Appendices

Appendix A:
Detailed Safety Assessments

Appendix A1: Existing Safety Analysis and Crash Risk Assessment for EWG Region

As part of the *Gateway to Safer Roadways: St. Louis Regional Safety Action Plan* (Action Plan), a thorough analysis of transportation safety within the East-West Gateway Council of Governments (EWG) Region was conducted using data spanning the years 2018 to 2022.

Crash data from 2018 to 2022 was gathered as part of this Action Plan and contained all crashes in the EWG Region, which includes the City of St. Louis, Franklin, Jefferson, St. Charles, and St. Louis counties in Missouri, as well as Madison, Monroe, and St. Clair counties in Illinois. The Missouri crash data was obtained from the Missouri Department of Transportation's (MoDOT's) Transportation Management Systems (TMS), and the Illinois crash data was provided by the Illinois Department of Transportation's (IDOT's) Transportation Safety Department.

The data includes all crashes occurring on public roadways that involve a fatality, injury, or property damage. Severity ratings are assigned by the responsible agencies based on the presence and significance of an injury resulting from the crash. Crash severity ratings are listed and defined below:

- Fatal – any injury that results in death within 30 days after the motor vehicle crash in which the injury occurred.
- Serious Injury – any injury other than fatal which prevents the person from walking, driving or normally continuing the activities the person could perform before the injury occurred, such as severe lacerations, broken or distorted extremity, crush injuries, suspected skull, chest, or abdominal injuries other than bruises or minor lacerations, significant burns, unconsciousness when taken from the crash scene, or paralysis.
- Minor Injury – any injury that is evident at the scene or reported or claimed that is not fatal or serious.
- Property Damage Only – when there is no apparent injury or when there is no reason to believe an injury occurred and when property damage of $500 or more for Missouri or $1,500 or more in Illinois occurred.

Crash Data: The analysis used comprehensive crash, person, and vehicle datasets sourced from MoDOT and IDOT. The crash data included information crucial to each crash, including the time and date of the crash, crash type, location, contributing factors, and lighting and weather conditions. Notably, each crash is given a unique identifier (crash ID) which is also linked to occupant and vehicle data. Occupant data within the dataset includes details about individuals involved in the crashes, including their gender, age, and the

severity of injuries sustained, with stringent measures undertaken by both agencies to scrub the data of any personally identifiable information. Additionally, the vehicle data offers valuable insights into the involved vehicle types, the use and functionality of safety devices, airbag deployment, and type of fixed objects struck by each vehicle during the crash.

Vehicle Miles Traveled (VMT): The Vehicle Miles Traveled (VMT) data, essential for understanding regional travel patterns and demand, was obtained from EWG. Covering the period from 2018 to 2022, this dataset includes VMT for each county within the EWG Region as well as aggregate regional data. The VMT data was provided in daily vehicle miles traveled format but was converted to annual vehicle miles traveled for these evaluations to be consistent with the crash data, which was summarized for each year. The VMT metric was used to compare the total number of crashes to VMT for each year to understand the correlation between the number of crashes and vehicle exposure.

Population Data: To correlate crash data with demographic trends, population estimates were sourced from EWG, based on U.S. Census Bureau data for the year 2020. Since the U.S. Census data was collected in 2020 and also aligns with the middle of the evaluation period, the 2020 population data was used for this analysis.

Equity Data: The information on disadvantaged communities was sourced from the Climate and Economic Justice Screening Tool (CEJST), a specialized tool designed to pinpoint these communities by evaluating burdens across various domains such as climate change, energy, health, housing, legacy pollution, transportation, water and wastewater, and workforce development. Within the CEJST framework, disadvantaged areas are delineated as census tracts that bear disproportionate burdens and lack adequate support concerning these environmental and economic challenges.

The data collection and processing efforts detailed above are foundational to the Action Plan. They enable a data-driven approach to understanding the dynamics of transportation safety and formulating strategies to mitigate risks and enhance safety across the EWG Region. This methodical approach ensures that the analyses are grounded in reliable data, facilitating informed decision-making in regional transportation planning and safety management.

Existing Crash Summary – EWG Region

Between 2018 and 2022, 348,528 crashes were reported in the EWG Region. **Figure 1** reports the total number of crashes across the eight counties, highlighting a particularly high frequency in St. Louis County and the City of St. Louis. St. Louis County stands out with the highest number of crashes, amounting to 142,293, which is significantly higher than any other county listed. The City of St. Louis follows with a total of 73,409 crashes. These two counties represent roughly 62% of the total crashes reported in the EWG Region. The other counties have notably lower figures: St. Charles with 39,627; St. Clair with 28,554; Franklin with 12,637; Madison with 27,240; Jefferson with 23,000; and Monroe with 2,768 crashes.

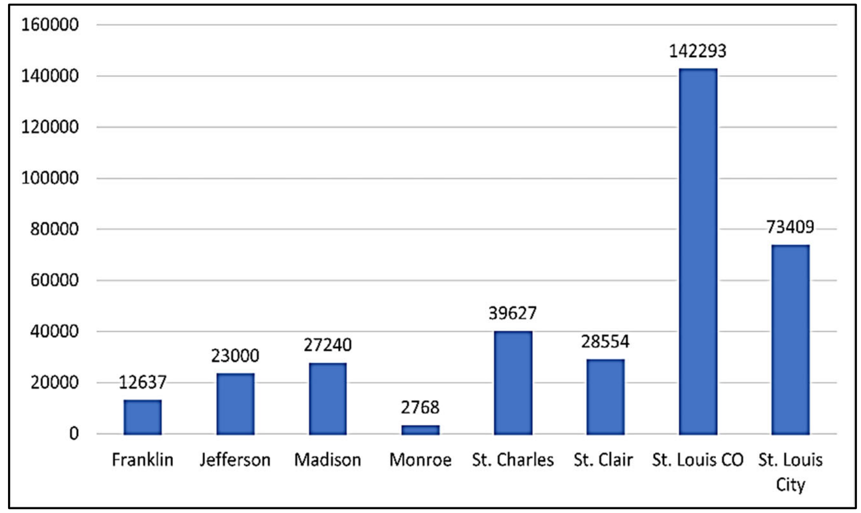


Figure 1: Total Crashes in EWG Region (2018-2022)

Figure 2 focuses on fatal and serious injury crashes only. Again, St. Louis County and City have the highest numbers of fatal and serious injury crashes in the EWG Region. The fatal crashes are represented by the orange bars and the serious injury crashes are the yellow bars. Between 2018 and 2022, 9,576 fatal and serious injury crashes were reported in the EWG Region. Like the total crashes, St. Louis County has the highest reported number of both serious injury crashes (2,506) and fatal crashes (415). The City of St. Louis also reports a significant number of serious injuries (1,552) and fatalities (315). The other counties have considerably fewer incidents: St. Clair reports 1,131 serious injuries and 172 fatalities; Madison shows 999 serious injuries and 160 fatalities; Jefferson has 672 serious injuries and 176 fatalities; St. Charles has 681 serious injuries and 156 fatalities; Franklin with 433 serious injuries and 101 fatalities; and Monroe has the fewest with 90 serious injuries and 17 fatalities.

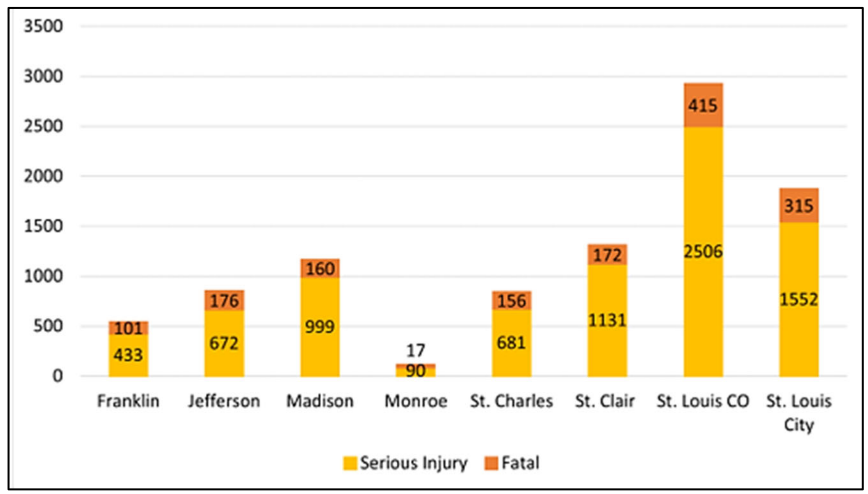


Figure 2 : Fatal and Serious Injury Crashes in EWG Region (2018-2022)

Trend Analysis – Crashes and Population

Figure 3 shows the total number of crashes per 100,000 residents in the different counties from 2018 to 2022, with a regional average of 2,686 total crashes per 100,000 residents per year. In this figure, the City of St. Louis is notably higher than the regional average and other counties, indicating a disproportionately high number of crashes relative to its population size. Other counties, while varying in their crash numbers, are distributed below or near this regional average.

Figure 4 offers a closer look at the fatal and serious injury crashes per 100,000 residents per year for the same counties and time period, with a regional average of around 74 crashes per year per 100,000 residents. The City of St. Louis, Franklin, Jefferson, Madison, and St. Clair counties have higher than average fatal and serious injury crashes per capita than the region average.

The data shows that high-severity crashes in these counties are more frequent than other counties in the EWG Region when normalized for population. This contrast with other counties could imply various risk factors at play within The City of St. Louis, such as urban density, traffic conditions, driving behavior, and socio-economic factors that contribute to the severity of crashes.

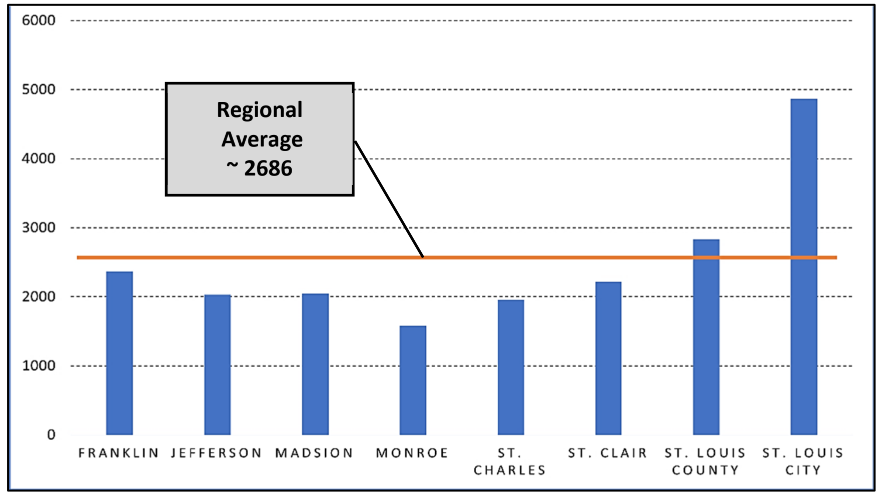


Figure 3: Total Crashes Per 100,000 Residents Per Year (2018-2022)

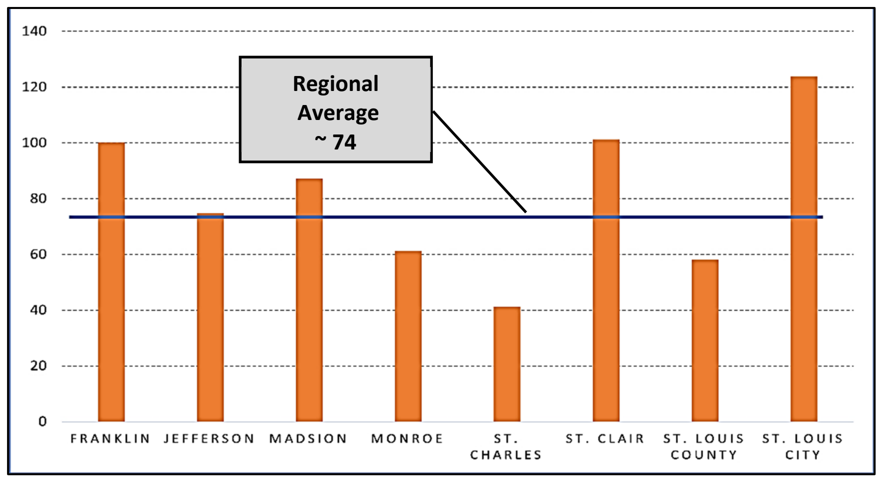


Figure 4: Fatal and Serious Injury Crashes Per 100,000 Residents Per Year (2018-2022)

Trend Analysis – Crashes and VMT

The annual total crashes per 100 million Vehicle Miles Traveled (VMT) across the various counties are shown with the regional average set at about 239 total crashes per 100 million VMT is shown in **Figure 5**. In comparison to the Region, The City of St. Louis shows a significantly higher crash rate, markedly exceeding the regional average. The other counties have lower crash rates, with most aligning more closely to the regional average. **Figure 6** focuses on the annual fatal and serious injury crashes per 100 Million VMT, with the regional average being 6.57 fatal and serious injury crashes per 100 million VMT. Here again, the City of St. Louis stands out with a rate that substantially surpasses the regional average, indicating a greater severity of crashes. The other counties have rates that hover around or below the regional average, signifying fewer fatal and serious injury crashes per 100 million VMT in comparison to the City of St. Louis.

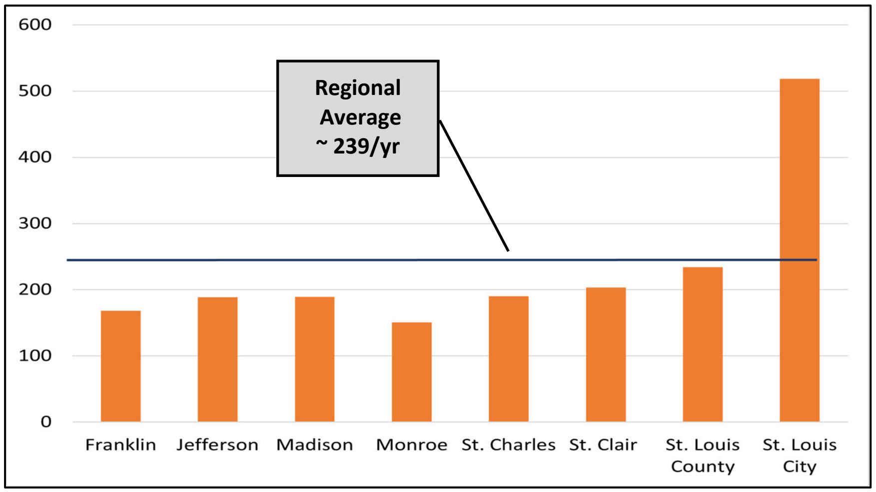


Figure 5: Annual Total Crashes per 100 million Vehicle Miles Traveled (VMT)

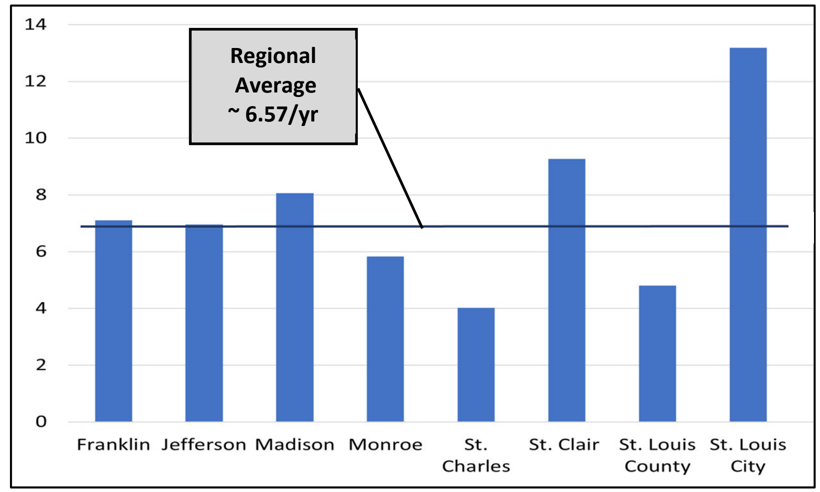


Figure 6: Annual Fatal and Serious Injury Crashes Per 100 million Vehicle Miles Traveled (VMT)

Trend Analysis – Fatal Crashes

Figure 7 demonstrates the yearly trends in fatal crashes in the EWG Region. The regional five-year average of fatal crashes is 302 crashes per year. The earlier years of 2018 and 2019 were below the regional average, pointing to a change in trend starting from 2020 onwards. In the years 2020, 2021, and 2022, the number of fatal crashes in the EWG Region each year surpassed the five-year regional average of 302 fatal crashes per year. This represents an upward trend over these three years, indicating an increasing number of fatal crashes. In 2020, the increase begins to be noticeable, continuing into 2022.

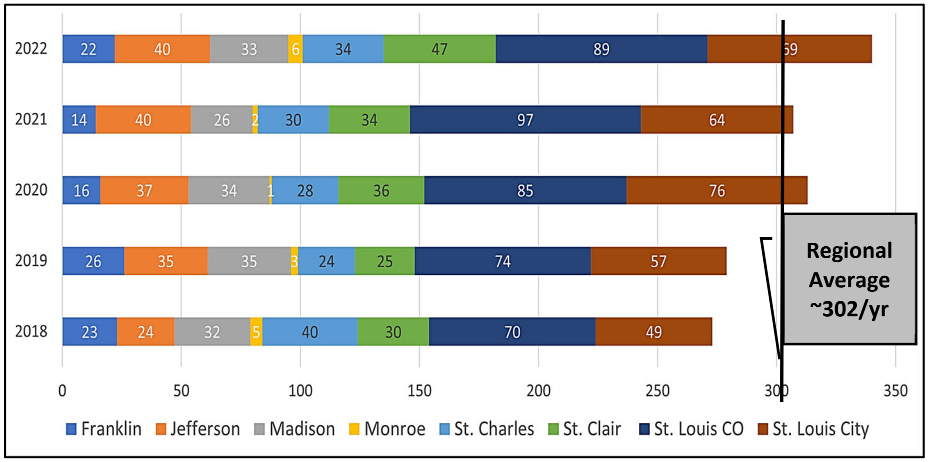


Figure 7: Fatal Crashes in EWG Region by Year and County (2018-2022)

St. Louis Compared to Other Regions: EWG publishes "Where We Stand, The Strategic Assessment of the St. Louis Region" to compare St. Louis to similar regions. One measure tracked through the program is motor vehicle crash fatalities per VMT (deaths per 100 million vehicle miles traveled). For comparison, the most recent available data was analyzed for the years 2018 to 2021. The St. Louis Metropolitan Statistical Area (MSA)[1] had a fatal crash rate per 100 million VMT ranging from 0.81 to 1.06, while the average among the fifty most populous MSAs had a fatal crash rate of 0.80 to 1.04. **Figure 8** compares St. Louis's fatality rate to the average among the 50 most populous MSAs and peer cities Kansas City and Chicago.

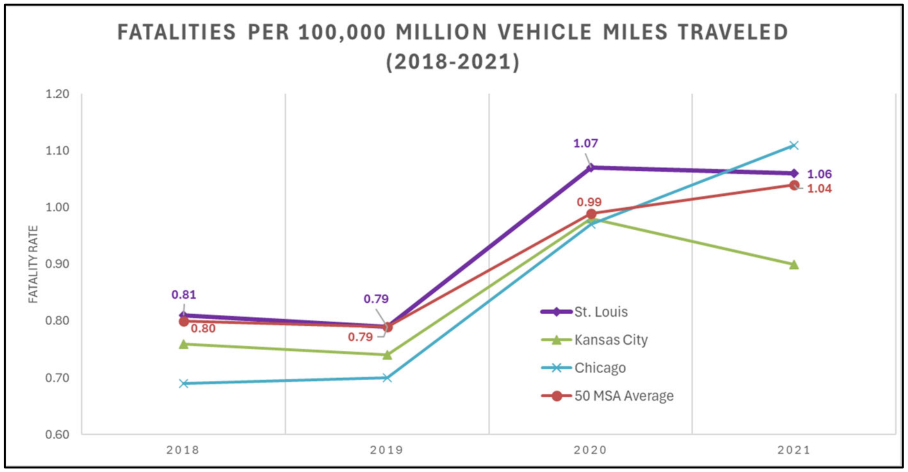


Figure 8: Comparison of Fatality Rate to Other Peer Regions

Generally, St. Louis's fatality rate has followed the average trend except in 2020, when it surpassed the average. Chicago and Kansas City were below the average prior to 2020 but converged on the average in 2020. In 2021, St. Louis dropped back to near the average while Chicago increased and Kansas City decreased.

[1] The St. Louis MSA includes the City of St. Louis; the Illinois counties of Bond, Calhoun, Clinton, Jersey, Macoupin, Madison, Monroe, and St. Clair (known collectively as the Metro East); and the Missouri counties of Crawford (only the City of Sullivan), Franklin, Jefferson, Lincoln, St. Charles, St. Louis (separate from and not inclusive of the city of St. Louis), and Warren

Trend Analysis – Serious Injury Crashes

Figure 9 demonstrates the yearly trends in serious injury crashes in the Region. For serious injury crashes, there's a more pronounced variance year to year. Notably, 2021 stands out with the highest number of serious injury crashes, exceeding the five-year regional average of 1,612 serious injury crashes per year. This trend continues into 2022, with serious injury crashes remaining above the average, although not as high as in 2021. The data suggests a sustained increase in serious injuries in the most recent years of the period studied. This spike contrasts with other years such as 2018 and 2019, which are closer to or below the regional average. The year 2020 had the lowest number of serious injury crashes, falling well below the regional average. The EWG Region saw a concerning increase in both fatal and serious injury crashes above the five-year average during 2020-2022, with a peak in 2021 for serious injuries and a consistent rise in fatalities over the same period.

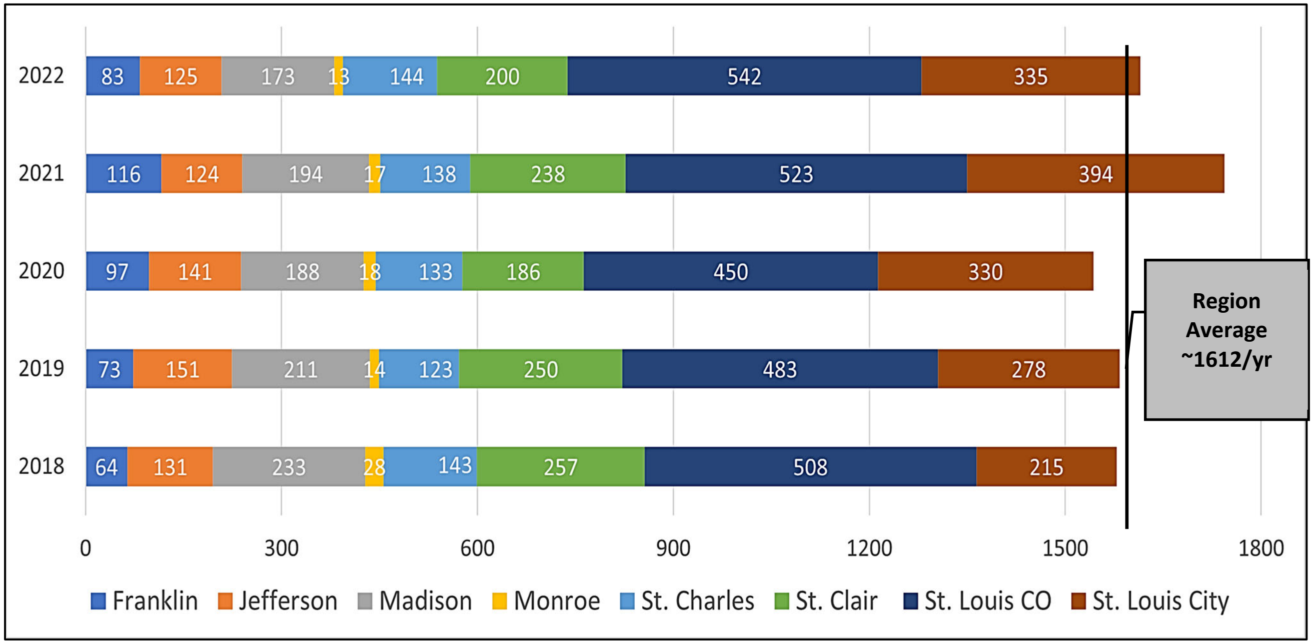


Figure 9: Serious Injury Crashes in EWG Region by Year and County (2018-2022)

CRASH RISK ASSESSMENT – EWG REGION

What are the Contributing Factors of Fatal and Serious Crashes?

When investigating the contributing circumstances of fatal and serious injury crashes, speeding emerges as the leading cause, with 30% of crashes indicating that driving at excessive speeds is a significant hazard. The second most frequent contributing factor is the failure to yield the right-of-way, accounting for 19% of crashes. This is followed by improper lane usage, which contributes to 16% of incidents. The use of alcohol or drugs is the fourth leading cause, involved in 11% of cases. Rounding out the top five factors are driver distraction and disregard for signs or signals, each accounting for 9% of crashes. The physical condition of the driver, including potentially medical or fatigue-related impairments, was a factor in 5% of incidents. Following too closely, an indicator of aggressive or inattentive driving, and driving the wrong way both contributed to 4% of crashes. Situations where drivers overcorrected their steering caused 3% of crashes. It should be noted that a single crash may involve multiple contributing factors, such as speeding, alcohol use, and disregarding signs or signals, simultaneously.

This breakdown underscores the varied nature of risk factors in severe roadway crashes, with the top five factors demonstrating the critical importance of responsible driving behavior, such as observing speed limits, yielding when required, staying within lanes, avoiding substance use, and following signs/signals on the road. The remaining factors highlight the need for further attention to driver condition, adherence to road rules, and safe driving practices to reduce the number of fatal and serious injury crashes. **Figure 10** shows the top contributing factors in fatal and serious injury crashes.

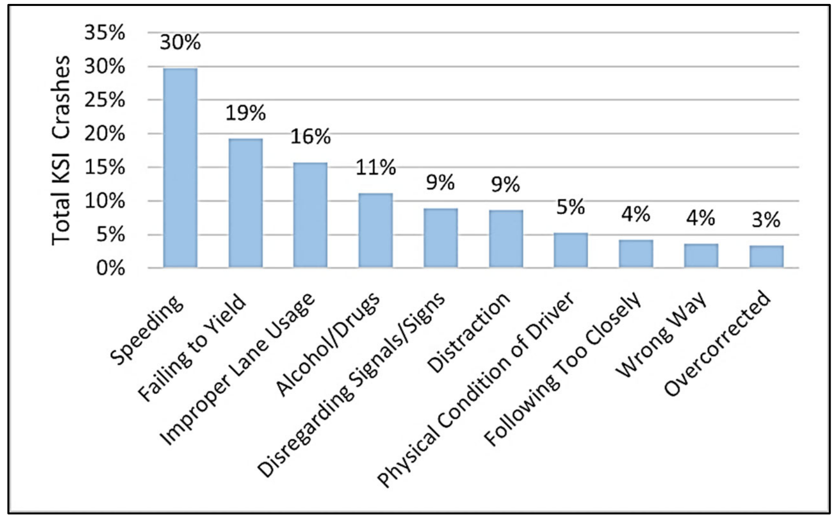


Figure 10: Top 10 Contributing Factors of Fatal and Serious Injury Crashes in the EWG Region (2018-2022)

What is the Age of Those Involved in Fatal and Serious Crashes?

To identify what age groups are more likely to be involved in fatal and serious injury crashes, the crash data was categorized into age groups based on the methodology used by the National Highway Traffic Safety Administration (NHTSA). This methodology includes those under 16 years old as a group, those older than 65 years old as a group and then groups for every five-year increments in-between.

The bar chart in **Figure 11** depicts the age distribution of persons involved in fatal and serious injury crashes in the EWG Region from 2018 to 2022, encompassing drivers, pedestrians, and bicyclists. The most prominent age group involved in fatal and serious injury crashes is the 26-30 bracket, followed closely by the 21-25 group. Both of these categories represent young adults, who appear to be at a higher risk or involved in more severe crashes compared to other age groups. Despite the consolidation in 'Over 65' age group, this group reflects a smaller number of fatal and serious injury crash involvements compared to the younger age categories.

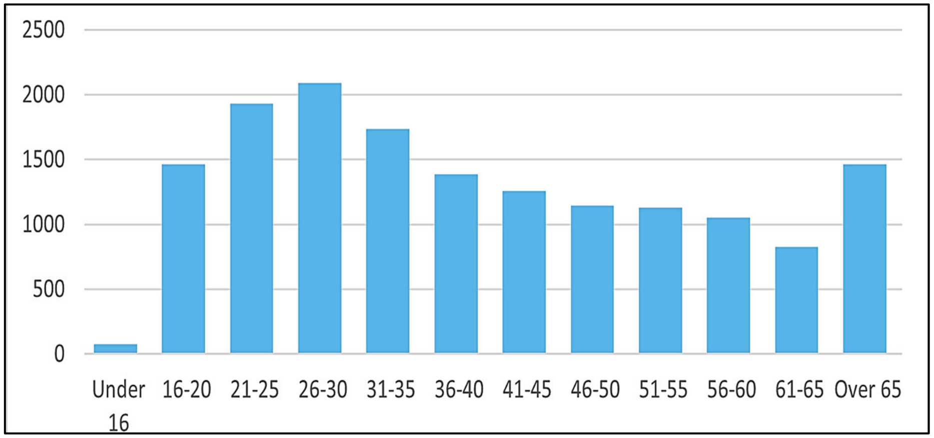


Figure 11: Age Distribution of Persons Involved in Fatal and Serious Injury Crashes in the EWG Region (2018-2022)

When do Fatal and Serious Crashes Occur?

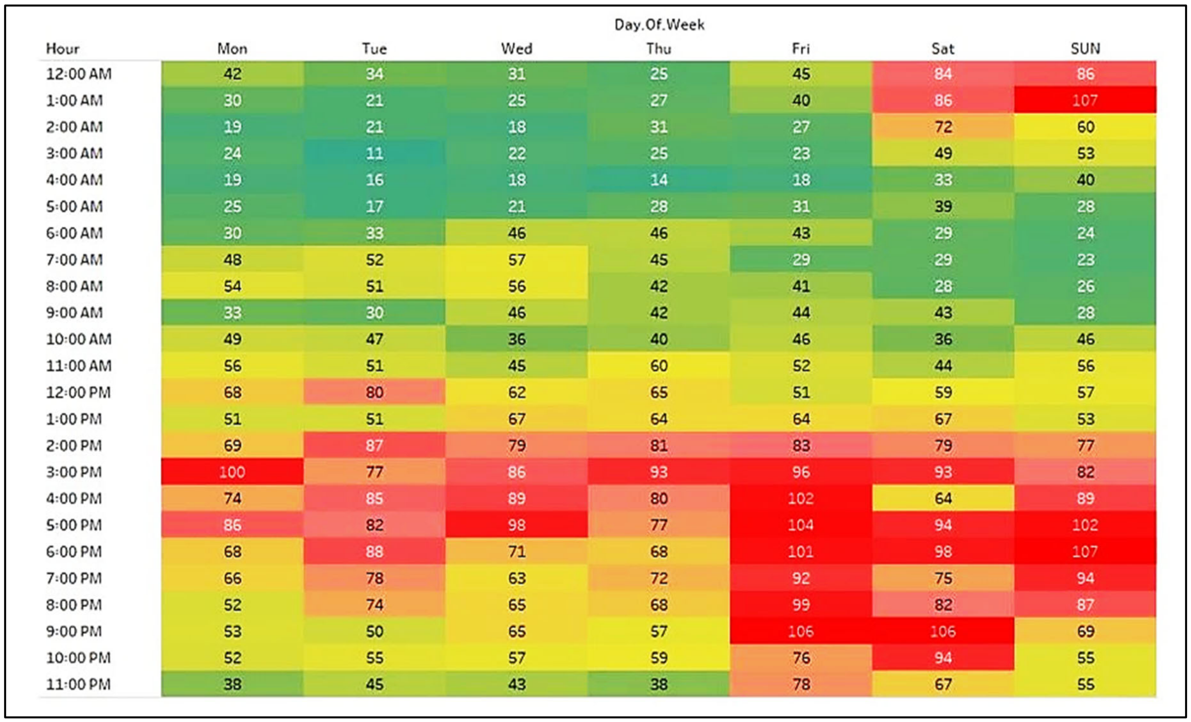
The heatmap provided in **Figure 12** shows fatal and serious injury crashes by month and day of the week in the EWG Region from 2018 to 2022. In the figure, red colors indicate higher frequencies of crashes while the green colors represent a lower frequency of crashes. A noticeable pattern emerges from the data: weekends, particularly Friday through Sunday, are more prone to severe crashes, with the highest number of crashes observed on Saturdays in September (172 crashes). Summer months display a peak in fatal and serious injury crashes, while cooler months like January and February resulted in fewer crashes. Mondays to Wednesdays generally experience fewer crashes, suggesting a trend where the risk of fatal and serious injury crashes increases towards the weekend, most notably starting Friday. The trend clearly emphases weekends and warmer months as periods of heightened concern.

	Date											
Day.Of.Week	January	February	March	April	May	June	July	August	September	October	November	December
Mon	95	59	72	95	91	111	130	117	100	121	109	113
Tue	99	74	86	93	108	106	115	103	115	128	115	102
Wed	88	60	101	83	96	120	119	117	132	132	118	110
Thu	94	67	104	113	102	124	114	108	104	120	102	108
Fri	103	97	107	101	153	145	147	135	130	136	137	111
Sat	101	86	103	126	161	152	140	144	172	153	111	113
Sun	102	91	114	119	158	125	134	149	147	162	100	118

59 172

Figure 12: Fatal and Serious Injury Crashes in the EWG Region by Month and Day (2018-2022)

A visible trend can be found when looking at the trend of the fatal and serious injury crashes by hour of the day and day of the week, see **Figure 13**. The data indicates an increase in crashes during the late afternoon to early evening period across all days, with the timeframe from 3:00 PM to 6:00 PM being particularly prone to higher frequencies of crashes. Conversely, the early morning hours from midnight to 6:00 AM during weekdays are associated with the lowest crash occurrences. The pattern that emerges from the data points to an increased likelihood of crashes in the latter half of the day, with a significant uptick as the week progresses towards the weekend. However, there is a concentration of crashes from Friday afternoon into Saturday morning. This pattern persists into Saturday afternoon and continues through to the early hours of Sunday, suggesting that the weekend afternoon and nighttime period experience a higher number of crashes. Furthermore, Sunday afternoons also register a considerable number of crashes, adding to the weekend's heightened risk profile. The data shows the imperative for enhanced safety measures and increased awareness during these hours of the week, especially in the late afternoons and evenings of Friday through Sunday, which are discernibly the most hazardous times for crashes.



	Day.Of.Week						
Hour	Mon	Tue	Wed	Thu	Fri	Sat	SUN
12:00 AM	42	34	31	25	45	84	86
1:00 AM	30	21	25	27	40	86	107
2:00 AM	19	21	18	31	27	72	60
3:00 AM	24	11	22	25	23	49	53
4:00 AM	19	16	18	14	18	33	40
5:00 AM	25	17	21	28	31	39	28
6:00 AM	30	33	46	46	43	29	24
7:00 AM	48	52	57	45	29	29	23
8:00 AM	54	51	56	42	41	28	26
9:00 AM	33	30	46	42	44	43	28
10:00 AM	49	47	36	40	46	36	46
11:00 AM	56	51	45	60	52	44	56
12:00 PM	68	80	62	65	51	59	57
1:00 PM	51	51	67	64	64	67	53
2:00 PM	69	87	79	81	83	79	77
3:00 PM	100	77	86	93	96	93	82
4:00 PM	74	85	89	80	102	64	89
5:00 PM	86	82	98	77	104	94	102
6:00 PM	68	88	71	68	101	98	107
7:00 PM	66	78	63	72	92	75	94
8:00 PM	52	74	65	68	99	82	87
9:00 PM	53	50	65	57	106	106	69
10:00 PM	52	55	57	59	76	94	55
11:00 PM	38	45	43	38	78	67	55

Figure 13: Fatal and Serious Injury Crashes in the EWG Region by Day and Hour (2018-2022)

Lighting Conditions of Fatal and Serious Crashes

Most fatal and serious injury crashes in the EWG Region between 2018 and 2022 occurred in daylight, accounting for 57% of the incidents. Crashes in dark conditions with streetlights constituted 26%, while those in dark conditions without streetlights made up 16%. There was a small percentage (1%) where the light condition was unknown, see **Figure 14**. When considering the counties in the region, only the City of St. Louis, had less than the regional average occurring during daylight conditions. **Figure 15** illustrates the breakdown of the percent of fatal and serious injury crashes occurred in the daylight and in what county.

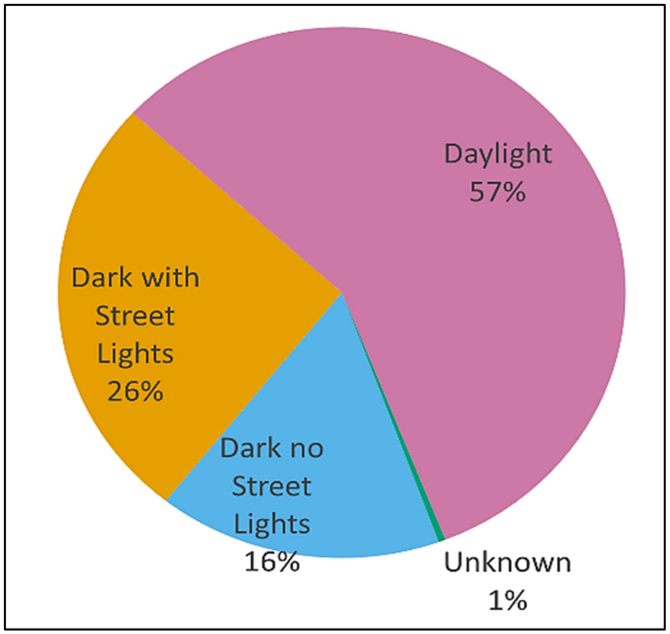


Figure 14: Fatal and Serious Injury Crashes in the EWG Region by Lighting

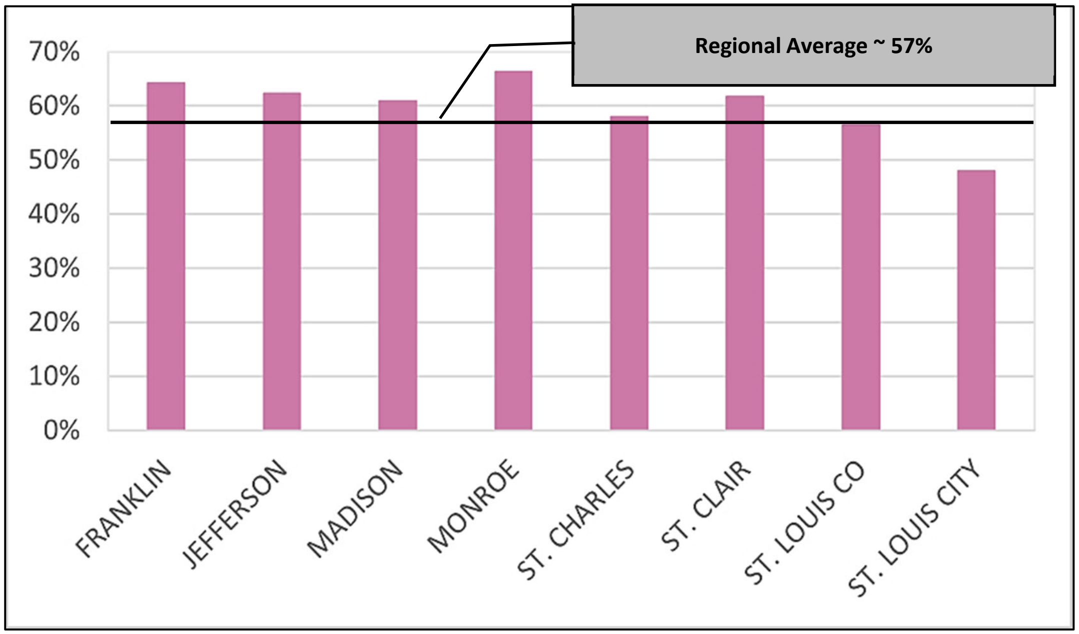


Figure 15: Fatal and Serious Injury Crashes in each County by Daylight (2018-2022)

Road Surface Condition of Fatal and Serious Injury Crashes

The majority of fatal and serious injury crashes in the EWG Region between 2018 and 2022 occurred on dry road surfaces, which was 84% of the reported crashes. Crashes on wet roads accounted for 14% of the total, while those involving ice, snow, or slush were relatively rare at 2%, see **Figure 16**. This distribution suggests that although adverse weather conditions can increase the risk of crashes, the predominant number of fatal and serious injury crashes happened on dry road surfaces in the region. When considering the counties in the Region, Franklin, Madison, Monroe, St. Clair, and St. Louis County, had less than the regional average occurring on dry pavement. **Figure 17** illustrates the breakdown of the percent of fatal and serious injury crashes that occurred on dry pavement by county.

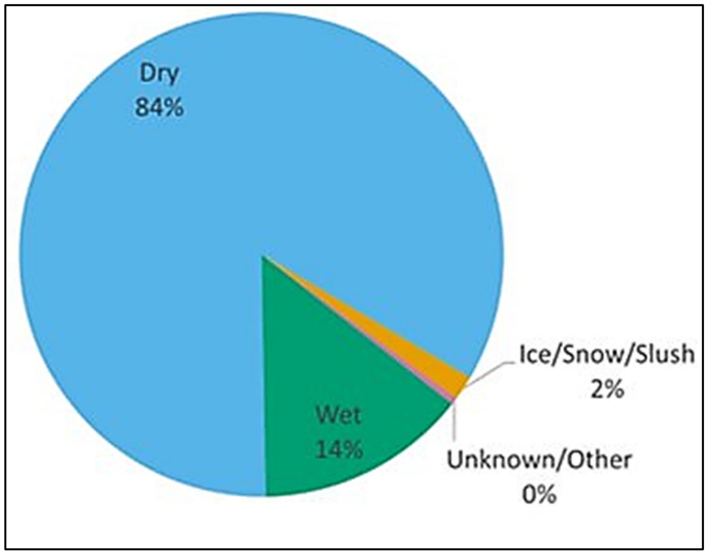


Figure 16: Fatal and Serious Injury Crashes in the EWG Region by Road Surface Condition (2018-2022)

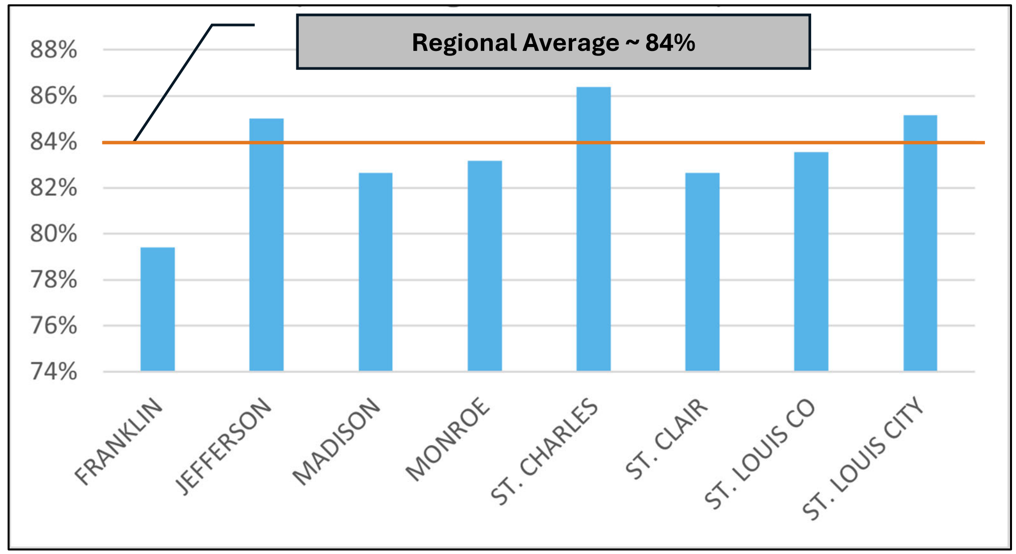


Figure 17: Fatal and Serious Injury Crashes in in each County by Dry Pavement

Where are Fatal and Serious Crashes Occurring?

The EWG Region includes a wide variety of roadway systems, such as interstates, arterials, collectors, and local roads as well as different characters of the area (urban versus rural). Since interstates are higher speed, access-controlled facilities with interchanges, the safety issues on those facilities are much different than the non-interstate facilities. As a result, for the systemic safety analysis, three main categories were developed: Interstate, Non-Interstate Rural, and Non-Interstate Urban.

The pie chart in **Figure 18** provides a breakdown of fatal and serious injury cashes in the EWG Region between 2018 and 2022 based on road type. As can be seen, 20% of the Region's fatal and serious injury crashes occurred on interstates, 17% occurred on non-interstate roads in the rural areas, and 63% occurred in non-interstate urban areas.

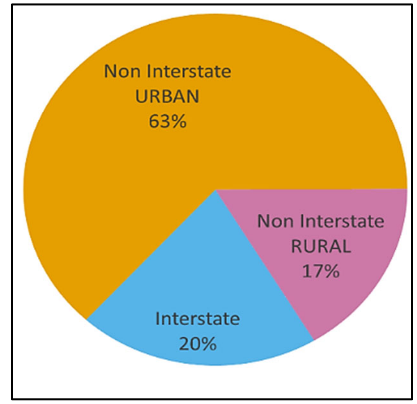


Figure 18: Fatal and Serious Injury Crashes in the EWG Region by Road Type

Interstate Crashes

The interstate crashes were classified as crashes occurring along the mainline interstate lanes as well as the interstate ramps entering and exiting the interstate. The crashes at the ramp connections to the cross streets at the interchange terminals are NOT included in the interstate crashes. It should be noted that the EWG Region has a few state maintained facilities that essentially operate as an interstate, therefore, were considered on the interstate system for this analysis and include: IL 255 north of I-270 to IL 111, MO 364 from I-270 to I-64, MO 367 north of I-270 to Missouri River, MO 370 from I-270 to I-70 and MO 21 from MO 141 to State Route B (Hillsboro Road).

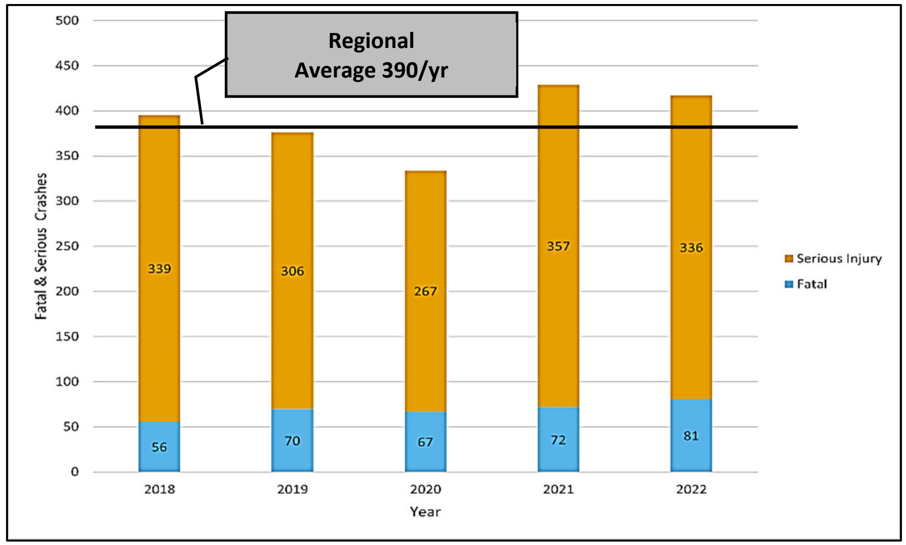


Figure 19: Interstate Fatal and Serious Injury Crashes in the EWG Region by Year

As shown in **Figure 19**, the Region's fatal and serious injury crashes represent approximately 390 per year on average between 2018 and 2022. In 2020, there was a notable reduction in both serious injuries and fatalities along the Region's interstates. This reflects the broader impact of the COVID-19 pandemic on the Region's interstate system. Unfortunately, the reduction was short-lived as there was a resurgence in 2021, returning to levels observed in pre-pandemic years and even slightly higher with the higher trend carrying into 2022. Interstates located in St. Louis County was approximately 40% of the Region's interstate crashes. Interstates in the City of St. Louis, St. Clair County, Madison County, and St. Charles County were 18%, 12%, 10% and 9%, respectively. Interstates within Franklin and Jefferson Counties were less than 5% each and Monroe County less than 1% of the Region.

On the freeway system, fixed object collisions, which includes out of control and run off road crashes, are the most frequent crash type. These are followed by rear-end, sideswipes, and then pedestrians, as shown in **Figure 20**. Among the fixed object crashes, concrete traffic barriers and guardrails are the most commonly struck object at approximately 55%. Although this data indicates that infrastructure elements (concrete barriers and guardrail) are a factor in interstate crash types, these objects are in place to prevent even more tragic crashes such as head on and rollover crashes. Specific corridors for implementing countermeasures can be found on the High-Injury Network (HIN) 5 - Interstate and locations listed in the interstate priority list should be a focus for improvements.

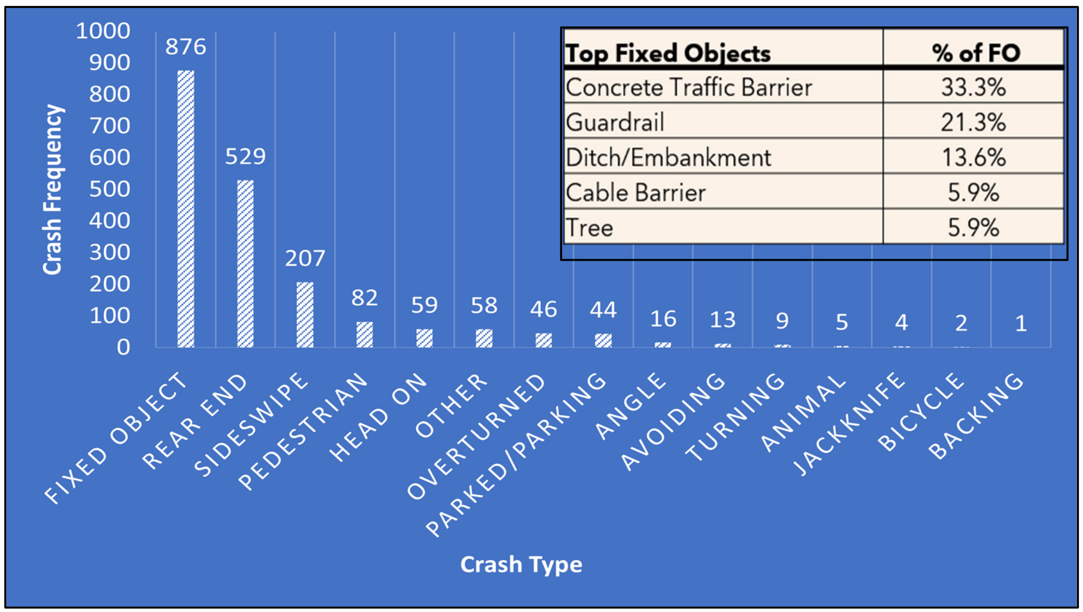
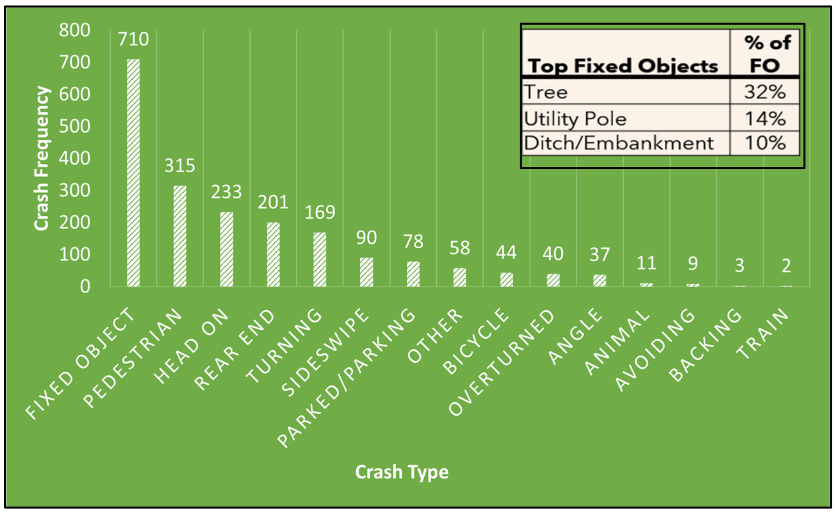


Figure 20: Interstate Fatal and Serious Injury Crashes in the EWG Region by Crash Type (2018-2022)

Non-Interstate Urban Focus

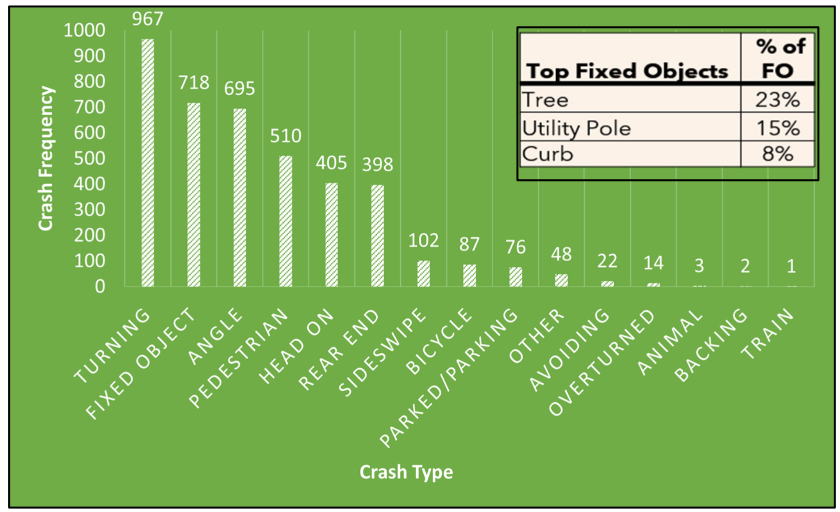
When considering crashes on roadways outside of the interstates, the urban areas generally have more vehicles on the road, more complex intersections, as well as more pedestrian and bicyclist. Approximately 72% of EWG Region non-interstate fatal and serious injury crashes occurred in the urban areas. As a result, improving safety in the urban areas would have a significant impact upon safety for the EWG Region. Specifically, the City of St. Louis has all urban crashes, while St. Louis County also primarily reports urban crashes. In contrast, St. Clair, St. Charles, and Jefferson Counties report a majority of their crashes in urban areas. When considering the urban areas, 67% of all crashes occurred at intersections and 33% occurred along segments.

The following figures summarize the fatal and serious injury crash types in the urban areas in the EWG region. **Figure 21** focuses on the segment crashes in urban areas, and demonstrates that fixed objects is the leading type, followed by pedestrian-involved, head-on and rear end crashes. **Figure 22** shows the types of crashes occurring at urban intersections, with turning-related incidents being the most frequent, followed by crashes involving fixed objects, angle crashes and pedestrians. Fixed objects are significant contributors to crash types in both settings (intersection versus segments), with trees being the most common fixed object involved in fatal and serious injury crashes.



Top Fixed Objects	% of FO
Tree	32%
Utility Pole	14%
Ditch/Embankment	10%

Figure 21: Non-Interstate Urban Segment Fatal and Serious Injury Crashes in the EWG Region by Type



Top Fixed Objects	% of FO
Tree	23%
Utility Pole	15%
Curb	8%

Figure 22: Non-Interstate Urban Intersection Fatal and Serious Injury Crashes in the EWG Region by Type

Non-Interstate Crashes – Rural Focus

According to the crash data between 2018 and 2022, approximately 28% of all non-interstate fatal and serious injury crashes occurred in rural areas. Although the regional crashes are significantly less in the rural areas, Franklin, Madison, and Monroe counties have 55% or more of their county's fatal and serious injury crashes occurring in rural areas and a reduction of severe crashes in the rural areas would have significant impacts in those counties.

When considering the rural areas, 67% of fatal and serious injury crashes occurred along rural segments and 33% occurred at intersections. **Figure 23** shows that fixed object crashes, which includes out of control and run off road crashes, are prevalent in rural segments, leading to the most significant number of crashes. Trees again constitute the highest percentage of these fixed object crashes (36%), followed by ditches/embankments (26%) and utility poles (11%). Intersection crashes were assumed to occur within 150 feet of an intersection, while segment crashes were assumed to occur at locations more than 150-foot away from an intersection.

Figure 24 illustrates that turning-related crashes are the most frequent type of fatal and serious crash occurring at rural intersections, followed by angle and fixed object collisions. Trees are the most common fixed object involved in these crashes, accounting for 35%, with ditches/embankments at 31% and signs/posts at 6%. This indicates that natural and road-adjacent features present significant hazards at both rural intersections and segments.

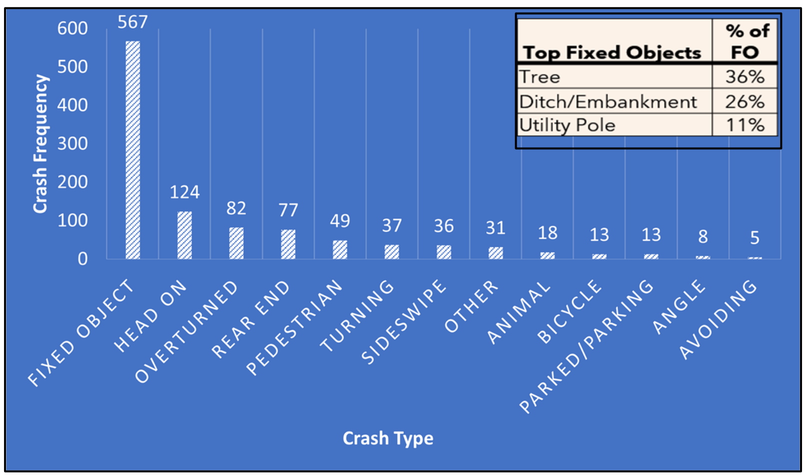


Figure 23: Non-Interstate Rural Segment Fatal and Serious Injury Crashes in the EWG Region by Crash Type

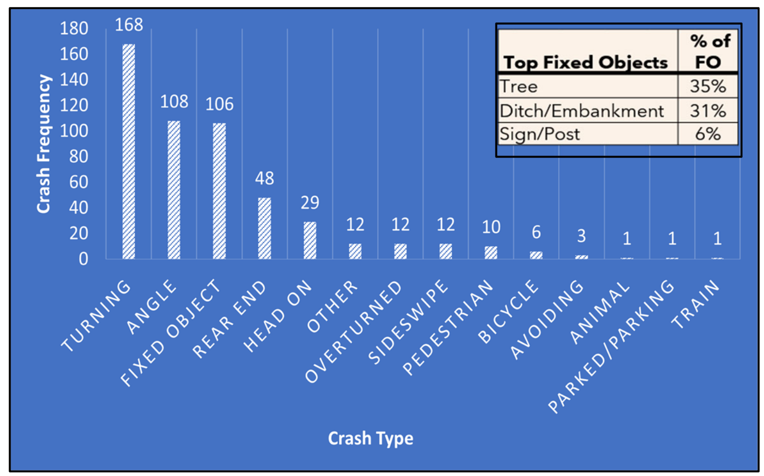


Figure 24: Non-Interstate Rural Intersection Fatal and Serious Injury Crashes in the EWG Region by Crash Type

Vulnerable Road Users and Motorcyclists

According to the Federal Highway Administration (FHWA), vulnerable road users are non-motorists including pedestrians, bicyclists, and individuals on personal conveyances, such as wheelchairs, who are at greater risk in traffic environments. Even though motorcycles are not included in the FHWA definition for vulnerable uses, it was clear that motorcycle crashes are over-represented in the fatal and serious injury crash data and therefore was included in this vulnerable user section to illustrate the large contrast.

The Sankey diagram in **Figure 25** provides a revealing perspective on the vulnerability of certain road users in the EWG Region (pedestrians, bicyclists and motorcycles). Despite representing a small fraction (2.49%) of total crashes in the region, these vulnerable road users account for a disproportionate percent (26.84%) of all fatal and serious injury crashes from 2018 to 2022. This subset of road users encompasses pedestrians, who are involved in 11.04% of fatal and serious injury crashes, motorcyclists at 14.21%, and bicyclists at 1.59%. These figures starkly contrast with other crashes, which constitute 97.51% of the total crashes yet account for 73.16% of severe outcomes. This disproportionality highlights the heightened risks faced by pedestrians, bicyclists, and motorcyclists—groups that, due to their exposure and lack of protective barriers, are significantly more susceptible to fatal and serious injuries in the event of a crash.

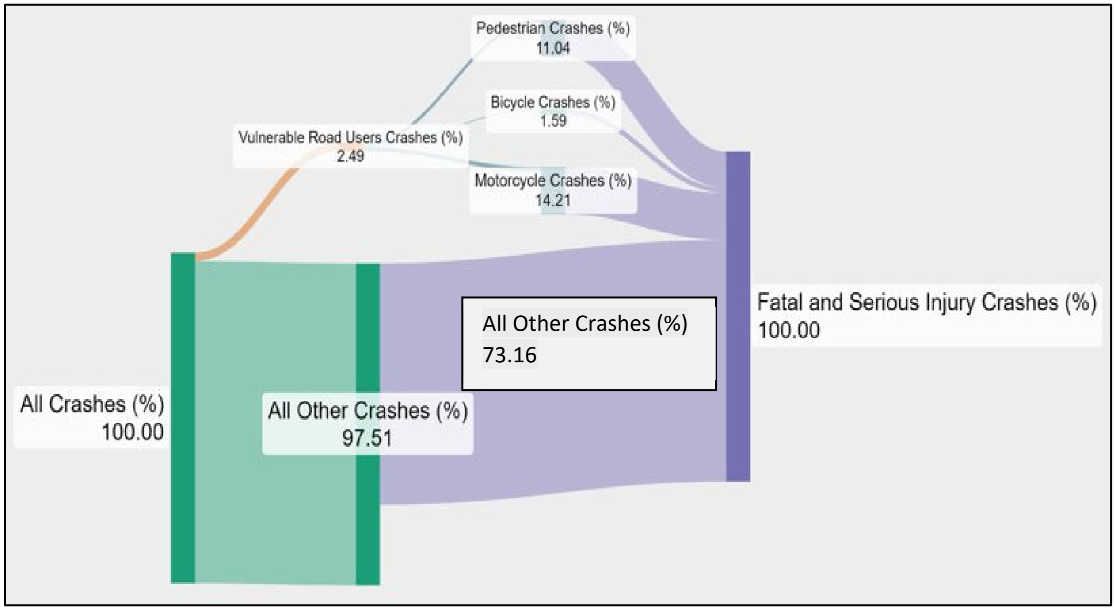


Figure 25: Distribution of Vulnerable Road Users and Motorcyclist Crashes in the EWG Region (2018-2022)

Pedestrian Focus

In the EWG Region there were 1,057 pedestrian-involved fatal and serious injury crashes from 2018 to 2022. Approximately 11% of all fatal and serious injury crashes involve a pedestrian, with that percentages rising to 19.5% when considering only fatal crashes.

When considering if the pedestrian crash occurred at either an intersection or non-intersection, the fatal crashes occurred slightly more at non-intersection locations 168 fatal crashes compared to 126 fatal crashes at intersections. When considering serious injury crashes, intersections were slightly higher with 395 crashes, while non-intersections had 368, as shown in **Figure 26.**

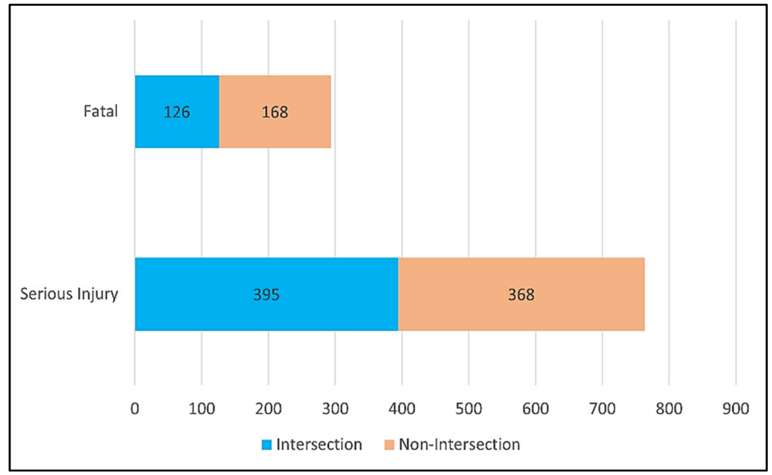


Figure 26: Location of Pedestrian Involved Fatal and Serious Injury Crashes in the EWG Region (2018-2022)

Figure 27: Pedestrian Involved Fatal and Serious Injury Crashes by Month and Day in the EWG Region (2018-2022)

The heatmap analysis in **Figure 27** reveals distinct patterns in pedestrian crashes within the EWG Region, highlighting specific days and months where fatal and serious injuries involving pedestrians are most prevalent. Notably, Sundays in October had the highest number of pedestrian fatalities along with Wednesdays and Fridays in September, October, and November, indicating increased pedestrian risk during these months and days. Conversely, the data indicates lower frequencies of pedestrian crashes in the early months of the year, such as January through April, across all days of the week. Overall, the heatmap suggests a seasonal influence on pedestrian crashes, with the late summer, fall months exhibiting more frequent incidents.

Additional analysis of the hourly distribution of pedestrian crashes throughout the months of the year, considering the sunset times, reveals critical insights into when these incidents are most likely to occur, refer **Figure 28**. The dashed horizontal line across the heatmap marks the sunset times throughout the year, offering a reference to the daylight conditions during which crashes happened.

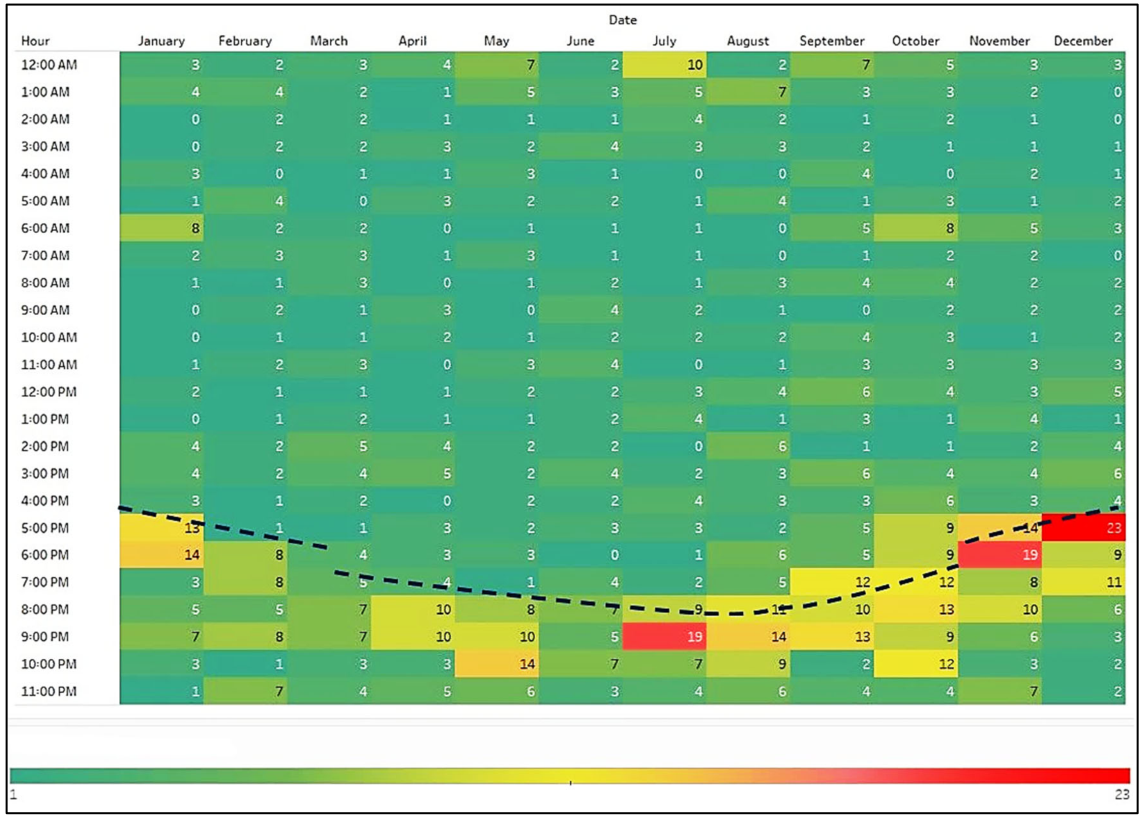


Figure 28: Pedestrian Involved Fatal and Serious Injury Crashes by Month and Hour of the Day in the EWG Region (2018-2022)

There's a significant increase in pedestrian crashes in the hours leading up to and shortly after sunset, particularly from the late afternoon into the evening. This suggests that the reduced visibility during and after twilight may contribute to the risk of crashes. The months of July through December show a surge in crashes after sunset, correlating with the pattern identified in the day of the week figure which indicated an overall increase in pedestrian crashes during these autumn months. Furthermore, the hours between 5:00 PM and 9:00 PM during these months are notably more hazardous, as evidenced by the deeper red color intensity on the heatmap. This is also the time when many people are likely to commute to/from home and work, contributing to higher pedestrian traffic and potentially more collisions. The correlation between month of the year and time of the day is clear: the risk to pedestrians increases in the later months of the year, with a specific vulnerability in the evenings when daylight fades.

Bicycle Focus

In the Region from 2018 to 2022, bicycle-involved crashes contributed to 152, or 1.6%, of fatal and serious injury crashes. Similar to the pedestrian crashes, the fatal bicycle crashes occurred more at non-intersections and the serious injury crashes occurred slightly more at intersections, see **Figure 29**.

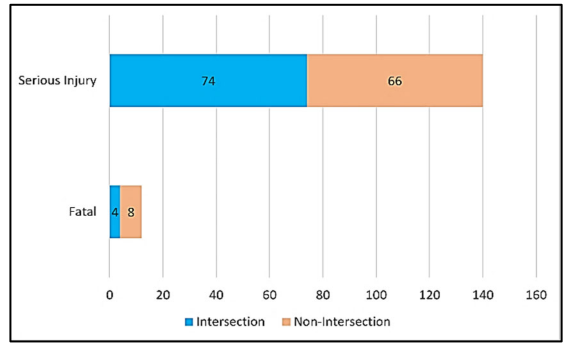


Figure 29: Location of Bicyclists Involved Fatal and Serious Injury Crashes

The hour and month analysis of bicycle crashes is shown in **Figure 30**. Trends are somewhat difficult to determine, partly due to the small dataset, but it appears that the late afternoon and evening hours, between 3:00 PM to 8:00 PM, saw a higher number of crashes, potentially associated with commuting times and lower visibility. Bicycle involved crashes peaked at different times throughout the year, notably in the summer months, which could correlate with increased bicycling activity.

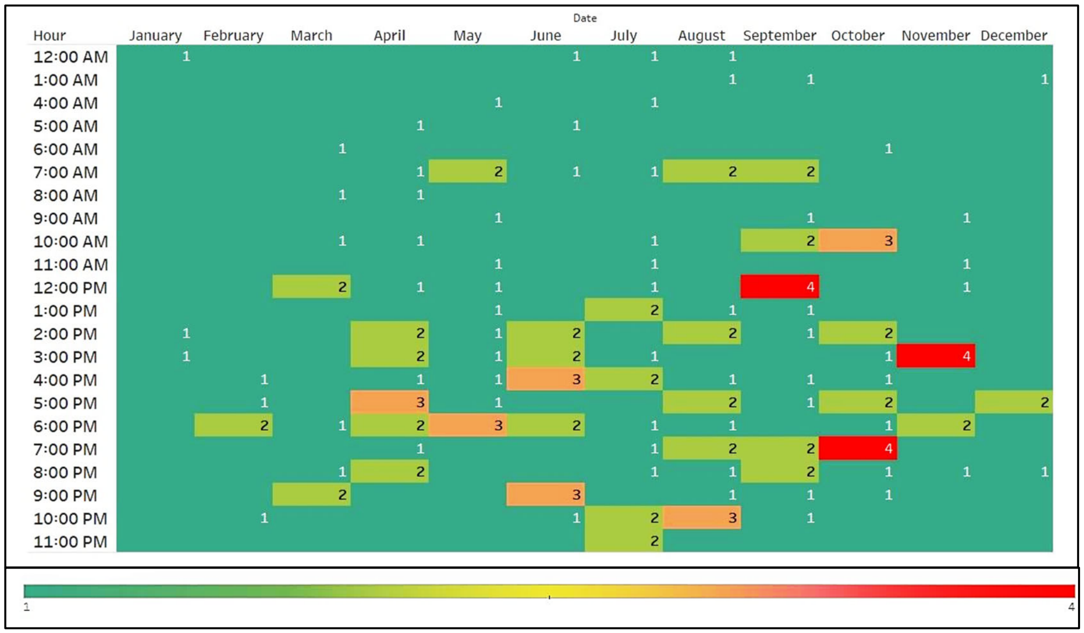


Figure 30: Bicyclists Involved Fatal and Serious Injury Crashes by Month and Hour of the Day in the EWG Region (2018-2022)

One of the more apparent trends is that 72% of the fatal and serious bicycle crashes occurred on arterial roads. These roads are generally higher speed and higher volume roads, which increases the risk of bicyclists being serious injured or killed. **Figure 31** illustrates the breakdown of the functional classification of the bicycle involved serious and fatal crashes.

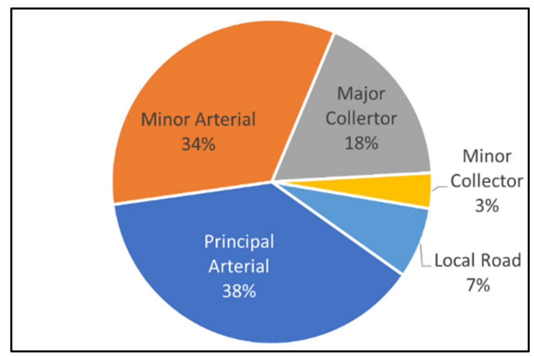


Figure 31: Functional Classification for Bicycle Involved Fatal and Serious Injury Crashes

Motorcyclists

In 2020, Missouri adopted a new helmet law, potentially contributing to significant changes in motorcycle crash fatalities. The legislative change allowed riders 26 and over with adequate medical benefits insurance and those who completed a safety course to ride without a helmet, contrasting with the previous universal helmet requirement. Younger riders and those without the specified insurance must still wear helmets. This policy shift towards more permissive helmet use criteria seems to correlate with the rise in fatal motorcycle crashes both statewide and in the EWG Region.

Before the amendment, an average of 106 fatal motorcycle crashes occurred statewide each year from 2014 to 2019. Post-amendment, from 2021 to 2023, the average number of fatal motorcycle crashes statewide rose to 157 per year, marking a 48% increase. Similarly, in the EWG Region's five Missouri counties, the average rose from 28 to 33 per year during the same periods, a 15% increase. These statistics, as shown in **Figure 32**, suggest that the relaxation of helmet laws may have had an adverse effect on rider safety.

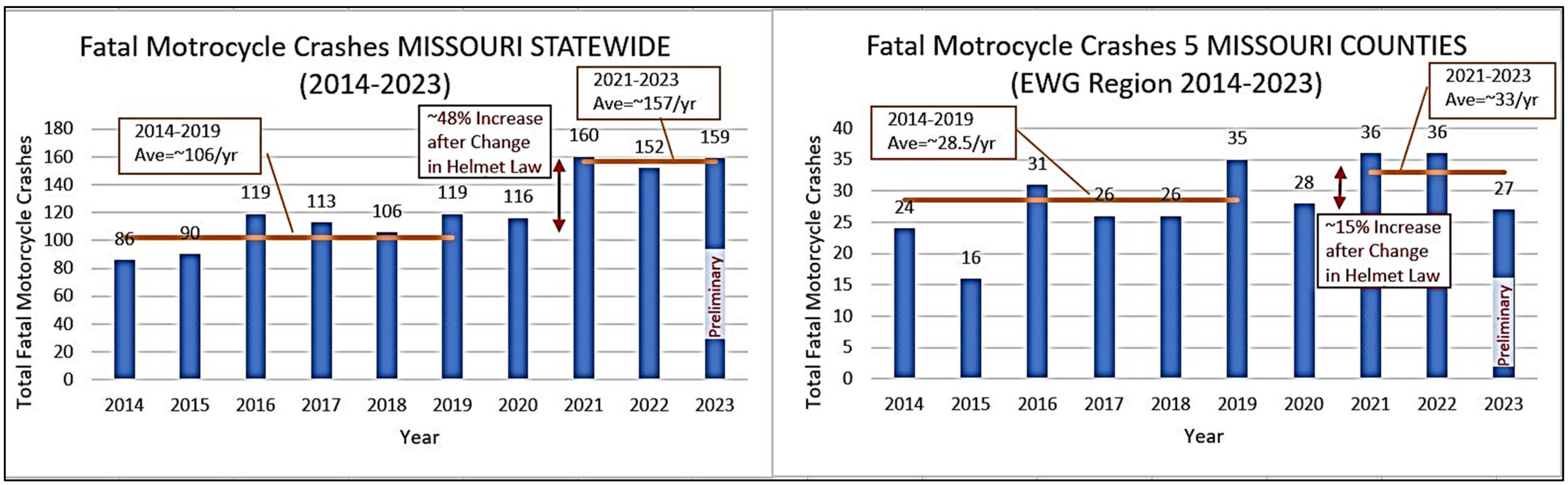


Figure 32: The Statewide and EWG Regional Trends of Fatal Motorcycle Involved Crashes

Underserved Communities Focus

The Climate and Economic Justice Screening Tool (CEJST) was used to identify disparities between crashes and disadvantaged communities within the EWG region. To identify these disparities, the percentage of the population living in disadvantaged communities was compared to the percentage of fatal and serious injury crashes recorded in those same CEJST areas. **Figure 33** summarizes the disadvantaged areas to the percentage of crashes in the eight counties as well as the EWG Region overall. If the percentages are the same, there is equal distribution of crashes in the CJEST areas versus the not-CEJST areas.

Considering the region, only 18% of the Region's population lives in disadvantaged areas, yet nearly 40% of the fatal and serious crashes occur in those disadvantaged areas. This indicates a trend that more fatal and serious injury crashes occur in the CEJST areas than the non-CEJST areas. The trend continues at all county levels as well. The City of St. Louis, St. Louis County, and St. Clair County show the largest disparities of severe crashes occurring in the disadvantaged areas.

This discrepancy highlights the need for targeted interventions and policy measures within disadvantaged areas to address the factors contributing to the higher incidence of fatal and serious injury crashes. By understanding the underlying burdens these communities face, as identified by the CEJST, efforts can be directed towards improving transportation safety and health outcomes for the residents most at risk.

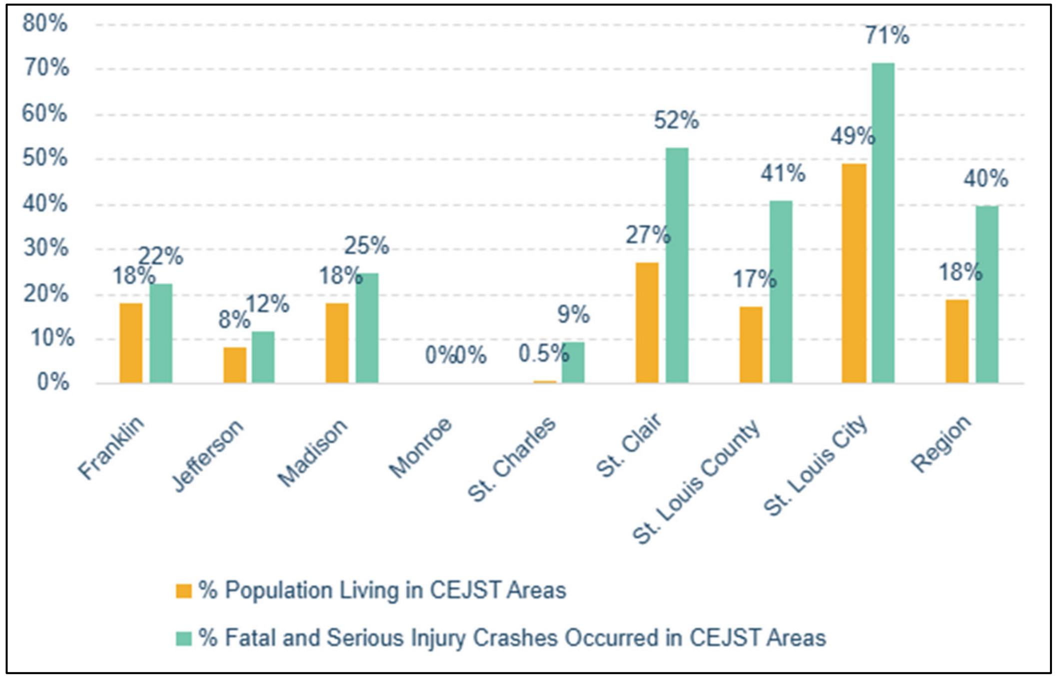


Figure 33: Comparison of Population and Fatal and Serious Injury Crashes in CEJST Areas in EWG Region (2018-2022)

Appendix A2: Existing Safety Analysis and Crash Risk Assessment for Jefferson County

As part of the *Gateway to Safer Roadways: St. Louis Regional Safety Action Plan* (Action Plan), a thorough analysis of transportation safety within the East-West Gateway Council of Governments (EWG) Region was conducted using data spanning the years 2018 to 2022.

Crash data from 2018 to 2022 was gathered as part of this Action Plan and contained all crashes in the EWG Region, which includes the City of St. Louis, Franklin, Jefferson, St. Charles, and St. Louis counties in Missouri, as well as Madison, Monroe, and St. Clair counties in Illinois. The Missouri crash data was obtained from the Missouri Department of Transportation's (MoDOT's) Transportation Management Systems (TMS), and the Illinois crash data was provided by the Illinois Department of Transportation's (IDOT's) Transportation Safety Department.

The data includes all crashes occurring on public roadways that involve a fatality, injury, or property damage. Severity ratings are assigned by the responsible agencies based on the presence and significance of an injury resulting from the crash. Crash severity ratings are listed and defined below:

- Fatal – any injury that results in death within 30 days after the motor vehicle crash in which the injury occurred.
- Serious Injury – any injury other than fatal which prevents the person from walking, driving or normally continuing the activities the person could perform before the injury occurred, such as severe lacerations, broken or distorted extremity, crush injuries, suspected skull, chest, or abdominal injuries other than bruises or minor lacerations, significant burns, unconsciousness when taken from the crash scene, or paralysis.
- Minor Injury – any injury that is evident at the scene or reported or claimed that is not fatal or serious.
- Property Damage Only – when there is no apparent injury or when there is no reason to believe an injury occurred and when property damage of $500 or more for Missouri or $1,500 or more in Illinois occurred.

Crash Data: The analysis used comprehensive crash, person, and vehicle datasets sourced from MoDOT and IDOT. The crash data included information crucial to each crash, including the time and date of the crash, crash type, location, contributing factors, and lighting and weather conditions. Notably, each crash is given a unique identifier (crash ID) which is also linked to occupant and vehicle data. Occupant data within the dataset includes details about individuals involved in the crashes, including their gender, age, and the

severity of injuries sustained, with stringent measures undertaken by both agencies to scrub the data of any personally identifiable information. Additionally, the vehicle data offers valuable insights into the involved vehicle types, the use and functionality of safety devices, airbag deployment, and type of fixed objects struck by each vehicle during the crash.

Vehicle Miles Traveled (VMT): The Vehicle Miles Traveled (VMT) data, essential for understanding regional travel patterns and demand, was obtained from EWG. Covering the period from 2018 to 2022, this dataset includes VMT for each county within the EWG Region as well as aggregate regional data. The VMT data was provided in daily vehicle miles traveled format but was converted to annual vehicle miles traveled for these evaluations to be consistent with the crash data, which was summarized for each year. The VMT metric was used to compare the total number of crashes to VMT for each year to understand the correlation between the number of crashes and vehicle exposure.

Population Data: To correlate crash data with demographic trends, population estimates were sourced from EWG, based on U.S. Census Bureau data for the year 2020. Since the US census data was collected in 2020 and also aligns with the middle of the evaluation period, the 2020 population data was used for this analysis.

Equity Data: The information on disadvantaged communities was sourced from the Climate and Economic Justice Screening Tool (CEJST), a specialized tool designed to pinpoint these communities by evaluating burdens across various domains such as climate change, energy, health, housing, legacy pollution, transportation, water and wastewater, and workforce development. Within the CEJST framework, disadvantaged areas are delineated as census tracts that bear disproportionate burdens and lack adequate support concerning these environmental and economic challenges.

The data collection and processing efforts detailed above are foundational to the Action Plan. They enable a data-driven approach to understanding the dynamics of transportation safety and formulating strategies to mitigate risks and enhance safety across the EWG Region. This methodical approach ensures that the analyses are grounded in reliable data, facilitating informed decision-making in regional transportation planning and safety management.

Jefferson County Trend Analysis

Trend Analysis - Crashes and VMT in Jefferson County

Figure 1 illustrates the trends in total crashes and Vehicle Miles Traveled (VMT) in Jefferson County from 2018 to 2022. The blue bars represent the total number of crashes, while the black line indicates VMT on the secondary axis to the right. Total crashes remained relatively consistent between 2018 and 2019, with 4,942 and 4,976 crashes respectively. However, in 2020, the number declined to 4,202, likely due to the COVID-19 pandemic and its impact on travel patterns. In 2021, total crashes increased to 4,460 and then slightly decreased to 4,420 in 2022.

The VMT follows a similar trend. There was a noticeable drop in 2020, with the VMT decreasing due to the pandemic's restrictions. VMT then rose sharply to over 26 million in 2022, reflecting a return to pre-pandemic travel behavior.

These trends indicate that while the pandemic had a significant impact on both VMT and total crashes in 2020, travel patterns and crash rates began to recover in the following years.

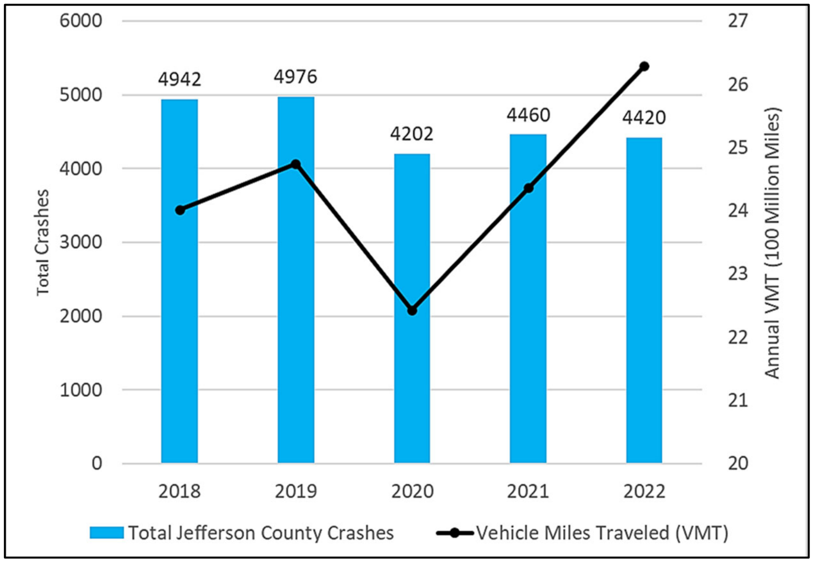


Figure 1: Annual Total Crashes and Vehicle Miles Traveled (VMT) in Jefferson County (2018-2022)

Trend Analysis – Fatal and Serious Injury Crashes in Jefferson County

Jefferson County had a total of 848 fatal and serious injury (KSI) crashes between 2018 and 2022 for an average of about 170 KSI crashes per year. **Figure 2** demonstrates the annual trends in KSI crashes in Jefferson County over the five-year period. The bar chart separates the data into two series to highlight the severity of crashes, while linear trendlines illustrate the progression over this five-year period.

Jefferson County had a total of 176 fatal crashes over the five-year period for an average of about 35 fatal crashes per year. Fatal crashes, represented by blue bars, started at 24 incidents in 2018 and then steadily increased to 35 in 2019 and 37 in 2020. The count further rose to 40 in both 2021 and 2022. The linear trendline for fatal crashes shows a gradual upward trajectory, indicating a steady increase in fatal incidents over the observed period.

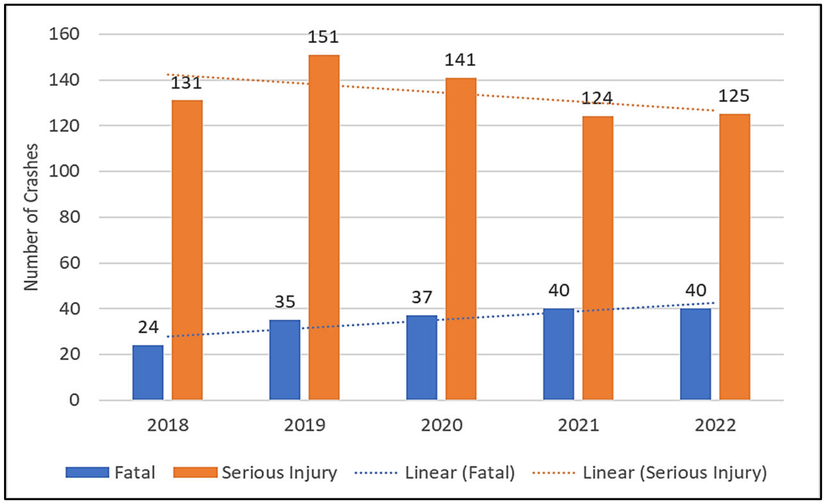


Figure 2: Fatal and Serious Injury Crashes in Jefferson County by Year (2018-2022)

Jefferson County had a total of 672 serious injury crashes over the five-year period for an average of about 135 serious injury crashes per year. Serious injury crashes, shown by the orange bars, follow a different pattern. They began at 131 incidents in 2018, peaked at 151 in 2019, and then decreased to 141 in 2020. The downward trend continued in 2021 and 2022, with 124 and 125 serious injury crashes, respectively. Despite this overall decline, the linear trendline for serious injuries remains relatively stable.

These figures highlight the need for targeted interventions to address both KSI crashes, particularly given the upward trajectory of fatal incidents.

JEFFERSON COUNTY CRASH RISK ASSESSMENT

What are the Contributing Factors of Fatal and Serious Crashes in Jefferson County?

Figure 3 analyzes the contributing factors of KSI crash data in Jefferson County from 2018 to 2022. Speeding is identified as the most significant contributing factor, responsible for 28% of incidents. This emphasizes the importance of targeted measures, such as speed enforcement and educational campaigns, to tackle this critical issue. Improper lane usage follows as the second most common cause, accounting for 23% of KSI crashes. This high percentage underlines the need for improved lane discipline and awareness of proper road use. Failing to yield and alcohol/drug impairment are each responsible for 18% of crashes, indicating that strict driving under the influence (DUI) enforcement and yielding compliance are crucial. Distraction contributes to 11% of incidents, highlighting the need for anti-distracted driving measures.

Other significant contributing factors include disregarding signals/signs (8%), driving the wrong way (7%), physical driver conditions (7%), overcorrecting (6%), and following too closely (4%). These diverse causes indicate the multifactorial nature of KSI crashes and underscore the importance of comprehensive road safety strategies to address each risky behavior.

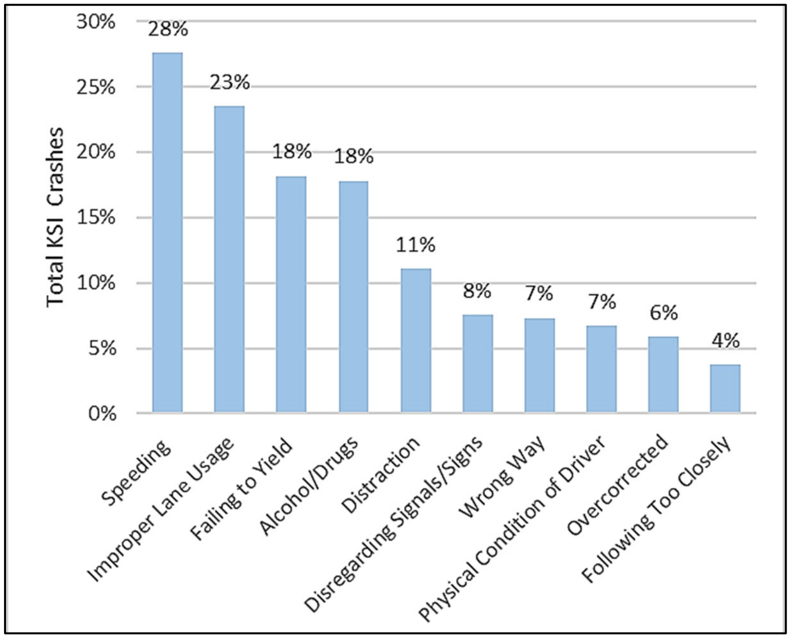


Figure 3: Top 10 Contributing Factors of Fatal and Serious Injury Crashes in Jefferson County (2018-2022)

What is the Age of Those Involved in Fatal and Serious Crashes in Jefferson County?

To identify what age groups are more likely to be involved in KSI crashes, the crash data was categorized into age groups based on the methodology used by the National Highway Traffic Safety Administration (NHTSA). This methodology includes those under 16 years old as a group, those older than 65 years old as a group and then groups for every five-year increments in-between.

Figure 4 provides an overview of the age distribution of individuals involved in KSI crashes in Jefferson County between 2018 and 2022, including drivers, pedestrians, and bicyclists.

Young adults aged 26-30 represent the age group most frequently involved in KSI crashes, exceeding 150 individuals. This is closely followed by those 65 and older. A large group aged 16-20, 21-25, 31-35, and 36-40, show relatively similar involvement rates.

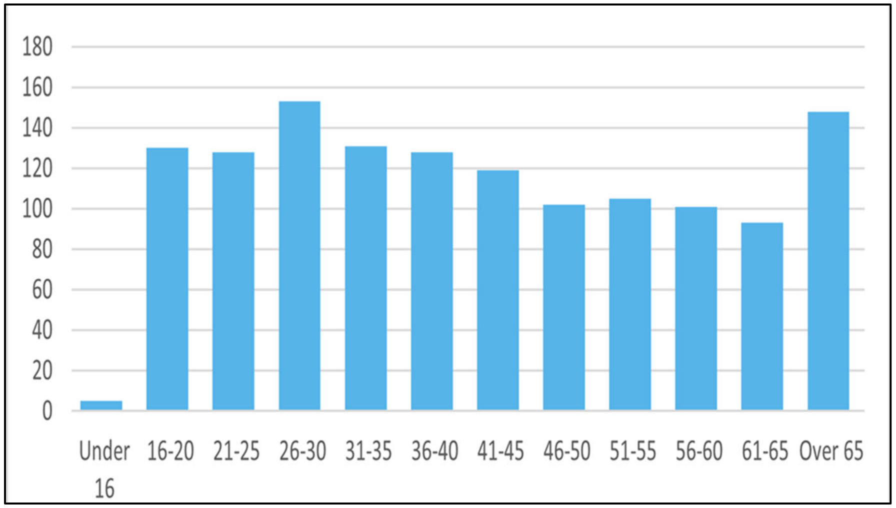


Figure 4: Age Distribution of Persons Involved in Fatal and Serious Injury Crashes in Jefferson County (2018-2022)

Those over 65 stand out with a significant number of KSI crashes. Despite older adults being less likely to be involved in these incidents due to generally cautious driving habits, they still face elevated risks in such crashes. The lowest involvement rates are found among those under 16, reflecting their limited driving exposure.

These patterns align with broader trends that reveal younger adults often engage in riskier driving behaviors like speeding or distraction, increasing their involvement in severe crashes. Meanwhile, older adults can be at higher risk due to the physical vulnerabilities associated with aging, necessitating more targeted road safety measures for each group.

When do Fatal and Serious Crashes Occur in Jefferson County?

Examining the temporal patterns of KSI crashes in Jefferson County between 2018 and 2022 reveals concerning trends across months, days, and times. A heat map in **Figure 5** highlights Fridays as being consistently high, particularly from August through October. Saturdays, Sundays and Wednesdays are also relatively high, especially from July to October. This pattern suggests that weekends are periods of heightened risk. Increased travel for social and recreational activities might contribute to this uptick, making Fridays, Saturdays and Sundays more susceptible to severe crashes.

Figure 5: Fatal and Serious Injury Crashes in the Jefferson County by Month and Day (2018-2022)

Figure 6 focuses on the daily distribution of KSI crashes throughout the week, revealing significant trends with time. Late afternoon and evening hours, particularly between 2:00 PM and 8:00 PM. Fridays from 4:00 PM to 8:00 PM stand out with highest consecutive hours of crashes, while Sunday evenings at 6:00 PM had the highest hourly total with 15 crashes, possibly due to factors like impaired driving or fatigue. Enhanced enforcement efforts, public awareness campaigns, and safe-driving programs focused on weekends and evenings could help reduce dangerous driving behaviors prevalent during these high-risk periods.

Hour	MON	TUE	WED	THU	FRI	SAT	SUN
12:00 AM	2	2	1	2	4	6	3
1:00 AM	3	1		2	3	3	10
2:00 AM		2	2	2	4	2	1
3:00 AM	1	3	1		1	1	3
4:00 AM	1	3	2			1	3
5:00 AM	4		2	3	4	3	2
6:00 AM	1	1	5	6	8	5	1
7:00 AM	3	6	4	3	2		4
8:00 AM	4	7	5	3	3	3	3
9:00 AM	2	3	4	2	4	4	4
10:00 AM	5	7	3	7	6	7	4
11:00 AM	10	3	4	9	8	4	4
12:00 PM	6	3	8	5	2	3	4
1:00 PM	4	8	4	6	6	3	9
2:00 PM	6	7	9	8	11	10	8
3:00 PM	8	13	9	7	7	11	7
4:00 PM	7	7	9	8	11	7	9
5:00 PM	4	6	10	3	13	6	10
6:00 PM	8	3	6	3	9	9	15
7:00 PM	4	9	7	9	13	11	5
8:00 PM	1	6	8	10	9	6	5
9:00 PM	3	1	5	7	8	4	7
10:00 PM	2	4	8	2	7	5	2
11:00 PM		1	5	3	8	8	2

CNT(County)

1.00 15.00

Figure 6: Fatal and Serious Injury Crashes in Jefferson County by Day and Hour (2018-2022)

Lighting Conditions of Fatal and Serious Crashes in Jefferson County

Figure 7 analyzes the light conditions for KSI crashes in Jefferson County between 2018 and 2022. The majority of these crashes occurred during daylight, which accounted for 62% of incidents. Crashes that occurred in dark conditions without streetlights account for 28% of the total, while those in the dark with streetlights make up 10%. This distribution shows that roadway lighting can help reduce crash risks but is not sufficient on its own.

Although a significant portion of crashes occurred during daylight hours, the dark with no streetlights percentage in Jefferson County (28%) was significantly higher than the regional average (16%).

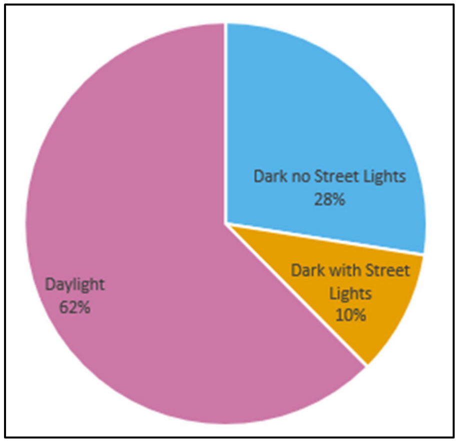


Figure 7: Fatal and Serious Injury Crashes in Jefferson County by Lighting (2018-2022)

Road Surface Condition of Fatal and Serious Injury Crashes in Jefferson County

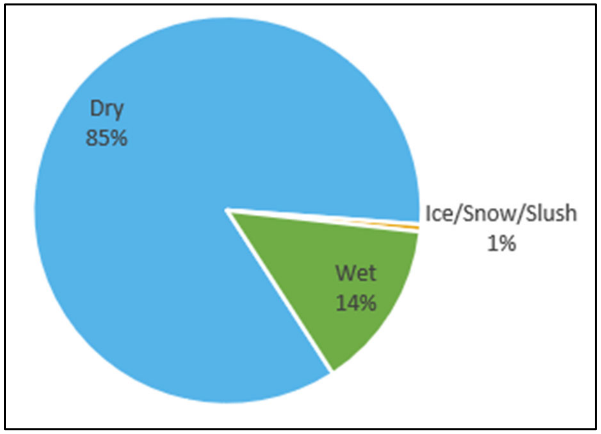


Figure 8: Fatal and Serious Injury Crashes in Jefferson County by Road Surface Condition (2018-2022)

Figure 8 analyzes the road surface conditions for KSI crashes in Jefferson County from 2018 to 2022. The majority of these crashes, 85%, occurred on dry road surfaces. Wet road surfaces contributed to 14% of KSI crashes, emphasizing that rain and wet pavement can significantly increase crash risks. Ice, snow, and slush conditions made up just 1% of these crashes. These findings indicate that while adverse weather can exacerbate road hazards, severe crashes are primarily influenced by driver behavior and roadway characteristics rather than surface conditions alone.

Where are Fatal and Serious Crashes Occurring in Jefferson County?

Jefferson County has a wide variety of roadway systems, such as interstates, arterials, collectors, and local roads. Since interstates are higher speed, access-controlled facilities with interchanges, the safety issues on those facilities are much different than the non-interstate facilities. As a result, for the systemic safety analysis, three main categories were developed: Interstate, Non-Interstate Rural, and Non-Interstate Urban.

Figure 9 provides a breakdown of KSI crashes in Jefferson County between 2018 and 2022 based on road type. The data reveals that a majority, 55%, of these crashes occurred on non-interstate urban roads. Non-interstate rural roads accounted for 32% of the KSI crashes, indicating that rural roads still present significant risks, possibly due to higher speeds, limited lighting, and fewer traffic controls. The remaining 13% of KSI crashes happened on interstate roads, reflecting the impact of higher-speed travel but benefiting from safer design features like controlled access and better roadway features.

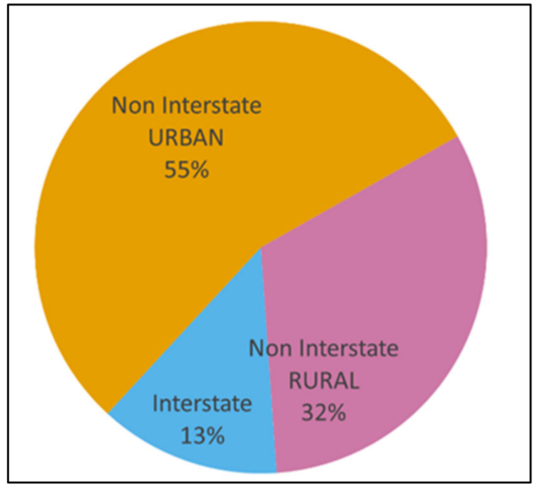


Figure 9: Fatal and Serious Injury Crashes in Jefferson County by Road Type (2018-2022)

Non-Interstate Crashes – Urban Areas in Jefferson County

According to the crash data between 2018 and 2022, approximately 61% of the Jefferson County KSI crashes occurred in urban areas. The urban non-interstate crashes consisted of a total of 466 KSI crashes or approximately 93 per year. To assist in determining potential systemic improvements in urban areas, crash types at intersections and crash types along segments were evaluated. Crashes within 150 feet of an intersection were considered intersection crashes.

When considering the non-interstate urban KSI crashes in Jefferson County, approximately 64% occurred at urban intersections (300 KSI crashes or about 60 per year). **Figure 10** shows a breakdown of crash types at **non-interstate urban intersections** in Jefferson County. Fixed object collisions, which includes out of control and run off road crashes, are the most frequent crash type, with 78 incidents. Turning collisions are a close second with 69 crashes, followed by angle (51), rear-end (34), head-on (29), pedestrian (10), and sideswipe crashes (7). Trees are the most frequently struck fixed objects, accounting for 36% of these collisions, while ditches or embankments (16%) and guardrails (8%) also contribute significantly to the crash frequency.

When considering the non-interstate urban KSI crashes in Jefferson County, 40% of KSI crashes occurred along urban segments (166 KSI crashes or about 33 per year). **Figure 11** display the types of KSI crashes occurring at **non-interstate urban road segments** in Jefferson County between 2018 and 2022. On urban road segments, fixed-object (run off road) collisions are significant with 93 incidents. Other notable crash types include head-on (17), rear-end (16), pedestrian (10), and sideswipe (7) crashes, along with avoiding collisions (5). Trees are once again the most frequently hit fixed objects, comprising 52% of crashes, while ditches or embankments (20%) and utility poles (8%) are also prominent hazards.

The high frequency of fixed-object collisions and turning maneuvers underscores the need for infrastructure improvements to reduce the risk of severe crashes involving drivers and pedestrians alike.

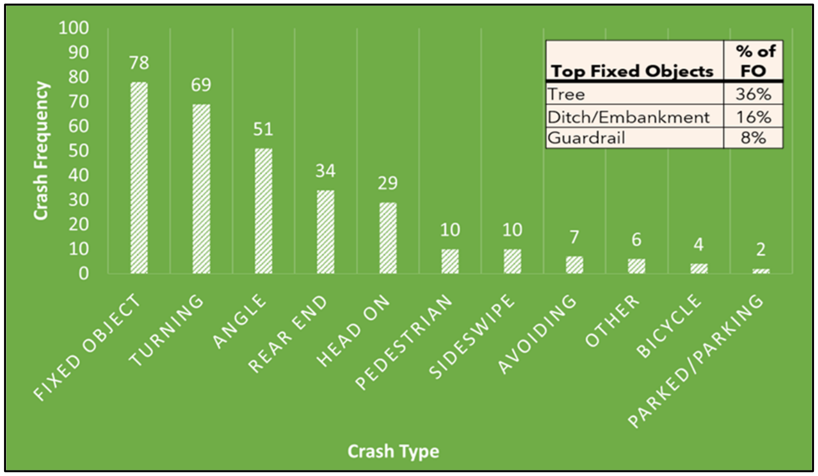


Figure 10: Non-Interstate Urban Intersection Fatal and Serious Injury Crashes in Jefferson County by Crash Type (2018-2022)

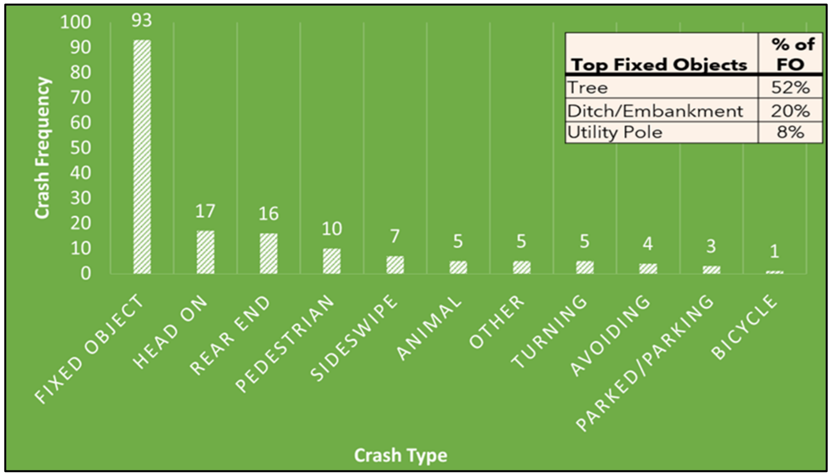


Figure 11: Non-Interstate Urban Segment Fatal and Serious Injury Crashes in Jefferson County by Crash Type (2018-2022)

Non-Interstate Crashes – Rural Areas in Jefferson County

According to the crash data between 2018 and 2022, approximately 32% of Jefferson County KSI crashes occurred on non-interstate roads in rural areas. The rural non-interstate crashes consisted of a total of 272 KSI crashes or approximately 54 per year. To assist in determining potential systemic improvements in rural areas, crash types at intersections and crash types along segments were evaluated. Crashes within 150 feet of an intersection were considered intersection crashes.

When considering the non-interstate rural KSI crashes in Jefferson County, 32% of KSI crashes occurred at rural intersections (88 KSI crashes or about 17 per year). **Figure 12** shows crash types at **non-interstate rural intersections** in Jefferson County from 2018 to 2022. Crashes involving fixed objects were the leading cause of KSI crashes, totaling 30 incidents. Turning crashes closely followed with 24 crashes, then head-on (14) and angle (7). Rear-end collisions, sideswipe, animal, and other less frequent crashes also occurred. Among the fixed objects struck, trees accounted for the majority, followed by ditches/embankments and culverts.

When considering the non-interstate rural KSI crashes in Jefferson County, 68% occurred along segments (184 KSI crashes or about 37 per year). **Figure 13** highlight the crash types at **non-interstate rural road segments** in Jefferson County from 2018 to 2022. Fixed-object collisions were the most significant crash type here, responsible for 125 incidents. Head-on and rear end crash types were also notable contributors. Crashes involving pedestrians and bicycles occurred less frequently. Trees stood out as the most common fixed object struck, followed by ditches/embankments and utility poles.

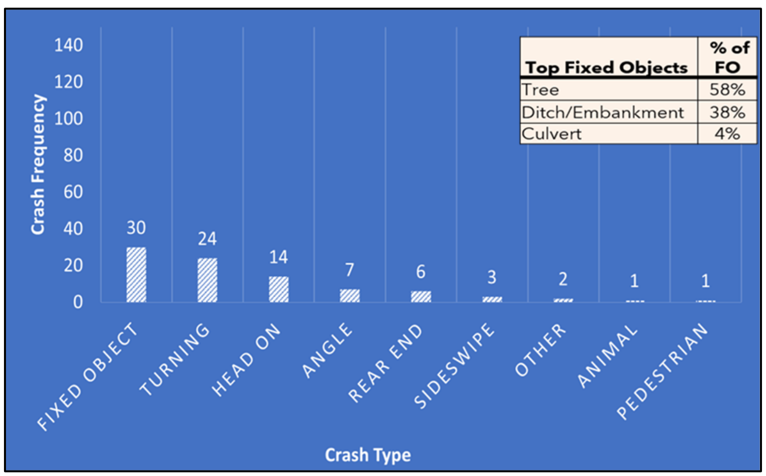


Figure 12: Non-Interstate Rural Intersection Fatal and Serious Injury Crashes in Jefferson County by Crash Type (2018-2022)

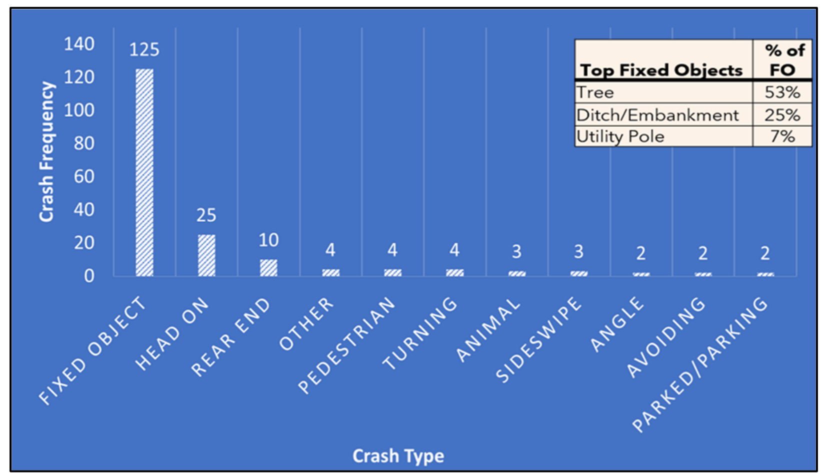


Figure 13: Non-Interstate Rural Segment Fatal and Serious Injury Crashes in Jefferson County by Crash Type (2018-2022)

Vulnerable Road Users

Pedestrian Focus in Jefferson County

In Jefferson County there were 39 pedestrian-involved KSI crashes from 2018 to 2022, which results in approximately 5% of all KSI crashes. 64% of these pedestrian-involved KSI crashes occurred in the dark, and 84% happened without streetlights, while 16% were in areas with streetlighting. Moreover, 69% of these crashes occurred along segments and not at intersections. These data underline the importance of improving pedestrian safety through enhanced lighting and infrastructure measures, especially at intersections, to reduce the frequency and severity of pedestrian-related crashes.

In Jefferson County, pedestrians were involved in 9% of all fatal crashes, with 80% of these fatal pedestrian incidents occurring in dark conditions. Among these, 83% happened without streetlights, while 17% had some level of streetlighting. Additionally, 66% of fatal pedestrian crashes occurred along segments and not at intersections, highlighting the risks pedestrians face at crossing points and in poorly lit areas.

Underserved Communities Focus in Jefferson County

The Climate and Economic Justice Screening Tool (CEJST) was used to identify disparities between KSI crashes and disadvantaged communities within Jefferson County. To identify these disparities, the percentage of the population living in disadvantaged communities was compared to the percentage of KSI crashes recorded in those same CEJST areas.

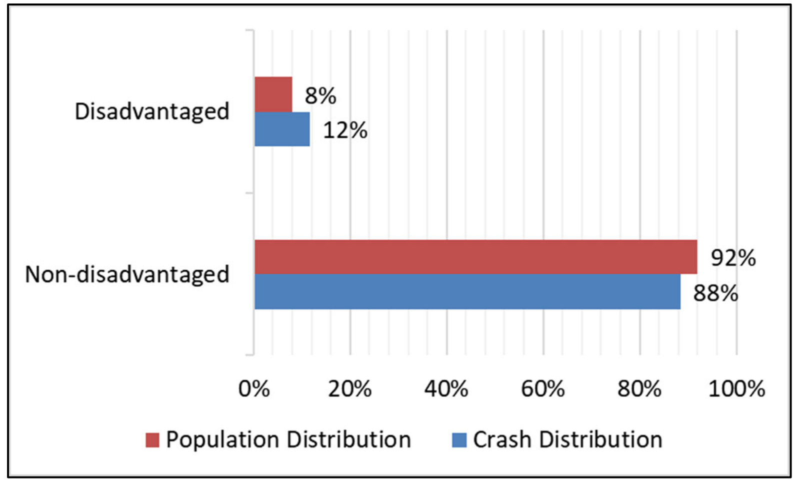


Figure 14: Comparison of Population and Fatal and Serious Injury Crashes in CEJST Areas in Jefferson County (2018-2022)

As shown in **Figure 14,** around 8% of Jefferson County's population lives in disadvantaged areas, yet about 12% of the fatal and serious crashes occur in those disadvantaged areas. This indicates a trend that more KSI crashes occur in the CEJST areas than the non-CEJST areas. This discrepancy highlights the need for increased resources and heightened efforts to address the underlying issues contributing to fatal and serious injury crashes within disadvantaged areas. It is important to understand the additional burdens and barriers these communities face, as identified by the CEJST so that more focused efforts can be directed toward improving transportation safety and health outcomes for the residents most at risk.

Summary of Findings for Jefferson County

The Jefferson County trend analysis, covering data from 2018 to 2022, reveals critical patterns in crash occurrences and contributing factors. Total crashes remained stable between 2018 and 2019, declined significantly in 2020 due to pandemic-related travel restrictions, and then rebounded in subsequent years as travel returned to normal. Despite this recovery, fatal crashes steadily increased over the observed period, while serious injury crashes, after peaking in 2019, gradually declined.

Speeding emerged as the leading cause of KSI crashes, followed by improper lane usage, and failing to yield, with distraction and alcohol/drug impairment also contributing significantly. Individuals aged 26-30 were most frequently involved in KSI crashes followed closely by those over 65, indicating higher risks due to age-related behaviors and vulnerabilities. Temporal analysis identified late afternoons and evenings on Fridays, as the highest-risk periods, especially between August and October. Although most fatal and serious injury crashes occurred in daylight and on dry roads, adverse conditions like darkness without streetlighting and wet road surfaces still posed significant risks.

Non-interstate urban roads accounted for most KSI crashes (55%), especially at intersections. Urban intersections experienced frequent collisions involving turning angle and fixed objects. Non-interstate rural roads, segments in particular, also posed substantial risks due to higher speeds and striking fixed objects such as trees, ditches, and guardrails. Although pedestrian safety was not a major factor in the overall crash composition, most pedestrians were struck at night and along segments.

These findings emphasize the need for targeted interventions and comprehensive safety strategies. Enhanced enforcement, public awareness campaigns, and safe-driving initiatives can help reduce the occurrence of fatal and serious crashes throughout Jefferson County.

Appendix A3: Existing Safety Analysis and Crash Risk Assessment for Franklin County

As part of the *Gateway to Safer Roadways: St. Louis Regional Safety Action Plan* (Action Plan), a thorough analysis of transportation safety within the East-West Gateway Council of Governments (EWG) Region was conducted using data spanning the years 2018 to 2022.

Crash data from 2018 to 2022 was gathered as part of this Action Plan and contained all crashes in the EWG Region, which includes the City of St. Louis, Franklin, Jefferson, St. Charles, and St. Louis counties in Missouri, as well as Madison, Monroe, and St. Clair counties in Illinois. The Missouri crash data was obtained from the Missouri Department of Transportation's (MoDOT's) Transportation Management Systems (TMS), and the Illinois crash data was provided by the Illinois Department of Transportation's (IDOT's) Transportation Safety Department.

The data includes all crashes occurring on public roadways that involve a fatality, injury, or property damage. Severity ratings are assigned by the responsible agencies based on the presence and significance of an injury resulting from the crash. Crash severity ratings are listed and defined below:

- Fatal – any injury that results in death within 30 days after the motor vehicle crash in which the injury occurred.
- Serious Injury – any injury other than fatal which prevents the person from walking, driving or normally continuing the activities the person could perform before the injury occurred, such as severe lacerations, broken or distorted extremity, crush injuries, suspected skull, chest, or abdominal injuries other than bruises or minor lacerations, significant burns, unconsciousness when taken from the crash scene, or paralysis.
- Minor Injury – any injury that is evident at the scene or reported or claimed that is not fatal or serious.
- Property Damage Only – when there is no apparent injury or when there is no reason to believe an injury occurred and when property damage of $500 or more for Missouri or $1,500 or more in Illinois occurred.

Crash Data: The analysis used comprehensive crash, person, and vehicle datasets sourced from MoDOT and IDOT. The crash data included information crucial to each crash, including the time and date of the crash, crash type, location, contributing factors, and lighting and weather conditions. Notably, each crash is given a unique identifier (crash ID) which is also linked to occupant and vehicle data. Occupant data within the dataset includes details about individuals involved in the crashes, including their gender, age, and the

severity of injuries sustained, with stringent measures undertaken by both agencies to scrub the data of any personally identifiable information. Additionally, the vehicle data offers valuable insights into the involved vehicle types, the use and functionality of safety devices, airbag deployment, and type of fixed objects struck by each vehicle during the crash.

Vehicle Miles Traveled (VMT): The Vehicle Miles Traveled (VMT) data, essential for understanding regional travel patterns and demand, was obtained from EWG. Covering the period from 2018 to 2022, this dataset includes VMT for each county within the EWG Region as well as aggregate regional data. The VMT data was provided in daily vehicle miles traveled format but was converted to annual vehicle miles traveled for these evaluations to be consistent with the crash data, which was summarized for each year. The VMT metric was used to compare the total number of crashes to VMT for each year to understand the correlation between the number of crashes and vehicle exposure.

Population Data: To correlate crash data with demographic trends, population estimates were sourced from EWG, based on U.S. Census Bureau data for the year 2020. Since the US census data was collected in 2020 and also aligns with the middle of the evaluation period, the 2020 population data was used for this analysis.

Equity Data: The information on disadvantaged communities was sourced from the Climate and Economic Justice Screening Tool (CEJST), a specialized tool designed to pinpoint these communities by evaluating burdens across various domains such as climate change, energy, health, housing, legacy pollution, transportation, water and wastewater, and workforce development. Within the CEJST framework, disadvantaged areas are delineated as census tracts that bear disproportionate burdens and lack adequate support concerning these environmental and economic challenges.

The data collection and processing efforts detailed above are foundational to the Action Plan. They enable a data-driven approach to understanding the dynamics of transportation safety and formulating strategies to mitigate risks and enhance safety across the EWG Region. This methodical approach ensures that the analyses are grounded in reliable data, facilitating informed decision-making in regional transportation planning and safety management.

Franklin County Trend Analysis

Trend Analysis - Crashes and VMT in Franklin County

Figure 1 reveals trends in total crashes and Vehicle Miles Traveled (VMT) in Franklin County from 2018 to 2022. The total number of crashes, shown in the blue bars, fluctuated over the years. In 2018, there were 2,652 crashes, which rose to a peak of 2,705 in 2019 before dropping to 2,343 in 2020 due to the impact of the COVID-19 pandemic on travel patterns. In subsequent years, crash numbers recovered, reaching 2,558 in 2021 and settling at 2,379 in 2022.

The black line indicates the trend in VMT, with the secondary axis on the right showing miles in millions. VMT followed a similar pattern to total crashes, peaking in 2019, declining sharply in 2020, and then rising again in 2021 and again in 2022. These patterns demonstrate that both VMT and crashes experienced a noticeable decline in 2020 due to the pandemic, but gradually returned to more normal levels in subsequent years as travel behavior began to increase again.

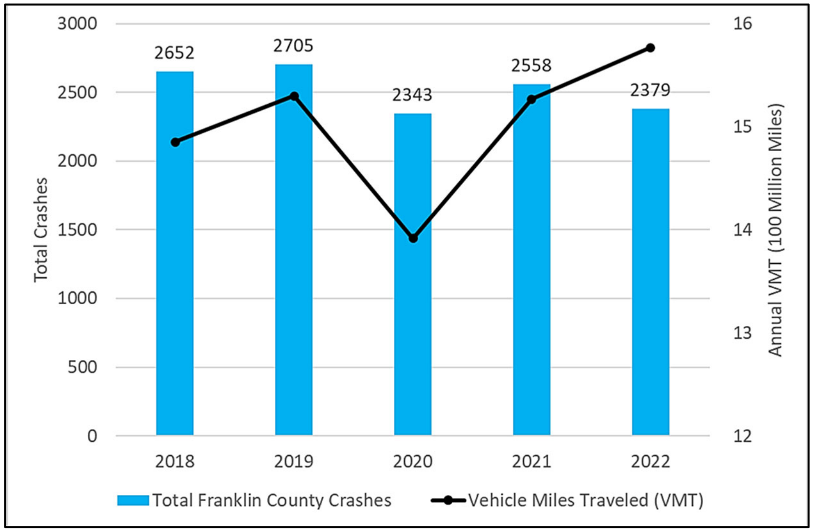


Figure 1: Annual Total Crashes and Vehicle Miles Traveled (VMT) in Franklin County (2018-2022)

Trend Analysis – Fatal and Serious Injury Crashes in Franklin County

Franklin County had a total of 534 Fatal and Serious Injury (KSI) crashes between 2018 and 2022 for an average of 107 KSI crashes per year. **Figure 2** illustrates the trends in KSI crashes from 2018 to 2022.

Franklin County had a total of 101 fatal crashes over the five-year period for an average of 20 fatal crashes per year fatal crashes (depicted by the blue bars) started at 23 incidents in 2018, rising to 26 in 2019 before dropping to 16 in 2020. They then declined further to 14 in 2021 before increasing again to 22 in 2022. The linear trendline suggests a relatively stable trend over time.

Franklin County had a total of 433 serious injury crashes over the five-year period for an average of about 87 serious injury crashes per year. Serious injury crashes (depicted by the orange bars) show a different pattern. Starting at 64 in 2018, the count rose to 73 in 2019 before dropping to 97 in 2020. It then peaked at 116 in 2021 before declining to 83 in 2022. The trendline indicates an overall upward progression, revealing a significant increase in serious injury crashes over the observed period.

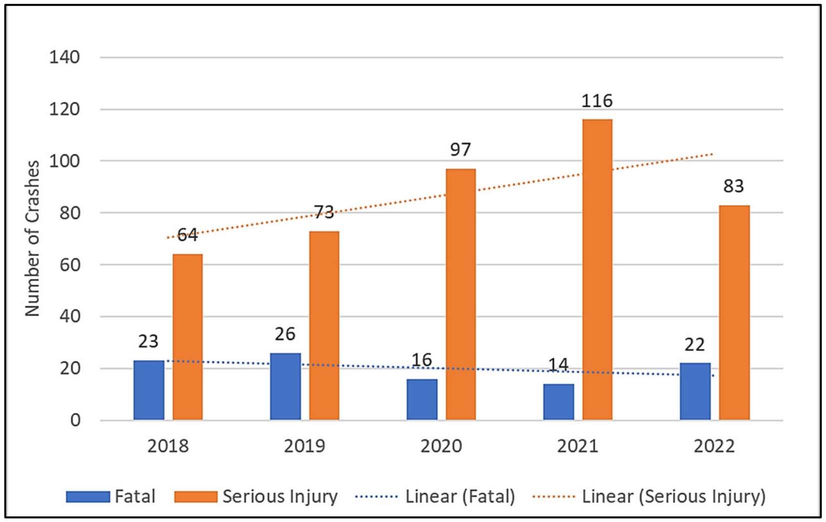


Figure 2: Fatal and Serious Injury Crashes in Franklin County by Year (2018-2022)

FRANKLIN COUNTY CRASH RISK ASSESSMENT

What are the Contributing Factors of Fatal and Serious Crashes in Franklin County?

Figure 3 presents data on the contributing factors of KSI crashes in Franklin County from 2018 to 2022. Speeding emerges as the most significant factor, involved in 37% of all KSI crashes. This high proportion underscores the critical need to address speeding through targeted enforcement and public education initiatives. Distraction is the second leading cause, accounting for 23% of these crashes. Alcohol and drug use are also prominent contributors, involved in 18% of crashes. Failure to yield plays a significant role, being a factor in 16% of KSI crashes, while overcorrected steering accounts for 14%. Improper lane usage, wrong-way driving, and the physical condition of the driver each contribute to a notable percentage, ranging between 7% and 13%. Disregarding signals/signs and following too closely account for 4% and 3% of KSI crashes, respectively.

These patterns emphasize the diverse nature of KSI crashes and the necessity for comprehensive road safety strategies. Addressing high-risk behaviors like speeding, distraction, and substance abuse remains crucial for reducing the number and severity of these incidents in Franklin County.

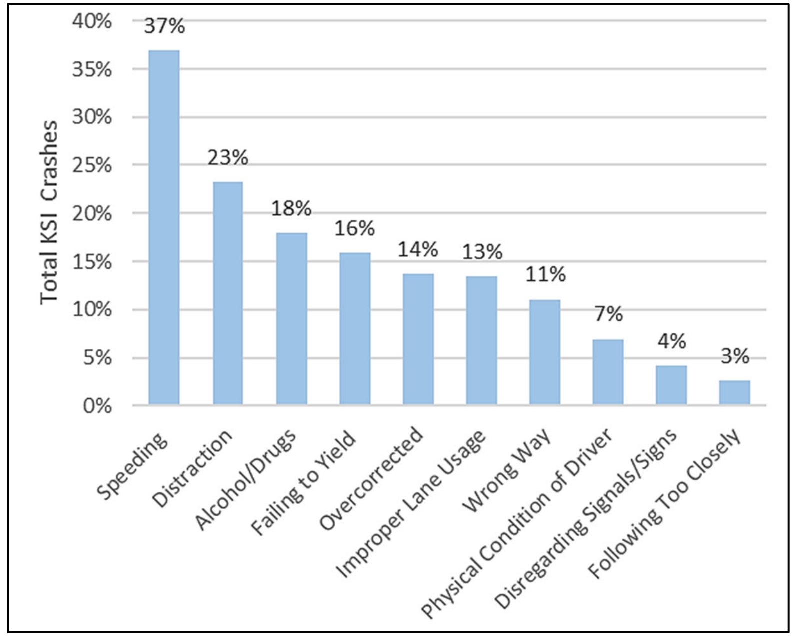


Figure 3: Top 10 Contributing Factors of Fatal and Serious Injury Crashes in Franklin County (2018-2022)

What is the Age of Those Involved in Fatal and Serious Crashes in Franklin County?

To identify what age groups are more likely to be involved in fatal or serious injury crashes, the crash data was categorized into age groups based on the methodology used by the National Highway Traffic Safety Administration (NHTSA). This methodology includes those under 16 years old as a group, those older than 65 years old as a group and then groups for every five-year increments in-between.

Figure 4 analyzes the age distribution of individuals involved in KSI crashes in Franklin County between 2018 and 2022, including drivers, pedestrians, and bicyclists. Adults aged 26-30 have the highest rate of involvement, with nearly 100 individuals affected, followed by those in the 16-20 age bracket and then those over 65.

This distribution aligns with regional and national patterns, where younger adults and older adults tend to be at higher risk for severe crashes due to inexperience and behaviors like speeding and distraction. Conversely, older adults over 65 may have more cautious driving habits but still face risks due to age-related physical or cognitive decline.

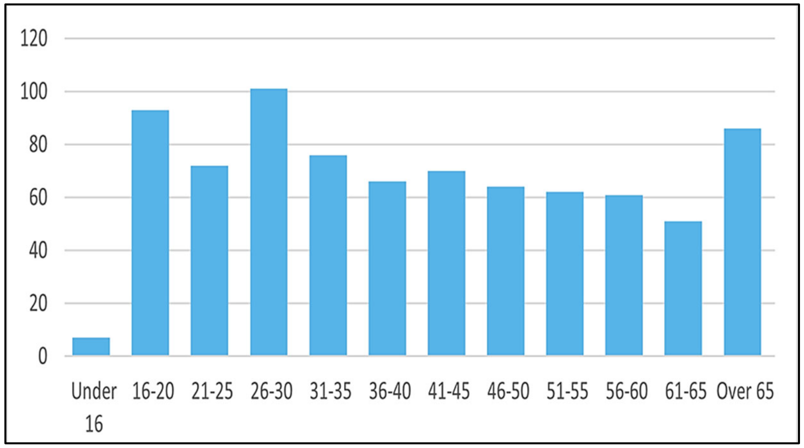


Figure 4: Age Distribution of Persons Involved in Fatal and Serious Injury Crashes in Franklin County (2018-2022)

When do Fatal and Serious Crashes Occur in Franklin County?

Examining the temporal patterns of KSI crashes in Franklin County between 2018 and 2022 reveals notable trends across months, days, and times. The heat map shown in **Figure 5** identifies more crashes on Saturdays with a notable spike from May through September. This pattern indicates that weekends and the start of the workweek are critical times for increased crash occurrences in Franklin County. The month of June saw the highest KSI crash frequency in the past 5 years.

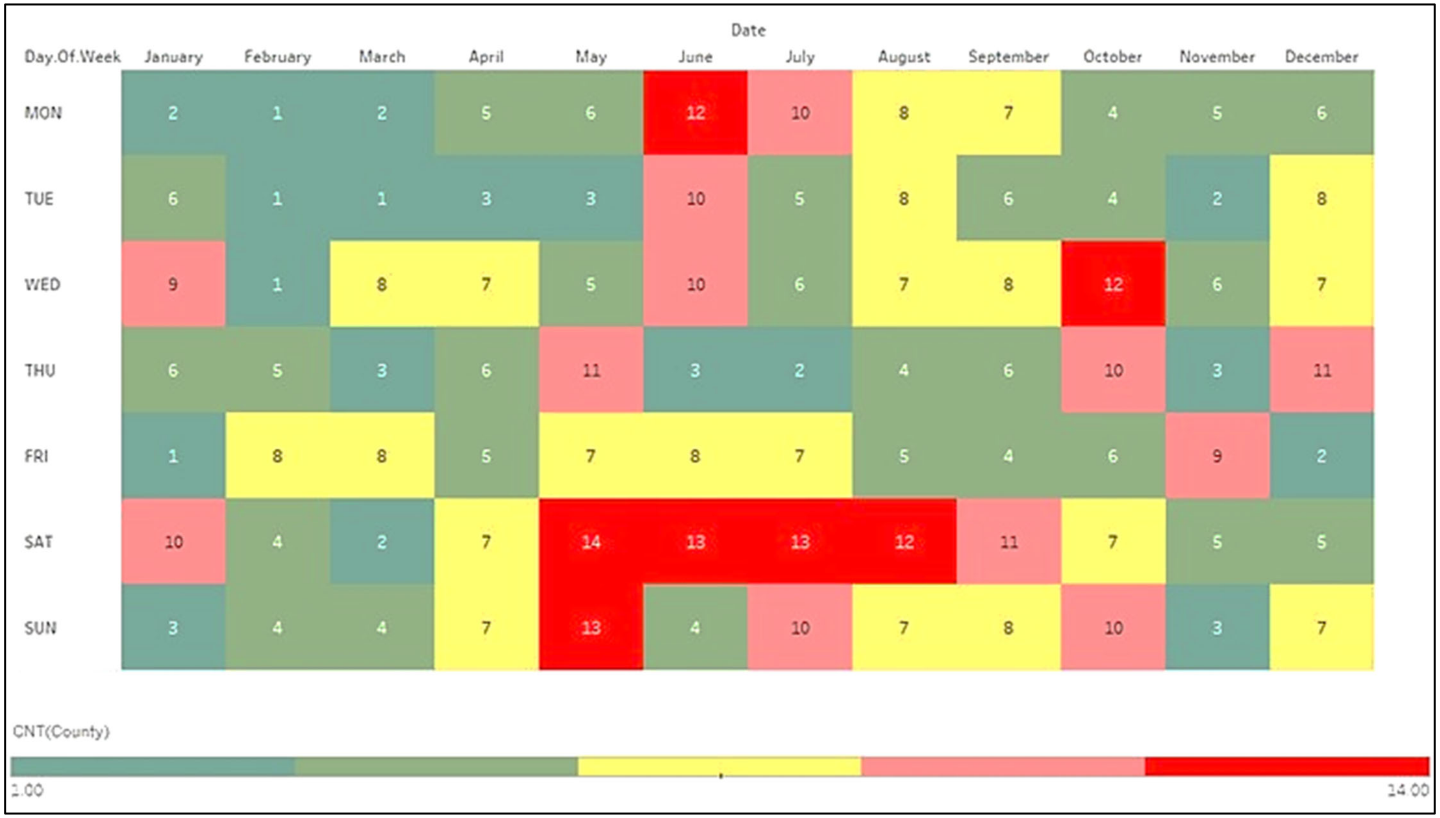


Figure 5: Fatal and Serious Injury Crashes in Franklin County by Month and Day of Week (2018-2022)

Figure 6 focuses on KSI crashes throughout each day of the week, revealing trends based on time of day. Late afternoon and evening hours, particularly between 3:00 PM and 8:00 PM, are high-risk periods, with a noticeable peak around 4:00 and 5:00 PM on Wednesdays, when up to 10 crashes occurred. Saturdays from 2:00 PM to 7:00 PM also stand out, showing an elevated crash frequency, which might be attributed to increased travel for weekend activities. Furthermore, early morning hours (from midnight to 2:00 AM) on Saturday present a higher risk, likely due to impaired driving or fatigue.

Hour	MON	TUE	WED	THU	FRI	SAT	SUN
12:00 AM	2	1	1	1	2	3	1
1:00 AM		1	1	1	3	5	3
2:00 AM	1			2	2	1	4
3:00 AM	2				1	1	3
4:00 AM			1	2	1	1	3
5:00 AM	2	2	2	3		2	1
6:00 AM	3	3	6	1	2	1	2
7:00 AM	4	3	4	1		2	1
8:00 AM	1	5	4	4	3	3	6
9:00 AM	3		2	1	1	3	3
10:00 AM	3	2	3	4	3	2	1
11:00 AM	1	1	5	6	1	6	4
12:00 PM	5	1	2	3	3	8	3
1:00 PM	2	4	5	3	2	4	2
2:00 PM	6	4	6	4	6	7	4
3:00 PM	7	1	3	5	6	8	9
4:00 PM	8	2	10	6	5	2	6
5:00 PM	3	5	10	3	5	9	2
6:00 PM	3	5	3	4	4	10	4
7:00 PM	2	2	4	6	7	3	7
8:00 PM	4	3	6	5	5	4	6
9:00 PM	2	4	6	3	2	6	
10:00 PM	3	2	1		1	6	4
11:00 PM	1	5	1	1	5	5	1

CNT(County)

1.000 – 10.000

Figure 6: Fatal and Serious Injury Crashes in Franklin County by Day and Hour (2018-2022)

These patterns highlight the need for targeted safety measures during specific periods. Enhanced traffic enforcement and public awareness campaigns focused on weekends and evenings could help reduce the frequency of dangerous driving behaviors prevalent during these high-risk times.

Lighting Conditions of Fatal and Serious Crashes in Franklin County

Figure 7 offers insight into the light conditions surrounding KSI crashes in Franklin County from 2018 to 2022. Most of these crashes occurred during daylight, accounting for 64% of incidents. A substantial proportion of crashes, 31%, took place in dark conditions without streetlights, underscoring the heightened risks associated with poorly lit roadways. Crashes in dark conditions with streetlights made up only 5% of the total. Although a significant portion of crashes occurred during daylight hours, the dark with no streetlights percentage in Franklin County (31%) was significantly higher than the regional average (16%).

These findings emphasize that driver behavior remains a critical factor across all lighting conditions, and while proper illumination can improve safety, it is not a stand-alone solution.

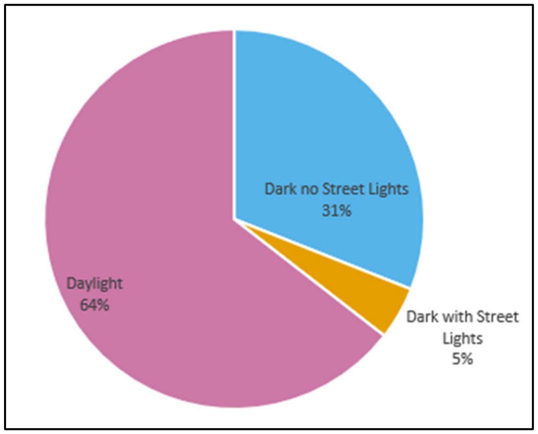


Figure 7: Fatal and Serious Injury Crashes in Franklin County by Lighting (2018-2022)

Road Surface Condition of Fatal and Serious Injury Crashes in Franklin County

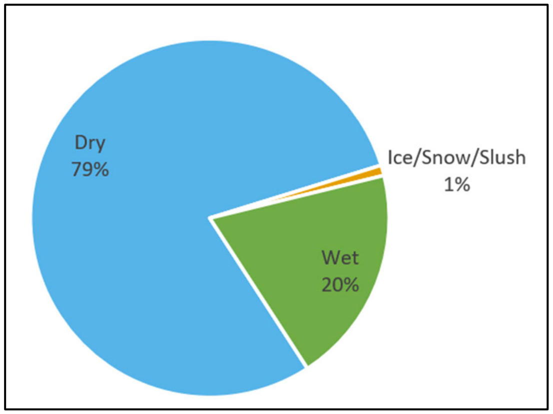


Figure 8: Fatal and Serious Injury Crashes in Franklin County by Road Surface Condition (2018-2022)

From 2018 to 2022 in Franklin County, most KSI crashes occurred on dry road surfaces, as shown in **Figure 8**. Dry conditions accounted for 79% of all incidents, emphasizing that KSI crashes predominantly happen in clear weather. Wet road surfaces were involved in 20% of KSI crashes, indicating that rain and wet pavement remain influential risk factors. Ice, snow, and slush conditions accounted for just 1% of crashes. These statistics highlight that while adverse weather can elevate road hazards, most KSI crashes are more closely tied to driver behavior or roadway characteristics rather than the road surface alone.

Although a significant portion of crashes occurred on dry road surfaces, the wet road surface percentage in Franklin County (20%) was notably higher than the regional average (14%).

Where are Fatal and Serious Crashes Occurring in Franklin County?

Franklin County has a wide variety of roadway systems, such as interstates, arterials, collectors, and local roads. Since interstates are higher speed, access-controlled facilities with interchanges, the safety issues on those facilities are much different than the non-interstate facilities. As a result, for the systemic safety analysis, three main categories were developed: Interstate, Non-Interstate Rural, and Non-Interstate Urban.

Figure 9 illustrates a breakdown of KSI crashes in Franklin County between 2018 and 2022 based on road type. As shown, 17% of the region's KSI crashes occurred on interstates, 27 occurred on non-interstate roads in urban areas, and 56% occurred on non-interstate roads in rural areas.

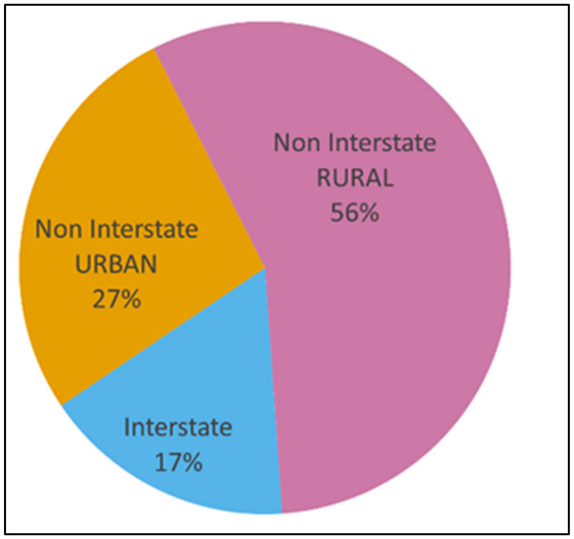


Figure 9: Fatal and Serious Injury Crashes in Franklin County by Road Type (2018-2022)

Non-Interstate Crashes – Urban Area in Franklin County

According to the crash data between 2018 and 2022, approximately 27% of Franklin County KSI crashes occurred on non-interstate roads in urban areas. The urban non-interstate crashes consisted of a total of 144 KSI crashes or approximately 30 per year. To assist in determining potential systemic improvements in urban areas, crash types at intersections and crash types along segments were evaluated. Crashes within 150 feet of an intersection were considered intersection crashes.

When considering the non-interstate urban KSI crashes in Franklin County, approximately 60% occurred at urban intersections (87 KSI crashes or about 17 per year). **Figure 10** shows a breakdown of crash types at **non-interstate urban intersections** in Franklin County. Turning crashes are the most frequent type of KSI crashes, totaling 28 crashes. Fixed-object crashes follow with 19 crashes, while head-on incidents contribute 12 crashes. Other crash types include angle (nine), rear-end (nine), sideswipe (five), bicycle (two), pedestrian (two), and one avoiding. Commonly struck objects include utility poles, ditches/embankments, and curbs.

When considering the non-interstate urban KSI crashes in Franklin County, 40% of KSI crashes occurred along urban road segments (57 KSI crashes or about 11 per year). **Figure 11** display the types of KSI crashes occurring at **non-interstate urban road segments** in Franklin County between 2018 and 2022. Fixed-object crashes dominate with 25 incidents, followed by head-on crashes (10) and pedestrian crashes (nine). Rear-ends, turning, bicycle, avoiding, parked and sideswipe account for five crashes or less each. Fixed objects commonly hit include ditches or embankments (33%), trees (22%), and utility poles (22%).

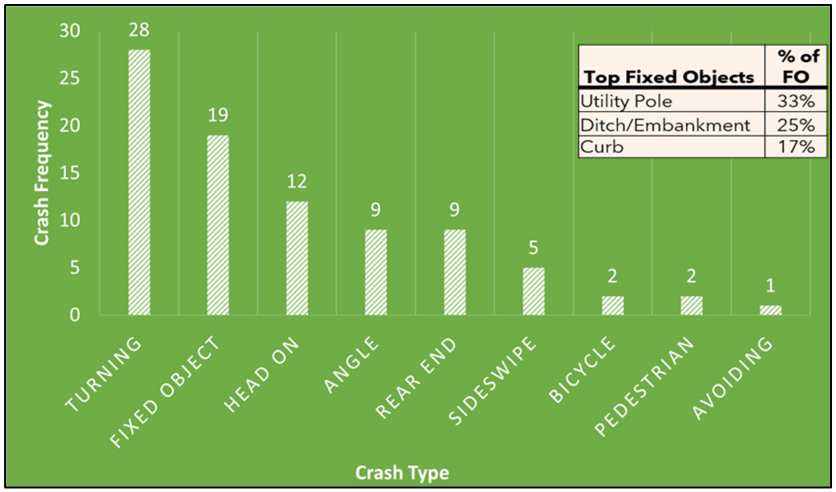


Figure 10: Non-Interstate Urban Intersection Fatal and Serious Injury Crashes in Franklin County by Crash Type (2018-2022)

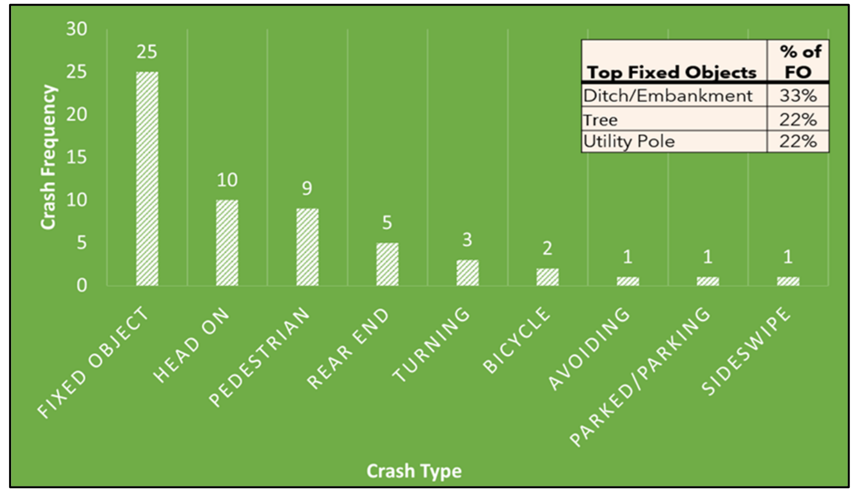


Figure 11: Non-Interstate Urban Segment Fatal and Serious Injury Crashes in Franklin County by Crash Type (2018-2022)

Non-Interstate Crashes – Rural Area in Franklin County

According to the crash data between 2018 and 2022, approximately 56% of Franklin County KSI crashes occurred on non-interstate roads in rural areas. The rural non-interstate crashes consisted of a total of 301 KSI crashes or approximately 60 per year. To assist in determining potential systemic improvements in rural areas, crash types at intersections and crash types along segments were evaluated. Crashes within 150 feet of an intersection were considered intersection crashes.

When considering the non-interstate rural KSI crashes in Franklin County, 25% of KSI crashes occurred at rural intersections (76 KSI crashes or about 15 per year). **Figure 12** shows fixed-object crashes were the leading cause of KSI crashes at **non-interstate rural intersections**, accounting for 30 crashes. Angle and turning crashes were also significant, with each contributing 14 incidents. Other crash types, including head on, rear end, sideswipe, avoiding, and pedestrian crashes were less frequent but still had a minor contribution.

When considering the non-interstate rural KSI crashes in Franklin, 66% occurred along rural segments (225 KSI crashes or about 45 per year). **Figure 13** highlights the crash types at **non-interstate rural road segments** in Franklin County from 2018 to 2022. Fixed-object crashes, which includes out of control and run off road crashes, were the most common type with 72% (163 incidents), while head-on crashes accounted for 27 crashes or 12%. Rear-end, sideswipe, turning ped animal, bike, other and avoiding had nine crashes or less each. The majority of fixed objects struck were trees and Ditches/embankments which made up 74% of crashes.

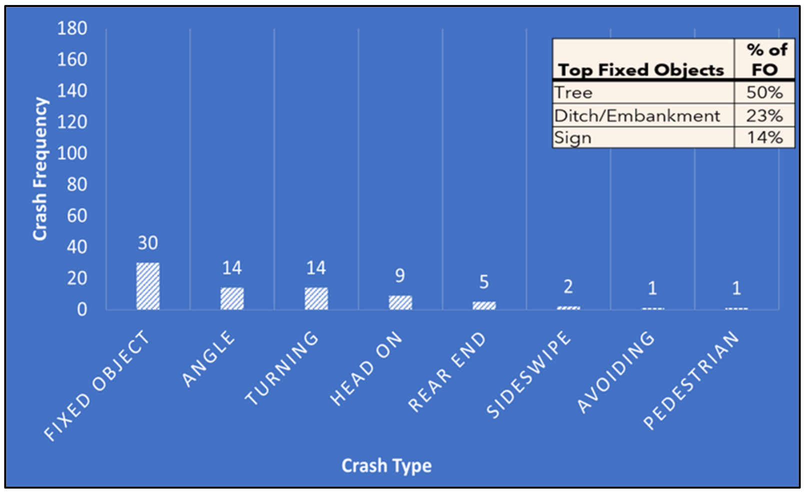


Figure 12: Non-Interstate Rural Intersection Fatal and Serious Injury Crashes in Franklin County by Crash Type (2018-2022)

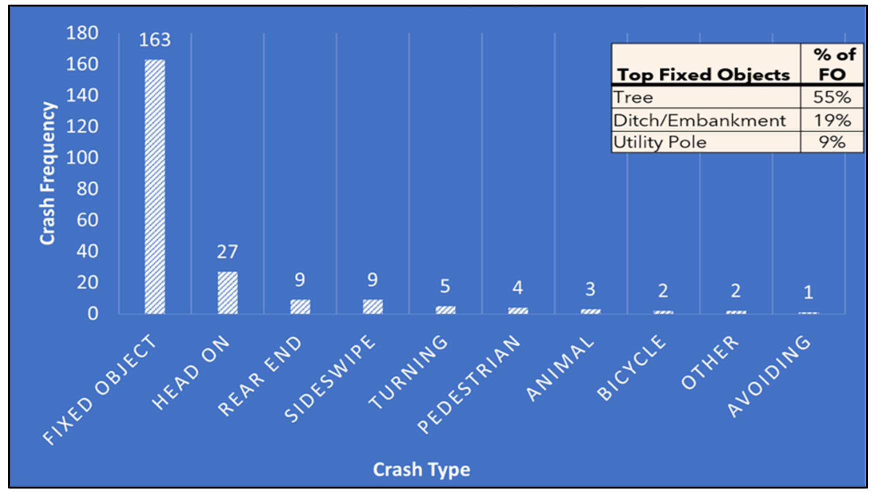


Figure 13: Non-Interstate Rural Segment Fatal and Serious Injury Crashes in Franklin County by Crash Type (2018-2022)

Vulnerable Road Users

Pedestrian Focus in Franklin County

In Franklin County, there were 26 pedestrian-involved KSI crashes from 2018 to 2022, which is approximately 5% of all KSI crashes. Approximately 58% of these crashes occur in dark conditions. Of those dark crashes, 80% took place in areas without streetlights. A significant 88% of KSI pedestrian crashes happened along road segments rather than at intersections, indicating that pedestrians are at a higher risk of severe crashes on these stretches.

These findings emphasize the need for safety improvements in areas lacking proper lighting and for targeted interventions along road segments where pedestrians face significant risks. Implementing better lighting infrastructure and enhancing pedestrian crossing facilities along segments can contribute to reducing the severity and occurrence of pedestrian-involved crashes in Franklin County.

Underserved Communities Focus in Franklin County

The Climate and Economic Justice Screening Tool (CEJST) was used to identify disparities between KSI crashes and disadvantaged communities within Franklin County. To identify these disparities, the percentage of the population living in disadvantaged communities was compared to the percentage of KSI crashes recorded in those same CEJST areas.

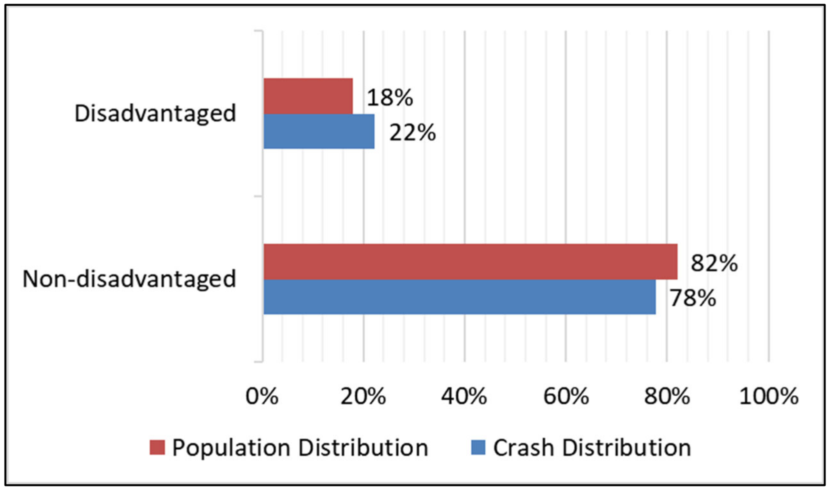


Figure 14: Comparison of Population and Fatal and Serious Injury Crashes in CEJST Areas in Franklin County (2018-2022)

As shown in **Figure 14,** approximately 18% of Franklin County's population lives in disadvantaged areas, yet about 22% of the fatal and serious crashes occur in those disadvantaged areas. This indicates a trend that more KSI crashes occur in the CEJST areas than in the non-CEJST areas. This discrepancy highlights the need for increased resources and heightened efforts to address the underlying issues contributing to fatal and serious injury crashes within disadvantaged areas. It is important to understand the additional burdens and barriers these communities face, as identified by the CEJST so that more focused efforts can be directed toward improving transportation safety and health outcomes for the residents most at risk.

Summary of Findings in Franklin County

A comprehensive analysis of crash data in Franklin County from 2018 to 2022 unveils concerning trends and offers valuable insights for enhancing road safety initiatives. The overall number of crashes mirrored Vehicle Miles Traveled (VMT) patterns, with a notable decrease in 2020 attributable to the COVID-19 pandemic. There was a slight decline in the fatal crashes over the 5 year period, but there was an increase in the number of serious injury crashes from 2018 to 2021.

Speeding emerged as the most significant contributing factor, followed by driver distraction and impairment. The data indicates that young adults and senior citizens constitute high-risk demographics, and weekends with evenings between 3:00 pm and 8:00 pm present periods of heightened crash risk. Although a significant portion of crashes occurred during daylight hours, the dark with no streetlights percentage was significantly higher than the regional average.

Non-interstate rural roads accounted for most fatal and serious injury (KSI) crashes (56%), especially along segments. Rural segments experienced frequent collisions involving fixed objects and head on. Non-interstate urban roads, intersections in particular, also posed substantial risks due to turning and striking fixed objects such as utility poles, and ditches/embankments. Although pedestrian safety was not a major factor in the overall crash composition, most pedestrians were struck at night and along urban road segments.

To effectively improve road safety, Franklin County should prioritize targeted enforcement campaigns that specifically address speeding, distracted driving, and driving under the influence, with a particular focus on high-risk demographics and peak crash times. Given the disproportionate share of severe crashes occurring on rural roads due to factors such as fixed objects, head-on collisions, and higher speeds, prioritizing roadway departure safety improvements and implementing clearer signage is important. By meticulously implementing these recommendations, Franklin County can make significant progress towards achieving a demonstrable reduction in both the number and severity of crashes on its roadways.

Appendix A4: Existing Safety Analysis and Crash Risk Assessment for Madison County

As part of the *Gateway to Safer Roadways: St. Louis Regional Safety Action Plan* (Action Plan), a thorough analysis of transportation safety within the East-West Gateway Council of Governments (EWG) Region was conducted using data spanning the years 2018 to 2022.

Crash data from 2018 to 2022 was gathered as part of this Action Plan and contained all crashes in the EWG Region, which includes the City of St. Louis, Franklin, Jefferson, St. Charles, and St. Louis counties in Missouri, as well as Madison, Monroe, and St. Clair counties in Illinois. The Missouri crash data was obtained from the Missouri Department of Transportation's (MoDOT's) Transportation Management Systems (TMS), and the Illinois crash data was provided by the Illinois Department of Transportation's (IDOT's) Transportation Safety Department.

The data includes all crashes occurring on public roadways that involve a fatality, injury, or property damage. Severity ratings are assigned by the responsible agencies based on the presence and significance of an injury resulting from the crash. Crash severity ratings are listed and defined below:

- Fatal – any injury that results in death within 30 days after the motor vehicle crash in which the injury occurred.
- Serious Injury – any injury other than fatal which prevents the person from walking, driving or normally continuing the activities the person could perform before the injury occurred, such as severe lacerations, broken or distorted extremity, crush injuries, suspected skull, chest, or abdominal injuries other than bruises or minor lacerations, significant burns, unconsciousness when taken from the crash scene, or paralysis.
- Minor Injury – any injury that is evident at the scene or reported or claimed that is not fatal or serious.
- Property Damage Only – when there is no apparent injury or when there is no reason to believe an injury occurred and when property damage of $500 or more for Missouri or $1,500 or more in Illinois occurred.

Crash Data: The analysis used comprehensive crash, person, and vehicle datasets sourced from MoDOT and IDOT. The crash data included information crucial to each crash, including the time and date of the crash, crash type, location, contributing factors, and lighting and weather conditions. Notably, each crash is given a unique identifier (crash ID) which is also linked to occupant and vehicle data. Occupant data within the dataset includes details about individuals involved in the crashes, including their gender, age, and the

severity of injuries sustained, with stringent measures undertaken by both agencies to scrub the data of any personally identifiable information. Additionally, the vehicle data offers valuable insights into the involved vehicle types, the use and functionality of safety devices, airbag deployment, and type of fixed objects struck by each vehicle during the crash.

Vehicle Miles Traveled (VMT): The Vehicle Miles Traveled (VMT) data, essential for understanding regional travel patterns and demand, was obtained from EWG. Covering the period from 2018 to 2022, this dataset includes VMT for each county within the EWG Region as well as aggregate regional data. The VMT data was provided in daily vehicle miles traveled format but was converted to annual vehicle miles traveled for these evaluations to be consistent with the crash data, which was summarized for each year. The VMT metric was used to compare the total number of crashes to VMT for each year to understand the correlation between the number of crashes and vehicle exposure.

Population Data: To correlate crash data with demographic trends, population estimates were sourced from EWG, based on U.S. Census Bureau data for the year 2020. Since the U.S. Census data was collected in 2020 and also aligns with the middle of the evaluation period, the 2020 population data was used for this analysis.

Equity Data: The information on disadvantaged communities was sourced from the Climate and Economic Justice Screening Tool (CEJST), a specialized tool designed to pinpoint these communities by evaluating burdens across various domains such as climate change, energy, health, housing, legacy pollution, transportation, water and wastewater, and workforce development. Within the CEJST framework, disadvantaged areas are delineated as census tracts that bear disproportionate burdens and lack adequate support concerning these environmental and economic challenges.

The data collection and processing efforts detailed above are foundational to the Action Plan. They enable a data-driven approach to understanding the dynamics of transportation safety and formulating strategies to mitigate risks and enhance safety across the EWG Region. This methodical approach ensures that the analyses are grounded in reliable data, facilitating informed decision-making in regional transportation planning and safety management.

Madison County Trend Analysis

Trend Analysis - Crashes and VMT in Madison County

Figure 1 for Madison County presents trends in total crashes and Vehicle Miles Traveled (VMT) between 2018 and 2022. The total number of crashes, represented by the blue bars, remained relatively steady in 2018 and 2019, with 5,692 and 5,832 incidents, respectively. However, 2020 saw a significant drop to 4,839, likely due to reduced travel during the COVID-19 pandemic. In 2021, total crashes surged to 5,648 and then slightly decreased to 5,219 in 2022.

The VMT, indicated by the black line on the secondary axis, follows a similar pattern, with a sharp decline in 2020 before rising again in 2021 and stabilizing in 2022. Despite the increase in 2021, VMT has not yet returned to pre-pandemic levels. These trends highlight the pandemic's impact on both VMT and crash patterns, with gradual recovery in subsequent years reflecting a resurgence in travel behavior and crash rates.

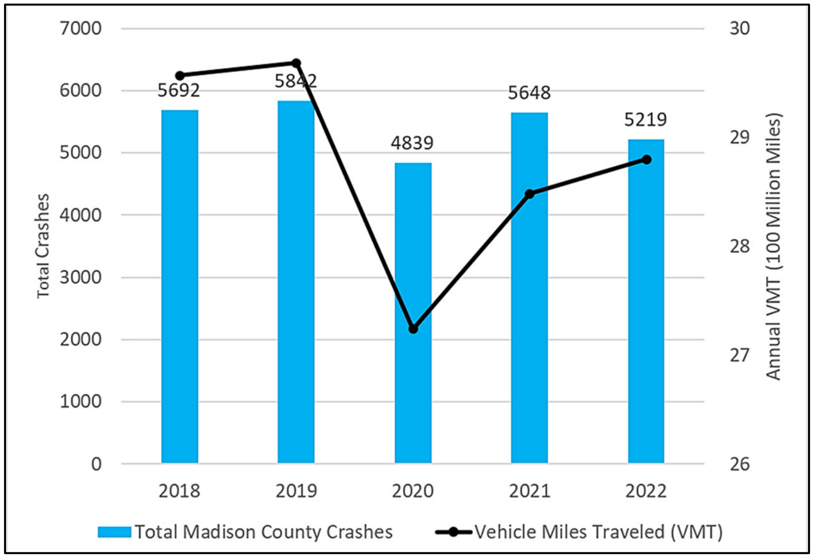


Figure 1: Annual Total Crashes and Vehicle Miles Traveled (VMT) in Madison County (2018-2022)

Trend Analysis – Fatal and Serious Injury Crashes in Madison County

Madison County had a total of 1,159 Fatal and Serious Injury (KSI) crashes between 2018 and 2022 for an average of 232 KSI crashes per year. **Figure 2** demonstrates the annual trends in fatal and serious injury crashes in Madison County over the five-year period. The bar chart separates the data into two series to highlight the severity of crashes, while linear trendlines illustrate the progression over this five-year period.

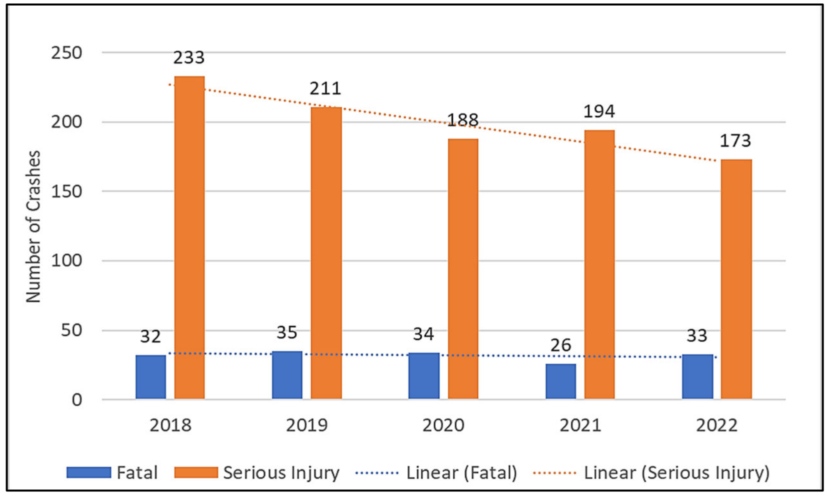


Figure 2: Fatal and Serious Injury Crashes in Madison County by Year (2018-2022)

Madison County had a total of 160 fatal crashes over the five-year period for an average of about 32 fatal crashes per year. Fatal crashes, represented by the blue bars, started at 32 incidents in 2018 and then increased to 35 in 2019. In 2020, fatal crashes remained relatively stable at 34, before dropping to 26 in 2021. In 2022, fatal crashes rebounded to 33. The linear trendline shows a steady pattern for fatal crashes across the period.

Madison County had a total of 999 serious injury crashes over the five-year period for an average of about 200 serious injury crashes per year. Serious injury crashes, represented by the orange bars, began at 233 incidents in 2018 and then steadily declined to 211 in 2019, 188 in 2020, and 194 in 2021. In 2022, serious injury crashes further decreased to 173. The linear trendline for serious injury crashes illustrates a downward trajectory, indicating a consistent decline in these incidents throughout the observed period. These trends emphasize the importance of implementing measures to maintain the reduction in serious injuries while addressing the relatively stable pattern of fatal crashes in Madison County.

MADISON COUNTY CRASH RISK ASSESSMENT

What are the Contributing Factors of Fatal and Serious Crashes in Madison County?

A detailed analysis of KSI crash data in Madison County between 2018 and 2022, reveals that speeding was the predominant contributing factor, accounting for 34%, as shown in **Figure 3.** Improper lane usage is next, responsible for 21% of incidents, followed by failure to yield (19%) and disregarding signals/signs (11%). Alcohol/drug impairment contributes to 10% of crashes, with physical conditions of the driver (6%), distraction (4%), following too closely (4%), and driving the wrong way (3%) also playing a role. Overcorrecting was reported in less than 1% of incidents.

These statistics indicate the diverse and multifactorial nature of KSI crashes. High-risk behaviors such as speeding, improper lane usage, and failure to yield account for a significant portion of these crashes, pointing to the need for comprehensive safety strategies.

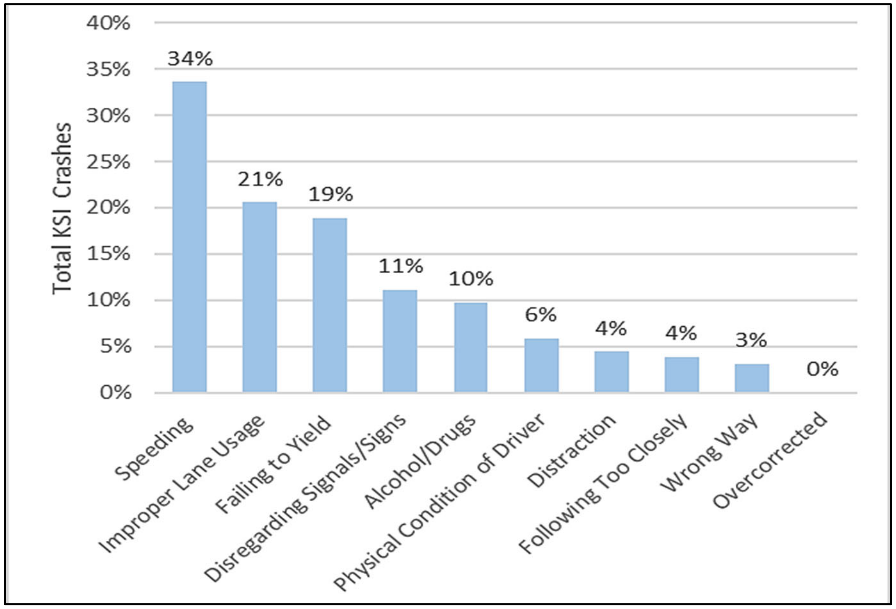


Figure 3: Top 10 Contributing Factors of Fatal and Serious Injury Crashes in Madison County (2018-2022)

What is the Age of Those Involved in Fatal and Serious Crashes in Madison County?

To identify what age groups are more likely to be involved in fatal and serious injury crashes, the crash data was categorized into age groups based on the methodology used by the National Highway Traffic Safety Administration (NHTSA). This methodology includes those under 16 years old as a group, those older than 65 years old as a group and then groups for every five-year increments in-between.

The bar chart in **Figure 4** illustrates the age distribution of people involved in KSI crashes in Madison County between 2018 and 2022 including drivers, pedestrians, and bicyclists. Individuals aged 21-25 were the most frequently involved in KSI crashes, with over 250 individuals impacted. This was closely followed by the 26-30 and 31-35 age groups, both of which involved over 200 individuals.

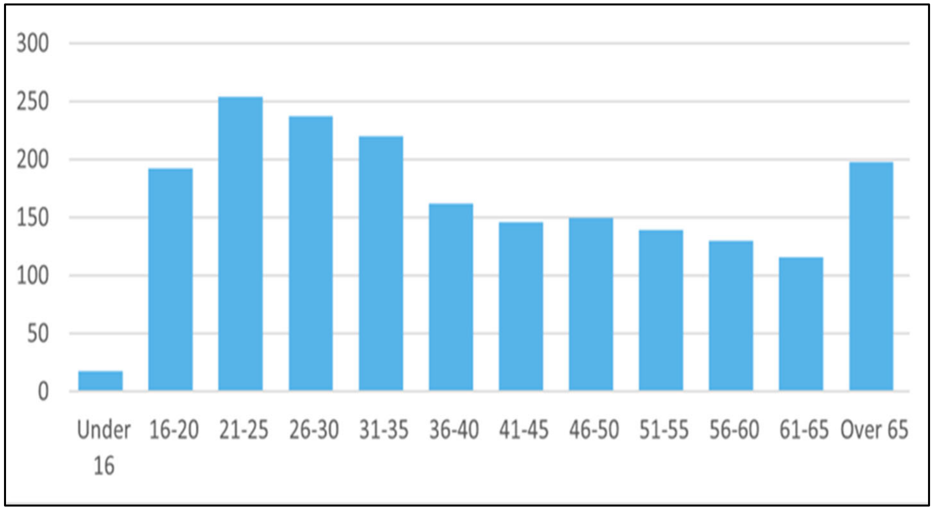


Figure 4: Age Distribution of Persons Involved in Fatal and Serious Injury Crashes in Madison County (2018-2022)

Those over 65 also showed a significant number, involving nearly 200 individuals in KSI crashes. Despite older adults often having more cautious driving habits, their physical vulnerabilities make them prone to serious injuries in crashes. Conversely, the under 16 group had the lowest involvement, which aligns with their limited exposure to driving.

These patterns highlight the importance of addressing risky behaviors among younger adults, who are more prone to distraction and speeding. Meanwhile, the increased risk among older adults points to the need for specific safety measures catering to the unique challenges of aging drivers.

When do Fatal and Serious Crashes Occur in Madison County?

Examining the temporal patterns of KSI crashes in Madison County between 2018 and 2022 reveals concerning trends across months, days, and times. A heat map in **Figure 5** highlights the periods with the most significant crash rates. Fridays and Saturdays are days with a consistently higher frequency of crashes, particularly in June, which experienced 25 or 26 crashes. This trend suggests that weekends, especially in the late spring and early autumn, are periods of heightened risk. Increased social and recreational travel might contribute to the uptick, making Fridays and Saturdays particularly vulnerable to serious crashes.

Figure 5: Fatal and Serious Injury Crashes in Madison County by Month and Day (2018-2022)

In **Figure 6**, the hour and weekday heatmap reveals that the late afternoon and evening hours, from 3:00 PM to 6:00 PM, are periods with elevated crash rates. Thursdays and Fridays both show peaks at 3:00 PM and 6:00 PM, while Friday evenings from 4:00 PM to 6:00 PM stand out with a high frequency of crashes, peaking at 23 incidents around 5:00 PM. Fridays and Saturdays during early morning hours also see a higher frequency, which might be due to impaired driving or driver fatigue. Addressing these patterns through targeted enforcement, public awareness campaigns, and weekend and evening-focused safe-driving programs can help reduce these dangerous driving behaviors.

Hour	Mon	Tue	Wed	Thu	Fri	Sat	Sun
12:00 AM	8	1	2	1	5	7	5
1:00 AM	5	8	4	3	5	10	10
2:00 AM	1	3	2	4	2	17	7
3:00 AM	5	1	9	2	3	10	6
4:00 AM	6	2	5	3	2	8	1
5:00 AM	8	2	2	5	9	9	5
6:00 AM	2	8	6	5	4	6	1
7:00 AM	5	7	8	11	4	3	6
8:00 AM	8	4	6	8	5	2	2
9:00 AM	4	4	8	5	5	8	1
10:00 AM	7	5	6	5	3		8
11:00 AM	8	7	11	6	7	7	7
12:00 PM	9	8	11	7	9	9	6
1:00 PM	6	4	5	7	8	13	4
2:00 PM	7	7	12	5	10	10	10
3:00 PM	12	9	12	19	13	13	8
4:00 PM	7	17	11	8	16	7	6
5:00 PM	14	8	9	6	23	15	17
6:00 PM	7	8	13	5	13	10	13
7:00 PM	6	10	3	7	8	6	6
8:00 PM	3	9	8	7	7	7	12
9:00 PM	6	4	9	4	12	12	6
10:00 PM	9	6	9	5	6	12	6
11:00 PM	5	3	2	1	6	3	2

CNT(County)

1.00 23.00

Figure 6: Fatal and Serious Injury Crashes in Madison County by Day and Hour (2018-2022)

Lighting Conditions of Fatal and Serious Crashes in Madison County

Figure 7 provides an analysis of the light conditions during KSI crashes in Madison County between 2018 and 2022. The majority of KSI crashes, or 61%, occurred during daylight hours. Crashes occurring in dark conditions without streetlights account for 21% of the total, while those in dark conditions with streetlights make up 18%. This distribution shows that while roadway lighting helps reduce crash risks, it is not sufficient on its own. A comprehensive approach requires considering both lighting conditions and driver behavior to improve road safety.

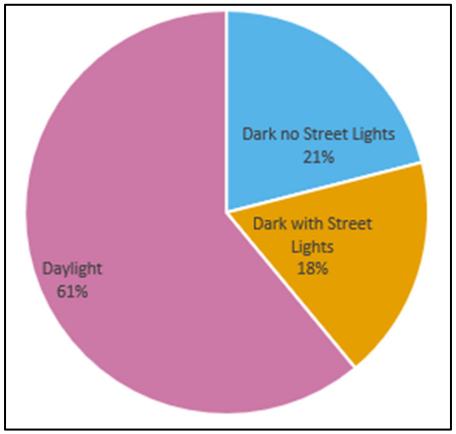


Figure 7: Fatal and Serious Injury Crashes in Madison County by Lighting (2018-2022)

Road Surface Condition of Fatal and Serious Injury Crashes in Madison County

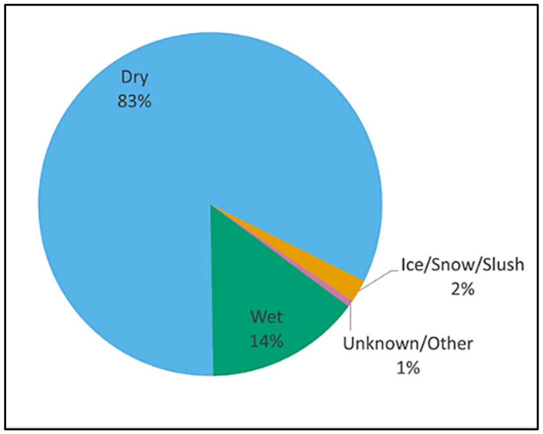


Figure 8: Fatal and Serious Injury Crashes in Madison County by Road Surface Condition (2018-2022)

Figure 8 analyzes the road surface conditions during KSI crashes in Madison County from 2018 to 2022. A large majority of KSI crashes, 83%, occurred on dry road surfaces. Wet road surfaces contributed to 14% of KSI crashes, highlighting that rain and wet pavement significantly increase crash risks. Ice, snow, and slush conditions accounted for only 2% of these crashes. Despite adverse weather exacerbating road hazards, these findings suggest that severe crashes are mainly influenced by driver behavior and roadway characteristics, rather than surface conditions alone.

Where are Fatal and Serious Crashes Occurring in Madison County?

Madison County includes a wide variety of roadway systems, such as interstates, arterials, collectors, and local roads as well as different characters of the area (urban versus rural). Since interstates are higher speed, access-controlled facilities with interchanges, the safety issues on those facilities are much different than the non-interstate facilities. As a result, for the systemic safety analysis, three main categories were developed: Interstate, Non-Interstate Rural, and Non-Interstate Urban.

The pie chart in **Figure 9** provides a breakdown of KSI crashes in Madison County between 2018 and 2022 based on road type. As shown, 17% of Madison County's KSI crashes occurred on interstates, 47% occurred on non-interstate roads in rural areas, and 36% occurred on non-interstate roads in urban areas.

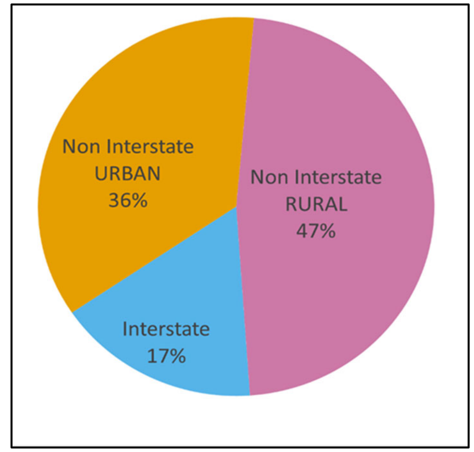


Figure 9: Fatal and Serious Injury Crashes in Madison County by Road Type (2018-2022)

Non-Interstate Crashes – Urban Focus in Madison County

According to the crash data between 2018 and 2022, approximately 36% of Madison County KSI crashes occurred on non-interstate roads in urban areas. The urban non-interstate crashes consisted of a total of 416 KSI crashes or approximately 83 per year. To assist in determining potential systemic improvements in urban areas, crash types at intersections and crash types along segments were evaluated. Crashes within 150 feet of an intersection were considered intersection crashes.

When considering the non-interstate urban KSI crashes in Madison County, 51% occurred at intersections (212 KSI crashes or about 42 per year). **Figure 10** shows a breakdown of crash types at **non-interstate urban intersections** in Madison County. Turning crashes are the most frequent, with 91 incidents, angle crashes account for 42 crashes and rear-end crashes contributed to 22 incidents. Pedestrian-involved crashes (19 crashes), fixed-object collisions (19 crashes), and head-on crashes (7 crashes) are also notable.

When considering the non-interstate urban KSI crashes in Madison County, 49% of KSI crashes occurred along segments (204 KSI crashes or about 41 per year). **Figure 11** breaks down the crash types **along non-interstate urban road segments** in Madison County, fixed-object (run off road) crashes dominate, with 56 incidents. These often involve vehicles leaving the roadway and striking objects like trees, poles, or barriers. Pedestrian crashes (27 incidents) and rear-end crashes (26 incidents) also contributed significantly. Head-on collisions account for 21 crashes, while turning-related crashes total 18. Other crash types include bicycle crashes (10), parked/parking collisions (6), and angle crashes (5) were less frequent but still had minor contributions.

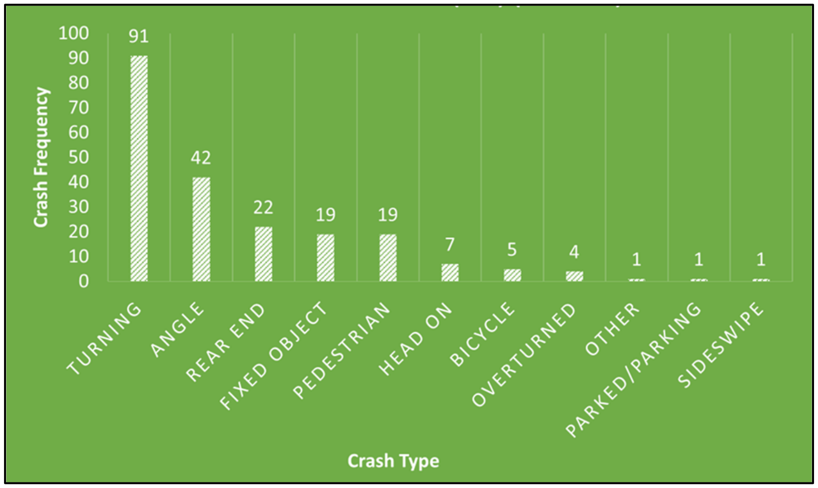


Figure 10: Non-Interstate Urban Intersection Fatal and Serious Injury Crashes in Madison County by Crash Type (2018-2022)

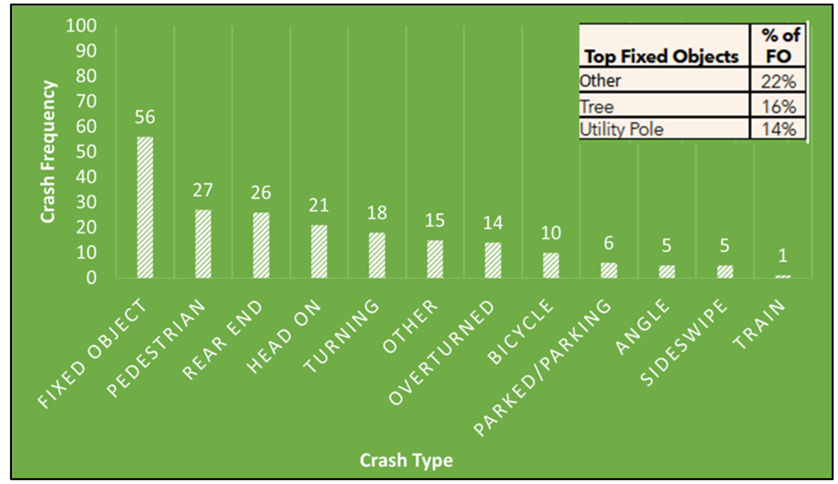


Figure 11: Non-Interstate Urban Segment Fatal and Serious Injury Crashes in Madison County by Crash Type (2018-2022)

Non-Interstate Crashes – Rural Focus in Madison County

According to the crash data between 2018 and 2022, approximately 47% of Madison County KSI crashes occurred on non-interstate roads in rural areas. The rural non-interstate crashes consisted of a total of 550 KSI crashes or approximately 110 per year. To assist in determining potential systemic improvements in rural areas, crash types at intersections and crash types along segments were evaluated. Crashes within 150 feet of an intersection were considered intersection crashes.

When considering the non-interstate rural KSI crashes in Madison County, 38% occurred at intersections (210 KSI crashes or about 42 per year). **Figure 12** shows a breakdown of crash types at **non-interstate rural intersections** in Madison County. Turning crashes are the most frequent, with 91 crashes, followed by angle crashes with 51 crashes and rear-end crashes with 22 crashes. Fixed-object collisions are also significant, contributing to 16 incidents, while head-on crashes account for 10 crashes. Crashes involving pedestrians, bicycles, sideswipe, head-on and parked vehicles make up the remaining counts.

When considering the non-interstate rural KSI crashes in Madison County, 62% of KSI crashes occurred along rural segments (340 KSI crashes or about 68 per year). **Figure 13** breaks down the crash types along **non-interstate rural road segments** in Madison County, where fixed-object collisions, which includes out of control and run off road crashes, dominate the statistics with 111 incidents, followed by overturns (53 crashes) and head-on crashes (43 crashes). Rear-end crashes add 37 to the total, and pedestrian-involved crashes account for 31 incidents. Other crash types include turning, sideswipe, parking-related, and animal-involved incidents.

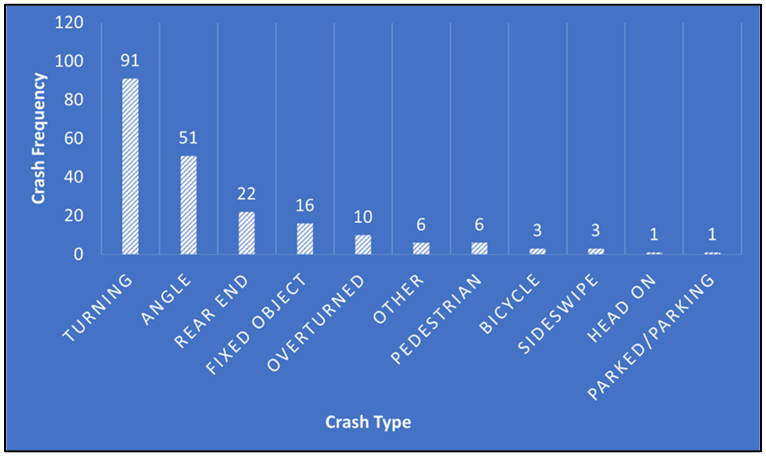


Figure 12: Non-Interstate Intersection Segment Fatal and Serious Injury Crashes in Madison County by Crash Type (2018-2022)

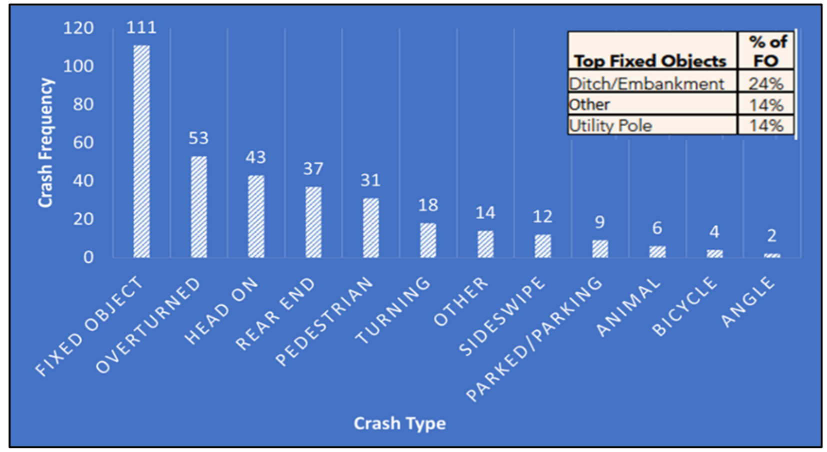


Figure 13: Non-Interstate Rural Segment Fatal and Serious Injury Crashes in Madison County by Crash Type (2018-2022)

Vulnerable Road Users

Pedestrian Focus in Madison County

In Madison County, there were 87 pedestrian-involved KSI crashes from 2018 to 2022, which results in approximately 8% of all KSI crashes. 61% of these pedestrian-involved KSI crashes occurred in the dark, and approximately 50% happened without streetlights and 50% were in areas with streetlighting. Moreover, 71% of these crashes occurred along segments and not at intersections. This data underlines the importance of improving pedestrian safety through enhanced lighting and infrastructure measures to reduce the frequency and severity of pedestrian-related crashes.

In Madison County, pedestrians were involved in 11% of all fatal crashes, with 50% of these fatal pedestrian incidents occurring in dark conditions. Among these, 50% happened without streetlights and 50% had some level of streetlighting. Additionally, 94% of fatal pedestrian crashes occurred along segments and not at intersections, highlighting the risks pedestrians face at crossing points and in poorly lit areas.

Underserved Communities Focus

The Climate and Economic Justice Screening Tool (CEJST) was used to identify disparities between KSI crashes and disadvantaged communities within Madison County. To identify these disparities, the percentage of the population living in disadvantaged communities was compared to the percentage of KSI crashes recorded in those same CEJST areas.

As shown in **Figure 14**, approximately 18% of Madison County's population lives in disadvantaged areas, yet about 25% of the fatal and serious crashes occur in those disadvantaged areas. This indicates a trend that more KSI crashes occur in the CEJST areas than the non-CEJST areas. This discrepancy highlights the need for increased resources and heightened efforts to address the underlying issues contributing to fatal and serious injury crashes within disadvantaged areas. It is important to understand the additional burdens and barriers these communities face, as identified by the CEJST so that more focused efforts can be directed toward improving transportation safety and health outcomes for the residents most at risk.

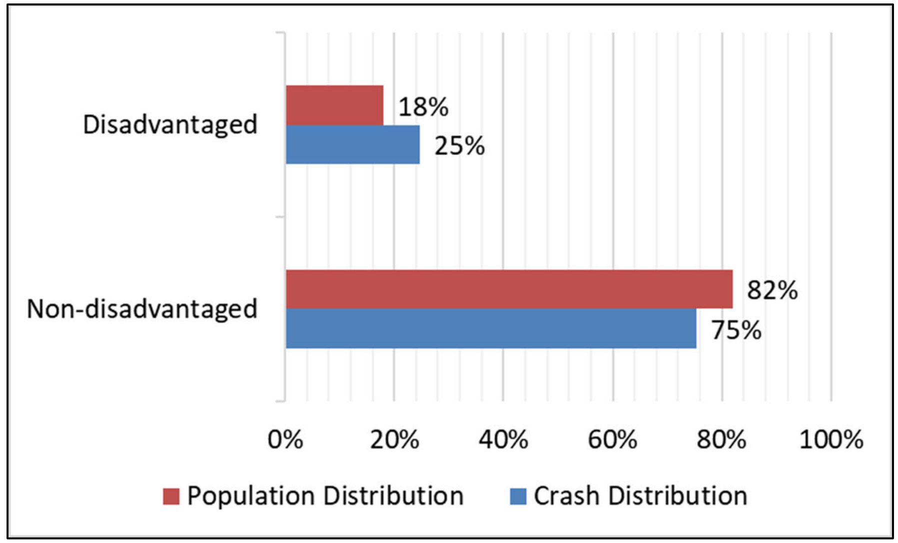


Figure 14: Comparison of Population and Fatal and Serious Injury Crashes in CEJST Areas in Madison County (2018-2022)

Summary of Findings for Madison County

The Madison County trend analysis reveals critical insights into fatal and serious injury (KSI) crash patterns between 2018 and 2022. Total crashes remained relatively stable in 2018 and 2019, then saw a significant drop in 2020 due to the COVID-19 pandemic before increasing again in 2021 and stabilizing in 2022. Fatal crashes remained steady across the years, while serious injury crashes consistently declined, emphasizing the importance of continued efforts to maintain this reduction.

Speeding emerged as the predominant contributing factor, responsible for over a third of all KSI crashes, followed by improper lane usage, failure to yield, and disregarding signals/signs. Young adults were found to be most frequently involved in severe injury crashes, although the involvement of senior citizens is a growing concern. Fridays and Saturdays, particularly in June, were periods of heightened risk, especially during late afternoon and evening hours, when social and recreational travel often peaked. Despite most KSI crashes occurring in daylight, the distribution also highlighted the elevated risk associated with driving in dark conditions, especially on poorly lit roads.

Non-interstate rural areas accounted for the largest percentage of KSI crashes (47%), with more crashes occurring along segments than at intersections, with run off road crashes being the dominant crash type. The non-interstate urban areas accounted for a smaller percentage (36%) and were more related to intersection crash types such as turning, angle and rear end. Pedestrians were also determined to be a particularly vulnerable population, with most pedestrian-related crashes occurring at night and away from intersections. Furthermore, the analysis revealed a disproportionate impact on disadvantaged communities, where a higher percentage of crashes occurred in CEJST areas despite representing a smaller share of the total population.

A multi-pronged approach is necessary to effectively improve road safety outcomes in Madison County. Targeted enforcement campaigns specifically addressing speeding, distracted driving, and driving under the influence should be prioritized, with a focus on high-risk demographics and peak crash times.

Appendix A5: Existing Safety Analysis and Crash Risk Assessment for Monroe County

As part of the *Gateway to Safer Roadways: St. Louis Regional Safety Action Plan* (Action Plan), a thorough analysis of transportation safety within the East-West Gateway Council of Governments (EWG) Region was conducted using data spanning the years 2018 to 2022.

Crash data from 2018 to 2022 was gathered as part of this Action Plan and contained all crashes in the EWG Region, which includes the City of St. Louis, Franklin, Jefferson, St. Charles, and St. Louis counties in Missouri, as well as Madison, Monroe, and St. Clair counties in Illinois. The Missouri crash data was obtained from the Missouri Department of Transportation's (MoDOT's) Transportation Management Systems (TMS), and the Illinois crash data was provided by the Illinois Department of Transportation's (IDOT's) Transportation Safety Department.

The data includes all crashes occurring on public roadways that involve a fatality, injury, or property damage. Severity ratings are assigned by the responsible agencies based on the presence and significance of an injury resulting from the crash. Crash severity ratings are listed and defined below:

- Fatal – any injury that results in death within 30 days after the motor vehicle crash in which the injury occurred.
- Serious Injury – any injury other than fatal which prevents the person from walking, driving or normally continuing the activities the person could perform before the injury occurred, such as severe lacerations, broken or distorted extremity, crush injuries, suspected skull, chest, or abdominal injuries other than bruises or minor lacerations, significant burns, unconsciousness when taken from the crash scene, or paralysis.
- Minor Injury – any injury that is evident at the scene or reported or claimed that is not fatal or serious.
- Property Damage Only – when there is no apparent injury or when there is no reason to believe an injury occurred and when property damage of $500 or more for Missouri or $1,500 or more in Illinois occurred.

Crash Data: The analysis used comprehensive crash, person, and vehicle datasets sourced from MoDOT and IDOT. The crash data included information crucial to each crash, including the time and date of the crash, crash type, location, contributing factors, and lighting and weather conditions. Notably, each crash is given a unique identifier (crash ID) which is also linked to occupant and vehicle data. Occupant data within the dataset includes details about individuals involved in the crashes, including their gender, age, and the

severity of injuries sustained, with stringent measures undertaken by both agencies to scrub the data of any personally identifiable information. Additionally, the vehicle data offers valuable insights into the involved vehicle types, the use and functionality of safety devices, airbag deployment, and type of fixed objects struck by each vehicle during the crash.

Vehicle Miles Traveled (VMT): The Vehicle Miles Traveled (VMT) data, essential for understanding regional travel patterns and demand, was obtained from EWG. Covering the period from 2018 to 2022, this dataset includes VMT for each county within the EWG Region as well as aggregate regional data. The VMT data was provided in daily vehicle miles traveled format but was converted to annual vehicle miles traveled for these evaluations to be consistent with the crash data, which was summarized for each year. The VMT metric was used to compare the total number of crashes to VMT for each year to understand the correlation between the number of crashes and vehicle exposure.

Population Data: To correlate crash data with demographic trends, population estimates were sourced from EWG, based on U.S. Census Bureau data for the year 2020. Since the U.S. Census data was collected in 2020 and also aligns with the middle of the evaluation period, the 2020 population data was used for this analysis.

Equity Data: The information on disadvantaged communities was sourced from the Climate and Economic Justice Screening Tool (CEJST), a specialized tool designed to pinpoint these communities by evaluating burdens across various domains such as climate change, energy, health, housing, legacy pollution, transportation, water and wastewater, and workforce development. Within the CEJST framework, disadvantaged areas are delineated as census tracts that bear disproportionate burdens and lack adequate support concerning these environmental and economic challenges.

The data collection and processing efforts detailed above are foundational to the Action Plan. They enable a data-driven approach to understanding the dynamics of transportation safety and formulating strategies to mitigate risks and enhance safety across the EWG Region. This methodical approach ensures that the analyses are grounded in reliable data, facilitating informed decision-making in regional transportation planning and safety management.

Monroe County Trend Analysis

Trend Analysis - Crashes and VMT in Monroe County

The trends depicted in **Figure 1** show the relationship between the total number of crashes and Vehicle Miles Traveled (VMT) in Monroe County from 2018 to 2022. In 2018, the County recorded 636 total crashes, which dropped to 594 in 2019 before plummeting to 441 in 2020 due to the COVID-19 pandemic and its effects on travel. In the following two years, total crashes rebounded, rising to 535 in 2021 and then to 562 in 2022.

VMT, represented by the black line on the secondary axis, follows a similar trend, declining sharply in 2020 and increasing slightly in 2021 and 2022 but not quite back to pre-pandemic levels. These patterns highlight the pandemic's initial impact on travel and crash rates, with a gradual increase after the pandemic.

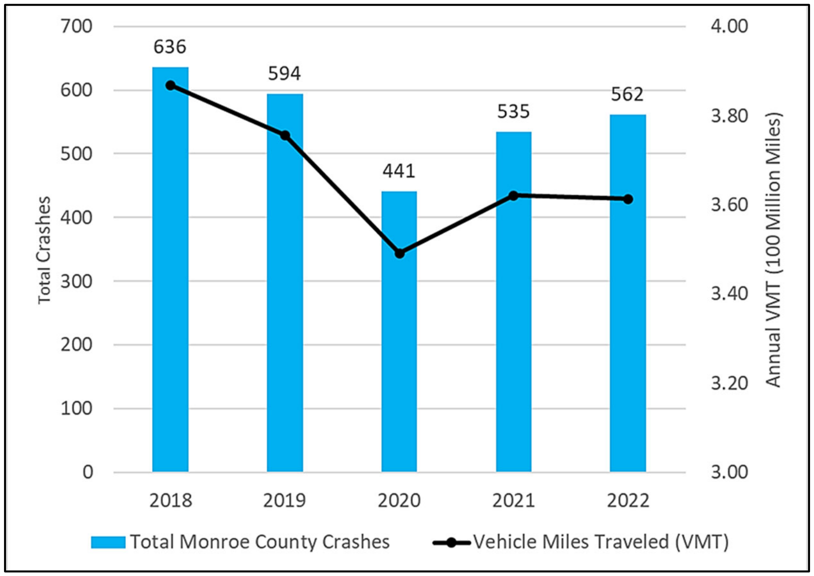


Figure 1: Annual Total Crashes and Vehicle Miles Traveled (VMT) in Monroe County (2018-2022)

Trend Analysis – Fatal and Serious Injury Crashes in Monroe County

Monroe County had a total of 107 Fatal and Serious Injury (KSI) crashes between 2018 and 2022 for an average of around 21 KSI crashes per year. **Figure 2** demonstrates the annual trends in fatal and serious injury crashes in Monroe County over the five-year period. The bar chart separates the data into two series to highlight the severity of crashes, while linear trendlines illustrate the progression over this five-year period.

Monroe County had a total of 17 fatal crashes over the five-year period for an average of about three fatal crashes per year. Fatal crashes, represented by blue bars, started at 5 incidents in 2018 and decreased to three in 2019. In 2020, fatal crashes further declined to one before increasing to two in 2021. By 2022, fatal crashes rose to six. The trendline shows a relatively stable pattern over the years, despite minor fluctuations.

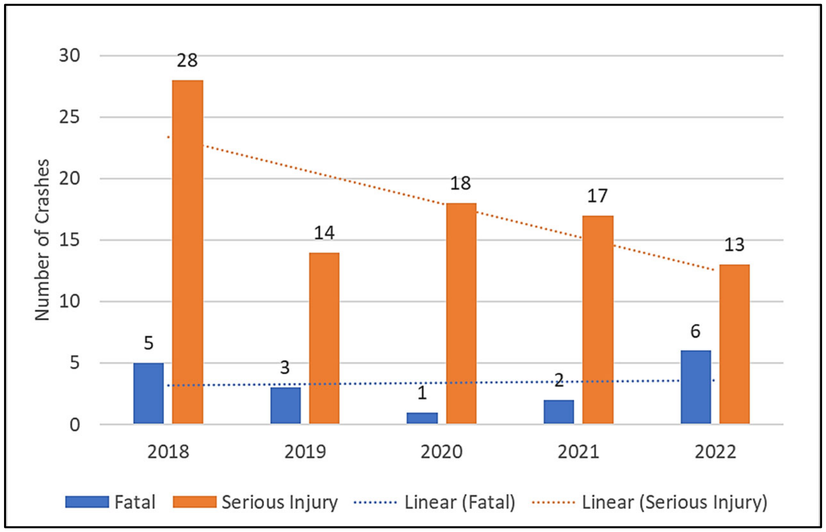


Figure 2: Fatal and Serious Injury Crashes in Monroe County by Year (2018-2022)

Monroe County had a total of 90 serious injury crashes over the five-year period for an average of about 18 serious injury crashes per year. Serious injury crashes, represented by orange bars, began at 28 incidents in 2018 before dropping to 14 in 2019. The count then increased to 18 in 2020 before slightly declining to 17 in 2021 and then to 13 in 2022. The linear trendline for serious injury crashes shows a consistent downward trajectory over the observed period.

This data suggests a reduction in serious injury crashes over time, indicating improvements in road safety. However, the rise in fatal crashes in recent years (2022) emphasizes the need for ongoing measures to prevent such incidents in Monroe County.

MONROE COUNTY CRASH RISK ASSESSMENT

What are the Contributing Factors of Fatal and Serious Crashes in Monroe County?

A detailed analysis of KSI crash data in Monroe County between 2018-2022 indicates that speeding is the primary factor behind KSI crashes, causing 42% of incidents, as shown in **Figure 3**. Failure to yield (21%), alcohol/drug impairment (12%), improper lane usage (8%), and distraction (7%) also play significant roles. Disregarding signals/signs (6%) and physical conditions of the driver (6%) are additional notable contributors, while following too closely (1%), driving the wrong way (1%) and overcorrecting (less than 1%) are less prominent. This emphasizes the importance of targeted measures, such as speed enforcement and educational campaigns, to tackle this critical issue.

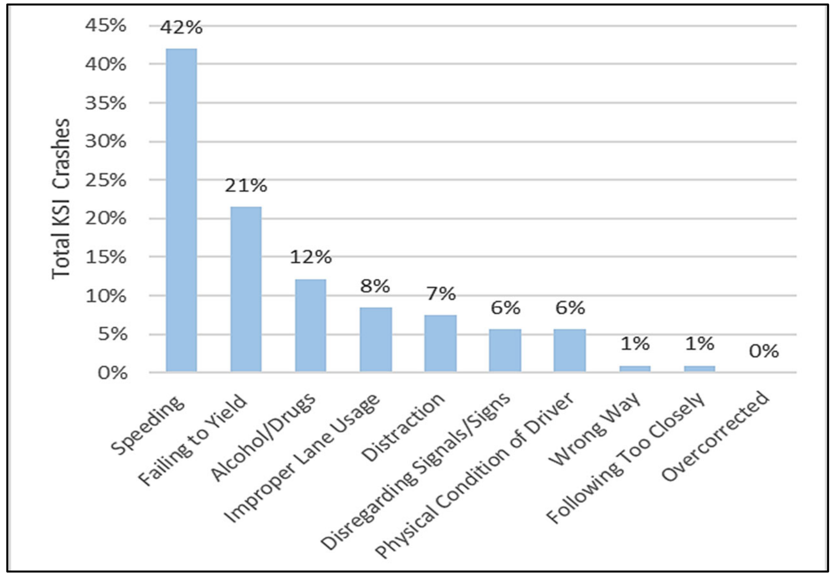


Figure 3: Top 10 Contributing Factors of Fatal and Serious Injury Crashes in Monroe County (2018-2022)

What is the Age of Those Involved in Fatal and Serious Crashes in Monroe County?

To identify what age groups are more likely to be involved in KSI crashes, the crash data was categorized into age groups based on the methodology used by the National Highway Traffic Safety Administration (NHTSA). This methodology includes those under 16 years old as a group, those older than 65 years old as a group and then groups for every five-year increments in-between.

The bar chart in **Figure 4** illustrates the age distribution of people involved in Monroe County between 2018 and 2022 including drivers, pedestrians, and bicyclists. Individuals aged 16-20 and over 65 were the most frequently involved in KSI crashes, each exceeding 20 individuals. The 31-35 age group closely followed, involving around 20 individuals, while the 21-25, 36-40, 51-55, and 56-60 groups exhibited consistent involvement rates.

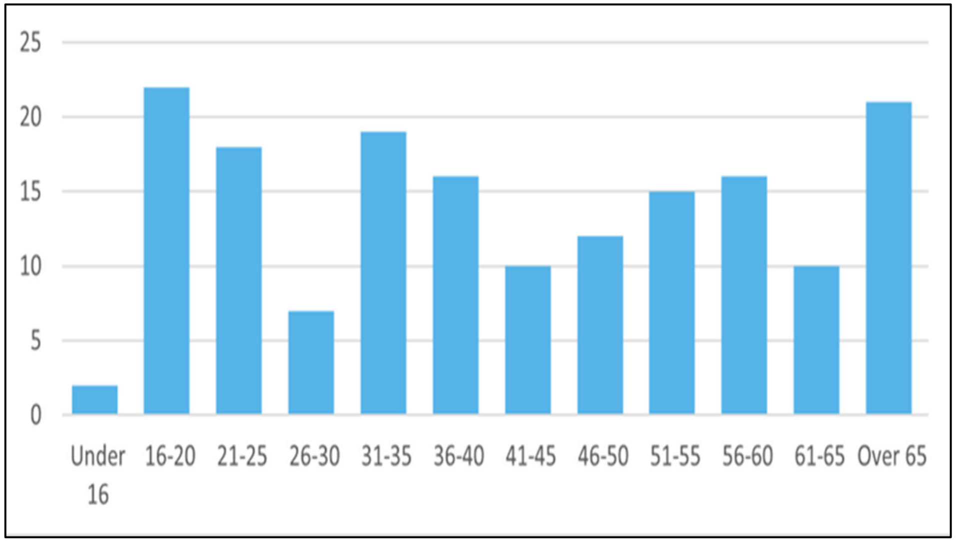


Figure 4: Age Distribution of Persons Involved in Fatal and Serious Injury Crashes in Monroe County (2018-2022)

The 26-30 group showed relatively lower involvement in KSI crashes, and the under 16 group had the least involvement, reflecting limited driving exposure. The over 65 demographic presented a noticeable increase in involvement, indicating that despite generally cautious driving habits, older adults remain vulnerable to serious injuries in crashes due to age-related physical limitations.
These trends highlight the importance of addressing high-risk behaviors in younger adults, as they tend to engage in riskier driving practices, while also emphasizing the need for targeted safety measures for older adults, who face unique challenges due to age-related vulnerabilities.

When do Fatal and Serious Crashes Occur in Monroe County?

The heatmap in **Figure 5** highlights the trends of KSI crashes by day and month in Monroe County from 2018 to 2022. Although there is a relatively small data set, Saturdays and Sundays appear particularly risky, with higher concentrations in August. Also, October, January and April also show elevated crash counts compared to other months of the year. The heatmap pattern suggests that weekends are periods of heightened risk, potentially due to increased travel for social or recreational activities.

Figure 5: Fatal and Serious Injury Crashes in Monroe County by Month and Day (2018-2022)

Figure 6 focuses on the distribution of crashes by hour and day of the week, revealing no strong pattern in hour of the day.

Hour	Mon	Tue	Wed	Thu	Fri	Sat	Sun
12:00 AM				2		3	
1:00 AM				1			1
2:00 AM		1					1
3:00 AM						1	
4:00 AM	1				1		2
5:00 AM			1	2		1	1
6:00 AM	1		2	1	1		
7:00 AM						1	1
8:00 AM	1						
9:00 AM				1	4	2	
10:00 AM	1	4	1		1	1	1
11:00 AM				2	1	1	
12:00 PM	1	1	1	1			2
1:00 PM	1						
2:00 PM	2	3	2			2	1
3:00 PM				2		1	2
4:00 PM		1	1	1	1	1	1
5:00 PM	1	3			1	1	
6:00 PM		1	1	1	1	2	
7:00 PM			1	1		1	
8:00 PM	1		2		3	1	2
9:00 PM				1			1
10:00 PM				2	2		
11:00 PM			1			1	

CNT(County)

1.000 4.000

Figure 6: Fatal and Serious Injury Crashes in Monroe County by Day and Hour (2018-2022)

Lighting Conditions of Fatal and Serious Crashes in Monroe County

Figure 7 provides an analysis of the light conditions during KSI crashes in Monroe County between 2018 and 2022. The majority of these crashes, accounting for 66% of incidents, occurred during daylight. Crashes occurring in dark conditions without streetlights make up 25% of the total, while those in the dark with streetlights account for 9%. This distribution suggests that streetlighting plays a role in reducing crash risks but does not completely eliminate them.

Although a significant portion of crashes occurred during daylight hours, the dark with no streetlights percentage in Monroe County (25%) was significantly higher than the regional average (16%).

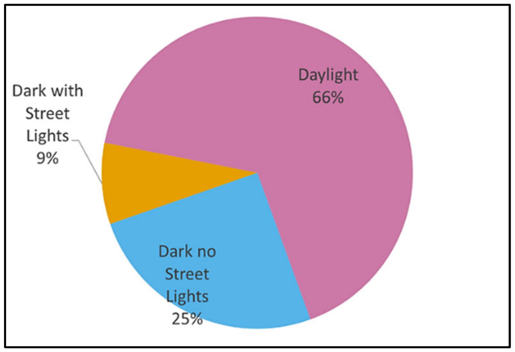


Figure 7: Fatal and Serious Injury Crashes in Monroe County by Lighting (2018-2022)

Road Surface Condition of Fatal and Serious Injury Crashes in Monroe County

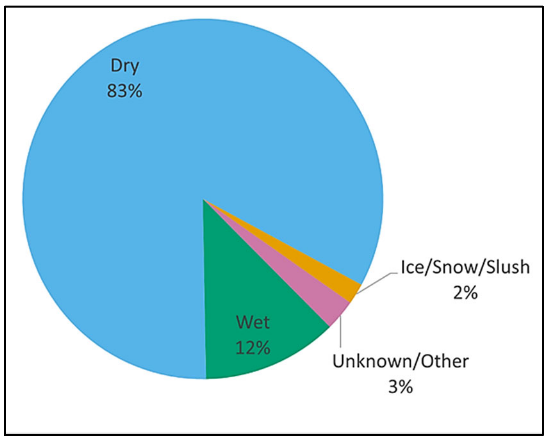


Figure 8: Fatal and Serious Injury Crashes in Monroe County by Road Surface Condition (2018-2022)

Figure 8 illustrates the road surface conditions during KSI crashes in Monroe County between 2018 and 2022. The majority of these crashes, 83%, occurred on dry road surfaces, indicating that optimal road conditions alone do not necessarily ensure safety. Wet road surfaces accounted for 12% of KSI crashes. Ice, snow, and slush conditions contributed to just 2% of these incidents, while the remaining 3% fell under "Unknown/Other" surface conditions.

These findings suggest that while adverse weather can amplify road hazards, severe crashes are primarily influenced by driver behavior, vehicle condition, and roadway characteristics rather than surface conditions alone. Therefore, safety measures should focus not only on improving road infrastructure but also on promoting safe driving habits.

Where are Fatal and Serious Crashes Occurring in Monroe County?

Monroe County includes a variety of roadway systems, such as interstates, arterials, collectors, and local roads, as well as different characteristics of the area (urban versus rural). Since interstates are higher-speed and access-controlled facilities with interchanges, the safety issues on those facilities are much different than those on non-interstate facilities. As a result, for the systemic safety analysis, three main categories were developed: Interstate, Non-Interstate Rural, and Non-Interstate Urban.

The pie chart in **Figure 9** breakdown of KSI crashes in Monroe County between 2018 and 2022 based on road type. As shown, 7% of Monroe County's KSI crashes occurred on interstates, 60% occurred on non-interstate roads in the rural areas, and 33% occurred in non-interstate urban areas.

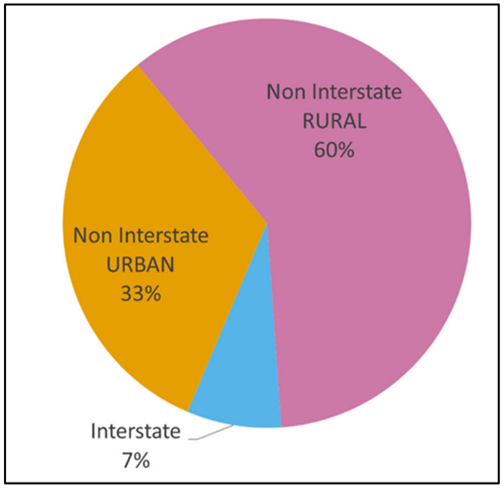


Figure 9: Fatal and Serious Injury Crashes in Monroe County by Road Type (2018-2022)

Non-Interstate Crashes – Urban Focus in Monroe County

According to the crash data between 2018 and 2022, approximately 33% of Monroe County KSI crashes occurred on non-interstate roads in urban areas. The urban non-interstate crashes consisted of a total of 35 KSI crashes or 7 per year. To assist in determining potential systemic improvements in urban areas, crash types at intersections and crash types along segments were evaluated. Crashes within 150 feet of an intersection were considered intersection crashes.

When considering the non-interstate urban KSI crashes in Monroe County, 57% occurred at intersections (20 KSI crashes). **Figure 10** shows a breakdown of crash types at **non-interstate urban intersections** in Monroe County. Turning crashes are the most frequent, with 10 crashes, followed by angle crashes with three crashes and rear-end crashes with three crashes. Crashes involving pedestrians, fixed objects, and head on make up the remaining crashes.

When considering the non-interstate urban KSI crashes in Monroe County, 43% of KSI crashes occurred along segments (15 KSI crashes). **Figure 11** breaks down the crash types along **non-interstate urban road segments** in Monroe County. Rear-end, angle, animal-involved, fixed-object collision, and head-on crashes are most common. Other crash types reported are turning, overturn, sideswipe, and pedestrian-involved.

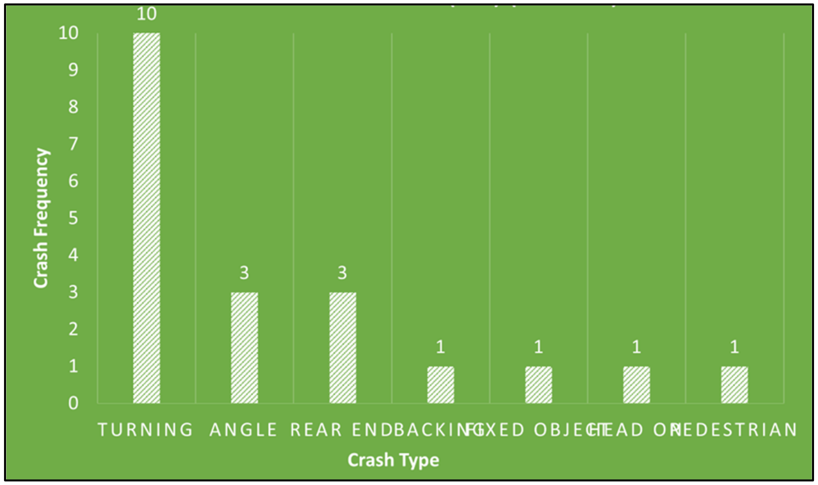
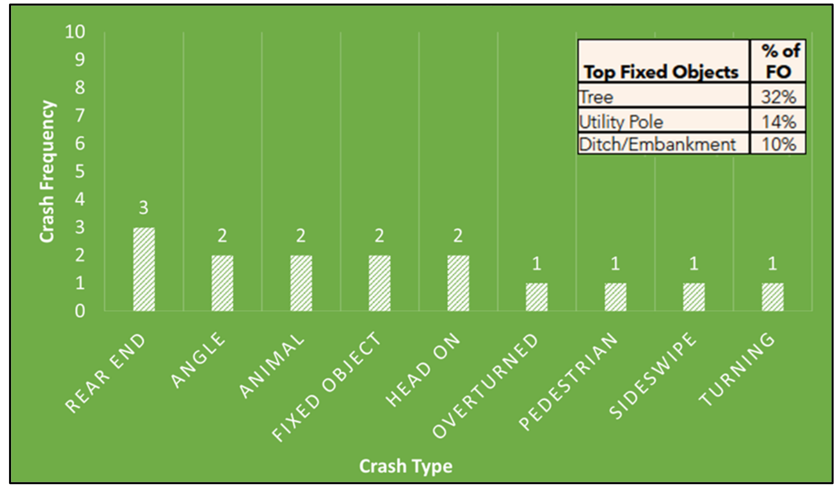


Figure 10: Non-Interstate Urban Intersection Fatal and Serious Injury Crashes in Monroe County by Crash Type (2018-2022)



Top Fixed Objects	% of FO
Tree	32%
Utility Pole	14%
Ditch/Embankment	10%

Figure 11: Non-Interstate Urban Segment Fatal and Serious Injury Crashes in Monroe County by Crash Type (2018-2022)

Non-Interstate Crashes – Rural Focus in Monroe County

According to the crash data between 2018 and 2022, approximately 60% of Monroe County KSI crashes occurred on non-interstate roads in rural areas. The rural non-interstate crashes consisted of a total of 64 KSI crashes or approximately 13 per year. To assist in determining potential systemic improvements in rural areas, crash types at intersections and crash types along segments were evaluated. Crashes within 150 feet of an intersection were considered intersection crashes.

When considering the non-interstate rural KSI crashes in Monroe County, 11% occurred at intersections (seven KSI crashes or about two per year). **Figure 12** shows a breakdown of crash types at **non-interstate rural intersections** in Monroe County. Turning crashes are the most frequent, with four crashes, followed by two angle crashes and one sideswipe crash.

When considering the non-interstate rural KSI crashes in Monroe County, 89% of KSI occurred along segments (57 KSI crashes or about 11 per year). **Figure 13** breaks down the crash types along **non-interstate rural road segments** in Monroe County. As shown, fixed-object collisions, which includes out of control and run off road crashes, dominate the statistics with 26 incidents, followed by overturns (10 crashes) and head-on crashes (five crashes). Other crash types include bicycle and pedestrian involved crashes, sideswipe, rear end, parking-related, angle and animal-involved incidents. Ditches or embankments, trees and guardrails are the most frequently struck fixed objects.

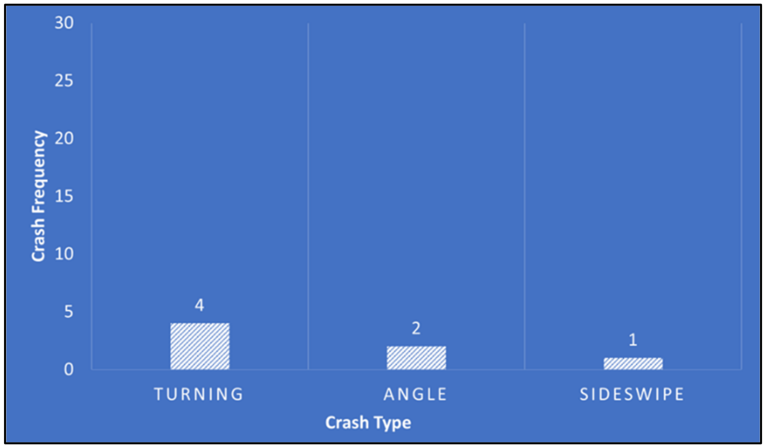


Figure 12: Non-Interstate Rural Intersection Fatal and Serious Injury Crashes in Monroe County by Crash Type (2018-2022)

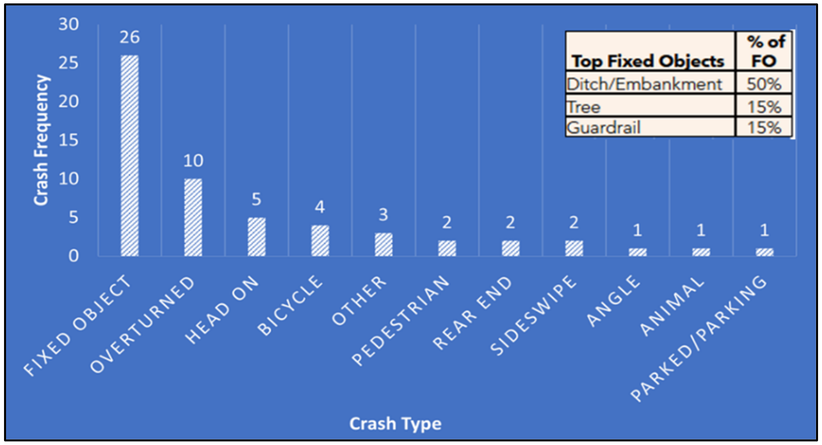


Figure 13: Non-Interstate Rural Segment Fatal and Serious Injury Crashes in Monroe County by Crash Type (2018-2022)

Vulnerable Road Users

Pedestrian Focus in Monroe County

In Monroe County, there were four pedestrian-involved KSI crashes from 2018 to 2022, which resulted in approximately 4% of all KSI crashes. Three of the four occurred in the dark, and 67% of these happened at locations without streetlights. Moreover, three of the four (75%) pedestrian crashes occurred along segments and not at intersections. This data underlines the importance of improving pedestrian safety through enhanced lighting and infrastructure measures, to reduce the frequency and severity of pedestrian-related crashes.

Underserved Communities Focus in Monroe County

The Climate and Economic Justice Screening Tool (CEJST) was used to identify disparities between crashes and disadvantaged communities within Monroe County. However, based on the CEJST data, Monroe County does not have any disadvantaged areas; therefore, this section is not applicable.

Summary of Findings for Monroe County

The crash analysis for Monroe County between 2018 and 2022 shows varying trends in total crashes and Vehicle Miles Traveled (VMT), which were significantly impacted by the COVID-19 pandemic. Crashes decreased sharply in 2020 due to the pandemic but have since rebounded. Fatal crashes remained relatively stable over the years, though they have shown a slight increase recently (2022). Serious injury crashes have declined steadily over time, highlighting some improvements in road safety.

Speeding remains the leading cause of fatal and serious injury (KSI) crashes, accounting for 42% of incidents. Other contributing factors include failure to yield, alcohol or drug impairment, improper lane usage, and distracted driving. Analysis of crash data by age reveals that individuals aged 16-20 and those over 65 are most frequently involved in KSI crashes. Younger drivers tend to exhibit riskier behaviors, while older drivers are more vulnerable due to age-related factors. Temporal analysis indicates that weekends, particularly Saturdays and Sundays, are periods of heightened risk, possibly due to increased travel for social or recreational activities. August stands out as a month with higher crash frequencies.

Crash data categorized by road types reveals that 60% of KSI crashes in Monroe County occur on rural non-interstate roads, with nearly all occurring along segments. Fixed-object collisions, overturns, and head-on crashes are most prevalent in these areas. Urban non-interstate roads account for 33% of KSI crashes, with turning and rear-end crashes being particularly common at urban intersections.

These trends highlight the need for comprehensive safety measures, including speed enforcement, awareness campaigns, and specific interventions for younger and older drivers.

Appendix A6: Existing Safety Analysis and Crash Risk Assessment for St. Charles County

As part of the *Gateway to Safer Roadways: St. Louis Regional Safety Action Plan* (Action Plan), a thorough analysis of transportation safety within the East-West Gateway Council of Governments (EWG) Region was conducted using data spanning the years 2018 to 2022.

Crash data from 2018 to 2022 was gathered as part of this Action Plan and contained all crashes in the EWG Region, which includes the City of St. Louis, Franklin, Jefferson, St. Charles, and St. Louis counties in Missouri, as well as Madison, Monroe, and St. Clair counties in Illinois. The Missouri crash data was obtained from the Missouri Department of Transportation's (MoDOT's) Transportation Management Systems (TMS), and the Illinois crash data was provided by the Illinois Department of Transportation's (IDOT's) Transportation Safety Department.

The data includes all crashes occurring on public roadways that involve a fatality, injury, or property damage. Severity ratings are assigned by the responsible agencies based on the presence and significance of an injury resulting from the crash. Crash severity ratings are listed and defined below:

- Fatal – any injury that results in death within 30 days after the motor vehicle crash in which the injury occurred.
- Serious Injury – any injury other than fatal which prevents the person from walking, driving or normally continuing the activities the person could perform before the injury occurred, such as severe lacerations, broken or distorted extremity, crush injuries, suspected skull, chest, or abdominal injuries other than bruises or minor lacerations, significant burns, unconsciousness when taken from the crash scene, or paralysis.
- Minor Injury – any injury that is evident at the scene or reported or claimed that is not fatal or serious.
- Property Damage Only – when there is no apparent injury or when there is no reason to believe an injury occurred and when property damage of $500 or more for Missouri or $1,500 or more in Illinois occurred.

Crash Data: The analysis used comprehensive crash, person, and vehicle datasets sourced from MoDOT and IDOT. The crash data included information crucial to each crash, including the time and date of the crash, crash type, location, contributing factors, and lighting and weather conditions. Notably, each crash is given a unique identifier (crash ID) which is also linked to occupant and vehicle data. Occupant data within the dataset includes details about individuals involved in the crashes, including their gender, age, and the

severity of injuries sustained, with stringent measures undertaken by both agencies to scrub the data of any personally identifiable information. Additionally, the vehicle data offers valuable insights into the involved vehicle types, the use and functionality of safety devices, airbag deployment, and type of fixed objects struck by each vehicle during the crash.

Vehicle Miles Traveled (VMT): The Vehicle Miles Traveled (VMT) data, essential for understanding regional travel patterns and demand, was obtained from EWG. Covering the period from 2018 to 2022, this dataset includes VMT for each county within the EWG Region as well as aggregate regional data. The VMT data was provided in daily vehicle miles traveled format but was converted to annual vehicle miles traveled for these evaluations to be consistent with the crash data, which was summarized for each year. The VMT metric was used to compare the total number of crashes to VMT for each year to understand the correlation between the number of crashes and vehicle exposure.

Population Data: To correlate crash data with demographic trends, population estimates were sourced from EWG, based on U.S. Census Bureau data for the year 2020. Since the U.S. Census data was collected in 2020 and also aligns with the middle of the evaluation period, the 2020 population data was used for this analysis.

Equity Data: The information on disadvantaged communities was sourced from the Climate and Economic Justice Screening Tool (CEJST), a specialized tool designed to pinpoint these communities by evaluating burdens across various domains such as climate change, energy, health, housing, legacy pollution, transportation, water and wastewater, and workforce development. Within the CEJST framework, disadvantaged areas are delineated as census tracts that bear disproportionate burdens and lack adequate support concerning these environmental and economic challenges.

The data collection and processing efforts detailed above are foundational to the Action Plan. They enable a data-driven approach to understanding the dynamics of transportation safety and formulating strategies to mitigate risks and enhance safety across the EWG Region. This methodical approach ensures that the analyses are grounded in reliable data, facilitating informed decision-making in regional transportation planning and safety management.

St. Charles County Trend Analysis

Trend Analysis - Crashes and VMT in St. Charles County

Figure 1 shows the trends in total crashes and Vehicle Miles Traveled (VMT) in St. Charles County from 2018 to 2022. The blue bars represent the total number of crashes, while the black line illustrates the VMT on the secondary axis on the right. The total crashes increased slightly from 8,590 in 2018 to a peak of 8,499 in 2019, then sharply declined to 6,967 in 2020, likely influenced by the COVID-19 pandemic and its impact on travel patterns. The subsequent years show recovery, with crashes rising to 7,908 in 2021 and then stabilizing at 7,658 in 2022.

VMT follows a similar pattern, with a noticeable drop in 2020 to around 38,000 million miles from its 2019 peak of 43,000 million miles. However, it rose to 41,000 million miles in 2021 and further to 42,000 million miles in 2022, reflecting a gradual return to pre-pandemic travel behavior.

These trends demonstrate that the pandemic significantly affected both VMT and total crashes, leading to a marked reduction in 2020. However, the subsequent increase in both indicators reflects the gradual normalization of travel patterns in St. Charles County over the following years.

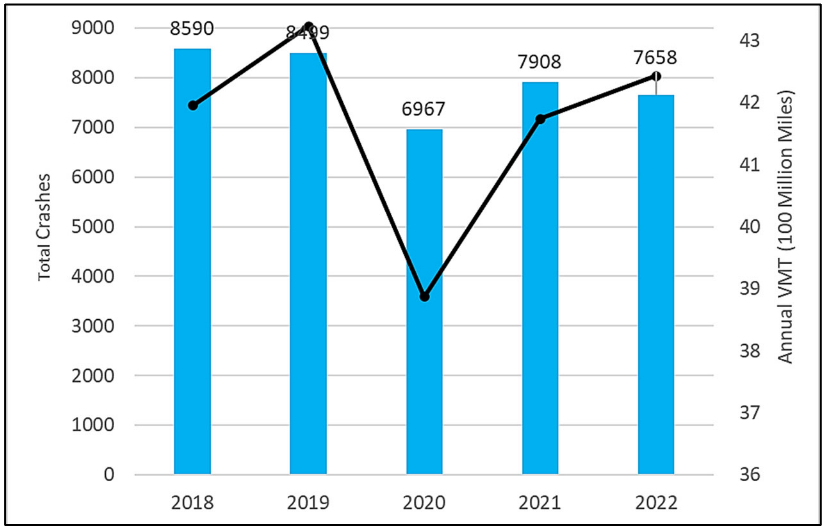


Figure 1: Annual Total Crashes and Vehicle Miles Traveled (VMT) in St. Charles County (2018-2022)

Trend Analysis – Fatal and Serious Injury Crashes in St. Charles County

St. Charles County had a total of 837 Fatal and Serious Injury (KSI) crashes between 2018 and 2022 for an average of 167 KSI crashes per year. **Figure 2** demonstrates the annual trends in fatal and serious injury crashes in St. Charles County over the five-year period. The bar chart separates the data into two series to highlight the severity of crashes, while linear trendlines illustrate the progression over this five-year period.

St. Charles County had a total of 156 fatal crashes over the five-year period for an average of about 31 fatal crashes per year. Fatal crashes (represented by blue bars) began at 40 incidents in 2018 before dropping to 24 in 2019. They then rose to 28 in 2020 and continued increasing to 30 in 2021 before reaching 34 in 2022. The trendline suggests a steady trend in fatal crashes over the observed period.

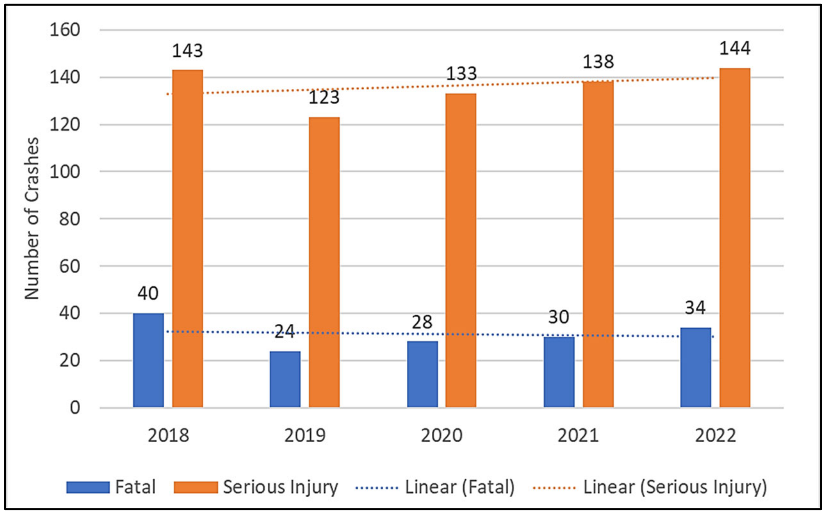


Figure 2: Fatal and Serious Injury Crashes in St. Charles County by Year (2018-2022)

St. Charles County had a total of 681 serious injury crashes over the five-year period for an average of about 136 serious injury crashes per year. Serious injury crashes (represented by orange bars) follow a similar pattern to fatal crashes. The count began at 143 in 2018 before declining to 123 in 2019. In 2020, serious injury crashes increased to 133, and then to 138 in 2021 before reaching 144 in 2022. The linear trendline shows a steady upward progression over this five-year period, pointing to a persistent rise in serious injury crashes.

ST. CHARLES COUNTY CRASH RISK ASSESSMENT

What are the Contributing Factors of Fatal and Serious Crashes in St. Charles County?

In St. Charles County, from 2018 to 2022, a detailed analysis of KSI crash data reveals that speeding is the leading contributing factor, accounting for 31% of incidents, as shown in **Figure 3**. This proportion emphasizes that excessive speed remains a significant hazard, necessitating enforcement and educational campaigns targeting this dangerous behavior. Improper lane usage is the second most frequent contributing factor, responsible for 22% of KSI crashes, indicating the need for improved awareness of safe lane practices. Alcohol and drug use contribute to 19% of KSI crashes, underscoring the importance of driving under the influence (DUI) enforcement and substance abuse prevention. Failure to yield accounts for 18% of incidents, while distraction is involved in 12% of crashes. Disregarding signals or signs, physical condition of the driver (like potential medical impairments or fatigue), following too closely, overcorrecting, and wrong-way driving account for 6% or less each.

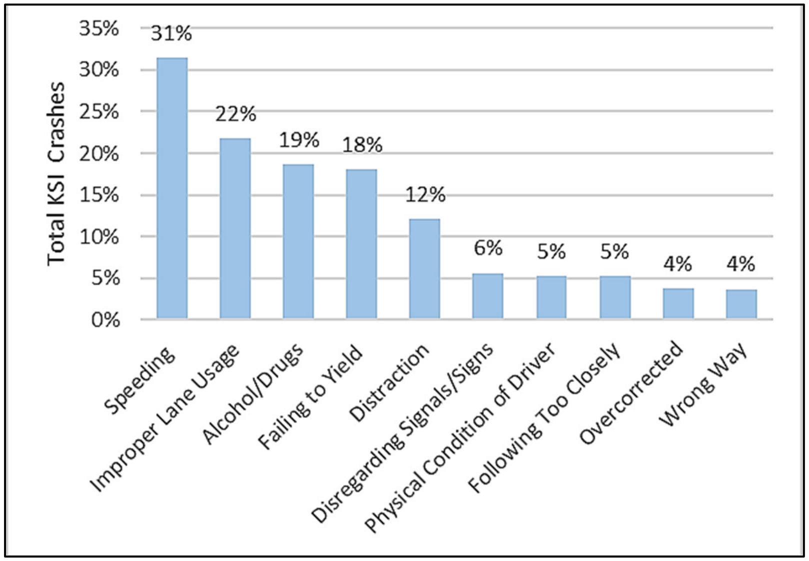


Figure 3: Top 10 Contributing Factors of Fatal and Serious Injury Crashes in St. Charles County (2018-2022)

These statistics highlight the complex nature of KSI crashes in St. Charles County. High-risk behaviors such as speeding, improper lane usage, impaired driving, and failure to yield account for a significant portion of these incidents, pointing to the need for comprehensive safety strategies. By addressing these underlying factors, road safety initiatives can significantly reduce the frequency and severity of crashes.

What is the Age of Those Involved in Fatal and Serious Crashes in St. Charles County?

To identify what age groups are more likely to be involved in fatal or serious injury crashes, the crash data was categorized into age groups based on the methodology used by the National Highway Traffic Safety Administration (NHTSA). This methodology includes those under 16 years old as a group, those older than 65 years old as a group and then groups for every five-year increments in-between.

Figure 4 provides an overview of the age distribution of individuals involved in KSI crashes in St. Charles County between 2018 and 2022, including drivers, pedestrians, and bicyclists.

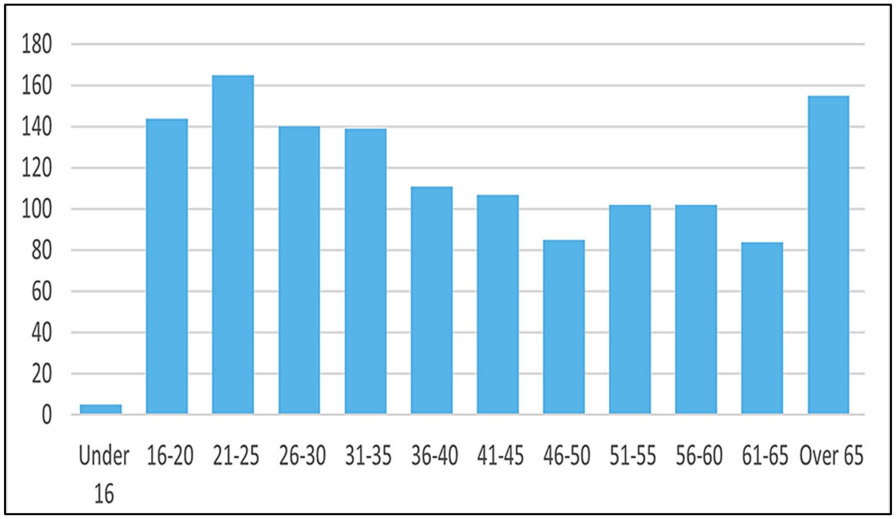


Figure 4: Age Distribution of Persons Involved in Fatal and Serious Injury Crashes in St. Charles County (2018-2022)

Adults aged 21-25 have the highest involvement rate, with around 160 individuals affected. The next most affected group is those 65 and older, closely followed by those aged 16-20, 26-30 and 31-35.

This distribution reflects broader national trends, where young adults often face higher risks due to their inexperience with driving and greater likelihood of engaging in risky behaviors like speeding and distracted driving. The elevated crash involvement among older adults (over 65) indicates that this demographic, while generally more cautious, still encounters challenges such as reduced reaction times and potential health conditions that can impact driving. Understanding these patterns can help in developing age-specific safety strategies and targeted interventions for reducing KSI crashes across all age groups.

When do Fatal and Serious Crashes Occur in St. Charles County?

In St. Charles County, between 2018 and 2022, the temporal patterns of KSI crashes reveal trends across the months and days, as shown in **Figure 5.** The heatmap categorizing KSI crashes by day of the week and month, highlights Saturdays and Sundays as consistently high-risk days. Sundays in September and October and Saturdays in July stand out with the highest number of incidents.

	Date											
Day.Of.Week	January	February	March	April	May	June	July	August	September	October	November	December
MON	10	2	11	9	3	9	7	15	7	5	14	10
TUE	11	3	8	7	8	11	13	7	9	13	12	8
WED	6	6	7	5	9	10	15	11	11	12	7	10
THU	10	8	4	6	8	10	11	10	5	5	11	10
FRI	4	6	8	6	14	11	11	11	15	14	13	9
SAT	8	7	10	10	15	13	18	16	10	11	11	12
SUN	7	13	13	10	15	12	12	10	18	26	8	11

CNT(County)
2.00 26.00

Figure 5: Fatal and Serious Injury Crashes in St. Charles County by Month and Day of Week (2018-2022)

Figure 6 is a heatmap illustrating KSI crashes by hour and day of the week. The late afternoon and evening hours, particularly from 3:00 PM to 8:00 PM, are periods of increased risk throughout the week. Fridays, Saturdays, and Sundays during these hours consistently show higher numbers of KSI crashes, aligning with heightened weekend activity. Sunday afternoon (1 PM to 10 PM) also shows elevated crash risks.

Enhanced enforcement efforts, public awareness campaigns, and safe-driving programs focused on weekend afternoons and evenings could help curb dangerous driving behaviors during these critical times.

Hour	MON	TUE	WED	THU	FRI	SAT	SUN
12:00 AM	3	2	3		4	8	7
1:00 AM	3			2	3	9	13
2:00 AM	1	2	2	2	3	5	5
3:00 AM				2	2	1	4
4:00 AM	1		1			1	3
5:00 AM	1	4	3	2	3	5	2
6:00 AM	5	7	5	5	2		
7:00 AM	6	3	7	4	5	4	2
8:00 AM	4	4	6	5	3	2	
9:00 AM	3	6	2	3	5	4	3
10:00 AM	5	2	1	2	2	4	6
11:00 AM	3	1	5	6	2	3	6
12:00 PM	2	12	4	4	5	2	6
1:00 PM	2	4	11	2	7	8	11
2:00 PM	5	5	3	7	5	6	12
3:00 PM	7	9	8	4	11	9	6
4:00 PM	8	3	5	6	12	13	11
5:00 PM	7	8	12	8	7	10	9
6:00 PM	3	12	5	8	9	10	11
7:00 PM	6	5	8	8	8	10	10
8:00 PM	10	8	6	5	8	7	4
9:00 PM	7	5	3	5	9	5	10
10:00 PM	5	5	4	5	4	12	6
11:00 PM	3	3	4	2	2	2	5

CNT(County)
1.00 13.00

Figure 6: Fatal and Serious Injury Crashes in St. Charles County by Day and Hour (2018-2022)

Lighting Conditions of Fatal and Serious Crashes in St. Charles County

Figure 7 provides an analysis of the light conditions during KSI crashes in St. Charles County between 2018 and 2022. Most of these crashes occurred during daylight, accounting for 58% of all incidents. KSI crashes that happened in dark conditions without streetlights made up 24% of the total, while those that occurred in the dark with streetlights accounted for 17%. An additional 1% of KSI crashes occurred under unknown lighting conditions.

Although a significant portion of crashes occurred during daylight hours, the dark with no streetlights percentage in St. Charles County (24%) was notably higher than the regional average (16%).

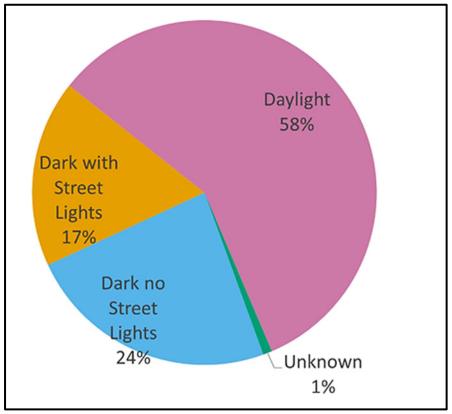


Figure 7: Fatal and Serious Injury Crashes in St. Charles County by Lighting (2018-2022)

Road Surface Condition of Fatal and Serious Injury Crashes in St. Charles County

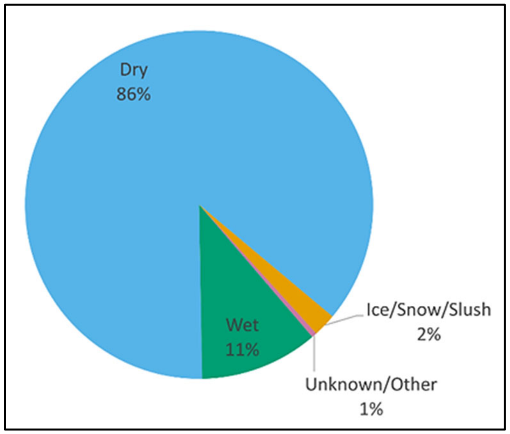


Figure 8: Fatal and Serious Injury Crashes in St. Charles County by Road Surface Condition (2018-2022)

Over the period from 2018 to 2022 in St. Charles County, the majority of KSI crashes occurred on dry road surfaces, as indicated in **Figure 8**. Dry conditions accounted for 86% of incidents, demonstrating that KSI crashes primarily occur during clear weather. Wet road surfaces were a factor in 11% of KSI crashes, indicating that rain and wet pavement can pose significant risks. Ice, snow, and slush conditions accounted for 2% of KSI crashes. An additional 1% of crashes occurred under unknown or other conditions.

This distribution emphasizes that while adverse weather may exacerbate road hazards, most severe incidents are more closely tied to driver behavior or roadway characteristics rather than road surface conditions alone.

Where are Fatal and Serious Crashes Occurring in St. Charles County?

St. Charles County includes a wide variety of roadway systems, such as interstates, arterials, collectors, and local roads as well as different characters of the area (urban versus rural). Since interstates are higher speed, access-controlled facilities with interchanges, the safety issues on those facilities are much different than the non-interstate facilities. As a result, for the systemic safety analysis, three main categories were developed: Interstate, Non-Interstate Rural, and Non-Interstate Urban

The pie chart in **Figure 9** provides a breakdown of KSI crashes in St. Charles County between 2018 and 2022 based on road type. As shown, 21% of St. Charles County's KSI crashes occurred on interstates, 18% occurred on non-interstate roads in rural areas, and 61% occurred on non-interstate roads in urban areas.

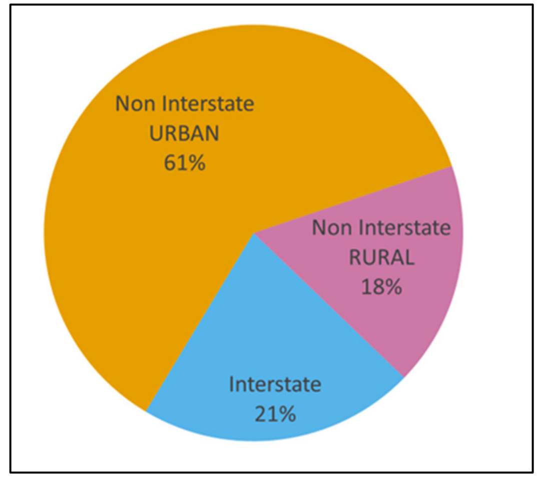


Figure 9: Fatal and Serious Injury Crashes in St. Charles County by Road Type (2018-2022)

Non-Interstate Crashes – Urban Areas in St. Charles County

According to the crash data between 2018 and 2022, approximately 61% of the St. Charles County KSI crashes occurred in urban areas. The urban non-interstate crashes consisted of a total of 512 KSI crashes or approximately 102 per year. To assist in determining potential systemic improvements in urban areas, crash types at intersections and crash types along segments were evaluated. Crashes within 150 feet of an intersection were considered intersection crashes.

When considering the non-interstate urban KSI crashes in St. Charles County, approximately 60% occurred at urban intersections (304 KSI crashes or about 61 per year). **Figure 10** shows a breakdown of crash types at **non-interstate urban intersection** crashes in St. Charles County. Fixed-object crashes, which includes out of control and run off road crashes, accounted for the highest number of KSI crashes, totaling 87 incidents. Turning crashes followed closely, with 67 crashes, while angle (39 crashes), rear-end (30 crashes), head-on (29 crashes), and pedestrian-involved (27 crashes) crashes also contributed significantly to the overall crash count. Among the fixed objects struck, curbs were most frequently hit, accounting for 16% of incidents, followed by trees (15%) and signs (15%).

When considering the non-interstate urban KSI crashes in St. Charles County, 40% of KSI crashes occurred along urban segments (208 KSI crashes or about 41 per year). **Figure 11** display the types of KSI crashes occurring at **non-interstate urban road segments** in St. Charles County between 2018 and 2022. Again, fixed objects represented the most frequent type of crash, with 89 incidents. Head-on collisions were the second most common type, with 30 crashes, while rear-end (28 crashes), pedestrian (21 crashes), and turning (16 crashes) crashes also appeared prominently in the data. Trees were the most common fixed objects struck on urban road segments, representing 28% of incidents, followed by ditches or embankments (20%) and utility poles (12%).

Complex traffic interactions, turning maneuvers, and pedestrian crossings contribute to the high concentration of severe crashes at intersections. Meanwhile, road segments present their own risks due to fixed-object collisions.

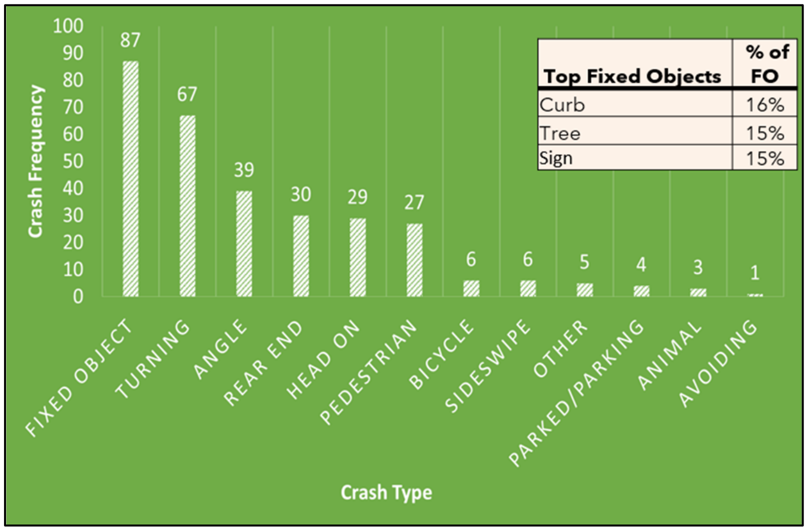


Figure 10: Non-Interstate Urban Intersection Fatal and Serious Injury Crashes in St. Charles County by Crash Type (2018-2022)

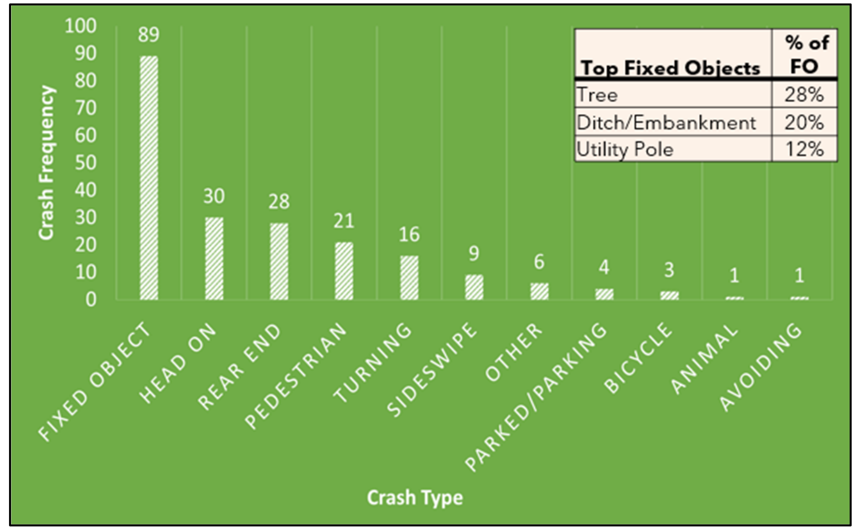


Figure 11: Non-Interstate Urban Segment Fatal and Serious Injury Crashes in St. Charles County by Crash Type (2018-2022)

Non-Interstate Crashes – Rural Areas in St. Charles County

According to the crash data between 2018 and 2022, approximately 18% of St. Charles County fatal and severe crashes occurred on non-interstate roads in rural areas. The rural non-interstate crashes consisted of a total of 146 KSI crashes or approximately 29 per year. To assist in determining potential systemic improvements in rural areas, crash types at intersections and crash types along segments were evaluated. Crashes within 150 feet of an intersection were considered intersection crashes.

When considering the non-interstate rural KSI crashes in St. Charles County, 34% of KSI crashes occurred at intersections (49 KSI crashes or about 10 per year). **Figure 12** shows the types of crashes occurring at St. Charels County **non-interstate rural intersections** between 2018 and 2022. Fixed objects accounted for the most incidents with 20 crashes, followed by eight turning crashes, six angle crashes, five rear-end crashes, and four head-on. Other crash types, including other, avoiding, and sideswipe incidents, were less frequent but still had minor contribution.

When considering the non-interstate rural KSI crashes in St. Charels County, 66% occurred along segments (97 KSI crashes or about 19 per year). **Figure 13** highlight the crash types at **non-interstate rural road segments** in St. Charles County from 2018 to 2022. Fixed objects (run off road) were again the most frequent crash with 72, followed by head-on collisions (eight crashes). Other crash types, including animal-related incidents, rear ends, pedestrian, sideswipe, and turning incidents, were less frequent but still had minor contribution. Trees were the most commonly stuck object (41%), while ditches or embankments and utility poles accounted for 20% and 19%, respectively.

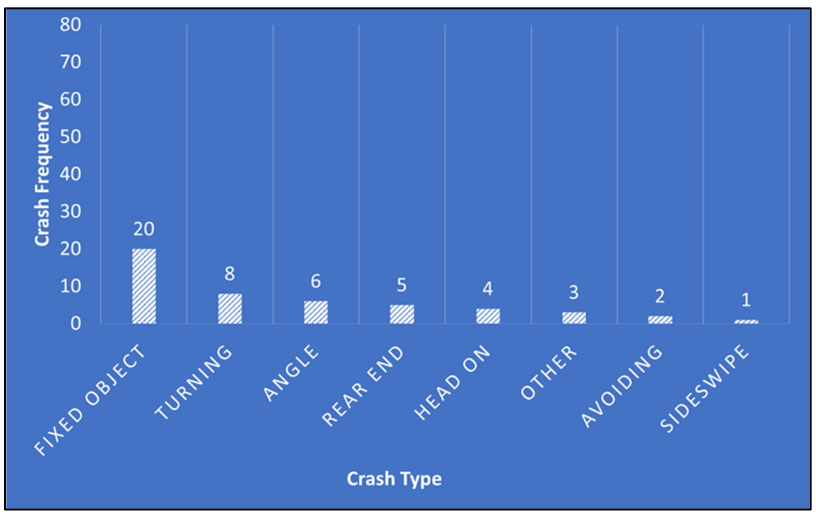


Figure 12: Non-Interstate Rural Intersection Fatal and Serious Injury Crashes in St. Charles County by Crash Type (2018-2022)

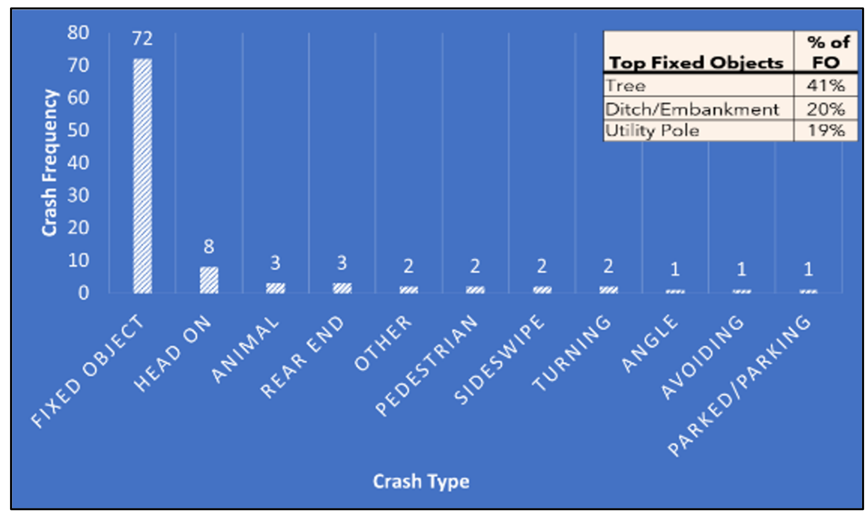


Figure 13: Non-Interstate Rural Segment Fatal and Serious Injury Crashes in St. Charles County by Crash Type (2018-2022)

Vulnerable Road Users

Pedestrian Focus in St. Charles County

In St. Charles County there were 63 pedestrian-involved KSI crashes from 2018 to 2022, which results in approximately 8% of all KSI crashes. Two-thirds of these pedestrian-involved KSI crashes occurred in the dark, most of which (60%) occurred at locations without streetlights. Moreover, 50% of these crashes occurred at intersections. This data underlines the importance of improving pedestrian safety through enhanced lighting and infrastructure measures, especially at intersections, to reduce the frequency and severity of pedestrian-related crashes.

In St. Charles County, pedestrians were involved in 13% of all fatal crashes, with 80% of these fatal pedestrian incidents occurring in dark conditions. Among these, 56% happened without streetlights. Additionally, 45% of fatal pedestrian crashes occurred at intersections.

Underserved Communities Focus in St. Charles County

The Climate and Economic Justice Screening Tool (CEJST) was used to identify disparities between crashes and disadvantaged communities within St. Charles County. Less than 1% of St Charles County's population lives in disadvantaged areas, while about 9% of the fatal and serious crashes occur in those disadvantaged areas. Although a very small sample size, this indicates a trend that more KSI crashes occur in the CEJST areas than non-CEJST areas.

This discrepancy highlights the need for increased resources and heightened efforts to address the underlying issues contributing to fatal and serious injury crashes within disadvantaged areas. It is important to understand the additional burdens and barriers these communities face, as identified by the CEJST so that more focused efforts can be directed toward improving transportation safety and health outcomes for the residents most at risk.

Summary of Findings for St. Charles County

The analysis reveals fluctuating trends in total crashes and Vehicle Miles Traveled (VMT), notably declining in 2020 due to the COVID-19 pandemic but gradually recovering thereafter. However, fatal and serious injury (KSI) crashes exhibit a consistent upward trajectory during the same period, indicating persistent challenges in road safety.

Contributing factors to these crashes include speeding, improper lane usage, alcohol/drug use, distraction, and disregarding signals, underscoring the need for comprehensive safety strategies. Demographic insights highlight disproportionately high involvement rates among younger and older drivers, emphasizing the necessity for targeted interventions across age groups. Temporal patterns reveal weekends as high-risk periods, particularly late afternoons and evenings, suggesting the importance of increased enforcement and awareness campaigns during these times.

Non-interstate urban areas accounted for a majority of the KSI crashes (61%), with a large percentage at intersections. The urban crash types included fixed objects, turning, angle, rear-end, head-on and pedestrian. The non-interstate rural areas accounted for a much smaller percentage (18%) but were dominated by fixed object crashes. Pedestrians were also determined to be a particularly vulnerable population, with many fatal pedestrian crashes occurring at night both at intersections and along segments.

To address these challenges, a multi-pronged approach is necessary. Targeted enforcement efforts could be considered to tackle speeding and failing to yield crashes. Public awareness campaigns should be focused on safe driving practices, especially for young and older adults. Furthermore, targeted interventions to improve pedestrian safety particularly during evening hours would be beneficial.

Appendix A7: Existing Safety Analysis and Crash Risk Assessment for St. Clair County

As part of the *Gateway to Safer Roadways: St. Louis Regional Safety Action Plan* (Action Plan), a thorough analysis of transportation safety within the East-West Gateway Council of Governments (EWG) Region was conducted using data spanning the years 2018 to 2022.

Crash data from 2018 to 2022 was gathered as part of this Action Plan and contained all crashes in the EWG Region, which includes the City of St. Louis, Franklin, Jefferson, St. Charles, and St. Louis counties in Missouri, as well as Madison, Monroe, and St. Clair counties in Illinois. The Missouri crash data was obtained from the Missouri Department of Transportation's (MoDOT's) Transportation Management Systems (TMS), and the Illinois crash data was provided by the Illinois Department of Transportation's (IDOT's) Transportation Safety Department.

The data includes all crashes occurring on public roadways that involve a fatality, injury, or property damage. Severity ratings are assigned by the responsible agencies based on the presence and significance of an injury resulting from the crash. Crash severity ratings are listed and defined below:

- Fatal – any injury that results in death within 30 days after the motor vehicle crash in which the injury occurred.
- Serious Injury – any injury other than fatal which prevents the person from walking, driving or normally continuing the activities the person could perform before the injury occurred, such as severe lacerations, broken or distorted extremity, crush injuries, suspected skull, chest, or abdominal injuries other than bruises or minor lacerations, significant burns, unconsciousness when taken from the crash scene, or paralysis.
- Minor Injury – any injury that is evident at the scene or reported or claimed that is not fatal or serious.
- Property Damage Only – when there is no apparent injury or when there is no reason to believe an injury occurred and when property damage of $500 or more for Missouri or $1,500 or more in Illinois occurred.

Crash Data: The analysis used comprehensive crash, person, and vehicle datasets sourced from MoDOT and IDOT. The crash data included information crucial to each crash, including the time and date of the crash, crash type, location, contributing factors, and lighting and weather conditions. Notably, each crash is given a unique identifier (crash ID) which is also linked to occupant and vehicle data. Occupant data within the dataset includes details about individuals involved in the crashes, including their gender, age, and the

severity of injuries sustained, with stringent measures undertaken by both agencies to scrub the data of any personally identifiable information. Additionally, the vehicle data offers valuable insights into the involved vehicle types, the use and functionality of safety devices, airbag deployment, and type of fixed objects struck by each vehicle during the crash.

Vehicle Miles Traveled (VMT): The Vehicle Miles Traveled (VMT) data, essential for understanding regional travel patterns and demand, was obtained from EWG. Covering the period from 2018 to 2022, this dataset includes VMT for each county within the EWG Region as well as aggregate regional data. The VMT data was provided in daily vehicle miles traveled format but was converted to annual vehicle miles traveled for these evaluations to be consistent with the crash data, which was summarized for each year. The VMT metric was used to compare the total number of crashes to VMT for each year to understand the correlation between the number of crashes and vehicle exposure.

Population Data: To correlate crash data with demographic trends, population estimates were sourced from EWG, based on U.S. Census Bureau data for the year 2020. Since the U.S. Census data was collected in 2020 and also aligns with the middle of the evaluation period, the 2020 population data was used for this analysis.

Equity Data: The information on disadvantaged communities was sourced from the Climate and Economic Justice Screening Tool (CEJST), a specialized tool designed to pinpoint these communities by evaluating burdens across various domains such as climate change, energy, health, housing, legacy pollution, transportation, water and wastewater, and workforce development. Within the CEJST framework, disadvantaged areas are delineated as census tracts that bear disproportionate burdens and lack adequate support concerning these environmental and economic challenges.

The data collection and processing efforts detailed above are foundational to the Action Plan. They enable a data-driven approach to understanding the dynamics of transportation safety and formulating strategies to mitigate risks and enhance safety across the EWG Region. This methodical approach ensures that the analyses are grounded in reliable data, facilitating informed decision-making in regional transportation planning and safety management.

St. Clair County Trend Analysis

Trend Analysis - Crashes and VMT in St. Clair County

Figure 1 for St. Clair County illustrates the trends in total crashes and Vehicle Miles Traveled (VMT) from 2018 to 2022. The blue bars represent the total number of crashes, while the black line indicates VMT on the secondary axis to the right. Crashes remained relatively stable between 2018 and 2019, with 6,279 and 6,259 incidents, respectively. However, a sharp decline to 4,993 in 2020 likely resulted from the COVID-19 pandemic and its significant impact on travel patterns. In 2021, total crashes rebounded to 5,640 before slightly dropping to 5,383 in 2022.

The VMT trend follows a similar pattern, with a substantial decrease in 2020 reflecting pandemic travel restrictions and a gradual recovery afterward. Although VMT increased steadily in 2021 and 2022, it hasn't yet returned to pre-pandemic levels. These trends demonstrate that while the pandemic significantly impacted both VMT and total crashes in 2020, subsequent years show a gradual recovery in travel patterns and crash rates.

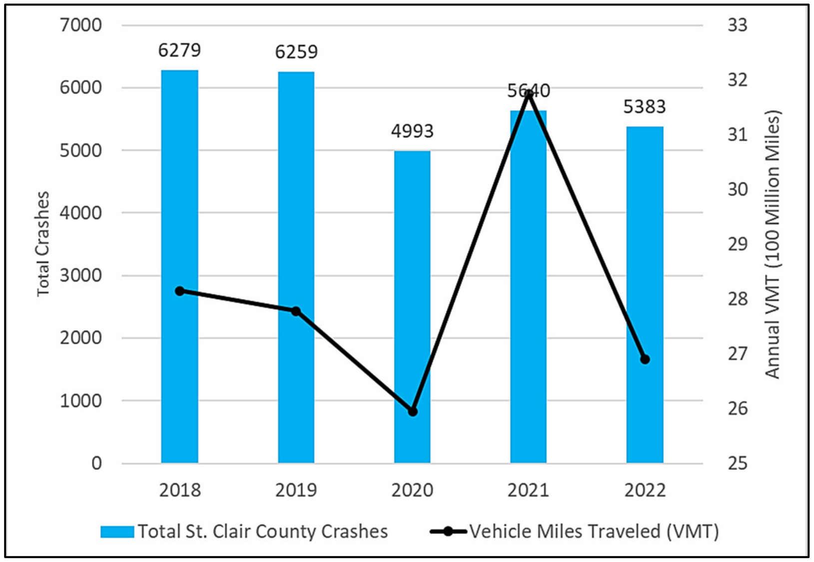


Figure 1: Annual Total Crashes and Vehicle Miles Traveled (VMT) in St. Clair County (2018-2022)

Trend Analysis – Fatal and Serious Injury Crashes in St. Clair County

St. Clair County had a total of 1,303 fatal and serious injury (KSI) crashes between 2018 and 2022 for an average of 261 KSI crashes per year. **Figure 2** for St. Clair County illustrates the trends in fatal and serious injury crashes between 2018 and 2022.

St. Clair County had a total of 172 fatal crashes over the five-year period for an average of about 35 fatal crashes per year. Fatal crashes, represented by the blue bars, began at 30 incidents in 2018 before declining to 25 in 2019. In 2020, fatal crashes rose to 36 and slightly decreased to 34 in 2021, before peaking at 47 in 2022. The linear trendline for fatal crashes shows a gradual increase, indicating an upward trajectory in fatal incidents over the observed period.

St. Clair County had a total of 1,131 serious injury crashes over the five-year period for an average of about 226 serious injury crashes per year. Serious injury crashes, represented by the orange bars, display a different pattern. They started at 257 incidents in 2018, decreased to 250 in 2019, and then dropped significantly to 186 in 2020. They further declined to 238 in 2021 and finally to 200 in 2022. Despite this overall decrease, the trendline shows a stable but downward trajectory.

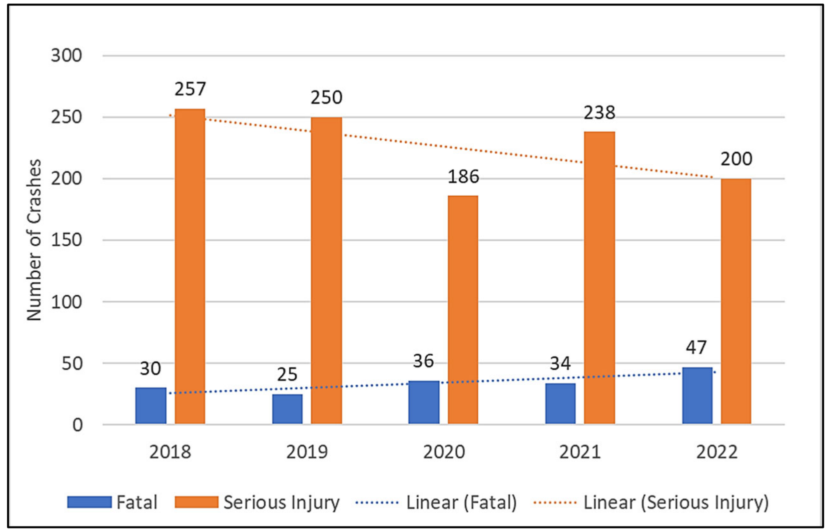


Figure 2: Fatal and Serious Injury Crashes in St. Clair County by Year (2018-2022)

ST. CLAIR COUNTY CRASH RISK ASSESSMENT

What are the Contributing Factors of Fatal and Serious Crashes in St. Clair County?

In St. Clair County from 2018 to 2022, speeding stands out as the leading contributing factor for KSI crashes, accounting for 31% of incidents, as shown in **Figure 3**. This high proportion emphasizes the need for targeted enforcement and educational campaigns around speed limits and safe driving practices. Failing to yield and improper lane usage both contribute to 17%. Disregarding signals/signs, and alcohol/drug impairment follow closely, responsible for 10% and 8% of crashes, respectively. Distraction also plays a role in 5% of incidents, while physical driver conditions and following too closely contribute to 5% and 4% of crashes, respectively. Minor factors include driving the wrong way (4%) and overcorrected maneuver (less than 1%).

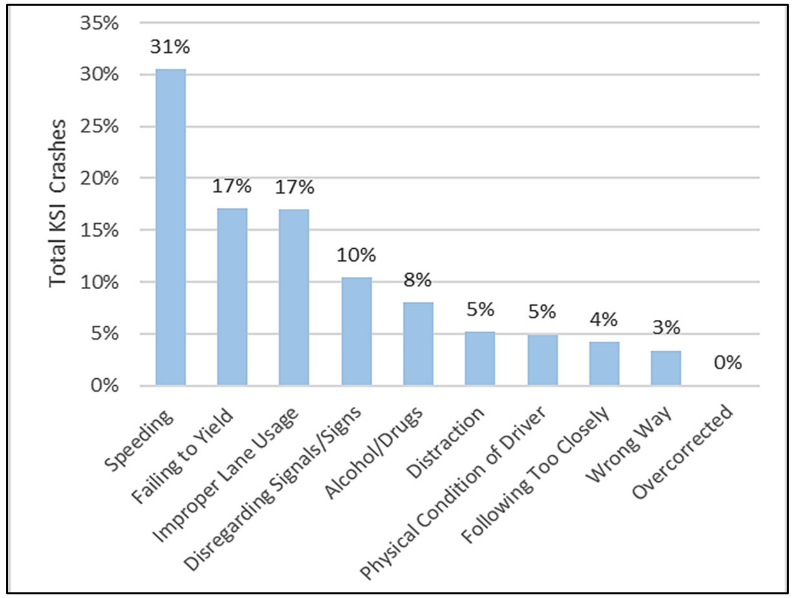


Figure 3: Top 10 Contributing Factors of Fatal and Serious Injury Crashes in St. Clair County (2018-2022)

These statistics highlight the complex nature of KSI crashes in St. Clair County. High-risk behaviors such as speeding, improper lane usage, failure to yield and disregarding signs and signals account for a significant portion of these incidents, pointing to the need for comprehensive safety strategies. By addressing these underlying factors, road safety initiatives can significantly reduce the frequency and severity of crashes.

What is the Age of Those Involved in Fatal and Serious Crashes in St. Clair County?

To identify what age groups are more likely to be involved in fatal or serious injury crashes, the crash data was categorized into age groups based on the methodology used by the National Highway Traffic Safety Administration (NHTSA). This methodology includes those under 16 years old as a group, those older than 65 years old as a group and then groups for every five-year increments in-between.

The bar chart in **Figure 4** depicts the age distribution of persons involved in KSI crashes in St. Clair County from 2018 to 2022, encompassing drivers, pedestrians, and bicyclists. In St. Clair County, the age group 26-30 represents the most frequently involved demographic in KSI crashes, with over 300 individuals. The next most affected age groups include those 21-25 and 31-35, each around 250 individuals. The over 65 demographic also stands out with more than 200 individuals in KSI crashes. Other age groups, such as 16-20, 36-40, 41-45, and 46-50, also show relatively similar involvement rates.

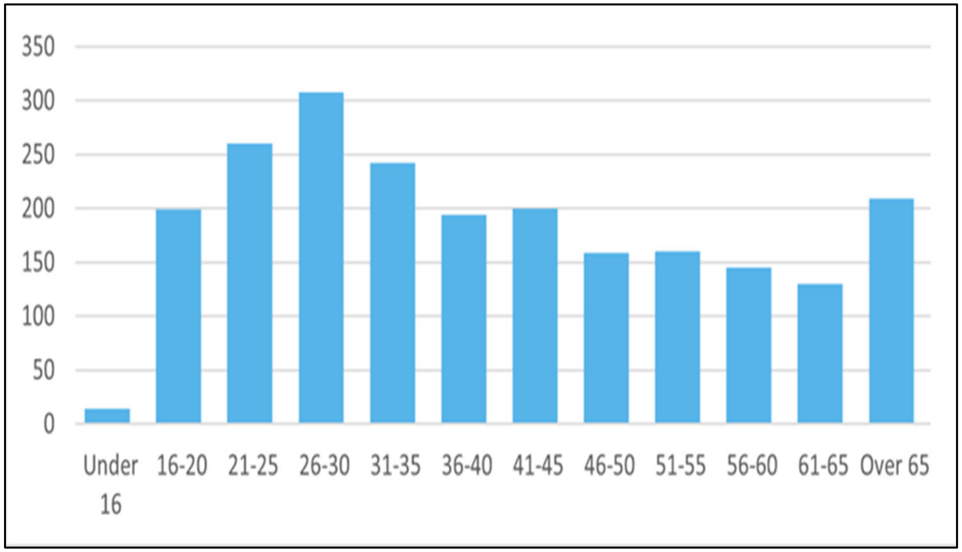


Figure 4: Age Distribution of Persons Involved in Fatal and Serious Injury Crashes in St. Clair County (2018-2022)

These patterns align with broader trends that reveal younger adults often engage in riskier driving behaviors like speeding or distraction, increasing their involvement in severe crashes. Meanwhile, older adults can be at higher risk due to the physical vulnerabilities associated with aging, necessitating more targeted road safety measures for each group.

When do Fatal and Serious Crashes Occur in St. Clair County?

Analyzing KSI crash data in St. Clair County from 2018 to 2022 reveals patterns across months, days, and hours. The heatmap in **Figure 5** summarizes the months and days and shows that Fridays, Saturdays, and Sundays have consistently high crash numbers, particularly between July and November. Saturdays in June and September experienced 26 and 24 crashes respectively, while Wednesdays in September and November had 28 and 26 crashes, respectively. This pattern suggests that weekends are periods of heightened risk, especially in the afternoons and evenings, likely due to increased travel for social and recreational activities.

Figure 5: Fatal and Serious Injury Crashes in St. Clair County by Month and Day (2018-2022)

Figure 6 provides a detailed look at the daily distribution of KSI crashes by the hour. Late afternoons and evenings, specifically between 2:00 PM and 8:00 PM, are periods of elevated risk across weekdays, with peaks around 3:00 PM on Mondays and 2:00 and 4:00 PM on Wednesdays. Fridays, see the highest crash period from 2:00 PM to 6:00 PM. Sunday evenings at 7:00 PM also show an increased risk. These patterns indicate the importance of enhancing safety measures, such as enforcement efforts and awareness campaigns focused on weekends and evening hours, to reduce high-risk driving behaviors during these periods.

Hour	Mon	Tue	Wed	Thu	Fri	Sat	Sun
12:00 AM	6	12	5	2	5	9	15
1:00 AM	3	3	6	3	9	10	13
2:00 AM	4	1	1	3	5	12	12
3:00 AM	3	1	4	6	6	8	10
4:00 AM	3	5	2	1	4	6	5
5:00 AM	3	1		3	3	12	6
6:00 AM	3	2	4	4	7	5	6
7:00 AM	9	6	10	7	4	3	4
8:00 AM	8	4	9	4	5	3	2
9:00 AM	3	7	6	8	4	4	5
10:00 AM	6	4	2	10	10	4	7
11:00 AM	8	10	4	7	9	4	12
12:00 PM	10	10	11	13	11	12	10
1:00 PM	10	7	9	11	8	10	9
2:00 PM	12	14	16	11	15	9	6
3:00 PM	17	14	10	14	15	9	11
4:00 PM	8	11	18	11	15	7	12
5:00 PM	8	8	14	13	16	12	9
6:00 PM	9	7	10	12	11	15	14
7:00 PM	8	10	10	7	8	5	17
8:00 PM	7	4	5	5	16	12	13
9:00 PM	6	3	8	5	9	15	3
10:00 PM	4	9	5	13	8	12	7
11:00 PM	2	7	4	4	9	9	6

CNT(County)

1.00 – 18.00

Figure 6: Fatal and Serious Injury Crashes in St. Clair County by Day and Hour (2018-2022)

Lighting Conditions of Fatal and Serious Crashes in St. Clair County

Figure 7 offers an analysis of light conditions during KSI crashes in St. Clair County between 2018 and 2022. The chart reveals that most of these crashes occurred during daylight, accounting for 62% of incidents. Crashes that happened in dark conditions with streetlights made up 21% of the total. Although artificial lighting can mitigate risks, it's not always enough to prevent accidents. Furthermore, 17% of KSI crashes occurred in dark conditions without streetlights.

This distribution underscores the importance of understanding both lighting conditions and driver behavior when assessing crash patterns. While lighting can improve safety, it is crucial to address risky driving behaviors that contribute to crashes regardless of the time of day.

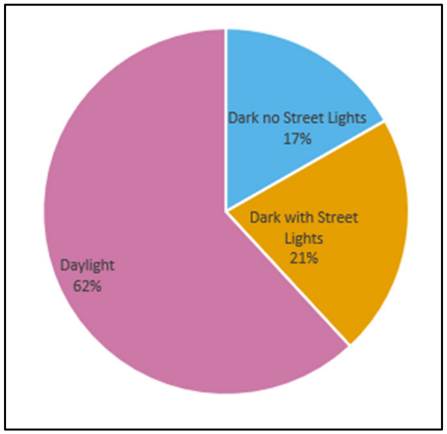


Figure 7: Fatal and Serious Injury Crashes in St. Clair County by Lighting (2018-2022)

Road Surface Condition of Fatal and Serious Injury Crashes in St. Clair County

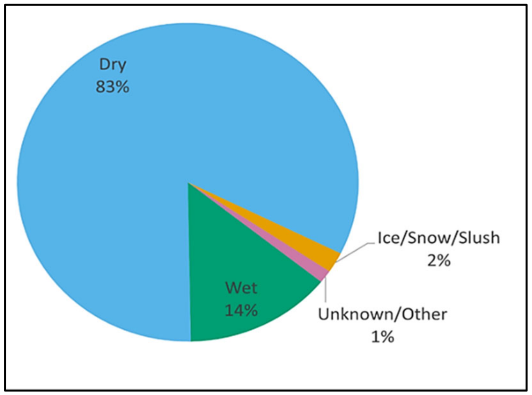


Figure 8: Fatal and Serious Injury Crashes in St. Clair County by Road Surface Condition (2018-2022)

Figure 8 provides a detailed look at the road surface conditions during KSI crashes in St. Clair County from 2018 to 2022. A significant 83% of these crashes occurred on dry road surfaces. Wet conditions are associated with 14% of the crashes, highlighting the increased risk during rainy or damp conditions. Conversely, ice, snow, and slush only accounted for a minimal 2% of the KSI crashes, emphasizing that severe crashes are less frequent under these conditions but can still present significant hazards. An additional 1% of crashes occurred under unknown or other conditions, suggesting occasional data gaps or unusual circumstances.

Where are Fatal and Serious Crashes Occurring in St. Clair County?

The St. Clair County includes a wide variety of roadway systems, such as interstates, arterials, collectors, and local roads. Since interstates are higher speed, access-controlled facilities with interchanges, the safety issues on those facilities are much different than the non-interstate facilities. As a result, for the systemic safety analysis, three main categories were developed: Interstate, Non-Interstate Rural, and Non-Interstate Urban.

The pie chart in **Figure 9** provides a breakdown of KSI crashes in St. Clair County between 2018 and 2022 based on road type. As can be seen, 19% of St. Clair County's KSI crashes occurred on interstates, 16% occurred on non-interstate roads in the rural areas, and 65% occurred in non-interstate urban areas.

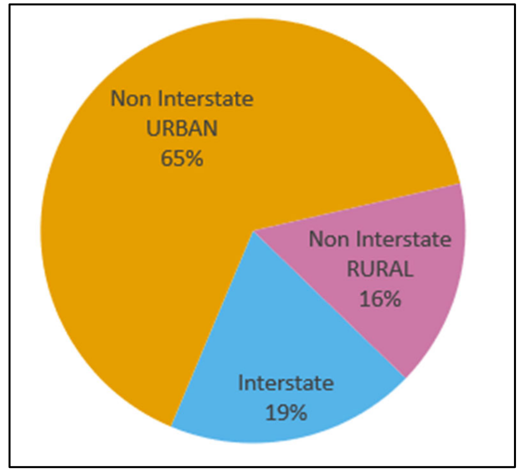


Figure 9: Fatal and Serious Injury Crashes in St. Clair County by Road Type (2018-2022)

Non-Interstate Crashes – Urban Areas in St. Clair County

According to the crash data between 2018 and 2022, approximately 65% of the St. Clair County KSI crashes occurred in urban areas. The urban non-interstate crashes consisted of a total of 848 KSI crashes or approximately 170 per year. To assist in determining potential systemic improvements in urban areas, crash types at intersections and crash types along segments were evaluated. Crashes within 150 feet of an intersection were considered intersection crashes.

When considering the non-interstate urban KSI crashes in St. Clair County, approximately 46% of KSI crashes occurred at urban intersections (388 KSI crashes or about 78 per year). **Figure 10** displays the types of KSI crashes that occurred at **non-interstate urban intersections** in St. Clair County. The most frequent type of intersection crash was turning, accounting for 155 incidents. Angle crashes were the second most common, with 115 incidents, followed by rear-end crashes with 47 then Pedestrian crashes with 20 incidents. Other crash types including fixed-object, overturned, head-on, bicycle, sideswipe crashes, other and train, were less frequent but still had minor contribution. Trees were the most frequently struck fixed objects, followed by utility poles and other barriers.

When considering the non-interstate urban KSI crashes in St. Clair County, 54% of KSI crashes occurred along urban segments (460 KSI crashes or 92 per year). **Figure 11** shows the types of urban KSI crashes that occurred at **non-interstate urban road segments**. Fixed-object collisions, which includes out of control and run off road crashes, led this category with 134 incidents, followed by pedestrian crashes with 59. Other significant crash types included rear-end (55), head-on (46), turning (43), and sideswipe (30). Crashes involving overturned vehicles, parked/parking, and animals were also present. Among the fixed objects struck in segment crashes, trees accounted for 19% of incidents, utility poles for 17%, and other obstacles for 13%.

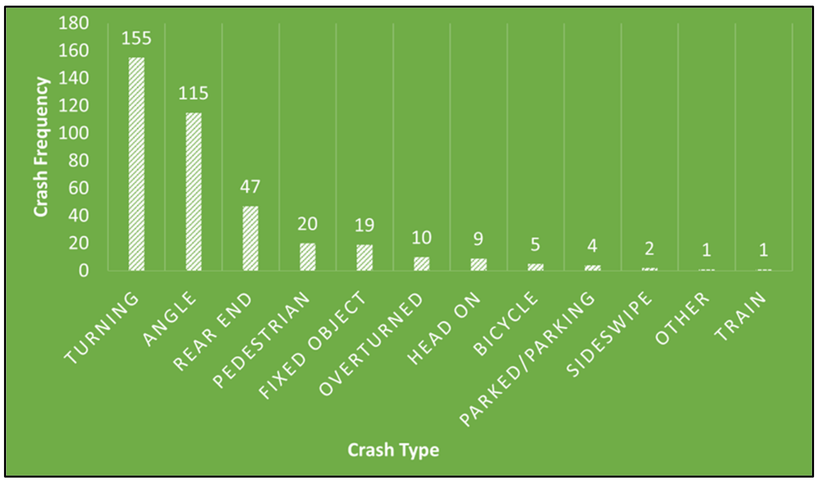


Figure 10: Non-Interstate Urban Intersection Fatal and Serious Injury Crashes in St. Clair County by Crash Type (2018-2022)

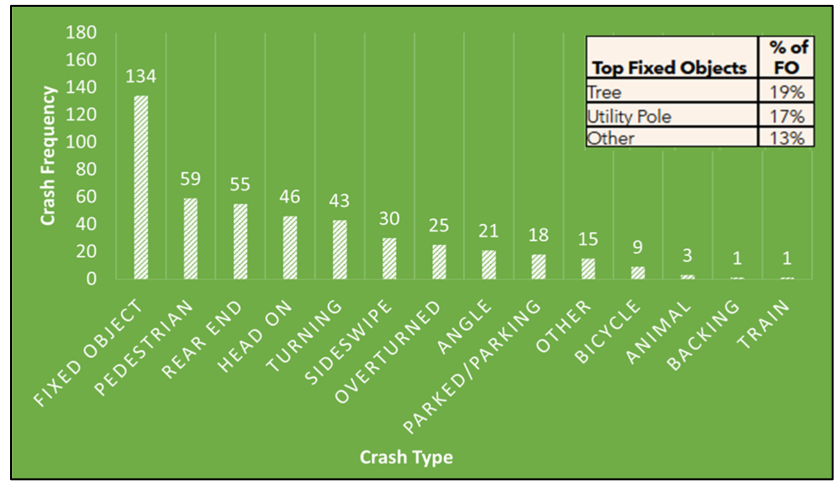


Figure 11: Non-Interstate Urban Segment Fatal and Serious Injury Crashes in St. Clair County by Crash Type (2018-2022)

Together, these figures illustrate the high concentration of severe crashes at intersections due to complex traffic interactions and turning maneuvers, particularly turning and angle crashes. Segment crashes are slightly more frequent, and also present notable risks from fixed-object collisions, pedestrian incidents, and high speeds.

Non-Interstate Crashes – Rural Areas in St. Clair County

According to the crash data between 2018 and 2022, approximately 16% of the St. Clair County KSI crashes occurred in rural areas. The urban non-interstate crashes consisted of a total of 206 KSI crashes or approximately 41 per year. To assist in determining potential systemic improvements in rural areas, crash types at intersections and crash types along segments were evaluated. Crashes within 150 feet of an intersection were considered intersection crashes.

When considering the non-interstate rural KSI crashes in St. Clair County, approximately 35% occurred at rural intersection (72 KSI crashes or about 14 per year). **Figure 12** examines the crash type at **non-interstate rural intersections** in St. Clair County. At intersections, turning, angle and rear end crashes were highest at 26, 25 and nine crashes, respectively. Other less frequent crash types included bicycle, fixed-object, overturned, pedestrian, sideswipe crashes and train.

When considering the non-interstate rural KSI crashes in St. Clair County, approximately 65% occurred at rural segments (134 KSI crashes or about 27 per year). **Figure 13** reveals the types of crashes occurring along **non-interstate rural segments** in St. Clair County. Fixed-object crashes were the most common type, accounting for 58 incidents. Overturned, head-on, rear end and turning crashes followed with 19, 15, 12 and seven occurrences, respectively. The remaining crash types, such as other, pedestrian, sideswipe, angle, bicycle, and animal had fewer instances. This data demonstrates the importance of addressing road hazards like fixed objects.

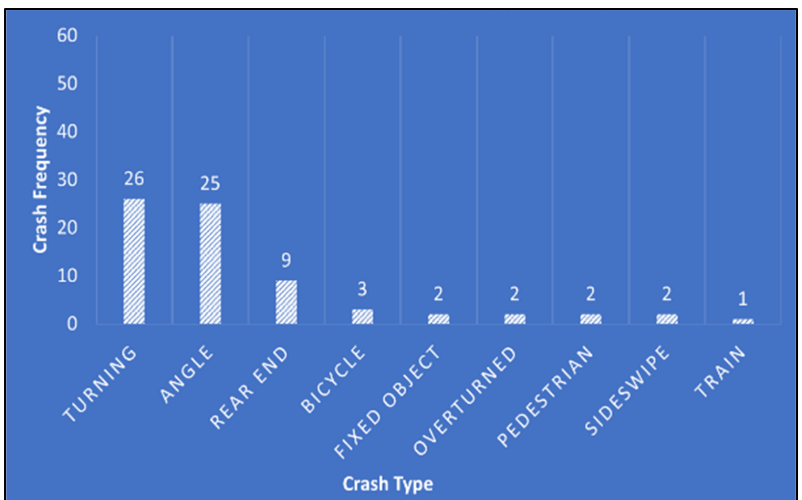


Figure 12: Non-Interstate Rural Intersection Fatal and Serious Injury Crashes in St. Clair County by Crash Type (2018-2022)

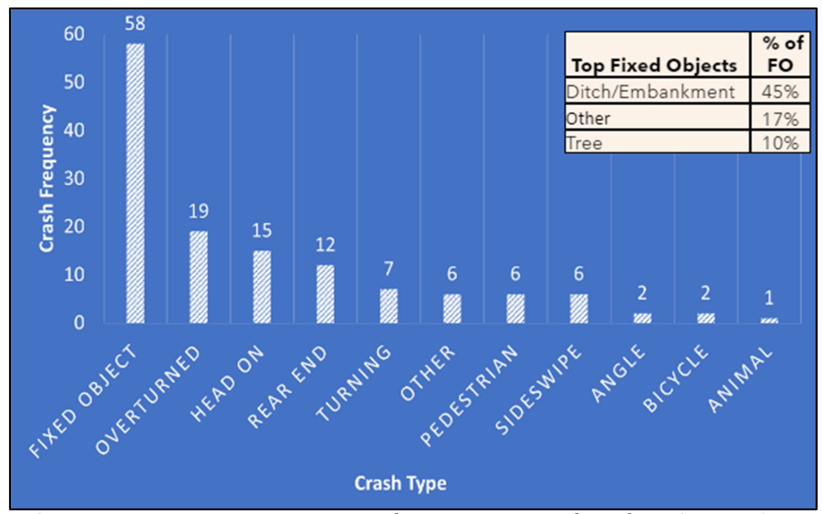


Figure 13: Non-Interstate Rural Segment Fatal and Serious Injury Crashes in St. Clair County by Crash Type (2018-2022)

Vulnerable Road Users

Pedestrian Focus in St. Clair County

In St. Clair County there were 99 pedestrian-involved KSI crashes from 2018 to 2022, which results in approximately 8% of all KSI crashes. 69% of these pedestrian-involved KSI crashes occurred in the dark, and 60% happened without streetlights, while 40% were in areas with streetlighting. Moreover, 50% of these crashes occurred along segments and not at intersections. These data underline the importance of improving pedestrian safety through enhanced lighting and infrastructure measures to reduce the frequency and severity of pedestrian-related crashes.

Further, pedestrians were involved in 22% of all fatal crashes. Most fatal pedestrian crashes happen in the dark (76%), and 89% occur away from intersections.

Figure 14 is a heatmap and highlights how pedestrian KSI crashes occur across months and days of the week. Notably, pedestrian crashes are more frequent in May through September. Saturdays stand out, especially in summer months of May through June, with a high frequency of pedestrian crashes. Fridays also display higher crash counts, aligning with increased weekend activity.

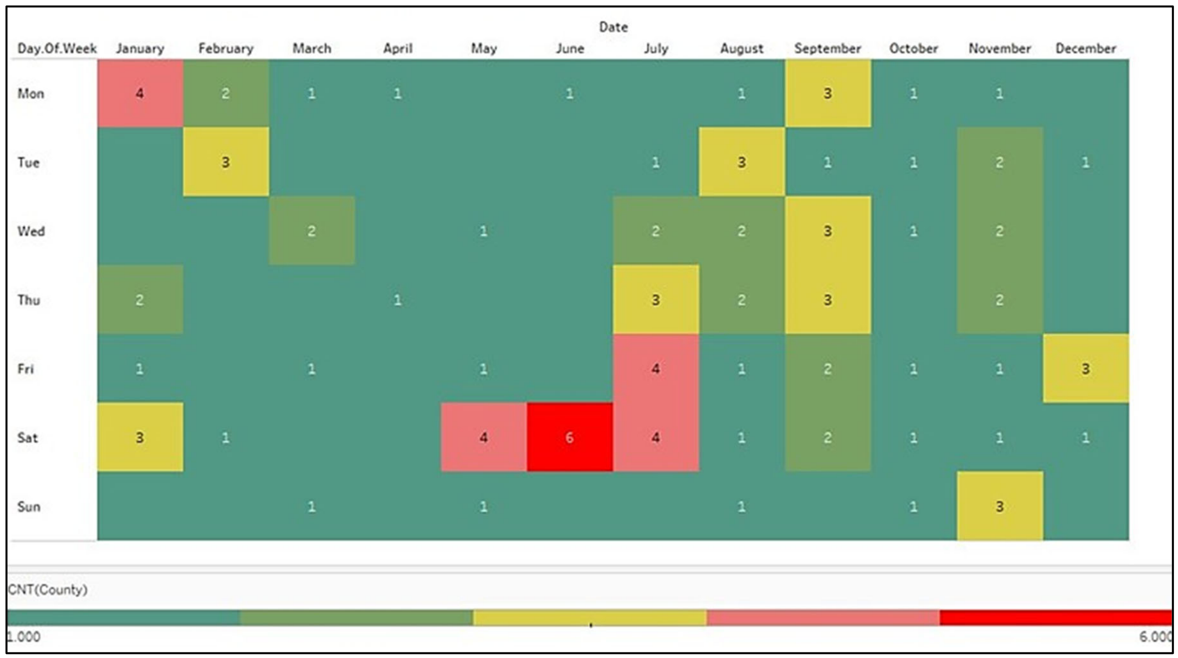


Figure 14: Pedestrian Involved Fatal and Serious Injury Crashes by Month and Day in St. Clair County (2018-2022)

In **Figure 15**, the heatmap illustrates when pedestrian crashes occur during the day. Late afternoon and evening hours, particularly from 5:00 PM to 10:00 PM, are high-risk periods for pedestrian crashes. This pattern remains consistent throughout the year but shows significant spikes from July to November, when twilight and darkness complicate visibility. Additionally, most fatal pedestrian crashes (71%) happen in dark conditions, and 73% occur in areas without streetlights, highlighting the significant risk posed by poor lighting.

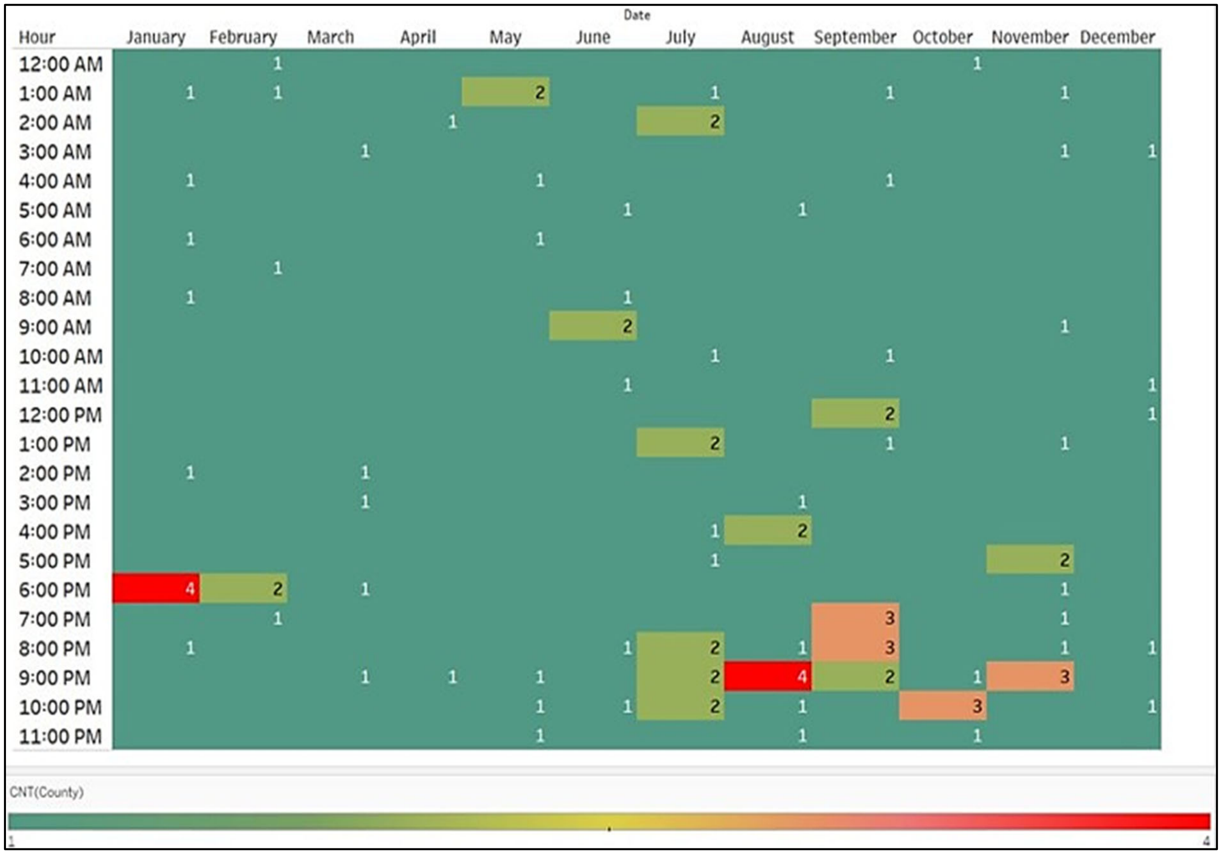


Figure 15: Pedestrian Involved Fatal and Serious Injury Crashes by Month and Hour in St. Clair County (2018-2022)

Underserved Communities Focus

The Climate and Economic Justice Screening Tool (CEJST) was used to identify disparities between crashes and disadvantaged communities within St. Clair County. To identify these disparities, the percentage of the population living in disadvantaged communities was compared to the percentage of KSI crashes recorded in those same CEJST areas.

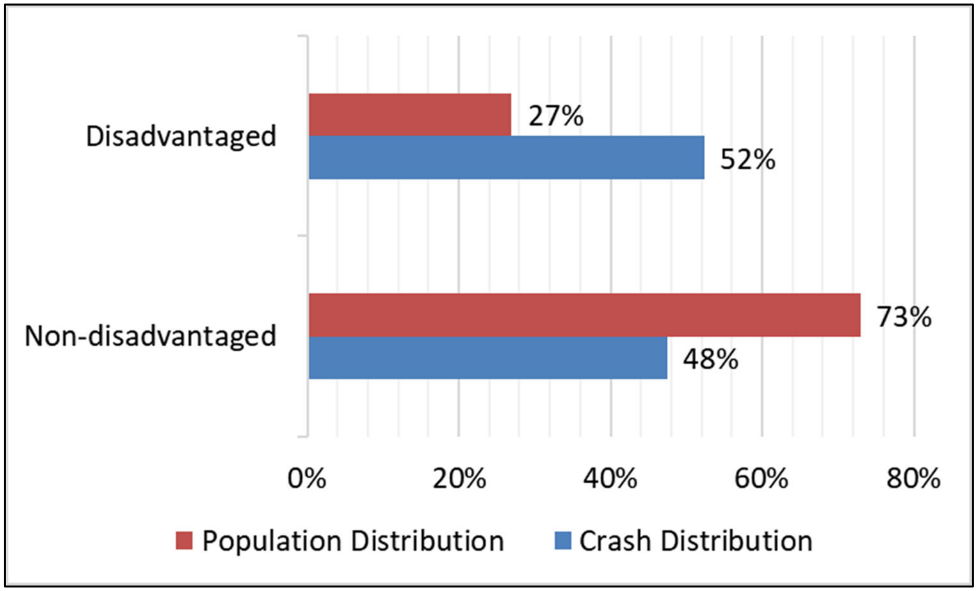


Figure 16: Comparison of Population and Fatal and Serious Injury Crashes in CEJST Areas in St. Clair County (2018-2022)

As shown in **Figure 16,** approximately 27% of St. Clair County's population lives in disadvantaged areas, yet about 52% of the fatal and serious crashes occur in those disadvantaged areas. This indicates a trend that more KSI crashes occur in the CEJST areas than the non-CEJST areas. It should be noted that St. Clair County had high percentage of pedestrian-involved KSI crashes (55%) occurring in underserved communities. This discrepancy highlights the need for increased resources and heightened efforts to address the underlying issues contributing to fatal and serious injury crashes within disadvantaged areas. It is important to understand the additional burdens and barriers these communities face, as identified by the CEJST so that more focused efforts can be directed toward improving transportation safety and health outcomes for the residents most at risk.

Summary of Findings in St. Clair County

A comprehensive analysis of crash data in St. Clair County from 2018 to 2022 unveils concerning trends and offers valuable insights for enhancing road safety initiatives. Total crashes exhibited a correlation with Vehicle Miles Traveled (VMT) patterns, reflecting a temporary decline during the COVID-19 pandemic. The fatal crash trend has gone upward over the five-year period, but the serious injury crash trend has decreased.

Speeding was identified as the most significant contributing factor, followed by distracted driving, failing to yield the right of way, and improper lane usage. Young adults were found to be most frequently involved in severe injury crashes, although the involvement of senior citizens is a growing concern. Fridays, Saturdays and Sundays between July and November displayed a marked increase in crash frequency. Interestingly, a significant portion of fatal and serious injury (KSI) crashes occurred during daylight hours, emphasizing the critical need to address risky driver behaviors even in seemingly optimal visibility conditions.

Non-interstate urban areas accounted for a majority of the KSI crashes (65%), with a near equal split between segments and intersections. The urban crash types included turning, fixed objects, angle, rear end, and pedestrians. The non-interstate rural areas accounted for a much smaller percentage (16%) but were more heavily skewed to fixed object and turning crashes. Pedestrians were also determined to be a particularly vulnerable population, with many fatal pedestrian crashes occurring at night and away from intersections. Furthermore, the analysis revealed a disproportionate impact on disadvantaged communities, where a higher percentage of crashes occurred despite representing a smaller share of the total population, especially pedestrian related crashes in those disadvantaged areas.

To effectively improve road safety outcomes in St. Clair County, a multi-pronged approach is necessary. Targeted enforcement campaigns specifically addressing speeding, distracted driving, and driving under the influence should be prioritized, with a focus on high-risk demographics and peak crash times. Additionally, implementing strategic safety investments including engineering improvements that enhance safety for all road users should be a focus. Furthermore, targeted interventions to improve pedestrian safety particularly during evening hours would be beneficial.

Appendix A8: Existing Safety Analysis and Crash Risk Assessment for St. Louis County

As part of the *Gateway to Safer Roadways: St. Louis Regional Safety Action Plan* (Action Plan), a thorough analysis of transportation safety within the East-West Gateway Council of Governments (EWG) Region was conducted using data spanning the years 2018 to 2022.

Crash data from 2018 to 2022 was gathered as part of this Action Plan and contained all crashes in the EWG Region, which includes the City of St. Louis, Franklin, Jefferson, St. Charles, and St. Louis counties in Missouri, as well as Madison, Monroe, and St. Clair counties in Illinois. The Missouri crash data was obtained from the Missouri Department of Transportation's (MoDOT's) Transportation Management Systems (TMS), and the Illinois crash data was provided by the Illinois Department of Transportation's (IDOT's) Transportation Safety Department.

The data includes all crashes occurring on public roadways that involve a fatality, injury, or property damage. Severity ratings are assigned by the responsible agencies based on the presence and significance of an injury resulting from the crash. Crash severity ratings are listed and defined below:

- Fatal – any injury that results in death within 30 days after the motor vehicle crash in which the injury occurred.
- Serious Injury – any injury other than fatal which prevents the person from walking, driving or normally continuing the activities the person could perform before the injury occurred, such as severe lacerations, broken or distorted extremity, crush injuries, suspected skull, chest, or abdominal injuries other than bruises or minor lacerations, significant burns, unconsciousness when taken from the crash scene, or paralysis.
- Minor Injury – any injury that is evident at the scene or reported or claimed that is not fatal or serious.
- Property Damage Only – when there is no apparent injury or when there is no reason to believe an injury occurred and when property damage of $500 or more for Missouri or $1,500 or more in Illinois occurred.

Crash Data: The analysis used comprehensive crash, person, and vehicle datasets sourced from MoDOT and IDOT. The crash data included information crucial to each crash, including the time and date of the crash, crash type, location, contributing factors, and lighting and weather conditions. Notably, each crash is given a unique identifier (crash ID) which is also linked to occupant and vehicle data. Occupant data within the dataset includes details about individuals involved in the crashes, including their gender, age, and the

severity of injuries sustained, with stringent measures undertaken by both agencies to scrub the data of any personally identifiable information. Additionally, the vehicle data offers valuable insights into the involved vehicle types, the use and functionality of safety devices, airbag deployment, and type of fixed objects struck by each vehicle during the crash.

Vehicle Miles Traveled (VMT): The Vehicle Miles Traveled (VMT) data, essential for understanding regional travel patterns and demand, was obtained from EWG. Covering the period from 2018 to 2022, this dataset includes VMT for each county within the EWG Region as well as aggregate regional data. The VMT data was provided in daily vehicle miles traveled format but was converted to annual vehicle miles traveled for these evaluations to be consistent with the crash data, which was summarized for each year. The VMT metric was used to compare the total number of crashes to VMT for each year to understand the correlation between the number of crashes and vehicle exposure.

Population Data: To correlate crash data with demographic trends, population estimates were sourced from EWG, based on U.S. Census Bureau data for the year 2020. Since the U.S. Census data was collected in 2020 and also aligns with the middle of the evaluation period, the 2020 population data was used for this analysis.

Equity Data: The information on disadvantaged communities was sourced from the Climate and Economic Justice Screening Tool (CEJST), a specialized tool designed to pinpoint these communities by evaluating burdens across various domains such as climate change, energy, health, housing, legacy pollution, transportation, water and wastewater, and workforce development. Within the CEJST framework, disadvantaged areas are delineated as census tracts that bear disproportionate burdens and lack adequate support concerning these environmental and economic challenges.

The data collection and processing efforts detailed above are foundational to the Action Plan. They enable a data-driven approach to understanding the dynamics of transportation safety and formulating strategies to mitigate risks and enhance safety across the EWG Region. This methodical approach ensures that the analyses are grounded in reliable data, facilitating informed decision-making in regional transportation planning and safety management.

St. Louis County Trend Analysis

Trend Analysis - Crashes and VMT in St. Louis County

The trends depicted in **Figure 1** highlight the relationship between the total number of crashes and Vehicle Miles Traveled (VMT) in St. Louis County from 2018 to 2022. The total number of crashes, represented by the blue bars, reveals a relatively consistent pattern. Crashes increased from 31,688 in 2018 to a peak of 32,018 in 2019, before dropping sharply to 23,608 in 2020. The following years show a recovery, with crashes rising to 27,401 in 2021 and stabilizing at 27,578 in 2022.

VMT, illustrated by the black line, follows a somewhat similar trajectory. It starts with an increase from 2018 to 2019 and then sharply declines in 2020, likely reflecting the pandemic's impact on travel patterns. In 2021, VMT rose before slightly decreasing again in 2022.

These patterns indicate that while total crashes generally declined during the COVID-19 pandemic in 2020, the following years show recovery and stabilization of incidents. VMT trends also suggest changes in travel behavior during this period, likely influenced by the pandemic's effects on mobility.

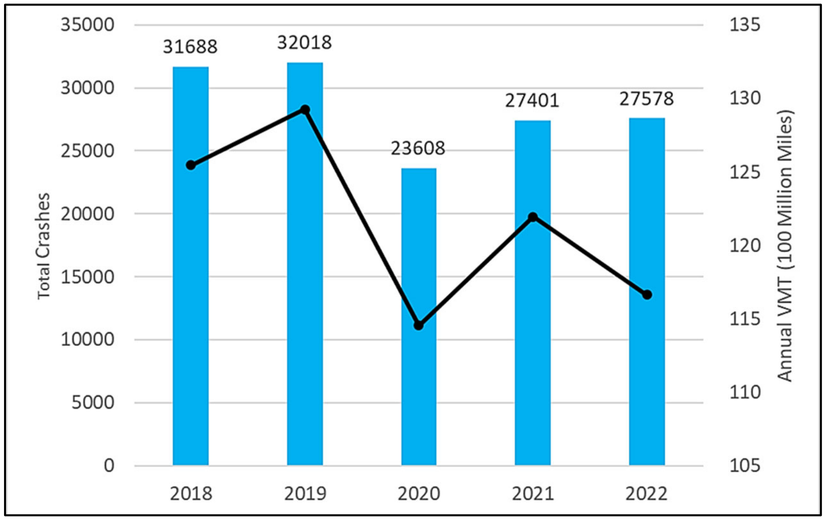


Figure 1: Annual Total Crashes and Vehicle Miles Traveled (VMT) in St. Louis County (2018-2022)

Trend Analysis – Fatal and Serious Injury Crashes in St. Louis County

St. Louis County had a total of 2,921 Fatal and Serious Injury (KSI) crashes between 2018 and 2022 for an average of 584 KSI crashes per year. **Figure 2** demonstrates the annual trends in fatal and serious injury crashes in St. Louis County over the five-year period. The bar chart separates the data into two series to highlight the severity of crashes, while linear trendlines illustrate the progression over this five-year period.

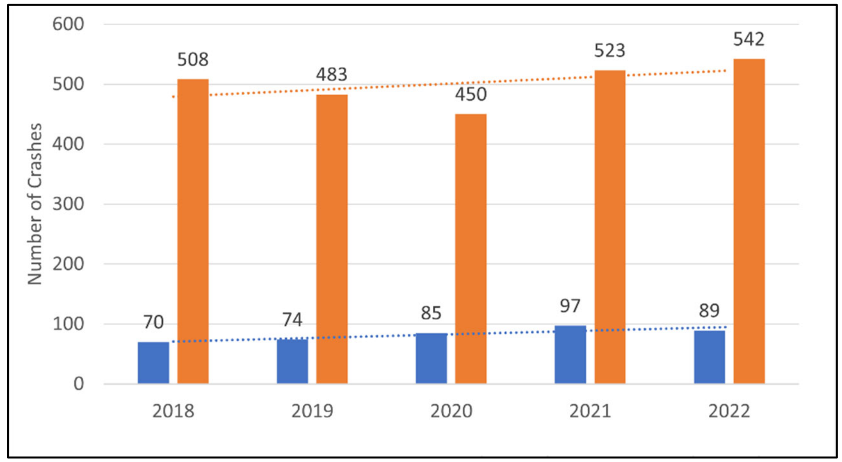


Figure 2: Fatal and Serious Injury Crashes in St. Louis County by Year (2018-2022)

St. Louis County had a total of 415 fatal crashes over the five-year period for an average of 83 fatal crashes per year. Fatal crashes (represented by blue bars) have generally increased over time. The count was 70 in 2018 and rose to 85 by 2020. Despite a brief peak of 97 in 2021, fatal crashes declined to 89 in 2022. The linear trendline indicates a slight upward trajectory, pointing to a gradual increase in fatal crashes over the observed period.

St. Louis County had a total of 2,506 serious injury crashes over the five-year period for an average of about 501 serious injury crashes per year. Serious injury crashes (represented by the orange bars) follow a consistent upward trend from 2018 to 2022. The count was 508 in 2018 and 450 in 2020, before rising to 523 in 2021 and 542 in 2022. The overall linear trendline shows a steady upward trend, showing persistent growth in serious injury crashes.

The trend reflects the importance of understanding the underlying factors contributing to both KSI crashes. Despite fluctuations in yearly data, the overall rising trajectory shows the needed efforts in road safety initiatives to prevent and reduce the number of severe traffic incidents in St. Louis County.

ST. LOUIS COUNTY CRASH RISK ASSESSMENT

What are the Contributing Factors of Fatal and Serious Crashes in St. Louis County?

A detailed analysis of KSI crash data in St. Louis County between 2018 and 2022, reveals that speeding is the most significant contributing factor in 29% of crashes, as shown in **Figure 3**. This proportion highlights that excessive speed remains a primary hazard, emphasizing the importance of targeted enforcement and educational campaigns to combat this issue. Failure to yield is the second most frequent contributing factor, responsible for 24% of KSI crashes. Improper lane usage follows with 15%, indicating the need for greater awareness and adherence to safe lane practices. Alcohol and drug use contribute to 13% of crashes, emphasizing the importance of substance abuse prevention efforts and stringent DUI enforcement. Distraction accounted for 10% of crashes, while disregarding signals and signs contributed to 7%. Physical conditions of drivers, such as medical impairments or fatigue, are involved in 6% of incidents. Following too closely and overcorrecting steering are each responsible for 6% and 4% of crashes, respectively. Wrong-way driving is associated with 3% of incidents.

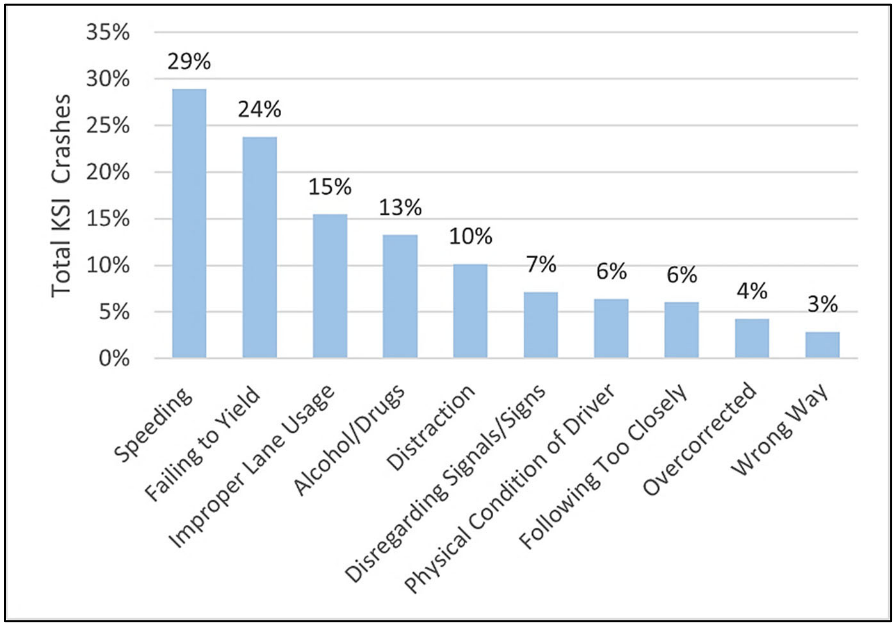


Figure 3: Top 10 Contributing Factors of Fatal and Serious Injury Crashes in St. Louis County (2018-2022)

These statistics indicate the diverse and multifactorial nature of KSI crashes. High-risk behaviors such as speeding, failure to yield, improper lane usage, and impaired driving account for a significant portion of these crashes, pointing to the need for comprehensive safety strategies.

What is the Age of Those Involved in Fatal and Serious Crashes?

To identify what age groups are more likely to be involved in fatal or serious injury crashes, the crash data was categorized into age groups based on the methodology used by the National Highway Traffic Safety Administration (NHTSA). This methodology includes those under 16 years old as a group, those older than 65 years old as a group and then groups for every five-year increments in-between.

The bar chart in **Figure 4** illustrates the age distribution of people involved in KSI crashes in St. Louis County between 2018 and 2022 including drivers, pedestrians, and bicyclists.

Adults aged 21-25 and 26-30 have the highest involvement rates, each surpassing 600 individuals. The next most affected group is those aged 31-35, followed by 16-20 and over 65.

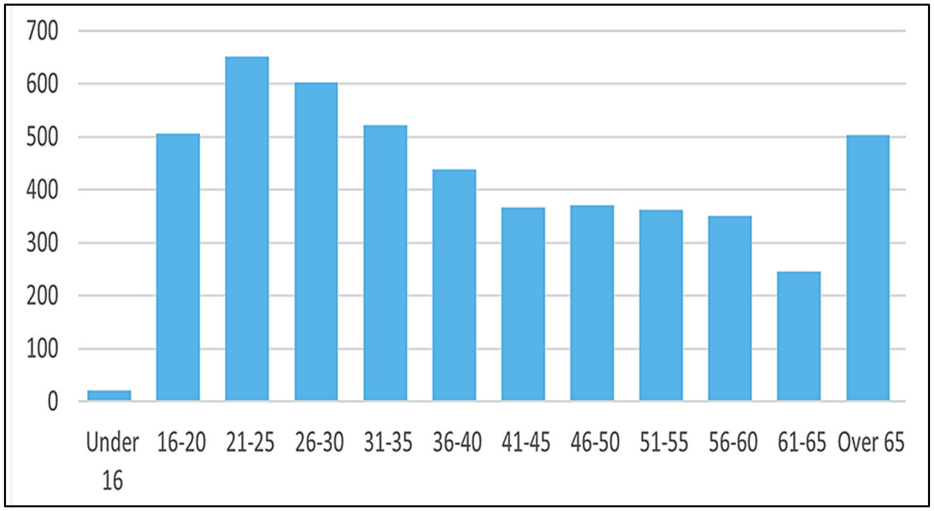


Figure 4: Age Distribution of Persons Involved in Fatal and Serious Injury Crashes in St. Louis County (2018-2022)

These patterns align with broader trends that reveal younger adults often engage in riskier driving behaviors like speeding or distraction, increasing their involvement in severe crashes. Meanwhile, older adults can be at higher risk due to the physical vulnerabilities associated with aging, necessitating more targeted road safety measures for each group.

When do Fatal and Serious Crashes Occur in St. Louis County?

Examining the temporal patterns of KSI crashes in St. Louis County between 2018 and 2022 reveals concerning trends across months, days, and times. A heat map in **Figure 5** highlights Sundays and Saturdays as days with consistently high crash rates, particularly May through October. Notably, Saturdays in September and October see the highest frequency with 53 and 56 crashes, while Sundays in May and August experience 55 and 53 KSI crashes. This pattern suggests weekends are periods of heightened risk. Increased travel for social and recreational activities might contribute to this uptick, making Saturdays and Sundays more susceptible to serious injury crashes.

Figure 5: Fatal and Serious Injury Crashes in St. Louis County by Month and Day of Week (2018-2022)

Figure 6 focuses on the daily distribution of KSI crashes throughout the week, revealing significant trends by time. Late afternoon and evening hours, particularly between 3:00 PM and 8:00 PM, are periods of elevated risk across most weekdays, with noticeable peaks around 6:00 PM on Tuesdays. Friday evenings into the early hours of Saturdays experience the highest crash frequency, potentially due to the start of weekend activities. Saturday evenings into the early hours of Sundays as well as Sunday afternoons (3:00 to 7:00 PM) reflect higher risks, reflecting possible factors like impaired and fatigued driving.

Hour	MON	TUE	WED	THU	FRI	SAT	SUN
12:00 AM	12	11	11	8	9	19	28
1:00 AM	8	3	7	6	4	29	31
2:00 AM	4	6	8	11		14	14
3:00 AM	5	3	4	5	5	12	12
4:00 AM	3	3	4	4	3	8	9
5:00 AM	5	6	9	4	6	2	5
6:00 AM	10	8	9	17	11	8	8
7:00 AM	17	21	19	15	9	13	3
8:00 AM	22	19	18	14	12	8	8
9:00 AM	10	7	16	14	16	9	9
10:00 AM	15	15	10	9	13	15	15
11:00 AM	12	23	11	17	16	10	17
12:00 PM	21	26	14	25	13	18	16
1:00 PM	17	18	21	28	17	19	13
2:00 PM	19	37	16	24	18	22	24
3:00 PM	30	25	23	24	28	29	32
4:00 PM	25	24	24	32	30	13	32
5:00 PM	36	26	27	28	24	26	42
6:00 PM	20	38	24	20	36	27	29
7:00 PM	21	32	13	21	26	23	23
8:00 PM	14	30	17	19	29	29	25
9:00 PM	21	18	22	19	47	37	28
10:00 PM	18	19	16	13	32	24	18
11:00 PM	16	18	15	14	24	21	16

CNT(County)

2.00 — 47.00

Figure 6: Fatal and Serious Injury Crashes in St. Louis County by Day and Hour (2018-2022)

Lighting Conditions of Fatal and Serious Crashes in St. Louis County

Figure 7 provides an analysis of the light conditions during KSI crashes in St. Louis County from 2018 to 2022. The majority of these crashes occurred during daylight, which accounted for 56% of incidents. Crashes that occurred in dark conditions with streetlights make up 29% of the total, indicating that artificial lighting helps mitigate risks but is not a guarantee of safety. The remaining 15% of KSI crashes occurred in dark conditions without streetlights. This distribution highlights the importance of considering both lighting conditions and driver behavior when analyzing KSI crash patterns.

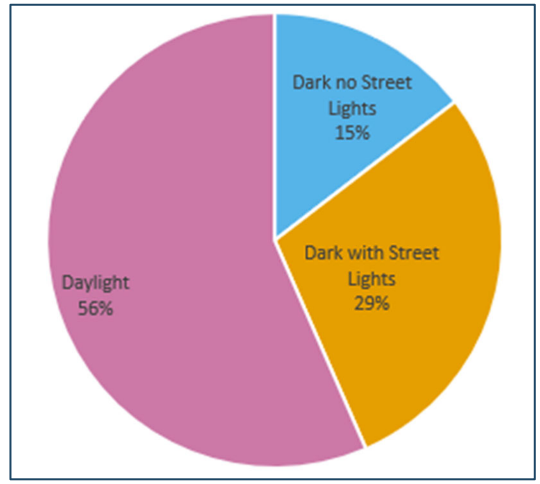


Figure 7: Fatal and Serious Injury Crashes in St. Louis County by Lighting (2018-2022)

Road Surface Condition of Fatal and Serious Injury Crashes in St. Louis County

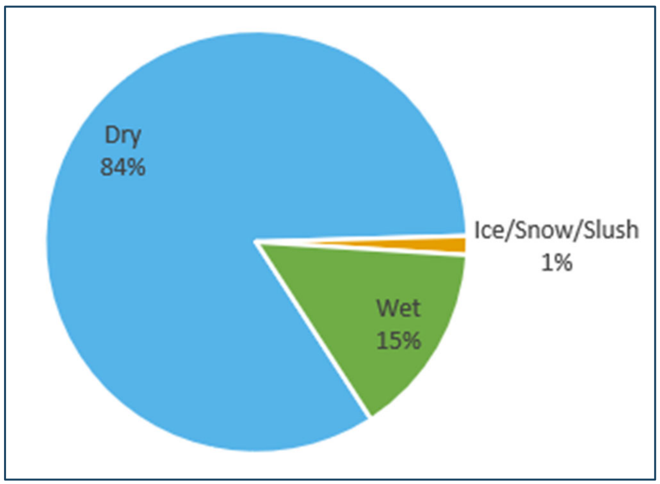


Figure 8: Fatal and Serious Injury Crashes in St. Louis County by Road Surface Condition (2018-2022)

Figure 8 analyzes the road surface conditions during KSI crashes in St. Louis County from 2018 to 2022. Most KSI crashes occurred on dry road surfaces. Dry conditions accounted for 84% of all incidents, highlighting that KSI crashes primarily occur in clear weather. Despite assumptions that adverse weather significantly contributes to crashes, these data indicate that even optimal road conditions don't guarantee safety.

Wet road surfaces contributed to 15% of KSI crashes, and ice, snow, and slush conditions made up a minimal 1% of crashes. The distribution underscores that while adverse weather can exacerbate road hazards, the majority of severe incidents are more closely linked to driver behavior or roadway characteristics rather than road surface conditions alone.

Where are Fatal and Serious Crashes Occurring in St. Louis County?

St. Louis County includes a wide variety of roadway systems, such as interstates, arterials, collectors, and local roads as well as different characters of the area (urban versus rural). Since interstates are higher speed, access-controlled facilities with interchanges, the safety issues on those facilities are much different than the non-interstate facilities. As a result, for the systemic safety analysis, three main categories were developed: Interstate, Non-Interstate Rural, and Non-Interstate Urban.

The pie chart in **Figure 9** provides a breakdown of KSI crashes in St. Louis County between 2018 and 2022 based on road type. As can be seen, 27% of St. Louis County's KSI crashes occurred on interstates, 1% occurred on non-interstate roads in the rural areas, and 72% occurred in non-interstate urban areas.

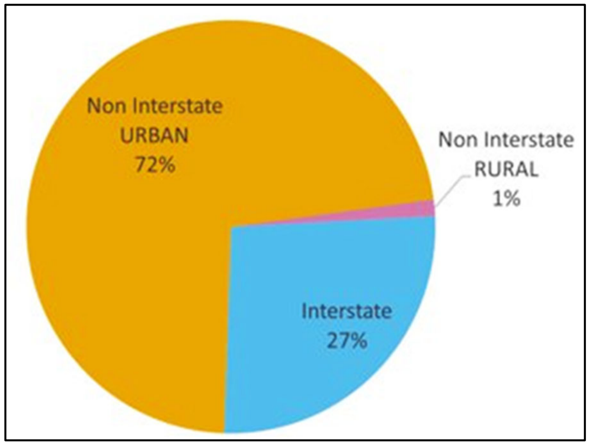


Figure 9: Fatal and Serious Injury Crashes in St. Louis County by Road Type (2018-2022)

Non-Interstate Crashes – Urban Areas in St. Louis County

According to the crash data between 2018 and 2022, approximately 72% of the St. Louis County KSI crashes occurred on non-interstate roads in urban areas. The urban non-interstate crashes consisted of a total of 2,113 KSI crashes or approximately 423 per year. To assist in determining potential systemic improvements in urban areas, crash types at intersections and crash types along segments were evaluated. Crashes within 150 feet of an intersection were considered intersection crashes.

When considering the non-interstate urban KSI crashes in St. Louis County, 71% occurred at intersections (1,497 KSI crashes or about 300 per year). **Figure 10** shows a breakdown of crash types at **non-interstate urban at intersections** in St. Louis County. Turning crashes were the most frequent type of KSI crashes, totaling 372 crashes. Fixed-object crashes, which includes out of control and run off road crashes, followed closely behind, accounting for 282 crashes, while pedestrian-involved crashes totaled 208. Head-on, rear-end, angle, and sideswipe crashes also contributed to the overall crash counts. Among the fixed objects struck, trees were most prevalent at 28%, followed by utility poles (24%) and traffic signals (8%).

When considering the non-interstate urban KSI crashes in St. Louis County, 29% of KSI crashes occurred along segments (616 KSI crashes or about 123 per year). An analysis of **non-interstate urban segment** crashes in St. Louis County indicates that fixed objects are the largest risk factor, with crashes involving pedestrians, head-on crashes and turning crashes also significant, see **Figure 11.** Fixed objects represented the highest proportion of segment crashes, with 210 incidents, followed by pedestrian crashes with 133 incidents. Head-on and turning crashes were also significant contributors to segment crash statistics, with 76 and 61 crashes, respectively. Among the fixed objects hit on road segments, trees were most common (41%), with utility poles (20%) and ditches/embankments (8%) also frequently struck.

Together, these figures highlight the high concentration of severe crashes at intersections due to complex traffic interactions, turning maneuvers, and pedestrian crossings. Segment crashes, while less frequent, still present notable risks due to fixed-object collisions and high vehicle speeds.

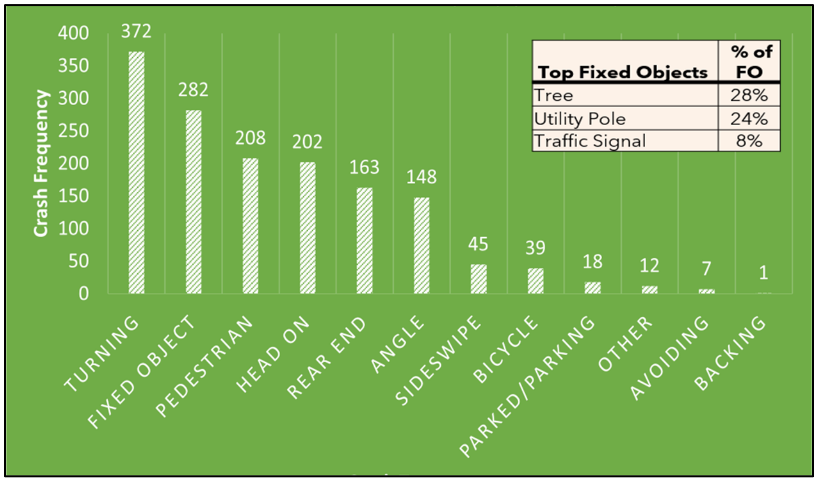


Figure 10: Non-Interstate Urban Intersection Fatal and Serious Injury Crashes in St. Louis County by Crash Type (2018-2022)

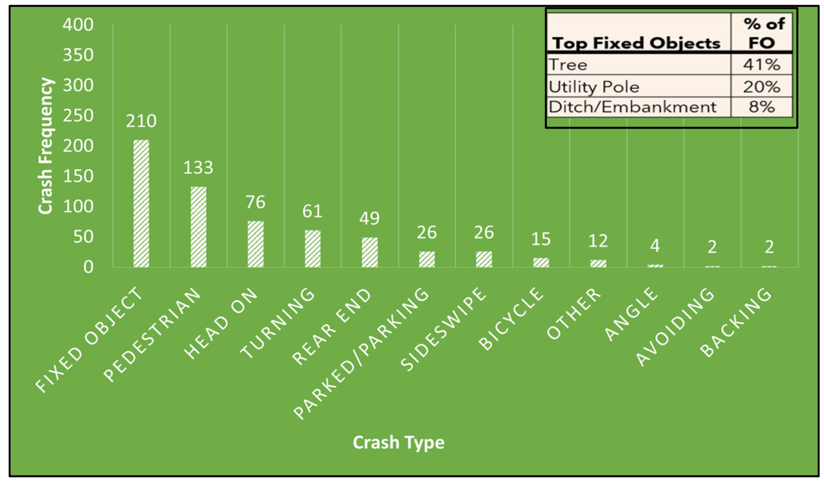


Figure 11: Non-Interstate Urban Segment Fatal and Serious Injury Crashes in St. Louis County by Crash Type (2018-2022)

Non-Interstate Crashes – Rural Areas in St. Louis County

According to the crash data between 2018 and 2022, approximately 1% of St. Louis County fatal and severe crashes occurred on non-interstate roads in rural areas. To assist in determining potential systemic improvements in rural areas, crash types at intersections and crash types along segments were evaluated. Crashes within 150 feet of an intersection were considered intersection crashes.

The rural non-interstate crashes consisted of a total of 38 KSI crashes or approximately eight (8) per year. Based on the relatively small dataset, when considering the rural areas in St. Louis County, 61% of KSI crashes occurred along segments and 39% occurred at intersections.

Figure 12 illustrate the types of crashes occurring at St. Louis County **non-interstate rural intersections** between 2018 and 2022. Again, fixed objects accounted for the majority of KSI crashes at rural intersections, totaling eight crashes (53%). Angle crashes were the next most frequent type, with three crashes (20%).

An analysis of **non-interstate rural segments** in St. Louis County, indicate that fixed objects accounted for more than half of KSI crashes, followed by rear-end crashes, which comprised about 17% of KSI crashes, see **Figure 13.**

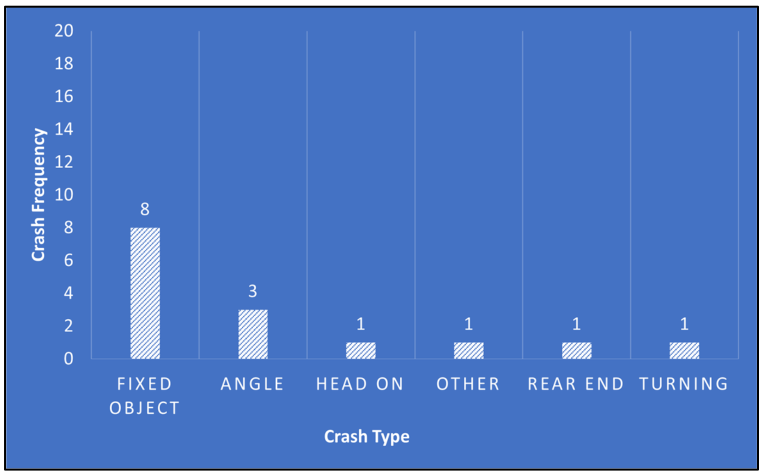


Figure 12: Non-Interstate Rural Intersection Fatal and Serious Injury Crashes in St. Louis County by Crash Type (2018-2022)

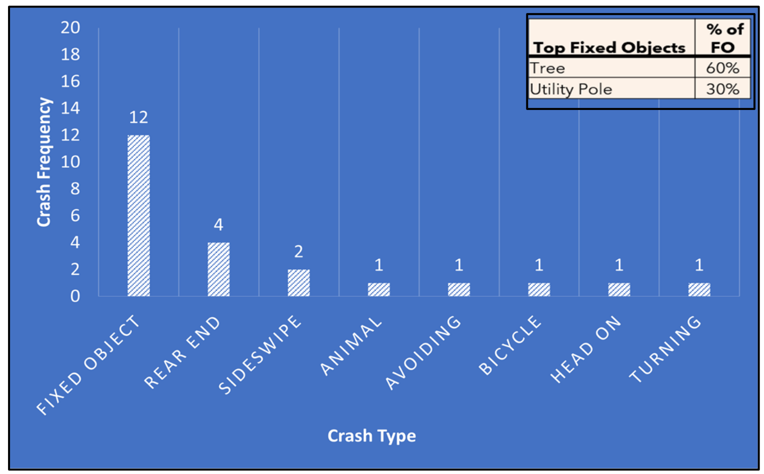


Figure 13: Non-Interstate Rural Segment Fatal and Serious Injury Crashes in St. Louis County by Crash Type (2018-2022)

Vulnerable Road Users

Pedestrian Focus in St. Louis County

In St. Louis County there were 400 pedestrian-involved KSI crashes from 2018 to 2022, which results in approximately 14% of all KSI crashes. When considering all KSI crashes involving pedestrians, 65% happened in dark conditions. Of these incidents, 59% occurred in areas with streetlights, while 41% occurred in areas without lighting. Additionally, 55% of the pedestrian involved KSI crashes occurred at intersections.

Figure 14 is a heatmaps depicting the month and day of week of pedestrian crash occurrences. As can be seen, August, October, November and December have higher frequency of pedestrian incidents. These late-year months reflect an uptick in pedestrian crashes, which appears to be aligned with reduced daylight hours and twilight conditions.

The month and hour heatmap shown in **Figure 15** reveals that late afternoon and evening hours, particularly from 5:00 PM to 8:00 PM, are periods of elevated risk. October through December feature spikes in pedestrian crashes, showing the challenges posed by twilight and darkness during these months.

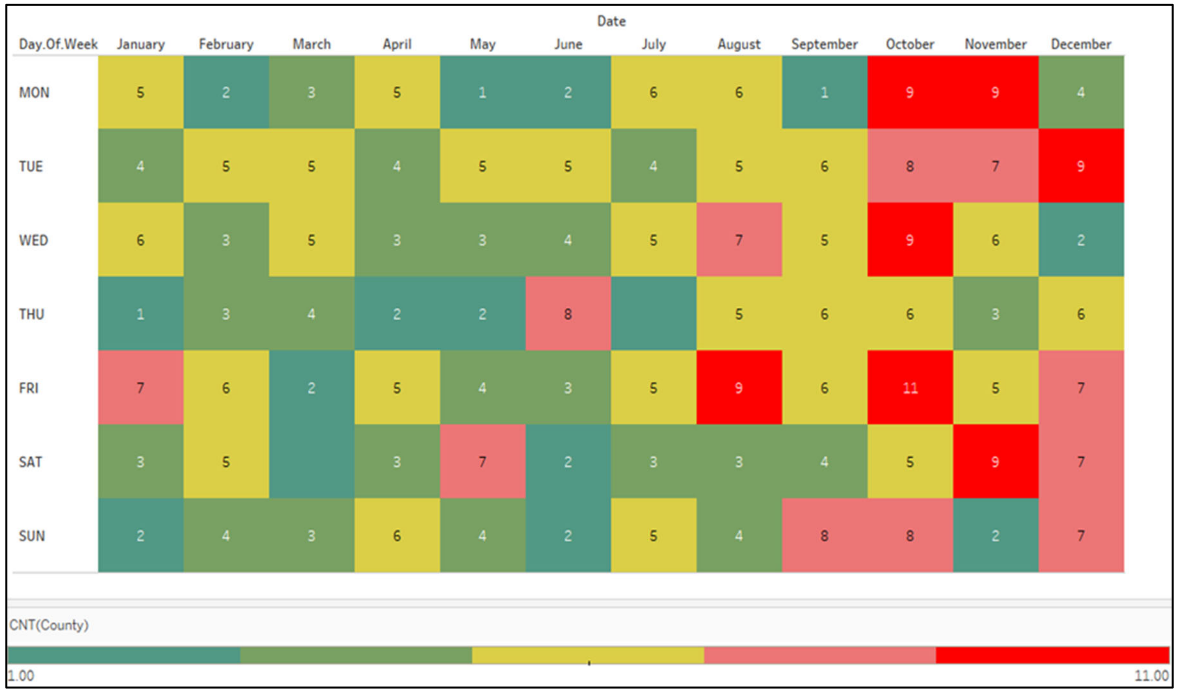


Figure 14: Pedestrian Involved Fatal and Serious Injury Crashes by Month and Day in St. Louis County (2018-2022)

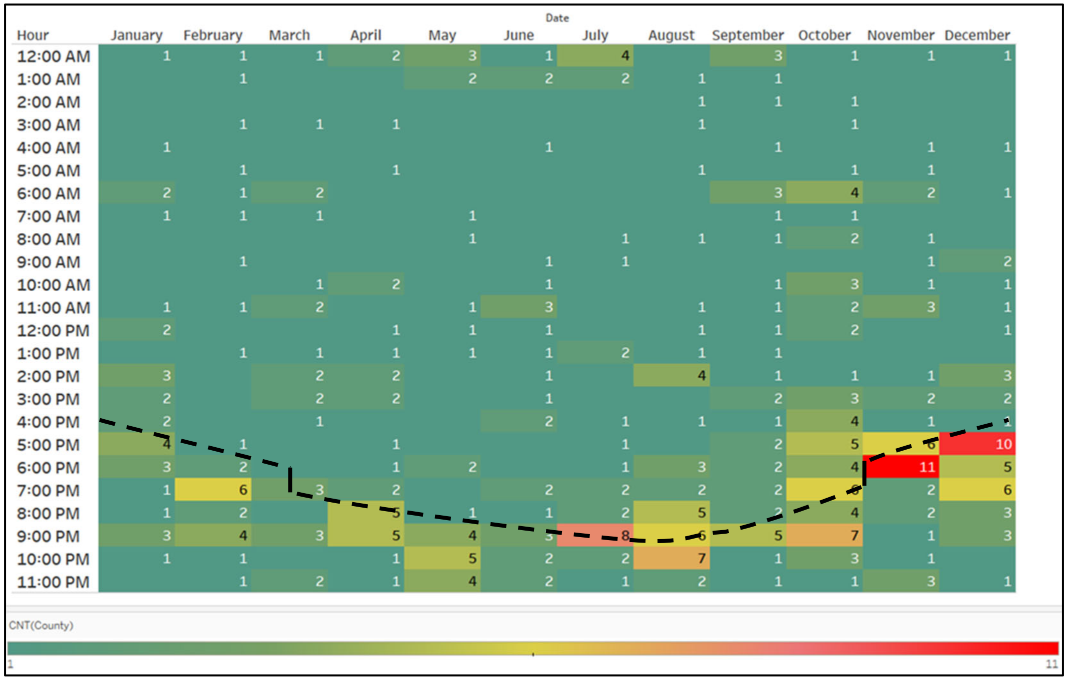


Figure 15: Pedestrian Involved Fatal and Serious Injury Crashes by Month and Hour in St. Louis County (2018-2022)

It should be noted that when considering just fatal crashes in St. Louis County, the pedestrian-involved crashes represent 26% of all fatal crashes. When considering fatal pedestrian crashes, 82% occurring in dark conditions with more than half occurring with streetlights present (55%). Furthermore, 65% of fatal pedestrian crashes took place at intersections, emphasizing the importance of focused interventions at intersections.

These trends make it clear that pedestrian safety requires comprehensive measures, particularly in St. Louis County. Efforts should focus on improving visibility at intersections and areas with frequent pedestrian activity, such as better lighting, traffic signal enhancements, and public awareness campaigns about pedestrian safety during twilight and evening hours.

Underserved Communities Focus in St. Louis County

The Climate and Economic Justice Screening Tool (CEJST) was used to identify disparities between crashes and disadvantaged communities within St. Louis County. To identify these disparities, the percentage of the population living in disadvantaged communities was compared to the percentage of KSI crashes recorded in those same CEJST areas.

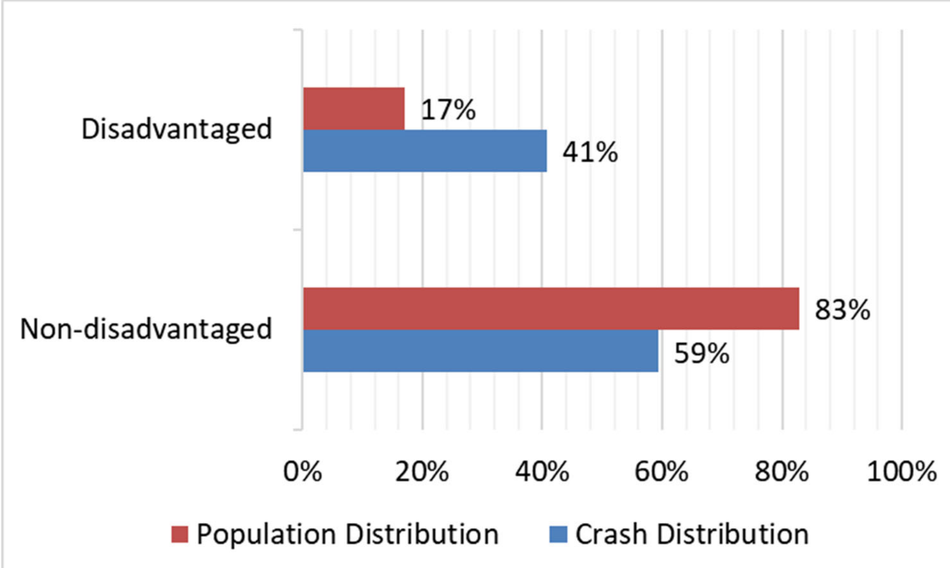


Figure 16: Comparison of Population and Fatal and Serious Injury Crashes in CEJST Areas in St. Louis County (2018-2022)

As shown in **Figure 16,** approximately 17% of St. Louis County's population lives in disadvantaged areas, yet about 41% of the fatal and serious crashes occur in those disadvantaged areas. This indicates a trend that more KSI crashes occur in the CEJST areas than the non-CEJST areas. It should be noted that St. Louis County had high percentage of pedestrian-involved KSI crashes (40%) occurring in underserved communities. This discrepancy highlights the need for increased resources and heightened efforts to address the underlying issues contributing to fatal and serious injury crashes within disadvantaged areas. It is important to understand the additional burdens and barriers these communities face, as identified by the CEJST so that more focused efforts can be directed toward improving transportation safety and health outcomes for the residents most at risk.

Summary of Findings for St. Louis County

Crash data analysis of St. Louis County reveals a concerning trend. While the total number of crashes fluctuates, the number of fatal and serious injury (KSI) crashes are on the rise. Speeding, followed by failing to yield and improper lane usage, are the top contributors to these severe crashes. Young adults are most at risk, and weekends and evenings see a spike in KSI crashes, possibly due to increased traffic and potential impaired driving. Although most KSI crashes happen during the day, a significant portion occurs at night, even with streetlights. This suggests that improved lighting alone might not be enough to prevent nighttime crashes.

Non-interstate urban roads accounted for a majority of the KSI crashes (72%), with a large percentage at intersections. These crashes often involve turning vehicles, fixed objects, and pedestrians. The non-interstate rural areas accounted for a very small percentage (1%) and were dominated by fixed object crashes. Pedestrian safety is also a major concern, with a high percentage of pedestrian crashes happening at night and at intersections. Fall months also see an increase in pedestrian crashes. Additionally, roadways in disadvantaged areas experience a disproportionate number of KSI crashes, especially pedestrian related crashes in those disadvantaged areas.

To address these challenges, a multi-pronged approach is necessary. Targeted enforcement efforts could be considered to tackle speeding and failing to yield crashes. Public awareness campaigns should be focused on safe driving practices, especially for young and older adults. Implementing strategic safety investments including engineering improvements and access management that enhance safety for all road users should be a focus. Furthermore, targeted interventions to improve pedestrian safety and evaluating existing streetlighting, particularly at intersections and during evening hours would be beneficial.

Appendix A9: Existing Safety Analysis and Crash Risk Assessment for the City of St. Louis

As part of the *Gateway to Safer Roadways: St. Louis Regional Safety Action Plan* (Action Plan), a thorough analysis of transportation safety within the East-West Gateway Council of Governments (EWG) Region was conducted using data spanning the years 2018 to 2022.

Crash data from 2018 to 2022 was gathered as part of this Action Plan and contained all crashes in the EWG Region, which includes the City of St. Louis, Franklin, Jefferson, St. Charles, and St. Louis counties in Missouri, as well as Madison, Monroe, and St. Clair counties in Illinois. The Missouri crash data was obtained from the Missouri Department of Transportation's (MoDOT's) Transportation Management Systems (TMS), and the Illinois crash data was provided by the Illinois Department of Transportation's (IDOT's) Transportation Safety Department.

The data includes all crashes occurring on public roadways that involve a fatality, injury, or property damage. Severity ratings are assigned by the responsible agencies based on the presence and significance of an injury resulting from the crash. Crash severity ratings are listed and defined below:

- Fatal – any injury that results in death within 30 days after the motor vehicle crash in which the injury occurred.
- Serious Injury – any injury other than fatal which prevents the person from walking, driving or normally continuing the activities the person could perform before the injury occurred, such as severe lacerations, broken or distorted extremity, crush injuries, suspected skull, chest, or abdominal injuries other than bruises or minor lacerations, significant burns, unconsciousness when taken from the crash scene, or paralysis.
- Minor Injury – any injury that is evident at the scene or reported or claimed that is not fatal or serious.
- Property Damage Only – when there is no apparent injury or when there is no reason to believe an injury occurred and when property damage of $500 or more for Missouri or $1,500 or more in Illinois occurred.

Crash Data: The analysis used comprehensive crash, person, and vehicle datasets sourced from MoDOT and IDOT. The crash data included information crucial to each crash, including the time and date of the crash, crash type, location, contributing factors, and lighting and weather conditions. Notably, each crash is given a unique identifier (crash ID) which is also linked to occupant and vehicle data. Occupant data within the dataset includes details about individuals involved in the crashes, including their gender, age, and the

severity of injuries sustained, with stringent measures undertaken by both agencies to scrub the data of any personally identifiable information. Additionally, the vehicle data offers valuable insights into the involved vehicle types, the use and functionality of safety devices, airbag deployment, and type of fixed objects struck by each vehicle during the crash.

Vehicle Miles Traveled (VMT): The Vehicle Miles Traveled (VMT) data, essential for understanding regional travel patterns and demand, was obtained from EWG. Covering the period from 2018 to 2022, this dataset includes VMT for each county within the EWG Region as well as aggregate regional data. The VMT data was provided in daily vehicle miles traveled format but was converted to annual vehicle miles traveled for these evaluations to be consistent with the crash data, which was summarized for each year. The VMT metric was used to compare the total number of crashes to VMT for each year to understand the correlation between the number of crashes and vehicle exposure.

Population Data: To correlate crash data with demographic trends, population estimates were sourced from EWG, based on U.S. Census Bureau data for the year 2020. Since the U.S. Census data was collected in 2020 and also aligns with the middle of the evaluation period, the 2020 population data was used for this analysis.

Equity Data: The information on disadvantaged communities was sourced from the Climate and Economic Justice Screening Tool (CEJST), a specialized tool designed to pinpoint these communities by evaluating burdens across various domains such as climate change, energy, health, housing, legacy pollution, transportation, water and wastewater, and workforce development. Within the CEJST framework, disadvantaged areas are delineated as census tracts that bear disproportionate burdens and lack adequate support concerning these environmental and economic challenges.

The data collection and processing efforts detailed above are foundational to the Action Plan. They enable a data-driven approach to understanding the dynamics of transportation safety and formulating strategies to mitigate risks and enhance safety across the EWG Region. This methodical approach ensures that the analyses are grounded in reliable data, facilitating informed decision-making in regional transportation planning and safety management.

CITY OF ST. LOUIS TREND ANALYSIS

Trend Analysis - Crashes and VMT in the City of St. Louis

Figure 1 illustrates the relationship between the total number crashes and Vehicle Miles Traveled (VMT) in the City of St. Louis from 2018 to 2022. The total number of crashes (represented by blue bars) remained relatively stable across the years, fluctuating between 14,010 and 15,759 crashes.

Meanwhile, the VMT (depicted by the black line) starts with an increase from 2018 to 2019 and then sharply declines in 2020, likely reflecting the pandemic's impact on travel patterns. In 2021, the VMT for the City of St. Louis rose and then declined again in 2022.

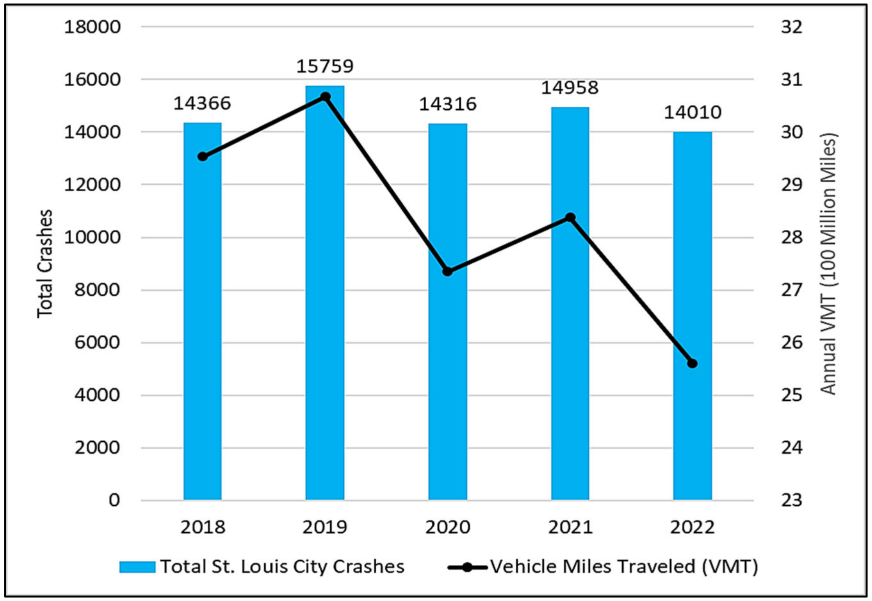


Figure 1: Annual Total Crashes and Vehicle Miles Traveled (VMT) in the City of St. Louis (2018-2022)

Trend Analysis – Fatal and Serious Injury Crashes in the City of St. Louis

The City of St. Louis had a total of 1,867 Fatal and Serious Injury (KSI) crashes between 2018 and 2022 for an average of 373 KSI crashes per year. **Figure 2** demonstrates the yearly trends in fatal and serious injury crashes in the City of St. Louis. The data is segmented into two series representing different crash severities, while linear trendlines illustrate the progression over the five-year period. Fatal crashes have fluctuated slightly over the years.

The City of St. Louis had a total of 315 fatal crashes over the five-year period for an average of 63 fatal crashes per year. The fatal crashes started at 49 crashes in 2018 and generally increased to a peak of 76 in 2020, with a subsequent decline to 64 in 2021. However, the fatal crashes slightly rose again to 69 in 2022. Despite these fluctuations, the linear trendline indicates a mild upward trajectory, suggesting a gradual increase in fatal crashes over time.

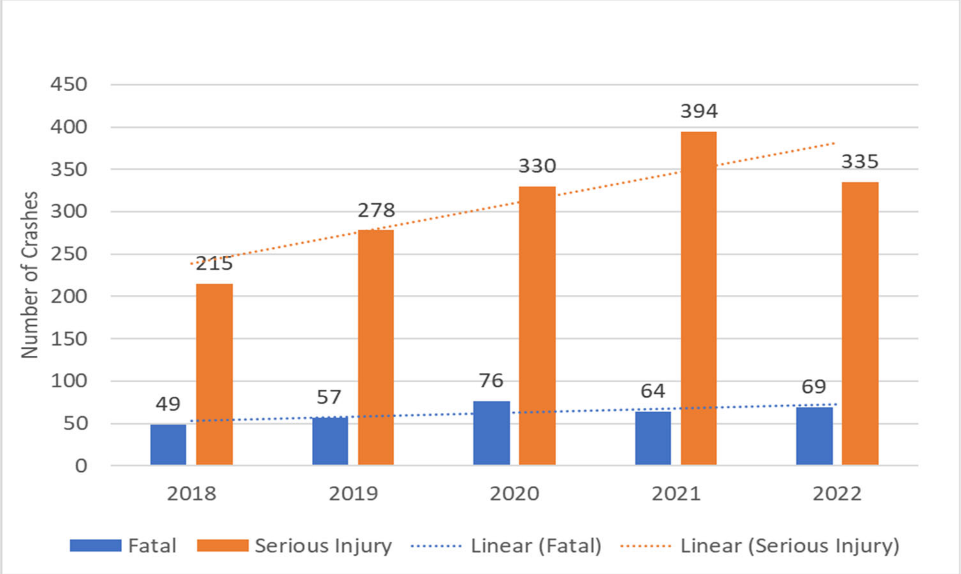


Figure 2: Fatal and Serious Injury Crashes in the City of St. Louis by Year (2018-2022)

The City of St. Louis had a total of 1,552 serious injury crashes over the five-year period for an average of about 310 serious injury crashes per year. Serious injury crashes showed a consistent upward trend, starting at 215 crashes in 2018 and steadily rising each year to 394 in 2021. Although there was a drop to 335 in 2022, the overall linear trendline shows a significant upward progression. This consistent rise is indicative of growing number of serious injury crashes over the last five-years.

CITY OF ST. LOUIS CRASH RISK ASSESSMENT

What are the Contributing Factors of Fatal and Serious Crashes in the City of St. Louis?

A detailed analysis of KSI crash data in the City of St. Louis between 2018 and 2022 reveals that speeding is the leading contributing factor, linked to 26% of crashes, as shown in **Figure 3.** This sizable proportion emphasizes that excessive speed continues to be a critical hazard, demanding effective enforcement and education to address this dangerous behavior. Failure to yield the right-of-way is the second most frequent contributing factor, accounting for 16% of KSI crashes. Disregarding signals and signs contribute to 13% of crashes, highlighting the need for stricter adherence to traffic control devices. Improper lane usage is also a notable factor, involved in 7% of crashes, indicating a need for improved lane discipline and awareness among drivers. Distraction and substance use, particularly alcohol or drugs, contribute to 4% and 3% of crashes, respectively. The physical condition of the driver, encompassing medical impairments or fatigue, was identified as a factor in 3% of crashes. Other notable factors include overcorrection of steering (3%), following too closely (2%), and driving the wrong way (2%).

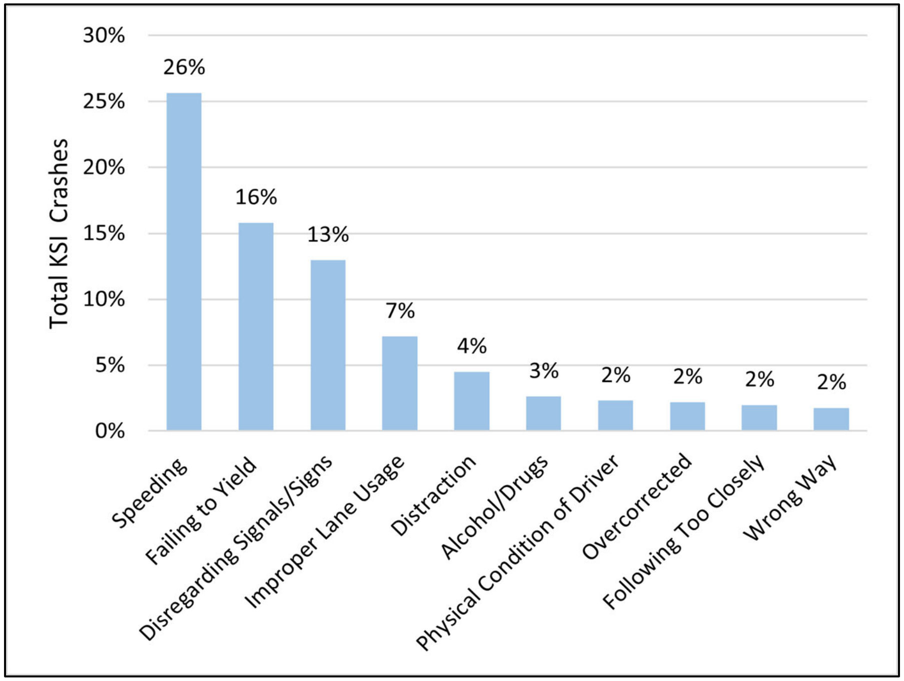


Figure 3: Top 10 Contributing Factors of Fatal and Serious Injury Crashes in the City of St. Louis (2018-2022)

These findings underline the complex nature of KSI crashes, often involving multiple contributing factors simultaneously. The prevalence of high-risk behaviors such as speeding, failing to yield, and disregarding signs/signals highlights the importance of reinforcing responsible driving practices through enforcement, public awareness campaigns, and driver education.

What is the Age of Those Involved in Fatal and Serious Crashes in the City of St. Louis?

To identify what age groups are more likely to be involved in fatal or serious injury crashes, the crash data was categorized into age groups based on the methodology used by the National Highway Traffic Safety Administration (NHTSA). This methodology includes those under 16 years old as a group, those older than 65 years old as a group and then groups for every five-year increments in-between.

The bar chart in **Figure 4** depicts the age distribution of persons involved in KSI crashes in the City of St. Louis from 2018 to 2022, encompassing drivers, pedestrians, and bicyclists. The most prominent age group involved in KSI crashes is the 26-30 bracket, followed closely by the 21-25 and 31-35 age group. These age groups are at a higher risk or involved in more severe crashes compared to other age groups. Despite the consolidation in the over 65 age group, this group reflects a smaller number of KSI crash involvements compared to the younger age categories. The City of St. Louis trend mirrors the regional data, which also shows higher involvement rates for young adults.

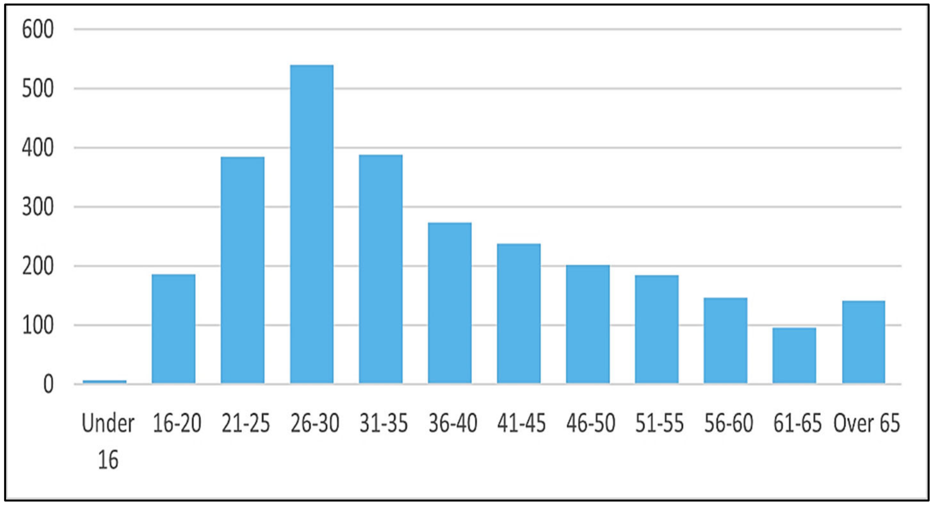


Figure 4: Age Distribution of Persons Involved in Fatal and Serious Injury Crashes in the City of St. Louis (2018-2022)

When do Fatal and Serious Crashes Occur in the City of St. Louis?

Analyzing the temporal patterns of KSI crashes in the City of St. Louis reveals that the risk of such incidents fluctuates with both the month and day of the week, as shown in **Figure 5**. The weekends (Friday, Saturday and Sunday) emerge as a particularly vulnerable time, with the number of crashes peaking on Fridays in May through July. Seasonal variations also play a role, with the warmer months experiencing more crashes, particularly March through September, while the cooler months show a downturn. This seasonality may reflect increased pedestrian and vehicle movement during warmer weather.

Figure 5: Fatal and Serious Injury Crashes in the City of St. Louis by Month and Day of Week (2018-2022)

When considering time of day and days of the week, **Figure 6,** the data indicates that Friday afternoons overnight into the very early Saturday mornings, Saturday evenings overnight into the very early Sunday mornings and Sundays evenings are especially prone to higher frequencies of crashes. This escalation aligns with increased weekend traffic due to recreational and social activities. Nighttime driving along with factors such as fatigue and impaired driving can add to the risk. When examining the distribution of crashes throughout the weekdays, there's a noticeable increase during the afternoon and evening hours, typically from 12:00 PM to 7:00 PM. Contrastingly, the early morning hours during the weekdays generally resulted in the fewest crashes.

Hour	MON	TUE	WED	THU	FRI	SAT	SUN
12:00 AM	9	5	8	9	16	29	27
1:00 AM	8	5	7	9	13	20	26
2:00 AM	8	6	3	7	11	21	16
3:00 AM	8	3	4	10	5	15	15
4:00 AM	4	3	3	4	7	8	14
5:00 AM	2	2	2	6	6	5	6
6:00 AM	5	4	9	7	8	4	6
7:00 AM	4	6	5	4	5	3	2
8:00 AM	6	8	8	4	10	7	5
9:00 AM	8	3	8	8	5	9	3
10:00 AM	7	8	10	3	8	3	4
11:00 AM	14	6	5	7	8	9	6
12:00 PM	14	19	11	7	8	7	10
1:00 PM	9	6	12	7	16	10	5
2:00 PM	12	10	15	22	18	13	12
3:00 PM	19	6	21	18	16	13	7
4:00 PM	11	20	11	8	12	14	12
5:00 PM	13	18	16	16	15	15	13
6:00 PM	18	14	9	15	18	15	21
7:00 PM	19	10	17	13	22	16	26
8:00 PM	12	14	13	17	22	16	20
9:00 PM	8	15	12	13	19	27	14
10:00 PM	11	10	14	19	16	23	12
11:00 PM	11	8	11	13	24	18	23

CNT(County)

2.00 29.00

Figure 6: Fatal and Serious Injury Crashes in the City of St. Louis by Day and Hour (2018-2022)

Lighting Conditions of Fatal and Serious Crashes in the City of St. Louis

Based on the distribution of KSI crashes in the City of St. Louis from 2018 to 2022, the lighting conditions represents a nearly equal division between daylight and dark conditions with streetlights, each accounting for approximately half of the crashes, see **Figure 7**. This contrasts with the broader EWG Region, where daylight conditions saw a higher percentage of KSI crashes at 57%. Dark conditions without streetlights represent a very small fraction in the City of St. Louis at 2%, which is significantly lower than the regional rate of 16%.

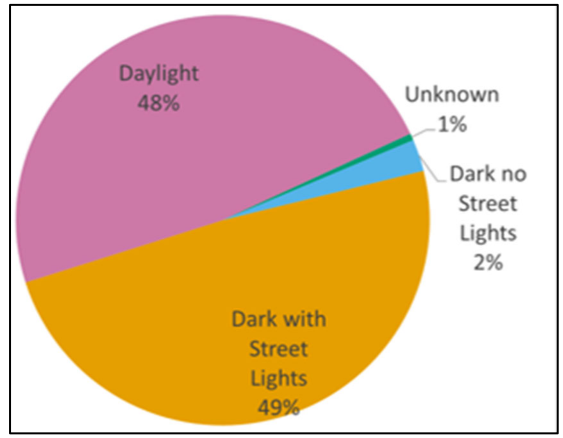


Figure 7: Fatal and Serious Injury Crashes in the City of St. Louis by Lighting (2018-2022)

Road Surface Condition of Fatal and Serious Injury Crashes in the City of St. Louis

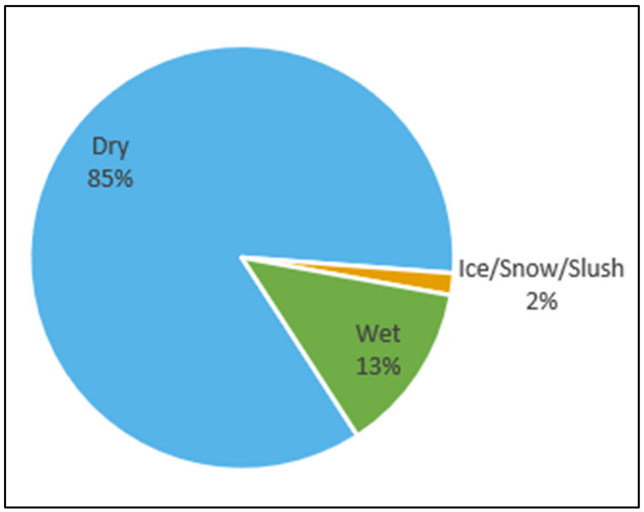


Figure 8: Fatal and Serious Injury Crashes in the City of St. Louis by Road Surface Condition (2018-2022)

Based on the road surface condition of the KSI crashes in the City of St. Louis from 2018 to 2022, dry road surface conditions represented 85% of the KSI crashes, see **Figure 8**. This is slightly higher than the EWG Region's percentage for dry conditions, which stands at 84%. Wet road surfaces were a factor in 13% of the KSI crashes in the City of St. Louis. Meanwhile, crashes on roads with ice, snow, or slush were minimal, comprising 2% of the crashes, which is in line with the regional trend. This distribution suggests that although adverse weather conditions can increase the risk of crashes, the predominant number of KSI crashes happened during clear road surface conditions in the City of St. Louis.

Where are Fatal and Serious Crashes Occurring in the City of St. Louis?

The City of St. Louis includes a wide variety of roadway systems, such as interstates, arterials, collectors, and local roads. Since interstates are higher speed, access-controlled facilities with interchanges, the safety issues on those facilities are much different than the non-interstate facilities. As a result, for the systemic safety analysis, three main categories were developed: Interstate, Non-Interstate Rural, and Non-Interstate Urban.

The pie chart in **Figure 9** provide a breakdown of KSI crashes in the City of St. Louis between 2018 and 2022 based on road type. As can be seen, 19% of the region's KSI crashes occurred on interstates and the remaining 81% occurred on non-interstate roads in the urban areas. The City of St. Louis is unique in that it is the only county in the region that does not have any rural areas.

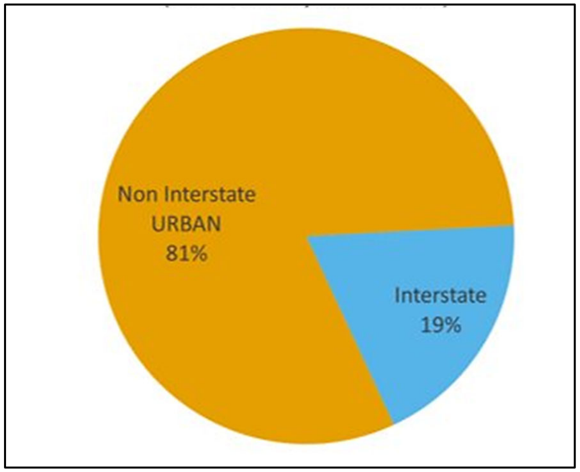


Figure 9: Fatal and Serious Injury Crashes in the City of St. Louis by Road Type (2018-2022)

Non-Interstate Crashes – Urban Areas in the City of St. Louis

According to the crash data between 2018 and 2022, approximately 81% of the City of St. Louis KSI crashes occurred on non-interstate roads in urban areas. The urban non-interstate crashes consisted of a total of 1,514 KSI crashes or approximately 303 per year. To assist in determining potential systemic improvements in urban areas, crash types at intersections and crash types along segments were evaluated. Crashes within 150 feet of an intersection were considered intersection crashes.

When considering the non-interstate urban KSI crashes in the City of St. Louis, 81% occurred at intersections (1,240 KSI crashes or about 248 per year). This represents a disproportionately high number of KSI crashes at intersections compared to the regional average (67%). When considering the specific breakdown of crash types at **non-interstate urban at intersections** in the City of St. Louis, angle crashes are the most frequent, followed closely by crashes involving pedestrians, fixed object, which includes out of control and run off road crashes, see **Figure 10.** Trees are the most common fixed object struck, with concrete barriers and buildings also being notable contributors.

When considering the non-interstate urban KSI crashes in the City of St. Louis, 19% of KSI crashes occurred along segments (274 KSI crashes or about 55 per year). An analysis of **non-interstate urban segment** crashes in the City of St. Louis indicates that fixed objects (run-off-road) are the largest risk factor, with crashes involving pedestrians also significant, see **Figure 11**.

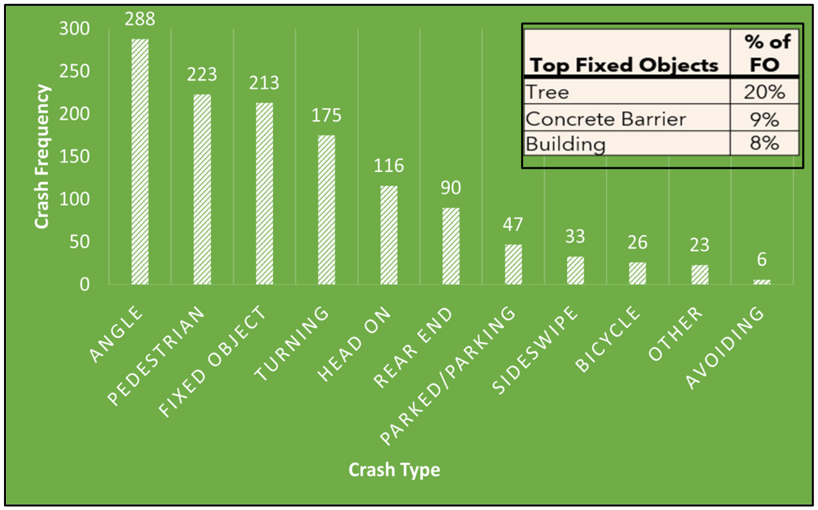


Figure 10: Non-Interstate Urban Intersection Fatal and Serious Injury Crashes in the City of St. Louis by Crash Type

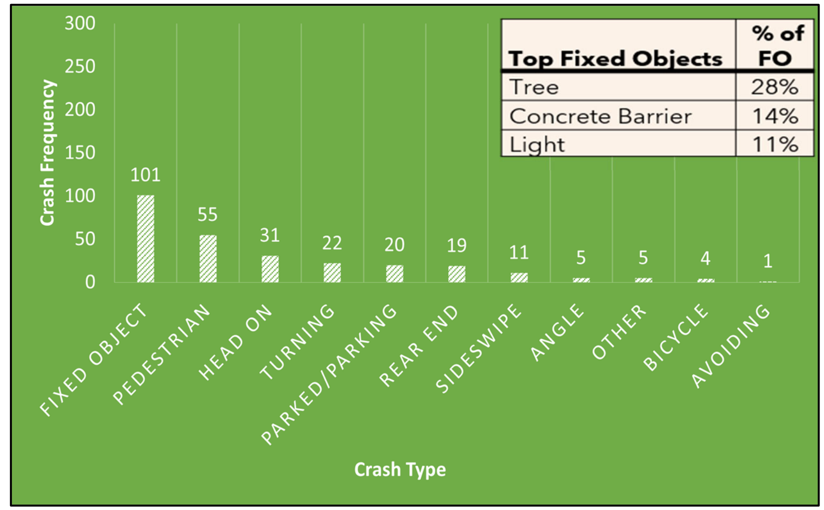


Figure 11: Non-Interstate Urban Segment Fatal and Serious Injury Crashes in the City of St. Louis by Crash Type

Vulnerable Road Users

Pedestrian Focus in the City of St. Louis

In the City of St. Louis there were 339 pedestrian-involved KSI crashes from 2018 to 2022, which results in approximately 18% of all KSI crashes. When considering all KSI crashes involving pedestrians, the data shows a consistent pattern, with 65% of these pedestrian crashes happening in dark conditions, and a significant majority, 75%, occurring at intersections. It's also notable that 93% of the KSI crashes that occurred in the dark had streetlights.

The heatmap analysis in **Figure 12** details the days of the week and months with higher pedestrian crashes occurred. As can be seen, November, September, May and October, and November have an increase in pedestrian crashes. Further, pedestrian crashes had more pedestrian KSI crashes on Fridays through Sundays.

Figure 12: Pedestrian Involved Fatal and Serious Injury Crashes by Month and Day in the City of St. Louis (2018-2022)

The hourly heatmap shown in **Figure 13** further illustrates the time-specific risks, especially from late afternoon into the evening, aligning with the end of daylight hours, as marked by sunset times. These periods show heightened pedestrian crashes, underscoring the risks associated with reduced visibility during twilight and evening hours. Pedestrian safety in the City of St. Louis is a critical concern, particularly in darker conditions with the summer and fall months posing additional risks.

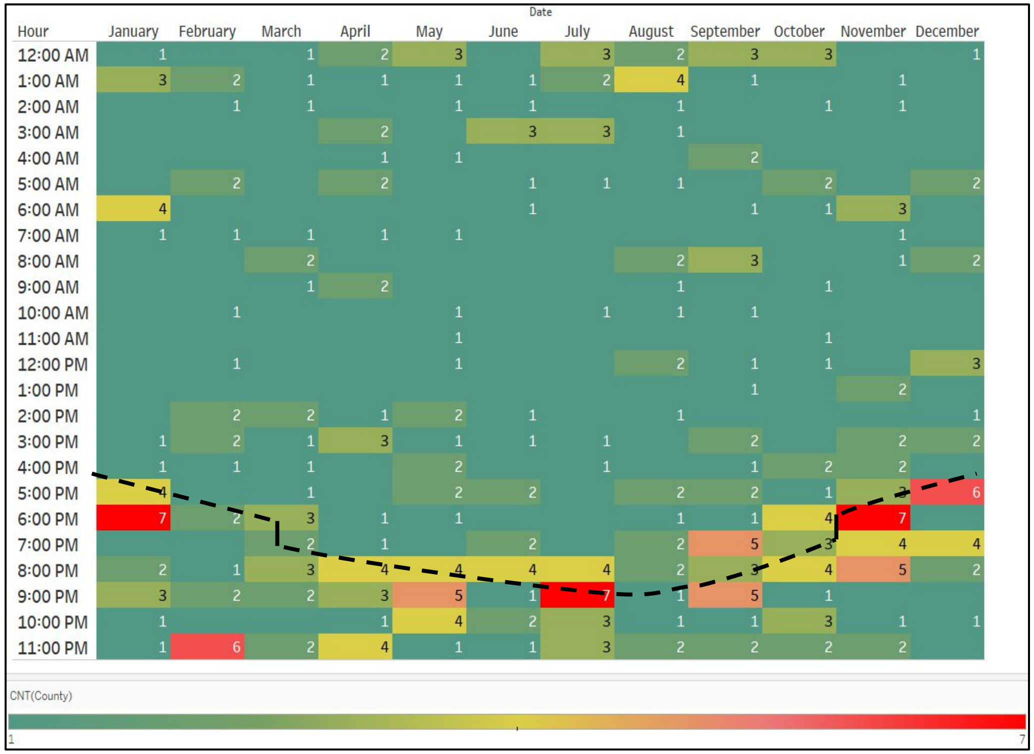


Figure 13: Pedestrian Involved Fatal and Serious Injury Crashes by Month and Hour of the Day in the City of St. Louis (2018-2022)

In the City of St. Louis approximately 29% of all fatal crashes involved a pedestrian. When considering fatal pedestrian crashes, approximately 72% occur in dark conditions, suggesting that streetlights may not be a standalone solution in preventing such severe incidents. Furthermore, 65% of these fatal pedestrian involved crashes occurring at intersections, pinpointing these areas as critical points for safety interventions.

Underserved Communities Focus in the City of St. Louis

The Climate and Economic Justice Screening Tool (CEJST) was used to identify disparities between crashes and disadvantaged communities within the City of St. Louis. To identify these disparities, the percentage of the population living in disadvantaged communities was compared to the percentage of KSI crashes recorded in those same CEJST areas.

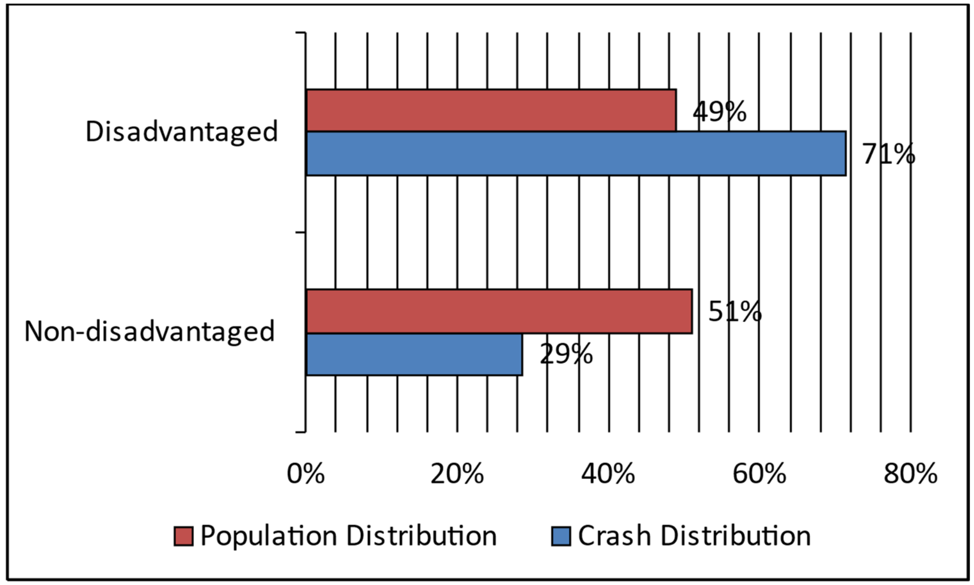


Figure 14: Comparison of Population and Fatal and Serious Injury Crashes in CEJST Areas in the City of St. Louis (2018-2022)

As shown in **Figure 14,** approximately 49% of the City of St. Louis' population lives in disadvantaged areas, yet about 71% of the fatal and serious crashes occur in those disadvantaged areas. This indicates a trend that more KSI crashes occur in the CEJST areas than the non-CEJST areas. It should be noted that the City of St. Louis had a very high percentage of pedestrian-involved KSI crashes (70%) occurring in underserved communities. This discrepancy highlights the need for increased resources and heightened efforts to address the underlying issues contributing to fatal and serious injury crashes within disadvantaged areas. It is important to understand the additional burdens and barriers these communities face, as identified by the CEJST so that more focused efforts can be directed toward improving transportation safety and health outcomes for the residents most at risk.

Summary of Findings for the City of St. Louis

A troubling trend is seen in the City of St. Louis crash patterns. While the overall number of crashes hasn't significantly changed over the five-year period, the VMT was down in 2020, slightly up in 2021 and even lower in 2022. The number of fatal and serious injury (KSI) crashes were both on the rise over the five years. Speeding, followed by failing to yield and ignoring traffic control, are the top contributors to these severe crashes.

Young adults were most frequently involved in KSI crashes. Temporal analysis identified Friday afternoons overnight into the very early Saturday mornings, Saturday evenings overnight into the very early Sunday mornings and Sundays evenings are especially prone to higher frequencies of crashes. Particularly Fridays in May through July. The City of St. Louis has a unique distribution of crashes compared to the region since crashes are almost equally likely to happen during the day or at night, even though a large percentage of roads have streetlights.

The City of St. Louis has non-interstate urban roads crashes, mostly occurring at intersections. These crashes often involve angle crashes, pedestrians, fixed objects and turning. Pedestrian safety is a major concern in the City of St. Louis, with a high percentage of fatal pedestrian crashes happening at night and at intersections. Fall months also see an increase in pedestrian crashes. The City of St. Louis experiences a disproportionate percentage of KSI crashes in disadvantaged areas, especially pedestrian related crashes in those disadvantaged areas.

To address these challenges, targeted enforcement efforts could be considered to address speeding, failing to yield, and ignoring traffic controls. Public awareness campaigns focused on safe driving practices, especially for young adults, are also crucial. Implementing strategic safety investments including engineering improvements and obeyance of traffic control devices that enhance safety for all road users should be a focus. Evaluating existing street lighting and exploring alternative solutions to improve nighttime visibility is important. Additionally targeted interventions to improve pedestrian safety, particularly at intersections and during evening hours, are essential.

Appendix B:
High-Injury Network Methodology

Appendix B: High-Injury Network Methodology

Table of Contents

1. Introduction

The purpose of this appendix is to describe the methodology used in the development of the high-injury networks created as part of East-West Gateway Council of Governments' (EWG) *Gateway to Safer Roadways: St. Louis Regional Safety Action Plan* (Action Plan). In general, the intent of the high-injury networks was to identify the roadways in the EWG Region associated with the most frequent fatal and serious injury (KSI) crashes over five (5) years of most recently available data (2018-2022) for use as part of planning and funding future projects, programs, and policies. To create the high-injury networks, the project team utilized a Geographic Information Systems (GIS) approach to perform spatial analysis correlating crash locations, quantities, and attributes to nearby transportation system elements and other areas of interest to visualize the results on a map. The following sections summarize the various data sources, preparation, processes, analysis, calculations, and rankings used as part of developing the high-injury networks for the Action Plan.

2. Data Sources

The high-injury networks were developed using a variety of data sources. First, the geographic roadway layers were used from both Illinois Department of Transportation (IDOT) and Missouri Department of Transportation (MoDOT). These datasets were merged into one standardized dataset for all crash data analysis and reporting. Boundary information was leveraged for further analysis, encompassing county lines, municipal boundaries, census data, and Climate and Economic Justice Screening Tool (CEJST) datasets. This data was ultimately stored in a Microsoft SQL Server database and created using ArcGIS tools and methodology.

Crashes

Five years of crash data were obtained from IDOT and MoDOT that includes all crashes between the dates of January 1st, 2018, and December 31st, 2022. This data, which was obtained from police crash reports, includes the location of the crash, as well as various attributes including the crash class, date and time of crash, road conditions, and crash severity. A comprehensive list of all crash data attributes can be found in **Attachment 1 Crash and Road Data Attributes**. Supplementary tables were also provided by IDOT that include specific information pertaining to the vehicle and persons involved in the crash, as well as any contributing factors that led to the event. This data was used throughout the entirety of the analysis.

Roadways

The IDOT and MoDOT roadway data was downloaded from the IDOT and MoDOT public GIS portal. This data was used as the base layer for creating the segments, intersections, and corridors as described in **Section 3. Data Preparation**.

> *IDOT Data Source: Data was downloaded from IDOT's public GIS download website – https://apps1.dot.illinois.gov/gist2/.*

> *MoDOT Data Source: Data was downloaded from MoDOT's public GIS download website – https://data-msdis.opendata.arcgis.com/datasets/MSDIS::mo-MoDOT-roads-arcs/explore?location=38.063796%2C-91.699837%2C7.18.*

Boundaries

State and county boundary data were used for classification and analysis of the high-injury network data. This data was obtained from the ArcGIS Online Living Atlas. County line data was used to help classify the data by county and displayed in the map to better understand the high-injury network data. Additionally, municipal boundary information was used in classification and analysis of the high-injury network data. This data was obtained from the US Census Bureau for both Illinois and Missouri. The last piece of boundary data that was used in the analysis was Census Tract data. This data was used for the equity analysis. The census tract data was obtained for Missouri and Illinois from the US Census Bureau.

State Boundary Data: Data from ArcGIS Online Living Atlas –
https://services.arcgis.com/P3ePLMYs2RVChkJx/arcgis/rest/services/USA_Boundaries_2022/FeatureServer

Illinois County Data Source: Data from ArcGIS Online Living Atlas –
https://services2.arcgis.com/aIrBD8yn1TDTEXoz/arcgis/rest/services/Counties/FeatureServer/0

Missouri County Data Source: Data from ArcGIS Online Living Atlas –
https://gis.mo.gov/arcgis/rest/services/BaseMap/county_boundary/MapServer/0

Illinois Municipal Boundary Data Source: Data from US Census Bureau –
https://www.census.gov/geographies/mapping-files/time-series/geo/cartographic-boundary.2023.html#list-tab-1883739534

Missouri Municipal Boundary Data Source: Data from US Census Bureau –
https://www.census.gov/geographies/mapping-files/time-series/geo/cartographic-boundary.2023.html#list-tab-1883739534

Illinois Census Tracts Data Source: Data from US Census Bureau –
https://www.census.gov/geographies/mapping-files/time-series/geo/cartographic-boundary.2023.html#list-tab-1883739534

Missouri Census Tracts Data Source: Data from US Census Bureau –
https://www.census.gov/geographies/mapping-files/time-series/geo/cartographic-boundary.2023.html#list-tab-1883739534

Climate and Economic Justice Screening Tool

The Climate and Economic Justice Screening Tool (CEJST) was also referenced as part of the analysis to generate the high-injury networks. This data was sourced from the public portal and used to identify disadvantaged areas for High-Injury Network 3 – Underserved Communities.

Geodatabase: https://www.census.gov/geographies/mapping-files/time-series/geo/tiger-data.html

ACS Census

Additional equity-related data was incorporated to help facilitate further equitable transportation planning decisions. This census data was obtained from the American Community Survey for 2021 and downloaded from the US Census Bureau viewer website, as noted below.

US Census Web viewer: https://data.census.gov/

3. Data Preparation

Crash Data Preparation

Due to differences between the IDOT and MoDOT datasets, it was necessary to merge the files together into one cohesive dataset. This allowed the data to be clean, uniform, organized, and analyzed over the entire study region, as opposed to developing two separate methods for analysis. To merge the data, an excel spreadsheet for each table was created that defined which fields matched between the two data sources and how their domain values should be coded in the final compiled dataset (see **Attachment 2 Crash and Road Data Compilation**). Automation was used to combine the data based on the information in the spreadsheet. Since each table has its own set of fields and domains, this process was conducted separately for Crashes, Persons, Vehicles, Contributing Factors, and Roads.

The tables were compiled in the following way:

- Crashes - IDOT Crash data (with added geometry field) merged with MoDOT Crash data.
    - (See Attachment 2 Table 1. Crashes Schema)

- Persons - IDOT Person data merged with MoDOT Supplemental data.
    - (See Attachment 2 Table 2. Persons Schema)

- Vehicles - IDOT Vehicle data merged with MoDOT Supplemental data.
    - (See Attachment 2 Table 3. Vehicles Schema)

- Contributing Factors - IDOT Crash data (Cause1 and Cause2 fields) merged with MoDOT Crash data (Contrb_Code01, Contrb_Code02, Contrb_Code03, Contrb_Code04 fields).
    - (See Attachment 2 Table 4. Contributing Factors Schema

- Roads – IDOT Road data merged with MoDOT Road data.
    - (See Attachment 2 Table 5. Roads Schema)

Roadway Segment Preparation

Once the roadway data was merged, the data for roadway segmentation was prepared. In general, it was necessary to standardize the length of all roadways to normalize the crash information across all roadways. By splitting the roadways to a standard length, this enabled the ability to perform comparative analysis across the entire Region.

The first step was to remove all dual line segment roadways, which were roads with more than one line segment. For example, the original MoDOT dataset had two line segments representing interstate I-70. This data was adjusted so that only one line would represent this entire roadway. This data preparation was only required on the MoDOT dataset.

After cleaning up the dual line segment roads, segments that were spatially stacked on top of each other were removed. It was essential to ensure that only one line segment existed per roadway prior to performing any analysis on the roadway datasets.

Once this was completed, additional road data cleanup was required for any segments that incorrectly extended beyond intersections. This was a manual process that allowed for the ability to automatically generate all intersection points, which are point locations representing two or more crossroads.

Once the intersection points were created, these were used to begin the process of segmenting the roads. Automation was used to split the roads from intersection point to intersection point, using a variety of spatial analysis tools. Once this was completed, the roadway segments were further segmented to a length no greater than 0.25 miles and the segments were evenly split between intersection points. This process was performed on all roadways for the entire Region.

Roadway Corridor Preparation

After the segmentation was completed, the roadway corridors were generated by combining any consecutive segments that had a matching IDOT/ MoDOT defined unique road identification and was greater than 1 mile and less than or equal to 3 miles. The purpose of the road corridors was the ability to analyze all crash data occurring across longer stretches of roadway.

Roadway Intersection Preparation

Intersection points were created by generating a point where segments intersect each other. Automated processes were then used to clean up intersection points that were incorrectly generated. The most vital check was to make sure that intersection points did not overlap any other intersection points. After this, the generated intersection points were manually checked to ensure that they were in the correct locations.

Equity Data

The ACS Census data was used to identify disparate crash trends throughout the EWG Region. Several factors were analyzed in the crash analysis methodology including the following:

Age

Age data for each census tract was divided into the following categories: Under 5, 5-9, 10-14, 15-19, 20-24, 35-29, 30-34, 35-39, 40-44, 45-49, 50-54, 55-59, 60-64, 65-69, 70-74, 75-79, 80-85, and over 85.

Gender

A female-to-male ratio was calculated, which highlights gender imbalance or variations in different areas. It was calculated by taking the Total Female Population divided by Total Male Population for each census tract.

$$Female\ to\ Male\ Ratio = \frac{Total\ Female\ Population}{Total\ Male\ Population}$$

Race

The minority percentage for each census tract was also calculated. This straightforward representation of diversity highlights areas with higher concentrations of minority groups, shedding light on inequities in crash trends for these groups. This was calculated by taking the total minority population and dividing it by the total population and multiplying it by 100.

$$Minority\ Percentage\ (\%) = \frac{Total\ Population - White\ Only\ Population}{Total\ Population} * 100$$

Ethnicity

The ethnicity percentage was calculated for each census tract. This was presented as a Hispanic & Latino percentage. This is calculated by taking the Hispanic & Latino population divided by total population and then multiplying it by 100.

$$Ethnicity\ Percentage\ (\%) = \frac{Hispanic\ \&\ Latino\ Population}{Total\ Population} * 100$$

Persons with Disabilities

A disability percentage of working age adults (18-64) was obtained for each census tract. This helped identify regions with higher concentrations of individuals with disabilities. This data was obtained from the US Census Bureau's ACS online data viewer.

Income

The percentage of population below the 200% federal poverty line was also included in the data. This threshold is often used as a measure of low income or eligibility for various programs and benefits, i.e., SNAP (Supplemental Nutrition Assistance Program). This threshold helps identify individuals and families who may be struggling financially but are not considered in poverty according to traditional measures. This data was obtained from the US Census Bureau's ACS online data viewer.

Limited English-Speaking Household

The percentage of limited English-speaking households helps emphasize language diversity and pinpoint areas with a higher concentration of such households.

$$English\ Speaking\ Households\ (\%) = \frac{Pop.\ 5\ yrs\ and\ over - Pop.\ 5\ yrs\ and\ over\ English\ Speaking}{Pop.\ 5\ yrs\ and\ over} * 100$$

Vehicle Ownership

The percentage of no vehicle households helps to highlight disparities in vehicle access and particularly need for non-motorized user facilities and safety countermeasures.

$$No\ Vehicle\ Household\ Percentage\ (\%) = \frac{Owner\ Occupied\ Houses\ with\ No\ Vehicles\ +\ Renter\ Occupied\ Houses\ with\ No\ Vehicles}{Total\ Occupied\ Housing\ Units} * 100$$

4. Database Schema and Development

Data Schema and Data Organization

A data schema is a structured network of tables that are used to organize datasets and data relationships with other data features. By designing the database schema in a way that retains the relationships between the crash data and the roadway segments, it was possible to efficiently generate scoring for the entire Region's roadway segments, corridors, and intersections.

The Crashes feature class was constructed with a many-to-one relationship to the three supplemental data tables, which include Persons, Vehicles, and Contributing Factors. This data was then summarized on the Crashes feature class and stored in designated fields. This was required to prepare the criteria to designate certain crashes for the five different high-injury networks. In addition, the roadway segments were developed with a one-to-many relationship to the Crashes feature class. This database architecture allowed for one segment to be associated with multiple crashes. More information on this methodology can be found in Section 6. Spatial Crash Associations. Lastly, the corridors were also related to the Road segments by a many to one relationship.

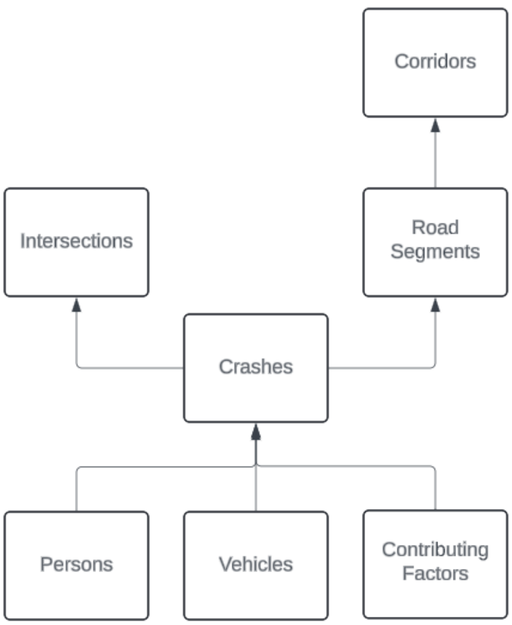


Figure 1. Database Schema and Infrastructure

See *Figure 1. Database Schema and Infrastructure* for a data schema visualization that includes all feature classes used for mapping and scoring the high-injury networks.

Each feature class was designed to store all scoring and supplemental information by use of dedicated fields for various processing and final scoring. A comprehensive list of all fields and their descriptions can be found in **Attachment 3 High-Injury Network Data Dictionary**.

5. Crash Type Associations

For each crash, the related information pertaining to the crash was summarized to the crash level. This was done to generate scoring based on certain attributes that are associated to the crash data. The purpose of summarizing this data to the crash levels allows for the ability to split the high-injury network scoring into the five different high-injury networks. See below for summarized fields that were populated by the following criteria.

- PedestrianCt - Total number of pedestrians involved in the crash.
- PedalcyclistCt - Total number of Pedalcyclists (or Bicyclists) involved in the crash.
- MotorcycleCt - Total number of Motorcyclists involved in the crash.
- ElderlyDriverCt - Total number of elderly drivers involved in the crash.
    - An elderly driver represents any persons above the age of 65.
- YoungDriverCt - Total number of young drivers involved in the crash.
    - A young driver represents any person below the age of 20.

The Contributing Factor fields were assigned a value of 'Yes' to associate a crash that includes any of the following contributing factors. These factors were ordered with the most frequent causes attributed to Contributing Factor 1. The top 5 contributing factors were based on the list as shown in *Table 1. Contributing Factors Cause Mappings* and shown on the high-injury network mapping.

Field Name	Cause(s)
Contributing Factor 1	Speeding / Failing To Reduce Speed / Exceeding Safe Speed for Conditions
Contributing Factor 2	Failing to Yield Right of Way
Contributing Factor 3	Improper Lane Usage
Contributing Factor 4	Alcohol/Drugs
Contributing Factor 5	Distraction
Contributing Factor 6	Disregarding Signals/Signs
Contributing Factor 7	Physical Condition of Driver
Contributing Factor 8	Overcorrected
Contributing Factor 9	Following Too Closely
Contributing Factor 10	Driving On Wrong Side/Wrong Way

Table 1. Contributing Factors Cause Mappings

6. Spatial Crash Associations

The high-injury network required various SQL and ESRI ArcGIS tools to associate the crashes to the roadway segment and intersection points. This spatial analysis was developed to associate each crash to its nearest roadway segment or intersection using select criteria, including crash type and distance between crash and roadway feature. The spatial associations were done using the following criteria for both intersections and roadway segments and later used to generate the scoring for the high-injury networks.

Intersections

Each crash that was within a 150-foot radius of an intersection was spatially associated to the nearest intersection. The ObjectID (unique identifier) of the intersection was then populated on the IntersectionID field in the crash feature class. If a crash was not within 150 feet of any intersection, the IntersectionID field was set to null, and no spatial association was generated. See below *Figure 2. Intersection Spatial Analysis* for example.

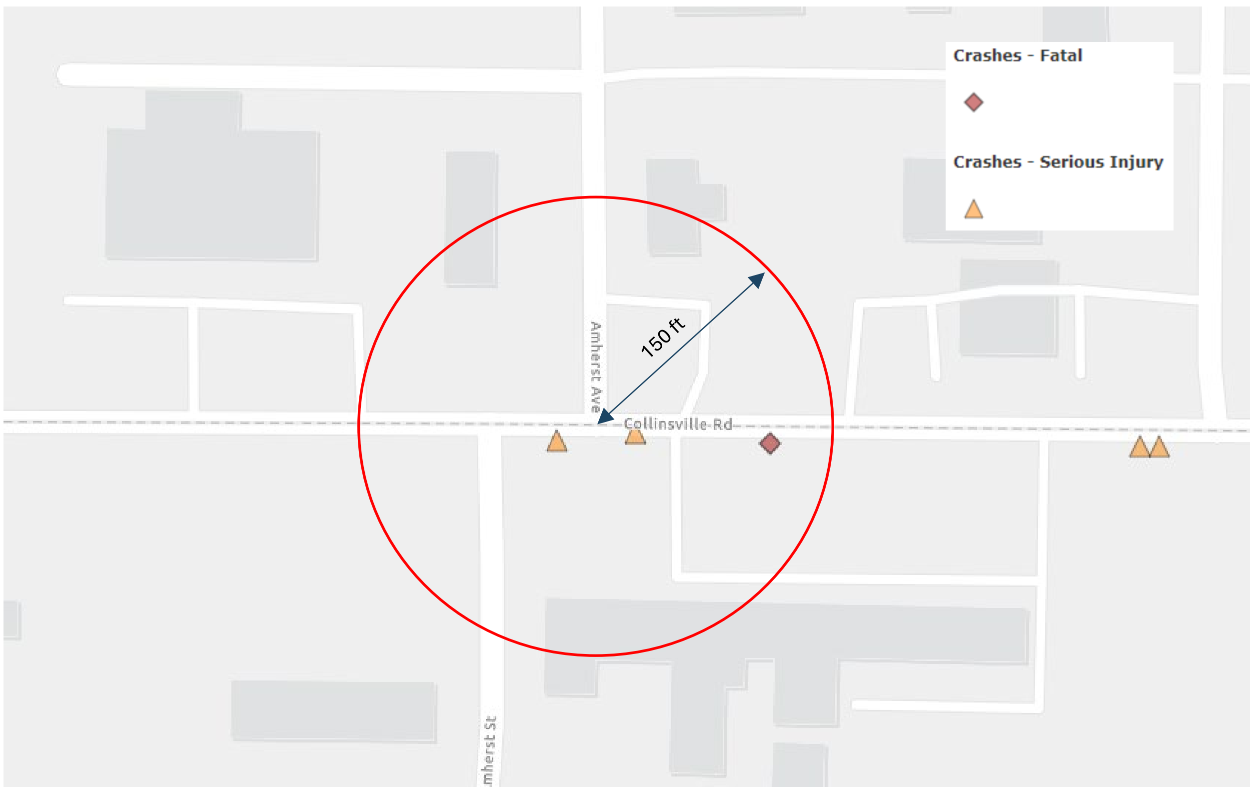


Figure 2. Intersection Spatial Association

As shown in *Figure 2. Intersection Spatial Association,* the red circle represents a 150-foot buffer surrounding the intersection at Amherst Ave and Collinsville Rd. This intersection has two (2) serious injury crashes and one (1) fatal crash associated with it since all three of these crashes are completely contained within the 150-foot buffer distance.

Along Crashes

Additionally, each crash was spatially associated to its closest roadway segment. These crashes occurred "along" the segment and are the primary mechanism for generating the high-injury network scoring. This spatial attribution was completed if the segment was the closest segment to the crash and was within about 1,300 feet of it. The ObjectID of the segment was then populated on the RoadID field in the crash feature class. If any crash was unable to be associated to a segment, this crash was manually moved to the police reported location, and the spatial analysis was performed again. See below for *Figure 3. Along Crash Spatial Associations*.

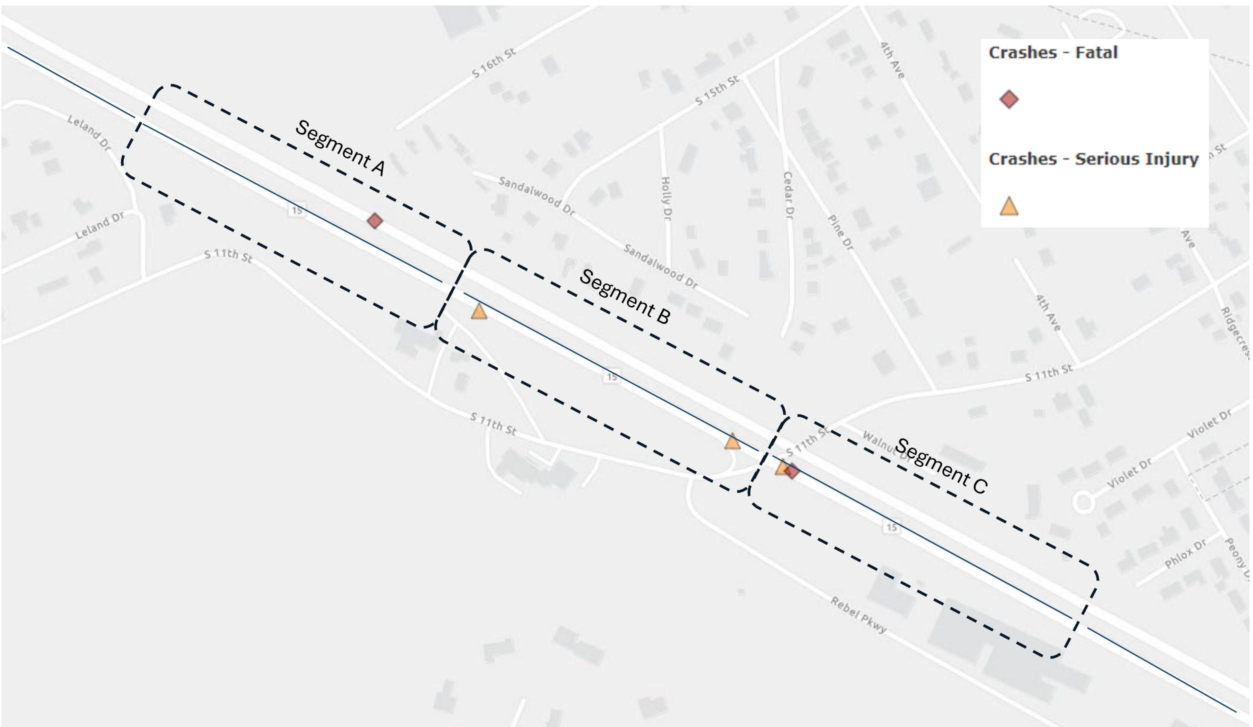


Figure 3. Along Crash Spatial Association

As shown in *Figure 3. Along Crash Spatial Association*, the blue dotted boundaries represent the segmentation and all crashes associated with these segments. One (1) fatal crash is associated to Segment A, two (2) serious injury crashes are associated to Segment B, and one (1) serious injury crash and one (1) fatal crash are associated to Segment C.

Near Crashes

Additionally, each crash was also associated to its second closest segment. The purpose of attributing the second closest, or "near", segments was to identify clusters of crashes that were localized or had correlations between two adjacent road segments. Since the associated "near" crashes may be related, but did not occur "along" a particular road segment, these crashes were factored by 25% (or ¼) so that "near" crashes were given less significance than "along" crashes for each segment. The 25% factor was based on the adjacent road representing one-fourth of the segment influence area as shown on *Figure 4. Near Crash Spatial Associations* below, where each adjacent section (*red dashed border*) is equal to one part and the assessed segment (black dashed border) is equal to two parts for a total of four associated parts. Also, this enables the high-injury network scoring to have consecutive or smooth scoring between its components rather than a fragmented visualization.

The parameters for this analysis included the following criteria: the segment must be within half of the distance of the attributed segment defined in the Along Crash spatial analysis and must match the IDOT/ MoDOT defined unique road identification. This ensures that near crashes may only happen along a corridor and avoids near crash segments getting associated to crossroads. See below for *Figure 4. Near Crash Spatial Associations*.

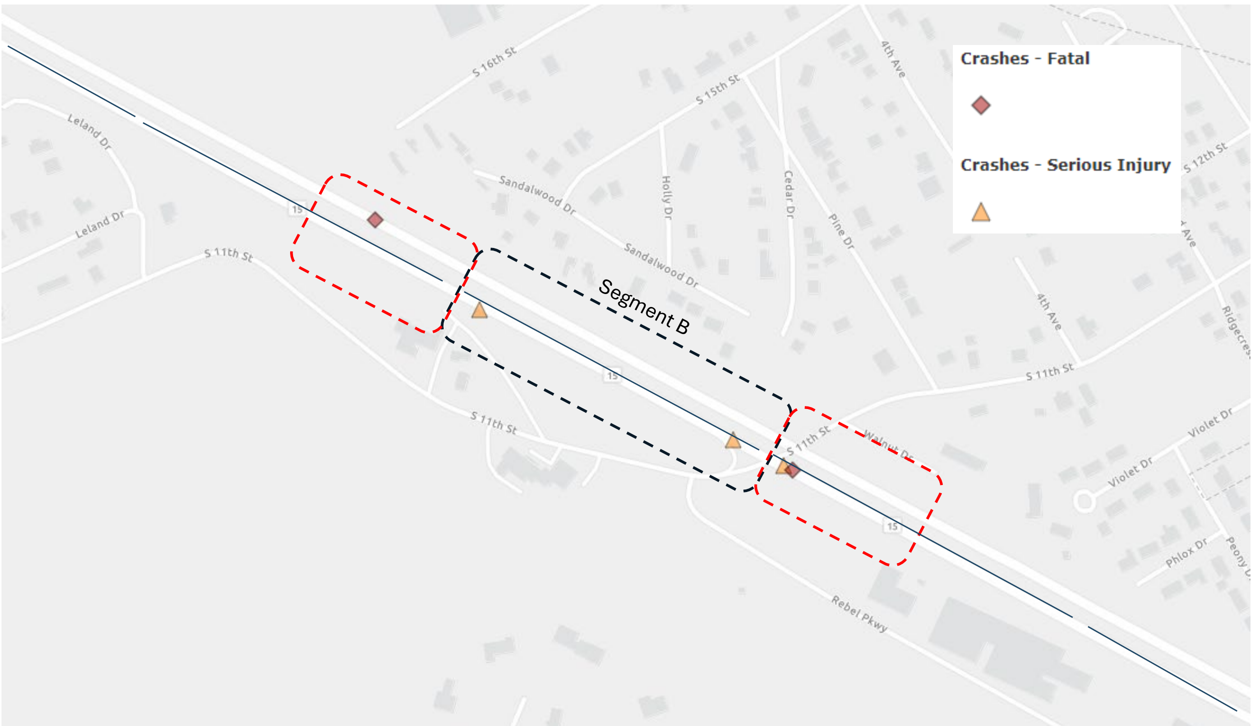


Figure 4. Near Crash Spatial Associations

As shown in *Figure 4. Near Crash Spatial Associations*, the red boundaries represent the near segments that contain any crashes that will be associated with Segment B as Near Crashes. In this example, there are a total of two (2) fatal crashes and one (1) serious injury crash associated as Near Crashes to Segment B.

7. High-Injury Network Scoring

General Scoring Methodology

For the scoring of the segments and intersections, only fatal and serious injury crashes (or KSI crashes), were used to generate the high-injury networks. Data was collected for minor injury crashes and property damage only crashes; however, this data was ignored for the high-injury network scoring.

KSI = Fatal Injury Crashes or Serious Injury Crashes

All crash analysis was based on the Roadway Safety Information Analysis standards by the Federal Highway Administration (FHWA). All corridor crash scoring was normalized using the length of road as opposed to AADT, which was unavailable in our datasets. According to FHWA, when AADT information is unavailable, it is recommended for comparative scoring analysis to use the length of analyzed section, as described in section 3.2.3 Crash Rates by Roadway Mileage.

Federal Highway Administration: 3.2.3. Crash Rates by Roadway Mileage – https://safety.fhwa.dot.gov/local_rural/training/fhwasa1210/index.cfm

The scoring of the intersections, segments, and corridors involved obtaining the total count of fatal and serious injury crashes from the spatial analysis. These values were weighted and calculated to generate a score that was used to compare the crash impact across the Region. However, fatal crashes were given a multiplier to compensate for the higher crash severity. Equivalent Property Damage Only (EPDO) Crash Ratings were used to determine the weighting factor for fatal crashes and can be referenced in *Table 2. EPDO Crash Ratings* as shown below. With this information, a weighting factor of 1.5 was used for all fatal crashes to account for their higher crash severity. See equation below for calculating the Fatal Crash Weighting.

EPDO Crash Ratings	
Crash Severity	**Value**
Fatal Crash	9
Serious Injury Crash	6
Minor Injury Crash	3
Property Damage Only Crash	1

Table 2. EPDO Crash Ratings

$$Fatal\ Crash\ Weighting = \frac{9}{6} = 1.5$$

Scoring Equations and Examples

For intersections, segments, and corridors, the high-injury networks were developed using multiple formulas to calculate the scoring for each type of feature. The equations used to generate these scores, as well as examples of how scores were calculated, are shown below.

Intersections

The intersections high-injury networks scores are based on the total weighted number of KSI crashes associated to the intersection. Below is a step-by-step of how the intersection high-injury networks scores were calculated.

$$KSI\ Weighted\ Score\ (Crashes) = (1.5\ *\ Fatal\ Crashes) + Serious\ Injury\ Crashes$$

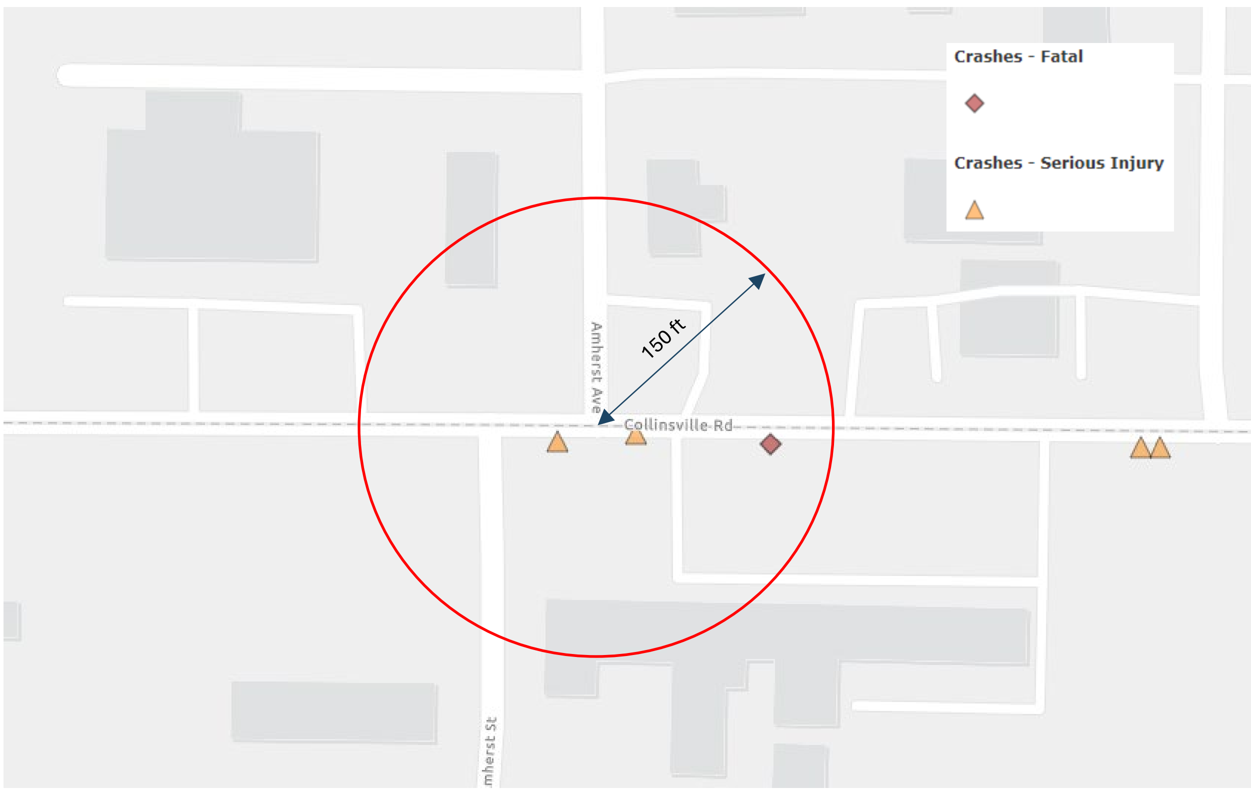


Figure 5. Intersection Crash Spatial Associations

For *Figure 5. Intersection Crash Spatial Associations* as shown above, the intersection includes one (1) fatal crash and two (2) serious injury crashes within 150 ft of the intersection.

$$KSI\ Weighted\ Score\ (Crashes) = (1.5\ *\ 1) + 2 = 4.5\ Crashes$$

Segments

The segments high-injury networks scores are based on the total weighted number of KSI crashes associated along and near the segment. Below is a step-by-step of how the intersection high-injury networks scores were calculated.

Along Weighted Crash Score

$$\begin{aligned} &Along\ Crash\ KSI\ Weighted\ Score\ (Crashes) \\ &\qquad = (1.5\ *Along\ Fatal\ Crashes) + Along\ Serious\ Injury\ Crashes \end{aligned}$$

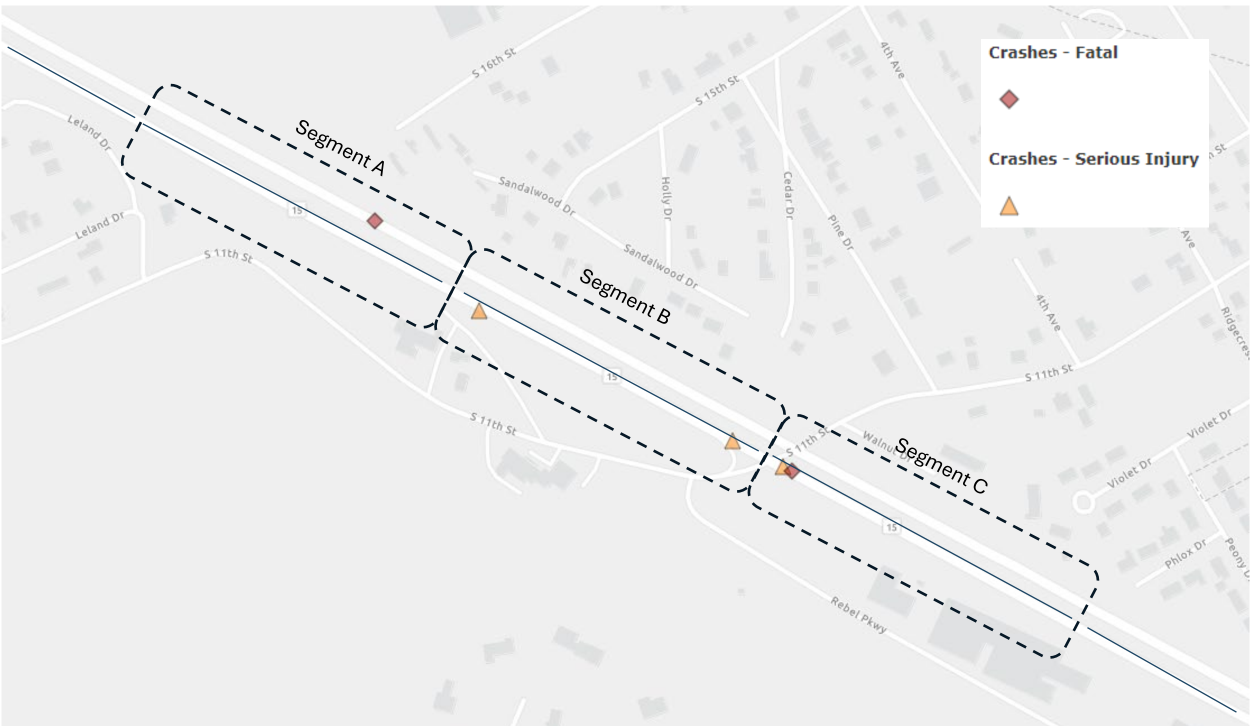


Figure 6. Along Crash Spatial Associations

For *Figure 6. Along Crash Spatial Associations* as shown above, Segment A includes one (1) fatal crash and zero (0) serious injury crashes along the segment.

$$\begin{aligned} &Segment\ A\ KSI\ Weighted\ Score\ (Crashes) = (1.5\ *\ 1) + 0 = 1.5 \\ &Segment\ B\ KSI\ Weighted\ Score\ (Crashes) = (1.5\ * 0) + 2 = 2 \\ &Segment\ C\ KSI\ Weighted\ Score\ (Crashes) = (1.5\ *\ 1) + 1 = 2.5 \end{aligned}$$

Near Weighted Crash Score

The near crash scoring was factored since these crashes were close but not along the segment, as noted in the previous section. As such, all near crashes were divided by four (4), accounting for the intended 25% factoring.

$$Near\ Crash\ KSI\ Weighted\ Score\ (Crashes) = \frac{(1.5\ *\ Near\ Fatal\ Crashes + Near\ Serious\ Injury\ Crashes)}{4}$$

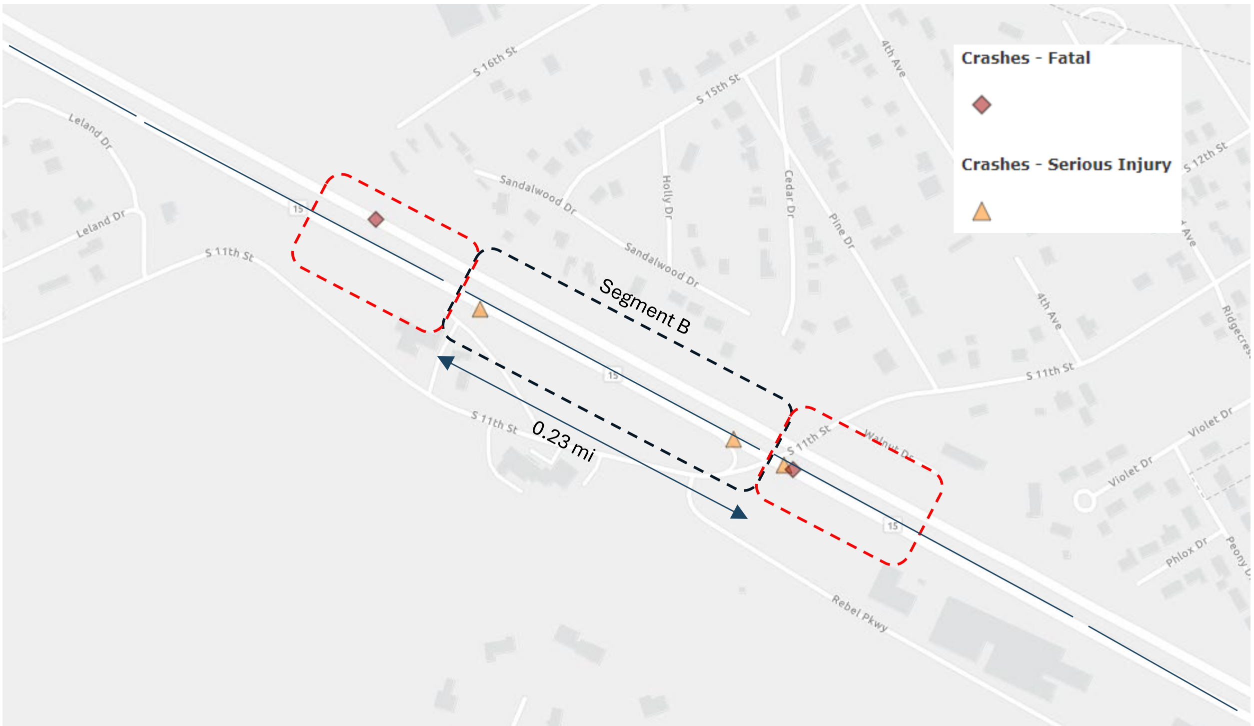


Figure 7. Near Crash Spatial Associations

As shown in *Figure 7. Near Crash Spatial Associations*, two (2) fatal crashes and one (1) serious injury crash are associated to Segment B as near crashes.

$$Segment\ B\ Near\ Crash\ KSI\ Weighted\ Score\ (Crashes) = \frac{(1.5 * 2) + 1}{4} = 1$$

Total Weighted Crashes

$$Total\ Weighted\ Crashes\ (Crashes)\ = Along\ Crash\ KSI +\ Near\ Crash\ KSI$$
$$Segment\ B\ Total\ Weighted\ Crashes\ (Crashes)\ = 2 +\ 1 = 3$$

Corridors

The corridors high-injury networks scores are based on the weighted number of KSI crashes associated along the corridor per year and normalized per mile. Below is a step-by-step of how the intersection high-injury networks scores were calculated.

Total Weighted Corridor Crashes

$$Total\ Weighted\ Corridor\ Crashes\ (Crashes)\ = (1.5\ * Along\ Fatal\ Crashes) + Along\ Serious\ Injury\ Crashes$$

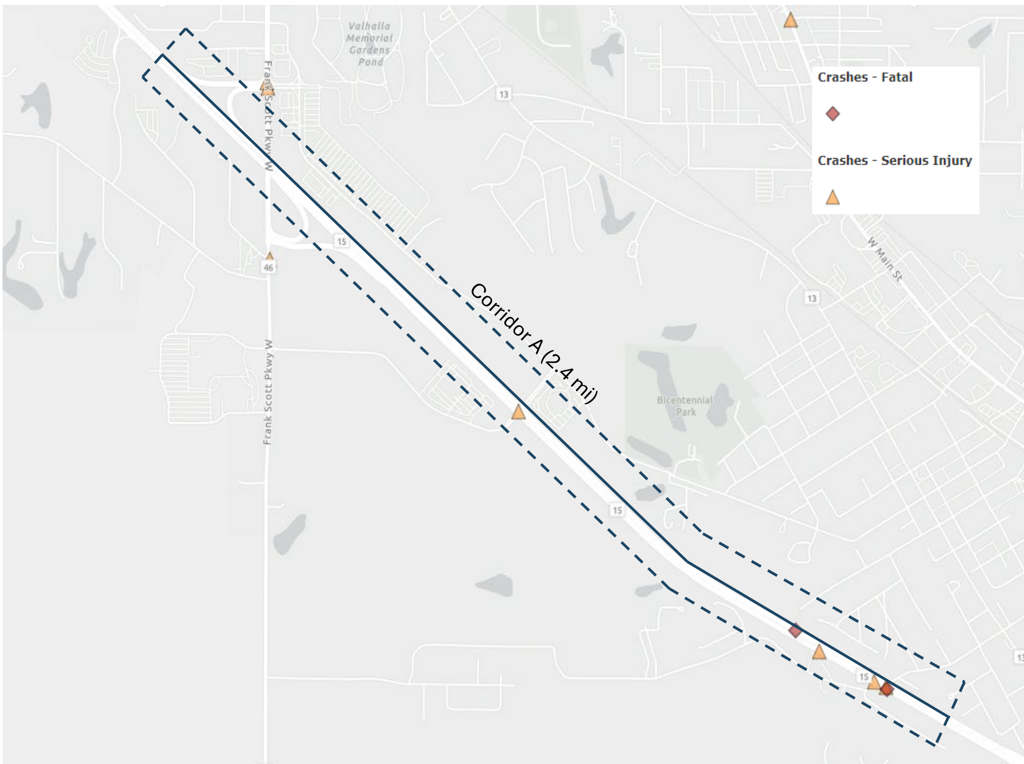


Figure 8. Corridor Crash Spatial Associations

As shown in *Figure 8. Corridor Crash Spatial Associations*, two (2) fatal crashes and four (4) serious injury crash are associated to Corridor A as near crashes.

$$Corridor\ A\ Total\ Weighted\ Corridor\ Crashes\ (Crashes) = (1.5\ * 2) + 4 = 7$$

Total Weighted Corridor Crashes / Year

$$Total\ Weighted\ Corridor\ Crashes\ per\ Year\ \left(\frac{Crashes}{Yr}\right) = \frac{Total\ Weighted\ Crashes}{5}$$

$$Corridor\ A\ Total\ Weighted\ Corridor\ Crashes\ per\ Year\ \left(\frac{Crashes}{Yr}\right) = \frac{7}{5} = 1.4$$

Total Weighted Corridor Crashes / Year / Mile

$$Total\ Weighted\ Corridor\ Crashes\ per\ Year\ per\ Mile\ \left(\frac{\frac{Crashes}{Yr}}{mi}\right) = \frac{Total\ Weighted\ Crashes\ per\ Year}{Length\ of\ Segment\ (mi)}$$

$$Corridor\ A\ Total\ Weighted\ Corridor\ Crashes\ /\ Year\ /\ Mile\ \left(\frac{\frac{Crashes}{Yr}}{mi}\right) = \frac{1.4}{2.8} = 0.5$$

High-Injury Network Criteria

The following criteria were used to distinguish the different high-injury networks. The data was first queried based on the following parameters and calculated with the remaining features. The criteria for each of the high-injury networks are shown below.

High-Injury Network 1 - All Modes

High-Injury Network 1 included all KSI crashes and all intersections and roadways except interstate and interstate ramp road classifications.

- Road Classification Criteria:
  - Freeway
  - Principal Arterial
  - Minor Arterial
  - Major Collector
  - Minor Collector
  - Local
- Crash Classification Criteria:
  - All Fatal Crashes
  - All Serious Injury Crashes

High-Injury Network 2 - Vulnerable Road User

High-Injury Network 2 included all KSI crashes that involved Pedestrian and Pedalcyclists (or Bicyclists) and all intersections and roadways except interstate and ramp road classifications.

- Road Classification Criteria:
  - Freeway
  - Principal Arterial
  - Minor Arterial
  - Major Collector
  - Minor Collector
  - Local
- Crash Classification Criteria:
  - Pedestrian
    - Fatal Crashes involving at least one pedestrian.
    - Serious Injury Crashes involving at least one pedestrian.

    Pedalcyclist (or bicyclist)
    - Fatal Crashes involving at least one bicyclist.
    - Serious Injury Crashes involving at least one bicyclist.

High-Injury Network 3 – Underserved Communities

High-Injury Network 3 included all KSI crashes that were located within a disadvantaged community as defined by CEJST and all intersections and roadways except interstate and interstate ramp road classifications.

- Road Classification Criteria:
  - Freeway
  - Principal Arterial
  - Minor Arterial
  - Major Collector
  - Minor Collector
  - Local
- Crash Classification Criteria:
  - All Fatal Crashes within CEJST disadvantaged areas.
  - All Serious Injury Crashes within CEJST disadvantaged areas.

High-Injury Network 4 – Contributing Factors

High-Injury Network 4 included all KSI crashes that included the pertaining contributing factor cause and all intersections and roadways except interstate and interstate ramp road classifications.

- Road Classification Criteria:
  - Freeway
  - Principal Arterial
  - Minor Arterial
  - Major Collector
  - Minor Collector
  - Local
- Crash Classification Criteria:
  - Contributing Factor 1 – Speeding
    - All fatal crashes involving at least one speeding related contributing factor.
    - All serious injury crashes involving at least one speeding related contributing factor.
  - Contributing Factor 2 – Failing to Yield Right of Way
    - All fatal crashes involving at least one failing to yield right-of-way contributing factor.
    - All serious injury crashes involving at least one failing to yield right-of-way contributing factor.
  - Contributing Factor 3 – Improper Lane Usage
    - All fatal crashes involving at least one improper lane usage contributing factor.
    - All serious injury crashes involving at least one improper lane usage contributing factor.
  - Contributing Factor 4 – Alcohol / Drugs
    - All fatal crashes involving at least one alcohol or drug contributing factor.

        - All serious injury crashes involving at least one alcohol or drug contributing factor.
    - Contributing Factor 5 – Distraction
        - All fatal crashes involving at least one distracted driving contributing factor.
        - All serious injury involving at least one distracted driving contributing factor.

High-Injury Network 5 – Interstate Hot Spots

High-Injury Network 5 included all KSI crashes and only interstate and ramp road classifications.

- Road Classification Criteria:
    - Interstate
    - Ramp
- Crash Classification Criteria:
    - All Fatal Crashes
    - All Serious Injury Crashes

In addition, a few state-maintained freeways with controlled access were associated as Interstates since they essentially operate as an interstate including IL 255 north of I-270 to IL 111, MO 364 from I-270 to I-64, MO 367 north of I-270 to Missouri River, MO 370 from I-270 to I-70 and MO 21 from MO 141 to State Route B (Hillsboro Road). These routes were excluded from High-Injury Networks 1 through 4.

Percentile Ranking and Visualization

Once scores were calculated for the intersections, segments, and corridors, they were summarized and ranked using the percentile method to identify the highest frequency of KSI crashes within the EWG Region. The ranked road features were categorized into four different tiers, as shown below. These tiers were used for the high-injury network map symbology and display colors.

- Top 10 Percent - Represents all crashes with a weighted score between the 100^{th} percentile and 90^{th} percentile of crashes. This category was symbolized as red on the high-injury network maps.
- Top 25 Percent - Represents all crashes with a weighted score between the 90^{th} percentile and 75^{th} percentile of crashes. This category was symbolized as orange on the high-injury network maps.
- Top 50 Percent - Represents all crashes with a weighted score between the 75^{th} percentile and 50^{th} percentile of crashes. This category was symbolized as yellow on the high-injury network maps.
- Below 50 Percent - Represents all crashes with a weighted score between the 50^{th} percentile and 0^{th} percentile of crashes and with a weighted score greater than 0. This category was only symbolized as blue on the county-level high-injury network layers.

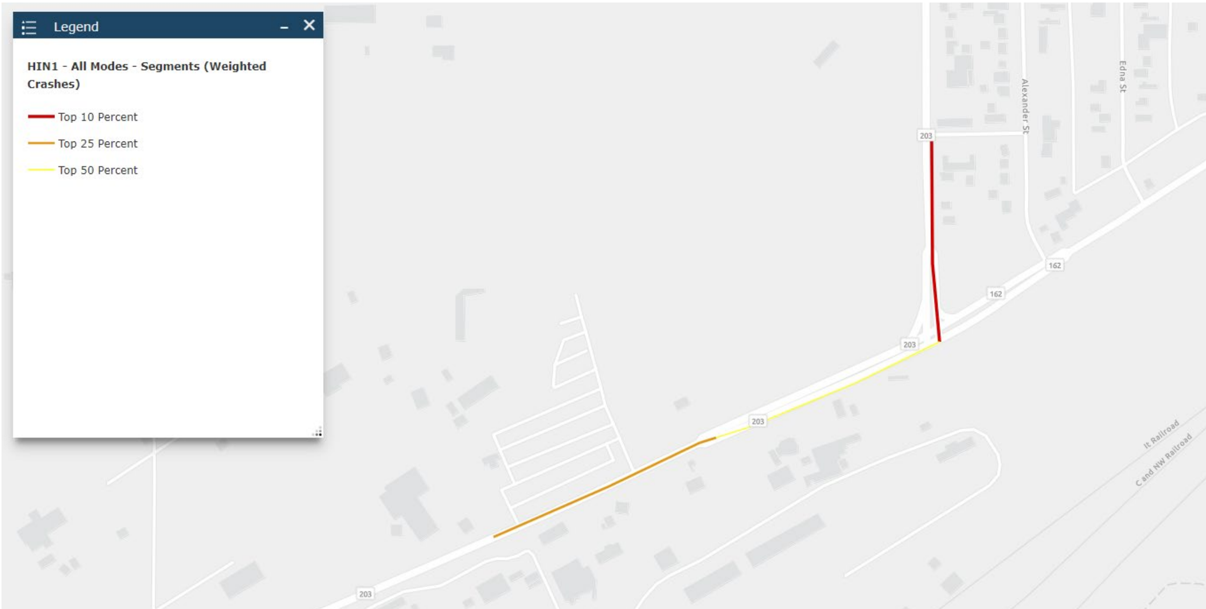


Figure 9. Percentile Categories

Regional vs. County Scoring

The percentile rankings discussed above were calculated for each high-injury network for the entire EWG Region based on the associated ranges of scores. These regional datasets and rankings can also be viewed for each specific county (or municipality) within the EWG Region by filtering the data on the corresponding fields for the various high-injury networks and corresponding road features (corridors, segments, and intersections) data tables.

In addition, the percentile rankings were calculated on the county level for High-Injury Network 1 – All Modes, which allows each county to view rankings based on their specific county score ranges independently from the EWG Region. However, due to the number of additional data fields and layers that would be required to calculate the ranking for every high-injury network for each county, the calculations for High-Injury Networks 2 through 5 were omitted from the final dataset at the county level. However, determining the highest frequency KSI corridors, segments, and intersections for each county (or municipality) relative to high-injury networks (*shortened to "HIN" for dataset & map layer naming*) 2 through 5 may also be completed using the following methodology while using the online web maps.

1. Select the particular county-specific dataset (corridors, segments, or intersections) to analyze.
    a. *For example: St. Louis County HIN Corridors, Madison HIN Segments, Jefferson HIN Intersections, etc.*
2. Filter the data by the specified high-injury network field for values greater than zero.
    a. *For example on Corridors: HIN 2 Pedestrians Corridor Weighted Crashes /Yr / Mile > 0*
    b. *For example on Segments: HIN 3 Equity Total Weighted Crashes > 0*
    c. *For example on Intersections: HIN 4 Contributing Factor 5 - Distraction Total Weighted Crashes > 0*
3. Sort the specified high-injury network field and filter scores in descending order.
4. Optional: Using this filtered dataset, export the data table and run percentiles for the scores.

8. High-Injury Network Maps

Once the above high-injury networks scoring and ranking data analysis was complete, the data was published to an interactive online map using ESRI's ArcGIS Online platform. The intent of the interactive online mapping was to share, collaborate, and review the various high-injury networks with the EWG project team and stakeholder groups as part of the engagement process. The interactive online mapping can be viewed and accessed with an example screenshot of the stakeholder portal shown in *Figure 10*. *Access to these web maps will be provided after the data has been finalized. The final data will be hosted on two interactive web mapping applications:*

- **Public EWG Gateway to Safer Roadways Website & Interactive HIN Mapping Portal (Public Use)**
- **Stakeholder EWG Gateway to Safer Roadways HIN Mapping Portal (Requires Credentials)**

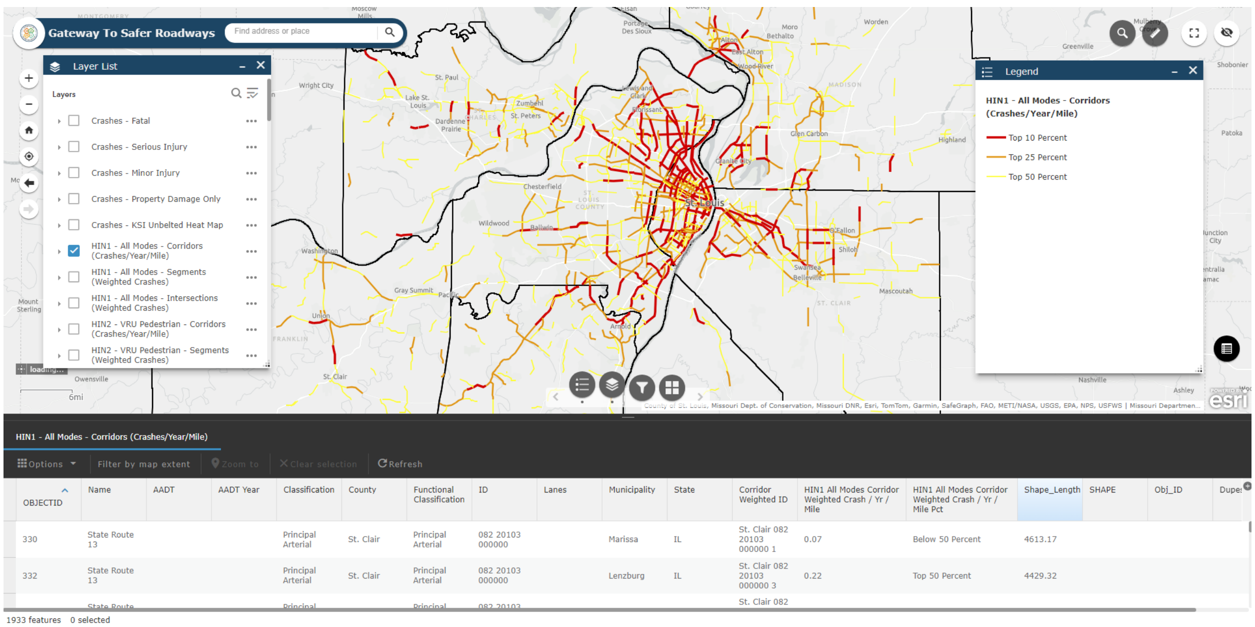


Figure 10. EWG Gateway to Safer Roadways Stakeholder HIN Mapping Portal Screenshot

Since all high-injury networks were ranked on the corridor, segment, and intersection road features, each high-injury network was divided into multiple layers as part of the interactive high-injury network mapping portal. Each of these layers were then configured to show only the data and ranking pertaining to each specific high-injury network. This process was similarly applied to each county for High-Injury Network 1 – All Modes only for the corresponding corridors, segments, and intersections. Figure 11 to the right shows the Layer List in the mapping portal with the various high-injury network layers, while the following Figures 12-15 showing high-injury network layer examples viewed in the mapping portal.

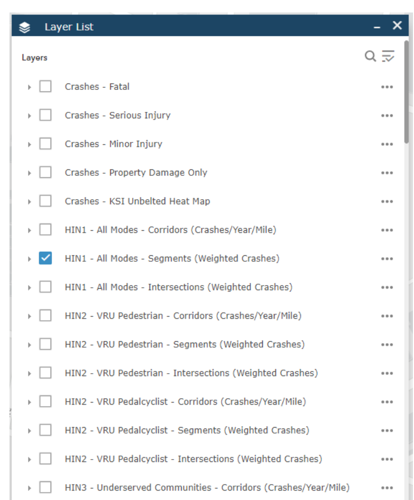


Figure 11. HIN Mapping Layer List

As shown in Figure 12, the legend shows how the corridors are symbolized based on Top 10 Percent, Top 25 Percent, and Top 50 Percent. Symbolizing the data into different categories allows the data to be interpreted and visualized with a spatial perspective that increases usability and understanding of the crash frequencies across the Region.

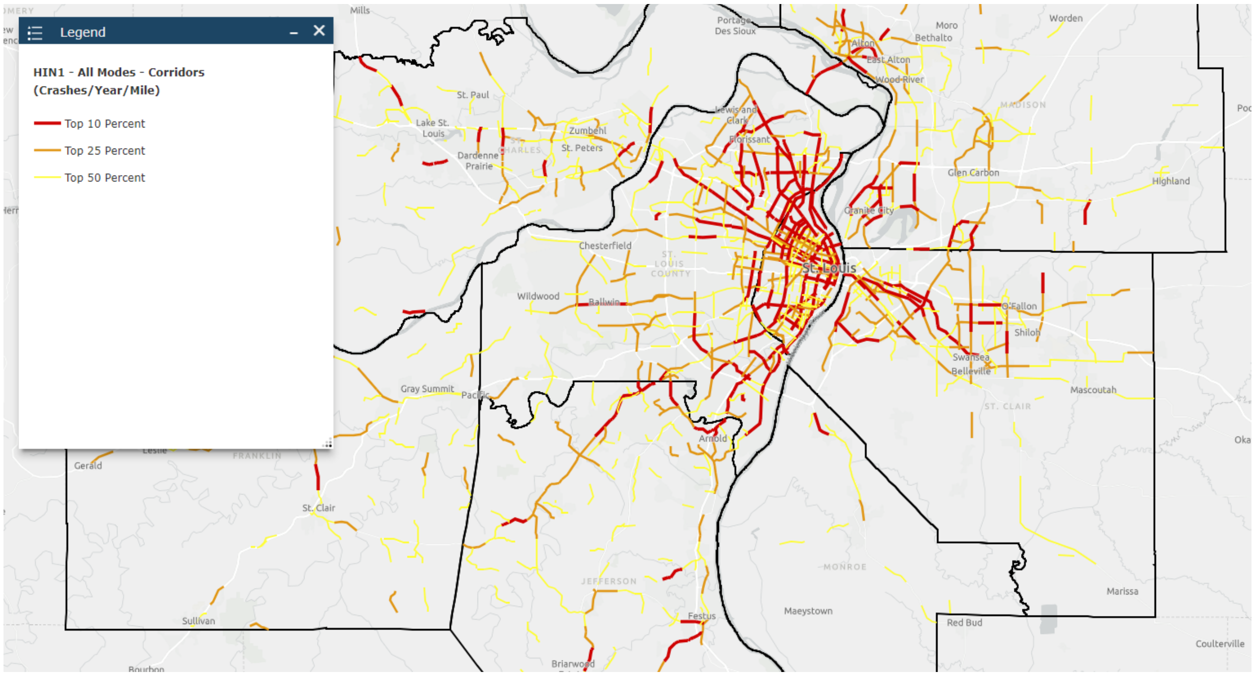


Figure 12. HIN 1 – All Modes Crash Ranking of Corridors

As shown in Figure 13, the legend shows how the intersections are symbolized based on Top 10 Percent, Top 25 Percent, and Top 50 Percent. Like corridors and segments, categorizing divisions enables users to identify areas with higher crash frequencies.

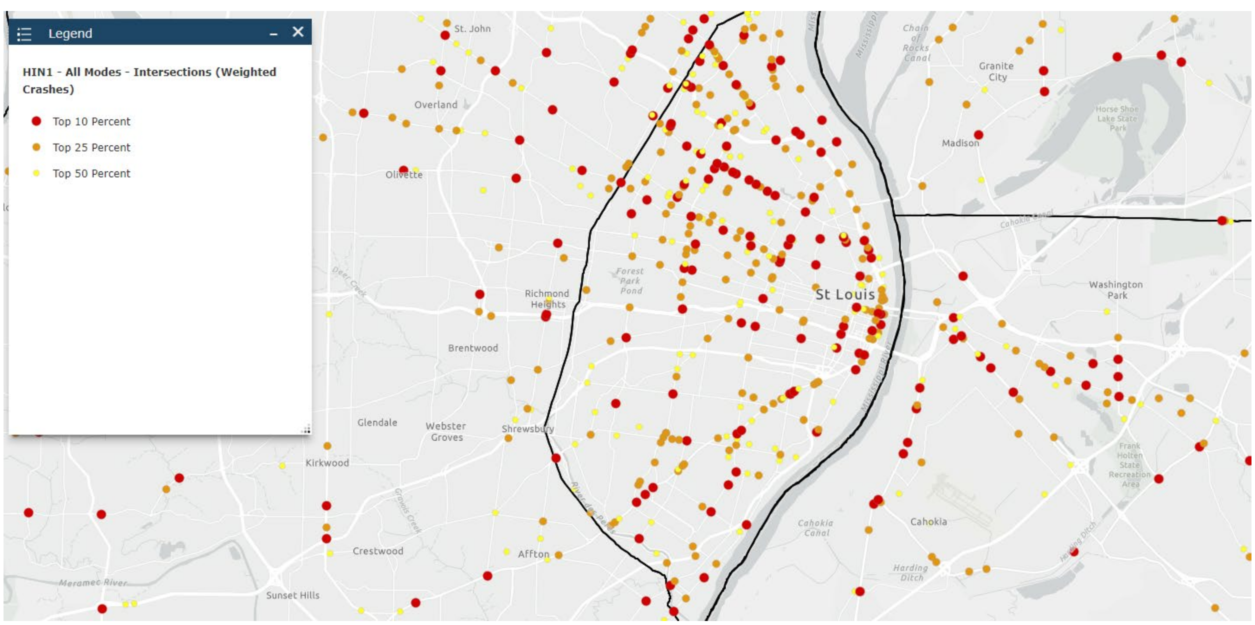


Figure 13. HIN1 – All Modes Intersection Ranking

The segments for the high-injury network are shown in Figure 14. Again, the legend shows how the segments are symbolized based on Top 10 Percent, Top 25 Percent, and Top 50 percent.

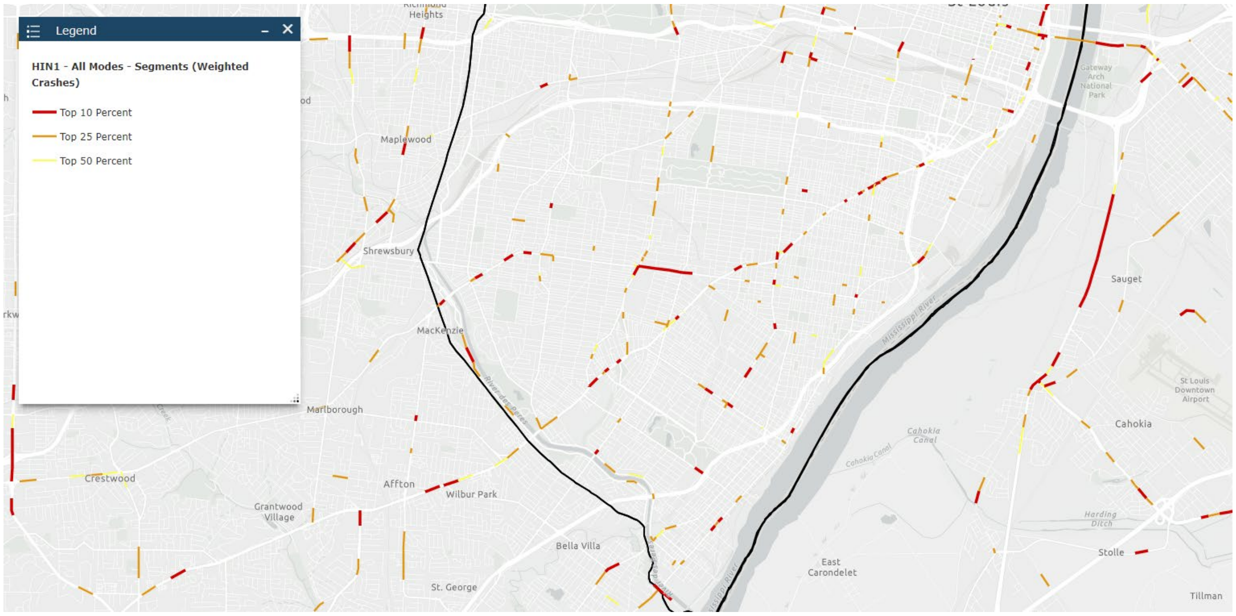


Figure 14. HIN1 – All Modes Road Segment Crash Ranking

Figure 15 shows an example of a segment identification using the Identification Pop-up tool in the interactive mapping portal. By clicking on the segment, users can view all information regarding the selected segment ranking, as well as various other attributes associated to the segment. This functionality is enabled on all layers within the interactive mapping portal.

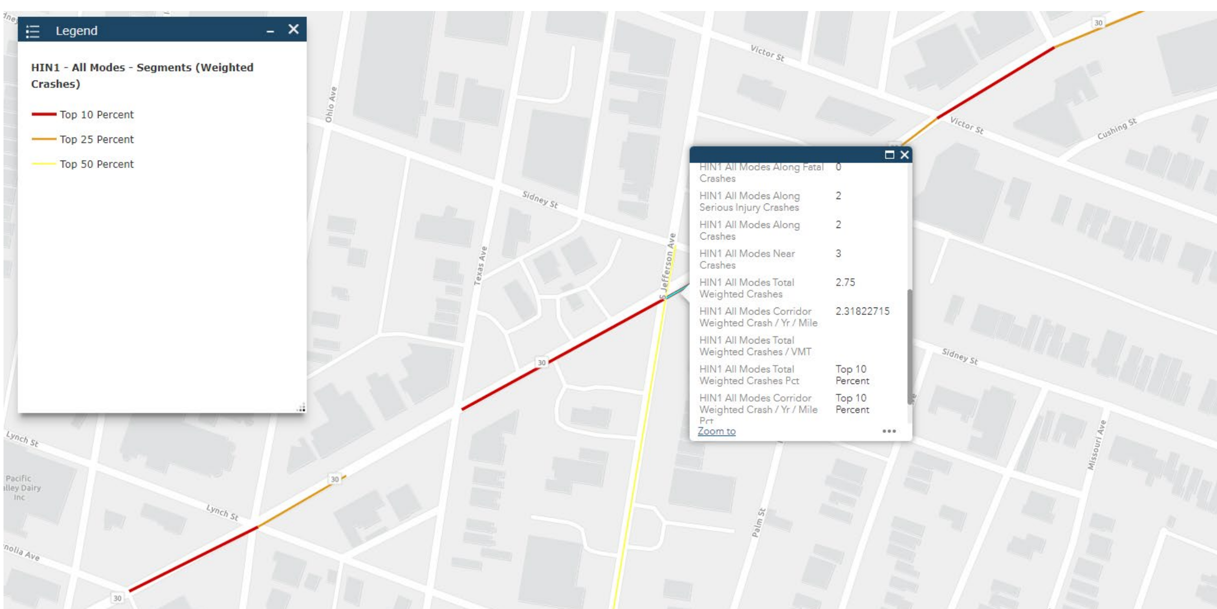


Figure 15. HIN1 – All Modes Identifying Road Segments

To supplement the above high-injury network data layers, additional datasets were included in the Stakeholder EWG Gateway to Safer Roadways HIN Mapping Portal. The crash locations and data were included then split into five (5) different layers, with one layer for each crash severity (Fatal, Serious Injury, Minor Injury, and Property Damage Only) and another layer showing KSI unbelted crashes as a heat map. Various equity layers were also included in the interactive mapping portal, with one layer showing the Climate and Economic Justice Scoring (CEJST) Disadvantaged rankings and multiple other layers showing various equity metrics using American Community Survey (ACS) Census Bureau all per census tract locations. Additional Boundary layers, such as county and municipality, were also included for reference.

As part of the EWG Gateway to Safer Roadways high-injury network interactive mapping portals, the EWG project team will also provide links to "How To" documentation for both public and stakeholder users. This documentation will briefly review how to access and navigate the EWG high-injury network interactive mapping portals, including an explanation of the various tools and widgets configured in the mapping portals. Additionally, this documentation will include a walk-through for stakeholder users on how to analyze, locate, and export datasets associated with the specific county, municipality, or jurisdiction of interest.

9. Summary

As summarized in the previous sections, the high-injury networks were developed using a variety of data sources, specifically including crash and road data from IDOT and MoDOT. These datasets, among other boundary information, were compiled into a single data source for all further analysis. The data was checked, prepared, and preprocessed so that all analysis could be performed using various spatial computations and associations. In general, the crash locations were spatially associated to each road feature including intersections, segments, and corridors. The road feature crash associations were subsequently used to quantify and score the frequency of KSI crashes for each feature. The resulting KSI crash frequency scores were further ranked using the percentile method (Top 10%, Top 25%, and Top 50%) to determine which features should be included in the corresponding high-injury network. The created high-injury networks were then displayed and shared in an interactive online mapping portal for further coordination between EWG and Stakeholders as part of current or future projects, programs, and/or policies.

Based on the magnitude of data and complexity of spatial analysis for this regional effort, the EWG project team created a specific data structure and corresponding scripts/tools to develop the high-injury networks and associated datasets. The intent of creating the project specific data structure and scripts was to share this information with EWG staff so that the high-injury networks and corresponding interactive mapping portals could be updated periodically with more recent crash and road data when available. The purpose of keeping this information updated and maintained will help track progress towards the *Gateway to Safer Roadways* program goals, as well as continue to provide this valuable information to EWG's Stakeholders and other partners.

For further details regarding the crash, road, and high-injury network data attributes, please review the following attached data summaries for each corresponding data table.

10. Attachments

Attachment 1	**Crash and Road Data Attributes**	
	Table 1	*IDOT Crash Attributes*
	Table 2	*IDOT Person Attributes*
	Table 3	*IDOT Vehicle Attributes*
	Table 4	*IDOT Road Attributes*
	Table 5	*MoDOT Crash Attributes*
	Table 6	*MoDOT Crash Supplemental Attributes*
	Table 7	*MoDOT Road Attributes*
Attachment 2	**Crash and Road Data Compilation**	
	Table 1	*Crash Schema Data Matching*
	Table 2	*Crash Domain Data Matching*
	Table 3	*Persons Schema Data Matching*
	Table 4	*Persons Domain Data Matching*
	Table 5	*Vehicles Schema Data Matching*
	Table 6	*Vehicles Domain Data Matching*
	Table 7	*Contributing Factors Schema Data Matching*
	Table 8	*Contributing Factors Domain Data Matching*
	Table 9	*Roads Schema Data Matching*
	Table 10	*Roads Domain Data Matching*
Attachment 3	**High-Injury Networks Data Dictionary**	
	Table 1	*Intersections Data Dictionary*
	Table 2	*Corridors Data Dictionary*
	Table 3	*Segments Data Dictionary*
	Table 4	*Census Tracts (ACS) Data Dictionary*
	Table 5	*Crashes Data Dictionary*
	Table 6	*Persons Data Dictionary*
	Table 7	*Vehicles Data Dictionary*
	Table 8	*Contributing Factors Data Dictionary*

Table 1. IDOT Crashes Attributes

Field Name
ICN
CrashID
CountyCode
CrashYr
CrashMonth
CrashDay
NumberOfVehicles
DayOfWeekCode
CrashHour
CityCode
CityClassCode
Township
CollisionTypeCode
TotalFatals
TotalInjured
NoInjuries
AInjuries
BInjuries
CInjuries
CrashSeverity
AgencyCode
RouteNumber
Milestation
ClassOfTrafficwayCode
NHS
TrafficControlDeviceCode
RoadSurfaceConditionCode
RoadDefectsCode
LightConditionCode
WeatherCode
Cause1Code
Cause2Code
RailroadCrossingNumber
TimeOfCrash
TrafficControlDeviceConditionCode
IntersectionRelated
HitAndRun
CrashDate
NumberOfLanes
AlignmentCode
TrafficwayDescriptionCode

RoadwayFunctionalClassCode
WorkZoneRelated
City_Township_Flag
TSCrashCoordinateX
TSCrashCoordinateY
TSCrashLatitude
TSCrashLongitude
CrashReportCounty
DayOfWeek
TypeOfFirstCrash
CityName
CityClass
ClassOfTrafficway
Cause1
Cause2
TrafficControlDevice
TrafficControlDeviceCond
RoadSurfaceCond
RoadDefects
CrashInjurySeverity
LightingCond
WeatherCond
RoadAlignment
TrafficwayDescrip
RoadwayFunctionalClass
InvestigatingAgencyDescrip
CrashSeverityCd
DamagedProperty1
DamagedProperty2
AgencyReportYear
AgencyReportNumber
SFE
DidCrashOccurInWorkZone
WorkZoneType
WereWorkersPresent
WorkZone
AccessControl
FlowCondition
DidInvolveSecondaryCrash
UrbanRural
Toll
TypeofReport

Table 2. IDOT Persons Attributes

Field Name
OBJECTID
ICN
CrashID
PersonTypeCode
UnitNo
BirthDate
AgeAtCrash
Gender
StateProvinceCode
DRAC
BAC
VIS
DRVA
SeatingPos
PersonInjuryClass
SAFT
AIR
EJCT
EMSResponding
HospitalName
PPA
PPL
PEDV
PersonType
PedBikeVisibility
ApparentPhysCond
AirBagDeployment
PedBikeAction
BACTestGiven
EjectExtricate
DriverAction
PedBikeLocation
DriverVision
SafetyEquipUsed
WasDistracted
DistractionReason
IsIncidentResponder
IncidentResponder
EjectionPath
Drug1
Drug2

Table 3. IDOT Vehicles Attributes

Field Name
OBJECTID
ICN
CrashID
CrashReportUnitNbr
VIN11
NbrOccupants
VehTypeCode
VehUseCode
VehDefectsCode
VehManeuverPriorCode
DirectionPriorTravelCode
IsTowed
IsFire
IsHazMatSpill
IsCommercial
EventMostSevereCode
EventMostSevereLocCode
MostHarmfulEvenNo
CrashEvent1Code
CrashEvent2Code
CrashEvent3Code
Event1LocCode
Event2LocCode
Event3LocCode
VehPointOfFistContactCode
DirectionPriorTravel
VehDefects
VehManeuverPrior
VehType
VehUse
EventMostSevere
EventMostSevereLoc
CrashEvent1
CrashEvent2
CrashEvent3
Event1Loc
Event2Loc
Event3Loc
VehYear
VehMake
VehModel

ExceedingSpeedLimit
TowedDueTo
AutomationInVehicle
LevelofAutomation
LevelOfAutomationDuringCrash
ExtentOfDamage
SpeedingRelated
County

Table 4. IDOT Roads Attributes

Field Name
OBJECTID
INVENTORY
BEG_STA
END_STA
AADT
AADT_YR
ACC_CNTL
BLT
CH
CNTYTWP
CO_ADJ
CONG
CONG_ADJ
COTWP
COUNTY_NAM
CRS_LOW
CRS_OPP
CRS_WITH
CRS_YR
DIST
DTRESS_OPP
DTRESS_WTH
FAULT_LOW
FAULT_OPP
FAULT_WITH
FC
FC_NAME
FREIGHT
FUNC_CLASS
HCV
HCV_MU_YR
HPMS_SECT
I_SHD1_TYP
I_SHD1_WTH
I_SHD2_TYP
I_SHD2_WTH
INV_CO
IRI_LOW
IRI_OPP
IRI_WITH
JUR_1

JUR_2
JUR_TYPE
KEY_RT_APN
KEY_RT_APP
KEY_RT_NBR
KEY_RT_SEG
KEY_RT_SUF
KEY_RT_TYP
LN_SPC
LN_SPC_NBR
LN_SPC_WTH
LN_WTH
LNS
LOC_ERROR
MAINT_TYPE
MARKED_RT
MARKED_RT2
MARKED_RT3
MARKED_RT4
MED_TYP
MED_WTH
MNT_1
MNT_2
MNT_DIST
MNT_SECT
MPO
MRK_RT_TY2
MRK_RT_TY3
MRK_RT_TY4
MRK_RT_TYP
MU_VOL
MUNI
MUNI_ADJ
MUNI_NAME
NHS
NON_ATTAIN
O_SHD1_TYP
O_SHD1_WTH
O_SHD2_TYP
O_SHD2_WTH
OP_1_2_WAY
PL_AGY
PL_AGY_ADJ
PRK_LT

PRK_RT
REP
REP_ADJ
ROAD_NAME
RUT_LOW
RUT_OPP
RUT_WITH
SEG_LENGTH
SP_LIM
SPEC_SYS
SU_VOL
SURF_TYP
SURF_WTH
SURF_YR
TOLL
TOWNSHIP_N
TRK_RT
TWP
TWP_ADJ
URBAN
IRISDate
Shape_Leng
Shape
GDB_GEOMATTR_DATA

Table 5. MODOT Crashes Attributes

Field Name
ACCIDENT_DATE
SEVERITY
STATUS
MODOT_DISTRICT_NO
MODOT_COUNTY_NM
ON_LOCATION_STREET
AT_LOCATION_STREET
LIGHT_CONDITION
WEATHER_COND_1
ROAD_CONDITION_1
LONG_SHORT_FORM
DESIGNATION
TRAVELWAY_NAME
DIRECTION
TRAVELWAY_ID
Log
PRIMARY_IND
ACCIDENT_DAY
ACCIDENT_MONTH
URBAN_RURAL_CLASS
HP_CONTRB_CIRCM_NO
CODE
ADDRESS_ZIP
SEX
HP_PERSON_INVL_CD
LANDED_LATITUDE
LANDED_LONGITUDE
VEHICLE_BODY_TYPE
PERSONAL_INJ_LEVEL
HP_ACC_IMAGE_NO
AIRBAG_FRONT
AIRBAG_SIDE
SAFETY_DEVICE
PED_LOCATION
PEDESTRIAN_TYPE
PEDESTRIAN_SCHOOL_INFO
PEDESTRIAN_CROSSING_ROAD_1
PEDESTRIAN_CROSSING_ROAD_2
DIR_ANALYSIS
INTERSECTION_TYPE
NO_OF_DISAB_INJURY

NO_OF_MINOR_INJURY
NUMBER_KILLED
HP_SEQ_EVNT_SEQ_NO
EVENT_CODE
TRAFFIC_CONTROL
HP_VEH_DRVR_ID
NO_OF_VEHICLES
DATE_OF_BIRTH
AgeAtCrash
SEAT_LOCATION
AIRBAG

Table 6. MODOT Supplemental Attributes

Field Name
County
District
Travelway
Log
Crash.Class
Date
Severity.Rating
Image.Num
Intersection.Num
Light.Cond
Road.Surf.Cond
Weather.Cond
Travelway.Id
Day.Of.Week
CrashMonth
Time
CrashTime
Prop.Dmg.Ind
Transaction.Id
Object.Id
Landed.Latitude
Landed.Longitude
TW.Ownership
No.of.Vehicles
Fixed.Objects
Interchange
Designation
Near.Street.Location
City
Planning.Org.Name
Major.Minor
Rural.Urban.Class
Total.AADT
Road.Alignment
On.Off.Roadway
Work.Zone
Vision_Obstructed
Too_fast_for_condition
Drug
Alcohol
Fatigue

Distracted
Improper_passing
Overcorrected
Speeding_related
Wrong_way
Intersection_type
Person_killed
Person_minor_injury
Person_serious_injury
Person_type01
Person_type02
Person_type03
Person_type04
Sex01
Sex02
Sex03
Sex04
Address_zip01
Address_zip02
Address_zip03
Address_zip04
Age01
Age02
Age03
Age04
Safety_device01
Safety_device02
Safety_device03
Safety_device04
AIRBAG01
AIRBAG02
AIRBAG03
AIRBAG04
Seat_Location01
Seat_Location02
Seat_Location03
Seat_Location04
Veh_body_type01
Veh_body_type02
Veh_body_type03
Veh_body_type04
PED_LOCATION
Contrb_code01
Contrb_code02

Contrb_code03
Contrb_code04
Ped01
Ped02
Ped03
Ped04
Ped_Age01
Ped_Age02
Ped_Age03
Ped_Age04
Ped_Sex01
Ped_Sex02
Ped_Sex03
Ped_Sex04
Ped_Zipcode01
Ped_Zipcode02
Ped_Zipcode03
Ped_Zipcode04
Ped_involved
Bike_involved

Table 7. MODOT Roads Attributes

Field Name
OBJECTID
SS_PAVEMEN
TRAVELWAY_
YEAR
TRF_INFO_S
TRF_INFO_1
TRAVELWAY1
TRAVELWA_1
TRAVELWA_2
TRAVELWA_3
BEG_CONTIN
END_CONTIN
DISTRICT
COUNTY_NAM
CNTL_TW_ID
CNTL_TW_DE
CNTL_TW_NA
CNTL_TW_DI
CNTL_TW_OF
CNTL_BEG_C
CNTL_END_C
AREA_DESG_
NUMBER_OF_
LANE_WIDTH
SHOULDER_T
SHOULDER_W
AADT
SURFACE_TY
SURFACE_DA
FUNC_CLASS
TMA_NON_TM
STATE_SYST
CRACK_INDE
PATCH_INDE
RAVEL_INDE
RUT_INDEX
RUT_DEPTH
CRACK_IN_1
PATCH_IN_1
SPALL_INDE
JOINT_INDE

AVERAGE_IR
PSR
ARAN_YEAR
DIVIDED_UN
LANE_COLLE
CONDITION_
PLANNING_O
PLANNING_1
AREA_ENGIN
TOTAL_AADT
TW_DSGN_PV
ROADWAY_TY
ACCESS_CAT
TW_ALIAS_N
URBAN_AREA
CITY_ID
TW_CNTL_ST
COUNTY_NUM
DESG_TRUCK
DESG_BYWAY
FED_CLS_NH
FED_CLS_NF
FED_CLS_PR
FED_CLS_ST
FED_CLS__1
FED_CLS_UN
FED_SYS_CL
TW_LANE_JO
LRPT
OVERLAPPIN
PLANNING_2
TRF_INFO_2
TW_SPEED_L
STATE_BRID
TW_OWNER_I
CITY_NAME
PRIOR_COUN
INTERCHANG
ARC_ID_BEG
POS_BEGIN
ARC_REF_BE
ARC_ID_END
POS_END
ARC_REF_EN

MSHP_TROOP
LAST_CHANG
LAST_CHA_1
COM_VOL_BY
INTERSECTI
THROUGH_LA
LEFT_SHOUL
LEFT_SHO_1
MAINT_TYPE
MAINT_DATE
MAINT_LOCA
SUBAREA_LO
LANE_MILES
CENTERLINE
DIRECTIONA
MAJOR_MINO
TRACKER_CO
LENGTH
DISTRICT_A
MAINT_OWNE
MAINT_OW_1
MAINT_JOB_
AADT_YEAR
FAP_SYS_CL
FED_AID_EL
CRACKING_P
FAULTING
FHWA_CONDI
GlobalID
Checked
Shape
GDB_GEOMATTR_DATA

Table 1. Crashes Schema

FieldName	Has Domain	IDOT Domain Values	MODOT Domain Values	IDOT Field Source	MODOT Field Source	Type
OBJECTID						int
ID				ICN	Image.Num	nvarchar(20)
IDOT_ID				ICN		nvarchar(20)
MODOT_ID					Image.Num	nvarchar(20)
RoadID						nvarchar(50)
NearRoadID						nvarchar(50)
IntersectionID						nvarchar(50)
CorridorID						nvarchar(50)
StreetName					Travelway	nvarchar(200)
CrashSeverity	Yes	See Table 2	See Table 2	CrashInjurySeverity	Severity.Rating	nvarchar(20)
Class	Yes	See Table 2	See Table 2	TypeOfFirstCrash	Crash.Class	nvarchar(50)
Date				CrashDate	Date	datetime
Month				CrashMonth	CrashMonth	int
Time				TimeOfCrash	CrashTime	nvarchar(10)
DayOfWeek	Yes	See Table 2	See Table 2	DayOfWeek	Day.Of.Week	nvarchar(10)
City				CityName	City	nvarchar(50)
County				CrashReportCounty	County	nvarchar(20)
UrbanRuralClass	Yes	See Table 2	See Table 2	ClassOfTrafficway	Rural.Urban.Class	nvarchar(20)
RoadAlignment	Yes	See Table 2	See Table 2	RoadAlignment	Road.Alignment	nvarchar(20)
MajorMinorType	Yes	See Table 2	See Table 2	RoadwayFunctionalClass	Major.Minor	nvarchar(20)
RoadSurfaceCondition	Yes	See Table 2	See Table 2	RoadSurfaceCond	Road.Surf.Cond	nvarchar(20)
LightCondition	Yes	See Table 2	See Table 2	LightingCond	Light.Cond	nvarchar(30)
WeatherCondition	Yes	See Table 2	See Table 2	WeatherCond	Weather.Cond	nvarchar(20)
WorkZoneIncident	Yes	See Table 2	See Table 2	DidCrashOccurInWorkZone	Work.Zone	nvarchar(20)
TotalFatalities				TotalFatals	Person_killed	int
TotalSeriousInjuries				AInjuries	Person_serious_injury	int
TotalMinorInjuries				MinorInjuries	Person_minor_injury	int
TotalPedestrian						int
TotalPedalcyclist						int
TotalElderlyDriver						int
TotalYoungerDriver						int
ContributingFactor1						nvarchar(10)
ContributingFactor2						nvarchar(10)
ContributingFactor3						nvarchar(10)
ContributingFactor4						nvarchar(10)
ContributingFactor5						nvarchar(10)
ContributingFactor6						nvarchar(10)
ContributingFactor7						nvarchar(10)
ContributingFactor8						nvarchar(10)
ContributingFactor9						nvarchar(10)
ContributingFactor10						nvarchar(10)
SeriusFatalUnbelted						nvarchar(10)
Latitude				TSCrashLatitude	Landed.Latitude	float
Longitude				TSCrashLongitude	Landed.Longitude	float
Shape				Shape	Shape	geometery
RoadDistance_FT						double
NearRoadDistance_FT						double

Table 2. Crashes Domain Matching

Field	Domain Code	IDOT Domain	MODOT Domain
Class	Angle	Angle	Right Angle
Class	Animal	Animal	Deer
Class	Animal	Animal	Dog
Class	Animal	Animal	Animal Not Deer/Dog/Farm Animal
Class	Animal	Animal	Animal Other Than Deer
Class	Animal	Animal	Farm Animal
Class	Animal	Animal	Animal Drawn Veh Or Ridden Animal
Class	Avoiding		Avoiding
Class	Backing	Rear to Side	Backing
Class	Backing	Rear to Front	Backing
Class	Backing	Rear to Rear	Backing
Class	Bicycle	Pedalcyclist	Pedalcycle
Class	Fixed Object	Fixed Object	Fixed Object
Class	Fixed Object	Fixed Object	Out Of Control
Class	Head On	Head On	Head On
Class	Head On	Front to Front	Cross Median

Class	Head On		Wrong Way On Divided Highway
Class	Jackknife		Jackknife
Class	Other	Other Object	Other
Class	Other	Other Non-Collision	Debris
Class	Other		Towed Unit Disconnects
Class	Overturned	Overturned	
Class	Parked/Parking	Parked Motor Vehicle	Parking Or Parked Car
Class	Pedestrian	Pedestrian	Pedestrian
Class	Rear End	Rear End	Rear End
Class	Rear End	Front to Rear	
Class	Sideswipe	Sideswipe Same Direction	Sideswipe
Class	Sideswipe	Sideswipe Opposite Direction	Passing
Class	Sideswipe		Changing Lane
Class	Train	Train	
Class	Turning	Turning	Left Turn Right Angle Collision
Class	Turning	Turning	Left Turn
Class	Turning	Turning	Right Turn Right Angle Collision
Class	Turning	Turning	Right Turn
Class	Turning		U - Turn
Class	Turning		Dual Lefts Collide
CrashSeverity	Fatal	Fatal Crash	Fatal
CrashSeverity	Minor Injury	Injury	Injury
CrashSeverity	Minor Injury	B Injury Crash	Injury
CrashSeverity	Minor Injury	C Injury Crash	Minor Injury
CrashSeverity	Property Damage Only	No Injuries	
CrashSeverity	Property Damage Only	Property Damage	Property Damage Only
CrashSeverity	Serious Injury	A Injury Crash	Disabling Injury
CrashSeverity	Serious Injury	A Injury Crash	Suspected Serious Injury
CrashSeverity	Unknown	NULL	NULL
CrashSeverity	Unknown		
DayOfWeek	Friday	5	FRI
DayOfWeek	Monday	1	MON
DayOfWeek	Saturday	6	SAT
DayOfWeek	Sunday	7	SUN
DayOfWeek	Thursday	4	THU
DayOfWeek	Tuesday	2	TUE
DayOfWeek	Wednesday	3	WED
LightCondition	Dark no Street Lights	Darkness	Dark W/ Street Lights Off
LightCondition	Dark with Street Lights	Darkness / Lighted Road	Dark W/ Street Lights On
LightCondition	Daylight	Dawn	Daylight
LightCondition	Daylight	Daylight	Daylight
LightCondition	Daylight	Dusk	Daylight
LightCondition	Unknown		Other
LightCondition	Unknown	Unknown	Not Stated/Unknown
LightCondition	Unknown		Dark - Unknown
MajorMinorType	LowVol	Local Road or Street (Non-Urban)	
MajorMinorType	LowVol	Local Road or Street (Urban)	
MajorMinorType	LowVol	Local Road or Street	
MajorMinorType	LowVol		LowVol
MajorMinorType	Major	Other Principal Arterial (PAS)	
MajorMinorType	Major	Interstate (PAS)	
MajorMinorType	Major	Freeway and Expressway (Urban Only) (PAS)	
MajorMinorType	Major	Freeway and Expressway (PAS)	
MajorMinorType	Major	InterState	
MajorMinorType	Major	Other Principal Arterial	
MajorMinorType	Major	Freeway and Expressway	
MajorMinorType	Major		Major
MajorMinorType	Major	Minor Arterial (Urban)	
MajorMinorType	Major	Minor Arterial (Non-Urban)	
MajorMinorType	Major	Minor Arterial	
MajorMinorType	Minor	Collector (Urban)	
MajorMinorType	Minor	Major Collector (Non-Urban)	
MajorMinorType	Minor	Major Collector	
MajorMinorType	Minor	Minor Collector (Non-Urban)	
MajorMinorType	Minor	Minor Collector	
MajorMinorType	Minor		Minor
MajorMinorType	NA	(UNK)	
MajorMinorType	NA		NA
RoadAlignment	Curve	Curve On Grade	
RoadAlignment	Curve	Curve On Hillcrest	
RoadAlignment	Curve	Curve	Curve
RoadAlignment	Curve	Curve	
RoadAlignment	Straight	Straight and Level	Straight

RoadAlignment	Straight	Straight On Grade	
RoadAlignment	Straight	Level	
RoadAlignment	Straight	Straight On Hillcrest	
RoadAlignment	Unknown	Unknown	Unknown
RoadAlignment	Unknown	(UNK)	
RoadSurfaceCondition	Dry	Dry	Dry
RoadSurfaceCondition	Ice/Snow/Slush	Ice	Ice
RoadSurfaceCondition	Ice/Snow/Slush	Snow or Slush	Snow
RoadSurfaceCondition	Ice/Snow/Slush		Slsh
RoadSurfaceCondition	Unknown	Other	
RoadSurfaceCondition	Sand/Mud/Gravel	Sand / Mud / Dirt	
RoadSurfaceCondition	Sand/Mud/Gravel		Mud
RoadSurfaceCondition	Sand/Mud/Gravel		Grvl
RoadSurfaceCondition	Unknown	Unknown	Unkn
RoadSurfaceCondition	Wet		Swtr
RoadSurfaceCondition	Wet		Mwtr
RoadSurfaceCondition	Wet	Wet	Wet
UrbanRuralClass	Rural	Unmarked Highway Rural	
UrbanRuralClass	Rural	County & Local Roads Rural	
UrbanRuralClass	Rural	State Numbered Rural	
UrbanRuralClass	Rural	Controlled Rural	
UrbanRuralClass	Rural	Rural Minor Arterial	
UrbanRuralClass	Rural	Rural InterState (PAS)	
UrbanRuralClass	Rural	Rural Minor Collector	
UrbanRuralClass	Rural	Rural Major Collector	
UrbanRuralClass	Rural	Rural Other Principal Arterial (PAS)	
UrbanRuralClass	Rural	Rural Local Road or Street	
UrbanRuralClass	Rural	Rural (UNK)	
UrbanRuralClass	Rural	Rural InterState	
UrbanRuralClass	Rural	Rural Other Principal Arterial	
UrbanRuralClass	Rural		Rural
UrbanRuralClass	Unknown	(UNK)	
UrbanRuralClass	Urban	City Streets Urban	
UrbanRuralClass	Urban	Controlled Urban	
UrbanRuralClass	Urban	State Numbered Urban	
UrbanRuralClass	Urban	Urban Local Road or Street	
UrbanRuralClass	Urban	Urban Minor Arterial	
UrbanRuralClass	Urban	Urban Other Principal Arterial (PAS)	
UrbanRuralClass	Urban	Urban InterState (PAS)	
UrbanRuralClass	Urban	Urban Major Collector	
UrbanRuralClass	Urban	Urban Freeway and Expressway (PAS)	
UrbanRuralClass	Urban	Urban (UNK)	
UrbanRuralClass	Urban	Urban Minor Collector	
UrbanRuralClass	Urban	Urban Other Principal Arterial	
UrbanRuralClass	Urban	Urban InterState	
UrbanRuralClass	Urban	Urban Freeway and Expressway	
UrbanRuralClass	Urban		Urbanized
UrbanRuralClass	Urban		Urban
WeatherCondition	Clear	Clear	Clear
WeatherCondition	Cloudy	Cloudy/Overcast	Cloudy
WeatherCondition	Crosswind	Severe Cross Wind	Crosswind
WeatherCondition	Fog/Smoke/Haze	Fog/Smoke/Haze	Fog/Mist
WeatherCondition	Freezing Rain	Freezing Rain	Freezing
WeatherCondition	Other	Blowing Sand	
WeatherCondition	Other	Other	Other
WeatherCondition	Rain	Rain	Rain
WeatherCondition	Sleet/Hail	Sleet/Hail	Sleet
WeatherCondition	Snow	Blowing Snow	
WeatherCondition	Snow	Snow	Snow
WeatherCondition	Unknown		Not Stated
WeatherCondition	Unknown	Unknown	Unknown
WorkZoneIncident	No	N	No
WorkZoneIncident	Yes	Y	Yes

Table 3. Persons Schema

FieldName	Has Domain	IDOT Domain Values	MODOT Domain Values	IDOT Field Source	MODOT Field Source	Type
OBJECTID						
ID				ICN	HP_ACC_IMAGE_NO	nvarchar(20)
IDOT_ID				ICN		nvarchar(20)
MODOT_ID					HP_ACC_IMAGE_NO	nvarchar(20)
CrashID				CrashID		nvarchar(20)
PersonType	Yes	See Table 4	See Table 4	PersonType	HP_PERSON_INVL_CD	nvarchar(50)
AgeAtCrash				AgeAtCrash	AgeAtCrash	smallint
ZipCode					ADDRESS_ZIP	nvarchar(10)
Gender	Yes	See Table 4	See Table 4	Gender	SEX	nvarchar(10)
PersonInjuryClass	Yes	See Table 4	See Table 4	PersonInjuryClass	PERSONAL_INJ_LEVEL	nvarchar(50)
PedestrianLocation	Yes	See Table 4	See Table 4	PedBikeLocation	PED_LOCATION	nvarchar(50)
SafetyEquipUsed	Yes	See Table 4	See Table 4	SafetyEquipUsed	SAFETY_DEVICE	nvarchar(50)
AirBagDeployed	Yes	See Table 4	See Table 4	AirBagDeployment	AIRBAG	nvarchar(50)

Table 4. Persons Domain Matching

Field	Domain Code	IDOT Domain	MODOT Domain	MODOT Descriptions
PersonType	Driver	Driver	01	DRIVER PRESENT
PersonType	Passenger	Passenger	02	PASSENGER
PersonType	Pedalcyclist	Pedalcyclist	04	PEDALCYCLIST
PersonType	Pedestrian	Pedestrian	03	PEDESTRIAN
PersonType	NCV	NCV		
PersonType	NMV	NMV		
PersonType	Vehicle Owner		05	VEHICLE OWNER
PersonType	Train Engineer		06	TRAIN ENGINEER
PersonType	Train Conductor		07	TRAIN CONDUCTOR
PersonType	Train Crew		08	TRAIN CREW
PersonType	Train Owner		09	TRAIN OWNER
PersonType	Property Owner		10	PROPERTY OWNER
PersonType	Witness		11	WITNESS
PersonType	Train Tracks Owner		12	TRAIN TRACKS OWNER
PersonType	No Driver		N	NO DRIVER
PersonType	Unknown Driver		U	UNKNOWN DRIVER
Gender	Male	M	M	
Gender	Female	F	F	
Gender	Unknown	U	U	
PedestrianLocation	In Roadway	In Roadway	3	ON ROADWAY
PedestrianLocation	In Crosswalk	In Crosswalk	7	ON MEDIAN / CROSSING ISLAND
PedestrianLocation	Unknown/NA	Unknown/NA	U	UNKNOWN
PedestrianLocation	Driveway Access	Driveway Access	5	IN DRIVEWAY ACCESS
PedestrianLocation	Not In Roadway	Not In Roadway	6	OFF ROADWAY
PedestrianLocation	On Roadside	On Roadside		
PedestrianLocation	Shoulder	Shoulder		
PedestrianLocation	Bikeway	Bikeway		
PedestrianLocation	Intersection		1	AT INTERSECTION
PedestrianLocation	Not at Intersection		2	NOT AT INTERSECTION
PedestrianLocation	On Sidewalk		4	ON SIDEWALK
SafetyEquipUsed	Seat Belts Used	Seat Belts Used		
SafetyEquipUsed	None Present	None Present	1	NONE
SafetyEquipUsed	Unknown/NA	Unknown/NA	9	USE UNKNOWN
SafetyEquipUsed	Unknown/NA		U	UNKNOWN
SafetyEquipUsed	Seat Belts Not Used	Seat Belts Not Used	2	NOT USED
SafetyEquipUsed	Child Restraint Used Improperly	Child Restraint Used Improperly		
SafetyEquipUsed	Child Restraint Used	Child Restraint Used	6	CHILD RESTRAINT
SafetyEquipUsed	Helmet Not Used	Helmet Not Used	8	NO HELMET
SafetyEquipUsed	Helmet Used	Helmet Used	13	OTHER HELMET
SafetyEquipUsed	Child Restraint Not Used	Child Restraint Not Used		
SafetyEquipUsed	Shoulder and Lap Belt Used	Shoulder and Lap Belt Used	5	SHOULDER AND LAP BELT
SafetyEquipUsed	Child Restraint -Forward	Child Restraint -Forward	11	CHILD RESTRAINT - FORWARD FACING
SafetyEquipUsed	Child Restraint - Rear	Child Restraint - Rear	12	CHILD RESTRAINT - REAR FACING
SafetyEquipUsed	None Used/Not Applicable	None Used/Not Applicable	N	NOT APPLICABLE
SafetyEquipUsed	Shoulder/Lap Belt	Shoulder/Lap Belt	3	SHOULDER BELT ONLY
SafetyEquipUsed	Shoulder/Lap Belt		4	LAP BELT ONLY
SafetyEquipUsed	Child Restraint - Unknown	Child Restraint - Unknown		
SafetyEquipUsed	Booster Seat	Booster Seat	10	BOOSTER SEAT
SafetyEquipUsed	Not DOT Compliant Helmet	Not DOT Compliant Helmet		
SafetyEquipUsed	Stretcher	Stretcher		
SafetyEquipUsed	DOT Compliant Helmet	DOT Compliant Helmet	7	DOT COMPLIANT MOTORCYCLE HELMET
SafetyEquipUsed	Bicycle Helmet	Bicycle Helmet		
SafetyEquipUsed	Wheelchair	Wheelchair		
SafetyEquipUsed	Reflective Clothing		14	REFLECTIVE CLOTHING

SafetyEquipUsed	Other		15	OTHER
PersonInjuryClass	Fatal	4	1	FATAL
PersonInjuryClass	Disabling Inury	3	2	DISABLING INJURY
PersonInjuryClass	Evident Injury (Not Disabling)	2	3	EVIDENT INJURY (NOT DISABLING)
PersonInjuryClass	Probably Injury (Not Apparent)	1	4	PROBABLY INJURY (NOT APPARENT)
PersonInjuryClass	None	0	5	NONE APPARENT
PersonInjuryClass	Unknown		6	UNKNOWN
PersonInjuryClass	Unknown		U	UNKNOWN
PersonInjuryClass	N/A		N	NA
AirBagDeployed	Did Not Deploy	Did Not Deploy	3	NOT DEPLOYED
AirBagDeployed	Deployed Front	Deployed / Front	5	DEPLOYED - FRONT
AirBagDeployed	Deployed Side	Deployed / Side	6	DEPLOYED - SIDE
AirBagDeployed	Deployed Combination	Deployed / Combination	9	DEPLOYED - COMBINATION
AirBagDeployed	Deployed Side		7	DEPLOYED - CURTAIN
AirBagDeployed	Deployed Other	Deployed Other (Knee / Air Belt / Etc.)	8	DEPLOYED - OTHER (KNEE, AIR BELT, ETC.)
AirBagDeployed	Deployment Unknown	Deployment Unknown	10	DEPLOYMENT UNKNOWN
AirBagDeployed	Deployment Unknown		U	AIR BAG PRESENCE UNKNOWN
AirBagDeployed	Not Applicable	Not Applicable	1	NONE / NA
AirBagDeployed	Not Applicable		4	REMOVED

Table 5. Vehicles Schema

FieldName	Has Domain	IDOT Domain Values	MODOT Domain Values	IDOT Field Source	MODOT Field Source	Type
OBJECTID						bigint
IDOT_ID				ICN		bigint
MODOT_ID					HP_ACC_IMAGE_NO	bigint
RelatedID				ICN	HP_ACC_IMAGE_NO	bigint
BodyType	Yes	See Table 6	See Table 6	VehType	VEHICLE_BODY_TYPE	nvarchar(50)

Table 6. Vehicles Domain Matching

Field	Domain Code	IDOT Domain	MODOT Domain	MODOT Descriptions
BodyType	Passenger	Passenger	01	PASSENGER CAR
BodyType	Station Wagon		02	STATION WAGON
BodyType	SUV	SUV	03	SPORT UTILITY VEHICLE
BodyType	Van	Van/Mini-Van	05	VAN (< 9 W / DRIVER)
BodyType	Small Bus	Bus Up to 15 Passengers	06	SMALL BUS (9-15 W / DRIVER)
BodyType	Small Bus	Bus 9 to 15 seats		
BodyType	Large Bus	Bus Over 15 Passengers	07	LARGE BUS (16+ W / DRIVER)
BodyType	Large Bus	Bus over 15 seats		
BodyType	Small School Bus		08	SCHOOL BUS (LESS THAN 16 WITH DRIVER)
BodyType	School Bus		09	SCHOOL BUS (16 OR MORE WITH DRIVER)
BodyType	Motorcycle	Motorcycle (Over 150cc)	10	MOTORCYCLE
BodyType	Motorcycle	Motorcycle		
BodyType	Motorcycle (3 Wheels)	Motorcycle-3 wheeled Motorcycle (2 rear wheels)		
BodyType	Motorcycle (3 Wheels)	Autocycle		
BodyType	ATV	ATV	11	ATV
BodyType	ATV	Recreational off-highway vehicle (ROV)		
BodyType	Motor Driven Cycle	Motor Driven Cycle	12	MOTORIZED BICYCLE
BodyType	Motor Driven Cycle	Moped or Motorized Bicycle		
BodyType	Pedalcycle		13	PEDALCYCLE
BodyType	Motor Home		14	MOTOR HOME
BodyType	Farm Implements	Farm Equipment	15	FARM IMPLEMENTS
BodyType	Heavy Machinery		16	CONSTRUCTION EQUIP. / HEAVY MACH.
BodyType	Other Vehicle	Other	17	OTHER VEHICLE
BodyType	Unknown	Unknown	18	UNKNOWN
BodyType	Pickup	Pickup	19	PICK UP
BodyType	Single Unit Truck		20	SINGLE UNIT TRUCK-2 AXLES, 6 TIRES
BodyType	Single Unit Truck	Truck Single Unit	21	SINGLE UNIT TRUCK-3 OR MORE AXLES
BodyType	Single Unit Truck With Trailer	Single Unit Truck with Trailer		
BodyType	Truck Tractor With No Units	Tractor Without Semi-Trailer	22	TRUCK TRACTOR WITH NO UNITS
BodyType	Truck Tractor With One Unit	Tractor With Semi-Trailer	23	TRUCK TRACTOR WITH ONE UNIT
BodyType	Truck Tractor With Two Units		24	TRUCK TRACTOR WITH TWO UNITS
BodyType	Truck Tractor With Three Units		25	TRUCK TRACTOR WITH THREE UNITS
BodyType	Other Heavy Truck		26	OTHER HEAVY TRUCK
BodyType	Van		27	CARGO VAN
BodyType	Limousine (6-15)		04	LIMOUSINE (6-15 FOR HIRE)
BodyType	Limousine (9-15)		28	LIMOUSINE (9-15 W / DRIVER)
BodyType	Limousine (7-8)		29	LIMOUSINE (7-8 W / DRIVER)
BodyType	Passenger Van		30	PASSENGER VAN (9+ W / DRIVER)
BodyType	Unknown		U	UNKNOWN
BodyType	Other Vehicle With Trailer	Other Vehicle With Trailer		
BodyType	Snowmobile	Snowmobile		

Table 7. Contributing Factors Schema

FieldName	Has Domain	IDOT Domain Values	MODOT Domain Values	IDOT Field Source	MODOT Field Source	Type
OBJECTID						bigint
ID				ID	ID	nvarchar(50)
IDOT_ID				ID		nvarchar(50)
MODOT_ID					ID	nvarchar(50)
Cause	Yes	See Table 8	See Table 8	ContributingFactor	ContributingFactor	nvarchar(50)

Table 8. Contributing Factors Domain Matching

Field	Domain Code	IDOT Domain	MODOT Domain
Cause	Advancing Legally On Red Light	Bicycle Advancing Legally On Red Light	
Cause	Advancing Legally On Red Light	Motorcycle Advancing Legally On Red Light	
Cause	Alcohol/Drugs	Under Influence of Alcohol/Drugs	DRUGS
Cause	Alcohol/Drugs		ALCOHOL
Cause	Alcohol/Drugs	Had Been Drinking	
Cause	Disregarding Signals/Signs	Disregarding Traffic Signals	VIOLATION SIGNAL / SIGN
Cause	Disregarding Signals/Signs	Disregarding Stop Sign	
Cause	Disregarding Signals/Signs	Disregarding Yield Sign	
Cause	Disregarding Signals/Signs	Disregarding Road Markings	
Cause	Disregarding Signals/Signs	Disregarding Other Traffic Signs	
Cause	Distraction	Cell Phone Use Other Than Texting	
Cause	Distraction	Texting	
Cause	Distraction	Distraction - From Inside Vehicle	
Cause	Distraction	Distraction - From Outside Vehicle	
Cause	Distraction	Distraction Other Electronic Device (Navigation Device / DVD Player / etc.)	
Cause	Distraction	Distraction – Other Electronic Device (Navigation Device / DVD Player / etc.)	
Cause	Distraction		DISTRACTED / INATTENTIVE
Cause	Driving On Wrong Side/Wrong Way	Driving On Wrong Side/Wrong Way	WRONG SIDE (NOT PASSING)
Cause	Driving On Wrong Side/Wrong Way	Driving On Wrong Side/Wrong Way	WRONG WAY (ONE-WAY)
Cause	Driving Skills/Knowledge/Experience	Driving Skills/Knowledge/Experience	
Cause	Evasive Action Due to Animal/Object	Animal	ANIMAL(S) IN ROADWAY
Cause	Evasive Action Due to Animal/Object	Evasive Action Due to Animal / Object / Non-Motorist	OBJECT / OBSTRUCTION IN ROADWAY
Cause	Exceeding Safe Speed For Conditions	Exceeding Safe Speed For Conditions	TOO FAST FOR CONDITIONS
Cause	Failed to Dim Lights		FAILED TO DIM LIGHTS
Cause	Failed to Use Lights		FAILED TO USE LIGHTS
Cause	Failing to Reduce Speed	Failing to Reduce Speed to Avoid Crash	
Cause	Failing to Yield Right of Way	Failing to Yield Right of Way	FAILED TO YIELD
Cause	Following Too Closely	Following Too Closely	FOLLOWING TOO CLOSE
Cause	Improper Backing	Improper Backing	IMPROPER BACKING
Cause	Improper Lane Usage	Improper Lane Usage	IMPROPER LANE USAGE / CHANGE
Cause	Improper Loading		FAILED TO SECURE LOAD / IMPROPER LOADING
Cause	Improper Parking		IMPROPERLY PARKED
Cause	Improper Passing	Improper Overtaking/Passing	IMPROPER PASSING
Cause	Improper Riding		IMPROPER RIDING / CLINGING TO VEHICLE EXTERIOR
Cause	Improper Start from Park		IMPROPER START FROM PARK
Cause	Improper Stop on Roadway		IMPROPERLY STOPPED ON ROADWAY
Cause	Improper Towing		IMPROPER TOWING / PUSHING
Cause	Improper Turning/No Signal	Improper Turning/No Signal	IMPROPER TURN
Cause	Improper Turning/No Signal		IMPROPER SIGNAL
Cause	Obstructed Crosswalks	Obstructed Crosswalks	
Cause	Other		OTHER
Cause	Overcorrected		OVERCORRECTED
Cause	Passing Stopped School Bus	Passing Stopped School Bus	
Cause	Physical Condition of Driver		DRIVER FATIGUE / ASLEEP
Cause	Physical Condition of Driver	Physical Condition of Driver	PHYSICAL IMPAIRMENT
Cause	Reckless Driving	Operating Vehicle In Reckless Manner	
Cause	Related to Bus Stop	Related to Bus Stop	
Cause	Road Construction/Maintenance	Road Construction/Maintenance	
Cause	Road Engineering/Surface/Marking Defects	Road Engineering/Surface/Marking Defects	
Cause	Speeding	Exceeding Authorized Speed Limit	SPEED EXCEEDED LIMIT
Cause	Turing Right On Red	Turning Right On Red	
Cause	Vehicle Condition	Equipment-Vehicle Condition	VEHICLE DEFECTS
Cause	Vision Obscured	Vision Obscured	VISION OBSTRUCTED
Cause	Weather	Weather	

Table 9. Roads Schema

FieldName	Has Domain	IDOT Domain Values	MODOT Domain Values	IDOT Field Source	MODOT Field Source	Type
OBJECTID						bigint
IDOT_OBJECTID				OBJECTID		bigint
MODOT_OBJECTID					OBJECTID	bigint
MODOT_ID					SS_PAVEMEN	bigint
ID				INVENTORY	TRAVELWAY_	nvarchchar(50)
Name				ROAD_NAME	TRAVELWA_1	nvarchchar(100)
Classification	Yes	See Table 10	See Table 10	FC_NAME	FUNC_CLASS	nvarchchar(50)
County				COUNTY_NAM	COUNTY_NAM	nvarchchar(50)
AADT				AADT	TOTAL_AADT	int
AADT_Year				AADT_YR	AADT_YEAR	datetime
Lanes				LNS	NUMBER_OF_	int
SpeedLimit	Yes	See Table 10	See Table 10	SP_LIM	TW_SPEED_L	int
SHAPE				SHAPE	SHAPE	geometry
GLOBALID						

Table 10. Roads Domain Matching

Field	Domain Code	IDOT Domain	MODOT Domain
Classification	Local	Local Road or Street	LOCAL
Classification	Major Collector	Major Collector	MAJOR COLLECTOR
Classification	Minor Collector	Minor Collector	MINOR COLLECTOR
Classification	Minor Arterial	Minor Arterial	MINOR ARTERIAL
Classification	Principal Arterial	Other Principal Arterial	PRINCIPAL ARTERIAL
Classification	Freeway	Freeway and Expressway	FREEWAY
Classification	Interstate	Interstate	INTERSTATE
Classification	Unknown		
SpeedLimit	NULL	0	0

Table 1. Intersections Data Dictionary

Field Name	Alias	Datatype	Description
OBJECTID	ObjectID	int	Unique Identifier
Street1	Street 1	nvarchar(254)	Cross street
Street2	Street 2	nvarchar(254)	Cross street
Street3	Street 3	nvarchar(254)	Cross street
Street4	Street 4	nvarchar(254)	Cross street
street5	street 5	nvarchar(254)	Cross street
street6	street 6	nvarchar(254)	Cross street
street7	street 7	nvarchar(254)	Cross street
street8	street 8	nvarchar(254)	Cross street
State	State	nvarchar(255)	State of intersection
County	County	nvarchar(255)	County of intersection
Municipality	Municipality	nvarchar(255)	Municipality of intersection
HIN1_All_FatalCrashes	HIN1 All Modes Fatal Crashes	int	Number of fatal crashes spatially associated with intersection
HIN1_All_SeriousInjuryCrsh	HIN1 All Modes Serious Injury Crashes	int	Number of serious injury crashes spatially associated with intersection
HIN1_All_TotalWtdCrashes	HIN1 All Modes Total Weighted Crashes	double	Total weighted crash score
HIN1_All_TotalWtdCrashesPct	HIN1 All Modes Total Weighted Crashes Pct	nvarchar(30)	Total weighted crash score percentile category
HIN1_Monroe_TotalWtdCrashesPct	HIN1 Monroe Total Weighted Crashes Pct	nvarchar(30)	Total weighted crash score percentile category in Monroe
HIN1_Madison_TotalWtdCrashesPct	HIN1 Madison Total Weighted Crashes Pct	nvarchar(30)	Total weighted crash score percentile category in Madison
HIN1_Jeff_TotalWtdCrashesPct	HIN1 Jefferson Total Weighted Crashes Pct	nvarchar(30)	Total weighted crash score percentile category in Jefferson
HIN1_Frnkln_TotalWtdCrashesPct	HIN1 Franklin Total Weighted Crashes Pct	nvarchar(30)	Total weighted crash score percentile category in Franklin
HIN1_StCharl_TotalWtdCrashesPct	HIN1 St. Charles Total Weighted Crashes Pct	nvarchar(30)	Total weighted crash score percentile category in St. Charles
HIN1_StClair_TotalWtdCrashesPct	HIN1 St. Clair Total Weighted Crashes Pct	nvarchar(30)	Total weighted crash score percentile category in St. Clair
HIN1_StLouis_TotalWtdCrashesPct	HIN1 St. Louis County Total Weighted Crashes Pct	nvarchar(30)	Total weighted crash score percentile category in St. Louis
HIN1_STLCity_TotalWtdCrashesPct	HIN1 STL City Total Weighted Crashes Pct	nvarchar(30)	Total weighted crash score percentile category in St. Louis City
HIN2_Peds_TotalWtdCrashes	HIN2 Pedestrians Total Weighted Crashes	double	Total weighted crash score involving Pedestrians
HIN2_Peds_TotalWtdCrashesPct	HIN2 Pedestrians Total Weighted Crashes Pct	nvarchar(30)	Total weighted crash score percentile category involving Pedestrians
HIN2_Pedcycl_TotalWtdCrashes	HIN2 Pedalcyclists Total Weighted Crashes	double	Total weighted crash score involving Pedalcyclists
HIN2_Pedcycl_TotalWtdCrashesPct	HIN2 Pedalcyclists Total Weighted Crashes Pct	nvarchar(30)	Total weighted crash score percentile category involving Pedalcyclists
HIN3_Equity_TotalWtdCrashes	HIN3 Equity Total Weighted Crashes	double	Total weighted crash score in a disadvantaged area
HIN3_Equity_TotalWtdCrashesPct	HIN3 Equity Total Weighted Crashes Pct	nvarchar(30)	Total weighted crash score percentile category in a disadvantaged area
HIN3_Equity_CensusTract	HIN3 Equity Census Tract	nvarchar(30)	Census tract the crash is located in, if any
HIN3_CEJST	HIN3 CEJST Areas	nvarchar(50)	CEJST Disadvantaged area the crash is located in, if any
HIN4_Contrib1_TotalWtdCrashes	HIN4 Contributing Factor 1 - Speeding - Total Weighted Crashes	double	Total weighted crash score involving Contributing Factor 1
HIN4_Ctrb1_TotalWtdCrashesPct	HIN4 Contributing Factor 1 - Speeding - Total Weighted Crashes Pct	nvarchar(30)	Total weighted crash score percentile category involving Contributing Factor 1
HIN4_Contrib2_TotalWtdCrashes	HIN4 Contributing Factor 2 - Failing to Yield Right of Way - Total Weighted Crashes	double	Total weighted crash score involving Contributing Factor 2
HIN4_Ctrb2_TotalWtdCrashesPct	HIN4 Contributing Factor 2 - Failing to Yield Right of Way - Total Weighted Crashes Pct	nvarchar(30)	Total weighted crash score percentile category involving Contributing Factor 2
HIN4_Contrib3_TotalWtdCrashes	HIN4 Contributing Factor 3 - Improper Lane Usage - Total Weighted Crashes	double	Total weighted crash score involving Contributing Factor 3
HIN4_Ctrb3_TotalWtdCrashesPct	HIN4 Contributing Factor 3 - Improper Lane Usage - Total Weighted Crashes Pct	nvarchar(30)	Total weighted crash score percentile category involving Contributing Factor 3
HIN4_Contrib4_TotalWtdCrashes	HIN4 Contributing Factor 4 - Alcohol/Drugs - Total Weighted Crashes	double	Total weighted crash score involving Contributing Factor 4
HIN4_Ctrb4_TotalWtdCrashesPct	HIN4 Contributing Factor 4 - Alcohol/Drugs - Total Weighted Crashes Pct	nvarchar(30)	Total weighted crash score percentile category involving Contributing Factor 4
HIN4_Contrib5_TotalWtdCrashes	HIN4 Contributing Factor 5 - Distraction - Total Weighted Crashes	double	Total weighted crash score involving Contributing Factor 5
HIN4_Ctrb5_TotalWtdCrashesPct	HIN4 Contributing Factor 5 - Distraction - Total Weighted Crashes Pct	nvarchar(30)	Total weighted crash score percentile category involving Contributing Factor 5
Latitude	Latitude	double	Latitude of intersection
Longitude	Longitude	double	Longitude of intersection

Table 2. Corridors Data Dictionary

Field Name	Alias	Datatype	Description
OBJECTID	OBJECTID	int	Unique Identifier
ID	ID	nvarchar(50)	First road segment ID
CorridorID	Corridor ID	nvarchar(50)	ID of corridor
Name	Name	nvarchar(100)	Name of corridor
Lanes	Lanes	int	Number of lanes
Classification	Classification	nvarchar(255)	DOT Classification of road
Funct_Classification	Functional Classification	nvarchar(255)	Processed Functional Classification used for HIN Crash Analysis
AADT	AADT	int	Average Annual Daily Traffic
AADT_YEAR	AADT Year	int	Year AADT was measured
State	State	nvarchar(255)	State of Road segment
County	County	nvarchar(50)	County of Road segment
Municipality	Municipality	nvarchar(255)	Municipality of Road segment
HIN1_All_CrridrCrshPrYrPrMi	HIN1 All Modes Corridor Weighted Crash / Yr / Mile	double	Total number of Corridor crashes per year per mile
HIN1_All_CrdrCrshPrYrPrMiPct	HIN1 All Modes Corridor Weighted Crash / Yr / Mile Pct	nvarchar(30)	Total weighted crash score percentile category
HIN1_Mnre_CrdrCrshPrYrPrMiPct	HIN1 Monroe Corridor Weighted Crash / Yr / Mile Pct	nvarchar(30)	Total number of Corridor crashes per year per mile percentile category in Monroe
HIN1_Madsn_CrdrCrshPrYrPrMiPct	HIN1 Madison Corridor Weighted Crash / Yr / Mile Pct	nvarchar(30)	Total number of Corridor crashes per year per mile percentile category in Madison
HIN1_Jeff_CrdrCrshPrYrPrMiPct	HIN1 Jefferson Corridor Weighted Crash / Yr / Mile Pct	nvarchar(30)	Total number of Corridor crashes per year per mile percentile category in Jefferson
HIN1_Frnkln_CrdrCrshPrYrPrMiPct	HIN1 Franklin Corridor Weighted Crash / Yr / Mile Pct	nvarchar(30)	Total number of Corridor crashes per year per mile percentile category in Franklin
HIN1_StChrl_CrdrCrshPrYrPrMiPct	HIN1 St. Charles Corridor Weighted Crash / Yr / Mile Pct	nvarchar(30)	Total number of Corridor crashes per year per mile percentile category in St. Charles
HIN1_StClar_CrdrCrshPrYrPrMiPct	HIN1 St. Clair Corridor Weighted Crash / Yr / Mile Pct	nvarchar(30)	Total number of Corridor crashes per year per mile percentile category in St. Clair
HIN1_STLCo_CrdrCrshPrYrPrMiPct	HIN1 St. Louis County Corridor Weighted Crash / Yr / Mile Pct	nvarchar(30)	Total number of Corridor crashes per year per mile percentile category in STL County
HIN1_STLCty_CrdrCrshPrYrPrMiPct	HIN1 STL City Corridor Weighted Crash / Yr / Mile Pct	nvarchar(30)	Total number of Corridor crashes per year per mile percentile category in STL City
HIN2_Peds_CridrCrshPrYrPrMi	HIN2 Pedestrians Corridor Weighted Crashes / Yr / Mile	double	Total number of Corridor crashes per year per mile involving Pedestrians
HIN2_Peds_CridrCrshPrYrPrMiPct	HIN2 Pedestrians Corridor Weighted Crashes / Yr / Mile Pct	nvarchar(30)	Total number of Corridor crashes per year per mile percentile category involving Pedestrians
HIN2_Pedcycl_CridrCrshPrYrPrMi	HIN2 Pedalcyclists Corridor Weighted Crashes / Yr / Mile	double	Total number of Corridor crashes per year per mile involving Pedalcyclists
HIN2_Pedcyc_CrdrCrshPrYrPrMiPct	HIN2 Pedalcyclists Corridor Weighted Crashes / Yr / Mile Pct	nvarchar(30)	Total number of Corridor crashes per year per mile percentile category involving Pedalcyclists
HIN3_Equity_CridrCrshPrYrPrMi	HIN3 Equity Corridor Weighted Crashes / Yr / Mile	double	Total number of Corridor crashes per year per mile in a disadvantaged area
HIN3_Equity_CrdrCrshPrYrPrMiPct	HIN3 Equity Corridor Weighted Crashes / Yr / Mile Pct	nvarchar(30)	Total number of Corridor crashes per year per mile percentile category in a disadvantaged area
HIN4_Contrib1_CridrCrshPrYrPrMi	HIN4 Contributing Factor 1 - Speeding - Corridor Weighted Crash / Yr Mile	double	Total number of Corridor crashes per year per mile involving Contributing Factor 1
HIN4_Ctrb1_CridrCrshPrYrPrMiPct	HIN4 Contributing Factor 1 - Speeding - Corridor Weighted Crash / Yr Mile Pct	nvarchar(30)	Total number of Corridor crashes per year per mile percentile category involving Contributing Factor 1
HIN4_Contrib2_CridrCrshPrYrPrMi	HIN4 Contributing Factor 2 - Failing to Yield Right of Way - Corridor Weighted Crash / Yr Mile	double	Total number of Corridor crashes per year per mile involving Contributing Factor 2
HIN4_Ctrb2_CridrCrshPrYrPrMiPct	HIN4 Contributing Factor 2 - Failing to Yield Right of Way - Corridor Weighted Crash / Yr Mile Pct	nvarchar(30)	Total number of Corridor crashes per year per mile percentile category involving Contributing Factor 2
HIN4_Contrib3_CridrCrshPrYrPrMi	HIN4 Contributing Factor 3 - Improper Lane Usage - Corridor Weighted Crash / Yr Mile	double	Total number of Corridor crashes per year per mile involving Contributing Factor 3
HIN4_Ctrb3_CridrCrshPrYrPrMiPct	HIN4 Contributing Factor 3 - Improper Lane Usage - Corridor Weighted Crash / Yr Mile Pct	nvarchar(30)	Total number of Corridor crashes per year per mile percentile category involving Contributing Factor 3
HIN4_Contrib4_CridrCrshPrYrPrMi	HIN4 Contributing Factor 4 - Alcohol/Drugs - Corridor Weighted Crash / Yr Mile	double	Total number of Corridor crashes per year per mile involving Contributing Factor 4
HIN4_Ctrb4_CridrCrshPrYrPrMiPct	HIN4 Contributing Factor 4 - Alcohol/Drugs - Corridor Weighted Crash / Yr Mile Pct	nvarchar(30)	Total number of Corridor crashes per year per mile percentile category involving Contributing Factor 4
HIN4_Contrib5_CridrCrshPrYrPrMi	HIN4 Contributing Factor 5 - Distraction - Corridor Weighted Crash / Yr Mile	double	Total number of Corridor crashes per year per mile involving Contributing Factor 5
HIN4_Ctrb5_CridrCrshPrYrPrMiPct	HIN4 Contributing Factor 5 - Distraction - Corridor Weighted Crash / Yr Mile Pct	nvarchar(30)	Total number of Corridor crashes per year per mile percentile category involving Contributing Factor 5
HIN5_Inter_CridrCrshPrYrPrMi	HIN5 All Modes Interstates Weighted Crash / Yr / Mile	double	Total number of interstate Corridor crashes per year per mile
HIN5_Inter_CridrCrshPrYrPrVMT	HIN5 All Modes Interstates Weighted Crash / Yr / Mile Vehicle Miles Traveled	double	Total number of interstate Corridor crashes per year per Vehicle Mile Traveled
HIN5_Inter_CrdrCrshPrYrPrMiPct	HIN5 All Modes Interstates Weighted Crash / Yr / Mile Pct	nvarchar(30)	Total number of interstate Corridor crashes per year per mile percentile category

Table 3. Segments Data Dictionary

Field Name	Alias	Datatype	Description
OBJECTID	NULL	int	Unique Identifier
ID	ID	nvarchar(50)	ID of road segment
CorridorID	Corridor ID	nvarchar(50)	Corridor road segment ID road segment is associated with
Name	Name	nvarchar(100)	Name of road
Lanes	Lanes	int	Number of lanes
Classification	Classification	nvarchar(255)	DOT Classification of road
Funct_Classification	Functional Classification	nvarchar(255)	Processed Functional Classification used for HIN Crash Analysis
AADT	AADT	int	Average Annual Daily Traffic
AADT_YEAR	AADT Year	int	Year AADT was measured
State	State	nvarchar(255)	State of Road segment
County	County	nvarchar(50)	County of Road segment
Municipality	Municipality	nvarchar(255)	Municipality of Road segment
HIN1_All_AlongFatalCrash	HIN1 All Modes Along Fatal Crashes	int	Number of fatal crashes along road segment
HIN1_All_AlongSrsInjCrash	HIN1 All Modes Along Serious Injury Crashes	int	Number of serious injury crashes along road segment
HIN1_All_AlongCrashes	HIN1 All Modes Along Crashes	int	Total number of Along crashes
HIN1_All_NearCrashes	HIN1 All Modes Near Crashes	int	Total number of Near crashes
HIN1_All_TotalWtdCrashes	HIN1 All Modes Total Weighted Crashes	double	Total weighted crash score
HIN1_All_CrridrCrshPrYrPrMi	HIN1 All Modes Corridor Weighted Crash / Yr / Mile	double	Total number of Corridor crashes per year per mile
HIN1_All_TotalWtdCrashPrVMT	HIN1 All Modes Total Weighted Crashes / VMT	double	Total number of Corridor crashes per year per Vehicle Mile Traveled
HIN1_All_TotalWtdCrashesPct	HIN1 All Modes Total Weighted Crashes Pct	nvarchar(30)	Total weighted crash score percentile category
HIN1_All_CrdrCrshPrYrPrMiPct	HIN1 All Modes Corridor Weighted Crash / Yr / Mile Pct	nvarchar(30)	Total number of Corridor crashes per year per mile percentile category
HIN1_Mnre_TotalWtdCrashesPct	HIN1 Monroe Total Weighted Crashes Pct	nvarchar(30)	Total weighted crash score percentile category in Monroe
HIN1_Mnre_CrdrCrshPrYrPrMiPct	HIN1 Monroe Corridor Weighted Crash / Yr / Mile Pct	nvarchar(30)	Total number of Corridor crashes per year per mile percentile category in Monroe
HIN1_Madsn_TotalWtdCrashesPct	HIN1 Madison Total Weighted Crashes Pct	nvarchar(30)	Total weighted crash score percentile category in Madison
HIN1_Madsn_CrdrCrshPrYrPrMiPct	HIN1 Madison Corridor Weighted Crash / Yr / Mile Pct	nvarchar(30)	Total number of Corridor crashes per year per mile percentile category in Madison
HIN1_Jeff_TotalWtdCrashesPct	HIN1 Jefferson Total Weighted Crashes Pct	nvarchar(30)	Total weighted crash score percentile category in Jefferson
HIN1_Jeff_CrdrCrshPrYrPrMiPct	HIN1 Jefferson Corridor Weighted Crash / Yr / Mile Pct	nvarchar(30)	Total number of Corridor crashes per year per mile percentile category in Jefferson
HIN1_Frnkln_TotalWtdCrashesPct	HIN1 Franklin Total Weighted Crashes Pct	nvarchar(30)	Total weighted crash score percentile category in Franklin
HIN1_Frnkln_CrdrCrshPrYrPrMiPct	HIN1 Franklin Corridor Weighted Crash / Yr / Mile Pct	nvarchar(30)	Total number of Corridor crashes per year per mile percentile category in Franklin
HIN1_StChrl_TotalWtdCrashesPct	HIN1 St. Charles Total Weighted Crashes Pct	nvarchar(30)	Total weighted crash score percentile category in St. Charles
HIN1_StChrl_CrdrCrshPrYrPrMiPct	HIN1 St. Charles Corridor Weighted Crash / Yr / Mile Pct	nvarchar(30)	Total number of Corridor crashes per year per mile percentile category in St. Charles
HIN1_StClar_TotalWtdCrashesPct	HIN1 St. Clair Total Weighted Crashes Pct	nvarchar(30)	Total weighted crash score percentile category in St. Clair
HIN1_StClar_CrdrCrshPrYrPrMiPct	HIN1 St. Clair Corridor Weighted Crash / Yr / Mile Pct	nvarchar(30)	Total number of Corridor crashes per year per mile percentile category in St. Clair
HIN1_STLCo_TotalWtdCrashesPct	HIN1 St. Louis County Total Weighted Crashes Pct	nvarchar(30)	Total weighted crash score percentile category in St. Louis County
HIN1_STLCo_CrdrCrshPrYrPrMiPct	HIN1 St. Louis County Corridor Weighted Crash / Yr / Mile Pct	nvarchar(30)	Total number of Corridor crashes per year per mile percentile category in St. Louis County
HIN1_STLCty_TotalWtdCrashesPct	HIN1 STL City Total Weighted Crashes Pct	nvarchar(30)	Total weighted crash score percentile category in St. Louis City
HIN1_STLCty_CrdrCrshPrYrPrMiPct	HIN1 STL City Corridor Weighted Crash / Yr / Mile Pct	nvarchar(30)	Total number of Corridor crashes per year per mile percentile category in St. Louis City
HIN2_Peds_AlongCrashes	HIN2 Pedestrians Along Crashes	int	Total number of Along crashes involving Pedestrians
HIN2_Peds_NearCrashes	HIN2 Pedestrians Near Crashes	int	Total number of Near crashes involving Pedestrians
HIN2_Peds_TotalWtdCrashes	HIN2 Pedestrians Total Weighted Crashes	double	Total weighted crash score involving Pedestrians
HIN2_Peds_CridrCrshPrYrPrMi	HIN2 Pedestrians Corridor Weighted Crashes / Yr / Mile	double	Total number of Corridor crashes per year per mile involving Pedestrians
HIN2_Peds_TotalWtdCrashesPct	HIN2 Pedestrians Total Weighted Crashes Pct	nvarchar(30)	Total weighted crash score percentile category involving Pedestrians
HIN2_Peds_CridrCrshPrYrPrMiPct	HIN2 Pedestrians Corridor Weighted Crashes / Yr / Mile Pct	nvarchar(30)	Total number of Corridor crashes per year per mile percentile category involving Pedestrians
HIN2_Pedcycl_AlongCrashes	HIN2 Pedalcyclists Along Crashes	int	Total number of Along crashes involving Pedalcyclists
HIN2_Pedcycl_NearCrashes	HIN2 Pedalcyclists Near Crashes	int	Total number of Near crashes involving Pedalcyclists
HIN2_Pedcycl_TotalWtdCrashes	HIN2 Pedalcyclists Total Weighted Crashes	double	Total weighted crash score involving Pedalcyclists
HIN2_Pedcycl_CridrCrshPrYrPrMi	HIN2 Pedalcyclists Corridor Weighted Crashes / Yr / Mile	double	Total number of Corridor crashes per year per mile involving Pedalcyclists
HIN2_Pedcycl_TotalWtdCrashesPct	HIN2 Pedalcyclists Total Weighted Crashes Pct	nvarchar(30)	Total weighted crash score percentile category involving Pedalcyclists
HIN2_Pedcyc_CrdrCrshPrYrPrMiPct	HIN2 Pedalcyclists Corridor Weighted Crashes / Yr / Mile Pct	nvarchar(30)	Total number of Corridor crashes per year per mile percentile category involving Pedalcyclists
HIN3_Equity_AlngCrsh	HIN3 Equity Along Crashes	int	Total number of Along crashes in a disadvantaged area
HIN3_Equity_NearCrashes	HIN3 Equity Near Crashes	int	Total number of Near crashes in a disadvantaged area
HIN3_Equity_TotalWtdCrashes	HIN3 Equity Total Weighted Crashes	double	Total weighted crash score in a disadvantaged area
HIN3_Equity_CridrCrshPrYrPrMi	HIN3 Equity Corridor Weighted Crashes / Yr / Mile	double	Total number of Corridor crashes per year per mile in a disadvantaged area

HIN3_Equity_TotalWtdCrshsPct	HIN3 Equity Total Weighted Crashes Pct	nvarchar(30)	Total weighted crash score percentile category in a disadvantaged area
HIN3_Equity_CrdrCrshPrYrPrMiPct	HIN3 Equity Corridor Weighted Crashes / Yr / Mile Pct	nvarchar(30)	Total number of Corridor crashes per year per mile percentile category in a disadvantaged area
HIN3_Equity_CensusTract	HIN3 Equity Census Tract	nvarchar(30)	Census tract the crash is located in, if any
HIN3_CEJST	HIN3 CEJST Areas	nvarchar(50)	CEJST Disadvantaged area the crash is located in, if any
HIN4_Contrib1_AlongCrashes	HIN4 Contributing Factor 1 - Speeding - Along Crashes	int	Total number of Along crashes involving Contributing Factor 1
HIN4_Contrib1_NearCrashes	HIN4 Contributing Factor 1 - Speeding - Near Crashes	int	Total number of Near crashes involving Contributing Factor 1
HIN4_Contrib1_TotalWtdCrashes	HIN4 Contributing Factor 1 - Speeding - Total Weighted Crashes	double	Total weighted crash score involving Contributing Factor 1
HIN4_Contrib1_CridrCrshPrYrPrMi	HIN4 Contributing Factor 1 - Speeding - Corridor Weighted Crash / Yr Mile	double	Total number of Corridor crashes per year per mile involving Contributing Factor 1
HIN4_Ctrb1_TotalWtdCrashesPct	HIN4 Contributing Factor 1 - Speeding - Total Weighted Crashes Pct	nvarchar(30)	Total weighted crash score percentile category involving Contributing Factor 1
HIN4_Ctrb1_CridrCrshPrYrPrMiPct	HIN4 Contributing Factor 1 - Speeding - Corridor Weighted Crash / Yr Mile Pct	nvarchar(30)	Total number of Corridor crashes per year per mile percentile category involving Contributing Factor 1
HIN4_Contrib2_AlongCrashes	HIN4 Contributing Factor 2 - Failing to Yield Right of Way - Along Crashes	int	Total number of Along crashes involving Contributing Factor 2
HIN4_Contrib2_NearCrashes	HIN4 Contributing Factor 2 - Failing to Yield Right of Way - Near Crashes	int	Total number of Near crashes involving Contributing Factor 2
HIN4_Contrib2_TotalWtdCrashes	HIN4 Contributing Factor 2 - Failing to Yield Right of Way - Total Weighted Crashes	double	Total weighted crash score involving Contributing Factor 2
HIN4_Contrib2_CridrCrshPrYrPrMi	HIN4 Contributing Factor 2 - Failing to Yield Right of Way - Corridor Weighted Crash / Yr Mile	double	Total number of Corridor crashes per year per mile involving Contributing Factor 2
HIN4_Ctrb2_TotalWtdCrashesPct	HIN4 Contributing Factor 2 - Failing to Yield Right of Way - Total Weighted Crashes Pct	nvarchar(30)	Total weighted crash score percentile category involving Contributing Factor 2
HIN4_Ctrb2_CridrCrshPrYrPrMiPct	HIN4 Contributing Factor 2 - Failing to Yield Right of Way - Corridor Weighted Crash / Yr Mile Pct	nvarchar(30)	Total number of Corridor crashes per year per mile percentile category involving Contributing Factor 2
HIN4_Contrib3_AlongCrashes	HIN4 Contributing Factor 3 - Improper Lane Usage - Along Crashes	int	Total number of Along crashes involving Contributing Factor 3
HIN4_Contrib3_NearCrashes	HIN4 Contributing Factor 3 - Improper Lane Usage - Near Crashes	int	Total number of Near crashes involving Contributing Factor 3
HIN4_Contrib3_TotalWtdCrashes	HIN4 Contributing Factor 3 - Improper Lane Usage - Total Weighted Crashes	double	Total weighted crash score involving Contributing Factor 3
HIN4_Contrib3_CridrCrshPrYrPrMi	HIN4 Contributing Factor 3 - Improper Lane Usage - Corridor Weighted Crash / Yr Mile	double	Total number of Corridor crashes per year per mile involving Contributing Factor 3
HIN4_Ctrb3_TotalWtdCrashesPct	HIN4 Contributing Factor 3 - Improper Lane Usage - Total Weighted Crashes Pct	nvarchar(30)	Total weighted crash score percentile category involving Contributing Factor 3
HIN4_Ctrb3_CridrCrshPrYrPrMiPct	HIN4 Contributing Factor 3 - Improper Lane Usage - Corridor Weighted Crash / Yr Mile Pct	nvarchar(30)	Total number of Corridor crashes per year per mile percentile category involving Contributing Factor 3
HIN4_Contrib4_AlongCrashes	HIN4 Contributing Factor 4 - Alcohol/Drugs - Along Crashes	int	Total number of Along crashes involving Contributing Factor 4
HIN4_Contrib4_NearCrashes	HIN4 Contributing Factor 4 - Alcohol/Drugs - Near Crashes	int	Total number of Near crashes involving Contributing Factor 4
HIN4_Contrib4_TotalWtdCrashes	HIN4 Contributing Factor 4 - Alcohol/Drugs - Total Weighted Crashes	double	Total weighted crash score involving Contributing Factor 4
HIN4_Contrib4_CridrCrshPrYrPrMi	HIN4 Contributing Factor 4 - Alcohol/Drugs - Corridor Weighted Crash / Yr Mile	double	Total number of Corridor crashes per year per mile involving Contributing Factor 4
HIN4_Ctrb4_TotalWtdCrashesPct	HIN4 Contributing Factor 4 - Alcohol/Drugs - Total Weighted Crashes Pct	nvarchar(30)	Total weighted crash score percentile category involving Contributing Factor 4
HIN4_Ctrb4_CridrCrshPrYrPrMiPct	HIN4 Contributing Factor 4 - Alcohol/Drugs - Corridor Weighted Crash / Yr Mile Pct	nvarchar(30)	Total number of Corridor crashes per year per mile percentile category involving Contributing Factor 4
HIN4_Contrib5_AlongCrashes	HIN4 Contributing Factor 5 - Distraction - Along Crashes	int	Total number of Along crashes involving Contributing Factor 5
HIN4_Contrib5_NearCrashes	HIN4 Contributing Factor 5 - Distraction - Near Crashes	int	Total number of Near crashes involving Contributing Factor 5
HIN4_Contrib5_TotalWtdCrashes	HIN4 Contributing Factor 5 - Distraction - Total Weighted Crashes	double	Total weighted crash score involving Contributing Factor 5
HIN4_Contrib5_CridrCrshPrYrPrMi	HIN4 Contributing Factor 5 - Distraction - Corridor Weighted Crash / Yr Mile	double	Total number of Corridor crashes per year per mile involving Contributing Factor 5
HIN4_Ctrb5_TotalWtdCrashesPct	HIN4 Contributing Factor 5 - Distraction - Total Weighted Crashes Pct	nvarchar(30)	Total weighted crash score percentile category involving Contributing Factor 5
HIN4_Ctrb5_CridrCrshPrYrPrMiPct	HIN4 Contributing Factor 5 - Distraction - Corridor Weighted Crash / Yr Mile Pct	nvarchar(30)	Total number of Corridor crashes per year per mile percentile category involving Contributing Factor 5
HIN5_Inter_AlongCrashes	HIN5 Interstates Along Crashes	int	Total number of interstate Along crashes
HIN5_Inter_NearCrashes	HIN5 Interstates Near Crashes	int	Total number of interstate Near crashes
HIN5_Inter_TotalWtdCrashes	HIN5 Interstates Total Weighted Crashes	double	Total weighted interstate crash score
HIN5_Inter_CridrCrshPrYrPrMi	HIN5 Interstates Corridor Weighted Crash / Yr / Mile	double	Total number of interstate Corridor crashes per year per mile
HIN5_Inter_CridrCrshPrYrPrVMT	HIN5 Interstates Corridor Weighted Crash / Yr / VMT	double	Total number of interstate Corridor crashes per year per Vehicle Mile Traveled
HIN5_Inter_TotalWtdCrashesPct	HIN5 Interstates Total Weighted Crashes Pct	nvarchar(30)	Total weighted interstate crash score percentile category
HIN5_Inter_CrdrCrshPrYrPrMiPct	HIN5 Interstates Corridor Weighted Crash / Yr / Mile Pct	nvarchar(30)	Total number of interstate Corridor crashes per year per mile percentile category

Table 4. Census Tracts Data Dictionary

Field Name	Alias	Datatype	Description
OBJECTID	OBJECTID	int	Unique Identifier
STATEFP	STATEFP	nvarchar(2)	State Numeric Identifier
COUNTYFP	COUNTYFP	nvarchar(3)	Count Numeric Identifier
TRACTCE	TRACTCE	nvarchar(6)	Tract Numeric Identifier
GEOID	GEOID	nvarchar(11)	Global ID
NAME	NAME	nvarchar(7)	Census Numeric Identifier with decimal
NAMELSAD	NAMELSAD	nvarchar(20)	Census Text bases Identifier
GEOID_Data	GEOID_Data	nvarchar(255)	Geoid Numeric Identifier
Female to Male Ratio	Female to Male Ratio	double	Female to Male ratio
Under_5_Years	Under_5_Years	double	Population under 5 years
Between_5_to_9	Between_5_to_9	double	Population between 5 and 9 years
Between_10_to_14	Between_10_to_14	double	Population between 10 and 14 years
Between_15_to_19	Between_15_to_19	double	Population between 15 and 19 years
Between_20_to_24	Between_20_to_24	double	Population between 20 and 24 years
Between_25_to_29	Between_25_to_29	double	Population between 25 and 29 years
Between_30_to_34	Between_30_to_34	double	Population between 30 and 34 years
Between_35_to_39	Between_35_to_39	double	Population between 35 and 39 years
Between_40_to_44	Between_40_to_44	double	Population between 40 and 44 years
Between_45_to_49	Between_45_to_49	double	Population between 45 and 49 years
Between_50_to_54	Between_50_to_54	double	Population between 50 and 54 years
Between_55_to_59	Between_55_to_59	double	Population between 55 and 59 years
Between_60_to_64	Between_60_to_64	double	Population between 60 and 64 years
Between_65_to_69	Between_65_to_69	double	Population between 65 and 69 years
Between_70_to_74	Between_70_to_74	double	Population between 70 and 74 years
Between_75_to_79	Between_75_to_79	double	Population between 75 and 79 years
Between_80_to_84	Between_80_to_84	double	Population between 80 and 84 years
Over_85	Over_85	double	Population over 85 years
Ethnicity_PCT	Ethnicity_PCT	double	Ethnicity Percentage
Minority_PCT	Minority_PCT	double	Minority Percentage
Total_Minority_Pop	Total_Minority_Pop	double	Total Minority Population
Disability_PCT	Disability_PCT	double	Disabaled Population Percentage
Total_Disabled_Pop	Total_Disabled_Pop	double	Total Disabled Population
Limited_English_PCT	Limited_English_PCT	double	Limitied English Speaking Percentage
Ttl_Limited_English_Pop	Ttl_Limited_English_Pop	double	Total Limitied English Speaking Population
No_Car_Household_PCT	No_Car_Household_PCT	double	Percentage of Households with no car
Pop_200_percent_pvrty_level	Pop_200_percent_pvrty_level	int	Population under 200 percent poverty level
Pop_200_percent_pvrty_lvl_PCT	Pop_200_percent_pvrty_lvl_PCT	double	Population percentage under 200 percent poverty level
Total_Pop	Total_Pop	double	Total Population
CJEST	CJEST	nvarchar(255)	If census tract meets CJEST criteria
Under_9_Years	Under_9_Years	double	Population under 9 years
Between_10_to_19	Between_10_to_19	double	Population between 10 and 19 years
Between_20_to_29	Between_20_to_29	double	Population between 20 and 29 years
Between_30_to_39	Between_30_to_39	double	Population between 30 and 39 years
Between_40_49	Between_40_49	double	Population between 40 and 49 years
Between_50_to_65	Between_50_to_65	double	Population between 50 and 65 years
Greater_than_65	Greater_than_65	double	Population greater than 65

Table 5. Crashes Data Dictionary

Field Name	Alias	Datatype	Description
OBJECTID	OBJECTID	int	Unique Identifier
IDOT_ID	IDOT ID	nvarchar(20)	IDOT Unique Crash Identifier
MODOT_ID	MODOT ID	nvarchar(20)	MODOT Unique Crash Identifier
ID	ID	nvarchar(20)	DOT Crash ID
CorridorID	Corridor ID	nvarchar(50)	Corridor road segment associated with
CrashSeverity	Crash Severity	nvarchar(20)	Severity of crash
Class	Class	nvarchar(50)	Type of crash
DATE_Crash	DATE Crash	datetime	Date of crash
Month	Month	int	Month of crash
Time	Time	nvarchar(10)	Time of crash
DayOfWeek	Day Of Week	nvarchar(10)	Day of week crash occurred
StreetName	Street Name	nvarchar(255)	Name of street
City	City	nvarchar(30)	City crash occurred
County	County	nvarchar(20)	County crash occurred
UrbanRuralClass	Urban Rural Class	nvarchar(50)	Urban or Rural classification
RoadAlignment	Road Alignment	nvarchar(50)	Alignment of Road
MajorMinorType	Major Minor Type	nvarchar(50)	Major or minor road type classification
RoadSurfaceCondition	Road Surface Condition	nvarchar(20)	Condition of Road Surface
LightCondition	Light Condition	nvarchar(50)	Light conditions during crash
WeatherCondition	Weather Condition	nvarchar(50)	Weather Conditions during crash
WorkZoneIncident	Work Zone Incident	nvarchar(10)	Crash involved Workzone
SeriousFatalUnbelted	Serious Fatal Unbelted	nvarchar(10)	Occupants of crash were unbelted
TotalFatalities	Total Fatalities	int	Total number of Fatalities
TotalSeriousInjuries	Total Serious Injuries	int	Total number of persons with Serious Injuries
TotalMinorInjuries	Total Minor Injuries	int	Total number of persons with Minor Injuries
TotalPedestrian	Total Pedestrian	int	Total number of pedestrians involved
TotalPedalcyclist	Total Pedalcyclist	int	Total number of pedalcyclists involved
TotalMotorcycles	Total Motorcycles	int	Total number of motorcycles involved
TotalElderlyDriver	Total Elderly Driver	int	Total number of elderly drivers involved
TotalYoungerDriver	Total Younger Driver	int	Total number of young drivers involved
ContributingFactor1	Contributing Factor 1	nvarchar(10)	Contributing Factor 1 associated to crash
ContributingFactor2	Contributing Factor 2	nvarchar(10)	Contributing Factor 2 associated to crash
ContributingFactor3	Contributing Factor 3	nvarchar(10)	Contributing Factor 3 associated to crash
ContributingFactor4	Contributing Factor 4	nvarchar(10)	Contributing Factor 4 associated to crash
ContributingFactor5	Contributing Factor 5	nvarchar(10)	Contributing Factor 5 associated to crash
ContributingFactor6	Contributing Factor 6	nvarchar(10)	Contributing Factor 6 associated to crash
ContributingFactor7	Contributing Factor 7	nvarchar(10)	Contributing Factor 7 associated to crash
ContributingFactor8	Contributing Factor 8	nvarchar(10)	Contributing Factor 8 associated to crash
ContributingFactor9	Contributing Factor 9	nvarchar(10)	Contributing Factor 9 associated to crash
ContributingFactor10	Contributing Factor 10	nvarchar(10)	Contributing Factor 10 associated to crash
IntersectionID	Intersection ID	nvarchar(50)	ObjectID of intersection the crash is spatially associated with
RoadID	Road ID	nvarchar(50)	ObjectID of road segment the crash is spatially associated with
RoadDistance_FT	Road Distance FT	double	Distance the crash is from the spatially associated road segment
NearRoadID	Near Road ID	nvarchar(50)	ObjectID of near road segment the crash is spatially associated with
NearRoadDistance_FT	Near Road Distance FT	double	Distance the crash is from the spatially associated near road segment
Orig_Latitude	Original Latitude	double	Latitude of crash location from DOT
Orig_Longitude	Original Longitude	double	Longitude of crash location from DOT
Latitude	Latitude	double	Latitude of crash after crash location processing
Longitude	Longitude	double	Longitude of crash after crash location processing

Table 6. Persons Data Dictionary

Field Name	Alias	Datatype	Description
OBJECTID	OBJECTID	int	Unique Identifier
IDOT_ID	IDOT ID	nvarchar(20)	IDOT Unique Crash Identifier
MODOT_ID	MODOT ID	nvarchar(20)	MODOT Unique Crash Identifier
ID	ID	nvarchar(20)	DOT Crash ID
PersonInjuryClass	Person Injury Class	nvarchar(50)	Class of injury
PersonType	Person Type	nvarchar(50)	Occupant type in vehicle, passenger or driver
AgeAtCrash	Age at Crash	int	Age of person during crash
Gender	Gender	nvarchar(10)	Gender
Zipcode	Zipcode	nvarchar(10)	Residential zipcode of person involved
AirbagDeployed	Airbag Deployed	nvarchar(50)	Airbag deployed during crash
SafetyEquipUsed	Safety Equipment Used	nvarchar(50)	Safety equip used by person during crash
PedestrianLocation	Pedestrian Location	nvarchar(50)	Location of pedestrian involved

Table 7. Vehicles Data Dictionary

Field Name	**Alias**	**Datatype**	**Description**
OBJECTID	OBJECTID	int	Unique Identifier
IDOT_ID	IDOT ID	nvarchar(20)	IDOT Unique Crash Identifier
MODOT_ID	MODOT ID	nvarchar(20)	MODOT Unique Crash Identifier
ID	ID	nvarchar(20)	DOT Crash ID
BodyType	Body Type	nvarchar(50)	Vehicle type of vehicle involved

Table 8. Contributing Factors Data Dictionary

Field Name	Alias	Datatype	Description
OBJECTID	OBJECTID	int	Unique Identifier
IDOT_ID	IDOT ID	nvarchar(20)	IDOT Unique Crash Identifier
MODOT_ID	MODOT ID	nvarchar(20)	MODOT Unique Crash Identifier
ID	ID	nvarchar(20)	DOT Crash ID
Cause	Cause	nvarchar(50)	Cause of crash

Appendix C:

Measuring and Tracking Progress

Appendix C: Measuring and Tracking Progress

1. Introduction

It is important to measure and track progress over time to ensure that the strategies and tools in the *Gateway to Safer Roadways: St. Louis Regional Safety Action Plan* (Action Plan) are adequately addressing the safety issues on the roadways in the East-West Gateway Council of Governments (EWG) Region. Additionally, it is important that there is transparency with the public about the EWG Region's progress over time. Thus, this document summarizes how EWG will track and display the EWG Region's progress toward achieving the set target to reduce roadway fatalities and serious injuries by 50% by 2050.

2. Goal Setting

EWG is committed to an eventual goal of zero fatalities and serious injuries resulting from crashes on the surface transportation system. As a first step towards this goal, the Action Plan sets a target to reduce the number of fatalities and serious injuries resulting from roadway crashes in the EWG Region by 50% by 2050 (Fifty by Fifty). Under the federal requirements for Safety Performance Management Measures, EWG has already been tracking the number of fatalities and serious injuries in the EWG Region and posting yearly updates on an existing performance dashboard located here: https://www.ewgateway.org/transportation-planning/long-range-transportation-planning/lrp-performance-dashboard/. EWG has been tracking the number of fatalities (the number of driver or passenger fatalities in motorized vehicles on the regional road network) and serious injuries (the number of driver or passenger serious injuries in motorized vehicle on the regional road network) using a five-year rolling average. For the Action Plan, this metric and performance dashboard will be used for the goal and tracking. The five-year rolling average in 2022 (i.e. 2018 – 2022), which is the most recent available data, is 311.6 roadway fatalities and 1935.0 serious injuries. Based on this, the goal is for the 2050 five-year rolling average (i.e. 2045-2050) to be less than 155.8 fatalities and 967.5 serious injuries, which equates to the need for a 2.5% annual reduction. Table 1 shows the annual targets for the fatalities and serious injuries five-year rolling averages to reach the Fifty by Fifty goal. These two metrics will continue to be updated and displayed annually on the existing performance dashboard linked above.

Table 1 Annual Targets (Five-Year Rolling Averages)

Year	*Fatalities*	*Serious Injuries*
2022 (baseline)	311.6	1935.0
2023	304.0	1887.7
2024	296.5	1841.5
2025	289.3	1796.5
2026	282.2	1752.6
2027	275.3	1709.7
2028	268.6	1667.9
2029	262.0	1627.1
2030	255.6	1587.3
2031	249.4	1548.5
2032	243.3	1510.7
2033	237.3	1473.7
2034	231.5	1437.7
2035	225.9	1402.5
2036	220.3	1368.3
2037	214.9	1334.8
2038	209.7	1302.2
2039	204.6	1270.3
2040	199.6	1239.3
2041	194.7	1209.0
2042	189.9	1179.4
2043	185.3	1150.6
2044	180.7	1122.4
2045	176.3	1095.0
2046	172.0	1068.2
2047	167.8	1042.1
2048	163.7	1016.6
2049	159.7	991.7
2050	155.8	967.5

3. How to Reach the Goal

Achieving a 50% reduction in fatal and serious injury crashes in the EWG Region by 2050 will be accomplished by: 1) implementing safety projects on the high-injury network, 2) applying safety treatments systemically across the EWG Region, and 3) adopting and implementing policy and programming recommendations.

1. Implement High-Injury Network Safety Projects

To mitigate the most severe crashes in the EWG Region, implement safety projects on all corridors, intersections, and segments shown on the top 25% lists on the following high-injury networks: HIN 1 – All Modes, HIN 2 – VRU Pedestrians and Bicyclists, and HIN 5 – Interstate. These corridors, intersections, and segments account for more than 50% of all fatal and serious injury crashes throughout the EWG Region. Reducing the number of fatal and serious injury crashes on these routes by an average of 60% will alone reduce the number of fatal and serious injury crashes in the EWG Region by 30%.

2. Implement Systemic Safety Treatments

Implement relevant systemic safety improvements throughout the EWG Region to address crash risks holistically. While attacking the problems on the high-injury network will address concentrated problem areas, many fatal and serious injury crashes occur in a more dispersed pattern. These fatal and serious injury crashes can be addressed through systemic treatments that address infrastructure with higher-risk characteristics. For example, curves on rural highways are known to have a higher incidence of roadway departure crashes. Applying low-cost treatments such as high-friction pavement, wet reflective pavement markings, and high visibility chevrons can reduce the incidence of fatal and serious injury crashes on these curves. As another example, urban arterials with high speeds, high traffic volumes, and high volumes of pedestrians experience more occurrences of pedestrian fatalities. The application of pedestrian infrastructure, such as provided in FHWA's STEP program and Proven Safety Countermeasures, can help to reduce the incidence of fatal and serious injury pedestrian crashes in these areas. The application of systemic safety improvements throughout the EWG Region can reduce the number of fatal and serious injury crashes in the EWG Region further by 10%.

3. Implement Policy and Programming Recommendations

Finally, human error plays a critical role in many fatal and serious injury crashes. Drivers who are speeding, distracted, or impaired with drugs or alcohol contribute to many of the EWG Region's fatal and serious injury crashes. Data shows that these issues contribute to well over half of fatal and serious injury crashes in the EWG Region. There is a need to change the transportation safety culture in the Region. The adoption and implementation of appropriate and relevant policy and program recommendations can help to change driver behavior and reduce fatal and serious injury crashes in the EWG Region by another 10%.

4. Goal Phasing Timeline

The following timeline has been established to achieve a 50% reduction in fatal and serious injury crashes by 2050.

By 2030:

1. Local agencies should implement safety projects on the High-Injury Network Priority Lists provided in the "Safety Analysis" section. Many of these areas have projects that are already programmed and undergoing design, so the EWG Region is well on its way to meeting this milestone.
2. Local agencies should pilot two to four new systemic treatments in their jurisdiction. Many of the local agencies have already been exploring new systemic treatments to pilot on the roads that they maintain so the EWG Region is well underway in meeting this milestone.
3. Kick-start two to four priority policy or programming recommendations. There was active discussion about policy and program ideas during the development of the Action Plan and wide support was expressed for many of the 16 different policy and program recommendations. There is a challenge in that many of these recommendations require partnerships, but the EWG regional community is determined to build the partnerships required to make this happen.

By 2035:

1. Fully implement safety projects on the top 10% of the following high-injury networks: HIN 1 – All Modes, HIN 2 – VRU Pedestrians and Bicyclists, and HIN 5 – Interstate.
2. Fully implement the systemic treatments piloted in years 2024-2030 and pilot two to four new systemic treatments.
3. Fully implement the policy or programming recommendations piloted in years 2024-2030 and kick-start two to four other policy or programming recommendations.

By 2050:

1. Implement safety projects on the top 25% of the following high-injury networks: HIN 1 – All Modes, HIN 2 – VRU Pedestrians and Bicyclists, and HIN 5 – Interstate.
2. Implement all relevant systemic treatments.
3. Implement all relevant policy and program recommendations.

5. Supplemental Data

In addition to the existing performance dashboard, a project website was developed that displays the high-injury network and key crash statistics identified in the Action Plan. This website is also accessible to the public and highlights the major findings of the Action Plan. When the Action Plan is updated with new crash data over the years, the project website will also be updated. The project website will be used by community members and local public agencies to identify corridors and locations where safety improvements are needed most. It also highlights major contributing factors and risk factors to fatalities and serious injuries in the EWG Region to identify systemic treatments and policy and programming needs. This supplemental data is a perfect complement to the existing progress tracking. The project website can be accessed here: www.ewgateway.org/GTSR

6. Conclusion

Overall, improving roadway safety in the EWG Region is imperative. The Action Plan provides the strategies and tools that will make the goal a reality, but it takes everyone to do their part within their own area of influence, from individuals and families up to elected officials. The existing performance dashboard and the new project website will allow for transparency with the public and for a collaborative effort by every community member to improve roadway safety for all users. Additionally, EWG staff will convene the Regional Task Force, at a minimum of twice a year, to advance the Action Plan's recommendations and follow its progress. The "Fifty by Fifty" goal is ambitious, but it is achievable through a concentrated, coordinated, and sustained effort. Achieving this goal would save more than 2,300 lives and prevent more than 14,000 serious injuries in the EWG Region between now and 2050 and help to ultimately eradicate all roadway fatalities and serious injuries.