

Dakota County Intersection Study

Location: CSAH 54 & CSAH 68

Date: November 2018

By: Luis C. Flores, Kristi Sebastian

Reason for Study

The intersection of CSAH 54 (Ravenna Trl.) and CSAH 68 (200th St.) was identified to be added to the county's intersection crash listing this year as it met the criteria of 5 crashes in a single year or 10 in 3 years. The intersection ranked as no. 2 on Dakota County's 2017 Intersection Crash Listing based on the crash index. Based on the recent increase in crashes, a detailed review is being conducted focusing on the safety aspects of this intersection.

Classification and Geometry

The intersection of CSAH 54 and CSAH 68 (see Figure 1) is located within Ravenna Township on the eastern end of Dakota County. CSAH 54 runs northwest/southeast, with one lane going in each direction, and it comes to a T at its intersection with CSAH 68. It has shoulders approximately eight ft. wide, it is classified as a Major Collector and has a statutory (55mph) speed limit. CSAH 68 is classified as a B Minor arterial and runs northeast-southwest. The NE-bound direction has one through lane with an approximately eight ft. shoulder and the SW-bound direction has one through lane, one dedicated right turn lane and an approximately eight ft. shoulder before the taper for the right turn lane. On its northeast leg, it has a posted speed limit of 55 mph and on its southwest leg; it has a posted speed limit of 45 mph.

Traffic control at this intersection is a stop sign for CSAH 54. Area is rural with brush and trees along each quadrant of this intersection. At the intersection there are two stop signs (36"x36") on both sides of CSAH 54 and a two-direction large arrow sign (48"x24") at the T, as seen in Figure 3.



Figure 1. Google Earth aerial of intersection of CSAH 54 and CSAH 68.

Intersection Conditions Approaching the Stop Control

Figure 2 below shows CSAH 54 approximately 700 ft. northwest of the intersection with CSAH 68, facing southeast. The stop ahead signs on both sides (36"x36") of the road are approximately 670 ft. away from the intersection. Faded "STOP AHEAD" pavement markings follow these signs a short distance after. The roadway curves to the right approaching the stop at CSAH 68 – the left/right stop signs at the intersection are likely in place to increase visibility due to this curve.



Figure 2. Google Earth aerial of intersection of CSAH 54 and CSAH 68.

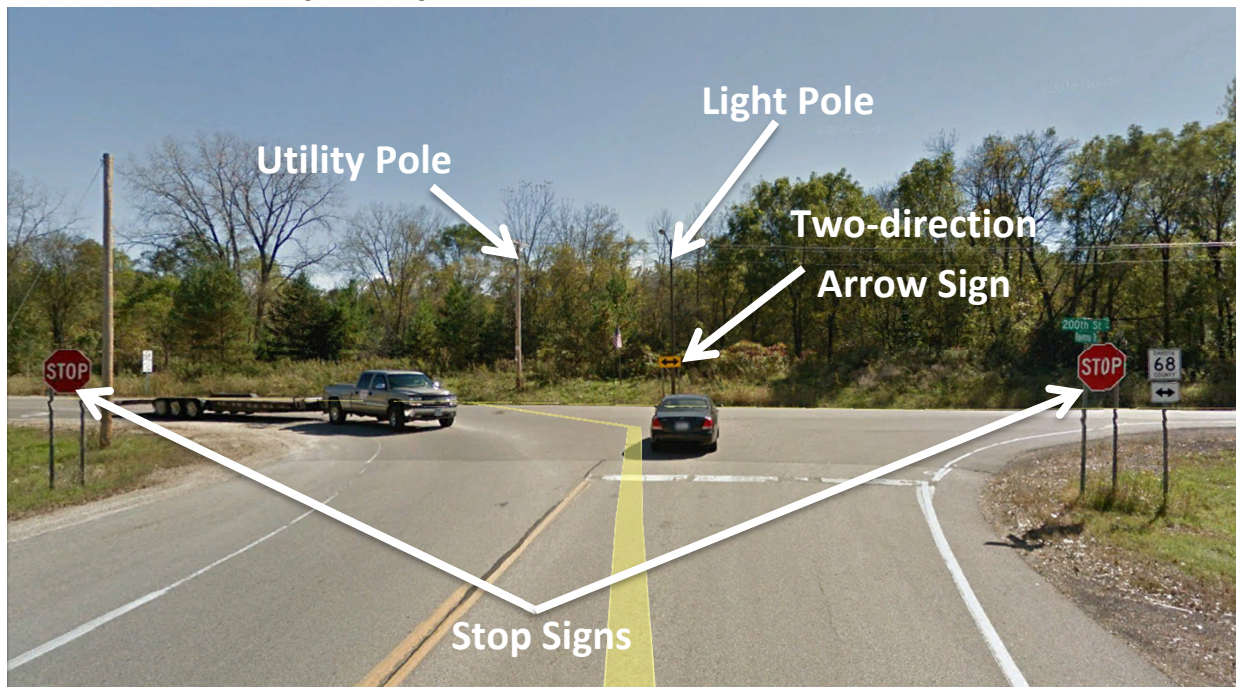


Figure 3. Google street view of intersection of CSAH 54 and CSAH 68, looking southeast.

Figure 4 shows signage leading up to the intersection of 54 and 68. Note that the nearest previous stop sign is 8.25 miles prior, near downtown Hastings. This distance, as well as the numerous horizontal curves leading up to the stop sign, are possible contributing factors leading to drivers not stopping at the stop sign.

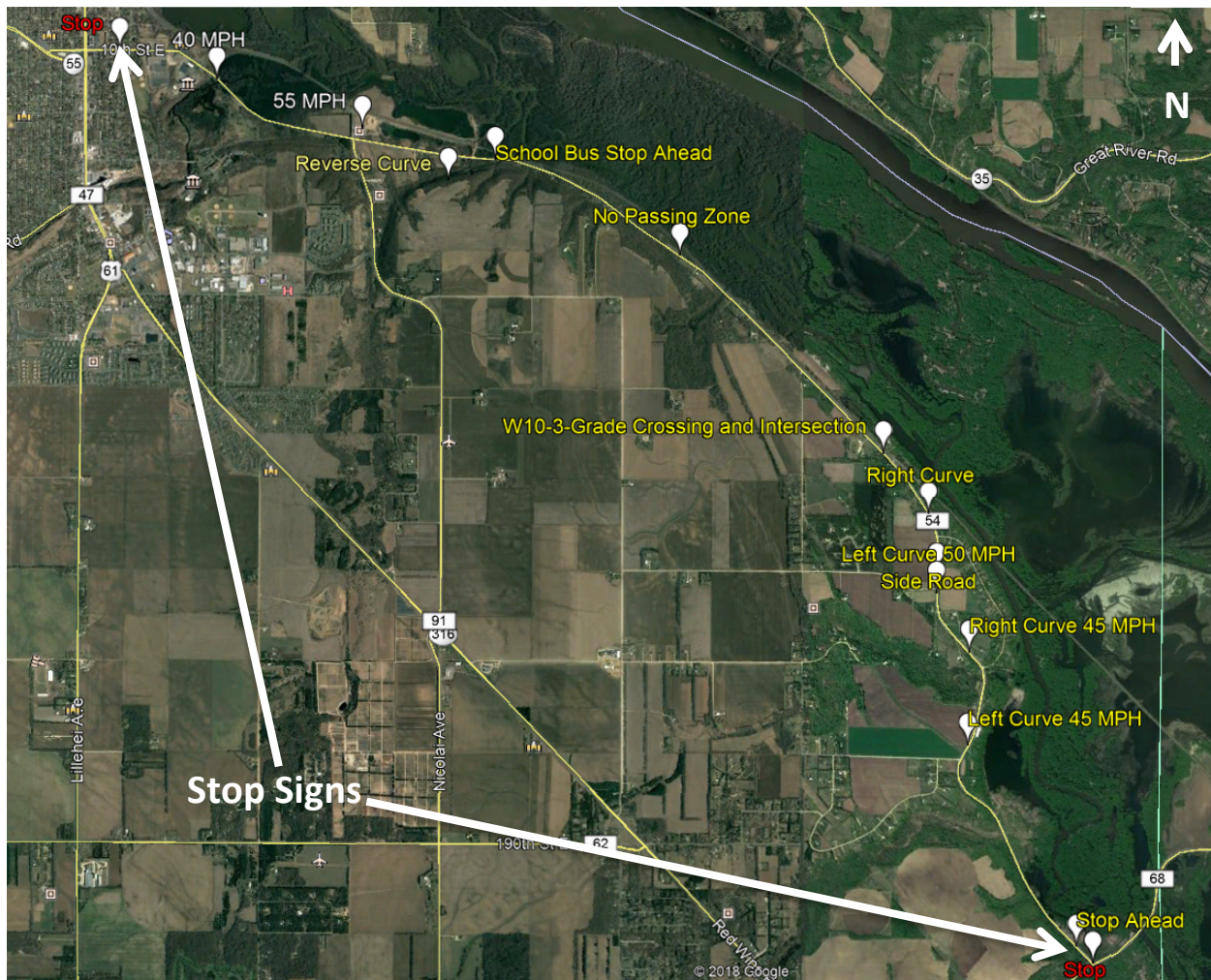


Figure 4. Google Earth aerial depicting signage for southeast-bound traffic along CSAH 54. The distance between both stop signs is 8.25 miles.

Volumes

The latest Average Annual Daily Traffic (AADT) for this intersection, per MnDOT's Traffic Data:
 3900 vpd along CSAH 54
 2700 vpd along CSAH 68, "west" of 54
 6400 vpd along CSAH 68, "east" of 54 toward Goodhue County

Safety

A three year and a half and 10.5 year assessment of this intersection were performed; one from 2015 to 2018 (2018 up to July) and from 2008 to 2018.

Three and a Half Year Assessment

From 2015 to 2018 there were a total of 23 crashes, with two occurring in 2015, 14 in 2016, five in 2017, and two in 2018 so far. Ten of these 23 were property-only crashes, with the rest involving an injury (severity: A=2, B=8, C=3) and no fatal crashes (See

Table 1).

Table 1. Three and half year (2015-2018) calculated crash rates and index.

Basic Intersection Crash Performance	
# of Yrs	3.5
Volume	6700
State Avg. Crash Rate	0.26
State Avg. Severity Rate	0.42
Crash Rate	2.69
Severity Rate	5.49
Critical Crash Rate	0.77
Crash Rate Index	3.50

The crash rate, severity rate, and crash rate index for this intersection for this period are 2.69, 5.49, and 3.50, respectively. An intersection with a crash rate index higher than 1 means the intersection crash rate above the standard rate is statistically significant and may have the potential of benefitting from review and potential improvements.

Nearly half of the collisions did not provide information on mode of collision; therefore, a more throughout review of the crashes through reading police report narratives was conducted. Additionally, given the low volume, rural nature of the intersection, a review of 10 years of data was included to assess trends and potential improvement measures to consider.

10 Year Assessment

To better discern a pattern, crashes were analyzed dating back to 2008 to the present. 29 of a total of 44 crashes, or 66%, involved CSAH 54 traffic, as seen in Table 2. Police report narratives were reviewed for all crashes in order to better categorize the mode of collision; notably crashes listed as “Officer Left Blank”. These involved single southeast-bound vehicle crashes failing to stop and either colliding with vertical features or ending up in a ditch on the other side of CSAH 68 due to distraction/other (2), the sun being in their eyes (3), a brake malfunction (2) or simply not anticipating the intersection (4) for a total of 12, falling under the “Other” row category for Mode of Collision and the “Did Not Stop” column for SE-bound Traffic. Similarly, rear end collisions occurred if there happened to be a stopped vehicle at the intersection. These rear end collisions caused by vehicles failing to react and slow down broke down as follows: 3 did not anticipate the intersection, 2 were distracted/asleep/other and 1 had the sun in her eyes. Overall 7 did not anticipate the intersection, eight were distracted/asleep/other (there was 1 deer accident included here), 4 said to have had the sun in their eyes, 2 claimed to have had a brake malfunction and one attributed the crash to weather conditions totaling in 22 vehicles that failed to stop. Vehicles that stopped, but failed to yield the right of way to CSAH 68 traffic were primarily involved in right angle (5) collisions, with one being involved in a rear-end collision along CSAH 68 and another involving a deer for a total of 7. Crashes involving SE-bound traffic on CSAH 54 and crashes involving SW-bound or NE-bound traffic on CSAH 68 were tabulated separately on the right side of Table 2. The main pattern for these crashes has to do with 7 of the 15 vehicles running off the road due to weather.

Table 2. 10.5 year (2008-2018) crash breakdown by mode of collision and severity.

Mode of Collision Per Police Report	Severity						SE-bound Traffic (54)		SW-bound/ NE-bound Traffic (68)
							Did Not Stop	Stopped and Pulled Forward	
Officer Left Field Blank	K	A	B	C	O	TOTAL			
Rear End		1		1	5	7	6	1	
Sideswipe -- Same Direction									
Left Turn									
Ran Off Road--Left Side			1	1	1	3	1		2
Right Angle			3	1	1	5		5	
Right Turn									
Ran Off Road -- Right Side				1	4	5			5
Head On		1	1		2	4			3
Sideswipe Opposing									
Other		1	6	2	9	18	13	1	4
Not Applicable				1	1	2	2		1
Officer Reported that Diagram was Unknown									
TOTAL	0	3	11	7	23	44	22	7	15
							29		

Table 3 below shows the breakdown of crashes by year. **44 crashes in total** occurred during this 10.5 year period, with almost a third of those, 14, happening in 2016. Seven of those 14 accidents took place in November, but a definitive reason for that has not been determined.

Table 3. 10.5 year (2008-2018) intersection crash breakdown by year.

Year	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	TOTAL
Crashes	1	2	5	1	6	5	1	2	14	5	2	44



Figure 5. Tax Parcel information.

Improvement Considerations: The main crash trend here of motorists traveling through the intersection without stopping. The following are a list of recommendations to address this and other issues at this intersection:

1. Light pole relocation:
 - a. As previously mentioned and as Figure 3 of this report shows, there are several vertical features on the southeast side of CSAH 68 that vehicles failing to stop at the stop sign on CSAH 54 are colliding with. To address this issue it is recommended that the light pole is relocated: A street light was installed at this intersection as part of a rural intersection lighting project to increase intersection recognition to improve safety. The pole is directly across from the intersection.
 - b. Based on the crash review, relocation of this light would be appropriate to address crashes. Relocate the street light -- The pole was installed by Dakota Electric for the County. County staff will contact the utility to relocate the pole.
2. Tree and shrub removal:
 - a. To increase visibility to both southwest-bound vehicles on CSAH 68 and southeast-bound vehicles on CSAH 54, tree and shrub removal is recommended on the north quadrant of this intersection. This would address crashes involving vehicles pulling from the stop sign unsafely and causing a collision.
 - b. Tree and shrub removal west of CSAH 54 leading up to the stop sign may provide better visibility and anticipation for southeast-bound traffic on CSAH 54.
 - c. Figure 5 above shows tax parcel information useful in seeing right of way distribution if tree and shrub removal are implemented.
3. Other considerations:
 - a. Signing (County Road Safety Plan, Section 4.1.7 pg. 4-17 to 4-20):
 - i. Mainline Dynamic Warning Sign: Install loop detectors on the minor leg approaches and a dynamic flashing sign on the major leg approaches. When a vehicle approaches on a minor leg, the loop detectors send a signal to flashers that warn drivers on the mainline of a vehicle at the upcoming minor intersection. Although considered an experimental strategy, initial evaluations in other states indicate a 25 to 35 percent reduction in right angle crashes.
 - b. A rural road intersection study will look at other options in context of a system review for consistency and effect application.

Recommendation – lighting relocation / Trees

June 2019 Status: As of June 12, 2019, the work required to move the light pole has been paid for and is pending. Foliage removal is also expected.