Safe Streets For All

Action Plan

Hickman County

January 2025

ACKNOWLEDGMENTS

Hickman County's SS4A Committee:

Jim Bates, Mayor

Ronald Coates, Hickman County Road Superintedndent

Joshua Hensel, Hickman County Highway Department Admin Assistant

Pete Tibbs, EMA Director

Jason Craft, Hickman County Sheriff

John Mullins, Hickman County School Superintendent

HICKMAN COUNTY, TENNESSEE

WHEREAS, the Hickman County Highway Commission has, at their regularly scheduled meeting on January 13th, 2025, voted unanimously to embrace the SS4A Comprehensive Safety Action Plan and pursue the elimination of all traffic fatalities and serious injuries on the county's roadways by the year 2045. Following complete review of the Comprehensive Safety Action Plan, the following matters will be settled:

WHEREAS, Vision Zero stands as a federally-endorsed strategy with the aim of eradicating all traffic-related fatalities and severe injuries while promoting safe, healthy, and equitable mobility for all.

WHEREAS, the Hickman County Highway Commission has successfully developed a Comprehensive Safety Action Plan to address the safety concerns of all road users in the unincorporated areas of Hickman County, Tennessee;

WHEREAS, the Comprehensive Safety Action Plan is grounded in the fundamental principles that acknowledge human fallibility and vulnerability, deem fatalities and serious injuries as unacceptable, advocate for shared and proactive responsibility in preventing such tragedies, and recognize that enhanced redundancy in infrastructure can provide additional layers of protection, known as the Safe Systems Approach;

WHEREAS, the Comprehensive Safety Action Plan utilized historical crash data and engaged the public, stakeholders, and a steering committee to identify a High Injury Network comprising the most injury-prone roads and intersections in unincorporated Hickman County; and

WHEREAS, the Comprehensive Safety Action Plan encompasses a multi-faceted approach to address safety concerns, including the identification of 14 High Injury Network locations, with the ultimate goal of eliminating fatalities and serious injuries.

NOW, THEREFORE, BE IT RESOLVED by the Hickman County Highway Commission in Tennessee to adopt the objective of eliminating traffic deaths and serious injuries by 2045, endorsing Vision Zero as a comprehensive and holistic approach towards achieving this goal.

BE IT FURTHER RESOLVED that the Comprehensive Safety Action Plan, detailed in Exhibit A, is hereby granted approval.

BE IT FINALLY RESOLVED that this becomes effective from and after the date of its passage, in accordance with the welfare of the County.

COMMISSION ACTION: 7 Aye 0 Nay _____ Pass _____ Absent

ADOPTED: Carl Sullivan

ATTEST:

Carl Sullivan, Chairman Hickman County Highway Commission

EXECUTIVE SUMMARY

From 2019-2023, there were 2,533 crashes throughout Hickman County. Of those crashes, 2,298 occurred in the county's unincorporated communities. Tragically, the crashes throughout the county resulted in the loss of 42 lives and the incapacitation of 187 individuals. These deaths and serious injuries occurred as people were going about their daily routines: commuting to school or work, meeting friends, or running errands. They were entirely preventable and should not be tolerated. The Hickman County Commission has produced this Comprehensive Safety Action Plan (CSAP) to combat increases in vehicular crashes, traffic congestion, and inaccessibility to safe roads. The goal of this plan is to identify steps that will bring the county closer to zero roadway fatalities and serious injuries. This goal upholds Tennessee's dedication to the Towards Zero Deaths (TZD) vision which uses education, enforcement, engineering, and emergency response initiatives to reduce the amount of and severity of crashes on Tennessee roadways. To achieve this goal, Hickman County will incorporate the following components into this plan:

Leadership Commitment, Goal Setting & Goal Timeline

Policy & Process Changes

Safety Analysis

Strategy & Project Selections

Engagement & Collaboration with the Public

Progress & Transparency Methods

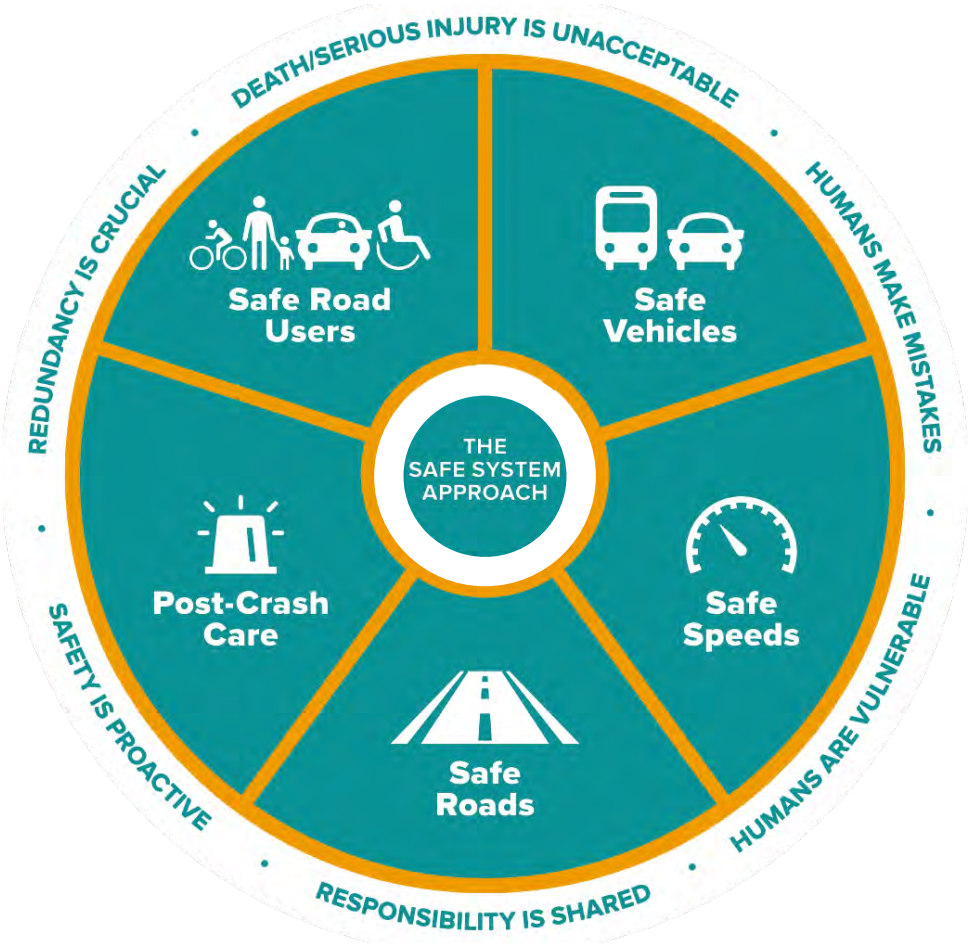
Equity Considerations

This CSAP is the county's initial step towards documenting our steadfast dedication to eliminating severe and fatal traffic crashes and outlining the essential partners and resources required to achieve our objective.

Following in-depth data analysis and community engagement, a High Injury Network (HIN) was defined, and various locations were identified as top priorities for improvement and investment. In addition to the data-driven approach and public feedback, this CSAP is founded on extensive policy and process reviews, identification of insufficient and inequitable access to safe and reliable transportation, and the prioritization of locations that pose risks for further safety issues.

The physical, emotional, and economic impacts that result from traffic crashes serve as reminders for the necessity of this plan. The strategic recommendations presented here will benefit the communities in Hickman County by addressing the most significant safety risks on our roadways. This plan is dedicated to the safety and well-being of all Hickman County residents and visitors but will focus primarily on improving transportation safety in the unincorporated local communities in the county.

TABLE OF CONTENTS


DEATH/SERIOUS INJURY IS UNACCEPTABLE
HUMANS MAKE MISTAKES
HUMANS ARE VULNERABLE
RESPONSIBILITY IS SHARED
SAFETY IS PROACTIVE
REDUNDANCY IS CRUCIAL
THE SAFE SYSTEM APPROACH
Safe Road Users
Safe Vehicles
Safe Speeds
Safe Roads
Post-Crash Care

OVERVIEW

Hickman County is located in middle Tennessee and its city of Centerville serves as the county seat. However there are eighteen unincorporated communities that make up the rest of the county.

To ensure the safety and well-being of all visitors and residents, the county has an audacious goal of eliminating fatal and serious injuries on its roadway network by 2045. This goal complies with the U.S. Department of Transportation's National Road Safety Strategy (NRSS) which states that even one death on our transportation systems is unacceptable.

The NRSS has adopted the Safe System Approach that focuses on both human error and vulnerability and creates a transportation system with excessive safety features designed to protect all transportation users. The following principles serve as the basis for a **Safe System Approach**:

- *Death and serious injuries are unacceptable.*
- *Transportation systems should be designed to avoid fatal and serious injuries when crashes do occur and to prepare for inevitable human mistakes.*
- *Transportation systems should be designed to accommodate the physical limits and vulnerabilities of humans.*
- *All stakeholders of the transportation system share responsibility for keeping our roadways safe.*
- *Safety issues in the transportation system should be addressed proactively.*
- *A system with redundancy will reduce risks and strengthen the transportation system.*

These guiding principles can be carried out using the **Five Complementary Objectives** corresponding to the Safe System Approach:

- **Safer People** - *Encourage safe, responsible driving and behavior by people who use our roads and create conditions that prioritize their ability to reach their destination unharmed.*
- **Safer Roads** - *Design roadway environments to mitigate human mistakes and account for injury tolerances, to encourage safer behaviors, and to facilitate safe travel by the most vulnerable users.*
- **Safer Vehicles** - *Expand the availability of vehicle systems and features that help to prevent crashes and minimize the impact of crashes on both occupants and non-occupants.*
- **Safer Speeds** - *Promote safer speeds in all roadway environments through a combination of thoughtful, equitable, context-appropriate roadway design, appropriate speed-limit setting, targeted education, outreach campaigns, and enforcement.*
- **Post-Crash Care** - *Enhance the survivability of crashes through expedient access to emergency medical care, while creating a safe working environment for vital first responders and preventing secondary crashes through robust traffic incident management practices.*

Why is the Safe Systems Approach Important?

Because every life is important, and every life faces risk on the transportation network. From 2019-2023, 42 people lost their lives in Hickman County, while 187 people faced incapacitation or other serious injuries. 39 of the fatalities and 178 of the incapacitations occurred in unincorporated locations within the county. These alarming statistics demand answers.

The Safe Systems Approach is an initiative that supports "Vision Zero" which is a concept that was first adopted in Sweden in 1997 but has since reached many transportation departments and has established zero deaths as the main objective of transportation safety plans. Hickman County pledges to abide by this commitment.

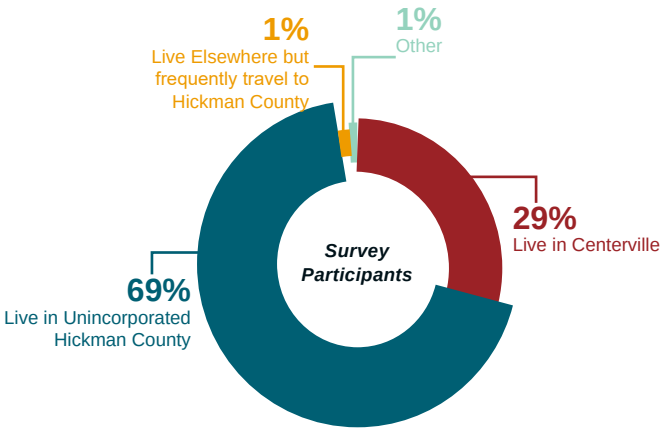
Within the Safe System Approach, transportation safety entails a collective responsibility among planners, constructors, operators, and users of the road network. It adopts a comprehensive perspective on road infrastructure, considering the dynamics between roads, travel speeds, vehicles, and road users. Hickman County has every intention to be proactive about the current safety issues present on our roadways and to champion our bold goal of bringing the number of deaths and serious injuries in our county to zero.

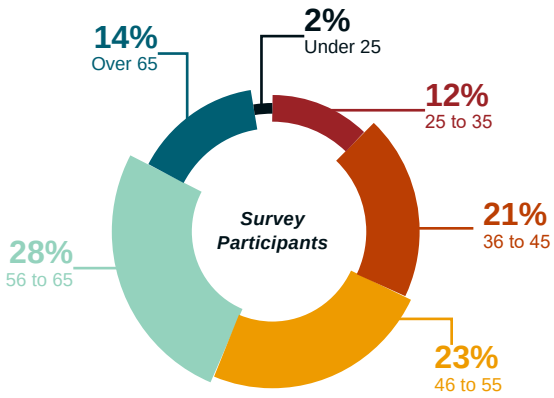
COMMUNITY ENGAGEMENT

Public involvement regarding a community's transportation network is essential in the decision-making process. While engineering judgment and data provide objective analyses, community input offers context to ensure that the proposed transportation improvements are aligned with the needs and the values of those who will be directly affected.

Hickman County prioritized community engagement by conducting a comprehensive survey to gather resident and visitor input on transportation issues and priorities. From February 8th to March 8th of 2024, a public survey was made available online. The survey was crafted to capture a wide range of perspectives, incorporating both quantitative and qualitative questions to endure a thorough understanding of community needs and preferences. The results were analyzed, providing valuable insights that informed strategic decision-making and fostered a sense of inclusion, transparency, and community.

The survey prompted 265 respondents, a majority of whom reside in unincorporated areas of Hickman County, as demonstrated in the charts below.





A significant portion of respondents reside in Districts 6 and 7 (Figure 1). Understanding the districts where our survey participants live is valuable, as it offers useful insights into the demographic distribution of our sample.

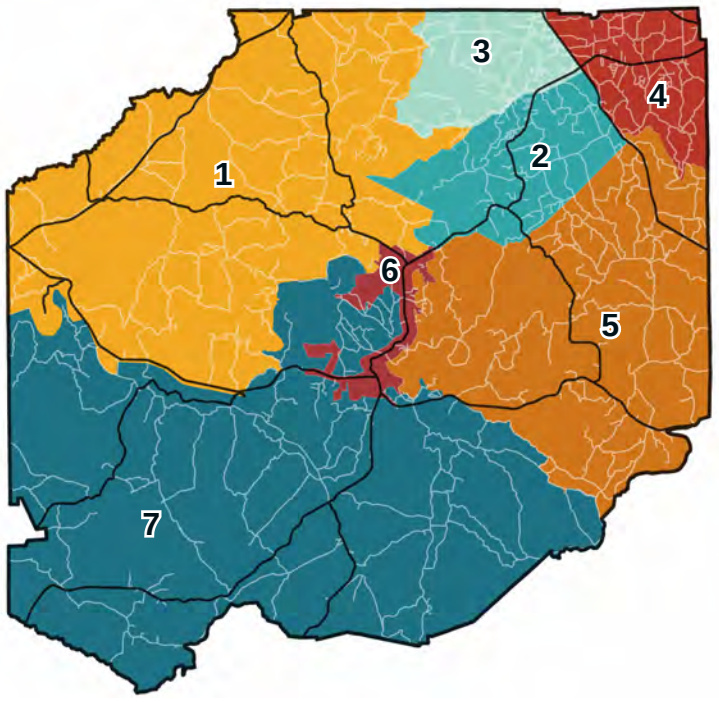


Figure 1: Hickman County District Map

District 1 - 12%

District 2 - 11%

District 3 - 7%

District 4 - 11%

District 5 - 13 %

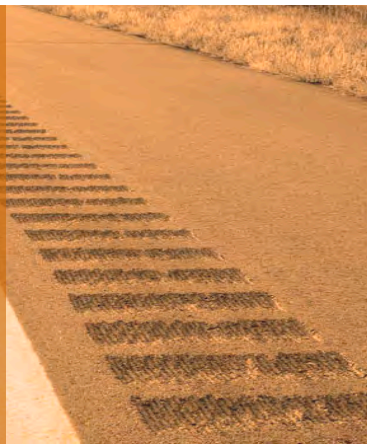
District 6 - 17%

District 7 - 15%

Respondent Unsure of District - 13%

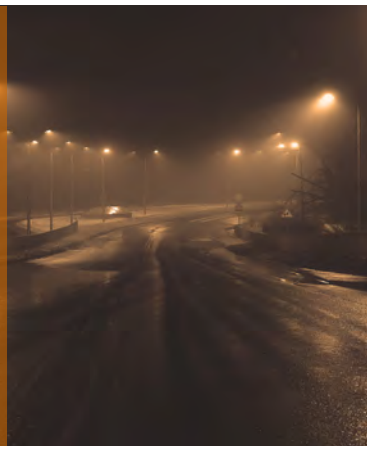
Respondent Lives Outside of Hickman County - 1%

57% of respondents believe that adding and/or widening shoulders throughout the county is essentioal for improving transportation safety.



Un-signalized intersections, unclear warning signs/ pavement markings & impeding roadside vegetation were also identified as prominent safety issues.

One of the top four safety concerns reported was inadequate street lighting.



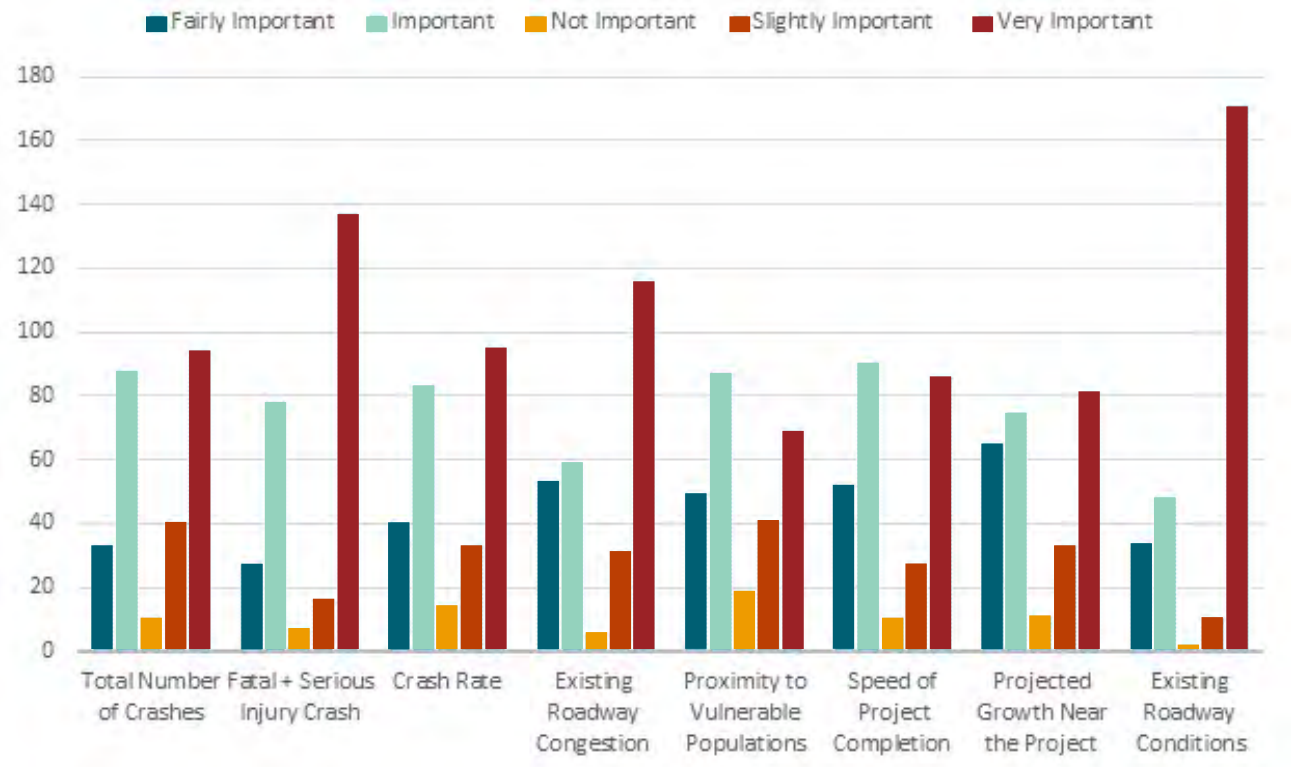
More than 50% of respondents supported the widening of travel lanes.

30% of survey respondents felt unsafe driving through intersections without turn lanes.

40% of respondents conveyed a need for more guardrails.

39% of respondents felt that the county should address safety concerns related to low-water crossings.

Additionally, participants were asked to prioritize the criteria they believe should guide the selection of transportation projects, results are shown in the bar chart below. This provided insight into both the key safety issues and the factors that are most important to the community when addressing these concerns.



Community engagement is vital to the Hickman County Commission, especially regarding transportation safety. The Commission regards resident and visitor feedback as a key priority in the decision-making process, as it creates an action plan tailored toward the community's needs. To ensure continuous improvement, the Commission will monitor progress following the implementation of this CSAP. Regular progress reports will be made publicly available to keep the community informed and involved.

EQUITY CONSIDERATIONS

Equity considerations are a crucial part of transportation planning because they ensure that safety improvements address the needs of all community members, particularly those who are most vulnerable or underserved, including pedestrians, cyclists, the elderly population, users with disabilities, and others who are at risk on the roadways. By incorporating equity into this CSAP, we can identify and prioritize areas where traffic safety issues disproportionately affect marginalized populations.

This approach creates a more inclusive strategy that not only aims to eliminate traffic fatalities and serious injuries but also reduces disparities and ensures that all individuals have equal access to safe transportation infrastructure. According to the USDOT Equitable Transportation Community (ETS) Explorer, the total population of Hickman County is 25,000 with 21,600 of the population living in disadvantaged census tracts.

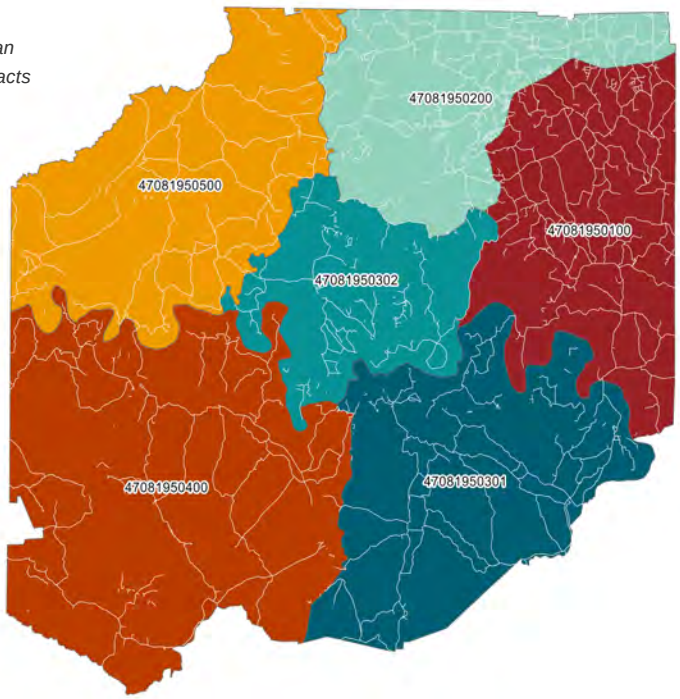
Hickman County Population: 25,000

86% of the population lives in a disadvantaged area

16% of the population is over 65 years old

Every census tract in Hickman County suffers from at least one of the disadvantages outlined by the Climate and Economic Justice Screening Tool (CEJST). Figure 2 shows each census tract in Hickman County and the categories of burden that are exhibited in each one.

Figure 2: Hickman County Census Tracts



Tract	Identified as Disadvantaged	Climate Change Burden	Energy Cost Burden	Health Vulnerability	Housing Vulnerability	Legacy Pollution	Transportation Vulnerability	Water and Wastewater	Workforce Development
47081950400	•	•		•			•		
47081950301	•	•		•			•		•
47081950100	•	•					•		
47081950200	•	•		•		•	•		
47081950500	•	•		•	•		•		
47081950302	•								

Categories of Burden as Outlined by the CEJST:

1. **Climate Change Burden**: Census tracts that are not at or above the 90th percentile for expected agriculture loss rate or expected building loss rate or expected population loss rate or projected flood risk or projected wildlife risk and are at or above the 65th percentile for low income.

2. **Energy Cost Burden**: Census tracts that are at or above the 90th percentile for energy cost or OM2.5 in the air and are at or above the 65th percentile for low income.

3. **Health Vulnerability**: Census tracts that are at or above the 90th percentile for asthma or diabetes or heart disease or low life expectancy and are at or above the 65th percentile for low income

4. **Housing Vulnerability**: Census tracts that experienced historic under investment or are at or above the 90th percentile for housing cost or lack of green space or lack of indoor plumbing or lead paint and are at or above the 65th percentile for low income.

5. **Legacy Pollution**: Census tracts that have at least one abandoned mine land or Formerly Used Defense Sites or are at or above the 90th percentile for proximity to hazardous waste facilities or proximity to Superfund Sites (National Priorities List (NPL)) or proximity to Risk Management Plan (RMP) facilities and are at or above the 65th percentile for low income.

6. **Transportation Vulnerability**: Census tracts that are at or above the 90th percentile for diesel particulate matter exposure or transportation barriers or traffic proximity and volume and are at or above the 65th percentile for low income.

7. **Water and Wastewater Burden**: Census Tracts that are at or above the 90th percentile for underground storage tanks and releases or wastewater discharge and are at or above the 65th percentile for low income.

8. **Workforce Development Burden**: Census tracts that are at or above the 90th percentile for linguistic isolation or low median income or poverty or unemployment and more than 10% of people ages 25 years or older whose high school education is less than a high school diploma.

The census tracts that have been identified as disadvantaged meet at least one of the following requirements:

- At or above the threshold for one or more environmental, climate, or other burdens
- At or above the threshold for an associated socioeconomic burden
- A census that is surrounded by disadvantaged communities and is at or above the 50% percentile for low income is also considered disadvantaged

Incorporating equity considerations into this CSAP is essential for fostering inclusive access to mobility and resources. By prioritizing the needs of underserved communities, Hickman County can address disparities in transportation access that disproportionately affect low-income, disadvantaged, and marginalized groups. Equity-driven planning ensures that all community members benefit from transportation investments, leading to improved social cohesion, economic opportunities, and overall quality of life. Ultimately, considering equity in transportation planning not only enhances the effectiveness of infrastructure projects but also promotes a more just and sustainable future for all residents of Hickman County

POLICY AND PROCESS REVIEWS

An evaluation process for assessing current policies, plans, guidelines, and standards was conducted by the Hickman County Commission to identify opportunities to enhance transportation safety.

Several agencies hold accountability for the safety and accessibility of the Hickman County transportation system, including The City of Centerville, and more. On a local level, there are few existing plans devoted to safety issues in Hickman County, but this CSAP has been developed to address that gap by providing a framework for prioritizing and enhancing safety measures. It marks the beginning of a structured approach to improving transportation safety throughout the country.

The following transportation plans have been reviewed and will serve to address issues in Hickman County as well as the entire state of Tennessee:

TDOT 25-Year Long-Range Transportation Policy Plan: Safety, Security, and Transportation Resilience

The TDOT 25-Year long-Range Transportation Policy Plan outlines a strategic vision for advancing safety, security, and resilience across Tennessee's transportation system. The plan focuses on integrating detection, to reduce accidents and enhance overall road safety. It also emphasizes strengthening infrastructure against natural and human-caused threats, including upgrading critical roadways and bridges to withstand extreme weather and other potential threats, Additionally, the plan advocated for comprehensive risk management strategies and emergency response frameworks to ensure quick recovery and minimal disruption during unforeseen events. By establishing clear long-term goals and implementing proactive measures, this policy paper aims to create a robust and adaptive transportation network that meets the evolving needs of the state.

TDOT Strategic Highway Safety Plan (SHSP)

The Tennessee Department of Transportation's Strategic Highway Safety Plan (SHSP) aims to reduce traffic fatalities and serious injuries by using data-driven strategies to address key issues like impaired driving, speeding, and pedestrian safety. The plan focuses on targeted actions, collaboration with various stakeholders, and ongoing evaluation to improve road safety across the state.

TDOT Highway Safety Improvement Program (HSIP) Annual Report

The Tennessee Department of Transportation's Highway Safety Improvement Program (HSIP) Annual Report highlights the program's efforts to enhance roadway safety through targeted projects and funding. It includes details on the implemented safety measures, performance metrics showing their impact on reducing crashes, and any challenges encountered. The report also outlines future goals and plans to further improve road safety across the state.

ANALYSIS OF EXISTING CONDITIONS AND HISTORICAL TRENDS

Crash Analysis for All Crashes in Hickman County

The historical crash data from Hickman County speaks for itself - 2,533 crashes occurred from 2019 through 2023. In this same period, 42 lives were lost due to fatal traffic collisions and another 187 individuals suffered from incapacitating injuries. In 2022 alone, Hickman County exhibited a higher fatality rate per 100,000 population compared to larger, metropolitan counties in Tennessee like Davidson, Shelby, and Knox Counties.

The crash data presented throughout this report was collected utilizing the Tennessee Department of Transportation's Enhanced Tennessee Roadway Information Management System (E-TRIMS), which is a database that includes all traffic safety data collected by law enforcement agencies throughout the state.

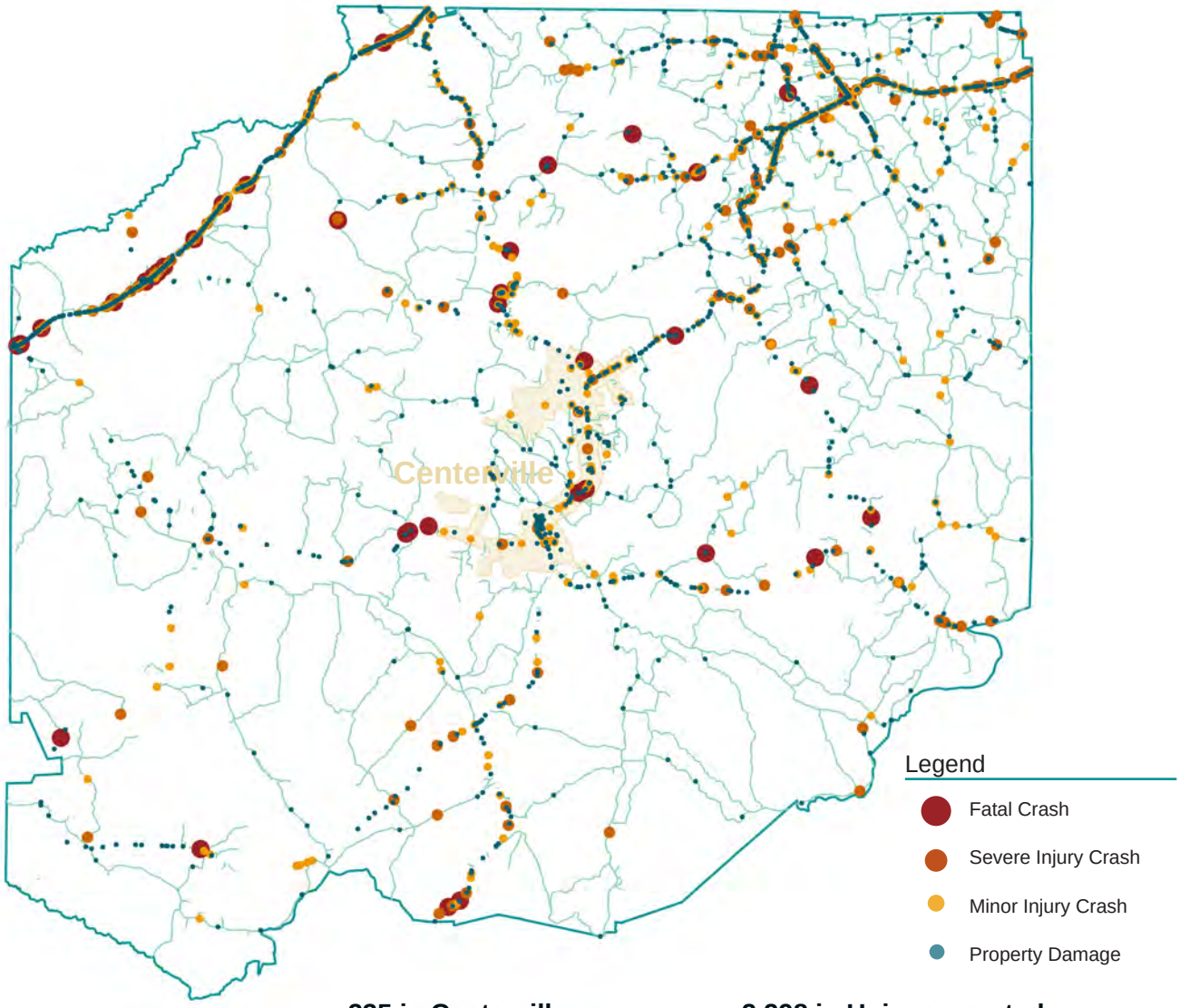


Figure 3 illustrates all crashes that have occurred throughout Hickman County from 2019 to 2023, highlighting their severity with distinct markers that indicate the extent of each accident.

235 in Centerville

2,298 in Unincorporated

To understand the deeper narrative, we must investigate the context of these crashes. Are they caused by factors inherent to rural driving - like winding roads, limited visibility, or wildlife encounters? Or are there systemic issues at play - like road maintenance, signage, or enforcement?

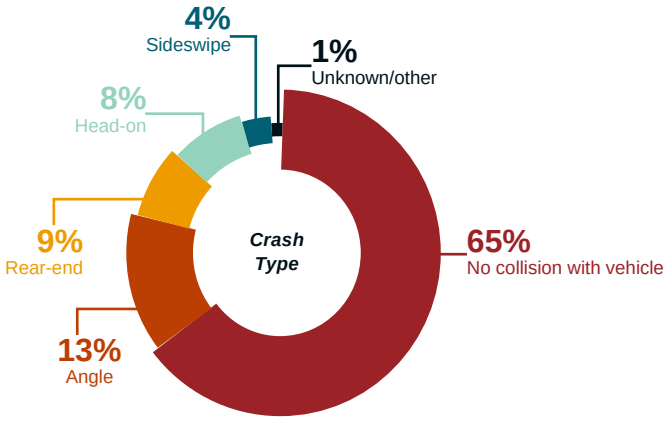
In the 5-year span from 2019 to 2023, the following people were killed or severely injured:

221 individuals driving

8 individuals walking

Crashes resulting in fatality and serious injuries included the following crash types:

- The data shows that approximately 65% of all fatal and serious injury crashes were non-collision crashes which involved drivers colliding with non-vehicular objects. The crash types that accounted for the remaining crashes are shown below.



No Collision with vehicle crashes were attributed to the following initial events:

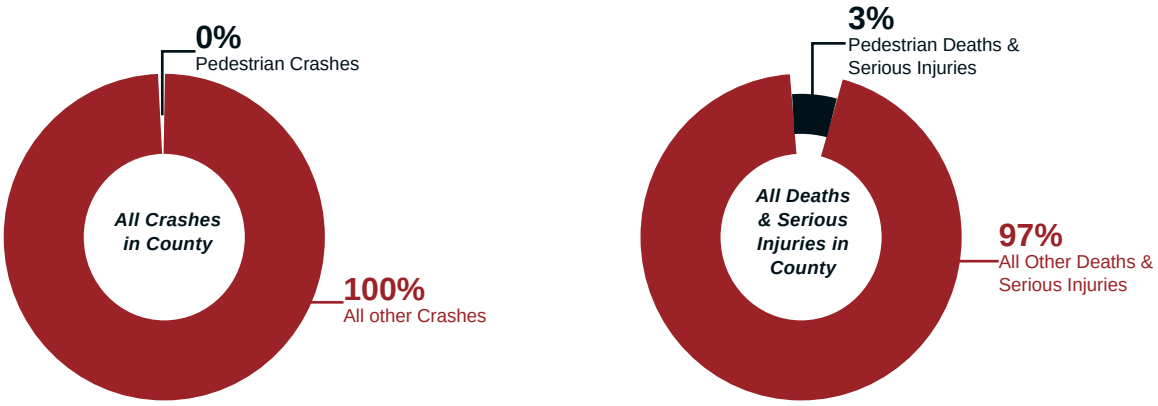
- Non-collision crashes accounted for 65% of all fatal and serious crashes (as displayed above), highlighting a significant concern. The initial events leading to these non-collision incidents include overturns, impacts with trees, and collisions with ditches and embankments.
- Additionally, 8 of these crashes involved vehicles striking pedestrians, which is particularly alarming. These results suggest a need for increased attention to roadside safety features and pedestrian protection measures. The events that culminated in these non-collision crashes are summarized below.

Standing Tree	32
Overturn	24
Ditch	13
Earth Embankment	17
Pedestrian	8
Guardrail	6
Culvert	4
Mailbox	4
Utility Pole	4

Bridge Rail	3
Fell/Jumped from Vehicle	2
Fence	2
Building	1
Curb	1
Highway Traffic Sign Post	1
Immersion	1
Other	2

Individuals walking on Hickman County roads are most at risk of death and serious injuries:

- The data shows that while pedestrian-related crashes accounted for less than 0.5% of all crashes, they resulted in 3.5% of the fatal and serious injuries throughout the county (Figure 7).
- Due to the unpredictability of traffic, it is crucial to Hickman County to prioritize the safety of vulnerable users through measures such as improved crosswalk visibility, efficient traffic calming strategies, and strict enforcement of speed limits to mitigate the risks of deaths and serious injuries.



The fatal and serious injury crashes throughout Hickman County can be attributed to the following driver actions:

- Human vulnerability is a significant cause of traffic crashes. Driver behavior can greatly influence the severity of accidents. Vulnerabilities like impaired reaction times, distraction, and fatigue increase the likelihood of collisions and can intensify their consequences.
- The data reveals that 47% of fatal and serious injury crashes occurred when drivers veered off the roadway, deviating from their designed travel lane (Lane Departure), the table below outlines the other driver actions involved in these fatal and serious injury crashes:

Driver Action	Percentage of Total Fatal & Serious Crashes
Lane Departure	47%
No Contributing Actions	16%
Unknown/Other	11%
Failure to Yield Right of Way	5%
Following improperly	4%
Driving Left of Center	3%
Careless Erratic Driving	2%
Operator Inexperience	2%
Speed too Fast for Conditions	2%
Exceeding Posted Speed Limit	2%
Failure to Obey Traffic Controls	2%
Inattentive (Eating, Reading, Talking, etc.)	1%
Over Correcting	1%
Failure to Use Lights	1%
Improper Lane Changing	1%
Improper Passing	1%
Improper Turn	1%
Operating Without Required Equipment	1%
Reckless Negligent Driving	1%
Swerved or Avoided	1%

Proper roadway construction is vital for ensuring safe transportation, but equally important are education, enforcement of traffic laws, and understanding driver characteristics. Throughout Hickman County, it was reported that 840 of the crashes had no contributing action by the driver. This hints at possible roadway issues, but it may also reflect instances where drivers have obscured details or minimized their behavior prior to the collision. Another 213 of the reported crashes were classified as “unknown”, which creates ambiguity in fully understanding the data. The driver characteristics leading to these crashes are summarized in the table below.

Driver Action	Number of Crashes
No Contributing Actions	840
Lane Departure	743
Unknown Action	213
Following Improperly	170
Failure to Yield Right of Way	104
Other (Narrative)	91
Speed too Fast for Conditions	66
Swerved or Avoided	61
Over Correcting	28
Careless Erratic Driving	25
Improper Lane Changing	23
Improper Turn	22
Reckless Negligent Driving	22
Operator Inexperience	19
Improper Backing	18
Driving Left of Center	17
Inattentive (Eating, Reading, Talking, etc.)	14
Failure to Obey Traffic Controls	11
Driver Distracted	9
Improper Passing	8
Vision Obstructed	7
Exceeding Posted Speed Limit	6
Aggressive Driving Road Rage	2
Driving Wrong Way on One-Way Roadway	2
GPS Distractions	2
Improper Loading of Vehicle Cargo or Passengers	2
Operating Without Required Equipment	2
Speed Too Slow	2
Failure to Observe Warning or Instructions	1
Failure to Signal Intentions	1
Failure to Use Lights	1
Texting/PDA/Blackberry Distraction	1

Speed Management Concerns and Speed Studies

Although speeding was reported as a driver characteristic in only 2.6% of the crashes throughout Hickman County, it may still present a potential risk in safety and contribute to crashes. Taking a proactive approach to speed related issues enhances road safety for all residents and creates redundancies to protect drivers, pedestrians, and other road users from potential injuries and fatalities. Speed studies were conducted on two roads that residents reported as areas of concern due to speeding. The results of those studies are summarized below:

Road Name	Posted Speed Limit (mph)	Total Crashes (2019-2023)	Total Fatalities	Total Incapacitations	AADT	Percent of Vehicles Driving over Posted Speed Limit	
						Eastbound Traffic	Westbound Traffic
Hidden Valley Rd.	35	19	0	1	849	86	79
John Crow Rd.	20	13	0	0	122	98	98

With a majority of vehicles driving over the speed limit on both of these roads, it is important to further assess these areas and consider potential speed management mitigations such as speed limit reductions, speed humps, speed safety cameras, etc.

This section provides an overview of traffic crash patterns across Hickman County. Notably, a significant proportion (91%) of the county's total crashes occur in unincorporated regions of the county. This leads to similar data trends for both the overall county and its unincorporated areas. In the next section, crash patterns on the county-maintained roads in unincorporated communities of Hickman County will be analyzed more specifically, offering a focused analysis of where these crash trends are occurring and how they can be mitigated.

Detailed Crash Analysis for Unincorporated Communities in Hickman County

A majority of the total crashes throughout the county occurred in unincorporated areas.

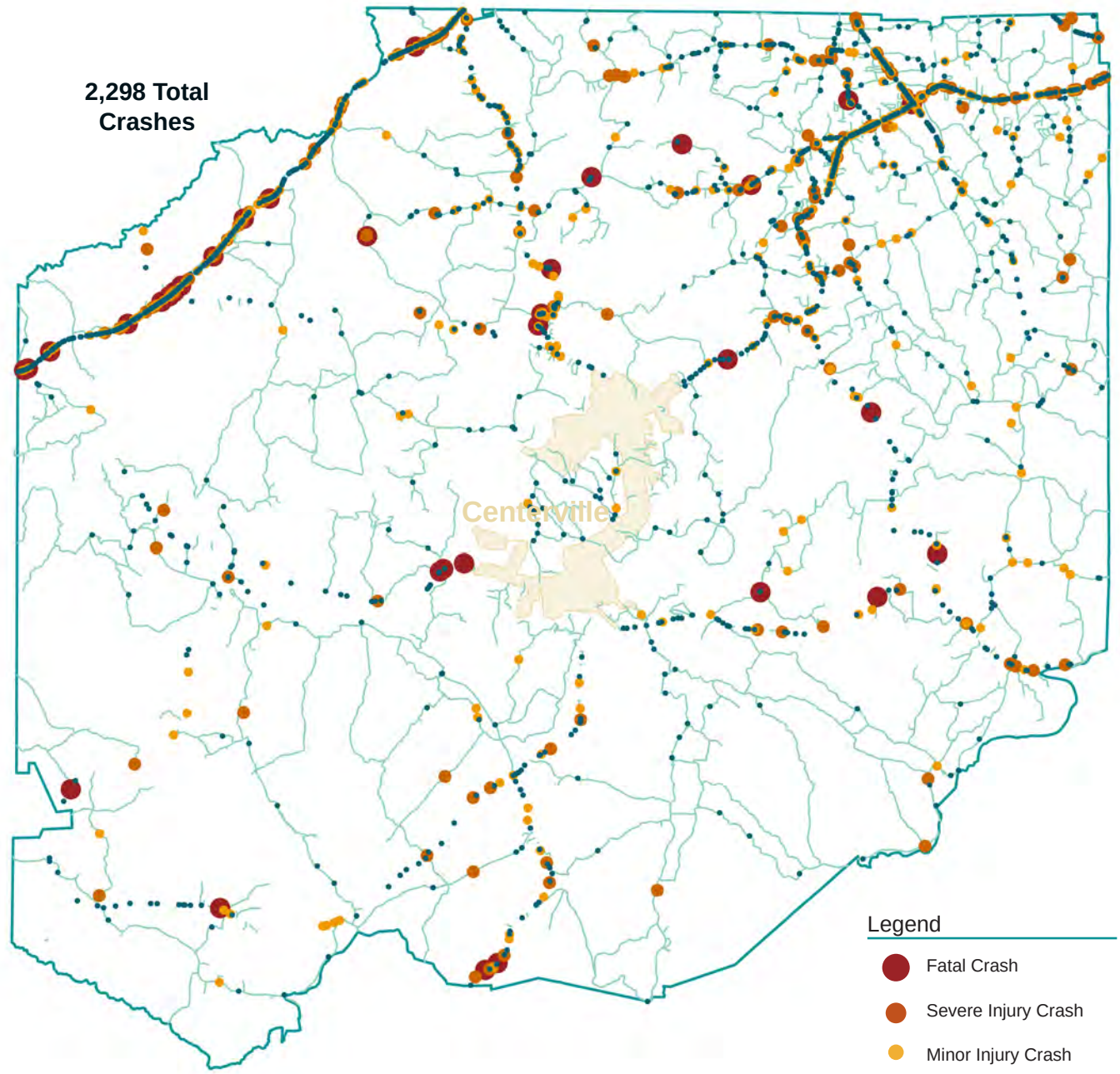
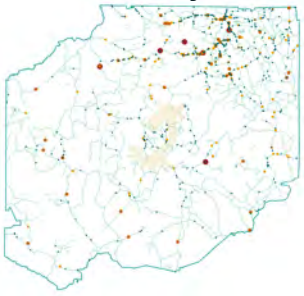


Figure 4: All crashes in Hickman County (2019-2023)

1,054 on State Routes

649 on County Roads

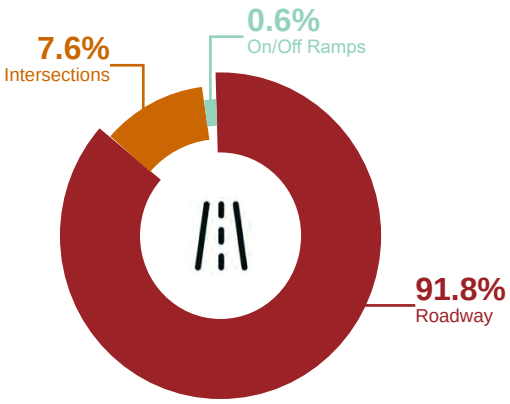


593 on Interstates

2 on State Park Roads

During the analysis of crash trends throughout *all unincorporated areas of Hickman County*, the following key findings were determined:

Where are the crashes occurring?



Who is impacted by the crashes?

13
involved pedestrian and/or cyclists

6/13
incapacitating

2/13
fatal

Pedestrians/cyclists accounted for less than half of a percent of all crashes but accounted for 5.5 % of all of the fatal crashes throughout the county.

Although the primary focus of this CSAP is on roads maintained by Hickman County, is crucial to emphasize road safety across all roadways throughout the county, regardless of jurisdiction. In fact, the data shows that the frequency of crashes occurring on state-maintained routes in the unincorporated county is disproportionately high compared to their share of the road network. These routes, despite comprising only 16% of the total centerline miles in the unincorporated community, account for a staggering 72% of all reported crashes. This is summarized in the table below for unincorporated routes.

Facility Type	Centerlane Miles		Total Crashes		Fatalities + Serious Injuries	
	Miles	Percent	Number	Percent	Number	Percent
Interstates	15.82	2	593	26	56	26
State Routes	133.34	14	1054	46	101	47
County Roads	809.37	83	649	28	60	27
State Park Roads	11.92	1	2	0	0	0

This disparity underscores a critical need for targeted safety measures and interventions to mitigate risks on these high-traffic and potentially hazardous routes. Because crashes on state routes account for 46% of all the unincorporated area crashes, Hickman County has compiled crash data on all the state routes in the county to identify crash patterns and gain insights into strategies for reducing these incidents.

State Route	Total Crashes	Total Fatalities	Total Incapacitating Injuries	AADT	Collision	
					Type	Total
SR007	136	0	7	4298	No collision w/ vehicle	51
					Rear-end	40
					Angle	30
					Unknown/Other	7
					Sideswipe	5
					Head-on	3
SR046	110	0	9	12393	Read-end	47
					No collision w/ vehicle	30
					Angle	19
					Unknown/Other	6
					Sideswipe	6
					Head-on	2
SR048	297	7	27	9416	No collision w/ vehicle	165
					Rear-end	51
					Angle	36
					Sideswipe	24
					Unknown/other	14
					Head-on	7
SR050	109	5	13	3298	No collision w/vehicle	77
					Rear-end	10
					Angle	8
					Unknown/other	6
					Sideswipe	6
					Head-on	2
SR100	456	3	30	12238	No collision w/ vehicle	174
					Rear-end	158
					Angle	56
					Sideswipe	37
					Unknown/other	25
					Head-on	6
SR230	74	2	6	1585	No collision w/ vehicle	57
					Unknown/other	4
					Angle	4
					Sideswipe	4
					Rear end	3
					Head-on	2
SR438	15	1	1	911	No collision w/ vehicle	11
					Angle	3
					Sideswipe	1

Detailed Crash Analysis for County-Maintained Roads in Unincorporated Communities

Hickman County prioritizes focus on safety and analysis of the unincorporated county-maintained routes. These roads often serve as vital routes for residents, and improving safety measures can significantly reduce the risk of accidents, protecting the lives of drivers, pedestrians, and cyclists. Furthermore, residents in unincorporated areas may have limited access to transportation alternatives so addressing safety on these roads can help bridge gaps and ensure equitable access to resources and opportunities. 649 crashes were reported on unincorporated county-maintained routes.

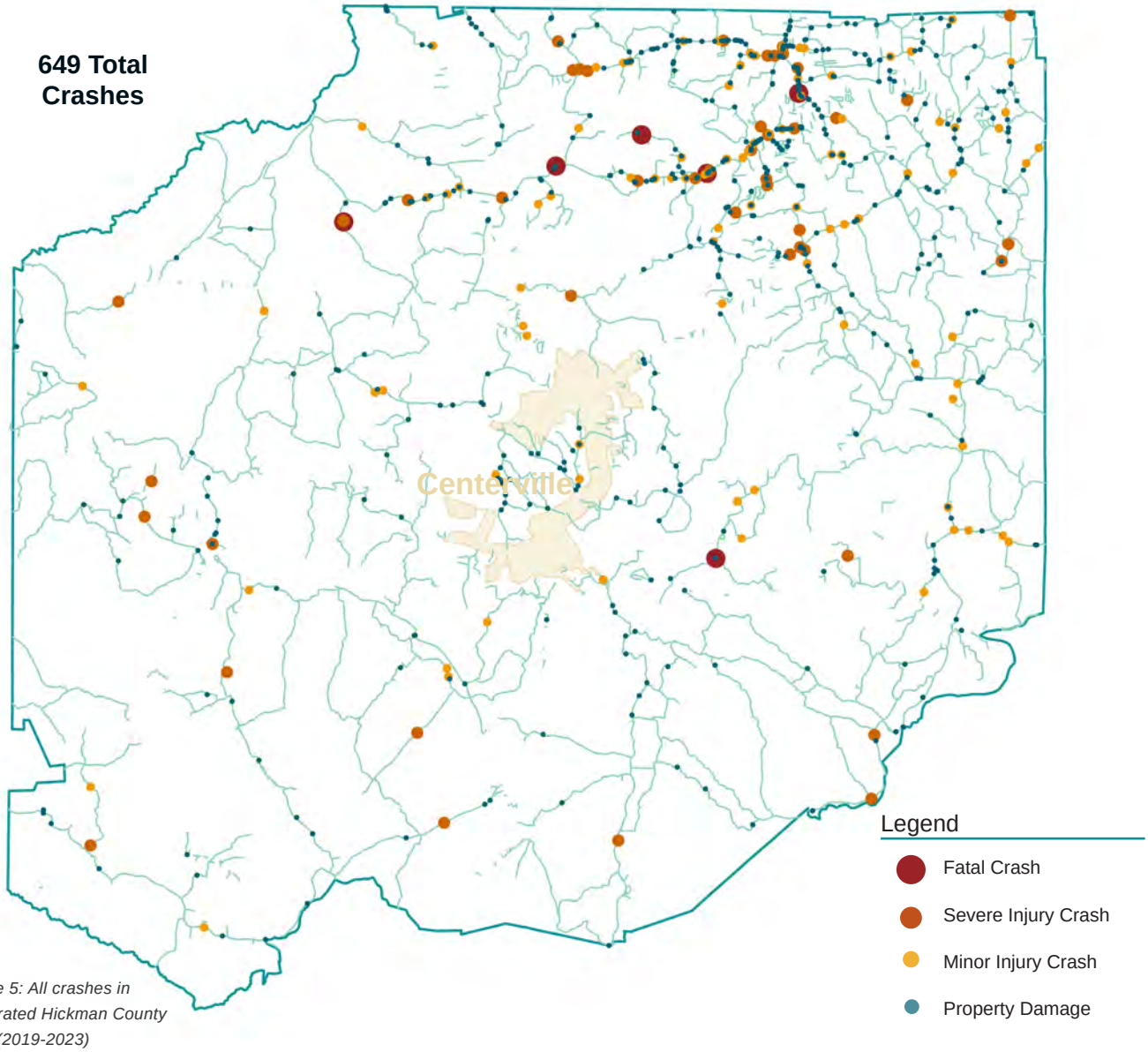
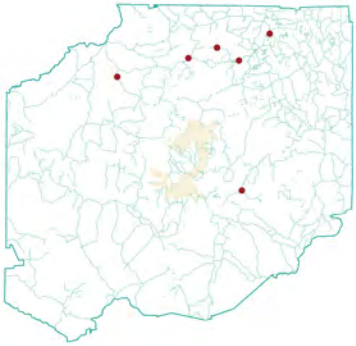
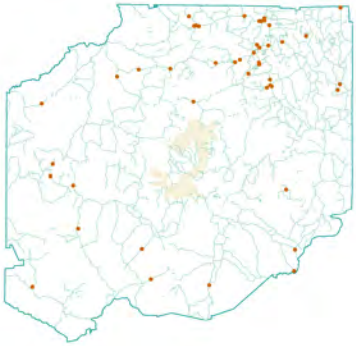


Figure 5: All crashes in Unincorporated Hickman County (2019-2023)

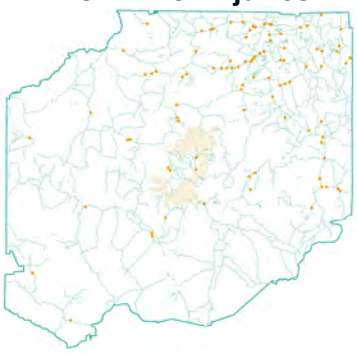
8 Fatalities



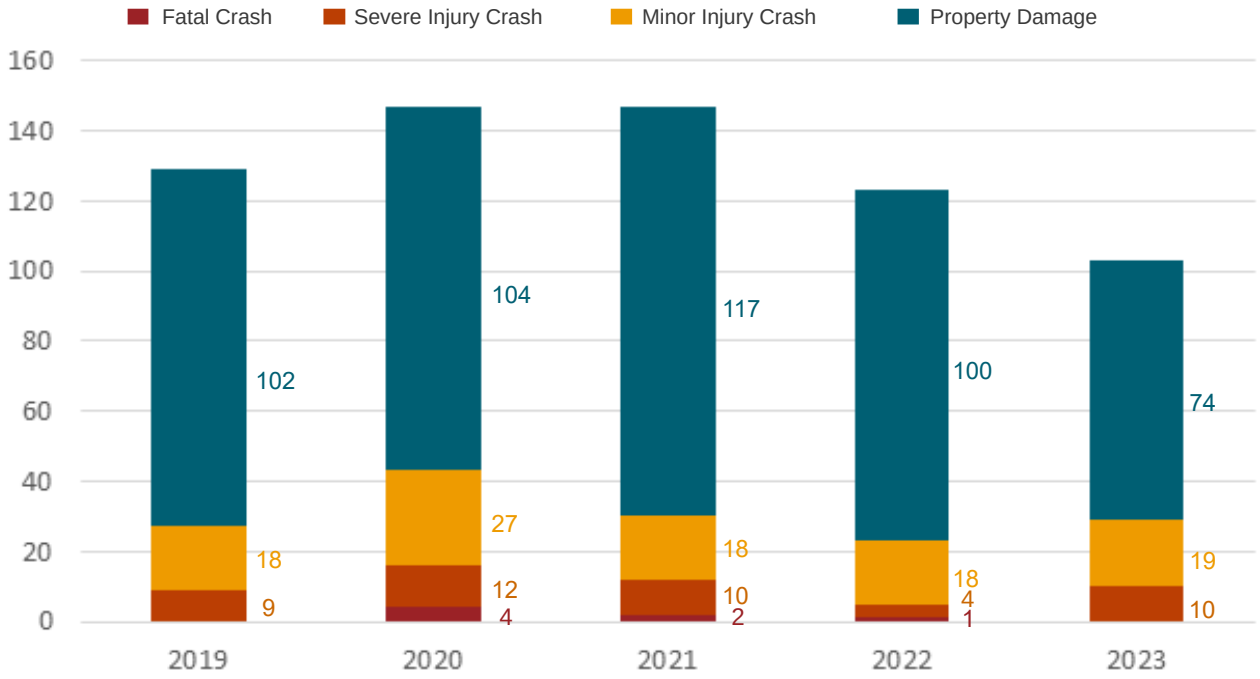
52 Severe Injuries



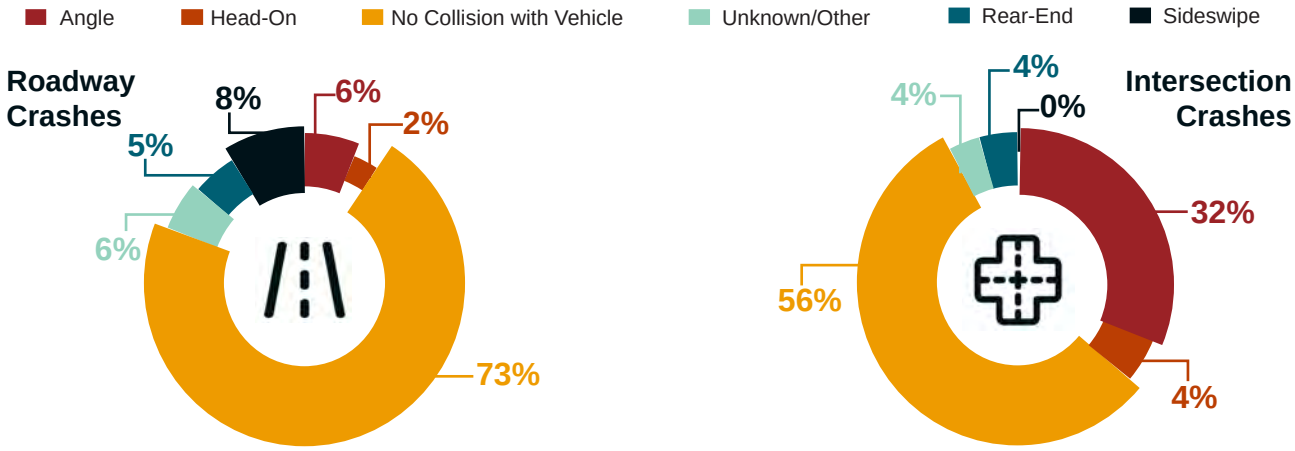
132 Minor Injuries



The distribution of crashes that occurred on county-maintained roads in Unincorporated Hickman County is shown below.



An overwhelming 96% of the crashes occurred directly on the roadway, with the remaining 4% taking place at intersections. Most of these incidents were characterized as non-collisions with other vehicles. These crashes have had profound consequences, resulting in 8 fatalities and 52 incapacitating injuries. The underlying event leading to most of these crashes was found to be some form of roadway departure, a trend often observed on rural roadways. Understanding and mitigating these patterns will be pivotal to addressing and improving overall road safety and reducing the incidence of accidents in the region.



Distinguishing between crashes that occur on the roadway versus those at intersections is important because different types of crashes often require distinct safety interventions. Understanding where crashes occur helps prioritize specific measures, such as improving signage, adding traffic signals, or redesigning intersections.

By identifying high-risk areas (whether on the roadway or at intersections) Hickman County can allocate resources more efficiently, focusing on locations with the highest potential for reducing crashes and enhancing safety.

After reviewing the crash data for county-maintained roads in the unincorporated areas, Hickman County has identified patterns that highlighted specific high-risk locations. By analyzing the frequency and severity of incidents, we were able to pinpoint areas that require immediate attention for safety improvements. This data-driven approach enables us to prioritize specific locations and allocate resources effectively to enhance overall road safety for all residents and visitors.

HIGH INJURY NETWORK

A high injury network (HIN) is a strategic selection of road segments and intersections within a region that have consistently high rates of severe injuries and fatalities resulting from traffic crashes. This network is identified through comprehensive analysis of crash data, focusing on areas where vulnerable road users such as pedestrians, cyclists, and motorcyclists are particularly at risk. The selection process involves evaluating factors such as crash frequency, severity, and specific contributing factors like speeding or inadequate infrastructure. By pinpointing these critical locations, transportation authorities can prioritize resources and interventions to address safety deficiencies and implement targeted improvements. The goal of establishing a high injury network is to reduce the incidence of severe injuries and fatalities on these identified roadways, ultimately creating safer environments for all road users.

Hickman County's HIN consists of 9 roadway segments and 5 spot locations. The HIN is shown below.

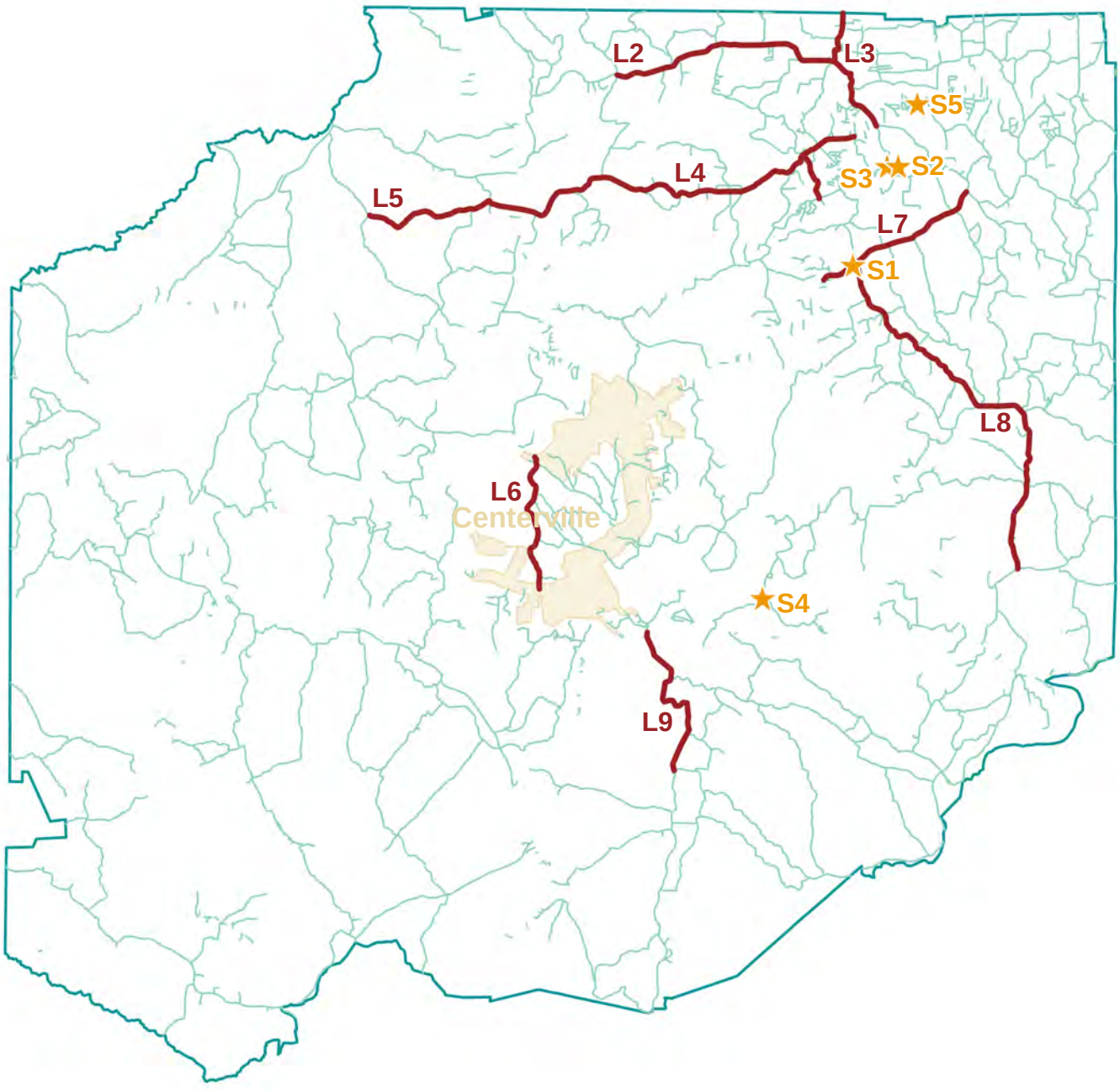


Figure 6: Hickman County High Injury Network

Map Label	Road Name	Total Crashes	Total Fatalities	Total Incapacitating Injuries
L1	Lyles Road	26	0	3
L2	Missionary Ridge Road	47	0	5
L3	Old SR-46	39	1	3
L4	Pinewood Road	43	3	7
L5	Hidden Valley Road	19	0	1
L6	Grinders Switch Road	10	0	0
L7	Brown Hollow Road	12	0	0
L8	Primm Springs Road	25	0	3
L9	Swan Creek Road (from SR-50 to Perry Bend Road)	8	0	0
S1	Brown Hollow Road & Primm Springs Road	4	0	1
S2	Johnny Crow Road & Johnny Crow Road	5	0	0
S3	Johnny Crow Road & Taylor Cemetery Road	3	0	0
S4	Totty's Bend Road (~0.12 miles south of Old Highway 50 E)	2	1	0
S5	State Highway 46 & State Highway 100	56	0	4

Hickman County's HIN accounts for:

48 **Miles of Roadways in Unincorporated Areas of the County**

> 46% **Of all the Fatal / Serious Crashes reported on County-Maintained Roads**

> 37% **Of all the Total Crashes reported on County-Maintained Roads**

The HIN was selected in Hickman County's unincorporated areas on its county-maintained roads only. However, one of the intersection spot locations evaluated as part of the HIN is a State-owned intersection. It is important to analyze this location regardless of ownership as it presents an opportunity for collaboration between state and local agencies at a high-risk location.

The chosen HIN in Hickman County was carefully selected to target areas with the highest incidence of accidents, ensuring that the planned improvements will significantly enhance safety and reduce injuries, ultimately fostering a safer environment for all road users and contributing to the Vision Zero goal.

LOW-WATER CROSSING

Hickman County's 88 low-water crossings, due to its varied terrain and numerous waterways, are critical to local infrastructure but present severe safety risks, especially during heavy rains or flooding. These crossings transform into dangerous obstacles when water levels rise, with fast-moving currents that can sweep vehicles off the road. Visibility is often poor, making it nearly impossible for drivers to assess the depth of the water or the condition of submerged roads. Worse still, strong currents and structural damage from floodwaters can lead to washed-out roads, stranding drivers and cutting off communities from key routes to work, schools, medical facilities, and grocery stores, leaving residents isolated without access to vital resources. In some cases, residents may be trapped in their homes for days, unable to leave until floodwaters recede.

One of the greatest concerns involves the impact on emergency response efforts. When low-water crossings flood, emergency vehicles may be delayed or entirely blocked from reaching residents in need of critical services. This puts lives at risk, especially during medical emergencies or when fires or rescues demand immediate attention. In life-threatening situations, such delays could be fatal.

A key area of concern is the safety and mobility of school buses. School buses that serve these areas often face dangerous conditions when crossing during or after heavy rains. Drivers may be forced to navigate flooded crossings or take lengthy detours, delaying student transportation and jeopardizing the safety of children. In extreme cases, buses may be unable to reach students altogether, leading to missed school days and significant disruptions to education.

The inability of school buses to operate safely during floods places additional strain on families who may lack alternative transportation, leaving children stranded at home and disconnected from essential services like schooling and meals.

The community's vulnerability due to these low-water crossings highlights the urgent need for safety improvements. Solutions include installing real-time water level signage and warning systems to alert drivers of hazardous conditions well in advance. Upgrading drainage systems and exploring alternative crossing designs, such as elevated roads or bridges, would help ensure that these routes remain passable even during floods. Infrastructure investment is critical for mitigating the dangers of low-water crossings, reducing isolation, and ensuring that residents can travel safely and reliably, regardless of weather conditions.

Raising public awareness about the dangers of crossing flooded roads is also vital. Many drivers underestimate the risks or are unaware of how quickly floodwaters can rise and become deadly. Educational campaigns could emphasize the importance of avoiding low-water crossings during storms, further promoting community safety.

For the disadvantaged communities reliant on these crossings, improving infrastructure is not just a matter of convenience—it's a matter of survival. These residents deserve safe, reliable access to emergency services, schools, workplaces, and basic necessities. Addressing the risks associated with low-water crossings is essential to ensuring the well-being of the entire community and preventing avoidable tragedies.

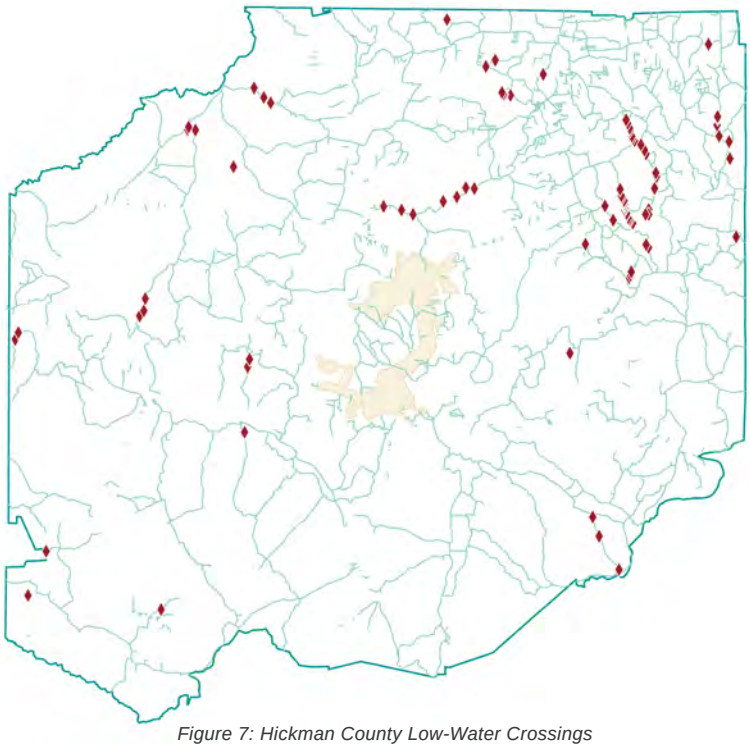


Figure 7: Hickman County Low-Water Crossings

GUARDRAIL SAFETY ISSUSES

Designed to prevent vehicles from leaving the roadway and encountering dangerous obstacles like cliffs, steep embankments, or fixed objects (such as trees, poles, or bridge supports), guardrails are critical components of roadside safety. However, guardrails themselves can become significant hazards if they are outdated, improperly maintained, or incorrectly installed. Hickman County aspires to ensure that guardrails do not become hazards themselves and can continue to provide safer roads for all. Through consistent attention and investment in roadside infrastructure, the county can significantly reduce the risks of roadway departures and make sure guardrails fulfill their intended role of saving lives.

Inadequate Guardrail Height and Structure

A key issue that can turn a guardrail into a hazard is its height or structural condition. Guardrails that do not meet current Federal Highway Administration (FHWA) standards—such as those less than 24 inches in height—are classified as non-functional. These low barriers are no longer capable of safely redirecting vehicles back onto the road. Particularly for larger or taller vehicles, low guardrails may cause the vehicle to vault over the top or slide beneath the rail, leading to rollovers, serious crashes, or even falls into dangerous off-road areas.

Outdated Guardrail Designs

Beyond height issues, outdated guardrail designs pose significant risks. Some older designs are less effective at absorbing or dissipating the energy from vehicle collisions compared to newer models. For instance, some guardrail end treatments designed decades ago have been linked to fatal crashes. A widely used guardrail end terminal, the ET-Plus, has sparked controversy for its role in crashes where the rail failed to crumble properly on impact. Instead of absorbing crash energy, it could impale vehicles, leading to life-threatening injuries.

Improper Guardrail Placement

Another issue arises when guardrails are installed in inappropriate locations or too close to the road's edge. Improper placement can increase risks for drivers, such as when guardrails are positioned along road sections with minimal chances of vehicle departure. In such cases, the guardrail may become a more dangerous obstacle than the natural surroundings. If a driver swerves to avoid an obstacle but instead strikes an improperly placed guardrail, the collision could cause more damage than if no guardrail were present. The strategic placement of guardrails is essential in balancing their protective function against the risks they may pose.

Damaged or Deteriorating Guardrails

Guardrails that have sustained damage—whether from previous crashes, weathering, or general wear and tear—can also become hazards. Bent, broken, or misaligned rails may lack the structural integrity to stop or redirect a vehicle in a collision effectively. According to FHWA guidelines, if a guardrail is pushed more than 18 inches out of alignment or if three or more posts are damaged or detached from the rail, it is no longer functional. In such cases, the guardrail may collapse upon impact, allowing the vehicle to break through and collide with the obstacles it was designed to protect against.

Defective Guardrail End Treatments

Guardrail end treatments—designed to terminate safely and absorb crash impact—are another area where guardrails can become hazardous. These end sections soften the impact of a vehicle hitting the end of the guardrail, preventing a collision with a rigid, immovable object. However, when these treatments are outdated, poorly installed, or damaged, they may fail to function correctly. Some older models have been known to "spear" vehicles upon impact, drastically increasing the risk of fatalities or severe injuries. Ensuring that all end treatments meet safety standards and are correctly installed is vital to reducing harm. Priority should be given to replacing end treatments that no longer meet safety standards, especially in high-traffic or high-risk areas.

Inconsistent Guardrail Coverage and Gaps

Inconsistent guardrail coverage or gaps in guardrail systems can also pose serious hazards. Large gaps in guardrail coverage can leave sections of the road unprotected, allowing drivers to swerve into these unguarded areas and encounter dangerous roadside hazards. Additionally, inconsistent coverage can confuse drivers, undermining their sense of protection. A continuous, well-maintained guardrail system is essential for ensuring that drivers remain shielded from off-road dangers.

Prioritizing Inspection and Replacement

Addressing these concerns requires a comprehensive approach, prioritizing the regular inspection, repair, and replacement of guardrails. Ensuring that all guardrails in Hickman County meet current FHWA standards is crucial to improving roadway safety. This process includes raising guardrails to the proper height, repairing damaged sections, and upgrading outdated designs and end treatments. The urgency of these upgrades is further highlighted by the fact that rural roads often present more dangers due to higher speeds, sharper curves, and less lighting. Hickman County's Comprehensive Safety Action Plan (CSAP) underscores the importance of addressing guardrail hazards, calling for immediate action to enhance the safety of drivers and passengers alike

SAFETY ENHANCEMENT SUGGESTIONS

The Federal Highway Administration (FHWA) has published a list of 28 countermeasures and strategies that have proven to be effective in reducing roadway fatalities and incapacitating injuries throughout the United States. The countermeasure categories include the following safety focus areas: speed management, intersections, roadway departures, or pedestrians/bicyclists, and crosscutting.

In mitigating the impacts of roadway departure crashes, which are the main source of crashes throughout Hickman County, the following countermeasures have been outlined:

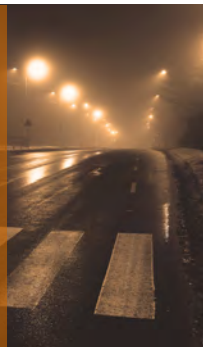
- Enhanced Delineation for Horizontal Curves: Improved and enhanced signage and marking strategies specifically designed for curves to enhance visibility and driver awareness, reducing the risk of accidents.
- Longitudinal Rumble Strips and Stripes on Two-Lane Roads: Installation of rumble strips along the centerline of two-lane roads to alert drivers who may inadvertently drift across lanes, improving safety by preventing head-on collisions.
- Median Barriers: Physical barriers installed in medians between opposing lanes of traffic to prevent crossover crashes, enhancing safety by minimizing the severity of collisions and protecting against wrong-way drivers.
- Roadside Design Improvements at Curves: Implementation of safety measures such as clear zones, guardrails, and improved roadside grading to mitigate the risk of run-off-the-road crashes at curves, ensuring safer road conditions.
- SafetyEdge[SM]: A pavement edge treatment that creates a safer transition between the road surface and the shoulder, reducing the likelihood of vehicles overturning or losing control if they leave the roadway.
- Wider Edge Lines: Application of wider, more visible edge lines along road shoulders to improve delineation and guide drivers, reducing the incidence of run-off-the-road crashes and improving overall road safety.

Hickman County has an ambitious goal of implementing more safety throughout each location on the HIN. In addition to the project specific recommendations made by Hickman County, the following county-wide solutions should be implemented to enhance the safety of roadways on the HIN and throughout the county regardless of their inclusion in the HIN.

Based on the community feedback received, the crash data analysis, and the HIN, Hickman County believes that these roadway safety enhancements will yield a safer transportation system by managing vehicle speeds, sight visibility, warning signs, and creating a safe space for vulnerable users. These county-wide safety enhancements include:

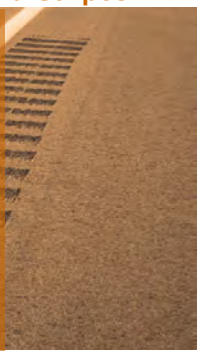
Roadway Lighting

This will enhance visibility and safety for both drivers and vulnerable users, such as cyclists and pedestrians. Inadequate street lighting was expressed by Hickman County community members, supported by the crash data, and posed safety concerns on many of the roads in the HIN.



Longitudinal Rumble Strips and Stripes

Rumble strips and stripes are designed to address roadway departure crashes by alerting distracted, drowsy, or otherwise inattentive drivers who drift from their lane. They are most effective when deployed systemically.

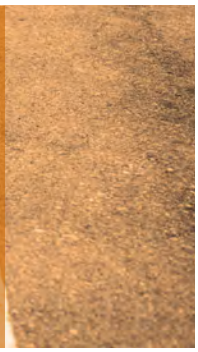


Intersection Signalization

This will provide exact indications for roadway users to advance their travels. It will also prevent uncertainty amongst drivers on what movements should be prioritized.

Pavement Markings

Refreshing existing pavement markings and adding them in areas where they are lacking will reduce driver and vulnerable user confusion and clearly define lanes, increasing guidance on the road.

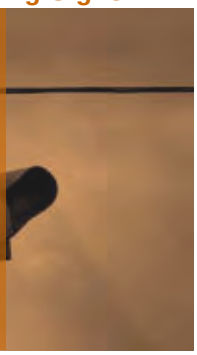


Widening Lanes

Many of the roads on the HIN provide inadequate space for both drivers and other road users. Widening the travel lanes and widening/creating shoulder lanes will provide adequate safety without affecting traffic flow.

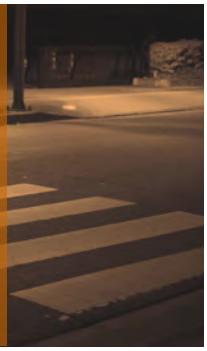
Flashing Beacons/Other Warning Signs

These are important to provide drivers and other roadway users with adequate warning to prepare for the road conditions they will be presented with.



High Visibility Crosswalks

These create more visibility for drivers and inform them that a crosswalk and/or pedestrians are ahead. It also provides a sense of comfort to pedestrians that are crossing roads.



High Visibility Stop Bars

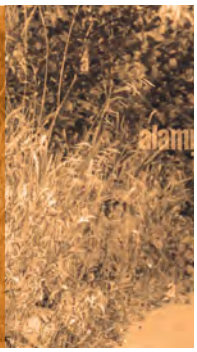
Adding this will alert drivers more easily that they have a stop ahead. This can potentially reduce collisions with other vehicles and roadway users.

Guardrail Installation

Increasing the amount of guardrail in high-risk areas that include sharp curves, ditches, and culverts will provide drivers with a physical barrier to redirect vehicles and/or prevent major collisions.

Removal of Roadway Obstructions

Removing overgrown vegetation and other roadway obstructions on or near the road will improve driver visibility and reduce the risk of crashes. Vegetation removal can also improve and lower the costs of infrastructure maintenance.



STRATEGY AND MEASURING PROGRESS

To promote transparency on the progress of this CSAP, Hickman County will publish clear and accessible traffic crash trend information online. The data will allow anyone to view and explore safety trends and project data to better understand our progress on achieving our Vision Zero goals and addressing our actions. This transparency will help keep us accountable in our bold approach towards improving safety on our streets and supporting equitable and healthy mobility for all.

Hickman County is dedicated to involving communities throughout the implementation of this CSAP's diverse strategies and actions. Our approach will involve collaborating with transportation advocates and a range of community-based organizations, including those serving vulnerable populations, as well as local residents and businesses. By leveraging these partnerships, we will gather ongoing feedback on safety priorities to inform our Vision Zero projects. We are committed to maintaining strong community relationships and conducting inclusive outreach at every stage of our planning process. We look forward to working together with the community to achieve our Vision Zero goal.

REFERNCES

Electronic Tennessee Roadway Information Management System (E-TRIMS). https://e-trims.tdot.tn.gov

Climate and Economic Justice Screening Tool (CEJST). https://screeningtool.geoplatform.gov

State Traffic Safety Information (STSI). https://cdan.dot.gov/STSI/stsi.htm

USDOT Equitable Transportation Community (ETC) Explorer. https://experience.arcgis.com/experience/0920984aa80a4362b8778d779b090723/page/Applicant-Explorer

APPENDIX A

All crashes on Hickman County maintained roads 2019 to 2023

Poplar Grove
Bold Spring
Wills Chapel
Whitehouse
Furnace
Only
Nunnelly
Fairfield
HICKMAN
Centerville
Coble
Crossroads
Watson
Kimmins
Tidwell
Craigfield
Lyles
Bates
Dogwood Flat
Primm Springs
Littlelot
Duck River
Williamsport
Hampshire
obelville
Heights

Hickman County

Hickman County Maintained Roads

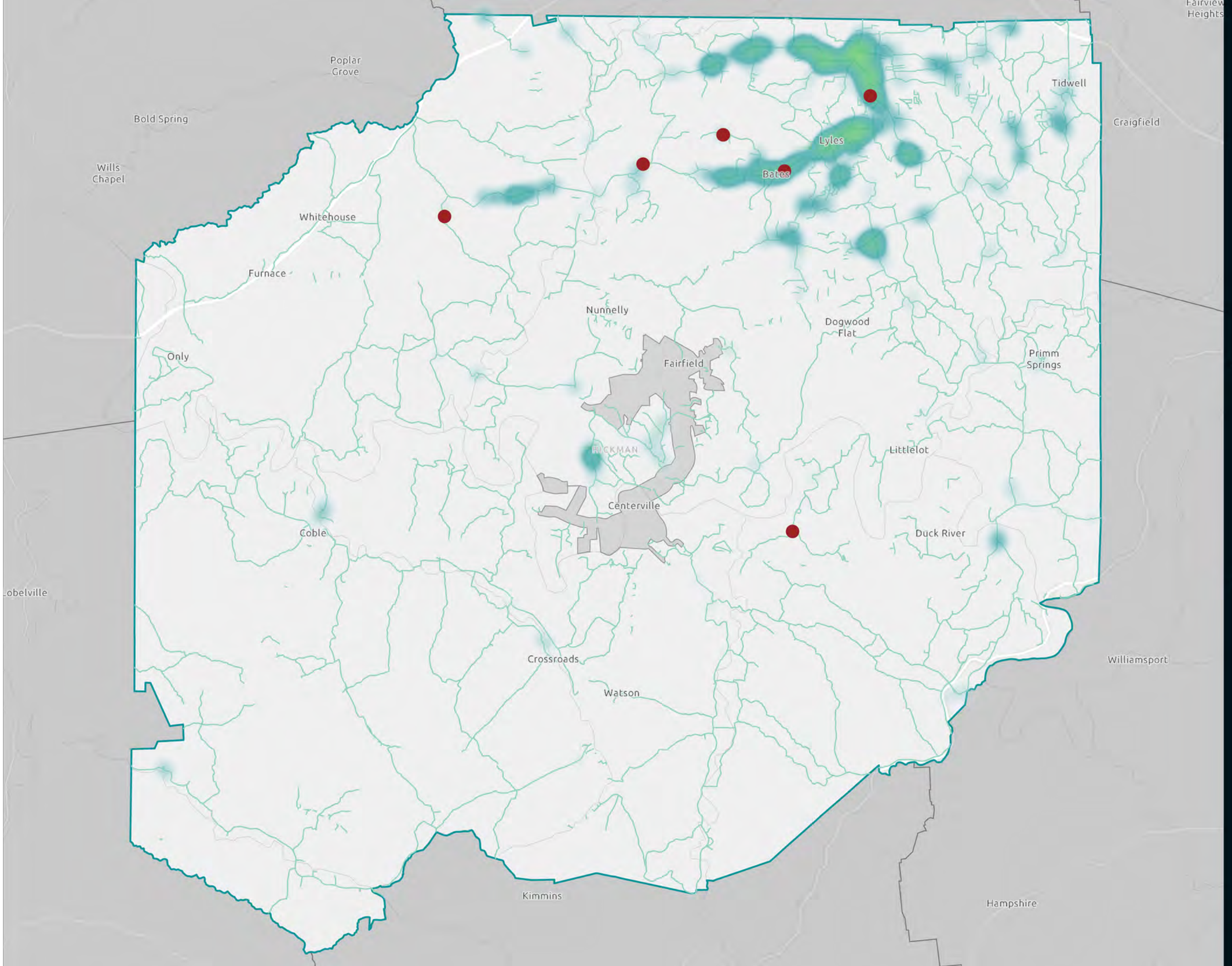
Type of Crash

- Fatal
- Suspected Serious Injury
- Suspected Minor Injury/ Possible Injury
- Property Damage

N
W E
S

0 1 2 Miles

1 inch equals 3 miles



Heatmap of all crashes on Hickman County maintained roads 2019 to 2023

Hickman County

Hickman County Maintained Roads

Fatal Crash

Crash Density

Sparse

Dense

N

W E

S

0 1 2 Miles

1 inch equals 3 miles

APPENDIX B

Map Label	Roadway Names	Total Crashes	Total Fatalities	Total Incapacitating Injuries	Property Damage Crashes	AADT	Max Speed Limit (MPH)	Weather Conditions	Light Conditions	Driver Actions	Manner of Collision	Other Notes	Roadway Enhancement Recommendations	Average Crash Rate Per year	Safety Countermeasure	CMF Applied (CMF ID)	CMF	Expected Crash reduction per year
L1	LYLES RD.	26	0	3	20	1942	40	53% of crashes occurred during clear weather conditions	42% of crashes occurred during dark lighting conditions	46% of crashes involved lane departures 57% of crashes involved veering off the roadway (ditches, embankments utility poles, etc.)	62% of crashes involved no collision with another vehicle. 23% of crashes involved sideswipes	Includes bus traffic Approx. 10 foot lanes	Install chevron signs at horizontal curves. Add longitudinal rumble strips and stripes to prevent vehicle encroachment. Address embankment slope issues. Improve roadway lighting. Refresh pavement markings.	5.2	Install chevron signs on horizontal curves	2431	0.82	0.936
L2	MISSIONARY RIDGE RD.	47	0	5	34	1869	40	66% of crashes occurred during clear weather conditions	38% of crashes occurred during dark lighting conditions	47% of crashes involved lane departures 59% of crashes involved manuevering through a curve.	72% of crashes involved no collision with another vehicle. 17% of crashes involved sideswipes and rear ends	Includes bus traffic Approx. 10 foot lanes	Install chevron signs at horizontal curves. Add longitudinal rumble strips and stripes to prevent vehicle encroachment. Increase roadway lighting. Refresh pavement markings. Improve sight distance at horizontal curve near Spring Creek Rd. (Add stop sign and bar)	9.4	Install chevron signs on horizontal curves	2431	0.82	1.692
L3	OLD SR-46	39	1	3	29	1609	35	67% of crashes occurred during clear weather conditions	54% of crashes occurred during dark lighting conditions	59% of crashes involved lane departures	76% of crashes involved no collision with another vehicle. 13% of crashes involved sideswipes and rear ends	Upgrade safety hardware, such as guardrails. RR crossings throughout road Historic site along roadway	Install chevron signs at horizontal curves. Add longitudinal rumble strips and stripes to prevent vehicle encroachment. Increase roadway lighting. Add stop bars at all stop-sign intersections. Upgrade guardrail end terminals near Old Bon Aqua Rd. intersection. Improve intersection at Church near RR crossing (possible turn lane for eastbound traffic).	7.8	Install edgeline rumble strips	3394	0.67	2.574
L4	PINEWOOD RD.	43	3	7	27	1745	40	67% of crashes occurred during clear weather conditions	37% of crashes occurred during dark lighting conditions	54% of crashes involved manuevering through a curve.	74% of crashes involved no collision with another vehicle. 16% of crashes involved sideswipes and rear ends	Approx. 8 foot travel lanes cracking on pavement surface	Install chevron signs at horizontal curves. Add longitudinal rumble strips and stripes to prevent vehicle encroachment. Widen travel lanes. Repave roadway. Refresh pavement markings. Add stop bars at all stop-sign intersections. Upgrade guardrails at sharp curve near McCaleb Rd. Consider intersection reconfiguration at Bates Crossing Rd.	8.6	Install chevron signs on horizontal curves	2431	0.82	1.548
L5	HIDDEN VALLEY RD.	19	0	1	15	N/A	35	63% of crashes occurred during clear weather conditions	84% of crashes occurred during daylight	32% of crashes involved lane departures 37% of crashes involved manuevering through a curve.	63% of crashes involved no collision with another vehicle. 26% of crashes involved sideswipes and rear ends		Add longitudinal rumble strips and stripes to prevent vehicle encroachment. Widen travel lanes.	3.8	Install edgeline rumble strips	3394	0.67	1.254
L6	GRINDERS SWITCH RD.	10	0	0	8	202	40	70% of crashes occurred during clear weather conditions	60% of crashes occurred during daylight	60% of crashes involved lane departures 50% of crashes involved manuevering through a curve.	70% of crashes involved no collision with another vehicle.	RR crossings throughout road Approx. 8 foot lanes	Install chevron signs at horizontal curves. Widen travel lanes. Refresh pavement markings. Widen edge lines. Upgrade RR signs at crossings.	2	Install chevron signs on horizontal curves	2431	0.82	0.36

Map Label	Roadway Names	Total Crashes	Total Fatalities	Total Incapacitating Injuries	Property Damage Crashes	AADT	Max Speed Limit (MPH)	Weather Conditions	Light Conditions	Driver Actions	Manner of Collision	Other Notes	Roadway Enhancement Recommendations	Average Crash Rate Per year	Safety Countermeasure	CMF Applied (CMF ID)	CMF	Expected Crash reduction per year
L7	BROWN HOLLOW RD.	12	0	0	8	1019	40	67% of crashes occurred during clear weather conditions	58% of crashes occurred during daylight	33% of crashes involved lane departures	75% of crashes involved no collision with another vehicle.	Includes bus traffic Approx. 9 foot lanes	Install chevron signs at horizontal curves. Add longitudinal rumble strips and stripes to prevent vehicle encroachment. Refresh pavement markings. Widen edge lines. Add stop bars at all stop-sign intersections. Repave roadway.	2.4	Install safety edge treatment	9211	0.79	0.504
L8	PRIMM SPRINGS RD.	25	0	3	18	600	45	72% of crashes occurred during clear weather conditions	52% of crashes occurred during daylight	56% of crashes involved lane departures	76% of crashes involved no collision with another vehicle.	Approx. 8 foot travel lanes cracking on pavement surface	Install chevron signs at horizontal curves. Add longitudinal rumble strips and stripes to prevent vehicle encroachment. Widen travel lanes. Refresh pavement markings. Widen edge lines. Add stop bars at all stop-sign intersections. Repave roadway.	5	Install edgeline rumble strips	3394	0.67	1.65
L9	SWAN CREEK RD. (FROM SR-50 TO PERRY BEND RD.)	8	0	0	7	443	N/A	88% of crashes occurred during clear weather conditions	63% of crashes occurred during daylight	50% of crashes involved lane departures 75% of crashes involved manuevering through a curve.	75% of crashes involved no collision with another vehicle.		Install chevron signs at horizontal curves throughout the roadway. Install longitudinal rumble strips and stripes to reduce vehicle encroachment.	1.6	Install chevron signs on horizontal curves	2431	0.82	0.288

Safety Countermeasure	Location	CMF	CMF ID	CMF Description	Applicability	Prior Condition Requirement	Volume Requirements
Rumble Strips and stripes	Centerline	0.56	3358	Install centerline rumble strips	All crashes besides property damage	No centerline rumble strips	Not Specified
Rumble Strips and stripes	Edgeline	0.67	3394	Install edgeline rumble strips	Run off road crashes. Applies to K (fatal),A (serious injury),B (minor injury),C (possible injury)	No Prior Condition(s)	Minimum of 180 to Maximum of 12776 Average Daily Traffic (ADT)
Chevron Signs at curves	Horizontal curves	0.82	2431	Install chevron signs on horizontal curves	All crashes besides property damage	No existing sign or sign without fluorescent sheeting	Minimum of 895 to Maximum of 20479 Annual Average Daily Traffic (AADT)
Chevron Signs at curves	Horizontal curves	0.84	2438	Install chevron signs on horizontal curves	All crashes besides property damage	No existing signs	Minimum of 261 to Maximum of 14790 Annual Average Daily Traffic (AADT)
Flatten sideslope from 1V:3H to 1V:4H	Roadside	0.92	4627	Flatten sideslope from 1V:3H to 1V:4H	Single Vehicle Crashes	No Prior Condition(s)	Not Specified
Flatten sideslope from 1V:4H to 1V:6H	Roadside	0.88	4632	Flatten sideslope from 1V:4H to 1V:6H	Single Vehicle Crashes	No Prior Condition(s)	Not Specified
Speed Safety Cameras	Urban Locations	0.632	7718	Installation of automated speed enforcement system. Determines average speed of vehicle over a long distance.	All crashes besides property damage	No Point-to-Point Automated Section Speed Enforcement System	Not Specified
Provide intersection illumination	Intersection	0.58	436	Provide intersection illumination	Nighttime, Vehicle/pedestrian. Applies to A (serious injury),B (minor injury),C (possible injury) crashes	No Prior Condition(s)	Not Specified
Provide intersection illumination	Intersection	0.62	433	Provide intersection illumination	Nighttime crashes, Applies to A (serious injury),B (minor injury),C (possible injury) crashes	No Prior Condition(s)	Not Specified
Provide highway lighting	Intersection	0.72	192	Provide highway lighting	Nighttime crashes, Applies to A (serious injury),B (minor injury),C (possible injury) crashes	No Prior Condition(s)	Not Specified
Provide intersection illumination	Intersection	0.67	2376	Provide intersection illumination	Angled Crashes	Rural 2-lane intersection with no lighting.	Major Road Traffic Volume: Minimum of 420 to Maximum of 15200 Minor Road Traffic Volume: Minimum of 80 to Maximum of 10400
Install safety edge treatment	Shoulder	0.892	9205	The safety edge is a low-cost treatment that is implemented in conjunction with pavement resurfacing and is intended to help minimize drop-off-related crashes.	K (fatal),A (serious injury),B (minor injury) crashes	Drop-off pavement edge	Minimum of 10 to Maximum of 18600 Annual Average Daily Traffic (AADT)
Install safety edge treatment	Shoulder	0.79	9211	The safety edge is a low-cost treatment that is implemented in conjunction with pavement resurfacing and is intended to help minimize drop-off-related crashes.	Run off road crashes	Drop-off pavement edge	Minimum of 10 to Maximum of 18600 Annual Average Daily Traffic (AADT)
Install safety edge treatment	Shoulder	0.813	9217	The safety edge is a low-cost treatment that is implemented in conjunction with pavement resurfacing and is intended to help minimize drop-off-related crashes.	Head on crashes. Excludes intersection-related crashes and animal-related crashes.	Drop-off pavement edge	Minimum of 10 to Maximum of 18600 Annual Average Daily Traffic (AADT)

Safety Countermeasure	Location	CMF	CMF ID	CMF Description	Applicability	Prior Condition Requirement	Volume Requirements
Introduce TWLTL (two-way left turn lanes) on rural two lane roads	Roadway	0.64	583	Introduce TWLTL (two-way left turn lanes) on rural two lane roads	All crashes	No Prior Condition(s)	Not Specified
Set posted speed limit 5 mph below engineering recommendations	Roadway	0.43	10250	Set posted speed limit 5 mph below engineering recommendations	Property Damage crashes only	Posted speed limit set equal to engineering recommendations	Not Specified
Installation of fixed speed cameras	Roadside	0.78	8183	Installation of fixed speed cameras on arterials limited access freeways	All crashes besides property damage	No speed camera present	8419 Annual Average Daily Traffic (AADT)
Install dynamic speed feedback sign	Roadside	0.78	10265	System consisting of a speed measuring device and a message sign that displays feedback to those drivers who exceed a predetermined threshold. It may be the actual speed, a message such as SLOW DOWN, or activation of a warning device, such as beacons or a curve warning sign	Crash Type: Other	No dynamic speed feedback sign present	Not Specified
Install a traffic signal	Intersection	0.56	325	Install a traffic signal	All crashes	Stop controlled intersection	Major Road Traffic Volume: Minimum of 3261 to Maximum of 29926 Annual Average Daily Traffic (AADT) Minor Road Traffic Volume: Minimum of 101 to Maximum of 10300 Annual Average Daily Traffic (AADT)
Install a traffic signal	Intersection	0.23	326	Install a traffic signal	Angled Crashes	No Prior Condition(s)	Major Road Traffic Volume: Minimum of 3261 to Maximum of 29926 Annual Average Daily Traffic (AADT) Minor Road Traffic Volume: Minimum of 101 to Maximum of 10300 Annual Average Daily Traffic (AADT)
Install a traffic signal	Intersection	0.4	327	Install a traffic signal	Left-turn crashes	No Prior Condition(s)	Major Road Traffic Volume: Minimum of 3261 to Maximum of 29926 Annual Average Daily Traffic (AADT) Minor Road Traffic Volume: Minimum of 101 to Maximum of 10300 Annual Average Daily Traffic (AADT)
Install lighting	Roadway	0.46	2870	Install lighting	All nighttime crashes with severity levels: A (serious injury),B (minor injury),C (possible injury)	Unlit roads	Not Specified
Provide 2-ft paved shoulders (both sides)	Shoulder	0.88	10398	Provide 2-ft paved shoulders on both sides of 2-lane rural roads	All run off road crashes	No Prior Condition(s)	Minimum of 30 to Maximum of 15900 Annual Average Daily Traffic (AADT)