APPENDIX D

DKS 428 J STREET, SUITE 340 • SACRAMENTO, CA 95814 • 916.368.2000 • DKSASSOCIATES.COM

DRAFT COLLISION ANALYSIS

DATE: June 18, 2025

TO: Andreina Aguilar, City of Fresno

FROM: Josh Pilachowski | DKS Associates
Sylinda Villado | DKS Associates

SUBJECT: City of Fresno Vision Zero Action Plan Project #24540-000

INTRODUCTION AND PURPOSE

PROJECT OVERVIEW AND PURPOSE

The purpose of this memo is to describe the existing safety conditions of the local road system within the City of Fresno and to propose emphasis areas that will serve as the framework for the City of Fresno Vision Zero Plan. The emphasis areas are derived from the analysis of reported crash data, highlighting crash types, causal factors, and vulnerable users that are involved in high severity crashes or that represent a large proportion of reported crashes.

DATA USED

To support the project analysis, collision injury data was primarily pulled from the City's Collision Database System (Crossroads) and supplemented with Transportation Injury Mapping System (TIMS) data. The crash data analyzed for this project included all crashes recorded in TIMS during the five-year period between January 1, 2019, and December 31, 2023.

COLLISION DATABASE SYSTEM (CROSSROADS)

Crossroads Software's Traffic Collision Database is a software platform for data input and management available for a fee from Crossroads Software, Inc. Crossroads provides data input and management for collisions, citations, and DUIs; queries and reports, including historical, high incidence, and monthly, as well as collision reports by day and hour and other parameters; graphs and charts for such categories as highest degree of injury, collision type, weather and lighting conditions.

STATEWIDE INTEGRATED TRAFFIC RECORDS SYSTEM (SWITRS)

The Statewide Integrated Traffic Records System (SWITRS) is a database[1] that serves as a means to collect and process California crash data gathered from a collision scene. SWITRS processes all reported crashes that occurred on California's state highways and all other roadways, excluding private property. SWITRS allows for the creation of custom reports requested by the user based on different categories including, but not limited to locations, dates, and collision types.

TRANSPORTATION INJURY MAPPING SYSTEM (TIMS)

The Transportation Injury Mapping System (TIMS) is a crash mapping and analysis application[2] developed by SafeTREC to process and geocode crash data available by SWITRS. Specifically, the project looked at the needs of agencies to geocode and map the crashes in an efficient and simple manner. As such, TIMS provides processed and cleaned SWITRS data, but only includes fatal and injury crashes, excluding all crash reports resulting in only property damage. TIMS data was used to supplement Crossroads data as the current data set does not provide descriptors for motorcycle-involved crashes.

CRASH RECORD DATA

Crash records are categorized at three different levels: by collision, by party (vehicle), and by victim. All three levels are linked by a unique Case ID for each collision. Crash records provide all data collected by the reporting officer, including crash identification (jurisdiction, route and postmile, location, date, time), demographics (sex, age, race, sobriety, safety equipment usage), environmental (lighting, weather, road surface), and crash details (primary collision factor, type of collision, vehicle/party type, severity). The codebook detailing the SWITRS crash record data and format is available on the SWITRS website or from TIMS.

For this project and most other safety analyses, the collision severity is defined in the Highway Safety Manual (HSM) as follows:

- **Fatal injury:** A collision that results in the death of a person within 30 days of the collision.
- **Severe (incapacitating) injury:** A collision that results in broken bones, dislocation, severe lacerations, or unconsciousness, but not death.
- **Other Visible injury (non-incapacitating):** A collision that results in other visible injuries, including minor lacerations, bruising, and rashes.
- **Possible injury (complaint of pain):** A collision that results in the complaint of non-visible pain/injury, such as confusion, limping, and soreness.
- **Property damage only (PDO):** A collision without injury or complaint of pain but resulting in property damage to a vehicle or other object, commonly referred to as a "fender bender." TIMS does not include non-injury crashes, therefore no PDOs are included in this analysis.

[1] https://iswitrs.chp.ca.gov/Reports/jsp/index.jsp
[2] Transportation Injury Mapping System (TIMS), Safe Transportation Research and Education Center, University of California, Berkeley. 2021, https://tims.berkeley.edu/

The most severe crashes, characterized as KSI (Killed or Severely Injured), are the main focus of this analysis.

CITY OF FRESNO CRASH DATA

BACKGROUND

The City of Fresno adopted a Local Roadway Safety Plan (LRSP) in 2020, which looked at crash data from 2014 to 2018. Analysis of that data showed that the three most frequent collision types were:

- Rear-end (25%)
- Broadside (21%)
- Hit object (18%)

The three most frequent collision types KSIs were:

- Pedestrian-involved (35%)
- Broadside (22%)
- Hit object (13%)

These three collision types (pedestrian-involved, broadside, hit object) account for 70% of KSIs in the City of Fresno during this time period. The LRSP identified these three collision types, along with signalized intersections along high-volume, high-speed arterials, and collision data reporting and monitoring as safety emphasis areas for the city.

The most frequent causes of collisions were identified to be:

- Unsafe Speed (21%)
- Driving Under Influence (13%)

The three most frequent causes of KSIs were:

- Driving Under Influence (17%)
- Pedestrian Violation (17%)
- Unsafe Speed (not provided)

RECENT FRESNO COLLISION TRENDS

The table below describes the proportion of each severity type in the City of Fresno. **Figure 1** provides a map of all the crashes in the City, excluding those occurring on the freeway.

TABLE 1: FRESNO CRASH SEVERITY SUMMARY, 2019-2023

SEVERITY	NUMBER OF CRASHES	PROPORTION OF CRASHES
FATAL INJURY	217	4%
SEVERE INJURY	629	11%
MINOR INJURY	1,695	30%
POSSIBLE INJURY	3,116	55%
TOTAL	5,657	100%

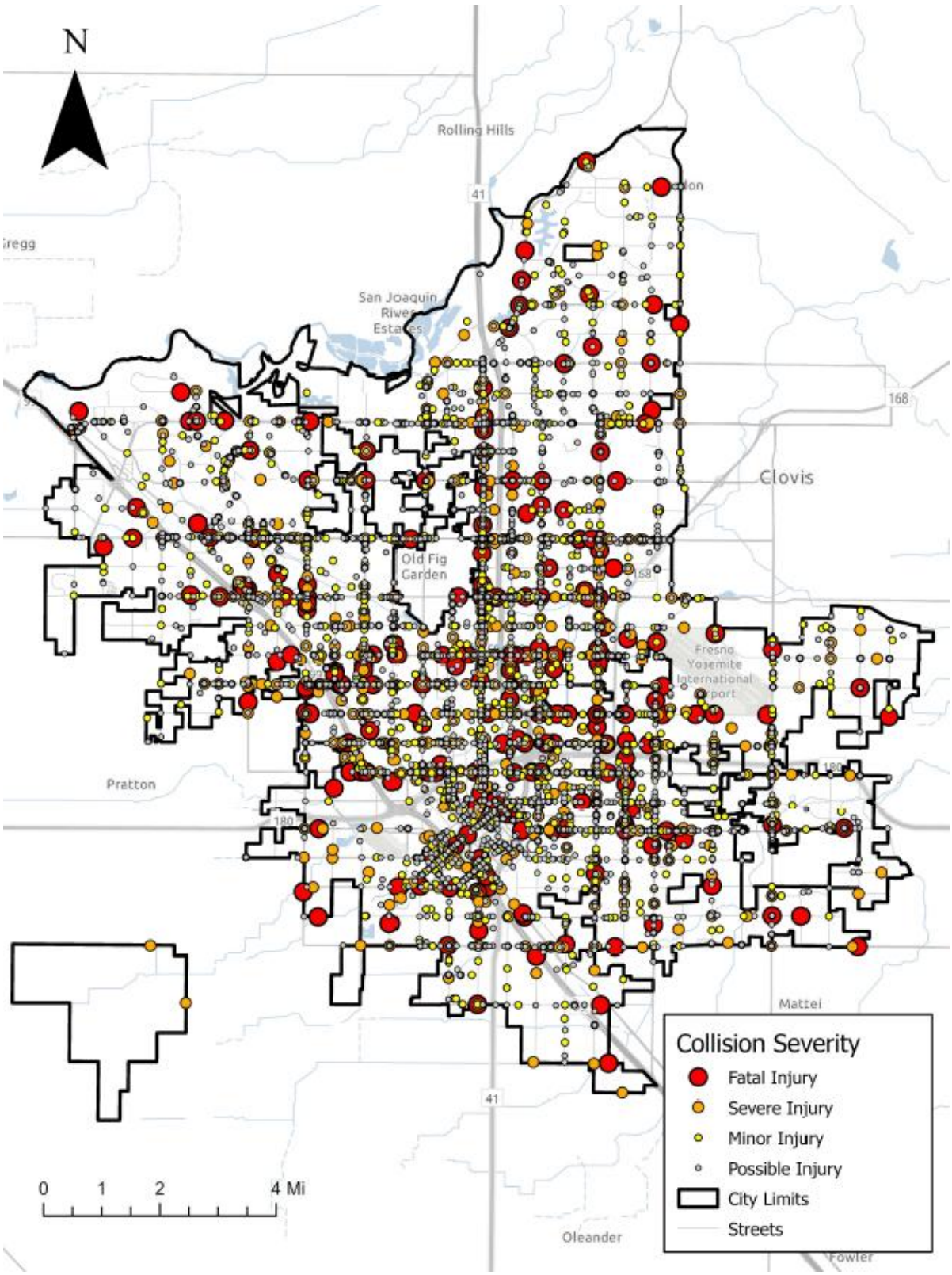

FIGURE 1: FRESNO COLLISION MAP ALL NON-FREEWAY CRASHES 2019-2023

FRESNO INJURY CRASH SUMMARY – ALL SEVERITIES (2019-2023)

This section summarizes all injury crashes in the City, regardless of severity. Reviewing all crash events provides sufficient data to determine the most common types of crashes, locations (i.e., intersections and non-intersections), and recorded violations. Crash trends by type are shown in Figure 2, while trends by location type are shown in Figure 3. CHP crash records do not specifically call out bicycle-involved crashes as a separate collision type, however frequency and severity of crashes involving vulnerable road users other than pedestrians (people riding bicycles or motorcycles) are discussed in the later Emphasis Area section of this memo.

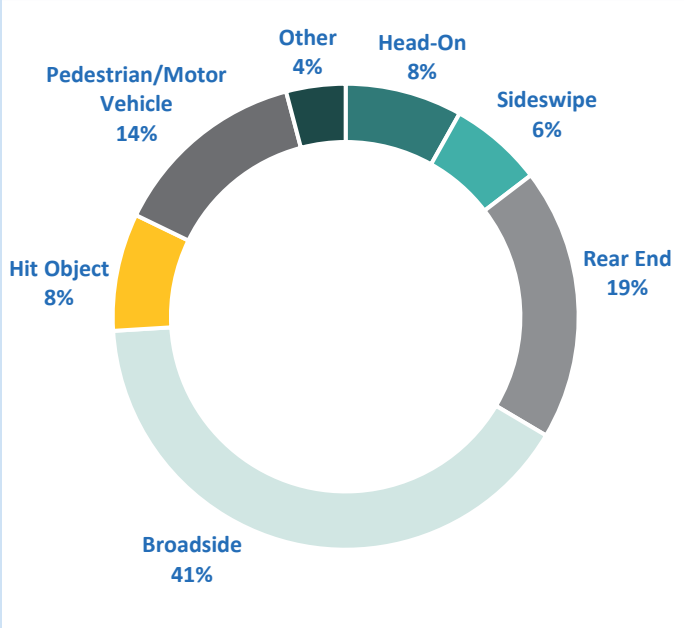

FIGURE 2: INJURY CRASHES BY TYPE OF COLLISION

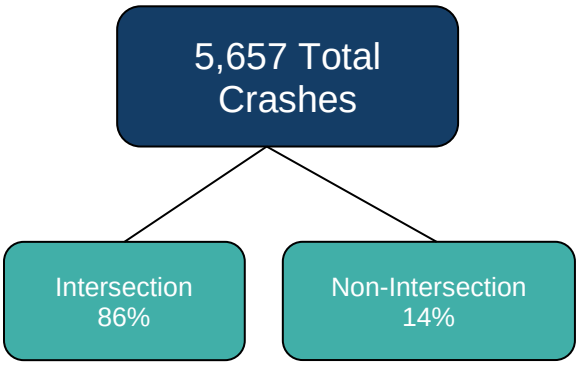

FIGURE 3: INJURY CRASHES BY LOCATION TYPE

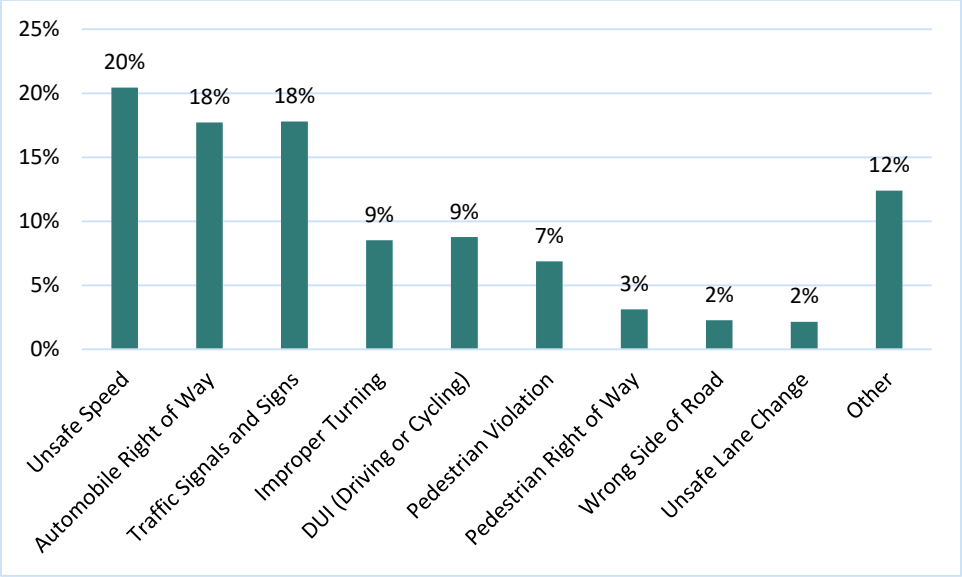

FIGURE 4: INJURY CRASHES BY PRIMARY COLLISION FACTOR

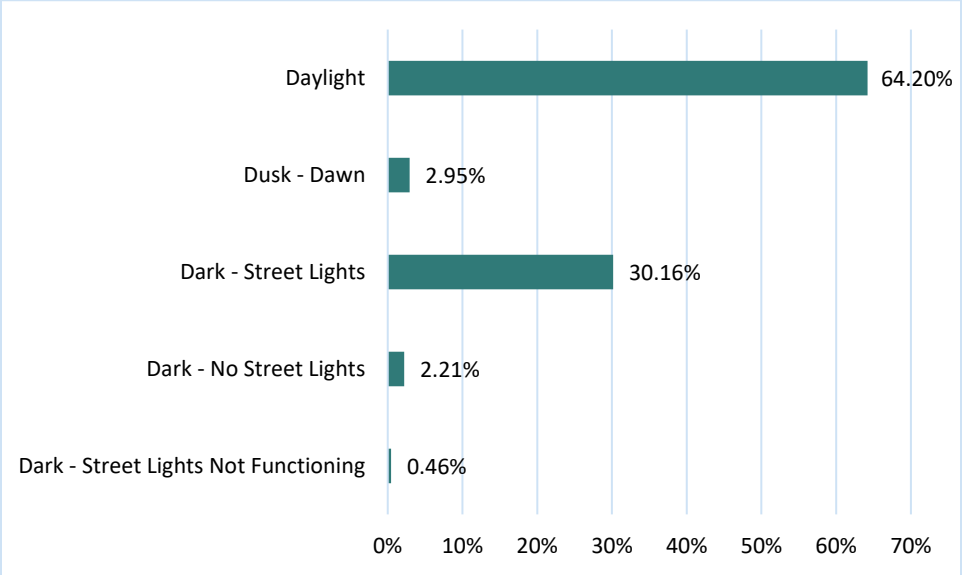

FIGURE 5: INJURY CRASHES BY LIGHTING CONDITIONS

In Fresno, almost all crashes (86%) occur within 250 feet of an intersection. Broadside and Rear End crashes, which both commonly occur at intersections, make up a combined 60% of crashes and are the two most commonly occurring crash types, consistent with the 2020 LRSP trends. The proportion of Broadside crashes, however, has significantly increased from 21% to 41%. Collisions with pedestrians make up 14% of crashes in Fresno as the third most common crash type, taking the place of hit object crashes from the 2020 LRSP trends.

Crash trends by cause of crash are shown in Figure 4 while by trends by lighting conditions are shown in Figure 5. Unsafe speed remains the most common cause of crashes, consistent with the 2020 LRSP trends, while driving under the influence has a significantly reduced proportion of

crashes, now as the fourth most common cause, with automobile right of way and traffic signals and signs occurring much more frequency as causes of crashes.

The vast majority of collisions occur in daylight or with streetlights, so most crashes occur in lit areas where visibility may not be a primary cause of the crash.

FRESNO FATAL AND SEVERE INJURY COLLISIONS (2019-2023)

This section focuses on fatal and severe injury collisions within the City of Fresno. During the five-year period from 2019 to 2023, there were a total of 217 fatal and 629 severe injury crashes within the city limits. These collisions are analyzed together as KSI crashes under the same categories as the entire crash data set in order to draw comparisons between lower and higher severity collision trends. Crash trends by type are shown in Figure 6, while trends by location type are shown in Figure 7. Similar to the previous section, CHP crash records do not specifically call out bicycle-involved crashes as a separate collision type, however frequency and severity of crashes involving vulnerable road users other than pedestrians (people riding bicycles or motorcycles) are discussed in the later Emphasis Area section of this memo.

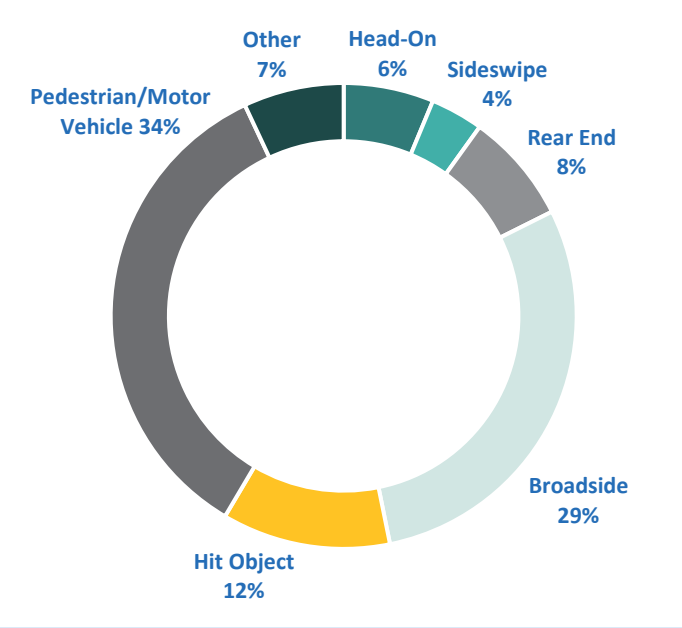

FIGURE 6: KSI CRASHES BY TYPE

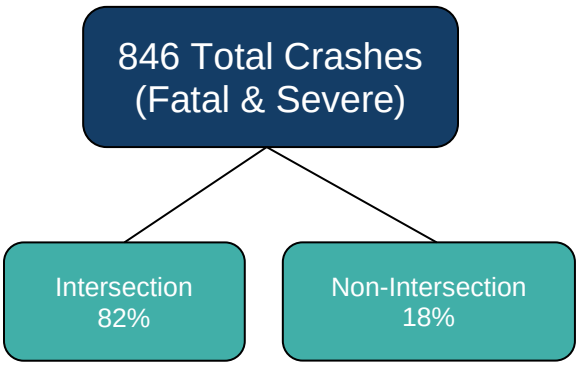

FIGURE 7: KSI CRASHES BY LOCATION TYPE

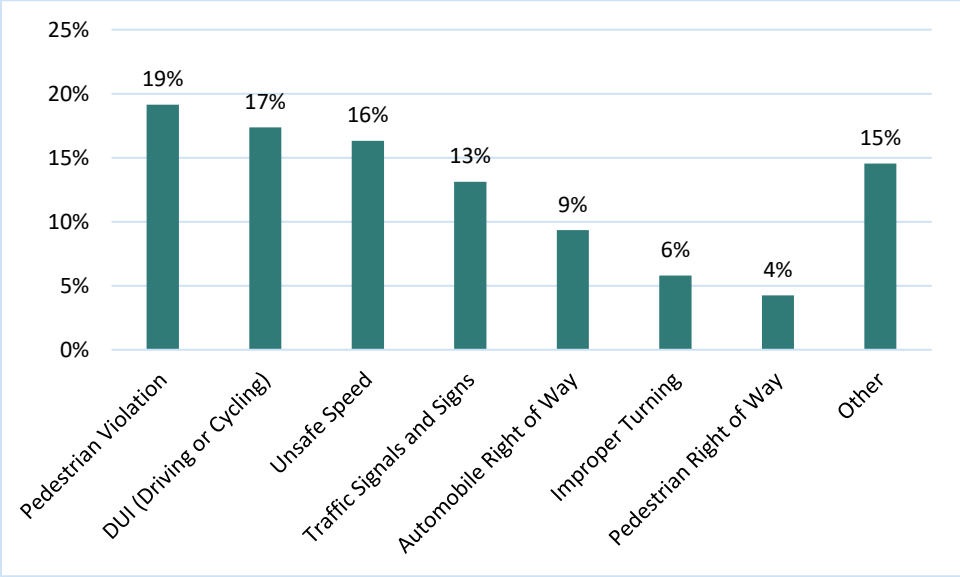

FIGURE 8: KSI CRASHES BY PRIMARY COLLISION FACTOR

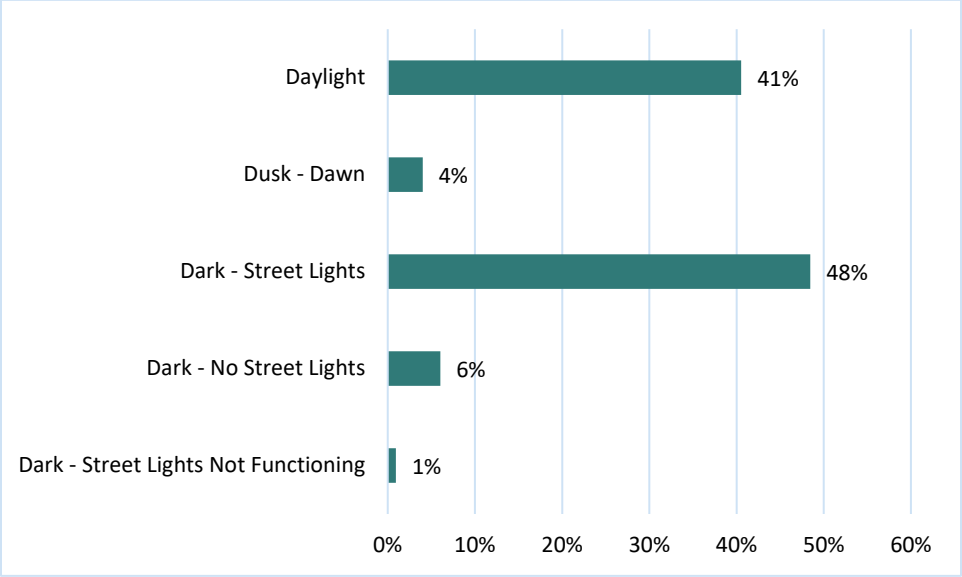

FIGURE 9: KSI CRASHES BY LIGHTING CONDITIONS

Similar to the trends for injury crashes citywide, most KSIs (82%) occur within 250 feet of an intersection. Pedestrian collisions are the most common type of KSIs than of all severities, with broadsides and hit object being the second and third most common crash types, respectively. This is consistent with trends from the 2020 LRSP.

Crash trends by cause of crash are shown in Figure 4 while by trends by lighting conditions are shown in Figure 5. Pedestrian violations, driving under the influence, and unsafe speeds are the three most common causes of KSI, consistent with the 2020 LRSP trends, though the proportion of KSIs caused by Pedestrian violations has increased slightly.

Similar to injury crash trends, the majority of KSIs occur in daylight or with streetlights, so lighting conditions may not be a primary cause of the crash. However, it should be noted that a higher proportion of KSI crashes (48%) do occur at night than all injury crashes (30%), so the quality of lighting and visibility may play a role in these higher severity crashes, especially when combined with risky behaviors such as unsafe speed and driving under the influence.

A map of all KSIs by severity is provided in Figure 10.

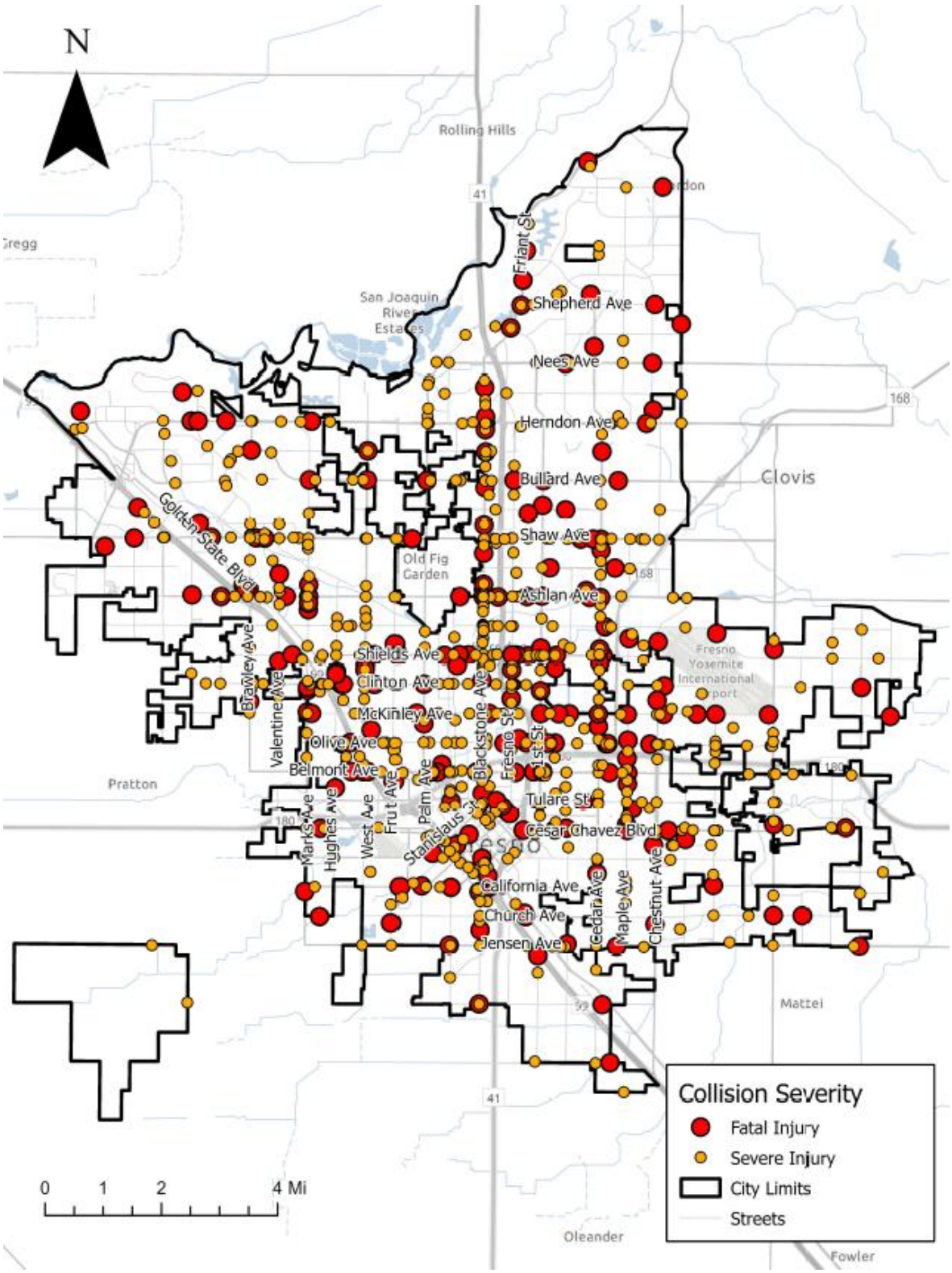

FIGURE 10: FRESNO KSI COLLISION MAP

FRESNO POTENTIAL EMPHASIS AREAS

Table 2 compares the proportion of injury crashes and KSIs for both the City of Fresno and Fresno County across multiple crash types and primary collision factors. The comparison will highlight large changes in crash proportions between injury crashes and KSIs, and use County crash data as a normalizing factor to compare to, with the intent to highlight crash types and causes that for disproportionately represented.

TABLE 2: FRESNO SUMMARY OF CRASH STATISTICS

CATEGORY	ALL INJURY CRASHES (5,657 CRASHES)	KSI CRASHES (846 CRASHES)	COUNTY CRASHES (11,477 CRASHES)	COUNTY KSI CRASHES (1,798 CRASHES)
PEDESTRIAN INVOLVED	14%	36%	8%	19%
BICYCLIST INVOLVED	7%	9%	4%	6%
MOTORCYCLIST INVOLVED[3]	6%	16%	6%	16%
IMPAIRED DRIVING	9%	17%	10%	19%
SPEEDING INVOLVED	20%	16%	19%	14%
LANE DEPARTURE	24%	23%	31%	38%
INTERSECTIONS	86%	82%	76%	65%

The proportion of pedestrian crashes is much higher for KSIs than for all injury crashes. Bicyclist involved crashes also make up a higher proportion of KSI crashes than all severities, though by a much smaller margin than pedestrians. Together, pedestrian and bicyclist involved crashes represent vulnerable road users without the protection of a car, leading to higher severity crashes.

Motorcycle users, who are vulnerable like pedestrians and bicyclists, being outside of an enclosed vehicle, but who use the roads at the same speeds as drivers, are likely to have more severe outcomes when involved in collisions. While only making up less than 6% of all crashes, motorcycles are involved in 16% of severe and fatal injury collisions.

Unsafe road user behaviors, including DUIs and speeding, make up a higher proportion of KSIs than all severity crashes. However, speeding makes up a higher proportion of all crashes than KSIs. DUIs make up the difference, with just under 9% of all crashes involving impairment, and 17% of KSIs involving impairment.

[3] Crash proportions calculated from TIMS (2019-2023) dataset

Collisions involving lane departures make up similar proportions of all severity crashes (24%) and KSIs (23%). Lane departures include Hit Object, Sideswipe, Head-On, and Overturned collisions.

A higher proportion of crashes in the City of Fresno occur within 250 feet of an intersection than throughout the County, however this is most likely due to a higher density of intersections within City limits.

EMPHASIS AREA RECOMENDATIONS

COMPARISON TO LRSP TRENDS AND RECOMMENDATIONS

The most frequent crash types identified in the 2020 LRSP (pedestrian-involved, broadside, hit object) continue to be the highest frequency crash types and the proportion of KSI associated with these crash types has increased from 70% to 75%, with most of the increase occurring in broadside collisions. The high proportion of crashes occurring at intersections and the high proportion of broadside crashes, which most often occur at signalized intersections, signifies the continued importance of looking at signalized intersections along high-volume, high-speed arterials. Finally, collision data reporting and monitoring continues to be an important part of identifying and evaluating efficient strategies for improving safety and reducing crashes.

Based upon these trends it is recommended to maintain all previous identified Emphasis Areas from the LRSP in the Vision Zero Plan.

CURRENT TRENDS AND RECOMMENDATIONS

Based on the crash trend analysis, three additional crash types and collision factors were identified as additional emphasis areas:

- **Crash Type: Motorcycle-involved crashes -** As vulnerable road users, crashes involving motorcycles make up 16% of all KSI crashes
- **Risky Behavior: Impaired Driving -** Crashes resulting from impaired driving make up 17% of all KSI crashes
- **Risky Behavior: Unsafe Speed -** Crashes resulting from drivers traveling at speeds inappropriate for the surrounding conditions make up 16% of all KSI crashes

RECOMMENDED LIST OF EMPHASIS AREAS

The full list of recommended Emphasis areas and categories is as follows:

- **Crash Types**
  - Pedestrian-involved crashes
  - Motorcycle-involved crashes
  - Broadside crashes
  - Hit Object crashes
- **Risky Behaviors**
  - Impaired Driving
  - Unsafe Speeds
- **Infrastructure**
  - Signalized intersections along high-volume, high-speed arterials
- **Safety Culture**
  - Collision data reporting and monitoring