



ALCOA
SAFE STREETS

APPROVAL LETTER FROM LEADERSHIP

Dear Residents of Alcoa,

Improving roadway safety has always been a priority of the City of Alcoa. In recent years, we have undertaken numerous projects to accommodate the growing number of vehicles and vulnerable road users that travel in and through our City.

To continue the ongoing effort to promote traffic safety, Alcoa leaders are proud to support this effort toward making our roadways safer for all travelers. Between 2020 and 2024, our City experienced 3,928 reported roadway crashes, of which 83 crashes led to deaths or serious injuries. These events are tragedies for the victims, their families, and our communities. The impacts are profound and devastating.

Fatalities and serious injuries due to traffic crashes are preventable, and the City of Alcoa is committed to significantly reducing and ultimately eliminating these occurrences. This Comprehensive Safety Action Plan is a crucial first step toward making this commitment a reality. As a data-driven and actionable document, this Safety Action Plan lays the groundwork for projects and strategies that can make a tangible difference on our roadways.

Access to safer roadways should not be reserved only for a select few; rather, the entire population of the City of Alcoa should be able to travel safely, regardless of their income level, where they live, their race, or their age. The City of Alcoa cannot achieve its goals without the support and participation of the people in our communities and our partner agencies. Every person has a role to play and a responsibility to help make our roads safer. Together, we can accomplish a great deal.

Our intent is that this Safety Action Plan will provide a roadmap of the steps that the City of Alcoa will take toward improving safety on the roadways. Based on the analysis of traffic and accident data and the input of citizens during the research phase, this plan provides specific steps necessary and the progress markers, allowing us the opportunity to take actions to improve traffic safety in our City. The work has only just begun, but having a solid plan is the foundation for achieving our goals and eliminating these preventable tragedies from our roadways.

Thank you for your commitment and support to improving roadway safety and the quality of life in the City of Alcoa, Tennessee.

Sincerely,



Bruce M. Applegate, Jr.

City Manager



SPECIAL THANKS

We extend our sincere appreciation and gratitude to the residents of Alcoa, the City staff, stakeholders, and the public who assisted in the public surveys, meetings, and the entire planning process. The critical input guided the development of the Safety Action Plan (SAP) and, in turn, will have a positive impact on the City.

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- Tanya Martin – Mayor of Alcoa
- Megan Brooks – Development Services Director
- Dakota Gentry – Development Services Engineer
- Shane Snoderly – Public Works Director
- Emily Crateau – Public Information Officer
- Ray Boswell – GIS Coordinator
- Lea Bergwall – GIS Analyst
- Jeremy Pearon – City Planner
- Ashley Miller – City Planner
- Collin Hurst – Fire Chief
- David Carswell – Police Chief
- Tracey Cooper – Vice Mayor / Planning Commission Chair
- Josh Blair – City Commissioner
- Bruce Applegate – City Manager
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- Bryan Daniels – Local Representative (President Blount Partnership)

Knoxville Transportation Planning Organization (TPO)

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Blount County

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Abbreviations

- SS4A – Safe Streets and Roads for All
- SAP – Safety Action Plan
- FHWA – Federal Highway Administration
- USDOT – United States Department of Transportation
- TDOT – Tennessee Department of Transportation
- COA – City of Alcoa
- SHSP – Strategic Highway Safety Plan
- AADT – Annual Average Daily Traffic
- TEV – Total Entering Vehicles
- VRU – Vulnerable Road User
- BIL – Bipartisan Infrastructure Law
- HIN – High Injury Network
- ACS – American Community Survey
- NCMV – No Collision with Motor Vehicle
- CMF – Crash Modification Factor
- ARIDE – Advanced Roadside Impaired Driving Enforcement
- NHTSA – National Highway Traffic Safety Administration
- HSM – Highway Safety Manual
- DDS – Department of Driver Services
- SFST – Standard Field Sobriety Testing
- PDO – Property Damage Only
- DRE – Drug Recognition Expert
- BAC – Blood-Alcohol Content
- ADA – Americans with Disabilities Act
- ADAS – Advanced Driver Assistance System
- PHB – Pedestrian Hybrid Beacon
- LPI – Leading Pedestrian Interval
- RRFB – Rectangular Rapid Flashing Beacon
- DSDS – Dynamic Speed Display Signs
- TIS – Traffic Impact Study
- MIRE – Model Inventory of Roadway Elements
- FDE – Fundamental Data Elements
- MMUCC – Model Minimum Uniform Crash Criteria
- ANSI – American National Standards Institute
- FARS – Fatality Analysis Reporting System
- RPM – Raised Pavement Marker
- WSB – Walking School Bus
- TZD – Towards Zero Deaths
- KABCO – Functional measure of injury severity for any person involved in the crash ((K) Fatal, (A) Suspected Serious Injury, (B) Suspected Minor Injury, (C) Possible Injury, (O) Property Damage Only)



Introduction

ALCOA



INTRODUCTION

ALIGNMENT WITH SS4A

The Bipartisan Infrastructure Law (BIL) established the Safe Streets and Roads for All (SS4A) discretionary program to fund regional, local, and Tribal initiatives through grants to prevent roadway deaths and serious injuries involving motorists, pedestrians, and cyclists.

One of the initiatives funded by the SS4A program is the development of a comprehensive safety action plan, which includes all seven (7) required SS4A program components shown in **Figure 1**. This Safety Action Plan (SAP) is a planning document that prioritizes safety improvements and justifies investment decisions. Having a formal plan will help the City of Alcoa communicate clearly with stakeholders and access funding opportunities under this program.

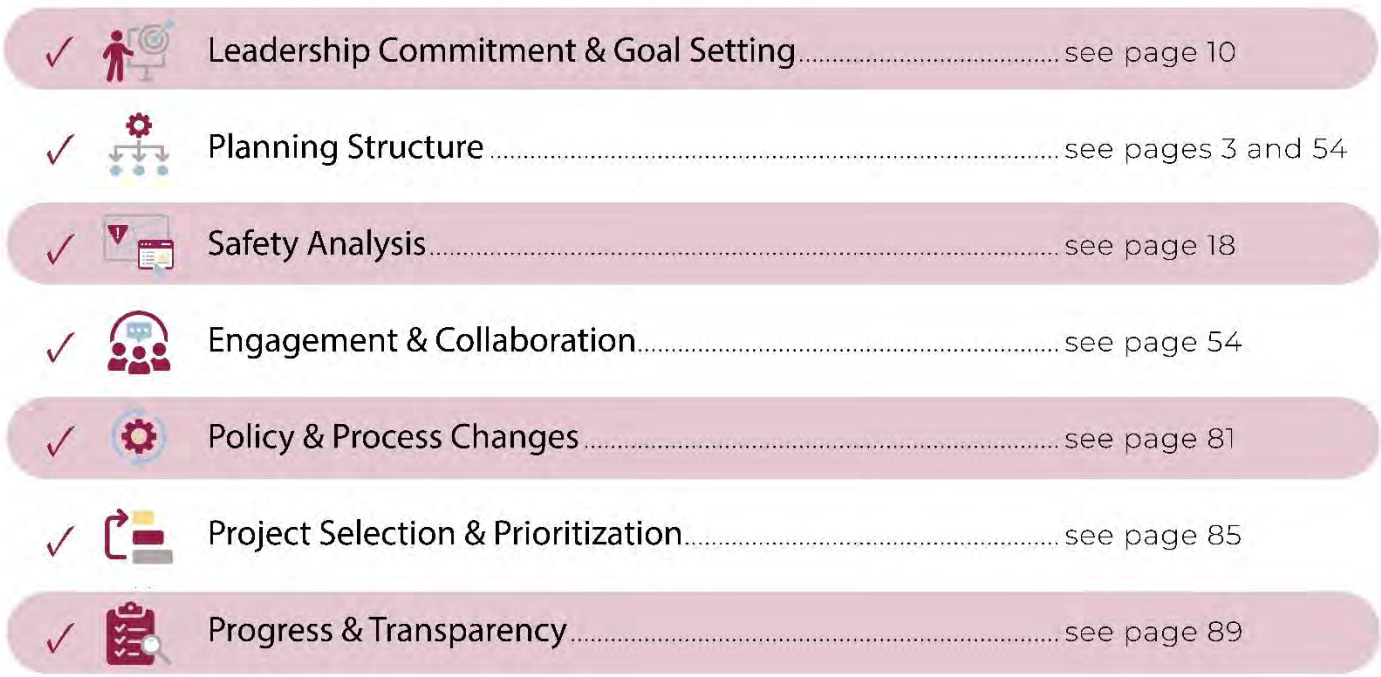


Figure 1: Alignment with SS4A

Document Organization

The Alcoa SAP is organized into the following chapters:



(Graphic Generated by AI)

Purpose of the SAP

The Alcoa SAP provides a framework for identifying and prioritizing effective safety improvements. The SAP recommendations aim to reduce fatal and serious injury crashes, guided by the principles established in the 2025-2029 Tennessee Strategic Highway Safety Plan (TN SHSP) and the systemic data analysis conducted for the City of Alcoa.

This report aligns with the components required to apply for SS4A Implementation Grant funding. As such, the SAP involves a community-informed and data-driven approach to roadway safety, with commitment from City leadership to reducing roadway fatalities and serious injury crashes.

Leadership Commitment & Goal Setting

The City of Alcoa commits to advancing a Safe System approach with the long-term objective of eliminating traffic fatalities and serious injuries for all roadway users. To measure progress, the City establishes an interim goal of reducing fatal and serious injury crash rates by 25-percent by 2040, relative to the projected trend.

The City recognizes that future major transportation and roadway investments may influence travel demand, route choice, and exposure to risk across the transportation system. Consistent with SS4A principles and performance-based planning practices, the City will monitor changes in transportation patterns and safety outcomes and may update this goal and associated targets as conditions evolve, while maintaining commitment to the long-term goal of zero traffic fatalities and serious injuries.

Table 1: Leadership Commitment Documentation

Agency	Commitment	Resolution Date
City of Alcoa, TN	25% Fatal & Serious Injury Crash Rate Reduction by 2040	05/22/2026

Figure 2 illustrates the five-year rolling average of the fatal & serious injury crash rate for the years 2020 to 2024, along with the 25-percent reduction commitment referenced earlier in the section. Based in the trend of the data, the crash rate is projected to have a 13 percent increase to an estimated 5.3 fatal and serious injury crash rates by 2040 without interventions; The City’s 25-percent reduction goal would reduce this to an estimated 3.9 fatal and serious injury crash rates by 2040. The existing annual growth rate is 0.62% per year. Additional details regarding crash trends and reductions are included in the **Crash Data Analysis** section of this document.

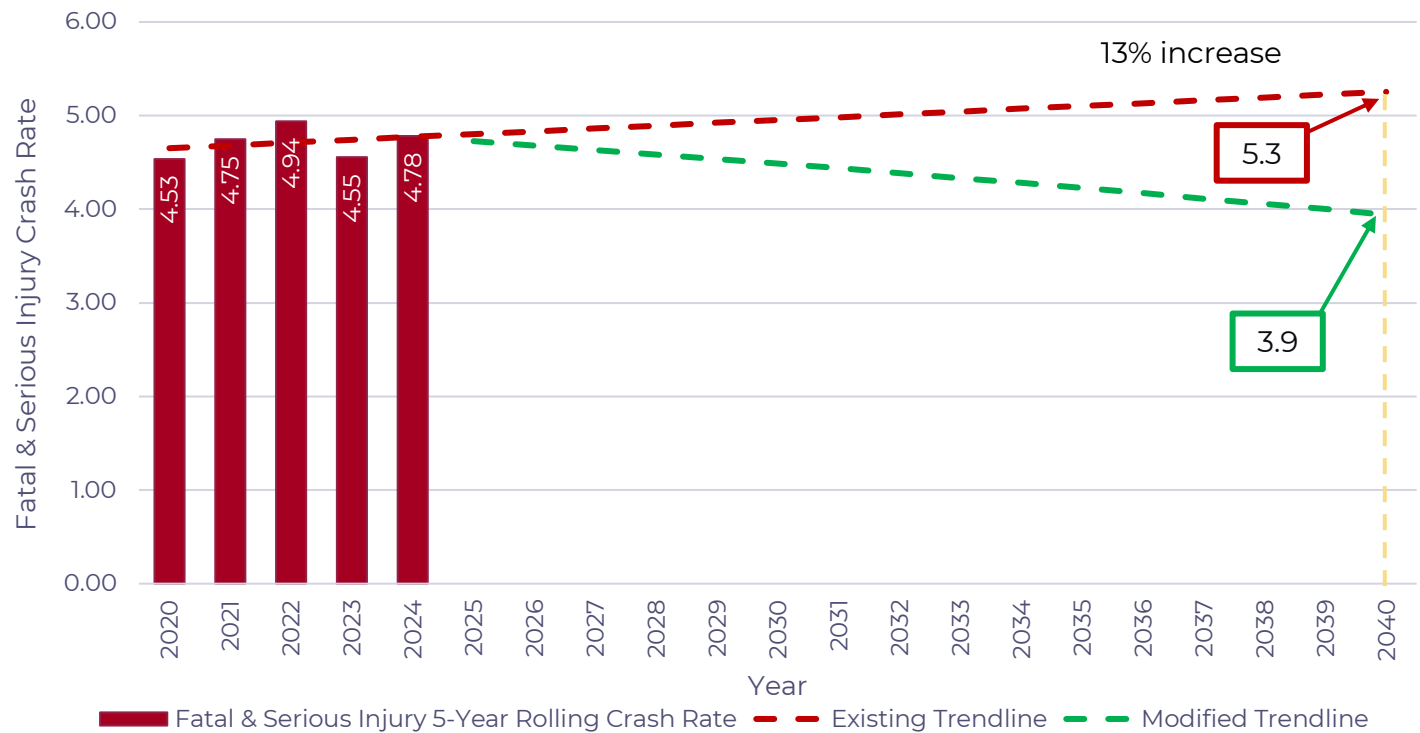


Figure 2: Alcoa Fatal & Serious Injury Crash Rate Trend

Safe System Approach

The activities conducted during this SAP build upon the Federal Highway Administration (FHWA) Safe System Approach, the TN SHSP, City-specific data analysis findings, and community feedback. The Safe System Approach is the guiding paradigm of the USDOT regarding roadway safety (see **Figure 3**). It prioritizes the elimination of crashes that result in death or serious injury. This approach is a shift from the conventional safety approach in that it focuses on both human mistakes and human vulnerability and seeks to design a system with multiple layers of protection. See **Figure 4** for a comparison between the traditional approach versus Safe System Approach. This SAP will integrate the Safe System Approach by analyzing the transportation system holistically and proposing solutions and strategies across six guiding principles:

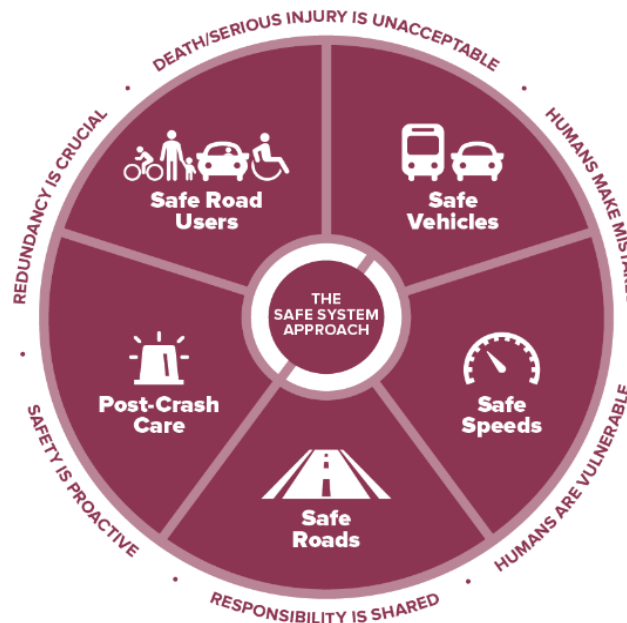


Figure 3: Elements of the Safe Systems Approach (Source: USDOT)

Traditional Approach	VS	Safe Systems Approach
Traffic Deaths and Serious Injuries are INEVITABLE		Traffic Deaths and Serious Injuries are PREVENTABLE
IMPROVE human behavior		INTEGRATE human error into approach
INDIVIDUAL responsibility		SHARED responsibility
Prevent COLLISIONS		Prevent FATAL AND SERIOUS INJURY CRASHES
REACT based on crash history		PROACTIVELY identify and address risks
Saving lives is EXPENSIVE		Saving lives is NOT EXPENSIVE

Figure 4: Traditional Approach vs Safe Systems Approach

Study Area

The City of Alcoa, Tennessee, is located in Blount County, in the Knoxville Transportation Planning Organization (TPO) area. It encompasses nearly 16 square miles of land and is home to approximately 13,500 residents. Located roughly 15 miles south of the City of Knoxville, Alcoa shares a border with the City of Maryville.

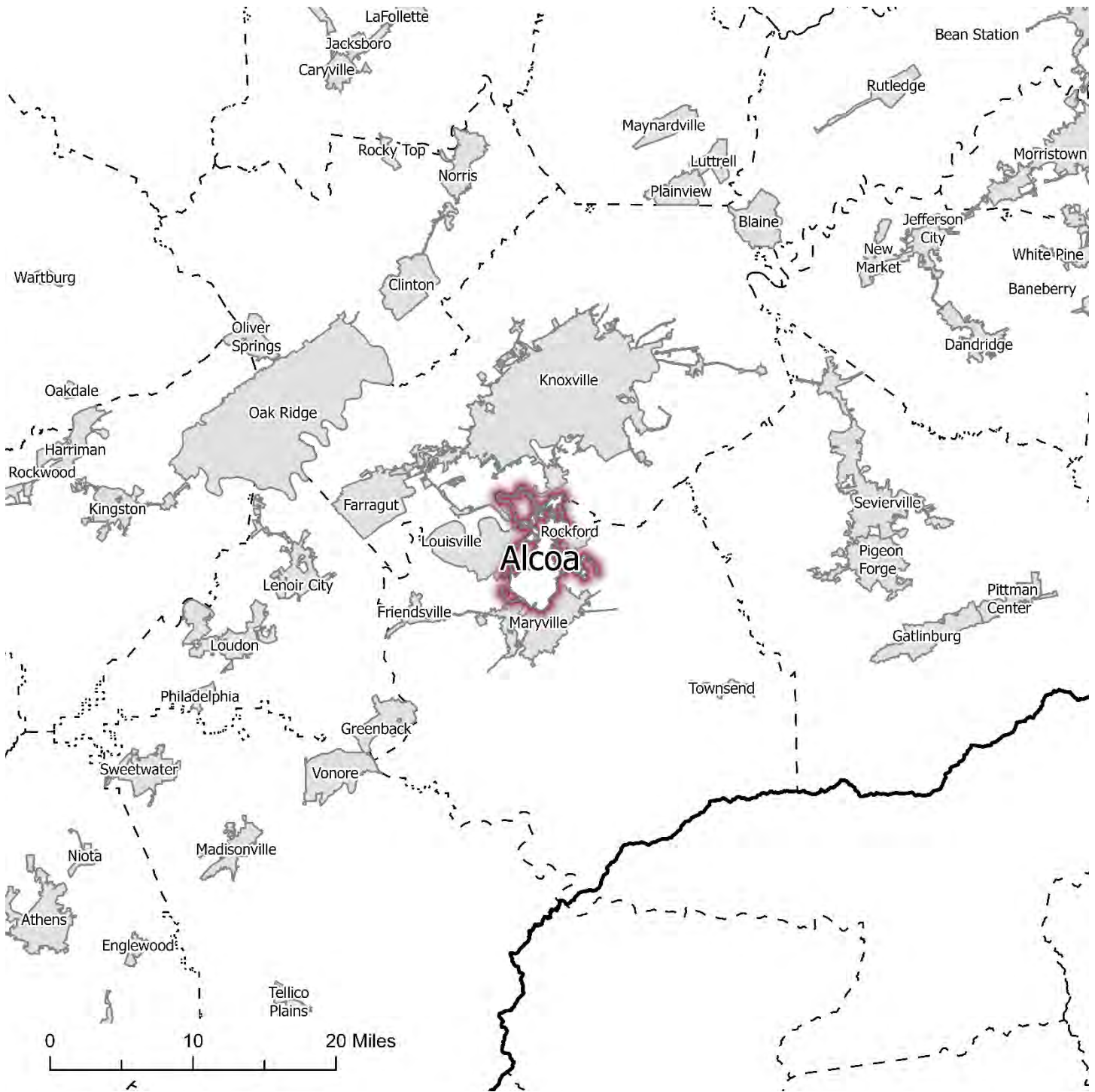


Figure 5: City of Alcoa Surrounding Area

History

The City of Alcoa (initially known as North Maryville) was officially incorporated in 1919 after the Aluminum Company of America (ALCOA) began purchasing land in the area in the early 1910s to establish a major aluminum smelting operation. Drawn by the hydroelectric potential of the nearby Little Tennessee River, the company began constructing its South Plant in 1913 and later expanded with the West Plant in 1919, laying the foundation for a fully planned industrial community. Early development included company-built housing, schools, utilities, and a hospital to support a rapidly growing workforce that reached more than 3,600 employees by 1920. As one of Tennessee’s earliest and most complete company towns, Alcoa’s identity and economy were deeply tied to aluminum production for decades, with the City weathering events such as labor strikes in the 1930s and major wartime industrial surges in the 1940s. In the postwar years, Alcoa gradually transitioned from direct company control to a more diversified municipal structure while continuing to serve as a regional industrial hub. Today, Alcoa has expanded beyond its early industrial roots, benefiting from its proximity to Knoxville, McGhee Tyson Airport, and the Great Smoky Mountains, and it remains a community shaped by the legacy of its unique beginnings as a purpose-built manufacturing town.



Land Uses and Attractions

Alcoa’s safety landscape is defined by its unique position as a regional engine of industry and transportation, balanced by a deep commitment to historic preservation and active recreation. The City’s roadway needs are shaped by the distinct demands of its four primary activity sectors:

Regional Activity Centers: Aviation and Major Employers:

McGhee Tyson Airport is a critical regional hub for business and tourism. This center is further bolstered by specialized institutions like the AVZ Flight Academy, which drives local aviation education. These centers generate high volumes of commuter traffic and freight movement, necessitating a focus on safe, efficient access for both professional transit and visitors unfamiliar with the local street network.



Commercial Corridors and Social Hubs: The City's economic vitality is concentrated along major arteries like Alcoa Highway (US-129) and Hall Road. These corridors host key community destinations. Safety planning in these areas prioritizes managing high-speed vehicle throughput while ensuring safe last-mile access for patrons visiting retail and dining establishments.



Industrial Land Uses and Historic Landmarks:

Reflecting its origins as an industrial powerhouse, Alcoa maintains significant industrial zones that interface with historic cultural assets. The 2035 Comprehensive Plan mentions that industrial uses account for approximately 12 percent of Alcoa’s land. Furthermore, the CSX Transportation and Norfolk Southern railroads traverse the City parallel to Alcoa Highway and have approximately 37 at-grade railroad crossings. Sites like the Millennium Manor Castle and the Sam Houston Historic Schoolhouse stand alongside modern industrial operations. This mix requires a safety approach that accounts for heavy truck traffic while protecting the integrity and accessibility of the City’s historic tourism sites.



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Trails System and Municipal Parks:

Alcoa’s commitment to quality of life is best seen in its robust active transportation network. The Maryville-Alcoa Greenway serves as the backbone for non-motorized travel, offering a scenic, multi-use trail system that links residents to nature. Complementing this spine are neighborhood-level assets like Howe Street Park, which provides essential family-friendly green space. The SAP emphasizes strengthening the safe system connections between these parks and surrounding residential areas to encourage walking and biking.



Roadway Network

The City of Alcoa is settled primarily at the eastern end of Interstate-140, allowing close access to surrounding cities and the national interstate system. Currently, the City of Alcoa is in the process of developing a downtown area within Springbrook Farm led by private development investment. US Route 129 (Alcoa Highway) is the primary thoroughfare in the City, carrying about 55,000 vehicles daily, which leads directly to the Knoxville and Maryville areas.

As the City of Alcoa continues to grow, several planned and ongoing transportation projects are expected to shape future traffic conditions and influence how people move throughout the community. **Figure 6** illustrates four approved segment improvement projects:

1. Alcoa Highway (State Route 115, US 129) Phase 3 (Knox County Border)
2. Alcoa Highway (State Route 115, US 129) Phase 5 and 6
3. State Route 334 (Louisville Road, Project Eagle)
4. Pellissippi Parkway (State Route 162)

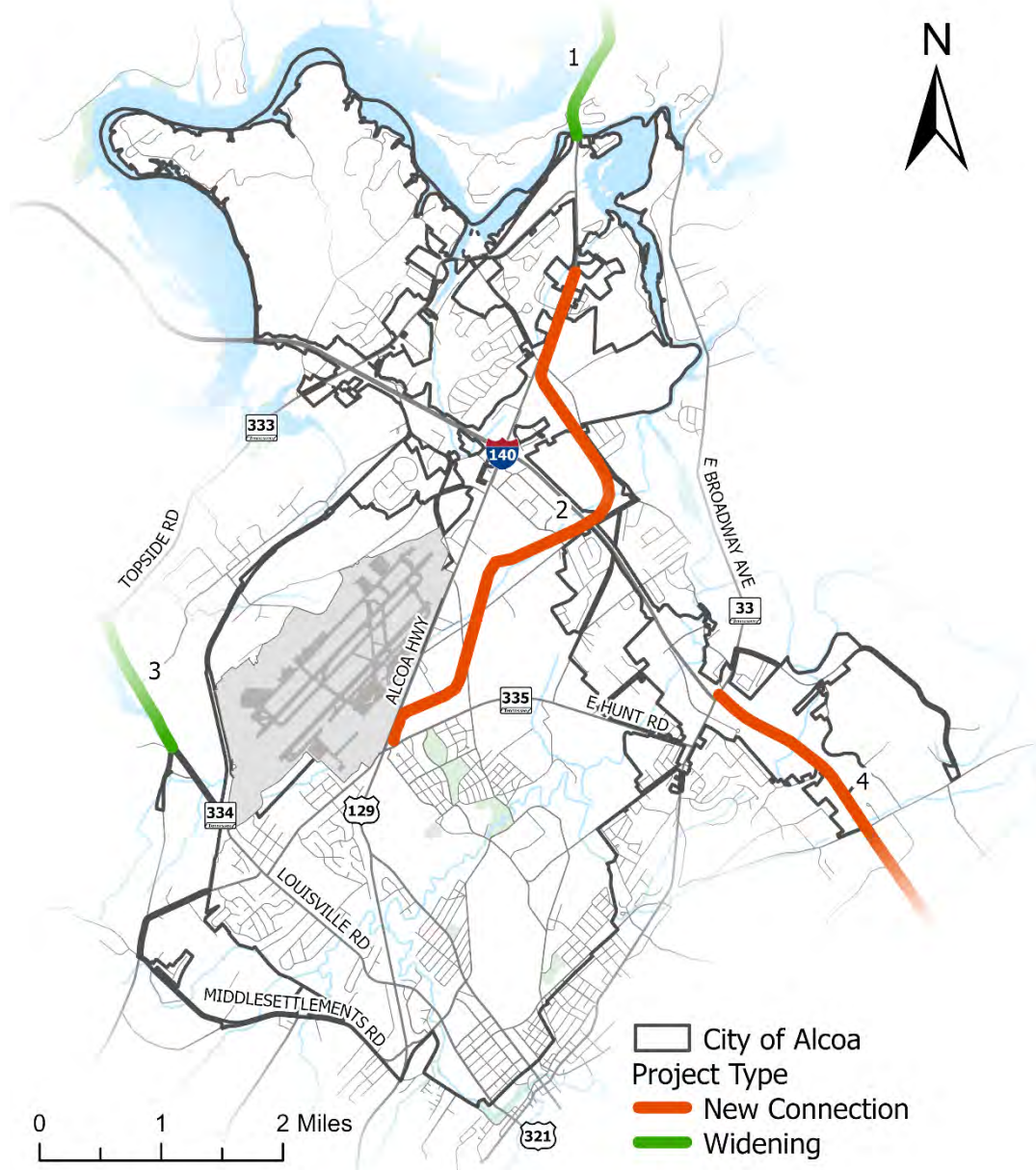


Figure 6: Alcoa Roadway Network

Schools

Five of the six schools within Alcoa are part of the Alcoa City School System, while Clayton-Bradley STEM Academy is a private school non-affiliated with Alcoa City schools.

- | | |
|------------------------------|---------------------------------|
| 1. Alcoa Elementary School | 4. Alcoa High School |
| 2. Alcoa Intermediate School | 5. Pershing Academy of Learning |
| 3. Alcoa Middle School | 6. Clayton-Bradley STEM Academy |

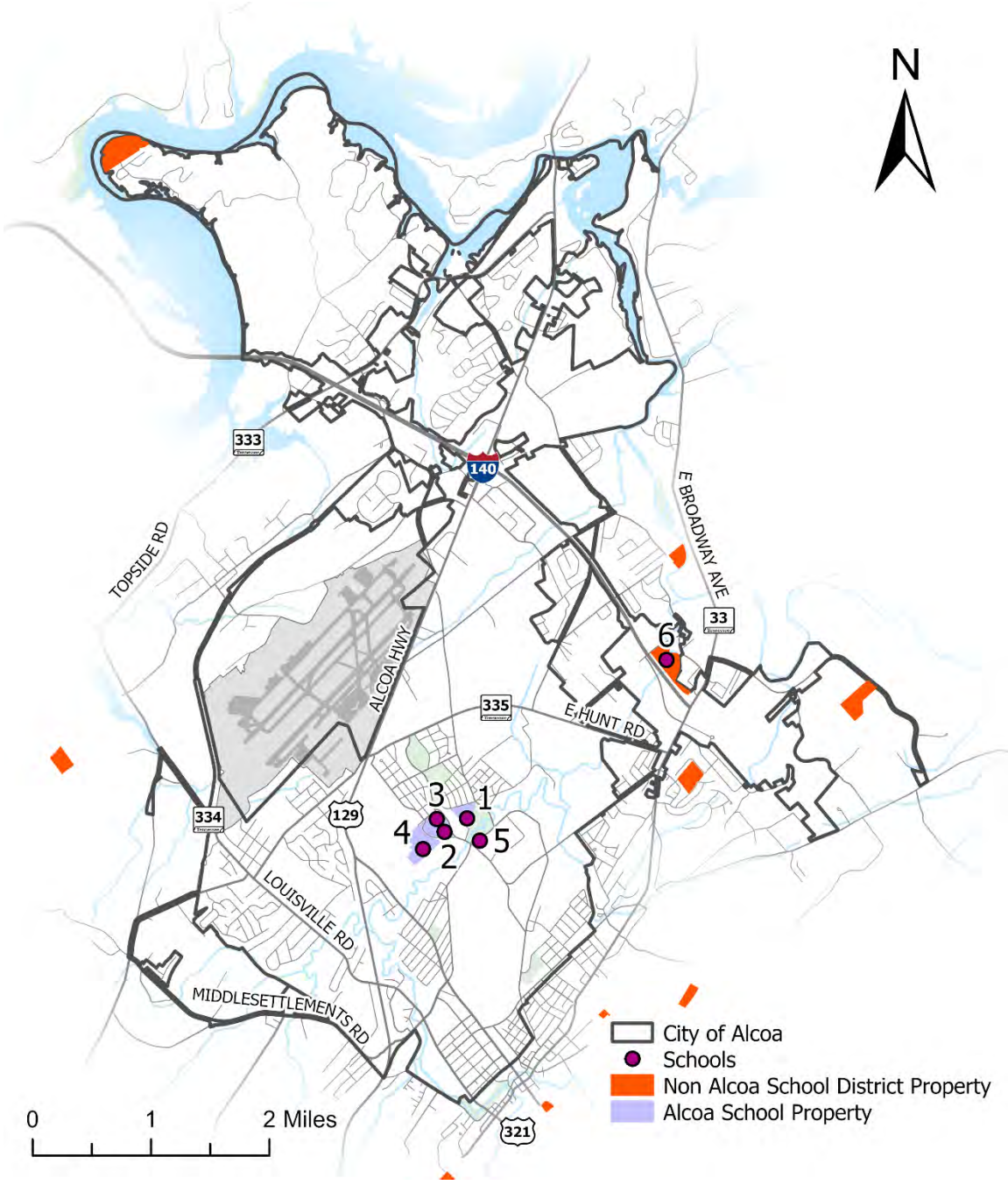
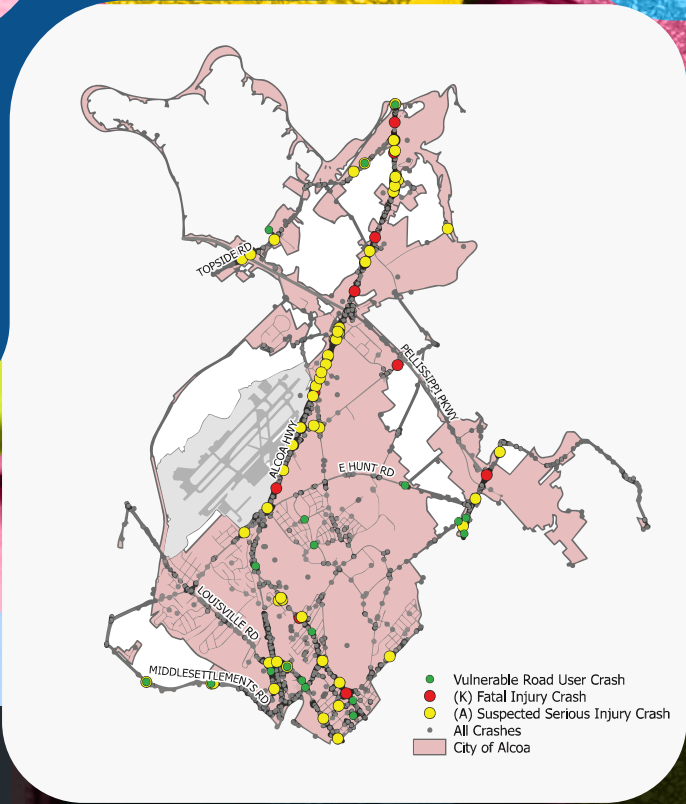


Figure 7: City of Alcoa Schools



Safety Analysis

SAFETY ANALYSIS

The safety analysis for the Alcoa SAP explored Citywide historical trends to understand spatial and temporal crash patterns, crash severities, and their contributing factors. This safety analysis section summarizes data sources, safety emphasis areas, Citywide crash trends, input received from the public, demographics considerations, and the identification of a high-injury network. The findings from this safety analysis helped inform the development of engineering projects and strategies identified later in this plan.

Crash Severity

As shown in **Figure 8**, there were 3,928 reported crashes on roadways in the City of Alcoa from 2020 to 2024, of which 83 resulted in fatalities or serious injuries.

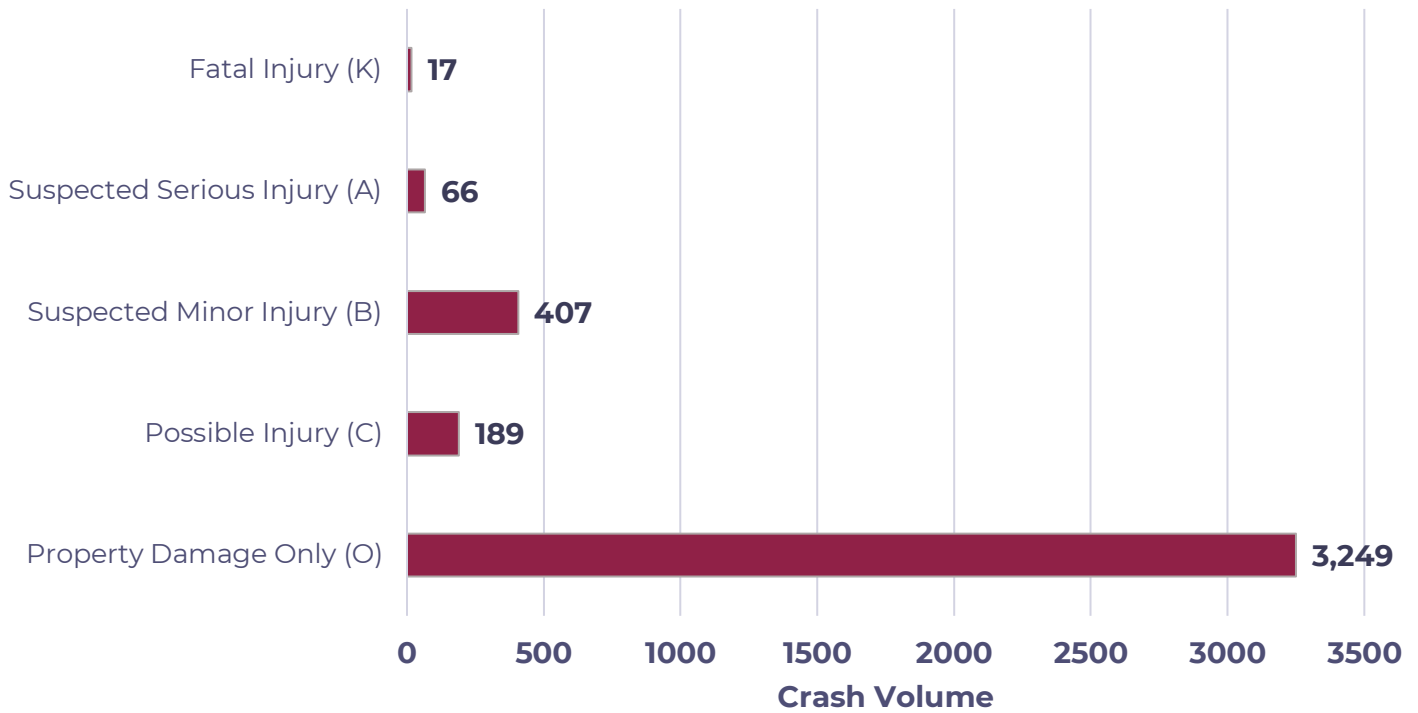


Figure 8: Crashes in Alcoa by KABCO Scale

DATA GATHERING

Crash data was obtained from the TDOT’s AASHTOWare Safety online database for crashes reported from 2020 to 2024. The data was combined and cleaned at a high level to provide a more complete record of crashes within the City. This cleaning included filtering out mainline interstate freeway crashes, duplicate crashes, erroneous crash information, and geographically inaccurate data. The analysis also incorporated roadway ownership information and additional roadway characteristics (such as functional classification and traffic volumes) provided by TDOT.

EMPHASIS AREAS

State DOTs develop Strategic Highway Safety Plans under the Federal Highway Administration’s direction to identify safety emphasis areas based on historical crash trends and severities. Crashes resulting in fatalities and serious injuries were evaluated in the 2020-2024 Tennessee Strategic Highway Safety Plan to identify the top statewide safety emphasis areas. These analysis results help inform how transportation safety funding should be directed to reduce statewide fatal and serious injury crashes for all road users.

Table 2 shows a comparison of the City of Alcoa’s fatal and serious injury crashes to statewide totals, while **Table 3** compares to urbanized areas in Tennessee. The tables are formatted to emulate the emphasis areas documented in the TN SHSP and are intended to highlight how the emphasis areas in Alcoa compare to statewide trends. Alcoa experienced higher percentages than the State average for several emphasis areas, including aggressive drivers/speeding, older drivers (65+), impaired drivers, crashes at intersections, and those involving bicycles, motorcycles, or large trucks.

Note that individual crash events may be associated with more than one emphasis area. For example, an intersection-related crash could have involved an impaired young driver. As such, the values in the columns may not add up to the exact totals. The light -red-shaded rows show which contributing factors were more prevalent in the City of Alcoa than the statewide data over the five-year study period, while the light-blue shaded cells show which contributing factors were less prevalent in the City of Alcoa.

Table 2: Crashes in Alcoa by Contributing Factors - Statewide Comparison

Category	Emphasis Areas	City of Alcoa			State of Tennessee	
		# of Fatal Crashes	# of Serious Injury Crashes	Total	% Fatal & Serious Injury Crashes	% Fatal & Serious Injury Crashes
All High-Severity Crashes		17	66	83	100.0%	100.0%
Drivers	Aggressive Drivers / Speeding	3	12	15	18.1%	12.0%
	Older Drivers (65+)	5	14	19	22.9%	18.0%
	Unrestrained Occupants	5	9	14	16.9%	25.7%
	Teen Drivers (13-19)	2	3	5	6.0%	13.6%
	Impaired Drivers	3	10	13	15.7%	12.3%
	Inattentive, Distracted, & Drowsy Drivers	1	2	3	3.6%	4.6%
Roadway	Intersections	9	31	40	48.2%	26.7%
	Roadway Departure	3	16	19	22.9%	25.6%
Special Users	Pedestrians	1	1	2	2.4%	9.2%
	Bicycles	0	2	2	2.4%	1.3%
Vehicles	Motorcycles	3	13	16	19.3%	14.9%
	Large Trucks (Truck/Bus)	3	8	11	13.3%	5.8%

Table 3: Crashes in Alcoa by Contributing Factors - Statewide Urbanized Area Comparison

Category	Emphasis Areas	City of Alcoa	Urban Areas – State of Tennessee
		% Fatal & Serious Injury Crashes	% Fatal & Serious Injury Crashes
All Severe Crashes		100.0%	100.0%
Drivers	Aggressive Drivers / Speeding	18.1%	14.4%
	Older Drivers (65+)	22.9%	17.0%
	Unrestrained Occupants	16.9%	22.5%
	Teen Drivers (13-19)	6.0%	16.5%
	Impaired Drivers	15.7%	10.3%
	Inattentive, Distracted, & Drowsy Drivers	3.6%	5.7%
Roadway	Intersections	48.2%	30.9%
	Roadway Departure	22.9%	15.9%
Special Users	Pedestrians	2.4%	12.8%
	Bicycles	2.4%	1.6%
Vehicles	Motorcycles	19.3%	13.4%
	Large Trucks (Truck/Bus)	13.3%	7.4%

CRASH DATA ANALYSIS

Table 4 summarizes crashes by KABCO Scale severity and year occurring on all roadways within the City of Alcoa. The last full year of data, 2024, shows the largest number of combined fatal and serious injury crashes during the last five years evaluated, with 25 crashes versus the 15 or fewer crashes in previous years.

Table 4: Crashes in Alcoa by Severity

Year	Fatal Injury (K)	Serious Injury (A)	Minor Injury (B)	Possible Injury (C)	PDO (O)	Total
2020	3	12	61	36	602	714
2021	3	12	74	43	657	789
2022	5	10	94	43	675	827
2023	1	12	82	26	671	792
2024	5	20	96	41	644	806
Total	17	66	407	189	3,249	3,928
Percentage of All Crashes	0.4%	1.7%	10.4%	4.8%	82.7%	100.0%

For this study, the data includes the total number of fatalities and serious injuries resulting from crashes within the analysis period. A single fatal crash can result in multiple fatalities, and similarly, a serious injury crash can lead to multiple serious injuries. For the purposes of this study, only the total number of vehicle crashes, regardless of injury type, was used in the evaluation.

Vehicle Miles Travelled (VMT)

Vehicle Miles Traveled (VMT) data were gathered through TDOT’s Highway Performance Monitoring System, organized by administrative systems, functional class, or county. From 2015 to 2040, Blount County experienced approximately 32% growth in VMT, as shown in **Figure 9** below. Based on the chart below, the annualized growth rate is 1.23% per year.

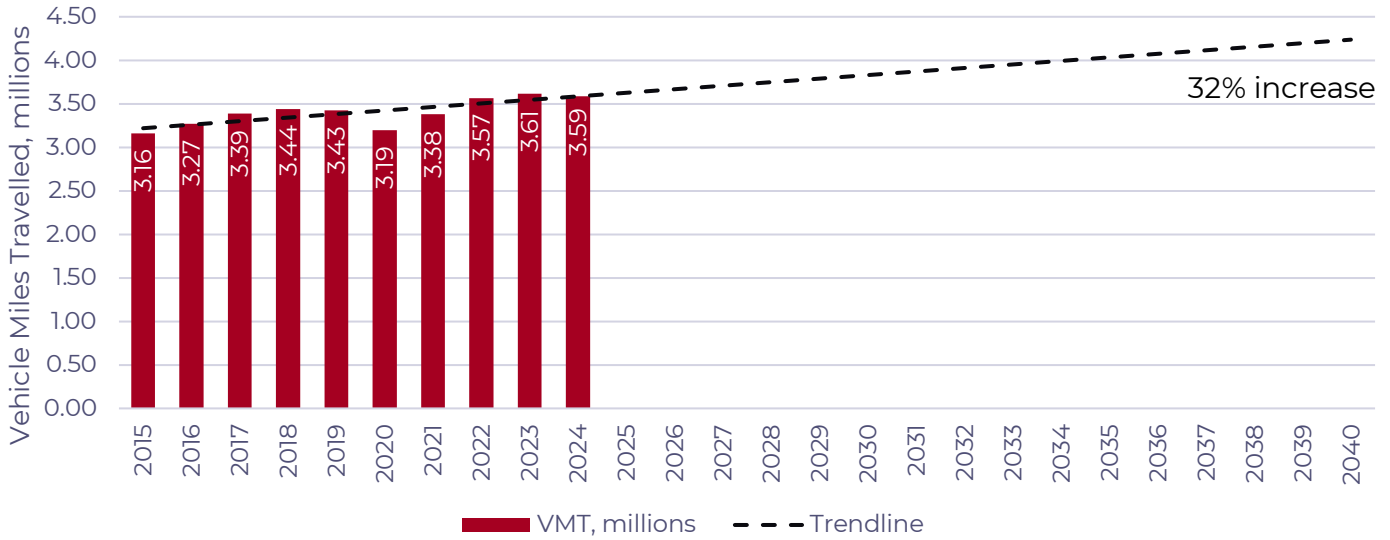


Figure 9: VMT Trends, Blount County

Crash Rate Analysis

In order to properly evaluate crash numbers, normalizing the crashes based on Blount County VMT and City of Alcoa population allows for acquiring a better context in terms of recent trends within the study area. As shown in **Figure 10**, Alcoa’s fatal and serious injury crash trends follow a similar trend to Blount County’s VMT data from 2015 to 2024.

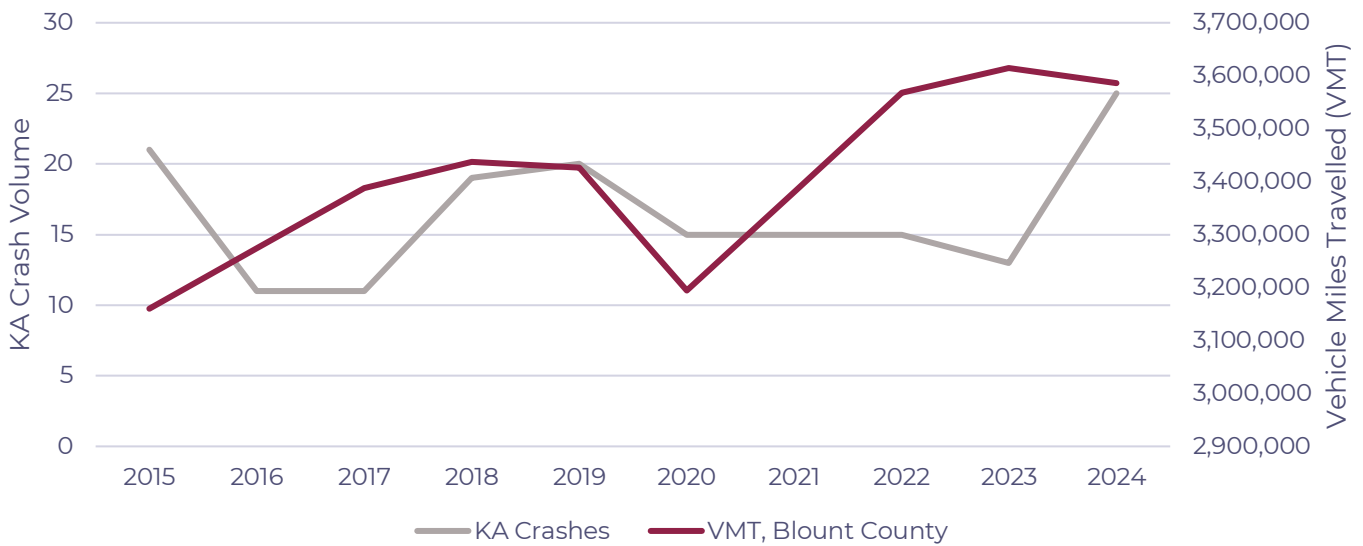


Figure 10: Alcoa KA Crash Trend vs Blount County VMT

Figure 11 shows a comparison between Alcoa’s fatal and serious injury crash trends and the change in population from 2016 to 2024. As illustrated in the figure, the City’s population has exhibited consistent growth, with the growth rate accelerating over the past few years. The KA crash rates declined from 2020 to 2023 but showed a marked increase in 2024.

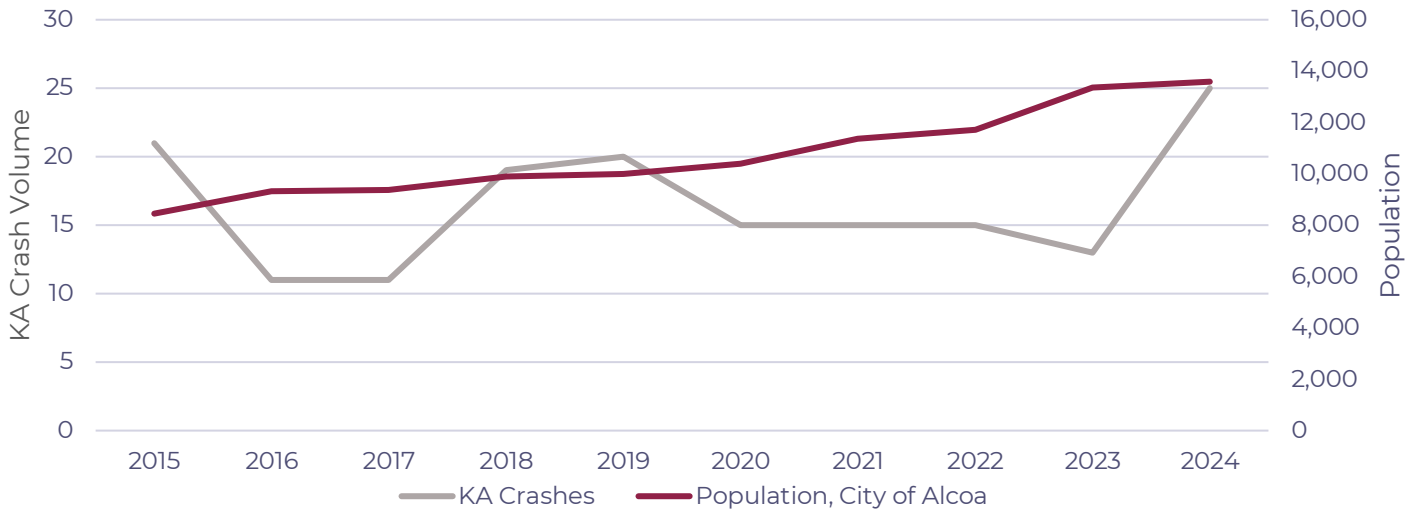


Figure 11: Alcoa KA Crash Trend vs City Population

The following sections visualize the five-year rolling average trends for fatal, serious injury, and vulnerable road user (VRU) crash rates over the study period (2020-2024). Ideally, crash rate trends will exhibit zero or negative slopes, resulting from the decline in crashes with respect to population or vehicle mileage growth in the area. Using a rolling average allows for an improved forecast of long-term trends by reducing short-term fluctuations in data.

Fatal Crash Rates

As shown in **Figure 12**, fatal five-year rolling average crash rate trends are projected to increase substantially (150%) from 2020-2040. This increase nearly doubles the growth on Blount County VMT data, highlighting the overrepresentation of fatal crashes within the study network. Based on the chart below, the annualized growth rate is 7.14% per year.

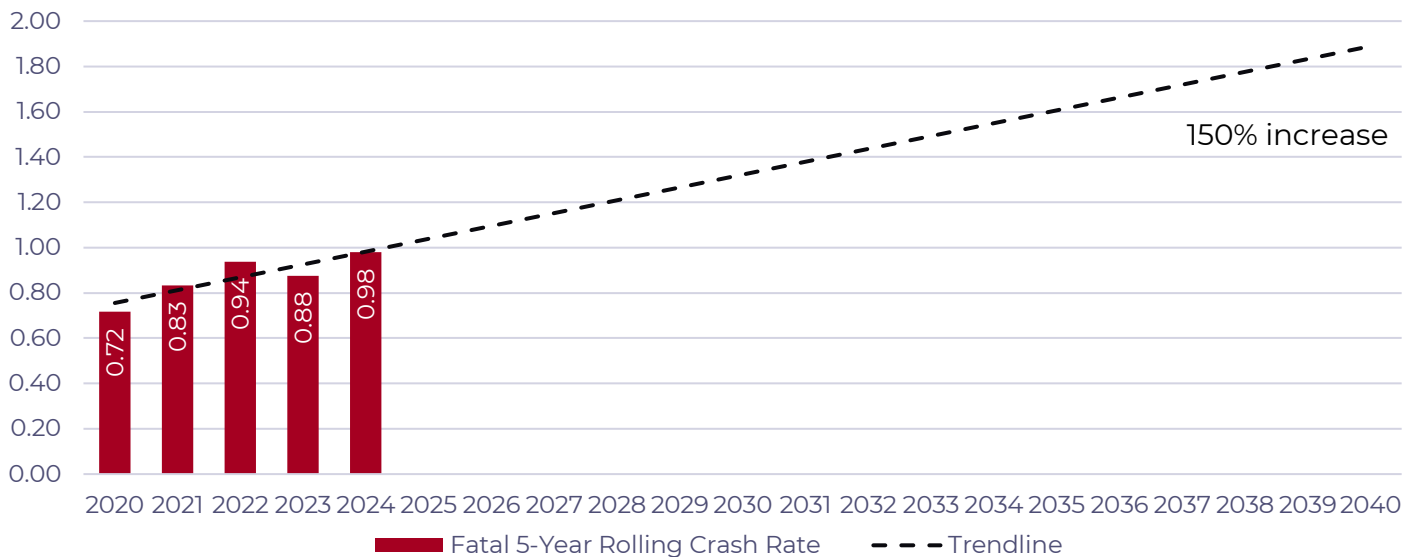


Figure 12: Fatal Crash Rates in Alcoa

Serious Injury Crash Rates

As shown in **Figure 13**, serious injury five-year rolling average crash rate trends are projected to decrease by 14% by 2040. The projected annual growth rate is .65% decrease per year. This slight decrease visualizes the decline of serious injury crashes with respect to the growth in Blount County over the study period.

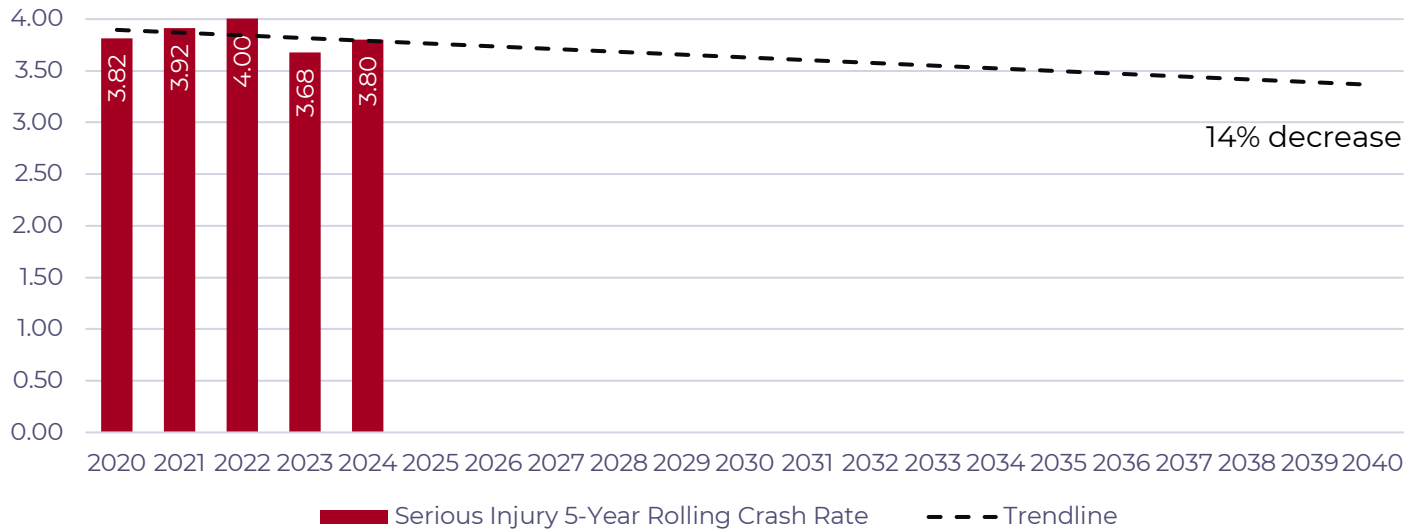


Figure 13: Serious Injury Crash Rates in Alcoa

VRU Crash Rates

As shown in **Figure 14**, VRU (i.e., bicycle and pedestrian) five-year rolling average crash rate trends are expected to increase by 51% by 2040. The projected annual growth rate is 2.43% per year. This increase highlights the overrepresented growth in VRU crashes compared to the growth in vehicle mileage within Blount County.

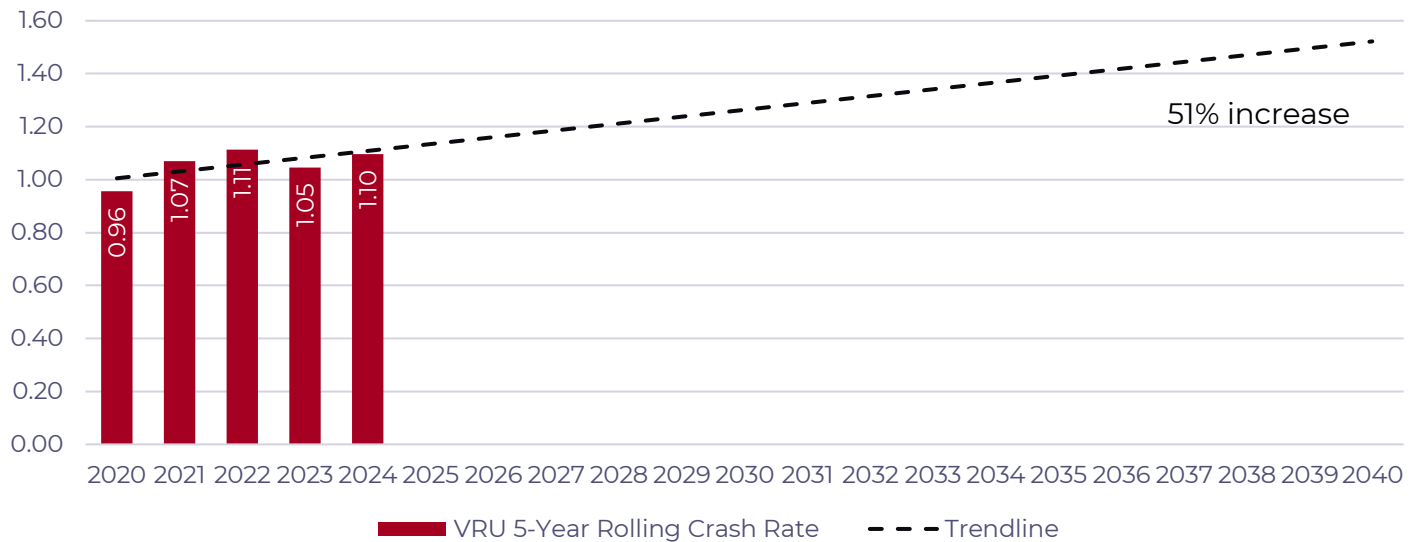


Figure 14: VRU Crash Rates in Alcoa

Crash Density

Crash density is commonly measured as crashes per mile. **Figure 15** displays the total crash density for Alcoa during the study period – highlighting locations where fatal, suspected serious injury, and vulnerable road user crashes occurred along the roadway network. The highest crash densities are typically observed at locations with higher traffic volumes, as this translates to more exposure and potential risk for all road users.

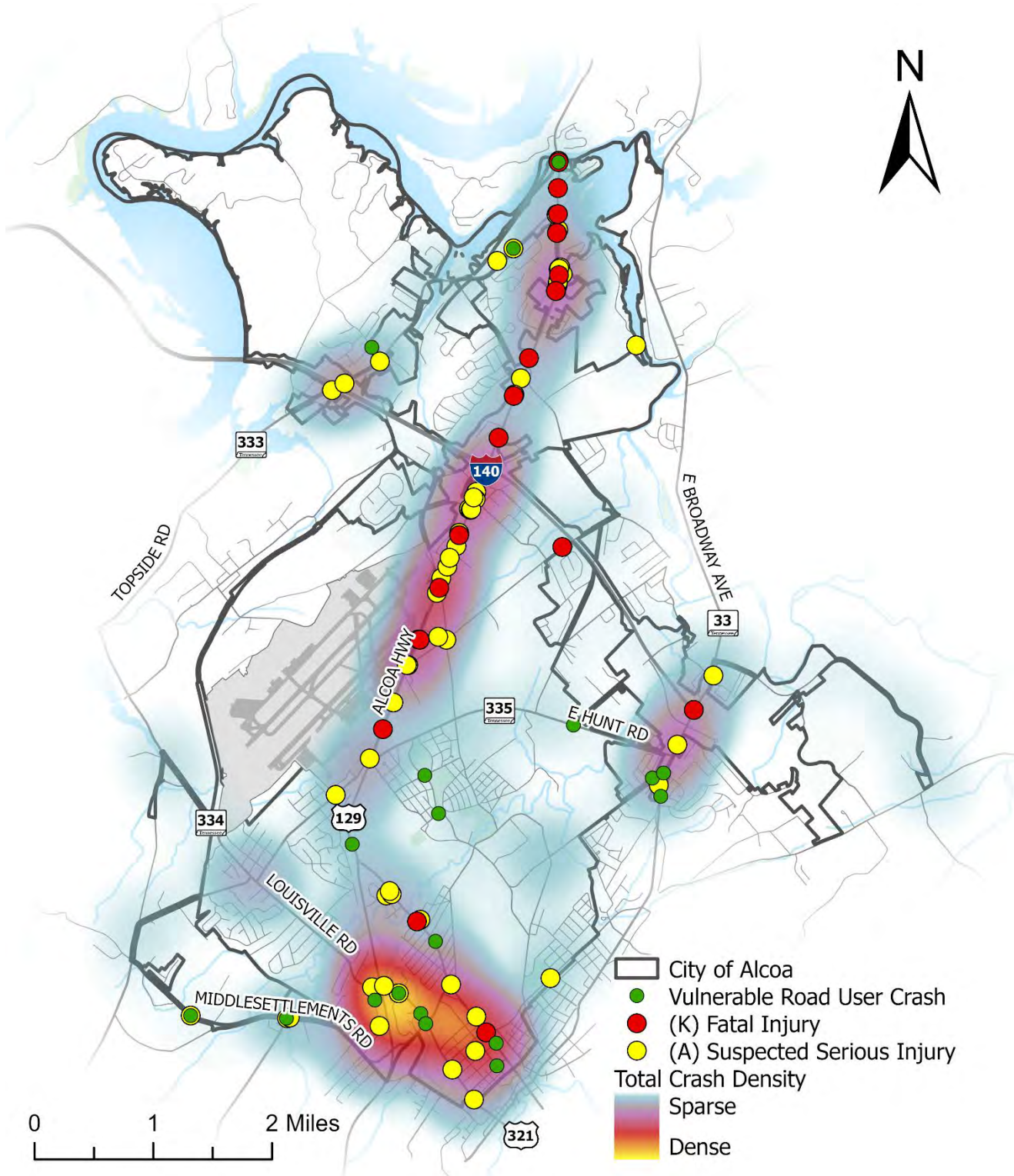


Figure 15: Fatal & Serious Injury Crashes with Overall Crash Density

Crashes by Type

Crash type is indicated on crash reports submitted by law enforcement agencies. Rear-end crashes were the most common type of crash over the study period, often occurring in congested traffic or when drivers are distracted. Rear-end crashes tend to be less severe because they often occur at lower speeds with less damaging crash angles. Angle crashes were the second most common crash type, often occurring at roadway intersections, driveways, and roads with prominent access management issues. The entire range of crash types is listed below in **Table 5**.

Table 5: Crashes in Alcoa by Type

Type of Crash	2020	2021	2022	2023	2024	Total
Rear-End	265	303	287	280	325	1,460
Angle	227	211	210	226	233	1,107
No Collision W/ Vehicle	112	122	139	114	110	597
Sideswipe, Same Dir	66	94	92	85	71	408
Other	13	22	54	37	34	160
Head-On	13	22	27	28	17	107
Sideswipe, Opp Dir	12	13	14	18	10	67
Rear to Side	5	2	1	4	3	15
Rear to Rear	1	-	3	-	3	7
Total	714	789	827	792	806	3,928

Compared to other urban areas within the State of Tennessee, the City of Alcoa experienced a higher percentage of rear-end crashes. This further advances the need for improvements at intersections that would lead to the mitigation of rear-end crashes, including updated signal timing and installation of turn lanes.

Crashes by Lighting Condition

Lighting is critical for safe and efficient travel by all roadway users. Street lighting allows all parts of the travelled roadway to be visible, especially during adverse weather conditions. Inadequate lighting conditions can be improved through various treatments, such as installing lighting structures, and retroreflective roadway striping and signage. Additionally, improvements aimed at mitigating sun glare can enhance driver awareness during sunrise and sunset, when the sun often shines directly into the driver's view at an uncomfortable angle.

The entire range of crashes by lighting condition is listed below in **Table 6**, while **Table 7** displays lighting conditions for fatal and serious injury crashes. The findings indicate that while most crashes in the City occur during daylight hours, there is a notable percentage of fatal and serious injury crashes that occur during non-daylight conditions (43 percent).

Table 6: Crashes in Alcoa by Lighting Condition

Lighting Condition	2020	2021	2022	2023	2024	Total
Daylight	564	580	566	584	588	2,882
Dark - Lighted	84	118	121	99	111	533
Dark - Not Lighted	36	58	67	48	40	249
Other	14	14	53	38	33	152
Dawn	11	14	10	12	23	70
Dusk	5	5	10	11	11	42
Total	714	789	827	792	806	3,928

Table 7: KA Crashes in Alcoa by Lighting Condition

Lighting Condition	2020	2021	2022	2023	2024	Total
Daylight	11	6	6	9	15	47
Dark - Lighted	3	8	4	3	6	24
Dark - Not Lighted	1	1	4	1	4	11
Dusk	-	-	-	-	-	1
Total	15	15	15	13	25	83

As shown in **Figure 16**, there was a high density of crashes during non-daylight conditions in the downtown area and along US-129. Lighting, along the roadway and at major intersections, can greatly reduce the potential for collisions due to poor visibility and a lack of driver awareness. Alternative options to lighting installations would be to implement retroreflective striping and signage, further advancing lane delineation and driver awareness of all potential roadway conflicts.

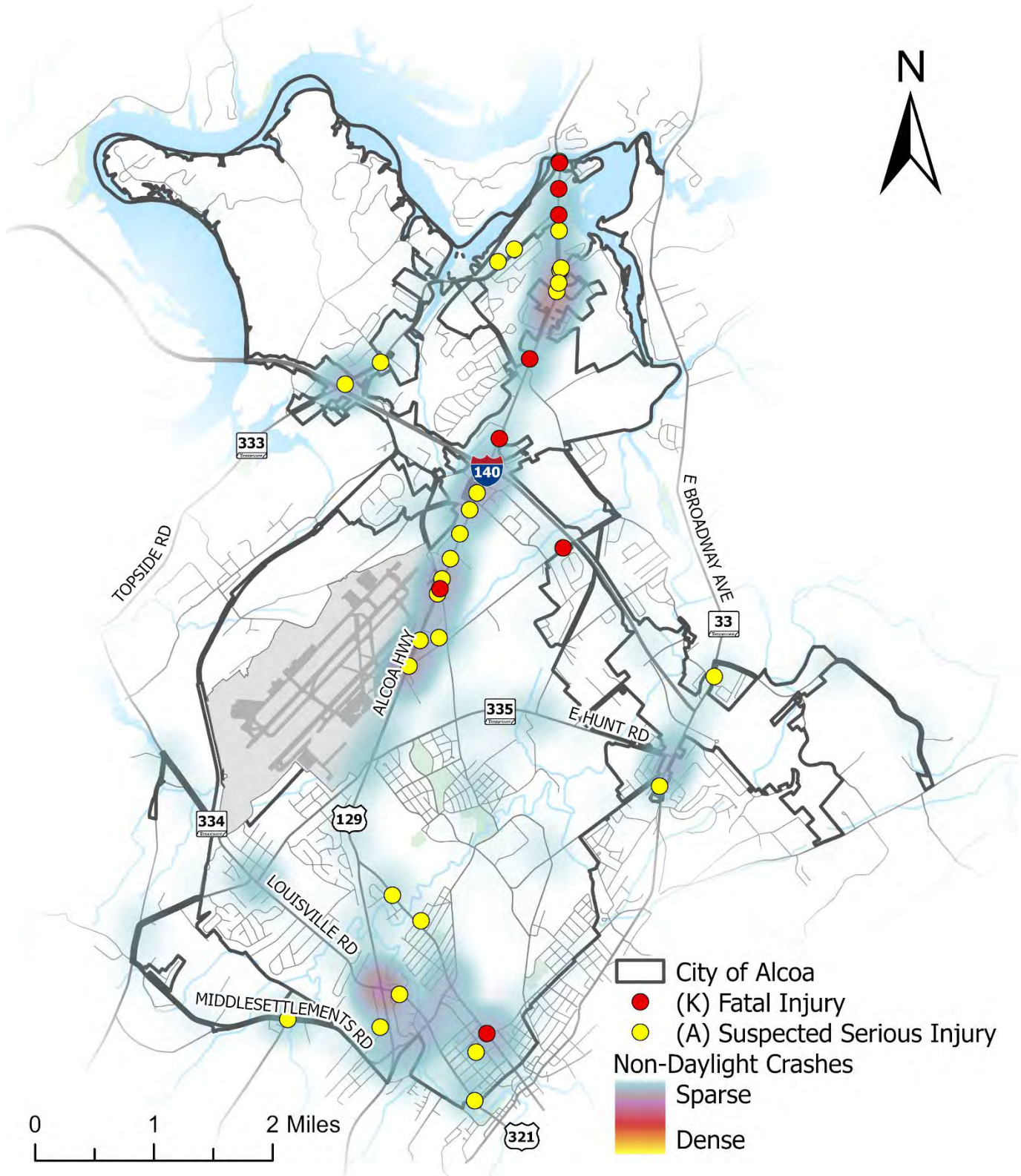


Figure 16: Alcoa Non-Daylight Crash Density

Crashes by Road Surface Condition

Roadway surface conditions impact how vehicles interact with the roadway and directly influence the frequency of crashes. Wet pavement can reduce tire traction and exacerbate the frequency and severity of crashes. Inadequate roadway surface conditions can be improved through pavement friction applications and treatments, as well as upgrading striping and signage to be more visible during adverse conditions.

The entire range of crashes by roadway surface condition is listed below in **Table 8**, while **Table 9** displays fatal and serious injury crashes. A high percentage of total crashes and fatal and serious injury crashes occurred along roadways with dry surface conditions. Neither total crashes nor fatal and serious injury crashes involving non-dry roadway surface conditions are overrepresented in Alcoa when compared to statewide records.

Table 8: Crashes in Alcoa by Road Surface Condition

Surface Condition	2020	2021	2022	2023	2024	Total
Dry	561	668	661	666	650	3,206
Wet	138	110	108	96	122	574
Unknown	10	11	49	30	20	120
Snow or Slush	5	-	6	-	5	16
Ice	-	-	3	-	8	11
Sand, Mud, Dirt or Oil	-	-	-	-	1	1
Total	714	789	827	792	806	3,928

Table 9: KA Crashes in Alcoa by Surface Condition

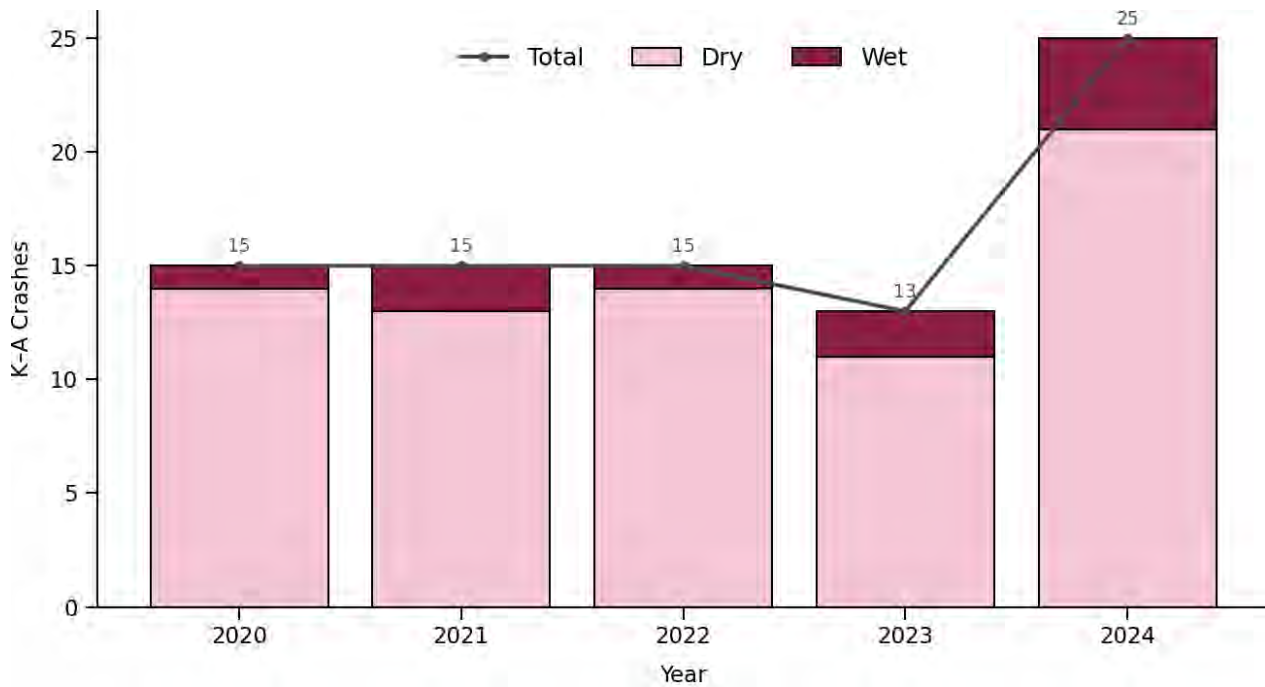


Figure 17 shows a higher density of crashes during non-dry roadway surface conditions in the downtown area and near the intersection of I-140 at US-129. These types of collisions commonly occur at locations requiring large speed reductions, including intersections and traffic signals, where braking effects can be reduced due to low levels of friction between vehicle tires and roadway pavement. The implementation of applications that improve pavement friction, including pavement textures, pavement surface treatments, and regular maintenance are greatly successful in reducing collisions caused by non-dry pavement conditions.

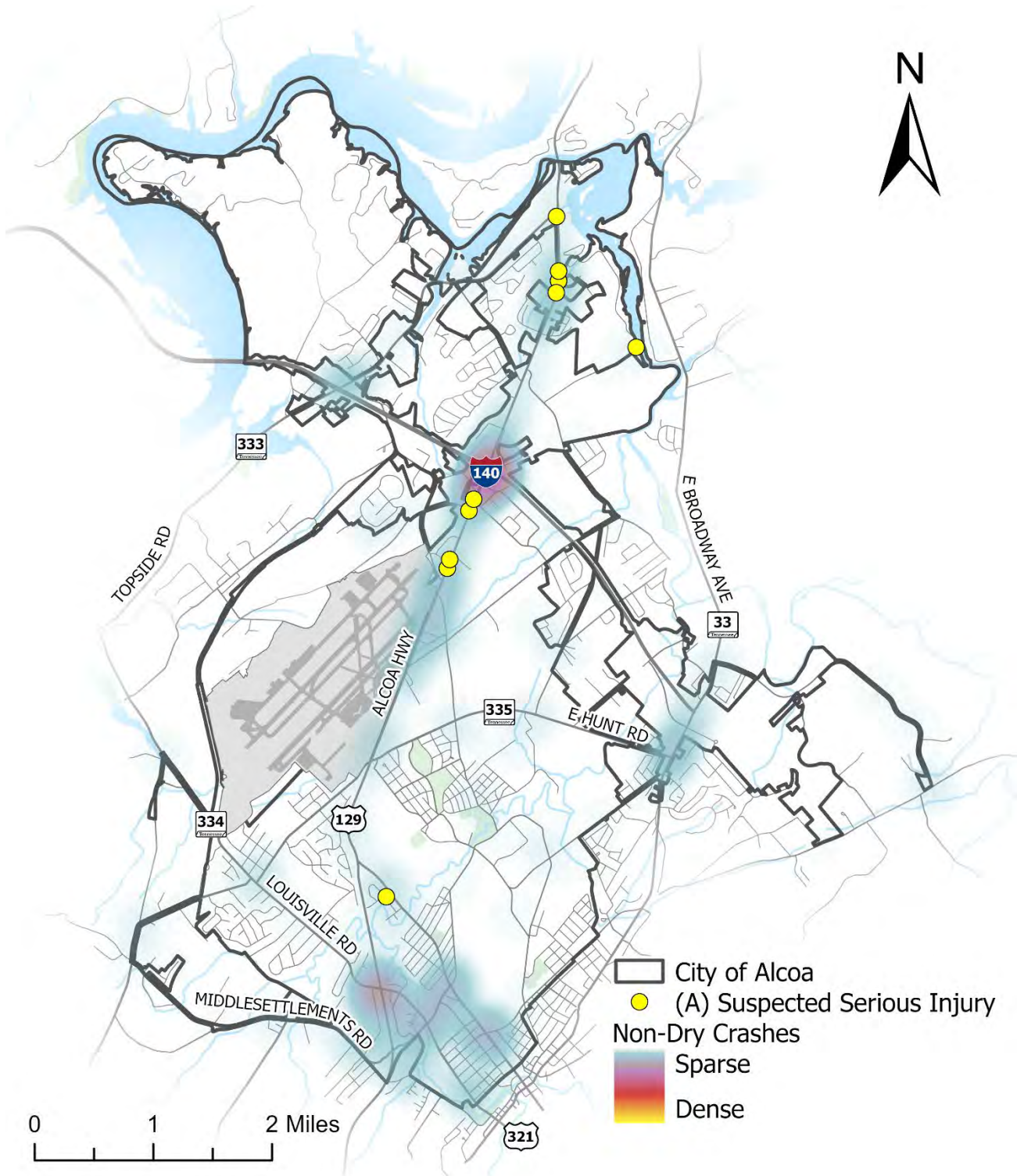


Figure 17: Alcoa Non-Dry Roadway Surface Conditions Crashes

High Crash Locations

The total number of crashes at a location does not tell the whole story, as areas with higher traffic volume are more likely to experience a greater frequency of crashes. Furthermore, locations with high traffic volumes often experience congestion, which may result in lower crash severity. Crash rate calculations account for traffic volumes to provide a more effective comparison at specific locations. The crash rates shown below are expressed as crashes per one million vehicle-miles traveled and were calculated using the FHWA Roadway Departure Safety manual methodology.

Table 10 summarizes the top 15 city intersections, based on total crashes and crash rates, while **Table 11** summarizes the top 15 city intersections, based on fatal and serious injury crashes and fatal and serious injury crash rates, respectively. While these metrics were not the only criteria for inclusion in the HIN, this analysis was an important first step in HIN development.

Table 10: High Crash Intersections

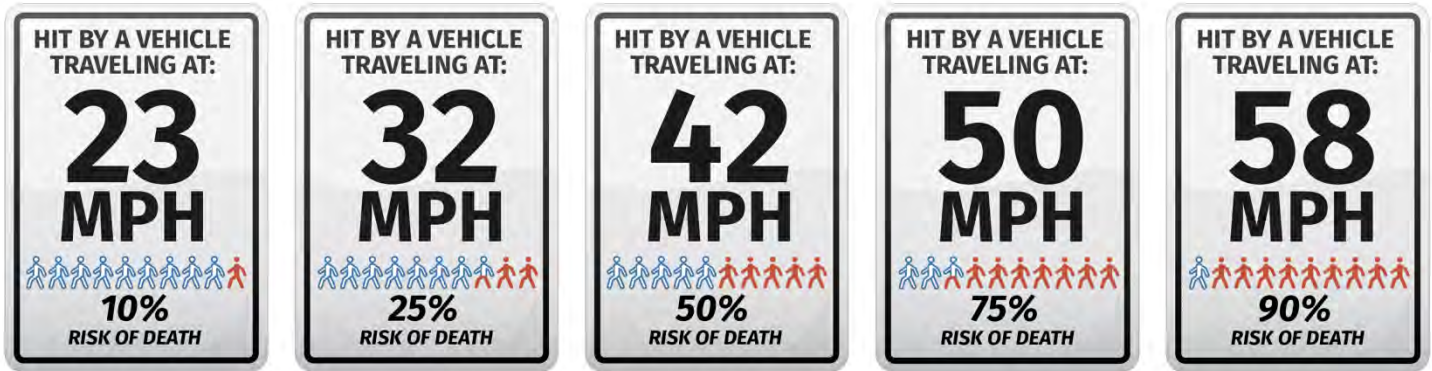
Intersection	Control Type	Total Crashes	TEV	Crash Rate	Rank by Crash Rate
W BESSEMER ST AT N CALDERWOOD ST	Signalized	88	37,500	1.29	1
ALCOA HWY AT LOUISVILLE RD	Signalized	78	50,000	0.85	5
ALCOA HWY AT N WRIGHT RD	Unsignalized	72	57,500	0.69	7
S HALL RD AT LINCOLN RD	Signalized	70	32,500	1.18	2
N HALL RD AT BESSEMMER RD	Signalized	65	35,000	1.02	4
ALCOA HWY AT CUSICK RD	Unsignalized	60	65,000	0.51	10
ALCOA HWY AT WHEELER RD	Unsignalized	47	60,000	0.43	11
LOUISVILLE RD AT HUNTERS CROSSING	Unsignalized	35	17,500	1.10	3
ALCOA HWY AT AIRBASE RD	Unsignalized	34	57,500	0.32	13
N HALL RD AT JOULE ST	Signalized	33	32,500	0.56	9
ALCOA HWY AT WRIGHTS FERRY RD	Unsignalized	33	57,500	.31	14
MIDDLESETTLEMENTS RD AT ATCHLEY DR	Signalized	29	20,000	.79	6
LOUISVILLE RD AT HAMILTON CROSSING DR	Signalized	28	22,500	.68	8
ALCOA HWY AT AIRPORT PLAZA BLVD	Unsignalized	26	65,000	.22	15
ASSOCIATES BLVD AT N HALL RD	Signalized	25	35,000	.39	12

Table 11: High KA Crash Intersections

Intersection	Control Type	KA Crashes	TEV	Crash Rate	Rank by Crash Rate
ALCOA HWY AT WHEELER RD	Unsignalized	6	37,500	0.05	2
ALCOA HWY AT AIRBASE RD	Unsignalized	3	50,000	0.03	5
ALCOA HWY AT AIRPORT PLAZA BLVD	Unsignalized	3	57,500	0.03	6
MIDDLESETTLEMENTS RD AT ATCHLEY DR	Signalized	2	32,500	0.05	1
ASSOCIATES BLVD AT N HALL RD	Signalized	2	35,000	0.03	4
ALCOA HWY AT N WRIGHT RD	Unsignalized	2	65,000	0.02	8
ALCOA HWY AT CUSICK RD	Unsignalized	2	60,000	0.02	10
LOUISVILLE RD AT HUNTERS CROSSING	Unsignalized	1	17,500	0.03	3
LOUISVILLE RD AT HAMILTON CROSSING DR	Signalized	1	57,500	0.02	7
S HALL RD AT LINCOLN RD	Signalized	1	32,500	0.02	9
N HALL RD AT BESSEMMER RD	Signalized	1	35,000	0.02	12
N HALL RD AT JOULE ST	Signalized	1	32,500	0.02	11
ALCOA HWY AT WRIGHTS FERRY RD	Unsignalized	1	57,500	0.01	13
W BESSEMER ST AT N CALDERWOOD ST	Signalized	0	37,500	0	14
ALCOA HWY AT LOUISVILLE RD	Signalized	0	50,000	0	15

Crashes Involving Vulnerable Road Users

Vulnerable road users (VRUs) include pedestrians, cyclists, mobility device users (e.g., wheelchairs), and shared micromobility riders (e.g., e-scooters). VRUs are more exposed and at higher risk in the event of a crash with motorists. Understanding the characteristics of roadways and their surrounding areas, such as retail density, number of travel lanes, and roadway speed limits, can help identify locations with potentially higher risk for VRUs. As mentioned in the Emphasis Areas section, VRU crashes are over-represented in the City of Alcoa compared to the statewide and other urban area percentiles. Although this trend can be attributed to the higher volume of VRU traffic in the area, the safety issue remains unacceptable. **Figure 18** displays the locations where VRU crashes occurred along the Alcoa roadway network.



(Source: USDOT)

Crash severity for vulnerable road users increases dramatically as vehicle speeds rise, with FHWA data showing a much higher likelihood of fatal or serious injury for pedestrians and cyclists struck at higher speeds compared to those struck at lower speeds.

Vehicle speed is one of the most critical factors influencing crash severity for vulnerable road users. FHWA data illustrates that even modest increases in speed substantially raise the risk of fatal and serious injuries for pedestrians and cyclists, underscoring the importance of speed management on City streets.

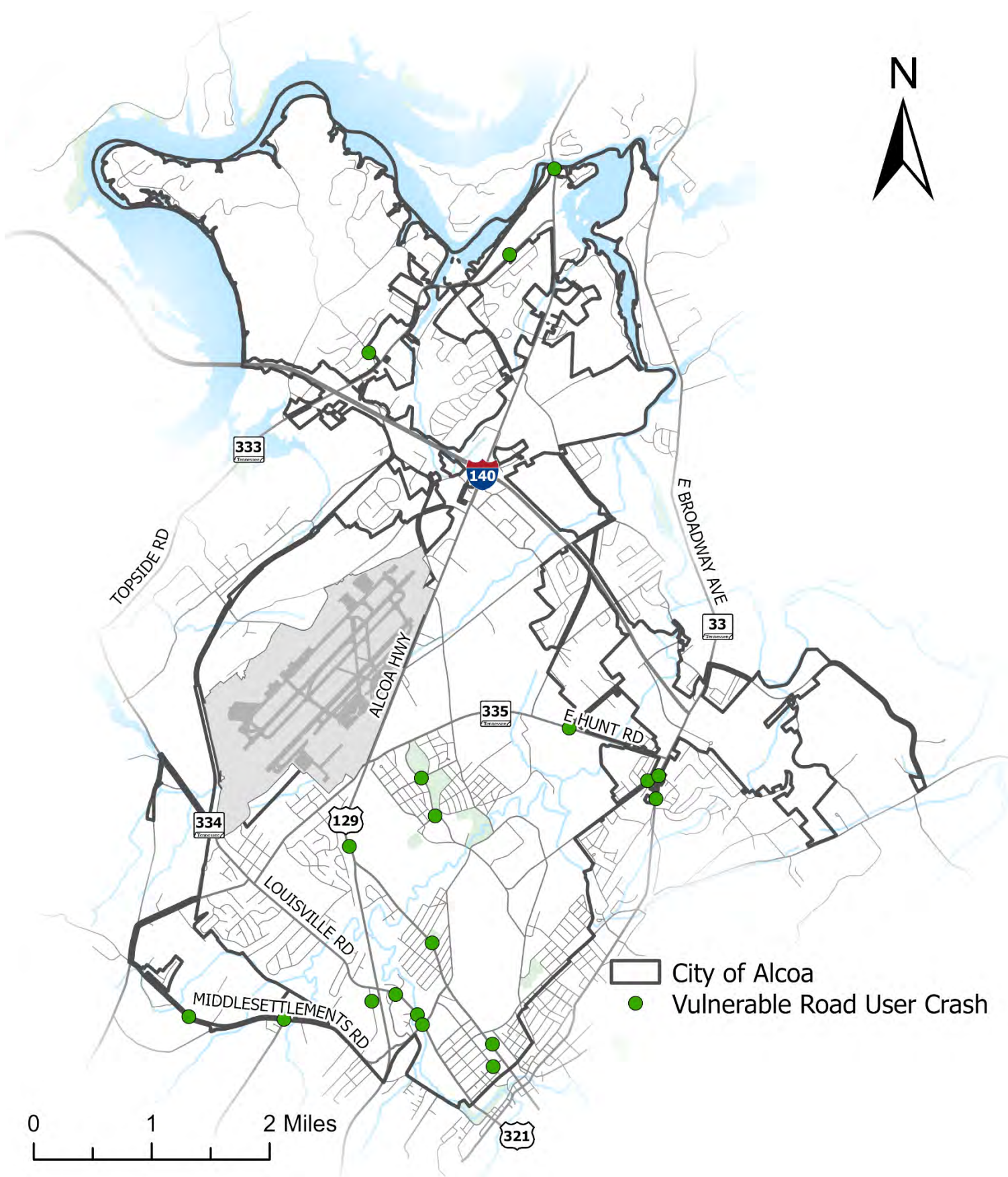


Figure 18: Crashes Involving Vulnerable Road Users (2020-2024)

Vulnerable Road User Path Connectivity

As shown in **Figure 19**, there are several areas in Alcoa that experience large gaps between sidewalks, trails, and paths. A disconnected pedestrian network can force VRUs into vehicle travel lanes with little to no shoulder, greatly increasing the risk of VRU-vehicular conflicts. Despite the presence of an extensive network of VRU paths in neighborhoods and parks, there is limited connectivity between neighborhoods and along higher-speed arterial and collector roads. Moreover, while many roads in the area have sidewalks, frequent switches from one side of the road to the other create numerous crossing points. These unnecessary crossings heighten the risk of conflicts between motorists and non-motorists. Implementing continuous sidewalks or shared-use paths on one or both sides of the roadway would help mitigate these conflicts and enhance overall safety.

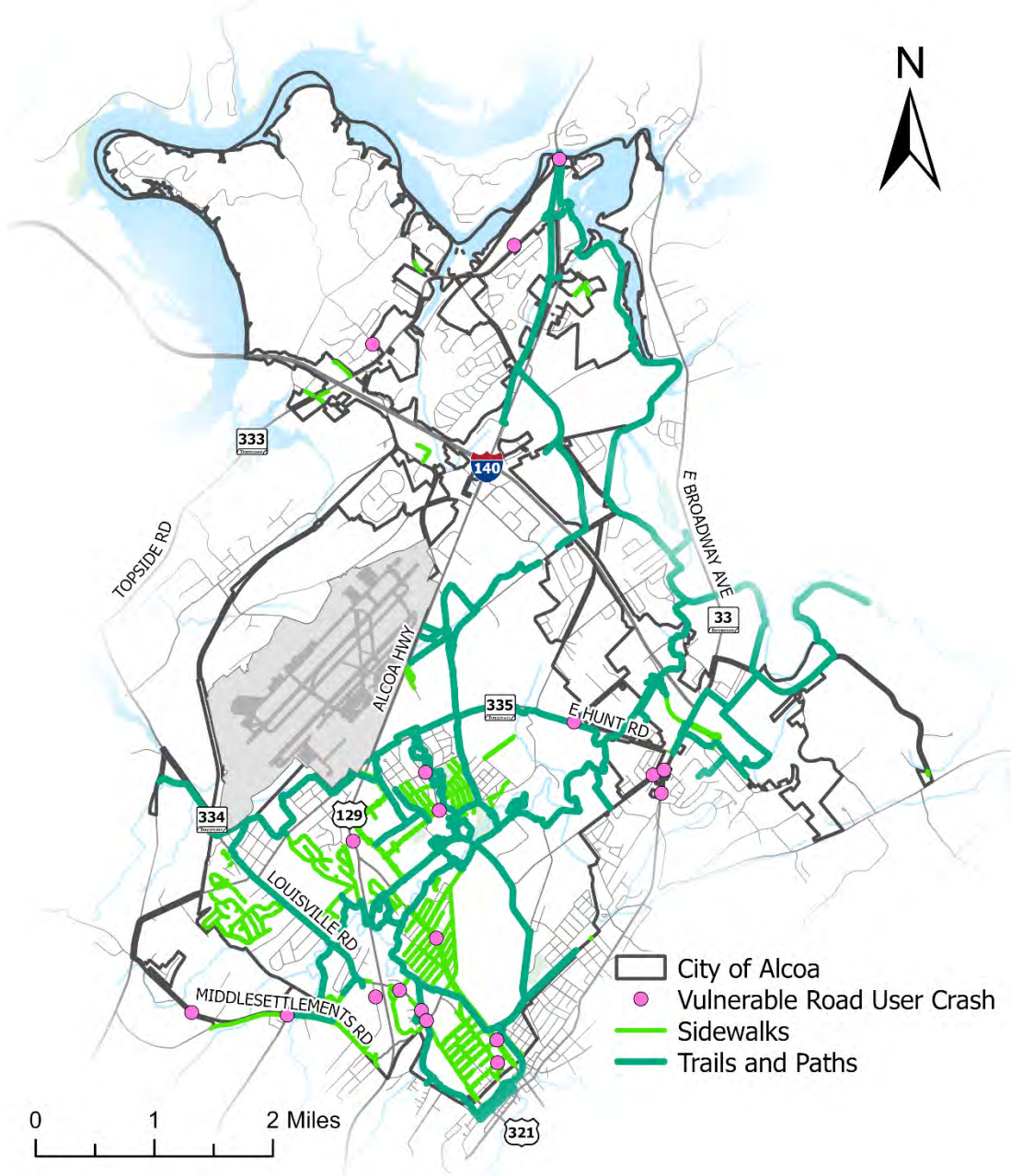


Figure 19: City of Alcoa Trails and Paths

At-Grade Rail Crossings

At-grade rail crossings – where the roadway intersects with railroad tracks at the same level – can experience additional risk to drivers, VRUs, and train vehicles. There were no reported fatal or serious injury crashes near at-grade crossings during the study period, per AASHTOWare data. However, there were two reported train-vehicle incidents at rail crossings in the past 10 years, per the Federal Rail Administration (FRA) Highway-Rail Grade Crossing Incident Data Form 57 data.

- **FRA Incident ID 137563:** In 2020, rail equipment struck a vehicle at Norfolk-Southern and Grade Road (crossing **730438E**), resulting in an injury. The grade crossing is equipped with crossbucks (warning signage).
- **FRA Incident ID 129907:** In 2018, rail equipment struck a vehicle at Norfolk-Southern and Grade Road (crossing **730438E**), resulting in property damage. The grade crossing is equipped with crossbucks (warning signage).

As shown on **Figure 20**, there were approximately 43 crashes within 150 feet of at-grade rail crossings, of which 42 were property damage only (KABCO type “O”) and one was possible Injury (KABCO type “C”). Crashes at these locations can cause extended vehicular delay and can also create disruptive impacts for rail freight.

Crashes near at-grade crossings can be mitigated through improved infrastructure, including static and dynamic warning systems, adequate gate arms, signal timing and phasing enhancements (e.g., preemption), and grade separation, as detailed in the FRA’s Highway-Rail Crossing Handbook, 3rd Edition.

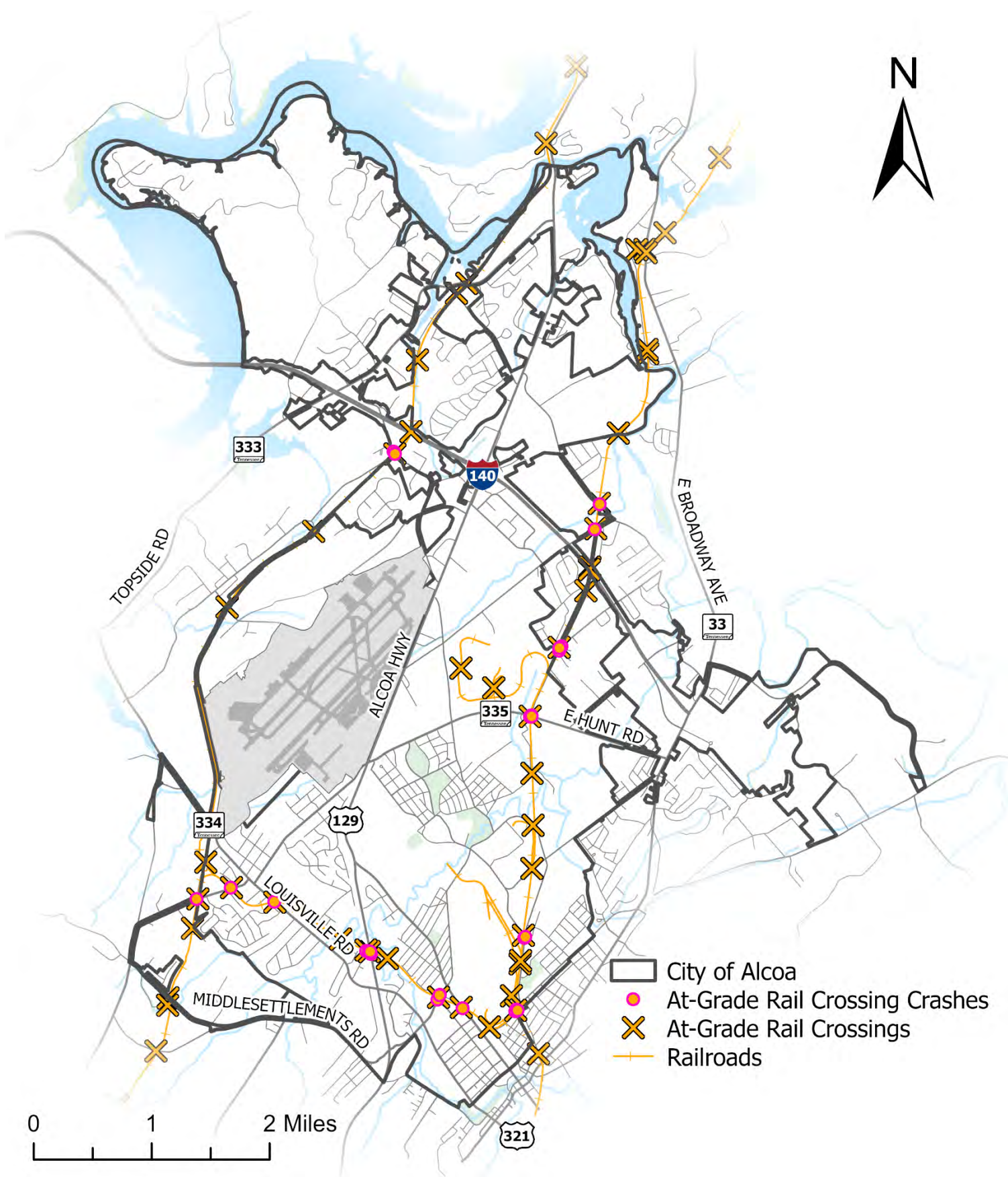


Figure 20: Alcoa At-Grade Rail Crossings

Older Drivers

As shown below in **Figure 21**, high-severity crashes involving older drivers primarily occurred in the downtown Alcoa area and along the Louisville Road and Alcoa Highway corridors. Prominent corridors included Alcoa Highway (US-129), Tennessee State Route 33, and Tennessee State Route 35. This age group is often given special consideration due to age-related changes in vision, physical fitness, and cognitive abilities, which can affect driving performance and increased crash risk. While older drivers tend to have the highest levels of experience among roadway users, they also may experience a decline in cognitive abilities. This crash type experienced a gradual increase over the previous five years, similar to the growth trends of total crashes over the same period.

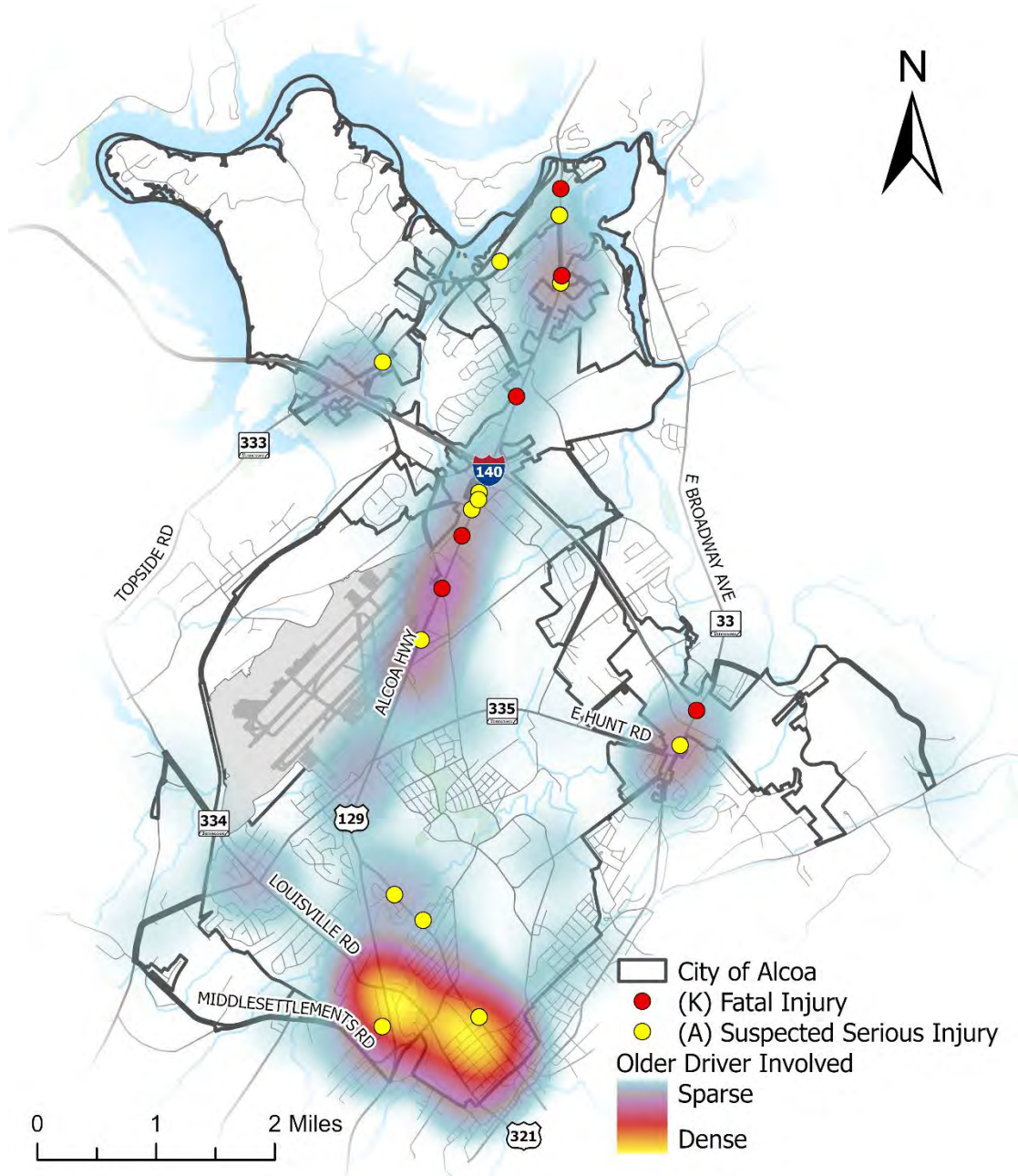


Figure 21: Alcoa Crashes Involving Older Drivers

Teen Drivers

As shown below in **Figure 22**, crashes involving teen drivers are mainly centered around the downtown region of Alcoa and along Alcoa Highway (US-129). Crashes are relatively low in the areas surrounding Alcoa High School. This specific age group is commonly associated with higher levels of dangerous driving behaviors, which can be attributed to a combination of inexperience, risk-taking habits, and susceptibility to in-vehicle distractions (phones, passengers, etc.). This crash type experienced a gradual growth over the previous five years, similar to the growth trends of total crashes over the same period.

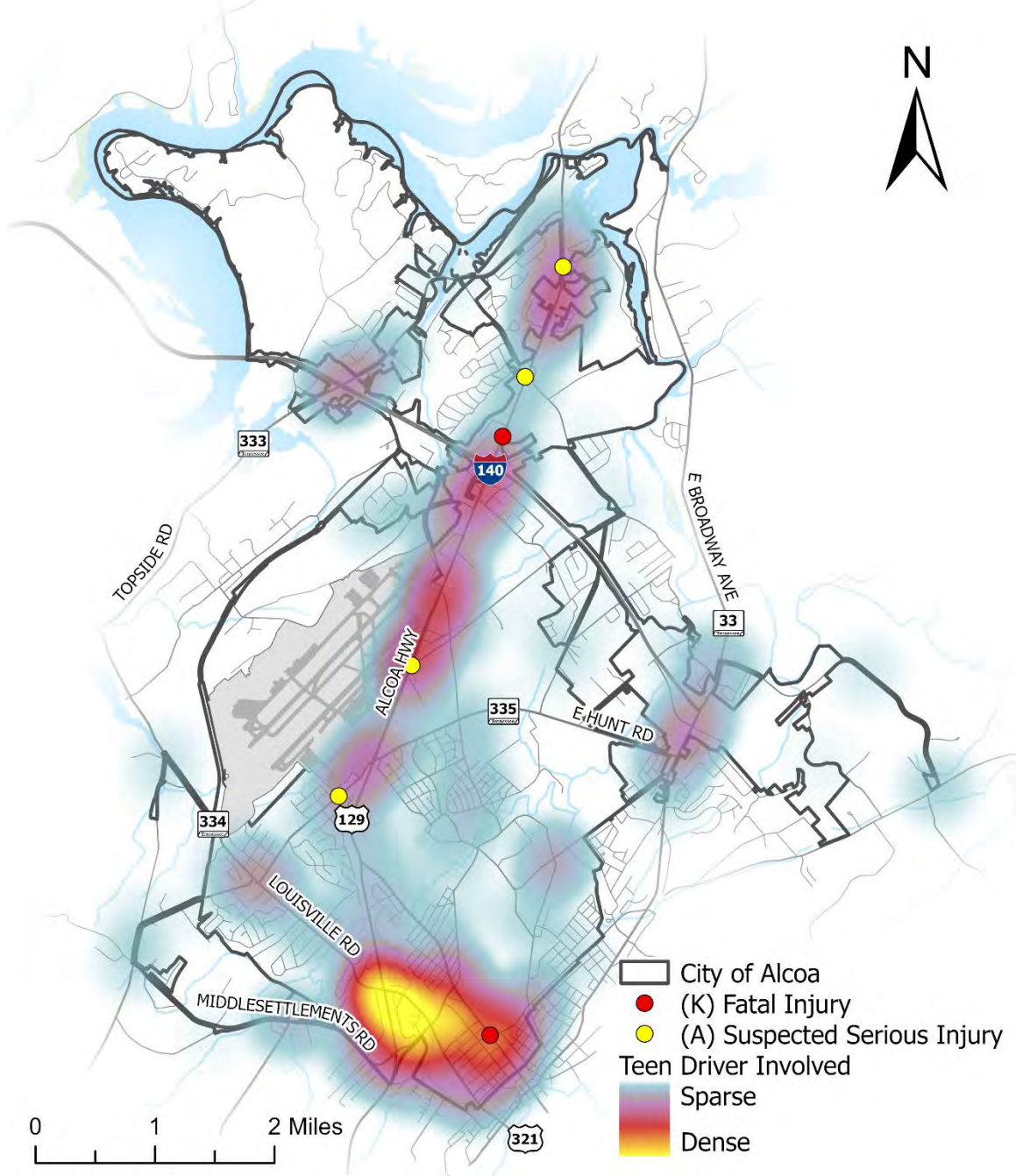


Figure 22: Alcoa Crashes Involving Teen Drivers

Impaired Drivers

As shown below in **Figure 23**, crashes involving an impaired driver primarily occurred along Alcoa Highway (US-129) and near the downtown Alcoa region, where higher speeds and alcohol-serving establishments are present. The location with the highest density of impaired driving crashes exhibits a high presence of hotels and restaurants, likely to attract people not familiar with the area. As shown in **Table 12**, drivers between 25 and 34 were most commonly involved in impaired driving crashes in total crashes (44%) and fatal and serious injury crashes (54%).

Table 12: Crashes in Alcoa involving Impaired Drivers

Driver Age Group	Percentage of Total Crashes Involving Impaired Drivers	Percentage of Fatal & Serious Injury Crashes Involving Impaired Drivers
15-24	26% (34/129)	46% (6/13)
25-34	44% (57/129)	54% (7/13)
35-44	31% (40/129)	8% (1/13)
45-54	23% (30/129)	39% (5/13)
55-64	12 (16/129)	15% (2/13)
65 and Over	9% (12/129)	23% (3/13)

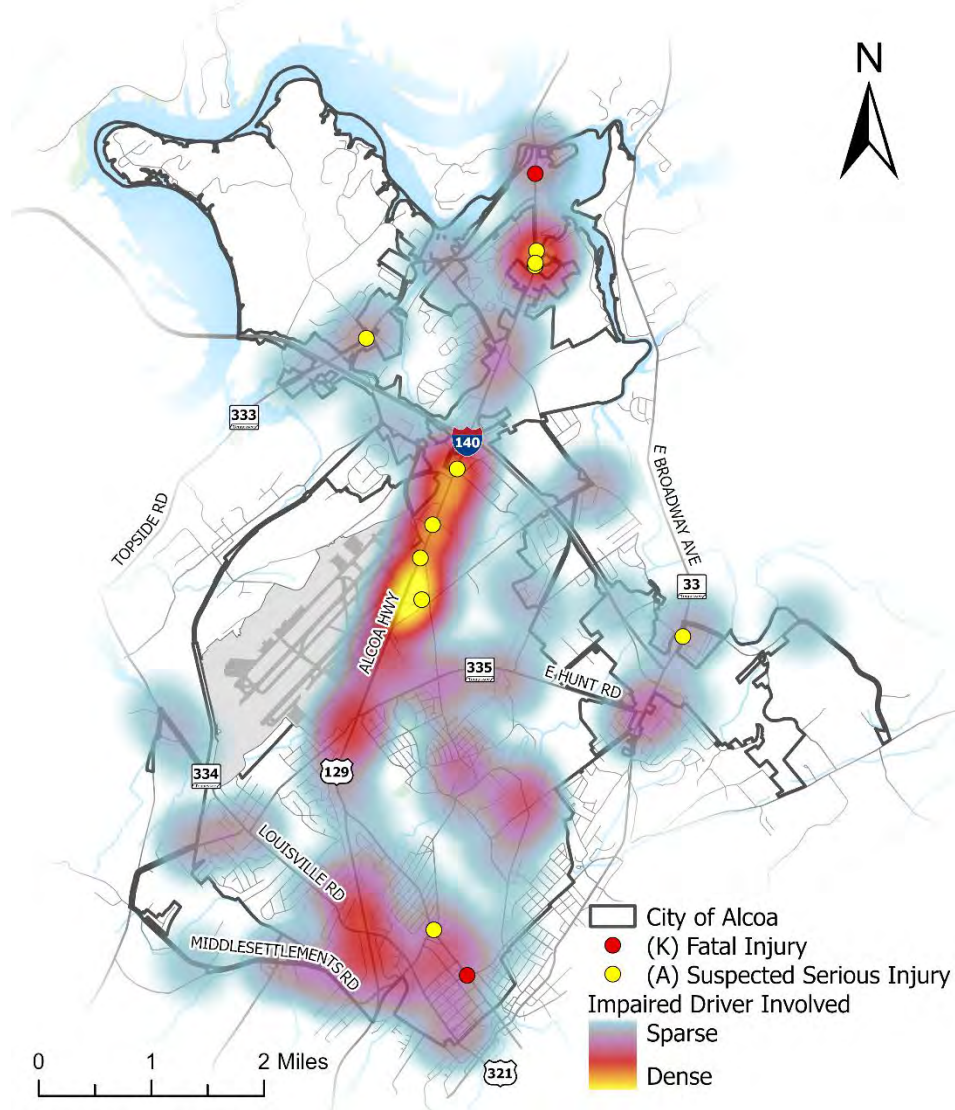


Figure 23: Alcoa Crashes Involving Impaired Drivers

Large Trucks Involved

The City of Alcoa has high freight activity due to its large industrial uses and advantageous location in the region and international freight network. **Figure 24** displays the existing freight network overlaid on the crash density heatmap of freight-related crashes. Over the study period, 176 freight-related crashes occurred in Alcoa, of which three resulted in a fatality and eight in a serious injury. Crashes most commonly occurred along the US-129 corridor, which is the major freight route within the City. Crashes were also common at the intersection of US-129 at Louisville Road, where there is a large commercial presence, along with a lumber company and truss company. This crash type has experienced a gradual growth over the previous five years, similar to the growth trends of total crashes over the same period.

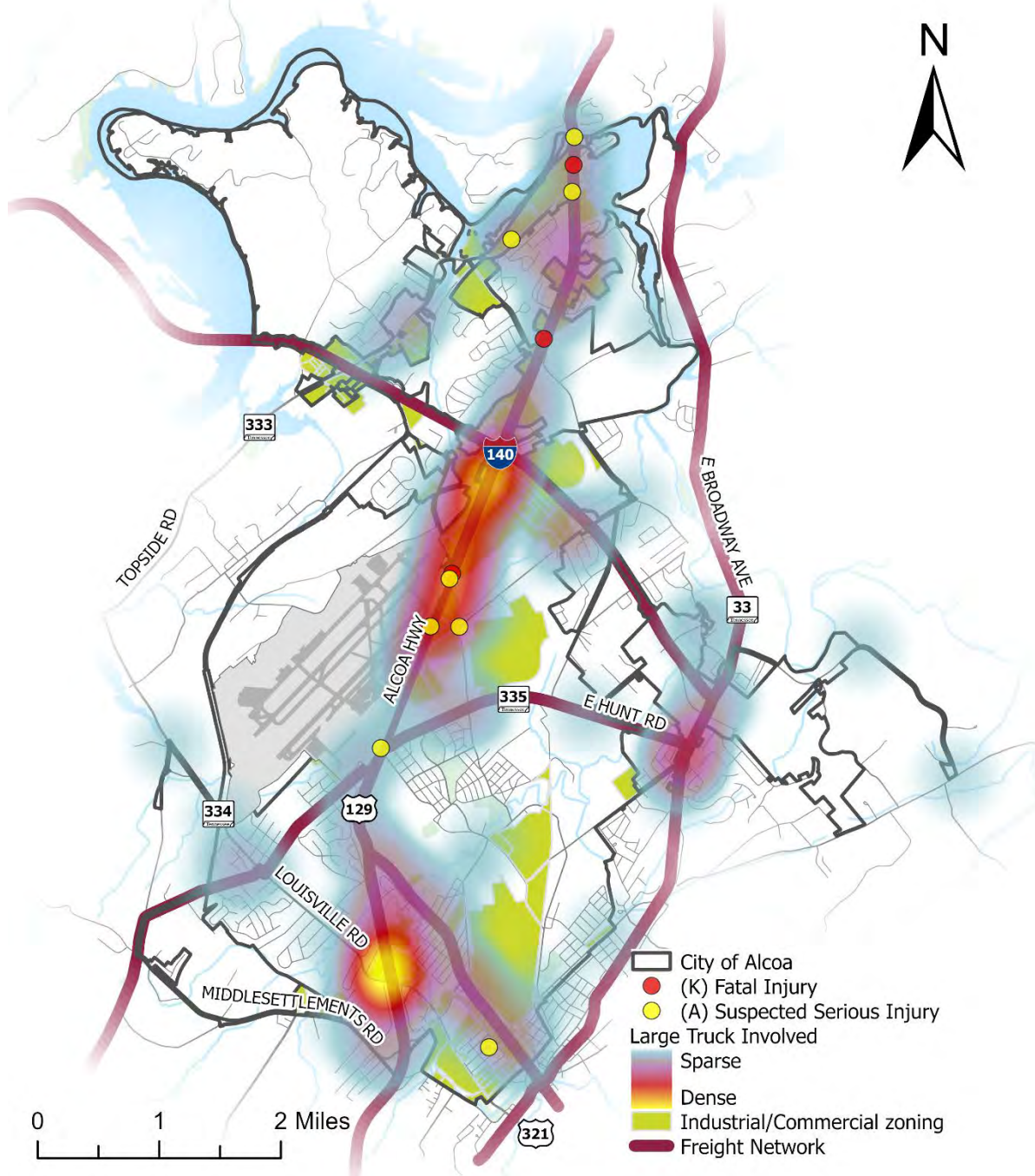


Figure 24: Alcoa Crashes Involving Large Trucks

Motorcycle Involved

While only 1.5% of total crashes within the study period involved a motorcycle, crashes involving a motorcycle resulted in roughly 29% of fatal and serious injury crashes within the City. As shown in **Table 13**, the most common crash types for motorcycle-involved crashes – for both total crashes and fatal and serious injury crashes – were *single vehicle* crashes and *angle* crashes. *Sideswipe same-direction* crashes were also very common within the study period, which can be attributed to the smaller size of motorcycles, which leads to lower awareness from standard vehicle drivers.

As shown in **Figure 25**, crashes involving motorcycles are spread throughout the City, with major dense areas near the downtown region. Fatal and serious injury crashes primarily occurred along Alcoa Highway (US-129), where high speeds by all modes of transportation cause a higher potential for increased crash severity involving motorcycles.

Table 13: Motorcycle Involved Crashes by Crash Type

Type of Crash	Percentage of Total Crashes Involving a Motorcycle	Percentage of Fatal & Serious Injury Crashes Involving a Motorcycle
Single Vehicle	39% (22/56)	31% (5/16)
Angle	25% (14/56)	38% (6/16)
Sideswipe, Same Direction	20% (11/56)	19% (3/16)
Rear-End	14% (8/56)	13% (2/16)
Other	2% (1/56)	0% (0/16)

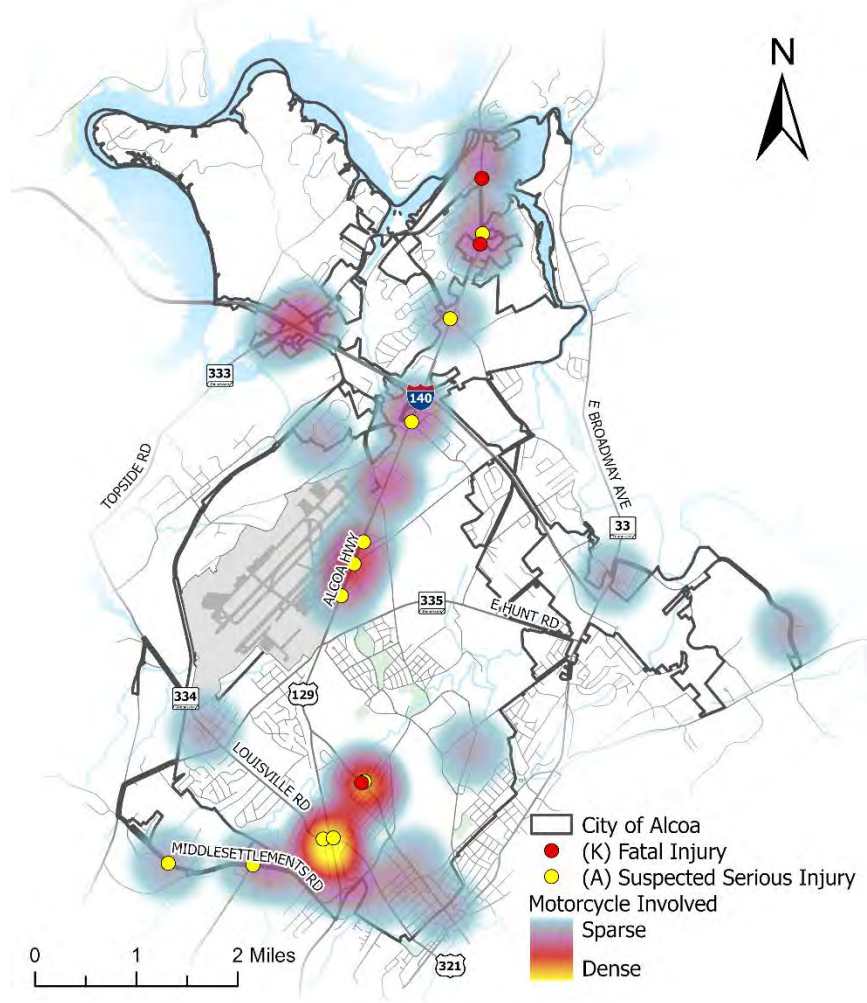


Figure 25: Alcoa Crashes Involving Motorcycles

Distracted Driver Involved

Drivers aged between 15 and 24 were most commonly involved in distracted driving crashes, which include distractions such as cell phones, eating, and passenger distractions. This crash type has experienced a gradual growth over the previous five years, similar to the growth trends of total crashes over the same period. As shown in **Figure 26**, crashes were most prominent in the downtown Alcoa area and along Alcoa Highway.

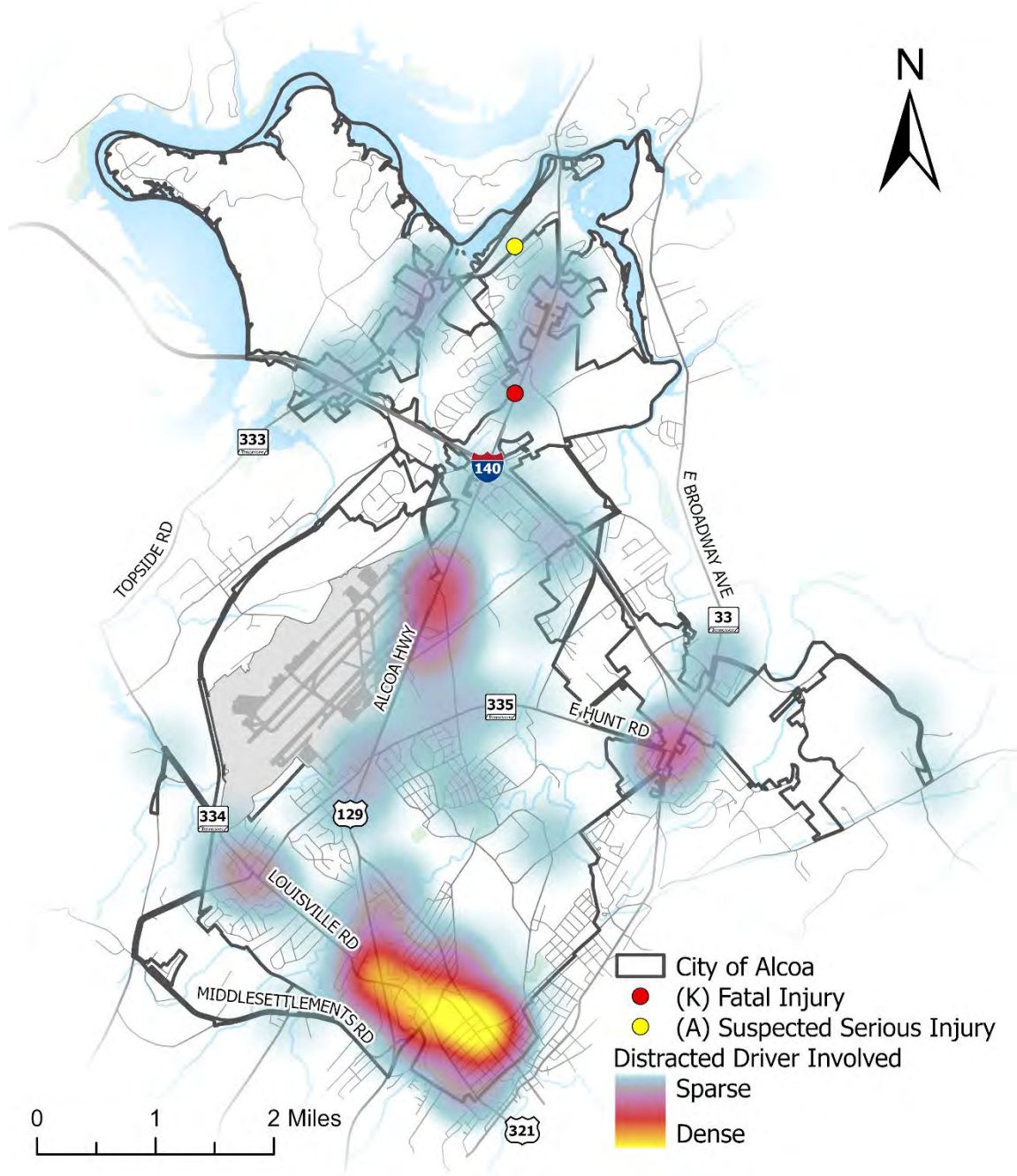


Figure 26: Alcoa Crashes Involving Distracted Drivers

Wild Animal-Related Crash

Over the study period, 71% of total crashes involving a wild animal crossing occurred during non-daylight conditions, including zero fatal or serious injury crashes. As shown in **Figure 27**, crashes are relatively spread evenly throughout the City limits, with no disproportionately dense areas. Without designated wildlife crossing areas, animals are forced to cross in uncontrolled areas where drivers are not readily expecting conflicts in the line of sight.

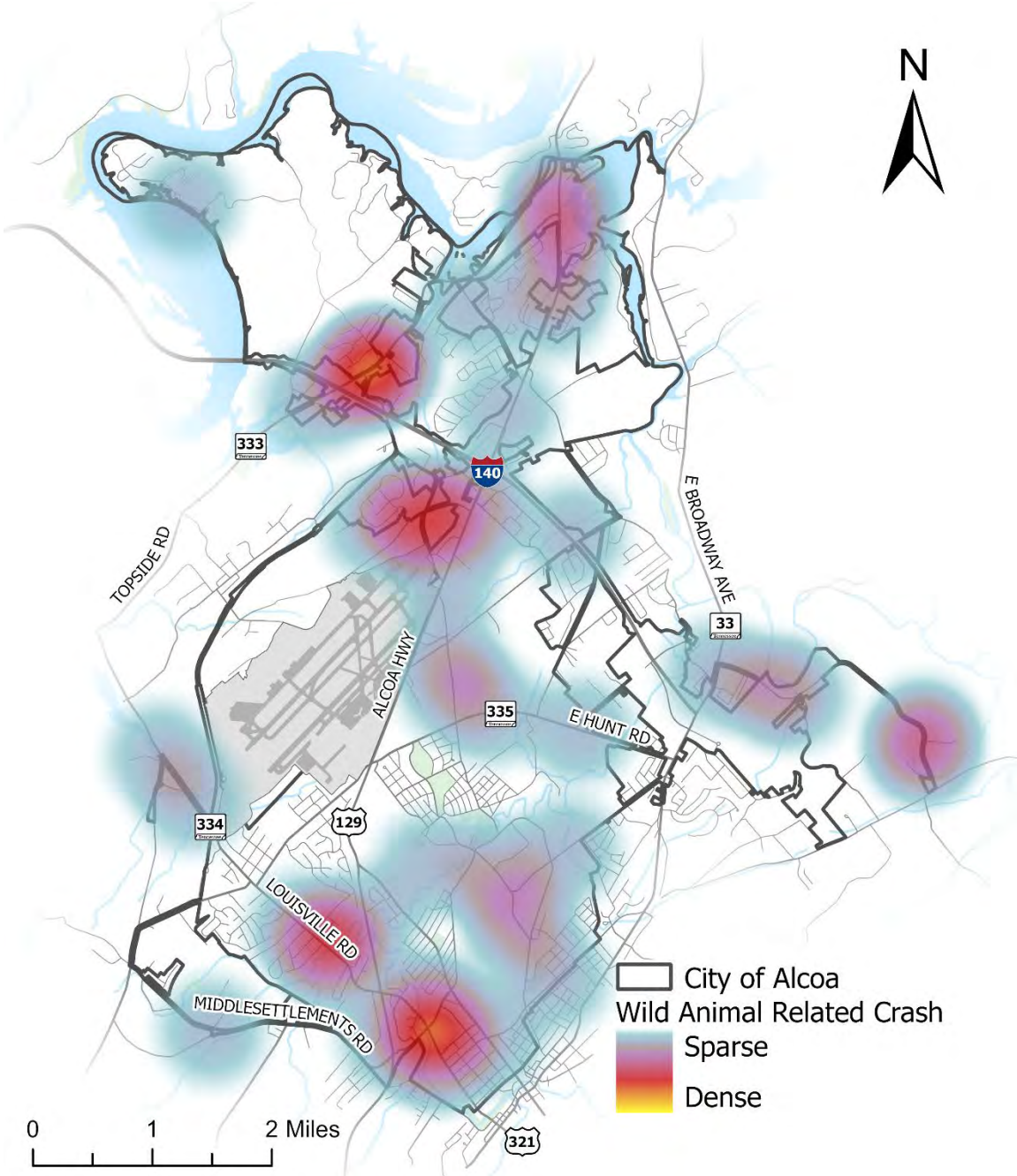


Figure 27: Alcoa Crashes Involving Wild Animals

Unrestrained Occupants

As shown in **Table 14**, the drivers between 15 and 24 were most commonly involved in total crashes involving an unrestrained occupant. In terms of fatal & serious injury crashes, drivers in the ranges of 25 to 34 and 45-54 were most commonly involved in crashes involving unrestrained occupants.

As shown in **Figure 28**, crashes involving unrestrained occupants were spread throughout the City of Alcoa, with major dense areas near downtown Alcoa and the TN-33 at TN-335 intersection. Fatal and serious injury crashes primarily occurred near the northern end of Alcoa Highway (US-129), with several others spread throughout the study network.

Table 14: Alcoa Crashes Involving Unrestrained Occupants by Age Group

Driver Age Group	Percentage of Total Crashes Involving Unrestrained Occupants	Percentage of Fatal & Serious Injury Crashes Involving Unrestrained Occupants
15-24	31% (16/52)	15% (2/13)
25-34	29% (15/52)	38% (5/13)
35-44	25% (13/52)	31% (4/13)
45-54	23% (12/52)	38% (5/13)
55-64	17% (9/52)	31% (4/13)
65 and Over	23% (12/52)	23% (3/13)

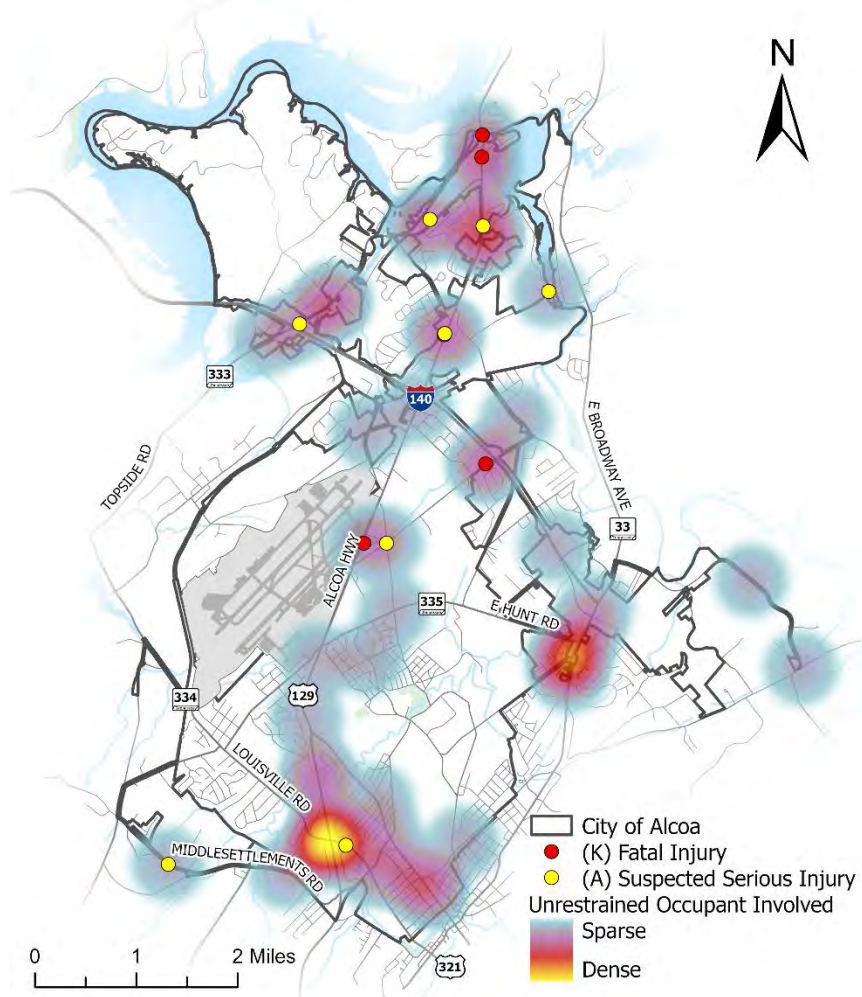


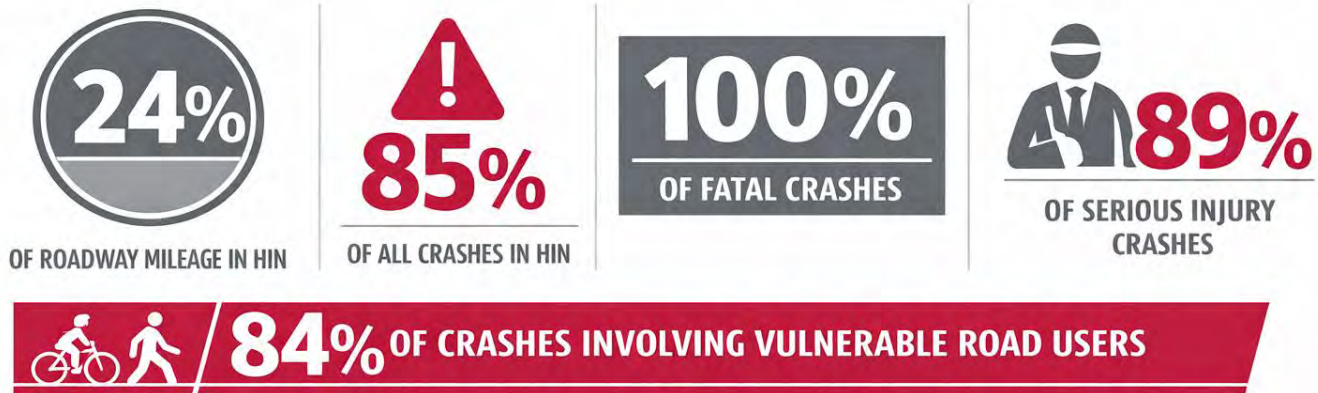
Figure 28: Alcoa Crashes Involving Unrestrained Occupants

IDENTIFYING A HIGH INJURY NETWORK

A High Injury Network (HIN) was developed to identify the routes with the most fatal and serious injury crashes in the City of Alcoa. A HIN is a collection of corridors where a disproportionate number of these crashes occur, as well as corridors that may pose higher risks for road users. Developing a HIN allows for the proper allocation of effort and funds towards specific areas of the City that need it most. While the HIN typically includes the major thoroughfares of a study area, the methodology used also allows for minor streets and local roads to be considered and included. Creating the HIN is a key step toward focusing resources in the right direction to develop projects that will help reduce fatal and serious injury crashes for all road users in the City of Alcoa.

Methodology

The HIN was identified by first evaluating segments throughout the City of Alcoa's roadway network with the highest reported crash volumes and rates during the study period (2020-2024) using TDOT's AASHTOWare Safety platform and ArcGIS analysis software. Fifteen (15) high-crash rate segments were identified at logical termini (i.e., municipal boundary, road name changes, or roadway characteristic changes such as number of lanes).



(Graphic Generated by AI)

High Injury Network

The City of Alcoa High Injury Network (HIN), as shown in **Figure 29**, consists of roadways within the City that are disproportionately exhibiting high-severity crashes and risk to all road users. As detailed in later sections of this SAP, these segments were selected using a variety of characteristics in an effort to accurately gauge the proper network.

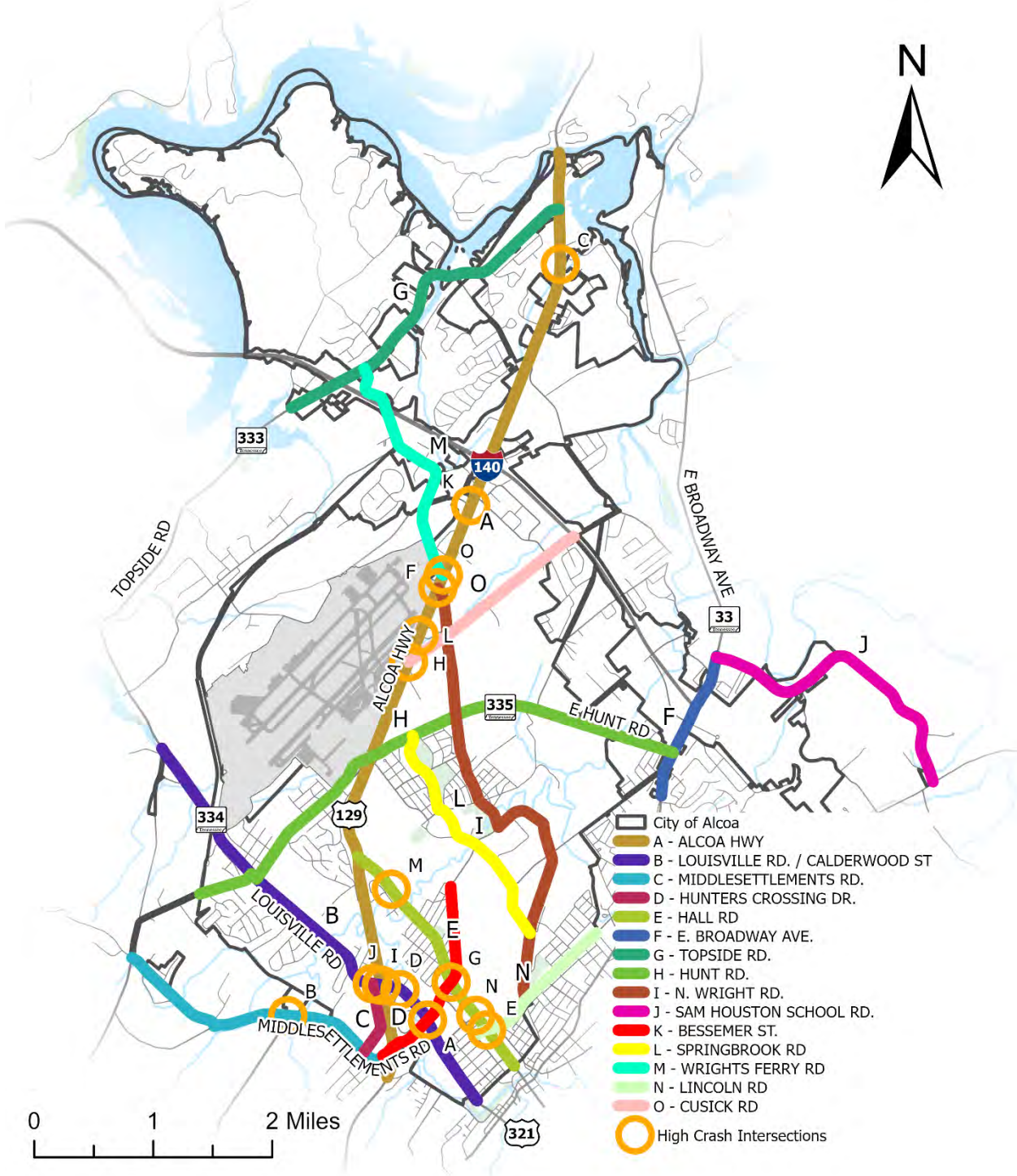


Figure 29: City of Alcoa High Injury Network

HIN Crash Coverage

As shown below in **Figure 30**, the HIN captures a high percentage of VRU crashes and fatal and serious injury crashes. Once identified as an HIN segment, countermeasures can be developed and applied to the relevant roadways in an effort to mitigate roadway fatalities and serious injuries.

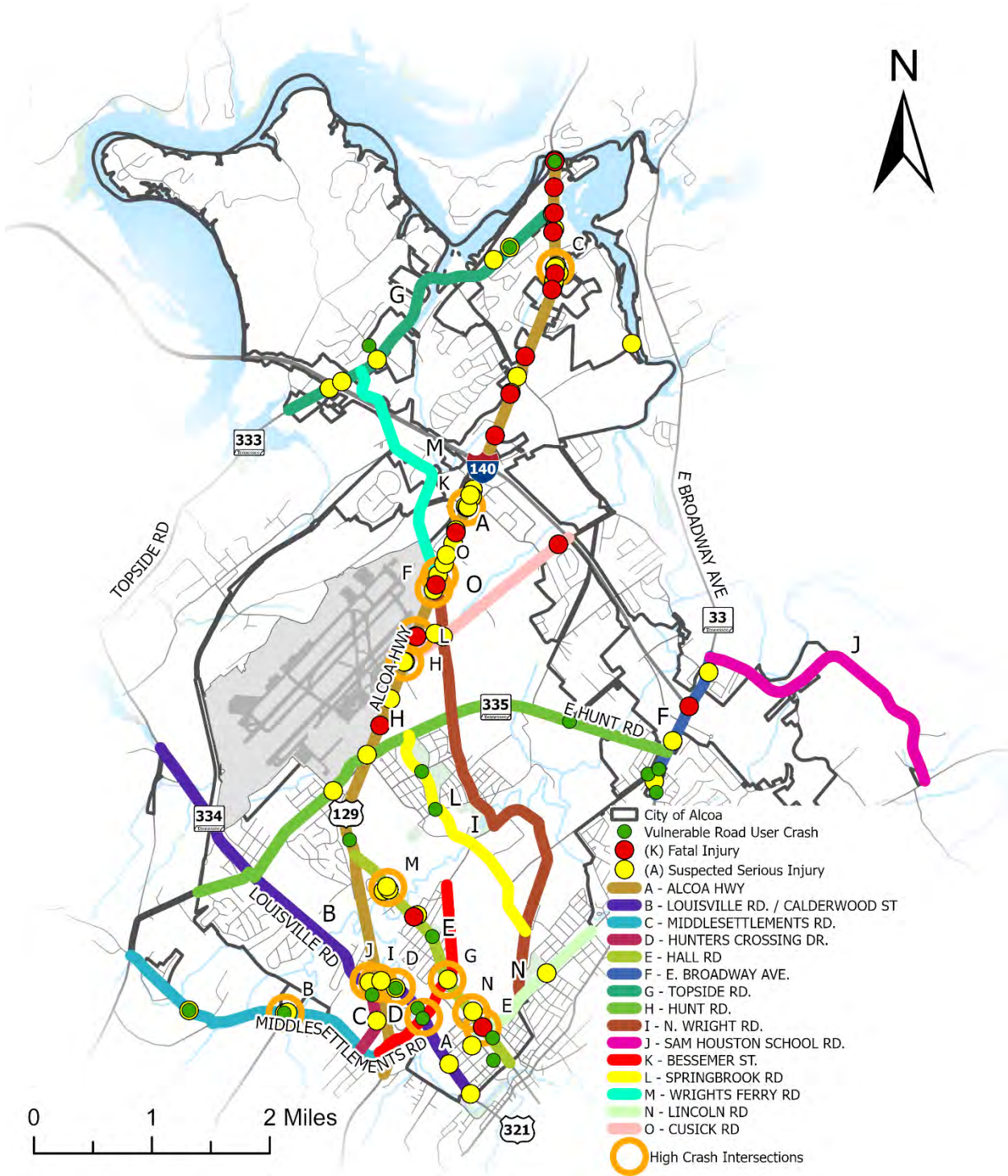


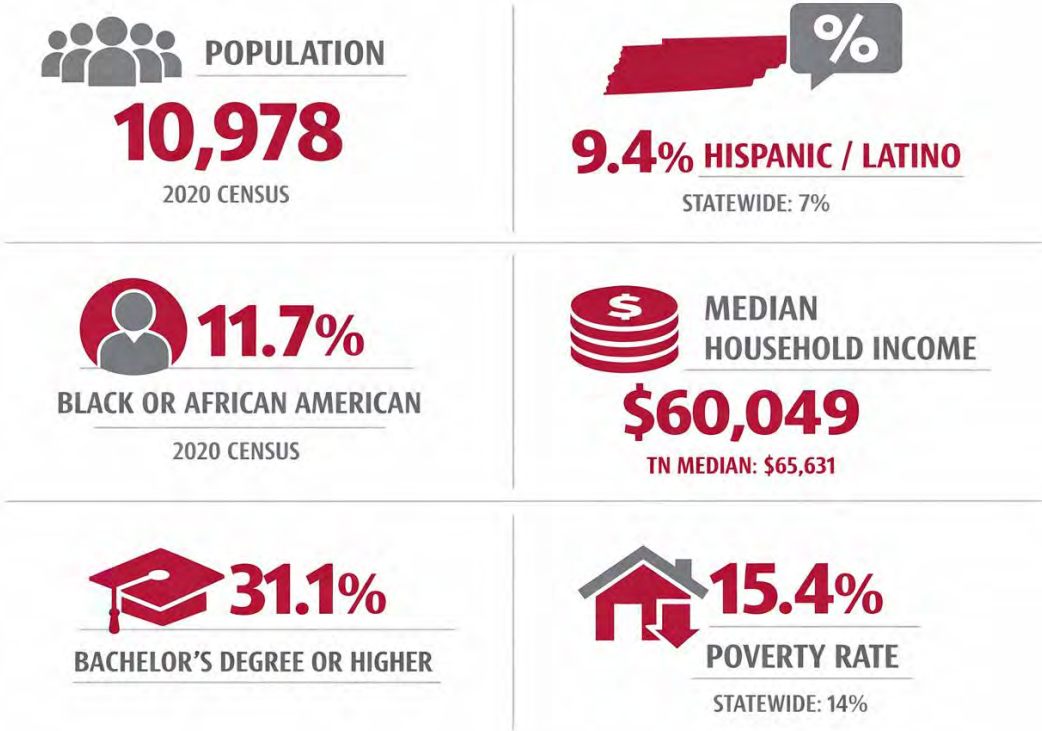
Figure 30: High Injury Network Crash Coverage



Community Characteristics and Demographics

COMMUNITY CHARACTERISTICS AND DEMOGRAPHICS

To ensure that underserved and vulnerable communities were considered within this SAP, special attention was given to the community and demographic characteristics of Alcoa. This was done through the lenses of both the national disadvantaged communities database and a locally developed index based on the specific attributes of the population of Alcoa.



(Graphic Generated by AI)

HISTORICALLY DISADVANTAGED COMMUNITIES

The Climate and Economic Justice Screening Tool highlights disadvantaged census tracts nationwide. A community is considered disadvantaged if it is located within a census tract that meets the threshold for one or more environmental, climate, or other burdens, and at least two associated socioeconomic burdens. As shown in **Figure 31**, of the 83 fatal and serious injury crashes that took place in Alcoa during the study period, 11 (or 13 percent) occurred in areas determined by the USDOT to be labeled as a Historically Disadvantaged Community.

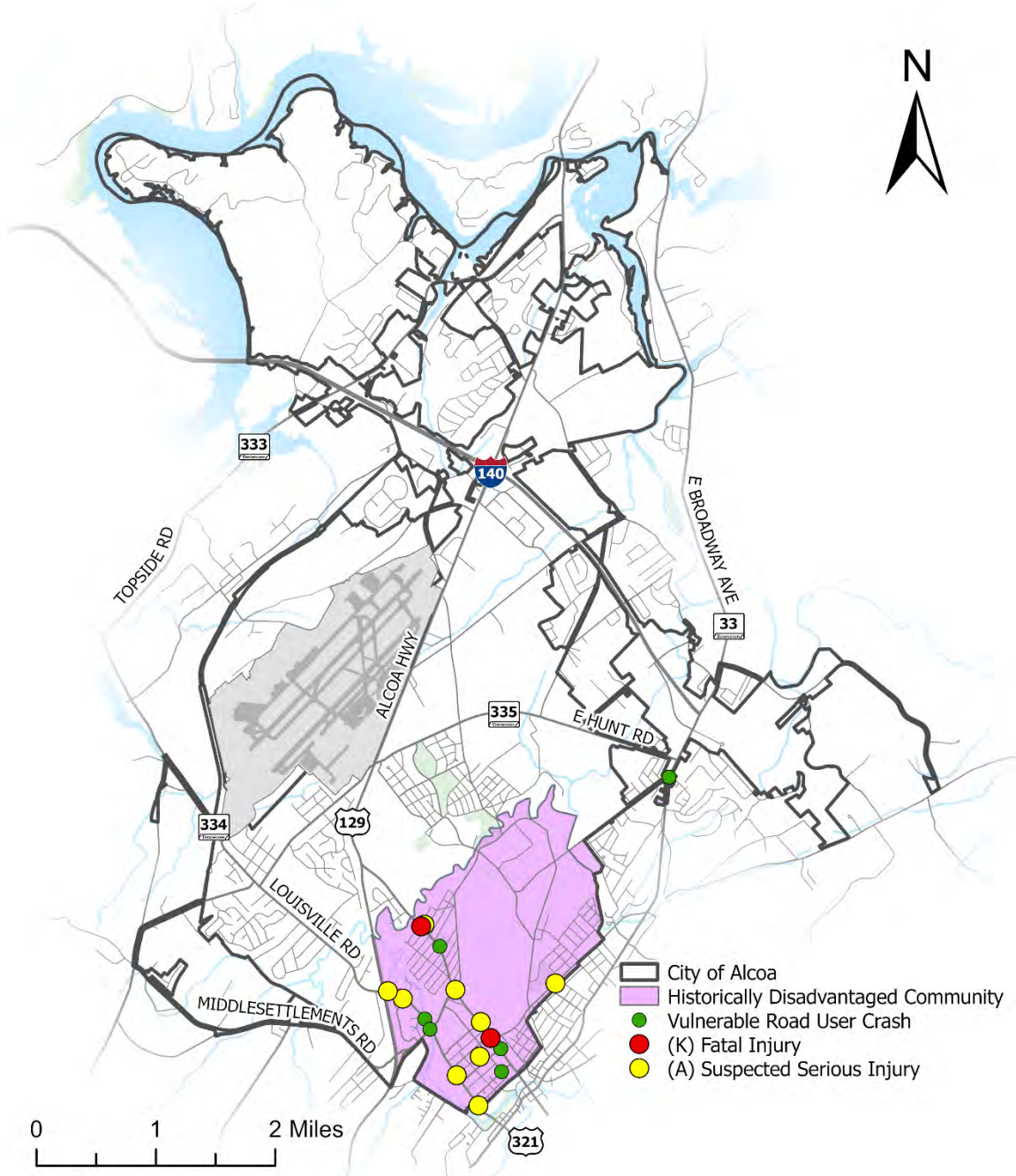


Figure 31: Historically Disadvantaged Communities

AREAS OF PERSISTENT POVERTY

An “Area of Persistent Poverty” is defined by the Bipartisan Infrastructure Law. A project is in an Area of Persistent Poverty if it meets one or more of the following criteria:

- The county in which the project is located consistently had greater than or equal to 20 percent of the population living in poverty in all three of the following datasets: (a) the 1990 decennial census; (b) the 2000 decennial census; and (c) the most recent (2021) Small Area Income Poverty Estimates; OR
- The Census Tract in which the project is located 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; OR
- The project is in any territory or possession of the United States.

As shown in **Figure 32**, of the 83 fatal and serious injury crashes occurring in Alcoa, 12 (or 14 percent) occurred in areas of persistent poverty.

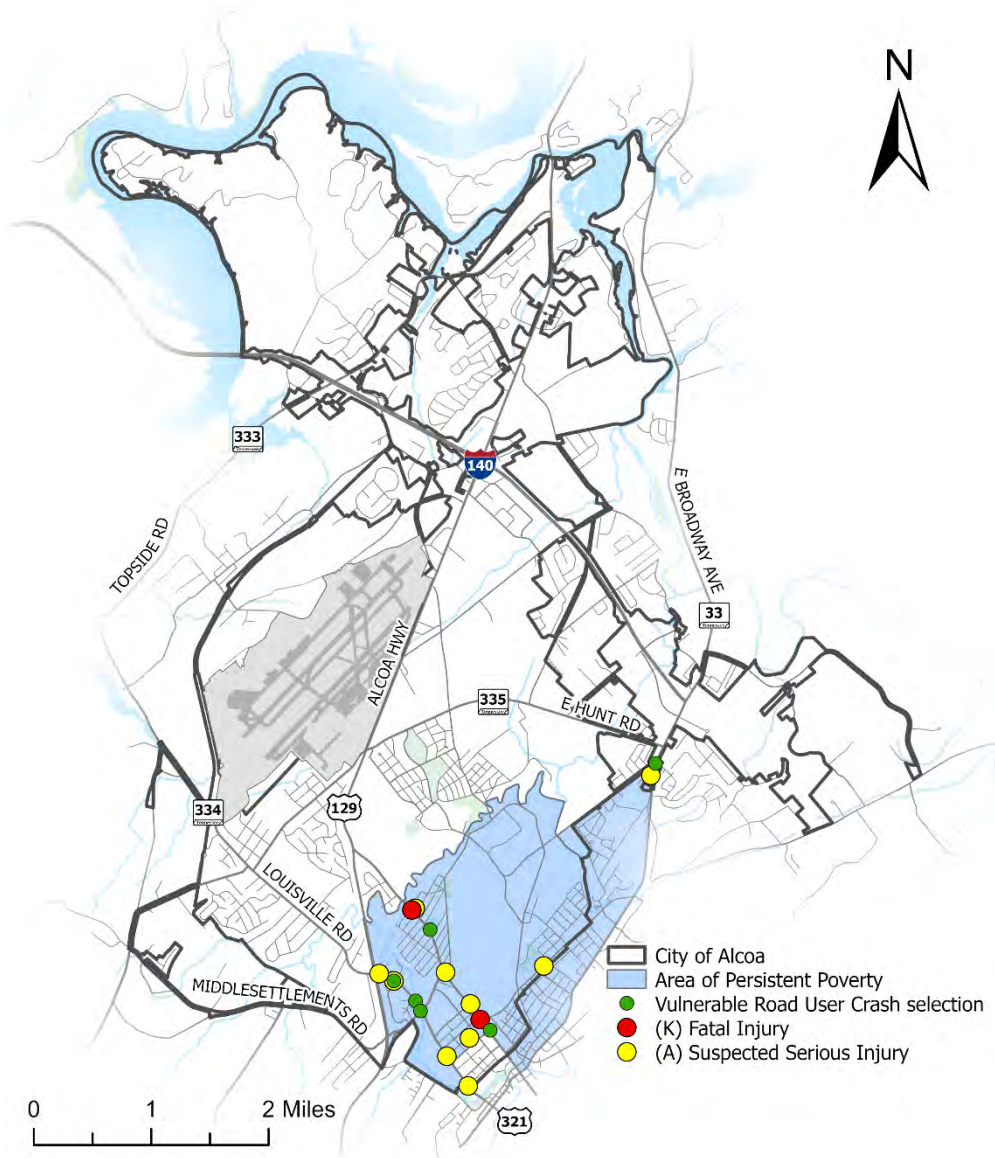


Figure 32: City of Alcoa Areas of Persistent Poverty

SOCIAL VULNERABILITY INDEX

The Centers for Disease Control and Prevention (CDC) developed the Social Vulnerability Index (SVI) tool that considers four overall categories of vulnerability: Socioeconomic Status, Household Characteristics, Racial & Ethnic Minority Status, and Housing Type & Transportation. Between these four categories, 16 individual variables are scaled and calculated to form an overall index score, ranging from 0 to 1 (where an index value of 1 is defined as the most socially vulnerable). Of the 83 fatal or suspected serious injury crashes occurring in Alcoa, 34 occurred within areas of high social vulnerability and 30 occurred within areas of medium-high social vulnerability. The SVI results, along with an overlay of the KA and VRU crashes, are shown below in **Figure 33**.

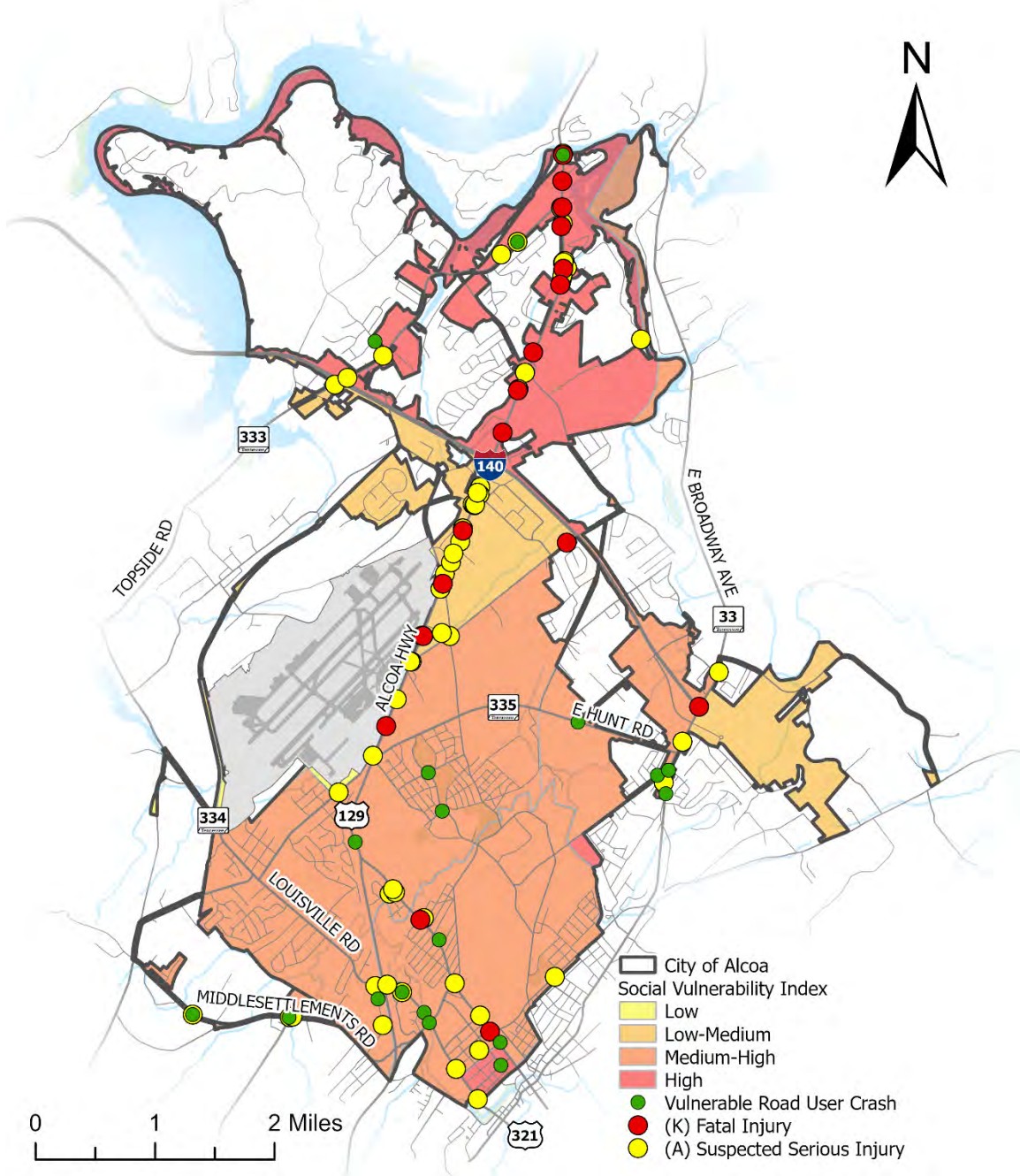


Figure 33: City of Alcoa Social Vulnerability Index

OPPORTUNITY ZONES

Opportunity Zones are economically distressed communities, defined by individual census tract, nominated by America’s Governors, and certified by the U.S. Secretary of the Treasury via their delegation of authority to the Internal Revenue Service. Their purpose is to serve as an incentive to spur private and public investment in underinvested communities. **Figure 34** illustrates Opportunity Zone areas in the City and their overlap with high-severity and VRU crashes.

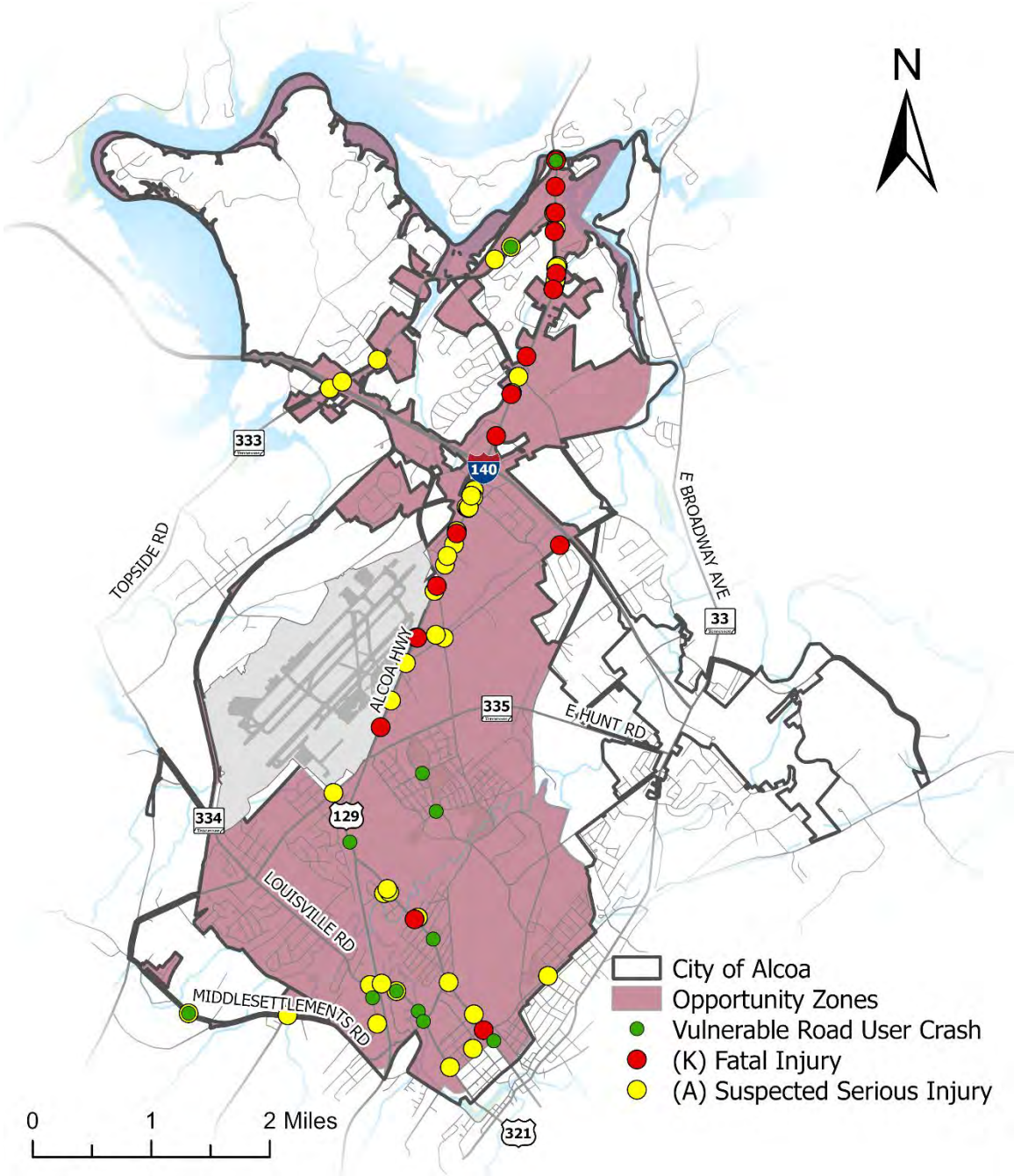


Figure 34: Opportunity Zones



Engagement and Collaboration

ENGAGEMENT & COLLABORATION

INTRODUCTION

Public outreach and engagement played a crucial role in collecting valuable insight into what Alcoa residents encounter daily while traveling routes in the study area, whether it is by car, bike, foot, or bus. During the study, multiple opportunities for participation and input were offered to the general public and to community stakeholders. This included in-person events, targeted e-mail outreach, social media posts, and a dedicated project website to gather and record input and disseminate information regarding the SAP and the SS4A Grant Program. By using a range of input methods, feedback was collected from a broad cross-section of residents, including individuals from traditionally underserved communities. The overall schedule of the SAP process is shown below in **Figure 35**.



Figure 35: Engagement and Collaboration Schedule (Graphic Generated by AI)

FORMATION OF STEERING COMMITTEE

To help guide the study, a Steering Committee made up of City/County engineering and planning staff, law enforcement representatives, business representatives, city school representatives, and communications team members was established. The role of the Steering Committee was two-fold. Firstly, the steering committee was crucial in providing local, informed input regarding current conditions and opportunities for improvement in Alcoa. Secondly, the members of the Steering Committee acted as outreach conduits to the community. Multiple times during the data collection phase, the City and members of the Steering committee engaged the community through direct e-mail communications, social media blasts, or direct communication to groups in the community and encouraged them to get involved and provide input. The work of this committee is in large part responsible for the success of the Public Outreach portion of this study.



PUBLIC OUTREACH AND ENGAGEMENT SUMMARY

Throughout the course of this study, a significant number of community members were reached across a variety of events and platforms as described above. This resulted in a robust response with 1,600 page views being logged on the project website. Additional engagement metrics are shown in **Figure 36** below.

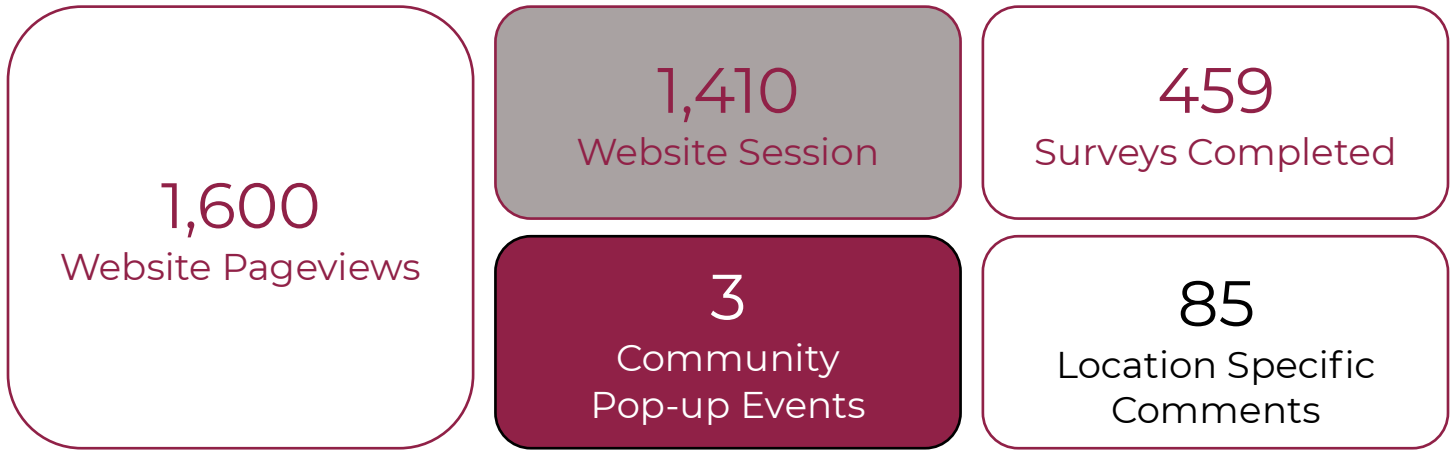


Figure 36: Engagement and Collaboration Summary

A “website pageview” refers to a single instance of a user loading the Alcoa SAP website, whereas a “website session” refers to a user loading and remaining on the website. The online survey was designed to gather feedback from people in Alcoa about their travel patterns and the safety issues or concerns they may have. The survey asked a series of questions to understand trends, concerns, and improvements that the public would like to see. The survey questions prompted the respondents for various useful data points, including relationship to Alcoa, travel mode preference, opinion of current safety measures, and unsafe segments and intersections. Additionally, there were the aforementioned optional questions about the respondents' demographics to help ensure that survey respondents generally reflect the demographics of the City as a whole. The goal of the survey was to gather a wide range of perspectives, suggestions, and input to help improve safety in Alcoa.



(Graphic Generated by AI)



Project Website

To display current crash data and analysis findings as well as provide a portal for public input and feedback, a project-specific website was created: alcoasafestreeets.org. An image of the website landing page is shown in **Figure 37**. Within the website, users could also find information on what a Safety Action Plan is, how it can benefit the community, and how they can participate by providing input.



Figure 37: City of Alcoa SAP Website

MAJOR OUTREACH ACTIVITIES

Starting in November 2025, a series of public outreach events were organized to inform the community about the SAP and collect feedback from various audiences. At these events, our team provided detailed information on the plan’s objectives and implementation strategies. QR codes were made available, allowing attendees to easily access the plan’s website and complete an online survey to share their feedback and suggestions. To ensure inclusive community engagement, written comment cards were also provided for those who preferred to give their input through this method

ALCOA

SAFE STREETS

Get Involved!
Scan the QR Code to learn more about the program and provide input on safety concerns within the City.

www.alcoasafestreets.org

City of Alcoa Community Day

In November 2025, a project information booth was set up at the city of Alcoa Community Day. The team was able to educate residents about the Safety Action Plan, designed to improve community safety. The booth provided details about the plan’s goals and how it will be implemented. To encourage active participation from all community members, QR codes were distributed, enabling attendees to visit the project website and fill out an online survey to offer their own insights and recommendations for the SAP.



Alcoa Basketball Game

On December 16th, 2025, a booth was set up at the Maryville vs Alcoa basketball game. The team was able to educate attendees of the game on the Alcoa Safety Action Plan and answer any questions. The booth provided community members with banners and QR code for more information about the plan and how they can get more involved.



Alcoa School Professional Development Day

On January 5th, 2026, the team got the opportunity to speak at four different schools during their professional development day. The team shared information about the SS4A program and what it means for the community. The presentations introduced the purpose of the safety action plan, highlighted findings from the crash analysis, and included several maps and graphics to help explain local safety conditions. The sessions also covered upcoming events and provided guidance on how students, teachers, and community members can get involved in shaping a safer city.



Online Engagement Results

Dispersion of the online survey and interactive map were achieved through a combination of tools as outlined in this section; each intended to drive traffic to and through the project website for ease of data collection and dissemination of project information.

ONLINE SURVEY

In addition to providing a broad range of safety information, the website hosted two key participation avenues. The first was an online survey that focused on user demographics and concerns. A total of 459 participants completed the online survey, providing input and background data, ranging from travel-related characteristics and demographic information to specific safety concerns. The last question in the survey was an open-ended question that served to allow respondents the ability to give any more input that they see fit, which resulted in a broad range of inputs, as shown in **Figure 38** and **Figure 39**.



Figure 38: Online Survey Input Category

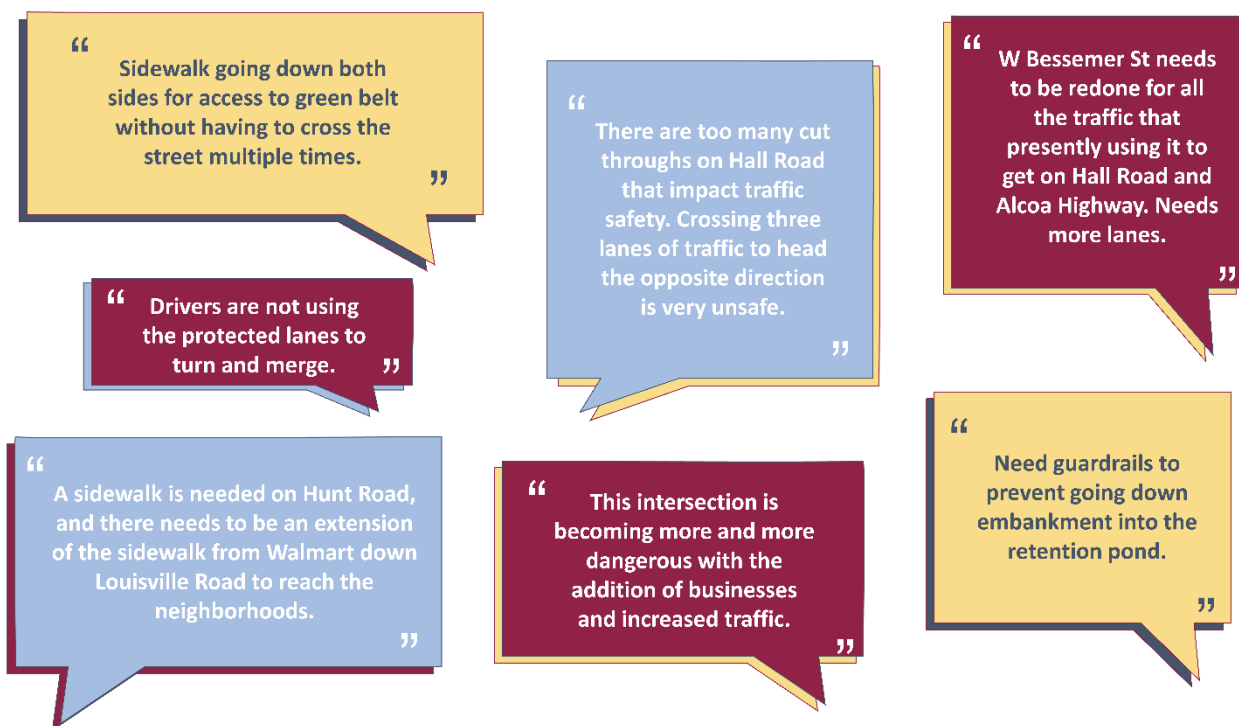


Figure 39: General Public Comments from Survey

Interactive Map Results

The interactive mapping application on the project website allowed users to drop ‘pins’ at specific locations where they had safety concerns or had experienced safety-related incidents. A total of 85 location-specific comments were input into the interactive map, which is shown in **Figure 40**.

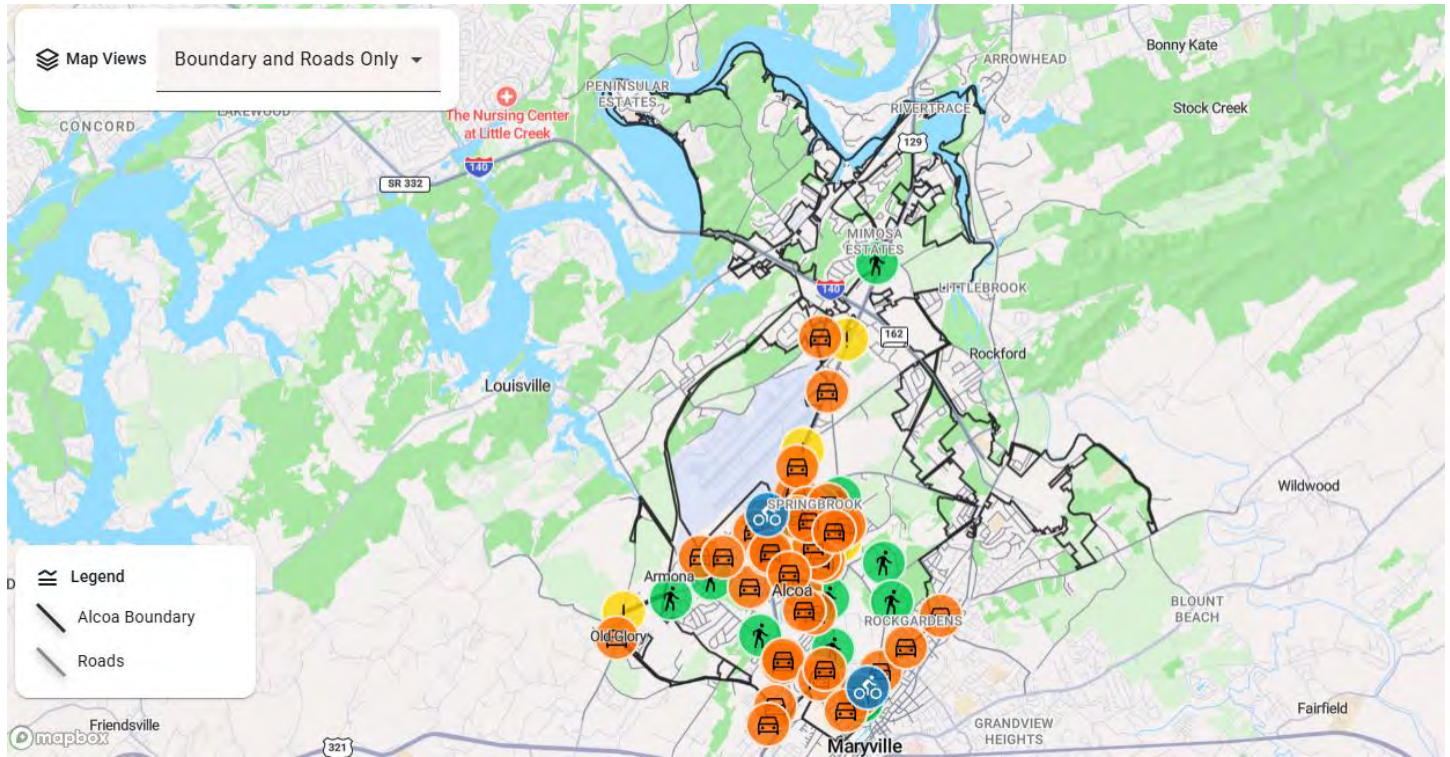


Figure 40: Results from Interactive Map

The map application provided six individual comment types for respondents to choose from: 1) pedestrian, 2) crash, 3) near crash, 4) mobility, 5) driver, and 6) bicyclist. Respondents were able to select their category and enter their related comment. There was no limit to the number of comments an individual could leave. Comments were analyzed and distilled for use in the project prioritization process, which will be discussed in a later section.

Public Input Heat Map

Based on the interactive map, respondents reported 85 individual comments for intersections within the City of Alcoa. Mapping these responses highlights areas of public concern that may not appear in crash data analysis. **Figure 41**, shown below, displays a heatmap of location-based comments.

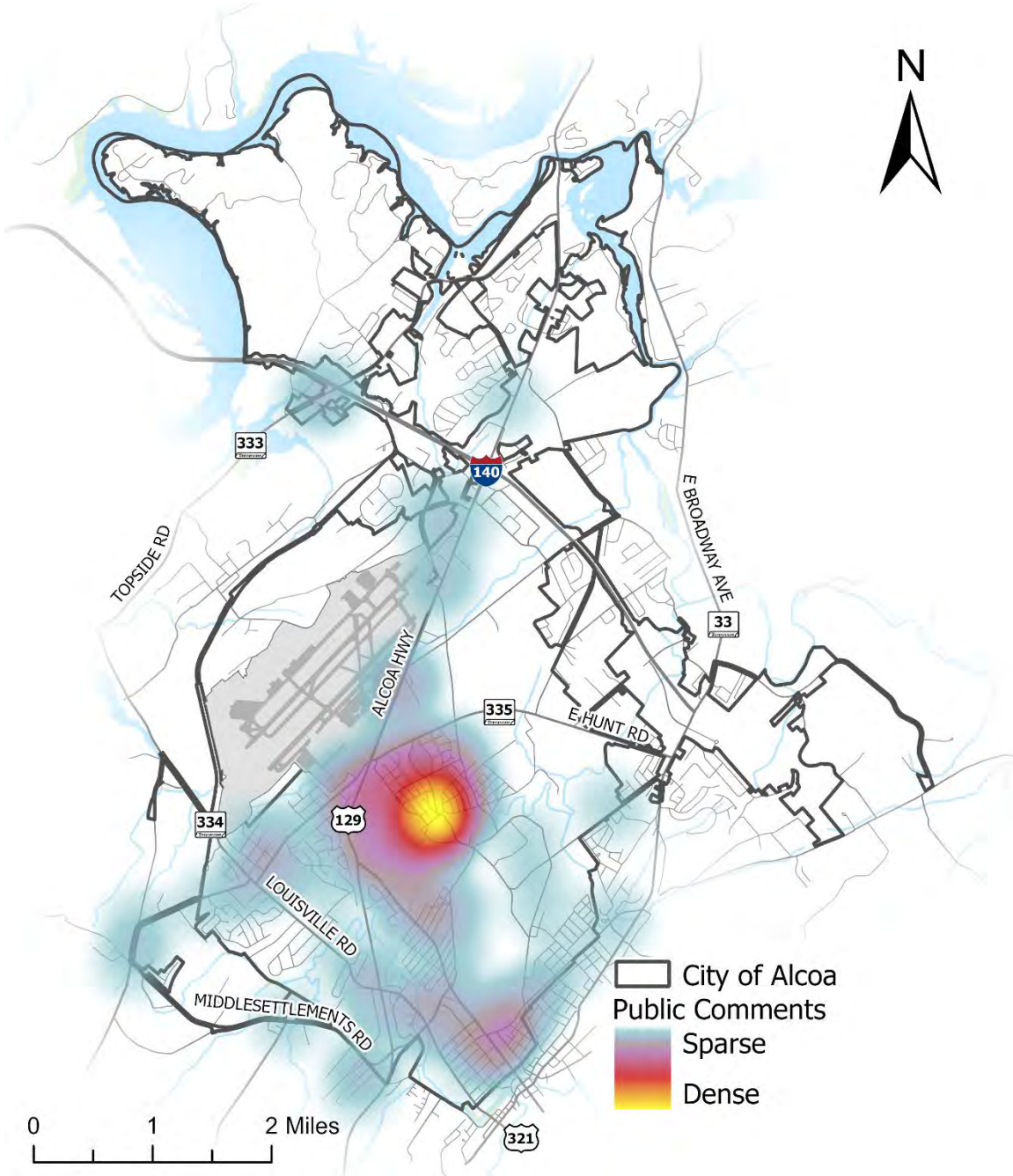


Figure 41: Concentration of Location-Specific Public Comments

Crash Data vs Public Comments

Comparing crash data with locations of public comments provides insight into areas where concerns align with existing data, as well as identifying potential safety issues that may not be evident from crash data alone. This comparison ultimately leads to a more comprehensive and effective approach toward improving safety. As shown in **Figure 42** and **Figure 43**, the emphasis areas of the dense locations based on the crash data tend to differ slightly from the dense areas based on public comments.

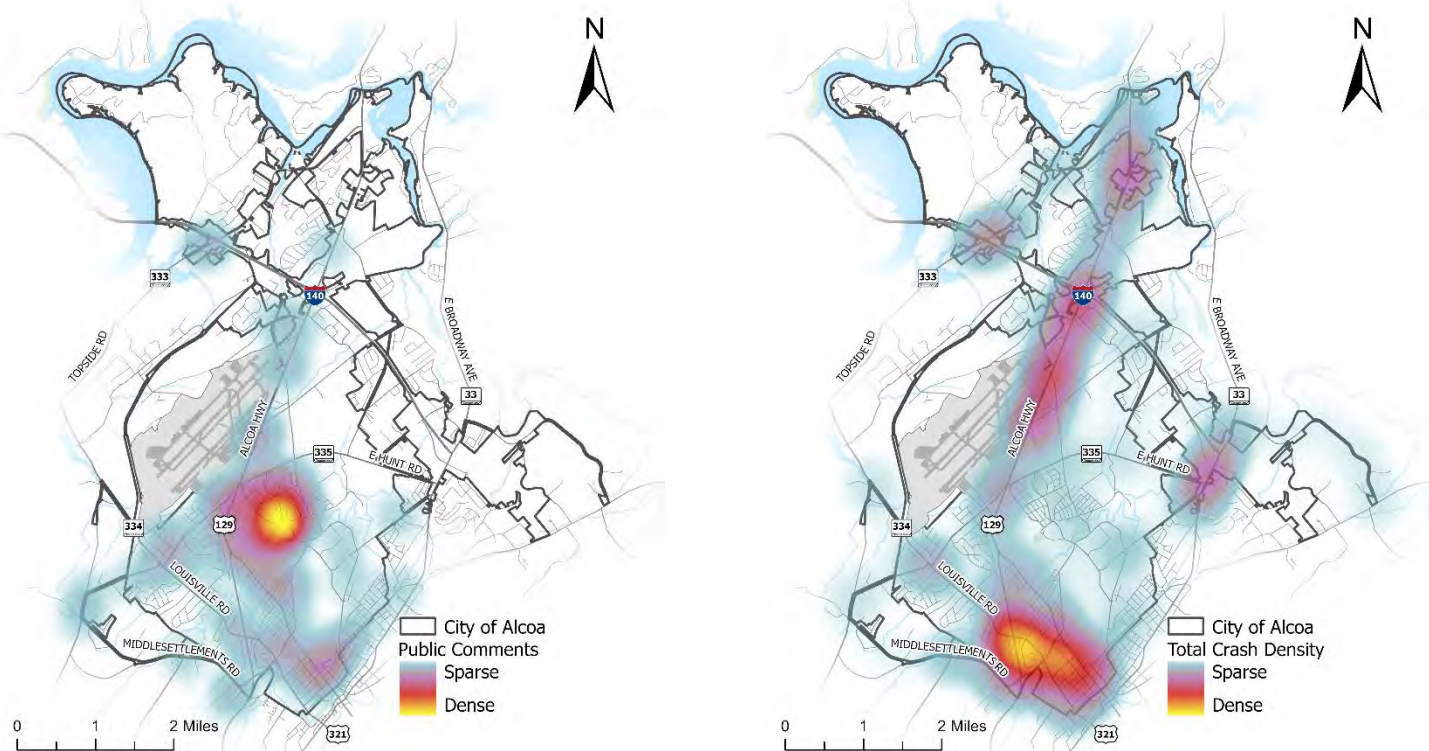


Figure 42 and Figure 43: Crash Density vs Public Comments Comparison

Summary of Survey Results

The survey and interactive map results reveal a variety of responses from individuals connected to the City of Alcoa. Community engagement revealed consistent safety concerns across all travel modes, informed by participation through in-person events, an online survey, and an interactive mapping tool. Residents expressed recurring concerns related to roadway safety, pedestrian and bicycle comfort, and overall operating conditions, particularly along major corridors and at key intersections. Location-specific comments often aligned with high-crash areas identified in the data analysis, while also highlighting additional locations where near-misses and other safety concerns appeared through the public. These findings reinforce the importance of combining the city’s data analysis with community experience and will directly inform the development of targeted systematic and programmatic recommendations to improve transportation safety for all road users.

Please see **Appendix D** for results on the online engagement survey.



Countermeasures and Strategies

COUNTERMEASURES AND STRATEGIES

The SAP identifies countermeasures and strategies addressing the City's fatal and suspected serious injury emphasis areas mentioned in the Safety Analysis section. The countermeasures are classified into two categories: (1) engineering countermeasures (project recommendations using toolkit) and (2) driver-related strategies. (countermeasures that specific to each driver related emphasis area where the crash rate was greater than the state-wide average)

ENGINEERING COUNTERMEASURES

Engineering Countermeasures refer to specific physical changes or improvements made to the roadway environment to enhance safety and reduce the likelihood of crashes. Examples of these measures include:

- **Traffic signal upgrades:** Installing or improving traffic signals to better manage traffic flow and reduce collisions.
- **Roadway design changes:** Modifying Road layouts, such as adding roundabouts, medians, or bike lanes, to improve safety for all users.
- **Pedestrian and cyclist infrastructure:** Enhancing crosswalks, sidewalks, and bike paths to protect non-motorized road users.
- **Speed management:** Implementing measures like road diets, bulb-outs, chicanes, or road narrowing to control vehicle speeds.
- **Visibility improvements:** Increasing Street lighting, adding reflective signs, and improving road markings to enhance visibility for drivers.

These countermeasures are designed and selected based on data analysis and safety studies to address specific risks and improve overall road safety.

Crash Modification Factors (CMF)

Because funding for infrastructure improvements is limited, the City of Alcoa can benefit from quantifying and comparing the potential benefits of safety countermeasures and treatments. Crash Modification Factors (CMF) can be used to assess the potential safety impact of improvements. A CMF is a numerical value that indicates the proportion of crashes that would be expected at a location after implementing a safety countermeasure. A CMF with a value of less than 1.0 indicates an expected decrease in crashes. Conversely, a CMF with a value greater than 1.0 indicates an expected increase in crashes. The FHWA maintains the CMF Clearinghouse, an online repository of CMFs documented in the Highway Safety Manual (HSM) and other industry resources. The following provides guidance to be considered when selecting and applying CMFs:

- Use a minimum of three years of crash data for urban and suburban sites and five years of crash data for rural sites.
- CMFs should be selected from Part D of the HSM or FHWA's CMF Clearinghouse website (<https://www.cmfclearinghouse.org/>).
- If possible, use CMFs with star ratings of four or five. The star rating indicates the quality or confidence in the results of the study producing the CMF.













CMFs are multiplicative, not additive, meaning that the application of two individual countermeasures with a 0.50 CMF will provide a 0.25 reduction ($0.50 \times 0.50 = 0.25$) instead of a 1.00 reduction ($0.50 + 0.50 = 1.00$). However, the application of multiple CMFs can overestimate the expected crash reduction. It is recommended to use no more than three independent CMFs at a particular site.

ENGINEERING COUNTERMEASURES TOOLKIT

A toolkit of engineering countermeasures was compiled for this SAP based on general applicability in the Alcoa study area, the level of evidence for crash reduction, and stakeholder and public feedback obtained during engagement (see **Appendix E**). **Table 15** provides a summary of a representative group of countermeasures used in project recommendations for this SAP, a general level of cost/effort, their crash modification factor range (where available), and a proposed timeframe for implementation. See **Appendix E** for a complete description of each countermeasure listed below.

Table 15: City of Alcoa Toolkit

SOURCE	COUNTERMEASURE	CMF	CONTEXT (URBAN/RURAL)	TIMEFRAME	COST
	APPROPRIATE SPEED LIMITS	0.86	BOTH	SHORT	\$
	CONDUCT INTERSECTION CONTROL & ALIGNMENT EVALUATION	N/A	BOTH	SHORT	\$
	ENHANCED DELINEATION FOR HORIZONTAL CURVES	0.82	RURAL	SHORT	\$
	EVALUATE PROPER APPROACH LANEAGE	0.40-0.52	BOTH	SHORT	\$
	IMPROVE SIGNAGE	0.65-.84	BOTH	SHORT	\$
	LEADING PEDESTRIAN INTERVAL	0.90	URBAN	SHORT	\$
	LONGITUDINAL RUMBLE STRIPS AND STRIPES ON TWO-LANE ROADS	0.74	RURAL	SHORT	\$
	RETROREFLECTIVE BACKPLATES	0.85	BOTH	SHORT	\$
	RETROREFLECTIVE PAVEMENT MARKERS	0.54-0.89	BOTH	SHORT	\$
	SIGHT DISTANCE EVALUATION	N/A	BOTH	SHORT	\$
	SYSTEMIC APPLICATION OF MULTIPLE LOW-COST COUNTERMEASURES AT STOP-CONTROLLED INTERSECTIONS	0.73	BOTH	SHORT	\$
	WIDER EDGE LINES	0.97	BOTH	SHORT	\$
	YELLOW CHANGE INTERVALS	0.99	BOTH	SHORT	\$
	BIKE LANES	0.43	BOTH	SHORT	\$\$
	CROSSWALK VISIBILITY ENHANCEMENTS	0.60	BOTH	SHORT	\$\$
	IMPROVE SIGNAL EQUIPMENT ALIGNMENT	N/A	BOTH	SHORT	\$\$
	FLASHING YELLOW ARROWS (FYA)	0.52-0.82	BOTH	MID	\$\$
	MEDIAN AND PEDESTRIAN REFUGE ISLAND	0.29	URBAN	MID	\$\$
	MEDIAN BARRIERS	0.29	BOTH	MID	\$\$

SOURCE	COUNTERMEASURE	CMF	CONTEXT (URBAN/RURAL)	TIMEFRAME	COST
	RECTANGULAR RAPID FLASHING BEACONS (RRFB)	0.31	BOTH	MID	\$\$
	SIDEWALKS AND MULTI-USE PATHS	0.60	BOTH	MID	\$\$
	TARGETED LIGHTING	0.68	BOTH	MID	\$\$
	TRAFFIC CALMING (CORRIDOR-WIDE SPEED MANAGEMENT)	0.60	BOTH	MID	\$\$
	COMPLETE MULTI-MODAL CORRIDOR EVALUATION	N/A	URBAN	MID	\$\$\$
	DEDICATED LEFT AND RIGHT-TURN LANES AT INTERSECTIONS	0.52-0.86	BOTH	MID	\$\$\$
	ELIMINATE NEGATIVE OFF-SETS AT INTERSECTIONS	0.60	BOTH	MID	\$\$\$
	FLATTEN MINOR STREET APPROACH	N/A	BOTH	MID	\$\$\$
	PEDESTRIAN HYBRID BEACONS	0.88	URBAN	MID	\$\$\$
	RAILROAD CROSSING ENHANCEMENTS	N/A	BOTH	MID	\$\$\$
	REDUCED LEFT-TURN CONFLICT INTERSECTIONS	0.71	BOTH	MID	\$\$\$
	WIDEN SHOULDERS	N/A	BOTH	MID	\$\$\$
	SMART CHANNEL RIGHT-TURN LANE	0.40	BOTH	LONG	\$\$\$
	CORRIDOR ACCESS MANAGEMENT	0.93	BOTH	LONG	\$\$\$\$
	ROADWAY RECONFIGURATION	0.53	URBAN	LONG	\$\$\$\$
	ROUNDBABOUTS	0.59	BOTH	LONG	\$\$\$\$

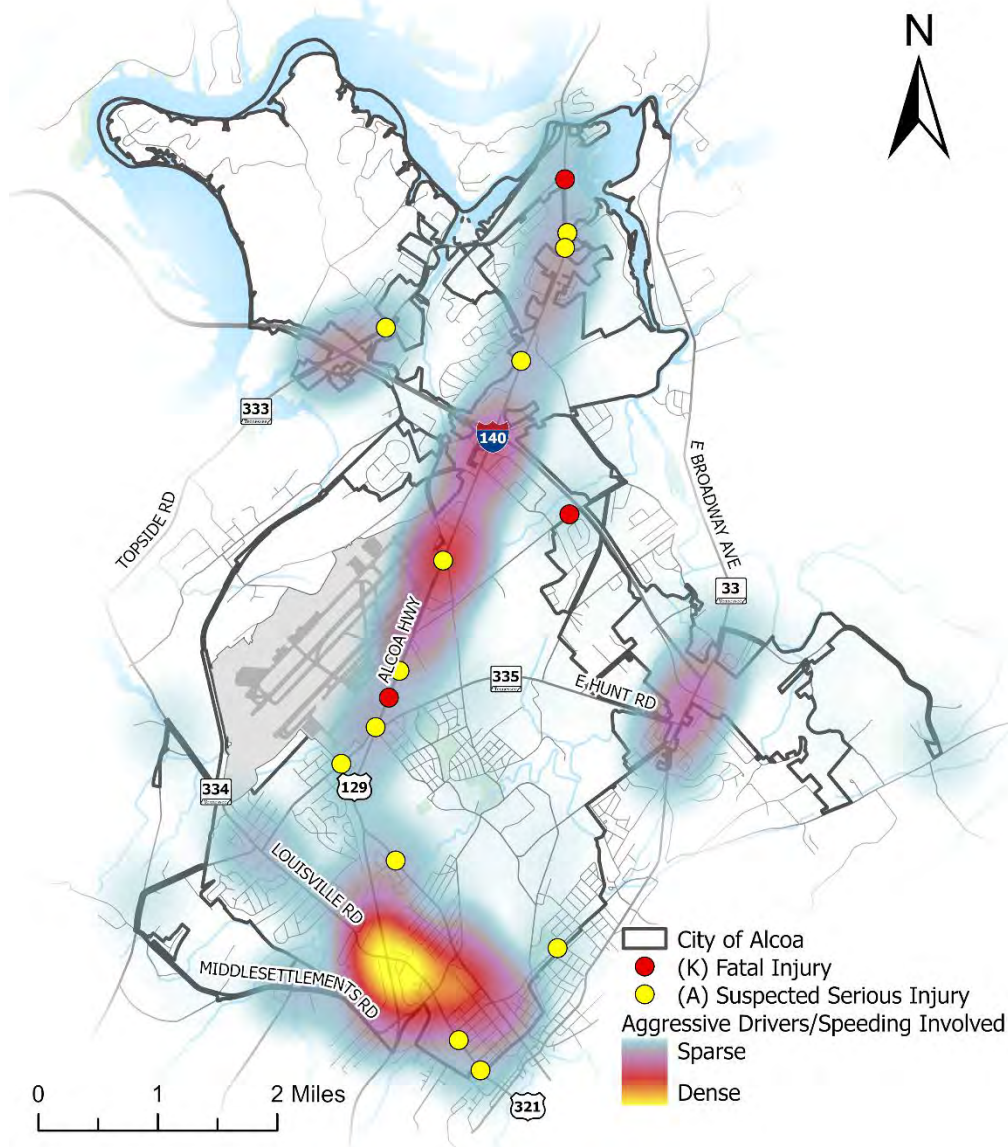
DRIVER-RELATED COUNTERMEASURES

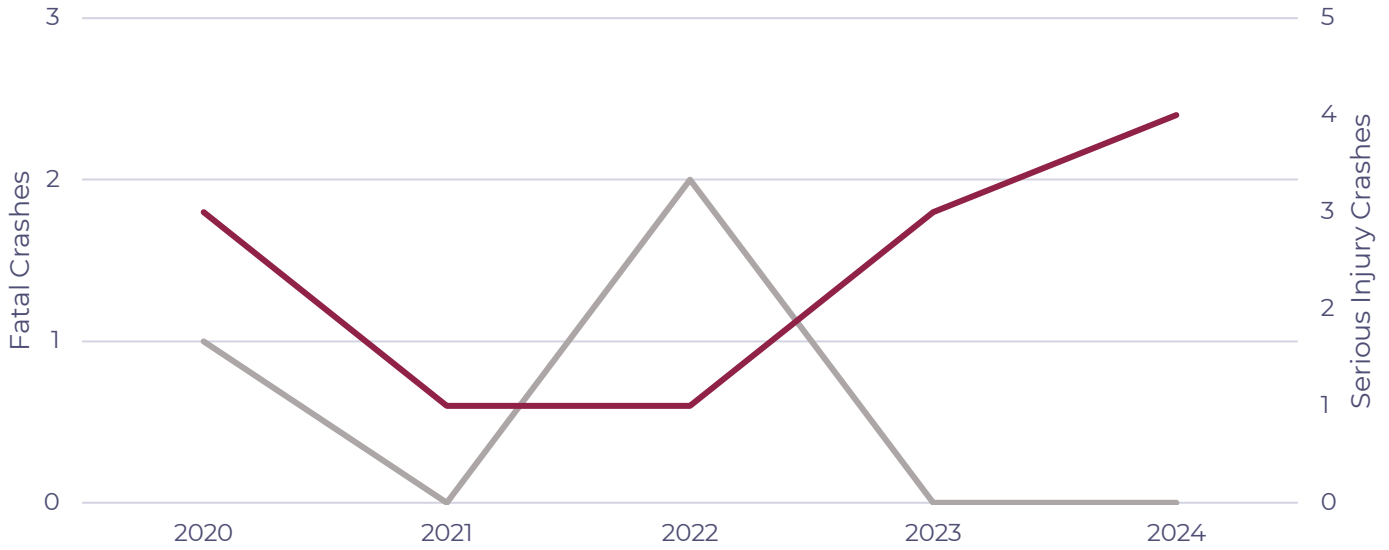
As described and presented in the **Safety Analysis** section, the data shows the City of Alcoa experienced higher percentages of severe crashes involving aggressive drivers/speeding, older drivers, impaired drivers, bicyclist, motorcyclist and large truck drivers than the Tennessee state average. The following tables include specific strategies to reduce crashes in these emphasis areas. The strategies referenced in this section can be implemented in the short term; however, they should remain in place in the long term to fully achieve the ideal benefits. These strategies incorporate the remaining three Es of traffic safety: Education, Enforcement, and Emergency Medical Services.

Aggressive Drivers/Speeding

Emphasis Area	Aggressive Drivers/Speeding
Safe Systems Element	Safe Road Users and Safe Speeds
How are fatal and serious injury crashes involving aggressive driving and speeding defined?	A crash in which any vehicle involved drives too fast for conditions or exceeds the posted speed limit.
Statewide Emphasis Area	Emphasis Area in the 2025 – 2029 Tennessee SHSP

Aggressive Drivers refer to individuals who engage in unsafe driving behaviors with deliberate disregard for safety. These behaviors can include speeding, tailgating, weaving in and out of traffic, running red lights, and other actions that endanger other road users. The data shows that 18.1 percent (15 crashes) of all fatal and serious injury crashes between 2020 and 2024 in the City of Alcoa involved aggressive drivers and/or speeding. This is 6.1 percent higher than the TN State average of 12 percent.





The following are recommended strategies that should be implemented to reduce fatal and serious injury crashes involving aggressive drivers and or speeding:

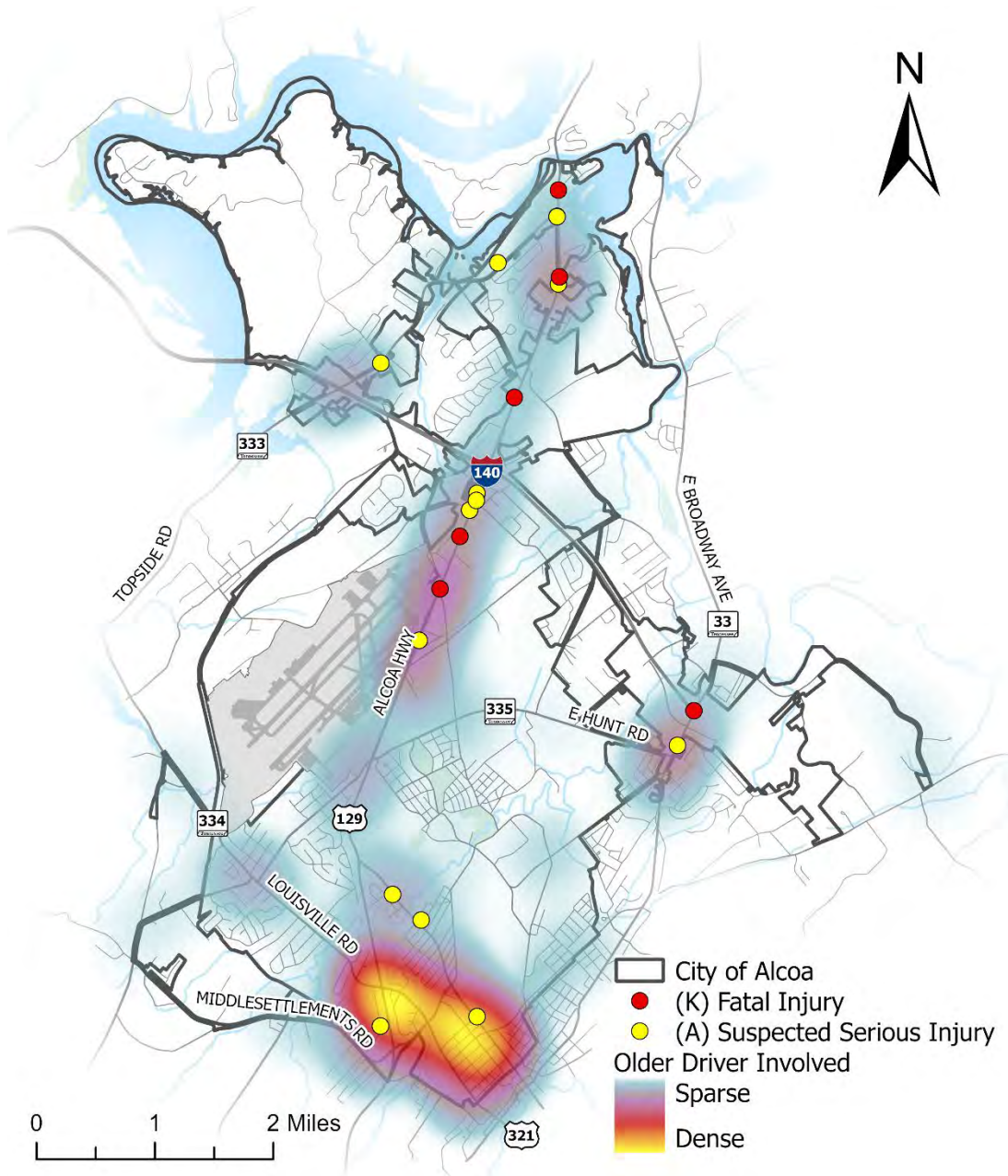
Table 16: Aggressive Drivers/Speeding Countermeasures

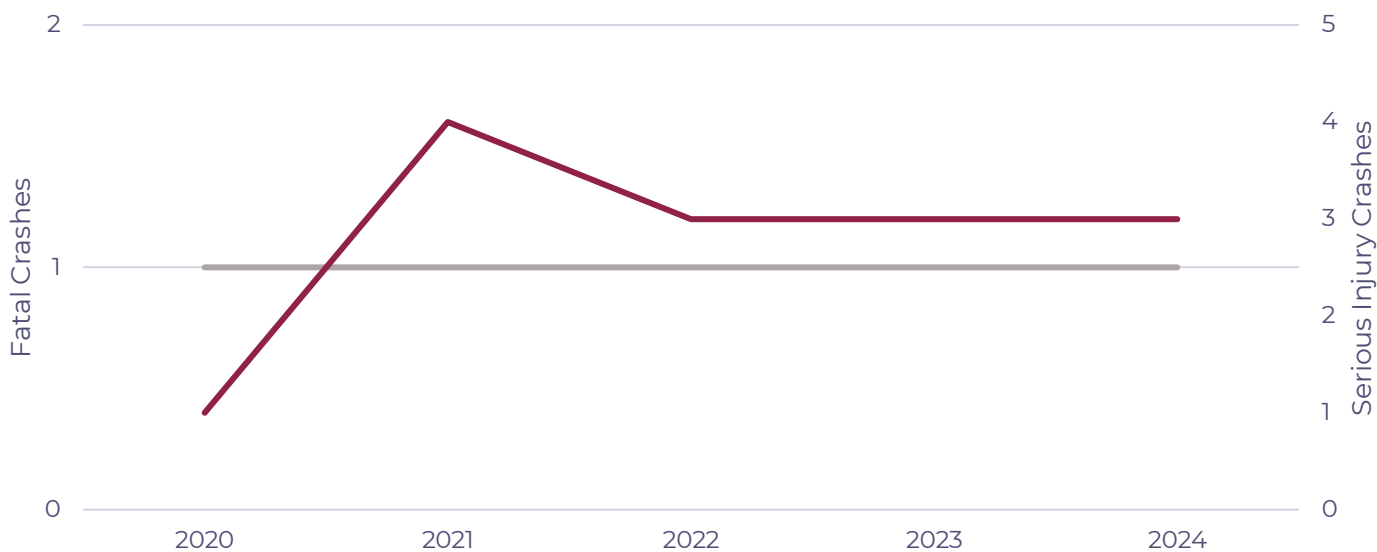
Emphasis Area	Driver-Related Countermeasure
Aggressive Drivers/Speeding	<i>Develop and implement enforcement programs aimed at aggressive driving in high frequency areas.</i>
	<i>Create Alcoa's local traffic calming policy to include additional effective devices and processes. This includes traffic calming equipment that implements vertical deflection (e.g., speed tables) horizontal deflection (e.g., chicanes), and roadside features (e.g., Dynamic Speed Display Signs [DSDS])</i>
	<i>Conduct a city-wide campaign highlighting the local consequences of aggressive drivers or speeding, using testimonials, local crash statistics, or interactive digital media.</i>

Older Drivers

Emphasis Area	Older Drivers (65+)
Safe Systems Element	Safe Road Users
How are fatal and serious injury crashes involving older drivers defined?	A crash that involves any driver or pedestrian who is 65 years of age or older.
Statewide Emphasis Area	Emphasis Area in the 2025 – 2029 Tennessee SHSP

Older Drivers refer to drivers aged 65 and older. This group is often given special consideration due to age-related changes in vision, physical fitness, and cognitive abilities, which can affect driving performance and increase crash risk. As shown earlier in the Safety Analysis Section, 22.9 percent (19 crashes) of all fatal and serious injury crashes between 2020 and 2024 in the City of Alcoa involved older drivers. This is 4.9 percent higher than the TN State Average of 18 percent.





The following are recommended strategies that should be implemented to reduce fatal and serious injury crashes involving older drivers:

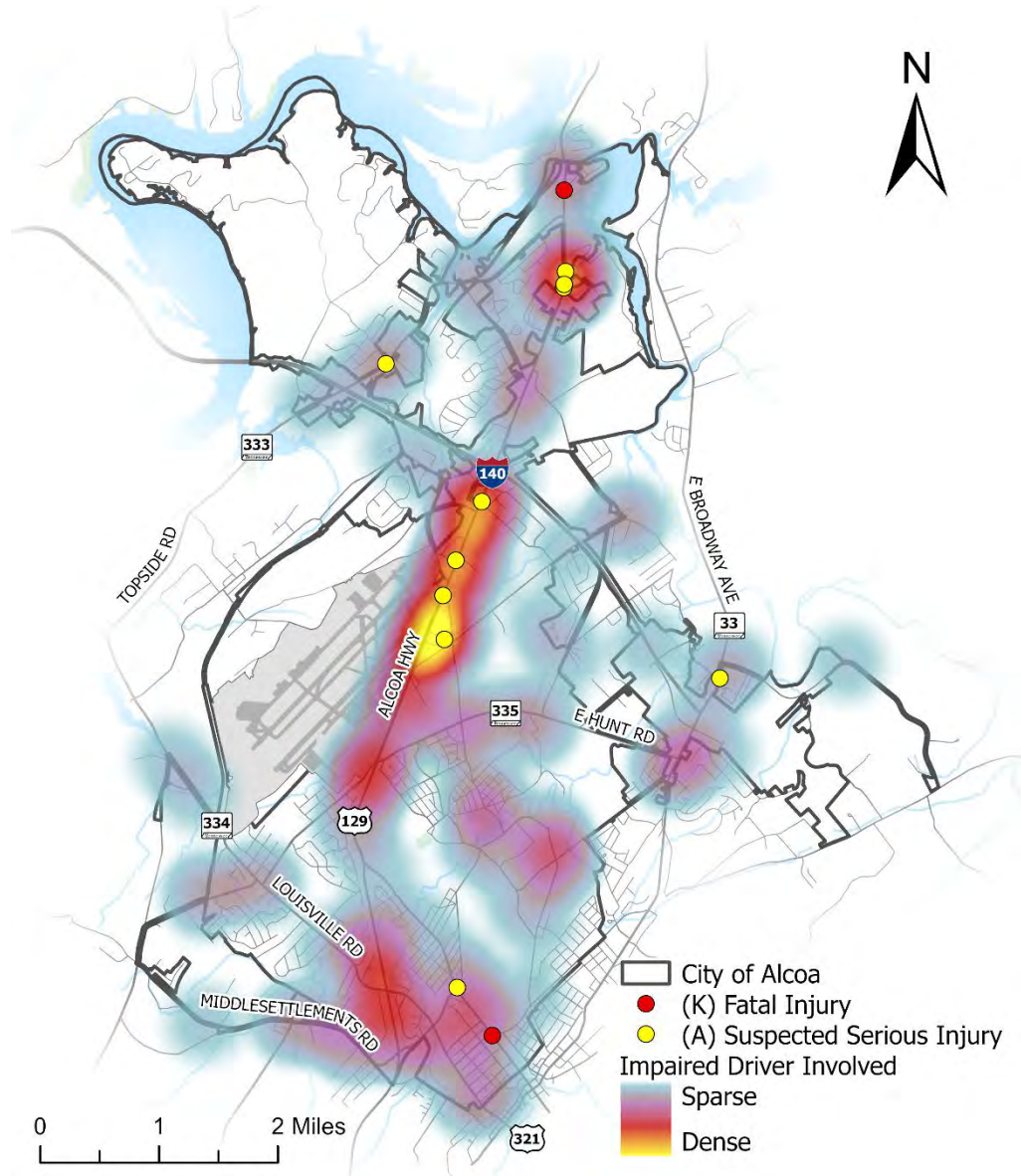
Table 17: Older Driver Countermeasures

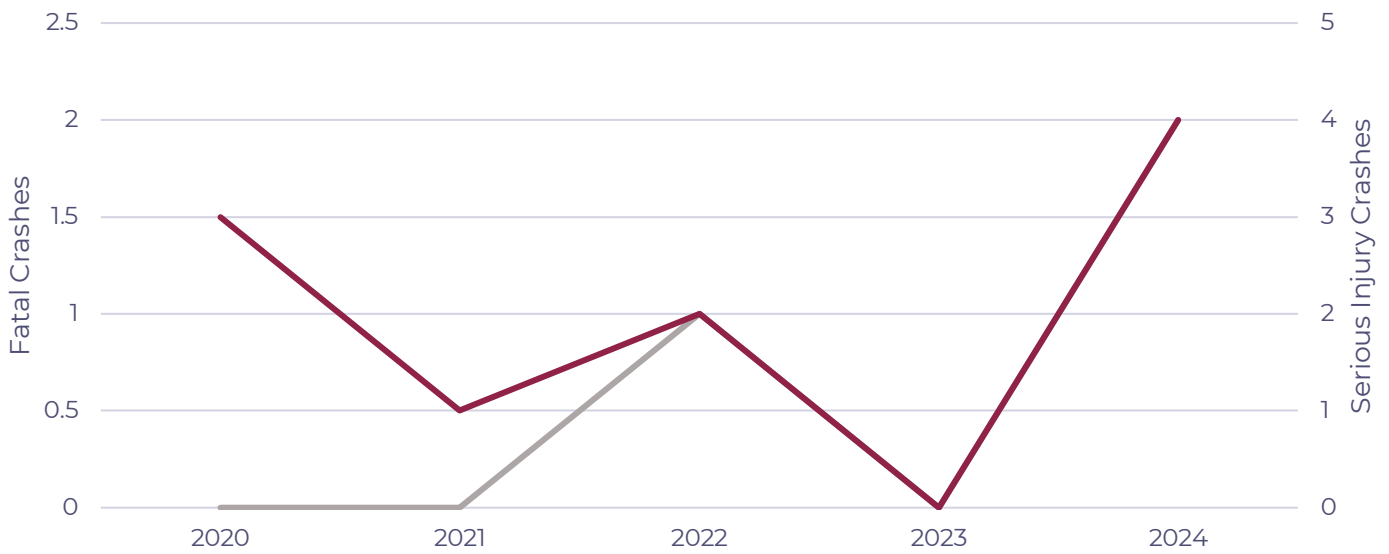
Emphasis Area	Driver-Related Countermeasure
Older Drivers	Support legislation to require in-person driver license renewal and vision testing for older drivers every five years, starting at age 75.
	Encourage efforts to link older drivers (65+) to the ride-share options and increase awareness of public and private transportation alternatives to driving
	Support education programs for older drivers including Yellow Dot, AAA RoadWide Driver, and Car Fit Check Events.

Impaired Drivers

Emphasis Area	Impaired Drivers
Safe Systems Element	Safe Road Users
How are fatal and serious injury crashes involving Impaired drivers defined?	A crash in which any driver was determined to be under the influence of alcohol, drugs, or other controlled substances at the time of the collision.
Statewide Emphasis Area	Emphasis Area in the 2025 – 2029 Tennessee SHSP

Impaired Drivers refer to individuals operating a vehicle while under the influence of alcohol, drugs (including prescription, over-the-counter, and illicit substances), or other substances that impair their ability to drive safely. This definition encompasses any condition that affects a driver's cognitive, physical, or motor skills, increasing the risk of crashes and endangering all road users. As shown earlier in the Safety Analysis Section, 15.7 percent (13 crashes) of all fatal and serious injury crashes between 2020 and 2024 in the City of Alcoa involved impaired drivers. This is 3.4 percent higher than the TN State Average of 12.3 percent.





The following are recommended strategies that should be implemented to reduce fatal and serious injury crashes involving impaired drivers:

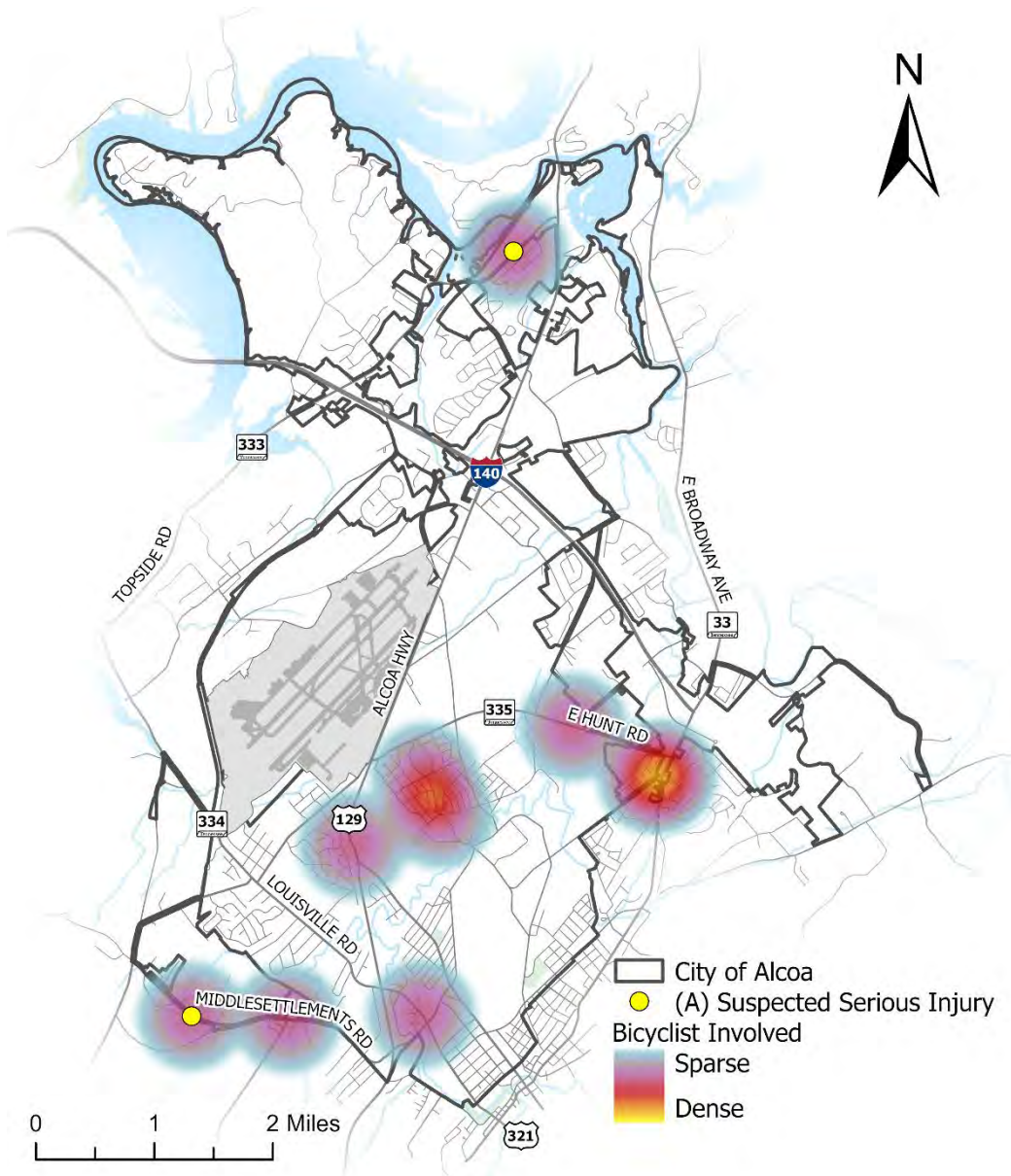
Table 18: Impaired Drivers Countermeasures

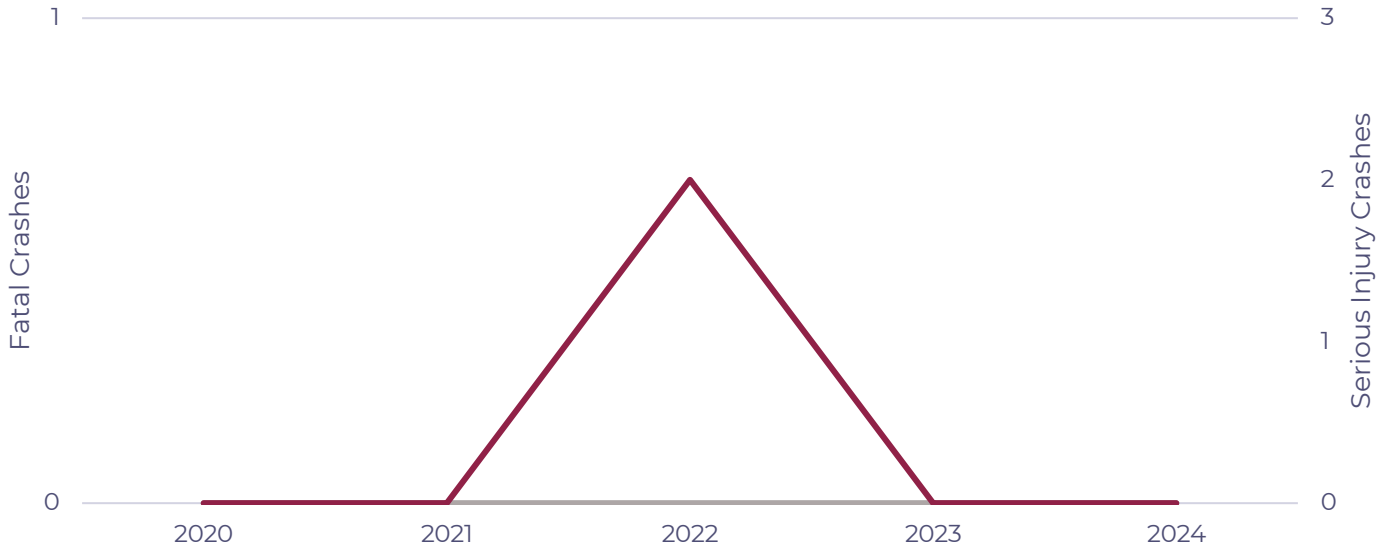
Emphasis Area	Driver-Related Countermeasure
Impaired Drivers	Participate in conference and training programs for enforcement agencies pertaining to detection, arrest, and conviction of impaired drivers, including Standard Field Sobriety Testing (SFST), Advanced Roadside Impaired Driving Enforcement (ARIDE), and Drug Recognition Expert (DRE).
	Participate in DUI enforcement projects, such as saturations and check points, which provide highly visible patrols, selective enforcement methods utilizing current field sobriety techniques and target areas with high impaired driving arrests and crashes through data-driven analysis.

Bicyclist

Emphasis Area	Bicyclists
Safe Systems Element	Safe Road Users
The operation of a bicycle on shard network with vehicles contributes to increased risks	While only accounting for 0.2% of total crashes, bicyclist-involved crashes accounted for 1.3% of fatal and serious injury crashes in 2024.
Statewide Emphasis Area	Emphasis Area in the 2025 – 2029 Tennessee SHSP

Bicyclists represent a vulnerable group of road users due to their limited physical protection and exposure to motor vehicle traffic. Although bicycling accounts for a small share of overall travel, crashes involving bicyclists often result in severe injuries or fatalities. Nationwide, bicyclists account for approximately 2 percent of all traffic fatalities. In Alcoa, the data indicates that 2.4 percent (2 crashes) of all fatal and serious injury crashes between 2020 and 2024 involved bicyclists. This is 1.1 percent higher than the TN state average of 1.3 percent.





The following are recommended strategies to improve bicyclist safety and reduce fatal and serious injury crashes involving bicyclists.

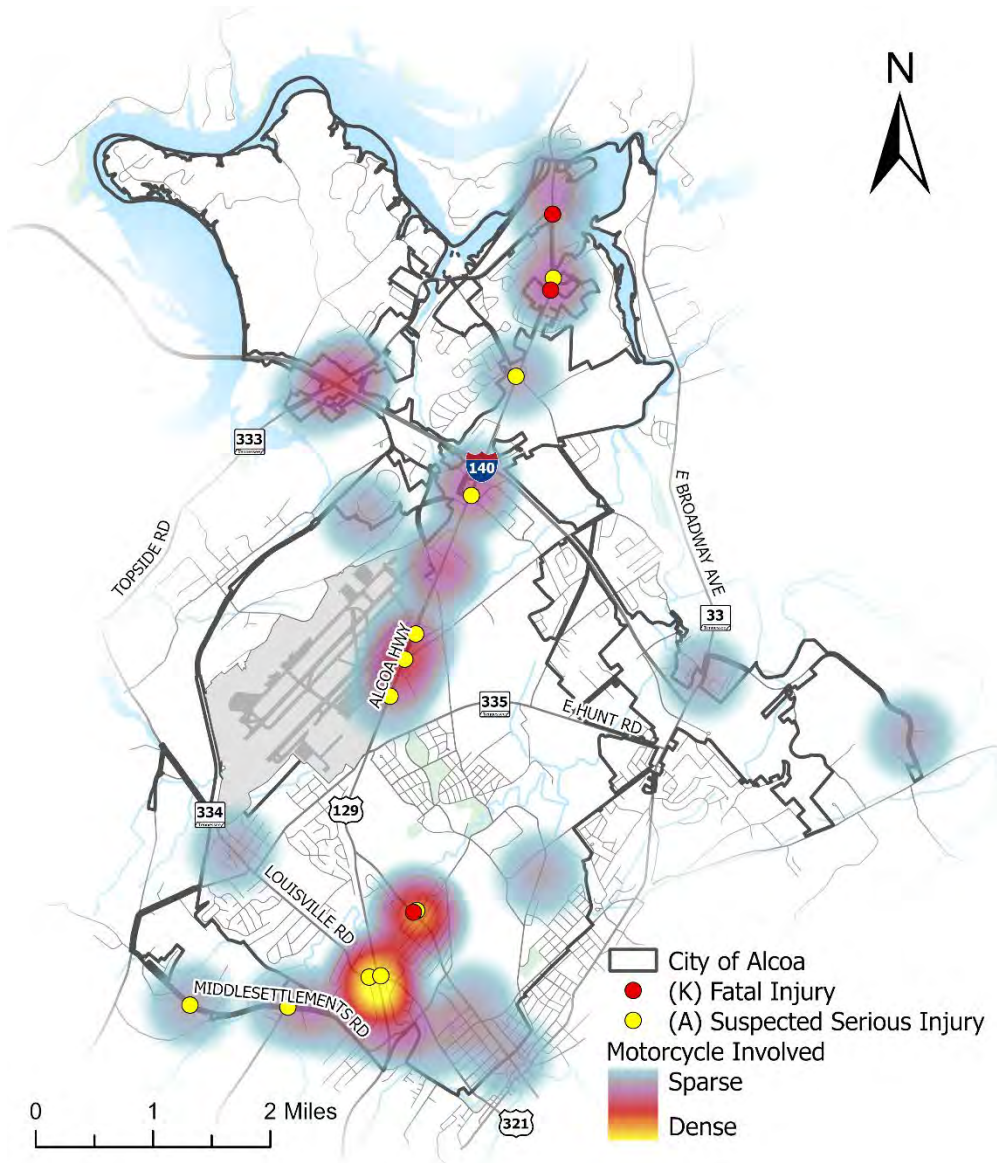
Table 19: Bicycle Countermeasures

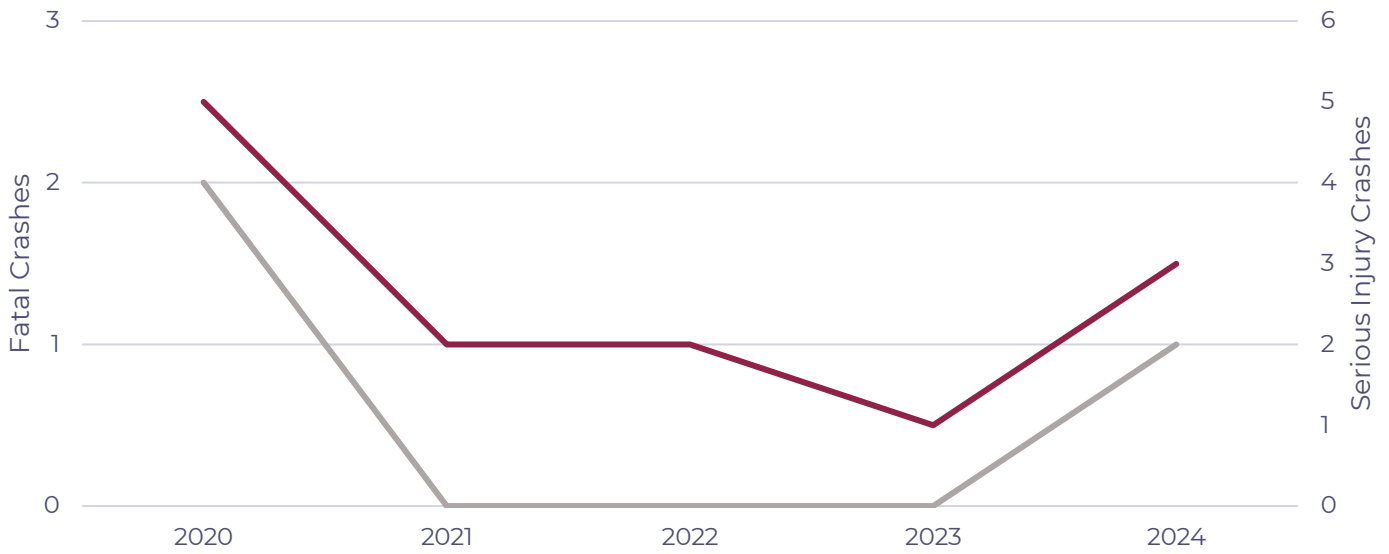
Emphasis Area	Driver-Related Countermeasure
Bicyclist	<i>Maintain, Improve, and Install bicycle and pedestrian facilities through bicycle and pedestrian specific projects and in conjunction with other roadway and safety improvements projects.</i>
	<i>Enhance driver awareness of bicyclists on the roads through communication efforts on social media and websites.</i>
	<i>Create a quick-build pilot program to implement safety countermeasures at high-crash locations for pedestrians, bicyclists and other low-speed users.</i>
	<i>Support and Enforcement of the Bicycle Helmet Laws for Children, and Universal Bicycle Helmet Laws</i>

Motorcyclist

Emphasis Area	Motorcyclists
Safe Systems Element	Safe Road Users
The operation of a motorcycle contributes to increased risks	According to the National Highway Traffic Safety Administration (NHTSA), motorcyclists accounted for 15 percent of all traffic fatalities nationwide, despite only accounting for an estimated 0.7 percent of VMT (NHTSA, Traffic Facts 2015)
Statewide Emphasis Area	Emphasis Area in the 2025 – 2029 Tennessee SHSP

Motorcyclists make up a disproportionate percentage of fatal and serious injury crashes. Though accounting for an estimated 0.7% of vehicle miles traveled, motorcyclists nationwide account for 15 percent of all traffic fatalities nationwide. In Alcoa, the data shows that 19.3 percent (16 crashes) of all fatal and serious injury crashes between 2020 and 2024 involved motorcyclists. This is 4.4 percent higher than the TN state average of 14.9 percent.





The following are recommended strategies to reduce fatal and serious injury crashes involving motorcycles.

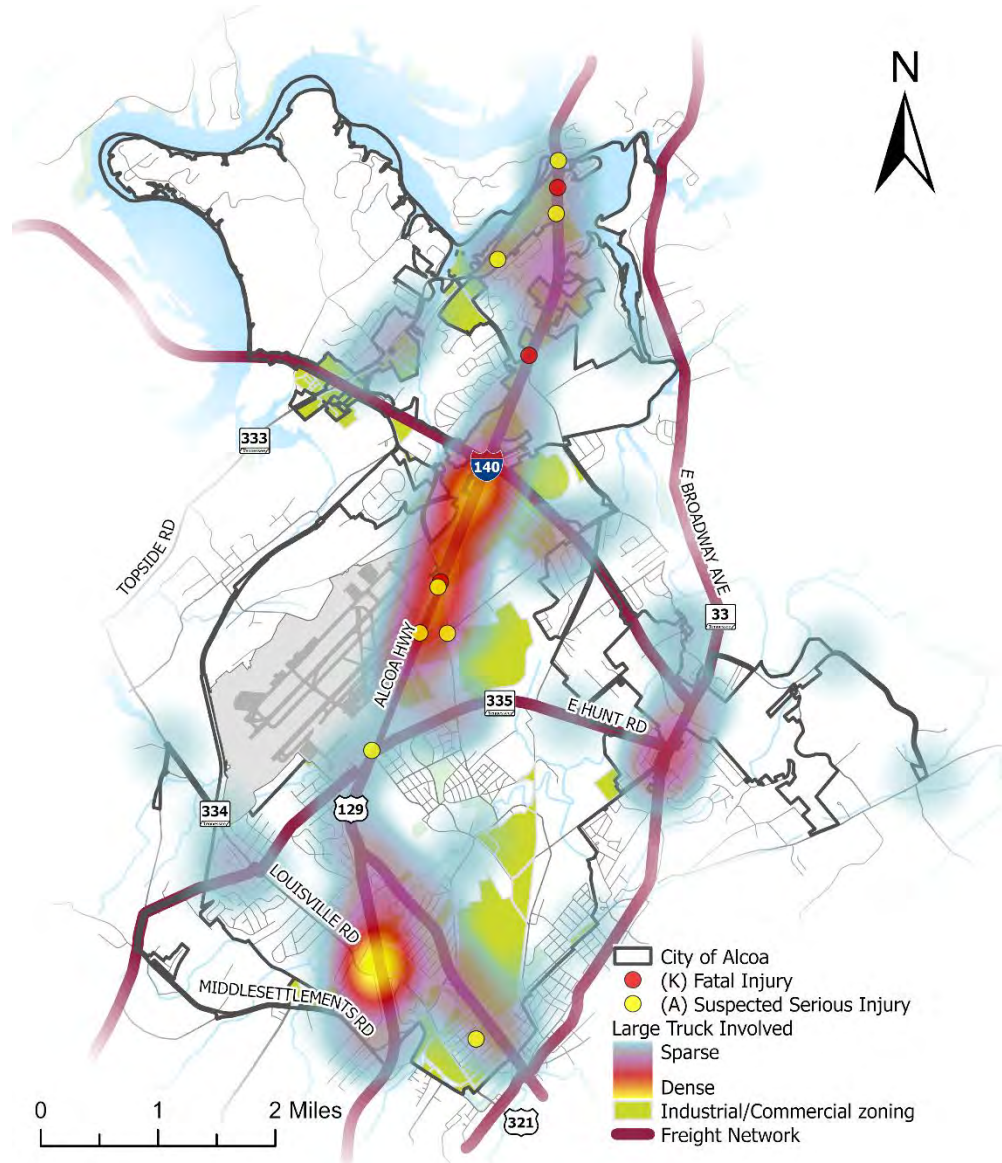
Table 20: Motorcycle Countermeasures

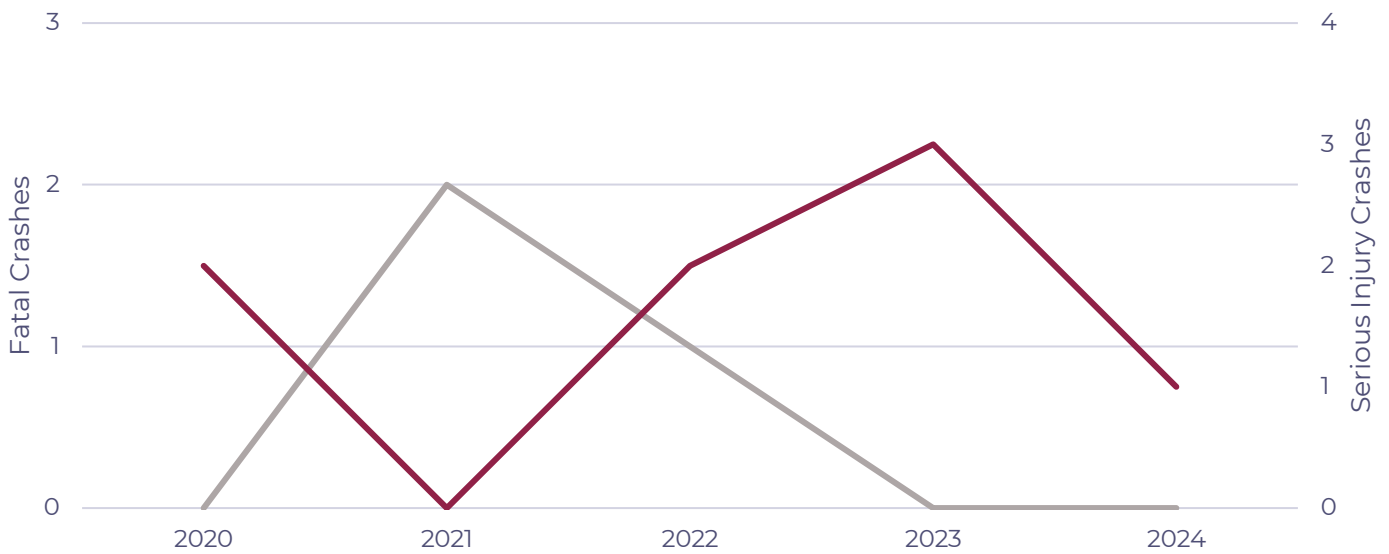
Emphasis Area	Driver-Related Countermeasure
Motorcyclist	Support and Enforcement of the Universal Motorcycle Helmet Use Laws
	Partner with TDOT in the statewide Tennessee Motorcycle Safety Strategic Plan update, anticipated in 2027

Large Trucks (Truck/Bus)

Emphasis Area	Large Trucks (Truck/Bus)
Safe Systems Element	Safe Vehicles and Safe Road Users
The operation of large trucks and freight vehicles contribute to increased risks for all roadway users	Large trucks and freight vehicles account for roughly 13% of all roadway fatalities despite representing only 5% of registered vehicles (NHTSA 2024).
Statewide Emphasis Area	Emphasis Area in the 2025 – 2029 Tennessee SHSP

Large truck and bus drivers operate some of the heaviest and most complex vehicles on the roadway, and crashes involving these vehicles can result in severe outcomes due to their size, weight, and long stopping distances. In Alcoa, available crash patterns indicate that collisions involving large trucks or buses—while less frequent than crashes involving passenger vehicles—tend to have higher severity due to the significant force exerted during impact. In Alcoa, the data shows that 13.3 percent (11 crashes) of all fatal and serious injury crashes between 2020 and 2024 involved large trucks (buses). This is 7.5 percent higher than the TN state average of 5.8 percent.





The following recommended strategies aim to reduce the likelihood and severity of crashes involving large truck and bus drivers.

Table 21: Large Truck and Bus Countermeasures

Emphasis Area	Driver-Related Countermeasure
Large Trucks	<i>Deploy enforcement forced on speeding and improper passing in known freight corridors and high-truck volume segments.</i>
	<i>Add enhanced lighting, retroreflective sign upgrades, and advance warning signs for curves, steep grades, merging zones and upcoming signals</i>
	<i>Evaluate signals for truck-specific timings: longer yellow intervals, allowed clearance, and protected left turns where truck/car conflicts are common</i>



Relevant Documents

Tennessee SHSP

The Tennessee SHSP identifies strategies that target the state’s most critical roadway safety challenges. Some of the strategies found in the plan that are particularly applicable to safety issues in the Alcoa study area consist of the following:



Towards Zero Deaths (TZD)

The Towards Zero Deaths (TZD): A National Strategy on Highway Safety identifies strategies that target the nation’s most critical roadway safety challenges. Some of the strategies found in the plan that are particularly applicable to safety issues in the study area include the following:



FHWA Proven Safety Countermeasures

The Federal Highway Administration’s (FHWA) Proven Safety Countermeasures (PSCs) provide 28 countermeasures and strategies that can offer significant and measurable improvements to safety affecting all road users. Each countermeasure addresses at least one of the USDOT’s safety focus areas, which include speed management, intersections, roadway departures, and pedestrians/bicyclists. Some of the PSCs are considered crosscutting, which identifies countermeasures that address more than one safety focus area at a time.



NHTSA Countermeasures that Work

The National Highway Traffic Safety Administration’s (NHTSA) Countermeasures That Work is a technical report that provides a reference guide of safety strategies and countermeasures, particularly focused on human behaviors related to transportation safety. This document presents strategies and countermeasures related to the following safety areas: alcohol-impaired driving, drug-impaired driving, seat belts and child restraints, speeding and speed management, distracted driving, motorcycle safety, young drivers, older drivers, pedestrian safety, bicycle safety, and drowsy driving. Countermeasures That Work also provides data-driven information such as effectiveness, costs, implementation time, and research references to support relevant countermeasures and strategies.





Policy and Process Changes

POLICY & PROCESS CHANGES

DOCUMENTS REVIEWED

Existing City of Alcoa plans and policies were reviewed as part of the SAP process to gain perspective on current efforts related to transportation safety goals, policies, and actions. Key findings within these plans and policies were identified to inform the SAP. This section also includes summarized recommendations for plan and policy changes aimed at enhancing transportation safety. **Table 22**, shown below, summarizes the key findings within the existing documents.

Table 22: Existing Plans Summary

Document Name	Summary/Goals Related to Safety
Knoxville TPO Regional Roadway Safety Action Plan (2023)	<ul style="list-style-type: none"> • This document commits to adopting a safe system approach and reduce traffic deaths and serious injuries by 66% by 2045. • The plan identifies major arterials and high-risk factors that make up a majority of the severe and fatal crashes. • The document identifies Knoxville’s high injury network and where targeted area crashes occur. • The plan gives specific safety countermeasures based on the data. • The plan also gives policy and responsibilities for certain groups of the city to implement. • Different safety goals, projects, and opportunities, are also implemented within the document
City of Alcoa 2025 Comprehensive Plan (2017)	<ul style="list-style-type: none"> • The document emphasizes the strong desire for safe walking and biking improvements. • The plan gives policies and goals in order to implements pedestrian improvements
Alignment Planning Study of Alcoa Highway (US 129/SR 115) and Corridor Development Plan (2022)	<ul style="list-style-type: none"> • This report highlights Alcoa Highway being unsafe due to its highway design and high speed and volumes • This plan also emphasis crash data and quantities from 2017-2021 including 19 serious injury crashes and 7 fatal crashes • The plan discusses potentially options when exploring how to make the corridor safer including traffic diversion, road diets, signal adjustments and access management • Pedestrian and Bicycle safety is also included in the report and includes many desires of different stakeholders in the area
Blount County SR 35 RSA Safety Report (2025)	<ul style="list-style-type: none"> • The study highlights safety concerns along SR 35, studying crashes and data from June 1, 2020, to May 31, 2023 • The document list lane widths, shoulder widths, speed limits, and daily volumes as factors that contribute to crash risk • The plan gives type of crash percentages and total occurring crashes within the study period • Pedestrian crashes are of concern along this corridor due to SR 35 separating many local neighborhoods • The document summarizes different safety countermeasures to improve the common safety issues in the area

<p>West Bessemer Street Corridor Study (2024)</p>	<ul style="list-style-type: none"> • This study explores West Bessemer Street as a corridor that has operational failures that directly create safety risk • The study identifies many characteristics of West Bessemer Street and correlates these traits to safety concerns • The plans goal is to implement the proposed widening of the road and allow vehicles to move more freely, without slowing or halting the flow of traffic
<p>Hall Road Corridor Study (2025)</p>	<ul style="list-style-type: none"> • This study evaluates the existing and future conditions of the Hall Road (SR 35) corridor (from Associates Blvd/Marconi Blvd to City Limits), incorporating public engagement and planned improvements • The study identifies various deficiencies in the existing corridor and correlates these traits to safety concerns • The plan identifies various improvements, including maintenance, traffic calming, access management, and multi-modal connectivity

PLAN CHECKLIST

To ensure the safety and well-being of all roadway users, it is imperative for agencies to have a set of plans and policies in place that guide and mandate roadway safety. A list of recommended plans and policies has been compiled to serve as a roadmap for addressing safety concerns and implementing appropriate measures. These plans provide strategies for designing and managing streets that prioritize safety, address accessibility needs, promote various transportation modes, assess traffic impacts of new developments, and outline a long-term vision for land use, transportation, and community development with a focus on safety considerations. **Table 23** contains the list of recommended plans and the corresponding plan(s), if applicable, in the City of Alcoa.

Table 23: Alignment of Safety Roadmap with Existing Plans

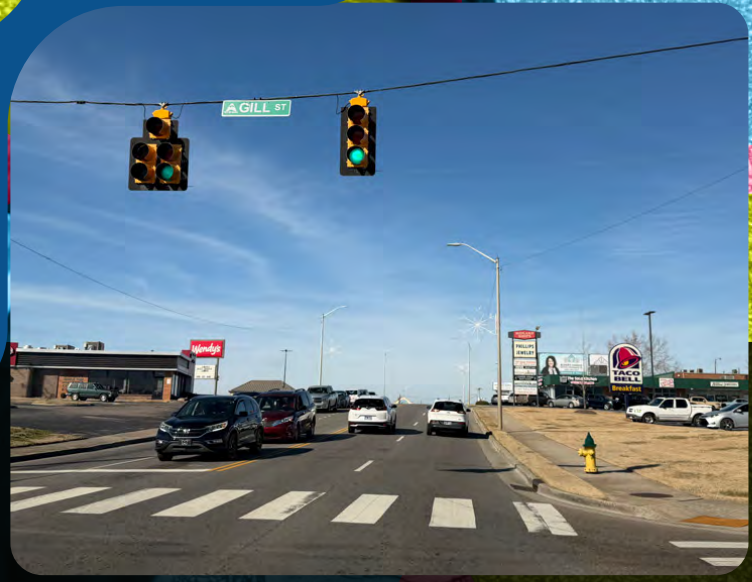
Checklist		Plan	Corresponding City of Alcoa Plan
	Complete Streets Policy Guidelines		
	ADA Transition Plan		Americans with Disabilities Act Self-Evaluation and Transition Plan
	Multi-Modal Plan		Comprehensive Plan
	Traffic Impact Study Guidelines (w/ Safety)		COA Traffic Access & Impact Analysis Requirements
	Comprehensive Plan		City of Alcoa 2025 Comprehensive Plan (2017)
	Pavement Management Plan		Inspection & Planning program through Cityworks Software package
	Subdivision Regulations		Standards for Land Subdivision
	Standard Street and Sidewalk Design Specifications		Street & Drainage Specifications
= Has Plan = Mentioned In Other Plan(s) = Does Not Have Plan			

RECOMMENDATIONS

The following recommendations are made to help the City better address and incorporate transportation safety through their existing plans, policies, and processes. The recommendations are provided alongside the related documents to which they apply, as well as the applicable element(s) of the “Four Es” of transportation safety (Engineering, Enforcement, Education, and Emergency Response).

Table 24: Recommended Policy and Process Changes

No.	Recommended Action	Timeframe	Lead
1	Integrate safety policy into all existing documents	Short-Term	Development Services Department
2	Update roadway and intersection design standards to promote safety for all roadway users and address deficiencies	Short-Term	Development Services Department
3	Establish a targeted enforcement program (for aggressive driving and high speeds) and coordinate with local law enforcement.	Short-Term	Alcoa Police Department
4	<p>PIO to organize educational campaigns/ provide information through community outreach.</p> <ul style="list-style-type: none"> • Topics include: driving behavior, speed awareness, seatbelt usage, safe practices, for bicyclists and pedestrians • Celebrate projects that improve safety and positive movements toward the City’s Safety Action Plan’s goal annually. <p>Create increased awareness within agency departments</p>	Short-Term	City Administration
5	Create a Safe Routes to School Partnership Program, coordinating with School Districts to organize Bike or Ride School Days.	Short-Term	City Schools
6	Implement a speed management program and traffic calming program	Mid-Term	Development Services Department
7	Reprioritize future projects that achieve safety goals for future funding allocations.	Mid-Term	Development Services Department
8	Increase safety education at schools and events to increase traffic safety culture of young drivers and adolescents, including increasing the awareness of the dangers of unrestrained drivers and occupants, speed, impaired driving, and distracted driving	Mid-Term	Alcoa Police Department
9	Upgrade Crosswalk (Install RRFB or Lighting & Signage at Both Sides of Railroad)	Long-Term	Development Services Department
10	Evaluate the adoption of a statutory traffic law through the legislative process to clearly define aggressive driving for enhanced enforcement efforts	Long-Term	Development Services Department

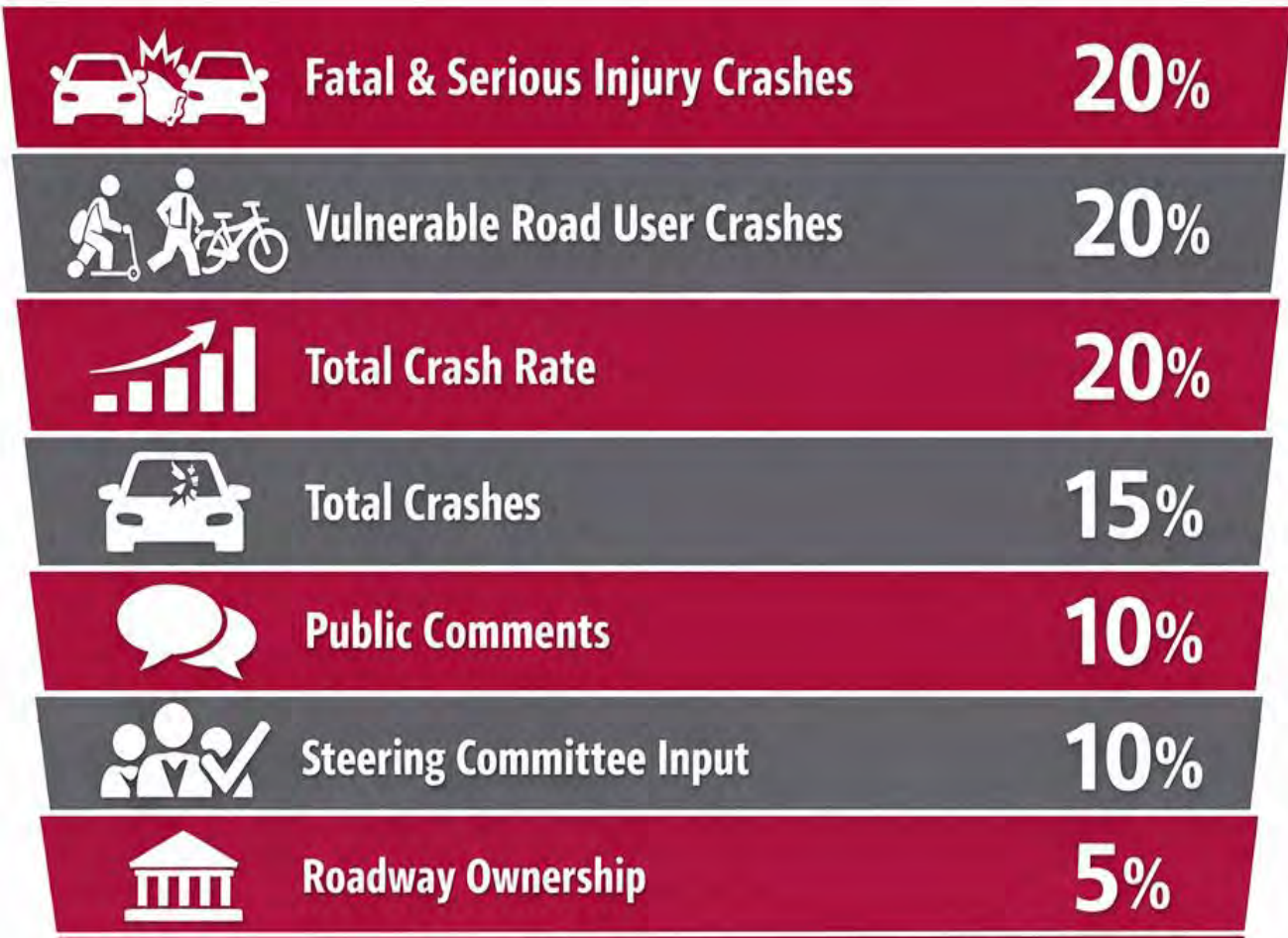


Project Selection and Prioritization

PROJECT SELECTION AND PRIORITIZATION

Prioritization

After the review and validation of the HIN by the Steering Committee, seven transportation safety factors were assigned individual weights to be used in the corridor prioritization process. The weightings were determined using input from members of the steering committee, and City staff. This exercise resulted in a methodology that is uniquely aligned with the priorities of the City. The seven factors are presented below. **Appendix B** provides a summary of the HIN prioritization exercise.



(Graphic Generated by AI)

These weightings were applied to the criteria for all the HIN segments to rank the corridors in order of priority. The results of this ranking are shown in **Table 25**.

Table 25: High Injury Network Prioritization

ID	Street Name	From	To	Score	Prioritization Rank
A	Alcoa Highway (US-129)	Middlesettlements Road / US-129 DDI	Little River	71.13	1
B	Louisville Road/Calderwood Street	Louisville Loop	Hannum Street / City Limits	55.52	2
E	Hall Road (SR-35)	Alcoa Highway (US-129)	Parham Avenue / City Limits	37.51	3
D	Hunters Crossing Drive	Middlesettlements Road	Louisville Road	34.61	4
L	Springbrook Road	Hunt Road	N Wright Road	31.95	5
K	Bessemer Street	Middlesettlements Road / US-129 DDI	E Edison Street	30.81	6
I	N Wright Road	Alcoa Highway (US-129)	E Lincoln Road	30.53	7
F	E Broadway Avenue (SR-33)	Old Knoxville Pike	Sam Houston School Road	28.76	8
C	Middlesettlements Road	Old Glory Road	Bessemer Street / US-129 DDI	28.36	9
N	Lincoln Road	Rankin Road	8th Street	28.26	10
H	Hunt Road (SR-335)	CSX Railroad / Amonia Road	Old Knoxville Highway	26.41	11
G	Topside Road (SR-333)	E Old Topside Road	Airport Highway	21.96	12
M	Wrights Ferry Road	Topside Road	Alcoa Highway (US-129)	16.22	13
O	Cusick Road	Alcoa Highway (US-129)	Pellissippi Parkway	13.90	14
J	Sam Houston School Road	Old Knoxville Highway	Wildwood Road	10.90	15

Factsheet Segments

City staff reviewed the final ranking, and selected segments from the HIN to further develop engineering countermeasure recommendations, considering current City projects and priorities. The 10 segments for which the project team developed countermeasure recommendations are shown in **Figure 44**. Factsheets illustrating the recommendations are included in **Appendix C**. Safety improvement recommendations were developed using the Engineering Countermeasures Toolkit presented in **Appendix E**.

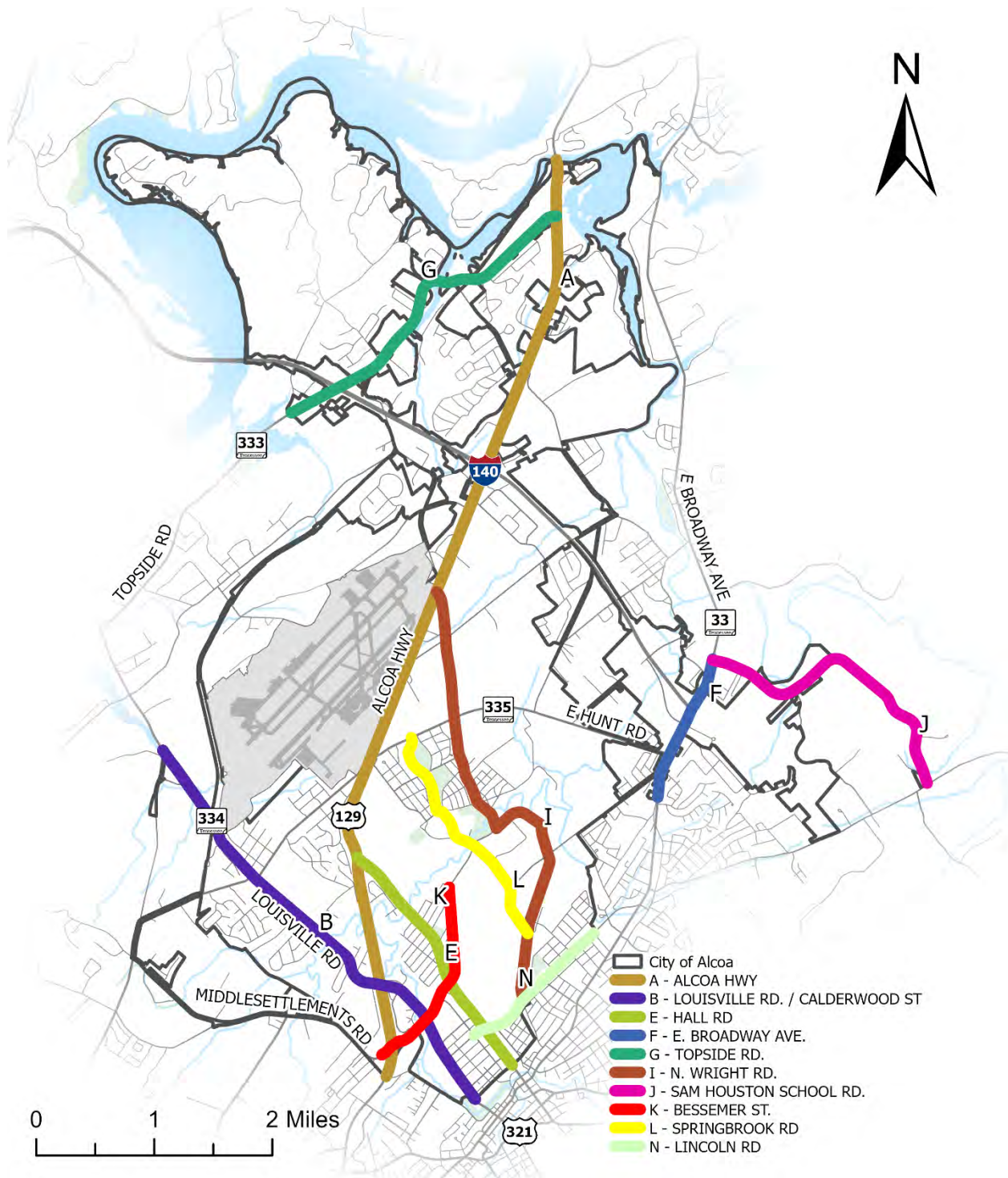


Figure 44: Factsheet Segments



Progress and Transparency



PROGRESS & TRANSPARENCY

The City of Alcoa SAP recommends a set of actions that will support the successful implementation and monitoring of the recommended projects and strategies. The City of Alcoa must work alongside related departments and agencies to implement the projects and policy changes described in this SAP and assume joint responsibility for the complete fulfillment of the Plan. The City and the task force described in the following section will continue to update the public on the progress of projects, policy, and process implementation. A progress and transparency toolkit has been provided to the City to keep the public informed and aware of ongoing projects and the benefits of the proposed improvements after implementation.

Implementation Process

To successfully implement an SS4A grant-funded projects, the City must undertake several key steps. The first step is the preparation and adoption of a comprehensive safety action plan, which is accomplished by the City of Alcoa through this document. Once the plan has been adopted, the City must engage in project-level planning, design, and development activities directly connected to the completion of the identified projects. This includes infrastructure improvements as well as behavioral and operational activities. The City must also ensure proper coordination among various stakeholders, including local government agencies, community organizations, and the public, to gather input and support for the projects. Additionally, the City must adhere to the timelines and funding requirements specified in the grant agreement, ensuring that all activities are completed within the stipulated period. Regular monitoring and evaluation of progress are essential to ensure that the safety goals are being met and that any necessary adjustments are made.

Task Force Implementation and Monitoring

It is recommended that a subset of the Steering Committee reconvenes in the future as an Alcoa Safety Task Force to direct the SAP implementation, monitoring, and future progress. The Task Force can consist of Development Services staff, other City of Alcoa departments, Alcoa Police Department, other local emergency service providers, key Blount County staff, key TDOT staff, other adjacent communities, and other stakeholders as needed. It is recommended that this group convene annually after the adoption of the Alcoa SAP to review the latest available crash data trends, discuss the progress of project implementation, and assess progress toward crash reduction goals. The Task Force will discuss opportunities to build upon the plan to address any changing crash trends alongside community needs, new technologies, and additional resources available to assist in implementation.



Public Posting of the Alcoa SAP

Upon completion and adoption, this plan will be made public on the dedicated project website (shown below in **Figure 45**) and the City’s website. It is recommended the project website be maintained to update the public with new crash data trends, project implementation status, and progress toward safety goals.



Figure 45: Alcoa SAP Website

Safety Dashboard Maintenance

The Alcoa Safety Task Force should periodically update the safety dashboard using TDOT’s AASHTOWare Safety online crash database in order to inform the public of the progress toward the City’s interim reduction goal and the long-term goal of zero traffic deaths and serious injuries.

Supplemental Visual Progress Indicators

These indicators can take various forms, such as maps and infographics, which visually represent the progress and impact of safety initiatives. Interactive maps can show the locations of ongoing and completed projects, allowing residents to see how their neighborhoods are being affected. Infographics can summarize key statistics and achievements in a visually appealing manner, helping to communicate the benefits of the projects effectively. By using these visual tools, the City of Alcoa can foster a sense of transparency and accountability, ensuring that the public remains informed and engaged throughout the implementation process. Additionally, these tools can be configured to serve as valuable feedback mechanisms, allowing residents to provide input and express concerns, which can be addressed in future project phases.



Appendix A

RESOLUTION NO. R26-508

A RESOLUTION OF THE ALCOA BOARD OF COMMISSIONERS OF THE CITY OF ALCOA, TENNESSEE, ADOPTING THE CITY OF ALCOA SAFETY ACTION PLAN AND ITS SAFETY TARGETS (PC Res 2026-16) (Public Hearing – 05/22/2026)

WHEREAS, there were 3,928 crashes reported within the Alcoa City limits from 2020 to 2024; and

WHEREAS, 17 people lost their lives in crash-related deaths on Alcoa roadways in the five-year period; and

WHEREAS, there were 66 people with suspected serious injuries caused from crashes on Alcoa roadways in the five-year period; and

WHEREAS, the Alcoa Board of Commissioners of the City of Alcoa, Tennessee is committed to the goal of significantly reducing and ultimately eliminating roadway fatalities and serious injuries on roadways within the City's police jurisdiction.

NOW, THEREFORE, BE IT RESOLVED by the Alcoa Board of Commissioners of the City of Alcoa, Tennessee, in a special called session on this the 22nd day of May, 2026, as follows:

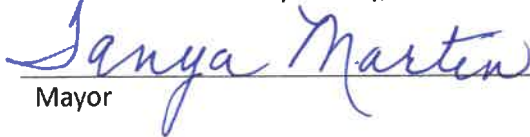
SECTION 1. That the Alcoa Board of Commissioners of the City of Alcoa, Tennessee, hereby adopts an interim target of reducing fatal and serious injury crash rates expressed in crashes per 100 million vehicle miles travel by twenty-five (25) percent by the year 2040; and

SECTION 2. That the Alcoa Board of Commissioners of the City of Alcoa, Tennessee, also hereby adopts the Safety Action Plan of the Safe Streets and Roads for All initiative, as attached hereto, to serve as a guiding document for the City as it works toward achieving its safety performance goals; and

SECTION 3. That a public hearing is hereby being held during this special called session at 11:15 AM; and

SECTION 4. That said resolution shall take effect forthwith upon its adoption, the public welfare requiring it.

ADOPTED this 22nd day of May, 2026.



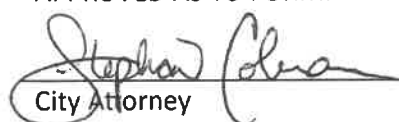
Mayor

ATTEST:

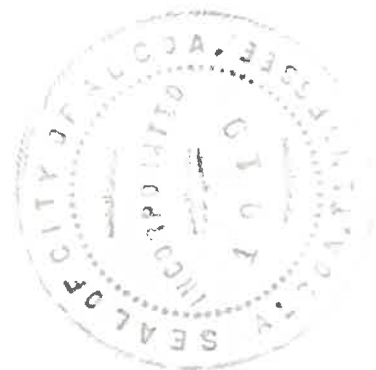


Recorder

APPROVED AS TO FORM:



City Attorney



A RESOLUTION OF THE ALCOA MUNICIPAL REGIONAL PLANNING COMMISSION ADOPTING THE CITY OF ALCOA SAFETY ACTION PLAN AND ITS SAFETY TARGETS

WHEREAS, there were 3,928 crashes reported within the Alcoa City limits from 2020 to 2024; and

WHEREAS, 17 people lost their lives in crash-related deaths on Alcoa roadways in the five-year period; and

WHEREAS, there were 66 people with suspected serious injuries caused from crashes on Alcoa roadways in the five-year period; and

WHEREAS, the Alcoa Municipal Regional Planning Commission, as part of its purpose of carrying out its general plan to guide and accomplish a coordinated, adjusted and harmonious development for the City and its greater Alcoa Planning Region, is committed to the goal of significantly reducing and ultimately eliminating roadway fatalities and serious injuries on roadways within the City's police jurisdiction.

NOW, THEREFORE, BE IT RESOLVED by the Alcoa Municipal Regional Planning Commission, in regular session on this the 21st day of May, 2026, as follows:

SECTION 1. That the Alcoa Municipal Regional Planning Commission hereby adopts an interim target of reducing fatal and serious injury crash rates expressed in crashes per 100 million vehicle miles travel by twenty-five (25) percent by the year 2040; and

SECTION 2. That the Alcoa Municipal Regional Planning Commission also hereby adopts the Safety Action Plan of the Safe Streets and Roads for All initiative, as attached hereto, to serve as a guiding document for the City as it works toward achieving its safety performance goals, and recommends adoption of the same by the Alcoa Board of Commissioners of the City of Alcoa; and

SECTION 3. That the Secretary, of the Alcoa Municipal Regional Planning Commission, certifies a copy of this resolution to the Alcoa Board of Commissioners of the City of Alcoa; and

SECTION 4. That a public hearing is hereby being held during this regular session at 5:30 PM.

ADOPTED this 21st day of May, 2026.


Chairman, Alcoa Municipal/Regional
Planning Commission

ATTEST:


Secretary



Appendix B

City of Alcoa - High Crash Segments

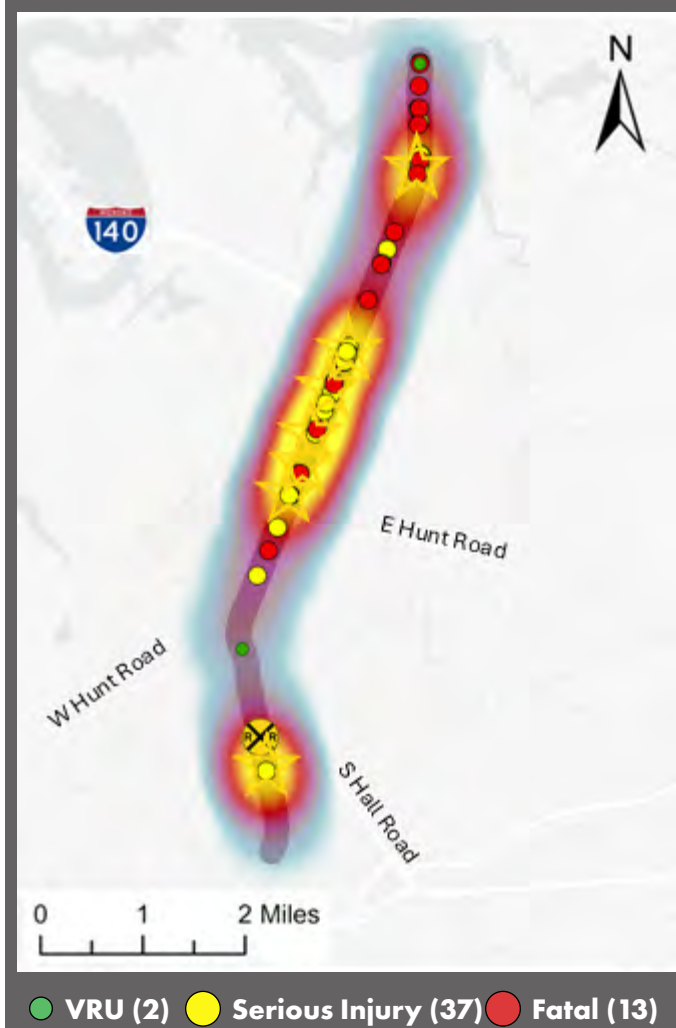
Weighting Variables								15%	20%	20%	20%	10%	10%	5%	100%	Rank
ID	Road Name	From	To	Ownership	AADT	Length, mi	Total Crashes	KA Crashes	Crash Rate	VRU Crashes	SC Votes	Survey Comments	Roadway Ownership	Total Score		
A	Alcoa Highway (US-129)	Middlesettlements Road / US-129 DDI	Little River	State	40,000	8.2	1372	50	2.30	2	11	5	0	71.13	1	
B	Louisville Road/Calderwood Street	Louisville Loop	Hannum Street / City Limits	Municipal	10,000	4.1	595	5	7.96	3	7	3	1	55.52	2	
C	Middlesettlements Road	Old Glory Road	Bessemer Street / US-129 DDI	Municipal	16,000	2.5	142	3	1.95	2	1	2	1	28.36	9	
D	Hunters Crossing Drive	Middlesettlements Road	Louisville Road	Municipal	6,000	0.6	113	2	16.50	1	1	0	1	34.61	4	
E	Hall Road (SR-35)	Alcoa Highway (US-129)	Parham Avenue / City Limits	State	25,000	2.2	372	6	3.66	2	8	3	0	37.51	3	
F	E Broadway Avenue (SR-33)	Old Knoxville Pike	Sam Houston School Road	State	14,000	1.3	231	4	7.08	2	3	0	0	28.76	8	
G	Topside Road (SR-333)	E Old Topside Road	Airport Highway	State	9,000	3.0	211	8	4.32	1	5	0	0	21.96	12	
H	Hunt Road (SR-335)	CSX Railroad / Amonia Road	Old Knoxville Highway	State	8,000	4.7	216	2	3.18	1	3	5	0	26.41	11	
I	N Wright Road	Alcoa Highway (US-129)	E Lincoln Road	Municipal	4,000	4.1	208	3	6.94	0	4	5	1	30.53	7	
J	Sam Houston School Road	Old Knoxville Highway	Wildwood Road	Municipal	5,500	2.6	72	0	2.71	0	2	0	1	10.90	15	
K	Bessemer Street	Middlesettlements Road / US-129 DDI	E Edison Street	Municipal	15,000	1.7	289	1	6.25	1	0	4	1	30.81	6	
L	Springbrook Road	Hunt Road	N Wright Road	Municipal	1,500	2.1	25	0	4.41	2	0	4	1	31.95	5	
M	Wrights Ferry Road	Topside Road	Alcoa Highway (US-129)	Municipal	3,000	2.1	75	1	6.60	0	0	1	1	16.22	13	
N	Lincoln Road	Rankin Road	8th Street	Municipal	7,000	1.4	154	2	8.89	0	0	5	1	28.26	10	
O	Cusick Road	Alcoa Highway (US-129)	Pellissippi Parkway	Municipal	6,000	1.7	98	4	5.13	0	0	0	1	13.90	14	





Appendix C

ALCOA ALCOA HIGHWAY (US-129)
SAFE STREETS from Middlesettments Road / US-129 DDI to Little River



Urban Other Principal Arterial (TDOT)

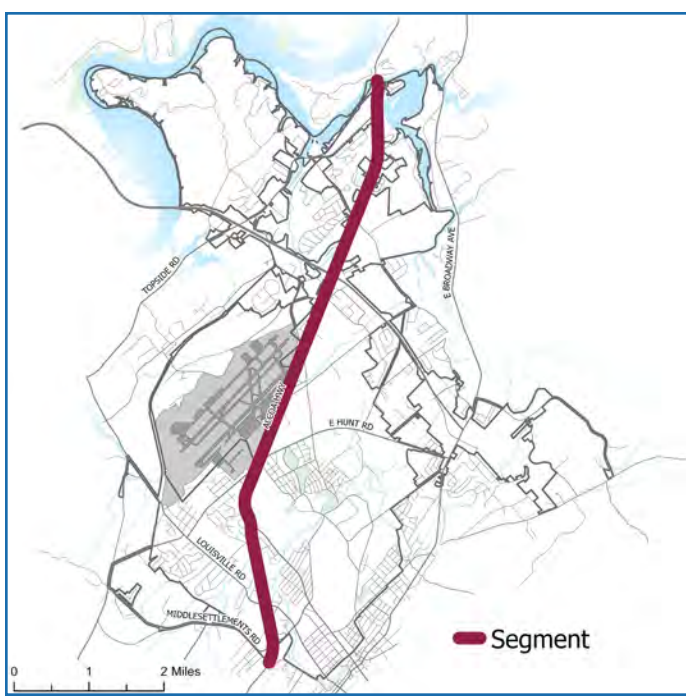
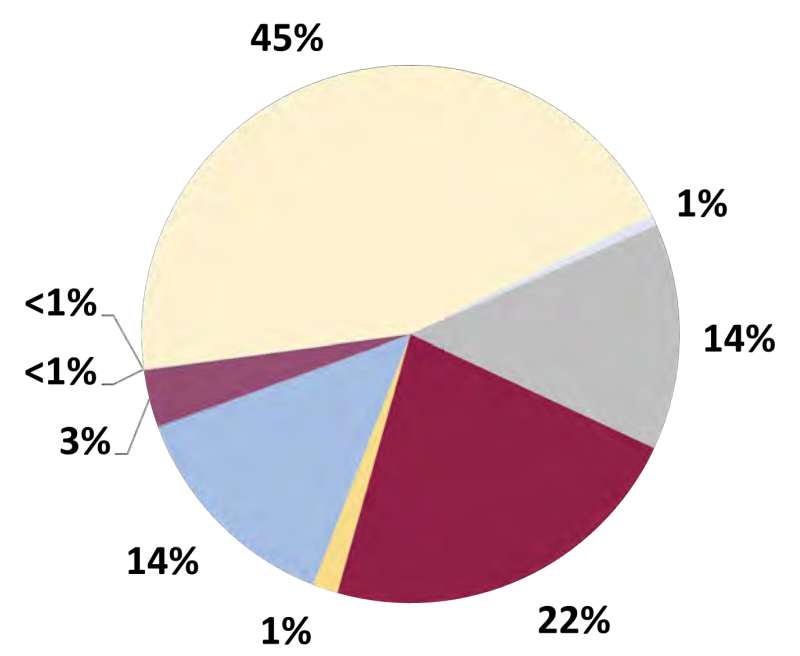
Speed Limit	55 mph
Lanes	4/6
Vehicles/Day	40,000
Total Crashes	1,372
HIN Intersections	7 ★

Characteristics
 Alcoa Highway (US-129) is a two-way roadway within Alcoa, providing access throughout the City, as well as connecting the Knoxville and Maryville areas. Opposing travel lanes are separated by a wide grass median, with a high presence of median openings at intersections and commercial driveways. This section of Alcoa Highway exhibits wide shoulders on all sides, however, there are no sidewalks/paths present.

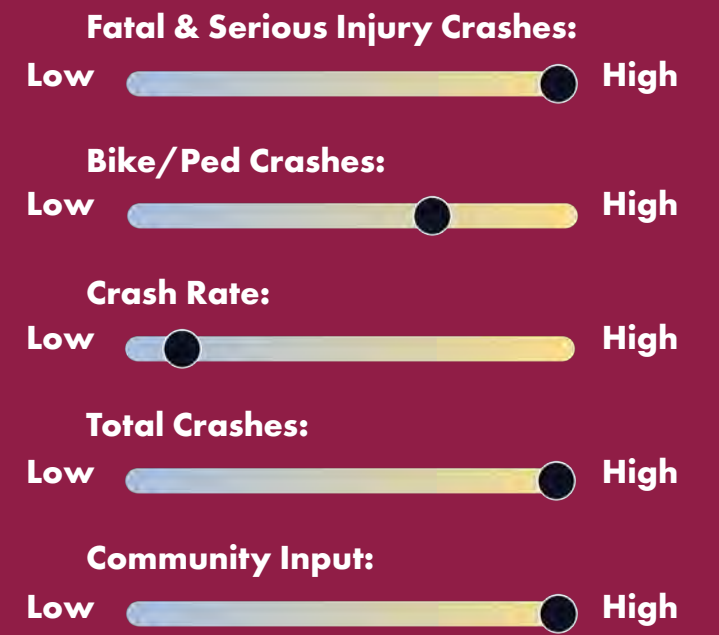


Along Alcoa Highway, Facing South, Just South of McGhee Place

- Angle
- Head-On
- No Collision W/ Vehicle
- Other
- Pedalcycle
- Pedestrian
- Rear-End
- Sideswipe, Opp Dir
- Sideswipe, Same Dir



OVERALL RANKING: 1
Ranking Index



Community Input

- “ Sidewalk going down both sides for access to green belt without having to cross the street multiple times ”
- “ W Bessemer St needs to be Redone for all the traffic that presently using it to get on Hall Rd and Alcoa Hwy. Needs more lanes. ”
- “ This intersection is becoming more and more dangerous with the addition of businesses and increased traffic. ”
- “ Drivers are not using the protected lane to turn and merge. ”
- “ A sidewalk is needed on Hunt Road, and there needs to be an extension of the sidewalk from Walmart down Louisville Road to reach the neighborhoods. ”
- “ Need guardrails to prevent going down embankment into retention pond. ”
- “ There are too many cut throughs on Hall Road that impact traffic safety. Crossing three lanes of traffic to head the opposite direction is very unsafe. ”

DISCLAIMER - 23 United States Code Section 407 - Discovery and admission as evidence of certain reports and surveys - Notwithstanding any other provision of law, reports, surveys, schedules, lists, or data compiled or collected for the purpose of identifying, evaluating, or planning the safety enhancement of potential accident sites, hazardous roadway conditions, or railway-highway crossings, pursuant to sections 130, 144, and 148 of this title or for the purpose of developing any highway safety construction improvement project which may be implemented utilizing Federal-aid highway funds 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.

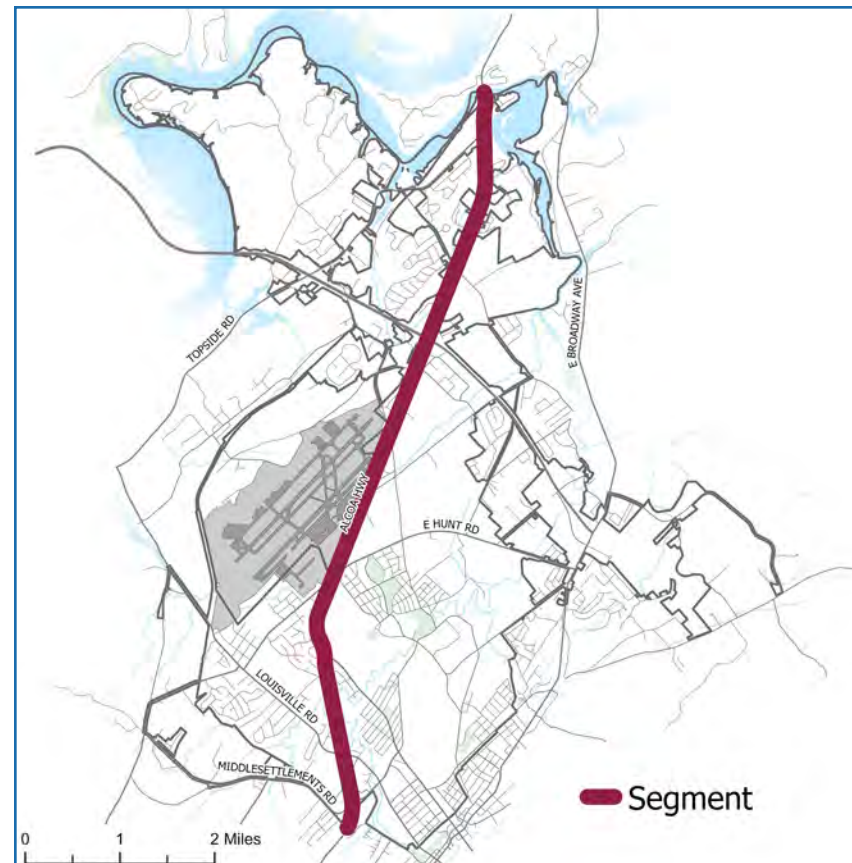
ALCOA ALCOA HIGHWAY (US-129)
SAFE STREETS from Middle settlements Road / US-129 DDI to Little River

ID	Countermeasure	Cost	Schedule	Project Readiness
1	Conduct Intersection Control & Alignment Evaluation (Payne Ave, Cusick Rd, N Wright Rd, Lois Ln, Airbase Rd, Northpark Blvd, Hillside Dr, Wheeler Rd, Rivertrace Blvd)	\$	Short-Term	Ready
2	Corridor Access Management (Cusick Rd to N Wright Rd, Wrights Ferry Rd, Northpark Blvd, Vista Rd, Singleton Station Rd, Starlite Rd, and Lakeview Way)	\$\$\$\$	Long-Term	Ready
3	Dedicated Left and Right-Turn Lanes at Intersections	\$\$\$	Mid-Term	Ready
4	Evaluate Proper Approach Laneage (Bessemer St On-Ramp and Cusick Rd)	\$	Short-Term	Ready
5	Railroad Crossing Enhancements	\$\$\$	Mid-Term	●
6	Smart Channel Right-Turn Lane (Airbase Rd and Topside Rd)	\$\$\$	Long-Term	●

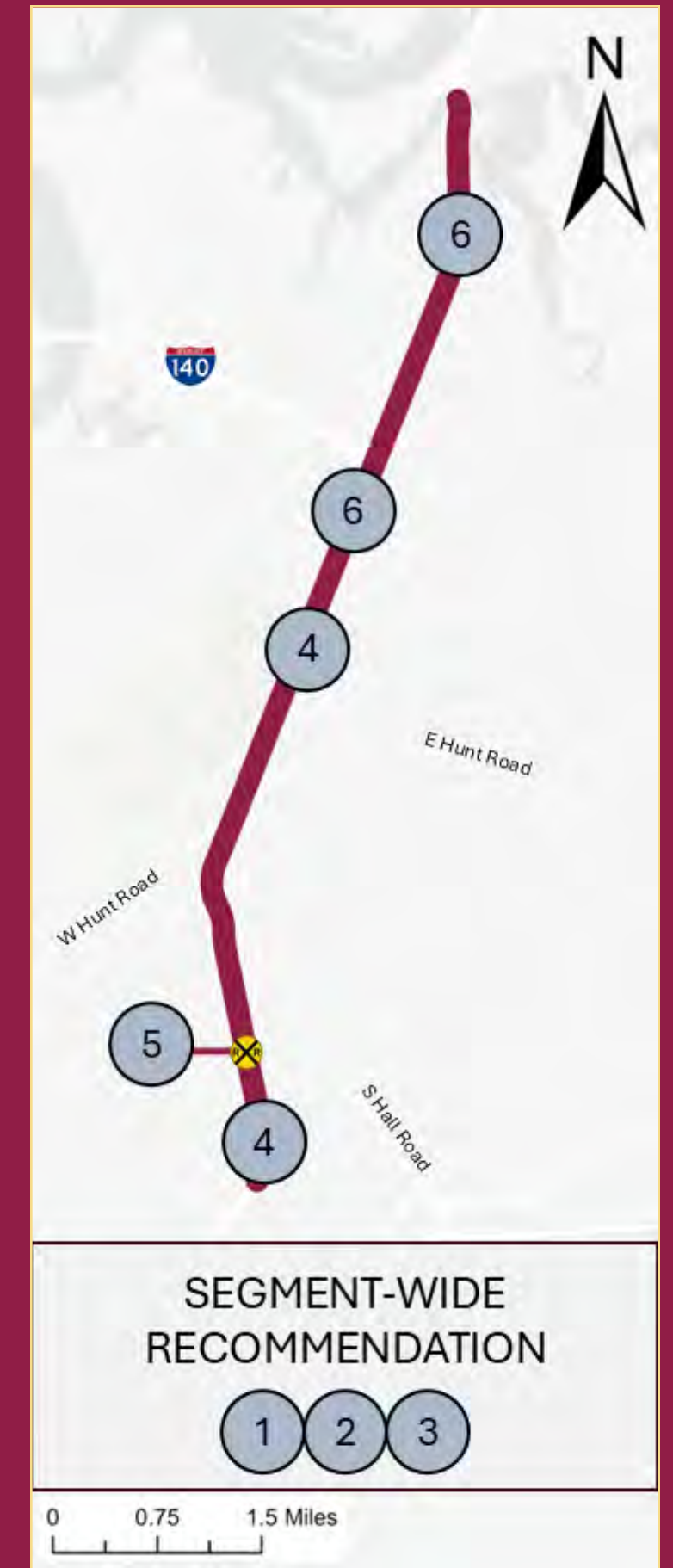
FHWA Proven Safety Countermeasure
 Crash Modification Factors Countermeasure
 Vulnerable Road User Related Countermeasure
 Requires ROW Acquisition
 Requires Utility Relocation

Benefit Summary

- Evaluating alternate intersection control or geometry ensures safer, more efficient designs by reducing severe crashes, improving pedestrian safety, and calming traffic.
- By promoting slower turning speeds and better visibility, "smart channel" right turns help reduce the likelihood of collisions at intersections.
- Turn lanes provide a dedicated space for drivers intending to make a turning maneuver, separating them from through traffic and reducing the likelihood of rear-end crashes.
- Proper access management at medians can prevent left-turn and head-on crashes by separating opposing traffic flows. Consolidating driveways can also facilitate better access management by controlling where vehicles can turn, thereby reducing unpredictable movements that can lead to crashes.
- Realigning skewed intersections improves safety by creating near perpendicular approaches, which enhance driver sightlines and simplify decision-making. This reduces complex turning movements, lowers vehicle speed variability, and minimizes conflict points—especially for left turns and large vehicles—leading to fewer severe crashes.



RECOMMENDED COUNTERMEASURES



ALCOA HIGHWAY (US-129)
 from Middle settlements Road / US-129 DDI to Little River

DISCLAIMER - 23 United States Code Section 407 - Discovery and admission as evidence of certain reports and surveys - Notwithstanding any other provision of law, reports, surveys, schedules, lists, or data compiled or collected for the purpose of identifying, evaluating, or planning the safety enhancement of potential accident sites, hazardous roadway conditions, or railway-highway crossings, pursuant to sections 130, 144, and 148 of this title or for the purpose of developing any highway safety construction improvement project which may be implemented utilizing federal-aid highway funds 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.

ALCOA LOUISVILLE ROAD/CALDERWOOD STREET
SAFE STREETS from Louisville Loop to Hannum Street / City Limits



Urban Minor Arterial (Alcoa, TN)

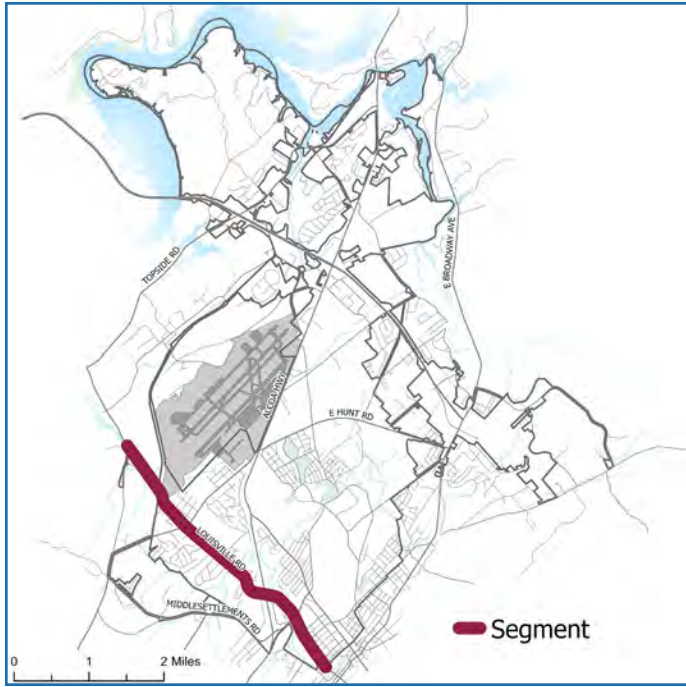
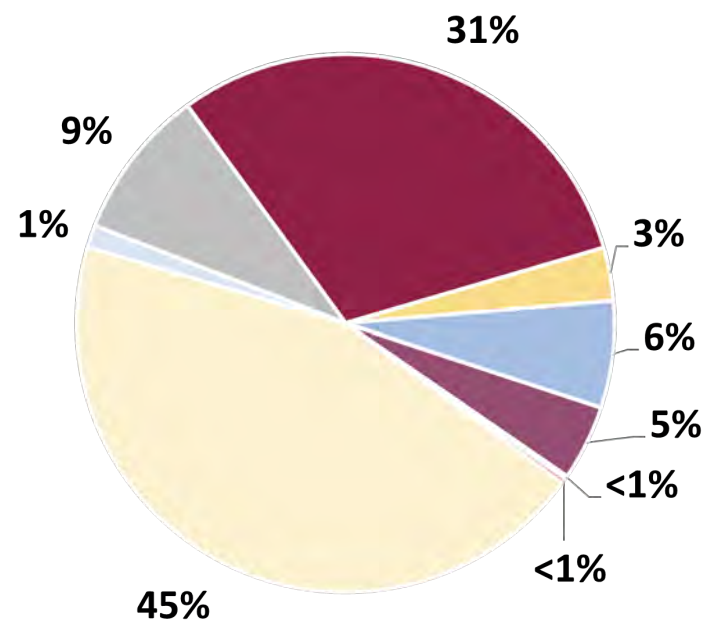
Speed Limit	40 mph
Lanes	2
Vehicles/Day	10,000
Total Crashes	595
HIN Intersections	4 ★

Characteristics
 Louisville Road/Calderwood Street is a two-way minor arterial within Alcoa, spanning from the outer city limits to the inner Alcoa area. This segment follows a lightly curved alignment over rolling terrain, with pedestrian infrastructure throughout the eastern end of the roadway corridor.

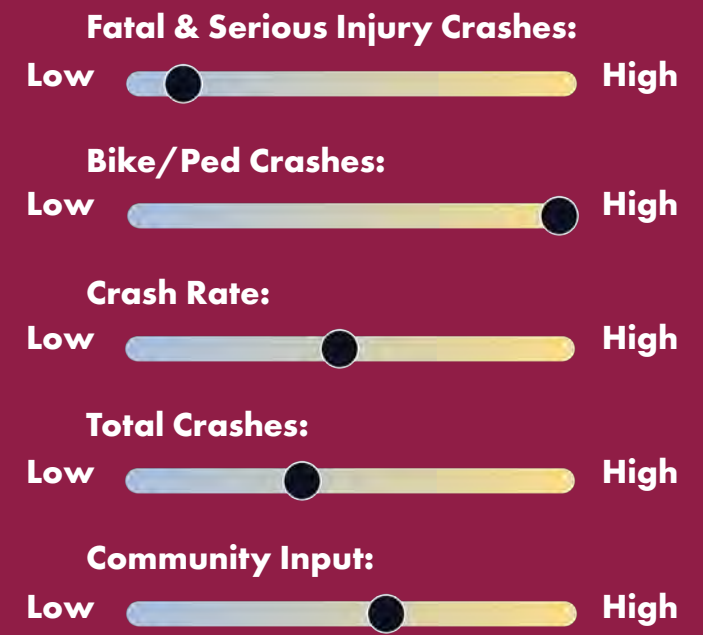


Along Calderwood Street, Facing North, Just North of Joule Street

- Angle
- Head-On
- No Collision W/ Vehicle
- Other
- Pedalcycle
- Pedestrian
- Rear-End
- Sideswipe, Opp Dir
- Sideswipe, Same Dir



OVERALL RANKING: 2
Ranking Index



Community Input

“ The intersection of Louisville Rd at Alcoa Hwy is a source of significant bottlenecks during AM and PM peak hours. Traffic backs up so much in both directions, it can create hazards when vehicles at full speed come upon queues of stopped cars. There needs to be a network-wide study of how to resolve this issue. If the stop light were removed and Louisville Rd traffic were able to go under or over US-129, it would solve some of the problem. ”

“ There needs better signage at the traffic light at Louisville road by our lady of Fatima church. I see cars in the middle lane go straight up toward green meadow all the time. ”

“ The sidewalk on Louisville Road from Walmart needs to be extended down to Hunt Road. ”

“ Needs sidewalks going down both sides for access to green belt without having to cross the street multiple times ”

LOUISVILLE ROAD/CALDERWOOD STREET
from Louisville Loop to Hannum Street / City Limits

DISCLAIMER - 23 United States Code Section 407 - Discovery and admission as evidence of certain reports and surveys - Notwithstanding any other provision of law, reports, surveys, schedules, lists, or data compiled or collected for the purpose of identifying, evaluating, or planning the safety enhancement of potential accident sites, hazardous roadway conditions, or railway-highway crossings, pursuant to sections 130, 144, and 148 of this title or for the purpose of developing any highway safety construction improvement project which may be implemented utilizing Federal-aid highway funds 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.



ALCOA LOUISVILLE ROAD/CALDERWOOD STREET

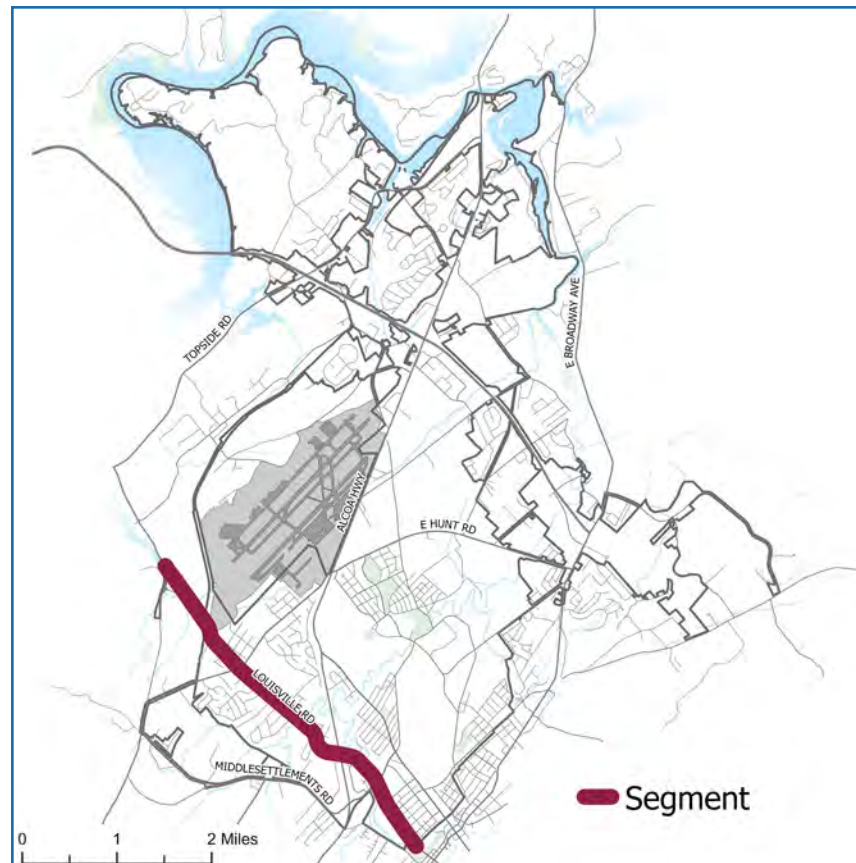
SAFE STREETS from Louisville Loop to Hannum Street / City Limits

ID	Countermeasure	Cost	Schedule	Project Readiness
1	Corridor Access Management	\$\$\$\$	Long-Term	Ready
2	Crosswalk Visibility Enhancement (Marilyn Ln and W Bessemer St)	\$\$	Short-Term	Ready
3	Retroreflective Pavement Markers	\$	Short-Term	Ready
4	Flashing Yellow Arrows (FYAs) (Marilyn Ln and W Bessemer St)	\$\$	Mid-Term	Ready
5	Longitudinal Rumble Strips and Strips on Two Lane Roads	\$	Short-Term	Ready
6	Sidewalks and Multi-Use Paths	\$\$	Mid-Term	● ●
7	Railroad Crossing Enhancements (Green Meadow Country Club Rd)	\$\$\$	Mid-Term	●

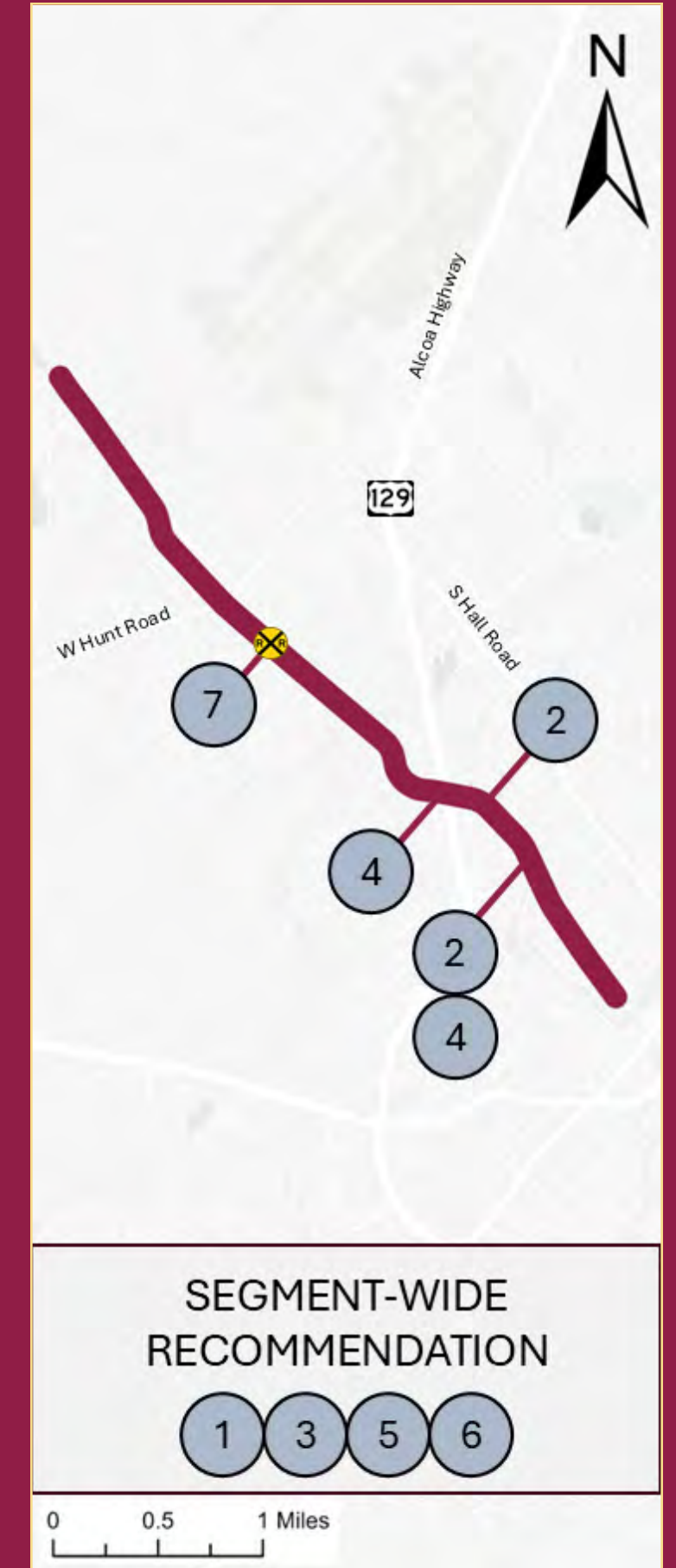
● FHWA Proven Safety Countermeasure
 ● Crash Modification Factors Countermeasure
 ● Vulnerable Road User Related Countermeasure
 ● Requires ROW Acquisition
 ● Requires Utility Relocation

Benefit Summary

- Proper access management at medians can prevent left-turn and head-on crashes by separating opposing traffic flows. Consolidating driveways can also facilitate better access management by controlling where vehicles can turn, thereby reducing unpredictable movements that can lead to crashes.
- Installing sidewalks and pedestrian infrastructure dramatically improves safety by reducing pedestrian crashes up to 88%, separating vulnerable users from traffic, and enhancing visibility and accessibility. These improvements also calm traffic, promote active transportation, and create safer, more livable communities.
- RPMs provide continuous lane guidance, which is particularly useful in navigating curves and complex intersections. The reflective properties of RPMs make them highly visible at night, reducing the risk of accidents by guiding drivers safely along the road.
- Properly-designed crossings—such as those with clear signage, warning lights, gates, and smooth road surfaces—significantly reduce the risk of collisions between trains, vehicles, and pedestrians. They enhance visibility and awareness for all users, helping drivers and walkers make safer decisions.



RECOMMENDED COUNTERMEASURES



SEGMENT-WIDE RECOMMENDATION

1 3 5 6

LOUISVILLE ROAD/CALDERWOOD STREET from Louisville Loop to Hannum Street / City Limits

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ALCOA HALL ROAD (SR-35)
SAFE STREETS from Alcoa Highway (US-129) to Parham Avenue / City Limits



Urban Other Principal Arterial (TDOT)

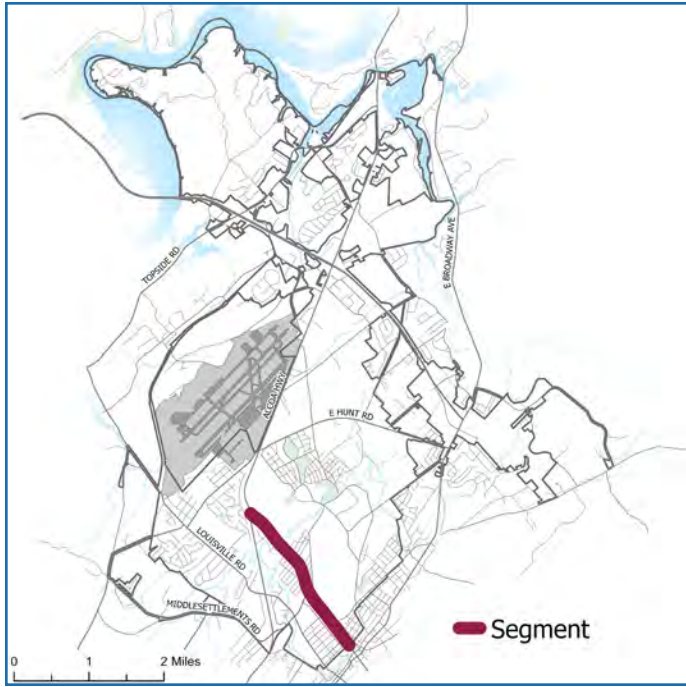
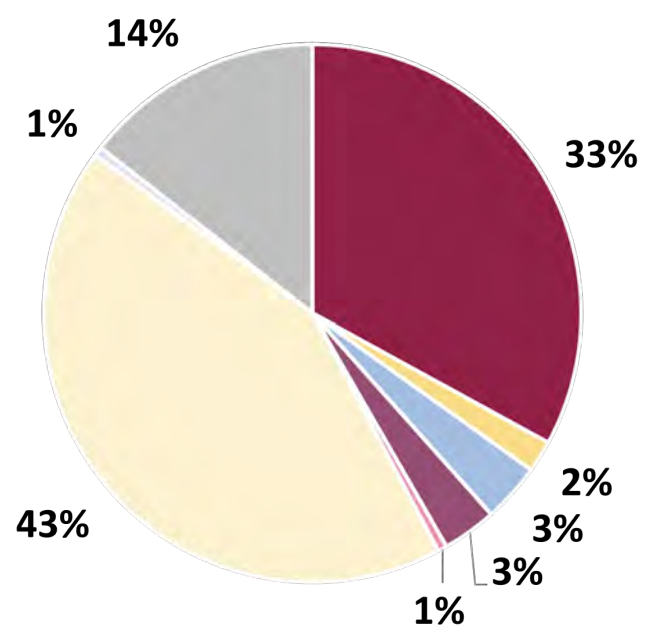
Speed Limit	35 mph
Lanes	4
Vehicles/Day	25,000
Total Crashes	372
HIN Intersections	3 ★

Characteristics
 Hall Road (SR-35) is a two-way roadway that works to connect Alcoa Highway (US-129) to the core Alcoa areas. This segment follows a largely straight alignment, with a minor reverse curve near the center. Sidewalks and pedestrian infrastructure can be found throughout this segment.

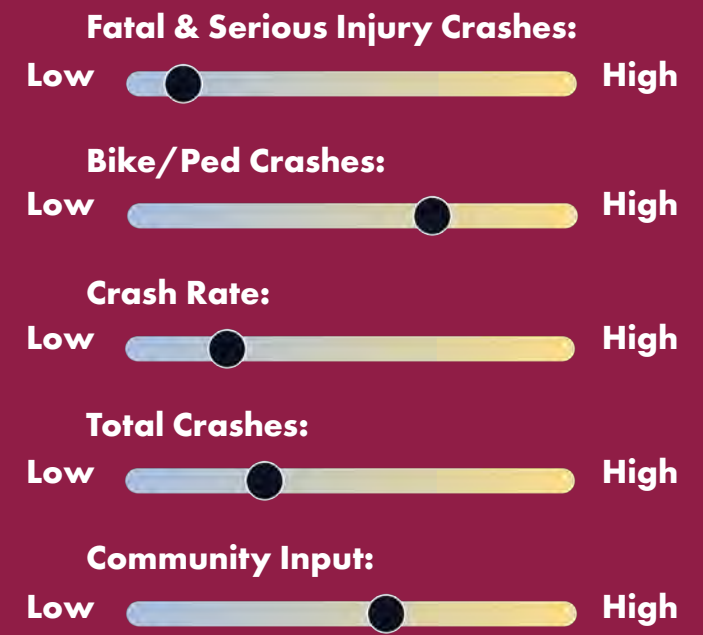


Along Hall Road (SR-35), Facing North, Just South of Kings Court

- Angle
- Head-On
- No Collision W/ Vehicle
- Other
- Pedestrian
- Rear-End
- Sideswipe, Opp Dir
- Sideswipe, Same Dir



OVERALL RANKING: 3
Ranking Index



Community Input

“ Access control for this section of Hall Road needs to be implemented. All of this was studied in 2024 and a full range of improvements recommended for Hall Road. Those need to be implemented. ”

“ The pedestrian crossing here is nearly useless. It needs to be upgraded to a full PHB. ”

“ There are too many cut throughs on Hall Road that impact traffic safety. Crossing three lanes of traffic to head the opposite direction is very unsafe. ”

HALL ROAD (SR-35)
 from Alcoa Highway (US-129) to Parham Avenue / City Limits

DISCLAIMER - 23 United States Code Section 407 - Discovery and admission as evidence of certain reports and surveys - Notwithstanding any other provision of law, reports, surveys, schedules, lists, or data compiled or collected for the purpose of identifying, evaluating, or planning the safety enhancement of potential accident sites, hazardous roadway conditions, or railway-highway crossings, pursuant to sections 130, 144, and 148 of this title or for the purpose of developing any highway safety construction improvement project which may be implemented utilizing Federal-aid highway funds 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.

ALCOA HALL ROAD (SR-35)

SAFE STREETS from Alcoa Highway (US-129) to Parham Avenue / City Limits

ID	Countermeasure	Cost	Schedule	Project Readiness
1	Conduct Intersection Control & Alignment Evaluation (Lindsay St)	\$	Short-Term	Ready
2	Corridor Access Management	\$\$\$\$	Long-Term	Ready
3	Crosswalk Visibility Enhancement (Howe St to Watt St and Lincoln Street)	\$\$	Short-Term	Ready
4	Flashing Yellow Arrows (FYAs) (Associates Blvd, Bessemer St, and Lincoln St)	\$\$	Mid-Term	Ready
5	Medians and Pedestrian Refuge Islands (Bessemer St and Lindsay St)	\$\$	Mid-Term	Ready
6	Eliminate Negative Off-sets at Intersections (Associates Blvd, Franklin St, Bell St, Bessemer St)	\$\$\$	Mid-Term	Ready
7	Smart Channel Right-Turn Lane (Bessemer St)	\$\$\$	Long-Term	●

● FHWA Proven Safety Countermeasure

● Crash Modification Factors Countermeasure

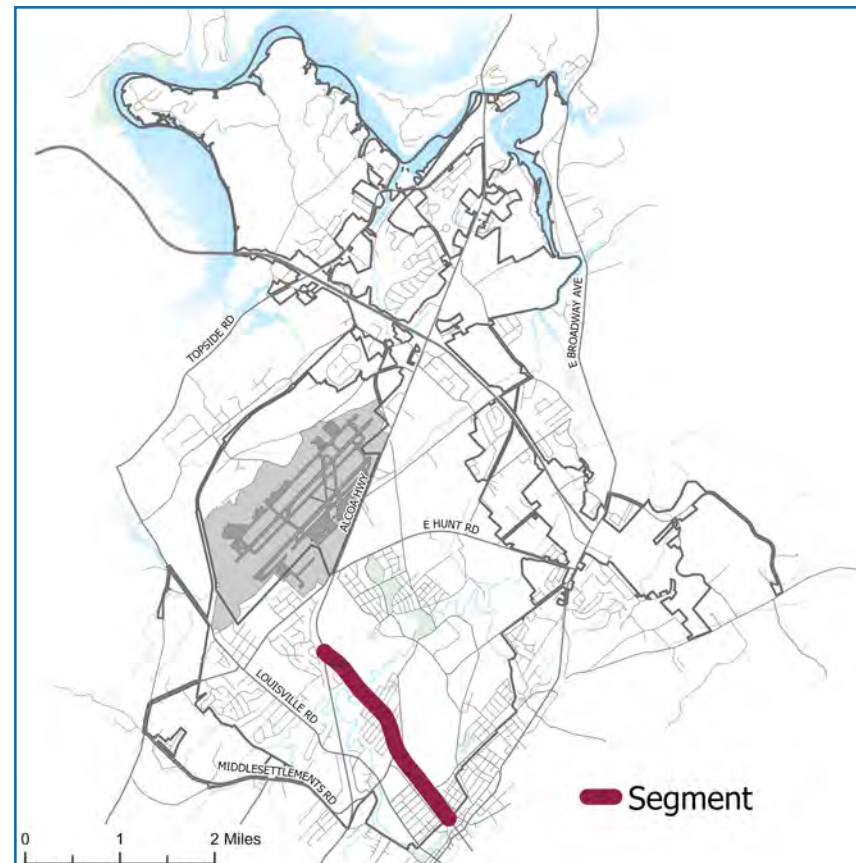
● Vulnerable Road User Related Countermeasure

● Requires ROW Acquisition

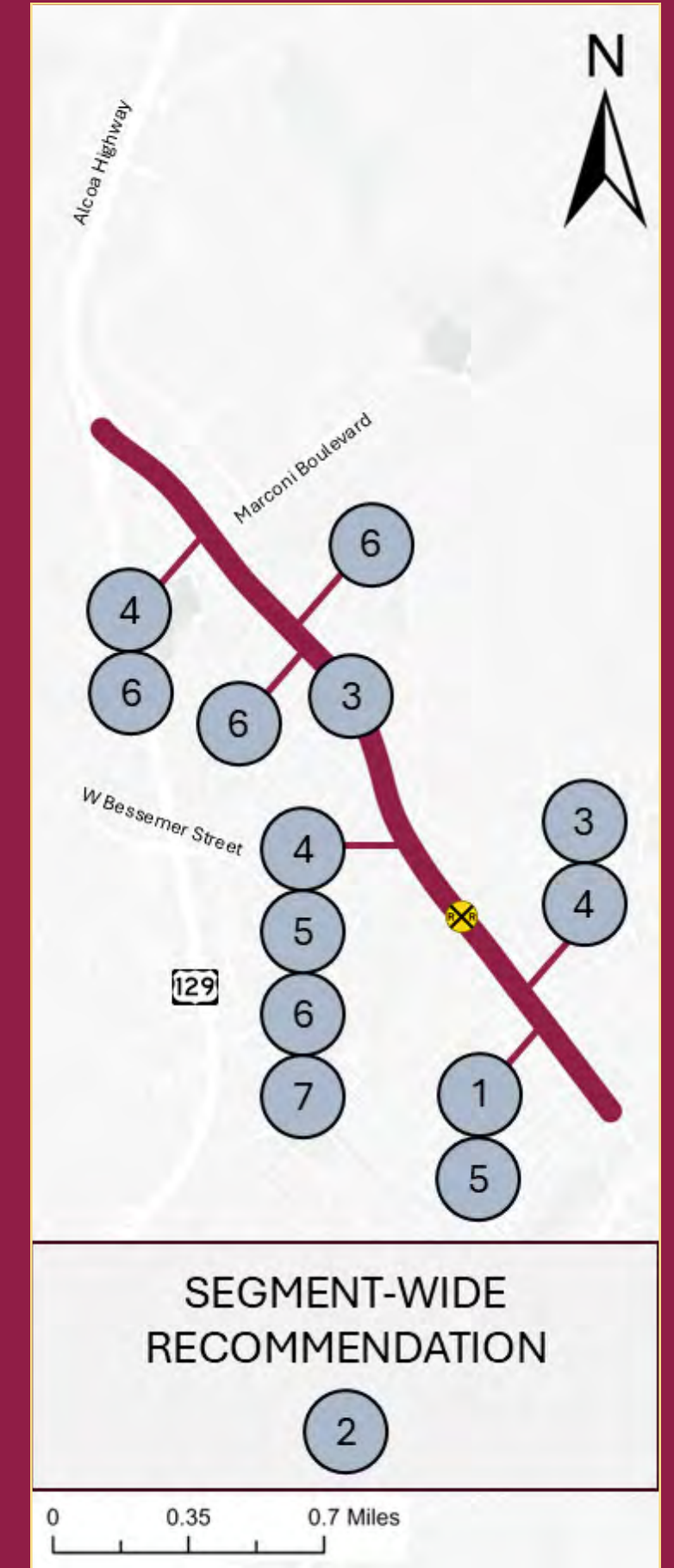
● Requires Utility Relocation

Benefit Summary

- Proper access management at medians can prevent left-turn and head-on crashes by separating opposing traffic flows. Consolidating driveways can also facilitate better access management by controlling where vehicles can turn, thereby reducing unpredictable movements that can lead to crashes.
- By promoting slower turning speeds and better visibility, "smart channel" right turns help reduce the likelihood of collisions at intersections.
- Clearly marked crosswalks, high-visibility striping, adequate lighting, and advance warning signs help drivers recognize pedestrian crossing areas sooner, reducing the risk of crashes. Accessible features such as curb ramps, tactile warning surfaces, audible signals, and sufficient crossing times ensure that people of all abilities are able to cross streets safely and independently.
- Shorter crosswalks minimize the time pedestrians spend in the roadway, thereby reducing the exposure to potential vehicle conflicts. Pedestrian refuge islands provide a safe space for pedestrians to wait if they are unable to cross the entire street in one traffic signal cycle or during heavy traffic.



RECOMMENDED COUNTERMEASURES



SEGMENT-WIDE RECOMMENDATION

2

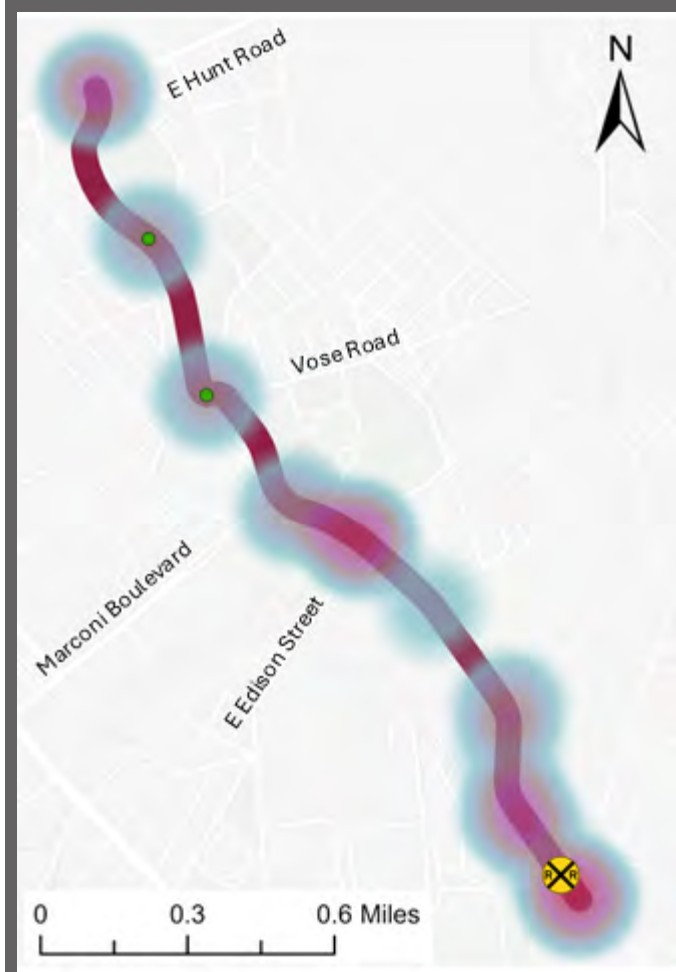
HALL ROAD (SR-35)
from Alcoa Highway (US-129) to Parham Avenue / City Limits

ALCOA **SPRINGBROOK ROAD**
SAFE STREETS from Hunt Road to N Wright Road

Urban Minor Arterial (Alcoa, TN)

Speed Limit	30 mph
Lanes	2
Vehicles/Day	1,500
Total Crashes	25
HIN Intersections	0 ★

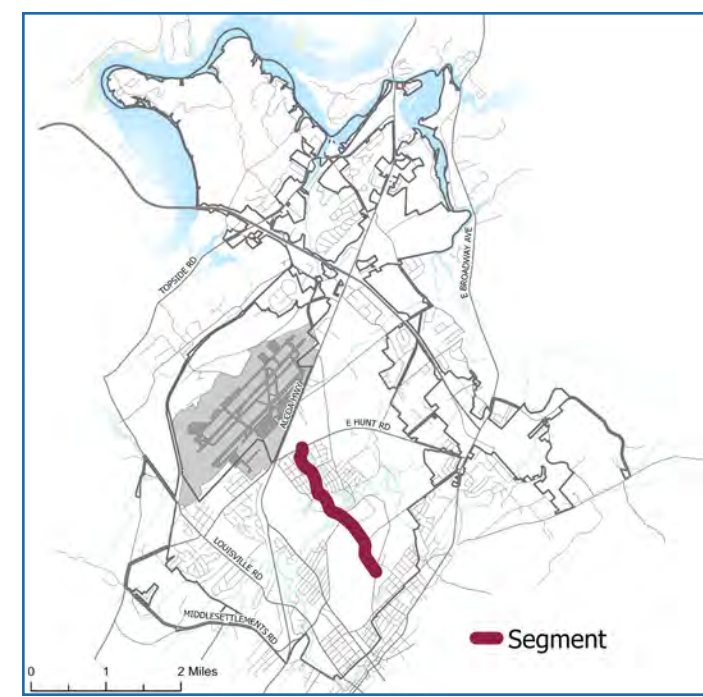
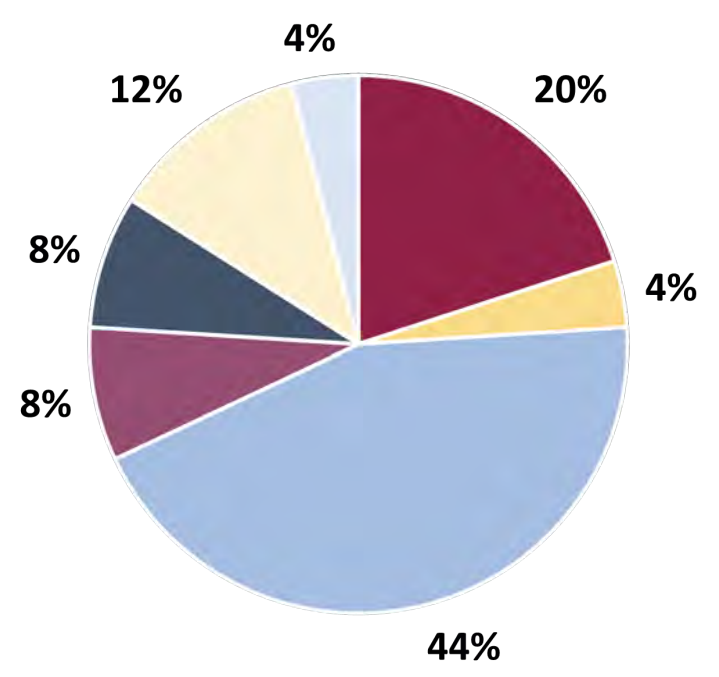
Characteristics
 Springbrook Road is a two-way roadway throughout residential areas of Alcoa. This segment follows a curved alignment over rolling terrain. Alcoa Elementary and Intermediate Schools are settled along this segment, with a high presence of sidewalks and multi-use paths.



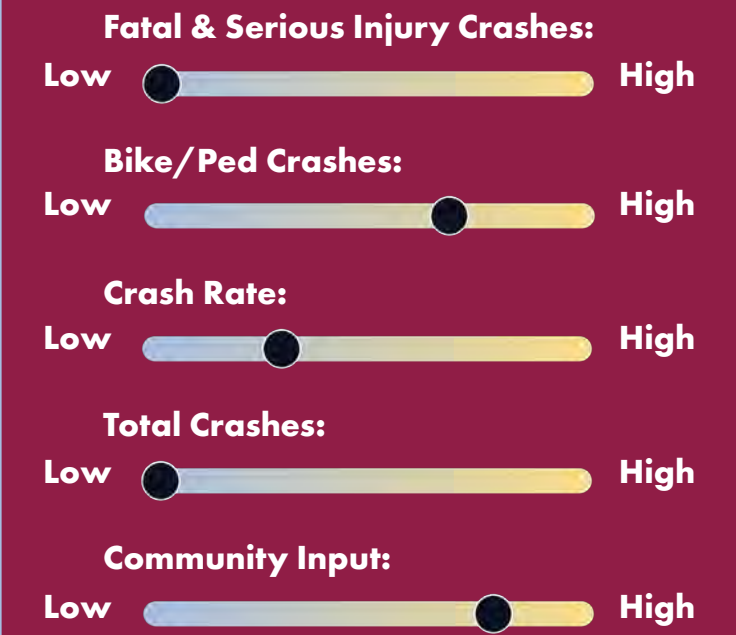
Along Springbrook Road, Facing South, Just South of Alcoa Road

● VRU (2) ● Serious Injury (0) ● Fatal (0)

- Angle
- Head-On
- No Collision W/ Vehicle
- Other
- Pedalcycle
- Rear-End
- Sideswipe, Opp Dir



OVERALL RANKING: 5
Ranking Index



Community Input

“ Should continue the sidewalks around the schools. ”

“ I call this area "malfunction junction" because it's confusing about who has the right of way. During school rush hours, it would be very helpful to have additional guidance. ”

“ Speeding down Springbrook Road. Students, parents, general public speeding on the way to school and rec center. ”

SPRINGBROOK ROAD
 from Hunt Road to N Wright Road

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ALCOA SPRINGBROOK ROAD

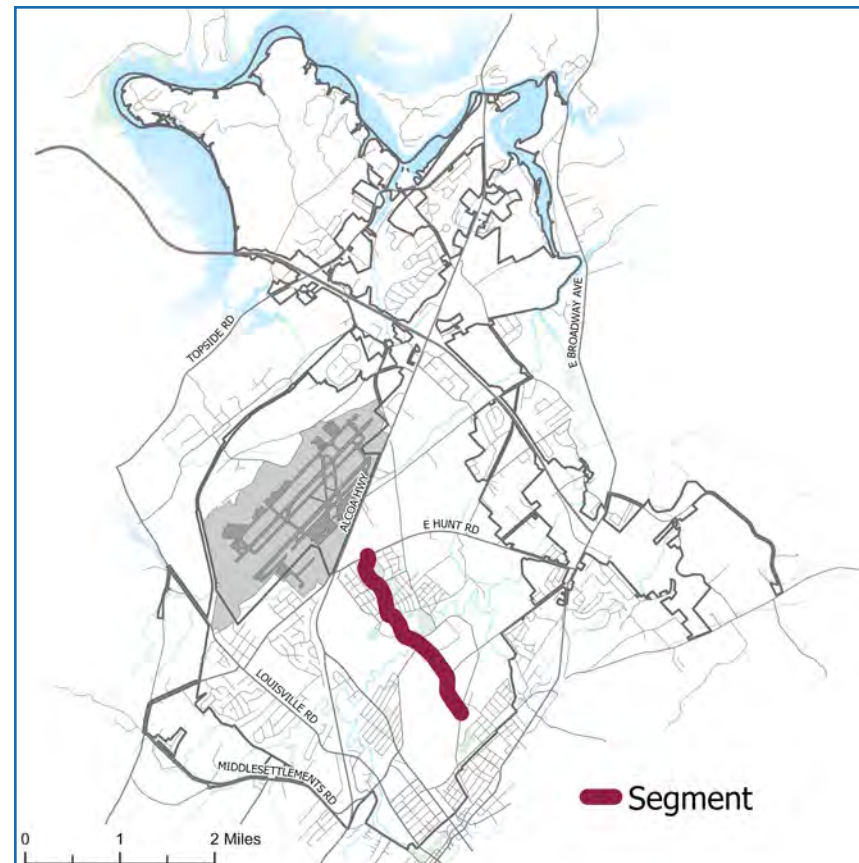
SAFE STREETS from Hunt Road to N Wright Road

ID	Countermeasure	Cost	Schedule	Project Readiness
1	Sidewalks and Multi-Use Path	\$\$	Mid-Term	●
2	Crosswalk Visibility Enhancement (N Wright Rd and Alcoa Rd)	\$\$	Short-Term	Ready
3	Enhanced Delineation for Horizontal Curves	\$	Short-Term	Ready
4	Evaluate Proper Approach Laneage (Faraday St)	\$	Short-Term	Ready
5	Traffic Calming (Corridor-Wide Speed Management)	\$\$	Mid-Term	Ready

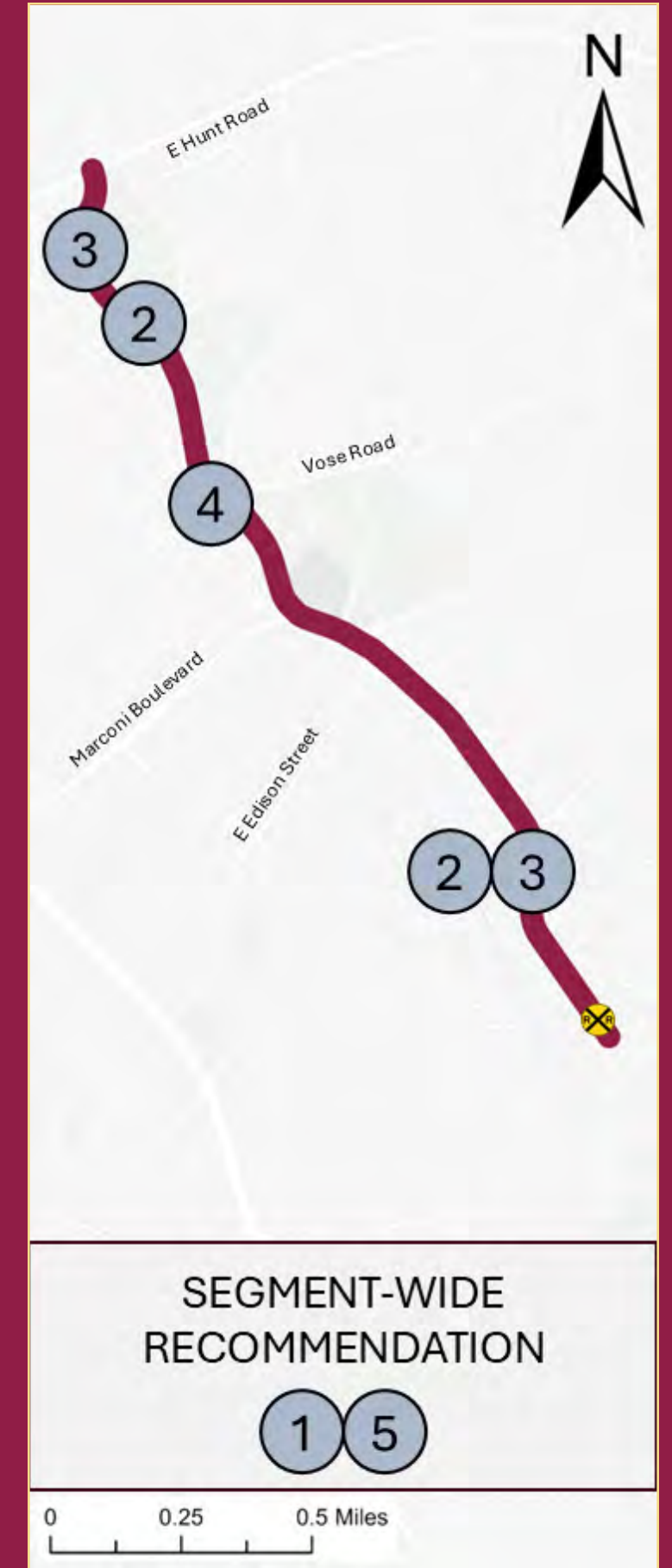
- FHWA Proven Safety Countermeasure
- Crash Modification Factors Countermeasure
- Vulnerable Road User Related Countermeasure
- Requires ROW Acquisition
- Requires Utility Relocation

Benefit Summary

- Installing sidewalks and pedestrian infrastructure dramatically improves safety by reducing pedestrian crashes up to 88%, separating vulnerable users from traffic, and enhancing visibility and accessibility. These improvements also calm traffic, promote active transportation, and create safer, more livable communities.
- Enhanced delineation provides enhanced guidance along curves by increasing driver awareness of the roadway alignment and potential risks of roadway departure.
- Clearly marked crosswalks, high-visibility striping, adequate lighting, and advance warning signs help drivers recognize pedestrian crossing areas sooner, reducing the risk of crashes. Accessible features such as curb ramps, tactile warning surfaces, audible signals, and sufficient crossing times ensure that people of all abilities are able to cross streets safely and independently.
- Realigning skewed intersections improves safety by creating near-perpendicular approaches, which enhance driver sightlines and simplify decision-making. This reduces complex turning movements, lowers vehicle speed variability, and minimizes conflict points—especially for left turns and large vehicles—leading to fewer severe crashes.

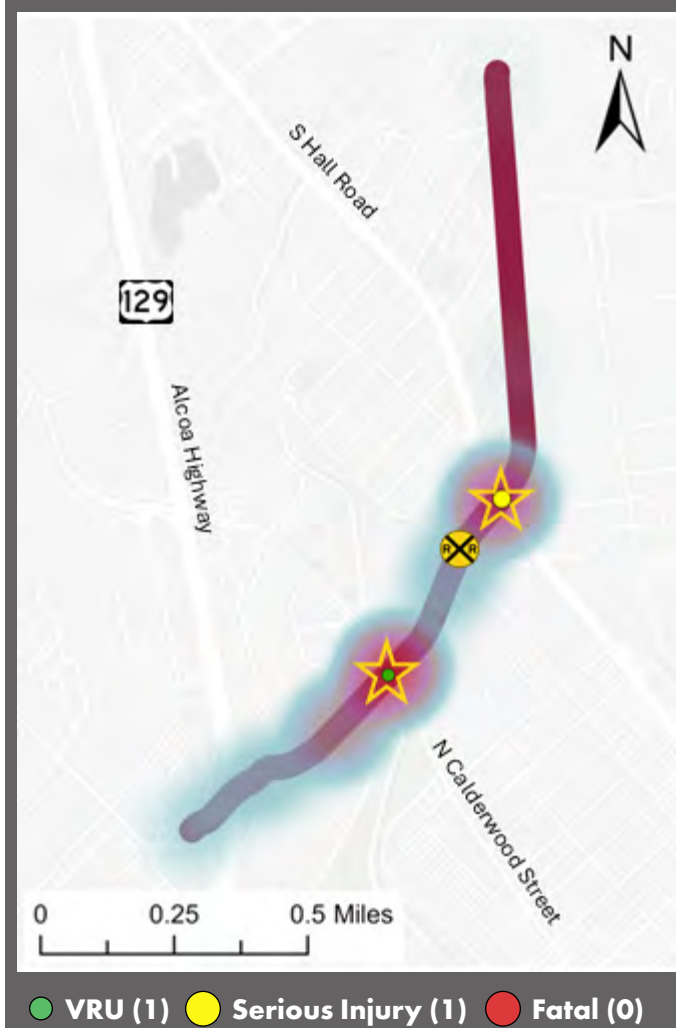


RECOMMENDED COUNTERMEASURES



SPRINGBROOK ROAD from Hunt Road to N Wright Road

ALCOA BESSEMER STREET
SAFE STREETS from Middlesettments Road / US-129 DDI to E Edison Street



Urban Minor Arterial (Alcoa, TN)

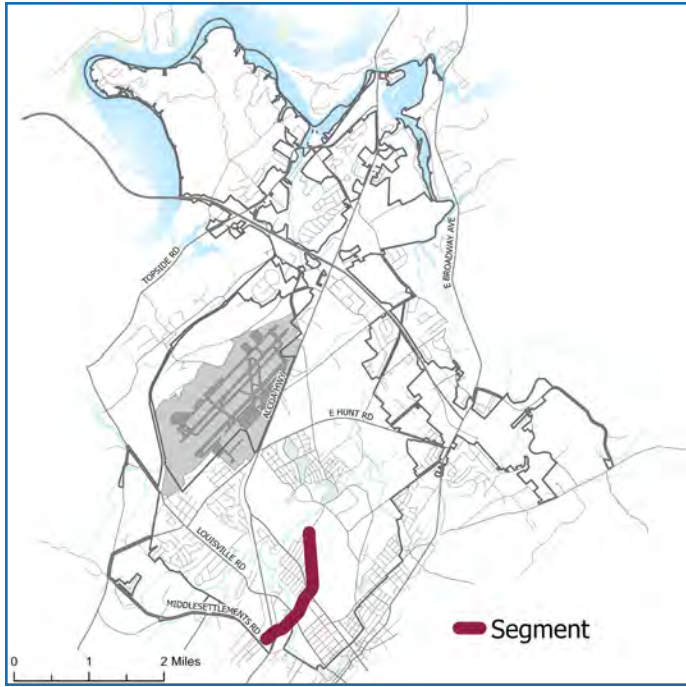
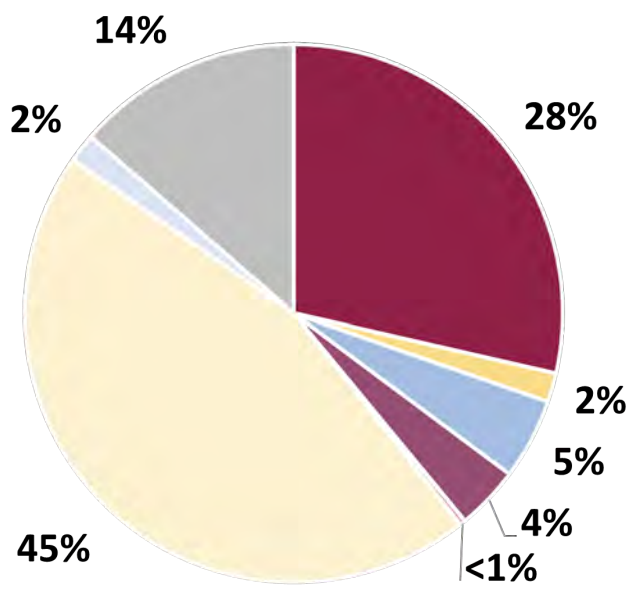
Speed Limit	35 mph
Lanes	2/4
Vehicles/Day	15,000
Total Crashes	289
HIN Intersections	2 ★

Characteristics
 Bessemer Street is a two-way roadway that travels between commercial and residential areas of Alcoa. The segment follows a largely straight alignment, with a large curve near the center. The Arconic property is settled along the northern end of the segment, providing access to a majority of employees and shipments

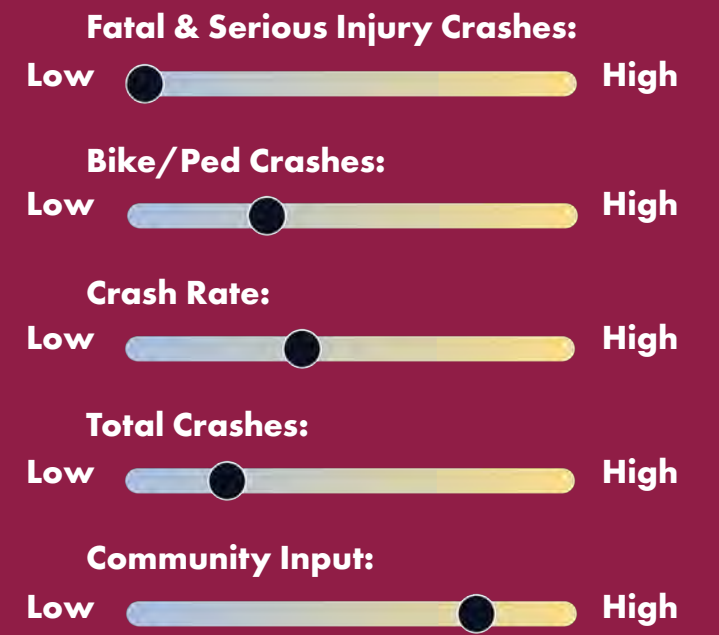


Along Bessemer Street, Facing North, Just South of N Rankin Street

- Angle
- Head-On
- No Collision W/ Vehicle
- Other
- Pedestrian
- Rear-End
- Sideswipe, Opp Dir
- Sideswipe, Same Dir



OVERALL RANKING: 6
Ranking Index



Community Input

“ W Bessemer St needs to be Redone for all the traffic that presently using it to get on Hall Rd and Alcoa Hwy. Needs more lanes. ”

“ Rankin and W Bessemer needs a round-a-bout. Very dangerous intersection when trying to pull onto W. Bessemer ”

“ Speed bumps need to be added as drivers from Bessemer will cut through volta to try and beat the red light. Drivers have hit the stop signs several times in the last few years. ”

BESSEMER STREET
 from Middlesettments Road / US-129 DDI to E Edison Street

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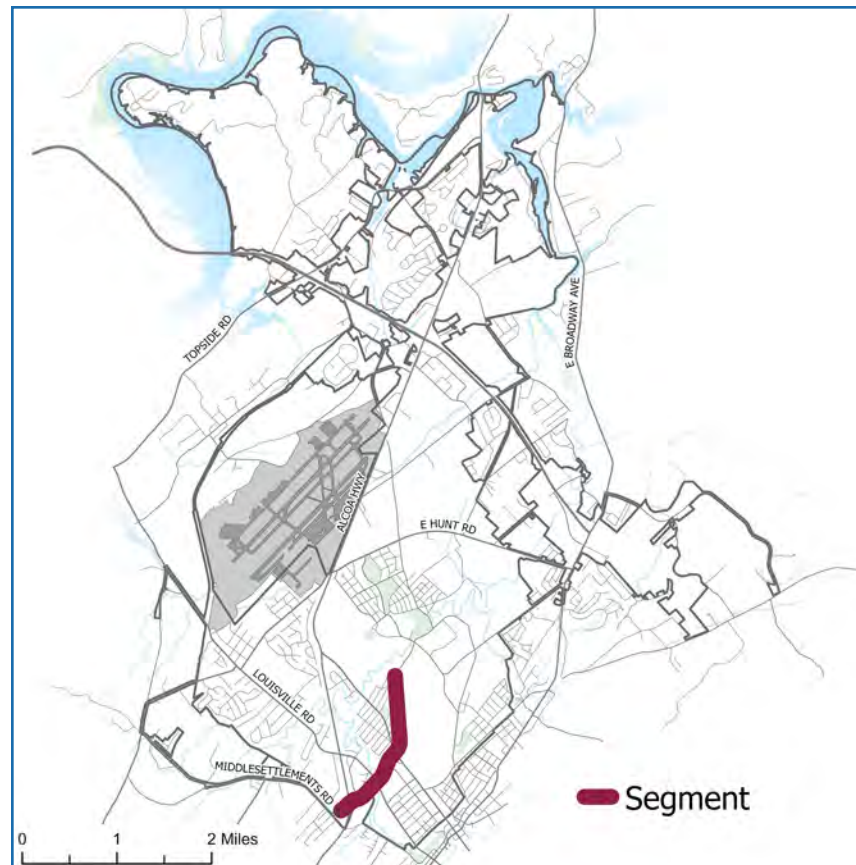
ALCOA BESSEMER STREET
SAFE STREETS from Middle settlements Road / US-129 DDI to E Edison Street

ID	Countermeasure	Cost	Schedule	Project Readiness
1	Conduct Intersection Control & Alignment Evaluation (E Edison St and N Rankin Rd)	\$	Short-Term	Ready
2	Retroreflective Pavement Markers	\$	Short-Term	Ready
3	Longitudinal Rumble Strips and Stripes on Two Lane Roads	\$	Short-Term	Ready
4	Medians and Pedestrian Refuge Islands	\$\$	Mid-Term	Ready
5	Eliminate Negative Off-sets at Intersections	\$\$\$	Mid-Term	Ready
6	Smart Channel Right-Turn Lane	\$\$\$	Long-Term	●
7	Widen Shoulders	\$\$\$	Mid-Term	●
8	Traffic Calming (Corridor-Wide Speed Management)	\$\$	Mid-Term	Ready
9	Flashing Yellow Arrows (FYAs)	\$\$	Mid-Term	Ready

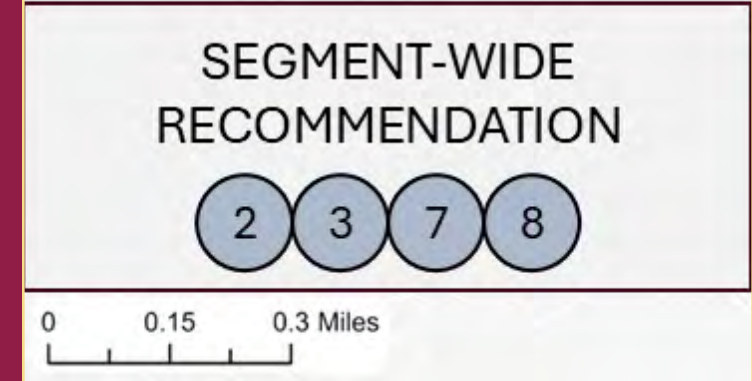
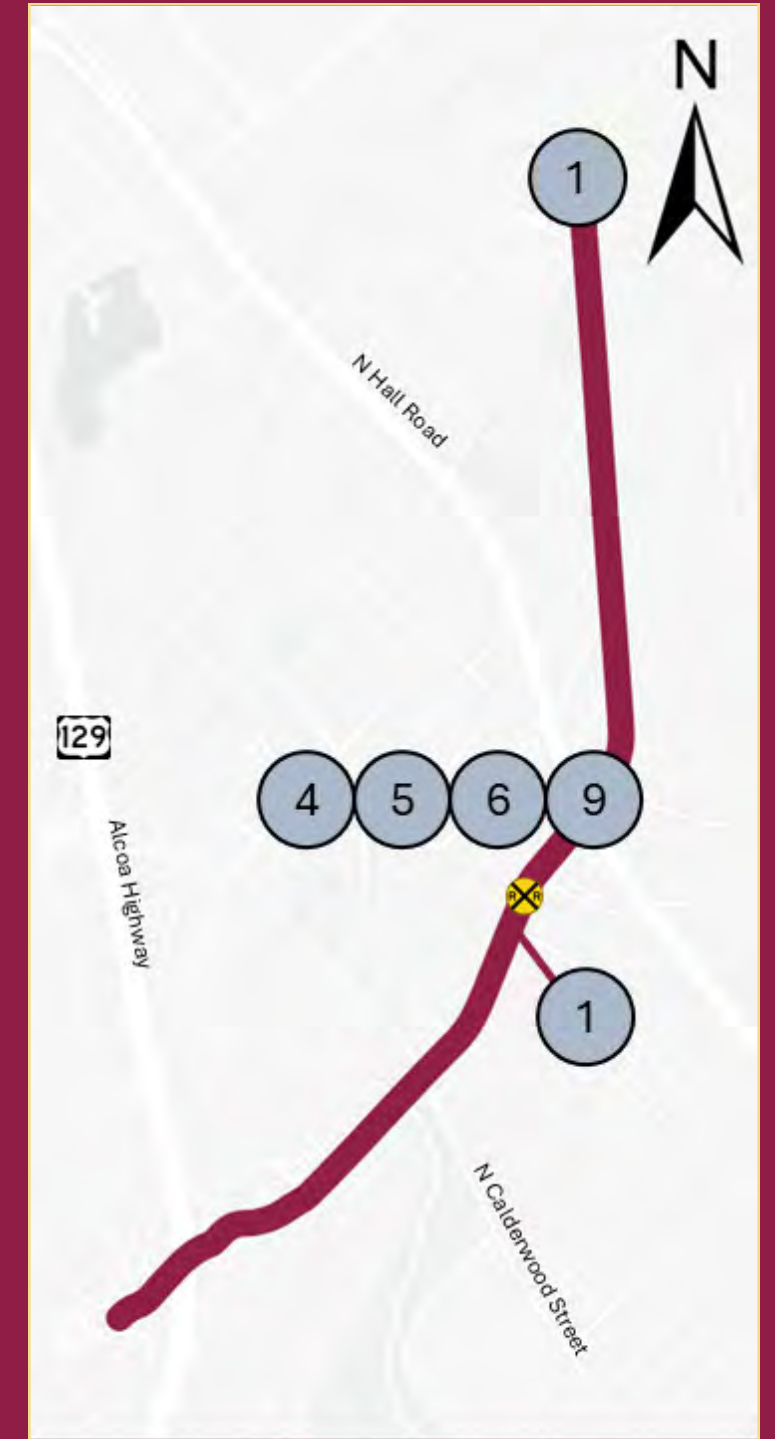
- FHWA Proven Safety Countermeasure
- Crash Modification Factors Countermeasure
- Vulnerable Road User Related Countermeasure
- Requires ROW Acquisition
- Requires Utility Relocation

Benefit Summary

- By promoting slower turning speeds and better visibility, “smart channel” right turns help reduce the likelihood of collisions at intersections.
- Shorter crosswalks minimize the time pedestrians spend in the roadway, thereby reducing the exposure to potential vehicle conflicts. Pedestrian refuge islands provide a safe space for pedestrians to wait if they are unable to cross the entire street in one traffic signal cycle or during heavy traffic.
- Shorter crosswalks minimize the time pedestrians spend in the roadway, thereby reducing the exposure to potential vehicle conflicts. Pedestrian refuge islands provide a safe space for pedestrians to wait if they are unable to cross the entire street in one traffic signal cycle or during heavy traffic.
- Rumble striping along edge/ centerlines provide tactile and auditory feedback to drivers when their vehicle strays from the lane, helping to reduce the risk for roadway departure crashes and head-on collisions.
- Wider shoulders provide additional space for vehicles to maneuver, reducing the likelihood of head-on, sideswipe, and fixed-object crashes.



RECOMMENDED COUNTERMEASURES



BESSEMER STREET
 from Middle settlements Road / US-129 DDI to E Edison Street

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ALCOA N WRIGHT ROAD
SAFE STREETS from Alcoa Highway (US-129) to E Lincoln Road



Urban Minor Collector (Alcoa, TN)

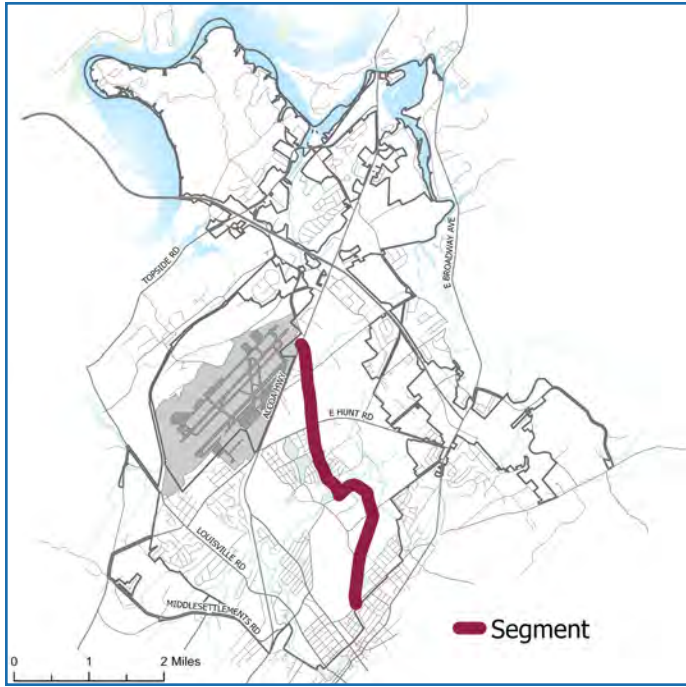
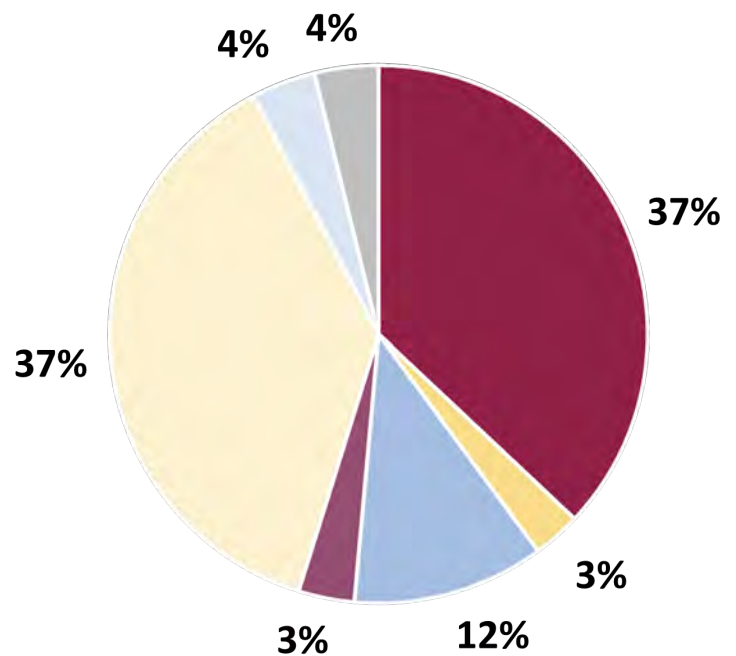
Speed Limit	30 mph
Lanes	2
Vehicles/Day	4,000
Total Crashes	208
HIN Intersections	1 ★

Characteristics
 N Wright Road is a two-way roadway through largely residential areas of Alcoa. The center of the segment experiences a large curve, with the ends of the segment exhibiting mainly straight alignment. Sidewalks and multi-use paths can be found near the center and northern end of the segment.

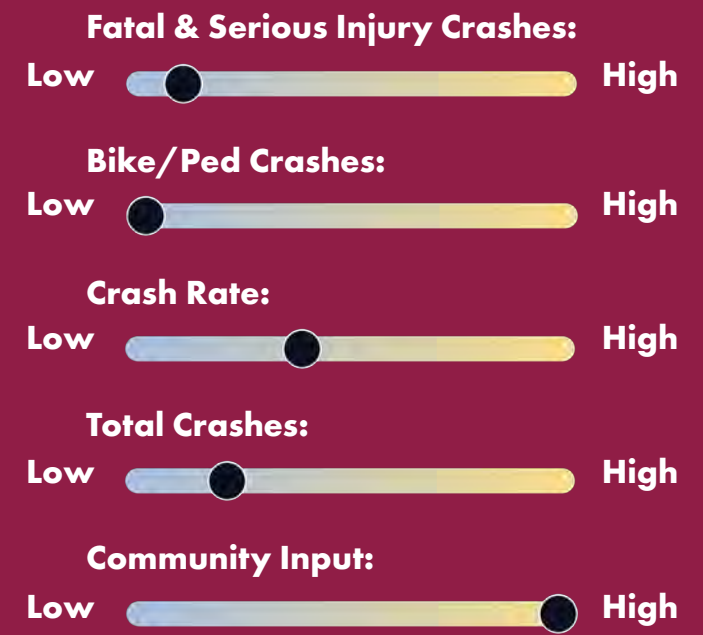


Along N Wright Road, Facing North, Just South of E Hunt Road (SR-335)

- Angle
- Head-On
- No Collision W/ Vehicle
- Other
- Rear-End
- Sideswipe, Opp Dir
- Sideswipe, Same Dir



OVERALL RANKING: 7
Ranking Index



Community Input

“ N Wright Rd at Alcoa Highway is a terrible intersection - traffic lights on Alcoa Highway would have saved millions of dollars. ”

“ Have sidewalk all the way along N. Wright Rd to be able to get from Springbrook to the Hunt Rd Greenway without having to walk dogs and children in the road on N. Wright Rd. ”

N WRIGHT ROAD
 from Alcoa Highway (US-129) to E Lincoln Road

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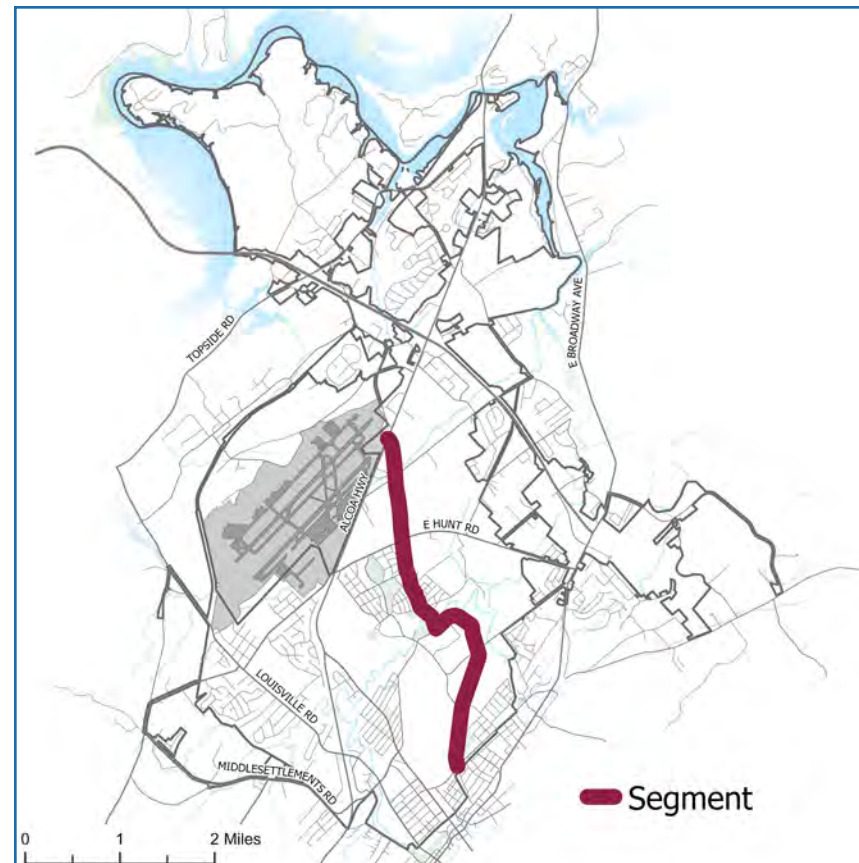
ALCOA N WRIGHT ROAD
SAFE STREETS from Alcoa Highway (US-129) to E Lincoln Road

ID	Countermeasure	Cost	Schedule	Project Readiness
1	Conduct Intersection Control & Alignment Evaluation (Alcoa Hwy and Faraday St)	\$	Short-Term	Ready
2	Crosswalk Visibility Enhancement (Marconi Blvd and Springbrook Rd)	\$\$	Short-Term	Ready
3	Retroreflective Pavement Markers	\$	Short-Term	Ready
4	Flashing Yellow Arrows (FYAs) (E Hunt Rd)	\$\$	Mid-Term	Ready
5	Longitudinal Rumble Strips and Stripes on Two Lane Roads	\$	Short-Term	Ready
6	Retroreflective Backplates (E Hunt Rd)	\$	Short-Term	Ready
7	Widen Shoulders	\$\$\$	Mid-Term	●
8	Sidewalks and Multi-Use Path	\$\$	Mid-Term	● ●

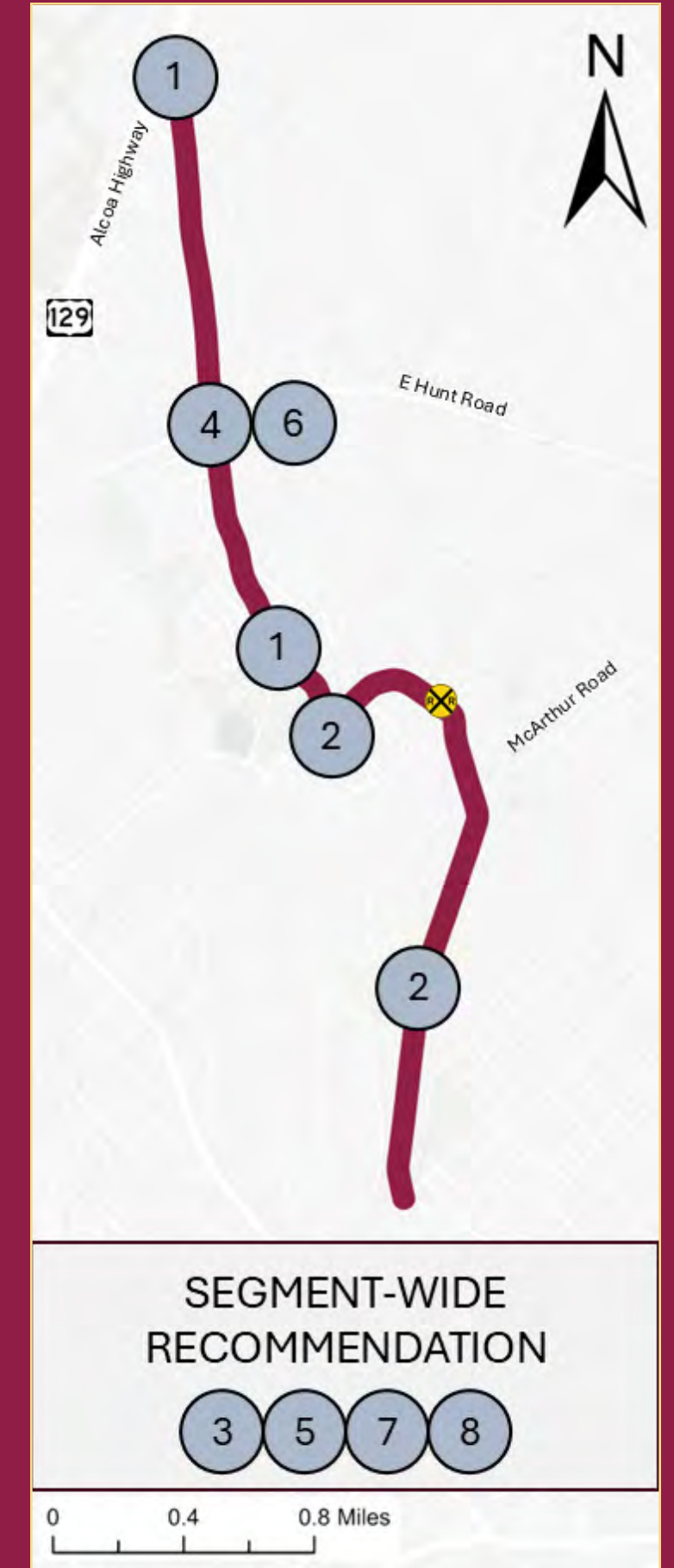
FHWA Proven Safety Countermeasure
 Crash Modification Factors Countermeasure
 Vulnerable Road User Related Countermeasure
 Requires ROW Acquisition
 Requires Utility Relocation

Benefit Summary

- **FYAs significantly reduce the number of left-turn crashes by providing a more distinct indication that drivers are required to yield during the permissive phase.**
- **Clearly marked crosswalks, high-visibility striping, adequate lighting, and advance warning signs help drivers recognize pedestrian crossing areas sooner, reducing the risk of crashes. Accessible features such as curb ramps, tactile warning surfaces, audible signals, and sufficient crossing times ensure that people of all abilities are able to cross streets safely and independently.**
- **Evaluating alternate intersection control or geometry ensures safer, more efficient designs by reducing severe crashes, improving pedestrian safety, and calming traffic.**
- **Rumble striping along edge/ centerlines provide tactile and auditory feedback to drivers when their vehicle strays from the lane, helping to reduce the risk for roadway departure crashes and head-on collisions.**
- **Backplates with retroreflective borders increase the conspicuity of traffic signal heads, especially under low-light conditions. They also help drivers quickly and easily identify traffic signals in the presence of visual clutter. This enhanced visibility and recognition can lead to a reduction in rearend and angle crashes at signalized intersections.**



RECOMMENDED COUNTERMEASURES



N WRIGHT ROAD from Alcoa Highway (US-129) to E Lincoln Road

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ALCOA E BROADWAY AVENUE (SR-33)
SAFE STREETS from Old Knoxville Pike to Sam Houston School Road



Urban Minor Arterial (TDOT)

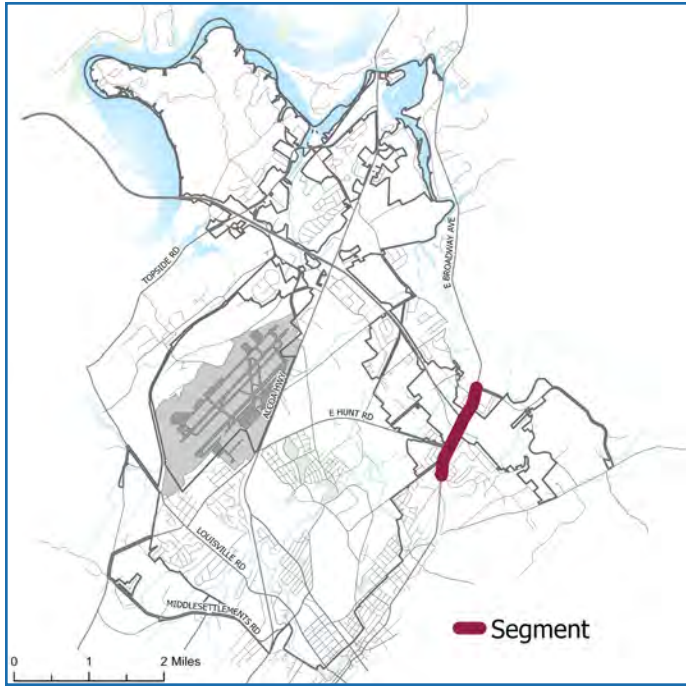
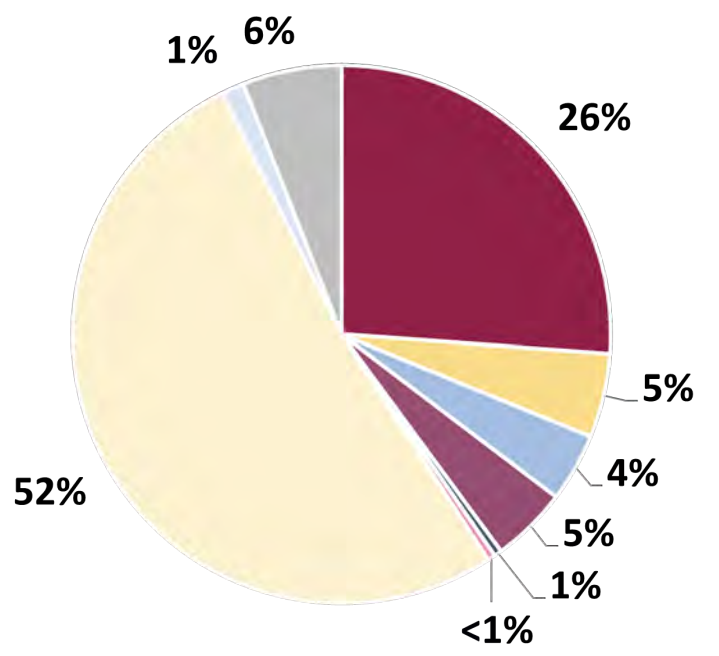
Speed Limit	40 mph
Lanes	2
Vehicles/Day	14,000
Total Crashes	231
HIN Intersections	0 ★

Characteristics
 E Broadway Avenue (SR-33) is a two-way roadway that connects the eastern end of Alcoa. This two-lane roadway follows a largely straight alignment over rolling terrain. Sidewalks can be found along the center of the segment, where there is more commercial demand and infrastructure.

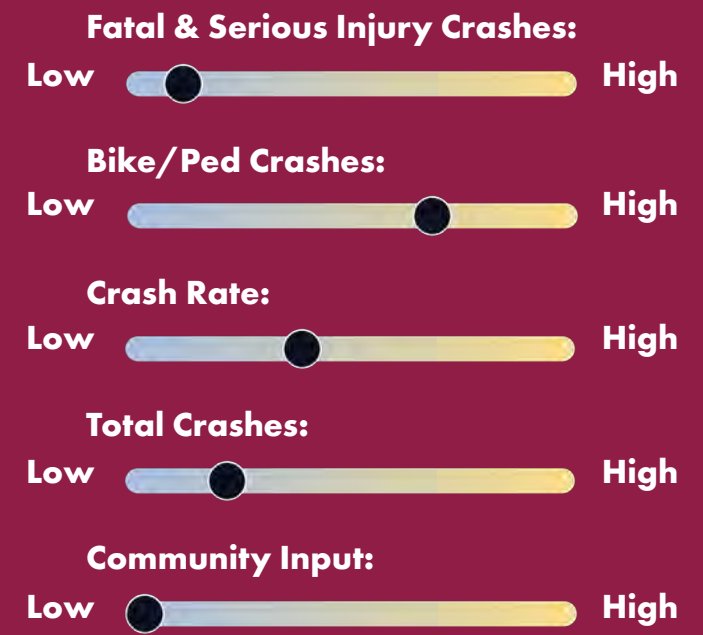


Along E Broadway Avenue (SR-33), Facing East, Just East of George Drive

- Angle
- Head-On
- No Collision W/ Vehicle
- Other
- Pedalcycle
- Pedestrian
- Rear-End
- Sideswipe, Opp Dir
- Sideswipe, Same Dir



OVERALL RANKING: 8
Ranking Index



Community Input

“ No location-specific public comments were received along this corridor during the public engagement phase of this SAP process. ”

E BROADWAY AVENUE (SR-33)
 from Old Knoxville Pike to Sam Houston School Road

DISCLAIMER - 23 United States Code Section 407 - Discovery and admission as evidence of certain reports and surveys - Notwithstanding any other provision of law, reports, surveys, schedules, lists, or data compiled or collected for the purpose of identifying, evaluating, or planning the safety enhancement of potential accident sites, hazardous roadway conditions, or railway-highway crossings, pursuant to sections 130, 144, and 148 of this title or for the purpose of developing any highway safety construction improvement project which may be implemented utilizing Federal-aid highway funds 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.

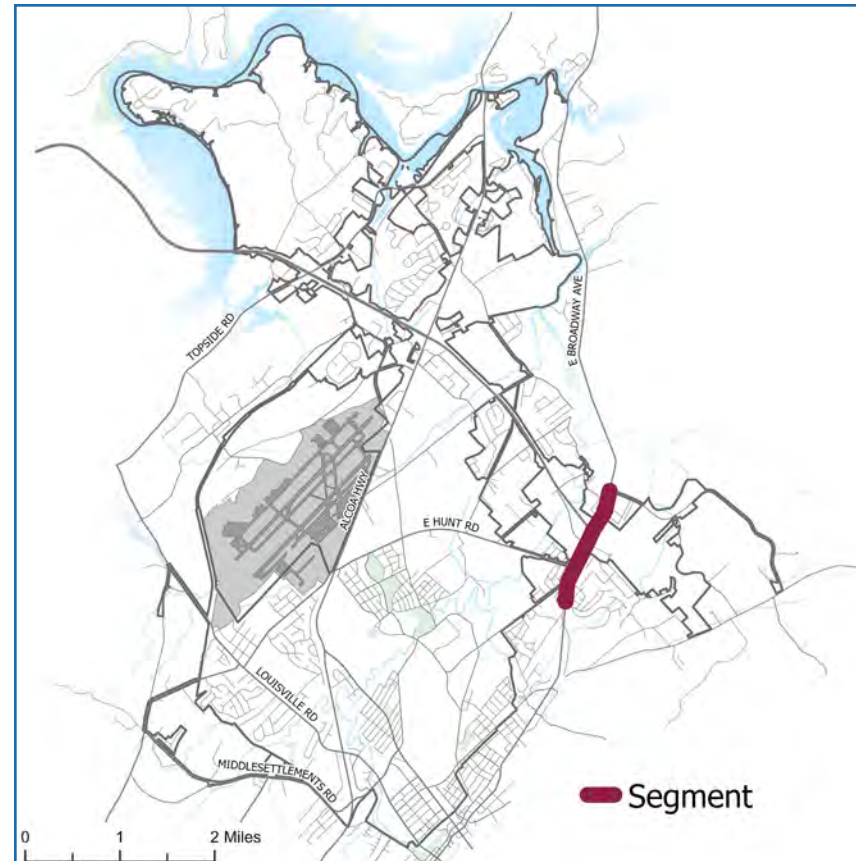
ALCOA E BROADWAY AVENUE (SR-33)
SAFE STREETS from Old Knoxville Pike to Sam Houston School Road

ID	Countermeasure	Cost	Schedule	Project Readiness
1	Corridor Access Management	\$\$\$\$	Long-Term	Ready
2	Crosswalk Visibility Enhancement	\$\$	Short-Term	Ready
3	Flashing Yellow Arrows (FYAs)	\$\$	Mid-Term	Ready

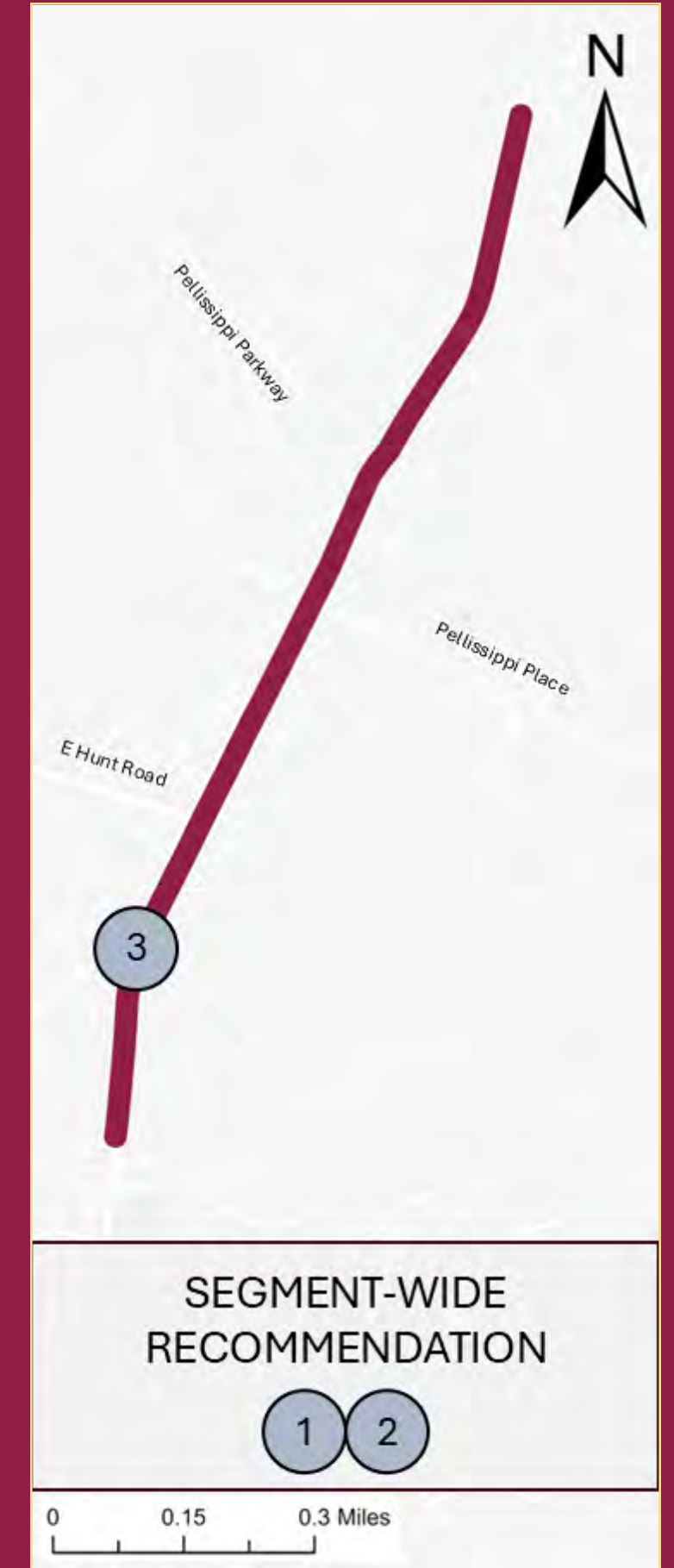
- FHWA Proven Safety Countermeasure
- Crash Modification Factors Countermeasure
- Vulnerable Road User Related Countermeasure
- Requires ROW Acquisition
- Requires Utility Relocation

Benefit Summary

- FYAs significantly reduce the number of left-turn crashes by providing a more distinct indication that drivers are required to yield during the permissive phase.
- Clearly marked crosswalks, high-visibility striping, adequate lighting, and advance warning signs help drivers recognize pedestrian crossing areas sooner, reducing the risk of crashes. Accessible features such as curb ramps, tactile warning surfaces, audible signals, and sufficient crossing times ensure that people of all abilities are able to cross streets safely and independently.
- Proper access management at medians can prevent left-turn and head-on crashes by separating opposing traffic flows. Consolidating driveways can also facilitate better access management by controlling where vehicles can turn, thereby reducing unpredictable movements that can lead to crashes.



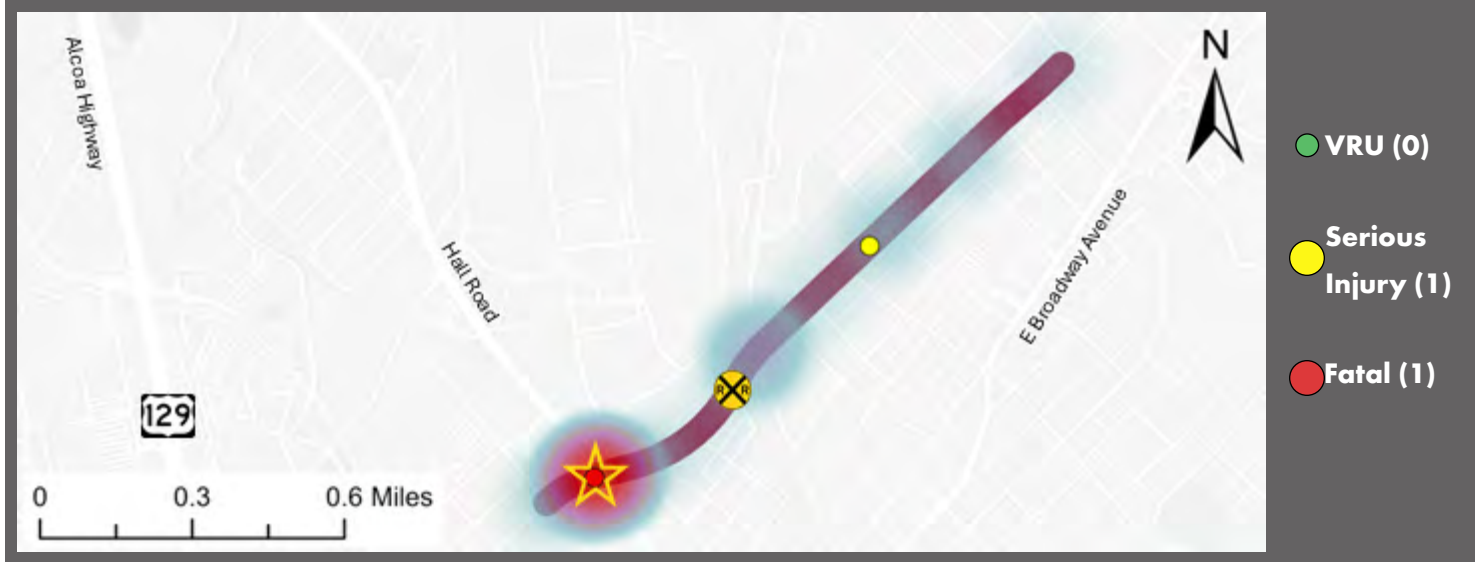
RECOMMENDED COUNTERMEASURES



E BROADWAY AVENUE (SR-33) from Old Knoxville Pike to Sam Houston School Road

DISCLAIMER - 23 United States Code Section 407 - Discovery and admission as evidence of certain reports and surveys - Notwithstanding any other provision of law, reports, surveys, schedules, lists, or data compiled or collected for the purpose of identifying, evaluating, or planning the safety enhancement of potential accident sites, hazardous roadway conditions, or railway-highway crossings, pursuant to sections 130, 144, and 148 of this title or for the purpose of developing any highway safety construction improvement project which may be implemented utilizing federal-aid highway funds 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.

ALCOA LINCOLN ROAD
SAFE STREETS from Rankin Road to 8th Street



Urban Major Collector (Alcoa, TN)	
Speed Limit	30 mph
Lanes	2
Vehicles/Day	7,000
Total Crashes	154
HIN Intersections	1 ★

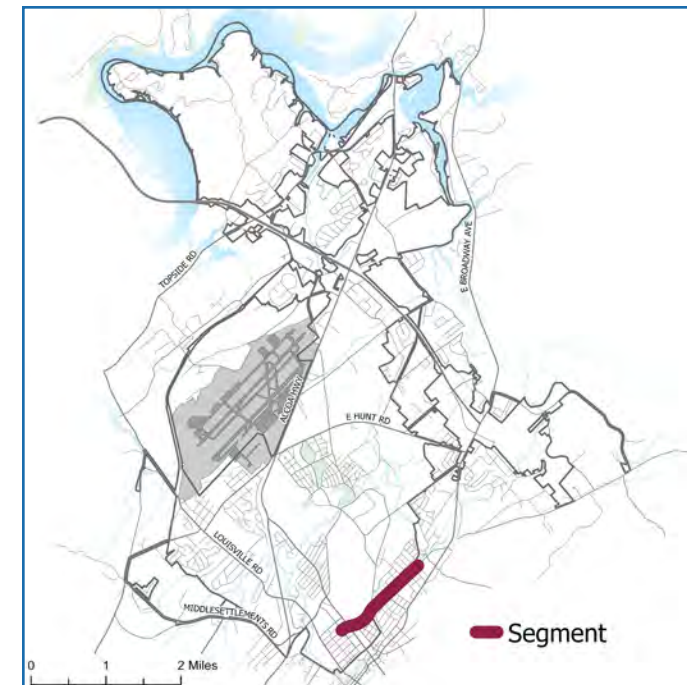
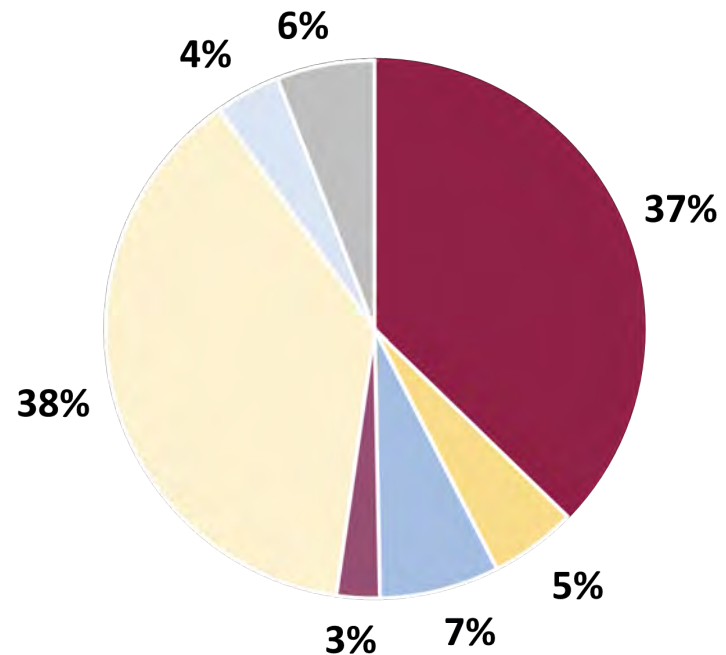
Characteristics

Lincoln Road is a two-way roadway through mainly residential areas of Alcoa. This segment follows a largely straight alignment, over lightly rolling terrain. Sidewalks and other pedestrian infrastructure can be found along the western end of the corridor.

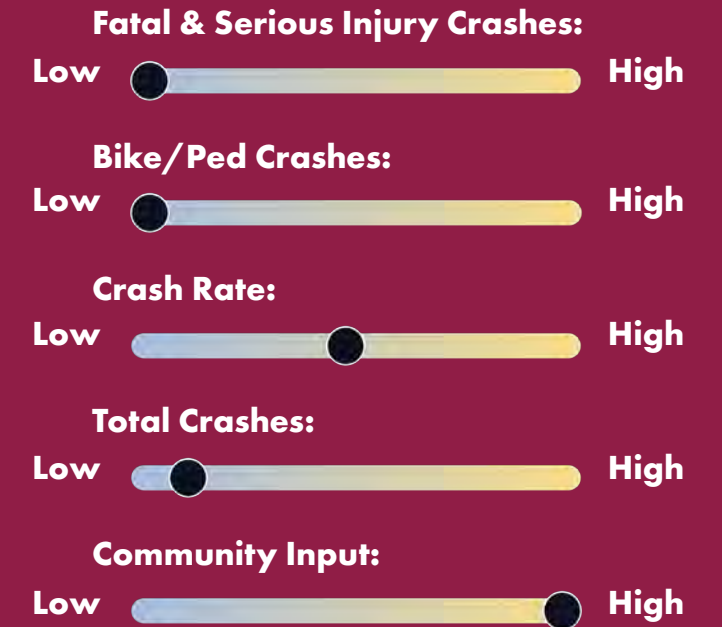


Along Lincoln Road, Facing East, Just East of McGinley Street

- Angle
- Head-On
- No Collision W/ Vehicle
- Other
- Rear-End
- Sideswipe, Opp Dir
- Sideswipe, Same Dir



OVERALL RANKING: 10
Ranking Index



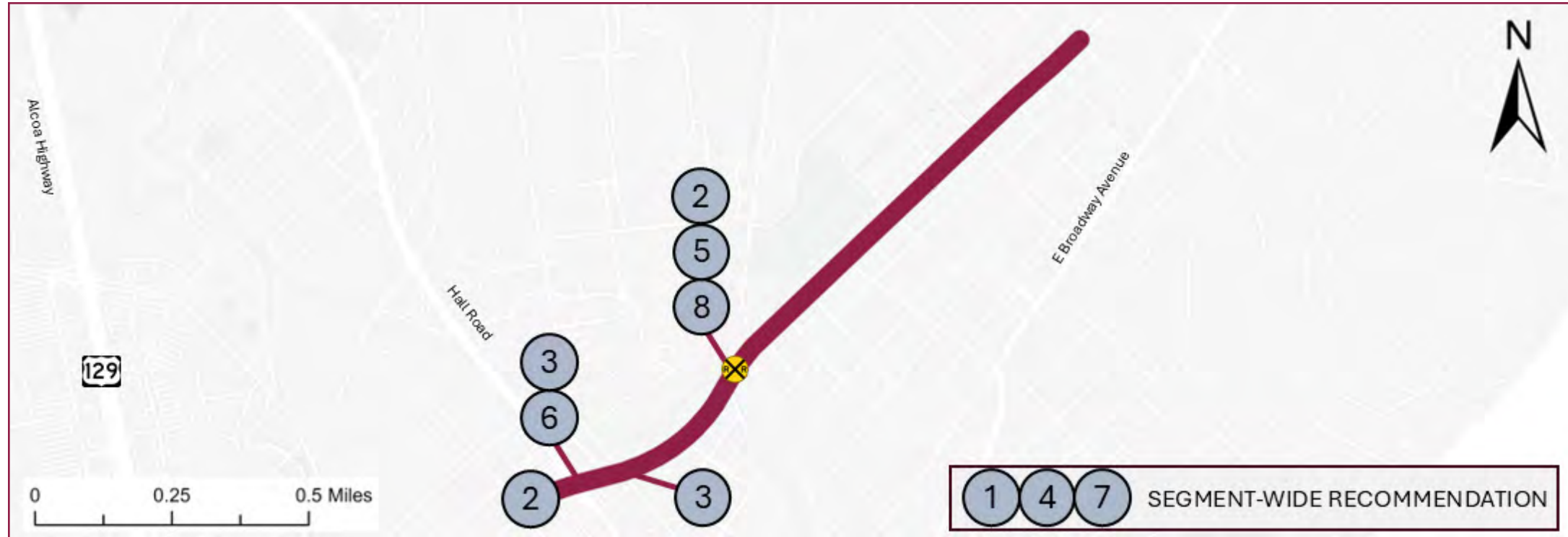
Community Input

- “ There isn't much guardrail or no guardrail at all before falling into a big ditch or creek. ”
- “ A roundabout would alleviate the issue at Lincoln Rd at Wright Road. ”
- “ Drivers making left turns onto Lincoln Road from Wright Road treat this intersection as a 4-way stop. They will pull into the intersection and gun it on front of a driver going straight on Wright Road. ”
- “ The entirety of Lincoln road needs its bike lane back after utility construction destroyed it starting a year ago. Vehicle drivers have no care or respect for cyclists on this road, but the bike lane helps keep a buffer between my work and home. ”

LINCOLN ROAD
from Rankin Road to 8th Street

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RECOMMENDED COUNTERMEASURES

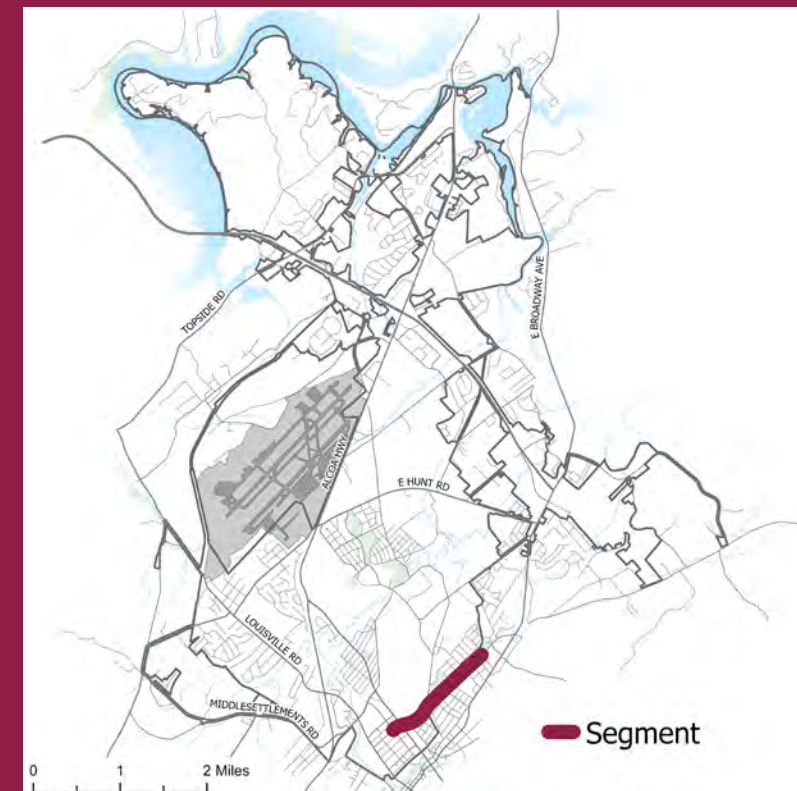


ID	Countermeasure	Cost	Schedule	Project Readiness
1	Bike Lanes	\$\$	Short-Term	Ready
2	Conduct Intersection Control & Alignment Evaluation	\$	Short-Term	Ready
3	Crosswalk Visibility Enhancement (S Hall Rd and Aluminum Ave)	\$\$	Short-Term	Ready
4	Retroreflective Pavement Markers	\$	Short-Term	Ready
5	Evaluate Proper Approach Laneage	\$	Short-Term	Ready
6	Flashing Yellow Arrows (FYAs)	\$\$	Mid-Term	Ready
7	Longitudinal Rumble Strips and Stripes on Two Lane Roads	\$	Short-Term	Ready
8	Railroad Crossing Enhancements	\$\$\$	Mid-Term	Ready

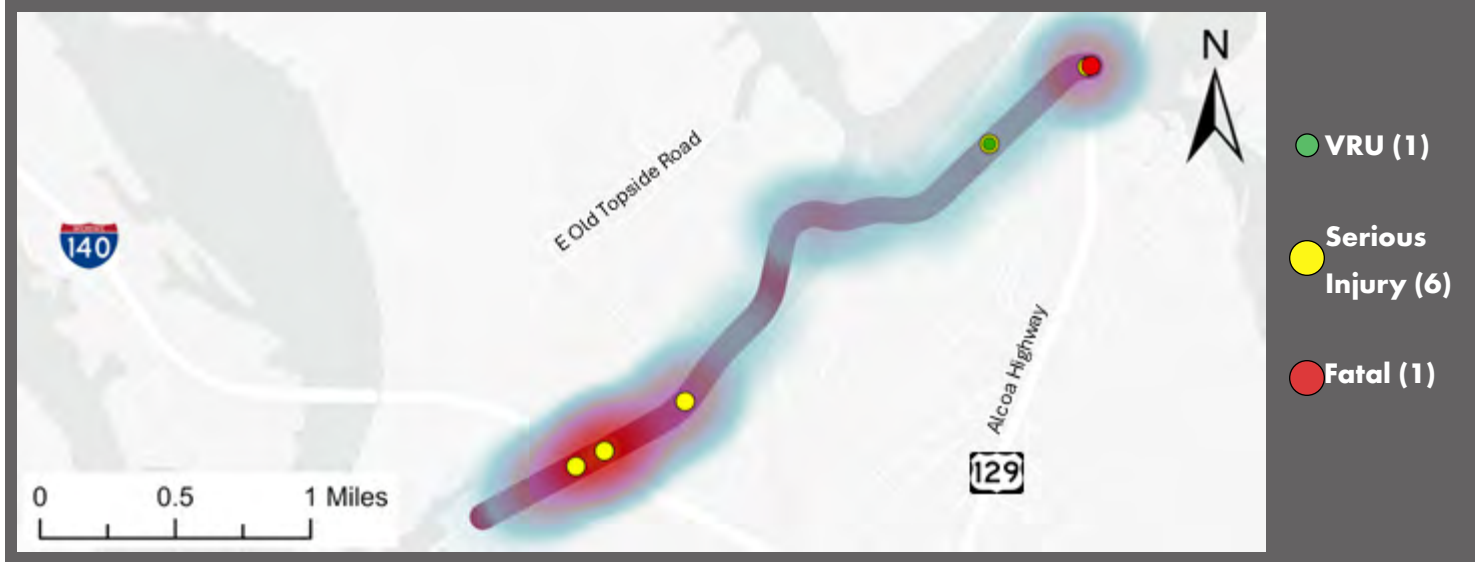
● FHWA Proven Safety Countermeasure
● Crash Modification Factors Countermeasure
● Vulnerable Road User Related Countermeasure
● Requires ROW Acquisition
● Requires Utility Relocation

Benefit Summary

- Rumble striping along edge/centerlines provide tactile and auditory feedback to drivers when their vehicle strays from the lane, helping to reduce the risk for roadway departure crashes and head-on collisions.
- Evaluating alternate intersection control or geometry ensures safer, more efficient designs by reducing severe crashes, improving pedestrian safety, and calming traffic.
- RPMs provide continuous lane guidance, which is particularly useful in navigating curves and complex intersections. The reflective properties of RPMs make them highly visible at night, reducing the risk of accidents by guiding drivers safely along the road.
- FYAs significantly reduce the number of left-turn crashes by providing a more distinct indication that drivers are required to yield during the permissive phase.



ALCOA TOPSIDE ROAD (SR-333)
SAFE STREETS from E Old Topside Road to Airport Highway



Urban Minor Arterial (TDOT)	
Speed Limit	45 mph
Lanes	2
Vehicles/Day	9,000
Total Crashes	211
HIN Intersections	0 ★

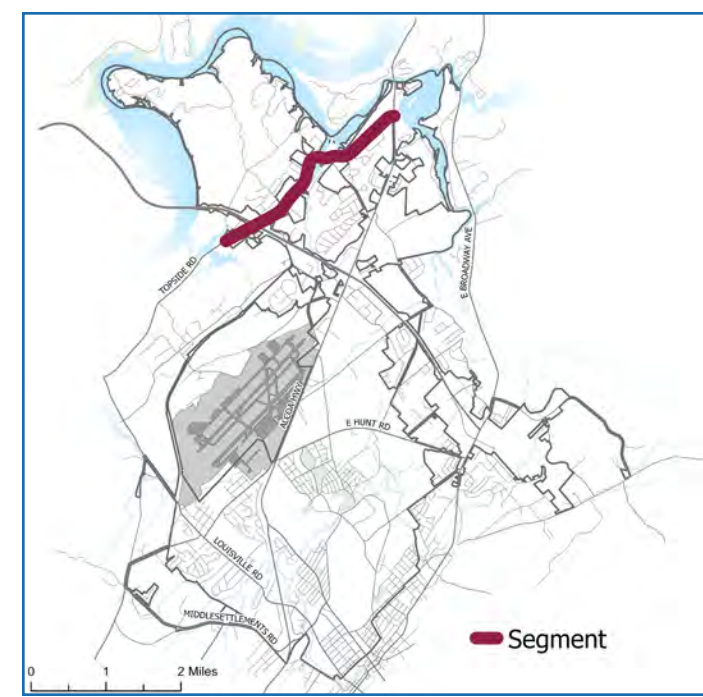
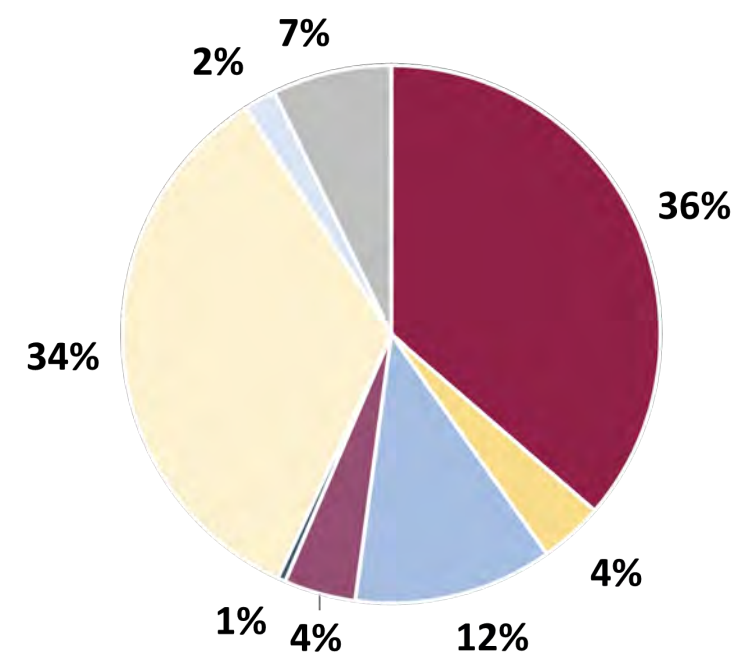
Characteristics

Topside Road (SR-333) is a two-way roadway in north Alcoa, following a curved alignment over rolling terrain. This segment connects between I-140 and Alcoa Highway (US-129), providing access to primarily residential and commercial land uses. This section of Topside Road exhibits no sidewalks or pedestrian infrastructure throughout the corridor.

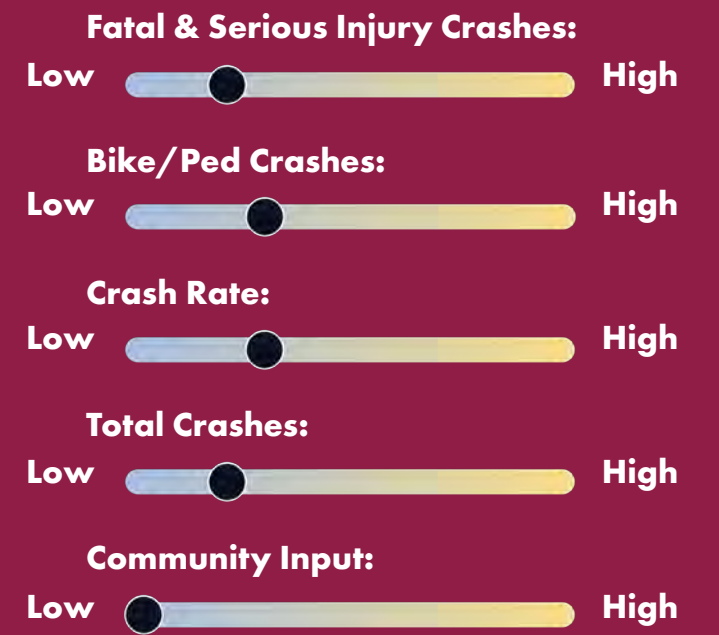


Along Topside Road (SR-333), Facing Southwest, Just Northeast of Central Park Boulevard

- Angle
- Head-On
- No Collision W/ Vehicle
- Other
- Pedalcycle
- Rear-End
- Sideswipe, Opp Dir
- Sideswipe, Same Dir



OVERALL RANKING: 12
Ranking Index



Community Input

“Where Topside meets Alcoa Highway is extremely dangerous. If it is too disruptive for a traffic light, then something else should be done (e.g., a ramp connecting Topside and Alcoa Highway going toward Knoxville- it could go over all the lanes of 129 and then loop around to 129N)”

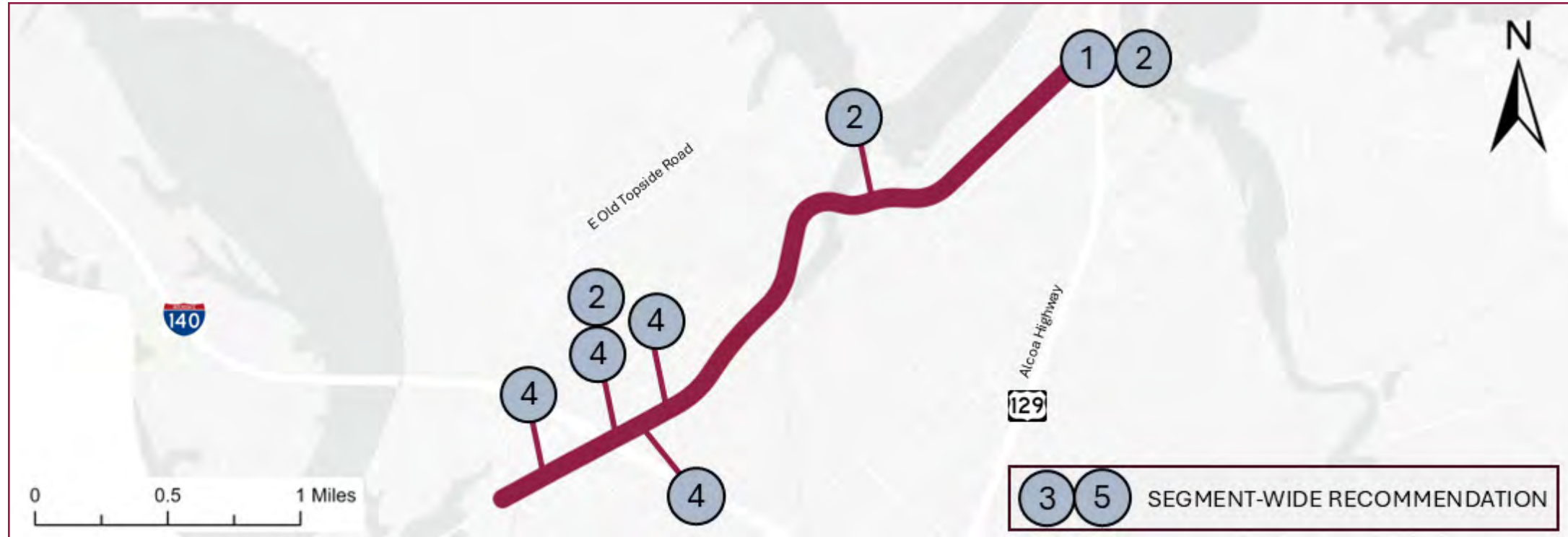
“The biggest danger is where 129/Topside Rd meet.”

“Widen all streets and create useful bicycle commuting plan. Add grocery stores along Topside Road.”

DISCLAIMER - 23 United States Code Section 407 - Discovery and admission as evidence of certain reports and surveys - Notwithstanding any other provision of law, reports, surveys, schedules, lists, or data compiled or collected for the purpose of identifying, evaluating, or planning the safety enhancement of potential accident sites, hazardous roadway conditions, or railway-highway crossings, pursuant to sections 130, 144, and 148 of this title or for the purpose of developing any highway safety construction improvement project which may be implemented utilizing Federal-aid highway funds 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.

ALCOA TOPSIDE ROAD (SR-333)
SAFE STREETS from E Old Topside Road to Airport Highway

RECOMMENDED COUNTERMEASURES

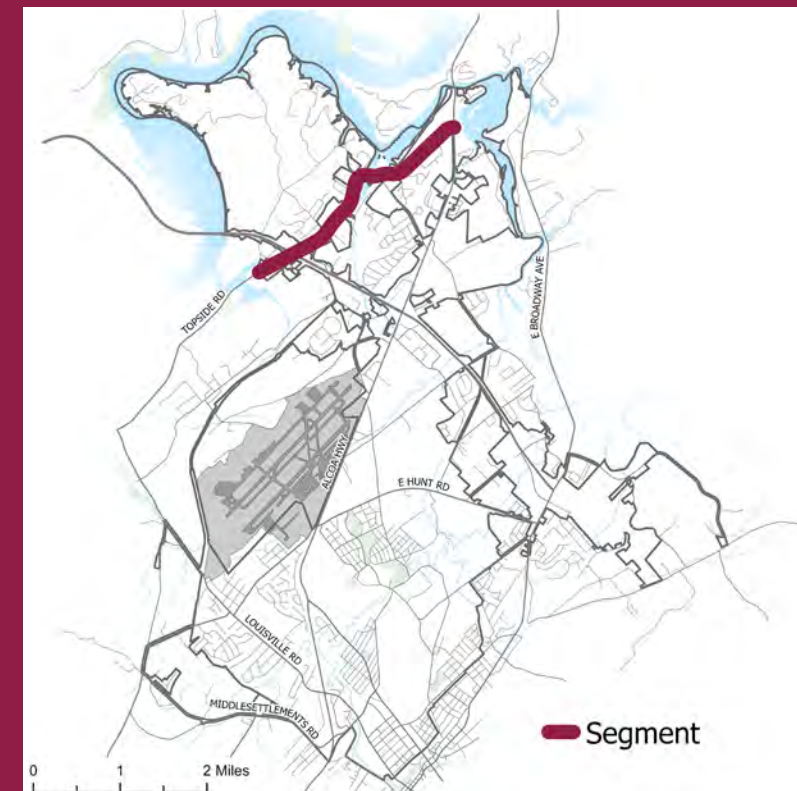


ID	Countermeasure	Cost	Schedule	Project Readiness
1	Smart Channel Right-Turn Lane	\$\$	Long-Term	Ready
2	Conduct an Intersection Control & Alignment Evaluation	\$	Short-Term	Ready
3	Flashing Yellow Arrows (FYAs) (McBath Rd, I-140 EB Ramps, Hawks Landing, Wrights Ferry Rd)	\$\$	Mid-Term	Ready
4	Retroreflective Pavement Markers	\$	Short-Term	Ready
5	Longitudinal Rumble Strips and Stripes on Two Lane Roads	\$	Short-Term	Ready

● FHWA Proven Safety Countermeasure
● Crash Modification Factors Countermeasure
● Vulnerable Road User Related Countermeasure
● Requires ROW Acquisition
● Requires Utility Relocation

Benefit Summary

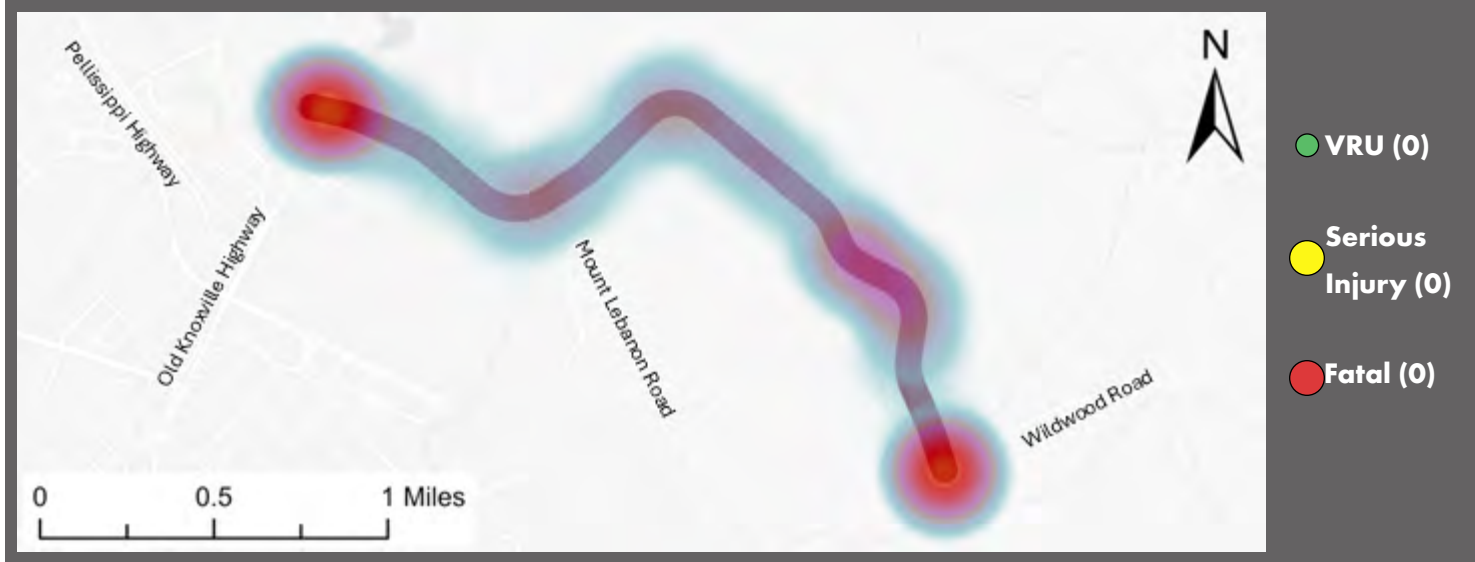
- By promoting slower turning speeds and better visibility, “smart channel” right turns help reduce the likelihood of collisions at intersections.
- Evaluating alternate intersection control or geometry ensures safer, more efficient designs by reducing severe crashes, improving pedestrian safety, and calming traffic.
- FYAs significantly reduce the number of left-turn crashes by providing a more distinct indication that drivers are required to yield during the permissive phase.
- Rumble striping along edge/centerlines provide tactile and auditory feedback to drivers when their vehicle strays from the lane, helping to reduce the risk for roadway departure crashes and head-on collisions.
- RPMs provide continuous lane guidance, which is particularly useful in navigating curves and complex intersections. The reflective properties of RPMs make them highly visible at night, reducing the risk of accidents by guiding drivers safely along the road.



TOPSIDE ROAD (SR-333)
 from E Old Topside Road to Airport Highway

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ALCOA **SAM HOUSTON SCHOOL ROAD**
SAFE STREETS from Old Knoxville Highway to Wildwood Road



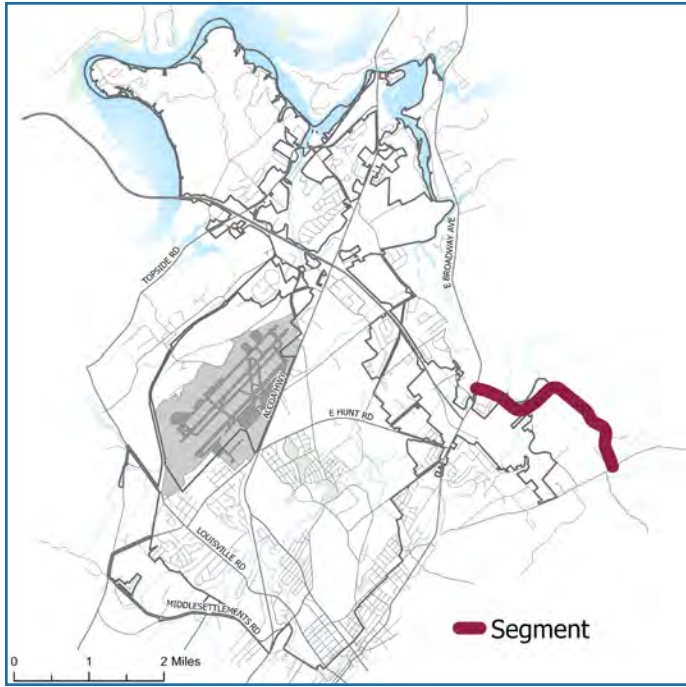
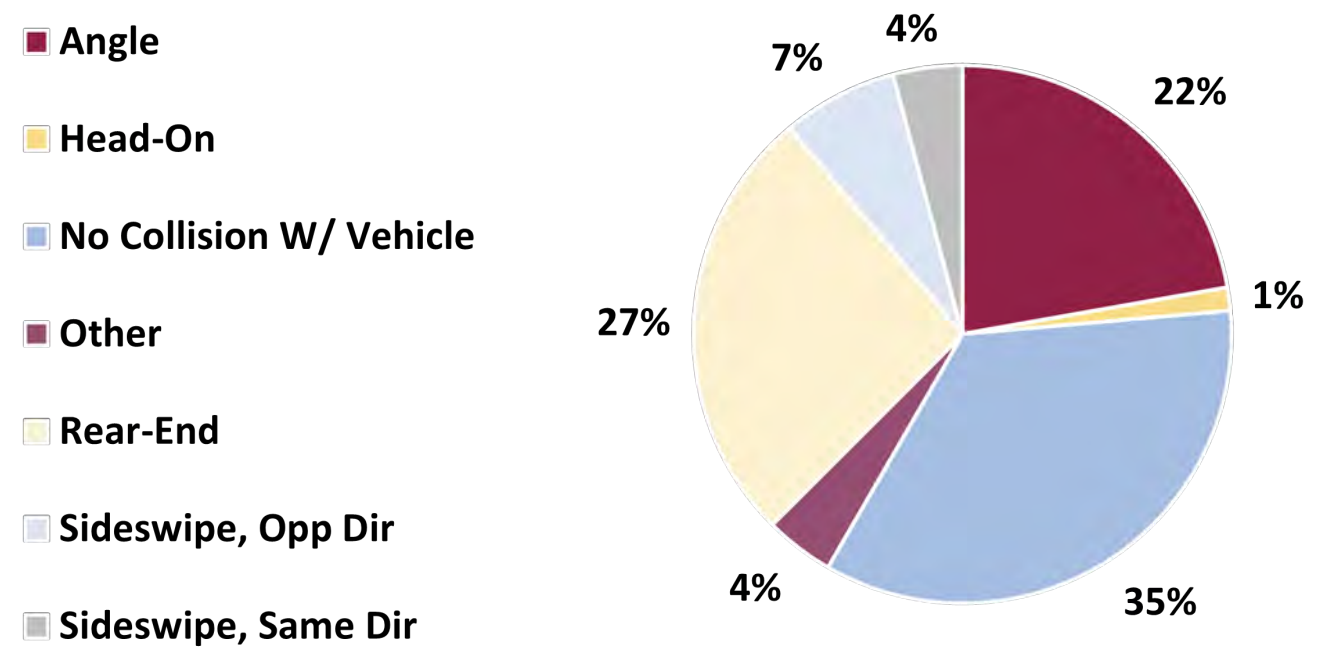
Urban Major Collector (Alcoa, TN)	
Speed Limit	45 mph
Lanes	2
Vehicles/Day	5,500
Total Crashes	72
HIN Intersections	0 ★

Characteristics

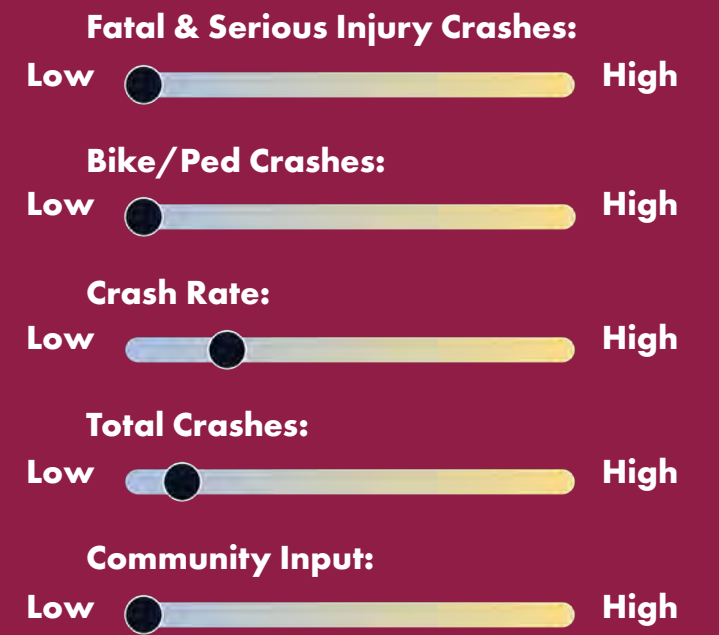
Sam Houston School Road is a rural two-lane roadway in eastern Alcoa, providing access to Eagleton Elementary School and the Sam Houston Historic Schoolhouse. The segment follows a largely curved alignment, over generally rolling terrain.



Along Sam Houston School Road, Facing South, Just North of De Armond Lane



OVERALL RANKING: 15
Ranking Index



Community Input

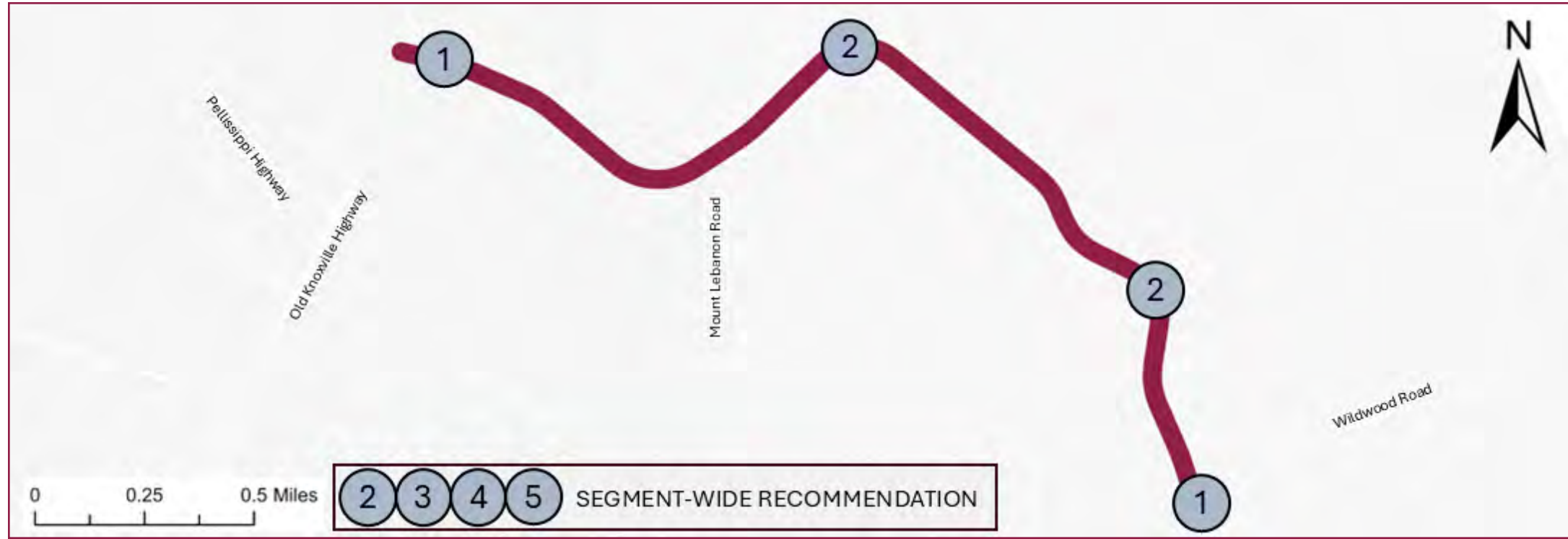
“ I live on Sam Houston and would love to see speed bumps. Every morning attempting to leave the driveway is like doing pit stops at the Daytona 500 ”

SAM HOUSTON SCHOOL ROAD
from Old Knoxville Highway to Wildwood Road

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ALCOA **SAM HOUSTON SCHOOL ROAD**
SAFE STREETS from Old Knoxville Highway to Wildwood Road

RECOMMENDED COUNTERMEASURES

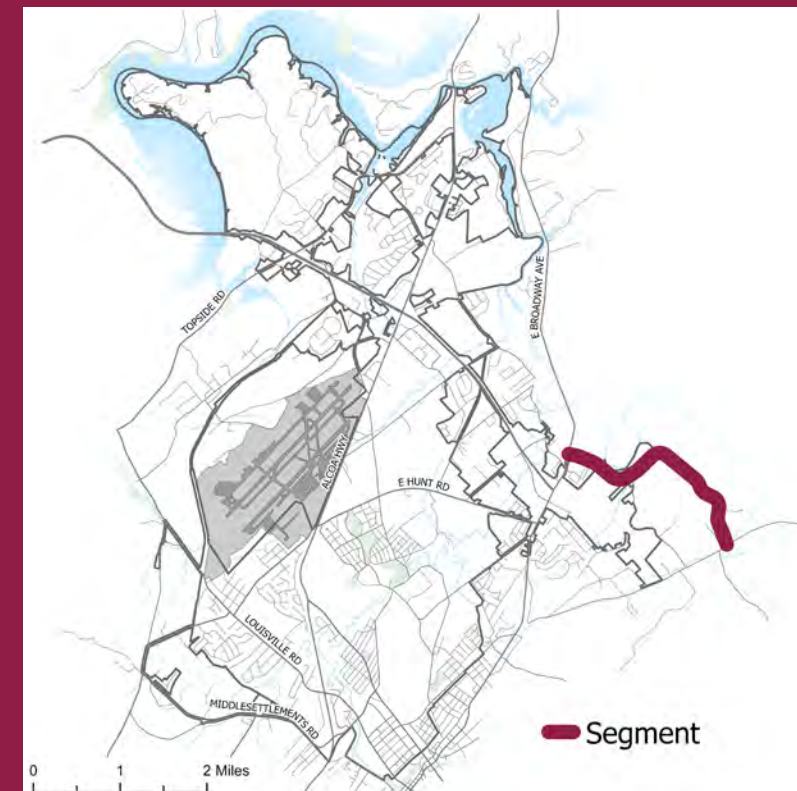


ID	Countermeasure	Cost	Schedule	Project Readiness
1	Conduct Intersection Control & Alignment Evaluation (Dollar General Driveway and Wildwood Rd)	\$	Short-Term	Ready
2	Enhanced Delineation for Horizontal Curves	\$	Short-Term	Ready
3	Longitudinal Rumble Strips and Stripes on Two Lane Roads	\$	Short-Term	Ready
4	Widen Shoulders	\$\$\$	Mid-Term	●
5	Traffic Calming (Corridor-Wide Speed Management)	\$\$	Mid-Term	Ready

● FHWA Proven Safety Countermeasure
● Crash Modification Factors Countermeasure
● Vulnerable Road User Related Countermeasure
● Requires ROW Acquisition
● Requires Utility Relocation

Benefit Summary

- Wider shoulders provide additional space for vehicles to maneuver, reducing the likelihood of head-on, sideswipe, and fixed-object crashes.
- Rumble striping along edge/centerlines provide tactile and auditory feedback to drivers when their vehicle strays from the lane, helping to reduce the risk for roadway departure crashes and head-on collisions.
- Evaluating alternate intersection control or geometry ensures safer, more efficient designs by reducing severe crashes, improving pedestrian safety, and calming traffic.
- Enhanced delineation provides enhanced guidance along curves by increasing driver awareness of the roadway alignment and potential risks of roadway departure.



SAM HOUSTON SCHOOL ROAD
from Old Knoxville Highway to Wildwood Road

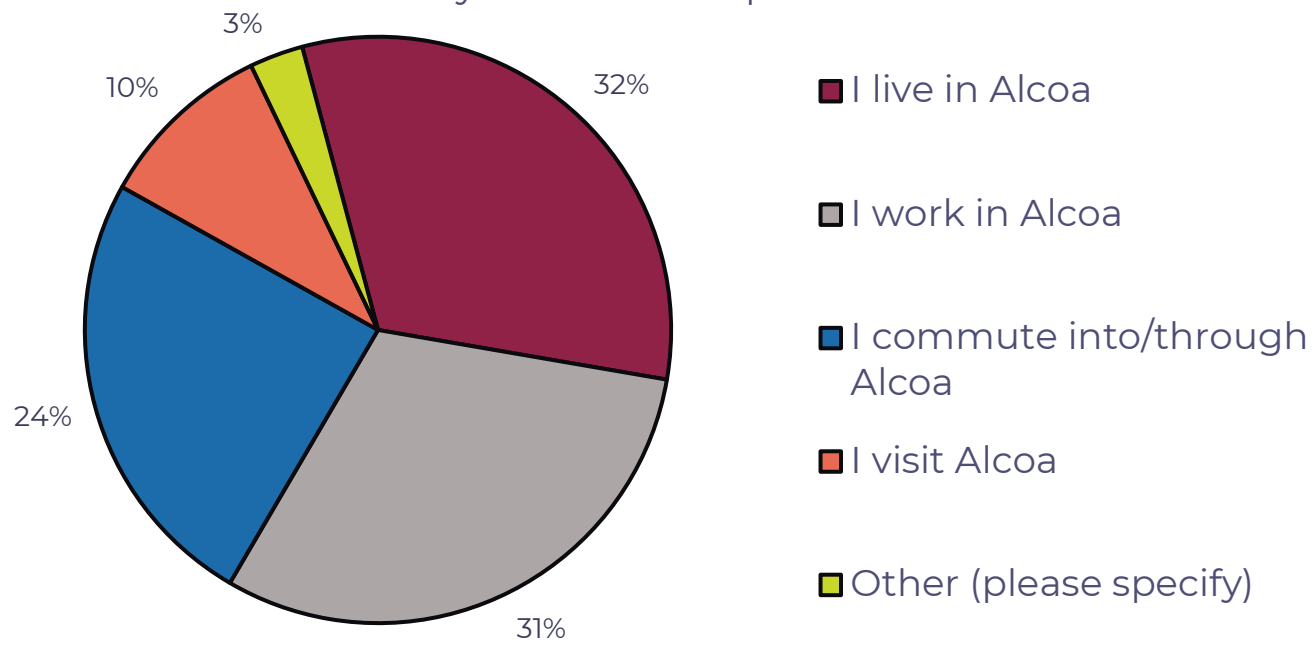
DISCLAIMER - 23 United States Code Section 407 - Discovery and admission as evidence of certain reports and surveys - Notwithstanding any other provision of law, reports, surveys, schedules, lists, or data compiled or collected for the purpose of identifying, evaluating, or planning the safety enhancement of potential accident sites, hazardous roadway conditions, or railway-highway crossings, pursuant to sections 130, 144, and 148 of this title or for the purpose of developing any highway safety construction improvement project which may be implemented utilizing federal-aid highway funds 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.



Appendix D

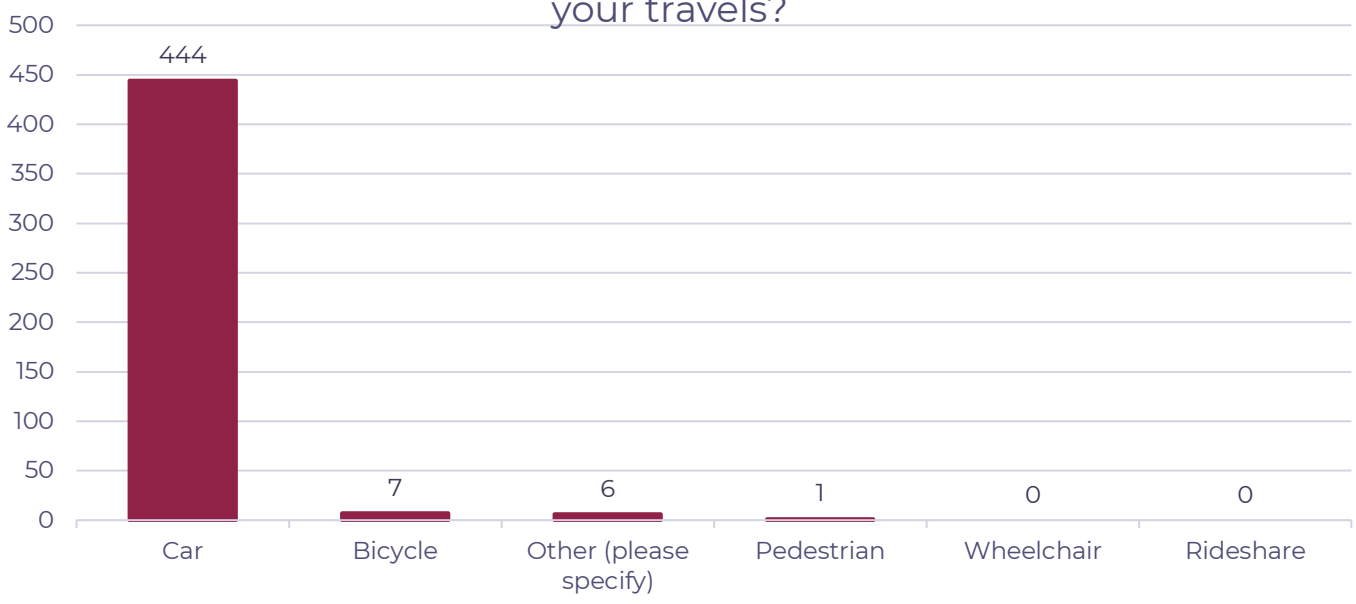
At the beginning of the survey, members were asked what their relationship to Alcoa was and whether they live or work in the area. Roughly 63% of respondents live or work within the Alcoa city limits, further validating that their experiences are focused on areas within the City.

What is your relationship to Alcoa



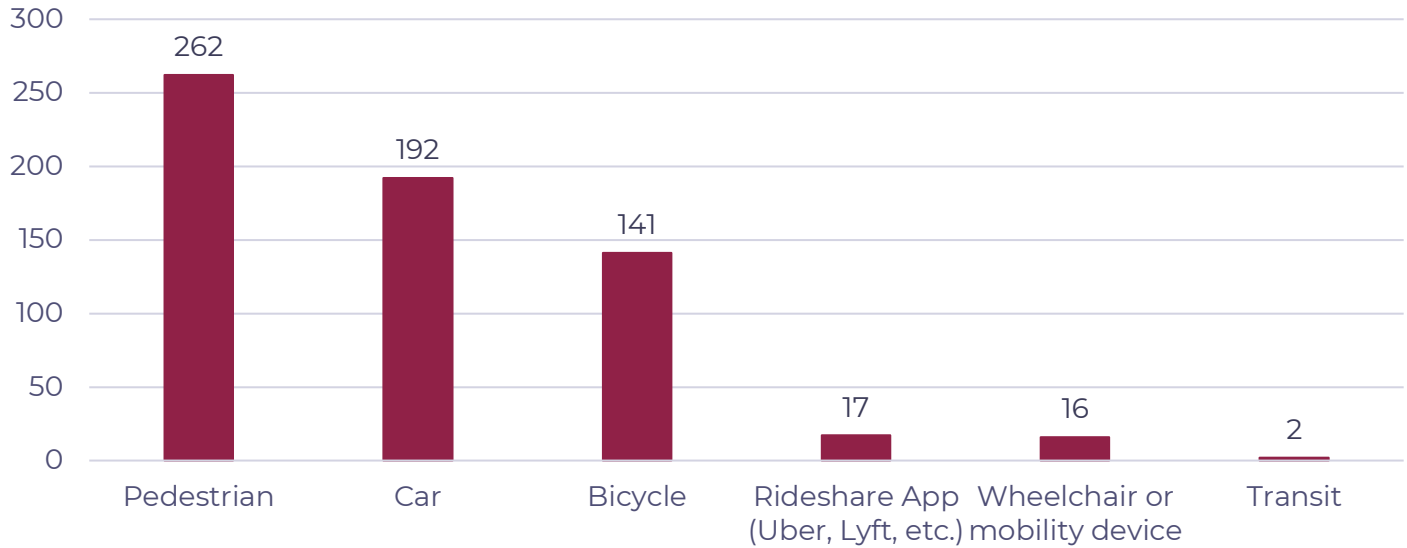
Respondents were asked to provide information on how they travel to Alcoa. It is inferred that while a large majority of the population travels by car, respondents have a healthy selection of travel choices. Travelling alone by car (444 responses) was the most popular response, followed by biking (7 responses), Other (6 responses), and walking (1 response).

What Mode of Transportation do you Primarily use for most of your travels?



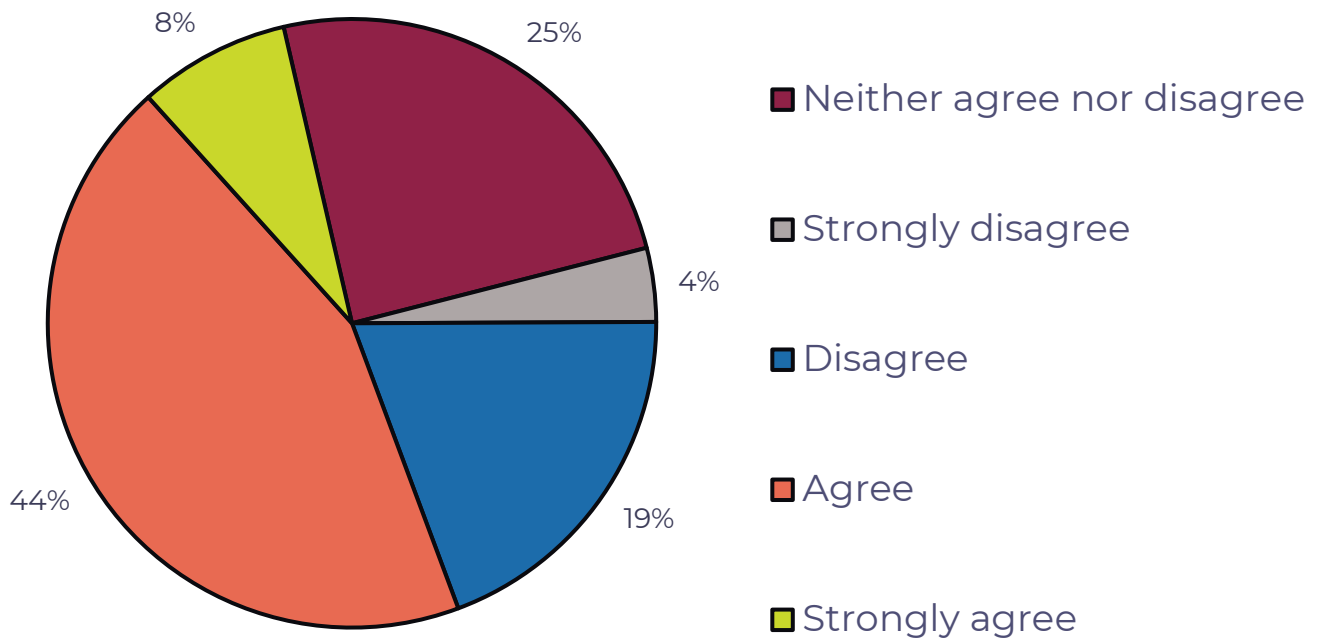
The following question was to gather information about which alternative mode of transportation community members use. It is assumed that weekday/work transportation modes are not always the same case for things like leisure activities, exercise, weekend travel, etc.

Which of the following alternative modes of transportation do you commonly use?



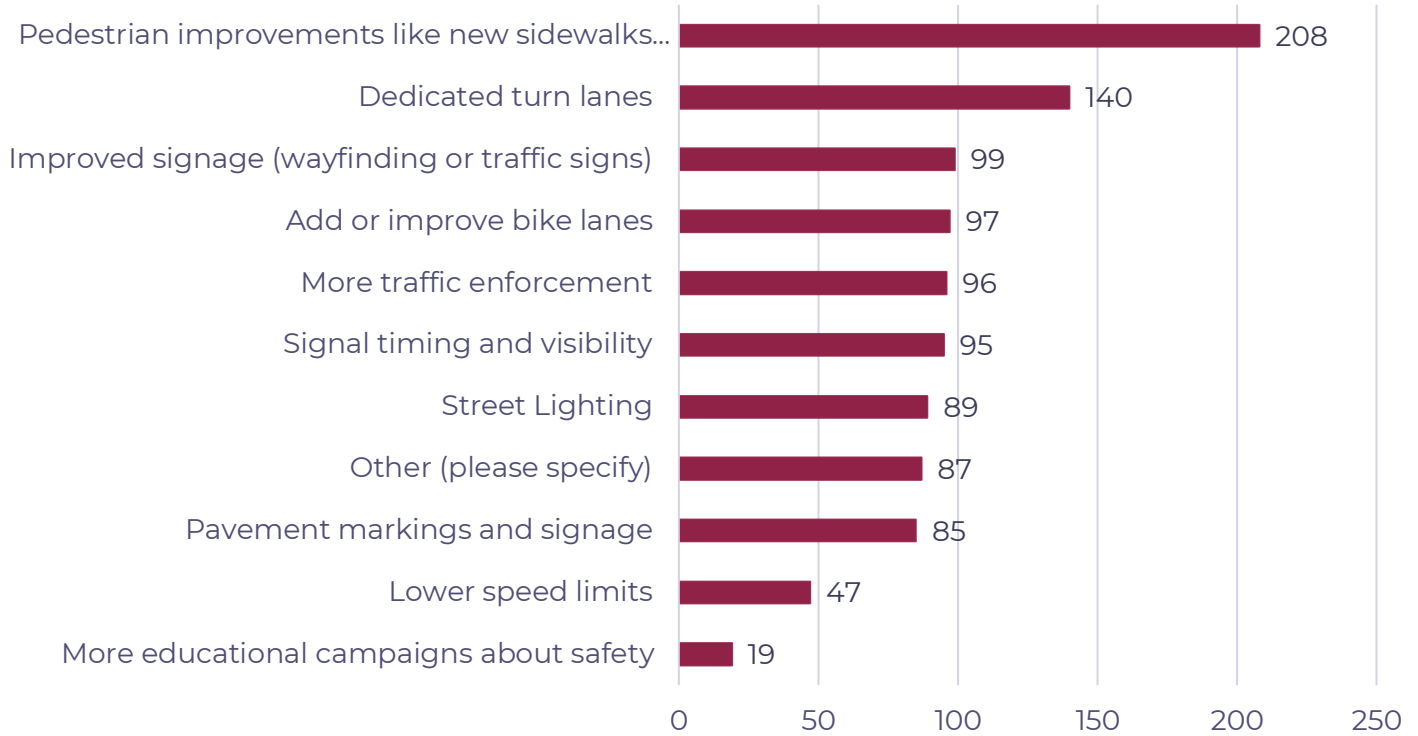
Respondents were also asked how strongly they agree that Alcoa streets are safe. About 52% of respondents felt that Alcoa streets were safe. Around 13% of respondents disagree however, indicating that they feel unsafe on the streets in Alcoa.

How strongly do you agree that Alcoa streets are safe?



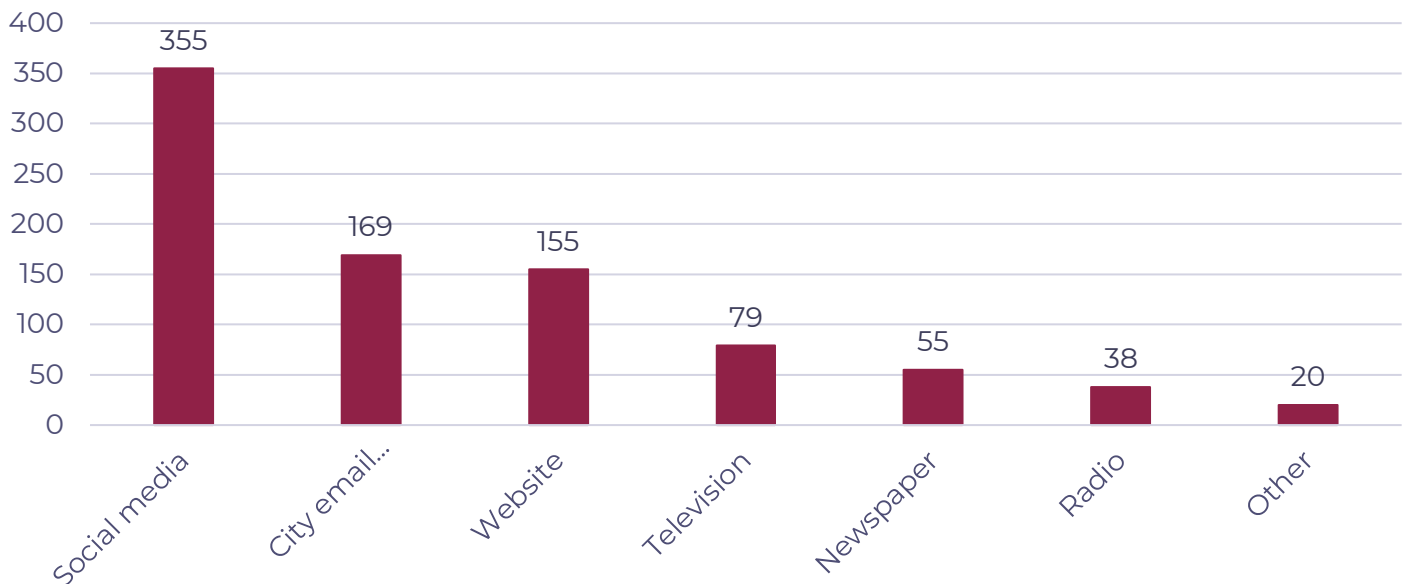
Respondents were asked to select up to three improvements that would make driving in Alcoa feel safer. The top three responses were pedestrian improvements, dedicated turn lanes, and improved signage.

Improvements to make driving safer



Respondents selected how they would like to hear about updates from the City regarding the Safety Action Plan. The most requested mode of communication was social media and city email communications.

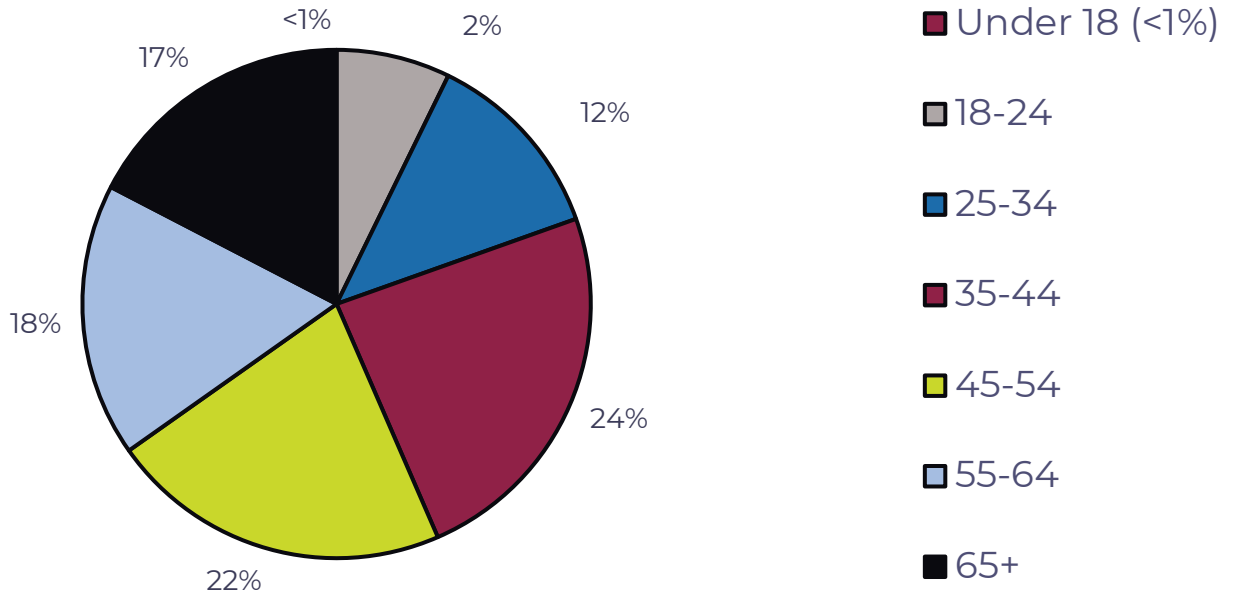
How would you prefer to learn about updates from the City?



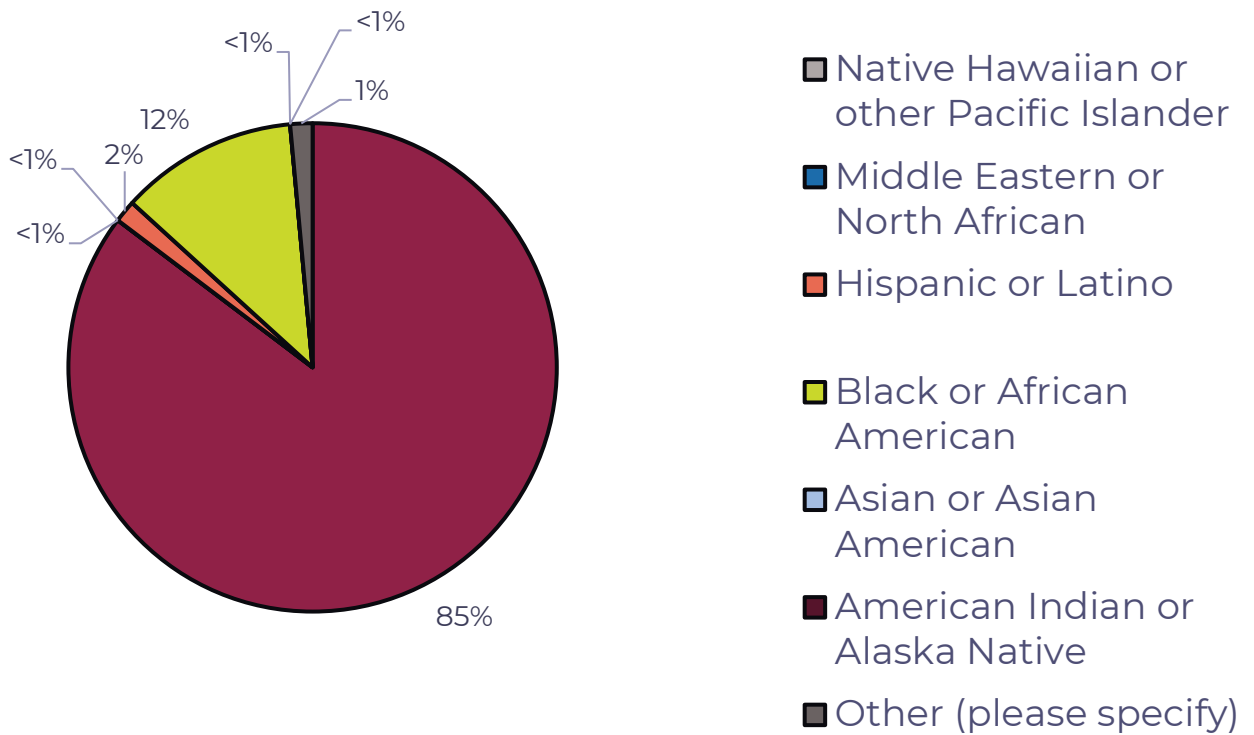


Key Demographics

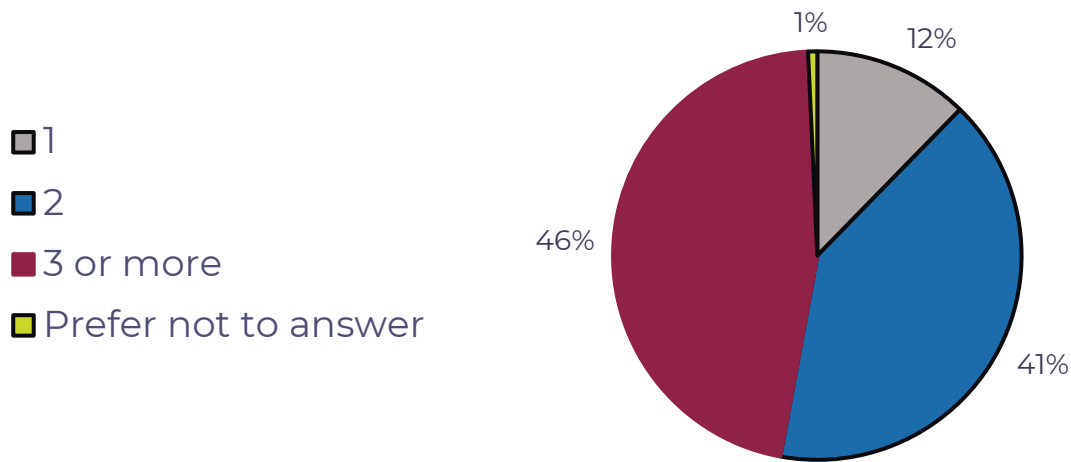
Age



Race



Number of Vehicles in Household



Annual Income Range





Appendix E

COUNTERMEASURE TOOLKIT













This section of the Alcoa MPO LRSP presents countermeasures that can be implemented in all Agencies within the region to improve safety. Priority should be given to roads along the HIN to lessen severity among crashes.

A countermeasure toolkit is a comprehensive collection of strategies and countermeasures designed to address specific traffic safety concerns. This toolkit provides agencies in the Alcoa MPO area with a range of options and resources to effectively improve safety and enhance the overall performance of roadways and transportation systems. As the countermeasure toolkit is implemented, educational campaigns will be needed to inform the public on proper and safe use of certain countermeasures.




For more information on Crash Modification Factors (CMF), please view the [CMF Clearinghouse](#).

Table 1. Countermeasure Toolkit

SOURCE	COUNTERMEASURE	CMF	CONTEXT (URBAN/RURAL)	TIMEFRAME	COST
● ● ●	APPROPRIATE SPEED LIMITS	0.86	BOTH	SHORT	\$
●	CONDUCT INTERSECTION CONTROL & ALIGNMENT EVALUATION	N/A	BOTH	SHORT	\$
● ●	ENHANCED DELINEATION FOR HORIZONTAL CURVES	0.82	RURAL	SHORT	\$
● ●	EVALUATE PROPER APPROACH LANEAGE	0.40-0.52	BOTH	SHORT	\$
●	IMPROVE SIGNAGE	0.65-.84	BOTH	SHORT	\$
● ● ●	LEADING PEDESTRIAN INTERVAL	0.90	URBAN	SHORT	\$
● ●	LONGITUDINAL RUMBLE STRIPS AND STRIPES ON TWO-LANE ROADS	0.74	RURAL	SHORT	\$
● ● ●	RETROREFLECTIVE BACKPLATES	0.85	BOTH	SHORT	\$
●	RETROREFLECTIVE PAVEMENT MARKERS	0.54-0.89	BOTH	SHORT	\$
● ●	SIGHT DISTANCE EVALUATION	N/A	BOTH	SHORT	\$
● ● ●	SYSTEMIC APPLICATION OF MULTIPLE LOW-COST COUNTERMEASURES AT STOP-CONTROLLED INTERSECTIONS	0.73	BOTH	SHORT	\$
● ●	WIDER EDGE LINES	0.97	BOTH	SHORT	\$
● ● ●	YELLOW CHANGE INTERVALS	0.99	BOTH	SHORT	\$
● ● ●	BIKE LANES	0.43	BOTH	SHORT	\$\$
● ● ●	CROSSWALK VISIBILITY ENHANCEMENTS	0.60	BOTH	SHORT	\$\$
	IMPROVE SIGNAL EQUIPMENT ALIGNMENT	N/A	BOTH	SHORT	\$\$
●	FLASHING YELLOW ARROWS (FYA)	0.52-0.82	BOTH	MID	\$\$
● ● ●	MEDIAN AND PEDESTRIAN REFUGE ISLAND	0.29	URBAN	MID	\$\$
● ●	MEDIAN BARRIERS	0.29	BOTH	MID	\$\$

SOURCE	COUNTERMEASURE	CMF	CONTEXT (URBAN/RURAL)	TIMEFRAME	COST
	RECTANGULAR RAPID FLASHING BEACONS (RRFB)	0.31	BOTH	MID	\$\$
	SIDEWALKS AND MULTI-USE PATHS	0.60	BOTH	MID	\$\$
	TARGETED LIGHTING	0.68	BOTH	MID	\$\$
	TRAFFIC CALMING (CORRIDOR-WIDE SPEED MANAGEMENT)	0.60	BOTH	MID	\$\$
	COMPLETE MULTI-MODAL CORRIDOR EVALUATION	N/A	URBAN	MID	\$\$\$
	DEDICATED LEFT AND RIGHT-TURN LANES AT INTERSECTIONS	0.52-0.86	BOTH	MID	\$\$\$
	ELIMINATE NEGATIVE OFF-SETS AT INTERSECTIONS	0.60	BOTH	MID	\$\$\$
	FLATTEN MINOR STREET APPROACH	N/A	BOTH	MID	\$\$\$
	PEDESTRIAN HYBRID BEACONS	0.88	URBAN	MID	\$\$\$
	RAILROAD CROSSING ENHANCEMENTS	N/A	BOTH	MID	\$\$\$
	REDUCED LEFT-TURN CONFLICT INTERSECTIONS	0.71	BOTH	MID	\$\$\$
	WIDEN SHOULDERS	N/A	BOTH	MID	\$\$\$
	SMART CHANNEL RIGHT-TURN LANE	0.40	BOTH	LONG	\$\$\$
	CORRIDOR ACCESS MANAGEMENT	0.93	BOTH	LONG	\$\$\$\$
	ROADWAY RECONFIGURATION	0.53	URBAN	LONG	\$\$\$\$
	ROUNDBABOUTS	0.59	BOTH	LONG	\$\$\$\$

CMF Crash Modification Factor

-  FHWA Proven Safety Counter Measure
-  Crash Modification Factors Countermeasure
-  Vulnerable Road User Related Countermeasures

\$ \$0 – \$50,000

\$\$ \$50,001 – \$100,000

\$\$\$ \$100,001 – \$500,000

\$\$\$\$ > \$500,000

1. APPROPRIATE SPEED LIMITS

Posted speed limits are often the same as the legislative statutory speed limit. Agencies with the authority to set speed limits can establish non-statutory speed limits or designate reduced speed zones, and an increasing number are doing so. Roadway safety experts agree that speed control is one of the most important methods for reducing fatal and serious injury crashes.

A driver may not see or be aware of the conditions along a corridor and may drive at a speed that feels reasonable for themselves but may not be for all system users, especially vulnerable road users, such as children and seniors. **A driver traveling at 30 miles per hour who hits a pedestrian has a 45 percent chance of killing or seriously injuring them. At 20 miles per hour, that percentage drops to 5 percent.**

Figure 1. Speed Limit Sign



Source: Adobe Stock

CMF: 0.86

Safety Emphasis Area Addressed:

Older Driver (65+), Aggressive/Speed Related, Unrestrained Occupant, Impaired Driving, Younger Drivers, Roadway Departure, Intersections, Local Roads, Work Zone, Motorcycle, Large Trucks, Pedestrian, Bicycle, Animal

Cost: \$ | Timeframe: SHORT

2. CONDUCT INTERSECTION CONTROL & ALIGNMENT EVALUATION

This strategy applies FHWA's Intersection Control Evaluation (ICE) framework to objectively screen and compare intersection control and geometric alternatives (e.g., stop control, signalization, roundabout, RCUT/MUT), and integrates a targeted alignment review (approach skew, grades, and turning geometry). Using FHWA tools—SPICE for planning level safety performance and CAP X for operations—alternatives are evaluated on predicted crashes, multimodal performance, operations, costs, and lifecycle impacts. The process yields a transparent, defensible selection of intersection control and an aligned geometric concept that improves safety and consistency for all users.

Figure 2. Example Signalized Intersection



Source: Adobe Stock

CMF: N/A

Safety Emphasis Area Addressed:

Older Driver (65+), Aggressive/Speed Related, Unrestrained Occupant, Impaired Driving, Younger Drivers, Intersections, Motorcycle, Large Trucks, Pedestrian, Bicycle

Cost: \$ | Timeframe: SHORT

3. ENHANCED DELINEATION FOR HORIZONTAL CURVES

Enhanced delineation for horizontal curves includes various strategies implemented in advance or within curves. Pavement markings, center, and edge lines help drivers establish their position on the road. In-lane curve warning pavement markings are solid center lines on two-lane roads that warn drivers that a curve is approaching. Retroreflective strips are material on signposts that reflect light back to the driver to help draw attention to the sign during the night. A delineator is a retroreflective device placed on a post or roadside barrier along the side of the road that lets a driver align themselves on the road. Chevron signs placed on the outside of the curve or on the edge of the road inform the driver of the direction of the road. Enhanced visibility at horizontal curves can be improved by adding or upgrading to larger, retroreflective signs. Dynamic curve warnings detect vehicle speeds approaching a curve and alert drivers if the vehicular speed exceeds the speed limit. **Sequential Dynamic Chevrons, a type of enhanced delineation, can lead to a 60 percent reduction in fatal and injury crashes.**

Figure 3. Enhanced Delineation for Horizontal Curves



CMF: 0.82

Safety Emphasis Area Addressed:

Older Driver (65+), Aggressive/Speed Related, Unrestrained Occupant, Impaired Driving, Younger Drivers, Roadway Departure, Motorcycle, Large Trucks, Bicycle

Cost: \$ | Timeframe: SHORT

Source: Adobe Stock

4. EVALUATE PROPER APPROACH LANEAGE

This strategy involves assessing and improving intersection approach lane configurations—including adding or extending left or right turn lanes, modifying turn lane geometry, or revising lane alignment—to reduce vehicle conflict points and improve operational efficiency. **Adding left turn lanes on major approaches is a proven safety countermeasure associated with an estimated 48 percent reduction in crashes (CMF = 0.52). Improvements to channelized right turn lanes, such as sharpening approach angles and improving sight distance, can reduce right turn crashes by approximately 60 percent (CMF = 0.397). These laneage modifications reduce rear end, angle, and turning collisions while improving visibility and predictability for all users.**

Figure 4. Lane Alignment Example



CMF: – 0.4 to 0.52

Safety Emphasis Area Addressed:

Older Driver (65+), Unrestrained Occupant, Impaired Driving, Younger Drivers, Intersections, Local Roads, , Motorcycle, Large Trucks, Pedestrian, Bicycle

Cost: \$ | Timeframe: SHORT

Source: Adobe Stock

5. IMPROVE SIGNAGE

This strategy enhances driver awareness and decision making by installing or upgrading critical warning and regulatory signs. Improvements may include adding advance warning signs (e.g., SIGNAL AHEAD, STOP AHEAD) and improving retroreflectivity for nighttime visibility. **Crash based evaluations show that installing advance warning signs can reduce angle crashes by 35 percent (CMF = 0.65), and non intersection injury crashes by 16 percent. These low cost signing treatments provide substantial safety benefits by improving driver recognition of upcoming conditions.**

Figure 5. Signal Ahead Signage



Source: Adobe Stock

CMF: 0.65 to 0.84

Safety Emphasis Area Addressed:

Older Driver (65+), Aggressive/Speed Related, Unrestrained Occupant, Impaired Driving, Younger Drivers, Intersections, Local Roads, Work Zone, Motorcycle, Large Trucks, Pedestrian, Bicycle, Animal

Cost: \$ | Timeframe: SHORT

6. LEADING PEDESTRIAN INTERVAL

A leading pedestrian interval (LPI) allows pedestrians to enter the crosswalk at an intersection 3-7 seconds before vehicles receive a green indication. An LPI increases pedestrian visibility, aiming to reduce conflict with vehicles. LPI also helps pedestrians who may require more time to cross the street. **Installing an LPI can lead to a 13 percent reduction in pedestrian-vehicle crashes at intersections.**

Figure 6. Leading Pedestrian Interval



Source: Adobe Stock

CMF: 0.9

Safety Emphasis Area Addressed:

Intersections, Pedestrians, Bicycles

Cost: \$ | Timeframe: SHORT

7. LONGITUDINAL RUMBLE STRIPS AND STRIPES ON TWO-LANE ROADS

Longitudinal rumble strips are milled or painted installations on the ground that alert a driver through vibration and sound. A longitudinal rumble strip is on the shoulder, edge, or near or at the center line of an undivided roadway. These are intended to warn drivers whose vehicles are crossing centerlines through the creation of noise and vehicular vibration. Rumble strips should be implemented meeting AASHTO and other safety guidelines for VRU safety. **Longitudinal rumble strips can result in a 44-64 percent reduction in head-on fatal and injury crashes on two-lane rural roads.**

Figure 7. Rumble Strips



Source: Adobe Stock

CMF: 0.74

Safety Emphasis Area Addressed:

Older Driver (65+), Aggressive/Speed Related, Impaired Driving, Younger Drivers, Roadway Departure

Cost: \$ | Timeframe: SHORT

8. RETROREFLECTIVE BACKPLATES

A retroreflective backplate is a backplate made by framing traffic signals with a 1-to-3-inch yellow retroreflective border. They improve the visibility of the signal by creating an illuminated border to provide greater contrast from the area around the signal. The backplates lead to improvements in both daytime and nighttime conditions. **Safety benefits for retroreflective backplates include a 15 percent reduction in total crashes.**

Figure 8. Retroreflective Backplates



Source: Adobe Stock

CMF: 0.85

Safety Emphasis Area Addressed:

Older Driver (65+), Impaired Driving, Younger Drivers, Intersections, Local Roads

Cost: \$ | Timeframe: SHORT

9. RETROREFLECTIVE PAVEMENT MARKERS

This treatment enhances lane visibility, particularly during nighttime and wet weather conditions, by providing continuous retroreflective guidance along the roadway. Improved delineation helps drivers maintain lane discipline and reduces the likelihood of run off road, nighttime, and wet weather crashes. **Based on CMF Clearinghouse studies evaluating wet reflective pavement markings—an analogous visibility enhancement—this countermeasure is associated with approximately an 11 percent reduction in total crashes (CMF = 0.887), with larger reductions on multilane roads (total crashes CMF = 0.825) and significant decreases in nighttime (CMF = 0.696) and run off road crashes (CMF = 0.538).**

Figure 9. Wet Reflective Pavement Markings



Source: Adobe Stock

CMF: 0.54 to 0.89

Safety Emphasis Area Addressed:

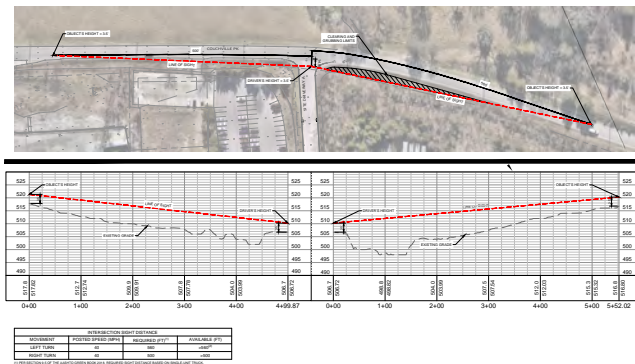
Older Driver (65+), Aggressive/Speed Related, Impaired Driving, Younger Drivers, Roadway Departure, Intersections, Local Roads, Work Zone, Motorcycle, Large Trucks, Pedestrian, Bicycle

Cost: \$ | Timeframe: SHORT

10. SIGHT DISTANCE EVALUATION

Conduct a thorough evaluation of available sight distance at intersections, driveways, and roadway segments to ensure compliance with AASHTO, MUTCD, and state design requirements. This includes verifying stopping sight distance, intersection sight distance, and decision sight distance, and identifying sight obstructions caused by vegetation, roadside features, horizontal/vertical geometry, or driveway placement. While no crash modification factor (CMF) is published for sight distance evaluation or correction, geometric design manuals emphasize that adequate sight distance is essential for safe operations. Evaluations should identify deficiencies and recommend corrective actions such as clearing vegetation, regrading approaches, modifying intersection geometry, adjusting corner radii, or applying traffic control to mitigate insufficient visibility.

Figure 10. Sight Distance Evaluation



Source: Kimley-Horn

CMF:N/A

Safety Emphasis Area Addressed:

Older Driver (65+), Aggressive/Speed Related, Younger Drivers, Intersections, Local Roads, Work Zone, Motorcycle, Large Trucks, Pedestrian, Bicycle

Cost: \$ | Timeframe: SHORT

11. SYSTEMIC APPLICATION OF MULTIPLE LOW-COST COUNTERMEASURES AT STOP-CONTROLLED INTERSECTIONS

This systemic approach to stop-controlled intersection safety involves deploying a package of multiple low-cost countermeasures, including enhanced signing and pavement markings, at intersections. These countermeasures increase driver awareness and recognition of the intersections and potential conflicts. **This application is associated with a 10 percent reduction of fatal and injury crashes at all locations/types/areas.**

Figure 11. Stop-Controlled Intersections



CMF: 0.73

Safety Emphasis Area Addressed:

Older Driver (65+), Impaired Driving, Younger Drivers, Intersections, Local Roads, Motorcycle, Pedestrian, Bicycle,

Cost: \$ | Timeframe: SHORT

Source: FHWA

12. WIDER EDGE LINES

Edge lines are the pavement markings at the edge of travel lanes and are designed to help drivers clearly identify the road alignment ahead. To improve safety, designers increase edge lines from the minimum normal line width of 4 inches to the maximum normal width of 6 inches. Wider edge lines enhance the visibility of travel lane boundaries compared to traditional edge lines. **Wider edge lines can reduce crashes by up to 22 percent for fatal and injury crashes on rural freeways.**

Figure 12. Wider Edge Lines



CMF: 0.97

Safety Emphasis Area Addressed:

Older Driver (65+), Aggressive/Speed Related, Impaired Driving, Younger Drivers, Roadway Departure

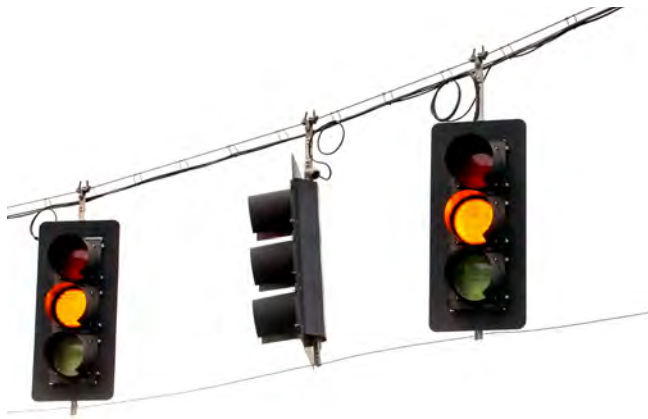
Cost: \$ | Timeframe: SHORT

Source: Adobe Stock

13. YELLOW CLEARANCE INTERVALS

The yellow clearance interval is the time the yellow signal indication is displayed following a green light signal indication. Red light running is a leading cause of crashes and fatalities at intersections, so timing the signal allows drivers to both stop safely without inviting accelerating through a yellow to red light transition. A well-timed yellow clearance interval helps reduce crashes, indicating green has passed and red is following next. This leads to appropriate speeds and speed management at signalized intersections. **Safety benefits include a 36-50 percent reduction in red light running when timed appropriately.**

Figure 13. Yellow Light at a Signal



Source: Adobe Stock

CMF: 0.99

Safety Emphasis Area Addressed:

Older Driver (65+), Younger Drivers, Intersections, Local Roads, Pedestrian, Bicycle

Cost: \$ | Timeframe: SHORT

14. BIKE LANES

A bike lane is a designated area of a roadway that is reserved for bicycles, typically marked with pavement markings and signage. Bike lanes provide bicyclists with a dedicated space to ride, improving safety by reducing conflicts with motor vehicles, and encouraging more people to choose bicycling as a mode of transportation. **Bike Lane Additions can reduce crashes by up to 49 percent for total crashes on urban 4-lane undivided collectors and local roads and 30 percent for total crashes on urban 2-lane undivided collectors and local roads.**

Figure 14. Bike Lane



Source: Adobe Stock

CMF: 0.43

Safety Emphasis Area Addressed:

Impaired Driving, Distracted Driving, Occupant Protection, Unsafe Speed, Vulnerable Road Users

15. CROSSWALK VISIBILITY AND ACCESSIBILITY ENHANCEMENTS

Crosswalk visibility enhancements encompass multiple strategies that can be used alone or in combination. High-visibility crosswalks use an inlay or thermoplastic tape patterns that are visible to the driver and pedestrians from far away. Improved lighting illuminates with a positive contrast that makes the pedestrian more visible by placing luminaires in forward locations. Enhanced signage and pavement markings alert the driver in advance that a pedestrian crosswalk is approaching, using either signage, pavement markings, or curb extensions. **High-visibility crosswalks can reduce pedestrian injury crashes up to 40 percent.**

Figure 15. High-Visibility Crosswalk



Source: Adobe Stock

CMF: 0.60

Safety Emphasis Area Addressed:

Distracted Driving, Intersections,
Pedestrians, Bicycles

Cost: \$\$ | Timeframe: SHORT

16. IMPROVE SIGNAL EQUIPMENT ALIGNMENT

This countermeasure improves the visibility and conspicuity of traffic signals by adjusting signal head orientation, repositioning equipment to meet MUTCD visibility requirements, and removing objects or geometric conditions that obstruct a driver's view of the signal. Proper alignment ensures that signal indications are clearly visible to approaching drivers, reducing the risk of red light running, sudden braking, and angle collisions. Although the CMF Clearinghouse does not publish a crash modification factor for signal alignment improvements, the Highway Safety Manual notes that inadequate visibility of traffic control devices contributes to intersection crashes, and correcting alignment issues is considered a critical safety maintenance activity.

Figure 16. Signal Head on Mast Arm



Source: Adobe Stock

CMF: N/A

Safety Emphasis Area Addressed:

Older Driver (65+), Unrestrained Occupant,
Impaired Driving, Younger Drivers,
Intersections, Motorcycle, Large Trucks,
Pedestrian, Bicycle

Cost: \$\$ | Timeframe: SHORT

18. FLASHING YELLOW ARROWS (FYA)

Flashing Yellow Arrows improve left turn safety by providing a clearer indication of permissive left turn operations and reducing driver confusion compared to the traditional circular green. FYA treatments allow agencies to fine tune left turn control, including time of day operations that reduce conflict risk during off peak conditions. **Crash Modification Factor (CMF) studies show that FYA installation can reduce angle or left turn crashes by 18 percent at dual left turn lane intersections (CMF = 0.82) and by up to 48 percent where time of day FYA operation is used with a single left turn lane (CMF = 0.52).**

Figure 18. Flashing Arrow Signal



Source: Adobe Stock

CMF: – 0.52 to 0.82
Safety Emphasis Area Addressed:
Older Driver (65+), Younger Drivers,
Intersections

Cost: \$\$ | Timeframe: MID

17. MEDIANS AND PEDESTRIAN REFUGE ISLANDS

Medians in urban and suburban areas can be defined by pavement markings, raised areas, or islands to separate motorized and non-motorized road users. Medians may also serve as a refuge for pedestrians. **A median with marked crosswalks can lead to a 46 percent reduction in pedestrian crashes, while also making walking a more comfortable experience.**

A pedestrian refuge island is a median with a refuge area that is intended to help protect pedestrians who are crossing a road, while also making walking a more comfortable experience. Pedestrian refuges can also help when crossing large multi-lane roads. **Pedestrian Refuge Islands contribute to a 56 percent reduction in pedestrian crashes.**

Figure 17. Median and Pedestrian Refuge Island



Source: Adobe Stock

CMF: 0.29
Safety Emphasis Area Addressed:
Older Driver (65+), Aggressive/Speed Related,
Unrestrained Occupant, Impaired Driving,
Younger Drivers, Roadway Departure,
Intersections, Local Roads, Work Zone,
Motorcycle, Pedestrian, Bicycle
Cost: \$\$ | Timeframe: MID

20. MEDIAN BARRIERS

Median barriers are longitudinal barriers that separate opposing traffic on a divided highway and are designed to redirect vehicles striking either side of the barrier. These barriers can take the form of cable barriers, concrete barriers, or metal-beam guardrails. Median barriers significantly reduce the number of cross-median crashes. These barriers significantly reduce head-on crashes and fatalities by physically separating the two sides of the road. **Median Barriers Installed on Rural Four-Lane Freeways lead to a 97 percent reduction in cross-median crashes.**

Figure 19. Median Barrier



Source: Adobe Stock

CMF: 0.29

Safety Emphasis Area Addressed:
Older Driver (65+), Aggressive/Speed Related, Impaired Driving, Younger Drivers, Roadway Departure

Cost: \$\$ | Timeframe: MID

19. RECTANGULAR RAPID FLASHING BEACONS (RRFB)

A rectangular rapid flashing beacon (RRFB) is a pedestrian-activated traffic control device installed at crosswalks to enhance visibility and alert drivers to the presence of pedestrians. When activated, the RRFB emits a rapid, alternating pattern of flashing lights to alert oncoming drivers to yield to pedestrians crossing the street. **According to FHWA, RRFBs can result in motorist yielding rates as high as 98 percent at marked crosswalks with varied speed limits, crossing distances, and number of travel lanes.**

Figure 20. Rectangular Rapid Flashing Beacon (RRFB)



Source: Kimley-Horn

CMF: 0.31

Safety Emphasis Area Addressed:
Pedestrian, Bicycle

Cost: \$\$ | Timeframe: MID

21. SIDEWALKS AND MULTI-USE PATHS

A sidewalk is a designated pathway alongside a road or street intended for pedestrian use. It provides a safe and separate space for pedestrians to walk or roll, separated from vehicular traffic. Sidewalks enhance pedestrian safety by reducing the risk of collisions with vehicles, promoting walking as a mode of transportation, and providing accessible routes for people of all ages and abilities. **Sidewalks can contribute up to a 89 percent reduction in crashes involving pedestrians walking along roadways.**

Figure 21. Sidewalk



Source: Adobe Stock



22. TARGETED LIGHTING

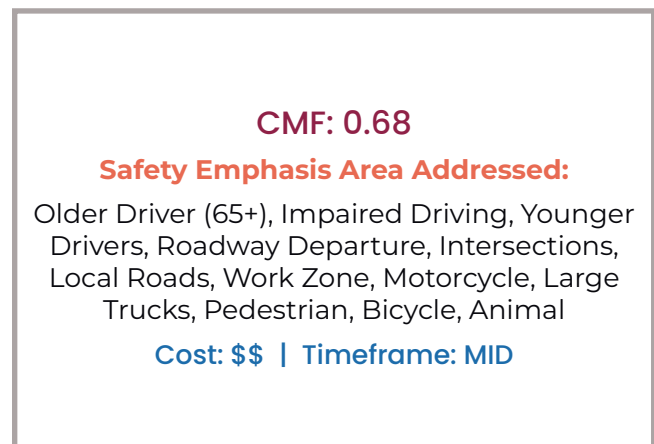
The number of fatal crashes occurring in daylight is about the same as those in darkness. However, the nighttime fatality rate is three times the daytime rate despite only 25 percent of vehicle miles traveled (VMT) occurring at night. At nighttime, vehicles traveling at higher speeds may not be able to stop once a hazard or change in the road ahead becomes visible by the headlights. Therefore, improvements to the lighting infrastructure of a roadway lead to a highly visible, safer roadway.

Adequate lighting (i.e., at or above minimum acceptable standards) is based on research recommending horizontal and vertical illuminance levels to provide safety benefits to all users of the roadway environment. Adequate lighting can also provide personal security benefits for people walking or rolling as they travel along and across roadways. Increased lighting can come in the form of intersection or corridor lighting depending on the needs of the community. **Lighting can reduce pedestrian nighttime crashes by up to 42 percent.**

Figure 22. Corridor Lighting



Source: Adobe Stock



23. TRAFFIC CALMING (CORRIDOR WIDE SPEED MANAGEMENT)

This strategy involves applying a combination of physical and self-enforcing design treatments—such as horizontal deflection, roadway narrowing, or vertical elements—to reduce vehicle speeds and discourage cut through traffic. Traffic calming enhances the safety, comfort, and mobility of pedestrians, bicyclists, and other non motorized users by creating a slower and more predictable operating environment. **These measures support community livability and are widely recognized by FHWA and ITE as effective tools for reducing the negative impacts of motor vehicle traffic by up to 42 percent.**

Figure 23. Traffic Calming Devices



Source: Adobe Stock

CMF: – 0.60

Safety Emphasis Area Addressed:

Older Driver (65+), Aggressive/Speed Related, Impaired Driving, Younger Drivers, Roadway Departure, Intersections, Local Roads, Work Zone, Motorcycle, Large Trucks, Pedestrian, Bicycle

Cost: \$\$ | Timeframe: MID

24. COMPLETE MULTI MODAL CORRIDOR EVALUATION

Conduct a corridor scale, Complete Streets evaluation that integrates community engagement, multimodal network connectivity analysis, person based performance measures, and Safe System safety diagnostics for all users. The process compiles safety, demand, reliability, access, equity, and curb/freight data; identifies network gaps; develops context sensitive alternatives (projects + operations); and applies FHWA multimodal performance methods to select a preferred program with transparent, lifecycle based criteria. Deliverables include an existing conditions atlas, a connectivity and gap analysis, an alternatives toolbox, a performance evaluation summary, and a phased implementation and monitoring plan.

Figure 24. Multimodal Intersection



Source: Adobe Stock

CMF: N/A

Safety Emphasis Area Addressed:

Older Driver (65+), Aggressive/Speed Related, Younger Drivers, Intersections, Local Roads, Motorcycle, Pedestrian, Bicycle

Cost: \$\$\$ | Timeframe: MID

25. DEDICATED LEFT- AND RIGHT-TURN LANES AT INTERSECTIONS

Auxiliary turn lanes—either for left-turns or right-turns—provide physical separation between turning traffic that is slowing or stopped and adjacent through traffic at approaches to intersections. Turn lanes can be designed to provide for deceleration prior to a turn, as well as for storage of vehicles that are stopped and waiting for the opportunity to complete a turn.

While turn lanes provide measurable safety and operational benefits at many types of intersections, they are particularly helpful at two-way stop-controlled intersections. It is important to also mention that additional lanes could cause VRUs to be in the roadway longer, and proper signage and safety considerations should be used. **A dedicated turn lane can lead to a 28-48 percent reduction in total crashes.**

Figure 25. Dedicated Left- and Right-Turn Lanes



Source: Adobe Stock

CMF: 0.52 – 0.86

Safety Emphasis Area Addressed:

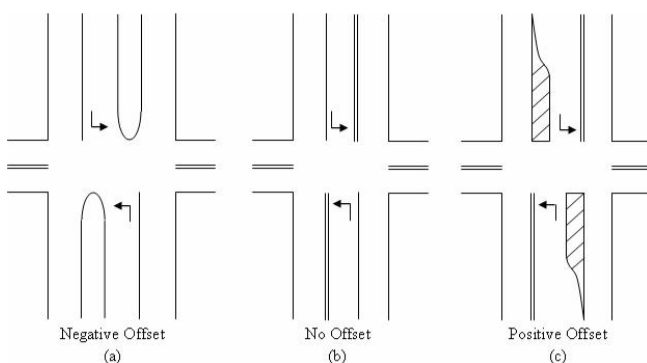
Older Driver (65+), Younger Drivers, Intersections, Large Trucks, Pedestrian, Bicycle

Cost: \$\$\$ | Timeframe: MID

26. ELIMINATE NEGATIVE OFFSETS AT INTERSECTIONS

This countermeasure improves safety by correcting intersection geometry where opposing left turn lanes are laterally aligned in a way that restricts drivers' view of oncoming through traffic. A negative offset limits sight distance, increasing the risk of left turn and angle crashes. By realigning the left turn lanes to achieve a zero or positive offset, driver visibility and judgment of acceptable gaps are significantly improved. **CMF Clearinghouse studies show that improving left turn lane offset can reduce total crashes by approximately 34 percent (CMF = 0.662) and left turn crashes by up to 38 percent (CMF = 0.62). This treatment enhances intersection transparency, reduces conflicts, and improves overall operational safety.**

Figure 26. Negative, No, and Positive Offset Left-Turn Lanes



Source: FHWA

CMF: 0.60

Safety Emphasis Area Addressed:

Older Driver (65+), Impaired Driving, Younger Drivers, Intersections, Motorcycle, Large Trucks, Pedestrian, Bicycle

Cost: \$\$\$ | Timeframe: MID

27. FLATTEN MINOR STREET APPROACH

This countermeasure improves safety by reducing steep grades and vertical curvature on the minor street approach to an intersection. Steep approach grades impair stopping ability, reduce sight distance, increase driver workload, and worsen vehicle acceleration from a stopped condition. Geometric design guidance from AASHTO recommends limiting intersection approach grades to 3 percent or less, with smoother transitions (“warping”) into the major roadway profile to maintain visibility and driver comfort. Although no Crash Modification Factor (CMF) exists in the CMF Clearinghouse for this treatment, flattening approach grades is widely recognized as an important measure to improve sight distance, reduce stopping distance, and reduce the likelihood of rear end, run off road, and angle conflicts.

Figure 27. Steep Intersection



Source: Adobe Stock

CMF:N/A

Safety Emphasis Area Addressed:

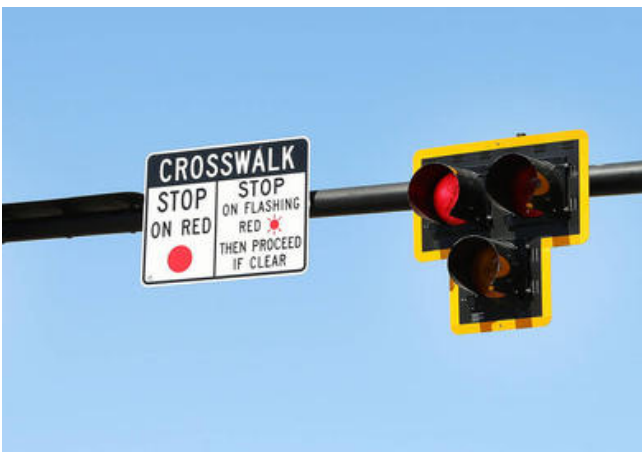
Older Driver (65+), Aggressive/Speed Related, Impaired Driving, Younger Drivers, Intersections, Local Roads, Work Zone, Motorcycle, Large Trucks, Pedestrian, Bicycle

Cost: \$\$\$ | Timeframe: MID

28. PEDESTRIAN HYBRID BEACONS

The pedestrian hybrid beacon (PHB) is a traffic control device designed to help pedestrians safely cross higher-speed roadways at midblock crossings and uncontrolled intersections. PHBs are typically effective at locations where three or more lanes will be crossed or in areas with high traffic volume. If PHBs are not familiar to a community, agencies and other governmental departments may need to provide education campaigns to ensure proper utilization. **PHBs can lead to a 55 percent reduction in pedestrian crashes.**

Figure 28. Pedestrian Hybrid Beacon



Source: Adobe Stock

CMF: 0.88

Safety Emphasis Area Addressed:

Pedestrian, Bicycle

Cost: \$\$\$ | Timeframe: MID

29. RAILROAD CROSSING ENHANCEMENTS

This strategy improves safety at highway–rail grade crossings through upgrades such as installing active warning devices (flashing lights, gates, cantilevered signals), enhancing signage, adding illumination, improving approach geometry, and incorporating pedestrian trespass deterrent measures. These improvements enhance driver and pedestrian awareness, increase conspicuity of the crossing, and reduce the likelihood of collisions with trains.

Figure 29. Active Railroad Warning Devices



Source: Adobe Stock

CMF: N/A

Safety Emphasis Area Addressed:

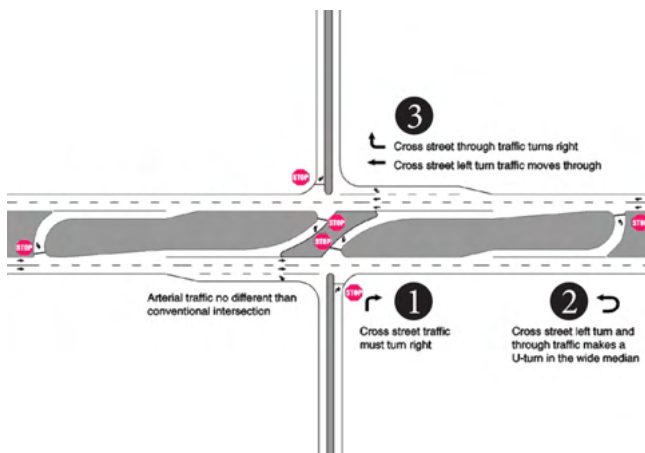
Older Driver (65+), Impaired Driving, Younger Drivers, Intersections, Local Roads, Motorcycle, Large Trucks, Pedestrian, Bicycle

Cost: \$\$\$ | Timeframe: MID

30. REDUCED LEFT-TURN CONFLICT INTERSECTIONS

Reduced left-turn conflict intersections (RCUT) are geometric designs that alter how left-turn movements occur. These intersections simplify drivers' decision-making and minimize the potential for higher-severity crash types, such as head-on and angle. Variations on the U-Turn are typical of these intersections. One type of these intersections, **the RCUT intersection, has been shown to lead to a 54 percent reduction in fatal and injury crashes.**

Figure 30. Reduced Left-Turn Conflict Intersection Example



Source: FHWA

CMF: 0.71

Safety Emphasis Area Addressed:

Older Driver (65+), Younger Drivers, Intersections, Motorcycle, Large Trucks, Pedestrian, Bicycle

Cost: \$\$\$ | Timeframe: MID

31. WIDEN SHOULDERS

Widening paved shoulders can improve vehicle recovery areas, provide space for disabled vehicles and bicyclists, and enhance roadway operations. Shoulder widening is most effective when paired with complementary safety improvements such as rumble strips, slope flattening, clear zone improvements, and access management. Shoulder improvements support multimodal needs and help create a safer, more forgiving roadside environment.

Figure 31. Wide Shoulder



Source: Adobe Stock

CMF: N/A

Safety Emphasis Area Addressed:

Older Driver (65+), Aggressive/Speed Related, Impaired Driving, Younger Drivers, Roadway Departure, Motorcycle, Large Trucks, Bicycle

Cost: \$\$\$ | Timeframe: MID

32. SMART CHANNEL RIGHT TURN LANE

This countermeasure redesigns a traditional, high speed channelized right turn lane into a pedestrian oriented smart channel. Improvements include tightening the turning radius, sharpening the entry angle, repositioning the stop bar, and reshaping the channelizing island to enhance sight distance and reduce vehicular turning speed. These changes reduce conflicts between right turning vehicles and both pedestrians and through traffic.

Figure 32. Smart Channel Right-Turn Lane



Source: Kimley-Horn

CMF: 0.40

Safety Emphasis Area Addressed:

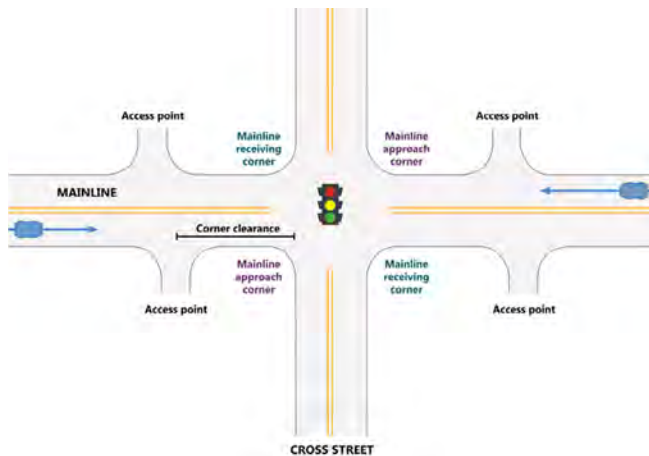
Older Driver (65+), Aggressive/Speed Related, Younger Drivers, Intersections, Local Roads, Motorcycle, Pedestrian, Bicycle

Cost: \$\$\$ | Timeframe: LONG

33. CORRIDOR ACCESS MANAGEMENT

Access management refers to the design, application, and control of entry and exit points along a roadway. This includes intersections with other roads and driveways that serve adjacent properties. Thoughtful access management along a corridor can simultaneously enhance safety for all modes, facilitate walking and biking, and reduce trip delay and congestion. While access management is a broad topic, strategies can include the intentional spacing of intersections, utilizing protected turn lanes, and generally minimizing conflict points on a corridor. Access management should also depend on the built environment context. **Safety benefits include a 25 to 31 percent reduction in fatal and injury crashes along urban/suburban arterials.**

Figure 33. Access Management



CMF: 0.93

Safety Emphasis Area Addressed:
Older Driver (65+), Aggressive/Speed Related, Younger Drivers, Intersections, Pedestrian, Bicycle

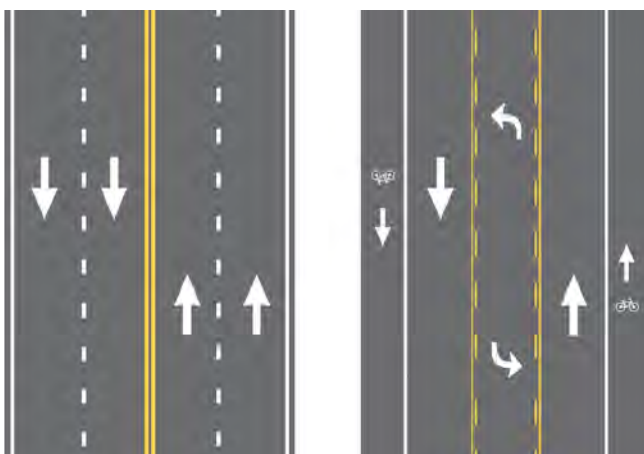
Cost: \$\$\$\$ | Timeframe: LONG

Source: FHWA

34. ROADWAY RECONFIGURATION

A roadway reconfiguration usually involves converting an existing four-lane roadway into a three-lane roadway. Implementing a roadway reconfiguration can improve safety, calm traffic, provide better mobility and access for all users, and enhance the quality of life in a community. Roadway reconfigurations make a roadway more “complete” by adding bike lanes or areas for pedestrians. Sometimes, roadway reconfigurations are called road diets and are typically a low cost countermeasure. **In the context of a 4-lane to 3-lane reconfiguration, a road segment can experience up to a 47 percent reduction in total crashes.**

Figure 34. Roadway Reconfiguration



CMF: 0.53

Safety Emphasis Area Addressed:
Older Driver (65+), Aggressive/Speed Related, Unrestrained Occupant, Impaired Driving, Younger Drivers, Local Roads, Motorcycle, Pedestrian, Bicycle

Cost: \$\$\$\$ | Timeframe: LONG

Source: FHWA

35. ROUNDABOUTS

A roundabout is a type of circular intersection where traffic flows continuously around a central island. Vehicles entering a roundabout must yield to traffic already circulating within it, promoting a smooth and efficient flow of traffic with reduced conflict points compared to traditional intersections. Roundabouts are designed to improve safety, reduce congestion, and enhance traffic flow. **Roundabouts lead to a 78-82 percent reduction in fatal and injury crashes.**

Figure 35. Roundabout



Source: Adobe Stock

CMF: 0.59

Safety Emphasis Area Addressed:

Older Driver (65+), Aggressive/Speed Related, Younger Drivers Intersections, Local Roads, Motorcycle, Pedestrian, Bicycle

Cost: \$\$\$\$ | Timeframe: LONG



ALCOA

SAFE STREETS

