BMTS

SAFETY ACTION PLAN

BMTS | Binghamton Metropolitan Transportation Study

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List of Abbreviations

Abbreviation Used	Term Defined
AADT	Annual Average Daily Traffic
ADA	Americans with Disabilities Act of 1990
BCA	Benefit-Cost Analysis
BCR	Benefit-Cost Ratio
BMTS	Binghamton Metropolitan Transportation Study
CIP	Capital Improvement Program
CLEAR	Crash Location & Engineering Analysis Repository (NYSDOT Crash Database)
CMF	Crash Modification Factor
CY	Cubic Yards
EA	Each (per element)
EMS	Emergency Medical Services
FHWA	Federal Highway Administration
HAWK	High-Intensity Activated Crosswalk (Overhead Pedestrian Signal with Red Indication)
HIC	High Injury Corridors
HII	High Injury Intersections
HIN	High Injury Network (HIC & HII)
HRN	High Risk Network
K	Fatal Crash
KABC	All Injury Crashes – Fatal (K), Serious (A), Minor (B), and Possible (C)
KSI	Fatal (K) or Serious Injury (SI) Crash
LED	Light-Emitting Diode
LF	Linear Feet
LOSS	Level of Service of Safety
LPI	Leading Pedestrian Interval
LS	Ladder Style (High-Visibility Crosswalk)
Mph	Miles per Hour
MUT	Median U-Turn (Type of Reduced Left Turn Conflict Intersection)
NOFO	Notice of Funding Opportunity
NYSDOT	New York State Department of Transportation
PSCi	Proven Safety Countermeasures Initiative (FHWA)
RCUT	Restricted Crossing U-Turn (Type of Reduced Left Turn Conflict Intersection)
RLTCI	Reduced Left Turn Conflict Intersection
SHSP	Strategic Highway Safety Plan
SI	Serious Injury (Incapacitating) Crash
SS4A	Safe Streets and Roads for All (USDOT Discretionary Grant Program)
PSC	Project Steering Committee
PHB	Pedestrian Hybrid Beacon (Also Known As a “HAWK” Signal)
RRFB	Rectangular Rapid Flashing Beacon
TIP	Transportation Improvement Program
USDOT	United States Department of Transportation
VPD	Vehicles per Day
VRU	Vulnerable Road User (Person Walking, Biking, or Using Assistive Mobility Device)

Introduction

Leveraging a Safe System approach, extensive data-driven crash analysis, potential implementation pathways enabled through the federal Safe Streets and Roads for All (SS4A) program, and input from the public and key stakeholders, this BMTS Safety Action Plan prioritizes safety actions and investments in pursuit of Vision Zero – the elimination of roadway-related fatalities and serious injuries – across Broome and Tioga Counties.

Consistent with Vision Zero best practice, this plan centers around the most severe crash outcomes – collisions in which a community member is Killed (K) or Seriously Injured (A/SI) – and pairs that focus with practical, implementable recommendations, including a prioritized list of capital projects, a suite of systemic countermeasures tailored to dominant crash patterns ("emphasis areas"), a menu of policy and program strategies, and an accountability framework for tracking progress over time.

Plan at a Glance

Vision

Eliminate roadway deaths and serious injuries (Vision Zero) across Broome and Tioga Counties.

Approach

Pair public input with crash, equity, and systemic risk analysis to target the greatest safety needs, and position local communities to access federal funding to address those needs.

Outputs

County-specific crash analyses, High Injury and High Risk Networks, 32 prioritized capital projects, systemic countermeasures for common emphasis areas, and policy and program strategies.

Plan Purpose

The intent of this plan is to position individual communities throughout Broome and Tioga Counties (e.g., Town of Vestal, City of Binghamton, Village of Waverly) to secure additional federal funding to support the implementation of safety improvement projects, strategies, and programs via a U.S. Department of Transportation (USDOT) SS4A discretionary grant award. Developing this plan serves as step one of the overall process, with the SS4A program offering two pathways to further federal funding.

1. Planning and Demonstration – can fund Supplemental Planning and Demonstration projects in areas where a Safety Action Plan is already underway, including Road Safety Audits
2. Implementation – intended to help communities with an Action Plan advance their recommendations by providing grant funding for "project-level planning, design and development activities for projects and strategies identified"[1]

Beyond the federal SS4A program, this data-driven approach to assessing roadway safety needs, locations of concern, and emphasis areas will support the identification of safety funding priorities and capital projects to be advanced within the context of other federal and non-federal programming discussions, competitive grant programs, and project solicitations.

In addition to identifying areas of need, this plan aims to elevate the role that safety plays in the development, prioritization, delivery, and operation of federally-funded transportation investments and planning processes across Broome-Tioga.

1. Though the Implementation program is primarily oriented towards the construction of infrastructure (e.g., delivering projects, purchasing related equipment, procuring emerging technology) it also allows for select operational (e.g., signal re-timing) and behavioral (e.g., education campaigns) approaches when they relate to improving safety.

SS4A Overview

The SS4A program was established via the 2021 Bipartisan Infrastructure Law to fundamentally reshape the way local jurisdictions and regional planning agencies approach roadway safety. Capitalized at $5 billion between 2022 and 2026, the program aims to transition US transportation systems towards a Safe System approach – moving from an emphasis on managing user behavior and reducing all crashes towards accommodating human error and targeting safety-related investments to the most severe and consequential crash events (i.e. those that result in fatalities and serious injuries).

Local jurisdictions in both Broome and Tioga Counties are already eligible to seek supplemental Planning and Demonstration grant funding. These "pre-implementation" funds can be used to trial potential approaches ahead of a larger roll-out (e.g., quick-build or pilot projects), conduct detailed engineering studies to determine the applicability of a proposed approach (e.g., Road Safety Audit, signal warrant analysis), or undertake more programmatic efforts (e.g., educational campaigns).

Once the Safety Action Plan has been submitted to the Federal Highway Administration (FHWA), local jurisdictions (e.g., Village of Endicott) and / or the plan sponsor (e.g., BMTS) can then apply for additional funding via the Implementation program. This final phase of the program is geared towards delivering safety-related projects, considers design an eligible expense, and even allows for "Safety Strategies Identified in Other Plans" (i.e., items not explicitly identified within this Safety Action Plan) to be submitted for SS4A funding under certain conditions. [2]

2. As noted on the SS4A Implementation website under "Safety Strategies Identified in Other Plans," applicants with an existing Action Plan who are eligible to apply to the Implementation program are allowed to submit projects and strategies identified in other reports (i.e., not this Safety Action Plan) for consideration under SS4A so long as the "projects and strategies [proposed for future funding] meet all of the following criteria: are within the jurisdiction covered by the Action Plan, are identified at a high level or are consistent with safety recommendations from the Action Plan; address an identified roadway safety problem; and provide safety benefits."

Safe System Summary

This Safety Action Plan is built upon the Safe System approach adopted within USDOT's National Roadway Strategy. The six principles of the Safe System are outlined below. A summary comparison between this emerging approach and traditional American notions of roadway safety is shown in the graphic on the next page. By leveraging each of the five elements of the Safe System, roadway designers and system managers can bolster the existing system with additional, redundant layers of protection to prevent future road-related deaths and serious injuries. Please refer to FHWA's Zero Deaths Resources page for further information on the Safe System and Vision Zero.

SAFE SYSTEM PRINCIPLES

Death/Serious Injury is Unacceptable

While no crashes are desirable, the Safe System approach prioritizes crashes that result in death and serious injuries, since no one should experience either when using the transportation system.

Humans Make Mistakes

People will inevitably make mistakes that can lead to crashes, but the transportation system can be designed and operated to accommodate human mistakes and injury tolerances and avoid death and serious injuries.

Humans Are Vulnerable

People have limits for tolerating crash forces before death and serious injury occurs; therefore, it is critical to design and operate a transportation system that is human-centric and accommodates human vulnerabilities.

Responsibility is Shared

All stakeholders (transportation system users and managers, vehicle manufacturers, etc.) must ensure that crashes don't lead to fatal or serious injuries.

Safety is Proactive

Proactive tools should be used to identify and mitigate latent risks in the transportation system, rather than waiting for crashes to occur and reacting afterwards.

Redundancy is Crucial

Reducing risks requires that all parts of the transportation system are strengthened, so that if one part fails, the other parts still protect people.

Source: Safe System Brochure, FHWA

Safe System Innovations Relative to Traditional Approach to Road Safety

TRADITIONAL APPROACH		VISION ZERO
Traffic Deaths are **INEVITABLE**		Traffic Deaths are **PREVENTABLE**
PERFECT human Behavior	VS	Integrate **HUMAN FAILING** in approach
Prevent **COLLISIONS**		Prevent **FATALATIES AND SEVERE CRASHES**
INDIVIDUAL responsibility		**SYSTEMS** approach
Saving lives is **EXPENSIVE**		Saving lives is **INEXPENSIVE**

Source: Vision Zero Network

SAFE SYSTEM ELEMENTS

Making a commitment to zero deaths means addressing every aspect of crash risks through the five elements of a Safe System, shown below. These layers of protection and shared responsibility promote a holistic approach to safety across the entire transportation system. The key focus of the Safe System approach is to reduce death and serious injuries through design that accommodates human mistakes and injury tolerances.

Safe Road Users

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

Safe Vehicles

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

Safe Speeds

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

Safe Roads

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

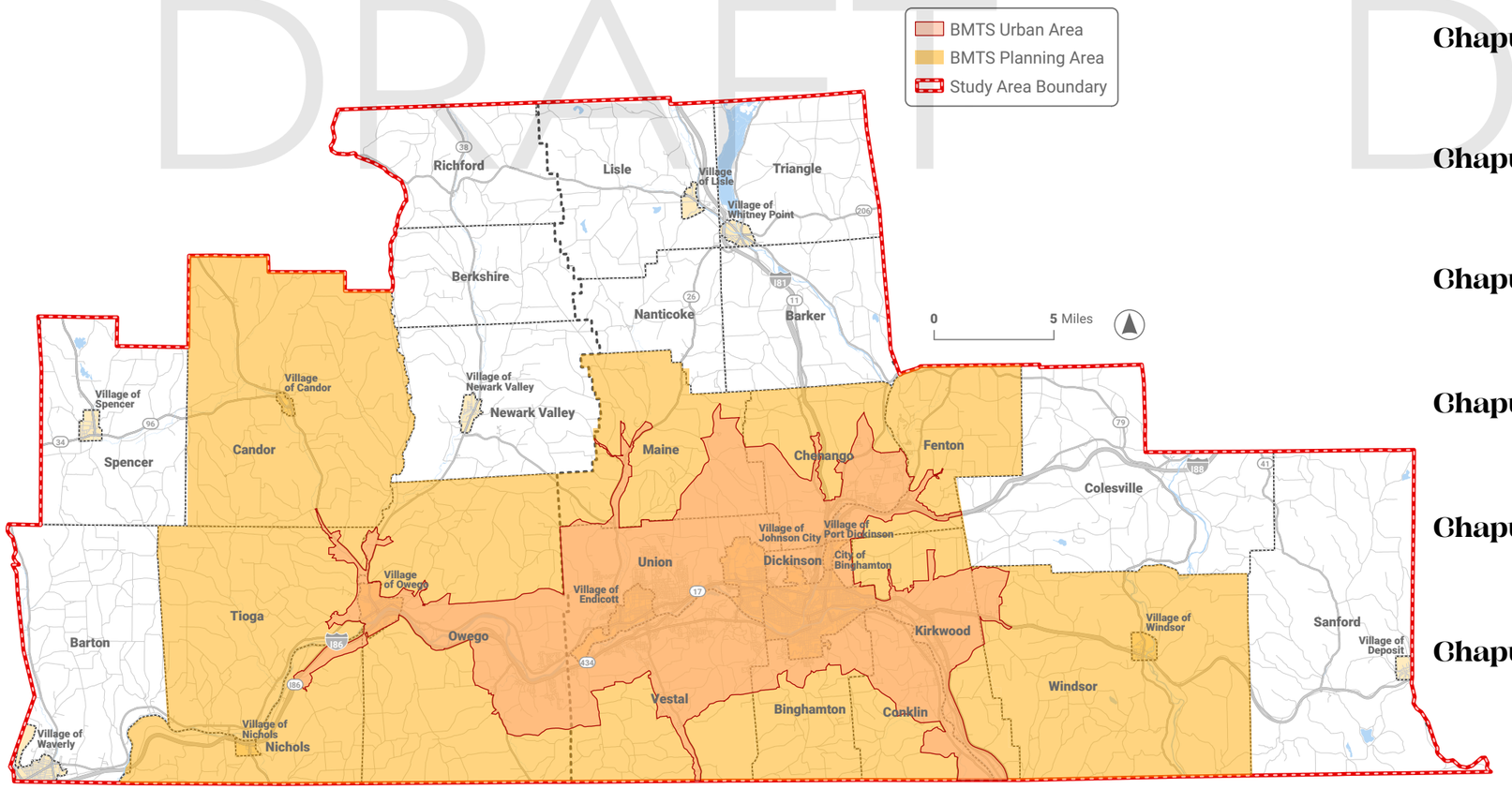
Post-Crash Care

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

Source: Safe System Brochure, FHWA

Study Area Extents

Since roadway safety is a topic that is not limited to jurisdictional bounds, the study area for this Safety Action Plan covers the entirety of Broome and Tioga Counties. As shown in the map below, the study area expands beyond the BMTS planning boundary (orange) to encompass all 39 cities, towns, and villages throughout both counties, bringing in additional outlying communities located in eastern and northern Broome (e.g., Deposit, Nanticoke), and western and northern Tioga (e.g., Waverly, Newark Valley). While a few components of this analysis were undertaken at the two-county or region-level, this plan has primarily been developed to offer county-level crash analyses, trends, and insights.



Plan Overview

The list below summarizes the primary contents of each chapter within this Safety Action Plan.

Chapter 1 — **Stakeholder Involvement:** Summary of engagement methods and key safety concerns raised through Project Steering Committee meetings, focus groups, pop-up outreach, an online survey, and an interactive safety map.

Chapter 2 — **Equity & Vulnerable Communities Analysis:** Identification of vulnerable communities using a study-specific seven-factor approach and comparison to USDOT's Underserved communities criteria; assessment of disproportionality in severe crash outcomes.

Chapter 3 — **Crash Analysis:** Five-year crash trends (2019–2023), crash characteristics, and contributing factors and the County level, with an emphasis on KSI collisions.

Chapter 4 — **High Injury Network (HIN):** A data-driven identification of corridors and intersections with the highest historical concentrations of injury crashes.

Chapter 5 — **Systemic Analysis & High-Risk Network (HRN):** A predictive, systemic risk model to identify where severe crashes are most likely to occur based on roadway characteristics and contextual factors.

Chapter 6 — **Capital Projects to Address the HIN:** A prioritized set of capital projects (corridors and intersections) with proposed countermeasures, costs, and crash reduction benefits, along with a transparent prioritization framework.

Chapter 7 — **Systemic Countermeasures for Emphasis Areas:** A set of scalable strategies aligned to the region's six common severe crash types and contributing actions.

Chapter 8 — **Policies, Programs & Strategies:** Recommended non-Engineering actions organized by Safe System element (Safe Roads, Safe Speeds, Safe Users, Safe Vehicles, Post-Crash Care).

Chapter 9 — **Monitoring Plan Outcomes:** Performance measures, reporting commitments, and crash reduction targets to guide implementation and accountability.

1

Stakeholder Involvement

Modes of Engagement

The planning process employed a variety of outreach methods to capture input from local stakeholders and community members regarding road safety concerns, needs, and opportunities. These methods included the activities shown below. Outreach activities kept stakeholders informed about the Safety Action Plan while collecting community insights to ground truth the plan's findings.

Project Steering Committee (PSC) meetings.

Focus Group discussions with expert stakeholders.

Pop-up tabling at popular events in Broome and Tioga Counties.

Key Findings

An online public survey.

An online interactive safety concerns map.

A project website and mailing list.

Project Steering Committee

A Project Steering Committee was established at the outset of the planning process to guide the development of the plan. Along with leadership and support from key BMTS staff, the seven person committee consisted of representatives from key government and community organizations. **Table 1.1** summarizes the topics discussed at each meeting.

The PSC held hybrid meetings to review project deliverables and ensure the plan aligned with community safety needs and priorities.

Table 1.1 Overview of Project Steering Committee Meetings

Meeting Number	Date	Agenda
PSC #1	December 16th, 2024	The kick-off meeting provided an overview of the USDOT's Safe Streets and Roads for All program, presented an analysis of crash types, contributing factors and trends within Broome and Tioga Counties, and unveiled the data-driven High-Injury and High-Risk networks (HIN & HRN) for both counties.
PSC #2	June 5th, 2025	The second meeting established an overall vision and a set of thematic goals for the plan, explored the interim findings based on the HIN and HRN, and discussed project branding and outreach activities.
PSC #3	September 9th, 2025	The next meeting summarized the summer-oriented outreach activities, results from the online survey and interactive map, identified potential project locations based on the HIN, and discussed local experiences with potential safety countermeasures at these preliminary locations.
PSC #4	February 5th, 2026	The fourth meeting solicited feedback on the draft Safety Action Plan, which was distributed prior to the meeting. This venue covered the project development process, prioritization approach for capital projects, and policy approaches to institutionalizing safety within the MPO and municipal partner's organizational processes.

Focus Group Discussions

Three virtual focus groups were organized with local stakeholders, each with a different theme. The purpose of the focus groups was to better understand the safety needs and concerns of specific users, including vulnerable users (i.e., those traveling outside of a vehicle) and underrepresented groups.

These discussions focused on identifying specific locations where people felt unsafe while walking, biking, and/or driving. The discussions also explored participant's opinions and views with regard to contributing factors, including unsafe behaviors or road design, and potentially relevant safety interventions based on their direct experiences within the study area.

Feedback Summary

Focus Group 1

Traffic, Safety, and Highway Officials

Focus Group 1 participants felt that areas with excessive speeding and traffic volumes caused unsafe conditions for drivers and pedestrians. They noted that transition areas, between highways and local roads or between downtown areas and less developed areas, for example, were particularly challenging.

Focus Group 2

Vulnerable User and Special Needs

Participants in Focus Groups 2 and 3 highlighted areas and conditions that created safety concerns for transit users and users with mobility, hearing, or sight impairments. They noted that uncontrolled pedestrian crossings, crossings where cars were making left turns, and poorly maintained pedestrian infrastructure were especially challenging for these users. Concerns were also raised over missing or disconnected bicycle lanes, sidewalk networks, and road shoulders, especially in rural areas. Both groups noted the unpredictable behavior of cyclists, who often travel on sidewalks and fail to follow traffic rules. Participants in Focus Group 2 highlighted "white cane behavior," in which a driver overreacts to a visually impaired pedestrian when they are crossing and stops before necessary, and beeps at the pedestrian to encourage them to cross. This behavior disrupts traffic and startles the pedestrian.

Focus Group 3

County Services, Senior Services, and Rural Health Transit

Several Focus Group participants observed that distracted and aggressive driving contributed to unsafe conditions, as well as drivers and bicyclists failing to follow road signs and designated pathways. Suggested interventions included visual or tactile cues that grab drivers' attention, including speed humps , and self-enforcing road design elements that slow traffic and help increase the visibility of pedestrians, including bump-outs or raised crossings. Participants also advocated for additional protected crossings to provide safer passage across area roadways, greater investment in (i.e., more rapid build-out of) accessible infrastructure, expanded bicycle and pedestrian infrastructure, and new safety education programs.

Table 1.2 Focus Groups Issues and Interventions Associated with Safe System Elements

Safe Systems Concern	Focus Group 1		Focus Group 2		Focus Group 3	
	Issues	Interventions	Issues	Interventions	Issues	Interventions
Safe Road Users	Drivers' inattention due to car screens or phones Disregard of installed signage The unsafe behavior of young E-bikers on the road, such as riding on sidewalks at 30-40 MPH	Flashing signs to grab drivers' attention (Rectangular Rapid Flashing Beacons, LED stop signs) Education, specifically, Governor Hochul's traffic safety program workshops to educate bicyclists	Lack of security and visibility at crosswalks, and visually impaired pedestrians cannot see the white lines Pedestrian buttons are needed in various locations (intersections in Endicott and Binghamton) During winter, unmaintained sidewalks (ice/ snow) cause wheelchair users to travel on the street.	Textured crosswalks, safety islands Install more pedestrian buttons across the county, which is in progress Business owners and homeowners manage snow and ice on sidewalks	Inattentive and distracted driving	Speed tables / humps
Safe Roads	Higher traffic congestion occurs near schools when they are in session, and more crashes are reported during the school year Excessive speeding and traffic volumes caused unsafe conditions for drivers and pedestrians.	Implementing a survey for parents to capture ideas on how to address traffic during school pick-up and drop-off Removable rubber speed humps and bumps to alleviate plowing challenges	Rural areas are inaccessible, especially for wheelchair users, since there are no sidewalks.	Access to transport, increasing access to transport for those with limited mobility e.g., to and from medical clinics for wheelchair users	Unmaintained sidewalks, uneven surfaces, and a lack of bicycl e infrastructure There are no sidewalks outside of villages, which causes pedestrians to walk in the road, and there are no curb cuts or crosswalks	Adding greenways, protected or grade-separated bike lanes Adequate shoulders that aren't too narrow
Safe Speeds					Due to speeding drivers, pedestrians still feel unsafe because they are unsure if a vehicle will stop at crossings.	Bump-outs, safety Islands, mid-crossing signs, Rectangular Rapid Flashing Beacons, stop signals with flashing lights

Pop-Up Event Tabling

The Project Team further engaged with the public by meeting them where they were – at popular summer events located across Broome and Tioga Counties. During tabling sessions, the Project Team promoted the online survey and interactive map and shared information about the BMTS Safety Action Plan. The Project Team gained additional feedback at these events through conversations with community members:

Strawberry Festival

Owego, NY
June 20, 2025
4:30 p.m. – 9 p.m.

- It feels unsafe to travel with children due to the risk of car accidents
- Need for better road maintenance
- The Village of Owego is not built for modern traffic

Car and Bike Show

Binghamton, NY
July 19, 2025
10 a.m. – 3 p.m.

- Lack of sidewalks in the Villages of Endicott, Lisle, and the Towns of Windsor and Owego
- Increase accessibility around disabled parking
- Need for better road maintenance, including snow removal on side streets
- Hazardous conditions for motorcyclists due to the lack of cleaning of construction zones
- Lack of sidewalks in the county, including in the Town of Owego

Windsor Farmers Market

Windsor, NY
August 16, 2025
9 a.m. – 1 p.m.

- Distracted drivers cause cyclists to feel unsafe
- Unpredictable biking behaviors
- Lack of bike lanes and adequate lighting for cyclists

Broome County Farmers Market

Binghamton, NY
August 23, 2025
9 a.m. – 1 p.m.

- Inadequate shoulders limit the potential to safely bike on rural roads, which constrains most from otherwise making different choices to fulfill their needs
- Drivers are inconsiderate of other modes

Survey

The project team developed an online BMTS Safety Action Plan Survey to capture broad public feedback about transportation safety concerns in Broome and Tioga Counties. The qualitative community input complemented quantitative data on fatal and serious injury crashes to help identify opportunities for safety improvements.

The survey opened on June 20th, 2025, and closed on August 25th, 2025. This tool was promoted throughout the summer through tabling at community events, a radio commercial on Cool 106.7 FM, emails to stakeholders, and posts on the BMTS website and social media accounts.

The survey asked respondents to complete a series of multiple choice questions related to unsafe behaviors and conditions they have encountered while driving, walking, biking, and/or using a mobility device. Quantitative road safety data informed the list of safety concerns and contributing factors that were presented to respondents in the multiple choice questions.

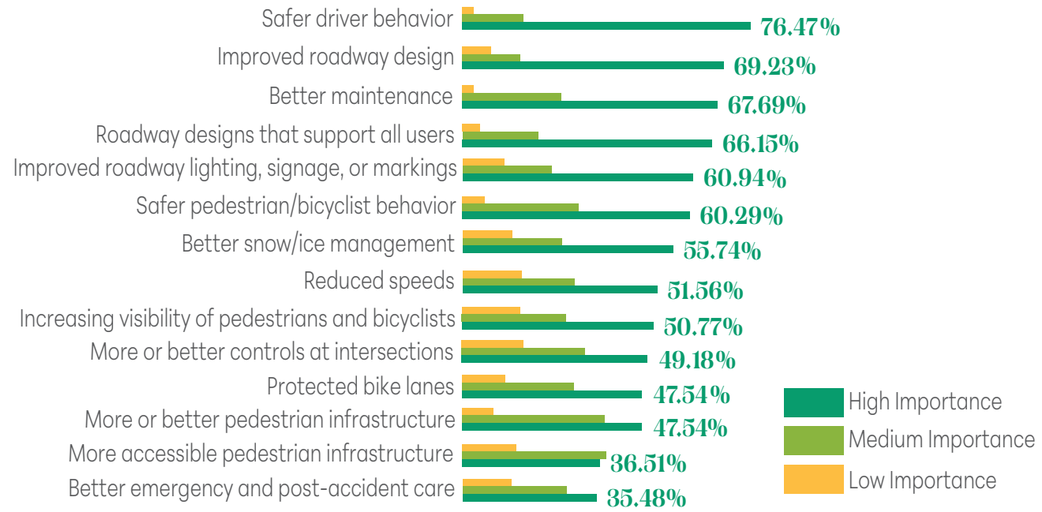
76 Total Survey Responses

Survey Results

Safety Improvements

When asked what changes they felt were most important for improving road safety, survey respondents focused on addressing their top safety concerns. Safer driver behavior was ranked highest, followed by improved roadway design (e.g., to reduce speeding and blind spots), better maintenance, and multimodal roadway design. A majority also prioritized interventions to promote safer pedestrian and cyclist behaviors, improve visibility and signage/markings, improve snow and ice management, and reduce speeds. Accessibility improvements were a priority for users most impacted by these challenges. These improvements coincide with the unsafe behaviors and conditions survey respondents have encountered, which are discussed in the following pages.

Figure 1.1 Priority Changes to Improve Safety

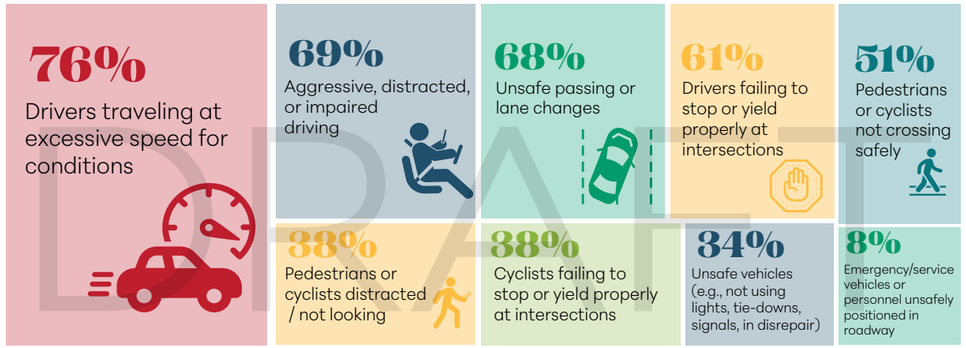


Common Unsafe Behaviors...

Drivers speeding was the most common unsafe behavior encountered by survey respondents across all modes of travel. Other behaviors commonly encountered across all modes were aggressive, distracted, or impaired driving and drivers failing to stop or yield properly at intersections. Unsafe bicyclist and pedestrian behaviors were also observed at a similar, less frequent rate for all groups. About one-third of respondents had observed distracted cyclists and pedestrians, and cyclists failing to yield.

...Experienced by People Traveling in Automobiles

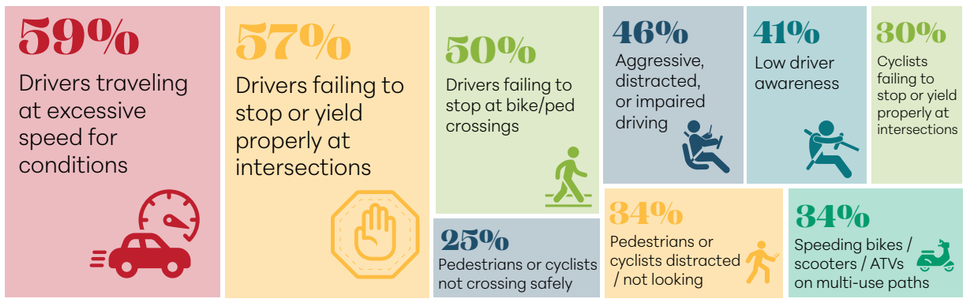
For survey respondents traveling in automobiles, unsafe lane changes was a commonly observed behavior. Over 50% had encountered pedestrians or cyclists not crossing safely, compared with 25% for other modes.



Unsafe Behaviors Survey Respondents Encountered While Traveling in an Automobile in Broome and/or Tioga Counties

...Experienced by Vulnerable Road Users

For pedestrians, bicyclists, and people using assistive mobility devices, about half had experienced drivers failing to stop at (mid-block) bicycle or pedestrian crossings. Between 30 and 40% reported low driver awareness, drivers failing to share the road, and speeding bikes/scooters/ATVs on multi-use paths.



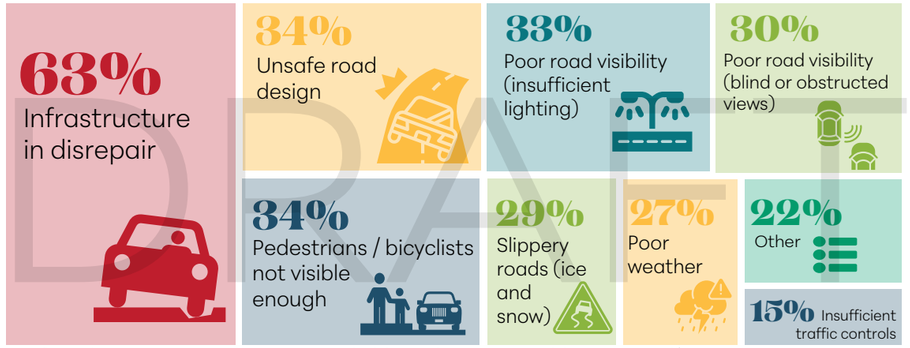
Unsafe Behaviors Survey Respondents Encountered as a Pedestrian, Bicyclist, or Assistive Device User in Broome and/or Tioga Counties

Common Unsafe Road Conditions...

Infrastructure in disrepair was the most frequently cited unsafe conditions across all travel modes. A close second for pedestrians, bicyclists, and mobile device users was a lack of pedestrians and cyclist infrastructure. Although survey respondents use infrastructure differently, the results underscore that maintaining roads, sidewalks, and bike lanes is essential to ensure everyone can travel safely. Unsafe road designs were the next most common safety problem for all groups.

...Experienced by People Traveling in Automobiles

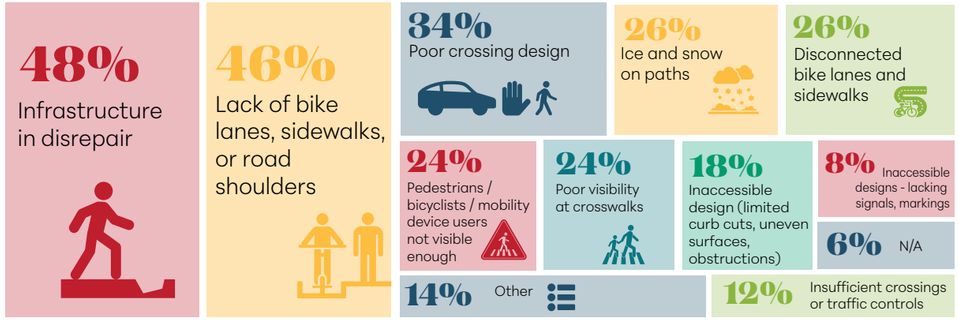
For people traveling in automobiles, 34% had encountered unsafe road designs while 34% of other users had encountered poor crossing designs. Poor road visibility was a challenge for one-third of automobile users, who reported difficulty seeing pedestrians and cyclists, insufficient lighting, and blind spots or obstructed views. Poor weather conditions were mentioned by 28%.



Unsafe Conditions Survey Respondents Encountered While Traveling in an Automobile in Broome and/or Tioga Counties

...Experienced by Vulnerable Road Users

Meanwhile, about a quarter of pedestrians, cyclists, and people using assistive mobility devices felt they were not visible enough to drivers at times, or experienced poor visibility at crosswalks. A similar number reported gaps in bike lanes or sidewalks and ice or snow on paths, reinforcing infrastructure and maintenance concerns. Inaccessible designs and insufficient crossing areas had impacted roughly one out of six respondents.



Unsafe Conditions Survey Respondents Encountered as a Pedestrian, Bicyclist, or Assistive Device User in Broome and/or Tioga Counties

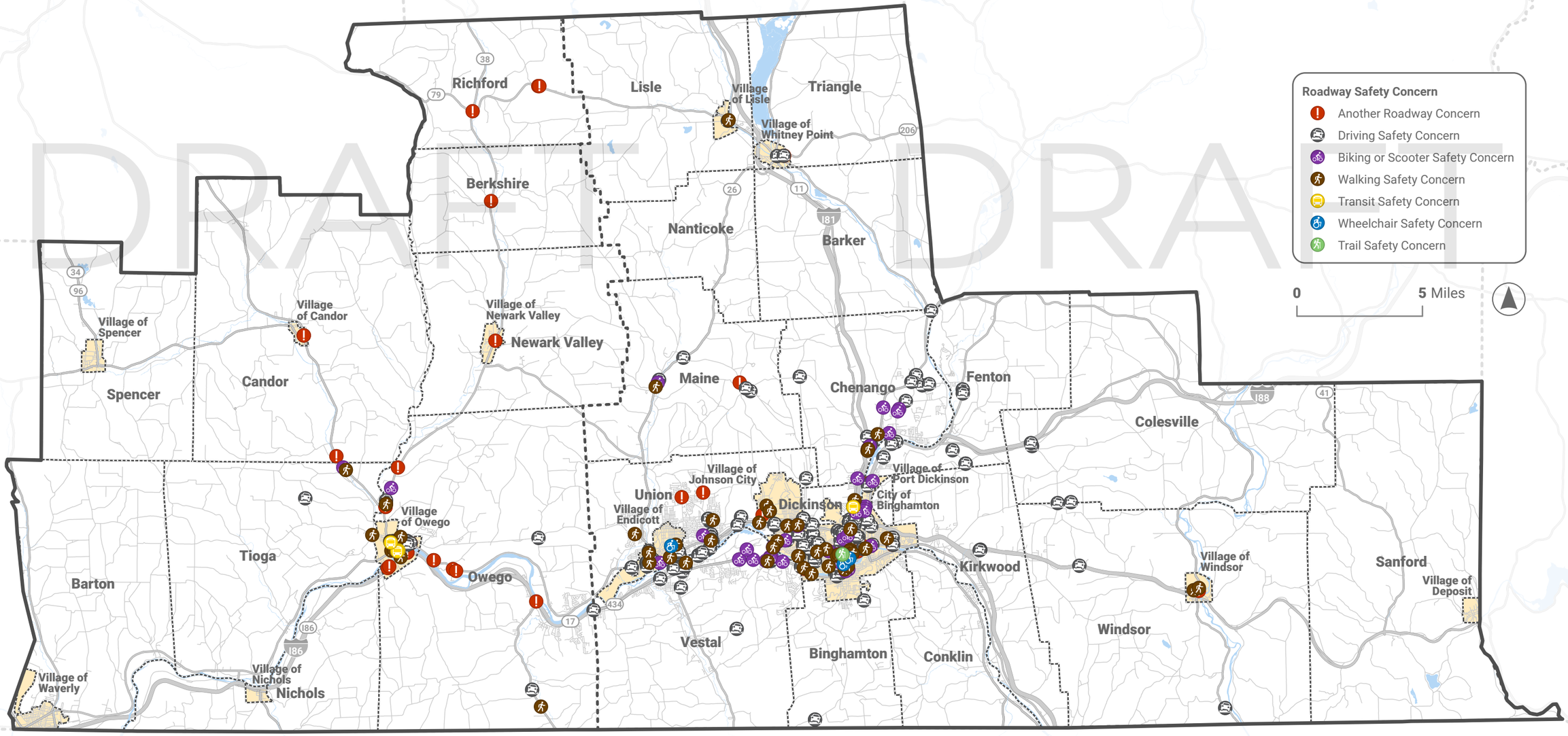
Interactive Map

The project team developed an interactive map in conjunction with the BMTS Safety Action Plan Survey to address location-specific concerns in Broome and Tioga Counties. The interactive map was open from June 20th, 2025, to August 25th, 2025, and was promoted through various channels alongside the survey.

The BMTS Interactive Map allowed participants to add a pin to a specific corridor or intersection within Broome or Tioga County and describe their safety concern at this location (**Figure 1.2**).

The map closed with 365 location-specific comments. Of these, 126 were added by participants directly, and 239 were captured through other outreach channels, including survey comments, pop-up events, and stakeholder discussions.

Figure 1.2 Interactive Web Map Pins in Tioga and Broome Counties



Broome County

Broome County received 302 comments across 18 municipalities as shown in **Figure 1.3**. At 59%, driving safety concerns were the most frequent type of concern countywide (Figure 7) and throughout the following municipalities:

- City of Binghamton (67/121 comments)
- Town of Union (17/24 comments)
- Village of Johnson City (15/28 comments)
- Town of Dickinson (12/16 comments)
- Town of Vestal (12/25 comments)
- Town of Chenango (11/22 comments)
- Town of Fenton (8/8 comments)

Figure 1.3 Interactive Web Map Responses in Broome County Muncipalities

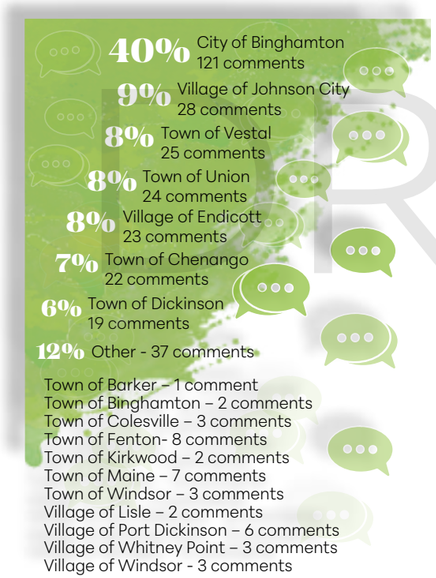


Figure 1.4 shows walking safety concerns (17%) were the second most frequent in Broome County. Respondents mapped 51 comments in this category: 47% were placed in the City of Binghamton, 11% in the Village of Johnson City, 8% in the Town of Union and the Village of Endicott, and 26% in other municipalities.

Many comments mentioned road disrepair, speeding vehicles, and aggressive driving behavior, sometimes in residential areas.

Many comments also noted a lack of bike lanes, unsafe crossing designs, and insufficient pedestrian signals. Respondents indicated that the absence of sidewalks and bike lanes makes it difficult for them to navigate safely. Some comments referred to the unsafe behaviors of E-bike users, including riding at high-speeds on pedestrian-first facilities like sidewalks. Respondents would like improved facilities and infrastructure for cyclists and pedestrians, emphasizing their safety and access. Locations in Broome County that received the most comments are listed in **Table 1.3**.

Figure 1.4 Interactive Web Map Responses in Broome County by Concern Type

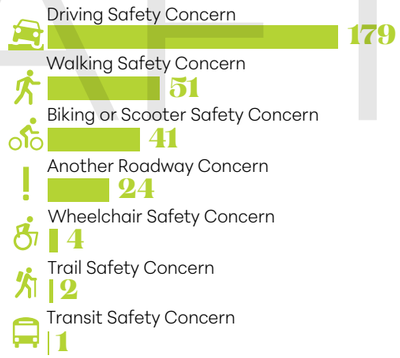


Table 1.3 Areas in Broome County with the Highest Concentration of Interactive Map Comments

Cluster Location	Number of Comments	Muncipality	Concern Type
Route 17	17	City of Binghamton, Towns of Vestal, Dickinson, and Union	Unsafe driver behaviors and roadway conditions
Court Street	9	City of Binghamton	Drivers failing to yield to pedestrians, and insufficient pedestrian facilities (lighting, infrastructure in disrepair, and lack of sidewalks past Tompkins St.)
Upper Front Street Roundabouts	8	Town of Dickinson	Drivers failing to yield to pedestrians and other drivers, and poor crossing design
Vestal Parkway	8	Town of Vestal / City of Binghamton	Unsafe driver behavior
NY-201 Bridge	6	Town of Vestal / Village of Johnson City	Lack of pedestrian / cyclist access and speeding

Tioga County

Tioga County received 63 map comments across eight municipalities **Figure 1.5**. The Village of Owego received 35 comments (56%) and the Town of Owego received 16 comments (25%). The Towns of Berkshire, Candor, Richford, Tioga and the Villages of Candor and Newark Valley received between one and four comments each.

Figure 1.5 Interactive Web Map Responses in Tioga County Muncipalities

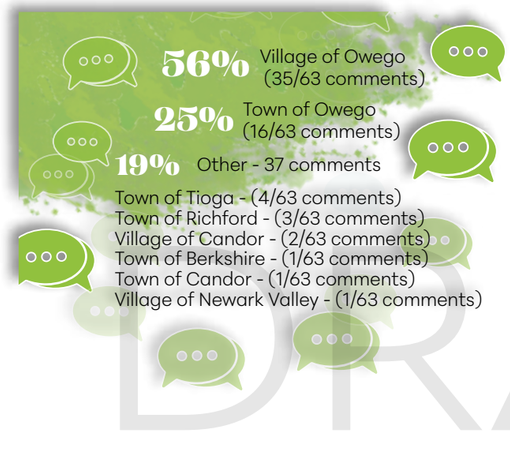


Figure 1.6 shows "other" roadway concerns were the type of comment received (43%) for Tioga County, followed by driving safety concerns (32%).

Comments about disrepair and inadequate infrastructure were prevalent, including poor road and shoulder conditions, and insufficient lighting. Respondents also noted the risks that pedestrians and cyclists face, such as inadequate crossings, poor visibility, and limited access for mobility devices.

Figure 1.6 Interactive Web Map Responses in Tioga County by Concern Type

Comments mentioned railroad trains blocking intersections and flooding during heavy rainfall as significant impediments to traffic flow. Respondents pointed out that low visibility conditions, especially at intersections and during night time driving, are a recurring concern. There were several mentions of speeding and unsafe driving behaviors, along with comments about road design, including improperly painted white lines that allow vehicles to park in turning lanes and turning lanes that obstructed views. Locations in Tioga County that received the most comments are listed in **Table 1.4**.

Table 1.4 Areas in Tioga County with the Highest Concentration of Interactive Map Comments

Cluster Location	No. of Comments	Muncipality	Concern Type
North Ave Underpass	5	Village of Owego	Poor visibility/poor underpass infrastructure
E. Front St and Main St	5	Village of Owego	Blocked roads for long periods of time due to trains and poor visibility
Main St (Route 17C)	4	Village of Owego	Sidewalk conditions
Front St	4	Village of Owego	Incorrectly painted road lines that cause vehicles to park in turning lanes

Key Findings: What Did We Hear?

Through PSC meetings, focus groups, pop-up events, and online tools including a survey and interactive web map, the public and stakeholder engagement process generated a broad range of input regarding roadway safety concerns across Broome and Tioga Counties. Many concerns focused on unsafe driving behaviors, road maintenance, and the lack of pedestrian and cyclist access. The findings provide qualitative context to complement quantitative crash data and highlight common concerns.

General Observations

Driving Behaviors

The most consistent concern raised throughout the outreach process was the prevalence of unsafe driving behaviors. Speeding and aggressive driving were frequently mentioned by community members, survey respondents, and interactive web map users. Distracted driving and drivers failing to yield to pedestrians at crosswalks were also commonly raised concerns.

Road Conditions (Maintenance and Visibility)

Unsatisfactory roadway conditions and maintenance were also prominent concerns. Throughout the outreach process, community members described deteriorating pavement, shoulders, markings, and sidewalks. These presented a barrier for drivers as well as vulnerable users with mobility, sight, and hearing impairments. Poor visibility of bicyclists, pedestrians, and the roadway due to poor lighting or obstructed views was a common theme.

Multimodal Concerns

Across both counties, missing or disconnected sidewalks, insufficient crosswalks, and poor pedestrian signalization were recurring concerns for all users. Cyclists reported unsafe conditions based on the lack of bike lanes and road shoulders. Community members also identified unsafe behaviors including speeding e-bike users and pedestrians and bicyclists failing to cross the road safely. In both Broome and Tioga Counties, participants desired more accessible pedestrian and bicycle facilities to support safer multimodal travel for all modes, ages, and abilities.

Focus Areas for Improvement

Based on the collective observations and suggestions from community members, key interventions to improve safety include promoting safer driver behavior, designing roadway that support all users, and investing in maintenance. These areas of improvement could alleviate many of the concerns raised by the public such as aggressive driving and speeding, missing bike lanes and sidewalks, inadequate visibility for all users, and poorly maintained roads and sidewalks.

Broome County – Common Issues & Frequently Noted Locations

In Broome County, the most frequently mapped safety concern was unsafe driving behavior. Many respondents felt unsafe while traveling in the county due to hazardous driving behaviors, including speeding, aggressive driving, drivers failing to yield to pedestrians, and driver inattention.

Frequently mapped locations included portions of Route 17, Court Street and the Upper Front Street roundabouts in the Town of Dickinson, Vestal Parkway, and the NY-201 bridge in the Village of Johnson City and the Town of Vestal. Insufficient facilities for pedestrians and/or cyclists were identified at the NY-201 bridge, as well as on Court Street and Front Street. Comments noted that the sidewalks are in disrepair and there is a lack of bike lanes. Their comments further explain that driver behavior increases the dangers of insufficient facilities for vulnerable road users, particularly when drivers speed or fail to yield to pedestrians or cyclists, as well as when there is a lack of maintenance during snowfall on the NY-201 bridge.

Tioga County – Common Issues & Frequently Noted Locations

Interactive web map comments showed that the frequently noted locations are in the Village of Owego. The most frequently mapped comments in Tioga County related to visibility, roadway designs, and sidewalk conditions.

Multiple comments were collected for locations in the Village of Owego, including a handful for the North Avenue underpass, Front Street, and Main Street. These comments highlighted disruptions in traffic flow. At Front Street, incorrectly painted white lanes mislead drivers into parking in turning lanes, while at East Front Street and Main Street, drivers are stopped for extended periods of time due to the Conrail Railroad. Similarly, at the underpass below the railroad at North Avenue, comments indicate that the location frequently floods during heavy rainfall, with no signage notifying drivers of any detours. Comments also mentioned poor visibility due to obstructed views in the area, which increases hazardous conditions for drivers during rainfall.

2

Equity & Vulnerable Communities Analysis

This chapter provides information on the extent to which fatal and serious injury crashes across Broome-Tioga tended to occur within communities that are home to vulnerable populations. Following a description of this study's seven-factor methodology, as well as the federal tool for Underserved communities, a series of county-level maps depicting the identified areas is provided. After a discussion of the similarities and differences in coverage across the two methods, the section concludes with a detailed summary regarding the relative share or prevalence of injury crashes within vulnerable communities, as identified within this study's seven-factor assessment.

As summarized concisely in **Figure 2.1**, equity focuses on creating the conditions necessary so that all can achieve similar outcomes, regardless of their abilities, beliefs, identity, etc. Equity is an important topic to assess within transportation safety studies given the historic pattern of both limited public investment and high crash rates within areas that have traditionally housed communities of low-income and minority individuals.

As demonstrated at the end of this chapter (Seven-Factor Assessment Results), vulnerable communities in both Broome and Tioga Counties were home to a disproportionately high share of fatal and serious injury crashes. Recognizing the comparatively high levels of road injury risk that persistently lingers in the background for residents of these vulnerable communities (i.e., the Top 40% of Census block groups in each county), will be used as one of several guides in crafting a prioritized list of safety improvement investments within this Safety Action Plan.

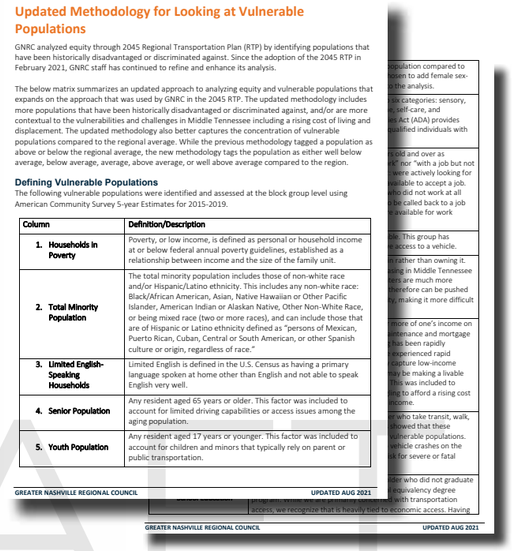
Figure 2.1 Equality v. Equity

"Equity" Recognizes Differences and Focuses on Achieving Equal Outcomes While "Equality" Views All Users as Identical and Ignores Results

Study-Specific Approach

Using data from the American Community Survey (2023 Five Year Estimates), a vulnerability priority index was created for each of Broome and Tioga Counties. This vulnerability index leveraged the methodology developed by the Greater Nashville Regional Council within its 2045 Long Range Transportation Plan. The following vulnerable populations were identified at the block group level:

- **Youth (individuals aged 17 or under)**
- **Senior (individuals aged 65 or older)**
- **Carless Households (household that does not have access to a working vehicle)**
- **Disabled**
- **Limited English Proficiency**
- **Low Income Households (at or below the federal poverty guidelines)**
- **Minority Status (individuals identifying as not "White Alone")**



Updated Methodology for Looking at Vulnerable Populations

GNRC analyzed equity through 2045 Regional Transportation Plan (RTP) by identifying populations that have been historically disadvantaged or discriminated against. Since the adoption of the 2045 RTP in February 2021, GNRC staff has continued to refine and enhance its analysis.

The below matrix summarizes an updated approach to analyzing equity and vulnerable populations that expands on the approach that was used by GNRC in the 2045 RTP. The updated methodology includes more populations that have been historically disadvantaged or discriminated against, and/or are more contextual to the vulnerabilities and challenges in Middle Tennessee including a rising cost of living and displacement. The updated methodology also better captures the concentration of vulnerable populations compared to the regional average. While the previous methodology tagged a population as above or below the regional average, the new methodology tags the population as either well below average, below average, average, above average, or well above average compared to the region.

Defining Vulnerable Populations

The following vulnerable populations were identified and assessed at the block group level using American Community Survey 5-year Estimates for 2015-2019.

Column	Definition/Description
1. Households in Poverty	Poverty, or low income, is defined as personal or household income at or below federal annual poverty guidelines, established as a relationship between income and the size of the family unit.
2. Total Minority Population	The total minority population includes those of non-white race and/or Hispanic/Latino ethnicity. This includes any non-white race: Black/African American, Asian, Native Hawaiian or Other Pacific Islander, American Indian or Alaskan Native, Other Non-White Race, or being mixed race (two or more races), and can include those that are of Hispanic or Latino ethnicity defined as "persons of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin, regardless of race."
3. Limited English-Speaking Households	Limited English is defined in the U.S. Census as having a primary language spoken at home other than English and not able to speak English very well.
4. Senior Population	Any resident aged 65 years or older. This factor was included to account for limited driving capabilities or access issues among the aging population.
5. Youth Population	Any resident aged 17 years or younger. This factor was included to account for children and minors that typically rely on parent or public transportation.

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For each of the seven variables, a county-level average and standard deviation was computed, with each block group then assigned a degree of vulnerability score based on the following classifications:

- Well Below Average (0) – more than one standard deviation below the mean
- Below Average (1) – one to one half standard deviation below the mean
- Average (2) – one half a standard deviation above or below the mean
- Above Average (3) – one half to one standard deviation above the mean
- Well Above Average (4) – more than one standard deviation above the mean

Across a total of seven variables, the maximum vulnerability score a block group could receive was 28 points. Based on the overall composite score, each area was then classified as falling within the Top 20%, Top 21-40%, or outside of the Top 40% of block groups within each county, as summarized below.

- High Priority Equity Area – Top 20% (within each county)
- Equity Area – Top 21-40% (within each county)
- Not an Equity Area – Not within the Top 40% (within each county)

A breakdown summarizing the disproportionate rate at which these communities experience fatal and serious injury, as well as all injury, crashes is provided the end of this chapter (see Seven-Factor Assessment Results).

In terms of geographic coverage across Broome County, the seven-factor assessment identified most block groups within the City of Binghamton, many block groups in Johnson City and Endicott, several in Vestal, Union, and Kirkwood, and minor representation in the towns of Binghamton, Dickinson, Port Dickinson, Maine, Fenton, Chenango. For Tioga County, nearly all the block groups within the villages of Waverly and Owego were identified, along with other clusters created by town-village pairs (Candor, Newark Valley, Spencer, Nichols) and minor representation in Tioga, Berkshire-Richford, and Barton.

Vulnerable Communities Map

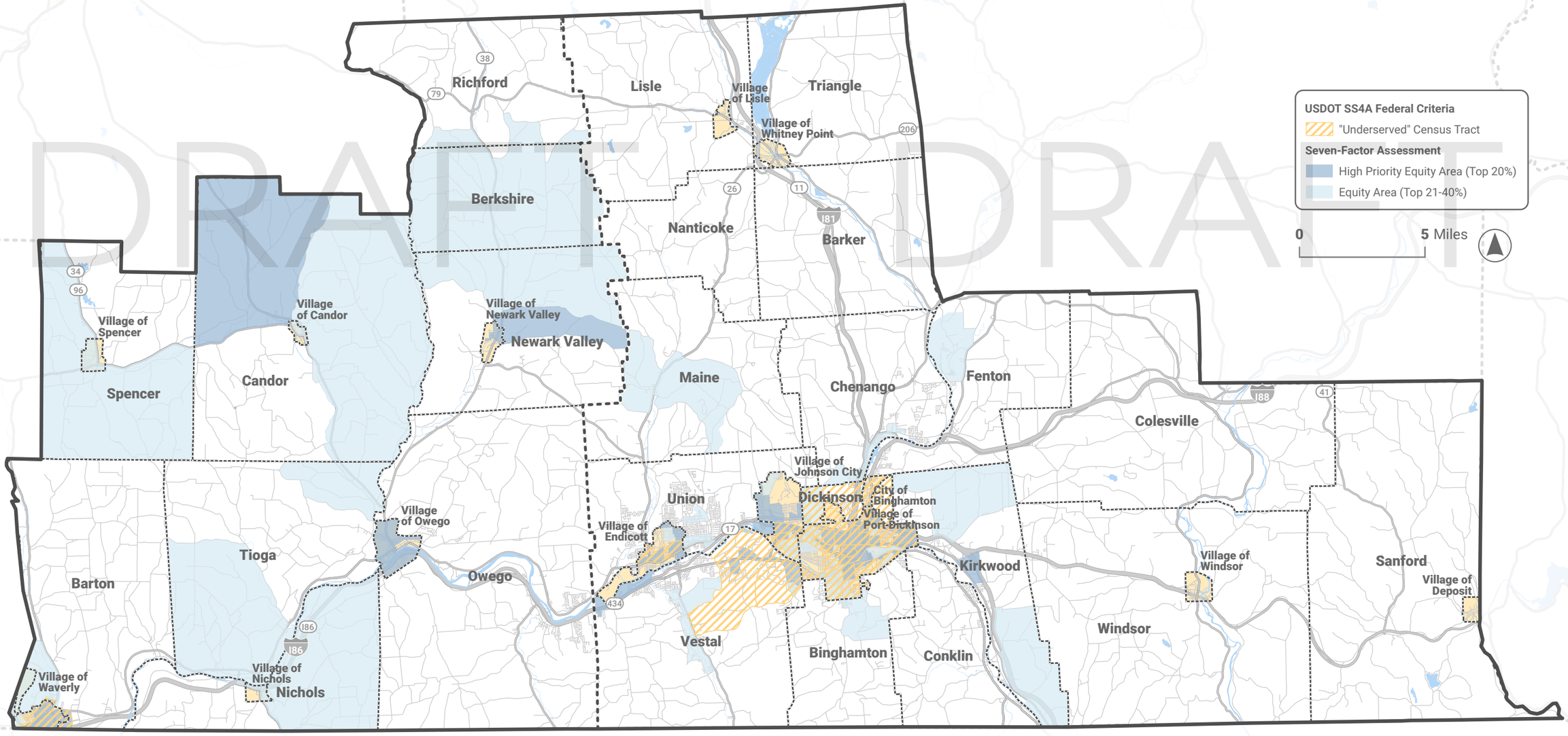
A map showing the location of Census block groups identified in this study's seven-factor, county-specific assessment, as well as Census tracts designated by the USDOT tool as Underserved, are provided in **Figure 2.2** (Broome) and (Tioga).

Federal Approach ("Underserved"Communities)

Based on data obtained from the USDOT's Underserved Communities Tool, which was published in conjunction with the FY 2025 Notice of Funding Opportunity for the SS4A program, a total of 24 Census Tracts were identified as Underserved.

All but one of these tracts is in Broome County, with the majority situated in and around the City of Binghamton. Beyond the city limits, there is also representation in Endicott, Vestal, Johnson City, Dickinson, and Port Dickinson. The lone community identified in Tioga County is located in Waverly.

Figure 2.2 Community Vulnerability Analysis



Comparison between the Two Frameworks

Both of these frameworks for assessing vulnerability were leveraged within the Project Prioritization process as means to steer road safety investments towards these communities. In addition, this study's seven-factor assessment was incorporated as one of several factors within this study's predictive High Risk Network. For more information, please refer to Section 5 (Prioritization Scheme) and Section 5 (Systemic Factors & Weights Included in the HRN), respectively.

In general, this study's seven-factor, county-based, block group-level assessment provided substantially more nuance in identifying vulnerable communities than the USDOT's nationwide, census tract-level Underserved Communities Tool (i.e., identified 99 Census block groups compared to 24 Census tracts). The seven-factor internal analysis identified many more potentially vulnerable areas in both counties, particularly for Tioga County.

When looking only at areas designated as Underserved in the USDOT tool, there is substantial overlap with those identified in this study's seven-factor assessment as either High Priority Equity Areas (Top 20%) and Equity Areas (Top 21-40%). The only areas identified by the USDOT tool that are not at least partially captured in this study's seven-factor assessment are in Dickinson and Port Dickinson.

In terms of similar coverage or coincidence, within Tioga County, there is direct overlap between the three block groups identified in this study and the Underserved tract in Waverly. In Broome County, similar levels of overlap can be found for Endicott and Johnson City. There is general alignment between the two models in Vestal. In the City of Binghamton, there is strong correspondence, though there are some discrepancies (i.e., areas identified in one model but not the other).

Within Broome County, additional areas identified by this study's assessment include portions of Maine, Fenton, Chenango, and Kirkwood. In Tioga County, communities in Candor, Newark Valley, and Owego each had areas designated as High Priority Equity Areas that were not highlighted by the USDOT tool. In addition, other Equity Areas (Top 21-40%) in Tioga County were identified in Nichols, Tioga, Spencer, and Berkshire-Richford, despite an absence of coverage in the USDOT tool.

Seven-Factor Assessment Results

Broome County

The Top 40% of block groups in Broome County were home to a disproportionate share of injury crashes. Based on the share of the county's road network, the Top 40% were the site of 64% more fatal and serious injury (KSI) crashes and 94% more all injury collisions than expected. As shown in **Table 2.1**, the Top 40% contained 28% of the county's mileage but were home to 47% of KSI and 55% of all injury crashes in Broome County. Adjusted for mileage, the Top 20% experienced 108% more KSI (**Figure 2.3**) and 170% more all injury crashes than expected. High Priority Equity Areas (Top 20% of block groups) saw 22% of KSI crashes and 28% of all injury collisions despite housing only 10% of the road network. Communities identified as Equity Areas (Top 21-40%) contained a larger share of the county's mileage and covered similar shares for both sets of injury crashes, with 39% more KSI and 49% more all injury collisions than expected.

Tioga County

The Top 40% of block groups in Tioga County experienced 41% more KSI and 41% more all injury collisions. As seen in **Table 2.2**, these communities witnessed 10% of fatal and serious injury crashes despite housing only 7% of the county's road mileage. When compared to expected rates, the Top 20% of block groups in Tioga County experienced 37% more KSI and 124% more all injury crashes.

Table 2.1 Vulnerability Analysis Summary – Broome County

BROOME COUNTY	COUNT				RATE / PROPORTION			
	Block Groups	Mileage	KA Crash	KABC Crash (All Inj.)	Block Groups	Mileage	KA Crash	KABC Crash (All Inj.)
High Priority Equity Area (Top 20%)	44	212.2	72	510	22%	10%	22%	28%
Equity Area (Top 21-40%)	36	364.2	83	482	18%	18%	25%	27%
All Equity Areas (BOTH)	**80**	**576.4**	**155**	**992**	**41%**	**28%**	**47%**	**55%**
Not an Equity Area (Bottom 60%)	117	1,447.4	176	808	59%	72%	53%	45%
TOTAL	**197**	**2,023.8**	**331**	**1,800**	**100%**	**100%**	**100%**	**100%**

Source: NYSDOT CLEAR, USDOT, Census

Figure 2.3 shows the systemic representation ratio for each of the three vulnerability classes in Broome County based on fatal and serious injury collisions. These figures can be interpreted as a multiplying factor beyond the typical level of risk (1.0). For example, High Priority Equity Areas show a value of 2.08, reflecting that they saw 108%, or slightly more than double, the expected number of KSI crashes based on the share of county road mileage within the block groups.

Figure 2.3 KSI Crash Representative Ratios (Broome County) – Community Equity Status

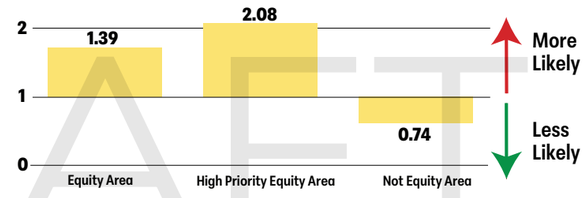


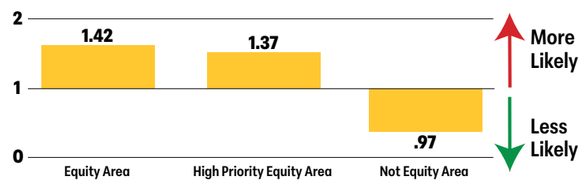
Table 2.2 Vulnerability Analysis Summary – Tioga County

TIOGA COUNTY	COUNT				RATE / PROPORTION			
	Block Groups	Mileage	KA Crash	KABC Crash (All Inj.)	Block Groups	Mileage	KA Crash	KABC Crash (All Inj.)
High Priority Equity Area (Top 20%)	8	19.2	3	21	18%	2%	2%	3%
Equity Area (Top 21-40%)	11	73.9	12	43	24%	6%	8%	7%
All Equity Areas (BOTH)	**19**	**93.1**	**15**	**64**	**42%**	**7%**	**10%**	**10%**
Not an Equity Area (Bottom 60%)	36	1,168.1	129	552	58%	93%	90%	90%
TOTAL	**45**	**1,261.2**	**144**	**616**	**100%**	**100%**	**100%**	**100%**

Source: NYSDOT CLEAR, USDOT, Census

High Priority Equity Areas contained 2% of the county's road network and were home to 2% of fatal and serious injury and 3% of all injury collisions. Adjusted for network coverage, communities identified as Equity Areas (Top 21-40%) witnessed 42% more fatal and serious injury crashes (**Figure 2.4**) and 19% more all injury collisions. These communities saw 8% of KSI and 7% of all injury collisions but contained 6% of Tioga's road mileage.

Figure 2.4 KSI Crash Representative Ratios (Tioga County) – Community Equity Status



3
Crash Analysis

The Vision Zero Approach

The purpose of this Safety Action Plan is to eliminate fatal and serious injury crashes in Broome and Tioga Counties. In contrast to historical highway safety-oriented approaches used by state DOTs, which tended to target safety investments towards locations that would reduce the highest volume of crashes, the paradigm shift within Vision Zero centers on narrowing the analytical lens to focus primarily on collisions that result in the most severe outcomes – when a community member is **Killed (K)** or suffers a **Serious Injury (SI)** that requires immediate medical transport.

Due to the substantive differences in terms of crash types and users involved between the two counties, this plan's analysis separates the data into two county-level frames, with the intention being a more accurate diagnosis of the relevant crash characteristics, underlying factors and location types at play in each county.

Killed
Serious
Injury

Data Source

To understand the underlying data concerning crashes in Broome/Tioga, the New York State Department of Transportation (NYSDOT)'s Crash Location & Engineering Analysis Repository (CLEAR) Crash Data Viewer was accessed to obtain available crash data records. The dataset included the most recent five-year span of fully available data, spanning from January 1, 2019, to December 31, 2023.

The crash analysis for this Safety Action Plan did not include crashes occurring on interstates (e.g., Interstate 86) and limited access roadways (e.g., portions of NY State Route 363) in Broome and Tioga Counties. These cases were set aside and not subjected to further analysis within this Safety Action Plan for two primary reasons. First, such facilities are typically under the jurisdiction of the NYSDOT. While NYSDOT has been consulted in the development of this plan, the intent of the SS4A program is to equip non-state entities (i.e., municipalities, counties, MPOs) with an understanding of safety issues and recommendations most relevant to their local roadways. Second, the nature of the safety issues along such state-owned facilities (e.g., higher speed corridors with design elements that separate opposing directions of travel and feature substantial controls at intersections) are often substantially different from those found along local roadways. Thus, this analysis discounts crashes along interstates and other high-speed, limited-access facilities in order to arrive at a Safety Action Plan focused on roadway safety issues and improvement strategies that are most relevant for roadways under local jurisdiction. Tools within the CLEAR platform, as well as a manual Geographic Information System (GIS)-based screening, were employed to eliminate records from these types of roads.

In line with Vision Zero and in pursuit of a more cost-effective use of limited safety improvement funding, this crash analysis eliminated Property Damage Only (O) crashes to enable a more detailed examination of crashes resulting in at least one injury.

Given limitations in the underlying input data, demographic characteristics of those involved in the collisions were not available. Similarly, although motorcyclists are inherently more vulnerable than the typical motor vehicle user, crashes involving motorcycles could not be isolated and analyzed independently (in contrast to those involving other vulnerable users like those walking or biking).

Crash Severity Definitions (KABCO)

Consistent with federal standards for crash reporting, the NYSDOT CLEAR dataset reflects Injury Severity for each crash (i.e., the nature and extent of the collision's immediate impact on a person's physical, mental, and perceptual faculties while at the scene of the crash), using a standardized five-category scale. The KABCO scale definitions and description of injury severity are shown in **Table 3.1**.

Table 3.1 Crash Severity Level Table of Definitions

Injury Severity Level	Alternate Name	Severity Code	Definition/Examples
Fatal	Killed	**K**	Crash resulting in a death.
Serious Injury	Incapacitating Injury	**A or SI**	Injuries require emergency hospitalization and can include severe lacerations, broken or distorted limbs, skull fractures, crushed chest, internal injuries, unconscious when taken from the crash scene.
Minor Injury	Non-Incapacitating Injury	**B**	Visible, but non-severe injuries including lumps on head, abrasions and minor lacerations.
Possible Injury	Complaint of Injury	**C**	Momentary unconsciousness, limping and complaint of pain with no visible injury.
Property Damage Only	No Injury	**O**	No injury reported to any involved party – damage only to vehicle or other property.

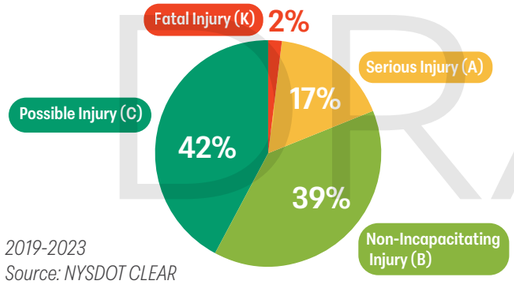
Source: Federal Highway Administration, "KABCO Injury Classification Scale and Definitions" (https://highways.dot.gov/media/20141)

Crash Trends

5-Year Totals — All Injury Crashes

Over the most recent five-year period where crash data was available (2019 – 2023), there was a total of 3,910 injury-resulting crashes, with approximately one-in-five (19%) resulting in at least one severe or fatal injury (**Figure 3.1**).

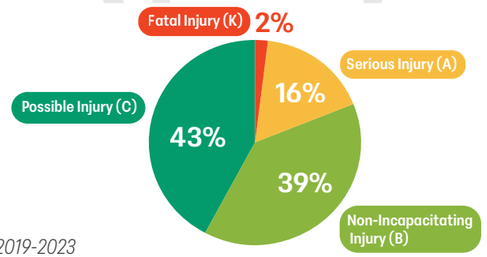
Figure 3.1 Broome/Tioga BMTS Region - Injury Crashes by Severity



2019-2023
Source: NYSDOT CLEAR

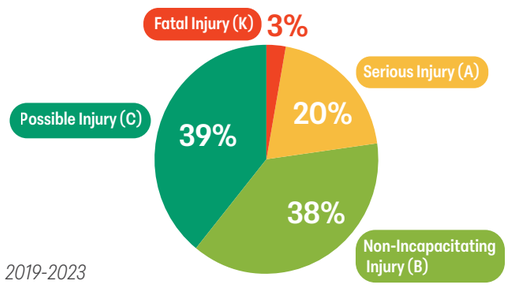
Figure 3.2 and **Figure 3.3** depict the county-level share of each severity level.

Figure 3.2 Broome County - Injury Crashes by Severity



2019-2023
Source: NYSDOT CLEAR

Figure 3.3 Tioga County - Injury Crashes by Severity



2019-2023
Source: NYSDOT CLEAR

Table 3.2 breaks down the geographic distribution and severity of crashes resulting in an injury over the five-year analysis period.

Table 3.2 Crashes by Injury Severity by Geographic Area

Crash Severity	Tioga County	Broome County	Broome/ Tioga
Fatal Injury (K)	25	46	71
Serious Injury (A / SI)	140	513	653
KSI CRASHES	165	559	724
Non-Incapacitating Injury (B)	274	1,247	1,521
Possible Injury (C)	278	1,387	1,665
TOTAL	**717**	**3,193**	**3,910**

2019-2023
Source: NYSDOT CLEAR

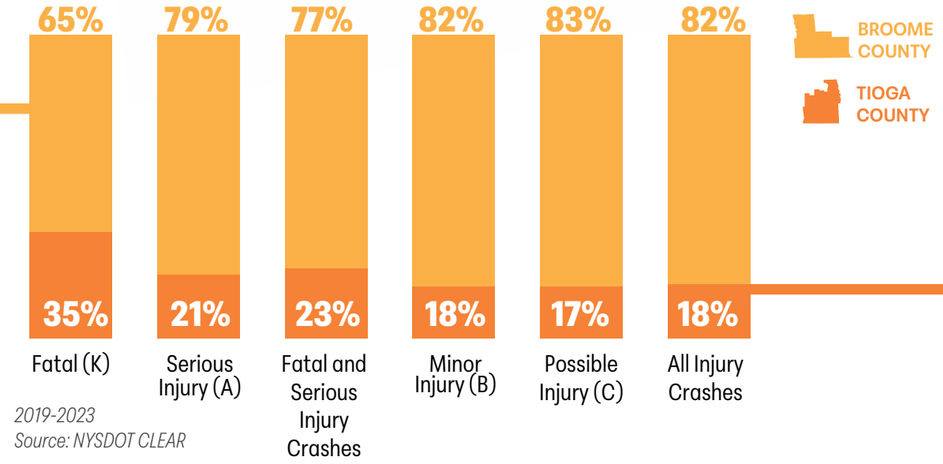
Figure 3.4 provides a county-to-county comparison for each severity level based on the two-county region's total crashes over the five-year period.

Isolating only crashes that resulted in death or serious injury (724 cases), the majority of the worst crashes occurred within **Broome County** (77% of two-county region's KSI collisions).

At the same time, **Tioga County** comprises a larger share of regional KSI crashes (23%) than it does for less severe crashes (18%).

This suggests that an injury-resulting crash in Tioga County is comparatively more likely to be more severe (i.e., involve death or immediate medical transport) than a given injury crash in Broome.

Figure 3.4 Injury (KABC) Crashes - Share by County



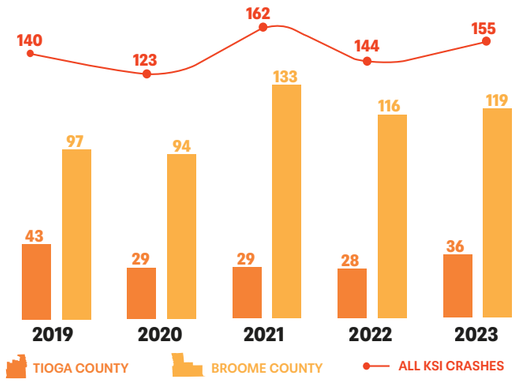
2019-2023
Source: NYSDOT CLEAR

Year-to-Year Trends - Killed or Seriously Injured Crashes

Across the five-year span of the crash data analyzed, year-to-year counts show that the volume of KSI crashes within the region remained relatively steady (**Figure 3.5**), with a marginal, albeit noticeable dip in 2020 – the first year of the COVID-19 pandemic. Traffic patterns were distinctly different that year, which likely contributed to this marked, temporary decline in fatal and serious injury crashes.

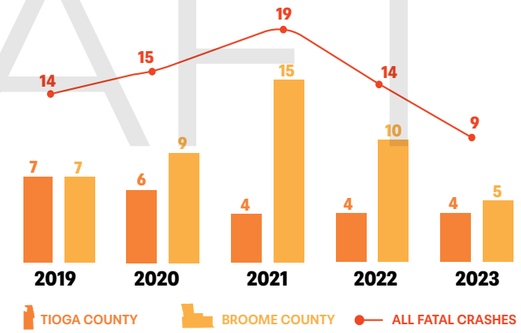
Comparing the relative influence of fatal versus serious injury crashes, the overall KSI trend is largely influenced by the year-to-year variability for serious injury crashes. Fatal crashes, which accounted for approximately 10% of the region's KSI crashes, peaked in 2021, particularly within Broome County, followed by a steady decline over the subsequent two years assessed (**Figure 3.6**). In contrast, serious injury crashes showed an overall increase in the five-year period (**Figure 3.7**).

Figure 3.5 Year over Year Fatal (K) and Serious Injury (A) Crashes



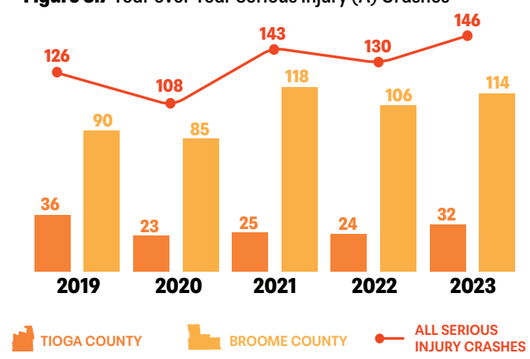
2019-2023
Source: NYSDOT CLEAR

Figure 3.6 Year over Year Fatal (K) Crashes

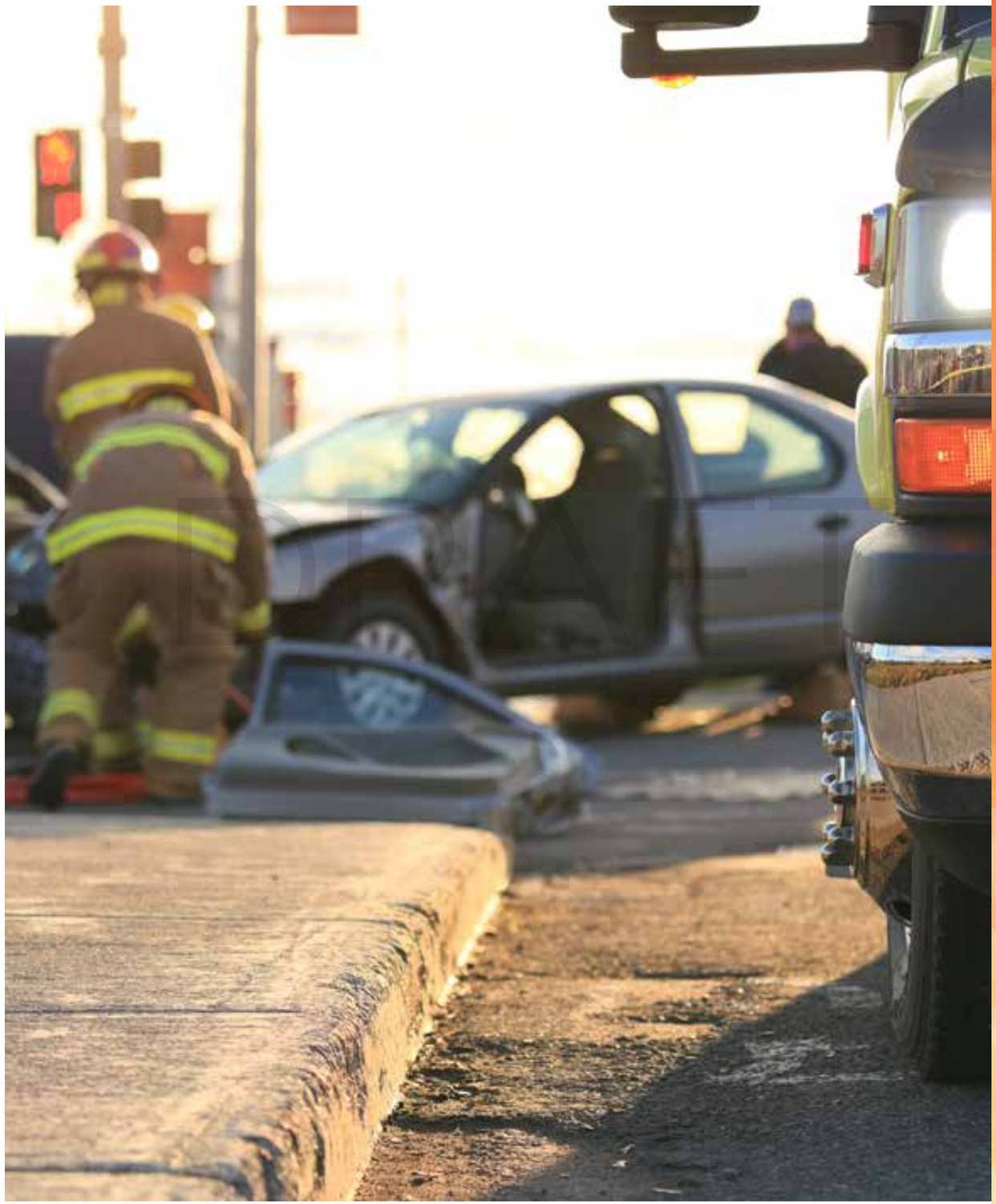


2019-2023
Source: NYSDOT CLEAR

Figure 3.7 Year over Year Serious Injury (A) Crashes



2019-2023
Source: NYSDOT CLEAR



Distribution of Severity among Municipalities

To understand which municipalities experienced the highest shares of fatal and serious injury crashes, the tables below present the relative percentage for each municipality based on the total number of crashes county-wide.

As shown in **Table 3.3**, the top three municipalities with the most fatal and serious injury crashes in Broome County – City of Binghamton (29%), Town of Vestal (11%) and Village of Endicott (10%) – combined to account for half of all KSI crashes.

50% of all KSI Crashes

29% from the City of Binghamton
11% from the Town of Vestal
10% from the Village of Endicott

Table 3.3 Relative Share of Crashes by Severity Type – Broome County

BROOME COUNTY Municipality	K Crash (Fatal)	A Crash (Ser. Inj.)	KA Crash	KABC Crash (All Inj.)	Share of County K	Share of County A	Share of County KA	Share of County KABC
City of Binghamton	6	158	164	872	13%	31%	29%	27%
Town of Vestal	6	54	60	592	13%	11%	11%	19%
Village of Endicott	1	55	56	377	2%	11%	10%	12%
Town of Union	5	43	48	261	11%	8%	9%	8%
Village of Johnson City	0	31	31	201	0%	6%	6%	6%
Town of Chenango	2	21	23	173	4%	4%	4%	5%
Town of Maine	5	18	23	91	11%	4%	4%	3%
Town of Kirkwood	2	19	21	80	4%	4%	4%	3%
Town of Colesville	5	13	18	90	11%	3%	3%	3%
Town of Windsor	3	15	18	66	7%	3%	3%	2%
Town of Conklin	2	15	17	58	4%	3%	3%	2%
Town of Fenton	2	11	13	51	4%	2%	2%	2%
Town of Dickinson	0	12	12	77	0%	2%	2%	2%
Town of Lisle	0	11	11	34	0%	2%	2%	1%
Town of Binghamton	1	9	10	34	2%	2%	2%	1%
Town of Barker	1	8	9	30	2%	2%	2%	<1%
Town of Sanford	1	7	8	18	2%	1%	1%	<1%
Town of Triangle	1	4	5	17	2%	<1%	<1%	<1%
Village of Port Dickinson	1	2	3	11	2%	<1%	<1%	<1%
Village of Whitney Point	0	3	3	22	0%	<1%	<1%	<1%
Village of Deposit	2	0	2	5	4%	0%	<1%	<1%
Town of Nanticoke	0	2	2	18	0%	<1%	<1%	<1%
Village of Lisle	0	1	1	5	0%	<1%	<1%	<1%
Village of Windsor	0	1	1	10	0%	<1%	<1%	<1%
TOTAL	**46**	**513**	**559**	**3,193**	**100%**	**100%**	**100%**	**100%**

2019-2023
Source: NYSDOT CLEAR

48% of all KSI Crashes

21% from the Town of Owego
15% from the Town of Candor
12% from the Town of Barton

Similarly, as shown in **Table 3.4**, Tioga County's top three municipalities – The Towns of Owego (21%), Candor (15%), and Barton (12%) – covered 48% of all KSI crashes in the county.

Table 3.4 Relative Share of Crashes by Severity Type – Tioga County

TIOGA COUNTY Municipality	K Crash (Fatal)	A Crash (Ser. Inj.)	KA Crash	KABC Crash (All Inj.)	Share of County K	Share of County A	Share of County KA	Share of County KABC
Town of Owego	4	31	35	201	16%	22%	21%	28%
Town of Candor	6	19	25	78	24%	14%	15%	11%
Town of Barton	3	16	19	54	12%	11%	12%	8%
Town of Tioga	1	17	18	65	4%	12%	11%	9%
Town of Nichols	0	17	17	47	0%	12%	10%	7%
Town of Newark Valley	3	9	12	37	12%	6%	7%	5%
Town of Richford	3	7	10	45	12%	5%	6%	6%
Town of Spencer	4	4	8	31	16%	3%	5%	4%
Village of Waverly	0	8	8	55	0%	6%	5%	8%
Village of Owego	0	7	7	61	0%	5%	4%	9%
Village of Spencer	0	3	3	10	0%	2%	2%	1%
Town of Berkshire	1	1	2	18	4%	<1%	1%	3%
Village of Newark Valley	0	1	1	6	0%	<1%	<1%	<1%
Village of Candor	0	0	0	2	0%	0%	0%	<1%
Village of Nichols	0	0	0	7	0%	0%	0%	1%
TOTAL	**25**	**140**	**165**	**717**	**100%**	**100%**	**100%**	**100%**

2019-2023
Source: NYSDOT CLEAR

Distribution of Severity within a Municipality

To understand which municipalities experienced comparatively higher shares of the most severe crashes within their borders, **Table 3.5** (Broome County) and **Table 3.6** (Tioga County) detail the share of KSI crashes compared to all injury crashes within each municipality.

Compared to a county-wide share of 1% of injury crashes categorized as fatal and 16% as serious injury, several municipalities within Broome County exhibited much higher rates. KSI crashes within Sanford (44%), Deposit (40%), Lisle (32%), and Barker (30%) accounted for nearly double the Broome County rate of 18%.

Table 3.5 Relative Share of Crashes by Severity Type by Municipality – Broome County

BROOME COUNTY Municipality	K Crash (Fatal)	A Crash (Ser. Inj.)	KA Crash	KABC Crash (All Inj.)	Pct. Fatal (Of All Inj. Crashes)	Pct. Ser. Inj.(Of All Inj. Crashes)	Pct. Fatal or Ser. Inj. (of All Inj. Crashes)
Town of Sanford	1	7	8	18	6%	39%	44%
Village of Deposit	2	0	2	5	40%	0%	40%
Town of Lisle	0	11	11	34	0%	32%	32%
Town of Barker	1	8	9	30	3%	27%	30%
Town of Binghamton	1	9	10	34	3%	27%	29%
Town of Triangle	1	4	5	17	6%	24%	29%
Town of Conklin	2	15	17	58	3%	26%	29%
Village of Port Dickinson	1	2	3	11	9%	18%	27%
Town of Windsor	3	15	18	66	5%	23%	27%
Town of Kirkwood	2	19	21	80	3%	24%	26%
Town of Fenton	2	11	13	51	4%	22%	26%
Town of Maine	5	18	23	91	6%	20%	25%
Town of Colesville	5	13	18	90	6%	14%	20%
Village of Lisle	0	1	1	5	0%	20%	20%
City of Binghamton	6	158	164	872	<1%	18%	19%
Town of Union	5	43	48	261	2%	17%	18%
Town of Dickinson	0	12	12	77	0%	16%	16%
Village of Johnson City	0	31	31	201	0%	15%	15%
Village of Endicott	1	55	56	377	<1%	15%	15%
Village of Whitney Point	0	3	3	22	0%	14%	14%
Town of Chenango	2	21	23	173	1%	12%	13%
Town of Nanticoke	0	2	2	18	0%	11%	11%
Town of Vestal	6	54	60	592	1%	9%	10%
Village of Windsor	0	1	1	10	0%	10%	10%
TOTAL	**46**	**513**	**559**	**3,193**	**1%**	**16%**	**18%**

2019-2023
Source: NYSDOT CLEAR

Similarly, within Tioga County, several municipalities also exhibited a relative share of KSI crash rate above 30%, including Nichols (36%), Barton (35%), Newark Valley (32%), Candor (32%), and Spencer (30%), compared to a county-wide rate of 23%.

It should be noted that although the outcomes in many smaller municipalities are more severe, there is also a substantially lower chance of experiencing a collision.

Table 3.6 Relative Share of Crashes by Severity Type by Municipality – Tioga County

TIOGA COUNTY Municipality	K Crash (Fatal)	A Crash (Ser. Inj.)	KA Crash	KABC Crash (All Inj.)	Pct. Fatal (Of All Inj. Crashes)	Pct. Ser. Inj.(Of All Inj. Crashes)	Pct. Fatal or Ser. Inj. (of All Inj. Crashes)
Town of Nichols	0	17	17	47	0%	36%	36%
Town of Barton	3	16	19	54	6%	30%	35%
Town of Newark Valley	3	9	12	37	8%	24%	32%
Town of Candor	6	19	25	78	8%	24%	32%
Village of Spencer	0	3	3	10	0%	30%	30%
Town of Tioga	1	17	18	65	2%	26%	28%
Town of Spencer	4	4	8	31	13%	13%	26%
Town of Richford	3	7	10	45	7%	16%	22%
Town of Owego	4	31	35	201	2%	15%	17%
Village of Newark Valley	0	1	1	6	0%	17%	17%
Village of Waverly	0	8	8	55	0%	15%	16%
Village of Owego	0	7	7	61	0%	12%	12%
Town of Berkshire	1	1	2	18	6%	6%	11%
Village of Candor	0	0	0	2	0%	0%	0%
Village of Nichols	0	0	0	7	0%	0%	0%
TOTAL	**25**	**140**	**165**	**717**	**4%**	**20%**	**23%**

2019-2023
Source: NYSDOT CLEAR

County Peer Comparison of Fatal Crash Rates

To better understand how the counties compare to other adjacent jurisdictions with similar residential populations in central New York, **Table 3.7** shows annual population-adjusted rates for fatal, non-intestate crashes across three levels – all fatal crashes, pedestrian-involved fatal crashes, and bicyclist-involved fatal crashes – per 100,000 residents based on data obtained from the National Highway and Traffic Safety Administration's (NHTSA) Fatality and Injury Reporting System Tool (FIRST).

Compared to the other eight counties, Broome had a relatively low overall fatal crash rate, a typical pedestrian-involved fatal crash rate, and a slightly lower than average bicyclist-involved fatal crash rate. Aside from Cortland, counties with under 50,000 residents, including Tioga County, had comparably higher overall fatal crash rates than the composite average, as well as those of the more populous counties assessed.

Counties with under 50,000 residents, including Tioga County, had comparably higher overall fatal crash rates than the composite average...

Table 3.7 Peer Comparison - Fatal Crash Rates per 100,000 Residents

County	Population	FATAL CRASHES ALL		FATAL CRASHES PEDESTRIAN-INVOLVED		FATAL CRASHES BICYCLIST-INVOLVED	
		5-Year Average Annual	Annual Average Per 100K Residents	5-Year Average Annual	Annual Average Per 100K Residents	5-Year Average Annual	Annual Average Per 100K Residents
Broome	**198,591**	**9.4**	**4.7**	**2.2**	**1.1**	**0.8**	**0.4**
Tompkins	102,237	7.0	6.8	1.8	1.8	0.8	0.8
Chemung	84,115	5.2	6.2	1.4	1.7	0.4	0.5
Otsego	58,524	3.4	5.8	0.4	0.7	0.4	0.7
Tioga	**48,567**	**6.2**	**12.8**	**0.6**	**1.2**	**0.0**	**0.0**
Chenango	47,220	6.8	14.4	0.6	1.3	0.8	1.7
Cortland	46,809	3.0	6.4	0.2	0.4	0.4	0.9
Delaware	44,308	5.8	13.1	0.6	1.4	0.0	0.0
Schuyler	17,898	2.0	11.2	0.2	1.1	0.0	0.0
ALL ABOVE	**648,269**	**48.8**	**7.5**	**8.0**	**1.2**	**3.6**	**0.6**

2019-2023
Source: NHTSA FIRST

Jurisdictional Analysis

This section discusses the location of crashes by severity across both counties based on roadway ownership (e.g., NYSDOT, counties, cities / towns / villages, etc.)[1]. **Table 3.8** and **Table 3.9** break down KABC crashes by jurisdiction for Broome and Tioga Counties respectively and includes the total share of roadway miles by jurisdiction.

Table 3.8 Relative Share of Crashes by Severity Type and Jurisdiction – Broome County

Jurisdiction (% of Mileage)	K Crash (Fatal)	A Crash (Ser. Inj.)	KA Crash	KABC Crash (All Inj.)	Owner Share of County K	Owner Share of County A	Owner Share of County KA	Owner Share of County KABC
State (14%)	20	162	182	1,123	43%	32%	33%	35%
County (17%)	9	84	93	408	20%	16%	17%	13%
Municipal (68%)	13	228	241	1,331	28%	44%	43%	42%
Unknown	4	39	43	331	9%	8%	8%	10%
TOTAL	**46**	**513**	**559**	**3,193**	**100%**	**100%**	**100%**	**100%**

Note: 1% of roadway miles classified as "Other."

2019-2023
Source: NYSDOT CLEAR

Table 3.9 Relative Share of Crashes by Severity Type and Jurisdiction – Tioga County

Jurisdiction (% of Mileage)	K Crash (Fatal)	A Crash (Ser. Inj.)	KA Crash	KABC Crash (All Inj.)	Owner Share of County K	Owner Share of County A	Owner Share of County KA	Owner Share of County KABC
State (13%)	16	52	68	326	64%	37%	41%	45%
County (13%)	4	26	30	122	16%	19%	18%	17%
Municipal (74%)	3	42	45	187	12%	30%	27%	26%
Unknown	2	20	22	82	8%	14%	13%	11%
TOTAL	**25**	**140**	**165**	**717**	**100%**	**100%**	**100%**	**100%**

Note: Less than 1% of roadway miles classified as "Other."

2019-2023
Source: NYSDOT CLEAR

State Roads

Regardless of the county assessed, most fatal crashes occur on state-owned roadways (43% in Broome, 64% in Tioga). State-owned roads accounted for 14% of non-interstate roadway mileage in Broome County and 13% in Tioga County. KSI crashes were relatively more common along state-owned roadways in Tioga County (41%) than Broome County (33%). The relative annual rates of a KSI crash per roadway mile were similar at one KSI crash per 7 state-owned miles in Broome County and 10 miles in Tioga County.

Muncipal Roads

Crashes resulting in a fatality or serious injury occurred more often along municipally-owned roadways in Broome County (43%) than in Tioga County (27%). Municipal-owned roadways account for the majority of non-interstate roadways in both counties, including 68% in Broome County and 74% in Tioga County. In a given year, this equated to approximately one KSI crash for every 27 municipally-owned roadway miles in Broome County and one for every 90 municipally-owned miles in Tioga County.

County Roads

For the county-owned roads, KSI crashes occurred at similar proportions in both counties (17% in Broome, 18% in Tioga), with a slightly higher representation of all injury crashes (KABC) on these roadways in Tioga County with 17% compared to 13% in Broome. This equated to one annual KSI crash for every 18 county-owned roadway miles in Broome and 23 county-owned miles in Tioga.

[1]"State" jurisdiction includes any crash coded in the CLEAR records as "NYSDOT" or "Other State Agency" jurisdiction. Similarly, crashes with a recorded jurisdiction of "City / Village" or "Town" were combined into a single "Municipal" category. The categories for "County" and "Unknown" include crashes where jurisdiction was formally recorded as such within the official crash records. Accounting for a small proportion of roadway miles within each county, "Other" jurisdictions (e.g., Private / Restricted Access, Army Corps of Engineers) were not included in this analysis. It should be noted that, within the crash records, there was one crash record where jurisdiction was coded as "Private / Restricted Access." However, all surrounding crashes were reflected as "Unknown." Given that the crash occurred on a public roadway and this study aims to cover all public accessways, that crash is reflected in the "Unknown" jurisdiction category within the subsequent tables for the sake of completeness and consistency.

Crash Characteristics

To address safety issues through design, it is important to understand the underlying characteristics typical among fatal and serious injury crashes. This section offers details on the key characteristics listed below. As opposed to Contributing Factors, which relate to the behavioral and decision-making elements of a crash, these two relatively objective sources of information serve as a technical foundation when developing and evaluating potential solutions to the safety problem at any given location.

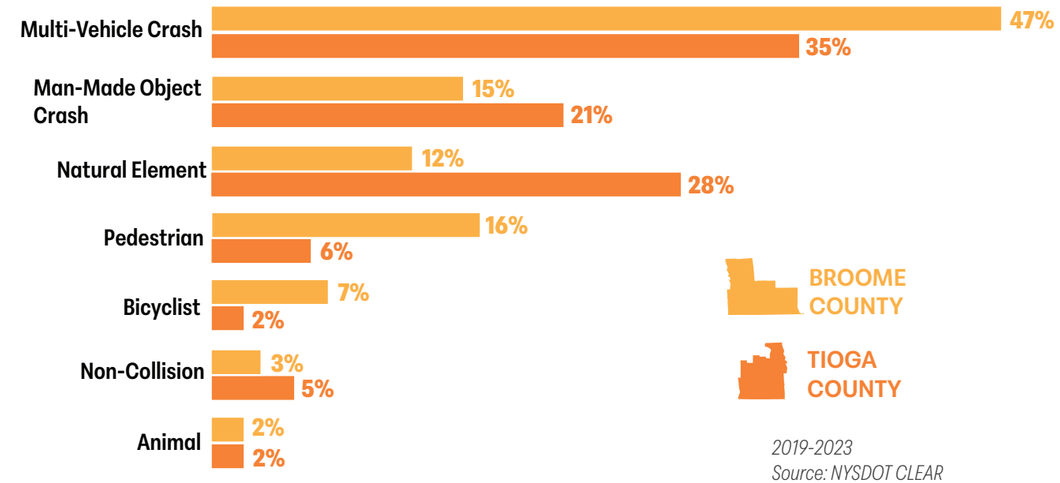
Collision Type

Figure 3.8 shows what the vehicle collided with (e.g., another vehicle, person walking or biking, a fixed object or natural element, an animal) when a crash resulted in a fatal or serious injury.

Approximately 47% of all fatal and serious injury crashes in Broome County were the result of a collision between two or more Motor Vehicles in Operation (MVIO).

Although Tioga County saw a lower share (35%), MVIO remained the primary collision type for KSI crashes in both counties. Beyond vehicle-on-vehicle crashes, collisions between a motor vehicle and a pedestrian, and collisions with fixed objects (i.e., utility pole, guardrail, etc.) or natural elements (e.g., tree, stone, embankment) comprised significant proportions of KSI crashes within both counties.

Figure 3.8 KSI Crashes by Collision Type



2019-2023
Source: NYSDOT CLEAR

Among KSI crashes, 23% involved someone walking or biking in Broome County compared to a share of 8% for Tioga County. For Broome, a high percentage of severe crashes involving people walking and biking is a concerning trend that warrants consideration for specific countermeasures oriented towards reducing impacts to this specific, inherently vulnerable set of user groups.

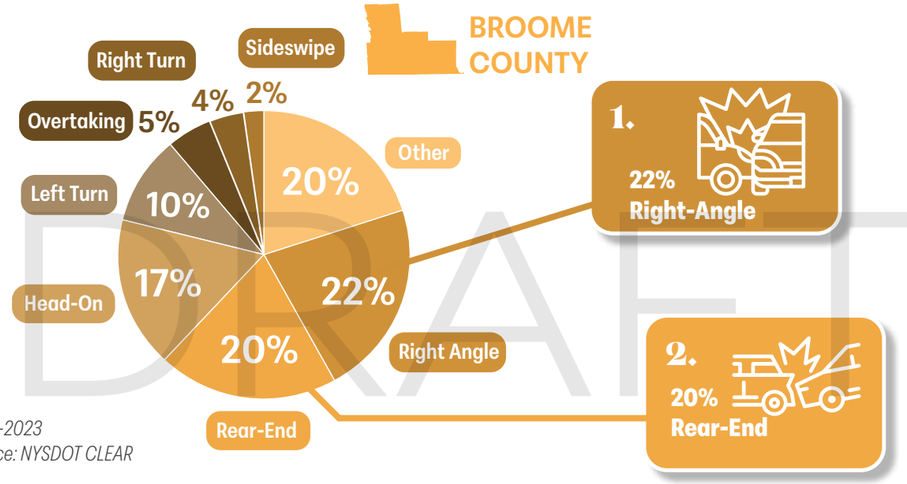
In Tioga County, collisions with fixed objects and collisions with natural elements, such as trees or stones, were far more prevalent than in Broome County, largely due to the rural, low-density nature of the county. Collisions with natural elements accounted for 28% of KSI crashes and collisions with a fixed object covering 21% of KSI crashes.

Crash Type

Crashes between two or more vehicles include many different crash types (e.g., head-on, sideswipe), each with their own set of relevant, effective, design-based safety countermeasures.

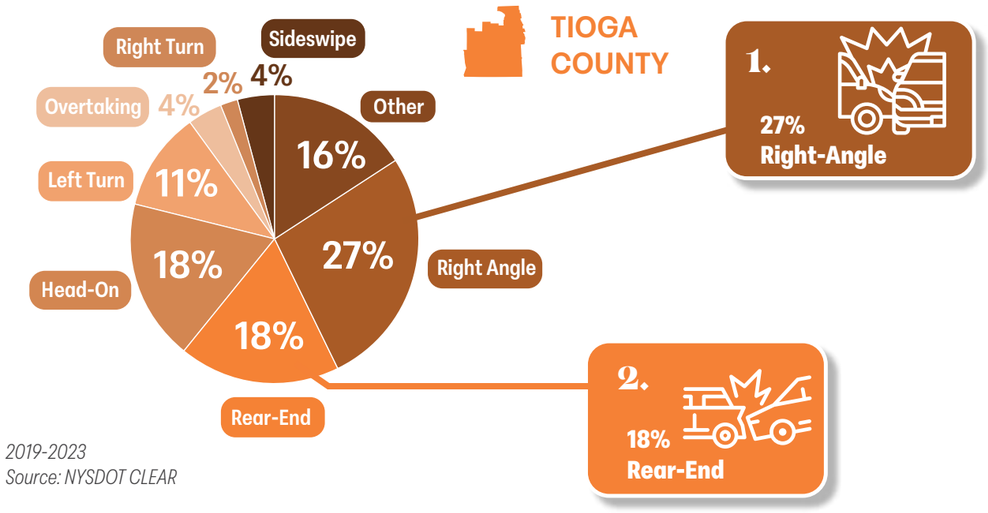
Among the fatal and serious injury collisions, crash types were largely consistent across both counties, with right-angle crashes comprising the largest proportion of KSI crashes in each – 22% in Broome (**Figure 3.9**) and 27% in Tioga (**Figure 3.10**) and rear-end coming in second with 20% in Broome County and 18% in Tioga.

Figure 3.9 KSI Crashes by Crash Type - Broome County



2019-2023
Source: NYSDOT CLEAR

Figure 3.10 KSI Crashes by Crash Type – Tioga County



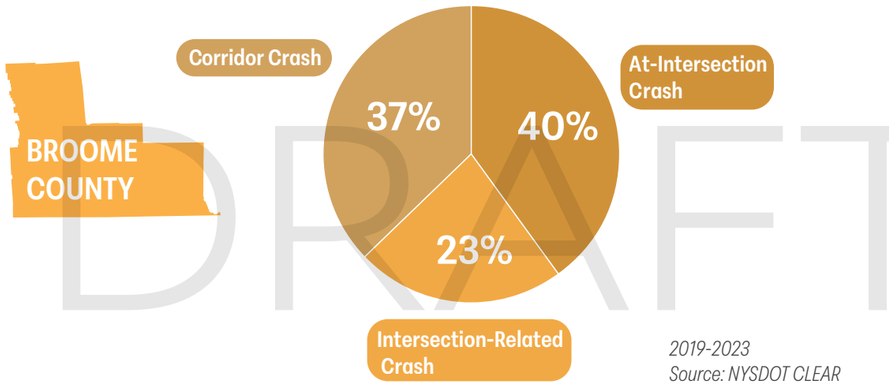
2019-2023
Source: NYSDOT CLEAR

Crash Location

Any potential engineering, design, or operational approach to addressing safety is fundamentally related to the nature of the location at which the crash occurred (i.e., near an intersection or along a segment). Understanding the prevalence of crashes by injury severity at these different location types is instrumental in helping determine both potential priority locations and the suite of relevant countermeasures that may be most appropriate to address the underlying crash risk. It should be noted that the NYSDOT CLEAR database defines three potential categories for crash location: At-Intersection, Intersection-Related and Not an Intersection (reflected as "Corridor" in the graphics).

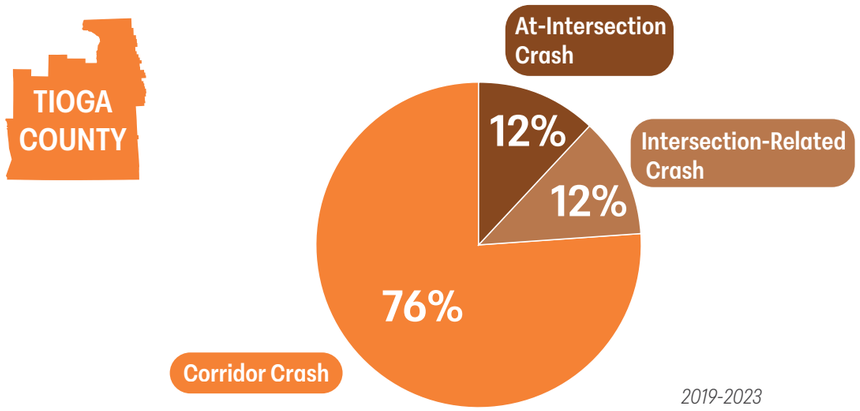
Figure 3.11 and **Figure 3.12** shows the share of KSI crashes by location type in each county. In Broome County, approximately 40% of fatal and serious injury crashes were recorded as At-Intersection. The remaining 60% were classified as either Corridor (37%) or Intersection-Related (23%). Within the less dense, more rural Tioga County, 76% of KSI crashes were explicitly coded as Corridor.

Figure 3.11 KSI Crashes by Crash Location - Broome County

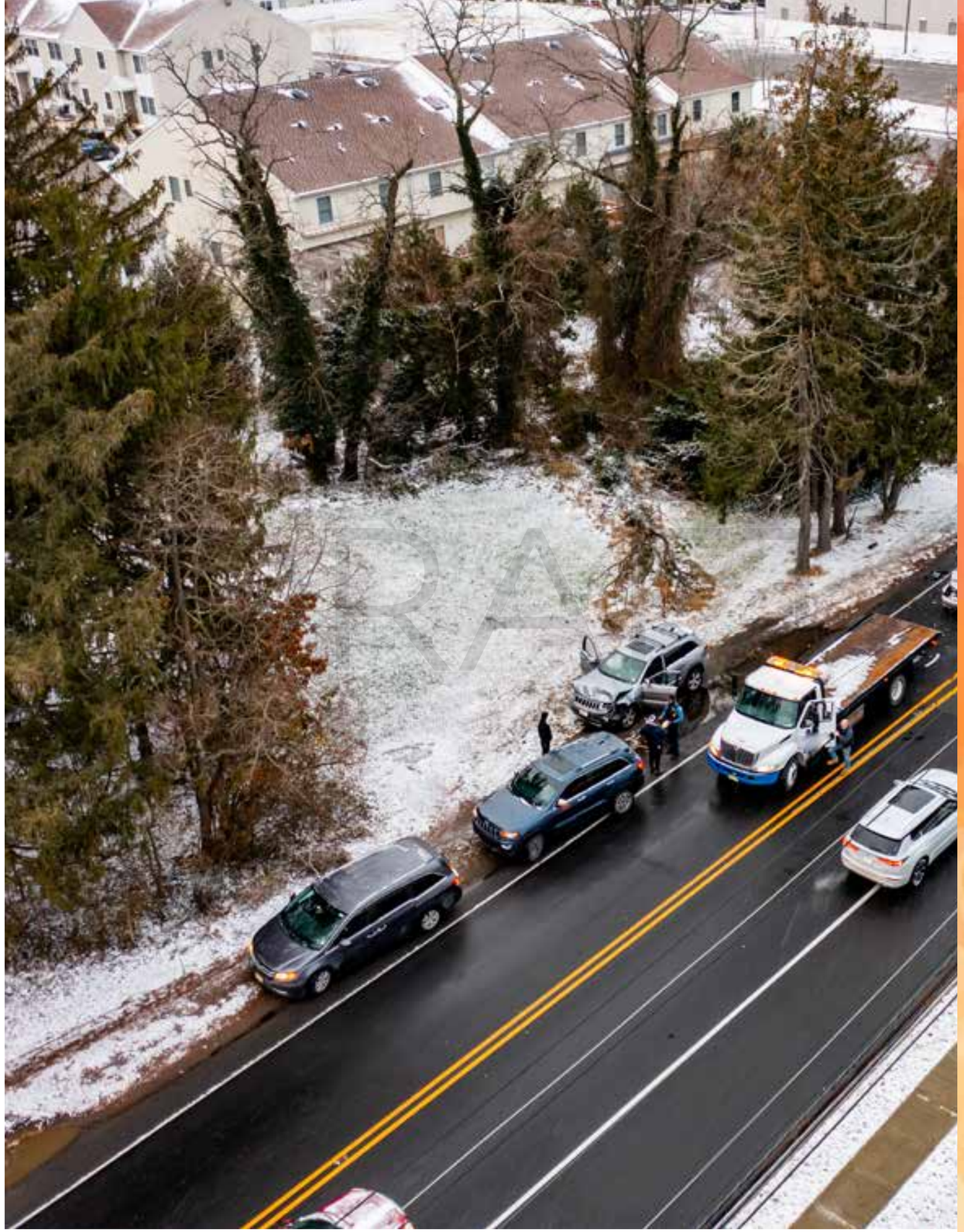


2019-2023
Source: NYSDOT CLEAR

Figure 3.12 KSI Crashes by Crash Location - Tioga County



2019-2023
Source: NYSDOT CLEAR



Contributing Factors

Beyond the primary characteristics of a crash event – what was involved, how it took place, where it occurred – CLEAR data provides additional details related to other factors that may have contributed to the reported collision. The records provide insight into a variety of other elements that may have contributed to the crash, including those listed below.

These factors directly impact the appropriate countermeasures for specific projects where a specific factor may be clustered. For example, if there are clusters of severe crashes occurring on a curved roadway, investigation into whether implementing guardrails, centerline rumble strips or other lane and roadway departure countermeasures would be warranted.

Physical Factors

roadway geometry, intersection control type, lighting presence

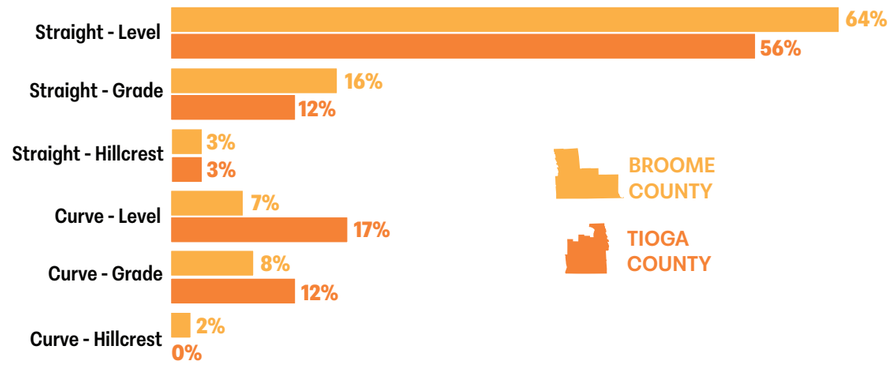
Roadway Geometry

One of the strengths of the NYSDOT CLEAR dataset is its data concerning horizontal and vertical curves. This information is particularly relevant given the topography of the region (i.e., a river valley with many hills and sharp bends).

Figure 3.13 shows the share of KSI crashes in each county based on the six unique combinations of horizontal and vertical curvature information. In both counties, corridor KSI crashes were most common on straight roadways (83% in Broome, 71% in Tioga). In Tioga County, the second most common were corridor crashes along horizontal curves at 29% of KSI crashes. By comparison, only 17% of Broome's KSI crashes were sited along a horizontal curve.

In both counties 24% of KSI crashes took place along a road segment with a vertical grade (i.e., up- or down-hill slope). KSI crashes at the top of a hillcrest were relatively uncommon (5% for Broome, 3% in Tioga). Roadways with both horizontal and vertical curvature (shown as "Curve – Grade" in the figure), which accounted for 8% KSI crashes in Broome County and 12% of KSI crashes in Tioga County, present a relatively unique and difficult case to address given the limited sight distance available.

Figure 3.13 Corridor KSI Crashes by Roadway Geometry

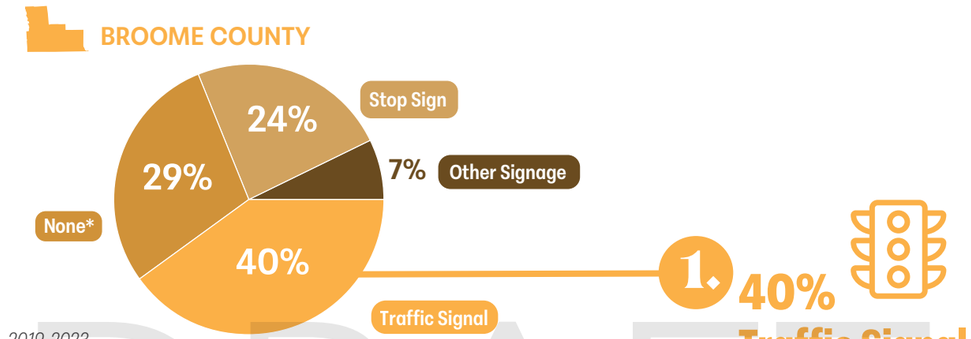


2019-2023
Source: NYSDOT CLEAR

Intersection Control Type

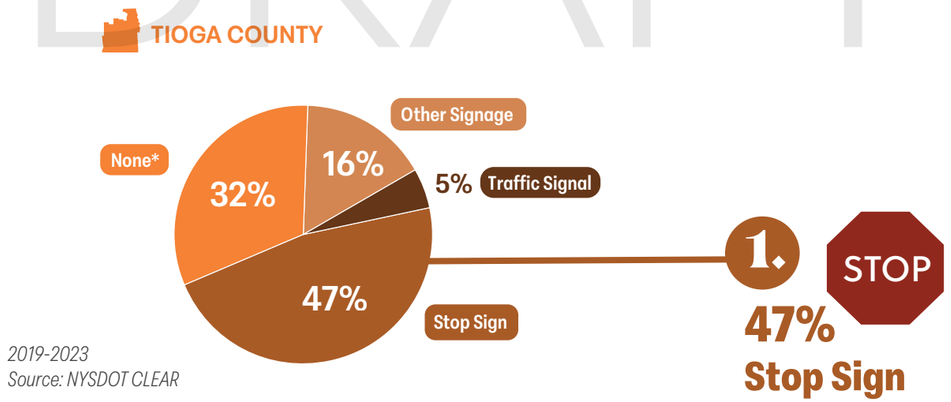
Figure 3.14 and **Figure 3.15** present the proportion of intersection-based KSI crashes based on the type of control (as coded in the crash report) in Broome and Tioga, respectively.

Figure 3.14 At-Intersection KSI Crashes by Control Type - Broome County



2019-2023
Source: NYSDOT CLEAR

Figure 3.15 At-Intersection KSI Crashes by Control Type - Tioga County



2019-2023
Source: NYSDOT CLEAR

* The "None" designation includes crashes for which no control mechanism was reported, as well as other common scenarios (e.g., vehicle involved had the right-of-way at the time of crash).

Broome County relies on a comparatively greater share of control devices at its intersections. Among Broome's intersection crashes, 40% occurred at a location where a traffic signal was present while 24% took place at a stop-controlled junction (**Figure 3.14**).

Tioga's more rural character results in more KSI crashes stop sign-controlled intersections, due to the more limited presence of traffic signal-controlled intersections. Nearly half (47%) of all "at-intersection" KSI crashes in Tioga County occurred at a stop sign-controlled intersection – nearly double the proportion for Broome County (**Figure 3.15**).

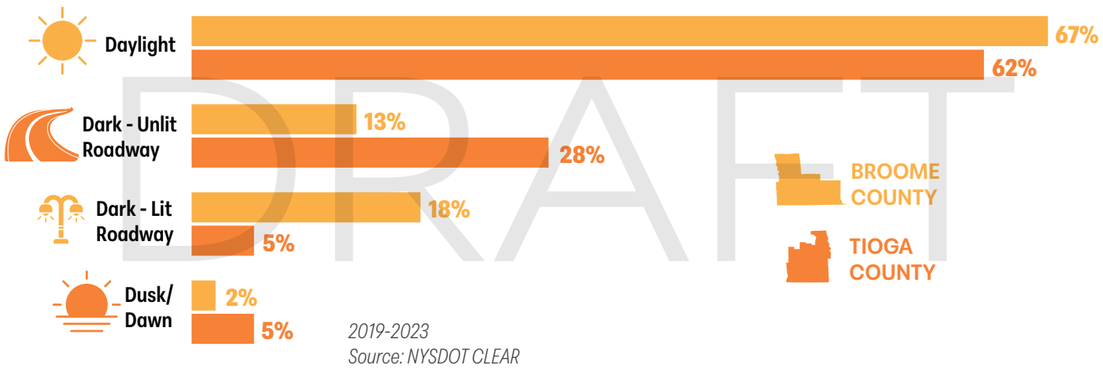
Across both counties, approximately 30% of intersection crashes took place at a location designated as "None." It should be noted that this does not necessarily indicate that a control mechanism was not present at or near the scene of the crash. This designation also covers crashes for which a traffic control device was present but the vehicle involved in the crash had the right-of-way.

Lighting Condition

Low visibility and poor lighting can contribute to more severe crash outcomes, particularly for crashes involving vulnerable road users and roadway departures. **Figure 3.16** presents the proportion of KSI crashes in each county based on time-of-day (daylight, dark, or dusk / dawn) and the presence of lighting elements during dark conditions (lit or unlit). In both counties, over 60% of KSI crashes took place during daylight hours. Tioga County exhibited a much more significant proportion of crashes that occurred in dark conditions along unlit roadways (28%).

Surprisingly, 18% of KSI crashes in Broome County took place in an area that included lighting elements.

Figure 3.16 KSI Crashes by Light Condition



2019-2023
Source: NYSDOT CLEAR

Environmental Factors

time of day

Temporal Distribution (Time-of-Day & Day-of-Week)

Table 3.10 shows a time-based listing of all 724 KSI crashes to highlight hotspots and identify temporal trends by time-of-day and day-of-week. By time-of-day, the highest share of crashes occurred in the 2:00 to 3:00 PM window (9%), with Monday's count reflecting the highest single contribution (nearly 2%). Consistent with afternoon activities and commuter peak periods, other significant time windows for KSI crashes included early afternoon (12:00 to 2:00 PM) and early evening (4:00 to 6:00 PM), each of which saw approximately 7% of KSI crashes. By day-of-week, compared to a uniform baseline of just over 14% for each of the seven days of the week, Saturdays (16%) and Mondays (16%) saw more KSI crashes than expected, with Wednesday experiencing the least (11%).

Table 3.10 Temporal Distribution of KSI Crashes

Hourly Window	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Total
12:00 AM	2			1	2	2	4	11
1:00 AM	1	2		2	1	4	3	13
2:00 AM	3	1	1				6	11
3:00 AM	4	2	3	1	1	1	5	17
4:00 AM	2			2			4	8
5:00 AM	1	1		2		2	3	9
6:00 AM	1		2	2	1	1		7
7:00 AM		6	6	2	4	3	2	23
8:00 AM	2	4	4	6	4	3	3	26
9:00 AM	1	7	3	3	2	4	3	23
10:00 AM	4	3	8	3	3	3	10	34
11:00 AM	7	6	8	6	4	7	4	42
12:00 PM	8	7	7	4	8	4	11	49
1:00 PM	9	7	6	4	10	6	7	49
2:00 PM	4	13	9	8	11	8	11	64
3:00 PM	2	6	8	6	4	4	6	36
4:00 PM	4	12	10	6	12	3	6	53
5:00 PM	9	12	8	4	8	8	3	52
6:00 PM	7	5	9	7	7	8	2	45
7:00 PM	9	6	6	3	7	5	5	41
8:00 PM	3	2	2	2	7	6	6	28
9:00 PM	4	6	5	2	9	5	7	38
10:00 PM	2	6	1		3	7	4	23
11:00 PM	3	2	2	5	2	4	4	22
TOTAL	**92**	**116**	**108**	**81**	**110**	**98**	**119**	**724**

2019-2023
Source: NYSDOT CLEAR

Traveler Behavior

unsafe speed, impairment (alcohol or illegal drugs), failure to yield, driver inattention, unsafe lane change, etc.

Across the 724 KSI crashes, a total of 1,094 contributing actions were reported. Thus, it should be recognized that the number of contributing actions reported for any given crash ranged from zero to multiple and was not limited to a single contributing action.

Table 3.11 highlights contributing factors that were reported in at least 10 KSI crashes over the five-year period. Taken together, the top three contributing factors – unsafe speed, failure to yield and driver inattention – were listed in over 50% of KSI crashes within both counties and amounted to 34% of all factors reported across KSI collisions in Broome/Tioga. Among the most reported contributing factors in KSI crashes, several involved driver behavior, particularly failure to yield, driver inattention, unsafe lane change, and following too close. These can be addressed by a combination of infrastructure-based countermeasures in addition to enforcement and education campaigns that serve to promote safer driving behaviors.

Some factors warrant additional description and discussion. For example, the difference between "Unsafe Lane Change" and "Passing / Unsafe Lane Usage." Typically, the former is related to merging or turning movements and not properly ensuring free space before making such a maneuver while the latter is broader and can include things such as inappropriate passing movements, weaving and other lane departures. Similarly, "Traffic Control Devices Disregarded" can include more than common actions like running a red light or stop sign. This contributing factor can also include cases such as disregarding "No Passing" signage or other safety control measures. "Obstructed View" can also encompass many conditions, ranging from a permanent physical obstruction (e.g., tree branch blocking view of stop sign) or a temporary condition (e.g., queued vehicle waiting to take a left-turn large truck preventing adequate sight distance for those making left-turns).

Table 3.11 Frequently Reported Contributing Actions for KSI Crashes

Contributing Action	Total Count	% of All Reported Contributing Actions	% Share in Broome	% Share in Tioga	% of Broome KSI Crashes	% Tioga KSI Crashes
Unsafe Speed	131	12%	64%	36%	15%	28%
Failure to Yield	119	11%	80%	20%	17%	15%
Driver Inattention	117	11%	88%	12%	18%	8%
Unsafe Lane Change	72	7%	68%	32%	9%	14%
Following Too Close	71	6%	82%	18%	9%	7%
Passing / Unsafe Lane Usage	60	5%	68%	32%	7%	12%
Traffic Control Devices Disregarded	59	5%	88%	12%	9%	4%
Alcohol	51	5%	73%	27%	7%	8%
Failure To Keep Right	39	4%	69%	31%	5%	7%
Slippery Pavement	32	3%	69%	31%	4%	6%
Lost Consciousness	31	3%	87%	13%	5%	2%
Turning Improper	25	2%	60%	40%	3%	6%
Illness	24	2%	75%	25%	3%	4%
Obstructed View	23	2%	91%	9%	4%	1%
Illegal Drugs	20	2%	95%	5%	3%	1%
Animals	20	2%	80%	20%	3%	2%
Driver Inexperience	20	2%	80%	20%	3%	2%
Aggressive Driving / Road Rage	16	1%	69%	31%	2%	3%
Fell Asleep	14	1%	50%	50%	1%	4%

2019-2023
Source: NYSDOT CLEAR

Unsafe Speeds

Speed acts as a direct input into crash severity. There are four main factors that contribute to the higher likelihood of severe outcomes among crashes involving unsafe speeds.

For vulnerable road users who lack the protection of a vehicle (e.g., those walking, biking, rolling, or using a motorcycle), higher speeds means there is a higher likelihood of a severe crash outcome, with survivability hovering around 75% at 30 mph, dropping to 50% near 30 mph, falling to 25% at 50 mph and shrinking to 10% just below 60 mph (**Figure 3.17**).

The only effective near-term influence that roadway officials can have on safety outcomes comes through speed management. Speed is a factor largely linked to roadway design (e.g., number of lanes, presence of median), geometry (e.g., horizontal curvature, approach angle, skew, vertical grades), intersection spacing, and intersection control type. Roadways designed for higher speeds frequently feature vehicle-oriented safety infrastructure, such as guardrails, medians and other deflection mechanisms.

Unsafe speed was listed as the top contributing factor, appearing in 12% of KSI crashes across both counties (**Table 3.11**). As seen in **Figure 3.20**, KSI crashes in Tioga County more frequently included unsafe speed as a contributing factor (28%), nearly double the share reported for Broome County (15%).

Higher Speed = More Kinetic Energy / Greater Impact Potential

Figure 3.17 Relationship Between Speed and Risk of Death

Source: USDOT & AAA Foundation for Traffic Safety

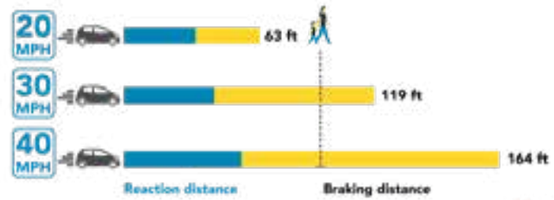
Higher Speed = Narrowed Field of Vision

Figure 3.19 Relationship between Speed and Field of Vision

Source: Vision Zero Network & NHTSA

Higher Speed = Increased Reaction & Braking Distance

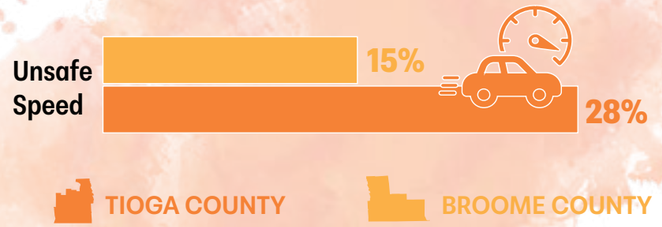
Figure 3.18 Perception-Reaction Time



Source: Vision Zero Network & NACTO

While Perception-Reaction Time May Be Consistent, Higher Vehicle Speeds Increase Distance Required to Avoid a Crash by Coming to a Complete Stop

Figure 3.20 Proportion of KSI Crashes Involving Unsafe Speeds



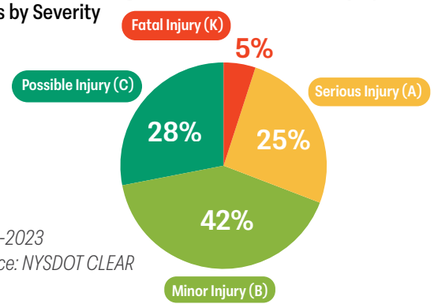
2019-2023 Source: NYSDOT CLEAR

Pedestrian-Involved Crashes

Crash Severity

Across Broome/Tioga, 8% of all injury crashes involved a pedestrian, rising to 14% when observing only fatal and serious injury crashes. This trend highlights the increased risk of a severe crash outcome for the least protected and slowest of road users (i.e., people walking). **Figure 3.21** shows the combined breakdown of each severity type across Broome/Tioga. **Table 3.12** displays the count of pedestrian-involved crashes by severity in both counties and across Broome/Tioga as a whole.

Figure 3.21 Boome/Tioga – Pedestrian-Involved Injury Crashes by Severity



2019-2023
Source: NYSDOT CLEAR

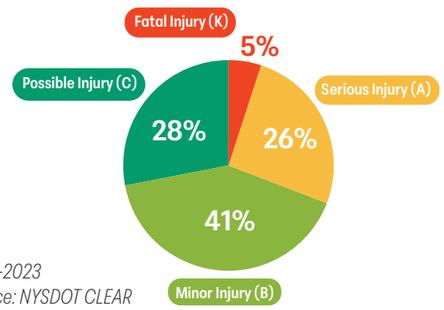
Table 3.12 Pedestrian-Involved Crashes by Severity by Geography

Crash Severity	Tioga County	Broome County	Broome/Tioga
Fatal Injury (K)	3	13	16
Serious Injury (A / SI)	7	75	82
KSI CRASHES	10	88	98
Non-Incapacitating Injury (B)	16	118	134
Possible Injury (C)	9	80	89
TOTAL	**35**	**286**	**321**

2019-2023
Source: NYSDOT CLEAR

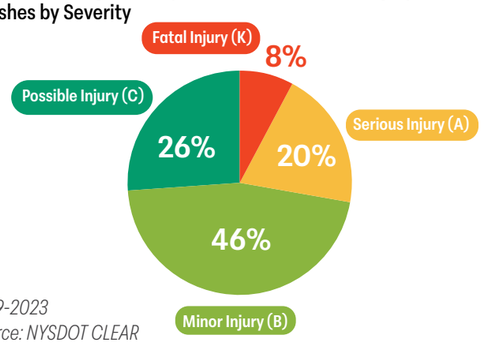
Figure 3.22 and **Figure 3.23** present the relative share of injury crashes by severity for pedestrian-involved collisions in each of the counties over the five-year period. At a county level, pedestrian-involved collisions were more common in Broome (9% of all injury crashes, 16% of KSI crashes) compared to Tioga (5% of all injury crashes, 6% of KSI crashes). When a pedestrian was involved, 31% of Broome's injury crashes led to a fatality (5%) or serious injury (26%). For Tioga County, 28% of pedestrian-involved injury crashes led to a fatality (8%) or serious injury (20%).

Figure 3.22 Broome County – Pedestrian-Involved Injury Crashes by Severity



2019-2023
Source: NYSDOT CLEAR

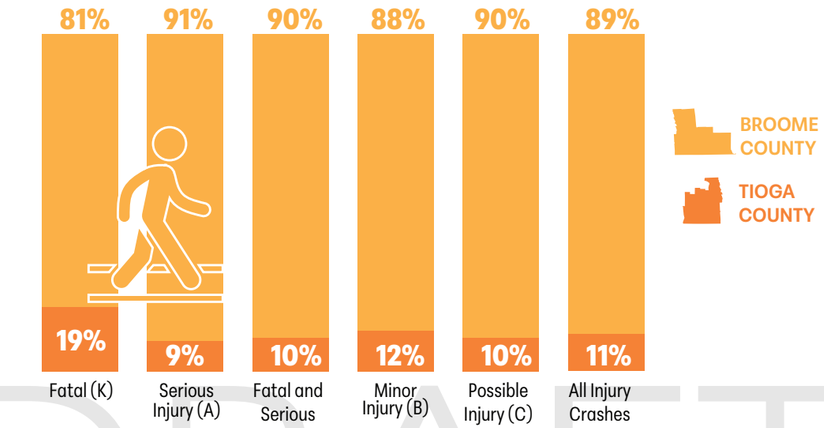
Figure 3.23 Tioga County – Pedestrian-Involved Injury Crashes by Severity



2019-2023
Source: NYSDOT CLEAR

The overwhelming majority of pedestrian-involved crashes occurred in Broome County, as shown in **Figure 3.24.**

Figure 3.24 Broome/Tioga – Pedestrian-Involved Injury Crashes – Severity Share by County



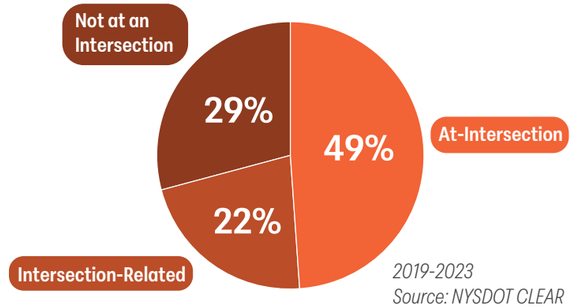
2019-2023
Source: NYSDOT CLEAR

Given the relatively minor share of pedestrian-involved collisions in Tioga County, the analysis of conditions related to these types of crashes is summarized across Broome/Tioga as a whole. This pedestrian crash analysis is based on all injury crashes, with the exception of the traveler behavior (contributing actions) section which investigates KSI crashes specifically.

Crash Location

As shown in **Figure 3.25**, approximately half (49%) of all pedestrian-involved injury crashes occur at intersections – the most common locations where pedestrians and vehicles are expected to interact. An additional 22% were coded as intersection-related, which means the crash was proximate to an intersection (but was not reported by the responding officer as having taken place at the intersection). The remaining 29% of pedestrian-involved crashes occurred along a roadway segment. Many of these are likely related to mid-block crossings, roadside incidents, or pedestrian presence in unexpected locations (i.e. crossing at a non-designated location).

Figure 3.25 Broome/Tioga – Pedestrian-Involved Injury Crashes by Crash Location



2019-2023
Source: NYSDOT CLEAR

Contributing Factors

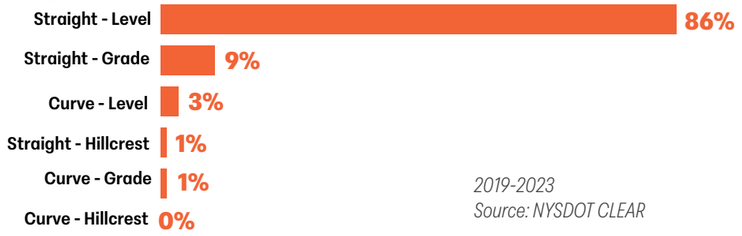
Physical Factors

Roadway Geometry

Roadway geometry does not appear to be a significant contributing factor to pedestrian-involved crashes, with 86% of injury crashes occurring on straight and level roadways (**Figure 3.26**)

Hills along a straight road accounted for 9% of pedestrian-involved injury crash locations. Approximately 5% of pedestrian-involved injury collisions took place along a horizontal curve or hillcrest.

Figure 3.26 Broome/Tioga – Pedestrian-Involved Injury Crashes by Roadway Geometry

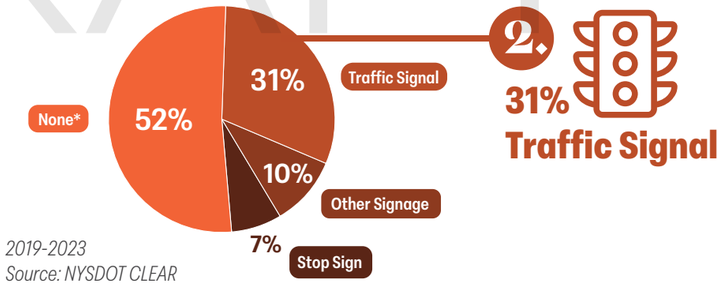


2019-2023
Source: NYSDOT CLEAR

Intersection Control Type

Intersections with traffic signal control accounted for 31% of pedestrian-involved injury collisions (**Figure 3.27**). Pedestrian-involved crashes across Broome-Tioga were found more often at intersections with other sign-based controls (10%) than at stop-controlled junctions (7%). As noted previously, "None" can correspond to locations without any form of control, as well as other cases where a control is present but the crash report indicates the vehicle involved had the right-of-way.

Figure 3.27 Broome/Tioga – At-Intersection Pedestrian-Involved Injury Crashes by Intersection Control Type



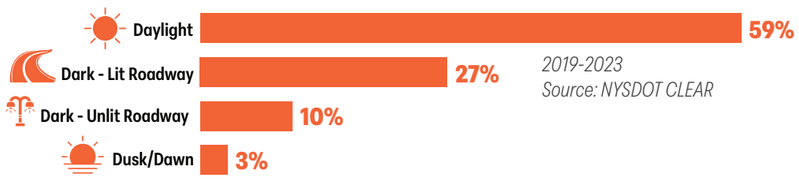
2019-2023
Source: NYSDOT CLEAR

* The "None" designation includes crashes for which no control mechanism was reported, as well as other common scenarios (e.g., vehicle involved had the right-of-way at the time of crash).

Lighting Condition

Similar to vertical and horizontal curves, lighting conditions do not appear to be a major contributing factor to pedestrian-involved injury crashes. A combined total of 86% of these crash types occurred under lit conditions, with only 10% occurring on unlit roadways (**Figure 3.28**). The remainder took place during low or dimly lit periods (dusk/dawn), with these cases likely influenced by glare and, as a result, reduced sightlines / visibility.

Figure 3.28 Pedestrian-Involved Injury Crashes by Light Condition



2019-2023
Source: NYSDOT CLEAR

Environmental Factors

Temporal Distribution (Time-of-Day & Day-of-Week)

As expected, most pedestrian-involved injury crashes occurred during daytime or early evening hours, when pedestrian activity is at its peak. The 4:00 PM to 7:00 PM block, which includes the hotspot of 5:00 to 6:00 PM (**Table 3.13**), accounted for over one-quarter of all pedestrian-involved injury crashes. Thursday and Monday account for one-third of all pedestrian-involved injury crashes, with the fewest crashes represented on weekend days.

Table 3.13 Broome/Tioga – Temporal Distribution of Pedestrian-Involved Injury Crashes

Hourly Window	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Total
12:00 AM	2			2				4
1:00 AM								0
2:00 AM	1		1					2
3:00 AM	2	1				1		4
4:00 AM							1	1
5:00 AM	1					1		2
6:00 AM					1		1	2
7:00 AM		3	1	3	1	1	1	10
8:00 AM	1	1	2	2	3	2	1	12
9:00 AM		2		1	1			4
10:00 AM		2	2	3	1		1	9
11:00 AM	2	7	6	4	2	6	2	29
12:00 PM	3	2	5	1	3	3	1	18
1:00 PM		1	3	5	5	2	3	19
2:00 PM	2	5	2	7	5	2	5	28
3:00 PM	1	3	3	6	3	2	1	19
4:00 PM		3	7		5	3	3	21
5:00 PM	4	9	4	4	6	9	4	40
6:00 PM	3	2	5	7	8	6		31
7:00 PM	4	3	3	1	1	2	1	15
8:00 PM	1	2	1	2	2	1	6	15
9:00 PM	2	4	4	3	5	3	2	23
10:00 PM	1	2		1	2	1	4	11
11:00 PM		1			1			2
TOTAL	**30**	**53**	**49**	**52**	**55**	**45**	**37**	**321**

2019-2023
Source: NYSDOT CLEAR

Traveler Behavior ("Contributing Actions")

Among the 98 KSI crashes that involved a pedestrian, there were a total of 83 reported contributing actions. These contributing actions were largely skewed towards a few common factors. **Table 3.14** outlines the Top 10 most reported contributing actions for KSI crashes involving a pedestrian. Nearly 90% of all reported actions among pedestrian-involved injury crashes fall within these ten categories. Driver Inattention was the most frequently reported contributing action for pedestrian-involved KSI crashes (27%), followed by Failure to Yield (13%).

Driver inattention contributed to **22 KSI crashes**

Failure to yield contributed to **13 KSI crashes**

Table 3.14 Broome/Tioga – Top 10 Contributing Actions in Pedestrian-Involved Fatal or Serious Injury Crashes

Contributing Action	Total Count	% of All Reported Contributing Actions	% of Region's Pedestrian-Involved KSI Crashes
Driver Inattention	22	27%	22%
Failure to Yield	13	16%	13%
Obstructed View	9	11%	9%
Traffic Control Device Disregarded	7	8%	7%
Impairment (Drugs/Alcohol)	5	6%	5%
Aggressive Driving/Road Rage	4	5%	4%
Unsafe Speed	3	4%	3%
Unsafe Backing	3	4%	3%
Glare	3	4%	3%
Turning Improper	2	2%	2%

2019-2023
Source: NYSDOT CLEAR

Photo: Robinson St crosswalk in Broome County

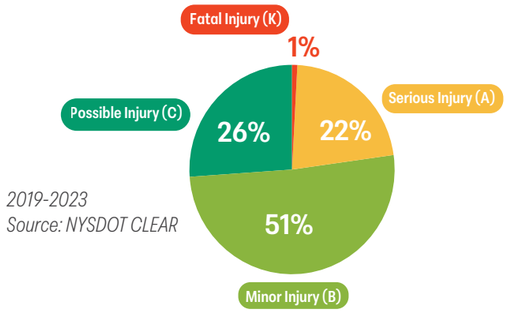
Photo: Cayuta Ave & Ithaca St crosswalk in Tioga County

Bicyclist-Involved Crashes

Crash Severity

Across Broome/Tioga, 4% of all injury crashes involved a bicyclist, rising to 6% when focusing on fatal or seriously injured collisions. As with those walking, this higher representation of cyclists involved in KSI crashes compared to all injury crashes demonstrates the inherent vulnerability of this user. **Figure 3.29** shows the proportion of bicyclist-involved injury crashes by severity throughout Broome/Tioga. **Table 3.15** presents the count cyclist-involved crashes by severity level in each county and across Broome/Tioga as a whole.

Figure 3.29 Broome/Tioga – Bicyclist-Involved Injury Crashes by Severity



2019-2023
Source: NYSDOT CLEAR

Table 3.15 Bicyclist-Involved Crashes by Severity by Geography

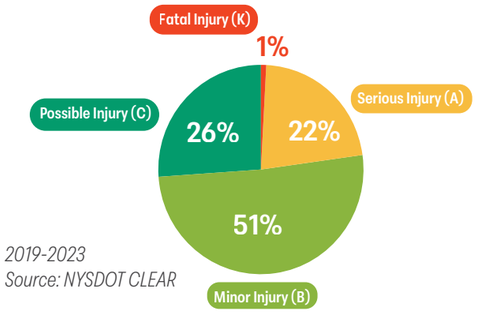
Crash Severity	Tioga County	Broome County	Broome/Tioga
Fatal Injury (K)	0	2	2
Serious Injury (A / SI)	4	35	39
KSI CRASHES	4	37	41
Non-Incapacitating Injury (B)	6	81	87
Possible Injury (C)	4	41	45
TOTAL	**14**	**159**	**173**

2019-2023
Source: NYSDOT CLEAR

Figure 3.30 and **Figure 3.31** show the share of injury crashes by severity for bicyclist-involved collisions for Broome and Tioga, respectively. Continuing the trend seen for pedestrians, bicyclist-involved injury collisions were more common in Broome (5% of all injury crashes, 7% of KSI crashes) than Tioga (2% of all injury crashes, 2% of KSI crashes).

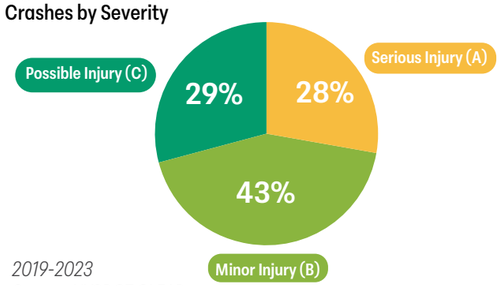
When a bicyclist was involved in an injury crash, 23% of Broome's injury crashes led to a serious injury (22%) or fatality (1%). For Tioga County exhibited a higher share of KSI outcomes among bicyclist-involved collisions (28%) but did not experience any bicyclist-involved fatalities during the period analyzed.

Figure 3.30 Broome County – Bicyclist-Involved Injury Crashes by Severity



2019-2023
Source: NYSDOT CLEAR

Figure 3.31 Tioga County – Bicyclist-Involved Injury Crashes by Severity

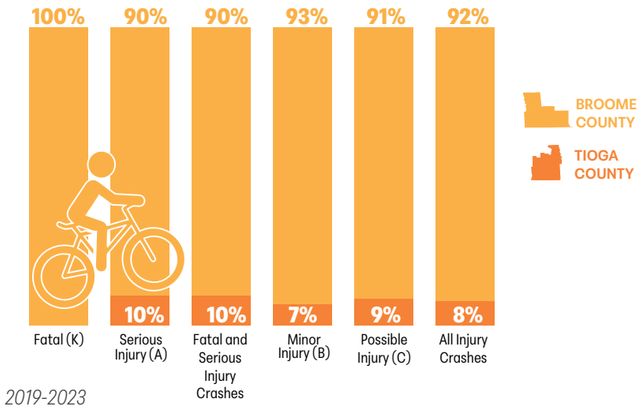


2019-2023
Source: NYSDOT CLEAR

Like the trend exhibited for pedestrian-involved injury crashes, Broome County was home to the majority of the bicyclist-involved injury crashes across Broome/Tioga (**Figure 3.32**).

Based on a relatively small share of bicyclist-involved injury crashes taking place in Tioga County, the analysis of conditions related to these types of crashes is summarized at the regional level. This bicyclist-involved crash analysis assesses all injury crashes, except for the travel behavior (contributing actions) section which orients specifically to KSI collisions.

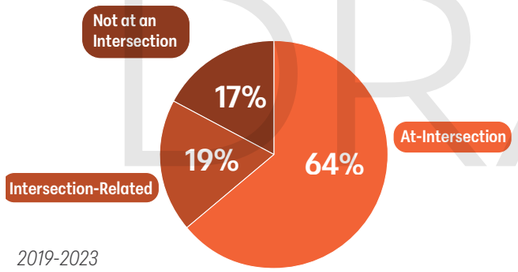
Figure 3.32 Bicyclist-Involved Crashes – Severity Share by County



2019-2023
Source: NYSDOT CLEAR

Crash Location

Figure 3.33 Broome/Tioga – Bicyclist-Involved Injury Crashes by Crash Location



2019-2023
Source: NYSDOT CLEAR

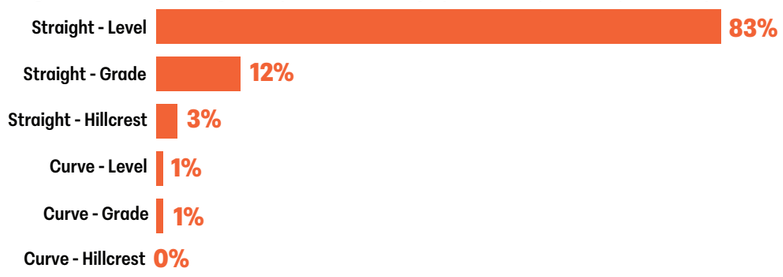
Contributing Factors

Physical Factors

Roadway Geometry

Similar to pedestrian-involved crashes, most injury crashes involving a bicyclist occurred on straight and level roadways, with an additional 15% occurring on straight roadways with either vertical deflection or at the crest of a hill where sightlines are limited. Relatively few crashes occurred at locations with horizontal deflection. As such, bicycle-specific interventions can largely be targeted on straight and level roadways to capture most injury-resulting bicycle crashes.

Figure 3.34 Broome/Tioga – Bicyclist-Involved Injury Crashes by Roadway Geometry



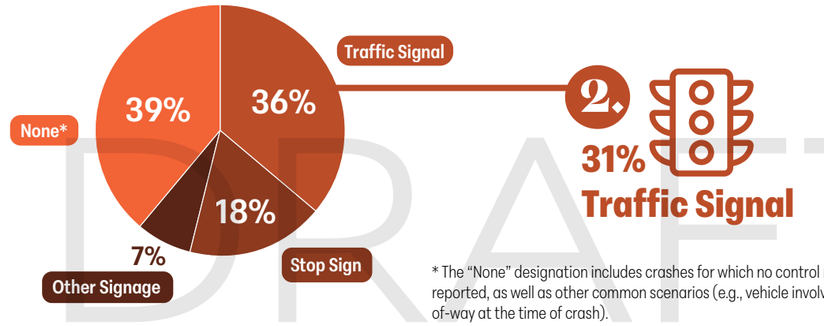
2019-2023
Source: NYSDOT CLEAR

Intersection Control Type

Figure 3.35 presents the type of control present at intersections where bicyclist-involved injury collisions occurred. When a bicyclist-involved injury crash took place at an intersection, 36% occurred at a traffic signal and 18% took place a stop-controlled junction. As noted previously, "None" can correspond to locations without any form of control, as well as other cases where a control is present but the crash report indicates the vehicle involved had the right-of-way.


Photo: Vestal Pkwy E & Rano Blvd in Broome County

Figure 3.35 Broome/Tioga – At-Intersection Bicyclist-Involved Injury Crashes by Intersection Control Type



* The "None" designation includes crashes for which no control mechanism was reported, as well as other common scenarios (e.g., vehicle involved had the right-of-way at the time of crash).

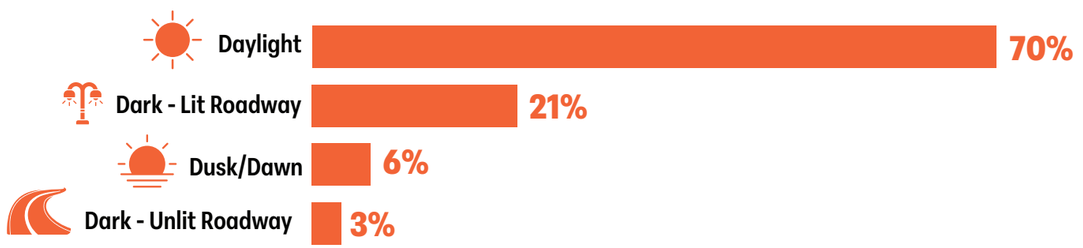
2019-2023
Source: NYSDOT CLEAR

Lighting Condition

As shown in **Figure 3.36**, light condition does not appear to be a major contributing factor for bicyclist-involved injury crashes. Only 3% of all bicycle crashes occurred along dark and unlit roadways; however, low-light conditions (dusk/dawn) accounted for an additional 6%.


Photo: Chemung St & Cayuta Ave in Tioga County

Figure 3.36 Broome/Tioga – Bicyclist-Involved Injury Crashes by Light Condition



2019-2023
Source: NYSDOT CLEAR

Environmental Factors

Temporal Distribution (Time-of-Day & Day-of-Week)

Bicyclist-involved injury crashes across Broome/Tioga were largely clustered on weekdays, as shown in **Table 3.16**. Relatively few occurred on Saturdays and Sundays, accounting for just 9% of crashes, each. A relatively even distribution of bicyclist-involved injury crashes was found among Tuesday, Wednesday, Thursday, and Friday, with each of these days accounting for approximately 17%, each. Time-of-day distribution is largely clustered in the late afternoon and early evening, with the 3:00 PM to 7:00 PM block accounting for 37% of all crashes. The 3:00 PM to 4:00 PM block and 6:00 PM to 7:00 PM block are largely consistent with school and work commuting patterns, respectively, which may result in increased bicycle activity during these periods.

Table 3.16 Temporal Distribution of Bicyclist-Involved Injury Crashes

Hourly Window	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Total
12:00 AM				1		1		2
1:00 AM						1	2	3
2:00 AM								
3:00 AM								
4:00 AM				1				1
5:00 AM			2					2
6:00 AM			1	2		2		5
7:00 AM	1	1		1		2		5
8:00 AM		1	3	1				5
9:00 AM		1	1	1			1	4
10:00 AM	2	1			1		1	5
11:00 AM	1	1	3				1	6
12:00 PM		1	2	1	2	1	2	9
1:00 PM	1		3	2	4	4		14
2:00 PM	1	1	2	3	2	2	1	12
3:00 PM		1	4	3	7	5	1	21
4:00 PM		7	1	1	2	2		13
5:00 PM		2		4	2	1	2	11
6:00 PM	4	2	3	6	2	2		19
7:00 PM	2		4	2	1		2	11
8:00 PM	2		2		2	3	1	10
9:00 PM		1	1	1	3			6
10:00 PM			1		1	3	1	6
11:00 PM	1				1	1		3
TOTAL	**15**	**20**	**33**	**30**	**30**	**30**	**15**	**173**

2019-2023
Source: NYSDOT CLEAR

Traveler Behavior ("Contributing Actions")

Among the 41 KSI crashes that involved a bicyclist, there were a total of 22 reported contributing actions. **Table 3.17** outlines the Top 10 contributing actions for bicyclist-involved KSI crashes. This list covers 100% of the contributing actions reported for these types of crashes. Reflecting a long-term struggle to be considered an equal user of the road, the leading contributing action for bicycle-involved KSI crashes was Failure to Yield (23%). Driver inattention was the second-most reported action for bicyclist-involved KSI crashes (18%).

Failure to yield contributed to **5 KSI crashes**

Driver inattention contributed to **4 KSI crashes**

Table 3.17 Broome/Tioga – Top 10 Contributing Actions in Bicyclist-Involved Fatal or Serious Injury Crashes

Contributing Action	Total Count	% of All Reported Contributing Actions	% of Region's Bicyclist-Involved KSI Crashes
Failure to Yield	5	23%	12%
Driver Inattention	4	18%	10%
Obstructed View	3	14%	7%
Unsafe Speed	2	9%	5%
Impairment (Drugs/Alcohol)	2	9%	5%
Passing/Unsafe Lane Usage	2	9%	5%
Turning Improper	1	5%	2%
Unsafe Lane Change	1	5%	2%
Passenger Distraction	1	5%	2%
Failure to Keep Right	1	5%	2%

2019-2023
Source: NYSDOT CLEAR

Summary Insights

Collision Type Trends

- Broome County: Multi-vehicle crashes; vulnerable road user crashes.
- Tioga County: Single-vehicle collisions with natural elements (e.g., trees) and fixed objects.

Crash Type Trends

- Broome County: Head-on, rear-end and right-angle crashes.
- Tioga County: Right-angle, rear-end, and head-on crashes.

Crash Location Trends

- Broome County: Larger emphasis on intersection crashes, particularly traffic signal controlled intersections. Corridor crashes are primarily straight, level roadways, but some with elevation change.
- Tioga County: Primarily straight, level roadways, with some KSI crashes related to curved roadways, particularly those with elevation change.

Environmental Factors (Time-Based Trends)

- 2:00 PM to 3:00 PM: highest one hour block over the five-year period.
- Afternoon (12PM – 4 PM) and Evening peak (4PM – 8PM) periods accounted for largest proportion of crashes at 27% and 26%, respectively.
- Monday, Thursday, Saturday accounted for ~50% of KSI crashes.
- Tioga County: Dark, unlit roadway crashes.

Traveler Behavior ("Contributing Actions") Trends

Top three contributing actions for KSI crashes in Boome and Tioga Counties:

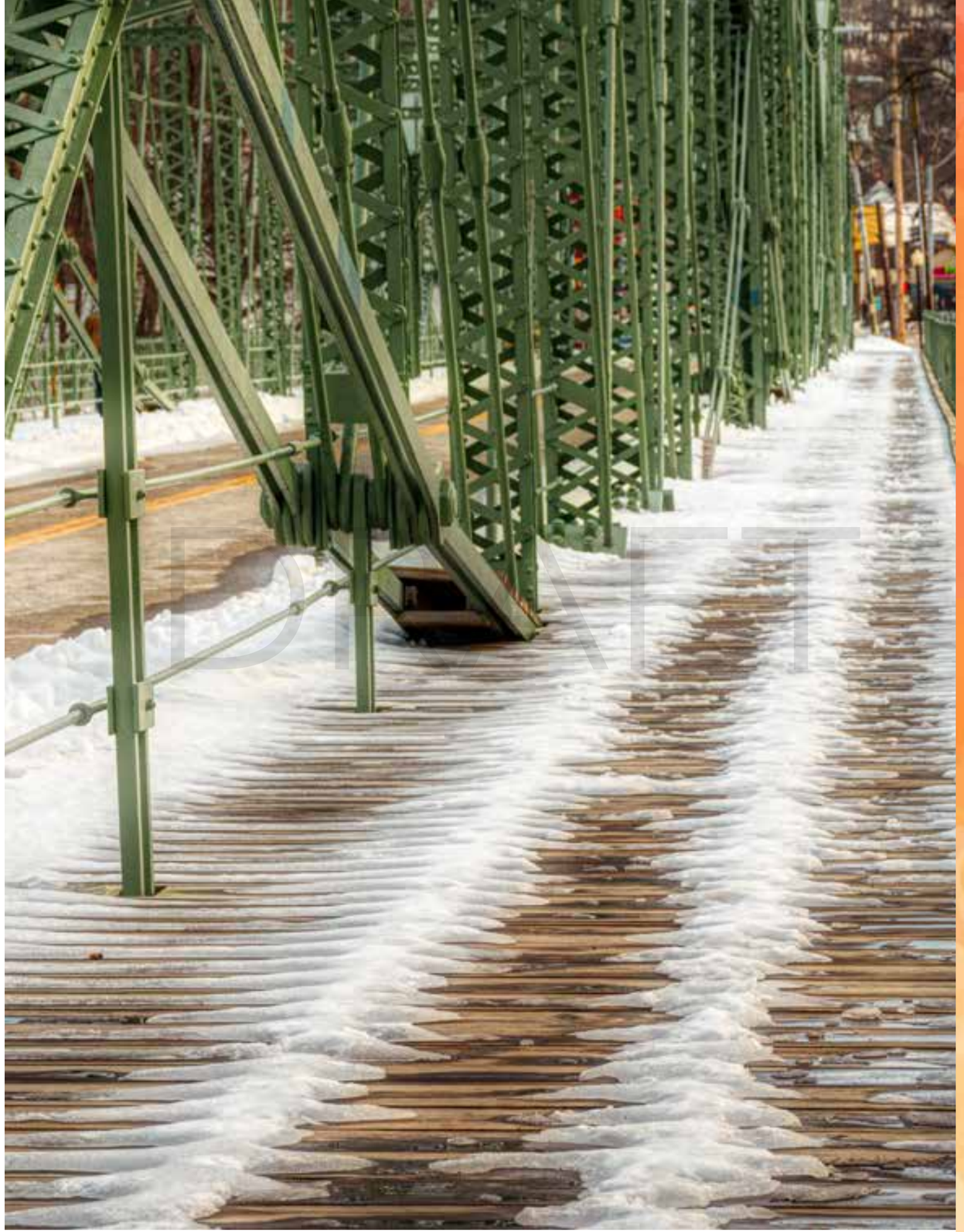
- Unsafe Speed
- Failure to Yield
- Driver Inattention

Pedestrian-Involved Injury Crash Trends

- Primarily within Broome County, typically at-intersection crashes, particularly those with no control mechanism reported or traffic signal-controlled crossings.
- Driver Inattention is a commonly reported traveler behavior associated with these crashes.
- Most crashes occur late afternoon (12PM – 4PM) or early evening (4PM – 8PM), with 5PM – 6PM accounting for the highest single-hour block.
- Roadway geometry and lighting conditions do not appear to be major contributing factors.
- Intersection layout and control and driver awareness are major contributing factors.

Bicyclist-Involved Injury Crash Trends

- Primarily Broome County, at-intersection crashes, more commonly spread across control types (i.e. stop sign-controlled intersections do not see a significantly lower representation like they do for pedestrian crashes.
- Failure to yield is the single most reported contributing driver action, with driver inattention a close second.
- Similar pattern of afternoon and early evening period crashes accounting for the majority of crashes; 3PM – 4PM and 6PM – 7PM, in particular.



4
High Injury Network

A High Injury approach identifies road segments and intersections for safety improvements based on the injury crash history at a particular location over a given period of time. This reactive, spatially-based High Injury approach focuses only on the extent to which injury crashes of varying severities have clustered at or near a given site in the recent past.

The "High Injury Network" (HIN) developed within this Safety Action Plan synthesizes the same five-year NYSDOT crash dataset to identify crash hotspots for segments (High Injury Corridors) and intersections (High Injury Intersections), with an emphasis on the highest concentrations of serious injury and fatal crashes. Past the crash maps and methodology summary that follow, Section High Injury Corridors and Section High Injury Intersections highlight the "High Injury Corridors" (segment-based crashes) and "High Injury Intersections" (intersection-based crashes) that comprise the overarching High Injury Network for each county.

Crash Maps

To provide an overall context for the High Injury Networks that follow, a series of county-level maps depicting the location of all injury crashes between 2019 and 2023 is provided in **Figure 4.1.**

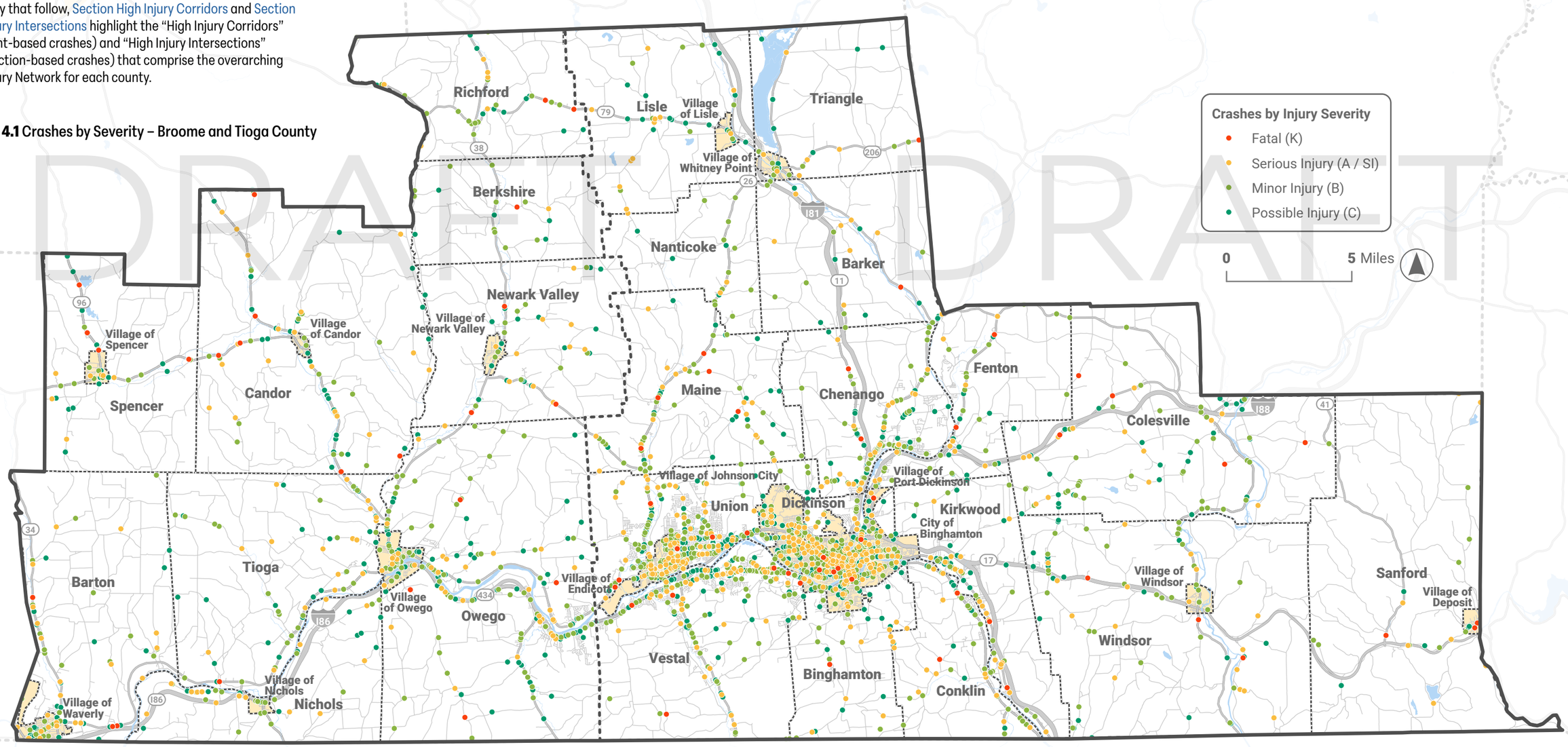


Figure 4.1 Crashes by Severity – Broome and Tioga County

2019-2023
Source: NYSDOT CLEAR

Overview of Methodology

Based on the highest injury severity level reported in the crash record, each collision with at least one injury (i.e. non-PDO) was assigned a maximum injury value (i.e., K, A, B or C). Like the crash analysis in Chapter 4, crashes occurring along interstate facilities and limited-access highways were filtered out from the underlying dataset that was used as the core input for the networks that follow. Each crash was assigned a weighting score based on the maximum injury severity for all parties involved, as shown in **Table 4.1.**

Table 4.1 High Injury Network – Injury Severity Weighting Scheme (Corridors & Intersections)

Crash Injury Severity Code	Severity Description	Other Terms Often Used	HIN Weight Applied
K	Fatal Injury	Killed	15
A / SI	Serious Injury	Incapacitating Injury	5
B	Minor Injury	Non-Incapacitating injury	2
C	Possible Injury	Complaint of Injury	1
O	No Injury	Property Damage Only	0

Each crash was then assigned to the most relevant nearby corridor or intersection based on the characteristics contained in the crash reports. For additional information on the methodology for the High Injury Network, please refer to Appendix – High Injury Network Methodology.

High Injury Corridors

A corridor qualified for the HIC portion of the HIN if it ranked in the Top 15% of all corridors in its respective county. To further understand the magnitude of the safety issue along each stretch and prioritize needs within the High Injury Corridors, segments were further subdivided to show the Top 10%, 5%, 3% and 1% of roadway segments in each county to identify key clusters of injury crashes.

As the HIC ranking expands from the Top 1% to the Top 15%, the share of injury crashes captured, regardless of severity, declines. This demonstrates that, based on the five-year crash history, the most critical, injury-causing locations are concentrated in the top segments of the HIC.

Broome County

Figure 4.2 displays the geographic distribution of all roadway segments comprising the HIC in Broome County by ranked percentile (e.g., Top 1%, Top 15%). The highest concentration of roadway segments that qualify as a High Injury Corridor can be found in the City of Binghamton and the Village of Endicott. While the highest ranked corridors are largely clustered in these more densely populated urban areas, some key regional corridors situated outside of these municipal and village centers also account for roadway segments within the top tiers of the HIC.

It should be noted that many of the bridge crossings, as well as their adjacent roadways, are ranked highly within the Broome County High Injury Corridors (e.g., Route 201, Tompkins St, Vestal Pkwy E., Court St, Chenango Bridge Rd). The following corridors span multiple municipal jurisdictions and feature substantial stretches of highly-ranked segments within the Broome County HIC, reflecting a well-established history of severe crash outcomes.

- Vestal Parkway East (Vestal – Binghamton)
- Union Center-Maine Highway (Endicott – Union – Maine) / Route 26 (Nanticoke)
- East Main Street (Endicott – Union)
- Front St (Binghamton) / Upper Front St (Dickinson – Chenango)
- Smith Hill Road (Chenango – Union)
- Route 79 (Windsor Town – Village)

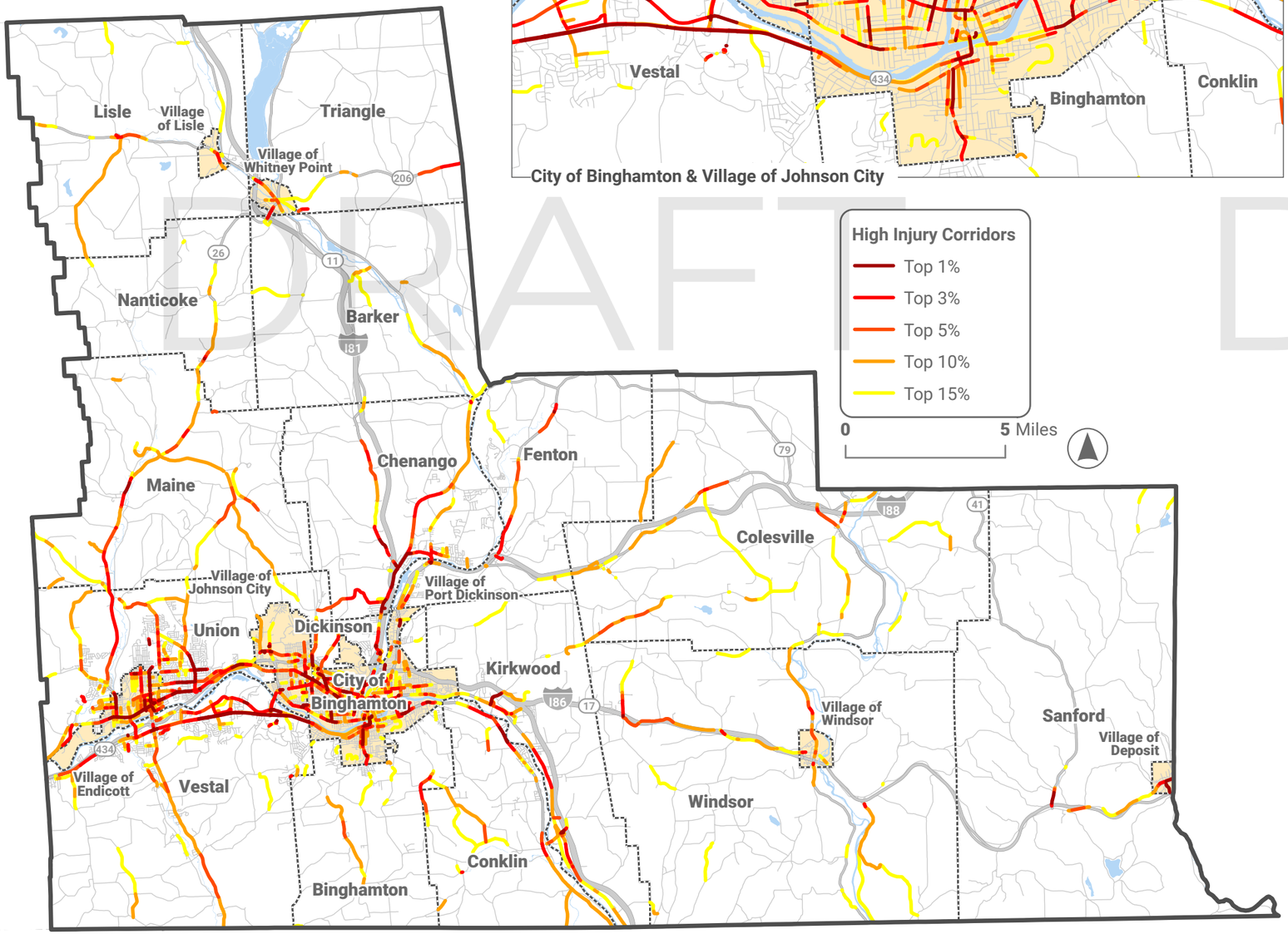
Based on a qualitative review of the HIC map, **Table 4.2** lists up to four facilities in each municipality ranked among the top segments within the Broome County HIC.

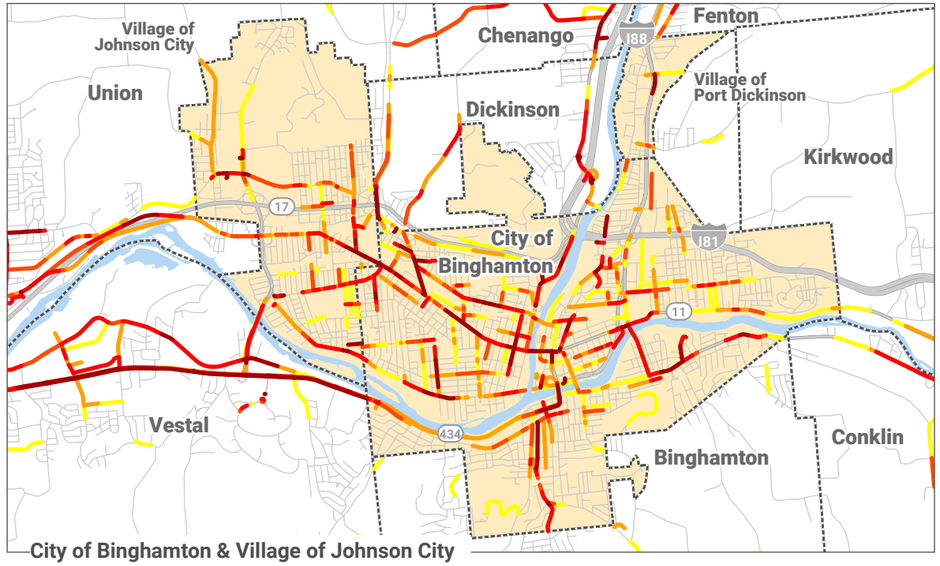
Photo: Vestal Parkway East (Vestal – Binghamton)

Photo: East Main Street (Endicott - Union)

Photo: Route 79 (Windsor Town - Village)

Figure 4.2 High Injury Corridors – Broome County





City of Binghamton & Village of Johnson City

Table 4.2 High Injury Corridors – Broome County – Notable Facilities by Municipality

BROOME COUNTY Town Name	HIC Facility #1	HIC Facility #2	HIC Facility #3	HIC Facility 4
Barker	Barker Rd	Route 79	Walters Rd	Route 11
Binghamton (C)	Main St	Clinton St	Tompkins St	Glenwood Ave
Binghamton (T)	Hawleyton Rd	Pierce Creek Rd	Morgan Rd	Park Ave
Chenango	Upper Front St	Route 12	Castle Creek Rd	Smith Hill Rd
Colesville	Route 79	Welton St	Colesville Rd	Route 7
Conklin	Conklin Rd (North)	Conklin Rd (South)	Pierce Creek Rd	Montrose Dr
Deposit	Oquaga Lake Rd	Second St	-	-
Dickinson	Airport Rd	Upper Front St	I-81 NB Exit 5 Ramps	-
Endicott	East Main St	N. Nanticoke Ave	Jennings St	Oak Hill Ave
Fenton	Route 369	Route 7B	Chenango St	Pigeon Hill Rd
Johnson City	Route 201 North	Riverside Dr	Reynolds Rd	Harry L. Dr
Kirkwood	Route 11 South	Route 11 North	Colesville Rd	Main St
Lisle (T)	Route 79	Church Rd	Caldwell Hill Rd	Route 11
Lisle (V)	River St	Main St	-	-
Maine	Route 26 South	Route 26 North	East Maine Rd	Farm to Market Rd
Nanticoke	Route 26 South	Route 26 North	Caldwell Hill Rd	-
Port Dickinson	-	-	-	-
Sanford	Route 41 near SR 17	Old Route 17 near SR 17	Stillson Rd	North Sanford Rd
Triangle	Chestnut Dr	Route 206 East	Route 206 West	-
Union	Union Center-Maine Hwy	East Main St	Hooper Rd	Watson Blvd
Vestal	Vestal Parkway	Vestal Rd	Route 201 North	Sycamore Rd
Whitney Point	Route 11 North	East Main St	Route 11 South	Route 26
Windsor (T)	Route 79	54	60	592
Windsor (V)	Main St (North of SR 17)	Main St (South of SR 17)	Chapel St	-

Table 4.3 shows the representation of fatal, serious injury, and all injury crashes within each rank of the Broome County High Injury Corridors. In Broome County, the Top 15% of corridors covered 100% of fatal, 96% of serious injury, and 89% of all injury, corridor-based crashes over the five-year period.

The bottom 85 percent (i.e., roads outside of the HIC or beyond the Top 15%) covered relatively few serious injury (4%) and only 11% of all injury crashes. The Top 1% in Broome includes 38% of fatal, 33% of serious injury, and 29% of all injury crashes. In aggregate, the Top 3% captures 68% of fatal, 59% of serious injury, and 50% of all injury crashes along corridors in Broome.

BROOME COUNTY

Table 4.3 Proportion of Segment-Based Crashes Covered by the HIC (by Severity Type) – Broome County

HIC Ranking	Fatal Injury (K) Crashes	Aggregate Share of K Crashes (%)	Serious Injury (A) Crashes	Aggregate Share of A Crashes (%)	KSI Combined	Aggregate Share of KSI Crashes (%)	All Injury Crashes (KABC)	Aggregate Share of Injury Crashes (%)
Top 1%	14	38%	98	33%	112	34%	534	29%
Top 3%	11	68%	76	59%	87	60%	379	50%
Top 5%	4	78%	33	70%	37	71%	227	63%
Top 10%	8	100%	51	87%	59	88%	338	81%
Top 15%	0	100%	28	96%	28	97%	142	89%
HIC TOTAL	**37**	**100%**	**286**	**96%**	**323**	**97%**	**1,618**	**89%**
Not In HIC	0	100%	11	4%	11	3%	202	11%
TOTAL	**37**	**100%**	**297**	**100%**	**334**	**100%**	**1,820**	**100%**

Table 4.4 examines how different towns within Broome County are represented within each rank across the HIC. For example, of the 22.4 roadway miles that comprise the Top 1% of the segment-based portion of the HIN, 24% are located within the Town of Vestal.

The Town of Vestal, City of Binghamton, and Town of Union accounted for the majority of roadway mileage falling within the aggregate Top 3% of HIN segments, indicating specific corridors in these municipalities are likely critical locations for safety interventions. Despite combining to account for 27% of the county's mileage, corridors in these three jurisdictions covered 58% of mileage in the Top 1% of the HIC, and 49% within the Top 3%. Other notable municipalities within the Top 10% and 15% ranks include Windsor, Maine, and Colesville. The "Not in HIC" column reflects segments with a crash history that fall outside the designated HIC.

BROOME COUNTY

Table 4.4 Relative Share of HIC Mileage by Municipality – Broome County

Town Name	Top 1%	Top 3%	Top 5%	Top 10%	Top 15%	Not in HIC	Total Mileage
Barker	0%	0%	0%	2%	5%	5%	4%
Binghamton (C)	22%	18%	14%	12%	12%	8%	9%
Binghamton (T)	0%	1%	2%	2%	3%	4%	3%
Chenango	10%	12%	7%	5%	2%	5%	5%
Colesville	0%	0%	6%	8%	12%	8%	8%
Conklin	2%	3%	4%	6%	4%	3%	3%
Deposit	2%	1%	0%	0%	0%	0%	0%
Dickinson	2%	3%	3%	2%	1%	1%	1%
Endicott	15%	6%	4%	5%	4%	2%	2%
Fenton	0%	4%	3%	4%	3%	5%	5%
Johnson City	4%	5%	5%	3%	3%	3%	3%
Kirkwood	3%	5%	3%	5%	6%	5%	5%
Lisle (T)	0%	0%	1%	5%	3%	4%	4%
Lisle (V)	0%	0%	0%	0%	0%	0%	0%
Maine	1%	4%	7%	11%	6%	4%	5%
Nanticoke	0%	0%	1%	1%	2%	2%	2%
Port Dickinson	1%	0%	0%	0%	0%	0%	0%
Sanford	1%	0%	1%	1%	2%	9%	8%
Triangle	0%	2%	2%	0%	2%	3%	3%
Union	12%	15%	13%	11%	8%	7%	8%
Vestal	24%	16%	16%	10%	10%	9%	10%
Whitney Point	0%	0%	1%	1%	1%	0%	0%
Windsor (T)	0%	2%	5%	7%	11%	9%	9%
Windsor (V)	0%	0%	1%	1%	0%	0%	0%
TOTAL MILEAGE	**22.4 mi.**	**45.2 mi.**	**45.3 mi.**	**112.4 mi.**	**113.3 mi.**	**1,928.3 mi.**	**2,266.9 mi.**

Tioga County

Figure 4.3 shows all HIC road segments in Tioga County based on ranked percentile. The highest concentration of High Injury Corridors is located in the Village of Owego. While the highest ranked corridors are largely clustered in these more densely populated villages (Owego, Spencer, Newark Valley, Candor, and Nichols), some key regional corridors situated outside of the village centers also account for high ranked segments of the HIC, including the towns of Owego, Spencer, Richford, Candor, and Newark Valley.

The following corridors cross municipal lines and appear prominently within the Tioga County HIC, demonstrated a substantial record of fatal and serious injury crashes.

- Waverly Rd / State Route 17C (Tioga – Owego Town – Village)
- Spencer Rd (Candor – Spencer)
- State Route 96 (Tioga – Candor)
- West River Rd (Nichols Town – Village)
- Ithaca Rd (Spencer Town – Village)
- Chemung St (Barton – Waverly – Barton)

Table 4.5 shows up to four facilities in each municipality ranked among the top segments within the Tioga County HIC based on a qualitative review of the map.

TIOGA COUNTY

Table 4.5 High Injury Corridors – Tioga County - Notable Facilities by Municipality

Town Name	HIC Facility #1	HIC Facility #2	HIC Facility #3	HIC Facility 4
Barton	SR 34 (North of Camptown Rd)	Route 17C	SR 34 (South of Talmadge Hill Rd)	Oak Hill Rd
Berkshire	East Berkshire Rd	West Creek Rd	-	-
Candor (T)	Spencer Rd	Park Settlement Rd	Owego Rd (Near Village)	Ithaca Rd
Candor (V)	Owego St	-	-	-
Newark Valley (T)	SR 38B	SR 38 (South of Village)	Newark Valley Maine Rd	Ketchumville Rd
Newark Valley (V)	Whig St	North Main St	South Main St	-
Nichols (T)	West River Rd	Stanton Hill Rd	East River Rd	Decker Hill Rd
Nichols (V)	West River Rd	South Main St	-	-
Owego (T)	SR 434 & SR 434 Connector	SR 17C	East Campville Rd	Lisle Rd
Owego (V)	North Ave	West Main St	Park St – Court St Couplet	Susquehanna River Bridge Rd
Richford	SR 79 East	SR 38 North	SR 79 West	West Creek Rd
Spencer (T)	Ithaca Rd	Candor Rd East	Sabin Rd	Dean Creek Rd
Spencer (V)	North Main St	Owego St	East Tioga St	Center St
Tioga	SR 96	Glenmary Dr	Waverly Rd	West Beecher Hill Rd
Waverly	Chemung St (near Barton)	Ithaca St	Pine St	Waverly St

Figure 4.3 High Injury Corridors – Tioga County

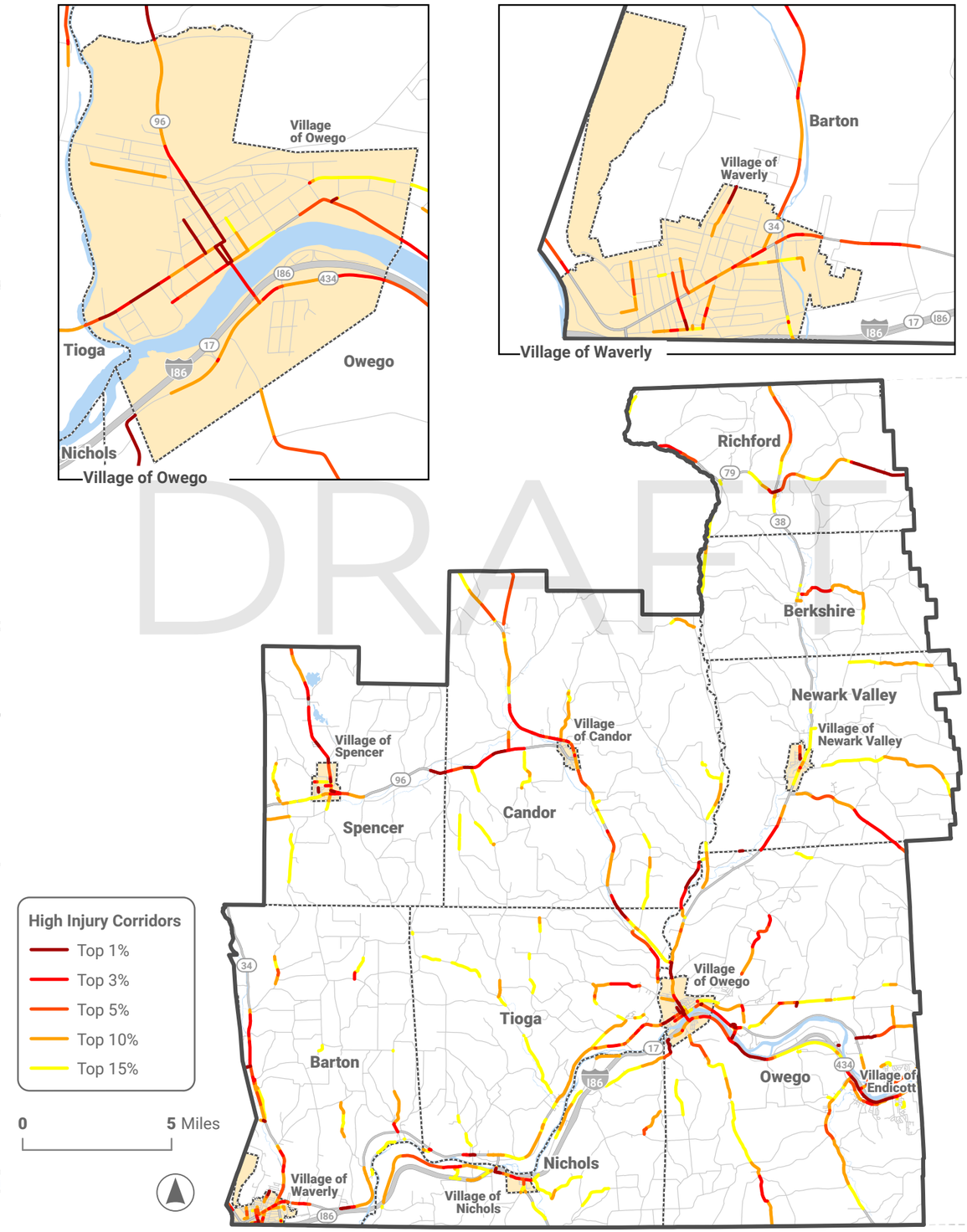


Table 4.6 shows how fatal, serious, and all injury crashes are concentrated at different levels within the Tioga County HIC. The Top 1% of corridors account for 50% of fatal, 25% of serious injury, and 17% of all injury crashes in Tioga County, indicating a high concentration of severe incidents in a small portion of the network. The Top 3% covers a combined 92% of fatal, 42% of serious injury, and 34% of all injury crashes. All but one fatal and serious injury crash was captured in the Tioga County HIC, with only 16% of all injury crashes distributed across the bottom 85% (i.e., off the HIC).

TIOGA COUNTY

Table 4.6 Proportion of Segment-Based Crashes Covered by the HIC (by Severity Type) – Tioga County

HIC Ranking	Fatal Injury (K) Crashes	Aggregate Share of K Crashes (%)	Serious Injury (A) Crashes	Aggregate Share of A Crashes (%)	KSI Combined	Aggregate Share of KSI Crashes (%)	All Injury Crashes (KABC)	Aggregate Share of Injury Crashes (%)
Top 1%	12	50%	31	25%	43	29%	107	17%
Top 3%	10	92%	24	45%	34	53%	104	34%
Top 5%	2	100%	18	60%	20	66%	81	47%
Top 10%	0	100%	34	88%	34	90%	152	71%
Top 15%	0	100%	14	99%	14	99%	76	84%
HIC TOTAL	**24**	**100%**	**121**	**99%**	**145**	**99%**	**520**	**84%**
Not In HIC	0	100%	1	1%	1	1%	101	16%
TOTAL	**24**	**100%**	**122**	**100%**	**146**	**100%**	**621**	**100%**

Table 4.7 shows the distribution of each HIC category across Tioga County municipalities. For example, of the 13.0 roadway miles that comprise the Top 1% of the segment-based portion of the HIN, 38% are located within the Town of Owego.

The Town of Owego is substantially over-represented within the Top 10%, particularly the Top 1% (38%), Top 5% (24%), and Top 10% (27%). The Town of Candor also shows consistently high shares, notably for the Top 3% (19%) and Top 5% (19%). Given its relatively small share of county mileage, the Town of Richford also has a notable share in the Top 1% (16%) and Top 5% (11%). In addition to these, the towns of Tioga, Newark Valley, and Barton also had strong showings within the higher ranks of the HIC (Top 10% and Top 15%). The "Not in HIC" column reflects segments with a crash history that fall outside the designated HIC.

TIOGA COUNTY

Table 4.7 Relative Share of HIC Mileage by Municipality – Tioga County

Town Name	Top 1%	Top 3%	Top 5%	Top 10%	Top 15%	Not HIC	Total Mileage
Barton	4%	12%	10%	9%	6%	13%	13%
Berkshire	0%	3%	2%	3%	3%	5%	4%
Candor (T)	13%	19%	19%	11%	16%	15%	15%
Candor (V)	0%	0%	0%	1%	0%	0%	0%
Newark Valley (T)	1%	10%	4%	9%	8%	7%	7%
Newark Valley (V)	1%	0%	1%	0%	1%	1%	1%
Nichols (T)	2%	2%	7%	10%	12%	8%	8%
Nichols (V)	0%	2%	1%	1%	1%	0%	0%
Owego (T)	38%	21%	24%	27%	21%	21%	22%
Owego (V)	10%	4%	4%	4%	1%	2%	2%
Richford	16%	4%	11%	5%	6%	6%	6%
Spencer (T)	7%	8%	2%	5%	5%	8%	7%
Spencer (V)	3%	3%	2%	1%	1%	0%	1%
Tioga	4%	9%	8%	12%	17%	11%	11%
Waverly	2%	2%	4%	3%	1%	2%	2%
TOTAL MILEAGE	**13.0 mi.**	**26.4 mi.**	**26.3 mi.**	**66.5 mi.**	**66.2 mi.**	**1,124.1 mi.**	**1,322.5 mi.**

High Injury Intersections

Broome County

Figure 4.4 shows the geographic distribution of the Top 100 intersections in Broome County. The HII is highly concentrated in Union, Vestal and the City of Binghamton. As shown in **Table 4.8**, the Top 100 intersections capture 58% of all "At-intersection" crashes that resulted in a fatal or serious injury, as well as 42% of all injury crashes. All nine fatal crashes occurred within the Top 40.

Table 4.8 Broome County High Injury Intersections – Injury Crashes Coverage Summary

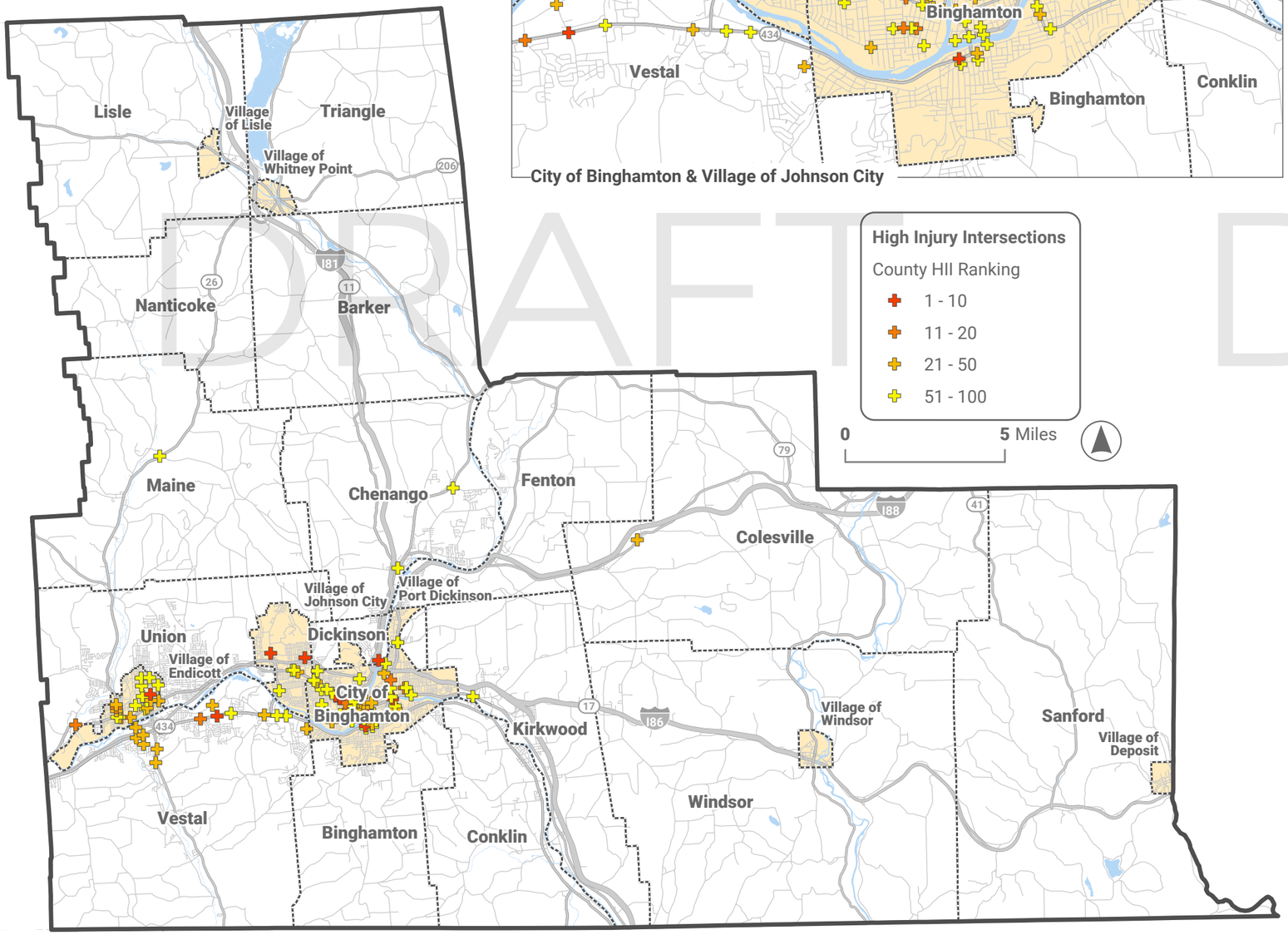
County Intersection Ranking	Fatal Injury (K) Crashes	Aggregate Share of K Crashes (%)	Serious Injury (A) Crashes	Aggregate Share of A Crashes (%)	KSI Combined	Aggregate Share of KA Crashes (%)	All Injury Crashes (KABC)	Aggregate Share of Injury Crashes (%)
Top 10	0	0%	26	12%	26	12%	120	9%
Top 20	3	33%	14	19%	17	19%	60	13%
Top 40	6	100%	27	31%	33	34%	97	20%
Top 60	0	100%	24	42%	24	44%	122	29%
Top 80	0	100%	16	50%	16	52%	91	36%
Top 100	0	100%	14	56%	14	58%	80	42%
HIC TOTAL	**9**	**100%**	**121**	**56%**	**130**	**58%**	**570**	**42%**
Not In HIC	0	100%	95	44%	95	42%	801	58%
TOTAL	**9**	**100%**	**216**	**100%**	**225**	**100%**	**1,371**	**100%**

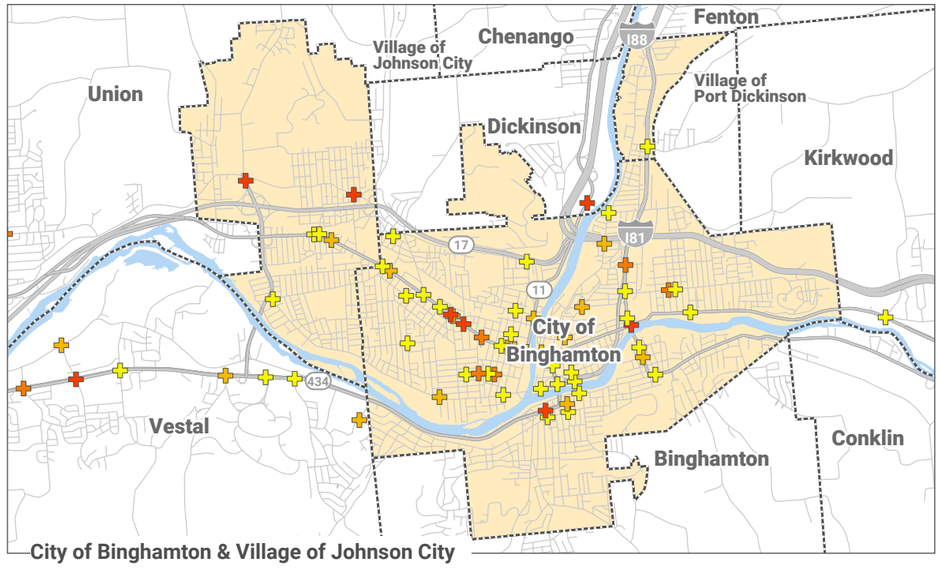
Table 4.9 shows the share of intersections in each municipality for different ranks within the HII. The City of Binghamton accounts for the single largest representation of intersections within each HII category, accounting for half of the intersections included in each with the exception of the Top 40 (i.e., for ranks 21 – 40). Outside of the City of Binghamton, urbanized areas, including Endicott and Vestal, account for significant shares of intersections falling within the intersection component of the HIN. Many of the Top 20 intersections fall within these three communities, with minor representation from Johnson City (two in Top 10), Union (two in Top 11-20), and Dickinson (1 in Top 10).

Table 4.9 Relative Share of HIC Mileage by Municipality – Broome County

BROOME COUNTY Town Name	Top 1-10	Top 11-20	Top 21-40	Top 41-60	Top 61-80	Top 81-100	Not in HII	Total
Barker	0%	0%	0%	0%	0%	0%	1%	1%
Binghamton (C)	50%	50%	45%	50%	55%	55%	22%	23%
Binghamton (T)	0%	0%	0%	0%	0%	0%	3%	3%
Chenango	0%	0%	0%	0%	0%	10%	5%	5%
Colesville	0%	0%	5%	0%	0%	0%	3%	3%
Conklin	0%	0%	0%	0%	0%	0%	3%	3%
Deposit	0%	0%	0%	0%	0%	0%	1%	1%
Dickinson	10%	0%	0%	0%	0%	0%	2%	2%
Endicott	10%	20%	15%	25%	20%	20%	7%	7%
Fenton	0%	0%	0%	0%	0%	0%	3%	3%
Johnson City	20%	0%	5%	0%	5%	10%	9%	8%
Kirkwood	0%	0%	0%	0%	0%	5%	3%	3%
Lisle (T)	0%	0%	0%	0%	0%	0%	1%	1%
Lisle (V)	0%	0%	0%	0%	0%	0%	0%	0%
Maine	0%	0%	0%	5%	0%	0%	2%	2%
Nanticoke	0%	0%	0%	0%	0%	0%	1%	0%
Port Dickinson	0%	0%	0%	0%	5%	0%	1%	1%
Sanford	0%	0%	0%	0%	0%	0%	1%	1%
Triangle	0%	0%	0%	0%	0%	0%	1%	1%
Union	0%	20%	0%	0%	0%	0%	17%	16%
Vestal	10%	10%	30%	20%	15%	0%	13%	13%
Whitney Point	0%	0%	0%	0%	0%	0%	1%	1%
Windsor (T)	0%	0%	0%	0%	0%	0%	2%	2%
Windsor (V)	0%	0%	0%	0%	0%	0%	1%	0%
TOTAL INTERSECTIONS	**10**	**10**	**20**	**20**	**20**	**20**	**4,714**	**4,814**

Figure 4.4 Top 100 High Injury Intersections – Broome County





City of Binghamton & Village of Johnson City

Table 4.10 lists the Broome County HII's Top 20 intersections with the most severe crash history based on the same injury severity scheme that was used for the HIC. Most locations have no fatal crashes, but many have multiple serious injury crashes, indicating that while deadly crashes are relatively rare, the most severe outcomes tend to be clustered at a limited number of specific intersections.

The Vestal Parkway East, Court Street, and Main Street corridors each had two intersections listed in the Top 10 entries. Several intersections, such as Leroy Street and Chapin Street, show fewer total crashes but a high number of serious injuries, signaling severity hotspots or the location of a fatal crash. The "Two-County Rank" reflects the intersection's overall position across the combined Broome/Tioga study area. The top 32 HII locations in the Broome/Tioga region are located in Broome County, though the table below only shows the Top 20.

BROOME COUNTY

Table 4.10 Intersection-Based Crash Counts and Rankings for the Top 20 HII (by Severity Type) – Broome County

County Rank	Two-County Rank	Cross-Streets	Fatal Injury (K) Crashes	Serious Injury (A / SI) Crashes	KSI Crashes Combined	All Injury (KABC) Crashes
1	1	Court St & Brandywine Ave	0	3	3	22
2	2	Vestal Parkway E. & S. Washington St	0	5	5	14
3	3	Vestal Parkway E. & Sycamore St	0	1	1	18
4	4	Main St & Beethoven St	0	4	4	9
5	5	State Highway 201 & Harry L. Dr	0	0	0	14
6	6	Court St & State St	0	2	2	13
7	7	Upper Front St & Bevier St	0	2	2	8
8	8	North St & McKinley Ave	0	3	3	8
9	9	Main St & Jarvis St	0	3	3	7
10	10	Harry L. Dr & Lester Ave	0	3	3	7
11	11	Leroy St & Chapin St	1	1	2	2
12	12	Main St & Edwards St	0	3	3	7
13	13	E. Main St & S Loder St	0	2	2	9
14	14	State Rte. 7 & Frederick St	0	0	0	11
15	15	N. Nanticoke St & Jennings Ave	0	3	3	5
16	16	Vestal Parkway E. & N. African Road	0	1	1	9
17	17	Hooper Dr & Country Club Rd	1	0	1	3
18	18	Leroy St & Chestnut St	0	2	2	6
19	19	Robinson St & Ely St	0	2	2	6
20	20	W. Main St & Glendale Dr	1	0	1	2

Tioga County

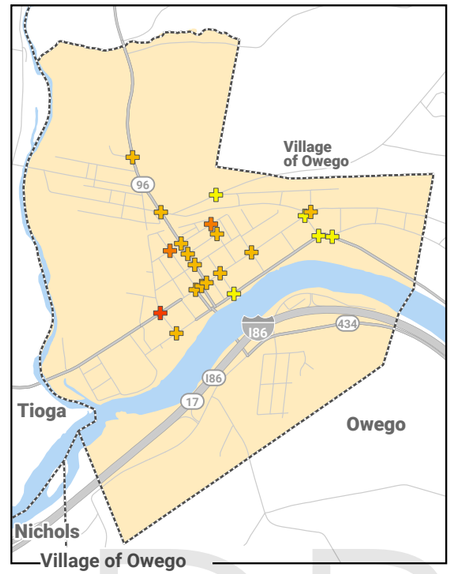
Figure 4.5 shows the Top 100 High Injury Intersection locations within Tioga County. There are clusters of HII locations within Waverly, Owego (both town and village), and Barton. Except for the Village of Candor, each municipality in Tioga County had at least one intersection identified within the Top 100, demonstrating a more widespread distribution than Broome.

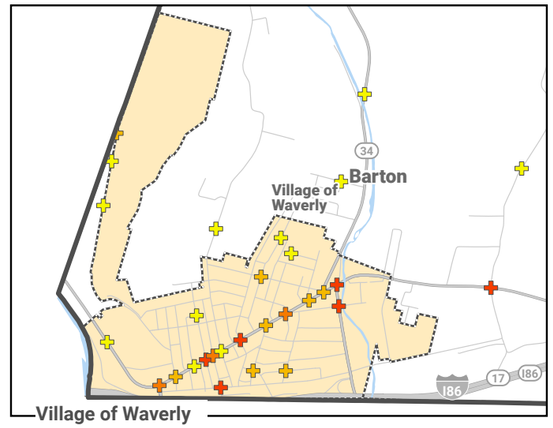
As shown in **Table 4.11**, the lone At-intersection fatal crash in Tioga County is captured in the Top 10; all severe injury crashes are accounted for within the Top 20; and all injury crashes, regardless of severity, are accounted for within the Top 80 intersections. This indicates that most At-intersection crashes resulting in an injury in Tioga County are clustered in relatively few geographic locations.

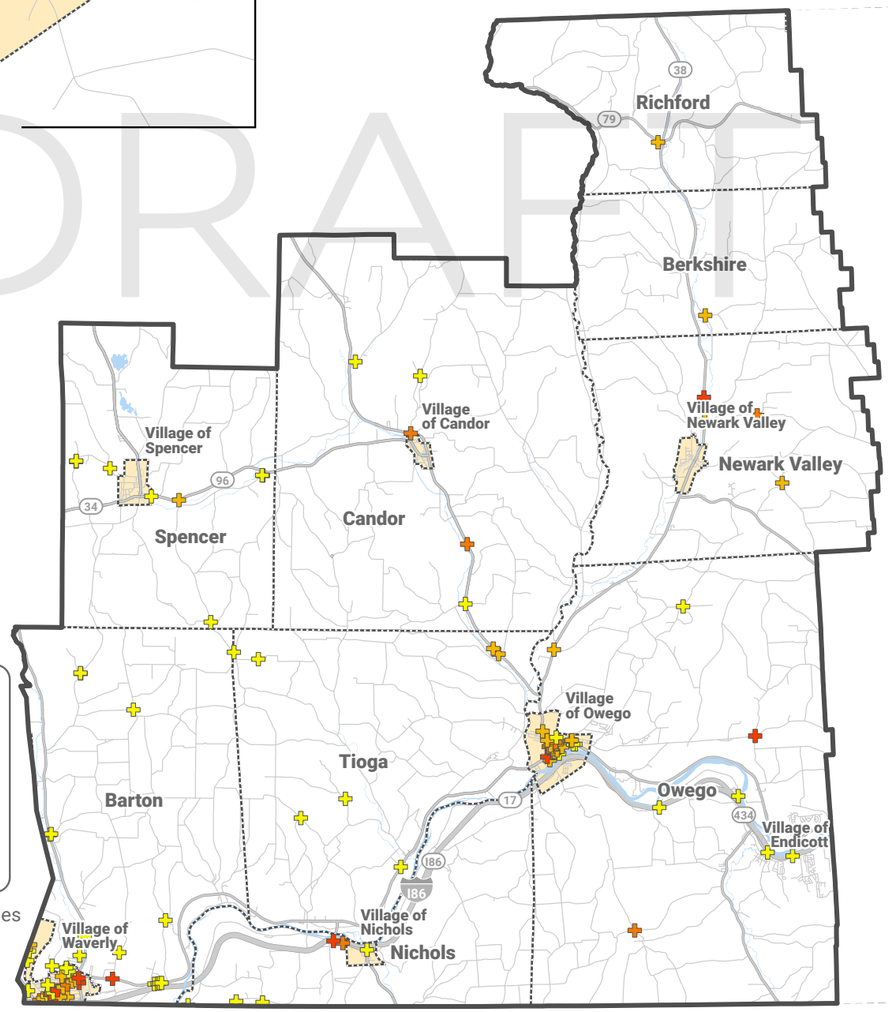
Table 4.11 Tioga County High Injury Intersections – Injury Crashes Coverage Summary

County Intersection Ranking	Fatal Injury (K) Crashes	Aggregate Share of K Crashes (%)	Serious Injury (A) Crashes	Aggregate Share of A Crashes (%)	KSI Combined	Aggregate Share of KSI Crashes (%)	All Injury Crashes (KABC)	Aggregate Share of Injury Crashes (%)
Top 10	1	100%	9	50%	10	53%	27	28%
Top 20	0	100%	9	100%	9	100%	16	45%
Top 40	0	100%	0	100%	0	100%	25	71%
Top 60	0	100%	0	100%	0	100%	22	94%
Top 80	0	100%	0	100%	0	100%	6	100%
Top 100	0	100%	0	100%	0	100%	0	100%
High Injury Intersections Total	**1**	**100%**	**18**	**100%**	**19**	**100%**	**96**	**100%**
Not In HII	0	100%	0	100%	0	100%	0	100%
Total	**1**	**100%**	**18**	**100%**	**19**	**100%**	**96**	**100%**

Figure 4.5 Top 100 High Injury Intersections – Tioga County







As shown in **Table 4.12**, 22% of the Top 100 intersections in Tioga County are located within the Village of Waverly, while only accounting for 8% of the County's intersections. Similarly, despite a relatively small share of county-wide mileage, the Village of Owego accounts for another 21% of the Top 100, with strong representation within the Top 40. Intersections falling within the Top 100 clustered around the urbanized village centers.

Table 4.12 Relative Share of High Injury Intersections by Municipality – Tioga County

TIOGA COUNTY Town Name	Top 1-10	Top 11-20	Top 21-40	Top 41-60	Top 61-80	Top 81-100	Not in HII	Total
Barton	10%	0%	5%	5%	35%	35%	11%	11%
Berkshire	0%	0%	0%	5%	0%	0%	3%	3%
Candor (T)	0%	20%	0%	5%	0%	10%	10%	9%
Candor (V)	0%	0%	0%	0%	0%	0%	2%	2%
Newark Valley (T)	10%	10%	5%	5%	0%	0%	4%	4%
Newark Valley (V)	0%	0%	0%	0%	0%	0%	2%	2%
Nichols (T)	10%	10%	0%	0%	15%	0%	5%	5%
Nichols (V)	0%	0%	0%	5%	0%	0%	1%	1%
Owego (T)	10%	10%	5%	15%	0%	10%	28%	27%
Owego (V)	10%	20%	60%	20%	10%	0%	6%	7%
Richford	0%	0%	5%	0%	0%	0%	4%	4%
Spencer (T)	0%	0%	5%	5%	25%	5%	6%	6%
Spencer (V)	0%	0%	0%	0%	0%	0%	2%	2%
Tioga	0%	0%	10%	5%	0%	20%	9%	9%
Waverly	50%	30%	5%	30%	15%	20%	7%	8%
TOTAL INTERSECTIONS	**10**	**10**	**20**	**20**	**20**	**20**	**1,498**	**1,598**

Table 4.13 shows the Top 20 intersections in Tioga County based on the weighted injury score. Most locations have a history of serious and other injury crashes, but no fatal crashes, with the exception of State Route 38. Several intersections, such as Cayuta Avenue and Ithaca Street and State Route 17 and Talmadge Hill Road, had multiple serious injury crashes during the five-year period.

Many of Tioga's Top 20 intersections can be found along Chemung Street, which indicates a broader, corridor-level safety concern. Tioga County had less severe injuries at intersections than Broome County, as indicated by the relatively low ranks for Tioga shown in the "Two-County Rank" column. In fact, the highest-ranked intersection in Tioga County came in 33rd overall on the Broome/Tioga combined list. Four of Tioga's Top 20 intersections fell within the Top 100 list for Broome/Tioga.

TIOGA COUNTY

Table 4.13 Intersection-Based Crash Counts and Rankings for the Top 20 HII (by Severity) – Tioga County

County Rank	Two-County Rank	Cross-Streets	Fatal Injury (K) Crashes	Serious Injury (A / SI) Crashes	KSI Crashes Combined	All Injury (KABC) Crashes
1	33	State Rt 38 & Green Valley Mobile Home Community [Newark Valley]	1	0	1	1
2	56	Cayuta Ave & Ithaca St	0	2	2	3
3	60	State Rt 17 & Talmadge Hill Rd	0	2	2	3
4	90	Tilbury Hill Rd & Day Hollow Rd	0	1	1	3
5	109	State Highway 282 & W River Rd	0	1	1	2
6	112	Broad St & Fulton St	0	0	0	5
7	113	Chemung St & Clark St	0	0	0	4
8	114	Chemung St & Park Ave	0	1	1	2
9	134	Chemung St & Cayuta Ave	0	1	1	2
10	135	W. Main St & McMaster St	0	1	1	2
11	144	Fox St & Central Ave	0	1	1	2
12	145	Chemung St & I-220	0	1	1	2
13	146	Chemung St & Fulton Ave	0	0	0	5
14	167	Owego Rd & Hamar's Estates Mobile Home & Jewel Trailer Park [Candor]	0	1	1	1
15	169	W. River Rd & Exit 62 Southbound Off-Ramp (I-86 / State Rt 17)	0	1	1	1
16	173	Chestnut Ridge Rd & Montrose Pkwy	0	1	1	1
17	174	Spencer Ave & Fox St	0	1	1	1
18	175	Chemung St & Sawyer Pl	0	1	1	1
19	230	Owego Rd & Cole Book Rd	0	1	1	1
20	243	Bailey Hollow Rd & Delaney Rd	0	1	1	1
TOTAL FOR TOP 20 (SHARE OF ALL INTERSECTION CRASHES)			**1 (100%)**	**18 (100%)**	**19 (100%)**	**43 (45%)**

5

Systemic Analysis & High-Risk Network

Introduction to Systemic Analysis

This chapter offers an introductory discussion of systemic analysis, then focuses primarily on the predictive High Risk Network (HRN), which leverages the results of the systemic analysis to predict crash risk across the entire roadway network. For detailed results from the systemic analysis results, please refer to APPENDIX –Systemic Analysis.

To better understand the roadway characteristics that contribute to the most severe traffic safety outcomes in Broome/Tioga, a systemic analysis was conducted using a range of variables drawn from both NYSDOT's Road Inventory and other relevant data sources (e.g., Census). The systemic approach goes beyond traditional hotspot analysis by examining network-wide patterns that may indicate elevated risk for Fatal or Seriously Injured (KSI) crashes, even in locations with no crash history.

To explore how each roadway characteristic is related to the risk for both KSI and all types of injury crashes, the characteristics were assessed individually and a representation ratio, or index, was calculated using the following formula:

$$\frac{\text{Fatal or Serious}_{\text{Roadway Type}}}{\text{Fatal or Serious}_{\text{Region}}} \Big/ \frac{\text{Miles}_{\text{Roadway Type}}}{\text{Miles}_{\text{Region}}}$$

Photo: Intersection of Court St & State St in the City of Binghamton

A representation ratio of 1 reflects the typical rate of crashes, averaged across the entire road network. Ratios greater than 1 reflect characteristics that were frequently present (i.e., overrepresented) at the site of KSI or All Injury crashes, indicating a higher relative crash risk. Features with ratios less than 1 appeared less often (i.e., underrepresented) at the site of KSI or All Injury crashes, which indicates comparatively lower risk.

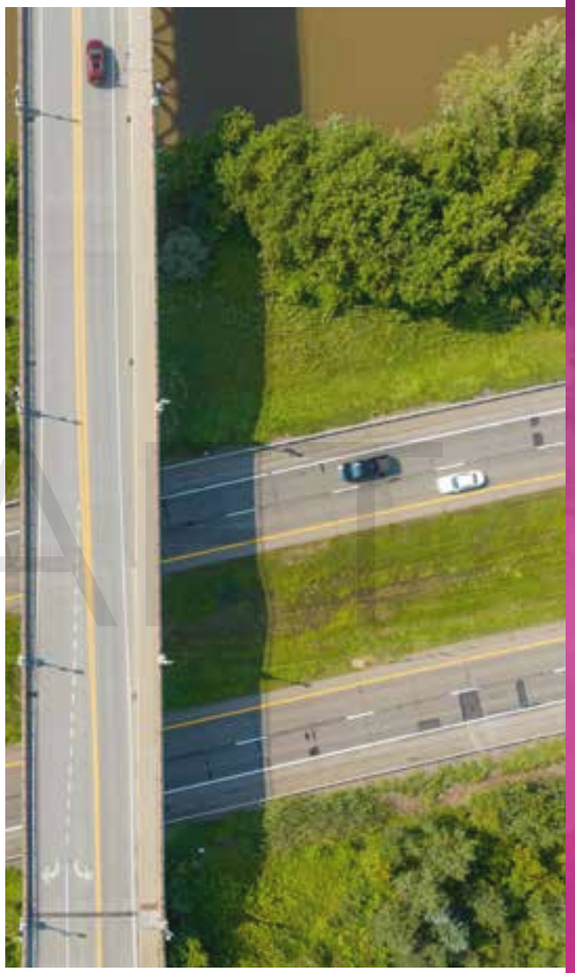
The variables selected for this systemic analysis span the categories outlined below.

- Roadway Operations – Daily Vehicle Volumes, Pedestrian-Bicycle Activity Levels
- Roadway Regulations – Posted Speed Limit, Functional Classification
- Roadway Capacity – Total Number of Vehicle Lanes
- Area Context – Area Type, Community Vulnerability Status

High Risk Network

While the High Injury Network is reactive and heavily location-based, the High Risk Network (HRN) is a predictive, risk-based systemic approach that seeks to estimate where future injury crashes are most likely to occur based on a host of factors that appear to be influential to fatal and serious injury crashes (e.g., speed limit, lane count, vehicle volumes).

In other words, it leverages the characteristics-based systemic analysis to target facilities that are expected to have a heightened crash risk now and into the future (in the absence of safety-oriented change).



Overview of Methodology

In generating the High Risk Network, a total of 100 potential HRN points were allocated among six key variables. Each of the characteristics selected for the HRN was found to occur more often than expected within fatal and serious injury crashes. Based on the magnitude of the KSI crash risk ratios, maximum weights were assigned among the variables. For each characteristic considered, sub-scores were developed for different categories based on a combination of the risk ratio and the category's prevalence across the regional road network. Any roadway data found to be missing or not reported was assigned zero points.

The roadways in the region are varied, and no single roadway received the maximum possible number of points, with the greatest HRN score assigned being 90 points. Roadways with equal points were then aggregated and the total length of roadway mileage for each score was calculated to develop a cohesive network-level ranking, or percentile, based upon categories of roadway mileage. The top 3% of all region roadways comprised the highest rankings, with total scores ranging from 44 to 90.

Table 5.1 shows the rubric used to classify each road segment into one of five HRN designations based on its percentile ranking among all roadway centerline miles.

Table 5.1 HRN Scoring Matrix

HRN Category	Share of Centerline Miles	Scoring Threshold
Highest	Top 3%	44 +
Higher	Top 5%	41 – 43
High	Top 10%	34 – 40
Moderate	Top 25%	31 – 33
Low	Top 50%	29 – 30
Not in HRN	Bottom 50%	0 – 28

HRN Evaluation Rubric & Systemic Analysis Summary

Table 5.2 summarizes the systemic analysis results and the data underlying the HRN, including the variables used, network coverage, HRN points assigned, and risk ratios for KSI and All Injury crashes.

Table 5.2 High Risk Network (Broome/Tioga) – Systemic Risk Results & HRN Weighting Scheme

Category	Variable Assessed	Risk Factor	Share of Center-line Miles	HRN Points Assigned	KSI Crash Risk Ratio	All Injury (KABC) Crash Risk Ratio
Roadway Operations	Daily Vehicle Volumes (AADT)	15,000 or More	<1 %	36	9.29	30.43
		10,000 - 14,999	1%	24	8.11	15.44
		5,000 - 9,999	3%	18	5.76	6.45
		2,500 - 4,999	5%	12	4.20	3.53
		Less than 2,500	81%	2	0.62	0.49
		No Data	10%	0	0.22	0.16
	Pedestrian – Bicycle Activity Levels	High Activity	3%	12	4.76	6.08
		Moderate Activity	7%	6	2.82	3.80
		Low Activity	78%	2	0.84	0.72
		No Data	13%	0	0.18	0.09
Roadway Regulations	Posted Speed Limit	65+ mph	0%	24	4.00	0.80
		55 – 60 mph	56%	21	0.85	0.63
		45 - 50 mph	5%	18	2.85	3.22
		35 - 40 mph	7%	6	1.18	1.67
		0- 30 mph	29%	0	1.03	1.23
		No Data	4%	0	0.50	0.88
Roadway Capacity	Total Number of Vehicle Lanes	4+ Lanes	1%	12	4.63	9.93
		3 Lanes	< 1%	4	1.61	4.02
		2 Lanes	93%	2	0.97	0.88
		1 Lane	2%	2	1.38	1.77
		No Data	4%	0	0.41	0.58
Area-Specific Variables	Area Type	Cluster	3%	10	1.36	1.53
		Urban	27%	6	1.73	2.15
		Rural	70%	3	0.70	0.52
	Community Vulnerability Status	High Priority Equity Area (Top 20%)	13%	6	2.24	3.12
		Equity Area (Top 21-40%)	7%	3	1.50	1.63
		Not an Equity Area	80%	0	0.81	0.71

Systemic Factors & Weights Included in the HRN

Daily Vehicle Volumes (AADT)

Average Annual Daily Traffic (AADT) refers to the typical daily volumes along a roadway derived from an estimate of annual traffic. Higher AADT is strongly associated with increased crash risk. As traffic volumes rise, so does the number of vehicle interactions, which naturally increases the potential for collisions. Roads with high AADT often support faster-moving traffic and may feature complex roadway designs, such as multi-lane arterials or interchanges, which can contribute to more severe crashes.

The combination of speed, volume and complexity means that, even though high-AADT roads may represent a small share of total roadway length, they were disproportionately represented in crash statistics. In addition, such corridors may carry a greater share of heavy vehicle trips. Depending on adjacent land uses, high AADT roadways may also feature relatively high activity levels for pedestrians and cyclists, particularly in urban settings.

As demonstrated in the systemic analysis, roadways with increased AADT are typically at higher risk for KSI and All Injury crashes. With some of the highest risk ratios seen within this analysis (e.g., the third highest class (5,000 – 9,999 vehicles per day) still carried ratios above 5x for both KSI and All Injury crashes), a total of 36 potential HRN points were allocated based on AADT.

Pedestrian / Bicycle Activity Levels

Pedestrian and bicycle activity can influence crash risk and injury severity due to the lack of protection that vulnerable road users have compared to motor vehicle occupants. When crashes involving pedestrians and cyclists occur, the outcomes for those outside of the vehicle are disproportionately severe (i.e., they have a higher rate of fatal and serious injury) when compared to all roadway users. Roadways with increased levels of pedestrian and bicycle activity pose a higher risk for interactions between vehicles and non-motorists.

Most BMTS roadways have low volumes of pedestrians and bicyclists. While less common, roadways with activity levels categorized as Moderate (2.8x KSI, 3.8x All Injury) or High (4.8x KSI, 6.1x All Injury) carried a comparatively greater risk for fatal and serious injury crashes. A total of 12 of potential HRN points were assigned based on Pedestrian and Bicycle Activity Levels.

Posted Speed Limit

As detailed in Section Unsafe Speeds, higher speeds tend to play a greater role in fatal and serious injury crashes due to the multiple ways in which they inhibit a driver's ability to respond to unexpected conditions. Higher speeds lead to greater impact forces during a collision, thereby increasing the likelihood that a crash will result in a fatality or serious injury (**Figure 3.17**). Higher speeds also reduce drivers' field of vision (**Figure 3.18**), thereby decreasing their ability to perceive obstacles and the movements of other roadway users. In addition, at higher speeds, vehicles travel comparatively further by the time the driver reacts to a change in conditions and comes to a complete stop (**Figure 3.19**).

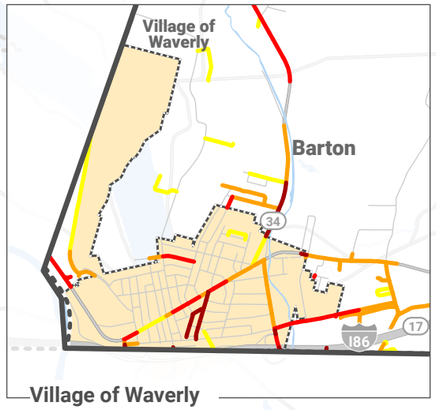
As demonstrated in the systemic analysis, roadways with posted speed limits of 35 mph or above tended to have higher injury risk for all roadway users, not just VRUs. For instance, roadways with a speed limit of 45 or 50 mph had a 2.8x KSI crash risk and a 3.2x All Injury risk.

As noted previously, "Unsafe Speed" was the leading contributing action reported in KSI crashes (28% of Tioga, 15% of Broome). Given the direct relationship between operating speed and crash injury severity, a total of 24 potential HRN points were allocated based on Posted Speed Limit.

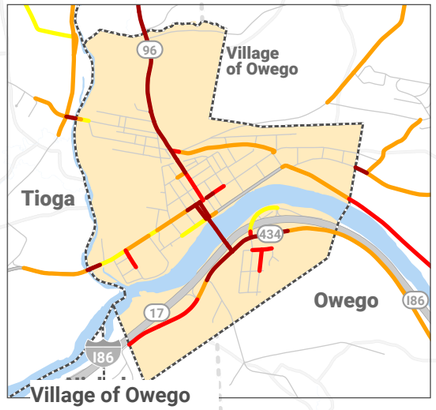
Total Number of Vehicle Lanes

Though the number of vehicle lanes is not a direct proxy for activity levels (like AADT), with each lane comes another opportunity for conflict.

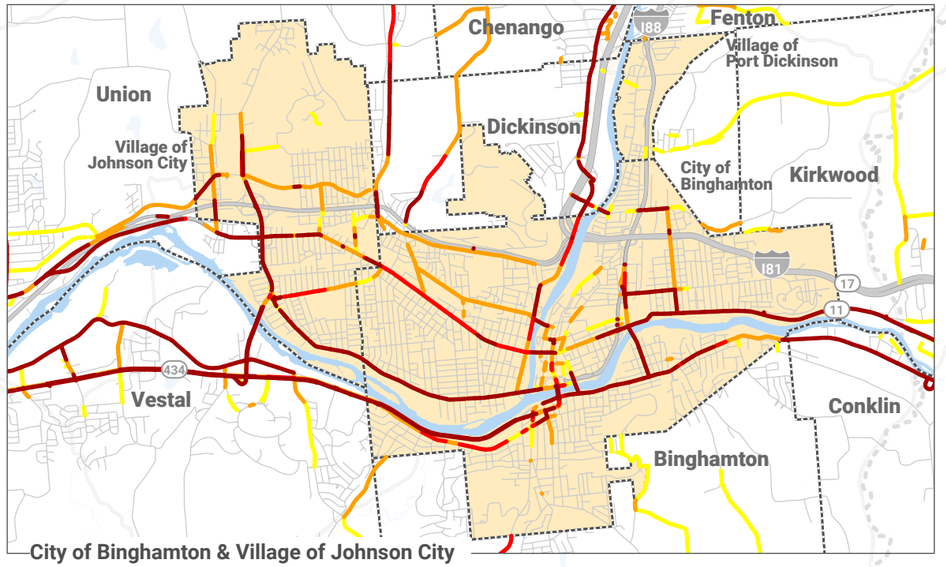
As demonstrated in the systemic analysis, four-lane roadways carried a 4.6x KSI and 9.9x All Injury ratio, followed by three-lane at 1.6x KSI and 4.0x All Injury. The majority of roadways in Broome/Tioga (93%) are typical two-lane roadways. Recognizing the limited number coverage of 3+-lane roadways, a total of 12 potential HRN points were assigned based on Total Number of Vehicle Lanes.



Village of Waverly



Village of Owego

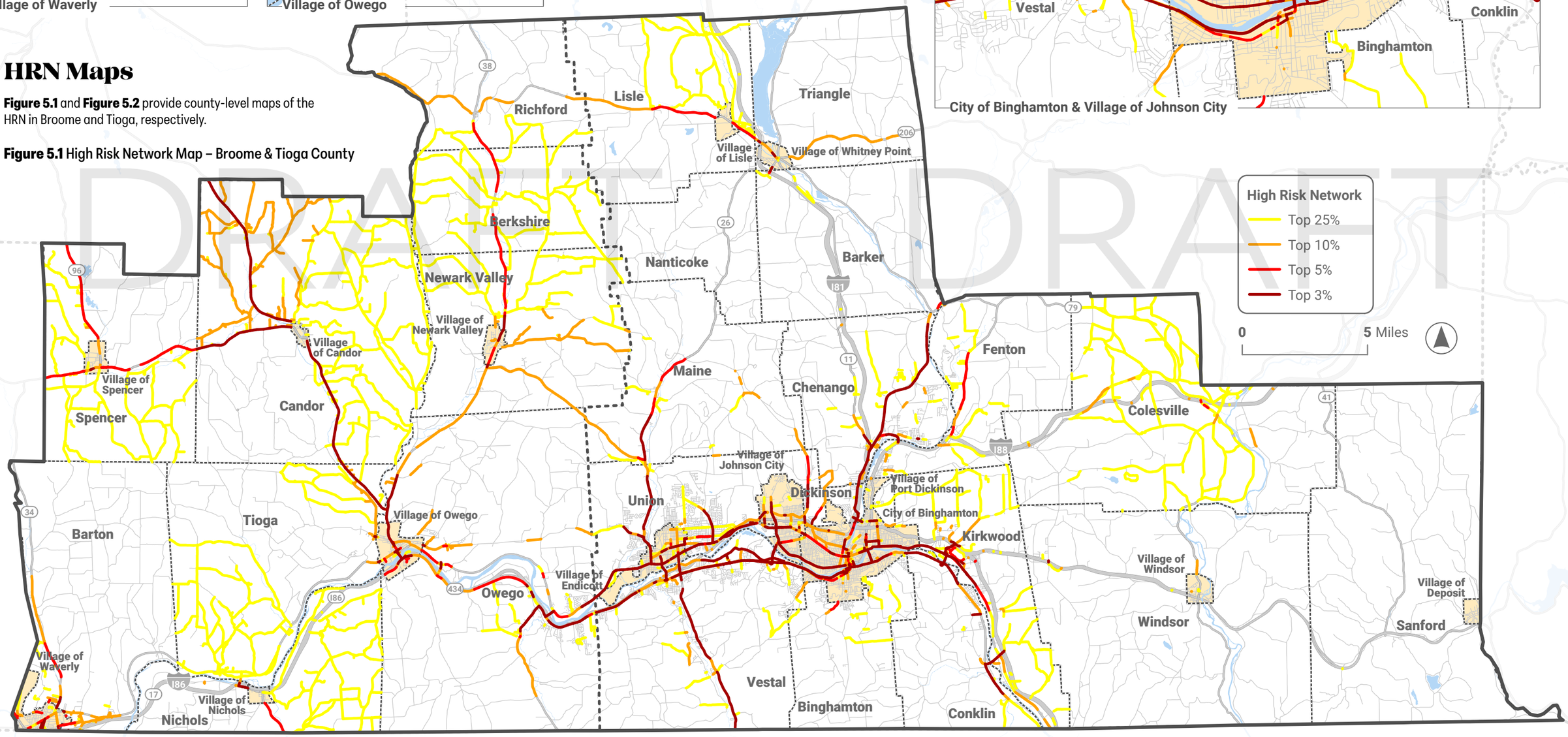


City of Binghamton & Village of Johnson City

HRN Maps

Figure 5.1 and **Figure 5.2** provide county-level maps of the HRN in Broome and Tioga, respectively.

Figure 5.1 High Risk Network Map – Broome & Tioga County



Area Type

Across Broome-Tioga, roadways within large, urbanized areas (defined by the Census as "Urban" with more than 200,000 residents) had a slightly greater KSI crash compared to those in smaller, urbanized areas (designated by the Census as "Cluster" with between 50,000 and 200,000 residents).

Most of the roadways across Broome/Tioga traverse areas classified as Rural (70%), with the majority of the rest (23%) classified as Urban. A few Cluster areas are present within Tioga County; however, none exist within Broome County. Responding to the desire to balance investments between urban and rural areas while addressing the transitional zones between them, a total of 10 potential HRN points were allocated based on Area Type, with a relatively greater weight applied to facilities located within the transitional Cluster areas.

Community Vulnerability Status

Using the tract-level designations developed within the seven-factor community vulnerability assessment (Chapter 2 – Equity & Vulnerable Communities Analysis), systemic results revealed that roads running through the Top 40% of tracts had injury crash risk ratios of at least 1.5x compared to non-equity areas, with tracts falling in the Top 20% experiencing a higher relative risk than the Top 21-40%.

The majority of the road network (80%) traverses areas that were not classified as vulnerable within this study's assessment. Given greater coverage across the road network and a higher KSI crash risk ratio (2.2x KSI, 3.1x All Injury), tracts classified in the Top 20% were awarded more points than those in the Top 21-40% . A total of 6 potential HRN points were assigned based on Community Vulnerability Status.

6

Capital Projects to Address the High-Injury Network

Prioritization Scheme

Table 6.1 outlines the evaluation rubric used within this prioritization scheme. The prioritized list of capital projects accounts for each location's crash history (HIN), relative risk (HRN and LOSS), potential to impact safety for vulnerable road users, proximity to equity communities, and relative competitiveness based on estimates of capital cost and expected crash reductions. This prioritization scheme awarded a total of 100 points across four categories and eight evaluation criteria, as summarized in the list below.

1. **Safety Impacts (50%)**
2. **Project Competitiveness (20%)**
3. **Vulnerable Road User & Community Facilities (15%)**
4. **Equity (15%)**

The total prioritization score was used as the primary ranking metric, with ties broken based on prioritization score component for High Injury Network Ranking, followed by benefit-cost ratio value. Order of magnitude capital cost estimates were used to define the implementation timeframe for each project. For more information, please consult APPENDIX – Project Development & Prioritization and APPENDIX - Benefit-Cost Analysis.

Table 6.1 Prioritization Score Evaluation Rubric

Category / Theme	Category Weight	Prioritization Criteria	Criteria Weight	Rankings / Classifications	Points Awarded
Safety Impact	50%	High Injury Network Ranking (Corridors / Intersection)	30%	Top 1% / Top 3	30 / 30
				Top 3% / Top 5	25 / 24
				Top 5% / Top 10	20 / 18
				Top 10% / Top 15	15 / 12
				Top 15% / Top 20	10 / 6
				Top 25% / Not Top 20	5 / 0
		High Risk Network Score	15%	Highest (Top 3%)	15
				Higher (Top 5%)	12
				High (Top 10%)	9
				Moderate (Top 25%)	6
				Low (Top 50%)	3
		CLEAR Level of Safety Service (LOSS)	5%	Highest (4)	5
				2nd Highest (3)	3
Project Competitiveness	20%	Benefit-Cost Ratio	20%	45	20.0
				15	13.3
				3	6.7
VRU & Community Facilities	15%	Vulnerable Road User Injury Crashes (KABC)	10%	2	10
				1	5
		Proximity to Schools & Parks	5%	Within 1/8 Mile	5
Equity	15%	Vulnerable Community Analysis	10%	High Priority (Top 20%)	10
				Priority (Top 40%)	5
		Federal Designation (Underserved)	5%	Meets Federal Criteria	5
4 Categories	**100%**	**8 Evaluation Criteria**	**100%**	**MAX SCORE**	**100**

Project List

The project locations and countermeasures proposed in this chapter reflect a comprehensive set of safety-oriented projects and strategies that have been informed by a thorough assessment of historical crash records, ample stakeholder input, on-the-ground insights gathered during field visits, and the application of federal guidance related to safe roadway design and operations. A total of 32 projects were recommended for safety improvements, including 16 corridors and 16 intersections spread across 11 municipalities. A map showing the location of the prioritized projects across Broome/Tioga is provided in **Figure 6.1**.

Nearly two-thirds (21 / 32) of the project locations are sited in Broome County, including 10 corridors and 11 intersections. Just over one-third (11/32) of the projects are in Tioga County, including six corridors and five intersections. For the Corridors, multiple projects were recommended in each of Union, Owego, and Binghamton. For the Intersections, Binghamton, Barton, Union, and Vestal each had multiple projects recommended.

A series of two tables present the safety countermeasures proposed and the individual criteria-specific prioritization scores that make up the total prioritization score. Corridor-based projects are shown in **Table 6.2** and **Table 6.3** while Intersections are covered in **Table 6.4** and **Table 6.5**. Within each table, the project's overall rank can be seen in the far-left column.

Project Profiles

Appendix 1 consists of four-page profiles that present existing safety issues, crash histories, proposed countermeasures, and estimated capital costs for many of the projects ranked previously. The project profiles are shown in order of priority ranking within each county, beginning with Corridor projects for Tioga, then Broome, and concluding with Intersection projects for Tioga and Broome.

These summary packages are intended to help advance these priority locations and safety concepts for future capital funding awards within the context of future federal or state discretionary grant solicitations (e.g., SS4A Implementation FY 26), or formula-based funding via the Highway Safety Improvement Program (HSIP).

Figure 6.1 Prioritized Capital Projects – Corridors & Intersections

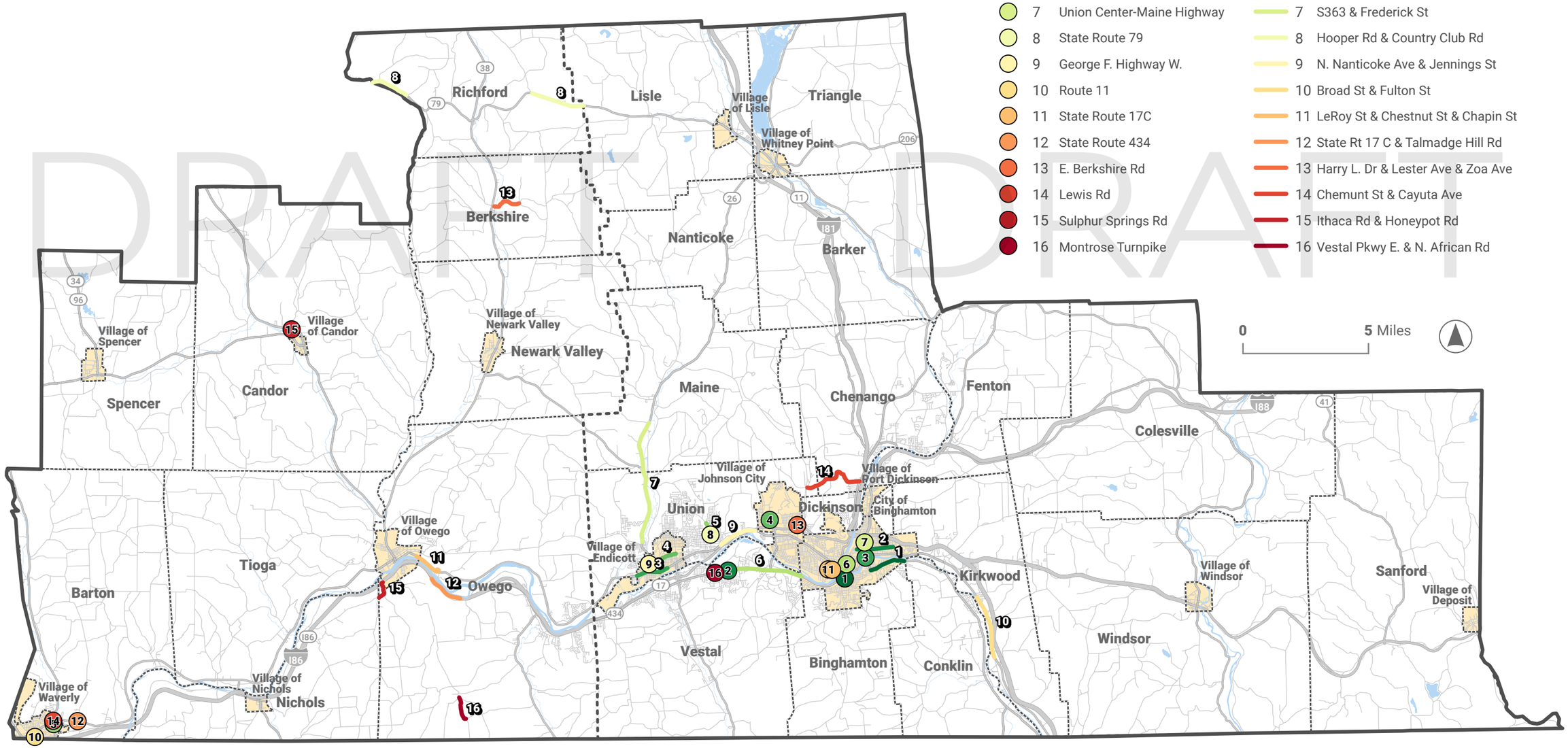


Table 6.2 Prioritized Capital Projects – Corridors – Proposed Countermeasures

TIOGA COUNTY / BROOME COUNTY						SPEED MANAGEMENT		ROADWAY DEPARTURE						INTERSECTIONS	VULNERABLE ROAD USERS (PEDESTRIANS & BICYCLISTS)							CROSS-CUTTING
Project Rank (Corridors)	County	Municipality	Corridor	From	To	Speed Cameras	New Speed Limit	Edge Lines	Enhanced Delineation for Curves	Rumble Strip	Safety Edge	Curve Design Improvements	Median Barrier	Retroreflective Backplates	Crosswalks	Bike Lanes	Rectangular Rapid Flashing Beacon (RRFB)	Refuge Islands	High-Intensity Activated Crosswalk (HAWK)	Road Diet	Sidewalks	Lighting
1	Broome	Binghamton	Conklin Ave	Tompkins St	City / Town Line				✓					✓		✓	✓					
2	Broome	Binghamton	Robinson St	Chenango St	Fairview Ave									✓	✓	✓	✓					
3	Broome	Union	E. Main St	Bassett Ave	Lincoln Ave									✓	✓	✓	✓				✓	
4	Broome	Union	North St	S. Nanticoke St	North McKinley St									✓	✓	✓	✓					
5	Broome	Union	Hooper Rd	Pheasant Ln	Hoover Ave									✓	✓	✓						
6	Broome	Vestal	Vestal Pkwy E.	State Highway 26	Club House Rd	✓							✓				✓	✓				
7	Broome	Union	Union Center-Maine Highway	Daugherty Rd	Nanticoke Creek						✓	✓				✓	✓					
8	Tioga	Lisle / Richford	State Route 79	MI Hill Rd / West Branch of Owego Creek	Shafer Rd / Brigham Rd				✓	✓												
9	Broome	Union	George F. Highway W.	East of Argonne Ave	Main St							✓			✓	✓			✓		✓	✓
10	Broome	Kirkwood	Route 11	Meadow Ln	Main St					✓	✓	✓										✓
11	Tioga	Owego	State Route 17C	State Route 17C On-Ramp	East of Taylor Rd									✓		✓					✓	
12	Tioga	Owego	State Route 434	South of Route 17	Degroat Rd				✓					✓								✓
13	Tioga	Berkshire	E. Berkshire Rd	East of State Route 38	Eastman Rd		✓	✓	✓			✓										
14	Broome	Chenango	Lewis Rd	Middle Stella Ireland Rd	Upper Front St			✓	✓		✓	✓										
15	Tioga	Owego	Sulphur Springs Rd	West of Montrose Ave	Sulphur Springs Rd		✓	✓	✓		✓	✓										
16	Tioga	Owego	Montrose Turnpike	Arbor Glade Rd	South Apalachin Rd			✓			✓	✓										

Table 6.3 Prioritized Capital Projects – Corridors – Prioritization Metrics & Benefit-Cost Estimates

TIOGA COUNTY / BROOME COUNTY							COST & TIMEFRAME		CRASH REDUCTION POTENTIAL & BENEFIT-COST COMPETITIVENESS				PRIORITIZATION SCORES								
Project Rank (Corridors)	County	Municipality	Corridor	From	To	Length (mi.)	Project Timeframe (Based on Scale of Capital Cost)	Order-of-Magnitude Capital Cost ($2025)	Total Injury Crashes Reduced (KABC)	Total Crashes Reduced (KABCO)	Benefits from Total Crashes Reduced (KABCO)	Benefit-Cost Ratio (7% Discount Rate)	Prioritization Score (100 Points)	Benefit-Cost Ratio (7%)	High Injury Network Ranking	High Risk Network Score	NYSDOT CLEAR LOSS Rating	Vulnerable Road User Injury Crashes	Proximity to Schools & Parks	BMTS Customized Vulnerability Criteria	USDOT Criteria for Underserved Communities
1	Broome	Binghamton	Conklin Ave	Tompkins St	City / Town Line	1.44	Short-Term	$228,300	27	152	$5,756,500	**25.2**	93.3	**13.3**	**30**	**15**	**5**	**10**	**5**	10	5
2	Broome	Binghamton	Robinson St	Chenango St	Fairview Ave	1.45	Mid-Term	$747,900	50	379	$11,399,000	**15.2**	88.3	**13.3**	**25**	**15**	**5**	**10**	**5**	10	5
3	Broome	Union	E. Main St	Bassett Ave	Lincoln Ave	1.28	Long-Term	$1,251,000	60	247	$12,535,500	**10.0**	86.7	**6.7**	**30**	**15**	**5**	**10**	**5**	10	5
4	Broome	Union	North St	S. Nanticoke St	North McKinley St	1.21	Short-Term	$271,800	50	253	$10,647,000	**39.2**	78.3	**13.3**	**20**	**15**	**5**	**10**	**0**	10	5
5	Broome	Union	Hooper Rd	Pheasant Ln	Hoover Ave	0.78	Short-Term	$91,200	29	172	$6,403,500	**70.2**	75.0	**20**	**30**	**15**	**0**	**5**	**0**	5	0
6	Broome	Vestal	Vestal Pkwy E.	State Highway 26	Club House Rd	3.48	Long-Term	$6,307,100	71	355	$18,346,500	**2.9**	75.0	**0**	**30**	**15**	**0**	**10**	**5**	10	5
7	Broome	Union	Union Center-Maine Highway	Daugherty Rd	Nanticoke Creek	4.95	Mid-Term	$589,400	32	201	$26,522,500	**45.0**	73.3	**13.3**	**25**	**15**	**0**	**5**	**5**	10	0
8	Tioga	Lisle / Richford	State Route 79	MI Hill Rd / West Branch of Owego Creek	Shafer Rd / Brigham Rd	2.13 / 1.46	Short-Term	$71,000	14	62	$36,026,000	**507.4**	69.0	**20**	**30**	**9**	**5**	**0**	**5**	0	0
9	Broome	Union	George F. Highway W.	East of Argonne Ave	Main St	1.52	Long-Term	$1,716,000	11	54	$15,238,000	**8.9**	61.7	**6.7**	**30**	**15**	**0**	**5**	**5**	0	0
10	Broome	Kirkwood	Route 11	Meadow Ln	Main St	2.53	Mid-Term	$497,700	8	36	$10,744,000	**21.6**	60.3	**13**	**25**	**12**	**5**	**0**	**5**	0	0
11	Tioga	Owego	State Route 17C	State Route 17C On-Ramp	East of Taylor Rd	0.97	Long-Term	$2,375,000	15	118	$3,340,000	**1.4**	55.0	**0**	**25**	**12**	**3**	**10**	**5**	0	0
12	Tioga	Owego	State Route 434	South of Route 17	Degroat Rd	1.45	Short-Term	$146,100	8	26	$1,590,500	**10.9**	53.7	**7**	**30**	**9**	**3**	**5**	**0**	0	0
13	Tioga	Berkshire	E. Berkshire Rd	East of State Route 38	Eastman Rd	1.15	Short-Term	$281,800	1	8	$10,834,500	**38.4**	52.3	**13**	**25**	**6**	**3**	**0**	**0**	5	0
14	Broome	Chenango	Lewis Rd	Middle Stella Ireland Rd	Upper Front St	2.59	Mid-Term	$506,600	13	40	$2,679,500	**5.3**	48.7	**7**	**25**	**9**	**3**	**0**	**0**	5	0
15	Tioga	Owego	Sulphur Springs Rd	West of Montrose Ave	Sulphur Springs Rd	0.75	Mid-Term	$819,700	5	18	$1,037,500	**1.3**	46.0	**0**	**30**	**3**	**3**	**0**	**0**	10	0
16	Tioga	Owego	Montrose Turnpike	Arbor Glade Rd	South Apalachin Rd	0.93	Short-Term	$280,000	1	3	$9,274,000	**33.1**	43.3	**13**	**25**	**0**	**5**	**0**	**0**	0	0

Table 6.4 Prioritized Capital Projects – Intersections – Proposed Countermeasures

TIOGA COUNTY / BROOME COUNTY					SPEED MANAGEMENT	ROADWAY DEPARTURE			INTERSECTIONS			VULNERABLE ROAD USERS (PEDESTRIANS & BICYCLISTS)							CROSS-CUTTING
Project Rank (Intersections)	County	Municipality	Major Street	Minor Street	New Speed Limit	Edge Lines	Enhanced Delineation for Curves	Median Barrier	Retroreflective Backplates	Dedicated Turn Lanes	Systemic Low-Cost Improvements	Crosswalks	Bike Lanes	Rectangular Rapid Flashing Beacon (RRFB)	Leading Pedestrian Interval (LPI)	Refuge Islands	Road Diet	Sidewalks	Lighting
1	Broome	Binghamton	Vestal Pkwy E.	S. Washington St					✓			✓			✓	✓			
2	Broome	Binghamton	Vestal Pkwy E.	Rano Blvd								✓				✓			
3	Broome	Union	Court St	Brandywine Ave									✓	✓	✓	✓	✓		
4	Broome	Union	Harry L. Dr	Reynolds Rd				✓				✓		✓		✓		✓	
5	Tioga	Barton	Cayuta Ave	Ithaca St							✓	✓							
6	Broome	Binghamton	Court St	State St						✓		✓	✓		✓				
7	Broome	Binghamton	S 363	Frederick St						✓		✓		✓	✓	✓			
8	Broome	Union	Hooper Rd	Country Club Rd					✓	✓		✓			✓				
9	Broome	Union	N. Nanticoke Ave	Jennings St								✓		✓		✓		✓	✓
10	Tioga	Barton	Broad St	Fulton St							✓	✓						✓	
11	Broome	Binghamton	LeRoy St	Chestnut St & Chapin St					✓			✓						✓	✓
12	Tioga	Barton	State Rt 17 C	Talmadge Hill Rd							✓								✓
13	Broome	Union	Harry L. Dr	Lester Ave & Zoa Ave								✓	✓					✓	✓
14	Tioga	Barton	Chemung St	Cayuta Ave					✓			✓							✓
15	Tioga	Candor	Ithaca Rd	Honeypot Rd		✓					✓								
16	Broome	Vestal	Vestal Pkwy E.	N. African Rd					✓			✓			✓	✓			

Table 6.5 Prioritized Capital Projects – Intersections – Prioritization Metrics & Benefit-Cost Estimates

TIOGA COUNTY / BROOME COUNTY					COST & TIMEFRAME		CRASH REDUCTION POTENTIAL & COMPETITIVENESS			BENEFIT-COST	PRIORITIZATION SCORES								
Project Rank (Intersections)	County	Municipality	Major Street	Minor Street	Project Timeframe (Based on Scale of Capital Cost)	Order-of-Magnitude Capital Cost ($2025)	Total Injury Crashes Reduced (KABC)	Total Crashes Reduced (KABCO)	Benefits from Total Crashes Reduced (KABCO)	Benefit-Cost Ratio (7% Discount Rate)	Prioritization Score (100 Points)	Benefit-Cost Ratio (7%)	High Injury Network Ranking	High Risk Network Score	NYSDOT CLEAR LOSS Rating	Vulnerable Road User Injury Crashes	Proximity to Schools & Parks	BMTS Customized Vulnerability Criteria	USDOT Criteria for Underserved Communities
1	Broome	Binghamton	Vestal Pkwy E.	S. Washington St	Short-Term	$155,700	21	101	$4,432,500	**28.5**	**93.3**	**13.3**	**30**	**15**	**5**	**10**	**5**	10	5
2	Broome	Binghamton	Vestal Pkwy E.	Rano Blvd	Short-Term	$163,200	35	190	$7,515,000	**46.0**	**93.0**	**20**	**30**	**15**	**3**	**10**	**0**	10	5
3	Broome	Union	Court St	Brandywine Ave	Long-Term	$483,100	7	27	$1,461,000	**3.0**	**79.7**	**6.7**	**30**	**15**	**3**	**10**	**0**	10	5
4	Broome	Union	Harry L. Dr	Reynolds Rd	Mid-Term	$353,000	25	229	$5,971,000	**16.9**	**72.3**	**13**	**24**	**15**	**5**	**5**	**0**	10	0
5	Tioga	Union	Cayuta Ave	Ithaca St	Short-Term	$157,900	5	6	$884,500	**5.6**	70.7	**6.7**	**30**	**9**	**5**	**0**	**5**	10	5
6	Broome	Vestal	Court St	State St	Mid-Term	$392,800	19	96	$4,091,500	**10.4**	**67.7**	**6.7**	**18**	**15**	**3**	**10**	**0**	10	5
7	Broome	Union	S 363	Frederick St	Mid-Term	$205,700	16	98	$3,434,000	**16.7**	**55.3**	**13.3**	**12**	**15**	**0**	**0**	**0**	10	5
8	Broome	Union	Hooper Rd	Country Club Rd	Short-Term	$31,800	5	30	$13,835,000	**435.1**	54.0	**20**	**6**	**15**	**3**	**10**	**0**	0	0
9	Broome	Union	N. Nanticoke Ave	Jennings St	Mid-Term	$190,000	11	33	$2,148,500	**11.3**	**53.7**	**6.7**	**12**	**15**	**5**	**10**	**0**	0	5
10	Tioga	Kirkwood	Broad St	Fulton St	Long-Term	$492,900	9	43	$1,953,500	**4.0**	52.7	**6.7**	**18**	**0**	**3**	**5**	**5**	10	5
11	Broome	Binghamton	LeRoy St	Chestnut St & Chapin St	Long-Term	$637,900	12	43	$13,063,000	**20.5**	50.3	**13.3**	**12**	**0**	**5**	**10**	**0**	5	5
12	Tioga	Owego	State Rt 17 C	Talmadge Hill Rd	Short-Term	$63,500	3	4	$625,000	**9.8**	**48.7**	**6.7**	**30**	**9**	**3**	**0**	**0**	0	0
13	Broome	Union	Harry L. Dr	Lester Ave & Zoa Ave	Mid-Term	$274,100	10	23	$1,894,500	**6.9**	46.7	**6.7**	**18**	**9**	**3**	**5**	**0**	5	0
14	Tioga	Barton	Chemung St	Cayuta Ave	Long-Term	$589,100	3	8	$512,500	**0.9**	45.0	**0**	**18**	**9**	**3**	**0**	**0**	10	5
15	Tioga	Candor	Ithaca Rd	Honeypot Rd	Short-Term	$15,200	4	11	$815,000	**53.6**	**45.0**	**20**	**6**	**6**	**3**	**0**	**0**	10	0
16	Broome	Vestal	Vestal Pkwy E.	N. African Rd	Mid-Term	$177,500	11	62	$2,460,000	**13.9**	37.7	**6.7**	**6**	**12**	**3**	**0**	**5**	0	5

7

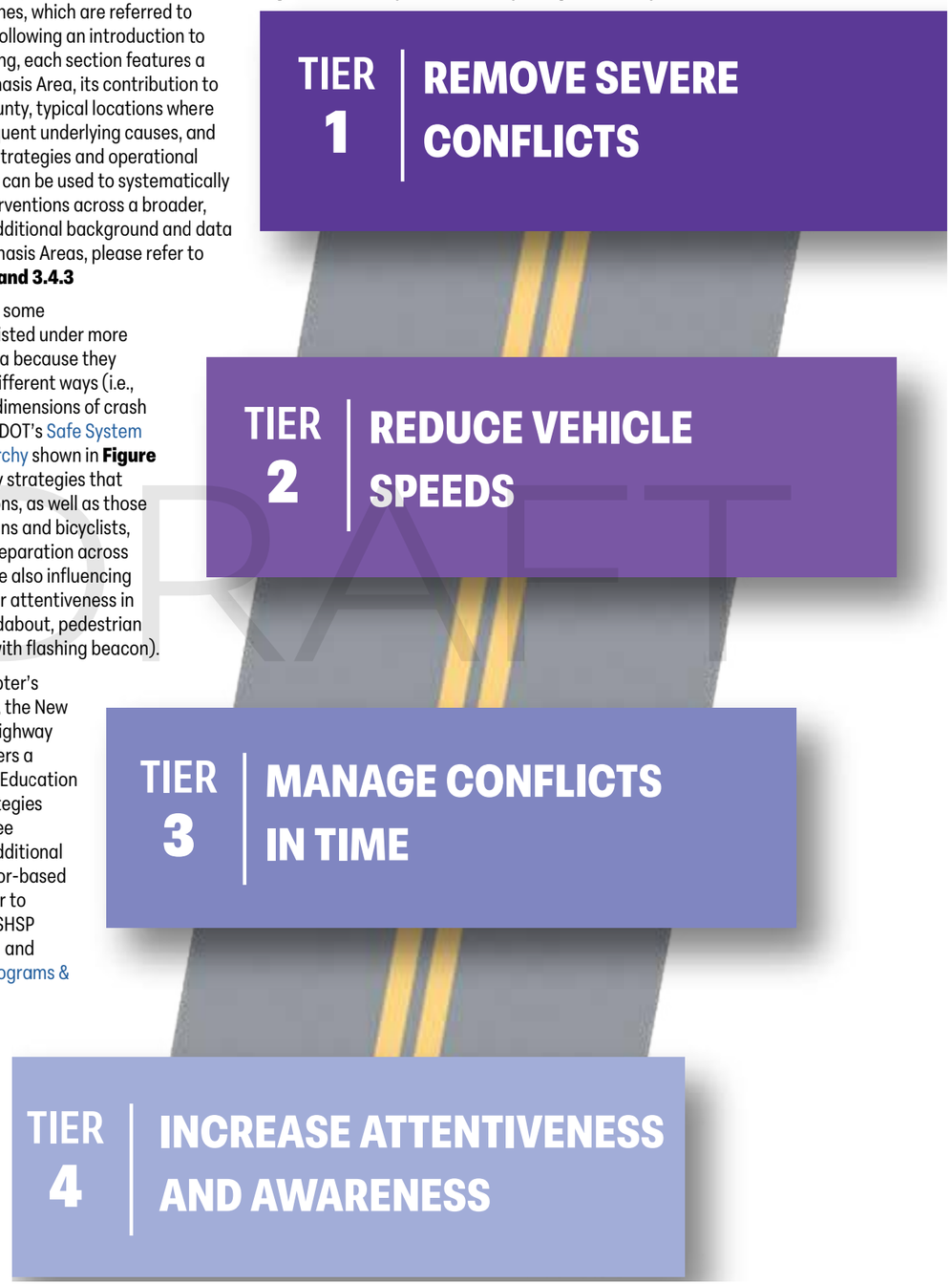
Systemic Approaches to Emphasis Areas

This chapter offers an outline of how BMTS can reduce some of the most prevalent causes of fatal and serious injury crashes, which are referred to as "Emphasis Areas." Following an introduction to systemic safety planning, each section features a description of an Emphasis Area, its contribution to KSI crashes in each county, typical locations where it clusters, a list of frequent underlying causes, and a list of safety design strategies and operational countermeasures that can be used to systematically program different interventions across a broader, area-wide scale. For additional background and data concerning these Emphasis Areas, please refer to **sections 3.3.1, 3.3.2, and 3.4.3**

It should be noted that some countermeasures are listed under more than one Emphasis Area because they mitigate crash risk in different ways (i.e., they address multiple dimensions of crash risk or "tiers" of the USDOT's Safe System Roadway Design Hierarchy shown in **Figure 7.1**). For instance, many strategies that reconfigure intersections, as well as those that cater to pedestrians and bicyclists, often serve to create separation across space and/or time while also influencing vehicle speeds and user attentiveness in the process (e.g., roundabout, pedestrian median refuge island with flashing beacon).

In addition to this chapter's Engineering measures, the New York State Strategic Highway Safety Plan (2023) offers a complementary set of Education and Enforcement strategies related to the first three Emphasis Areas. For additional information on behavior-based strategies, please refer to APPENDIX – New York SHSP 2023-2027: Appendix 1 and Chapter 8 (Policies, Programs & Strategies).

Figure 7.1. Safe System Roadway Design Hierarchy



(Source: FHWA-SA-22-069, pg. 1)

The Systemic Safety Lens

Analysis of crash data shows that severe crash outcomes are often driven by both the specific nature of the crash (i.e., what a vehicle collides with (**Figure 3.8**) and how it collides (**Figure 3.9** and **Figure 3.10**) and recurring contributing actions like unsafe speed and failure to yield (**Table 3.7**). Many fatal and serious injury collisions occur at sites that do not yet exhibit high crash frequency but share common risk characteristics. To address this gap, a systemic safety approach that proactively mitigates known risk factors across multiple roadway segments and intersections should be considered.

A systemic safety program shifts from a reactive, location-specific approach to a predictive, network-wide strategy that:

- Identifies roadway segments and intersections with similar risk characteristics;
- Targets known contributing factors to fatal and serious injury crashes;
- Deploys proven, scalable countermeasures at multiple locations; and
- Prioritizes reductions in crash severity in addition to crash frequency.

Effective crash reduction is generally not achieved by focusing solely on driver behavior. The most successful strategies treat crashes as a system-level failure and attempt to correct this deficiency by applying layered interventions across engineering, policy, enforcement, vehicle design, and data analytics to reduce both the likelihood and severity of crashes. Systemic approaches to improve safety recognize that human error is inevitable and informs the design of transportation systems so that crashes do not result in serious injury or death. Under a systemic safety approach, the responsibility for safety is shared amongst designers / engineers, system managers, policy makers, and roadway users.

Defining Emphasis Areas

Notable Crash Types & Contributing Actions

A substantive review of the crash data presented previously for Broome and Tioga Counties identified three factors based on crash type and three contributing actions that had an above average frequency of fatal and serious injury collisions. These six "Emphasis Areas" are as follows:

Crash Type:

- **Intersections**
- **Roadway Departure**
- **Vulnerable Road User Crashes**

Contributing Action:

- **Unsafe Speed**
- **Failure to Yield**
- **Passing / Unsafe Lane Usage**

Emphasis Area #1 – Intersections

Due to the perpendicular nature of the conflicts and the limited lateral crash protection of vehicles, right angle crashes represented a disproportionate share of fatal and serious injury crashes throughout the study area network between 2019 and 2023. In fact, this was the most frequent crash type for KSI collisions involving multiple vehicles in both counties. Of the fatal and serious injury crashes assessed, right angle collisions accounted for approximately 10% in Broome (22% of Multi-Vehicle's 47% overall) and 9% in Tioga (27% of Multi-Vehicle's 35% overall).

These crashes typically occur at at-grade intersections and are frequently associated with failure to yield, disregarding traffic control devices, excessive approach speeds, and limited sight distance. Crash data and systemic safety analysis indicate that intersections with complicated geometric characteristics, permissive traffic control, and higher operating speeds consistently experience elevated rates of right-angle crashes. These patterns demonstrate that the issue is systemic rather than isolated, warranting a programmatic, infrastructure-focused response.

Systemic approaches to reducing right angle crashes should prioritize eliminating / reducing potential conflict points, speed management, and survivable crash conditions. Systemic strategies to eliminate or substantially reduce right angle crashes are outlined below. It should be noted that the countermeasures listed under "Basic Countermeasures" and "Supplemental Countermeasures" are explored further within FHWA's Low-Cost Safety Enhancements for Stop-Controlled and Signalized Intersections (FHWA-SA-09-020).

Strategies:

Roundabouts

Corridor Access Management

Backplates with Retroflective Borders

Yellow Change Intervals

Lighting

Signalized Intersection

Basic Countermeasures

- High-visibility signal heads, retroreflective backplates, and signage
- One traffic signal head per approach lane
- Eliminating any late night flashing operations
- Increasing all-red clearance times at signalized intersection to accommodate late entries or driver error (i.e., dilemma zones, yellow change intervals)

Supplemental Countermeasures

- Protected left-turn phasing or split phasing at high-risk intersections (i.e., eliminating permissive turning movements)
- Advance detection control systems at isolated high-speed signalized intersections where reg-light running angle crashes are an issue
- Signal timing strategies that support speed consistency and compliance (e.g., "green wave")

Other Countermeasures for Signalized Intersections

- Adding, upgrading, or removing signals as warranted
- Conversion of traditional at-grade intersections to roundabouts
- Access consolidation and intersection spacing improvements (Access Management)
- Channelization of movements to reduce or eliminate conflict points
- Geometric design modifications to reinforce appropriate operating speeds

Stop-Controlled Intersections (Four Legs)

Basic Countermeasures

- Through Approach – Doubled up (left and right), oversize advance intersection warning signs, including street names on plaques
- Stop Approach – Doubled up, oversize signs, including "Stop Ahead" intersection warning signs and STOP signs, and a 6 ft. wide raised splitter island

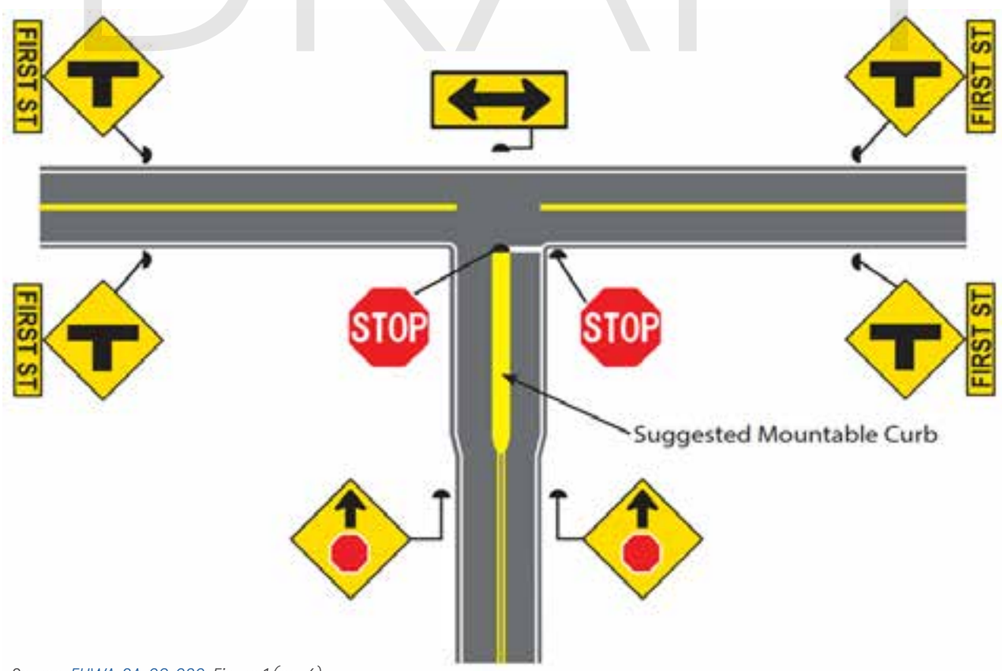
Supplemental Countermeasures (Used Alongside Basic Countermeasures)

- Flashing solar-powered LED beacons on advance warning and STOP signs OR flashing overhead intersection beacons
- Dynamic warning sign to inform through traffic that a stopped vehicle is present and could potentially enter the intersection
- Transverse rumble strips across the stop approach lanes (or "Stop Ahead" pavement markings if noise is a concern)
- Reflective strips on signposts and retroreflective STOP signs

For Multi-Lane Divided Highways

- Reduced Left Turn Conflict Intersection (e.g., J-Turn Modifications, "Michigan Left," Restricted Crossing U-Turn (RCUT), Median U-Turn (MUT))

Figure 7.2 Basic Low-Cost Countermeasures for Stop-Controlled T Intersections



Source: FHWA-SA-09-020, Figure 1 (pg. 6)

Stop-Controlled T Intersections (Three Legs)

Same set of Basic and Supplemental Countermeasures as Four Leg

- Double arrow warning sign on stop-controlled approach (as shown in **Figure 3.35**)

Crosscutting

New or upgraded intersection lighting

Improved intersection sight triangles through the removal of obstructions

Emphasis Area #2 – Roadway Departure

Head-On Collisions

Head-on collisions are among the most severe crash types on highway facilities, frequently resulting in fatal or serious injuries due to the combined speed of opposing vehicles. This was the third most frequent KSI crash type for collisions involving multiple vehicles in both counties. Of the fatal and serious injury crashes assessed, head-on collisions accounted for approximately 8% in Broome (17% of Multi-Vehicle's 47% overall) and 6% in Tioga (18% of Multi-Vehicle's 35% overall).

These crashes typically occur on two-lane rural highways and undivided multi-lane highways. Such collisions are often associated with lane departure, improper passing maneuvers, driver error / impairment, or loss of vehicle control. Crash data and systemic safety screening indicate that roadway segments with similar geometric characteristics, such as narrow lanes / shoulders, limited clear zones, horizontal curves, or an absence of median separation, experience an elevated risk for head-on crashes.

Strategies:

Pavement Friction Management

Median Barriers

Enhanced Delineation for Horizontal Curves

Longitudinal Rumble Strips and Stripes on Two-Lane Roads

Systemic strategies to eliminate or substantially reduce head-on collisions include:

- Installation of median barriers on undivided multi-lane facilities
- Use of cable median barrier where available right-of-way is limited
- Conversion of two-lane roadways to three-lane sections with a center two-way left-turn lane (TWLTL)
- Installation of centerline delineators (e.g., raised pavement markers)
- Centerline rumble strips to provide tactile and audible warnings
- Shoulder rumble strips to prevent roadway departures resulting in driver overcorrection
- Widened or paved shoulders to provide additional recovery space
- Improved pavement friction (e.g., High Friction Surface Treatment), particularly on horizontal / vertical curves
- Enhanced curve warning signage and chevrons
- Improved roadway lighting
- Review and restriction of passing zones based on sight distance

Natural Element Crashes

Crashes involving natural roadside elements (e.g., trees, rock outcrops, steep embankments, drainage features, bodies of water) are especially severe, as they involve rigid, unforgiving objects. As shown previously in **Figure 3.8**, of the fatal and serious injury crashes assessed, natural element collisions were the second most frequent KSI collision type in Tioga (28% overall) and the fourth most frequent in Broome (12% overall).

Natural element crashes most often occur along rural roads and high-speed facilities. Such crashes typically occur when vehicles depart the travelled way due to driver error, adverse weather, fatigue / impairment, or loss of vehicle control. Crash data and systemic safety analysis indicate that roadway segments with narrow clear zones, steep side slopes, horizontal curvature, and limited roadside recovery space tend to experience a higher number of natural element crashes.

Strategies:

Wider Edge Lines

Lighting

Enhanced Delineation for Horizontal Curves

Longitudinal Rumble Strips and Stripes on Two-Lane Roads

Roadside Design Improvements at Curves

Systemic strategies to eliminate or substantially reduce natural element crashes include:

- Removal or relocation of trees, vegetation, and fixed objects within the clear zone
- Flattening of side slopes and embankments
- Regrading and reshaping of drainage ditches to traversable designs
- Installation of guiderail or barrier systems to shield rigid natural features
- Shoulder and centerline rumble strips
- Widening or paved shoulders to provide recovery space
- Enhanced roadway delineation, including wider edge lines and reflective markers
- Curve realignment or superelevation improvements
- Advance warning signage and chevrons on curves
- Improved roadway lighting in critical highway segments
- High-visibility pavement markings and signage

Emphasis Area #3 – Vulnerable Road User-Involved Collisions

Due to their lack of physical protection, vulnerable road users (VRUs), which include pedestrians, bicyclists, micro-mobility users, and people using wheelchairs, are highly susceptible to serious or fatal injury at relatively low impact speeds. Of the KSI collisions assessed from 2019 to 2023, crashes involving persons walking or biking accounted for 23% in Broome (16% walk, 7% bike) and 8% in Tioga (6% walk, 2% bike).

VRU crashes frequently occur along high-speed arterials, at intersections, in areas with limited pedestrian or bicycle infrastructure, and where roadway design prioritizes motor vehicle throughput over multimodal safety. Crash data and systemic safety analysis indicate that corridors with high operating speeds, wide cross-sections, long crossing distances, insufficient access control, and inconsistent pedestrian / bicycle accommodations experience elevated VRU crash risk.

Safety countermeasures for pedestrians emphasize the separation of multimodal conflicts across both space (e.g., dedicated facilities like sidewalks and mid-block refuges) and time (e.g., leading pedestrian intervals, eliminating concurrent phasing that pits drivers turning against those walking, biking, or rolling). Relevant countermeasures seek to heighten driver awareness of locations where pedestrians are expected to cross through the use of high-visibility treatments (e.g., colored or textured pavement, dynamic lighting, retroreflective elements, button-activated signage, etc.).

Similar to pedestrians, safety countermeasures for bicyclists emphasize the separation of multimodal conflicts across both space (e.g., dedicated facilities like protected bike lanes or multi-use paths, sufficiently wide crossing islands, bike boxes and two-stage left turn lanes for queuing) and time (e.g., dedicated bicycle signals, exclusive intervals for those walking, biking, or rolling). In addition to the pedestrian strategies noted above, one particularly useful enhancement for bicyclists is the provision of detection equipment (e.g., camera or sensor integrated with adjacent traffic controls) that helps to limit stopping and otherwise support the use of exclusive phasing intervals for cyclists.

Strategies:


Leading Pedestrian Interval


Lighting


Bicycle Lanes


Crosswalk Visibility Enhancements


Walkways


Pedestrian Hybrid Beacons


Rectangular Rapid Flashing Beacons


Medians and Pedestrian Refuge Islands in Urban and Suburban Areas

Systemic strategies to eliminate or substantially reduce crashes involving VRUs include:

- Lane reductions or road diets where appropriate
- Gateway treatments to emphasize the need for drivers to transition to lower speeds when entering thickly settled, human-oriented environments (e.g., villages)
- Narrowed lanes, Traffic Calming elements (e.g., speed humps, speed tables, chicanes, raised intersections, chokers, etc.), or curb extensions to reinforce lower operating speeds
- Sidewalk installation or upgrades to meet current standards
- Separated bicycle facilities and shared-use paths where appropriate
- Raised medians and refuge islands to provide protected crossing opportunities
- High-visibility crosswalks and advance stop bars
- Leading Pedestrian Intervals (LPIs) and bicycle-specific signalization
- Pedestrian countdown signals and Accessible Pedestrian Signal (APS) equipment
- Protected (dedicated and exclusive) signal phases for pedestrians and bicyclists
- Removal of permissive turning movements where motorized conflicts with VRUs are prevalent
- At midblock crossings and uncontrolled intersections, a Rectangular Rapid Flashing Beacon (RRFB) or, along higher-speed roads, a Pedestrian Hybrid Beacon (PHB or a "HAWK" signal)
- Improved driveway design and spacing considerations (Access Management)
- Improved pedestrian-scale lighting

Emphasis Area #4 – Unsafe Speed

The most frequent contributing action among KSI crashes in Tioga was unsafe speed (28%), which ranked a close third among KSI contributing actions in Broome (15%). By decreasing the time available to respond to changing conditions, excessive speed increases the likelihood of a crash. By increasing the kinetic energy at play, excessive speed comparatively increases the severity of a collision.

Unsafe speed crashes often take place along highways and arterial facilities; however, the potential for excessive speed exists along the majority of roadways throughout America. Crash data and systemic safety analysis consistently show that roadway segments with high operating speed, wide cross-sections, long uninterrupted (intersection-free) segments, and limited speed management features experience elevated rates of speed-related crashes.

Systemic strategies to eliminate or substantially reduce unsafe speeds include:

- Lane width reductions and road diets where appropriate
  - Lane narrowing using rumble strips parallel to the edge lines (or raised pavement markers where noise issues or bicycle safety concerns may be present)
- Gateway treatments near thickly settled areas, as well as predictable transitions between highway facility types
- Horizontal alignment modifications to reinforce appropriate speeds (e.g., chicanes, lateral shift)
- Vertical treatments to reduce speeds (e.g., raised intersections, speed tables)
- Conducting corridor-wide speed studies to set appropriate speed limits so that the posted speed limit aligns with surrounding land uses
- Targeted speed enforcement programs
- Dynamic speed feedback signs

Strategies:

Road Diets

Appropriate Speed Limits for All Road Users

Variable Speed Limits

Emphasis Area #5 – Failure to Yield

Ranked second among contributing actions in KSI crashes for both counties (17% in Broome, 15% in Tioga), failure to yield right-of-way collisions occur when one driver, who is supposed to wait for oncoming traffic to clear, either does not observe, fails to respond with sufficient time to, or simply disregards, the existing traffic control present along the roadway (e.g., stop sign, signal, yield sign).

Failure to yield crashes are commonly found at intersections, driveways, and crossing locations. These crashes frequently result in right angle, turning, and VRU-involved crashes and often occur where drivers are required to make complex, time-critical decisions regarding gap selection and right-of-way assignment. Crash data and systemic safety analysis demonstrate that facilities with characteristics like high operating speeds, complex intersection treatments involving multiple conflict points, and inconsistent traffic control exhibit an elevated rate failure to yield KSI crashes.

Systemic strategies to eliminate or substantially reduce failure to yield include:

- Conversion of high-risk intersections to roundabouts, particularly at locations with a high frequency of right angle collisions
- Conversion of high-risk intersections along multi-lane divided highways to Reduced Left-Turn Conflict Intersections (e.g., Restricted Crossing U-Turn or "J Turn" or a Median U-Turn depending on adjacent land uses and desired movements) at locations where obstructions, roadway geometry, or other issues lead to complex decision-making for those crossing, or turning on / off, the primary roadway
- Consolidation of minor side streets and driveways (Access Management)
- Channelization of turning movements
- Grade separation where volumes and speed warrant
- Protected-only left turn phasing or split phasing at signalized intersections
- Removal of permissive turning movements
- Increased all-red clearance time intervals
- Conversion of two-way stop control to all-way stop control or signal control where warranted
- Advance warning signage (e.g., Intersection Conflict Warning Systems) to improve driver expectancy

Strategies:

Reduced Left-Turn Conflict Intersections

Roundabouts

Corridor Access Management

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

Dedicated Left- and Right-Turn Lanes at Intersections

Emphasis Area #6 – Passing / Unsafe Lane Usage

Crashes stemming from passing maneuvers or unsafe lane usage (e.g., failing to signal when changing lanes, weaving) occur when drivers misjudge available gaps, violate no-passing zones, or drift from their designated lane, often due to distraction, fatigue, or impairment. From 2019 to 2023, this contributing action was reported in 12% of KSI crashes in Tioga and 7% of KSI collisions in Broome.

Issues with passing maneuvers and unsafe lane usage are most common along two-lane rural highways and undivided multi-lane facilities. This contributing action is typically found in crashes coded as head-on, sideswipe, or collisions with a natural element. Crash data and systemic safety analysis indicate that highway segments with limited passing opportunities, narrow lanes and shoulders, horizontal curves, and inconsistent delineation experience elevated rates of passing-related and unsafe lane usage crashes.

Strategies:

Lighting

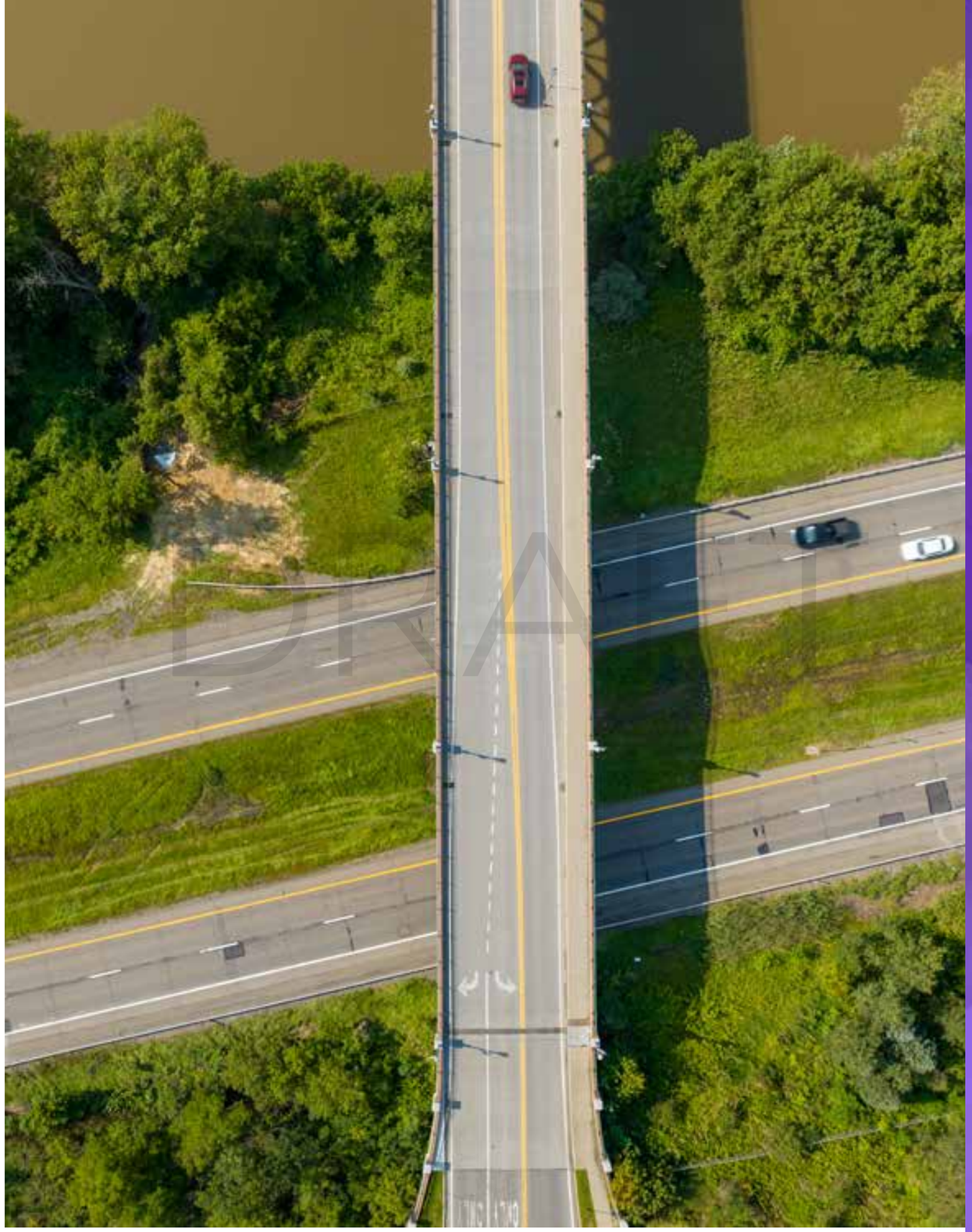
Median Barriers

Enhanced Delineation for Horizontal Curves

Longitudinal Rumble Strips and Stripes on Two-Lane Roads

Systemic strategies to eliminate or substantially reduce passing / unsafe lane usage include:

- Installation of two-way left-turn lanes (TWLTL)
- Provisions for periodic passing lanes ("Super 2 design") in constrained two-way corridors
- Review and refinement of passing zones based on sight distance
- Centerline rumble strips
- Median treatments / barriers on undivided multi-lane facilities
- High-visibility pavement markings, including wider centerlines
- Enhanced curve signage and chevrons
- Consistent lane configurations and transitions along corridors
- Improved nighttime visibility through delineation and lighting
- Geometric design refinements to encourage appropriate operating speeds



8

Policies, Programs, & Strategies

Policies, Programs, & Strategies

Policies, programs and strategies play a crucial role in shaping the non-design elements of the Safe System Approach by embedding safety into the broader transportation ecosystem beyond infrastructure. Policies establish the legal and regulatory framework that enables proactive safety measures, such as speed management, automated enforcement and vehicle safety standards, while programs operationalize these policies through education, outreach and equity-focused initiatives. Strategies align goals across agencies, prioritize systemic risk reduction and ensure that safety interventions are data-driven and equitably distributed amongst BMTS communities.

Together, these elements reinforce the Safe System's core principles – acknowledging human error, protecting vulnerable users and sharing responsibility – by creating layers of protection that reduce the likelihood and severity of crashes. They also support post-crash care systems and institutionalize safety culture, making the approach sustainable and adaptable across jurisdictions.

This action plan follows the principles of the Safe System Approach and provides strategies to achieve zero fatalities and serious injuries in the region under the five categories of the Safe Systems Approach:

Safe Roads: Create predictable, self-enforcing, self-explaining roads and intersections that allow for unavoidable errors by reducing the severity of the consequences

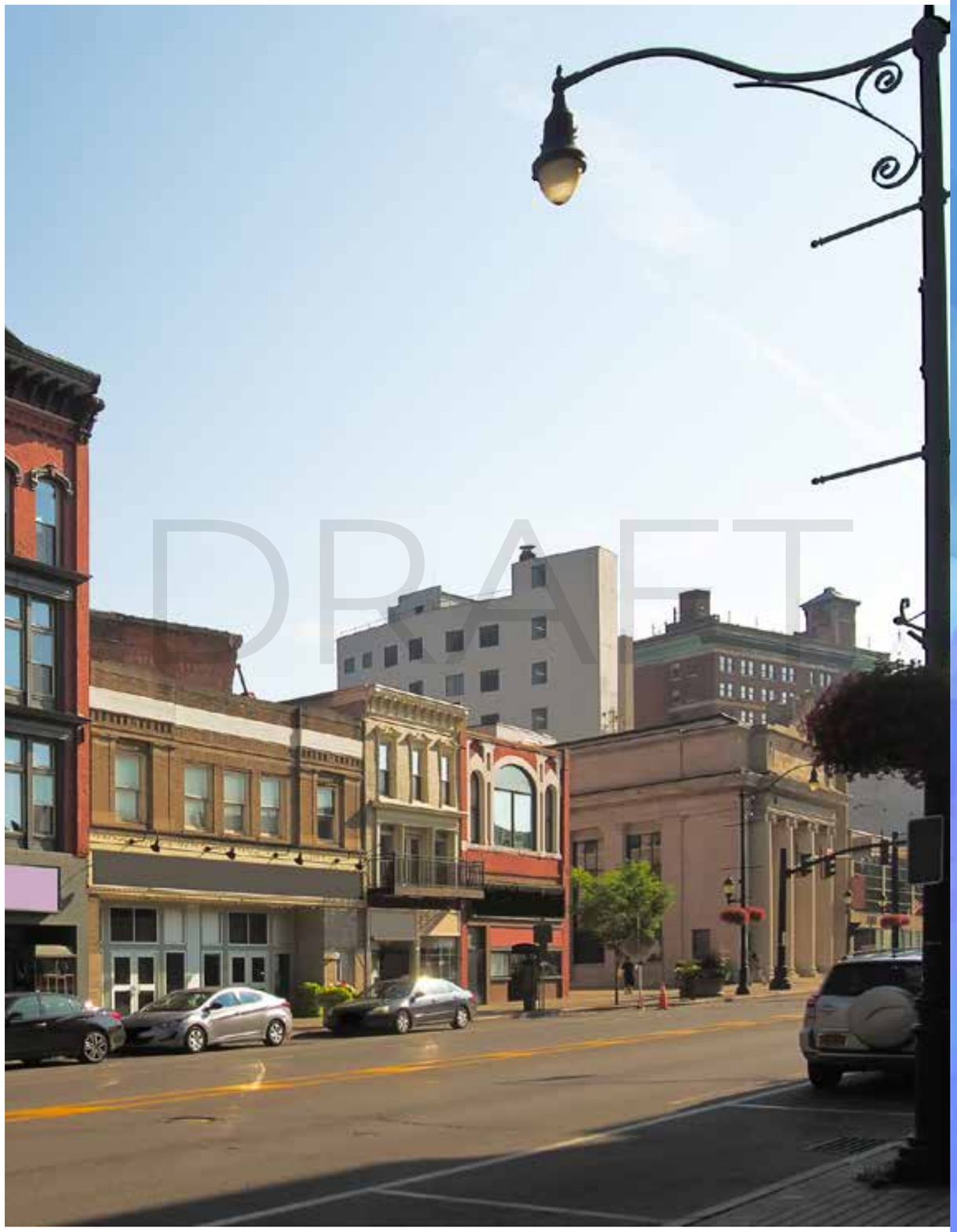
Post-Crash Care: Provide resources and support to establish a timely and effective emergency response system for crashes, injuries and victims

Safe Users: Promote safe travel behavior among all road users, whether they are using a vehicle, walking, biking, or rolling

Safe Vehicles: Design and regulate safe vehicles and incorporate updated technologies and fleet modifications to promote safety

Safe Speeds: Prevent fatal and serious injury crashes by managing vehicle speeds

These strategies have been identified based on a review of other successful Vision Zero action plans and FHWA's Vision Zero Toolkit, as well as an evaluation of their potential applicability to BMTS.



Safe Roads

To create and finance predictable, intuitive and safer streets for all users, a broad set of design, operations, and programmatic strategies needs to be collaboratively developed. One strategy is to prioritize safety within BMTS's Transportation Improvement Program (TIP) project evaluation process. Supporting quick-build and demonstration projects, especially within the High Injury Network, is a strategy to improve safety outcomes.

Updating Complete Streets policies and design criteria, as well as advocating for municipal- and county-level changes in these regards, to align with Vision Zero principles is a strategy that will ensure consistency across public and private development. Additional measures include conducting Road Safety Audits to identify and mitigate crash risks, designating Pedestrian Safety Zones in high-risk areas, and implementing systemic signal upgrades (e.g., ITS sensors, countdown timers and high-visibility markings).

Table 8.1 Safe Roads Strategies

	Strategy Policy	Responsible Agency/-ies Supporting Party/-ies	Timeline	Components and Considerations
1.1.	Identify deficiencies in the pedestrian and bicycle network and prioritize projects to address those gaps.	BMTS, Municipalities	Ongoing	BMTS will continue to advocate for filling in gaps in the walking and cycling network, as well as broader build-out of the Two Rivers Greenway. Municipalities will continue to install pedestrian and bicycle facilities where there are gaps and inadequacies in the network.
1.2.	Quick-build and demonstration projects to improve safety	Municipalities, Counties, BMTS, NYSDOT, Non-profits, Safety Advocacy Groups	Short-term	Deployment of quick-build and demonstration projects that improve safety for all road users, especially within the High-Injury Network.
1.3.	Update BMTS Complete Streets Policy to Incorporate Recent Federal Guidance and Vision Zero Principles	BMTS	Short-term	BMTS adopted a Complete Streets Policy in 2016. Technical literature related to walking and biking in the United States has progressed substantially over the last decade. BMTS will work to incorporate key insights from USDOT-issued design and operational guidance related to walking, biking, rolling, and connecting via transit.
1.4.	Prioritize Safety in Transportation Improvement Programming (TIP) Project Selection Processes	BMTS Planning and Policy Committees	Ongoing	Prioritize safety in TIP by formally incorporating a safety-based project rating within the evaluation / scoring process.
1.5.	Road Safety Audits	BMTS	Annual	BMTS currently has an annual goal of conducting two RSAs. Road Safety Audits follow a formal process utilizing a multidisciplinary group that reviews street safety aspects and makes recommendations. To the extent such measures are relevant, BMTS will consider implementing traffic calming measures as part of future RSA recommendations.
1.6	Systemic Signal Improvement	BMTS, NYSDOT, Municipalities	Long-term	All new and upgraded existing signals should consider retroreflective backplates, intelligent transportation systems (ITS) sensors, pedestrian countdown timers and future capability of red-light running detection where appropriate. Additionally, all signalized intersections should include high-visibility crosswalk striping and stop bars.
1.7	Encourage the Adoption or Update of Local Complete Streets Policies as Best Practices Change	Municipalities, BMTS	Mid-term	The City of Binghamton led the way in 2011 by adopting the region's first Complete Streets Policy. Since then some of the smaller municipalities have established similar policies (e.g., Village of Johnson City, Town of Dickinson, Village of Deposit). BMTS will encourage the adoption of Complete Streets policies by municipalities via collaboration, education, and outreach.
1.8	Access Management and Driveway Guidelines for Private Development	Municipalities, BMTS	Short-term	Update municipal zoning regulations to include best practices for access management and driveway design.
1.9	Support Systemic Safety Training for Local Planning & Zoning Decision-Makers	BMTS, Municipalities	Short-term	Provide training to local Planning and Zoning boards on systemic safety treatments, particularly in regard to pedestrian facilities that may be implemented through the land use review process.
1.10	Update Development Review Checklists	Municipalities, Local Planning Departments	Short-term	Update development review checklists to include Complete Streets elements and, where a traffic study is needed, a crash analysis should be included. Traffic studies should incorporate safety as part of their core evaluation criteria. The crash analysis should be performed in alignment with Vision Zero and Safe System principles and all improvements constructed in the public right-of-way by private entities should demonstrate a safety benefit through the use of the Highway Safety Manual methodology.
1.11	Safe Routes to School (SRTS) Program Development and Funding Pursuit	BMTS, Municipalities, School Districts	Ongoing	Establish SRTS programs in communities to enhance safety for children. Implementation of SRTS programs has shown 10-20% reduction in severe pedestrian and cyclist crashes around schools. SRTS efforts also have the added benefit of increasing walking and biking to school.

Post-Crash Care

Post-crash care strategies focus on enhancing emergency response systems and ensuring coordinated, timely action following collisions. One post-crash care strategy is to review the fatal and serious injury crashes through multidisciplinary investigations and identify contributing factors and recommend preventive measures.

These recommendations are used to inform future safety improvements and guide policy updates. Support for crash victims is strengthened through improved access to medical care, legal resources and follow-up services is another strategy. By integrating post-crash data into planning and decision-making, these actions contribute to a safer transportation system and help reduce the risk of future fatal crashes.

Table 8.2 Post-Crash Strategies

Strategy Policy		Responsible Agency/-ies Supporting Party/-ies	Timeline	Components and Considerations
2.1.	Convene the Traffic Incident Management (TIM) Committee	BMTS, EMS, Counties, Municipalities	Short-term	Secure a formal commitment from local or regional leadership to prioritize roadway safety and adopt the Safe System Approach. The Traffic Incident Management Committee brings agencies together to coordinate quick, safe responses to roadway incidents. Its goal is to improve communication and reduce congestion while protecting responders and motorists.
2.2.	Monitor High-Risk Locations	BMTS, Counties, Municipalities	Mid-term	Track and evaluate roadway segments and intersections identified as high-risk to reduce fatalities and serious injury over a specific recurring period. Crash trends, speed compliance, and implemented improvements at these locations can be part of monitoring at these locations.
2.3.	Annual Assessment	BMTS	Ongoing	Prepare a brief annual assessment that summarizes yearly crash statistics and outlines progress towards Vision Zero goals.
2.4.	Update Core Inputs (HIN, HRN, and Equity) on a Routine Basis	BMTS	Every two to three years	Update the High Injury Network, High Risk Network and Transportation Equity map layers with most current data.
2.5.	Augment Data on Fatal and Serious Injuries by Incorporating Hospitals, Emergency Responders and Demographic Information	BMTS, Counties, Municipalities, Hospitals, EMS	Mid-term	Explore ways to collect demographic information at crash sites to help better assess equity. Supplementing police-collected crash data with additional sources of information, such as hospitals and emergency responders, is an emerging best practice. It has been shown that police data can undercount incidents among some populations. [2]
2.6.	Host an Interactive Safety Dashboard	BMTS	Short-term	Develop an interactive safety dashboard where members of the public can easily access the networks and trends developed within this Safety Action Plan.
2.7.	Advocate for Proper Maintenance of Emergency Vehicle Pre-Emption Equipment at Intersections along Key Corridors	BMTS, EMS, First Responders	Ongoing	Emergency vehicle pre-emption technology allows for traffic signal phases to be modified in real-time so as to cater to emergency response movements and maneuvers. This approach not only provides for more reliable response times to emergency events but also improves safety for first responders while en route to the scene. BMTS will advocate for and encourage proper maintenance of these regional assets, as this intersection-based signal pre-emption equipment ultimately supports Public Safety in general (in addition to addressing the Post-Crash Care element of the Safe System approach).
2.8.	Map Cell Phone Dead Zones and Coordinate to Improve Response Times	BMTS, EMS, First Responders, Telecommunications	Mid-term	The ability to dispatch emergency services can be influenced both by population density, as well as topographic challenges. In a rural river valley like Broome/Tioga, there are likely many corridors where establishing contact with EMS may be unreliable or simply not possible given current infrastructure. To combat this gap, BMTS will study where coverage drops out and develop strategies designed to mitigate that issue.

[2] Prioritizing Health Equity in Vision Zero Planning, Vision Zero Network, 2023

Safe Users

Safe Users strategies include targeted education. A communications and outreach campaign will be launched to support enforcement efforts and raise public awareness around key safety behaviors such as speeding, seatbelt use and distracted driving. These campaigns will be developed in collaboration with municipalities and the New York Governor's Traffic Safety Committee (GTSC).

With representation from a broad array of state-level agencies, including, the GTSC serves as the primary coordinating entity for targeted safety activities across New York State and includes representatives from various executive departments (e.g., Transportation, Motor Vehicles, State Police, Health, Education, Criminal Justice, Thruway, Finance). One of the primary functions of the GTSC is to disseminate safety-related outreach materials, such as brochures, manuals, videos, and guides, oriented towards specific road safety concerns (e.g., distracted driving, younger drivers, sharing the road with cyclists).

Table 8.3 Safe Users Strategies

Strategy Policy		Responsible Agency/-ies Supporting Party/-ies	Timeline	Components and Considerations
3.1.	Communications and Outreach Supporting Enforcement	BMTS, Municipalities, Traffic Safety Boards	Ongoing & Short-term	Public education campaigns on speeding, seatbelt use, impaired driving, distracted driving, etc.

Safe Vehicles

The safe vehicles strategies contribute to a safer transportation environment by addressing vehicle-related risks through both equipment and education. Improving vehicle safety is supported by upgrading fleet vehicles with modern crash-reduction technologies, such as backup cameras and blind spot detection. Another strategy under this category is right-sizing fleet vehicles, which helps reduce crash severity and improve fuel efficiency. Additionally, vehicle safety education and awareness efforts, such as distributing best practice materials and hosting safety forums, promoting safer driving behaviors and encouraging adoption of safety technologies across public and private fleets.

Table 8.4 Safe Vehicles Strategies

Strategy Policy		Responsible Agency/-ies Supporting Party/-ies	Timeline	Components and Considerations
4.1.	Government Fleet Vehicle Improvements	Municipalities, Counties, State agencies	Long-term	Require that all new fleet procurements feature the latest crash-reduction technology and safety equipment (e.g., back-up cameras, blind spot detection, intelligent speed assist). Given that smaller vehicles are less lethal in crashes and more fuel-efficient, future government purchases should seek to reduce the size and mass of the vehicles while also including safety-first design treatments (e.g., teardrop windows, modified mirrors).
4.2.	Vehicle Safety Education and Awareness	Municipalities, Counties, State Agencies, Non-profits	Mid-term	Provide education content on vehicle safety best practices. NYCDOT has led the Vision Zero Fleet Safety Forum, an initiative that brings together stakeholders from government, private fleets, non-profits and academia to improve vehicle safety and share best practices. It features information on past and upcoming events, downloadable resources, like flyers, videos and presentations, as well as safety campaigns and videos.

Safe Speeds

Safe Speeds strategies include lowering statutory speed limits in residential districts to 25 mph or less, conducting a regional Speed Management Plan to identify priority areas for traffic calming and adopting updated speed-setting criteria that reflect federal guidance and local context. Dynamic speed feedback signs will be deployed at high-risk locations to encourage compliance. Although current state law does not allow municipalities in Broome/Tioga to use automated speed enforcement, regulatory changes at the state level regarding the use of speed and red-light cameras, should be monitored to eventually leverage the safety benefit of these devices.

Table 8.5 Safe Speeds Strategies

Strategy Policy		Responsible Agency/-ies Supporting Party/-ies	Timeline	Components and Considerations
5.1.	Reduce Statutory Speed Limit to 25 mph as permitted by NYS Assembly Bill A1007A	Municipalities, BMTS, Counties	Short-term	Lower the statutory speed limit to 25 mph on streets within residential districts, considering the process required by NYS for lowering speed limit to under 30 mph.
5.2.	Establish Safe Speed Limits	Municipalities, BMTS	Mid-term	The policy will follow updated federal guidance (e.g., USLIMITS2) to incorporate a range of factors, including crash history, intersection spacing, driveway density, roadway geometry, roadside conditions, roadway functional classification, traffic volume, pedestrian and bicycle activity, land use context and observed speeds.
5.3.	Dynamic Speed Feedback Signs at High-Risk Locations	Local Law Enforcement	Short-term	Speed feedback signs dynamically show the driver's speed and the posted speed limits and have been shown to slow overall speeds where deployed. They can also be used in part to educate drivers about the importance of safe speeds.

9

Monitoring Plan Outcomes

Performance Measures

The Plan goal to reduce fatal and serious injury crashes by 50% by 2040 and 80% by 2050 will require a collaborative effort among the project team and stakeholders. To measure progress towards this goal and the implementation of this Plan, both process and outcome measures will be reported publicly.

Adopted Crash Reduction Targets

To help monitor long-term progress towards Vision Zero, this plan establishes several crash reduction targets based on the injury severity of the crash and/or the types of road users involved. This Safety Action Plan's quantitative crash reduction targets are summarized in bullets below. For each performance measure, the targets assume a consistent, proportional reduction.

- 2025 serves as the baseline (informed by 5-year annual average from 2019 to 2023)
- 50% reduction by 2040 as the midpoint goal for this Safety Action Plan
- 80% reduction by 2050
- 100% reduction in fatalities and serious injuries remains the ultimate target

Table 9.1 through **Table 9.3** present detailed listings of the plan's recommended performance measures for monitoring, beginning with Broome County, moving to Tioga County, and concluding with Broome-Tioga. Within each table, the performance measures are shown in rows, with the first set of data indicating the annual crash count, followed by the annual crash rate per 100,000 residents.

The monitoring metrics presented in this section should be thoroughly reviewed every five years to determine how to best adjust course towards Vision Zero. Performance measures may be adjusted in future plan updates based on trends identified in the Vision Zero Performance Report, along with the breadth and depth of transportation-related data available to assess safety trends.

Potential Metrics for Consideration during Future Updates

In addition to the crash-based metrics established within this plan, BMTS may consider assessing other transportation-related metrics, such as those listed below, to gauge progress as part of future five-year updates.

Safety Infrastructure:

Assessing the implementation and safety impact of infrastructure improvements that stem from this plan (e.g., prioritized projects, Road Safety Audits)

Equity:

Evaluating whether safety improvements are addressing disparities in safety outcomes across different demographic groups

Speed Management:

Reviewing the number of municipalities that have adopted municipality-wide speed limit reductions

Table 9.1 Crash Reduction Targets – Broome County

Jurisdiction	Type of Change to Monitor	User Type(s) / Focus Area	Injury Severity Level	Unit of Analysis	Absolute Targets (Annual Count) 5-Year Total Count	2025 Baseline	2040 (- 50%)	2050 (- 80%)	Population-Adjusted Targets (Annual Rate per 100,000 Residents) Base Population	2025 Baseline	2040 (-50%)	2050 (- 80%)
BROOME COUNTY	Crash Outcomes	All Users	Fatal	Crashes	46	9	5	2	197,738	4.7	2.3	0.9
			Serious Injury		513	103	51	21		51.9	25.9	10.4
		Pedestrian-Involved or Bicyclist-Involved	Fatal or Serious Injury		125	25	13	5		12.6	6.3	2.5

Source: NYSDOT CLEAR 5-Year Crash Counts

Table 9.3 Crash Reduction Targets – All Metrics – Broome-Tioga

Jurisdiction	Type of Change to Monitor	User Type(s) / Focus Area	Injury Severity Level	Unit of Analysis	Absolute Targets (Annual Count) 5-Year Total Count	2025 Baseline	2040 (- 50%)	2050 (- 80%)	Population-Adjusted Targets (Annual Rate per 100,000 Residents) Base Population	2025 Baseline	2040 (-50%)	2050 (- 80%)
TIOGA COUNTY	Crash Outcomes	All Users	Fatal	Crashes	25	5	3	1	48,106	10.4	5.2	2.1
			Serious Injury		140	28	14	6		58.2	29.1	11.6
		Pedestrian-Involved or Bicyclist-Involved	Fatal or Serious Injury		14	3	1	1		5.8	2.9	1.2

Source: NYSDOT CLEAR 5-Year Crash Counts

Table 9.2 Crash Reduction Targets – Tioga County

Jurisdiction	Type of Change to Monitor	User Type(s) / Focus Area	Injury Severity Level	Unit of Analysis	Absolute Targets (Annual Count) 5-Year Total Count	2025 Baseline	2040 (- 50%)	2050 (- 80%)	Population-Adjusted Targets (Annual Rate per 100,000 Residents) Base Population	2025 Baseline	2040 (-50%)	2050 (- 80%)
TIOGA & BROOME COUNTY	Crash Outcomes	All Users	Fatal	Crashes	71	14	7	3	245,844	5.8	2.9	1.2
			Serious Injury		653	131	65	26		53.1	26.6	10.6
		Pedestrian-Involved or Bicyclist-Involved	Fatal or Serious Injury		139	28	14	6		11.3	5.7	2.3

Source: NYSDOT CLEAR 5-Year Crash Counts

Approach to Monitoring Progress

Vision Zero Committee

To implement the BMTS Safety Action Plan, BMTS will establish a Vision Zero Committee. Such groups are usually comprised of representatives from local municipalities, county departments, and other relevant stakeholders (e.g., transit, emergency response, commerce). The Vision Zero Committee will meet periodically to discuss recent KSI collisions and trends, coordinate safety-related efforts, initiatives, and projects, and guide the annual Vision Zero Performance Report. The Committee can also serve as a forum for community engagement ahead of the report's annual release, offering a space where stakeholders and the public can openly discuss recent outcomes, lessons learned, and opportunities for improvement.

Reporting Progress

The annual Vision Zero Performance Report will analyze roadway safety data from the previous year, note current progress towards plan goals, and describe key victories, projects delivered, and other sources of momentum that will help sustain the drive to zero. This report will be made publicly available and presented to the BMTS Policy Committee.

Reporting Progress

A public-facing online dashboard has been established as part of the BMTS Safety Action Plan. It is a powerful tool to ensure accountability and transparency en route to Vision Zero. The dashboard will help the public understand and remain engaged with this technical topic, offering key lessons learned from the data compiled and analyzed each year. The BMTS Safety Action Plan, project dashboard, and Annual Report will be sent to the Vision Zero Committee members and made publicly accessible on the project website.

The online dashboard can be accessed here.

Photo: Site Visit at Vestal Pkwy E & S Washington St in Broome County

BMTS

SAFETY ACTION PLAN

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