



PROJECT MEMORANDUM

INTERCHANGE MODIFICATION STUDY
AND ENVIRONMENTAL REVIEW

CRASH ANALYSIS

To: Study Advisory Team

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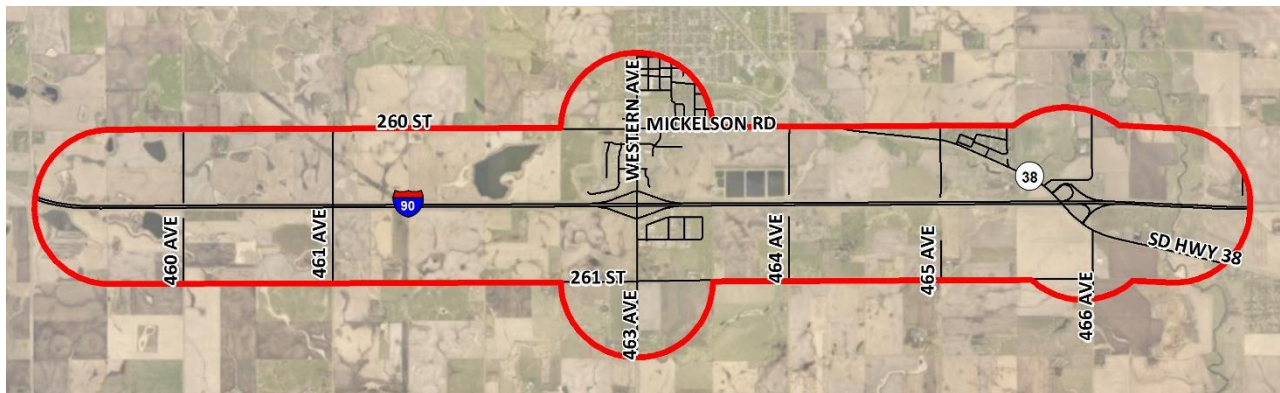
Introduction

This document presents the crash analysis and results performed for the Exit 387 study area. The study area can be seen in **Figure 1**.

Results from this analysis will be used to identify safety issues that can be mitigated through roadway improvements. A set of potential improvements will be developed in subsequent alternatives analysis, with expected safety improvements evaluated using the Federal Highway Administration's Interactive Highway Safety Design Model (IHSDM).

Crash data from the South Dakota Department of Transportation was collected and analyzed for nine study area intersections, as well as the I-90, Western Avenue, and SD Highway 38 segments in the study area. The study period is the five-year period between Jan 1, 2013 and Dec 31, 2017.

Figure 1: Study Area



In addition to the three study segments, the study intersections analyzed are:

1. Western Avenue and 261st Street
2. Western Avenue and Jeffrey Street
3. Western Avenue and I-90 EB Ramps (South Ramps)
4. Western Avenue and I-90 WB Ramps (North Ramps)
5. Western Avenue and Diamond Trail
6. Western Avenue and Opal Lane
7. Western Avenue and Mickelson Road
8. SD 38 and I-90 EB Ramps (South Ramps)
9. SD 38 and I-90 WB Ramps (North Ramps)

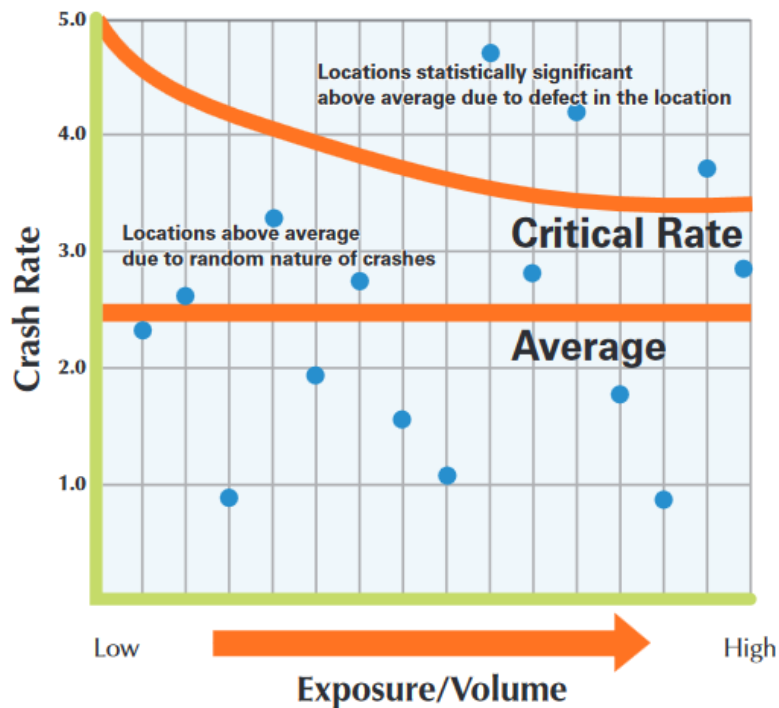
Methodology

Crash frequencies, rates, and severities were evaluated for study intersections and roadway segments. To determine if potential safety issues are present, intersection and segment crash rates were compared to typical crash rates on similar facilities. The data used for this comparison was published by the Minnesota Department of Transportation for similar roadway types as similar data from SDDOT is not readily available.

To determine whether crash rates are above typical crash rates simply due to the random nature of crashes or if elevated crash rates are attributable to roadway design or traffic control, the *critical crash analysis* methodology was used. The critical crash analysis method uses statistical analysis to determine if differences between observed crash rates and typical crash rate are statistically significant, typically at a 99 percent confidence interval. Improvements to reduce crashes will be considered in the alternatives analysis report at locations with crash rates above the critical crash rate.

A summary of all crash data used in this analysis including typical and critical crash rates can be seen in **Appendix A**.

Figure 2: Critical Crash Rate Concept

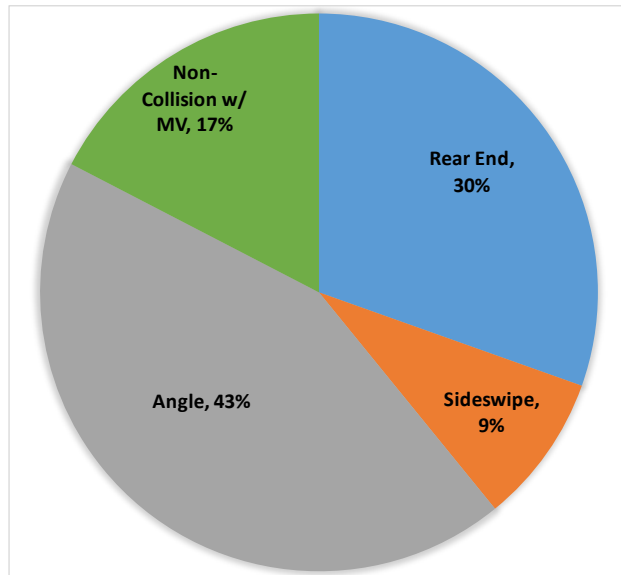


Western Avenue Corridor Crash History

Crash history was evaluated on the one-mile long segment of Western Avenue between 261st Street and Mickelson Road. There are seven intersections on this segment, including the I-90 interchange ramps.

The Western Avenue corridor experienced 22 total crashes in the five-year analysis period, with 18 of these being intersection or intersection-related crashes. There were no fatal crashes. A summary of the types of crashes occurring on Western Avenue can be seen in **Figure 3**.

Figure 3: Crash Types on Western Avenue (2013-2017)



Note: This graphic includes both intersection and segment type crashes

Intersection Crashes

All intersections have crash rates below the critical crash rate, however the intersections with 261st Street, the I-90 eastbound and westbound ramps, and Mickelson Road have crash rates above typical crash rates at similar intersections. While crash rates are above the typical rate at many Western Avenue intersections due to low traffic volumes, no more than four crashes were reported at any of these intersections, resulting in fewer than one crash per year on average. Angle crashes were the most common intersection crash type at Western Avenue intersections (9 crashes), followed by rear-end crashes (5 crashes).

Of the 18 intersection crashes, six resulted in injury crashes or possible-injury crashes. There was one incapacitating injury crash at 261st Street (sideswipe collision) and one incapacitating injury crash at the I-90 eastbound ramps (run-off-the-road crash).

Segment Crashes

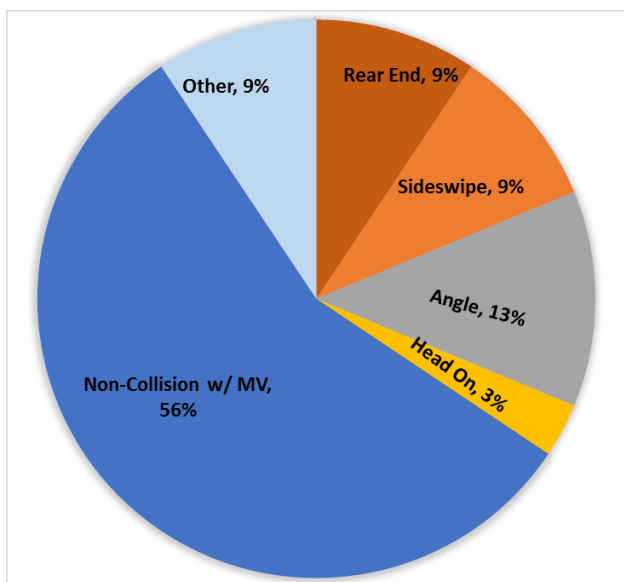
Not including the intersection crashes, there were four segment-type crashes on Western Avenue. Note that this analysis does not consider a rear-end crash that occurred when there was temporary signal control at the interchange. Three of these segment-type crashes occurred south of the I-90 westbound ramps, resulting in a crash rate above the typical rate on this segment (I-90 westbound ramps to 261st Street). Fewer than one crash per year was reported on the corridor with no serious injuries reported (two crashes reported as possible injury crashes).

SD Highway 38 Crash History

Crash history was also evaluated on the 2.9-mile-long segment of SD Highway 38 between 465th Avenue and 467th Avenue.

There were 32 crashes in the SD Highway 38 study area in the five-year analysis period, with only four crashes occurring at the two ramp intersections. No fatal crashes occurred in the study period. A summary of the types of crashes occurring on SD Highway 38 can be seen in **Figure 4**.

Figure 4: Crash Types on SD Highway 38 (2013-2017)



Note: This graphic includes both intersection and segment type crashes

Intersection Crashes

Three intersection crashes were reported at the westbound I-90 ramp intersection and one crash was reported at the eastbound I-90 ramp intersection. One incapacitating run-off-the-road crash involving a motorcycle was reported at the I-90 westbound ramp intersection. The three intersection crashes at the westbound ramps result in a crash rate above the typical crash rate, however this is an average of fewer than one crash per year.

Segment Crashes

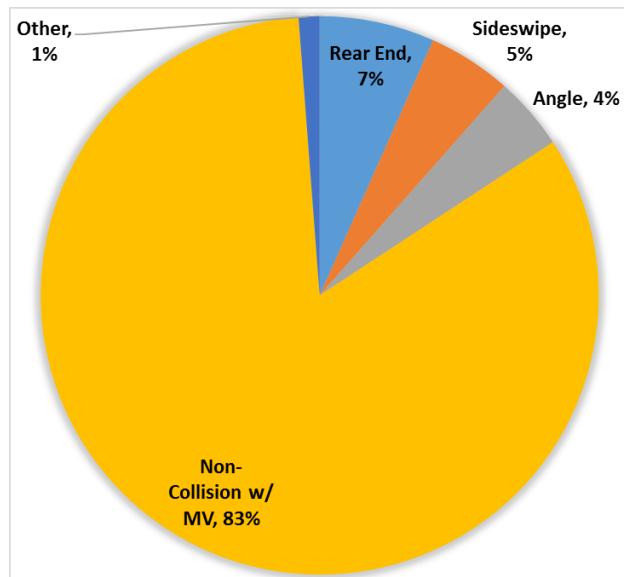
The other 28 crashes on SD Highway 38 were segment-type crashes which is just under the typical rate for similar Rural Minor Arterials. 16 of these segment-type crashes were single-vehicle collisions, with 12 involving collisions with animals. The next most prevalent segment-crash type was run-off-the-road crashes, with 10 such crashes being reported. Seven of the 28 segment crashes resulted in injuries or possible injuries, with one incapacitating injury crash being reported (opposite direction sideswipe crash).

Interstate 90 Crash History

Crash history was evaluated for the eight mile I-90 segment between 459th Avenue and 467th Avenue. There were 165 segment crashes in the 5-year analysis period, of which 25 crashes resulted in injuries or possible injuries (six incapacitating injuries). No fatalities were reported in the study period.

Single vehicle crashes were the most reported crash type, with 131 such crashes reported (83 percent). 69 single vehicle crashes on I-90 were collisions with animals.

Figure 5: Crash Types on I-90 (2013-2017)



Bridge Collisions at Exit 387

In the past five years, two trucks collided with the overhead bridge structure at Exit 387/Western Avenue. One collision occurred in 2014 and the other in 2016

Appendix A

Crash Data

Intersection Crashes:

Intersection	Traffic Control	Total Crashes	Crash Severity					Typical Crash Rate*	Observed Crash Rate	Critical Crash Rate	Crash Type					
			Fatal	Incap. Inj.	Non-Incap. Inj.	Possible Inj.	Property Damage Only				Rear End	Sideswipe	Angle	Head On	Non-Collision w/ MV	Other
261st Street/Western Ave	Rural Thru/Stop	2	0	1	1	0	0	0.25	0.44	0.97	0	1	1	0	0	0
Jeffrey Street/Western Ave	Rural Thru/Stop	1	0	0	0	0	1	0.25	0.19	0.9	0	0	0	0	1	0
I90 EB ramps/Western Ave	Rural Thru/Stop	4	0	1	0	0	3	0.25	0.56	0.8	1	0	2	0	1	0
I90 WB ramps/Western Ave	Rural Thru/Stop	4	0	0	0	1	3	0.25	0.36	0.68	3	1	0	0	0	0
Diamond Trail/Western Ave	Rural Thru/Stop	2	0	0	0	0	2	0.25	0.18	0.69	0	0	2	0	0	0
Opal Lane/Western Ave	Rural Thru/Stop	2	0	0	0	2	0	0.25	0.23	0.74	0	0	2	0	0	0
Mickelson Road/Western Ave	Rural Thru/Stop	3	0	0	0	0	3	0.25	0.36	0.76	1	0	2	0	0	0
I-90 WB/Hwy 38	Rural Thru/Stop	3	0	1	0	0	2	0.25	0.36	0.76	1	0	1	0	1	0
I-90 EB/Hwy 38	Rural Thru/Stop	1	0	0	0	0	1	0.25	0.13	0.77	0	0	0	0	1	0
*2015 MnDOT Typical Intersection Crash Rates																

Segment Crashes:

Segment	Roadway Section	Total Crashes	Crash Severity					Typical Crash Rate*	Observed Crash Rate	Critical Crash Rate	Crash Type					
			Fatal	Incap. Inj.	Non-Incap. Inj.	Possible Inj.	Property Damage Only				Rear End	Sideswipe	Angle	Head On	Non-Collision w/ MV	Other
Western Ave (South of I-90 WB ramps)	Rural Local Road	3	0	0	0	0	3	1.15	1.03	2.94	1	0	1	0	1	0
I-90	Rural - Interstate	165	0	6	6	13	140	0.90	0.87	1.08	11	8	7	0	137	2
Highway 38	Rural Minor Arterial	28	0	1	5	1	21	1.76	1.51	2.58	2	3	2	1	17	3
Western Ave (North of I-90 WB ramps)	Rural Local Road	1	0	0	0	0	1	1.15	0.36	2.99	0	0	0	0	1	0
*2017 SDDOT Typical Segment Crash Rates																