TRIANGLE WEST
Transportation Planning Organization

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Triangle West Transportation Planning Organization

VISION ZERO

Acknowledgments

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01

Roadway Safety Vision

What is a Vision Zero Plan?

The Triangle West Transportation Planning Organization (TWTPO) Vision Zero Plan marks a critical and fundamental shift in the approach to roadway safety. For decades, our streets have prioritized convenience and speed over safety—moving cars as quickly as possible even as the number of roadway fatalities increased across the country and in our hometowns. Consistently, streets have been designed with the assumption that crashes are accidents—events that no one can predict or prevent—or that these numbers are just the cost for the system to function. While communities have grieved the loss of individual friends and family members, this traditional approach to transportation has accepted roadway fatalities as an unfortunate inevitability.

This Vision Zero Plan proclaims that nothing on our roadways is more important than human life and that everyone deserves to make it to their destination safely. It begins by believing that roadway deaths and serious injuries are preventable, and that the responsibility is on each of us to create safer streets for everyone that lives, works, and enjoys the region.

The TWTPO Vision Zero Plan takes a data-driven approach to focus infrastructure, design, policy, and programs around the goal of zero traffic fatalities or severe injuries, while increasing safe and healthy mobility for all community members.

The TWTPO Vision Zero Plan sets a goal of eliminating fatal and serious injury crashes in the region by 2050 and reducing the number of fatal and serious injury crashes in half by 2035. Achieving this goal will require partnerships across the region and with NCDOT. Additionally, it requires a focus on addressing roadway safety at the system level, with daily choices, policy changes, and projects that make a real impact.

FIGURE 1 Safe System Approach Framework

FIGURE 2 Safe System Approach

02

Regional Crash Summary

Crash Map

Crashes occur for a variety of reasons and often a combination of contributing factors. These factors may include excessive speed, roadway conditions, equipment failure, inexperience, environmental conditions (e.g., weather, lighting, glare), and human behaviors such as distraction, impairment, and not complying with traffic laws. With 1,467 total Killed or Serious Injury crashes over a seven-year period (2017-2023), the High Injury Network represents the most critical corridors that should be addressed in the region.

People Impacted by Crashes

Over the last seven years, there have been 1,467 fatal and serious injury crashes impacting 1,746 people in the Triangle West region. Each of these crashes is at least one person – people who were getting around in different ways, were different ages, were different races and ethnicities, and were traveling on different types of streets.

In the Triangle West region and across the United States, traffic crashes and other negative outcomes of the transportation system have disproportionate impacts on populations that are vulnerable to transportation disadvantage based on socioeconomic factors.

For example:

- Children and youth are often not independently mobile and rely on guardians to accompany them as they travel.
- Households in poverty may spend an outsized portion of their income on travel expenses.
- People in households without a vehicle – or even people who have limited access to the vehicle within their household – may be dependent on the availability of safe multimodal facilities to access their daily needs.
- People with disabilities are less likely to drive and more likely to rely on public transportation than nondisabled residents, meaning safe, accessible, and intuitive infrastructure is critical for ensuring people with vision, hearing, cognitive, or mobility-related disabilities can go about their daily lives.[1]
- Lack of safe and convenient transportation is a major barrier for households facing food insecurity. For people in food deserts, affordable transportation options are essential for accessing health foods and/or free food services.
- People with lower levels of English proficiency may face challenges understanding or communicating in a safety-critical situation. [2]

What is a Serious Injury?

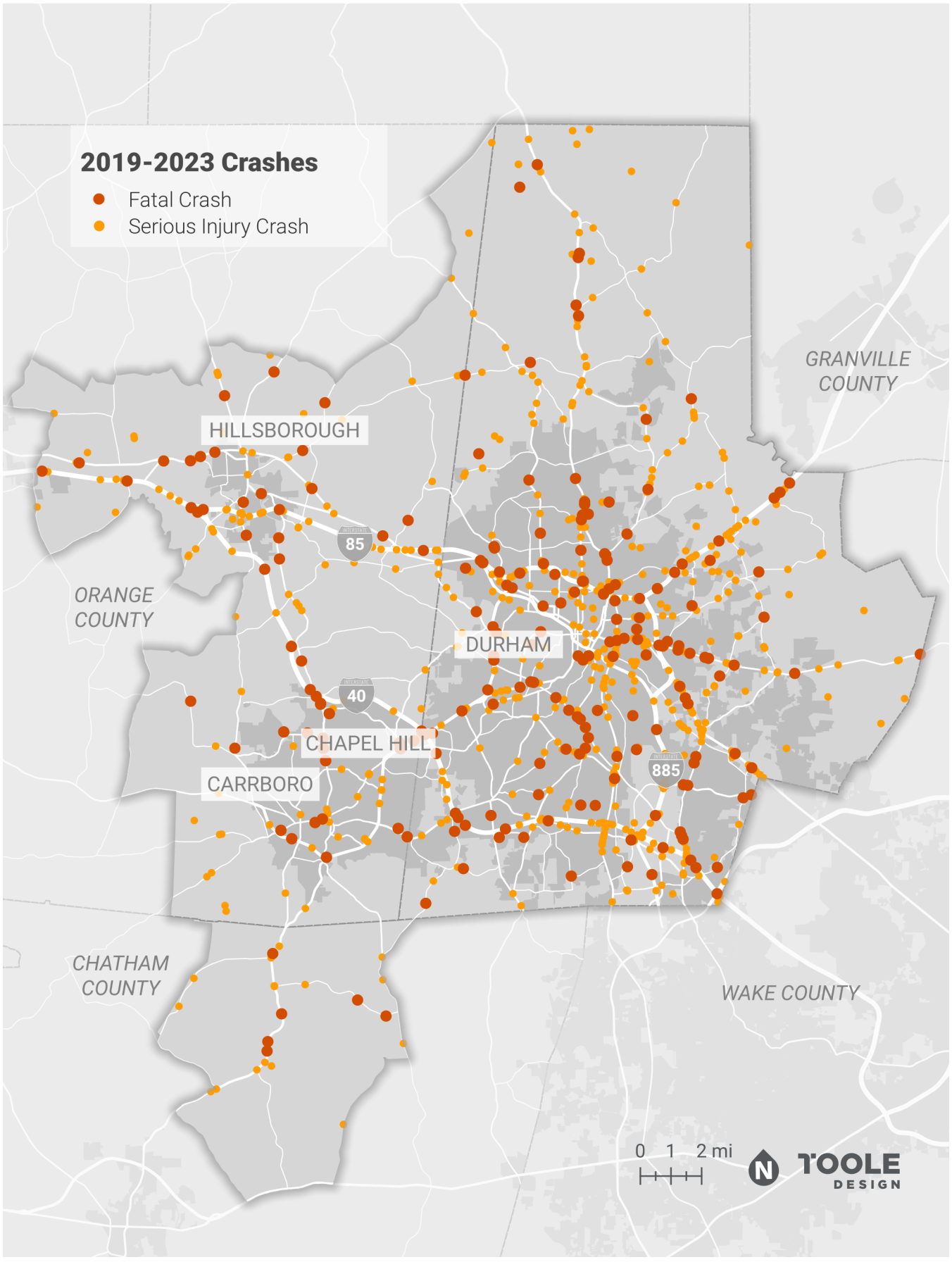
A **serious injury** involves one or more of the following factors:

- Severe laceration resulting in exposure of muscle/tissue/ organs or resulting in significant loss of blood
- Broken or distorted arm or leg
- Crush injuries
- Suspected skull, chest, or abdominal injury
- Second or third degree burns over 10% of the body
- Unconsciousness
- Paralysis

1 Data Analysis. Data Analysis | Bureau of Transportation Statistics. (2011, November 30)

2 Marudut Bernadtua Simanjuntak. (2024). The Impact Of English Communication On Transportation Safety Practices. International Journal of Educational Development, 1(2), 79–87.

MAP 1 Regional Crash Map



To improve safety outcomes for people facing the most transportation challenges, the TWTPO Vision Zero Action plan conducted a demographic analysis to identify and map areas throughout the region with the highest proportions of people in **eight key populations**:

- Black, Indigenous, and other People of Color, specifically the ACS race and ethnicity categories:
- Black or African American
- American Indian and Alaska Native
- Asian
- Two or More Races
- Hispanic or Latino
- Households in poverty
- Carless households
- Youth under 18 years old
- Older adults over 64 years old
- People with disabilities
- People with limited English proficiency
- People with limited educational attainment

The demographic analysis results in **Map 2** shows that there are key populations located across the region, but the highest concentrations are in East Durham near downtown and along the Durham Freeway; Southeast Durham along Fayetteville Street and E Cornwallis Road; Southwest Durham along Durham Chapel Hill Boulevard; along I-85 just west of Hillsborough; and in North Hillsborough between Cornelius Street and NC-86.

Achieving an equitable transportation system requires understanding of how both positive and negative impacts are distributed throughout a region and across different demographic groups. In the Triangle West region, people of different races, ages, and genders experience different fatality crash rates.

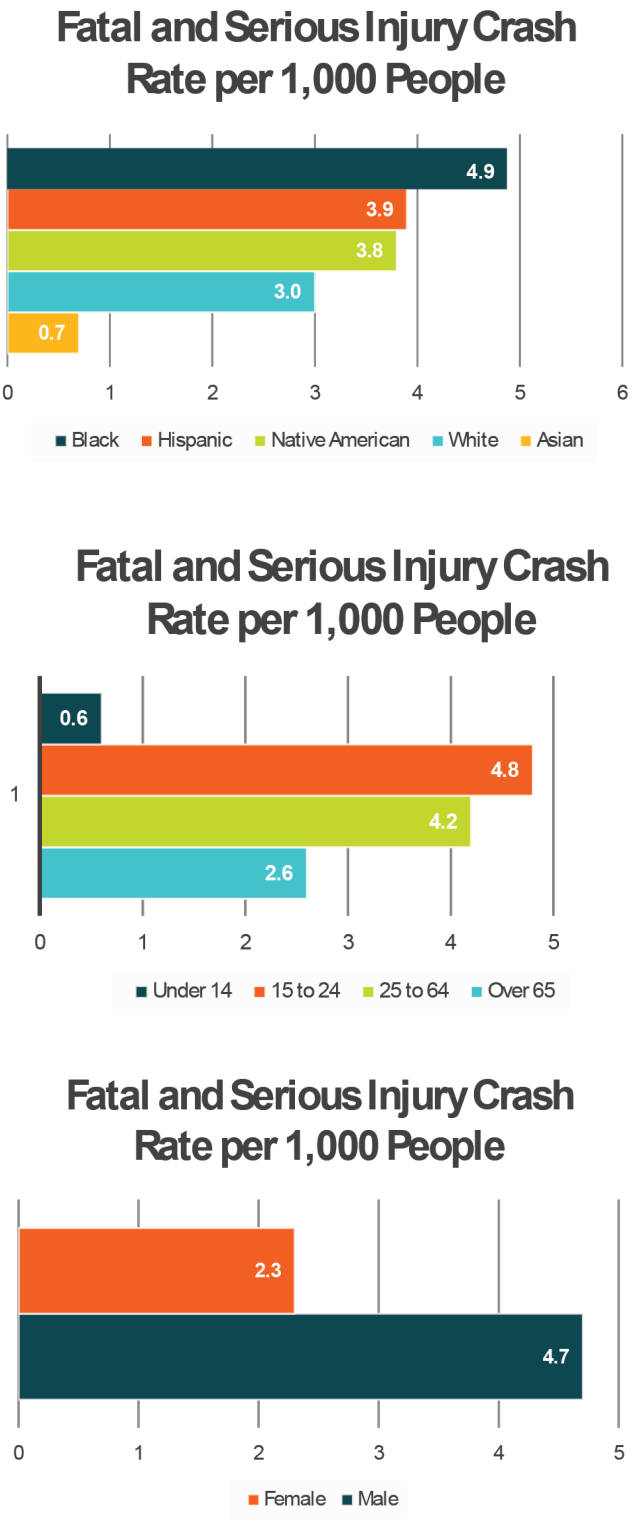
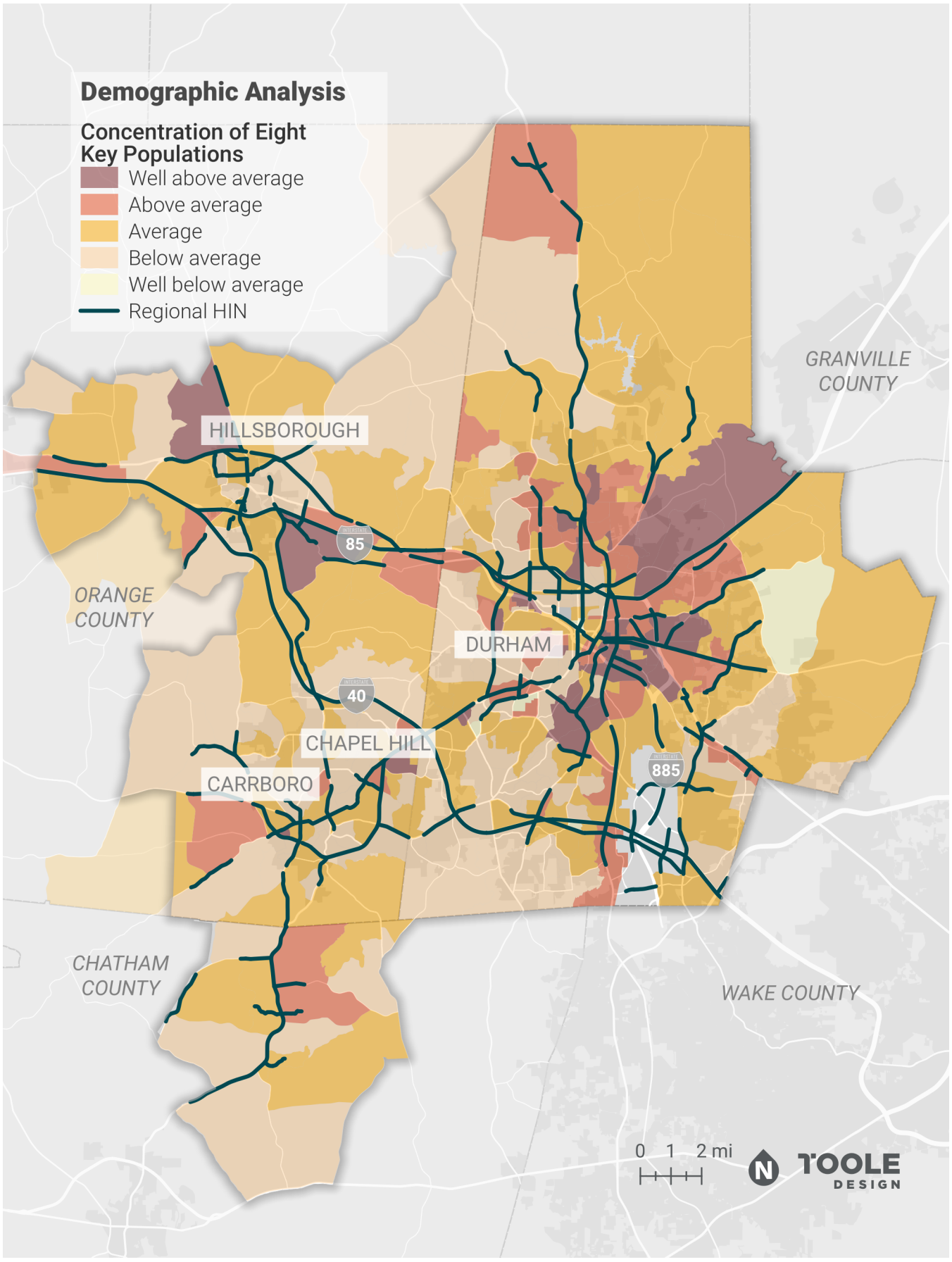


FIGURE 3 Fatal and Serious Injury Crash Rates by Race/Ethnicity, Age, and Gender

MAP 2 Demographic Analysis Results Map



High Injury Network

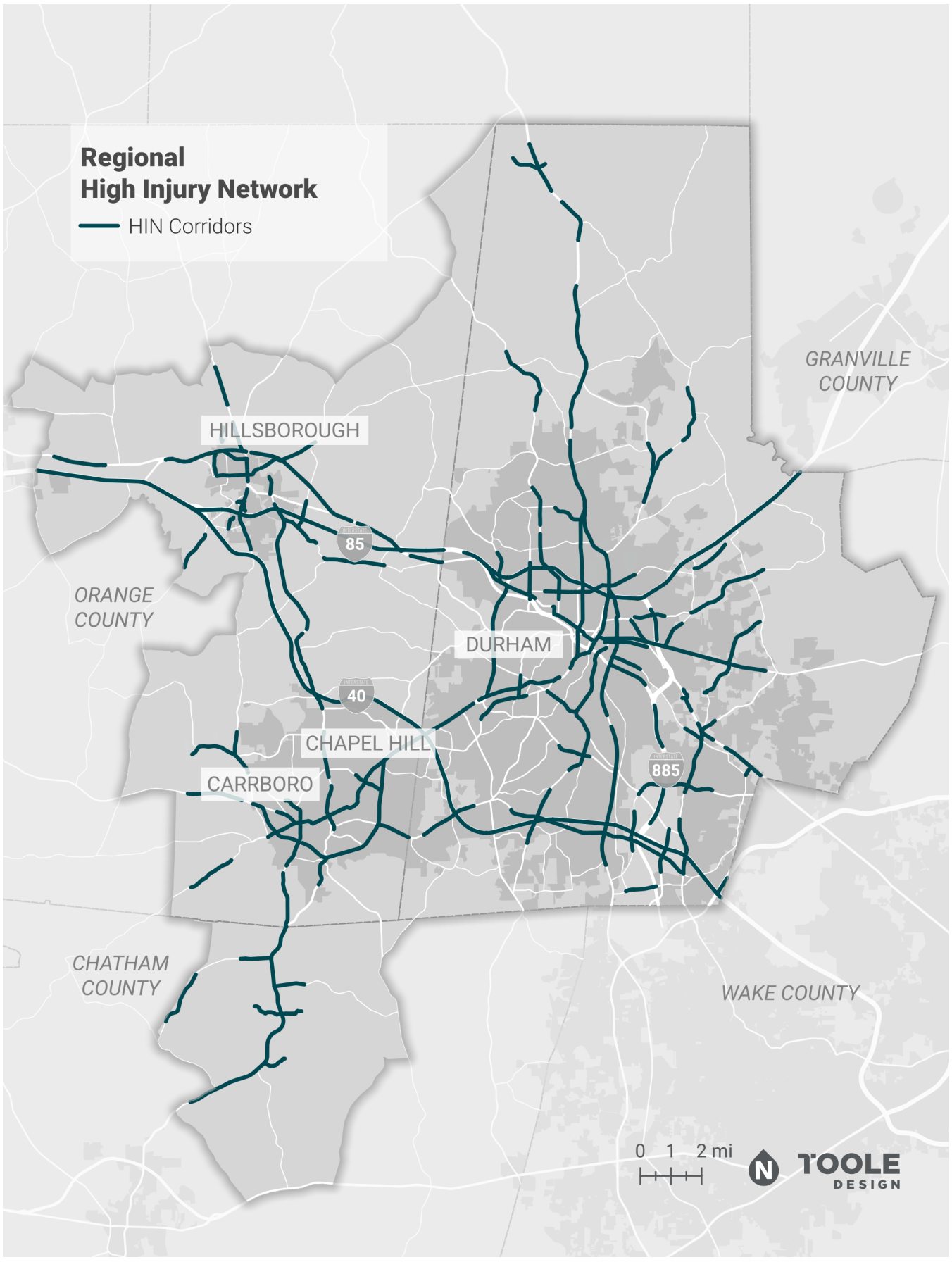
One way to go beyond the traditional hot-spot crash analysis is to identify a High Injury Network (HIN) map that focuses on segments of roadway network where the highest number of fatal and serious injury crashes occur. This provides a bigger-picture perspective on the roadways and intersections with the highest concentration of the worst crashes in the city over the past five years. This can be used to identify locations where it is appropriate to make changes to the roadway to prevent similar crashes from happening in the future.

The HIN represents 7.82% of total roadway miles across the Triangle West region, while also accounting for 63.5% of the total killed or serious injury crashes.

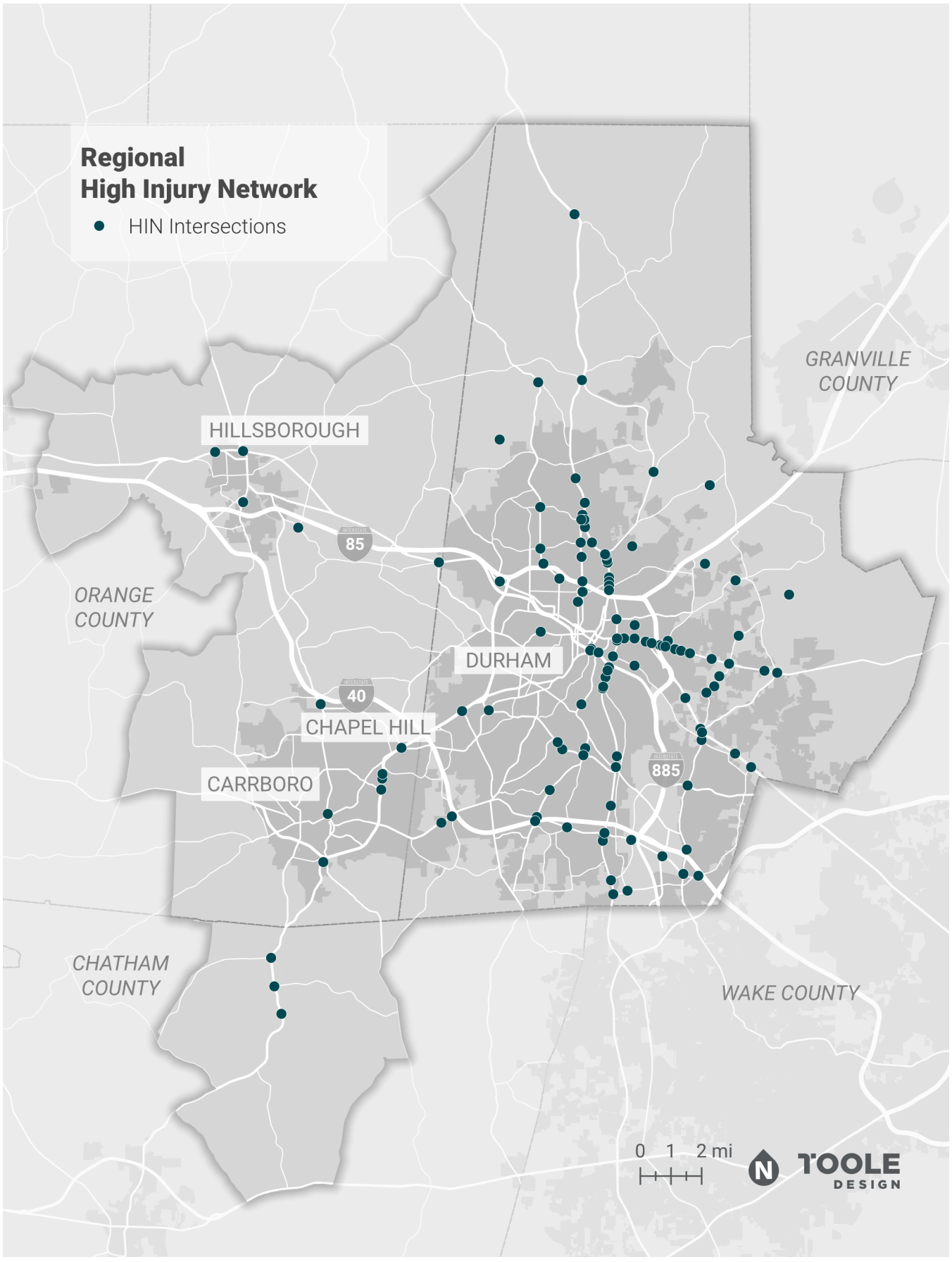
TABLE 1 High Injury Network (HIN) Roadway Miles and Crash Severity Distribution

	Hillsborough	Chapel Hill	Carrboro	Orange County	Chatham County	Durham County	Durham
HIN: Percent of Roadway Miles	16.12%	13.74%	13.52%	10.70%	11.72%	13.35%	10.02%
HIN: Percent of Killed or Serious Injury Crashes	100.0%	88.0%	100.0%	78.0%	94.0%	72.0%	74.0%

MAP 3 Regional High Injury Network Corridors Map



MAP 4 Regional High Injury Network Intersections Map



High Risk Network

The HIN effectively captures what has happened in the immediate past. The HIN was also analyzed to identify any common conditions that exist on roadway segments on the HIN – for example, the land use context, number of lanes, posted speed limit and other factors. The High Risk Network map (on the following page) identifies locations throughout the city where those same conditions exist and where it is reasonable to anticipate that serious crashes are likely to happen in the future.

The risk analysis accounts for three main pillars: Exposure, Likelihood, and Severity. The TWTPO risk analysis identifies:

- Areas where there is an expectation of higher exposure risk for all road users based on potential for conflict between road users.
- Roadways where there is an expectation of higher exposure risk for all road users based on number of vehicles
- Roadways where there is an expectation of higher severity risk based on speed
- Roadways where there is an expectation of increased likelihood of specific crash emphasis areas, independent of crash history, based on shared location characteristics.

This risk analysis can be used to identify systemic changes to the roadway network that need to be made whenever the opportunity presents itself, as well as elements of roadway design that should be avoided in the future.

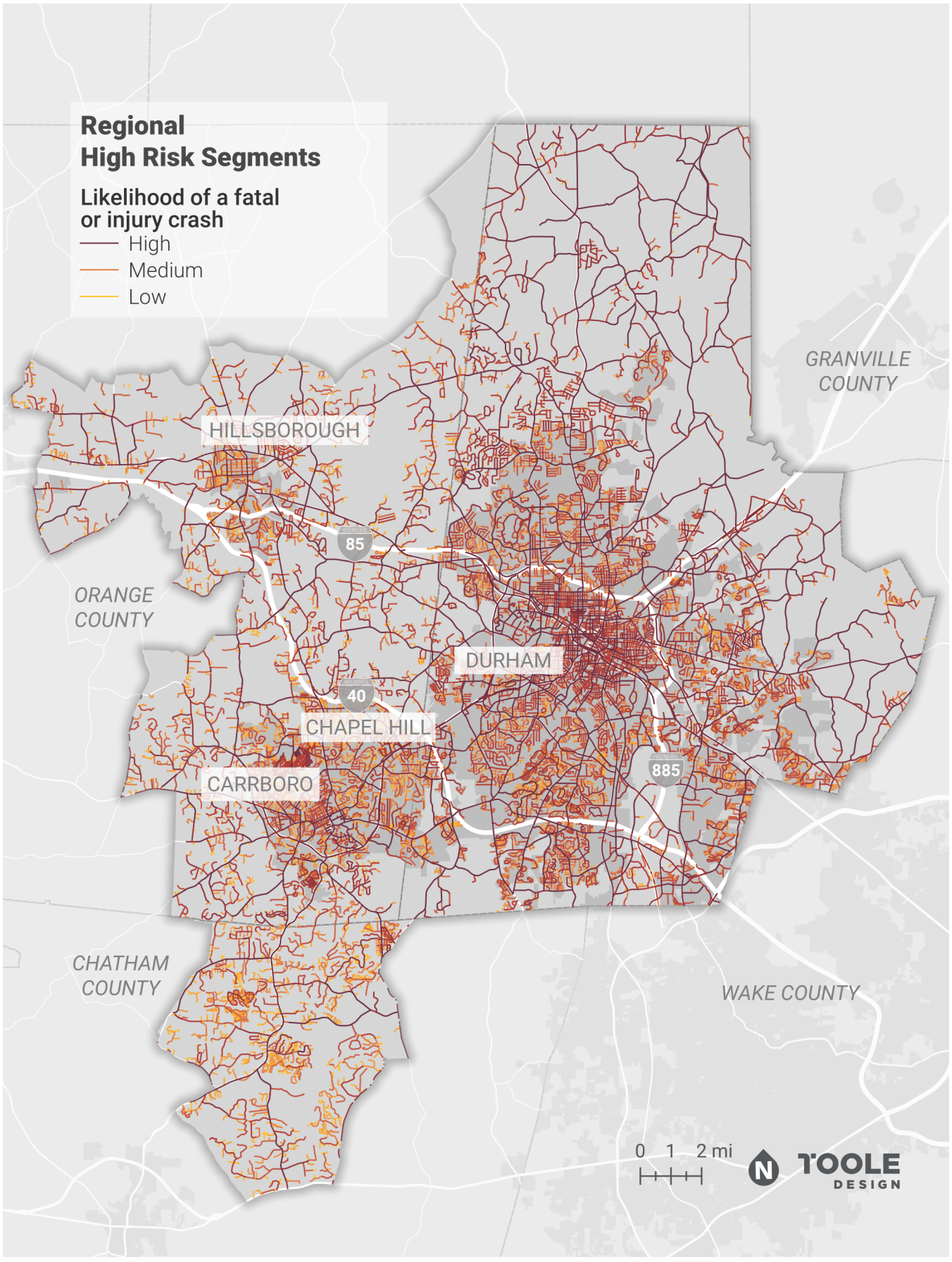
Three Pillars of Risk Analysis

Exposure - Reduce the interactions where potential collisions may occur

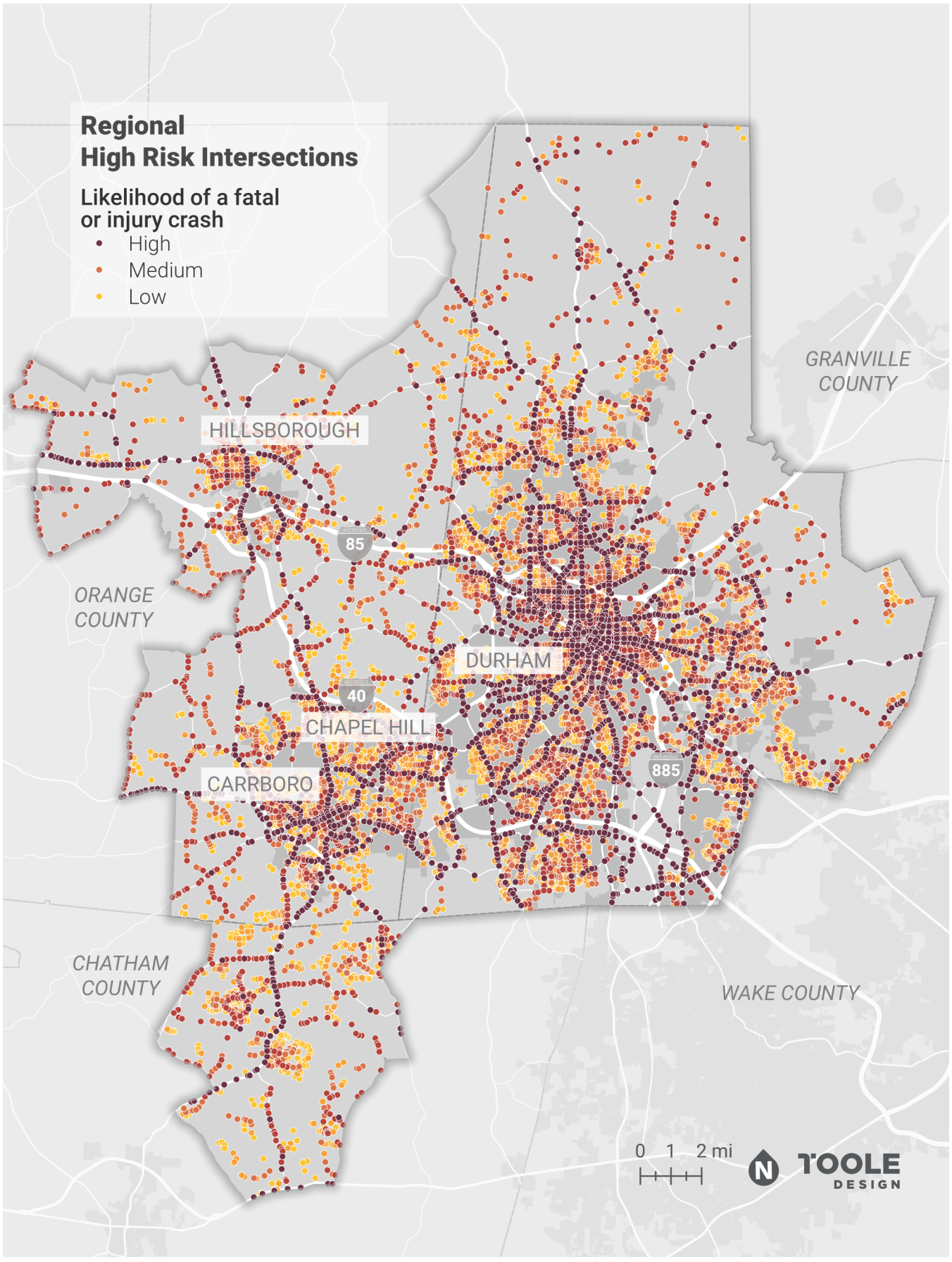
Risk/Likelihood – Reduce the likelihood of a collision occurring

Severity – Reduce the kinetic energy associated with collisions

MAP 5 Regional High Risk Network Segments Map



MAP 6 Regional High RiskbNetwork Intersections Map



Vulnerable Road Users

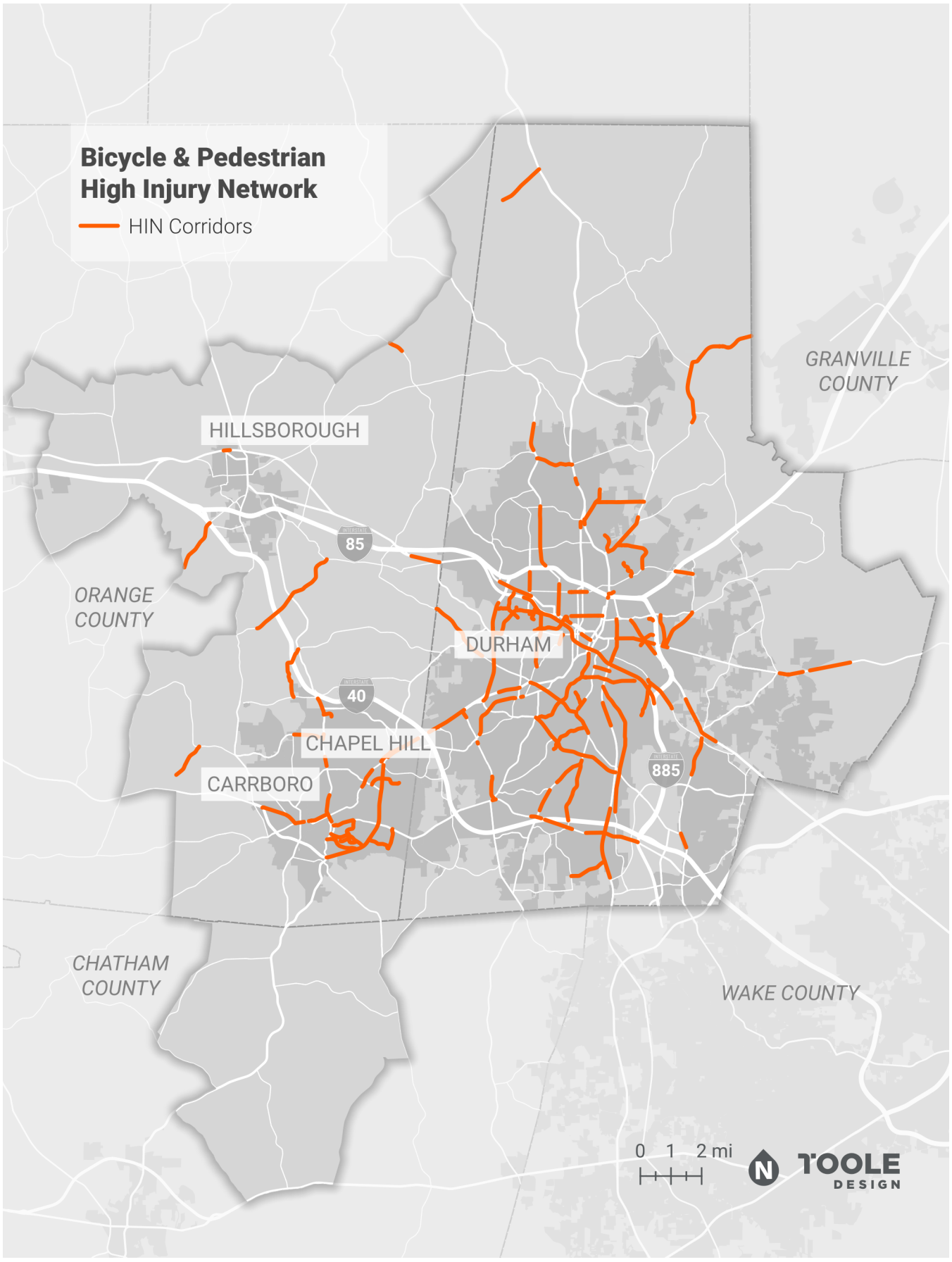
When a person walking or bicycling is struck by a vehicle, there is no bumper or airbag to protect them. When a crash occurs, these Vulnerable Road Users are more likely to be killed or seriously injured. Vehicle safety technology has seen significant advancements in recent decades, with airbags, anti-lock brakes, and lane-awareness sensors all working to protect a driver in a crash. Pedestrians and bicyclists, however, are unprotected and are especially vulnerable to the impact of a crash. A growing share of roadway fatalities across the United States are people traveling on foot or by bicycle.3 This disparity underscores the importance of prioritizing safety for vulnerable road users who are most impacted when a crash occurs.

Between the years 2017 and 2023, 80 people were killed while walking or bicycling, while 127 people walking or bicycling were involved in crashes that resulted in serious injuries in the Triangle West region.

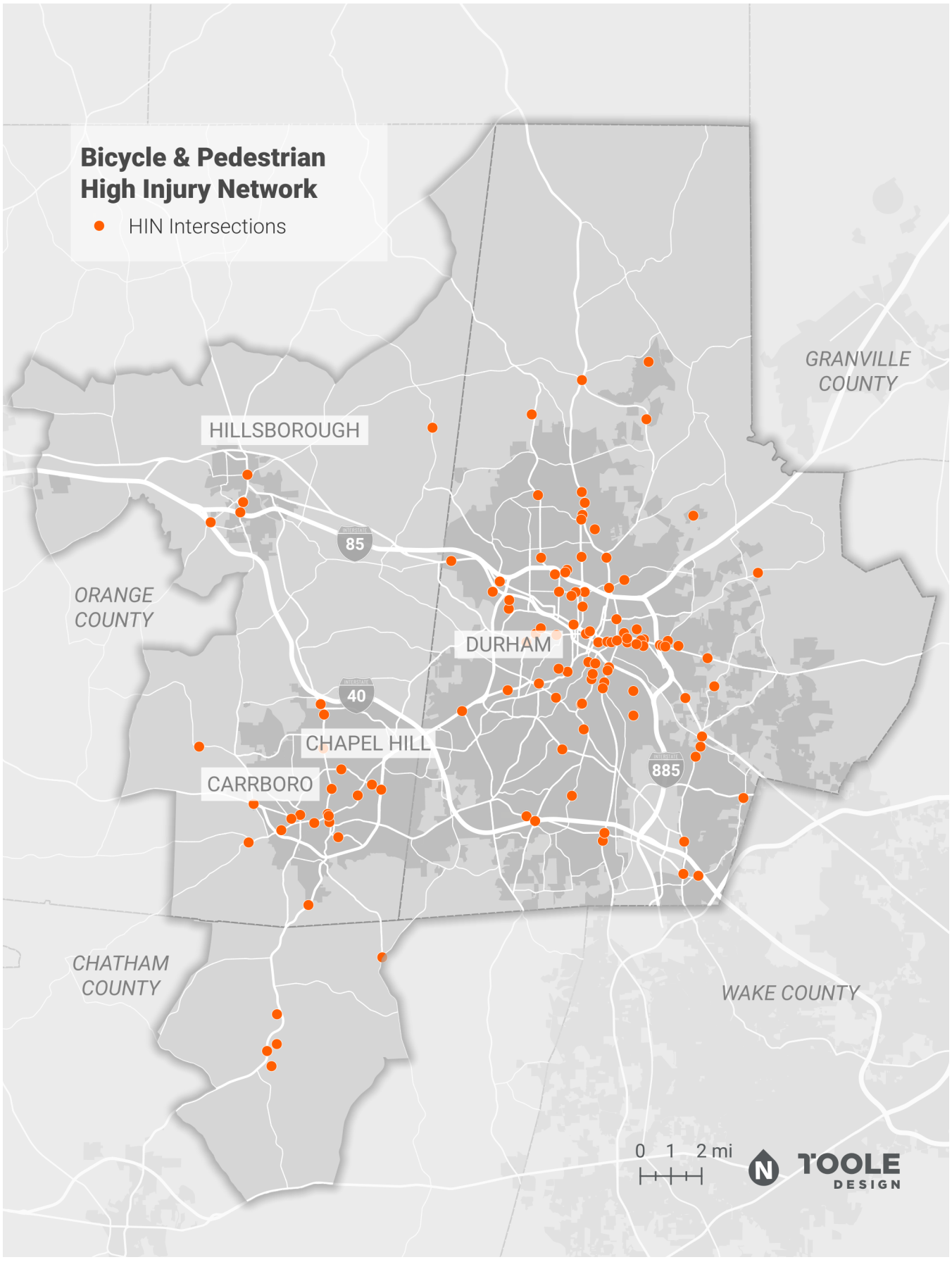
TABLE 2 Fatalities and Serious Injuries Among Vulnerable Road Users (2017-2023)

	People Riding Bicycles	People Walking
Total Fatalities	6	74
Total Serious Injuries	16	111

MAP 7 Bicycle & Pedestrian HIN Corridors Map



MAP 8 Bicycle & Pedestrian HIN Intersections Map



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03

Engagement and Input

Public and stakeholder engagement played a critical role in shaping the Triangle West TPO Vision Zero Plan, ensuring that the process reflected community needs, local priorities, and technical expertise. A variety of engagement activities were conducted to solicit feedback on roadway safety and ultimately inform the Plan, ranging from in-person events to online surveys.

Together, these engagement efforts helped shape a data-driven, community-informed plan that prioritizes safety, accessibility, and mobility for all users. The following sections provide a detailed summary of each engagement event or activity and key themes that emerged.

Technical Advisory Committee (TAC)

The Technical Advisory Committee (TAC) met three times during the development of the Safety Action Plan. The TAC brought together agency representatives, planners, and transportation professionals to discuss safety priorities, review data, and guide the plan development, ensuring alignment across regional and local stakeholders.

- **Meeting 1 (August 20, 2024):** Introduction of the Safe System Approach (SSA) and review of safety data, including the High-Injury Network (HIN), High-Risk Network (HRN), and equity analysis.
- **Meeting 2 (December 10, 2024):** Analysis of crash types, roadway contexts, and regional risk factors, including school zones and transit access gaps.
- **Meeting 3 (February 25, 2025):** Final plan recommendations, implementation strategies, on-going progress tracking, and opportunities to strengthen regional partnerships.

Insights gathered from these meetings helped refine the Triangle West Vision Zero Plan's strategies, funding priorities, and implementation roadmap, ensuring a coordinated approach to reducing serious injuries and fatalities in the region.

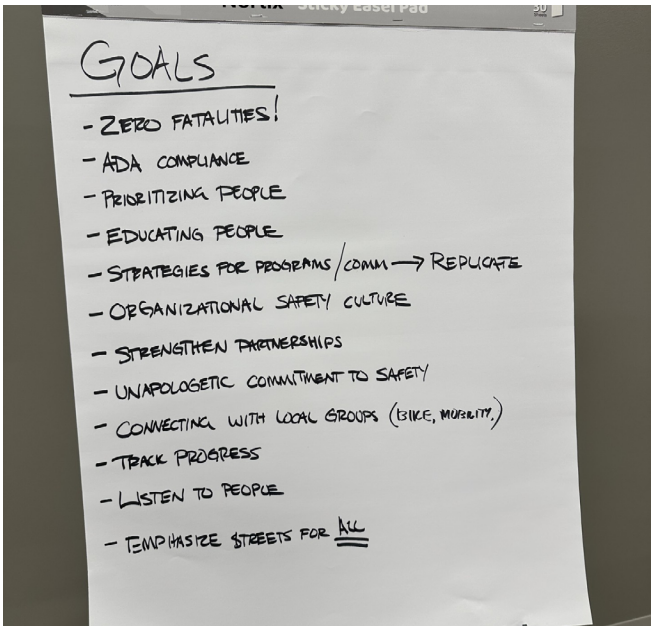


FIGURE 4 Collaborative Technical Adivisory Committee Meetings

Safety Summit

Public Engagement was kicked off in October 2024 with a half-day Safety Summit, which brought together transportation professionals, policymakers, and community organizations to discuss regional roadway safety. The event included breakout sessions focusing on community perceptions, equity considerations, technical solutions, and policy coordination to address safety challenges in the region.

Breakout Session Discussions:

- Community perceptions of roadway safety
- Infrastructure and technical solutions
- Policy coordination
- Equitable engagement
- Infrastructure funding

FIGURE 5 Pledge Wall

Open House

A November 2024 Open House, held at the Chapel Hill public library, was designed to gather real-life experiences and insights, with many attendees sharing personal stories about safety challenges, past crashes, and the loss of loved ones due to roadway incidents. These firsthand experiences provided valuable context to the data-driven findings, reinforcing the need for targeted safety interventions. The event featured interactive boards and hands-on activity stations for children and adults, as well as an opportunity for participants to provide additional feedback through an online survey.

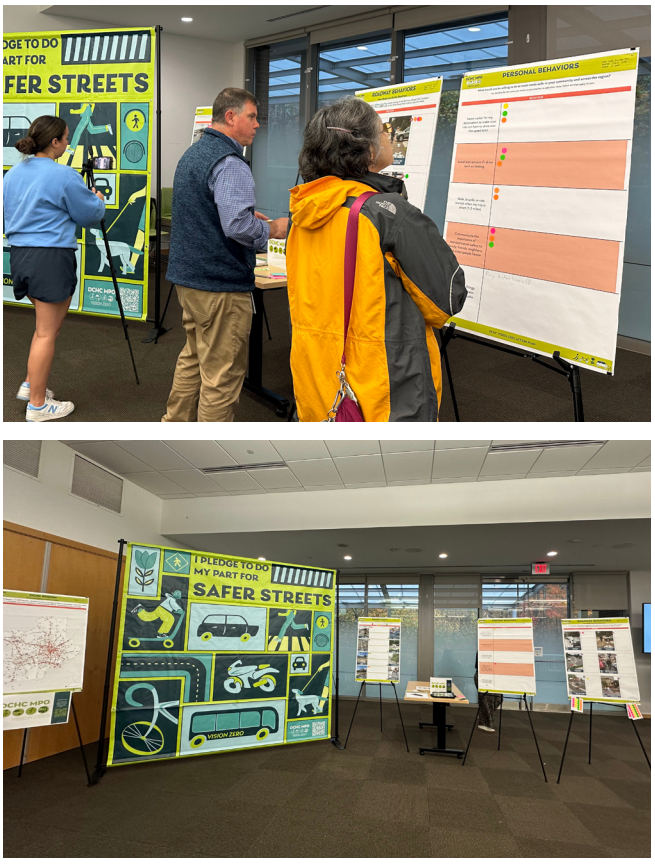


FIGURE 6 Interactive Boards at Open House Event

Local Events

Agency staff members participated in several local events where they presented plan updates, shared information at tabling events, and gathered input from municipal and county representatives, advocacy groups, and other regional partners. These events allowed for direct discussions between local leaders and stakeholders about transportation needs and priorities.

- September 30, 2024: Durham Vision Zero/Safe Streets Strategies Workshop at Durham Armory
- October 13, 2024: Move-A-Bull City at Durham Central Park
- October 30, 2024: Safetoberfest at UNC Campus
- November 17, 2024: Durham World Day of Remembrance at POOF Teen Center in Durham

FIGURE 8 Local Events: Move-A-Bull City (top) & Safetoberfest (bottom)

Online Survey and Interactive Webmap

To ensure broad public participation beyond in-person events, an online survey was created and made available from October 2024 to March 2025. The survey provided an opportunity for the public to share insights on safety challenges, helping to identify high-risk corridors and key concerns for pedestrians and bicyclists.

A total of 89 surveys were submitted, with participants contributing 145 location-specific comments, identifying areas where they felt unsafe or had experienced roadway safety issues.

Survey Highlights:

- Missing and poor sidewalks
- Insufficient bikeways
- Dangerous intersections
- Speeding vehicles
- Aggressive and distracted drivers

Online Survey Highlights

Survey: Oct '24 - Mar '25

89 Responses

145 Location-specific Comments

Interactive Webmap:

The interactive mapping responses revealed specific corridors and intersections in Durham, Chapel Hill, and Carrboro where pedestrian and bicyclist safety are a community concern. Factors such as lane widths, traffic volume, and proximity of transit stops to schools and employment centers were commonly cited as contributing to high-risk conditions.

FIGURE 9 Interactive Survey Webmap

04

Focus Areas and Priority Projects

Increasing safety on the transportation system in the region must prioritize addressing locations where history or likelihood of fatal and serious injury crashes exists. Deploying countermeasures systemically along with addressing concerns on high injury corridors and intersections will focus the region as projects are planned, designed, and deployed.

Proven Safety Countermeasures

There are many tools and resources that can improve transportation safety for all users. As an industry best practice, the FHWA Proven Safety Countermeasures initiative (PCSi) is a collection of countermeasures that have been proven to decrease serious injuries and fatalities on roadways throughout the country. FHWA has created an online tool that recommends potential countermeasures based on roadway characteristics such as its land use context, expected volumes, crash history, and more to help communities across the country improve roadway safety.

Addressing safety in the Triangle West region will require using a variety of these proven safety countermeasures across the transportation network, starting with the High Injury Network. The right countermeasure (or mix of countermeasures) will vary based on the existing roadway conditions, safety issues, and the community's vision for how it should be serving their transportation and access needs into the future, which may be different than how it functions today.

Selection and design of safety countermeasures on every street project in the region should be decided through the lens of the Safe System Approach, so that if a crash occurs it will not result in a fatal or serious injury. Safety countermeasures should not be compromised or simplified during the design or construction phases.

The safety countermeasures listed below include hyperlinks to provide a more detailed description and an overview of each countermeasure's effectiveness of improving safety:

Speed Management

Appropriate Speed Limits for All Road Users

Variable Speed Limits

Pedestrian/Bicyclist

Bicycle Lanes

Crosswalk Visibility Enhancements

Leading Pedestrian Interval

Medians & Pedestrian Refuge Islands

Pedestrian Hybrid Beacons

Rectangular Rapid Flashing Beacond

Road Diets (Roadway Reconfiguration)

Walkways

Roadway Departure

Enhanced Delineation for Horizontal Curves

Median Barriers

Longitudinal Rumble Strips and Stripes on Two-Lane Roads

Roadside Design Improvements at Curves

SafetyEdge

Wider Edge Lines

Intersections

Backplates with Retroreflective Borders

Corridor Access Management

Dedicated Left & Right-Turn Lanes at Intersections

Yellow Change Intervals

Reduced Left-Turn Conflict Intersections

Systemic Application of Multiple Low-Cost Countermeasure at Controlled Intersections

Roundabouts

Crosscutting

Local Road Safety Plans

Pavement Friction Management

Road Safety Audit

Proactive Systemic Safety Countermeasures

Safety countermeasures can be installed proactively and integrated into existing or planned roadway projects through quick builds, resurfacing or maintenance work, or full reconstruction, especially on the High Injury Network. The following list highlights several safety countermeasures that are recommended to improve safety in the Triangle West region: Many of these interventions can be implemented with low-cost treatments such as paint and flexible delineators. Bolt-in roundabouts may also be used to retrofit existing intersections, bringing critical safety interventions to the High Injury Network rapidly and affordably.

Eliminate excess roadway widths that contribute to higher speeds, repurposing the space with medians, dedicated transit lanes, bicycle lanes, landscaping, etc.

Install roundabouts instead of new signals or four-way stops and convert two-way stops and appropriate signalized intersections to roundabouts.

Reduce the crossing distance and spacing between crossings based on land use context and transit stop locations.

Provide appropriate dedicated bicycle facilities on roadways with posted speeds greater than 25mph or with vehicle volumes greater than approximately 3,000 vehicles per day.

Implement leading pedestrian intervals at signalized intersections, specifically on High Injury Network and high-risk locations.

Install pedestrian-scale lighting along the High Injury Network, especially at arterial crossings.

Implement no right turns on red in dense urban contexts and along the High Injury Network and high-volume pedestrian routes.

Adjust signal timing and signage for speed limits on arterials.

Set target speeds based on the Safe System Approach, including context sensitive design.

Implement raised medians or comparable devices to prohibit across-roadway movements such as turns for midblock driveways, particularly for multi-lane roadways and where there are high pedestrian and bicyclist volumes.

Road diets can also be implemented as a part of regular resurfacing projects or through targeted restriping projects. FHWA notes that road diets are feasible on roadways with four or more lanes and daily volumes of 25,000 or less.[1] Excess roadway width is correlated with speeding and safety risks; reducing excess width creates safer streets. Removing space purely allocated for high-speed vehicle travel will increase space for other modes and create opportunities for roadway enhancements such as medians, improving the experience for all users.

Proactive and systemic safety countermeasures should be considered for installation on the HIN first and then as part of other street projects with similar conditions where crashes could occur, and eventually in a more widespread fashion, as budget and staff resources allow.

1 FHWA. Road Diet Informational Guide (2014)

Prioritization Criteria

The development of prioritization criteria was The development of prioritization criteria was based on the results of safety analyses and an understanding of the Safe System Approach. The list of possible projects that results from the prioritization process should highlight corridors that have experienced high numbers and density of fatal and serious injury crashes, as well as opportunities to address risk characteristics to increase safety. This Plan uses the following prioritization criteria to identify both corridors and intersections that are suitable for project development by implementing agencies across the Triangle West TPO region.

Severity – Reduce the kinetic energy associated with collisions

Projects that reduce the kinetic energy of collisions will be prioritized. Crashes that occur at higher speeds and at more severe angles are more likely to result in a fatality or serious injury. The most effective proven safety countermeasures are effective because they can either 1) reduce the speed at which a potential collision occurs or, 2) reduce the angle (i.e., sideswipes instead of head on or angle crashes) at which crashes occur.

Exposure - Reduce the interactions where potential collisions may occur

Reducing exposure to collisions is another method of reducing severe crashes. This can take many forms, but a simple example may be the presence of bicycle and pedestrian traffic generators near major traffic thoroughfares. Priority is given to corridors that have higher daily motor vehicle volumes and is context specific, meaning that exposure may be higher in urban areas along streets with daily volumes greater than 15,000 due to multimodal conditions and density of intersections as compared with a rural roadway.

Risk/Likelihood – Reduce the likelihood of a collision occurring

Proactive projects that prevent a collision from occurring should be prioritized. The Action Plan may include projects that remove or reduce potential conflicts that tend to result in more severe outcomes. Priority is given to corridors and intersections identified in the High Injury Network, Risk Networks, or the High Injury Intersections.

Priority Projects

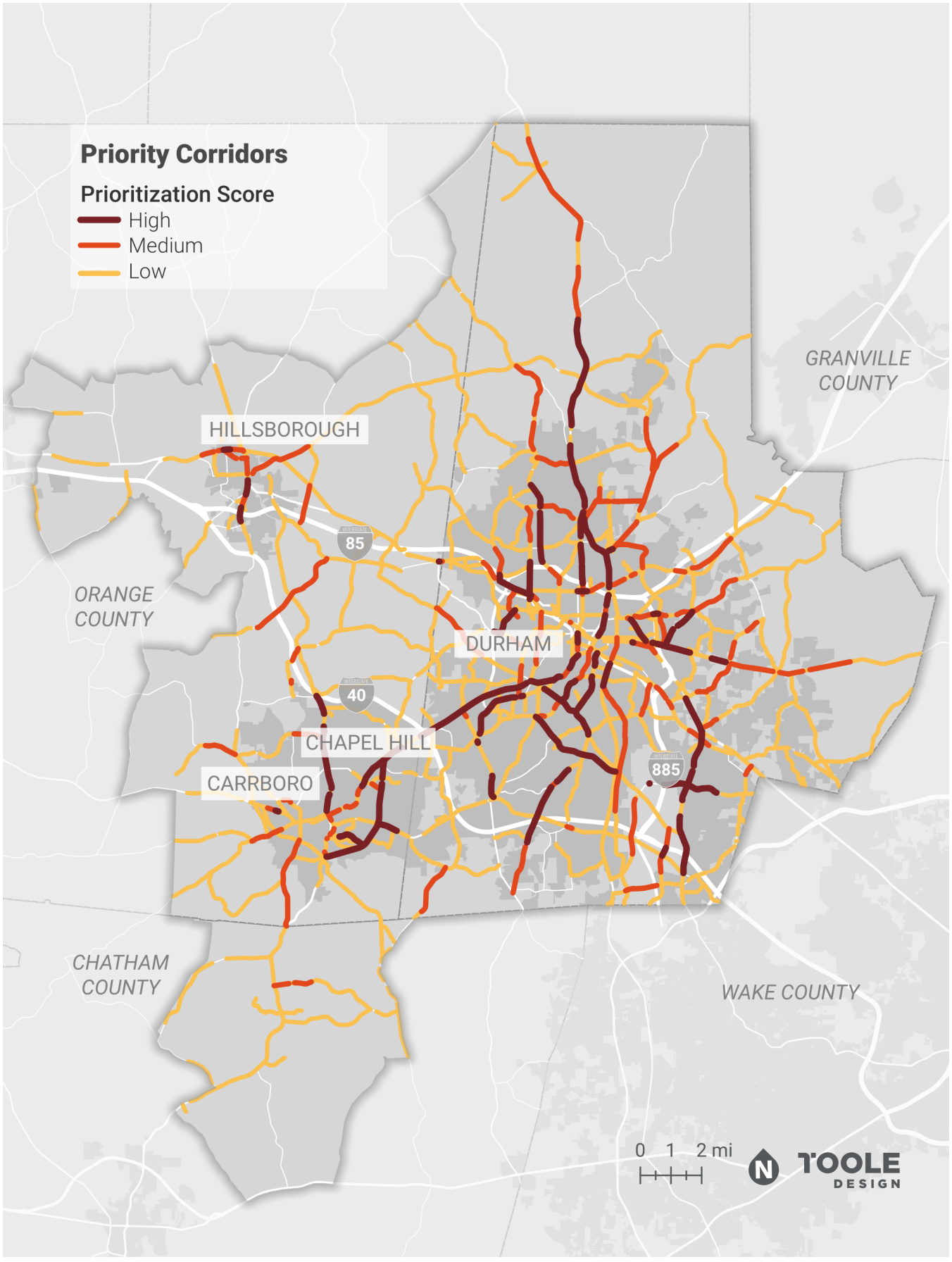
The following shows priority corridors and intersections across the region based on the criteria described above. Priority corridors and intersections for local agencies are displayed in map packages in Appendix XX.

Regional Priority Corridors

TABLE 3 Regional Priority Corridors Overview

Corridors	Municipality	County
NC-86 / Martin Luther King Jr Blvd	Chapel Hill	ORANGE
US-70 BUS/ Hillsborough Rd	Durham	DURHAM
US-15 Fordham Blvd	Chapel Hill	ORANGE
US-15 Business/N Roxboro St at I-85 Interchange	Durham	DURHAM
US-15 Business/N Roxboro St	Durham	DURHAM
US-15 BUS/ Durham Chapel Hill Blvd	Durham	DURHAM
US-501 N Duke St	Durham	DURHAM
US-70 S Miami Blvd	Durham	DURHAM
SR-1158 S Cornwallis Rd	Durham	DURHAM
SR-1321 Hillandale Rd	Durham	DURHAM
SR-1010 E Franklin St	Chapel Hill	ORANGE
SR-1118 Fayetteville Rd	Durham	DURHAM
University Dr	Durham	DURHAM
Martin Luther King Jr Blvd	Durham	DURHAM

MAP 9 Regional Priority Corridors

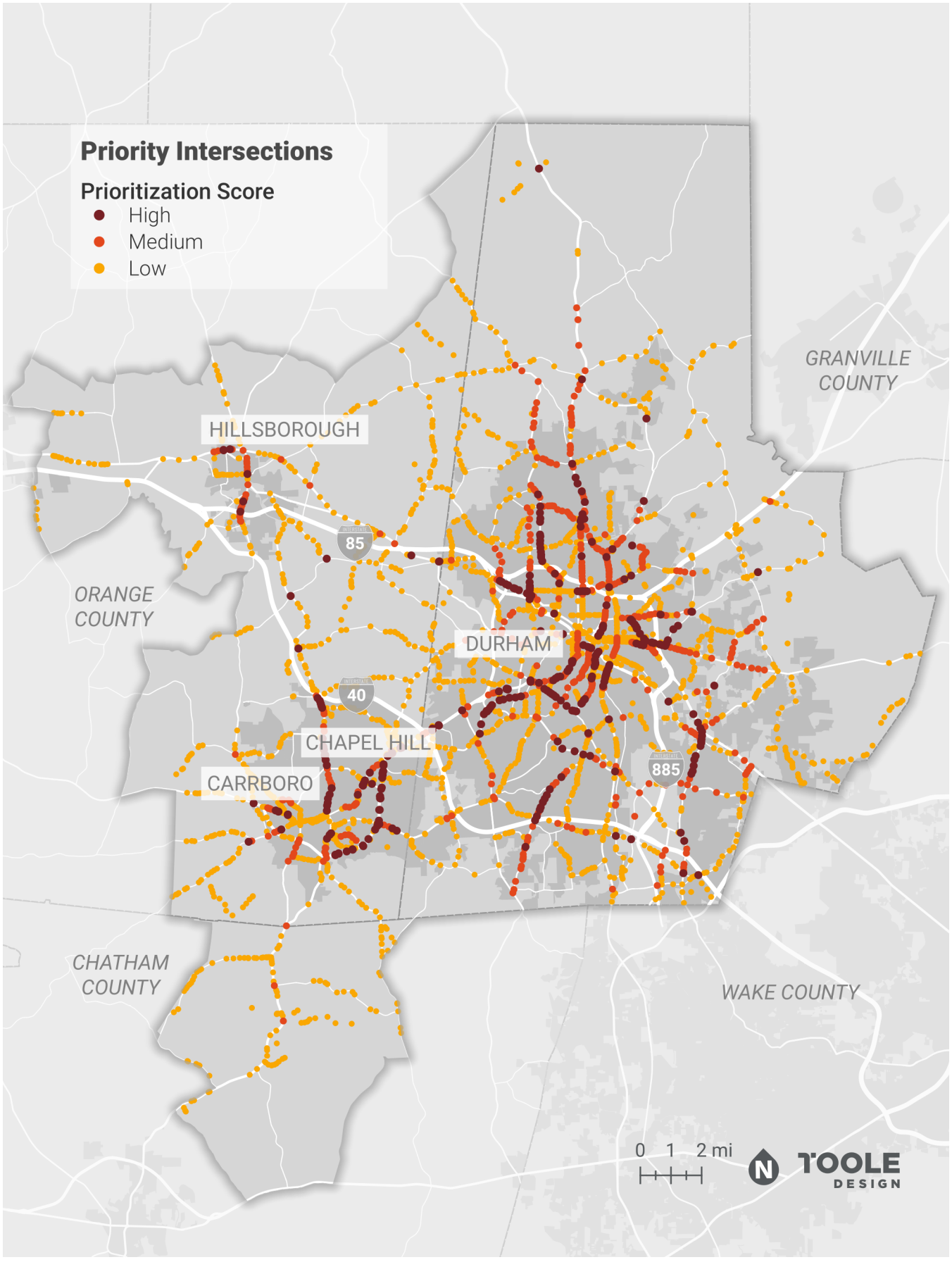


Regional Priority Intersections

TABLE 4 Regional Priority Intersections Overview

Corridors	Municipality	County
NC-86 at Central Park Ln	Chapel Hill	ORANGE
Hillandale Rd (SR-1321) at W Wilson St	Durham	
Timber Hollow Ct at NC-86	Chapel Hill	ORANGE
Manning Dr at Woodbine Dr	Chapel Hill	ORANGE
NC-86 at North St	Chapel Hill	ORANGE
NC-86 at Piney Mountain Rd	Chapel Hill	ORANGE
Hillandale Rd (SR-1321) at Sprunt Ave	Durham	
NC-55 at Mint St	Durham	
US-15 at Fordham Blvd	Chapel Hill	ORANGE
SR-1118 at Woodcroft Pkwy	Durham	
US-15 at Europa Dr	Chapel Hill	ORANGE
NC-55 at Dayton St	Durham	
US-15 at Fordham Blvd	Chapel Hill	ORANGE
US-70 BUS at Hillandale Rd Hillsborough Rd Ramp	Durham	
SR-1321 at W Club Blvd	Durham	
US-15 at SR-1741	Chapel Hill	ORANGE

MAP 10 Regional Priority Intersections



05

Strategies and Actions

The ultimate goal of the Triangle West TPO Vision Zero Plan—to Save Lives of people across the region—requires changing not only what we do but also how we plan, design, and operate the system that people use for daily trips. The Safe System Approach is the foundation for this change that elevates human life above everything else. Analyses in this Plan highlight important safety projects that can respond to locations where higher numbers and densities of fatal and serious injury crashes have occurred—displayed in the HIN and HII. Additionally, roadway characteristics were reviewed to understand where to address safety risk leading to projects, policies, and programs that can be proactive in addressing the safety of the transportation network.

To develop comprehensive solutions—both reactive and proactive—for the transportation safety challenges that exist across the Triangle West TPO region, the strategies and actions should focus on the principles and elements of the Safe System Approach:

Principles

- Death and Serious Injuries are Unacceptable

- Humans Make Mistakes

- Humans Are Vulnerable

- Responsibility is Shared

- Safety is Proactive

- Redundancy is Crucial

Elements

- Safe Road Users

- Safe Vehicles

- Safe Speeds

- Safe Roads

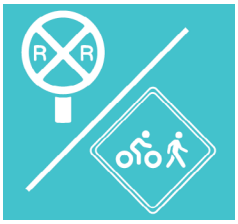
- Post-Crash Care

Safety Action Strategies

Triangle West TPO's Vision Zero Plan is a guide to increasing roadway safety. With a clear goal of eliminating fatal and serious injury crashes, supporting strategies provide support for operational changes that impact how roadway safety can be increased in a variety of ways—from project selection to roadway restriping, to resource development.

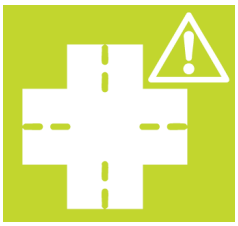
Action items are organized into the following strategy categories. Each strategy category is based on results of analysis, input from stakeholders and the public, along with best practices for addressing roadway safety. The intent of developing categories is to support the TPO and people across the region as they identify opportunities to increase safety. Safety Action Strategies

Roadway Safety Resources and Guidance



Trail and Railroad Crossings

Walking and Biking in Urban/Downtown Contexts



Unsafe Intersections

Multimodal Safety Along Multilane Arterials

Behavior and Distraction

Rural High-Speed Corridors

Land Development Practices and Procedures

Safer Routes to Schools

Vulnerable Road Users (VRUs) at Night

Traffic Calming On Local Streets

How to Use the Action Items Tables

A. Strategy Category

Strategies are overarching changes that may be operational, contextual, or mode-specific to systematically address the factors that lead to fatal and serious injury crashes and promote a culture of safety.

B. Action Items

Each action item is a discrete, specific effort that can be advanced by the TPO, member agencies, supporting agencies, or NCDOT.

C. Systemic Actions

Items followed by an asterisk represent systemic safety countermeasures that can be installed on the HIN or proactively across the region where similar conditions exist for crashes to potentially occur.

D. Timeframe

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

Timeframes include:

- Immediate: Within 1 year;
- Short-term: 1-5 years; or
- Mid-term: 5-10 years.

E. General Cost

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

- $ - low (less than $250k)
- $$ - medium (between $250k-$1M)
- $$$ - high ($1M and above)

F. Action Leaders and Partners

Each action item may have several agencies that can take the lead. These agencies along with agencies/organizations that can provide support are noted. This is not an exhaustive list, and each action may create opportunities for partnerships in each community and across the region.

A

Walking and Biking in Urban/Downtown Contexts

B

Increasing safety for people walking and biking—the most vulnerable road users—is paramount for municipalities across the region. As the downtowns in the City of Durham, and Towns of Chapel Hill, Carrboro, and Hillsborough continue to increase in density and attract more people, roadway safety is critical. The following actions identify opportunities to prioritize pedestrian and bicyclist mobility in the core of these communities that experience high volumes of daily trips.

TABLE 4 Walking and Biking in Urban/Downtown Contexts: Actions & Implem

E

Action	D Timeframe	Cost	Action Leaders and Partners F
Install No Turn on Red signs at all signalized intersections*	Immediate	$	NCDOT
Install Leading Pedestrian Intervals (LPIs) on auto recall at all signalized intersections*	Short	$	NCDOT, Municipalities
Construct curb extensions (interim solutions or concrete curbing) to daylight mid-block and intersection crossings along with formalizing parking/loading locations*	Short	$$$	NCDOT, Municipalities

C

Although the TWTPO is not an implementing agency, there are numerous resources that can support roadway safety across the region. Additionally, member agencies are consistently developing new policies and programs that can be useful to other communities. These actions identify opportunities to create resources that can be hosted by the TPO and shared among its members.

TABLE 5 Roadway Safety Resources and Guidance: Actions & Implementation

Action	Timeframe	Cost	Action Leaders and Partners
Create and adopt a regional Complete Streets Design Guide as a resource for the region	Short	$	Municipalities, NCDOT
Convene a standing Transportation Safety Committee or Vision Zero Task Force to review crash and safety audit reports, coordinate efforts between jurisdictions, and track progress toward Vision Zero goals	Immediate	$	TPO, Municipalities, NCDOT
Develop a region-wide safety campaign to share information with the community about traffic safety for all modes	Short	$	Municipalities, TPO
Develop an annual program budget to support the TWTPO region's Vision Zero Program	Short	$$	TPO
Ensure that asset management and maintenance programs reflect Vision Zero priorities.	Immediate	$	Municipalities, NCDOT
Publish annual reports for measuring progress with Vision Zero implementation, including crash data and other safety metrics for transparency and accountability.	Immediate	$	TPO, Municipalities
Adopt a Vision Zero Quick Build/Interim Design Policy that identifies interim design solutions with proven safety countermeasures that can be installed for safety projects while the more permanent solution is in the design and pre-construction processes.	Short	$	TPO, Municipalities
Develop and adopt a regional framework for developing annual safety targets that are focused on aggressively reducing fatal and serious injury crashes in the TWTPO region.	Immediate	$	TPO
Develop a region-specific traffic calming guide that identifies best practices and applications for specific design elements.	Short	$	TPO, Municipalities NCDOT

Walking and Biking in Urban/Downtown Contexts

Increasing safety for people walking and biking—the most vulnerable road users—is paramount for municipalities across the region. As the downtowns in the City of Durham, and Towns of Chapel Hill, Carrboro, and Hillsborough continue to increase in density and attract more people, roadway safety is critical. The following actions identify opportunities to prioritize pedestrian and bicyclist mobility in the core of these communities that experience high volumes of daily trips.

TABLE 6 Walking and Biking in Urban/Downtown Contexts: Actions & Implementation

Action	Timeframe	Cost	Action Leaders and Partners
Install No Turn on Red signs at all signalized intersections*	Immediate	$	NCDOT
Install Leading Pedestrian Intervals (LPIs) on auto recall at all signalized intersections*	Short	$	NCDOT, Municipalities
Construct curb extensions (interim solutions or concrete curbing) to daylight mid-block and intersection crossings along with formalizing parking/loading locations*	Short	$$$	NCDOT, Municipalities
Deploy protected left turn signal phases (removing permissive left turns during active pedestrian crossing phases) in downtown areas and along high-volume pedestrian and bicycle corridors*	Short	$$	NCDOT, Municipalities
Create a sidewalk gap program to fill short segments outside of the private development or CIP processes*	Short	$$$	Municipalities
Host Complete Streets design trainings/workshops for local government staff, elected officials, NCDOT project managers, consultants, etc.	Immediate	$	TPO, Municipalities, NCDOT
Consider rest in red phase for downtown signals in off-peak, late night, or early morning periods*	Short	$	NCDOT, Municipalities
Deploy hardened centerlines and turn wedges for motor vehicle turning movements at intersections*	Short	$	Municipalities

Multimodal Safety Along Multilane Arterials

Similar to many communities, roadway safety is a key concern along corridors where people are walking, bicycling, using transit, and driving in conditions with high motor vehicle volumes and numerous travel lanes. Safety action items for these corridors must elevate the Safe System principles and framework to ensure that users are separated wherever possible, and design emphasizes slower speeds where conflicts occur. The following actions not specific actions that can impact project development and policy decisions along with encouraging additional evaluation and study to understand key characteristics that impact local safety on multimodal multilane arterials.

TABLE 7 Multimodal Safety Along Multilane Arterials: Actions & Implementation

Action	Timeframe	Cost	Action Leaders and Partners
Construct separated pedestrian and bicycle facilities- detached sidewalks, sidepaths, separated bike lanes.	Short	$$$	NCDOT, Municipalities
Install speed limit feedback signage	Short	$	NCDOT, Municipalities
Set/reduce speed limits for multilane arterials based upon context[1]	Immediate	$	NCDOT, Municipalities
Conduct regular Road Safety Audits on high-risk arterials	Immediate	$	TPO, NCDOT, Municipalities
Remove permissive left turns during active pedestrian phases at intersections starting with intersections that include trail crossings and adjacent to transit stops.	Short	$$	NCDOT, Municipalities
Develop corridor studies for HIN corridors, including crash types, speeds, multimodal facilities, crossings, and lighting/ visibility	Mid	$$	TPO, NCDOT, Municipalities
Develop a region-specific traffic calming guide that identifies best practices and applications for specific design elements.	Short	$$	NCDOT, Municipalities

1 https://safety.fhwa.dot.gov/provencountermeasures/appropriate-speed-limits.cfm

Rural High-Speed Corridors

The TWTPO Vision Zero Plan recognizes that roadway safety and context must be considered together to eliminate fatal and serious injury crashes. In the rural context, roadway design should consider how lane departures on high-speed corridors can be mitigated along high injury corridors as well as deploy proactive countermeasures to increase roadway safety. The list below includes specific actions related to curvature and speeds while also noting the need for thoughtful intersection control/design and trail crossing enhancements.

TABLE 8 Rural High-Speed Corridors: Actions & Implementation

Action	Timeframe	Cost	Action Leaders and Partners
Install enhanced delineation for horizontal curves for corridors along the HIN or HRN*	Immediate	$	NCDOT, Municipalities
Install wider edge lines on high-speed rural roadways*	Mid	$$	NCDOT
Create a policy, procedure, and multi-agency team to conduct a Road Safety Audit for rural corridors along the HIN and in response to future KSI crashes.	Immediate	$	TPO, Municipalities, Counties
Review speed limits on the rural HIN, evaluate the speed limit change process, and explore rural corridors for design and signal improvements and speed limit reduction	Short	$	NCDOT, Municipalities, Counties
Consider a roundabout-first policy to address speeds and dangerous intersections along rural high-speed corridors	Immediate	$	TPO, NCDOT, Municipalities, Counties
Install high visibility and enhanced trail crossings (i.e., high visibility crossings, RRFBs, PHBs, raised crossings, neck downs, etc.) along rural corridors*	Short	$$	NCDOT, Municipalities
Create and adopt an intersection control/design selection policy.	Immediate	$	TPO, Municipalities

Safe Routes to School

Increasing safety for students is an opportunity to protect one of the most vulnerable populations in each community and provide opportunities to educate children about mobility in the built environment. These actions are focused on changing infrastructure at and approaching schools to create safer and more intuitive infrastructure for all roadway users.

TABLE 9 Safe Routes to School: Actions & Implementation

Action	Timeframe	Cost	Action Leaders and Partners
Install high visibility crosswalks within a one-mile travelshed of all schools*	Immediate	$	School Districts, Municipalities
Construct curb extensions and median refuge islands for street crossings within a half mile of all schools*	Short	$$	NCDOT, Municipalities, School Districts
Install separated bikeway facilities--separated bike lanes or shared use paths--along corridors that are within a half mile of schools*	Short	$$	NCDOT, Municipalities, School Districts
Install speed feedback signage along with RRFBs/PHBs for mid-block crossings within a half mile of all schools*	Short	$$	NCDOT, Municipalities, School Districts
Provide raised crosswalks at mid-block crossings and at intersections used for walking and bicycling to/from schools	Mid	$$$	NCDOT, Municipalities, School Districts
Conduct targeted/automated enforcement of handheld device bans, distracted driving, yielding, and speeding within school zones	Short	$	Law enforcement
Implement a comprehensive crossing guard program	Short	$$	NCDOT, Municipalities
Develop resident/ambassador program to support local SRTS programs (i.e., counts, safety audits, infrastructure project review, etc.)	Immediate	$	School Districts, Municipalities, SRTS
Create a walking and bicycling school bus leader guide and program development information.	Immediate	$	School Districts, Municipalities, SRTS
Create a traffic playground pop-up toolkit that can be used at local events to teach walking and bicycling in a playful manner.	Immediate	$	County health department, School Districts, Municipalities, SRTS, TPO
Identify locations for permanent traffic playgrounds and asphalt art locations that can support education and speed management.	Short	$$	County health department, School Districts, Municipalities, SRTS, TPO
Adopt a Safe Routes to School Action Plan	Short	$	Municipalities

Traffic Calming on Local Streets

Reducing speed on local streets creates safer and more livable places for residents in communities across the region. Traffic calming actions emphasize changing streets to allow for shared spaces for a variety of users that are comfortable because of slower moving vehicles along streets and intersections.

TABLE 10 Traffic Calming on Local Streets: Actions & Implementation

Action	Timeframe	Cost	Action Leaders and Partners
Implement road diets/lane removals to provide space for walking, bicycling, transit, green space, and/or on-street parking*	Short	$$$	NCDOT, Municipalities
Develop a neighborhood slow streets program	Immediate	$	Municipalities
Create a neighborhood traffic calming program to manage community traffic safety requests in a transparent, consistent, and equitable manner.	Short	$	Municipalities
Deploy mini traffic circles, speed cushions, chicanes, neck downs, hardened centerlines, and curb extensions on residential streets to reduce vehicle speeds and cut through traffic	Short	$$	Municipalities
Install a network of bicycle boulevards/neighborhood slow streets to expand existing bicycle networks and reduce motor vehicle speeds.	Mid	$$	Municipalities
Narrow travel lane widths along local streets at the corridor level or at strategic locations*	Short	$$	Municipalities

Trail and Railroad Crossings

Similar to unsafe intersection, trail and railroad crossings impact the experience of roadway users and can present barriers to accessing key destinations. These actions identify opportunities to change crossing locations that prioritize trail users and coordinate the railroad companies to create strategic plans for future changes.

TABLE 11 Trail and Railroad Crossings: Actions & Implementation

Action	Timeframe	Cost	Action Leaders and Partners
Daylight intersections (removing obstacles that impair sight lines) for all trail and railroad crossings*	Short	$$	NCDOT, Municipalities
Construct grade separated crossings for trails at streets with posted speeds of greater than 45 mph*	Mid	$$$	NCDOT, Municipalities
Install crossings arms and enhanced warning devices at all uncontrolled railroad crossings*	Mid	$$$	NCDOT, NCRR, Other rail partners
Install lighting at all mid-block trail crossings*	Short	$$	NCDOT, Municipalities
Install RRFBs or PHBs for trail crossings on high-speed corridors until grade separated crossing is constructed*	Short	$$	NCDOT, Municipalities
Coordinate with Railroad companies to create a strategic plan to address crossing locations	Mid	$	Municipalities, Railroad Companies

Unsafe Intersections

Intersections are inherently locations where multimodal conflicts exist due to the confluence of people walking, bicycling, using transit, and driving. As all these street users make decisions at an intersection, these actions provide guidance on how to reduce conflicts and exposure while creating more intuitive design that prioritizes more vulnerable users.

TABLE 12 Unsafe Intersections: Actions & Implementation

Action	Timeframe	Cost	Action Leaders and Partners
Implement Systemic Safety Improvements at highest risk rural intersections annually*	Short	$$	NCDOT
Implement daylighting at urban high risk and mid-block intersections with on street parking and near transit stops*	Short	$$	NCDOT, Municipalities
Add pedestrian countdown signals and Leading Pedestrian Intervals (LPIs) at high risk signalized intersections and adjacent to transit stops*	Immediate	$$	NCDOT, Municipalities
Study the implementation of automated enforcement for red light running in school zones	Short	$	TPO, NCDOT, Municipalities, School District
Remove permissive left turns during active pedestrian phases*	Short	$	NCDOT, Municipalities
Tighten turning radii to reduce turning speeds and include truck aprons on freight routes*	Mid	$$$	NCDOT, Municipalities
Consider a roundabout-first policy to address speeds and dangerous intersections along the HIN and high-risk corridors	Immediate	$	NCDOT, Municipalities Counties, TPO
Close slip lanes where applicable, starting with the HIN	Mid	$$$	NCDOT, Municipalities
Deploy protected intersections for pedestrians and bicyclists along multilane arterials, transit corridors, and where bikeways exist or are planned.	Mid	$$$	NCDOT, Municipalities
Use intersection control/design selection process to determine appropriate intersection treatments.	Short	$	Municipalities

Behavior and Distraction

Addressing behavior of roadway users is one part of increasing safety and aligns with the Safe Road User element of the Safe System Approach. These actions should be used alongside other actions that make physical changes to streets.

TABLE 13 Behavior and Distraction: Actions & Implementation

Action	Timeframe	Cost	Action Leaders and Partners
Establish county-metrics for seatbelt and car seat public education campaigns	Short	$	TPO, Law enforcement, NCDOT
Conduct High Visibility Enforcement for seatbelts and impaired driving	Short	$	Law enforcement
Promote and implement safe driving and anti-distraction messaging and policies.	Short	$	TPO, Law enforcement, NCDOT
Host community conversations about roadway safety.	Short	$	TPO, Local governments, Trauma-Centers, Local advocacy groups
Develop program for emergency responders to tell their stories about roadway safety that can be shared with communities to emphasize the impact fatal and serious injury crashes have on people.	Short	$	TPO, Trauma-Centers, Law enforcement,Local advocacy groups

Land Development Practices and Procedures

The Safe System Approach is grounded in the reality that increasing safety will require making changes to the system and not only individual parts. Land use impacts on the transportation network are important and the policies and plans that guide development are an opportunity making transportation safety changes.

TABLE 14 Land Development Practices and Procedures: Actions & Implementation

Action	Timeframe	Cost	Action Leaders and Partners
Deploy access management strategies to combine driveways to adjacent properties, provide cross-access between developments, and construct medians to reduce conflicts near driveways and intersections	Mid	$$	Municipalities
Incorporate into TPO Federal Funding Policy a regional Project Evaluation Framework to exclude undivided multi-lane highways from regional funding priorities. Every multilane road must have median (preferred) and/or turn lane (at a minimum).	Short	$$	TPO, NCDOT
Develop guidance and coordinate with external stakeholders to ensure that access for people walking, bicycling, and using transit is maintained during roadway or site construction and special events	Immediate	$$	Municipalities
Integrate the HIN into project and development reviews	Immediate	$	TPO, NCDOT, Municipalities
Update, adopt, and implement land use, Transportation Demand Management (TDM), and street design policies that increase safety, reduce Vehicle Miles Travelled (VMT), and decrease dependence on single-occupancy vehicle (SOV) trips	Short	$	TPO, CPRC, Municipalities
Review and update land use policies and development standards to prioritize the safety of all road users (e.g., block size, crosswalk spacing, access management)	Immediate	$$$	Municipalities
Update local and regional plans and policies to be inclusive of all modes and ensure safety as a primary priority. Plans include comprehensive plans, land use plans, mode specific plans, etc.	Immediate	$	LGAs

Vulnerable Road Users at Night

Roadway safety should not be dependent on the time of day or the transportation mode of the person taking the trip. Across the TWTPO region, there are opportunities to make changes that will increase visibility and reduce exposure for people walking and bicycling, no matter the trip purpose—commuting to/from work for a night shift, leaving a local evening event, or exercising early in the morning.

TABLE 15 Vulnerable Road Users at Night: Actions & Implementation

Action	Timeframe	Cost	Action Leaders and Partners
Install street lighting along high frequency transit corridors, specifically at transit stops and crossings	Mid	$$$	NCDOT, Municipalities
Deploy high visibility crosswalks*	Immediate	$	NCDOT, Municipalities
Install RRFBs or PHBs to catch attention of drivers, specifically at night*	Short	$$	NCDOT, Municipalities
Narrow lane widths to support traffic calming and reduce crossing distances for pedestrians and bicyclists.	Mid	$$	NCDOT, Municipalities
Conduct night-time Road Safety Audits along key high-risk roadways and for fatal or serious injury crashes that involve a VRU at night.	Immediate	$	TPO, NCDOT, Municipalities
Install pedestrian-scale lighting strategically along the HIN and high-risk roadways, especially at trail crossings and transit stops, to improve visibility to drivers*	Mid	$$$	NCDOT, Municipalities

06

Metrics and Accountability

The Triangle West TPO Vision Zero Plan is a commitment along with an initial set of goals and actions to achieve zero fatal and serious injurie crashes on roadways across the region by 2050. However, Vision Zero must be more than a document; it must be embraced, discussed, emphasized, reinforced, and acted upon every day. This Plan must be a living document that unites people across agencies, departments, organizations, and the region to prioritize roadway safety.

Performance Metrics

There must be accountability at a variety of levels for eliminating fatalities and serious injuries crashes. TWTPO will need to monitor and report the progress and impact of Plan actions related to safety strategies. Evaluation and regular reporting are essential in understanding whether actions, tactics, and approaches are working. If certain actions are not successful, not moving fast enough, or not working for another reason, the TWTPO should assess and modify actions as needed. However, it is critical that monitoring does not reduce or minimize the focus on the ultimate performance measure of eliminating fatal and serious injuries on all roadways in the Triangle West region.

Measuring progress and success can be accomplished in a variety of ways—frequent tracking, data dashboards, local agency reports. Routine updates to performance metrics when new projects are funded, designed, and implemented highlight changes and mark milestone efforts related to increasing roadway safety. While the items that can be measured can change over time, key performance metrics may include but are not limited to:

- Number and rates of fatal and serious injury crashes
- Changes in number and rates of fatal and serious injury crashes over time
- Crashes along the HIN and changes in crash rates over time
- Crashes involving bicycles and pedestrians
- Crashes resulting from unsafe speeds
- Crashes on NCDOT roadways versus local roadways
- Crashes occurring on roadways in communities where a high number of indicators of potential disadvantage exist

Target Setting Framework

Moving toward Zero

Target setting for the TWTPO should emphasize the ultimate goal – eliminating fatal and serious injuries across the region. Using the performance metrics, the following is a framework for setting annual targets and five-year milestones. Each element of the framework includes context (local or NCDOT), crashes by mode, along with goals for annual and milestone changes. Aiming to meet or exceed each of these annual goals will ensure TWTPO and member agencies are successful in achieving the goal of eliminating fatal and serious injuries.

Fatal Crashes

TABLE 17 Annual and Five-Year Target Framework for Fatal Crashes

Context	Type	1-Year Target				5-Year Milestone			
		Number		Rate		Number		Rate	
		Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural
NCDOT									
	PEDESTRIAN								
	BICYCLIST								
	MOTORIST								
	SUBTOTAL								
LOCAL									
	PEDESTRIAN								
	BICYCLIST								
	MOTORIST								
	SUBTOTAL								
TOTALS									

Serious Injury Crashes

TABLE 16 Annual and Five-Year Target Framework for Sevior Injury Crashes

Context	Type	1-Year Target				5-Year Milestone			
		Number		Rate		Number		Rate	
		Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural
NCDOT									
	PEDESTRIAN								
	BICYCLIST								
	MOTORIST								
	SUBTOTAL								
LOCAL									
	PEDESTRIAN								
	BICYCLIST								
	MOTORIST								
	SUBTOTAL								
TOTALS									

Annual Report

In addition to tracking performance measures, TWTPO should produce an annual report to summarize accomplishments and communicate planned next steps toward eliminating fatal and serious injury crashes. A true commitment to the Safe System Approach does not mean that results are immediate; however, annual reporting is a valuable tool to keep roadway safety at the forefront until the goal of zero is accomplished. Some metrics will be reported annually while others will be updated as resources allow depending on the complexity of the data. Other topics and metrics to consider for annual reporting include:

- Efforts to impact factors that increase the likelihood of fatal and serious injury crashes such as speed, visibility, driving under the influence, or education, among others.
- Funding associated with safety projects across the region
- Funding invested in infrastructure improvements in Disadvantaged Communities as a percentage of all transportation projects.
- Changes in land use policies or practices to increase safe connections between residential areas and employment locations.
- Projects completed (including corridor or spot treatments)
- Locations and number of street segment and intersection improvements made on the High Injury Network.
- Locations and number of off-street segment improvements (sidewalks, multi-use paths, bike trails) made adjacent to the High Injury Network.
- Changes in KSI crashes after projects and have been completed
- Proven Safety Countermeasures deployed

Sharing Responsibility for Vision Zero

To carry out everything presented in this Vision Zero Plan and to eliminate fatalities and serious injury crashes on all roadways across the Triangle West region, everyone—from elected officials and municipal staff to local employers and residents of all ages and abilities— will need to consider the actions they can take, individually and collectively. The TWTPO, NCDOT, and member agencies all have key roles in building a safer transportation system in the region.

- TWTPO: Develop resources, identify and secure project funding, provide technical support
- NCDOT: Safer project development, funding resources, partnerships, clear guidance for safety projects
- Member Agencies: Adopt safety-focused plans and policies, initiate safety programs, prioritize safety projects, take action (both responding to crashes and deploying proactive countermeasures)

We all have a personal responsibility to make the right choices and to communicate the importance of why roadway safety matters—making the region's efforts even more effective. The goal of zero is not simple, but it is important because everyone deserves to arrive home safely.