

COMPREHENSIVE SAFETY ACTION PLAN



CHAPTER 3 *CRASH HISTORY*

INTRODUCTION

The crash history analysis for Guthrie was a primary element in the development of the CSAP. To study the crashes that occurred in the City, crash data from 2017-2021 was collected from the Oklahoma Highway Safety Office (OHSO) and analyzed to determine which roadways posed the highest risk to the community. This analysis provides a comprehensive look at the current state of safety in the City and serves as the foundation for the rest of this plan. Assessing the safety needs specific to Guthrie is crucial in developing a comprehensive plan that addresses the issues present in the City.

Citywide Crash Trends
Crash Density
Societal Cost of Crashes
**Oklahoma Strategic Highway
Safety Plan Emphasis Areas**
Equity Considerations



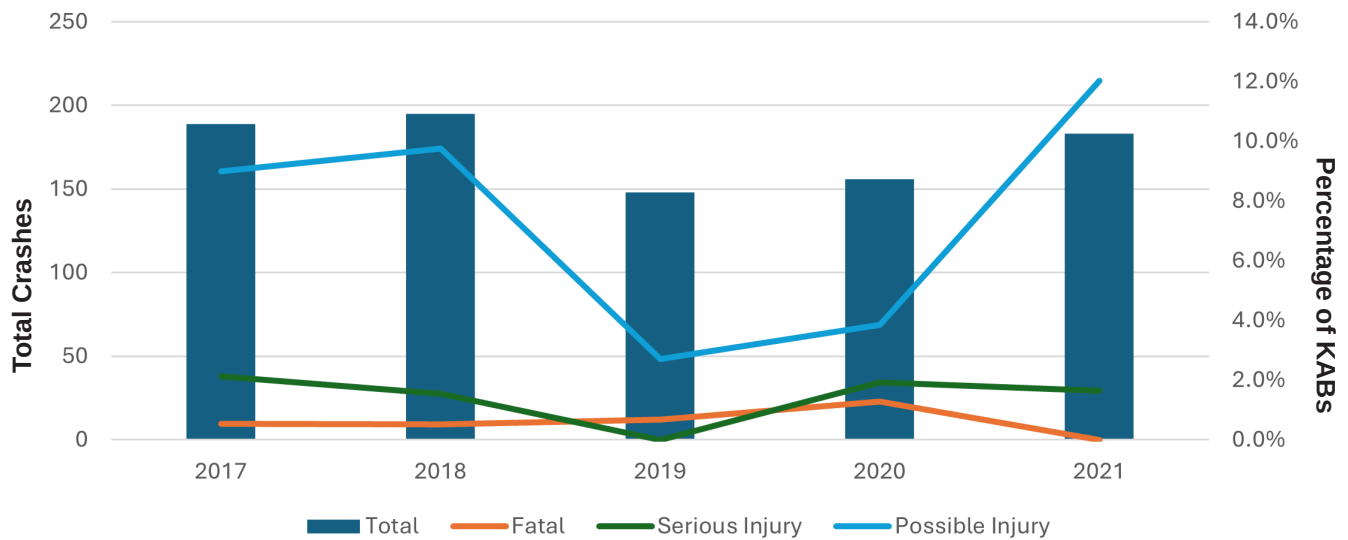
Citywide Crash Trends

Over the five-year period of 2017-2021, there were a total of 871 crashes in Guthrie with 86 of them resulting in a fatality (K), serious injury (A), or possible injury (B). In 2018, the highest number of crashes occurred with 195 reported. During this time, five fatal crashes happened in Guthrie. **Table 1** and **Figure 13** shows the crashes that occurred within Guthrie city limits from 2017-2021 by crash severity.

Table 1. Guthrie Crashes by Year

TOTAL		K - FATAL		A - SERIOUS INJURY		B - POSSIBLE INJURY	
2017	189	1	0.5%	4	2.1%	17	9.0%
2018	195	1	0.5%	3	1.5%	19	9.7%
2019	148	1	0.7%	0	0.0%	4	2.7%
2020	156	2	1.3%	3	1.9%	6	3.8%
2021	183	0	0.0%	3	1.6%	22	12.0%

Figure 13. Guthrie Crash Trends (2017-2021)



Top Contributing Factors

Crashes can happen for various reasons, such as distracted driving, speeding, or impairment. Identifying the factors that caused a crash is crucial for effective safety planning, as it highlights the specific issues leading to the incident. For instance, if an area experiences many severe crashes due to drivers ignoring stop signs and red lights, safety efforts should focus on preventing such violations.

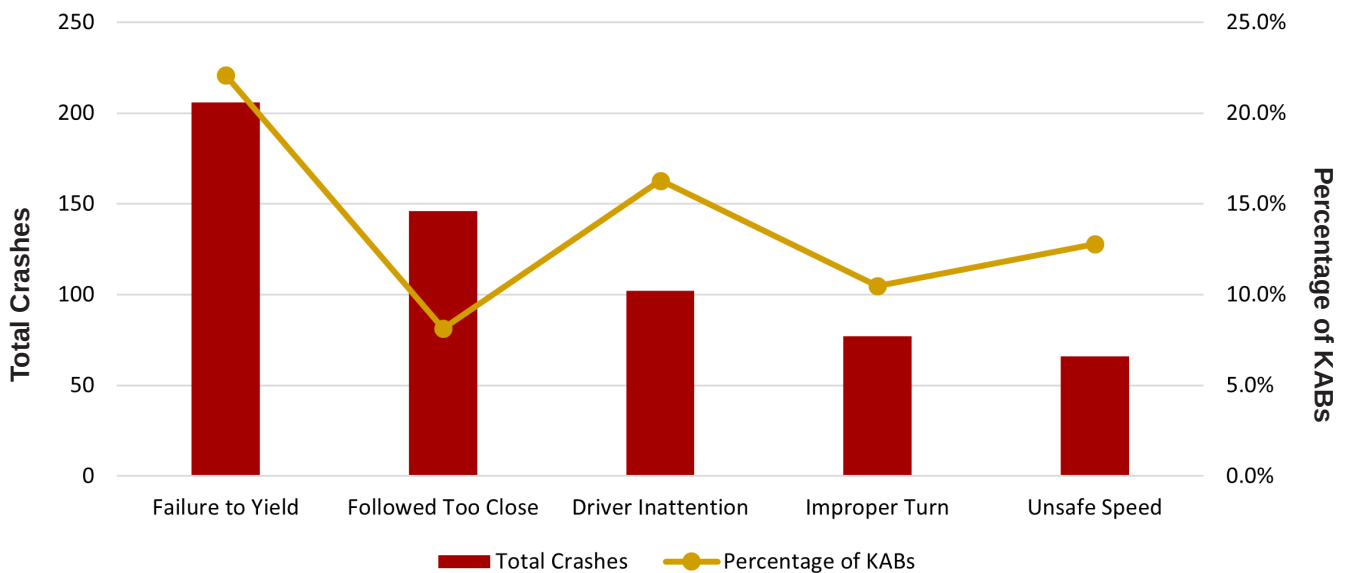
The most common contributing factors of crashes in City of Guthrie are shown in **Table 2** and **Figure 14**.

'Failure to Yield' was the highest contributing factor in the City, with 206 total crashes (23.7%) and 19 fatal and injury-related crashes (22.1% of KABs). The other 4 most contributing factors to fatal, serious injury, and minor injury crashes are: 'Followed Too Close' (146), 'Driver Inattention' (102), 'Improper Turn' (77), and 'Unsafe Speed' (66).

Table 2. Top Contributing Factors

TOP CONTRIBUTING FACTORS	TOTAL CRASHES	PERCENTAGE OF CRASHES	KABS	PERCENTAGE OF KABS
Failure to Yield	206	23.7%	19	22.1%
Followed Too Close	146	16.8%	7	8.1%
Driver Inattention	102	11.7%	14	16.3%
Improper Turn	77	8.8%	9	10.5%
Unsafe Speed	66	7.6%	11	12.8%

Figure 14. Top Contributing Factors Compared to Percentage of KABs





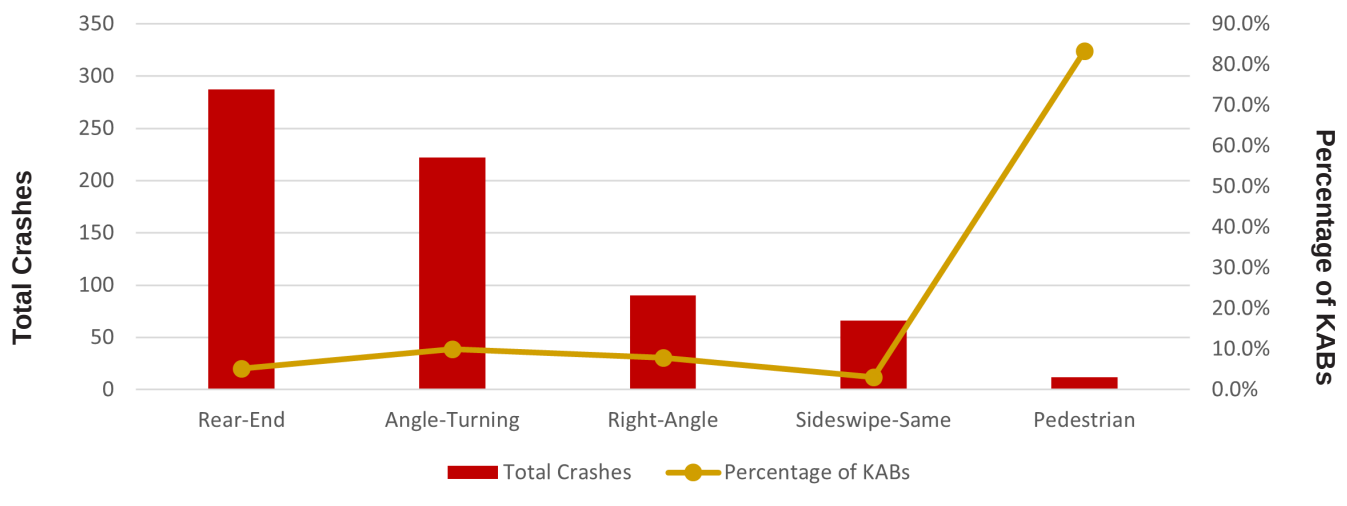
Top Manners of Collision

While contributing factors give an insight into why a crash may have occurred, manners of collision describe how the crash occurred. The top manner of collision in Guthrie from 2017-2021 was 'Rear-End' crashes as shown in **Table 3** and **Figure 15** on page 24. This commonly occurs in areas with a lack of dedicated turn lanes, which many areas in Guthrie with high volumes of crashes are experiencing. Additionally, 'Angle-Turning' crashes, (222 total crashes) account for the most of fatal, serious injury, and minor injury crashes (22 KABs).

Table 3. Top Manners of Collision

TOP MANNERS OF COLLISION	TOTAL CRASHES	PERCENTAGE OF CRASHES	KABS	PERCENTAGE OF KABS
Rear-End	287	33.0%	15	5.2%
Angle-Turning	222	25.5%	22	9.9%
Right-Angle	90	10.3%	7	7.8%
Sideswipe-Same	66	7.6%	2	3.0%
Pedestrian	12	1.4%	10	83.3%

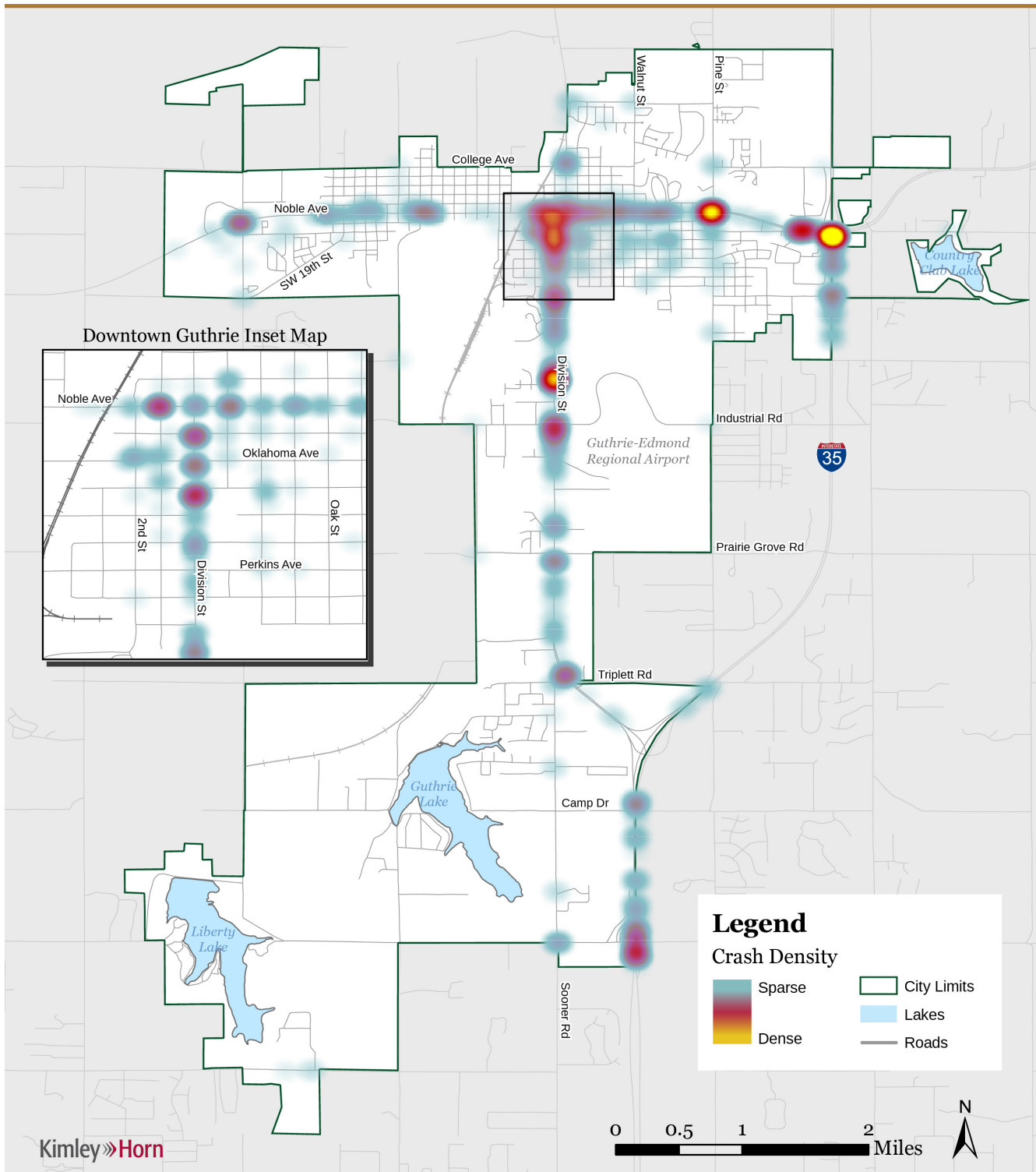
Figure 15. Top Manners of Collision Compared to Percentage of KABs



Crash Density

Exhibit 2 on page 24 displays a crash heat map that highlights the density of crashes in Guthrie from 2017-2021. The crash heat map visualizes the pure density of crash counts at various locations in the City and does not consider specific roadway or crash characteristics such as functional classification, traffic volumes, context, and crash severity. Each of these factors, though, contributes to the frequency of crashes. In Guthrie, the most common area for crashes includes downtown Division St, Noble Ave, and I-35.

Exhibit 2. Crash Heat Map





Societal Cost of Crashes

An additional trend that sheds light on the impact crashes have on communities is the societal cost of crashes. Simply, crashes of all severities ultimately cost money. These costs span across a wide range of areas including medical costs, property damage, decrease in economic productivity, and quality of life. Societal cost is determined by assigning a monetary value to the impact of crashes by their severity. These costs are a blend of economic costs and the monetized value of impacts. The values used in this analysis are from the Highway Safety Benefit-Cost Analysis Guide from the Federal Highway Administration (FHWA) Safety Program.

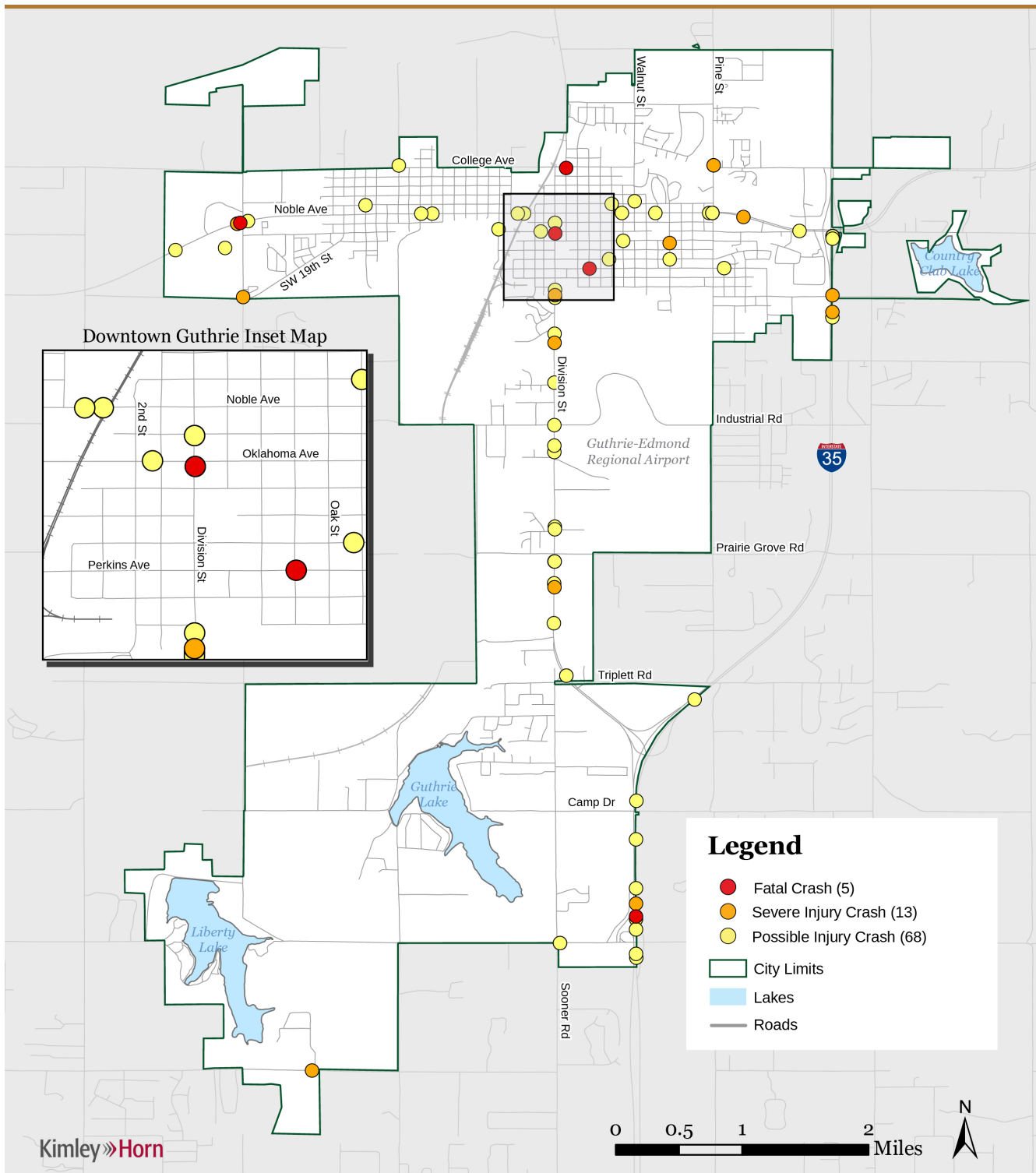
The total cost of the crashes that occurred in the study area between 2017-2021 is just over \$103 million with fatal crashes making up approximately 56% of the total cost. The cost breakdown by severity is shown in **Table 4**.

Table 4. Total Societal Cost of Crashes in Guthrie (2017 - 2021)

CRASH SEVERITY	SOCIETAL COST PER CRASH*	GUTHRIE CRASHES	SOCIETAL COST OF CRASHES
K - Fatal Injury	\$11,637,947	5	\$58,189,735.00
A - Suspected Serious Injury	\$674,353	13	\$8,766,589.00
B - Suspected Minor Injury	\$204,143	68	\$13,881,724.00
C - Possible Injury	\$129,001	113	\$14,577,113.00
Non-injury and Unknown	\$12,108	672	\$8,136,576.00
Total Societal Cost of Crashes in Guthrie:			\$103,551,737.00

* <https://highways.dot.gov/safety/hsip/highway-safety-benefit-cost-analysis-guide-0>

Exhibit 3. Fatal, Severe, and Minor Injury Crashes





Oklahoma Strategic Highway Safety Plan Emphasis Areas

In November 2023, ODOT updated their Strategic Highway Safety Plan (SHSP). The SHSP is a comprehensive plan detailing strategies and initiatives aimed at reducing traffic-related fatalities and injuries on Oklahoma roadways. Oklahoma crash data was analyzed to identify high-risk contributing factors in fatal and serious crashes. These high-risk contributing factors are the eight safety emphasis areas detailed in this section. All data regarding the emphasis areas are from the ODOT SHSP (2023). These safety emphasis areas guided the crash analysis for the City of Guthrie to ensure a comprehensive approach to the development of safety recommendations. The SHSP emphasis areas are detailed below, but it is important to note that based on the availability of data, the following emphasis areas were able to be mapped in Guthrie; Intersections, Unsafe Speed, Roadway & Lane Departures, Impaired Driving, and Commercial Motor Vehicles and Work Zones.



Occupant Protection

where a vehicle occupant was not restrained or not using appropriate child restraints or seat belts



Motorcycles and All-Terrain Vehicles

crashes involving motorcycles and all-terrain vehicles



Intersections

crashes in which the first harmful event occurred on an approach to or an exit from an intersection and is related to movement through the intersection



Vulnerable Road Users

crashes involving pedestrian and bicyclists



Unsafe Speed

contributing factor to crash involving motor vehicles traveling under the limit or over the limit at unsafe speeds



Roadway & Lane Departure

vehicles run off the road or travel outside of their dedicated lane



Impaired Driving

driver was identified as having been drinking, having taking medication or been under the influence of alcohol or drugs



Commercial Motor Vehicles and Work Zones

crashes involve vehicles used for business purposes, such as trucks, buses, and delivery vehicles and crashes occur in or near areas where road construction, maintenance, or utility work is being performed



Occupant Protection



Occupant Protection crashes are crashes involving people not wearing seatbelts. An incident is an Occupant Protection crash if even one occupant of a vehicle is not wearing a seatbelt. National Highway Traffic Safety Administration (NHTSA) reports that wearing a seatbelt reduced the risk of fatal injury by 45% and moderate to critical injury by 50% in the result of a crash. Additionally, 36% of fatal and serious injuries in the State of Oklahoma involved a person who was not wearing a seatbelt. When even one occupant is not restrained, they can be a risk to themselves as well as others in the vehicle. It is important to ensure that seatbelts and child safety seats are used properly. Failure to wear a seatbelt when combined with other risky driving behaviors such as speeding or intoxication often leads to fatality or serious injury.



Source: Adobe Stock

Motorcycles and All-Terrain Vehicles



Motorcycles and All-Terrain Vehicles (ATVs) are at increased risk in collisions, due to the lack of protection in the event of a crash. The lack of structural protection or airbags makes protective equipment, such as helmets, and traffic safety critical for motorcycle and ATV users. According to the ODOT SHSP, from 2017 through 2021, there were 377 fatal collisions involving motorcyclists and 172 collisions involving ATVs on public roads in Oklahoma. Fatal motorcycle crashes primarily occur in daylight on highways, while fatal ATV crashes are relatively split between daylight and dark unlit conditions on county roads. Unsafe speed when operating a motorcycle or ATV significantly decreases the survival rate of crashes. ODOT also emphasizes that wearing a helmet when operating a motorcycle or ATV significantly reduces the occurrence of a fatality or serious injury in a crash. 70% of motorcyclist fatalities in Oklahoma from 2017-2021 were not wearing a helmet.



Source: Adobe Stock



Intersections



Intersection-related crashes are common due to the number of conflict points available at a signalized and non-signalized intersection. Fatal and serious injury intersection related crashes most commonly occur on highways and city streets with dry road conditions in daylight. Intersection crashes can happen when drivers have poor visibility of traffic lights or stop signs, preventing them from reacting to oncoming traffic in time. The lack of or low visibility of pavement markings can also make turning at an intersection hazardous. Proper driver education about signage and traffic laws can increase safety, especially at stop-controlled intersections. Distracted driving and impaired driving increase safety risks at intersections for all roadway and sidewalk users.



Source: Adobe Stock

High Crash Intersections

Intersection safety is a top priority when approaching traffic safety because a majority of crashes in Guthrie occur at intersections. Approximately 61.4% of crashes in the City are intersection related. Intersections commonly involve vehicles, pedestrians, and bicycle users in Guthrie, primarily in downtown and residential areas. Improving intersection safety helps make roadways safer and more efficient for users of all ages and abilities. **Table 5** displays the top 12 high crash intersections from 2017-2021 and the locations can be seen in **Exhibit 4** on page 30.

Intersection-related crashes are the most common contributing factors for crashes in the City. 535, or approximately 61.4% of crashes in Guthrie were intersection related from the years 2017-2021, as shown in **Table 6**. Intersection-related crashes have a average rate of fatalities and serious injuries compared to all citywide crashes with 9.7% resulting in a KAB.

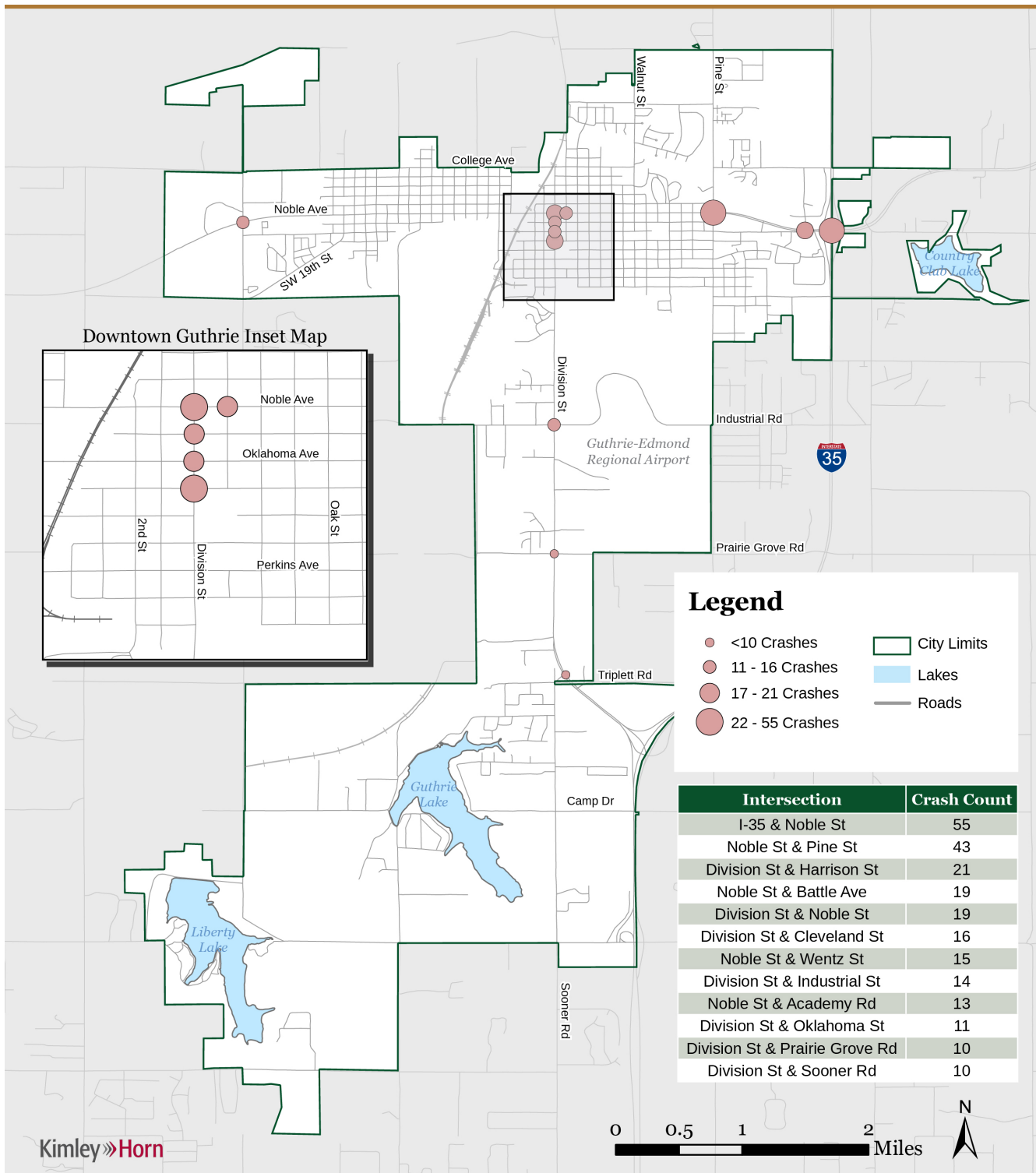
Table 5. High Crash Intersections

INTERSECTION	CRASH COUNT
I-35 & E Noble Ave	55
E Noble Ave & Pine St	43
Division St & Harrison St	21
Noble Ave & Battle Ave	19
Division St & Noble Ave	19
Division St & Cleveland St	16
Noble Ave & Wentz St	15
Division St & Industrial Rd	14
Noble Ave & Academy Rd	13
Division St & Oklahoma St	11
Division St & Prairie Grove Rd	10
Division St & Sooner Rd	10

Table 6. Intersection Related Crash Data (2017-2021)

CRASH TYPE	TOTAL CRASHES	HIGH INJURY CRASHES (KABS)	PERCENT KABS
Intersection-Related Crashes	535	52	9.7%
All Crashes	871	86	9.9%

Exhibit 4. High Crash Intersections



Vulnerable Road Users



Vulnerable Road Users (VRUs) are defined as crashes involving bicyclists or pedestrians. Fatal and serious injury crashes involving VRUs occur more often during weekday commuting hours. The risk of these crashes can be exacerbated when a city lacks proper sidewalks, trails, or crossings that move these users safely and separate from vehicular traffic. Distracted driving and driving impairment also pose a major concern for VRUs, particularly involving alcohol and phone usage. Crashes resulting in fatality or serious injury primarily occur in dark unlit conditions on city streets.



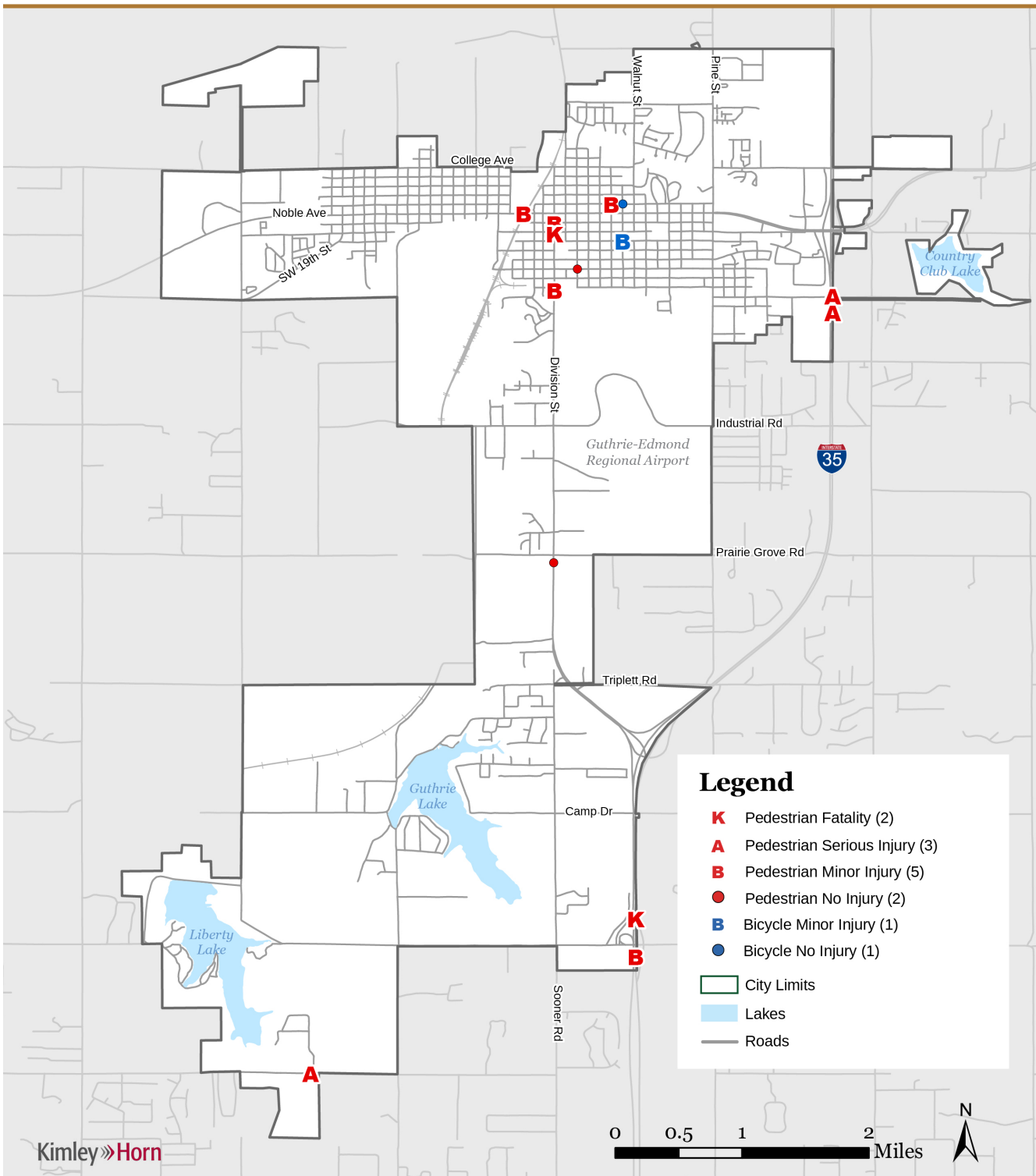
Source: Adobe Stock

Bicyclists and pedestrians are the most vulnerable road users to fatal or serious injuries in the event of a crash. In the years 2017-2021, Guthrie experienced 12 pedestrian crashes and 2 bicyclist crashes as shown in **Table 7**. Of the 14 crashes that involved pedestrians or bicyclists, 12 of them resulted in a fatality, suspected serious injury, or suspected minor injury. In Guthrie, bicycle and pedestrian related crashes are the top emphasis areas in terms of a crash resulting in a fatality or serious injury. Pedestrian safety in the City is a crucial topic that is covered in this plan due to 83% of pedestrian related crashes resulting in a KAB. The downtown area of Guthrie is the primary location where these crashes are occurring as seen in **Exhibit 5** on page 32.

Table 7. Bicycle & Pedestrian Crash Data

CRASH TYPE	TOTAL CRASHES	HIGH INJURY CRASHES (KABS)	PERCENT KABS
Pedestrian Related Crashes	12	10	83.3%
Bicycle Related Crashes	2	1	50.0%
All Crashes	871	86	9.9%

Exhibit 5. Bicycle & Pedestrian Crashes



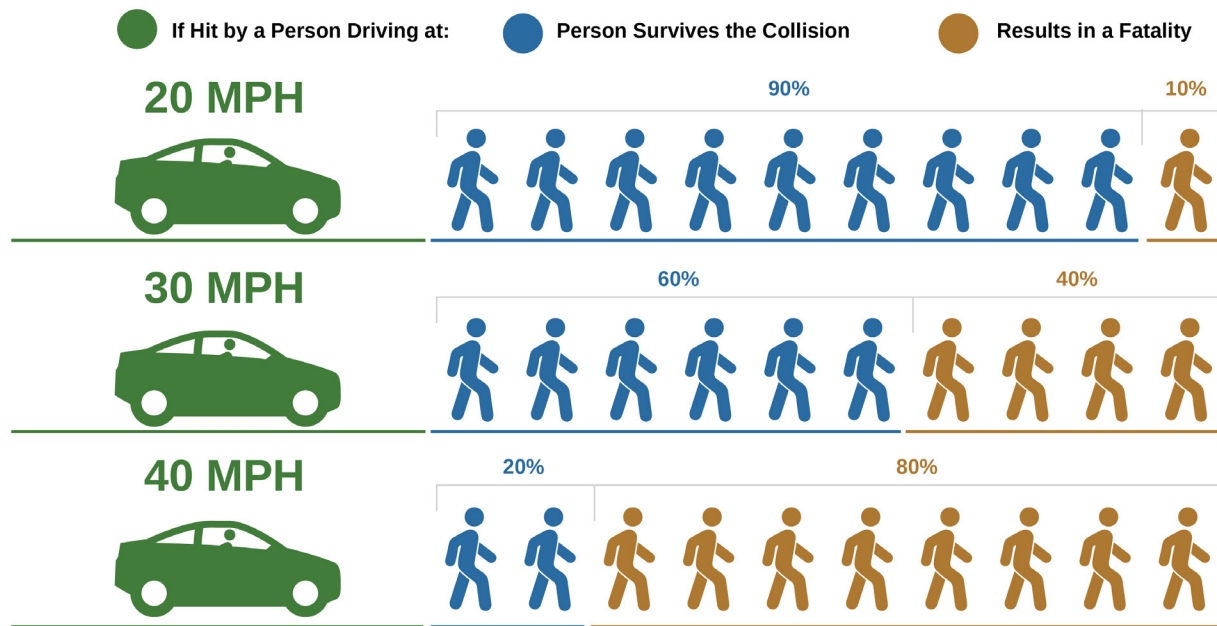


Unsafe Speed



Unsafe Speed occurs when a driver exceeds the posted speed limit or drives too fast for conditions. Unsafe speed crashes often go underreported, and the true impact of unsafe speed is likely greater than what is shown in collected data. Unsafe speed crashes resulting in a fatality or serious injury most often occur on highways with dry road conditions in daylight according to ODOT. Exceeding the posted speed limit can increase the severe injury and fatality rate of all types of collisions, making unsafe speed a top safety emphasis area. If speed is safely reduced, the force of impact will be far less - increasing the survival rate of collisions. The top two contributing factors to making an unsafe speed crash fatal are lane departures and occupant protection. Unsafe speed also greatly impacts pedestrian related crash severity. **Figure 16** displays the chance of pedestrian fatalities compared to vehicle speeds.

Figure 16. Vehicle Speed Comparison to Chance of Pedestrian Fatality

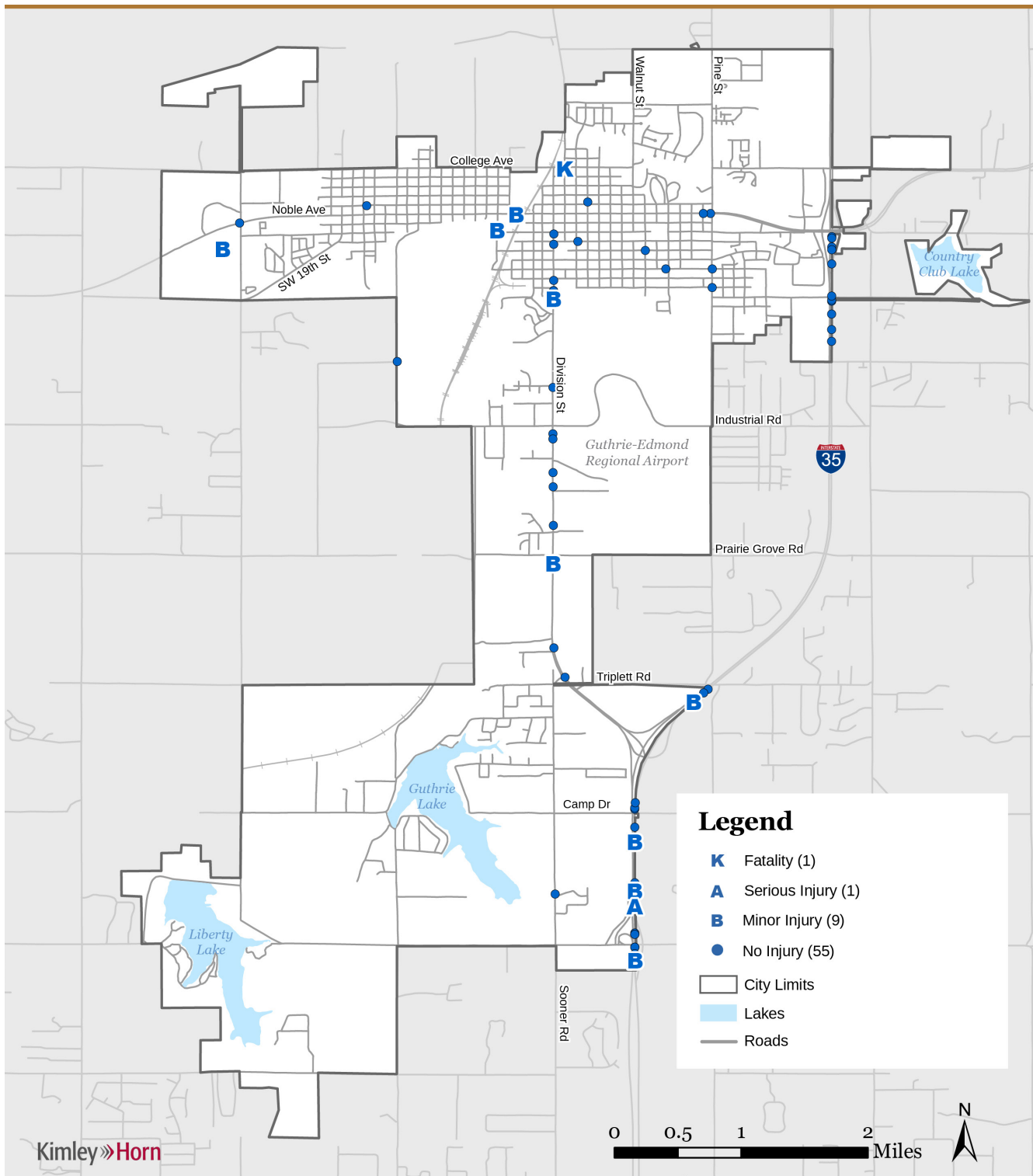


Speeding is a priority safety concern for citizens and stakeholders of the City of Guthrie. From 2017-2021, the City saw 66 total speed-related crashes and one (1.5%) speed-related fatality. **Table 8** and **Exhibit 6** on page 34 display the locations of all speed-related crashes that occurred in Guthrie from 2017-2021. According to the OHSO data, Division St and I-35 are the most common locations in Guthrie where unsafe speeding has been reported.

Table 8. Unsafe Speed Crash Data (2017-2021)

CRASH TYPE	TOTAL CRASHES	HIGH INJURY CRASHES (KABS)	PERCENT KABS
Unsafe Speed Related Crashes	66	11	16.7%
All Crashes	871	86	9.9%

Exhibit 6. Unsafe Speed Crashes





Roadway & Lane Departures



A roadway or lane departure occurs when a vehicle departs from the traveled way – crossing center or edge lines. Roadway and lane departures are the most reported contributing factor to crashes.

Roadway and lane departure crashes resulting in fatalities or serious injuries most commonly occur on highways with dry roadway conditions in daylight according to ODOT. Unsafe driver behavior, unsafe speeds, and impaired driving are often the main factors leading to these crashes. Roadway and lane departure crashes are extremely dangerous due to the manner of collision that they can lead to such as head-on collision and rollovers.



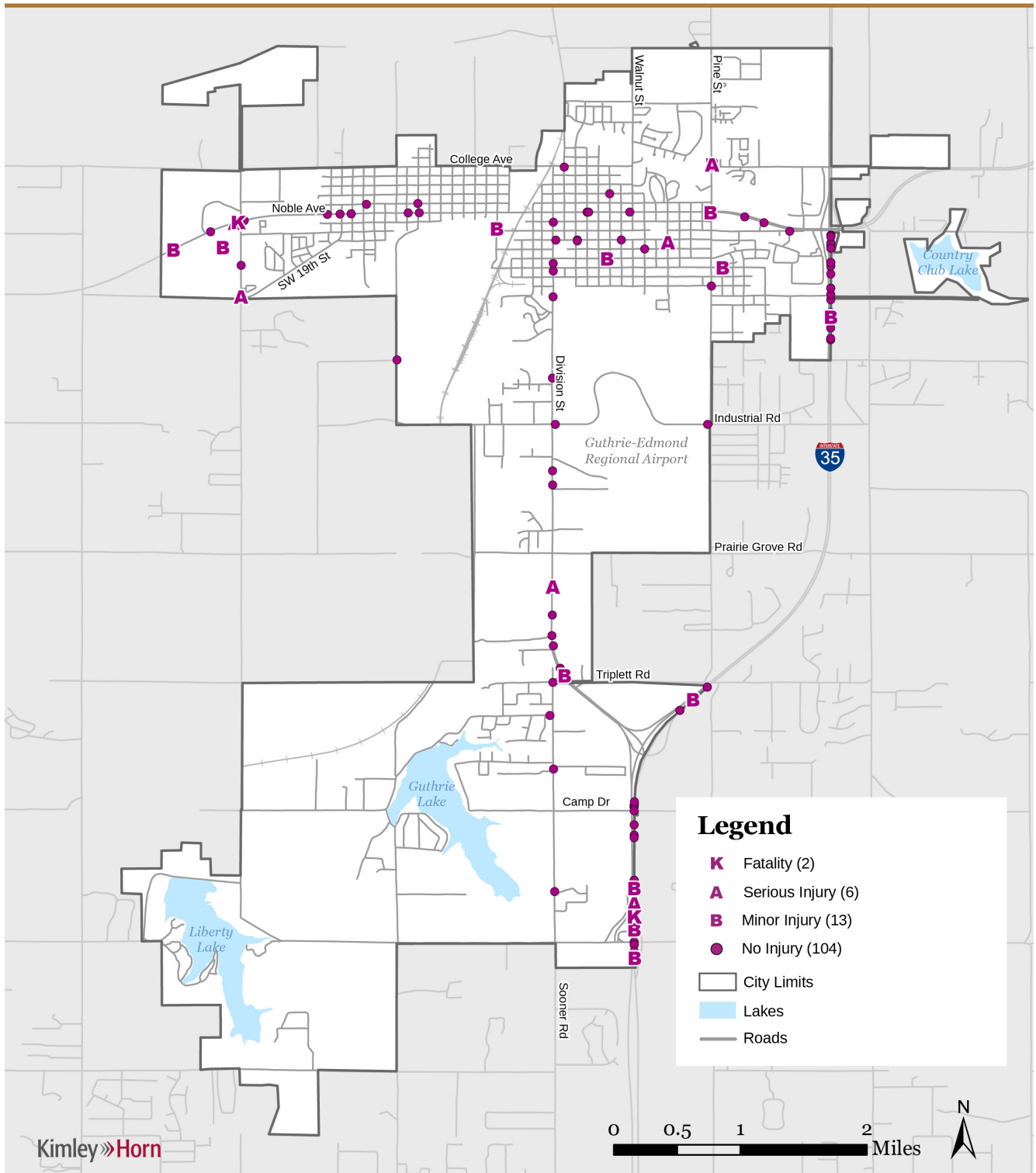
Source: Adobe Stock

Roadway and lane departures are a top contributing factor for crashes on Guthrie roads. These types of crashes most commonly occur on highways and high-volume corridors such as I-35, Division St, and Noble Ave. During 2017-2021, the City experienced 125 total roadway departure related crashes and 21 high injury or fatal roadway or lane departure crashes. **Table 9** and **Exhibit 7** on page 36 display the locations of all roadway and lane departure crashes that occurred in Guthrie during this five-year span. These crashes most commonly occur along I-35, Division St, and Noble Ave.

Table 9. Roadway & Lane Departure Crash Data (2017-2021)

CRASH TYPE	TOTAL CRASHES	HIGH INJURY CRASHES (KABS)	PERCENT KABS
Roadway & Lane Departure Crashes	125	21	16.8%
All Crashes	871	86	9.9%

Exhibit 7. Roadway & Lane Departure Crashes



Impaired Driving



According to ODOT, impaired driving consists of drugs, including prescription medications, and physical impairments such as drowsy driving, poor vision, or reduced cognitive capabilities. Using alcohol, drugs, or some medications will affect the driver's ability to perceive danger and react appropriately in a reasonable amount of time to avoid a collision. Impaired driving crashes most commonly occur under dry roadway conditions on highways in dark unlit conditions according to the ODOT SHSP. When a person chooses to drive with any impairment(s), it endangers all roadway users. Driving impaired slows reaction time and motor skills, reducing a driver's window of time to safely react to a potentially dangerous situation. The most common form of impaired driving is driving while intoxicated, which means having a BAC of between 0.05 and 0.08. These types of crashes disproportionately affect individuals aged 16-30 in Oklahoma.



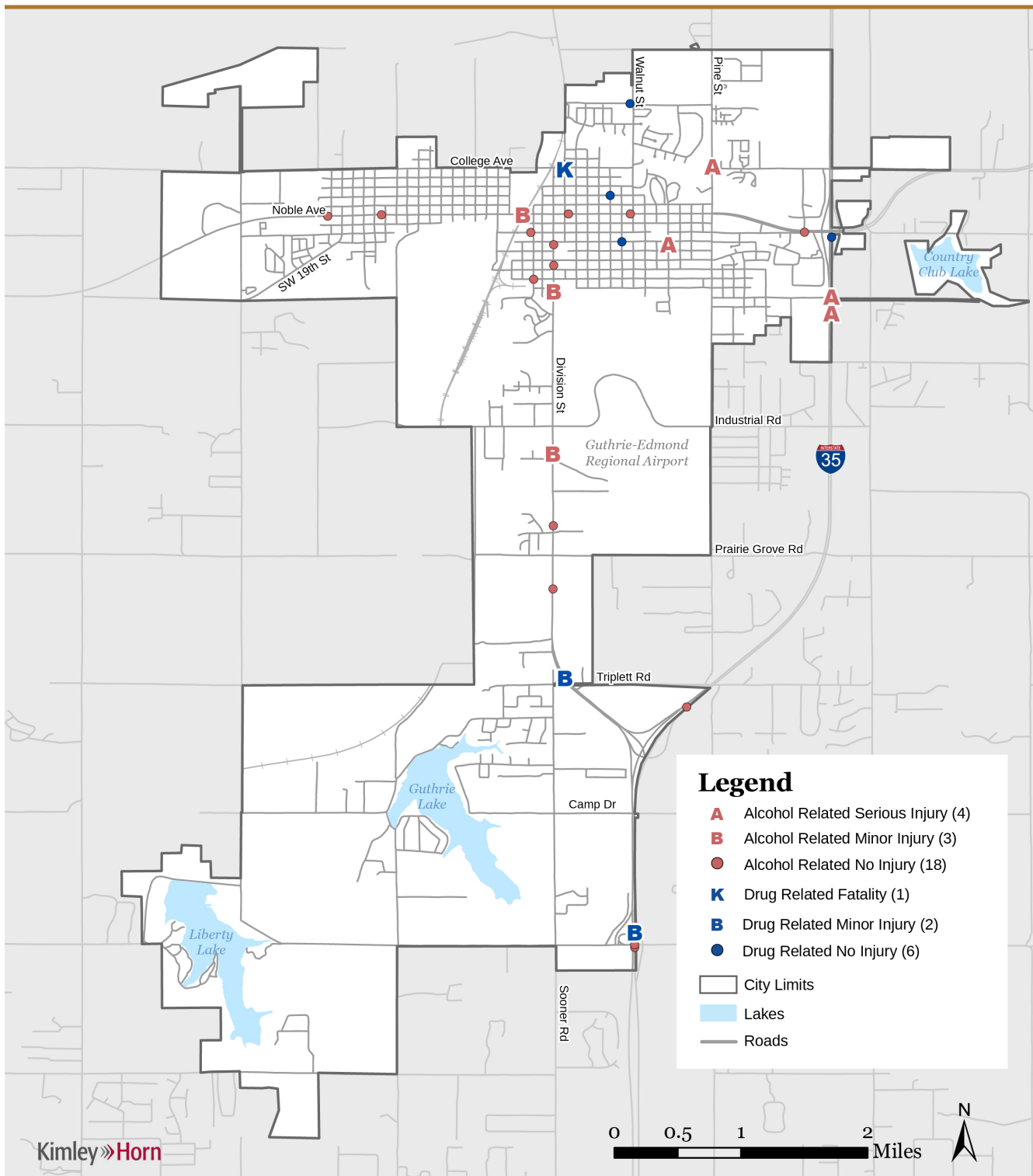
Source: Adobe Stock

From 2017-2021, the City experienced 34 total impaired driving-related crashes, with 10, or 29.4%, of those resulting in a KAB (fatality, serious injury, or minor injury) as shown in **Table 10**. Impaired driving contributes to a high likelihood of a crash resulting in a KAB in Guthrie. **Exhibit 8** on page 38 displays the locations of all impaired driving crashes that occurred in Guthrie from 2017-2021. Downtown Guthrie experiences the most impaired driving related crashes.

Table 10. Impaired Driving Crash Data (2017-2021)

CRASH TYPE	TOTAL CRASHES	HIGH INJURY CRASHES (KABS)	PERCENT KABS
Alcohol Related Crashes	25	7	28.0%
Drug Related Crashes	9	3	33.3%
All Impaired Driving Crashes	34	10	29.4%
All Crashes	871	86	9.9%

Exhibit 8. Impaired Driving Crashes





Commercial Motor Vehicles and Work Zones



A Commercial Motor Vehicle (CMV) is described by the Federal Motor Carrier Safety Administration (FMCSA) as a vehicle with a gross weight of 10,001 pounds or more. Due to the weight of a CMV, the force of impact in any crash can be fatal. CMV-related crashes result from CMV driver and non-CMV driver behaviors such as distracted driving, impaired driving, speeding, unsafe lane changes, and following too closely. Fatal and severe injury CMV crashes primarily occur on highways with dry roadway conditions in the daylight. Work zone-related crashes occur where there is roadway construction, maintenance, or utility work taking place. Work zones should be clearly marked and have reduced speed limits. Work zones may have a reduced number of lanes, reduced lane width, improper pavement markings, heavy machinery, and workers present. Driver inattention due to impairment or distraction in a work zone is extremely hazardous.



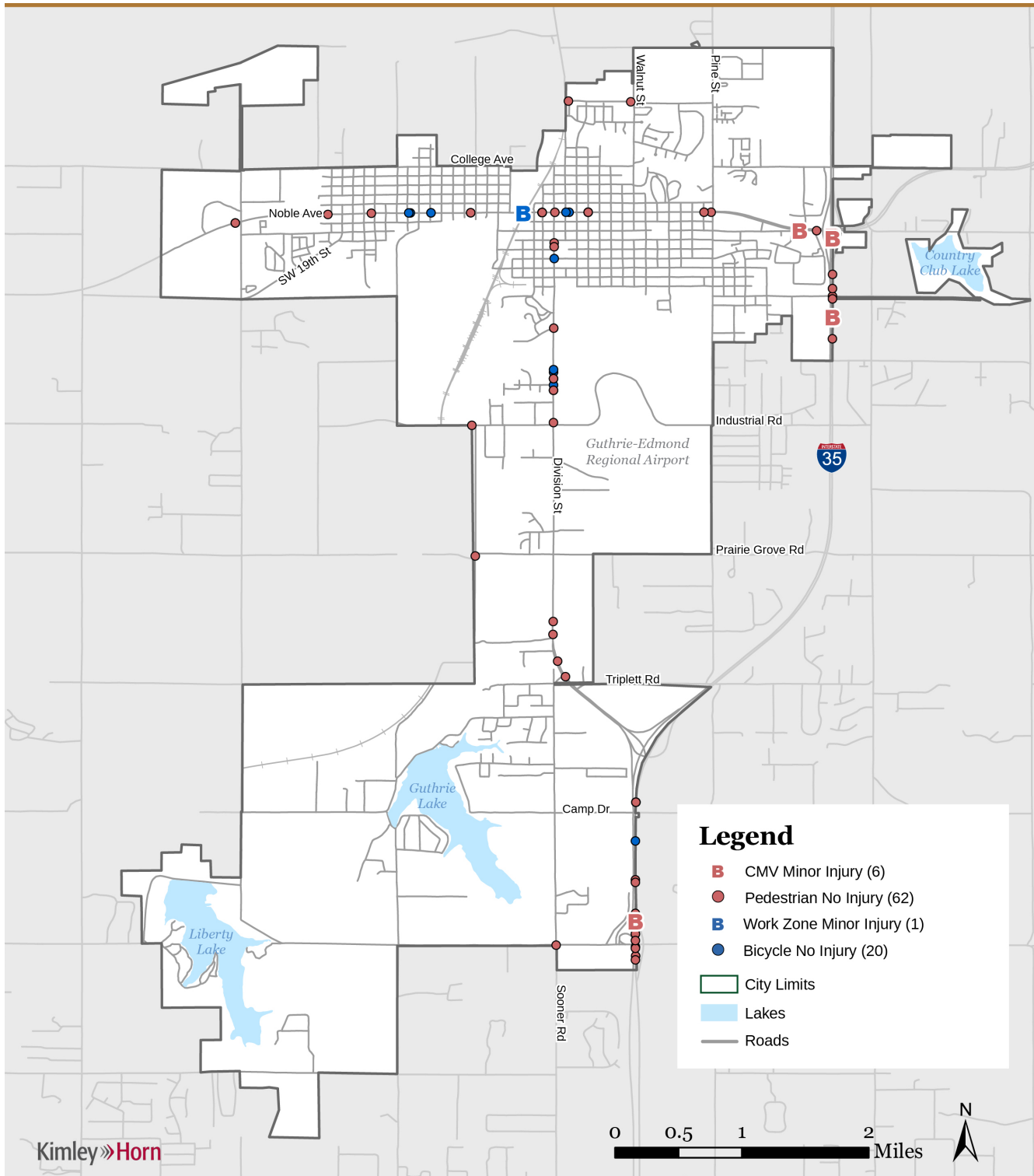
Source: Adobe Stock

The majority of CMV and work zone crashes in Guthrie occur along primary roadways such as I-35, SH 77 (Division St), and SH 33 (Noble Ave). A total of 68 crashes occurred in the City of Guthrie involving CMVs and 21 crashes in work zones. Of the CMV and work zone related crashes, 7 resulted in a KAB during 2017-2021. These crashes result in a slightly lower percentage of KABs compared to the City average. In Guthrie, CMV and work zone crashes are not as severe of an issue in comparison to the state. **Table 11** showcases the CMV and work zone crash data and **Exhibit 9** on page 40 displays these crashes.

Table 11. CMV and Work Zone Crash Data

CRASH TYPE	TOTAL CRASHES	HIGH INJURY CRASHES (KABS)	PERCENT KABS
Commercial Motor Vehicle Crashes	68	6	8.8%
Work Zone Crashes	21	1	4.8%
All CMV and Work Zone Crashes	89	7	7.9%
All Crashes	871	86	9.9%

Exhibit 9. Commercial Motor Vehicles & Work Zone Crashes





Equity Considerations

Equity is a crucial consideration when prioritizing and selecting future transportation investment opportunities in Guthrie. Equity involves shaping resources and interventions to meet the specific needs of all people, ensuring that vulnerable communities have the necessary support and investments to achieve similar safety goals. The U.S. Department of Transportation (USDOT) defines disadvantaged census tracts as communities that score at the 65th percentile based on national scoring data; scoring is conducted through an assessment based on the following criteria:

✓ **Transportation Insecurity**

Lack of reliable transportation options for users to get to their desired destination, which includes access to public transportation.

✓ **Environmental Burden**

Environmental characteristics such as pollution, hazardous material exposure, or the built environment that contribute to health disparities, negative educational outcomes, and economic hardships.

✓ **Social Vulnerability**

Socioeconomic factors such as poverty rates contribute to a larger burden on individuals

✓ **Health Vulnerability**

Assesses the increased prevalence of health conditions that may result from air, noise, water pollution, and other lifestyle factors such as poor walkability and long commute times.

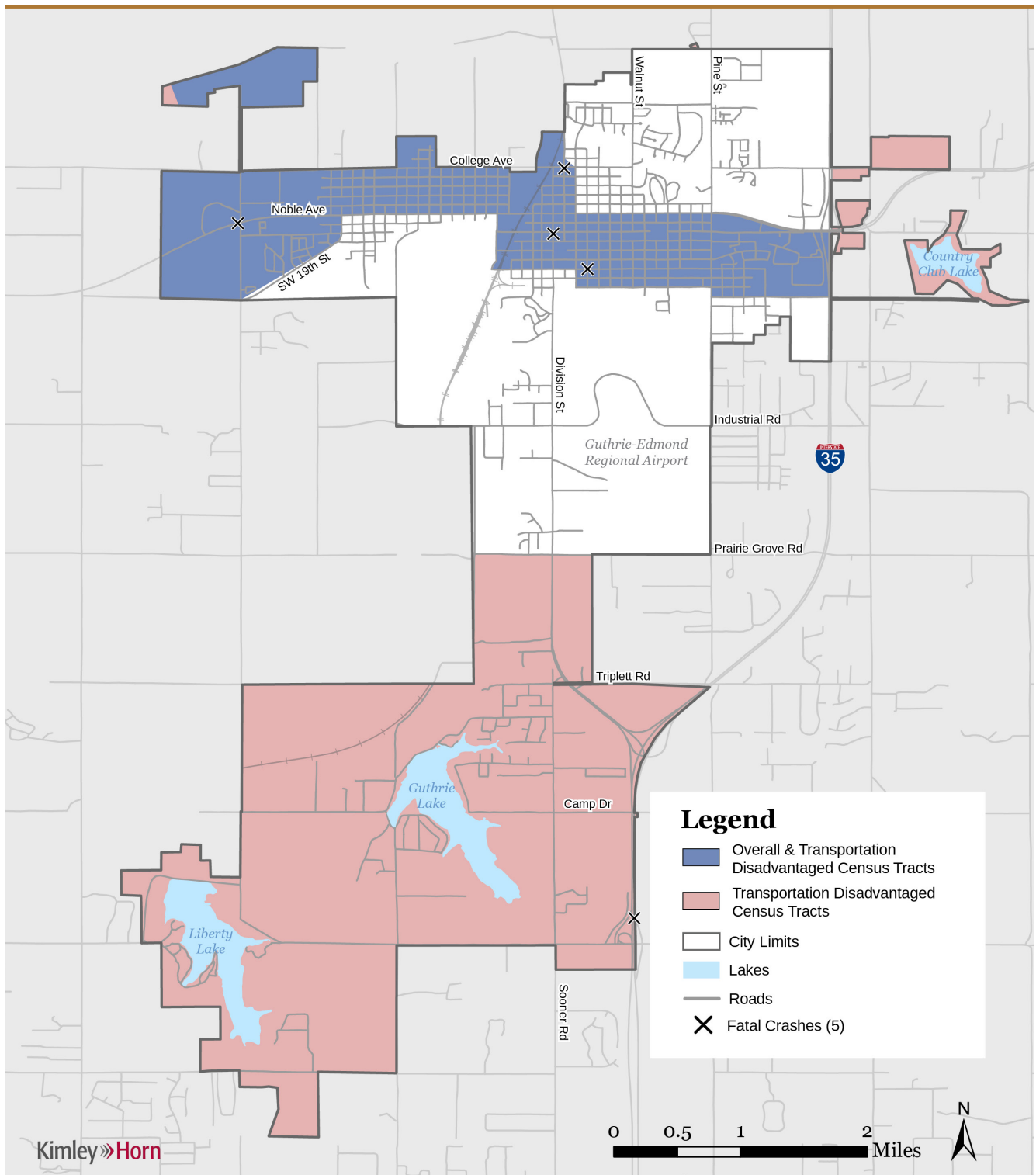
✓ **Climate and Disaster Risk Burden**

Measures the current and future risks to communities from climate and natural disasters, based on potential losses from existing hazard exposure and vulnerability.

The five components are scored, summed, and the resulting percentiles are ranked to create the final score. Disadvantaged census tracts may also experience higher rates of traffic crashes while having inadequate infrastructure for vulnerable road users. Identifying these tracts played a crucial part in the analysis of corridors for Guthrie CSAP and allows the project identification process to incorporate equity opportunities.

Exhibit 10 on page 42 displays the Overall and Transportation Disadvantaged Census Tracts in Guthrie. This input is a combination of the five criteria for the equity analysis. It is important to note that all five fatal crashes in Guthrie from 2017-2021 occurred in a disadvantaged census tract. Due to this, it was a focal point of the CSAP to address safety concerns in disadvantaged areas to ensure traffic safety for all people. This analysis was used to prioritize the study corridors found in **Chapter 5** to ensure an equitable selection process for the CSAP.

Exhibit 10. Disadvantaged Census Tracts





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