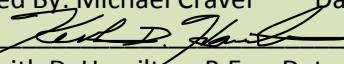


Abbreviated Study			
District: 12	County: Geauga	Route: US 422	Section: (11.10-11.55)
GEA-422-(11.10-11.55)			
2016 HSP # 064 (Rural Non-Freeway), #082 (Rural Intersection)			
Prepared December 18, 2017			
Prepared By: Drake Brauer			
Reviewed By: Michael Craver		Date: June 20, 2018	
Approved By: 		Date: 6/25/2018	
Keith D. Hamilton, P.E.			

Existing Conditions

The study location is a 0.45 mile section of US-422 that begins just east of Great Lakes Parkway and ends at Rapids Road in Troy Township. The study location also includes the intersection of US-422 and Rapids Road. US-422 is classified as a principal arterial and has a statutory speed limit of 45 MPH. Rapids Rd is classified as a local road and has a statutory speed limit of 55 MPH. According to 2016 traffic counts reported in TIMS, US-422 has an ADT of 14,101 with 10% truck traffic. Rapids Rd has an ADT of 919 south of the intersection and an ADT of 1,842 north of the intersection. Truck data not available on Rapids Road.

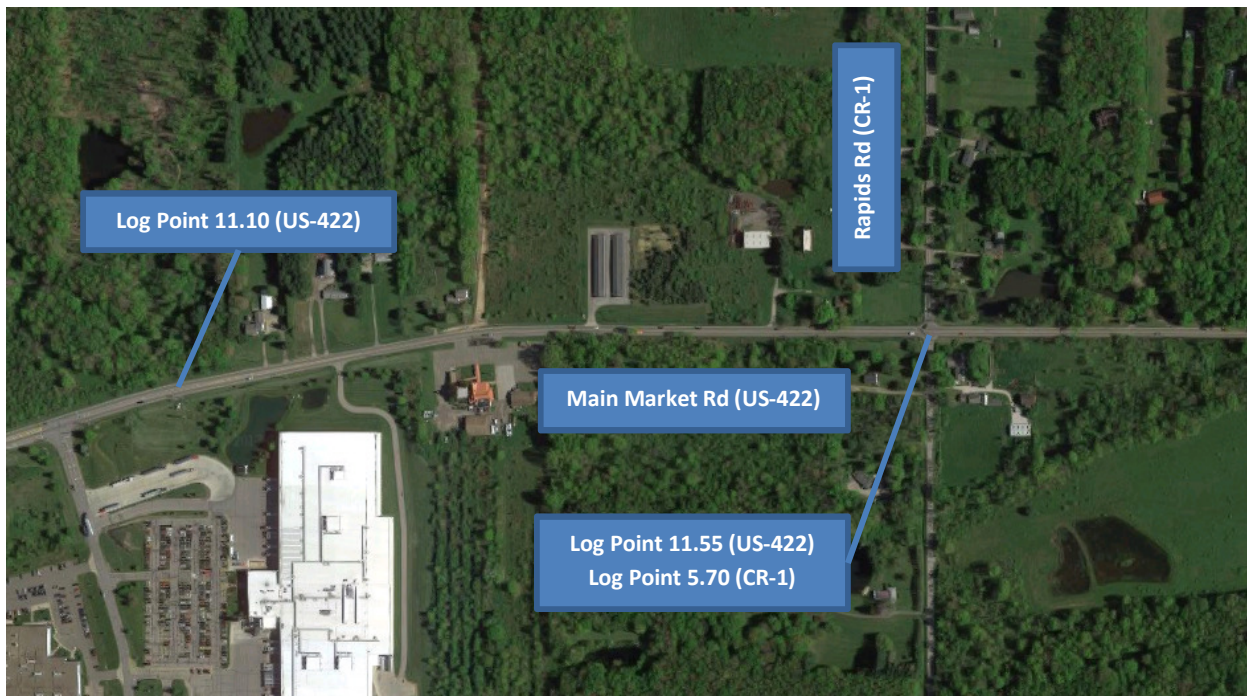


Figure 1- Study Location of US-422 near Rapids Rd

Crash Information

A GCAT spatial query was run from log point 11.10 to log point 11.60 on US-422 from 2014-2016 and from log point 5.65 to log point 5.75 on Rapids Rd from 2014-2016. The query identified a total of 33 crashes. All crashes were reviewed and hand logged revisions were made where needed. Three crashes were removed from the analysis; one animal crash and two crashes that occurred outside the study limits. Of the remaining 30 crashes, 23 were corrected for log point and street name. The following tables represent the breakdown of total number of crashes per year, type of crash, road condition, crash severity, day of the week, and time of day.

TRAFFIC_CRASH_YEAR	Number	%
2014	13	43.3%
2015	9	30.0%
2016	8	26.7%
Grand Total	30	100.0%

TYPE_OF_CRASH	Number	%
Rear End	12	40.0%
Angle	8	26.7%
Fixed Object	7	23.3%
Sideswipe - Passing	1	3.3%
Backing	1	3.3%
Left Turn	1	3.3%
Grand Total	30	100.0%

ROAD_CONDITION	Number	%
Dry	23	76.7%
Snow	4	13.3%
Wet	3	10.0%
Grand Total	30	100.0%

CRASH_SEVERITY	Number	%
Injury Crash	9	30.0%
Property Damage Crash	21	70.0%
Grand Total	30	100.0%

DAY_OF_WEEK	Number	%
Monday	7	23.3%
Friday	6	20.0%
Tuesday	5	16.7%
Thursday	4	13.3%
Saturday	4	13.3%
Sunday	3	10.0%
Wednesday	1	3.3%
Grand Total	30	100.0%

HOUR_OF_DAY	Number	%
02	1	3.3%
07	4	13.3%
08	3	10.0%
09	2	6.7%
10	2	6.7%
12	1	3.3%
13	2	6.7%
14	1	3.3%
15	4	13.3%
16	4	13.3%
17	1	3.3%
18	2	6.7%
19	2	6.7%
20	1	3.3%
Grand Total	30	100.0%

See Appendix A for the complete CAM Tool Data Analysis Summary.

HSP History

SEGMENT	2014	2015	2016
SLM 11.13 – 11.23	#413 (Rural Non-Freeway)	None	None
SLM 11.20 – 11.30	None	#116 (Rural Non-Freeway)	#64 (Rural Non-Freeway)
SLM 11.23 – 11.33	#149 (Rural Non-Freeway)	None	None
SLM 11.55	#67 (Rural Intersection)	#17 (Rural Intersection)	#82 (Rural Intersection)

Analysis

The most frequent type of crash was rear end, accounting for 40% (12 crashes) of the crashes. The second most frequent type of crash was angle, accounting for 27% (8 crashes) of the crashes. The third most frequent type of crash was fixed object, accounting for 23% (7 crashes) of the crashes. A total of 13 crashes occurred within the segment on US-422. Of the 13 crashes, 6 were rear end crashes and 6 were fixed object crashes. Congestion and the number of drives within the segment appear to be contributing factors of the rear end crashes. The presence of deficient shoulder widths on US-422 appears to be a contributing factor to the number of fixed object crashes. A total of 17 crashes occurred at the intersection with Rapids Road. Of the 17 crashes, 8 were angle crashes and 6 were rear end crashes. A total of 11 crashes have occurred at the intersection since the signal was activated on 12/5/2014. 5 of those 11 crashes were the result of a vehicle running a red light. Congestion appears to be a contributing factor of the angle and rear end crashes.

A study was conducted on this section of US-422 in 2014 by LJB. Crash data was queried between the years of 2011-2013 and a total of 17 crashes were found. Of the 17 crashes, 10 were rear end crashes, 5 were angle crashes and 2 were fixed object crashes. As a result of this study, a signal was installed and centerline rumble strips were added to US-422.

Countermeasures

This section of US-422 was resurfaced as part of PID 22221 in 2017.

The following countermeasures should be considered for improving this intersection:

Short-Term

- Continue to monitor crash trends.
- Consider installing back plates on the signal heads.
- Consider placement of additional 40 MPH warning signs in advance of the signals on all approaches.

Long-Term

- Consider the addition of left turn lanes at the intersection of US-422 & Rapids Rd.
- Consider widening the shoulders on US-422.

Implementation Plan

Continue to monitor crash trends.

Appendix A

CAM Tool Summaries

GEA-422-(11.10-11.55) GCAT 14-16

	Number
Total	30

CRASH SEVERITY	Number	%
Injury Crash	9	30.0%
Property Damage Crash	21	70.0%
Grand Total	30	100.0%

TRAFFIC_CRASH_YEAR	Number	%
2014	13	43.3%
2015	9	30.0%
2016	8	26.7%
Grand Total	30	100.0%

DAY OF WEEK	Number	%
Monday	7	23.3%
Friday	6	20.0%
Tuesday	5	16.7%
Thursday	4	13.3%
Saturday	4	13.3%
Sunday	3	10.0%
Wednesday	1	3.3%
Grand Total	30	100.0%

HOUR OF DAY	Number	%
02	1	3.3%
07	4	13.3%
08	3	10.0%
09	2	6.7%
10	2	6.7%
12	1	3.3%
13	2	6.7%
14	1	3.3%
15	4	13.3%
16	4	13.3%
17	1	3.3%
18	2	6.7%
19	2	6.7%
20	1	3.3%
Grand Total	30	100.0%

TYPE OF CRASH	Number	%
Rear End	12	40.0%
Angle	8	26.7%
Fixed Object	7	23.3%
Sideswipe - Passing	1	3.3%
Backing	1	3.3%
Left Turn	1	3.3%
Grand Total	30	100.0%

GEA-422-(11.10-11.55) GCAT 14-16

WEATHER_CONDITION	Number	%
Clear	17	56.7%
Cloudy	9	30.0%
Snow	2	6.7%
Rain	2	6.7%
Grand Total	30	100.0%

ROAD_CONDITION	Number	%
Dry	23	76.7%
Snow	4	13.3%
Wet	3	10.0%
Grand Total	30	100.0%

LIGHT_CONDITION	Number	%
Daylight	23	76.7%
Dark - Roadway Not Lighted	5	16.7%
Dawn	2	6.7%
Grand Total	30	100.0%

NUMBER_OF_VEHICLES	Number	%
1	7	23.3%
2	19	63.3%
3	4	13.3%
Grand Total	30	100.0%

LOCATION	Number	%
Four-Way Intersection	17	56.7%
Not An Intersection	12	40.0%
Driveway/Alley Access	1	3.3%
Grand Total	30	100.0%

CRASH_MONTH_NBR	Number	%
1	5	16.7%
2	4	13.3%
3	3	10.0%
4	3	10.0%
5	1	3.3%
6	1	3.3%
7	2	6.7%
8	4	13.3%
9	2	6.7%
10	3	10.0%
11	3	10.0%
12	2	6.7%
Grand Total	30	100.0%

ROAD_CONTOUR	Number	%
Straight Level	25	83.3%
Straight Grade	4	13.3%
Curve Level	1	3.3%
Grand Total	30	100.0%

SPECIAL_AREA	Number	%
(blank)	30	100.0%
Grand Total	30	100.0%

ANIMAL_TYPE	Number	%
(blank)	30	100.0%
Grand Total	30	100.0%

GEA-422-(11.10-11.55) GCAT 14-16

ACTION1	Number	%
Straight Ahead	25	83.3%
Backing	1	3.3%
Overtaking/Passing	1	3.3%
Making Left Turn	1	3.3%
Slowing Or Stopped In Traffic	1	3.3%
Entering Traffic Lane	1	3.3%
Grand Total	30	100.0%

CONTRIBUTING_FACTOR1	Number	%
Followed To Closely/ACDA	13	43.3%
Ran Red Light	5	16.7%
Failure To Yield	4	13.3%
Failure To Control	3	10.0%
Improper Lane Change/Passing/Offroad	3	10.0%
Improper Backing	1	3.3%
None-Motorist	1	3.3%
Grand Total	30	100.0%

	Number	%
Total	30	100.0%

TRAFFIC_CONTROL1	Number	%
Pavement Markings	13	43.3%
Traffic Signal	12	40.0%
Stop Sign	3	10.0%
Traffic Flashers	2	6.7%
Grand Total	30	100.0%

DRIVER_ALCOHOL1	Number	%
No	29	96.7%
Yes	1	3.3%
Grand Total	30	100.0%

DRIVER_DRUGS1	Number	%
No	30	100.0%
Grand Total	30	100.0%

GEA-422-(11.10-11.55) GCAT 14-16

DIRECTION_FROM1	Number	%
West	12	40.0%
East	11	36.7%
North	5	16.7%
South	2	6.7%
Grand Total	30	100.0%

DIRECTION_TO1	Number	%
East	12	40.0%
West	11	36.7%
South	6	20.0%
North	1	3.3%
Grand Total	30	100.0%

POSTED_SPEED1	Number	%
45	27	90.0%
55	2	6.7%
	1	3.3%
Grand Total	30	100.0%

ESTIMATED_SPEED1	Number	%
45	10	33.3%
40	5	16.7%
10	3	10.0%
5	3	10.0%
20	3	10.0%
35	2	6.7%
50	2	6.7%
0	1	3.3%
3	1	3.3%
Grand Total	30	100.0%

VEHICLE_TYPE1	Number	%
Compact	6	20.0%
Mid Size	6	20.0%
Pickup	5	16.7%
Van	4	13.3%
Full Size	3	10.0%
Sport Utility Vehicle	3	10.0%
Tractor/Semi-Trailer	1	3.3%
Minivan	1	3.3%
Unknown Or Hit/Skip	1	3.3%
Grand Total	30	100.0%

VEHICLE_TYPE2	Number	%
Mid Size	9	30.0%
	7	23.3%
Sport Utility Vehicle	4	13.3%
Pickup	4	13.3%
Minivan	2	6.7%
Full Size	2	6.7%
Single Unit Truck; 3+ Axles	1	3.3%
Compact	1	3.3%
Grand Total	30	100.0%

GEA-422-(11.10-11.55) GCAT 14-16

ACTION2	Number	%
Slowing Or Stopped In Traffic	15	50.0%
	7	23.3%
Straight Ahead	6	20.0%
Making Left Turn	2	6.7%
Grand Total	30	100.0%

CONTRIBUTING_FACTOR2	Number	%
None-Motorist	23	76.7%
	7	23.3%
Grand Total	30	100.0%

DIRECTION_FROM2	Number	%
West	9	30.0%
East	8	26.7%
	7	23.3%
South	3	10.0%
North	3	10.0%
Grand Total	30	100.0%

DIRECTION_TO2	Number	%
East	10	33.3%
West	8	26.7%
	7	23.3%
North	3	10.0%
South	2	6.7%
Grand Total	30	100.0%

DRIVER_ALCOHOL2	Number	%
(blank)	30	100.0%
Grand Total	30	100.0%

DRIVER_DRUGS2	Number	%
(blank)	30	100.0%
Grand Total	30	100.0%

GEA-422-(11.10-11.55) GCAT 14-16

SEVERITY	CRASH_SEVERITY	
TRAFFIC_CRASH_YEAR	Property Damage Crash	Injury Crash
2014	10	3
2015	4	5
2016	7	1
Grand Total	21	9

TRAFFIC_CRASH_YEAR	Fatalities	Incapacitating Injuries
2014	0	2
2015	0	0
2016	0	0
Grand Total	0	2

TRAFFIC_CRASH_YEAR	INJ_TYPE2_SERIOUS_VISIBLE	INJ_TYPE3_MINOR_VISIBLE	INJ_TYPE4_NO_VISIBLE
2014	2	1	3
2015	0	2	4
2016	0	2	0
Grand Total	2	5	7