
Image source: Bike Walk Tompkins

Cyclist and Pedestrian Safety for All Ages:

Breaking Down Policy Barriers Across Jurisdictions

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Executive Summary

This comprehensive report delves into the intricacies of advancing age-friendly active transportation in Tompkins County, offering a strategic framework informed by data analysis, plan and policy review, and stakeholder insights.

The report opens with an exploration of the imperative for age-friendly active transportation planning in Tompkins County. Highlighting demographic shifts and the evolving needs of older adults and children, it emphasizes the need for a current comprehensive active transportation plan.

Our methodology articulates a multifaceted approach involving crash data analysis, interview-based insights, existing conditions assessment, a local case study review, policies and procedures analysis, and planning interventions for immediate action. This methodological foundation ensures a nuanced understanding of the current state of bicycle and pedestrian safety.

1. Crash Data Analysis: The study utilizes crash data spanning a decade, employing spatial analysis to identify high-frequency crash locations. Visual representations like heat maps and KDE plots pinpoint areas of concern.
2. Interview-Based Insights: Key stakeholders contribute valuable perspectives, enriching the analysis with qualitative data on concerns, challenges, and potential solutions.
3. Existing Conditions Assessment: Infrastructure mapping and policy analysis reveal gaps and opportunities within the current active transportation landscape.
4. Policies and Procedures Analysis: An investigation into the legal framework and state approval processes governing road safety enhances understanding of regulatory aspects. This section includes a local success story of the Dryden Rail Trail.
5. Planning Interventions for Immediate Action: Short-term, cost-effective interventions are proposed based on a review of peer community best practices and stakeholder consultations.

The report concludes with a set of targeted policy recommendations and strategic interventions, urging the establishment of an age-friendly urbanism grant application program. This program, inspired by successful models in other cities, encourages community-led initiatives, aligning with Tompkins County's history of supporting local innovation and cross-jurisdictional initiatives.

By integrating age-friendly elements into the county's transportation framework, the report envisions a positive impact on the lives of current and future generations, fostering mobility, independence, safety, and a sense of community for all residents.

Introduction

Society is undergoing a profound shift as the aging population continues to grow worldwide. Per the 2020 Census, 1 in 6 Americans is now over 65, with this proportion growing 5 times faster than the rate of US population growth (Caplan & Rabe, 2023). With 77 percent of older adults expressing the desire to age in place (Binette & Farago, 2021), the accessibility of diverse transportation options has emerged as a critical determinant of seniors' quality of life. Walking and biking opportunities are especially beneficial to older adults' mental, social, and physical health and independence. Active transportation lowers the likelihood of cognitive impairment and depression (Smith et al., 2021), improves intergenerational social connections (Mizuta et al., 2023), and is even credited with improving longevity (Garcia et al., 2023). Many older adults reap these benefits each year: people above 65 account for 6 percent of all bike trips and 14 percent of all walking trips made in the United States (Federal Highway Administration, 2018). By improving older adults' independent mobility regardless of their car ownership status, active transportation is one of the more equitable and sustainable transportation modes.

The benefits of active mobility are not exclusive to older adults. Concerns over the safety of public spaces have led American parents to increasingly shuttle their children between locations in private cars (Marzi & Reimers, 2018), decreasing children's independent mobility. Areas with well-established cycling and walking infrastructure, however, report higher rates of children relying on active transportation for traveling, particularly to school, alongside higher rates of childhood physical and social activity (Smith et al., 2019). Therefore, planning for safe, active transportation emerges as a proven strategy to restore not only the independent mobility of older adults but also that of children.

Current land use patterns do not make active transportation planning easy, however, especially for children and older adults. Most Americans simply do not have access to walkable or bikeable areas. Walkable neighborhoods comprise only 0.07 percent of total US land area, and only 3 out of 10 Americans have access to a bike lane or bike path in their community (Complete Streets USA, 2022). Those that do walk or bike face a mounting safety threat. Although the number of car trips has decreased since the pandemic, pedestrian and cyclist fatalities are on the rise across the country and

across age groups. Children and older adults are particularly vulnerable to vehicle crashes. In 2021, child pedestrian/cyclist injuries and fatalities increased for the first time since 1970 despite the lower percentage of children walking and biking with each subsequent year. Older adults became the most at-risk group of all pedestrians: the pedestrian most likely to be fatally struck by a vehicle in 2022 was an 80-year-old man (NHTSA, 2022). Tompkins County is far from immune from these trends, with five fatal crashes in 2021 compared to two each in 2018 and 2019.

Despite this transportation landscape, a search for age-friendly transportation policy primarily yields information about paratransit and other on-demand options. While fixed-route and on-demand transit options are essential, particularly for seniors with disabilities, focusing solely on less active forms of transportation neglects the diversity of ability and mobility levels within older adult communities and often ignores the specific needs of children. A truly all-age-friendly understanding of transportation understands there is no one way to age and, therefore, no one way to move around communities.

As such, this report seeks to analyze active transportation safety for all ages in Tompkins County and identify the barriers and opportunities for future age-friendly planning and policy efforts. We explore policy and planning interventions across jurisdictions to give the most complete view of the county's active transportation system and the most exciting avenues for change. Ideally, this report will supplement the work of local planners and changemakers pursuing active transportation reform and encourage the community to adopt an all-ages mobility framework.

Methodology

To delve into the challenges of age-friendly transportation planning in Tompkins County, we conducted a thorough analysis of crash data and bike-ped infrastructure and existing plans and policy frameworks. By unraveling the complexities of jurisdictional disparities and analyzing local success stories like the Dryden Rail Trail, the report seeks not only to diagnose existing issues but also to prescribe strategic interventions that align with the needs of all age groups. Our final policy and planning recommendations were informed by this research and case studies from dozens of other communities nationwide.

Our process is outlined below.

1. **Spatial data analysis**

   To understand the current state of bicycle and pedestrian safety in Tompkins County, we performed spatial analysis on crash data obtained from Tompkins County spanning from January 2012 to December 2022. Spatial analysis identified high-frequency crash locations and severity using kernel density estimation (KDE). Maps include heat maps and KDE plots.

2. **Qualitative data collection**

   Through interviews with key stakeholders and local experts, we identified common concerns, challenges, opportunities, and successes within the community. Interviewees included:

   - Fernando de Aragon, Director of Ithaca Tompkins County Transportation Council
   - Niki Friske, Interim Director of Bike Walk Tompkins
   - Erin Cuddihy, Transportation Engineer at the City of Ithaca Department of Public Works
   - Professor David Orr, Senior Engineer for the Cornell University Local Roads Program
   - Professor Dan Lamb, Deputy Town Supervisor for the Town of Dryden, Lecturer at Cornell University
   - Professor Jonathan Wood, former Tompkins County Attorney, current Professor of Law at Cornell University

3. Plan and policy review

We first reviewed existing local and county-level planning documents for age- friendly active transportation principles. Upon noticing the limited authority of county and local plans to address issues on state roads, we performed a review of New York State policy (New York State Department of Transportation *Highway Design Manual*) that pertains to traffic calming, speed limits, and active transportation projects. This included a case study of the Dryden Rail Trail, a collaboration between the county, the town of Dryden, and New York State.

4. Case study review and recommendations

We supplemented our policy review and study of local, low-cost planning interventions to improve pedestrian and cyclist safety with examples from university towns and rural communities throughout the nation. These case studies informed recommendations for Tompkins County.

Crash Data Analysis

To understand areas of high pedestrian and cyclist fatality risk, we analyzed crash data obtained from Tompkins County. This dataset includes all 264 crashes that occurred within Tompkins County from January 1st, 2012 to December 31st, 2022 and involved at least one vehicle and at least one pedestrian or cyclist. Accidents range in severity and from minor injury to fatal.

The spatial distribution of all crashes identifies 257 unique locations, with a notable concentration of recurrent incidents within the City of Ithaca, where the highest frequency of crashes for a single site was observed thrice. The most severe accidents also occurred in the Ithaca urbanized area. This is unsurprising. The City of Ithaca is the densest population center in Tompkins County, with the highest traffic flow, the highest number of residents, and the highest number of pedestrians and cyclists. Most of Tompkins County's active transportation infrastructure is also located within the City of Ithaca, attracting pedestrians and cyclists to the area from elsewhere within the county.

It is important to note that areas with the lowest concentration of crashes are not necessarily the safest areas for pedestrians and cyclists. In fact, because many of these lower crash areas are in more rural communities with little to no active transportation infrastructure and high road speeds, the comparatively low concentration of crashes likely indicates that few people feel safe enough to walk or bike in these areas. It is, therefore, difficult to quantify the true level of risk: crash location and severity is one part of a risk analysis framework, but we cannot estimate how many active transportation trips (and crashes between vehicles and pedestrian/cyclists) might have occurred in these areas had roadways been better designed for active transportation. The number of crashes is also a strong reflection of population distribution. Although there are fewer crashes in rural communities and smaller towns, there is roughly the same number of crashes per capita between Ithaca and rural communities like Groton, Dryden, and Caroline because the population in these areas is significantly lower.

The high concentration of accidents along state roads proves important. State Routes 13, 96, 34, and 79 saw frequent crashes both along these routes and in nearby communities. Route 13 and Route

96B serve as the primary thoroughfares utilized by individuals entering Ithaca. Due to their comparatively high daily traffic counts, these roads can pose significant risks. Stakeholders reported that community members find these roads stressful to navigate as both drivers and pedestrians. Drivers fear the many other drivers exceeding the speed limit, the frequency of abrupt accelerations, and the difficulty of performing safe left turns. Pedestrians and cyclists fear crossing busy roads with cars traveling at high speeds, poor or absent active transportation infrastructure, and drivers' unwillingness to change behavior for their safety.

This shared unease among drivers and pedestrians highlights the urgent need for comprehensive safety measures and improved infrastructure. While Tompkins County is devising strategies and planning to enhance road safety, including the exciting Ithaca Active Transportation Network, implementation is expected to take a considerable amount of time, particularly due to the complexity of managing roads that fall under different jurisdictions. Especially with state routes like route 13 and 96B, coordination and approval processes span multiple administrative levels and can be time-consuming. This includes navigating bureaucratic procedures, securing funding, and ensuring that changes meet the diverse needs of all road users. Additionally, engaging in discussions with daily users of state routes such as 96B is crucial to understand its unique challenges and tailor safety measures accordingly. The multi-jurisdictional nature of these routes necessitates a collaborative approach, balancing efficiency with comprehensiveness to ensure effective road safety improvements.

Further maps and mapping methodology can be found in the Appendix.

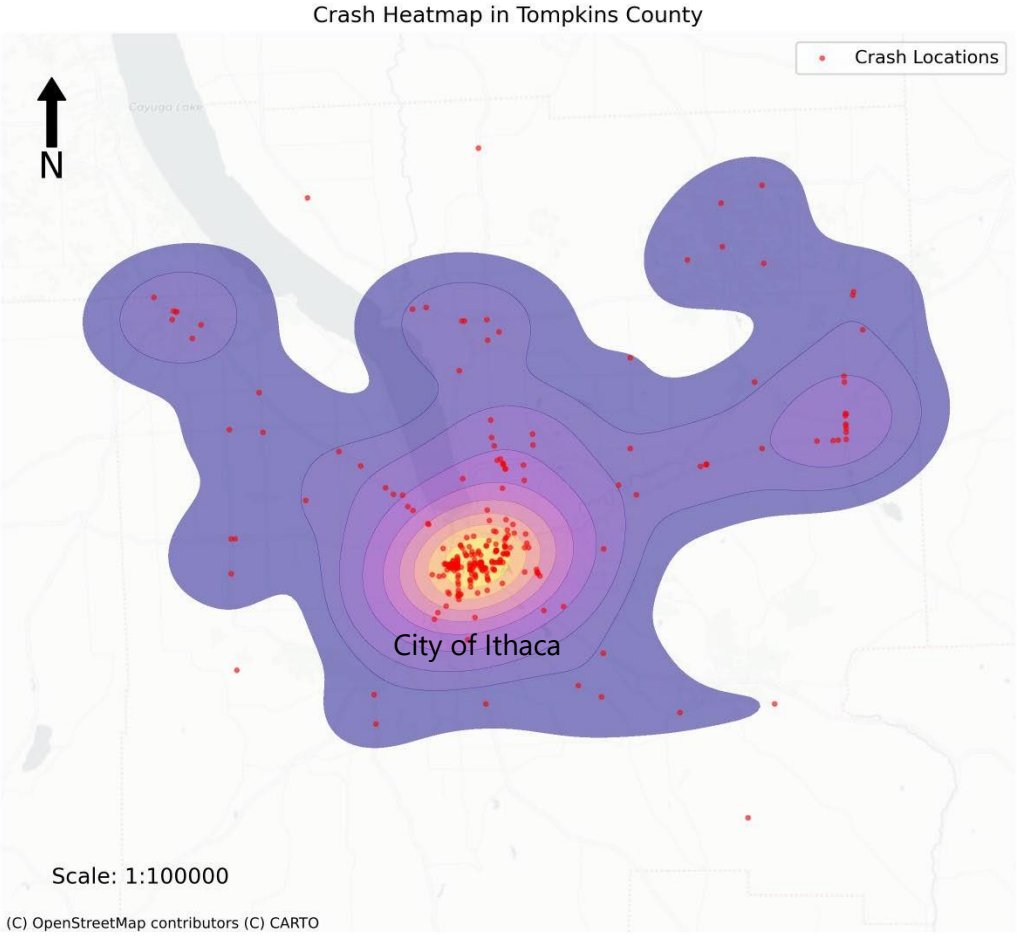

Figure 1: Crash Heat Map of Tompkins County (2012-2022). Crash locations are clustered in the City of Ithaca, with the highest concentration in the Downtown area. Further maps and methodology can be found in the appendices.

Source: Made by the Author using data provided by Ithaca-Tompkins County Transportation Council.

Tompkins County Plan Review

Although Tompkins County has a robust 2040 Long-Range Transportation Plan (LRTP), Tompkins County currently lacks a comprehensive active (bike-walk) transportation plan. Advocacy from organizations such as the Ithaca-Tompkins County Transportation Council (ITCTC) and community initiatives like Bike Walk Tompkins' Better Bike Network calls for either an update to the outdated 1997 plan or the development of a new Bike-Walk Master Plan. The 2040 Long-Range Transportation Plan acknowledges the deficiency in cycling infrastructure especially, referring to cycling as the missing mode in both rural municipalities and central Ithaca due to the absence of connected bike lane networks.

Presently, there are approximately 7 miles of dedicated bicycle lanes and 30 miles of multi-use trails in Tompkins County, concentrated in the Ithaca urbanized area. The LRTP further reveals that 77 percent of respondents to Bike Walk Tompkins' 2018 survey expressed a desire for more bike infrastructure in the county. Although walking is relatively better supported, sidewalk miles still lag road miles, especially in rural municipalities. Tompkins County, recognizing walking as a key commuting mode, has directed recent pedestrian and walkability projects toward commuters, exemplified by the Dryden Rail Trail.

Current plans, including the LRTP, the 2015 Tompkins County Comprehensive Plan, Plan Ithaca, and the 2023-2027 Transportation Improvement Program, underscore the need to establish connections between neighborhoods and key destinations such as employment opportunities, retail and service centers, recreational facilities, and natural spaces. This comprehensive approach aligns with the diverse needs of residents, emphasizing the importance of various transportation modes and program strategies (ITCTC, 2019, pp. 83). Ongoing pedestrian projects aim to not only enhance commuter pathways but also connect residents to a variety of destinations, prioritizing the unique needs of children and older adults who may deviate from typical commuter patterns. Given the nature of our research, we reviewed plans for Tompkins County with an eye for two primary topics: active transportation safety and age-friendly transportation.

Active Transportation Safety

- Tompkins County emphasizes maintaining infrastructure, expanding multi-modal mobility (transit, ridesharing, walking, biking), and community collaboration for transportation demand management and mobility services (2040 Long Range Transportation Plan).

- Traffic calming techniques and education programs, like bicycling safety in schools, are employed to improve traffic safety. Emphasis is also on traffic law enforcement with technological aids like remote radar and smart signs (2040 Long Range Transportation Plan).

- Federal and state safety planning includes strategic goals and countermeasures to reduce fatalities and serious injuries on New York roads, with an annual reduction target of two percent (2040 Long Range Transportation Plan).

- Safety is a core component of the ITCTC's mission across modes, but highway safety for both drivers and pedestrians/cyclists takes precedence over other modal safety concerns given the high number of fatalities in recent years (2023-2027 Transportation Improvement Program).

- Federal Transit Administration's Transit Asset Management rule focuses on maintaining public transportation assets in a good state of repair, thereby enhancing safety. Transit safety, including safety in accessing transit resources, is also a crucial part of local planning efforts (Transportation Plan 2019, 2023-2027 Transportation Improvement Program).

Age-Friendly Transportation

1. **Special Efforts for Older Adults and Disabled**:

    - ITCTC demands compliance with the Americans with Disabilities Act (ADA) for all projects in the 2023-2027 Transportation Improvement Program, ensuring accessible

multi-modal transportation services (2023-2027 Transportation Improvement Program).

- Shifting demographics indicate an increasing demand for expanded transportation services for the elderly, especially in rural areas. Improving transportation alternatives also benefits youth, low-income, and physically challenged individuals who lack personal automobile access (Tompkins County Comprehensive Plan, Transportation).

2. **Action Plan for Expanding Accessible Transportation Choices**:

    - The local emphasis on expanding the number of options for safe, efficient, and healthy transportation, including biking, walking, public transit, paratransit, carpooling, and use of electric or hybrid cars does not explicitly mention accessibility across ages. This approach aims to provide equitable transportation solutions across various community segments (Transportation Plan 2019).

Tompkins County has established a comprehensive framework for transportation planning that addresses both safety and the diverse needs of its aging population. By fostering multimodal mobility and community collaboration, the county aims to maintain and improve its transportation infrastructure, emphasizing safety through traffic calming, education, and law enforcement supported by technology. The transportation plans are aligned with federal and state safety goals, seeking to significantly reduce fatalities and serious injuries.

Additionally, the county's transportation plans reflect a commitment to sustainable accessibility and equity, striving to minimize environmental impacts while enhancing the mobility options available to the community. Age-friendly transportation initiatives ensure that projects comply with ADA standards and recognize the growing need for services catering to the young and the old, particularly in rural areas.

Efforts are also made to expand transportation choices, promoting an array of safe, efficient, and healthy options like biking, walking, public transit, and car-sharing. These plans are not only aimed at improving the current state but also at paving the way for future innovations and technologies that

will continue to evolve and enhance the transportation landscape in Tompkins County. This comprehensive approach ensures that the transportation system is not only robust and reliable but also inclusive, catering to the needs of all citizens regardless of age or ability.

While Tompkins County has made considerable strides in developing a transportation framework that considers safety and the needs of an aging population, there is always room for growth. The following are some potential areas for improvement:

- **Infrastructure and System Maintenance:** While the plan stresses maintaining existing infrastructure, it may not fully address the needs for upgrading or expanding infrastructure to meet future demands, especially in rapidly developing areas or regions facing significant demographic changes, especially related to age.
- **Transportation Insecurity:** The plan acknowledges the existence of transportation-insecure groups. There may be gaps in providing consistent, reliable transportation options for these groups, especially in non-urbanized areas. There is also limited discussion of how age feeds into transit insecurity.
- **Interjurisdictional Coordination:** For areas that border other jurisdictions, there may be gaps in the seamless transition of transportation services, which is particularly important for those who rely on multiple modes within their travels.

Policies and Procedures

As our existing conditions analysis showed, several traffic crashes involving pedestrians and cyclists have taken place along state roads, especially Route 13, 96, 34, and 79. These busy, high-speed roads often cut through small communities, becoming the "main street" of the municipality and thus posing a safety hazard for residents. Given that the state maintains these roads, local governments have limited power to implement traffic calming and active transportation safety measures. To achieve better interjurisdictional coordination and collaboration between local and state governments, it is imperative to understand state policies, standards, and procedures concerning road safety, which are broadly discussed in this section.

New York State Vehicle and Traffic Law

The process to modify the speed limit of a road, other than the statutory maximum speed limit of 55 mph, varies according to the road ownership and the governing body pursuing change. In the case of the state government, the Department of Transportation holds the authority to modify speed limits on state-maintained highways through orders, rules, or regulations. The legislative bodies of cities and villages can similarly modify the speed limits of roads within their boundaries—excluding state-maintained highways—via local laws, ordinances, orders, rules, or regulations. When it comes to counties and towns, the county superintendent of highways or town board can seek the modification of speed limits on roads within their respective boundaries by requesting such changes to the State Department of Transportation. In any case, the law prohibits lowering the speed limit to less than 25 mph, or less than 15 mph in the case of roads near schools.

In broad terms, various levels of government can implement further traffic calming measures on roads under their respective jurisdictions. These measures include designating roads as through highways, designating intersections as stop or yield intersections, and designating bike paths and pedestrian crossings. Similarly, state and local governments can order the implementation of traffic control measures like signs, signals, and markings on roads within their respective jurisdictions. More

detailed information regarding speed limit modification and traffic regulation by state and local authorities can be found in Articles 37 to 44 of the New York State Vehicle and Traffic Law.

Procedures for Alternative Traffic Calming Measures

It is often the case that state highways cut through smaller municipalities. As these state-maintained highways traverse smaller communities, they oftentimes end up becoming the main street in these areas. These roads most often remain under the jurisdiction of the state despite them being within the boundaries of the local jurisdiction. As a result, the State Department of Transportation stays as the ultimate decision maker on the traffic regulations that can be imposed over such roads, limiting the ability of smaller municipalities to implement alternative traffic calming measures. Nonetheless, local governments may seek traffic calming solutions on state-maintained highways upon request to the department of transportation and under certain conditions.

In October 2023, the team conducted an interview with a local road expert with over 30 years of experience on a wide variety of highway engineering and construction matters. This highway professional highlighted that the state government is more likely to approve alternative traffic calming measures when said solutions adhere to the standards and procedures of the New York State DOT's *Highway Design Manual* (HDM). This document is particularly relevant to the implementation of unconventional traffic calming measures over state-maintained roads.

Chapter 25 of the HDM indicates that the department of transportation generally considers alternative "traffic calming measures as a tool to address congestion, safety, and quality of life issues" (1999, pp. 4). The HDM states that said strategies must be considered to address locally developed traffic calming plans, consistent traffic collisions along a road, and/or community requests to improve road safety. The manual specifically emphasizes that these strategies must be implemented with significant input from the community and recommends first applying "temporary, more forgiving traffic calming measures" before opting for more permanent infrastructures (1999, pp. 5). The HDM also states that alternative traffic calming projects should pursue specific objectives, including the improvement of driver behaviors, the safety of all road users—including cyclists and

pedestrians—and the quality of life of communities. Similarly, traffic calming objectives include reducing speed limits near incompatible land uses, as well as reducing the need for human enforcement.

The *Highway Design Manual* provides a series of test questions to be considered for the selection and design of alternative traffic calming measures, a majority of which must be satisfied to obtain DOT approval for its implementation. The first set of questions pertains to local community support. This category aims to determine whether the community has continuously requested the implementation of traffic calming and whether stakeholders—including emergency services, local businesses, and transit operators—approve such a project. Local community support similarly aims to ensure that the traffic calming measure aligns with the objectives of the local comprehensive plan and zoning ordinance (*Highway Design Manual: Chapter 25 - Traffic Calming*, 1999).

A second category of the HDM test questions aims to address traffic conditions, mobility, and safety matters. Relevant test questions regarding traffic operations are set to determine whether "significant pedestrian/bicycle generators (schools, community or recreational facilities)" are present, as well as determining whether drivers consistently violate the speed limit imposed over the road in question. Other test questions concerning transportation safety seek to determine whether current signalization fails to tackle speeding and safety concerns and whether pedestrians and cyclists are constantly exposed to collisions with vehicles. Another relevant test question seeks to determine if the road in question is a state-maintained highway serving as the community's "Main Street" (*Highway Design Manual: Chapter 25 - Traffic Calming*, 1999, pp. 9).

These are just a few of the conditions the state DOT assesses when considering alternative traffic calming solutions. This report includes those conditions and questions that are relevant to age-friendly pedestrian safety planning. Chapter 25 of the *Highway Design Manual* contains further information on the criteria for the potential approval of unconventional traffic calming measures.

Success Story: Dryden Rail Trail

During an interview with the deputy supervisor of the Town of Dryden, we gained further insights on securing state support to make active transportation projects happen. For two decades, Dryden had considered building a rail trail to serve as a commuting route to Cornell University for residents opting for alternative modes of transportation. A series of state-level policy barriers stalled this project for decades before leaders pushed it through local channels.

In 2016, the deputy supervisor and the Town of Dryden passed a local resolution to establish the Dryden Rail Trail Task Force and finally address the obstacles to building such trail. One major challenge involved obtaining permission to cut through state-owned land managed by the Department of Environmental Conservation (DEC). After a series of negotiations, Dryden and the DEC finally signed a 20-year memorandum of understanding allowing the trail's passage through the property.

Although approximately two-thirds of the Dryden Rail Trail have been successfully completed, Route 13 poses an additional challenge to the project. Dryden's deputy supervisor stated that concerns about crossing this busy, high-speed state road have kept some residents from taking further advantage of the trail. To address these safety concerns, the town has been pursuing the construction of a bridge to safely connect pedestrians to the next portion of the trail. In 2019, the town secured a $1.5 million state grant to support the construction of the pedestrian bridge, which is set to begin in 2024.

More recently, the rail trail task force succeeded in lowering the speed limit on a portion of Game Farm Road, a county road. According to the interviewee, the installation of a pedestrian crossing was crucial to connect two sections of the trail. County officials, however, would only approve said crossing if vehicles were slowed down to a speed they considered safer for pedestrians. In collaboration with the Town of Ithaca—which shares a portion of this road—the municipality passed a resolution to request the State Department of Transportation (DOT) approve a speed limit reduction on Game Farm Road. After intense negotiations, the DOT conducted a traffic study to determine

whether such a speed reduction would be appropriate. The DOT ultimately granted this speed limit reduction to 30 mph, and the county approved the pedestrian crossing.

The success of these negotiations can be attributed to the Dryden Rail Trail project aligning with the state government objectives. The Dryden deputy supervisor highlighted during the interview that state government administrations are increasingly prioritizing transportation projects that help reduce car use by promoting alternative modes of transportation and commuting. Given that the Dryden Rail Trail connects several communities to Cornell University—a major employer in the region—the project was able to achieve commuter trail status, which was instrumental in securing state funding for the construction of the Route 13 pedestrian bridge.

The interviewee furthermore emphasized how community interest significantly influences government support for transportation projects. He mentioned how parents often prefer communities that offer safe public spaces for their children, while older adults often look for safe areas where they can retire. Therefore, age-friendly projects promoting safe active transportation have the potential to garner support from a substantial part of the community, as they contribute to the provision of such safe spaces.

Planning Interventions for Immediate Action

Although large-scale active transportation reform is needed and possible, as evinced by the Dryden Rail Trail, the current state of pedestrian and cyclist safety demands immediate action alongside these long-range projects. Tompkins County should consider projects that can be implemented on a shorter time scale, with low labor and construction costs, and which do not require negotiating with the state. These solutions should not be viewed as permanent or sufficient solutions, but they can supplement larger safety initiatives that require cross-jurisdictional planning. Many of these smaller interventions are also complementary, addressing different facets of pedestrian and cyclist safety in different areas to the benefit of different communities. The flexible nature of these interventions allows the county and its localities to mix-and-match or shape actions to their individual realities, needs, and goals.

Temporary actions are also encouraged by the *Highway Design Manual*, aligning local needs with state-approved processes and methods.

The following examples describe comparatively low-cost, short-range pedestrian and cyclist safety interventions that have been deployed in similar communities to Tompkins County, largely rural, semi-rural, or university town communities. Most are not specifically designed with children or older adults in mind but present clear benefits for these populations and improve greater overall safety. These interventions can be pursued at multiple levels of government or even, in select circumstances, non-governmentally by communities, non-profits, schools, and private businesses like senior care facilities or medical offices. These solutions can be categorized as either **physical interventions** or **behavior modifications**. Although physical interventions are considered successful when they modify pedestrian, cyclist, and, above all, driver behavior, behavior modifications do not use street infrastructure as the mode for enacting change. Rather, they emphasize individual actions or collective action designed to facilitate better daily practices or improve the ways in which planners and governments integrate resident safety concerns.

Physical Interventions

Temporary Curb Extensions

Curb extension is an umbrella term for physical interventions that visually or physically narrow the roadway and grant pedestrians more space to walk or wait for crossings. Curb extensions can take several forms, from bus bulbs that create larger spaces for waiting, boarding, and alighting buses to pinchpoints with cutaways for bike crossings. Most extensions are permanent concrete structures, occasionally accompanied with street plantings or other accessories like tactile paving, seating, or bike racks.

Temporary extensions rely on the same underlying street design principles as their permanent counterparts but are forced to be more creative with their materials and structure types. Most create the illusion of permanent space, often through vertical steel posts or rubber bumpers delimiting the area reserved for pedestrians or three-dimensional rubber platforms anchored into the ground. These interventions can be quickly anchored to and unanchored from the pavement, allowing for relocation or repositioning as planners test and iterate new street designs. They often serve as placeholders for future permanent extensions, but temporary measures can become permanent or semi-permanent in rural or underfunded areas that cannot afford larger infrastructural investments. Temporary extensions can also incorporate street beautification measures like pavement painting and vegetation to enliven streets while enhancing pedestrian safety.

While this is not an inherently age-friendly street design intervention, temporary bulb-outs could be easily combined with school zone crosswalks to accommodate the number of children and parents waiting at a given time and make streets more colorful and engaging for children. If graded properly to allow for the movement of wheelchairs and other mobility aids, temporary bulb-outs can also facilitate walking and crossing for older adults, especially because older adults often require more space to comfortably maneuver with these aids. In Tompkins County, temporary curb extensions could be useful in school zones, areas surrounding popular bus stops, and areas near health clinics and senior centers where pedestrians are more likely to have mobility aids.

Figure 2. A temporary curb extension composed of painted pavement protected by metal posts in Nashville, Tennessee. Source: Complete Streets USA.

Bethel Better Block– Bethel, Vermont

In 2016, Bethel, a town of 1,942 residents in Windsor County, Vermont, experimented with a street revitalization program with the goal of slowing traffic speeds and improving walkability. Funded by AARP of Vermont and led by the Better Block Initiative, Bethel implemented temporary bulb-outs, zebra crossings, outdoor and curbside pop-up shops, temporary crossings, parklet construction and beautification, and bench additions with a total budget of $15,000. The "better blocks" proved to be a smash hit with both Bethel residents and traffic modelers. Experimental street interventions reduced traffic speeds and noise without enforcement, taking traffic speeds from an average of 25 miles per hour to 15 and noise from 80 to 60 decibels.

The town retested bulb-outs and bulb-out placement in 2018 through a temporary program that used moveable rubber extensions with integrated pedestrian foot traffic counters and space for flowerpots and paintings. These extensions were tested at three locations. By analyzing foot traffic data, Bethel then decided which locations saw the most pedestrians and would therefore be better

suited to more permanent sidewalk extensions and concrete bulb-outs. Bethel later made these improvements, alongside many of those tested in 2016, permanent downtown to encourage active transportation and patronage of downtown businesses.

Figure 3: A plastic and rubber temporary platform installed as a curb extension in Bethel, Vermont. Source: Better Block Initiative.

Community-Painted Crosswalks

Many communities are replacing official zebra crosswalks with vibrant alternatives. Painted crosswalks often involve city oversight for placement and design review but fall under the design and maintenance authority of local residents. These designs can convey local history, values, or color schemes, but most importantly they show citizens' involvement in their street safety and neighborhood identity. Community involvement also reduces the overall labor and even material costs of these interventions while encouraging community members to take an active role in protecting their own safety.

These painted crosswalks play a crucial role in pedestrian safety. Drivers are significantly more likely to yield to painted crosswalks compared to marked but unpainted or poorly painted crosswalks. The vivid colors of many community-painted crossings are also more likely to hold driver attention and

prevent accidents at intersections. For pedestrians, clear, colored paths also deter jaywalking or crossings at unmarked intersections. By eliminating ambiguity around crossings, both drivers and pedestrians are more likely to make safe decisions. In Tompkins County, community painted crosswalks would be a valuable addition to the streetscape in areas with currently unmarked crosswalks or dangerous intersections, especially by key community amenities.

Figure 4: Community members paint a colorful design at a faded crosswalk in Price, Utah. Source: American Planning Association.

Tactical Urbanism Application System– Fayetteville, Arkansas

Fayetteville is a vibrant university town in Arkansas and home to many University of Arkansas students, staff, and professors. Starting in 2017, Fayetteville pioneered a tactical urbanism program in which community groups and members can propose tactical urbanism projects to the city for funding and planner and engineer oversight. One of the city's most successful projects involved community members painting colorful designs along a busy but unmarked intersection near a large coffee chain popular among all age groups. The designs were created by community summer camp attendees and reviewed by city planners, incorporating citizens of all ages into the planning process. This crosswalk was maintained by volunteers for three years before the city supplemented their paintings with a traditional zebra crosswalk and took over maintenance responsibilities. This program creates an avenue for citizens to propose street level improvements and exercise their creativity and agency

with city support. Because of the city's oversight, this program also creates a pathway for cities to formalize measures introduced by communities.

Figure 5: Volunteers in high-visibility vests paint a polka dot pattern around a curb and two-way crosswalk in Fayetteville, Arkansas. Source: Fayetteville Department of City Planning.

Increased Signage

Signs are a common way to alert drivers to potential risks or upcoming changes in infrastructure. While most signs are heavily regulated and required by law to indicate changing road conditions or traffic signals, some signs are optional or the result of local incidents such as crashes or roadway damage. Deer crossing signs, for example, are usually installed at the request of a town and its residents in areas where deer are frequently seen and deer-vehicle crashes have been recorded. There is no defined process or incident threshold mandating these signs, although there is a

suggested process for drivers to follow at these signs: slow speeds, proceed with caution, and flash headlights to indicate deer sightings to other drivers.

Some communities have utilized similar signage to alert drivers to the presence of cyclists or pedestrians in areas without clearly demarcated active transportation infrastructure. These signs, often designed to mimic School Zone or Deer Crossing signs carry messages like "Cyclist and Pedestrian Crossing" or "Watch for Cyclists" to encourage motorists to be wary of pedestrians and cyclists. Although they might not share roadways consistently, reminding drivers that cyclists and pedestrians are still a possibility regardless of roadway infrastructure can change drivers' understanding of and behavior on the roadway. These signs are vital in rural communities who do not see consistent flows of foot or bicycle traffic but may have intermittent pedestrians and cyclists that drivers are ill-prepared to accommodate. Instilling awareness and a sense of caution could result in lower speeds on these roads, more vigilance at intersections, and mindfulness of road shoulders and roadway edges, potentially reducing the severity of accidents overall.

In Tompkins County, cyclists and pedestrians are less frequent on rural roads than in the central City of Ithaca, but there have still been several pedestrian-vehicle and cyclist-vehicle crashes, several of which have been fatal. Tompkins County could add pedestrian and cyclist alert signage to each location where crashes have occurred and other locations that have been highlighted as potentially unsafe by planners, traffic engineers, or residents. Because drivers are well-accustomed to safety protocol for Deer Crossing or Watch for Deer signs, new signage in a similar vein is unlikely to confuse drivers but can improve driver vigilance.

Behavior Modifications

Child and Older Adult Cyclist/Pedestrian Safety Audit

City planners and engineers court public opinion in myriad ways, but by far the most common is the traditional public meeting. Residents, often those with abundant free time, attend meetings in public buildings to voice their opinion on proposed planning efforts or current city functioning. While this is an effective way to solicit public opinion, it is less active and dynamic and does not encourage planners to truly understand the lived experiences of their town's residents.

In the spirit of meeting people where they are, several public engagement experts have recommended more hands-on engagement tactics such as urban walks and citizen community audits. These strategies gather community members to walk through their neighborhoods alongside city planners and public engagement coordinators and share their opinions and experiences of different facets of the city. Many also include some measure of citizen audit: walkers from the community often record their impressions or ratings of local infrastructure on notecards or maps throughout their walk.

The benefits of urban walks are manifold. Walking encourages community members to share stories and thoughts they may not recollect or feel comfortable sharing in a large public meeting and ties general concerns (like a lack of pedestrian safety) to specific locations. This method also challenges planners– some of whom may not walk through their communities regularly– to experience daily life as their residents do and face challenges they may not be used to. Although these meetings may seem less accessible for older adults or disabled city residents, urban walks encourage greater accessibility. Mobility issues or challenges encountered on the walk showcase issues with the built environment that younger or able-bodied planners may not have considered previously. This interactive format is also more accessible to families because a walk's activity level and the ability to share opinions freely keeps children more engaged. The more diverse the participants, the more holistic experiences planners and engineers can learn from and the more issues their plans can seek to remedy.

In Tompkins County, urban walks have great potential. With the involvement of the Youth Bureau or Tompkins County Office for the Aging, planners could explicitly recruit children and older adults to attend urban walks and share their experiences. The initiative could also be expanded to include community cycles. Bike Walk Tompkins has advocated for Community Leaders' Rides in Ithaca in which community leaders are encouraged to bike around the city to better understand existing barriers to safe cycling.

Figure 6: Middle schoolers walking outdoors hold up colored picture frames to highlight features of their walk in Boulder, Colorado. Source: Growing Up Boulder.

Youth Barriers to Transportation with Centennial Middle School– Boulder, Colorado

In 2018, Growing Up Boulder, an innovative non-profit working to elevate children's voices in the planning process, conducted multiple urban walks with middle school students to understand the barriers that prevent children from riding public transit. On these walks, children used the Photovoice process to highlight built environment features they enjoyed or struggled with: children hold up large green picture frames to frame features they enjoy and red picture frames to highlight things they believe should be improved. Children then recorded their observations and proposed their own solutions to the problems they noted to city planners. These proposals contributed to a child-friendly bus stop feature pilot program in 2020 and the RTD Zero Fare for Youth pilot program, a program

that grants residents under 19 free public transit access for one year (from September 2023-September 2024). By integrating children into the planning process, city officials were able to support programs with confidence that they would be well enjoyed and well-used by Boulder's children and their families.

Reflective Garment and Clip-On Light Distribution

Many pedestrians and cyclists mistakenly assume they are visible to drivers at all hours provided there are streetlights. Unfortunately, the brightness and clarity of streetlights and headlights cannot compensate for long distance visibility difficulties. The National Highway Traffic Safety Administration (NHTSA) estimates that 50 percent of all pedestrian fatalities occurred after 6 PM, with 8 out of 10 drivers reporting they simply did not see those they hit. Further studies found that pedestrians walking in dark colored clothing at night are first seen approximately 55 feet away, giving the driver traveling at 60 mph less than one second reaction time.

Reflective clothing and vests, though not a perfect solution, boost visibility and can prevent the most avoidable accidents by giving drivers longer to react to pedestrians and cyclists. They are also very adaptable to personal tastes and safety concerns: cyclists, for example, can wear clothing with lights or reflective stripes on their backs because they will typically be seen by drivers from behind. While pedestrians and cyclists will need to be educated on the importance of wearing these garments, they are easy enough to integrate into daily walking and biking practice that there is no need for more intensive user education initiatives. This makes the entire initiative, from the cost of the garments or lights to the cost of training and education, extremely affordable.

Garment and light distribution can be pursued in myriad ways, as formally or informally as makes sense to reach pedestrians and cyclists. Community hubs from libraries, schools, senior centers, and fire departments are natural distributors for garments or lights, as are community organizations that focus on active transportation or safety.

Los Angeles Police Department Pedestrian Safety Initiative– Los Angeles, California

Starting in 2018, the Los Angeles Police Department opted to replace fines and tickets for pedestrians who violate traffic rules with warnings and gear distribution. Police officers provide any pedestrian stopped for illegal crossings, jaywalking, reckless behavior, or other traffic violations with a vest and clip-on light. This initiative aims to change the goal of police intervention from criminalizing walking– an issue in a city with limited pedestrian infrastructure–to encouraging pedestrian safety and creating a "defensive walking" mentality. The program was also widely heralded as more equitable for low-income Los Angeles residents, a fair proportion of whom cannot afford cars and rely on walking as their primary transportation mode.

Pedestrian and Cyclist Flags/Signs

Crossing aids are used to alert drivers to pedestrians crossing in areas with high traffic and potentially limited sightlines. These aids rely on pedestrians to signal their presence to drivers, usually by increasing their visibility. Common examples include crossing flags and high-visibility signs that pedestrians brandish as they cross roads to catch drivers' attention. Seattle, Washington D.C., Berkeley, and Bridgeport, Connecticut have all experimented with crossing flags and signage to mixed results. The basic model places flags in buckets at each side of dangerous or low-visibility intersections with signs communicating instructions for their use: pedestrians and cyclists pick up a flag at one side of the road and replace it at the other side for another pedestrian to use.

While theoretically useful in signaling road crossings, several practical challenges emerge. Flags often end up on only one side of the crosswalk based on prevailing crossing directions or otherwise disappear as people inadvertently or knowingly leave with them. Many cities need to replace flags consistently to keep the program operational, an unexpected cost for a low-cost program. Adoption is another issue. In Berkeley, street engineers found that only 2 percent of pedestrians use the flags, most ignoring them or choosing not to use them because they were too embarrassed to draw

further attention to themselves (Davies, 2014). Adults were the most averse to their use, some reporting feeling patronized by the insinuation that they needed help crossing the street.

Despite these challenges, these pedestrian flags have a clear audience: older adults and families with children. Both older adults and children are more fearful of crossing intersections and may require more time to cross, placing them in harm's way for longer periods of time. The flags ensure they are visible for the duration of their crossing. Children especially enjoy the novelty of crossing with a flag, turning street safety and visibility into a game rather than a chore. If placed in locations around schools, parks, and senior living centers, these flags have the greatest potential to be used and used properly.

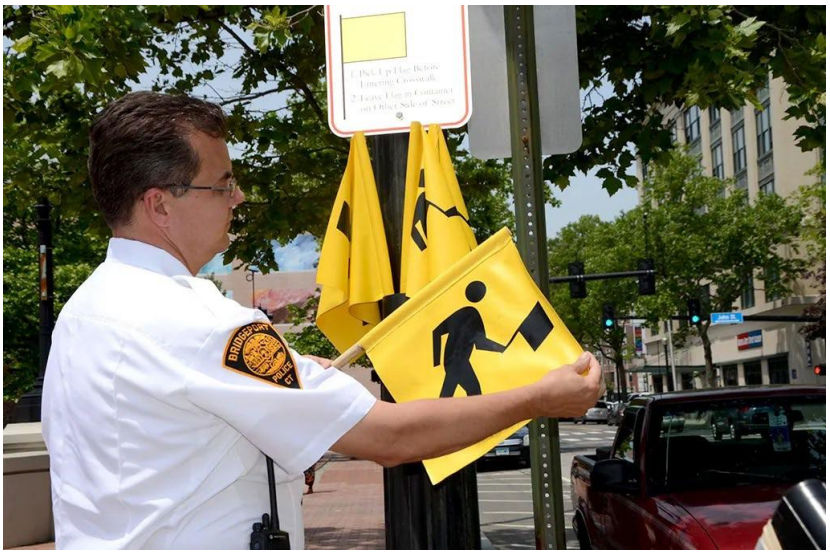

Figure 7: A police officer installs yellow flags printed with a pedestrian crossing symbol at a crosswalk in Bridgeport, Connecticut. Source: Wired.

Be Your Own Crossing Guard– Ketchum, Idaho

Starting in 2006, Ketchum, Idaho launched an initiative to "turn pedestrians into their own crossing guards" using bright orange flags at 174 key crossings, many of which without formal crosswalks. Anecdotal evidence has shown that drivers are more likely to yield to pedestrians with orange flags than pedestrians who do not use them, improving safety in areas without other safety infrastructure

like crosswalk painting, curb extensions, or crosswalk timers. Given Ketchum's previous car reliance, this program was part of a larger effort to make the city more walkable for residents and hot spring tourists. Additionally, many of the flags were sponsored by local schools, increasing the school district's involvement in children's transportation safety.

Recommendations Summary

1. Temporary curb extensions near areas with high foot traffic by older adults and children such as schools, senior centers, or community centers such as libraries, fire departments, or places of worship.
2. Community-painted crosswalks near dangerous intersections and community amenities without marked crosswalks.
3. Increased signage on rural roads alerting drivers to potential pedestrian and cyclist presence.
4. Children and older adult cyclist/pedestrian safety audits conducted by city planners to solicit opinions and understand the daily experiences of pedestrians and cyclists.
5. Community distribution of reflective garments and clip-on lights by libraries, schools, senior centers, and fire departments.
6. Pedestrian and crossing flags around age-sensitive locations to attract driver attention to crossings.

To implement other age-friendly active transportation solutions recommended by local community members and organizations, Tompkins County should consider instituting an age-friendly urbanism grant application program. Similar programs, wildly successful in cities such as Atlanta, Nashville, and Fayetteville, allow community members to apply for public funding to implement low-cost, short-

term approaches to improving streets and public spaces. The city reviews all applications and grants small grants to community members and organizations to implement their ideas with city oversight. By eliminating labor costs and relying on community volunteer installation and maintenance, these initiatives are low-cost but with the potential for huge community benefits.
Community initiatives that prove successful and tenable in the long term can even be internalized by city governments and made permanent or kept under the leadership of volunteers and local organizations.

A community grant program would provide a pathway to explore age-friendly initiatives not enumerated in this report or currently considered by local and county governments. With the success of grant programs in Tompkins County such as the Tompkins Outdoors Grant and the Community Celebrations Grant, Tompkins County has a strong history of supporting local innovation and community development initiatives. Age-friendly urbanism, especially active transportation, is vitally important to the safety of our communities. As such, it merits its own revenue flow so that community members can continue to experiment with interventions that protect the quality of life for children and older adults in the county.

Conclusion

The imperative for age-friendly active transportation planning in Tompkins County stems from the ongoing demographic shifts and the evolving needs of both older adults and children. The aging population's desire to age in place coupled with a growing trend away from children's independent mobility, underscores the necessity for a transportation infrastructure that accommodates diverse abilities and mobility levels.

The call for an age-friendly transportation plan in Tompkins County is amplified by national pedestrian and cyclist fatality trends and the absence of a comprehensive active transportation plan with a primary focus on reversing these trends. Advocacy from organizations like the Ithaca-Tompkins County Transportation Council and Bike Walk Tompkins, along with insights from current transportation plans emphasizes the critical need for updates and improvements, especially in cycling and pedestrian infrastructure.

Our recommendations extend beyond conventional transportation measures, imploring planners, engineers, policymakers, advocates, and residents to exercise their creativity. A forward-looking approach that considers the unique needs of older adults and children is essential for fostering independence and enhancing overall community well-being. The identified active mobility challenges and existing gaps in infrastructure highlight the urgency of prioritizing safe, accessible, and age-friendly transportation alternatives at all road types and across multiple levels of government.

As Tompkins County navigates the complexities of planning for the future, our proposed policies and interventions aim to create a transportation system that transcends age and fosters a more inclusive, resilient community. By strategically integrating age-friendly elements into the county's transportation framework, we can positively impact the lives of both current and future generations, promoting not only mobility but also independence, safety, and a sense of community for all residents.

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Appendix

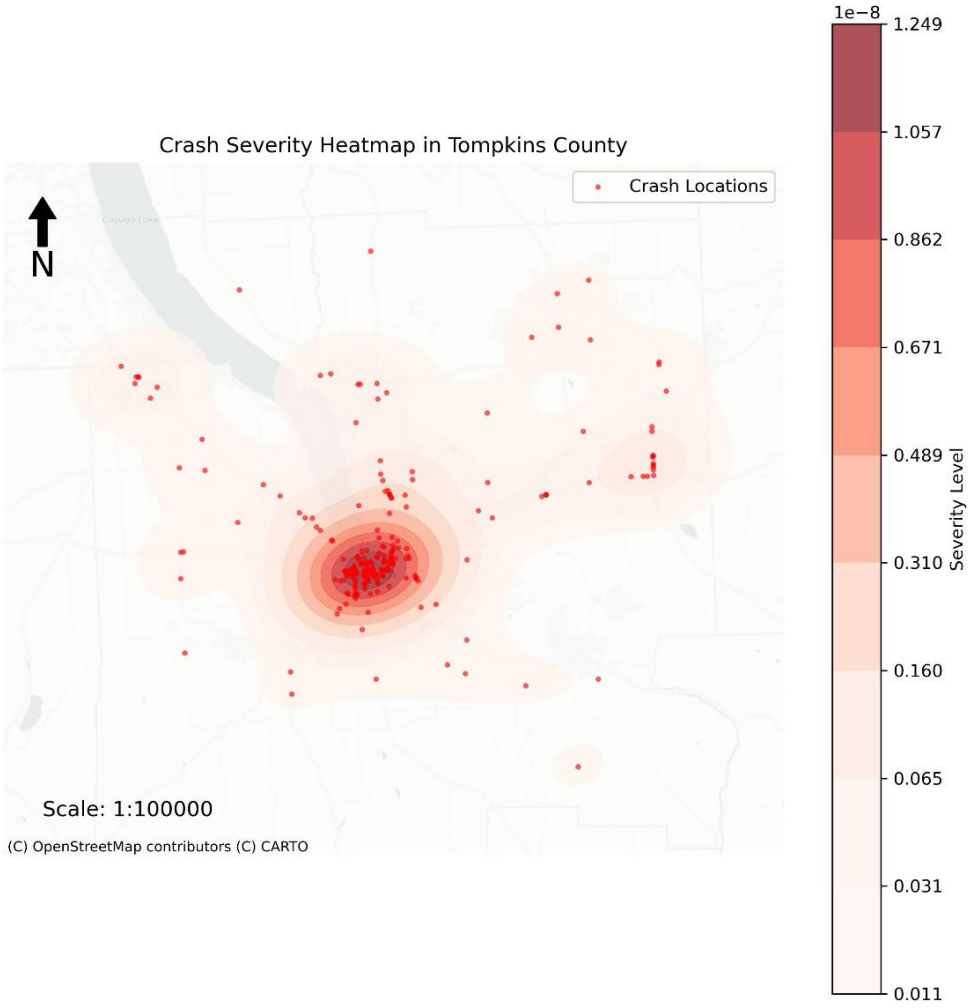

Figure 8: Crash Severity Heat Map in Tompkins County (2012-2022). Made by the Author with data obtained from Ithaca-Tompkins County Transportation Council.

The visualization applies a kernel density estimation to spatially represent the severity of vehicular collisions. The chromatic scale transitions from light to dark red, delineating increasing severity. Each collision is marked with a red dot. Accompanying the map is a color bar that serves as a legend for severity levels. The methodology synthesizes geographic coordinates with severity indices, yielding a nuanced depiction of collision intensity.

The crash severity was calculated by crash data from Ithaca-Tompkins County Transportation Council. Upon evaluating the severity of crashes, which is calculated by using kernel density, it was found that City of Ithaca not only had the highest crash frequency but also a slightly higher mean severity score of approximately 0.67. In contrast, the other locations had a lower mean severity score of 0.60. This information underscores the risk associated with the most crash-prone location, not just in terms of crash frequency but also in terms of crash severity.

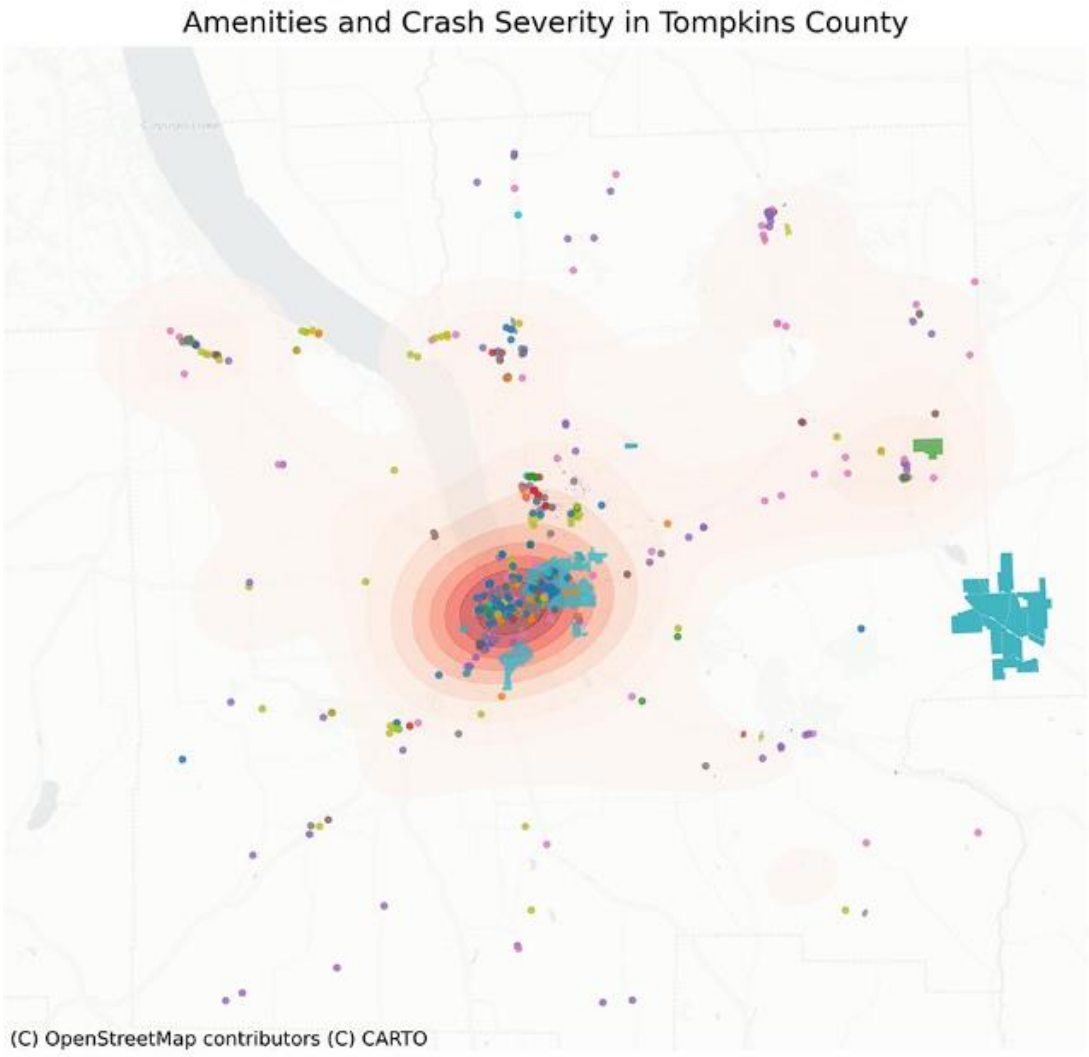

Figure 9: Amenities and Crash Severity in Tompkins County (2012-2022). Made by the Author with data obtained from Ithaca-Tompkins County Transportation Council and Open Street Map.

This map overlays a kernel density estimate of crash severity with the geographic locations of public amenities, distinguished by diverse symbols and hues as classified in the legend. The kernel density plot is generated from crash severity data, and amenities data are derived from OpenStreetMap, both projected onto a congruent coordinate reference system to assure precise superimposition.

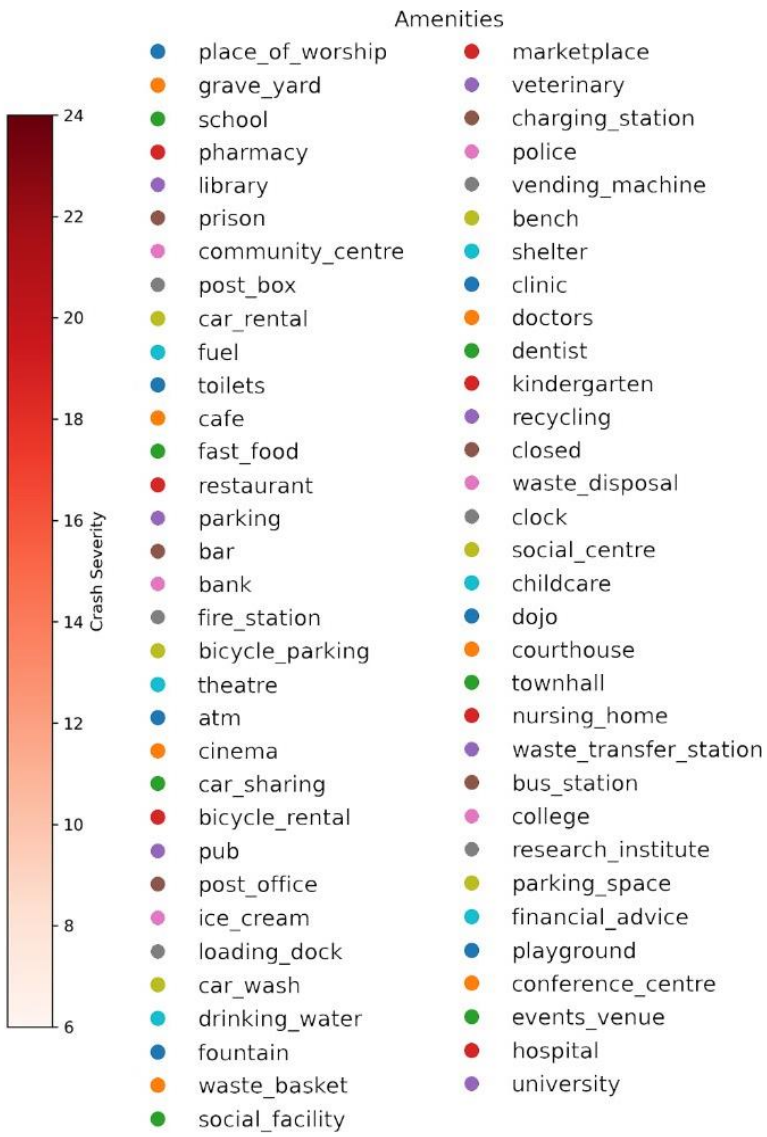

Figure 10: Legend of Figure 9 – Amenities and Crash Severity in Tompkins County (2012-2022). Made by the Author with data obtained from Ithaca-Tompkins County Transportation Council and Open Street Map.

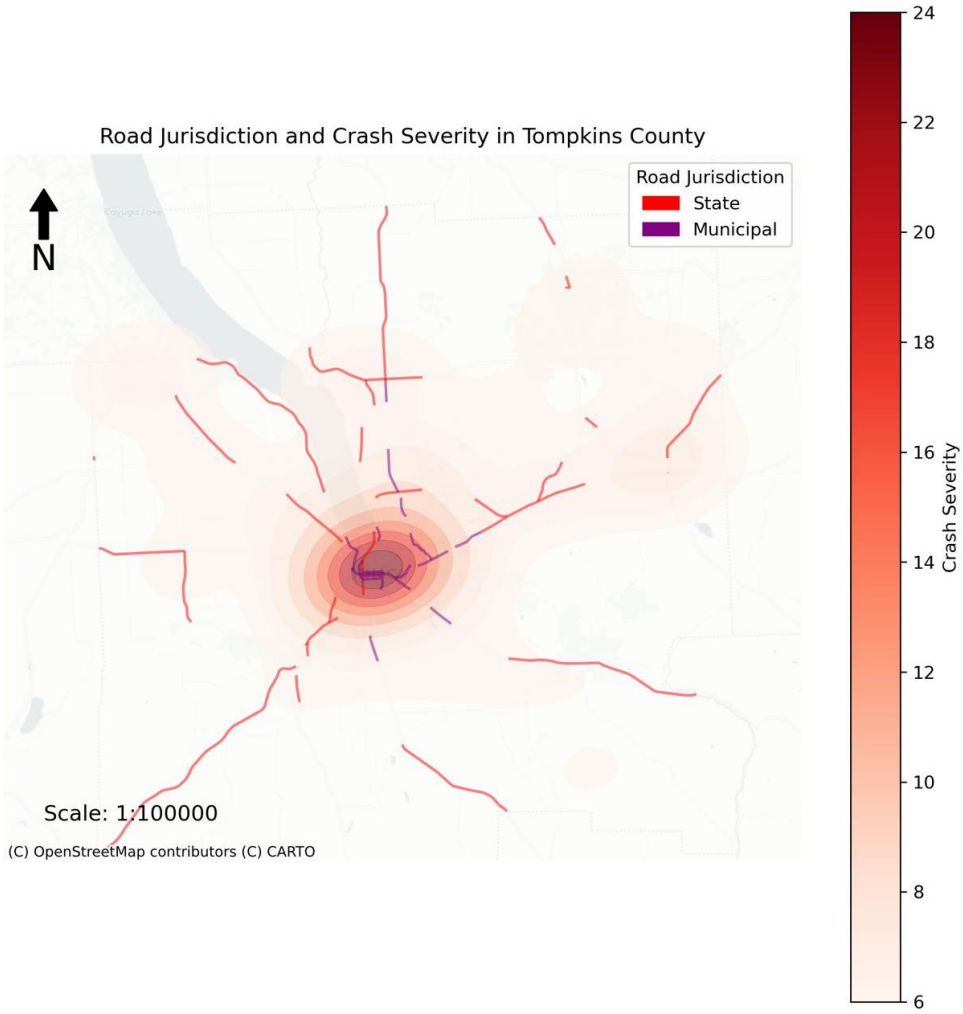

Figure 11: Road Jurisdiction and Crash Severity in Tompkins County (2012-2022). Made by the Author with data obtained from Ithaca-Tompkins County Transportation Council.

This figure illustrates the correlation between the jurisdictional classification of roads and the severity of traffic collisions. The roads are depicted in hues corresponding to their administrative authority—red for state and purple for municipal roads. The gradation of the backdrop signifies the severity of collisions. A spatial analysis was conducted to correlate the jurisdictional data with collision severity, thereby elucidating potential patterns of administrative influence on traffic incidents.