

TMACOG Region Roundabouts Report



Benefits of Roundabouts

- Improved Traffic Flow
- Traffic Calming
- Reduced Cuing and Vehicle Emissions
- Less Fuel Consumption
- Improved Safety





The purpose of the study is to evaluate the before and after safety of roundabouts in the TMACOG area.

Safety metrics studied in this report:

- Crash frequency
- Crash severity
- Injury percentage
- Cost of crashes







Crash Frequency

This metric measures the total crashes and crashes per year. In this report, three (3) years of crash data were collected prior to construction and compared to three (3) years post construction.



Crash Severity (EPDO Rate)

The EPDO Rate is a measure that is based upon the ratio of fatal and injury crashes compared to property damage only (PDO) crashes.

The ratios used for the study were:

- 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 (ODOT Safety Study Guidelines, 2017)

Determining the EPDO rate generates a calculated number. The higher the number at that location the higher the severity.



Injury Percentage

This metric measures the percentage of crashes at a location that have either an injury or fatality. Having an injury percentage higher than 30% is a metric used by ODOT to determine if it is eligible for safety funding.





Cost of Crashes

For this report, the total cost of each crash severity type were assigned based on a FHWA report and then divided by the total number of years studied. The costs used for each crash severity type are below.

- **\$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

Existing Roundabouts

At the start of this report there were 51 existing roundabouts in the TMACOG region spread throughout 17 different municipalities.

These 51 roundabouts were classified into two categories:

- One-Lane Roundabouts (42 total)
- Two-Lane Roundabouts (9 total).



DORR ST. @ MCCORD RD. Springfield Township - Constructed in 2020

Pre-Construction



Prior to roundabout construction this location was a 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 percentage 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.

Reports for Individual Roundabouts

Data was analyzed for each roundabout. A before and after summary was created for each location studied.

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.

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

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



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



Overall Statistics – Single Lane Roundabouts

Overall, all metrics have improved after roundabout construction. Prior to construction, there was a total of **432 crashes** (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** (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 \$6,244,036 (81% decrease).





Overall Statistics – Single Lane Roundabouts

Roundabouts are great at making roads safer for everyone – drivers, pedestrians, and cyclists. At regular intersections, some serious types of crashes like angle crashes, left turn crashes, rear-end crashes, and head-on crashes happen more often and can be more severe. The statistics show that for the single lane roundabouts in the region these severe types of crashes have drastically reduced.

Overall Statistics – Two Lane Roundabouts

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.





Crashes Post Construction -Contributing Factors

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 to close.



Summary of 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

Summary of 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

Crashes Post-Construction

Two additional concerning statistics pertain to the demographic distribution of crash involvement, indicating that 19% of those involved in crashes are aged 65 years or older, while a significant 35% comprises individuals between the ages of 15 and 25.







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