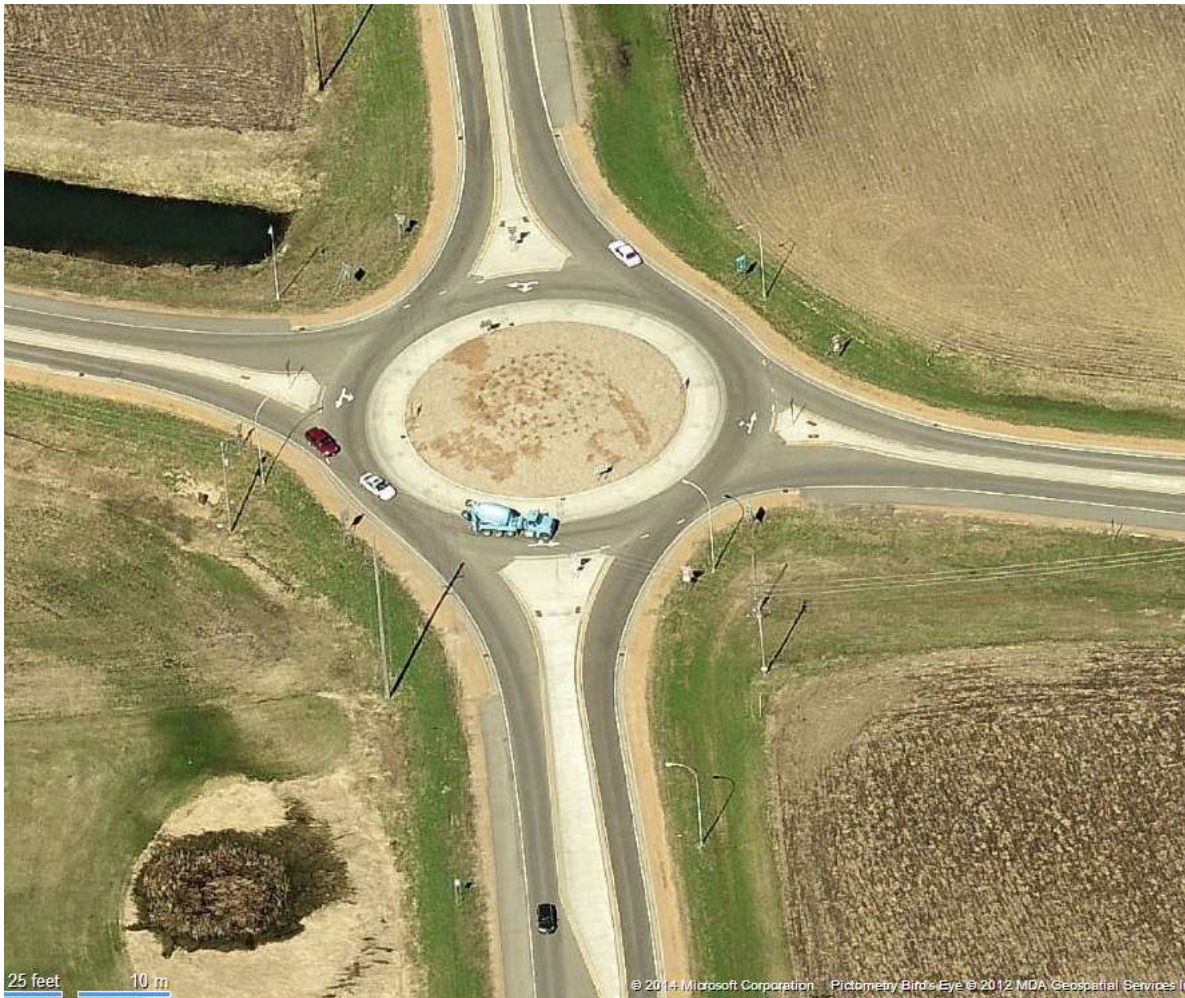


A Study of the Traffic Safety at Single Lane Roundabouts in Minnesota



**Office of Traffic, Safety, and Technology
Minnesota Department of Transportation**



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Executive Summary

The first Minnesota modern roundabout was installed in 1995. Roundabouts have been being constructed and used in Minnesota for a number of years. This report examines the safety performance of these intersections by comparing the before and the after crash data. Overall, single lane roundabouts are performing well when looking at the safety record. Single Lane Roundabouts in Minnesota have shown an 80% reduction in fatal and serious injury crashes.

Roundabout Study Locations

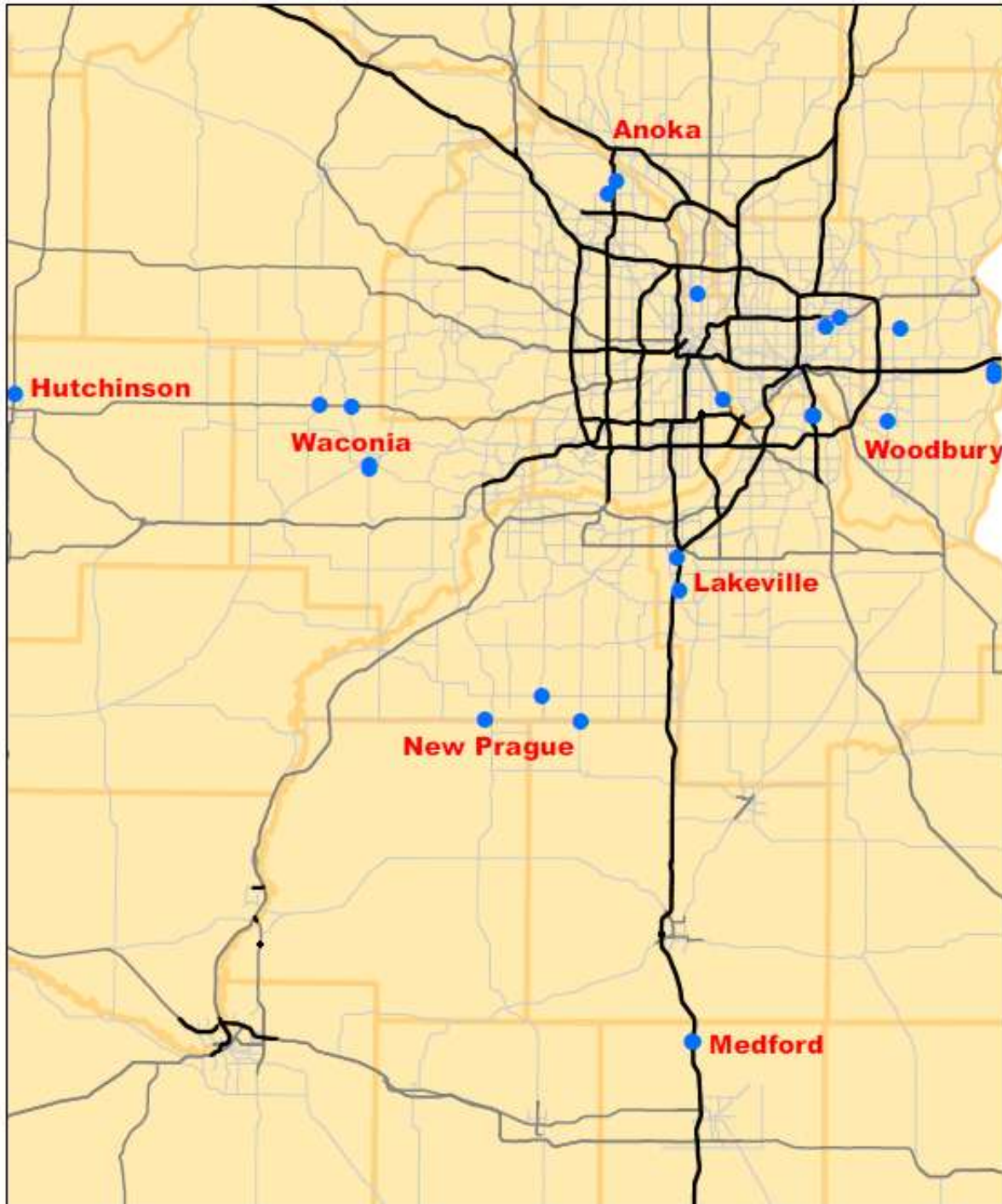
In order to appropriately analyze the safety impact of roundabouts, sites were selected based on the number of years since the construction year. Sites with a minimum of three years following the installation date and a minimum of three years before were selected. For this analysis, 24 sites fit the selection criteria.

The 24 sites are listed here:

CITY	COUNTY	INTERSECTION
West St. Paul	Dakota	TH 52 at Wentworth W / (CSAH 8)
South St. Paul	Dakota	TH 52 at Wentworth E / (CR 8)
Champlin	Hennepin	117th Ave at Business Park Blvd
Burnsville	Dakota	Burnhaven and 150th Street
Maple Grove	Hennepin	109th at Elm Creek Pkwy/Lancaster Ln
Columbia Heights	Anoka	39th Avenue / Jefferson St.
Maplewood	Ramsey	Frost Avenue / English St.
Cedar Lake Twp	Scott	TH 13 (Langford Ave) at CSAH 2 (260th St E)
Waconia	Carver	TH 284 & CSAH 10
near Mayer	Carver	TH 7 and Carver CSAH 10
near Mayer	Carver	TH 7 and TH 25
Maplewood	Ramsey	Castle Avenue/Van Dyke Street
Lakeville	Dakota	175th St and Kenrick Ave
Waconia	Carver	TH 284 and Sparrow Road/15th Street
near New Prague	LeSeuer	TH 19 and 11 Ave NW
Minneapolis	Hennepin	Minnehaha Ave and Godfrey Pkwy
Hutchinson	McLeod	CSAH 12 / TH 15
Lakeland	Washington	CSAH 18 / 4th St.
Lakeland	Washington	CSAH 18 / 5th St.
Lakeland	Washington	CSAH 18 / Division St.
Lake Elmo	Washington	TH 5 and CSAH 6 / Jamaca
Medford	Steele	I-35 and CSAH 12 E
Medford	Steele	I-35 and CSAH 12 W
near Elko	Scott	CSAH 23, TH 19, and CSAH 86

Single-Lane Roundabouts, 2013

with at least 3 years of Before and After crash data



Before Crash Data

All the roundabouts in the sample above contained at least three years of before crash data, and some had before construction data up to 6 years. The earliest roundabout in this sample was constructed in 2001 (Minnehaha and Godfrey in Minneapolis)

The total number of site-years* totaled to 118 before and 146 after the roundabout was installed. *(A site-year is a way to quantify the amount of exposure to traffic each site has had. A site with three years of data would have three site-years, another with four years would have four-site years. These can be additive; the two sites mentioned would have a total of 7 site-years.)

Total Crashes Before	Total Years Before	K Severity Before	A Injury Severity Before	B Injury Severity Before	C Injury Severity Before	PDO Injury Severity Before
231	118	5	8	37	64	117

The total number of vehicles entering these intersections before construction was 329,060,275 in the 3-6 years prior. The reason for recording and using the total number of vehicles entering is a way to help equally compare different locations that may have different traffic conditions, or to compare a site over time as the traffic volume has changed.

After Crash Data

The roundabouts in the sample above contained at least three years of after crash data, and some had after construction data up to 11 years.

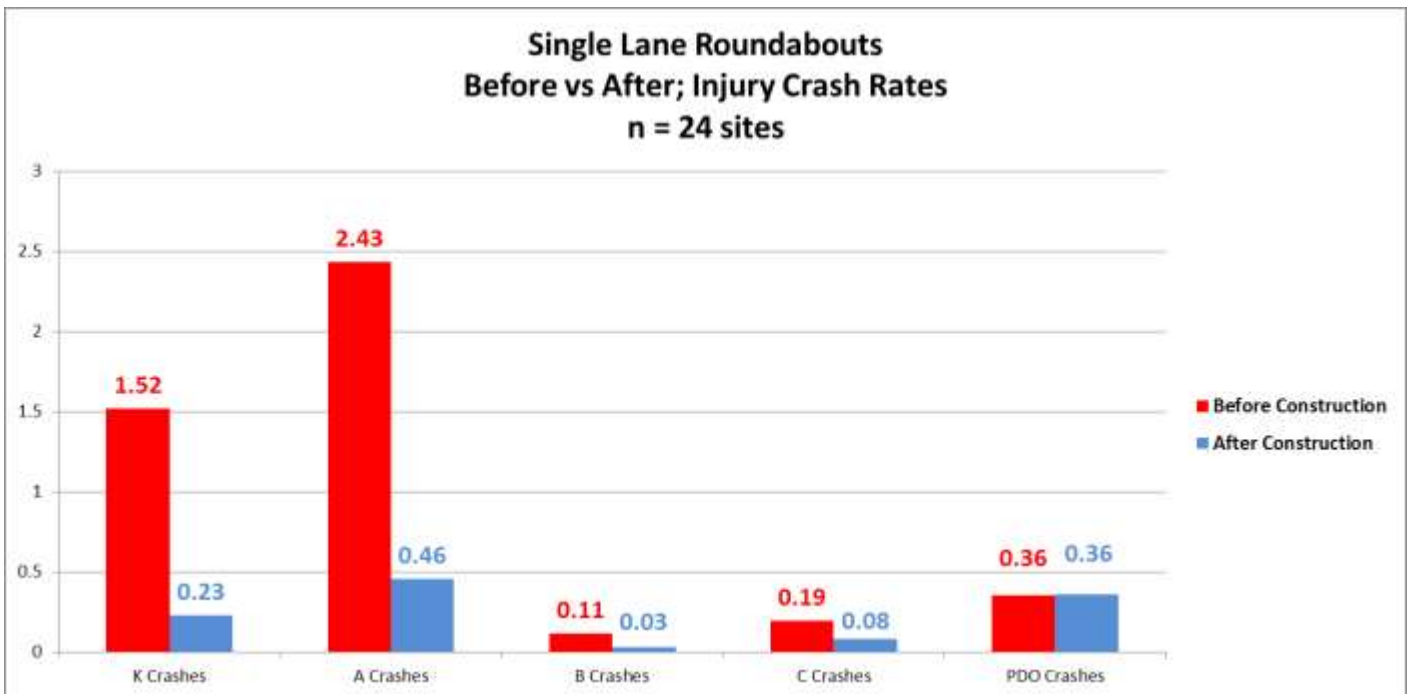
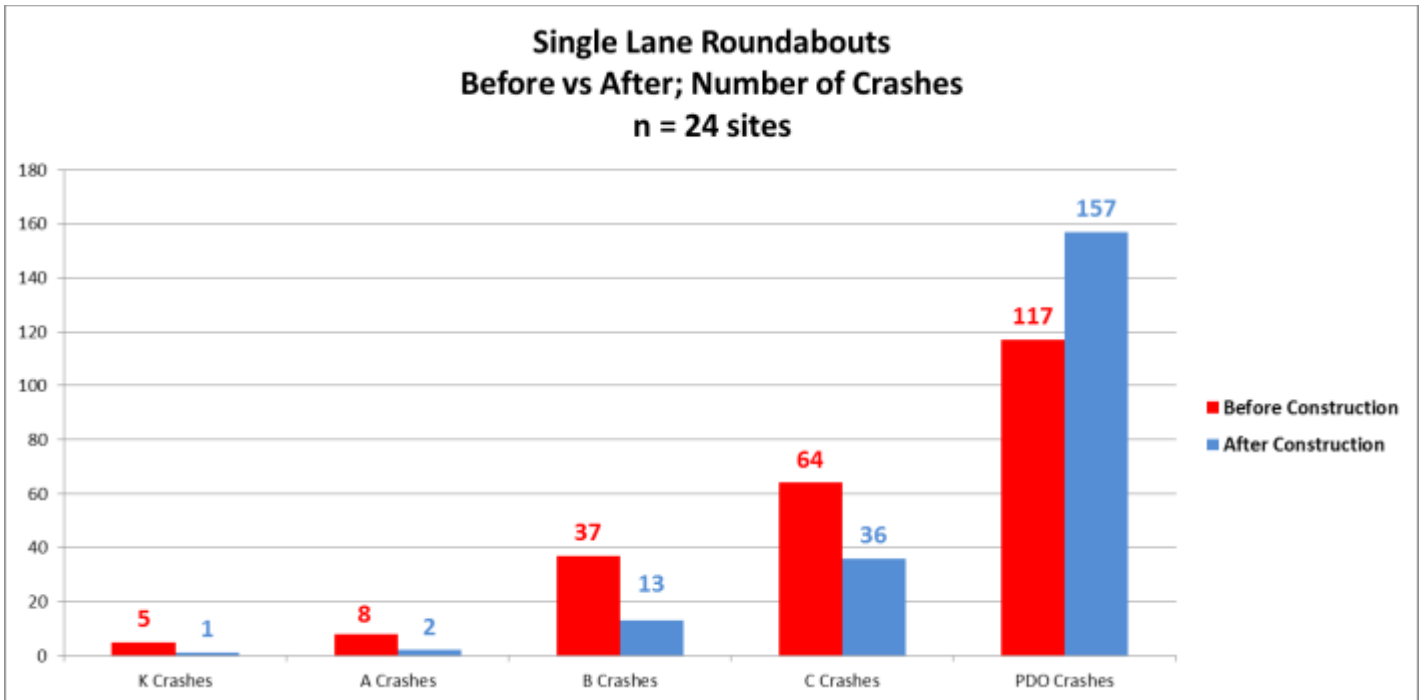
Total Crashes After	Years After	K Severity After	A Injury Severity After	B Injury Severity After	C Injury Severity After	PDO Injury Severity After
209	146	1	2	13	36	157

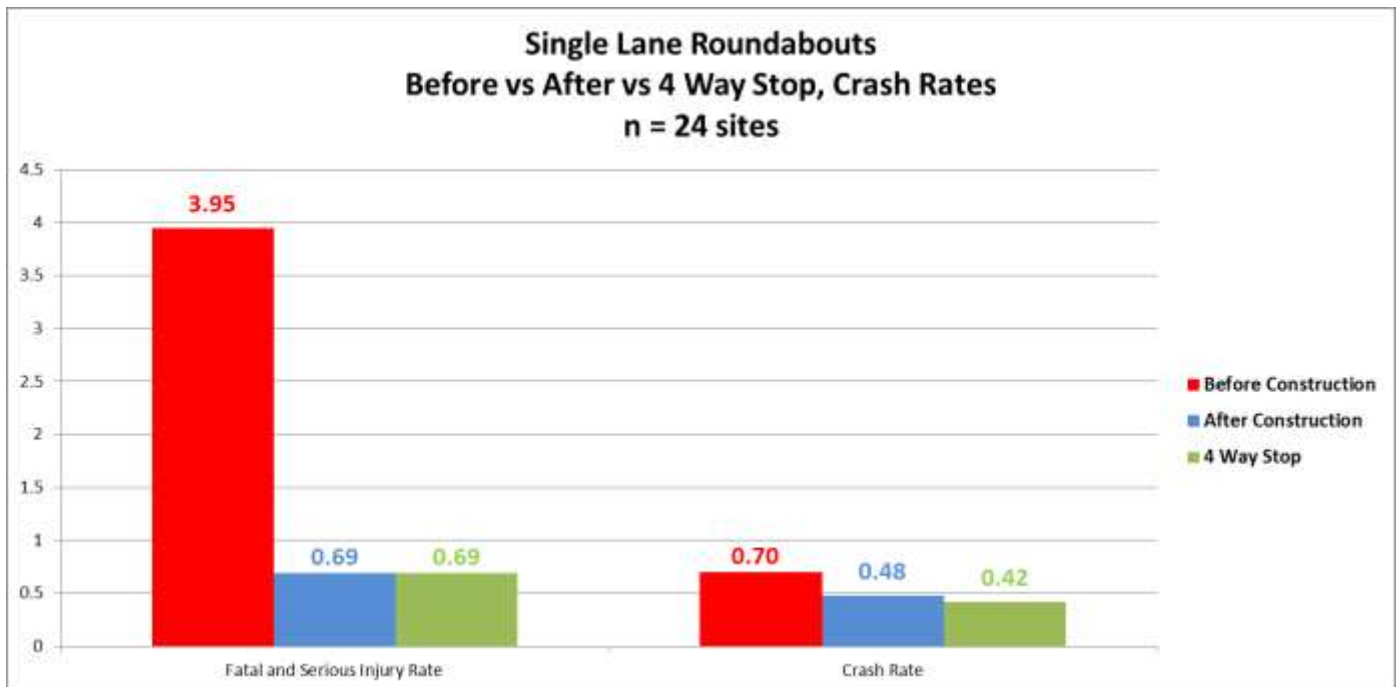
The total number of vehicles entering after construction was 436,524,488 in the 3-11 years after completion.

Comparison

Description	Years	K Crashes	A Crashes	B Crashes	C Crashes	PDO Crashes	Entering Vehicles	Crash Rate	FA Rate
Before	118	5	8	37	64	117	329,060,275	0.70	3.95
After	146	1	2	13	36	157	436,524,488	0.48	0.69
Change %	+23.7%	-80.0%	-75.0%	-64.8%	-43.8%	+37.2%	+32.7%	-31.6%	-82.6%

The crash data obtained has shown that roundabouts have reduced all crashes by over 30%. More importantly, they have reduced injury crashes by over 65% (when comparing injury crashes by rate) and the most severe crashes (Fatal and A-injury) by over 82%.





Conclusion

The roundabouts in Minnesota appear to be matching what has happened on the national level as well. Roundabouts nationwide have continuously shown to decrease the number of injury crashes, and drastically reduce the number of fatal and serious injury crashes. Minnesota's crash data have typically shown a small spike in Property-Damage-Only (PDO) type crashes in the first year after opening. This is likely due to the community adjusting to a new intersection type. After the initial opening, these crashes typically drop down to a lower level. The fatal and injury crash reductions appear to be sustained over the life of the roundabout.

The crash data obtained has shown that roundabouts have reduced all crashes by over 30%. Roundabouts have reduced injury crashes by over 65% and the most severe crashes (Fatal and A-injury) by over 80%.

The crash performance of single lane roundabouts appears to be similar to those of four-way stops. However, most research is starting to show that single lane roundabouts have double the capacity and lower delay than that of a four-way stop. Single Lane Roundabouts may also have greater capacity with lower delay than a signalized intersection with a comparable number of through lanes.