Cherokee Nation

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Safe Streets and Roads for All (SS4A) Comprehensive Safety Action Plan

September 2025

Signed by:
Shella Bowlin
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Chuck Hoskin Jr. Principal Chief

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Approval or Revision Date

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List of Acronyms

AADT – Annual Average Daily Traffic
AASHTO – American Association of Highway and Transportation Officials
AIAN – American Indians and Alaska Natives
ACS – American Community Survey
BIA – Bureau of Indian Affairs
CMF – Crash Modification Factors
CNDOT – Cherokee Nation Department of Transportation
FHWA – Federal Highway Administration
GIS – Geographic Information System
HIN – High Injury Network
IIJA – Infrastructure Investment and Jobs Act
INCOG – Indian Nations Council of Governments
KATS – Ki Bios Area Transit System
MCT – Muskogee County Transit Service
MMUCC- Model Minimum Uniform Crash Criteria
MOE – Measure of Effectiveness
MOU – Memorandums of Understanding
MTTA – Metropolitan Tulsa Transit Authority
MTTA – Metropolitan Tulsa Transit Authority
NHTSA- National Highway Traffic Safety Administration
NOFO – Notice of Funding Opportunity
OCERS – Oklahoma Crash Electronic Reporting
ODOT – Oklahoma Department of Transportation
OHSO – Oklahoma Highway Safety Office
PTS – Pelivan Transit Service
PDO – Property Damage Only
QR – Quick Response
SRTS – Safe Routes to School
SS4A – Safe Streets and Roads for All
TAP – Transportation Alternatives Program
TTP – Tribal Transportation Program
URL – Uniform Resource Locator
USDOT – U.S. Department of Transportation
VRU - Vulnerable Road User

A Message from Principal Chief Hoskin

Ensuring safe, accessible, and desirable transportation across the Cherokee Nation is vital to the well-being of all families and communities. Our transportation network must accommodate users of all ages and abilities, and safety is an upmost priority. With this commitment, Cherokee Nation has set ambitious goals: to reduce fatal and serious injury crashes by 10% by 2030, 25% by 2035, and achieve a 34% reduction by 2045.

From 2017 to 2021, Cherokee Nation roads saw over 32,220 recorded crashes, including 454 fatalities and 1,263 serious injuries. These numbers represent real people, our friends, family, neighbors, and co-workers whose lives have been tragically altered. Vulnerable community members, such as pedestrians, bicyclists, and those from lower-income neighborhoods who rely on walking and public transportation, are also impacted, revealing a need to address these issues in transportation safety.

Cherokee Nation pledges to improve transportation safety, with reducing fatal and serious injury crashes. The Safe Streets for All (SS4A) Comprehensive Safety Action Plan (CSAP) is our data-driven, actionable approach that guides investments and decisions to create safer outcomes. This plan calls for collaboration across departments, partner agencies, and the broader community, fostering engagement and leveraging local expertise to solve neighborhood-specific issues.

The success of our safety initiative relies on commitment and partnership. We are deeply grateful to the community, stakeholders, federal, state, and municipal partners whose feedback and service have shaped this plan. Every resident can contribute to safer roadways; together, we can prevent fatal and serious injuries crashes and build a future where roadway tragedies remain unacceptable.

Safe travel is a right for everyone, regardless of residence, age, or transportation mode. Our CSAP lays a strong foundation for long-term improvement and builds a Cherokee Nation transportation system that works for all.

Thank you for your interest in traffic safety. For questions or suggestions, please contact us.

Sincerely,

Chuck Hoskin Jr.
Principal Chief

Executive Summary

The U.S. Department of Transportation (USDOT) Safe Streets and Roads for All (SS4A) program was created by the 2021 Infrastructure Investment and Jobs Act (IIJA), aka Bipartisan Infrastructure Law_and provides $5 billion over 5 years to fund community-led projects that address the preventable crisis of deaths on our nation's roads, streets, and highways. It provides grants to local, regional, and Tribal communities for planning, demonstration, and implementation activities as part of a systematic approach. Under the SS4A Program, one of the funded grant opportunities is a planning grant for the development of a Comprehensive Safety Action Plan OR Safety Action Plan, which provides the basis for supplemental planning, demonstration, and implementation grants.

The Cherokee Nation Department of Transportation (CNDOT) applied for and was subsequently awarded funding to develop an SS4A Comprehensive Safety Action Plan in 2024. The Plan was led by the Cherokee Nation's Department of Transportation, and a project oversight team was formed to provide vision, guidance, direct, and oversee the project's progress, WSB as the consultant lead.

Document & Data Collection and Analysis

Existing plans, relevant plans, studies, and other transportation safety documents were collected and reviewed. Additionally, a 5-year crash history, and roadway inventory data from Oklahoma Department of Transportation (ODOT) were collected and analyzed. Primary factors contributing to crash occurrences were identified. Based on the distribution of crashes, a High-Injury Network (HIN) was developed encompassing all fatal, incapacitating injury, and non-incapacitating injury crashes. Despite covering only 17.44 percent of the roadway network and 3.64 percent of intersections, the HIN captures the full extent of severe crashes and provides Cherokee Nation with a focused framework for prioritizing safety investments and reducing fatal and serious injury outcomes.

Public Outreach and Stakeholder Engagement

To provide the most opportunity for public and stakeholder participation, in person and virtual engagement options were made available. This included an interactive project website, sharing details on the Cherokee Nation's website, Facebook posts, meeting flyers, stakeholder emails, postcards, newspaper advertisements, and public meetings. A survey, comment map, helpline, and comment cards were used to gather input on safety concerns and current conditions. The Cherokee Nation's geographic area was divided into three regions—North, South, and Urban—to personalize the crash data to each region. Two rounds of stakeholder and public meetings were conducted in each region. The first set was in September 2024 to present the existing conditions analysis and to solicit feedback and input. The second set of stakeholder and public meetings were conducted in February 2025 to provide an update on the safety analysis, input received, and participants were given another opportunity to provide feedback. The crash

hot spots, High Injury Network, and project and strategy prioritization process were shared pertaining to Cherokee Nation. Each round of meetings was documented with a summary report to outline what the meetings were about, those who participated and document feedback.

Plan Development:

A set of prioritization criteria was established to guide the Cherokee Nation in identifying roadway safety hotspots based on the identified High Injury Network (HIN) and developing strategies to address the safety concerns. Strategies include enhanced crash data collection, infrastructure improvements, Safe Street to School programs, and Road Safety Audits, organized into short-, medium-, and long-term actions. Recommendations follow the Safe System Approach and are supported by mitigation strategies and Crash Modification Factors to systematically improve safety across the Nation.

The goal of the Cherokee Nation Safety Action Plan is aimed at reducing and eliminating fatal and serious injury crashes for all roadway users in Cherokee Nation. The safety improvement strategies and projects in the Plan address significant transportation safety risks that can be applied during various time frames over the next 20 years. The USDOT has described seven components of a successful Safety Action Plan in order for Cherokee Nation to be eligible for supplemental planning/demonstration activities and construction. These seven components are addressed throughout this Plan.

The Safety Action Plan is posted on the Cherokee Nation website; it indicates how progress is measured over time, and is reviewed annually by the Cherokee Nation Oversight Committee.

1. Introduction

Chapter 1 Highlights:

The Plan:

- Utilizes SS4A funding to address rural, high-risk roadway conditions
- Applies FHWA's Safe System Approach and 4 E's framework
- Combines data analysis and community input to identify crash hotspots
- Prioritizes improvements for high-crash areas and vulnerable users
- Emphasizes public coordination with Cherokee Nation Department of Transportation (CNDOT), and alignment with other efforts
- Reflects a long-term vision for safer, more inclusive roads

Safety is a priority for Cherokee Nation as they work to protect the well-being of their citizens, visitors, and communities traveling throughout the reservation. Recognizing the need to address high-risk areas and improve roadway conditions, Cherokee Nation applied for federal funding through the Safe Streets and Roads for All grant program. Through this grant, Cherokee Nation secured resources to develop a comprehensive safety action plan that will guide future investments and help reduce serious injuries and fatalities on their transportation network.

The SS4A Safety Action Plan for Cherokee Nation aims to enhance roadway safety, reduce fatal and serious injury crashes, and promote equitable access to safe transportation within Cherokee Nation. This plan primarily addresses safety concerns in rural areas with limited infrastructure and high-risk conditions within Cherokee Nation's boundaries.

Building on previous safety initiatives and grounded in the Federal Highway Administration (FHWA) Safe System Approach, this SS4A Safety Action Plan includes key safety strategies that align with the FHWA "4E's" – Engineering, Education, Enforcement, and Emergency Services.

A key aspect of the SS4A Safety Action Plan is the integration of data-driven analysis and public input. By analyzing crash data to identify high-risk "hotspot" locations and incorporating feedback from the public and stakeholders, the plan targets specific areas of concern and proposes mitigation countermeasures to address existing safety issues at and around these locations. This collaborative approach ensures that solutions are community-specific and address the most pressing safety issues. The plan outlines best practices and safety protocols to guide long-term efforts. Locations with significant safety concerns, identified through data analysis and community input, are prioritized for immediate safety improvement considerations.

The plan addresses high-crash locations, including roadway segments and intersections with high rates of fatal and serious injury crashes, while also accounting for pedestrian and bicycle crashes to protect vulnerable road users. Factors such as impartiality, community input, proximity to key sites, and alignment with other projects were also considered in identifying locations with safety concerns. The SS4A Safety Action Plan involves close coordination with the Cherokee Nation Department of Transportation to ensure the success of the plan, emphasizing making Cherokee Nation's roadway safer for all users.

USDOT outlines seven key required for a successful Safety Action Plan, which are necessary for Cherokee Nation to be eligible for supplemental planning and demonstration activities. These components are listed below as well as described throughout in the Plan:

Leadership Commitment & Goal Setting	**Policy & Project Changes**
Planning Structure	**Strategy & Project Selections**
Safety Analysis	**Progress & Transparency**
Engagement & Collaboration	

Note: *A reference table in* ***Appendix G*** *summarizes the plan sections/pages where each component is addressed.*

By following the SS4A program's requirements, Cherokee Nation is committed to preventing traffic-related tragedies and enhancing roadway safety. This plan reflects a long-term vision of reducing crashes, particularly those involving fatalities and serious injuries.

2. Overview: Cherokee Nation

Chapter 2 Highlights:

- Cherokee Nation spans 6,950 sq. miles across 14 counties in northeastern Oklahoma, with a population of over 517,000 citizens nationwide, making it the largest federally recognized tribe in the U.S.
- Road network includes 13,705 miles—4,105 miles of main roads and 9,600 miles of local roads.
- Most roadways (around 97%) have low traffic volume; shoulder width is inadequate on many minor and local roads.
- Public transit is provided through Cherokee Nation Transit providers - KATS, PTS, MCT, MTTA, and CPT- offering both fixed-route and demand-response services.
- Governance is directed by the Principal Chief, Tribal Council, and the Department of Transportation, in coordination with federal (TTP, BIA) and state (ODOT) partners.
- An Oversight Team and WSB consultants collaboratively developed the SS4A Safety Action Plan.

2.1 Geography and Land Use

Cherokee Nation is located in northeastern Oklahoma, encompassing approximately 6,950 square miles. It is the largest federally recognized tribe in the United States by enrollment, with a population of over 517,000 citizens—more than 140,000 of whom reside within the reservation boundaries. Cherokee Nation's reservation area includes a mix of rural, suburban, and small urban communities and spans 14 counties either fully or partially: Adair, Cherokee, Craig, Delaware, Mayes, McIntosh, Muskogee, Nowata, Ottawa, Rogers, Sequoyah, Tulsa, Wagoner, and Washington counties (as shown in **Figure 1**).

Supplementary data on the Cherokee Nation overview, including key landmarks and major traffic generators, is provided in **Appendix A - Supplementary Data on the Cherokee Nation Overview, Section A.1.**

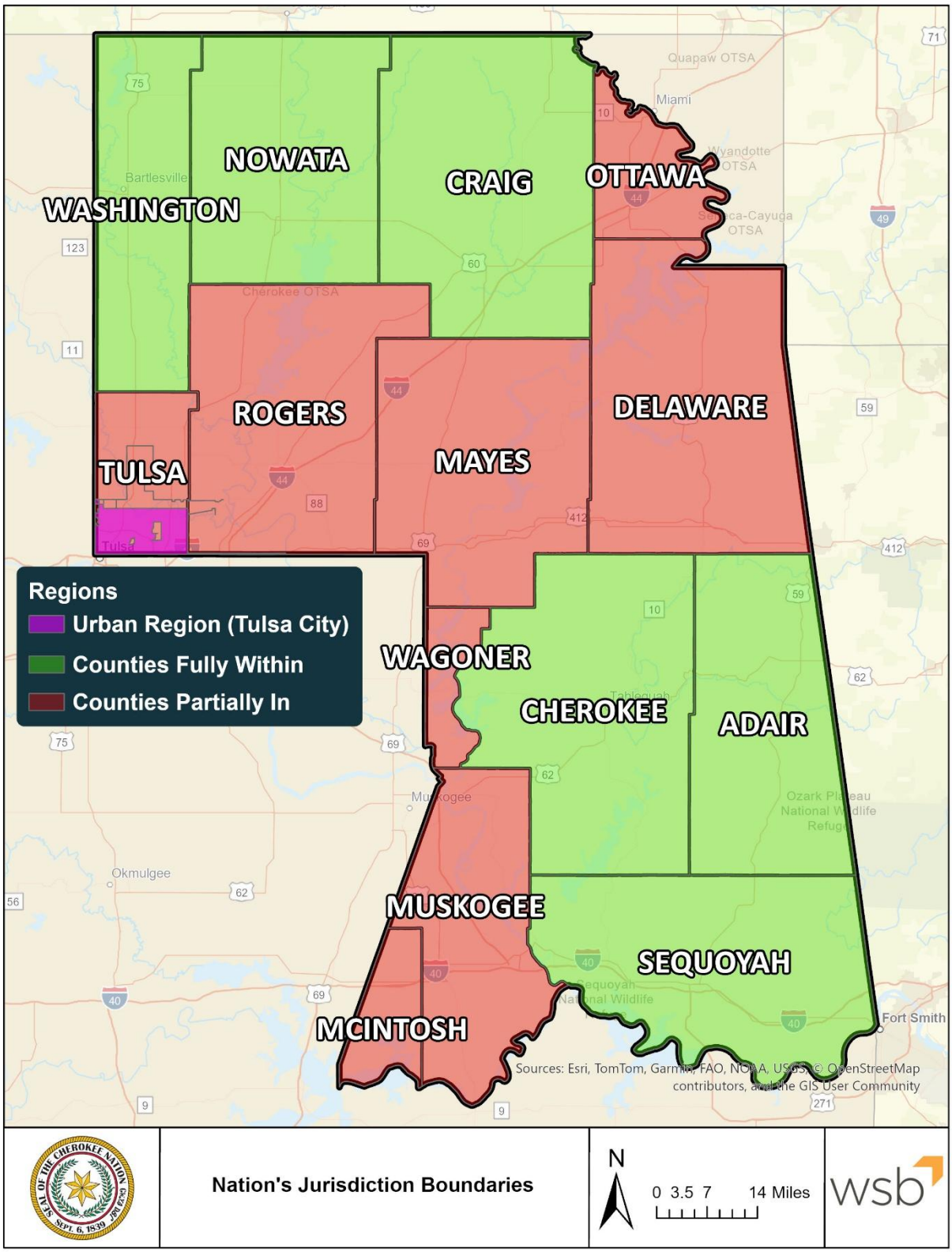

Figure 1 - Cherokee Nation's Reservation Boundaries

2.2 Demographics

Cherokee Nation has experienced steady population growth over the past several years. In 2020, the Cherokee Nation reported an enrollment of approximately 392,000 citizens. By 2025, this number had grown to over 517,000, representing an increase of nearly 32% over this period. This upward trend underscores the importance of strategic planning to ensure that infrastructure, transportation systems, and public services effectively accommodate the expanding population and enhance the quality of life for all residents.

2.2.1 Population Density by County

Table 1 presents the population density by county that is within Cherokee Nation's reservation. Population density refers to the number of people per square mile in each county. As shown in the table, Tulsa has the highest population by a large margin, resulting in a higher population density, followed by Wagoner, Rogers, and Washington counties. **Figure 2** shows the population density (per square mile) by county.

Table 1 - Population Density by County

County	Population (2020) *	Land Area (sq miles)	Density (per sq mile)
Tulsa	127,058	192.6	660
Rogers	90,585	665.1	136
Washington	52,378	424.2	123
Cherokee	47,307	776	61
Sequoyah	39,422	710.6	55
Delaware	38,394	763.6	50
Mayes	37,693	649.8	58
Muskogee	24,059	460.5	52
Adair	19,837	577.2	34
Craig	14,171	762.6	19
Nowata	9,483	580.8	16
Ottawa	7,301	178	41
Wagoner	6,673	90.2	74
McIntosh	3,105	116.4	27

* *Note: The population values refer specifically to the portions of each county that fall within the CHEROKEE NATION reservation.*
Source: 2020 U.S. Decennial Census.

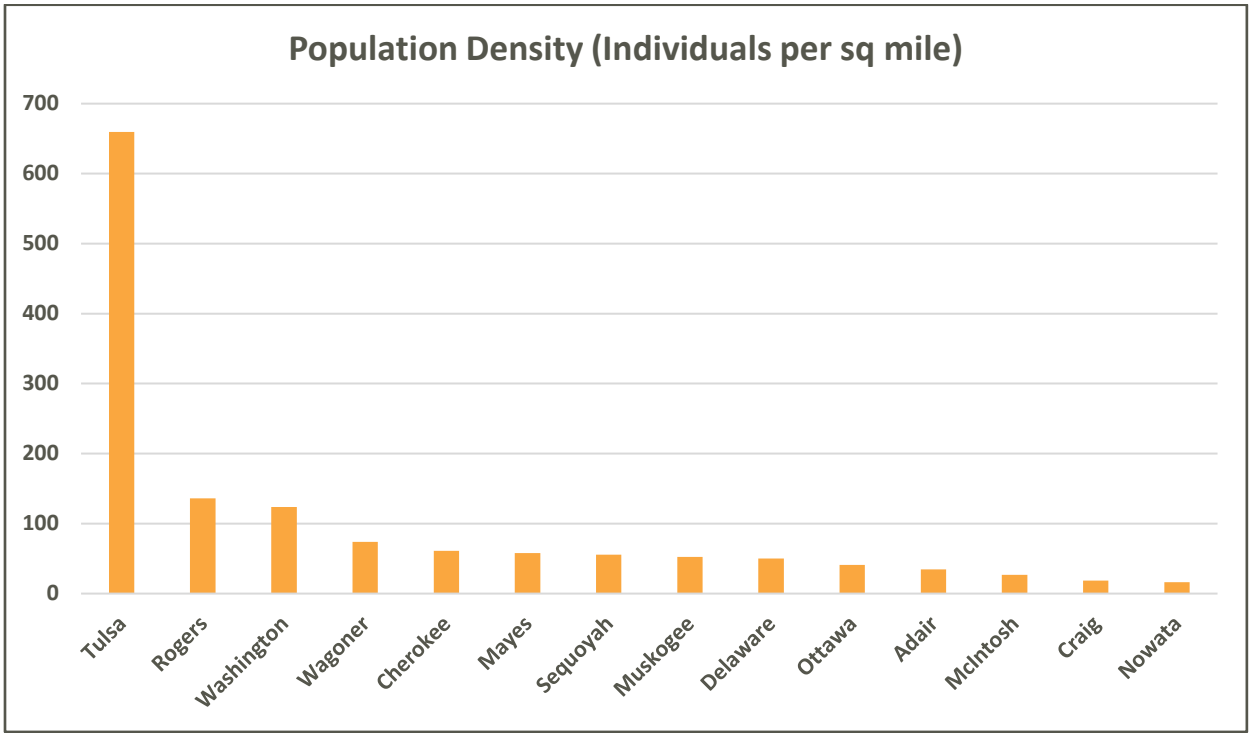

Figure 2 - Population Density by County (2020)

Higher-density counties within Cherokee Nation, such as Tulsa, Wagoner, and Rogers, may face transportation challenges related to increased road usage and elevated levels of pedestrian activity. These conditions often require more advanced traffic management strategies and targeted pedestrian safety measures. In contrast, rural counties with lower population densities, such as Nowata, Craig, and McIntosh, may benefit more from improvements focused on roadway conditions, enhanced visibility, and emergency response planning.

2.2.2 Additional Demographic Data: Summary of Population and Income Distribution

Cherokee Nation's reservation area reflects a distinct demographic profile, with a significantly higher percentage of American Indian and Alaska Native residents compared to both the national (0.6%) and state averages. In many counties within Cherokee Nation, Native Americans make up 15% to over 40% of the population, underscoring the strong tribal presence in the region. Populations identifying as Hispanic, Asian, and African American are generally lower than national averages, which aligns with broader demographic patterns across rural and northeastern Oklahoma.

In terms of household income, the Cherokee Nation's reservation shows a strong representation in the middle-income brackets, particularly among households earning $50,000 to $74,999 annually. This trend

mirrors statewide income distributions but includes fewer households in the highest income brackets compared to the U.S. overall. These economic conditions may influence issues such as transportation affordability, vehicle ownership, and access to transit options, key factors to consider in transportation planning assessments.

2.3 Transportation Network and Infrastructure

To analyze roadway segments within the Cherokee Nation, roadway network layers from the ODOT Geographic Information System (GIS) database were examined, and two relevant GIS datasets were identified. The first dataset, titled Main Roadways, includes all functional classes except local roads. The second, called Local Roadways, specifically represents local roads. Combined, these two datasets indicate that the total roadway network within the Cherokee Nation consists of approximately 13,705 miles of roads.

Main roadways are categorized into six types based on functional classification, totaling 4,105 miles. **Figure 3** illustrates these roadway types with their respective percentages, while **Figure *4*4** presents a map of the functional classifications within the main roadway network.

Local roadways, unlike main roadways, are not classified under specific road types in the ODOT GIS database. Instead, an alternative database is used to identify and assess local roads, which account for 9,600 miles of the total Cherokee Nation roadway network.

To understand traffic patterns, roadways within Cherokee Nation were classified based on Annual Average Daily Traffic (AADT). This metric provides an estimate of the average number of vehicles traveling on a roadway each day. The AADT was broken into the following three categories using the Jenks Natural Breaks algorithm (Reference: Jenks, G. F. (1967). "The Data Model Concept in Statistical Mapping," International Yearbook of Cartography, 7, 186–190):

- Low Traffic Volume: AADT below 11,400 vehicles per day - Majority of the roads (96.93%)
- Medium Traffic Volume: AADT between 11,400 and 42,900 vehicles per day (2.91% of total roadways)
- High Traffic Volume: AADT above 42,900 vehicles per day (0.16% of total roadways)

Note: A map showing the geographic distribution of roadways by AADT categories is provided in **Appendix A - Supplementary Data on the Cherokee Nation Overview, Section A.2.1.**

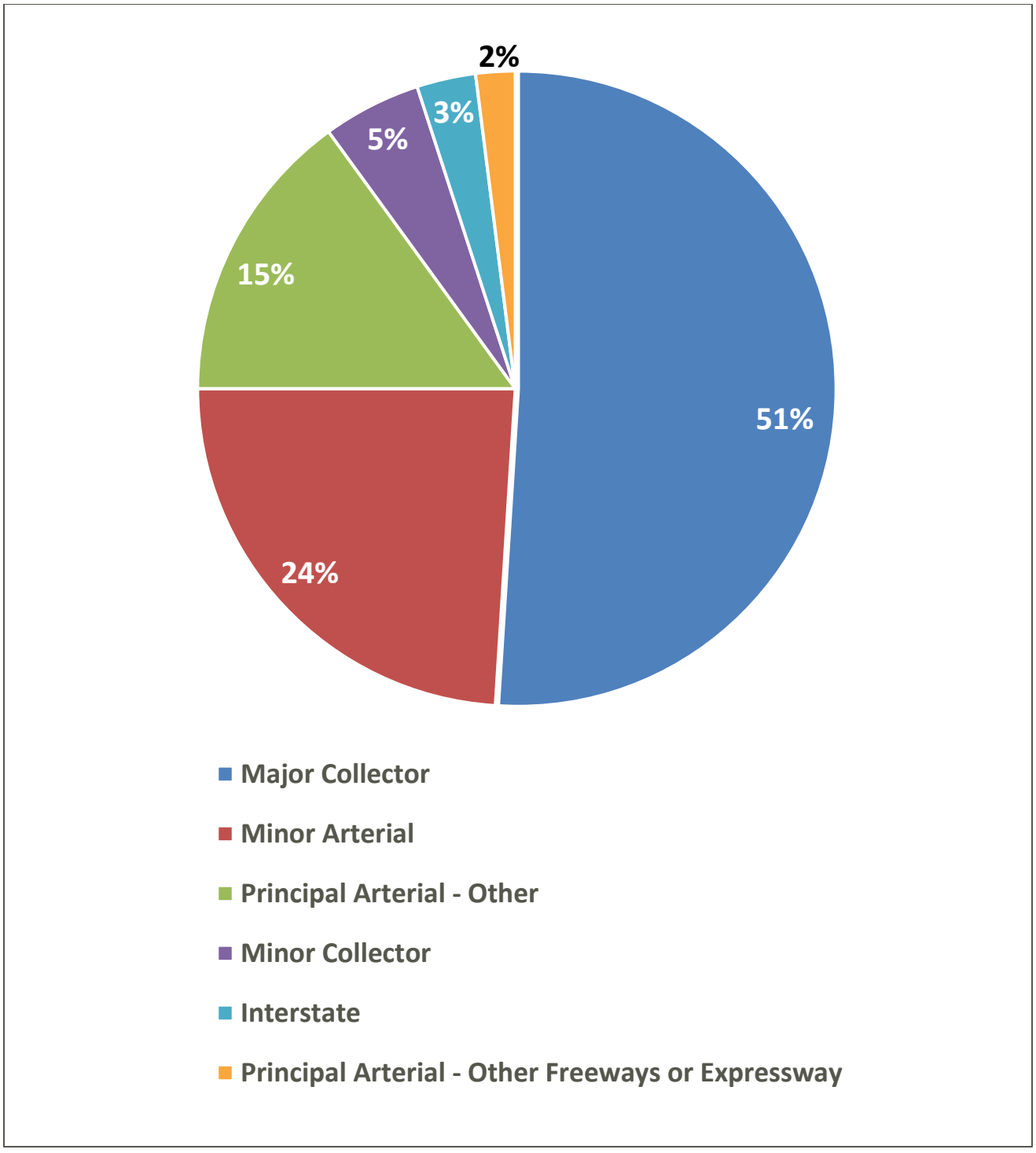

Figure 3 - Main Roadway Network Functional Classification Percentages

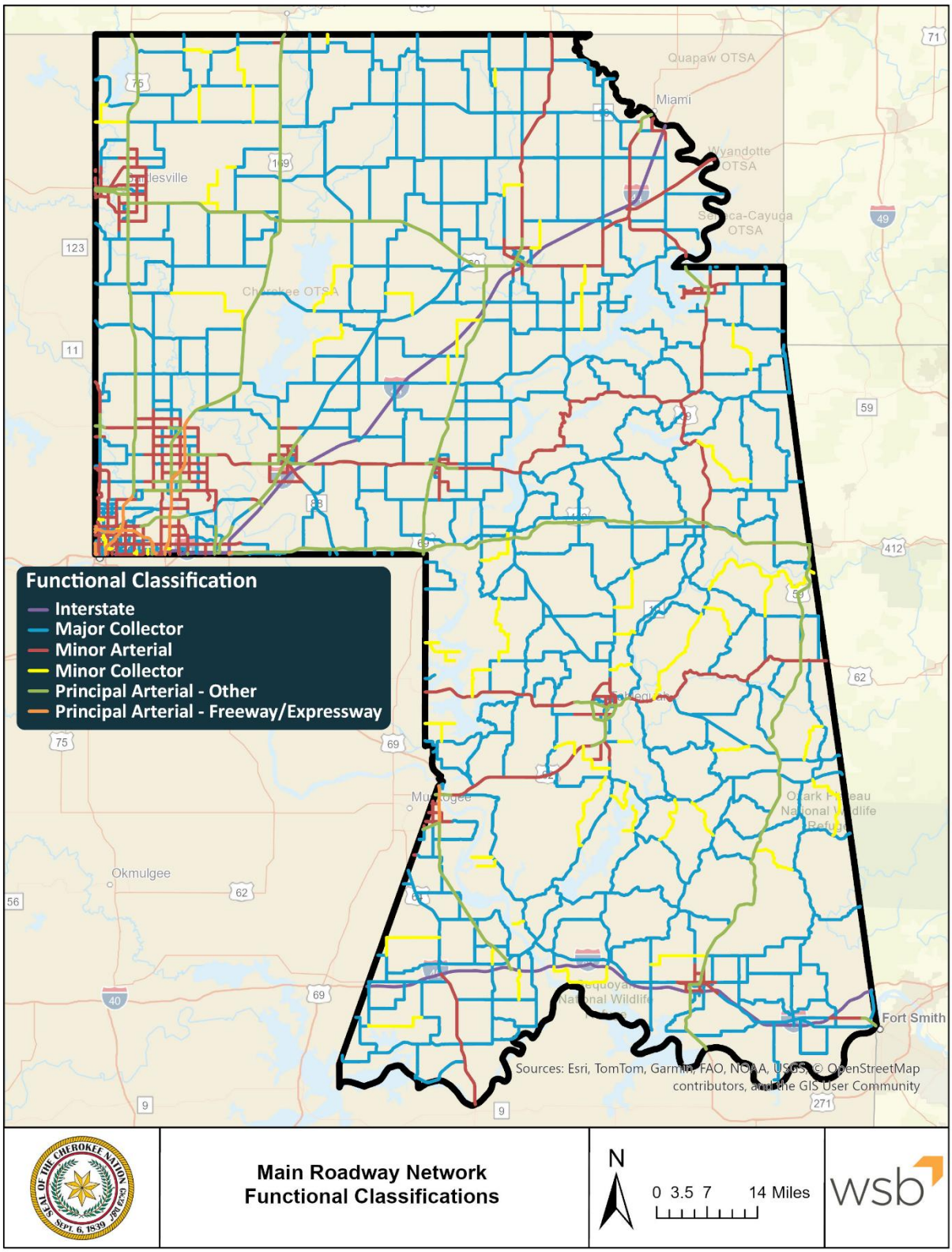

Figure 4 - Main Roadway Network Functional Classification

2.3.1 Shoulder Width

Shoulder width is a key component of roadway safety and operational efficiency. Adequate shoulders provide space for emergency stops, enhance accessibility for non-motorized users, and contribute to smoother traffic flow. In Cherokee Nation, shoulder width conditions vary across roadway types, with a notable percentage of minor and local roads falling below adequacy standards. Details on the specific thresholds and mileage distribution by road type are provided in **Appendix A - Supplementary Data on the Cherokee Nation Overview, Section A.2.2**

2.3.2 Transit Systems

Cherokee Nation supports transit access through both its own services and partnerships with regional providers. These transit systems offer demand-response and limited commuter-route services to residents across the 14-county reservation, ensuring mobility for citizens, especially those in rural and unserved areas. Cherokee Nation's Public Transit Program provides curb-to-curb demand-response and commuter-route transportation across various parts of Cherokee Nation. These services are available to the public, with a focus on helping individuals without access to personal vehicles, access work, healthcare, education, and other essential services. Rides must be scheduled in advance, and availability may vary by location and demand.

Ki Bois Area Transit System (KATS)

KATS operates demand-response and commuter-route services in coordination with Cherokee Nation in Adair, Sequoyah, McIntosh, Wagoner, and Cherokee counties. Dispatch centers are located in key population hubs, and rides can be scheduled for employment, medical appointments, shopping, or other daily needs.

Pelivan Transit Service (PTS)

Pelivan Transit provides public transportation in several northeastern counties within Cherokee Nation, including Craig, Mayes, Delaware, Ottawa, Rogers, and Nowata. Like KATS, Pelivan offers demand-response services and some commuter-route options in specific areas such as the city of Miami.

Muskogee County Transit (MCT)

MCT offers demand-response and commuter-route services within Muskogee County, part of which falls within Cherokee Nation. The service focuses on rural and elderly populations, with expanded scheduling for medical and essential trips.

Cimarron Public Transit (CPT)

CPT operates demand-response services within Washington County and the City of Skiatook within Tulsa County. CPT is offering curb-to-curb transportation that can be scheduled for employment, medical care, shopping, or other daily needs.

Metropolitan Tulsa Transit Authority (MTTA)

Based in Tulsa County, MTTA provides critical access for Cherokee Nation residents who live or travel in the Tulsa metro area. MTTA operates fixed-route bus services via Tulsa's MetroLink, and on-demand Micro Transit through the Micro Link program. Tulsa acts as a major economic and medical hub for many Cherokee Nation citizens.

Figure 5 provides a visual overview of the transit service areas and coverage provided by these systems across Cherokee Nation's reservation.

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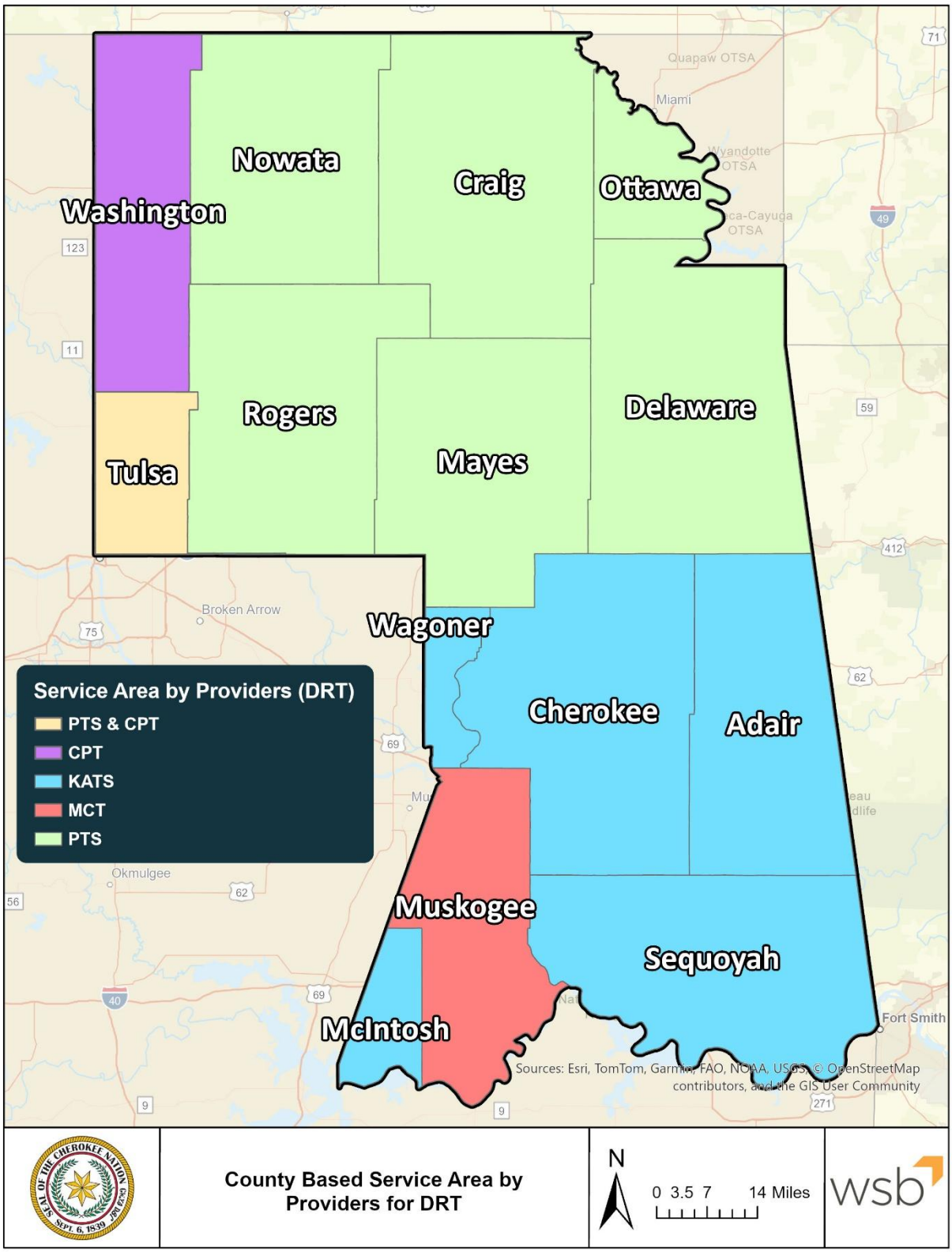


Figure 5 - Overview of the transit service areas and coverage in Cherokee Nation

2.4 Transportation Authority and Governance Structure

2.4.1 Authority

Cherokee Nation operates under a well-defined governance structure that provides the Tribal government with the authority to plan, manage, and oversee transportation infrastructure across its 14-county reservation. The Principal Chief and the Tribal Council exercise executive and legislative powers over Cherokee Nation's policies, including those related to transportation planning, development, and maintenance.

While the Cherokee Nation reservation stretches across 14 Oklahoma counties, multiple agencies participate in the construction, maintenance, and improvement of roadways, bridges, and transportation assets serving Tribal lands. ODOT has primary responsibility over the highway system whereas the county commissioners are responsible for maintaining rural roadways outside of the city street systems. Cherokee Nation possesses a 4,000-mile inventory of federally designated roads that seamlessly integrates the state, county, and city street systems. Funding allocated to CNDOT specifically targets the improvement of roads and bridges within this designated inventory, enhancing the overall infrastructure. Together, these agencies work together to ensure transportation systems serving Tribal lands are safe and efficient for all roadway users in each of the communities located within the reservation. These partnerships include:

- **Federal Support**

Through the Federal Highway Administration's Tribal Transportation Program (TTP), Cherokee Nation receives technical assistance and funding for planning, construction, and maintenance of roadways serving Tribal lands.

- **State-Level Coordination**

Cherokee Nation collaborates with the ODOT on joint projects, highway planning, and the management of shared corridors. This coordination helps ensure that tribal and state transportation goals are aligned, particularly for routes crossing reservation boundaries.

- **County and Municipal Partnerships**

In order to effectively address the transportation needs of rural communities, Cherokee Nation pools resources with county commissioners and a various municipal officials within the 14-county reservation. This initiative emphasizes the vital importance of maintaining safe and reliable roadways and bridges for the local communities. Coordinated efforts involve leveraging funds, engineering expertise, construction materials, and project oversight.

Other Cherokee Nation departments that focus on infrastructure safety improvements include Cherokee Nation Public Health, which plays a crucial role in enhancing community wellness. This department actively engages in projects aimed at upgrading sidewalks, thereby promoting safer walking environments for community residents. These sidewalk improvements are part of a broader Cherokee Nation public health initiative dedicated to fostering healthier communities. Collaborations between Cherokee Nation Public Health and CNDOT are essential for addressing various safety concerns. Together, these departments work diligently to enhance highway and pedestrian safety within the reservation boundary, ensuring a safer environment for all.

2.4.2 Project Governance

In support of the development of the SS4A Action Plan, CNDOT formed a Project Oversight Team. This team was composed of key Cherokee Nation staff including:

- **Robert Endicott**, Planner, CNDOT
- **Andy Quetone**, Director, CNDOT
- **Michael Lynn**, Executive Director, Transportation and Infrastructure
- **Sherry Waters,** Budget Analyst, CNDOT
- **Regina Compelube**, Chief Designer, CNDOT
- **Hillary Mead,** Supervisor, Primary Prevention Project, Public Health

The Oversight Team provided strategic leadership, made key decisions, and represented Cherokee Nation's interests throughout the planning process.

A Project Team was also assembled to support technical and planning activities, including members from Cherokee Nation and the consulting firm WSB. The teams worked collaboratively to ensure clear communication, stakeholder engagement, and transparency throughout the SS4A planning process. Regular bi-monthly and monthly meetings were held to review progress, share updates, and integrate community and leadership input.

As the SS4A Safety Action Plan moves toward implementation, the Cherokee Nation Oversight Team is expected to continue providing guidance, monitor progress, and ensure that transportation safety initiatives align with community needs and tribal priorities.

3. Safety Analysis

Chapter 3 Highlights:

- Data Collected from Crash Trends Snapshot (2017–2021)
- Total Crashes: 30,227
- Fatal Crashes: 454 (1.5%)
- Most Common: Rear-end, fixed-object, angle-turning
- Top Causes: Poor lighting, speeding, failure to yield, distraction
- Rural Areas: Higher fatality rate, more rollovers/fixed-object crashes
- Urban Areas: More total crashes, especially rear-end and intersection-related
- High-Risk Groups: Older adults (65+), male drivers, unbelted occupants
- Pedestrian/Bike Crashes: Only 1.65% of total, but 12.55% of all fatalities

3.1 Data Collection

The data used in this study consists of a 5-year historical crash dataset from January 1, 2017, to December 31, 2021, the latest years for which completed set of data was available. This data was requested and collected from the ODOT Collision Data Request Portal on September 30th.

For pedestrian and bicycle crashes, the dataset from the Oklahoma Highway Safety Office (OHSO) was used, as it reports a higher number of such incidents—totaling 500—and includes additional details such as age, sex, injury type, and the conditions of both the driver and pedestrian. While ODOT categorizes pedestrian crashes as one of many crash types, OHSO reports them separately with more detailed attributes.

After integrating the OHSO dataset and removing duplicate pedestrian and bicycle crashes from the ODOT dataset, the final dataset for analysis includes **29,727** unique vehicle crashes from ODOT and **500** pedestrian and bicycle crashes from OHSO, resulting in a total of **30,227 unique crashes.** The full data filtering and integration process is detailed in **Appendix B - Supplementary Data on Safety Analysis, Section B.1.**

3.2 Crash Analysis

3.2.1 Total Crashes by Severity

According to the FHWA injury classification scale and definitions for Oklahoma, collisions are ranked on a severity scale of 1 to 5, categorized as follows:

1 – Property Damage Only (PDO)/No Injuries: If the person has no injuries.

2 – Possible Injury: An injury reported or claimed which is not a fatal injury, incapacitating injury or non-incapacitating evident injury.

3 – Non-incapacitating Injury: Any injury, other than a fatal injury or an incapacitating injury, which is evident to observers at the scene of the accident in which the injury occurred.

4 – Incapacitating Injury: Any injury, other than a fatal injury, which prevents the injured person from walking, driving or normally continuing the activities the person was capable of performing before the injury occurred.

5 – Fatality: if the person is fatally injured (death occurs within 30 days of the date of the collision).

Figure 6 shows the percentage of crashes by crash severity in Cherokee Nation. These crashes include 454 fatal crashes, 1,263 incapacitating injury crashes, 4,645 non-incapacitating injury crashes, 5,642 possible injury crashes, and 18,223 property damage-only crashes.

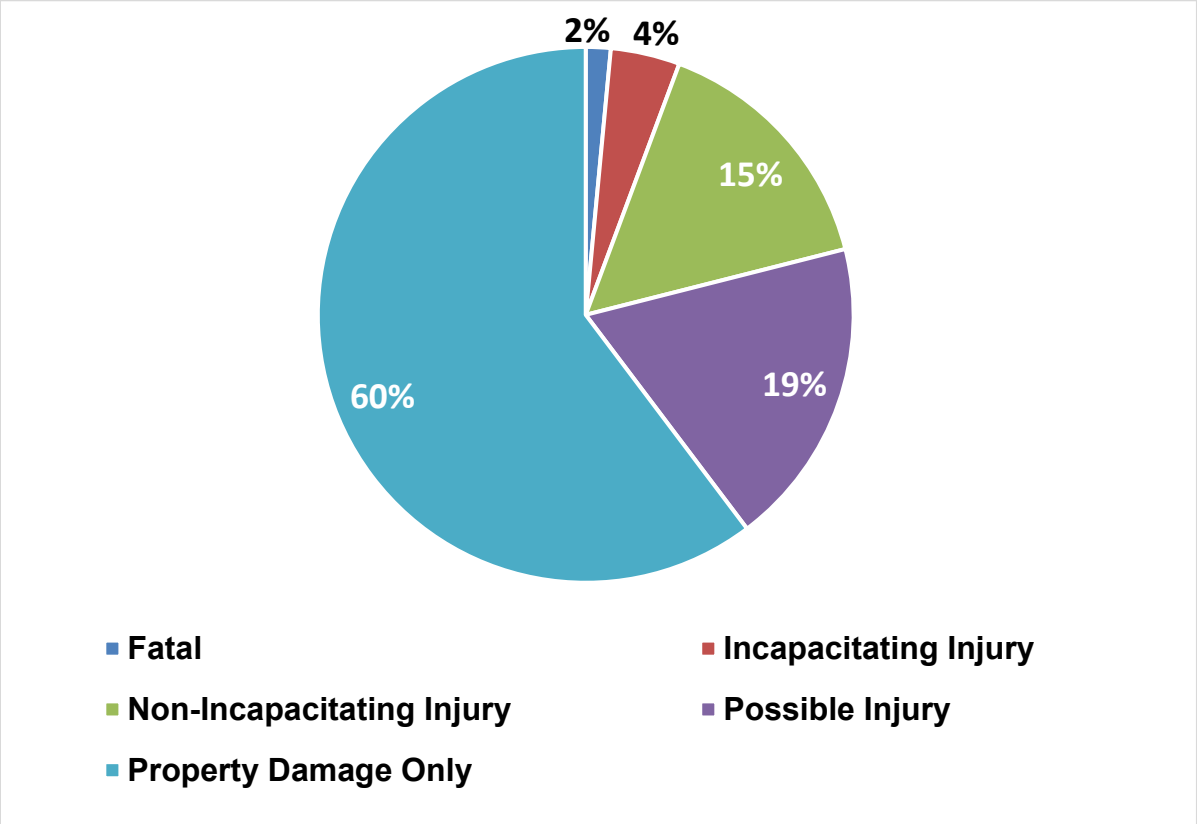


Figure 6 - Total Crashes by Severity (2017-2021) - Entire Cherokee Nation

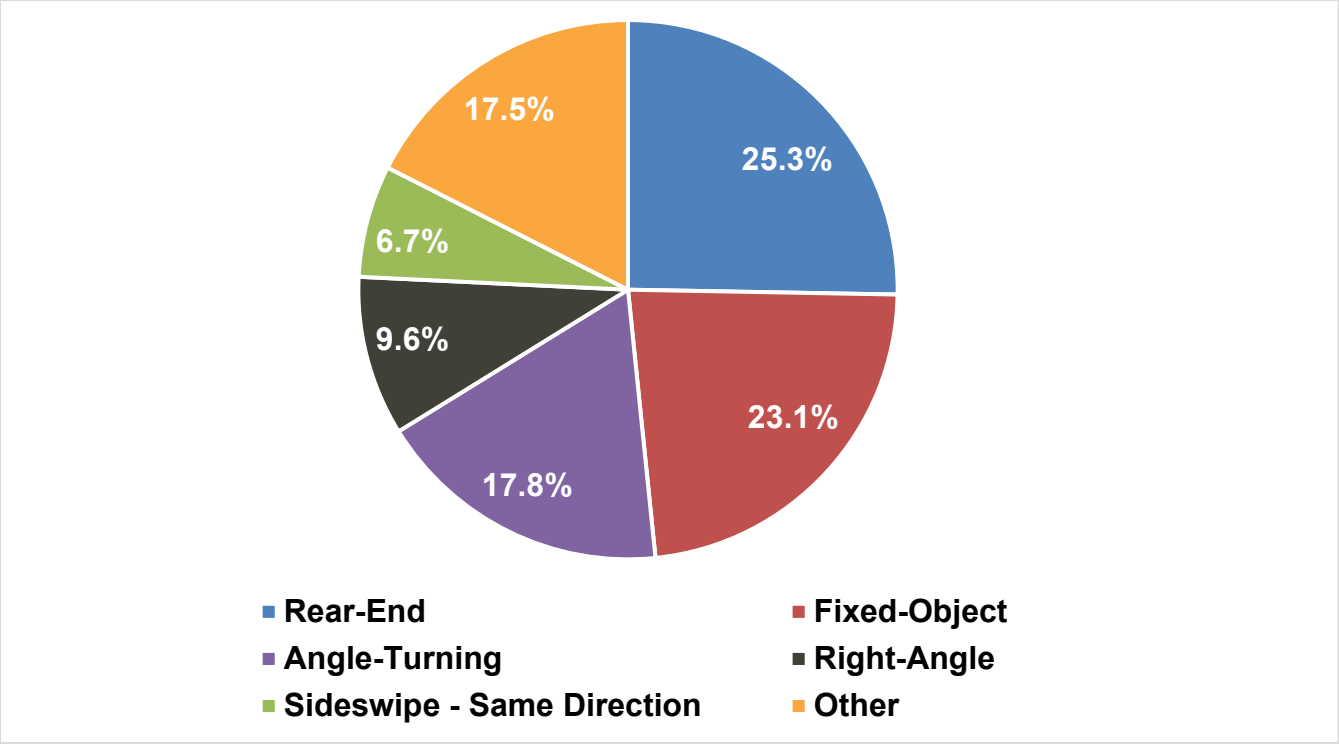
3.2.2 Crash Types

Crashes within Cherokee Nation vary by type, with some categories presenting more significant safety concerns than others. **Figure 7** shows the most common types of crashes that happened between the years 2017-2021 in Cherokee Nation. As shown in **Note:** Crash types with less than 5% involvement, including rollover, head-on, and animal-related crashes, are categorized as "Other".

Figure 7, Rear-End crashes have the highest percentage, followed by Fixed-Object and Angle-Turning.

Figure 8 displays the three most common crash types for each County. In Tulsa County, which includes urban areas within Cherokee Nation, rear-end crashes are the most frequent (2,359 incidents), followed by angle-turning (1,831) and sideswipe–same direction crashes (765). In contrast, more rural counties such as Rogers, Sequoyah, and Delaware report a high number of fixed-object crashes, with Rogers reaching 976. Rollover crashes are notably frequent in Sequoyah (181), Delaware (146), and Mayes (158). Additionally, animal-related crashes are common in counties like Sequoyah (122) and Delaware (77). Right-angle and angle-turning crashes are prevalent across both urban and rural areas, indicating shared risk patterns despite different roadway environments.

Figure 9 illustrates the differences in crash types between intersection-related and roadway-related crashes, which derives from distinct driving conditions and traffic patterns. Intersection crashes often involve conflicts between crossing or turning vehicles, while roadway crashes are influenced by speed, lane changes, and road departures. As shown in this figure, intersection-related crashes are predominantly angle-turning (32.86%) and rear-end (31.41%) collisions, with right-angle crashes (22.33%) also being prevalent. Roadway-related crashes most commonly involve fixed-object collisions (34.27%), rear-end crashes (21.44%), and sideswipe-same direction crashes (9.19%). Although angle-turning crashes occur in both categories, they are significantly more frequent at intersections.



Note: Crash types with less than 5% involvement, including rollover, head-on, and animal-related crashes, are categorized as "Other".

Figure 7 - Total Crashes by Crash Type - Entire Cherokee Nation

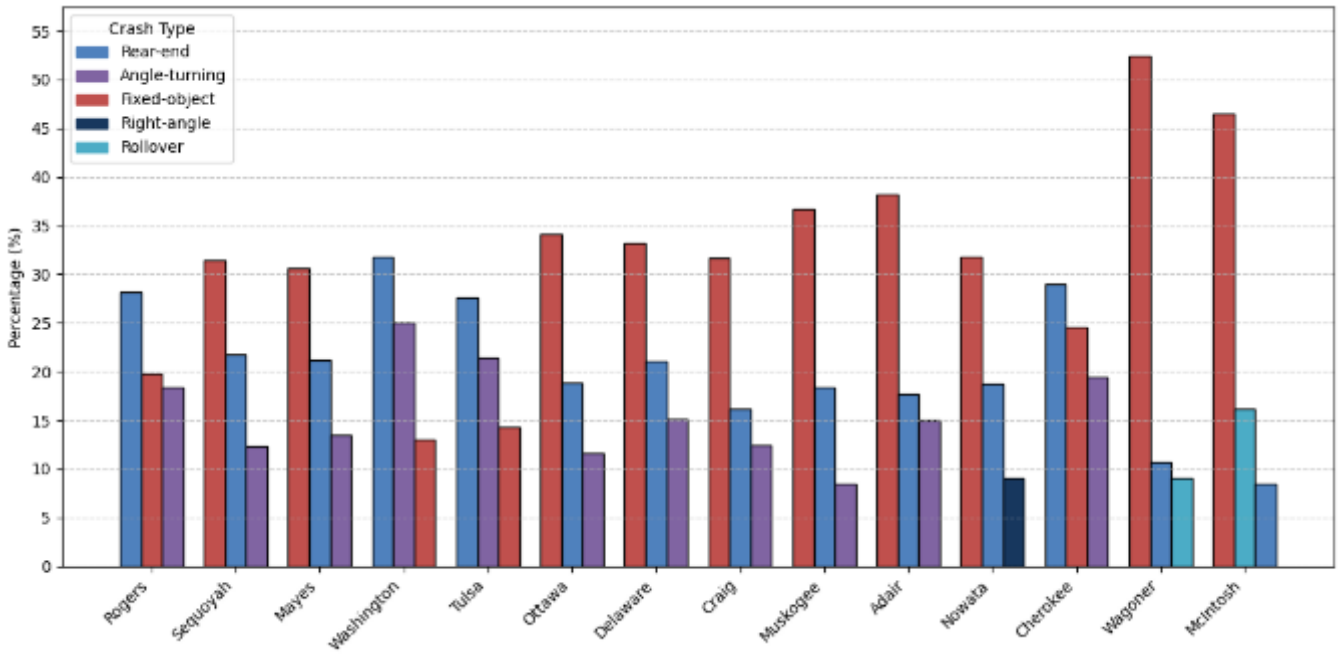
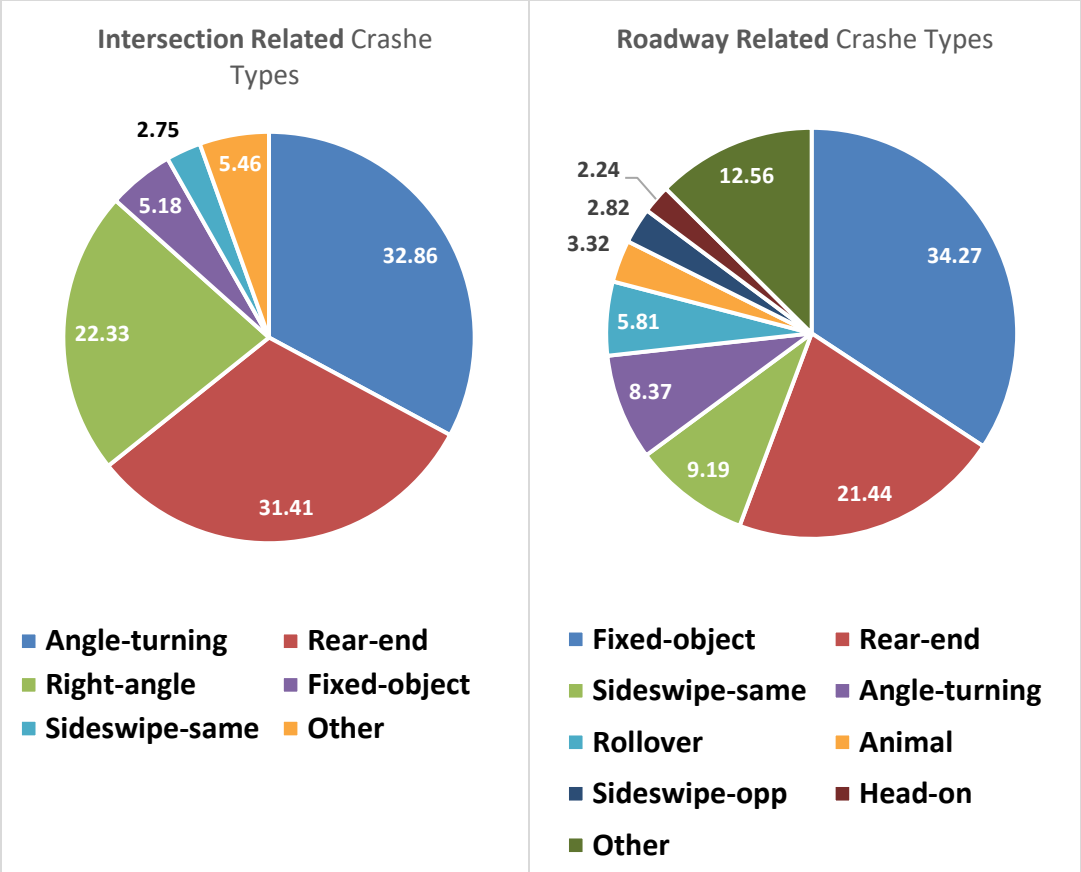


Figure 8 - Crash Types by County



Note: Crash types with less than 2% involvement, including Pedestrian, Bicyclist, Head-On, Other Angles, Sideswipe, Opposite Direction, are categorized as "Other".

Figure 9 - Main Crash Types in Roadway Related and Intersection Related Crashes

3.2.3 Contributing Factors (Crash Reasons)

Understanding the factors that contribute to crashes is crucial for identifying key safety concerns and implementing effective countermeasures. A number of reasons can lead to crashes, but some stand out as more significant than others. The analysis focuses on these major contributing factors to highlight critical behavioral and environmental issues affecting roadway safety.

Of all the categories representing the reasons behind crashes, as provided in the data, only the contributing percentages higher than 5% were identified as the main contributing factors. Error! Reference source not f ound. presents the primary contributing factors in crashes for Cherokee Nation. It shows the number and percentage of crashes associated with each of these reasons, ordered from highest to lowest based on the total contributing percentage. This table includes the following:

- **Contributing Crashes (Total):** Represents the total number of crashes where this reason was one of the contributing factors.

- **Sole Cause Crashes:** Represents the number and percentage of crashes where this reason was the only cause.

Table 2 presents the primary contributing factors in crashes across Cherokee Nation. **Poor lighting** is the most frequently involved factor, contributing to 21.3% of crashes, though it is rarely the sole cause (0.97%). **Unsafe speed** (19.24%) and **failure to yield** (18.29%) follow closely, with **failure to yield** being the sole cause of 14.13% of crashes—more than any other factor. **Inattention** (14.96%) is another major contributor and is the sole cause in over 10% of cases. Other notable factors include **poor weather conditions** (13.75%), **following too closely** (8.44%), and **alcohol or drug involvement** (7.61%). While several other factors like **improper turn** and **unsafe lane changes** appear less frequently overall, they still represent meaningful shares when considering sole-cause incidents.

Table 2 - Primary Contributing Factors in Crashes (≥5% Contribution) – Entire Cherokee Nation

Crash Reasons	Contributing Crashes (Total)		Sole Cause Crashes	
	Number	Percentage	Number	Percentage
Poor Lighting	6438	21.3	293	0.97
Speeding	5817	19.24	2275	7.53
Failed to Yield	5528	18.29	4270	14.13
Distraction	4523	14.96	3166	10.47
Poor Weather	4157	13.75	84	0.28
Followed too Closely	2552	8.44	1892	6.26
Alcohol/Drug	2301	7.61	825	2.73
Improper Turn	1729	5.72	1257	4.16

In addition to the major contributing factors that cause crashes, the use of protective devices (such as seat belts, helmet or child seats) impacts the severity of the crash. Crash records include an attribute indicating whether the person involved was using a protective device. According to crash data from the ODOT

database (2017-2021), approximately 57% of fatalities were linked to instances where the protective device was not used, highlighting the critical need for promoting usage of safety devices.

3.2.4 Crashes by Demographic Patterns, Area Type, and Region

Between 2017 and 2021, several patterns emerged regarding crashes in Cherokee Nation. **Older drivers** (65+) were involved in **7.71% of total crashes** and **9.29% of fatal crashes**, indicating a higher fatality rate relative to their overall involvement. **Teenage drivers** accounted for **14.12% of total crashes,** but a smaller percentage **(11.63%) of fatal crashes**, suggesting these incidents are generally less severe. Gender analysis showed that male drivers were involved in a disproportionate share of both total and fatal crashes.

Crashes also varied significantly between rural and urban areas. **Rural areas** exhibited a **higher fatality rate (1.66%)** compared to urban areas (**0.83%**), while urban areas experienced more injuries (42.70%) and a higher number of crashes overall. Property damage crashes were slightly more common in rural areas.

Further analysis of crashes by region revealed regional differences in crash severity level as shown below:

- The Urban Area recorded the highest number of crashes across all severity levels, with 49 fatal crashes, 200 incapacitating injuries, and over 3,300 property damage-only incidents. This reflects the high exposure and dense traffic conditions typical of urban environments.

- The Northern Region experienced a moderate number of crashes but had the highest number of fatal (21) and incapacitating injury (36) crashes among the rural regions, indicating a higher rate of severe outcomes relative to its overall crash count.

- The Southern Region reported the lowest overall number of crashes, but still had a notable share of severe incidents, with 13 fatal and 8 incapacitating injury crashes. Although smaller in total volume, the severity proportion in this region remains concerning.

Crash types varied by region:

- The Northern Region experienced the highest number of crashes across almost all types, particularly rear-end (4,568), angle-turning (3,065), and fixed-object (3,897) crashes. This pattern suggests a combination of busier roads and higher intersection density, along with rural stretches that increase the likelihood of fixed object impacts and rollovers (653).

- The Southern Region showed a similar rural crash profile, with a high number of fixed-object (2,256) and rollover crashes (441). These are consistent with higher-speed, lower-volume rural roads where vehicles are more likely to leave the roadway.

- The Urban Area (Tulsa) was dominated by rear-end crashes (1,417), angle-turning (1,280), and sideswipe–same direction crashes (607), reflecting congested traffic conditions, frequent intersections, and lane-changing behavior typical of urban environments.

For detailed data, including specific tables, figures, and further analysis, refer to **Appendix B - Supplementary Data on Safety Analysis, Section B.2.**

3.2.5 Crashes by County

Error! Reference source not found. presents the percentage of crashes by severity level for each county w ithin Cherokee Nation, along with the total number of crashes in each county, ordered from the county with the highest number of crashes to the lowest. For counties that are only partially within Cherokee Nation, only crashes occurring within Cherokee Nation's boundaries have been considered. According to this table:

- Tulsa County has the highest total number of crashes (8,532), with fatal crashes accounting for less than 1%, and property damage-only crashes comprising 57.8%. This distribution suggests a greater share of minor incidents, likely due to urban traffic conditions with lower speeds and more congestion.

- Rogers County follows with 4,948 crashes, maintaining a similar pattern, with a relatively low fatality rate (1.5%) and a high percentage of non-incapacitating (18.2%) and possible injury crashes (18.4%), pointing to a higher prevalence of moderate injuries.

- Mayes County stands out with a fatal crash rate of 2.4%, which is above average, despite having fewer total crashes than Tulsa and Rogers. McIntosh County, on the other hand, recorded the highest proportion of property damage-only crashes at 59.2%, suggesting fewer injury-related incidents.

- Craig, Nowata, and Ottawa Counties, though lower in total crash volume, report fatal crash rates ranging from 2% to 4.8%, highlighting the severity often seen in rural crashes.

- Washington County shows a large share of possible injury crashes (34.2%), while Wagoner County reports relatively low total crashes (122) with a moderate share of injuries and fatalities.

These points reinforce a regional pattern: rural counties tend to show higher fatal crash rates, likely due to higher travel speeds and limited access to immediate emergency response, while urban counties, such as Tulsa, have a higher volume of minor and moderate crashes, often tied to higher traffic density and improved roadway safety features.

A detailed breakdown of normalized crash data by population and area, as well as contributing crash factors

across counties (e.g., failed to yield, speeding, poor lighting), is provided in **Appendix B - Supplementary Data on Safety Analysis, Section B.3.**

Table 3 - Crash Distribution by County and Severity Level

County	Severity Level					Total Crashes
	Fatal	Incapacitating Injury	Non-Incapacitating Injury	Possible Injury	Property Damage	
Tulsa	72	281	1,372	1,875	4,932	8,532
Rogers	72	227	900	909	2,840	4,948
Sequoyah	36	105	170	432	2,140	2,883
Washington	21	86	280	612	1,787	2,786
Mayes	56	111	540	376	1,384	2,467
Cherokee	41	105	335	426	1,487	2,394
Delaware	35	111	383	325	1,457	2,311
Craig	13	38	133	200	602	986
Muskogee	32	76	167	147	521	943
Adair	30	45	139	142	397	753
Ottawa	16	26	104	85	285	516

3.2.6 Pedestrian and Bicycle Crashes

According to data from the OHSO for the years 2017 to 2021, there were **373 pedestrian-involved crashes**, representing **1.23%** of all crashes in the region. Additionally, **127 bicycle-involved crashes** accounted for **0.42%** of total crashes.

Pedestrian and bicycle crashes, while comprising only **1.65%** of all crashes, contribute disproportionately to severe outcomes. Of the **454 fatal crashes** recorded in the study area, **57 (over 12%)** involved pedestrians or bicyclists, underscoring their heightened vulnerability. Serious injuries were also significant, with **77 crashes** classified as incapacitating. Non-incapacitating and possible injuries made up the majority of incidents (291 crashes), while only **75 crashes** resulted in property damage alone. **Figure 10** shows pedestrian and bike crashes by severity level.

A breakdown of non-motorized crashes by county shows that Tulsa County recorded by far the highest number of both pedestrian (188) and bicycle (63) crashes, reflecting its dense urban environment, high traffic volumes, and greater pedestrian and cyclist activity. Washington (33 pedestrian, 16 bicycle) and Rogers (31 pedestrian, 22 bicycle) Counties followed, indicating moderate levels of non-motorized crashes in these semi-urban areas.

Cherokee, Sequoyah, Mayes, and Delaware also had a noticeable share of incidents, with pedestrian crash counts ranging from 19 to 23, and bicycle crashes in the low single digits. In contrast, rural counties such as Nowata, Ottawa, and Wagoner reported very few non-motorized crashes, and some counties (e.g., Seminole, not listed) appear to have no reported incidents in this dataset. Detailed regional and county-level pedestrian and bicycle crash data are provided in **Appendix B - Supplementary Data on Safety Analysis, Section B.4.**

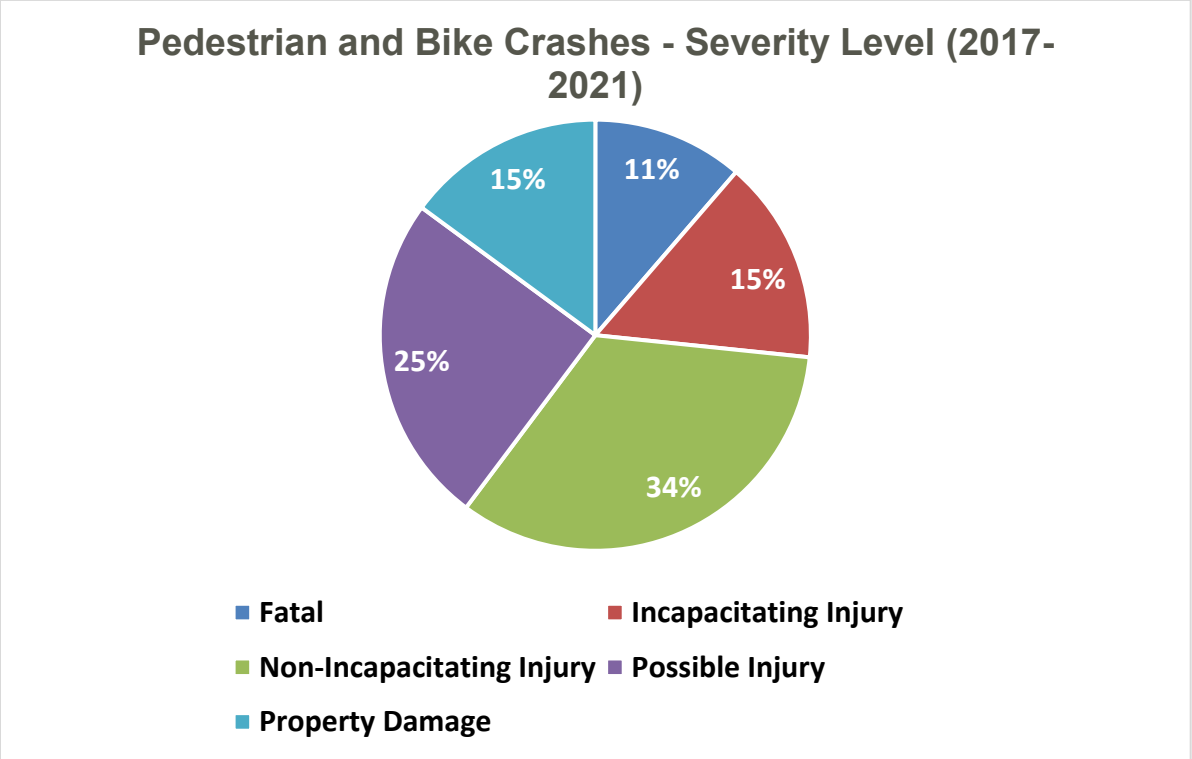


Figure 10 - Pedestrian and Bike Crashes Severity Level Distribution in Cherokee Nation (2017-2021)

3.2.7 Crash Heatmaps

To gain a clear understanding of areas with higher crash concentrations, heatmaps were created to enhance visualization. The heatmap was created based solely on crash frequency, with red areas indicating locations with the highest concentration of fatal and injury crashes, gradually transitioning to green for lower frequencies. Areas without color experienced no fatal or injury crashes. **Figure 11** and **Figure 12** display the heatmaps for total crashes, and for pedestrian and bike crashes, respectively.

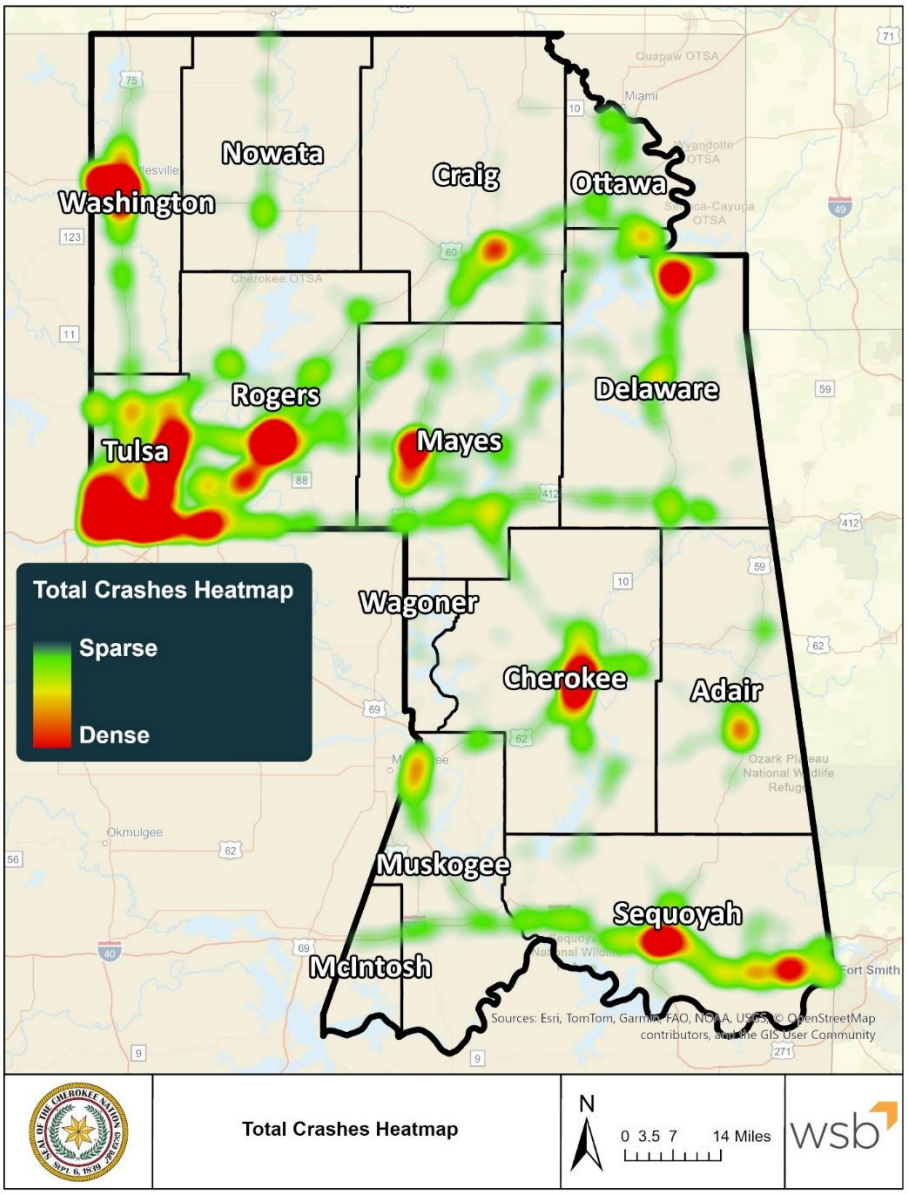


Figure 11 - Total Crashes Heatmap

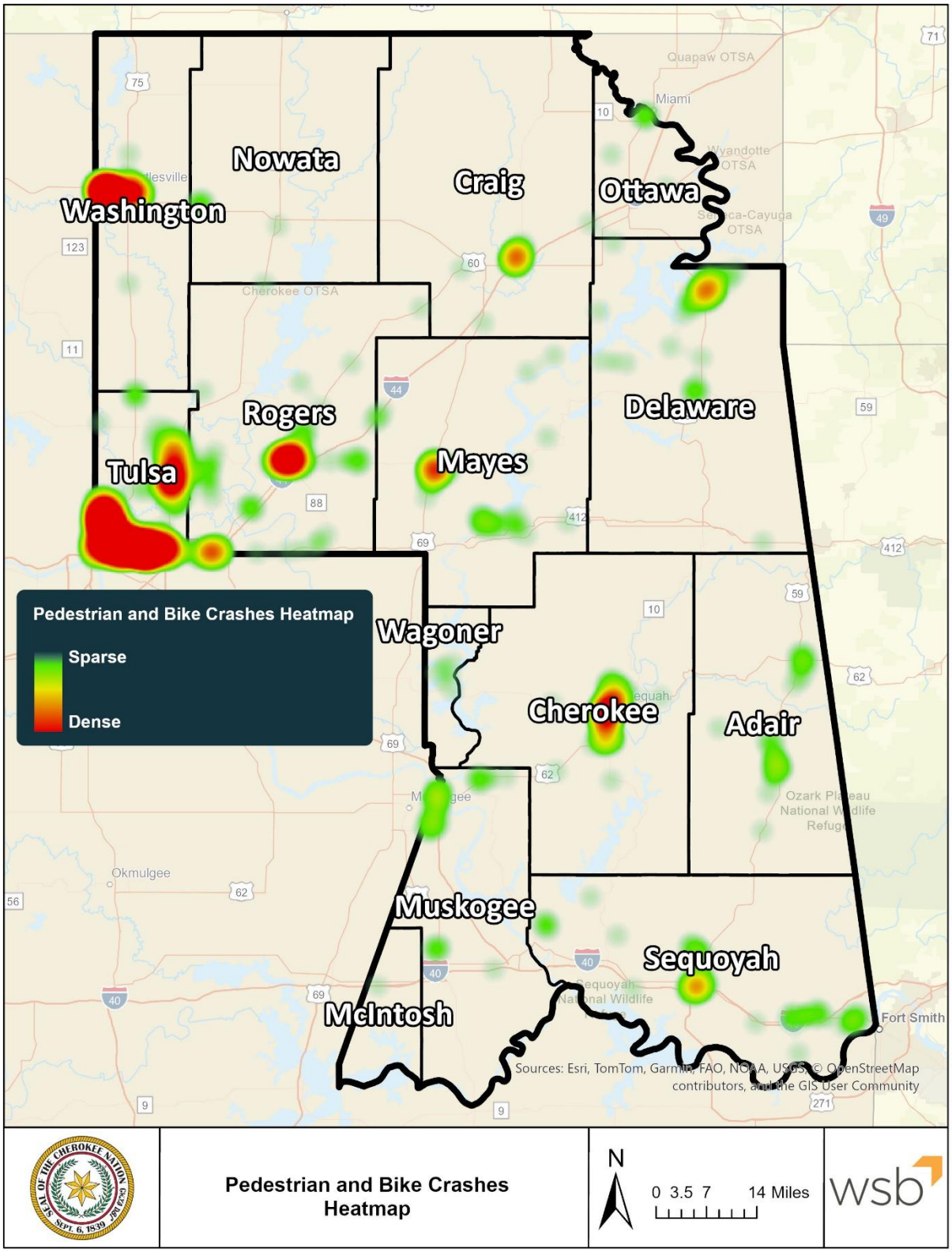


Figure 12 - Pedestrian and Bike Crashes Heatmap

The total crashes heatmap reveals that cities such as Tulsa, Muskogee, and Okmulgee experience higher concentrations of crashes. Additionally, major roadways, particularly interstates and major arterials, exhibit notable crash density.

The heatmap for pedestrian and bike crashes follows a similar pattern to the total crashes heatmap. Higher concentrations of pedestrian and bike crashes are observed in cities like Tulsa, Muskogee, Okmulgee, Bristow, and Wagoner, which aligns with expectations given their higher population densities and traffic activity.

3.2.8 High Injury Network

In line with the Vision Zero strategy—aimed at eliminating all traffic fatalities and severe injuries—identifying locations with a high incidence of severe crashes is crucial. The High-Injury Network (HIN) is a method for network screening, focusing on street corridors and intersections that have a history of severe crashes. The resulting HIN encompasses all crashes with fatal, incapacitating injury, and non-incapacitating injury severities, capturing the full extent of severe crash occurrences across the network.

Figure 13 illustrates the overall High-Injury Network. The HIN represents 17.44 percent of the roadway network and 3.64 percent of intersections, emphasizing its focused coverage relative to the overall system. **Figure 14** displays the HIN specifically for the vulnerable road user (VRU) pedestrian and bike crashes. **Figure 15** shows the HIN with roadway functional classifications and **Figure 16** shows coverage percentage of HIN by roadway functional classification.

As detailed in **Appendix C** (**High Injury Network Interactive Map**), an interactive Google Map was developed to allow users to view and explore the roadway segments and intersections included in the High-Injury Network.

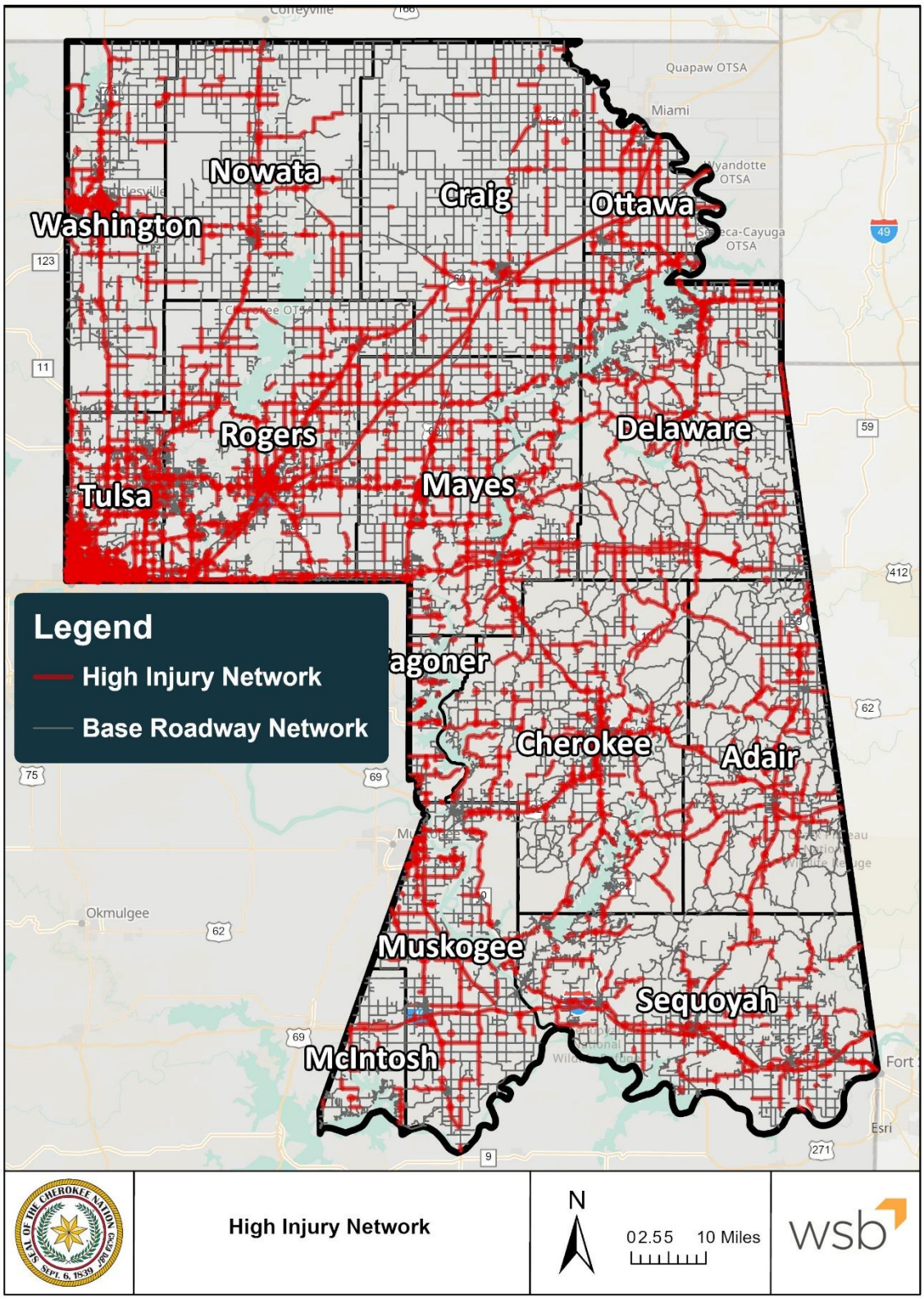


Figure 13 - All Crashes High Injury Network

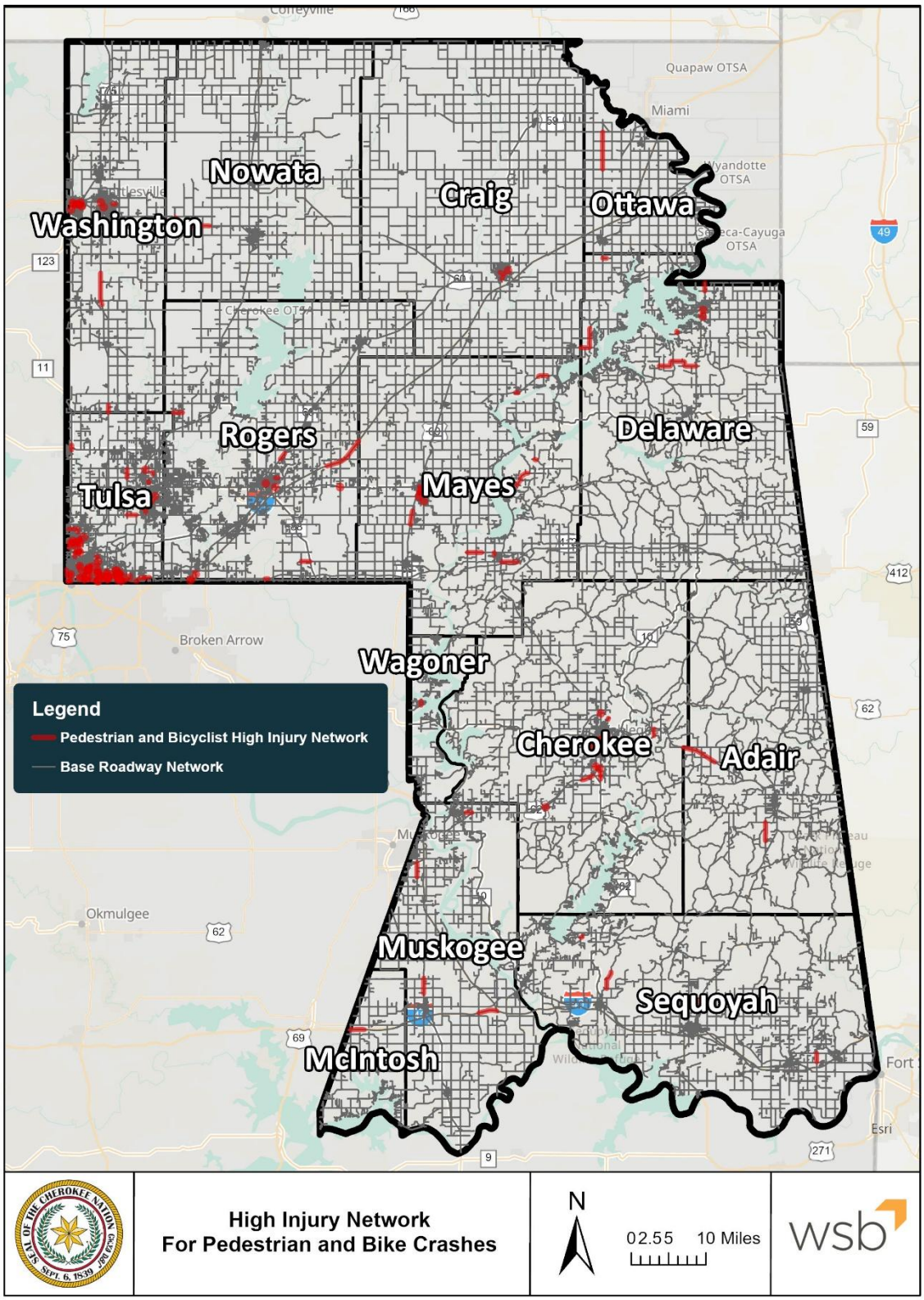


Figure 14 - Pedestrian and Bike Crashes High Injury Network

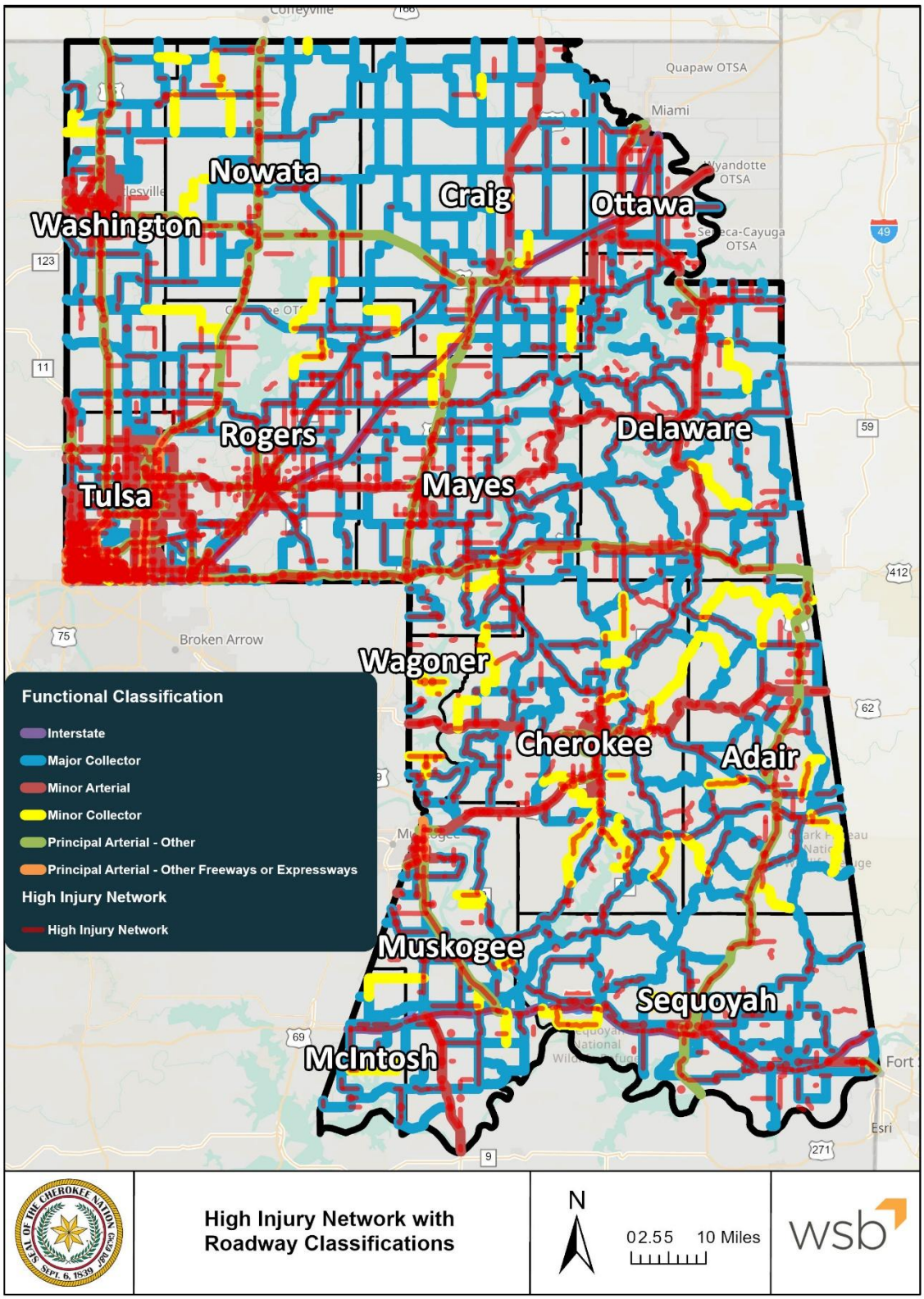


Figure 15 - All Crashes High Injury Network with Roadway Functional Classifications

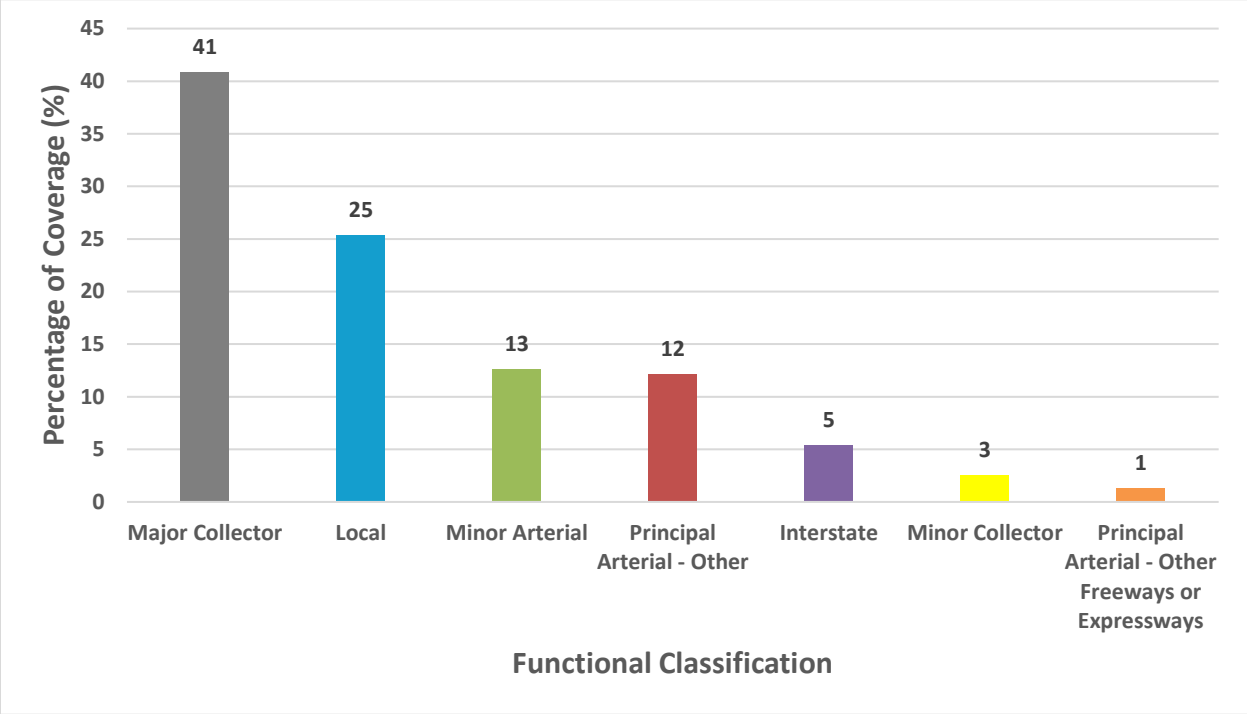


Figure 16 - Coverage Percentage of High Injury Network by Roadway Functional Classification

4. Public Outreach and Stakeholder Engagement

Chapter 4 Highlights:

- Accessible outreach engaged Cherokee Nation residents, transportation staff, local and regional government representatives, schools, and first responders
- Community input was collected from a survey, comment map, helpline, comment cards, and 6 meetings, 3 of which were hybrid
- The project website (CNSafetyAndTransit.com) served as a central hub with accessible resources, updates, and ways to provide feedback
- 83 survey responses, 31 map comments, and 1 helpline inquire, and 10 comment cards helped inform the plan
- Social media, community meetings and local news were the preferred methods of communication
- Distracted driving, poor road conditions, speeding, and poor road design were the top survey concerns

4.1 Approach

Public engagement is a core element of the SS4A program, ensuring the voices of Cherokee Nation residents and community organizations are represented. Integrating community input with the analysis of available data ensures information is considered that may not necessarily, or sufficiently, be recorded in the available data.

An engagement plan was developed early in the process to gather input. Community input was key to ensuring issues regarding roadway safety from their perspectives were brought forward as the many who drive, walk, or bike in Cherokee Nation.

The following groups were invited to participate in the planning process:

- **Community Members:** Including the broader community and Cherokee Nation citizens.
- **Cherokee Nation Department of Transportation**: Lead coordinating all transportation safety information across Cherokee Nation.
- **Local and Regional Government Representatives**: County Commissioners and Mayors from various regions within Cherokee Nation, contributed local insights and perspectives.
- **First Responders and Law Enforcement**: Local police departments, sheriff's offices, and emergency responders who provide crucial input on road safety and emergency response strategies.
- **State Transportation Agencies**: Collaboration with the Oklahoma Department of Transportation

to ensure alignment with state-level transportation and safety strategies.

- **Educational Institutions, School Districts, and Businesses**: Engaged to address transportation safety concerns for youth, employees, and the broader community.
- **Transportation Groups and Planning Organizations**: Offered technical expertise to ensure a comprehensive approach to safety across all travel modes.

Cherokee Nation's geographic area was divided into three regions—North, South, and Urban—to personalize the crash data to each region, see **Figure 17** .

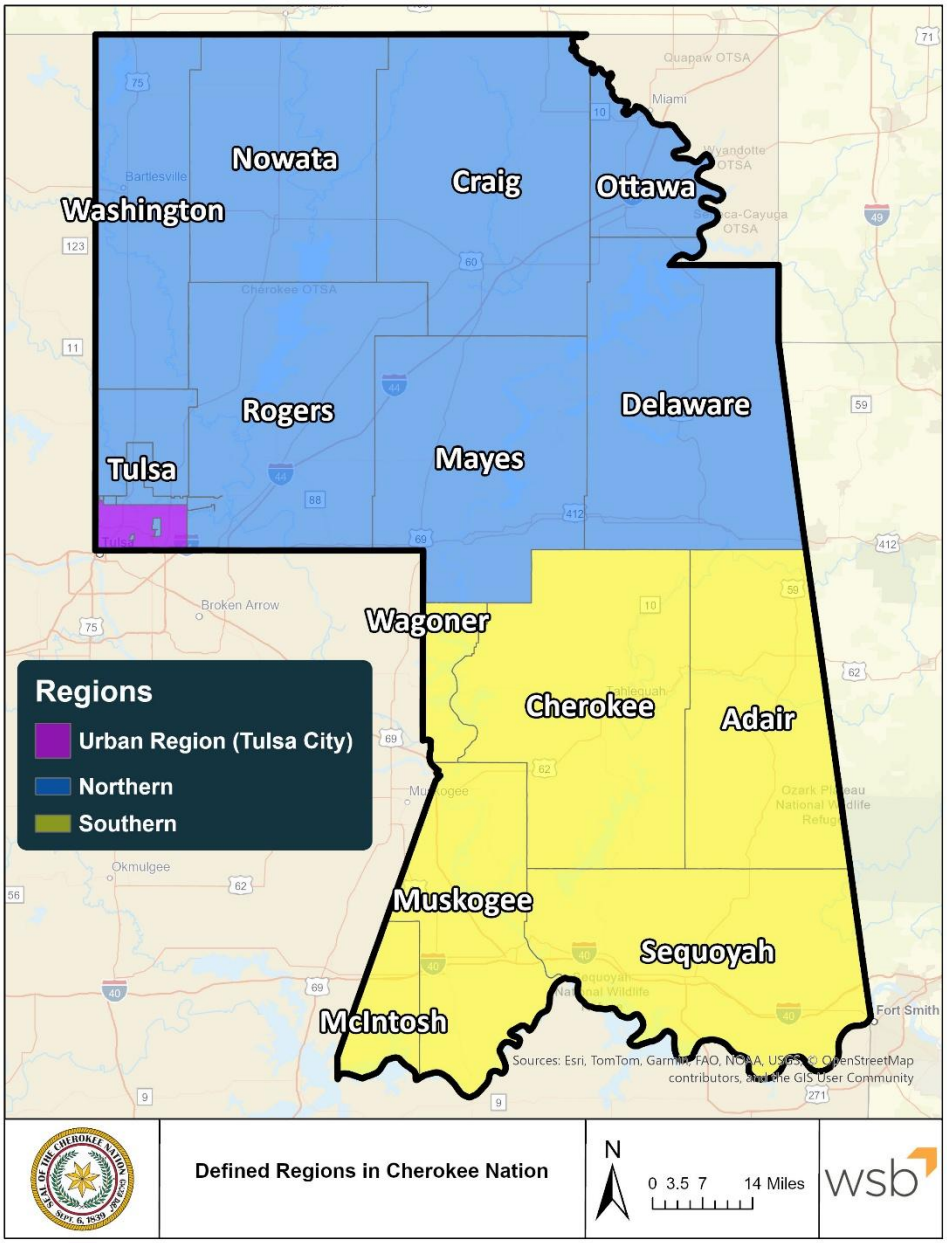


Figure 17 - Defined Regions in Cherokee Nation

4.2 Strategies

To provide the most opportunity for public and stakeholder participation, in person and virtual engagement options were made available from September 2024 to February 2025. This included an interactive project website, sharing details on the Cherokee Nation's website, Facebook posts, meeting flyers, stakeholder emails, postcards, newspaper advertisements, and public meetings. A survey, comment map, helpline, and comment cards were used to gather input on safety concerns and current conditions.

1. **Interactive project website:** Hosted via an ArcGIS Hub site and provided a one stop shop for all things the public and stakeholders needed to know about the project and ways they could get involved. The website hosted a survey, comment map, meeting calendar, helpline information, and engagement summaries. A custom Uniform Resource Locator (URL) "CNSafetyAndTransit.com" and Quick Response (QR) code were included in all promotional materials to direct people to the website.

    a. **Comment map:** A tool that allowed people to add comments to specific locations on a map. The entire boundary of Cherokee Nation was outlined, and commenters were only allowed to comment within this boundary. This was open from September 2024 to April 2025. It received 31 comments regarding specific locations that need safety improvements.
    b. **Survey:** Consisted of 21 questions and collected 83 responses. The Survey was hosted on the project website, and printed copies were made available at the public meetings. It was open from September 2024 to April 2025.
2. **Helpline**: Included an email and phone number to provide a direct way for people to get in touch with the project team to share information and ask questions. Throughout the project, one inquiry was received and responded to.
3. **Stakeholder and public meetings:** Two rounds of stakeholder and public meetings were conducted in each region. The first set was in September 2024 to present the existing conditions analysis and to solicit feedback and input. The second set of stakeholder and public meetings were conducted in February 2025 to provide an update on the safety analysis, input received, and participants were given another opportunity to provide feedback. The crash hot spot locations, High Injury Network, and the project and strategy prioritization process were shared pertaining to Cherokee Nation. Each round of meetings was documented with a summary report to outline what the meetings were about, those who participated, and document feedback.

    a. Ten comment cards were received pertaining to specific areas that need safety improvements
    b. Email invites and thank you messages were sent to 143 stakeholders from the following counties: Adair, Cherokee, Craig, Delaware, McIntosh, Mayes, Muskogee, Nowata,

Ottawa, Rogers, Sequoyah, Tulsa, Wagoner, and Washington

c. Details were posted on the project website and Cherokee Nation's website
d. Postcards and invitation flyers were distributed around Cherokee Nation
e. Cherokee Nation language was used in greetings in email invitations to stakeholders, welcome boards, and the power point presentations

Full meeting summaries can be found in **Appendix D**.

4.3 Findings

Raw survey results can be found in **Appendix D**.

Key findings from the survey

- **Primary mode of transportation:** Nearly all respondents (95.18%) use personal vehicles.
- **Daily travel:** 65.06% travel more than 10 miles per day.
- **Children's school transportation:** 61.02% of children are dropped off for school by car, 22.03% of respondents did not have children, and 11.86% of children take the school bus.
- **Safety concerns for school commutes:** Respondents prioritized crosswalks, pedestrian signals, and improved sidewalk conditions.
- **Vehicle safety:** 57.58% feel "somewhat safe" in vehicles, while 19.70% feel "very safe."
- **Walking safety:** 31.82% feel "somewhat safe," 28.79% feel "somewhat unsafe" and 21.21% feel "very unsafe".
- **Bicycle safety:** 33.33% feel "very unsafe" when cycling, 24.24% do not/rarely ride a bike and 19.70% feel "somewhat unsafe".
- **Street accessibility:** 43.75% find streets "very inaccessible" for all users and 34.38% find streets "somewhat inaccessible".

- **Factors negatively impacting transportation safety:** Distracted driving (74.24%), poor road conditions (71.21%), speeding (62.12%), and poor road design (51.52%) were the top concerns.
- **Safety improvement suggestions:** 78.79% believe road improvements (ranked #1), like better signage and lighting, would be most effective, followed by increased traffic enforcement (ranked #2), and public awareness campaigns (ranked #3).
- **Preferred communication channels:** Social media (ranked #1), community meetings (ranked #2), and local news (ranked #3) were the most preferred for traffic safety updates.
- **Support for the safety committee:** 91.94% support the formation of a committee to enhance road safety efforts.

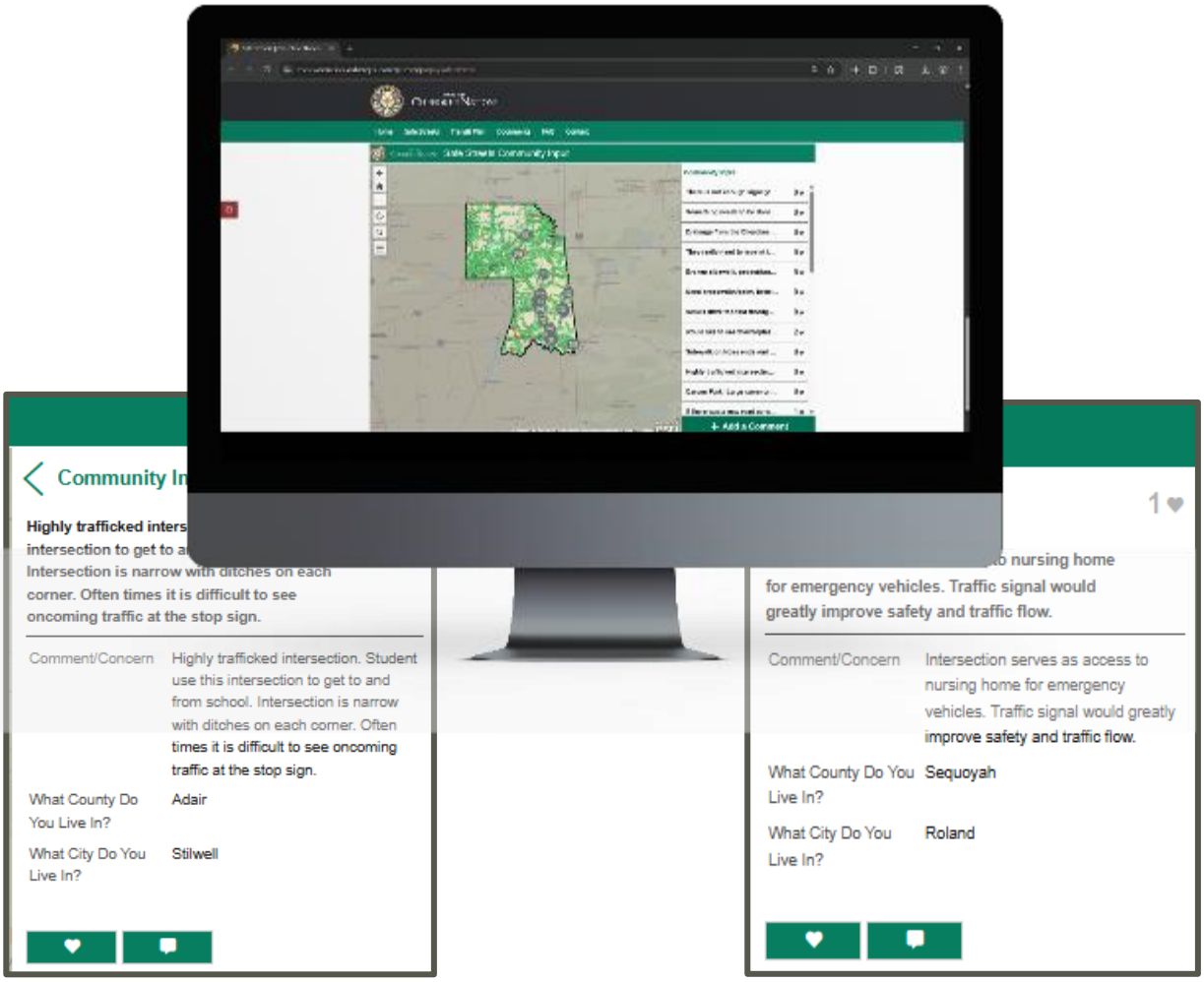
General concerns and suggestions received through the survey and comment map

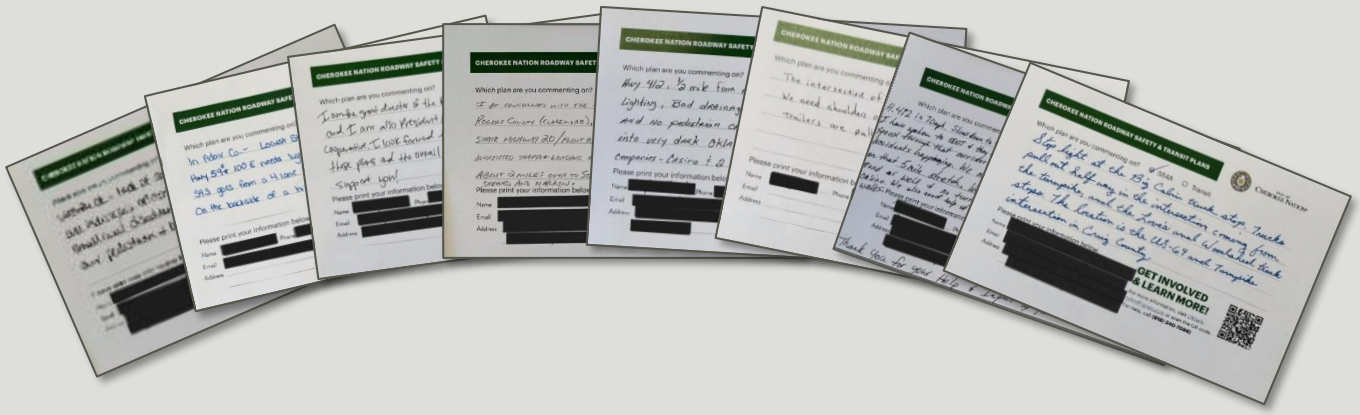
In addition to the survey, respondents were asked to identify intersections that they believe need safety improvements in Cherokee Nation by placing comments at the locations on a map that included al roads in Cherokee Nation. The interactive map was available from September 6 through April 1, 2025, on the project website. Survey responses and comments left on the map emphasized the need for more sidewalks, rural road shoulders, crosswalks, and flashing lights at dangerous intersections. General concerns and suggestions are below.

1. **Road safety and infrastructure**
    a. Many respondents expressed concern about poor road conditions, particularly mentioning potholes, lack of road maintenance, and issues with road design, including narrow lanes and dangerous curves.
    b. Improving road signage and adding more streetlights were commonly suggested, especially at high-traffic intersections and dangerous turns.
    c. Pedestrian safety is a significant issue, with requests for more crosswalks, pedestrian signals, and better sidewalk conditions.
2. **Driving behavior and enforcement**
    a. Distracted driving (especially due to cell phone use) was a major safety concern. Respondents emphasized stricter penalties for violators.
    b. Several suggested the need for increased traffic enforcement, including speed limits, running red lights, and stop signs.
    c. There were multiple comments addressing speeding, particularly in residential areas and near schools.
3. **Public awareness and education**
    a. Many respondents recommended education campaigns to raise awareness about safe driving habits, the dangers of distracted driving, and the importance of following traffic laws.
    b. Some suggested more driver education programs, particularly for young drivers, to improve

driving etiquette.

4. **Public transportation**
    a. Public transportation was highlighted as underutilized, and a few comments suggested improvements in this area to reduce traffic congestion and promote road safety.
5. **Specific locations for improvements**
    a. Respondents frequently pointed out specific roads, intersections, and neighborhoods needing safety improvements, such as:
        i. Dangerous intersections lack proper signals or visibility.
        ii. Areas with frequent traffic congestion causing unsafe conditions.
        iii. Requests for more bike lanes to improve cyclists' safety.
        iv. Usable shoulders for emergency vehicles in rural areas.
        v. Having measures in place to prevent roadway flooding in rural areas when it rains.
6. **Children's commute to school**
    a. Many respondents were concerned about the safety of children's school commutes, citing:
        i. There is a need for more school crossing guards.
        ii. Calls for improving sidewalks and crosswalks near schools.
        iii. Some suggested reduced speed limits in school zones and increased enforcement during school hours.
7. **Cycling and walking**
    a. There was significant concern about cycling safety, with many respondents stating they feel riding bicycles is unsafe due to speeding vehicles, lack of bike lanes, and poor road conditions.
    b. Similarly, several respondents mentioned feeling unsafe while walking, especially in areas without proper sidewalks or pedestrian-friendly infrastructure.
8. **Communication and involvement**
    a. Respondents were generally in favor of forming a committee to address road safety and suggested using various communication channels (e.g., newsletters, social media) to keep the public informed about safety initiatives.





5. Community Considerations

Chapter 5 Highlights:

- Community outreach strategy.
- Data and partner collaboration.
- 181 census tracts fall under Areas of Persistent Poverty.
- AIAN populations make up 16.22% of residents, with higher concentrations in select counties.
- 5.82% of households lack vehicle access, increasing transportation vulnerability.
- Outreach included in-person meetings, virtual options, and multiple feedback tools were created to reduce participation barriers.

Community outreach strategies in the Safety Action Plan.

Highway and pedestrian safety were a central focus in developing the Cherokee Nation's SS4A Safety Action Plan, guiding community outreach strategies. The plan was shaped using a comprehensive process that reflects the SS4A program's emphasis on collaboration. To support this approach, the team conducted data-driven analyses to identify strategic locations for community meetings in collaboration with key partners. These analyses considered urban and rural population characteristics, as well as affected agencies, ensuring that the needs and voices of all community members were meaningfully integrated into the planning process.

5.1 Analysis and Metrics

As a part of the review process, various datasets provided by the USDOT were analyzed, including the American Community Survey (ACS) data related to American Indians and Alaska Natives (AIAN) populations and vehicle ownership. This approach helps to inform safety and transportation needs. The primary datasets used for community considerations are summarized in **Table 4.**

Table 4 - Primary Datasets for Community Considerations

Data	Source / Year	What this showed us	How we used it
Areas of Persistent Poverty	USDOT / 2020	Identifies geographic areas with consistently high poverty rates over time.	Help reveal if communities with fewer resources experience disproportionately higher road safety risks due to factors like older infrastructure or limited access to safe transportation options.
AIAN Population	American Community Survey / 2021	Shows the spatial distribution of AIAN populations.	Analyzing this alongside crash data can highlight systemic inequities in infrastructure, traffic enforcement, or access to driver safety education.
Vehicle Ownership	American Community Survey / 2021	Indicates the percentage of households with vehicle access.	This helps understand mobility patterns and identify communities reliant on walking, cycling, or public transit, which might face higher risks if pedestrian and bicycle infrastructure or public transportation safety measures are inadequate.

5.1.1. Areas of Persistent Poverty

Persistent poverty is defined by the U.S. Department of Agriculture as counties where 20% or more of the population has lived in poverty over the last 30 years. According to the U.S. Census Bureau's 2021 American Community Survey 5-Year Estimates, **181 census tracts** in Cherokee Nation fall within areas classified as Areas of Persistent Poverty. **Figure 18** illustrates these areas. As shown in this figure, no country within Cherokee Nation is fully outside of areas of persistent poverty. All of Adair County, along with most of Mayes, Delaware, Cherokee, Muskogee, and Sequoyah counties—and portions of other counties within the Cherokee Nation—fall within areas of persistent poverty.

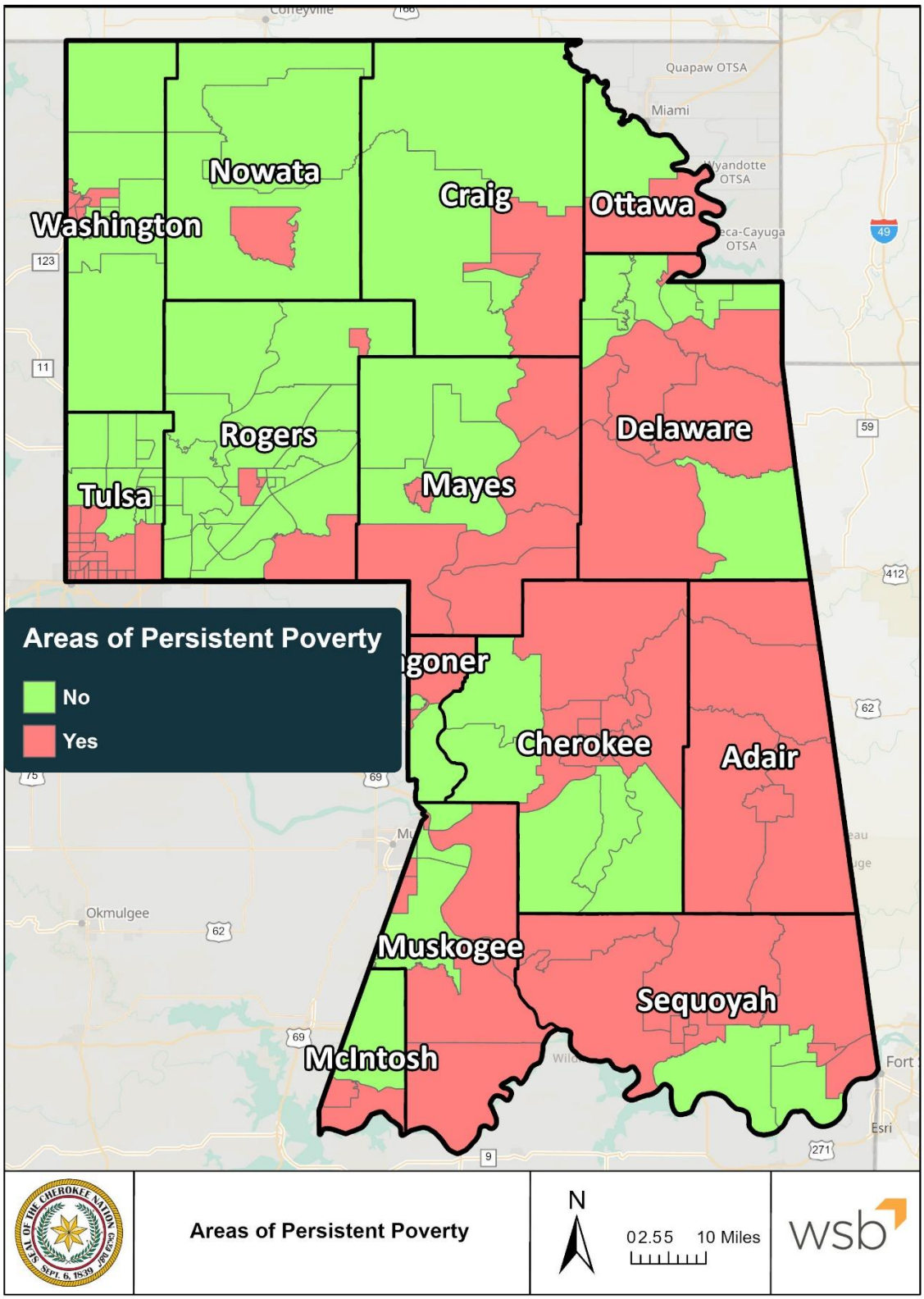


Figure 18 – Areas of Persistent Poverty

5.1.2. American Indian and Alaska Native (AIAN) Population

The majority of the population within Cherokee Nation is White, with a notable Native American population and smaller populations of African American, Hispanic, and Asian descent. Approximately 16.22% of the population is classified as American Indian and Alaska Native (AIAN). **Figure 19** illustrates the distribution of AIAN populations across the census tracts within Cherokee Nation. As shown in this figure, parts of Mayes, Delaware, Cherokee, Adair, and Sequoyah counties have higher percentages of AIAN populations.

5.1.3. Vehicle Ownership

Approximately **5.82% of households** within Cherokee Nation reservation do not have access to a vehicle. Lack of vehicle ownership is a critical issue, especially in rural and tribal areas where public transportation is often limited or unavailable. Without access to a personal vehicle, households may struggle to reach employment opportunities, schools, healthcare services, grocery stores, and other essential destinations.

From a roadway safety perspective, individuals without vehicles are more likely to walk, bike, or depend on others for transportation. These alternative modes can expose them to higher crash risk, particularly in areas that lack pedestrian or cyclist infrastructure.

Integrating vehicle ownership data into the safety planning process enables Cherokee Nation to better identify susceptible populations and prioritize investments in multimodal infrastructure, traffic calming measures, and connectivity improvements. This approach directly ensures that susceptible communities receive targeted safety improvements. **Figure 20**, Household Vehicle Ownership, illustrates the percentage of households without vehicles across each census tract within the Cherokee Nation reservation.

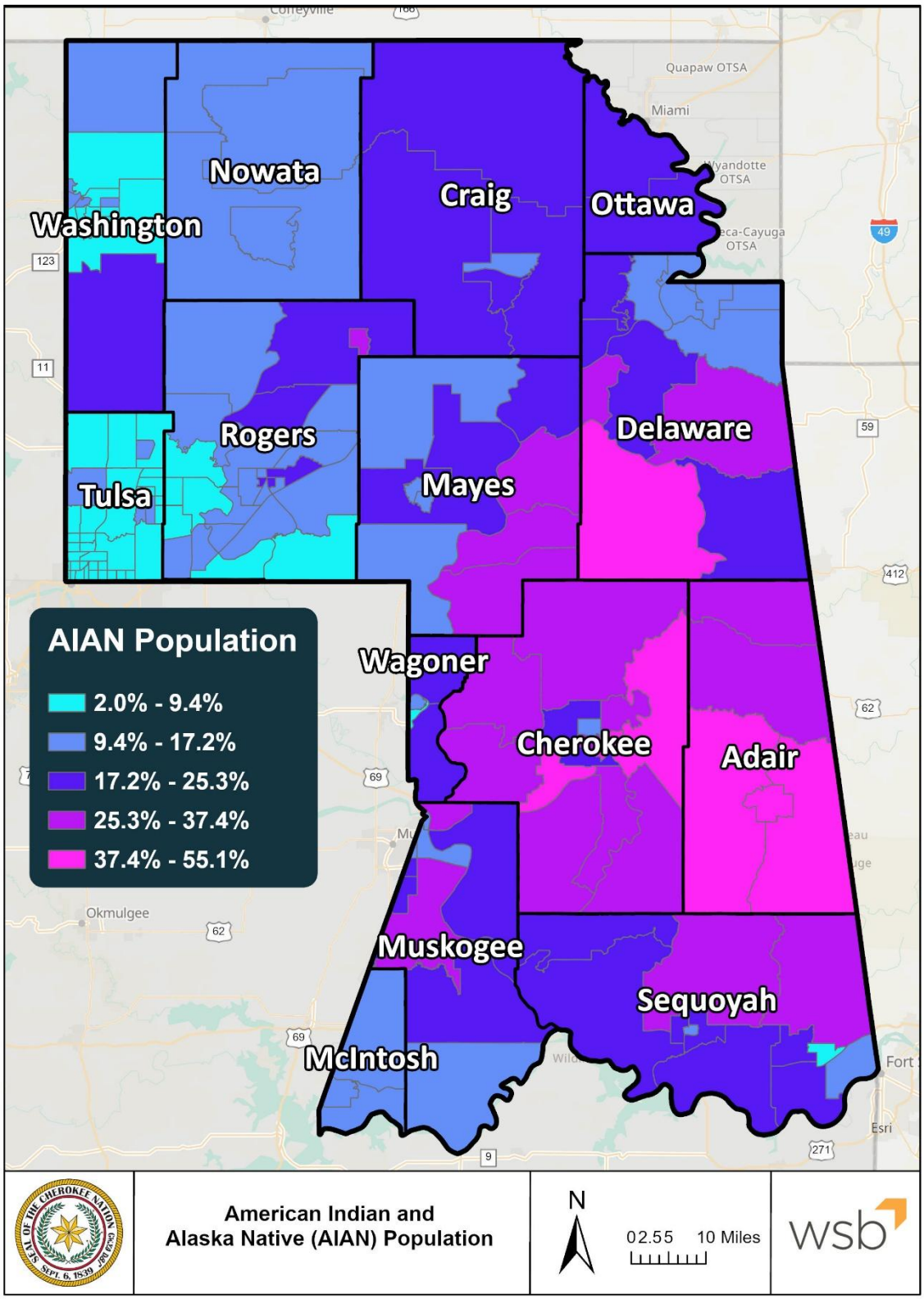


Figure 19 - AIAN Population

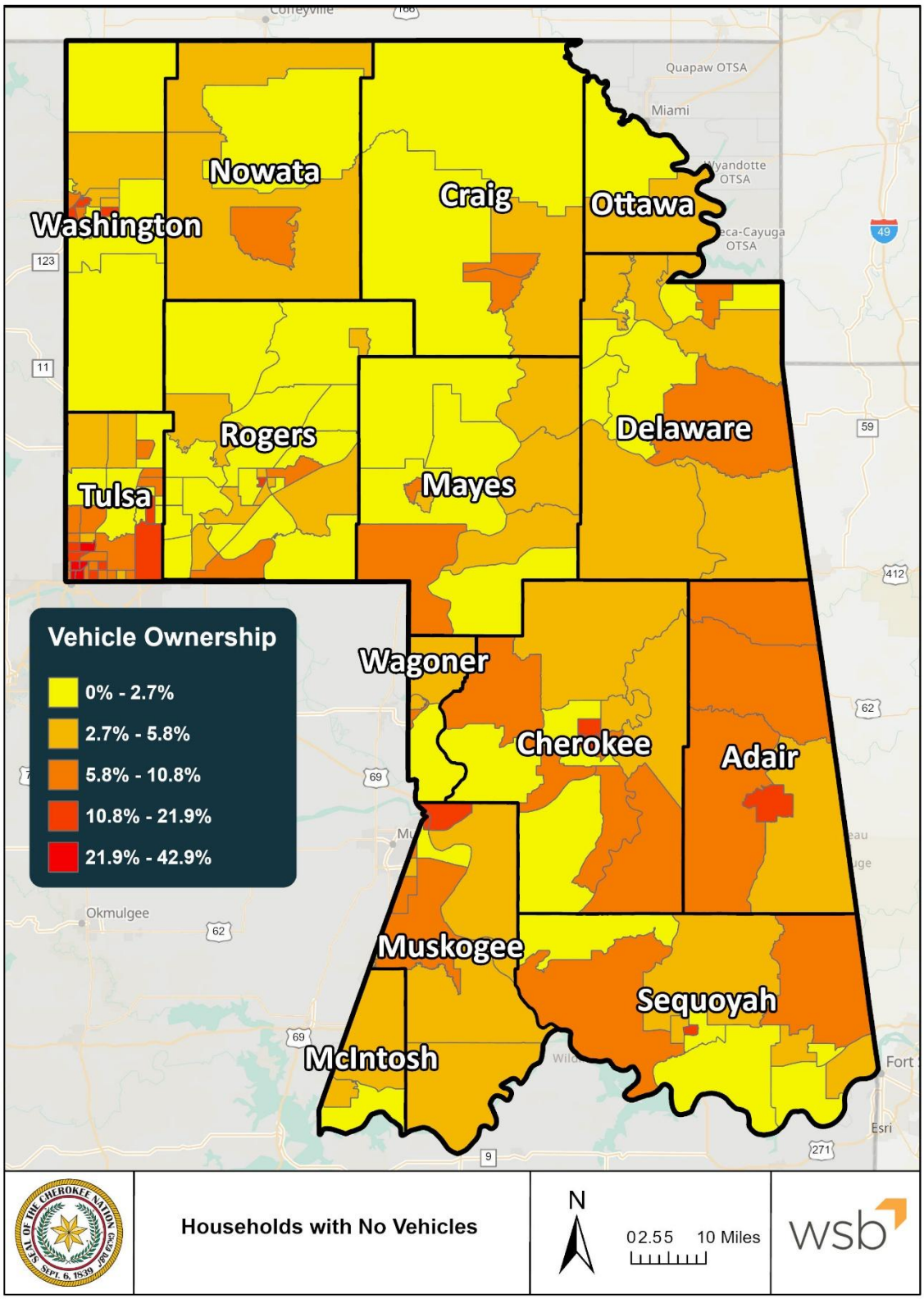


Figure 20 - Household Vehicle Ownership

5.2 Strategies for Community Outreach

To ensure public and community input was considered in the development of the SS4A Safety Action Plan, the following outreach and engagement methods were implemented:

- Public meetings, hosted in September 2024 and February 2025, occurred in six different locations over a span of two weeks across Cherokee Nation. Each meeting occurred in each of the three regions to make it easier to attend in person and provide accessibility for all communities, detailed in Chapter 4.

- During the public meetings hosted in February 2025, a virtual option was provided to offer another method to present information and solicit feedback from the various communities across the entire Cherokee Nation.

- The project website was established to provide communication and transparency to the project. It was used as a communication tool to deliver information about the project and provide a feedback loop for Cherokee Nation's residents, community members, those employed in the community and the many stakeholders who serve Cherokee Nation

- A survey (on-line and hard copy), a comment map, email address and a 24-hour hot-line were other tools utilized to gather public input as well as provide an avenue for community members to ask questions or voice concerns about transportation safety in their communities. These strategies provided flexible alternatives for people to participate and reduce barriers for public input and engagement.

6. Existing Plans, Policy, and Process Review

Chapter 6 Highlights:

- Review of Cherokee Nation, federal, state, and local transportation safety plans
- Assessment and alignment with other plans utilizing the Safe System Approach
- County level public transportation plans were identified but not reviewed
- Emphasis on plan updates, data sharing, project coordination, and stakeholder collaboration
- Recommended transportation safety improvements to include crash data systems and safety improvements for all road users

Policy and process assessment and recommendations are part of the USDOT Safe Streets and Roads for All Grant Program. Aligning Cherokee Nation's policies and processes with other agencies, organizations, and departments utilizing the Safe System Approach is a critical step to successfully achieving a reduction in fatal and serious injury crashes.

The relevant, existing, and available Cherokee Nation plans and procedures were collected and reviewed, including plans and documents from federal, state and county governments. Below is a summary of the analysis and findings of those reviewed plans and documents. See **Appendix E for details.**

6.1. Existing Relevant Cherokee Nation Plans

The existing Cherokee Nation plans that address transportation safety consisted of the 2020 Highway Infrastructure Safey Plan, the 2016 Highway Infrastructure Safety Plan and the Long-Range Transit Plan, 2018. For each plan, recommendations were documented that address transportation safety & data analysis, roadway safety & infrastructure, public transit safety, bicycle & pedestrian safety, emergency response & coordination, public education, safety project development, and implementation.

6.2. Existing Federal/Tribal Plans

Federal and Tribal plans that address transportation safety were collected and reviewed. Items looked for in each plan included but were not limited to crash data quality, sharing and integration, funding

opportunities, law enforcement collaboration, planning, roadway safety, and general strategies to improve transportation safety.

The following Federal and Tribal existing plans and documents were reviewed:

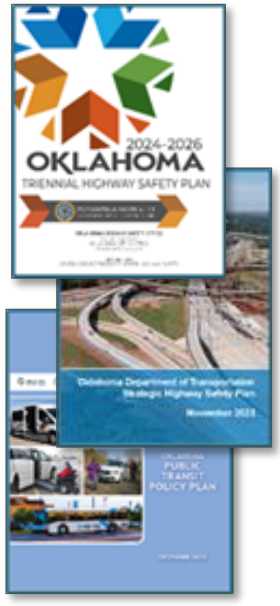
- Report to Congress – Options for Improving Transportation Safety in Tribal Areas (2018)
- Tribal Governments & Transportation Safety Data (2016)
- Tribal Transportation Strategic Safety Plan (2017)
- Safe Routes to School in Tribal Communities; National Center for Safe Routes to School

6.3. Existing Oklahoma Statewide Plans

The State of Oklahoma plans that address transportation safety were reviewed as part of this Safety Action Plan process. Each plan had a focus on reducing crashes by various methods to include education, infrastructure, countermeasures, enforcement, performance measures, collaboration, and providing safe alternatives for travelers. Each plan provided recommendations and opportunities for a safe traveling environment and a commitment to traffic crash reduction.

The following State-Level plans were reviewed:

- Oklahoma Triennial Highway Safety Plan (2024-2026)
- Oklahoma Department of Transportation Strategic Highway Safety Plan (November 2023)
- Oklahoma Public Transit Policy Plan (December 2020)



6.4. Existing County Level Plans

County plans also contribute to reducing fatal and serious injury crashes and improving transportation safety in Cherokee Nation. After a thorough search, these plans or documents were found to be available for public review. The documents that were located are listed below; however, they were not reviewed

as part of this project.

The following county level plans have been identified but have not been reviewed:

- Cherokee County
  - Tahlequah Transportation Safety Action Plan (2025)
  - Cherokee County & Municipalities SS4A Safety Action Plan (2025)
- Craig County
  - Craig County Long-Range Transportation Plan
- Delaware County
  - Delaware County Long-Range Transportation Plan (2022)
- Mayes County
  - Mayes County Long-Range Transportation Plan
- Nowata County
  - Nowata County Long-Range Transportation Plan (2018)
- Rogers County
  - Rogers County Comprehensive Plan (2023)
  - Rogers County Long-Range Transportation Plan (2017)
- Tulsa County
  - Tulsa County Home & Consortium & Tulsa County Community Development Block Grant Urban County Five Year Consolidation Plan 2023-2027 & Program Year 2023 Annual Action Plan
  - Tulsa Comprehensive Plan (2016)
- Wagoner County
  - Wagoner County Comprehensive Plan (2023-2025)
- Washington County
  - Washington County Long-Range Transportation Plan

6.5. Memorandums of Understanding (MOU) & Agency Agreements

MOU’s and agency agreements play a role in transportation safety, disaster & emergency response, law enforcement activities, transit & public transportation, and resource sharing. Cherokee Nation has cross-deputization agreements with many law enforcement agencies within the roughly 6,950 square miles boundary. This includes every local police department, sheriff's office, Grand River Dam Authority, and the Oklahoma Highway Patrol can work together in the best interests of public safety.

6.6 Key Findings

The development, maintenance, and updating of transportation safety plans, documents, MOUs, policies, and procedures are crucial for ensuring the overall safety of the Cherokee Nation roadway network. The creation and maintenance of these plans and integrated training sessions facilitate collaboration and resource sharing among federal, state, county, and municipal stakeholders. These documents aim to enhance roadway safety and infrastructure, improve transportation safety & crash data analysis, advance public transit safety enhancements, promote bicycle & pedestrian safety initiatives, and refine emergency response & coordination efforts.

Additionally, the various activities surrounding these plans, documents, and agreements create opportunities for stakeholders to exchange knowledge on best practices in transportation safety, present educational opportunities, and provide future safety project ideas.

6.7. Recommendations for Transportation Safety

Several plans were reviewed from the federal and state levels, including those from Cherokee Nation. Many of these planning documents prominently featured safety-related themes.

It is suggested that each county within Cherokee Nation review and consider adopting or supporting the Cherokee Nation SS4A Safety Action Plan and participate in its implementation. Additionally, in other reservations that have completed or are in the process of developing SS4A Safety Action Plans, Cherokee Nation should acknowledge and support these plans to foster efficient collaboration. The integration and alignment of all SS4A plans in Cherokee Nation will promote transportation safety.

Additional recommendations include:

- Develop a safety culture through collaboration, data collection, information sharing, and emergency response coordination.
- Develop a Traffic Incident Response Plan to enhance a traffic safety culture and further the process of agency and organization collaboration.
- Develop a Hazard Mitigation Plan to assist field responders during a natural disaster to safely move, transport, or relocate people within the reservation.
- Protect vulnerable road users by analyzing crash data, implementing countermeasures, and raising awareness through education.
- Expand and improve daily transit services and resources, ensuring safety during disasters and emergency responses.
- Conduct joint high-visibility law enforcement operations, impaired driving checkpoints, and public education campaigns.

- Enhance emergency response coordination by implementing Traffic Incident Management Plans to improve incident response coordination.
- Provide safe and adequate infrastructure for pedestrians and bicyclists, ensuring improved user facilities.
- Increase partnerships among Federal, State, County, and local emergency responders and support personnel.
- Confirm participation of all law enforcement agencies in the Oklahoma Crash Electronic Reporting System (OCERS).
- Address unsafe driving behaviors through refined legislation, strong enforcement, and public education campaigns.
- Identify and prioritize improvements to roadway and infrastructure safety using citizen feedback and thorough data analysis.
- Offer transportation safety education programs to inform all road users and promote safer practices.
- Integrate advanced technologies and infrastructure measures to ensure safer transit services.
- Provide effective traffic safety messaging by partnering with existing media outlets to increase awareness.
- Deliver specialized training for law enforcement on enforcement strategies and reporting techniques.

7. The Comprehensive Safety Action Plan

Chapter 7 Highlights:

- Adoption of the High Injury Network
- Safety Strategies and Countermeasures
- Infrastructure Improvement Recommendations: Roadway/Multimodal, pedestrian and bicycle infrastructure, traffic calming, signage, and lighting improvement
- Strategies align with the Safe Systems Approach
- Implementation Timelines: Short-Term (1-3 years), Medium-Term (3-5 years), Long-Term (5+ years)

This Comprehensive Safety Action Plan (CSAP) establishes a framework for reducing fatal and serious injury crashes through data-driven strategies, proven countermeasures, and coordinated actions. It outlines systemwide priorities, funding opportunities, and accountability measures to ensure progress. Together, these actions provide a roadmap for implementing the Safe System Approach and advancing safety across the Cherokee Nation

7.1 Adopt the High Injury Network (HIN)

This plan formally adopts the High Injury Network (HIN), detailed in **Chapter 3,** as the basis for identifying the highway and pedestrian safety needs of the Cherokee Nation. This network is pivotal as it forms the foundation upon which all subsequent safety initiatives and projects will be based. By focusing on corridors and intersections in this network, Cherokee Nation can ensure that safety resources are allocated where they will have the greatest impact. Ultimately, the HIN will aid the Cherokee Nation in coordinating investments and tracking progress toward reducing fatalities and serious injuries.

7.2 Goals for Improvement

The Cherokee Nation CSAP aims to lower the number of fatal and serious injury crashes by 10 percent by 2030, 25 percent by 2035, and 34 percent by 2045. This target will be addressed through FHWA's Safety System approach, which includes but is not limited to the following key areas:

- speed management
- distracted and impaired driving
- pedestrian and bicycle safety
- proper lighting and signage
- adequate line of sight
- roadway departure
- intersection safety
- emergency response

These measures are intended to improve road safety, user safety, speed control, and post-crash care.

Progress toward these reduction goals will be monitored, tracked, and publicly reported to ensure transparency for all communities within Cherokee Nation.

7.3 Proven Safety Countermeasures

Cherokee Nation is committed to enhancing road safety by implementing the following proven countermeasures and strategies recommended by the Federal Highway Administration (FHWA) as well as other common best practices. As part of this planning process, a comprehensive safety analysis was conducted to identify areas for improvement using data-driven insights. These recommendations align with the FHWA's Safe System Approach, ensuring a proactive stance on safety enhancements across the reservation. By adopting these best practices, Cherokee Nation aims to create a more systematic approach to safety that prioritizes the wellbeing of all road users.

Table 5 - Systemwide Safety Improvements and Mitigation Strategies

Systemwide Safety Improvement Category	Safety Improvement / Mitigation Strategy
Safer Roads: Intersections	Install or improve traffic control devices: signal heads, stop signs, overhead signs, flashing beacons.
	Ensure uniform placement of traffic signals; install redundant heads for visibility.
	Add or upgrade pedestrian crosswalks with signals, push buttons, and detection systems.
	Install “RIGHT LANE MUST TURN RIGHT” signs at designated lanes.
	Improve pavement striping and retro reflectivity for night visibility.
	Install Crossroad / Intersection Advance Warning signs with advisory speed panels.
	Enhance lighting at wide rural intersections.
	Remove line-of-sight obstructions around signals and crosswalks.
	Optimize signal timing, including adaptive signal control.
	Add dedicated left and right turn lanes.
Safer Roads: Roadway Departure	Widen paved shoulders and install rumble strips and safety edges.
	Install cable median and roadside barriers where needed.
	Refurbish and maintain pavement markings, including edge lines.
	Reduce ditch angles and improve roadside terrain.
	Resurface poor-condition roads and upgrade bridges.
	Reduce angled turning
Safer Roads: Poor Signage	Conduct a full inventory of signs and install missing regulatory and warning signs (curve, speed advisory, school bus warning, no passing, etc.).
	Standardize and improve sign visibility and mounting height.
Safer Roads: Poor Line of Sight	Re-align roadways and crosswalks to improve sight distance.
	Clear vegetation and other visual obstructions near signals and pedestrian crossings.
	Improve visibility of signal heads and crosswalks.
Safer Roads: Pedestrian/Bike Safety	Improve pedestrian crossings and install high-visibility crosswalks.
	Provide safe walking infrastructure, including paths and lighting.
	Add dedicated bicycle lanes or separate bike paths.
	Enhance school bus stop delineation for better visibility.

Safer People: Pedestrian/Bike Safety	Conduct community education programs on pedestrian and bike safety.
	Establish school drop-off safety programs and Safe Routes to School initiatives.
	Collaborate with transit providers to improve service coverage and safety.
	Launch public education campaigns targeting unsafe walking, cycling, and driver awareness.
Safer People: High-Risk Driving Behaviors	Run public education campaigns on aggressive and inattentive driving.
	Enhance driver education, especially targeting risky maneuvers like failure to yield and unsafe turns.
Safer People: Distracted Driving & Speeding	Launch awareness campaigns focused on dangers of texting while driving and speeding.
	Organize pop-up events and community outreach on distracted driving.
Safer People: Drug-Impaired Driving	Provide law enforcement training for impaired driving detection.
	Implement high-visibility enforcement like sobriety checkpoints and saturation patrols.
Safer People: Occupant Safety	Promote seatbelt and child seat use through high-visibility enforcement campaigns.
Safer Speeds	Conduct speed zone studies and install or reset speed limit signs.
	Install advisory speed signs at curves and critical locations.
	Deploy speed safety cameras and speed trailers to monitor and deter speeding.
	Implement enforcement and traffic calming measures to reduce excessive speed.
	Install speed monitoring devices for real-time feedback to drivers.
Post Crash Care	Develop and implement Traffic Incident Management (TIM) plans in collaboration with stakeholders.
	Establish MOUs with neighboring jurisdictions for coordinated emergency response.
	Enhance EMS and emergency response through improved interagency communication.
	Develop structured emergency operations plans with local authorities and first responders.
	Add capacity and reduce emergency response times with staff and ambulatory vehicles

Identified safety concerns, recommended countermeasures, and nationally identified Crash Modification Factors (CMFs) to support a data-driven approach to prioritizing and implementing safety improvement projects are summarized in **Appendix F**. This Appendix also organizes strategies and recommended countermeasures into short-term (1–3 years), medium-term (3–5 years), and long-term (5+ years) timeframes, following the principles of the Safe System Approach.

7.4 Funding Sources

Securing adequate funding is crucial for the successful implementation of safety projects. Here are several strategies to consider:

- Seek and secure all available federal, state, and local sources of funding for safety improvements such as:

- Apply for SS4A Supplemental Planning, Demonstration, and Implementation Grants. This program will make funds available through 2026
- Apply for Tribal Transportation Program Safety Funding
- Apply for safety funds administered by ODOT, for example:
  - Transportation Alternatives Program (TAP)
  - Safe Routes to School (SRTS)
  - Municipal Road Drilling Activity Funds
  - Other ODOT programs https://oklahoma.gov/odot/programs-and-projects.html
- Consider other federal grant opportunities including grants that could leverage and complement SS4A implementation projects with co-benefits such as workforce development access, hazard prevention, air quality, flood mitigation, infrastructure investment, resilience, and rural access. For example:
  - **Reconnecting Communities Pilot (RCP) Grant Program (https://www.transportation.gov/reconnecting)
  - Better Utilizing Investments to Leverage Development Program (BUILD) Better Utilizing Investments to Leverage Development (BUILD) Grant Program | US Department of Transportation
  - **PROTECT (Promoting Resilient Operations for Transformative, Efficient, and Cost-saving Transportation Program (PROTECT) | US Department of Transportation) offers two types of awards: planning grants and Competitive Resilience Improvement Grants.

Note 1: *All grant timelines and funding availability referenced are based on past cycles and current projections. While these programs are expected to reopen for FY2026, final dates and requirements may change. It is recommended to confirm the most up-to-date information from official sources at the time of application.*

Note 2: *** Temporarily "On Hold"*

7.5 Other Recommended Improvement Strategies

It is recommended to enhance crash data quality by encouraging the use of the National Highway Traffic Safety Administrations Model Minimum Uniform Crash Criteria (MMUCC) to standardize crash reports across tribal, state, and federal agencies. The MMUCC is a voluntary guideline that represents a minimum, standardized set of data variables to describe motor vehicle traffic crashes, which could be used to identify traffic safety problems and design countermeasures to improve traffic safety nationally and in each state.

Other strategies include:

- Invite ODOT to improve and add shoulders to rural two-lane highways.
- Encourage ODOT to address highway safety concerns on the state and federal highway system (major state collectors and above).
- Focus Cherokee Nation safety improvement funding on rural local roads and collectors including adjacent highway intersections or pedestrian access points.
- Partner with other agencies to cooperatively fund transportation safety projects in areas of specific Cherokee interests (all roadways, intersections, and pedestrian access points).
- Implement Safe Routes to School in all local school districts. This process focuses on creating a safe, convenient, and fun environment for all students by addressing traffic safety issues like traffic congestion, pedestrian safety, and infrastructure improvements.
- Conduct Road Safety Audits to continue to find ways to reduce fatal and injury crashes. They seek to use an independent, multidisciplinary team to identify road safety issues and opportunities for all users. This can also be integrated into the project development process.
- Review processes and procedures on how transportation safety projects are currently being evaluated after implementation and how that information is used. Develop a policy to guide what metrics projects should be evaluated by, based on the type and scale of the project.
- Consider synergy with other projects, leveraging opportunities to gain efficiencies and economies of scale by combining improvements.
- Bundling countermeasures by combining two or more safety countermeasures (e.g., implementing multiple improvements within a corridor as a single project) to increase efficiency and minimize construction-related impacts on the public.
- Systemwide or area-wide implementation by applying similar or identical countermeasures across multiple locations (e.g., pedestrian safety improvements at several sites within the same area) and combining them into a single project for greater efficiency.
- Coordination with other agencies and organizations to review highway safety plans, on a routine basis, to ensure consistent performance and accountability throughout Cherokee Nation.

7.6 Progress and Transparency

Transparency and regular reporting ensure accountability and community engagement. Consider these measures:

- Dedicate space to transportation safety on the CNDOT website.
- Provide the ability for the public to provide input.
- Disseminate training and safety brochures to schools and community centers.

8. Implementation Strategies

Chapter 8 Highlights:

- Develop evaluation criteria and Measures of Effectiveness (MOEs) to guide in the selection of projects
- Integrate safety into capital projects, field practices, and construction management
- Conduct regular road safety audits
- Conduct safety review of construction and maintenance operations
- Maintain emergency preparedness through updated plans, drills, and supplies
- Track safety performance, gather feedback, adopt new tech, and revise protocols
- Develop outreach materials and engage cities, counties, schools, and businesses
- Collaborate on initiatives with co-benefits like public health and workforce development
- Apply for SS4A, FHWA, FEMA, and other federal grants to fund implementing safety countermeasures
- Monitor and evaluate safety project impacts using crash data and performance measures
- Share progress transparently online with data dashboards, public input, and educational materials

8.1 Project Selection Criteria

An overarching strategy should be the integration of safety into all aspects of Cherokee Nation's business practices. Each subsection delineates specific guidelines, procedures, and strategies. Success factors have been identified and are considered essential to ensuring adequate leadership and oversight, progress, and transparency in the implementation of the plan towards making it a reality. This chapter describes several actions and initiatives to be considered and aimed at addressing the issues and priorities identified in this plan and creating a framework for accountability and measurement of progress.

Formation of an oversight committee | Integration of safety into all business practices | Advocacy and collaboration | Funding sources | Data and performance measures | Transparency and reporting

This chapter presents systemwide strategies and recommendations to improve transportation safety. It is anticipated that specific projects will be developed and implemented based on these strategies. To guide decisions on project selection and prioritization, Cherokee Nation should apply relevant criteria. Examples of such criteria, along with supporting Measures of Effectiveness (MOEs), are proposed in **Table 6**.

Table 6 - Examples of Prioritization Criteria and MOEs

Criteria	MOE
#1. Safety	• Crash Rate (CR)
	• Number of Total Crashes (NTC)
	• Crash Reoccurrence (CR)
	• High Severity Crash Rate (HSCR)
	• Crash Type Based on Severity (CTS)
#2. Demographics	• Areas of Persistent Poverty (APP)
	• Urban-Rural Classification (URC)
	• AIAN Population (AIANP)
	• Vehicle Ownership (VO)
#3. Community Engagement	• Public/Stakeholder Input (PSI)
#4. Proximity	• Proximity to Cherokee Nation Buildings, Casinos, Schools, or Railroad Crossings (PBCSR)
#5. Vulnerable Users	• Pedestrian Crash Rate (PCR)
	• Bicycle Crash Rate (BCR)
#6. Roadway Inventory	• CN Inventory (WCI)
#7. Synergy with other projects	• Addressed by other Projects
#8. Functional Classification	• Urban and Rural Functional Classification Systems
#9. Other Agency Contributions	• State, County, Municipal, or other agency matching funds.

8.2 Form an Oversight Committee

To track the progress of the Safety Action Plan it is recommended that an oversight committee should be formed. This committee should meet annually or otherwise determined by the committee, with the goal of ensuring progress in the implementation of all aspects of the plan and updating the plan at appropriate intervals. Membership in the oversight committee should consist of key stakeholders such as relevant

CNDOT staff, law enforcement, and ODOT. Residents or key businesses representatives may be selected as committee members or collaborators.

8.3 Integration of Safety into All Business Practices

This section outlines the fundamental measures and procedures designed to integrate safety comprehensively into all business practices.

- Require construction projects to address safety within project limits when feasible
    - Develop guidelines and criteria
- Develop and implement safety procedures and requirements for CNDOT field staff
- Consider setting aside annual funds to implement Safety Action Plan countermeasures
- Prioritize work zone safety in construction management and construction traffic control processes

8.3.1 Safety Training and Education

Effective safety culture and training is critical for reducing risks and ensuring that all staff are knowledgeable about safety protocols. This section highlights the importance of training and lists key initiatives.

- Provide regular safety training for all employees
- Implement specialized training for high-risk areas
- Develop a certification program for safety compliance
- Collaborate with law enforcement and schools to educate students about transportation safety
- Prepare and distribute pamphlets and brochures focused on safety
- Ensure all new hires receive comprehensive safety orientation

8.3.2 Safety Audits and Inspections

Conducting regular safety audits and inspections would help to identify potential hazards and ensure continuous improvement. This section outlines possible procedures for audits and inspections.

- Develop a schedule for regular road safety audits guided by crash data or reported unsafe roadway of operational conditions
- Establish criteria for safety inspections of field operation and construction zones
- Document and address all findings from audits and inspections
- Implement corrective actions promptly

8.3.3 Emergency Preparedness

Preparing for emergencies is vital for minimizing the impact of crashes or hazardous weather or other conditions. This section details the emergency preparedness plans and initiatives to ensure readiness.

- Create and update emergency response plans
- Conduct regular emergency drills with response agencies
- Develop a communication plan for emergencies
- Ensure availability of emergency equipment and supplies

8.3.4 Continuous Improvement

Continuous improvement in safety practices is crucial for evolving and adapting to new challenges. This section emphasizes the importance of ongoing evaluation and enhancement of safety measures.

- Establish a system for tracking safety performance
- Encourage feedback from employees on safety practices
- Implement new technologies to enhance safety
- Review and revise safety protocols regularly

8.4 Advocacy and Collaboration

The following steps outline how to effectively advocate and collaborate:

- Develop informational and educational material with focus on transportation safety
- Engage cities and counties as partnering agencies to promote safety, for example CNDOT could serve in an advisory role for City of Tulsa stakeholder efforts such as transportation and health-related task forces
- Develop partnerships that advance co-benefits such as workforce development, public health and safety so efforts are cost-effective and integrate related efforts
- Seek endorsement and partnership from cities and counties in support of implementing plan recommendations
- Engage schools, businesses and public transportation providers

8.5 Data and Performance Measures

Collecting and analyzing data is vital for tracking progress and identifying areas for improvement. The following steps can help establish effective data and performance measures:

- Establish a list of projects addressing identified safety issues

- Compile and report information about projects in design or construction addressing safety
- Conduct before-after studies to document the benefits of implemented projects
- In collaboration with ODOT, compile crash statistics and comparison tables to document progress in reducing fatal and serious injury crashes

Appendix A

Supplementary Data on the Cherokee Nation Overview

A.1 Key Landmarks and Traffic Generators

Figure 1 highlights key landmarks and traffic generators within the Cherokee Creek Nation, including 11 casinos and over 349 public schools.

Casinos are key landmarks, serving as economic and social hubs that generate revenue for local communities. As popular destinations for visitors, they are critical points of focus in a road safety plan. Ensuring safe access to and from these locations is essential to reducing accident risks and enhancing transportation safety. The Nation is home to more than 349 **public schools**, including elementary, middle, and high schools. These schools have high-traffic areas, especially during school hours. Strengthening road safety measures near schools is important to create a secure environment for children, minimizing risks associated with pedestrian and vehicular interactions.

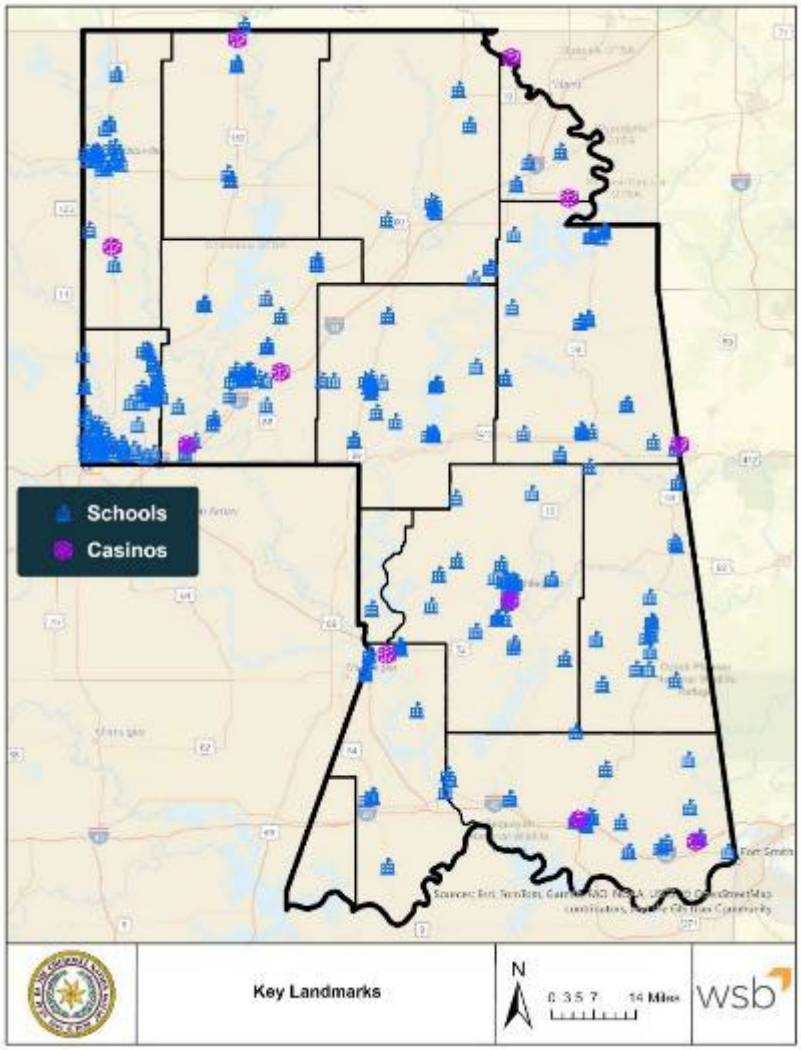


Figure 1 - Key Landmarks and Traffic Generators within Cherokee Creek Nation

A.2 Additional Data on Roadway Network Analysis

A.2.1 Geographic Distribution of Annual Average Daily Traffic (AADT) Classifications

Figure 2 displays the spatial distribution of roadways within the Cherokee Creek Nation based on the AADT classification described in Section 2.2. It visually represents areas of low, medium, and high traffic volume, as determined by the Jenks Natural Breaks algorithm.

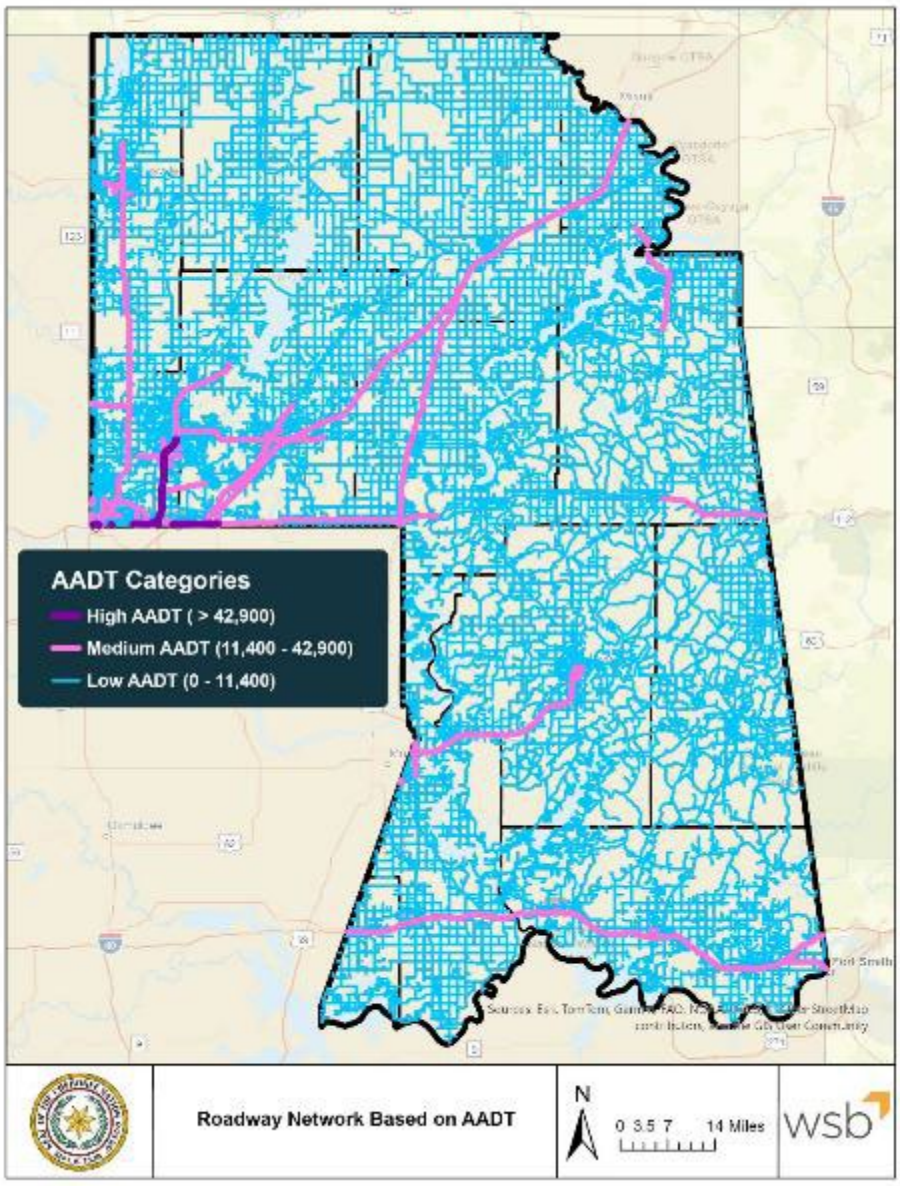


Figure 2 - Geographic Distribution of Roadways Based on AADT Thresholds

A.2.2 Shoulder Width Analysis

Shoulders play a critical role in roadway safety by providing space for emergency stops, accommodating non-motorized users, and improving overall traffic operations. The American Association of Highway and Transportation Officials (AASHTO) Green Book establishes specific shoulder width thresholds for different roadway types. **Table 1** presents these thresholds as defined by AASHTO.

Table 1: Shoulder Width Thresholds by Roadway Type

Roadway Type	Inadequate Shoulder Width	Adequate Shoulder Width	More than Adequate Shoulder Width
High-Speed, High-Volume Roads (e.g., Interstate, Principal Arterial)	< 10 ft	10–12 ft	> 12 ft
Secondary Arterials & Major Collectors	< 6 ft	6–8 ft	> 8 ft
Secondary Collectors & Low-Volume Highways (Local)	< 2 ft	2–6 ft	> 6 ft

Table 2 presents the distribution of roadway mileage based on shoulder width adequacy across different road types in Cherokee Creek Nation:

- **Secondary Collector and Local Roads** – The majority (81.2%) have inadequate shoulder width.
- **Secondary Arterials & Major Collectors** – A significant portion (88.2%) have inadequate shoulders, but some (4.2%) exceed the required width.
- **High-Speed, High-Volume Roads (Interstate and Principal Arterials)** – While 38.3% have inadequate shoulders, the majority (61.7%) meet or exceed the required width.

Figure 3, Figure 4, and **Figure 5** show the three categories of shoulder width adequacy for each roadway type, visually illustrating the distribution of shoulder conditions across the Cherokee Creek Nation Road network.

Table 2: Distribution of Roadway Types by Shoulder Condition in MCN

Road Type	Shoulder Width		
	Mileage with Adequate Width (Mile)	Mileage with Inadequate Width (Mile)	Mileage with More than Adequate Width (Mile)
	Number (%)		
Secondary Collector and Local Roads	1,804.51 (74.3%)	8,044.96 (72.6%)	60.14 (31.2%)
Secondary Arterials & Major Collectors	233.65 (9.6%)	2,794.05 (25.2%)	132.22 (68.7%)
High-Speed, High-Volume Roads (Interstate and Principal Arterial)	390.96 (16.1%)	243.26 (2.2%)	0.10 (0.1%)
Total	**2,429.12 (100%)**	**11,082.27 (100%)**	**192.46 (100%)**

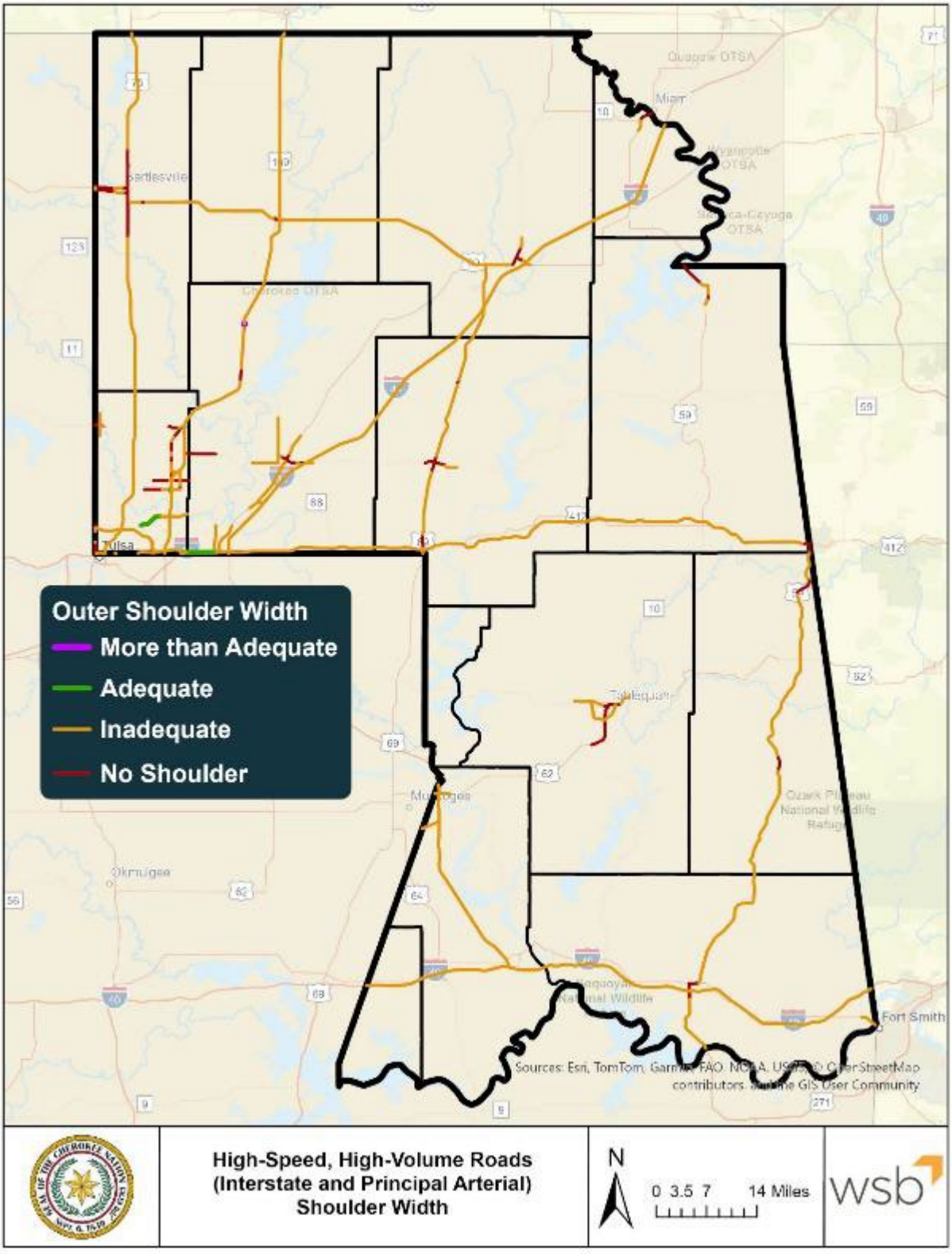


Figure 3 - Interstate and Principal Arterial Roads Shoulder Width

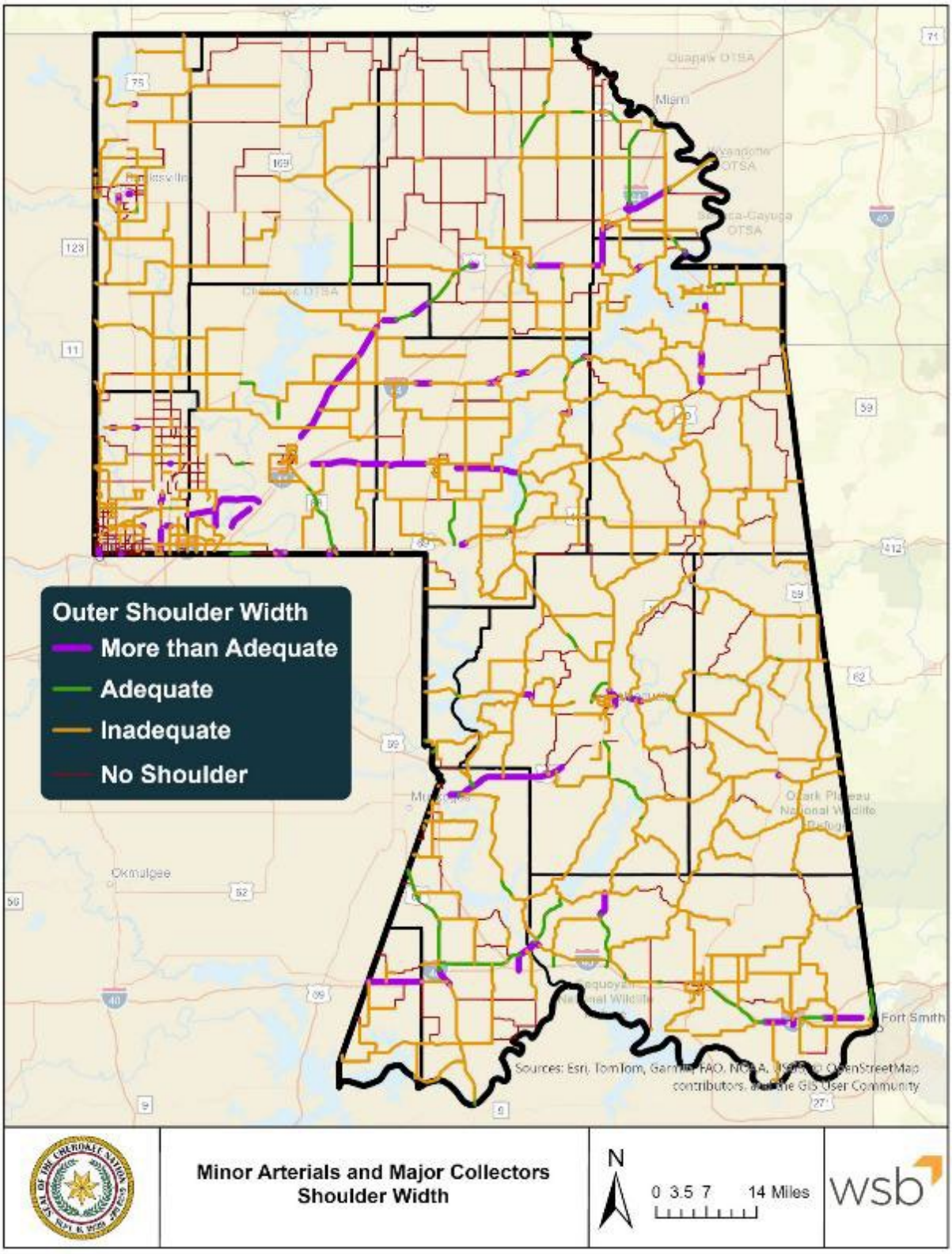


Figure 4 - Secondary Arterial and Major Collector Roads Shoulder Width

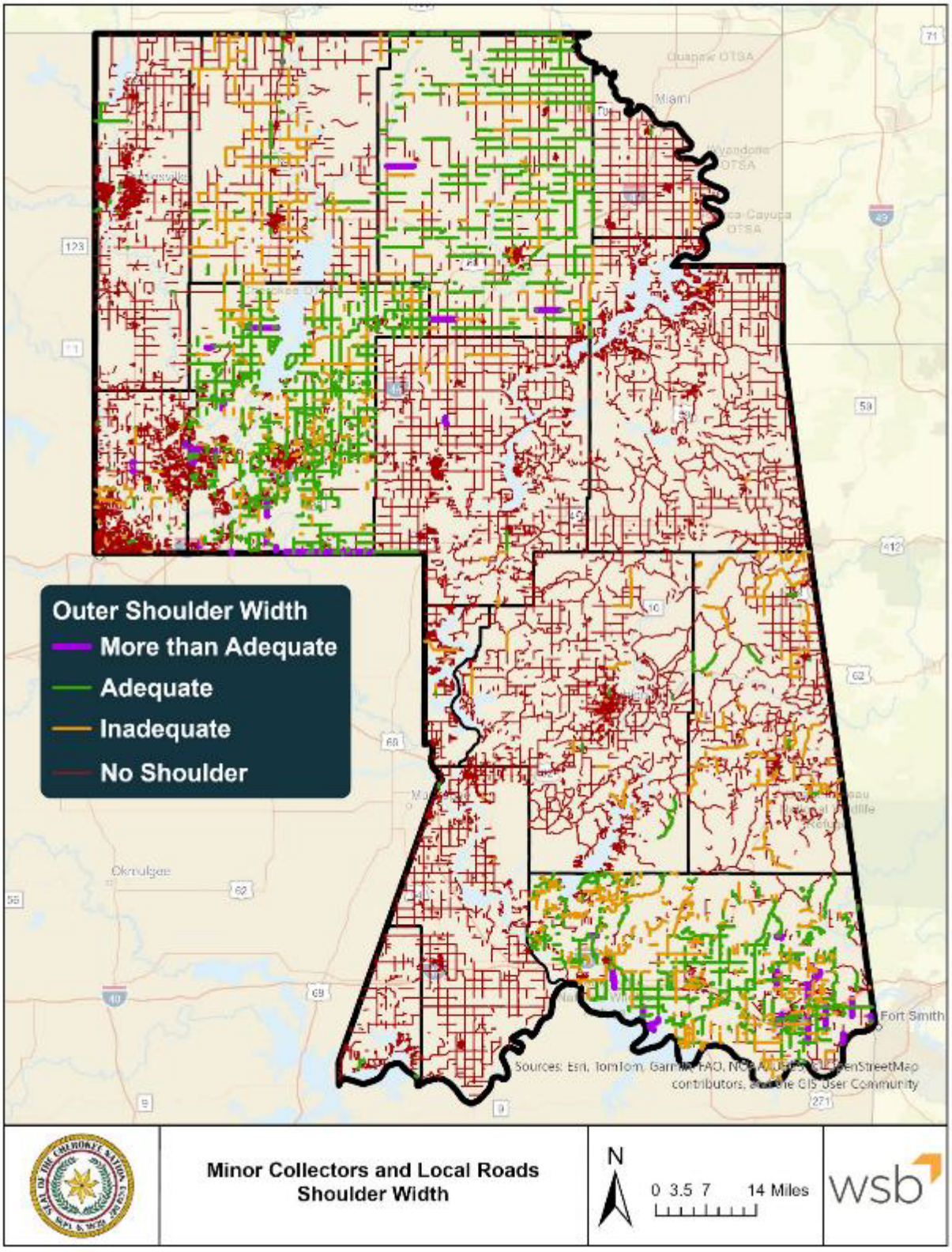


Figure 5 - Secondary Collector and Local Roads Shoulder Width

Appendix B

Supplementary Data on Safety Analysis

B.1 Data Filtering and Integration Process

The data used in this study consists of a 5-year historical crash dataset from January 1, 2017, to December 31, 2021. This data was requested and collected from the Oklahoma Department of Transportation (ODOT) Collision Data Request Portal on September 30th, 2024. The raw dataset contained **101,509 records**, each representing an individual involved in a crash, such as a driver, passenger, or pedestrian, rather than a unique crash event. After filtering, the dataset was narrowed down to 33,936 unique crashes. Incomplete data was addressed by removing 17 crashes that lacked severity information, and 3,853 crashes with incorrect or missing latitude or longitude values were also eliminated, leaving 30,066 crash records.

ODOT provides a valuable dataset for vehicle crashes; however, its coverage of pedestrian and bicycle crashes is limited, containing only 339 records involving pedestrians or cyclists. In contrast, the Oklahoma Highway Safety Office (OHSO) dataset reports a higher number of pedestrian and bicycle crashes, totaling 500, and includes additional details such as age, sex, injury type, and the conditions of both the driver and pedestrian. While ODOT categorizes pedestrian crashes as one of many crash types, OHSO reports them separately with more detailed attributes. A quality control process was conducted by overlaying ODOT data onto OHSO data, confirming that OHSO comprehensively covers the pedestrian and bicycle crash records found in ODOT, making the ODOT data redundant. To prevent double-counting, pedestrian and bicycle crashes were removed from the ODOT dataset, and the OHSO dataset from 2017 to 2021 was used for pedestrian crash analysis, while ODOT data was used for vehicle crash analysis.

After integrating the OHSO dataset and removing duplicate pedestrian and bicycle crashes from the ODOT dataset, the final dataset for analysis includes 29,727 unique vehicle crashes from ODOT and 500 pedestrian and bicycle crashes from OHSO, resulting in a total of **30,227 unique crashes** for analysis.

B.2 Crashes by Demographic Patterns, Area Type, and Region – Additional Information

B.2.1 Crashes by Demographic Patterns

Between 2017 and 2021, older drivers (age 65 and above) were involved in 19.49% of total crashes in the Cherokee Nation and 23.79% of fatal crashes, indicating a slightly higher fatality rate relative to their overall crash involvement. Their crash numbers dropped significantly in 2020, likely due to reduced driving during COVID-19, but remained fairly consistent in other years. Teenage drivers accounted for a higher percentage of total crashes (27.03%) but a lower percentage of fatal crashes (17.84%), suggesting that while they are more frequently involved in crashes, these incidents tend to be less severe.

Table 1 provides a breakdown of total crashes and fatal crashes involving older and teenage drivers from 2017 to 2021, including the percentage of these crashes relative to the total crashes and fatal crashes across all years. **Figure 1** shows the percentage of crashes involving male and female drivers from 2017 to 2021, relative to the total crashes and fatal crashes across all years.

Table 1 - Crash Involvement by Age Group (2017-2021) – Entire CN

Year	Older Drivers				Teenage Drivers			
	Total Crashes		Fatal Crashes		Total Crashes		Fatal Crashes	
	Number of Crashes involving Older Drivers	% of Total Crashes	Number of Crashes involving Older Drivers	% of Total Fatal Crashes	Number of Crashes Involving Teenage Drivers	% of Total Crashes	Number of Crashes Involving Teenage Drivers	% of Total Fatal Crashes
2017	**1,360**	**20.52%**	**19**	**23.17%**	**1,892**	**28.54%**	**15**	**18.29%**
2018	**1,198**	**19.16%**	**26**	**30.95%**	**1,732**	**27.70%**	**11**	**13.10%**
2019	**1,275**	**20.50%**	**17**	**22.97%**	**1,652**	**26.56%**	**14**	**18.92%**
2020	**1,008**	**18.66%**	**20**	**21.28%**	**1,418**	**26.25%**	**23**	**24.47%**
2021	**1,049**	**18.33%**	**26**	**21.67%**	**1,476**	**25.79%**	**18**	**15.00%**
Total	**5,890**	**19.49%**	**108**	**23.79%**	**8,170**	**27.03%**	**81**	**17.84%**

B.2.2 Crashes in Rural Vs. Urban Areas

The Cherokee Nation consists mainly of rural areas, with limited urban sections. Since the characteristics and crash patterns of urban and rural areas differ, this section focuses on analyzing these variations within the crash data.

- Urban Areas: The urban areas (Tulsa City) comprise 12.51% of the population but cover only 0.75% of the total area within the Cherokee Nation.
- Rural Areas: Rural areas encompass total population of 87.49% in the 99.25% of the total area.

Figure 1 compares the total number of crashes and the percentages of fatal, injury, and property damage-only crashes in urban and rural areas across the entire Cherokee Nation, highlighting the differences in crash rates between these areas.

The fatality rate is notably higher in rural areas (1.66%) compared to urban areas (0.83%), suggesting that crashes in rural regions tend to be more severe, potentially due to higher speeds, longer emergency response times, and less frequent traffic law enforcement. On the other hand, the injury rate is higher in urban areas (42.71%) than in rural areas (37.12%), likely due to the higher volume of crashes in urban environments. Additionally, rural areas have a slightly higher property damage rate (61.22%) compared to urban areas (56.46%).

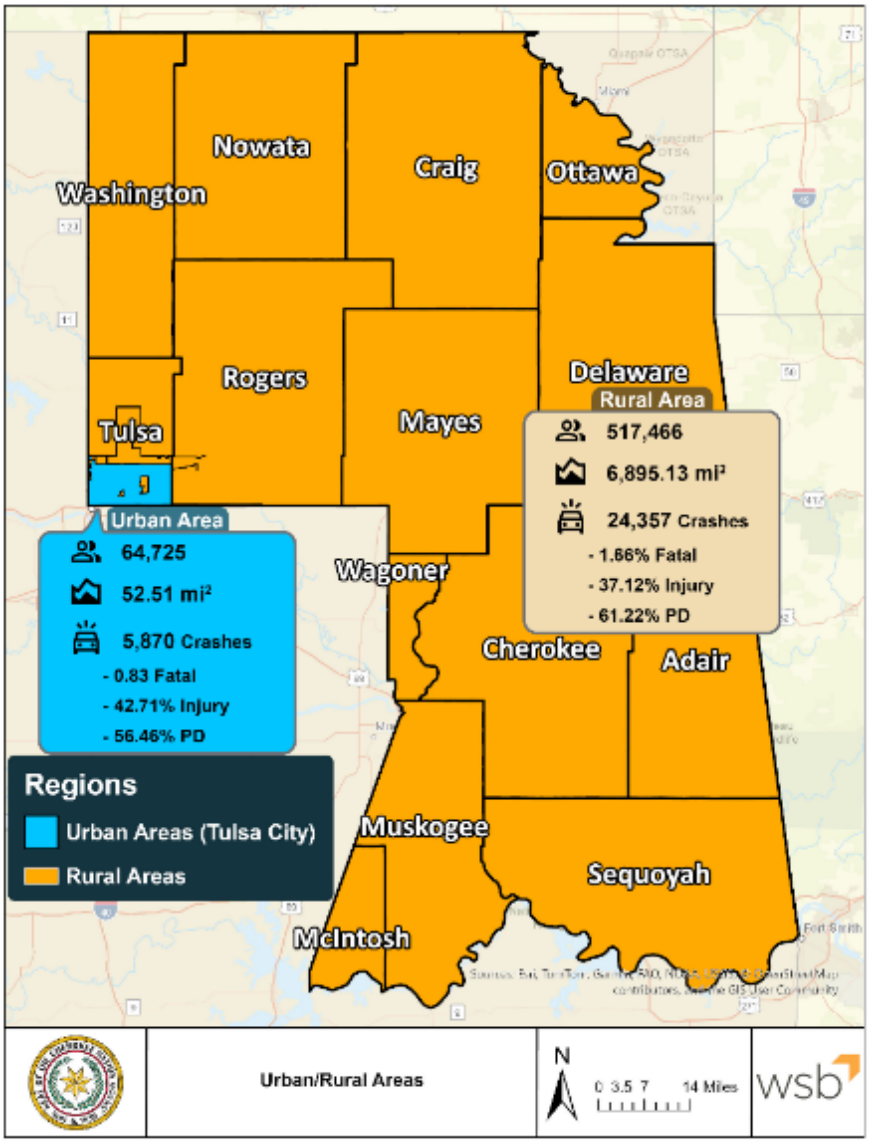


Figure 1: Urban/Rural Areas in Cherokee Nation

B.2.3 Crashes by Region

For this analysis, the Cherokee Nation was divided into three regions, and crash analysis was conducted to identify unique crash patterns for each region. **Figure 2** shows the different regions and displays the population and total area (mi²) for each region. The regions are as follows:

- Northern Region: Washington, Nowata, Craig, Ottawa, Rogers, Mayes, Delaware, and portions of Tulsa County.
- Southern Region: Adair, Cherokee, Sequoyah, Muskogee, McIntosh, and Wagoner County.
- Urban Area: Tulsa City.

Table 2 presents the total number of crashes, categorized by severity level, for each region. As shown in the table, the **northern region** has the highest number of crashes across all severity levels, which aligns with its larger population and geographic coverage. In contrast, the **urban (Tulsa city)** region has the lowest total number of crashes, consistent with its more concentrated urban layout and smaller area.

The overall trend shows that while severity distribution varies, the **northern region** accounts for the majority of fatal (56%), incapacitating (56%), non-incapacitating (61%), possible injury (55%), and property damage-only (56%) crashes. This indicates a consistent dominance across all crash types.

The **southern region** follows with 33% of fatal crashes and lower shares in the other severity categories—highlighting a relatively lower crash volume compared to the Northern Region, but still notable fatal and incapacitating crash counts.

The **urban (Tulsa City)** region, although accounting for a smaller share of total crashes, shows a proportionally higher percentage of **possible injury** (24%) and **non-incapacitating injury** (21%) crashes, suggesting that crashes in the urban area are more likely to involve less severe injuries than in other regions.

Crash types vary across different regions of the Cherokee Nation, shaped by the rural–urban characteristics of each area. **Figure 3** illustrates the six most common crash types in each region.

The **Tulsa urban area**, representing a more urbanized setting, has the highest percentage of **rear-end** (24.14%) and **angle-turning** (21.81%) crashes, reflecting conditions like traffic congestion, frequent stops, and numerous intersections. **sideswipe-same** and **right-angle** crashes are also common, suggesting lane changes and signal-controlled intersections play a role.

In the **northern region**, **rear-end** (26.68%) and **fixed-object** (22.76%) crashes dominate, indicating a mix of congested corridors and higher-speed road segments. The region also shows notable shares of **angle-**

turning and **right-angle** crashes, consistent with higher intersection density.

In contrast, the **southern region** has a strikingly high share of **fixed-object** crashes (31.18%) and elevated **rollover** and **rear-end** crash rates. These patterns point to more rural, high-speed roadways with fewer roadside safety features and more severe crash outcomes.

These trends suggest that urban areas may benefit from improved intersection design and traffic flow management, while rural regions require enhanced roadside safety infrastructure and speed control interventions.

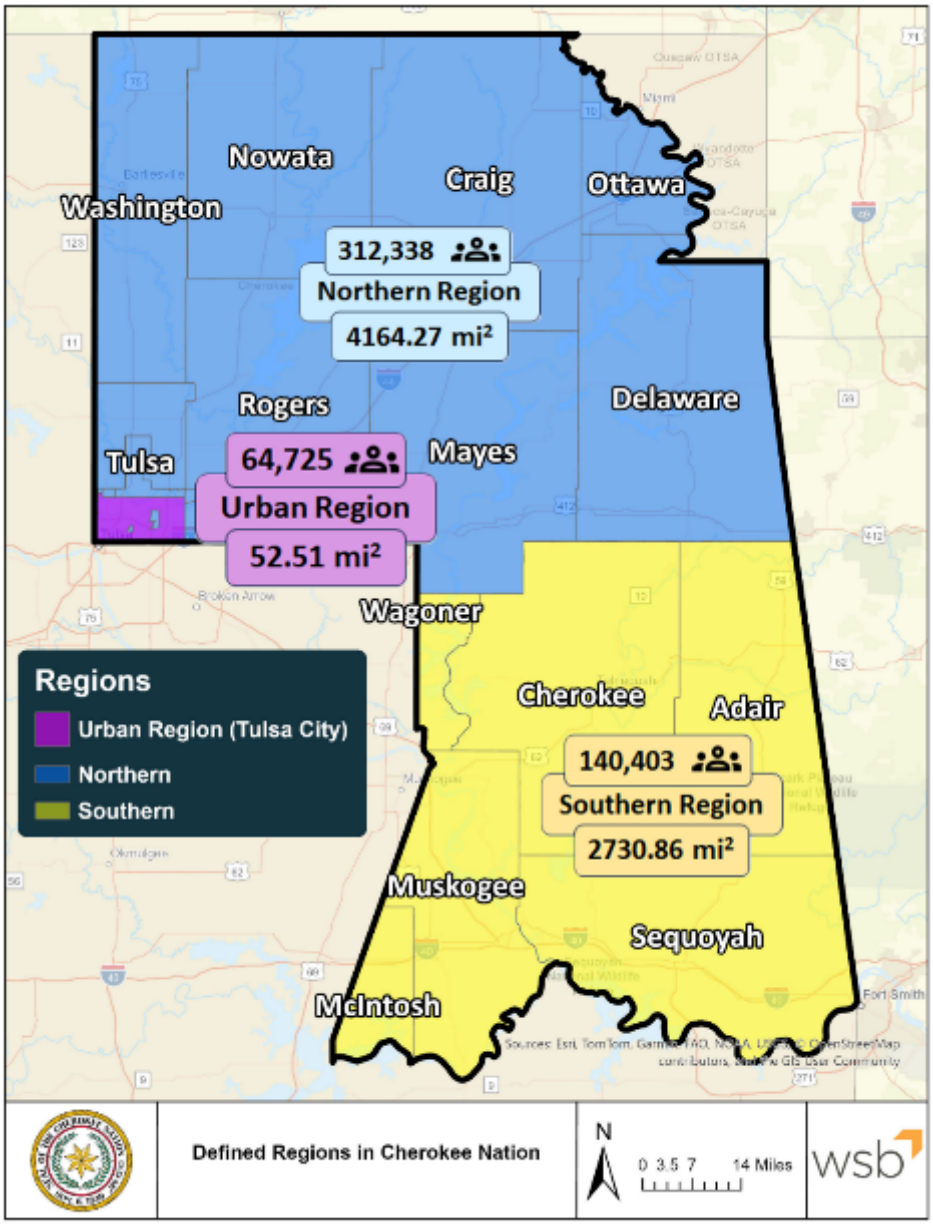


Figure 2 - Geographic Distribution of Cherokee Nation Regions

Table 2 - Total Crashes by Severity for each Region

Region	Severity Level				
	Fatal	Incapacitating Injury	Non-Incapacitating Injury	Possible Injury	Property Damage
Northern	254	707	2,808	3,116	10,237
	56%	56%	61%	55%	56%
Southern	151	356	856	1,200	4,672
	33%	28%	18%	21%	26%
Urban (Tulsa City)	49	200	981	1,326	3,314
	11%	16%	21%	24%	18%

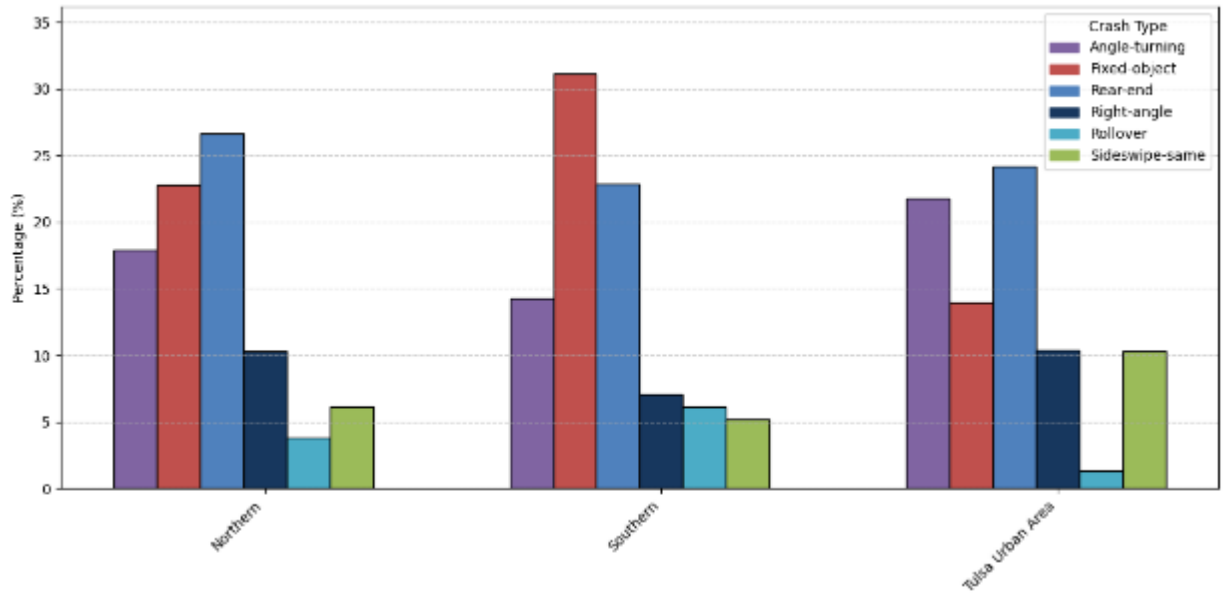


Figure 3 - Distribution of Common Crash Types Across Cherokee Nation Regions

B.3 County Level Crash Analysis

B.3.1 Crash Rates Normalized by Population

To account for population density and prevent bias from counties that rank higher solely due to their population size, the total and fatal crashes were normalized by population as well. **Table 3** presents the number of total and fatal crashes per 100,000 individuals, ordered from the highest to the lowest total crashes per 100,000 individuals. According to the table:

- Sequoyah County has the highest total crash rate at 7,313.18 per 100,000 individuals, followed closely by Ottawa County (7,067.52) and Craig County (6,957.87). Although Tulsa County has the highest number of total crashes (8,532), its crash rate is slightly lower at 6,715.04.
- Ottawa County also exhibits the highest fatal crash rate at 219.15, indicating a disproportionately high number of fatal crashes relative to its population.
- McIntosh County and Nowata County follow with fatal crash rates of 193.24 and 179.27, respectively, despite relatively low total crash volumes—suggesting that crashes in these counties are more likely to be fatal.
- Adair County and Mayes County also show elevated fatal crash rates, at 151.23 and 148.57, respectively.
- In contrast, Washington County has one of the lowest fatal crash rates (40.09), despite a moderate number of crashes overall, while Tulsa County maintains the lowest rate among high-population counties at 56.67, indicating relatively better crash outcomes per capita.

B.3.2 Crash Rates Normalized by Area

Similar to the normalization by population, the data has been normalized by area to account for the impact of larger geographic regions. **Table 4** presents the number of total and fatal crashes per unit area, ordered from the highest to the lowest total crashes per unit area. According to this table:

- **Tulsa County**, the most urbanized area, has by far the highest total crash density at **44.30 crashes per square mile** and the highest fatal crash rate at **0.37**, reflecting the concentration of traffic, intersections, and urban roadway activity.
- **Rogers County** ranks second in both total (**7.44**) and fatal (**0.11**) crash density, showing a relatively higher crash rate than surrounding rural counties.
- **Mayes County** has a moderate total crash density (**3.80**) but ties for the highest fatal crash rate per area (**0.09**, along with **Ottawa County**), indicating a higher concentration of severe crashes relative to land area.
- **Ottawa County** stands out with a lower total crash density (**2.90**) but a disproportionately high fatal

crash rate (**0.09**), highlighting the severity of crashes despite lower volume.

- **Muskogee**, **Cherokee**, and **Sequoyah Counties** show mid-range total crash rates between **2.05** and **4.06** crashes per square mile, with relatively low fatal crash rates (**0.05–0.07**).
- More rural counties like **Craig**, **Nowata**, and **McIntosh** have the lowest crash densities, with total crash rates under **1.30** and fatal crash rates under **0.05**, indicating more dispersed incidents over larger areas.

Table 3 - Normalized Total and Fatal Crashes per Population

County	Fatal Crashes	Total Crashes	Population	Total Crash Per 100,000 Individuals	Fatal Crash Per 100,000 Individuals
Tulsa	72	8,532	127,058	6,715.04	56.67
Rogers	72	4,948	90,585	5,462.27	79.48
Mayes	56	2,467	37,693	6,544.98	148.57
Cherokee	41	2,394	47,307	5,060.56	86.67
Sequoyah	36	2,883	39,422	7,313.18	91.32
Delaware	35	2,311	38,394	6,019.17	91.16
Muskogee	32	943	24,059	3,919.53	133.01
Adair	30	753	19,837	3,795.94	151.23
Washington	21	2,786	52,378	5,319.03	40.09
Nowata	17	443	9,483	4,671.52	179.27
Ottawa	16	516	7,301	7,067.52	219.15
Craig	13	986	14,171	6,957.87	91.74
Wagoner	7	122	6,673	1,828.26	104.90

McIntosh	**6**	**142**	**3,105**	**4,573.27**	**193.24**

Table 4 - Normalized Total and Fatal Crashes per Unit Area by County

County	Fatal Crashes	Total Crashes	Area (mile^2)	Total Crash Per Unit Area	Fatal Crash Per Unit Area
Tulsa	**72**	**8,532**	**192.6**	**44.30**	**0.37**
Rogers	**72**	**4,948**	**665.1**	**7.44**	**0.11**
Mayes	**56**	**2,467**	**649.8**	**3.80**	**0.09**
Cherokee	**41**	**2,394**	**776**	**3.09**	**0.05**
Sequoyah	**36**	**2,883**	**710.6**	**4.06**	**0.05**
Delaware	**35**	**2,311**	**763.6**	**3.03**	**0.05**
Muskogee	**32**	**943**	**460.5**	**2.05**	**0.07**
Adair	**30**	**753**	**577.2**	**1.30**	**0.05**
Washington	**21**	**2,786**	**424.2**	**6.57**	**0.05**
Nowata	**17**	**443**	**580.8**	**0.76**	**0.03**
Ottawa	**16**	**516**	**178**	**2.90**	**0.09**
Craig	**13**	**986**	**762.6**	**1.29**	**0.02**
Wagoner	**7**	**122**	**90.2**	**1.35**	**0.08**
McIntosh	**6**	**142**	**116.4**	**1.22**	**0.05**

B.3.3 Contributing Crash Causes Across Counties

Different counties within the Cherokee Nation experience varying contributing factors to crashes, with some factors being more prevalent than others in certain counties. **Figure 4** provides an overview of the key contributing crash causes across counties within the Cherokee Nation.

Poor lighting is the leading contributing factor in several counties, especially Wagoner, McIntosh, Nowata, Craig, Ottawa, and Mayes, indicating lighting infrastructure issues particularly in rural areas. Speeding is a major factor in McIntosh, Wagoner, Ottawa, and Craig, suggesting the presence of high-speed rural roadways and limited enforcement. Failure to yield is most prevalent in Washington and Tulsa, pointing to intersection-related crashes due to unclear right-of-way or poor signage. Alcohol or drug involvement is significant in Wagoner, Adair, Mayes, and Ottawa, emphasizing the need for stronger DUI enforcement, especially in rural areas. Poor weather contributes notably to crashes in McIntosh, Nowata, Muskogee, and Craig, likely due to road conditions or driver inexperience in inclement conditions. Urban areas like Tulsa and Muskogee show more intersection-related crashes (e.g., failed-to-yield, lane changes), while rural counties face higher risks from speed and poor lighting, highlighting the need for tailored safety interventions.

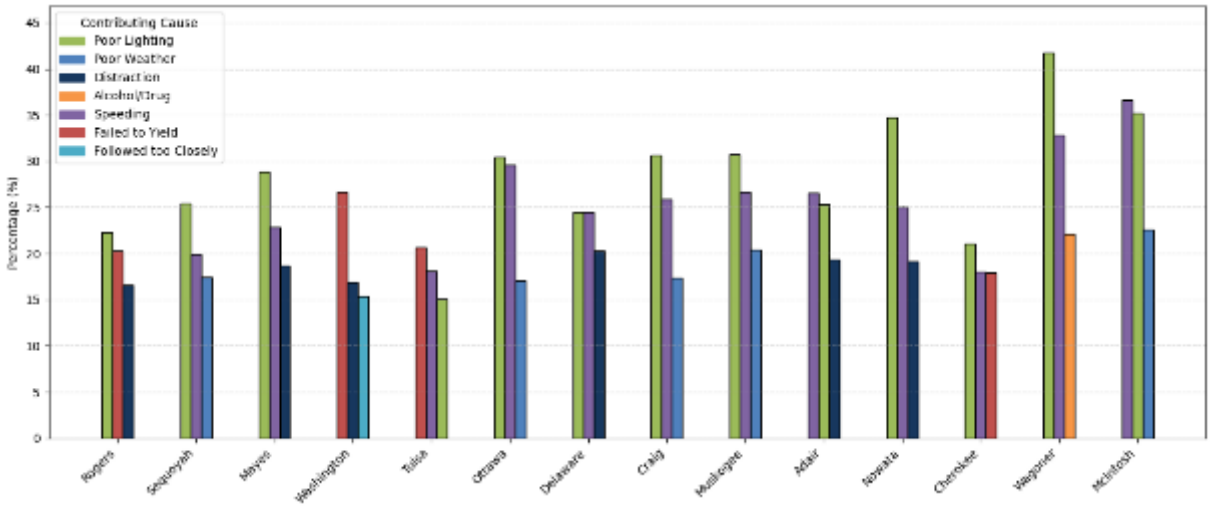


Figure 4: Top Three Contributing Crash Factors by County

Failed to Yield-Related Crashes:

Failure to yield remains one of the most significant contributing factors in crashes across the region. Washington County reports the highest proportion of failed-to-yield crashes (26.67%) and a high fatal crash share as well (23.81%), indicating a persistent issue with right-of-way violations. Tulsa (20.72%), Rogers (20.33%), and Cherokee (17.88%) counties also show substantial involvement of this factor in total crashes, though fatal crash proportions are lower in these areas. Counties like Mayes (15.89%), Adair (15.01%), and

Sequoyah (14.05%) have moderate rates of total failed-to-yield crashes, while Ottawa (18.75%) has one of the highest fatal crash proportions for this cause despite a lower overall rate (12.02%). In contrast, Muskogee (10.50%), McIntosh (7.75%), and Wagoner (6.56%) report the lowest total crash involvement from this factor, with no fatal crashes attributed to it in the latter two. These findings emphasize that while failure to yield is widespread, its fatal impact varies significantly by county, reinforcing the importance of improved signage, education, and intersection design.

Speed-Related Crashes:

Speeding remains a significant contributing factor in many counties. McIntosh County has the highest proportion of crashes related to speeding (36.62%), with 50% of its fatal crashes also involving speeding. Similarly, Adair County shows both a high overall speed-related crash rate (26.56%) and a high fatal involvement (50%), underscoring the severity of this factor in rural settings. Other counties with elevated speed-related crash rates include Wagoner (32.79%), Ottawa (29.65%), Muskogee (26.62%), and Craig (25.86%). Delaware and Mayes Counties each report nearly a quarter of crashes involving speeding, with Delaware having 40% and Mayes 25% of fatal crashes tied to this behavior. Despite recording the highest number of total crashes, Tulsa County has a lower rate of speed-related crashes (18.07%) and a moderate fatal crash percentage from speeding (15.28%), likely due to more regulated urban road conditions. Overall, these trends reinforce that speeding in rural areas is associated with a higher risk of fatal outcomes, highlighting the need for enhanced enforcement and speed management strategies.

Poor Lighting-Related Crashes:

Poor lighting remains one of the most prominent contributing factors in rural crash patterns. Wagoner County has the highest proportion of crashes occurring under poor lighting conditions (41.80%), followed closely by McIntosh (35.21%), Nowata (34.76%), Muskogee (30.75%), Craig (30.63%), and Ottawa (30.43%). These high rates point to inadequate nighttime visibility and insufficient roadway lighting infrastructure, especially in rural areas. Fatal crash involvement is also notable, with Wagoner (57.14%), McIntosh (50.00%), Nowata (47.06%), Craig (53.85%), and Washington (52.38%) reporting over half of their fatal crashes under poor lighting conditions. In contrast, Tulsa County shows a lower poor lighting crash rate (15.08%) and a lower fatal lighting-related share (31.94%), likely reflecting more developed urban lighting infrastructure.

Poor Weather-Related Crashes:

McIntosh County has the highest proportion of crashes related to poor weather conditions (22.54%), though none of these resulted in fatalities. Muskogee (20.36%), Nowata (18.96%), and Sequoyah (17.41%) also report high shares of weather-related crashes. In terms of fatal crashes, Nowata County has the highest proportion, with 17.65% of its fatal crashes linked to poor weather, followed by Adair (16.67%), Cherokee

(17.07%), and Delaware (11.43%). Mayes County, despite having a weather-related crash rate of 13.62%, shows a lower fatal involvement (8.93%). Wagoner County has a modest share of weather-related crashes (10.66%) but reported no weather-related fatalities. Tulsa County, which has the highest total number of crashes, reports a relatively low poor weather involvement rate (9.93%) and a fatal crash rate from this factor of just 5.56%, possibly reflecting better infrastructure, drainage, or road maintenance.

Distraction-Related Crashes:

Delaware County has the highest proportion of crashes attributed to inattention or distraction (20.34%), followed closely by Adair (19.39%), Nowata (19.19%), and Mayes (18.69%). In terms of fatal crashes, Sequoyah County stands out with 25.00% of its fatal crashes involving distraction, followed by Mayes (8.93%), Muskogee (9.38%), and Nowata (5.88%). Rogers County, while reporting a high number of distraction-related crashes overall (16.57%), had a lower fatal involvement rate (4.17%). Despite having the highest number of total crashes, Tulsa County has one of the lowest distraction-related crash rates (10.94%) and only 1.39% of its fatal crashes involved distraction, possibly due to better enforcement or roadway design. These findings suggest that while distraction is widespread across both urban and rural areas, its contribution to fatal crashes is particularly pronounced in certain rural counties.

Followed Too Closely Related Crashes:

Cherokee County has the highest proportion of crashes related to following too closely (16.71%), followed by Washington (15.36%), Sequoyah (8.12%), and Rogers (7.90%). Notably, Rogers County is the only county in the dataset with a fatal crash attributed to this factor, though it represents a small share of its fatal crashes (1.39%). Despite relatively high involvement in total crashes, Tulsa, Muskogee, Adair, and others reported no fatalities from crashes involving vehicles following too closely. This suggests that while this behavior is a common contributor to collisions, it rarely results in fatal outcomes—though continued monitoring and education remain important, particularly in high-density traffic areas.

Alcohol/Drug Intoxication-Related Crashes:

Fatal crashes due to alcohol or drug intoxication remain a serious concern across several counties. Wagoner County has the highest proportion, with 57.14% of its fatal crashes involving alcohol or drugs. Other counties with notably high fatal crash involvement include McIntosh (33.33%), Nowata (35.29%), Mayes (33.93%), and Delaware (40.00%). These rural counties show a disproportionate number of fatalities tied to impaired driving. Even in counties with lower fatality proportions—such as Tulsa (20.83%) and Muskogee (21.88%)—the absolute number of substance-related crashes remains substantial due to higher crash volumes. For example, Tulsa had 565 alcohol/drug-involved crashes, the highest total among all counties. This data emphasizes that while alcohol- and drug-related crashes are widespread, their fatal consequences are more severe in rural counties, highlighting the urgent need for targeted enforcement,

education campaigns, and prevention strategies.

B.3.4 Impact of Protective Devices on Fatalities Across different Counties:

Table 4 presents the number of unrestrained fatalities, total fatalities, and the unrestrained fatality rate for each county within the Cherokee Nation. The unrestrained fatality rate is calculated by dividing unrestrained fatalities by total fatalities.

As shown in the table, Craig County has the highest unrestrained fatality rate at 66.7%, followed closely by Adair (65.6%) and McIntosh (60.0%), indicating a strong association between the lack of seatbelt use and fatal outcomes in these areas. Rogers, Muskogee, and Cherokee Counties each report that 50% or more of their fatal crashes involved unrestrained individuals. Despite having the highest number of total fatalities, Tulsa County reports a lower unrestrained fatality rate of 44.2%, suggesting better seatbelt usage in more urbanized environments. This data underscores the need for enhanced enforcement and public education campaigns on restraint use, particularly in counties with higher unrestrained fatality rates.

Table 5 - Unrestrained Fatalities and Fatality Rates by County

County	Unrestrained Fatalities	All Fatalities	Unrestrained Fatality Rate
Craig	8	12	66.7
Adair	21	32	65.6
McIntosh	3	5	60
Rogers	35	68	51.5
Muskogee	16	32	50
Cherokee	22	44	50
Delaware	17	35	48.6
Tulsa	23	52	44.2
Mayes	25	58	43.1

Ottawa	9	21	42.9
Wagoner	3	7	42.9
Washington	8	19	42.1
Nowata	7	18	38.9
Sequoyah	13	36	36.1

B.4 Regional and County-Level Pedestrian and Bicycle Crash Data

B.4.1 Pedestrian and Bicycle Crashes by Region

Table 5 and **Table 6** present the number of pedestrian and bicycle crashes, respectively, categorized by region and severity level from 2017 to 2021.

Table 6: Pedestrian Crashes Severity Level per Region (2017-2021)

Region	Severity Level (Number)					
	Fatal	Incapacitating Injury	Non-Incapacitating Injury	Possible Injury	Property Damage	Total
Urban (Tulsa City)	21	27	63	30	27	168
Northern	17	31	43	32	15	138
Southern	11	8	18	20	10	67
Total	49	66	124	82	52	373

Table 7: Bike Crashes Severity Level per Region (2017-2021)

Region	Severity Level (Number)					
	Fatal	Incapacitating Injury	Non-Incapacitating Injury	Possible Injury	Property Damage	Total
Urban (Tulsa City)	2	6	21	8	8	45
Northern	4	5	19	28	9	65
Southern	2	0	5	4	6	17

Total	**8**	**11**	**45**	**40**	**23**	**127**

The Tulsa Urban Area, encompassing the most densely populated and urbanized parts of the Nation, reports the highest number of both pedestrian (168) and bicycle (45) crashes across all severity levels. This aligns with its higher traffic volumes and increased pedestrian and cyclist activity.

The Northern Region follows with the second-highest crash counts for both modes—138 pedestrian and 65 bicycle crashes—likely due to moderate urban development and regional hubs with active transportation use.

In contrast, the Southern Region reports significantly fewer incidents—67 pedestrian and 17 bicycle crashes—reflecting its more rural character and reduced exposure to non-motorized travel.

These trends underscore the relationship between urban density and vulnerable road users crash frequency, highlighting the need for targeted safety measures in high-exposure areas like Tulsa, while maintaining vigilance in rural regions where severe outcomes may still occur.

B.4.2 Pedestrian and Bicycle Crashes by County

Table 7 and **Table 8** show pedestrian and bicycle crash data, respectively, broken down by county and severity level for the years 2017–2021.

Table 8: Pedestrian Crashes Severity Level per County (2017-2021)

County	Pedestrian Crashes Severity Level (Number)					
	Fatal	Incapacitating Injury	Non-Incapacitating Injury	Possible Injury	Property Damage	Total
Tulsa	**24**	**30**	**73**	**33**	**29**	**189**
Washington	**2**	**8**	**4**	**16**	**3**	**33**
Rogers	**4**	**3**	**13**	**7**	**4**	**31**
Cherokee	**5**	**4**	**7**	**4**	**3**	**23**
Sequoyah	**2**	**3**	**3**	**9**	**4**	**21**
Mayes	**5**	**6**	**6**	**1**	**2**	**20**

Delaware	1	8	5	3	2	19
Muskogee	2	1	5	3	1	12
Craig	1	1	4	1	1	8
Adair	1	0	0	4	2	7
Wagoner	1	0	3	0	0	4
Nowata	1	1	0	1	0	3
Ottawa	0	1	1	0	1	3
Total	49	66	124	82	52	373

Table 9: Bike Crashes Severity Level per County (2017-2021)

County	Bike Crashes Severity Level (#)					
	Fatal	Incapacitating Injury	Non-Incapacitating Injury	Possible Injury	Property Damage	Total
Tulsa	2	8	26	16	11	63
Rogers	2	1	8	8	3	22
Washington	0	0	5	10	1	16
Cherokee	1	0	4	0	2	7
Adair	0	0	1	3	1	5
Sequoyah	0	0	0	1	2	3
Craig	0	1	0	1	1	3

Mayes	**1**	**1**	**1**	**0**	**0**	**3**
Delaware	**0**	**0**	**0**	**1**	**1**	**2**
Ottawa	**1**	**0**	**0**	**0**	**0**	**1**
McIntosh	**1**	**0**	**0**	**0**	**0**	**1**
Muskogee	**0**	**0**	**0**	**0**	**1**	**1**
Wagoner	**0**	**0**	**0**	**0**	**0**	**0**
Total	**8**	**11**	**45**	**40**	**23**	**127**

- **Tulsa County, the most populous and urbanized area within the Cherokee Nation, accounts for the highest number of both pedestrian (189) and bicycle (63) crashes, underscoring the increased exposure of non-motorized users in high-density traffic environments.**
- **Rogers (31 pedestrian, 22 bicycle) and Washington Counties (33 pedestrian, 16 bicycle) follow, reflecting a mix of suburban development and moderate pedestrian and cyclist activity.**
- **In contrast, rural counties such as Adair, Craig, Nowata, Ottawa, and Delaware report significantly lower crash totals across both modes, which is likely tied to lower population densities and less non-motorized travel.**
- **These findings emphasize the importance of focusing safety interventions in high-exposure areas while ensuring rural counties are not overlooked, especially given the potential severity of crashes that do occur.**

Appendix C

High Injury Network Interactive Map

Technical Memorandum

High Injury Network Interactive Map

To: Robert Endicott

From: Antony Atencio

Date: 11/11/2025

Re: Safe Street for All - Cherokee Nation

Introduction

To support visualization and continued analysis, an interactive Google Map was developed identifying the roadway segments and intersections that comprise the High-Injury Network (HIN). This map allows users to explore the locations where fatal, incapacitating-injury, and non-incapacitating-injury crashes have occurred across the Cherokee Nation roadway system.

Roadway Segments

Each roadway segment included in the HIN contains the following attributes:

- Roadway Name (“Unknown” is listed where a name was unavailable)
- Segment Length (mi)
- Average Annual Daily Traffic (AADT)
- Number of Fatal Crashes
- Number of Incapacitating Injury Crashes
- Number of Non-Incapacitating Injury Crashes

Intersections

Each intersection record includes:

- Name (formed by the two intersecting street names)
- AADT of the First Street
- AADT of the Second Street
- Number of Fatal Crashes
- Number of Incapacitating Injury Crashes
- Number of Non-Incapacitating Injury Crashes

The interactive map link provided below enables users to view, filter, and update these attributes as new data become available. Because the map is hosted in a modifiable online environment, it can be updated in the future to incorporate additional roadway segments, revised crash data, or new attribute information.

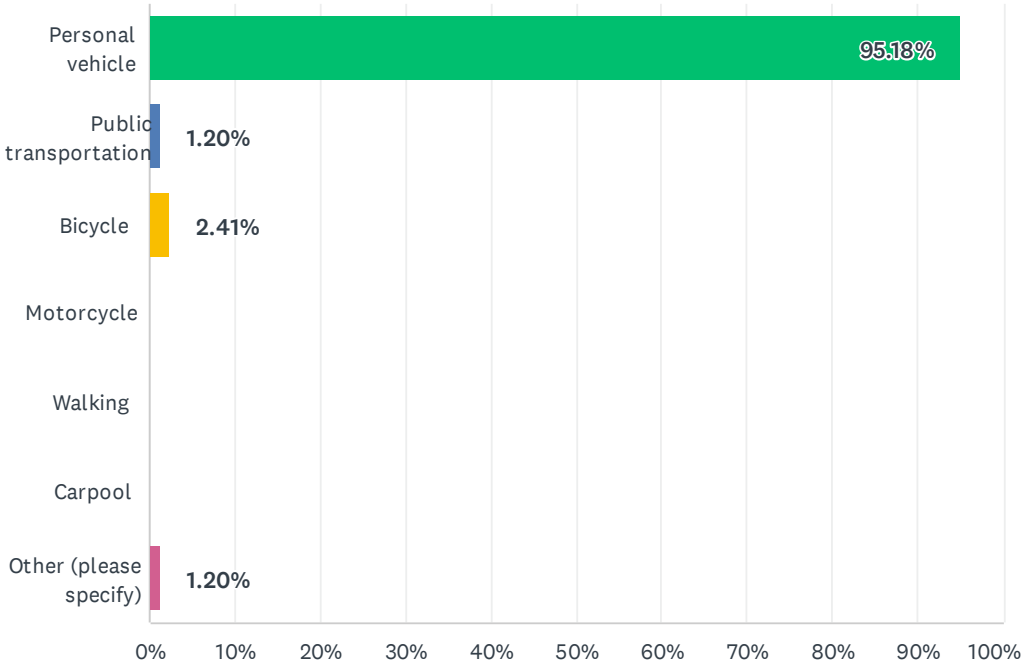
[Interactive Google Map Link]

Appendix D

Survey Results and Meeting Summaries

Q1 What is your primary mode of transportation?

Answered: 83 Skipped: 0



ANSWER CHOICES	RESPONSES	
Personal vehicle (1)	95.18%	79
Public transportation (2)	1.20%	1
Bicycle (3)	2.41%	2
Motorcycle (4)	0.00%	0
Walking (5)	0.00%	0
Carpool (6)	0.00%	0
Other (please specify) (7)	1.20%	1
TOTAL		83

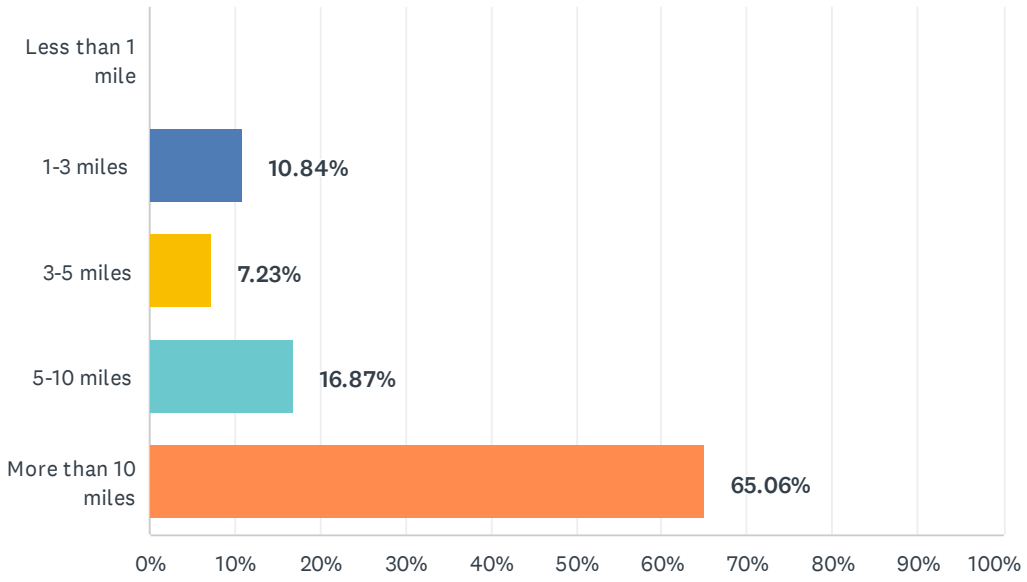
BASIC STATISTICS

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	7.00	1.00	1.13	0.72

#	OTHER (PLEASE SPECIFY)	DATE
1	Bus stops is in front of my house and people speed and it’s a blind hill on both ends and no signs or bus signs or speed signs are marked for this are	3/19/2025 2:12 PM

Q2 How many miles do you travel on an average day?

Answered: 83 Skipped: 0



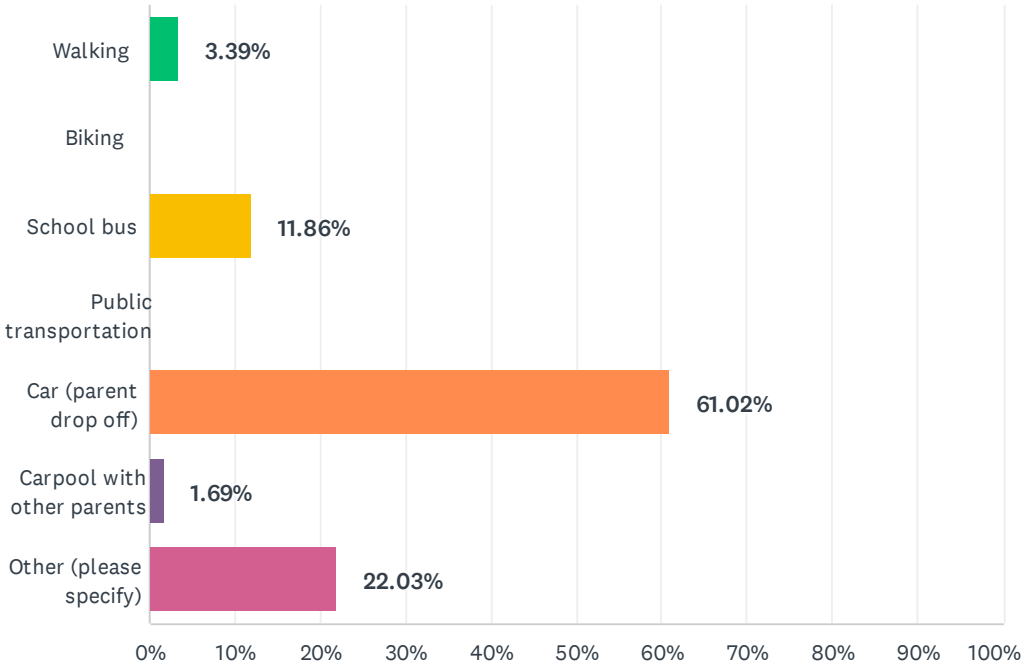
ANSWER CHOICES	RESPONSES	
Less than 1 mile (1)	0.00%	0
1-3 miles (2)	10.84%	9
3-5 miles (3)	7.23%	6
5-10 miles (4)	16.87%	14
More than 10 miles (5)	65.06%	54
TOTAL		83

BASIC STATISTICS

Minimum	Maximum	Median	Mean	Standard Deviation
2.00	5.00	5.00	4.36	1.01

Q3 If you have children going to school, what is their mode of transportation to and from school?

Answered: 59 Skipped: 24



ANSWER CHOICES	RESPONSES	
Walking (1)	3.39%	2
Biking (2)	0.00%	0
School bus (3)	11.86%	7
Public transportation (4)	0.00%	0
Car (parent drop off) (5)	61.02%	36
Carpool with other parents (6)	1.69%	1
Other (please specify) (7)	22.03%	13
TOTAL		59

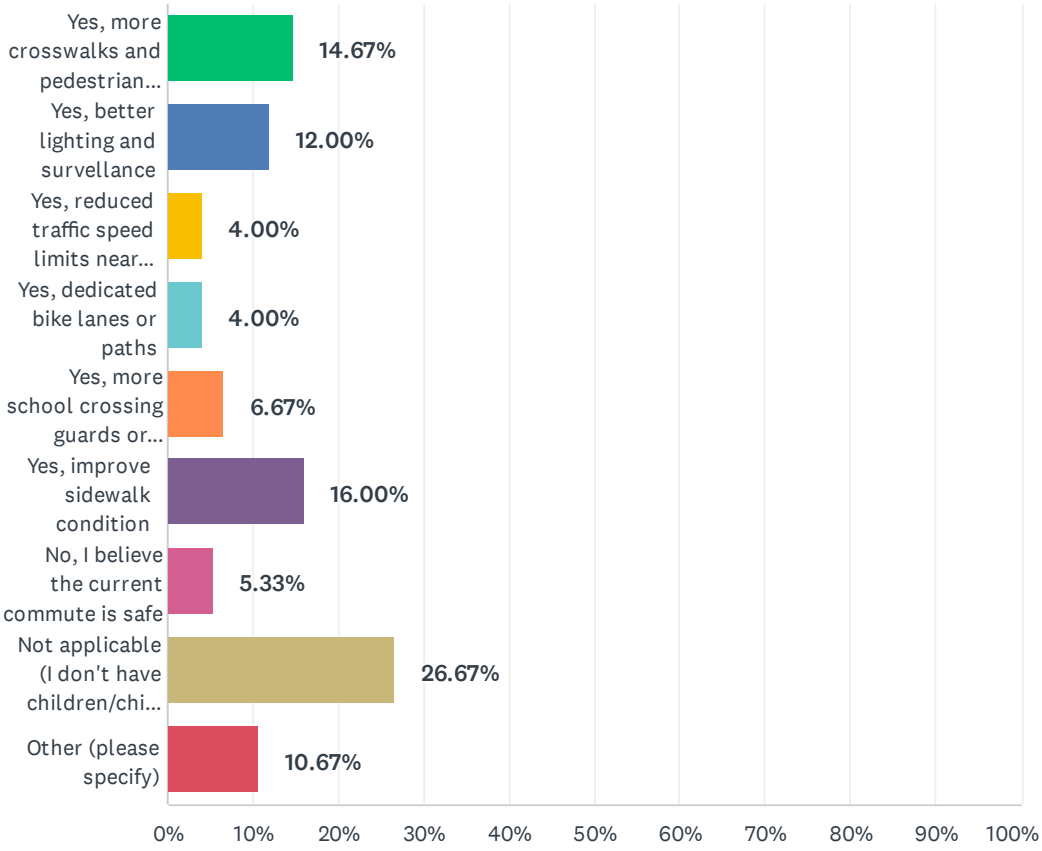
BASIC STATISTICS				
Minimum	Maximum	Median	Mean	Standard Deviation
1.00	7.00	5.00	5.08	1.38

#	OTHER (PLEASE SPECIFY)	DATE
1	No chicken	3/23/2025 8:10 AM
2	No children	3/21/2025 7:07 PM
3	I	3/20/2025 4:16 PM

4	N/A	3/20/2025 12:44 AM
5	No children at home.	3/19/2025 8:47 PM
6	They have a vehicle	3/19/2025 7:23 PM
7	Na	3/19/2025 6:28 PM
8	N/A	3/19/2025 2:15 PM
9	NA	2/17/2025 3:20 PM
10	no kids	2/17/2025 3:06 PM
11	N/A	2/17/2025 2:18 PM
12	a mile drive to the bus stop and school bus for the duration and after school pickup is full personal vehicle use.	2/17/2025 11:31 AM
13	N/A	2/17/2025 10:58 AM

Q4 Are there ways to make your children's commute to school safer?

Answered: 75 Skipped: 8



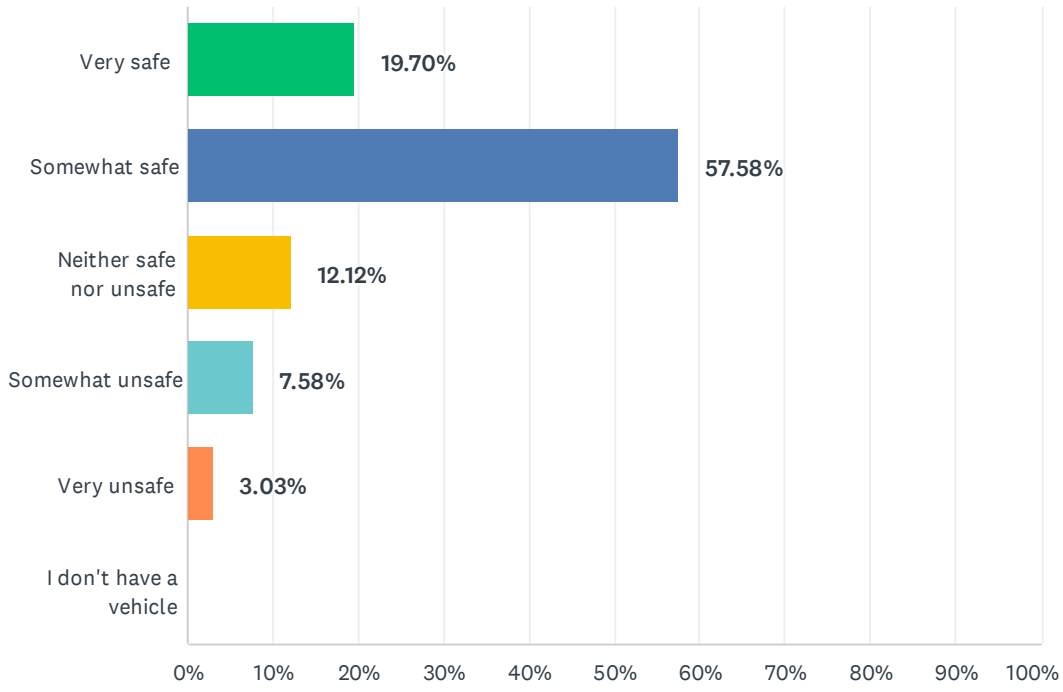
ANSWER CHOICES	RESPONSES	
Yes, more crosswalks and pedestrian signals (1)	14.67%	11
Yes, better lighting and surveillance (2)	12.00%	9
Yes, reduced traffic speed limits near schools (3)	4.00%	3
Yes, dedicated bike lanes or paths (4)	4.00%	3
Yes, more school crossing guards or volunteers (5)	6.67%	5
Yes, improve sidewalk condition (6)	16.00%	12
No, I believe the current commute is safe (7)	5.33%	4
Not applicable (I don't have children/children in school) (8)	26.67%	20
Other (please specify) (9)	10.67%	8
TOTAL		75

BASIC STATISTICS				
Minimum	Maximum	Median	Mean	Standard Deviation
1.00	9.00	6.00	5.43	2.82

#	OTHER (PLEASE SPECIFY)	DATE
1	No children	3/23/2025 8:10 AM
2	N/A	3/20/2025 12:44 AM
3	Where I'd like to build my house is essentially inaccessible by bus. The far east end of Elm Grove Road has bridges on each side marked as dangerous per a study done 2/3 years ago. Replacing those bridges would make it easier and safer to send my son to school once we build.	3/19/2025 11:33 PM
4	Na	3/19/2025 6:28 PM
5	N/W	3/19/2025 2:15 PM
6	Put up bus stop ahead signs for the bus route. The bus stops in front of my house which is blinded by two hills down in a dip. And their is always someone speeding.	3/19/2025 2:12 PM
7	no kids	2/17/2025 3:06 PM
8	Sidewalks; crosswalks; potholes; loose asphalt and gravel	9/19/2024 12:38 PM

Q5 How safe do you feel while traveling in a vehicle?

Answered: 66 Skipped: 17

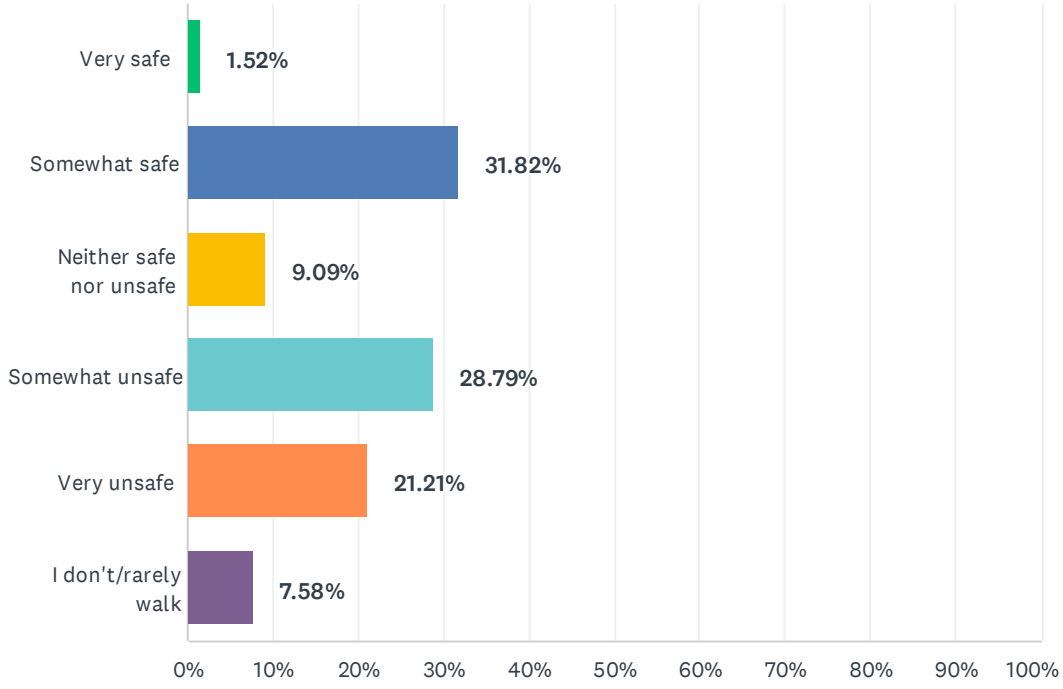


ANSWER CHOICES	RESPONSES	
Very safe (1)	19.70%	13
Somewhat safe (2)	57.58%	38
Neither safe nor unsafe (3)	12.12%	8
Somewhat unsafe (4)	7.58%	5
Very unsafe (5)	3.03%	2
I don't have a vehicle (6)	0.00%	0
TOTAL		66

BASIC STATISTICS				
Minimum	Maximum	Median	Mean	Standard Deviation
1.00	5.00	2.00	2.17	0.93

Q6 How safe do you feel when walking?

Answered: 66 Skipped: 17

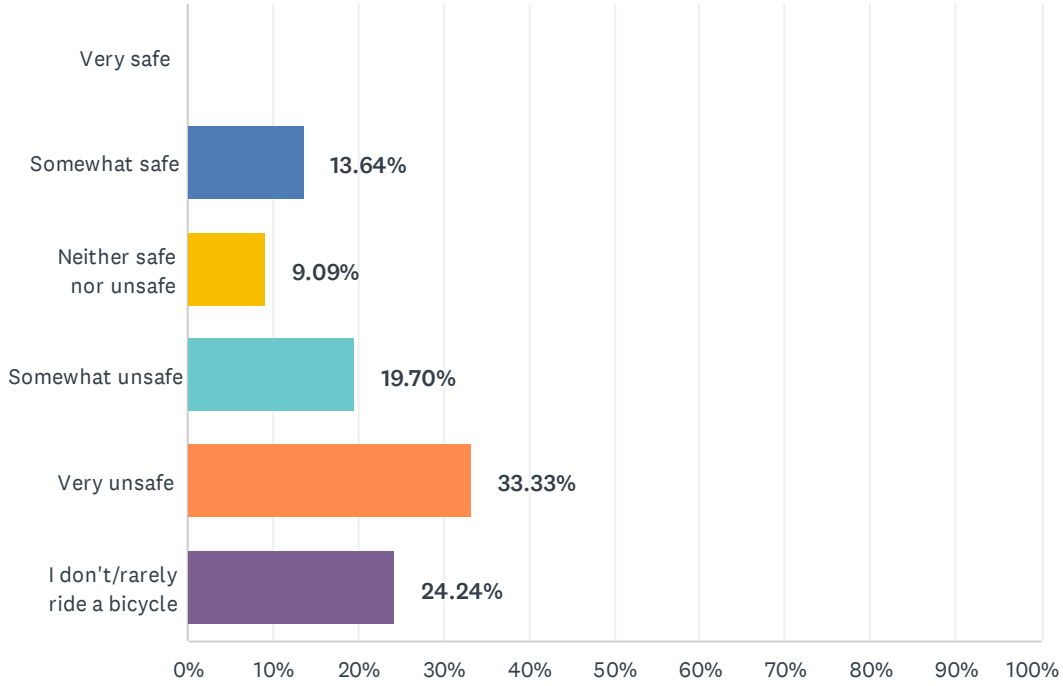


ANSWER CHOICES	RESPONSES	
Very safe (1)	1.52%	1
Somewhat safe (2)	31.82%	21
Neither safe nor unsafe (3)	9.09%	6
Somewhat unsafe (4)	28.79%	19
Very unsafe (5)	21.21%	14
I don't/rarely walk (6)	7.58%	5
TOTAL		66

BASIC STATISTICS				
Minimum	Maximum	Median	Mean	Standard Deviation
1.00	6.00	4.00	3.59	1.36

Q7 How safe do you feel when riding a bicycle?

Answered: 66 Skipped: 17

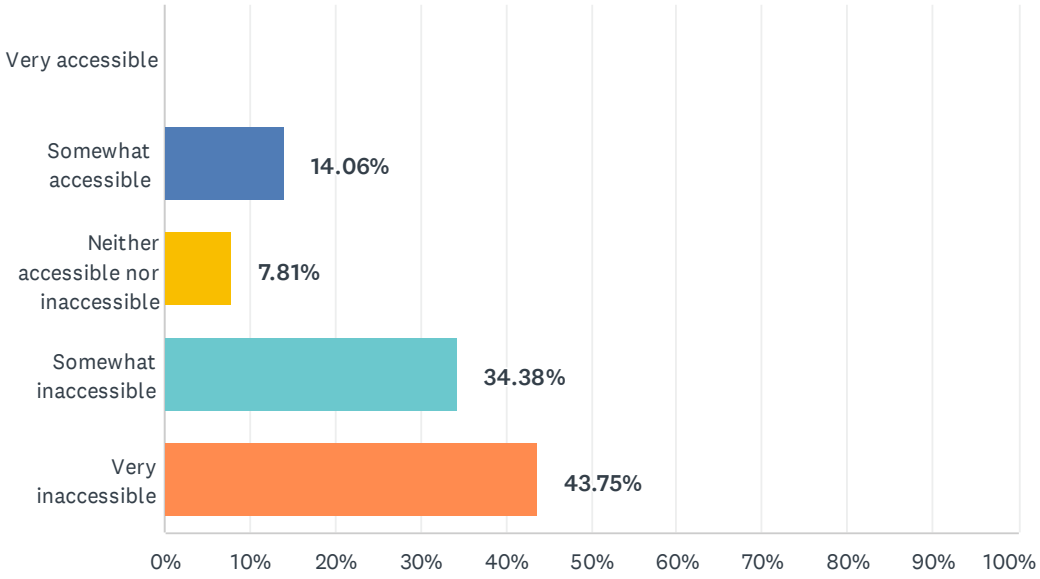


ANSWER CHOICES	RESPONSES	
Very safe (1)	0.00%	0
Somewhat safe (2)	13.64%	9
Neither safe nor unsafe (3)	9.09%	6
Somewhat unsafe (4)	19.70%	13
Very unsafe (5)	33.33%	22
I don't/rarely ride a bicycle (6)	24.24%	16
TOTAL		66

BASIC STATISTICS				
Minimum	Maximum	Median	Mean	Standard Deviation
2.00	6.00	5.00	4.45	1.32

Q8 How accessible do you feel the streets are for all users, including those with disabilities?

Answered: 64 Skipped: 19

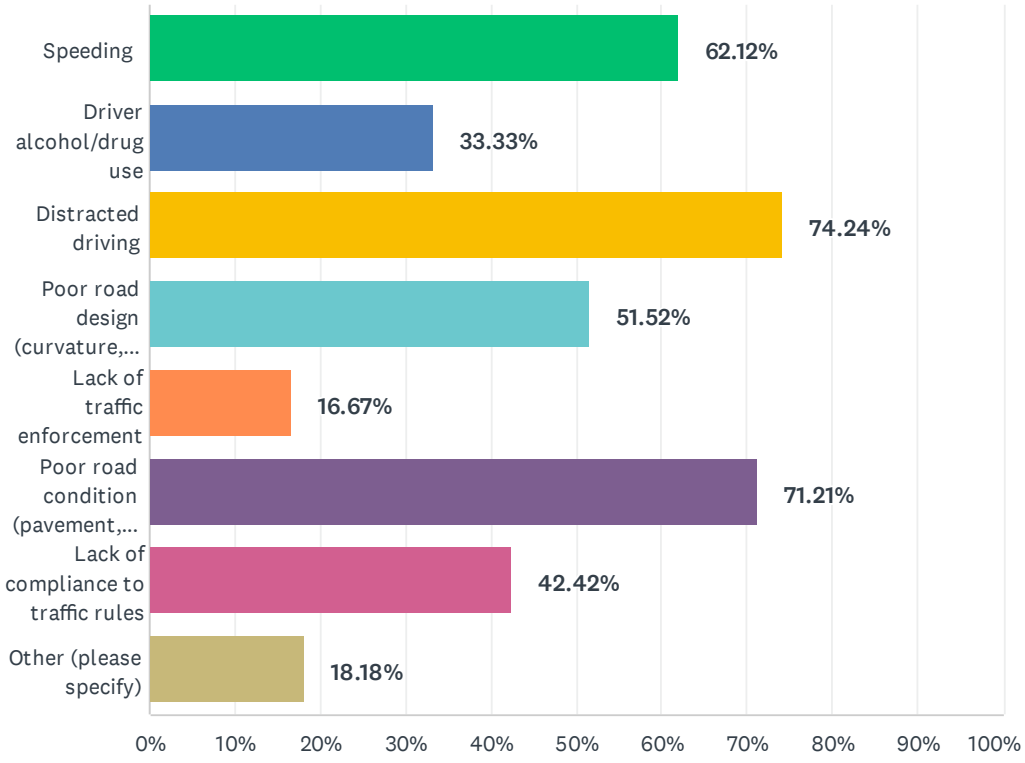


ANSWER CHOICES	RESPONSES	
Very accessible (1)	0.00%	0
Somewhat accessible (2)	14.06%	9
Neither accessible nor inaccessible (3)	7.81%	5
Somewhat inaccessible (4)	34.38%	22
Very inaccessible (5)	43.75%	28
TOTAL		64

BASIC STATISTICS				
Minimum	Maximum	Median	Mean	Standard Deviation
2.00	5.00	4.00	4.08	1.04

Q9 What are the factors that negatively impact transportation safety in your community? (select all that apply)

Answered: 66 Skipped: 17



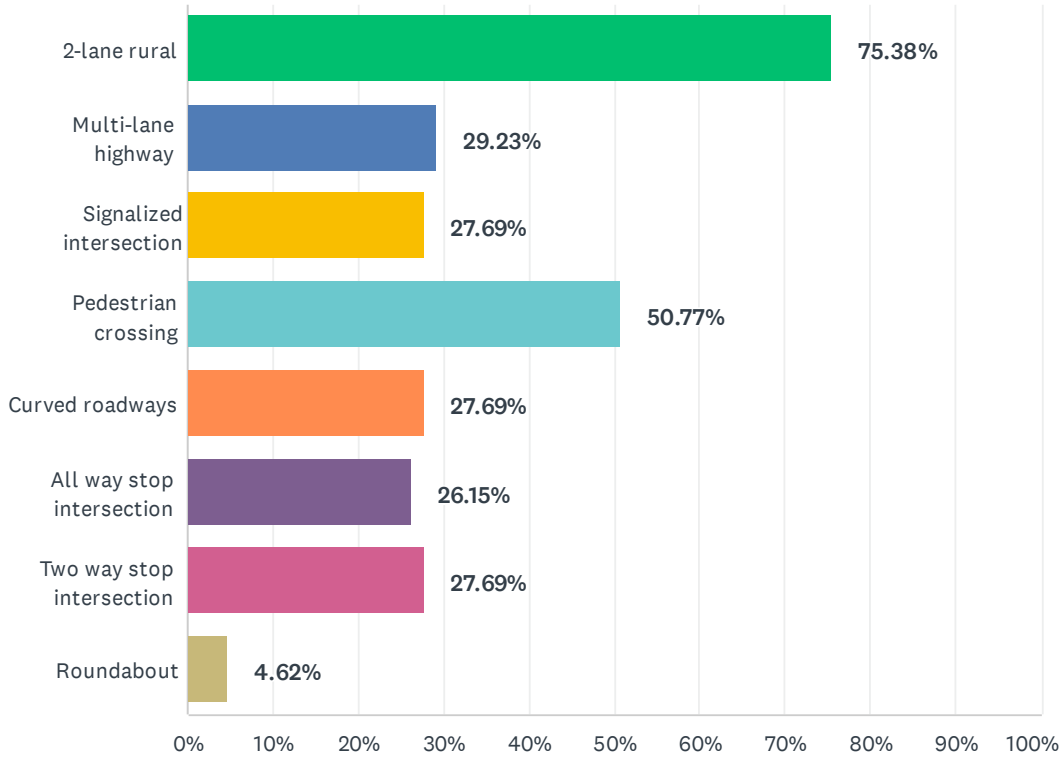
ANSWER CHOICES	RESPONSES	
Speeding (1)	62.12%	41
Driver alcohol/drug use (2)	33.33%	22
Distracted driving (3)	74.24%	49
Poor road design (curvature, line of sight, etc.) (4)	51.52%	34
Lack of traffic enforcement (5)	16.67%	11
Poor road condition (pavement, weather, etc.) (6)	71.21%	47
Lack of compliance to traffic rules (7)	42.42%	28
Other (please specify) (8)	18.18%	12
Total Respondents: 66		

BASIC STATISTICS				
Minimum	Maximum	Median	Mean	Standard Deviation
1.00	8.00	4.00	4.09	2.17

#	OTHER (PLEASE SPECIFY)	DATE
1	Very little/low quality infrastructure for pedestrians and cyclists	3/19/2025 5:50 PM
2	On highway 82 and e horseshoe bend there needs to be a signal light installed	3/19/2025 5:39 PM
3	Drainage from the Cherokee Springs Golf course onto the road.	2/17/2025 1:12 PM
4	no alternate paths for walkers and pedestrians. Pedestrians need to use crosswalks and need educaiton to use cross walks, share with vehicles, not just walk out in front of you (and espedially when not in a cross walk).	2/17/2025 11:37 AM
5	Striping of the roads and sidestreets should always be visible	2/17/2025 11:13 AM
6	No road striping/paint, pedestrian right-of-way, broken sidewalks	9/30/2024 4:30 PM
7	Lack of pedestrian infrastructure	9/27/2024 9:12 AM
8	no flashing lights at dangerous intersections.	9/19/2024 12:42 PM
9	Little to no sidewalks or shoulders	9/18/2024 4:14 PM
10	Several roads in our communities lack shoulders and closely border a deep ditch or cliff	9/13/2024 9:35 AM
11	Little to no sidewalks	9/11/2024 11:11 AM
12	flooding	9/5/2024 2:28 PM

Q10 Which intersection(s) or road segments do you believe need safety improvements in your community? (select all that apply)

Answered: 65 Skipped: 18

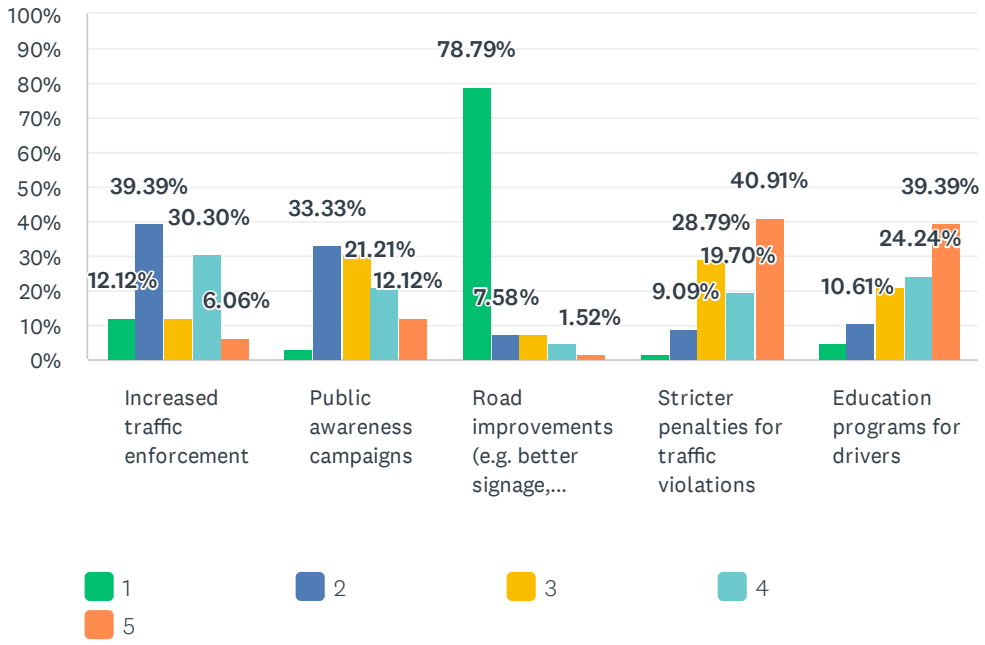


ANSWER CHOICES	RESPONSES	
2-lane rural (1)	75.38%	49
Multi-lane highway (2)	29.23%	19
Signalized intersection (3)	27.69%	18
Pedestrian crossing (4)	50.77%	33
Curved roadways (5)	27.69%	18
All way stop intersection (6)	26.15%	17
Two way stop intersection (7)	27.69%	18
Roundabout (8)	4.62%	3
Total Respondents: 65		

BASIC STATISTICS				
Minimum	Maximum	Median	Mean	Standard Deviation
1.00	8.00	4.00	3.51	2.12

Q11 What types of improvements do you think are going to be most effective in improving transportation safety? Rank the following options from 1 to 5, with 1 being the most preferred and 5 being the least preferred.

Answered: 66 Skipped: 17

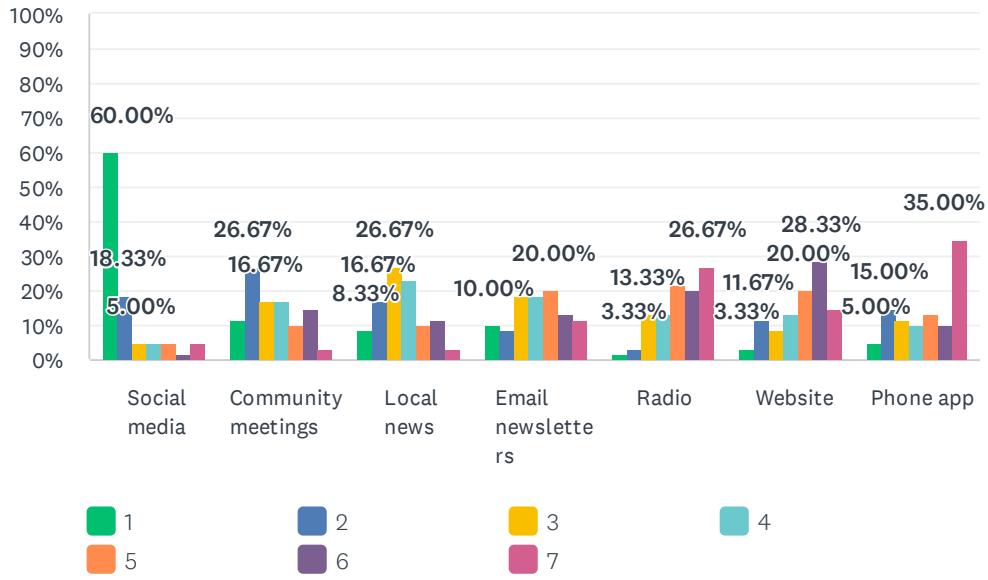


	1	2	3	4	5	TOTAL	SCORE
Increased traffic enforcement	12.12% 8	39.39% 26	12.12% 8	30.30% 20	6.06% 4	66	3.21
Public awareness campaigns	3.03% 2	33.33% 22	30.30% 20	21.21% 14	12.12% 8	66	2.94
Road improvements (e.g. better signage, lighting)	78.79% 52	7.58% 5	7.58% 5	4.55% 3	1.52% 1	66	4.58
Stricter penalties for traffic violations	1.52% 1	9.09% 6	28.79% 19	19.70% 13	40.91% 27	66	2.11
Education programs for drivers	4.55% 3	10.61% 7	21.21% 14	24.24% 16	39.39% 26	66	2.17

BASIC STATISTICS					
	MINIMUM	**MAXIMUM**	**MEDIAN**	**MEAN**	**STANDARD DEVIATION**
Increased traffic enforcement	1.00	5.00	2.00	2.79	1.17
Public awareness campaigns	1.00	5.00	3.00	3.06	1.07
Road improvements (e.g. better signage, lighting)	1.00	5.00	1.00	1.42	0.92
Stricter penalties for traffic violations	1.00	5.00	4.00	3.89	1.09
Education programs for drivers	1.00	5.00	4.00	3.83	1.19

Q12 How would you like local authorities to communicate traffic safety information to you? Rank the following options from 1 to 7, with 1 being the most preferred and 7 being the least preferred.

Answered: 60 Skipped: 23

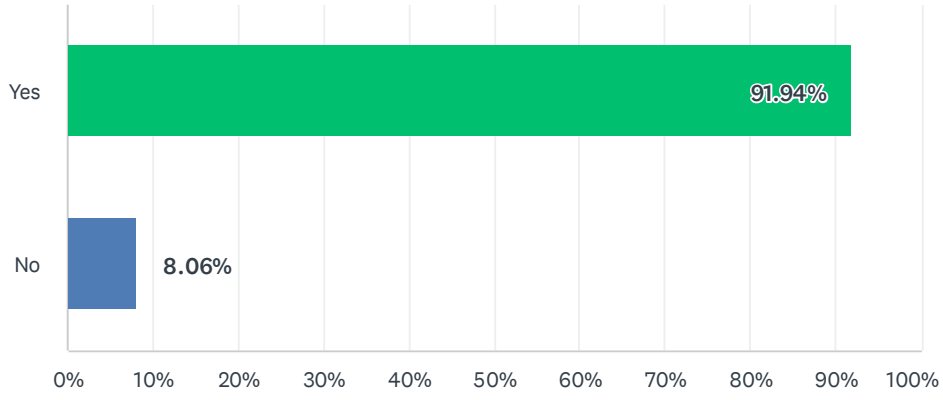


	1	2	3	4	5	6	7	TOTAL	SCORE
Social media	60.00% 36	18.33% 11	5.00% 3	5.00% 3	5.00% 3	1.67% 1	5.00% 3	60	5.98
Community meetings	11.67% 7	26.67% 16	16.67% 10	16.67% 10	10.00% 6	15.00% 9	3.33% 2	60	4.55
Local news	8.33% 5	16.67% 10	26.67% 16	23.33% 14	10.00% 6	11.67% 7	3.33% 2	60	4.42
Email newsletters	10.00% 6	8.33% 5	18.33% 11	18.33% 11	20.00% 12	13.33% 8	11.67% 7	60	3.83
Radio	1.67% 1	3.33% 2	13.33% 8	13.33% 8	21.67% 13	20.00% 12	26.67% 16	60	2.83
Website	3.33% 2	11.67% 7	8.33% 5	13.33% 8	20.00% 12	28.33% 17	15.00% 9	60	3.20
Phone app	5.00% 3	15.00% 9	11.67% 7	10.00% 6	13.33% 8	10.00% 6	35.00% 21	60	3.18

BASIC STATISTICS					
	MINIMUM	**MAXIMUM**	**MEDIAN**	**MEAN**	**STANDARD DEVIATION**
Social media	1.00	7.00	1.00	2.02	1.68
Community meetings	1.00	7.00	3.00	3.45	1.73
Local news	1.00	7.00	3.00	3.58	1.54
Email newsletters	1.00	7.00	4.00	4.17	1.78
Radio	1.00	7.00	5.00	5.17	1.57
Website	1.00	7.00	5.00	4.80	1.70
Phone app	1.00	7.00	5.00	4.82	2.05

Q13 Do you think forming a committee to enhance existing efforts to make our roads safe would be a good idea?

Answered: 62 Skipped: 21



ANSWER CHOICES	RESPONSES	
Yes (1)	91.94%	57
No (2)	8.06%	5
TOTAL		62

BASIC STATISTICS

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	2.00	1.00	1.08	0.27

Q14 Do you have additional comments or suggestions for improving traffic safety in our community?

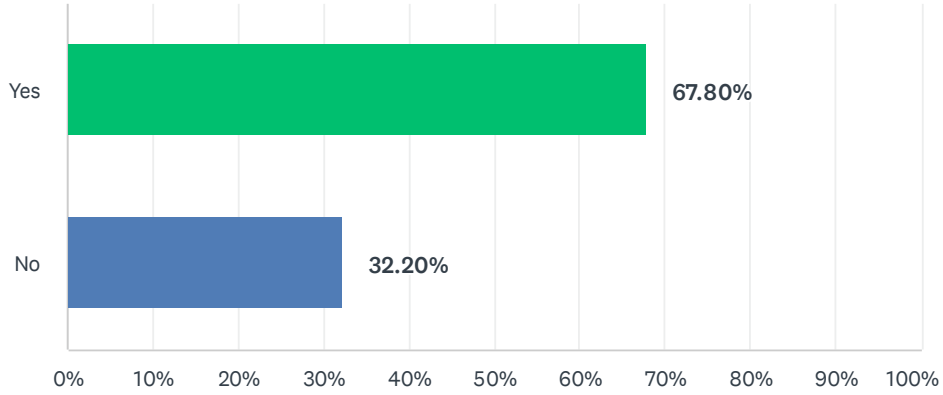
Answered: 26 Skipped: 57

#	RESPONSES	DATE
1	Put an overpass at Hwy 59/69 and Hwy 125	3/21/2025 7:12 PM
2	There needs to be more sidewalks built for the safety of students walking home to and from school. Sidewalks along Stick Ross Mountain road and Willis Ave	3/20/2025 9:17 PM
3	More law enforcement in rural towns.	3/20/2025 9:19 AM
4	Back roads and back streets along with 2-lane higheays	3/20/2025 2:22 AM
5	Making usable shoulders for emergency use in rural areas	3/19/2025 9:37 PM
6	Need street improvements and sidewalks in town	3/19/2025 8:35 PM
7	I think following Complete Street principles is one of the best ways to improve traffic safety, particularly for those who cannot drive, such as children and elders. Public transit is also a great way to improve both efficiency and safety by reducing the number of cars on the street. Thirdly, it is horrifying how many non-human relatives are murdered on the road; I'm not sure what the solution for this is in urban areas other than animal crossing signs and lower speeds, but on highways we need wildlife crossings over/under highways. Overall, we need to be designing for living beings not cars if we want to improve safety.	3/19/2025 5:57 PM
8	The only concern I have is at highway 82 and e horseshoe bend there needs to be a traffic signal or even stop signed for all way stop at the location	3/19/2025 5:40 PM
9	Sidewalks for pedestrians so they are not walking or riding bikes in the highway. Roads need shoulders and pavement improvements. Some major intersection on highway 59 and 125 have blind spots and deep ditches that vehicles turn off into or run others off in to and small bridges that are not wide enough.	3/19/2025 3:43 PM
10	More sidewalks/bike paths and a route to ease congestion on Muskogee	3/19/2025 2:18 PM
11	Mark county roads with speed limits. Unmarked county roads people are speeding. Blind drives or curves need a attention. More people have moved in a certain area makes higher traffic volumes. More speed regulations need to set fort. And more bus stops signs need to be in forced along with farm equipment on road ways. Unmarked county roads with higher then usual traffic volumes need to be addressed.	3/19/2025 2:18 PM
12	The committee should consist of people that actually drive around Tahlequah and are aware of high-risk locations. Not just talk about improvements but actually do something about it or allow businesses to be located in areas that cause more traffic problems.	2/17/2025 1:22 PM
13	Education on the new LED lighted billboards showing pedestrians and drivers to use crosswalks safely, even in shopping center streets.	2/17/2025 11:39 AM
14	I think having a SAFE place to walk like adding sidewalks/bike paths near main roads would help.	2/17/2025 11:26 AM
15	Road Striping is a must especially on Black Top!!!!!	2/17/2025 11:15 AM
16	No.	2/17/2025 11:03 AM
17	No	10/3/2024 11:25 AM
18	Need speed bumps, better sidewalks so we don't walk on the street, crosswalks/paint,	9/30/2024 4:32 PM
19	please consider how to help rural underserved communities to improve the pedestrian infrastructure	9/27/2024 9:14 AM
20	The intersection in Welch at 10 and 2 needs a flashing light. Too many accidents; however, no	9/19/2024 12:45 PM

	deaths. County refuses due to no deaths. State there needs to be at least 3 deaths before one is placed.	
21	Need more sidewalks and rural roads with shoulders.	9/18/2024 4:16 PM
22	I'm not sure if it's traffic safety, but I think there should be more sidewalks. Pretty much everywhere.	9/16/2024 4:48 PM
23	Throughout Tahlequah, additional sidewalks and pedestrian crossings are desperately needed, along with driver education and stricter enforcement of drivers who don't follow traffic laws in regards to pedestrians and pedestrians who don't use the crosswalks - instead opting to walk through the streets in random and unexpected locations.	9/13/2024 8:57 AM
24	Curtis street turning south off hwy 10 in Welch needs pavement repairs from a previous water line break. Potholes are huge cause bus and personal vehicle suspension damage	9/5/2024 3:35 PM
25	I live in a rural area outside of Vinita (S 4460 RD) and when it rains heavily, there are two separate areas of that road that flood pretty bad. There have been a few times in the past that I was unable to get to town because of the floodwaters being so high.	9/5/2024 2:31 PM
26	Several of our pedestrians travel on 2-lane roads with little to no shoulder. Walking is their main mode of transportation. This can prove to be dangerous as most are walking with their back to oncoming traffic.	9/3/2024 8:56 AM

Q15 Are you a Cherokee Nation citizen?

Answered: 59 Skipped: 24

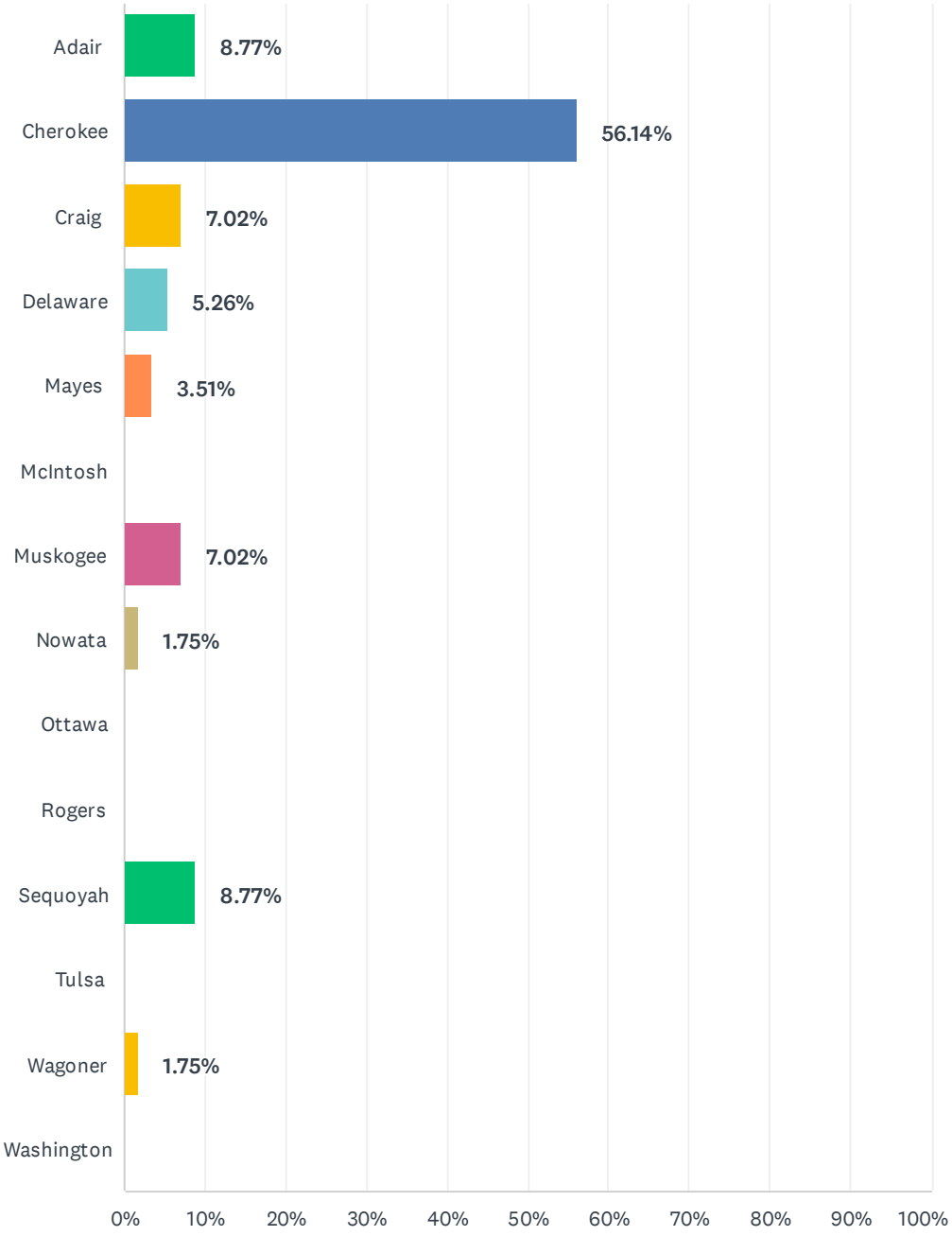


ANSWER CHOICES	RESPONSES	
Yes (1)	67.80%	40
No (2)	32.20%	19
TOTAL		59

BASIC STATISTICS				
Minimum	Maximum	Median	Mean	Standard Deviation
1.00	2.00	1.00	1.32	0.47

Q16 What county do you live in?

Answered: 57 Skipped: 26



ANSWER CHOICES	RESPONSES	
Adair	8.77%	5
Cherokee	56.14%	32
Craig	7.02%	4
Delaware	5.26%	3
Mayes	3.51%	2
McIntosh	0.00%	0
Muskogee	7.02%	4
Nowata	1.75%	1
Ottawa	0.00%	0
Rogers	0.00%	0
Sequoyah	8.77%	5
Tulsa	0.00%	0
Wagoner	1.75%	1
Washington	0.00%	0
TOTAL		57

BASIC STATISTICS

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	13.00	2.00	3.63	3.10

Q17 What city/town do you live in? (please specify)

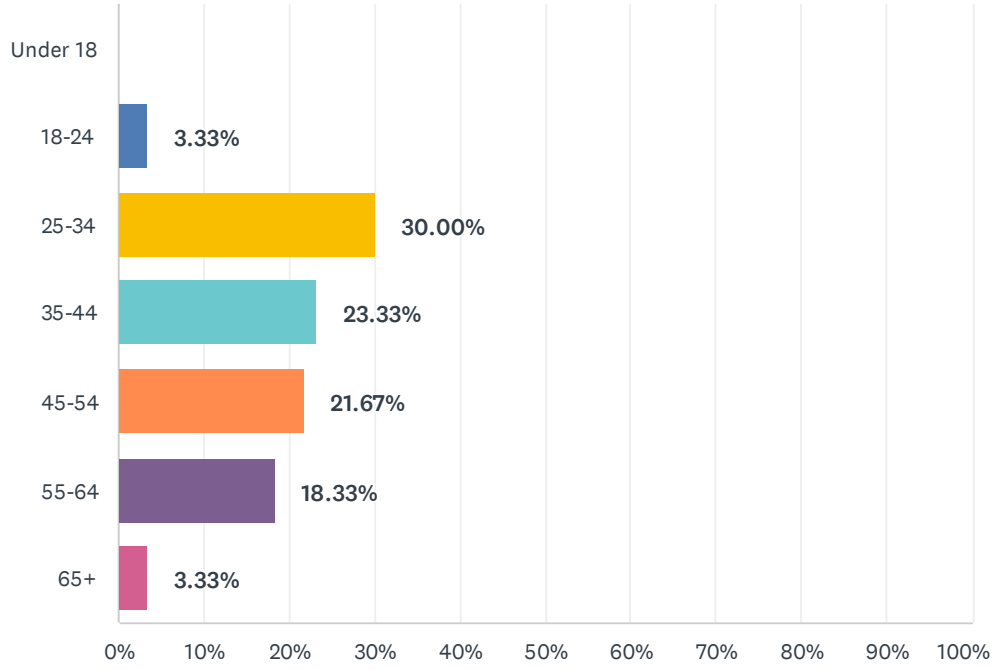
Answered: 58 Skipped: 25

#	RESPONSES	DATE
1	Bernice	3/21/2025 7:13 PM
2	Vinita	3/20/2025 9:34 PM
3	Tahlequah	3/20/2025 9:18 PM
4	Jay	3/20/2025 4:26 PM
5	Gore	3/20/2025 11:17 AM
6	Wann	3/20/2025 9:20 AM
7	Westville	3/20/2025 2:23 AM
8	Warner	3/19/2025 11:36 PM
9	Tahlequah	3/19/2025 11:21 PM
10	Muskogee	3/19/2025 9:38 PM
11	Stilwell	3/19/2025 8:36 PM
12	Langley	3/19/2025 7:28 PM
13	Norman, OK	3/19/2025 5:58 PM
14	Westville	3/19/2025 4:32 PM
15	Bernice	3/19/2025 3:44 PM
16	Lost City	3/19/2025 2:22 PM
17	Tahlequah	3/19/2025 2:19 PM
18	Sallisaw Brushy mountain 2 miles from the school on a very high volume county road	3/19/2025 2:19 PM
19	tahlequah	2/25/2025 7:23 AM
20	Moodys	2/18/2025 9:36 AM
21	Fort Gibson	2/18/2025 9:22 AM
22	Parkhill	2/17/2025 7:23 PM
23	Tahlequah	2/17/2025 3:24 PM
24	Porter	2/17/2025 3:21 PM
25	Keys	2/17/2025 3:08 PM
26	Tahlequah	2/17/2025 2:22 PM
27	Tahlequah	2/17/2025 2:05 PM
28	Tahlequah	2/17/2025 1:22 PM
29	Tahlequah	2/17/2025 1:09 PM
30	Welling	2/17/2025 11:39 AM
31	Tahlequah	2/17/2025 11:26 AM
32	Tahlequah	2/17/2025 11:16 AM
33	N/A	2/17/2025 11:05 AM

34	Hulbert	2/17/2025 10:56 AM
35	Tahlequah	2/17/2025 10:56 AM
36	Westville	11/22/2024 2:00 PM
37	Houston	10/3/2024 11:25 AM
38	Marble City	9/30/2024 4:32 PM
39	Welch	9/19/2024 12:46 PM
40	County near Adair	9/18/2024 5:03 PM
41	Tahlequah	9/18/2024 4:17 PM
42	Tahlequah	9/16/2024 6:01 PM
43	Park Hill	9/16/2024 4:53 PM
44	Tahlequah	9/16/2024 4:48 PM
45	Tahlequah	9/16/2024 4:24 PM
46	Tahlequah	9/16/2024 3:01 PM
47	Tahlequah	9/16/2024 2:49 PM
48	Peggs	9/16/2024 10:44 AM
49	Roland	9/13/2024 12:33 PM
50	Sallisaw	9/13/2024 9:36 AM
51	Tahlequah	9/13/2024 8:58 AM
52	Tahlequah	9/12/2024 1:51 PM
53	Tahlequah	9/12/2024 9:25 AM
54	Sallisaw	9/11/2024 11:12 AM
55	Hulbert	9/11/2024 11:10 AM
56	Welch	9/5/2024 3:36 PM
57	Vinita	9/5/2024 2:31 PM
58	Tahlequah	9/3/2024 8:57 AM

Q18 What is your age?

Answered: 60 Skipped: 23

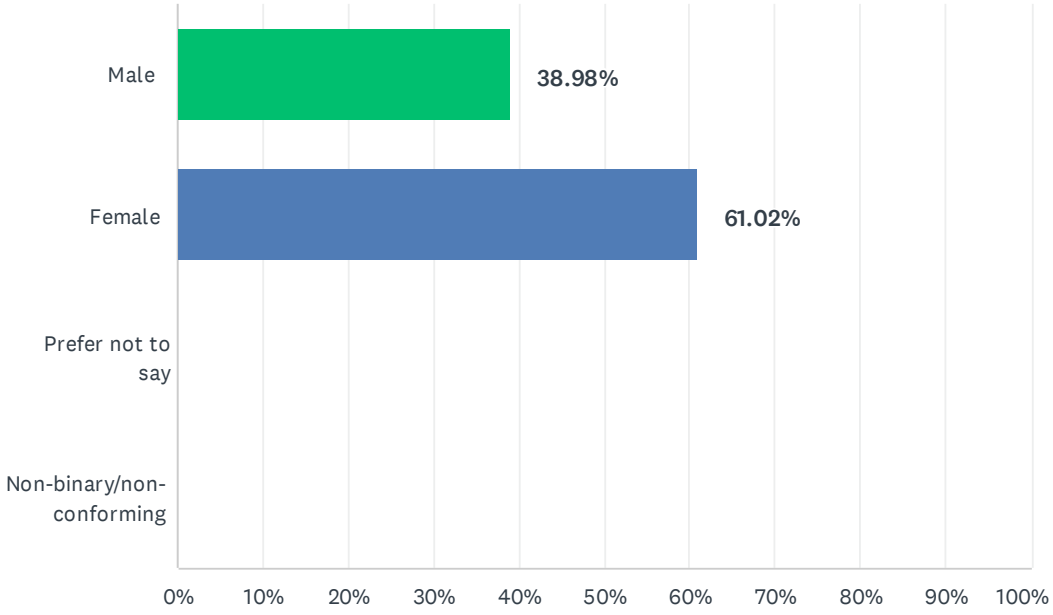


ANSWER CHOICES	RESPONSES	
Under 18 (1)	0.00%	0
18-24 (2)	3.33%	2
25-34 (3)	30.00%	18
35-44 (4)	23.33%	14
45-54 (5)	21.67%	13
55-64 (6)	18.33%	11
65+ (7)	3.33%	2
TOTAL		60

BASIC STATISTICS				
Minimum	Maximum	Median	Mean	Standard Deviation
2.00	7.00	4.00	4.32	1.26

Q19 How do you identify yourself?

Answered: 59 Skipped: 24

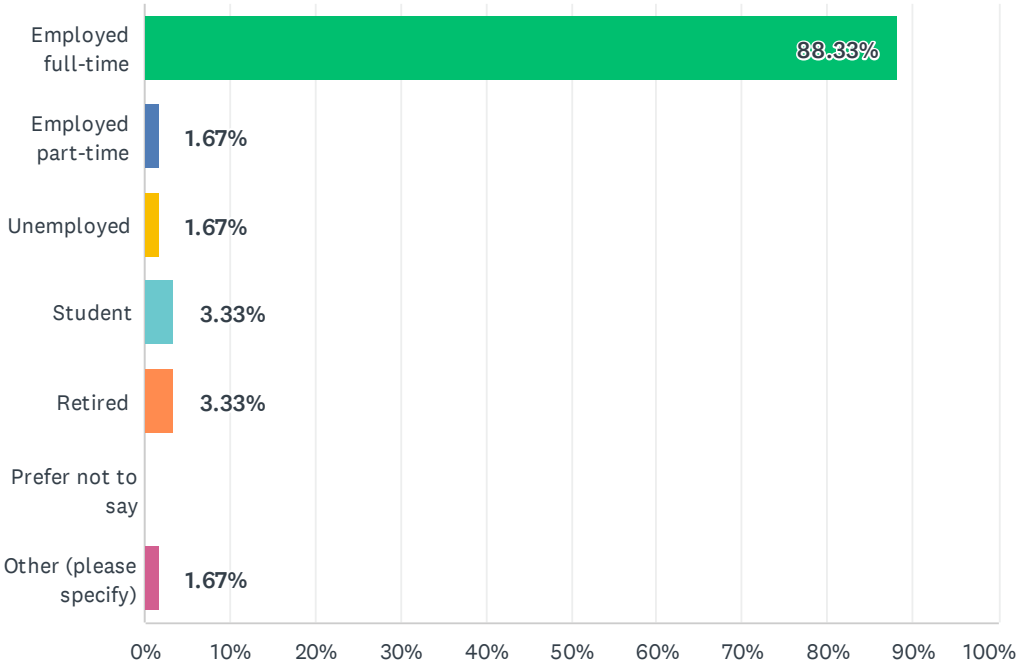


ANSWER CHOICES	RESPONSES	
Male (1)	38.98%	23
Female (2)	61.02%	36
Prefer not to say (3)	0.00%	0
Non-binary/non-conforming (4)	0.00%	0
TOTAL		59

BASIC STATISTICS				
Minimum	Maximum	Median	Mean	Standard Deviation
1.00	2.00	2.00	1.61	0.49

Q20 What is your employment status?

Answered: 60 Skipped: 23



ANSWER CHOICES	RESPONSES	
Employed full-time (1)	88.33%	53
Employed part-time (2)	1.67%	1
Unemployed (3)	1.67%	1
Student (4)	3.33%	2
Retired (5)	3.33%	2
Prefer not to say (6)	0.00%	0
Other (please specify) (7)	1.67%	1
TOTAL		60

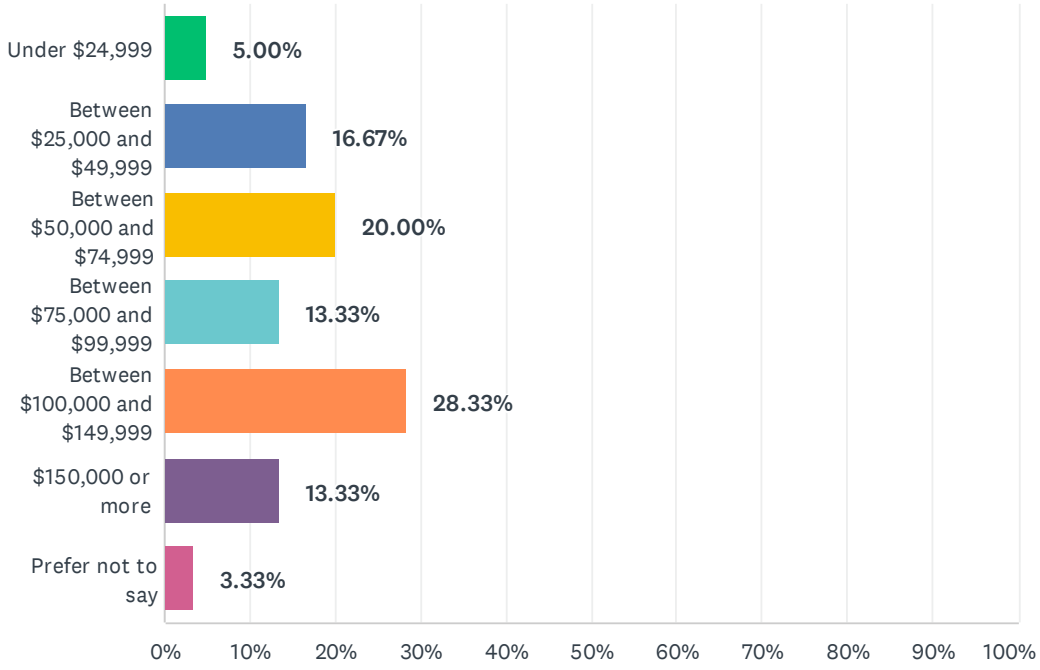
BASIC STATISTICS

Minimum	Maximum	Median	Mean	Standard Deviation
1.00	7.00	1.00	1.38	1.17

#	OTHER (PLEASE SPECIFY)	DATE
1	Disabled	3/20/2025 9:20 AM

Q21 What is your approximate household income?

Answered: 60 Skipped: 23



ANSWER CHOICES	RESPONSES	
Under $24,999 (1)	5.00%	3
Between $25,000 and $49,999 (2)	16.67%	10
Between $50,000 and $74,999 (3)	20.00%	12
Between $75,000 and $99,999 (4)	13.33%	8
Between $100,000 and $149,999 (5)	28.33%	17
$150,000 or more (6)	13.33%	8
Prefer not to say (7)	3.33%	2
TOTAL		60

BASIC STATISTICS				
Minimum	Maximum	Median	Mean	Standard Deviation
1.00	7.00	4.00	3.97	1.56

Appendix E

Existing Plans and Document Review Analysis

Cherokee Nation and Tribal Plans & Documents

Cherokee Nation Highway Infrastructure Safety Plan - 2020			
Summary: The Cherokee Nation's 2020 Highway Safety Plan, developed by the Cherokee Nation Department of Transportation (CNDOT), outlines a strategic framework to reduce highway-related injuries and fatalities within its jurisdiction. It aligns with federal mandates (e.g., FAST Act) and emphasizes a multi-pronged approach: engineering, education, enforcement, and emergency services (the "4E's")—to improve roadway safety. The plan integrates crash data, demographic insights, and infrastructure assessments to guide future safety investments and policy decisions. By leveraging federal funding, enhancing inter-agency coordination, and addressing both infrastructure and behavioral factors, the Cherokee Nation seeks to create a safer transportation environment for its residents, especially those in rural areas. The plan underscores the importance of sustained investment, education, and enforcement to achieve long-term safety outcomes.			
Transportation Safey Issues	Safety Category	Safe System Principles	Alignment with SS4A Plan
Rural roads often have poor geometry, no shoulders, steep grades, and limited sight distances	Roadway Safety and Infrastructure	Safer Roads	X
High accident rates in Cherokee and Craig counties.	Transportation Safety and Crash Data Analysis	Safer Roads	
Rear-end and fixed-object crashes are most common.	Transportation Safety and Crash Data Analysis	Safer Roads	X
Unsafe speed and impaired driving are leading causes of fatalities	Emergency Response and Law Enforcement Coordination	Multiple	
Fatality rate in the 14-county area: 1.24 per million vehicle miles traveled	Transportation Safety and Crash Data Analysis	Multiple	
22% of fatalities are due to unsafe speeds; 23% due to impaired driving	Emergency Response and Law Enforcement Coordination	Multiple	
Rural areas see more fatalities due to limited enforcement and poor road conditions	Roadway Safety and Infrastructure	Safer Roads	X
Engineering: Focus on improving rural roads, intersections, and bridges using TTP and other funding sources	Roadway Safety and Infrastructure	Safer Roads	X
Education: Programs like "Alive at 25," "Drive Sober or Get Pulled Over," and "Drive Aware OK" target young and impaired drivers	Public Education Safety Initiatives	Safer People	
Enforcement: Limited funding for tribal law enforcement; cross-deputization agreements help extend jurisdiction	Emergency Response and Law Enforcement Coordination	Safer People	X
Emergency Services: EMS coverage is uneven, especially in rural areas; CNEMS is nationally accredited and expanding	Emergency Response and Law Enforcement Coordination	Post Crash Care	X
Funding gaps exist for both infrastructure and non-infrastructure safety programs	Roadway Safety and Infrastructure	Multiple	
Jurisdictional complexity limits CNDOT's role in non-infrastructure safety efforts	Transportation Safety and Crash Data Analysis	Multiple	
Integrate crash data into planning	Emergency Response and Law Enforcement Coordination	Multiple	X

Cherokee Nation and Tribal Plans & Documents

Encourage state and tribal collaboration on safety statistics and rural road improvements.	Transportation Safety and Crash Data Analysis	Post Crash Care	X
Promote defensive driving, seatbelt use, and enhanced 911 systems	Public Education Safety Initiatives	Safer People	X
Cherokee Nation Highway Infrastructure Safety Plan – 2018			
Summary: The Cherokee Nation Highway Safety Plan identifies serious risks across its transportation network, particularly in rural areas where infrastructure and emergency services are underdeveloped. Fatality rates and impaired driving incidents exceed state and national averages, pointing to an urgent need for sustained, multi-faceted action. By leveraging funding from the Tribal Transportation Program and collaborating with federal and state agencies, the Cherokee Nation is positioned to make strategic safety improvements. Continued progress will depend on data-driven infrastructure investment, culturally relevant public education, enhanced enforcement, and robust emergency response systems.			
Transportation Safey Issues	Safety Category	Safe System Principles	Alignment with SS4A Plan
Lack of shoulders, poor road geometry, and limited visibility contribute heavily to rural accidents	Roadway Safety and Infrastructure	Safer Roads	X
Campaigns such as “Drive Sober or Get Pulled Over,” “Click-It or Ticket,” and “Drive Aware OK” promote driver awareness and behavioral change	Public Education Safety Initiatives	Safer People	X
Develop highway safety public messaging, to expand communications via existing media channels	Public Education Safety Initiatives	Safer People	
Training programs for tribal and local personnel (e.g., defensive driving, crash data collection) are available and beneficial for capacity-building	Public Education Safety Initiatives	Safer People	X
Impaired driving checkpoints and speed enforcement are supported by OHSO grants, though participation within the Nation varies	Emergency Response and Law Enforcement Coordination	Safer People	X
Enforcement coverage is limited in rural areas, where resource constraints reduce visibility and effectiveness	Emergency Response and Law Enforcement Coordination	Safer	
EMS coverage is inconsistent across the Nation. Some counties lack enhanced 911 services or have long EMS response times, especially in rural areas like Craig, Nowata, and Delaware counties	Emergency Response and Law Enforcement Coordination	Post Crash Care	X
The Cherokee Nation EMS (CNEMS) is nationally accredited and based in Tahlequah. It covers Cherokee County and supports nearby areas when possible but is currently at capacity	Emergency Response and Law Enforcement Coordination	Post Crash Care	
Rural Road Upgrades – Increase funding for county roads with unsafe geometry and surfaces	Roadway Safety and Infrastructure	Safer Roads	
Education Campaigns – Launch Cherokee-specific messaging around impaired driving, speeding, and seatbelt use	Public Education Safety Initiatives	Safer People	X
Data-Driven Planning – Use crash data to target high-risk corridors for safety enhancements	Transportation Safety and Crash Data Analysis	Multiple	X
Expand EMS and 911 Services – Improve coverage in rural areas with long emergency response times	Emergency Response and Law Enforcement Coordination	Post Crash Care	

Cherokee Nation and Tribal Plans & Documents

Stronger Enforcement Presence – Pursue more grant funding and collaboration for DUI and seatbelt enforcement	Emergency Response and Law Enforcement Coordination	Safer People	X

Cherokee Nation Long-Range Transportation Plan - 2018

Summary: The **Cherokee Nation Long-Range Transit Plan** views transportation safety not just as roadway engineering, but as **equitable access to mobility**. For many Cherokee citizens, especially in rural zones, the greatest threat to safety is **isolation**—from jobs, healthcare, and emergency services.

Transportation Safey Issues	Safety Category	Safe System Principles	Alignment with SS4A Plan
Eight out of 14 counties exceed the national average for commute time, with distances and isolation posing safety risks	Transportation Safety and Crash Data Analysis	Safer People	
Enhance data collection on rider safety needs	Transportation Safety and Crash Data Analysis	Safer People	
Reduce unsafe travel behaviors (e.g., unregulated carpools, walking on highways).	Public Education Safety Initiatives	Safer People	X

Options for Improving Transportation Safety in Tribal Areas - 2018

Summary: This report describes national trends, issues and options for addressing transportation safety topics. It also provides a list of areas to address in a safety plan for improving transportation safety. Actions can be taken to improve transportation safety and can be optimized when all safety professionals are working collaboratively with shared goals and strategies. Tribes can develop safety plans that examine crash history and establish communication links among all levels of government.

Transportation Safey Issues	Safety Category	Safe System Principles	Alignment with SS4A Plan
Establish data driven goals and implement strategies	Transportation Safety and Crash Data Analysis	Multiple	X
Develop and update safety plans	Multiple	Multiple	
Improve data collection and sharing	Transportation Safety and Crash Data Analysis	Multiple	X
Analyze crash data and contributing factors	Transportation Safety and Crash Data Analysis	Multiple	X
Improve usage rates	Emergency Response and Law Enforcement Coordination	Multiple	
Education and enforcement campaigns surrounding seatbelts, car seats, and helmets	Public Education Safety Initiatives	Safer People	X
Pursue primary seatbelt law	Emergency Response and Law Enforcement Coordination		
Keep vehicles in there lane of travel and minimize crash severity if the vehicle does leave it's lane of travel	Roadway Safety and Infrastructure	Safer Roads	
Install warning signs, road surface friction treatments, rumble strips, and maintain the roadways surface	Roadway Safety and Infrastructure	Safer Roads	X

Cherokee Nation and Tribal Plans & Documents

Flaten roadway slops, remove hazardous roadside objects, and update or install guardrail/barriers	Roadway Safety and Infrastructure	Safer People	
Enforce existing impaired driving laws with properly trained law enforcement staff	Emergency Response and Law Enforcement Coordination	Safer People	X
Coordinate and publicize education and enforcement campaigns	Public Education Safety Initiatives	Safer People	
Provide alternatives to driving/walking surrounding drinking establishments	Public Transit Safety Enhancements	Safer People	X
Provide safe infrastructure for walking, e.g. adequate walking paths, lighting, eliminate pedestrian hazards	Bicycle and Pedestrian Safety Initiatives	Safer Roads	X
Minimize exposure when crossing roadways and increase education on pedestrian safety	Bicycle and Pedestrian Safety Initiatives	Safer People	X
Optimize crash response times	Emergency Response and Law Enforcement Coordination	Post Crash Care	X
Provide medical training for law enforcement and volunteers	Emergency Response and Law Enforcement Coordination	Post Crash Care	
Provide training in basic incident management and collect performance measures	Emergency Response and Law Enforcement Coordination	Post Crash Care	
Assess communication protocols to optimize needs	Emergency Response and Law Enforcement Coordination	Post Crash Care	

Tribal Transportation Strategic Safety Plan - 2017

Summary: A Strategic Transportation Safety Plan should identify problems and guide a collaborative effort toward addressing the high-risk attributes of transportation infrastructure, human behavior, and vehicles. This Tribal Transportation Strategic Safety Plan offers an assessment of transportation safety needs in tribal areas and provides tribal governments with strategies and resources that can be utilized in the pursuit of saving lives.

Transportation Safey Issues	Safety Category	Safe System Principles	Alignment with SS4A Plan
Transportation safety plans require a collaborative and cyclical approach including engaging stakeholders, analyzing crash data, implementing safety measures, and evaluating outcomes	Multiple	Multiple	
Improved, accurate and comprehensive crash data collection is essential for planning safety interventions	Transportation Safety and Crash Data Analysis	Multiple	X
Enforce seat belt and child safety seat laws, conduct seat belt usage education campaigns and establish child safety seat inspection stations	Multiple	Safer People	
Install rumble strips and guardrails, enhance road markings and warning signs, implement better roadway lighting and visibility measures	Roadway Safety and Infrastructure	Safer Roads	X
Implement sobriety checkpoints, expand community education and alternative transportation options	Emergency Response and Law Enforcement Coordination	Safer People	X
Improve pedestrian pathways and crosswalks, increase road lighting and educate both pedestrians and drivers about safe practices	Roadway Safety and Infrastructure	Safer Roads	X

Enhance training for law enforcement in emergency medical response and improve dispatch & communication systems	Emergency Response and Law Enforcement Coordination	Post Crash Care	
Increase the availability of air ambulance services and medical facilities	Emergency Response and Law Enforcement Coordination	Post Crash Care	
Speed limit enforcement and traffic calming measures	Multiple	Safer Roads	X
Public awareness campaigns on the dangers of texting while driving	Public Education Safety Initiatives	Safer People	
Graduated licensing programs for young drivers and educational initiatives on safe driving for older adults	Public Education Safety Initiatives	Safer People	X
Develop off-road vehicle safety guidelines	Multiple	Safer People	
Install wildlife crossings and fencing to reduce animal-related accidents	Roadway Safety and Infrastructure	Safer Roads	
Tribal Governments & Transportation Safety Data - 2016			
Summary: Improving transportation safety for tribal communities requires a comprehensive approach, including better crash data collection, enhanced collaboration between agencies, increased use of technology, and expanded funding opportunities. By addressing these key challenges, the federal government and tribal nations can work together to reduce traffic fatalities and injuries in tribal areas, ultimately creating safer transportation systems for American Indian/Alaska Native (AI/AN) populations.			
Transportation Safey Issues	Safety Category	Safe System Principles	Alignment with SS4A Plan
Challenges: Underreported crash data, lack of standardized data collection and limited access to federal and state funding due to poor/incomplete data reporting	Transportation Safety and Crash Data Analysis		
Recommendations:			
Enhance crash data quality - Encourage the use of Model Minimum Uniform Crash Criteria (MMUCC) to standardize crash reports across tribal, state, and federal agencies	Transportation Safety and Crash Data Analysis	Multiple	X
Encourage the use of Model Minimum Uniform Crash Criteria (MMUCC) to standardize crash reports across tribal, state, and federal agencies	Transportation Safety and Crash Data Analysis	Multiple	X
Establish training programs for tribal law enforcement to improve crash reporting accuracy and completeness	Transportation Safety and Crash Data Analysis	Safer People	
Improve data sharing and integration:			
Develop partnerships between the Federal Highway Administration (FHWA), National Highway Traffic Safety Administration (NHTSA), and Bureau of Indian Affairs (BIA) to integrate tribal crash data into national databases	Transportation Safety and Crash Data Analysis	Multiple	
Create a centralized crash data clearinghouse to facilitate information sharing between tribal, state, and federal authorities	Transportation Safety and Crash Data Analysis	Multiple	X
Expand technology use:			

Implement Geographic Information System (GIS) mapping to improve crash location tracking and safety analysis	Transportation Safety and Crash Data Analysis	Post Crash Care	X
Encourage the use of electronic crash reporting systems to replace paper-based reports and improve data accuracy	Transportation Safety and Crash Data Analysis	Post Crash Care	
Enhance funding opportunities:			
Ensure tribes can access Tribal Transportation Program Safety Funds (TTP Safety Funds) by allowing applications using alternative safety data sources	Multiple	Safer People	
Provide technical assistance to tribes in applying for state and federal grants	Multiple	Safer People	X
Strengthen law enforcement collaboration:			
Develop Memorandums of Understanding (MOUs) between tribal and state law enforcement agencies to facilitate data sharing	Transportation Safety and Crash Data Analysis	Safer People	
Provide training for tribal police on crash investigation and reporting best practices	Emergency Response and Law Enforcement Coordination	Post Crash Care	
Safe Routes to School in Tribal Communities			
Summary: The Safe Routes to School initiative in Tribal Communities is a vital program that enhances transportation safety, public health, and environmental sustainability. By addressing infrastructure deficiencies, engaging communities, and leveraging funding opportunities, tribal nations can create safer and healthier school commutes for children while strengthening community connections.			
Transportation Safey Issues	Safety Category	Safe System Principles	Alignment with SS4A Plan
Encourages walking and bicycling as safe and viable options for students	Bicycle and Pedestrian Safety Initiatives	Safer People	
Improves traffic safety around schools by enhancing infrastructure such as crosswalks and bike lanes	Bicycle and Pedestrian Safety Initiatives	Safer Roads	X
Lack sidewalks or bike lanes, and have high-speed roads without adequate traffic controls	Bicycle and Pedestrian Safety Initiatives	Safer Roads	
Pedestrian and Bicycle Paths: Development of dedicated lanes and trails for safer travel	Bicycle and Pedestrian Safety Initiatives	Safer Roads	
Traffic Control Measures: Installation of crosswalks, pedestrian signals, speed bumps, and roundabouts to slow down traffic near schools	Roadway Safety and Infrastructure	Safer Roads	X
Improved Lighting: Increased street lighting in school zones to enhance visibility and safety	Roadway Safety and Infrastructure	Safer Roads	X
Signage and Road Markings: Clear, multilingual signage to guide students and drivers in school zones	Roadway Safety and Infrastructure	Safer Roads	
Programmatic Initiatives: Remote drop-off programs, traffic enforcement and speed reduction, community engagement & education	Bicycle and Pedestrian Safety Initiatives	Safer People	X

Appendix E

Existing Plans and Document Review Analysis

Oklahoma Statewide Plans & Documents

Oklahoma Triennial Highway Safety Plan - 2024			
Summary: The Oklahoma Triennial Highway Safety Plan (FY2024-FY2026) outlines a comprehensive and proactive approach to improving road safety. By leveraging enforcement, education, engineering, and emergency response strategies, the plan aims to make Oklahoma's roadways safer for all users. Through ongoing collaboration and data-driven interventions, the state is committed to reducing traffic-related fatalities and injuries in the coming years.			
Transportation Safey Issues	Safety Category	Safe System Principles	Alignment with SS4A Plan
High-Visibility Enforcement (HVE): Sobriety checkpoints and saturation patrols targeting impaired drivers	Emergency Response and Law Enforcement Coordination	Safer People	X
Public Education and Awareness: Campaigns such as "ENDUI" to inform the public about the dangers of impaired driving	Public Education Safety Initiatives	Safer People	
Judicial and Law Enforcement Training: Specialized programs to improve DUI enforcement and prosecution effectiveness	Future Safety-Focused Transportation Projects		
Improved Drug and Alcohol Testing: Enhanced laboratory capabilities for accurate detection and processing of DUI cases	Future Safety-Focused Transportation Projects		
Seat Belt Enforcement Campaigns: Programs like "Click It or Ticket" to increase compliance	Emergency Response and Law Enforcement Coordination	Safer People	X
Child Passenger Safety Programs: Distribution of car seats and child restraint inspections	Public Education Safety Initiatives	Safer People	
Public Awareness and Training: Educating communities on the importance of seat belt and child restraint use	Public Education Safety Initiatives	Safer People	X
Automated Enforcement Technologies: Red-light cameras and speed monitoring devices	Roadway Safety and Infrastructure	Safer Roads	X
Targeted Enforcement Programs: Increased patrols in high-crash zones	Emergency Response and Law Enforcement Coordination	Safer Speeds	X
Public Education Campaigns: Messaging to promote responsible driving behavior	Public Education Safety Initiatives	Safer People	
Infrastructure Improvements: Installation of crosswalks, pedestrian signals, and bike lanes	Bicycle and Pedestrian Safety Initiatives	Safer Roads	X
Community Engagement: Programs to educate road users on safe walking and cycling practices	Bicycle and Pedestrian Safety Initiatives	Safer People	X
Law Enforcement Support: Targeted enforcement in areas with high pedestrian and cyclist activity	Bicycle and Pedestrian Safety Initiatives	Safer Speeds	
Graduated Driver Licensing (GDL) Support: Strengthening laws and enforcement for new drivers	Public Education Safety Initiatives	Safer People	
Teen Driver Education Initiatives: School-based programs and parental involvement strategies	Public Education Safety Initiatives	Safer People	

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Awareness Campaigns: Efforts to reduce risky behaviors such as texting while driving	Public Education Safety Initiatives	Safer People	

Oklahoma DOT Strategic Highway Safety Plan - 2023

Summary: The 2023-2028 SHSP provides a comprehensive, data-driven framework to enhance traffic safety across Oklahoma. By focusing on key emphasis areas and leveraging advanced technologies, enforcement strategies, and public engagement, the state aims to significantly reduce fatalities and serious injuries. Ultimately, moving toward a safer roadway system for all users.

Transportation Safey Issues	Safety Category	Safe System Principles	Alignment with SS4A Plan
Lane Departures: Most common type of crash in Oklahoma	Roadway Safety and Infrastructure		
Lane Departures: Strategies include installing cable barriers, rumble strips, high-friction surface treatments, and improving road design to mitigate risks	Roadway Safety and Infrastructure	Safer Roads	X
Impaired Driving: Education programs like AlcoholEdu for high school	Public Education Safety Initiatives	Safer People	
Impaired Driving: Law enforcement efforts such as high-visibility patrols and sobriety checkpoints	Emergency Response and Law Enforcement Coordination	Safer Speeds	X
Occupant Protection: Programs like "Click It or Ticket" and legislative efforts to expand seat belt requirements aim to increase compliance	Emergency Response and Law Enforcement Coordination	Safer People	
Occupant Protection: Public education campaigns target high-risk groups, including young drivers and pickup truck occupants, who have lower seat belt usage rates	Public Education Safety Initiatives	Safer People	
Unsafe Speeds: Strategies to manage speed include engineering solutions, public awareness campaigns, and strict law enforcement	Emergency Response and Law Enforcement Coordination	Safer Speeds	
Intersections: Countermeasures include installing roundabouts, improving signage and lighting, and using Intersection Control Evaluation to select optimal designs	Roadway Safety and Infrastructure	Safer Roads	X
Commercial Motor Vehicles (CMVs) and Work Zones: Enforcement focuses on addressing risky driver behavior, such as speeding and following too closely	Emergency Response and Law Enforcement Coordination	Safer Speeds	
Commercial Motor Vehicles (CMVs) and Work Zones: ODOT has implemented educational programs targeting teen drivers & CMV operators to promote work zone safety	Public Education Safety Initiatives	Safer People	
Motorcycle and All-Terrain Vehicle (ATV) Crashes: Safety programs emphasize helmet use, rider education, and public awareness initiatives	Public Education Safety Initiatives	Safer People	

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Vulnerable Road Users (VRU) Safety: Strategies to enhance VRU safety include improved crosswalks, better lighting, reduced speed limits, and targeted law enforcement	Roadway Safety and Infrastructure	Safer Roads	X
Vulnerable Road Users Education: Public education campaigns focus on safe crossing behaviors and driver awareness	Public Education Safety Initiatives	Safer People	X
Oklahoma Public Transit Policy Plan - 2020			
Summary: The Oklahoma Public Transit Policy Plan integrates various safety measures to reduce traffic-related incidents and enhance the overall security of transit users. By investing in infrastructure, driver training, technology, and emergency preparedness, the state aims to create a safer and more efficient public transportation system. Addressing existing challenges and leveraging new opportunities will be key to achieving long-term traffic safety goals.			
Transportation Safey Issues	Safety Category	Safe System Principles	Alignment with SS4A Plan
Expansion of dedicated transit lanes to reduce conflicts between buses and private vehicles	Roadway Safety and Infrastructure	Safer Roads	
Enhanced lighting, signage, and visibility at transit stops to protect pedestrians and waiting passengers	Bicycle and Pedestrian Safety Initiatives	Safer Roads	X
Investments in bus shelters and designated pick-up/drop-off points to minimize unsafe boarding and exiting	Bicycle and Pedestrian Safety Initiatives	Safer Roads	X
Encouraging the use of public transportation to decrease the number of private vehicles on the road, thus reducing overall traffic accidents	Public Education Safety Initiatives	Safer People	
Enhancing collaboration between transit agencies and local law enforcement to identify high-risk areas and implement safety interventions	Emergency Response and Law Enforcement Coordination	Safer Speeds	X
Implementing speed management strategies around transit hubs and pedestrian-heavy areas	Bicycle and Pedestrian Safety Initiatives	Safer Roads	X
Comprehensive training programs for transit operators, including defensive driving and emergency response procedures	Public Education Safety Initiatives	Safer People	
Strict enforcement of drug and alcohol testing policies to ensure that transit operators maintain the highest levels of safety	Emergency Response and Law Enforcement Coordination	Safer People	
Ongoing safety audits and performance reviews for transit drivers to reinforce best practices and prevent unsafe driving behaviors	Public Education Safety Initiatives	Safer People	
Installation of collision avoidance systems, automatic braking, and onboard cameras to enhance passenger and driver safety	Future Safety-Focused Transportation Projects	Safer Vehicles	
Implementation of electronic fare collection and contactless payment options to reduce conflicts between passengers and drivers	Future Safety-Focused Transportation Projects	Safer Vehicles	
Designing transit routes with dedicated bicycle lanes and pedestrian pathways to minimize conflicts between different modes of transportation	Bicycle and Pedestrian Safety Initiatives	Safer Roads	

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Promoting public awareness campaigns on transit safety, focusing on proper pedestrian behavior around buses and transit stops	Bicycle and Pedestrian Safety Initiatives	Safer People	X
Encouraging "complete streets" policies that prioritize safe access for all road users, including those relying on public transit	Future Safety-Focused Transportation Projects	Safer People	X
Development of emergency response protocols in coordination with local authorities and first responders	Emergency Response and Law Enforcement Coordination	Post Crash Care	X
Implementation of communication networks to alert passengers of emergencies and alternate routes in real-time	Future Safety-Focused Transportation Projects	Safer People	
Increased state and federal investment in transit safety programs	Future Safety-Focused Transportation Projects	Safer People	
Enhanced data collection and analysis to identify high-risk areas and deploy targeted safety measures	Roadway Safety and Infrastructure	Safer Roads	X
Public-private partnerships to support the adoption of innovative transit safety technologies	Public Education Safety Initiatives	Safer People	

Appendix F

Safety Issues – Recommended Countermeasures and CMF

Safer Roads

Safety Category	Safety Concern/Issue	Strategies & Countermeasures	CMF (Crash Modification Factor)	Implementation Term
Intersections	No or limited overhead signs, one-way, do not enter signs, no signal heads, move heads closer to stop bar, left turn signs confusing/missing, no left side heads, no right lane must turn right signs, need flashing beacons, no or limited speed limit signs, intersection ahead signs, crossroad signs, pedestrian crossing, no right arrow lens.	Install, improve traffic control devices/signal heads	0.56 (Install signal head)	Short-Term / Medium-Term
			0.78 (Installing stop signs at an unsignalized intersection)	
		Dedicated turn lanes at intersections	0.73 (Install left turn lane)	Medium-Term
			0.834 (Install right turn lane)	
		Consider roundabout as an alternative to enhance safety and operations specially in high crash intersections		Medium-Term / Long-Term
	Visibility obstructed from signal heads and crosswalks	Remove all line-of-sight obstructions	0.62 (Remove fixed object)	Short-Term
	Need to evaluate signal timing	Improve signal timing	0.678 (Install adaptive traffic signal control)	Short-Term / Medium-Term
	Travel lanes not properly aligned	Re-align travel lanes	-	Medium-Term
	Crosswalk may interfere with traffic line of sight	Re-alignment of crosswalk	-	Medium-Term
	No paved shoulders	Improve paved shoulder width	$CMF = e^{-0.070(SW_{new} - SW_{existing})}$ Where: SW_{new} = new (or proposed) average paved shoulder width in feet $SW_{existing}$ = existing average paved shoulder width in feet	Medium-Term / Long-Termf
	Lane drop pavement markings needed	Installation of proper road markings/striping	0.865 (Implement systemic signing and making improvements)	Short-Term
	Study speed zones for speed limit adjustments, no or limited speed limit signs	Conduct speed zone studies. Install or re-set speed limit signs		

Safer Roads (cont.)				
Safety Category	**Safety Concern/Issue**	**Strategies & Countermeasures**	**CMF (Crash Modification Factor)**	**Implementation Term**
Roadway Departure	Existing paved shoulders need rumble strips	Safety edges – or minimal edges no drop offs	0.59 - 0.868 (Install safety edge treatment)	Medium-Term
		Install cable barriers and median barriers	0.16 (Install cable median barriers)	Long-Term
		Install rumble strips in rural areas	0.76 - 1.18 (Install rumble strips)	Short-Term
	Pavement markings need refurbishing	Install proper road markings/striping	0.78 - 0.85 (Install edge line pavement marking on rural roads)	Short-Term
			0.153 - 0.509 (Modify/Install wrong way sign)	
	No or narrow paved shoulders	Improve paved shoulder width	0.57 (Add new paved shoulder) modify shoulder on rural road	Medium-Term / Long-Term
	No delineators, no Type 3 delineators	Install delineator posts	0.85 - 1.04 (Install post mounted delineator)	Short-Term / Medium-Term
			0.55 (Install edge lines, centerlines, post mounted delineator)	
	Steep ditches	Reduce ditch angles	-	Long-Term
	Sidewalk close to road	Re-align roadway or sidewalk	-	Long-Term
	Dirt roads, or poor road conditions	Resurface roads and improve bridges	0.74 - 1.03 (Change street surface condition from poor to good)	Long-Term

Safer Roads (cont.)				
Safety Category	**Safety Concern/Issue**	**Strategies & Countermeasures**	**CMF (Crash Modification Factor)**	**Implementation Term**
Poor signage	No or needed road signs (curve, no passing, crossroad, speed advisory, speed limit, icy bridge, mail truck stopping, stop ahead, mixture of ununiform regulator & warning, chevron, school bus warning, end divided highway)	Inventory all signs (curve, icy bridge, stop ahead, signal ahead, no passing, etc.) and install	0.85 - 0.93 (Install sign to conform to MUTCD)	Short-Term / Medium-Term
Poor line of sight	Visibility issues with seeing signal heads and crosswalks	Re-align roadway, clear all visual obstructions	0.62 (Remove fixed object)	Short-Term / Medium-Term
			0.93 (Improve visibility of signal head)	
			0.6 (Install high visibility crosswalk)	
Pedestrian/bike safety	Pedestrian/bike facility	Improving pedestrian crossings are recommendations based on data analysis	-	Short-Term / Medium-Term
		Provide safe infrastructure for walking, e.g. adequate walking paths, lighting, eliminate pedestrian hazards	0.52 (Install pedestrian fencing)	Medium-Term
			0.82 (Pedestrian crosswalk at midblock)	
		Improve facilities and infrastructure risks to non-motorized users	0.86 (Median treatment)	Medium-Term
			0.6 (Install high-visibility crosswalk)	
		Vulnerable Road Users: reduced speed limits, and targeted law enforcement	$CMF = e^{(-0.06230*[Y-X])}$ **Y = proposed posted speed limit in MPH** **X = existing posted speed limit in MPH**	Short-Term
	School bus stop not delineated	Better school bus stop delineation	0.63 (High visibility yellow, continental crosswalk type at schools)	Short-Term
			0.18 (Presence of bus stop)	
		Add dedicated bicycle lanes	0.552 (Install separated bike lanes)	Medium-Term / Long-Term

Safer People

Safer People				
Safety Category	**Safety Concern/Issue**	**Strategies & Countermeasures**	**CMF (Crash Modification Factor)**	**Implementation Term**
Pedestrian/Bike Safety	Community engagement & education, student drop-off programs	Conduct community education & establish school drop-off procedures	-	Short-Term
	Limited rural transit service	Collaboration with Ki Bois Area Transit (KATS) to expand coverage	-	Medium-Term
	Transit reliability for daily commuters	Optimize and update public transit schedules for safety and reliability	-	Medium-Term
	Lack of public transit access	Expand transit services	-	Long-Term
	Lack of transit prioritization	Implement transit signal and lane priority	0.806 – 0.836	Medium-Term / Long-Term
	Unsafe walking and cycling habits	Launch road user education programs for walking and cycling safety	-	Short-Term
	Unsafe crossing behaviors and low driver awareness	Launch public education campaigns	-	Short-Term
	Child pedestrian safety near schools	Implement Safe Routes to School programs	0.87	Medium-Term
High-Risk Driving Behaviors	Aggressive / inattentive driving	Run public education campaigns for safe driving	-	Short-Term
	High-risk maneuvers (failed to yield, following too closely, unsafe turns)	Enhance driver education programs in schools	-	Medium-Term
Distracted Driving, Speeding	Lack of awareness about emergency safety behavior	Launch public awareness campaigns during emergencies	-	Short-Term
	Texting while driving	Organize public pop-up events and campaigns on distracted driving dangers	-	Short-Term
Drug-Impaired Driving	Insufficient law enforcement training	Train law enforcement on impaired driving detection	-	Short-Term / Medium-Term
	Impaired driving (alcohol, drugs)	High-Visibility Enforcement: Sobriety checkpoints & saturation patrols	-	Short-Term
Occupant Safety	Seatbelt and child seat non-compliance	Promote High Visibility Enforcement (HVE) campaigns for occupant protection	-	Short-Term

Safer Speeds

Safer Speeds				
Safety Category	**Safety Concern/Issue**	**Strategies & Countermeasures**	**CMF (Crash Modification Factor)**	**Implementation Term**
High Risk Driving Behaviors	Lack of coordinated enforcement on violations	Collaboration with multiple agencies to enhance enforcement efforts	-	Medium-Term
	Speeding, failed to yield, alcohol/drug, crash clusters	Increased and coordinated Law Enforcement HVE in HIN and hot spots	-	Short-Term
Speeding	Speed violations in targeted areas	Install speed safety cameras	0.865 (Install fixed speed camera)	Medium-Term
	Recurring speeding in neighborhood or corridor	Deploy speed trailers	-	Short-Term
	Excessive speed and aggressive driving	Implement speed limit enforcement & traffic calming measures	-	Medium-Term / Long-Term
Speed Limit Signage	Missing or limited speed limit signs	Conduct speed limit sign inventory and install missing signs	0.92 (Install variable speed limit sign)	Short-Term
Speed Advisory Signage	Missing advisory signs at curves	Install advisory speed signs at curves	0.92 (Install variable speed limit sign)	Short-Term
Speed Monitoring	Lack of real-time speed feedback	Install speed monitoring devices (intersection safety devices)	0.66 - 0.936 (Install safety device)	Short-Term / Medium-Term

Post Crash Care

Post Crash Care				
Safety Category	**Safety Concern/Issue**	**Strategies & Countermeasures**	**CMF (Crash Modification Factor)**	**Implementation Term**
Crash Scene Safety and Response	Delayed EMS and emergency response times	Enhance EMS and emergency response times	-	Short-Term
	Need for better interagency communication & coordination	Enhance emergency response through collaboration with multiple agencies and disciplines	-	Medium-Term
	Resource limitations during large-scale incidents	Develop Memorandums of Understanding (MOUs) with neighboring jurisdictions & transit agencies	-	Medium-Term / Long-Term
	Lack of structured emergency operation procedures	Development of emergency response operation plans with local authorities & first responders	-	Medium-Term

Appendix G

SS4A Safety Action Plan Reference Document

Cherokee Nation - SS4A Certification Reference Table

Leadership Commitment and Goal Setting		
Chapter, Section	Text	Page #
A Message from Principal Chief Hoskin	The Nation's goal year of 2045 and accompanying fatal and serious injury crash percentage reduction goals of 10 percent by 2030, 25 percent by 2035, 34 percent by 2045.	vi
Executive Summary	"The Safety Action Plan is posted on the Cherokee Nation website…. (it) is reviewed annually by the Cherokee Nation Oversight Committee"	vii

Planning Structure		
Chapter, Section	Text	Page #
2.4.1	Cherokee Nation operates under a well-defined governance structure that provides the Tribal government with the authority to plan, manage, and oversee transportation infrastructure…"	21
2.4.2	"…of the development of a SS4A Action Plan, the CNDOT formed a Project Oversight Team."	22

Safety Analysis		
Chapter, Section	Text	Page #
3.2.1	"According to the FHWA injury classification scale and definitions for Oklahoma, collisions are ranked on a severity scale of 1 to 5, categorized as follows…."	23
3.2.3	"Understanding the factors that contribute to crashes is crucial for identifying key safety concerns and implementing effective countermeasures."	27
5.1	"…various datasets provided by the USDOT were analyzed, including the American Community Survey (ACS) data related to American Indians and Alaska Natives (AIAN) populations and vehicle ownership."	48

Engagement and Collaboration		
Chapter, Section	Text	Page #
4.1	"An engagement plan was developed early in the process to gather input. Community input was key to ensuring issues regarding roadway safety from their perspectives were brought forward as the many who drive, walk, or bike in Cherokee Nation. The following groups were invited to participate in the planning process:"	40
4.2	Stakeholder and public meetings: Two rounds of stakeholder and public meetings were conducted in each region.	42

Cherokee Nation - SS4A Certification Reference Table

4.1	“Cherokee Nation’s geographic area was divided into three regions-North, South, and Urban-to personalize the crash data to each region.”	41
4.2	“To provide the most opportunity for public and stakeholder participation, in person and virtual engagement options were made available from September 2024 to February 2025.”	42

Policy and Process Changes		
Chapter, Section	Text	Page #
6.1	“…relevant, existing, and available Cherokee Nation plans and procedures were collected and reviewed, including plans and documents from federal, state and county governments.”	55
6.2	“Federal and Tribal plans that address transportation safety were collected and reviewed.”	55
6.7	“Several plans were reviewed from the federal and state levels, including those from Cherokee Nation. Many of these planning documents prominently featured safety-related themes. It is suggested that each county within Cherokee Nation review and consider adopting or supporting the Cherokee Nation SS4A Safety Action Plan and participate in its implementation.”	58

Strategy and Project Selection		
Chapter, Section	Text	Page #
7	“It outlines systemwide priorities, funding opportunities, and accountability measures to ensure progress. Together, these actions provide a roadmap for implementing the Safe System Approach and advancing safety across the Cherokee Nation.”	60
7.1	“This network is pivotal as it forms the foundation upon which all subsequent safety initiatives and projects will be based.”	60
7.3	“a comprehensive safety analysis was conducted to identify areas for improvement using data-driven insights. These recommendations align with the FHWA's Safe System Approach, ensuring a proactive stance on safety enhancements across the reservation.”	61
7.3	“Identified safety concerns, recommended countermeasures, and nationally identified Crash Modification Factors (CMFs) to support a data-driven approach to prioritizing and implementing safety improvement projects are summarized in Appendix G.”	62

Cherokee Nation - SS4A Certification Reference Table

Progress and Transparency		
Chapter, Section	Text	Page #
7.6	"Transparency and regular reporting ensure accountability and community engagement. Consider these measures: • Dedicate space to transportation safety on the CNDOT website. • Provide the ability for the public to provide input. • Disseminate training and safety brochures to schools and community centers."	64
8.1	"To track the progress of the Safety Action Plan it is recommended that an oversight committee should be formed. This committee should meet annually… with the goal of ensuring progress in the implementation of all aspects of the plan…"	65
8.5	"Collecting and analyzing data is vital for tracking progress and identifying areas for improvement."	68

Action Plan Date		
Document	Date Finalized	Page #
Cherokee Nation SS4A Comprehensive Safety Action Plan	TBD	All