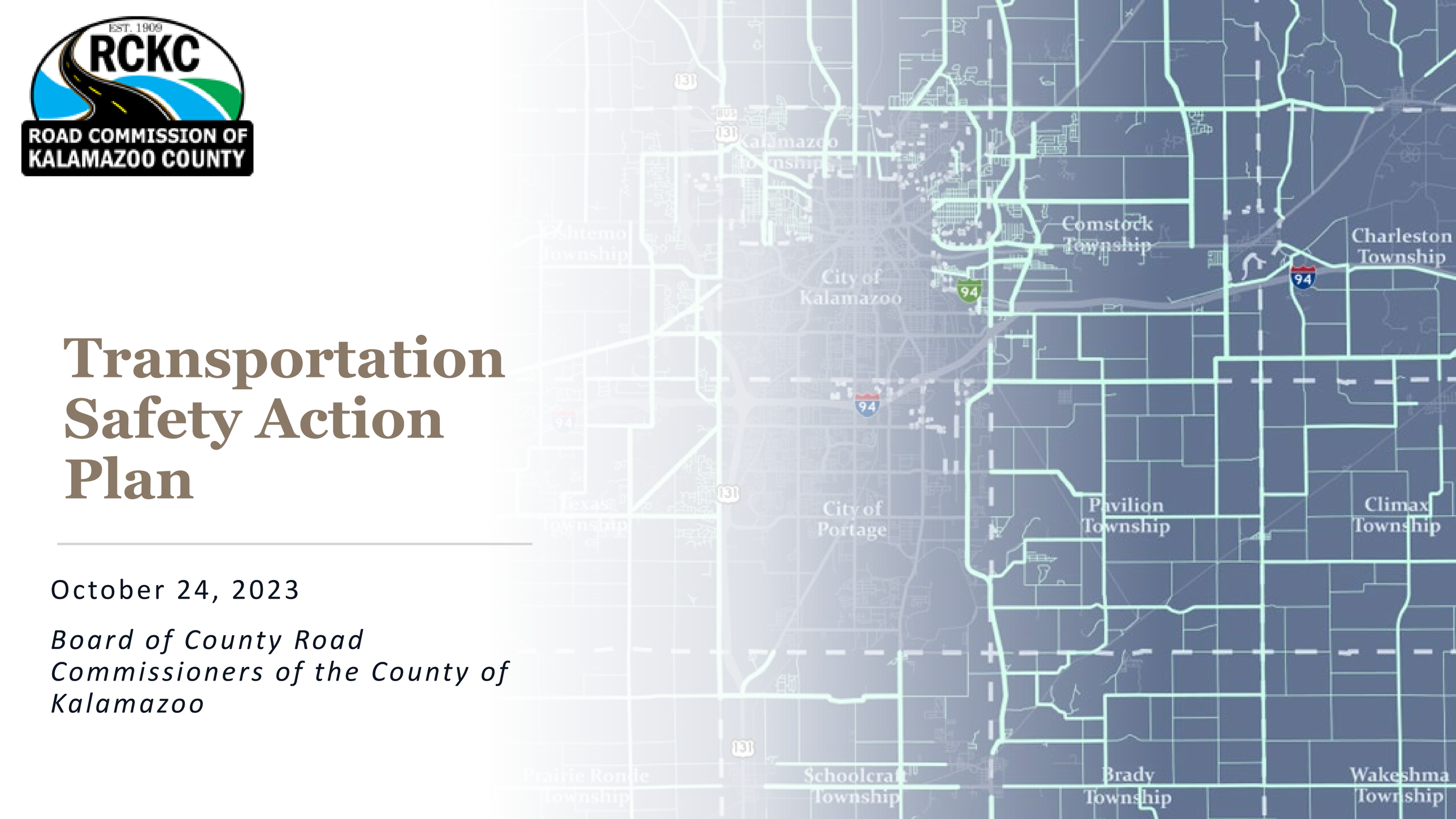
Transportation Safety Action Plan

October 24, 2023

Board of County Road Commissioners of the County of Kalamazoo



VISION

Eliminate all fatalities and serious injuries on RCKC's roadways so that everyone arrives at their destination safely.

GOALS

Eliminate fatalities from 20 in 2021 to 0 by 2050.
Eliminate serious injuries from 60 in 2021 to 0 by 2050.

Guiding Principles

The Safe System Approach

- A proactive method with the goal of saving lives
- 6 principles
- 5 elements

E's of Safety

- A multidisciplinary approach of addressing safety
- 5 E's of Safety

Guiding Principles *continued*

Five Elements of the Safe Systems Approach

SAFE ROAD USERS
The Safe System Approach addresses the safety of all road users, including those who walk, bike, drive, ride transit, and travel by other modes.

SAFE VEHICLES
Vehicles are designed and regulated to minimize the occurrence and severity of collisions using safety measures that incorporate the latest technology.

SAFE SPEEDS
Humans are unlikely to survive high-speed crashes. Reducing speeds can accommodate human injury tolerances in three ways: reducing impact forces, providing additional time for drivers to stop, and improving visibility.

SAFE ROADS
Designing to accommodate human mistakes and injury tolerances can greatly reduce the severity of crashes that do occur. Examples include physically separating people traveling at different speeds, providing dedicated times for different users to move through a space, and alerting users to hazards and other road users.

POST-CRASH CARE
When a person is injured in a collision, they rely on emergency first responders to quickly locate them, stabilize their injury, and transport them to medical facilities. Post-crash care also includes forensic analysis at the crash site, traffic incident management, and other activities.

Adopted from the U.S. Department of Transportation Federal Highway Administration "The Safe System Approach"

Guiding Principles *continued*

Five E's of Safety

ENGINEERING
Improve physical and operational elements of the infrastructure to increase safety for all road users.

EDUCATION
Provide the knowledge and abilities needed to navigate the transportation system safely based on principles of shared responsibility where educators, parents, drivers, and others share a commitment to safety.

ENFORCEMENT
Ensure road users follow the laws governing the transportation system and practice safe behaviors.

EMERGENCY RESPONSE
Provide adequate response and quality care when responding to traffic incidents.

EQUITY
Ensure the transportation system is safe for all road users, in all communities, and for all demographic groups.

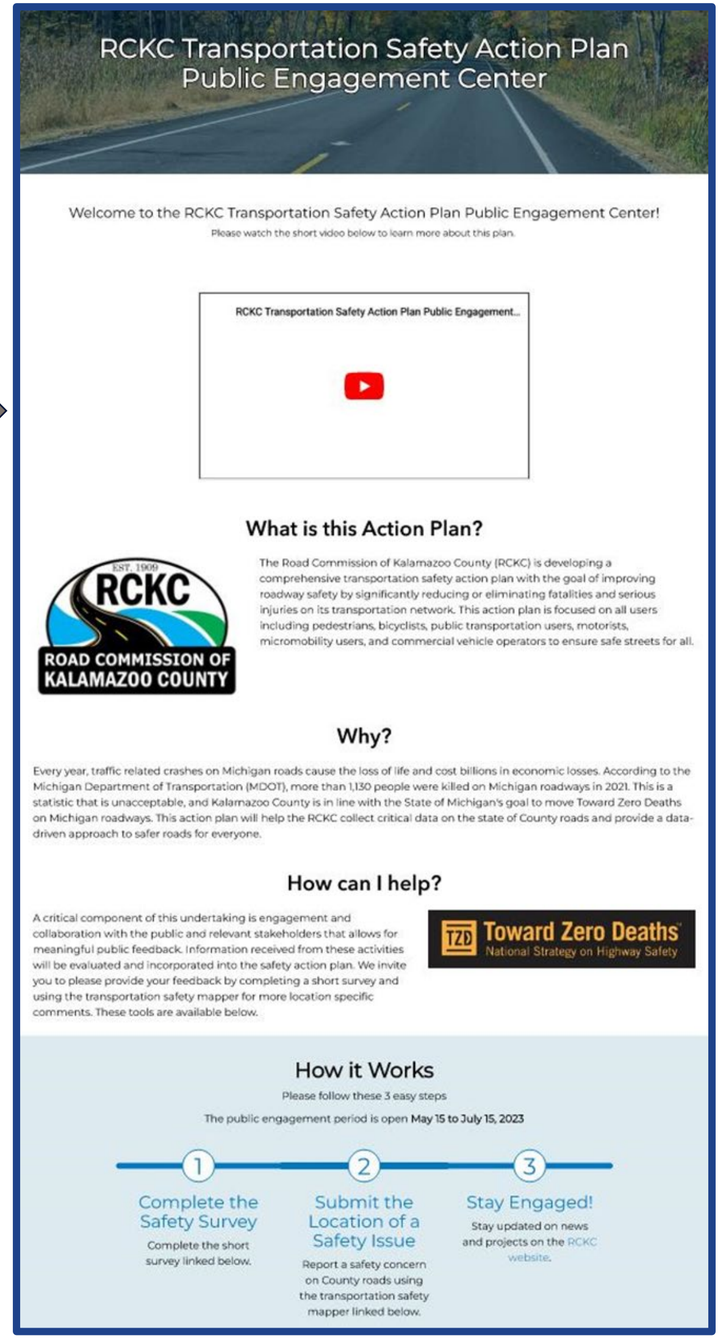
Public Engagement

The RCKC Transportation Safety Action Plan Public Engagement Center

- Open for 3 Months (May 15, 2023 to July 15, 2023)
- Informational video recording
- Built in Survey
- Interactive Mapping System

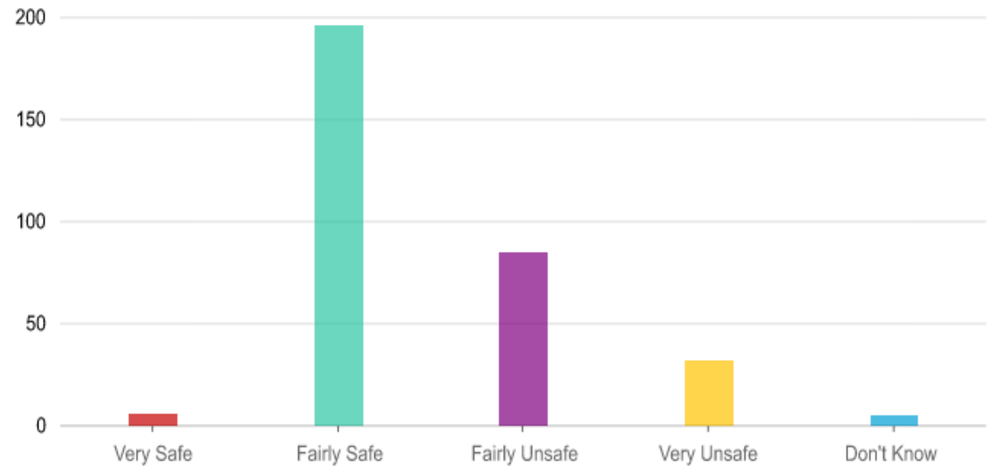
324
Survey responses received

184
Location specific safety concerns collected

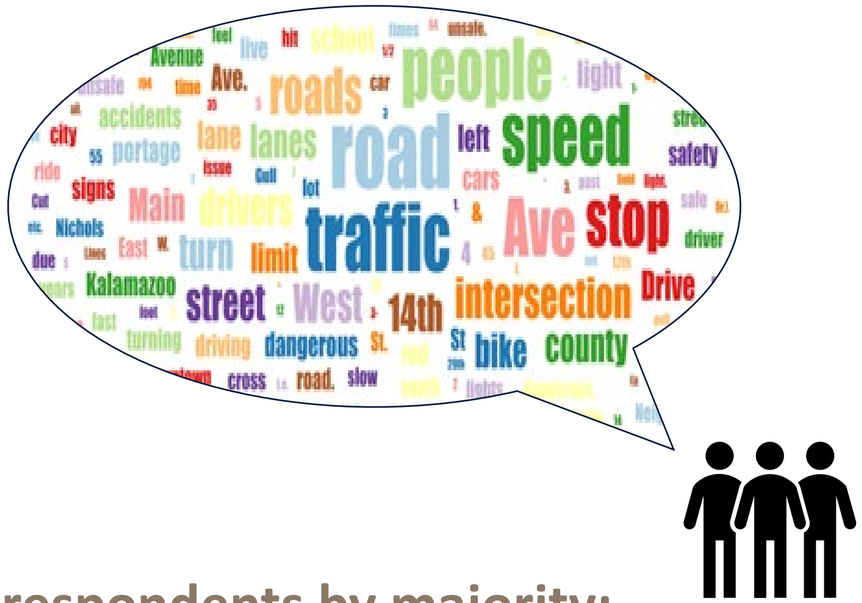


Public Engagement - *Survey*

How would you rate the safety of the County roads? *



Answers	Count	Percentage
Very Safe	6	1.85%
Fairly Safe	196	60.49%
Fairly Unsafe	85	26.23%
Very Unsafe	32	9.88%
Don't Know	5	1.54%



Survey respondents by majority:

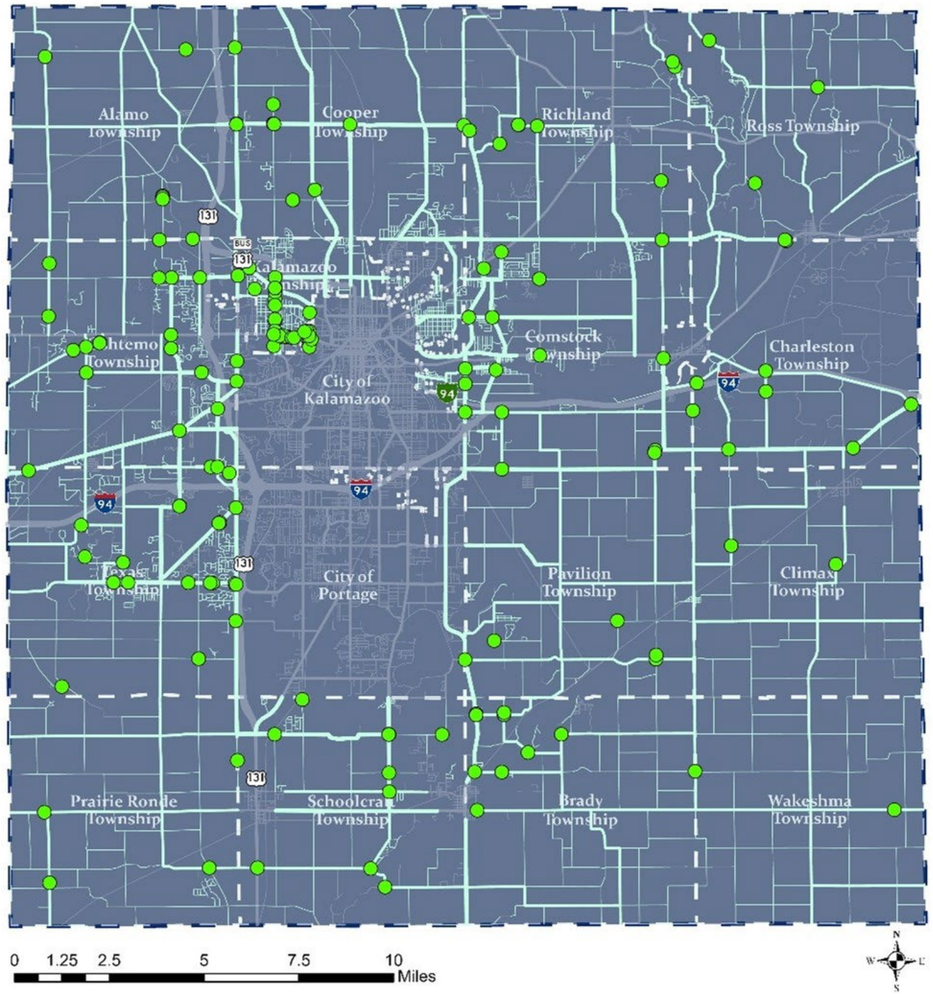
Mode of Travel – Personal vehicle with a few bicycle, pedestrian, motorcycles.

Existing Safety Perception – Road are fairly safe

Safety Issues – Distracted driving, speeding or aggressive drivers, inadequate infrastructure.

Strategies – Engineering, traffic enforcement and education

Public Engagement – *Interactive Mapping System*



Interactive Mapping System general findings:

Response Safety Categories – 39% roads, 44% intersections, 15% pedestrian and bicycle, 2% other

Road Safety Themes – Congestion, Horizontal curvature, Lack of shoulders, Narrow lanes, Pavement conditions, Speeding

Intersection Safety Themes – Congestion, Delineation, Inadequate traffic control, Signal timing/phasing, Speeding, Turning movements, Visibility

Pedestrian and Bicycle Safety Themes – Delineation, Lack/condition of nonmotorized facilities, Speeding, Visibility, Wide roads

Public Engagement – *Interactive Mapping System*

Interactive Mapping System Top 10 Most Cited Locations *(road limits are approximate)*

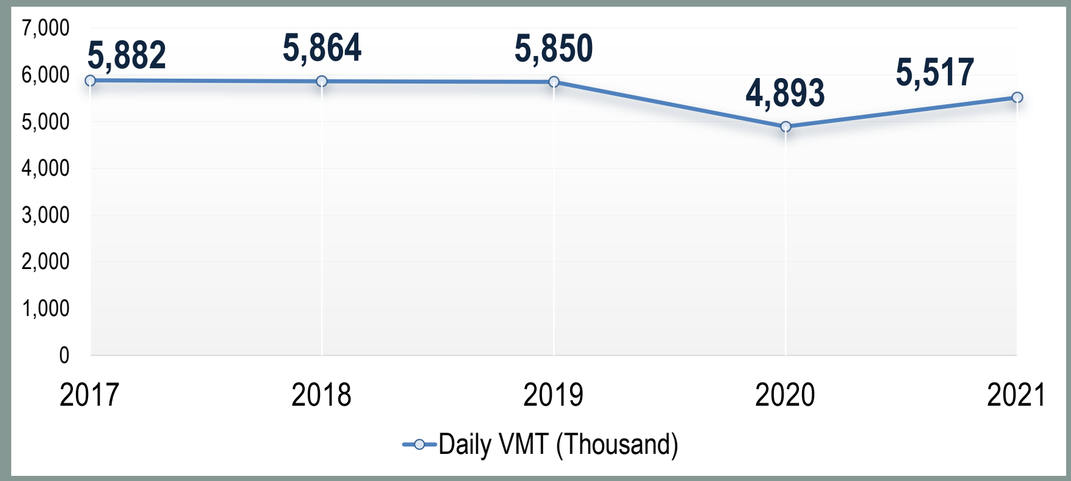
- D Ave & 14th St (11)
- Nichols Rd & Ravine Rd (4)
- 12th St & Q Ave (3)
- Mercury Dr & Michigan Ave (3)
- Portage Rd & U Ave (3)
- M N Ave – 34th St to 35th St (3)
- 9th St – Kvcc Way to San Gabriel Dr (2)
- 27th St – D Ave to D Ave (2)
- Almena Dr – 4th St to Main St (2)
- G Ave – 39th St to Augusta Dr (2)

Safety Context

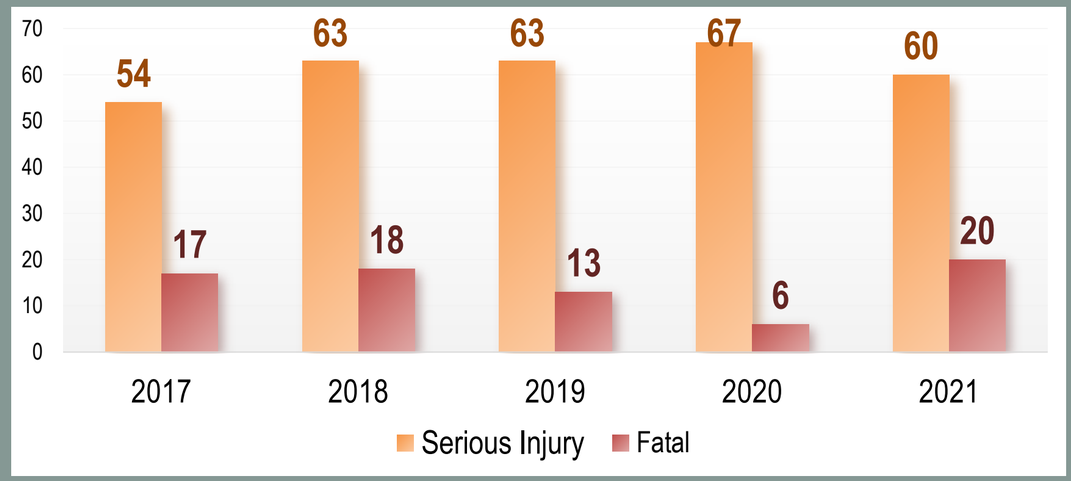
Total Crashes
- 5-year data (2017-2021)

Fatalities & Serious Injuries
- Primary focus

Safety Context
- Crash Characteristics
- Trends
- Temporal Factors
- Equity



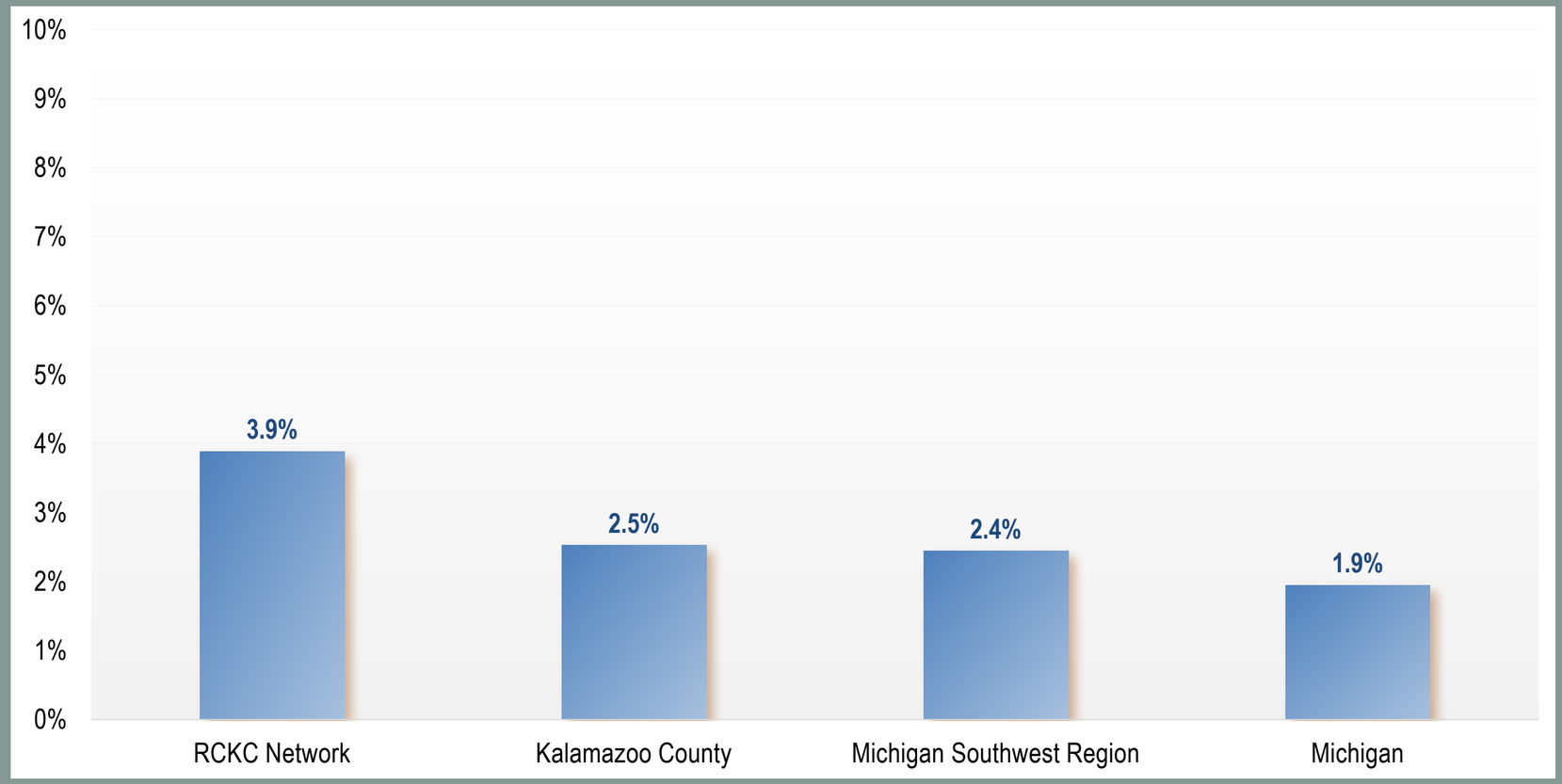
Daily Vehicle Miles Traveled (Thousand) in Kalamazoo County, 2017-2021



Fatalities and Serious Injuries on the RCKC Transportation Network, 2017-2021

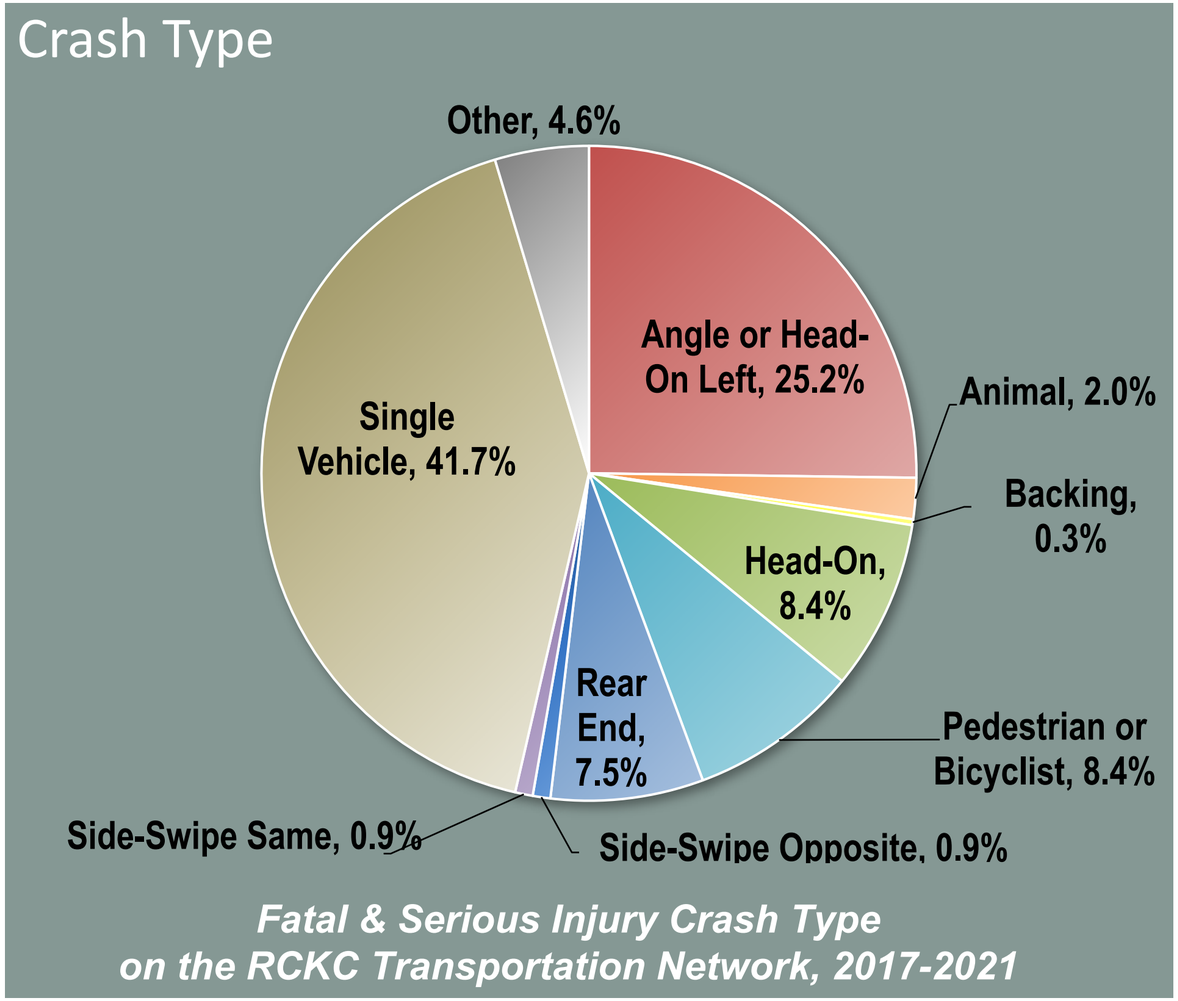
Safety Context continued

Regional Comparisons



Percent of Fatal and Serious Injury Crashes relative to Total Crashes, 2017-2021

Safety Context *continued*



Common crash contributing factors:

Single Vehicle Crashes – Lane departure, Distracted driving, Impaired driving, Inexperienced driving, Pavement/Weather condition, Road alignment/terrain, Speeding

Angle or Head-On Left Crashes – Intersection related, Distracted driving, Disregard for traffic control device, Failure to Yield, Improper turning, Impaired driving, Inexperienced driving, Misjudging gaps

Head-On Crashes – Lane departure, Distracted driving, Impaired driving, Improper passing/lane use, Pavement/Weather condition, Speeding

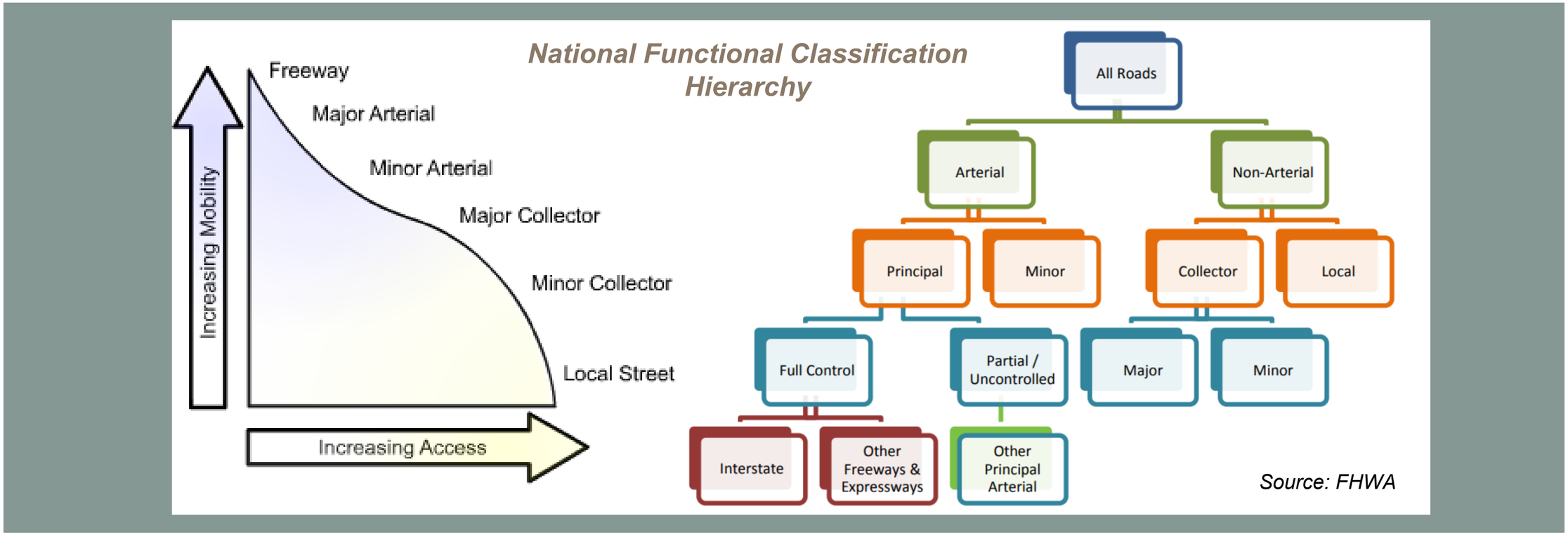
Pedestrian and Bicycle Crashes – Intersection related, Crossing at unmarked locations, Disregard for traffic control device, Distracted driving, Failure to Yield, Impaired driving, Walking/cycling along roadway, Speeding

Safety Context continued

Roadway Classifications:

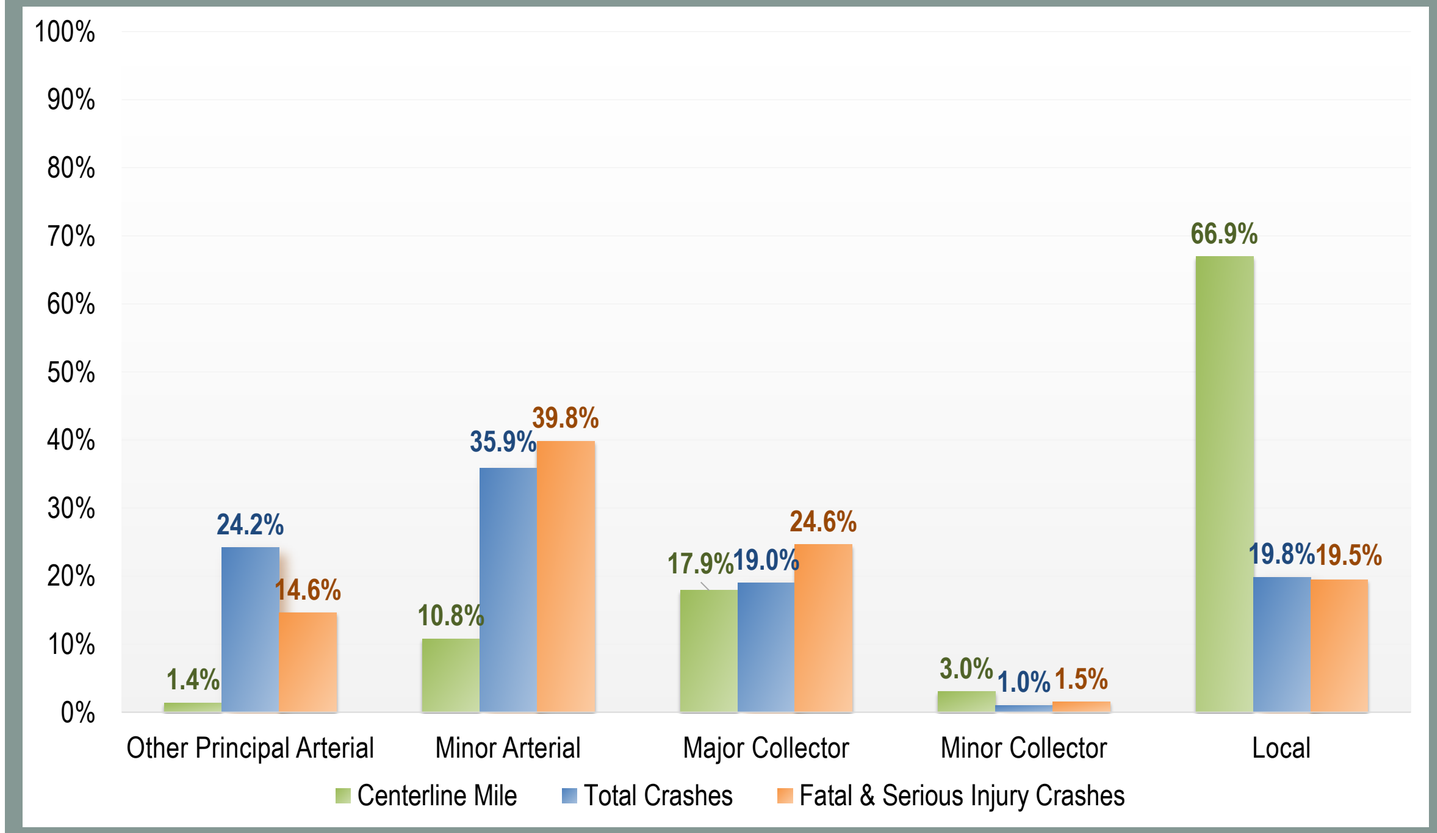
National Functional Classification (NFC) – Standard nationwide classification that groups public roadways into a logical series of decisions based upon the character of travel service they provide. It is primary a function of mobility and land access

Other Classification – Under Act 51, county roads can be classified as either primary or local roads. Primary roads are selected by the counties on the basis of the greatest general importance to the community.

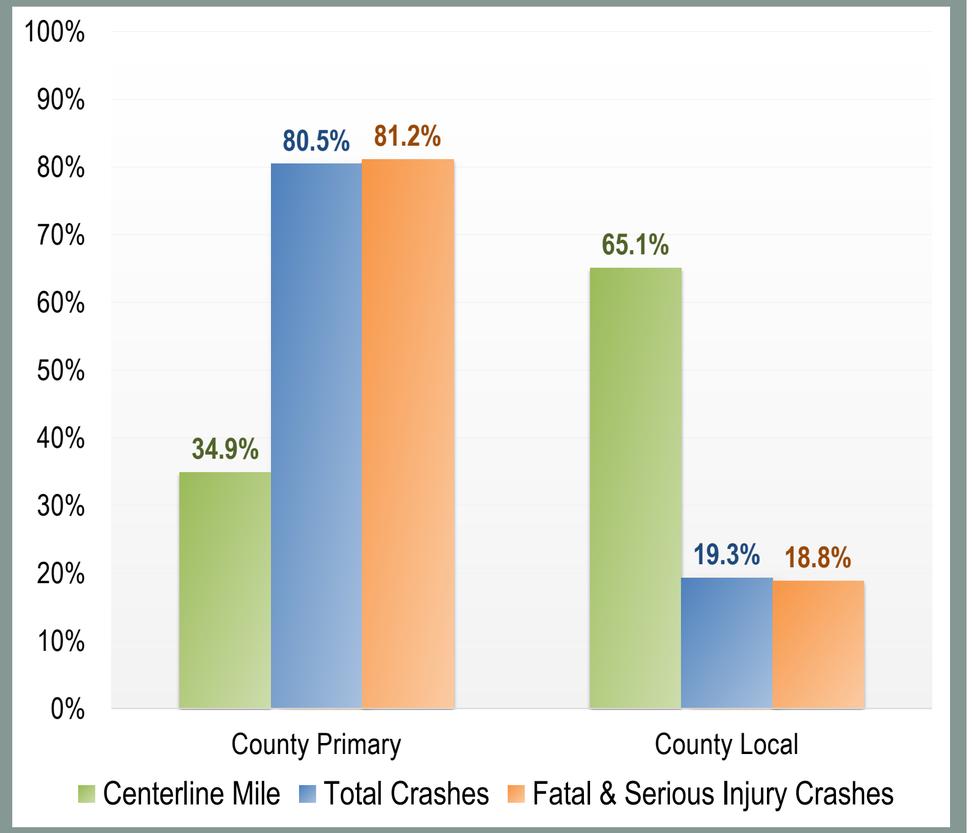


Safety Context continued

Classification Comparisons



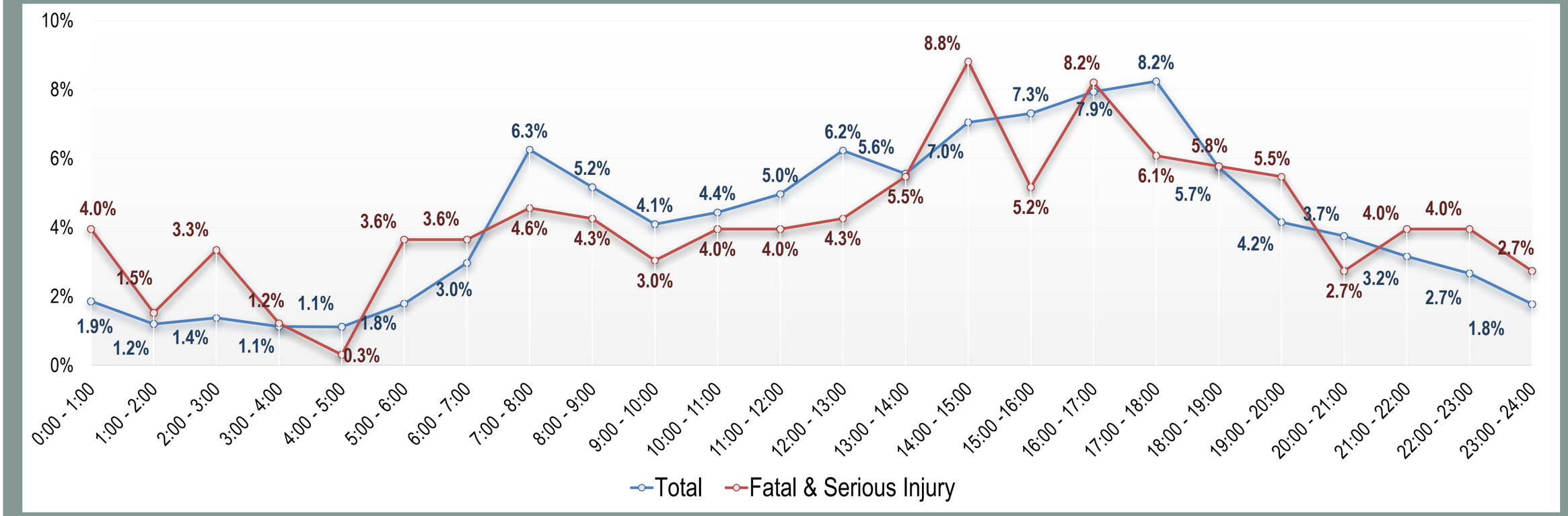
NFC and the RCKC Transportation Network, 2017-2021



Act 51 Classification and the RCKC Transportation Network, 2017-2021

Safety Context *continued*

Temporal Factors



Crashes by Time of Day on the RCKC Transportation Network, 2017-2021

Road User Safety Characteristics:

- Pedestrian or bicycle crashes comprise 1.4% of all crashes but 9.7% of all fatalities and serious injuries
- Motorcycle crashes comprise 1.7% of all crashes but 15.2% of all fatalities and serious injuries

Measuring Progress

Emphasis Areas

ENGINEERING INFRASTRUCTURE

Lane Departure
Intersection
Access Management
Work Zone

AT-RISK ROAD USERS

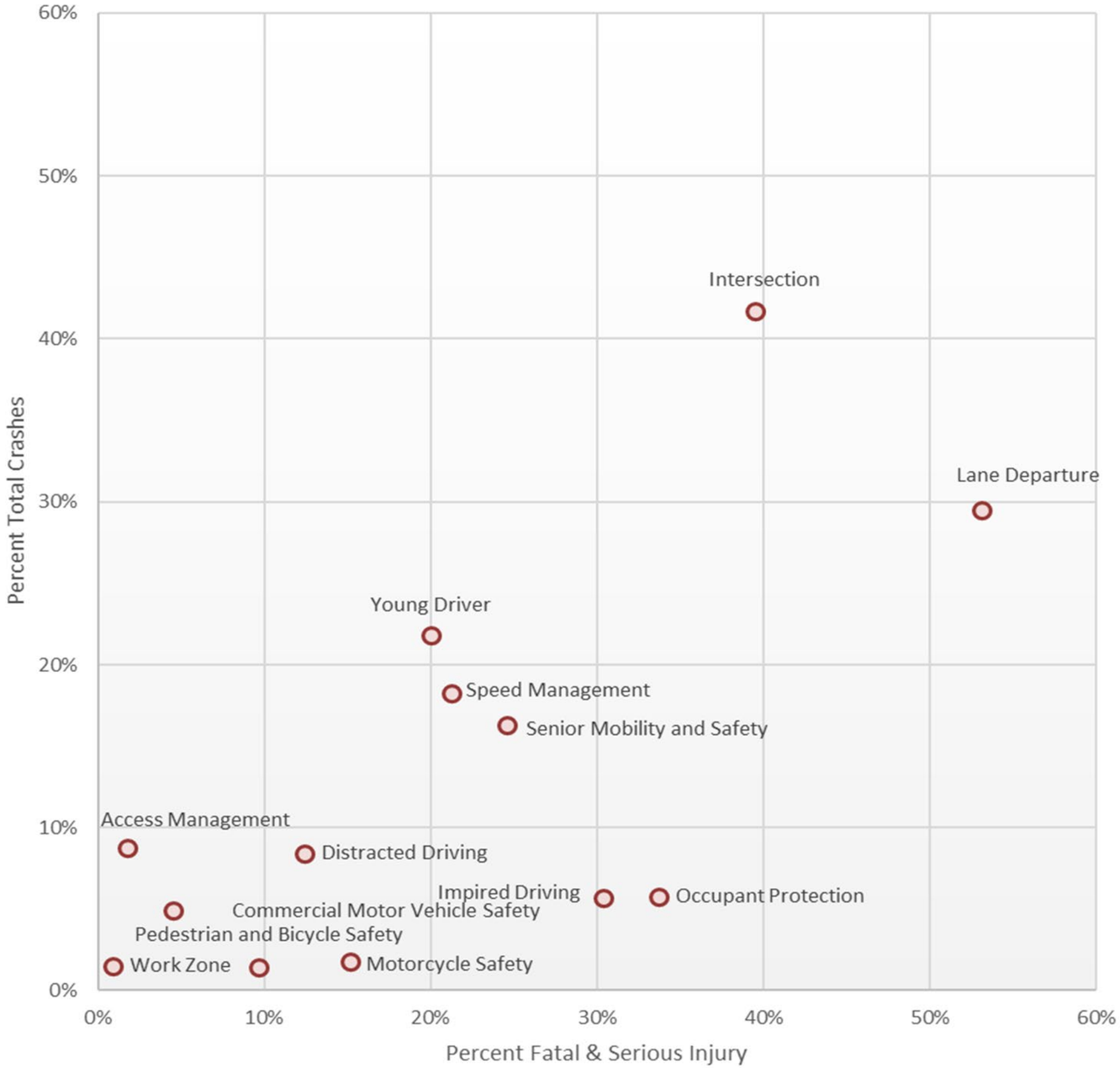
Senior Mobility and Safety
Commercial Safety
Motorcycle Safety
Pedestrian and Bicycle Safety
Young Driver

HIGH-RISK BEHAVIORS

Occupant Protection
Impaired Driving
Distracted Driving
Speed Management

SYSTEM ADMINISTRATION

Traffic Incident Management
Traffic Records and Information Systems

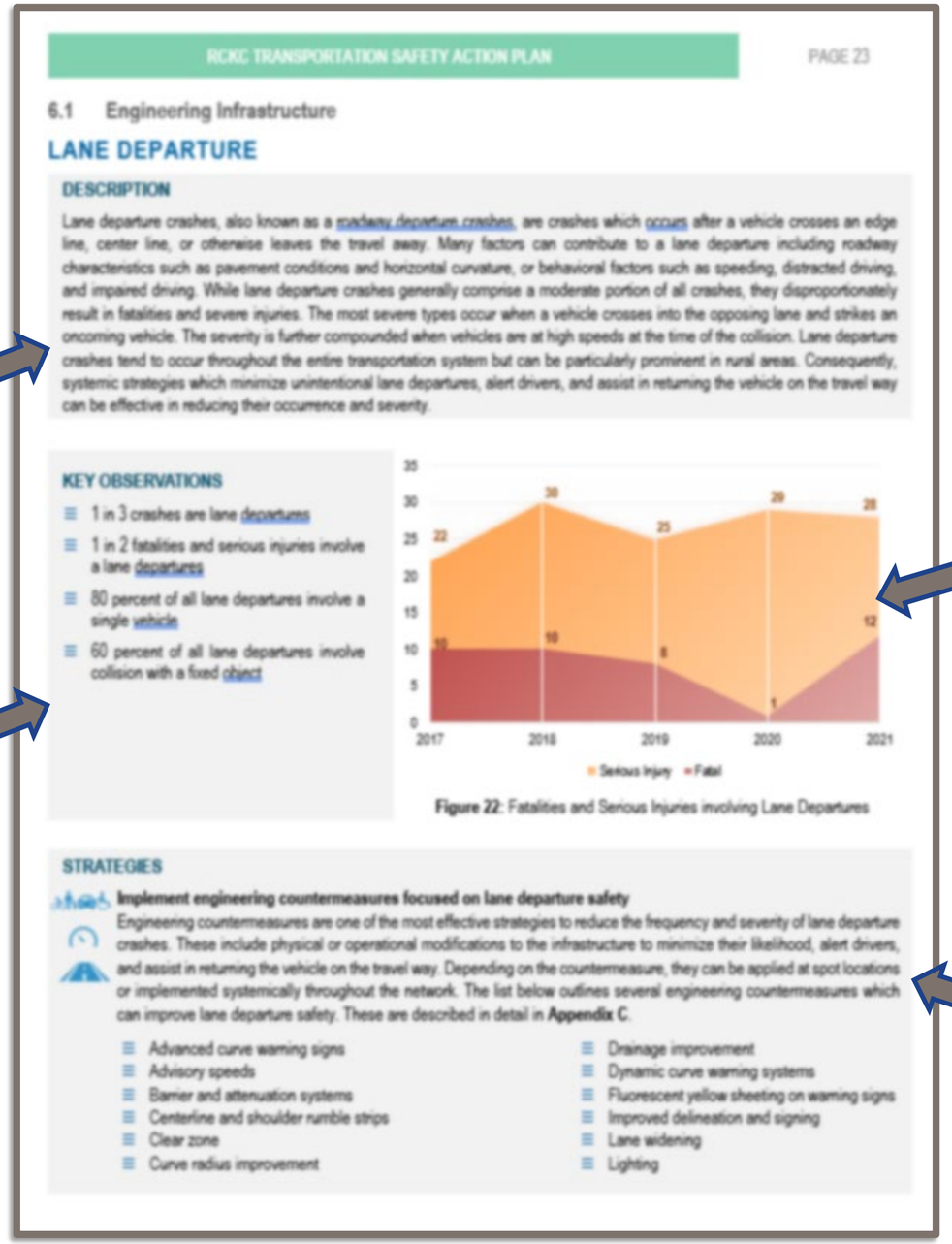


Emphasis Area Safety Matrix, 2017-2021

Emphasis Areas
Example Toolkit

Description of emphasis area

Key observations related to emphasis area safety data



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6.1 Engineering Infrastructure

LANE DEPARTURE

DESCRIPTION

Lane departure crashes, also known as a roadway departure crashes, are crashes which occurs after a vehicle crosses an edge line, center line, or otherwise leaves the travel away. Many factors can contribute to a lane departure including roadway characteristics such as pavement conditions and horizontal curvature, or behavioral factors such as speeding, distracted driving, and impaired driving. While lane departure crashes generally comprise a moderate portion of all crashes, they disproportionately result in fatalities and severe injuries. The most severe types occur when a vehicle crosses into the opposing lane and strikes an oncoming vehicle. The severity is further compounded when vehicles are at high speeds at the time of the collision. Lane departure crashes tend to occur throughout the entire transportation system but can be particularly prominent in rural areas. Consequently, systemic strategies which minimize unintentional lane departures, alert drivers, and assist in returning the vehicle on the travel way can be effective in reducing their occurrence and severity.

KEY OBSERVATIONS

- 1 in 3 crashes are lane departures
- 1 in 2 fatalities and serious injuries involve a lane departures
- 80 percent of all lane departures involve a single vehicle
- 60 percent of all lane departures involve collision with a fixed object

Figure 22: Fatalities and Serious Injuries involving Lane Departures

STRATEGIES

Implement engineering countermeasures focused on lane departure safety

Engineering countermeasures are one of the most effective strategies to reduce the frequency and severity of lane departure crashes. These include physical or operational modifications to the infrastructure to minimize their likelihood, alert drivers, and assist in returning the vehicle on the travel way. Depending on the countermeasure, they can be applied at spot locations or implemented systemically throughout the network. The list below outlines several engineering countermeasures which can improve lane departure safety. These are described in detail in **Appendix C**.

- Advanced curve warning signs
- Advisory speeds
- Barrier and attenuation systems
- Centerline and shoulder rumble strips
- Clear zone
- Curve radius improvement
- Drainage improvement
- Dynamic curve warning systems
- Fluorescent yellow sheeting on warning signs
- Improved delineation and signing
- Lane widening
- Lighting

Data/chart visualizing fatal and serious injury crash numbers

Strategies based on the guiding principles (Safe System Approach & E's of Safety)

Engineering Countermeasure
Example Toolkit

CENTERLINE & SHOULDER RUMBLE STRIPS	
EMPHASIS AREA	Lane Departure Distracted Driving Senior Mobility and Safety
DESCRIPTION	Rumble strips are proven countermeasure for reducing lane departure crashes. They warn drivers of potential danger through vibration and noise transmitted from the wheel of the vehicle to the vehicle's interior. They can be installed over centerlines or on shoulders. When installed over a centerline, rumble strips alert drivers that they are crossing on the opposing direction lane and thus help avoid head-on or sideswipe opposite collisions. When installed on a shoulder, rumble strips alert drivers that they have drifted from the travel way and thus help reduce run-off-the-road crashes. The installation of shoulder rumble strips should also consider bicyclists in the implementation to maintain adequate shoulder width for their use. A nationwide review performed by FHWA indicated that most road agencies experience only isolated locations where rumble strips may degrade or accelerate pavement deterioration. These were along roadway segments where the pavement surface was in poor condition at the time of installation. The FHWA has published guidance on rumble strips installation on two-lane roads to help in this decision-making process. The FHWA recommends that pavement age, condition, type, and thickness be considered when installing rumble strips. For example the most recent surface layer should be thicker than the rumble strip depth to prevent water infiltration. It is also important that if overlays do cover the rumble strips that they be re-milled to ensure adequate depth and functionality. See the 2015 FHWA publication Rumble Strip Implementation Guide: Addressing Pavement Issues on Two-Lane Roads for more information.
PHOTO	 *Source: FHWA*
LOCATION	Rural two-lane and four-lane roads where the posted speed limit is 50 miles per hour or higher. Roadways should have adequate lane width, adequate pavement depth, and fair to good pavement conditions. Priority should be given to roadway segments experiencing considerable lane departure crashes and/or collisions with opposing traffic.
ESTIMATED SAFETY BENEFIT	Centerline Rumble Strips – 55% reduction in run-of-the-road crashes, sideswipe opposite, and head-on crashes[1]. Shoulder Rumble Strips – 20% reduction in run-of-the-road crashes[1].
ESTIMATED COST	Low – Medium

Description of countermeasure

General photo of countermeasure

Potential safety benefit of countermeasure

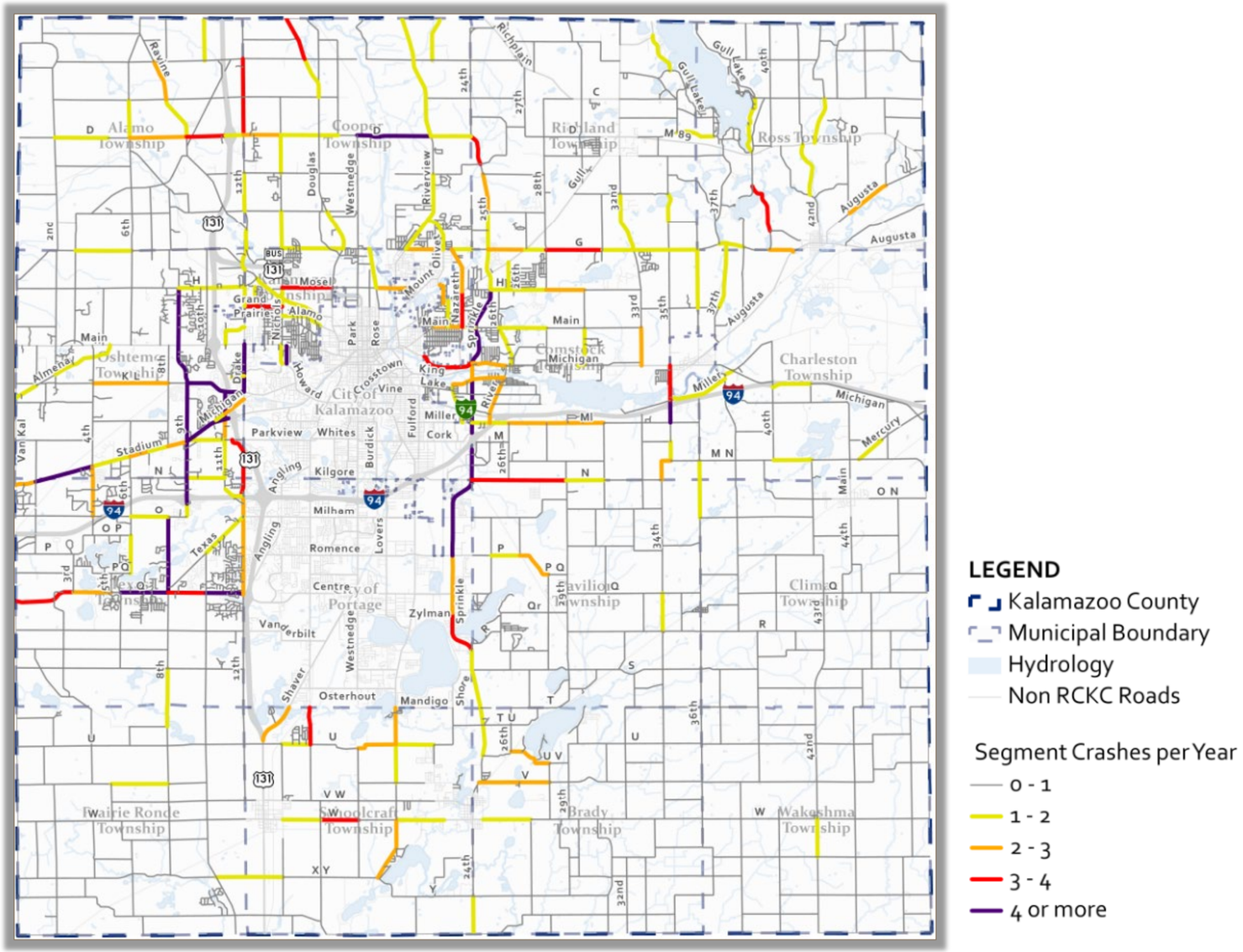
Applicable emphasis areas for countermeasure

Potential location where countermeasure can be implemented

General cost range of countermeasure

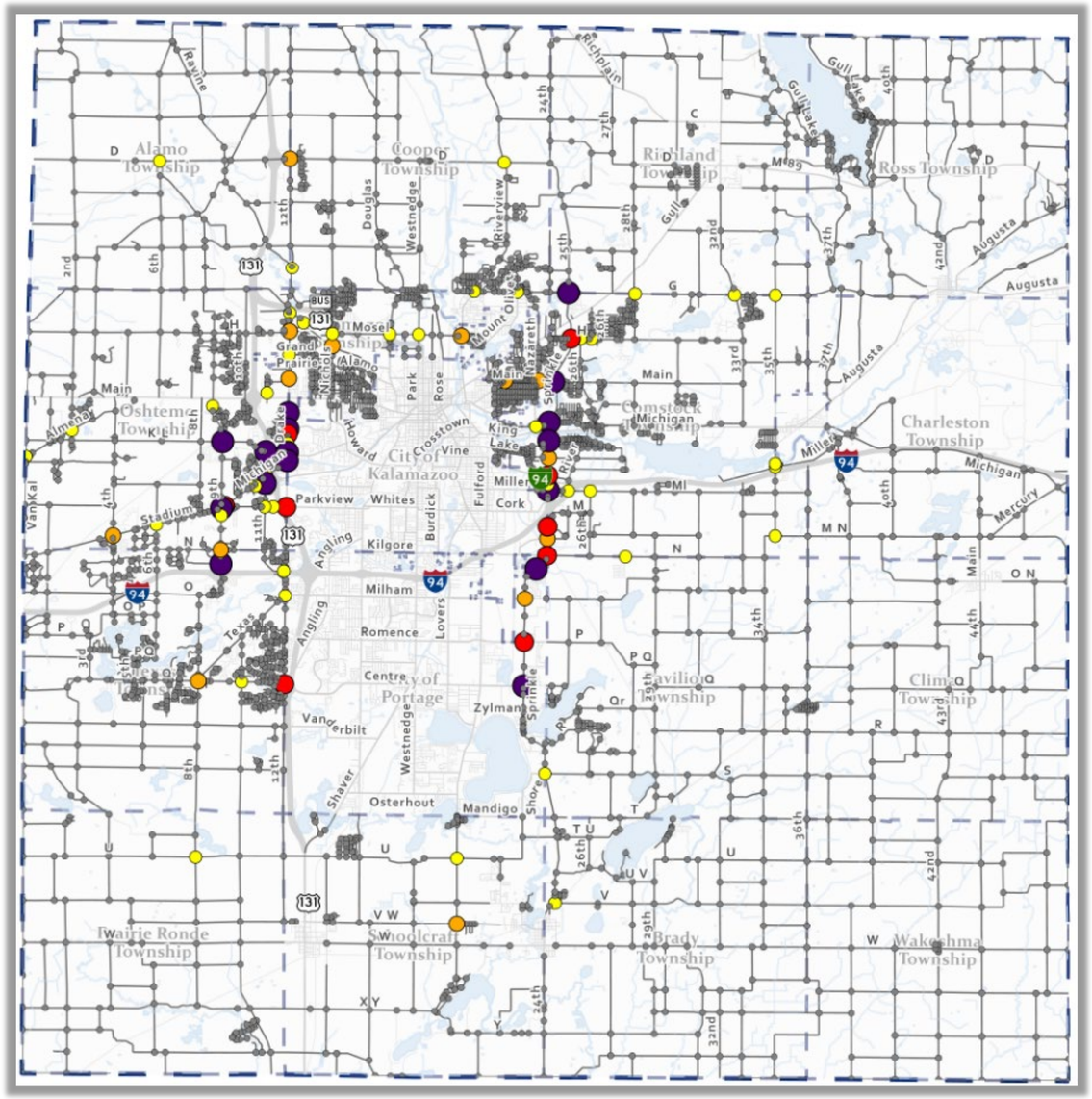
Prioritization

- Data-driven
- Multiple performance measures based on rates and frequency
- Identify high-risk segments and intersections
- Safety maps and high-risk segments and intersections



Segment Crash Frequency on the RCKC Transportation Network, 2017-2021

Prioritization *continued*



Intersection Crash Frequency on the RCKC Transportation Network, 2017-2021

Prioritization

- 40 locations selected for additional safety review
- 20 segments/20 intersections based on total and fatal & serious injury crash frequencies

Segments by total crashes

- Drake Rd - K L Ave to W Main St
- 9th St - I-94 Exit Ramp (EB) to N Ave
- Sprinkle Rd - N Ave to I-94 Entry Ramp
- Sprinkle Rd - Milham Ave to N Ave
- Kendall Ave - Solon St to Main St
- Stadium Dr - 9th St to Michigan Ave
- Sprinkle Rd - Cork St to M L Ave
- K L Ave - 9th St to 11th St
- 9th St - Stadium Dr to K L Ave
- Sprinkle Rd - Michigan Ave to E Main St

Segments by fatal & serious injury crashes

- N Ave - 26th St to 29th St
- Nazareth Rd - Main St to Gull Rd
- 11th St - Stadium Dr to K L Ave
- Sprinkle Rd - Bishop Rd to Milham Ave
- Sprinkle Rd - D E Ave to D Ave
- Douglas Ave - B Ave to Baseline Rd
- E Michigan Ave - Wallace Ave to Sprinkle Rd
- Sprinkle Rd - 24th St to Zylman Ave
- Riverview Dr - Mount Olivet Rd to E Ave
- Douglas Ave - Mosel Ave to G Ave

Intersections by total crashes

- Drake Rd & K L Ave
- 9th St & Stadium Dr
- Sprinkle Rd & M L Ave
- Drake Rd & Driftwood Ave
- 11th St & K L Ave
- Drake Rd & Stonebrooke St
- 9th St & Beatrice Dr
- Sprinkle Rd & Midlink Dr
- Drake Rd & Green Meadow Ave
- Main St & Humphrey St

Intersections by fatal & serious injury crashes

- G Ave & 35th St
- D Ave & 14th St
- M L Ave & River St
- Sprinkle Rd & S Ave
- M N Ave & 38th St
- 12th St & B Ave
- Sprinkle Rd & V Ave
- 26th St & M L Ave
- Drake Rd & Ravine Rd
- Sprinkler Rd & T U Ave

What's Next?

Implementation

Utilize the toolkit to select strategies and/or countermeasures to implement at locations identified and prioritized.

Evaluation

Monitor progress and evaluate outcomes of implementation efforts. Monitor progress and measure effectiveness by looking at data.

VISION ZERO
NO MORE TRAFFIC DEATHS