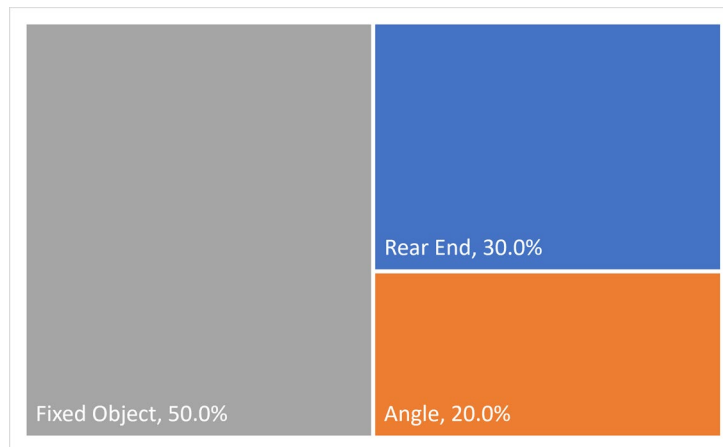
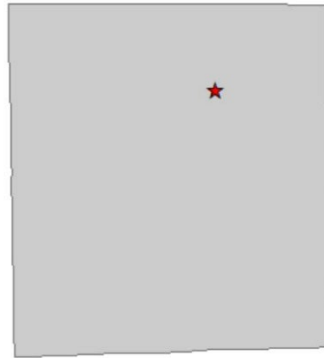


Figure 59: US 23 NB Ramps @ US 223 – Crash Types for 3 Years Post-Construction

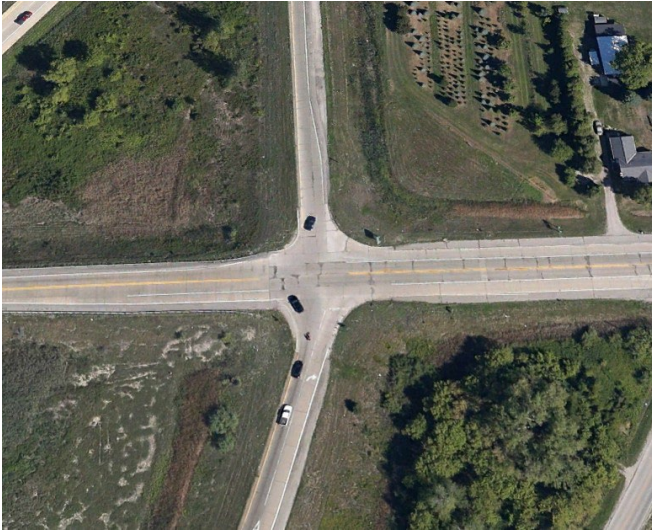


US 23 SB RAMPS @ US 223

Whiteford Township – Constructed in 2013



Pre-Construction



Prior to roundabout construction this location was a rural 4-leg 2-way stop intersection at an interchange. For the 3-year period from 2010 to 2012 there were a total of 12 crashes. During this time period there were no injury crashes thus the crash severity rating for this time period was 1.0. The annual cost of crashes per year for the crashes at this location was \$50,456.

Post-Construction



This roundabout opened in 2013. For the 3-year period from 2014 to 2016 there were a total of 8 crashes. While there have been fewer crashes at this location now the severity rating is now 2.282, which is 181.8% increase. The annual cost of crashes per year for the crashes at this location is now \$205,675 which is a 308% increase.

Summary

Crashes decreased in the 3 years post construction, however the severity went up a bit due to having a couple of injury crashes. Going beyond the 3 years post-construction the crashes per year and severity has decreased.

Table 30: US 23 SB Ramps @ US 223 – Annual Crash Statistics

<i>Data</i>	<i>3 Years Pre-Construction</i>	<i>3 Years Post-Construction</i>	<i>% Change</i>	<i>All Years Post-Construction</i>
Dates	2010-2012	2014-2016	N/A	2014-2022
Configuration	4-Leg 2-Stop Intersection	4-Leg Roundabout	N/A	4-Leg Roundabout
Total Crashes	12	8	-33.3%	12
Crashes Per Year	4	2.67	-33.3%	1.71
Fatal Crashes	0	0	0.0%	0
Serious Injury Crashes	0	0	0.0%	0
Minor Injury Crashes	0	2	N/A	2
Possible Injury Crashes	0	1	N/A	1
PDO Crashes	12	5	-58.3%	10
Severity	1.00	2.82	182.0%	2.12
Percent Injury	0.0%	37.5%	37.5%	23.1%

Figure 60: US 23 SB Ramps @ US 223 – Crash Types for 3 Years Pre-Construction

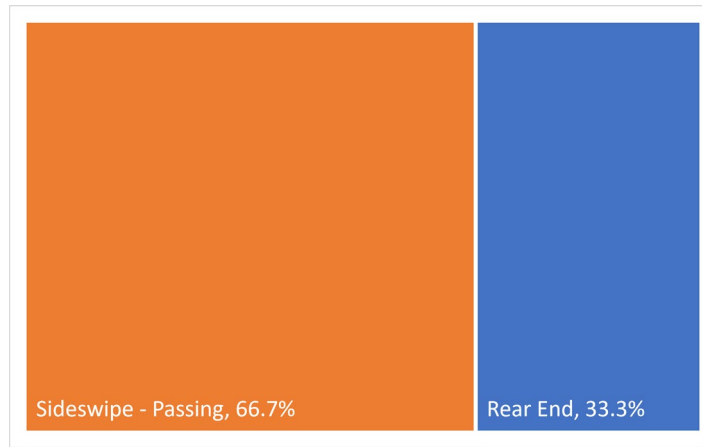
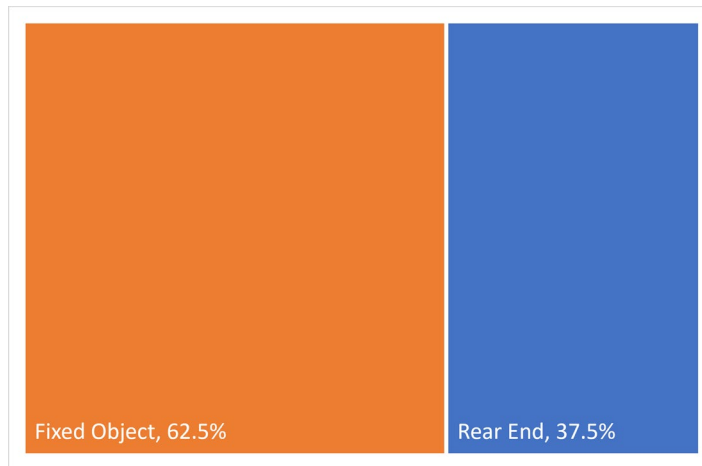


Figure 61: US 23 SB Ramps @ US 223 – Crash Types for 3 Years Post-Construction



CONCLUSION

After analyzing all 55 roundabouts in the region, it is apparent that the construction of these roundabouts has provided numerous benefits to the region. While not every roundabout provided the best expected benefits when analyzed individually, when all are analyzed together the benefits are apparent.

OVERALL STATISTICS

Below are the before and after overall statistics of all of the roundabouts in the region. Note that there is data for both one-lane roundabouts, two-lane roundabouts, and the combined data for both.

Table 55: Summary of the Three Years Pre-Construction

Roundabout Type	Before									
	Fatal Crashes	Serious Injury Crashes	Minor Injury Crashes	Possible Injury Crashes	PDO	Severity (EPDO)	Total Crashes	Total Injury crashes	Percent Injury	Annual Cost of Crashes
One-lane	4	17	69	60	282	4.80	432	150	34.7%	\$33,374,824
Two-Lane	0	5	13	23	115	2.50	156	41	26.3%	\$3,573,189
Totals	4	22	82	83	397	4.19	588	191	32.5%	\$36,948,014

Table 56: Summary of the Three Years Post-Construction

Roundabout Type	After									
	Fatal Crashes	Serious Injury Crashes	Minor Injury Crashes	Possible Injury Crashes	PDO	Severity (EPDO)	Total Crashes	Total Injury Crashes	Percent Injury	Annual Cost of Crashes
One-lane	0	5	33	29	236	2.20	303	67	22.1%	\$6,244,036
Two-Lane	0	4	23	48	391	1.77	466	75	16.1%	\$6,415,915
Totals	0	9	56	77	627	1.94	769	142	18.5%	\$12,659,951

Table 57: Summary of All Years Post-Construction

Roundabout Type	All Years After									
	Fatal Crashes	Serious Injury Crashes	Minor Injury Crashes	Possible Injury Crashes	PDO	Severity (EPDO)	Total Crashes	Total Injury Crashes	Percent Injury	Annual Cost
One-lane	2	8	49	48	406	2.86	513	107	20.9%	\$7,546,478
Two-Lane	0	6	53	92	775	1.77	926	151	16.3%	\$5,912,602
Totals	2	14	102	140	1181	2.16	1439	258	17.9%	\$13,459,080

Overall, for single lane roundabouts, all of the metrics have improved after roundabout construction. Prior to roundabout construction there was a total of 432 crashes (in the 3 years prior to construction) which resulted in a severity rating of 4.80, an injury percentage of 34.7% and an annual cost of crashes of \$33,374,824. Post construction these numbers have improved to 303 crashes (in the 3 years after construction) which resulted in a severity rating of 2.20, an injury percentage of 22.1% and an annual cost of crashes of \$6,244,0366 (an 81% decrease).

Figure 110: Crash Severity & Percent Injury for One-Lane Roundabouts

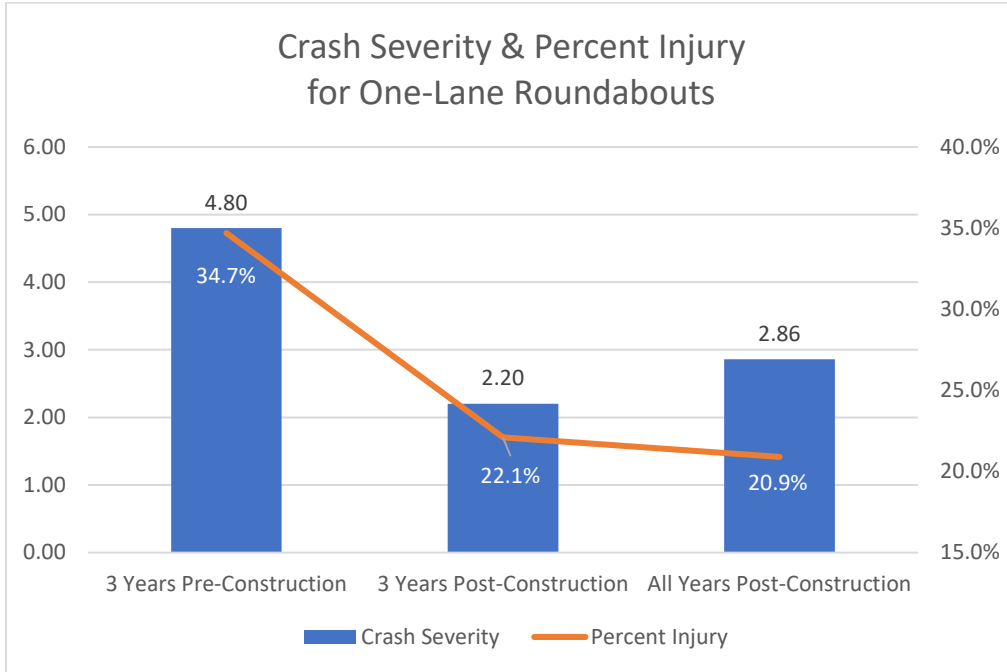
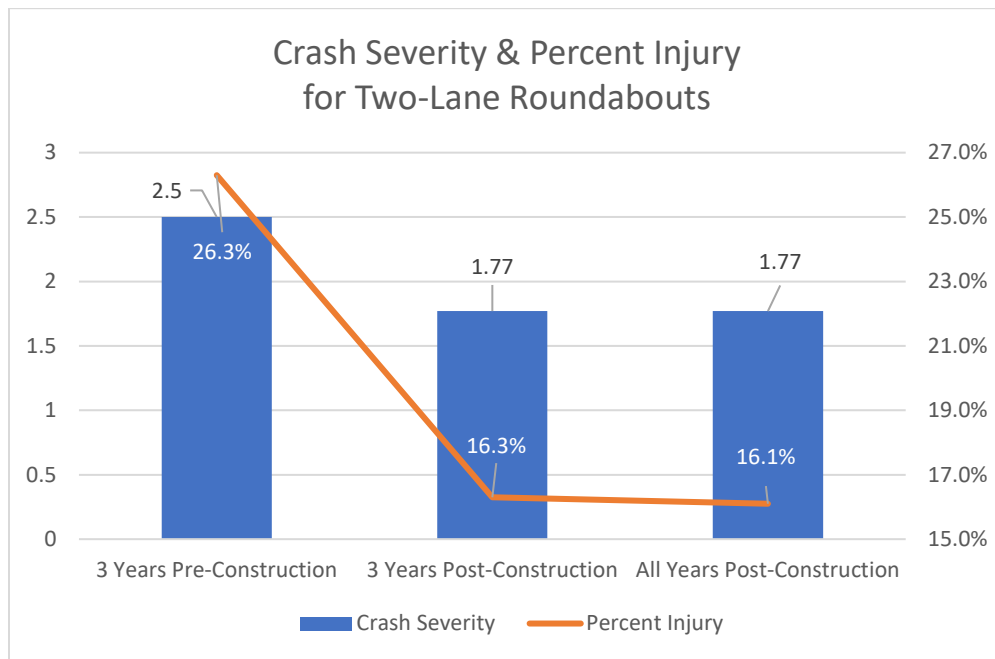
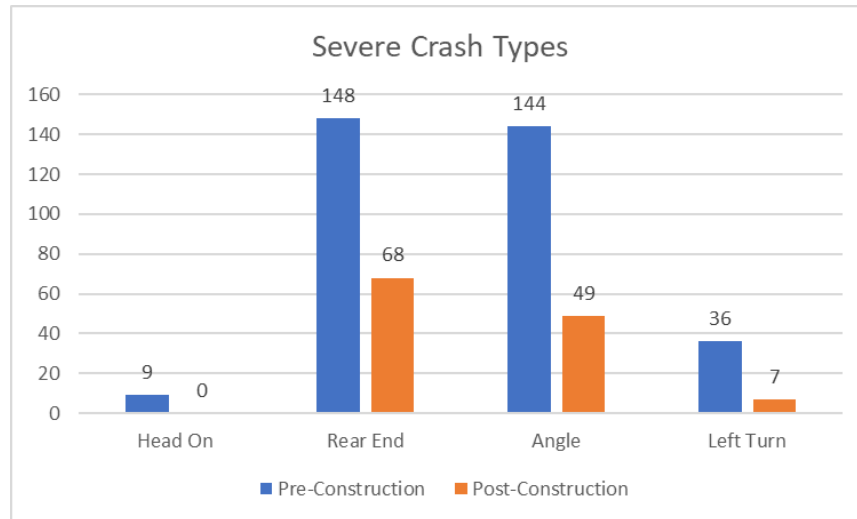


Figure 111: Crash Severity & Percent Injury for Two-Lane Roundabouts



Roundabouts should effectively mitigate a range of crash types, improving overall safety for motorists, pedestrians, and cyclists. Angle crashes, left turn crashes, rear end crashes, and head on crashes tend to be the more severe crashes that happen at a normal intersection. Overall, for single-lane roundabouts, these types of crashes were greatly reduced after construction.

Figure 112: Severe Crash Types



CRASH TYPES AND METRICS POST CONSTRUCTION

Below are some statistics of what is happening after roundabout construction.

Table 58: Emphasis Area

Location	Total Crashes	Emphasis Area							
		Alcohol Related Involvement	Percent Related to Alcohol	Speed Related Involvement	Percent Related to Speed	Young Driver Involvement	Percent Related to Younger Drivers	Older Driver Involvement	Percent Related to Older Drivers
One-Lane Roundabouts	513	34	6.6%	59	11.5%	207	40.4%	105	20.5%
Two-Lane Roundabouts	926	13	1.4%	43	4.6%	295	31.9%	174	18.8%
Total	1439	47	3.3%	102	7.1%	502	34.9%	279	19.4%

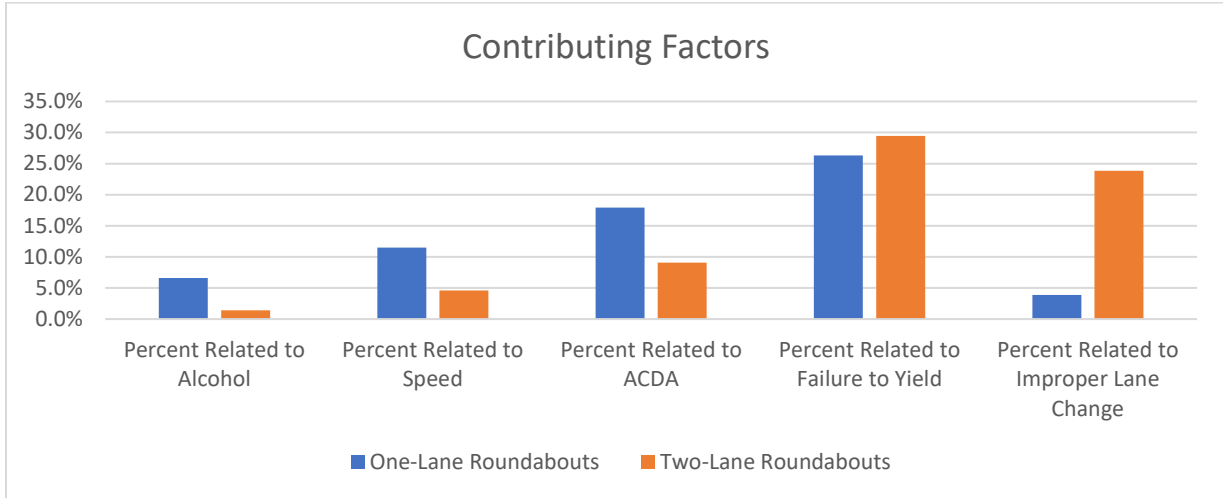
Table 59: Contributing Circumstance

Location	Total Crashes	Contributing Circumstance					
		Following Too Closely/ ACDA	Percent Related to ACDA	Failure to Yield	Percent Related to Failure to Yield	Improper Lane Change	Percent Related to Improper Lane Change
One-Lane Roundabouts	513	92	17.9%	135	26.3%	20	3.9%
Two-Lane Roundabouts	926	84	9.1%	273	29.5%	221	23.9%
Total	1439	176	12.2%	408	28.4%	241	16.7%

For two lane roundabouts the numbers are not as impressive, but there are still metrics that have decreased post construction. Severity at these roundabouts went from 2.50 prior to construction to 1.77 after construction. The injury percentage also reduced from 26.3% prior to construction compared to 16.1% after construction.

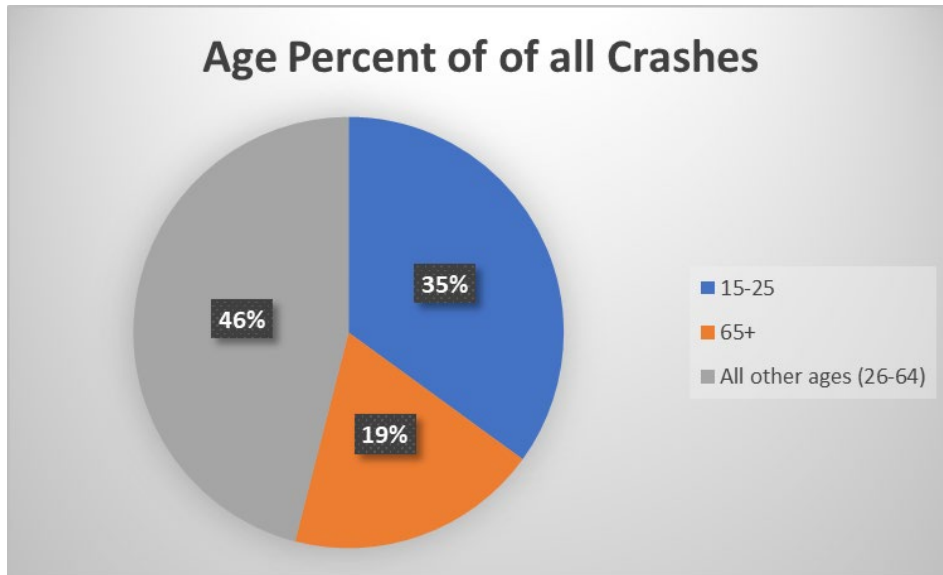
Digging deeper to determine why some crashes still happen after construction at some of these locations led to some interesting findings. Nearly 2.5% of the crashes that happen at roundabouts have alcohol involved. Another 7% of the crashes have unsafe speeds going into the roundabout. Some other contributing factors include 25% of drivers failing to yield, 17% of drivers improperly changing lanes, and 12% of drivers following too close.

Figure 113: Contributing Factors



Two more statistics that are worth noting are that 19% of the people that are involved in a crash are 65 years or older and a concerning 35% are people 15 to 25 years of age.

Figure 114: Age Percent of All Crashes



Appendix A

