CAMBRIDGE SYSTEMATICS

Tompkins County SS4A Joint Safety Action Plan

Network Screening and Systemic Analysis Memo

prepared for

Tompkins County Joint Safety Action Plan Project Team

prepared by

Cambridge Systematics, Inc.

with

Sam Schwartz Engineering

FHI Studio

Planning4Places

February 19, 2025

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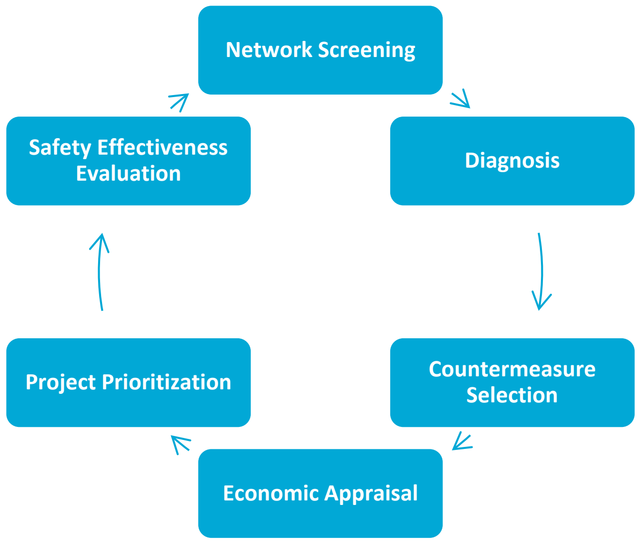
1.0 Introduction

The Roadway Safety Management Process (Figure 1.1) is a data-driven approach to applying proven analysis tools for identifying, implementing, and evaluating potential safety improvements at a network level.

Figure 1.1 Roadway Safety Management Process



Source: Highway Safety Manual (American Association of State Highway and Transportation Officials)

The NYSDOT *Highway Safety Improvement Program Procedures and Techniques* ("Red Book") has divided this process into three broad components (Figure 1.2) with respective approaches for Hotspot and Systemic network screening.

The **Hotspot Approach** focuses on sites with the highest potential for safety improvement and is based on crash history, traffic volumes, site characteristics, and other factors. It first identifies locations with the highest potential for safety improvement, and then presents diagnosis and countermeasures. This is also known as a *reactive* approach to safety.

The **Systemic Approach** also focuses on sites with the highest potential for safety improvement, but does so from a systemwide perspective. Common crash types and contributing factors represented in the data are identified, then locations where those contributing factors may arise are identified. This is also known as a *proactive* approach to safety.

These two approaches are complementary and should each be conducted to support a comprehensive approach to safety management.

Figure 1.2 NYSDOT HSIP Process

Planning	
Hotspot	**Systemic**
Screening Diagnosis	Diagnosis Screening
Countermeasure Selection	
Economic Appraisal	
Project Prioritization	

↓

Implementation

↓

Evaluation

This memorandum describes the hotspot approach (in Section 2.0) and systemic approach (in Section 3.0) to network screening within Tompkins County. After these locations are solidified, next steps in the process will include the creation of "profiles" for the priority locations with photos, recommended countermeasures, and more site-specific information.

2.0 Hotspot Screening

The first step of the network screening analysis was to identify intersections and segments that are over-represented in terms of their crash history from 2019 to 2023, which is the most recent five-year period with complete crash data. This was done in two ways: once using all crashes that resulted in a fatality or a serious injury and again using all crashes that involved a collision with a vulnerable road user (VRU). These two screenings were completed using NYSDOT's CLEAR Safety application, explained below.

2.1 Process

2.1.1 CLEAR Safety Application

Areas that are over-represented in terms of their crash history are defined by their Potential for Safety Improvement (PSI). PSI is based on a comparison of the site-specific safety performance to the statewide average of similar facilities. NYSDOT has calibrated specific Safety Performance Functions (SPFs) for each of the 70 Facility Types[1].

PSI was calculated using the CLEAR Safety application using the Excess Expected Crash Frequency with Empirical Bayes Adjustment. This methodology allows for calculations to account for both differences in traffic volumes and possible bias due to regression-to-the-mean, accounting for changes to crash totals over specific years included in the analysis. This means the identification of hotspots will not be biased by one

[1] NYSDOT Highway Safety Improvement Program Procedures and Techniques aka 'Red Book', Appendix A.

bad year of crashes. The final outputs of the CLEAR Safety Tool are intersections and segments, analyzed using a sliding window analysis, which analyzes a 0.3 mile window that moves at 0.1 mile increments across the roadway network.

Each of those intersections and segments has an associated PSI, which is then used to break the segments into four categories called a Level of Service of Safety (LOSS). The four LOSS categories and their definitions are seen in Table 2.1. The higher the LOSS level, the greater impact a theoretical safety project would have if implemented in that area.

Table 2.1 Level of Service of Safety Categories

LOSS Level	PSI Percentiles	Description
Level 4	Above the 90th percentile	A high potential for crash reduction
Level 3	50th – 90th percentile	A moderate to high potential for crash reduction
Level 2	10th – 50th percentile	A low to moderate potential for crash reduction
Level 1	Lower than the 10th percentile	A low potential for crash reduction

Source: NYSDOT Highway Safety Improvement Program Procedures and Techniques.

2.1.2 Manual Adjustments to CLEAR Outputs

Because of data availability issues, post-processing adjustments to the CLEAR Safety network screening outputs needed to be made to make corrections in the calculations for LOSS and PSI. There were two attributes that were either lacking or incorrect that resulted in incorrect data. For the affected segments, the relevant performance measures were recalculated using the Safety Performance Functions Parameters for Intersections, Ramps, and Segments spreadsheet provided by NYSDOT on the Crash Analysis Toolbox. These parameters are the same ones used by CLEAR Safety to calculate LOSS and PSI for each Facility Type.

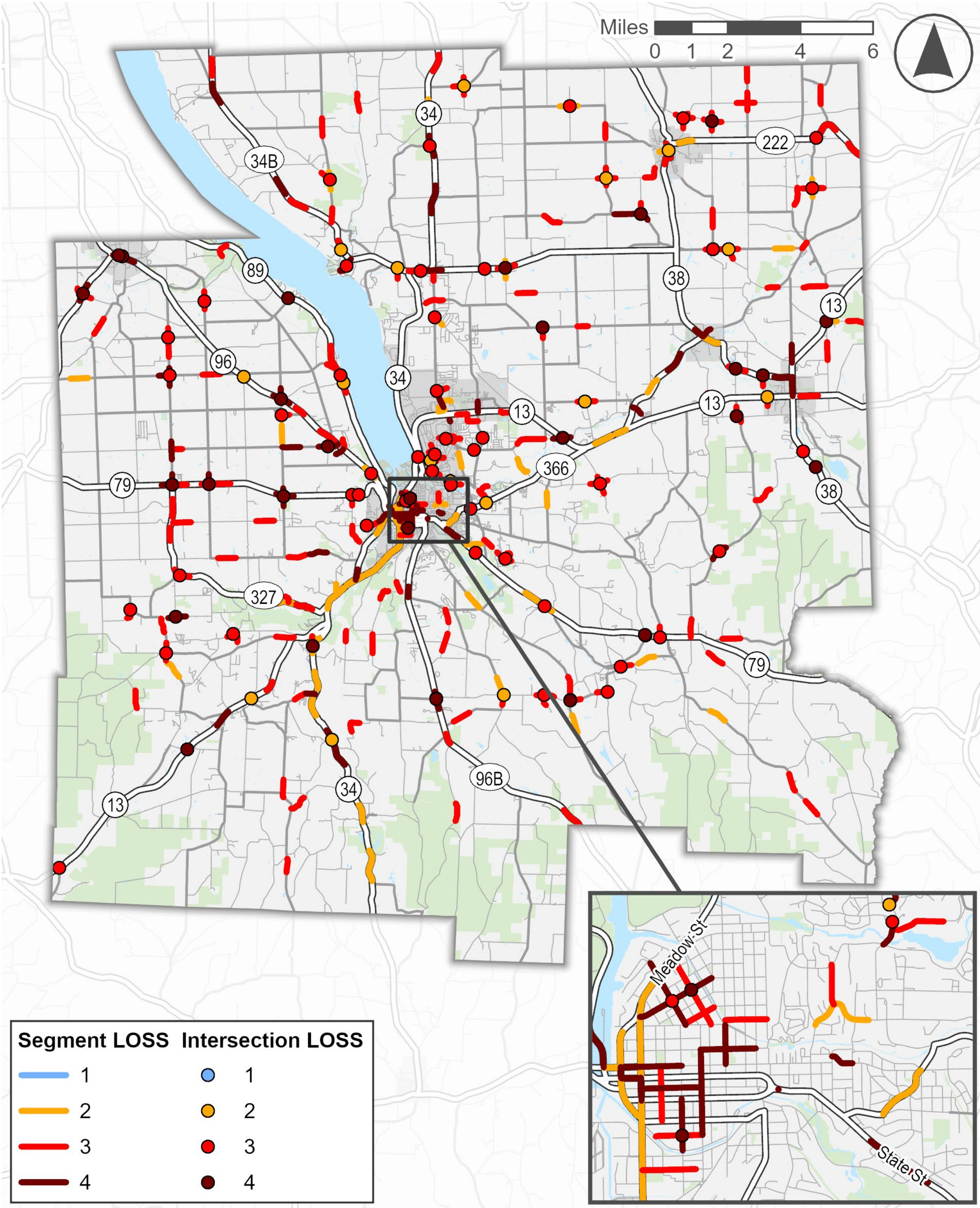
First, some segments were lacking average annual daily traffic (AADT) data. The AADT, either actual or estimated counts, from the NYSDOT Traffic Data Viewer were spatially joined to the segments to correct for this. Data from 2021 was the most recent data available from the Highway Data Services Bureau and is the midpoint of the five-year period (2019-2023) of crashes included in the network screening. A small number of AADT figures were still not able to be joined to the CLEAR export segments. In those cases, a NYSDOT-provided predicted number of crashes was used in those calculations.

Second, there were segments whose Facility Type attributes did not correspond to those listed in the tool. In those cases, aerial imagery was reviewed to assess the urban/rural context, number of lanes, and access control. An updated Facility Type was selected that matched those defining characteristics. The performance measures were then able to be calculated based upon the proper parameters.

2.1.3 Final CLEAR Screening Results

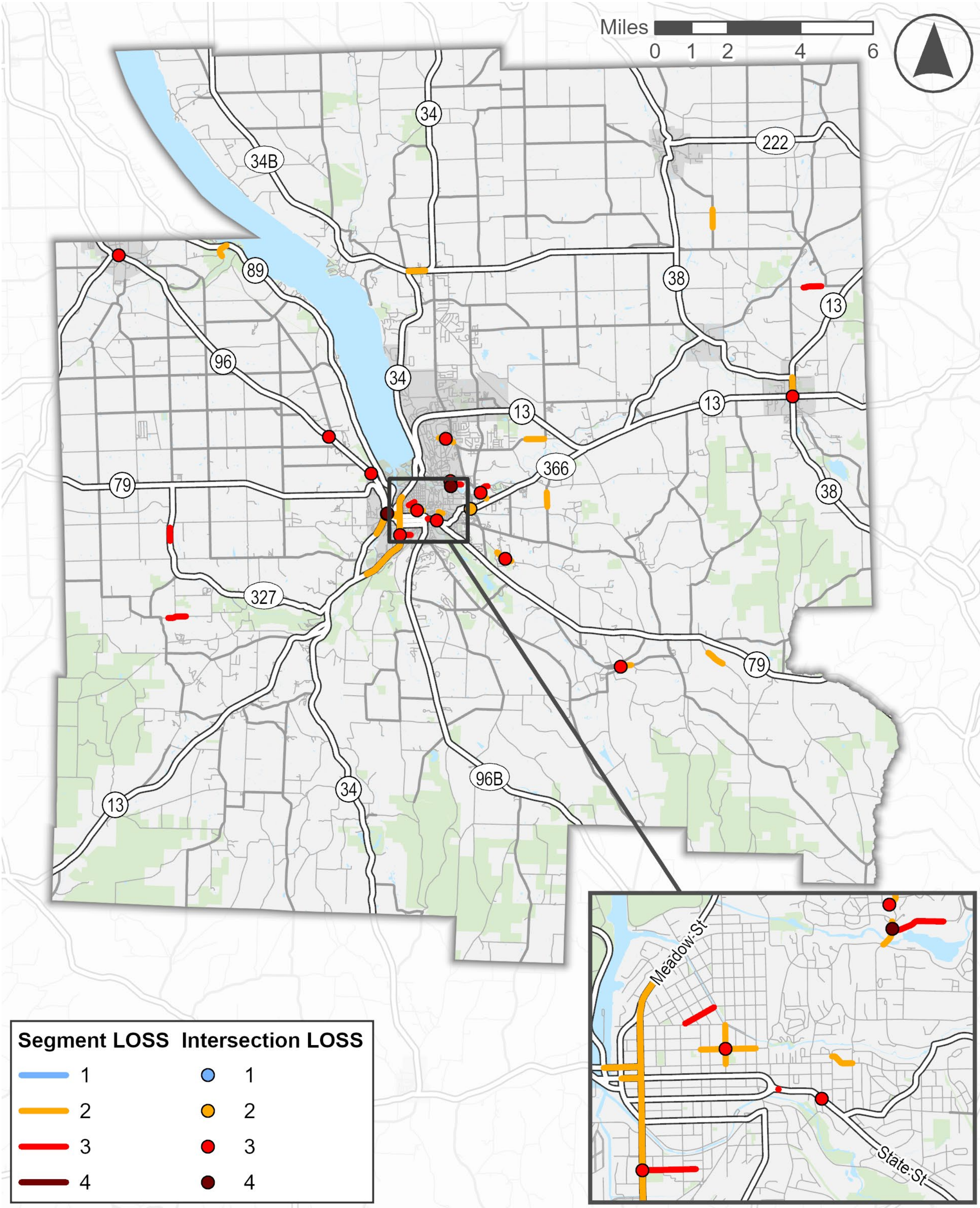
After running the CLEAR Safety tool, manually adjusting the outputs to account for missing data, and going over the results with stakeholders, the final hotspot CLEAR results were selected. The intersections and segments identified in the CLEAR tool are seen in Figure 2.1 for the fatality and serious injury screening and Figure 2.2 for the vulnerable road user screening.

Figure 2.1 Fatality and Serious Injury CLEAR Screening Results



Source: NYSDOT CLEAR, 2019-2023; Analysis by Cambridge Systematics.

Figure 2.2 Vulnerable Road User CLEAR Screening Results



Source: NYSDOT CLEAR, 2019-2023; Analysis by Cambridge Systematics.

2.2 Crashes and Exposure

To address gaps in the CLEAR data availability, an additional crash analysis was completed that has more consistent coverage, but less precision. This involved looking at trip activity at the block group level and joining that with crashes from CLEAR to get an estimate of crash rate for that block group, which provides a measure of the relative risk of crashes occurring in each area. This crash rate is then applied to all the segments and intersections within that block group to achieve an estimate of crashes and exposure.

2.2.1 LOCUS Data

Trip activity data was taken from the LOCUS platform, a location-based service capturing multimodal travel flows at a block group level. It helps address the limitations of using Average Annual Daily Traffic volumes (AADT) for crash rate calculations. AADTs are mainly collected for motor vehicles on arterial roadways and do not provide contextual information about origins and destinations, traveler demographics, and types of trips. Further, it also does not include measures of non-motorized travel. This limits the ability to identify areas with high densities of crashes and their varying degrees of exposure. By using LOCUS, risk among different types of road users and patterns within the local transportation network are able to be analyzed, including vulnerable road users and communities identified by equity considerations.

2.2.2 Results

LOCUS data was downloaded and segmented into the following two categories:

Annual average daily trips that occur within a block group in 2023, regardless of mode

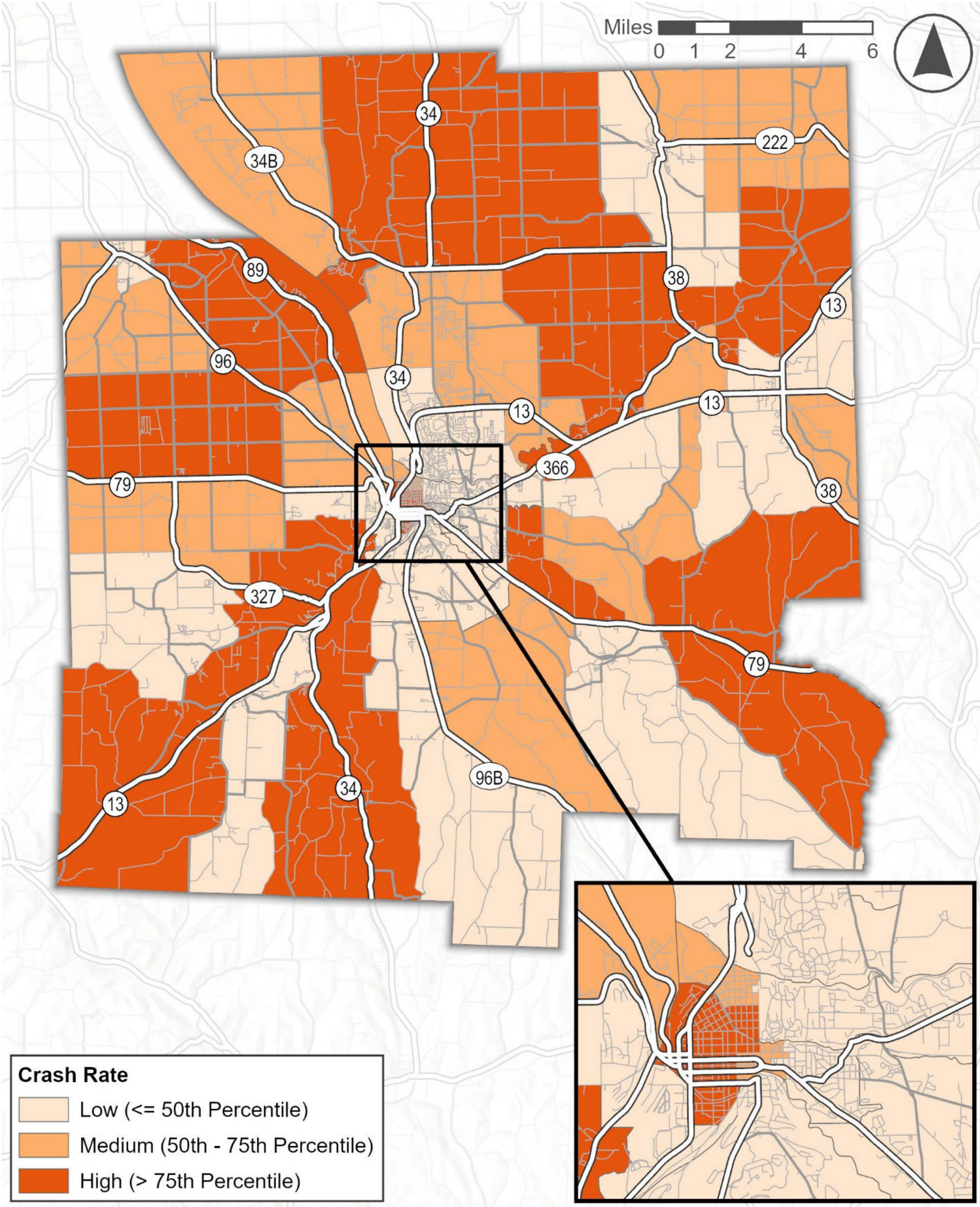
Annual average daily VRU trips that occur within a block group in 2023

All crashes that occurred in 2023 were overlaid onto the first set of data to get a crash rate for all road users in Tompkins County. Similarly, VRU-related crashes occurred during the same period were overlaid with the second set of data to obtain a crash rate specifically for VRUs. These crash rate results are shown in Figure 2.3 and Figure 2.4, respectively.

For Tompkins County, the average crash rate across all block groups is 0.15 per 10,000 trips, while the average VRU crash rate is 0.05 per 10,000 VRU trips. Based on the 75th percentile threshold, block groups with crash rates exceeding 0.22 per 10,000 trips or VRU crash rates over 0.03 per 10,000 trips are considered as high-risk areas. These areas are primarily concentrated in the City of Ithaca and the northwest and southwest corners of the County. Notably, two block groups (one in the City of Ithaca and another in the Town of Newfield) were found to have both overall crash rates and VRU crash rates above the region's 90th percentile, marking them as priority areas for safety improvements. Additionally, four block groups, located in the Towns of Ithaca and Dryden, exhibited relatively low overall crash rates but high VRU crash rates, which suggests that future efforts should focus more on VRU roadway safety in these areas.

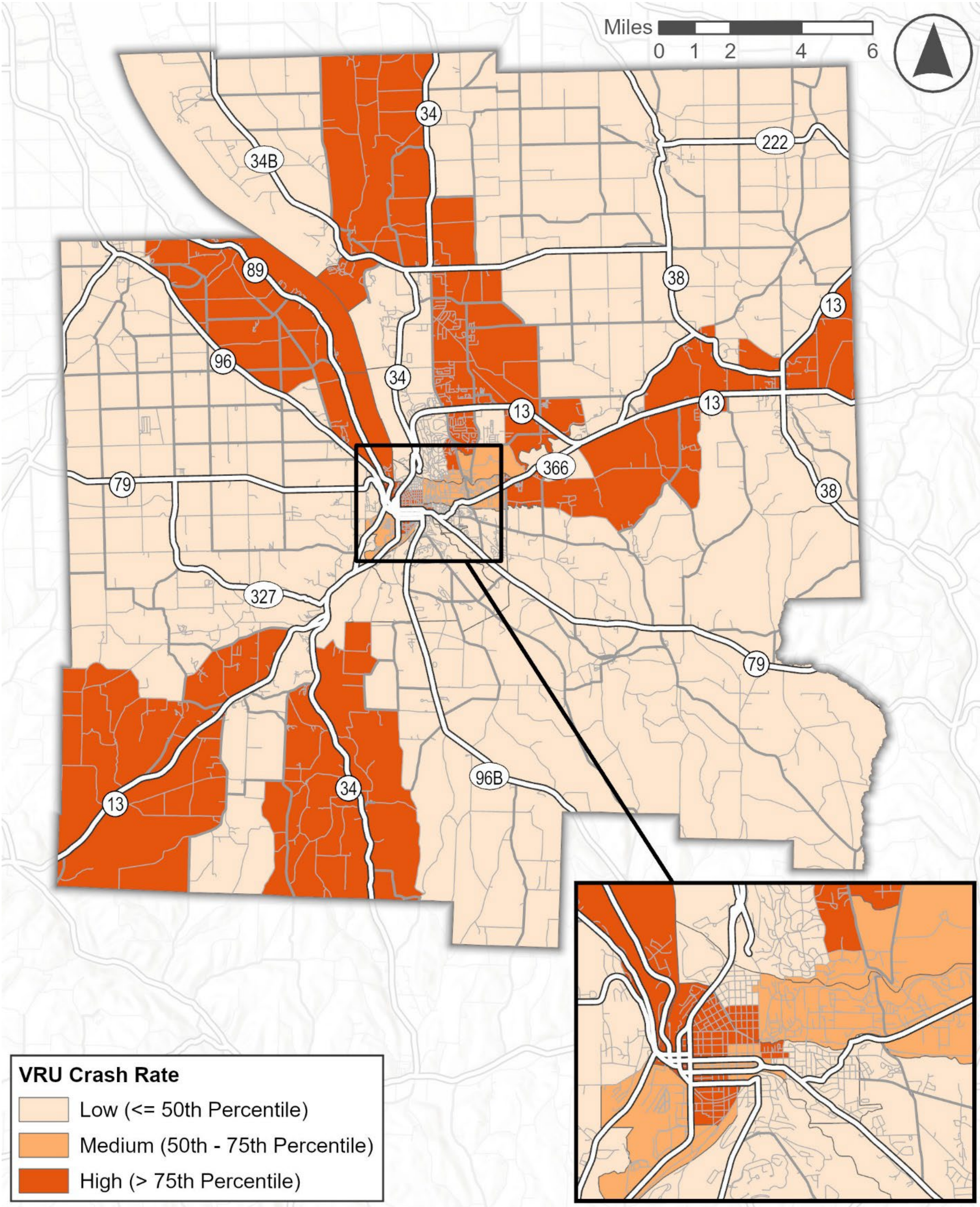
While most of the higher VRU crash rates are in urban areas within the county such as downtown Ithaca, there are targeted rural areas that display higher VRU crash rates, such as the areas around SR-13, SR-34, SR-89, and SR-96. While the total crash numbers are not high in these areas, the relative lack of infrastructure makes any sort of active transportation inherently riskier.

Figure 2.3 Crash Rate by Block Group for All Modes



Source: LOCUS, 2023; NYSDOT CLEAR, 2023.

Figure 2.4 VRU Crash Rate by Block Group for Active Transportation Modes



Source: LOCUS, 2023; NYSDOT CLEAR, 2023.

2.3 Equity Analysis

2.3.1 Equity Priority Areas

To identify historically underserved communities within Tompkins County, an equity assessment was conducted for each 2022 Block Group to evaluate their equity levels, and the results were compared with the disadvantaged communities defined at the national level by the Climate and Economic Justice Screening Tool (CEJST), and at the state level by the New York State Energy Research and Development Authority (NYSERDA) to ensure for some measure of consistency across sources.

For the equity assessment, ten indicators were selected to develop equity scores using data from the 2018 – 2022 American Community Survey (ACS), the most up-to-date five-year estimates of ACS data available. Those ten indicators of equity included:

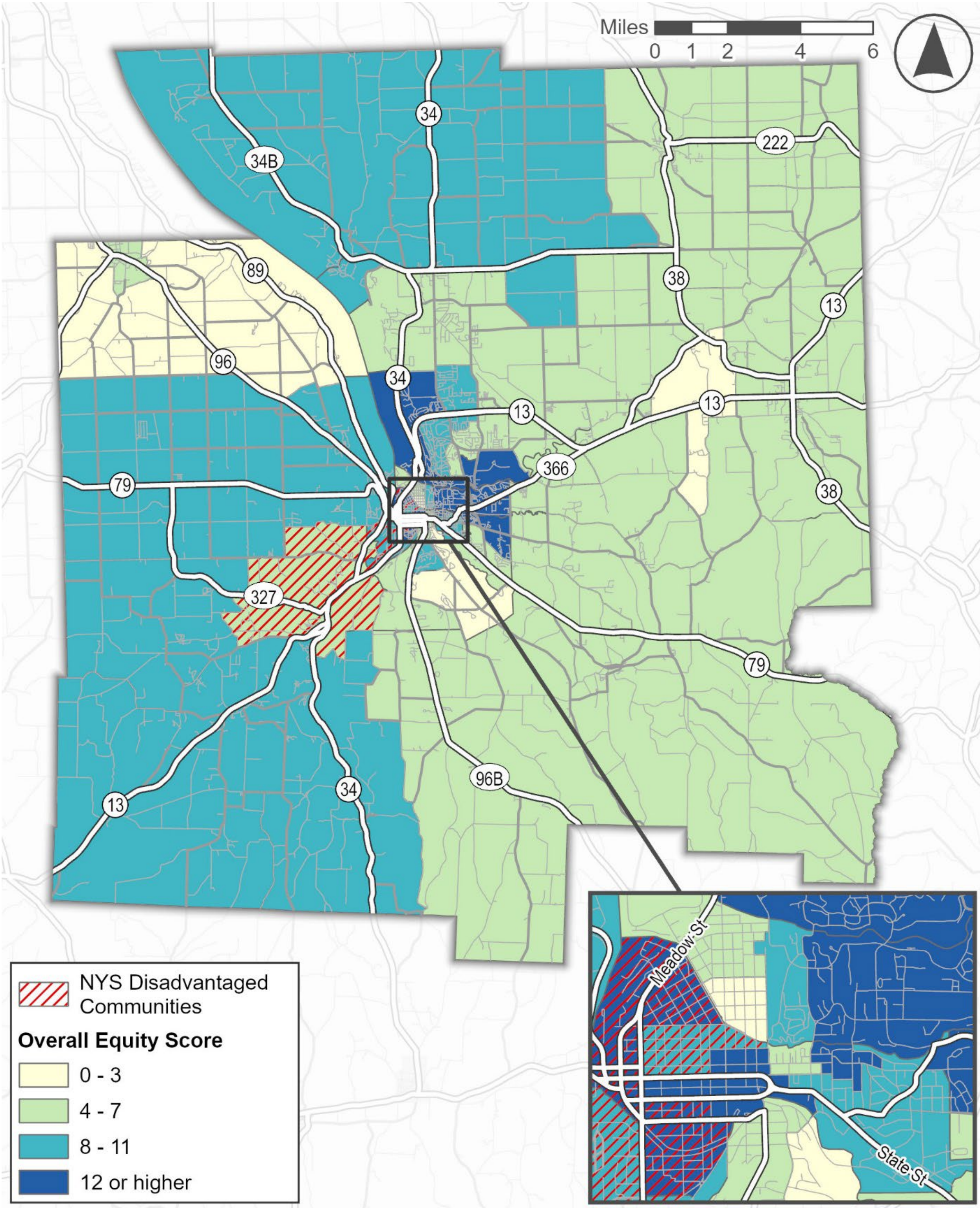
- Minority
- Limited English proficiency
- Disability
- Elderly
- Youth
- Zero car households
- Single mother
- Foreign born
- Poverty
- Educational attainment

Scores for each indicator ranged from zero to four, where zero indicates a Block Group with a value lower than the regional average. Scores valued above zero were defined based on the distribution of scores and meaningful variance between score groupings. Each indicator was weighted equally.

Areas that had overall equity scores at or above the 85^{th} percentile of scores for the entire County (a score of 12 or above) were defined as equity focus areas. The areas in the darkest blue in Figure 2.5 were the final equity focus areas for the region.

More information on the equity analysis can be found in the Equity Assessment memo dated August 21, 2024.

Figure 2.5 Equity Areas in Tompkins County



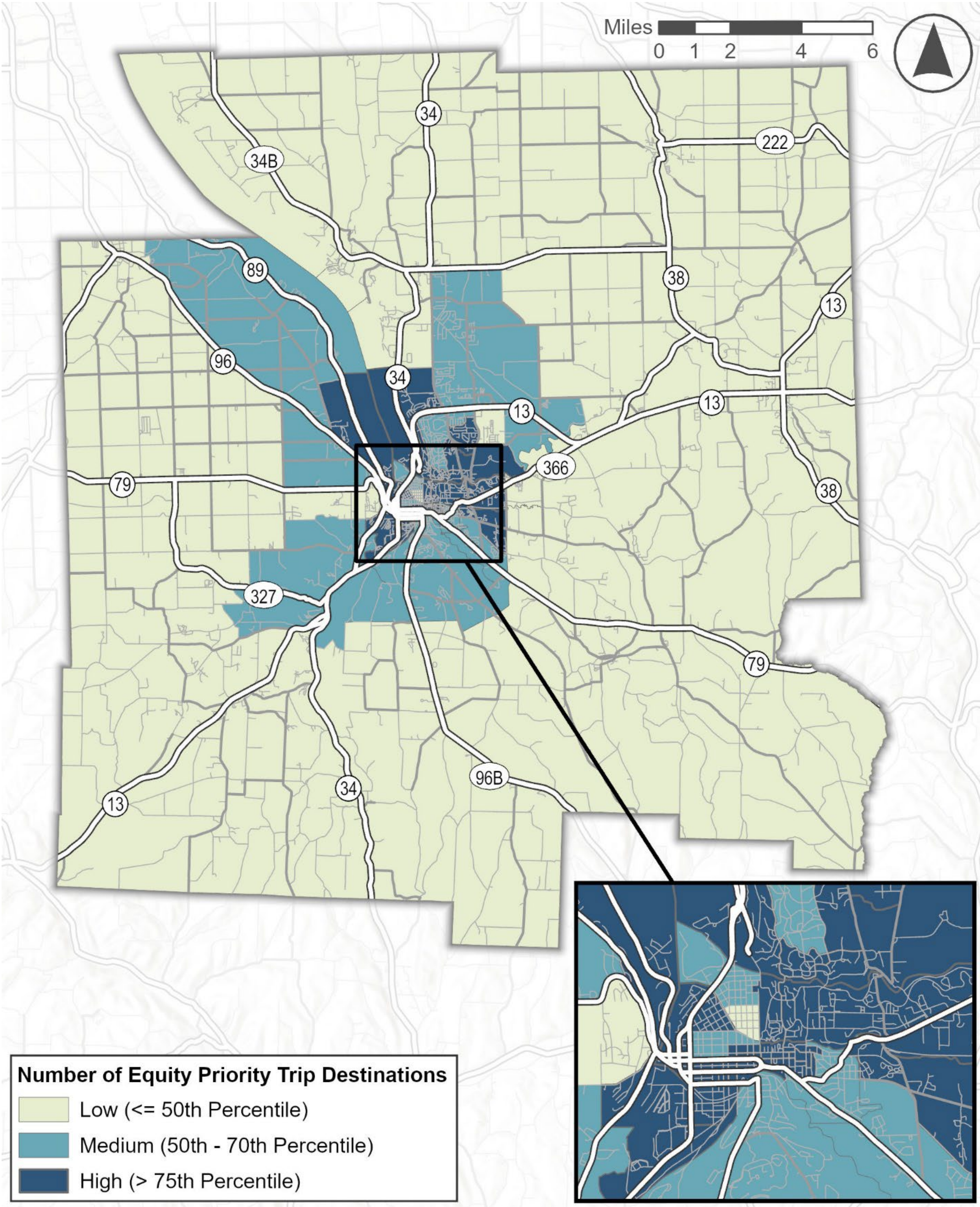
Source: American Community Survey, 2018-2022; analysis by FHI Studio.

2.3.2 Key Equity Destinations

While people who live in equity priority areas often start their trips from their homes, their destinations may lie outside of these equity areas as people travel to employment or commercial locations. Therefore, to effectively identify crash risks associated with the daily travel of underserved populations, it is important to target safety improvements not only within the equity priority areas, but also at the most frequently visited destinations of these trips.

To identify the top destinations for residents of equity priority areas, 2023 annual average daily trip activity data was collected from the LOCUS platform. For each block group within Tompkins County, the number of trips starting from any identified equity priority area and ending in that particular block group was calculated. Block groups where the number of trip destinations was greater than the County's 75th percentile value were considered as key equity destinations. Most of these top destinations are concentrated in or around the City of Ithaca, and their locations are highlighted in dark blue in Figure 2.6.

Figure 2.6 Key Equity Destinations in Tompkins County



Source: LOCUS, 2023; Equity Priority Areas identified by FHI Studio.

2.4 Other Relevant Factors

2.4.1 Statewide Vulnerable Road User Risk Assessment

As part of the New York Strategic Highway Safety Plan (SHSP), NYSDOT completed a Vulnerable Road User Safety Assessment (VRUSA) to examine crash locations across the state and quantitatively assess risk by census tract based on crash data, factoring in equity considerations. The VRU Risk Assessment is a key component of VRUSA[2].

This risk assessment used CLEAR data from 2017 to 2021 to first identify locations with higher-than-expected rates of fatal and serious injury VRU crashes as Priority Investigation Locations (PILs). Then the Potential for Safety Improvement (PSI) was calculated for each PIL by estimating the difference between expected and predicted crash frequency. At the census tract level, the identified PILs and PSI values were aggregated, and a Vulnerable Road User Score was assigned accordingly. Finally, an additional equity weighting of 10% was applied to any census tract that falls within the ‘Combined Special Equity Areas’, a geographic designation that combines disadvantaged communities identified by either state or federal guidelines, as well as state and federally recognized tribal nations.

The Vulnerable Road User Score were then grouped into risk are categories, seen below:

Low Risk: 0.01 – 14.46

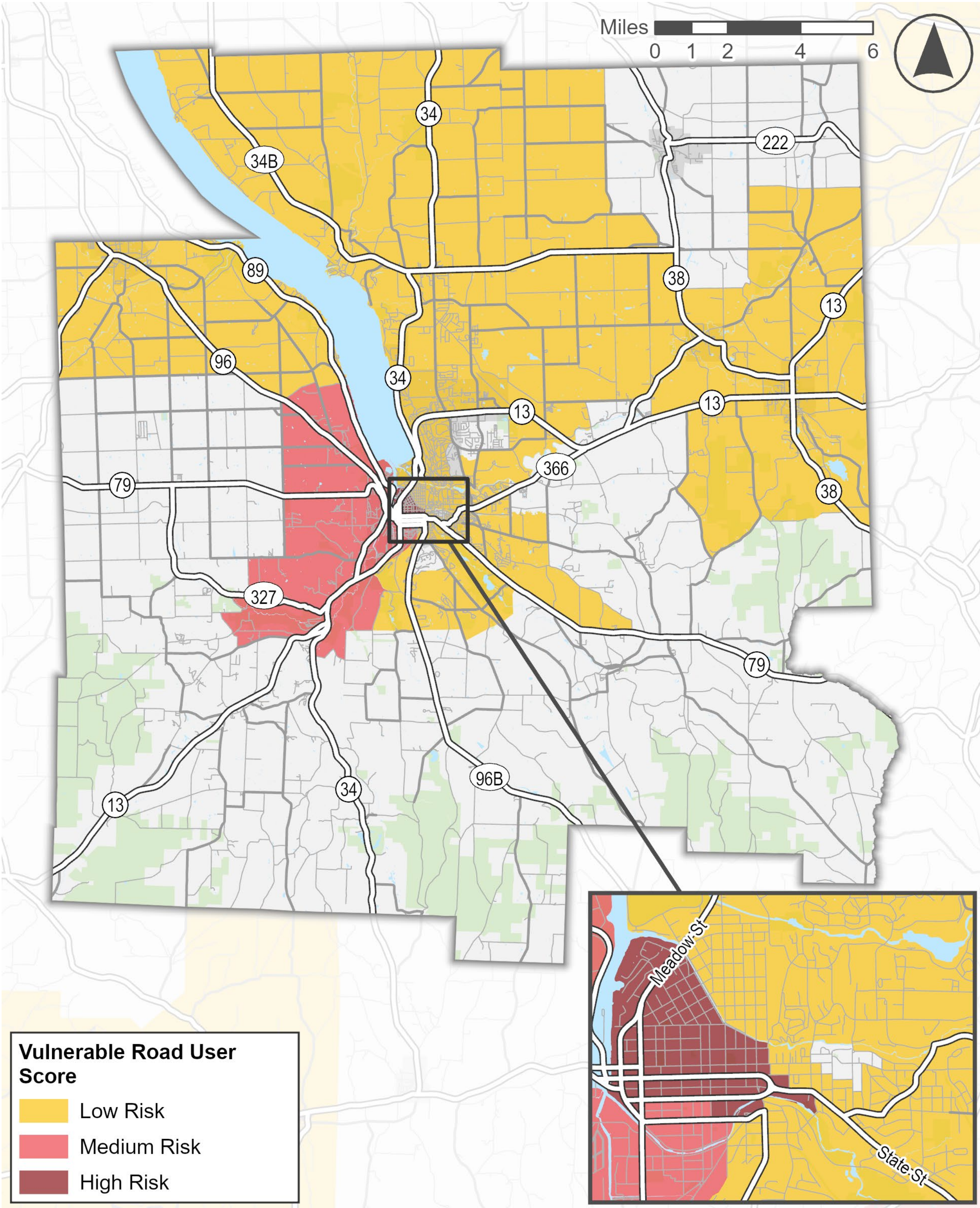
Medium Risk: 14.46 – 42.08

High Risk: Greater than 42.08

This final measure of Vulnerable Road User Risk is seen in Figure 2.7 for Tompkins County. The highest VRU Risk is seen in the downtown portion of the City of Ithaca, which makes sense as that area contains the highest concentration and the majority of the activity of pedestrians, bicyclists, and other vulnerable road users.

[2] NYSDOT Vulnerable Road User Safety Assessment, 2023-2027.

Figure 2.7 VRU Risk Areas in Tompkins County



Source: NYSDOT Vulnerable Road User Safety Assessment, 2023-2027.

2.4.2 Isolated Transit Stops

Transit stops located a significant distance from intersections or crosswalks present significant safety risks to road users, particularly vulnerable road users, by increasing the likelihood of crashes. These isolated transit stops reduce accessibility and often compel users to cross roads at unsafe locations in an attempt to reach their destinations more quickly, increasing the risk of pedestrian-vehicle conflicts. A comprehensive analysis to identify these isolated stops is another component to finalize a priority safety network.

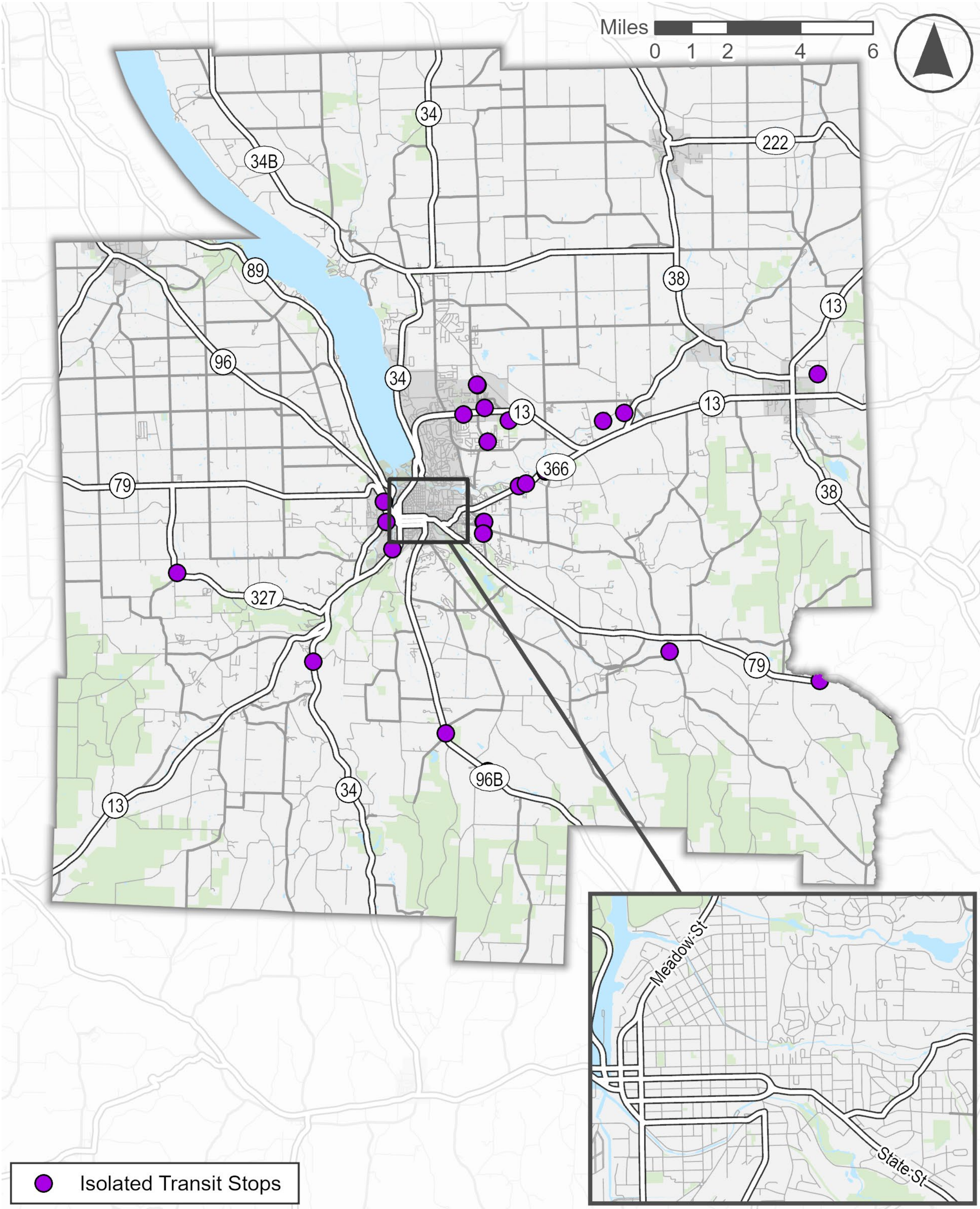
To locate the isolated transit stops, the following steps were taken:

- Identify the relevant transit agencies operating in Tompkins County
  - » Tompkins Consolidated Area Transit, Inc. (TCAT) is the private transit operator which provides public bus and paratransit services in Tompkins County. It largely serves the City of Ithaca and surrounding urban areas.
  - » Cortland Transit largely serves the Cortland County, but it also provides services to Tompkins County.[3]
- Download the transit stop locations from GTFS feeds for TCAT and Cortland Transit
  - » General Transit Feed Specification (GTFS) is an open standard that provides transit data in a format that can be used in different software applications for analysis.
- Obtain the location of intersections on all roadways from NYSDOT
- Using spatial analysis, identify the transit stops that situated at least 550 ft away from the nearest intersection
  - » The distance of 550 ft was derived from the research involving the placement of crosswalks. NACTO states that there is no absolute rule of crosswalk spacing and it depends upon the block length, street width, traffic signals, etc. They suggest a spacing of a minimum of 120 to 200 ft between crosswalks. NACTO also cites the Unified Development Code of San Antonio, Texas, that states mid-block crossings should be provided on all blocks longer than 550 ft. Thus, to locate isolated transit stops, 550 ft of distance was chosen for this analysis.
- Manually clean the results from the geospatial analysis
  - » The spatial analysis identified transit stops that were at least 550 ft away from an intersection. However, the intersection file from NYSDOT did not include all mid-block crossings. Therefore, a manual check needed to be done to remove transit stops near mid-block crossings.
  - » Additionally, there were many transit stops situated in the parking lots of the commercial centers. These were also removed from the list of isolated transit stops.

[3] As of the beginning of 2025, Cortland County is in the process of changing to Centro as the primary transit service provider. Routes will remain the same through 2025, but there is potential for system redesign in the future.

The spatial analysis identified 35 isolated transit stops in Tompkins County, shown in Figure 2.8.

Figure 2.8 Isolated Transit Stops in Tompkins County



Source: General Transit Feed Specification; analysis by Cambridge Systematics.

2.5 Final Priority Location Network

Combining all of these separate elements together is the final step to create a final priority location network for Tompkins County. This process is done in three steps:

Step 1: Mathematically combine and weight each of the elements listed throughout this document to calculate a combined safety score for roadway segments and roadway intersections

Step 2: Identify the top-scoring locations from that mathematical exercise by smoothing out the weighted scores, filling in logical gaps in the network, considering feedback from community engagement efforts, and validating the top locations by ensuring robust crash histories

Step 3: Refine that list of top locations with the Joint Safety Action Plan team and other relevant stakeholders

Relevant stakeholders included representatives from Tompkins County and each of the ten municipalities involved in the Tompkins County Joint Safety Action Plan. Each municipality gave feedback on whether the first draft of locations was appropriate, given their knowledge of the area, and gave options for substitute locations that reflect a greater concern from their point of view. Most individual municipalities provided feedback during these meetings, and there was a final confirmation with all municipalities before finalizing the network.

2.5.1 Weighted Screening Elements

The screening elements, along with their weights, are shown in Table 2.2. All of these elements are further explained in Section 0 through Section 2.4. Both intersections and segments were scored in the same manner. The maximum score a location could receive is 100 points.

Table 2.2 Network Screening Elements & Weights

Screening Element	Maximum Points	Description	Points
LOSS – Fatal & Serious Injury Screening	45	LOSS (Fatal and Serious Injury Screening) of 4	45
		LOSS (Fatal and Serious Injury Screening) of 3	25
		LOSS (Fatal and Serious Injury Screening) less than 3	0
LOSS – VRU Screening	10	LOSS (VRU Screening) of 4	10
		LOSS (VRU Screening) of 3	5
		LOSS (VRU Screening) less than 3	0
Crashes per Trip	5	Over the 75th percentile of crashes per trip in the County	5
		50th – 75th percentile of crashes per trip in the County	2.5
		0th – 50th percentile of crashes per trip in the County	0
VRU Crashes per Trip	5	Over the 75th percentile of VRU crashes per VRU trip in the County	5
		50th – 75th percentile of VRU crashes per VRU trip in the County	2.5
		0th – 50th percentile of VRU crashes per VRU trip in the County	0
Equity Priority Areas	20	In an Equity Priority Area	20
		Not in an Equity Priority Area	0
Key Equity Destinations	5	Over the 75th percentile of trip destinations by equity populations in the County	5
		50th – 75th percentile of trip destinations by equity populations in the County	2.5
		0th – 50th percentile of trip destinations by equity populations in the County	0
VRU Risk	5	High Risk	5
		Medium Risk	2.5
		Low Risk	1
		No Risk	0
Isolated Transit Stops	5	At least 1 isolated transit stop in the immediate area	5
		0 isolated transit stops in the immediate area	0

Source: NYSDOT Highway Safety Improvement Program Procedures and Techniques.

2.5.2 Final Priority Location Network

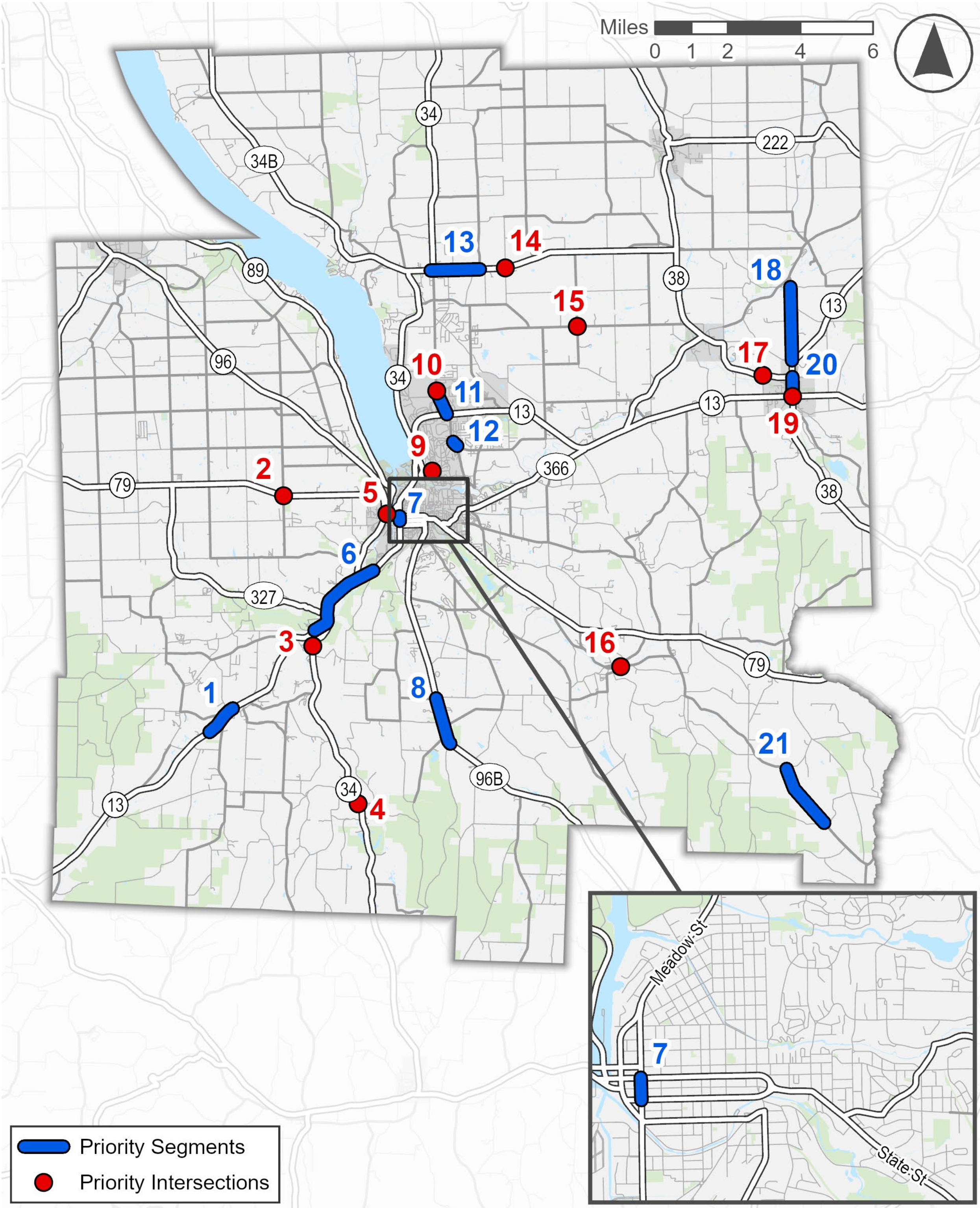
After applying the weights above, the final scored network was created. Segments and intersections with high scores in each municipality were selected with feedback from stakeholders within each of Tompkins County's jurisdictions. The final network contains 11 intersections and 10 segments for a total of 21 priority safety locations. The locations are listed in Table 2.3 and seen in Figure 2.9. The network contains a mix of locally-controlled locations and state-controlled locations spread across the County.

The numbers and colors do not indicate a ranking of these corridors; the numbers and colors are for identification purposes only and serve as a link between the table and the map.

Table 2.3 Final Priority Location Network List

#	Location	Municipality	Ownership	Type
1	NY-13 NB between Protts Hill Rd & Main St	Town of Newfield	NYSDOT	Segment
2	Mecklenburg Road (NY-79)/Sheffield Road	Town of Ithaca	NYSDOT owns Mecklenburg Rd (NY-79); Tompkins County owns Sheffield Rd	Intersection
3	West Danby Road(NY 34/96)/Decker Road	Town of Newfield	NYSDOT owns NY 34/96; Town of Newfield owns Decker Rd	Intersection
4	Station Rd/Maple Ave and Route 34/96	Town of Danby	NYSDOT owns Route 34; Tompkins County owns Station Rd; Town of Danby owns Valley View Rd and Maple Ave	Intersection
5	Floral Ave/Elm St/Hector St	City of Ithaca	City of Ithaca	Intersection
6	NY-13 from the Town of Newfield/Town of Ithaca Line to the City of Ithaca	Town of Ithaca	NYSDOT	Segment
7	NY-13 NB between West Seneca St & West Green St	City of Ithaca	NYSDOT	Segment
8	Route 96B from Miller Rd to Michigan Hollow Rd	Town of Danby	NYSDOT	Segment
9	Cayuga Heights and Wyckoff St	Village of Cayuga Heights	Village of Cayuga Heights	Intersection
10	North Triphammer Rd & Craft Rd	Village of Lansing	Village of Lansing	Intersection
11	North Triphammer Rd between Craft Rd & NY-13	Village of Lansing	Village of Lansing	Segment
12	Hanshaw Rd	Village of Cayuga Heights	Village of Cayuga Heights	Segment
13	NY-34B NB between NY-34 & Van Ostrand Rd	Town of Lansing	NYSDOT	Segment
14	Peruville Rd (NY-34B) & Scofield Rd	Town of Lansing	NYSDOT owns Peruville Rd (NY-34B); Town of Lansing owns Scofield Rd	Intersection
15	Sheldon Road and West Dryden Road	Town of Dryden	Tompkins County	Intersection
16	Valley Rd/Lounsberry Rd	Town of Caroline	Tompkins County	Intersection
17	Freeville Rd (NY-38) & Springhouse Rd	Town of Dryden	NYSDOT owns NY-38; Town of Dryden owns Springhouse Rd	Intersection
18	North Rd between Fall Creek Rd & NY-13	Town of Dryden/Village of Dryden	Tompkins County	Segment
19	NY-13 & W Main St	Village of Dryden	NYSDOT	Intersection
20	NY-13 NB between NY-38 & W Main St	Village of Dryden	NYSDOT	Segment
21	Seventy Six Rd between Yaple Rd & Smith Rd	Town of Caroline	Tompkins County	Segment

Figure 2.9 Final Priority Location Network Map



3.0 Systemic Screening

Given the relatively rare and dispersed occurrence of severe crashes in Tompkins County, a systemic analysis was performed as a complement to the hotspot analysis. Unlike hotspot analysis, which screens the system based on site-specific historical crash data, the systemic analysis focuses on identifying risk factors commonly associated with severe crashes and screen the network based on site-specific risk levels. Therefore, this systemic approach can proactively prioritize locations with high crash risks for potential safety improvements, even in areas that may lack significant crash history.

The process of a systemic analysis, as described by the FHWA, typically involves the following six steps:

- Identify focus crash types, focus facility types, and risk factors
- Screen and prioritize candidate locations for safety improvements
- Identify and select countermeasures for each prioritized site
- Prioritize systemic projects for transportation programs
- Prepare, implement, and track systemic safety improvement projects
- Evaluate systemic safety projects, countermeasures, programs, and overall performance

Considering the emphasis areas identified in the NYSDOT 2023 Strategic Highway Safety Plan (SHSP) and Tompkins County's recent five-year crash trends from 2019 to 2023, the focus crash types selected for this systemic analysis include speed-related crashes, intersection-related crashes, pedestrian-related crashes, and roadway departure crashes. To effectively reduce the frequency and severity of those four focus crash types, the subsequent analysis, which includes the identification of the most prevalent crash locations and contributing factors, was conducted separately for each individual group.

Throughout this section, the header "KA Crashes" refers to Fatal and Serious Injury Crashes. This abbreviation is used to shorten headers in tables.

3.1 Intersection-Related Crashes

As a major focus area of NYSDOT SHSP, intersection-related crashes remain the most common type in New York State. This pattern is also observed in Tompkins County. In 2023, the number of intersection-related crashes increased by 159 percent compared to 2019, representing 23 percent of all emphasis crash types identified in the SHSP. A similar upward trend was also reflected in fatal and serious injury crashes at intersections in Tompkins County, emphasizing the critical need to identify facility types and risk factors based on intersection crash data to prioritize sites for targeted safety improvements.

3.1.1 Focus Facility Types

Focus facility types are generally identified as those with the highest concentration of focus crashes within the system. Due to the inherent differences in roadway design standards and operational characteristics across facility types, risk factors are often highly correlated with specific facility types. Thus, for a more streamlined selection of risk factors, facility types were grouped into broader categories to allow for the subsequent analysis to focus on identifying the specific risk factors associated with each category.

For intersection-related crashes, area type, geometry type, and traffic control type were chosen as key facility elements to refine the categorization of facility types. To account for variations in vehicle exposure among different facilities, crash data was normalized by the number of intersections, as the daily traffic volume data entering each intersection was not reliable. Table 3.1 lists all the possible facility types that experienced at least one intersection-related fatal/serious injury crash between 2019 and 2023, ranked in the descending order based on the number of intersection-related fatal/serious injury crashes per intersection.

As indicated by the distribution of intersection-related crashes, urban signalized cross-intersections and rural stop-controlled cross-intersections accounted for the highest proportion of fatal/serious injury crashes in urban and rural areas respectively (as highlighted in **red** in Table 3.1). After normalizing by the number of intersections, these two intersection types remained the highest in both overall crash rates and fatal/serious injury crash rates among facility types with at least 10 intersection locations, while urban signalized T-intersections demonstrated the second highest crash rates. Although Tompkins County has only three urban signalized Y-intersections (listed below), the significantly high fatal/serious injury crash rates observed at this facility type warrant its inclusion as part of a broader category.

- Intersection at Elmira Road and Five Mile Drive
- Intersection at Pine Tree Road and Slaterville Road
- Intersection at East State Street and Ferris Place

Thus, urban signalized Y-intersections were grouped with urban signalized cross-intersections and T-intersections into a combined category of urban signalized three/four-leg intersections. This combined category and rural stop-controlled cross-intersections were identified as focus facility types for intersection-related crashes.

Table 3.1 Intersection-Related Crash Distribution by Facility Types

Area Type	Geometry Type	Traffic Control Type	# of Inter-sections	# of Crash-es	% of Total Crash-es	# of KA Crash-es	% of Total KA Crash-es	# of Crashes Per Inter-section	# of KA Crashes Per Intersection
Urban	Cross-Intersection	Other	1	21	0.4%	2	1.0%	21	2.000
Urban	Cross-Intersection	Yield Sign	1	5	0.1%	1	0.5%	5	1.000
Urban	**Y-Intersection**	**Signalized**	**3**	**30**	**0.6%**	**2**	**1.0%**	**10**	**0.667**
Rural	Cross-Intersection	Signalized	2	42	0.8%	1	0.5%	21	0.500
Urban	**Cross-Intersection**	**Signalized**	**64**	**1,383**	**26.9%**	**32**	**16.4%**	**21.61**	**0.500**
Urban	Five or more Legs and Not Circular	Stop-Controlled	4	6	0.1%	1	0.5%	1.50	0.250
Rural	**Cross-Intersection**	**Stop-Controlled**	**153**	**475**	**9.3%**	**37**	**19.0%**	**3.10**	**0.242**
Urban	**T-Intersection**	**Signalized**	**14**	**229**	**4.5%**	**2**	**1.0%**	**16.36**	**0.143**
Urban	Cross-Intersection	Stop-Controlled	171	671	13.1%	24	12.3%	3.92	0.140
Rural	Cross-Intersection	Uncontrolled	72	70	1.4%	9	4.6%	0.97	0.125
Rural	Y-Intersection	Stop-Controlled	77	117	2.3%	7	3.6%	1.52	0.091
Urban	T-Intersection	Yield Sign	12	43	0.8%	1	0.5%	3.58	0.083
Rural	T-Intersection	Stop-Controlled	327	477	9.3%	27	13.9%	1.46	0.083
Urban	T-Intersection	Stop-Controlled	420	635	12.4%	19	9.7%	1.51	0.045
Urban	Y-Intersection	Uncontrolled	70	110	2.1%	3	1.5%	1.57	0.043
Urban	Y-Intersection	Stop-Controlled	110	225	4.4%	4	2.1%	2.05	0.036
Rural	T-Intersection	Uncontrolled	481	274	5.3%	16	8.2%	0.57	0.033
Urban	T-Intersection	Uncontrolled	159	145	2.8%	5	2.6%	0.91	0.031
Rural	Y-Intersection	Uncontrolled	174	97	1.9%	2	1.0%	0.56	0.011

Source: NYSDOT CLEAR, 2019-2023

Note: Facility types highlighted in **bold** are the selected focus facility types. Those also highlighted in **red** show either high fatal/serious injury crash rates or crash frequencies that justify the inclusion of these facility types in the focus facility list.

3.1.2 Risk Factors

Following the identification of focus facility types, characteristics that are common among the locations within these facility types and are potentially associated with an increased risk of intersection-related crashes were examined, and risk factors were identified accordingly. For intersection-related crashes in Tompkins County, based on crash types and apparent crash factor information, key facility characteristics that were considered to have potential impacts on crash frequency and crash severity are listed in Table 3.2 along with their possible attributes.

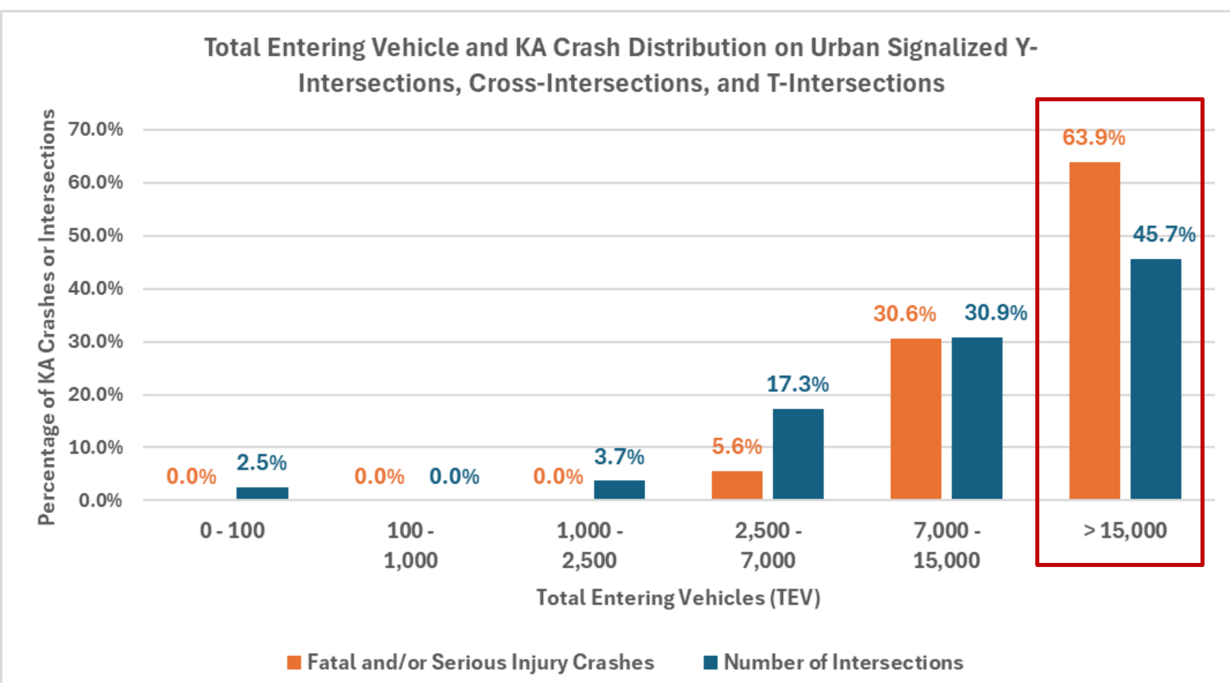
Table 3.2 Potential Risk Factors for Intersection-Related Crashes

Potential Risk Factors	Risk Factor Attributes
Presence of lighting	• Yes • No
Traffic control types	• Uncontrolled • Two-way stop • All-way stop • Yield sign • Signalized (with ped signal) • Signalized (w/out ped signal)
Left-turn lane types	• No left turn lanes • Conventional left turn lane(s) • U-turn followed by right turn • Right turn followed by U-turn • Right turn followed by left turn (e.g. jughandle near side) • Right turn followed by right turn (e.g. jughandle far side) • Left turn crossover prior to intersection (e.g. displaced left turn) • Other
Right-turn channelization types	• None • Painted island with receiving lane • Painted island without receiving lane • Raised island with receiving lane • Raised island without receiving lane
Crosswalk types	• Unmarked crosswalk • Marked crosswalk • Marked crosswalk with supplemental devices (e.g. in-street yield signs, in-pavement warning lights, pedestrian bulb outs, etc.) • Marked crosswalk with refuge island • Marked with refuge island and supplemental devices (e.g. in-street yield signs, in-pavement warning lights, pedestrian bulb outs, etc.) • Pedestrian crossing prohibited at this approach • Other
Intersection skew angles (degree)	• 0 – 3 • 4 – 6 • 7 – 9

Potential Risk Factors	Risk Factor Attributes
	• > 9
Pedestrian signal types	• None • Activated by traffic signal (e.g., recall) • Pushbutton actuated • Other
Total entering vehicles (TEV)	• 0 – 100 • 100 – 1,000 • 1,000 - 2,500 • 2,500 - 7,000 • 7,000 - 15,000 • > 15,000

The overrepresentation method was applied to compare the proportion of fatal/serious injury crashes with a certain characteristic to the proportion of intersections sharing the same characteristic for each focus facility type. Figure 3.1 demonstrates an example of this analysis for intersection total entering vehicles across the combined focus facility type of urban signalized Y-intersections, cross-intersections, and T-intersections. Total entering vehicles were categorized into 6 groups based on natural breaks, and intersections with more than 15,000 entering vehicles had the highest concentrations of fatal/serious injury crashes relative to intersection counts. Accordingly, total entering vehicles exceeding 15,000 was selected as a risk factor for these urban signalized intersections.

Figure 3.1 Risk Factor Analysis Plot for Total Entering Vehicles on Urban Signalized Y-Intersections, Cross-Intersections, and T-Intersections



Source: NYSDOT CLEAR, 2019-2023; analysis by Cambridge Systematics.

For rural stop-controlled cross-intersections, factors such as right-turn channelization types and pedestrian signal types were excluded from the analysis, as these features were absent at all analyzed locations. Risk factors were determined based on a comparison of crash distributions and facility characteristics distributions, where factors with a higher proportion of fatal/serious injury crashes compared to their intersection proportion were selected. Table 3.3 and Table 3.4 show the risk factors identified for each focus facility type, along with the corresponding percentages of intersection-related crashes, fatal/serious injury crashes, and intersection locations, as well as the number of fatal/serious injury crashes per intersection.

Table 3.3 Risk Factors for Intersection-Related Crashes on Urban Signalized Y-Intersections, Cross-Intersections, and T-Intersections

Urban Signalized Y-Intersections, Cross-Intersections and T-Intersections					
Risk Factors	**Risk Factor Criteria**	**1,642 Crashes**	**36 KA Crashes**	**81 Intersections**	**KA Crashes Per Intersection**
Presence of Lighting	No	2.7%	5.6%	3.7%	0.667
Traffic Control Type	Signalized (without ped signal)	19.9%	41.2%	29.6%	0.583
Left-Turn Lane Type	Conventional left turn lane(s)	49.1%	72.2%	33.3%	0.963
Right-Turn Channelization Type	Painted island without receiving lane; Raised island without receiving lane	9.8%	11.1%	7.4%	0.667
Crosswalk Type	Unmarked crosswalk	15.3%	36.1%	18.5%	0.867
Pedestrian Signal Type	None	24.1%	41.7%	32.1%	0.577
Total Entering Vehicles	> 15,000	60.1%	63.9%	45.7%	0.622
Intersection Skew Angle (degree)	> 6	52.2%	58.8%	40.7%	0.606

Source: NYSDOT CLEAR, 2019-2023

Table 3.4 Risk Factors for Intersection-Related Crashes on Rural Stop-Controlled Cross-Intersections

Rural Stop-Controlled Cross-Intersections					
Risk Factors	**Risk Factor Criteria**	**475 Crashes**	**37 KA Crashes**	**153 Intersections**	**KA Crashes Per Intersection**
Presence of Lighting	No	68.0%	86.5%	69.9%	0.299
Total Entering Vehicles	2,500 – 15,000	71.2%	64.9%	37.9%	0.414
Intersection Skew Angle (degree)	> 6	39.6%	40.5%	17.6%	0.556

Source: NYSDOT CLEAR, 2019-2023

3.2 Roadway Departure Crashes

Roadway departures are a leading cause of fatal and serious injury crashes both statewide and within Tompkins County. Over the past five years, roadway departure crashes accounted for 18 percent of fatal and serious injury crashes in Tompkins County, despite comprising only 1.4 percent of total crashes. This significant disparity indicated that roadway departure crashes have high potential for severe outcomes.

3.2.1 Focus Facility Types

Although the exact locations of roadway departure crashes are difficult to predict, the types of facilities where those crashes tend to occur can be inferred from historical crash data. Using roadway functional class and area type as facility classifications, the distribution of roadway departure crashes and fatal/serious injury crashes from 2019 to 2023 was analyzed. In addition, crash rates per lane mile were calculated to normalize for differences in vehicle exposure across facility types. Table 3.5 shows the analysis results with facility types ranked in descending order based on fatal/serious injury crash rates.

Table 3.5 Roadway Departure Crash Distribution by Facility Types

Functional Class	Area Type	Total Lane Miles	# of Crashes	% of Total Crashes	# of KA Crashes	% of Total KA Crashes	# of Crashes Per Mile	# of KA Crashes Per Mile
Arterial - Exclude Freeway	**Rural**	**78.92**	**276**	**21.0%**	**26**	**29.5%**	**3.50**	**0.329**
Arterial - Interstate or Other Freeway	Urban	9.39	24	1.8%	2	2.3%	2.56	0.213
Major Collector	**Rural**	**123.22**	**254**	**19.3%**	**16**	**18.2%**	**2.06**	**0.130**
Minor Collector	Rural	84.88	94	7.2%	10	11.4%	1.11	0.118
Arterial - Exclude Freeway	Urban	62.46	151	11.5%	7	8.0%	2.42	0.112
Major Collector	Urban	46.97	83	6.3%	3	3.4%	1.77	0.064
Local	**Rural**	**671.78**	**334**	**25.4%**	**23**	**26.1%**	**0.50**	**0.034**
Local	Urban	163.15	96	7.3%	1	1.1%	0.59	0.006
Minor Collector	Urban	0.44	1	0.1%			2.25	

Source: NYSDOT CLEAR, 2019-2023

Note: Facility types highlighted in **bold** are the selected focus facility types. Those also highlighted in **red** show either high fatal/serious injury crash rates or crash frequencies that justify the inclusion of these facility types in the focus facility list.

Since the purpose of this systemic analysis is to identify safety countermeasures that can be adopted by municipalities to address risk factors associated with focus facility types, those facilities were qualitatively selected which both had a relative high number of KA crashes per mile as well as a significant number of locations that were included in the analysis. Therefore, rural arterials (excluding freeways), rural major collectors, and rural local roads were identified as focus facility types for roadway departure crashes (as highlighted in **red**). Further analysis of risk factors associated with these three facility types is essential to reducing the frequency and severity of roadway departure crashes. It should also be noted that the systemic analysis does not preclude other facility types which may be candidates for similar treatments in future projects.

3.2.2 Risk Factors

Based on the collision types and apparent factors of roadway departure crashes in Tompkins County, it was hypothesized that shoulder width, posted speed limit, annual average daily traffic (AADT), number of through lanes, median width, median types, roadway types, and access control types are potential risk factors for roadway departure crashes on the selected focus facility types. The possible attributes of each potential risk factor are shown in Table 3.6.

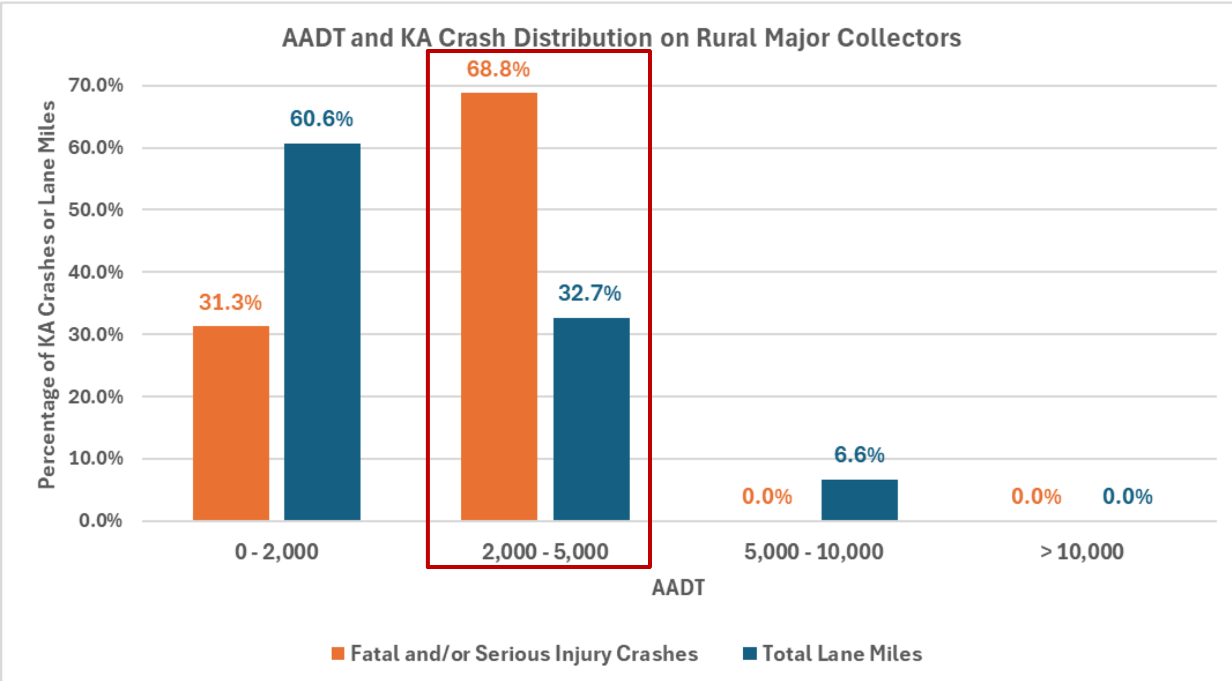
Table 3.6 Potential Risk Factors for Roadway Departure Crashes

Potential Risk Factors	Risk Factor Attributes
Number of through lanes	• 1 • 2 • >= 3
Annual average daily traffic (AADT)	» 0 – 2,000 » 2,000 – 5,000 • 5,000 – 10,000 • > 10,000
Shoulder width (feet)	• 0 or NA • 1 – 4 • 5 – 8 • 9 – 12 • >= 13
Posted speed limit (MPH)	• < 35 • 35 – 40 • 45 – 50 • 55
Divided	• Yes • No
Median width (feet)	• 0 – 8 • 9 - 12 • 13 - 30 • 31 - 50 • > 50
Median types	• None • Unprotected • Curbed • Positive Barrier- unspecified • Positive Barrier – flexible • Positive Barrier - semi-rigid • Positive Barrier – rigid • Flush paved Median
Access control types	• Full • Partial
Truck route types	• Qualifying highway (National Network) • Access limited (restrictions) • Access highway

To confirm the suspected risk factors for each facility type, the proportions of fatal/serious injury roadway departure crashes that occurred on segments with specific characteristics were compared against the proportions of total lane miles with the same characteristics. Figure 3.2 illustrates this comparison for AADT on rural major collectors. Because segments with AADT between 2,000 and 5,000 accounted for 68.8

percent of fatal/serious injury crashes but only 32.7 percent of total lane miles, this AADT range was identified as a risk factor for roadway departure crashes on this facility type.

Figure 3.2 Risk Factor Analysis Plot for AADT on Rural Major Collectors



Source: NYSDOT CLEAR, 2019-2023; analysis by Cambridge Systematics.

Based on the analysis of each hypothesized characteristic factor, Table 3.7, Table 3.8, and Table 3.9 list all risk factors identified separately for roadway departure crashes on rural arterials (excluding freeways), rural major collectors, and rural local roads to help prioritize higher-risk facility elements for safety improvements.

Table 3.7 Risk Factors for Roadway Departure Crashes on Rural Arterials

Rural Arterials (Excluding Freeways)					
Risk Factors	Risk Factor Criteria	276 Crashes	26 KA Crashes	78.9 Lane Miles	KA Crashes Per Mile
Number of Through Lanes	2	1.1%	3.8%	2.4%	0.529
Posted Speed Limit (MPH)	< 35; 55	81.5%	84.6%	71.8%	0.388
AADT	2,000 – 5,000	60.9%	57.7%	52.0%	0.366

Source: NYSDOT CLEAR, 2019-2023

Table 3.8 Risk Factors for Roadway Departure Crashes on Rural Major Collectors

Rural Major Collectors					
Risk Factors	**Risk Factor Criteria**	**254 Crashes**	**16 KA Crashes**	**123.2 Lane Miles**	**KA Crashes Per Mile**
Number of Through Lanes	2	0.4%	6.3%	1.3%	0.610
AADT	2,000 – 5,000	52.0%	68.8%	32.7%	0.273
Shoulder Width (ft)	1 – 4; 9 – 12	29.1%	31.3%	25.7%	0.158

Source: NYSDOT CLEAR, 2019-2023

Table 3.9 Risk Factors for Roadway Departure Crashes on Rural Local Roads

Rural Local Roads					
Risk Factors	**Risk Factor Criteria**	**334 Crashes**	**23 KA Crashes**	**671.8 Lane Miles**	**KA Crashes Per Mile**
AADT	500 – 2,000	28.1%	17.4%	8.4%	0.071
Shoulder Width (ft)	5 – 8	70.4%	60.9%	56.5%	0.037

Source: NYSDOT CLEAR, 2019-2023

3.3 Pedestrian-Related Crashes

Pedestrians are more susceptible to serious injuries and fatalities than other roadway users when hit by a motor vehicle. In Tompkins County, while pedestrian-related crashes only accounted for 0.9 percent of all crashes across statewide focus areas between 2019 and 2023, pedestrian-related serious injury/fatal crashes made up 6.3 percent of all fatal and serious injury crashes. This further confirms the high severity potential of pedestrian-related crashes.

3.3.1 Focus Facility Types

Through analyzing the pedestrian-related intersection crashes by intersection area type, geometry type, and traffic control type, the top three facility types with the highest fatal/serious injury crash frequency were identified as urban signalized and stop-controlled cross-intersections, and urban stop-controlled and uncontrolled T-intersections. However, after incorporating the exposure normalization measure (i.e., the number of intersections), pedestrian-related crashes and fatal/serious injury crashes were found to be significantly overrepresented at urban signalized and uncontrolled T-intersections, and urban signalized and stop-controlled cross-intersections compared to other facility types with at least 10 intersection locations, as highlighted in **red** in Table 3.10. Considering both the frequency of fatal/serious injury crashes and the normalized crash rates, urban signalized T-intersections and urban signalized cross-intersections were combined into a broader category of urban signalized three- or four-leg intersections. This combined category, along with urban uncontrolled T-intersections and urban stop-controlled cross-intersections, were identified as the focus facility types for pedestrian-related intersection crashes.

Table 3.10 Pedestrian-Related Crash Distribution by Facility Types

Area Type	Geometry Type	Traffic Control Type	# of Inter-section	# of Crash	% of Total Crash	# of KA Crash	% of Total KA Crash	# of Crashes Per Intersection	# of KA Crashes Per Intersection
Urban	Cross-Intersection	Other	1	1	1.0%	1	5.3%	1.00	1.000
Rural	Cross-Intersection	Signalized	2	2	2.1%	1	5.3%	1.00	0.500
Urban	**T-Intersection**	**Signalized**	**14**	**8**	**8.3%**	**1**	**5.3%**	**0.57**	**0.071**
Urban	**Cross-Intersection**	**Signalized**	**64**	**35**	**36.5%**	**4**	**21.1%**	**0.55**	**0.063**
Urban	**T-Intersection**	**Uncontrolled**	**159**	**8**	**8.3%**	**3**	**15.8%**	**0.05**	**0.019**
Urban	**Cross-Intersection**	**Stop-Controlled**	**171**	**13**	**13.5%**	**3**	**15.8%**	**0.08**	**0.018**
Urban	Y-Intersection	Stop-Controlled	110	6	6.3%	1	5.3%	0.05	0.009
Urban	T-Intersection	Stop-Controlled	420	14	14.6%	3	15.8%	0.03	0.007
Rural	T-Intersection	Stop-Controlled	327	2	2.1%	1	5.3%	0.01	0.003
Rural	T-Intersection	Uncontrolled	481	1	1.0%	1	5.3%	0.00	0.002
Rural	Cross-Intersection	Stop-Controlled	153	5	5.2%			0.03	
Urban	Five or more Legs and Not Circular	Signalized	1	1	1.0%			1.00	

Source: NYSDOT CLEAR, 2019-2023

Note: Facility types highlighted in **bold** are the selected focus facility types. Those also highlighted in **red** show either high fatal/serious injury crash rates or crash frequencies that justify the inclusion of these facility types in the focus facility list.

3.3.2 Risk Factors

Since pedestrian exposure is a critical factor influencing the risk of pedestrian-related crashes, the annual average daily pedestrian trip activity data was collected from the LOCUS platform at the block group level, and applied to all intersections based on their geographic locations to serve as a surrogate measure of pedestrian exposure. Additionally, based on the results of the statewide vulnerable road user risk assessment discussed in Section 2.4.1, intersections located within census tracts identified as high-risk areas for vulnerable road users were also examined as a potential risk factor to test their correlation with the pedestrian-related fatal/serious injury crashes. The possible attributes of these two factors are listed in Table 3.11.

Table 3.11 Potential Risk Factors for Pedestrian-Related Crashes

Potential Risk Factors	Risk Factor Attributes
Pedestrian Daily Trip Count	• 0 – 483 • 484 – 1,589 • 1,590 – 4,154 • 4,155 – 6,378 • > 6,378
VRU High-Risk Area	• Yes • No

Similar to the risk factor analysis performed for intersection-related crashes, other facility characteristics hypothesized to contribute to the increased risk of severe pedestrian-related crashes included the presence of lighting, left-turn lane types, right-turn channelization types, crosswalk types, traffic control types, intersection skew angles, pedestrian signal types, and total entering vehicles (TEV), as shown in Table 3.2. By comparing the percentages of fatal/serious injury crashes with the distribution of intersections sharing each characteristic, risk factors for pedestrian-related crashes on urban signalized T-intersections and cross-intersections, urban uncontrolled T-intersections, and urban stop-controlled cross-intersections were determined and listed in Table 3.12, Table 3.13, and Table 3.14, respectively.

Table 3.12 Risk Factors for Pedestrian-Related Crashes on Urban Signalized Cross-Intersections and T-Intersections

Urban Signalized Cross-Intersections and T-Intersections					
Risk Factors	Risk Factor Criteria	43 Crashes	5 KA Crashes	78 Intersections	KA Crashes Per Intersection
Presence of Lighting	No	4.7%	20.0%	2.6%	0.500
Left-Turn Lane Type	No left turn lanes	69.8%	80.0%	66.7%	0.077
Crosswalk Type	Marked crosswalk	100.0%	100.0%	83.3%	0.077
Pedestrian Signal Type	Pushbutton actuated	86.0%	80.0%	70.5%	0.073
Total Entering Vehicles	> 7,000	74.4%	100.0%	75.6%	0.085
Intersection Skew Angle (degree)	> 6	39.5%	80.0%	38.5%	0.133
Average Daily Pedestrian Trips within the Census Tract	1,590 – 4,154	53.5%	60.0%	29.5%	0.130
VRU High-Risk Area	Yes	58.1%	80.0%	48.7%	0.105

Source: NYSDOT CLEAR, 2019-2023

Table 3.13 Risk Factors for Pedestrian-Related Crashes on Urban Uncontrolled T-Intersections

Urban Uncontrolled T-Intersections					
Risk Factors	**Risk Factor Criteria**	**8 Crashes**	**3 KA Crashes**	**159 Intersections**	**KA Crashes Per Intersection**
Presence of Lighting	No	50.0%	66.7%	53.5%	0.024
Total Entering Vehicles	2,500 – 15,000	62.5%	100.0%	23.3%	0.081
Intersection Skew Angle (degree)	> 9	25.0%	66.7%	8.2%	0.154
Average Daily Pedestrian Trips within the Census Tract	1,590 – 4,154	37.5%	33.3%	13.2%	0.048

Source: NYSDOT CLEAR, 2019-2023

Table 3.14 Risk Factors for Pedestrian-Related Crashes on Urban Stop-Controlled Cross-Intersections

Urban Stop-Controlled Cross-Intersections					
Risk Factors	**Risk Factor Criteria**	**13 Crashes**	**3 KA Crashes**	**171 Intersections**	**KA Crashes Per Intersection**
Crosswalk Type	Unmarked crosswalk	23.1%	66.7%	49.7%	0.024
Traffic Control Type	Two-way stop	61.5%	100.0%	84.2%	0.021
Total Entering Vehicles	100 – 1,000; > 7,000	53.8%	100.0%	25.7%	0.068
Intersection Skew Angle (degree)	4 – 9	30.8%	66.7%	12.3%	0.095
Average Daily Pedestrian Trips within the Census Tract	485 – 1,589	53.8%	66.7%	48.5%	0.024
VRU High-Risk Area	Yes	23.1%	33.3%	18.1%	0.032

Source: NYSDOT CLEAR, 2019-2023

3.4 Speed-Related Crashes

Speeding can directly increase the likelihood of a crash and the risk of fatal and serious injuries in the event of a crash. Over the past five years, crashes involving unsafe speeds have been the third most prevalent type in Tompkins County among all emphasis crash types identified in the NYSDOT SHSP, accounting for 15 percent of all fatal and serious injury crashes.

3.4.1 Focus Facility Types

For speed-related crashes on roadway segments, a process similar to the focus facility type selection for roadway departure crashes was applied. Crash data was filtered by roadway functional class and area type, and roadway mileage was used as an exposure measure for crash data normalization. As indicated by

Table 3.15, after excluding arterials (interstates and other freeways), which have relatively small roadway coverage in Tompkins County, rural arterials (excluding freeways) and rural major collectors had the highest concentrations of speed-related crashes and fatal/serious injury crashes relative to the lane miles on these facilities (as highlighted in **red**). Accordingly, they were selected as the focus facility types for segment speed-related crashes. In addition, although rural local roads demonstrated relatively low crash rates per lane mile, they accounted for nearly one-third of all speed-related crashes. This suggests that rural local roads should also be included as a focus facility type, particularly given that traffic volumes on these roads may not be high.

Table 3.15 Speed-Related Crash Distribution by Facility Types

Functional Class	Area Type	Total Lane Miles	# of Crash	% of Total Crash	# of KA Crash	% of Total KA Crash	# of Crashes Per Mile	# of KA Crashes Per Mile
Arterial - Interstate or Other Freeway	Urban	9.39	14	2.1%	2	3.5%	1.49	0.213
Arterial - Exclude Freeway	**Rural**	**78.92**	**134**	**20.4%**	**13**	**22.8%**	**1.70**	**0.165**
Major Collector	**Rural**	**123.22**	**135**	**20.5%**	**10**	**17.5%**	**1.10**	**0.081**
Arterial - Exclude Freeway	Urban	62.46	62	9.4%	3	5.3%	0.99	0.048
Minor Collector	Rural	84.88	48	7.3%	4	7.0%	0.57	0.047
Major Collector	Urban	46.97	30	4.6%	2	3.5%	0.64	0.043
Local	**Rural**	**671.78**	**200**	**30.4%**	**22**	**38.6%**	**0.30**	**0.033**
Local	Urban	163.15	34	5.2%	1	1.8%	0.21	0.006

Source: NYSDOT CLEAR, 2019-2023

Note: Facility types highlighted in **bold** are the selected focus facility types. Those also highlighted in **red** show either high fatal/serious injury crash rates or crash frequencies that justify the inclusion of these facility types in the focus facility list.

3.4.2 Risk Factors

Once the focus facility types were identified for speed-related crashes, roadway attributes and operational factors that have direct correlations with drivers' speeding behavior were analyzed. These factors included posted speed limit, annual average daily traffic (AADT), number of through lanes, median types, shoulder width, and access control types, as demonstrated in Table 3.6.

Using the overrepresentation method, risk factors associated with an increased likelihood of severe speed-related crashes were identified separately for each focus facility type. For both rural arterials (excluding freeways) and rural local roads, posted speed limits between 35 and 40 mph were observed to cause higher concentrations of fatal/serious injury crashes on roadway segments, while for rural major collectors, posted speed limits lower than 35 mph or exactly 55 mph were identified as one risk factor because segments with this characteristic had the highest fatal/serious injury crash rates per lane mile. Table 3.16, Table 3.17, and Table 3.18 summarize the selected risk factors for different focus facility types and the corresponding fatal/serious injury crash rates per lane mile.

Table 3.16 Risk Factors for Speed-Related Crashes on Rural Arterials

Rural Arterials (Excluding Freeways)					
Risk Factors	**Risk Factor Criteria**	**134 Crashes**	**13 KA Crashes**	**78.9 Lane Miles**	**KA Crashes Per Mile**
Number of Through Lanes	2	2.2%	7.7%	2.4%	0.529
AADT	2,000 – 5,000	53.7%	61.5%	52.0%	0.195
Shoulder Width (ft)	9 – 12	29.9%	38.5%	29.1%	0.217
Posted Speed Limit (MPH)	35 – 40	1.5%	7.7%	4.3%	0.293

Source: NYSDOT CLEAR, 2019-2023

Table 3.17 Risk Factors for Speed-Related Crashes on Rural Major Collectors

Rural Major Collectors					
Risk Factors	**Risk Factor Criteria**	**135 Crashes**	**10 KA Crashes**	**123.2 Lane Miles**	**KA Crashes Per Mile**
Number of Through Lanes	2	0.7%	10.0%	1.3%	0.610
AADT	2,000 – 5,000	47.4%	50.0%	32.7%	0.122
Shoulder Width (ft)	1 – 4; 9 – 12	37.8%	50.0%	25.7%	0.158
Posted Speed Limit (MPH)	< 35; 55	74.8%	80.0%	53.9%	0.121

Source: NYSDOT CLEAR, 2019-2023

Table 3.18 Risk Factors for Speed-Related Crashes on Rural Local Roads

Rural Local Roads					
Risk Factors	**Risk Factor Criteria**	**200 Crashes**	**22 KA Crashes**	**671.8 Lane Miles**	**KA Crashes Per Mile**
AADT	500 – 2,000	28.1%	17.4%	8.4%	0.071
Shoulder Width (ft)	5 – 8	70.4%	60.9%	56.5%	0.045
Posted Speed Limit (MPH)	35 – 40	4.5%	4.5%	0.7%	0.204

Source: NYSDOT CLEAR, 2019-2023

3.5 Systemic Screening Conclusions

Through the systemic screening analysis process, focus facility types and their associated risk factors were identified for each of the four focus crash types. An interactive online map was created that visualizes the locations of all segments or intersections within each focus crash and focus facility type, along with the count of identified risk factors present. Each risk factor was weighted equally, and a risk score was calculated for each location based on the total number of factors present.

The County and other facility owners can use this online map to visualize sites that are candidates for systemic countermeasures to address the identified risks. The countermeasures can be applied in the design of a single corridor project or can be bundled into a single project across a large number of locations system-wide. Project bundling often allows facility owners to address a greater number of locations at a lower unit cost than could be achieved through multiple smaller projects.

The Strategies and Actions in the Safety Action Plan will include a comprehensive set of systemic countermeasures. NYSDOT has approved an increasing number of systemic treatments that are adopted in the NY Strategic Highway Safety Plan through the further adoption of specific Emphasis Area plans. These include:

- *Pedestrian Safety Action Plan* (2018)
- *Vulnerable Road User Safety Assessment* (2023)
- *Roadway Departure Safety Action Plan* (2024)

These plans have included both individual countermeasures and packages that are tailored to specific focus facilities and other locations demonstrating identified risk factors. The Toolbox notes the NYS Systemic Treatment Reference refers to citations in the NYSDOT Emphasis Area plans, Engineering Instruction bulletins, or other guidance that allows for these treatments to be applied systemically without a benefit-cost analysis for Highway Safety Improvement Program funding.