from MAIN STREETS to SAFE STREETS

Appendix A: Local Road Safety Plan

Submitted by
Indian Nations Council of Governments
in partnership with the Oklahoma cities of
Bixby, Bristow, Claremore, Collinsville, Sapulpa, and Skiatook

Indian Nations Council of Governments Local Road Safety Plan

2022

Source: FHWA

Contents

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City of Owasso

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Rogers County

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Welcome Message

INCOG is committed to providing planning and coordination services to assist in creating solutions to local and regional challenges in transportation, including safety planning. We recognize that while we continuously make efforts to address safety, we know we can do more. Over the last 10 years, there were nearly 40,000 crashes on non-State roads in our region, with over 4,200 of those involving a fatal or serious injury. These lives lost or severely affected are our neighbors and members of our communities.

In response, we have come together with a group of safety stakeholders and partners to develop proactively a plan of strategies and actions to address the fatal and serious injury crashes occurring on our roadways. This Local Road Safety Plan (LRSP) is a call to action – to work together with other agencies in our region to promote and improve the safety culture within our region. We ask that you join us in implementing this plan. Our vision is to eliminate fatalities and serious injuries on our roadways—but only with your collaboration do we believe it can be achieved.

Executive Summary

This Local Road Safety Plan (LRSP) was developed to address safety on local (non-State owned) roads in the Indian Nations Council of Governments (INCOG) region. It incorporates many of the principles and elements of the Safe System approach and provides a data-driven framework to focus safety efforts for INCOG and its member agencies. The LRSP aligns with the Oklahoma Strategic Highway Safety Plan (SHSP) and includes strategies and action items that can lead to a reduction of traffic related fatalities and serious injuries in the INCOG region when implemented collectively by the INCOG stakeholders.

The LRSP's vision, mission, and goal are:

Vision: Incorporate the 5Es approach (Engineering, Enforcement, Education, Emergency Services, and Everyone) to reach zero deaths.

Mission: Establish a Culture of Safety where EVERYONE helps to ensure their own safety and the safety of others through their actions, attitudes, and behaviors.

Goal: Reduce annual traffic fatalities and serious injuries by 25 percent by 2030.

Crash data analysis for 2010-2019 showed the following percentages for fatal and serious injury crash types, locations, and risk factors:

- 44% are intersection-related crashes
- 37% are angle and right-angle crashes
- 19% are fixed object crashes
- 16% are rear end crashes
- 15% involved alcohol
- 13% involved not using seat belts
- 12% are pedestrian and bicycle crashes
- 12% involved young drivers (age 15 to 20 years old)
- 11% involved older drivers (65 years and older)

INCOG stakeholders identified the following emphasis areas based on discussions and data analysis:

- Lane departures
- Native American fatalities
- Intersections
- Non-motorized users
- Young/older drivers
- Behavior
    - Unbelted
    - Speeding
    - Impaired driving
    - Distracted

For each of these emphasis areas, INCOG stakeholders identified nearly 100 strategies and actions for reducing crashes, focusing on engineering, education, enforcement, and emergency services countermeasures. Key sources for strategies included:

- FWHA's Proven Safety Countermeasures
- National Highway Traffic Safety Administration's (NHTSA) Countermeasures that Work
- FHWA's Crash Modification Factors Clearinghouse

Example strategies and actions included:

- Install rumble strips
- Remove/relocate fixed objects on the roadside
- Provide enhanced curve delineation
- Install turn lanes
- Install pedestrian hybrid beacons
- Construct roundabouts
- Conduct road safety audits (RSAs)

Stakeholders identified priority intersections and corridors as potential project locations for implementing these strategies and actions.

The INCOG LRSP incorporates the Safe System approach for eliminating traffic fatalities and serious injuries for all roadway users. This approach is based on the following principles: the human body is vulnerable, humans make mistakes, and it is unacceptable that these mistakes result in death and injury. The Safe System approach considers the five elements of a safe transportation system: safe road users, safe vehicles, safe speeds, safe road, and post-crash care. By utilizing the Safe System approach during the LRSP implementation, INCOG and its stakeholders can have success in reducing traffic fatalities and serious injuries on its roadways.

Introduction

The Indian Nations Council of Governments (INCOG) is the Metropolitan Planning Organization (MPO) for the Tulsa area. INCOG serves Creek, Osage, Rogers, Tulsa, and Wagoner counties, more than 50 cities and towns located in those counties, and the Cherokee, Muscogee, and Osage Nations. INCOG facilitates a cooperative effort with Federal, State, and local governments and other transportation agencies to assess the area's transportation requirements, as well as to develop comprehensive, multi-modal plans and programs that address the needs and goals of the region.

INCOG partnered with the Federal Highway Administration (FHWA) to develop this Local Road Safety Plan (LRSP). A stakeholder group guided the development of the LRSP by participating in two virtual workshops. These stakeholders included representatives from:

- INCOG
- Oklahoma DOT
- FHWA Office of Safety
- FHWA Oklahoma Division
- City of Tulsa
- City of Jenks
- City of Glen Pool
- City of Sand Springs
- City of Owasso
- City of Coweta
- Rogers County
- Tulsa County
- Oklahoma Highway Safety Office

The INCOG Connected 2045 Regional Transportation Plan, November 2017, recommended development of a regional safety plan to outline goals and strategies for improving safety. This LRSP fulfills that recommendation. This LRSP also complements the 2018 Oklahoma Strategic Highway Safety Plan (SHSP). The SHSP is a statewide-coordinated safety plan that provides a comprehensive framework for reducing highway fatalities and serious injuries on all public roads in Oklahoma.

Safe System Approach

The Safe System Approach is a method for eliminating traffic fatalities and serious injuries for all roadway users. It is based on the following principles: the human body is vulnerable, humans make mistakes, and it is unacceptable that these mistakes result in death and injury. Furthermore, it is critical to design and operate the roadway system to keep impact energy on the human body at tolerable levels.

Source: FHWA

Figure 1. Graphic. The Safe System Approach (FHWA, n.d.).

The Safe System Approach moves beyond reacting solely on crash history by proactively identifying risk factors associated with severe crash types and implementing safety countermeasures systemically based on those factors. This LRSP includes the systemic implementation of strategies. All parts of the transportation system need to be strengthened to build in redundancy to prevent any failures of the system. Examples of redundancy include installation of curve warning signs to alert motorists of conditions in which a slower speed is necessary combined with speed feedback signs and education and enforcement campaigns that help avoid behaviors that may result in crashes.

The Safe System Approach considers the five elements of a safe transportation system: safe road users, safe vehicles, safe speeds, safe road, and post-crash care. Road users represent all modes of travel, and their capabilities may be influenced by factors such as age, level of impairment, and other behaviors. System owners and other stakeholders can use strategies such as signing, enforcement, and education campaigns to address these limitations and encourage change in behavior. Safe vehicles incorporate new technology and other features to prevent crashes from occurring, and if they do, reduce the severity of a crash. Safe speeds reduce the likelihood of an individual dying in a crash. Appropriate speed limits and signing, as well as speed feedback signs, help reduce the speed of users. These can be reinforced with enforcement and education campaigns. Safe roads incorporate strategies during design, construction, maintenance, and operations to prevent crashes and manage impacts to keep kinetic energy at tolerable levels should a crash occur. Post-crash care is critical when a crash occurs, and a person is injured. This includes first responders being able to locate and respond quickly to the crash and stabilize and transport the individual.

Ultimately, the Safe System Approach puts safety at the forefront and shifts the prioritization of transportation investments. By using the Safe System Approach during the LRSP implementation, INCOG and its stakeholders can succeed in reducing traffic fatalities and serious injuries on its roadways.

LRSP Development Process

Developing an LRSP is one of several FHWA Proven Safety Countermeasures. It is developed using a six-step process. The following sections describe each step. This LRSP considers the unique needs and issues specific to the INCOG region and integrates the principles and elements of a Safe System Approach where applicable. Implementation is key and has been kept in the forefront during the LRSP development process.

Source: FHWA

Figure 2. Graphic. The LRSP development process (FHWA, 2018).

Establish Leadership

INCOG engaged local, regional, State, and Federal safety stakeholders to provide input into the development of the LRSP. These partnerships and collaborative efforts recognize a shared responsibility to eliminating fatal and serious injury crashes and provide the opportunity to share knowledge, leverage resources and maximize implementation of the LRSP. An initial kickoff meeting was held to identify additional stakeholders and sources of data.

Analyze Safety Data

The safety data analysis (i.e., crash, traffic, roadway data) for the non-State roadways in the INCOG region identified crash trends and risk factors. The analysis included fatal and serious injury crashes for the period of 2010 to 2019. These are represented by KA, in the KABCO injury classification scale:

- K – fatal injury
- A – incapacitating (serious) injury
- B – non-incapacitating injury
- C – possible injury
- O – no injury

Crash trees helped to identify opportunities for systemic application of safety countermeasures. Crash maps identified corridors of interest and hot spots.

Determine Emphasis Areas

Emphasis areas in a LRSP enable the safety stakeholders to better focus available resources. Safety stakeholders considered the nine Oklahoma SHSP emphasis areas and the corresponding data analysis results in identifying the following emphasis areas for INCOG's LRSP.

- Lane departures
- Native American fatalities
- Intersections
- Non-motorized users
- Young/older drivers
- Behavior

Identify Strategies

Based on the selected emphasis areas, data analysis results, and local knowledge, the stakeholders discussed and identified various countermeasures for inclusion in the LRSP. Many of these are identified in the Oklahoma SHSP and are considered effective countermeasures by FHWA and National Highway Traffic Safety Administration (NHTSA). They also align with elements of the Safe System Approach, such as Safe Roads, Safe Road Users, and Safe Speeds.

Prioritize and Incorporate Strategies

Each emphasis area in the INCOG LRSP includes a series of strategies and action items incorporating these countermeasures. The stakeholders considered the principles and elements of the Safe Systems Approach and the method of implementation (e.g., proactive systemic approach) during this process. Each action item is listed in priority order and includes the lead agency and partners, method of application, priority locations and corridors to focus immediate implementation efforts, and potential funding sources. Each action item also includes an implementation time frame. Crash Modification Factors (CMFs) were also included to show the expected impact to crashes. For example, a CMF of 0.81 indicates a reduction in crashes of 19 percent.

Evaluate and Update

The LRSP is a living document which should be evaluated and updated on a regular cycle. Evaluation can include yearly analysis of crashes to determine if crashes are increasing or decreasing. Most agencies conduct an update of their safety plan every 3 to 5 years. Tracking the allocation of resources, positive changes in user behavior, and the reduction in crashes as strategies and action items are implemented can be the mechanism with which INCOG and its safety stakeholders evaluate the effectiveness of the LRSP. This also will assist INCOG and its stakeholders in identifying new action items or those that should be expanded, determining necessary resources for implementation, and pursuing grant opportunities.

INCOG LRSP Vision, Mission and Goal

The INCOG stakeholders developed the LRSP Vision, Mission, and Goal statements during the first stakeholders' workshop.

Vision

Incorporate the 5Es approach (Engineering, Enforcement, Education, Emergency Services, and Everyone) to reach zero deaths.

Mission

Establish a Culture of Safety where EVERYONE helps ensure their own safety and the safety of others through their actions, attitudes, and behaviors.

Goal

Reduce annual traffic fatalities and serious injuries by 25 percent by 2030.

These statements reflect Safe System Approach principles that death and serious injuries are unacceptable and that shared responsibility by all stakeholders is necessary. The Vision statement recognizes that a collaborative effort by all the safety partners is necessary to achieve the reductions in traffic related fatalities set forth by the Goal. The Mission demonstrates that everyone has a role to play in improving safety for themselves and others. Strategies and action items identified in later sections of this LRSP reflect Safe System elements such as Safe Roads, Safe Road Users, and Safe Speeds and support achieving the Vision, Mission, and Goal statements.

Existing Efforts

Several initiatives are already being planned for the INCOG region. The INCOG 2017 Connected 2045 Regional Transportation Plan (RTP) recommended greater emphasis on and resource allocation to transportation safety in the region. To reduce crashes in the region, the RTP recommended:

- Creation of an INCOG Regional Safety Council to promote cooperation between various member agencies and across all modes of travel. An initial objective of this Council is to develop a regional safety plan to outline goals and strategies for improving safety. The plan recommends the creation of both the Council and the safety plan within 5 years of the RTP being published.
- Further development of collision analysis tools and strategies.
- Creation of a transportation safety committee within INCOG to oversee safety-related programs and projects and monitor progress on goals established by the regional transportation safety plan, as well as safety performance measures established by the FHWA.

INCOG has produced four safety videos on pedestrian and bicyclist safety and disseminated them online. "Travel with Care" is a public awareness campaign from INCOG and the Oklahoma Highway Safety Office (OHSO) that educates the public on the rules of the road.

The 2015 Tulsa Regional Bicycle and Pedestrian Master Plan included a goal to improve safety and security for all users of the transportation system by applying strategies that reduce fatal and injury crash rates in the Tulsa metropolitan area. At the state level, the Oklahoma SHSP developed statewide emphasis areas, used as a starting point in developing emphasis areas for this LRSP. The state emphasis areas included:

- Unsafe driver behavior (including restraint use, speeding and aggressive driving, distraction and inattention, and drug or alcohol impairment)
- Lane departure
- Intersections
- Younger drivers
- Commercial Motor Vehicle (CMV) crashes
- Native American fatalities
- Motorcycle crashes
- Older drivers
- Non-motorized crashes

The Oklahoma Highway Safety Office (OHSO) oversees the annual Highway Safety Plan (HSP) to prioritize and fund projects that aim to improve safety on roadways across the state. OHSO coordinates a statewide behavioral highway safety program that makes federal funds from the National Highway Traffic Safety Administration (NHTSA) available to state and local entities. These dollars fund programs that help enforce traffic laws, educate the public in traffic safety, and provide varied and effective

means of reducing fatalities, injuries, and economic losses from crashes. OHSO awards grants to help address:

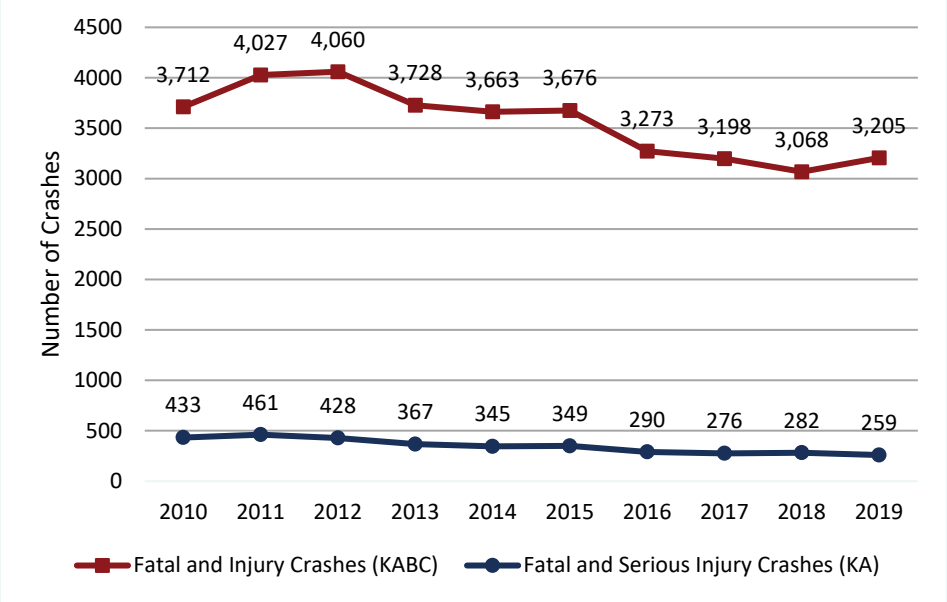
- Impaired driving
- Speeding
- Occupant protection and child passenger safety
- Pedestrian and bicycle safety
- Driver education programs
- Motorcycle safety

Data Analysis

Crash Data Analysis

The Oklahoma Department of Transportation (ODOT) provided crash data for public, non-State owned and maintained roads within the five-county INCOG region (Creek, Osage, Rogers, Tulsa, and Wagoner counties). This crash data covered the period between 2010 and 2019. During this period a total of 39,810 injury crashes occurred on non-State roads, of which 4,157 involved a fatal or serious injury.

Figures 3 through 5 were developed to illustrate crash trends in the INCOG region on non-State roads based on the ten-year period of collected data. Figure 3 depicts the total amount of fatal and injury crashes and fatal and serious injury crashes in Tulsa County. The number of county crashes, regardless of severity, have shown a steady decline over the past decade.

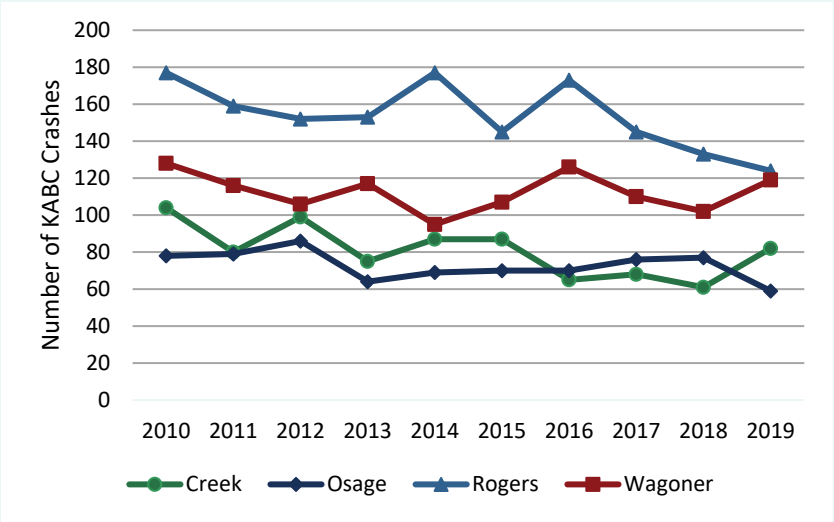


Source: FHWA

Figure 3. Graphic. Crashes per year, Tulsa County | 2010 to 2019.[1]

[1]In February 2021, INCOG pulled data from ODOT's secure Safe-T site (https://www.oksafe-t.org/). The project team used the data to make this graph.

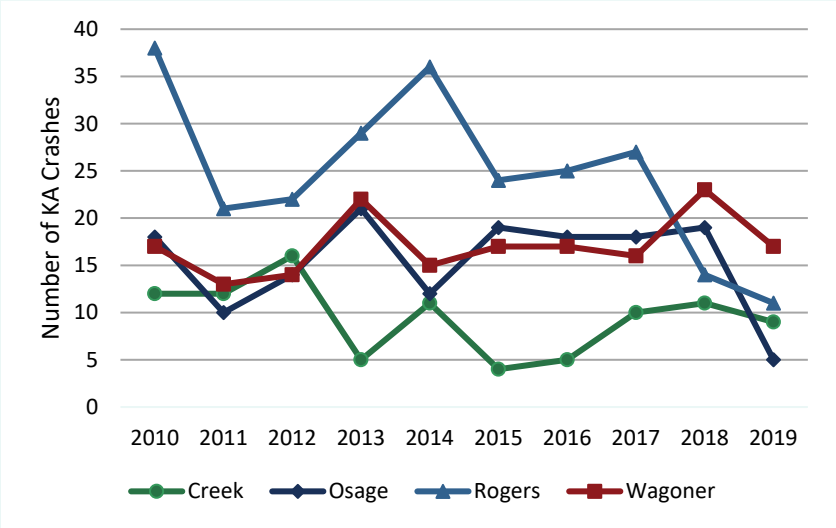
Figure 4 shows fatal and injury crashes between 2010 and 2019 for the four other counties in the INCOG area. There have been fluctuations in these numbers with different spikes for each county.



Source: FHWA

Figure 4. Graphic. Fatal and injury crashes per year, Creek, Osage, Rogers, and Wagoner Counties | 2010 to 2019.[2]

Figure 5 focuses on fatal and serious injury crashes in the same counties as figure 4. The fluctuations are more pronounced with the smaller number of crashes reflected in this analysis.

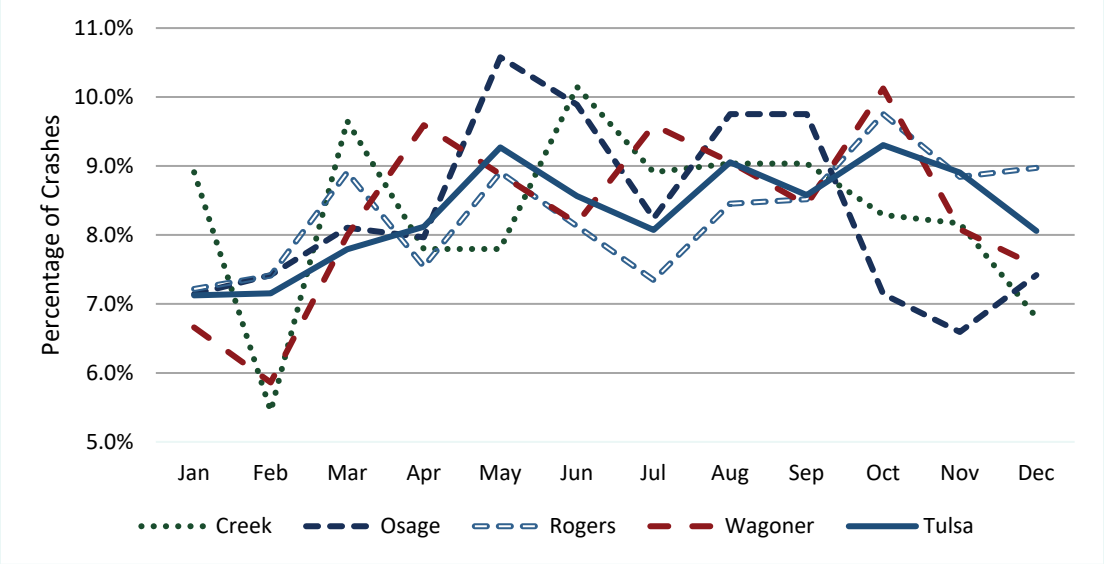


Source: FHWA

Figure 5. Graphic. Fatal and serious injury crashes per year, Creek, Osage, Rogers, and Wagoner Counties | 2010 to 2019.[2]

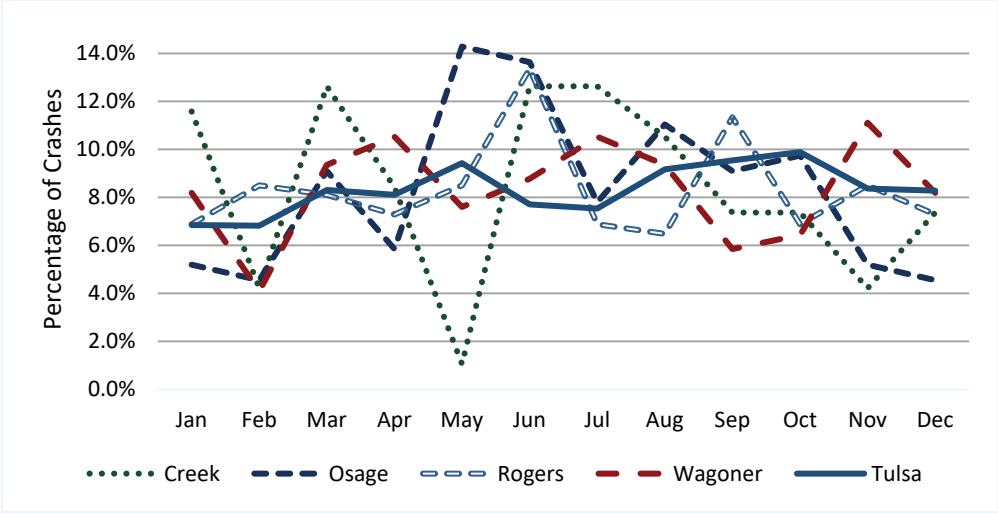
[2] In February 2021, INCOG pulled data from ODOT's secure Safe-T site (https://www.oksafe-t.org/). The project team used the data to make this graph.

Figure 6 and figure 7 depict the percentage of crashes by calendar months for fatal and injury crashes and fatal and serious injury crashes respectively. In Tulsa County, October and May appear to be the peak months. The other counties peak at different times: Osage in May, Creek in June, Rogers in October for all injuries and June for fatal and serious injuries, and Wagoner in October for all injuries and November for fatal and serious injuries.



Source: FHWA

Figure 6. Graphic. Fatal and injury crashes by month | 2010 to 2019.[3]

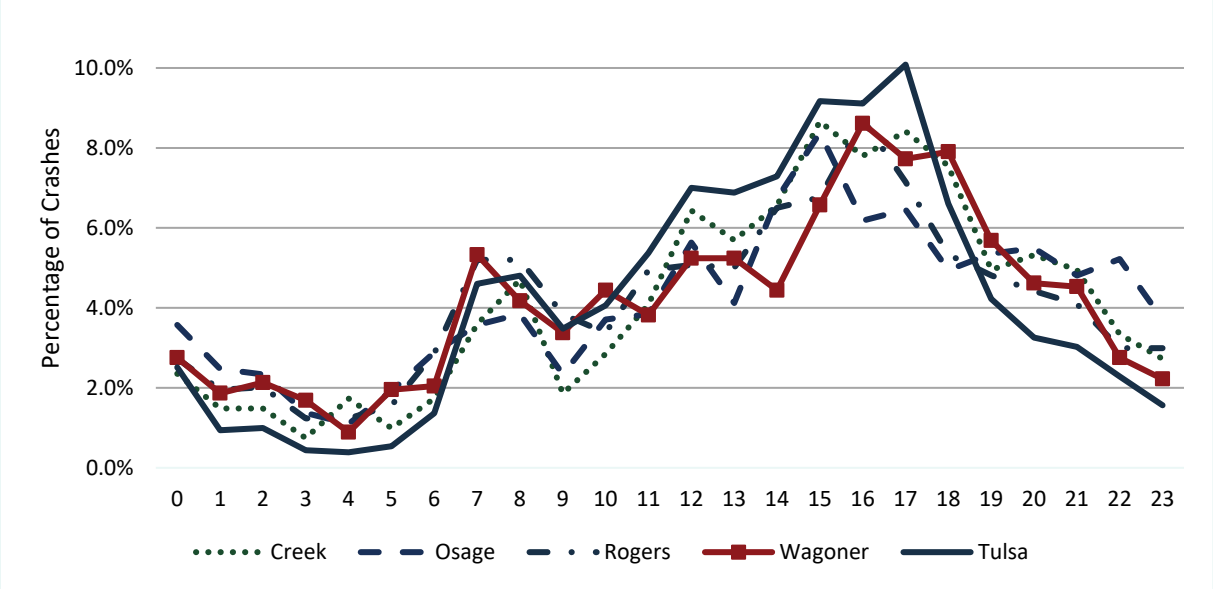


Source: FHWA

Figure 7. Fatal and serious injury crashes by month | 2010 to 2019.[3]

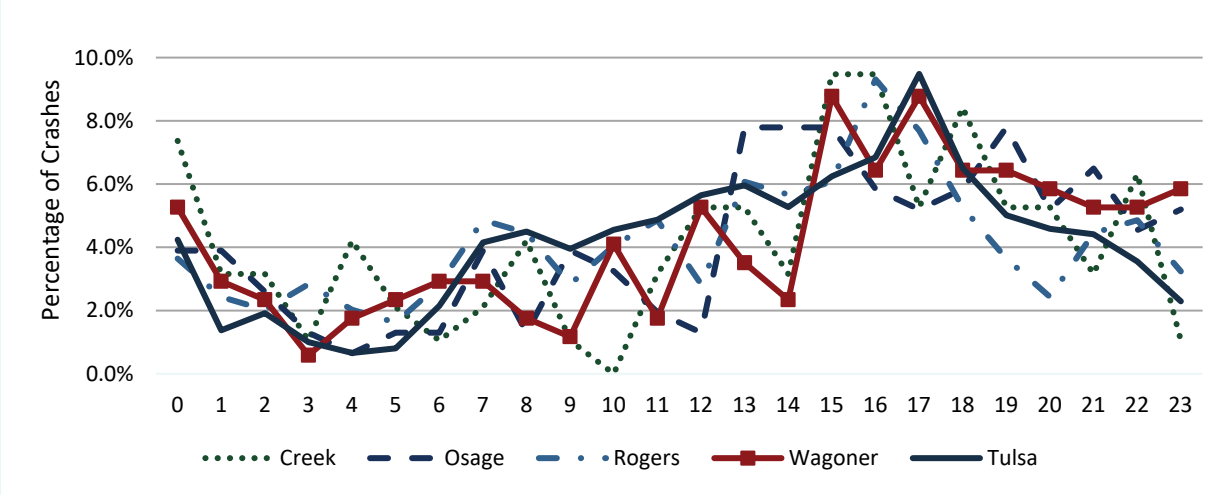
[3] In February 2021, INCOG pulled data from ODOT's secure Safe-T site (https://www.oksafe-t.org/). The project team used the data to make this graph.

Figure 8 and figure 9 illustrate crash percentages by time of day between 2010 and 2019. There is a clustering of fatal and injury crashes during the afternoon peak hours in Tulsa County during the 5:00 p.m. hour (17:00) and slightly earlier for the other four counties. There is also a morning peak at the 8:00 a.m. hour. For fatal and serious injuries, there is a notable higher proportion of such crashes in the late-evening and midnight hour.



Source: FHWA

Figure 8. Graphic. Fatal and injury crashes by time of day | 2010 to 2019.[4]



Source: FHWA

Figure 9. Graphic. Fatal and serious injury crashes by time of day | 2010 to 2019.[4]

[4] In February 2021, INCOG pulled data from ODOT's secure Safe-T site (https://www.oksafe-t.org/). The project team used the data to make this graph.

Table 1 depicts crash types in the INCOG region as reported in ODOT's data system for all injury crashes. This is denoted by the KABCO scale: K = fatal crash; A = incapacitating injury; B = non-incapacitating injury; C = possible injury; and O = no injury. This table shows that angle, right-angle, and rear end crashes account for approximately 73 percent of all injury crashes. These types of crashes usually occur at intersections, which helps identify intersections as a potential emphasis area. Fixed object crashes account for approximately 10 percent of all injury crashes and nearly 19 percent of all fatal and serious injury crashes. Fixed object crashes are typically lane departure crashes, making lane departures a potential emphasis area. Pedestrian and bicycle crashes account for 12 percent of the fatal and serious injury crashes, making these types of vulnerable road users another potential emphasis area.

Table 1. INCOG crash types | 2010 to 2019.[5]

	All Injury Crashes	KA Crashes	% of Injury Total	KA % of Total
Angle	10,871	988	27.4%	23.8%
Right-Angle	5,838	548	14.7%	13.2%
Head On	679	159	1.7%	3.8%
Rear End	12,389	676	31.1%	16.3%
Sideswipe, Opposite Direction	558	82	1.4%	2.0%
Sideswipe, Same Direction	1,022	67	2.6%	1.6%
Rollover	756	137	1.9%	3.3%
Fixed Object	4,076	780	10.2%	18.8%
Pedestrian	1,211	383	3.0%	9.2%
Bicycle	543	119	1.4%	2.9%
Animal	119	21	0.3%	0.5%
Other	1,748	197	4.4%	4.7%
Total	39,810	4,157	100%	100%

Table 2 shows the percentage of fatal and serious injury crashes by their type in each county in the region. The table illustrates the differences in crash types for the more urban county (Tulsa) as compared to the more rural counties (Creek, Osage, Rogers, and Wagoner). The shaded percentages highlight the counties with the highest percentage of a particular crash type. For example, the four "rural" counties experience a much higher percentage of fixed object crashes than the "urban" Tulsa County. These differences can provide guidance on which types of strategies each county may want to prioritize for implementation.

[5] In February 2021, INCOG pulled data from ODOT's secure Safe-T site (https://www.oksafe-t.org/). The project team used the data to make this table.

Table 2. Crash types as a percentage of county fatal and serious injury crashes | 2010 to 2019.[6]

	Tulsa	Creek	Osage	Rogers	Wagoner
Angle	26.7%	5.3%	4.5%	8.5%	14.0%
Right-Angle	14.2%	7.4%	4.5%	9.3%	8.2%
Head On	3.4%	6.3%	5.8%	4.0%	8.2%
Rear End	18.4%	3.2%	3.9%	5.3%	7.0%
Sideswipe, Opposite Direction	2.1%	1.1%	0.6%	2.0%	1.8%
Sideswipe, Same Direction	1.9%	0.0%	0.0%	0.0%	1.2%
Rollover	1.9%	9.5%	14.9%	4.9%	15.2%
Fixed Object	12.6%	51.6%	58.4%	56.7%	35.1%
Pedestrian	10.1%	5.3%	3.2%	5.7%	4.1%
Bicycle	3.2%	3.2%	0.0%	0.8%	2.3%
Animal	0.2%	3.2%	3.2%	1.2%	1.2%
Other	5.3%	4.2%	0.6%	1.6%	1.8%
Total KA Crashes	3,490	95	154	247	171

Systemic Analysis

Crashes might appear to be random in nature, but traditional site-specific (hot spot) analysis aims to review existing crash data to determine areas of spot improvements through the identification of individual locations with large numbers of crashes (crash density). A systemic analysis does not replace traditional site-specific analysis; however, this complementary technique provides a comprehensive approach to safety. The system-based approach reviews existing crash data and evaluates the entire system by identifying associated risk factors to determine their corresponding crash and facility types. Once the network has been screened, low-cost proven countermeasures can be applied to identified locations and segments.

Crash trees were developed for the Oklahoma SHSP emphasis areas. These systemic analyses targeted fatal and severe (KA) crashes to identify associated risk factors, including:

- Alcohol involvement
- Intersection-related
- Lane departures
- Non-motorized
- Young drivers
- Older drivers
- Restraint use

[6] In February 2021, INCOG pulled data from ODOT's secure Safe-T site (https://www.oksafe-t.org/). The project team used the data to make this table.

The crash trees are summarized below and are also included in full in Appendix A. Highlights from these crash trees include:

- Alcohol – Fifteen percent of the fatal and serious injury crashes involved alcohol. Fifty-eight percent of these crashes were during weekends, and 48 percent of all alcohol-related crashes took place during the evening/night (6:00 PM to 12:00 AM).
- Intersections – Seventy-one percent of intersection-related crashes were during daylight hours, and 60 percent were angle crashes.
- Lane departure – Eighty-three percent of these crashes involved fixed objects, with trees making up 29 percent of the fixed object crashes.
- Non-motorized – Seventy percent of pedestrian-involved crashes are not at intersections and 60 percent are during the night. Fifty percent of bicyclist-involved crashes occurred at intersections, and 67 percent of bicycle crashes take place during the day.
- Younger and older drivers – Younger and older drivers are involved in twelve percent and eleven percent of fatal and serious injury crashes, respectively.
- Restraint use – Thirteen percent of fatal and serious injury crashes involved lack of restraint use.

The systemic analysis helps to identify key combinations of factors that contribute to predominant crash types and is especially helpful to address locations where crashes have not yet occurred; however, it is still useful to review maps to identify key corridors with a noted crash history.

Heatmaps were developed for fatal and injury crashes. A heatmap depicts the density of crashes to allow for easier identification of potential crash hot spots. Instead of analyzing crash history at individual locations, the heatmap's systemic approach looks at crash history on an aggregate basis to identify potentially high-risk locations.

While fatal and serious injury crashes are the focus of this LRSP, the low incidence of these severity types can make it difficult to see patterns in crash locations. Therefore, the team developed two sets of heatmaps for each county (maps for Tulsa County are split by inside or outside the Tulsa city limits for ease of readability):

- KA crashes heatmaps.
- KABC crashes heatmaps.

The following heatmaps identify specific hotspot locations that future projects can target. Brighter shading on the map indicates a higher density of crashes for that location. The maps call out specific intersections and corridors with the highest density of crashes.

Source: FHWA

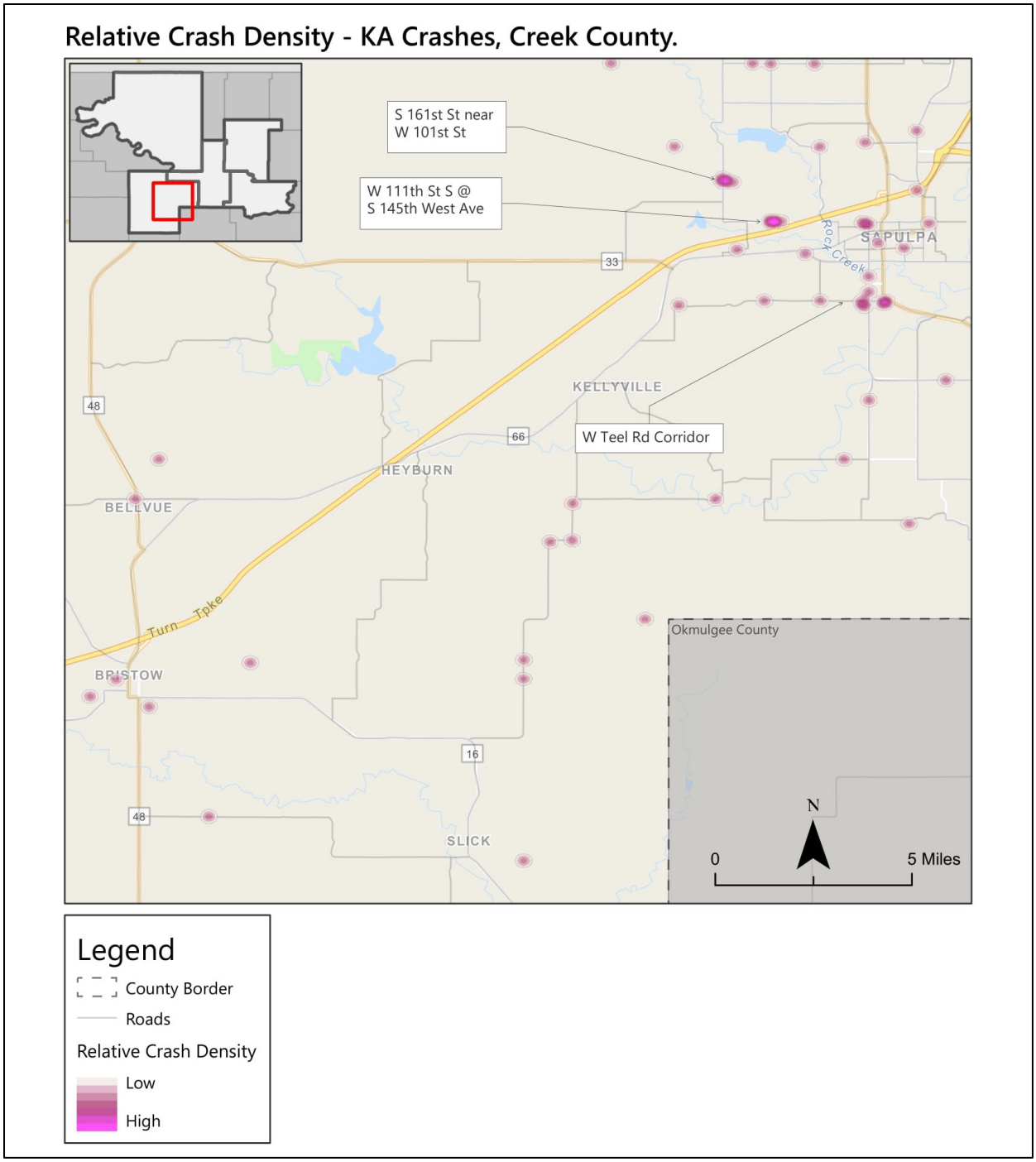
Figure 10. Graphic. Fatal and serious injury crashes in the City of Tulsa 2010-2019.[7]

[7] In February 2021, INCOG pulled data from ODOT's secure Safe-T site (https://www.oksafe-t.org/). The project team used the data to make this map.

Source: FHWA

Figure 11. Graphic. Crash density in the City of Tulsa 2010-2019.[8]

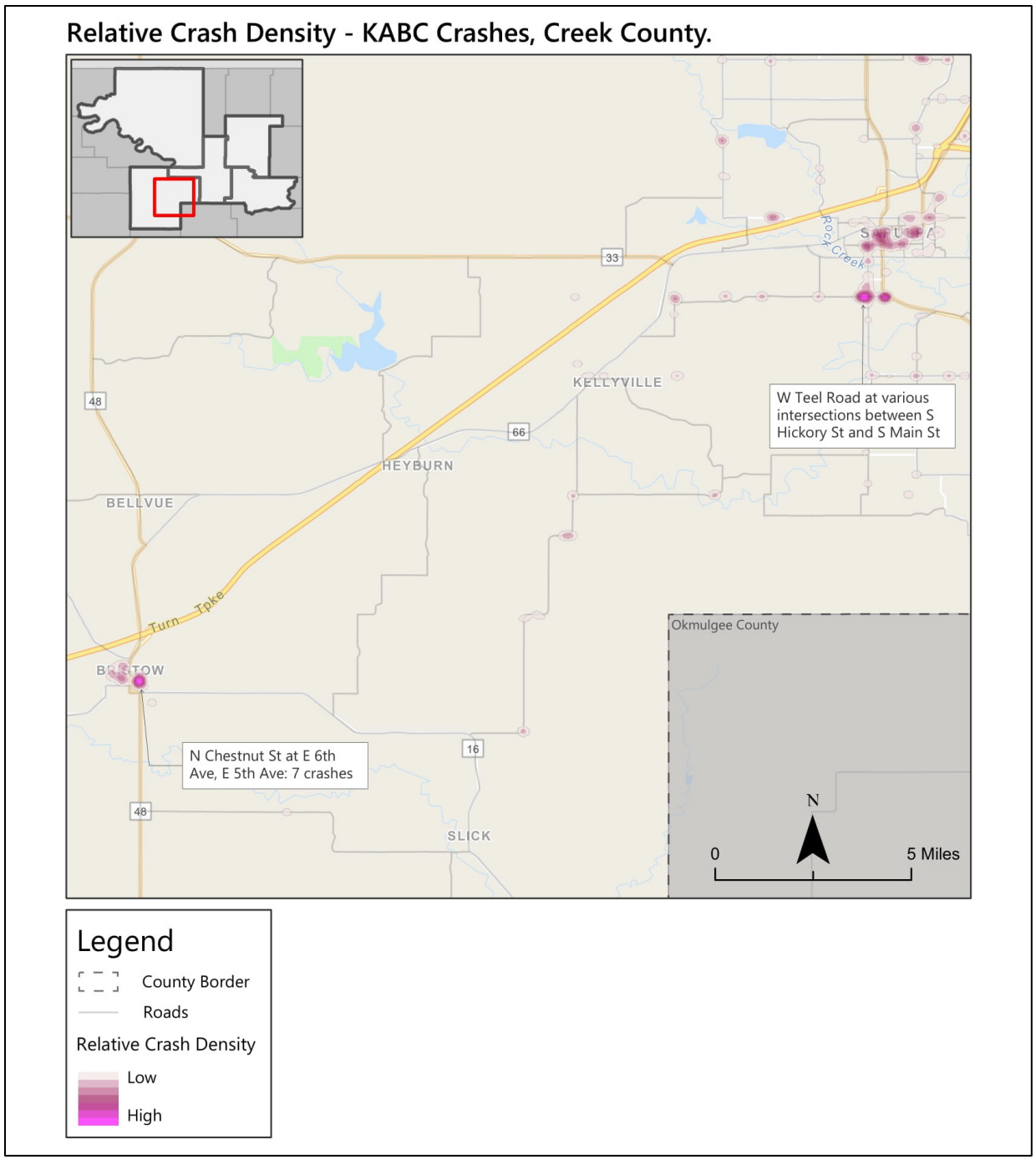
[8] In February 2021, INCOG pulled data from ODOT's secure Safe-T site (https://www.oksafe-t.org/). The project team used the data to make this map.



Source: FHWA

Figure 12. Graphic. Fatal and serious injury crash density in Creek County 2010-2019.[9]

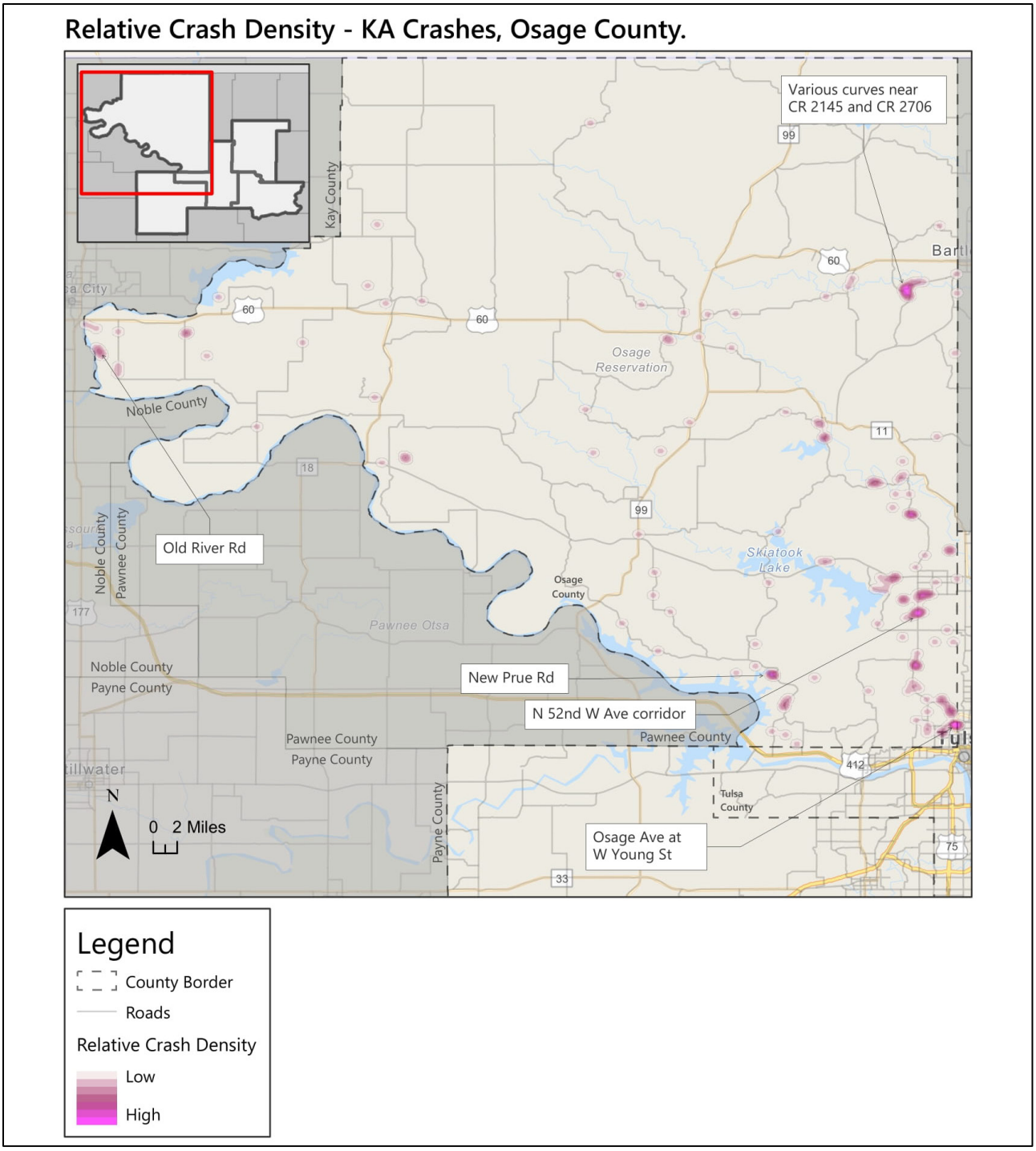
[9] In February 2021, INCOG pulled data from ODOT's secure Safe-T site (https://www.oksafe-t.org/).. The project team used the data to make this map.



Source: FHWA

Figure 13. Graphic. Crash density in Creek County 2010-2019.[10]

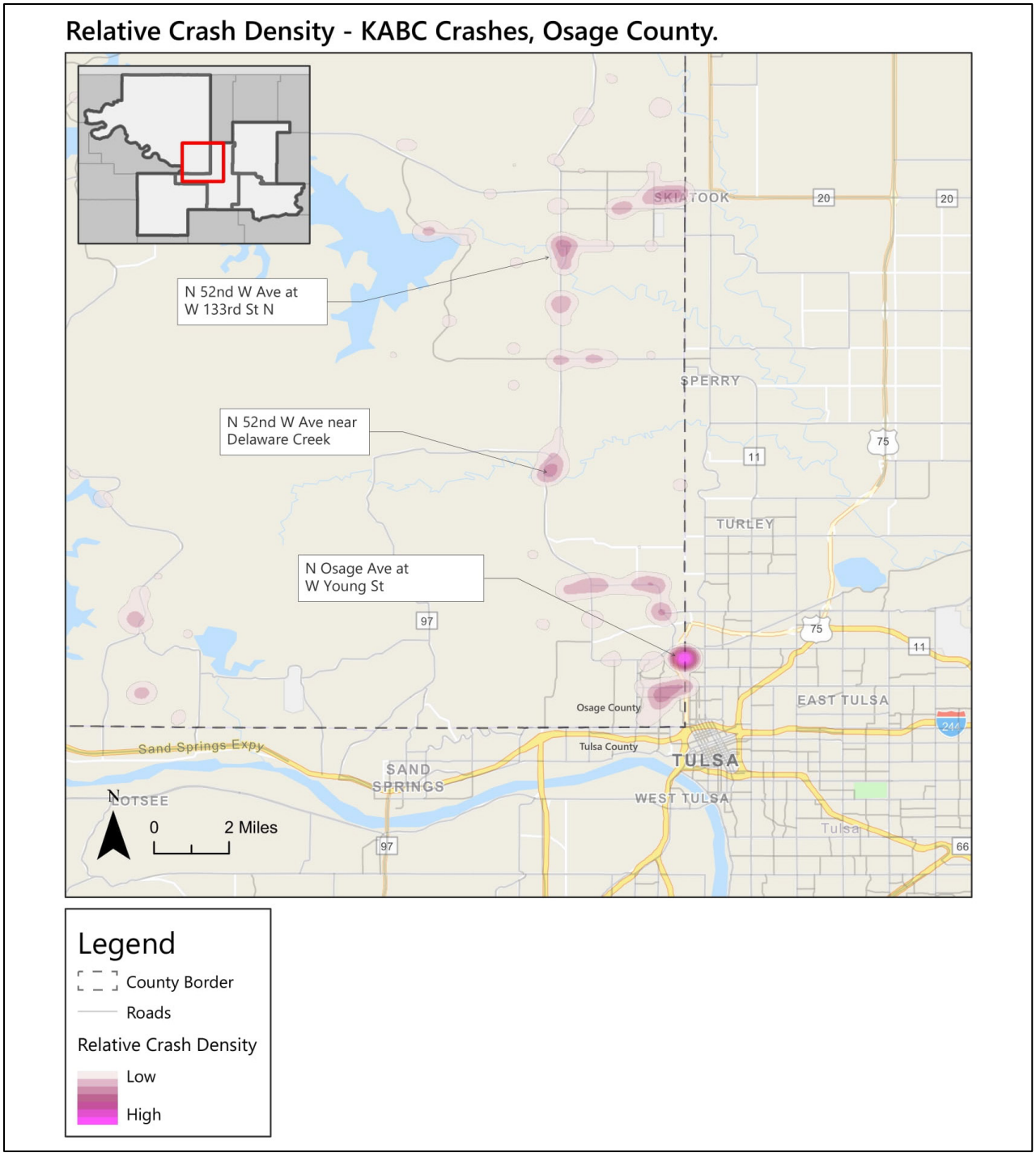
[10] In February 2021, INCOG pulled data from ODOT's secure Safe-T site (https://www.oksafe-t.org/). The project team used the data to make this map.



Source: FHWA

Figure 14. Graphic. Fatal and serious injury crash density in Osage County 2010-2019.[11]

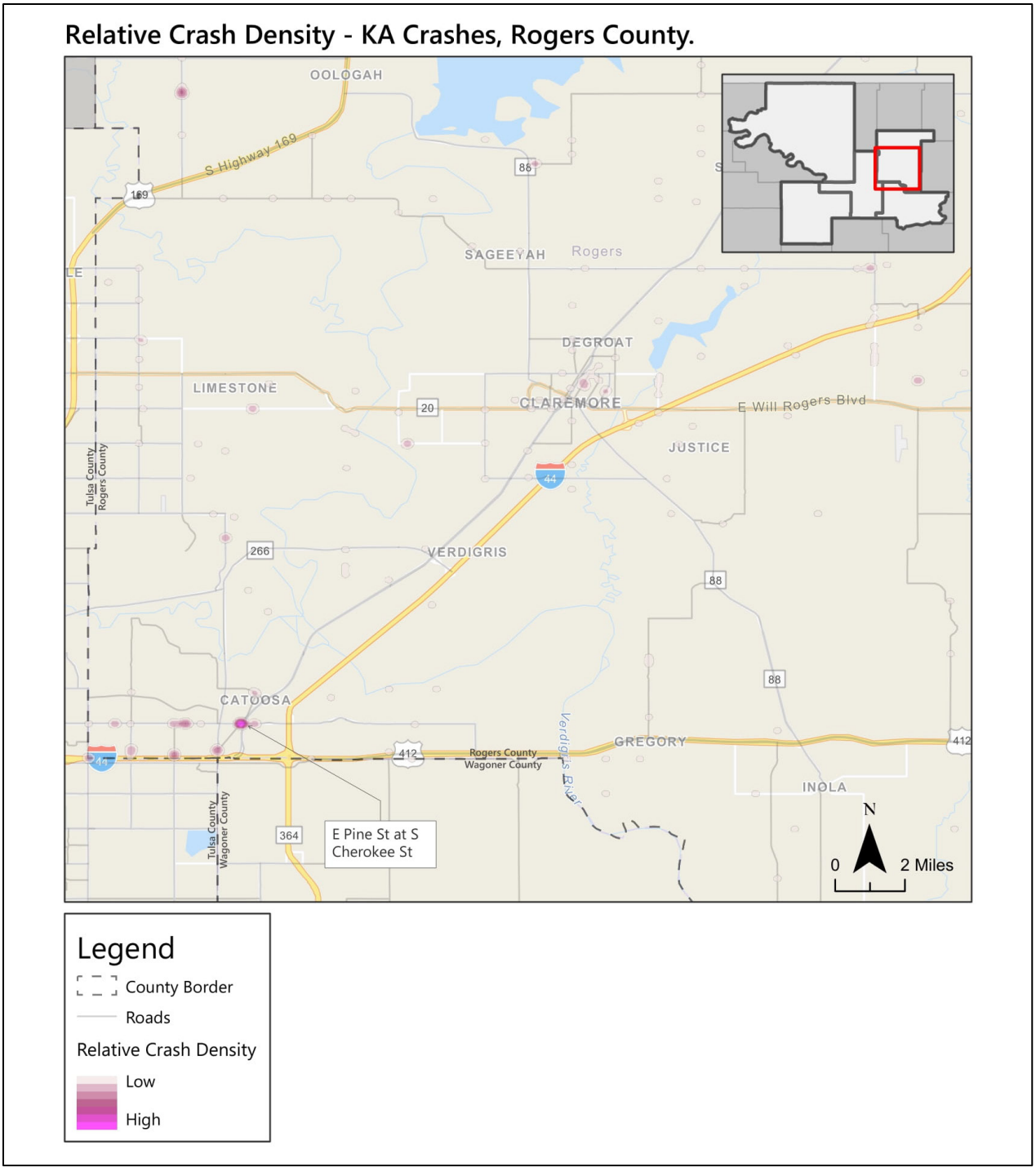
[11] In February 2021, INCOG pulled data from ODOT's secure Safe-T site (https://www.oksafe-t.org/). The project team used the data to make this map.



Source: FHWA

Figure 15. Graphic. Crash density in Osage County 2010-2019.[12]

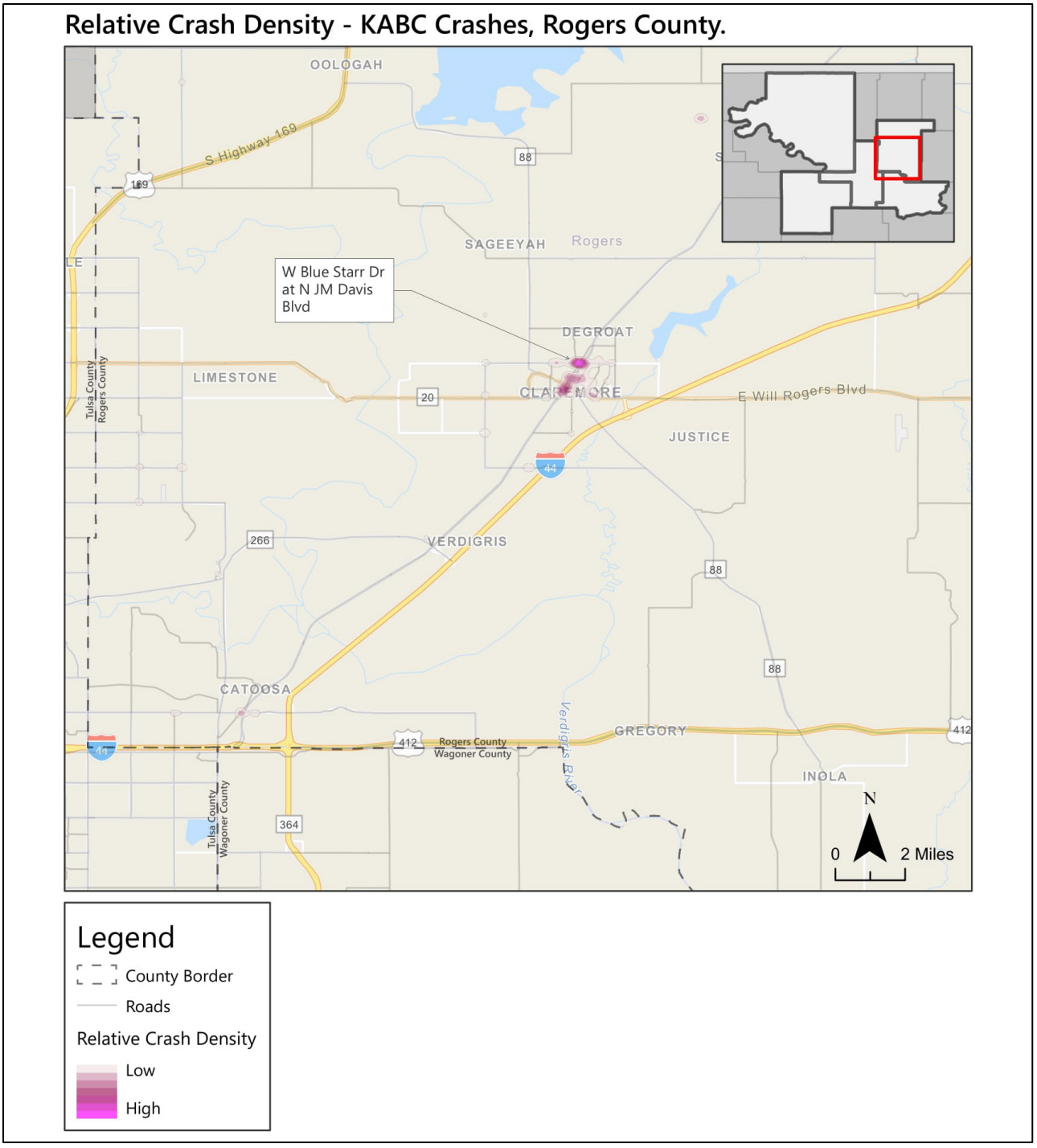
[12] In February 2021, INCOG pulled data from ODOT's secure Safe-T site (https://www.oksafe-t.org/). The project team used the data to make this map.



Source: FHWA

Figure 16. Graphic. Fatal and serious injury crash density in Rogers County 2010-2019.[13]

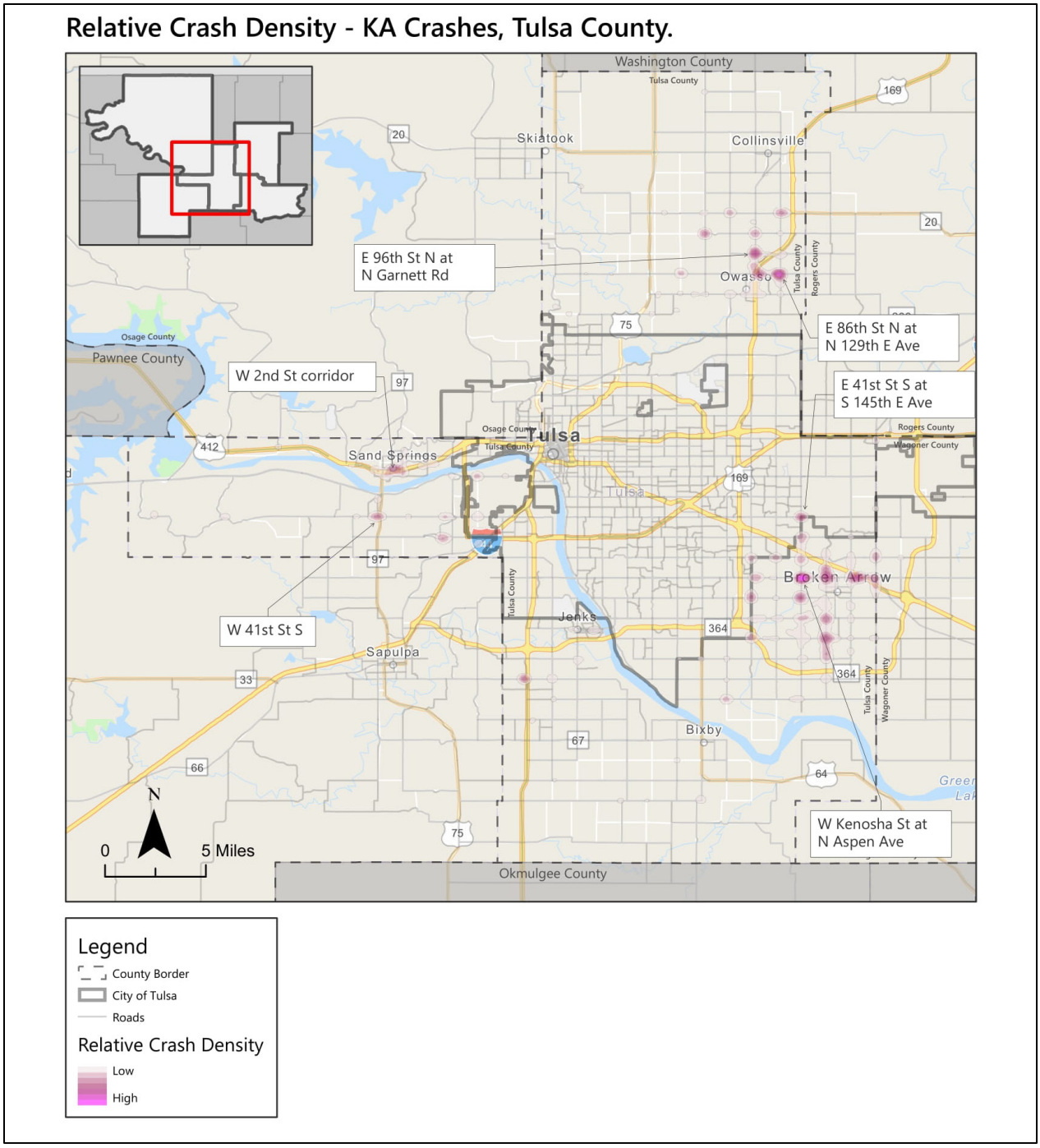
[13] In February 2021, INCOG pulled data from ODOT's secure Safe-T site (https://www.oksafe-t.org/). The project team used the data to make this map.



Source: FHWA

Figure 17. Graphic. Crash density in Rogers County 2010-2019.[14]

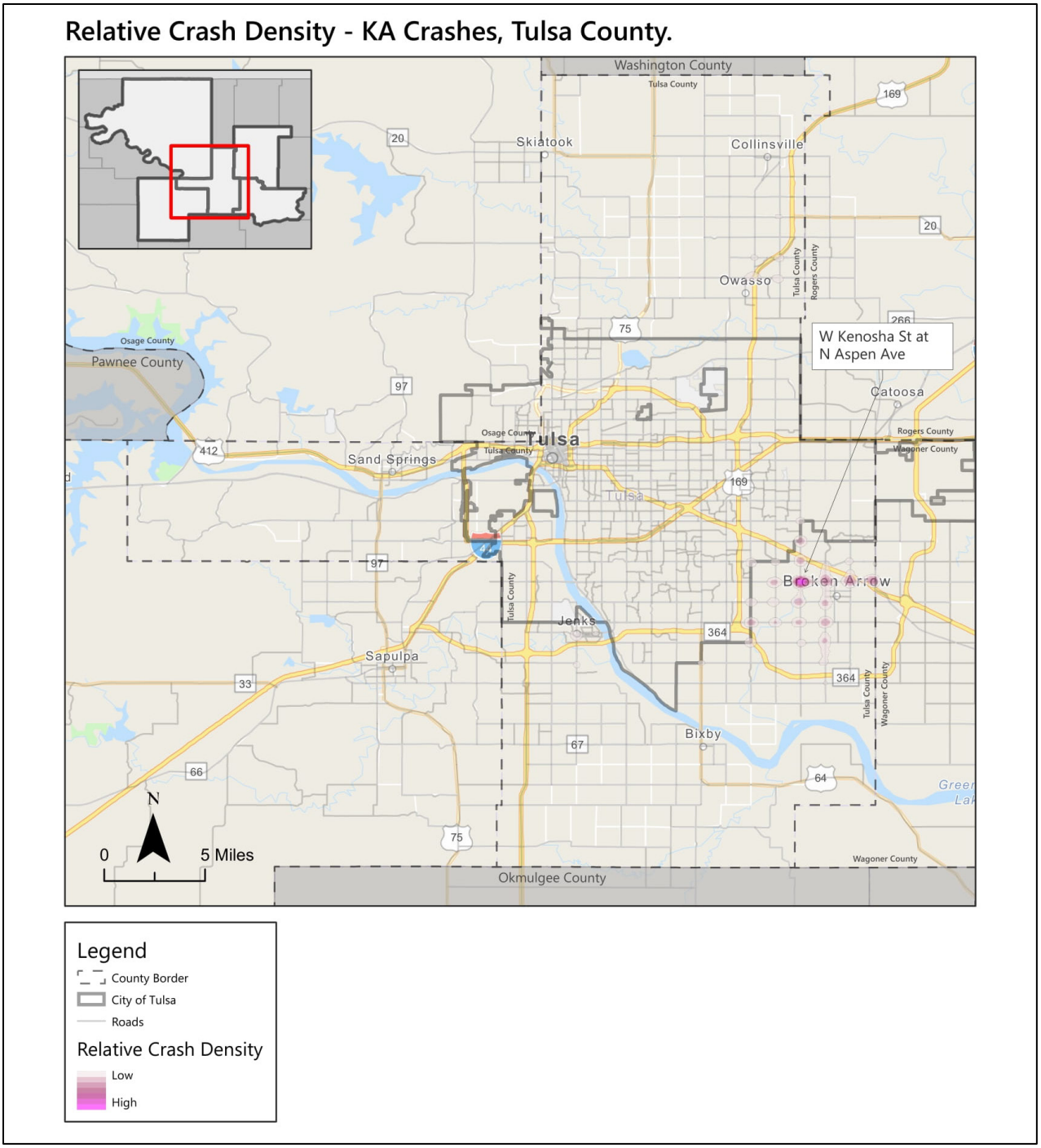
[14] In February 2021, INCOG pulled data from ODOT's secure Safe-T site (https://www.oksafe-t.org/). The project team used the data to make this map.



Source: FHWA

Figure 18. Graphic. Fatal and serious injury crash density in Tulsa County (excluding the City of Tulsa) 2010-2019.[15]

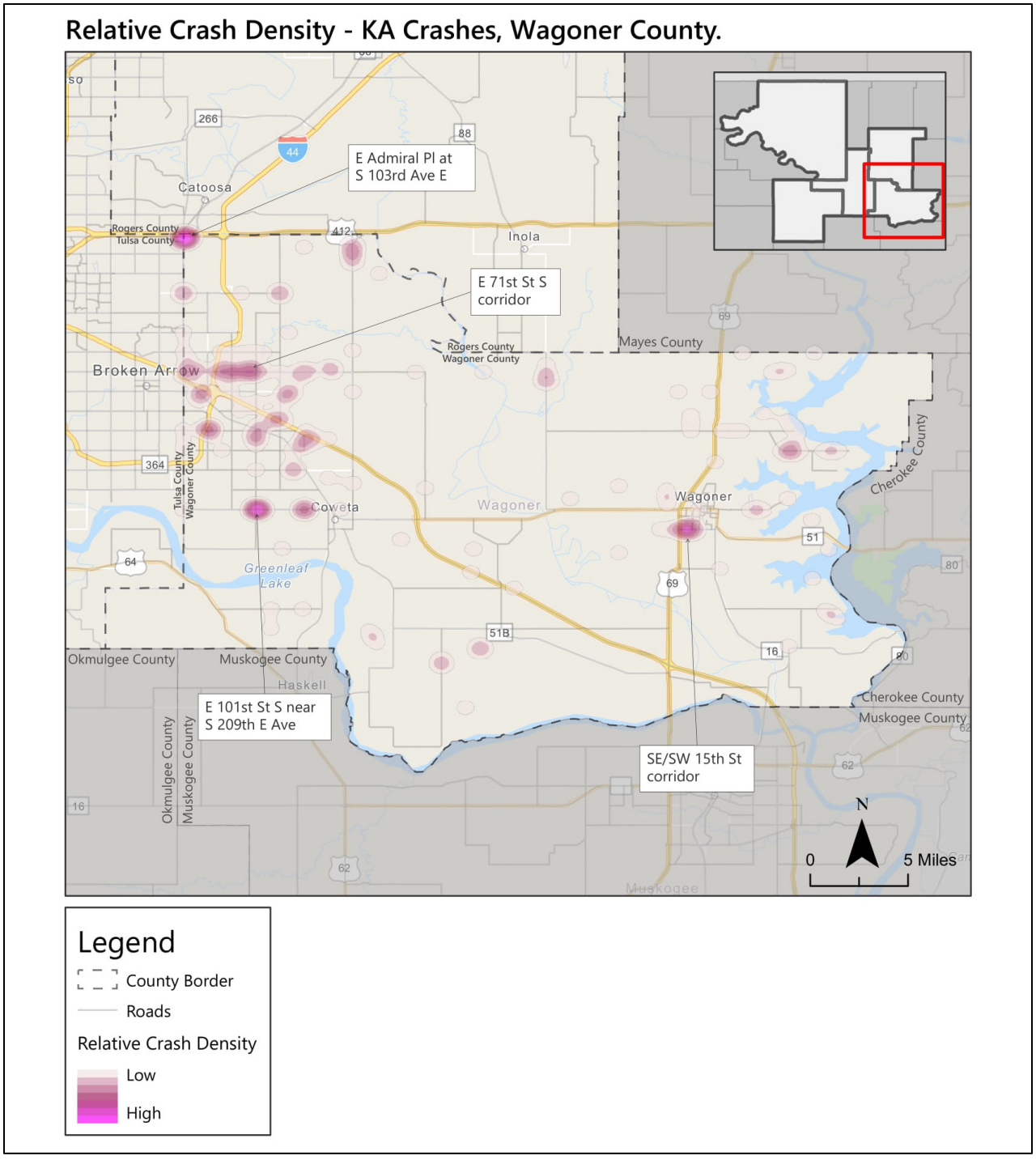
[15] In February 2021, INCOG pulled data from ODOT's secure Safe-T site (https://www.oksafe-t.org/). The project team used the data to make this map.



Source: FHWA

Figure 19. Graphic. Crash density in Tulsa County (excluding the City of Tulsa) 2010-2019.[16]

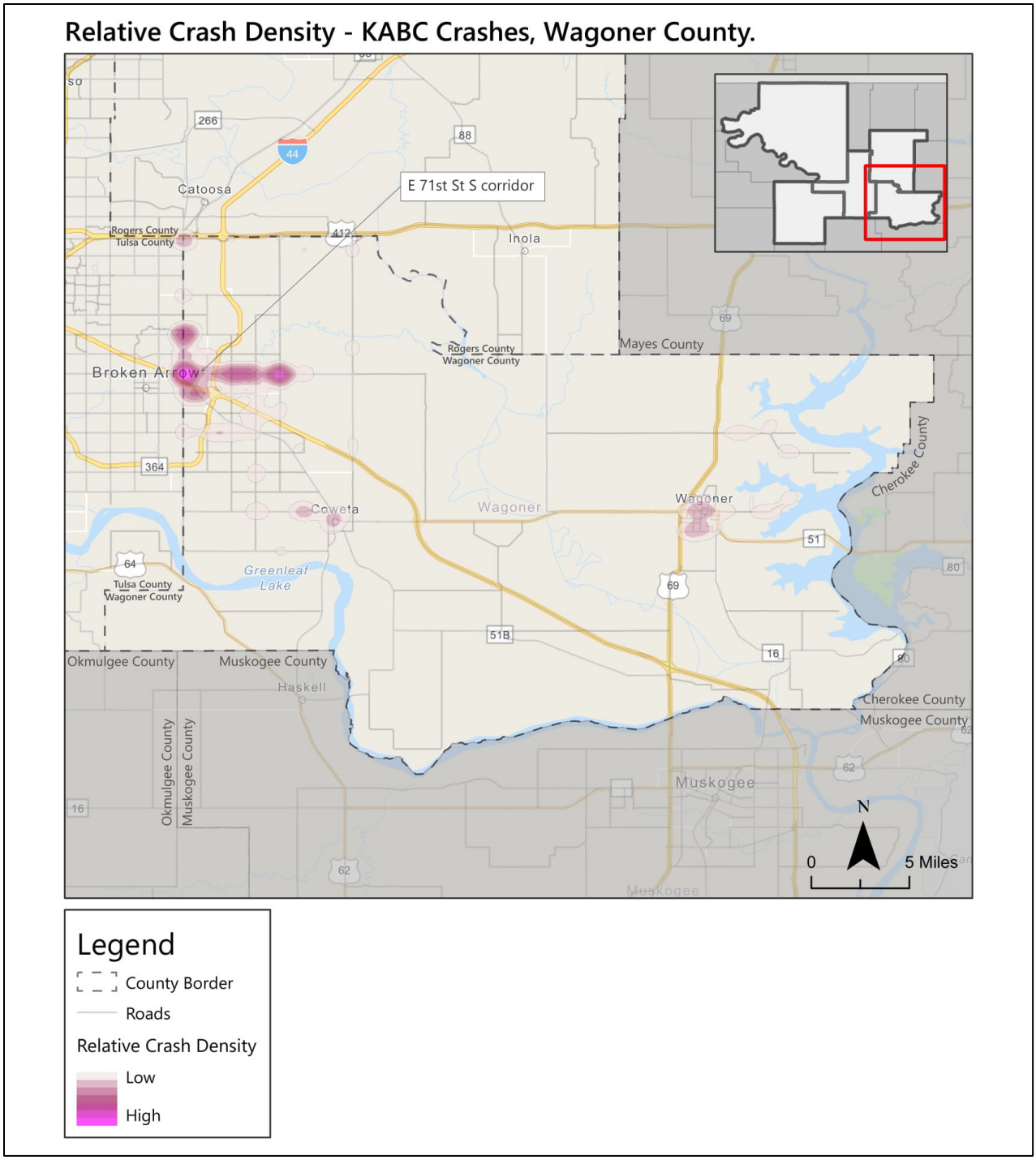
[16] In February 2021, INCOG pulled data from ODOT's secure Safe-T site (https://www.oksafe-t.org/). The project team used the data to make this map.



Source: FHWA

Figure 20. Graphic. Fatal and serious injury crash density in the Wagoner County 2010-2019.[17]

[17] In February 2021, INCOG pulled data from ODOT's secure Safe-T site (https://www.oksafe-t.org/). The project team used the data to make this map.



Source: FHWA

Figure 21. Graphic. Crash density in Wagoner County 2010-2019.[18]

[18] In February 2021, INCOG pulled data from ODOT's secure Safe-T site (https://www.oksafe-t.org/). The project team used the data to make this map.

Emphasis Areas

Emphasis areas represent the crash types and factors associated with high frequencies and/or disproportionate numbers of fatal and serious injury crashes. Focusing safety strategies on these areas provides the greatest opportunity to achieve the LRSP vision, mission, and goal.

The INCOG stakeholders used the Oklahoma SHSP emphasis areas as a starting point and identified the following list of emphasis areas based on crashes and input:

- Lane departures
- Native American fatalities
- Intersections
- Non-motorized users
- Young/older drivers
- Behavior
    - Unbelted
    - Speeding
    - Impaired driving
    - Distracted

Crash types and road user behaviors were identified through the comparison of the regional crash frequencies to the state crash frequencies. This overrepresentation analysis factored in the selection of emphasis areas, along with stakeholder input and crash frequencies. Overrepresentation analysis tables for the INCOG region and for individual counties are shown in Tables 3 through 14. In these tables, crash attributes are compared at the crash level while driver attributes (at the bottom of each table) are compared at the person level. Bold numbers indicate crash percentages that are higher than the state percentages and that emphasis area could have a greater focus for the geographic area listed for the table. Shaded cells indicate crashes that may not be higher than the State percentages but are still considered notable for additional focus for the listed geography. Since the state data used KAB for persons, and not KA for crashes, this is not a representative "apple to apples" comparison. Therefore, a comparison between the KA and KABC for INCOG crashes and the state's KAB was completed.

Table 3. Overrepresentation analysis by crash attribute on non-State roads in the INCOG Region | 2010 to 2021.[19]

Emphasis Area / Crash Attribute	**Percent of KA Crashes (4,157)**	**Percent of KABC Crashes (39,810)**	***Percent of State KAB Persons***
Unsafe Driver Behavior			
Alcohol Involved Crashes	**14.5%**	6.9%	*12.9%*
Intersection-Related	**44.4%**	**52.6%**	*39.2%*
Lane Departures			
Statewide Lane Departure Percentage	N/A	N/A	*36.8%*
Primary Vehicle Crosses Median or Centerline	4.8% of event 1 2.2% of event 2	2.2% of event 1 1.0% of event 2	*N/A*
Primary Vehicle Collides with Curb	2.2% of event 1 2.9% of event 2	1.0% of event 1 1.4% of event 2	*N/A*
Fixed Object Crashes	18.8%	10.2%	*N/A*
Fixed Object – Tree	5.4%	2.3%	*N/A*
Head-On Crashes	3.8%	1.7%	*N/A*
Non-Motorized Crashes			
Primary Vehicle Strikes Pedal Cycle	**2.8%**	**1.4%**	*1.2%*
Primary Vehicle Strikes Pedestrian	**9.1%**	3.0%	*3.1%*
Motorcycle/Moped Involved	**14.3%**	**4.5%**	*6.9%*
Commercial Vehicle Involved[20]	3.3% of vehicle 1 2.4% of vehicle 2	3.3% of vehicle 1 2.7% of vehicle 2	*6.3%*
Other Observed Overrepresentation			
Dark-Unlighted Crashes	*15.8%*	*9.1%*	*N/A*
County Roads	*15.6%*	*9.8%*	*N/A*

Table 4. Overrepresentation analysis by person attribute on non-State roads in the INCOG Region | 2010 to 2021.[18]

Emphasis Area / Person Attribute	**Percent of KA Drivers (7,530)**	**Percent of KABC Drivers (78,922)**	***Percent of State KAB Persons***
Young Drivers (15-20)	11.9%	13.3%	*27.4%*
Older Drivers (65+)	**10.5%**	**9.8%**	*9.3%*
No Restraint Used	13.1%	5.1%	*N/A*

Note: N/A = not applicable.

[19] In February 2021, INCOG pulled data from ODOT's secure Safe-T site (https://www.oksafe-t.org/). The project team used the data to make this table.

[20] Includes bobtail, semi/double, single-unit truck 2-axle, single-unit truck 3+ axle, truck/semi, truck/trailer, unclassified truck 5+ tons, and van under 5 tons.

Table 5. Overrepresentation analysis by crash attribute on non-State roads in Creek County | 2010 to 2019.[21]

Emphasis Area / Crash Attribute	Percent of KA Crashes (95)	Percent of KABC Crashes (808)	*Percent of State KAB Persons*
Unsafe Driver Behavior			
Alcohol Involved Crashes	**24.2%**	15.2%	*12.9%*
Intersection-Related	14.7%	26.1%	*39.2%*
Lane Departures			
Statewide Lane Departure Percentage	N/A	N/A	*36.8%*
Fixed Object	**51.6%**	44.9%	*N/A*
Fixed Object – Tree	21.1%	12.4%	*N/A*
Non-Motorized Crashes			
Primary Vehicle Strikes Pedal Cycle	**3.2%**	1.6%	*1.2%*
Primary Vehicle Strikes Pedestrian	**5.3%**	2.1%	*3.1%*
Motorcycle/Moped Involved	**24.2%**	7.8%	*6.9%*
Commercial Vehicle Involved	1.1% Vehicle 1 1.1% Vehicle 2	1.4% Vehicle 1 1.1% Vehicle 2	*6.3%*
Other Observed Overrepresentation			
Crashes on Sunday	*18.9%*	*13.6%*	*N/A*
Crashes from 12:00 AM to 5:59 AM	*21.1%*	*8.8%*	*N/A*
Dark – Unlighted	*34.7%*	*25.9%*	*N/A*
County Roads	*74.7%*	*65.5%*	*N/A*

Table 6. Overrepresentation analysis by person attribute on non-State roads in Creek County | 2010 to 2019.[20]

Emphasis Area / Person Attribute	Percent of KA Drivers (125)	Percent of KABC Drivers (1,153)	*Percent of State KAB Persons*
Young Drivers (15-20)	20.0%	21.2%	*27.4%*
Older Drivers (65+)	7.2%	9.0%	*9.3%*
No Restraint Used	34.6%	17.4%	*N/A*

Note: N/A = not applicable.

[21] In February 2021, INCOG pulled data from ODOT's secure Safe-T site (https://www.oksafe-t.org/). The project team used the data to make this table.

Table 7. Overrepresentation analysis by crash attribute on non-State roads in Osage County | 2010 to 2019.[22]

Emphasis Area / Crash Attribute	Percent of KA Crashes (154)	Percent of KABC Crashes (728)	*Percent of State KAB Persons*
Unsafe Driver Behavior			
Alcohol Involved Crashes	**24.0%**	18.8%	*12.9%*
Intersection-Related	13.0%	16.8%	*39.2%*
Lane Departures			
Statewide Lane Departure Percentage	N/A	N/A	*36.8%*
Primary Vehicle Departs to the Right	**42.2%**	37.1%	*N/A*
Fixed Object	**58.4%**	50.8%	*N/A*
Non-Motorized Crashes			
Primary Vehicle Strikes Pedal Cycle	0.0%	0.7%	*1.2%*
Primary Vehicle Strikes Pedestrian	**3.2%**	1.8%	*3.1%*
Motorcycle/Moped Involved	**20.1%**	10.7%	*6.9%*
Commercial Vehicle Involved	1.3% Vehicle 2 2.0% Vehicle 2	2.9% Vehicle 1 1.2% Vehicle 2	*6.3%*
Other Observed Overrepresentation			
County Roads	*87.0%*	*78.3%*	*N/A*

Table 8. Overrepresentation analysis by person attribute on non-State roads in Osage County | 2010 to 2019.[21]

Emphasis Area / Person Attribute	Percent of KA Drivers (125)	Percent of KABC Drivers (934)	*Percent of State KAB Persons*
Young Drivers (15-20)	16.8%	17.1%	*27.4%*
Older Drivers (65+)	8.4%	7.9%	*9.3%*
No Restraint Used	39.6%	28.4%	*N/A*

Note: N/A = not applicable.

[22] In February 2021, INCOG pulled data from ODOT's secure Safe-T site (https://www.oksafe-t.org/). The project team used the data to make this table.

Table 9. Overrepresentation analysis by crash attribute on non-State roads in Rogers County | 2010 to 2019.[23]

Emphasis Area / Crash Attribute	Percent of KA Crashes (247)	Percent of KABC Crashes (1,538)	*Percent of State KAB Persons*
Unsafe Driver Behavior			
Alcohol Involved Crashes	**16.2%**	10.7%	*12.9%*
Intersection-Related	20.2%	28.2%	*39.2%*
Lane Departures			
Statewide Lane Departure Percentage	N/A	N/A	*36.8%*
Primary Vehicle Crosses Median or Centerline	18.6%	12.1%	*N/A*
Fixed Object	**56.7%**	44.5%	*N/A*
Fixed Object – Tree	19.8%	12.2%	*N/A*
Non-Motorized Crashes			
Primary Vehicle Strikes Pedal Cycle	0.8%	0.8%	*1.2%*
Primary Vehicle Strikes Pedestrian	**5.7%**	2.0%	*3.1%*
Motorcycle/Moped Involved	**15.0%**	7.2%	*6.9%*
Commercial Vehicle Involved	2.0% Vehicle 1 0.8% Vehicle 2	2.5% Vehicle 1 0.9% Vehicle 2	*6.3%*
Other Observed Overrepresentation			
Crashes on Sunday	*17.0%*	*11.6%*	*N/A*
Crashes in June	*13.4%*	*8.1%*	*N/A*

Table 10. Overrepresentation analysis by person attribute on non-State roads in Rogers County | 2010 to 2019.[22]

Emphasis Area / Person Attribute	Percent of KA Drivers (323)	Percent of KABC Drivers (2,291)	*Percent of State KAB Persons*
Young Drivers (15-20)	22.6%	24.2%	*27.4%*
Older Drivers (65+)	**10.5%**	9.5%	*9.3%*
No Restraint Used	29.9%	12.7%	*N/A*

Note: N/A = not applicable.

[23] In February 2021, INCOG pulled data from ODOT's secure Safe-T site (https://www.oksafe-t.org/). The project team used the data to make this table.

Table 11. Overrepresentation analysis by crash attribute on non-State roads in Wagoner County | 2010 to 2019.[24]

Emphasis Area / Crash Attribute	Percent of KA Crashes (171)	Percent of KABC Crashes (1,126)	*Percent of State KAB Persons*
Unsafe Driver Behavior			
Alcohol Involved Crashes	**26.9%**	13.9%	*12.9%*
Intersection-Related	24.6%	36.6%	*39.2%*
Lane Departures			
Statewide Lane Departure Percentage	N/A	N/A	*36.8%*
Primary Vehicle Departs to the Right	29.2%	23.8%	*N/A*
Fixed Object	35.1%	33.9%	*N/A*
Fixed Object – Tree	17.5%	9.7%	*N/A*
Head-On	8.2%	3.7%	*N/A*
Rollover	15.2%	8.3%	*N/A*
Non-Motorized Crashes			
Primary Vehicle Strikes Pedal Cycle	**2.3%**	1.6%	*1.2%*
Primary Vehicle Strikes Pedestrian	**4.1%**	2.7%	*3.1%*
Motorcycle/Moped Involved	**12.9%**	6.1%	*6.9%*
Commercial Vehicle Involved	2.9% Vehicle 1 2.3% Vehicle 2	2.8% Vehicle 1 1.7% Vehicle 2	*6.3%*
Other Observed Overrepresentation			
Crashes from 7:00 PM to 11:59 PM	*28.7%*	*19.8%*	*N/A*
Dark – Unlighted	*36.3%*	*24.0%*	*N/A*
Crashes on County Roads	*59.1%*	*44.0%*	*N/A*

Table 12. Overrepresentation analysis by person attribute on non-State roads in Wagoner County | 2010 to 2019.[23]

Emphasis Area / Person Attribute	Percent of KA Drivers (252)	Percent of KABC Drivers (1,791)	*Percent of State KAB Persons*
Young Drivers (15-20)	19.1%	20.2%	*27.4%*
Older Drivers (65+)	7.1%	9.9%	*9.3%*
No Restraint Used	24.2%	12.5%	*N/A*

Note: N/A = not applicable.

[24] In February 2021, INCOG pulled data from ODOT's secure Safe-T site (https://www.oksafe-t.org/). The project team used the data to make this table.

Table 13. Overrepresentation analysis by crash attribute on non-State roads in Tulsa County | 2010 to 2019.[25]

Emphasis Area / Crash Attribute	Percent of KA Crashes (3,490)	Percent of KABC Crashes (35,610)	*Percent of State KAB Persons*
Unsafe Driver Behavior			
Alcohol Involved Crashes	**13.1%**	6.1%	*12.9%*
Intersection-Related	**49.2%**	55.5%	*39.2%*
Lane Departures			
Statewide Lane Departure Percentage	N/A	N/A	*36.8%*
Primary Vehicle Crosses Median or Centerline	2.9%	1.2%	*N/A*
Primary Vehicle Strikes Curb	2.5%	1.0%	*N/A*
Fixed Object	12.6%	6.4%	*N/A*
Fixed Object – Tree	3.0%	1.1%	*N/A*
Head-On	3.4%	1.5%	*N/A*
Non-Motorized Crashes			
Primary Vehicle Strikes Pedal Cycle	**3.2%**	1.4%	*1.2%*
Primary Vehicle Strikes Pedestrian	**10.1%**	3.1%	*3.1%*
Motorcycle/Moped Involved	**13.8%**	4.2%	*6.9%*
Commercial Vehicle Involved	5.8%	5.9%	*6.3%*
Other Observed Overrepresentation			
Crashes from 12:00 AM to 6:59 AM	*12.1%*	*7.2%*	*N/A*
Dark – Unlighted	*12.4%*	*7.0%*	*N/A*

Table 14. Overrepresentation analysis by person attribute on non-State roads in Tulsa County | 2010 to 2019.[24]

Emphasis Area / Person Attribute	Percent of KA Drivers (6,639)	Percent of KABC Drivers (72,753)	*Percent of State KAB Persons*
Young Drivers (15-20)	10.8%	12.7%	*27.4%*
Older Drivers (65+)	**10.8%**	9.9%	*9.3%*
No Restraint Used	10.6%	4.1%	*N/A*

Note: N/A = not applicable.

[25] In February 2021, INCOG pulled data from ODOT's secure Safe-T site (https://www.oksafe-t.org/). The project team used the data to make this table.

Safety Strategies

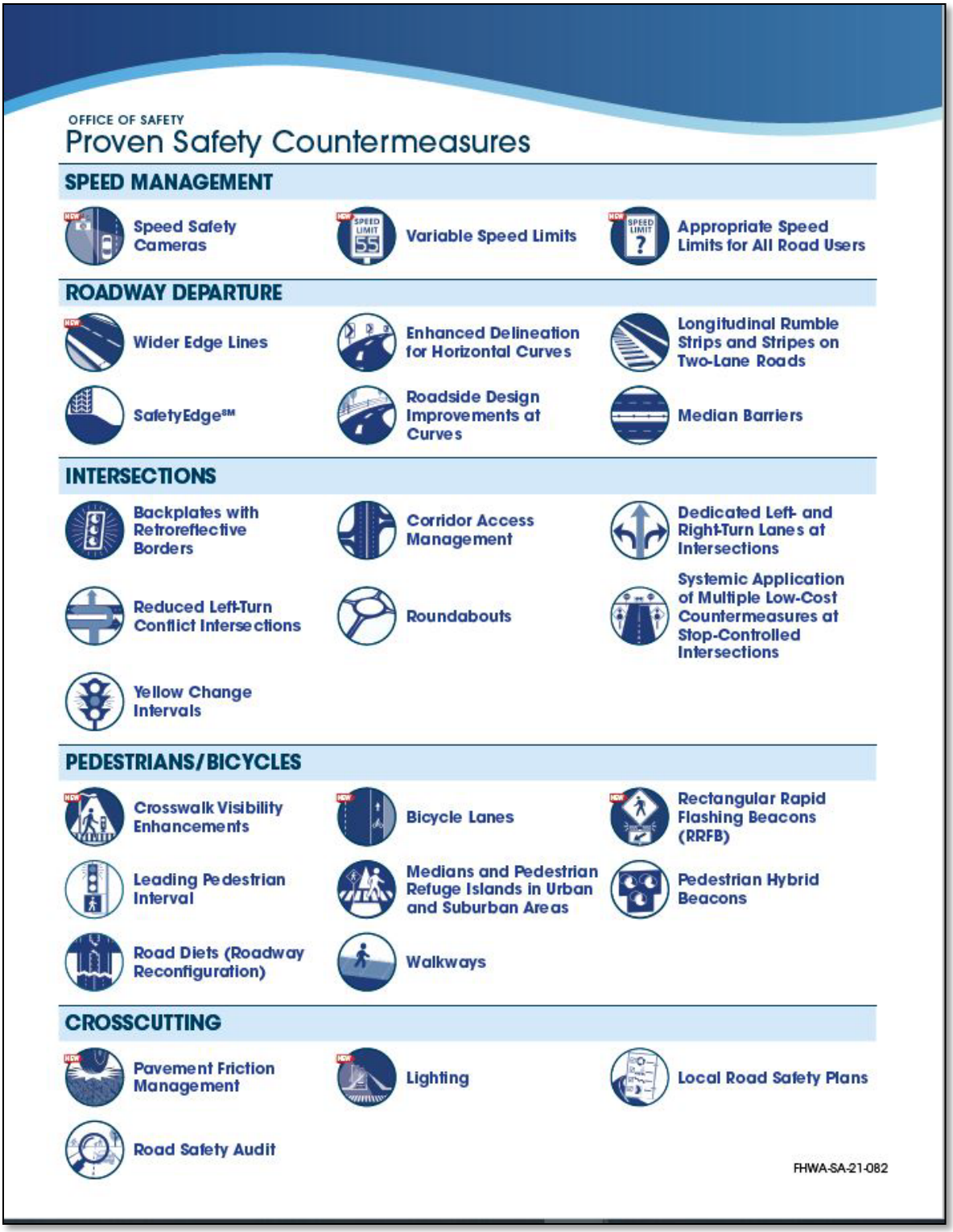
INCOG safety stakeholders identified strategies for each of the emphasis areas following the "five Es" approach to traffic safety depicted in figure 22. Each of the five Es represents a category of strategies that address roadway safety. Engineering represents any solutions oriented towards the improvement of road infrastructure. Enforcement includes any law enforcement related solutions. Education includes any public education campaigns or outreach activities. Emergency services includes any improvement in the emergency services such as fire and emergency medical response. Finally, "everyone" means that the responsibility for road safety is everyone's (all road users).

Source: FHWA

Figure 22. Graphic. The "Five E's" of traffic safety.

INCOG used multiple resources in developing appropriate safety strategies, including:

- FHWA's Proven Safety Countermeasures (figure 23) (FHWA, 2022a).
- NHTSA's "Countermeasures that Work" (NHTSA, 2021).
- FHWA's Crash Modification Factors Clearinghouse (FHWA, 2022b).



Source: FHWA

Figure 23. Graphic. FHWA Proven Safety Countermeasures (FHWA, 2022a).

During the second workshop, stakeholders selected multiple strategies and action items from these and other sources to address each of the emphasis areas. Stakeholders provided the following key points:

- Oklahoma does not allow photo speed enforcement or red light cameras.
- Oklahoma does not currently share HSIP funding with local agencies.
- Approximately 8 million dollars in traffic safety grants are funded annually from OHSO.
- Oklahoma has a primary seat belt law.

The following sections highlight the strategies and actions that the stakeholders deemed as providing a significant opportunity to reduce traffic related fatalities and serious injuries in the region. Appendix B provides a detailed summary of the identified strategies and action items. The following strategies, actions, and crash percentages refer to the entire INCOG region unless otherwise noted.

The effectiveness of an engineering related action item is measured by a crash modification factor (CMF) from the FHWA Crash Modification Factors Clearinghouse (FHWA, 2022b). NHTSA's (2021) publication Countermeasures That Work: A Highway Safety Countermeasure Guide for State Highway Safety Offices contains star ratings for behavior (education and enforcement) related countermeasures that are used most regularly by State Highway Safety Offices and have the most evidence of effectiveness.

A CMF is an estimate of the change in crashes expected after implementation of a countermeasure. For example, an intersection is experiencing 100 angle crashes per year. If you apply a countermeasure that has a CMF of 0.80 for angle crashes, then you can expect 80 angle crashes per year following the implementation of the countermeasure (100 x 0.80 = 80).

(FHWA, 2022b)

Behavior Countermeasure Star Ratings
★★★★ or ★★★★★ Effective
★★★ Promising, and Likely To Be Effective
☆☆ Effectiveness Still Undetermined
☆ Limited or No High-Quality Evaluation Evidence
(NHTSA, 2021)

Lane Departure

A lane departure crash is defined as a crash which occurs after a vehicle crosses an edge line, center line or otherwise leaves the traveled way. Fixed object, rollover, sideswipe, and head-on crashes make up 29 percent of the serious injury and fatal crashes in the region.

Emphasis Area Objective: *Reduce number of lane departure fatal and serious injury crashes*
Emphasis Area Success Metric: *Reduce the number of emphasis area related crashes by 25% by 2030*

Description	CMF/Star Rating	Safe System Element
Install centerline, shoulder, or edge line rumble strips.	0.56-0.87	Safe Roads
Widen and/or pave shoulders to provide drivers with a recovery area.	0.89	Safe Roads
Install Safety Edge℠ when resurfacing roadways.	0.88	Safe Roads
Remove or relocate fixed objects in the roadside to provide an object-free recovery area for vehicles leaving the travel way.	0.62	Safe Roads
Install or widen pavement markings for centerlines and edgelines.	0.78	Safe Roads
Provide enhanced curve delineation, such as chevrons and pavement markings in accordance with MUTCD criteria.	0.76-0.84	Safe Roads
Use High Friction Surface Treatment (HFST) to increase traction through sharp curves.	0.76	Safe Roads
Install guardrail at steep slopes and to shield fixed objects near the roadside.	0.72	Safe Roads
Replace non-standard barrier end treatments with crash-worthy treatments	0.86	Safe Roads
Post Safe driving tips/videos on agency website to address roadway departures, targeted to young/inexperienced drivers	Undetermined	Safe Users
High-visibility enforcement of aggressive driving, speeding, and impaired driving	★★★★★	Safe Users
Perform road safety audits at high priority locations	0.40-0.90	Safe Roads

Native American Fatalities

Data on Native American fatalities was unavailable from the ODOT crash database. Note that data on tribal citizenship is not collected or reported in the ODOT crash database. However, this is one of the Oklahoma SHSP emphasis areas, and since three Tribal Nations are in the INCOG region, the stakeholders decided to keep Native American fatalities as an emphasis area. The Cherokee Nation, Osage Nation, and Muscogee Nation have their own safety plans, which identified the following key emphasis areas:

- Pedestrians.
- Intersections.
- Road departure.
- Impaired driving.
- Lack of seat belt use.

***Emphasis Area Objective**: Reduce the number of Native Americans fatalities*
***Emphasis Area Success Metric**: Reduce the number of emphasis area related crashes by 25 percent by 2030*

These emphasis areas are common to the INCOG LRSP emphasis areas, and the strategies and actions for these emphasis areas will be the same.

Intersections

Intersecting roadways are necessary to connect people driving, walking, and cycling from one route to another. However, these intersections of roads and paths create conflict points where crashes can occur. Intersection-related crashes happen more frequently at locations where traffic volumes are high. Intersection crashes account for 44 percent of all fatal and serious injury crashes in the INCOG region.

***Emphasis Area Objective**: Reduce the number of fatalities and serious injuries at intersections*
***Emphasis Area Success Metric**: Reduce the number of emphasis area related crashes by 25% by 2030*

Description	CMF/Star Rating	Safe System Element
Improve intersection signage and lighting to improve driver visibility.	0.90	Safe Roads, Safe Users
Verify sight triangles and eliminate obstructions.	0.53	Safe Roads
Install roundabouts.	0.31	Safe Roads, Safe Speeds
Use Radar Speed Feedback Signs to reduce driver speeds.	0.95	Safe Roads, Safe Speeds, Safe Users
Install flashing yellow arrow signals.	0.86	Safe Roads, Safe Users
Construct left- and/or right-turn lanes.	0.52-0.86	Safe Roads, Safe Users
Post safe driving tips/videos on agency website.	Undetermined	Safe Users
Perform road safety audits.	0.40-0.90	Safe Roads

Non-Motorized Users

Non-motorized roadway users for this plan are pedestrians and cyclists, which includes micromobility users (E-scooters, E-bikes) They are the most exposed and least protected users of the roadway. Pedestrian and bicycle crashes account for twelve percent of the fatal and serious injury crashes on roadways within the INCOG region. These crashes tend to occur less frequently than other crash types, but tend to be more severe for the non-motorized user. Recognizing and addressing the vulnerability of non-motorized users aligns with the Safe System Approach by seeking to keep impact energy on the human body at tolerable levels.

***Emphasis Area Objective**: Reduce the number of bicycle and pedestrian fatalities and serious injuries*
***Emphasis Area Success Metric**: Reduce the number of emphasis area related crashes by 25% by 2030*

Description	CMF	Safe System Element
Prioritize pedestrian crossing improvement and installation projects	N/A	Safe Roads
Improve signs, signals, and pavement markings at pedestrian crossing locations	0.60	Safe Roads, Safe Speeds, Safe Users
Improve road geometry (narrow lanes, reduce curb radii, provide refuge islands) to improve pedestrian safety	0.44	Safe Roads
Implement sidewalk, trails, and lighting infrastructure improvements	0.11-0.35	Safe Roads
Install pedestrian hybrid beacons	0.45-0.71	Safe Roads, Safe Users
Install bike lanes/shoulders	0.44	Safe Roads, Safe Users
Increase enforcement of passing and share the road laws	Undetermined	Safe Users
Identify high risk pedestrian crossing areas	Undetermined	Safe Roads, Safe Users

Young/Older Drivers

Young drivers are defined as drivers under the age of 20. This demographic typically has less experience on the road and may not have the judgement necessary to avoid or handle unexpected conditions.

Older drivers are defined as drivers of the age 65 and older. Driver vision and perception-reaction time can often diminish with age, which can make driving difficult and could result in safety related consequences.

Younger drivers account for twelve percent of the fatal and serious injury crashes on roadways in the region, while older drivers account for eleven percent.

***Emphasis Area Objective**: Reduce the number of young/older driver related crashes*
***Emphasis Area Success Metric**: Reduce the number of emphasis area related crashes by 25% by 2030*

Description	CMF/Star Rating	Safe System Element
Improve lighting at intersections	0.29	Safe Roads, Safe Users
Increase use of advance warning signs	0.70	Safe Roads, Safe Users
Increase size and letter height of roadway signs, width of striping, and use retro-reflective signal back-plates	0.65	Safe Roads, Safe Users
Implement seat belt awareness campaign	★★★★	Safe Users

Behavior

Research shows that the human element is a contributing factor in over 90 percent of crashes (FHWA, 2021). The Safe System Approach recognizes that road users will make mistakes and attempts to accommodate for those mistakes through safe roads, safe users, safe vehicles, and safe speeds. Key behaviors associated with crashes include speeding, impaired driving, unbelted occupants, and distracted driving.

Alcohol-involved crashes account for fifteen percent of the fatal and serious injury crashes on roadways in the region, and unbelted occupants comprise thirteen percent of the fatalities and serious injuries. Speed-related and distracted driving crash data were not available; however, the INCOG stakeholders recognized these behaviors as priorities for safety countermeasures.

***Emphasis Area Objective**: Reduce the number of fatalities and serious injuries involving unbelted vehicle occupants, speed, aggressive driving, impaired driving, and distracted driving*

***Emphasis Area Success Metric**: Reduce the number of emphasis area related crashes by 25% by 2030*

Description	CMF/Star Rating	Safe System Element
Conduct publicized sobriety checkpoints	★★★★★	Safe Users
Conduct high visibility saturation patrols	★★★★	Safe Users
Conduct aggressive enforcement efforts for non-use of seatbelts and child safety seats	★★★★★	Safe Users
Engage agencies in coordinating enforcement activities and initiatives that address driving while under the influence of drugs and alcohol	★★★	Safe Users, Safe Roads
Set well-established speed limits based on the use of appropriate engineering practices	0.74	Safe Roads, Safe Speeds
Initiate high-visibility outreach campaigns that support speed and aggressive driving enforcement programs	Undetermined	Safe Users, Safe Speeds
Use traffic calming methods to reduce operating speeds	0.68	Safe Users, Safe Roads, Safe Speeds
Implement distracted driving awareness campaign	Undetermined	Safe Users
Increase enforcement of distracted driving laws	★★★★	Safe Users, Safe Roads

Potential Project Locations

Implementation of safety strategies at high priority locations will help reduce fatal and serious injury crashes, which is the goal of this LRSP. The following sections highlight key project locations for INCOG stakeholders to consider for potential safety projects. High frequency crash types occurring at these locations are shown in parentheses. The previous section of this plan provides strategies to consider for implementation at these locations.

Project Locations and Associated Emphasis Areas

During the second workshop, the stakeholder discussed hotspots based on crash data and project locations previously identified in tribal safety plans. Based on these findings, the following locations were identified as potential safety projects. Items in parentheses are the crash emphasis areas associated with that location.

Tulsa County

- E 7th Street/S Elgin Avenue – (Intersection)
- W 15th Street/S Boulder Avenue – (Intersection)
- E 71st Street/S Yale Avenue (Intersection, Alcohol)
- E 71st Street/S Braden Avenue – (Intersection)
- E 71st Street/S Canton Avenue – (Intersection)
- E 71st Street/S Quincy Avenue – (Intersection and Older Drivers)
- E 51st Street/S Yale Avenue – (Non-motorized)
- E 81st Street, Riverside Parkway to S Wheeling Avenue – (Non-motorized)
- S 145th E Avenue/E 41st Street – (Lane Departure)
- Riverside Parkway, Entire corridor – (Lane Departure)
- N 161st East Avenue, Entire corridor – (Lane Departure)

Rogers County

- Pine Street/Woodcrest Lane – (Intersection)
- Pine Street/S Cherokee Street – (Intersection)
- Pine Street/N 177th E Street – (Intersection)
- E 400 Road/S 4060 Road – (intersection)
- N Florence Avenue/E 17th Street – (Non-motorized)
- Pine Street, Tulsa border to Fair Oaks area – (Lane Departure)
- S 4220 Road, NE Akin Road to Rt 20 – (Lane Departure)
- E 410 Road, S OK 66 to S 4230 Road – (Lane Departure)
- N 193rd Street/ E 69th Street – (Lane Departure)
- E 410 Road – (Lane Departure)
- E 430 Road – (Lane Departure)

Creek County

- W 151st Street, Entire Corridor – (Lane Departure)

Osage County

- Osage Street/W Young Street – (Intersection)
- Lake Rd – (Lane Departure)
- N 52nd W Avenue, W 43rd Street to W 53rd Street – (Lane Departure)

- County Road 5905, County Road 5520 to County Road 5470 – (No Restraint Used and Lane Departure)
- County Road 2230 – (Lane Departure)

Wagoner County

- E 71st Street, County border to S 305th East Avenue – (Intersection and Older Drivers)
- E 141st Street/S 241st East Avenue – (Intersection and Younger Drivers)
- OK 251C, Airport to the lake – (No Restraint Used and Lane Departure)

The Muscogee Nation and Osage Nation identified locations in their safety plans for safety improvements. These safety plans did not indicate the types of crashes or the recommended improvements for these locations. These locations are included here, and INCOG and its stakeholders are encouraged to work with the Tribal Nations to identify locations for road safety audits from this list:

Priority Locations from Muscogee Nation's Safety Plan

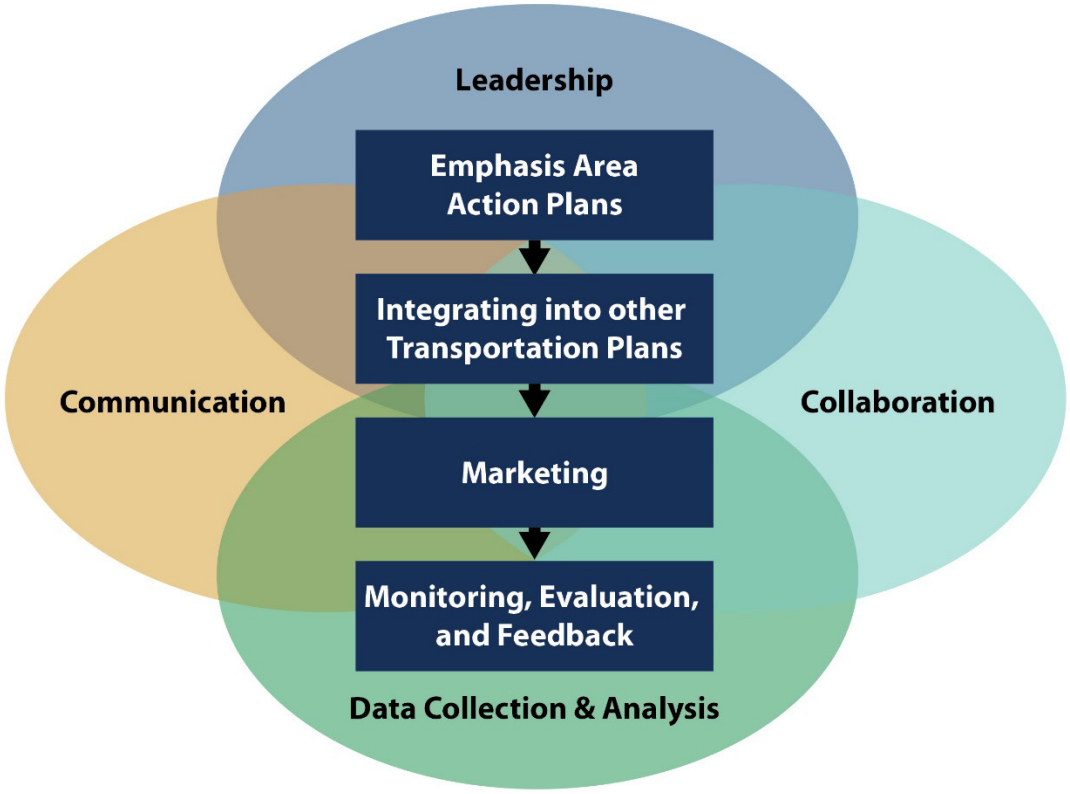
- US Hwy 75 & Will Sampson Road (Okmulgee County)
- County Road E960 at County Road N3620 (Okfuskee County)
- SH 48 between and at intersections of SH 33 and SH 51 (Creek County)
- SH 33 approaching I-44 from the west (Creek County)
- US 75 (Business) in Henryetta (Okmulgee County)
- US 75 between Henryetta and Okmulgee (Okmulgee County)
- US 64 / SH 72 / US 62, south of Haskell (Muskogee County)
- US 69 between Eufaula and Checotah (McIntosh County)
- US 75 and US Alt 75, west of Winchester and Liberty (Okmulgee County/Tulsa County)
- US 75 and SH 56 Intersection at the MCN Complex Area
- SH 56 Loop and Mission Street at the MCN Complex Area

Priority Locations from Osage Nation's Safety Plan

- SH 18 – South of Shidler
- 52nd W Avenue & 133rd Street N (Skiatook)

Implementation and Evaluation

An effective LRSP is feasible, implementable, regularly updated, and supported by safety stakeholders. Figure 24 highlights FHWA's eight elements of a SHSP Implementation Process Model.



Source: FHWA

Figure 24. Graphic. FHWA SHSP implementation process model (FHWA, 2010).

These elements and the following components are key factors in implementing this LRSP:

- Identify the required resources and action steps for implementing each countermeasure.
- Identify a process to track countermeasure and action step implementation.
- Integrate the LSRP with other transportation safety plans like the INCOG Regional Transportation Plan.
- Market LRSP through branding, news events, web sites, and newsletters.
- Regularly track the extent to which emphasis area strategies are being implemented.

Activities to implement, evaluate, and update the INCOG LRSP and to encourage stakeholder participation in implementing the plan include:

- Form a LRSP Champions Working Group of key safety stakeholders to identify issues affecting the implementation of the plan, guide the implementation process, promote successes, and identify emerging safety issues and discuss new safety strategies.

- Actively participate in the ODOT SHSP and HSIP processes.
- Keep appropriate elected officials and Tribal Nations abreast of implementation activities, soliciting their assistance when necessary and allow them an opportunity to celebrate successes.
- Hold quarterly meetings of law enforcement, engineering, planning and maintenance staff to discuss safety issues and any new crash patterns.
- Keep key advocacy groups involved by inviting them to participate in safety meetings and INCOG Transportation Technical Committee meetings.
- Host an annual Traffic Safety Conference to promote traffic safety for all stakeholders
- Update the LRSP on a regular cycle, e.g., every 3 to 5 years.
- Update crash data annually.

A key benefit of the INCOG LRSP is its alignment with the Oklahoma SHSP. As the State has prioritized its safety funding based on its Emphasis Areas, the alignment of the INCOG LRSP strategies and actions with State priorities enhances their eligibility for Federal safety funds. Federal funding from the HSIP to support County highway infrastructure projects is predicated on this linkage to emphasis areas in the SHSP; therefore, the County's alignment with the State's safety efforts is critical. Accessing these Federal funds helps to supplement local funding for projects stemming from this LRSP. In addition, Federal behavioral safety grant funding from NHTSA and managed in Oklahoma by the Highway Safety Office is available on an annual basis.

The Bipartisan Infrastructure Law (BIL) establishes the new Safe Streets and Roads for All (SS4A)[26] discretionary program that will provide $5-6 billion in grants over the next 5 years. Funding supports regional, local, and Tribal initiatives through grants to prevent roadway deaths and serious injuries.

The strategies and actions in the INCOG LRSP can also link to the current and future updates of INCOG-led programs including the Long Range Transportation Plan, the Transportation Improvement Program, Bicycle/Pedestrian Master Plan, and Regional Transit Plan. Bringing together the LRSP with these other plans and programs has the potential to reduce administrative burden, encourages the use of consistent data and analysis methods, and allocates resources to identified locations and programs that address the greatest safety needs in the region.

Evaluation of the LRSP will be in the form of process and outcomes. Process evaluation involves reviewing each numbered action under the strategies in the LRSP and determining if progress has been made. Outcome evaluation looks at the impact of activities. For some projects, such as site-specific projects, it is relatively straightforward to determine safety impact based on pre-construction and post-construction crash statistics. For other projects, it may be a combination of several activities that lead to a change in crash frequency. For example, a change in the frequency of impaired driving crashes may be a result of a combination of educational and enforcement initiatives. Therefore, because of the interrelationship between different safety activities in the region, it is ideal to evaluate outcomes at the emphasis area level. The LRSP can use fatalities and injuries as the metric for annual progress in each of the emphasis areas.

In addition to crash frequency, evaluations should also consider other metrics, if data allow. Changes in traffic volumes, crash severity, and characteristics of crashes also provide meaningful insight into the

[26] https://www.transportation.gov/SS4A

effect of safety countermeasures. The Highway Safety Manual (HSM) is a useful resource that provides further information on different performance measures and evaluation methods.

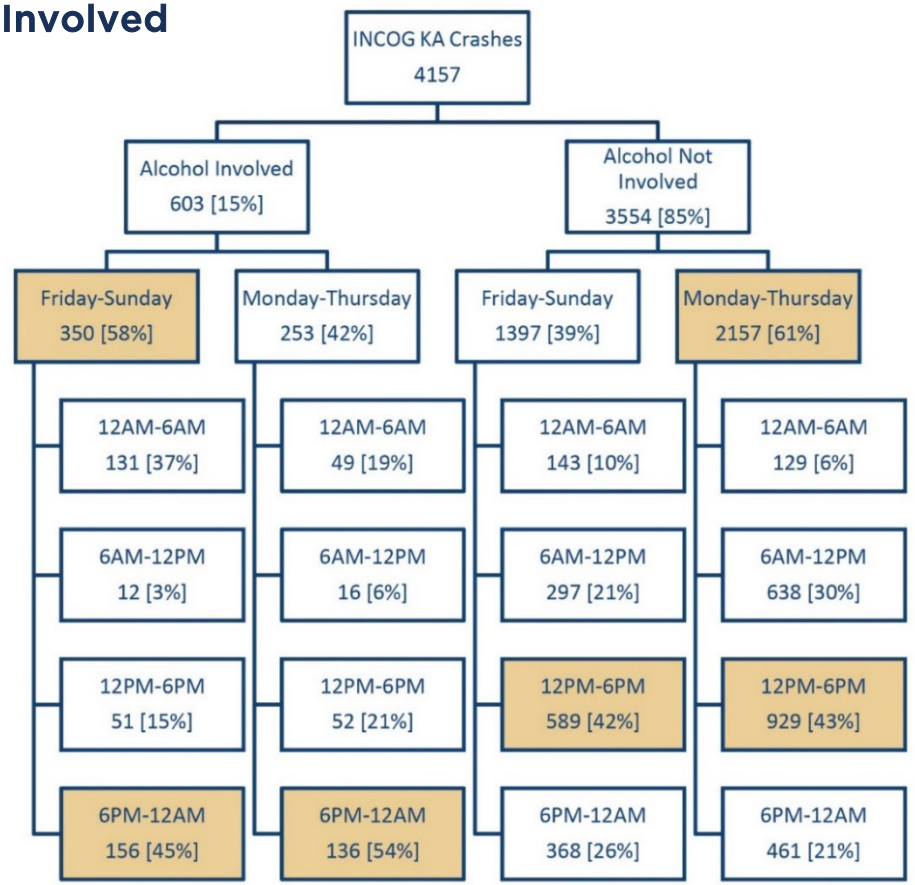
INCOG recognizes that some strategies may take several years to fully implement. Additionally, it may take several years to realize the benefit of the strategies through a reduction of fatal and serious injury crashes. Like the State SHSP, a full update of the LRSP is anticipated to be completed on a regular cycle. However, more frequent updates to the individual strategies and actions may take place to reflect the Plan's progress and any new policies that affect implementation.

Appendices

A. Crash Trees
B. Safety Strategies and Actions

Appendix A: Crash Trees

2010-2019 All Local Roads in INCOG Jurisdictions – Alcohol Involved

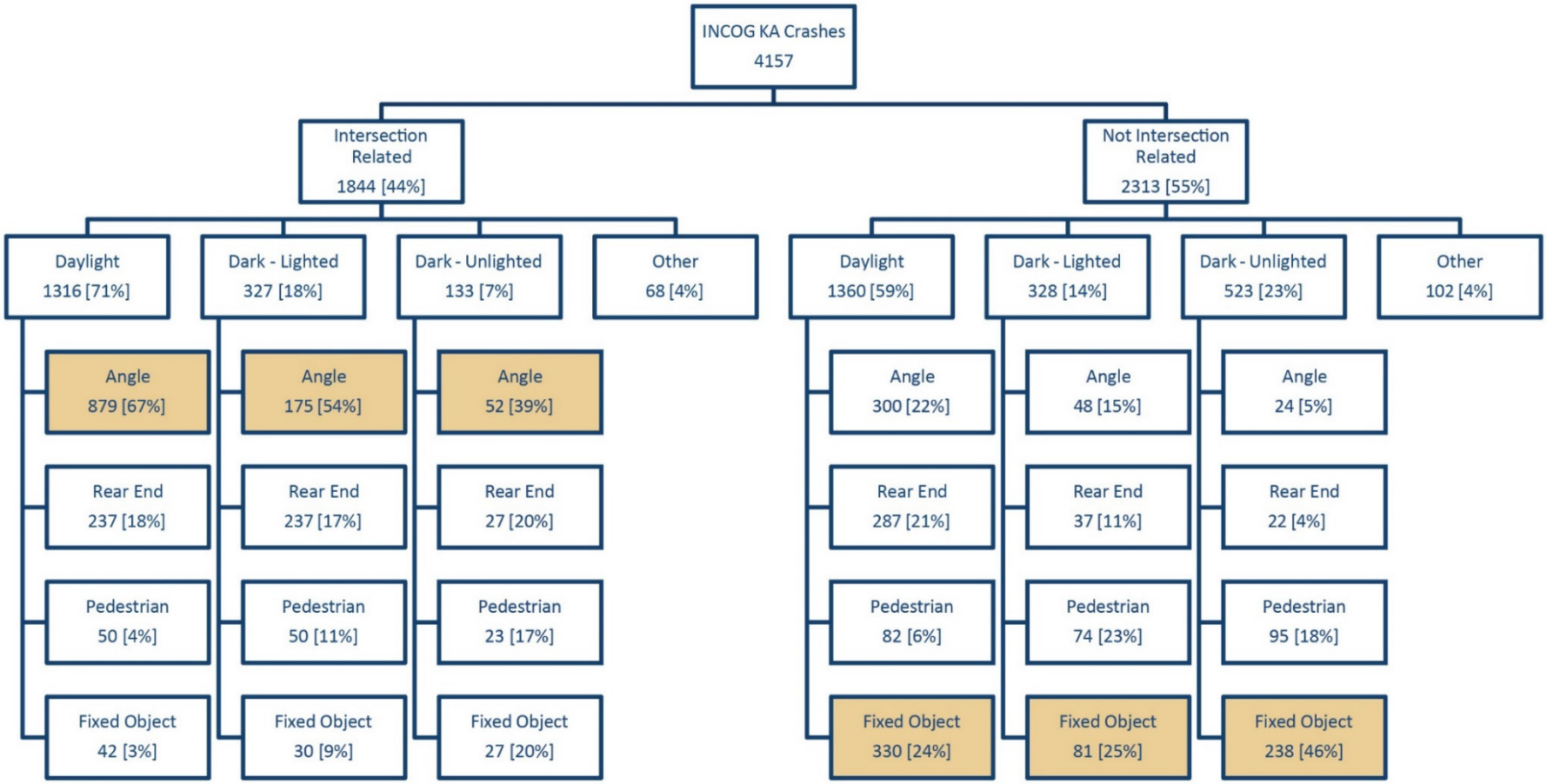


Source: FHWA

Figure 25. Graphic. Crash tree of alcohol-involved fatal and serious injury crashes on all local roads.[27]

[27] In February 2021, INCOG pulled data from ODOT's secure Safe-T site (https://www.oksafe-t.org/). The project team used the data to make this crash tree.

2010-2019 All Local Roads in INCOG Jurisdictions – Intersection Related

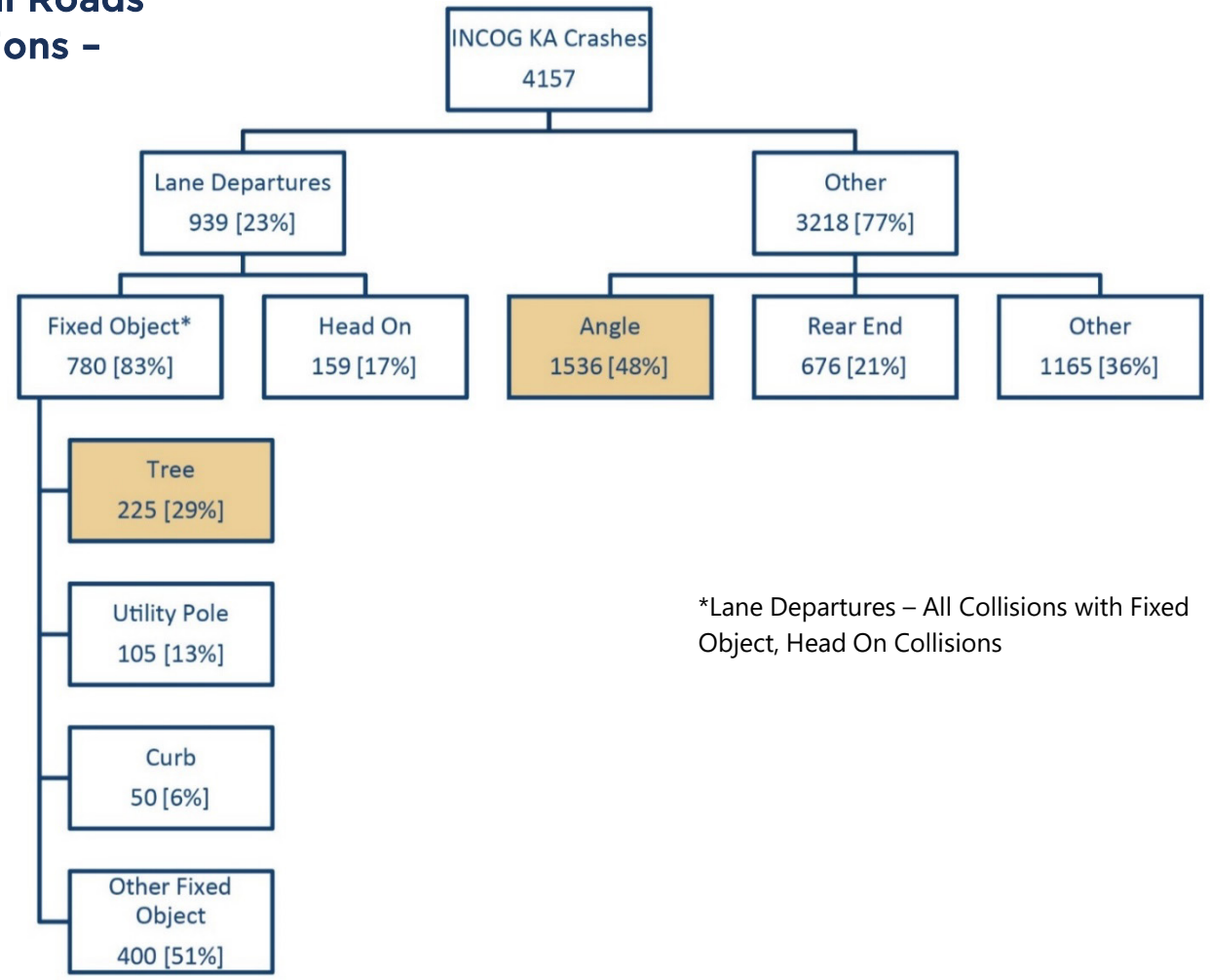


Source: FHWA

Figure 26. Graphic. Crash tree of intersection-related fatal and serious injury crashes on all local roads.[28]

[28]In February 2021, INCOG pulled data from ODOT's secure Safe-T site (https://www.oksafe-t.org/). The project team used the data to make this crash tree.

2010-2019 All Local Roads in INCOG Jurisdictions – Lane Departures



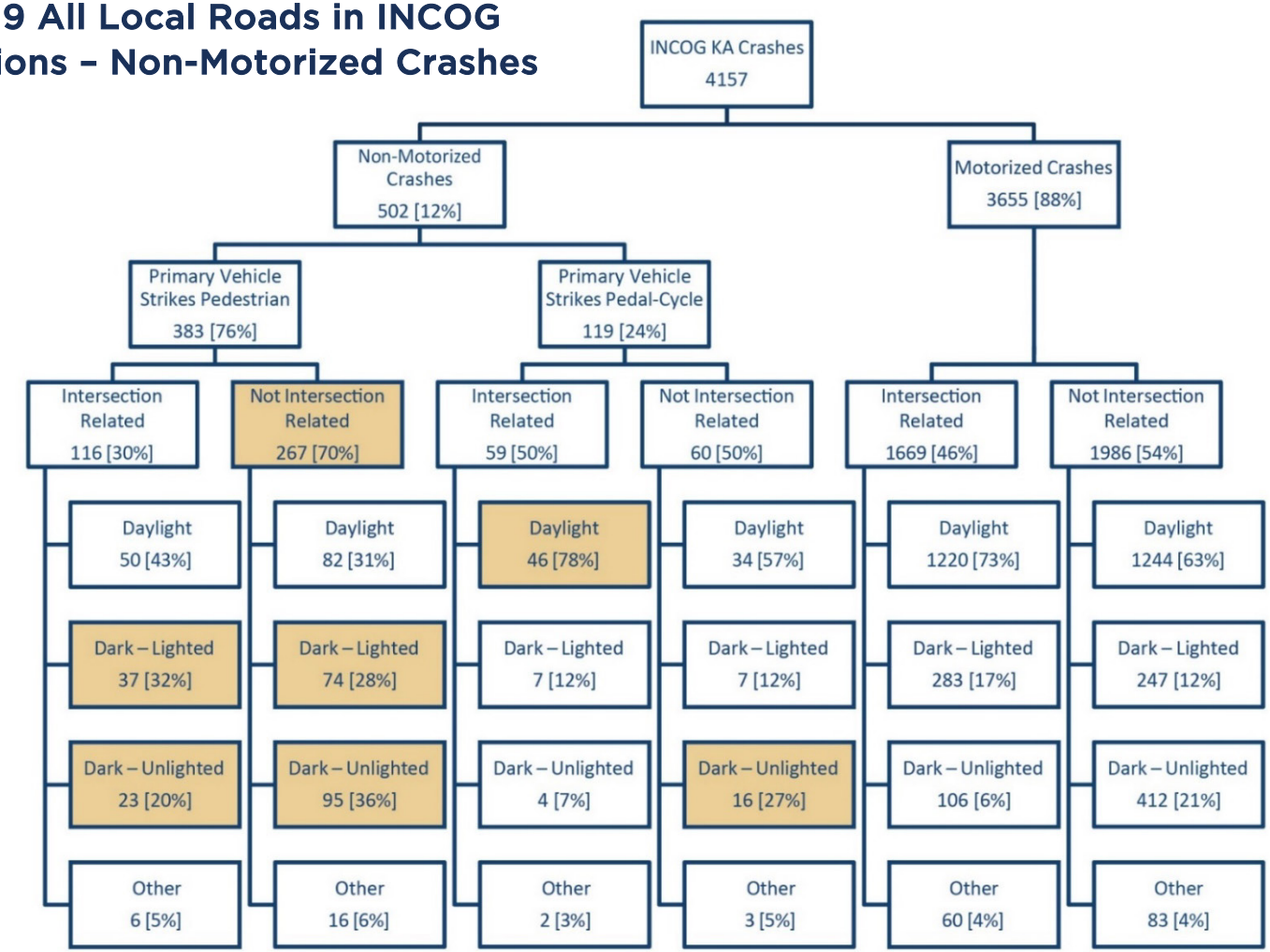
*Lane Departures – All Collisions with Fixed Object, Head On Collisions

Source: FHWA

Figure 27. Graphic. Crash tree of lane departure fatal and serious injury crashes on all local roads.[29]

[29] In February 2021, INCOG pulled data from ODOT's secure Safe-T site (https://www.oksafe-t.org/). The project team used the data to make this crash tree.

2010-2019 All Local Roads in INCOG Jurisdictions – Non-Motorized Crashes

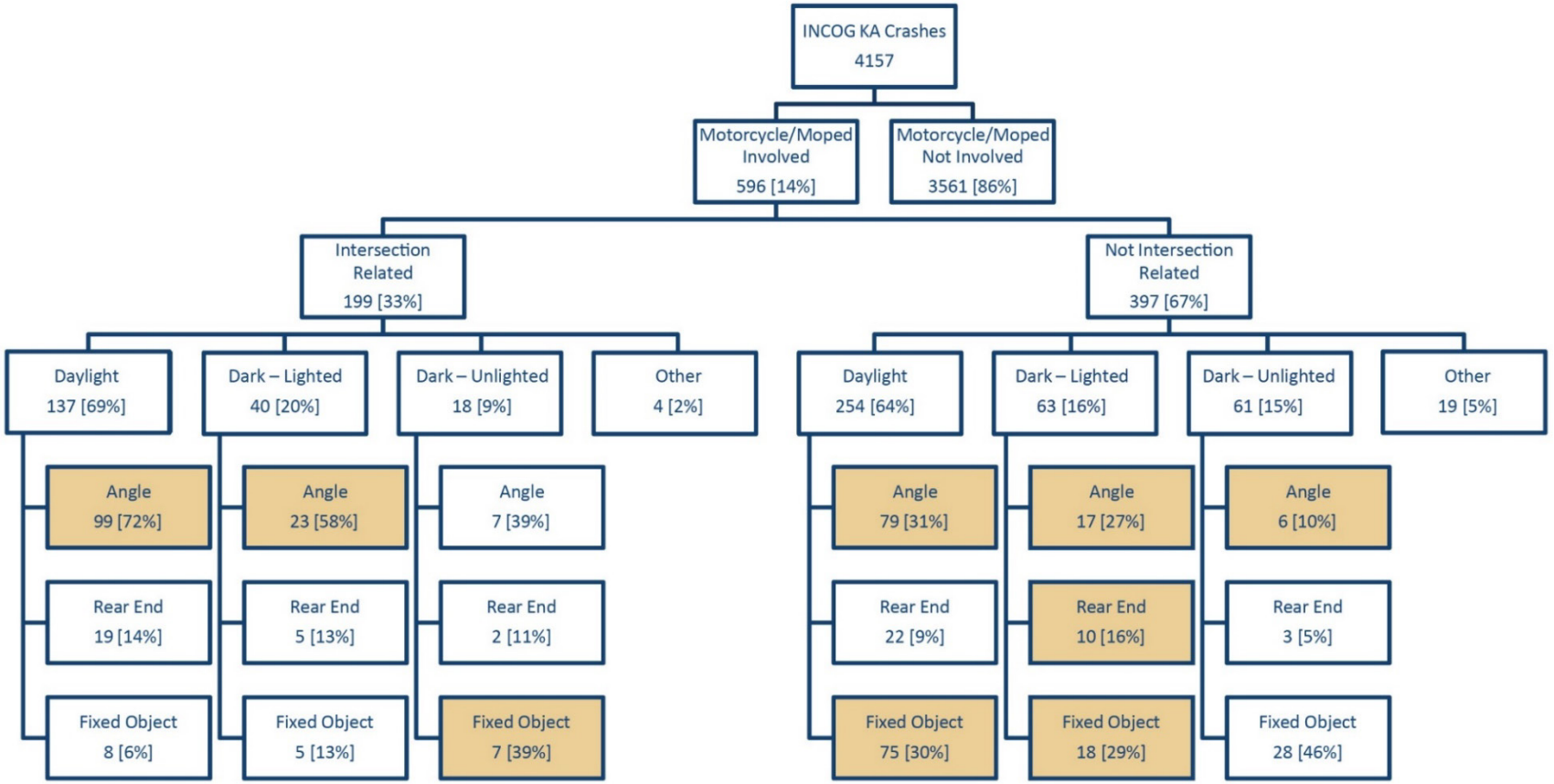


Source: FHWA

Figure 28. Crash tree of non-motorized fatal and serious injury crashes for all local roads.[30]

[30] In February 2021, INCOG pulled data from ODOT's secure Safe-T site (https://www.oksafe-t.org/). The project team used the data to make this crash tree.

2010-2019 All Local Roads in INCOG Jurisdictions – Motorcycle/Moped Involved

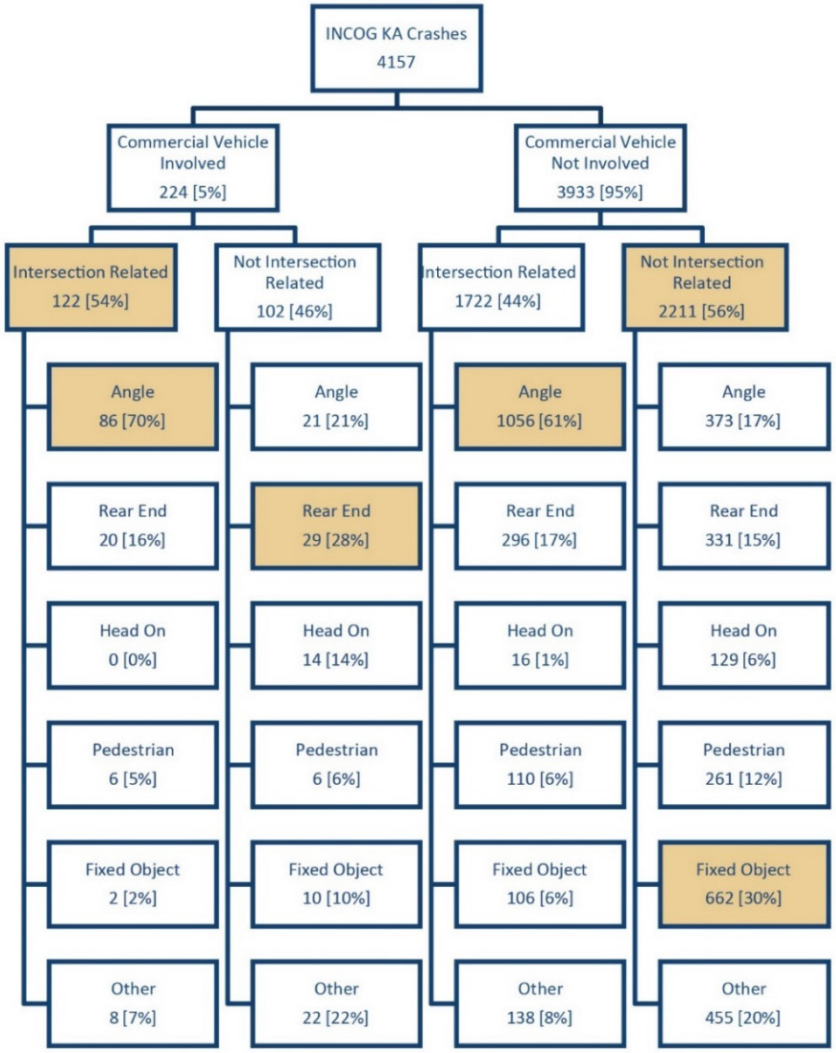


Source: FHWA

Figure 29. Graphic. Crash tree of motorcycle/moped involved fatal and serious injury crashes on all local roads.[31]

[31] In February 2021, INCOG pulled data from ODOT's secure Safe-T site (https://www.oksafe-t.org/). The project team used the data to make this crash tree.

2010-2019 All Local Roads in INCOG Jurisdictions – Commercial Vehicle Involved

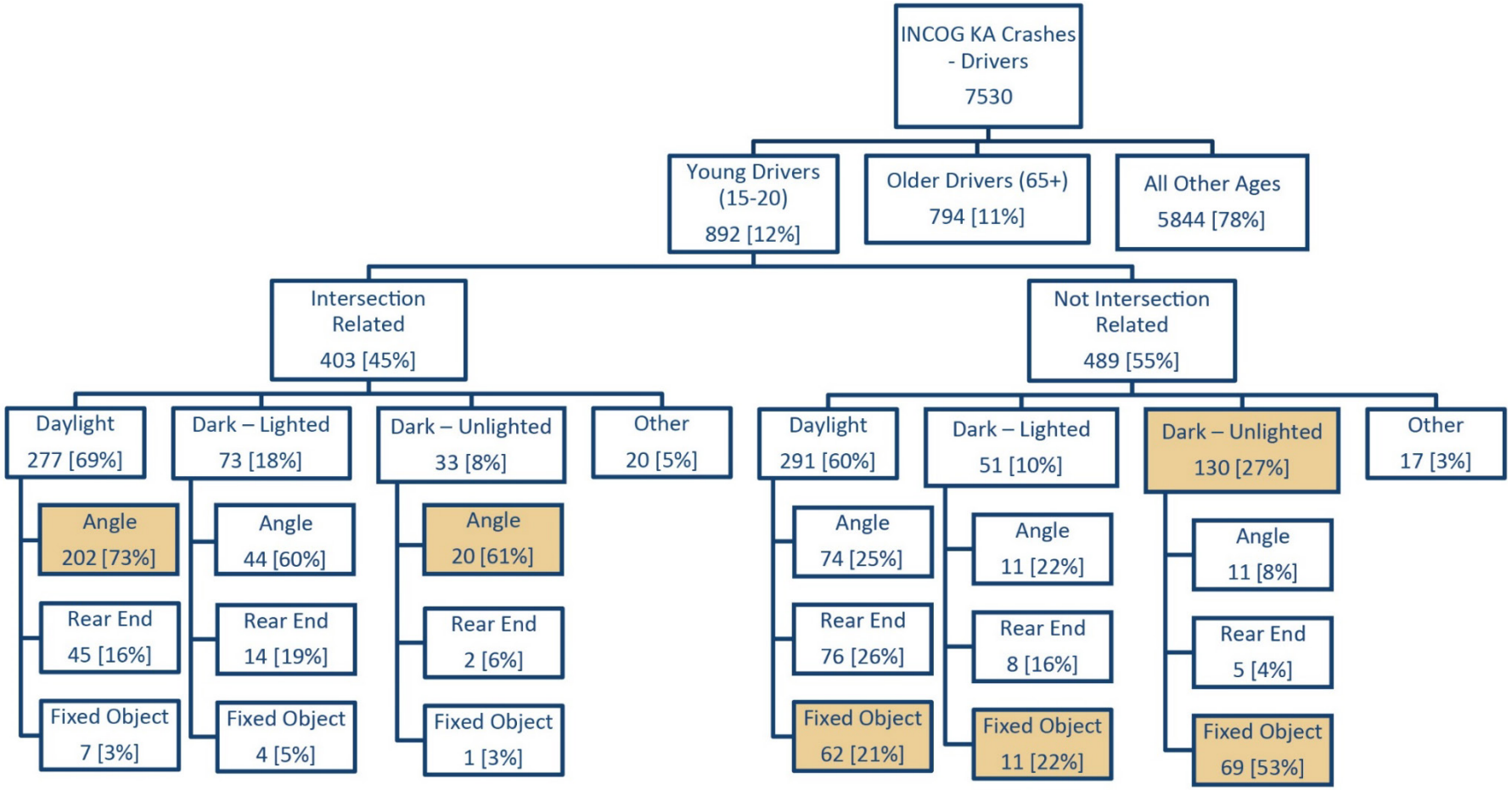


Source: FHWA

Figure 30. Graphic. Crash tree of commercial vehicle involved fatal and serious injury crashes on all local roads.[32]

[32] In February 2021, INCOG pulled data from ODOT's secure Safe-T site (https://www.oksafe-t.org/). The project team used the data to make this crash tree.

2010-2019 All Local Roads in INCOG Jurisdictions – Young Drivers

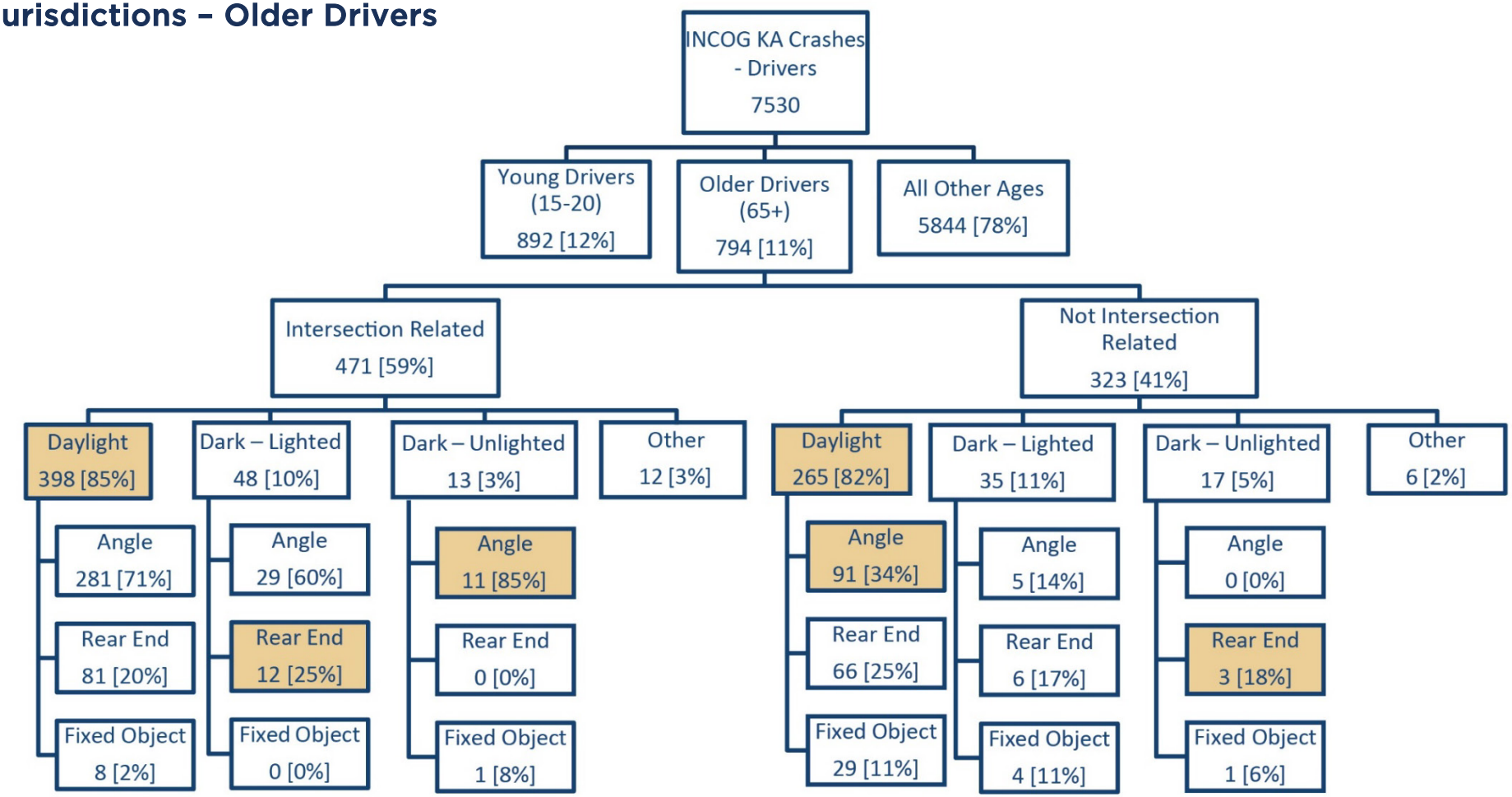


Source: FHWA

Figure 31. Graphic. Crash tree of alcohol-involved fatal and serious injury crashes on all local roads.[33]

[33] In February 2021, INCOG pulled data from ODOT's secure Safe-T site (https://www.oksafe-t.org/). The project team used the data to make this crash tree.

2010-2019 All Local Roads in INCOG Jurisdictions – Older Drivers

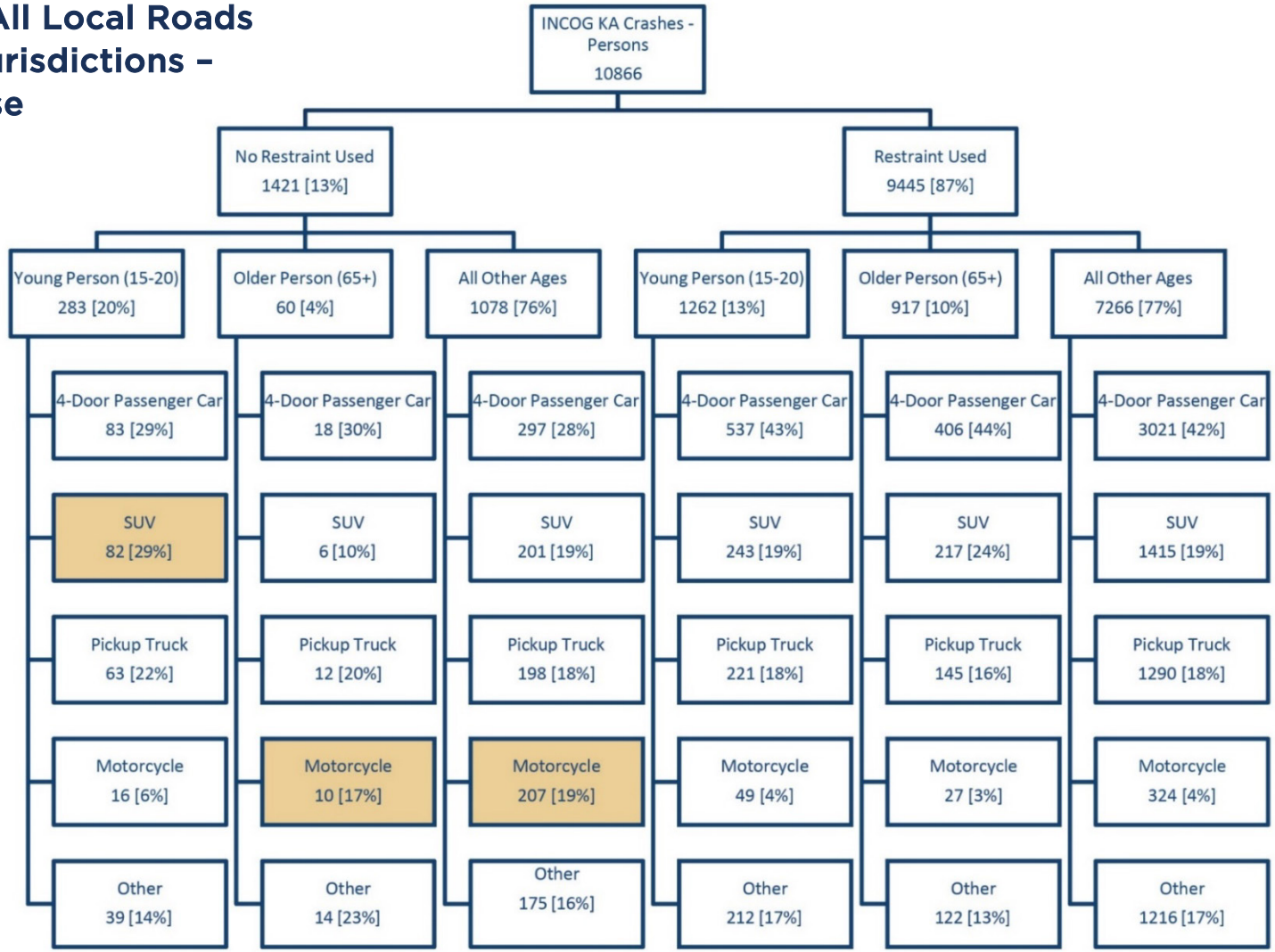


Source: FHWA

Figure 32. Graphic. Crash tree for older driver fatal and serious injury crashes on all local roads.[34]

[34] In February 2021, INCOG pulled data from ODOT's secure Safe-T site (https://www.oksafe-t.org/). The project team used the data to make this crash tree.

2010-2019 All Local Roads in INCOG Jurisdictions – Restraint Use



Source: FHWA

Figure 33. Graphic. Crash tree for restraint use fatal and serious injury crashes on all local roads.[35]

[35] In February 2021, INCOG pulled data from ODOT's secure Safe-T site (https://www.oksafe-t.org/). The project team used the data to make this crash tree.

Appendix B: INCOG Local Road Safety Plan Strategies and Actions

Emphasis Area 1 – Lane Departures

Emphasis Area Objective: Reduce number of lane departure fatal and serious injury crashes

Emphasis Area Success Metric: *Reduce the number of emphasis area related crashes by 25% by 2030*

Strategy 1.1: Implement physical countermeasures to reduce lane departure crashes

Number	Action	Proposed Lead Agency (*and partners*)	Activity Performance Metric	CMF	Application	Potential Funding Source(s)	Implementation Time Frame
1.1.1	Install centerline, shoulder, or edge line rumble strips on rural county roads	County, Tribe, ODOT	Miles of rumble strip constructed	0.51	Various Major/Minor Collector Roads	County, Tribe, ODOT	Start two years out.
1.1.2	Widen and/or pave shoulders to provide drivers with a recovery area, (utilize Safety Edge)	County, Tribe, ODOT	Miles of shoulder added	0.25		County, Tribe, ODOT	Start five years out.
1.1.3	Install, enhance, or maintain centerline and edge line pavement markings.	County, Tribe	Miles of roadway treated	0.76	All Major/Minor Collector Roads	County, Tribe, ODOT	Complete within two years.
1.1.4	Provide enhanced curve delineation, such as chevrons and pavement markings in accordance with MUTCD criteria.	County, Tribe, ODOT	Number of curves evaluated and addressed	0.81	Various system curves	County, Tribe, ODOT	Complete within three years.

1.1.5	Use High Friction Surface Treatment (HFST) to increase traction through sharp curves prioritizing according to crash rate.	County, Tribe, ODOT	Linear feet of HFST placed.	0.57	Various system curves	County, Tribe, ODOT	Start one year out, finish within five years.
1.1.6	Remove or relocate fixed objects in the roadside according to clear zone standards.	County, Tribe	Number of objects removed.	0.62	County system	County, Tribe, ODOT	Start right away. Finish prioritized according to difficulty and cost.
1.1.7	Incorporate Safety Edge℠ on new projects	County, Tribe	LF of Safety Edge℠ constructed	0.643	Various Major/Minor Collector Roads	County, Tribe, ODOT	Complete within three years.
1.1.8	Install guardrail where needed	County, Tribe	LF of guardrail	0.723	Various Major/Minor Collector Roads	County, Tribe, ODOT	Complete within three years.
1.1.9	Improve barrier end treatments	County, Tribe	Number of end treatments improved	0.855	Various Major/Minor Collector Roads	County, Tribe, ODOT	Complete within three years.

Strategy 1.2: Implement educational efforts to address lane departure safety

Number	**Action**	**Proposed Lead Agency (*and partners)***	**Activity Performance Metric**	**Application**	**Potential Funding Source(s)**	**Implementation Time Frame**
1.2.1	Safe driving tips/videos on agency website.	County, Tribe, ODOT	Number of views/clicks	County system	Oklahoma Highway Safety Office	As soon as possible. Launch one year out.

Strategy 1.3: Enhance enforcement activity to address lane departure safety

Number	Action	Proposed Lead Agency (*and partners*)	Activity Performance Metric	Application	Potential Funding Source(s)	Implementation Time Frame
1.3.1	Aggressive impaired driving enforcement	Tribe, County Sheriff, other law enforcement partners.	Hours logged	Throughout County	Oklahoma Highway Safety Office	Annually
1.3.2	High-visibility enforcement of aggressive driving/speed laws to reinforce established speed limits	Tribe, County Sheriff, other law enforcement partners.	Hours logged	Throughout County	Oklahoma Highway Safety Office	Annually

Strategy 1.4: Improve data collection and analysis practices that relate to lane departure safety

Number	Action	Proposed Lead Agency (*and partners*)	Activity Performance Metric	Application	Potential Funding Source(s)	Implementation Time Frame
1.4.1	Perform road safety audits.	Tribe, County, Law enforcement, ODOT	Locations analyzed	Begin with high priority corridors identified in LRSP	FHWA, ODOT, INCOG, County, Tribe	Immediately, within first 6 months.

Emphasis Area 2 – Native American Fatalities

Emphasis Area Objective: Reduce the number of Native Americans fatalities

Emphasis Area Success Metric: *Reduce the number of emphasis area related crashes by 25% by 2030*

Strategy 2.1: Implement physical countermeasures to reduce crashes resulting in Native Americans fatalities

Number	Action	Proposed Lead Agency (*and partners)*	Activity Performance Metric	CMF	Application	Potential Funding Source(s)	Implementation Time Frame
2.1.1	Widen and/or add shoulders	Tribe, County, ODOT	Miles of shoulders	0.25	Systemwide	County, Tribe, ODOT	Start five years out.
2.1.2	Add pedestrian facilities to rural roads	Tribe, County, ODOT	Miles of pedestrian facilities	0.26	Systemwide	County, Tribe, ODOT	Within five years.

Strategy 2.2: Implement educational efforts to address Native Americans fatalities

Number	Action	Proposed Lead Agency (*and partners)*	Activity Performance Metric	Application	Potential Funding Source(s)	Implementation Time Frame
2.2.1	Implement impaired driving awareness campaign	Tribe, County, ODOT	Number of campaigns	Systemwide	Oklahoma Highway Safety Office, Tribe	Ongoing
2.2.2	Implement safe operating speed awareness campaign	Tribe, County, ODOT	Number of campaigns	Systemwide	Oklahoma Highway Safety Office, Tribe	Ongoing

2.2.3	Implement seat belt and child restraint awareness campaign	Tribe, County, ODOT	Number of campaigns	Systemwide	Oklahoma Highway Safety Office, Tribe	Ongoing
2.2.4	Implement distracted driving campaign	Tribe, County, ODOT	Number of campaigns	Systemwide	Oklahoma Highway Safety Office, Tribe	Ongoing
2.2.5	Implement targeted "safe" walking by pedestrian education campaign	Tribe, County, ODOT	Number of campaigns	Systemwide	Oklahoma Highway Safety Office, Tribe	Ongoing

Strategy 2.3: Enhance enforcement activity to address Native Americans fatalities

Number	**Action**	**Proposed Lead Agency (*and partners)***	**Activity Performance Metric**	**Application**	**Potential Funding Source(s)**	**Implementation Time Frame**
2.3.1	Increase speed enforcement	Law enforcement	Number of hours	Systemwide	Oklahoma Highway Safety Office, Tribe	Ongoing
2.3.2	Increase seat belt and child restraint enforcement	Law enforcement	Number of hours	Systemwide	Oklahoma Highway Safety Office, Tribe	Ongoing
2.3.3	Increase distracted driving enforcement	Law enforcement	Number of hours	Systemwide	Oklahoma Highway Safety Office, Tribe	Ongoing

Strategy 2.4: Improve data collection and analysis practices that relate to Native American fatalities

Number	Action	Proposed Lead Agency (*and partners)*	Activity Performance Metric	Application	Potential Funding Source(s)	Implementation Time Frame
2.4.1	Perform road safety audits.	Tribe, County, Law enforcement, ODOT	Locations analyzed	Begin with high priority intersections and corridors identified in LRSP	FHWA, ODOT, INCOG, County, Tribe	Immediately, within first 6 months.

Emphasis Area 3 – Intersections

Emphasis Area Objective: Reduce the number of fatalities and serious injuries at intersections

Emphasis Area Success Metric: *Reduce the number of emphasis area related crashes by 25% by 2030*

Strategy 3.1: Implement physical countermeasures to reduce crashes related to intersection safety.

Number	Action	Proposed Lead Agency (*and partners)*	Activity Performance Metric	CMF	Application	Potential Funding Source(s)	Implementation Time Frame
3.1.1	Improve intersection signing, markings or street lighting at rural intersections to increase intersection conspicuity	Tribe, County	Intersections assessed and plans implemented	0.734	High risk locations	County, Tribe, ODOT	Three-year completion
3.1.2	Verify sight triangles and eliminate obstructions	Tribe, County	Intersections assessed and plans implemented	0.53	Systemwide	County, Tribe, ODOT	Five-year completion

3.1.3	Install roundabouts	Tribe, County	Intersections assessed and plans implemented	0.309	High risk locations	County, Tribe, ODOT	Two-year completion
3.1.4	Use Radar Speed Feedback Signs to reduce driver speeds	Tribe, County	Intersections assessed and plans implemented	0.93	Systemwide	County, Tribe, ODOT	Pilot project
3.1.5	Install flashing yellow arrow signals	Tribe, County	Intersections assessed and plans implemented	0.857	Signalized intersections	County, Tribe, ODOT	Two-year completion
3.1.6	Construct left- and/or right-turn lanes	Tribe, County	Intersections assessed and plans implemented	0.81	High risk locations	County, Tribe, ODOT	Two years

Strategy 3.2: Implement educational efforts to address intersection safety

Number	**Action**	**Proposed Lead Agency (*and partners)***	**Activity Performance Metric**	**Application**	**Potential Funding Source(s)**	**Implementation Time Frame**
3.2.1	Safe driving tips/videos on agency website.	County, Tribe, ODOT	Number of views/clicks	County system	Oklahoma Highway Safety Office, Tribe, County	As soon as possible. Launch one year out.

Strategy 3.3: Enhance enforcement activity to address intersection safety

Number	Action	Proposed Lead Agency (*and partners)*	Activity Performance Metric	Application	Potential Funding Source(s)	Implementation Time Frame
3.3.1	Aggressive impaired driving enforcement	Tribe, County Sheriff, other law enforcement partners.	Hours logged	Throughout County	Oklahoma Highway Safety Office, Tribe, County	Annually

Strategy 3.4: Improve data collection and analysis practices that relate to intersection safety

Number	Action	Proposed Lead Agency (*and partners)*	Activity Performance Metric	Application	Potential Funding Source(s)	Implementation Time Frame
3.4.1	Perform road safety audits.	Tribe, County, Law enforcement, ODOT	Locations analyzed	Begin with high priority intersections identified in LRSP	FHWA, ODOT, INCOG, County, Tribe	Immediately, within first 6 months.

Emphasis Area 4 – Bicycles and Pedestrians

Emphasis Area Objective: Reduce the number of bicycle and pedestrian fatalities and serious injuries

Emphasis Area Success Metric: *Reduce the number of emphasis area related crashes by 25% by 2030*

Strategy 4.1: Implement physical countermeasures to reduce bicycle and pedestrian crashes

Number	Action	Proposed Lead Agency (*and partners)*	Activity Performance Metric	CMF	Application	Potential Funding Source(s)	Implementation Time Frame
4.1.1	Prioritize pedestrian crossing improvement and installation projects	Tribe, County, ODOT	Number of crossings	0.718	Locations with high pedestrian volumes	County, Tribe, ODOT	Annually
4.1.2	Improve signs, signals, and pavement markings at pedestrian crossing locations	Tribe, County, ODOT	Number of crossings	0.6	System pedestrian crossings	County, Tribe, ODOT	Within five years
4.1.3	Improve road geometry (narrow lanes, reduce curb radii, provide refuge islands) to improve pedestrian safety	Tribe, County, ODOT	Number of improvements implemented	0.86	Systemwide	County, Tribe, ODOT	Within five years
4.1.4	Implement sidewalk, trails, and lighting infrastructure improvements	Tribe, County, ODOT	Number of improvements implemented	0.3	Systemwide	County, Tribe, ODOT	Within five years
4.1.5	Install pedestrian hybrid beacons	Tribe, County, ODOT	Number of improvements implemented	0.543	High risk locations	County, Tribe, ODOT	Within five years
4.1.6	Install bike lanes/shoulders	Tribe, County, ODOT	Number of miles	0.435	High bike volume locations	County, Tribe, ODOT	Within five years

Strategy 4.2: Implement educational efforts to address bicycle and pedestrian crashes

Number	Action	Proposed Lead Agency (*and partners)*	Activity Performance Metric	Application	Potential Funding Source(s)	Implementation Time Frame
4.2.1	Increase awareness of jaywalking laws	Law enforcement	Number of clicks or promotions completed	Systemwide	Oklahoma Highway Safety Office	Annually
4.2.2	Conduct pedestrian and bicyclist safety campaigns	Tribe, County, INCOG	Number of clicks or campaigns completed	Systemwide	Oklahoma Highway Safety Office	Annually

Strategy 4.3: Enhance enforcement activity to address bicycle and pedestrian crashes

Number	Action	Proposed Lead Agency (*and partners)*	Activity Performance Metric	Application	Potential Funding Source(s)	Implementation Time Frame
4.3.1	Increase enforcement of jaywalking laws	Law enforcement	Number of hours	Systemwide	Oklahoma Highway Safety Office	Annually
4.3.2	Increase enforcement of passing and share the road laws	Law enforcement	Number of hours	Systemwide	Oklahoma Highway Safety Office	Annually

Strategy 4.4: Improve data collection and analysis practices that relate to bicycle and pedestrian crashes

Number	Action	Proposed Lead Agency (*and partners*)	Activity Performance Metric	Application	Potential Funding Source(s)	Implementation Time Frame
4.4.1	Identify high risk pedestrian crossing areas	Tribe, County, ODOT, INCOG	Conducted or not	Systemwide	County, Tribe	Annually

Emphasis Area 5 – Unbelted Vehicle Occupants

Emphasis Area Objective: Reduce the number of fatalities and serious injuries involving unbelted vehicle occupants

Emphasis Area Success Metric: *Reduce the number of emphasis area related crashes by 25% by 2030*

Strategy 5.1: Implement educational efforts to address unbelted vehicle occupants.

Number	Action	Proposed Lead Agency (*and partners*)	Activity Performance Metric	Application	Potential Funding Source(s)	Implementation Time Frame
5.1.1	Effective, high-visibility communications and outreach campaigns and workshops that support the use of seatbelts and child safety seats	Tribe, County	Number of classes; Number of clicks on key webpage	Countywide	Oklahoma Highway Safety Office, Tribe, County	Annually

Strategy 5.2: Enhance enforcement activity to address unbelted vehicle occupants.

Number	Action	Proposed Lead Agency (*and partners*)	Activity Performance Metric	Application	Potential Funding Source(s)	Implementation Time Frame
5.2.1	Aggressive enforcement efforts for non-use of seatbelts and child safety seats	Law enforcement	Number of hours	Key corridors	Oklahoma Highway Safety Office	Annually

Strategy 5.3: Improve data collection and analysis practices that relate to unbelted vehicle occupants.

Number	Action	Proposed Lead Agency (*and partners*)	Activity Performance Metric	Application	Potential Funding Source(s)	Implementation Time Frame
5.3.1	Analyze use of seatbelts in crashes	Law enforcement, ODOT, INCOG	Conducted or not	Systemwide	Oklahoma Highway Safety Office, ODOT	Annually

Emphasis Area 6 – Speed (and Aggressive) Drivers

Emphasis Area Objective: Reduce the number of fatalities and serious injuries involving speed or aggressive driving

Emphasis Area Success Metric: *Reduce the number of emphasis area related crashes by 25% by 2030*

Strategy 6.1: Implement physical countermeasures to reduce crashes related to speed (and aggressive) drivers

Number	Action	Proposed Lead Agency (*and partners*)	Activity Performance Metric	CMF	Application	Potential Funding Source(s)	Implementation Time Frame
6.1.1	Set well-established speed limits based on the use of appropriate engineering practices	Tribe, County	Number of miles	0.92	Countywide	County, Tribe	Within two years
6.1.2	Expand the use of advisory speed signs to advise motorists of geometric conditions where traveling at the posted speed is ill-advised	Tribe, County	Number of locations	0.71	Countywide	County, Tribe	Within two years
6.1.3	Increase the use of Radar Speed Feedback Signs to notify drivers of their speeds	Tribe, County	Number of locations	0.93	Countywide	Oklahoma Highway Safety Office	Within two years

6.1.4	Reduce lane widths through re-striping to encourage slower speeds	Tribe, County	Number of Miles	0.76	Minor and Collector Roads	County, Tribe	Within two years

Strategy 6.2: Implement educational efforts to address speed (and aggressive) drivers

Number	Action	Proposed Lead Agency (*and partners*)	Activity Performance Metric	Application	Potential Funding Source(s)	Implementation Time Frame
6.2.1	Effective, high-visibility communications and outreach campaigns that support speed and aggressive driving enforcement programs	Law enforcement	Number of campaigns	Countywide	Oklahoma Highway Safety Office	Ongoing
6.2.2	Engage Law Enforcement Liaison in coordinating countywide initiatives that address aggressive driving	Law enforcement	Number of hours	Countywide	Oklahoma Highway Safety Office	Ongoing

Strategy 6.3: Enhance enforcement activity to address speed (and aggressive) drivers

Number	Action	Proposed Lead Agency (*and partners*)	Activity Performance Metric	Application	Potential Funding Source(s)	Implementation Time Frame
6.3.1	Enhanced, high-visibility enforcement of aggressive driving and speed laws and supportive adjudication of these efforts to reinforce established speed laws	Law enforcement	Number of hours	Countywide	Oklahoma Highway Safety Office	Ongoing
6.3.2	Engage Law Enforcement Liaison in coordinating countywide initiatives that address aggressive driving	Law enforcement	Number of hours	Countywide	Oklahoma Highway Safety Office	Ongoing

Emphasis Area 7 – Impaired Driving

Emphasis Area Objective: Reduce the number of roadway fatalities and serious injuries involving Impaired Driving

Emphasis Area Success Metric: *Reduce the number of emphasis area related crashes by 25% by 2030*

Strategy 7.1: Implement educational efforts to address Impaired Driving related crashes.

Number	Action	Proposed Lead Agency (*and partners)*	Activity Performance Metric	Application	Potential Funding Source(s)	Implementation Time Frame
7.1.1	Effective, high-visibility communication and outreach campaigns supporting enforcement efforts	Tribe, County	Number of clicks' Number of events completed	Countywide	Oklahoma Highway Safety Office	Ongoing

Strategy 7.2: Enhance enforcement activity to address Impaired Driving related crashes.

Number	Action	Proposed Lead Agency (*and partners)*	Activity Performance Metric	Application	Potential Funding Source(s)	Implementation Time Frame
7.2.1	Publicized sobriety checkpoints	Law enforcement	Number of hours	Countywide	Oklahoma Highway Safety Office	Ongoing
7.2.2	High visibility saturation patrols	Law enforcement	Number of hours	Countywide	Oklahoma Highway Safety Office	Ongoing
7.2.3	Preliminary Breath Test Devices (PBT)	Law enforcement	Number of tests	Countywide	Oklahoma Highway Safety Office	Ongoing

Emphasis Area 8 – Distracted Driving

Emphasis Area Objective: Reduce the number of fatalities and serious injuries from distracted driving

Emphasis Area Success Metric: *Reduce the number of emphasis area related crashes by 25% by 2030*

Strategy 8.1: Implement physical countermeasures to reduce crashes that relate to distracted driving

Number	Action	Proposed Lead Agency (*and partners)*	Activity Performance Metric	CMF	Application	Potential Funding Source(s)	Implementation Time Frame
8.1.1	Install centerline, shoulder, or edge line rumble strips on rural county roads	County, Tribe, ODOT	Miles of rumble strip constructed	0.51	Major/Minor Collector Roads	County, Tribe, ODOT	Start two years out.

Strategy 8.2: Implement educational efforts to address crashes that relate to distracted driving

Number	Action	Proposed Lead Agency (*and partners)*	Activity Performance Metric	Application	Potential Funding Source(s)	Implementation Time Frame
8.2.1	Implement awareness campaign	Tribe, County, ODOT	Number of clicks or campaigns completed	Systemwide	Oklahoma Highway Safety Office	Ongoing

Strategy 8.3: Enhance enforcement activity to address crashes that relate to distracted driving

Number	Action	Proposed Lead Agency (*and partners)*	Activity Performance Metric	Application	Potential Funding Source(s)	Implementation Time Frame
8.3.1	Increase enforcement of distracted driving laws	Law enforcement	Number of hours	Systemwide	Oklahoma Highway Safety Office	Ongoing

Emphasis Area 9 – Young/Older Drivers

Emphasis Area Objective: Reduce the number of young/older driver related crashes

Emphasis Area Success Metric: *Reduce the number of emphasis area related crashes by 25% by 2030*

Strategy 9.1: Implement physical countermeasures to reduce young/older driver related crashes

Number	Action	Proposed Lead Agency (*and partners)*	Activity Performance Metric	CMF	Application	Potential Funding Source(s)	Implementation Time Frame
9.1.1	Improve lighting at intersections	Tribe, County, ODOT	Number of lights installed	0.29	Systemwide	County, Tribe, ODOT	Within five years
9.1.2	Increase use of advance warning signs	Tribe, County, ODOT	Number of signs installed	0.697	Systemwide	County, Tribe, ODOT	Within five years
9.1.3	Increase size and letter height of roadway signs, width of striping, and use retro-reflective signal back-plates	Tribe, County, ODOT	Count of infrastructure installed	0.65	Systemwide	County, Tribe, ODOT	Within five years

Strategy 9.2: Implement educational efforts to address young/older driver related crashes

Number	Action	Proposed Lead Agency (*and partners)*	Activity Performance Metric	Application	Potential Funding Source(s)	Implementation Time Frame
9.2.1	Implement seat belt awareness campaign	Tribe, County, ODOT	Number of campaigns	Systemwide	Oklahoma Highway Safety Office	Annually

Strategy 9.3: Improve data collection and analysis practices that relate to young/older driver related crashes

Number	Action	Proposed Lead Agency (*and partners)*	Activity Performance Metric	Application	Potential Funding Source(s)	Implementation Time Frame
9.3.1	Evaluate age related crashes	Law enforcement, ODOT, INCOG	Conducted or not	Systemwide		Annually

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