NWA Regional
VISION ZERO

Northwest Arkansas
Safety Action Plan

June 2023 | DRAFT

NWA
Regional
Planning
Commission

Fayetteville, AR | Credit: NWAonline, Spencer Tirey


15 years
to ZERØ

FEDERAL PARTICIPATION: This notice is in accordance with the Northwest Arkansas Regional Planning Commission (NWARPC) 2045 Metropolitan Transportation Plan, the Federal Infrastructure Investment and Jobs Act (IIJA) in cooperation with local agencies, the Arkansas Department of Transportation (ARDOT), the Missouri Department of Transportation (MoDOT), the Federal Highway Administration (FHWA), and the Federal Transit Administration (FTA). This document was funded in part through grant(s) from the FHWA, FTA, and/or the United States Department of Transportation. The views and opinions of the NWARPC expressed herein do not necessarily state or reflect those of the United States Department of Transportation.

Contents

List of Abbreviations

ACAT: Arkansas Crash Analytics Tool

ACS: American Community Survey

AR: Arkansas

ARDOT: Arkansas Department of Transportation

ATSDR: Agency for Toxic Substances and Disease Registry

CDC: Centers for Disease Control and Prevention

DUI: Driving Under the Influence

FHWA: Federal Highway Administration

FTA: Federal Transit Administration

GTFS: General Transit Feed Specification

HIN: High Injury Network

KABCO: Injury Severity Scale (Arkansas):

- K: Fatal injury
- A: Suspected serious injury
- B: Suspected minor injury
- C: Possible injury
- O: No apparent injury

Injury Severity Scale (Missouri)

- 1: Fatal
- 2: Disabling
- 3: Evident – Not Disabling
- 4: Probable – Not Apparent
- 5: None Apparent

KSI: Killed or Serious Injury (K and A on KABCO scale also 1 and 2 on Injury scale)

LRS: Linear Referencing System

MO: Missouri

MODOT: Missouri Department of Transportation

MP: Mile Post

NWA: Northwest Arkansas

NWARPC: Northwest Arkansas Regional Planning Commission

OSM: OpenStreetMap

PCSi: Proven Safety Countermeasure initiative

RRFB: Rectangular Rapid Flashing Beacon

SRTS: Safe Routes to School

STARS: Missouri Statewide Traffic Accident Records System

SVI: Social Vulnerability Index

TDM: Transportation Demand Management

USDOT: United States Department of Transportation

VRU: Vulnerable Road User includes Pedestrian, Bicyclists, or Motorcyclist*

**Note this Plan is using the National Safety Council definition that includes Motorcycles. USDOT does not include motorcycles in their definition and only includes non-motorized users.*

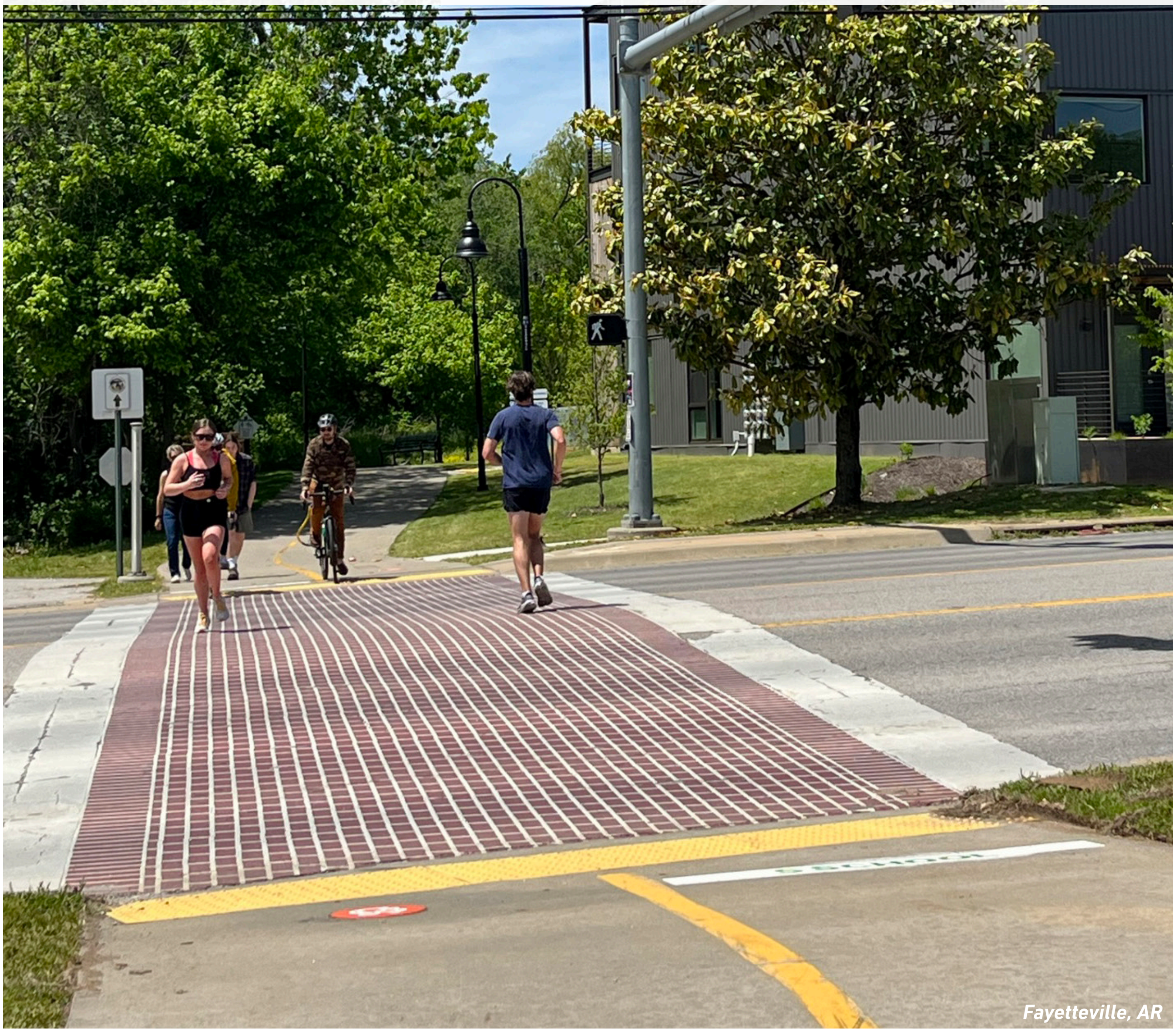
NWARPC Members

Avoca
Bella Vista
Benton County
Bentonville
Cave Springs
Centerton
Decatur
Elkins
Elm Springs
Farmington
Fayetteville
Garfield
Gateway
Gentry
Goshen
Gravette
Greenland
Highfill
Hindsville*
Huntsville*
Jane, Missouri
Johnson
Lincoln
Little Flock
Lowell
McDonald County, Missouri
Pea Ridge
Pineville, Missouri
Prairie Grove
Rogers
Siloam Springs
Springdale
Springtown
Sulphur Springs
Tontitown
Washington County
West Fork
Winslow
ARDOT
MODOT
Beaver Water District*
Razorback Transit
University of Arkansas*
National Airport Authority

**Indicates non-voting member*

15 years to ZERØ

The Northwest Arkansas Vision Zero Safety Action Plan (NWA Vision Zero Plan) recognizes that one life lost within the region's transportation network is one too many and something must change. The Northwest Arkansas Regional Planning Commission (NWARPC) has developed this Plan and sets a target to eliminate all killed and serious injury (KSI) crashes that occur on the regional roadway network by 2038. Although the horizon is 15 years from the development of this Plan, action starts now. Traditional safety strategies have not proven to decrease the number of life-altering crashes, highlighted by the increase of fatal crashes in recent years. This Plan emphasizes a shift towards the prioritization of safe, accessible, and equitable mobility for all roadway users and away from the disproportionate focus on moving vehicles efficiently—less delay that often results in higher speeds.



Fayetteville, AR

Executive Summary

The purpose of the NWA Vision Zero Plan is to emphasize change related to traffic safety because fatal and serious injury crashes cannot be tolerated. The Plan outlines strategies and actions that should be taken within the next ten years, yet it must not be considered unchangeable. As a living document, this Plan must be dynamic to address safety in a region that is experiencing rapid growth. The recommended actions included are meant to be a starting point, not an all-encompassing list. Over time, the actions taken by the NWARPC, member agencies, and partner organizations should measure and report actions that are proving to reduce fatal and serious injuries along with continuing to incorporate safety innovations and opportunities to eliminate traffic fatalities and injuries as time passes.

The NWA Vision Zero Plan is organized into four sections. An overview of each section is provided below to serve as a summary of the Plan in its entirety.

1. A Paradigm Shift

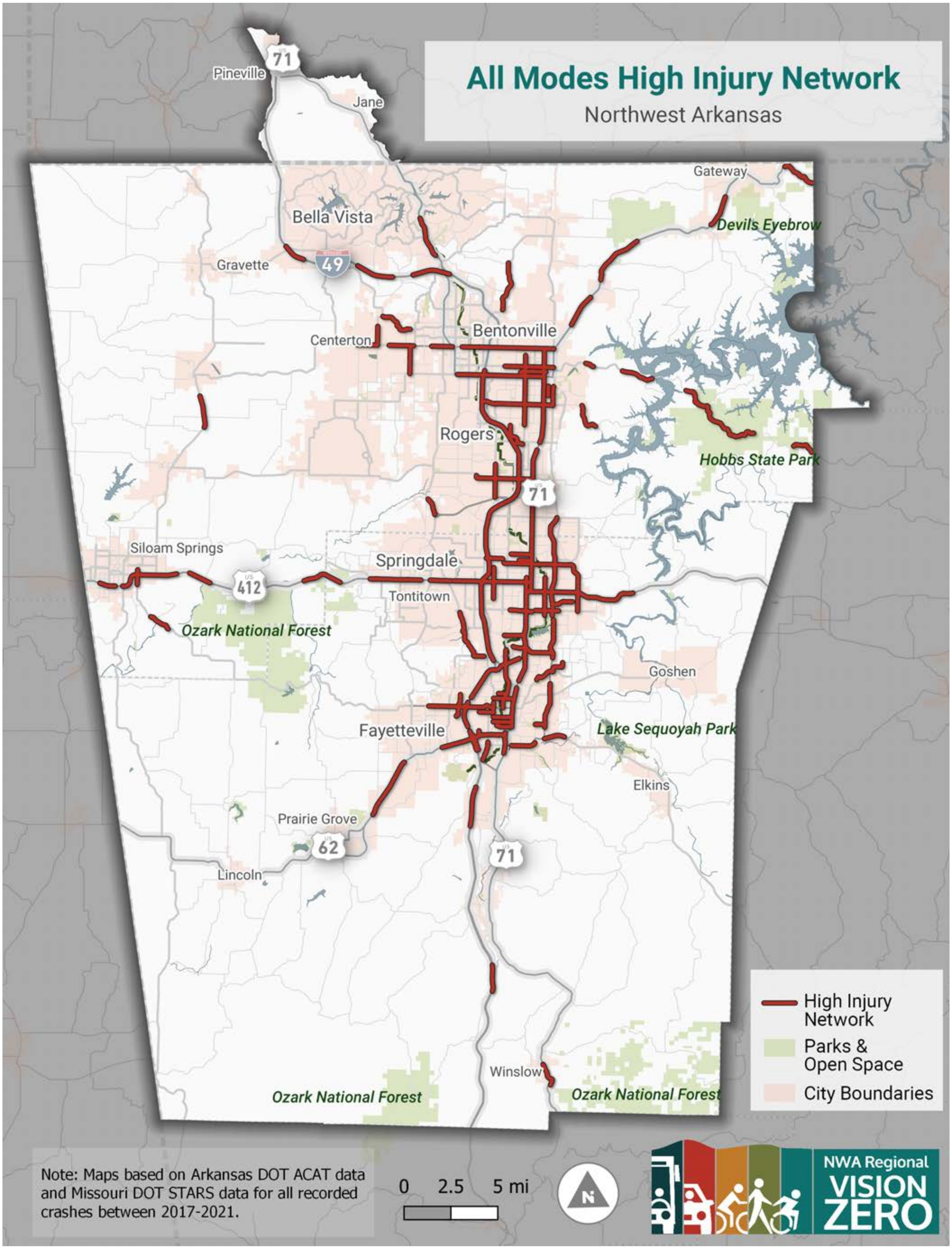
Fatal and serious injury crashes have increased across the nation, the state of Arkansas, and in the Northwest Arkansas Region. In the traditional approach to roadway safety, traffic deaths have been understood as inevitable. This alone is not acceptable and therefore a new approach to safety is needed. This section describes how Vision Zero is grounded in the Safe System Approach that anticipates human mistakes and ensuring that when collisions occur that they do not result in death or serious injury. A clear understanding of the Principles and Elements of the Safe System Approach is foundational to the NWA Vision Zero Plan and will be instrumental in increasing safety for all roadway users moving forward.

2. Roadway Safety in NWA

Crashes over a 5-year period (2017-2021) resulted in 220 people—mothers, fathers, children, grandparents, friends, and coworkers—losing their lives in Northwest Arkansas. An average of 44 people each year; however, 2021 alone was a year when 55 people died in roadway crashes—a 25% increase from the five year average. These sobering numbers are part of today's roadway safety narrative in Northwest Arkansas. This section reviews existing plans, policies, and programs that are already in place that are attempting to increase safety in several communities in the region. It notes opportunities for communities to refine or add policies that can impact safety through capital projects and new development. This section uses crash data to establish a High Injury Network (HIN)—representing the corridors in Northwest Arkansas with the highest number of fatal and serious injury crashes. Along with the HIN, the Plan identifies historically disadvantaged communities, areas of persistent poverty, and locations with varying degrees of social vulnerability to understand where equitable investments can be made to increase safety for people that may be disproportionately impacted.

Traditional Approach	vs.	Vision Zero
Traffic deaths are inevitable		Traffic deaths are preventable
Aims to fix humans		Changes systems
Expects perfect human behavior		Integrates human failure
Prevents collisions		Prevents fatal and serious crashes
Exclusively addresses traffic engineering		Considers the road system as a whole
Doesn't consider disproportionate impacts		Regards road safety as an issue of social equity

High Injury Network Map



3. Community Outreach

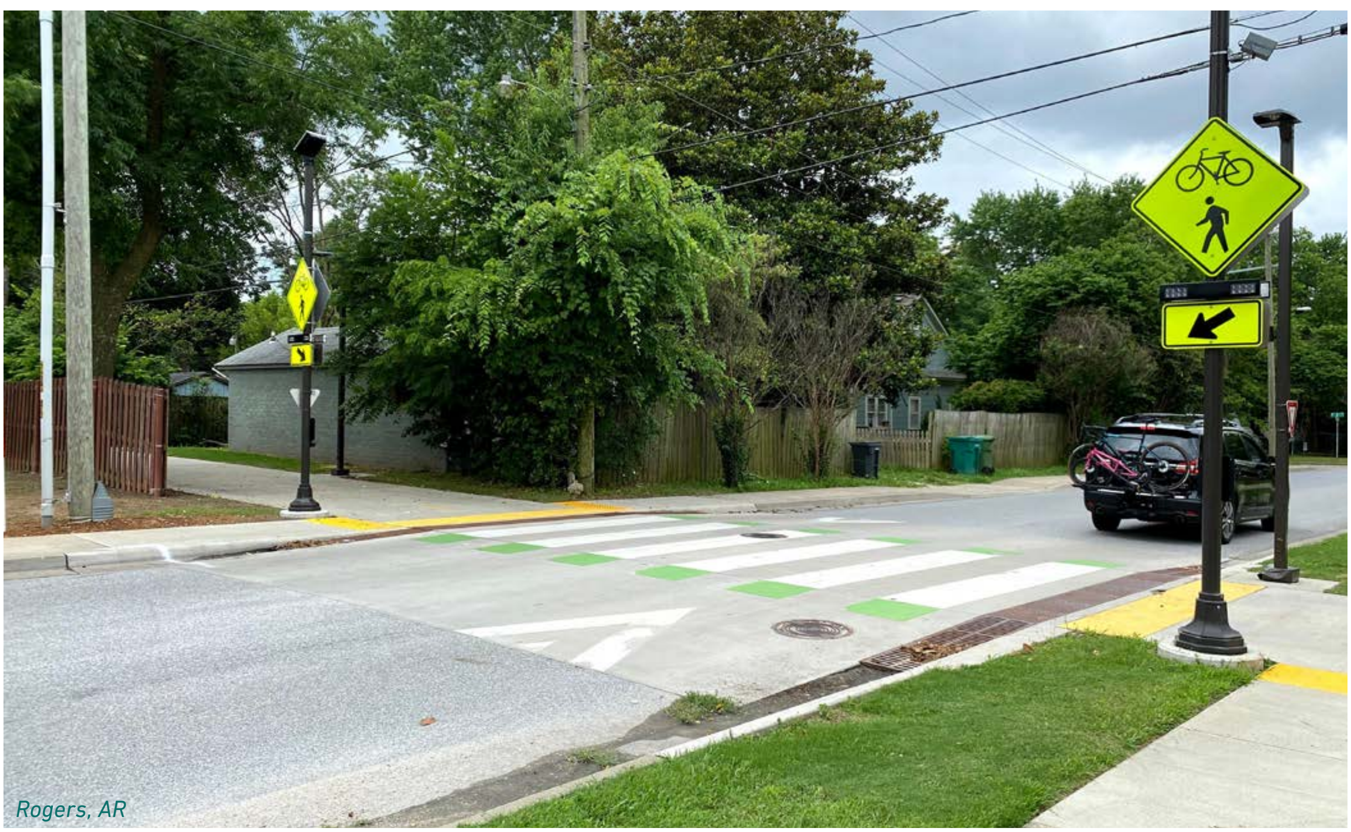
Starting a conversation around roadway safety was a key component of the NWA Vision Zero Plan. Information about the current state of safety along with opportunities for feedback were distributed across the region. Online resources were developed that included surveys, an interactive map, and a series of safety webinars. To complement online engagement opportunities, a “go-to” approach to engagement resulted in tabling and interacting with people at over one dozen existing events. Materials were available in English and Spanish to provide opportunities for people to review and provide input in the most convenient way possible. Additionally, a Regional Working Group provided guidance for the development of the NWA Vision Zero Plan through a series of meetings and listening sessions. Two safety demonstration site walks were included to see and experience how the Safe System Framework is already being used within the region. These site walks allowed municipal staff, local advocates, and elected officials to hear why decisions made related to safety can have such an enormous impact. Engagement during Plan devlopment is only the beginning and must be continued at the regional and local levels to see real change occur.

4. Goals and Actions

Achieving the goal of zero fatal and serious injury crashes by 2038 will not happen if the status quo is maintained. Roadway safety must be integrated into the work of various agencies and individual departments to see results. This section establishes goals that capture the desires for safety by the Regional Working Group along with a variety of actions that can be taken to change the roadway safety narrative in Northwest Arkansas. Goals include:

- Promote a culture that prioritizes people’s safety
- Reduce conflicts between roadway users
- Establish policies, practices, and programs that focus on safety at all levels
- Slow vehicle speeds

For each action, a timeline, action leader, and supporting partners are noted. Additionally, Elements of the Safe System Approach that align with each action are listed. The actions in this Plan are not intended to be an exhaustive list; rather, they are strategic and can begin to eliminate fatal and serious injury crashes on the transportation network.



Rogers, AR

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Bentonville, AR

1 A Paradigm Shift

1. A Paradigm Shift

What is a Vision Zero Safety Action Plan?

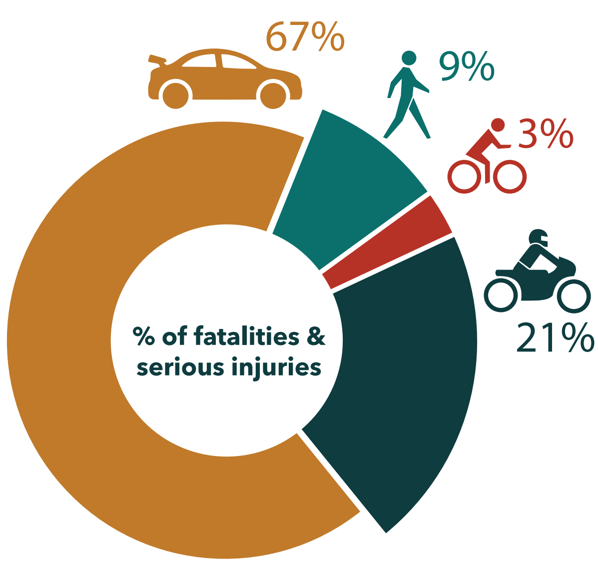
Every year, people in the NWA Region lose family, friends, neighbors, and colleagues to preventable traffic crashes on our roads. Between 2017 and 2021, 1,369 people were killed or seriously injured in crashes in NWA, averaging more than five people every week. Across the state, motor vehicle crashes account for more than twice the number of deaths as homicides.

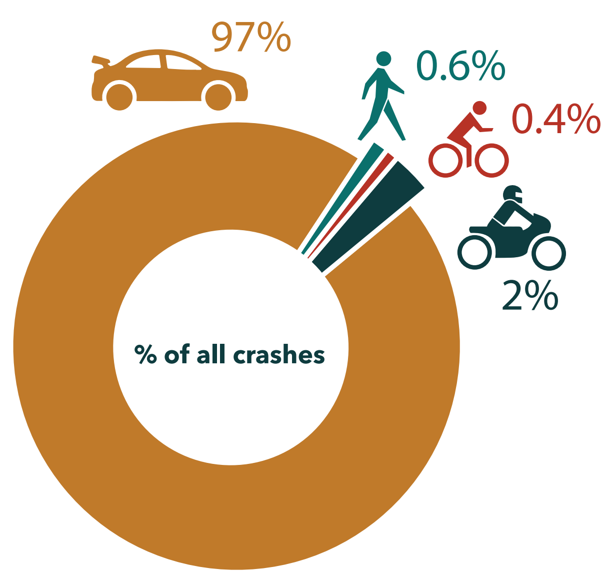
For the last century, our transportation system has been built on the belief that these crashes are accidents – events no one can fully prevent or predict. While no one thinks traffic deaths among friends and family are acceptable, the historical approach to transportation has taken roadway fatalities as an unfortunate inevitability rather than a preventable public health crisis.

Vision Zero is a traffic safety philosophy rooted in the belief that nothing on our roadways is more important than a human life. It represents a paradigm shift in the region's approach to road safety, beginning with the simple idea that traffic deaths and serious injuries are preventable. Since the 1990s, Vision Zero has been successfully implemented across Europe and in more than 45 communities in the US - some of which have now had consecutive years of zero roadway fatalities. Vision Zero lays out a new set of principles for engineering roads, educating travelers, and creating a sense of collective responsibility for ourselves and our fellow travelers.

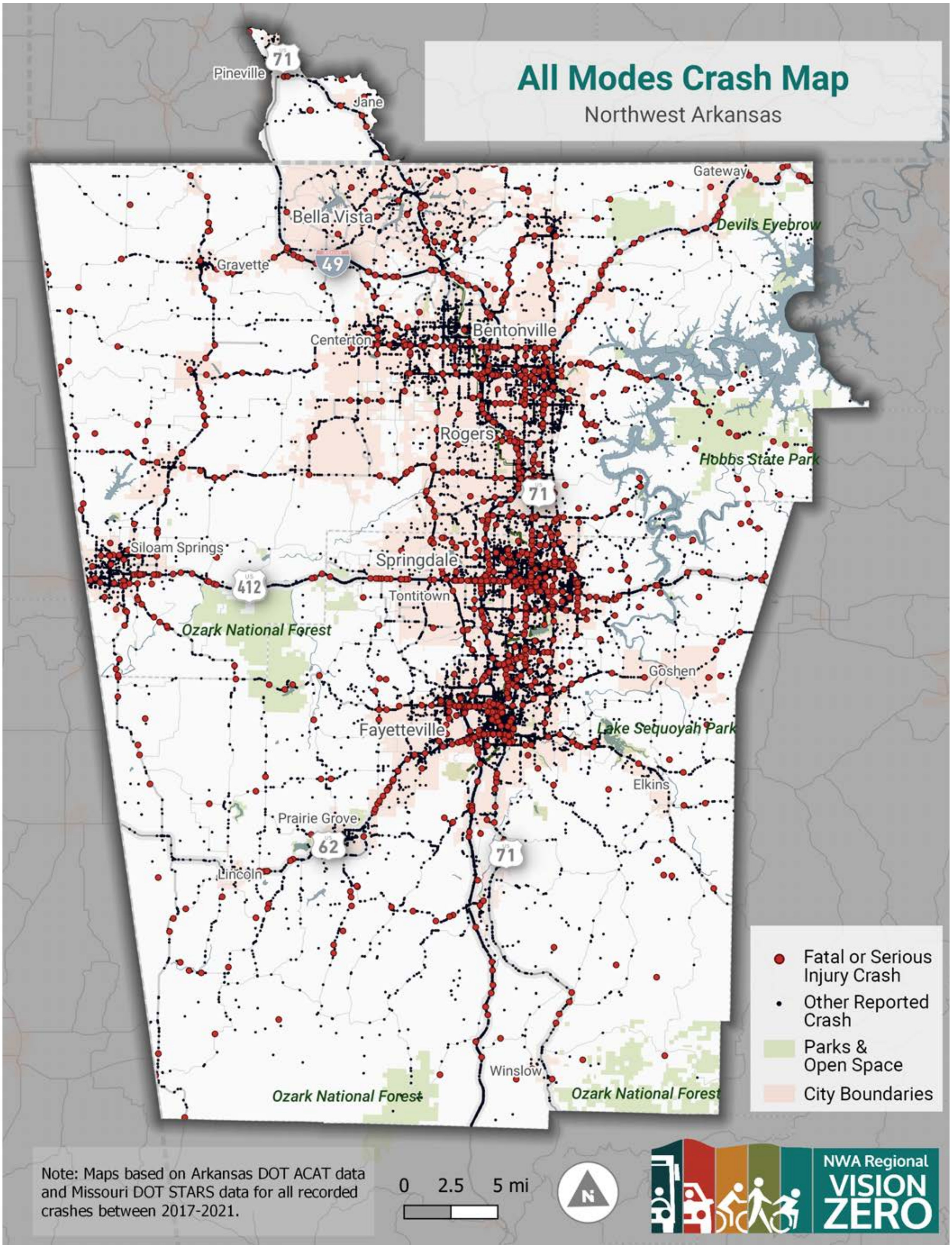
Vulnerable Users

When a crash occurs, people walking, bicycling, and riding motorcycles are more likely to be killed or seriously injured. Vehicle safety technology has seen significant advancements in recent decades, with airbags, anti-lock brakes, and lane-awareness sensors all working to protect a driver in a crash. Pedestrians, bicyclists, and motorcyclists however are unprotected and are especially vulnerable to the impact of a crash. This Plan is using the National Safety Council's definition for vulnerable roadway users that includes motorcyclists. USDOT does not include motorcycles in their definition and only includes non-motorized users. In Northwest Arkansas, vulnerable roadway users accounted for only 3% of all roadway crashes but 33% of serious injuries and fatalities.

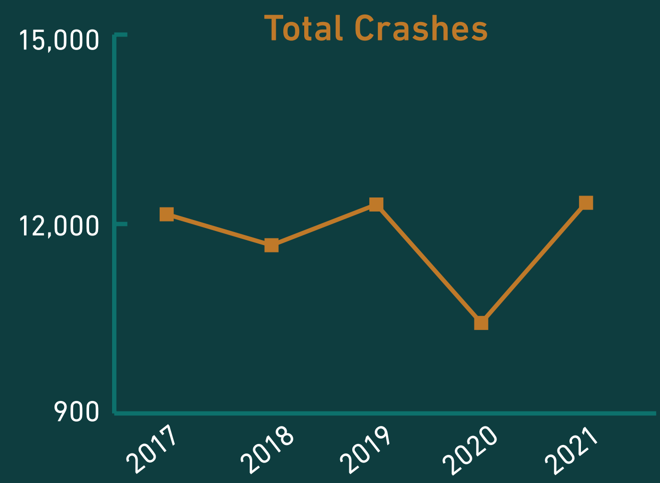


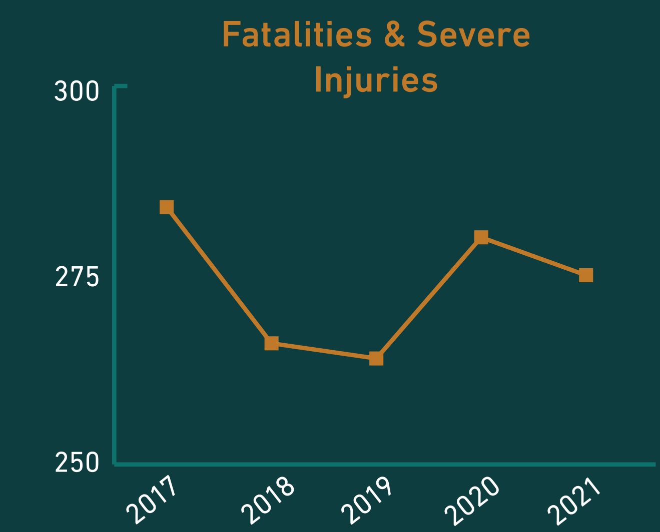


All Modes Crash Map



Between 2017 and 2021 1,369 people were killed or seriously injured in crashes in NWA, averaging more than five people every week.





Averaging

44 fatalities a year / **5** KSI crashes a week

over 5 years

The Safe System Approach

This Plan is the NWA Region's roadmap to achieving Vision Zero. It is grounded in the Safe System Approach, which aims to eliminate fatal and serious injuries by anticipating human mistakes and minimizing impacts on the human body when crashes do occur.

The six Safe System Principles shown around the outside ring are the fundamental beliefs that the approach is built on.

1. **Death & serious injury is unacceptable**

   While no one likes to get in a fender-bender, this plan focuses on crashes that lead to deaths and serious injuries.

2. **Humans make mistakes**

   Even the best drivers will inevitably make mistakes that can lead to a crash. How we design and operate our transportation system can ensure these mistakes don't have life-altering impacts.

3. **Humans are vulnerable**

   Human bodies can only withstand so much impact from a crash before death or serious injuries occur.

4. **Responsibility is shared.**

   Every part of our transportation system, from elected officials to everyday users, to planners and engineers, has a role to play in Vision Zero.

5. **Safety is proactive**

   Rather than waiting for crashes to occur, transportation agencies should seek to proactively identify and address dangerous situations.

6. **Redundancy is crucial**

   Redundancy means making sure every part of the transportation system is safe. This way, if one part fails, people are still protected.

The Safe System Approach is implemented through five Elements.

1. **Safe Road Users**

   Working towards a culture of safety starts with developing a network of civic partners, educating road users, and creating personal connections to the community's Vision Zero efforts.

2. **Safe Vehicles**

   Making vehicles safer can be done through advanced driver assistance systems and by ensuring future technology prioritizes vulnerable roadway users.

3. **Safe Speeds**

   Slower vehicle speeds increase visibility and reaction times for drivers and reduce impact forces when a crash occurs. Moving towards safe speeds can be done through speed limit reduction, traffic calming, and roadway design.

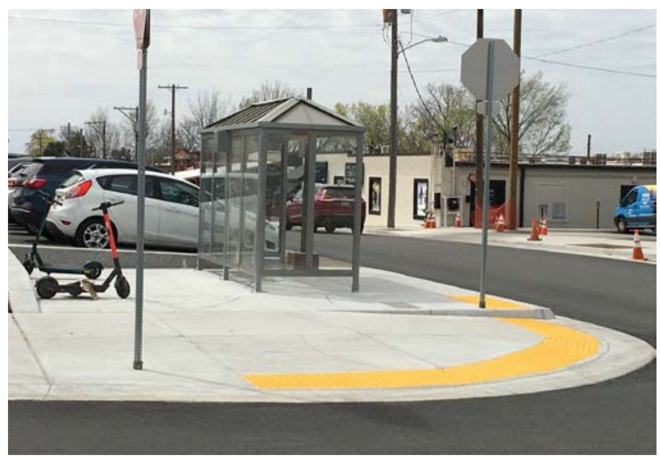
4. **Safe Roads**

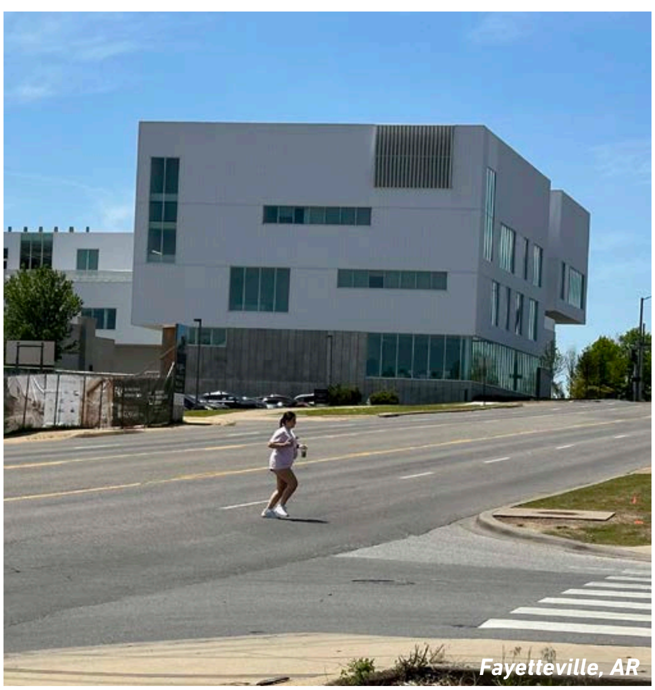
   Safer roads come from providing physical separation (like separated bike lanes and sidewalks) as well as designing to accommodate human mistakes.

5. **Post-Crash Care**

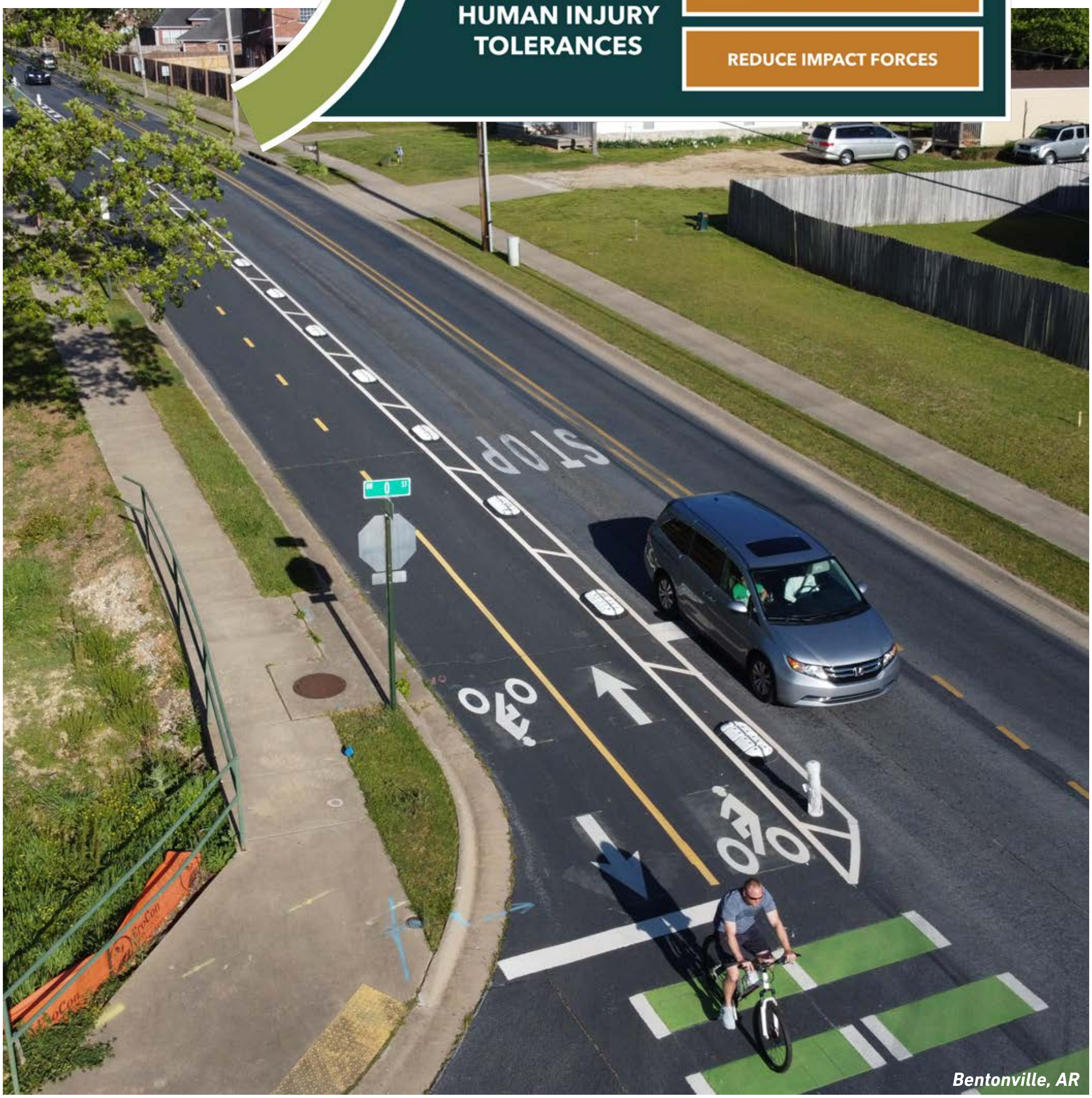
   A system-wide approach means working towards safety even after a crash has occurred. This comes from improving emergency response, traffic incident reporting, and traffic management.

Fayetteville, AR




Fayetteville, AR

The Safe System Framework



Bentonville, AR

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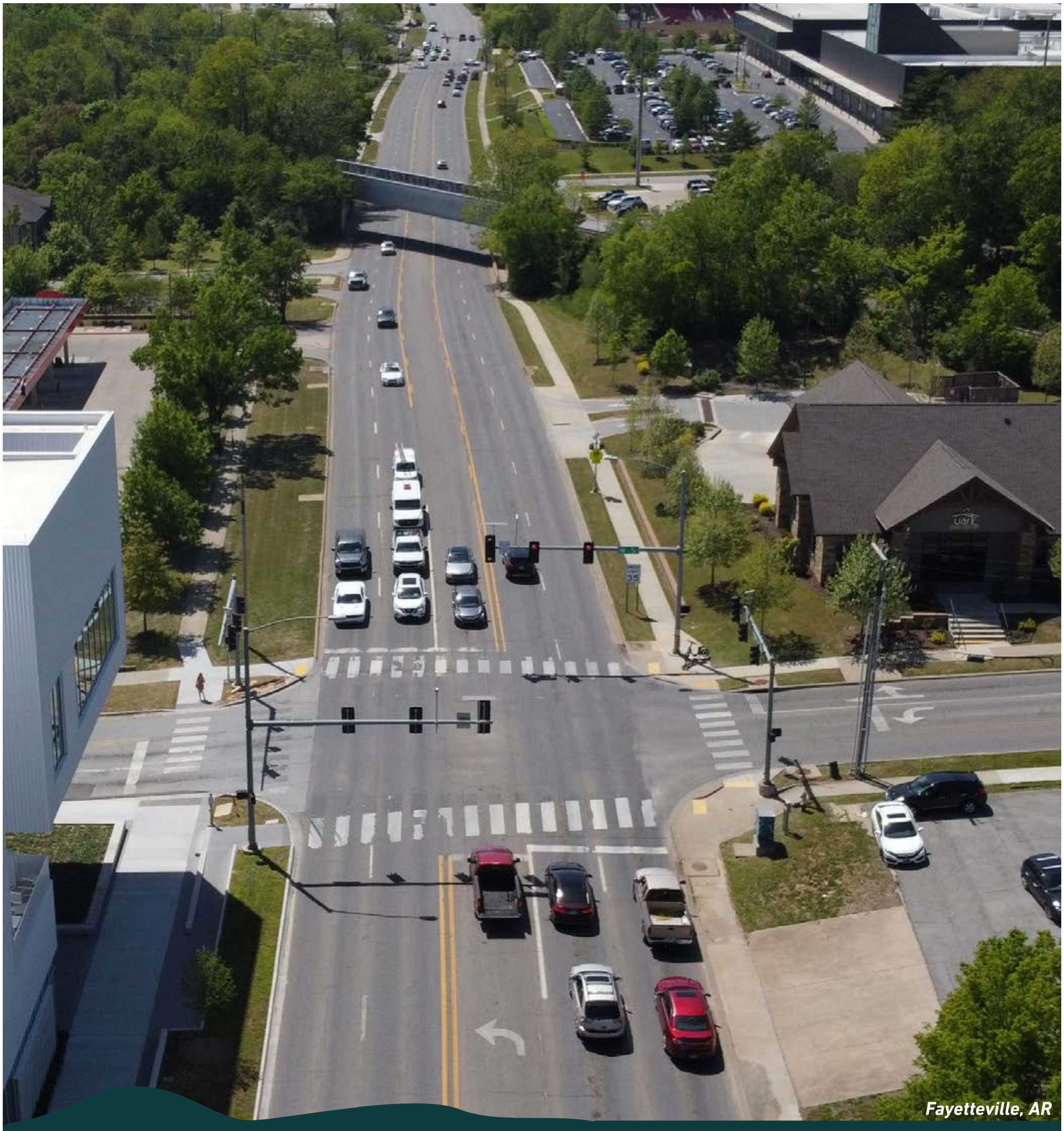


Fayetteville, AR

2 Roadway Safety in Northwest Arkansas

2. Roadway Safety in Northwest Arkansas

Plans, Policies, and Programs

In response to rapid population growth and an increase in fatal and serious crashes, Northwest Arkansas has addressed road safety both through targeted interventions and by integrating it into existing planning, policies, and programs.

Planning Efforts

Many existing local, regional, and statewide plans have addressed the issue of road safety in some capacity. Examples include transportation plans, bicycle and pedestrian plans, and corridor studies. See Table 1 for a summary of plans reviewed during the development of this Plan.

Local Plans

At the local level, road safety has largely been addressed through transportation plans, bicycle and pedestrian plans, and Safe Routes to School plans. Many of these plans include recommendations for reducing vehicle speeds on local roads, improving sidewalk and bike lane networks, and increasing driver education and awareness. Recent examples include the Fayetteville Mobility Plan, the Bella Vista Trail and Greenway Master Plan, the Bentonville Bike & Pedestrian Master Plan, and the University of Arkansas Active Transportation Plan.

Regional Plans

Regional plans addressing road safety include the NWA Bike Infrastructure Plan, NWARPC 2045 Metropolitan Transportation Plan, and the NWA Congestion Management Process. These plans coordinate efforts across the region and offer insight on emerging trends and funding opportunities, many of which inform this Plan's approach to regional road safety.

Statewide Plans

Arkansas and Missouri have both adopted Strategic Highway Safety Plans that provide a statewide framework to eliminate traffic deaths and serious injuries through the Safe System Approach. The plans include strategies to address the top contributing factors to fatal and serious injuries. Arkansas also has a statewide Bicycle and Pedestrian Transportation Plan, which includes a focus on bicycle and pedestrian safety.

Regional Plan Highlight: 2019 NWA Bike Infrastructure Plan

The Northwest Arkansas Bike Infrastructure Plan identifies a priority network of bikeways focused on increasing safety and connectivity. It includes corridor concepts designed to make bicycling a safe and accessible travel option for riders of all ages and abilities.

Table 1: Summary Plans Reviewed

Plan Name	Year	Jurisdiction
Bella Vista Trail and Greenway Master Plan	2015	Bella Vista
Bentonville Bike and Pedestrian Master Plan	2021	Bentonville
Fayetteville Active Transportation Plan	2023	Fayetteville
Fayetteville Mobility Plan	2018	Fayetteville
University of Arkansas Transportation Plan	2022	Fayetteville
NWARPC 2045 Metropolitan Transportation Plan	2021	NWA Region
NWA Regional Bicycle and Pedestrian Master Plan	2014	NWA Region
NWA Congestion Management Process	2022	NWA Region
NWA Bike Infrastructure Plan	2019	NWA Region
NWA Regional ITS Architecture and Deployment Plan	2007	NWA Region
NWA Transportation Alternatives Analysis Study	2014	NWA Region
Connect Northwest Arkansas 10-Year Transit Development Plan	2020	NWA Region
Arkansas Bicycle and Pedestrian Transportation Plan	2017	Statewide
ARDOT Strategic Highway Safety Plan (SHSP)	2022	Statewide
Missouri Show-Me Zero	2021	Statewide

Policies

Safe Routes to School

Safe Routes to School (SRTS) programs enable students to safely walk and bicycle for their school commute. SRTS includes planning, development, and implementation of projects and activities that will improve safety and reduce traffic, fuel consumption, and air pollution around schools.

Complete Streets

Complete Streets policies direct transportation planners and engineers to consistently design the right of way to accommodate all users, including drivers, transit riders, pedestrians, and bicyclists, as well as for older people, children, and people with disabilities. Most local jurisdictions in Northwest Arkansas have not adopted any form of Complete Streets policy. The 2015 NWA Regional Bicycle and Pedestrian Master Plan identified the adoption of these policies as a catalyst program and provided a sample Complete Streets Resolution designed for NWA communities.

Design Standards

Street design standards have a significant impact on road safety. Context appropriate street design encourages safe behavior and reduces conflicts between users. Existing standards vary across the region, but some include provisions that promote safety. For example, the City of Bentonville Minimum Standard Specifications for Streets includes a section on Neighborhood Traffic Safety that includes design criteria for various traffic calming devices. Additionally, roundabouts constructed on Highway 112 are examples of proven safety countermeasures on the ground.

Design Standards Highlight: Fayetteville Minimum Street Standards

The City of Fayetteville Minimum Street Standards provide an example of how to prioritize safety for all road users. They include an emphasis on multimodal level of service and reference best practice design guidance such as the National Association of City Transportation Officials' (NACTO's) Don't Give Up at the Intersection and the Federal Highway Administration's (FHWA's) Guide for Improving Pedestrian Safety at Uncontrolled Crossing Locations.

Feyetteville, AR (credit: NWARPC)

Springdale, AR (credit: NWARPC)

Traffic Calming Policy Highlight: Springdale Traffic Calming Policy

The City of Springdale has a policy that enables the installation of traffic calming measures such as curb extensions, raised intersections, and speed cushions to address speeding and conflicts between people walking and driving. Criteria for installation include observed speeds, sidewalk connectivity, crash history, and the presence of children walking to school.

Traffic Calming

Traffic calming consists of physical design and other measures put in place on existing roads to reduce vehicle speeds and improve safety for pedestrians and bicyclists. Several cities in NWA have implemented traffic calming policies that facilitate the installation of traffic calming on residential streets.

Emergency Response

One component of the Safe System Approach is to streamline emergency response and medical care. Based on discussions from the NWA Active Transportation Committee, Bentonville and Fayetteville have updated their CAD systems and improved GIS data to assist with quicker emergency response on the trail system.

Parking Requirements

Minimum parking requirements for developments present a barrier to the creation of dense, walkable urban environments. The City of Fayetteville abolished its commercial parking minimums citywide in 2015 while retaining downtown parking maximums. This change has enabled new businesses to open using long-disused sites and buildings.

Evaluation of Existing Codes and Ordinances

The table on the following page provides a high-level review of local codes and ordinances for cities with over 2,000 residents.[1] For each element (e.g. building entrances) a score was assigned for each city to indicate the state of policy on that issue, ranging from 1 (Codes / ordinances do not include this element) to 3 (Codes / ordinances include this element and it generally meets best practices). This evaluation was based on the information available to the project and should be viewed as a starting point for where to focus attention with regard to code and ordinance amendments to promote road safety. Some issues, such as speed limits and crosswalk markings, were not included due to the limited presence of local policy on these issues.

1 Population based on 2021 American Community Survey data. Most cities with fewer than 2,000 residents do not have codes and ordinances addressing road safety through street design or land use, though there are some exceptions, including Highfill, Decatur, and Greenland.

Table 2: Review of Local Codes & Ordinances

City	Population (2021)	Sidewalks / Frontage Improvements	Connectivity / Block Sizes	Mid-Block Access / Crossings	Building Entrances	Parking	Parking Placement	Access Management / Driveways	Complete Streets	Traffic Calming
Fayetteville	95,230	3	3	3	3	3	3	3	2	3
Springdale	89,576	2	1	1	1	1	1	1	1	1
Rogers	71,112	3	1	1	3	1	3	3	2	3
Bentonville	56,734	3	3	2	3	2	3	3	2	3
Bella Vista	30,808	2	2	2	1	1	1	3	1	2
Centerton	19,984	3	1	1	1	1	1	2	1	1
Siloam Springs	17,575	3	3	1	1	1	1	3	1	1
Lowell	10,177	2	3	2	1	2	1	3	1	1
Farmington	8,242	3	2	1	1	1	1	1	1	1
Pea Ridge	7,140	2	2	2	1	1	1	3	1	1
Cave Springs	5,916	3	2	2	1	2	1	3	1	1
Tontitown	5,633	3	2	2	2	2	1	3	2	3
Gentry	4,000	2	3	2	1	1	1	1	1	1
Elkins	3,743	3	3	1	1	1	1	1	1	1
Gravette	3,647	3	3	1	2	1	3	1	1	2
Johnson	3,631	3	1	1	1	2	1	3	2	1
Little Flock	3,004	1	2	1	1	1	1	1	1	1
Huntsville	2,981	2	2	3	1	1	1	3	1	1
Elm Springs	2,581	2	2	1	3	1	3	1	1	1
West Fork	2,335	3	2	2	1	1	1	2	1	1
Lincoln	2,306	2	3	1	1	2	2	1	1	2
Goshen	2,188	2	2	2	1	1	1	2	1	1

Key:

1 Codes / ordinances do not include this element

2 Codes / ordinances include this element but it could use improvement

3 Codes / ordinances include this element and it generally meets best practices

Laws and Enforcement

Traffic laws and enforcement have been a central piece of Northwest Arkansas' approach to addressing traffic fatalities and serious injuries.

Speed Limits

Addressing speed is a crucial step to making streets safer. Vehicle speed increases both the likelihood of a crash, as well as the severity of the crash. Higher speeds diminish drivers' ability to recognize and avoid potential conflicts and increase the force of impact, escalating the chances of fatalities and serious injuries, particularly for more vulnerable road users. Many streets throughout NWA have relatively high speed limits that do not match the roadway context.

> **Context Appropriate Speed Limits: University of Arkansas and Residential Areas**
>
> Responding to road safety concerns and new guidance from NACTO, the City of Fayetteville lowered the default residential speed limit from 25 to 20 mph in 2021. The following year, the University of Arkansas also lowered posted speed limits on most campus streets, including a default campus area speed limit of 20 mph.

Distracted Driving

Since 2009, when Arkansas first banned texting while driving for all drivers, the state has strengthened laws around distracted driving to include a ban on all use of handheld devices for drivers under 18 and in certain areas. In 2021, the State passed a new distracted driving law that prohibits all drivers from holding or using a handheld device while driving, with a few exceptions, such as using a phone in a hands-free mode or in an emergency.

Driving Under the Influence

Arkansas also has strict laws around driving under the influence. In 2015, the State lowered the blood alcohol level (BAC) limit for drivers to 0.08%, which is consistent with recommendations from the National Highway Traffic Safety Administration (NHTSA). Arkansas also mandates ignition interlock devices (IIDs) for certain driving under the influence (DUI) offenders, as a condition of license reinstatement. Washington and Benton Counties have established diversion court programs that offer an alternative to traditional punitive measures, such as jail time, allowing participants to receive treatment, counseling, and other support services to help them overcome their addiction and avoid future DUI offenses. Benton County also has a Driving While Intoxicated (DWI) unit that is responsible for the pro-active detection, investigation, and arrest of alcohol and/or drug-impaired drivers.[2]

Automated Enforcement

Arkansas prohibits the use of unmanned traffic enforcement systems, which includes both red light cameras and speed cameras. Speed cameras are only allowed in school zones or at rail crossings, and a police officer must be present and issue citation at time and place of violation.[3] Red light cameras are not allowed under any circumstances. These legal requirements severely limit the potential use and efficacy of automated enforcement in Northwest Arkansas.

Programs

Bicycle Education

Over the last decade, bicycle education has become a part of the school curriculum in Fayetteville, Springdale, Rogers, and Bentonville. These programs, provided by Trailblazers, help to train the next generation of responsible road users by teaching kids the rules of the road and make bicycling accessible to kids who may not otherwise have the opportunity to ride.

Pilot and Demonstration Projects

Resolution 2016-2 authorized NWARPC to coordinate, manage, and assist with the implementation of bicycle pilot/demonstration projects in various locations to test protected bike lane concepts. Trailblazers

2 Benton County Sherriff's Office. DWI Unit.

3 Governors Highway Safety Association. Speed and Red Light Cameras: Arkansas.

has partnered with NWARPC and the Walton Family Foundation on a series of pilot projects in Bella Vista, Bentonville, Rogers, Springdale, Fayetteville, and Siloam Springs. These projects tested the feasibility of design treatments focused on creating safer streets for all users.

Slow Streets

Local cities have partnered with Trailblazers on the temporary installation of Slow Streets. Through temporary installations of traffic calming materials, Slow Streets create safe, family-friendly routes for people to bike and walk, sometimes for a single day or weekend and sometimes seasonally.

A temporary Slow Street installation in Rogers (credit: Trailblazers)

Pilot Project Highlight: Siloam Springs Neighborhood Greenway Pilot Project

Trailblazers worked with the City of Siloam Springs to design and install a Neighborhood Greenway pilot project from Downtown Siloam Springs to the Dogwood Springs Walking Trail. A neighborhood greenway is a traffic calmed, slow-speed street that creates a shared space for drivers, bicyclists, and pedestrians. The project rollout included an evaluation of vehicle speeds and volumes, bicycle volumes, and crash data, as well as a post-installation survey to collect public feedback.

Siloam Springs Neighborhood Greenway Instalation (credit: Trailblazers)

Roadway Safety Analysis

Crashes occur because of a variety and often a combination of contributing factors. These factors may include excessive speed, roadway conditions, equipment failure, inexperience, environmental conditions (e.g., weather, lighting, glare), and human behaviors, including distraction, impairment, and not complying with traffic laws. With 1,369 KSI crashes over a five-year period, the HIN represents the most critical corridors that should be addressed in the region. Crash analysis resulted in numerous findings related to street characteristics and contexts in Northwest Arkansas. The following highlights a few of those findings along with the full HIN map for all modes.

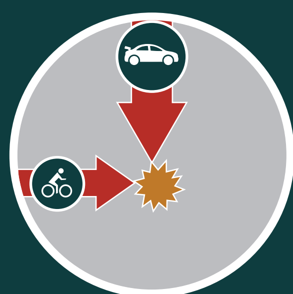
Most Dangerous Crash Types:

Crash type with the highest number of KSI crashes for each mode

Pedestrian

Pedestrian crossing road; vehicle traveling straight

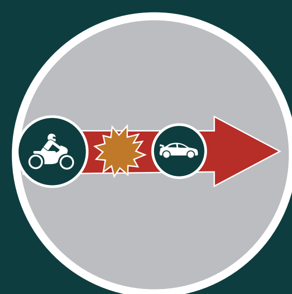
56 KSI Crashes
116 Total



Bicycle

Bicycle crossing road; vehicle traveling straight

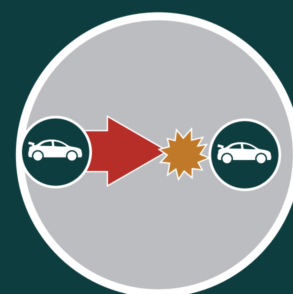
14 KSI Crashes
61 Total



Motorcycle

Motorcycle traveling straight; Vehicle slowing

6 KSI Crashes
11 Total



Motor Vehicle

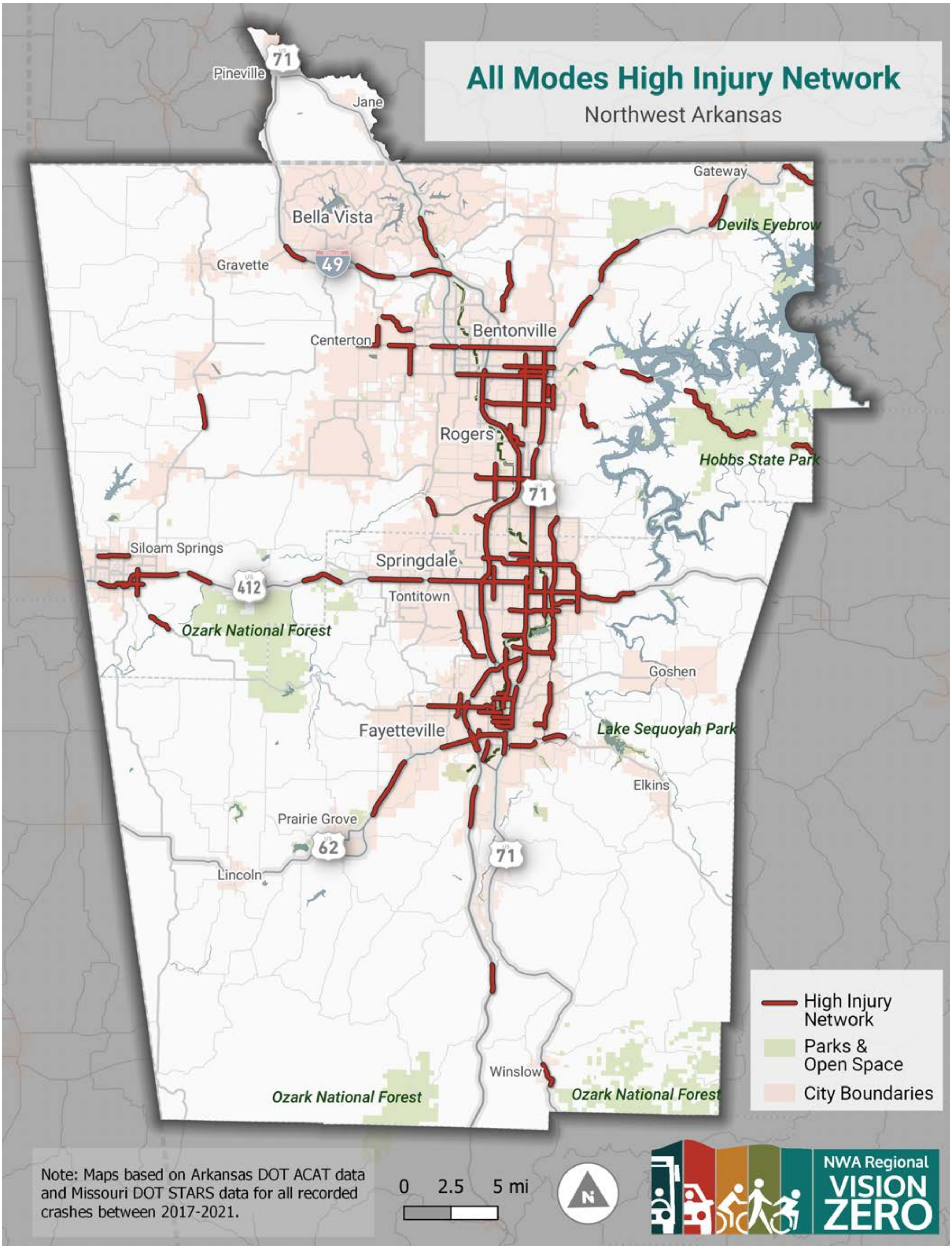
Vehicle traveling straight; vehicle stopped in traffic

25 KSI Crashes
4,664 Total

43%

of speeding crashes resulted in a fatality or serious injury for vulnerable users

High Injury Network



Equity

Increasing safety across the region cannot succeed without a focus on equity and identifying communities that have disproportionate traffic safety impacts. The transportation system in Northwest Arkansas must work for everyone across the region; therefore, equity is integrated throughout the NWA Vision Zero Plan. Together with the Safe System Approach, recommended actions can address safety for people that have experienced a historical disadvantage, persistent poverty, and/or social vulnerability.

To create a broad characterization of communities that have sociodemographic vulnerabilities and to define the populations, this Plan used criteria for Areas of Persistent Poverty, Historically Disadvantaged Communities as identified by the USDOT, and the Social Vulnerability Index (SVI) as defined by the Centers for Disease Control and Prevention (CDC) and Agency for Toxic Substances and Disease Registry (ATSDR).

Historically Disadvantaged Communities[4] refers to populations sharing a particular characteristic, as well as geographic communities, that have been systematically denied a full opportunity to participate in aspects of economic, social, and civic life.

- Transportation access disadvantage - communities and places that spend more, and take longer, to get where they need to go.
- Health disadvantage - communities based on variables associated with adverse health outcomes, disability, as well as environmental exposures.
- Environmental disadvantage - communities with disproportionately high levels of certain air pollutants and high potential presence of lead-based paint in housing units.
- Economic disadvantage - areas and populations with high poverty, low wealth, lack of local jobs, low homeownership, low educational attainment, and high inequality.
- Resilience disadvantage - communities vulnerable to hazards caused by climate change.
- Equity disadvantage - communities with a high percentile of persons (age 5+) who speak English "less than well."

Equity Defined

Equity is a pluralistic concept that centers on the concept of fairness and justice. Any equitable effort should consider and address historical marginalization, disenfranchisement, and disinvestment. The equity analysis for the NWA Vision Zero Plan examined the disproportionate impacts and disparate outcomes for those who have been harmed.

Area of Persistent Poverty[5] is defined by the USDOT as any County or Census Tract that has consistently had greater than or equal to 20 percent of the population living in poverty over a defined period.

Social Vulnerability[6] refers to the potential negative effects on communities caused by external stresses on human health. Factors include:

- Socioeconomic status (below 150% poverty, unemployed, housing cost burden, no high school diploma, no health insurance)
- Household characteristics (aged 65 or older, aged 17 or younger, civilian with a disability, single-parent households, English language proficiency)
- Racial and ethnic minority status (Hispanic or Latino (of any race); Black and African American, Not Hispanic or Latino; American Indian and Alaska Native, Not Hispanic or Latino; Asian, Not Hispanic or Latino; Native Hawaiian and Other Pacific Islander, Not Hispanic or Latino; Two or More Races, Not Hispanic or Latino; Other Races, Not Hispanic or Latino)
- Housing type & transportation (multi-unit structures, mobile homes, crowding, no vehicle, group quarters)

The NWA Vision Zero Plan identified and prioritized investments in communities that have experienced varying degrees of disadvantage. Additionally, recommended actions have been intentionally developed to ensure policing and other enforcement efforts do not create or perpetuate disparities and unintended consequences in communities of color or areas of persistent poverty.

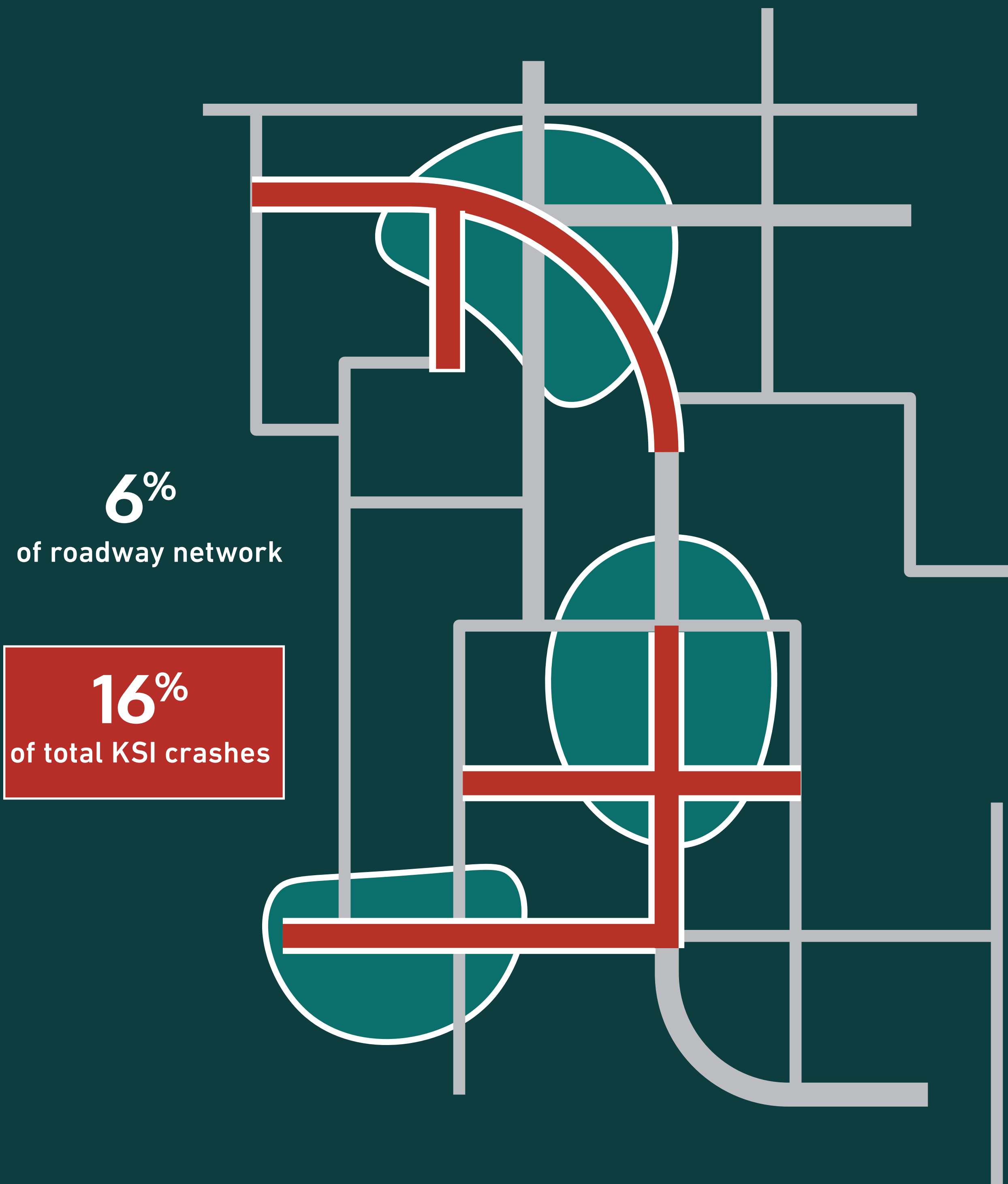
4 Historically Disadvantaged Communities Methodology: https://www.transportation.gov/priorities/equity/justice40/transportation-disadvantaged-census-tracts-historically-disadvantaged

5 Areas of Persistent Poverty: https://www.transportation.gov/RAISEgrants/raise-app-hdc

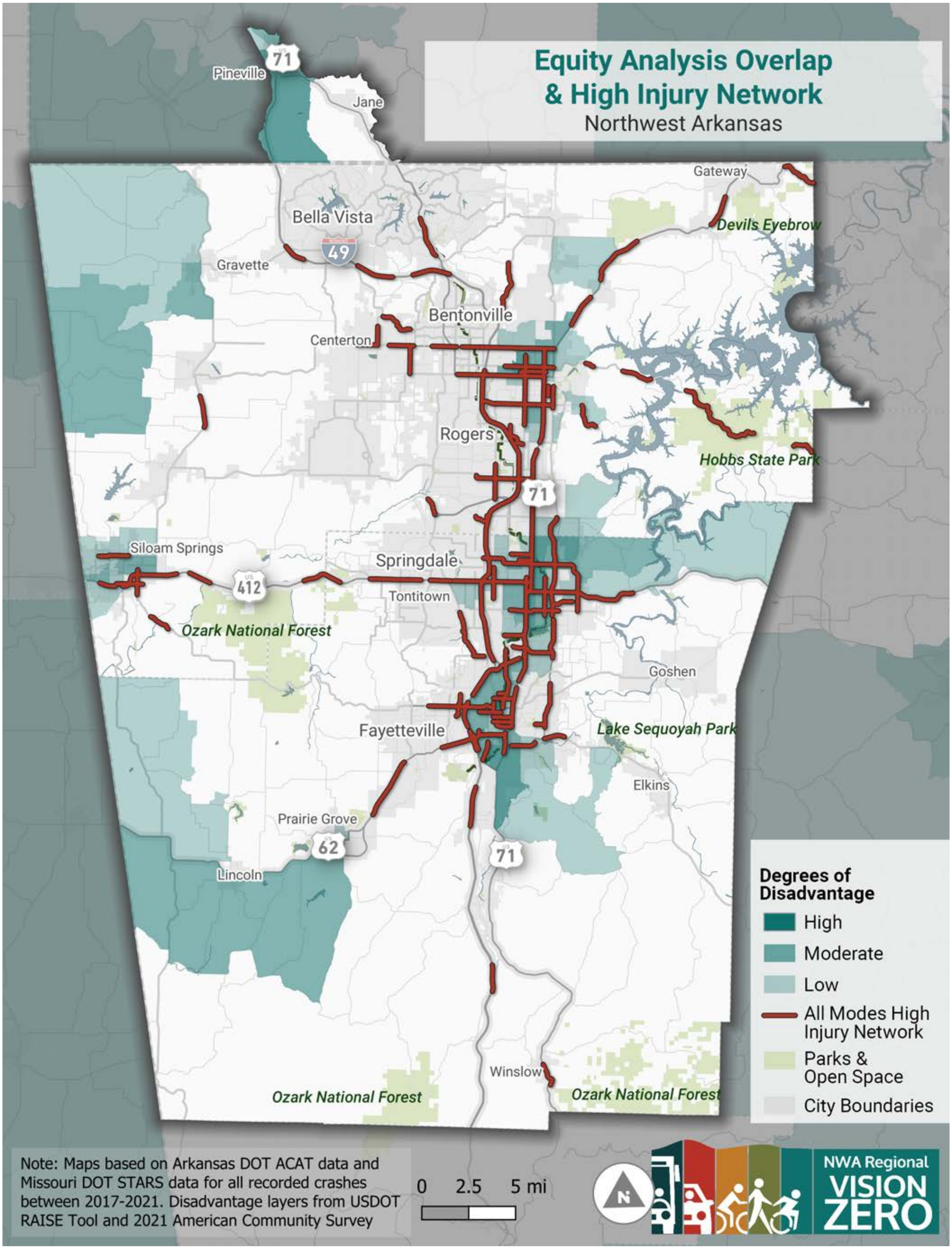
6 Social Vulnerability: https://www.atsdr.cdc.gov/placeandhealth/svi/at-a-glance_svi.html

Bentonville, AR

Vulnerable roadway users that live in disadvantaged areas are overrepresented in fatal and serious injury crashes.



Equity Analysis Overlap and HIN



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Rogers, AR

3 Community Outreach

3. Community Outreach

The NWA Vision Zero Plan employed a wide range of digital and in-person engagement tools to inform the community and solicit feedback on roadway safety. Communicating the importance of roadway safety during the development of this Plan was an important step in long-lasting efforts to engage and empower people in the region to make changes that save lives. Five key elements were foundational for engagement:

1. **Listen First:** Events and outreach were structured so people could have multiple opportunities and options to share their experiences, interests, and concerns related to safety.
2. **Provide an Open and Transparent Process:** Engagement was accessible to as many members of the community as possible.
3. **Educate on Positive Traffic Safety Culture:** Each engagement event incorporated education components about the personal and community benefits of safety.
4. **Give Proper Notice:** Engagement provided community members sufficient advanced notice for in-person events as well as online feedback opportunities, allowing them to plan and prioritize their participation.
5. **Prioritize Equity:** Activities ensured that minority and low-income populations were specifically engaged and heard and materials were provided in English and Spanish.

Fayetteville, AR

Source https://nwa.pressreader.com/article/281878712709691

Promotion and Media Coverage

Promotion for the Plan relied on digital/social media, word of mouth, and traditional print media. The Northwest Arkansas Democrat-Gazette for the May 8, 2023 Issue highlighted the Safety Demonstration Site Walk in Fayetteville that took a group of municipal staff, local advocates, and elected officials from across the region on a tour near the intersection of M.L.K. Jr. Boulevard and S. School Avenue (US Business 71) to discuss and see different implemented solutions for safety along with street characteristics that should still be addressed.

Listening Sessions

Scheduled listening sessions with municipal staff provided understanding and background for the state of safety within the region along with past efforts that have increased safety. Each listening session included conversation related to:

- Traffic safety culture,
- Process for project implementation,
- Effective tools already being used,
- Challenges to increasing safety,
- Specific locations where changes should be made, and
- Concerns about staff capacity and/or resources available.

Listening sessions revealed that while ongoing efforts are being made at the local level, there is still a lot of work left to do. Major arterials moving through communities present some of the biggest threats. Simultaneously, there is a need for policies and programs to target speed, eliminate distracted driving, and prioritize people walking and bicycling to achieve a safer system as a whole.

Public Interaction

In-person activities are showcased in Table 3. They included a mix of pop-ups at various events and safety demonstration site walks around the region.

Table 3: In-Person Engagement Events

Event Name	Date	Community
Bentonville Moves	4/27/2023	Bentonville
Springdale EV Meeting NWARPC	4/28/2023	Springdale
Beaver Watershed LID Smart Growth	4/27/2023	Springdale
Bentonville Safety Project Demo	5/2/2023	Bentonville
Fayetteville Safety Demonstration Project	5/3/2023	Fayetteville
Safe Streets for All Working Group Meeting 3	5/4/2023	Springdale
Bentonville First Friday	5/5/2023	Bentonville
Lower Ramble	5/5/2023	Fayetteville
First Friday	5/5/2023	Huntsville
Rogers Concert Series	5/5/2023	Rogers
Square 2 Square Ride (Bentonville End)	5/6/2023	Bentonville
Bentonville Farmers Market	5/6/2023	Bentonville
Coler Noon to Moon	5/6/2023	Bentonville
Rogers Concert Series	5/6/2023	Rogers
Rogers Farmers Market	5/6/2023	Rogers
Square 2 Square Ride (Springdale Halfway Halt)	5/6/2023	Springdale
Farmers Market Springdale	5/6/2023	Springdale

Safety Demonstration Site Walks

Two Safety Project Demonstration Site Walks were held, one in Bentonville and one in Fayetteville, that gave residents, municipal staff, and advocates from around the region the opportunity to walk and talk about local municipality infrastructure problems and solutions. Approximately 40 people attended the two Safety Demonstrations. Bentonville's Safety Demonstration focused on touring the quick build, parking protected, two-way separated bike lane on SW 8th Street, while the Fayetteville Safety Demonstration focused on examining different pedestrian and bicycle constraints: large state-owned arterials and intersections and a few successful pedestrian crossings for the Razorback Greenway. The demonstrations also allowed advocates and residents to discuss problems they experience and witness along each route.

Pop-Up Booths

A go-to approach to engagement led to multiple events with pop-up booths for the NWA Vision Zero Plan throughout the region. The pop-ups included posters showcasing the number of fatalities and serious injury crashes in the region and business cards with QR codes for the public survey. Pop-up booth locations included the Square 2 Square Halfway Halt, Bentonville First Friday, Huntsville First Friday, Rogers Concert Series, Rogers Farmers Market, and the Farmers Market in Springdale. Square 2 Square is a biannual bike ride along the Razorback Regional Greenway for 30 miles between Fayetteville and Bentonville with nearly 2,000 riders, both local and regional, attending. Two events, the Rogers Concert Series and the Springdale Cinco de Mayo Farmers Market, had large Latino and Hispanic attendance which gave the opportunity to engage Spanish speaking residents.


Fayetteville, AR

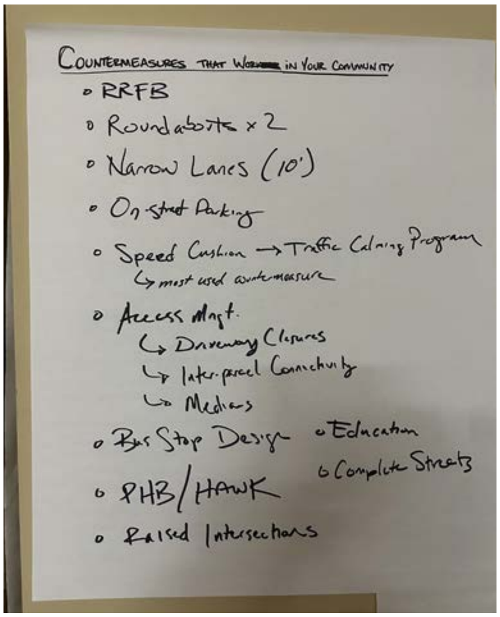
Rogers, AR

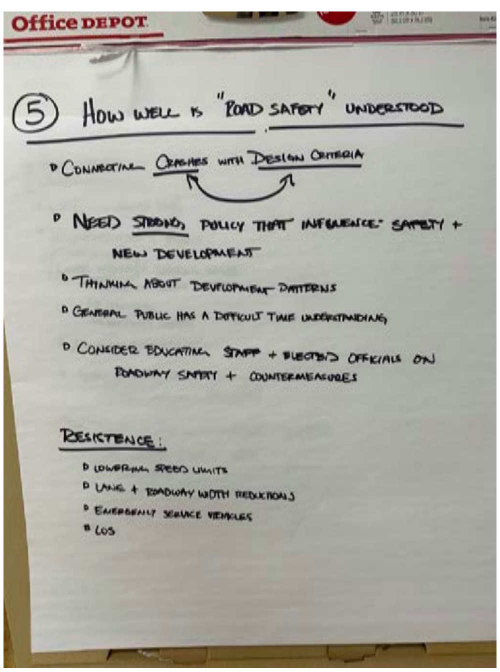

Springdale, AR


Rogers, AR

Regional Safety Working Group

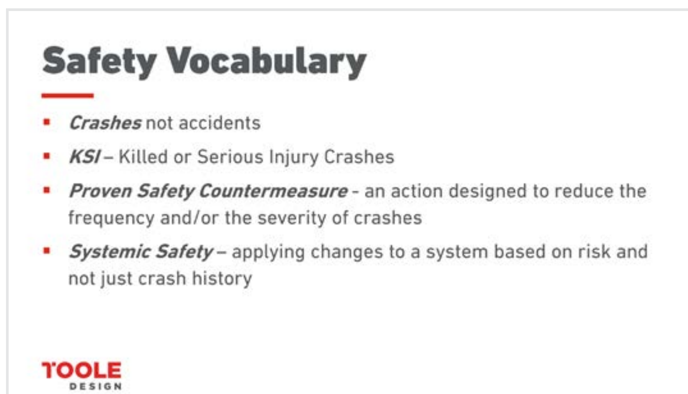
The regional safety working group met four times over the course of the NWA Vision Zero Plan development. It consisted of municipal staff, elected officials, regional advocates, and more. A key role of the working group was to discuss safety in the region, to guide recommended actions for policies, programs, and projects. Using the Safe System Approach foundation, the regional working group helped shape the NWA Vision Zero Plan and customize the recommendations that will reduce serious injury and fatal crashes in the region.





Safety Webinar Series

Educating decision-makers and the general public about safety in the region and specifically the Safe System Approach was an important role of engagement for the NWA Vision Zero Plan. Safety Webinars were developed to serve as a lasting resource to explain how addressing safety should emphasize the characteristics of the roadways that are leading to the lives being lost and that a Safe System Approach should be both reactive—implementing solutions along the High Injury Network—and proactive—deploying safety countermeasures to reduce risk. The Safety Webinar Series was recorded and posted to the project website to allow for on-demand listening.



Public Feedback

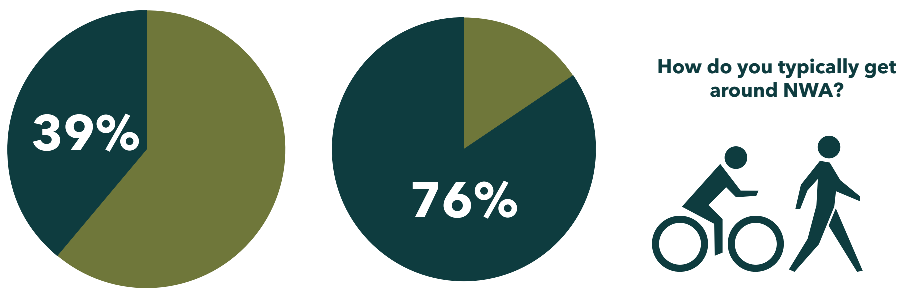
Digital engagement tools included an online survey and map. Participants that provided feedback on the interactive map were asked to identify the following:

- Locations where they feel unsafe
- Locations where they feel safe
- Places where a roadway improvement could be made

Most people who commented live in the eastern part of the region, yet most of the points are shown in the larger, more dense areas of Fayetteville and Bentonville. Overall, 316 people responded to the survey, placing over 600 points on the interactive map.

When asked what the major issues are affecting your safety on the roadways in Northwest Arkansas, community members responded that distracted driving, lack of sidewalks and/or continuous sidewalks, and people driving too fast were the top three major issues.

When asked how you typically get around Northwest Arkansas, most respondents drove, walked, or rode their bike. When asked how often they bike or walk, 39% walked or biked daily and 76% walked or biked at least once a week.

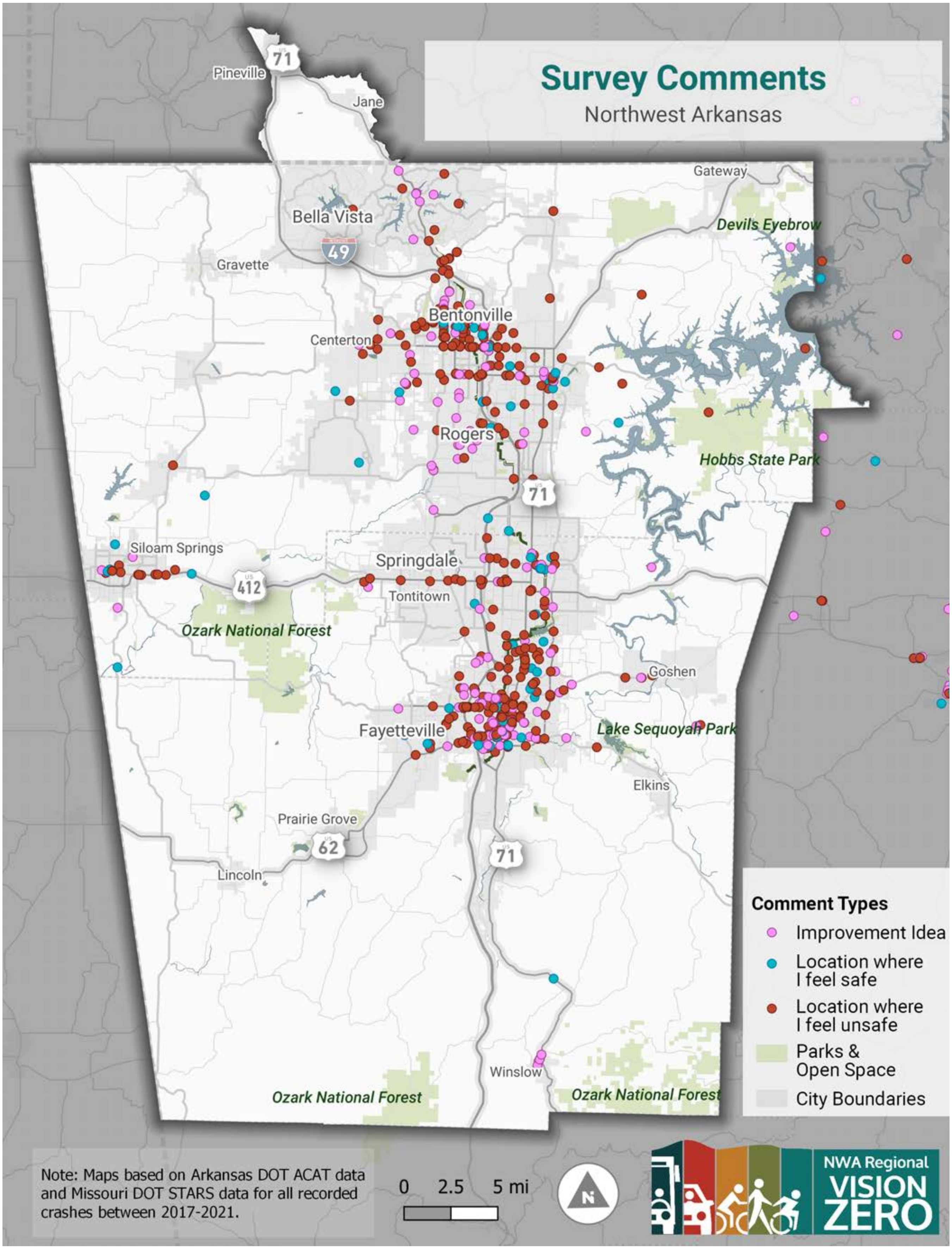


Walk or bike daily

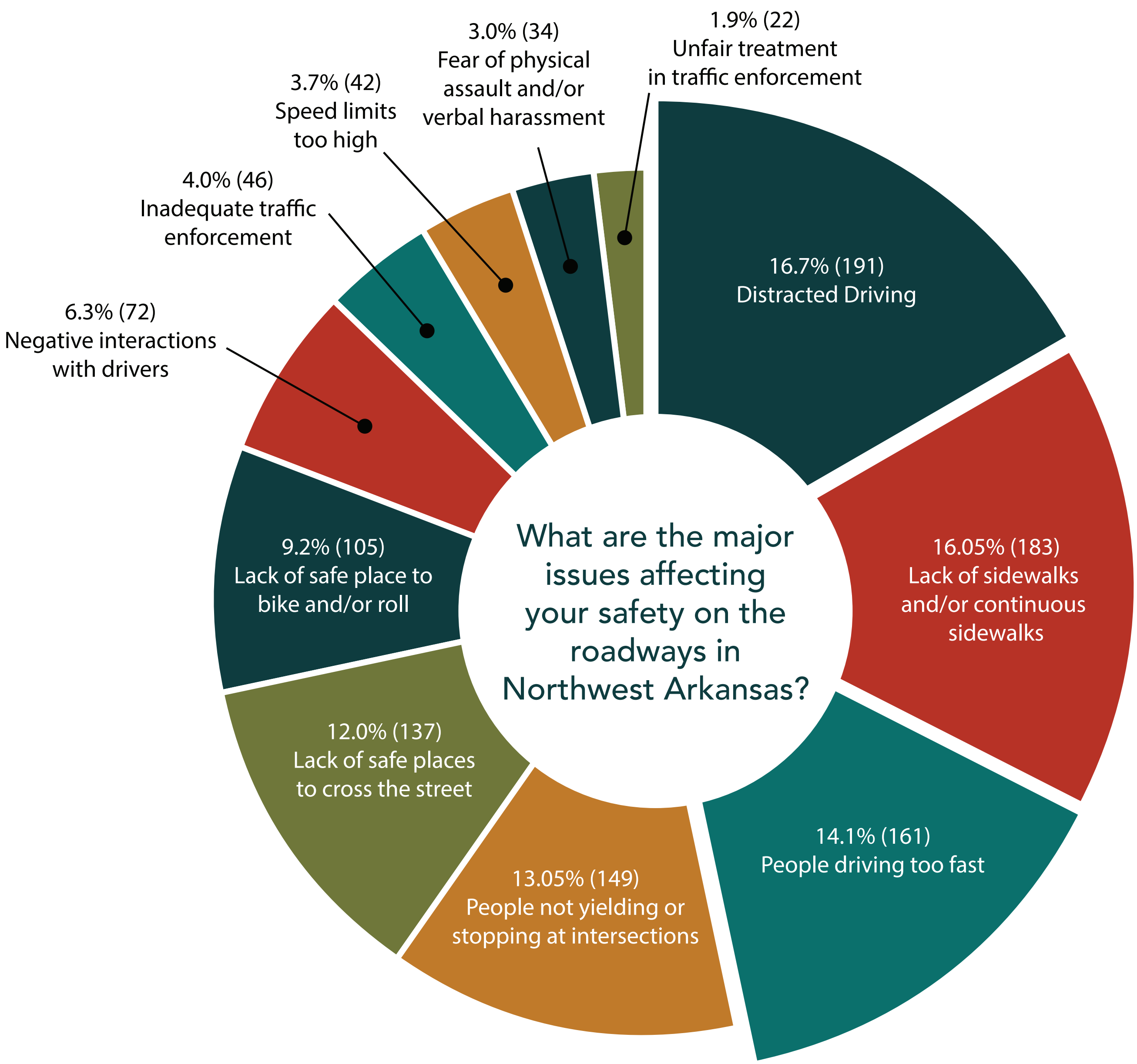
Walk or bike at least once a week

Bentonville, AR

Interactive Map Comments



Public Survey Results



Bentonville, AR

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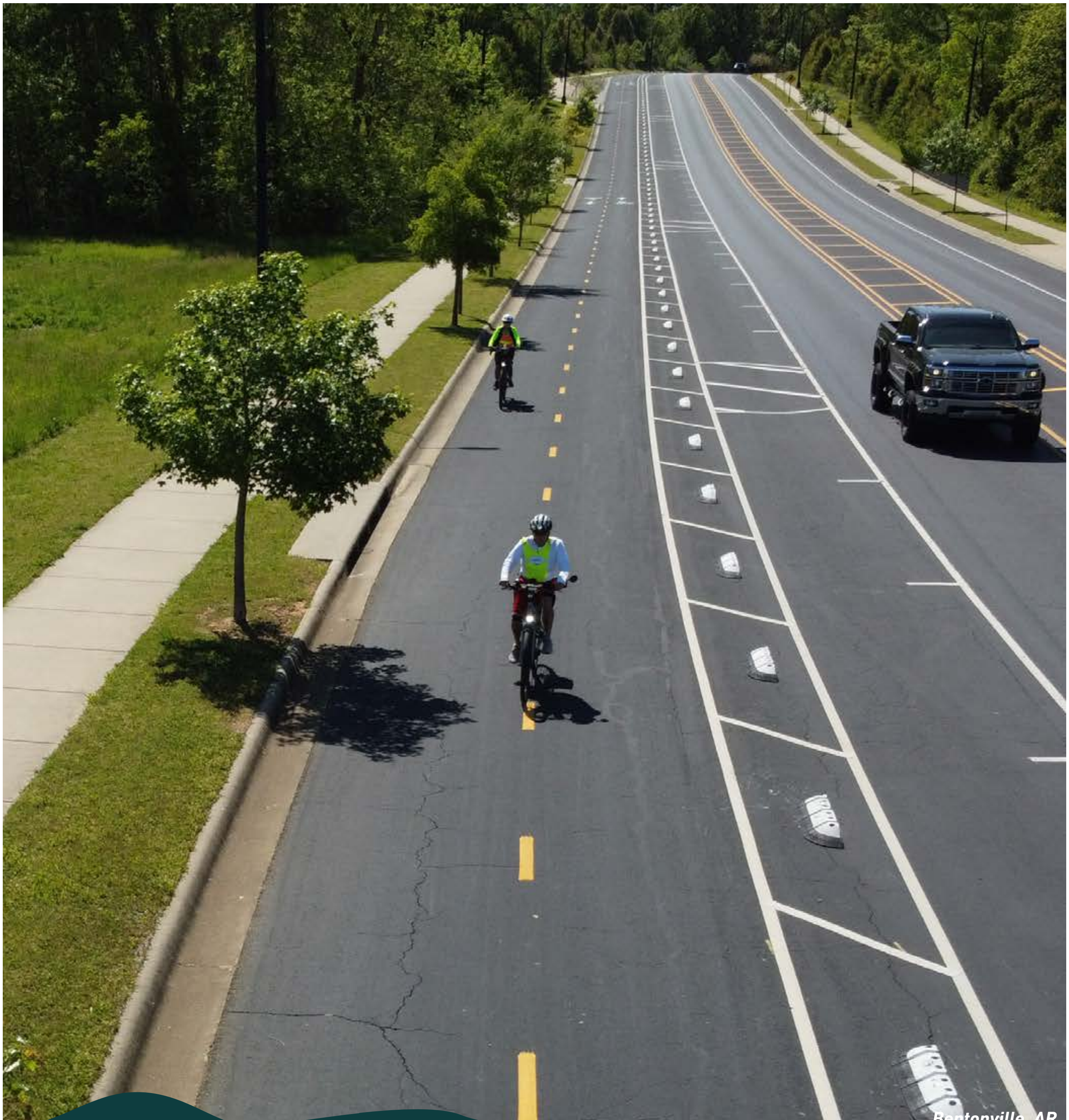


4 Goals and Actions

4. Goals and Actions

Goals

The mission of Vision Zero—to Save Lives—requires changing how we design and operate our transportation system. The Safe System Approach is the foundation for this change that prioritizes human life above everything else. Through this Plan's analysis, a High Injury Network has been established based on severity of crashes, roadway characteristics, individual behaviors, and unsafe speeds which highlights corridors where fatal and serious crashes are overrepresented on the regional roadway network.

This Plan establishes four goals for addressing roadway safety and implementing Vision Zero in Northwest Arkansas:

1. **Promote a culture that prioritizes people's safety**
2. **Reduce conflicts between roadway users**
3. **Establish policies, practices, and programs that focus on safety at all levels**
4. **Slow vehicle speeds**

Fayetteville, AR

Actions

Achieving goals is not always quick or easy. Effective implementation comes from coordinating various agencies and people to take action focused on safety. The staff of agencies and their partners must have clear tasks. Institutions must have proper incentives and authority to implement their mission.

Each goal is supported by actions that are assigned lead agencies and timeframes. By breaking overarching goals into specific actions this Plan builds a comprehensive set of efforts that together will implement Vision Zero and save lives. All actions consider and support the five Safe System Elements.


Springdale, AR

What you'll see here...

A. Action items - Each is a discrete, specific effort that can be advanced by a Vision Zero partner.

B. Asterisk (*) - Items followed by an astrisk represent systemic safety countermeasus that can be installed on the HIN or proactively jurisdiction-wide where similar conditions exist for crashes to potentially occur. Learn more about these actions on page 51.

C. Timeframe - Action items are assigned general timeframes to help action leaders prioritize their efforts. Although the timeframes note a number of years, these timeframes align with the level of effort for completing these actions.

   Timeframes include:

   a. Immediate: 0-2 years;

   b. Short: 2-5 years; or

   c. Medium-Long: 5-10 years.

D. Cost - There is an anticipated annual cost level listed with each step based on the following ranges:

   a. $ - low (less than $100k)

   b. $$ - medium (between $100k-$500k)

   c. $$$ - high ($500k and above)

E. Action Leader and Supporting Partners - Each action item is led by an action leader and supported by various agency partners.

	A Action	B	C Timeframe	D Cost	Action Leader	E Supporting Partners
1-3	Create guidance for micro sidewalk gap program		Immediate	$	Member Agency, NWARPC	
1-11	Conduct roadway safety audits after every KSI crash		Short	$ - $$	Member Agency	
1-18	Install lighting on arterial roadways, starting with the HIN *		Medium-Long	$$$	ARDOT, MODOT, Member Agency	NWARPC

The Actions that follow are understood to be general recommendations. For some Actions, implementation would only occur when and where appropriate based on further analysis, engineering design, and environmental assessment. Other Actions may require policy changes in alignment with other agency goals. Due to staffing, financial, and other constraints, each agency will need to consider how to prioritize implementation of these Actions in support of Vision Zero.

1

Promote a culture that prioritizes people's safety

Ongoing communication along with projects that put safety first are critical to culture change. Culture is more than messaging; it is a set of behaviors and a way of life that values the safety of fellow roadway users by every person during every trip.

Fayetteville, AR

	Action	Timeframe	Cost	Action Leader	Supporting Partners
1-1	Work with media partners to report traffic crashes more accurately, to avoid victim blaming, and report crashes in the context of Vision Zero	Immediate	$	NWARPC	Member Agency
1-2	Enhance training for law enforcement and emergency service personnel responsible for crash reporting to address the unique attributes required to accurately report crash circumstances involving people walking and bicycling	Immediate	$ - $$	NWARPC	Member Agency
1-3	Create guidance for micro sidewalk gap program	Immediate	$	Member Agency, NWARPC	
1-4	Consider hiring Vision Zero staff dedicated to safety projects and programs across departments	Immediate	$ - $$	Member Agency	NWARPC
1-5	Develop branded Vision Zero signage to be deployed with Vision Zero infrastructure projects during construction	Immediate	$	Member Agency	NWARPC
1-6	Promote using transit to reduce vehicle trips	Immediate	$	Member Agency, NWARPC	
1-7	Partner with youth organizations to create peer-to-peer anti-distraction messaging campaigns	Short	$	Member Agency	
1-8	Promote Transportation Demand Management (TDM) and street design policies that reduce Vehicle Miles Traveled (VMT) and automobile dependence	Short	$ - $$	NWARPC	Member Agency
1-9	Promote Street Networks and Land Use Patterns that Reduce Trip Distances and Automobile Dependence	Short	$	Member Agency	NWARPC
1-10	Develop a Region-Wide Safety Campaign to Share Information with the Community about Traffic Safety for All Modes	Short	$ - $$	NWARPC	Member Agency
1-11	Conduct roadway safety audits after every KSI crash	Short	$ - $$	Member Agency	

	Action	Timeframe	Cost	Action Leader	Supporting Partners
1-12	Conduct analysis of inequities within native populations	Short	$	NWARPC	
1-13	Prioritize Vision Zero investments in areas with high social vulnerability	Medium-Long	$$ - $$$	Member Agency	NWARPC
1-14	Pursue a sustainable funding source for transit to increase frequency, reduce travel time, and expand service area	Medium-Long	$$ - $$$	Transit Agency	Member Agency
1-15	Support DUI/DWI court programs that focus on education and treatment over punishment	Medium-Long	$	Member Agency	
1-16	Encourage large employers of truckers to put speed governors on trucks	Medium-Long	$	NWARPC	
1-17	Install pedestrian-scale lighting along the HIN, especially at trail crossings *	Medium-Long	$$ - $$$	Member Agency	
1-18	Install lighting on arterial roadways, starting with the HIN *	Medium-Long	$$$	ARDOT, MODOT, Member Agency	NWARPC
1-19	Conduct ongoing safety campaigns and events with the community - community safety advisory team (religious leaders, community centers, rec centers)	Medium-Long	$ - $$	NWARPC	Member Agency
1-20	Analyze growth areas adjacent to HIN for future planned development	Medium-Long	$	NWARPC	Member Agency
1-21	Conduct economic and equity analysis	Medium-Long	$	NWARPC	

2

Reduce conflicts between roadway users

Anticipating human error means providing more space and/or time between users to minimize crash severity if and when it happens. Reducing conflicts is rooted in designing streets that consider how different users move in time and space and using effective strategies and best practices to increase safety.

Bentonville, AR

	Action	Timeframe	Cost	Action Leader	Supporting Partners
2-1	Implement no right turn on red on the HIN or high-volume pedestrian routes	Short	$	ARDOT, Member Agency	
2-2	Implement pedestrian friendly cycle lengths, maximum 3' per second of walking speed	Short	$ - $$	ARDOT, Member Agency	
2-3	Standardize crosswalk design standards including ladder spacing and widths	Short	$	NWARPC, ARDOT	Member Agency
2-4	Review crosswalk spacings and distance of crossings (include pedestrian refuge islands)	Short	$	ARDOT, Member Agency	
2-5	Implement a sidewalk gap program to fill short segments outside of development process	Short	$$	ARDOT, Member Agency	
2-6	Identify walking zones for schools, recreation centers, and other community identified priorities for connectivity	Short	$	ARDOT, Member Agency	School Board
2-7	Assess and install bicycle and pedestrian projects to increase separation	Short	$$$	Member Agency	NWARPC, ARDOT
2-8	Install median refuge and pedstrian crossing signals (RRFB or PHB) for mid-block crossings, starting with transit stops on the HIN	Short	$$$	Member Agency, ARDOT	
2-9	Reduce distances between crossings along arterials with long distances between signalized intersections	Medium-Long	$$ - $$$	ARDOT	NWARPC, Member Agency
2-10	Implement road diets along the HIN where applicable	Medium-Long	$$$	Member Agency	ARDOT
2-11	Close gaps in bicycle and pedestrian networks	Medium-Long	$$ - $$$	Member Agency	
2-12	Close slip lanes where applicable, starting with the HIN	Medium-Long	$ - $$$	Member Agency	
2-13	Implement leading pedestrian intervals at signalized intersections, specifically on applicable HIN corridors	Medium-Long	$ - $$	ARDOT, Member Agency	

	Action	Timeframe	Cost	Action Leader	Supporting Partners
2-14	Implement pedestrian recall on all permissive and through signal phases specifically on applicable HIN corridors	**Medium-Long**	$ - $$$	ARDOT, Member Agency	
2-15	Install or retrofit countdown pedestrian signal heads	**Medium-Long**	$$ - $$$	ARDOT, Member Agency	
2-16	Consider removing permissive left turns during active pedestrian signal phase	**Medium-Long**	$$	ARDOT, Member Agency	
2-17	Install sidepath or separated/raised/protected facilities for bicycle routes on roadways with speeds above 35 mph in accordance with FHWA Bikeway Selection Guide	**Medium-Long**	$$$	ARDOT, Member Agency	
2-18	Install edge and center line treatment with bicycle-friendly rumble strips on roadways with marked shoulders	**Medium-Long**	$$ - $$$	ARDOT, MODOT, Member Agency	
2-19	Design and install overpass or tunnel for trail crossings of roadways with 55 mph+ vehicle speeds	**Medium-Long**	$$$	ARDOT, Member Agency	
2-20	Daylight intersections (removing obstacles that impair sight lines) in town centers and in high-volume pedestrian areas	**Medium-Long**	$	ARDOT, Member Agency	
2-21	Convert front-in angle parking to back-in angle or parallel parking in downtown areas	**Medium-Long**	$$	Member Agency	
2-22	Provide buffers to sidewalks and sidepaths (paint, greenspace, trees, etc.)	**Medium-Long**	$$ - $$$	ARDOT, Member Agency	
2-23	Install backplates with retroreflective boards at all signalized intersections and use reflectors on curves and bridges, starting with the HIN	**Medium-Long**	$$ - $$$	Member Agency, ARDOT	
2-24	Deploy access management strategies to combine driveways to adjacent properties OR build medians to restrict left turns near driveways and intersections	**Medium-Long**	$$ - $$$	ARDOT, Member Agency	

3

Establish policies, practices, and programs that focus on safety at all levels

Bentonville, AR

Accomplishing zero fatal and serious injury crashes requires changes at every level. Policy sets the stage for daily decisions to change and can influence practices, programs, and mindsets that are essential for the Safe System Approach to be effective.

	Action	Timeframe	Cost	Action Leader	Supporting Partners
3-1	Adopt Complete Streets policies	Immediate	$	NWARPC, Member Agency, ARDOT	
3-2	Establish equitable zero tolerance policies and incentive programs to reduce and eliminate speeding	Immediate	$	Member Agency, Police Department	
3-3	Establish program and procedures to conduct roadway safety audit after KSI crash	Immediate	$	Member Agency	NWARPC, ARDOT, MODOT
3-4	Create regional and local roadway safety education program for practitioners, boards, and elected officials	Immediate	$ - $$	NWARPC, Member Agency	
3-5	Develop a Vision Zero dashboard to track performance metrics related to KSI crashes, safety projects, completed actions, and other items that focus on the Safe Systems Approach	Immediate	$	NWARPC	ARDOT, Member Agency
3-6	Publish annual report on crashes and other safety metrics for transparency and accountability	Immediate	$	NWARPC, Member Agency	ARDOT, MODOT
3-7	Create policy to site transit stops closer to intersections to reduce dart and dash crashes	Immediate	$	Member Agency, Transit Agency	NWARPC
3-8	Review and update land use policies and development standards to prioritize the safety of all road users (e.g., block size, crosswalk spacing, access management)	Immediate	$	Member Agency	NWARPC
3-9	Develop a multimodal safety toolbox that identifies strategies available to address safety concerns for all modes	Short	$	NWARPC	
3-10	Establish multidisciplinary crash response teams to evaluate and address fatal and serious injury crashes at crash locations	Short	$	Member Agency	NWARPC, ARDOT, MODOT
3-11	Adopt specifications for incorporating safety features in new fleet vehicle purchases and retrofit existing vehicles	Short	$	NWARPC	Member Agency

	Action	Timeframe	Cost	Action Leader	Supporting Partners
3-12	Advocate for changes to state law to expand the use of automated safety cameras	Short	$	NWARPC	Member Agency
3-13	Conduct crash analysis by type of vehicle due to semis and large trucks with trailers on roads	Short	$	NWARPC	ARDOT, Member Agency
3-14	Conduct analysis of crashes on curves and hills in region	Short	$	NWARPC	ARDOT, Member Agency
3-15	Conduct analysis of crashes related to two-way left-turn lanes and access management on arterials, especially in commercial areas	Short	$	NWARPC	ARDOT, Member Agency
3-16	Analyze crashes within new greenfield development, housing, and commercial	Short	$	NWARPC	Member Agency
3-17	Establish policy to conduct routine walking audits to review safety needs for roadway projects during scoping phase	Short	$	Member Agency	
3-18	Address safety through installing proven countermeasures during routine roadway maintenance	Medium-Long	$ - $$$	ARDOT, MODOT, Member Agency	
3-19	Identify and implement applicable road safety countermeasures through routine resurfacing	Medium-Long	$$ - $$$	ARDOT, MODOT, Member Agency	
3-20	Consider policies that provide alternatives for primary access to schools on arterials or HIN for future school sites	Medium-Long	$	School Board	Member Agency
3-21	Analyze before and after crash trends along recent roadway projects	Medium-Long	$	NWARPC, ARDOT	
3-22	Conduct ongoing safety analyses for intersections, specifically along the HIN	Medium-Long	$ - $$	NWARPC	Member Agency

4

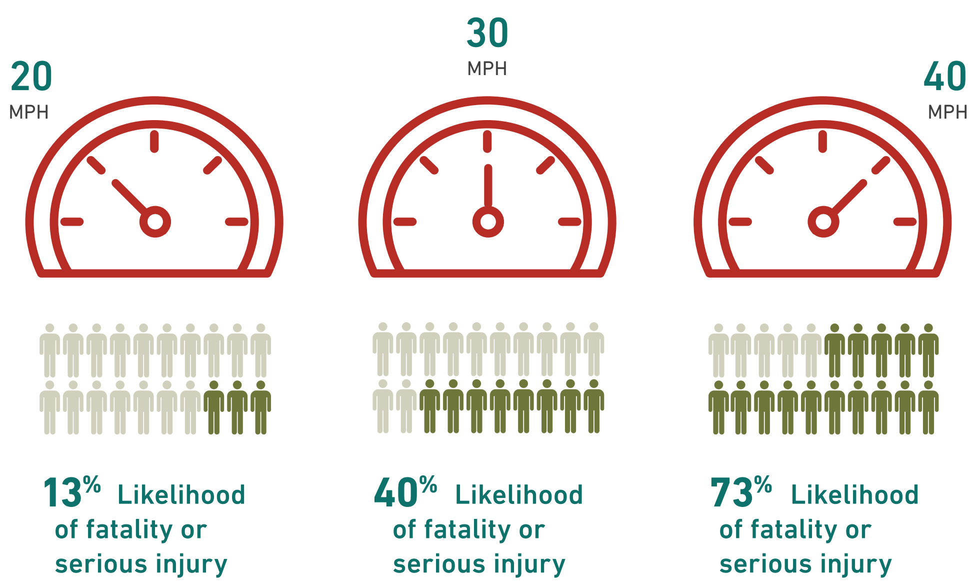
Slow Vehicle Speeds

Excessive speed is at the heart of fatal and serious injury crashes. Getting people to drive slower will take more than just a lower speed limit. Reducing vehicle speeds will require several tools and strategies to work together for the safety of all roadway users.

Fayetteville, AR

	Action	Timeframe	Safe System Elements	Action Leader	Supporting Partners
4-1	Post nighttime speed limits *	Immediate	$ - $$	Member Agency, ARDOT	
4-2	Develop guidance for equitable traffic calming policies and resources	Immediate	$	NWARPC	Member Agency
4-3	Reduce speed limits on local streets to 20 mph *	Short	$	Member Agency	
4-4	Conduct a special speed study in local jurisdictions for blanket speed limit reduction	Short	$$	NWARPC, Member Agency	
4-5	Engage state legislature to change laws related to speed limit setting	Short	$ - $$	NWARPC, Member Agency	
4-6	Adjust signal timing and signage for speed limit on arterials *	Short	$ - $$	Member Agency, ARDOT	
4-7	Review speed limits on the HIN	Medium-Long	$	NWARPC	Member Agency, ARDOT
4-8	Tighten turning radii to reduce turning speeds and include truck aprons on freight routes *	Medium-Long	$$	Member Agency, ARDOT	

Pedestrian vulnerability when struck by a vehicle at this speed



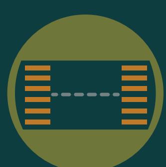
Data Citation: Tefft, B.C. (2011). *Impact Speed and a Pedestrian's Risk of Severe Injury or Death* (Technical Report). Washington, D.C.: AAA Foundation for Traffic Safety.

Proactive Systemic Safety Countermeasures

Systemic safety countermeasures can be installed on the HIN or proactively across the region and in member agency jurisdictions where similar conditions exist for crashes to potentially occur. Generally, systemic safety improvements increase safety of all road users. These proactive systemic safety countermeasures will likely require additional funding for implementation and perpetual maintenance for staffing and materials and/or changing a policy or standard by member agencies or the State to allow the measures to be installed for use in a more widespread manner. These systemic safety countermeasures could also be implemented proactively or established as safety standards as part of other safety projects, such as street reconstruction or as part of new land use development projects.

The following highlights several safety countermeasures for proactive, systemic implementation in Northwest Arkansas that were listed in the previous action tables. Proactive and systemic safety countermeasures should be installed on the HIN first, as part of other street projects, in similar conditions where crashes could occur and eventually in a more widespread fashion, as budget and staff resources allow.

Install pedestrian-scale lighting along the HIN, especially at trail crossings and along arterials



Reduce distances between crossings along arterials with long distances between signalized intersections

Daylight intersections (remove obstacles that impair sight lines) in town centers and in high-volume pedestrian areas

Implement leading pedestrian intervals at signalized intersections, specifically on applicable HIN corridors

Implement no right turns on red on the HIN or high-volume pedestrian routes

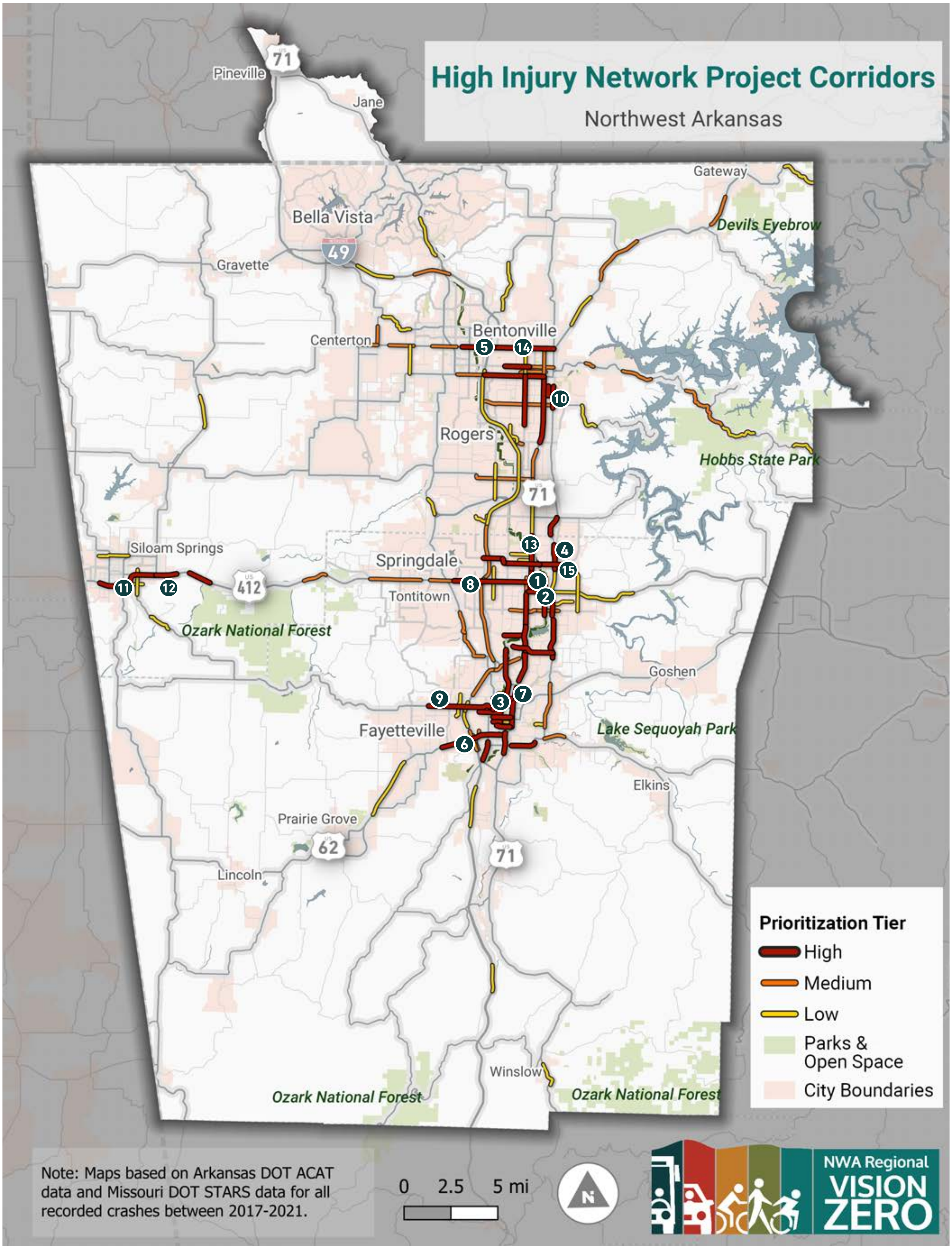
Adjust signal timing and signage for speed limit on arterials

Highest Priority Projects

The following map shows prioritized HIN project corridors for the region. The Top 15 highest scoring projects are listed below.

1. **West Robinson Avenue (US 412)**
   South Thompson Street to Turner Street (Springdale)
2. **South Thompson Street (US 71B)**
   West Emma Avenue to Curchill Avenue/West Lakeview Drive (Springdale)
3. **North Garland Avenue**
   West Lawson Street to West Berry Street (Fayetteville)
4. **North Old Missouri Road (Hwy 265)**
   Old Wire Road/Dick Trammel Highway to East Emma Avenue (Springdale)
5. **Southeast 14th Street (Hwy 102)**
   Phyllis Street to West Hudson Road/Water Tower Road/Bekaert Drive (Bentonville)
6. **West Martin Luther King Jr. Boulevard**
   South School Avenue to West Ozark Trail/East Main Street (Fayetteville)
7. **North College Avenue (US 71B)**
   East Center Street to East Township Street (Fayetteville)
8. **West Sunset Avenue (US 412)**
   Westside Village Street/East Henri de Tonti Boulevard to South Thompson Street (Springdale)
9. **West Wedington Drive**
   West North Street/North Garland Avenue to MP 16.40 (Fayetteville)
10. **South Mountie Boulevard**
    West Oak Street/South 5th Street to West Olrich Street (Bentonville)
11. **US 412; AR 59**
    West extent of US 412;AR 59 to Arkotex Road (Siloam Springs)
12. **US 412**
    MP 11.65 to Arkotex Road/US 412; AR 59 (Siloam Springs)
13. **North Thompson Street (US 71B)**
    West Emma Avenue to West County Line Road (Springdale)
14. **West Hudson Road (US 62)**
    Water Tower Road to North 2nd Street (Rogers)
15. **East Huntsville Avenue**
    Mill Street to East Emma Avenue/Butterfield Coach Road (Springdale)

High Injury Network Projects



Proven Safety Countermeasures

Addressing safety in Northwest Arkansas will require the deployment of proven safety countermeasures across the regional transportation network, starting with the HIN. Selection and design of safety countermeasures on every street project in the region should be decided through the lens of the Safe System Approach, so that if a crash occurs it will not result in a fatal or serious injury. Safety countermeasures should not be compromised or simplified during the design or construction phases. These modifications can reduce the level of safety for all road users.

The FHWA Proven Safety Countermeasures initiative (PCSi) is a collection of specific design or operational changes to streets that have been proven nationally to improve safety. Safety countermeasures are listed below along with hyperlinks to provide a more detailed description and effectiveness of the full safety countermeasure.

Speed Management

Appropriate Speed Limits for All Road Users


Speed Safety Cameras

Variable Speed Limits

Pedestrian/Bicyclist


Bicycle Lanes


Crosswalk Visibility Enhancements


Leading Pedestrian Interval


Medians and Pedestrian Refuge Islands


Pedestrian Hybrid Beacons


Rectangular Rapid Flashing Beacons (RRFB)


Road Diets (Roadway Configuration)


Walkways

Roadway Departure

Enhanced Delineation for Horizontal Curves

Longitudinal Rumble Strips and Stripes on Two-Lane Roads

Median Barriers

Roadside Design Improvements at Curves

Safety Edge

Wider Edge Lines

Intersections

Backplates with Retro-reflective Borders

Corridor Access Management

Dedicated Left- and Right-Turn Lanes at Intersections

Reduced Left-Turn Conflict Intersections

Roundabouts

Systemic Application of Multiple Low-Cost Countermeasures at Stop-Controlled Intersections

Yellow Change Intervals

Crosscutting

Lighting

Local Road Safety Plans

Pavement Friction Management

Road Safety Audit

Taking Action

The NWA Vision Zero Plan is a commitment along with an initial set of goals and actions to reach the vision of zero fatal and serious injuries on roadways across Northwest Arkansas. However, Vision Zero must be more than a document; it must be embraced, discussed, emphasized, and reinforced every day. This Plan must be a living document that unites people across agencies, departments, organizations, and the region to prioritize roadway safety.

Performance Measures

NWARPC and member agencies will need to monitor the success of individual Vision Zero actions related to each goal. Evaluation and regular reporting are essential for the data-driven approach to Vision Zero. There must be accountability to the commitment of eliminating traffic deaths and severe injuries. If certain actions are not successful, not moving fast enough, or not working for another reason, the region and member agencies should assess and modify actions as needed. However, it is critical that monitoring does not reduce or minimize the focus on the ultimate performance measure of eliminating fatal and serious injuries on all roadways in Northwest Arkansas by 2038. Actions such as the data dashboard and annual reporting can track progress and provide insight into a number of metrics, including but not limited to:

- Crashes involving bicycles and pedestrians
- Crashes resulting from unsafe speeds
- Crashes in rural versus urbanized areas
- Crashes occurring on roadways in Historically Disadvantaged Communities, Areas of Persistent Poverty, and/or Socially Vulnerable communities.

Sharing Responsibility for Vision Zero

To carry out everything presented in this Vision Zero Plan and to eliminate fatalities and serious injuries on all roadways across Northwest Arkansas by 2038, everyone—from elected officials and municipal staff to local employers and residents of all ages and abilities—will need to take action. We all have a personal responsibility to make the right choices and to communicate the importance of why roadway safety matters—making the region's efforts even more effective.

Fayetteville, AR

Acknowledgements

The creation of the NWA Vision Zero Plan would not have been possible without the dedication of numerous NWARPC staff, municipal staff from member agencies, elected officials, and community partners.

This effort was led by the NWARPC, in partnership with the Regional Working Group.

NORTHWEST ARKANSAS REGIONAL PLANNING COMMISSION

Elizabeth Bowen

Tim Conklin

MEMBER AGENCIES

ADVOCACY ORGANIZATIONS

Trailblazers

Bentonville Moves

Bentonville Coalition

Runway Group

Walton Family Foundation

Bentonville Traffic Safety Committee

Fayetteville Traffic Safety Committee

STATEWIDE AGENCIES

ARDOT

MODOT

PROJECT CONSULTANT

Toole Design Group

NWA Regional VISION ZERO

Safety Action Plan

Appendices

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Contents

Disclaimer: Information contained in this document is for planning purposes and should not be used for final design of any project. All results, recommendations, concept drawings, cost opinions, and commentary contained herein are based on limited data and information and on existing conditions that are subject to change. Further analysis and engineering design are necessary prior to implementing any of the recommendations contained herein. Geographic and mapping information presented in this document is for informational purposes only, and is not suitable for legal, engineering, or surveying purposes. Data products presented herein are based on information collected at the time of preparation. Toole Design Group, LLC makes no warranties, expressed or implied, concerning the accuracy, completeness, or suitability of the underlying source data used in this analysis, or recommendations and conclusions derived therefrom.

Federal law 23 United States Code Section 409 governs use of the data in this report. Under this law, data maintained for purposes of evaluating potential highway safety enhancements "...shall not be subject to discovery or admitted into evidence in a federal or state court proceeding or considered for other purposes in any action for damages arising from any occurrence at a location mentioned or addressed in such reports, surveys, schedules, lists, or data." If you should attempt to use the information in this report in an action for damages against City, the State of Washington, or any other jurisdiction involved in the locations mentioned in the data, these entities expressly reserve the right, under Section 409, to object to the use of the data, including any opinions drawn from the data.

List of Abbreviations

AADT Annual Average Daily Traffic
ACAT Arkansas Crash Analytics Tool
ACS American Community Survey

AR Arkansas
ARDOT Arkansas Department of Transportation
DUI Driving Under the Influence
FHWA Federal Highway Administration
GTFS General Transit Feed Specification
HIN High Injury Network
KABCO Injury Severity Scale (Arkansas):
- **K**: Fatal injury
- **A**: Suspected serious injury
- **B**: Suspected minor injury
- **C**: Possible injury
- **O**: No apparent injury

Injury Severity Scale (Missouri)
- **1**: Fatal
- **2**: Disabling
- **3**: Evident – Not Disabling
- **4**: Probable – Not Apparent
- **5**: None Apparent

KA/KSI Killed or Serious Injury
LRS Linear Referencing System
MO Missouri
MODOT Missouri Department of Transportation
NWA Northwest Arkansas
NWARPC Northwest Arkansas Regional Planning Commission
OSM OpenStreetMap
STARS Missouri Statewide Traffic Accident Records System
VRU Vulnerable Road User includes Pedestrian, Bicyclists, or Motorcyclist
VPD Vehicles Per Day

Appendix A: Crash Maps Report

Toole Design has prepared the following High Injury Network (HIN) and Sliding Windows Analysis maps for the Northwest Arkansas (NWA) Region as part of the Regional Vision Zero Action Plan. The following memo describes our crash data sources, methodologies, and thresholds for development of the maps created.

Crash Data Sources

Maps are based on Arkansas Department of Transportation (ADOT) Arkansas Crash Analysis Tool (ACAT) and the Missouri Department of Transportation (MDOT)Statewide Traffic Accident Records System (STARS) for all recorded crashes between 2017-2021.[1] [2]

Killed and Seriously Injured Crash Maps

The Safe System Approach focuses identifying and addressing the factors that lead to fatal or suspected serious injury (KA) crashes, similar conditions where they could occur, or proactive and system-wide safety solutions before a crash occurs. This report includes maps highlighting where KA crashes have occurred for each mode as well as non-KA crash locations. Areas with high concentrations of KA crashes will become the basis of the HIN.

1 https://experience.arcgis.com/experience/1911f992cabc484a98f64e7c36c2b262/

2 https://www.mshp.dps.missouri.gov/MSHPWeb/SAC/stars_index.html

Figure 1: Pedestrian Crash Map

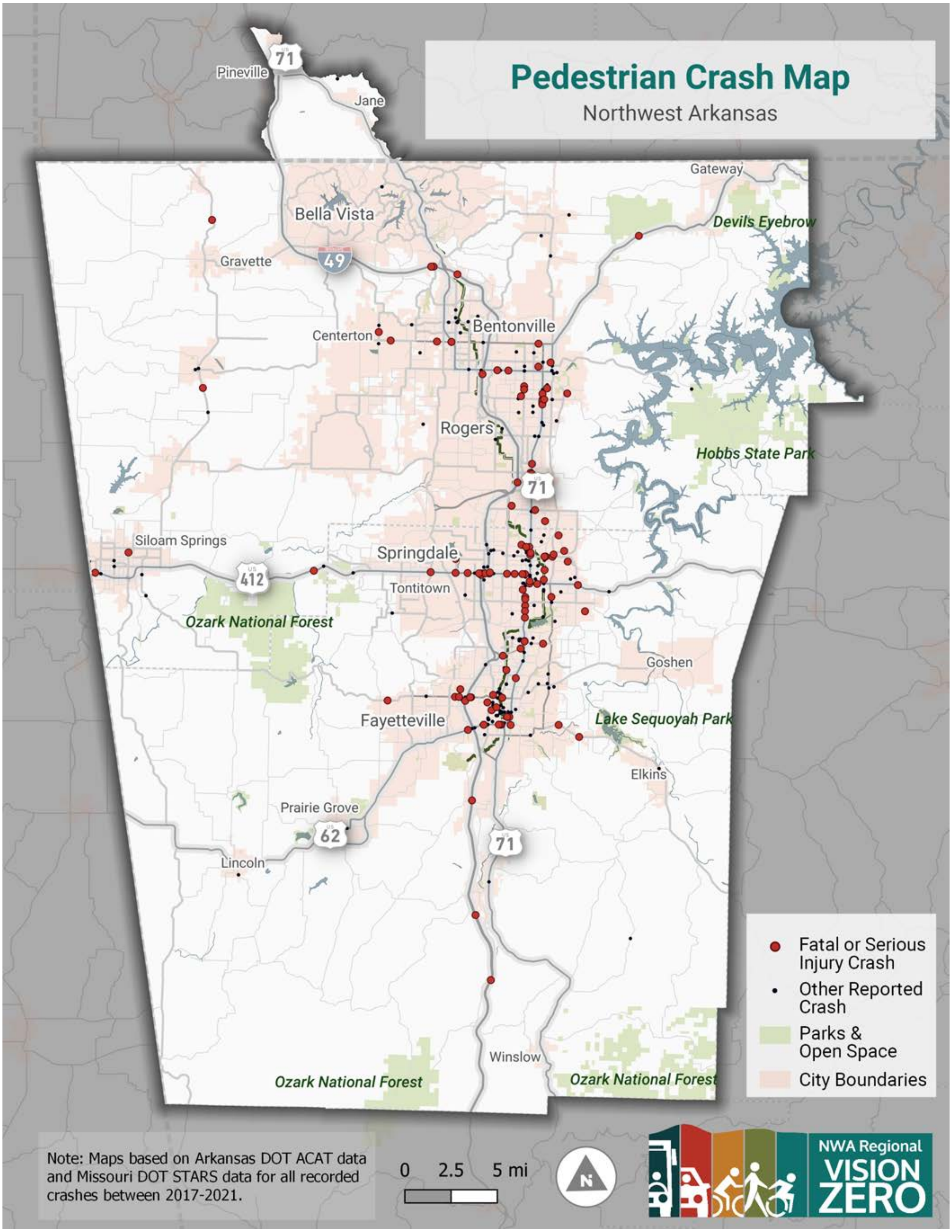


Figure 2: Figure 2: Bicycle Crash Map

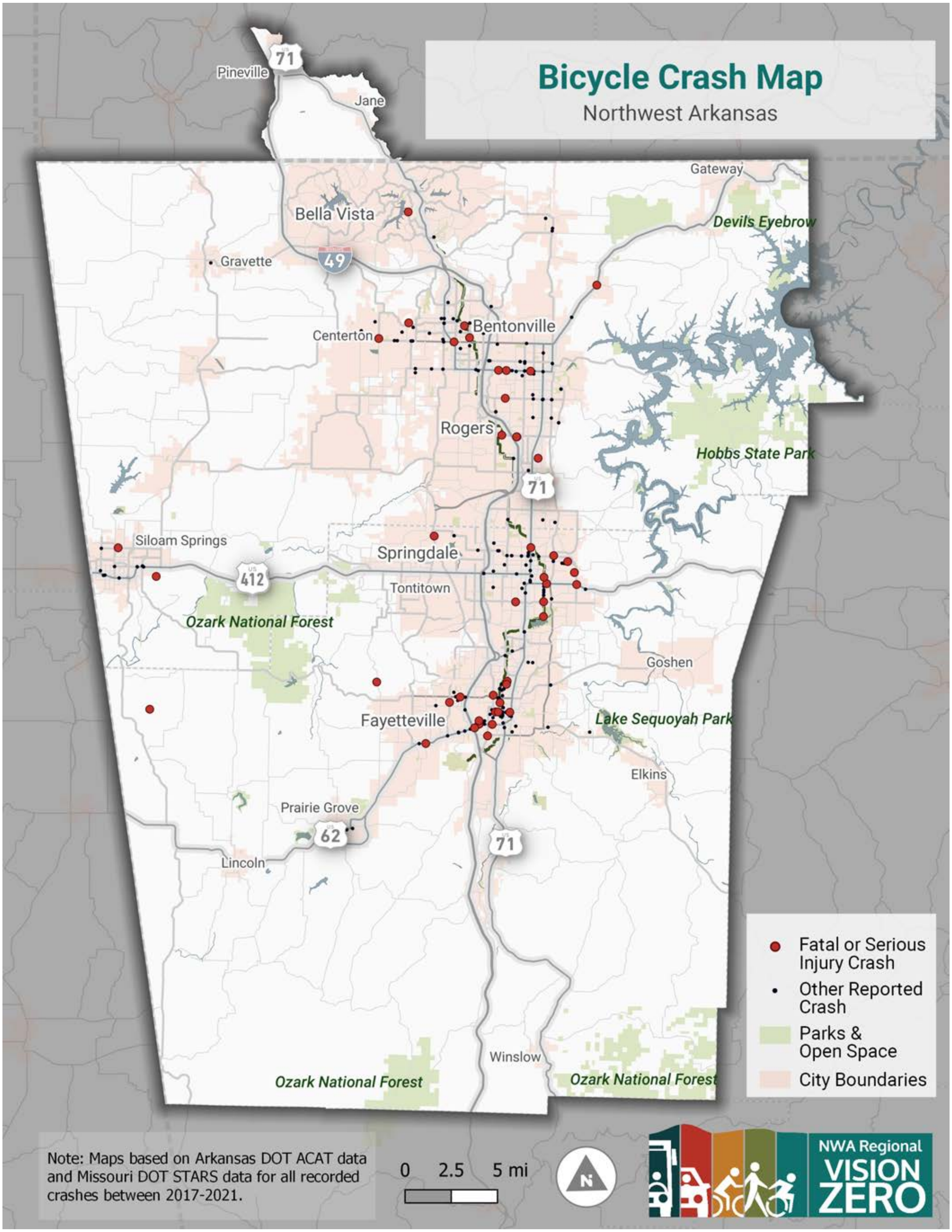


Figure 3: Motorcycle Crash Map

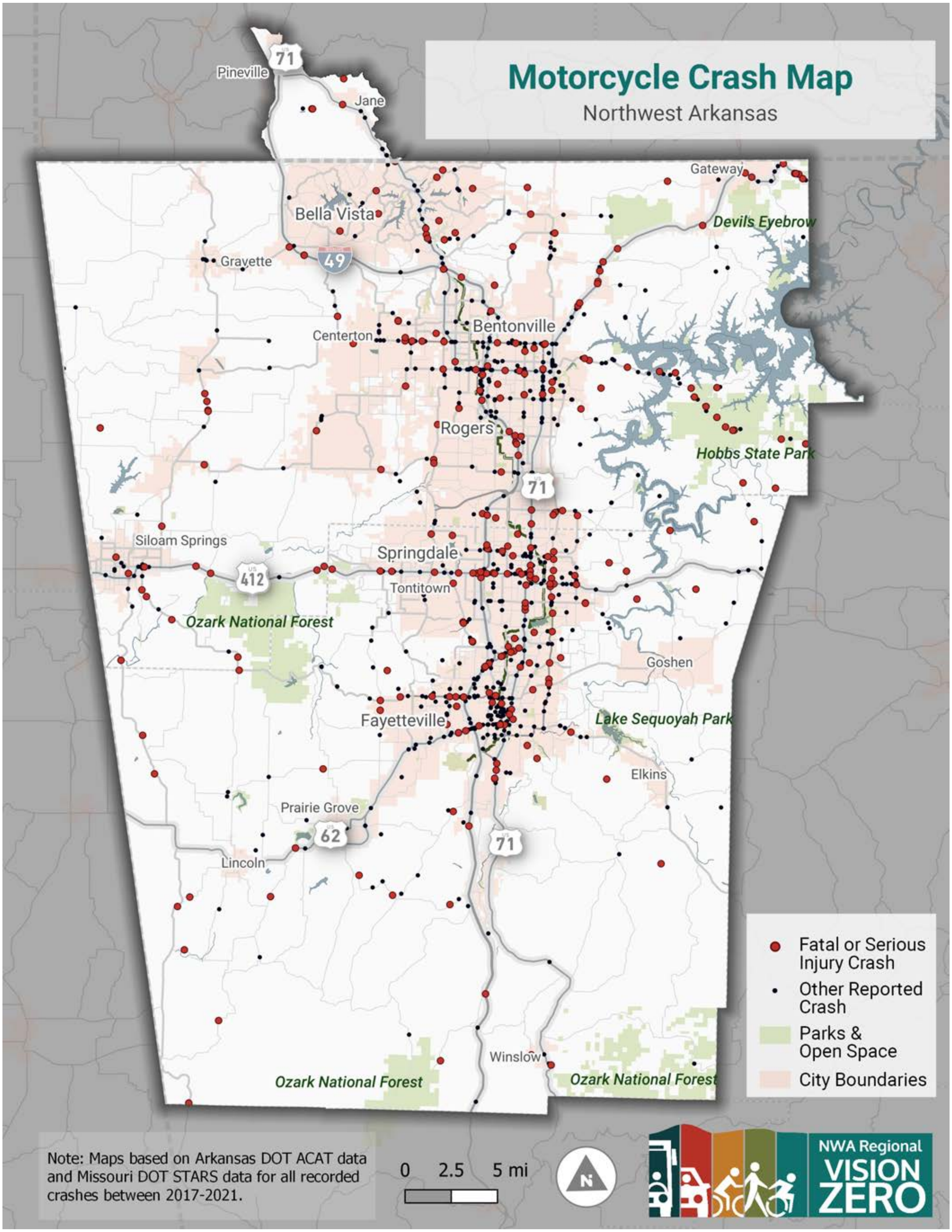


Figure 4: Motor Vehicle Crash Map

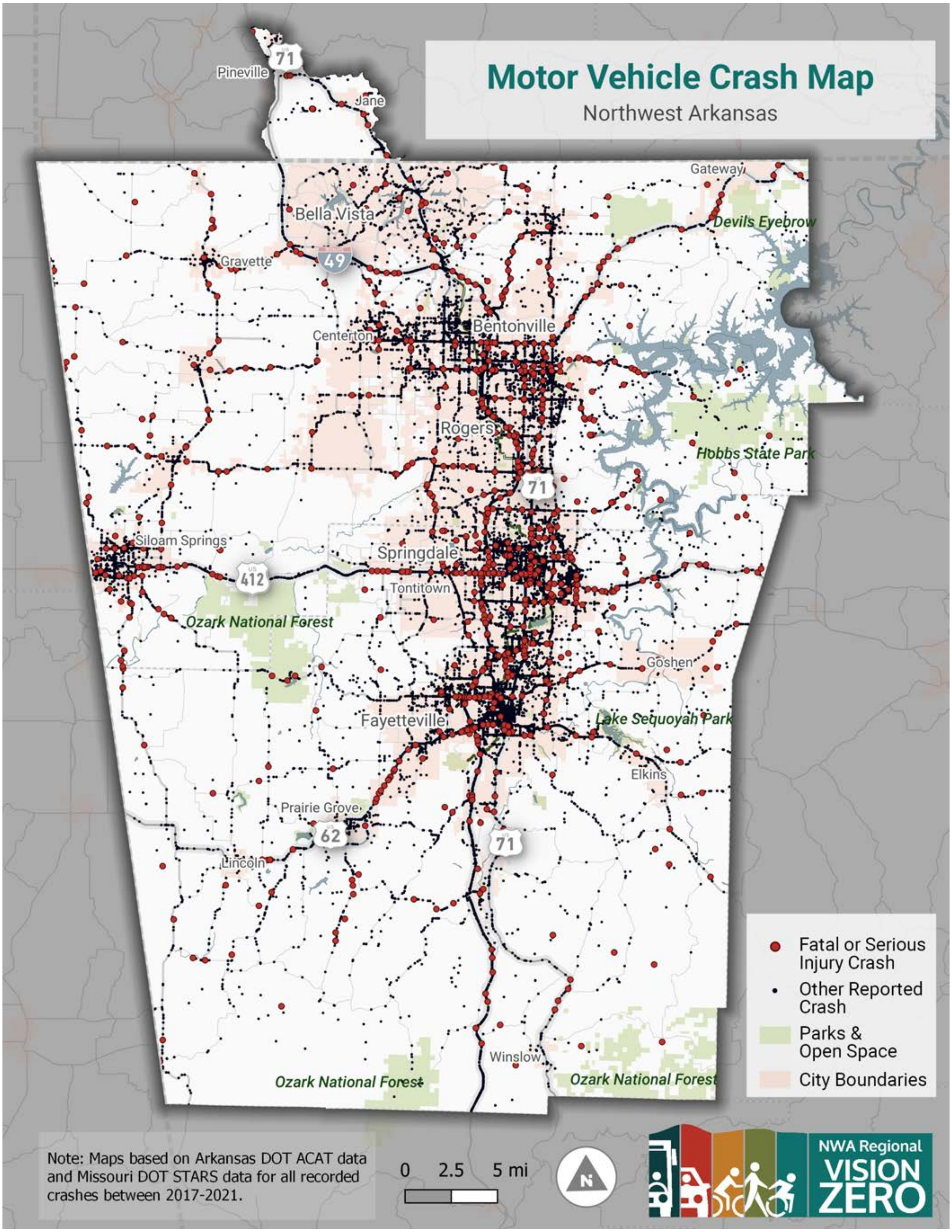
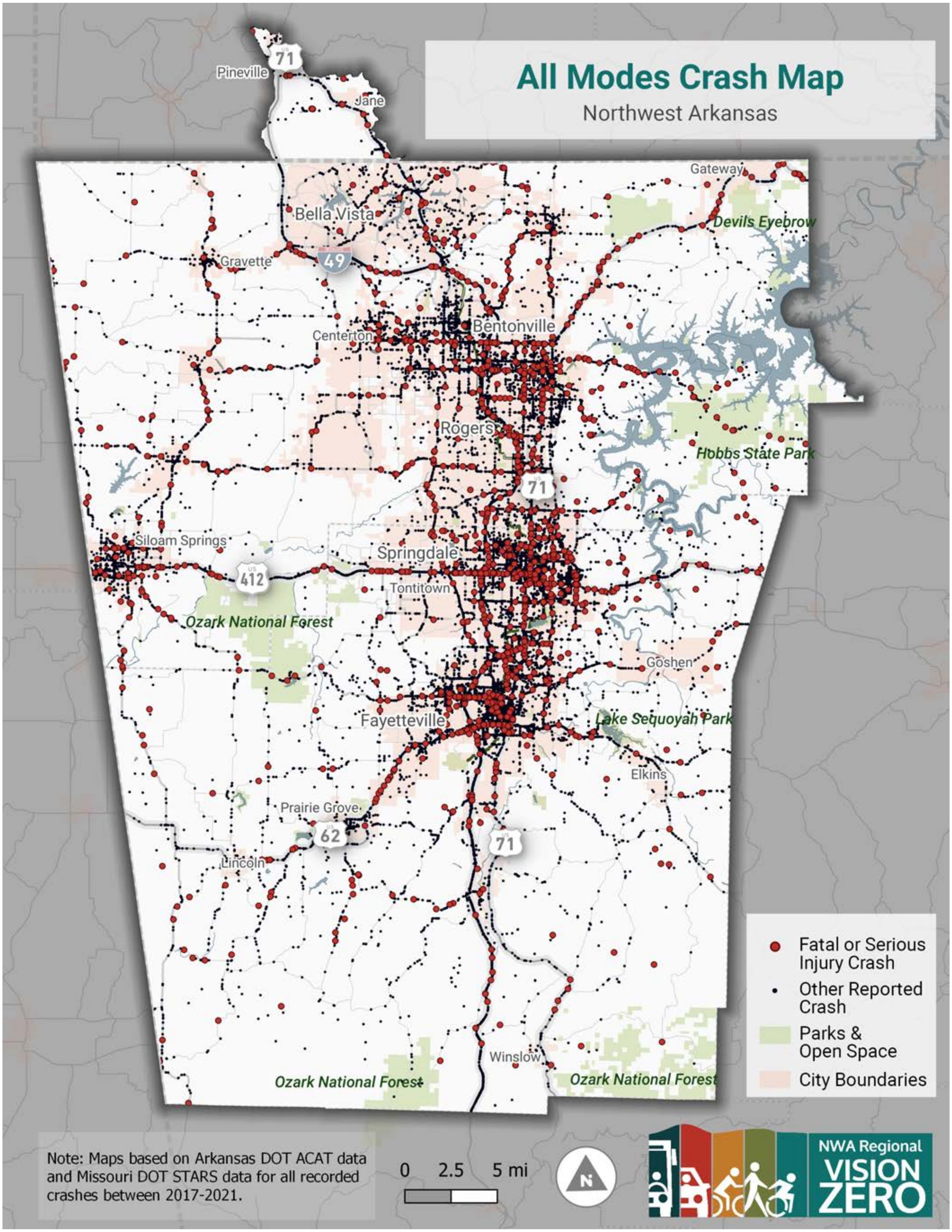


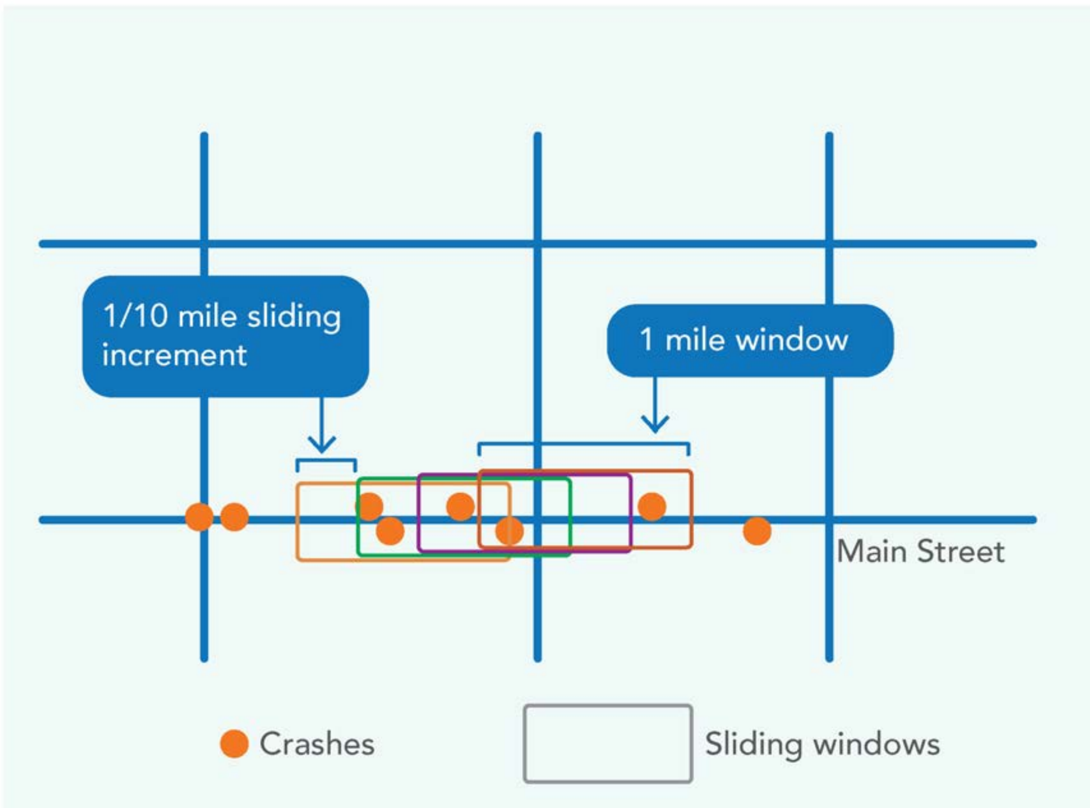
Figure 5: All Modes Crash Map



Sliding Windows Analysis Methodology

A sliding window analysis helps understand crashes throughout a transportation network and identify segments with the highest crash density and crash severity. For the NWA Region, the analysis was done by determining the number and severity of crashes in a **one-mile window** on a roadway and shifting that window along the roadway 1/10 of a mile at a time. In this approach, a virtual "window" is moved along each corridor, counting the number of crashes by density and severity by mode that occurred within each successive one-mile segment. The one-mile moving window slides along a corridor scoring crashes, only stopping for a road name or functional road classification change. Both intersection and segment crashes were included in this evaluation, as the focus is on overall corridor conditions. An example of a Sliding Windows analysis is shown below.

Figure 6: Example of the Sliding Windows analysis. Source: Toole Design.



The Sliding Windows score is calculated by multiplying the number of Fatal Injury/Fatal (K/1) and Suspected Serious Injury/ Disabling (A/2) crashes by 3 and multiplying the number of Suspected Minor Injury/ Evident-Not Disabling crashes (B/3) by 1, and not including Possible Injury/ Probable-Not Apparent (C/4), and No Apparent Injury/ None Apparent (O/5) crashes. Once the weights are established and applied to the crashes, the number of crashes is aggregated along a corridor while incorporating the crash severity weighting. Lower injury crashes (C/4 and O/5) crashes were excluded from the motor vehicle Sliding Windows analysis but included for bicycle, pedestrian, and motorcycle Sliding Windows due to the potential for a crash to result in an injury when a vulnerable roadway user is involved. Each segment is scored based on this methodology and those Sliding Windows scores are shown in the Sliding Windows maps for pedestrian, bicyclists, motorcyclists, and motor vehicles accordingly. For instance, with KA crashes weighted at three times minor injury crashes, a corridor with two KA crashes will have the same weighted total as a corridor with six minor injury crashes.

Figure 7: Pedestrian Sliding Windows Analysis

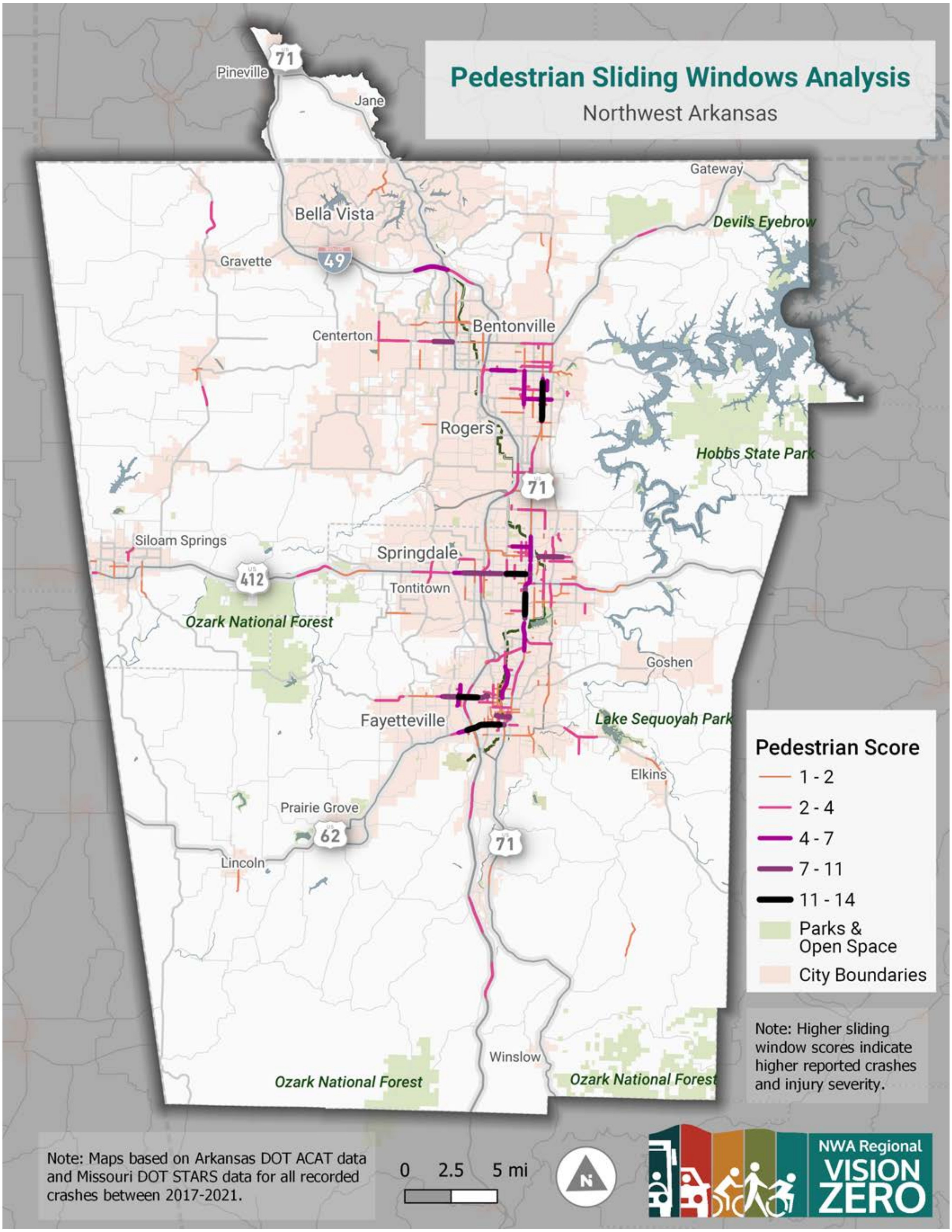


Figure 8: Bicycle Sliding Windows Analysis

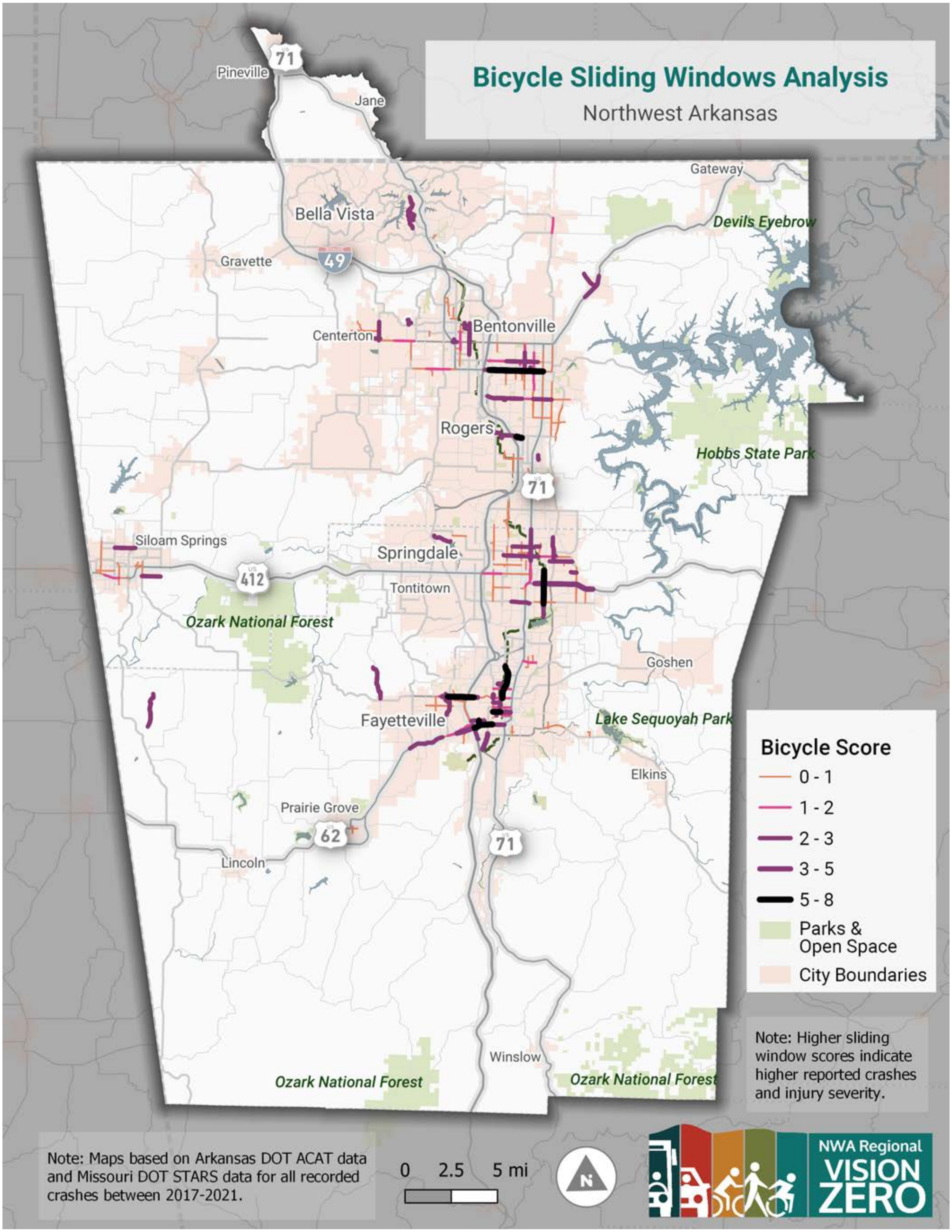


Figure 9: Motorcycle Sliding Window Analysis

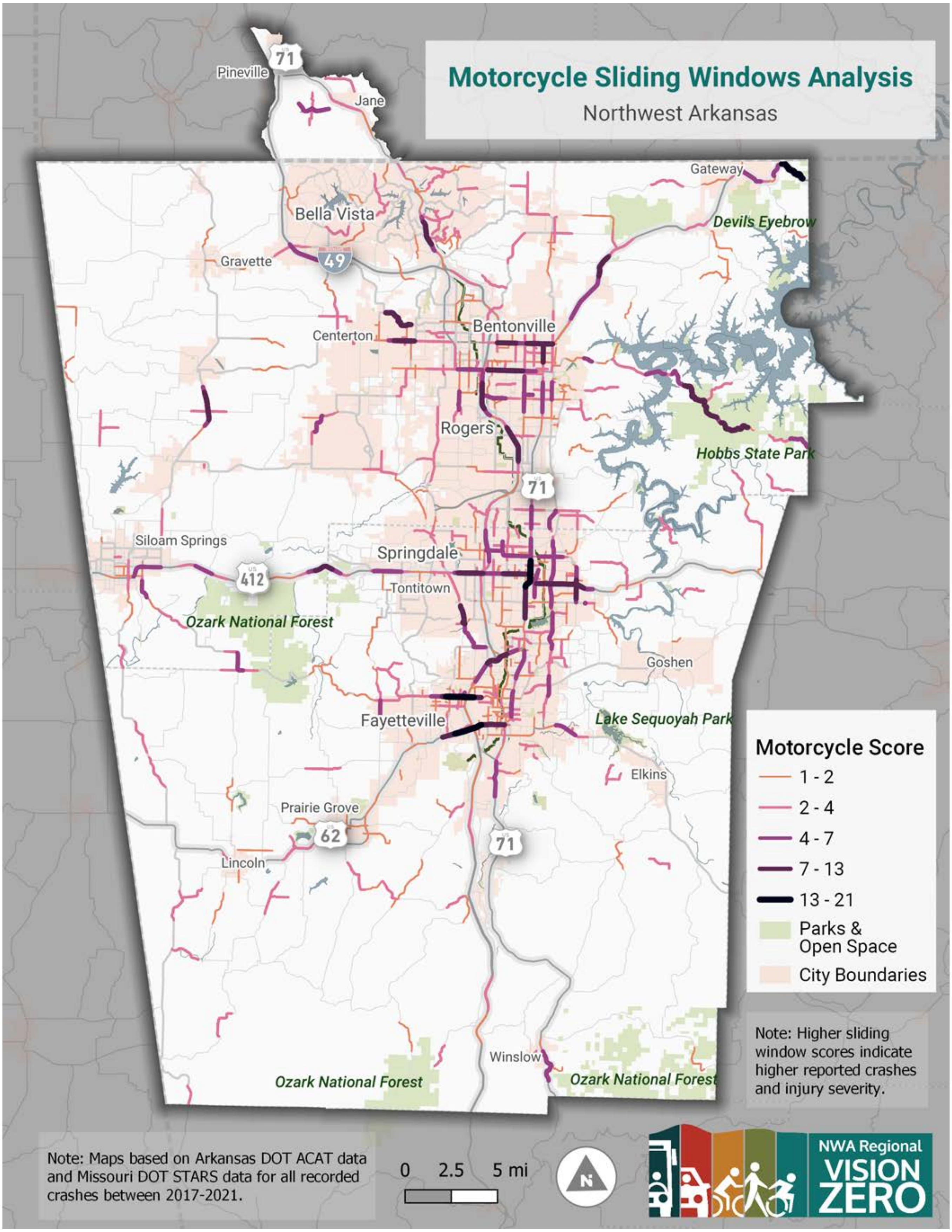
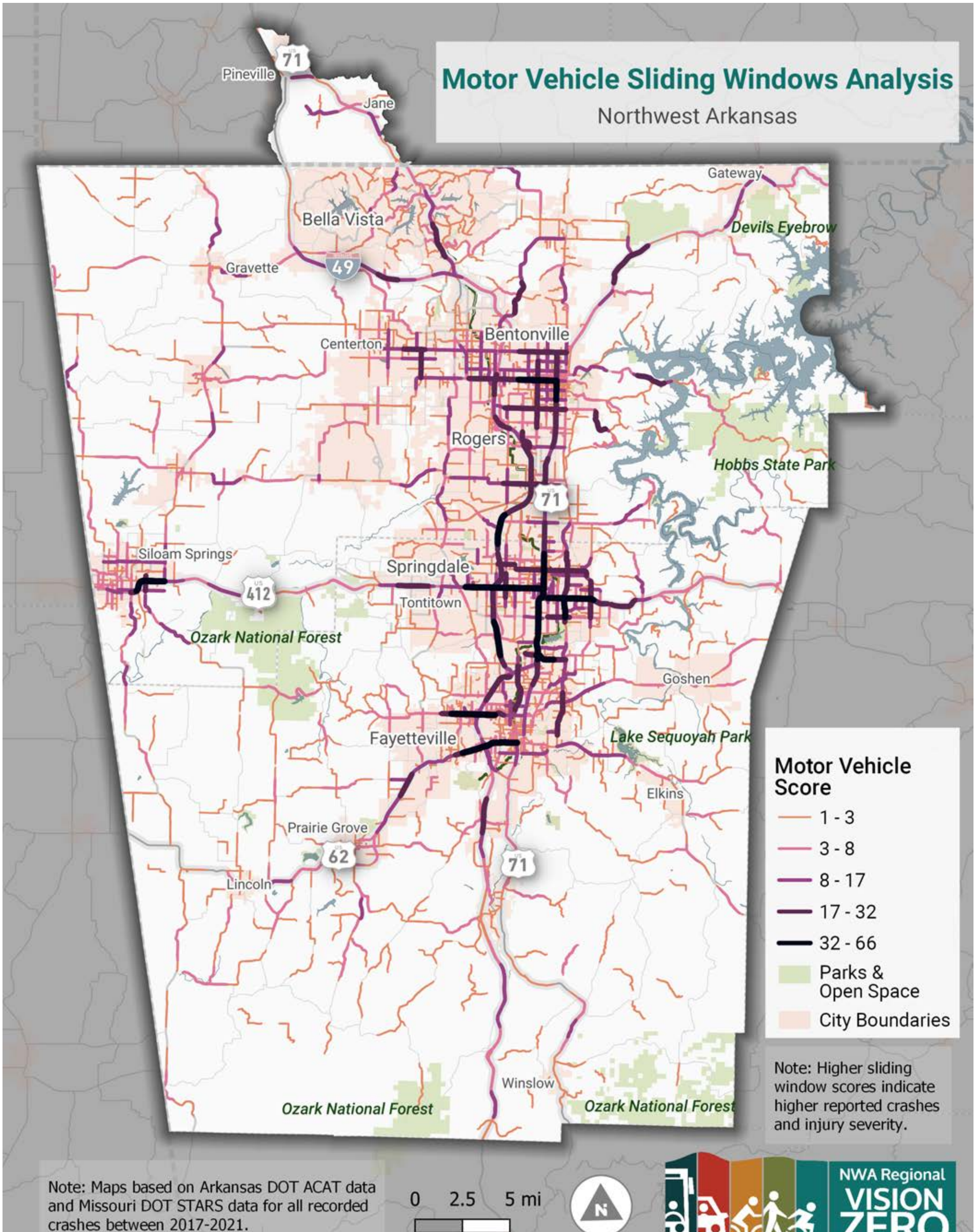


Figure 10: Motor Vehicle Sliding Windows Analysis



Development of High Injury Network

The development of a HIN is a key element of a safety plan to help prioritize where historic crashes have occurred at the greatest density and severity. The HIN development process involves developing crash density estimates along street corridors throughout the region, weighing them by crash severity, and then identifying the highest crash risk sections for each mode individually from the Sliding Windows analysis. HIN corridors are identified by applying a one-mile moving window aggregation to the street network.

High Injury Network Process

Development of the HIN should emphasize that the key goal of Vision Zero is elimination of fatal and serious injury crashes, and therefore the more severe crashes count for more in the analysis but still including lesser injury crashes in the analysis. The combination of crash injury severity and the density of all crashes from the Sliding Windows analysis is how the HIN maps, for each mode and all modes combined, were developed using the following steps:

1. Map the Sliding Windows analysis results for each mode (pedestrian, bicycle, motorcycle, and motor vehicle) individually
2. For each mode, determine the threshold of the Sliding Windows output required to be included in the HIN. This step eliminates streets that have a lower crash density thereby prioritizing streets that have higher crash severities and frequencies.
3. Review false-positive segments that have a high crash score due to a single intersection crash but do not have any other crashes along the corridor.

High Injury Network Thresholds

The goal of setting higher HIN Sliding Windows score threshold is to settle on the Sliding Windows score for each mode independently that will identify key corridors where safety risk is highest based on crash density and injury severity to help agencies prioritize where safety improvements should be made first. A segment that meets or exceeds the Sliding Windows scores for each mode that included in the HIN for the NWA region are listed below:

- **Pedestrian: 4**
- **Bicycle: 4**
- **Motorcycle: 7**
- **Motor Vehicle: 15**

The weighted crash score thresholds for areas included in the HIN do not exactly follow the weighted crash score ranges from the Sliding Windows, as the HIN is a compilation of the highest weighted crash scores.

Manual Refinements

The HIN development process relies on historical crash data, which is imperfect and incomplete because not every crash is reported. As such, this process is both and art and a science. Key areas to manually review in the HIN revision process include areas where a street name or functional road classification changes, but the crash density or injury severity risk seem higher or lower. Manual refinements to the HIN maps should be minimized and really account for key context changes that cannot be captured in a data driven process. For example, an area where the Sliding Window continues but the road context changes drastically.

The following corridor extents were manually adjusted based on review by the project team to account for unique street contexts the automated Sliding Windows Analysis did not account for. The following corridors were manually adjusted based on the following reasons:

1. Segment along West Huntsville Avenue originally terminated at the end of the curve. This segment was manually extended through the White Road curve to fill a small gap between high crash areas.
2. Segment along West Don Tyson Parkway has been manually extended through the curve to account for the existing divided roadway.
3. Segment along East Wagon Wheel Road was manually extended through the ramp entrance to I-49. This extension increased the overall motor vehicle Sliding Window score above the threshold of 15.
4. Segment along South 26th Street was manually shortened to remove the portion of the segment north of West Laurel Avenue where few crashes have occurred and no KSI crashes.
5. Segment along West Hudson Road was manually added to the HIN due to the number of crashes and contiguity with segments of Highway 62 that are on the HIN.

Figure 11: All Modes High Injury Network

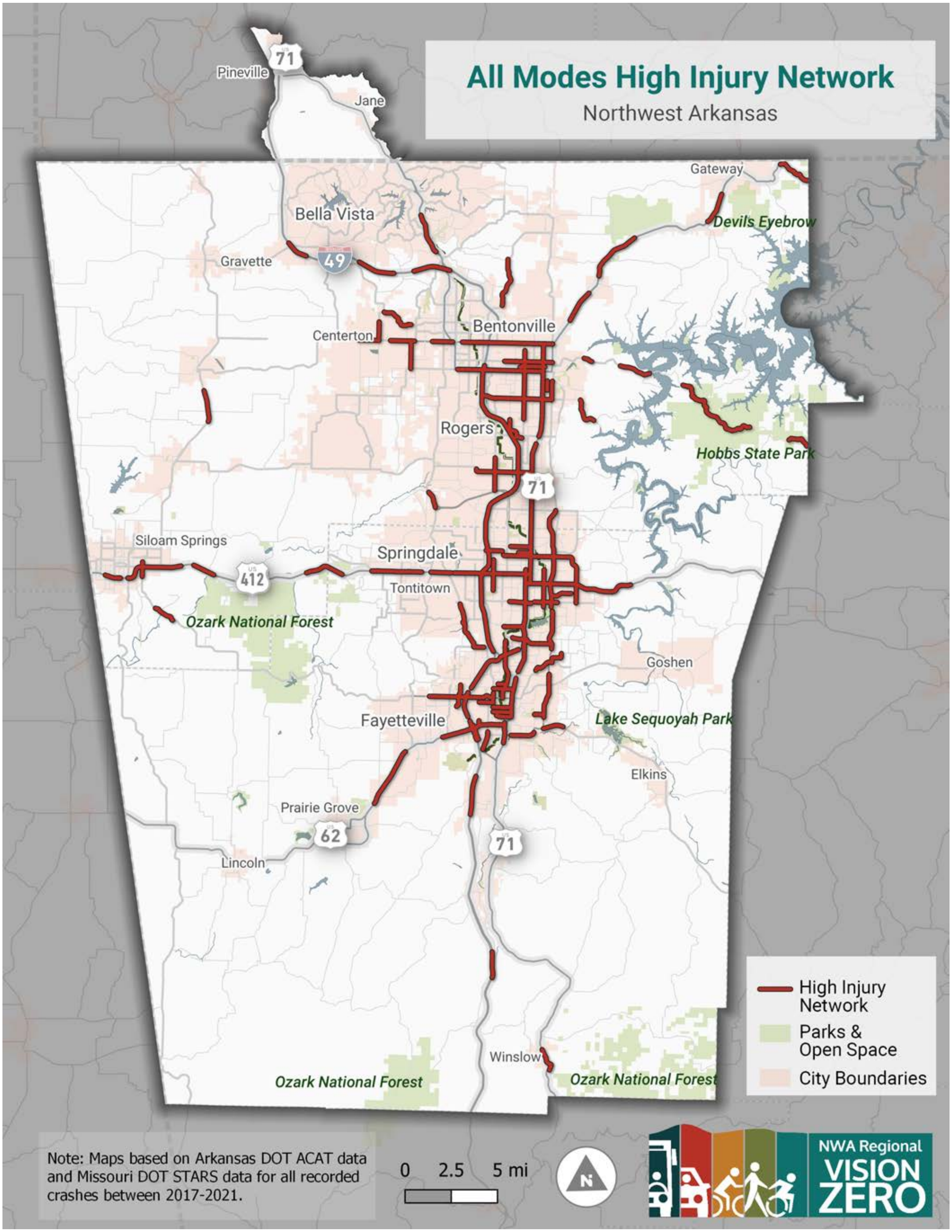


Figure 12: Pedestrian High Injury Network

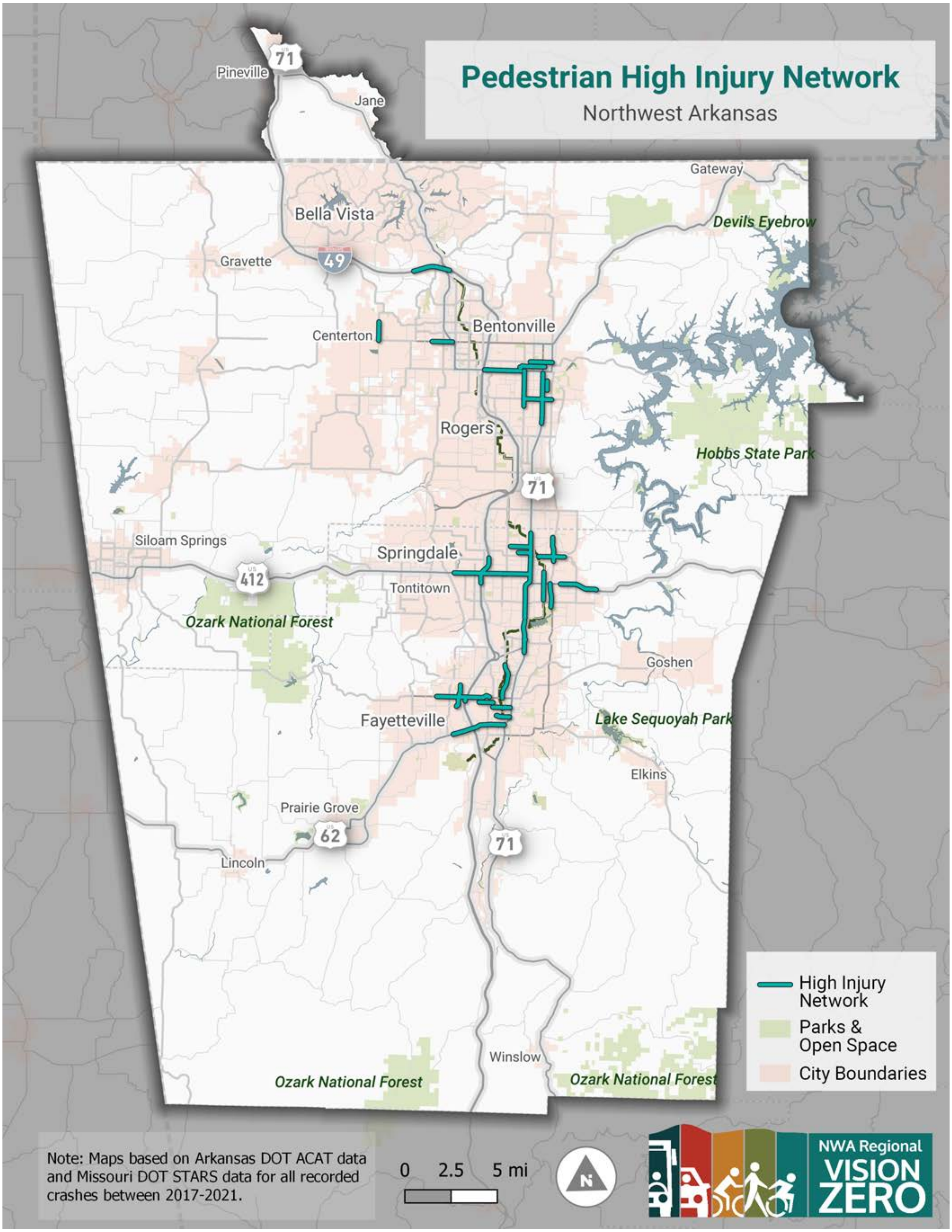


Figure 13: Bicycle High Injury Network

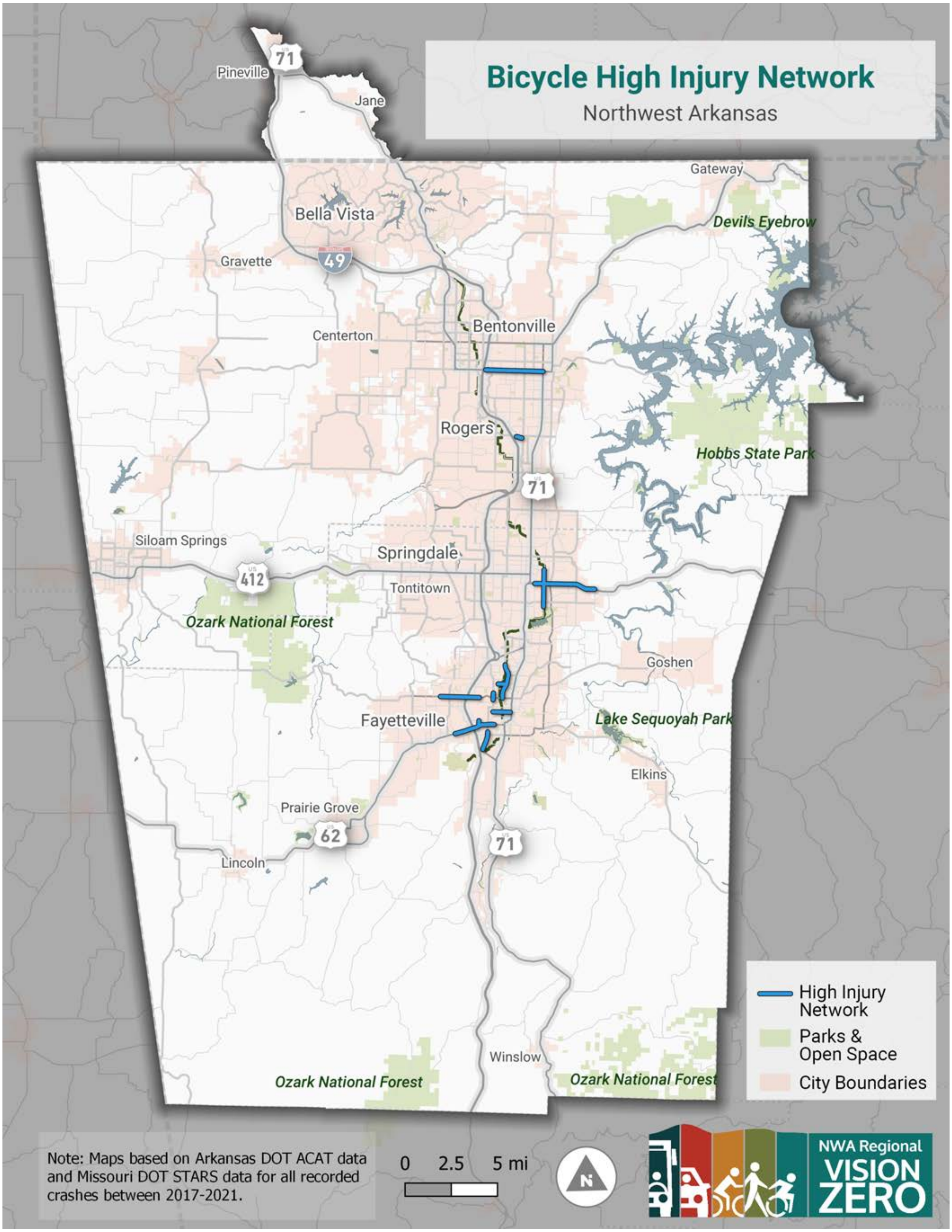


Figure 14: Motorcycle High Injury Network

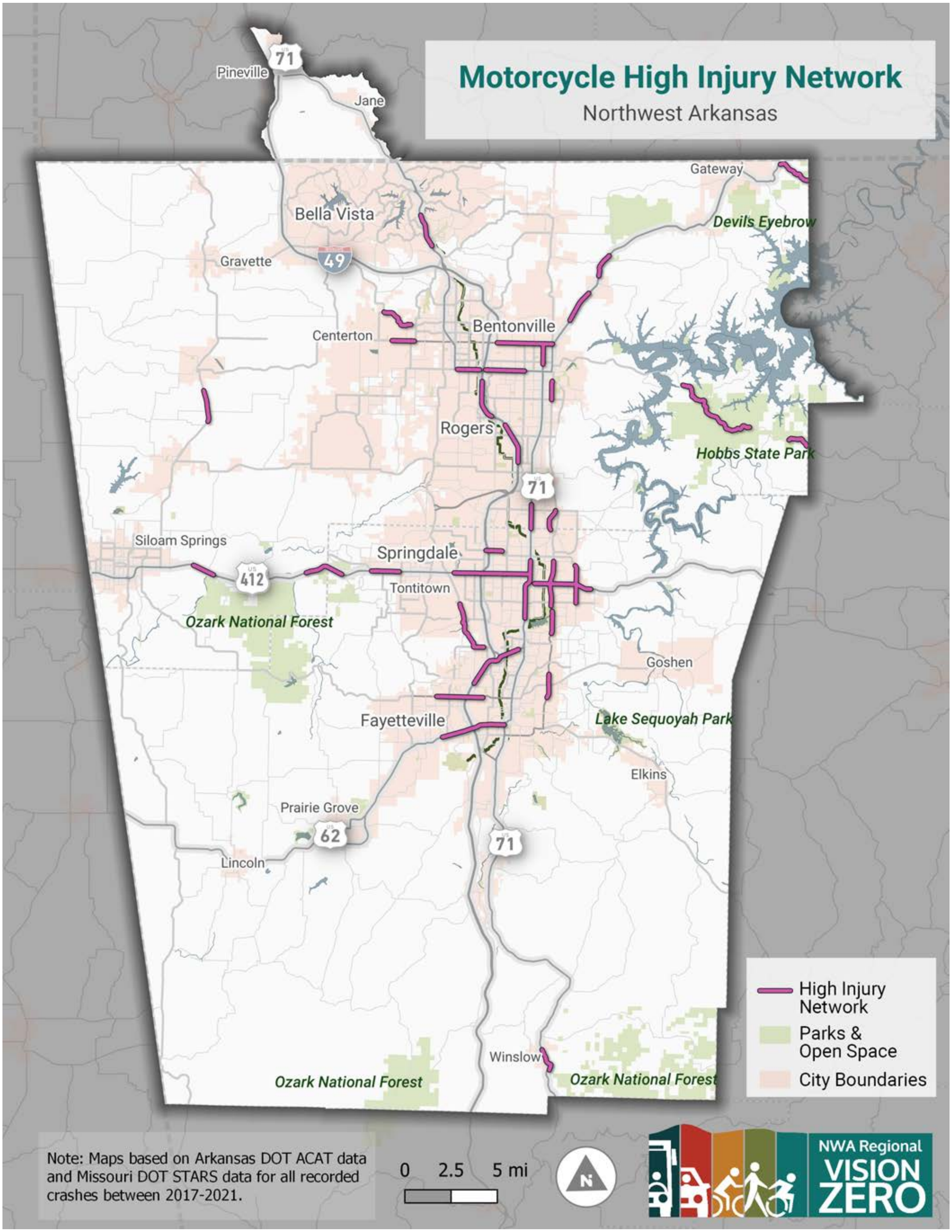
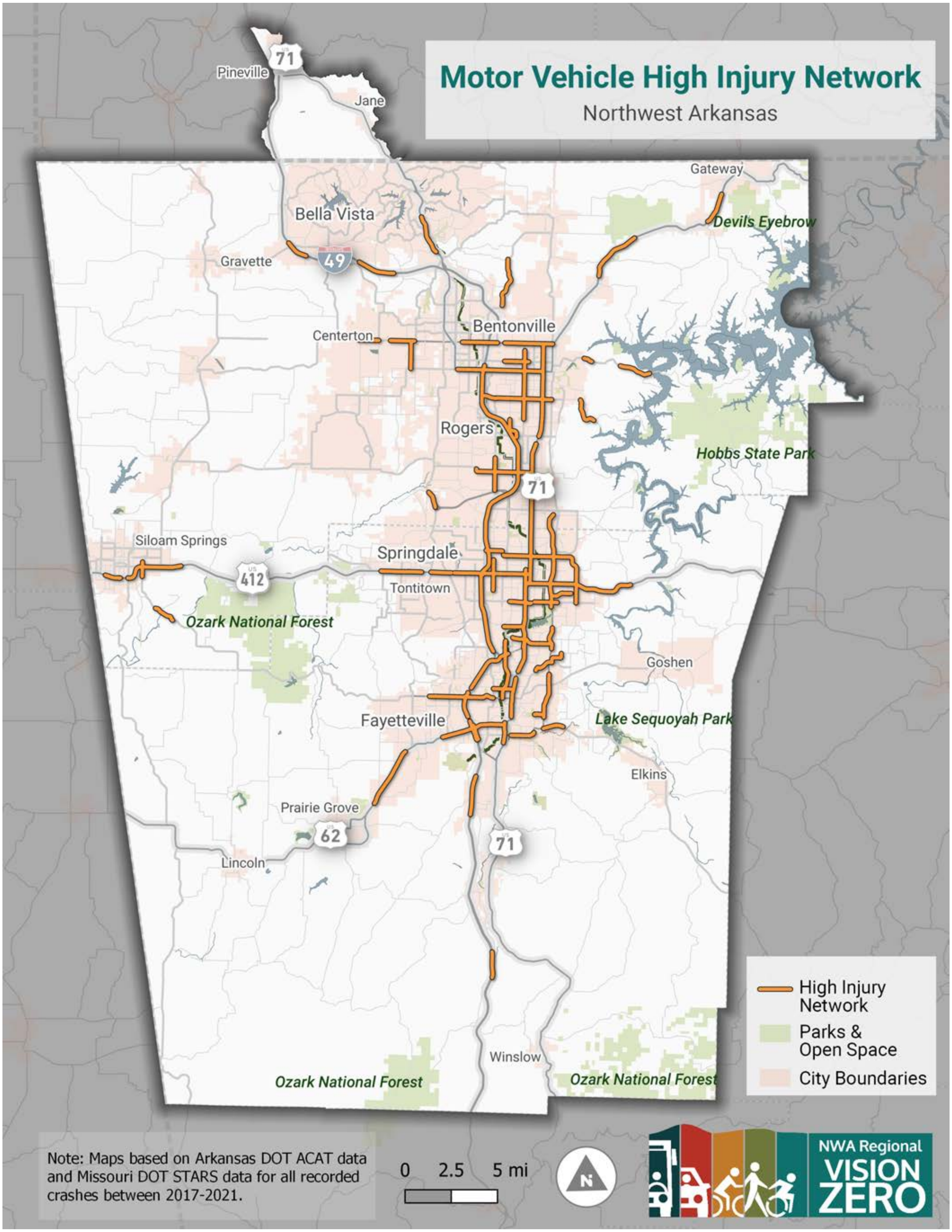


Figure 15: Motor Vehicle High Injury Network

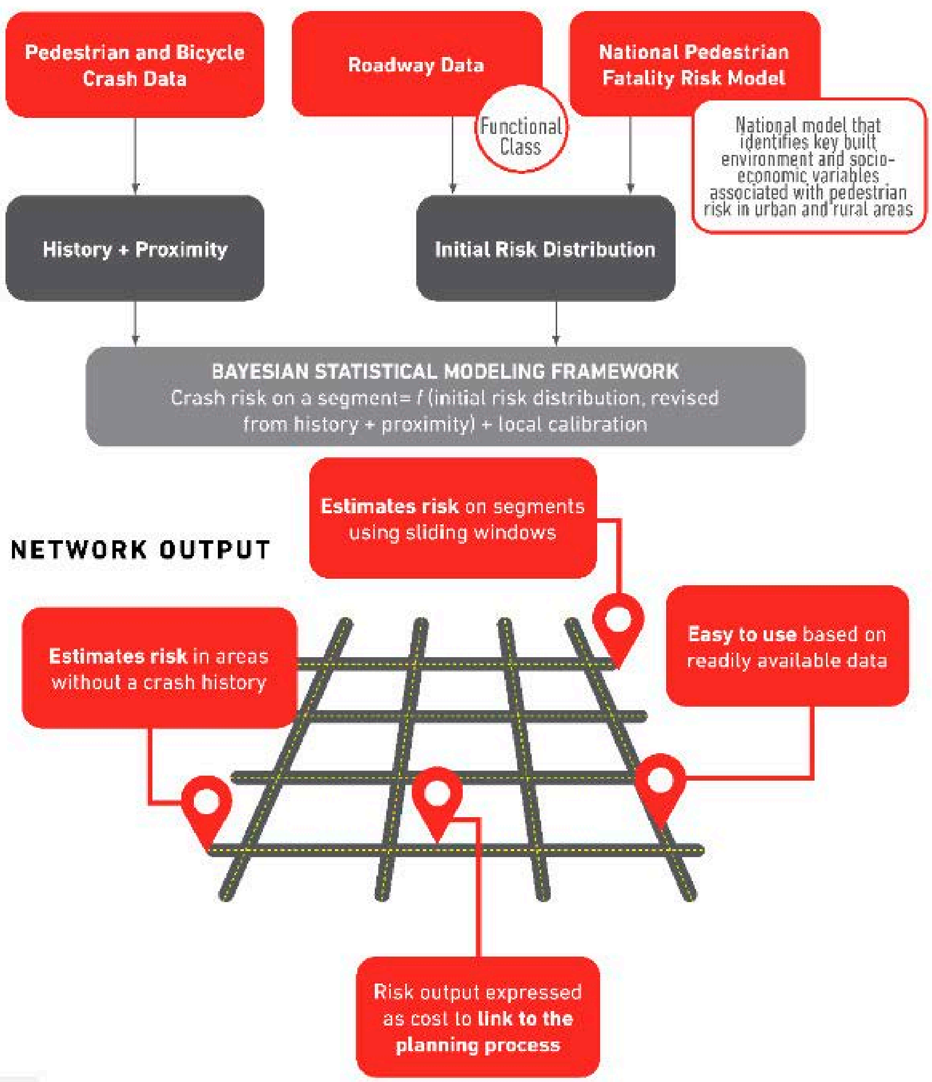


Safer Streets Priority Finder (SSPF) Tool

SSPF Tool Background

Toole Design, in collaboration with the City of New Orleans, University of New Orleans Transportation Institute, and New Orleans Regional Transit Authority, developed the SSPF tool.[3] The SSPF Tool is a free, interactive, open-source resource available at the national scale that can help transportation practitioners identify a street network that is similar to a HIN for bicyclists and pedestrians. The network goes further than a typical HIN by not only taking into consideration areas where a disproportionate share of fatal and serious injury crashes have already occurred, but also areas that have factors present that are likely to contribute to future risk.

Figure 16: Safer Streets Priority Finder Tool Methodology. Source: Toole Design Group.



3 https://www.saferstreetspriorityfinder.com/tool/

The SSPF produces two main outputs:

- **Sliding Windows Analysis:** How the HIN maps were developed for this report in the previous section.
- **Safer Street Model:** Estimated future societal costs forbicycle and pedestrian crashes only.

The following sections will provide high level summaries for each analytical methodology and the results from each analysis. For more detailed information on the methodologies for each analysis, please see SSPF Technical Report.

Safer Streets Model

The Safer Streets Model brings the segmented road network window segments, produced in the Sliding Windows Analysis, into a Bayesian statistical framework to estimate crash risk throughout the system. This framework incorporates external information about how many crashes might be expected, called a Bayesian prior, alongside the crash history.

The model estimates crash risk rates per mile for each road segment for pedestrian and bicyclists based on injury severity. These values are then converted to societal crash cost estimates based on the costs assigned to each crash severity.[4]

The Safer Streets Model is only available to model bicycle and pedestrian crashes. The model cannot estimate or model future motor vehicle or motorcycle crashes at this time.

Key Output

Corridors with highest potential risk for bicycle and pedestrian crashes to occur in the future using both historical crash data and a statistical crash cost model based on functional road classification. The values used to assign corridors were:

- **One-year costs for pedestrians: $100,000**
- **One-year costs for bicyclists: $25,000**
- **Pedestrian Safer Streets Model Rankings**
    - o **High: $600,000 +**
    - o **Moderate-High: $20,0000 - $60,0000**
    - o **Moderate: $50,000 - $20,0000**
    - o **Moderate-Low: $25,000 - $50,000**
    - o **Low: $0 - $25,000**
- **Bicycle Safer Streets Model Rankings**
    - o **High: $30,000 +**
    - o **Moderate-High: $15,000 - $30,000**
    - o **Moderate: $5,000 - $15,000**
    - o **Moderate-Low: $2,500 - $5,000**
    - o **Low: $0 - $2,500**

4 https://safety.fhwa.dot.gov/hsip/docs/fhwasa17071.pdf

Figure 17: Pedestrian Safer Streets Model

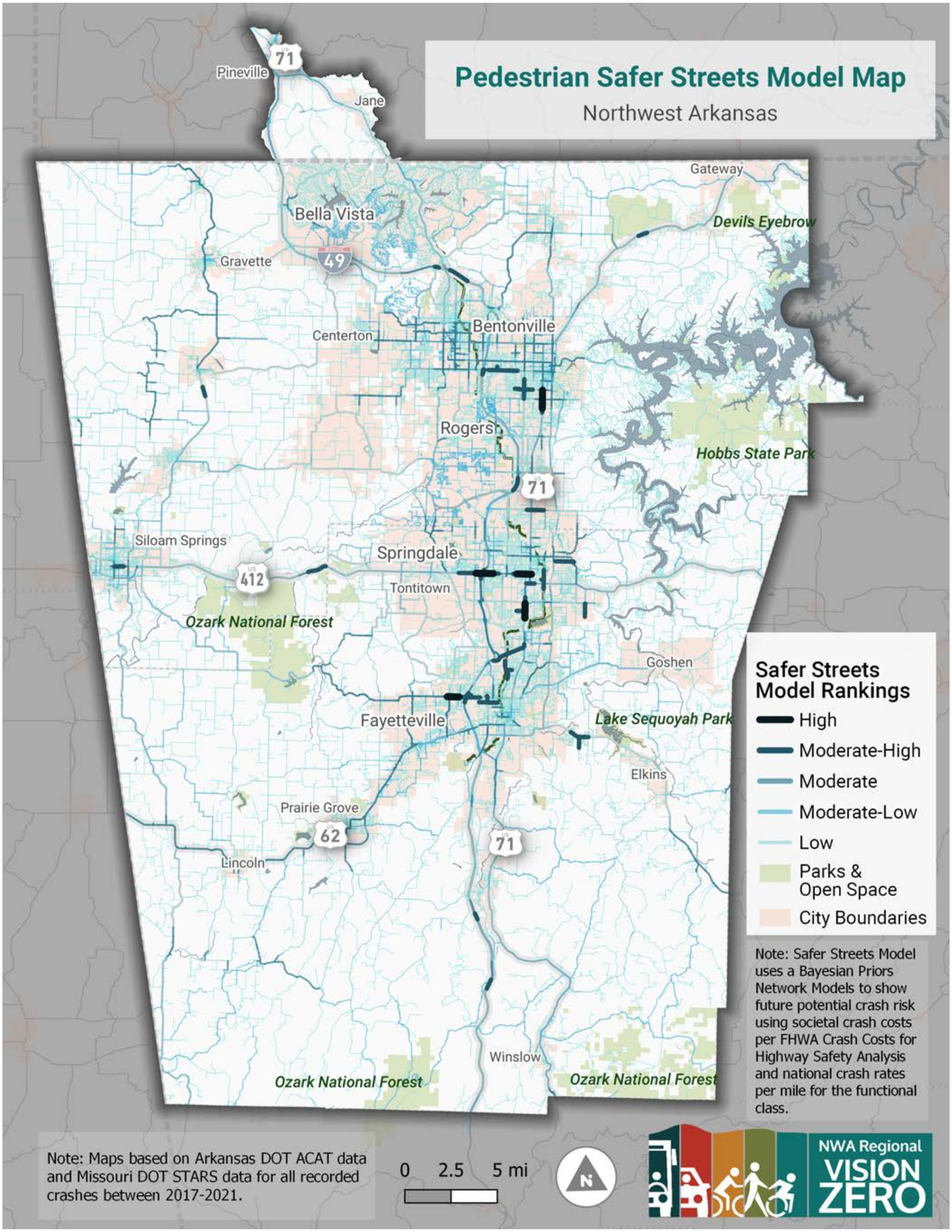
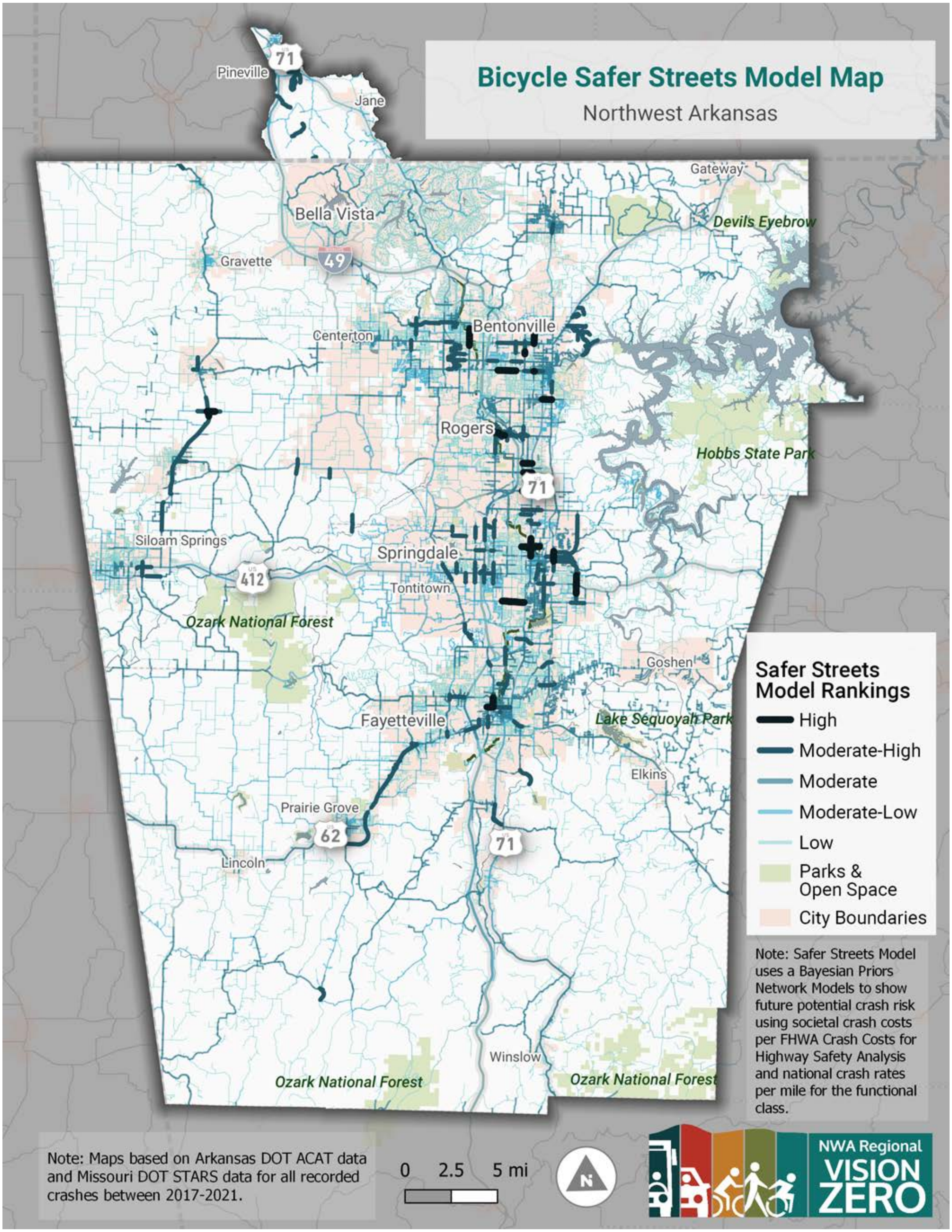


Figure 18: Bicycle Safer Streets Model



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Appendix B: Descriptive Crash Analysis

This document summarizes the results of the descriptive crash analysis conducted for the Northwest Arkansas Region Planning Commission (NWARPC) as part of the Vision Zero Plan development process. The focus of Vision Zero and the Safe System Approach is on eliminating deaths and serious injury crashes on roadways. Thus, this descriptive crash analysis aims to systematically analyze killed and serious injury (KSI) crashes—using the injury classification codes KA—as well as all reported crashes that have occurred throughout the region. The descriptive analysis uses pivot tables to provide an overview of factors and contexts that contribute to reported crashes on all roads in Northwest Arkansas from January 1st, 2017 through December 31st, 2021.

During this period, the United States experienced a variety of changes due to the global COVID-19 pandemic. While traffic volumes reduced during this time, fatal and serious crashes on roadways across the country and in Northwest Arkansas were sustained and, in many places, increased. This analysis does not specifically call out crashes during this pandemic era, rather, it focuses on a variety of characteristics of the region's roadways that may impact fatal and severe injury crashes.

The descriptive crash analysis methodology consisted of data collection, consolidation, processing, and contextualization based on available crash and roadway attribute data in Arkansas and Missouri to develop the results shown. A series of high-level descriptive summary tables capture relationships between region-wide crash data, infrastructure data, and contextual variables. These tables explore overall crash trends and patterns that can be used to guide the selection of variables warranting deeper analysis, new roadway behavior programs, policy changes, or the selection of safety countermeasures for project development. The Descriptive Crash Analysis Report information provides engineers and decision makers with more information to design roads that respond to historical crashes and determine where similar crash conditions exist across the system. This Report also provides information on education, engagement, and enforcement initiatives that can improve road user behaviors as well as policy changes that increase safety.

The Descriptive Crash Analysis Report relates to both the Crash Maps Report and the Equity Analysis Framework. These reports should be used to inform actions and project prioritization in the Vision Zero Plan.

Overview of State Crash Report Forms and Guidance

Police officers complete the Arkansas or Missouri Vehicle Accident Report Forms (Report Forms) when investigating a roadway crash.[1,2] The Report Forms allow responding officers to document information about the involved parties, location, crash factors, as well as the vehicle types involved in the crash.

The Arkansas Motor Vehicle Crash Report Instructions Guide and the Missouri Uniform Crash Report Preparation Manual (the Guides) provide police officers with guidance on completing the Report Forms.[3,4] Aside from providing instructions, these Guides stress the importance of accurate crash data reporting and usually note the time in which injury severity needs to be tracked and updated following a crash. The Report Forms and Guides outline how crash details are collected and guide accuracy of information collected that informs changes to projects, programs, and policies that can improve roadway safety.

1 https://www.dfa.arkansas.gov/images/uploads/driverServicesOffice/SR121.pdf
2 https://dor.mo.gov/forms/1140.pdf
3 https://www.nhtsa.gov/sites/nhtsa.gov/files/documents/arcrash_report_instruction_manual_1_2007.pdf
4 https://www.mshp.dps.missouri.gov/MSHPWeb/PatrolDivisions/PRD/documents/SHP-2%20STARS%20Statewide%20Manual.pdf

Overview of Data Resources

The *Arkansas Crash Analytics Tool* (ACAT) and the *Missouri Statewide Traffic Accident Records System* (STARS) are online interactive mapping tools and data portals that allow users to access, query, and summarize crash data in the States of Arkansas and Missouri.[5,6] Users can use filters, such as geography or crash severity, to refine their queries and summarize the data through a variety of report types and chart types.

Descriptive Crash Analysis Methodology & Data Sources

This section describes the steps taken to assemble the working datasets (see Table 1), as well as the analytical framework used to develop pivot table results for all reported crashes using the same study period as the Crash Maps Report, from 2017 through 2021. The memo presents descriptive statistics of historical crashes stratified by various attributes, such as injury severity, environmental conditions, behaviors, and movement types.

Table 1: Data Sources

Dataset	State	Source	Dataset(s)
Crash Data	AR	ACAT	Crashes_FC
	MO	STARS	• rpc_crashes_2017_2021 • sequence_of_events • contributing_circumstances
Crash Driver Data	AR	ACAT	• Driver • DriverAction • DriverCondition
	MO	STARS	driver_passenger_nwarpc_2017_2021
Crash Passenger Data	AR	ACAT	Passenger
	MO	STARS	driver_passenger_nwarpc_2017_2021
Crash Vehicle Data	AR	ACAT	Vehicle
	MO	STARS	vehicle_nwarpc_2017_2021
Crash Non-Motorist Data	AR	ACAT	• NonMotorist • NonMotoristActionAtTimeOfCrash
	MO	STARS	N/A – part of driver_passenger_nwarpc_2017_2021
Centerline	Both	OSM	ways
Intersection	Both	OSM	N/A - derived from OSM ways
Functional Class	AR	ARDOT	SIR_TIS/Road_Inventory_Vector_Tiles/Functional Class
	MO	MDOT	SS_PAVEMENT_2021
Lane Count	AR	ARDOT	SIR_TIS/Road_Inventory_OnSystem/RoadInventory SemiLive - OnSystem
	MO	MODOT	SS_PAVEMENT_2021
AADT	AR	ARDOT	SIR_TIS/Combined_Traffic_Data/Average Daily Traffic Stations
	MO	MODOT	SS_PAVEMENT_2021
Speed	AR	ARDOT	TPP_GISMapping/Linear_Speed_Zones/Linear Speed Zones
	MO	MODOT	SS_PAVEMENT_2021
Traffic Control	MO	MODOT	SS_INTERSECTION_2021
	Both	OSM	nodes
Transit Stops	Both	Ozark Regional Transit and Razorback Transit	General Transit Feed Specification (GTFS) data feed
Population by Age	Both	US Census Bureau	2021 ACS 5-year estimates, Table B01001
Urban/Rural	Both	US Census Bureau	2020 Decennial Census Urbanized Areas and Urban Clusters

5 https://experience.arcgis.com/experience/1911f992cabc484a98f64e7c36c2b262/
6 https://www.mshp.dps.missouri.gov/TR15Map/index.jsp

Geocoding Crash Data

Geocoded crash data is critical to understanding crash patterns. Crash Report Forms completed by the police are the primary source for crash data. While this data only captures crashes reported to authorities, it is often the most complete data source and provides necessary details for informing engineering treatments, such as the location of the crash and dynamics between the primary parties involved in the crash.

Crash data used in this analysis were collected using the Arkansas and Missouri ACAT and STARS portals and processed by the consultant team. Crash data were filtered to include all crashes that occurred within the NWARPC boundary from 2017 through 2021 for all modes. The crash data used in this analysis was reviewed and assessed by the consultant team for accuracy and consistency.

It is important to note for this analysis, vulnerable road users include pedestrians, bicyclists, or motorcyclists. The consultant team coded crashes based on the most vulnerable road user involved, using the following order: pedestrian, bicycle, motorcycle, and motor vehicle. For example, a crash between a motor vehicle and pedestrian involves both of those modes, but since the pedestrian is the more vulnerable road user, the overall crash would be coded as pedestrian. When a crash occurred between users of the same mode, or if there was only mode type involved in a crash, the crash was coded to that mode. For example, a crash between two motor vehicles, or a crash of just a single motor vehicle would both be coded as a motor vehicle crash.

Crashes that occurred on the Interstate Highway System are sometimes excluded from crash analysis. Some of these reasons include different crash dynamics and safety countermeasures that are applicable for Interstate highways and less so with local roads, complex jurisdictional coordination required for addressing crash risk along the Interstate, and often enforcement efforts are used as a primary safety countermeasure. This crash analysis includes all crashes on all road types regardless of roadway ownership within the NWARPC to look at all roads as one system through the Safe System Approach.[7] However, coordination for improvements may need to be coordinated with the entity that owns and maintains the right-of-way.

Spatial Data Consolidation

A full centerline dataset that covered both the Arkansas (AR) and Missouri (MO) portions of the NWA region was not available. There were centerline datasets available from Arkansas Department of Transportation (ARDOT) and Missouri Department of Transportation (MoDOT), however their geometries did not align at the border, nor did they use consistent conventions for street names, both of which would cause issues in the HIN analysis. Instead of attempting to rectify these differences, it was decided to use OpenStreetMap (OSM) data and conflate other attributes onto that. This was because the OSM dataset was consistent across the NWA region, and spatially aligned well with the other ARDOT and MoDOT datasets, giving the conflation process a higher degree of accuracy.

Like centerlines, a full intersection dataset for both the AR and MO portions of NWA region was not available. There was an intersection dataset from MoDOT, but not one from ARDOT. However, since the analysis used a topologically valid centerline network from OSM, it was decided to create a new intersection dataset based on this road network, and then assign the relevant information from other datasets to this new intersection layer. Intersection points were created at all segments start/end points. Then to filter out non-intersections (i.e., dead ends and breaks along a single segment due to an attribute change), only points with three or more legs were considered to be valid intersections.

Functional Classification

Functional classification data from ARDOT and MoDOT was available for a subset of the road network for both the AR and MO portions of the NWARPC region. Values between the two datasets were not the same in terms of spelling and grouping[8], so they were first consolidated into a single list. Then, these known values were conflated onto the OSM network using spatial matching. After known values were conflated, gaps were filled using known data by matching the known

7 https://safety.fhwa.dot.gov/zerodeaths/docs/FHWA_SafeSystem_Brochure_V9_508_200717.pdf

8 For example, "Interstate Highway" might be used in one dataset while "IH" is used in another dataset. They mean the same thing but will be treated as different things when we use programming scripts to perform the analysis. Make them consistent is necessary to make sure our analysis results are accurate.

and unknown segments based on the OSM name, and the OSM highway tags (the OSM version of functional classification). Finally, for anything that remained unknown, functional classification was determined based on the most common functional classification type per OSM highway tag.

Lane Count

Lane count data from ARDOT and MoDOT was available for a subset of the MPO road network. The MoDOT lane data was provided as directional linework with values for each direction, which were first combined into a single dataset. These two datasets were then conflated onto the OSM network. Since lane count was an attribute within the crash datasets, road network segments with missing values were assigned the median lane count value of the crashes that occurred on them. Finally, remaining gaps were filled by matching segments with known values to those with unknown values based on matching name and functional classification. Finally, any remaining unknown segments were assigned a value based on an average known value for their functional classification.

Annual Average Daily Traffic (AADT)

AADT data was available from ARDOT and MoDOT, but not for all roads within the NWARPC region. The ARDOT AADT data was provided in point form, but with some linear referencing system (LRS) information about the segments of roadway that it encompassed. In order to transform it into segment data to conflate onto the OSM network, statewide LRS information was acquired, and using the LRS information in the points, extents along the LRS network were created. The MoDOT AADT data was provided in segment form, so it was not necessary to do a similar transformation. However, it was part of the same bidirectional dataset that contained lane data, so it was first pre-processed to create a combined AADT value. With known values in segment form created, these were then conflated onto the OSM network. These known values were then used to fill in gaps based on name and functional classification matches. For remaining gaps, a value was assigned based on the average value by functional classification.

Speed Limit

Speed limit was available from both ARDOT and MoDOT, although not with full coverage for the MPO. These known values were then spatially conflated to the OSM network. Like lane count, speed limit was an attribute of the crash data, so where these values were reported in the crashes, the median recorded value was assigned to the road network. Gaps in the data were then filled in by matching segments with known values to those with unknown values based on matching name and functional classification. Remaining gaps were then assigned a value based on the average value for their functional classification.

Intersection Control

Intersection control data was only available from MoDOT for the MO area of the NWA region, but were not available in the AR portion of the NWA region. The MoDOT intersection data was limited to signalization and those were assigned to the intersection dataset. Then for the rest of the intersections, signalization and stop control data were assigned from information available in OSM, including traffic lights in the AR portion of the NWA region. Any intersection with stops was assigned as stop controlled (i.e., both two-way and all-way stops). In lieu of any other data sources, the lack of any known control at an intersection was assumed to be uncontrolled.

Study Limitations

Multiple State Crash Data Standards

Since the NWARPC covers both Arkansas and Missouri, crash data from both states were used for this analysis. While both state's crash data generally tracked the same type of information, the nuances of how specific details were tracked varied between the two. Given that each state uses different forms and consolidates crash data differently, there were a few datasets that could only be analyzed in either Arkansas or Missouri that were not included in this report for the entire region. For the purpose of this report for NWARPC, only common datasets between both states were analyzed to understand crashes at a regional level. This provides consistency in analysis and methodology for the entire region.

As a result of this, the analysis preformed was limited to categories that were present in both datasets. For example, if one dataset listed the primary cause of a crash, and the other dataset listed multiple contributing causes, it would not be possible to create either a primary crash cause or a list of crash causes, because each of those datasets is not available in the other state. Additionally, in circumstances where there were matching overall categories but the values for each category differed, the lowest common denominator of coding was used. For example, if one dataset listed crashes with specific types of fixed objects (tree, guardrail, traffic signal, etc.), but the other data just listed all crashes with fixed objects the same, both datasets would be simplified to only list the crash as with a fixed object. Possible additional analysis of datasets unique to each state may be suggested to further understand crashes based on individual state data availability.

Temporal Consistency Limitations

The consultant team studied crashes that occurred over a period of five years, from 2017 through 2021. The compiled roadway data reflect current conditions according to the data made available at the time of this analysis. It can be assumed that some changes in roadway design and operations have occurred over the previous five years that cannot be accounted for. For example, if a crash occurred in 2016 and the posted speed limit changed from 35 mph down to 30 mph in 2018, this analysis would link the 2016 crash with the present day 30 mph configuration.

Roadway Improvements during Study Period

Results are based on crash data and current attribute data from 2017-2021 and do not account for any roadway improvements made during the study period. It is recommended that the NWA Region conduct a further before and after comparison analysis at any location with major safety improvements to determine if the roadway improvements had any effect on crash severity, crash frequency, crash causes, and/or crash types. This type of analysis would also inform the effectiveness of roadway safety improvements within the region.

Exposure data

Region-wide volumes via average annual daily traffic (AADT) for motor vehicles were available, however pedestrian and bicyclist volumes were not readily available. The analyses reported here do not adjust for exposure rates based on volumes by modes. Therefore, results show crash density but not frequency of crashes based on how many people are walking, which is also called exposure. For example, in many communities, pedestrian crashes are more common during daylight conditions than dark conditions. This does not mean that daylight conditions are more dangerous than dark conditions. Rather, it reflects the fact that people are more likely to travel, and especially more likely to travel by walking, in light conditions than in dark conditions. Having volume by mode would allow for understanding exposure and frequency for those two modes. Some proxies for exposure are noted in this analysis, such as land use, transit facilities and functional classification.

Transportation Data for Future Study

As the Safe System Approach is used throughout the region, additional data can assist communities to understand crash risk and take a more proactive approach to safety.

- Regionwide bicycle and pedestrian volume data were not available to more accurately measure crash risk for bicyclists and pedestrians.
- Several datasets listed below would help identify or refine risk factors but were either not available in GIS format, or were available, but with limited coverage:
  - Roadway ownership and jurisdiction
  - Vehicle operating speeds
  - Crosswalk style
  - Street width
  - Traffic signal phasing
  - Transit frequency and boarding/alighting counts
  - Location of fixed objects (raised medians, barriers, utility poles, etc.)
  - Marked crosswalks and crosswalk enhancements
  - Sidewalks

Statistical Test Methodology

To test if a certain category of crashes has a significantly higher KA crash rate (defined as the number of KA crashes out of all crashes) than the average KA crash rate, a two-proportion Z-test was performed. When this test is applied to overall crash categories, the KA crash rate for each category is compared with the overall average KA crash rate (i.e., 1,369 out of 58,896 as shown in Table 2). When this test is applied to VRU crash categories, the KA crash rate for each category is compared with the VRU average KA rate (447 out of 1,644 as can be referred from Table 4) instead of the overall average KA rate to identify factors that are associated with significantly high KA rate for VRU crashes. The confidence level used for this test is 95%. Categories that have either less than 10 KA crashes or less than 10 non-KA crashes are excluded from the analysis because they don't meet the sample size requirement of the test. Throughout the report, statistically significant results are highlighted in red.

Summary of Key Findings

Year of crash data: 2017-2021

Total crashes: 58,896

Total fatal (K) crashes: 220

Total serious injury (A) crashes: 1,149

Crashes by Year:

While 2020 had the smallest share of all crashes across the five years (17.71%), it had the second highest percentage of KA crashes (20.45%) and the highest percentage of crashes resulting in KAs (2.68%).

Injury Severity:

While the majority of crashes result in less severe injuries in NWA, an average of 44 crashes resulted in death and 230 crashes resulted in serious injury in the NWA region.

Crashes by Mode:

- **Pedestrians:** Pedestrian cashes (320) made up 0.6% of all crashes with a known mode (57,087) and 9% of KA crashes with a known mode (1,345)
- **Bicycles:** Bicycle crashes (245) made up 0.4% of all crashes with a known mode (57,087) and 3% of KA crashes with a known mode (1,345)
- **Motorcycles:** Motorcycle crashes (1,079) made up 2% of all crashes with a known mode (57,087) and 21% of KA crashes with a known mode (1,345)
- **Motor Vehicles:** Motor vehicle crashes (55,443) made up 97% of all crashes with a known mode (57,087) and 67% of KA crashes with a known mode (1,345)

First Harmful Event:

Collision with vehicle in transport is a subset of the total crashes (37,499 crashes at 73.98% of all crashes and 572 KA crashes with 45.61% of all KA crashes) was the most common crash type, however, collision with a pedestrian was the collision type with the greatest risk of resulting in a KA (203 all crashes and 106 KA crashes with 34.30% resulting in a KA). See Table 6.

Bicycle Crashes:

Motorist traveling straight with bicyclist crossing road (36% crashes, 31% KA crashes) was the highest bicycle KA crash type (14 KA crashes)

Pedestrian Crashes:

Motorist traveling straight with pedestrian crossing road (39% crashes, 48% KA crashes) was the highest pedestrian KA crash type (56 KA crashes)

Motorcycle Crashes:

Motorist turning left with motorcycle traveling straight (30% crashes, 35% KA crashes) was the highest motorcycle KA crash type (52 KA crashes)

Motor Vehicle Crashes:

Vehicle 1 traveling straight with vehicle 2 straight (24% crashes, 42% KA crashes) was the highest motor vehicle KA crash type (224 KA crashes)

Speeding:

43% of speeding crashes resulted in a KA when a vulnerable roadway user was involved compared to just 6% for all modes.

Intersections vs. Segments:

Crashes occurred most often at intersections (65% of crashes, 54% of KA crashes). While segment crashes had a lower share of both overall crashes and KA crashes, segment crashes had a slightly higher rate of resulting in a KA outcome (3%).

Urban vs. Rural:

There are more crashes in urban areas (all, KA, and vulnerable road users) than rural areas in NWA. However, more rural crashes are likely to result in a KA outcome for all modes (4.46%) and vulnerable road users (35.75%).

Traffic Volume:

Streets with an AADT less than 5,000 had the largest share of both overall crashes (31%) and KA crashes (35%).

Functional Classification:

Most crashes (all, KA, and vulnerable road user) occurred on major and minor arterials in NWA.

Posted Speed Limit:

KA crashes occurred most often on streets with a 55mph posted speed limit (21% of KA crashes) and the highest percentage of crashes resulting in a KA (6.27%) also occurred on streets with a 55 mph posted speed limit. The majority of crashes and KA crashes involving a vulnerable road user occurred on streets with a posted speed limit of 45mph.

Number of Lanes:

Crashes occurred most often on four-lane roads (40% crashes, 38% KA crashes). For vulnerable road users, the most crashes (760, 46.63%) and the most KA crashes (194, 43.79%) occurred on two-lane roads.

One-Way vs. Two-Way Streets:

For all modes, crashes occurred most often on two-way streets (82% crashes, 85% KA crashes). Crashes on two-way roads were slightly more severe for all modes. Vulnerable modes followed a similar trend with the most crashes occurring on two-way roads (90% crashes, 87% KA crashes). However, the severity of crashes for vulnerable road users significantly increased on one-way streets, with 35% of crashes for vulnerable road users on one-way streets resulted in a KA.

Intersection Control:

For all modes, crashes occurred most often at intersections with no traffic control (58% crashes, 68% KA crashes). Crashes at stop sign controlled intersections were slightly more severe with 2.45% of crashes resulting in a KA outcome.

Historically Disadvantaged Communities and Areas of Persistent Poverty:

Areas where historically disadvantaged communities and persistent poverty overlap has 14% (8,174) of regional total crashes and 12% (165) KA crashes, despite having only 6% of the regional roadway centerline miles. For vulnerable road user involved crashes, areas where historically disadvantaged communities and persistent poverty overlap have 15% (246) of regional total crashes and 16% (71) KA crashes, despite only 6% of the regional roadway centerline miles.

Time of Day:

For all modes, crashes were fairly evenly distributed across the day but occurred most often between 3:00pm and 6:00pm (20% crashes, 16% KA crashes). Night crashes between 9:00pm and midnight were slightly more severe than other times of day with 4% of crashes resulting in a KA outcome.

Roadway Surface Condition:

For all modes, crashes occurred most often in dry conditions (80% crashes, 82% KA crashes). For all modes, crashes occurred most often in dry conditions (80% crashes, 82% KA crashes). This is true for vulnerable road users involved crashes as well as over 90% of overall crashes and KSI crashes happening in dry conditions.

Lighting Conditions:

For all modes, crashes occurred most often in daylight (74% crashes, 61% KA crashes). Dark crashes without lighting were the most severe with just under 5% of crashes resulting in a KA outcome.

Proximity to Transit, Schools, or Parks:

Most crashes do not happen within 500 feet of a transit stop, school, or park in the NWA region.

Crash Trends

The following sections summarize crash data from 2017 through 2021 to provide statistical trends into temporal patterns, actions leading up to a crash, and environmental characteristics.

Crashes by Year[9]

Table 2 summarizes the number of crashes and crashes that resulted in KA crashes from 2017 through 2021. The Percent KA Crashes by Year column shows the share of KA crashes in each year compared to the other years. The Percent Crashes resulting in a KA column show of all the crashes that occurred in that year, what percent resulted in a fatality or series injury.

While 2020 had the smallest share of all crashes across the five years (17.71%), it had the second highest percentage of KA crashes (20.45%) and the highest percentage of crashes resulting in KAs (2.68%). In 2021, the number of KA crashes and the percentage of crashes resulting in a KAs decreased, but the overall number of crashes rose to a record high of 12,336.

Injury Severity[10]

Table 3 summarizes crashes by injury severity based on the highest level of injury reported to be sustained in the crash. Based on this data, an average of 44 crashes resulted in death and 230 crashes resulted in serious injury in the NWA region. Less severe crashes account for the largest share of crashes, whereas the most severe crashes account for the lowest share of crashes. More details about the location of the crashes and the dynamics related to the crashes will be described throughout this analysis.

Table 3: Crashes by Injury Severity, 2017-2021

Injury Severity	# Crashes	% Crashes
Fatal injury (K)	220	0.37%
Suspected serious injury (A)	1,149	1.95%
Suspected minor injury (B)	4,705	7.99%
Possible injury (C)	7,186	12.20%
No apparent injury (O)	45,636	77.49%
Total	58,896	100.00%

Table 2: Crashes by Year, 2017-2021

Year	Total # of Crashes	% Crashes by Year	# KA Crashes	% KA Crashes by Year	% Crashes resulting in KA
2017	12,154	20.64%	284	20.75%	2.34%
2018	11,664	19.80%	266	19.43%	2.28%
2019	12,309	20.90%	264	19.28%	2.14%
2020	10,433	17.71%	280	20.45%	2.68%
2021	12,336	20.95%	275	20.09%	2.23%
Total	58,896	100.00%	1,369	100.00%	2.32%

9 Crash year was derived from the provided crash reports. For AR, that was the column `crash_date` in the table `crashes_fc`, and for MO that was the column `date_0` in the table `rpc_crashes_2017_2021`

10 Crash level injury severity was obtained directly from the crash reports. For AR, that was the column `crashseverity` in the table `crashes_fc`, and for MO that was the column `acc_svrty_rtng_nm` in the table `rpc_crashes_2017_2021`

Crashes by Mode[11]

Table 4 summarizes crashes by injury severity and mode. Motor vehicle crashes accounted for most of the crashes with 97% of total crashes. This is expected as most trips in the United States are typically made by motor vehicle. Motorcycles followed with roughly 2% of crashes. Pedestrian crashes ranked third highest with roughly 1% of the total crashes, while bicycle crashes had the lowest crash share at slightly less than 0.5%.

While motor vehicle crashes accounted for the largest share of both overall crashes and KA crashes, when vulnerable road users were involved in a crash, the risk of death or serious injury increased disproportionately (see Table 5 and Figure 1).

- Pedestrians: Pedestrian cashes made up 0.6% of all crashes but 9% of KA crashes
- Bicycles: Bicycle crashes made up 0.4% of all crashes but 3% of KA crashes
- Motorcycles: Motorcycle crashes made up 2% of all crashes but 21% of KA crashes
- Motor Vehicles: Motor vehicle crashes made up 97% of all crashes but only 67% of KA crashes

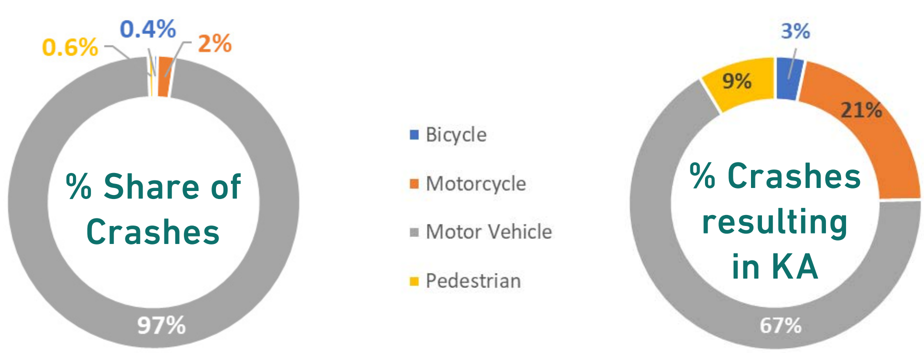
Table 4: Crashes by Injury Severity and Mode, 2017-2021

Injury Severity	Bicycle	Pedestrian	Motorcycle	Motor Vehicle	Unknown Mode
Fatal injury (K)	4	37	38	138	3
Suspected serious injury (A)	41	79	248	760	21
Suspected minor injury (B)	112	125	399	3,950	119
Possible injury (C)	51	59	167	6,743	166
No apparent injury (O)	37	20	227	43,852	1,500
Total	245	320	1,079	55,443	1,809

Table 5: Share of crashes compared to the % of crashes that resulted in a KA, 2017-2021

Mode	Total # of Crashes	% Share of Cashes	Total # of KA Crashes	%KA crashes by Mode	% Crashes resulting in KA
Bicycle	245	0.4%	45	3.3%	18.4%
Pedestrian	320	0.5%	116	8.5%	36.3%
Motorcycle	1,079	1.8%	286	20.9%	26.5%
Motor Vehicle	55,443	94.1%	898	65.6%	1.6%
Unknown	1,809	3.1%	24	1.8%	1.3%
Total	58,896	100.00%	1,369	100.00%	2.3%

Figure 19: Share of crashes compared to the % of crashes that resulted in a KA, 2017-2021



11 Crash mode was determined by the most vulnerable road user involved in the overall crash. Person mode was derived from various elements within the crash reports. For AR, pedestrians and bicycles were identified using the column `non_motorist_type` in the table `non_motorist`. Pedestrians were those with values 1 (`Pedestrian`) and 2 (`Other pedestrian (wheelchair)`). Bicycles were those with values 5 (`Bicyclist`) and 6 (`Other cyclist (tricycle, etc.)`). Motorcycles and motor vehicles were identified using the column `vehicle_type` in the table `vehicle`. Motorcycles were the values 30 (`Motorcycle`), 31 (`Motor scooter`), and 30 (`Moped`). Motor vehicles were all other values for `vehicle_type` For MO, pedestrian, bicycle, and motor vehicle were from the column `hp_person_invl_cd` of the table `driver_passenger`. Motor vehicles were the value 01 (`DRIVER`), pedestrians were the value 02 (`PEDESTRIAN`), and bicycles were the value 03 (`PEDALCYCLIST`). Motorcycles were identified as a subset of motor vehicles, using the column `vehicle_body_type` in the table `vehicle`, with the values 10 (`MOTORCYCLE`) and 12 (`MOTORIZED BICYCLE`).

Crash Causation

First Harmful Event[12]

Table 6 summarizes the crash causes based the recorded first harmful event for all crashes where first harmful event is known. The most common crashes were motor vehicle crashes, collisions with other vehicles, fixed objects, with parked vehicles or an animal. However, these types of crashes were less likely to result in KAs.

Collisions with pedestrians were the crash cause with the highest injury severity, with 34% of crashes resulting in KAs. Collisions with bicyclists were also significantly severe with 18% resulting in KAs. The following crash causes also lead to significantly higher rates of crashes resulting in KAs compared to the average rate: Fell or jumped from vehicle (29.17%), collision with a fixed object, collision with a non-fixed object, and overturn or rollover. Seven percent of crashes resulting in a KA were also caused by on unknown first harmful event.

Table 6: First Harmful Event by All Modes, 2017- 2021

Cause of Crash	# of Crashes	% of Crashes	# of KA	% KA	% of Crashes that Resulted in KA
Collision with vehicle in transport	37,499	73.98%	572	45.61%	1.50%
Collision with fixed object	7,798	15.39%	356	28.39%	4.37%
Collision with parked vehicle	1,782	3.52%	17	1.36%	0.94%
Collision with animal	1,364	2.69%	9	0.72%	0.66%
Over turn or rollover	831	1.64%	109	8.69%	11.60%
Collision with pedestrian	203	0.40%	106	8.45%	34.30%
Collision with non-fixed object	242	0.48%	14	1.12%	5.47%
Other non-collision	219	0.43%	8	0.64%	3.52%
Cargo shift or loss	186	0.37%		0.00%	0.00%
Collision with bicycle	135	0.27%	30	2.39%	18.18%
Unknown	151	0.30%	11	0.88%	6.79%
Ran off road - right	80	0.16%	5	0.40%	5.88%
Fell or jumped from vehicle	34	0.07%	14	1.12%	29.17%
Ran off road - left	43	0.08%	1	0.08%	2.27%
Crossed centerline	42	0.08%	1	0.08%	2.33%
Jackknife	34	0.07%	1	0.08%	2.86%
Equipment failure	12	0.02%		0.00%	0.00%
Collision with railway vehicle	10	0.02%		0.00%	0.00%
Immersion	9	0.02%		0.00%	0.00%
Ran off road - other	5	0.01%		0.00%	0.00%
Fire or explosion	3	0.01%		0.00%	0.00%
Separation of units	2	0.00%		0.00%	0.00%
Crossed median	1	0.00%		0.00%	0.00%
Total	50,685[1]	100.00%	1,254	100.00%	2.41%

1 This number is different from the total number of crashes (58,896) because 6,842 crashes have no First Harmful Event identified and are excluded from this table.

12 Crash level first harmful event was derived from various elements of the crash reports. For AR, this was simply the column `first_harmful_event` in the table `crashes_fc`. For MO, it was derived from the column `event_code` in the table `sequence_of_events`. This table contained multiple events per person per crash. To get the first harmful event, the first harmful `event_code` value (`event_code` >= 16) was selected per person, using the order provided in `hp_seq_evnt_seq_no`. In crashes where there were multiple persons with a first harmful event, the event that happened to the person who sustained the highest injury level was used. For how the values between the AR and MO crash reports were recorded for consistency see Appendix A.

Bicycle Crashes

Table 7 summarizes bicycle crashes by the primary motorist's pre-crash movement and the bicyclist's pre-crash action to form bicycle "crash types".[13,14,15] While this data is limited it provides a glimpse into what actions were at play leading up to the crash.

The most common bicycle crash types in order of total KA crashes include:

- Motorist traveling straight – bicyclist crossing road (36% crashes, 31% KA crashes)
- Motorist traveling straight – bicyclist in roadway (12% crashes, 13% KA crashes)

Overall, motorists traveling straight led to the most crashes and the most severe crashes across all bicycle movements (70% of crashes and 71% of KA crashes). Crashes with a motorist traveling straight and bicyclist crossing the road resulted in a significantly higher-then-average percentage of KAs.

Table 7: Bicycle Crash Types with One or More KA Crashes, 2017-2021

Motorist Pre-Crash Movement	Bicyclist Pre-Crash Action	# of Crashes	% of Crashes	# of KA	% KA	% of Crashes that Resulted in KA
Other	Unknown	1	0.59%	1	2.22%	100.00%
Other Total		**1**	**0.59%**	**1**	**2.22%**	**100.00%**
Parked	Crossing road	6	3.55%	1	2.22%	16.67%
	In roadway	1	0.59%	1	2.22%	100.00%
Parked Total		**7**	**4.14%**	**2**	**4.44%**	**28.57%**
Straight	Adjacent to roadway	13	7.69%	3	6.67%	23.08%
	Along roadway - with traffic	13	7.69%	5	11.11%	38.46%
	Crossing road	61	36.09%	14	31.11%	22.95%
	In roadway	20	11.83%	6	13.33%	30.00%
	Other	3	1.78%	1	2.22%	33.33%
	Unknown	8	4.73%	3	6.67%	37.50%
Straight Total		**118**	**69.82%**	**32**	**71.11%**	**27.12%**
Turn – left	Along roadway - with traffic	8	4.73%	2	4.44%	25.00%
	Crossing road	12	7.10%	2	4.44%	16.67%
	In roadway	3	1.78%	1	2.22%	33.33%
Turn – left Total		**23**	**13.61%**	**5**	**11.11%**	**21.74%**
Turn – right	Along roadway - with traffic	3	1.78%	1	2.22%	33.33%
	In roadway	12	7.10%	1	2.22%	8.33%
	Other	2	1.18%	1	2.22%	50.00%
	Unknown	3	1.78%	2	4.44%	66.67%
Turn – right Total		**20**	**11.83%**	**5**	**11.11%**	**25.00%**
Total		169	100.00%	45	100.00%	26.63%

13 Bicycle pre-crash movement was derived from data within the crash reports. For AR, the column `action_prior_to_crash` from the table `non_motorist` was used. See <APPENDIX> for how these values were recoded. For MO, since there were no bicycle crashes in the study area, this step was skipped.

14 Motor vehicle pre-crash movement was derived from the crash reports. For AR, the column `vehicle_maneuver` from the table `vehicle` was used. For MO, the column `event_code` from the table `sequence_of_events` was used. The first value for `event_code` as ordered by `hp_seq_evnt_seq_no` was assigned to the vehicle. See <APPENDIX> for how different values between these two datasets were consolidated.

15 To determine bicycle crash types, only crashes that involved one or more bicycle and one or more motor vehicle were used. In cases where there were multiples of the same mode, the pre-crash movement of the highest severity injury level of each mode was selected as that mode's pre-crash movement.

Pedestrian Crashes

Table 8 summarizes pedestrian crashes by derived crash types.[16] The same approach was used to develop the pedestrian crash types by combining the primary motorist pre-crash movement and the pre-crash pedestrian action.[17]

The most common pedestrian crash types in order of KA crashes include:

- Motorist traveling straight – pedestrian crossing road (39% crashes, 48% KA crashes)
- Motorist turning left – pedestrian crossing roadway (11% crashes, 3% KA crashes)
- Motorist traveling straight – pedestrian adjacent to roadway (9% crashes, 7% KA crashes)
- The combination of vehicles traveling straight and pedestrians either crossing the road or in the roadway resulted in a significantly higher KA crash rate than the average KA crash rate.

Motorcycle Crashes[18]

Table 9 summarizes motorcycle crashes by crash types. The same approach was used to develop the motorcycle crash types by combining the primary motorist pre-crash movement and the motorcycle pre-crash action.[19]

The most common motorcycle crash types in order of KA crashes include:

- Motorist turning left – motorcycle traveling straight (30% crashes, 35% KA crashes)
- Motorist traveling straight – motorcycle traveling straight (27% crashes, 28% KA crashes
- These two crash combinations also resulted in KAs at a significantly higher rate than the average KA crash rate.

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16 To determine pedestrian crash types, only crashes that involved one or more pedestrian and one or more motor vehicle were used. In cases where there were multiples of the same mode, the pre-crash movement of the highest severity injury level of each mode was selected as that mode's pre-crash movement.

17 Pedestrian pre-crash movement was derived from data within the crash reports. For AR, the column `action_prior_to_crash` from the table `non_motorist` was used. See <APPENDIX> for how these values were recoded. For MO, there was only one pedestrian involved crash, so the pre-crash movement was manually coded to match the AR coding.

18 To determine motorcycle crash types, only crashes that involved one or more motorcycle and one or more motor vehicle were used. In cases where there were multiples of the same mode, the pre-crash movement of the highest severity injury level of each mode was selected as that mode's pre-crash movement.

19 Motorcycle pre-crash movement was derived from data within the crash reports. For AR, the column `vehicle_maneuver` from the table ` vehicle` was used. For MO, the column `event_code` from the table `sequence_of_events` was used. The first value for `event_code` as ordered by `hp_seq_evnt_seq_no` was assigned to the vehicle. See <APPENDIX> for how different values between these two datasets were consolidated.

Table 8: Pedestrian Crash Types with One or More KA Crashes, 2017-2021

Motorist Pre-Crash Movement	Pedestrian Pre-Crash Action	# of Crashes	% of Crashes	# of KA	% KA	% of Crashes that Resulted in KA
Backing	Other	2	0.68%	1	0.86%	50.00%
	Unknown	3	1.02%	2	1.72%	66.67%
Backing Total		**5**	**1.69%**	**3**	**2.59%**	**60.00%**
Changing lanes	Adjacent to roadway	1	0.34%	1	0.86%	100.00%
	Crossing road	3	1.02%	2	1.72%	66.67%
Changing Lanes Total		4	1.36%	3	2.59%	75.00%
Other	On sidewalk	1	0.34%	1	0.86%	100.00%
	Other	2	0.68%	1	0.86%	50.00%
Other Total		3	1.02%	2	1.72%	66.67%
Parked	Adjacent to roadway	2	0.68%	1	0.86%	50.00%
Parked Total		2	0.68%	1	0.86%	50.00%
Stopped in traffic	In Roadway	1	0.34%	1	0.86%	100.00%
	Other	1	0.34%	1	0.86%	100.00%
Stopped in traffic Total		**2**	**0.68%**	**2**	**1.72%**	**100.00%**
Straight	Adjacent to roadway	26	8.81%	8	6.90%	30.77%
	Along roadway - against traffic	7	2.37%	3	2.59%	42.86%
	Along roadway - with traffic	14	4.75%	5	4.31%	35.71%
	Crossing road	116	39.32%	56	48.28%	48.28%
	In roadway	24	8.14%	10	8.62%	41.67%
	None	4	1.36%	1	0.86%	25.00%
	On sidewalk	5	1.69%	2	1.72%	40.00%
	Other	16	5.42%	4	3.45%	25.00%
	Unknown	5	1.69%	3	2.59%	60.00%
Straight Total		**217**	**73.56%**	**92**	**79.31%**	**42.40%**
Turn - left	Adjacent to roadway	6	2.03%	1	0.86%	16.67%
	Crossing Road	31	10.51%	3	2.59%	9.68%
	Unknown	3	1.02%	1	0.86%	33.33%
Turn – left Total		40	13.56%	5	4.31%	12.50%
Turn - Right	Crossing road	14	4.75%	3	2.59%	21.43%
	On sidewalk	2	0.68%	1	0.86%	50.00%
Turn – right Total		**16**	**5.42%**	**4**	**3.45%**	**25.00%**
Unknown	Crossing road	3	1.02%	2	1.72%	66.67%
	Unknown	3	1.02%	2	1.72%	66.67%
Unknown Total		6	2.03%	4	3.45%	66.67%
Total		**295**	**100.00%**	**116**	**100.00%**	**39.32%**

Table 9: Pre-Crash Movements for Non-Solo Motorcycle Crashes with One or More KA, 2017-2021

Motorist Pre-Crash Movement	Motorcyclist Pre-Crash Action	# of Crashes	% of Crashes	# of KA	% KA	% of Crashes that Resulted in KA
Backing	Straight	3	0.54%	1	0.68%	33.33%
Backing total		**3**	**0.54%**	**1**	**0.68%**	**33.33%**
Changing lanes	Parked	1	0.18%	1	0.68%	100.00%
	Straight	13	2.34%	3	2.03%	23.08%
Changing lanes total		**14**	**2.52%**	**2.70%**	**28.57%**	**2.70%**
Other	Straight	4	0.72%	2	1.35%	50.00%
Other total		**4**	**0.72%**	**2**	**1.35%**	**50.00%**
Overtaking	Overtaking	1	0.18%	1	0.68%	100.00%
	Turn - left	1	0.18%	1	0.68%	100.00%
Overtaking total		**2**	**0.36%**	**2**	**1.35%**	**100.00%**
Parked	Parked	12	2.16%	1	0.68%	8.33%
	Stopped in traffic	6	1.08%	2	1.35%	33.33%
	Straight	21	3.78%	2	1.35%	9.52%
Parked total		**39**	**7.03%**	**5**	**3.38%**	**12.82%**
Slowing	Straight	11	1.98%	6	4.05%	54.55%
Slowing total		**11**	**1.98%**	**6**	**4.05%**	**54.55%**
Stopped in traffic	Straight	45	8.11%	4	2.70%	8.89%
Stopped in traffic total		**45**	**8.11%**	**4**	**2.70%**	**8.89%**
Straight	Changing lanes	13	2.34%	5	3.38%	38.46%
	Overtaking	4	0.72%	2	1.35%	50.00%
	Slowing	7	1.26%	2	1.35%	28.57%
	Stopped in traffic	23	4.14%	3	2.03%	13.04%
	Straight	148	26.67%	42	28.38%	28.38%
	Turn - left	23	4.14%	5	3.38%	21.74%
	Turn - right	9	1.62%	2	1.35%	22.22%
Straight total		**227**	**40.90%**	**61**	**41.22%**	**26.87%**
Turn - left	Overtaking	5	0.90%	3	2.03%	60.00%
	Straight	164	29.55%	52	35.14%	31.71%
	Turn - left	6	1.08%	1	0.68%	16.67%
	Turn - right	2	0.36%	1	0.68%	50.00%
Turn – left total		**177**	**31.89%**	**57**	**38.51%**	**32.20%**
Turn - right	Straight	21	3.78%	3	2.03%	14.29%
	Turn - right	4	0.72%	1	0.68%	25.00%
Turn – right total		**25**	**4.50%**	**4**	**2.70%**	**16.00%**
Unknown	Straight	8	1.44%	2	1.35%	25.00%
Unknown - total		**8**	**1.44%**	**2**	**1.35%**	**25.00%**
Total		**555**	**100.00%**	**148**	**100.00%**	**26.67%**

Motor Vehicle Crashes[20]

Table 10 summarizes motor vehicle crashes by crash types.[21] A similar approach was used to develop the motor vehicle crash types by combining the primary motorist pre-crash movement (motorist 1) and the motorist 2 pre-crash action. Motor vehicle crash types were determined based on crashes involving one or more motor vehicles. Crashes involving only one motor vehicle were considered solo crashes, and therefore the only had one pre-crash action assigned. For crashes involving two or more motor vehicles, the pre-crash actions of the first two motor vehicles were selected by order of injury severity, which the most severely injured assigned as the first movement and the second most severely injured assigned as the second. In cases where the injury levels were the same, the first two motor vehicles were selected based on their vehicle ID values within the crash report.

The most common motor vehicle crash types in order of KA crashes include:

- Vehicle 1 traveling straight – vehicle 2 straight (24% crashes, 42% KA crashes)
- Vehicle 1 turning left – vehicle 2 traveling straight (12% crashes, 15% KA crashes)
- Vehicle 1 traveling straight – vehicle 2 turning left (9% crashes, 12% KA crashes)

Vehicles traveling straight accounted for the greatest percent of KA crashes (65%), however no pre-crash movement or crash combination had a statistically significant percent of crashes resulting in a KA compared to the average KA crash rate.

Table 10: Pre-Crash Movements for Multi-Motor Vehicle Crashes with One or More KA Crashes, 2017-2021

Motorist 1 Pre-Crash Movement	Motorist 2 Pre-Crash Action	# of Crashes	% of Crashes	# of KA	% KA	% of Crashes that Resulted in KA
Backing	Overtaking	6	0.01%	1	0.19%	16.67%
	Solo	120	0.30%	1	0.19%	0.83%
Backing total		**126**	**0.31%**	**2**	**0.38%**	**1.59%**
Changing lanes	Changing lanes	86	0.21%	1	0.19%	1.16%
	Other	4	0.01%	1	0.19%	25.00%
	Straight	1,501	3.74%	8	1.51%	0.53%
	Turn - left	43	0.11%	1	0.19%	2.33%
	Turn - right	34	0.08%	1	0.19%	2.94%
	Solo	273	0.68%	11	2.08%	4.03%
Changing lates total		**1,941**	**4.84%**	**23**	**4.35%**	**1.18%**
Other	Straight	145	0.36%	5	0.95%	3.45%
	Solo	172	0.43%	4	0.76%	2.33%
Other total		**317**	**0.79%**	**9**	**1.70%**	**2.84%**
Overtaking	Other	3	0.01%	1	0.19%	33.33%
	Straight	102	0.25%	3	0.57%	2.94%
	Turn - left	56	0.14%	2	0.38%	3.57%
Overtaking total		**161**	**0.40%**	**6**	**1.13%**	**3.73%**

20 Motor vehicle pre-crash movement was derived from the crash reports. For AR, the column `vehicle_maneuver` from the table `vehicle` was used. For MO, the column `event_code` from the table `sequence_of_events` was used. The first value for `event_code` as ordered by `hp_seq_evnt_seq_no` was assigned to the vehicle. See <APPENDIX> for how different values between these two datasets were consolidated.

21 Motor vehicle pre-crash movement was derived from the crash reports. For AR, the column `vehicle_maneuver` from the table `vehicle` was used. For MO, the column `event_code` from the table `sequence_of_events` was used. The first value for `event_code` as ordered by `hp_seq_evnt_seq_no` was assigned to the vehicle. See <APPENDIX> for how different values between these two datasets were consolidated.

Motorist 1 Pre-Crash Movement	Motorist 2 Pre-Crash Action	# of Crashes	% of Crashes	# of KA	% KA	% of Crashes that Resulted in KA
Parked	Parked	637	1.59%	3	0.57%	0.47%
	Stopped in traffic	533	1.33%	1	0.19%	0.19%
	Straight	905	2.26%	3	0.57%	0.33%
	Turn - right	23	0.06%	1	0.19%	4.35%
	Solo	53	0.13%	1	0.19%	1.89%
Parked total		**2,151**	**5.37%**	**9**	**1.70%**	**0.42%**
Slowing	Straight	791	1.97%	9	1.70%	1.14%
Slowing total		**791**	**1.97%**	**9**	**1.70%**	**1.14%**
Stopped in traffic	Parked	468	1.17%	3	0.57%	0.64%
	Stopped in traffic	628	1.57%	5	0.95%	0.80%
	Straight	3,676	9.17%	18	3.40%	0.49%
Stopped in traffic total		**4,772**	**11.90%**	**26**	**4.91%**	**0.54%**
Straight	Changing lanes	1197	2.99%	4	0.76%	0.33%
	Other	145	0.36%	3	0.57%	2.07%
	Overtaking	53	0.13%	2	0.38%	3.77%
	Parked	1257	3.14%	8	1.51%	0.64%
	Slowing	358	0.89%	7	1.32%	1.96%
	Stopped in traffic	4675	11.66%	25	4.73%	0.53%
	Straight	9,650	24.07%	224	42.34%	2.32%
	Turn - left	3584	8.94%	61	11.53%	1.70%
	Turn - right	839	2.09%	6	1.13%	0.72%
	Unknown	99	0.25%	2	0.38%	2.02%
Straight total		**21,857**	**54.52%**	**342**	**64.65%**	**1.56%**
Turn - left	Overtaking	55	0.14%	1	0.19%	1.82%
	Straight	4775	11.91%	81	15.31%	1.70%
	Turn - left	598	1.49%	1	0.19%	0.17%
	Turn - right	136	0.34%	2	0.38%	1.47%
	Solo	328	0.82%	7	1.32%	2.13%
Turn – left total		**5,892**	**14.70%**	**92**	**17.39%**	**1.56%**
Turn - right	Straight	1161	2.90%	3	0.57%	0.26%
	Turn - left	203	0.51%	1	0.19%	0.49%
	Solo	320	0.80%	2	0.38%	0.63%
Turn – right total		**1,684**	**4.20%**	**6**	**1.13%**	**0.36%**
U-Turn	Straight	101	0.25%	1	0.19%	0.99%
U-turn total		**101**	**0.25%**	**1**	**0.19%**	**0.99%**
Unknown	Straight	70	0.17%	2	0.38%	2.86%
	Solo	227	0.57%	2	0.38%	0.88%
Unknown - total		**297**	**0.74%**	**4**	**0.76%**	**1.35%**
Total		**40,090**	**100.00%**	**529**	**100.00%**	**1.32%**

Parties Involved

In addition to identifying the conditions under which crashes occurred and the specifics of crashes, it is also critical to understand who was most affected by unsafe roadway conditions in the Northwest Arkansas region. In the following section, the distribution of parties (people) involved in a crash is compared overall and for fatal or serious injury outcomes for age groups. These comparisons are based on the number of parties, not the number of crashes, therefore the total numbers at the bottom of Table 11 are different than the totals in tables that are based on number of crashes. Any given crash may injure multiple parties, at different levels of severity.

Parties by Age[22]

Table 11 compares the crash party age breakdown against the age breakdown of residents in the Northwest Arkansas Region. To compare these distributions, the percentage of crash victims and of KA crash victims within a given age range is divided by the percentage share in the population overall. Values greater than 1 (red cells) indicate that a given age group is overrepresented in the crash data. Values less than 1 (blue cells) indicate that age group is underrepresented in the crash data.

The percent of parties resulting from a KA field was calculated by dividing the number of KA parties by the total number of parties. This field is similar to the percent of crashes resulting in a KA field in previous tables that were based on number of crashes rather than number of parties.

The age percent of population field is the total age brackets percentage of the region's total population. For example, 20–24-year-old people make up 8.16% of the total population in the region.

Table 11: Parties by Age[1], 2017-2021

Age	# of Parties	% of Parties	# of KA Parties	% of KA Parties	% of parties resulting from a KA	Age % of Population	All Crashes: Population Ratio	KA: Population Ratio
0-4	4,672	3.46%	20	1.24%	0.43%	6.88%	0.5	0.18
5-9	4,385	3.25%	20	1.24%	0.46%	7.62%	0.43	0.16
10-14	4,170	3.09%	29	1.80%	0.70%	6.91%	0.45	0.26
15-19	17,803	13.18%	140	8.67%	0.79%	7.96%	1.66	1.09
20-24	19,145	14.17%	192	11.90%	1.00%	8.16%	1.74	1.46
25-29	14,341	10.62%	170	10.53%	1.19%	7.74%	1.37	1.36
30-34	12,223	9.05%	153	9.48%	1.25%	7.72%	1.17	1.23
35-39	10,995	8.14%	155	9.60%	1.41%	7.19%	1.13	1.34
40-44	9,097	6.73%	119	7.37%	1.31%	6.83%	0.99	1.08
45-49	8,084	5.98%	120	7.43%	1.48%	6.15%	0.97	1.21
50-54	7,142	5.29%	106	6.57%	1.48%	5.41%	0.98	1.21
55-59	6,658	4.93%	112	6.94%	1.68%	5.53%	0.89	1.26
60-64	5,225	3.87%	97	6.01%	1.86%	4.46%	0.87	1.35
65-69	4,025	2.98%	66	4.09%	1.64%	3.98%	0.75	1.03
70-74	3,042	2.25%	58	3.59%	1.91%	3.02%	0.75	1.19
75-79	1,873	1.39%	27	1.67%	1.44%	2.04%	0.68	0.82
80-84	1,093	0.81%	17	1.05%	1.56%	1.23%	0.66	0.86
85-over	1,117	0.83%	13	0.81%	1.16%	1.17%	0.71	0.69
Total	135,090	100.00%	1,614	100.00%	1.19%	100.00%	1	1

1 Where age is known.

22 Age was derived from the crash reports. For AR, this was the column `age` from the table `person_index`. For MO, it was determined from comparing the column `date_of_birth` from the table `driver_passenger` to the column `date_0` from the table `rpc_crashes_2017_2021` to determine the persons age at the time of the crash.

In general, younger travelers were involved in a larger share of total crashes and KA outcomes. People aged 20-24 were the most overrepresented for all crashes and for KA outcomes. Older age brackets were less represented in both crashes and KA outcomes. Interestingly, people in their 50s and 60s were slightly under-represented in overall crashes but overrepresented in KA outcomes. This may point to drivers becoming more experienced with age but also becoming increasingly frail and more likely to be killed or seriously injured if involved in a crash.

Behaviors

Alcohol Impairment[23]

Table 12 summarizes crashes by alcohol impairment. These crashes include both when the alcohol level was reported as over the legal limit as well as when alcohol use was listed as a contributing crash factor in the collision report. Most crashes (96%) did not include an alcohol impairment party. Despite there being only 4% of crashes that involved alcohol impaired, these crashes accounted for 8% of KAs.

The impact of alcohol on KA outcomes was even more pronounced when analyzed for vulnerable road users. Table 13 shows when a vulnerable roadway user was involved in an alcohol related crash, the outcomes were more severe with 48% of crashes resulting in a KA outcome.

Table 12: Crashes by Reported DUI, All Modes, 2017-2021

Alcohol Impaired	# of Crashes	% of Crashes	# of KA Crashes	% of KA Crashes	% of Crashes that Resulted in KA
Yes	2,132	3.62%	173	12.64%	8.11%
No	56,764	96.38%	1196	87.36%	2.11%
Total	58,896	100.00%	1369	100.00%	2.32%

Table 13: Crashes by Reported DUI, Vulnerable Road Users, 2017-2021

Alcohol Impaired	# of Crashes	% of Crashes	# of KA Crashes	% of KA Crashes	% of Crashes that Resulted in KA
Yes	71	4.32%	34	7.61%	47.89%
No	1,573	95.68%	413	92.39%	26.26%
Total	1,644	100.00%	447	100.00%	27.19%

23 Alcohol impairment was derived from the crash reports. For AR, alcohol was determined from multiple sources: the column `condition` with the value of 7 (`Under the influence of alcohol`) from the table `driver_condition`; the column `driver_action` with the value 28 (`Under the influence of alcohol`) in the table `driver_action`; the column `blood_alcohol_content` with a value >= 0.08 from the table `driver`; and the column `blood_alcohol_content` with a value >= 0.08 from the table `non_motorist`. For MO, alcohol was determined using the column `code` in the table ` contributing_circumstances`, using the value 18 (`ALCHOL`). If any one of these conditions for any one person involved was true, then the crash was considered alcohol involved.

Speeding[24]

Table 14 summarizes crashes where either exceeding the speed limit or driving too fast for the conditions was noted in the collision report. The 4,339 crashes that involved speeding made up only 7% of all crashes but 18% of KAs.

While the percentages of crashes involving speeding for vulnerable road users are similar to those for all modes, there is a significant jump in severity. Table 15 shows that 43% of speeding crashes resulted in a KA when a vulnerable roadway user was involved compared to just 6% in the previous table. Nationally, speeding remains the largest contributing factor influencing fatal and sever injury crashes.[25] The data below shows that in Northwest Arkansas, even though vehicle crashes make up a large portion of the total crashes, the impact of speed remains significant. Pedestrians, bicyclists, and motorcyclists are referred to as vulnerable modes specially because of their exposure to high impacts and their lack of additional protection such as air bags or bumpers in in a high-speed crash.

Table 14: Crashes by Reported Speeding, All Modes, 2017-2021

Speeding	# of Crashes	% of Crashes	# of KA Crashes	% of KA Crashes	% of Crashes that Resulted in KA
Yes	4,339	7.37%	249	18.19%	5.74%
No	54,557	92.63%	1,120	81.81%	2.05%
Total	58,896	100.00%	1,369	100.00%	2.32%

Table 15: Crashes by Reported Speeding, Vulnerable Road Users, 2017-2021

Speeding	# of Crashes	% of Crashes	# of KA Crashes	% of KA Crashes	% of Crashes that Resulted in KA
Yes	137	8.33%	59	13.20%	43.07%
No	1,507	91.67%	388	86.80%	25.75%
Total	1,644	100.00%	447	100.00%	27.19%

24 Speeding was determined based on the data in the crash reports. For AR, this was the column `speeding_relation` in the table `driver`, where the value any of: 2 (`Racing`), 3 (`Exceeded Speed Limit`), or 4 (`Too fast for conditions`). For MO, the column was `code` in the table `contributing_circumstances` where the value was any of: 04 (`SPEED EXCEEDED LIMIT`), 05 (`TOO FAST FOR CONDITIONS`), or 42 (`EXCESSSIVE SPEED`). If any one of these conditions for any one vehicle involved was true, then the crash was considered speeding.

25 https://www.nhtsa.gov/campaign/speeding-catches-up-with-you

Roadway Characteristics

Crash Location (Intersection vs. Segment) [26,27]

Table 16 below summarizes crash frequencies by location type for all modes. Crashes were identified as an intersection crash if the crash data point was located within 250 ft of an intersection, and if the closest segment was a part of that intersection (i.e., preventing a crash along a highway to be assigned to intersection of a nearby frontage road). Crashes not assigned as intersection crashes were assumed as segment crashes. Crashes occurred most often at intersections (65% of crashes, 54% of KA crashes) with roughly 2% of crashes resulting in a KA. For more details on the traffic control present at intersections see Table 32 and Table 33.

While segment crashes had a lower share of both overall crashes and KA crashes, segment crashes had a slightly higher rate of resulting in a KA outcome (3%).

Table 17 summarizes crashes by location for vulnerable road users. Like above, most crashes occurred at intersections (67% crashes, 62% KA crashes) compared to segment locations (32% crashes, 38% KA crashes).

Segment crashes were not the most frequent crash location for vulnerable road users, but they tended to be more severe than intersection crashes with 32% of crashes resulting in a KA (compared to 25% at intersections).

Table 16: Crashes by Location, All Modes, 2017-2021

Crash Location	# of Crashes	% of Crashes	# of KA	% KA	% of Crashes that Resulted in KA
Intersection	37,870	64.68%	732	54.02%	1.93%
Segment	20,682	35.32%	623	45.98%	3.01%
Total	**58,552**	**100.00%**	**1,355**	**100.00%**	**2.31%**

Table 17: Crashes by Location, Vulnearble Road Users 2017-2021

Crash Location	# of Crashes	% of Crashes	# of KA	% KA	% of Crashes that Resulted in KA
Intersection	1,102	67.61%	275	62.08%	24.95%
Segment	528	32.39%	168	37.92%	31.82%
Total	**1,630**	**100.00%**	**443**	**100.00%**	**27.18%**

26 Segment crashes were all non-intersection crashes that occurred within 50 ft of a roadway segment.

27 Intersection involved crashes were determined spatially rather than by crash report. They were within 250 ft of an intersection that connects to the segment which they occurred (as defined by street name).

Urban vs. Rural[28]

Table 18 and Table 21 summarize crashes that occurred in urban versus rural areas. Urban crashes were identified as any crashes that occurred within 2020 Census defined urban areas. All crashes outside of these areas were designed as rural crashes. There are more crashes in urban areas (all, KA, and vulnerable road users) than rural areas in NWA. However, more rural crashes are likely to result in a KA outcome for all modes (4.46%) and vulnerable road users (35.75%). For all modes, there were slightly more KA crashes in urban areas (57% of KA crashes in urban versus 43% of KA crashes in rural). This difference was more pronounced for vulnerable road users where 66% of KA crashes occurred in urban areas and 34% in rural areas.

Table 18: Crashes in urban vs. rural areas, All Modes 2017-2021

Crash Location	# of Crashes	% of Crashes	# of KA	% KA	% of Crashes that Resulted in KA
Urban	45,806	77.77%	785	57.34%	1.71%
Rural	13,090	22.23%	584	42.66%	4.46%
Total	**58,896**	**100.00%**	**1,369**	**100.00%**	**2.32%**

Table 19: Crashes in urban vs. rural areas, Vulnerable Road Users 2017-2021

Crash Location	# of Crashes	% of Crashes	# of KA	% KA	% of Crashes that Resulted in KA
Urban	1,216	73.97%	294	65.77%	24.18%
Rural	428	26.03%	153	34.23%	35.75%
Total	**1,644**	**100.00%**	**447**	**100.00%**	**27.19%**

28

Traffic Volume[29]

Table 20 summarizes crashes by AADT for all modes. Streets with an AADT less than 5,000 had the largest share of both overall crashes (31%) and KA crashes (35%). However, the majority of the street network throughout the region has an AADT less than 5,000 (i.e., local and residential streets), resulting in relatively low crashes per mile and KA crashes per mile. Streets that had an AADT between 5,000 and 9,999 and over 30,000 had the second highest shares of KA crashes (16% and 15% respectively).

It's important to keep in mind that streets with higher traffic volumes often have higher crash frequencies. While AADT estimates are available, it is not available citywide for motorcycles, bicyclists, and pedestrians. Having detailed citywide volumes estimates would allow for the estimation of crash risk for each mode.

Table 21 summarizes crashes by traffic volume on a roadway where vulnerable road users were involved. Like Table 20, most crashes occurred on streets with lower AADT which is due to the overall network coverage of those streets. Crashes along lower volume street also tended to be less severe on average with roughly 24% of crashes resulting in a KA compared to 32% of crashes resulting in a KA along streets with an AADT of at least 25,000.

While the above two tables provide insight into the relationship between AADT and crashes they do not capture the distribution of those crashes along roadway miles across the region. Table 22 highlights the mileage and percentage of the entire roadway network for each AADT category as well as the ratio of the percent of crashes to percent of overall mileage. While, low AADT roadways had a high number of crashes, they also accounted for 88% of all the roadways in the region.

Table 20: Crashes by AADT, All Modes, 2017-2021

AADT	# of Crashes	% of Crashes	# of KA	% KA	% of Crashes that Resulted in KA
0 – 4,999	18,000	30.82%	476	35.16%	2.64%
5,000 – 9,999	7,984	13.67%	214	15.81%	2.68%
10,000 – 14,999	6,243	10.69%	159	11.74%	2.55%
15,000 – 19,999	4,017	6.88%	79	5.83%	1.97%
20,000 – 24,999	4,720	8.08%	109	8.05%	2.31%
25,000 – 29,999	6,098	10.44%	113	8.35%	1.85%
30,000 - over	11,351	19.43%	204	15.07%	1.80%
Grand Total	**58,413**	**100.00%**	**1,354**	**100.00%**	**2.32%**

Table 21: AADT on Roadways where Crashes involved Vulnerable Road Users, 2017-2021

AADT	# of Crashes	% of Crashes	# of KA	% KA	% of Crashes that Resulted in KA
0 – 4,999	635	38.98%	153	34.54%	24.09%
5,000 – 9,999	234	14.36%	59	13.32%	25.21%
10,000 – 14,999	171	10.50%	46	10.38%	26.90%
15,000 – 19,999	85	5.22%	27	6.09%	31.76%
20,000 – 24,999	136	8.35%	41	9.26%	30.15%
25,000 – 29,999	140	8.59%	45	10.16%	32.14%
30,000 - over	228	14.00%	72	16.25%	31.58%
Grand Total	**1629**	**100.00%**	**443**	**100.00%**	**27.19%**

29 Includes both known and assumed traffic volumes.

Conversely, roads with over 30,000 AADT made up only 1% of total roadway mileage but the highest percentage of crashes.

The crash ratios below were calculated by the percent of total crashes, KAs and non-KA that occurred within each AADT category divided by the category's percent of mileage in the overall roadway network. Values above 1 (shown in red) indicate that there was a higher percent of crashes relative to mileage, while values below 1 (in blue) have a lower percent of crashes relative to mileage.

Table 22: AADT Ratios

AADT	Mileage	% of Mileage	Crash Ratio: All Crashes	Crash Ratio: KA Crashes
0 – 4,999	5,996	88%	0.35	0.40
5,000 – 9,999	319	5%	2.91	3.37
10,000 – 14,999	162	2%	4.48	4.93
15,000 – 19,999	78	1%	5.99	5.08
20,000 – 24,999	75	1%	7.31	7.28
25,000 – 29,999	71	1%	10.05	8.03
30,000 - over	88	1%	15.02	11.65
Total	**6,788**	**100%**	**1.00**	**1.00**

Functional Classification[30]

Table 23 below outlines crashes by roadway classification for all modes. Major arterials had the most crashes of with 17,216 crashes (29% of all crashes). However, minor arterials had a higher number of KA crashes (406, 29% of KAs). Minor collectors had the greatest risk for a crash resulting in a KA outcome, where 5.44% of all crashes resulted in KA outcomes.

Table 24 summarizes crashes by functional classification for crashes involving vulnerable road users. As in the previous table, major and minor arterials had a higher number of crashes and KA outcomes. The greatest risk of a crash resulting in a KA outcome was on interstates (39.47%)

Table 25 highlights the mileage of each functional class category as a percent of the overall roadway mileage and compares it to the percent of crashes occurring within each category. The crash ratio fields were calculated by the percent of total crashes, KAs and non-KA that occurred within each Functional Class category divided by that category's percent of mileage in the overall roadway network. Values above 1 (shown in red) indicate that there was a higher percent of crashes relative to mileage, while values below 1 (in blue) have a lower percent of crashes relative to mileage.

This analysis highlights the disproportionate share of crashes that occur on Arterials. The combined 10% of Major and Minor Arterial roadway mileage accounts for 56% of KA crashes. Meanwhile local roads which make up 62% of all road miles carry less than 10% of KA crashes.

Table 23: Crashes by Functional Classification, All Modes, 2017-2021

Functional Classification	# of Crashes	% of Crashes	# of KA	% KA	% of Crashes that Resulted in KA
Interstate	6,067	10.36%	126	9.30%	2.08%
Freeway	584	1.00%	17	1.25%	2.91%
Major Arterial	17,216	29.40%	352	25.98%	2.04%
Minor Arterial	15,560	26.57%	406	29.96%	2.61%
Major Collector	11,813	20.18%	294	21.70%	2.49%
Minor Collector	478	0.82%	26	1.92%	5.44%
Local	6,834	11.67%	134	9.89%	1.96%
Grand Total	**58552**	**100.00%**	**1355**	**100.00%**	**2.31%**

Table 24: Crashes by Functional Classification, Vulnerable Road Users, 2017-2021

Functional Classification	# of Crashes	% of Crashes	# of KA	% KA	% of Crashes that Resulted in KA
Interstate	76	4.66%	30	6.77%	39.47%
Freeway	11	0.67%	7	1.58%	63.64%
Major Arterial	434	26.63%	132	29.80%	30.41%
Minor Arterial	438	26.87%	126	28.44%	28.77%
Major Collector	431	26.44%	94	21.22%	21.81%
Minor Collector	18	1.10%	6	1.35%	33.33%
Local	222	13.62%	48	10.84%	21.62%
Grand Total	**1630**	**100.00%**	**443**	**100.00%**	**27.18%**

30 Includes both known and assumed functional classifications.

Table 25: Functional Classification Ratios

Functional Classification	Mileage	% of Mileage	Crash Ratio: All Crashes	Crash Ratio: KA Crashes
Interstate	184	2.71%	3.82	3.43
Freeway	20	0.30%	3.34	4.20
Major Arterial	180	2.66%	11.07	9.78
Minor Arterial	499	7.34%	3.62	4.08
Major Collector	1,436	21.14%	0.95	1.03
Minor Collector	292	4.30%	0.19	0.45
Local	4,181	61.55%	0.19	0.16
Grand Total	**6,793**	**100.00%**	**1.00**	**1.00**

Posted Speed Limit[31]

Table 26 summarizes crashes and by posted speed limit for all roadway users. Crashes occurred most often on roadways with a posted speed limit of 45mph (23% crashes, 20% KA crashes) followed by streets with a posted speed limit of 40mph (18% crashes, 14% KA crashes). KA crashes occurred most often on streets with a 55mph posted speed limit (21% of KA crashes) and the highest percentage of crashes resulting in a KA (6.27%) also occurred on streets with a 55 mph posted speed limit.

Table 26: Crashes by Posted Speed Limit, All Modes, 2017-2021

Posted Speed Limit (MPH)	# of Crashes	% of Crashes	# of KA	% KA	% of Crashes that Resulted in KA
10	16	0.03%	1	0.07%	6.25%
15	98	0.17%	1	0.07%	1.02%
20	554	0.95%	8	0.59%	1.44%
25	6,918	11.82%	101	7.45%	1.46%
30	4,707	8.04%	96	7.08%	2.04%
35	9,691	16.55%	172	12.69%	1.77%
40	10,725	18.32%	195	14.39%	1.82%
45	13,528	23.10%	274	20.22%	2.03%
50	1,752	2.99%	55	4.06%	3.14%
55	4,565	7.80%	286	21.11%	6.27%
60	401	0.68%	21	1.55%	5.24%
65	1,380	2.36%	40	2.95%	2.90%
70	2,978	5.09%	75	5.54%	2.52%
75	1,238	2.11%	30	2.21%	2.42%
Grand Total	**58,5511**	**100.00%**	**1355**	**100.00%**	**2.31%**

1 This number is less than the total number of crashes (58,896) because crashes are joined to the nearby roadway to extract the speed limit information from the roadway segment. Crashes that are located too far away from a roadway will not be assigned to a roadway segment, hence no speed limit information.

31 Includes both known and assumed posted speed limits

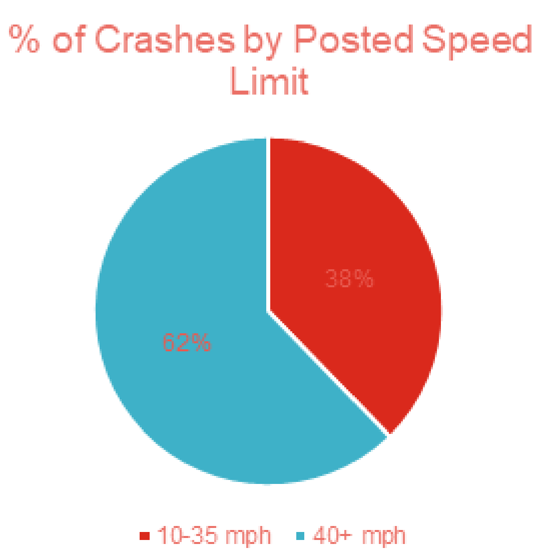
Summaries for crashes involving a vulnerable roadway user by posted speed limit are shown in Table 27 and follows a similar trend as the table above with the majority crashes and KA crashes involving a vulnerable road user occurred on streets with a posted speed limit of 45mph. However, the highest risk of a crash resulting in a KA outcome was on streets with a posted speed of 70mph when a vulnerable road user was involved.

Table 28 below takes the information from the two previous tables and highlights the ratio of crashes to each speed category's percentage of the total mileage. The crash ratio fields were calculated by taking the percent of total crashes, KAs and non-KA that occurred within each Speed category divided by that category's percent of mileage in the overall roadway network. Values above 1 (shown in red) indicate that there was a higher percent of crashes relative to mileage, while values below 1 (in blue) have a lower percent of crashes relative to mileage.

While 25mph streets make up over half of all roadway miles, they account for only a small percentage of crashes. Higher speed roadways make up smaller shares of the overall roadway network but had increasing numbers of fatal and severe injury crashes.

Table 27: Crashes by Posted Speed Limit, Vulnerable Road Users, 2017-2021

Posted Speed Limit (MPH)	# of Crashes	% of Crashes	# of KA	% KA	% of Crashes that Resulted in KA
10	1	0.06%	0	0.00%	0.00%
15	5	0.31%	1	0.23%	20.00%
20	20	1.23%	3	0.68%	15.00%
25	273	16.75%	48	10.84%	17.58%
30	155	9.51%	34	7.67%	21.94%
35	238	14.60%	58	13.09%	24.37%
40	274	16.81%	71	16.03%	25.91%
45	317	19.45%	94	21.22%	29.65%
50	46	2.82%	18	4.06%	39.13%
55	201	12.33%	71	16.03%	35.32%
60	18	1.10%	10	2.26%	55.56%
65	29	1.78%	10	2.26%	34.48%
70	39	2.39%	17	3.84%	43.59%
75	14	0.86%	8	1.81%	57.14%
Grand Total	**1,630**	**100.00%**	**443**	**100.00%**	**27.18%**



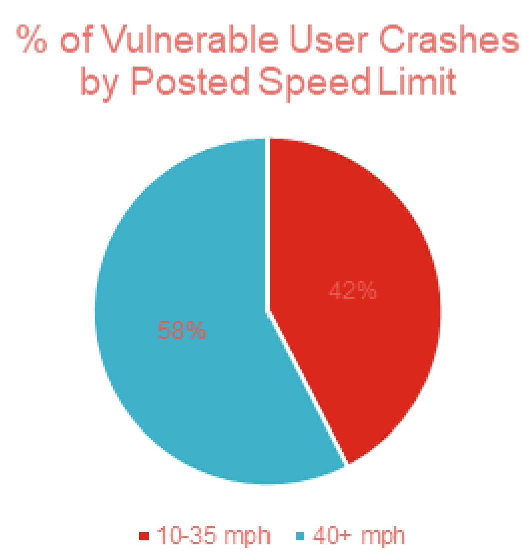


Table 28: Crash Speed Ratios

Crash Speed (MPH)	Mileage	% of Mileage	Crash Ratio: All Crashes	Crash Ratio: KA Crashes
10 - 14	3	0%	0.62	1.68
15 - 19	9	0%	1.33	0.59
20 - 24	77	1%	0.84	0.52
25 - 29	3724	55%	0.22	0.14
30 - 34	441	6%	1.24	1.09
35 - 39	654	10%	1.72	1.32
40 - 44	551	8%	2.26	1.77
45 - 49	376	6%	4.17	3.65
50 - 54	155	2%	1.31	1.78
55 - 59	557	8%	0.95	2.58
60 - 64	20	0%	2.31	5.23
65 - 69	93	1%	1.72	2.15
70 - 74	71	1%	4.88	5.31
75 - over	61	1%	2.37	2.48
Grand Total	**6,792**	**100%**	**1.00**	**1.00**

Number of lanes[32]

Table 29 summarizes crashes by number of lanes for all roadway users. Crashes occurred most often on four-lane roads (40% crashes, 38% KA crashes) followed by two-lane roads (36% crashes, 46% KA crashes). KA crashes occurred most often on two-lane roads and these crashes also tended to be the most severe, with 3% of all crashes on 2 lane roads resulted in KAs.

Table 30 summarizes crashes by number of lanes for vulnerable road users only. Data for these modes follows a similar trend as the table above, but the impact of two-lane road crashes is more pronounced. For vulnerable road users, the most crashes (760, 46.63%) and the most KA crashes (194, 43.79%) occurred on two-lane roads. However, crashes with the greatest risk of resulting in a KA involving a vulnerable road users occurred on six-lane roads as these are corridors with higher-speed free-flowing vehicle traffic.

Table 31 below takes the information from the two previous tables and highlights the ratio of crashes to each lane category's percentage of the total mileage. While the two previous tables showed the most crashes occurring on two-lane roads, these roads also make up almost 90% of the roadways in Northwest Arkansas. While fewer crashes occur on six and eight-lane roads the roads they account for a proportionally much higher rate of crashes per mile.

32 Through lanes only. Includes both known lane count and assumed lane count.

Table 29: Crashes by Number of Lanes, All Modes, 2017-2021

Number of Lanes	# of Crashes	% of Crashes	# of KA	% KA	% of Crashes that Resulted in KA
1	1,709	2.92%	20	1.48%	1.17%
2	20,858	35.62%	627	46.27%	3.01%
3	3,390	5.79%	54	3.99%	1.59%
4	23,466	40.08%	511	37.71%	2.18%
5	5,231	8.93%	66	4.87%	1.26%
6	3,442	5.88%	71	5.24%	2.06%
7	114	0.19%	0	0.00%	0.00%
8	342	0.58%	6	0.44%	1.75%
Grand Total	**58,552**	**100.00%**	**1.355**	**100.00%**	**2.31%**

Table 30: Crashes by Number of Lanes, Vulnerable Road Users, 2017-2021

Number of Lanes	# of Crashes	% of Crashes	# of KA	% KA	% of Crashes that Resulted in KA
1	20	1.23%	6	1.35%	30.00%
2	760	46.63%	194	43.79%	25.53%
3	96	5.89%	18	4.06%	18.75%
4	584	35.83%	185	41.76%	31.68%
5	116	7.12%	22	4.97%	18.97%
6	46	2.82%	16	3.61%	34.78%
7	1	0.06%	0	0.00%	0.00%
8	7	0.43%	2	0.45%	28.57%
Grand Total	**1630**	**100.00%**	**443**	**100.00%**	**27.18%**

Table 31: Number of Lanes Ratios

Number of Lanes	Mileage	% of Mileage	Crash Ratio: All Crashes	Crash Ratio: KA Crashes
1	119	2%	1.69	0.84
2	6,007	88%	0.40	0.52
3	151	2%	2.62	1.79
4	379	6%	7.19	6.76
5	82	1%	7.49	4.04
6	50	1%	8.00	7.11
7	0.1	0%	109.59	0.00
8 and over	4	0%	10.48	7.90
Total	**6,792**	**100%**	**1.00**	**1.00**

One-way vs. Two-Way Streets[33]

Table 32 and Table 33 summarize crashes by street direction for all modes and for vulnerable road users. For all modes, crashes occurred most often on two-way streets (82% crashes, 85% KA crashes). Crashes on two-way roads were slightly more severe for all modes. Vulnerable modes followed a similar trend with the most crashes occurring on two-way roads (90% crashes, 87% KA crashes). However, the severity of crashes for vulnerable road users significantly increased on one-way streets, with 35% of crashes for vulnerable road users on one-way streets resulted in a KA compared to just under 2% for all modes.

Intersection Control[34]

Table 34 and Table 35 summarize crashes by intersection control for all modes and for vulnerable road users. For all modes, crashes occurred most often at intersections with no traffic control (58% crashes, 68% KA crashes). Crashes at stop sign controlled intersections were slightly more severe with 2.45% of crashes resulting in KAs.

These trends were even more pronounced for vulnerable road users. Again, the most crashes occurred at intersections with no signal control (66% crashes, 71% KA crashes). Stop controlled intersection crashes were also the most severe for vulnerable modes with 29% resulting in a KA outcome.

Table 32: Street Direction, All Modes, 2017-2021

Street Direction	# of Crashes	% of Crashes	# of KA	% KA	% of Crashes that Resulted in KA
Two-way	47,987	81.96%	1147	84.65%	2.39%
One-way	10,565	18.04%	208	15.35%	1.97%
Total	**58,552**	**100%**	**1,355**	**100.00%**	**2.31%**

Table 33: Street Direction, Vulnerable Road Users, 2017-2021

Street Direction	# of Crashes	% of Crashes	# of KA	% KA	% of Crashes that Resulted in KA
Two-way	1,460	89.57%	384	86.68%	26.30%
One-way	170	10.43%	59	13.32%	34.71%
Total	**1,630**	**100.00%**	**443**	**100.00%**	**27.18%**

Table 34: Intersection Control, All Modes, 2017-2021

Intersection Control Device	# of Crashes	% of Crashes	# of KA	% KA	% of Crashes that Resulted in KA
Signal	14,016	37.01%	190	25.96%	1.36%
Stop Sign	1,918	5.06%	47	6.42%	2.45%
None	21,936	57.92%	495	67.62%	2.26%
Total	**37,870**	**100.00%**	**732**	**100.00%**	**1.93%**

Table 35: Intersection Control, Vulnerable Road Users, 2017-2021

Intersection Control Device	# of Crashes	% of Crashes	# of KA	% KA	% of Crashes that Resulted in KA
Signal	310	28.13%	61	22.18%	19.68%
Stop Sign	70	6.35%	20	7.27%	28.57%
None	722	65.52%	194	70.55%	26.87%
Total	**1,102**	**100.00%**	**275**	**100.00%**	**24.95%**

33 All streets were assumed two-way unless otherwise noted.

34 Only applies to intersection crashes. Where no data is present, intersection is assumed uncontrolled.

Environmental Characteristics

Historically Disadvantaged Communities and Areas of Persistent Poverty

Table 36 to Table 39 summarize crashes by historically disadvantaged communities and areas of persistent poverty for all modes and for vulnerable road users. Despite having only about 14% of the regional roadway centerline miles, historically disadvantaged communities have about 23% of all crashes and the same share of KA crashes for all modes. Similarly, about 22% of all crashes and 18% of KA crashes happened within areas of persistent poverty, though only about 8% of regional roadway centerline miles fall in these areas. This indicates historically disadvantaged communities and areas of persistent poverty may have disproportionately higher crash risks. Areas where historically disadvantaged communities and persistent poverty overlap has 14% and 12% of regional total crashes and KA crashes respectively, despite having only 6% of the regional roadway centerline miles (see Table 38).

The vulnerable road users involved crashes tell a very similar story, with about 25% of both all crashes and KA crashes happen in historically disadvantaged communities and the percentage of crashes that resulted in KA in these communities is about the same as the regional level. A slightly lower percentage of KA crashes happened in areas of persistent poverty compared to all crashes. The percentage of crashes that resulted in KA in these areas is about 3% lower than the regional value. However, they are still much higher than the share of roadway centerline miles in these areas. Similarly, for vulnerable road user involved crashes, areas where historically disadvantaged communities and persistent poverty overlap have 15% of regional total crashes and 16% KA crashes, respectively, despite only 6% of the regional roadway centerline miles (see Table 41).

Table 36: Crashes by Historically Disadvantaged Communities, All Modes, 2017-2021

Historically Disadvantaged Communities	# of Crashes	% of Crashes	# of KA	% KA	% of Crashes that Resulted in KA	% of roadway centerline miles
Yes	13,900	23.6%	305	22.3%	2.19%	14%
No	44,996	76.4%	1,064	77.7%	2.36%	86%
Total	**58,896**	**100%**	**1,369**	**100%**	**2.32%**	**100%**

Table 37: Crashes by Areas of Persistent Poverty, All Modes, 2017-2021

Areas of Persistent Poverty	# of Crashes	% of Crashes	# of KA	% KA	% of Crashes that Resulted in KA	% of roadway centerline miles
Yes	12,682	21.5%	239	17.5%	1.88%	8%
No	46,214	78.5%	1,130	82.5%	2.45%	92%
Total	**58,896**	**100%**	**1,369**	**100%**	**2.32%**	**100%**

Table 38: Crashes in Areas where Historically Disadvantaged Communities and Areas of Persistent Poverty Overlap, All Modes, 2017-2021

Areas where Historically Disadvantaged Communities and Areas of Persistent Poverty Overlap	# of Crashes	% of Crashes	# of KA	% KA	% of Crashes that Resulted in KA	% of roadway centerline miles
Yes	8,174	13.9%	165	12.1%	2.02%	6%
No	50,722	86.1%	1,204	87.9%	2.37%	94%
Total	**58,896**	**100%**	**1,369**	**100%**	**2.32%**	**100%**

Table 39: Crashes by Historically Disadvantaged Communities, Vulnerable Road Users, 2017-2021

Historically Disadvantaged Communities	# of Crashes	% of Crashes	# of KA	% KA	% of Crashes that Resulted in KA
Yes	422	25.7%	110	24.6%	26.07%
No	1,222	74.3%	337	75.4%	27.58%
Total	**1,644**	**100%**	**447**	**100%**	**27.19%**

Table 40: Crashes by Areas of Persistent Poverty, Vulnerable Road Users, 2017-2021

Areas of Persistent Poverty	# of Crashes	% of Crashes	# of KA	% KA	% of Crashes that Resulted in KA
Yes	422	25.7%	102	22.8%	24.17%
No	1,222	74.3%	345	77.2%	28.23%
Total	**1,644**	**100%**	**447**	**100%**	**27.19%**

Table 41: Crashes in Areas where Historically Disadvantaged Communities and Areas of Persistent Poverty Overlap, Vulnerable Road Users, 2017-2021

Areas where Historically Disadvantaged Communities and Areas of Persistent Poverty Overlap	# of Crashes	% of Crashes	# of KA	% KA	% of Crashes that Resulted in KA	% of roadway centerline miles
Yes	246	15.0%	71	15.9%	28.9%	6%
No	1398	85.0%	376	84.1%	26.9%	94%
Total	**1,644**	**100%**	**447**	**100%**	**27.2%**	**100%**

Time of Day[35]

Table 42 and Table 43 summarize crashes by time of day for all modes and for vulnerable road users. For all modes, crashes were fairly evenly distributed across the day but occurred most often between 3:00pm and 6:00pm (20% crashes, 16% KA crashes). Night crashes between 9:00pm and midnight were slightly more severe than other times of day with 4% of crashes resulting in a KA outcome.

Like many of the tables above, these trends were even more pronounced for vulnerable road users. Again, crashes for vulnerable modes were fairly evenly distributed across the day but occurred most often between 3:00pm and 6:00pm (21% crashes, 17% KA crashes). The severity of nighttime crashes between 9pma and midnight increased significantly for vulnerable modes with 37% of crashes during this time period resulting in KAs.

Table 42: Crashes by Time of Day, All Modes, 2017-2021

Time of Day	# of Crashes	% of Crashes	# of KA	% KA	% of Crashes that Resulted in KA
12:00-2:59 AM	3,866	6.56%	140	10.23%	3.62%
3:00-5:59 AM	5,428	9.22%	129	9.42%	2.38%
6:00-8:59 AM	10,338	17.56%	210	15.34%	2.03%
9:00-11:59 AM	8,965	15.22%	192	14.02%	2.14%
12:00-2:59 PM	99,48	16.89%	191	13.95%	1.92%
3:00-5:59 PM	12,044	20.45%	225	16.44%	1.87%
6:00-8:59 PM	5,964	10.13%	187	13.66%	3.14%
9:00-11:59 PM	2,336	3.97%	95	6.94%	4.07%
Total	**58,889**	**100.00%**	**1369**	**100.00%**	**2.32%**

Table 43: Crashes by Time of Day, Vulnerable Road Users, 2017-2021

Time of Day	# of Crashes	% of Crashes	# of KA	% KA	% of Crashes that Resulted in KA
12:00-2:59 AM	103	6.27%	24	5.37%	23.30%
3:00-5:59 AM	124	7.54%	33	7.38%	26.61%
6:00-8:59 AM	230	13.99%	65	14.54%	28.26%
9:00-11:59 AM	229	13.93%	68	15.21%	29.69%
12:00-2:59 PM	248	15.09%	68	15.21%	27.42%
3:00-5:59 PM	353	21.47%	78	17.45%	22.10%
6:00-8:59 PM	264	16.06%	77	17.23%	29.17%
9:00-11:59 PM	93	5.66%	34	7.61%	36.56%
Total	**1644**	**100.00%**	**447**	**100.00%**	**27.19%**

35 Time of day was obtained from the crash reports. For AR, the time was extracted from the column `crash_date` from the table `crashes_fc`, and for MO, the time was from the column `time` in the table `rpc_crashes_2017_2021`.

Roadway Surface Condition[36]

Table 44 and Table 45 summarize crashes by reported roadway condition for all modes and for vulnerable road users. For all modes, crashes occurred most often in dry conditions (80% crashes, 82% KA crashes). Crashes with "other" roadway conditions were the most severe with just under 6% resulting in a KA outcome.

Crashes involving vulnerable road users were similar with the most crashes again occurring on dry roads (92% crashes, 91% KA crashes). Despite a higher number of vulnerable mode crashes on dry roads, the severity of crashes for vulnerable modes shifted significantly for wet and icy roads. 33% of crashes on icy roads and 32% of crashes on wet roads resulted in a KA outcome.

Table 44: Table 44: Crashes by Reported Roadway Condition, All Modes, 2017-2021

Reported Roadway Condition	# of Crashes	% of Crashes	# of KA	% KA	% of Crashes that Resulted in KA
Dry	47,180	80.11%	1128	82.40%	2.39%
Ice	914	1.55%	25	1.83%	2.74%
Other	286	0.49%	17	1.24%	5.94%
Snow	252	0.43%	3	0.22%	1.19%
Unknown	293	0.50%	-	0.00%	0.00%
Wet	9,969	16.93%	196	14.32%	1.97%
Grand Total	**58,894**	**100.00%**	**1369**	**100.00%**	**2.32%**

Table 45: Table 45: Crashes by Reported Roadway Condition, Vulnerable Road Users, 2017-2021

Reported Roadway Condition	# of Crashes	% of Crashes	# of KA	% KA	% of Crashes that Resulted in KA
Dry	1,511	91.97%	406	90.83%	26.87%
Ice	9	0.55%	3	0.67%	33.33%
Other	12	0.73%	4	0.89%	33.33%
Snow	2	0.12%	0	0.00%	0.00%
Unknown	4	0.24%	0	0.00%	0.00%
Wet	105	6.39%	34	7.61%	32.38%
Grand Total	**1,643**	**100.00%**	**447**	**100.00%**	**27.21%**

36 Road surface condition was derived from data within the crash reports. For AR, the column `roadway_surface_condition` from the table `crashes_fc` was used. For MO, the column `rd_surf_cond_type` from the table `rpc_crashes_2017_2021` was used. See <APPENDIX> for how values between these two datasets were consolidated.

Lighting Condition[37]

Table 46 and Table 47 summarize crashes by reported lighting condition for all modes and for vulnerable road users. For all modes, crashes occurred most often in daylight (74% crashes, 61% KA crashes). Dark crashes without lighting were the most severe with just under 5% of crashes resulting in a KA outcome.

Crashes for vulnerable modes were similar with the most crashes again occurring in daylight conditions (71% crashes, 62% KA crashes). For vulnerable modes the most severe crashes also occurred in dark conditions without lighting. The severity however increased significantly over that of all crashes with 42% of "dark-without lighting" crashes for vulnerable modes resulting in a KA.

Table 46: Crashes by Reported Lighting Condition, All Modes, 2017-2021

Reported Lighting Condition	# of Crashes	% of Crashes	# of KA	% KA	% of Crashes that Resulted in KA
Dark - unknown lighting	1,027	1.74%	34	2.48%	3.31%
Dark - with lighting	5.309	9.01%	150	10.96%	2.83%
Dark - without lighting	6.435	10.93%	295	21.55%	4.58%
Daylight	43,439	73.76%	836	61.07%	1.92%
Dusk/dawn	2354	4.00%	51	3.73%	2.17%
Other	57	0.10%	1	0.07%	1.75%
Unknown	273	0.46%	2	0.15%	0.73%
Grand total	**58,894**	**100.00%**	**1,369**	**100.00%**	**2.32%**

Table 47: Crashes by Reported Lighting Condition, Vulnerable Road Users, 2017-2021

Reported Lighting Condition	# of Crashes	% of Crashes	# of KA	% KA	% of Crashes that Resulted in KA
Dark - unknown lighting	45	2.74%	15	3.36%	33.33%
Dark - with lighting	167	10.16%	56	12.53%	33.53%
Dark - without lighting	202	12.29%	84	18.79%	41.58%
Daylight	1,165	70.86%	278	62.19%	23.86%
Dusk/dawn	62	3.77%	12	2.68%	19.35%
Other	2	0.12%	1	0.22%	50.00%
Unknown	1	0.06%	1	0.22%	100.00%
Grand total	**1,644**	**100.00%**	**447**	**100.00%**	**27.19%**

37 Lighitng condition was derived from data within the crash reports. For AR, the column \`lighting_condition\` from the table \`crashes_fc\` was used. For MO, the column \`light_cond_name\` from the table \`rpc_crashes_2017_2021\` was used. See <APPENDIX> for how values between these two datasets were consolidated.

Proximity to Transit

Table 48 and Table 49 summarize crashes by proximity to transit stops for all modes and for vulnerable road users. For all modes, crashes occurred most often beyond 500 ft of a transit stop (90% crashes, 93% KA crashes). It should be noted that a robust transit system does not currently exist throughout the entirety of the region.

For Vulnerable Road Users, slightly more crashes occurred within 500 ft of a transit stop but crashes still occurred most often beyond 500 ft (87% crashes, 89% KA crashes). These figures may point to the fact that transit users are often reliant on a vulnerable mode (walking or biking) to travel to or from a transit stop. Pedestrians and bicyclists may have higher crash exposure near transit stops as well as they are more likely to include public transit in their trip compared to motorists. The location of transit stops however are often tightly correlated with other factors such as density, land use, roadway functional class which make it difficult to draw transit-specific conclusions based on this data.

Table 48: Crashes by Proximity to Transit Stops, All Modes, 2017-2021

Proximity to Transit Stop	# of Crashes	% of Crashes	# of KA	% KA	% of Crashes that Resulted in KA
Within 500 feet	5,743	9.75%	91	6.65%	1.58%
Greater than 500 feet	53,153	90.25%	1,278	93.35%	2.40%
Total	**58,896**	**100.00%**	**1,369**	**100.00%**	**2.32%**

Table 49: Crashes by Proximity to Transit Stops, Vulnerable Road Users, 2017-2021

Proximity to Transit Stop	# of Crashes	% of Crashes	# of KA	% KA	% of Crashes that Resulted in KA
Within 500 feet	223	13.56%	48	10.74%	21.52%
Greater than 500 feet	1,421	86.44%	399	89.26%	28.08%
Total	**1,644**	**100.00%**	**447**	**100.00%**	**27.19%**

Proximity to Schools

Table 50 and Table 51 summarize crashes by proximity to schools for all modes and for vulnerable road users. For all modes, KA crashes occurred most often beyond 500 ft of a school (95% crashes, 97% KA crashes).

Proximity to Parks

Table 52 and Table 53 summarize crashes by proximity to parks for all modes and for vulnerable road users. For all modes, crashes occurred most often beyond 500 ft of a park (94% crashes, 95% KA crashes). Vulnerable modes saw a similar trend with 92% of total crashes and 93% of KA crashes occurring beyond 500ft of a par**k.**

Table 50: Crashes by Proximity to Schools, All Modes, 2017-2021

Proximity to a School	# of Crashes	% of Crashes	# of KA	% KA	% of Crashes that Resulted in KA
Within 500 feet	2752	4.67%	40	2.92%	1.45%
Greater than 500 feet	56,144	95.33%	1,329	97.08%	2.37%
Total	**58,896**	**100.00%**	**1,369**	**100.00%**	**2.32%**

Table 51: Crashes by Proximity to Schools, Vulnerable Road Users, 2017-2021

Proximity to a School	# of Crashes	% of Crashes	# of KA	% KA	% of Crashes that Resulted in KA
Within 500 feet	83	5.05%	14	3.13%	16.87%
Greater than 500 feet	1,561	94.95%	433	96.87%	27.74%
Total	**1,644**	**100.00%**	**447**	**100.00%**	**27.19%**

Table 52: Crashes by Proximity to Parks, All Modes, 2017-2021

Proximity to a Park	# of Crashes	% of Crashes	# of KA	% KA	% of Crashes that Resulted in KA
Within 500 feet	3,823	6.49%	71	5.19%	1.86%
Greater than 500 feet	55,073	93.51%	1,298	94.81%	2.36%
Total	**58,896**	**100.00%**	**1,369**	**100.00%**	**2.32%**

Table 53: Crashes by Proximity to Parks, Vulnerable Road Users, 2017-2021

Proximity to a Park	# of Crashes	% of Crashes	# of KA	% KA	% of Crashes that Resulted in KA
Within 500 feet	124	7.54%	32	7.16%	25.81%
Greater than 500 feet	1520	92.46%	415	92.84%	27.30%
Total	**1644**	**100.00%**	**447**	**100.00%**	**27.19%**

Appendix A - Crash Code Value Consolidations

First harmful event

Value	Decoded Value	Consolidated Value
4	Jackknife	jackknife
5	Cargo/equipment loss or shift	cargo shift or loss
6	Equipment failure (blown tire, brake failure, etc.)	equipment failure
7	Separation of units	separation of units
8	Ran off roadway right	ran off road - right
9	Ran off roadway left	ran off road - left
10	Deliberately crossed median	crossed median
11	Unintentionally crossed median	crossed median
12	Crossed centerline	crossed centerline
13	Downhill runaway	downhill runaway
14	Fell/jumped from motor vehicle	fell or jumped from vehicle
15	Reentering roadway	reentering road
16	Object thrown or fallen on or near motor vehicle	cargo shift or loss
17	Other non-collision	other non-collision
18	Collision with pedestrian	collision with pedestrian
19	Collision with pedalcycle	collision with bicycle
20	Collision with other non-motorist	collision with non-fixed object
21	Collision with railway vehicle (train, engine)	collision with railway vehicle
22	Collision with animal (live)	collision with animal
23	Collision with motor vehicle in transport	collision with vehicle in transport
24	Collision with parked motor vehicle	collision with parked vehicle
25	Collision with falling/shifting cargo or anything set in motion by motor vehicle	cargo shift or loss
26	Collision with work zone/maintenance equipment	collision with non-fixed object
27	Collision with other non-fixed object	collision with non-fixed object
28	Collision with impact attenuator/crash cushion	collision with fixed object
29	Collision with bridge overhead structure	collision with fixed object
30	Collision with bridge pier or support	collision with fixed object
31	Collision with bridge rail	collision with fixed object
32	Collision with cable barrier	collision with fixed object
33	Collision with culvert	collision with fixed object
34	Collision with curb	collision with fixed object
35	Collision with ditch	collision with fixed object
36	Collision with embankment	collision with fixed object
37	Collision with guardrail face	collision with fixed object
38	Collision with guardrail end	collision with fixed object
39	Collision with concrete traffic barrier	collision with fixed object
40	Collision with other traffic barrier	collision with fixed object
41	Collision with tree (standing)	collision with fixed object
42	Collision with utility pole/light support	collision with fixed object
43	Collision with traffic sign support	collision with fixed object
44	Collision with traffic signal support	collision with fixed object
45	Collision with other post, pole, or support	collision with fixed object

Value	Decoded Value	Consolidated Value
46	Collision with fence	collision with fixed object
47	Collision with mailbox	collision with fixed object
48	Collision with other fixed object	collision with fixed object
49	Unknown	unknown
50	Collision with building	collision with fixed object

Value	Decoded Value	Consolidated Value
16	CROSS MEDIAN	crossed median
17	CROSS CENTER OF ROAD	crossed centerline
18	CROSS ROAD	crossed centerline
19	AIRBORNE	airborne
20	RAN OFF ROAD - RIGHT	ran off road - right
21	RAN OFF ROAD - LEFT	ran off road - left
22	OVERTURN / ROLLOVER	over turn or rollover
23	FIRE / EXPLOSION	fire or explosion
24	IMMERSION	immersion
25	JACKKNIFE	jackknife
26	CARGO LOSS / SHIFT	equipment failure
27	EQUIPMENT FAILURE	equipment failure
28	SEPARATION OF UNITS	separation of units
29	RETURNED TO ROAD	reentering road
30	COLLISION INV PEDESTRIAN	collision with pedestrian
31	COLLISION INV. BICYCLE / PEDALCYCLE	collision with bicycle
32	COLLISION INV. RAILWAY VEH.	collision with railway vehicle
33	COLLISION INV ANIMAL	collision with animal
34	COLLISION INV MV IN TRANSPORT	collision with vehicle in transport
35	COLLISION INV PARKED MV	collision with parked vehicle
36	COLLISION INV FIXED OBJECT	collision with fixed object
37	COLLISION INV OTHER OBJECT	collision with non-fixed object
38	OTHER NON COLLISION	other non-collision
39	COLLISION INV. BICYCLE / PEDALCYCEL IN BICYCLE LANE	collision with bicycle
40	COLLISION INV ANIMAL DRAWN VEH / ANIMAL RIDDEN FOR TRANSPORTATION	collision with animal
41	COLLISION INV. WORKING MV	collision with non-fixed object
42	DOWNHILL RUNAWAY	downhill runaway
43	FELL / JUMPED FROM MV	fell or jumped from vehicle
44	THROWN / FALLNG OBJECT	collision with non-fixed object
45	STRUCK BY FALLING, SHIFTING CARGO, OBJECT SET IN MOTION BY OWN MV	cargo shift or loss
46	RAN OFF ROADWAY - OTHER	ran off road - other
47	CROSS SEPARATOR	crossed median
U	UNKNOWN	unknown

Maneuvers

Value	Decoded Value	Consolidated Value
1	Movement essentially straight ahead	straight

Value	Decoded Value	Consolidated Value
2	Negotiating a curve	straight
3	Backing	backing
4	Changing lanes	chaing lanes
5	Overtaking/passing	overtaking
6	Turning right	turn - right
7	Turning left	turn - left
8	Making U-turn	turn - U
9	Leaving traffic lane	chaing lanes
10	Entering traffic lane	slowing
11	Slowing	parked
12	Parked	parked
13	Stopped in traffic	stopped in traffic
14	Other	other
15	Unknown	unknown

Value	Decoded Value	Consolidated Value
1	None	none
2	Crossing roadway	crossing road
3	Waiting to cross roadway	adjacent to roadway
4	Walking/cycling along roadway with traffic (in or adjacent to travel lane)	along roadway - with traffic
5	Walking/cycling along roadway against traffic (in or adjacent to travel lane)	along roadway - against traffic
6	Walking/cycling on sidewalk	on sidewalk
7	In roadway - other	in roadway
8	Adjacent to roadway (e.g., shoulder, median)	adjacent to roadway
9	Working in trafficway (incident response)	in roadway
10	Other	other
11	Unknown	unknown

Value	Decoded Value	Consolidated Value
01	GOING STRAIGHT	straight
02	OVERTAKING	overtaking
03	MAKING RIGHT TURN	turn - right
04	RIGHT TURN ON RED	turn - right
05	MAKING LEFT TURN	turn - left
06	MAKING U-TURN	turn - U
07	SKIDDING / SLIDING	other
08	SLOWING OR STOPPING	slowing
09	START IN TRAFFIC	other
10	START FROM PARKED	parked
11	BACKING	backing
12	STOPPED IN TRAFFIC	stopped in traffic
13	PARKED	parked
14	CHANGING LANES	chaing lanes
15	AVOIDING	other

Surface Condition

Value	Decoded Value	Consolidated Value
1	Dry	dry
2	Wet	wet
3	Snow	snow
4	Slush	snow
5	Ice/Frost	ice
6	Water	wet
7	Sand	other
8	Mud, Dirt, or Gravel	other
9	Oil	other
10	Other	other

The column `rd_surf_cond_type` was not listed in the received data dictionary. Therefore, the table below does only contain the full list of possible values, and instead only that were present in the received crash data. Additionally, the decode values were determined based on professional judgement.

Value	Decoded Value (assumed)	Consolidated Value
DRY	Dry	dry
WET	Wet	wet
SNOW	Snow	snow
ICE	Ice	ice
SWTR	unsure of value	unknown

Lighting Condition

Value	Decoded Value	Consolidated Value
1	Daylight	daylight
2	Dawn	dusk/dawn
3	Dusk	dusk/dawn
4	Dark - Lighted	dark - with lighting
5	Dark - Not Lighted	dark - without lighting
6	Dark - Unk. Lighting	dark - unknown lighting
7	Other	other
8	Unknown	unknown

The column ` light_cond_name` was not listed in the received data dictionary. Therefore, the table below does only contain the full list of possible values, and instead only that were present in the received crash data. Additionally, the decode values were determined based on professional judgement.

Value	Decoded Value (assumed)	Consolidated Value
DRY	Dry	dry
WET	Wet	wet
SNOW	Snow	snow
ICE	Ice	ice
SWTR	unsure of value	unknown

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Appendix C: Equity Analysis Framework

Methodology and Findings
May 2, 2023

Introduction

As a part of the Northwest Arkansas Regional Planning Commission's (NWARPC) process of developing a Vision Zero Plan, the project team developed a methodology for identifying communities that have disproportionate safety impacts. The focus was placed on communities that have experienced historic marginalization, disenfranchisement, and disinvestment to examine how past harms may continue to disadvantage them, specifically in terms of traffic violence.

The goal of the analysis is to present NWARPC with a process for distinguishing populations that are underserved and under-resourced and an approach to assessing how they are impacted by outcomes of the transportation system like safety risk. The results of the analysis reveal demographic patterns in safety outcomes and provide valuable information for adopting an equity lens to prioritizing safety investments. Taken with crash analysis, development of the High Injury Network (HIN), and community engagement findings, the results can provide an understanding of the implications of safety risk disparities on various communities.

This document begins with background information to describe our approach to equity analysis. Next, it details the methods of identifying populations and analyzing safety impact in relation to them. It then presents the results, spatially and graphically, and concludes with recommendations for applying the findings of this analysis.

Definitions

Community and population are often used interchangeably to describe groups of people sharing similar characteristics or experiences. In this document, we use community to mean a collection of persons that share experiences or cultures. Population is used to describe a group defined by shared demographic attributes, typically identified through Census data.

Racial minority and "non-white" are not terms used in this analysis. When referring to people that have been racialized, we will reference their specific identity (African-American, Asian-American, Pacific Islands, Hispanic, and Native American) or use the term Black, Indigenous, or Person of Color (BIPOC). Distinguishing Black and Indigenous people calls attention to the grave injustices that these communities have faced in this country.

Low-income refers to people or households that have financial constraints that impact their daily lives. There is no one threshold for what is considered low income. It can be described using poverty guidelines, median household income, housing burden, or transportation burden.

Equity is a pluralistic concept that centers on the concept of fairness and justice. We recognize the need for any equity construction to redress historical marginalization, disenfranchisement, and disinvestment. An equity analysis should examine disproportionate impacts and disparate outcomes for those who have been harmed.

Area of Persistent Poverty is defined by the USDOT as any County or Census Tract that has consistently had greater than or equal to 20 percent of the population living in poverty over a defined period.

Historically Disadvantaged Communities refers to populations sharing a particular characteristic, as well as geographic communities, that have been systematically denied a full opportunity to participate in aspects of economic, social, and civic life.

Equity Analyses

An equity analysis is one component of unraveling inequities and advancing transportation equity. It provides information that must be used in concert with knowledge learned through engagement to determine actions that improve the lived experiences of people that have been systemically burdened or have had benefits withheld. This quantitative analysis does not answer the question, "is this plan/project equitable?"

and instead should be used to inform investment and prioritization decisions to advance equitable outcomes.

A first step in equity analysis is often demographic mapping. Populations are distinguished based on demographic factors that reflect communities who have been systemically oppressed and marginalized. Then they are categorized using available data (typically Census/American Community Survey data) and geographically located. The resulting maps help understand demographic patterns across a region or city.

The demographic patterns can then be spatially compared to various transportation system outcomes, such as safety risk. This can be used to compare outcomes experienced by various populations, revealing disparities and establishing a baseline to improve upon. This improvement comes as the analysis is used in a framework that systematically makes decisions and investments to eliminate socio-demographic disparities and redresses past harms.

Defining Populations

How are populations defined?

NWARPC conducted an environmental justice analysis during their long-range planning process for the 2045 Metropolitan Transportation Plan. Through geospatial analysis, NWARPC identified underrepresented populations required by regulations1 – racial and ethnic communities and low-income households. They also name additional demographic factors of age, sex, ability, car ownership/access, and population and employment density that are relevant and could be evaluated as needed.

To create a broad characterization of communities that have sociodemographic vulnerabilities and to define the populations that we consider in this analysis, we used criteria for *Areas of Persistent Poverty, Historically Disadvantaged Communities* as identified by the USDOT RAISE Mapping Tool, and the *Social Vulnerability Index* (SVI) as defined by the Centers for Disease Control and Prevention (CDC) and Agency for Toxic Substances and Disease Registry (ATSDR).

Areas of Persistent Poverty

An Area of Persistent Poverty is defined by the USDOT as any County that has consistently had greater than or equal to 20 percent of the population living in poverty during the last 30-year period, as measured by the 1990 and 2000 decennial census and the most recent (2021) annual Small Area Income and Poverty Estimates as estimated by the Bureau of the Census or a Census Tract that has a poverty rate of at least 20 percent as measured by the 2014-2018 5-year data series available from the American Community Survey of the Bureau of the Census.

Historically Disadvantaged Communities

The USDOT considers certain qualifying census tracts to be historically disadvantaged based on 22 indicators collected at the census tract level and grouped into six (6) categories of transportation disadvantage:

- Transportation access disadvantage identifies communities and places that spend more, and take longer, to get where they need to go. (4 indicators)
- Health disadvantage identifies communities based on variables associated with adverse health outcomes, disability, as well as environmental exposures. (3 indicators)
- Environmental disadvantage identifies communities with disproportionately high levels of certain air pollutants and high potential presence of lead-based paint in housing units. (6 indicators)
- Economic disadvantage identifies areas and populations with high poverty, low wealth, lack of local jobs, low homeownership, low educational attainment, and high inequality. (7 indicators)
- Resilience disadvantage identifies communities vulnerable to hazards caused by climate change. (1 indicator)
- Equity disadvantage identifies communities with a with a high percentile of persons (age 5+) who speak English "less than well." (1 indicator)

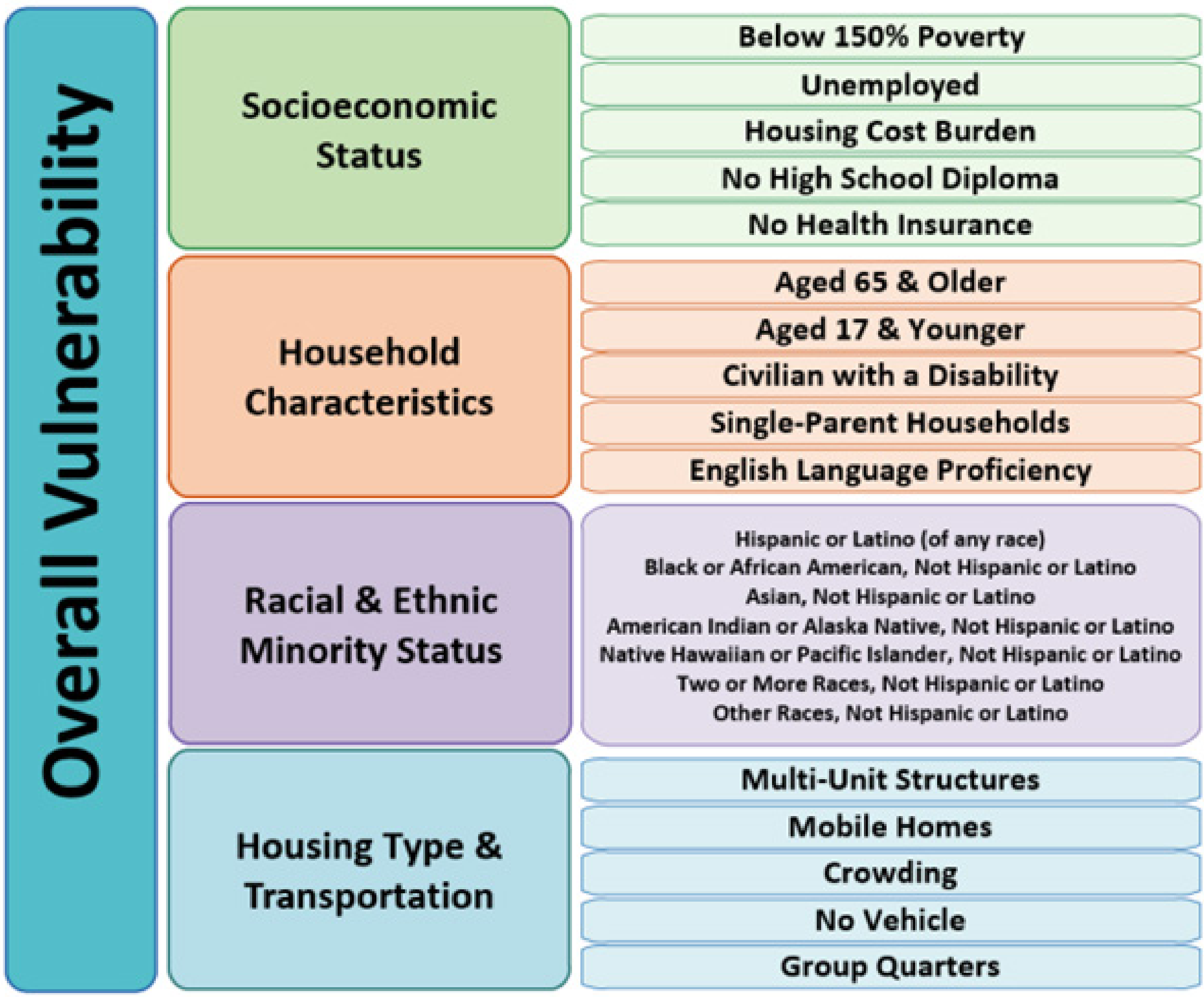
The comprehensive list of underlying indicators is presented on USDOT's Justice40 Initiative.

1 Executive Order 12898 Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations was signed in 1994 and required all recipients of federal funds to "identify and address the disproportionately high and adverse human health or environmental effects of their actions on minority and low-income populations." This executive order and Title VI of the Civil Rights Act for the basis for the industry's approach to transportation equity.

Social Vulnerability Index (SVI)

The CDC and ATSDR define social vulnerability as the ability of a community to survive and thrive when confronted by external stressors on human health. We can consider transportation disadvantage (lack of or restricted mobility) among these stressors. They rank each Census Tract along 16 factors categorized into four themes (Figure 1).

Figure 1: Social Vulnerability Index developed by the Centers for Disease Control and Prevention (CDC) and Agency for Toxic Substances and Disease Registry (ATSDR).



How is this definition of populations used?

The CDC/ATSDR SVI categorizes vulnerability along four themes, each of which also impacts mobility and can affect transportation disadvantage.

Socioeconomic status: Factors categorized in this theme relate to the economic vulnerability of individuals and households. These factors link to transportation disadvantage; they identify populations whose current economic situation may limit their mobility or for whom disruptions in mobility could negatively impact their financial situation.

Race and ethnicity: The racial and ethnic groups in this theme reflect populations that have experienced historic discrimination. As we know, historic discrimination excluded and denied services, investments and funding, power in decision making, and other areas critical to having agency over one's lived experience to racialized populations. The effect of this discrimination continues to impact Black, Indigenous, and other People of Color (BIPOC). Disinvestment in and disenfranchisement of BIPOC communities has led to inadequate mobility including longer travel times, missing and deteriorating infrastructure, and greater safety risk.

Household characteristics: As NWARPC stated in their environmental justice analysis, age, ability, and English proficiency can restrict mobility options. The other factor in this theme is single-parent households. Households with children (and dependents) with a single parent can face mobility challenges based on limited travel choices for household members (e.g., children need supervision on transit or a driver) and constrained income.

Housing and transportation: The factors categorized in this theme have important impacts to vulnerability, but have less of a direct impact to mobility, aside from zero-car households. Therefore, this theme is not included in the equity analysis and zero-car household is included as a factor in the household characteristics theme.

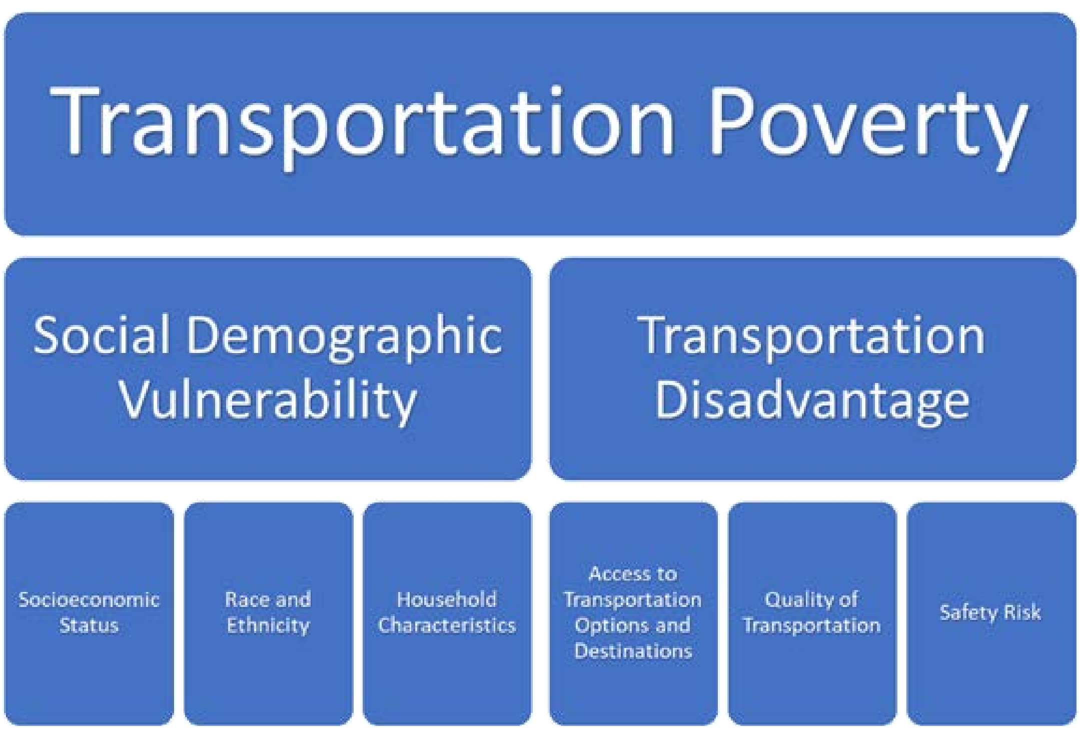
Given the populations defined above, we created an index score for each Census block group in the MPO. We used this index score to rank all block groups in the MPO and delineated the block groups in the top quantile as "high social vulnerability areas."

Understanding Disparities

What impacts are evaluated?

As a part of the Safety Action Plan, this analysis will focus on safety risk. However, there are other transportation impacts that have real and substantial effects on equity and a person's lived experiences. Impacts such as elevated safety risk, limited access to transportation options and desired destinations, and low quality of transportation can signify transportation disadvantage. When transportation disadvantage is paired with sociodemographic vulnerability, it creates a state of transportation poverty, where a person lacks resources to meet their mobility needs. Transportation poverty may limit to access to work, health care, education, or social networks, and leads to social exclusion and diminished quality of life.

Figure 2: Transportation poverty is the confluence of sociodemographic vulnerability and transportation disadvantage. This transportation poverty framework shows how these two components can be characterized and the factors this analysis uses to quantify them.



Safety Risk: This equity analysis focuses on safety outcomes given its application for the Safety Action Plan. Safety impacts and risks were evaluated through the safety analysis for the NWA Vision Zero Plan. We use the results of the safety analysis with the results of all three equity analysis methods—Areas of Persistent Poverty (Figure 3), Historically Disadvantaged Communities (Figure 4), and Social Vulnerability Index (Figure 5)—to identify segments of the HIN that are in areas with high equity scores.

Figure 3: High Injury Network in areas of persistent poverty

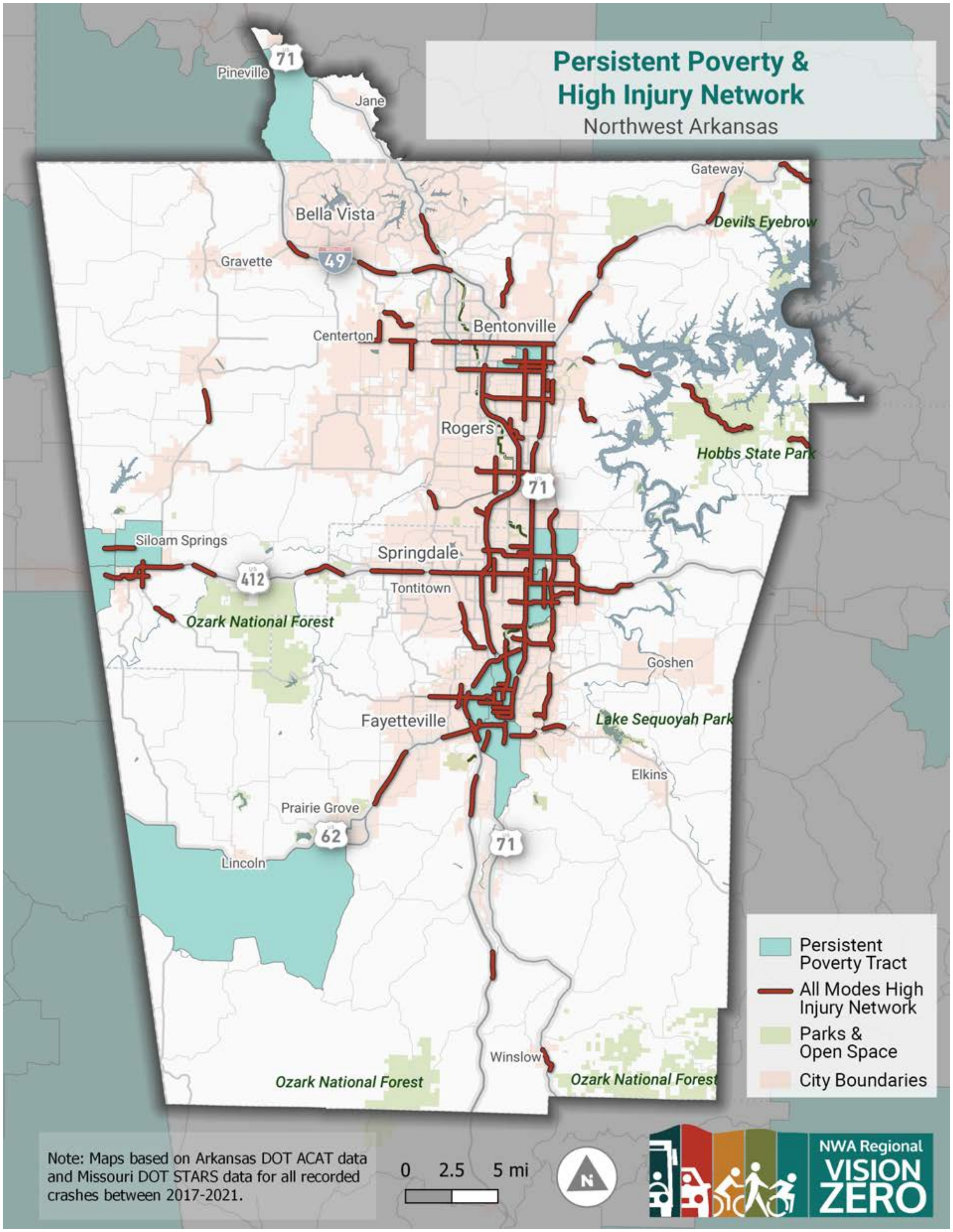


Figure 4: High Injury Network in historically disadvantaged communities.

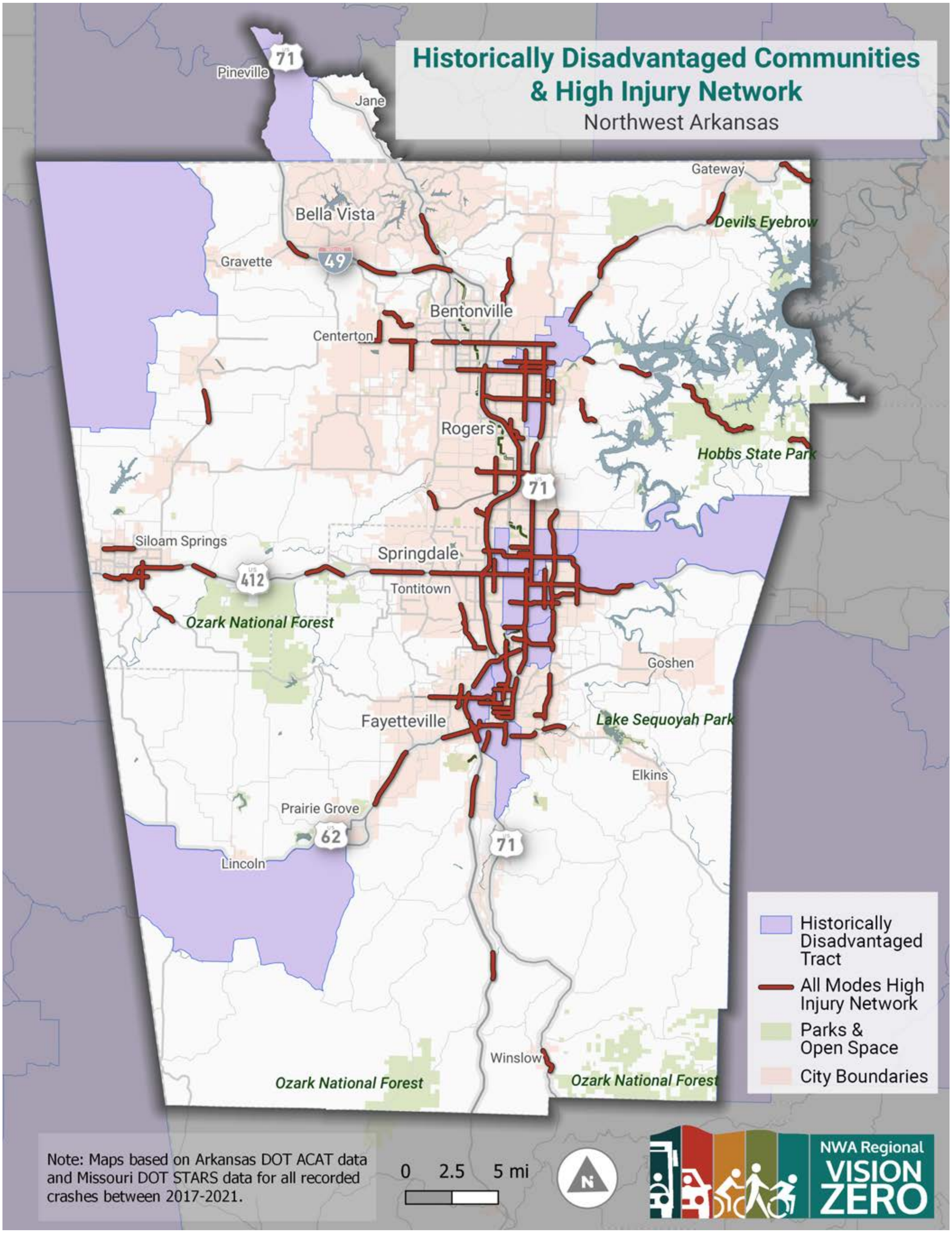
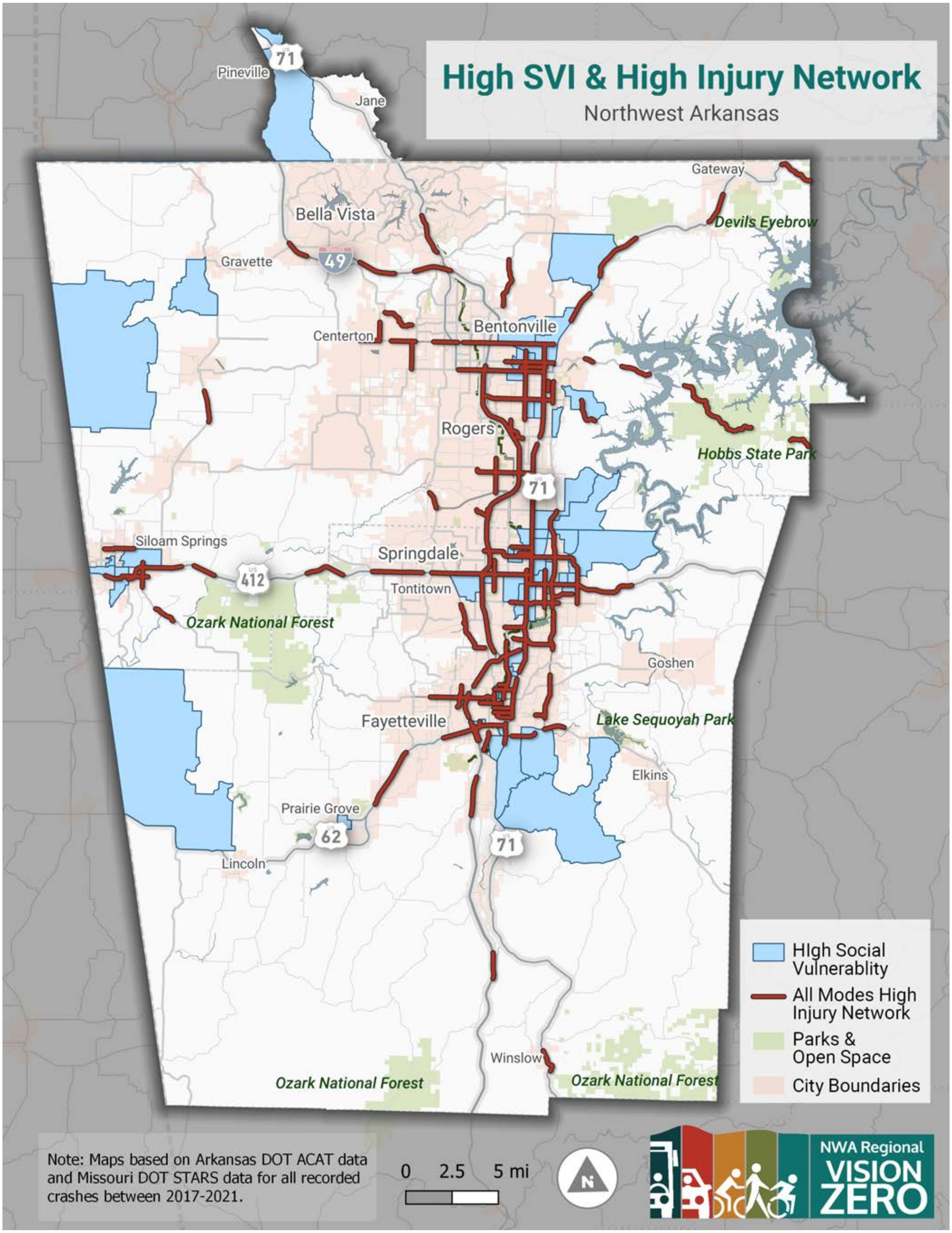


Figure 5: High Injury Network in areas with high SVI.



The scope of this analysis does not include a robust evaluation of accessibility disparities, however, as this project progresses, exploring the impacts and contributing factors of transportation disadvantage will enrich the results and recommendations of the work. Although the focus of this project is safety, accessibility is inherently related; accessibility assumes safety and safe transportation is in service of accessibility to destinations.

Regardless of demographic factors that can limit one's mobility, such as age, ability, and income, expanding quality mobility options can remove some of the restrictions and enable more freedom of movement.

Qualitative Data: The quantitative equity analysis provides only part of the puzzle. To understand transportation disparities, we need to understand the lived experience. The best data for this assessment is from community engagement. This data helps define transportation disadvantage, identify areas of safety risk, highlight barriers to access and mobility, and establish the existing conditions and context.

Advancing Equity

As stated before, an equity analysis is one part of advancing transportation equity. How the information from the analysis is used is key to moving an equity analysis from a mapping exercise to an effective tool. The information from this analysis can be used in equitable distribution of safety investments, storytelling at the regional and local levels, and monitoring how outcomes change over time.

Equitable Distribution of Safety Investments

The equity analyses are a component of the Safety Action Plan with the express purpose of influencing the decision making related to the results of this project. Recognizing that traffic violence (and other negative outcomes of the transportation system) has disproportionate impacts on BIPOC, low-income households, and other communities that have been marginalized, focusing interventions and improvements to serve these communities advances equity. Using these analyses, investments on HIN in areas with high equity scores may be prioritized or engagement efforts might focus on communities that have more high-risk roadways and higher equity scores. The results of each of the analysis along with the places and communities where they overlap (Figure 6) will be used to understand where projects may be prioritized and implemented to achieve safe and equitable outcomes.

Storytelling

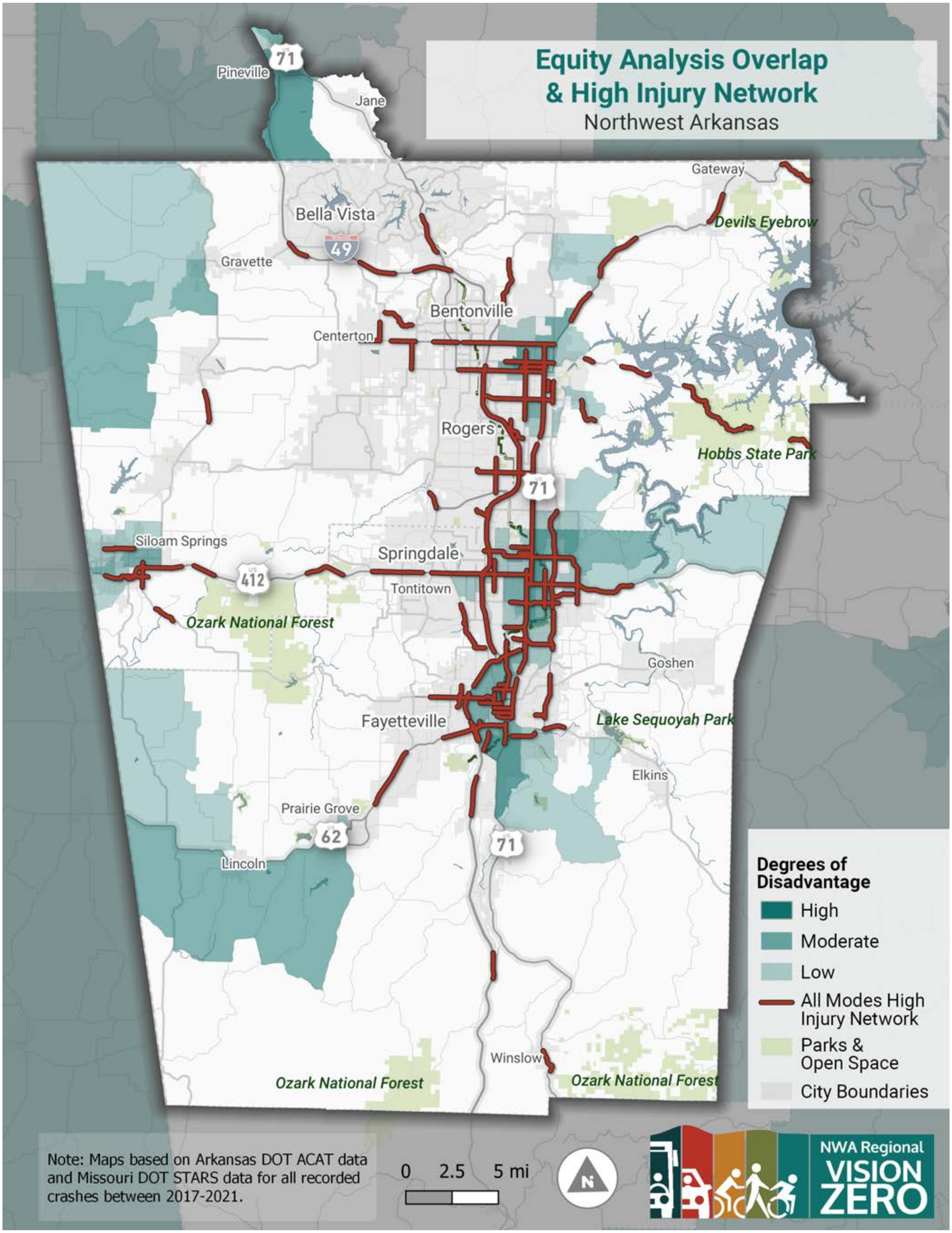
NWARPC allocates funding but is not an implementing agency. Additionally, many safety interventions must happen at the local level, although NWARPC has a regional focus. Still, NWARPC can influence equity outcomes through storytelling using the high-level issues and patterns identified in the regional analyses.

The regional mapping can be used by smaller towns and rural communities with fewer resources to conduct their own analyses. In this way, NWARPC can help these jurisdictions tell the story of their transportation needs and who is vulnerable to mobility limitations.

The story crafted by this analysis can and should be modified based on the results of regional engagement. An equity analysis groups people into broad demographic-based populations, but there are nuances in how people within a population experience the same impact. Furthermore, populations based on demographic data are different than communities that are considered a group based on shared experiences and interests. Demographic data also has geographic bounds (defined by the US Census) that may not align with neighborhood boundaries. As a result, equity analyses present rough estimations of communities and impacts they may experience. These broad analyses also will not capture the lived experience of individuals or how overlapping and intersecting identities that compound mobility impacts.

To facilitate storytelling and examine more individualized outcomes, we can employ the concept of personas. Using the results of the equity and safety risk analyses and engagement, we can distill mobility challenges and contributing factors along with how an individual's identities interact with these challenges. We can use this to craft personalized examples of how individuals throughout the region experience the transportation system. These personas can help make disparate impacts more tangible and also communicate with local jurisdictions.

Figure 6: High Injury Network and Equity Analysis Overlap



Continued Assessment

As NWARPC evaluates their progress on safety (and other) targets, they can examine progress in addressing disparities. By assessing the distribution of impacts across high SVI areas and demographic groups over time, NWARCP can monitor the impact investment decision are having. In this way, investments can be prioritized to address performance while targeting disproportionate impacts and underinvestment among marginalized communities.

Recommendations

Equity has largely been considered in the environmental justice and Title VI context, which often creates analyses to address a requirement and mark a checkbox. For example, the long-range plan was developed and the selected projects were overlaid on demographic maps to visualize impacts on racialized and low-income populations. The analysis, however, did not influence which projects were selected or where and how they would be implemented. The equity analysis for the Safety Action Plan considers equity in the initial phases to identify and prioritize locations for interventions and determine types of interventions informed by the analysis and guided by the community.

Starting with the Safety Action Plan, NWARCP can continue to integrate equity analysis into decision making by using the equity analysis to assess potential outcomes like accessibility and use the results to influence which projects are selected and prioritized. This lays the foundation for a more systemic equity framework that uses equity to make decisions throughout the agency.

Additionally, iterating on an equity analysis can fine tune the process over time by adjusting demographic factors and indicators as needed and focusing on various relevant impacts. Repeating the analysis at regular intervals can also help evaluate outcomes over time to monitor improvement and direct ongoing efforts towards equity.

Finally, it is important to remember that inequities are a result of past discrimination, disinvestment, and disenfranchisement. Understanding the history of Northwest Arkansas relative to racialized communities and other key communities can highlight what harms should be redressed. These may not be limited to transportation although they will affect one's mobility. Advancing equity is a continual process; the equity analysis is one step in a multidisciplinary, multi-sectoral endeavor.

Appendix D: Project Prioritization

The Northwest Arkansas region is committed to Vision Zero to eliminate roadway fatalities and serious injuries by 2038. The NWA Vision Zero Plan establishes the goals and actions that need to be taken by the state, regional, and local agencies along with supporting partners to achieve Vision Zero. This report serves to provide direction on project prioritization and safety countermeasure selection for traffic safety projects across Northwest Arkansas. The actions, Prioritization Frameworks, and the proven safety countermeasures in the NWA Vision Zero Plan should be used congruently to guide the implementation of the strategies that specifically relate to roadway safety infrastructure improvements.

The information in this report is a guide for the Region and member agencies to prioritize and implement traffic safety projects using the Safe Systems Approach. The Northwest Arkansas Regional Planning Commission (NWARPC) will be able to use the Project Prioritization Frameworks to further prioritize and implement projects as funding is allocated for safety projects.

This report has two sections. In the first section, the Project Prioritization Framework outlines the criteria for prioritization and select location-specific and systemic safety projects. The second section lists the projects along the high-injury network and the outputs from the Safer Streets Priority Finder model along with their scoring based on these criteria.

Project Prioritization Framework

The Project Prioritization Framework will support the Northwest Arkansas region in the decision-making process to target its Vision Zero strategies and ultimately eliminate roadway fatalities and serious injuries. The Frameworks will allow the region to:

1. identify the locations to focus its limited resources and the projects to prioritize at those priority locations, and
2. prioritize systemic improvements that member agencies can do across their roadway networks to increase safety without needing to do further analysis.

This section outlines the prioritization process for location-specific projects and systematic proactive projects.

Location-Specific Project Prioritization and Monitoring Frameworks

Location-specific project prioritization ranks roadway segments by safety need through a data-driven process. In this framework, five metrics that incorporate roadway crash history, crash severity, community input, and equity are used to prioritize roadway segments. The metrics are weighted to help ensure that projects deployed at the prioritized locations will have the best likelihood to help the region and member agencies achieve Vision Zero. Total scores were developed for each location-specific projects on the HIN. Note that since all of the corridors are on the HIN, the corridors are ranked equally under that metric. Projects were categorized into three projects tiers—Tier 1 being the highest priority and Tier 3 being the lowest—with approximately equal number of projects in each tier. Adjustments were made to ensure projects with the same total scores were always in the same tier.

The table below summarizes the five metrics and outlines the weighting for each.

Table 1: Metrics for the Location-Specific Project Prioritization Framework

Metric	Description	Weight	Score Type
Number of Killed or Seriously Injured (KSI) Crashes	The total number of KSI crashes per mile on the roadway segment in the most recent five years of crash data. This is the top-weighted metric to prioritize the goal of Vision Zero—eliminate fatalities and serious injuries on roadways across Northwest Arkansas. Crash data is sourced from both the Arkansas and Missouri Departments of Transportation.	30%	Rank by Tiers 3 – Highest 2 – Middle 1 - Lowest
On the Overall High Injury Network (HIN)	Roadway segments that are on the Overall HIN should be prioritized in the region's overall roadway project prioritization process. While project prioritization would score all projects, using the overall HIN metric ensures safety is paramount in ranking all roadway projects. This metric weights where crashes are occurring at the greatest injury severity and density through a sliding windows analysis.	20%	Part of HIN 3 – Yes 0 - No
Equity and Degrees of Disadvantage	The highest Degree of Disadvantage area that the roadway segment travels through. Equity analysis identifies the areas of the region where a higher proportion of historically disadvantaged people lives along with areas of persistent poverty that can result in social vulnerability.	25%	Rank by Tiers 3 – Highest degree of disadvantage, persistent poverty, and social vulnerability 2 – Some degree of disadvantage, persistent poverty, or social vulnerability 1 - Minimal degree of disadvantage, persistent poverty, or social vulnerability
Total Crashes	The total number of crashes per mile of all severity types that occurred on the roadway segment in the most recent five years of crash data. Crash data is sourced from both the Arkansas and Missouri Departments of Transportation.	10%	Rank by Tiers 3 – Highest tier of total crashes 2 – Middle tier of total crashes 1 – Lowest tier of total crashes
Number of Unsafe Location Comments from Public	The total number of comments received from the public about the roadway segment being unsafe. Road users' perception of safety can help proactively identify unsafe locations that may not have a significant crash history. Data is sourced from the mapping activity conducted as part of the NWA Vision Zero Plan process.	15%	Rank by Tiers 3 – Highest density of comments 2 – Medium density of comments 1 – Lowest density of comments 0 – no comments
		100%	

Once the region and its member agencies have prioritized locations for projects, an additional framework will be used to identify and rank the countermeasures to implement at the priority locations. The Location-Specific Prioritized Project Monitoring Framework will allow the region to move location-specific projects through the process to select countermeasures and tracking of outcomes through these seven steps outlined in the table below. Some projects along the HIN have already been identified by member agencies for safety projects and the countermeasures may have already been identified based on understanding of crashes. This framework should be used to track and evaluate projects consistently and objectively for accountability and flexibility.

Table 2: Steps in the Location-Specific Prioritized Project Monitoring Framework

Step		Description
1	Understanding Crash Causation	Identify individual countermeasures for each of the priority corridors by evaluating the crash causation in the most recent five years of crash data. Evaluate the crash types, contributing factors, and roadway context that may have contributed to crashes, with particular attention to KSI crashes. When evaluating corridors that are on the Overall HIN, identify which of the modal HIN the corridor is on to identify which mode has been most at risk for KSI crashes. As needed, look further into crash causes, by reviewing the full crash reports that occurred on the prioritized corridor. Longer road corridors from the Location-Specific Prioritization Framework can be further segmented. This segmentation can be done for several reasons a.) to match a change in context or configuration of the road (e.g. the road goes from six lanes to four), b.) to select a more management segment length because of limited resources, c.) to match the limits of another corresponding project (e.g. pavement restoration), or d.) to match changes in the prevailing crash risk factors along the corridor.
2	Initial Safety Countermeasures Selection	Conduct a review of the corridor to select safety countermeasures and key design features that would increase traffic safety on the priority corridor. Use the information on crash causation from Step 1 to develop an initial countermeasures list from the proven safety countermeasures and associated toolkit.
3	Final Safety Countermeasures Selection	Fine-tune the countermeasures list from Step 2 based on feasibility, funding, and context. The Crash Modification Factors (CMF)[1] information about each countermeasure (Step 4) should provide insight into the final selection of countermeasures.
4	CMF Modeling	Model CMFs to estimate if the safety countermeasures selected will eliminate KSI crashes. Values for CMFs are used to identify safety countermeasures with the greatest possible safety benefit for a particular location, with the goal of layering multiple safety countermeasures to get a CMF of zero.
5	Design and Engineering	After the set of countermeasures is determined for the location from Steps 3 and 4, begin design and engineering with the goal to provide safe and comfortable places for all road users, especially vulnerable users. Ensure the countermeasures are designed in a layered approach to complement each other and work together to reduce crash severity and eliminate KSI crashes.
6	Construction	Implement the countermeasures. Ensure the construction process follows work zone safety best practices to allow the safe movement of all road users.
7	Safety Outcome Performance	Monitor the safety outcomes and performance of projects by conducting field observations, conducting surveys of road users' perception of safety, and reviewing crash data to determine if desired behaviors changed and if crash frequency and severity are reduced. Perform systemic evaluation across the region and within member agency jurisdictions to see how projects constructed are working toward eliminating KSI crashes by 2038.

1 USDOT Crash Modification Factors Clearinghouse provides a database of factors that estimates the possible effect countermeasures could have on reducing crashes. https://www.cmfclearinghouse.org/

Systemic Proactive Project Prioritization Framework

Systemic treatment implementation is a common Vision Zero approach that identifies many locations for the rapid application of proven safety countermeasures designed to reduce the number of KSI crashes. Systemic treatments can be proactively implemented throughout the regional and in member agency jurisdictions and are generally considered well-suited for widespread implementation because of their safety effectiveness, cost effectiveness, and feasibility for implementation at multiple locations. These traffic safety infrastructure improvements can usually be made where common safety risk factors exist and often do not require any further analysis implement at specific locations.

The table below lists the safety countermeasures that are recommended for proactive, systemic implementation in Northwest Arkansas, and the ultimate locations where each countermeasure should be implemented.

Table 3: Systemic Proactive Safety Countermeasures

Northwest Arkansas Regional Priority Location-Specific Projects

Location-specific projects across Northwest Arkansas have been identified though the development of the HIN along with using the Safer Streets Priority Finder model to identify a variety of corridors and roadway segments where safety risks could be addressed proactively. The following tables show the prioritized lists of corridors along the HIN. The maps and tables include all projects in the NWA region along with sorted tables and corresponding maps for projects in the following communities:

- Bella Vista
- Bentonville
- Centerton
- Fayetteville
- Rogers
- Siloam Springs
- Springdale

Each table lists the following information related to the location-specific project:

1. Corridor Name
2. To/From Extents
3. Municipality
4. Length (miles)
5. Project Tier
6. Total Score
7. KSI Score
8. KSI Crashes/Mile
9. All Crash Score
10. All Crashes/Mile
11. Equity Score
12. HIN Score
13. Public Comment Score
14. HIN Modes
    - p: pedestrian
    - b: bicycle
    - mc: motorcycle
    - mv: motor vehicle

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Table 4: NWARPC_HIN

Corridor	To Extent	From Extent	Municipality	Length (mi)	Project Tier	Total Score	KSI Score	KSI Crashes/ Mile	All Crash Score	All Crashes/ Mile	Equity Score	HIN Score	Public Comment Score	HIN Modes
West Robinson Avenue	South Thompson Street	Turner Street	Springdale	0.4	1	2.85	3	5.4	3	412.8	3	3	2	mv
South Thompson Street	West Emma Avenue	Curchill Avenue/West Lakeview Drive	Springdale	3.2	1	2.85	3	8.8	3	311.9	3	3	2	mc, mv, p
North Garland Avenue	West Lawson Street	West Berry Street	Fayetteville	0.4	1	2.75	3	5.0	2	153.8	3	3	2	b
North Old Missouri Road	Old Wire Road/Dick Trammel Highway	East Emma Avenue	Springdale	1.3	1	2.75	3	5.4	2	131.5	3	3	2	mv, p
Southeast 14th Street	Phyllis Street	West Hudson Road/Water Tower Road/Bekaert Drive	Bentonville, Rogers	0.6	1	2.6	3	6.4	3	1002.3	2	3	2	mv
West Martin Luther King Jr. Boulevard	South School Avenue	West Ozark Trail/East Main Street	Fayetteville	3.5	1	2.6	3	7.8	3	439.4	2	3	2	b, mc, mv, p
North College Avenue	East Center Street	East Township Street	Fayetteville	2.1	1	2.6	3	5.2	3	372.9	2	3	2	mv, p
West Sunset Avenue	Westside Village Street/East Henri de Tonti Boulevard	South Thompson Street	Springdale	4.1	1	2.6	3	8.8	3	438.1	2	3	2	mc, mv, p
West Wedington Drive	West North Street/North Garland Avenue	MP 16.40	Fayetteville	3.5	1	2.5	3	6.6	2	245.1	2	3	2	b, mc, mv, p
South Mountie Boulevard	West Oak Street/South 5th Street	West Olrich Street	Rogers	0.5	1	2.5	3	6.0	2	11.9	2	3	2	p
US 412;AR 59	W extent of US 412;AR 59	Arkotex Road	Siloam Springs	2.1	1	2.5	3	5.6	2	202.0	2	3	2	mv
US 412	MP 11.65	Arkotex Road/US 412;AR 59	Siloam Springs	1.1	1	2.5	3	8.2	2	178.2	2	3	2	mc, mv
South School Avenue	South Archibald Yell Boulevard	West Nonnamaker Drive	Fayetteville	1.1	1	2.45	2	0.9	2	54.5	3	3	2	mv
North Thompson Street	West County Line Road	West Emma Avenue	Springdale	1.7	1	2.45	3	5.2	2	225.2	3	3	0	mv, p
West Olive Street	Kingswood Drive	150 ft W of North 16th Street	Rogers	1.3	1	2.45	2	0.8	2	89.2	3	3	2	mv, p
East Huntsville Avenue	East Emma Avenue/ Butterfield Coach Road	Mill Street	Springdale	2.0	1	2.45	2	4.5	2	97.7	3	3	2	mv, p
South Razorback Road	525 ft S of South Razorback Road	South Treat Street/Dowell Drive	Fayetteville	1.0	1	2.45	2	1.0	2	29.9	3	3	2	b
West Hudson Road	North 2nd Street/Northeast Hudson Road/West Hudson Road	West Hudson Road/Water Tower Road/Bekaert Drive/ Southeast 14th Street	Rogers	3.0	1	2.45	2	3.3	2	168.7	3	3	2	mc, mv
West Sycamore Street	North Garland Avenue	North Woodland Avenue	Fayetteville	0.9	1	2.45	2	1.1	2	90.9	3	3	2	mv
Powell Street	Caudle Avenue/Park Street	Southland Drive	Springdale	2.0	1	2.45	2	2.0	2	32.2	3	3	2	b, p
East 15th Street	South Happy Hollow Road	South College Avenue	Fayetteville	1.3	1	2.45	2	1.5	2	90.6	3	3	2	mv
North Crossover Road	305 ft NE of Hillside Terrace	MP 9.80	Fayetteville, Springdale	1.2	1	2.35	3	8.3	3	363.3	1	3	2	mc, mv
West Walnut Street	115 ft E of West Walnut Street	South 8th Street/North 8th Street	Rogers	3.2	1	2.3	2	4.4	3	309.3	2	3	2	b, mc, mv, p
Southeast 14th Street	Phyllis Street	Southeast East Street	Bentonville	1.3	1	2.3	2	3.1	3	495.0	2	3	2	mv
Elm Springs Road	Elm Springs Road	White Road	Springdale	1.1	1	2.3	2	0.9	3	333.1	2	3	2	mc, mv
South Old Missouri Road	Ivey Lane/North Crossover Road	South Old Missouri Road	Fayetteville, Springdale	1.3	1	2.2	3	6.4	2	151.9	2	3	0	mc, mv, p

Corridor	To Extent	From Extent	Municipality	Length (mi)	Project Tier	Total Score	KSI Score	KSI Crashes/ Mile	All Crash Score	All Crashes/ Mile	Equity Score	HIN Score	Public Comment Score	HIN Modes
West Center Street	West Clinton Drive/North Harmon Avenue	North East Avenue/South East Avenue	Fayetteville	0.7	1	2.2	2	1.4	2	69.1	2	3	2	p
West Dickson Street	300 ft E of North Mcilroy Avenue/North Ozark Avenue/ West Dickson Street	North Arkansas Avenue	Fayetteville	0.4	1	2.2	2	2.6	2	36.0	2	3	2	b
North College Avenue	South Thompson Street/ Curchill Avenue/West Lakeview Drive	65 ft SW of East Sunbridge Drive	Fayetteville, Springdale	4.7	1	2.2	2	2.3	2	164.9	2	3	2	mv, p
West Maple Street	North Highland Avenue	North Garland Avenue	Fayetteville	0.9	1	2.2	2	1.1	2	91.9	2	3	2	p
Main Drive	North College Avenue/East Lake Fayetteville Road	North Ball Street	Fayetteville, Johnson, Springdale	1.1	1	2.2	2	1.9	2	66.1	2	3	2	mv
West Cleveland Street	North Sang Avenue	105 ft W of West Cleveland Street/North Willis Avenue	Fayetteville	1.2	1	2.2	2	3.5	2	51.2	2	3	2	p
South 8th Street	East Pleasant Grove Road/ North Bloomington Street	West Walnut Street	Rogers	3.5	1	2.2	2	4.3	2	153.3	2	3	2	mv, p
North Gregg Avenue	West North Street	1960 ft S of West Van Asche Drive	Fayetteville	3.2	1	2.2	2	2.5	2	108.8	2	3	2	b, mv, p
South 1st Street	S 1st St/South 1st Street	East Glendale Lane	Rogers	1.2	1	2.2	2	0.9	2	63.8	2	3	2	mc
West Huntsville Avenue	White Road	Mill Street	Springdale	1.9	1	2.2	2	1.6	2	161.0	2	3	2	mv
North Crossover Road	80 ft S of North Crossover Road/East Brandon Circle	MP 7.15	Fayetteville, Springdale	2.1	1	2.2	2	4.8	2	207.6	2	3	2	mc, mv
US 412	385 ft W of South Washington Street	Jonathan Barnett Highway/ South Carl Street	Siloam Springs	0.9	1	2.2	3	10.5	2	228.9	2	3	0	mc, mv
White Road	Elm Springs Road	West Huntsville Avenue	Springdale	0.2	1	2.2	2	4.2	2	97.7	2	3	2	mv
US 412	MP 8.85	MP 14.15		1.2	1	2.2	3	7.5	2	163.3	2	3	0	mc, mv
Dick Trammel Highway	Remington Drive	AR 264/Old Wire Road	Springdale	1.0	1	2.2	3	4.9	2	61.2	2	3	0	mc
East Joyce Boulevard	North Steele Boulevard	North Crossover Road	Fayetteville	2.2	1	2.2	2	2.7	2	220.7	2	3	2	mv
South Dixieland Road	West Walnut Street	Cunningham Avenue	Rogers	2.6	1	2.2	2	3.5	2	75.4	2	3	2	mv, p
N Exit 3900	N extent of N Exit 3900	S extent of N Exit 3900	Fayetteville	0.1	1	2.2	3	13.6	2	74.6	2	3	0	p
South Futrall Drive	2735 ft N of South Futrall Drive/West Best Way Street	West Old Farmington Road/ Futrall Drive	Fayetteville	0.8	2	2.15	2	1.2	2	45.9	3	3	0	mv
Fulbright Expressway	Fulbright Expressway/I 49;US 62;US 71	MP 2.50	Fayetteville	1.6	2	2.15	2	2.5	2	56.3	3	3	0	mc
West Olive Street	North 2nd Street	95 ft E of North 14th Place	Rogers	1.2	2	2.15	2	0.8	2	97.8	3	3	0	mv, p
West Don Tyson Parkway	Turner Street	530 ft E of Johnson Road	Springdale	1.6	2	2.15	2	0.6	2	105.8	3	3	0	mv
Fulbright Expressway	I 49;US 62;US 71	MP 123.20	Fayetteville	1.8	2	2.15	2	3.4	2	171.7	3	3	0	mc, mv
West Persimmon Street	North 22nd Street	70 ft W of West Persimmon Street/North 7th Street	Rogers	1.4	2	2.15	2	1.4	2	20.3	3	3	0	p
South Sang Avenue	South Hollywood Avenue/ West Martin Luther King Jr. Boulevard	West Stone Street	Fayetteville	0.3	2	2.15	2	3.7	2	77.4	3	3	0	b

Corridor	To Extent	From Extent	Municipality	Length (mi)	Project Tier	Total Score	KSI Score	KSI Crashes/ Mile	All Crash Score	All Crashes/ Mile	Equity Score	HIN Score	Public Comment Score	HIN Modes
South Pleasant Street	Watson Avenue	South Thompson Street	Springdale	0.9	2	2.15	2	2.2	2	148.2	3	3	0	mv
East Don Tyson Parkway	525 ft W of East Don Tyson Parkway	Turner Street	Springdale	1.3	2	2.15	2	0.8	2	68.9	3	3	0	mv
North 8th Street	West Hudson Road	West Walnut Street	Rogers	1.5	2	2.15	2	4.0	2	156.5	3	3	0	mc, mv
Southwest 14th Street	MP 5.05	South Main Street	Bentonville	1.3	2	2.05	2	4.6	3	261.5	1	3	2	mv, p
Southeast Walton Boulevard	215 ft W of Southeast Walton Boulevard/Moberly Lane	W extent of Southeast Walton Boulevard	Bentonville	1.3	2	2.05	2	2.3	3	544.9	1	3	2	mc, mv
Pleasant Crossing Boulevard	West Pleasant Grove Road/ South 26th Street	60 ft N of Pleasant Crossing Boulevard/Pleasant Crossing Drive	Rogers	0.1	2	2.05	3	14.0	3	322.8	1	3	0	mv
East Wagon Wheel Road	E extent of East Wagon Wheel Road	Puppy Creek Road	Springdale	0.1	2	2.05	3	8.4	3	395.2	1	3	0	mv
North Bloomington Street	MP 7.40	East Monroe Avenue/West Monroe Avenue	Lowell	1.6	2	1.95	2	3.8	2	93.8	1	3	2	mv
AR 12	355 ft NW of AR 12/Hilltop Drive	MP 24.65		3.2	2	1.95	2	2.8	2	19.1	1	3	2	mc
West Centerton Boulevard	275 ft W of Western Heights Circle	North Main Street/Ginn Road	Centerton	1.1	2	1.95	2	1.8	2	118.2	1	3	2	mv
South Shiloh Drive	MP 1.15	N extent of South Shiloh Drive	Fayetteville	1.1	2	1.95	2	1.8	2	148.2	1	3	2	mv
East Henri de Tonti Boulevard	North Barrington Road/South Barrington Road	130 ft E of East Henri de Tonti Boulevard/Towne Park Road	Tontitown	1.1	2	1.95	2	0.9	2	202.7	1	3	2	mv
North Main Street	West Centerton Boulevard/ East Centerton Boulevard/ Ginn Road	Seba Road/Town Vu Road	Centerton	1.0	2	1.95	2	4.0	2	98.1	1	3	2	p
West New Hope Road	West New Hope Road	South 1st Street	Rogers	3.7	2	1.95	2	2.5	2	95.9	1	3	2	mv, p
North Crossover Road	65 ft NW of North Crossover Road/East Shagbark Bend	285 ft N of East Deerpath Drive	Fayetteville	2.4	2	1.95	2	4.2	2	182.9	1	3	2	mc, mv
Bella Vista Bypass	MP 0.40	MP 21.95	Bella Vista, Bentonville	1.9	2	1.95	2	4.2	2	87.9	1	3	2	mv, p
East Centerton Boulevard	MP 2.40	MP 1.25	Bentonville, Centerton	1.3	2	1.95	2	3.1	2	223.1	1	3	2	mc, mv
South Bloomington Street	West Apple Blossom Avenue/ North Thompson Road/East Apple Blossom Avenue	East Monroe Avenue/West Monroe Avenue	Lowell	1.0	2	1.95	2	3.0	2	154.4	1	3	2	mv
US 412	MP 1.10	MP 21.70		1.2	2	1.95	3	7.2	2	157.6	1	3	0	mc, mv
South Maestri Road	225 ft NW of South Maestri Road/Greathouse Springs Road	Western Trails Drive	Springdale, Tontitown	1.2	2	1.95	2	2.5	2	35.8	1	3	2	mc
AR 12	Prairie Creek Drive/Phillips Road	Mountain Lake Drive/Prairie Creek Drive	Prairie Creek	0.5	2	1.95	3	24.0	2	181.2	1	3	0	mv
West Henri de Tonti Boulevard	80 ft E of CR 58/West Henri de Tonti Boulevard	480 ft W of Klenc Road/West Henri de Tonti Boulevard	Tontitown	2.7	2	1.95	2	4.1	2	40.7	1	3	2	mc, mv
US 62	MP 21.90	MP 23.60	Garfield, Gateway	1.7	2	1.95	3	10.0	2	64.7	1	3	0	mc, mv
AR 12	Beaver Shores Road/AR 12	MP 9.25	Prairie Creek	1.6	2	1.95	3	6.9	2	51.9	1	3	0	mv
Pleasant Crossing Drive	South Dixieland Road/W Pleasant Crossing Dr	Pleasant Crossing Boulevard	Rogers	0.3	2	1.95	3	6.5	2	71.5	1	3	0	b

Corridor	To Extent	From Extent	Municipality	Length (mi)	Project Tier	Total Score	KSI Score	KSI Crashes/ Mile	All Crash Score	All Crashes/ Mile	Equity Score	HIN Score	Public Comment Score	HIN Modes
US 62	MP 8.25	MP 11.80	Avoca	3.0	2	1.95	3	5.7	2	36.7	1	3	0	mc, mv
West Monroe Avenue	MP 4.00	North Bloomington Street/ South Bloomington Street	Lowell	3.1	2	1.95	2	2.2	2	124.0	1	3	2	mv
East Huntsville Road	115 ft SE of East Huntsville Road/Jarnigan Street	South Crossover Road	Fayetteville	1.1	2	1.95	2	0.9	2	90.9	1	3	2	mv
AR 112	240 ft W of North Cris Hollow Road/AR 112	MP 6.05	Fayetteville, Johnson	1.9	2	1.95	2	1.6	2	33.2	1	3	2	mc
I 49;US 62;US 71	MP 90.65	MP 114.75	Fayetteville, Johnson, Springdale	7.6	2	1.95	2	3.3	2	111.8	1	3	2	mv, p
East Robinson Avenue	320 ft W of Sonora Acres Road/Sonora Acres	Turner Street	Springdale	5.4	3	1.9	2	3.3	2	133.1	2	3	0	b, mc, mv, p
Ramp	MP 0.30	MP 0.20	Springdale	0.3	3	1.9	1	0.0	2	117.5	2	3	2	mv
Monte Northeast Road	AR 94/AR 94S	East New Hope Road/Blue Hill Road	Rogers	1.6	3	1.9	2	3.7	2	26.3	2	3	0	mv
Butterfield Coach Road	East Huntsville Avenue/East Emma Avenue	East Don Tyson Parkway	Springdale	2.3	3	1.9	2	3.0	2	91.7	2	3	0	mc, mv
Cheri Whitlock Drive	475 ft E of North Carl Street	North Lincoln Street	Siloam Springs	1.6	3	1.9	2	3.1	2	65.6	2	3	0	mv
Northeast Hudson Road	MP 10.60	355 ft SW of Happy Trails Drive	Avoca, Rogers	1.8	3	1.9	2	2.2	2	23.9	2	3	0	mc
AR 16	MP 13.30	MP 0.25	Fayetteville	0.2	3	1.9	1	0.0	2	56.0	2	3	2	p
Backus Avenue	North Thompson Street/ Sanders Avenue	125 ft W of Backus Avenue/ San Miguel Drive	Springdale	1.1	3	1.9	2	1.8	2	87.3	2	3	0	p
South Old Missouri Road	East Emma Avenue	East Robinson Avenue	Springdale	1.2	3	1.9	2	4.0	2	148.0	2	3	0	mc, mv
Electric Avenue	South Old Missouri Road	375 ft W of Electric Avenue/ Woodford Street	Springdale	1.1	3	1.9	2	1.8	2	31.8	2	3	0	mv
Progress Avenue	North Progress Avenue	230 ft S of Progress Avenue/ Carousel Drive	Siloam Springs	1.3	3	1.9	2	0.8	2	74.5	2	3	0	mv
West Dickson Street	East Dickson Street/Highland Avenue	North Arkansas Avenue	Fayetteville	0.5	3	1.9	2	1.8	2	174.2	2	3	0	b
AR 59	MP 22.40	MP 27.85		1.7	3	1.9	2	3.5	2	20.0	2	3	0	mc
South 40th Street	225 ft S of South 40th Street/ Holt Avenue	225 ft S of Haile Lane	Springdale	1.6	3	1.9	2	1.2	2	75.6	2	3	0	mv
North Dixieland Road	185 ft S of North Dixieland Road/West Easy Street	West Walnut Street	Rogers	1.1	3	1.85	1	0.0	2	106.4	3	3	0	mv
West Poplar Street	North Gregg Avenue	North Leverett Avenue	Fayetteville	0.5	3	1.85	1	0.0	2	39.6	3	3	0	b
AR 12	Van Winkle Place Road	MP 19.70		2.1	3	1.65	2	4.3	2	29.0	1	3	0	mc
North Salem Road	West Persimmon Street/North Mountain Ranch Boulevard	130 ft S of North Salem Road/ West Fairfax Street	Fayetteville	1.3	3	1.65	2	0.8	2	30.4	1	3	0	p
I 49	MP 86.60	MP 79.50		1.4	3	1.65	2	4.3	2	120.7	1	3	0	mv
Spring Creek Road	West Monroe Avenue/Bellview Street	125 ft S of Spring Creek Road	Lowell, Springdale	1.1	3	1.65	2	0.9	2	4.5	1	3	0	mv
I 49	MP 52.05	MP 85.60	Greenland	2.1	3	1.65	2	2.9	2	80.5	1	3	0	mv

Corridor	To Extent	From Extent	Municipality	Length (mi)	Project Tier	Total Score	KSI Score	KSI Crashes/ Mile	All Crash Score	All Crashes/ Mile	Equity Score	HIN Score	Public Comment Score	HIN Modes
State Highway 72	MP 1.30	150 ft S of State Highway 72/ East Plentywood Road	Bentonville	2.7	3	1.65	2	3.7	2	48.1	1	3	0	mv
Rock Road	MP 0.40	MP 1.50		1.2	3	1.65	2	1.7	2	5.0	1	3	0	mc
South 26th Street	Pleasant Crossing Boulevard/ West Pleasant Grove Road	85 ft S of Everest Avenue/ South 26th Street	Rogers	1.1	3	1.65	2	2.7	2	27.4	1	3	0	mv
US 71	365 ft NE of US 71/Pine Drive	475 ft NW of Jenny Lynn Lane/ US 71	Winslow	1.3	3	1.65	2	0.8	2	9.2	1	3	0	mc
US 62	MP 35.85	MP 26.10		2.0	3	1.65	2	4.1	2	14.4	1	3	0	mc
AR 16	MP 12.25	360 ft E of AR 16/Osgood Lane		1.2	3	1.65	2	4.2	2	20.0	1	3	0	mv
Bellview Street	155 ft S of Willowbend Drive/ Ridgewood Avenue	Spring Creek Road/West Monroe Avenue	Lowell	0.8	3	1.65	2	2.7	2	15.9	1	3	0	mv
West State Highway 72	Southwest 2nd Street/ Southwest Black Hawk Road	Main Street	Bentonville, Centerton	1.9	3	1.65	2	1.6	2	33.9	1	3	0	mc
Bella Vista Way	MP 2.35	MP 4.65	Bella Vista	2.2	3	1.65	2	1.8	2	106.8	1	3	0	mc, mv
Greenhouse Road	Southwest Regional Airport Boulevard/Southwest Cornerstone Road	East Centerton Boulevard	Bentonville, Centerton	1.5	3	1.65	2	2.0	2	59.1	1	3	0	mv
US 62	MP 31.70	US 62/Orchid Road	Farmington, Prairie Grove	3.3	3	1.65	2	4.0	2	31.4	1	3	0	mv
North Shiloh Drive	West Wedington Drive	N extent of North Shiloh Drive	Fayetteville	0.3	3	1.65	1	0.0	2	19.0	1	3	2	mv
North Main Street Elm Springs	Wagon Wheel Road/South Main Street (Cave Springs)	S extent of North Main Street Elm Springs	Springdale	0.9	3	1.65	2	3.3	2	42.7	1	3	0	mv
East Wagon Wheel Road	Puppy Creek Road	270 ft N of East Wagon Wheel Road/South Zion Road	Springdale	1.0	3	1.65	2	2.1	2	43.2	1	3	0	mv
North Thompson Road	80 ft N of West Apple Blossom Avenue/South Bloomington Street/East Apple Blossom Avenue	West County Line Road/North Thompson Street	Springdale	2.0	3	1.65	2	1.5	2	110.5	1	3	0	mc, mv
I 49;US 62;US 71	MP 114.75	MP 169.30	Lowell, Rogers, Springdale	9.8	3	1.65	2	2.9	2	119.9	1	3	0	mc, mv
Bella Vista Bypass	MP 13.70	MP 18.90	Gravette	2.0	3	1.65	2	4.0	2	83.5	1	3	0	mv, p
North Shiloh Drive	West Wedington Drive/North Shiloh Drive	MP 1.80	Fayetteville	1.1	3	1.65	1	0.0	2	23.6	1	3	2	mv
Christian Avenue	Elmdale Drive	North Thompson Street	Springdale	0.7	3	1.6	1	0.0	2	16.6	2	3	0	p
East Kenwood Road	550 ft E of East Kenwood Road/South Hico Street	380 ft W of East Kenwood Road/Lewis Circle	Siloam Springs	1.4	3	1.6	1	0.0	2	22.9	2	3	0	mv
East Cliffs Boulevard	North Crossover Road	North Happy Hollow Road	Fayetteville	0.5	3	1.6	1	0.0	2	7.5	2	3	0	mv

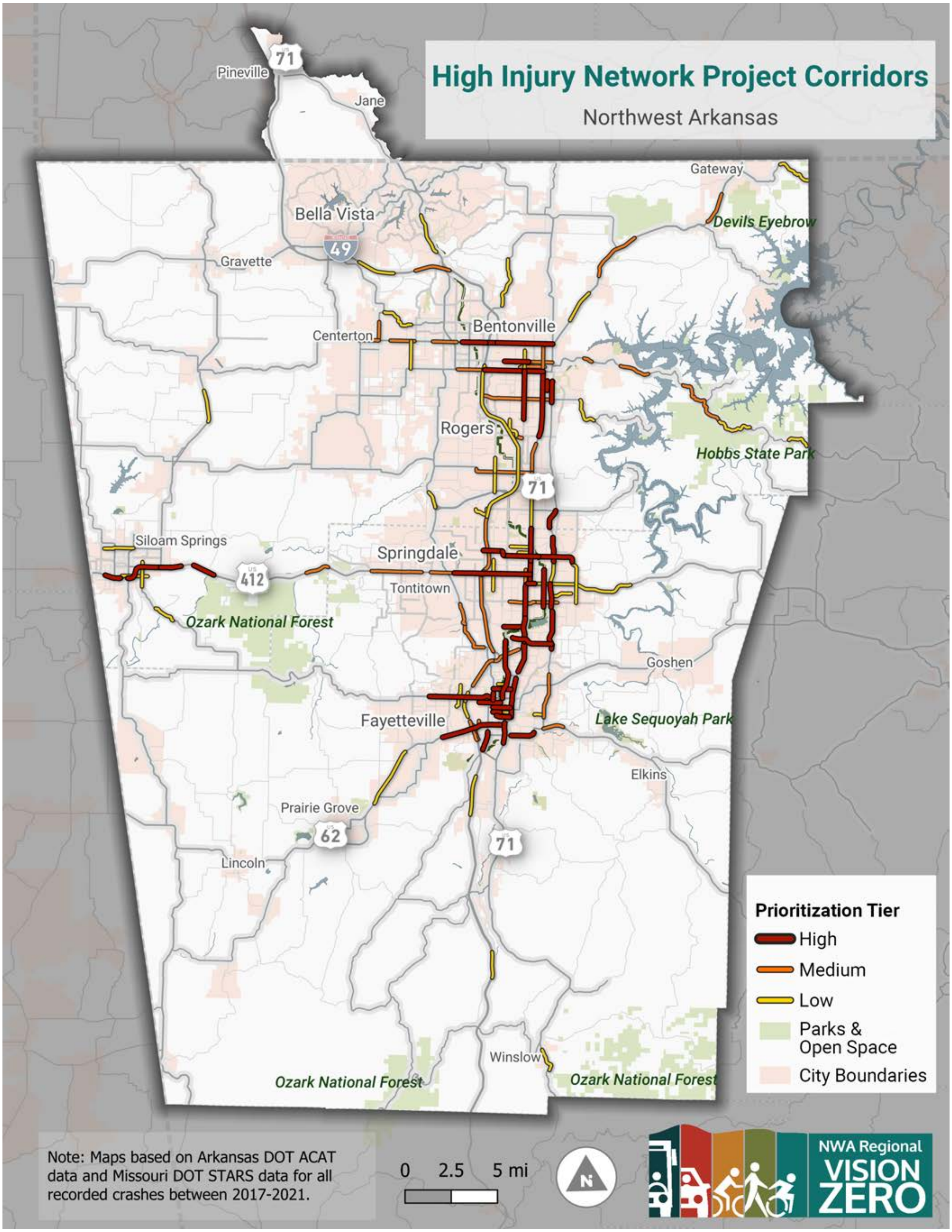
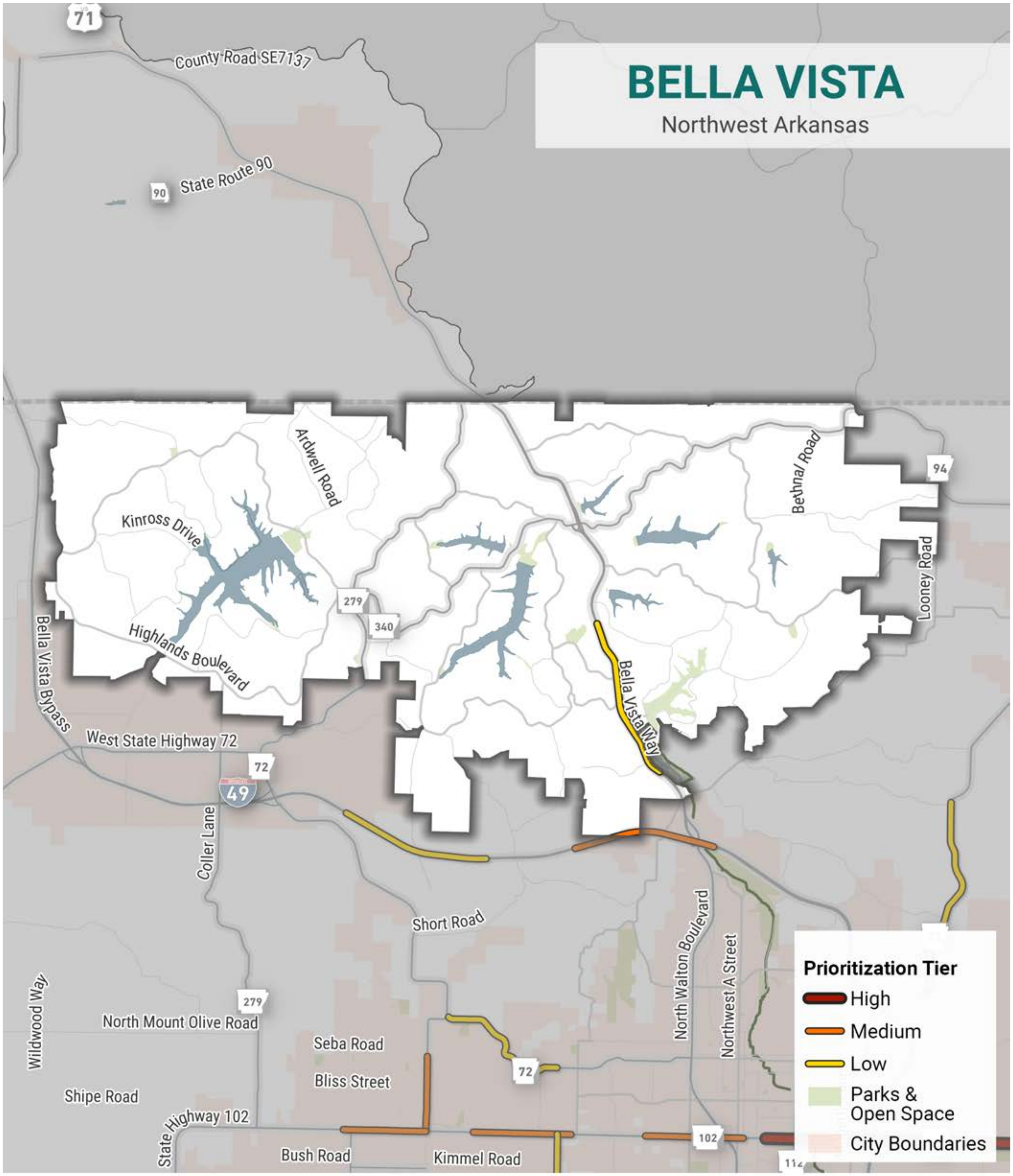

High Injury Network Project Corridors
Northwest Arkansas
Pineville
Jane
Gateway
Bella Vista
Devils Eyebrow
Gravette
Bentonville
Centerton
Rogers
Hobbs State Park
Siloam Springs
Springdale
Tontitown
Ozark National Forest
Goshen
Fayetteville
Lake Sequoyah Park
Elkins
Prairie Grove
Lincoln
Winslow
Ozark National Forest
Ozark National Forest
Prioritization Tier
High
Medium
Low
Parks & Open Space
City Boundaries
Note: Maps based on Arkansas DOT ACAT data and Missouri DOT STARS data for all recorded crashes between 2017-2021.
0 2.5 5 mi
NWA Regional VISION ZERO

Table 5: Bella Vista HIN

Corridor	To Extent	From Extent	Municipality	Length (mi)	Project Tier	Total Score	KSI Score	KSI Crashes/ Mile	All Crash Score	All Crashes/ Mile	Equity Score	HIN Score	Public Comment Score	HIN Modes
Bella Vista Bypass	MP 0.40	MP 21.95	Bella Vista, Bentonville	1.9	2	1.95	2	4.2	2	87.9	1	3	2	mv, p
Bella Vista Way	MP 2.35	MP 4.65	Bella Vista	2.2	3	1.65	2	1.8	2	106.8	1	3	0	mc, mv



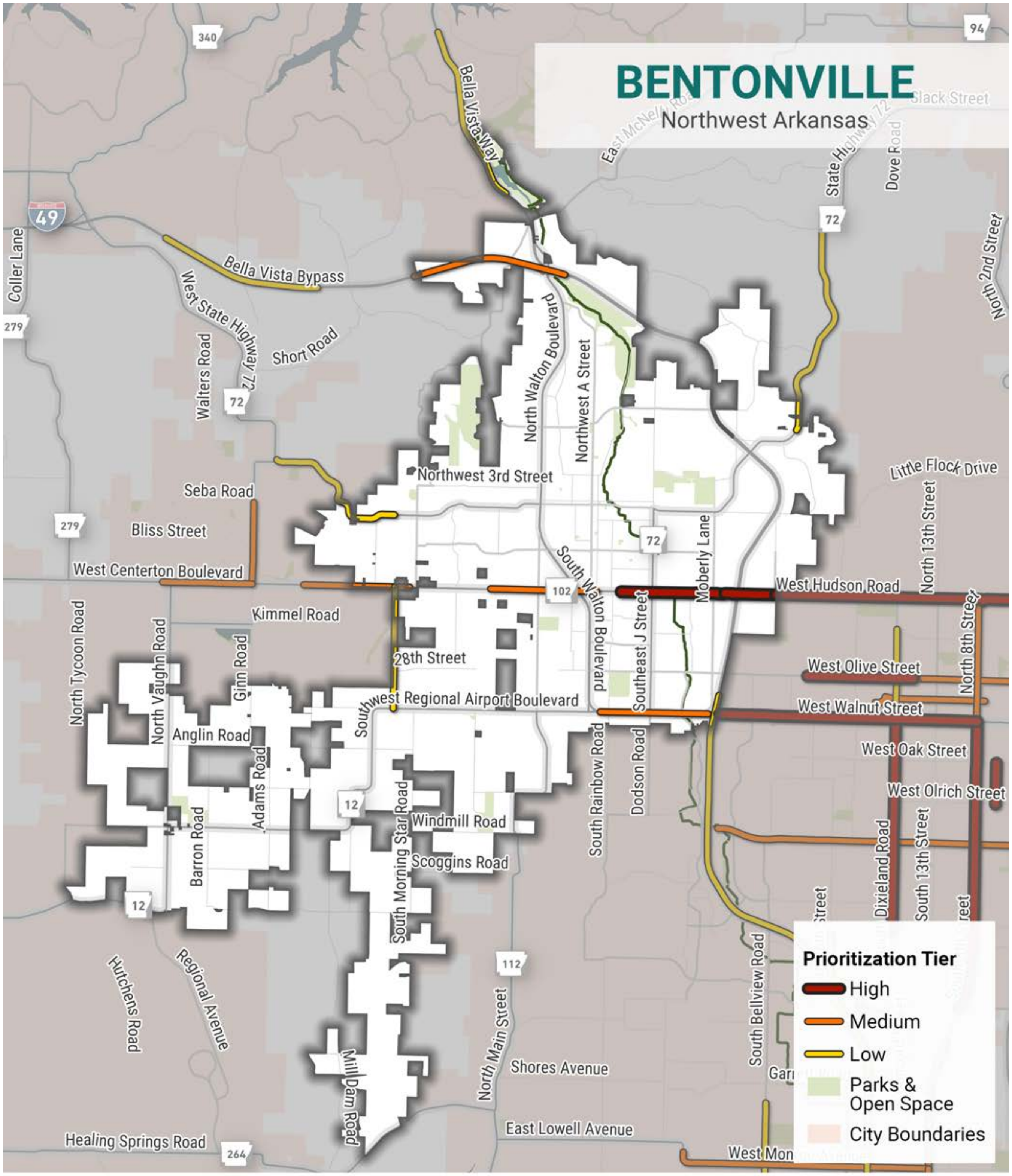
Note: Maps based on Arkansas DOT ACAT data and Missouri DOT STARS data for all recorded crashes between 2017-2021.

0 1 2 mi

NWA Regional VISION ZERO

Table 6: Bentonville HIN

Corridor	To Extent	From Extent	Municipality	Length (mi)	Project Tier	Total Score	KSI Score	KSI Crashes/ Mile	All Crash Score	All Crashes/ Mile	Equity Score	HIN Score	Public Comment Score	HIN Modes
Southeast 14th Street	Phyllis Street	West Hudson Road/Water Tower Road/ Bekaert Drive	Bentonville, Rogers	0.6	1	2.6	3	6.4	3	1002.3	2	3	2	mv
Southeast 14th Street	Phyllis Street	Southeast East Street	Bentonville	1.3	1	2.3	2	3.1	3	495.0	2	3	2	mv
Southwest 14th Street	MP 5.05	South Main Street	Bentonville	1.3	2	2.05	2	4.6	3	261.5	1	3	2	mv, p
Southeast Walton Boulevard	215 ft W of Southeast Walton Boulevard/ Moberly Lane	W extent of Southeast Walton Boulevard	Bentonville	1.3	2	2.05	2	2.3	3	544.9	1	3	2	mc, mv
Bella Vista Bypass	MP 0.40	MP 21.95	Bella Vista, Bentonville	1.9	2	1.95	2	4.2	2	87.9	1	3	2	mv, p
East Centerton Boulevard	MP 2.40	MP 1.25	Bentonville, Centerton	1.3	2	1.95	2	3.1	2	223.1	1	3	2	mc, mv
State Highway 72	MP 1.30	150 ft S of State Highway 72/East Plentywood Road	Bentonville	2.7	3	1.65	2	3.7	2	48.1	1	3	0	mv
West State Highway 72	Southwest 2nd Street/ Southwest Black Hawk Road	Main Street	Bentonville, Centerton	1.9	3	1.65	2	1.6	2	33.9	1	3	0	mc
Greenhouse Road	Southwest Regional Airport Boulevard/ Southwest Cornerstone Road	East Centerton Boulevard	Bentonville, Centerton	1.5	3	1.65	2	2.0	2	59.1	1	3	0	mv



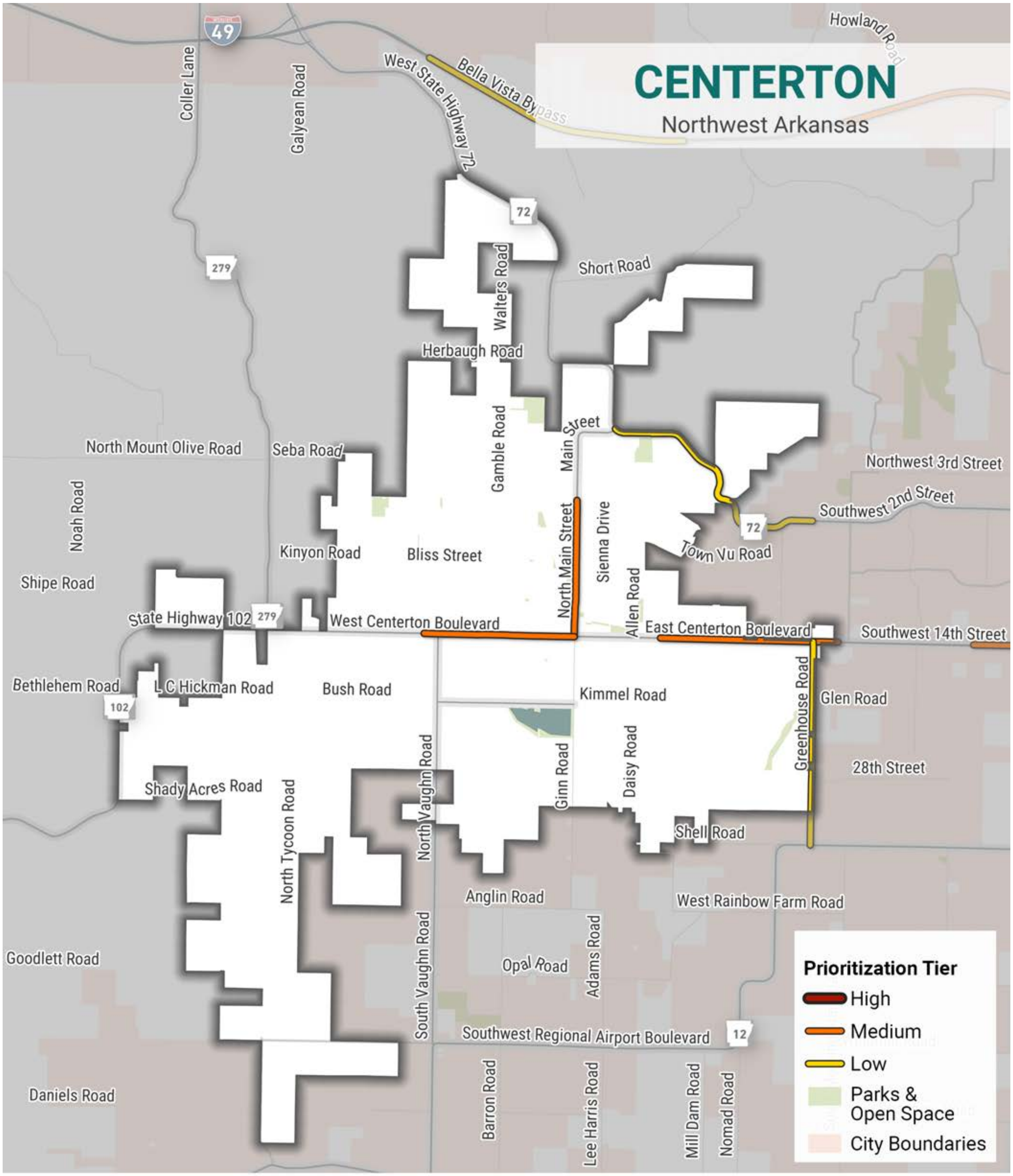
Note: Maps based on Arkansas DOT ACAT data and Missouri DOT STARS data for all recorded crashes between 2017-2021.

0 1 2 mi

NWA Regional VISION ZERO

Table 7: Centerton HIN

Corridor	To Extent	From Extent	Municipality	Length (mi)	Project Tier	Total Score	KSI Score	KSI Crashes/ Mile	All Crash Score	All Crashes/ Mile	Equity Score	HIN Score	Public Comment Score	HIN Modes
West Centerton Boulevard	275 ft W of Western Heights Circle	North Main Street/Ginn Road	Centerton	1.1	2	1.95	2	1.8	2	118.2	1	3	2	mv
North Main Street	West Centerton Boulevard/ East Centerton Boulevard/ Ginn Road	Seba Road/ Town Vu Road	Centerton	1.0	2	1.95	2	4.0	2	98.1	1	3	2	p
East Centerton Boulevard	MP 2.40	MP 1.25	Bentonville, Centerton	1.3	2	1.95	2	3.1	2	223.1	1	3	2	mc, mv
West State Highway 72	Southwest 2nd Street/ Southwest Black Hawk Road	Main Street	Bentonville, Centerton	1.9	3	1.65	2	1.6	2	33.9	1	3	0	mc
Greenhouse Road	Southwest Regional Airport Boulevard/ Southwest Cornerstone Road	East Centerton Boulevard	Bentonville, Centerton	1.5	3	1.65	2	2.0	2	59.1	1	3	0	mv



Note: Maps based on Arkansas DOT ACAT data and Missouri DOT STARS data for all recorded crashes between 2017-2021.

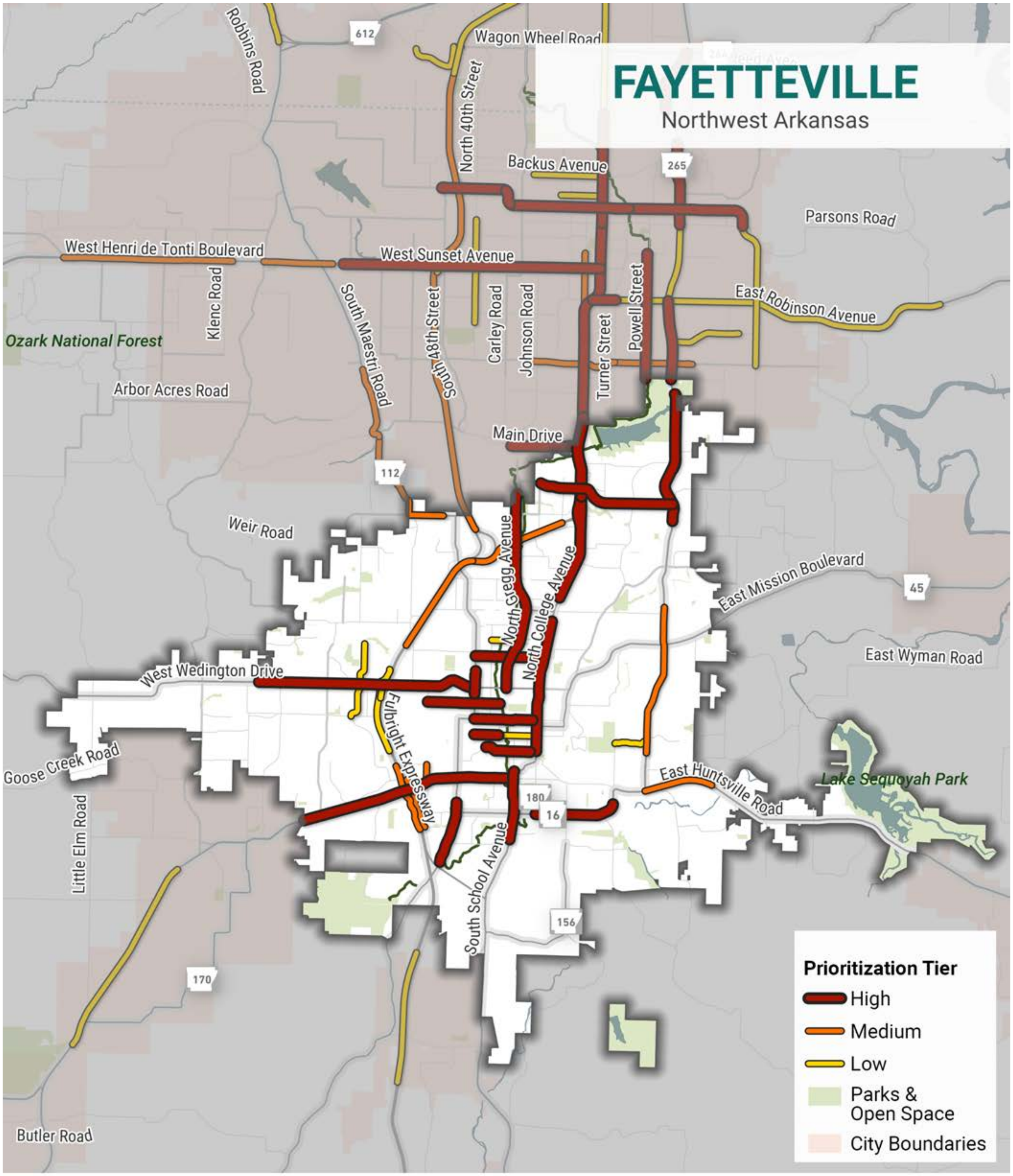
0 0.5 1 mi

Table 8: Fayetteville

Corridor	To Extent	From Extent	Municipality	Length (mi)	Project Tier	Total Score	KSI Score	KSI Crashes/ Mile	All Crash Score	All Crashes/ Mile	Equity Score	HIN Score	Public Comment Score	HIN Modes
North Garland Avenue	West Lawson Street	West Berry Street	Fayetteville	0.4	1	2.75	3	5.0	2	153.8	3	3	2	b
West Martin Luther King Jr. Boulevard	South School Avenue	West Ozark Trail/East Main Street	Fayetteville	3.5	1	2.6	3	7.8	3	439.4	2	3	2	b, mc, mv, p
North College Avenue	East Center Street	East Township Street	Fayetteville	2.1	1	2.6	3	5.2	3	372.9	2	3	2	mv, p
West Wedington Drive	West North Street/North Garland Avenue	MP 16.40	Fayetteville	3.5	1	2.5	3	6.6	2	245.1	2	3	2	b, mc, mv, p
South School Avenue	South Archibald Yell Boulevard	West Nonnamaker Drive	Fayetteville	1.1	1	2.45	2	0.9	2	54.5	3	3	2	mv
South Razorback Road	525 ft S of South Razorback Road	South Treat Street/Dowell Drive	Fayetteville	1.0	1	2.45	2	1.0	2	29.9	3	3	2	b
West Sycamore Street	North Garland Avenue	North Woodland Avenue	Fayetteville	0.9	1	2.45	2	1.1	2	90.9	3	3	2	mv
East 15th Street	South Happy Hollow Road	South College Avenue	Fayetteville	1.3	1	2.45	2	1.5	2	90.6	3	3	2	mv
North Crossover Road	305 ft NE of Hillside Terrace	MP 9.80	Fayetteville, Springdale	1.2	1	2.35	3	8.3	3	363.3	1	3	2	mc, mv
South Old Missouri Road	Ivey Lane/ North Crossover Road	South Old Missouri Road	Fayetteville, Springdale	1.3	1	2.2	3	6.4	2	151.9	2	3	0	mc, mv, p
West Center Street	West Clinton Drive/North Harmon Avenue	North East Avenue/South East Avenue	Fayetteville	0.7	1	2.2	2	1.4	2	69.1	2	3	2	p
West Dickson Street	300 ft E of North Mclilroy Avenue/ North Ozark Avenue/West Dickson Street	North Arkansas Avenue	Fayetteville	0.4	1	2.2	2	2.6	2	36.0	2	3	2	b

Corridor	To Extent	From Extent	Municipality	Length (mi)	Project Tier	Total Score	KSI Score	KSI Crashes/ Mile	All Crash Score	All Crashes/ Mile	Equity Score	HIN Score	Public Comment Score	HIN Modes
North College Avenue	South Thompson Street/Curchill Avenue/West Lakeview Drive	65 ft SW of East Sunbridge Drive	Fayetteville, Springdale	4.7	1	2.2	2	2.3	2	164.9	2	3	2	mv, p
West Maple Street	North Highland Avenue	North Garland Avenue	Fayetteville	0.9	1	2.2	2	1.1	2	91.9	2	3	2	p
Main Drive	North College Avenue/East Lake Fayetteville Road	North Ball Street	Fayetteville, Johnson, Springdale	1.1	1	2.2	2	1.9	2	66.1	2	3	2	mv
West Cleveland Street	North Sang Avenue	105 ft W of West Cleveland Street/North Willis Avenue	Fayetteville	1.2	1	2.2	2	3.5	2	51.2	2	3	2	p
North Gregg Avenue	West North Street	1960 ft S of West Van Asche Drive	Fayetteville	3.2	1	2.2	2	2.5	2	108.8	2	3	2	b, mv, p
North Crossover Road	80 ft S of North Crossover Road/East Brandon Circle	MP 7.15	Fayetteville, Springdale	2.1	1	2.2	2	4.8	2	207.6	2	3	2	mc, mv
East Joyce Boulevard	North Steele Boulevard	North Crossover Road	Fayetteville	2.2	1	2.2	2	2.7	2	220.7	2	3	2	mv
N Exit 3900	N extent of N Exit 3900	S extent of N Exit 3900	Fayetteville	0.1	1	2.2	3	13.6	2	74.6	2	3	0	p
South Futrall Drive	2735 ft N of South Futrall Drive/West Best Way Street	West Old Farmington Road/Futrall Drive	Fayetteville	0.8	2	2.15	2	1.2	2	45.9	3	3	0	mv
Fulbright Expressway	Fulbright Expressway/I 49;US 62;US 71	MP 2.50	Fayetteville	1.6	2	2.15	2	2.5	2	56.3	3	3	0	mc
Fulbright Expressway	I 49;US 62;US 71	MP 123.20	Fayetteville	1.8	2	2.15	2	3.4	2	171.7	3	3	0	mc, mv
South Sang Avenue	South Hollywood Avenue/ West Martin Luther King Jr. Boulevard	West Stone Street	Fayetteville	0.3	2	2.15	2	3.7	2	77.4	3	3	0	b

Corridor	To Extent	From Extent	Municipality	Length (mi)	Project Tier	Total Score	KSI Score	KSI Crashes/ Mile	All Crash Score	All Crashes/ Mile	Equity Score	HIN Score	Public Comment Score	HIN Modes
South Shiloh Drive	MP 1.15	N extent of South Shiloh Drive	Fayetteville	1.1	2	1.95	2	1.8	2	148.2	1	3	2	mv
North Crossover Road	65 ft NW of North Crossover Road/East Shagbark Bend	285 ft N of East Deerpath Drive	Fayetteville	2.4	2	1.95	2	4.2	2	182.9	1	3	2	mc, mv
East Huntsville Road	115 ft SE of East Huntsville Road/ Jarnigan Street	South Crossover Road	Fayetteville	1.1	2	1.95	2	0.9	2	90.9	1	3	2	mv
AR 112	240 ft W of North Cris Hollow Road/ AR 112	MP 6.05	Fayetteville, Johnson	1.9	2	1.95	2	1.6	2	33.2	1	3	2	mc
I 49;US 62;US 71	MP 90.65	MP 114.75	Fayetteville, Johnson, Springdale	7.6	2	1.95	2	3.3	2	111.8	1	3	2	mv, p
AR 16	MP 13.30	MP 0.25	Fayetteville	0.2	3	1.9	1	0.0	2	56.0	2	3	2	p
West Dickson Street	East Dickson Street/ Highland Avenue	North Arkansas Avenue	Fayetteville	0.5	3	1.9	2	1.8	2	174.2	2	3	0	b
West Poplar Street	North Gregg Avenue	North Leverett Avenue	Fayetteville	0.5	3	1.85	1	0.0	2	39.6	3	3	0	b
North Salem Road	West Persimmon Street/North Mountain Ranch Boulevard	130 ft S of North Salem Road/West Fairfax Street	Fayetteville	1.3	3	1.65	2	0.8	2	30.4	1	3	0	p
North Shiloh Drive	West Wedington Drive	N extent of North Shiloh Drive	Fayetteville	0.3	3	1.65	1	0.0	2	19.0	1	3	2	mv
North Shiloh Drive	West Wedington Drive/North Shiloh Drive	MP 1.80	Fayetteville	1.1	3	1.65	1	0.0	2	23.6	1	3	2	mv
East Cliffs Boulevard	North Crossover Road	North Happy Hollow Road	Fayetteville	0.5	3	1.6	1	0.0	2	7.5	2	3	0	mv



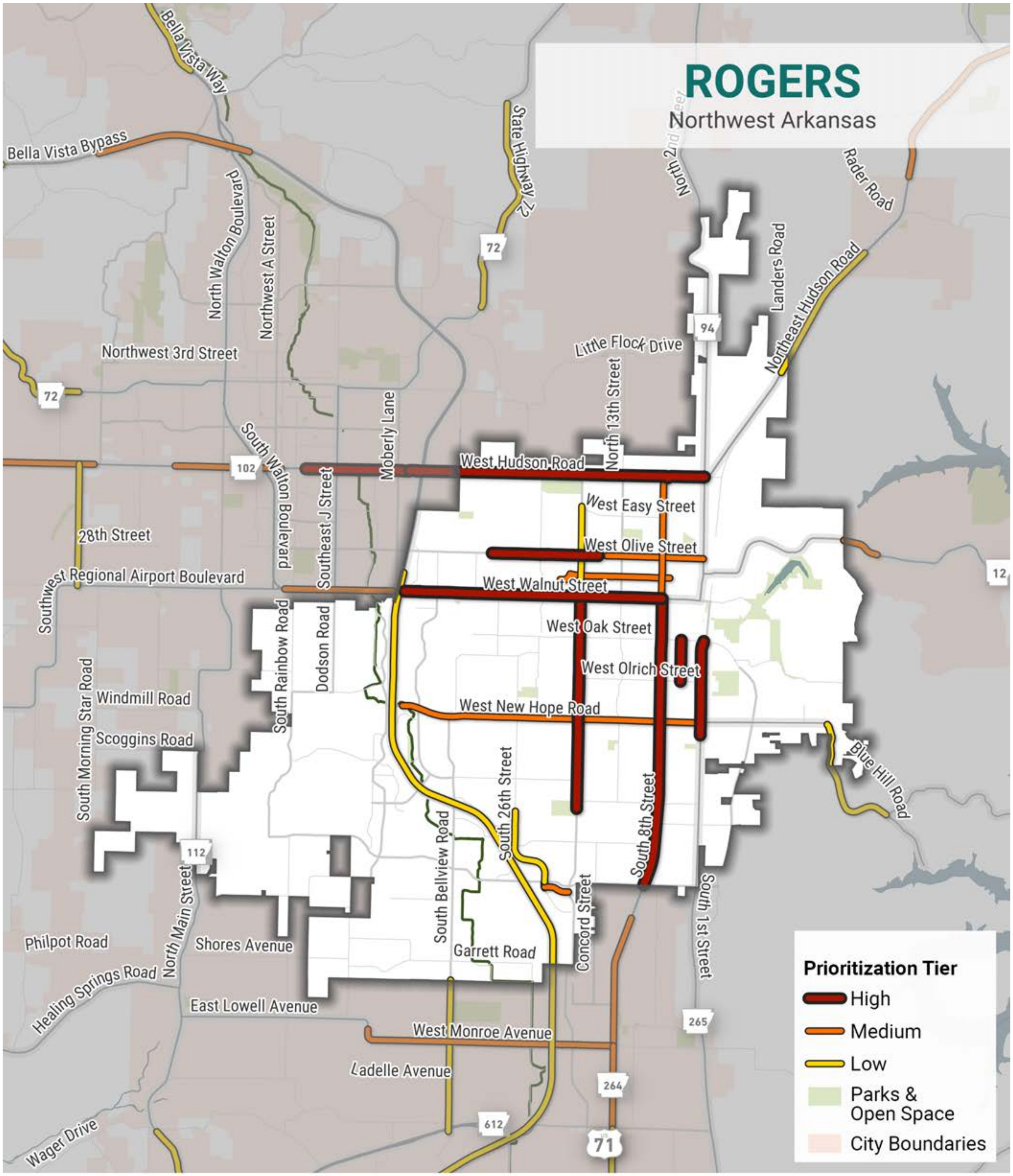
Note: Maps based on Arkansas DOT ACAT data and Missouri DOT STARS data for all recorded crashes between 2017-2021.

0 1 2 mi

NWA Regional VISION ZERO

Table 9: Rogers HIN

Corridor	To Extent	From Extent	Municipality	Length (mi)	Project Tier	Total Score	KSI Score	KSI Crashes/ Mile	All Crash Score	All Crashes/ Mile	Equity Score	HIN Score	Public Comment Score	HIN Modes
Southeast 14th Street	Phyllis Street	West Hudson Road/Water Tower Road/ Bekaert Drive	Bentonville, Rogers	0.6	1	2.6	3	6.4	3	1002.3	2	3	2	mv
South Mountie Boulevard	West Oak Street/ South 5th Street	West Olrich Street	Rogers	0.5	1	2.5	3	6.0	2	11.9	2	3	2	p
West Olive Street	Kingswood Drive	150 ft W of North 16th Street	Rogers	1.3	1	2.45	2	0.8	2	89.2	3	3	2	mv, p
West Hudson Road	North 2nd Street/ Northeast Hudson Road/West Hudson Road	West Hudson Road/Water Tower Road/Bekaert Drive/Southeast 14th Street	Rogers	3.0	1	2.45	2	3.3	2	168.7	3	3	2	mc, mv
West Walnut Street	115 ft E of West Walnut Street	South 8th Street/ North 8th Street	Rogers	3.2	1	2.3	2	4.4	3	309.3	2	3	2	b, mc, mv, p
South 8th Street	East Pleasant Grove Road/North Bloomington Street	West Walnut Street	Rogers	3.5	1	2.2	2	4.3	2	153.3	2	3	2	mv, p
South 1st Street	S 1st St/South 1st Street	East Glendale Lane	Rogers	1.2	1	2.2	2	0.9	2	63.8	2	3	2	mc
South Dixieland Road	West Walnut Street	Cunningham Avenue	Rogers	2.6	1	2.2	2	3.5	2	75.4	2	3	2	mv, p
West Olive Street	North 2nd Street	95 ft E of North 14th Place	Rogers	1.2	2	2.15	2	0.8	2	97.8	3	3	0	mv, p
West Persimmon Street	North 22nd Street	70 ft W of West Persimmon Street/North 7th Street	Rogers	1.4	2	2.15	2	1.4	2	20.3	3	3	0	p
North 8th Street	West Hudson Road	West Walnut Street	Rogers	1.5	2	2.15	2	4.0	2	156.5	3	3	0	mc, mv
Pleasant Crossing Boulevard	West Pleasant Grove Road/ South 26th Street	60 ft N of Pleasant Crossing Boulevard/Pleasant Crossing Drive	Rogers	0.1	2	2.05	3	14.0	3	322.8	1	3	0	mv
West New Hope Road	West New Hope Road	South 1st Street	Rogers	3.7	2	1.95	2	2.5	2	95.9	1	3	2	mv, p



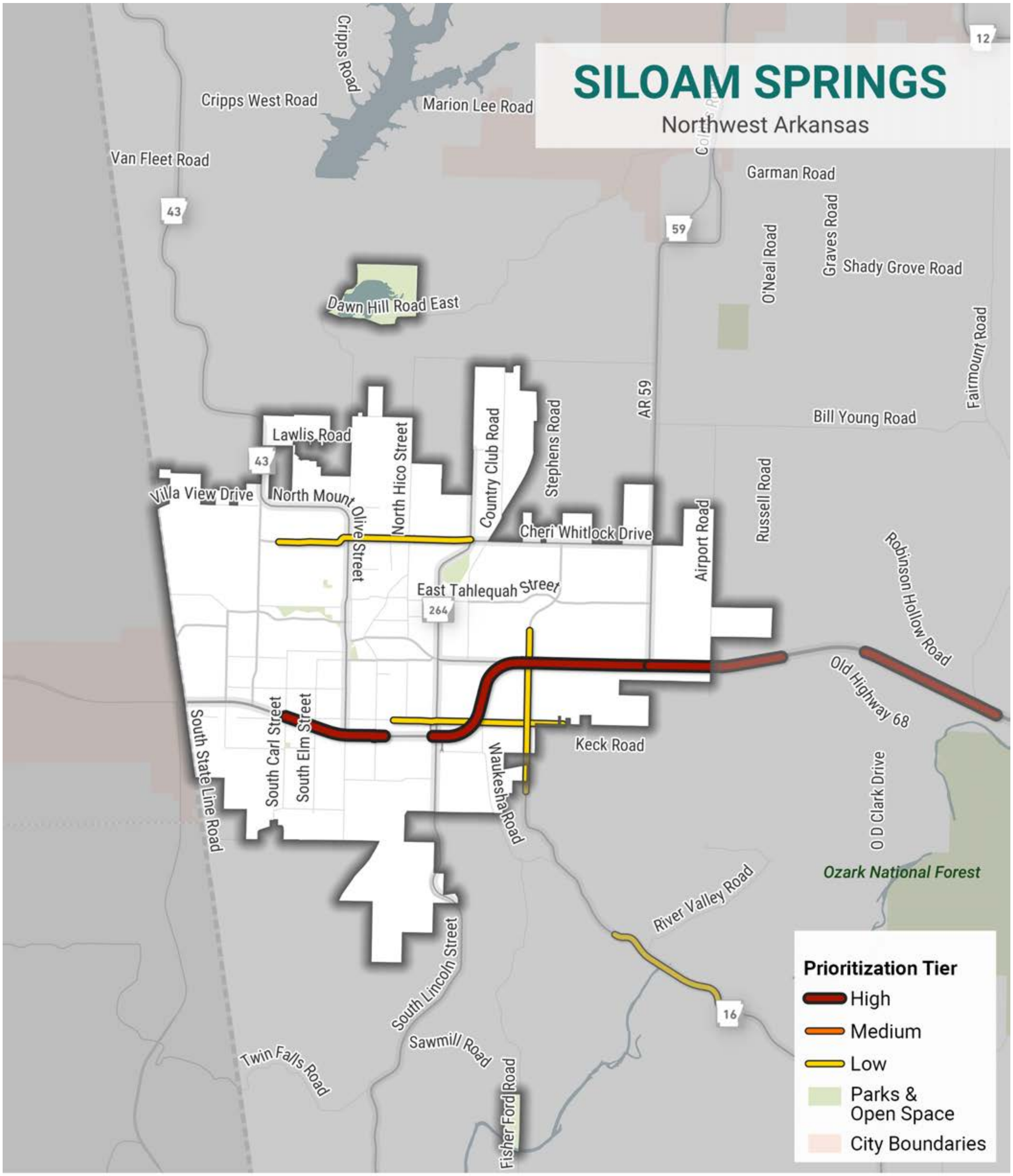
Note: Maps based on Arkansas DOT ACAT data and Missouri DOT STARS data for all recorded crashes between 2017-2021.

0 1 2 mi

NWA Regional VISION ZERO

Table 10: Siloam Springs HIN

Corridor	To Extent	From Extent	Municipality	Length (mi)	Project Tier	Total Score	KSI Score	KSI Crashes/ Mile	All Crash Score	All Crashes/ Mile	Equity Score	HIN Score	Public Comment Score	HIN Modes
US 412;AR 59	W extent of US 412;AR 59	Arkotex Road	Siloam Springs	2.1	1	2.5	3	5.6	2	202.0	2	3	2	mv
US 412	MP 11.65	Arkotex Road/ US 412;AR 59	Siloam Springs	1.1	1	2.5	3	8.2	2	178.2	2	3	2	mc, mv
US 412	385 ft W of South Washington Street	Jonathan Barnett Highway/ South Carl Street	Siloam Springs	0.9	1	2.2	3	10.5	2	228.9	2	3	0	mc, mv
Cheri Whitlock Drive	475 ft E of North Carl Street	North Lincoln Street	Siloam Springs	1.6	3	1.9	2	3.1	2	65.6	2	3	0	mv
Progress Avenue	North Progress Avenue	230 ft S of Progress Avenue/ Carousel Drive	Siloam Springs	1.3	3	1.9	2	0.8	2	74.5	2	3	0	mv
East Kenwood Road	550 ft E of East Kenwood Road/South Hico Street	380 ft W of East Kenwood Road/Lewis Circle	Siloam Springs	1.4	3	1.6	1	0.0	2	22.9	2	3	0	mv



Note: Maps based on Arkansas DOT ACAT data and Missouri DOT STARS data for all recorded crashes between 2017-2021.

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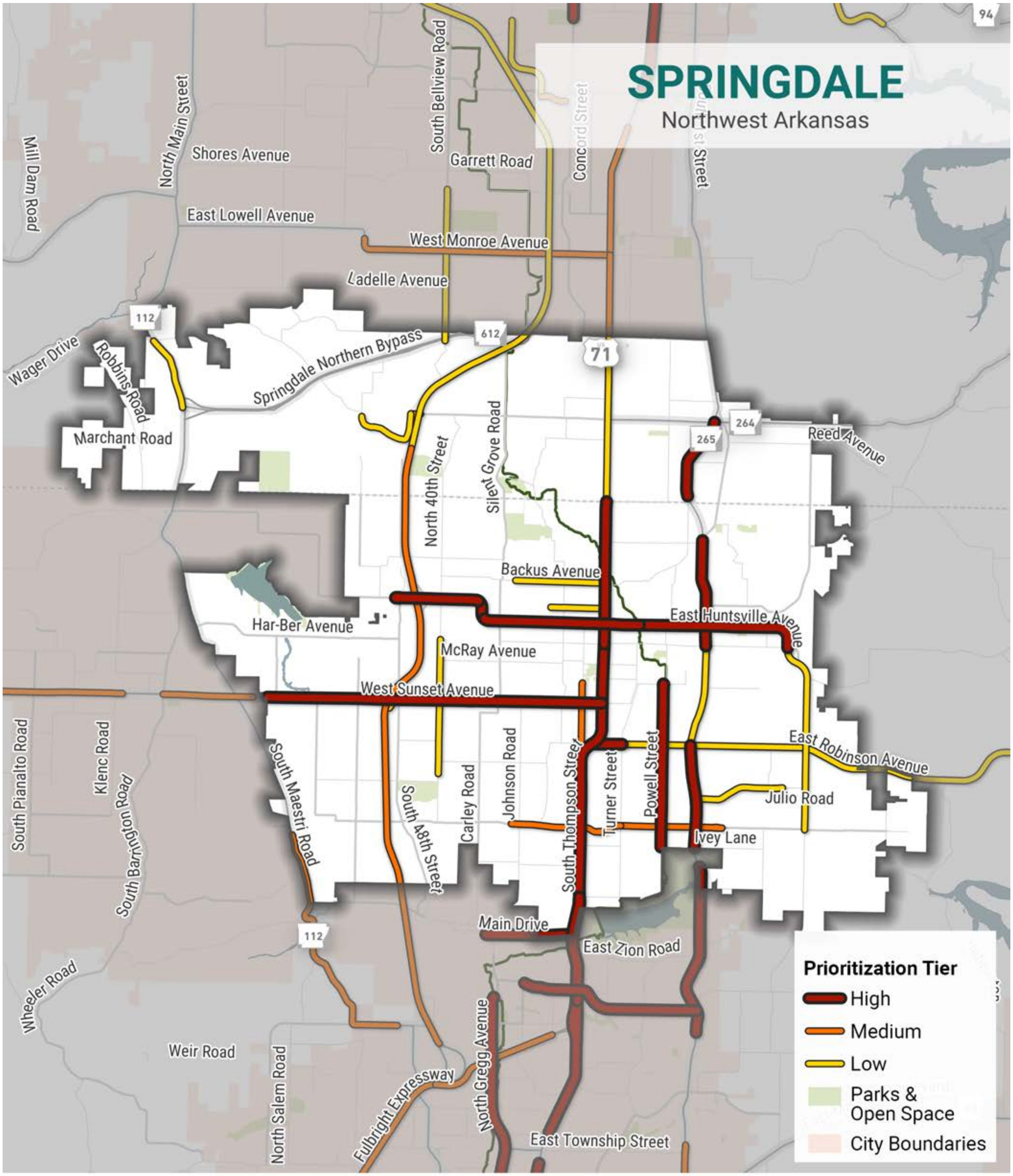
Table 11: Springdale HIN

Corridor	To Extent	From Extent	Municipality	Length (mi)	Project Tier	Total Score	KSI Score	KSI Crashes/ Mile	All Crash Score	All Crashes/ Mile	Equity Score	HIN Score	Public Comment Score	HIN Modes
West Robinson Avenue	South Thompson Street	Turner Street	Springdale	0.4	1	2.85	3	5.4	3	412.8	3	3	2	mv
South Thompson Street	West Emma Avenue	Curchill Avenue/West Lakeview Drive	Springdale	3.2	1	2.85	3	8.8	3	311.9	3	3	2	mc, mv, p
North Old Missouri Road	Old Wire Road/ Dick Trammel Highway	East Emma Avenue	Springdale	1.3	1	2.75	3	5.4	2	131.5	3	3	2	mv, p
West Sunset Avenue	Westside Village Street/ East Henri de Tonti Boulevard	South Thompson Street	Springdale	4.1	1	2.6	3	8.8	3	438.1	2	3	2	mc, mv, p
North Thompson Street	West County Line Road	West Emma Avenue	Springdale	1.7	1	2.45	3	5.2	2	225.2	3	3	0	mv, p
East Huntsville Avenue	East Emma Avenue/ Butterfield Coach Road	Mill Street	Springdale	2.0	1	2.45	2	4.5	2	97.7	3	3	2	mv, p
Powell Street	Caudle Avenue/ Park Street	Southland Drive	Springdale	2.0	1	2.45	2	2.0	2	32.2	3	3	2	b, p
North Crossover Road	305 ft NE of Hillside Terrace	MP 9.80	Fayetteville, Springdale	1.2	1	2.35	3	8.3	3	363.3	1	3	2	mc, mv
Elm Springs Road	Elm Springs Road	White Road	Springdale	1.1	1	2.3	2	0.9	3	333.1	2	3	2	mc, mv
South Old Missouri Road	Ivey Lane/ North Crossover Road	South Old Missouri Road	Fayetteville, Springdale	1.3	1	2.2	3	6.4	2	151.9	2	3	0	mc, mv, p
North College Avenue	South Thompson Street/Curchill Avenue/West Lakeview Drive	65 ft SW of East Sunbridge Drive	Fayetteville, Springdale	4.7	1	2.2	2	2.3	2	164.9	2	3	2	mv, p
Main Drive	North College Avenue/ East Lake Fayetteville Road	North Ball Street	Fayetteville, Johnson, Springdale	1.1	1	2.2	2	1.9	2	66.1	2	3	2	mv

Corridor	To Extent	From Extent	Municipality	Length (mi)	Project Tier	Total Score	KSI Score	KSI Crashes/ Mile	All Crash Score	All Crashes/ Mile	Equity Score	HIN Score	Public Comment Score	HIN Modes
West Huntsville Avenue	White Road	Mill Street	Springdale	1.9	1	2.2	2	1.6	2	161.0	2	3	2	mv
North Crossover Road	80 ft S of North Crossover Road/East Brandon Circle	MP 7.15	Fayetteville, Springdale	2.1	1	2.2	2	4.8	2	207.6	2	3	2	mc, mv
White Road	Elm Springs Road	West Huntsville Avenue	Springdale	0.2	1	2.2	2	4.2	2	97.7	2	3	2	mv
Dick Trammel Highway	Remington Drive	AR 264/Old Wire Road	Springdale	1.0	1	2.2	3	4.9	2	61.2	2	3	0	mc
West Don Tyson Parkway	Turner Street	530 ft E of Johnson Road	Springdale	1.6	2	2.15	2	0.6	2	105.8	3	3	0	mv
South Pleasant Street	Watson Avenue	South Thompson Street	Springdale	0.9	2	2.15	2	2.2	2	148.2	3	3	0	mv
East Don Tyson Parkway	525 ft W of East Don Tyson Parkway	Turner Street	Springdale	1.3	2	2.15	2	0.8	2	68.9	3	3	0	mv
East Wagon Wheel Road	E extent of East Wagon Wheel Road	Puppy Creek Road	Springdale	0.1	2	2.05	3	8.4	3	395.2	1	3	0	mv
South Maestri Road	225 ft NW of South Maestri Road/ Greathouse Springs Road	Western Trails Drive	Springdale, Tontitown	1.2	2	1.95	2	2.5	2	35.8	1	3	2	mc
I 49;US 62;US 71	MP 90.65	MP 114.75	Fayetteville, Johnson, Springdale	7.6	2	1.95	2	3.3	2	111.8	1	3	2	mv, p
East Robinson Avenue	320 ft W of Sonora Acres Road/Sonora Acres	Turner Street	Springdale	5.4	3	1.9	2	3.3	2	133.1	2	3	0	b, mc, mv, p
Ramp	MP 0.30	MP 0.20	Springdale	0.3	3	1.9	1	0.0	2	117.5	2	3	2	mv
Butterfield Coach Road	East Huntsville Avenue/East Emma Avenue	East Don Tyson Parkway	Springdale	2.3	3	1.9	2	3.0	2	91.7	2	3	0	mc, mv

Corridor	To Extent	From Extent	Municipality	Length (mi)	Project Tier	Total Score	KSI Score	KSI Crashes/ Mile	All Crash Score	All Crashes/ Mile	Equity Score	HIN Score	Public Comment Score	HIN Modes
Backus Avenue	North Thompson Street/Sanders Avenue	125 ft W of Backus Avenue/ San Miguel Drive	Springdale	1.1	3	1.9	2	1.8	2	87.3	2	3	0	p
South Old Missouri Road	East Emma Avenue	East Robinson Avenue	Springdale	1.2	3	1.9	2	4.0	2	148.0	2	3	0	mc, mv
Electric Avenue	South Old Missouri Road	375 ft W of Electric Avenue/ Woodford Street	Springdale	1.1	3	1.9	2	1.8	2	31.8	2	3	0	mv
South 40th Street	225 ft S of South 40th Street/Holt Avenue	225 ft S of Haile Lane	Springdale	1.6	3	1.9	2	1.2	2	75.6	2	3	0	mv
Spring Creek Road	West Monroe Avenue/ Bellview Street	125 ft S of Spring Creek Road	Lowell, Springdale	1.1	3	1.65	2	0.9	2	4.5	1	3	0	mv
North Main Street Elm Springs	Wagon Wheel Road/South Main Street (Cave Springs)	S extent of North Main Street Elm Springs	Springdale	0.9	3	1.65	2	3.3	2	42.7	1	3	0	mv
East Wagon Wheel Road	Puppy Creek Road	270 ft N of East Wagon Wheel Road/South Zion Road	Springdale	1.0	3	1.65	2	2.1	2	43.2	1	3	0	mv
North Thompson Road	80 ft N of West Apple Blossom Avenue/South Bloomington Street/East Apple Blossom Avenue	West County Line Road/ North Thompson Street	Springdale	2.0	3	1.65	2	1.5	2	110.5	1	3	0	mc, mv
I 49;US 62;US 71	MP 114.75	MP 169.30	Lowell, Rogers, Springdale	9.8	3	1.65	2	2.9	2	119.9	1	3	0	mc, mv
Christian Avenue	Elmdale Drive	North Thompson Street	Springdale	0.7	3	1.6	1	0.0	2	16.6	2	3	0	p



Note: Maps based on Arkansas DOT ACAT data and Missouri DOT STARS data for all recorded crashes between 2017-2021.

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Safety Action Plan