



Real People. Real Solutions.

1960 Premier Drive
Mankato, MN 56001-5900

Ph: (507) 625-4171
Fax: (507) 625-4177
Bolton-Menk.com

September 9, 2025

Molly Westman
City of Mankato
10 Civic Center Plaza
Mankato, MN 56001
(507) 720-2559
mwestman@mankatomn.gov

Reference: Victory Ridge Apartments
Mankato, Minnesota

Subject: Signal Phasing Analysis

Dear Ms. Westman:

The following is a letter summarizing the signal phasing analysis performed at the intersection of N Victory Drive (CSAH 82) and Adams Street in conjunction with the proposed Victory Ridge Apartments development to be located along Dublin Road, east of N Victory Drive (CSAH 82) in Mankato, Minnesota. This letter has been prepared to assess the need for a change in phasing for the westbound left-turn movement (Adams Street) that currently operates with permissive only phasing. Analysis was performed to determine if protected-permissive phasing with a flashing yellow arrow (FYA) is warranted for the minor-street.

MnDOT's "Flashing Yellow Operations Worksheet Tool" was utilized to determine if there is a sight distance issue at the intersection and at what times of day the relative risk for a left-turn crashes are the highest. Based on this tool, the peak hour turning movement counts, and the intersection geometry, it was determined there is no sight distance issue at the intersection. Additionally, out of the hours analyzed, none had a relative risk higher than 1.00 for left-turn crashes. Typically, a relative risk higher than 1.00 causes consideration for phasing changes. It should be noted though that the PM peak hour did have the highest risk at 0.92/1.00. The FYA could be considered during the PM peak hour due to these higher percentages. Refer to the attachments for the tool's outputs.

Crash history from the past 5-year period (2021-2024) was also reviewed to determine if the number of left-turn type crashes occurring at the intersection meets the MnDOT guidance for implementing a FYA which is typically 1 left-turn crash per year for five years. Looking at the crash history, seven (7) left-turn crashes did occur between 2021-2024 with three (3) occurring on Adams Street and four (4) occurring along N Victory Drive. Also, based on CMF Clearinghouse, there are multiple crash modification factors (CMF) for the installation of a flashing yellow arrow as shown below supporting that the implementation of FYA does reduce left-turn crashes. Refer to the attachments for crash summaries and a CMF comparison.

- CMF 4147 = 0.753
- CMF 4175 = 0.635
- CMF 7728 = 1.047
- CMF 7730 = 0.857

The intersection of N Victory Drive (CSAH 82) and Adams Street was reviewed in conjunction with the proposed Victory Ridge development to determine the need for a change in signal phasing for the westbound left-turn movement from permissive only to protected-permissive with FYA. Based on MnDOT's "Flashing Yellow Operations Worksheet Tool" and recent crash history, it was determined that protected-permissive with FYA could be beneficial in reducing left-turn type crashes at the intersection, specifically during the PM peak hour and should be considered.

If you have any questions or concerns, please do not hesitate to contact me. I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision, and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

Sincerely,
Bolton & Menk, Inc.

A handwritten signature in cursive script, appearing to read "Danielle", followed by a horizontal line.

Danielle Troutman, PE
Transportation Project Engineer
License No. 63168

Attachments: MnDOT Flashing Yellow Operations Worksheet Tool Outputs
Crash Short Summaries
CMF Comparison

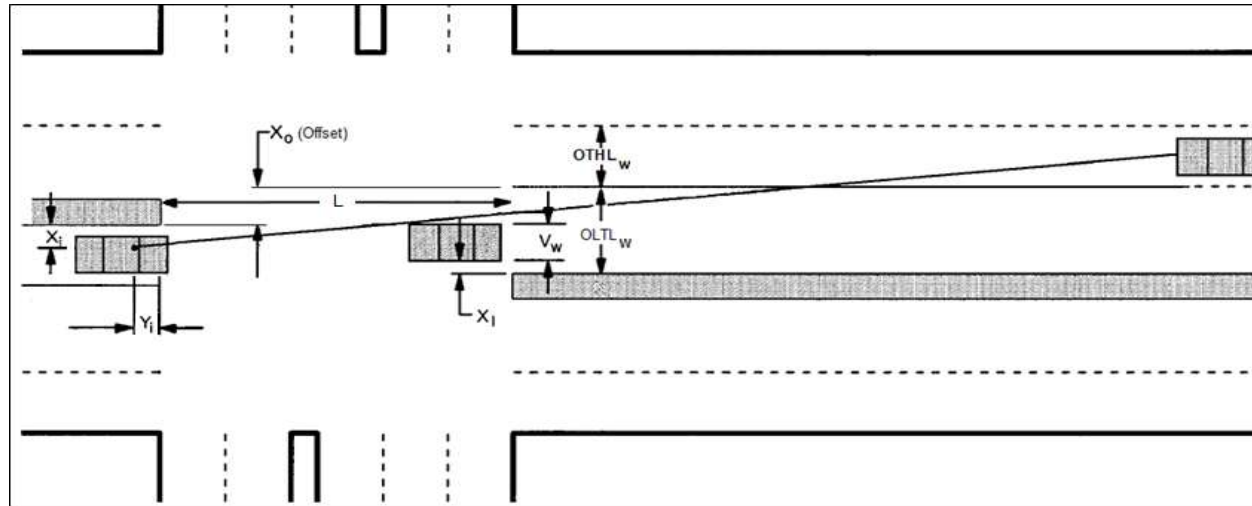
MnDOT FYA Operations Tool Output

Is there any opposing LT movement? (Y/N):

Y

If the answer is no, there is no SD problem

Input	
# opposing lanes ¹	2
Opposing speed limit (mph)	30
LT offset X_0 (ft)	0
Intersection Length, L (ft)	125
OTHL _w (ft)	12
OLTL _w (ft)	12
Y_i (ft) ²	0
V_w (ft)	7
lateral position of OLT vehicle x_i (ft) ³	1.5
x_i (ft) ⁴	3.5



Required SD (ft): 264

Available SD (ft): 1500

* Y_i is negative in this figure because the driver's eye is behind the end of the median at the time of making decision.

* If the opposing approach has a significant horizontal/vertical curve ending at intersection, this worksheet cannot be used to calculate the available SD. The required SD can still be calculated by this worksheet; but for the available SD you should use the real sight plan. Google map would be an easy way to approximate the available SD.

- 1) the number of lanes that a left-turning vehicle has to cross to complete a left-turn maneuver, including the right-turn lane unless the right turn lane is channelized as a free right turn.
- 2) Y_i is positive if the driver's eye is beyond the tip of median (or stop bar) at the decision time. It is negative if the driver is behind the tip of median/stop bar.
- 3) This parameter can be between .5 to 2.5 feet depending on the OLTLw and opposing median condition. Keep it at 1.5 ft unless you have a good reason.
- 4) This parameter can be between 2.5 to 4.5 feet depending on the LTLw and median condition. Keep it at 3.5 ft unless you have a good reason.

No SD Problem

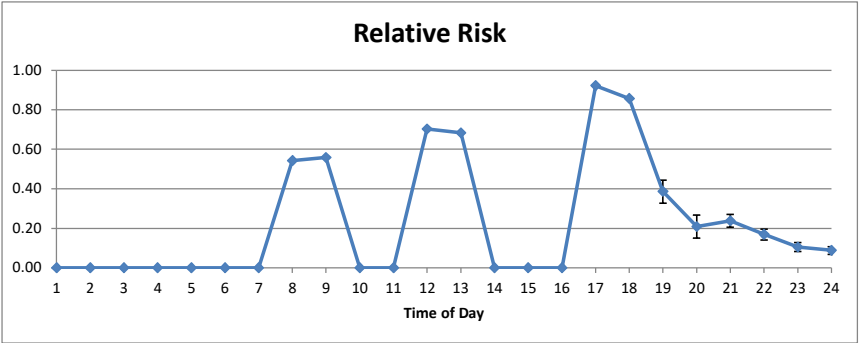
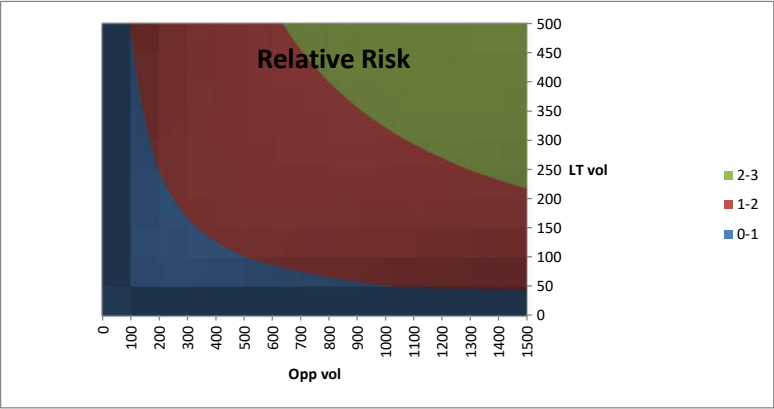
Protected/Permitted left turn phasing, Speed limit <45 mph, No Sight Distance Problem

Model Parameters		Base Condition		Run																			
beta 1:	0.38	LT vol	200																				
beta 2:	0.37	Opp vol	250																				

Sampled hours	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
LT vol	0	0	0	0	0	0	0	91	93	0	0	120	117	0	0	0	182	166						
Opp vol	0	0	0	0	0	0	0	108	114	0	0	163	156	0	0	0	222	200						

Estimated 24-hour turning movement volumes																								
LT vol	0	0	0	0	0	0	0	91	93	0	0	120	117	0	0	0	182	166	56	23	36	15	10	8
LT st. deviation	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	17.3	15.5	8.2	4.8	4.6	3.5
Opp vol	0	0	0	0	0	0	0	108	114	0	0	163	156	0	0	0	222	200	71	34	30	29	12	9
Opp st. deviation	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18.1	9.6	8.6	8.4	4.4	3.7

Relative Risk	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.54	0.56	0.00	0.00	0.70	0.68	0.00	0.00	0.00	0.92	0.86	0.39	0.21	0.24	0.17	0.10	0.09
RR sd	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.00	0.00	#DIV/0!	#DIV/0!	0.00	0.00	#DIV/0!	#DIV/0!	#DIV/0!	0.00	0.00	0.06	0.06	0.03	0.03	0.02	0.02



Turning Movement Count Calculations

Existing 2021																		
Sampled h	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
LT vol								27	35			75	70				123	104
Opp vol								94	100			148	141				202	181

Projected 2025																		
Sampled h	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
LT vol	0	0	0	0	0	0	0	28	36	0	0	78	72	0	0	0	128	108
Opp vol	0	0	0	0	0	0	0	98	104	0	0	154	146	0	0	0	210	186

Gas Station Trips																		
Sampled h	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
LT vol								41	40			35	38				47	46
Opp vol								10	10			9	10				12	12

Residential Trips																		
Sampled hr	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
LT vol								23	18			10	9				12	16
Opp vol								0	0			0	0				0	0

Future	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Sampled h																		
LT vol	0	0	0	0	0	0	0	91	93	0	0	120	117	0	0	0	182	166
Opp vol	0	0	0	0	0	0	0	108	114	0	0	163	156	0	0	0	222	200

2021				
2025				
1				
			Enter	Exit
Gas Station Daily Trips	=	3341	1671	1671
Residential Daily Trips	=	1229	615	615

	Land Use #1		Land Use #2	
	LUC #45		LUC #20	
	Enter	Exit	Enter	Exit
SBR				
SBT				
SBL	40%		45%	
SBU				
WBR				
WBT		10%		
WBL		40%		35%
WBU				
NBR	40%			
NBT			35%	
NBL				
NBU				
EBR				
EBT	10%			
EBL				
EBU				
TOTAL TRIPS	1671	1671	615	615

	enter	exit	enter	exit
	LUC 220		LUC 945	
6-7 AM	1.4%	6.9%	4.7%	4.5%
7-8 AM	2.0%	10.8%	6.2%	6.1%
8-9 AM	3.1%	8.5%	5.8%	5.9%
9-10 AM	2.9%	4.9%	5.0%	5.1%
10-11 AM	2.4%	4.8%	5.2%	5.2%
11-12 PM	3.8%	4.7%	5.3%	5.2%
12-1 PM	4.5%	4.1%	5.8%	5.8%
1-2 PM	4.0%	4.4%	5.4%	5.3%
2-3 PM	5.6%	4.9%	6.1%	5.8%
3-4 PM	6.9%	5.3%	6.5%	6.4%
4-5 PM	10.1%	5.6%	7.2%	7.1%
5-6 PM	11.4%	7.6%	7.0%	6.9%
6-7 PM	9.7%	6.7%	6.5%	6.6%
	68.0%	79.2%	76.6%	76.0%

LUC 945												
Southbound			Westbound			Northbound			Eastbound			
Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	
6-7 AM	0	0	31	0	8	50	31	0	0	8	0	
7-8 AM	0	0	41	0	10	41	41	0	0	10	0	
8-9 AM	0	0	38	0	10	40	39	0	0	0	10	0
9-10 AM	0	0	34	0	8	34	34	0	0	0	8	0
10-11 AM	0	0	34	0	9	34	34	0	0	0	9	0
11-12 PM	0	0	36	0	9	35	36	0	0	0	9	0
12-1 PM	0	0	38	0	10	38	38	0	0	0	10	0
1-2 PM	0	0	36	0	9	36	36	0	0	0	9	0
2-3 PM	0	0	40	0	10	39	40	0	0	0	10	0
3-4 PM	0	0	43	0	11	43	43	0	0	0	11	0
4-5 PM	0	0	48	0	12	47	48	0	0	0	12	0
5-6 PM	0	0	46	0	12	46	46	0	0	0	12	0
6-7 PM	0	0	43	0	11	44	43	0	0	0	11	0
	0	0	509	0	129	507	509	0	0	0	129	0

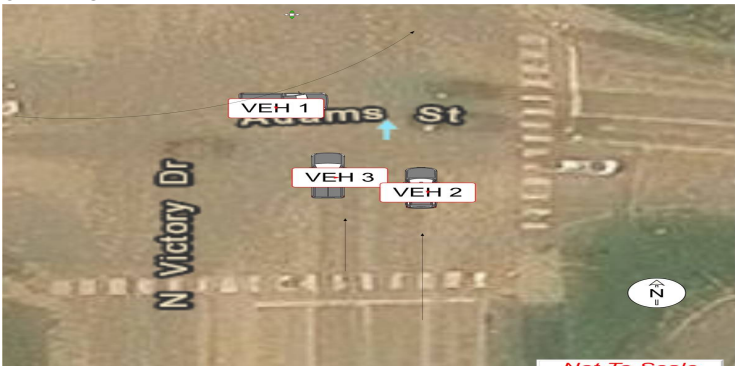
	Land Use #2											
	Southbound			Westbound			Northbound			Eastbound		
	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left
6-7 AM	0	0	4	0	0	15	0	3	0	0	0	0
7-8 AM	0	0	6	0	0	23	0	4	0	0	0	0
8-9 AM	0	0	9	0	0	18	0	7	0	0	0	0
9-10 AM	0	0	8	0	0	10	0	6	0	0	0	0
10-11 AM	0	0	7	0	0	10	0	5	0	0	0	0
11-12 PM	0	0	11	0	0	10	0	8	0	0	0	0
12-1 PM	0	0	12	0	0	9	0	10	0	0	0	0
1-2 PM	0	0	11	0	0	10	0	9	0	0	0	0
2-3 PM	0	0	16	0	0	10	0	12	0	0	0	0
3-4 PM	0	0	19	0	0	11	0	15	0	0	0	0
4-5 PM	0	0	28	0	0	12	0	22	0	0	0	0
5-6 PM	0	0	32	0	0	14	0	26	0	0	0	0
6-7 PM	0	0	27	0	0	14	0	21	0	0	0	0
	0	0	190	0	0	168	0	147	0	0	0	0



Crash Detail Report - Short Form

INCIDENT ID	ROUTE SYS	ROUTE NUM	MEASURE	ROUTE NAME			ROUTE ID		COUNTY		CITY	
01219656	04-CSAH	0082	1.792	VICTORY DR			0400006594520082-I		7-Blue Earth		Mankato	
INTERSECT WITH			# VEH	# KILL	DATE	TIME	DAY	LAT	LONG	UTM X	UTM Y	WORK ZONE TYPE
ADAMS STREET			3	0	12/02/24	15:57	Mon	44.170601	-93.968804	422550.5	4891276.8	NOT APPLICABLE
BASIC TYPE		CRASH SEVERITY			FIRST HARMFUL				LIGHT CONDITION		WEATHER PRIMARY	
Angle		N - Prop Damage Only			Motor Vehicle In Transport				Daylight		Clear	

Unit Type	Unit 1	Unit 2	Unit 3	Unit 4
Vehicle Type	Motor Vehicle in Transport	Motor Vehicle in Transport	Motor Vehicle in Transport	
Direction of Travel	Pickup	Sport Utility Vehicle	Pickup	
Maneuver	Northbound	Northbound	Northbound	
Age/Sex	Turning Left	Moving Forward	Moving Forward	
Physical Cond	56 M	25 M	65 F	
Contributing Factor 1	Apparently Normal	Apparently Normal	Apparently Normal	
	Failure to Yield Right-of-Way	Unknown	No Clear Contributing Action	

OFFICER SKETCH	NARRATIVE
	ON 12/02/2024 AT 1558 HOURS, A MOTOR VEHICLE CRASH WAS REPORTED AT THE INTERSECTION OF N VICTORY DRIVE AND ADAMS STREET IN THE CITY OF MANKATO. VEHICLE #1 WAS A BLUE IN COLOR CHEVY SILVERADO MAKING A LEFT TURN OFF OF ADAMS ONTO N VICTOR AND THE DRIVER FAILED TO YIELD RIGHT OF WAY TO NORTHBOUND TRAFFIC ON NORTH VICTORY CAUSING A COLLISION WITH VEHICLE #2 WHICH WAS A BLACK IN COLOR FORD ESCAPE NORTHBOUND IN THE RIGHT LANE. VEHICLE #3 WAS A SILVER IN COLOR DODGE DAKOTA PICKUP NORTHBOUND ON N VICTORY IN THE LEFT LANE. NO INJURIES WERE REPORTED. PHOTOS WERE TAKEN AT THE SCENE. VEHICLES WERE TOWED FROM THE SCENE DUE TO DISABLING DAMAGE. ALL DRIVERS WERE CITED FOR VARIOUS VIOLATIONS. - END.

INCIDENT ID	ROUTE SYS	ROUTE NUM	MEASURE	ROUTE NAME			ROUTE ID		COUNTY		CITY	
01083104	04-CSAH	0082	1.798	VICTORY DR			0400006594520082-I		7-Blue Earth		Mankato	
INTERSECT WITH			# VEH	# KILL	DATE	TIME	DAY	LAT	LONG	UTM X	UTM Y	WORK ZONE TYPE
ADAMS ST			3	0	02/21/23	14:50	Tue	44.170677	-93.968803	422550.6	4891285.2	NOT APPLICABLE
BASIC TYPE		CRASH SEVERITY			FIRST HARMFUL			LIGHT CONDITION		WEATHER PRIMARY		
Left Turn		C - Possible Injury			Motor Vehicle In Transport			Daylight		Snow		

Unit Type	Unit 1	Unit 2	Unit 3	Unit 4
Vehicle Type	Motor Vehicle in Transport	Motor Vehicle in Transport	Motor Vehicle in Transport	
Direction of Travel	Sport Utility Vehicle	Passenger Car	Pickup	
Maneuver	Southbound	Northbound	Westbound	
Age/Sex	Turning Left	Moving Forward	Vehicle Stopped or Stalled in	
Physical Cond	26 M	25 M	34 F	
Contributing Factor 1	Apparently Normal	Apparently Normal	Apparently Normal	
	Failure to Yield Right-of-Way	No Clear Contributing Action	No Clear Contributing Action	

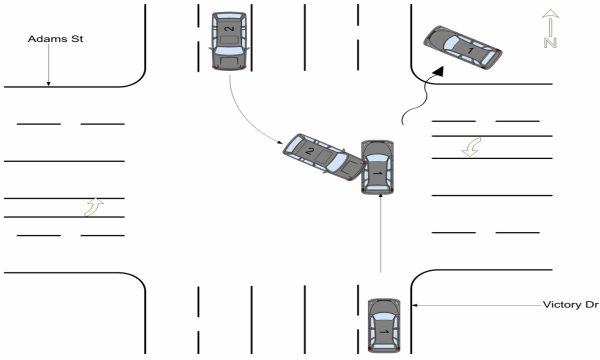
OFFICER SKETCH	NARRATIVE
	ON FEBRUARY 21, 2023 AT 1449HRS, OFFICERS WERE DISPATCHED TO A MOTOR VEHICLE CRASH AT THE INTERSECTION OF ADAMS STREET/VICTORY DRIVE. V1 WAS TRAVELING SOUTHBOUND ON VICTORY DRIVE. THE SEMAPHORE AT THE INTERSECTION OF ADAMS STREET/VICTORY DRIVE WAS DISPLAYED GREEN FOR NORTH/SOUTH TRAFFIC. V2 WAS TRAVELING NORTHBOUND ON VICTORY DRIVE. V2 CONTINUED THROUGH THE INTERSECTION AS THE SEMAPHORE WAS DISPLAYED GREEN. V1 FAILED TO YIELD THE RIGHT OF WAY AND TURNED EASTBOUND ONTO ADAMS STREET; SUBSEQUENTLY CRASHING INTO V2. V2 SPUN OUT OF CONTROL AND CRASHED INTO V3. V3 WAS STOPPED FACING WESTBOUND AT THE DISPLAYED RED SEMAPHORE. THE DRIVER OF V1 STATED HE WAS UNABLE TO STOP DUE TO SLIPPERY ROAD CONDITIONS. IT SHOULD BE NOTED, V1 HAD A FRONT PASSENGER THAT LEFT THE SCENE PRIOR TO OFFICERS ARRIVAL.



Crash Detail Report - Short Form

INCIDENT ID	ROUTE SYS	ROUTE NUM	MEASURE	ROUTE NAME			ROUTE ID		COUNTY		CITY	
01002554	04-CSAH	0082	1.802	N VICTORY DR			0400006594520082-I		7-Blue Earth		Mankato	
INTERSECT WITH			# VEH	# KILL	DATE	TIME	DAY	LAT	LONG	UTM X	UTM Y	WORK ZONE TYPE
ADAMS ST			2	0	01/27/22	15:30	Thu	44.170745	-93.968803	422550.7	4891292.8	NOT APPLICABLE
BASIC TYPE		CRASH SEVERITY			FIRST HARMFUL				LIGHT CONDITION		WEATHER PRIMARY	
Left Turn		C - Possible Injury			Motor Vehicle In Transport				Daylight		Cloudy	

Unit Type	Unit 1	Unit 2	Unit 3	Unit 4
Vehicle Type	Motor Vehicle in Transport	Motor Vehicle in Transport		
Direction of Travel	Passenger Car	Sport Utility Vehicle		
Maneuver	Northbound	Southbound		
Age/Sex	Moving Forward	Turning Left		
Physical Cond	23 F	82 M		
Contributing Factor 1	Apparently Normal	Apparently Normal		
	No Clear Contributing Action	Failure to Yield Right-of-Way		

OFFICER SKETCH	NARRATIVE
	UNIT 1 WAS TRAVELING NORTH BOUND ON VICTORY DR AND IT WAS APPROACHING THE INTERSECTION OF ADAMS ST. UNIT 2 WAS TRAVELING SOUTH BOUND ON VICTORY DR APPROACHING THE SAME INTERSECTION. UNIT 2 PROCEEDED TO MAKE A LEFT TURN ON TO ADAMS. UNIT 1 CONTINUED STRAIGHT. UNIT 2 IMPACTED THE LEFT SIDE OF UNIT 1 WITH ITS FRONT BUMPER. UNIT 1 STATED SHE HAD A GREEN LIGHT. AN IDENTIFIED WITNESS FOLLOWING UNIT 1 CONFIRMED THAT THEY HAD A GREEN LIGHT TO PROCEED NORTH BOUND ON VICTORY DR.

INCIDENT ID	ROUTE SYS	ROUTE NUM	MEASURE	ROUTE NAME			ROUTE ID		COUNTY		CITY	
01012960	05-MSAS	0122	1.203	ADAMS ST			0500023958310122-I		7-Blue Earth		NOT IN A CITY	
INTERSECT WITH			# VEH	# KILL	DATE	TIME	DAY	LAT	LONG	UTM X	UTM Y	WORK ZONE TYPE
VICTORY DR			1	0	03/17/22	05:40	Thu	44.170731	-93.969225	422517.0	4891291.7	NOT APPLICABLE
BASIC TYPE		CRASH SEVERITY			FIRST HARMFUL				LIGHT CONDITION		WEATHER PRIMARY	
Single Vehicle Run Off Road		N - Prop Damage Only			Other Post, Pole or Support				Dark (Unknown Light)		Clear	

Unit Type	Unit 1	Unit 2	Unit 3	Unit 4
Vehicle Type	Motor Vehicle in Transport			
Direction of Travel	Sport Utility Vehicle			
Maneuver	Not on Roadway			
Age/Sex	Turning Left			
Physical Cond	89 M			
Contributing Factor 1	Apparently Normal			
	No Clear Contributing Action			

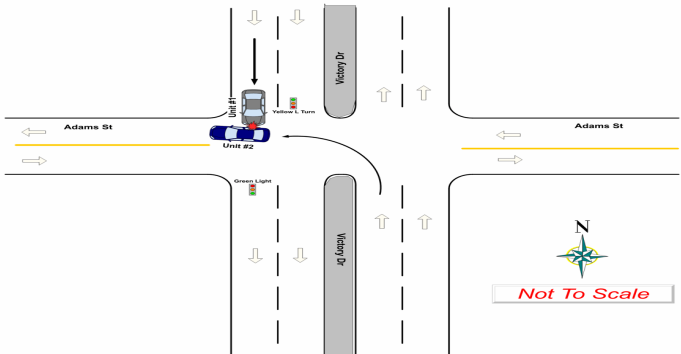
OFFICER SKETCH	NARRATIVE
	ON 3/17/22 AT APPROXIMATELY 0540 HOURS, VEHICLE 1 WAS IN THE LEFT TURN LANE, FACING WESTBOUND, ON ADAMS STREET. VEHICLE 1 ATTEMPTED TO NEGOTIATE A LEFT TURN ONTO N VICTORY DR. FROM ADAMS STREET. VEHICLE 1 STRUCK THE TRAFFIC PUSH-BUTTON CROSSWALK POLE/POST LOCATED AT THE SOUTHWEST CORNER OF ADAMS ST/N VICTORY DR. NO INJURIES WERE REPORTED AND NO TOW WAS REQUESTED. VEHICLE 1 SUSTAINED MINOR DAMAGE TO THE FRONT-END BUMPER.



Crash Detail Report - Short Form

INCIDENT ID	ROUTE SYS	ROUTE NUM	MEASURE	ROUTE NAME			ROUTE ID		COUNTY		CITY	
01139174	05-MSAS	0122	1.206	ADAMS ST			0500023958310122-I		7-Blue Earth		Mankato	
INTERSECT WITH			# VEH	# KILL	DATE	TIME	DAY	LAT	LONG	UTM X	UTM Y	WORK ZONE TYPE
			2	0	10/23/23	19:01	Mon	44.170729	-93.969168	422521.5	4891291.4	NOT APPLICABLE
BASIC TYPE		CRASH SEVERITY			FIRST HARMFUL				LIGHT CONDITION		WEATHER PRIMARY	
Angle		C - Possible Injury			Motor Vehicle In Transport				Dark (Str Lights On)		Clear	

Unit Type	Unit 1	Unit 2	Unit 3	Unit 4
Vehicle Type	Motor Vehicle in Transport	Motor Vehicle in Transport		
Direction of Travel	Passenger Car	Passenger Car		
Maneuver	Southbound	Westbound		
Age/Sex	Moving Forward	Turning Left		
Physical Cond	23 F	17 M		
Contributing Factor 1	Apparently Normal	Apparently Normal		
	No Clear Contributing Action	Failure to Yield Right-of-Way		

OFFICER SKETCH	NARRATIVE
	ON 10/23/2023 AT 1901 HOURS, I RESPONDED TO ADAMS ST/ VICTORY DR FOR A REPORT OF A MOTOR VEHICLE CRASH INVOLVING INJURIES. THE INITIAL 911 CALLS INDICATED THAT THIS CRASH INVOLVED A CAR VS PEDESTRIAN, HOWEVER IT WAS LATER CLARIFIED THAT THE CRASH INVOLVED TWO VEHICLES. UPON MY ARRIVAL, I OBSERVED UNIT #1 WAS IN THE BLOCKING TRAFFIC ON VICTORY DRIVE. UNIT #2 WAS OBSERVED BLOCKING TRAFFIC ON ADAMS STREET. ALL OCCUPANTS WERE OUT OF THE VEHICLES AND STANDING STREET SIDE. UNIT #1 HAD SUSTAINED HEAVY FRONT END DAMAGE. UNIT #1 WAS NOT DRIVABLE AND WAS ULTIMATELY TOWED FROM THE SCENE BY AFFORDABLE TOWING. UNIT #2 HAD SUSTAINED HEAVY SIDE DAMAGE TO THE RIGHT/PASSENGER SIDE. UNIT #2 HAD A MAJORITY OF THE AIRBAGS DEPLOYED. UNIT #2 WAS NOT DRIVABLE AND WAS ULTIMATELY TOWED FROM THE SCENE BY AFFORDABLE TOWING. I APPROACHED DRIVER #1 OF UNIT #1. DRIVER #1

INCIDENT ID	ROUTE SYS	ROUTE NUM	MEASURE	ROUTE NAME			ROUTE ID		COUNTY		CITY	
01118566	05-MSAS	0122	1.223	ADAMS ST			0500023958310122-I		7-Blue Earth		Mankato	
INTERSECT WITH			# VEH	# KILL	DATE	TIME	DAY	LAT	LONG	UTM X	UTM Y	WORK ZONE TYPE
VICTORY DR			2	0	07/05/23	13:10	Wed	44.170729	-93.968803	422550.7	4891291.1	NOT APPLICABLE
BASIC TYPE		CRASH SEVERITY		FIRST HARMFUL				LIGHT CONDITION		WEATHER PRIMARY		
Left Turn		B - Minor Injury		Motor Vehicle In Transport				Daylight		Clear		

Unit Type	Unit 1	Unit 2	Unit 3	Unit 4
Vehicle Type	Motor Vehicle in Transport	Motor Vehicle in Transport		
Direction of Travel	Passenger Car	Passenger Car		
Maneuver	Southbound	Northbound		
Age/Sex	Turning Left	Moving Forward		
Physical Cond	16 M	37 M		
Contributing Factor 1	Apparently Normal	Apparently Normal		
	Failure to Yield Right-of-Way	No Clear Contributing Action		

OFFICER SKETCH	NARRATIVE
	VEHICLE 1 WAS TRAVELING SOUTHBOUND ON VICTORY DRIVE AND IN THE TURN LANE TO GO EAST ON ADAMS ST. VEHICLE 2 WAS GOING NORTHBOUND ON VICTORY DRIVE IN THE OUTSIDE LANE. VEHICLE 1 TURNED IN FRONT OF VEHICLE 2 ON A FLASHING ORANGE TURN SIGNAL. DRIVER 1 STATED HE DID NOT SEE THE OTHER VEHICLE DUE TO OTHER VEHICLES ALSO GOING NORTHBOUND AND THAT HE THOUGHT IT WAS CLEAR. VEHICLES 1 AND 2 ATTEMPTED TO AVOID THE COLLISION BUT STRUCK EACH OTHER CAUSING EXTENSIVE DAMAGE. WITNESS 1 STATED VEHICLE 1 WAS TWO CARS AHEAD OF HER IN THE TURN LANE ON VICTORY DRIVE. SHE SAID SHE COULD SEE VEHICLE 2 COMING BUT DUE TO TRAFFIC AND VEHICLE 1 BEING CLOSER SHE DID NOT BELIEVE HE COULD HAVE SEEN VEHICLE 2.

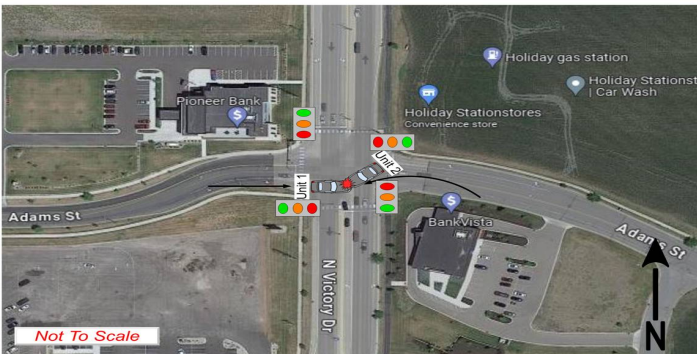


Crash Detail Report - Short Form

INCIDENT ID	ROUTE SYS	ROUTE NUM	MEASURE	ROUTE NAME			ROUTE ID		COUNTY		CITY	
01155294	05-MSAS	0122	1.223	ADAMS ST			0500023958310122-I		7-Blue Earth		Mankato	
INTERSECT WITH			# VEH	# KILL	DATE	TIME	DAY	LAT	LONG	UTM X	UTM Y	WORK ZONE TYPE
N VICTORY DR			2	0	01/11/24	16:25	Thu	44.170729	-93.968803	422550.7	4891291.1	NOT APPLICABLE
BASIC TYPE		CRASH SEVERITY			FIRST HARMFUL			LIGHT CONDITION			WEATHER PRIMARY	
Left Turn		N - Prop Damage Only			Motor Vehicle In Transport			Daylight			Clear	

Unit Type	Unit 1	Unit 2	Unit 3	Unit 4
Vehicle Type	Motor Vehicle in Transport	Motor Vehicle in Transport		
Direction of Travel	Sport Utility Vehicle	Passenger Car		
Maneuver	Eastbound	Westbound		
Age/Sex	Moving Forward	Turning Left		
Physical Cond	15 F	32 F		
Contributing Factor 1	Apparently Normal	Apparently Normal		
	No Clear Contributing Action	No Clear Contributing Action		

OFFICER SKETCH



NARRATIVE

UNIT 1 WAS DRIVING ON ADAMS ST., GOING EAST, TOWARDS THE INTERSECTION OF ADAMS ST. AND N. VICTORY DR. UNIT 1 WAS GOING TO CONTINUE EAST ON ADAMS ST., TO CROSS N. VICTORY DR. UNIT 2 WAS DRIVING ON ADAMS ST., GOING WEST, TOWARDS THE INTERSECTION OF ADAMS ST. AND N. VICTORY DR. UNIT 2 WAS GOING TO TURN LEFT AT THE INTERSECTION OF ADAMS ST. AND N. VICTORY DR., TO GO SOUTH ON N. VICTORY DR. THE DRIVER OF UNIT 1 STATED THEY HAD A GREEN LIGHT TO PROCEED THROUGH THE INTERSECTION. THE DRIVER OF UNIT 2 STATED THEY HAD A GREEN LIGHT TO PROCEED THROUGH THE INTERSECTION AND TURN LEFT, HOWEVER THEY DID NOT HAVE A GREEN ARROW, AND HAD TO YIELD TO ONCOMING TRAFFIC. UNIT 1 PROCEEDED THROUGH THE INTERSECTION. UNIT 2 PROCEEDED THROUGH THE INTERSECTION AND CRASHED INTO UNIT 1. THE FRONT END OF UNIT 2 CRASHED INTO THE SIDE OF UNIT 1, BY THE FRONT DRIVER'S SIDE DOOR. UNIT

Selection Filter:

WORK AREA: County('7') - FILTER: Year('2021','2022','2023','2024'), Vehicle Maneuver('24','5') - SPATIAL FILTER APPLIED - ROUTE FILTER APPLIED

Analyst:

Notes:

Ross Tillman

[Home » Compare CMFs](#)

CMF COMPARISON

Below you will find comparisons for the CMFs you chose.

Please note that the rows **highlighted and bold/italic** contain the differences in the selected CMFs.

Countermeasure Name	Changing left turn phasing from at least one permissive approach to flashing yellow arrow (FYA)	Changing left turn phasing from at least one permissive approach to flashing yellow arrow (FYA)	Install flashing yellow arrow	Install left turn flashing yellow arrow with supplemental traffic control
CMF ID	4174	4175	7728	7730
CMF	0.753	0.635	1.047	0.857
Study Reference	<u>SRINIVASAN, ET AL., 2011</u>	<u>SRINIVASAN, ET AL., 2011</u>	<u>SCHATTLER ET AL., 2015</u>	<u>SCHATTLER ET AL., 2015</u>
Unadjusted Standard Error AMF	0.094	0.126		
CMFunction				
Star Rating	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Rating Score Total	125	120	120	120
Crash Type	All	Left turn	Left turn	Left turn
Crash Severity	All	All	All	All
Crash Time of Day	Not specified	Not specified	All	All
Area Type	Urban	Urban	Urban	Urban
Road Division Type			All	All
Road Type	Not Specified	Not Specified	All	All
Min Number of Lanes			2	2
Max Number of Lanes			7	7
Number of Lanes Direction				
Number of Lanes Comment				
Intersection Type	Roadway/roadway (not interchange related)	Roadway/roadway (not interchange related)		
Intersection Geometry	4-leg	4-leg	3-leg, 4-leg	3-leg, 4-leg
Traffic Control	Signalized	Signalized	Signalized	Signalized
Minimum Speed Limit				
Maximum Speed Limit				
Speed Unit				
Speed Limit Comment				
Study Type	2	2	2	2
Years From			2007	2007
Years To			2013	2013
Traffic Volume Unit	Annual Average Daily Traffic (AADT)	Annual Average Daily Traffic (AADT)	Average Daily Traffic (ADT)	Average Daily Traffic (ADT)
Min Traffic Volume				
Max Traffic Volume				
Min Major Rd Volume	8260	8260	3250	3250
Max Major Rd Volume	43000	43000	37500	37500

Min Minor Rd Volume	600	600	63	63
Max Minor Rd Volume	13745	13745	14700	14700
Avg Traffic Volume				
Avg Major Rd Volume	22575	22575	17215	17215
Avg Minor Rd Volume	4285	4285	4576	4576
State of Origin	NC,OR,WA	NC,OR,WA	IL	IL
Municipality			Peoria	Peoria
Country	USA	USA	USA	USA
Comments			CMFs of left-turn related crashes on signalized intersections, including roadway with roadway and interchange related intersections. Applies to approaches with dedicated left turn lanes and PPLT phasing before and after. Nearby intersections had supplemental sign "Left Turn Yield on Flashing Yellow Arrow" mounted on mast arm.	CMFs of left-turn crashed on signal intersections, including interchange related intersections. Applies to approaches with left turn lanes and phasing before and after.