# 2024 Barrow County Safety Action Plan Executive Summary

***Working toward a goal of zero roadway fatalities by the year 2050***

*Full plan available for viewing on the Barrow County Website*

Barrow County is growing at a rapid rate. To supply residents with the amenities they desire and need, existing infrastructure must be expanded. One step on the path toward this goal is the creation of a Safety Action Plan for Barrow County roadways. Utilizing Safe Streets and Roads for All (SS4A) grant funding, planned roadway improvements can make Barrow's street network safer for all road users.

The SS4A program was established in 2021 as a component of the Bipartisan Infrastructure Law (BIL). Between 2022-2026, $5 billion in appropriated funds are available for local, regional, and tribal initiatives to work towards preventing roadway deaths and serious injuries.

Before 2021, roadway improvement projects were managed by state department of transportation (DOT) entities. Through SS4A, barriers to entry for local input were reduced. Jurisdictions have the capacity to work directly with the federal government to make changes in their respective communities. Closer to the issues at hand than state DOT employees, members of these jurisdictions have a better grasp on what projects to prioritize and where.

The information on the following pages outlines the efforts conducted to create a Safety Action Plan for Barrow County as well as why an Action Plan is important for the future of Barrow County Residents.

Barrow
COUNTY GEORGIA

# BARROW COUNTY - SAFETY ACTION PLAN SCHEDULE

## 2024

| JAN | FEB | MAR | APR |
|---|---|---|---|
| **1/31** Project Kick-off | **2/14** Stakeholder Meeting 1 | **3/10** Stakeholder Meeting 2 | **4/19** Safety Data Compiled |

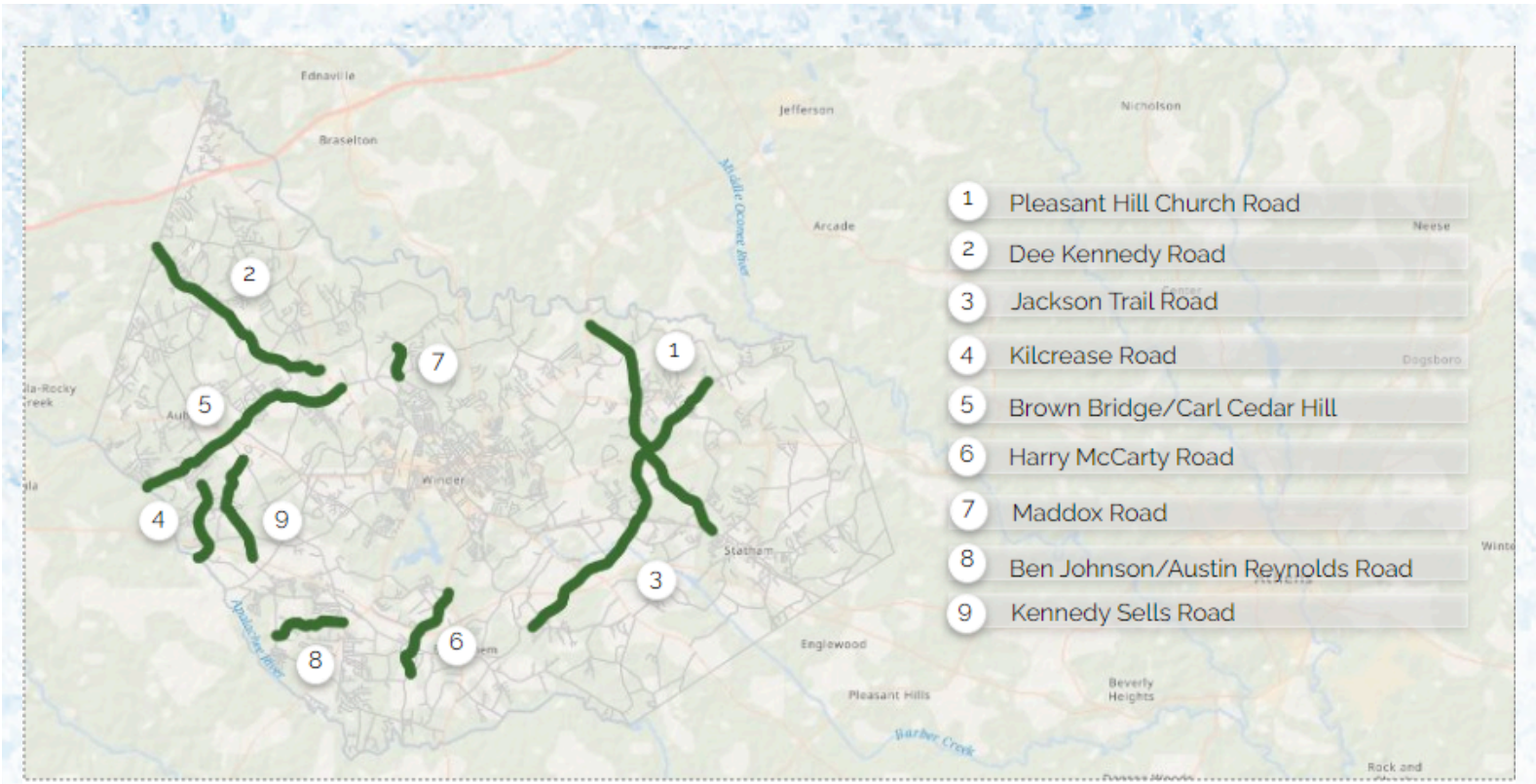
| MAY | JUNE | | AUG |
|---|---|---|---|
| **5/28** Safety Data Analyzed | **6/26** Public Meeting 1 | | **8/22** Countermeasure Strategy Developed |

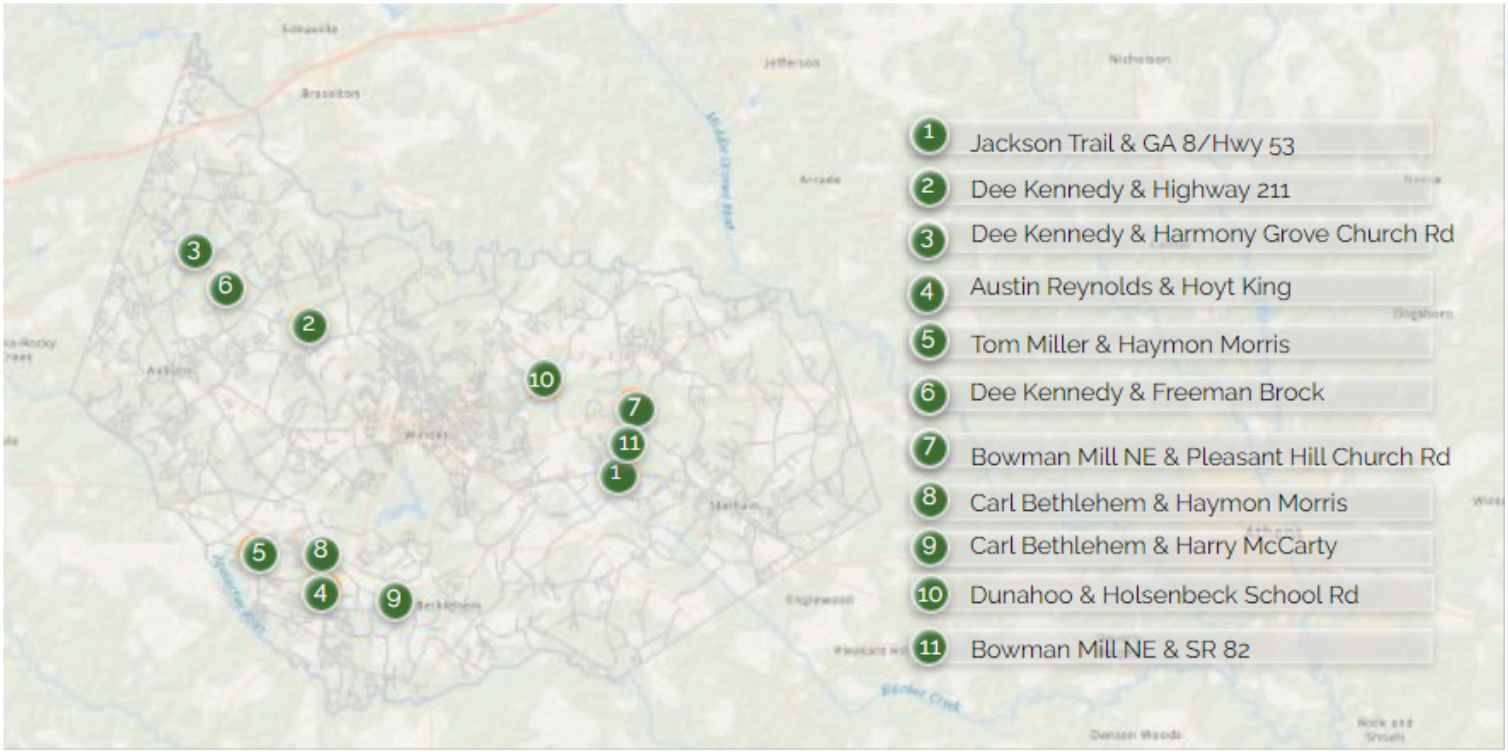
| SEP | OCT | DEC | JAN |
|---|---|---|---|
| **9/12** Stakeholder Meeting 3 **9/26** Public Meeting 2 | **10/11** Draft Plan Submitted | **12/10** Commission Work Session | Plan Adoption |

The Action Plan will be updated every three to five years with additional data collected.

# BARROW COUNTY - SEGMENTS AND INTERSECTIONS

The Barrow Injury Network (BIN) is a culmination of local street segments and intersections with a documented number of fatal and serious injury crashes in the past 5 years. It also encompasses segments and intersections perceived to be less safe by the general public. To make the best use of County resources, most streets on the BIN are not on the state highway system.

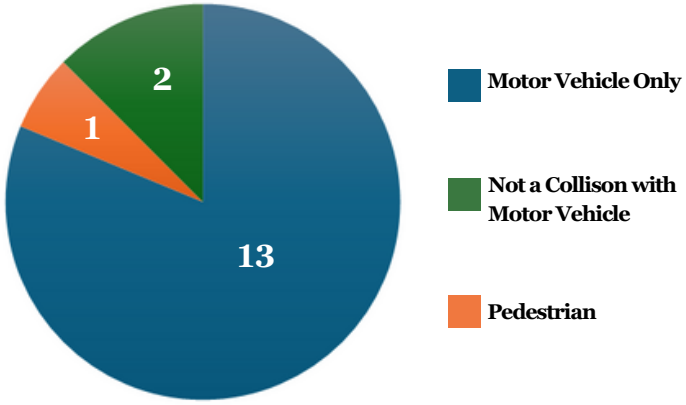


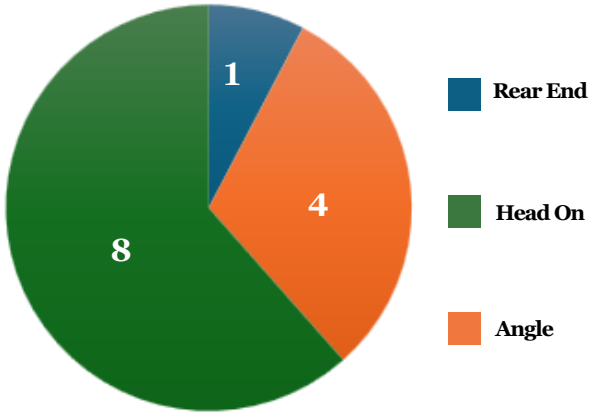



# BARROW COUNTY - WHY IS AN ACTION PLAN IMPORTANT?

On the BIN alone, sixteen lives have been lost to roadway crashes and thirty roadway crashes have resulted in serious injury. As more people move to Barrow County, the risk of these numbers increasing , without intervention, will go up. To support the goal of zero roadway deaths by 2050, an Action Plan has been devised (highlighting streets with the highest history of KA crashes, highest risk of future crashes, and highest probability of receiving future funding) for prioritization.

| Fatal Crashes (K) | Serious Injury Crashes (A) | Other Crashes |
|---|---|---|
| 16 | 30 | 1,240 |
| *35% of KA Crashes* | *65% of KA Crashes* | |




Several state-owned roads and intersections in Barrow County are in the process of being redesigned by GDOT. This Action Plan has a localized focus: 98% of the roads analyzed for improvement are county-owned. Not only does a localized focus capture the roads that GDOT is not working on, it also enables the county to turnaround projects on a faster timeline. Segments and intersections listed as a priority are displayed on page 4. This network of streets has been labeled as the Barrow Injury Network (BIN).

| 2% State Roads | 98% Local Roads |
|---|---|

# BARROW COUNTY - ROAD SAFETY COUNTERMEASURES

## TYPES OF COUNTERMEASURES

1. Near-Term
2. Middle-Term
3. Long-Term

## EXAMPLES

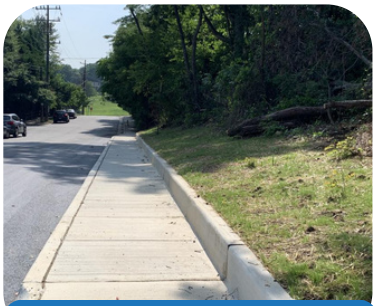
1

Reducing Speed Limit

2


Installing Lighting

3


Building Sidewalks

## HOW WERE COUNTERMEASURES CHOSEN?

29 engineering countermeasures approved by the Federal Highway Administration were narrowed down to 9 for the purposes of creating a safer street network in Barrow. This is how the 9 countermeasures ( near, middle, and long -term) were chosen.

- **Local Input**

Local input was gathered through a combination of stakeholder meetings, public meetings and conversations with county staff. Out of each of the three inputs listed here, local input was the most valuable in the process of determining locations for safety countermeasures.

- **Case Studies**

Previous examples of effective countermeasures were used to decide which countermeasure solutions might increase road safety in Barrow County.

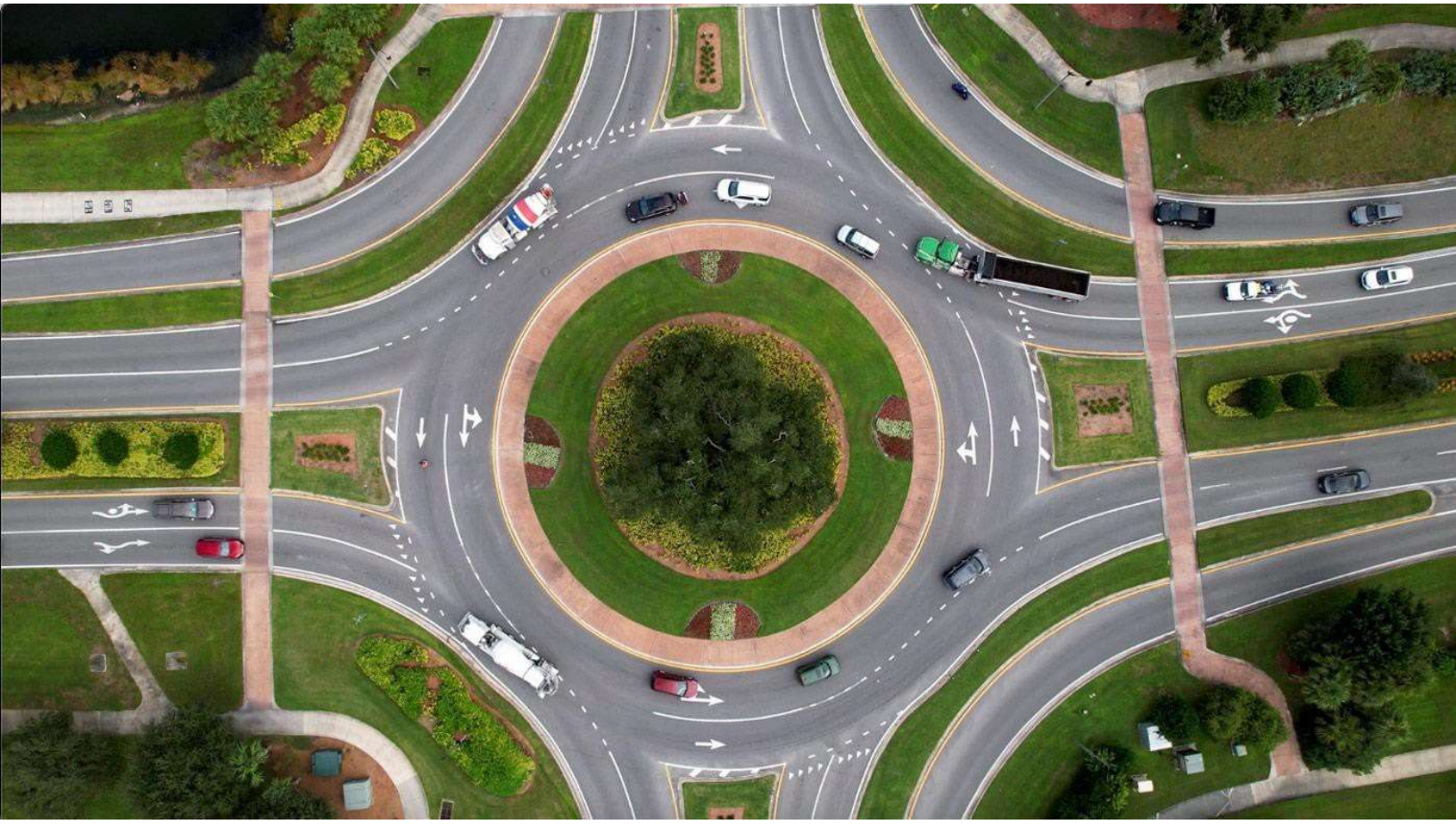
- **Data from Barrow Injury Network**

The number of Fatal and Serious crashes along roads throughout the county were counted. A risk score was derived based upon street conditions that may increase the likelihood of future severe accidents.

These countermeasures , applied strategically per segment and intersection on the BIN, will push Barrow County closer to the **goal of zero traffic related fatalities**

# BARROW COUNTY SAFETY ACTION PLAN

Prepared for Barrow County
December 2024



Prepared by:

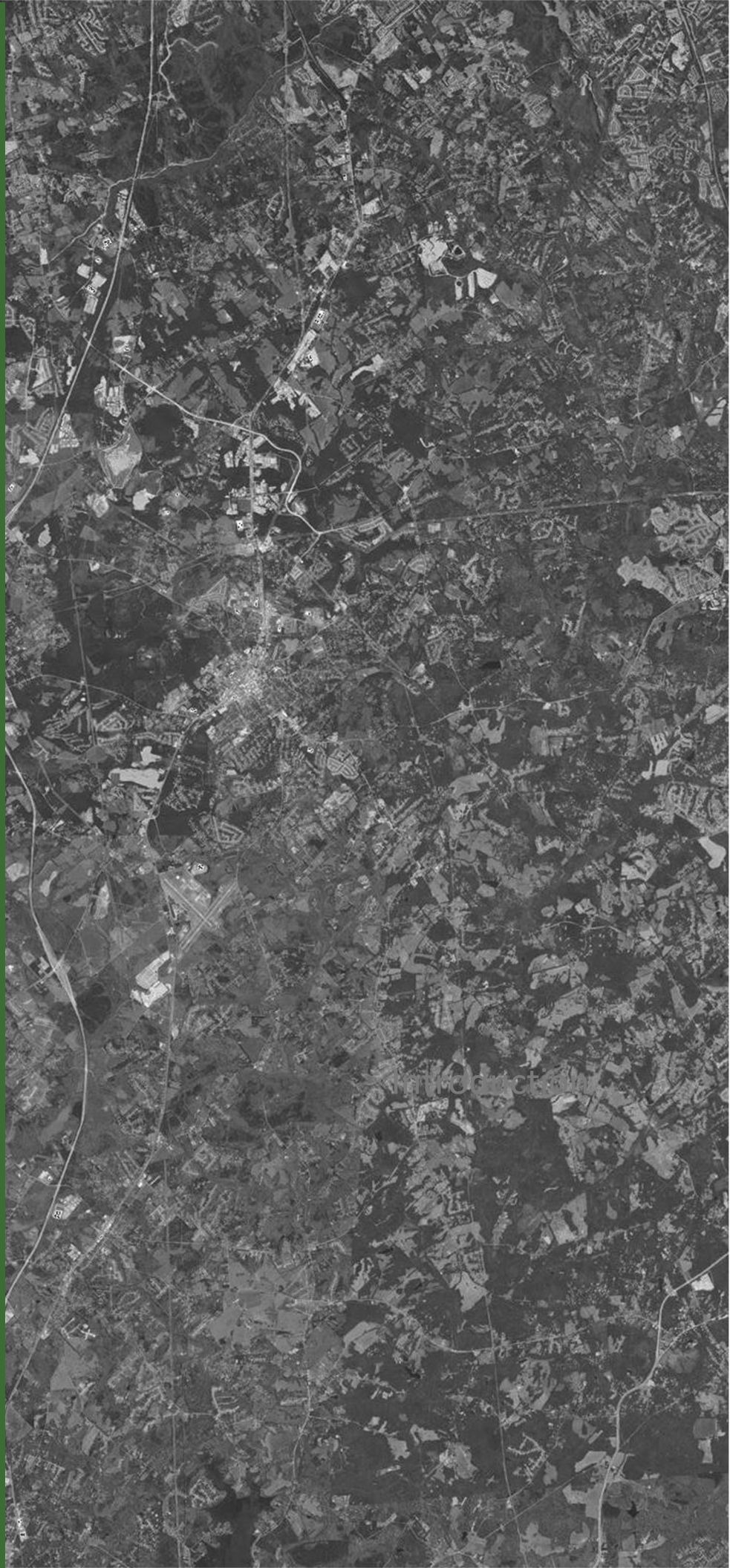
FORESITE group

&

HIGH STREET

# CONTENTS

# Introduction



# INTRODUCTION

Barrow is a rapidly growing county located in north central Georgia and is included in the Atlanta, Sandy Springs, and Roswell metropolitan statistical area. Current day, the county covers approximately 163 square miles and includes the incorporated cities of Auburn, Statham, and Winder which are surrounded by unincorporated areas of Barrow County.

Between 2019 and 2023, 16 fatal crashes occurred in the county. In this same period, 30 serious injury crashes occurred.

Barrow County's Safety Action Plan (the Plan) will be a road map to substantially reduce fatal and serious injury crashes on roads throughout the county in order to achieve Vision Zero by 2050.

## WHAT IS A SAFETY ACTION PLAN?

A safety action plan is a community-specific framework for reducing traffic-related fatalities and serious injuries. Safety Action Plans establish a vision and goals for transportation safety, identify high-crash, high- risk intersections and streets through data analysis and community input, and then develop projects and strategies to address roadway safety issues.

To assist with implementation of projects and strategies, the Highway Safety Improvement Program (HSIP) and Safe Streets and Roads for All (SS4A) are Federal funding programs that support implementation of countermeasures that address road safety challenges on public roads.

A safety action plan can help establish project and program eligibility for HSIP. To pursue federal SS4A funding, a local agency must have a safety action plan in place. Access to these funds can assist Barrow in funding engineering-related solutions that make its roads safer for all road users.

To be eligible for SS4A funding, Safety Action Plans must include eight key components.

**Figure 1** outlines the how these elements are woven into the Safety Action Planning Process.

# ALIGNMENT WITH STATEWIDE EFFORTS

The 2022-2024 Strategic Highway Safety Plan (SHSP) is a statewide, coordinated safety plan that identifies key safety needs and helps direct funding to improvements that reduce highway fatalities and serious injuries on all public roads in Georgia. [1] It is a data-driven, strategic plan that integrates the four E's: engineering, education, enforcement, and emergency medical services (EMS) using the Safe System Approach.

The 2022-2023 SHSP builds on Georgias' 14 emphasis areas, or areas that are the main topics for roadway safety in Georgia. These emphasis areas include:

- Lane Departure Crashes
- Impaired Driving
- Occupant Protection
- Speeding and Aggressive Driving
- Intersection Crashes
- Pedestrians
- Older Drivers
- Motorcycle Crashes
- Younger Drivers
- Large Truck-Involved Crashes
- Driver Distraction
- Bicyclists
- Safety of Persons Working on Roadways
- At-Grade Rail Crossings

The 2023 SHSP identifies six initiatives to create safer roadways across the State:

- Address Top-Risk Locations and Populations
- Implement Speed Management to Realize Safer Speeds
- Take an Active Role to Affect Change in Vehicle Design, Features, and Use
- Double Down on What Works
- Accelerate Research and Adoption of Technology
- Implement New Approaches to Public Education and Awareness

[1] *Georgia Strategic Highway Safety Plan, 2022-2024 (SHSP)*

# SAFETY ACTION PLANNING

This planning process follows the eight elements outlined in the 2024 SS4A Self- Certification Eligibility Worksheet. The process may happen sequentially, but this is not required. Figure 1, below, describes these eight elements.

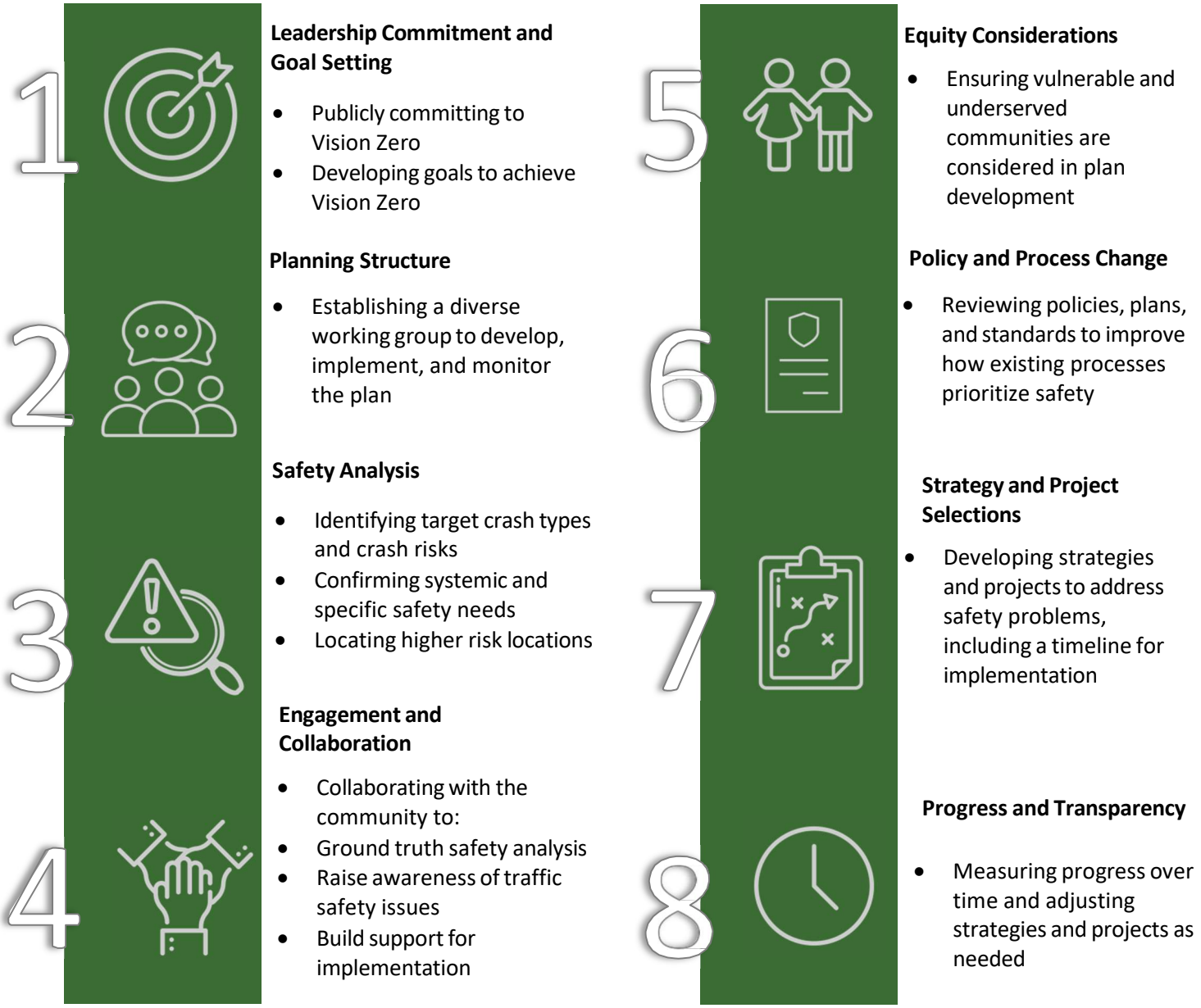



*Figure 1: The Safety Action Planning Process*

# SAFE SYSTEM APPROACH

In January 2022, the United States Department of Transportation released its National Roadway Safety Strategy [3] that adopted the Safe System Approach as its core strategy (**Figure 2**). In 2022, Georgia adopted the Safe System Approach in its Strategic Highway Safety Plan. The Safe System Approach focuses on modifying transportation system design to anticipate human errors and lessen impact forces to reduce crash severity and save lives. In a Safe System, all stakeholders work together who include, but are not limited to, road users, transportation system managers, law enforcement, emergency responders, and vehicle manufacturers.

This timely adoption of the Safe System Approach will help the nation respond to traffic deaths that continue to be unacceptably high across the country. In 2022, there were 42,514 traffic-related fatalities in the United States. [4] In Georgia, there were 1,797 fatalities in 2022. These numbers do not include serious injury crashes that also significantly change the lives of people involved and the communities they live in. The Safe System Approach aims to eliminate fatal and serious injuries on roadways and will require change in traffic safety culture, standards, practices, and partnerships.

There are three key components of the Safe System Approach to understand: the Safe System "**approach**," "**principles**," and "**elements**." In addition, the term "Safe System" is singular to depict an overall safe road system rather than individual elements that would be addressed in isolation.


**Figure 2. The Safe System Approach (USDOT, FHWA)**

The Safe System "approach" is the broadest and describes all aspects of the Safe System.

Six Safe System "principles" encompass the fundamental beliefs that the approach is built upon. A successful Safe System approach weaves together all six principles. The six principles are shown around the outside ring of the graphic.

Five Safe System "elements" are conduits with which the Safe System approach must be implemented. These promote a holistic understanding of safety across the entire roadway system and acknowledge shared responsibility. Making a commitment to zero deaths means addressing every aspect of crash risks through the five elements presented in the middle ring of the graphic.

[3] National Roadway Safety Strategy, United States Department of Transportation, January 2022
https://www.transportation.gov/sites/dot.gov/files/2022-02/USDOT-National-Roadway-Safety-Strategy.pdf

[4] National Highway Traffic Safety Administration Overview of Motor Vehicle Crashes in 2022.
https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/813560

Roadway system managers in the Safe System Approach use a proactive approach to safety to try and address safety concerns before crashes occur, contrasting with traditional road safety practices that are reactive to when crashes occur. This involves using crash data, roadway design characteristics and employing a data-driven approach to identify crash patterns and trends associated with crash risk. Transportation system managers then systemically implement proven safety countermeasures at all locations matching those crash risk factors to mitigate against future crashes.

Finally, redundancy is key in reducing crash occurrences in a transportation system. All parts of the system should be strengthened so that if one part fails, other parts of the system still protect roadway users. A simple implementation of this would be rumble strips that protect people when their own ability to be safe road users is compromised by distractions or drowsiness.

While the Georgia SHSP focuses on statewide issues, Barrow County's Safety Action Plan focuses on local challenges. The fundamental change to adopting the Safe System Approach locally is to use its elements and principles to help guide decisions and promote collaboration across different roadway responsibilities. Barrow County's Safety Action Plan aligns with the principles and elements of the Safe Systems Approach, as delineated in **Table 1** and **Table 2**.

Ultimately, Barrow County's Safety Action Plan adopts a Safe System Approach and encourages forward- thinking strategies, addressing the fact that historical approaches to traffic safety have not been effective enough in preventing fatal and serious injuries. Commitment from County staff and road safety partners to prioritize safety in their efforts and implement both proven and innovative ideas are key to the Plan being impactful and in line with recent commitments at the national and state level.

The vision, goals, supporting information, and actions for the Action Plan are documented in the following sections.

Table 1. Safe System Principles Alignment

| Safe System Principle | Action Plan Recommendations |
|---|---|
| **Death/Serious Injury is Unacceptable** | ■ Substantially reduce fatal and serious injury crashes |
| **Humans Make Mistakes** | ■ Identify opportunities to improve the roadway network that allows human error to occur without resulting in a fatality or serious injury |
| **Humans are Vulnerable** | ■ Remove severe conflict points<br>■ Reduce vehicle speeds<br>■ Prioritize safety over travel time |
| **Responsibility is Shared** | ■ Formalize a traffic safety task force or forum to meet regularly including partner agencies and organizations |
| **Safety is Proactive** | ■ Include systemic countermeasures and strategies to proactively address safety<br>■ Implement proven countermeasures at locations with higher potential crash risk |
| **Redundancy is Crucial** | ■ Overlap efforts between all roadway safety partners to create a culture of traffic safety |

Table 2. Safe System Elements Alignment

| Safe System Elements | Action Plan Recommendations |
|---|---|
| **Safe Road Users** | ■ Identify engineering countermeasures to prioritize vulnerable roadway users<br>■ Support and develop public education materials and equitable enforcement efforts to address safety emphasis areas |
| **Safe Vehicles** | ■ Support legislation and other implementation strategies to develop safe vehicle technologies |
| **Safe Speeds** | ■ Support and implement countermeasures and strategies to reduce unsafe speeds including engineering roadway design, public education, and equitable enforcement efforts. |
| **Safe Roads** | ■ Update policies, design standards, and decision-making processes to prioritize safe road design (e.g., apply the Safe System Road Design Hierarchy) |
| **Post-Crash Care** | ■ Identify opportunities to reduce emergency medical times or improve access to crash sites or medical care<br>■ Support on-scene crash incident safety and medical training |

# Vision and Goals

## VISION

**Apply the Safe System Approach to substantially reduce fatal and serious injury crashes and crash risk in Barrow County.**

## GOALS

| | | |
|---|---|---|
| 1 | **Use data-informed analysis and community input to identify and prioritize approaches to reduce crash risk.** | a. Establish a recurring process to identify locations for safety improvements using county wide crash and crash risk data, and community input.<br>b. Systemically implement proven safety countermeasures at intersections and streets with similar crash patterns, crash risks, and/or community concerns.<br>c. Reinforce engineering countermeasures through community-supported education and enforcement strategies. |
| 2 | **Adopt a Complete Streets policy that strategizes implementation for future and existing infrastructure to create a healthier, greener, and safer roadway system.** | a. Prioritize other modes of transportation that are disproportionate in our community.<br>b. Safety Action Plan working group to engage local community on a quarterly basis to identify existing infrastructure that needs improvement. |
| 3 | **Adopt a Complete Streets policy that strategizes implementation for future and existing infrastructure to create a healthier, greener, and safer roadway system.** | a. Identify Lead Agency and Safety Action Plan coordinator within Barrow County to facilitate the implementation of Safety Action Plan projects and strategies.<br>b. Establish multi-agency Safety Action Plan working group that meets on a quarterly basis to review data, community input, and action plan progress.<br>c. Use multidisciplinary partnerships, including community partners, to implement Safety Action Plan projects and strategies |

# Planning Structure

# PLANNING STRUCTURE

Barrow County and its Stakeholder Committee, working alongside Foresite Group, created this Plan to provide information and direction on strategies and treatments most likely to improve roadway safety performance within the county. The Safety Action Plan was developed consistent with USDOT guidance on Safety Action Planning.[6]

The development of this plan was funded by USDOT through the Safe Streets for All (SS4A) program. The content of this plan was developed in collaboration with the County and its multidisciplinary partners in implementation. The plan supports Barrow's vision and goals specific to roadway safety performance by:

1. Establishing that county staff will, implement, and monitor the plan,
2. Using safety data to identify county wide safety patterns and trends,
3. Identifying proven countermeasures and strategies to address those trends, and
4. Prioritizing solutions for implementation

The plan establishes a basis for evaluating and informing roadway safety performance improvements over the next three to five years. It provides a method the county can use to update its list of high crash, high risk locations and produce projects and programs to improve safety in the future.

## STAKEHOLDER COMMITTEE AND PUBLIC ENGAGEMENT

While data is an important and useful tool to help define safety issues, it can be incomplete for a variety of reasons. These might include inaccurate reporting, an inability to capture safety issues like near-misses, and difficulty pinpointing streets or areas people currently avoid because they feel unsafe. The Safety Action Plan took a data-informed approach to planning, using data analysis together with engagement with a Stakeholder Committee and the public to highlight lived experience in addition to data to develop a more comprehensive view of the transportation safety issues in the county. 4 meetings were held with the Stakeholder Committee on February 14, 2024; March 10, 2024; and September 12, 2024 along with 2 Public Meetings on June 26, 2024, and September 26, 2024.

[6] Comprehensive Safety Action Plans, United States Department of Transportation, Accessed March 2024 https://www.transportation.gov/grants/ss4a/comprehensive-safety-action-plans

## INPUT GATHERED

The Stakeholder Group met three times over the course of the Safety Action Plan's development, discussing certain topics as summarized below:

- Vision and Goals for the Safety Action Plan
- Data and analysis findings specific to crash and risk patterns and trends identified across the county and specific locations identified as higher priority for improvements.
- Specific countermeasures for use by the county on a systemic or widespread basis

### *High Injury Network Development Tool*

For use as an education and outreach tool, a dashboard was developed for the Barrow County' Safety Action Plan with the ESRI ArcGIS. The dashboard can be accessed here:

https://experience.arcgis.com/experience/a0e48175b6db4306adfed21d02fab688/

The dashboard includes a summary of the High Injury Network (HIN), project background information, maps and materials related to different planning process phases, an interactive mapping tool, and a public input survey.

# Safety Analysis and Results

# Safety Analysis and Results

## High Injury Network (HIN)

The safety analysis results in a High Injury Network (HIN) that prioritizes segments with fatalities and serious injuries through a combination of both historic need and potential risk. Several networks were created related to ownership (non-state owned) and crash types (non-motorized). The below 3-step process outlines the methodology taken to arrive to our High Injury Network:

**Step 1 - Need:**

**Location-Specific (Hot Spot) Analysis** reactively identifies roadway junctions and segments with higher concentrations of observed fatal (K) and serious injuries (A) crashes. This traditional "hot spot" analysis focuses investments at locations where a higher preponderance of severe crash events has occurred in the past five years. The resulting data shows high fatalities and serious injuries at segments and a "Location Score", which ranks features based on the number of KA crashes in the five-year period of 2019 to 2023. The process filtered, combined, and spatially joined our crashes to segments within 150 feet of the roadway; matching recommendations from the Highway Safety Manual.

**Step 2 - Risk:**

**Systemic Based (Risk) Analysis** uses a machine learning model (Poisson regression) that identifies features of the regional roadway that correlate with fatalities and serious injuries regardless of whether such events occurred recently. The goal is to flag infrastructure with roadway features (e.g., lane count) and driver behaviors (e.g., speeding) that may increase the likelihood of future severe incidents on the network. The resulting attribute of this work is a "Risk Score" that calls attention to particularly risky roadway and junction facilities.

**Step 3 - Overall Trends:**

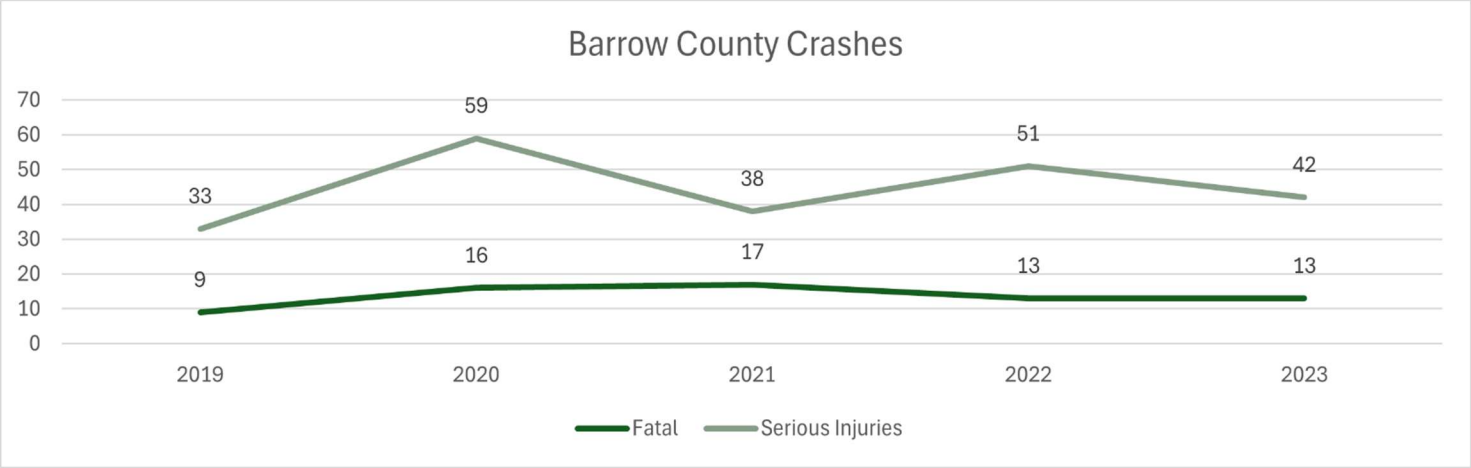
**Regional crash trends** were analyzed to develop a set of emphasis areas. The trend analysis, grounded in rigorous examination of 2019 – 2023 crash data showed 229 crashes that resulted in a serious injury or a fatality ("A" severity or "K" severity respectively), accounted for 2.89 percent of all crashes. The highest correlations were found on Multi-Lane Principal Arterials through Angle and Lane Departure Crashes.

From this 3-step process, a High Injury Network was created considering **Need**, **Risk**, and **Emphasis Area Trends**. Iterations were made to the scoring of the HIN to prioritize segments that could be the most impactful. Our scoring method ensured that the HIN consisted of both high- crash locations and high-risk locations. This High Injury Network was used to determine corridors and intersections considered for countermeasure selection based on a set of countermeasures preferred by the county. These countermeasures were chosen based on ease of county programmatic approval, not effectiveness. Prioritization of these projects are shown in the following pages.

## DATA

| | 2019 | 2020 | 2021 | 2022 | 2023 |
|---|---|---|---|---|---|
| Fatal (K) Crashes | 9 | 16 | 17 | 13 | 13 |
| Serious Injury (A) Crashes | 33 | 59 | 38 | 51 | 42 |
| Total Fatalities | 10 | 18 | 20 | 14 | 15 |
| Total Serious Injuries | 44 | 73 | 55 | 69 | 52 |

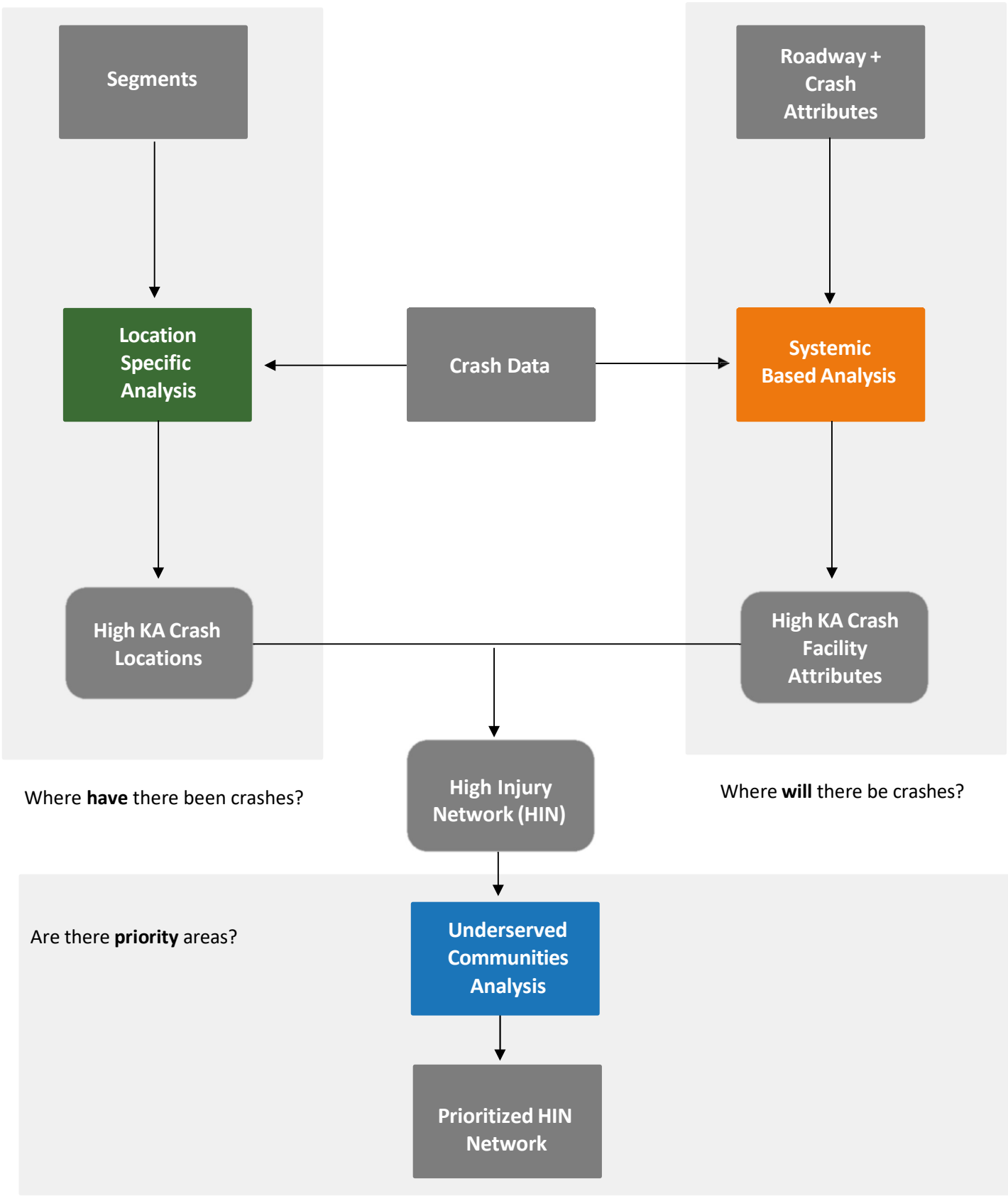
## TRENDS




| | Manner of Collision | Fatalities | Serious Injuries |
|---|---|---|---|
| Intersection Related | **Angle** | **36** | **99** |
| | Not a Collision with a Motor Vehicle | 20 | 97 |
| Segment Related *(Rear Ends and Roadway Departures)* | **Head On** | **13** | **48** |
| | **Rear End** | **7** | **48** |
| | **Sideswipe: Opposite Direction** | **1** | **0** |
| | **Sideswipe: Same Direction** | **0** | **1** |

| | Top User Contributing Factors | Fatalities | Serious Injuries |
|---|---|---|---|
| Intersection Related | **Failed to Yield** | **2** | **24** |
| | **Disregarded Traffic Controls** | **6** | **12** |
| | Driver Lost Control | 6 | 10 |
| Segment Related | **Wrong Side of Road** | **3** | **8** |
| | **Following Too Close** | **1** | **6** |
| | Under the Influence | 1 | 6 |

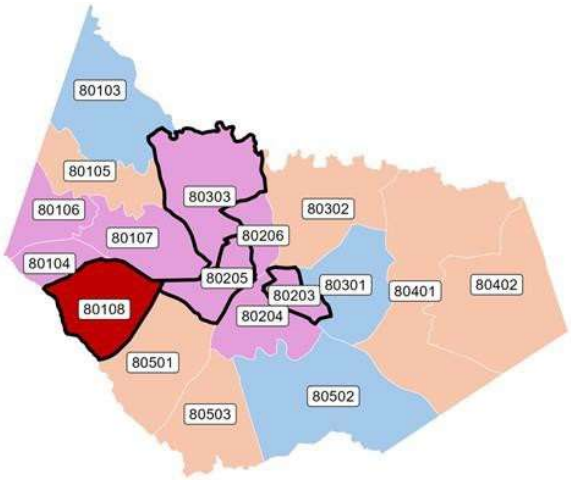
## METHODOLOGY



# Equity Analysis

From the perspective of Barrow County, these sites are **Maddox Road, Jackson Trail Road** between SR 29 and SR 53, **census tracts 80108, 80203,** and **80205** more broadly. In coordinating with Georgia DOT, improvements along SR 211 and SR 29 should also be prioritized where possible.

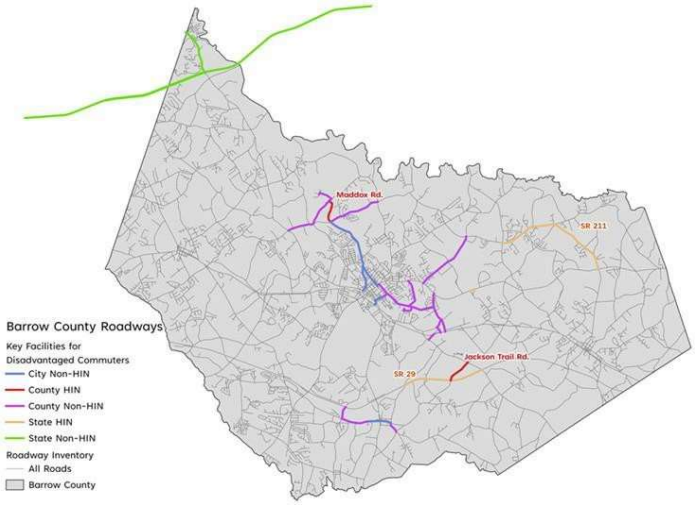
The goal of equity analysis for SS4A planning and implementation is to identify which portions of the county where residents are simultaneously exposed to facilities that are part of the High Injury Network (HIN) as well as being more likely to be disadvantaged in some way as defined by the Climate and Economic Justic Screening Tool (CEJST).




To achieve this, we employed a **4-step systematic process:**

- Determine which Census Tracts with a **greater exposure** to the HIN.
- Determine which Census Tracts had the highest relative **degree of disadvantage.**
- Determine which Census Tracts correlate to **both** *less equitable* and *more dangerous* conditions relative to both the overall HIN and the non-motorized HIN.
- Determine which roadways are more likely to be part of a shortest commute path for a worker from a disadvantaged population compared to a typical worker.

| | Lower HIN Exposure | Higher HIN Exposure |
|---|---|---|
| Lower Disadvantage | More Equitable and Safer | More Equitable but More Dangerous |
| Higher Disadvantage | Less Equitable but Safer | Less Equitable and More Dangerous |




In reviewing the distribution of workers' residences and work locations for the census tracts in and around Barrow County, several facilities were identified as being more likely to be utilized by a disadvantaged worker than by a typical worker. These facilities represent a mixture of ownership (state, county, and city) with several being part one or more of the High Injury Networks. Facilities that are also on High Injury Networks include two county-owned facilities (Maddox Road and a portion of Jackson Trail Road) and two state-owned facilities (portions of SR 211 and SR 29).

# Conclusion

While a complete picture of crash context and influencing factors is not possible given current data availability, the project team can identify correlations between fatalities, serious injuries, and the other data points available. Subsequent updates can expand on this analysis with additional data that can be collected in the future.

The data collection process also indicates opportunities for improved data density and relevance that can be pursued through later local funding, collaboration with GDOT, or federal grants. Many of these projects focus on setting up systems to collect, maintain, and examine data. However, investment in this area can yield dividends in both dollars and lives as more effective interventions can be more accurately deployed as Barrow continues to grow. The below tables define the captured data sets and typical datasets that would advance this analysis:

*Table 1: Captured Datasets*

| Data | Alignment | Quality |
|---|---|---|
| Crash Data | All | High |
| Roadway Data | Safer Roads | Medium |
| Volume Data | Safer Roads | High |
| Justice40 Disadvantaged Tracts | Equity | High, but not relevant |

*Table 2: Potential additional datasets to advance analysis.*

| Data | Alignment |
|---|---|
| Junction Data | Safer Roads |
| EMS Response Time, Crash Incident Medical Records | Post-Crash Care |
| Speed Posting Limits, Instantaneous Speeds | Safer Speeds |
| Vehicle Type Registration | Safer Vehicles |
| GDOT Vulnerable Road User Analysis Spatial Points | Vulnerable Road Users |
| Geolocated Safety Projects | Historical Effectiveness |
| Pedestrian/Bicycle Volume Counts | Vulnerable Road Users |

# Countermeasures, Strategies, and Policies

# COUNTERMEASURES, STRATEGIES, & POLICIES

Improving roadway safety in Barrow will take a coordinated effort from various partners and viewpoints. This section presents multidisciplinary recommendations for Barrow to consider as they make investments and advancements in improving roadway safety across the county.

The recommendations are based on the crash and crash risk patterns and trends described in the previous section. They are organized into three safety treatment categories:

- **Countermeasures:** A term used for engineering infrastructure improvements that can be implemented to reduce the risk of crashes.
- **Strategies:** A term used for non-engineering practices that address traffic safety – often related to behavior or components of a Safe System that build a culture of safety.
- **Policies:** A term used for non-engineering practices that address traffic safety and are often related to government documents that form a basis for decision-making.

## COUNTERMEASURES

The project team compiled a list of engineering countermeasures with the following considerations:

- **Crash reduction potential.** Countermeasures that address Barrow's Injury Network (BIN) and fall reduce risk of serious and fatal injury crashes by removing severe conflicts, reducing vehicle speeds, managing conflicts in time, and increasing attentiveness and awareness.[15]
- **Potential for systemic application.** Countermeasures that can be applied systemically throughout the county. The project team focused on systemic countermeasures that can address Barrow's three chosen SHSP emphasis areas: bicycle, pedestrian, and speeding/aggressive driving.
- **Cost/resource alignment.** Countermeasures that can be implemented using existing or expected resources.
- **Community input.** Countermeasures that will resonate with the community and meet the community's needs.

These countermeasures are generally organized into three categories:

- Bicycle Treatments
- Pedestrian Treatments
- Roadway Treatments

Each of the treatments are discussed in more detail below, including general benefits, constraints, typical applications, and design considerations. A matrix of FHWA approved Countermeasures that address both short and long term in nature, were focused on: Speed Management; Bicycles/Pedestrians; Road Departures; Intersections; and Crosscutting.

[15] USDOT. (January 2024). Safe System Road Design Hierarchy: Engineering and Infrastructure-related Countermeasures to Effectively Reduce Roadway Fatalities and Serious Injuries. Safe System Roadway Design Hierarchy: Engineering and Infrastructure-related Countermeasures to Effectively Reduce Roadway Fatalities and Serious Injuries (dot.gov)

## Speed Management


Appropriate Speed Limits for All Road Users

Speed Safety Cameras


Variable Speed Limits

## Pedestrian/Bicyclist

Bicycle Lanes

Crosswalk Visibility Enhancements

Leading Pedestrian Interval

Medians and Pedestrian Refuge Islands in Urban and Suburban Areas

Pedestrian Hybrid Beacons

Rectangular Rapid Flashing Beacons (RRFB)

Road Diets (Roadway Reconfiguration)

Walkways

## Roadway Departure

Enhanced Delineation for Horizontal Curves

Longitudinal Rumble Strips and Stripes on Two-Lane Roads

Median Barriers

Roadside Design Improvements at Curves

SafetyEdge℠

Wider Edge Lines

## Intersections

Backplates with Retroreflective Borders

Corridor Access Management

Dedicated Left- and Right-Turn Lanes at Intersections

Reduced Left-Turn Conflict Intersections

Roundabouts

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

Yellow Change Intervals

## Crosscutting

Lighting

Local Road Safety Plans

Pavement Friction Management

Road Safety Audit

https://highways.dot.gov/safety/proven-safety-countermeasures

## COUNTERMEASURES TO THE HIN

The project team in conjunction with county staff applied the FHWA countermeasures noted above into an analysis matrix. We looked at all segments and intersections of the HIN with an initial screen on practicability of the measures in the field. A final list of countermeasures for each segment and intersection was developed through field work and technical analysis.

The resultant assessment of the County HIN showed some themes of countermeasures that could be incorporated in the short, mid, and long term as noted below:

## SHORT TERM COUNTERMEASURES


### REDUCING SPEED LIMITS

This involves lowering speed limits along the length of a roadway, including replacing signage. This reduces the number of collisions and accidents as well as the severity of incidents when they occur.



### SPEED FEEDBACK SIGNAGE

Speed feedback signs encourage drivers to slow down by informing them of their speed and the speed limit. They can be used alongside reduced speed limits or independently


## MIDDLE TERM COUNTERMEASURES

### INSTALL LIGHTING

Roadway lighting increases evening visibility and reduces crashes in the evening and twilight hours.

### INTERSECTION ADVANCE WARNINGS

Intersection Advance Warnings increase visibility of intersections before cars approach them. This gives road users time to slow down.

## LONG TERM COUNTERMEASURES

### SIDEWALKS

Sidewalks offer pedestrians dedicated grade separated right of way along roadways and near intersections, reducing risk for vulnerable road users.

### ROUNDABOUTS

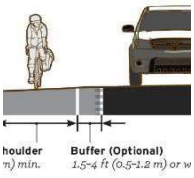
Roundabouts are a safer alternative to traffic signals and stop signs. The tight circle of a roundabout forces drivers to slow down, and the most severe types of intersection crashes — right-angle, left-turn and head-on collisions — are unlikely.

### RUMBLE STRIPS

Rumble strips are a textured addition to the roadway and can be installed along the outer edges of the roadway and/or along a centerline to alert drivers of lane departure. These will only be installed alongside a regraded shoulder

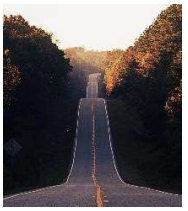
### PAVE SHOULDERS

Regraded shoulders along a roadway provide additional roadway width at grade which can reduce the frequency of vehicles going off the road and provide additional space for the installation of rumble strips.




### INCREASE SIGHT DISTANCE

Increasing sight distance improves roadway visibility, often at intersections or curves, by removing obstructions or modifying design. Methods include clearing vegetation, adjusting alignment, widening lanes, or adding signage to reduce crash risks.

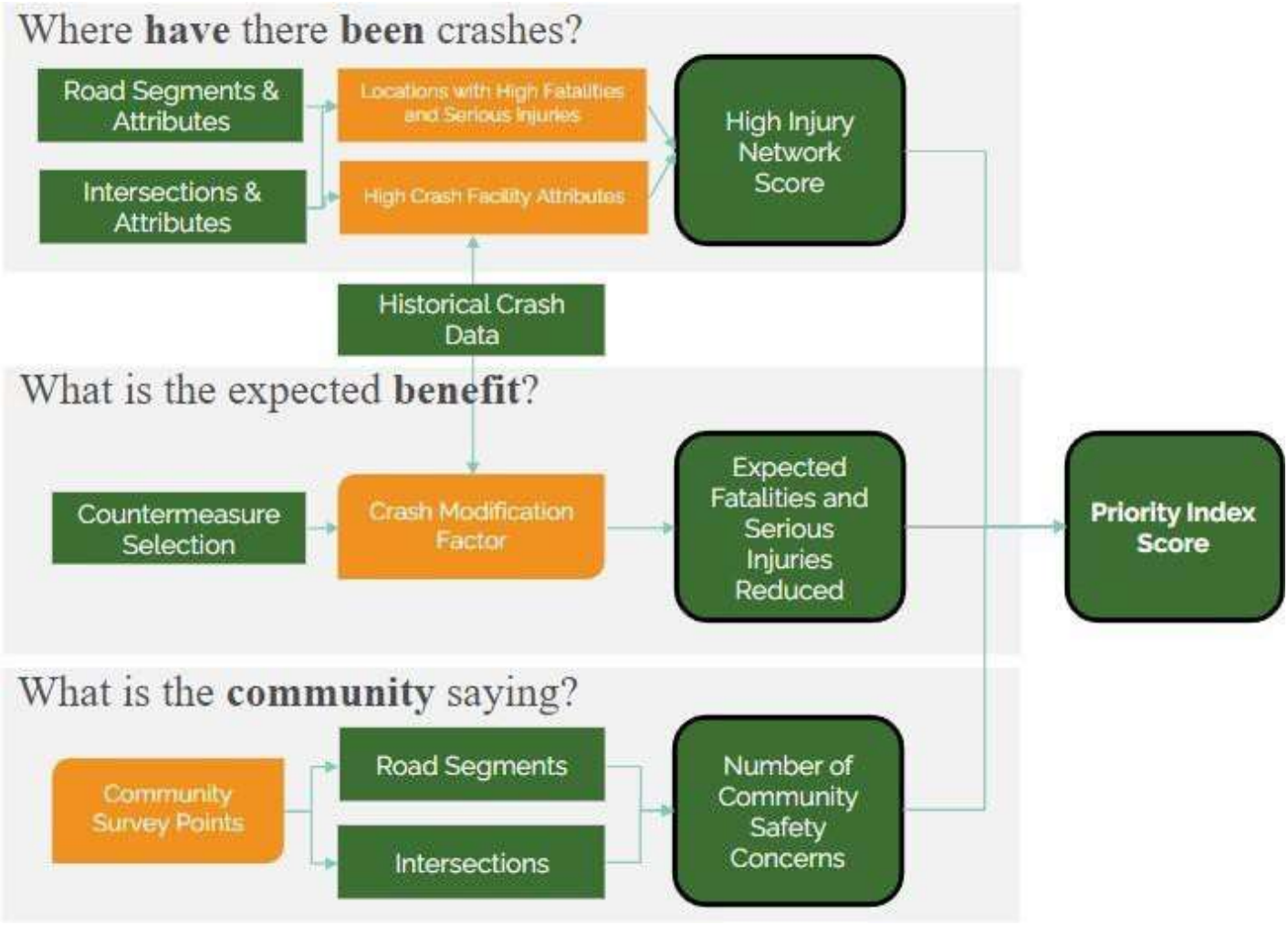


# PROJECT AND STRATEGY PRIORITIZATION

## Segment Analysis

The following segment analysis analyzes select segments on the HIN and applies multiple CMFs on each segment to determine the potential reduction in fatalities and serious injuries over 5 years. Table 1 shows the segments ranked by "Priority Index" which is a metric that combines the total historical fatalities and serious injuries, the reduction in historical fatalities and serious injuries, and the HIN score. The table also shows the number of countermeasures applied and the potential 5-year reduction in fatalities and serious injuries. In conjunction with the county, the team identified countermeasures that were specific to their community and easily programmable for each segment and intersection for county facilities.

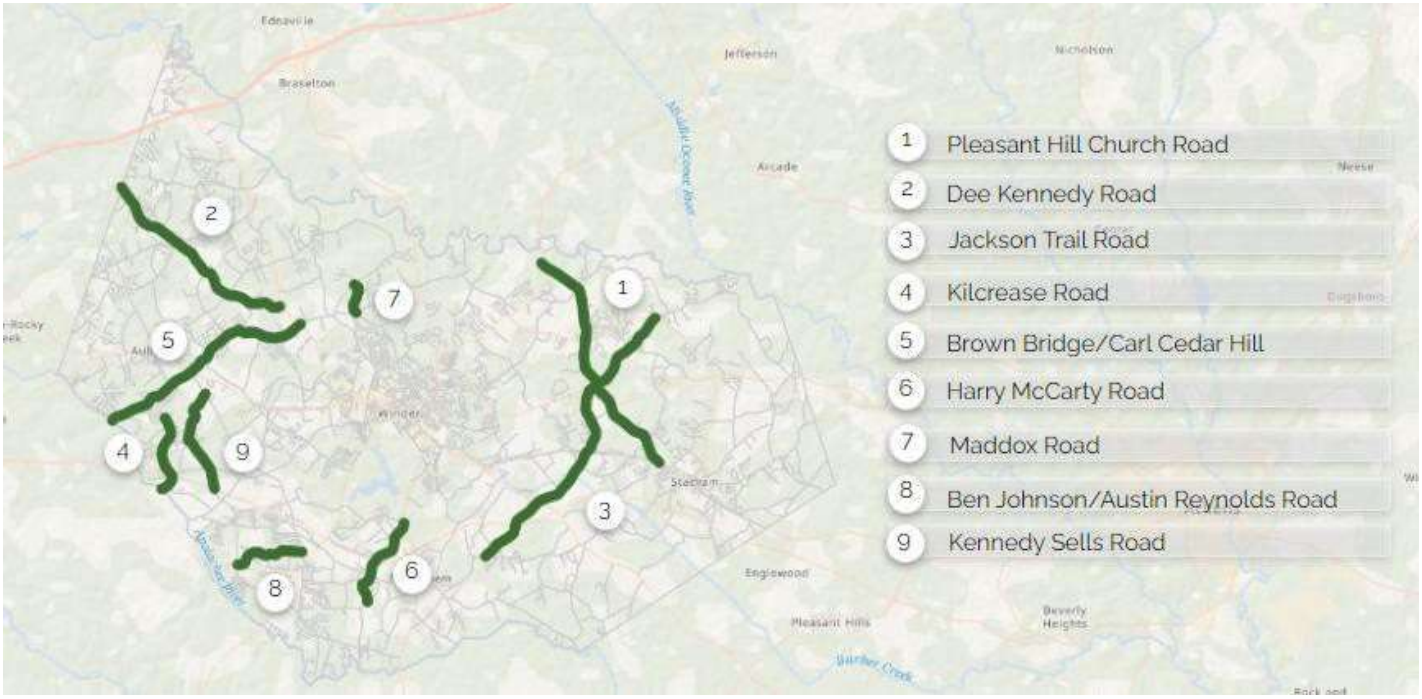
*Table 1: Segment Results Overview*



# CMF Application Approach

The following pages detail the specific countermeasures applied to specific segments and intersections identified by Barrow County and the community as locations with potential safety concerns. CMF's were applied based on historical crashes from 2019 to 2023, rather than using Safety Performance Functions (SPF) due to data limitations. The "Priority Index" is a calculation that combines the HIN score, the reduction in fatal and serious injury crashes, and the number of survey results on the segment or intersection. The HIN score is averaged for intersections or, if only one segment is on the HIN, the score for that segment is used.

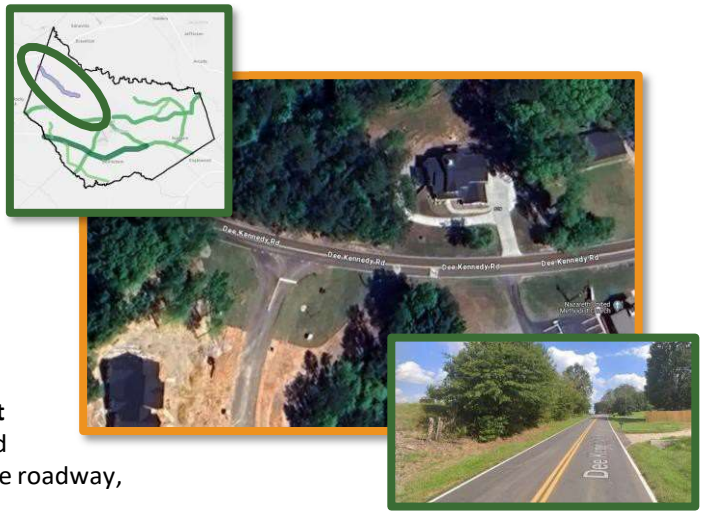
## Segments




## Intersections

# Dee Kennedy Rd

| Priority Index | 5.2 |
|---|---|
| Potential Fatal & Serious Injuries Crashes Reduced Over 5 Years | 2 |



## Roadway Attributes & Concerns

Dee Kenney Road is a **2-lane undivided minor collector** in Barrow County that scored **4.5 out of 10 on the HIN**. The equity analysis conducted found that Dee Kennedy Road is in a **"More Equitable but More Dangerous"** area. Barrow County and the community expressed concerns regarding lighting issues, the need to widen shoulders on the roadway, the need for lower speeds, and site distance concerns.

| Fatal & Serious Injury Crash Historical Types (2019-2023) | |
|---|---|
| Rear End | 1 |
| Head On | - |
| Angle | - |
| Sideswipe | - |
| Not a Collision with Motor Vehicle | 4 |
| Pedestrian | - |
| **Total** | **5** |

## Countermeasures Applied

### FEEDBACK SPEED MONITORS


**Description:** Speed feedback signs encourage drivers to slow down by displaying the speed and the speed limit. They can be used alongside reduced speed limits.
**CMF:** 0.930

### RUMBLE STRIPS

**Description:** Rumble strips are a textured addition to the roadway and can be installed on a shoulder and/or a centerline to alert drivers of lane departure.
**CMF:** 0.800

### LIGHTING

**Description:** Roadway lighting increases evening visibility and reduces crashes in the evening and twilight hours.
**CMF:** 0.680

### REDUCING SPEED LIMITS


**Description:** This involves lowering speed limits along the length of a roadway. This reduces the number and severity of collisions.
**CMF:** 0.856

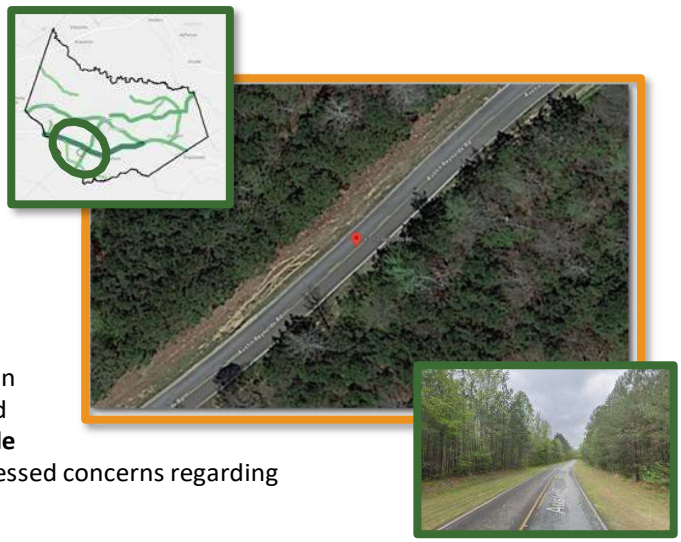
### PAVE SHOULDER

**Description:** Paving shoulders provides additional clearance to drivers that can be helpful when negotiating a curve.
**CMF:** 0.770 (Fatal)
0.900 (Srs Inj)

# Ben Johnson Rd / Austin Reynolds Rd

| Priority Index | 0.4 |
|---|---|
| Potential Fatal & Serious Injuries Crashes Reduced Over 5 Years* | - |

** No 5-Year Historical Fatal or Serious Injury Crashes.*



## Roadway Attributes & Concerns

Ben Johnson/ Austin Reynolds Road is a **2-lane undivided local road** in Barrow County that **is not on the HIN**. The equity analysis conducted found that Ben Johnson/ Austin Reynolds Road is in a **"More Equitable but More Dangerous"** area. Barrow County and the community expressed concerns regarding lighting issues. **Two community survey results called out this road**.

| Fatal & Serious Injury Crash Historical Types (2019-2023) | |
|---|---|
| Rear End | - |
| Head On | - |
| Angle | - |
| Sideswipe | - |
| Not a Collision with Motor Vehicle | - |
| Pedestrian | - |
| **Total** | **-** |

## Countermeasures Applied

### LIGHTING

**Description:** Roadway lighting increases evening visibility and reduces crashes in the evening and twilight hours.
**CMF:** 0.680

### RUMBLE STRIPS

**Description:** Rumble strips are a textured addition to the roadway and can be installed on a shoulder and/or a centerline to alert drivers of lane departure.
**CMF:** 0.800

# Kilcrease Rd

| Priority Index | 2.3 |
|---|---|
| Potential Fatal & Serious Injuries Crashes Reduced Over 5 Years | 1 |

## Roadway Attributes & Concerns

Kilcrease Road is a **2-lane undivided major collector** in Barrow County that scored **4.5 out of 10 on the HIN**. The equity analysis conducted found that Kilcrease Road is in a **"Less Equitable and More Dangerous"** area. Barrow County and the community expressed concerns regarding the need to widen shoulders on the roadway and site distance concerns.

| Fatal & Serious Injury Crash Historical Types (2019-2023) | |
|---|---|
| Rear End | - |
| Head On | 1 |
| Angle | 4 |
| Sideswipe | - |
| Not a Collision with Motor Vehicle | 1 |
| Pedestrian | - |
| **Total** | **6** |

## Countermeasures Applied

### RUMBLE STRIPS

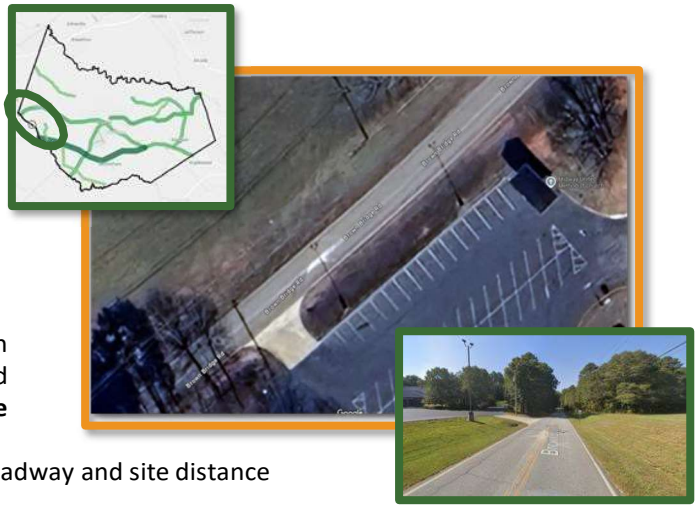
**Description:** Rumble strips are a textured addition to the roadway and can be installed on a shoulder and/or a centerline to alert drivers of lane departure.
**CMF:** 0.800

### PAVE SHOULDER

**Description:** Paving shoulders provides additional clearance to drivers that can be helpful when negotiating a curve.
**CMF:** 0.770 (Fatal)
0.900 (Srs Inj)

# Brown Bridge Rd/ Carl Cedar Hill Rd

| Priority Index | 2.2 |
|---|---|
| Potential Fatal & Serious Injuries Crashes Reduced Over 5 Years | 2 |



## Roadway Attributes & Concerns

Brown Bridge/ Carl Cedar Hill Road is a **2-lane undivided local road** in Barrow County that **is not on the HIN**. The equity analysis conducted found that Brown Bridge/ Carl Cedar Hill Road is in a **"Less Equitable and More Dangerous"** area. Barrow County and the community expressed concerns regarding the need to widen shoulders on the roadway and site distance concerns. **One community survey result called out this road**.

| Fatal & Serious Injury Crash Historical Types (2019-2023) | |
|---|---|
| Rear End | - |
| Head On | 2 |
| Angle | 6 |
| Sideswipe | - |
| Not a Collision with Motor Vehicle | 3 |
| Pedestrian | - |
| **Total** | **11** |

## Countermeasures Applied

### RUMBLE STRIPS

**Description:** Rumble strips are a textured addition to the roadway and can be installed on a shoulder and/or a centerline to alert drivers of lane departure.
**CMF:** 0.800

### PAVE SHOULDER

**Description:** Paving shoulders provides additional clearance to drivers that can be helpful when negotiating a curve.
**CMF:** 0.770 (Fatal)
0.900 (Srs Inj)

# Kennedy Sells Rd

| Priority Index | – |
|---|---|
| Potential Fatal & Serious Injuries Crashes Reduced Over 5 Years* | – |

** No 5-Year Historical Fatal or Serious Injury Crashes.*

## Roadway Attributes & Concerns

Kennedy Sells Road is a **2-lane undivided local road** in Barrow County that **is not on the HIN**. The equity analysis conducted found that Kennedy Sells Road is in a **"Less Equitable and More Dangerous"** area. Barrow County and the community expressed concerns regarding lighting issues, the need to widen shoulders on the roadway, and site distance concerns.

| Fatal & Serious Injury Crash Historical Types (2019-2023) | |
|---|---|
| Rear End | – |
| Head On | – |
| Angle | – |
| Sideswipe | – |
| Not a Collision with Motor Vehicle | – |
| Pedestrian | – |
| **Total** | **–** |

## Countermeasures Applied

### LIGHTING

**Description:** Roadway lighting increases evening visibility and reduces crashes in the evening and twilight hours.
**CMF:** 0.680

### RUMBLE STRIPS

**Description:** Rumble strips are a textured addition to the roadway and can be installed on a shoulder and/or a centerline to alert drivers of lane departure.
**CMF:** 0.800

### PAVE SHOULDER

**Description:** Paving shoulders provides additional clearance to drivers that can be helpful when negotiating a curve.
**CMF:** 0.770 (Fatal)
0.900 (Srs Inj)

# Harry McCarty Rd

| Priority Index | 3.8 |
|---|---|
| Potential Fatal & Serious Injuries Crashes Reduced Over 5 Years | 1 |

## Roadway Attributes & Concerns

Harry McCarty Road is a **2-lane undivided local road** in Barrow County that **is not on the HIN**. The equity analysis conducted found that Harry McCarty Road is in a **"More Equitable but More Dangerous"** area and is an **"Identified Disadvantaged Route." One community survey result called out this road**.

| Fatal & Serious Injury Crash Historical Types (2019-2023) | |
|---|---|
| Rear End | - |
| Head On | - |
| Angle | 3 |
| Sideswipe | - |
| Not a Collision with Motor Vehicle | - |
| Pedestrian | - |
| **Total** | **3** |

## Countermeasures Applied

### RUMBLE STRIPS

**Description:** Rumble strips are a textured addition to the roadway and can be installed on a shoulder and/or a centerline to alert drivers of lane departure.
**CMF:** 0.800

### INTERSECTION ADVANCE WARNING


**Description:** Flashing beacons are used to alert drivers of the impending end of the green indication by using sensor to monitor the incoming cars and traffic at the intersection
**CMF:** 0.564

# Jackson Trail Rd

| Priority Index | 4.3 |
|---|---|
| Potential Fatal & Serious Injuries Crashes Reduced Over 5 Years | 2 |

## Roadway Attributes & Concerns

Jackson Trail Road is a **2-lane undivided minor collector** in Barrow County that **is not on the HIN**. The equity analysis conducted found that Jackson Trail Road is in a **"More Equitable but More Dangerous"** area and is an **"Identified Disadvantaged Route."** Barrow County and the community expressed concerns regarding the need to widen shoulders on the roadway and the need for lower speeds. **Six community survey results called out this road**.

| Fatal & Serious Injury Crash Historical Types (2019-2023) | |
|---|---|
| Rear End | - |
| Head On | 2 |
| Angle | 4 |
| Sideswipe | - |
| Not a Collision with Motor Vehicle | 1 |
| Pedestrian | - |
| **Total** | **7** |

## Countermeasures Applied

### FEEDBACK SPEED MONITORS


**Description:** Speed feedback signs encourage drivers to slow down by displaying the speed and the speed limit. They can be used alongside reduced speed limits.
**CMF:** 0.930

### REDUCING SPEED LIMITS


**Description:** This involves lowering speed limits along the length of a roadway. This reduces the number and severity of collisions.
**CMF:** 0.856

### RUMBLE STRIPS

**Description:** Rumble strips are a textured addition to the roadway and can be installed on a shoulder and/or a centerline to alert drivers of lane departure.
**CMF:** 0.800

# Pleasant Hill Church Rd

| Priority Index | 6.1 |
|---|---|
| Potential Fatal & Serious Injuries Crashes Reduced Over 5 Years | 3 |

## Roadway Attributes & Concerns

Pleasant Hill Church Road is a **2-lane undivided minor collector** in Barrow County that **is not on the HIN**. The equity analysis conducted found that Pleasant Hill Church Road is in a **"More Equitable but More Dangerous"** area. Barrow County and the community expressed concerns regarding the need to widen shoulders on the roadway, the need for lower speeds, and blind spots. **Two community survey results called out this road**.

| Fatal & Serious Injury Crash Historical Types (2019-2023) | |
|---|---|
| Rear End | - |
| Head On | - |
| Angle | 1 |
| Sideswipe | - |
| Not a Collision with Motor Vehicle | 3 |
| Pedestrian | 2 |
| **Total** | **6** |

## Countermeasures Applied

### FEEDBACK SPEED MONITORS


**Description:** Speed feedback signs encourage drivers to slow down by displaying the speed and the speed limit. They can be used alongside reduced speed limits.
**CMF:** 0.930

### REDUCING SPEED LIMITS


**Description:** This involves lowering speed limits along the length of a roadway. This reduces the number and severity of collisions.
**CMF:** 0.856

### RUMBLE STRIPS

**Description:** Rumble strips are a textured addition to the roadway and can be installed on a shoulder and/or a centerline to alert drivers of lane departure.
**CMF:** 0.800

### PAVE SHOULDER

**Description:** Paving shoulders provides additional clearance to drivers that can be helpful when negotiating a curve.
**CMF:** 0.770 (Fatal)
0.900 (Srs Inj)

# Maddox Rd

| Priority Index | 3.8 |
|---|---|
| Potential Fatal & Serious Injuries Crashes Reduced Over 5 Years | <0.5 |

## Roadway Attributes & Concerns

Maddox Road is a **2-lane undivided local road** in Barrow County that **is not on the HIN**. The equity analysis conducted found that Maddox Road is in a **"Less Equitable but Safer"** area and is an **"Identified Disadvantaged Route."** Barrow County and the community expressed concerns regarding the need to widen shoulders on the roadway. **One community survey result called out this road**.

| Fatal & Serious Injury Crash Historical Types (2019-2023) | |
|---|---|
| Rear End | - |
| Head On | - |
| Angle | 1 |
| Sideswipe | - |
| Not a Collision with Motor Vehicle | - |
| Pedestrian | - |
| **Total** | **1** |

## Countermeasures Applied

### RUMBLE STRIPS

**Description:** Rumble strips are a textured addition to the roadway and can be installed on a shoulder and/or a centerline to alert drivers of lane departure.
**CMF:** 0.800

### PAVE SHOULDER

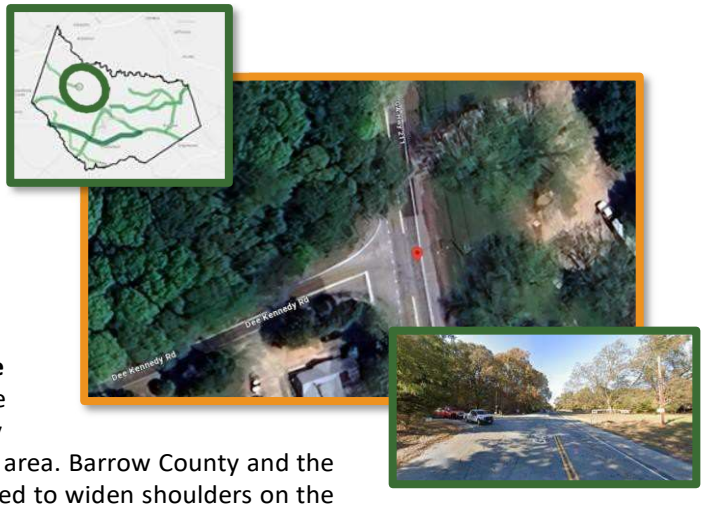
**Description:** Paving shoulders provides additional clearance to drivers that can be helpful when negotiating a curve.
**CMF:** 0.770 (Fatal)
0.900 (Srs Inj)

### INTERSECTION ADVANCE WARNING


**Description:** Flashing beacons are used to alert drivers of the impending end of the green indication by using sensor to monitor the incoming cars and traffic at the intersection
**CMF:** 0.564

# Dee Kennedy Rd & Highway 211

| Priority Index | 4.5 |
|---|---|
| Potential Fatal & Serious Injuries Crashes Reduced Over 5 Years | <1 |




## Roadway Attributes & Concerns

Dee Kenney Road is a **2-lane undivided minor collector** in Barrow County that scored **4.5 out of 10 on the HIN**. Highway 211 is a **2-lane undivided minor arterial** in Barrow County that **is not on the HIN**. The equity analysis conducted found that the intersection of Dee Kennedy Road & Highway 211 is in a **"More Equitable but More Dangerous"** area. Barrow County and the community expressed concerns regarding lighting issues and the need to widen shoulders on the roadway. GDOT has a future roundabout programmed at this intersection.

| Fatal & Serious Injury Crash Historical Types (2019-2023) | |
|---|---|
| Rear End | - |
| Head On | 2 |
| Angle | - |
| Sideswipe | - |
| Not a Collision with Motor Vehicle | - |
| Pedestrian | - |
| **Total** | **2** |

## Countermeasures Applied

### LIGHTING

**Description:** Roadway lighting increases evening visibility and reduces crashes in the evening and twilight hours.
**CMF:** 0.680

### PAVE SHOULDER

**Description:** Paving shoulders provides additional clearance to drivers that can be helpful when negotiating a curve.
**CMF:** 0.770 (Fatal)
0.900 (Srs Inj)

### ROUNDABOUT

**Description:** Roundabouts help reduce speeds while maintaining the flow of traffic through an intersection and can be an alternative to traditional 4-way and 2-way stop-controlled intersections.
**CMF:** 0.290

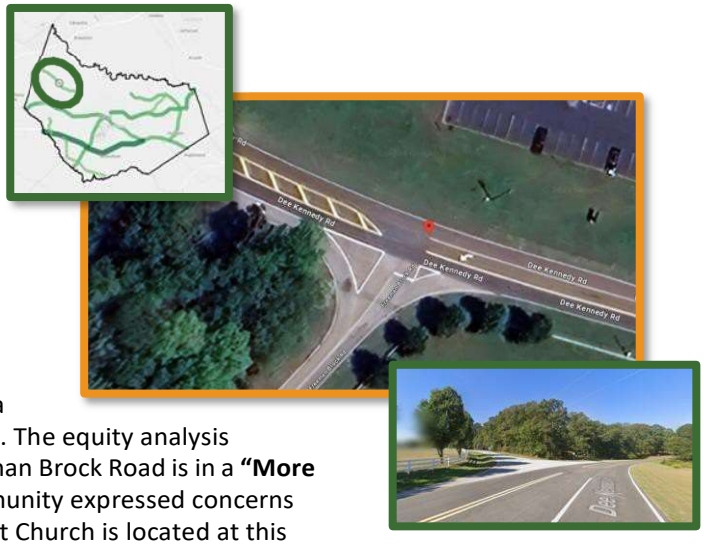
**Programmed Projects**

- Roundabout programmed by GDOT

# Dee Kennedy Rd & Freeman Brock Rd

| Priority Index | 0.5 |
|---|---|
| Potential Fatal & Serious Injuries Crashes Reduced Over 5 Years* | - |

** No 5-Year Historical Fatal or Serious Injury Crashes.*



## Roadway Attributes & Concerns

Dee Kennedy Road is a **2-lane undivided minor collector** in Barrow County that scored **4.5 out of 10 on the HIN**. Freeman Brock Road is a **2-lane undivided local road** in Barrow County that **is not on the HIN**. The equity analysis conducted found that the intersection of Dee Kennedy Road & Freeman Brock Road is in a **"More Equitable but More Dangerous"** area. Barrow County and the community expressed concerns regarding site distance and the lack of sidewalks since Sharon Baptist Church is located at this intersection and Bramlett Elementary School is about 1,000' down the road which may have an increased number of pedestrians.

| Fatal & Serious Injury Crash Historical Types (2019-2023) | |
|---|---|
| Rear End | - |
| Head On | - |
| Angle | - |
| Sideswipe | - |
| Not a Collision with Motor Vehicle | - |
| Pedestrian | - |
| **Total** | **-** |

## Countermeasures Applied

### FLASHING SIGNAGE

**Description:** Flashing signage can be implemented on many types of road signs to increase visibility of intersections and other road features.
**CMF:** 0.590

### SIDEWALKS

**Description:** Sidewalks offer pedestrians dedicated grade separated right of way along roadways and near intersections, reducing risk for vulnerable road users.
**CMF:** 0.598

# Dee Kennedy Rd & Harmony Grove Church

| Priority Index | 4.2 |
|---|---|
| Potential Fatal & Serious Injuries Crashes Reduced Over 5 Years | <0.5 |

## Roadway Attributes & Concerns

Dee Kennedy Road is a **2-lane undivided minor collector** in Barrow County that scored **4.5 out of 10 on the HIN**. Harmony Grove Church is a **2-lane undivided local road** in Barrow County that **is not on the HIN**. The equity analysis conducted found that the intersection of Dee Kennedy Rd & Harmony Grove Church is in a **"More Equitable but More Dangerous"** area. Barrow County and the community expressed concerns regarding signage, site distance issues and the need to widen shoulders on the roadway.

| Fatal & Serious Injury Crash Historical Types (2019-2023) | |
|---|---|
| Rear End | - |
| Head On | - |
| Angle | - |
| Sideswipe | - |
| Not a Collision with Motor Vehicle | 1 |
| Pedestrian | - |
| **Total** | **1** |

## Countermeasures Applied

### SIDEWALKS

**Description:** Sidewalks offer pedestrians dedicated grade separated right of way along roadways and near intersections, reducing risk for vulnerable road users.
**CMF:** 0.598

### PAVE SHOULDER

**Description:** Paving shoulders provides additional clearance to drivers that can be helpful when negotiating a curve.
**CMF:** 0.770 (Fatal)
0.900 (Srs Inj)

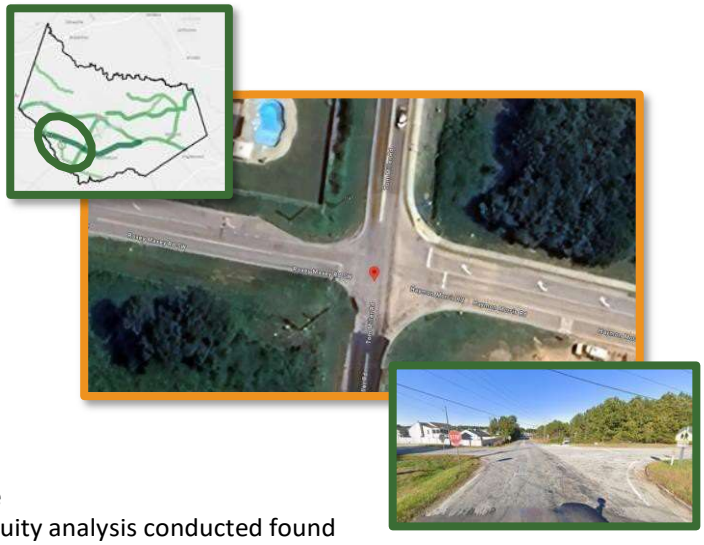
### INTERSECTION ADVANCE WARNING


**Description:** Flashing beacons are used to alert drivers of the impending end of the green indication by using sensor to monitor the incoming cars and traffic at the intersection
**CMF:** 0.564

# Tom Miller Rd & Haymon Morris Rd

| Priority Index | 0.8 |
|---|---|
| Potential Fatal & Serious Injuries Crashes Reduced Over 5 Years* | – |

** No 5-Year Historical Fatal or Serious Injury Crashes.*



## Roadway Attributes & Concerns

Tom Miller Road is a **2-lane undivided local road** in Barrow County that scored **4.2 out of 10 on the HIN**. Haymon Morris Road is a **2-lane undivided local road** in Barrow County that **is not on the HIN**. The equity analysis conducted found that the intersection of Tom Miller Road & Haymon Morris Road is in a **"More Equitable but More Dangerous"** area. Barrow County and the community expressed concerns regarding the lack of sidewalks, lighting issues, and the need to widen shoulders on the roadway. **Two community survey results called out this intersection.** The county has a future roundabout programmed at this intersection.

| Fatal & Serious Injury Crash Historical Types (2019-2023) | |
|---|---|
| Rear End | – |
| Head On | – |
| Angle | – |
| Sideswipe | – |
| Not a Collision with Motor Vehicle | – |
| Pedestrian | – |
| **Total** | **–** |

**Programmed Projects**

- Intersection improvement required as a condition of new development
- Roundabout being programmed by the county

# Countermeasures Applied

## SIDEWALKS

**Description:** Sidewalks offer pedestrians dedicated grade separated right of way along roadways and near intersections, reducing risk for vulnerable road users.
**CMF:** 0.598

## LIGHTING

**Description:** Roadway lighting increases evening visibility and reduces crashes in the evening and twilight hours.
**CMF:** 0.680

## PAVE SHOULDER

**Description:** Paving shoulders provides additional clearance to drivers that can be helpful when negotiating a curve.
**CMF:** 0.770 (Fatal)
0.900 (Srs Inj)

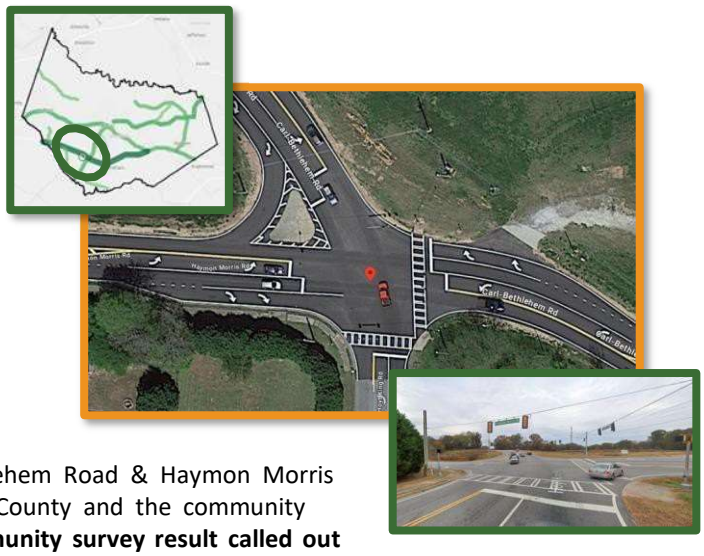
## ROUNDABOUT

**Description:** Roundabouts help reduce speeds while maintaining the flow of traffic and can be an alternative to traditional 4-way or 2-way stop-controlled intersections.
**CMF:** 0.290

# Carl Bethlehem Rd & Haymon Morris Rd

| Priority Index | 0.2 |
|---|---|
| Potential Fatal & Serious Injuries Crashes Reduced Over 5 Years* | - |

** No 5-Year Historical Fatal or Serious Injury Crashes.*




## Roadway Attributes & Concerns

Carl Bethlehem Road is a **2-lane undivided minor arterial** in Barrow County that **is not on the HIN**. Haymon Morris Road is a **2-lane undivided local road** in Barrow County that **is not on the HIN**. The equity analysis conducted found that the intersection of Carl Bethlehem Road & Haymon Morris Road is in a **"More Equitable but More Dangerous"** area. Barrow County and the community expressed concerns regarding lighting issues and signage. **One community survey result called out this intersection**.

| Fatal & Serious Injury Crash Historical Types (2019-2023) | |
|---|---|
| Rear End | - |
| Head On | - |
| Angle | - |
| Sideswipe | - |
| Not a Collision with Motor Vehicle | - |
| Pedestrian | - |
| **Total** | **-** |

## Countermeasures Applied

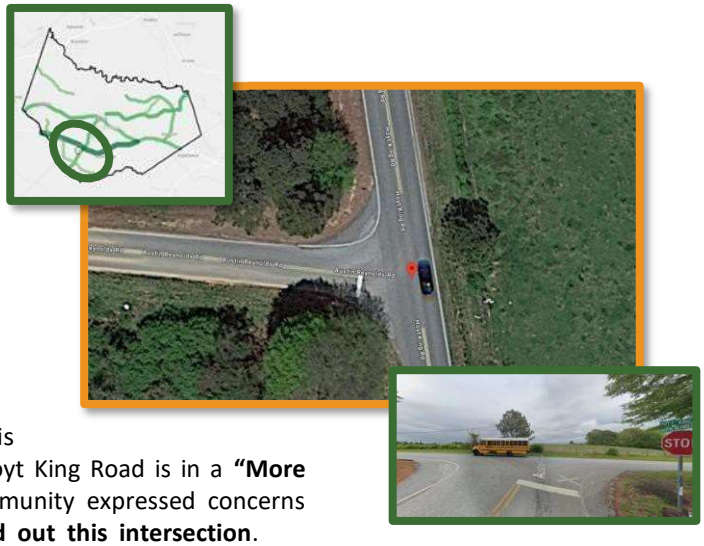
### LIGHTING

**Description:** Roadway lighting increases evening visibility and reduces crashes in the evening and twilight hours.
**CMF:** 0.680

# Austin Reynolds Rd & Hoyt King Rd

| Priority Index | 0.4 |
|---|---|
| Potential Fatal & Serious Injuries Crashes Reduced Over 5 Years* | - |

** No 5-Year Historical Fatal or Serious Injury Crashes.*



## Roadway Attributes & Concerns

Austin Reynolds Road is a **2-lane undivided local road** in Barrow County that **is not on the HIN**. Hoyt King Road is a **2-lane undivided local road** in Barrow County that **is not on the HIN**. The equity analysis conducted found that the intersection of Ausitn Reynolds Road & Hoyt King Road is in a **"More Equitable but More Dangerous"** area. Barrow County and the community expressed concerns regarding site distance issues. **Two community survey results called out this intersection**.

| Fatal & Serious Injury Crash Historical Types (2019-2023) | |
|---|---|
| Rear End | - |
| Head On | - |
| Angle | - |
| Sideswipe | - |
| Not a Collision with Motor Vehicle | - |
| Pedestrian | - |
| **Total** | **-** |

## Countermeasures Applied

### INTERSECTION ADVANCE WARNING


**Description:** Flashing beacons are used to alert drivers of the impending end of the green indication by using sensor to monitor the incoming cars and traffic at the intersection
**CMF:** 0.564

# Carl Bethlehem Rd & Harry McCarty Rd

| Priority Index | 0.2 |
|---|---|
| Potential Fatal & Serious Injuries Crashes Reduced Over 5 Years* | - |

** No 5-Year Historical Fatal or Serious Injury Crashes.*

## Roadway Attributes & Concerns

Carl Bethlehem Road is a **2-lane undivided minor arterial** in Barrow County that **is not on the HIN**. Harry McCarty Road is a **2-lane undivided local road** in Barrow County that **is not on the HIN**. The equity analysis conducted found that the intersection of Carl Bethlehem Road & Harry McCarty Road is in a **"More Equitable but More Dangerous"** area and is on an **"Identified Disadvantaged Route."** Barrow County and the community expressed concerns regarding site distance. **One community survey result called out this intersection**.

| Fatal & Serious Injury Crash Historical Types (2019-2023) | |
|---|---|
| Rear End | - |
| Head On | - |
| Angle | - |
| Sideswipe | - |
| Not a Collision with Motor Vehicle | - |
| Pedestrian | - |
| **Total** | **-** |

## Countermeasures Applied

### INTERSECTION ADVANCE WARNING

**Description:** Flashing beacons are used to alert drivers of the impending end of the green indication by using sensor to monitor the incoming cars and traffic at the intersection
**CMF:** 0.564

# Bowman Mill Rd & Pleasant Hill Church Rd

| Priority Index | 0.4 |
|---|---|
| Potential Fatal & Serious Injuries Crashes Reduced Over 5 Years* | - |

** No 5-Year Historical Fatal or Serious Injury Crashes.*

## Roadway Attributes & Concerns

Bowman Mill Road is a **2-lane undivided minor collector** in Barrow County that scored **4.2 out of 10 on the HIN**. Pleasant Hill Church Road is a **2-lane undivided minor collector** in Barrow County that **is not on the HIN**. The equity analysis conducted found that the intersection of Bowman Mill Road & Pleasant Hill Church Road is in a **"More Equitable but More Dangerous"** area. Barrow County and the community expressed concerns regarding speed, site distance, blind spots, and the need to widen shoulders.

| Fatal & Serious Injury Crash Historical Types (2019-2023) | |
|---|---|
| Rear End | - |
| Head On | - |
| Angle | - |
| Sideswipe | - |
| Not a Collision with Motor Vehicle | - |
| Pedestrian | - |
| **Total** | **-** |

## Countermeasures Applied

### FEEDBACK SPEED MONITORS

**Description:** Speed feedback signs encourage drivers to slow down by displaying the speed and the speed limit. They can be used alongside reduced speed limits.
**CMF:** 0.930

### REDUCING SPEED LIMITS


**Description:** This involves lowering speed limits along the length of a roadway. This reduces the number and severity of collisions.
**CMF:** 0.856

### PAVE SHOULDER

**Description:** Paving shoulders provides additional clearance to drivers that can be helpful when negotiating a curve.
**CMF:** 0.770 (Fatal)

### INTERSECTION ADVANCE WARNING

**Description:** Flashing beacons are used to alert drivers of the impending end of the green indication by using sensor to monitor the incoming cars and traffic at the intersection
**CMF:** 0.564
0.900 (Srs Inj)

# Dunahoo Rd & Holsenbeck School Rd

| Priority Index | – |
|---|---|
| Potential Fatal & Serious Injuries Crashes Reduced Over 5 Years* | – |

** No 5-Year Historical Fatal or Serious Injury Crashes.*

## Roadway Attributes & Concerns

Dunahoo Road is a **2-lane undivided minor collector** in Barrow County that **is not on the HIN**. Holsenbeck School Road is a **2-lane undivided local road** in Barrow County that **is not on the HIN**. The equity analysis conducted found that the intersection of Dunahoo Road & Holsenbeck School Road is in a **"More Equitable but More Dangerous"** area and is on an **"Identified Disadvantaged Route."** Barrow County and the community expressed concerns with site distance.

| Fatal & Serious Injury Crash Historical Types (2019-2023) | |
|---|---|
| Rear End | – |
| Head On | – |
| Angle | – |
| Sideswipe | – |
| Not a Collision with Motor Vehicle | – |
| Pedestrian | – |
| **Total** | **–** |

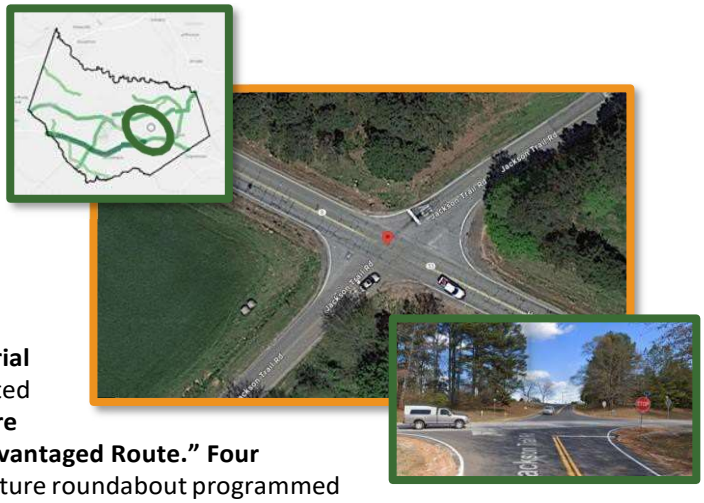
## Countermeasures Applied

### INTERSECTION ADVANCE WARNING


**Description:** Flashing beacons are used to alert drivers of the impending end of the green indication by using sensor to monitor the incoming cars and traffic at the intersection
**CMF:** 0.564

# Jackson Trail Rd & SR 53

| Priority Index | 4.8 |
|---|---|
| Potential Fatal & Serious Injuries Crashes Reduced Over 5 Years | 1 |



## Roadway Attributes & Concerns

Jackson Trail Road is a **2-lane undivided minor collector** in Barrow County that **is not on the HIN**. GA-8 is a **2-lane undivided minor arterial** in Barrow County that **is not on the HIN**. The equity analysis conducted found that the intersection of Jackson Trail Road & GA-8 is in a **"More Equitable but More Dangerous"** area and is on an **"Identified Disadvantaged Route." Four community survey results called out this intersection.** GDOT has a future roundabout programmed at this intersection.

| Fatal & Serious Injury Crash Historical Types (2019-2023) | |
|---|---|
| Rear End | - |
| Head On | - |
| Angle | 3 |
| Sideswipe | - |
| Not a Collision with Motor Vehicle | - |
| Pedestrian | - |
| **Total** | **3** |

## Countermeasures Applied

### ROUNDABOUT

**Description:** Roundabouts help reduce speeds while maintaining the flow of traffic through an intersection and can be an alternative to traditional 4-way and 2-way stop-controlled intersections.
**CMF:** 0.290

### FLASHING SIGNAGE


**Description:** Flashing signage can be implemented on many types of road signs to increase visibility of intersections and other road features.
**CMF:** 0.590

**Programmed Projects**

- Roundabout programmed for the intersection of SR 53
- Short term GDOT project scheduled for intersection with 316 that will limit traffic coming from/to 316

# Bowman Mill Road NE and SR 82

| Priority Index | 4.5 |
|---|---|
| Potential Fatal & Serious Injuries Crashes Reduced Over 5 Years | 1 |

## Roadway Attributes & Concerns

Bowman Mill Road is a **2-lane undivided minor collector** in Barrow County that scored **4.2 out of 10 on the HIN**. State Route 82 is a **2-lane undivided major collector** in Barrow County that **is not on the HIN**. The equity analysis conducted found that the intersection of Bowman Mill Road & State Route 82 is in a **"More Equitable and Safer"** area. Barrow County and the community expressed concerns regarding site distance. GDOT has a future roundabout programmed at this intersection.

| Fatal & Serious Injury Crash Historical Types (2019-2023) | |
|---|---|
| Rear End | - |
| Head On | - |
| Angle | 4 |
| Sideswipe | - |
| Not a Collision with Motor Vehicle | - |
| Pedestrian | - |
| **Total** | **4** |

## Countermeasures Applied

### ROUNDABOUT

**Description:** Roundabouts help reduce speeds while maintaining the flow of traffic through an intersection and can be an alternative to traditional 4-way and 2-way stop-controlled intersections.
**CMF:** 0.290

### INTERSECTION ADVANCE WARNING


**Description:** Flashing beacons are used to alert drivers of the impending end of the green indication by using sensor to monitor the incoming cars and traffic at the intersection
**CMF:** 0.564

**Programmed Projects**

- Roundabout programmed by GDOT

# STRATEGIES

## EDUCATION STRATEGIES

Education strategies are focused on teaching road users the principles of traffic safety. These strategies can be developed to include interactive activities, comprehensive teaching notes and information on road safety messages and concepts that can be taught at school or in other community spaces.
Potential partners for implementation include:

- Barrow County Board of Health
- Barrow County Sheriff's Office
- Barrow County Public Schools
- Community Based Organizations

**Table 8** outlines the recommended education-related strategies identified for Barrow County.

*Table 8. Education Strategies*

| Education Strategies | Brief Description |
|---|---|
| **Road Safety Education to Children** | Road safety education to children includes strategies such as safe routes to school, walking school bus, and bicycle trains that promote road safety to all users, particularly for pedestrians and bicyclists. These strategies or practices have shown communities and families that walking and biking can be a viable and safe transportation option, and thus can be incorporated into their own daily travel patterns.<br><br>School-focused road safety education for drivers of all ages is an important complement to road safety education for children. Transportation safety campaigns scheduled at times when higher numbers of children may walk or bike to school (e.g., beginning of the school year, after Spring Vacation) can foster community awareness of a shared responsibility for road safety near schools. |

| Education Strategies | Brief Description |
|---|---|
| **Seat Belt Safety Campaign** | A safety campaign to increase seat belt use may help improve safety throughout Barrow. Seat Belt Safety Campaigns may include strategies like targeted communication for low-belt-use groups, car seat checks to provide hands-on education for installing and using child car seats, increased publicizing of fines for seat belt law violations, and high-visibility seat belt law enforcement. These strategies inform residents of the risks of not using a seat belt and encourage them to use seat belts. |
| **Speed Monitoring Awareness Radar Trailer** | The speed trailer is an educational device that helps drivers become more aware of their speed in relation to the posted speed. This trailer is usually deployed in a street or neighborhood for a few days so the residents can monitor the speeds on their own streets and become aware of their own driving behaviors. |
| **Visibility Enhancements and Education** | The purpose of enhancing visibility for pedestrians is to increase the opportunity for drivers to see and avoid pedestrians, particularly when it is dark. Educating pedestrians to wear reflective clothing and walk in well-lit areas can be implemented as targeted campaigns.<br><br>These campaigns can include giveaways of wearable lights and reflectors for people to use when traveling at night. GDOT's 2023 SHSP includes a goal to expand existing programs to get more safety equipment into the hands of road users (e.g., bicycle lights, car seats). |
| **Vulnerable Road User Education** | Road safety education regarding vulnerable road users like pedestrians and bicyclists includes strategies involving education from police officers. If the driver encroaches into the bike lane or fails to yield to the pedestrian at the crossing, the police officer pulls the driver over and hands them a flyer that has the information for drivers to adapt their behavior towards all road users; this can be in addition to a citation. |
| **High-Visibility Cell Phone and Text Messaging Media Campaign** | The High Visibility Enforcement model combines dedicated law enforcement with paid and earned media supporting the enforcement activity. Paid media includes advertisements on TV, radio, online, and via billboards, while earned media includes things like press events and news releases covering the efforts. Both types of media support enforcement activity are needed to ensure the public is aware of the enforcement activity, and to create the impression that violators will be caught. |

| Education Strategies | Brief Description |
|---|---|
| **DUI Educational Programs** | An educational program to reduce driving under the influence of drugs or alcohol may help improve safety throughout the county. A DUI program may involve collaborating with community partners to identify opportunities to influence driving under the influence behaviors, as well as coordinating with enforcement to identify focus locations for enforcement activities and education opportunities. It may also be beneficial to implement educational programs with local school districts to target underage impaired driving. |
| **Safe Vehicles Education** | Another way to increase roadway safety is to ensure vehicles are performing as designed. This includes vehicles upkeep, maintenance, and record keeping. Barrow County may consider producing media campaigns encouraging maintenance, provide programs to alleviate maintenance costs, and partner with local organizations, mechanics, and auto shops to promote upkeep. |

## EQUITABLE ENFORCEMENT STRATEGIES

Police enforcement can increase driver awareness and consequently reduce crashes. Any directed enforcement strategies should be undertaken with great care to avoid inequitable enforcement activities. The most effective enforcement strategies tend to be those that can be done **transparently, consistently, and in coordination with education or outreach campaigns** such as enforcement in school zones during school hours. Potential partners for implementation include:

Barrow County Sheriff's Office

Education Strategy Partners

Municipal Police Departments

**Table 9** outlines enforcement-related strategies identified for Barrow County.

*Table 9. Enforcement Strategies*

| Enforcement Strategies | Brief Description |
|---|---|
| **Progressive Ticketing** | Progressive ticketing is a method for introducing ticketing through a three-staged process. Issuing tickets is the strongest strategy of an enforcement program and it is usually reserved for changing unsafe behaviors that other strategies failed to change or that pose a real threat to the safety of road users. There are three main steps of an effective progressive ticketing program:<br>1. ***Educating*** - Establish community awareness of the problem. The public needs to understand that drivers are speeding and the consequences for road safety. Raising awareness about the problem will change some behaviors and create public support for the enforcement efforts to follow.<br>2. ***Warning*** - Announce what action will be taken and why. Give the public time to change behaviors before ticketing starts. Fliers, signs, newspaper stories and official warnings from officers can all serve as reminders.<br>3. ***Ticketing*** – After the "warning" period, hold a press conference announcing when and where the police operations will occur. If offenders continue their unsafe behaviors, police officers issue tickets. |
| **Speed Enforcement in School Zones** | Strict enforcement of speed laws in school zones is a law enforcement tool to address improve the safety for children walking and bicycling to school as well as drivers. Potential approaches include a 'zero tolerance' policy for speeding in school zones and increases in fines for drivers who violated the posted school zone speed limit. |
| **High Visibility Saturation Patrols** | A saturation patrol, also called a dedicated DWI patrol consists of many law enforcement officers patrolling a specific area to look for drivers who may be impaired. These patrols usually take place at times and locations where impaired driving crashes commonly occur. Like publicized sobriety checkpoint programs, the primary purpose of publicized saturation patrol programs is to deter driving after drinking by increasing the perceived risk of arrest. |

## EMERGENCY RESPONSE STRATEGIES

Emergency response is critical in reducing the severity of injuries sustained from crashes. The effectiveness of emergency response is tied closely to the time it takes for a person injured in a crash to receive medical care. Research indicates there is a "golden hour"—if pre-hospital time is under 60 minutes, the patient is more likely to live. Potential partners for Implementation:

- Barrow County Board of Health
- Barrow County Fire Department
- Barrow Sheriff's Office

**Table 10** outlines emergency response-related strategies identified for Barrow County.

*Table 10. Emergency Response Strategies*

| Post Collision Care Strategies | Brief Description |
|---|---|
| **Partner with Local Hospitals or Outreach Groups** | Partnering with local hospitals or outreach groups can help provide bystander training courses to the public (i.e., train members of the public to respond to emergencies since they are sometimes the first on the scene at a crash. Opportunities for this strategy include:<br>■ Partner with hospitals offering public education courses<br>■ Exploring and engaging Community Emergency Response Team (CERT) program, which trains community members in first responder skills<br>■ Work with local groups, such as fire departments, to be trainers themselves and then offer training more frequently in their local community<br>■ Partner with local trauma centers which are required to provide injury prevention programs<br>■ Consider a collaborative media campaign to inform and educate motorists on how to help emergency vehicles move faster by slowing down and moving over |

| Post Collision Care Strategies | Brief Description |
|---|---|
| **Work with Partners** | The County can collaborate with partners such as emergency service groups to:<br>■ Maximize efficiency with response times through evidence- based techniques<br>■ Identify reasons for delay in transport for both ground EMS (using registry data and EMS records)<br>■ Identify equipment upgrades, training, or enhancements that would improve patient outcomes<br>■ Identify barriers if any to rapid transfer of patients from lower-acuity hospitals to nearby trauma centers |

## STATE HIGHWAY COORDINATION STRATEGIES

Work on state-owned roads will take coordination and funding, but opportunities for both exist. The Safe Streets and Roads for All (SS4A) grant program funds planning, demonstrations and implementation projects for safety which can include work on state- and county-owned roads.

Other funding opportunities exist outside of the SS4A program that are managed either by the Georgia Department of Transportation (GDOT) or the CORE MPO.
In general, for the segments and intersections on the State Highway System the following countermeasures should be discussed with these entities with the goal of programming funds for:

- Feedback Speed Monitoring
- Intersection Delineation
- Improved Lighting
- Development of Shared-Use Paths

**Table 11** outlines the recommended state highway strategies identified for Barrow County that will lead to improvements of the HIN.

*Table 11. GDOT and MPO Coordination Strategies*

| Coordination Strategies | Brief Description |
|---|---|
| **Prioritize Safety in Planning and Funding Efforts** | In terms of setting policies, planning, and implementation, the Core MPO could work with Barrow County to use data, targets, and metrics to ensure safety is prioritized regionally and part of the HIN in the county. |
| **Education Strategies** | **Brief Description** |
| **Measure And Share Speeding-Related Data to Make Policy and Design Change** | Barrow can document and advocate for safety improvements, including those on the state system. GDOT is increasingly being asked to update their approach to speed management to reflect best practices |
| **Include State Agency Staff and Policymakers in Local Vision Zero Planning** | Collaborating with peers in other local communities on similar issues can inspire innovative ways to achieve Vision Zero goals, not just in individual places but also on the state system. Recognizing that most communities face similar challenges and opportunities for improvement, there is benefit in making more systemic safety changes by including GDOT as part of those conversations. |
| **Collaborate On Safety Improvements to GDOT Roads** | The CSAP plan highlights areas of concern on GDOT-owned roads and collaborates with the city to address them. Safety improvements may be quick-build pilot projects or longer-term efforts that take significant planning and funding. Georgia DOT's Quick Response Program (QR) is making a huge difference in reducing congestion and improving safety in Georgia's communities. The QR Program, which is administered by the Local Grants Office, allows the Department a mechanism to quickly identify, approve and construct small traffic operational projects throughout the district.<br><br>This may involve collaborating with community partners to identify opportunities to influence driving under the influence behaviors, as well as coordinating with enforcement to identify focus locations for enforcement activities and education opportunities. It may also be beneficial to implement educational programs with local school districts to target underage impaired driving. |

| Education Strategies | Brief Description |
|---|---|
| **Safe Vehicles Education** | Another way to increase roadway safety is to ensure vehicles are performing as designed. This includes vehicles upkeep, maintenance, and record keeping. Barrow County may consider producing media campaigns encouraging maintenance, provide programs to alleviate maintenance costs, and partner with local organizations, mechanics, and auto shops to promote upkeep. |

# POLICIES and PROCESS CHANGES

Policies establish guiding principles for decision-making. The following policy recommendations were identified for Barrow County.

- Based upon countermeasure recommendations, update county design standards for the roadway typical section to deal with new subdivision development.
    - Require pavement of shoulders and sidewalks along streets with access points to new development.
    - Construct new streets in accordance with current GDOT sight distance standards. Pay special attention to topographical limitations within the county. Enforce additional sight distance requirements where significant grade changes impact visibility.
- Specific education, equitable enforcement, emergency response, and coordination with state highway authorities, strategies are explained in detail in the plan and will facilitate the creation of safer roads and safer vehicles to achieve Vision Zero for Barrow County.
- Recommend a freight study with emphasis on exploring current and potential truck routes as well as impacts of truck cut through traffic on county roadways.
- Assessment at a corridor level for each of the HIN segments should be undertaken for the proposed countermeasures and others due to the growth the county is experiencing.

# Evaluation and Implementation

# EVALUATION AND IMPLEMENTATION

This section describes the steps that Barrow County can take to evaluate the success of this Safety Action Plan and steps needed to update the Plan in the future.

## OUTCOME MEASURES

Measures that the County can use to evaluate its ongoing success in reducing fatal and serious injury crashes and crash risk include:

- Total number of fatal and serious injury crashes on county roads
- Number of fatal and serious injury crashes on county roads by the following categories:
  - Pedestrian-involved crashes
  - Bicycle-involved crashes
  - Speeding and aggressive driving-related crashes

Fatal and serious injury crashes may be reported annually, with performance evaluated within the context of the latest five-year annual average to normalize for random fluctuations in crashes on a year-over-year basis.

## IMPLEMENTATION MEASURES

Measures that the county can use to evaluate progress in implementing the Safety Action Plan include:

- Number of Projects/Strategies implemented
- Number of Projects/Strategies continued from prior year
- Frequency of communication with Barrow County Stakeholders
- Number of changes to guidance, policies, practices, or standards to support the Safe System

## UPDATING THE PLAN

The Safety Action Plan relies on crash data from 2019–2023. Data was collected between December 2023 and February 2024. Barrow County should review crash data for key findings and performance measures to track progress annually. More substantial updates to the Safe Action Plan can occur at longer intervals (approximately every three years).

Barrow County can assess the Plan, consider new trends and technologies, and determine if an update to the Plan is needed. As new strategies are identified, the county may update goals and assign champions for specific projects and strategies.

# Appendix

Barrow County, Georgia

# Data Memorandum

SS4A Action Plan
Safety Data

April 19, 2024

HIGH STREET

# Introduction

This memo details the data collected and its associated preparation for the Barrow County, Georgia, Safe Streets for All (SS4A) Action Plan. Data was collected between January 2024 and March 2024. Following the conclusion of this project, updated data should be gathered periodically (every 1-2 years) from existing sources, and new data sources should be evaluated to determine whether they should be added to the local safety analysis process or if they should replace the data currently in use.

This document also summarizes the coverage of the data sources used, the validation and preparation processes applied to the raw data, and any notes for future safety analyses.

# Safe System Approach

The team integrated the Safe System Approach (SSA) into the analysis by careful consideration of all available quality data that align with five SSA objectives of Safer People, Safer Vehicle, Safer Speeds, Safer Roads, and Post-Crash Care. Figure 1 shows the data elements the team used organized by SSA objective and Table 1 defines the data source credits and attributes used. Note that there has been no data collected for post-crash care. Example data would be emergency response time by crash or medical records within the county with a cause attribute that ties into traffic accident.

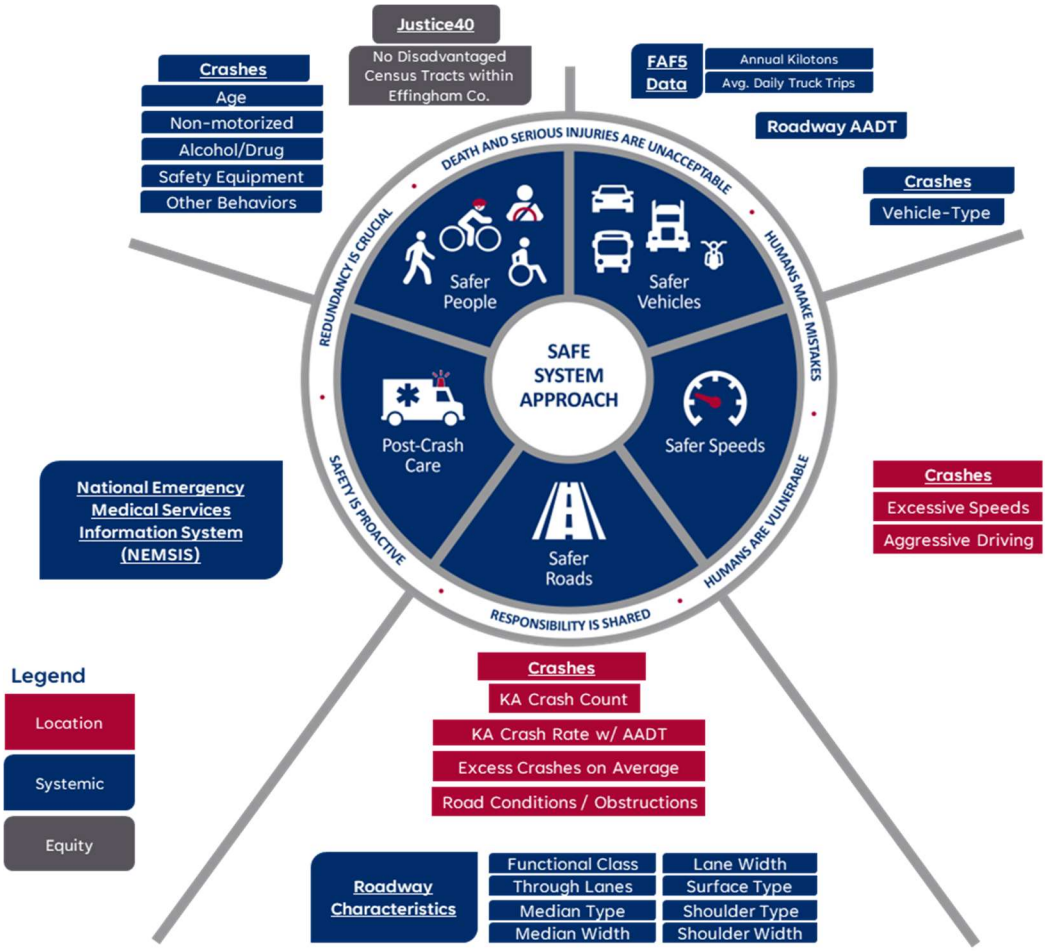



*Figure 1 - Data collected relative to Safe Systems Objectives*

# Data Sources

*Table 1 - Data Sources*

| Name | Provider | Approach Area | Description | Link / Location |
|---|---|---|---|---|
| Crash Data | Georgia Department of Transportation | All | 2019 to 2025 crash point data | Requested from CrashInquiries@dot.ga.gov |
| Roadway Inventory | Georgia Department of Transportation | Safer Roads | Roadways in Barrow County | https://www.dot.ga.gov/GDOT/Pages/RoadTrafficData.aspx |
| Traffic Volumes | Georgia Department of Transportation | Safer Vehicles & Roads | 2022 traffic volumes on all roads | https://www.dot.ga.gov/GDOT/Pages/RoadTrafficData.aspx |
| Municipal & County Boundaries | US Census Bureau | Safer Roads | Geographic boundaries for cities and counties in the study area | https://data.census.gov/ |
| FAF5 | Federal Highway Administration | Safer Vehicles & Roads | Freight volumes in terms of trucks and tonnage | https://faf.ornl.gov/faf5/ |
| Disadvantaged Census Tracts | CEJST (Justice40) | Safer People | Areas that are overburdened or under-served | https://screeningtool.geoplatform.gov/en/ |

Unfortunately, these sources do not cover every section of the SSA approach. Post-crash care is especially sparse as the project team was unable to obtain information about 911 response times or outcomes of associated hospitalizations, but an effort is currently underway to gather data from the National Emergency Medical Services Information System (NEMSIS). The safer speeds section is also lacking as instantaneous speed data is not available for non-National Highway System (NHS) facilities.

The coverage section also shows that many of the roadway characteristics provided by GDOT are not available across the entire system. In fact, many of them are only available on a small handful of segments. Increasing this data density through direct observations, remote sensing, or data entry from local projects would greatly enhance future safety analysis efforts.

## Georgia Department of Transportation

Data from the Georgia Department of Transportation (GDOT) is central to this effort. Databases retrieved were crashes from the GEARS database (via CrashInquiries) and the GDOT AASHTO Safety dashboard, the roadway inventory, and traffic volumes.

## Crashes

Crash data was provided by GDOT through a request to CrashInuiries@dot.ga.gov. The data provided comes from the Georgia Electronic Accident Reporting System (GEARS). GEARS is the portal for the Georgia's repository of traffic accident reports that are filled out by Georgia law enforcement agencies. This means that the data within is limited in its accuracy and how recently the data has been updated given the processes of the agencies inputting data.

In emails with GDOT, state staff noted that only the agency writing the report can update or supplement the report. However, data available on the American Association of State Highway and Transportation Officials (AASHTO) safety dashboard is typically more accurate because GDOT staff correct the recording errors only for fatalities and make updates to the fatality numbers before the data is published to the AASHTO dashboard. Because several data fields about individual crashes are not accessible through the dashboard, the project team chose to use the GEARS data during initial analysis.

The form used by GEARS is the Georgia Motor Vehicle Crash Report (DOT Form 523). Based on that form, the following crash characteristics considered: manner of collision, location of impact, lighting conditions, surface condition, roadway composition, driver age, driver safety equipment, vehicle type, direction of travel, maneuvers, harmful events (e.g. collisions with other objects), traffic controls, number of lanes, traffic flow, work zones, and other contributing factors from the roadway or the driver(s).

Other contributing factors included "Aggressive Driving", "Changed Lanes Improperly", "Disregard Other Traffic Control", "Disregard Police - Evasion", "Disregard Police - Traffic Control", "Disregard Stop Sign/Signal", "Driver Condition", "Driver Lost Control", "Driver Lost Control - Distracted", "Driver Lost Control - Impairment", "Driver Lost Control - Speed Related", "Exceeding Speed Limit", "Failed to Yield", "Following too Close", "Improper Backing", "Improper Passing", "Improper Turn", "Inattentive or Other Distraction", "Mechanical Or Vehicle Failure", "Misjudged Clearance", "No Signal/Improper Signal", "Not Visible (Object)", "Occupant Distraction", "Other Activity - Mobile Device", "Other Exterior Distraction", "Other Interior Distraction", "Parked Improperly", "Reaction to Object or Animal", "Reckless Driving", "Talking on Hand-Held Device" "Talking on Hands-Free Device", "Texting", "Too Fast For Conditions", "Under the Influence", "Vision Obscured", and "Wrong Side of Road".

## Roadway Inventory

GDOT's Office of Transportation Data (OTD) maintains roadway data for more than 125,000 centerlines miles of public roads in the state. The spatial geodatabase of roadway information contains information about the county, functional class, median, shoulder, surface type, and through lanes that describe the physical characteristics of a given road segment.[1]

## Traffic Volumes

GDOT OTD gathers data about traffic volumes (as Average Annual Daily Traffic or AADT) from continuous counters, short-term counters, and weigh-in-motion counters. Where facilities do not

[1] See the data dictionary at https://www.dot.ga.gov/DriveSmart/Data/Documents/Road_Inventory_Data_Dictionary.pdf for more detail.

have direct observations of vehicles, volumes are estimated based on nearby counts or counts on similar facilities. GDOT's traffic data also includes AADT for single and combination unit trucks.[2]

## Census Bureau

The project team gathered municipal and county boundaries from the US Census Bureau. The 2019 Tiger Line country boundary was the dividing point for roadway facility geometries that extended well beyond the county.

Demographic and socioeconomic information will be gathered as needed from the Bureau's Decennial Census and American Community Survey tables.

## Federal Highway Administration

The project team retrieved supplemental freight data from the Federal Highway Administration's (FHWA) Freight Analysis Framework 5 (FAF5). This dataset includes annual kilotons and daily truck trips on a subset of the county road network, providing further detail about existing conditions as well as forecasts for future highway freight volumes.

# Validation

For each dataset, the project team performed the following data quality and assurance checks:

- **Spatial completeness:** Does the layer cover all of Barrow County? Are there gaps?
- **Percent of null column values:** What percentage of rows in the columns we plan to use are null?
- **Distribution of column values:** Are there outliers in the values of the columns we plan to use? Do the values make logical sense? Is there evidence of placeholder values?
- **Geocoding**: Do any points, lines, or polygons look geocoded incorrectly? If so, does this impact large amount of data or are there only a few instances?
- **Data structure** – Is the data in a wide format, meaning each attribute is in a separate column, or a long format, meaning each attribute is in a separate row? Are any transformations needed to join all of the data together and perform the analysis?

Once the original data had been cleaned and prepared for analysis, the project team compared it to the AASHTO safety dashboard and summarized "K" and "A" crashes, fatalities, and serious injuries according to other factors such as calendar year, functional classification, and traffic volume. As noted previously, GDOT cannot fix errors in GEARS that stem from inaccurate crash reports due to legal restrictions. However, errors related to fatalities are adjusted before the data is made publicly available on the GDOT portion of the AASHTO Safety Analyst Dashboard[3].

*Table 2 - Comparison of received fatal crash data to AASHTO Safety Analyst Dashboard*

| Data Source | 2019 | 2020 | 2021 | 2022 | 2023 |
|---|---|---|---|---|---|
| GDOT Crash Inquiry Data | 9 | 16 | 17 | 13 | 13 |
| AASHTO Dashboard Data | 9 | 16 | 17 | 14 | NA |

[2] See https://www.dot.ga.gov/GDOT/Pages/RoadTrafficData.aspx for tabular and spatial roadway and traffic data downloads.

[3] https://gdot.aashtowaresafety.net/crash-data#/

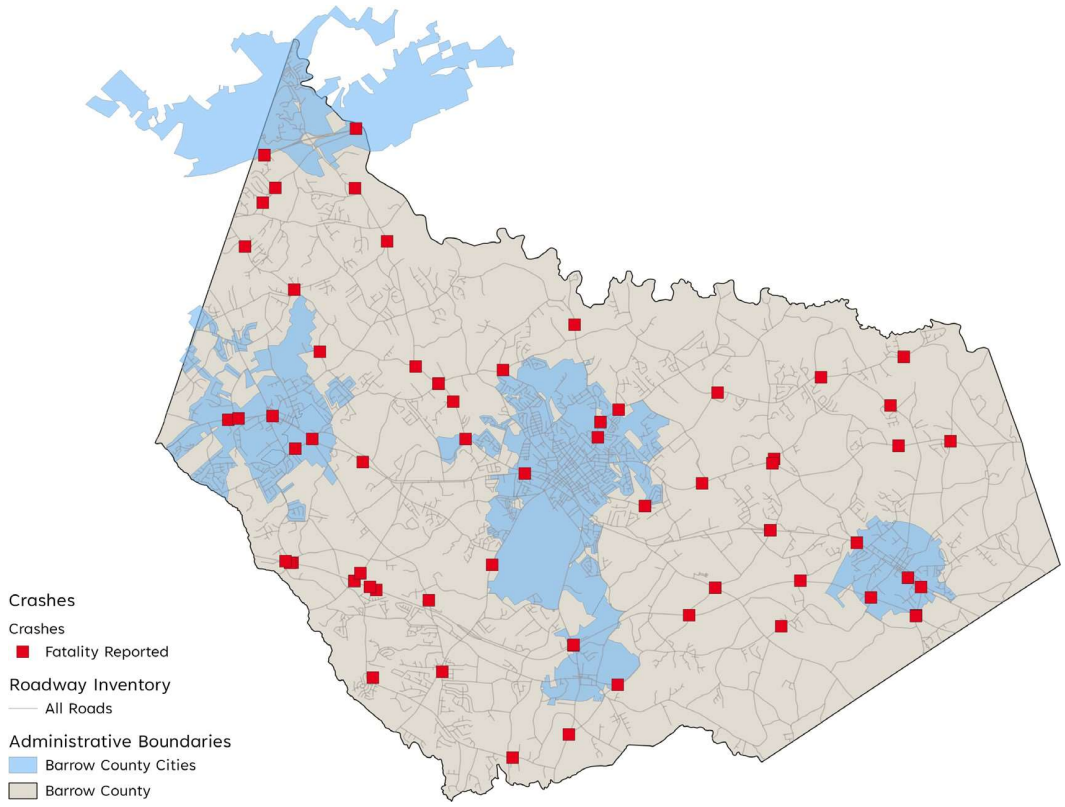
# Coverage

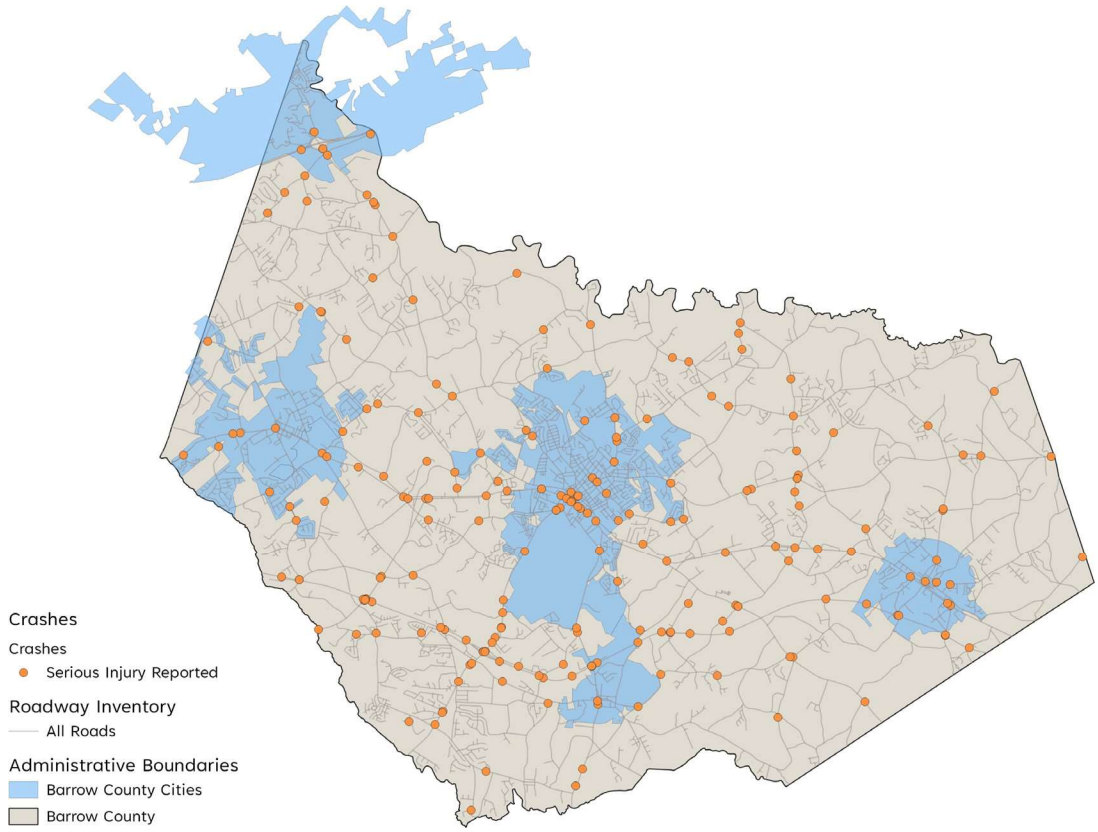
## Crashes

This study considers crashes with fatalities and serious injuries that are categorized as “K” or “A” severity in the 5-year stretch from 2019 through 2023. These crashes are visualized in the following figures, and the number of fatalities, serious injuries, and K and A crashes per year are shown in Table 3.

*Table 3. Annual crashes, fatalities, and injuries in Barrow County from motor vehicles, 2019-2023.*

| | 2019 | 2020 | 2021 | 2022 | 2023 |
|---|---|---|---|---|---|
| Fatal (K) Crashes | 9 | 16 | 17 | 13 | 13 |
| Serious Injury (A) Crashes | 33 | 59 | 38 | 51 | 42 |
| Total Fatalities | 10 | 18 | 20 | 14 | 15 |
| Total Serious Injuries | 44 | 73 | 55 | 69 | 52 |






## Roadway Characteristics

GDOT gathers roadway characteristics from remote sensing, Local Road Activity (LRA) reports, construction design plans, and data mining efforts; however, data on many roadways is still limited. The following maps show coverage for the roadway characteristics available through GDOT's Road Inventory spatial geodatabase.

Through lanes and functional class are the only characteristics available on the majority of the network. Surface type is available on some major roads, and all other variables are available on just a few segments. The limitation of coverage from these characteristics limits the systemic risk analysis portion of the report which defines what types of roadways correlate the highest with fatalities and serious injuries. The table below defines each roadway characteristics with the coverage shown, with "High" being the only coverage that can adequately produce a strong systemic correlation analysis. The figures in the following pages visualize each roadway characteristic.

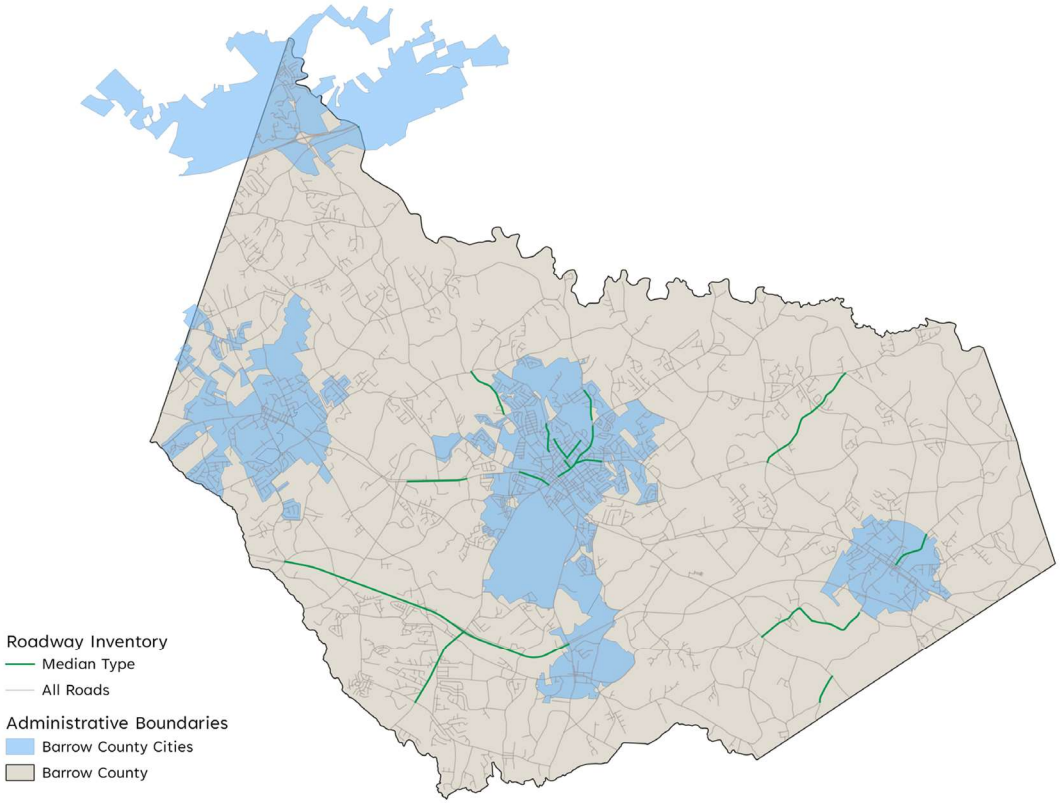
*Table 4 - Roadway Characteristics Coverage*

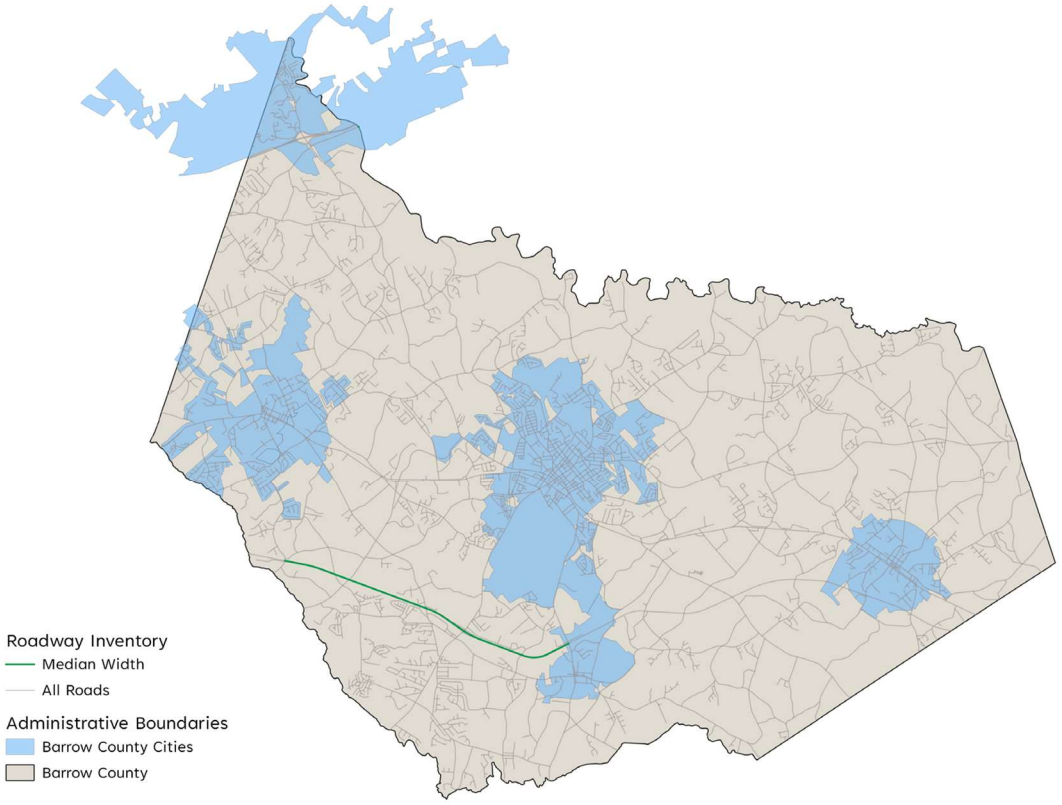
| Roadway Characteristics | Description | Coverage |
|---|---|---|
| Median Type | Type of barrier exists between opposing directions of travel. | Low |
| Median Width | Total width in feet of the center median. | Low |
| Shoulder Type | Nature of and surface material of the shoulder. | Low |
| Shoulder Width | Total width in feet of the right shoulder. | Low |
| Surface Type | Material used to construct the roadway (asphalt, concrete, gravel, etc.) | Medium |
| Through Lanes | Number of lanes on roadway. | High |
| Functional Classification | Grouping of streets and highways according to the current type of service they provide. | High |
| Lane Width | Typical width of one lane. | Low |

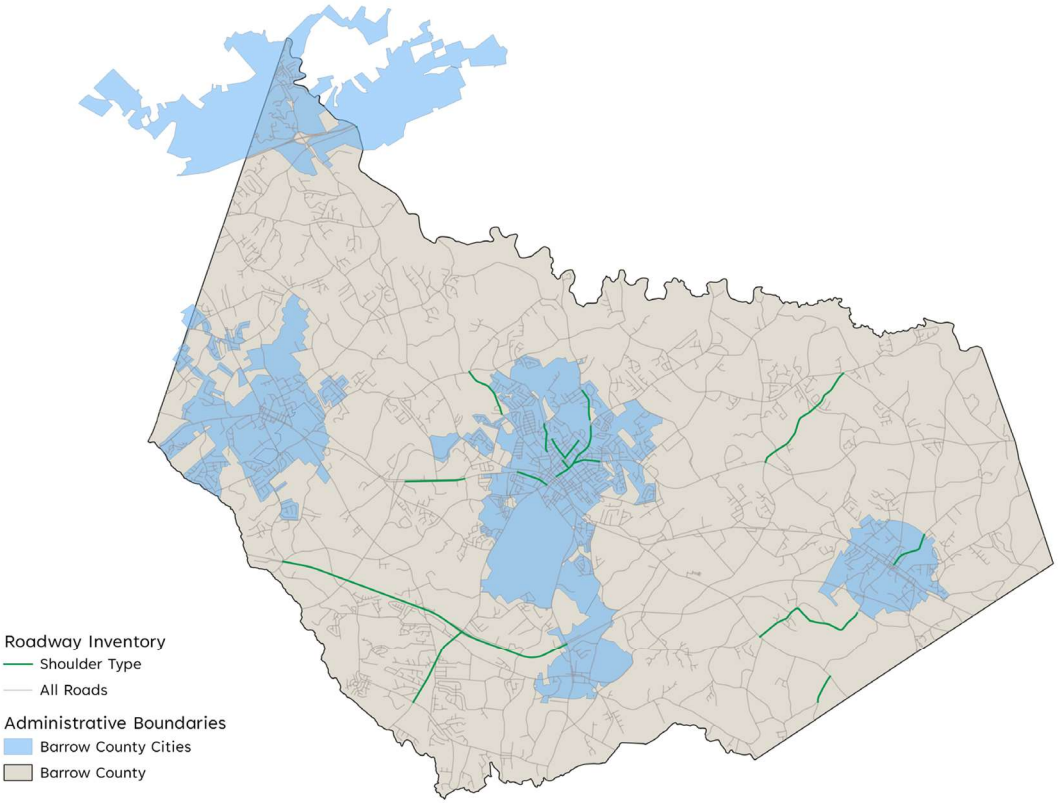
**See GDOT's Road Inventory Data Dictionary for more information on field values.*

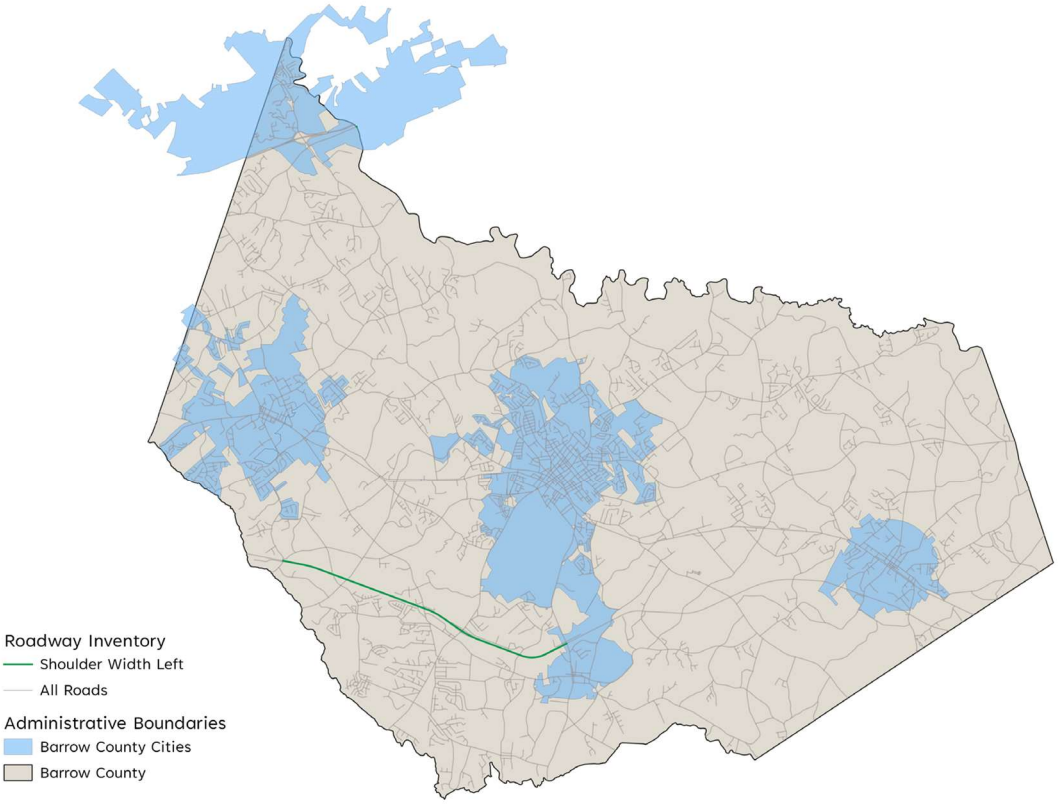
The sparse roadway information available through GDOT highlights the need for a better asset management database for local roads. Having a location where municipal and county staff can update and utilize this information will allow for better prioritization of local funds for maintenance and improvements.

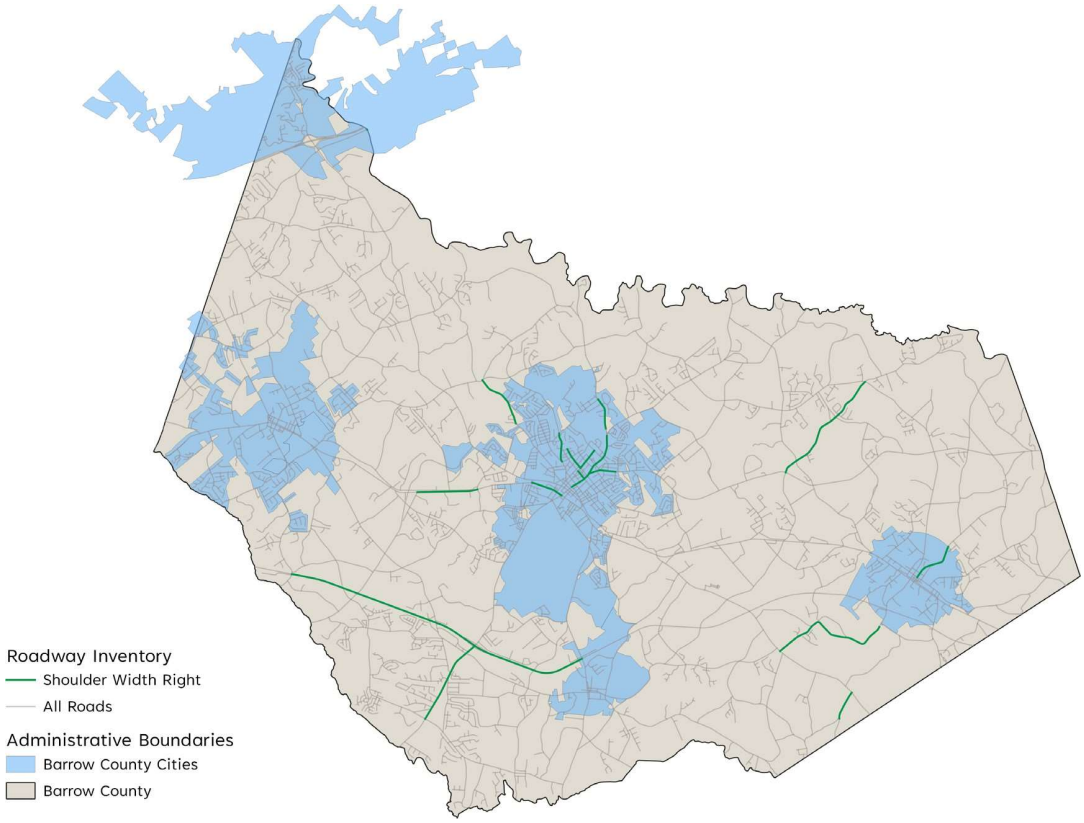
The following maps indicate the presence of data on a segment with a **green** line while segments without any information concerning the field are grayed out.

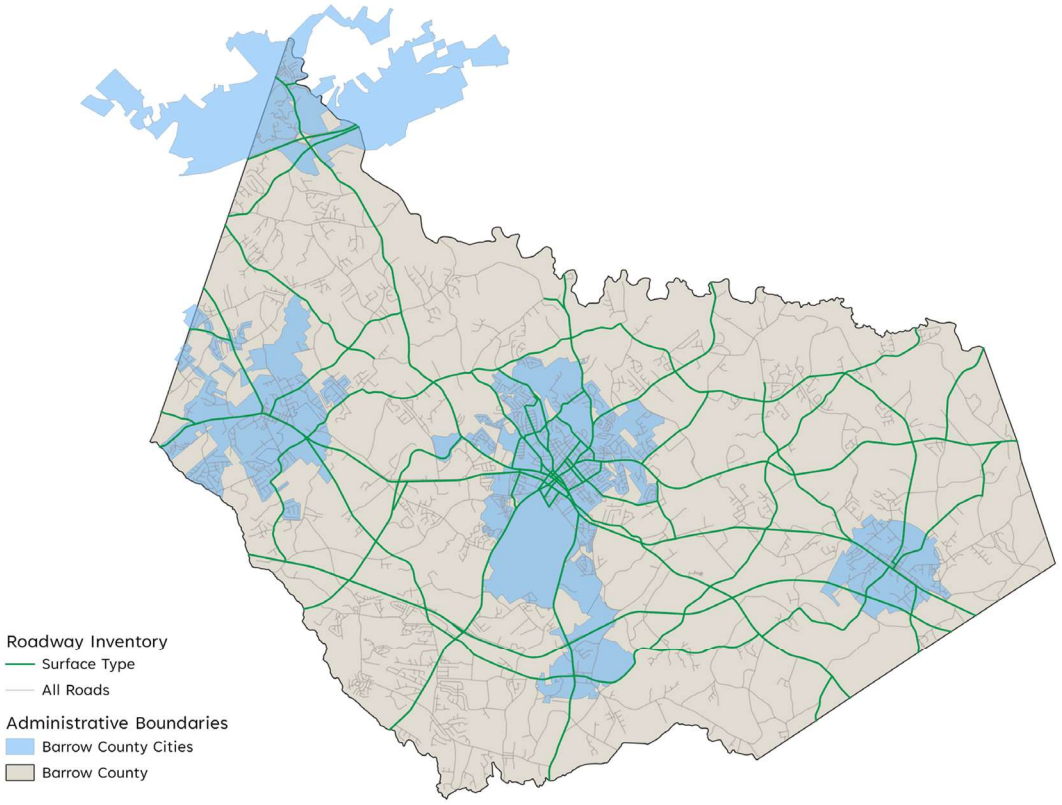

Roadway Inventory
Median Type
All Roads
Administrative Boundaries
Barrow County Cities
Barrow County

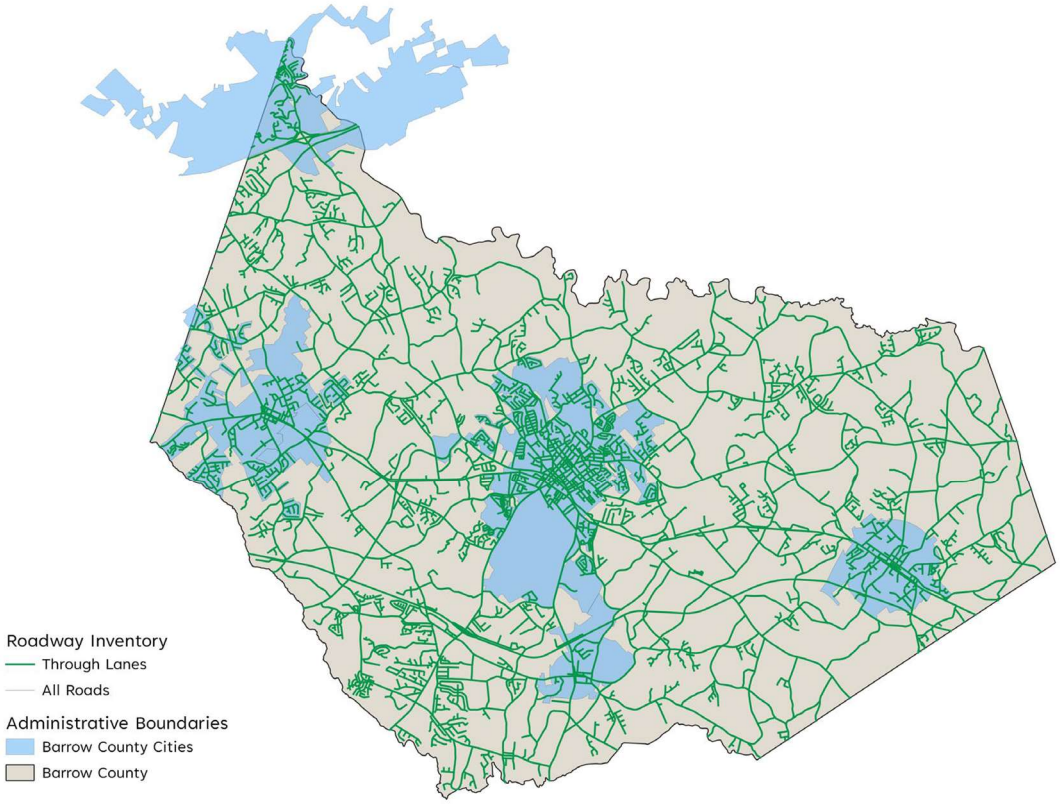

Roadway Inventory
Median Width
All Roads
Administrative Boundaries
Barrow County Cities
Barrow County

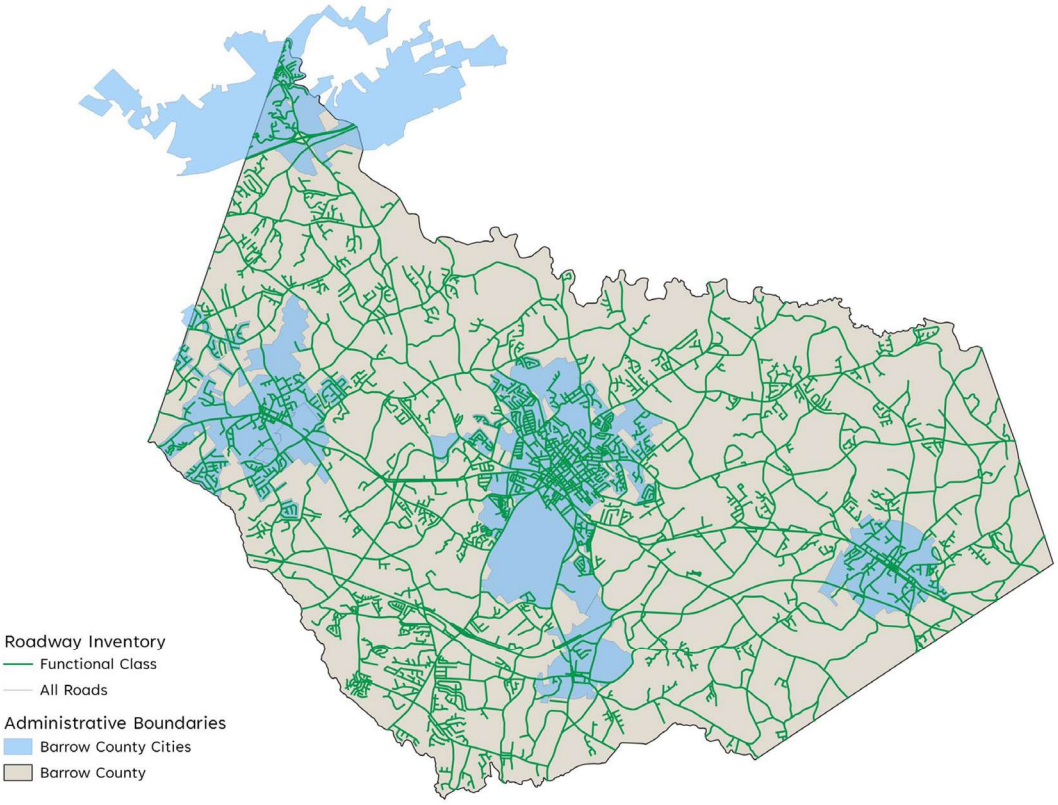

Roadway Inventory
Shoulder Type
All Roads
Administrative Boundaries
Barrow County Cities
Barrow County

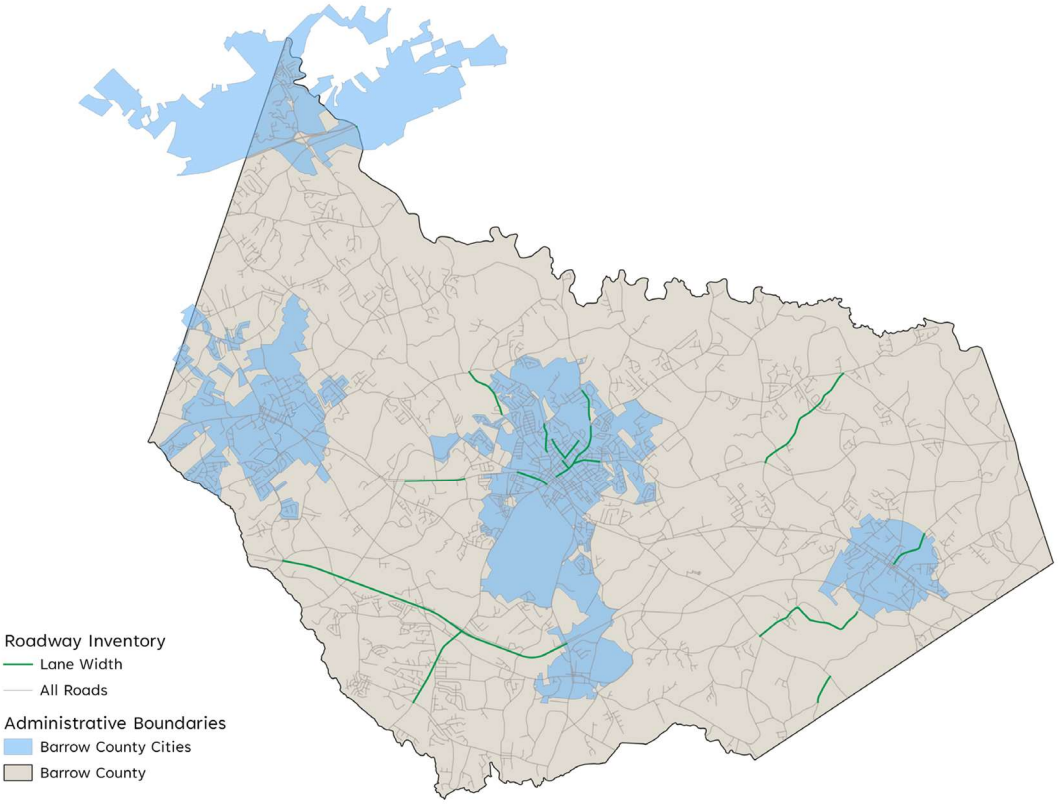

Roadway Inventory
Shoulder Width Left
All Roads
Administrative Boundaries
Barrow County Cities
Barrow County


Roadway Inventory
Shoulder Width Right
All Roads
Administrative Boundaries
Barrow County Cities
Barrow County


Roadway Inventory
Surface Type
All Roads
Administrative Boundaries
Barrow County Cities
Barrow County


Roadway Inventory
Through Lanes
All Roads
Administrative Boundaries
Barrow County Cities
Barrow County


Roadway Inventory
Functional Class
All Roads
Administrative Boundaries
Barrow County Cities
Barrow County


Roadway Inventory
Lane Width
All Roads
Administrative Boundaries
Barrow County Cities
Barrow County

## Traffic Volumes

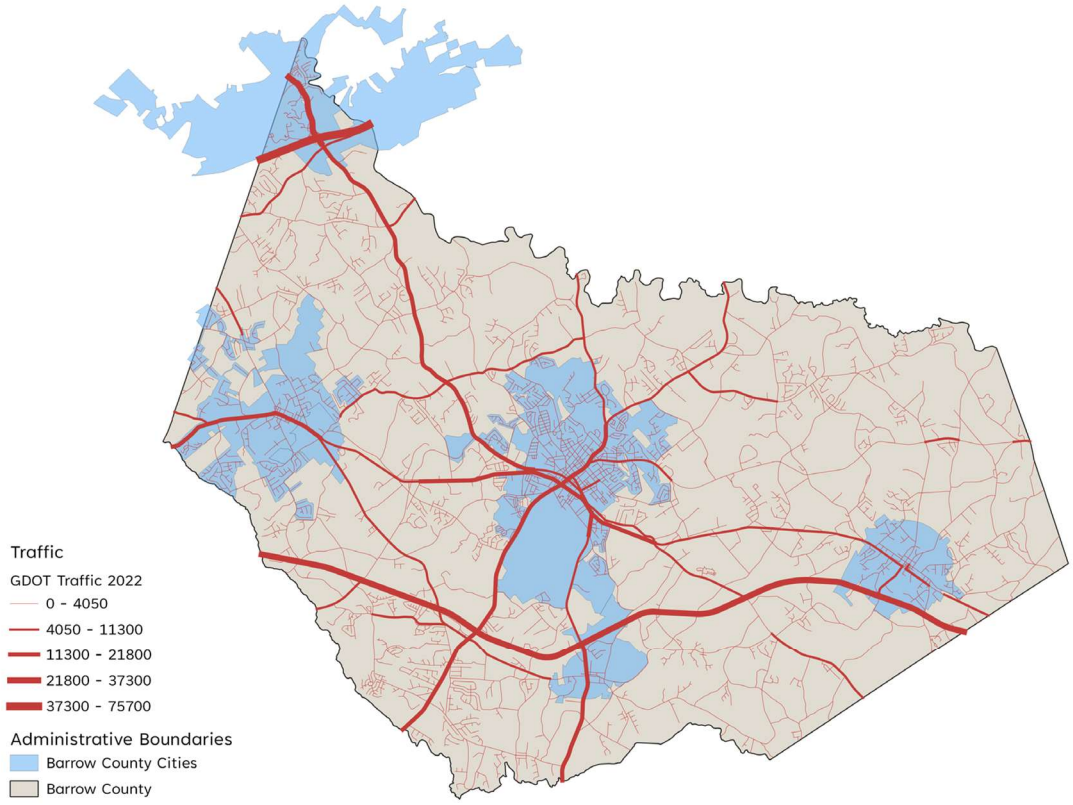
Traffic volume is useful in safety data analysis to determine a correlation to severity or frequency. While some roads may have the largest number of fatalities, those same roads may have the largest volume. Calculating crash rate is defined as the number of crashes over the volume of roadway.

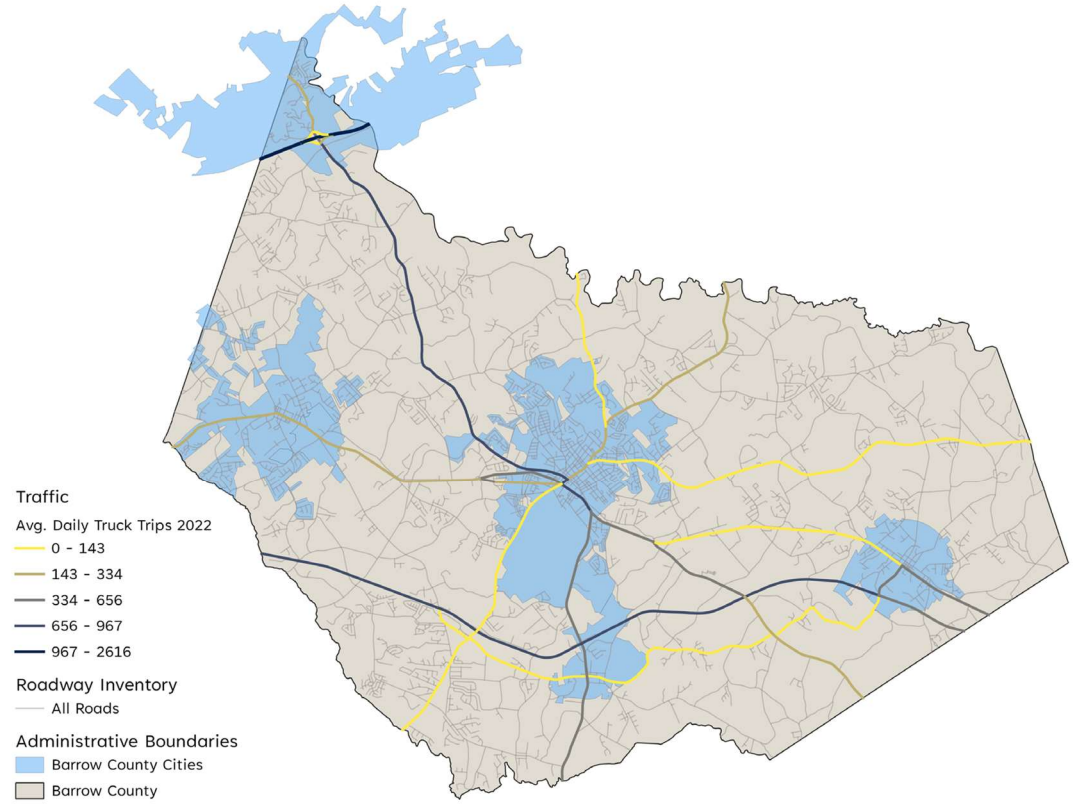
There are dozens of traffic count sites in Barrow County, and Average Annual Daily Traffic (AADT) values are available on all the roads included in GDOT's spatial dataset. This also includes AADT values for 20 years in the future as well as for single and combination unit trucks. **The volume dataset is adequate to use for the full range of safety data analysis.**

Information about truck volumes in terms of annual kilotons and average daily truck trips are also available from the FAF5 dataset. The complete dataset also provides information about the commodity split (e.g. SCTG2 codes) and forecasts for future years. **The coverage of this dataset is limited and can only give perspective for freight corridors. The use of this dataset is dependent on the location of truck crashes.**

*Table 5 - Volume Data Coverage*

| Volume Information | Coverage |
|---|---|
| Average Annual Daily Traffic | High |
| Average Annual Daily Truck Traffic | Medium |


Traffic
GDOT Traffic 2022
0 - 4050
4050 - 11300
11300 - 21800
21800 - 37300
37300 - 75700
Administrative Boundaries
Barrow County Cities
Barrow County


Traffic
Avg. Daily Truck Trips 2022
0 - 143
143 - 334
334 - 656
656 - 967
967 - 2616
Roadway Inventory
All Roads
Administrative Boundaries
Barrow County Cities
Barrow County

# Conclusion

While a complete picture of crash context and influencing factors is not possible given current data availability, the project team can identify correlations between fatalities, serious injuries, and the other data points available. Subsequent analysis will develop a high-injury network (HIN) and assess systemic risks for “K” and “A” crashes in Barrow County.

The current coverage and availability of the data allows a **location-specific hotspot analysis** of segments and a **simple correlation analysis of systemic high risk roadway attributes**. We are unable to run a machine learning model to produce a high accuracy model of high-risk roadway attributes, however this analysis can be aided by research of peer area high risk attributes.

The data collection process also indicates opportunities for improved data density and relevance that can be pursued through later local funding, collaboration with GDOT, or federal grants. Many of these projects focus on setting up systems to collect, maintain, and examine data. However, investment in this area can yield dividends in both dollars and lives as more effective interventions can be more accurately deployed as Barrow continues to grow. The below table defines the available captured datasets and also typical datasets that would advance this analysis:

*Table 6 - Captured Datasets*

| Dataset | SS4A Topic(s) | Quality |
|---|---|---|
| Crash Data | All | High |
| Roadway Data | Safer Roads | Medium |
| Volume Data | Safer Roads | High |
| Justice40 Disadvantaged Tracts | Equity | High |

*Table 7 - Potential additional datasets to advance analysis.*

| Dataset | SS4A Topic(s) |
|---|---|
| Junction Data | Safer Roads |
| Speed Posting Limits, Instantaneous Speeds | Safer Speeds |
| Vehicle Type Registration | Safer Vehicles |
| GDOT Vulnerable Road User Analysis Spatial Points | Vulnerable Road Users |
| Geolocated Safety Projects | Historical effectiveness |
| Pedestrian / Bicycle Volume Counts | Vulnerable Road Users |

# Final Safety Analysis Memorandum
# Barrow County | 05.28.2024

SS4A Safety Action Plan
Safety Analysis

FORESITE group

Prepared By:

HIGH STREET

# Executive Summary

This document presents a analysis of existing conditions related to traffic safety in Barrow County, setting the groundwork for a targeted Safety Action Plan. Our analysis, grounded in rigorous examination of 2019 – 2023 crash data through location and systemic analysis, underscores the critical areas where interventions can significantly enhance road safety and reduce fatal and serious injury crashes.

The results of the analysis show a High Injury Network (HIN) that prioritizes segments with fatal and serious injury crashes through a combination of need and risk. This network can be displayed via the link below to an interactable ESRI Dashboard:

https://experience.arcgis.com/experience/1632ca40d37a42cab138d7d3f649d4fc/

## Identified Emphasis Areas:

| Emphasis Areas | Description |
|---|---|
| Junction Crashes | Primarily Angle crash types. |
| Higher Speeds | Crashes occurring on roadways with higher speed limits, typically over 40 mph, where speed is a contributing factor to the severity or likelihood of the crash. |
| Lane Departure Crashes | Crashes involving a vehicle leaving the lane, including overturns, head-on, and sideswipes. |
| Principal and Minor Arterials | Crashes occurring on major roadways that serve high traffic volumes and connect significant areas, including both primary and secondary arterial roads. |
| 4+ Lanes | Crashes on roadways with four or more lanes, often involving complex traffic interactions and higher traffic volumes. |
| Middle-Aged Drivers | Crashes involving drivers typically aged between 35 and 64 years, considering their driving behavior and risk factors. |
| Larger Vehicles | Crashes involving larger vehicles such as trucks, buses, and SUVs, which may have different dynamics and impacts compared to smaller passenger vehicles. |
| Non-Motorized Users | Crashes involving pedestrians, bicyclists, and other pedestrian/bicyclist users. |

### Causation vs. Correlation

This analysis identifies features that are correlated with higher numbers of fatalities and serious injuries. This does not necessarily mean that the presence of the characteristic is contributing to crashes. This may be particularly true of characteristics that are likely acting as proxies for other features (e.g., the presence of more lanes may be a surrogate for higher speeds).

### Crash Type vs. Contributing Factor

Crash Type describes how a crash happens (e.g., rear-end, angle), offering an objective classification based on observable evidence. Countermeasures can be identified to target specific crash types.

In contrast, Contributing Factor (e.g., distracted driving) involves subjective judgment about why a crash occurred, such as distracted driving or weather conditions, which can be unreliable due to reporting inaccuracies or cross-cutting across multiple crash types and not informative for strategy development.

Focusing on crash types allows the plan to identify countermeasures targeted to the most common crash patterns.

# Safe System Approach

The team integrated the Safe System Approach (SSA) into the analysis by careful consideration of all available quality data that align with five SSA objectives of Safer People, Safer Vehicle, Safer Speeds, Safer Roads, and Post-Crash Care. Figure 1 shows the data elements the team used organized by SSA objective.

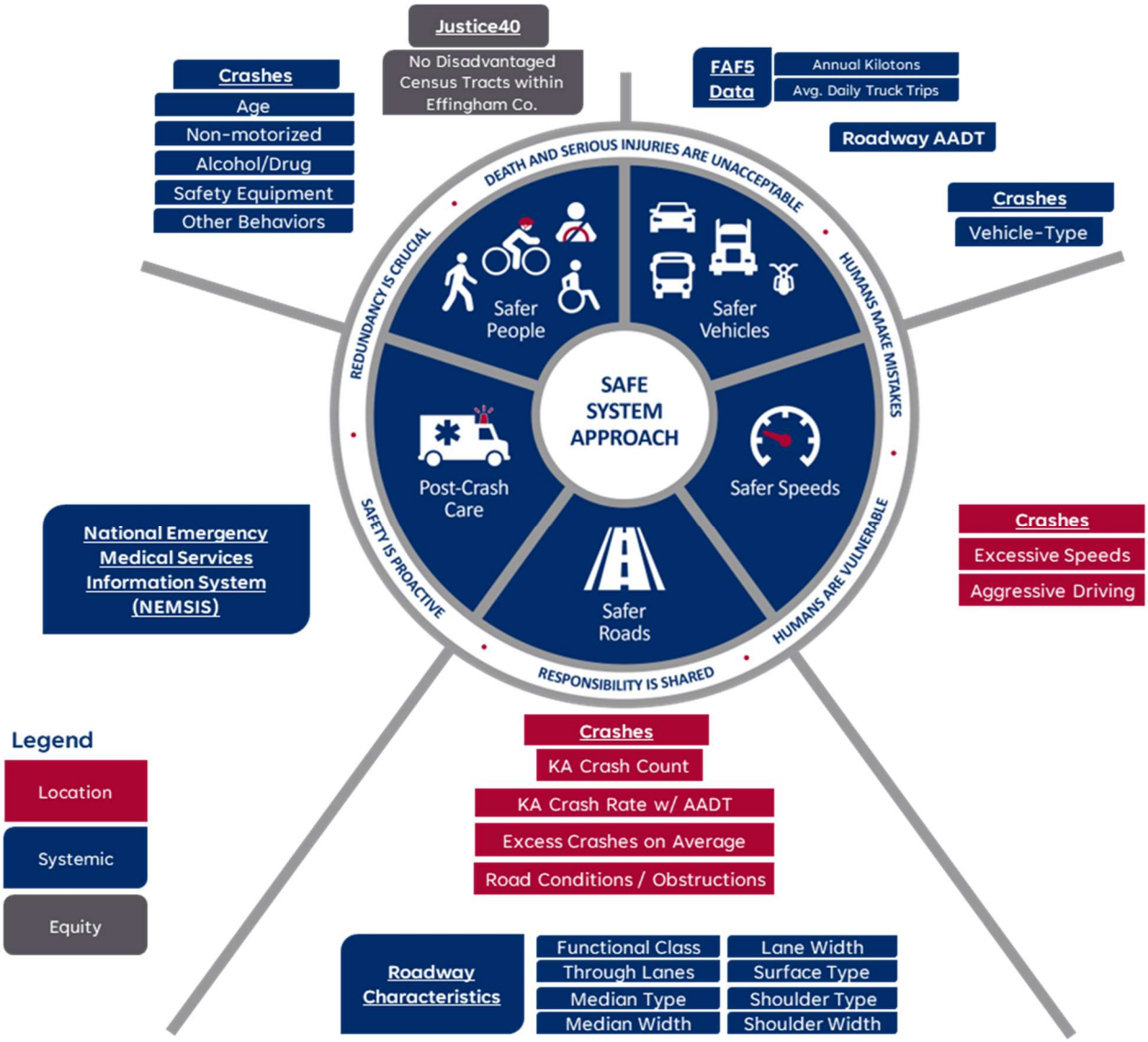



*Figure 1 - Data collected relative to Safe Systems Objectives*

# Methodology

## Overview

This section describes the methodology of the analysis for understanding and reproducibility. The High Injury Network (HIN) was constructed through a methodical process that integrates both location-specific and systemic analyses as shown in Figure 2. Crash data was analyzed in conjunction with roadway and crash attributes to identify areas of concern. All active mode or non-motorized crashes were analyzed to identify and analyze vulnerable road users crashes.

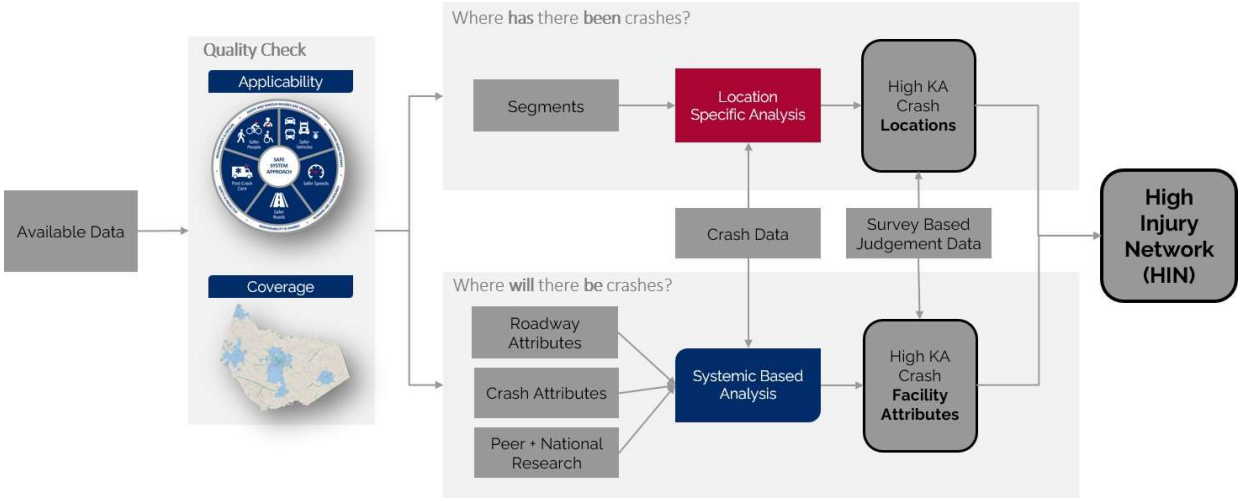



*Figure 2. Two-Prong HIN Process*

1. **Location-Specific (Hot Spot) Analysis** reactively identifies roadway junctions and segments with higher concentrations of observed fatal (K) and serious injuries (A) crashes. This traditional "hot spot" analysis focuses investments at locations where a higher preponderance of severe crash events have occurred in the past five years. The resulting data shows high fatalities and serious injuries at segments and a "Location Score", which ranks features based on the number of KA crashes in the five-year period of 2019 to 2023.

2. **Systemic Based (Risk) Analysis** uses a machine learning model (Poisson regression) that identifies features of the regional roadway that correlate with fatalities and serious injuries regardless of whether such events occurred recently. The goal is to flag infrastructure with roadway features (e.g., lane count) and driver behaviors (e.g., speeding) that may increase the likelihood of future severe incidents on the network. The resulting attribute of this work is a "Risk Score" that calls attention to particularly risky roadway and junction facilities.

The result of these two analyses was used to create a **high-injury network (HIN) score** that ranks the county's roadway segments through an identical score of features with the highest frequency of fatal and serious injury crashes and features with variables that contribute most to high risk. The creation of this HIN ensured that the network reflects both the granular details of specific crash sites and the broader systemic risks of the county.

## Process

We conducted a systematic process to organize, process, and analyze the data. Figure 3 below shows a 4-step process of data management, location analysis, systemic analysis, and High Injury Network (HIN) analysis in order to arrive at our HIN Layer.

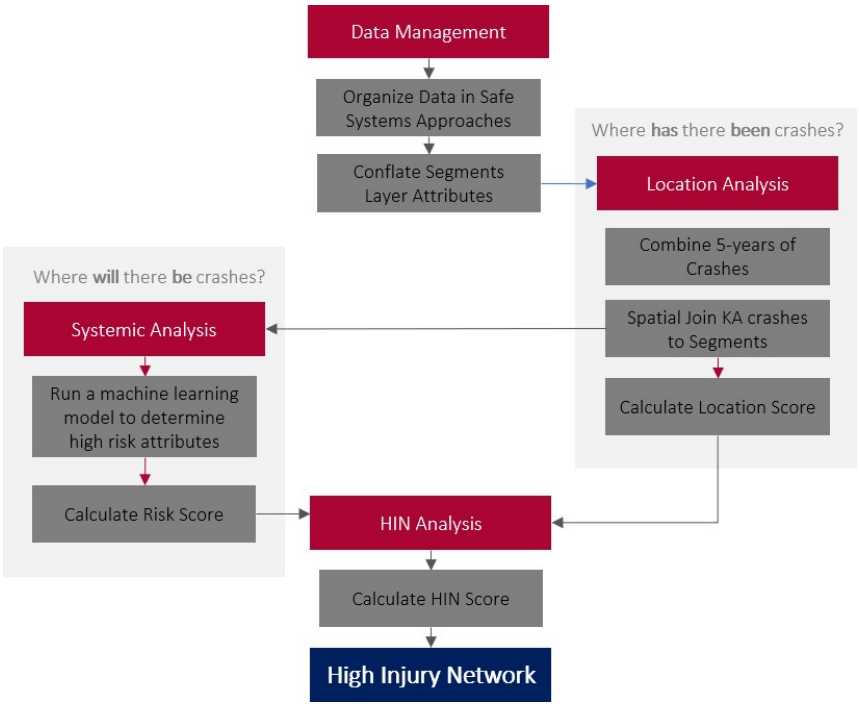



*Figure 3. Overall Process of creating the HIN*

## Data Management (Conflation)

The first step in developing a usable data layer is to conflate all information into one linear referencing system that we have called "conflated segments" in Figure 4 below.

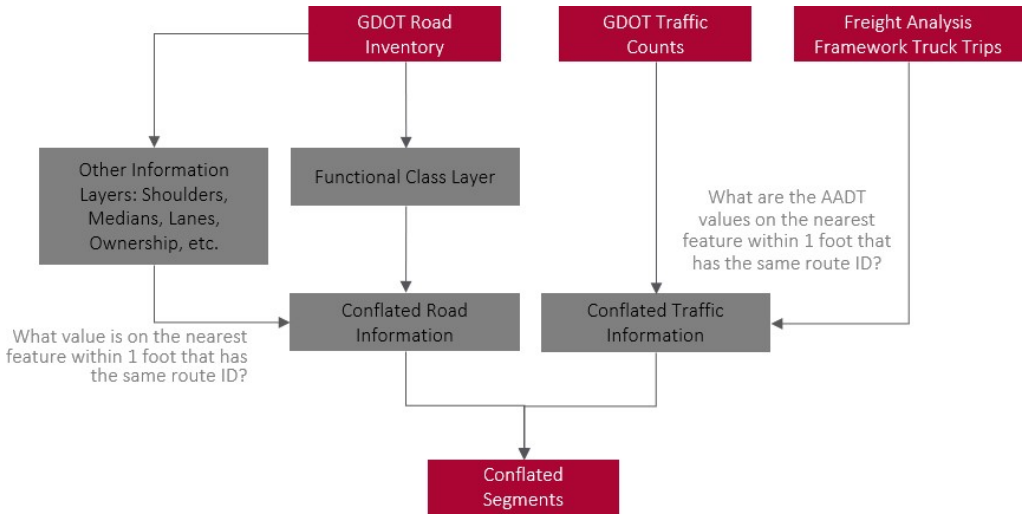



*Figure 4. Conflating multiple attributes of roadways into one layer*

## Location-Specific Hot Spot Scoring (Location Analysis)

The second step in the process is to filter, combine, and spatially join our crashes to segments within 150 feet of the roadway; matching recommendations from the Highway Safety Manual.

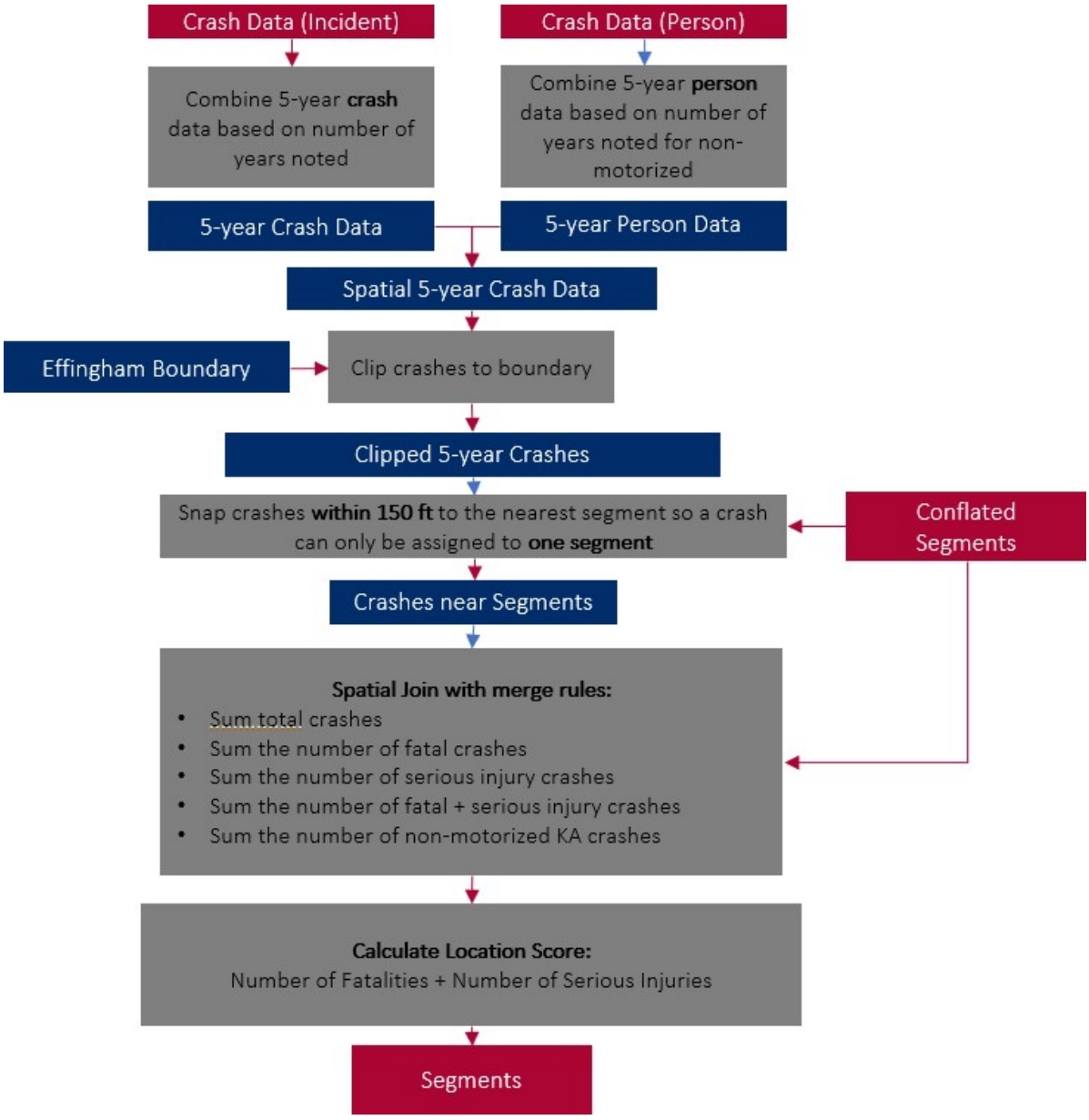



*Figure 5. Calculating the location score by assigning crashes to segments*

## Systemic-Based Risk Scoring (Systemic Analysis)

Using the conflated segments layer with crashes, we've conducted a statistical regression analysis that determines which location attributes (derived from either the GDOT roadway inventory or the crash data) are correlated fatalities and serious injuries. The process is shown in Figure 6, where the analyzed crash types $ii$ include fatalities and serious injuries for all crashes, crashes involving non-motorized users (i.e., pedestrians and cyclists), and crashes involving large trucks (tractor trailers, box trucks, etc.) for a total of 6 possible combinations. Selected characteristics were verified against research of other locations and industry best practices in transportation safety.

**Selected Roadway Metrics:**

- Functional Class (e.g., interstate, arterial, etc.)
- Traffic Volume (Average Annual Daily Traffic for all vehicles, single unit trucks, and combination unit trucks)
- Speed Limit
- Through Lanes

Analysis found that non-motorized crash fatalities and serious injuries were strongly associated with low-lighting conditions. While data on whether a road segment or intersections were well lit was not available for the analysis, findings in local crashes and in research of national best practices indicates that lighting pedestrian and cyclist facilities is key for those users' safety.

## High Injury Network Scoring

Our final step is to combine both location-specific and systemic-based scores into a High Injury Network score that will help us determine which segments to prioritize. This process equally weighted the systemic and location scores. Scores greater than three (3) standard deviations above the mean are assigned to a high injury network (HIN) for all crashes, crashes involving non-motorized users, and crashes involving large trucks. Separate HINs were prepared for all roads within the county and for roadways that are owned by the county or municipalities the intersect the county. Three standard deviations was selected as the threshold because it produced HINs that were distinct from one another, highlighting key locations for each crash and ownership group.

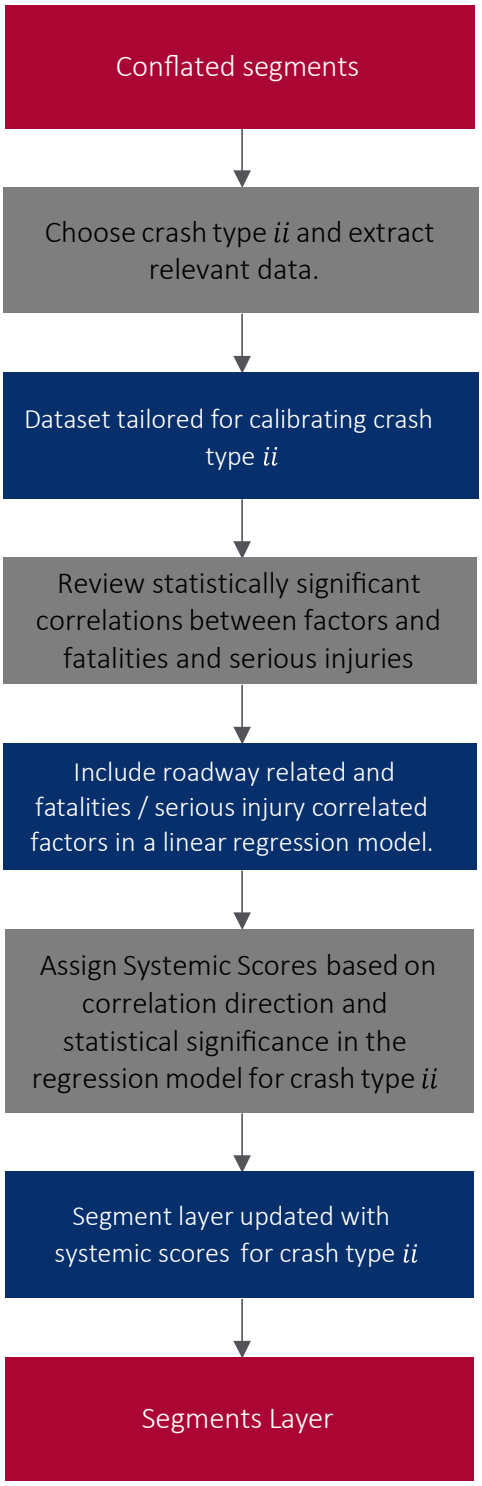



*Figure 6. Calculating the risk/systemic score by finding roadway attributes of high risk*

# Analysis Findings

This section covers the results of the crash review in Barrow County including an overview of general trends in crashes between 2019 and 2023 and the development of the HIN based on the evaluation of location-based and systemic-based risks. A region-wide trend of crashes showcased that **Angle crashes correlated the most to fatal and serious injury crashes** as shown in Figure 7 below. These types of crashes typically occur at an intersection.

| | Manner of Collision | Fatalities | Serious Injuries |
|---|---|---|---|
| Intersection Related | **Angle** | **36** | **99** |
| | Not a Collision with a Motor Vehicle | 20 | 97 |
| Segment Related *(Rear Ends and Roadway Departures)* | **Head On** | **13** | **48** |
| | **Rear End** | **7** | **48** |
| | **Sideswipe: Opposite Direction** | **1** | **0** |
| | **Sideswipe: Same Direction** | **0** | **1** |

| | Top User Contributing Factors | Fatalities | Serious Injuries |
|---|---|---|---|
| Intersection Related | **Failed to Yield** | **2** | **24** |
| | **Disregarded Traffic Controls** | **6** | **12** |
| | Driver Lost Control | 6 | 10 |
| Segment Related | **Wrong Side of Road** | **3** | **8** |
| | **Following Too Close** | **1** | **6** |
| | Under the Influence | 1 | 6 |

*Figure 7. Fatality and Serious Injury Count Per Crash Type*

## Safer Roads

### Crash Review

Table 1 shows the scoring criteria that resulted from the systemic safety analysis of roadway characteristics. Due to data coverage limitations, the primary characteristics considered were **functional classification, traffic volumes, and speed limit**. When a facility met the criteria listed for the crash type, we assigned one point, with the final scores scaled to the range of 0.0 to 0.5 for HIN scoring. Due to their limited presence in the county, interstates were not given any points; however, the did show a statistically significant and highly negative correlation with total fatalities and serious injuries in the "all crashes" model.

In general, these findings indicate that, when comparing facilities of a similar functional class, more lanes, greater throughput, and **higher speeds are correlated with more fatalities and serious injuries** in general. When considering crashes with large truck and/or non-motorized users, trends may indicate that crashes are more severe on smaller facilities; however, there were far fewer of these crashes, so statistical analysis is less reliable given the smaller sample size.

*Table 1. Systemic Scoring Criteria*

| Variable | All Fatal and Serious Injury Crashes | Large Trucks | Non-Motorized |
|---|---|---|---|
| Interstate | | | |
| Major Arterial | | | ✓ |
| Minor Arterial | | | ✓ |
| Major Collector | ✓ | | ✓ |
| Minor Collector | ✓ | | |
| Local Road | ✓ | | |
| Through Lanes | 3+ | = 2 | = 2 |
| Traffic *All Vehicles* | > Median Value | < Median Value | < Median Value |
| Traffic *Single Unit Trucks* | | > Median Value | |
| Traffic *Combination Trucks* | | > Median Value | |
| Speed Limit | > Median Value | < Median Value | < Median Value |

### General Trends

The **2022-2024 GDOT SHSP – Strategic Highway Safety Plan** found that a significant portion of traffic fatalities, 47%, were due to a vehicle **roadway departure** which is classified as "crossing an edge line or a center line" which can cause a collision with opposing traffic.

Similarly, the **GDOT VRU Assessment** identified several high risk areas for vulnerable road users such as:

1. High social vulnerability (age, disability, income, minority status, and transportation access)
2. Transit stops
3. Proximity to schools
4. Undivided and high lane roadways
5. Principal and minor arterials
6. Higher speeds.

Their analysis also found that the majority of VRU fatalities, 77%, occurred in non-daylight conditions, and that between 2013-2022 **"principal and minor arterials"** had the highest share of pedestrian and bicyclist fatalities. Additionally, they found that the number of transit stops, lack of lighting, the number of lanes, traffic volume, and speed limit were all positively correlated with Pedestrian crashes.

The **Macon MPO 2050 Transportation Plan** also identified "wide streets with **four or more lanes of fast-moving** traffic, unprotected pedestrian crossings and bike lanes, and longer distances between signals" as locations with a higher probability of fatal collisions.

The GDOT SHSP, GDOT VRU, and Macon MPO 2050 Transportation Plan all identify roadway characteristics where there is a higher chance for fatalities. These characteristics were taken into consideration when developing the Barrow County HIN.

## Safer People

### Crash Review

Reviewing the comparison of number of severe crashes (resulted in at least one fatality or serious injury), middle-aged drivers were more likely to see fatalities or serious injuries in their crashes compared to drivers who were under the age of 24 or over the age of 65, see Figure 8. Other factors were not considered to be reliably reported enough to validate local severe crash trends.

### General Trends

Road users also play a key role in reducing fatalities and serious injuries through their behavior. The **2022-2024 GDOT SHSP – Strategic Highway Safety Plan** identified distracted driving, impaired driving, occupant protection, and older drivers as emphasis areas.

- **Distracted Driving:** "Drivers aged 25-to-34 years received more distracted driving citations after a crash, more distracted driving convictions, and were more involved in distraction-related motor vehicle crashes compared to any other age group."
- **Impaired Driving:** "In 2019, there were 353 people fatally injured in alcohol-impaired driving crashes in Georgia. These alcohol-impaired driving fatalities accounted for 24 percent of all motor vehicle traffic fatalities."
- **Occupant Protection:** "More than half of the PV occupants fatally injured were restrained (52 percent), 39 percent were unrestrained, and 9 percent were unknown restraint use."
- **Older Drivers:** "Across the decade, the 55-to-64 age group represented approximately half of all older drivers involved in fatal crashes."

Additionally, the **Macon MPO 2050 Transportation Plan** found that the largest contributing factor to collision severity is the "unsafe operation of the vehicle by the drivers themselves."

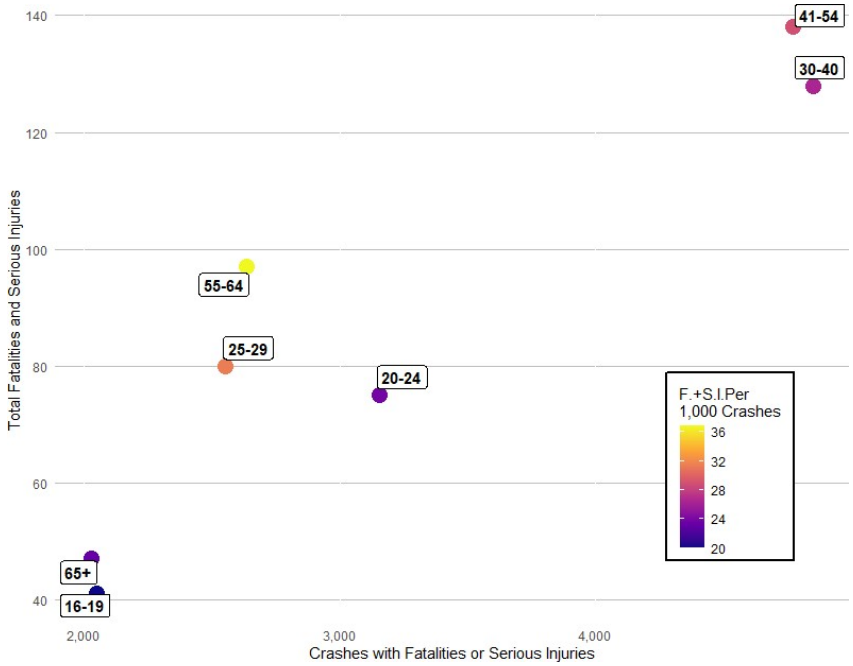



*Figure 8. Total crashes compared to number of fatalities plus serious injuries by driver age group.*

## Safer Speeds

### Crash Review

While speed limits were shown in statistical regression models to be a predictive factor in the number of fatalities and injuries, crash report user factors such as “Too fast for conditions”, “Exceeding speed limit”, “Reckless Driving”, “Aggressive Driving”, or “Driver lost control – speed related” had almost no statistical correlation. These behaviors are clearly not desirable in drivers, but this result may indicate that facility design speeds have more bearing on the severity of crashes and that facilities should leverage design rather than enforce to reduce speeds and crash severity.

### General Trends

The **Macon MPO 2050 Transportation Plan** and **GDOT VRU Assessment** both identified speed as contributing factors to the severity of a collision where “a person walking who is struck by a vehicle traveling at **40+ mph** is 8 times more likely to die or receive a serious injury than one struck by a vehicle traveling at less than 20 mph.” This aligns with the safe system approach to safer speeds to reduce the likelihood of a fatal collision.

## Safer Vehicles

### Crash Review

Due to the small number of large truck crashes (seven segments with just four fatalities and six serious injuries), statistical analysis of large vehicles’ impact on crashes was not possible at the local scale.

### General Trends

As mentioned above the **2022-2024 GDOT SHSP – Strategic Highway Safety Plan** identified occupant protection as an emphasis areas because 39% of passenger vehicle occupant fatalities were unrestrained. In August 2023, NHTSA proposed a rulemaking to expand seat belt warning systems in vehicles to rear passengers, and this is indicative of the collaboration needed with vehicle manufactures. However, safer vehicles expand to those outside of vehicles as well. Due to the increase in the number of larger and heavier vehicles on the road, such as SUVs and large trucks, **FHWA’s Safe System Approach for Speed Management** states that “pedestrians and bicyclists are likely at greater risk as a result of these vehicle fleet changes.” This is due in part to the **“increased speed and mass of these larger vehicles [that] correspond to higher likelihoods of people being killed or seriously injured in crashes.”** Thus, this highlights the importance of create vehicles that are not only safer for occupants but also for those outside the vehicle in a collision, and accounting for the increase in larger vehicles when considering roadway safety in street design.

## Post Crash Care

### Crash Review

Data has been requested from NEMSIS and is currently being processed. This analysis is to be included in the final analysis memo.

### General Trends

The US Department of Transportation in their **Post-Crash Care** page highlights the current problem where 40% of collision patients "were alive when first responders arrived, but later died." Additionally, in 2022, EMS responded to 169,462 collisions with seriously injured patients. However, there are countermeasure that can be applied to help mitigate these problems such as emergency medical dispatch, timely on-scene care, transportation to a trauma center, and performance management.

# High Injury Network (HIN)

The culmination of the analysis results in a High Injury Network (HIN) that prioritizes segments with fatalities and serious injuries through a combination of need and risk.

The general trends identified that were associated with higher fatalities or high risk, with respect to VRUs, were wide streets, such as principal and minor arterials, with more lanes and higher speeds. However, in addition to roadway characteristics, road users also play a role in helping ensure safer roads for all users such as avoiding distracted driving, impaired driving, using occupant protection. Older road users were also identified as an emphasis area. Finally, the trends to larger and heavier vehicles pose a greater risk to VRUs and there is a need to improve the post-crash care outcomes for those involved in a collision with a serious injury.

In review, the following types were identified as correlated to fatalities and serious injuries:

- Higher Speeds
- Lane Departure Crashes
- Principal and Minor Arterials
- 4+ Lanes
- Middle-Aged Drivers
- Larger Vehicles
- Non-Motorized Users

Iterations were made to the scoring of the HIN to prioritize segments that could be the most impactful. Our scoring method ensured that the HIN consisted of both high- crash locations and high-risk locations. The figures below denote in red the HIN for both non-motorized users and all users.

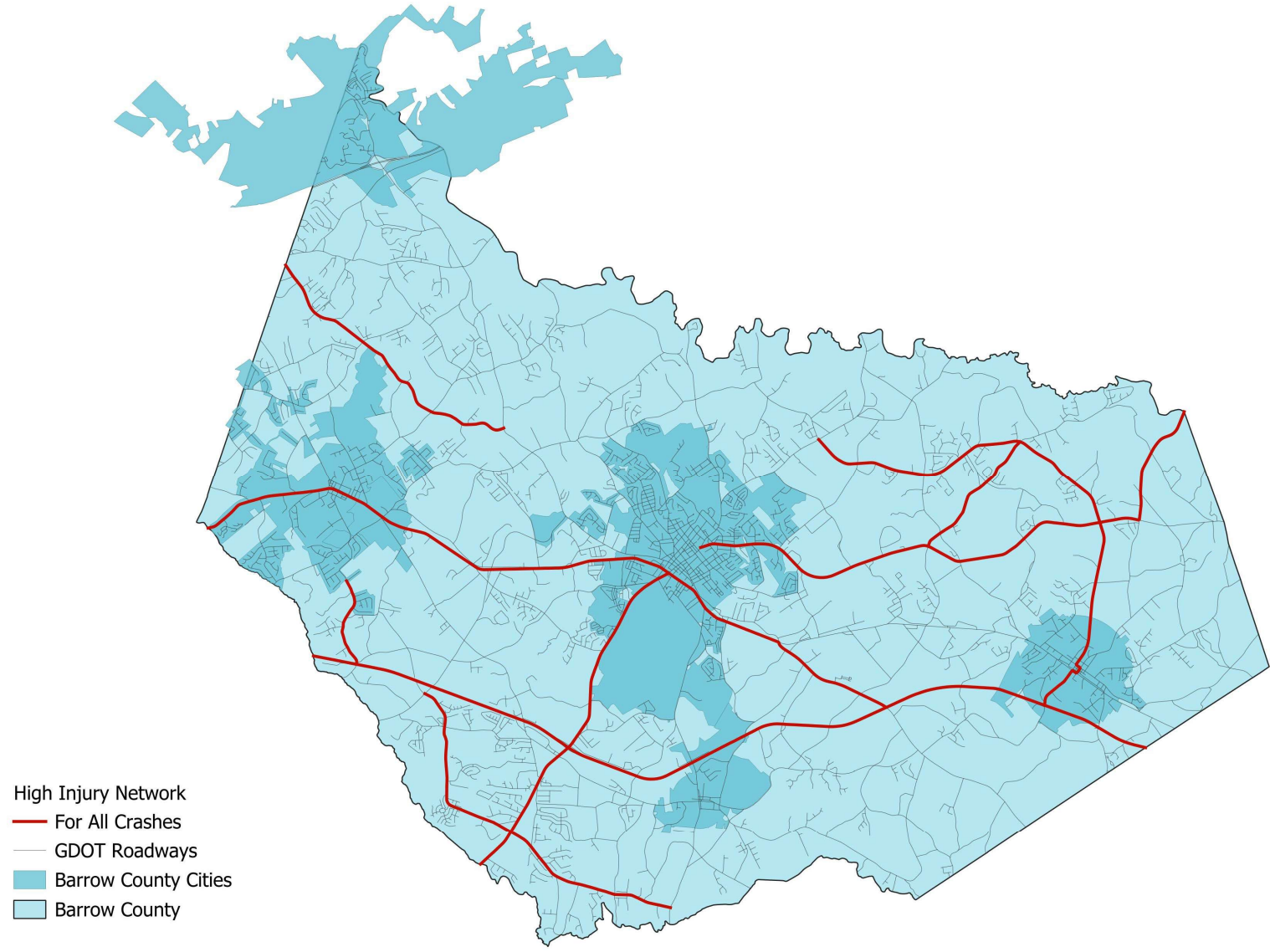



*Figure 9. High Injury Network for All Crashes, All Roads*

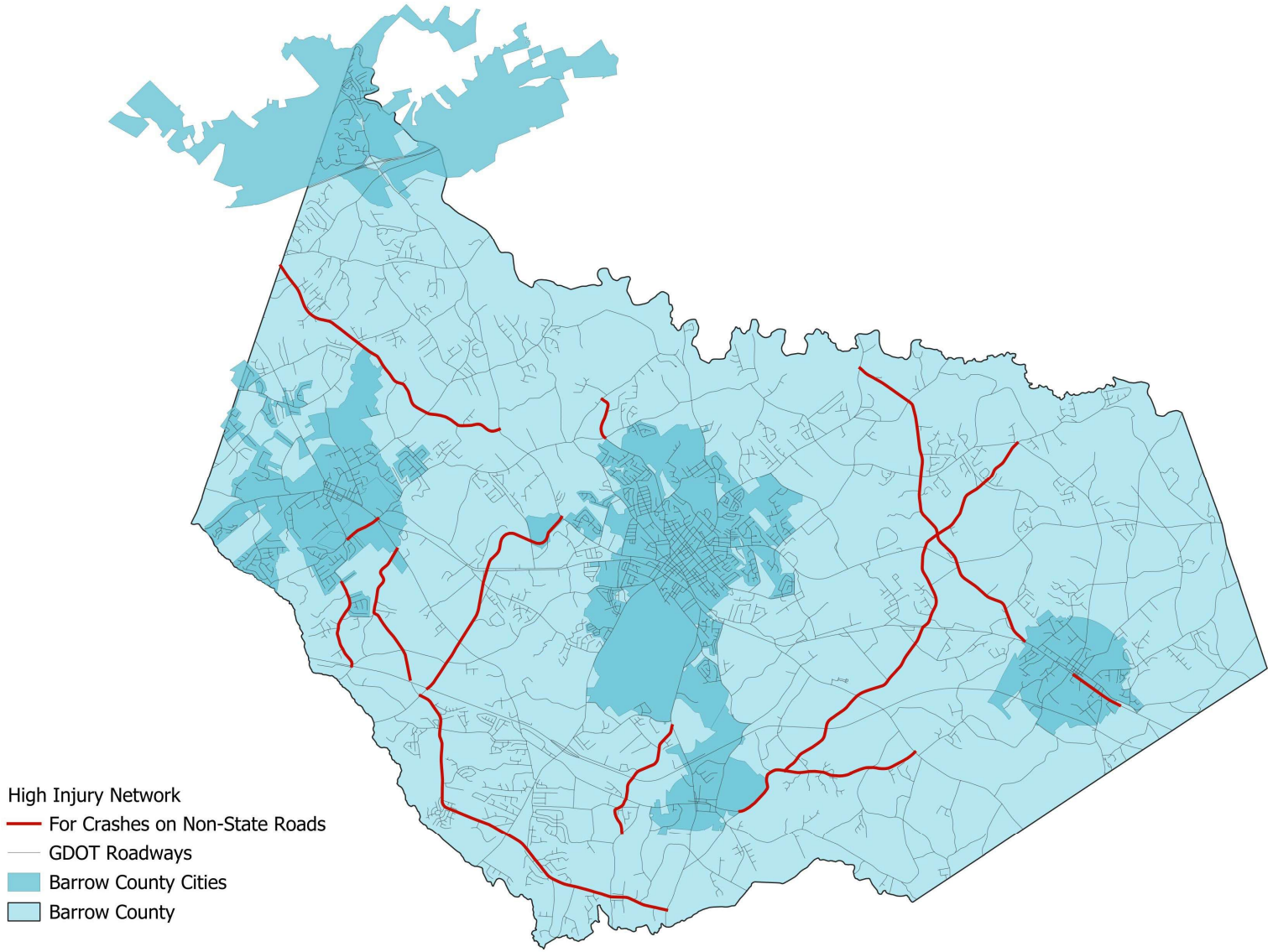



*Figure 10. High Injury Network for All Crashes, Non-State-Owned Roads*

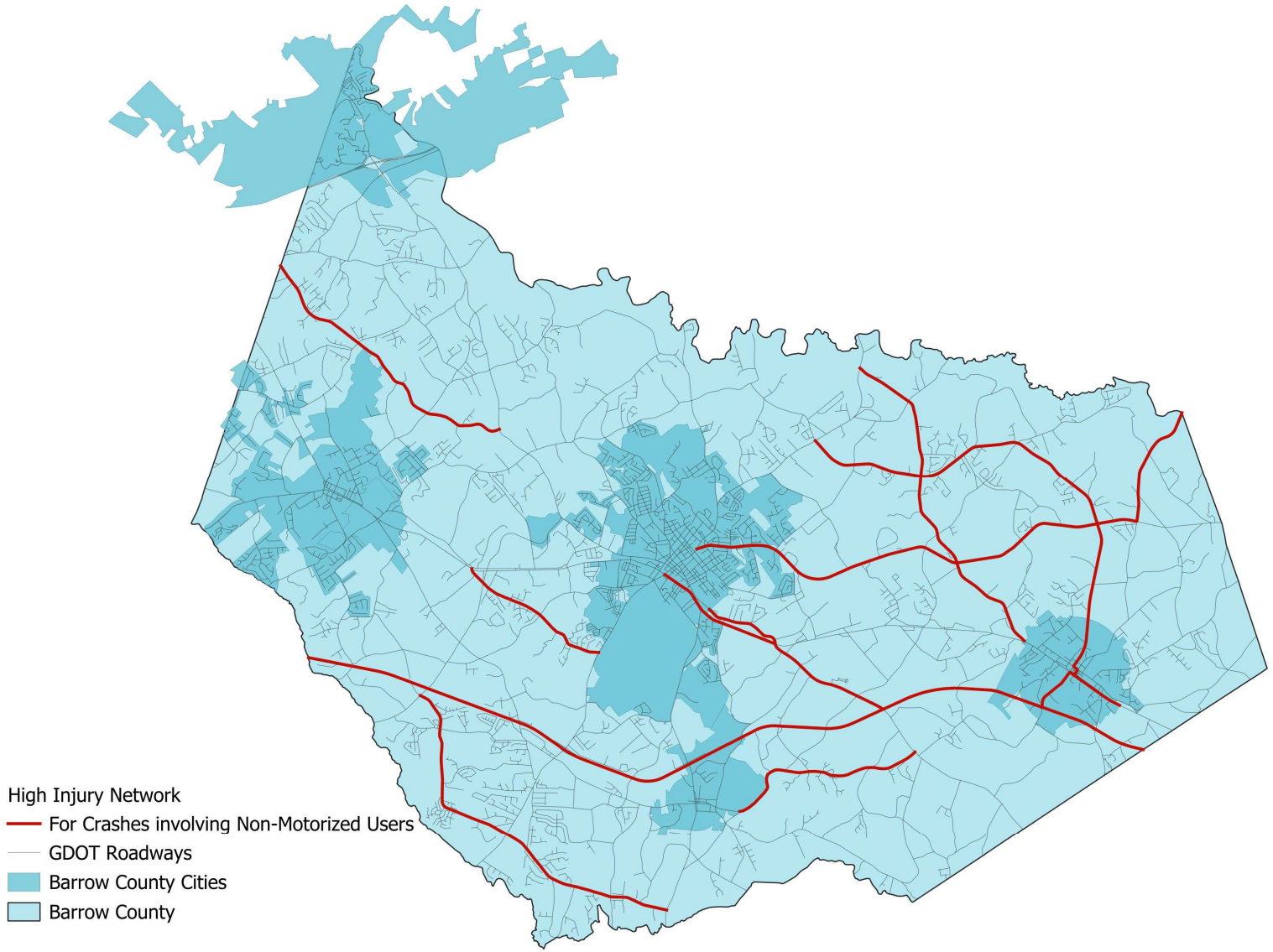



*Figure 11. Crashes involving Non-Motorized Users, All Roads*

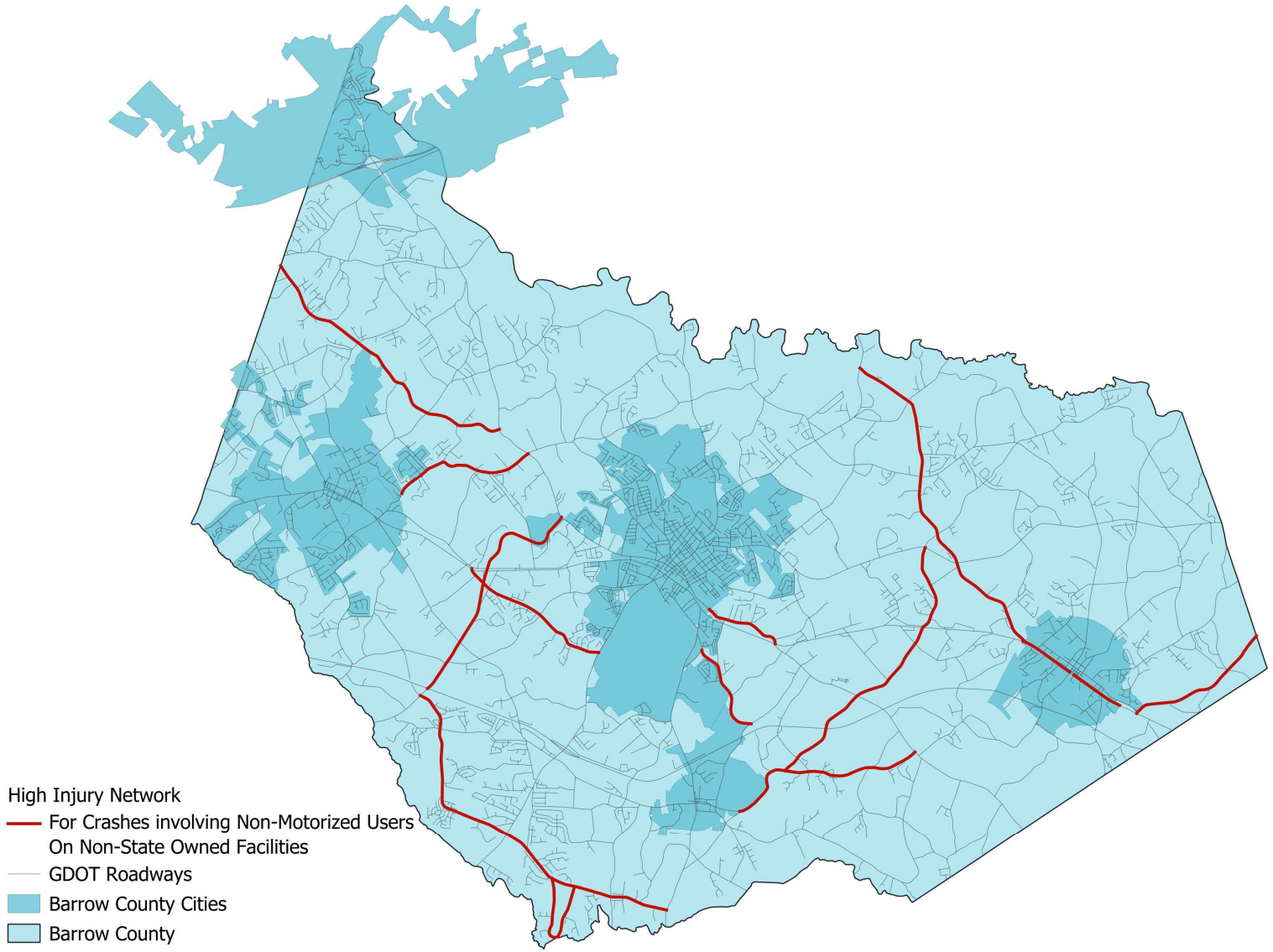



*Figure 12. High Injury Network for Crashes involving Non-Motorized Users, Non-State-Owned Roads*

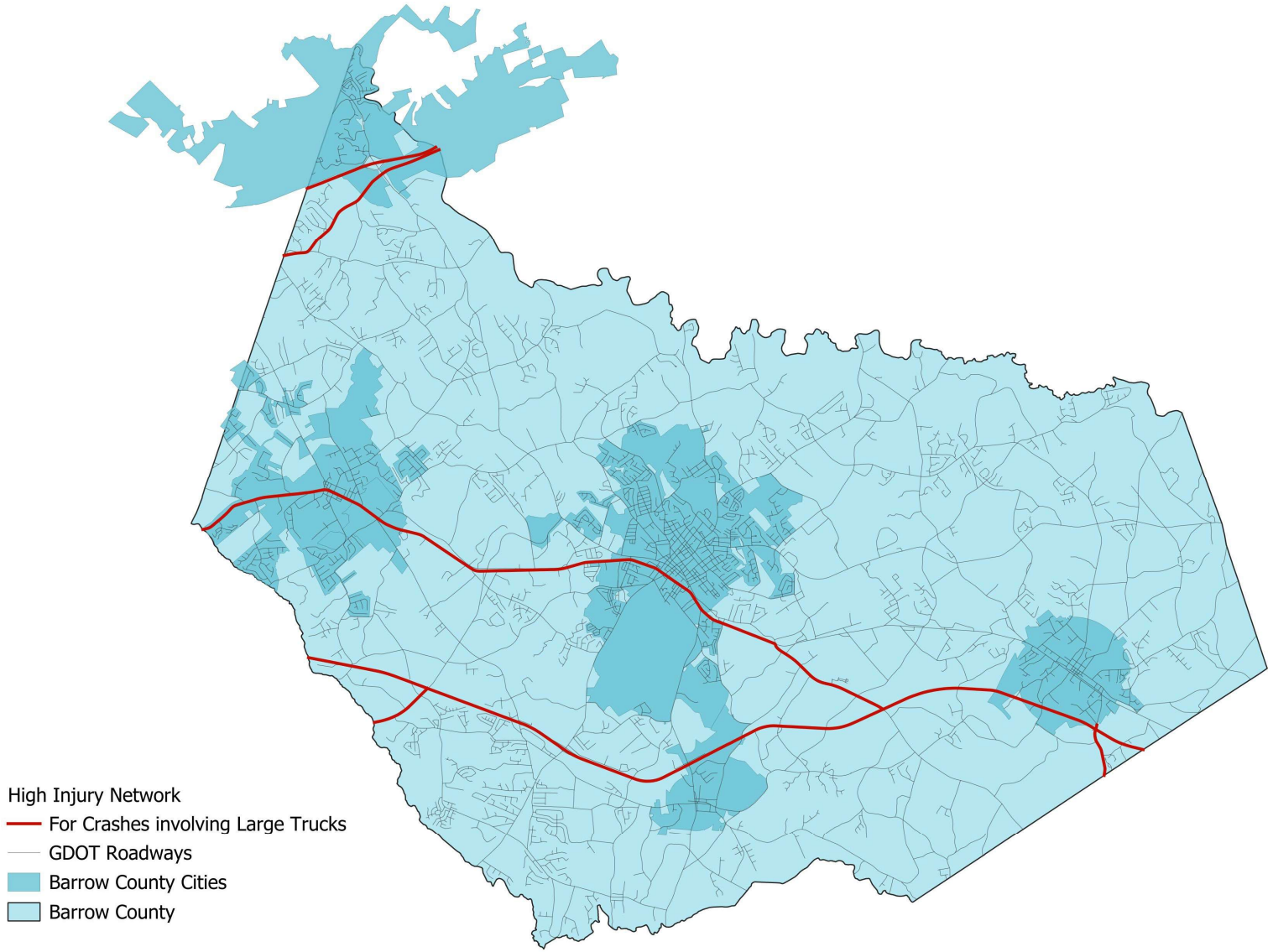



*Figure 13. High Injury Network for Crashes involving Large Trucks, All Roads*

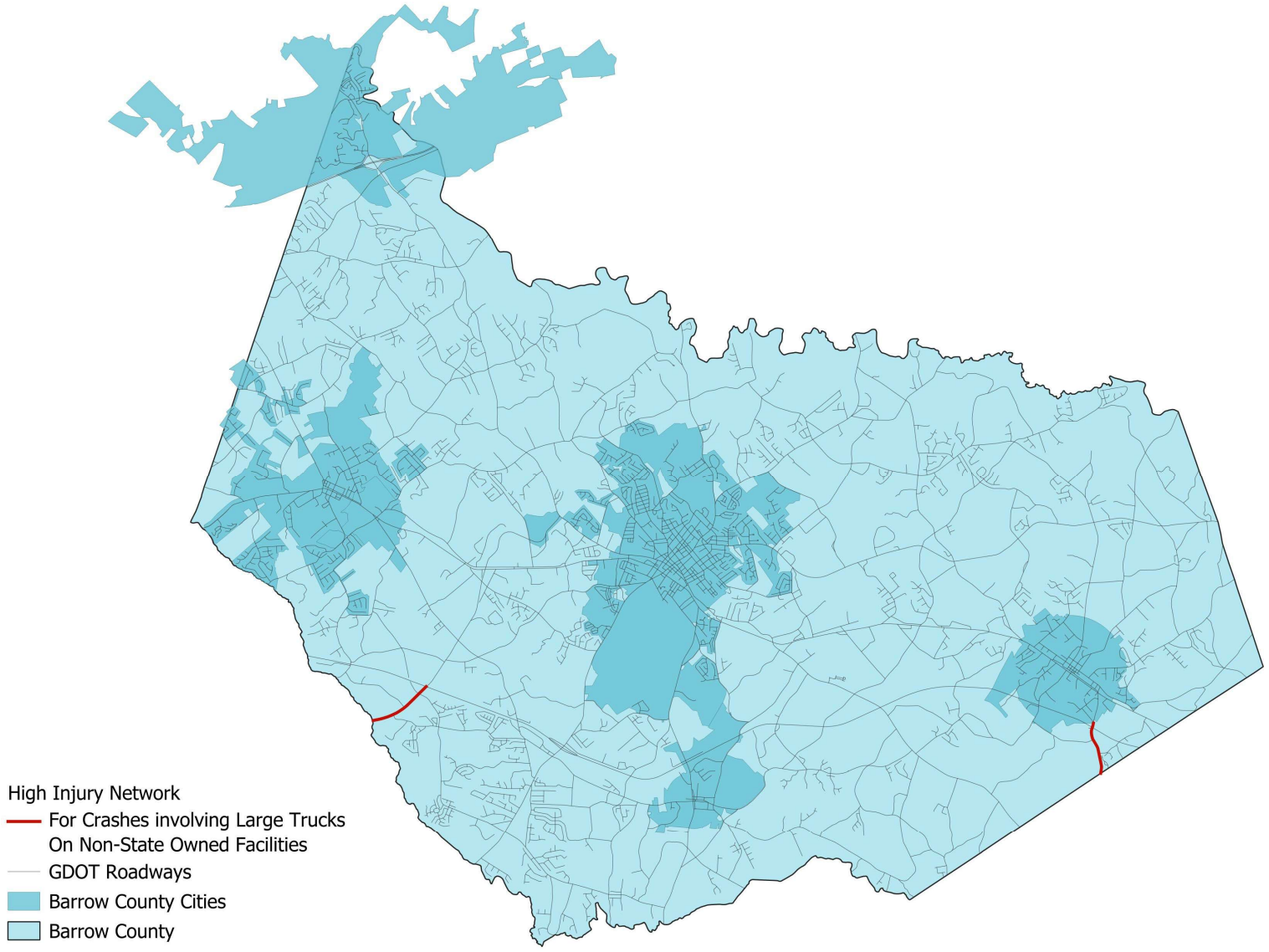



*Figure 14. High Injury Network for Crashes involving Large Trucks, Non-State-Owned Roads*

# EQUITY ANALYSIS

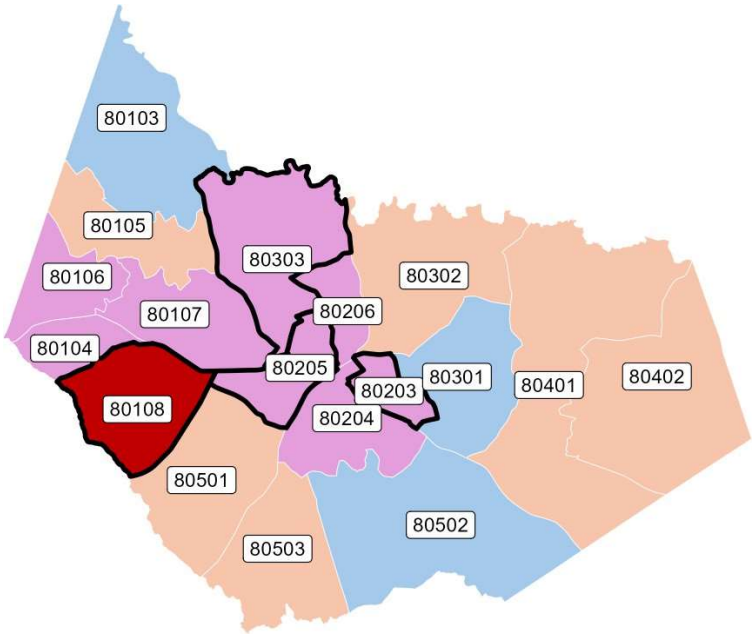
The goal of equity analysis for SS4A planning and implementation is to identify which portions of the county where residents are simultaneously exposed to facilities that are part of the High Injury Network (HIN) as well as being more likely to be disadvantaged in some way as defined by the Climate and Economic Justic Screening Tool (CEJST).

To achieve this, we employed a **4-step systematic process**:

1. Determine which Census Tracts with a **greater exposure** to the HIN.
2. Determine which Census Tracts had the highest relative **degree of disadvantage.**
3. Determine which Census Tracts that correlate to **both** to *less equitable* and *more dangerous* conditions relative to both the overall HIN and the non-motorized HIN.
4. Determine which roadways are more likely to be part of a shortest commute path for a worker from a disadvantaged population compared to a typical worker.

| | Lower HIN Exposure | Higher HIN Exposure |
|---|---|---|
| **Lower Disadvantage** | More Equitable and Safer | More Equitable but More Dangerous |
| **Higher Disadvantage** | Less Equitable but Safer | ***Less Equitable and More Dangerous*** |

Tracts **80108** is **the highest priority** tract for the **non-state-owned HIN**, while tracts 80103, 80301, and 80502 are lowest priority from a combined equity and safety perspective.

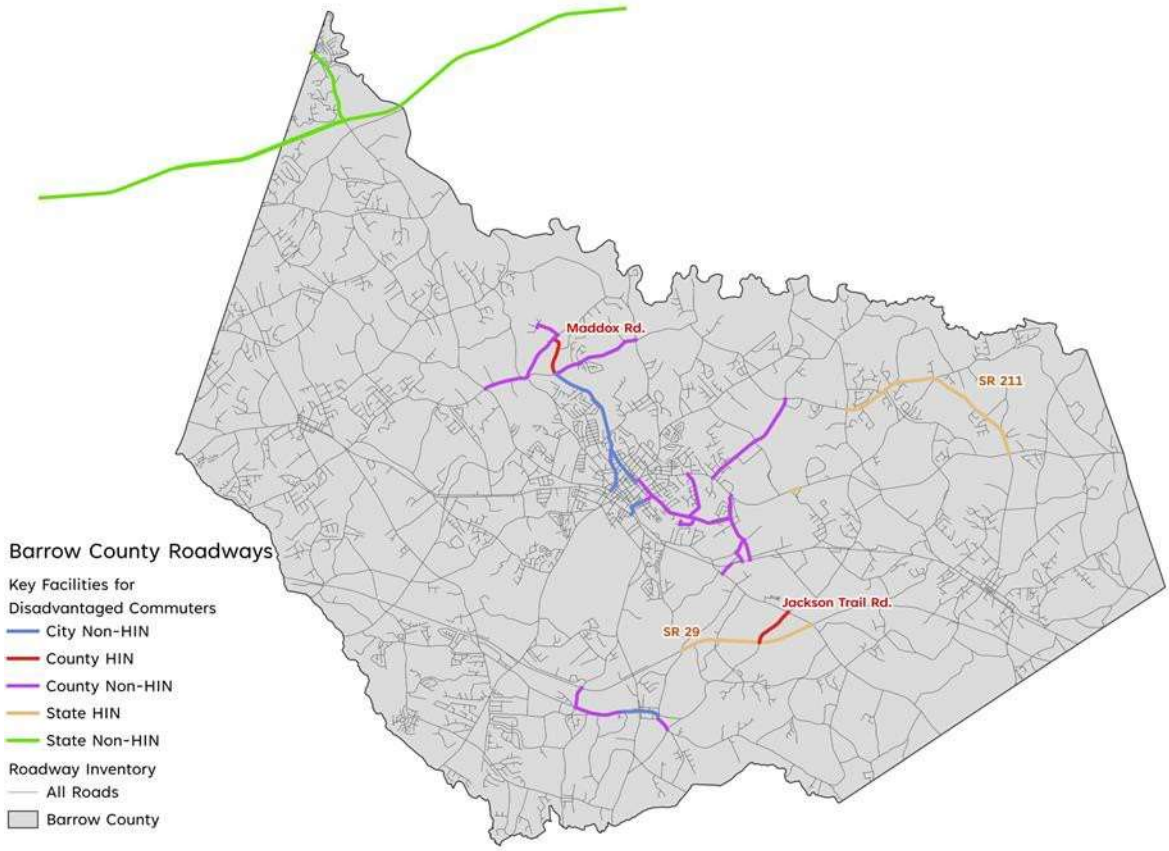



The differences between exposure to various HIN networks based on whether all roads or only non-state-owned facilities are considered and whether the focus is all crashes, crashes involving non-motorized users (pedestrians and cyclists), or crashes involving large trucks is shown in subsequent tables and maps.

Additionally, tracts outlined in black are “disadvantaged” due to the

thresholds of one or more categories being exceeded by conditions within the area. (These are tracts 80108, 80203, 80205, and 80303.)

In reviewing the distribution of workers' residences and work locations for the census tracts in and around Barrow County, several facilities were identified as being more likely to be utilized by a disadvantaged worker than by a typical worker. These facilities represent a mixture of ownership (state, county, and city) with several being part one or more of the High Injury Networks. Facilities that are also on High Injury Networks include two county-owned facilities (Maddox Road and a portion of Jackson Trail Road) and two state-owned facilities (portions of SR 211 and SR 29)




This geographic and facility-level information has been incorporated into the next prioritization section by tagging specific corridors or intersections as "**High Priority Equity Location**" in the following pages.

# EQUITY ANALYSIS APPENDIX

## Methodology

The goal of equity analysis for SS4A planning and implementation is to identify which portions of the county where residents are simultaneously exposed to facilities that are part of the High Injury Network (HIN) as well as being more likely to be disadvantaged in some way as defined by the Climate and Economic Justic Screening Tool (CEJST). To achieve this, we employed a **4-step systematic process**:

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4. Determine which roadways are more likely to be part of a shortest commute path for a worker from a disadvantaged population compared to a typical worker.

The CEJST data includes census tract percentiles for the following data points that describe degree of disadvantage across several categories.

- Diagnosed diabetes among adults aged greater than or equal to 18 years
- Current asthma among adults aged greater than or equal to 18 years
- Coronary heart disease among adults aged greater than or equal to 18 years
- Diesel particulate matter exposure
- Energy burden
- Expected agricultural loss rate
- Expected building loss rate
- Expected population loss rate
- Housing burden
- Low life expectancy
- Linguistic isolation
- Low median household income as a percent of area median income
- PM2.5 in the air
- Percent individuals age 25 or over with less than high school degree
- Percent of individuals < 100% Federal Poverty Line
- Percent of individuals below 200% Federal Poverty Line, imputed and adjusted
- Percent pre-1960s housing (lead paint indicator)
- Share of homes with no kitchen or indoor plumbing (percent)
- Proximity to NPL sites
- Proximity to Risk Management Plan (RMP) facilities
- Proximity to hazardous waste sites
- Traffic proximity and volume
- Unemployment
- Wastewater discharge
- Leaky underground storage tanks

# **Step 1:** Exposure to the HIN

To describe how much exposure the residents of a given census tract have to the HIN relative to the size (miles of roadway) and usage of the network (annual vehicle miles traveled (AVMT)), the ratio of AVMT on the HIN compared to AVMT on the entire network is calculated for each census tract. Those values reported in Table 1, and tracts whose exposure to HIN AVMT is greater than expect (i.e., greater than 1.0) are mapped in Figure 1.

*Table 1. Ratio of HIN AVMT to total AVMT by census tract and HIN type, CEJST disadvantaged tract IDs are underlined and ratios greater than expect (i.e., greater than one) are bolded.*

| Census Tract ID | Ratio of HIN AVMT to Total AVMT | | | | | |
|---|---|---|---|---|---|---|
| | *All Roads; All Users* | *Non-State Owned; All Users* | *All Roads; Non-Motorized Users* | *Non-Stated Owned, Non-Motorized Users* | *All Roads; Large Trucks* | *Non-State Owned; Large Trucks* |
| 80103 | 0.03 | 0.26 | 0.04 | 0.21 | **1.67** | 0.00 |
| 80104 | **1.93** | 0.51 | 0.00 | 0.00 | **2.13** | 0.00 |
| 80105 | 0.61 | **5.53** | 0.82 | **4.52** | 0.00 | 0.00 |
| 80106 | 0.65 | 0.00 | 0.00 | 0.00 | 0.71 | 0.00 |
| 80107 | 0.51 | 0.44 | 0.04 | 3.18 | 0.53 | 0.00 |
| 80108 | **1.80** | **1.64** | **1.70** | 0.14 | **1.92** | **5.26** |
| 80203 | 0.41 | 0.00 | **1.22** | **3.66** | 0.22 | 0.00 |
| 80204 | **1.18** | 0.00 | 0.63 | 0.01 | 0.51 | 0.00 |
| 80205 | **1.31** | 0.00 | 0.07 | 0.40 | **1.05** | 0.00 |
| 80206 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 80301 | 0.77 | 0.82 | **1.13** | 0.67 | 0.06 | 0.00 |
| 80302 | 0.20 | **1.13** | 0.44 | 0.93 | 0.00 | 0.00 |
| 80303 | 0.00 | 0.31 | 0.00 | 0.00 | 0.00 | 0.00 |
| 80401 | **1.41** | **2.47** | **1.91** | **1.09** | 0.75 | **3.01** |
| 80402 | 0.74 | **2.00** | **1.30** | **3.76** | 0.00 | 0.26 |
| 80501 | **1.65** | **1.38** | **1.99** | **1.32** | **1.48** | **5.07** |
| 80502 | **1.57** | 0.81 | **2.23** | 0.66 | **1.73** | 0.00 |
| 80503 | **1.70** | **1.33** | **1.28** | **1.30** | 0.88 | 0.00 |

This shows that tract **80108** is the most exposed tract (especially for non-state-owned facilities) that is also disadvantaged while tract 80303 has low exposure to the six HINs. Among other tracts, 80501 is the only tract that is more exposed to every HIN than would be expected.

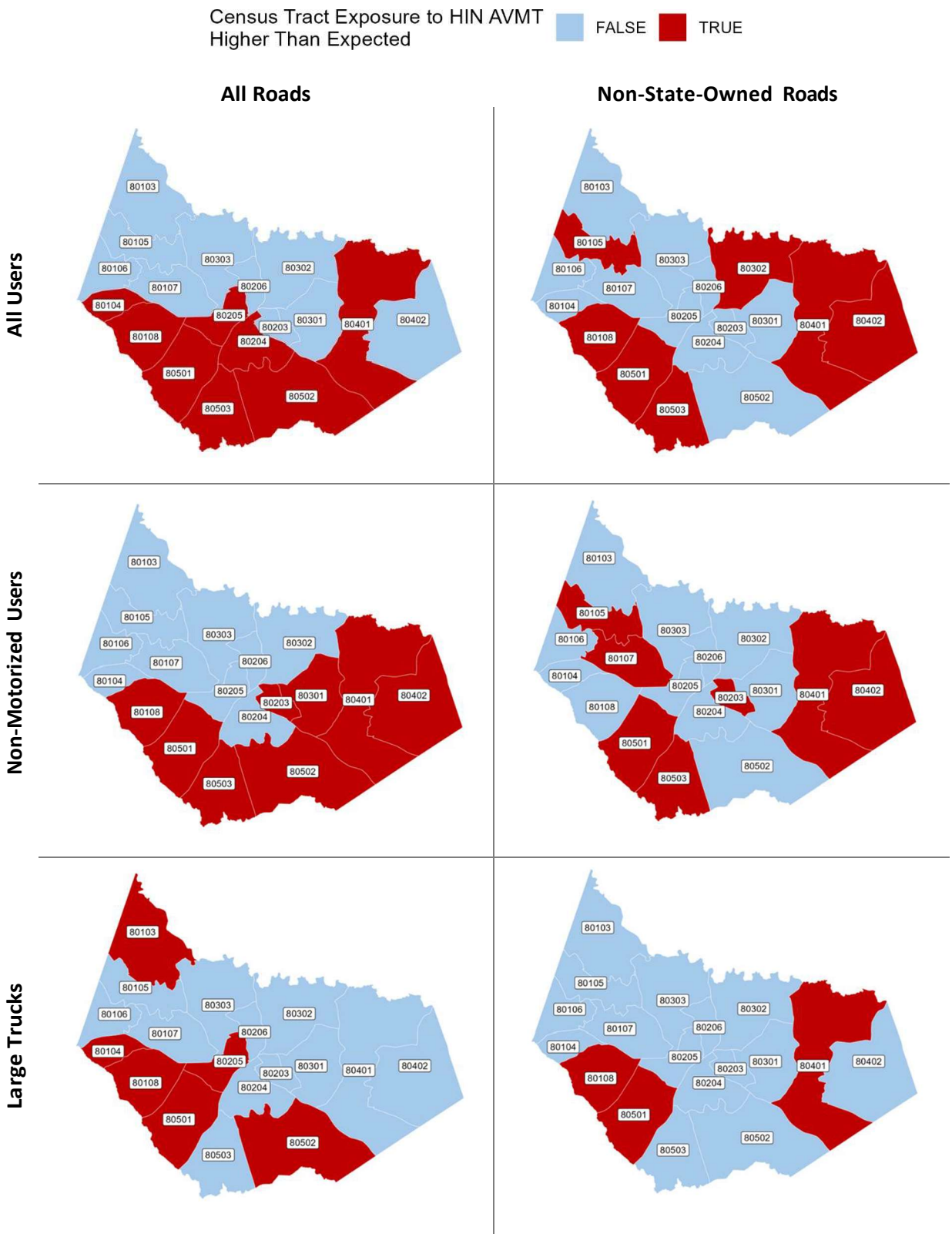


*Figure 1. Identification of census tracts that have a higher exposure to HIN AVMT than to AVMT across all facilities within the tract.*

# **Step 2:** Degree of Disadvantage

To determine whether a census tract is "disadvantage", CEJST checks whether any of the categories exceed the 90th percentile. Although there are four disadvantaged census tracts within Barrow County, the raw percentiles are averaged across all indicators, and tracts with an average above the median (45.7) will also be considered relatively "more disadvantaged". Those tracts are mapped in

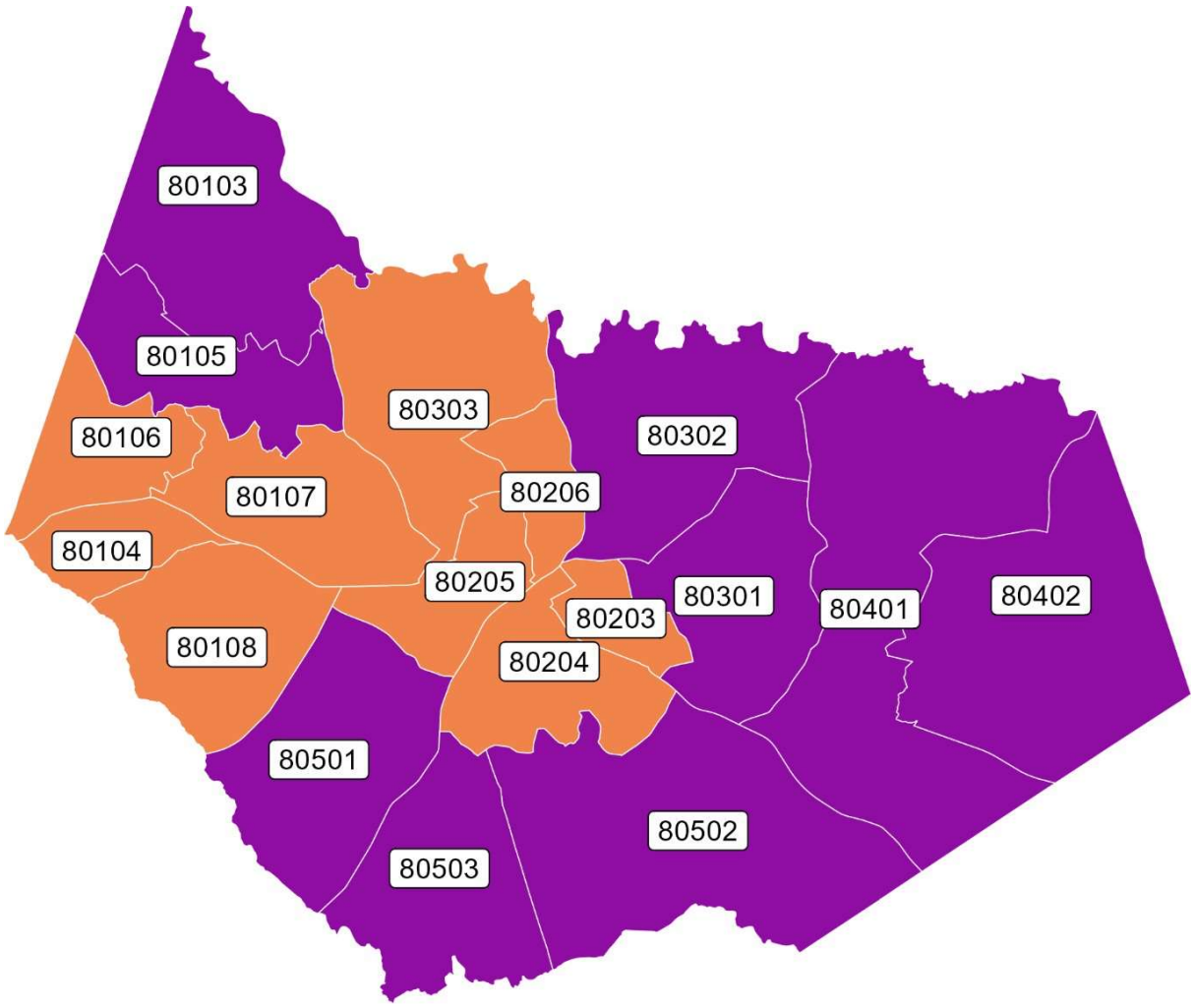


Figure 2, and their average percentile for disadvantaged factors are reported in Table 2.

*Table 2. Average CEJST Disadvantage Factor Percentile by Census Tract, CEJST Disadvantaged tracts highlighted in red and tracts above the median for the averaged disadvantaged percentile are bolded.*

| Census Tract ID | Mean Disadvantage Percentile |
|---|---|
| 80103 | 36.7 |
| **80104** | **50.5** |
| 80105 | 37.4 |
| **80106** | **50.6** |
| **80107** | **51.9** |

| | |
|---|---|
| **80108** | **46.8** |
| **80203** | **60.3** |
| **80204** | **55.7** |
| **80205** | **62.6** |
| **80206** | **50.9** |
| 80301 | 42.9 |
| 80302 | 43.3 |
| **80303** | **48.2** |
| 80401 | 38.1 |
| 80402 | 44.6 |
| 80501 | 41.2 |
| 80502 | 43.7 |
| 80503 | 40.4 |

This shows that, in addition to the already disadvantaged tracts of **80108**, **80203**, **80205**, and **80303**, tracts **80104**, **80106**, **80107**, **80204**, and **80206** are more disadvantaged compared to the rest of the county.

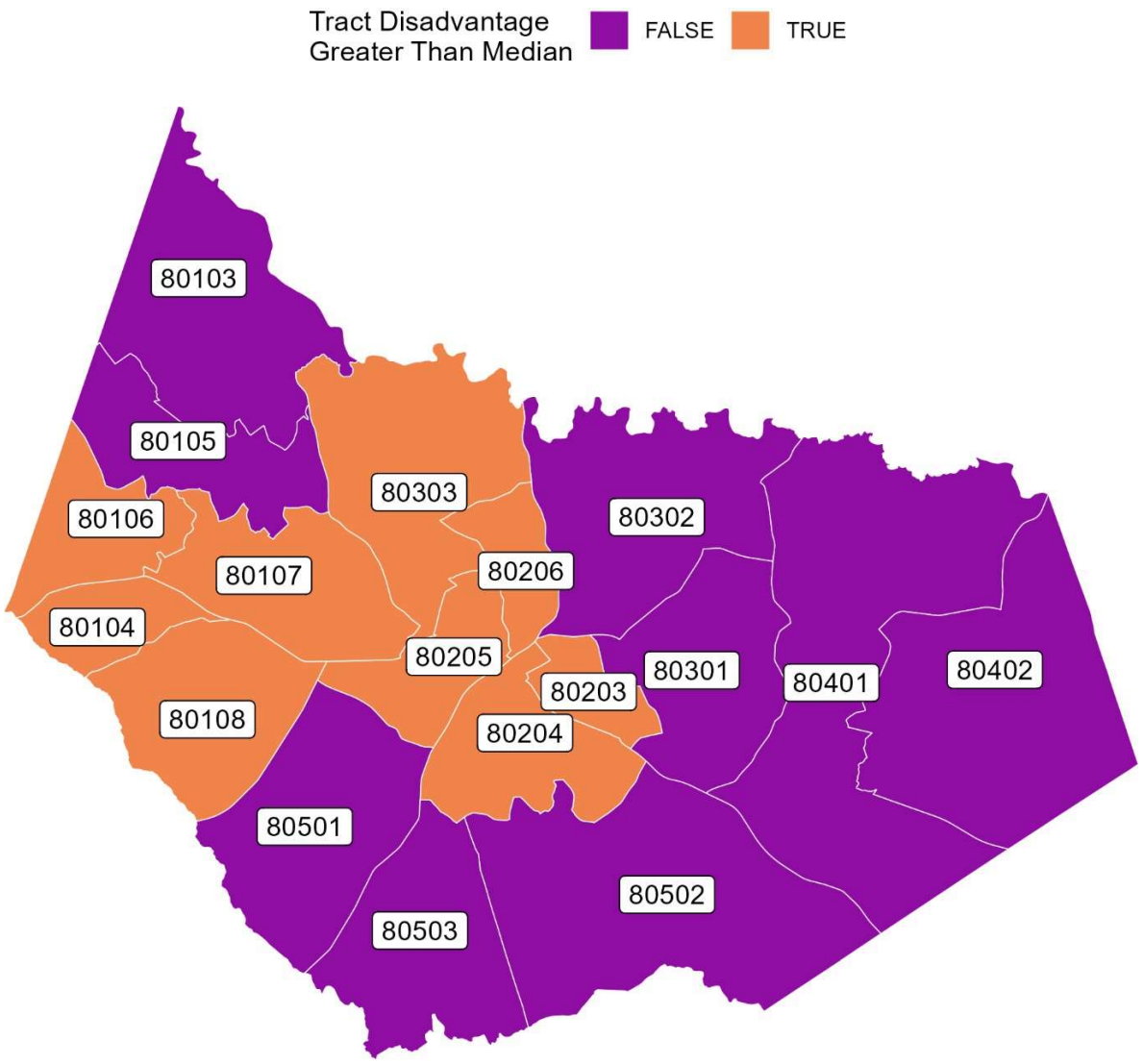


*Figure 2. The average census tract percentile of disadvantage compared to the median.*

# **Step 3:** Safety & Disadvantage

To determine which tracts should be prioritized for safety interventions from an equity perspective, tracts are grouped into four categories as shown in Table 3 and mapped in **Error! Reference source not found.** The federal Justice40 initiative aims to see 40 percent of investment occur in disadvantaged communities, so $4 out of every $10 spent on safety improvements should be directed towards these less equitable and dangerous areas.

| | **Lower HIN Exposure** | **Higher HIN Exposure** |
|---|---|---|
| **Lower Disadvantage** | More Equitable and Safer | More Equitable but More Dangerous |
| **Higher Disadvantage** | Less Equitable but Safer | Less Equitable and More Dangerous |

*Table 3. Safety and Disadvantage Group by Census Tract for each HIN*

| **Census Tract ID** | **Less Equitable and More Dangerous?** | | | | | |
|---|---|---|---|---|---|---|
| | *All Roads; All Users* | *Non-State Owned; All Users* | *All Roads; Non-Motorized Users* | *Non-Stated Owned, Non-Motorized Users* | *All Roads; Large Trucks* | *Non-State Owned; Large Trucks* |
| 80103 | | | | | | |
| 80104 | ✓ | | | | ✓ | |
| 80105 | | | | | | |
| 80106 | | | | | | |
| 80107 | | | | ✓ | | |
| 80108 | ✓ | ✓ | ✓ | | ✓ | ✓ |
| 80203 | | | ✓ | ✓ | | |
| 80204 | ✓ | | | | | |
| 80205 | ✓ | | | | ✓ | |
| 80206 | | | | | | |
| 80301 | | | | | | |
| 80302 | | | | | | |
| 80303 | | | | | | |
| 80401 | | | | | | |
| 80402 | | | | | | |
| 80501 | | | | | | |
| 80502 | | | | | | |
| 80503 | | | | | | |

As a result, tracts **80108**, **80203**, **and 80205** are highest priority due to their status as CEJST disadvantaged communities followed by tracts **80104** and **80204** in evaluating the location of safety interventions from a combined equity and safety perspective.

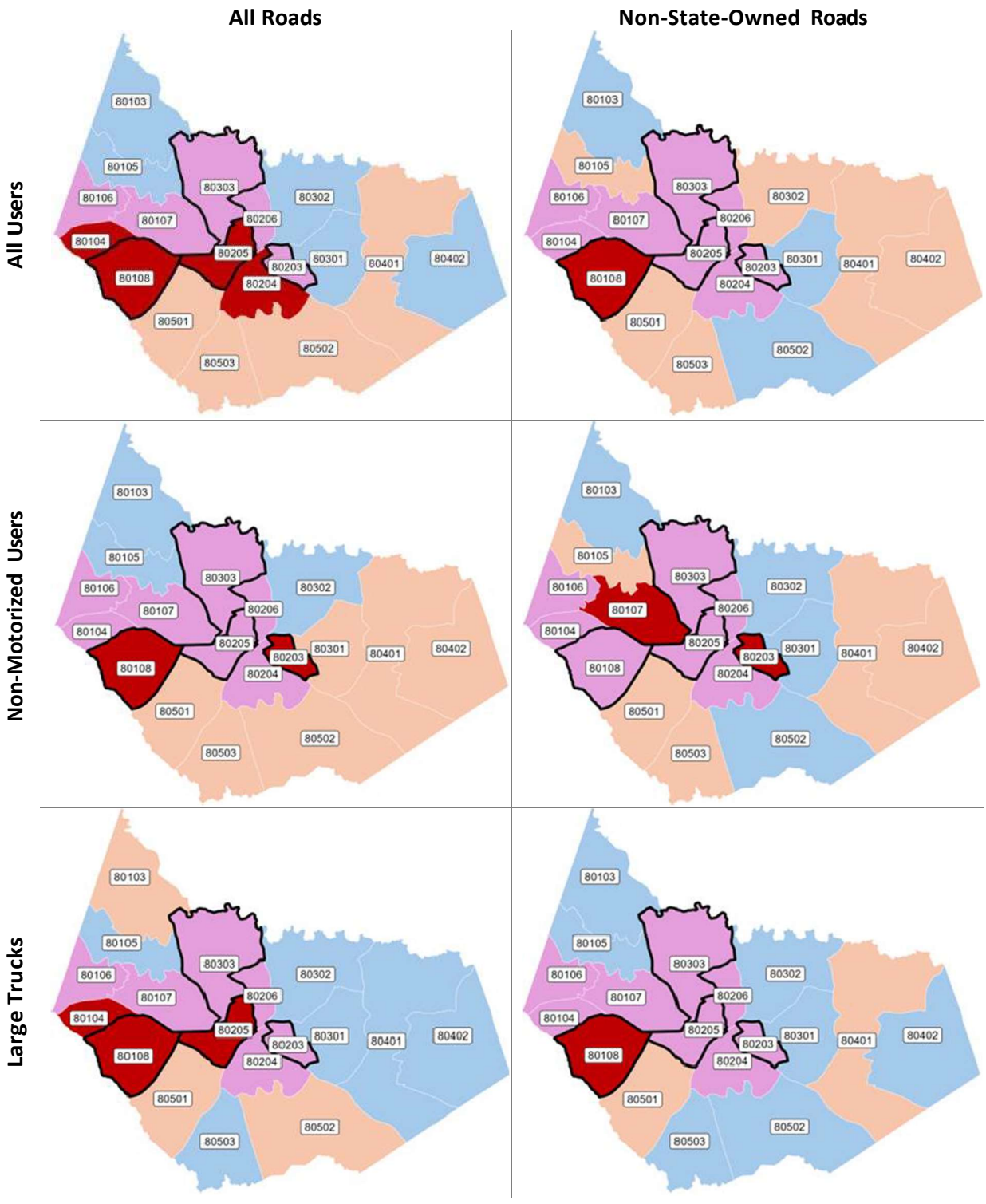


*Figure 3. Safety and equity groups for each HIN.*

# **Step 4:** Disadvantaged Commuters

Using commuter origin-destination data from the Longitudinal Employer-Household Dynamics (LEHD) Origin-Destination Employment Statistics (LODES), the Climate and Economic Justice Screening Tool (CEJST), and the GDOT roadway inventory, shortest paths were calculated for commuters living and working in Barrow County as well as counties within 25 miles. Network centrality was calculated for each roadway based on total workers moving between census tracts and for a proportion number of workers based on the number of disadvantage categories met by origin and destination tracks.

This process accounts for the fact that disadvantaged individuals may not live or work within Barrow County but are nonetheless impacted by the safety of local facilities.

The normalized ratio of commuters using the facility as part of their shortest route between tracts were compared for all workers and for an estimated number of disadvantaged workers. Facilities where the disadvantaged ratio exceeds the ratio for all workers are mapped in Figure 4 and listed below. These results support equity-oriented investment in tracts 80205, 80206, and 80303.

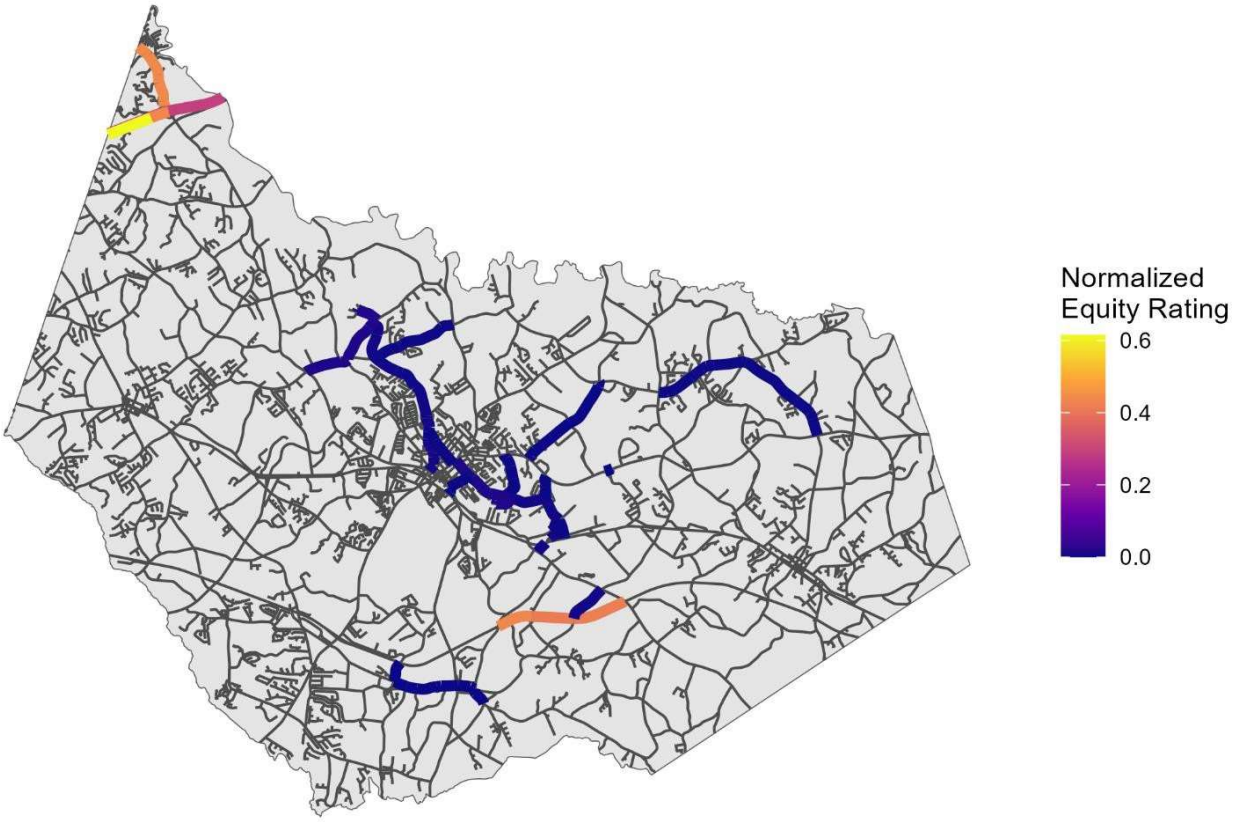


*Figure 4. Facilities where the ratio of estimated disadvantaged workers exceeds the ratio of all workers.*

Facilities used by more disadvantaged workers than by all workers. HIN facilities are bolded and colored in red.

- Interstate 85
- SR 211 from I-85 north to the county border
- **Maddox Road** (*County Owned*) / Miles Patrick Road
- Chicken Lyle Road
- Rockwell Church Road NW from SR 211 to Chicken Lyle Road and from Maddox Road to SR 53
- Lincoln Drive
- West New Street
- West Midland Avenue from Miles Patrick Road to North Center Street
- North Center Street from SR 211 to West Midland Avenue
- East Wright Street
- Oak Hill Road
- Lays Drive
- Dunahoo Road from East Broad Street to SR 211
- **SR 211 from Pleasant Hill Church Road NE to SR 82**
- Harry McCarthy Road from SR 29 to Carl-Bethlehem Road
- Carl-Bethlehem Road from Harry McCarthy Road to Manning Gin Road
- Manning Gin Road from Carl-Bethlehem Road to Bethlehem Church Road
- **Jackson Trail Road between SR 29 and SR 53** (*County Owned*)
- **SR 29 from Harrison Mill Road to SR 53**

# Conclusions

Communities across the county are home to individuals who have been disadvantaged in one way or another. Whether the source was social, cultural, economic, health, or other circumstances, further harm to these groups will continue to inhibit their ability to overcome the hurdles set before them. In turn their communities will bear more of the burden, than might be born by those with greater means or less disadvantage.

Many of the place where safety interventions are already recommended align with equity and disadvantage areas. Therefore, focusing investment on the locations and facilities identified through this methodology has the potential to improve outcomes for the entire community in an equitable and effective manner.

From the perspective of Barrow County, these sites are **Maddox Road**, **Jackson Trail Road** between SR 29 and SR 53, **census tracts 80108**, **80203**, and **80205** more broadly. In coordinating with Georgia DOT, improvements along SR 211 and SR 29 should also be prioritized where possible.

| HIN TOOL | HIN? | | HIN Score | | Road Type | | Identified Disadvantaged Route | Equity Analysis |
|---|---|---|---|---|---|---|---|---|
| Countermeasure | | | | | | | | |
| Term | | | | | | | | |
| Cost | | | | | | | | |
| **INTERSECTIONS** | **Segment 1** | **Segment 2** | **Segment 1** | **Segment 2** | **Segment 1** | **Segment 2** | | |
| Dee Kennedy & Highway 211 | Y | N | 0.45 | NA | 6 - Minor Collector | 4 - Minor Arterial | | More Equitable but More Dangerous |
| Dee Kennedy & Freeman Brock | Y | N | 0.45 | NA | 6 - Minor Collector | 7 - Local | | More Equitable but More Dangerous |
| Dee Kennedy & Harmony Grove Church | Y | N | 0.45 | NA | 6 - Minor Collector | 7 - Local | | More Equitable but More Dangerous |
| Tom Miller & Patrick Mill | Y | N | 0.42 | NA | 7 - Local | 5 - Major Collector | | Less Equitable and More Dangerous |
| Tom Miller & Haymon Morris | Y | N | 0.42 | NA | 7 - Local | 7 - Local | | More Equitable but More Dangerous |
| Carl Bethlehem & Haymon Morris | N | N | NA | NA | 4 - Minor Arterial | 7 - Local | | More Equitable but More Dangerous |
| Austin Reynolds & Hoyt King | N | N | NA | NA | 7 - Local | 7 - Local | | More Equitable but More Dangerous |
| Carl Bethlehem & Harry McCarty | N | N | NA | NA | 4 - Minor Arterial | 7 - Local | Y | More Equitable but More Dangerous |
| Bowman Mill Road NE & Pleasant Hill Church Road NE | Y | N | 0.42 | NA | 6 - Minor Collector | 6 - Minor Collector | | More Equitable but More Dangerous |
| Bowman Mill Road NE and SR 82 | Y | Y | 0.42 | NA | 6 - Minor Collector | 5 - Major Collector | | More Equitable and Safer |
| Dunahoo & Holsenbeck | N | N | NA | NA | 6 - Minor Collector | 7 - Local | Y | More Equitable but More Dangerous |

| HIN TOOL | HIN? | HIN Score | Road Type | Identified Disadvantaged Route | Equity Analysis |
|---|---|---|---|---|---|
| Countermeasure | | | | | |
| Term | | | | | |
| Cost | | | | | |
| **SEGMENTS** | | | | | |
| Dee Kennedy | Y | 0.45 | 6 - Minor Collector | | More Equitable but More Dangerous |
| Ben Johnson (becomes Austin Reynolds) | N | NA | 7 - Local | | More Equitable but More Dangerous |
| Kilcrease | Y | 0.45 | 5 - Major Collector | | Less Equitable and More Dangerous |
| Brown Bridge + Carl Cedar Hill Road | N | NA | 7 - Local | | Less Equitable and More Dangerous |
| Kennedy Sells | N | NA | 7 - Local | | Less Equitable and More Dangerous |
| Harry McCarty | N | NA | 7 - Local | Y | More Equitable but More Dangerous |
| Jackson Trail | N | NA | 6 - Minor Collector | Y | More Equitable but More Dangerous |
| Pleasant Hill Church | N | NA | 6 - Minor Collector | | More Equitable but More Dangerous |
| Maddox | N | NA | 7 - Local | Y | Less Equitable but Safer |

| HIN TOOL | | | COMMUNITY CONCERNS | | | |
|---|---|---|---|---|---|---|
| | Signage | Sidewalk | Lower Speeds | Improve Site Distance | Blind Spots | Widen Shoulder |
| Countermeasure | | | | | | |
| Term | | | | | | |
| Cost | | | | | | |
| **INTERSECTIONS** | | | | | | |
| Dee Kennedy & Highway 211 | | | | | | X |
| Dee Kennedy & Freeman Brock | | X | | X | | |
| Dee Kennedy & Harmony Grove Church | X | | | X | | X |
| Tom Miller & Patrick Mill | | | | | | |
| Tom Miller & Haymon Morris | | X | | | | X |
| Carl Bethlehem & Haymon Morris | X | | | | | |
| Austin Reynolds & Hoyt King | | | | X | | |
| Carl Bethlehem & Harry McCarty | | | | X | | |
| Bowman Mill Road NE & Pleasant Hill Church Road NE | | | X | X | X | X |
| Bowman Mill Road NE and SR 82 | | | | X | | |
| Dunahoo & Holsenbeck | | | | X | | |

| HIN TOOL | | | COMMUNITY CONCERNS | | | |
|---|---|---|---|---|---|---|
| | Signage | Sidewalk | Lower Speeds | Improve Site Distance | Blind Spots | Widen Shoulder |
| Countermeasure | | | | | | |
| Term | | | | | | |
| Cost | | | | | | |
| **SEGMENTS** | | | | | | |
| Dee Kennedy | | | X | X | | X |
| Ben Johnson (becomes Austin Reynolds) | | | | | | |
| Kilcrease | | | | X | | X |
| Brown Bridge + Carl Cedar Hill Road | | | | X | | X |
| Kennedy Sells | | | | X | | X |
| Harry McCarty | | | | X | | X |
| Jackson Trail | | | X | | | X |
| Pleasant Hill Church | | | X | | X | X |
| Maddox | | | | | | X |

| HIN TOOL | Shoulder Type | Shoulder Width | Improve Lighting | Survey Results |
|---|---|---|---|---|
| Countermeasure | | | | |
| Term | | | | |
| Cost | | | | |
| **SEGMENTS** | | | | |
| Dee Kennedy | | | X | - |
| Ben Johnson (becomes Austin Reynolds) | | | X | 2 |
| Kilcrease | | | | - |
| Brown Bridge + Carl Cedar Hill Road | | | | 1 |
| Kennedy Sells | | | X | - |
| Harry McCarty | | | | 1 |
| Jackson Trail | | | | 6 |
| Pleasant Hill Church | | | | 2 |
| Maddox | | | | 1 |
| **INTERSECTIONS** | | | | |
| Dee Kennedy & Highway 211 | | | X | - |
| Dee Kennedy & Freeman Brock | | | | - |
| Dee Kennedy & Harmony Grove Church | | | | - |
| Tom Miller & Patrick Mill | | | | - |
| Tom Miller & Haymon Morris | | | X | 2 |
| Carl Bethlehem & Haymon Morris | | | X | 1 |
| Austin Reynolds & Hoyt King | | | | 2 |
| Carl Bethlehem & Harry McCarty | | | | 1 |
| Bowman Mill Road NE & Pleasant Hill Church Road NE | | | | - |
| Bowman Mill Road NE and SR 82 | | | | - |
| Dunahoo & Holsenbeck | | | | - |

| HIN TOOL | | | | C |
|---|---|---|---|---|
| | Sidewalks | Speed | | Lighting |
| Countermeasure | Adding Sidewalks | Feedback (Speed) Monitors | Reducing Speed Limits | Install Lighting |
| Term | Long | Near | Near | Middle |
| Cost | | | | |
| **CMF** | | | | |
| Crash Type | Vehicle/pedestrian | All | All | All |
| Crash Severity | All | All | KABC | All |
| Area Type | NA | Rural | NA | All |
| CMF | 0.598 | 0.930 | 0.856 | 0.680 |
| TOD | All | All | All | Night |
| **SEGMENTS** | | | | |
| Dee Kennedy | | 0.930 | 0.856 | 0.680 |
| Ben Johnson (becomes Austin Reynolds) | | | | 0.680 |
| Kilcrease | | | | |
| Brown Bridge + Carl Cedar Hill Road | | | | |
| Kennedy Sells | | | | 0.680 |
| Harry McCarty | | | | |
| Jackson Trail | | 0.930 | 0.856 | |
| Pleasant Hill Church | | 0.930 | 0.856 | |
| Maddox | | | | |

| HIN TOOL | | | | C |
|---|---|---|---|---|
| | Sidewalks | Speed | | Lighting |
| Countermeasure | Adding Sidewalks | Feedback (Speed) Monitors | Reducing Speed Limits | Install Lighting |
| Term | Long | Near | Near | Middle |
| Cost | | | | |
| **INTERSECTIONS** | | | | |
| Dee Kennedy & Highway 211 | | | | 0.680 |
| Dee Kennedy & Freeman Brock | 0.598 | | | |
| Dee Kennedy & Harmony Grove Church | 0.598 | | | |
| Tom Miller & Patrick Mill | | | | |
| Tom Miller & Haymon Morris | 0.598 | | | 0.680 |
| Carl Bethlehem & Haymon Morris | | | | 0.680 |
| Austin Reynolds & Hoyt King | | | | |
| Carl Bethlehem & Harry McCarty | | | | |
| Bowman Mill Road NE & Pleasant Hill Church Road NE | | 0.930 | 0.856 | |
| Bowman Mill Road NE and SR 82 | | | | |
| Dunahoo & Holsenbeck | | | | |

| HIN TOOL | OUNTERMEASURES | | | | | |
|---|---|---|---|---|---|---|
| | Road Geometry | | Shoulders | | Other | Site Distance |
| Countermeasure | Roundabout | Rumble Strips | Pave Shoulder | Pave Shoulder | Flashing Signage | Intersection Advance Warning |
| Term | Long | Long | Long | Long | Near | Middle |
| Cost | | | | | | |
| Crash Type | All | All | Fixed object,Head on,Run off road,Sidesw | Fixed object,Head on,Run off road,Sidesw | Angle | Angle |
| Crash Severity | All | All | K | ABC | All | All |
| Area Type | Rural | Rural | Rural | Rural | NA | NA |
| CMF | 0.290 | 0.800 | 0.770 | 0.900 | 0.59 | 0.564 |
| TOD | NA | All | All | All | All | All |
| **SEGMENTS** | | | | | | |
| Dee Kennedy | | 0.800 | 0.770 | 0.900 | | |
| Ben Johnson (becomes Austin Reynolds) | | 0.800 | | | | |
| Kilcrease | | 0.800 | 0.770 | 0.900 | | |
| Brown Bridge + Carl Cedar Hill Road | | 0.800 | 0.770 | 0.900 | | |
| Kennedy Sells | | 0.800 | 0.770 | 0.900 | | |
| Harry McCarty | | 0.800 | | | | 0.564 |
| Jackson Trail | | 0.800 | | | | |
| Pleasant Hill Church | | 0.800 | 0.770 | 0.900 | | |
| Maddox | | 0.800 | 0.770 | 0.900 | | 0.564 |

| HIN TOOL | OUNTERMEASURES | | | | | |
|---|---|---|---|---|---|---|
| | Road Geometry | | Shoulders | | Other | Site Distance |
| Countermeasure | Roundabout | Rumble Strips | Pave Shoulder | Pave Shoulder | Flashing Signage | Intersection Advance Warning |
| Term | Long | Long | Long | Long | Near | Middle |
| Cost | | | | | | |
| **INTERSECTIONS** | | | | | | |
| Dee Kennedy & Highway 211 | 0.290 | | 0.770 | 0.900 | | |
| Dee Kennedy & Freeman Brock | | | | | 0.590 | |
| Dee Kennedy & Harmony Grove Church | | | 0.770 | 0.900 | | 0.564 |
| Tom Miller & Patrick Mill | | | | | | |
| Tom Miller & Haymon Morris | 0.290 | | 0.770 | 0.900 | | |
| Carl Bethlehem & Haymon Morris | | | | | | |
| Austin Reynolds & Hoyt King | | | | | | 0.564 |
| Carl Bethlehem & Harry McCarty | | | | | | 0.564 |
| Bowman Mill Road NE & Pleasant Hill Church Road NE | | | 0.770 | 0.900 | | 0.564 |
| Bowman Mill Road NE and SR 82 | 0.290 | | | | | 0.564 |
| Dunahoo & Holsenbeck | | | | | | 0.564 |

| HIN TOOL | K Crashes | | | | | | |
|---|---|---|---|---|---|---|---|
| Countermeasure | Rear End | Head On | Angle | Sideswipe | Not A Collision with Motor Vehicle | Pedestrian | **Total K Crashes** |
| Term | | | | | | | |
| Cost | | | | | | | |
| **SEGMENTS** | | | | | | | |
| Dee Kennedy | 1 | - | - | - | 1 | - | **2** |
| Ben Johnson (becomes Austin Reynolds) | - | - | - | - | - | - | - |
| Kilcrease | - | - | 1 | - | - | | **1** |
| Brown Bridge + Carl Cedar Hill Road | - | 1 | 3 | - | - | - | **4** |
| Kennedy Sells | - | - | - | - | - | - | - |
| Harry McCarty | - | - | - | - | - | - | - |
| Jackson Trail | - | 2 | 3 | - | - | - | **5** |
| Pleasant Hill Church | - | - | - | - | - | 1 | **1** |
| Maddox | - | - | 1 | - | - | - | **1** |

| HIN TOOL | K Crashes | | | | | | |
|---|---|---|---|---|---|---|---|
| Countermeasure | Rear End | Head On | Angle | Sideswipe | Not A Collision with Motor Vehicle | Pedestrian | **Total K Crashes** |
| Term | | | | | | | |
| Cost | | | | | | | |
| **INTERSECTIONS** | | | | | | | |
| Dee Kennedy & Highway 211 | - | 1 | - | - | - | - | **1** |
| Dee Kennedy & Freeman Brock | - | - | - | - | - | - | - |
| Dee Kennedy & Harmony Grove Church | - | - | - | - | 1 | - | **1** |
| Tom Miller & Patrick Mill | - | - | - | - | - | - | - |
| Tom Miller & Haymon Morris | - | - | - | - | - | - | - |
| Carl Bethlehem & Haymon Morris | - | - | - | - | - | - | - |
| Austin Reynolds & Hoyt King | - | - | - | - | - | - | - |
| Carl Bethlehem & Harry McCarty | - | - | - | - | - | - | - |
| Bowman Mill Road NE & Pleasant Hill Church Road NE | - | - | - | - | - | - | - |
| Bowman Mill Road NE and SR 82 | - | - | - | - | - | - | - |
| Dunahoo & Holsenbeck | - | - | - | - | - | - | - |

| HIN TOOL | # of KABCO CRASHES (NO BUILD) | | | | | | |
|---|---|---|---|---|---|---|---|
| | A Crashes | | | | | | |
| Countermeasure | Rear End | Head On | Angle | Sideswipe | Not A Collision with Motor Vehicle | Pedestrian | **Total A Crashes** |
| Term | | | | | | | |
| Cost | | | | | | | |
| **INTERSECTIONS** | | | | | | | |
| Dee Kennedy & Highway 211 | - | 1 | - | - | - | - | **1** |
| Dee Kennedy & Freeman Brock | - | - | - | - | - | - | - |
| Dee Kennedy & Harmony Grove Church | - | - | - | - | - | - | - |
| Tom Miller & Patrick Mill | - | - | - | - | - | - | - |
| Tom Miller & Haymon Morris | - | - | - | - | - | - | - |
| Carl Bethlehem & Haymon Morris | - | - | - | - | - | - | - |
| Austin Reynolds & Hoyt King | - | - | - | - | - | - | - |
| Carl Bethlehem & Harry McCarty | - | - | - | - | - | - | - |
| Bowman Mill Road NE & Pleasant Hill Church Road NE | - | - | - | - | - | - | - |
| Bowman Mill Road NE and SR 82 | - | - | 4 | - | - | - | **4** |
| Dunahoo & Holsenbeck | - | - | - | - | - | - | - |

| HIN TOOL | # of KABCO CRASHES (NO BUILD) | | | | | | |
|---|---|---|---|---|---|---|---|
| | A Crashes | | | | | | |
| Countermeasure | Rear End | Head On | Angle | Sideswipe | Not A Collision with Motor Vehicle | Pedestrian | Total A Crashes |
| Term | | | | | | | |
| Cost | | | | | | | |
| **SEGMENTS** | | | | | | | |
| Dee Kennedy | - | - | - | - | 3 | - | **3** |
| Ben Johnson (becomes Austin Reynolds) | - | - | - | - | - | - | - |
| Kilcrease | - | 1 | 3 | - | 1 | - | **5** |
| Brown Bridge + Carl Cedar Hill Road | - | 1 | 3 | - | 3 | - | **7** |
| Kennedy Sells | - | - | - | - | - | - | - |
| Harry McCarty | - | - | 3 | - | - | - | **3** |
| Jackson Trail | - | - | 1 | - | 1 | - | **2** |
| Pleasant Hill Church | - | - | 1 | - | 3 | 1 | **5** |
| Maddox | - | - | - | - | - | - | - |

| HIN TOOL | | | | | | | |
|---|---|---|---|---|---|---|---|
| | BCO Crashes | | | | | | |
| Countermeasure | Rear End | Head On | Angle | Sideswipe | Not A Collision with Motor Vehicle | Pedestrian | Total |
| Term | | | | | | | |
| Cost | | | | | | | |
| **SEGMENTS** | | | | | | | |
| Dee Kennedy | **39** | **2** | **44** | **10** | **30** | - | **125** |
| Ben Johnson (becomes Austin Reynolds) | - | **2** | **7** | **2** | **12** | - | **23** |
| Kilcrease | **160** | **5** | **53** | **23** | **59** | - | **300** |
| Brown Bridge + Carl Cedar Hill Road | **5** | - | **3** | **2** | **7** | - | **17** |
| Kennedy Sells | **2** | **1** | - | - | - | - | **3** |
| Harry McCarty | **77** | **4** | **56** | **10** | **50** | - | **197** |
| Jackson Trail | **34** | **1** | **119** | **16** | **40** | - | **210** |
| Pleasant Hill Church | **20** | **2** | **68** | **6** | **43** | - | **139** |
| Maddox | **1** | - | **1** | **1** | **5** | - | **8** |

| HIN TOOL | | BCO Crashes | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Countermeasure | | Rear End | Head On | Angle | Sideswipe | Not A Collision with Motor Vehicle | Pedestrian | Total |
| Term | | | | | | | | |
| Cost | | | | | | | | |
| **INTERSECTIONS** | | | | | | | | |
| Dee Kennedy & Highway 211 | | **30** | – | **8** | **6** | **6** | – | **50** |
| Dee Kennedy & Freeman Brock | | **1** | **1** | **10** | **1** | **1** | – | **14** |
| Dee Kennedy & Harmony Grove Church | | – | – | **1** | – | **3** | – | **4** |
| Tom Miller & Patrick Mill | | **4** | – | **15** | – | **5** | – | **24** |
| Tom Miller & Haymon Morris | | **2** | – | **9** | **1** | **1** | – | **13** |
| Carl Bethlehem & Haymon Morris | | **1** | – | **3** | **1** | – | – | **5** |
| Austin Reynolds & Hoyt King | | – | **2** | **4** | – | **3** | – | **9** |
| Carl Bethlehem & Harry McCarty | | – | – | – | – | – | – | – |
| Bowman Mill Road NE & Pleasant Hill Church Road NE | | – | – | **4** | – | **6** | – | **10** |
| Bowman Mill Road NE and SR 82 | | **3** | – | **66** | **3** | **5** | – | **77** |
| Dunahoo & Holsenbeck | | – | – | **5** | – | **7** | – | **12** |

| HIN TOOL | # of KA CRASHES (BUILD) | | | | | | |
|---|---|---|---|---|---|---|---|
| | K Crashes | A Crashes | | | | | |
| | Total K Crashes Reduced | Total A Crashes Reduced | Priority Index (HIN & KA Reduction & Survey Pts) | | | | |
| Countermeasure | | | | | | | |
| Term | | | | | | | |
| Cost | | | | | | | |
| **SEGMENTS** | | | **HIN** | **KA Reduction %** | **Survey** | **Sum** | |
| Dee Kennedy | **0.960** | **1.419** | 0.05 | 0.476 | 0.000 | 0.52 | **5.2** |
| Ben Johnson (becomes Austin Reynolds) | - | - | 0.00 | 0.000 | 0.042 | 0.04 | **0.4** |
| Kilcrease | **0.163** | **0.953** | 0.05 | 0.186 | 0.000 | 0.23 | **2.3** |
| Brown Bridge + Carl Cedar Hill Road | **0.802** | **1.415** | 0.00 | 0.202 | 0.021 | 0.22 | **2.2** |
| Kennedy Sells | - | - | 0.00 | 0.000 | 0.000 | 0.00 | **0.0** |
| Harry McCarty | - | **1.085** | 0.00 | 0.362 | 0.021 | 0.38 | **3.8** |
| Jackson Trail | **1.515** | **0.606** | 0.00 | 0.303 | 0.125 | 0.43 | **4.3** |
| Pleasant Hill Church | **1.000** | **2.381** | 0.00 | 0.563 | 0.042 | 0.61 | **6.1** |
| Maddox | **0.362** | - | 0.00 | 0.362 | 0.021 | 0.38 | **3.8** |

| HIN TOOL | # of KA CRASHES (BUILD) | | | | | | |
|---|---|---|---|---|---|---|---|
| | K Crashes | A Crashes | | | | | |
| | Total K Crashes Reduced | Total A Crashes Reduced | Priority Index (HIN & KA Reduction & Survey Pts) | | | | |
| Countermeasure | | | | | | | |
| Term | | | | | | | |
| Cost | | | | | | | |
| **INTERSECTIONS** | | | | | | | |
| Dee Kennedy & Highway 211 | **0.421** | **0.394** | 0.05 | 0.408 | 0.000 | 0.45 | **4.5** |
| Dee Kennedy & Freeman Brook | - | - | 0.05 | 0.000 | 0.000 | 0.05 | **0.5** |
| Dee Kennedy & Harmony Grove Church | **0.371** | - | 0.05 | 0.371 | 0.000 | 0.42 | **4.2** |
| Tom Miller & Patrick Mill | - | - | 0.04 | 0.000 | 0.000 | 0.04 | **0.4** |
| Tom Miller & Haymon Morris | - | - | 0.04 | 0.000 | 0.042 | 0.08 | **0.8** |
| Carl Bethlehem & Haymon Morris | - | - | 0.00 | 0.000 | 0.021 | 0.02 | **0.2** |
| Austin Reynolds & Hoyt King | - | - | 0.00 | 0.000 | 0.042 | 0.04 | **0.4** |
| Carl Bethlehem & Harry McCarty | - | - | 0.00 | 0.000 | 0.021 | 0.02 | **0.2** |
| Bowman Mill Road NE & Pleasant Hill Church Road NE | - | - | 0.04 | 0.000 | 0.000 | 0.04 | **0.4** |
| Bowman Mill Road NE and SR 82 | - | **1.634** | 0.04 | 0.408 | 0.000 | 0.45 | **4.5** |
| Dunahoo & Holsenbeck | - | - | 0.00 | 0.000 | 0.000 | 0.00 | **0.0** |