IOWA DOT
US 30 Planning Study

US 30 Cedar and Clinton Counties
PLANNING AND ENVIRONMENTAL LINKAGES (PEL) STUDY

Existing Crash and Safety Performance Report

Office of Location and Environment | JANUARY 2019

EXECUTIVE SUMMARY

As part of the US 30 Planning and Environmental Linkages (PEL) Study, referred to hereafter as the Study, this report summarizes an analysis of the safety performance of the existing US 30 corridor. The Study corridor includes approximately 40-miles of US 30 in Cedar and Clinton counties in eastern Iowa beginning just east of the Mt. Vernon/Lisbon bypass near Charles Avenue and continuing to near 260th Avenue, or approximately 0.5 miles west of the US 30/US 61 interchange near DeWitt. The analysis is based on the Iowa Department of Transportation's (DOT) most recent complete 5 years of crash data (2013 through 2017). Within the safety study corridor, 205 crashes occurred during the study period. The total number of crashes were relatively consistent, year-over-year, with a high of 46 crashes in 2017 and a low of 35 crashes in 2016. The corridor experienced one fatal crash, occurring in 2013 as the result of a head-on collision involving a vehicle crossing the roadway centerline just west of Lowden. Of the 205 total crashes, 52 involved injuries.

Review of the 2013-2017 crash data information and attributes associated with crash events occurring within the safety study corridor suggest the following:

- The most common crash types were multi-vehicle crashes (44 percent of total and 60 percent of injury crashes) and collisions with animals (26 percent of total).
- Crashes along roadway segments were more frequent than at intersections but intersection crashes tended to be more severe.
- Rear-end and broadside crashes were most common among multi-vehicle crashes at intersections.
- Cross-centerline crashes were the most frequent and most severe type of multi-vehicle crash in the corridor. A notable decline in the number of cross-centerline crashes occurred after 2014 over the eastern half of the Study corridor; this decline in the data coincides with construction of centerline and shoulder rumble strips along US 30 east of Clarence.
- Crashes predominately occurred under good weather and pavement surface conditions; 10 percent of the total crashes (seven percent of the injury crashes) occurred with snow and ice conditions while only four percent of the total crashes (11 percent of the injury crashes) occurred during rain and wet pavement conditions (of these, only one crash was reported as having wet conditions as a factor contributing to the crash).
- The time the crashes occurred were distributed throughout the day; the data does not suggest that time of day is a factor contributing to the overall crash trends.
- 19 percent of total crashes (29 percent of injury crashes) occurred during dawn, dusk, or dark conditions.
- 24 percent of total crashes (36 percent of injury crashes) occurred at intersections.

- Failure to yield right-of-way at intersections was the most common cause of intersection-related crashes and combined with cross-centerline crashes accounted for more than half of the injury crashes.

- Frequency of crashes tends to increase in the months of October, November, and December (36 percent of total and 28 percent of injury crashes) which coincides with an increase in animal-related crashes (52 percent of all animal crashes) during those same months.

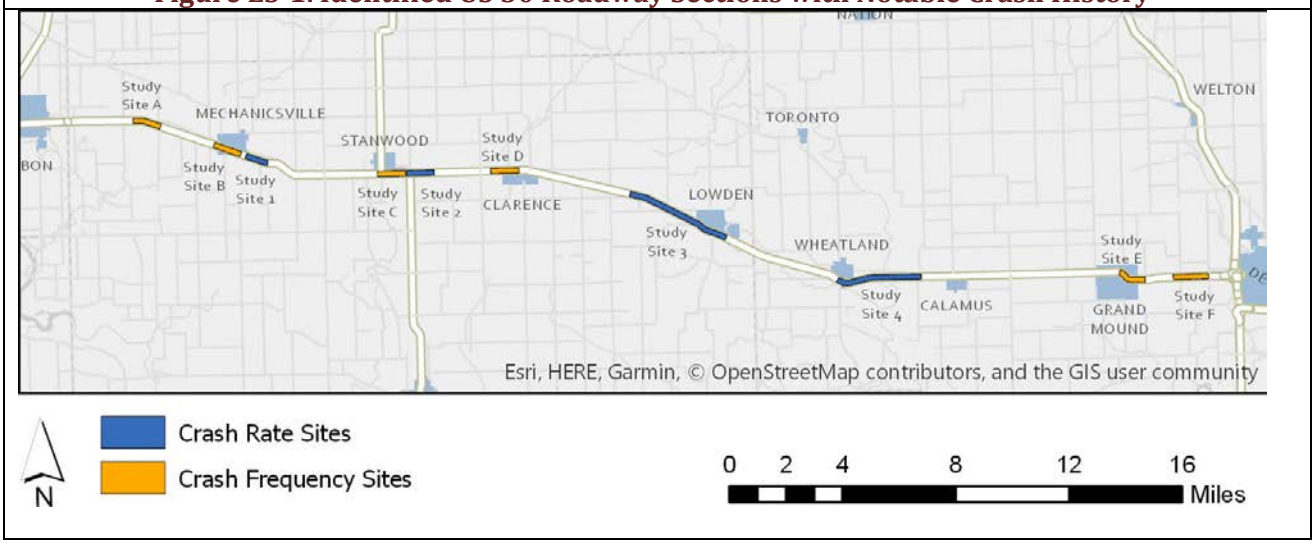
- Between 13 and 24 percent of the traffic on US 30 is heavy truck traffic; heavy trucks or agricultural equipment were involved in 18 percent of the total crashes (19 percent of injury crashes) and were distributed throughout the calendar year.

- By centerline miles, rural sections of US 30 account for 82 percent of the corridor miles and 67 percent of crashes; municipal sections account for 18 percent of the corridor miles and 33 percent of the crashes.

To normalize the crash statistics against the volume of traffic within the study corridor, crash rates were calculated for roadway segments approximately one-mile in length. Roadway segmentation was performed using two methods (continuous 1-mile segments and separating municipal and rural segments with nearly one-mile sub-segment lengths) to minimize any bias in crash rate calculations introduced by the selection of segment limits. Crash rates were calculated for each segmentation method and compared against 5-year statewide average crash rates for US highways prepared by Iowa DOT. Locations where either fatal crash rates, fatal and injury crash rates, and/or total crash rates exceeded the statewide values with both segmentation methods were identified and studied further.

A total of 10 US 30 segments within the Study corridor were identified as having crash rates greater than those of comparable US highways in Iowa (Study Sites 1-4) and/or a crash frequency of 10 or more crashes or 5 or more injury crashes (Study Sites A-F). These segments are depicted in Figure ES-1; a summary of the crash characteristics at each location is provided in Table ES-1. It should be noted that having a crash rate higher than the statewide average rate, or a higher frequency of crashes compared to other roadway segments, does not necessarily indicate a safety problem persists at any of these locations. Rather, these locations have just experienced more crashes than would be expected over a 5-year period compared to other similar roadways.

Figure ES-1. Identified US 30 Roadway Sections with Notable Crash History



Each of the 10 study sites have both unique and common characteristics. The commonalities between many of the sites include:

- Crashes involving failure to yield right-of-way at STOP signs by drivers turning onto US 30; in most of the cases, the driver making the turn from the minor approach onto US 30 was cited in the crash.
- Cross-centerline crashes occurred at a number of the sites; as noted the majority of those east of Clarence occurred prior to the 2014 project that added centerline and shoulder rumble strips to US 30.
- Many of the crashes are intersection related, animal crashes, and/or are clustered at or near roadway curves.

Table ES-1. US 30 Locations with Greatest Crash Frequency, Severity, and/or Crash Rate (2013-2017)

Study Site	Roadway Segment	Crash Characteristics
A	US 30 MP 270.9 to MP 271.9	• 12 total crashes with 4 injury crashes • 4 of the 12 total crashes involved either animal collisions or alcohol • 2 of 3 intersection crashes resulted in injuries • All injury crashes were either minor or possible injury

Table ES-1. US 30 Locations with Greatest Crash Frequency, Severity, and/or Crash Rate (2013-2017)

Study Site	Roadway Segment	Crash Characteristics
B	US 30 MP 273.9 to MP 274.9 at Mechanicsville	• 9 total crashes with no injury crashes 6 of the crashes were multi-vehicle and 3 were intersection related • 7 of the 9 crashes occurred between 5:00 AM and 10:00 AM • Stakeholder input identified crashes commonly occur in this area when trains are present on the adjacent UP railroad corridor
1	Mechanicsville municipal limits to approximately 1,500 feet east of Grant Avenue. (MP 275.0 to MP 275.9)	• 5 of 8 total crashes resulted in injuries with the majority of the crashes being a combination of cross-centerline, sideswipe same direction, and lane departure crashes. • 3 crashes were located near curves in the roadway • 4 crashes occurred during dark conditions and without roadway lighting present; 3 were animal related
C	US 30 MP 279.9 to MP 280.9 at Stanwood	• 10 total crashes of which 2 had possible injuries • 6 of the 10 crashes were intersection related with 3 of them at the IA 38 intersection • 5 of the crashes on this segment occurred in a single year (2013)
2	Stanwood City limit(east) to 4,400 feet east of IA 38. (MP 280.9 to MP 281.9)	• 8 of 9 total crashes occurred at the US 30 intersection with Monroe Ave./IA 38 with most resulting from a vehicle failing to yield right-of-way • Nearly 70% of the volume on the south leg of the intersection (IA 38) turns left onto US 30
D	US 30 MP 283.9 to 284.9 in Clarence	• 6 of 9 total crashes were injury crashes • 3 crashes were intersection related and right angle/broadside collisions
3	2.6 miles west of western Lowden City limits, to 0.25 miles east of Hoover Highway (MP 288.9 to MP 292.6)	• 7 of 27 total crashes were intersection related with the majority of those at the US 30/Herbert Hoover Highway intersection • The one fatal crash in the corridor, which occurred just west of Lowden and resulted from cross-centerline head-on collision • 8 animal related crashes and 2 crashes involving alcohol.

Table ES-1. US 30 Locations with Greatest Crash Frequency, Severity, and/or Crash Rate (2013-2017)

Study Site	Roadway Segment	Crash Characteristics
4	In Wheatland, 500 feet west of 130th Avenue to approximately 700 feet east of 158th Avenue (MP 296.9 to MP 299.9)	• 32 total crashes on this segment of roadway with most resulting in no or only minor injuries • 13 of the 32 crashes were intersection related with over 7 occurring at the US 30/130th Ave/County Road Y4E intersection in Wheatland • 14 of the crashes on this segment were animal related (this US 30 segment is near the Wapsipinicon River and the Syracuse Wildlife Management area)
E	US 30 MP 306.9 to MP 307.9 in Grand Mound	• 3 of 10 total crashes were injury crashes • 4 crashes were lane departure crashes • 5 crashes were intersection related • Crashes were spread across the segment, but clusters of crashes occurred on or near the reverse roadway curves in Grand Mound
F	US 30 MP 308.9 to MP 310.1	• 13 total crashes of which 4 were injury crashes • 2 of the injury crashes involved major injuries • 4 crashes were intersection related, 5 were rear end collisions, and 2 were cross-centerline collisions • Iowa DOT has a current project, planned for 2019 construction to improve the US 30/260th Avenue intersection that includes adding right and left turn lanes along US 30

The findings of this safety study will be used as one of the data inputs into the development and evaluation of potential improvement alternatives for the US 30 corridor being prepared and considered as part of the overall US 30 PEL Study. How the crash data is applied to the alternatives process and how the potential improvement projects can address and improve safety in the US 30 PEL Study corridor, will be documented as part of a separate PEL report.

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ACRONYMS AND ABBREVIATIONS

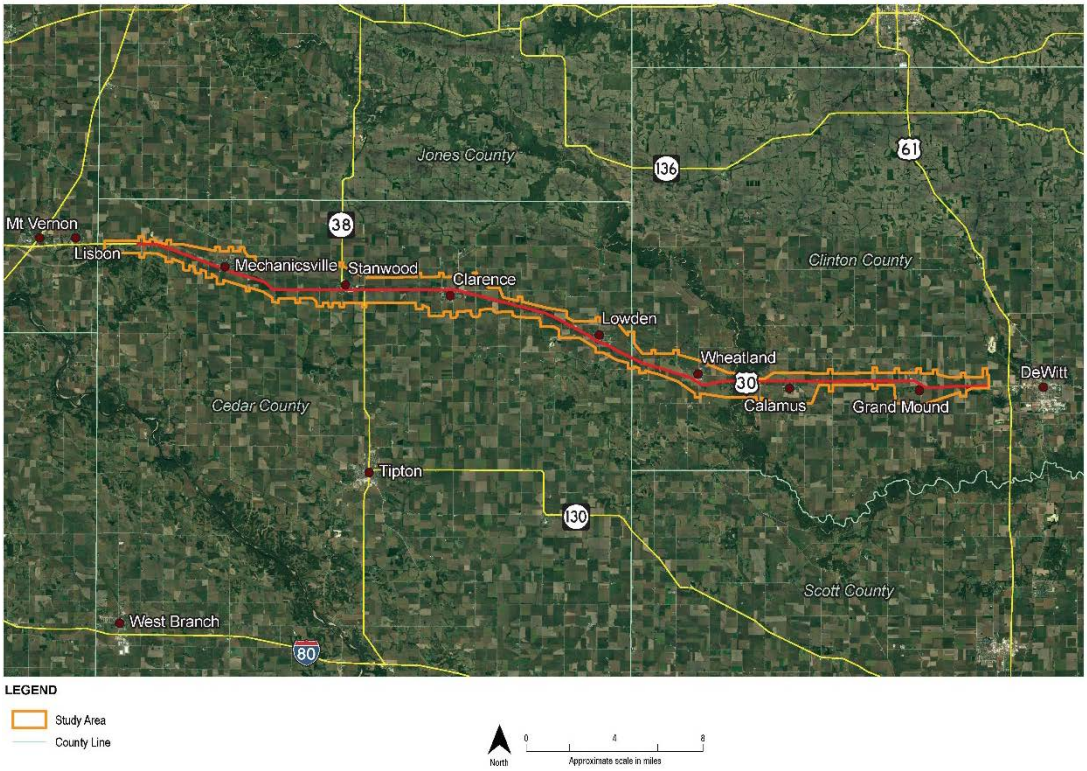
US 30	United States Highway 30
AADT	Average Annual Daily Traffic
DOT	Department of Transportation
FHWA	Federal Highway Administration
HMVMT	Hundred Million Vehicle Miles Traveled
IA	Iowa
PDO	Property Damage Only
PEL	Planning and Environmental Linkages

1 INTRODUCTION

The Iowa Department of Transportation (DOT) is conducting a planning study, referred to hereafter as the Study, of a 40-mile-long section of US Highway 30 (US 30) in eastern Iowa, extending from Charles Road just east of Lisbon, in Cedar County, to 260th Avenue just west of DeWitt, in Clinton County (see Figure 1). This section of US 30 passes through or near seven communities and, depending on the location within the corridor, carries between 2,200 and 5,600 vehicles per day (of which 13 to 24 percent are trucks and other heavy vehicles).
The Study will examine whether the existing facility is able to meet current and future travel and mobility needs and identify any potential improvement projects that may be necessary to meet future demands. Specifically, the goals of this Study are:

- Develop a range of possible improvement alternatives for the corridor.
- Provide recommendations on the potential bypass of one or more of the communities along the corridor.
- Provide a recommended prioritization of improvement projects that can be used to consider project construction needs against available construction funding.

Figure 1. US 30 Planning Study Area



For the Study, Iowa DOT is following the Federal Highway Administration's (FHWA's) Planning and Environmental Linkages (PEL) Study process, which represents an approach to transportation decision making that considers environmental, community, and economic goals early in the planning stage and carries them through project development, design, and construction. The PEL Study process is intended to be an efficient decision-making model that:

- Minimizes duplication of effort
- Promotes efficient and cost-effective solutions and environmental stewardship
- Reduces delays in project implementation

This report summarizes an analysis of the safety performance of the existing US 30 corridor and identifies areas in the corridor where crashes are most common and the characteristics surrounding those crashes. The findings of this safety performance evaluation will feed into other phases of the Study, including development and evaluation of improvement alternatives that will address and meet the future transportation needs of the corridor.

2 STUDY AREA

Existing US 30 is a two-lane rural highway throughout the Study area. The corridor is mostly rural but passes near or through the small communities of Mechanicsville, Stanwood, Clarence, Lowden, Wheatland, Calamus, and Grand Mound. The start and end of this safety study corridor are locations where US 30 widens/narrows to/from a four-lane divided highway section. There are numerous at-grade intersections along the corridor including intersections with both gravel and paved local roadways. The Union Pacific (UP) railroad corridor parallels US 30 throughout the majority of the Study area and is located close to the US 30 mainline. The close spacing of the railroad tracks in relation to US 30 results in minimal storage areas available for vehicle queuing when the at-grade railroad crossings are in use; available information suggests that the number of trains per day within the Study corridor varies but can reach upwards of 60 trains per day. When trains are present, traffic queues can back up onto US 30 with vehicles parking on the US 30 shoulders, making U-turns in traffic, and/or stopping within the travel way. This was observed at several of the US 30 intersections with local roads, especially around Mechanicsville, during a windshield survey of the corridor and is consistent with information and feedback provided by local stakeholder groups.

A summary of the existing roadway physical conditions including the roadway alignment and intersection geometric characteristics are documented in the US 30 PEL Study *Existing Conditions Memorandum.*

3 METHODOLOGY

This safety performance evaluation and crash analysis utilized Iowa DOT's most recent and complete 5 years of crash data (2013 through 2017). Preliminary 2018 data were also available at the time of this study, however, since the data are still considered preliminary and does not include the full calendar year, it was excluded, unless noted otherwise, from the safety study evaluations and findings. Analyzing crash data statistics yearly generally results in crash numbers varying sporadically from year to year. To gain a more representative understanding of

the safety performance of the corridor, it is common to look at 5 or more years of data to estimate yearly average statistics and crash trends.

All crashes that occurred along US 30 between the new US 30 Mt. Vernon/Lisbon bypass construction (approximately 400 feet east of Adams Avenue near US 30 milepost 268.9) in Cedar County and the existing four-lane section of US 30 (approximately 2,000 feet east of 260th Street near US 30 milepost 310.1) in Clinton County were included in this analysis; crashes at or attributed to the US 30/US 61 interchange at DeWitt were not included. Crashes within 500 feet of US 30 on the local roadway approaches in the Study corridor were also included in the analysis if the crash data identified them as intersection-related.

Given the size of the corridor and its varying traffic patterns, the safety study area was divided into smaller study segments for analysis. To minimize bias in establishing the roadway segments, the corridor was subdivided using two methods:

- **Method 1:** Continuous one-mile segments beginning at the start of the analysis area; this resulted in a total of 41 roadway segments.

- **Method 2:** Rural and urban segments divided at each municipal boundary and then subdivided into roughly one-mile long segments, or as close to one-mile as possible, over the various rural and urban roadway sections; this method resulted in 38 segments.

For the 2013-2017 period, referred to as the safety study period hereafter, crash data were evaluated for trends in the type, frequency, location, severity, and other contributing factors and roadway conditions at the time of the crashes. Evaluating these characteristics and factors provide insight on the crash history within the corridor and any prevailing trends in the data that could point to crash causation and/or areas of focus to improve travel safety.

Crash rates, which compare the frequency of crashes over a segment of roadway against average daily traffic volumes, were also considered. Comparing crash rates helps to normalize the crash data by accounting for the amount of exposure for a crash to occur. For example, in urban areas, the frequency of crashes tends to be higher than in rural areas. Likewise, traffic volumes, are generally higher in urban areas creating higher levels of exposure for a crash to occur compared to rural areas. Simply comparing the frequency of crashes in such instances can be misleading and suggest the urban areas have a poorer safety performance compared to rural areas. By normalizing the data with traffic volumes, areas can be compared while minimizing the bias created by varying levels of traffic on individual roadway segments and intersections.

Roadway segment crash rates were developed for all segments identified using the two methods noted above. Crash rates were calculated for fatal-only crashes, fatal and injury crashes, and total crashes. Crash rates were calculated based on crashes per hundred million vehicle miles traveled (HMVMT) using individual roadway segment average annual daily traffic (AADT) values obtained from available Iowa DOT traffic counts and maps.

All reported crashes within the safety study corridor between 2013 and 2017 were included in crash-rate calculations; crashes were not excluded from the analysis on any basis or external factors such as alcohol involvement, work zone presence, collision with animals, intersection-related, etc. Like other crash statistics, crash rates typically are calculated considering multiple

years of data to adjust for annual variability and allow for better trend comparison with statewide crash statistics; for this safety study, crash rates were calculated considering all reported crashes in the 5-year study period.

The calculated crash rates were compared to 5-year average statewide crash rates developed by Iowa DOT for 2012 through 2016[1] (see Table 1). The basis of the Iowa DOT 5-year statewide crash rates is similar to the approach used to calculate 5-year crash rates for this safety study including the consideration of all crash types and factors and based on roadway segments about one-mile in length, including intersections. Statewide fatal and injury crash rates also consider all level of injury (fatal, major, minor, and possible). For the roadway segments identified based on a continuous one-mile segmentation (Method 1), rates were compared to the overall Statewide-US Routes crash rates in Table 1. Method 2 segmentation crash rates, which separate urban from rural crashes, were compared to the respective US highway municipal and rural statewide 5-year statistics shown in Table 1.

Table 1. Iowa DOT 5-Year Average Crash Rates, 2012-2016

Benchmark Crash Rates (Crashes per HMVMT)			
	Fatal	**Fatal and Injury**	**All**
Statewide—US Routes	0.85	38	131
Rural—US Routes	0.89	20	76
Municipal—US Routes	0.76	78	256

Source: *Crash Rates and Crash Densities in Iowa by Road System 2007-2016*, Iowa Department of Transportation, Office of Traffic Safety and Engineering Bureau Highway Division

Roadway segments identified as having one or more of the calculated crash rates greater than the comparable statewide crash rate were identified for each segmentation method. Locations where both segmentation methods resulted in one or more crash rates exceeding statewide averages were deemed overrepresented in the crash data. Being overrepresented in the crash data does not necessarily imply a safety concern persists at these locations, rather it simply means the given section of roadway sees more crashes than would be expected compared to other similar roadway segments in Iowa.

Locations where more crashes occurred than would be expected were investigated further to identify any prevailing trends that could suggest a safety concern is present, including a deeper dive into the safety study period crash data for events that occurred along the specific roadway segments in question. To supplement the safety study period crash data at these locations, preliminary 2018 crash data and long crash forms with reporting officer narratives, provided by Iowa DOT, were also referenced to help identify any common factors or contributing

[1] Source: *Crash Rates and Crash Densities in Iowa by Road System 2001-2016*, Office of Traffic and Safety Engineering Bureau, Highway Division, September 22, 2017. Accessed: https://iowadot.gov/crashanalysis/pdfs/crash_rate-density_comparables_segments_2007-2016_20170718_statewide.pdf.

circumstances related to the crashes. Review of the long crash forms were limited to crashes that resulted in a fatality or injuries.

4 RESULTS

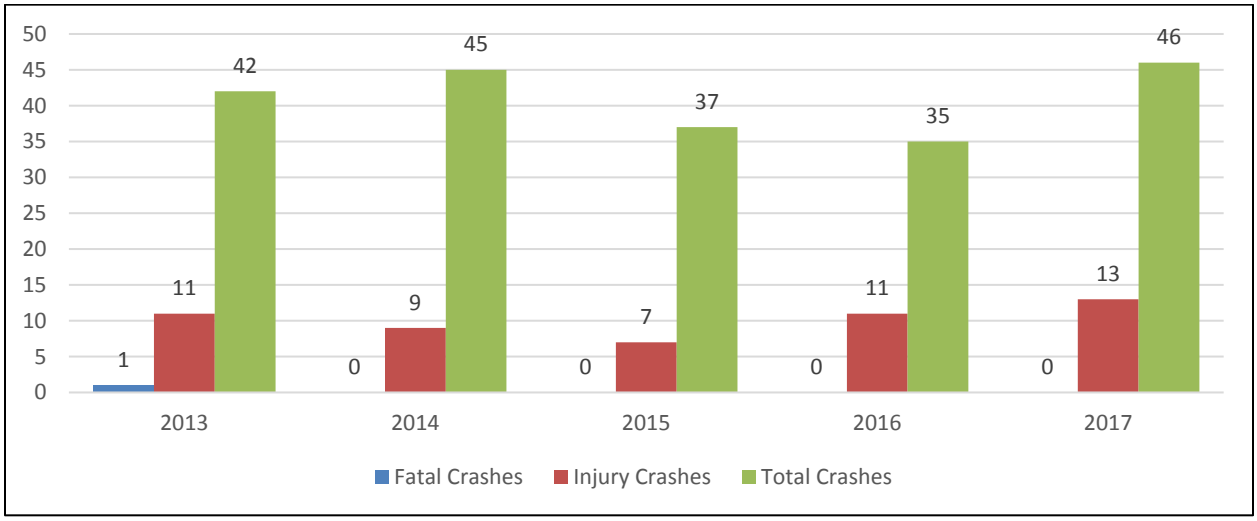
Between 2013 and 2017, a total of 205 crashes occurred within the safety study corridor. Of those, 52 were crashes that resulted in at least one injury. The distribution of crashes along the safety study corridor is depicted in the series of graphics provided in Appendix A. A summary of crash frequency, severity, and crash rates are provided in Appendix B and Appendix C for the corridor segments determined using segmentation Method 1 and Method 2, respectively. Additional crash details and summaries are provided below.

4.1 CORRIDOR-WIDE CRASH DATA CHARACTERISTICS

CRASH FREQUENCY AND SEVERITY

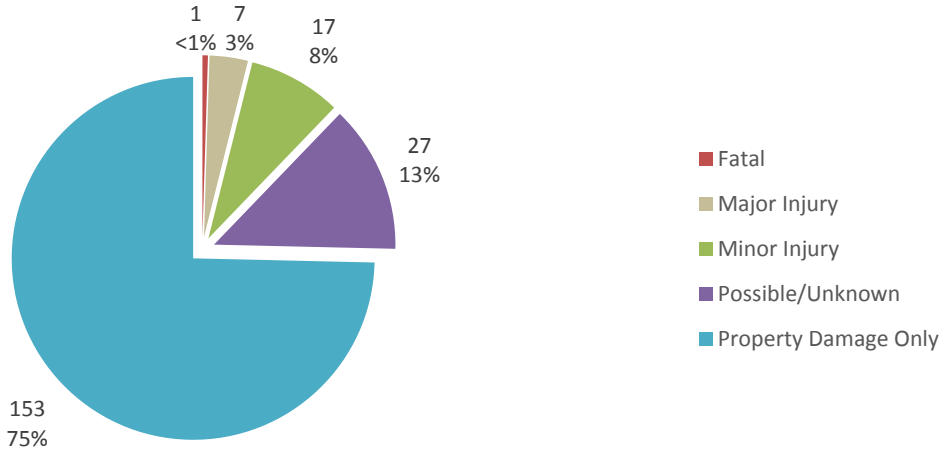
From 2013 through 2017, the total annual crash frequency throughout the corridor was relatively constant, ranging from a low of 35 crashes in 2016 to a high of 46 crashes in 2017, as shown in Figure 2. The frequency of injury crashes also remained level, ranging from a low of 7 crashes in 2015 to a high of 13 crashes in 2017. The sole fatal crash within the study period occurred in 2013 near the western limits of Lowden.

Figure 2. Fatal, Injury, and Total Crashes by Year, 2013 through 2017



In general, the majority of crashes were of low or no severity within the corridor during the study period. As shown in Figure 3, 75 percent of all crashes in the corridor were property-damage-only crashes, or crashes in which no involved person sustained any known or possible injury. Eight crashes (3 percent) resulted in a major, or incapacitating, injury and only one fatal crash (<1 percent) occurred resulting in one death.

Figure 3. Crashes by injury severity, 2013 through 2017



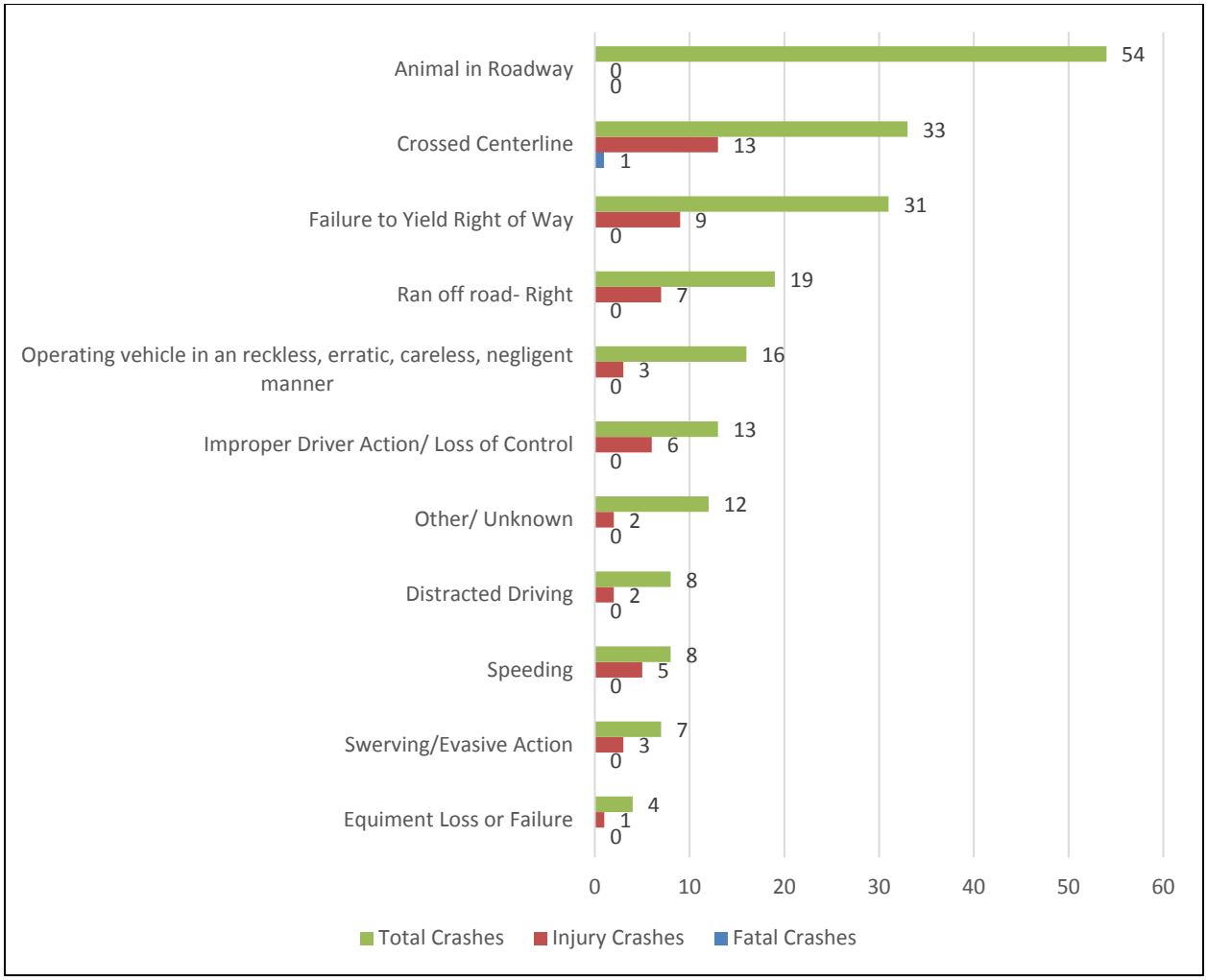
PRE-CRASH ACTION

Figure 4 shows fatal, injury, and total crashes by pre-crash action (action or event that occurred immediately prior to the crash occurring). It is not uncommon for a single crash to have a variety of contributing factors related to environmental conditions, infrastructure elements, and driver behavior. Contributing crash factors help to understand common issues leading to a collision. The most common pre-crash action involved an animal(s) in the roadway (26 percent). The second most common pre-crash action was a vehicle (or more than one vehicle) crossing the centerline into the opposing lane of traffic (16 percent). These cross-centerline crashes resulted in the highest proportion of injury crashes (25 percent) as well as the one fatal crash within the safety study corridor between 2013 and 2017. "Failure to yield right-of-way"[2] (typically crashes at an intersection) and "ran off road to the right"[3] (typically single-vehicle roadway departure crashes) resulted in the third (15 percent) and fourth (9 percent) highest numbers of total crashes and second (18 percent) and third (14 percent) highest numbers of injury crashes, respectively.

[2] "Failure to yield right-of-way" can refer to several situations involving two or more vehicles wherein one vehicle does not allow another vehicle to travel freely along the legally established traveled way. The various specific legal descriptions of failing to yield right-of-way in Iowa are defined in 2015 Iowa Code TITLE VIII – TRANSPORTATION SUBTITLE 2 – VEHICLES CHAPTER 321 - MOTOR VEHICLES AND LAW OF THE ROAD.

[3] "Ran of road to the right" includes a crash where a vehicle exists the intended travel lane to the right based on the intended direction of travel.

Figure 4. Fatal, Injury and Total Crashes by Pre-crash Action, 2013-2017



COLLISION TYPE

Figure 5 shows fatal, injury, and total crashes by type of collision and manner of collision. The data suggest that the frequency of multi-vehicle and single-vehicle crashes are nearly evenly split within the safety study corridor. The most common collision type reported in the crash data was among vehicles in traffic (meaning two or more vehicles were involved and the collision did not include a vehicle parked on/adjacent to the roadway) accounting for 91 of the total crashes (44 percent) and 31 (61 percent) of the injury crashes as well as the one fatal crash. The next highest number of collisions were with animals which accounted for 55 (26 percent) of the total crashes. Animal crashes tend to involve just a single vehicle. Collisions with fixed roadside objects resulted in 32 (16 percent) of the total crashes and 10 (20 percent) of the injury crashes. Roadside objects could include a number of features including, but not limited to, utility poles, roadway ditches, trees, and drainage culverts. Crashes with fixed objects generally suggest one or more vehicles left the roadway surface; these are often time single-vehicle crashes but could involve two or more vehicles. Fixed-object crashes were distributed throughout the entire corridor, with no clear clustering at any one point, or about any one object.

Figure 5. Fatal, Injury, and Total Crashes by Collision Type, 2013-2017

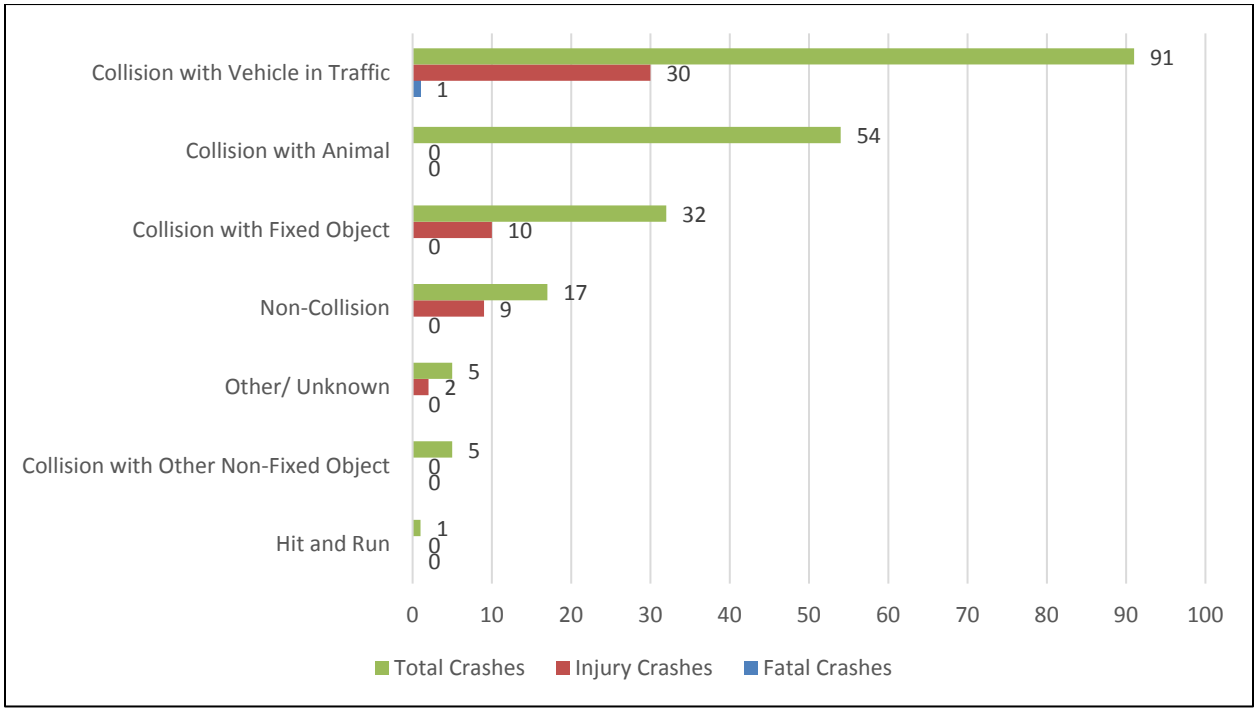
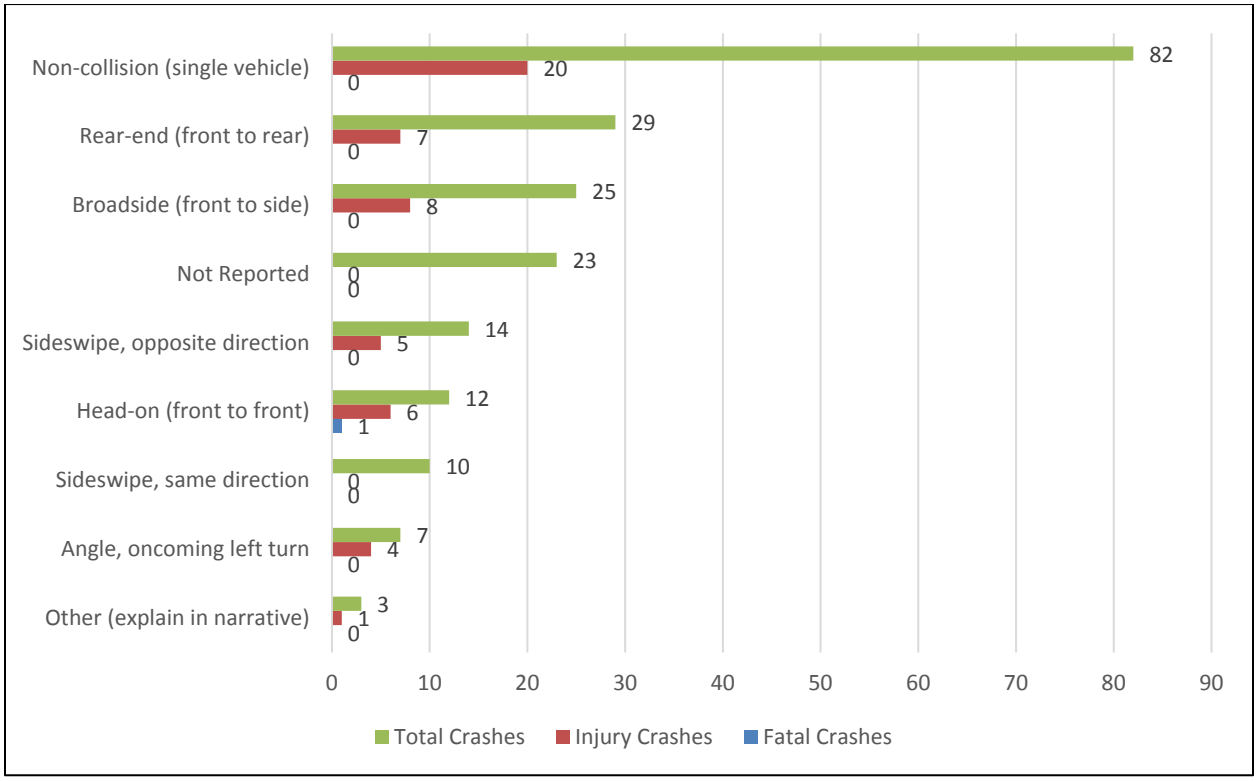


Figure 6 presents a breakdown of crashes by manner of collision. Non-collision (single-vehicle) crashes comprise 82 (40 percent) of the total crashes and 20 (39 percent) of the total injury crashes. Rear-end and broadside crashes were also among the most common collision types and typically occurred at or near an intersection or driveway. While head-on (12 crashes) and angle crashes (7 crashes) comprise much less of the total, more than 50 percent of those crashes resulted in an injury (including the one fatal crash within the corridor). This suggests that it can be expected that head-on and angle crashes will more frequently result in an injury compared to other collision types. Cross-centerline crashes occurred in greater numbers in 2013 and 2014 with a steep drop off observed starting in 2015. Prior to 2015, cross-centerline crashes were evenly distributed throughout the corridor, whereas after 2014, the crashes were more prevalent in the western part of the corridor. East of Clarence, US 30 was resurfaced with the addition of centerline and shoulder rumble strips in a timeframe consistent with the sharp decline in cross-centerline crashes. This trend suggests the centerline rumble strips were effective in reducing the cross-centerline crashes; no notable changes in the frequency of the lane departure crashes were noted.

Figure 6. Fatal, Injury, and Total Crashes by Manner of Collision, 2013-2017



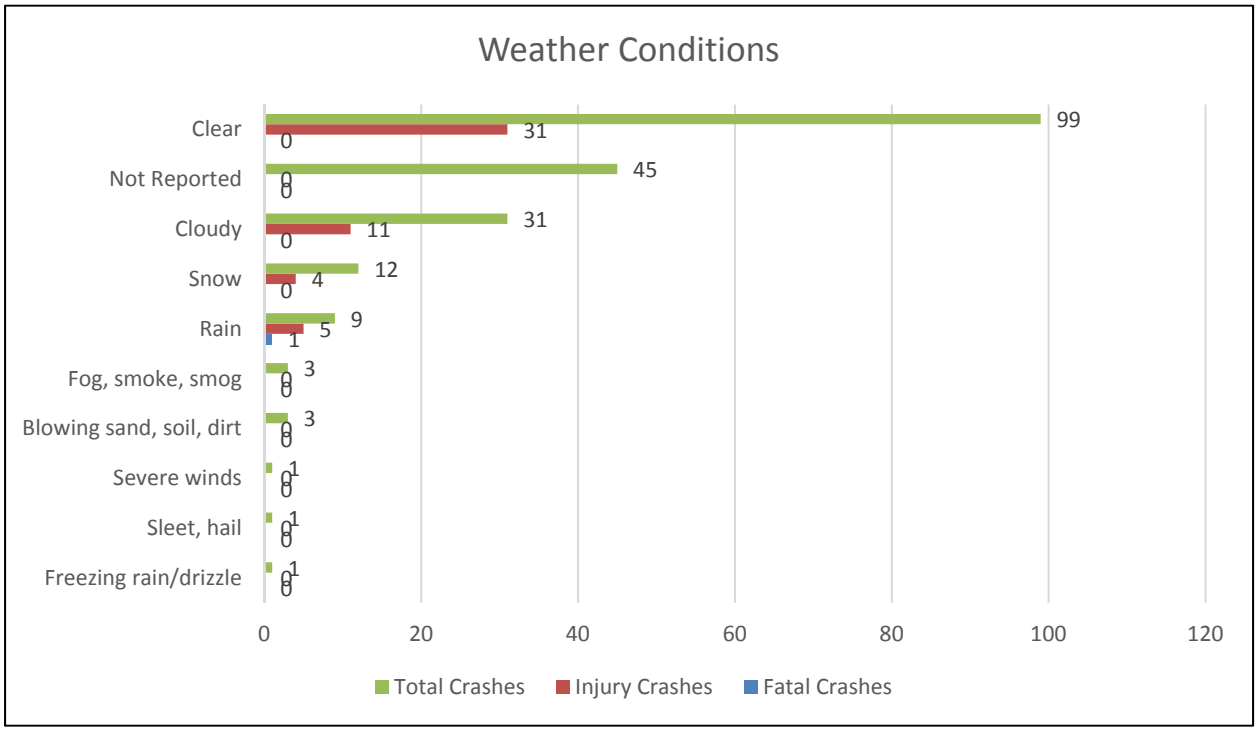
WEATHER AND PAVEMENT CONDITIONS

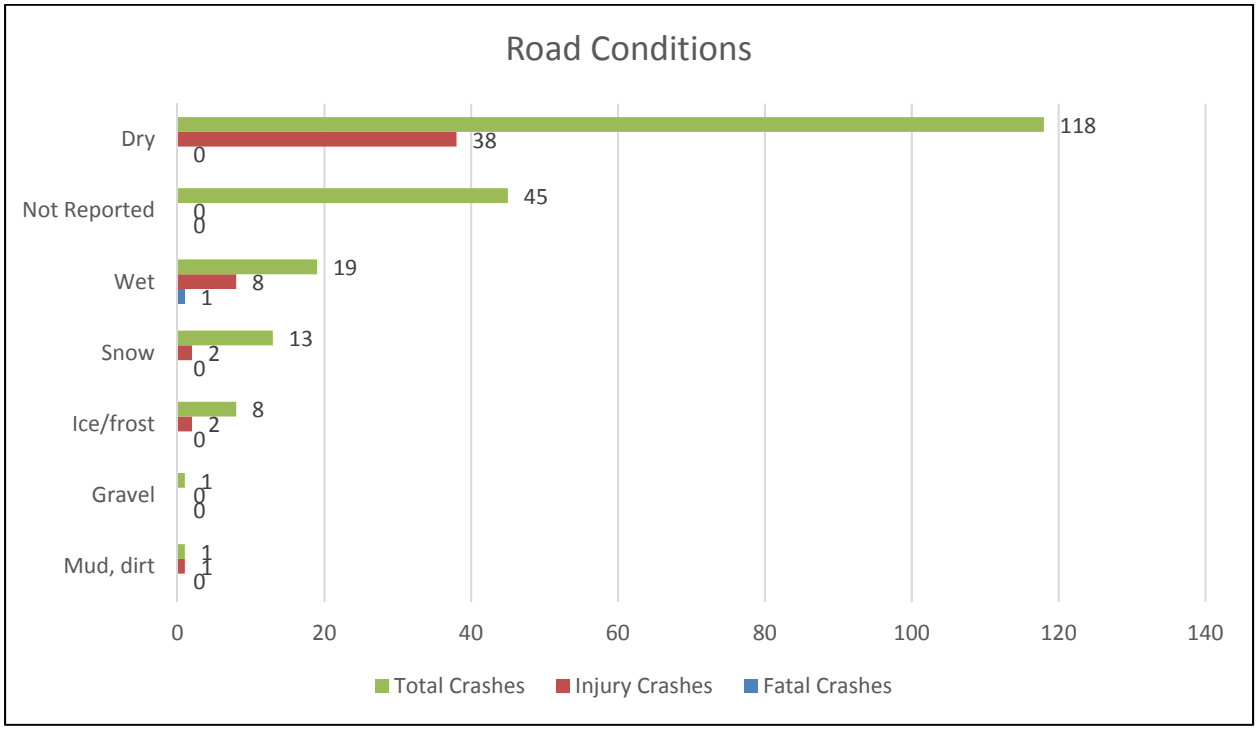
Figure 7 provides a breakdown of crashes by weather and pavement conditions. Adverse weather conditions can affect drivers in multiple ways. For example, rain or snow can impair a driver's vision, obscure pavement markings, and reduce traction on roadway surfaces.

A variety of weather-related factors were reported along the corridor, though the most commonly reported weather conditions were "clear" and "cloudy." It is notable that 70 (35 percent) of the total crashes had no weather condition attributes included in the crash data; all of these crashes were property-damage-only crashes. Nine (4 percent) of the total crashes occurred during rain, six of which resulted in an injury, including the one fatal crash and two minor injury crashes. Of the crashes occurring during rainy conditions, only one of the crashes listed the weather as a contributing factor to the crash.

Crashes occurring on snow, ice/frost, or slush covered roads resulted in 21 (10 percent) of the total crashes and four (eight percent) of the injury crashes. Like rain, the contribution of snow and ice conditions to the overall crashes in the corridor during the study period is relatively minor.

Figure 7. Fatal, Injury, and Total Crashes by Reported Weather Conditions and by Roadway Conditions, 2013-2017





TIME OF DAY

Figure 8 presents the distribution of crashes by time of day. Total crashes and injury crashes both tended to occur during the daylight hours with 72 percent of total crashes and 75 percent of injury crashes happening between 6:00 AM and 8:00 PM. Crash frequency also increased during AM and PM peak traffic hours (times when commuter travel between home and work and the largest volumes of traffic are on the road). The number of injury crashes is highest from 2:00 PM to 6:00 PM with 20 (38 percent) of the injury crashes occurring during this time.

In general, the crash data does not suggest that time of day is a contributing factor in the overall crash trends of the Study corridor.

Figure 8. Fatal, Injury, and Total Crashes by Time of Day, 2013-2017

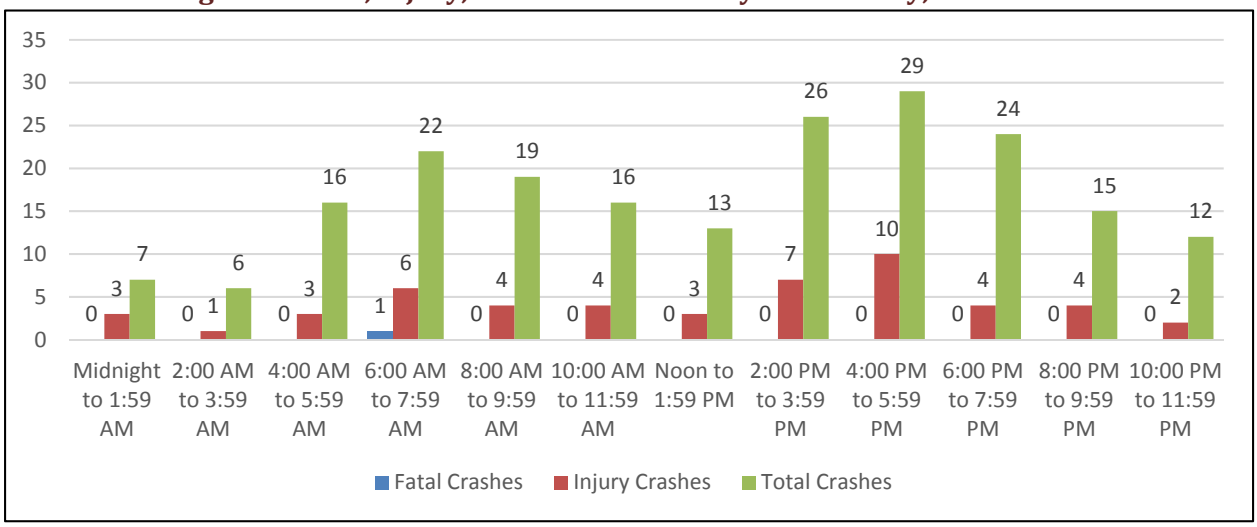
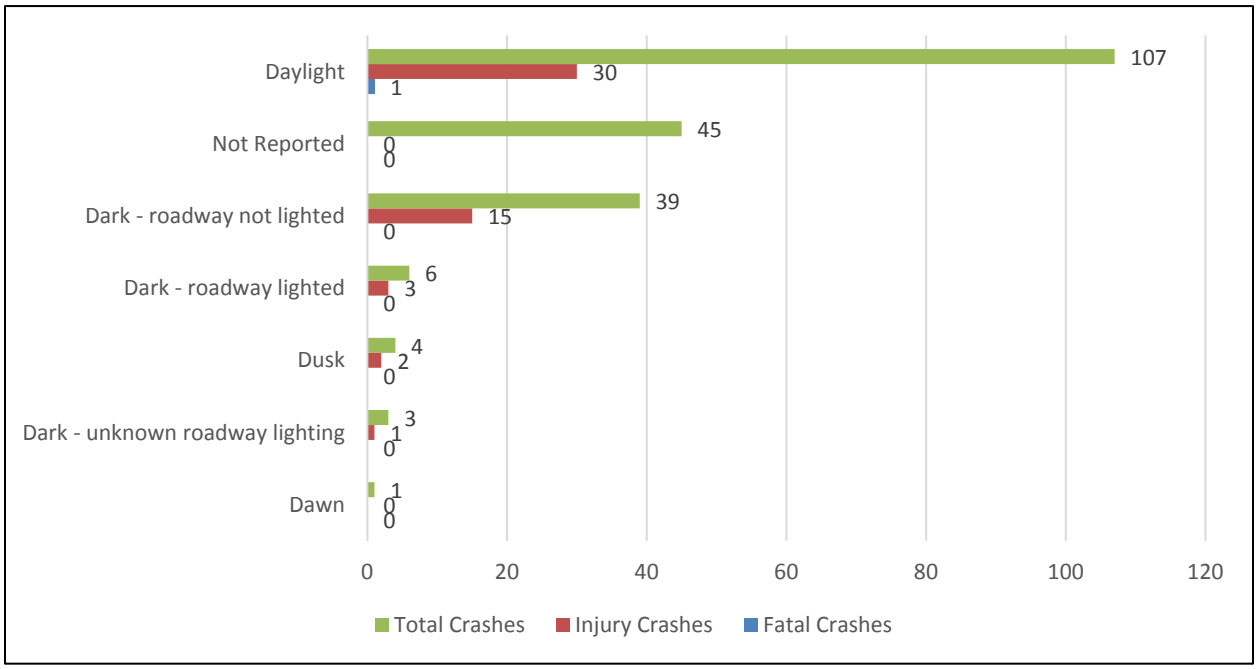


Figure 9 shows the number of crashes by lighting condition. Lighting conditions for crashes in the corridor are consistent with time of day trends, with 107 (52 percent) of the total crashes occurring during daylight. However, it is notable that 39 (19 percent) of the total crashes, and 15 (29 percent) of the injury crashes occurred during dark, dawn, or dusk and without the presence of roadway lighting. Further investigation of the 39 dark, not lighted, crashes noted that only six occurred at intersections.

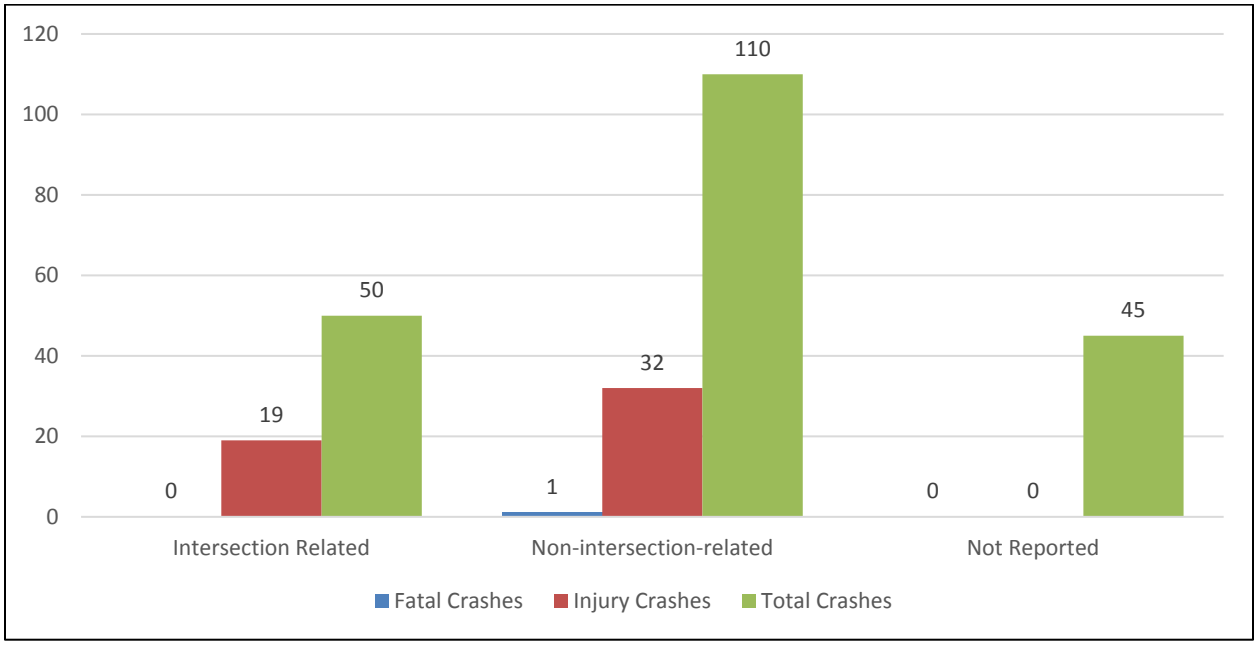
Figure 9. Fatal, Injury, and Total Crashes by Lighting Condition, 2013-2017



INTERSECTION RELATED

A breakdown of all crashes by intersection relationship is presented in Figure 10. While only 50 (24 percent) of the total crashes occurred at intersections, intersection-related crashes were responsible for about 36 percent of the total injury crashes in the safety study corridor between 2013 and 2017. Of the total crashes, 45 (22 percent) had no information in the crash data to identify the crash as intersection-related or non-intersection-related.

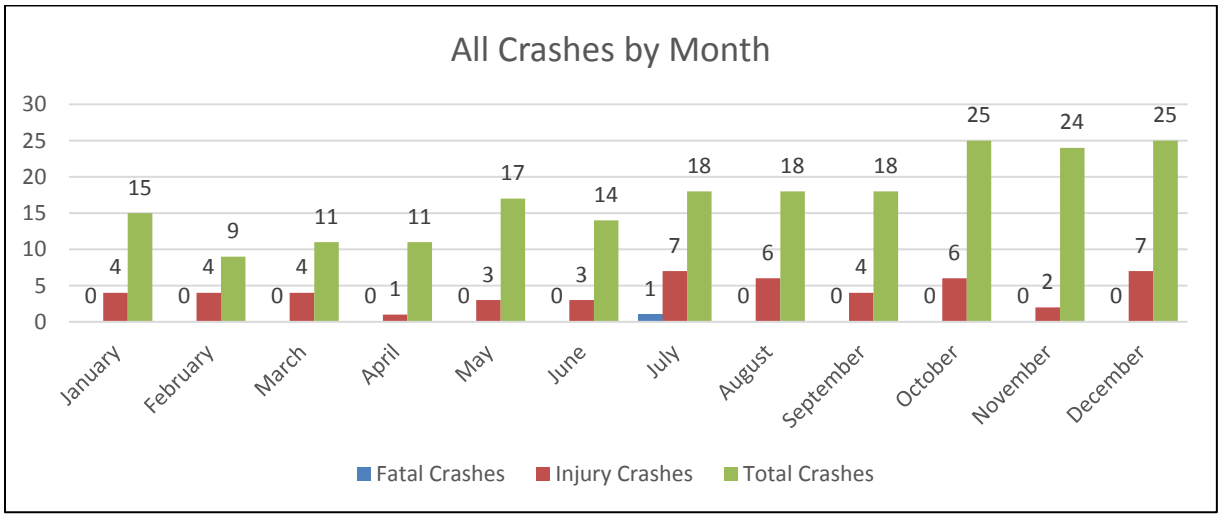
Figure 10. Fatal, Injury, and Total Crashes by Intersection Relationship (2013-2017)

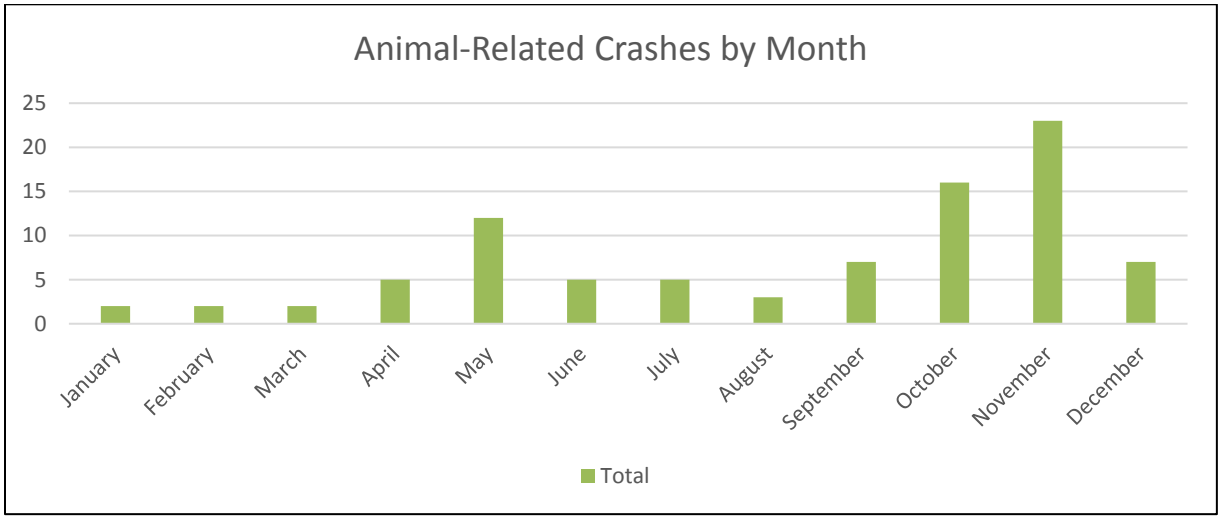


TIME OF YEAR (MONTH)

Crashes by month are presented in Figure 11. Crashes increase during certain months of the year. The monthly crash frequencies could be related to weather conditions and monthly fluctuations in traffic patterns due to factors such as school sessions and activities, agricultural truck travel, or tourism during the summer months. The data shows that crashes in the safety study corridor tend to increase during October, November, and December. As previously noted, snow and ice conditions do not show a statistically significant correlation to the frequency of crashes. However, animal related crashes in the corridor also increase in this same period indicating a possible correlational with the time of year and animal crashes; 52 percent of all the animal crashes occurred in the October to December timeframe.

Figure 11. Fatal, Injury and Total Crashes by Month and Total Animal-Involved Crashes by Month, 2013-2017





TRUCKS AND OTHER HEAVY VEHICLES

Of the total crashes, 36 (18 percent) involved a large truck/commercial vehicle and only one crash (<1/2 percent) involved an agricultural vehicle. Large trucks/commercial vehicles were involved in 10 (19 percent) of the injury crashes in the corridor; the only agricultural vehicle-related crash resulted in only property damage. Crash trends by month did not suggest truck or agricultural equipment crashes were more likely during planting or harvest periods. Rather, they tended to occur randomly throughout the year.

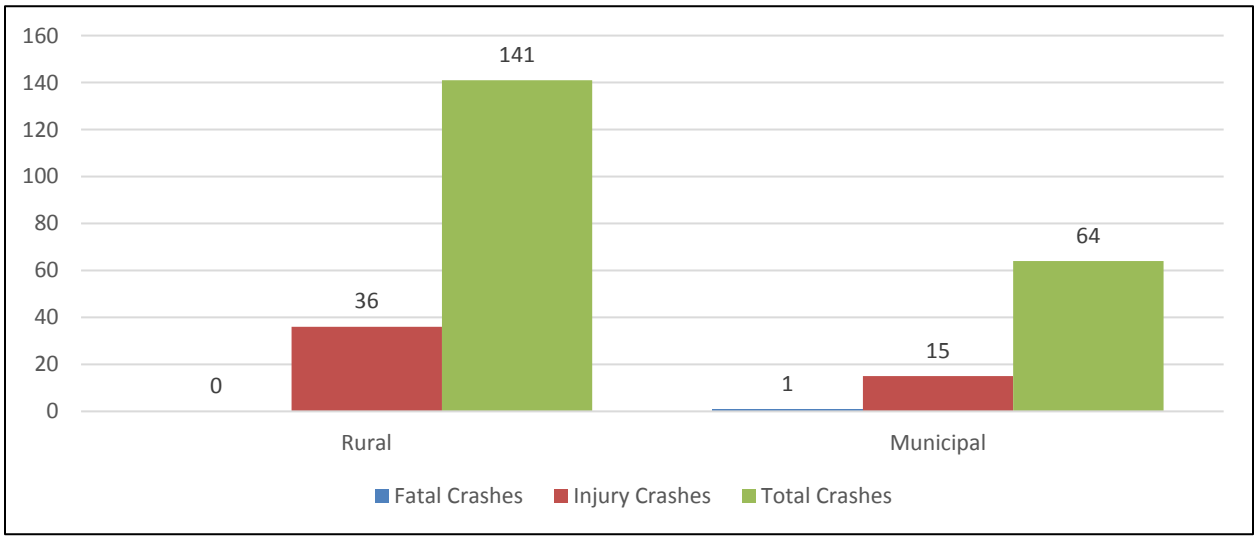
TRAINS

Only two crashes were directly related to collisions with trains, however, as noted previously, there are sections of the Study corridor where the existing UP Railroad line crosses the minor approach of an intersecting roadway very close to US 30. At these locations, vehicle queues may develop while waiting for trains to pass and increase potential for crashes on US 30 to occur. With the crash event being located on US 30 and not a direct collision with a train, reporting officers may not necessarily record the crash as being train-related and thus the influence of trains on crashes may not be reflected accurately in the crash data. Feedback from local police departments and other stakeholders suggest that some minor property-damage-only crashes along US 30 are the result of cars queued within the US 30 roadway and shoulder area while waiting for the at-grade railroad crossings to clear; stakeholders suggested these crash occurrences are most frequent near the US 30 intersections at Mechanicsville.

URBAN VERSUS RURAL

Finally, crash frequency was compared to the roadway setting. Figure 12 presents the distribution of crashes occurring on rural sections versus sections within the municipal boundaries along the safety study corridor. Roughly 33 percent of total and fatal and injury crashes occurred in municipal areas, while the remaining 67 percent occurred in rural areas. By centerline miles, only 18 percent of the corridor is located in municipal areas versus 82 percent in rural areas. This indicates more total and injury crashes occurred on municipal sections of the safety study corridor than would be expected considering the proportion of municipal roadway miles in the Study corridor.

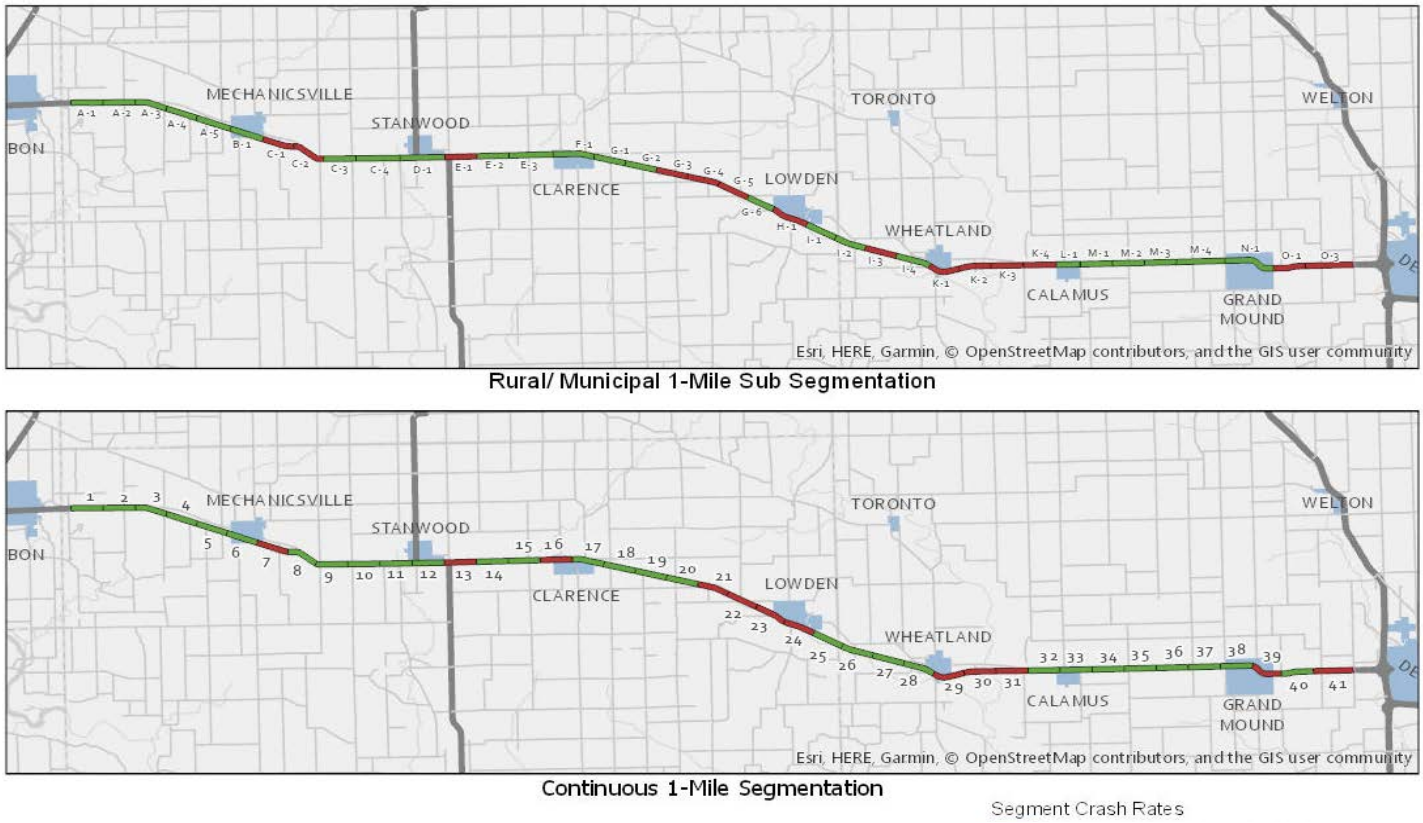
Figure 12. Fatal, Injury, and Total Crashes by Rural/Municipal Crash Location, 2013-2017



4.2 CRASH RATE ANALYSIS BY SEGMENT

The results of the calculated crash rate comparisons to statewide averages are presented in Figure 13. As shown, roadway segments highlighted by the crash rate comparisons tend to be located on segments near or along US 30 roadway curves and in or near the municipal areas, particularly Lowden and Wheatland. Comparing the identified roadway segments using segmentation Methods 1 and 2, the segments highlighted using both methods were noted as having more crashes than expected. These locations are listed in Table 2 and have total and/or fatal plus injury crash rates greater than statewide averages. Additional details regarding the crash trends of these four roadway segments are provided in Section 5.2 of this report.

Figure 13. Comparison of Corridor Segments to Statewide Averages



Note: Segmentation by rural/ municipal boundaries with one-mile sub-segmentation (top). Continuous one-mile segmentation beginning at west study limits (bottom). Overlapping red segment were used to define study sites.

Table 2. Roadway Segments Exceeding Statewide Crash Rate Statistics in both Segmentation Methods*.

Study Site	Method 1 Segment(s)	Method 2 Segment(s)	Approximate Milepost Location	
			Begin Milepost	End Milepost
1	7	C-1	275.0	275.9
2	13	E-1	280.9	281.9
3	22	G-4	288.9	292.6
	23	G-5		
	24	G-6		
		H-1		
4	29	K-1	296.9	299.9
	30	K-2		
	31	K-3		
		K-4		

*See Section 5.2 of this Report for a map and summary of crashes at these study sites.

5 SAFETY PERFORMANCE HIGHLIGHTED LOCATIONS

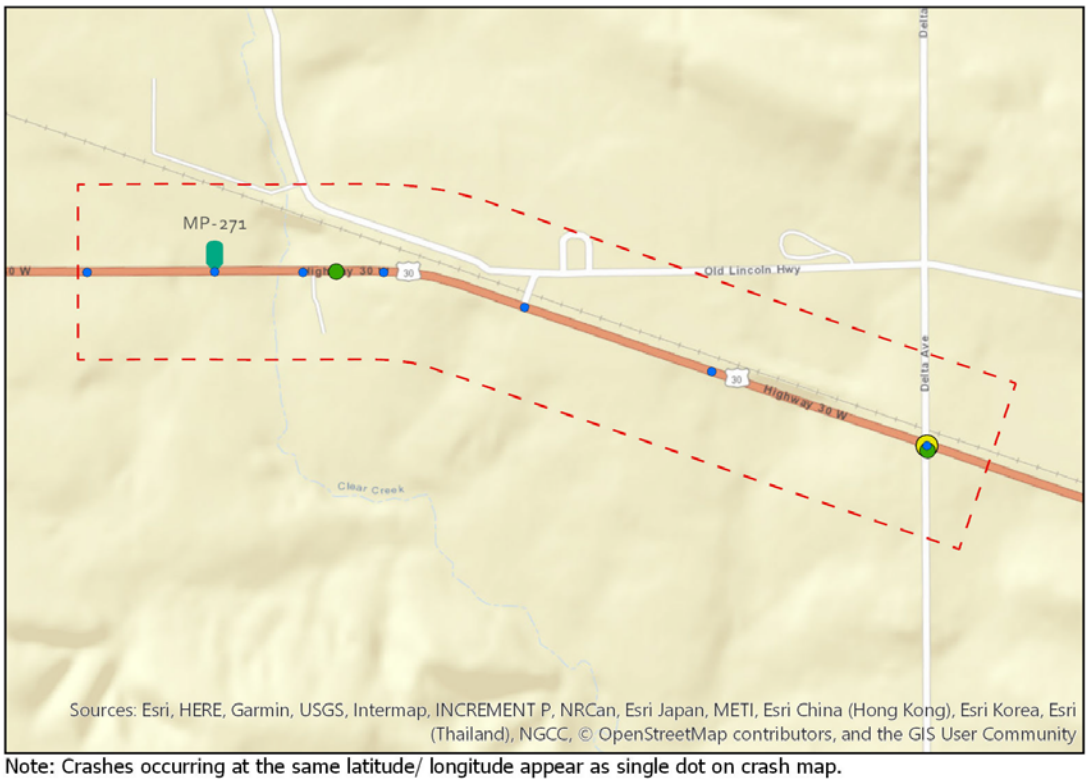
The following summaries provide further details on the locations that experienced the highest frequency and/or crash rates within the safety study corridor between 2013 and 2017.

5.1 FREQUENCY AND SEVERITY

The roadway segments listed in Table 3 were identified in the crash data as having a larger frequency of total and injury crashes compared to other US 30 segments in the Study corridor. However, these segments also have calculated crash rates lower than statewide averages suggesting that fewer crashes actually occurred on them than would be expected compared to other similar roadways across the state. Table 3 also includes a brief summary of the crash data observations at each of the locations and the subsequent maps show how the crashes are distributed over the individual roadway sections.

Table 3. Crash Data Observations at Roadway Segments with High-Frequency of Crashes but Below Statewide Average Crash Rates

Site	Roadway Segment	Crash Data Observations
A	US 30 MP 270.9 to MP 271.9	• 12 total crashes with 4 injury crashes • 4 of the 12 total crashes involved either animal collisions or alcohol • 2 of 3 intersection crashes resulted in injuries • All injury crashes were either minor or possible injury
B	US 30 MP 273.9 to MP 274.9 at Mechanicsville	• 9 total crashes with no injury crashes 6 of the crashes were multi-vehicle and 3 were intersection related • 7 of the 9 crashes occurred between 5:00 AM and 10:00 AM • Stakeholder input identified crashes commonly occur in this area when trains are present on the adjacent UP railroad corridor
C	US 30 MP 279.9 to MP 280.9 at Stanwood	• 10 total crashes of which 2 had possible injuries • 6 of the 10 crashes were intersection related with 3 of them at the IA 38 intersection • 5 of the crashes on this segment occurred in a single year (2013).
D	US 30 MP 283.9 to 284.9 in Clarence	• 6 of 9 total crashes were injury crashes • 3 crashes were intersection related and right angle/broadside collisions
E	US 30 MP 306.9 to MP 307.9 in Grand Mound	• 3 of 10 total crashes were injury crashes • 4 crashes were lane departure crashes • 5 crashes were intersection related • Crashes were spread across the segment, but clusters of crashes occurred on or near the reverse roadway curves in Grand Mound.
F	US 30 MP 308.9 to MP 310.1	• 13 total crashes of which 4 were injury crashes • 2 of the injury crashes involved major injuries • 4 crashes were intersection related, 5 were rear end collisions, and 2 were cross-centerline collisions • Iowa DOT has a current project, planned for 2019 construction to improve the US 30/260th Avenue intersection that includes adding right and left turn lanes along US 30.



Note: Crashes occurring at the same latitude/ longitude appear as single dot on crash map.

Study Site A

US-30 milepost 270.9 to milepost 271.9

Animal-Related Crashes: 3
Alcohol-Related Crashes: 1
Intersection-Related Crashes: 3
Speeding-Related Crashes: 1

Crash Notes:
-2 of 3 intersection-related crashes resulted in minor injry crashes.
-6 crashes (including 2 intersection) occurred in dark unlight conditions.
-5 multivehicle crashes (including 2 crossover crahses).

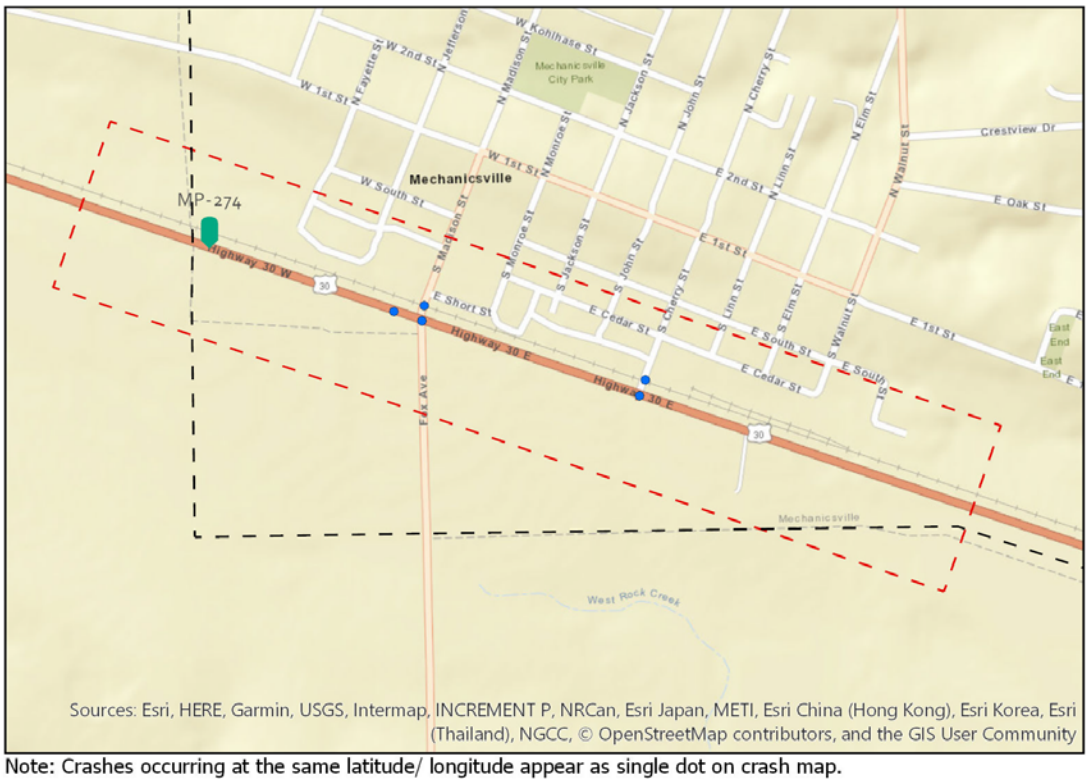
Legend

Crashes by Severity

- Property Damage Only: 8 Crashes
- Possible/Unknown: 2 Crashes
- Minor Injury: 2 Crashes
- Major Injury: 0 Crashes
- Fatality: 0 Crashes
- Mile Posts
- Municipal Boundaries
- Study Site A

N

0 0.05 0.1 0.2 0.3 0.4 Miles



Note: Crashes occurring at the same latitude/ longitude appear as single dot on crash map.

Study Site B

US-30 milepost 273.9 to milepost 274.9

Animal-Related Crashes: 0
Alcohol-Related Crashes: 0
Intersection-Related Crashes: 3
Speeding-Related Crashes: 0

Crash Notes:
-8 Daylight, 1 dark-lighted crashes
-6 multi-vehicle crashes
-5 crashes occurred on Friday or Saturday
- 7 crashes occurred between 5:00 AM and 10:00 AM

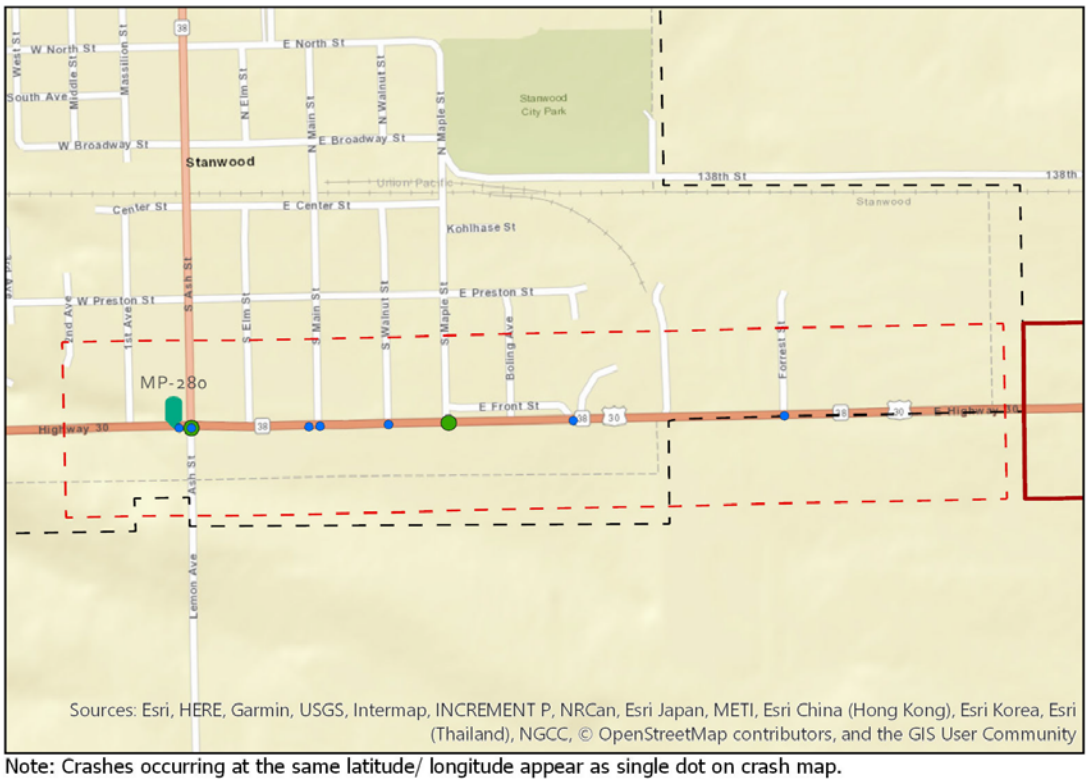
Legend

Crashes by Severity

- Property Damage Only: 9 Crashes
- Possible/Unknown: 0 Crashes
- Minor Injury: 0 Crashes
- Major Injury: 0 Crashes
- Fatality: 0 Crashes
- Mile Posts
- Municipal Boundaries
- Study Site B

N

0 0.05 0.1 0.2 0.3 0.4 Miles



Note: Crashes occurring at the same latitude/ longitude appear as single dot on crash map.

Study Site C

US-30 milepost 279.9 to milepost 280.9

Animal-Related Crashes: 1
Alcohol-Related Crashes: 0
Intersection-Related Crashes: 6
Speeding-Related Crashes: 1

Crash Notes:
-2 Head-on crashes (both PDO)
-3 Intersection-related crashes at Ash Street
-8 Daylight crashes, 1 dusk, and 1 unreported lighting condition
- 5 of 10 crashes occurred in 2013

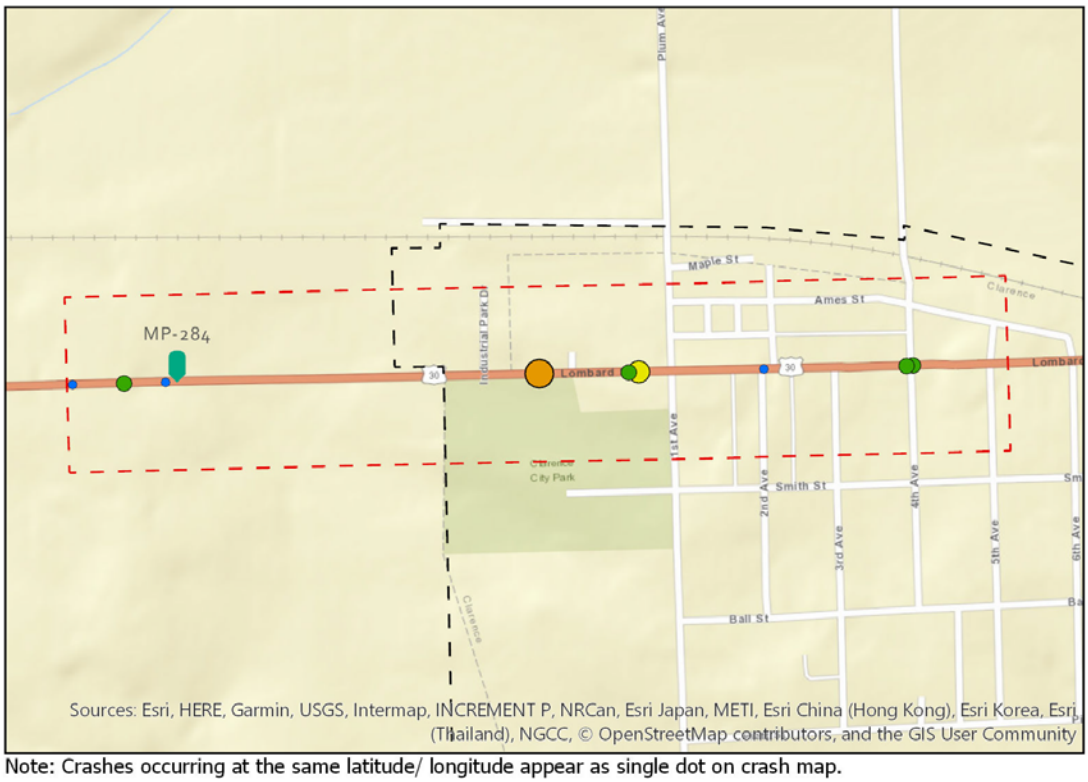
Legend

Crashes by Severity

- Property Damage Only: 8 Crashes
- Possible/Unknown: 2 Crashes
- Minor Injury: 0 Crashes
- Major Injury: 0 Crashes
- Fatality: 0 Crashes
- Mile Posts
- Municipal Boundaries
- Study Site C

N

0 0.05 0.1 0.2 0.3 0.4 Miles



Note: Crashes occurring at the same latitude/ longitude appear as single dot on crash map.

Study Site D

US-30 milepost 283.9 to milepost 284.9

Animal-Related Crashes: 1
Alcohol-Related Crashes: 1
Intersection-Related Crashes: 3
Speeding-Related Crashes: 0

Crash Notes:
-1 Dark-no lighitng crash (PDO)
- The major injury crash involved alcohol and an attmpted left turn resulting in a broad side crash
-There were a total of 3 angle/ oncoming left turn crashes (2 injury 1 PDO)

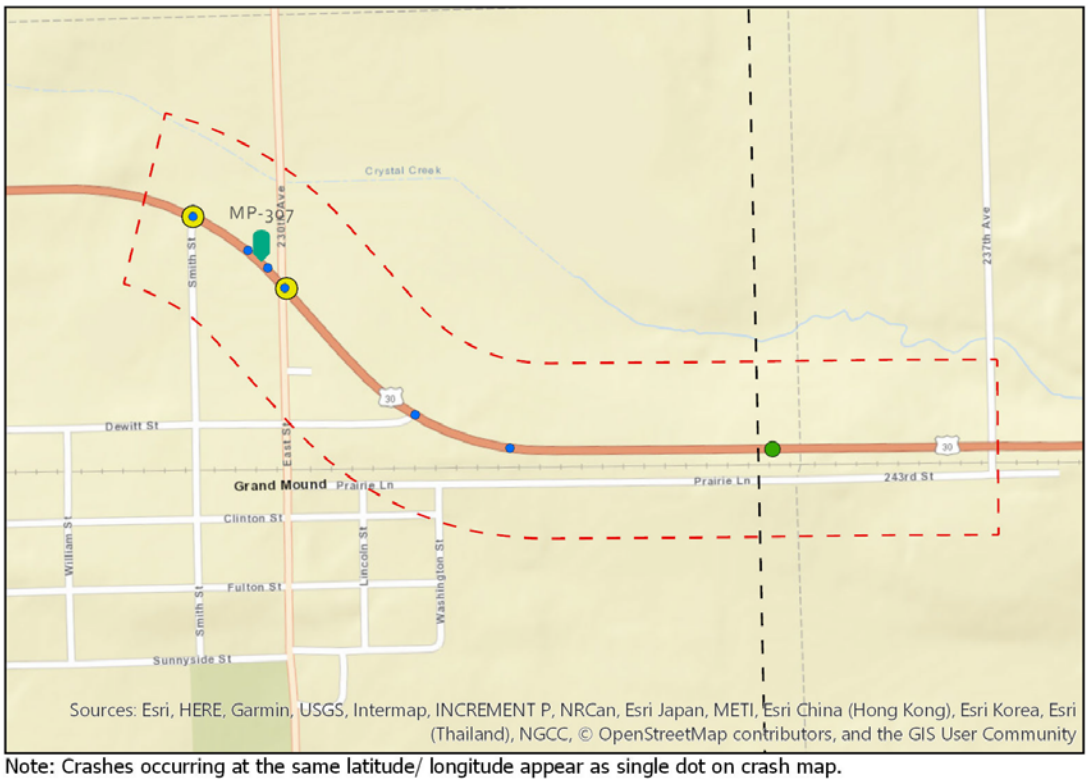
Legend

Crashes by Severity

- Property Damage Only: 3 Crashes
- Possible/Unknown: 4 Crashes
- Minor Injury: 1 Crashes
- Major Injury: 1 Crashes
- Fatality: 0 Crashes
- Mile Posts
- Municipal Boundaries
- Study Site D

N

0 0.05 0.1 0.2 0.3 0.4 Miles



Note: Crashes occurring at the same latitude/ longitude appear as single dot on crash map.

Study Site E

US-30 milepost 306.9 to milepost 307.9

Animal-Related Crashes: 0
Alcohol-Related Crashes: 1
Intersection-Related Crashes: 5
Speeding-Related Crashes: 0

Crash Notes:
-4 crashes were roadway departure (3 to the right and 1 to the left)
-3 crashes invovled vehicles failing to yield right of wway from minor approaches or driveways (1 injury and 2 PDO)
-2 dark- no lighting crashes occurred

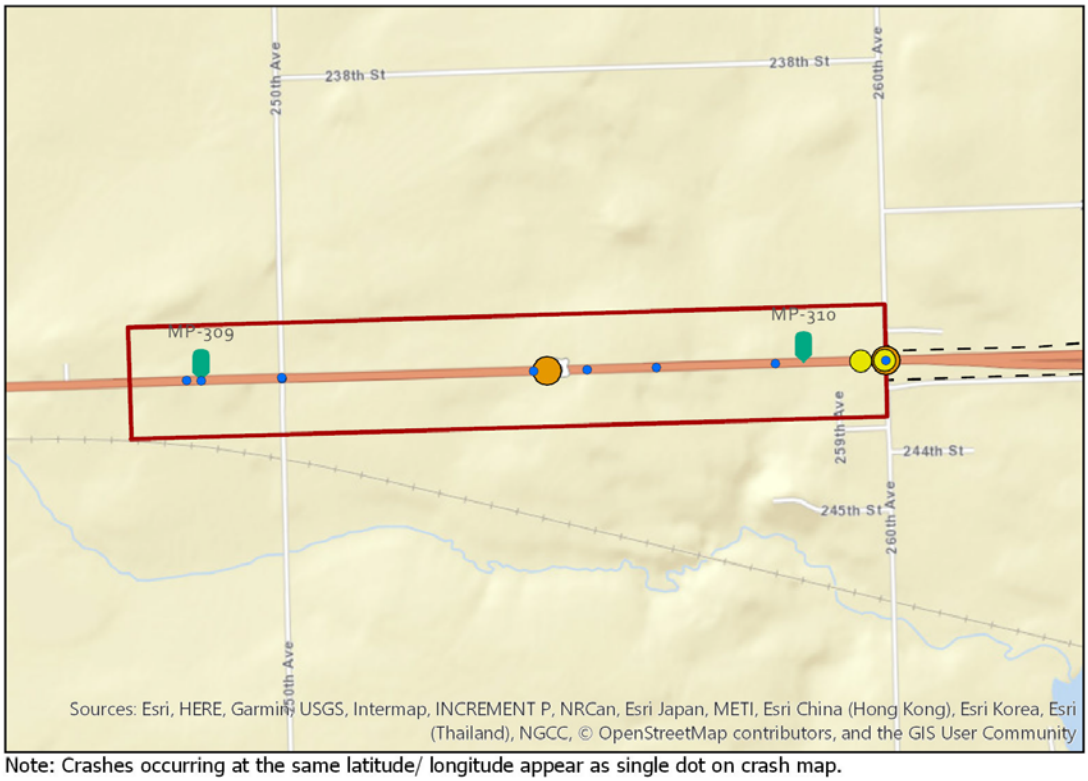
Legend

Crashes by Severity

- Property Damage Only: 7 Crashes
- Possible/Unknown: 1 Crashes
- Minor Injury: 2 Crashes
- Major Injury: 0 Crashes
- Fatality: 0 Crashes
- Mile Posts
- Municipal Boundaries
- Study Site E

N

0 0.05 0.1 0.2 0.3 0.4 Miles



Note: Crashes occurring at the same latitude/ longitude appear as single dot on crash map.

Study Site F

US-30 milepost 308.9 to milepost 310.1

Animal-Related Crashes: 4
Alcohol-Related Crashes: 0
Intersection-Related Crashes: 4
Speeding-Related Crashes: 0

Crash Notes:
-1 intersection crash resulted in a major injury
-4 crashes involved either driver distraction or following too closely
-5 crashes were rear end collisions
-2 crshes were crossover crashes

Legend

Crashes by Severity

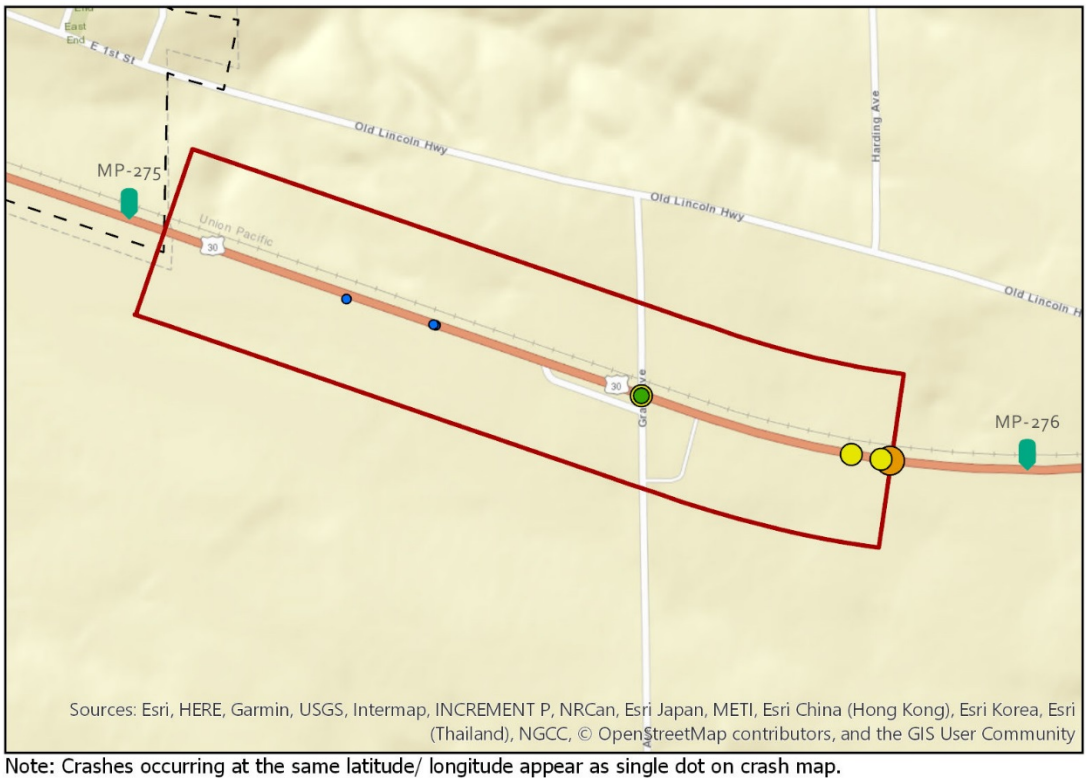
- Property Damage Only: 9 Crashes
- Possible/Unknown: 0 Crashes
- Minor Injury: 2 Crashes
- Major Injury: 2 Crashes
- Fatality: 0 Crashes
- Mile Posts
- Municipal Boundaries
- Study Site F

N

0 0.07 0.15 0.3 0.45 0.6 Miles

5.2 CRASH RATES

The following locations are the roadway segments in the safety study corridor noted as having crash rates greater than statewide averages for both Segmentation Methods 1 and 2 described previously. More crashes occurred on these roadway segments than would be expected when compared to crash trends on similar roadway in Iowa. The maps show how the crashes are distributed over the individual roadway sections with the higher crash rates and a supplemental summary and evaluation of the crash data is also provided for each site.



Note: Crashes occurring at the same latitude/ longitude appear as single dot on crash map.

Study Site 1

US-30 milepost 275.0 to milepost 275.9

Animal-Related Crashes: 3
Alcohol-Related Crashes: 1
Intersection-Related Crashes: 1
Speeding-Related Crashes: 0

Legend

Crashes by Severity

- Property Damage Only: 3 Crashes
- Possible/ Unknown: 1 Crashes
- Minor Injury: 3 Crashes
- Major Injury: 1 Crashes
- Fatality: 0 Crashes
- Mile Posts
- Study Site 1
- Municipal Boundaries

N

0 0.05 0.1 0.2 0.3 0.4 Miles

Study Site 1: Mechanicsville Municipal Limits to Approximately 1,500 Feet East of Grant Avenue (MP 275.0 to MP 275.9)

Critical Crash Data: Fatal and Injury crash rate, 5 or more injury crashes

AADT: 4,700	Length: 0.9 mile

Crashes by Severity		Crashes by Year	
Fatal	0	2013	1
Major Injury	1	2014	2
Minor Injury	3	2015	1
Possible/ Unknown	1	2016	2
Property Damage Only	3	2017	2
Total Crashes	**8**	2018 (preliminary)	0

Animal-Related Crashes	3	Intersection-Related Crashes	1
Alcohol-Related Cashes	1	Speeding-Related Crashes	0

Crash Notes:

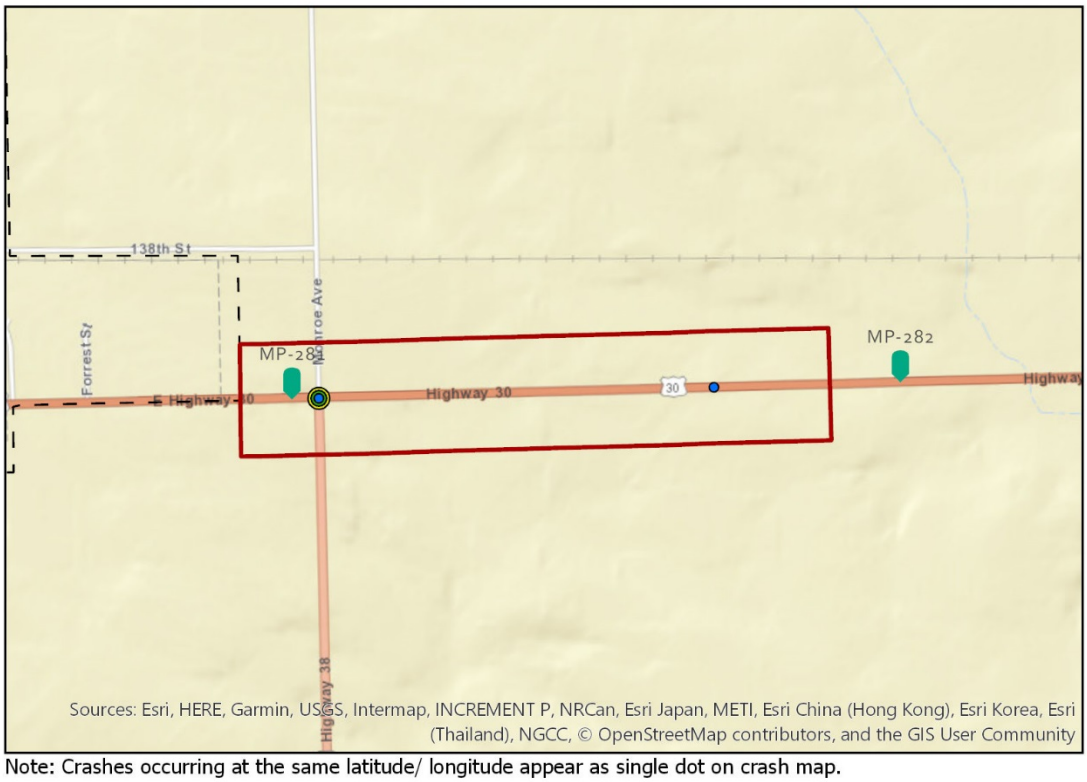
- 4 crashes recorded as "Dark – roadway not lighted"
- 3 crashes involved crossing centerline, 1 head-on, 1 sideswipe opposite direction, one rollover
- 3 crashes occurred at beginning/end of horizontal curve just east of the segment
- Rollover involved a roadway departure left and ended on northside railroad tracks.
- The collision with the ditch occurred on the northwest corner of the Grant Ave. intersection.

Infrastructure Notes:

- Roadway lighting not present at the Grant Ave./US 30 intersection; existing lighting is at Grant Ave. at-grade railroad crossing.
- Roadside north of US 30 may not be traversable at all locations, particularly near Grant Avenue, with steep roadway and railroad embankment slopes.
- Railroad control cabinet obstructs sight lines to the west from Grant Avenue
- Permitted passing in both directions.

Looking west from Grant Avenue SB STOP sign.

US 30 east of Grant Ave. looking east.



Note: Crashes occurring at the same latitude/ longitude appear as single dot on crash map.

Study Site 2

US-30 milepost 280.9 to milepost 281.9

Animal-Related Crashes: 0
Alcohol-Related Crashes: 1
Intersection-Related Crashes: 8
Speeding-Related Crashes: 0

Legend

Crashes by Severity

- Property Damage Only: 6 Crashes
- Possible/ Unknown: 1 Crashes
- Minor Injury: 2 Crashes
- Major Injury: 0 Crashes
- Fatality: 0 Crashes
- Mile Posts
- Study Site 2
- Municipal Boundaries

N

0 0.07 0.15 0.3 0.45 0.6 Miles

Study Segment 2: Stanwood City Limit (east) to 4,400 Feet East of IA 38. (MP 280.9 to MP 281.9)

Critical Crash Data: Fatal and Injury crash rate

AADT: 4,200	Length: 1 mile

Crashes by Severity		Crashes by Year	
Fatal (K)	0	2013	1
Major Injury (A)	0	2014	2
Minor Injury (B)	2	2015	2
Possible/ Unknown (C)	1	2016	2
Property Damage Only (O)	6	2017	1
Total Crashes	**9**	2018 (preliminary)	1
Animal-Related Crashes	0	Intersection-Related Crashes	8
Alcohol-Related Cashes	1	Speeding-Related Crashes	0

Crash Notes:

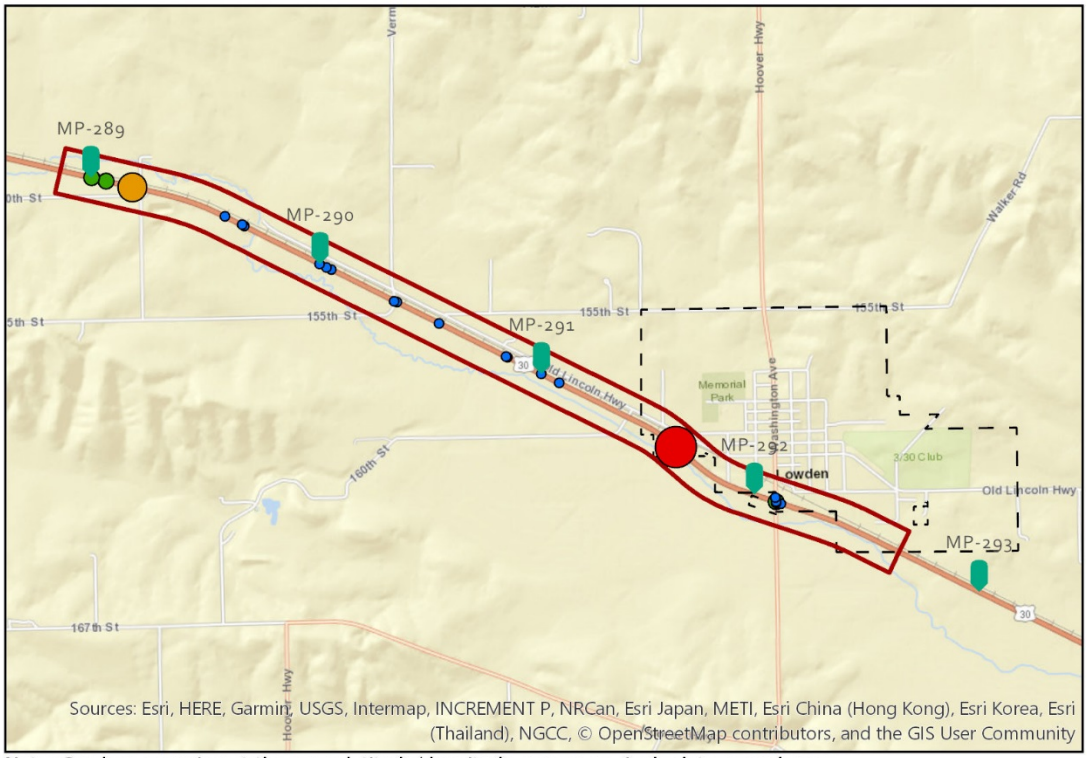
- All non-alcohol-related crashes involved the intersection of US 30 and IA 38.
- 5 Crashes involved failure to yield right of way
  - 4 from IA 38 turning left onto US 30
  - 1 from US 30 turning left onto IA 38
- 5 Crashes occurred between 3:00 PM and 5:00 PM.
- 8 of 9 Crashes involved two vehicles.
- The only single-vehicle crash was alcohol-related and involved a high rate of speed.

Infrastructure Notes:

- North and south legs of IA 38 separated by approx. 1-mile (north leg in Stanwood).
- Approximately 70 percent of traffic from the south leg of the intersection turns left onto US 30.
- Intersection lighting is present.
- Dedicated left-turn, thru, and right-turn lanes on US 30 (both directions) at the intersection.

US 30 looking west from Monroe Ave./IA 38.

South leg of Monroe Ave./IA 38 intersection.



Note: Crashes occurring at the same latitude/ longitude appear as single dot on crash map.

Study Site 3

US-30 milepost 288.9 to milepost 292.6

Animal-Related Crashes: 8
Alcohol-Related Crashes: 2
Intersection-Related Crashes: 7
Speeding-Related Crashes: 0

Legend

Crashes by Severity

- Property Damage Only: 21 Crashes
- Possible/ Unknown: 4 Crashes
- Minor Injury: 0 Crashes
- Major Injury: 1 Crashes
- Fatality: 1 Crashes
- Mile Posts
- Study Site 3
- Municipal Boundaries

N

0 0.2 0.4 0.8 1.2 1.6 Miles

Study Segment 3: 2.6 miles west of western Lowden City limits, to 0.25 miles east of Hoover Highway (MP 288.9 to MP 292.6)			
Critical Crash Data: Fatal crash rate			
AADT: 2,670	Length: 3.8 miles		
Crashes by Severity		**Crashes by Year**	
Fatal (K)	1	2013	7
Major Injury (A)	1	2014	3
Minor Injury (B)	0	2015	4
Possible/ Unknown (C)	4	2016	6
Property Damage Only (O)	21	2017	3
Total Crashes	**27**	2018 (preliminary)	4
Animal-Related Crashes	8	Intersection-Related Crashes	7
Alcohol-Related Cashes	2	Speeding-Related Crashes	0

Crash Notes:

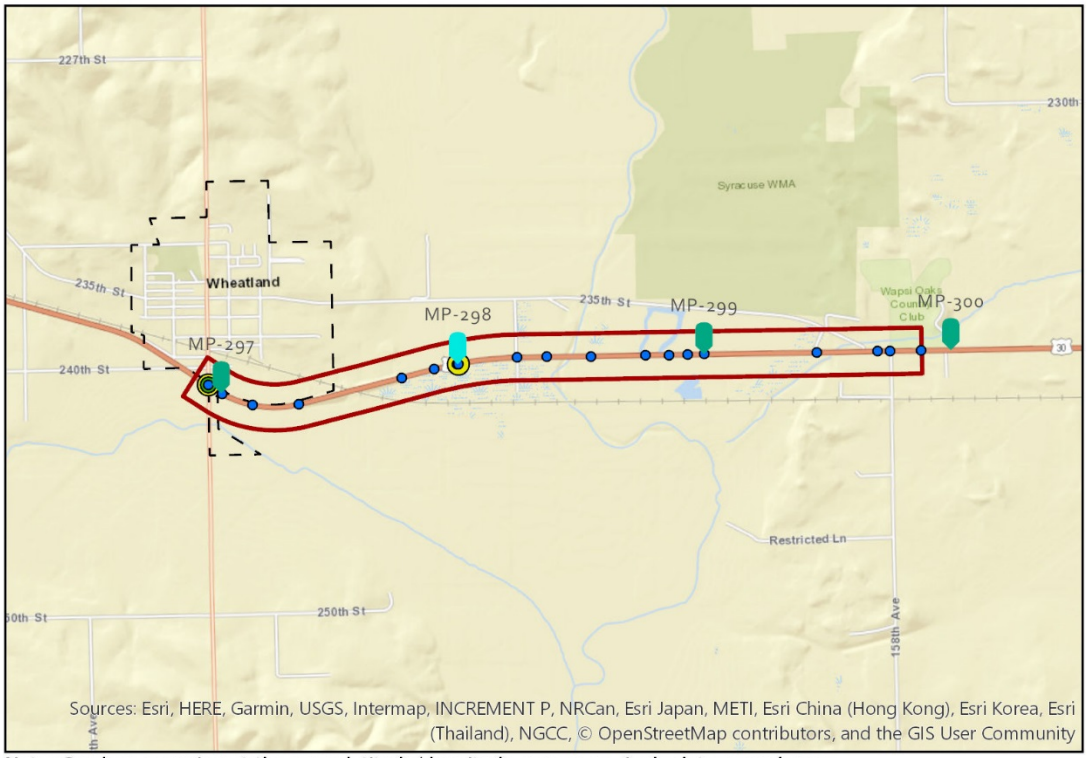
- 4 of 6 injury crashes involved a vehicle crossing the roadway centerline (all four occurred in 2013 and 2014, prior to the rumble strip installation and included the corridor's fatal crash).
- 13 of the crashes occurred during daylight, including all 5 of the injury crashes; 5 crashes occurred at unlit intersections under dark conditions.
- 6 of 7 intersection crashes occurred at US 30/Herbert Hoover Highway intersection in Lowden all of which involved vehicle failing to yield right-of-way from STOP sign.

Infrastructure Notes:

- Dedicated left turn lane with combination thru/right-turn lanes are provided on US 30 at the intersection with Hoover Hwy; two-way STOP control on Herbert Hoover Hwy legs.
- No roadway lighting at the intersection is present.
- US 30 centerline and shoulder rumble strips present east of Hoover Highway intersection.
- 150th Street intersects US 30 at west end of horizonal curve.
- Series of roadway curves through the Lowden area, may impact intersection sight distance at Herbert Hoover Hwy.

US 30 looking east from 150th Avenue.

US 30 near MP 292 looking east towards Herbert Hoover Highway intersection.



Note: Crashes occurring at the same latitude/ longitude appear as single dot on crash map.

Study Site 4

US-30 milepost 296.9 to milepost 299.9

Animal-Related Crashes: 14
Alcohol-Related Crashes: 0
Intersection-Related Crashes: 13
Speeding-Related Crashes: 0

Legend

Crashes by Severity

- Property Damage Only: 29 Crashes
- Possible/ Unknown: 1 Crashes
- Minor Injury: 2 Crashes
- Major Injury: 0 Crashes
- Fatality: 0 Crashes
- Mile Posts
- Study Site 4
- Municipal Boundaries

N

0 0.2 0.4 0.8 1.2 1.6 Miles

Study Segment 4: In Wheatland, 500 feet west of 130th Avenue to approximately 700 feet east of 158th Avenue (MP 296.9 to MP 299.9)			
Critical Crash Data: Total crash rate, more than 10 crashes/mile			
AADT: 3,190	Length: 3.0 miles		
Crashes by Severity		**Crashes by Year**	
Fatal (K)	0	2013	6
Major Injury (A)	0	2014	7
Minor Injury (B)	2	2015	5
Possible/ Unknown (C)	1	2016	1
Property Damage Only (O)	29	2017	9
Total Crashes	**32**	2018 (preliminary)	4
Animal-Related Crashes	14	Intersection-Related Crashes	13
Alcohol-Related Cashes	0	Speeding-Related Crashes	0

Crash Notes:

- 6 crashes involved running of failing to yield right-of-way at 2-way STOP controlled intersections.
- 4 crashes involved following too closely near intersections resulting in rear-end and same direction sideswipe crashes.
- 7 of the 13 intersection-related crashes occurred at US 30 and 130th Ave/County Road Y4E.

Infrastructure Notes:

- 4 two-way minor leg stop-controlled intersections along segment, no roadway lighting present.
- Centerline and shoulders shoulder rumble strips present.
- 4 locations along segment with bridges. Each location tapers shoulders to bridge width guardrails, no crashes related to bridges/narrower shoulders.
- Includes Wapsipinicon River crossings and is adjacent to the Syracuse Wildlife Preserve and Wheatland Wildlife Management Areas.
- Grade separated crossing of the UP railroad with steeper roadway grades.

US 30 looking east from US 30/130th Ave./County Road Y4E intersection.

US 30 looking east from near MP 298.

6 CONCLUSIONS AND NEXT STEPS

Between 2013 and 2017, a total of 205 crashes occurred between roughly the US 30 and Charles Avenue intersection in Cedar County and the intersection of US 30 and 260th Street in Clinton County. Of these, 52 involved injuries including one fatal crash and 7 crashes with major or incapacitating injuries. Review of the various crash attributes, pre-crash actions, and contributing factors identified the following general crash trends in the US 30 PEL Study corridor:

- The most common crash types were multi-vehicle crashes (44 percent of total and 60 percent of injury crashes) and collisions with animals (26 percent of total).
- Crashes along roadway segments were more frequent than at intersections but intersection crashes tended to be more severe.
- Rear-end and broadside crashes were most common among multi-vehicle crashes at intersections.
- Cross-centerline crashes were the most frequent and most severe type of multi-vehicle crash in the corridor. A notable decline in the number of cross-centerline crashes occurred after 2014 over the eastern half of the Study corridor; this decline in the data coincides with construction of centerline and shoulder rumble strips along US 30 east of Clarence.
- Crashes predominately occurred under good weather and pavement surface conditions; 10 percent of the total crashes (seven percent of the injury crashes) occurred with snow and ice conditions while only four percent of the total crashes (11 percent of the injury crashes) occurred during rain and wet pavement conditions (of these, only one crash was reported as having wet conditions as a factor contributing to the crash).
- The time the crashes occurred were distributed throughout the day; the data does not suggest that time of day is a factor contributing to the overall crash trends.
- 19 percent of total crashes (29 percent of injury crashes) occurred during dawn, dusk, or dark conditions.
- 24 percent of total crashes (36 percent of injury crashes) occurred at intersections.
- Failure to yield right-of-way at intersections was the most common cause of intersection-related crashes and combined with cross-centerline crashes accounted for more than half of the injury crashes.
- Frequency of crashes tends to increase in the months of October, November, and December (36 percent of total and 28 percent of injury crashes) which coincides with an increase in animal-related crashes (52 percent of all animal crashes) during those same months.

- Between 13 and 24 percent of the traffic on US 30 is heavy truck traffic; heavy trucks or agricultural equipment were involved in 18 percent of the total crashes (19 percent of injury crashes) and were distributed throughout the calendar year.

- By centerline miles, rural sections of US 30 account for 82 percent of the corridor miles and 67 percent of crashes; municipal sections account for 18 percent of the corridor miles and 33 percent of the crashes.

Four roadway segments were found to have crash rates (fatal crash rate, fatal and injury crash rate, and/or total crash rate) greater than statewide average rates for US highways in rural and municipal areas of Iowa. This does not necessarily indicate a safety problem exists at any of these locations; rather, it simply indicates that more crashes occurred on these sections of roadway than would be typically expected in a 5-year period when compared to crash trends on other similar roadways in Iowa.

The findings of this safety study will be used as one of the data inputs into the development and evaluation of potential improvement alternatives for the US 30 corridor being prepared and considered as part of the overall US 30 PEL Study. How the crash data is applied to the alternatives process and how the potential improvement projects can address and improve safety in the US 30 PEL Study corridor, will be documented as part of a separate PEL report.

APPENDIX A—DISTRIBUTION OF 2013-2017 (AND PARTIAL 2018) CRASHES BY LOCATION

US-30 Study Corridor from Approx. Milepoint 269 to Milepoint 274

US-30 Study Corridor from Approx. Milepoint 274 to Milepoint 279

Legend

Crashes by Severity

- Fatal
- Major Injury
- Minor Injury
- Possible/Unknown
- Property Damage Only
- Mile Posts

N

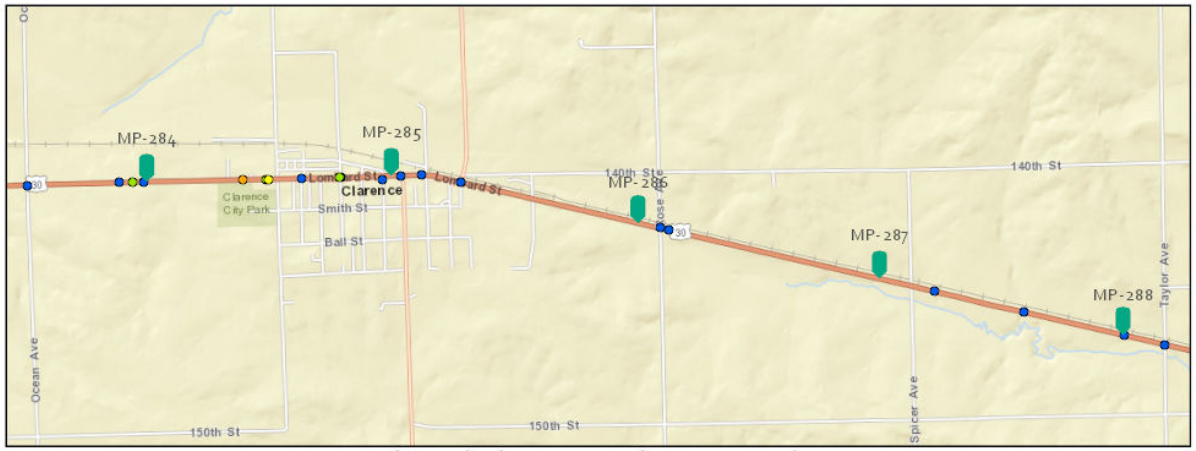
0 0.15 0.3 0.6 Miles

Page 1

Notes:
Crash data are courtesy of Iowa Department of Transportation and encompass 2013 through 2018

Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, © OpenStreetMap contributors, and the GIS User Community

US-30 Study Corridor from Approx. Milepoint 279 to Milepoint 284



US-30 Study Corridor from Approx. Milepoint 284 to Milepoint 288

Legend

Crashes by Severity

- Fatal
- Major Injury
- Minor Injury
- Possible/Unknown
- Property Damage Only
- Mile Posts

N

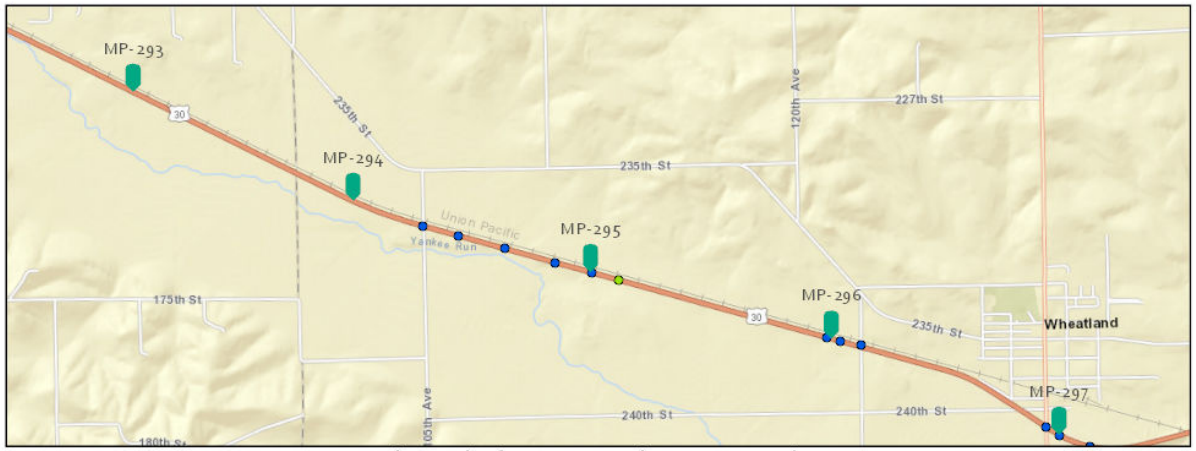
0 0.15 0.3 0.6 Miles

Page 2

Notes:
Crash data are courtesy of Iowa Department of Transportation and encompass 2013 through 2018

Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, © OpenStreetMap contributors, and the GIS User Community

US-30 Study Corridor from Approx. Milepoint 289 to Milepoint 292



US-30 Study Corridor from Approx. Milepoint 293 to Milepoint 297

Legend

Crashes by Severity

- Fatal
- Major Injury
- Minor Injury
- Possible/Unknown
- Property Damage Only
- Mile Posts

N

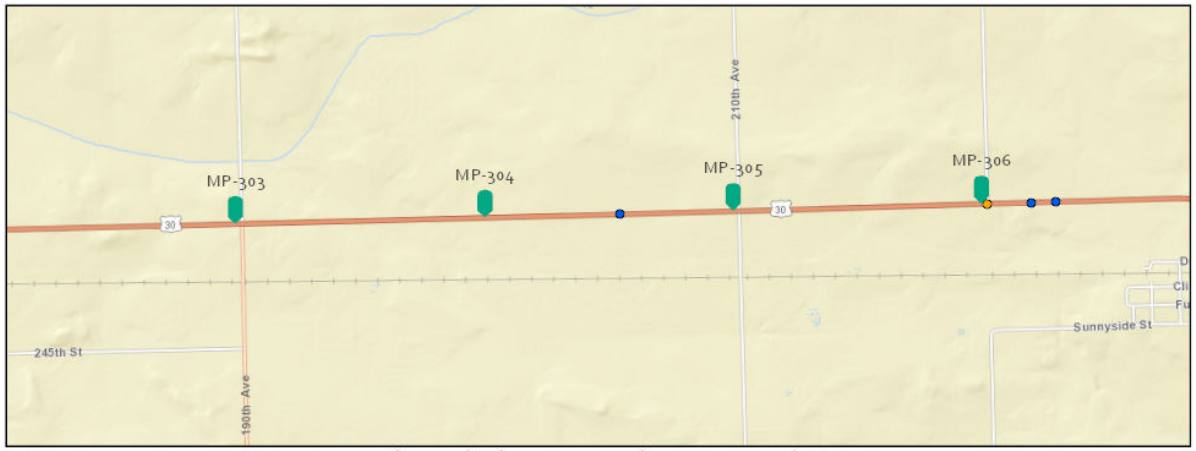
0 0.15 0.3 0.6 Miles

Page 3

Notes:
Crash data are courtesy of Iowa Department of Transportation and encompass 2013 through 2018

Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, © OpenStreetMap contributors, and the GIS User Community

US-30 Study Corridor from Approx. Milepoint 298 to Milepoint 302



US-30 Study Corridor from Approx. Milepoint 302 to Milepoint 307

Legend

Crashes by Severity

- Fatal
- Major Injury
- Minor Injury
- Possible/Unknown
- Property Damage Only
- Mile Posts

N

0 0.15 0.3 0.6 Miles

Page 4

Notes:
Crash data are courtesy of Iowa Department of Transportation and encompass 2013 through 2018

Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, © OpenStreetMap contributors, and the GIS User Community

US-30 Study Corridor from Approx. Milepoint 307 to Milepoint 310

Legend

Crashes by Severity

- Fatal
- Major Injury
- Minor Injury
- Possible/Unknown
- Property Damage Only
- Mile Posts

N

0 0.15 0.3 0.6 Miles

Page 5

Notes:
Crash data are courtesy of Iowa Department of Transportation and encompass 2013 through 2018

Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, © OpenStreetMap contributors, and the GIS User Community

APPENDIX B—CRASH RATE RESULTS FOR CONTINUOUS MILE SEGMENTATION (METHOD 1)

Segment Description			*Crash Counts*							*Crash Rates*			
Segment	AADT	Length (Miles)	Fatal	Major Injury	Minor Injury	Possible/ Unknown Injury	Property Damage Only	Fatal and Injury Crashes	Total Crashes	Fatal Crash Rate	Fatal and Injury Crash Rate	Total Crash Rate	Above State Benchmark
1	5900	1.00	0	0	0	0	6	0	6	0.00	0.00	55.72	No
2	5900	1.00	0	0	0	0	3	0	3	0.00	0.00	27.86	No
3	5900	1.00	0	0	2	2	8	4	12	0.00	37.15	111.45	No
4	5900	1.00	0	0	1	2	3	3	6	0.00	27.86	55.72	No
5	5900	1.00	0	1	0	2	4	3	7	0.00	27.86	65.01	No
6	4977	1.00	0	0	0	0	9	0	9	0.00	0.00	99.09	No
7	4668	1.00	0	1	3	1	5	5	10	0.00	58.69	117.38	Yes
8	4700	1.00	0	0	1	1	2	2	4	0.00	23.32	46.63	No
9	4700	1.00	0	0	1	2	3	3	6	0.00	34.98	69.95	No
10	4700	1.00	0	0	0	0	2	0	2	0.00	0.00	23.32	No
11	4679	1.00	0	0	0	0	2	0	2	0.00	0.00	23.42	No
12	5006	1.00	0	0	0	2	8	2	10	0.00	21.89	109.46	No
13	4207	1.00	0	0	2	1	5	3	8	0.00	39.07	104.20	Yes
14	4030	1.00	0	0	0	1	1	1	2	0.00	13.60	27.19	No
15	4030	1.00	0	0	1	0	2	1	3	0.00	13.60	40.79	No
16	3773	1.00	0	1	1	4	3	6	9	0.00	87.14	130.71	Yes
17	2927	1.00	0	0	0	0	3	0	3	0.00	0.00	56.16	No
18	2670	1.00	0	0	0	0	1	0	1	0.00	0.00	20.52	No
19	2670	1.00	0	0	0	0	2	0	2	0.00	0.00	41.04	No
20	2670	1.00	0	0	0	0	3	0	3	0.00	0.00	61.57	No
21	2670	1.00	0	1	0	2	3	3	6	0.00	61.57	123.13	Yes

Segment Description			*Crash Counts*							*Crash Rates*			
Segment	AADT	Length (Miles)	Fatal	Major Injury	Minor Injury	Possible/ Unknown Injury	Property Damage Only	Fatal and Injury Crashes	Total Crashes	Fatal Crash Rate	Fatal and Injury Crash Rate	Total Crash Rate	Above State Benchmark
22	2670	1.00	0	0	0	0	7	0	7	0.00	0.00	143.66	Yes
23	2643	1.00	1	0	0	0	2	1	3	20.73	20.73	62.20	Yes
24	2273	1.00	0	0	0	2	5	2	7	0.00	48.22	168.76	Yes
25	2211	1.00	0	0	0	0	0	0	0	0.00	0.00	0.00	No
26	2220	1.00	0	0	0	0	4	0	4	0.00	0.00	98.73	No
27	2220	1.00	0	0	0	1	1	1	2	0.00	24.68	49.36	No
28	2205	1.00	0	0	0	0	3	0	3	0.00	0.00	74.55	No
29	2266	1.00	0	0	0	1	7	1	8	0.00	24.18	193.45	Yes
30	2861	1.00	0	0	1	0	11	1	12	0.00	19.15	229.83	Yes
31	3190	1.00	0	0	0	0	8	0	8	0.00	0.00	137.42	Yes
32	3174	1.00	0	0	0	0	2	0	2	0.00	0.00	34.53	No
33	3203	1.00	0	0	0	0	4	0	4	0.00	0.00	68.43	No
34	3300	1.00	0	0	0	0	0	0	0	0.00	0.00	0.00	No
35	3300	1.00	0	0	0	0	0	0	0	0.00	0.00	0.00	No
36	3300	1.00	0	0	0	0	1	0	1	0.00	0.00	16.60	No
37	3300	1.00	0	0	0	0	0	0	0	0.00	0.00	0.00	No
38	3454	1.00	0	1	0	0	2	1	3	0.00	15.86	47.59	No
39	4173	1.00	0	0	2	1	7	3	10	0.00	39.39	131.31	Yes
40	4800	1.00	0	0	0	2	2	2	4	0.00	22.83	45.66	No
41	4800	1.26	0	2	2	0	9	4	13	0.00	36.36	118.16	No

APPENDIX C—CRASH RATE RESULTS FOR RURAL/ MUNICIPAL SEGMENTATION WITH ONE-MILE SUB-SEGMENTATION (METHOD 2)

Segment Description				*Crash Counts*							*Crash Rates*			
Segment	AADT	Length (Miles)	Area Type	Fatal	Major Injury	Minor Injury	Possible/ Unknown Injury	Property Damage Only	Fatal and Injury Crashes	Total Crashes	Fatal Crash Rate	Fatal and Injury Crash Rate (KABC)	Total Crash Rate	Above State Benchmark
A-1	5900	1.00	Rural	0	0	0	0	6	0	6	0.00	0.00	55.72	No
A-2	5900	1.00	Rural	0	0	0	0	3	0	3	0.00	0.00	27.86	No
A-3	5900	1.00	Rural	0	0	2	2	8	4	12	0.00	37.15	111.45	Yes
A-4	5900	1.00	Rural	0	0	1	2	3	3	6	0.00	27.86	55.72	No
A-5	5900	1.13	Rural	0	1	0	2	4	3	7	0.00	24.74	57.73	No
B-1	4789	1.06	Urban	0	0	0	0	11	0	11	0.00	0.00	118.32	No
C-1	4700	1.00	Rural	0	1	4	1	3	6	9	0.00	69.95	104.93	Yes
C-2	4700	1.06	Rural	0	0	1	3	2	4	6	0.00	44.02	66.04	Yes
C-3	4700	1.00	Rural	0	0	0	0	4	0	4	0.00	0.00	46.63	No
C-4	4700	1.38	Rural	0	0	0	0	3	0	3	0.00	0.00	25.43	No
D-1	4911	1.40	Urban	0	0	0	2	8	2	10	0.00	15.97	79.83	Yes
E-1	4183	1.00	Rural	0	0	2	1	5	3	8	0.00	39.30	104.79	Yes
E-2	4030	1.00	Rural	0	0	0	1	1	1	2	0.00	13.60	27.19	No
E-3	4030	1.38	Rural	0	0	1	1	4	2	6	0.00	19.71	59.12	No
F-1	3306	1.28	Urban	0	1	1	3	4	5	9	0.00	64.63	116.34	No
G-1	2670	1.00	Rural	0	0	0	0	1	0	1	0.00	0.00	20.52	No
G-2	2670	1.00	Rural	0	0	0	0	1	0	1	0.00	0.00	20.52	No
G-3	2670	1.00	Rural	0	0	0	0	4	0	4	0.00	0.00	82.09	Yes

Segment Description				*Crash Counts*							*Crash Rates*			
Segment	AADT	Length (Miles)	Area Type	Fatal	Major Injury	Minor Injury	Possible/ Unknown Injury	Property Damage Only	Fatal and Injury Crashes	Total Crashes	Fatal Crash Rate	Fatal and Injury Crash Rate (KABC)	Total Crash Rate	Above State Benchmark
G-4	2670	1.00	Rural	0	1	0	2	0	3	3	0.00	61.57	61.57	Yes
G-5	2670	1.00	Rural	0	0	0	0	9	0	9	0.00	0.00	184.70	Yes
G-6	2670	0.90	Rural	0	0	0	0	3	0	3	0.00	0.00	68.50	No
H-1	2404	1.18	Urban	1	0	0	2	5	3	8	19.37	58.10	154.94	Yes
I-1	2210	1.00	Rural	0	0	0	0	0	0	0	0.00	0.00	0.00	No
I-2	2219	1.00	Rural	0	0	0	0	3	0	3	0.00	0.00	74.08	No
I-3	2220	1.00	Rural	0	0	0	1	2	1	3	0.00	24.68	74.05	Yes
I-4	2213	1.09	Rural	0	0	0	0	3	0	3	0.00	0.00	68.27	No
K-1	2251	1.00	Rural	0	0	0	1	6	1	7	0.00	24.34	170.40	Yes
K-2	2719	1.00	Rural	0	0	1	0	10	1	11	0.00	20.15	221.68	Yes
K-3	3190	1.00	Rural	0	0	0	0	6	0	6	0.00	0.00	103.06	Yes
K-4	3190	1.03	Rural	0	0	0	0	6	0	6	0.00	0.00	99.59	Yes
L-1	3133	0.75	Urban	0	0	0	0	4	0	4	0.00	0.00	93.00	No
M-1	3300	1.00	Rural	0	0	0	0	0	0	0	0.00	0.00	0.00	No
M-2	3300	1.00	Rural	0	0	0	0	0	0	0	0.00	0.00	0.00	No
M-3	3300	1.00	Rural	0	0	0	0	0	0	0	0.00	0.00	0.00	No
M-4	3300	1.51	Rural	0	1	0	0	1	1	2	0.00	10.98	21.96	No
N-1	3703	1.60	Urban	0	0	2	0	9	2	11	0.00	18.49	101.71	No
O-1	4800	1.00	Rural	0	0	0	2	2	2	4	0.00	22.83	45.66	Yes
O-3	4800	1.51	Rural	0	2	2	1	9	5	14	0.00	37.78	105.77	Yes