Safety and Security White Paper

Adopted September 3, 2020

**CDTC is monitoring the mobility impacts of COVID-19 and plans to update this chapter based on changing trends and new uncertainties.*

CDTC
CAPITAL DISTRICT TRANSPORTATION COMMITTEE

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Protection of Data from Discovery Admission into Evidence

23 U.S.C. 148(h)(4) states “Notwithstanding any other provision of law, reports, surveys, schedules, lists, or data compiled or collected for any purpose relating to this section [HSIP], shall not be subject to discovery or admitted into evidence in a Federal or State court proceeding or considered for other purposes in any action for damages arising from any occurrence at a location identified or addressed in the reports, surveys, schedules, lists, or other data.”

23 U.S.C. 409 states “Notwithstanding any other provision of law, reports, surveys, schedules, lists, or data compiled or collected for the purpose of identifying, evaluating, or planning the safety enhancement of potential accident sites, hazardous roadway conditions, or railway-highway crossings, pursuant to sections 130, 144, and 148 of this title or for the purpose of developing any highway safety construction improvement project which may be implemented utilizing Federal-aid highway funds shall not be subject to discovery or admitted into evidence in a Federal or State court proceeding or considered for other purposes in any action for damages arising from any occurrence at a location mentioned or addressed in such reports, surveys, schedules, lists, or data.”

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1. Introduction

The Capital District Transportation Committee (CDTC) is the Metropolitan Planning Organization (MPO) for Albany, Rensselaer, Schenectady and Saratoga Counties (with the exception of the Town of Moreau and the Village of South Glens Falls). One of CDTC's primary responsibilities is to develop a Metropolitan Transportation Plan (MTP), also known as a regional transportation plan, with a long term (20+ year) planning horizon, updated every five years. The MTP establishes regional planning and investment principles, strategies and actions that lead to an integrated multi-modal transportation system facilitating the safe and efficient movement of people and goods. CDTC is currently updating its regional transportation plan which will be known as New Visions 2050. The current schedule allows for extensive public input with CDTC adoption planned for September 2020.

To support the development of New Visions 2050, CDTC assigned its Regional Operations and Safety Advisory Committee (ROSAC) with the task of updating the Safety and Security portion of the 2015 Operations and Safety White Paper. This work has led to the preparation of a new Safety and Security White Paper. The group met periodically throughout 2019 to review the status of the safety and security recommendations in the current plan, review what has changed in the region since the previous plan was adopted and develop a set of recommendations to be considered for incorporation into the new plan. Federal Safety and Security related data, CDTC's Local Road Safety Action Plan (developed and completed in 2019), the New York State Strategic Highway Safety Plan (2017), other state and regional plans as well as federal safety performance measures were also considered.

2. Safety Performance Measures

Data driven decision making is an important aspect of the transportation planning process. It can improve the delivery of safety projects and CDTC's safety program, it can inform investment decisions, it can better focus on regional safety priorities and it can provide greater transparency and accountability for decision makers. The national Fixing America's Surface Transportation Act (FAST Act) requires CDTC to integrate performance-based planning and programming into its decision-making processes and further requires safety performance measures and targets for roadway and transit safety. The following describes the performance measures and tracks the region's progress toward achieving the targets CDTC is supporting.

New York State Roadway Safety Measures

The federal Safety Performance Measure Final rule became effective on April 14, 2016 and outlines the specific requirements for a state to reduce serious injuries and fatalities on all public roads. There are five highway safety performance measures for which New York State is required to set statewide annual targets. The targets for these measures are reported by NYSDOT to the Federal Highway Administration (FHWA). The purpose of these targets is to have consistent metrics in all states to allow for consistent progress tracking and state to state data comparisons. The five safety performance measures are the 5-year rolling averages for:

1. Number of Fatalities
2. Rate of Fatalities (Fatalities per 100 Million Vehicle Miles Traveled)
3. Number of Serious Injuries
4. Rate of Serious Injuries (Serious Injuries per 100 Million Vehicle Miles Traveled)
5. Number of Non-motorized Fatalities and Non-motorized Serious Injuries

A 5-year rolling average is used to reduce the year to year variation in the number of fatalities and serious injuries being tracked. The targets for the number of fatalities, number of serious injuries and rate of fatalities must be identical to those set annually by the Governor's Traffic Safety Committee (GTSC). GTSC reports its targets to the National Highway Traffic Safety Administration (NHTSA). The data sources for the performance measures have been specified by FHWA and include the national Fatality Analysis Reporting System (FARS) for fatalities and state crash databases for serious injuries. For New York State, the serious injury crash data is provided by the Traffic Safety Statistical Repository (TSSR) maintained by the Institute for Traffic Safety Management and Research (ITSMR). The 2020 New York State safety targets are provided in Table 1.

Table 1: New York State 2020 Safety Performance Targets

Performance Measures	% Reduction	2020 NYSDOT Target
Number of Fatalities	- 4.0%	1,040.4
Rate of Fatalities (Fatalities per 100 Million Vehicle Miles Traveled (VMT))	- 4.0%	0.826
Number of Serious Injuries	- 2.0%	11,017.0
Rate of Serious Injuries (Serious Injuries per 100 Million VMT)	- 2.0%	8.709
Number of Non-motorized Fatalities and Non-motorized Serious Injuries	- 4.0%	2,626.8

Source: NYSDOT. Note: Due to a lag in the availability of the most recent year of FARS and TSSR crash data, estimates are used for 2018 and 2019 crashes to set targets.

CDTC Safety Performance

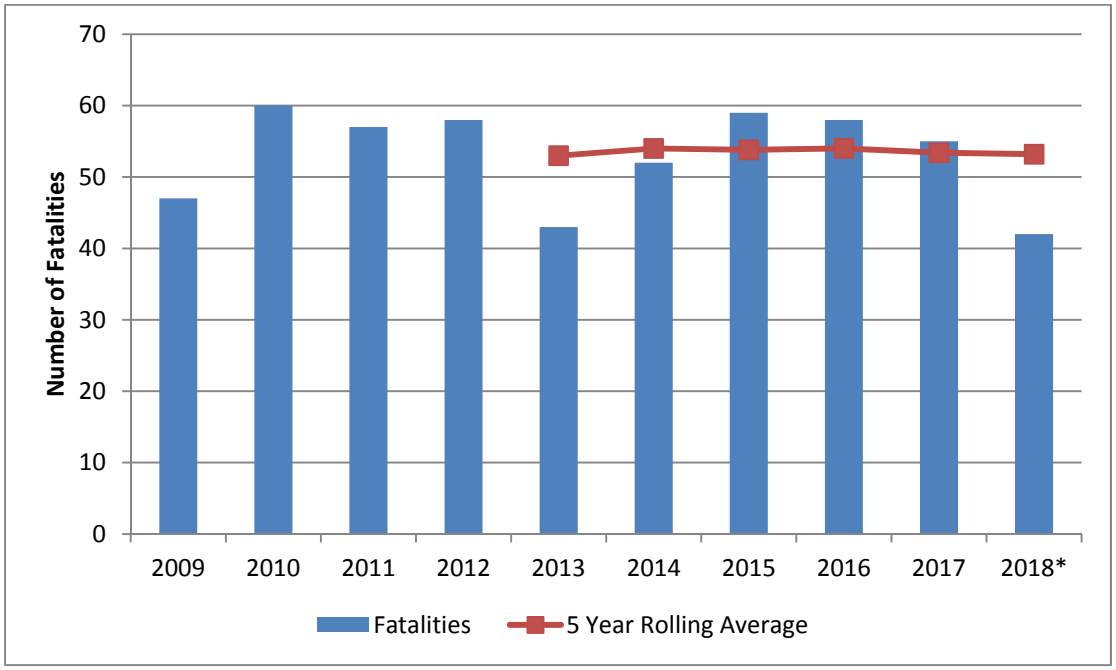
Each year, CDTC is required to take formal action on the proposed NYSDOT safety performance measures and targets, agreeing to plan and program projects that contribute toward the achievement of NYSDOT's targets. To monitor the region's performance, CDTC reviews crash data and tracks progress in each safety performance measure. Given the relatively low number of crashes in the four-county region when compared to the state (in 2018, nearly 62% of the entire state's fatalities and personal injuries occurred in New York City and Long Island), the percent change in the 5-year rolling average of crash data is more relevant when tracking performance than the annual numbers. CDTC's Safety Performance Measure Summary in Table 2 and the charts in Figures 1 through 5 provide the trend data for each performance measure through 2018, the most recent year for which the official crash data is available.

Table 2: CDTC Area Safety Performance Summary

Performance Measures	2018 NYSDOT % Reduction Target	CDTC 2011-2015 5-Year Average	CDTC 2014-2018* 5-Year Average	CDTC 2018 % Change
Number of Fatalities	- 5.0%	54	53	- 1.8%
Rate of Fatalities (Fatalities per 100 Million VMT)	- 3.0%	0.67	0.64	- 4.5%
Number of Serious Injuries	- 6.0%	614	655	6.7%
Rate of Serious Injuries (Serious Injuries per 100 Million VMT)	- 5.0%	7.6	7.9	3.8%
Number of Non-motorized Fatalities and Non-motorized Serious Injuries	- 1.0%	98	101	1.1%

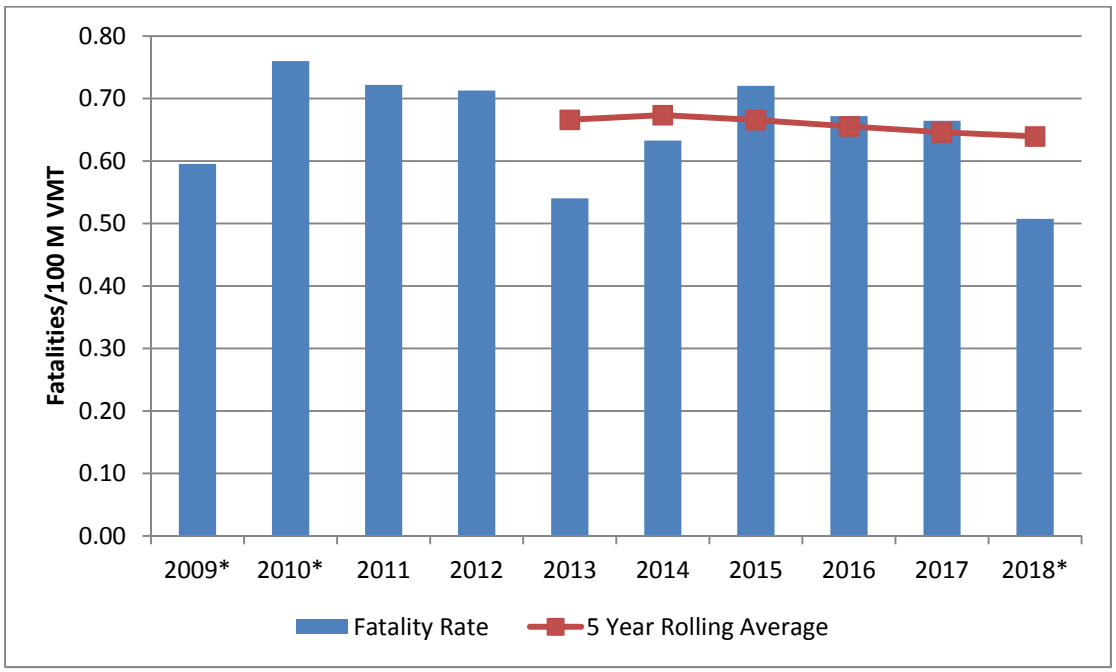
**2018 fatality data is preliminary and subject to change. Sources: FARS, FARS Annual Report File (2018), TSSR and the Highway Performance Monitoring System (HPMS) for vehicle miles travelled data.*

Figure 1: Number of Capital Region Fatalities



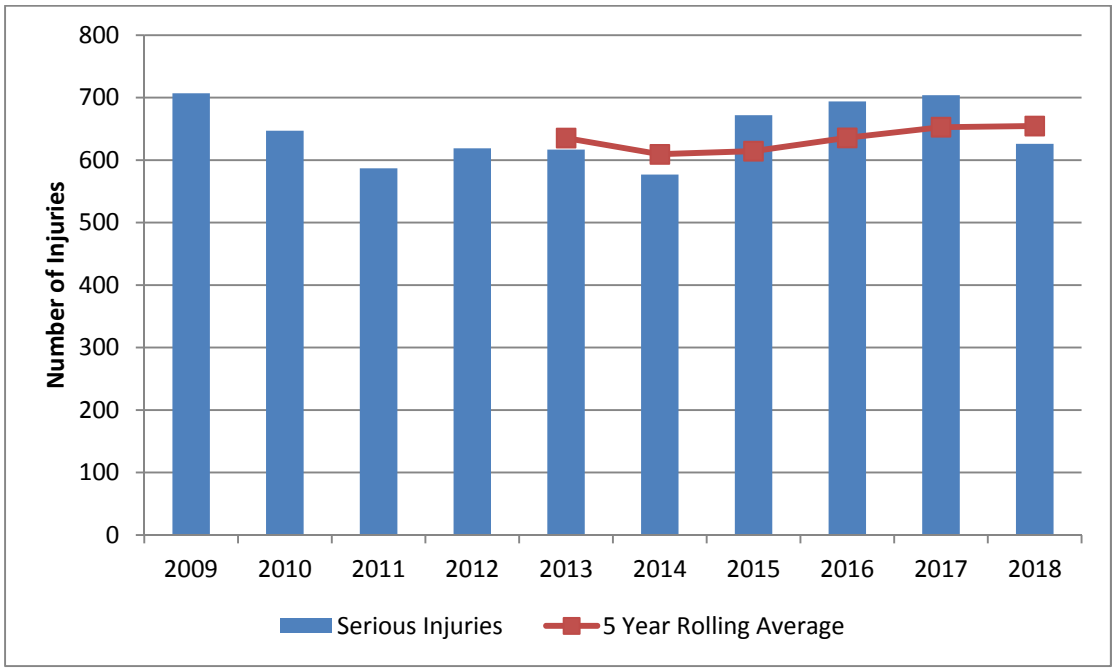
*Sources: FARS, FARS Annual Report File. * 2018 FARS data is preliminary.*

Figure 2: Rate of Capital Region Fatalities/100 Million Vehicle Miles Traveled



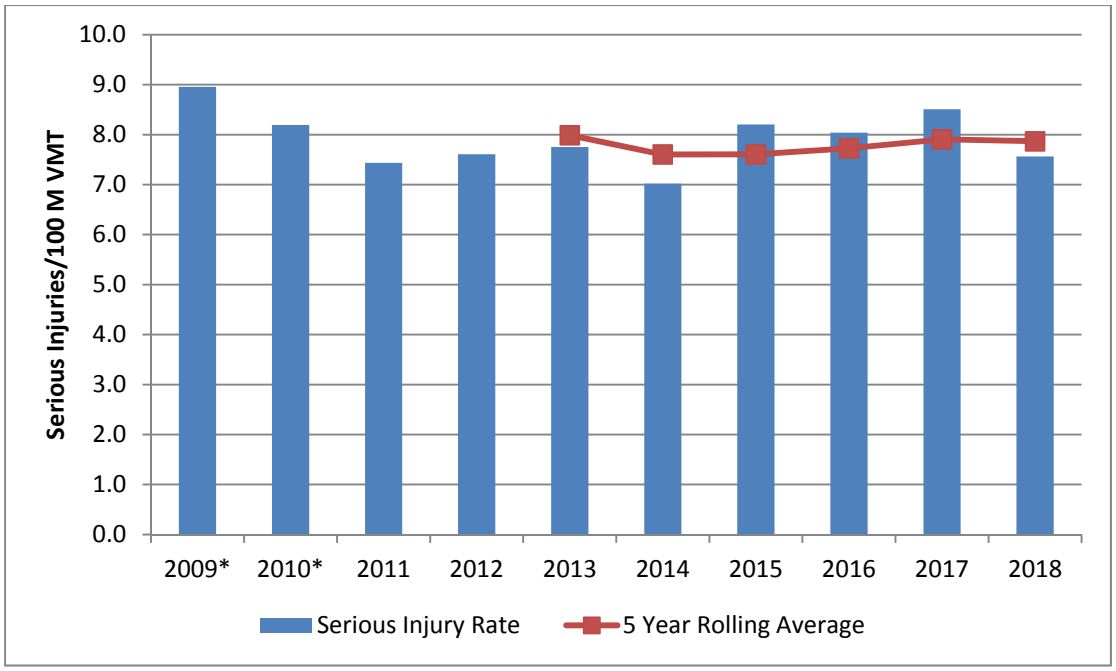
Data Source: FARS, FARS Annual Report File, Highway Performance Monitoring System.
**2018 FARS data is preliminary.*

Figure 3: Number of Capital Region Fatalities



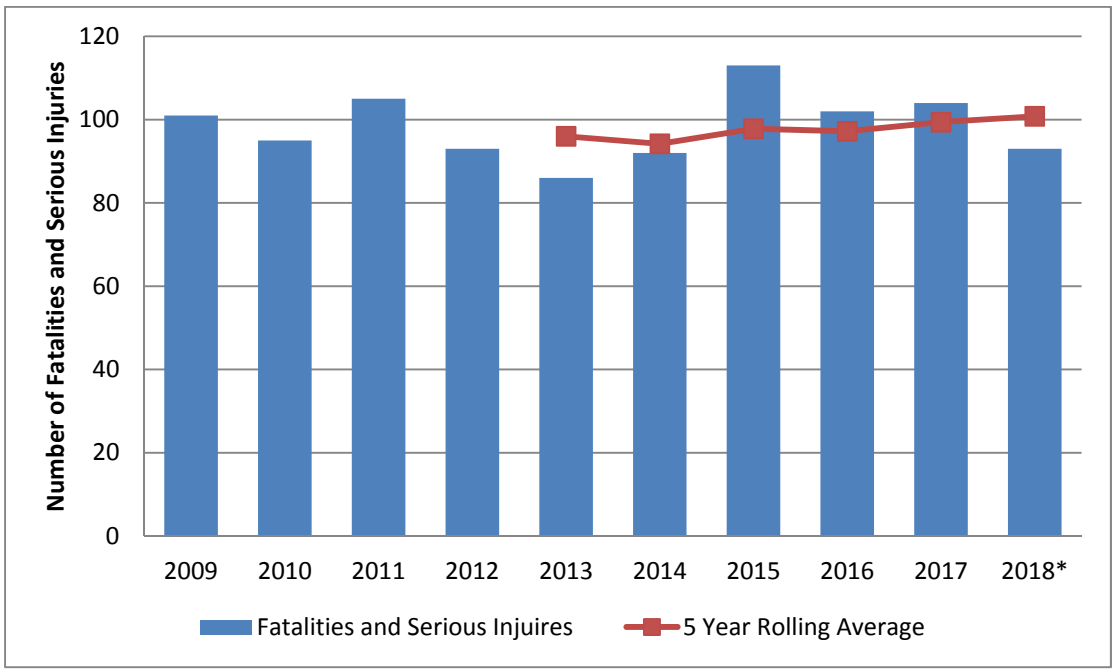
Data Source: ITSMR TSSR

Figure 4: Capital Region Rate of Serious Injuries/100 Million Vehicle Miles Traveled



Data Source: ITSMR TSSR, Highway Performance Monitoring System

Figure 5: Number of Non-motorized Fatalities and Non-motorized Serious Injuries



*Data Sources: FARS, FARS Annual Report File, ITSRM TSSR. *2018 FARS data is preliminary.*

Key findings in the review of CDTC's regional safety performance data include:

1. The number and rate of fatalities are trending downward.
2. The number and rate of serious injuries are trending upward although 2018 experienced a decline in both categories.
3. The number of non-motorized fatalities and non-motorized serious injuries has trended upward overall.

In summary, while progress has been made to reduce fatalities, the region only met one of the state's five 2018 safety targets based on the available crash data. The state may have set ambitious targets in 2018 compared to those set in 2020 but was is of greater concern to the region is the overall increase in serious injuries. While many factors contribute to these numbers and CDTC's influence is not as significant as that of its member agencies, CDTC may need to offer more support to its members through strategic safety programs that could assist with reversing upward trends.

Transit Safety Performance Measures

On July 19, 2019, the federal Public Transportation Agency Safety Plan (PTASP) Final Rule became effective and will require the Capital District Transportation Authority (CDTA) to develop a Safety Plan with safety performance measures and targets. The rule applies to all operators of public transportation systems that are recipients and sub-recipients of federal financial assistance under the Federal Transit Administration's (FTA) Urbanized Area Formula Program (Section 5307). The FTA has deferred this requirement for transit operators that only receive funds through the Enhanced Mobility of Seniors and Individuals with Disabilities Formula Program (Section 5310) and the Rural Area Formula Program (Section 5311).

The PTASP and performance targets must be shared with CDTC by July 20, 2020 and must be referenced in CDTC's Transportation Improvement Program and regional transportation plan updated or amended after July 20, 2021. There are seven safety performance targets by mode described below and Table 3 provides the baseline data currently available. The measures are:

1. Total number of reportable fatalities (confirmed within 30 days of the incident)
2. Fatality rate per total vehicle revenue miles (VRM) by mode
3. Total number of reportable injuries (defined as one or more persons needing immediate transport away from the scene for medical attention)
4. Injury rate per total VRM by mode.
5. Total number of safety events (safety events include collisions, fires or any event that meets a reporting threshold other than immediate transport for medical attention for one person)
6. Safety event rate per total VRM by mode.
7. System Reliability: Mean distance between major mechanical failures by mode.

Table 3: Baseline Safety Performance Data (2018)

Reporting Agency	Public Transit Mode (NTD)	Service Type	Fatalities and Fatalities/ VRM	Injuries	Injuries/ VRM	Events	Number of Mechanical Failures*
CDTA	Commuter Bus	Purchased Service	0	0	0	0	5
	Demand Response	Directly Operated	0	2	0.000002	2	67
	Demand Response	Purchased Service	0	0	0	0	Unknown
	Demand Response	Purchased Service	0	3	0.000002	3	Unknown
	Bus	Directly Operated	0	47	0.000006	41	1,668
	Bus	Purchased Service	0	0	0	0	Unknown
	Bus Rapid Transit	Directly Operated	0	0	0	0	Unknown
	Vanpool	Directly Operated	0	0	0	0	Unknown
	Vanpool	Purchased Service	0	0	0	0	1
City of Mechanicville	Bus	Directly Operated	0	0	0	0	Unknown

** Baseline reliability data not available. As a proxy, the number of mechanical failures by mode is reported.*
Source: National Transit Database

3. Progress on New Visions 2040 Recommendations

New Visions 2040 identified eight recommendations related to improving the safety and security of the region's transportation system. CDTC's Regional Operations and Safety Advisory Committee reviewed the status of these recommendations and documented the progress made on each over the last five years. The outcome of this review is summarized in Table 4.

Table 4: Progress on New Visions 2040 Recommendations

Recommendation	Description	Progress
Safety Performance Measures and Targets Development	The Safety Performance Measure Final rule became effective on April 14, 2016 identified five performance measures. New York set its first set of required targets in 2017 which CDTC supported that same year. The targets are updated and adopted annually.	Ongoing
Develop a Regional Safety Action Plan	The state has an active safety program for state owned roads and strong network screening. Given limited resources and the limited attention paid to local road crashes at a regional scale, the plan became a Local Road Safety Action Plan. The plan was completed in 2019	Complete
Establish a Community Safety Evaluation Program	Limited resources resulted in this initiative being put on hold. The Local Road Safety Action Plan highlighted the need for such a program in the future.	On hold
Develop Safety Education Programs	Capital Coexist, CDTC bicycle safety program, expanded to include education on pedestrian safety. Safety programs expanded further with the creation of CDTC's Traffic Safety Ambassador Program.	Ongoing
Foster communication and provide a forum for security	CDTC coordinated with Local Emergency Planning Committees at the County level to provide traffic modeling services, primarily simulation of traffic patterns resulting from emergency road or bridge closures.	Ongoing
Continue funding the regional Transportation Management Center (TMC) and Highway Emergency Local Patrol (HELP)	CDTC has provided funding to support the region's TMC and HELP trucks and will continue to do so. CDTC has also support Intelligent Transportation System projects.	Ongoing
Technical Support and Information Dissemination	CDTC used its traffic demand model to develop evacuation scenarios.	Ongoing
Vulnerability Planning	While the state has a vulnerability assessment of their transportation system, the local system does not yet have the same kind of assessment.	Partially complete

4. CDTC Safety Planning

Safety is CDTC's highest priority and is integrated into every decision that CDTC makes. It is a major component of the capital project evaluation process, it is reviewed in CDTC funded regional, corridor and community-based plans, and it is considered in all of CDTC's transportation program areas. Transportation related fatalities and injuries are a major public health issue with significant societal impacts including lost productivity, lost quality of life, high medical costs, legal and court costs, emergency service costs (EMS), insurance administration costs, congestion costs, property damage, and workplace losses. Reducing the risk of serious crashes is a major goal of CDTC's safety planning efforts. Transportation system security is also important to CDTC as the region has essential

infrastructure and facilities to be protected and the traveling public should feel safe and secure when using the region's transportation system.

The FAST Act (2015) retained Safety and Security as planning factors for Metropolitan Planning Organization's like CDTC to address in regional planning. The FAST Act also continued the Highway Safety Improvement Program (HSIP) as a core federal-aid program through FHWA. The HSIP consists of three main components, the Strategic Highway Safety Plan, the State's HSIP (the state's highway safety improvement projects) and the Railway-Highway Crossing Program. The following summarizes CDTC's planning approach and involvement in regional Safety and Security planning with a focus on the requirements of FHWA, NHTSA and FTA.

Existing Safety and Security Principle

New Visions 2040 set forth an integrated approach to reduce risk and enable safe access for all users of the transportation system. The safety and security principle states:

> ***We can significantly save lives and reduce injuries when we decrease traffic accidents and better respond to traffic emergencies.*** *CDTC and its members need to improve the safety of the regional transportation system by creating a travel environment that is consistent with the community context and reduces risk. Safety considerations will be integrated into all investment decisions. Roundabouts and road diets will be considered in proposed highway and intersection projects to address safety concerns as well as low cost safety improvements. Examination of security issues and incorporation of security actions using computer modeling and scenario planning will be considered in transportation planning and investment decisions.*

Historically, CDTC's safety program sought to examine crash data, identify high crash locations, identify roadway characteristics that are common to locations with a crash history, identify potential mitigation measures and solutions, and identify sources of funding to make improvements. These efforts were challenged by limited crash and roadway data and limited analysis tools to undertake a regional scale assessment of all public roads in the region for safety.

At the time New Visions 2040 was adopted, CDTC was expanding its safety planning program as new data became available and new programs were being established by New York State. These new resources, particularly the Accident Location Information System (ALIS), allowed CDTC to better document the region's safety problems and develop programs to support the implementation of engineering, education and enforcement safety strategies. Engineering measures support the design of safer transportation facilities, education measures increase awareness of safe travel behaviors and enforcement penalizes unsafe travel behaviors.

Since 2015, CDTC has developed working relationships with many of the region's safety stakeholders, regularly attends Albany County Traffic Safety Board meetings and has expanded its role in improving regional transportation system safety. This white paper will update the safety and security principle based on the many changes in the region related to safety and security planning, the development of safety and security plans and through other state, regional and local initiatives that have contributed to the safety and security of the region's transportation system.

Safety Plans

Several New York State agencies and CDTC have completed safety plans since New Visions 2040 was adopted in 2015. Each plan is generally developed using the steps identified in Figure 6 and may be broad in nature by examining a range of crash problems or they may have a specific focus such as

on pedestrian safety. CDTC staff has been directly involved in the development of most of the safety plans prepared by NYSDOT and has coordinated with NYSDOT and the regions safety stakeholders on regional safety plans. The major state and regional transportation safety plans that guide safety planning and programming activities at CDTC are discussed in this section.

Figure 6: Steps to Develop a Safety Plan

Strategic Highway Safety Plan (SHSP)

The New York State SHSP was developed in 2017 by NYSDOT in collaboration with various state, regional and local safety stakeholders. The SHSP is a data driven, five-year plan with the goal to reduce fatalities and serious injuries on all public roads. The SHSP used crash data to identify six emphasis areas targeting specific crash types contributing to higher numbers of fatalities and serious injuries in New York State. The six emphasis areas are Intersections, Lane Departure, Vulnerable Users (bicyclists, pedestrians, motorcyclists, and work zone workers/travelers), Age-related (younger and older drivers), Road User Behavior (impaired driving, occupant protection, distracted and drowsy driving) and Speed. The plan also emphasizes emergency response, data and automated/connected vehicles as cross cutting issues that affect all crash types.

Strategies and actions to reduce fatalities and serious injuries are identified for each emphasis area and are summarized in Table 5. The SHSP is also developed cooperatively with the New York State Highway Safety Strategic Plan and has consistent safety goals, objectives and performance targets for fatalities, fatality rate and serious injuries (see page 14). CDTC supports the implementation of the SHSP in its New Visions 2050 regional transportation plan and has developed planning and programming activities that are consistent with the SHSP.

Table 5: New York State Strategic Highway Safety Plan (2017) Emphasis Areas and Strategies

Intersection

- Develop an Intersection Safety Action Plan.
- Develop a systemic intersection safety improvement program.
- Implement safety improvements at intersections based on crash experience.
- Support policy initiatives that improve intersection safety.
- Support the use of technology (e.g., intelligent transportation systems [ITS], connected vehicles) and Traffic Incident Management (TIM).
- Improve or eliminate highway-railroad grade crossings.
- Develop education and training materials.
- Improve enforcement of traffic laws at intersections.

Lane Departure

- Complete a Lane Departure Action Plan.
- Implement a program of systemic safety improvements that decrease the number and severity of lane departure crashes.
- Implement safety countermeasures at locations based on lane departure crash experience.
- Develop education and training materials related to lane departure crashes.
- Continue enforcement of traffic laws that reduce lane departure crashes.

Vulnerable Users

- Continue to implement infrastructure projects to enhance vulnerable user safety.
- Enhance data processes to easily obtain current vulnerable user data.
- Support policy initiatives to increase vulnerable user safety.
- Continue educational programs related to vulnerable user safety.
- Enforce traffic laws that pertain to both vulnerable users and motorists.

Age Related

- Implement engineering designs to accommodate users of all ages.
- Develop safe-driving education initiatives for at-risk age groups.
- Improve enforcement efforts to address age-appropriate driving issues.

Road User Behavior

- Implement engineering improvements to mitigate high-risk driver behavior.
- Conduct educational and outreach efforts to build awareness of safe driving habits.
- Conduct coordinated targeted enforcement efforts.

Speed Related

- Implement infrastructure projects to decrease the number and severity of crashes due to speeding.
- Continue educational programs related to safe speeds and promote culture change.
- Work with judiciary to address speeding issues.
- Enforce safe travel speeds.

Source: https://www.dot.ny.gov/divisions/operating/osss/highway-repository/NYS_SHSP_TotalReport.pdf

Highway Safety Strategic Plan (2019)

The Highway Safety Strategic Plan (HSSP) is developed annually by the New York State Governor's Traffic Safety Committee (GTSC) and is required under the FAST Act. The plan guides GTSC's administration of the federal highway safety grant funding awarded by NHTSA to New York which is typically distributed to law enforcement agencies and non-profits through a competitive process. A

data driven approach is used to identify safety problems in the HSSP and to set highway safety program priorities. The Federal Fiscal Year 2019 priorities are listed in Figure 7. The plan's goals are to prevent motor vehicle crashes, save lives, and reduce the severity of injuries suffered in crashes. The HSSP and the SHSP are required to be developed cooperatively and have consistent safety goals, objectives and performance targets for fatalities, fatality rate and serious injuries.

Figure 7: New York State Highway Safety Strategic Plan (2019) Program Areas

Impaired Driving
Police Traffic Services
Motorcycle Safety
Non-Motorized (Pedestrians)
Non-Motorized (Bicyclists)
Occupant Protection
Traffic Records
Community Traffic Safety Programs

Source: https://trafficsafety.ny.gov/system/files/documents/2019/06/HSSP-2019.pdf

Pedestrian Safety Action Plan (2016)

New York State completed a Pedestrian Safety Action Plan in 2016, developed collaboratively between NYSDOT, the New York State Department of Health and the Governor's Traffic Safety Committee with support from the state's MPOs and other safety stakeholders. As a focus state for pedestrian safety, based on a high number of pedestrian fatalities, the Action plan used crash data to identify engineering, education and enforcement strategies and projects that could be implemented to improve pedestrian safety on all public roads. The specific objectives of the Plan include:

- Identify risk factors present for pedestrians on state and locally owned roads.
- Identify counties and municipalities, as well as specific locations and corridors where there is a potential to reduce pedestrian crashes.
- Identify a toolbox of countermeasures.
- Identify appropriate performance metrics in order to monitor progress, evaluate effectiveness and adjust approaches accordingly.

Among the identified engineering strategies, the state proposed to launch as Systemic Safety Program to proactively address widespread safety issues by implementing low cost countermeasures throughout the roadway network based on the presence of high risk roadway features correlated with pedestrian crashes rather than crash frequency. Applying the systemic approach could help address crash types that have not been identified through the state's network screening process.

To implement the plan, the state reserved a portion of HSIP funds over a five year period, supported by a combination of additional federal, state and local funding sources. The data analysis found that 50% of all pedestrian crashes outside of New York City occur in 20 communities in New York State, two of which are in the Capital Region (the Cities of Albany and Schenectady). The most common crash types related to pedestrian safety identified in the plan are signalized intersections and uncontrolled, often mid-block, locations. The report is available on the New York State pedestrian safety webpage at https://www.ny.gov/sites/ny.gov/files/atoms/files/pedestriansafetyactionplan.pdf.

Local Road Safety Action Plan (2019)

Local Road Safety Plans are an FHWA recognized proven safety countermeasure. Because over 40% of the region's most serious crashes occur off the state highway system, CDTC provided resources to undertake the development of this action plan. The crash data for local roads, defined as those owned and maintained by a county, city, town and village, has not previously been reviewed regionally as there is a lack of data to undertake network screening. This plan attempts to bridge that gap by evaluating fatal and serious injury crash data to better understand the types and characteristics of local road crashes. The data analysis revealed that there were 1,810 fatal or serious injury local road crashes of which 375 (approximately 20%) occurred in rural areas.

A major finding of the plan is that the region's local road crash emphasis areas are the same six as those identified in the New York State SHSP. A summary of the crash data by county and emphasis area is shown in Table 6. The data also revealed that crash emphasis areas vary between the four counties indicating the need for tailored strategies by both local governments and CDTC in each section of the region. As with the statewide plans, engineering, education and enforcement strategies were identified for each emphasis area that could be implemented by local governments, CDTC and other safety partners. Figure 8 provides a summary of the recommendations for local government Appendix A provides detailed information on the recommended strategies and actions for each emphasis area.

Table 6: Local Road Fatal and Serious Injury Crashes by County and Emphasis Area

Emphasis Area	County								Total Crashes	Avg.
	Albany		Rensselaer		Saratoga		Schenectady			
Intersections	294	36%	157	19%	168	21%	199	24%	818	204.5
Road User Behavior										
Impaired	83	34%	43	18%	80	33%	39	16%	245	61
Distracted	119	37%	32	10%	73	23%	95	30%	319	80
Drowsy	12	30%	3	8%	16	40%	9	23%	40	10
Aggressive	63	34%	45	24%	56	30%	24	13%	186	46.5
Total	277		123		225		167			
Age Related										
20 and Younger	82	31%	69	26%	80	30%	36	13%	267	67
65 and Older	75	28%	33	12%	102	38%	58	22%	268	67
Total	157		102		182		94			
Vulnerable Users										
Pedestrian	123	46%	38	14%	32	13%	73	27%	269	67
Bicyclist	39	38%	17	17%	22	21%	25	24%	103	26
Motorcyclist	83	32%	46	18%	89	34%	40	16%	258	64.5
Total	245		101		143		138			
Lane Departure	156	26%	111	19%	254	42%	79	13%	600	150
Speed	99	27%	73	20%	134	37%	56	15%	362	90.5

Avg. = Average; Note: some crashes are included in more than one Emphasis Area. Source: ALIS

Because of the lack of data to undertake network screening to identify high accident locations, the plan calls for system level strategies that are more likely to be effective in improving safety on the local road system. However, many local governments lack staff, technical expertise and financial resources to develop robust proactive safety programs without the support of CDTC, NYSDOT and others. CDTC will be exploring methods to assist local governments with data analysis and project development to access Highway Safety Improvement Program funding to implement programs and projects that relate to the Local Road Safety Action Plan.

Figure 8: Local Road Safety Action Plan Recommendations for Local Governments

System Safety Program Plan (CDTA)

CDTA's Safety Plan was developed and implemented in January 2018. The plan includes a policy statement committing CDTA to provide "safe and reliable transportation to the general public at a reasonable cost". The policy covers training and safe working conditions for staff, defensive driving and customer relations training for drivers and a commitment for all employees to comply with the provisions of CDTA's accident prevention program. In 2020, CDTA will be required by FTA to develop and provide to CDTC a Public Transportation Agency Safety Plan with safety performance measures and targets.

Regional Safety Program

The primary goal of CDTC's safety planning program is to reduce crashes, especially fatal and serious injury crashes, on all public roads. A challenge that CDTC has attempted to overcome is the difference between how state owned and maintained roads are monitored for safety versus locally owned and maintained roads. The following describes the safety planning approach being utilized for state and local roadway systems at the regional level.

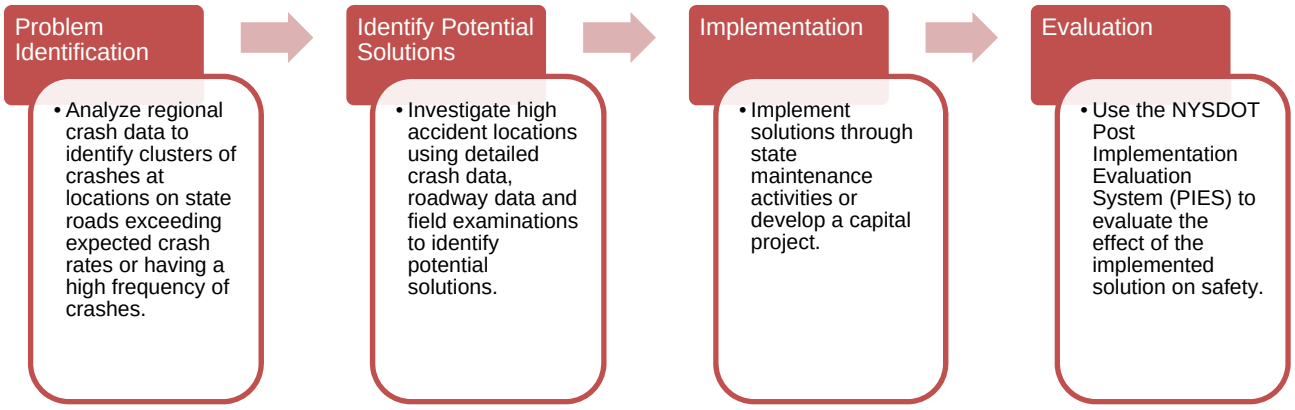
NYSDOT Safety Program

NYSDOT's Core Safety Program includes a combination of proactive and reactive initiatives that rely on data and field reviews to develop cost effective safety treatments for implementation. Figure 9 illustrates the core safety program elements. When a proposed project is large enough, CDTC partners with NYSDOT to ensure HSIP funds are allocated to those projects that address the largest regional safety issues in the most cost-effective way.

Figure 9: NYSDOT Core Safety Programs

NYSDOT's HSIP relies on a set of systematic procedures summarized in Figure 10 to identify and correct hazardous locations on state owned roadways. This traditional process of network screening for hot spots identifies lists of High Accident Locations which are further categorized into Priority Investigation Locations (PILs). A location is identified as a PIL if it exceeds NYSDOT defined thresholds for crash frequency and if the accident rate is statistically significant. PIL lists are calculated annually and NYSDOT undertakes a Highway Safety Investigation for up to 20% of the identified PILs each year. The Investigation procedure is defined in the state's highway safety improvement program. Other sources of information that may lead to a NYSDOT safety investigation include citizen complaints, observations from law enforcement or NYSDOT staff, and safety screenings as part of larger capital projects.

Figure 10: NYSDOT Highway Safety Improvement Program Procedure



Source: NYSDOT Safety Investigation Procedures Manual (2000)

NYSDOT's safety investigations can lead to the identification of solutions which may include engineering, education and enforcement recommendations. Engineering solutions may range from low cost maintenance activities to higher cost capital projects. A benefit/cost analysis is used to further evaluate proposed engineering solutions to safety problems. Many low cost solutions can be implemented through route maintenance activities while larger capital projects enter the project development pipeline for potential consideration for HSIP funding. Once a project is implemented, NYSDOT evaluates the outcomes through its Post Implementation Evaluation System (PIES).

NYSDOT's approach requires detailed crash and roadway data, traffic volume data and dedicated staff to undertake the investigations and conduct post project implementation reviews. The data and resources available to NYSDOT, which are even limited within the Department, generally do not exist for owners of local roadways making it difficult if not impossible to undertake regional network screening for safety on all public roads. CDTC has sought to fill this gap by building its safety planning capacity and making resources available to local governments for safety planning.

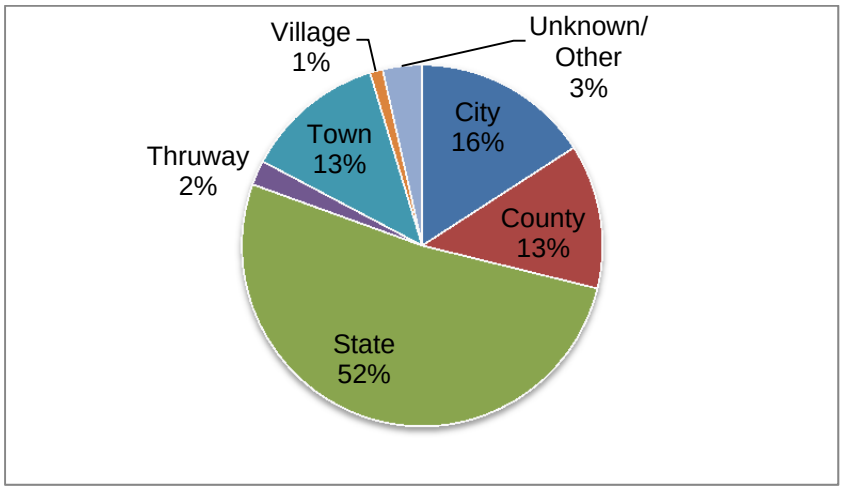
NYSDOT's Safety Program also includes its Safety Appurtenance Program (SAFETAP), Skid Accident Reduction Program (SKARP), and the development and support of crash and roadway data systems to support safety planning and project development. The SAFETAP program proactively integrates safety into maintenance paving projects by implementing simple, low cost treatments such as pavement markings and signs. The SKARP program addresses safety at locations with a history of wet road crashes through the review of Wet Road PILs, testing the friction of the roadway surface and treating those with low friction through resurfacing or microsurfacing.

Finally, NYSDOT's Safety Program Management and Coordination Bureau is responsible for maintaining the safety data systems that NYSDOT, CDTC and local governments rely on. The Accident Location Information System (ALIS) is the primary crash data system supporting many state and local agencies. ALIS allows for spatial analysis of crash data on all public roads, includes location coding of crashes and allows approved users such as CDTC access to the data through a web application. NYSDOT also has two internal systems including the Safety Information Management System (SIMS) for state road network screening and the Post Implementation Evaluation System (PIES) for the evaluation of project outcomes and the development of crash reduction factors.

CDTC Safety Planning Program

Complementing NYSDOT's Safety Program is CDTC's Safety Planning Program. The FAST Act continued to authorize the use of Highway Safety Improvement Program (HSIP) funds on all public roads. This is important to the region as it gives local governments access to safety funding that typically could only be spent on roadways eligible for federal aid, which tend to be higher volume roads owned by the state. Expanding HSIP eligibility to include all public roads is supported by CDTC as 43% of all fatal and serious injury crashes occur on local roads versus 52% on state roads (excluding the NYS Thruway) as shown in Figure 11. AS CDTC found in the development of the Local Road Safety Action Plan, local road crashes are generally not investigated in a systematic manner.

Figure 11: 2011-2018 Fatal and Serious Injury Crashes by Road System



Source: ALIS

One of the largest challenges to local road network screening for CDTC is the overall lack of data. Data gaps include limited traffic volume and roadway characteristic data, the lack of a local road linear referencing system to assign crash locations to, the lack of a local road classification system to categorize similar roadways together for comparison purposes, inconsistent crash data and the lack of statewide average local road crash rates to determine whether a location should be considered a high accident location. These complications were noted in the Local Road Safety Action Plan and by New York State in its Strategic Highway Safety Plan which identified 14 strategies intended to improve the data that safety funding relies so heavily on. A few of the statewide data improvement strategies most relevant to CDTC and local road owners include:

- Integrate the NYSDOT Roadway Information System (RIS) with the Safety Information Management System (SIMS) and ALIS to provide the ability to analyze the local highway system using the similar methods currently used on the state system.
- Create a statewide intersection inventory to help build stronger relationships between crash data and roadway data.
- Improve the integration of NYSDOT data including safety related maintenance work, capital project data, and asset and inventory data.

Despite these challenges, CDTC has built a safety program that continues to mature. On the data analysis side, CDTC staff has assisted communities with the review of their local road crash data through the Local Road Safety Action Plan and has a number of safety programs available to all users of the transportation system and local government members in particular. In additions, with limited staff and data resources available to execute the traditional network screening approach to identify

high accident locations, CDTC has increasingly supported the use of the systemic approach to improving transportation system safety.

CDTC Safety Resources

Capital Coexist

Capital Coexist was launched in 2010 and is CDTC's safety education and awareness program, geared toward pedestrians, bicyclists, and motorists safely coexisting when using the region's roadways. The webpage for the program (www.cdtcmpo.org/capitalcoexist) has safety tips for transportation system users and information about current projects, events, and educational materials. Through Capital Coexist, CDTC sponsors and organizes the annual bike to work event as part of May bike month, hosts Bicycle & Pedestrian Education webinars and funding for local education programs and projects through the Traffic Safety Ambassador mini-grant program launched in 2016.

The Traffic Safety Ambassador Program funds projects that: 1) improve bicycle and pedestrian safety by reducing the number of vehicle crashes involving bicyclists and pedestrians, and 2) increase the number of bicycle and pedestrian trips (especially commuting trips) in the Capital Region. Any local government agency, certified first responder, 501(c)3 non-profit corporation, and private for-profit organization within the CDTC-area is eligible to apply. CDTC solicits for projects annually and has developed a toolkit of resources including a guidebook outlining eligible project types.

Complete Streets

CDTC's Complete Streets program is supported by a Complete Streets Advisory Committee and is detailed in the Complete Streets White Paper. CDTC's approach has been to encourage local governments to adopt Complete Street policies to design and operate local roads for all users of all ages and abilities. A properly designed "Complete Street" improves safety, encourages walking and biking, slows traffic, improves air quality, promotes local business, and encourages social interaction. The Educational & Technical Workshop Series was developed in 2018 to assist local governments with overcoming challenges to developing and implementing Complete Streets policies. The workshops are free and highly interactive, with the goal of building local capacity and strengthening relationships between transportation practitioners, other departments, and the community. Learn more about the workshops on CDTC's Complete Streets workshop series webpage: https://www.cdtcmpo.org/page/207-complete-streets-educational-technical-workshop-series.

Linkage Planning Program

The Community and Transportation Linkage Planning Program (the Linkage Program) was launched in 2000 and has funded a total of 89 collaborative, jointly-funded planning studies working with 40 separate sponsors representing urban, suburban and rural municipalities, counties, not-for-profits and other public entities. Roughly $6.5 million in federal, state and local funds have been committed to date and remains very popular for local governments to access planning funds for corridor studies, subarea studies, bicycle and pedestrian plans and numerous other initiatives that integrate land use and transportation. Transportation safety is a strong consideration in these planning studies and is often noted as a top concern from community members in the study areas. Learn more by visiting the Linkage Program webpage at https://www.cdtcmpo.org/what-we-do/linkage.

Technical Assistance

CDTC's Community Planning Technical Assistance Program was launched in 2018 as a joint program with the Capital District Regional Planning Commission (CDRPC) to provide staff assistance to local governments for small scale community planning initiatives that resonate with the principles of New Visions 2040. Among the eligible initiatives are data collection, analysis and mapping, comprehensive/neighborhood planning, community design assessments for public safety and general community planning activities. Small scale crash data reviews, road safety audits and other safety evaluations are also eligible. CDTC and CDRPC select projects through an annual solicitation. Visit CDTC's Technical Assistance program webpage to learn more: www.cdtcmpo.org/techassist.

ROSAC

CDTC's Regional Operations and Safety Advisory Committee (ROSAC) is the primary forum to discuss regional safety planning, safety programs and safety projects. ROSAC members include staff from state and regional agencies including NYSDOT and the New York State Police, local government members including counties, cities, towns and villages and other safety stakeholders. The group meets regularly and served as the technical advisory committee in the development of CDTC's Local Road Safety Action Plan. CDTC has several other advisory committees in which safety is a major topic of conversation including the Bicycle and Pedestrian Advisory Committee and the Complete Streets Advisory Committee. White papers in development by these and other advisory committees are expected to discuss the issue of transportation safety.

NYSAMPO Safety Working Group

The NYSAMPO established a Safety Working Group (SWG) in 2005 to increase safety planning coordination, collaboration and cooperation in New York State. SWG has developed many safety resources including Safety Assessment Guidelines which outline a process, similar to the FHWA Road Safety Audits, to improve safety on all types of local transportation facilities. Safety Assessments tailor the Road Safety Audit process to the local context in New York State.

SWG also developed educational fact sheets to provide information to local governments and other safety partners on topics including: Statewide Safety Plans, Bicycle and Pedestrian Laws, Designing Intersections to Accommodate All Users, Timing Traffic Signals to Accommodate Pedestrians, Complete Streets, and Complete Streets 2.0. The fact sheets provide information on best practices and resources and are available on the NYSAMPO Safety Working Group webpage at www.nysmpos.org.

SWG also partnered with FHWA and NYSDOT to bring a Local Road Safety Peer Exchange in 2018. The peer exchange brought together practitioners from various agencies in New York to learn more about the State of the Highway Safety Improvement Program (HSIP) and local safety planning in New York, as well as local safety efforts in Michigan and New Jersey. The event concluded with breakout discussions to identify gaps, challenges and opportunities to advance local road safety efforts in New York. Some of the suggested actions include update the state HSIP process, encourage enforcement training, building partnerships with local governments, provide more funding to local governments based on crash data and develop local road safety plans.

Additional Safety Programs and Resources

There are numerous safety programs and resources in New York State. The following section identifies key partners and resources CDTC utilizes in delivering its safety planning program.

Governor's Traffic Safety Committee (GTSC)

GTSC is the designated New York State Highway Safety Office, an interagency committee tasked with managing the state's Highway Safety Program. GTSC implements federal grant programs to address behavioral highway safety issues and develops the Highway Safety Strategic Plan. The staff supports the committee by handling administration of federal grant programs and implementing and coordinating safety programs that are critical in New York State. These programs include but are not limited to STOP-DWI, occupant restraint, pedestrian and wheel sport safety, all areas of safe driver behavior, police traffic enforcement and traffic records management. GTSC has been a leader in New York State with the implementation of the Pedestrian Safety Action Plan recommendations focused on law enforcement.

New York State Department of Health (DOH)

The NYSDOH website states that "Motor vehicle traffic injuries are a major public health problem. They are the leading cause of injury related death, second leading cause of injury related hospitalizations, and third leading cause for injury related emergency department visits in New York State. On average, three New Yorkers die every day due to a traffic-related crash." The NYSDOH is addressing this problem in cooperation with NYSDOT and the GTSC by providing educational materials for all roadway users and coordinating education efforts associated with the SHSP. Complete streets and the safety of pedestrians and bicyclists have been major program focal points and the NYSDOH has led the development and implementation of the pedestrian safety awareness campaign See! Be Seen! identified as a need in the state's Pedestrian Safety Action Plan.

FHWA Proven Safety Countermeasures

FHWA promotes certain infrastructure-oriented safety treatments and strategies, chosen based on proven effectiveness and benefits, to encourage widespread implementation by State, and local transportation agencies to reduce serious injuries and fatalities. This list of 20 Proven Safety Countermeasures includes treatments and strategies that have successfully addressed roadway departure, intersection, and pedestrian and bicycle crashes on local and state-maintained roadways. Fact sheets for each of the 20 countermeasures are included on the FHWA Proven Safety Countermeasures website https://safety.fhwa.dot.gov/provencountermeasures/. The 20 Countermeasures are:

1. Roadside Design Improvement at Curves
2. Reduced Left-Turn Conflict Intersections
3. Systemic Application of Multiple Low Cost Countermeasures at Stop-Controlled Intersections
4. Leading Pedestrian Interval
5. Local Road Safety Plan
6. USLIMITS2 (a free, web-based tool designed to assist with assessing and establishing speed limits for specific segments of roadway)
7. Enhanced Delineation and Friction for Horizontal Curves
8. Longitudinal Rumble Strips and Stripes on Two-Lane Roads
9. Median Barrier

10. Safety EdgeSM (eliminates the vertical drop-off at the pavement edge
11. Traffic Signal Backplates with Retroreflective Borders
12. Corridor Access Management
13. Dedicated Left- and Right-Turn Lanes at Intersections
14. Roundabouts
15. Yellow Change Intervals (appropriately timed yellow phase at signalized intersections)
16. Medians and Pedestrian Crossing Islands in Urban and Suburban Areas
17. Pedestrian Hybrid Beacon
18. Road Diet
19. Walkways
20. Road Safety Audit

Cornell Local Roads Program

The Cornell Local Roads Program is the designated Local Technical Assistance Program (LTAP) Center for New York State. It provides training, technical assistance, and information to municipal officials and employees responsible for the maintenance, construction, and management of local highways and bridges. Local road safety is a major emphasis area of their work.
https://www.clrp.cornell.edu/

5. CDTC Security Planning

Since the events of September 11, 2001, the role of MPOs in security planning has been expanding. The FAST Act has security as part of one of the planning factors for CDTC to address in regional planning. CDTC and its member agencies have undertaken several initiatives since New Visions 2040 was adopted to support regional security planning.

Energy Security

CDTC hosted a Resiliency workshop in November 2018 that focused on the National Association of State Energy Official's (NASEO) Initiative for Resiliency in Energy through Vehicles (iREV). iREV brings together a unique cross-section of practitioners in emergency management, energy assurance, homeland security, and transportation to support the incorporation of alternative fuel vehicles in emergency response and preparedness operations. iREV's resources and technical assistance aid emergency management entities in examining the potential costs, benefits, and interdependencies associated with diversifying their fleets, reducing dependence on petroleum, and investing in electric, natural gas, propane, and biodiesel vehicles and infrastructure in support of energy security.

The iREV tracking tool combines data from the Alternative Fuels Data Center (AFDC), on-the-ground fleet and infrastructure information relayed through Clean Cities Coalitions, which CDTC coordinates for the region, and disaster readiness tools being used at the national level to support critical infrastructure and homeland security. The tool helps emergency planning entities understand the various alternative fuel vehicles and infrastructure assets and options at their disposal, and optimize their planning and investment based on their specific fuel supply, geography, and risk profile. The workshop held by CDTC reviewed the iREV tool offered information to emergency management agencies on integrating the iREV resources into their emergency management plans and encouraged them to request a login for the iREV tool.

Local Emergency Planning Committees

CDTC established working relationships with county level Local Emergency Planning Committees to offer traffic simulation of regional travel patterns in the event of major transportation system emergencies such as the closure of an interstate or a major bridge. CDTC's STEP Model provides traffic simulation data that can be used to review various scenarios and establish procedures and processes should major events occur. This information is helpful for evacuation route planning during terrorist attacks and detours as a result of road or bridge closures from catastrophic flooding, major traffic incidents, power outages, etc.

County Security Related Plans

Each of the four counties in the region has some form of emergency management plan. The plans are routinely updated and focus on different types of emergencies and county procedures to respond to these emergencies. These plans are typically developed through a team of local government officials, the New York State Emergency Management Office staff and emergency services providers and support the statewide emergency management program. County plans include the Albany County Comprehensive Emergency Management Plan (2015), the Schenectady County Hazard Mitigation Plan (2016), the Draft Rensselaer County Hazard Mitigation Plan (draft as of October 2019), the Saratoga County Comprehensive Emergency Management Plan and the Saratoga County Hazard Mitigation Plan (2019). CDTC has made its resources available to the entities responsible for the development of these plans in the event more detailed transportation system analysis is required.

StormReady Communities

Albany, Saratoga and Schenectady counties as well as the Town of Bethlehem and the City of Cohoes have been designated as StormReady Communities. Storm Ready is an official program of the National Weather Service which allows communities to apply for the designation if they meet the following criteria:

- Establish a 24-hour warning point and emergency operations center
- Have more than one way to receive severe weather warnings and forecasts and to alert the public
- Create a system that monitors weather conditions locally
- Promote the importance of public readiness through community seminars
- Develop a formal hazardous weather plan, which includes training severe weather spotters and holding emergency exercises.

6. Regional Crash History and Trends

CDTC reviewed the region's crash data to identify trends and common factors in crashes. Data analysis is the backbone of performance-based planning and programming and this effort has confirmed the regional safety priorities to be Intersection, Road User Behavior, Age Related (younger and older drivers), Vulnerable User (pedestrians, bicyclists and motorcyclists), Lane Departure and Speed Related crashes. These emphasis areas will be considered in the data reviewed in this white paper and in future CDTC data analyses for safety.

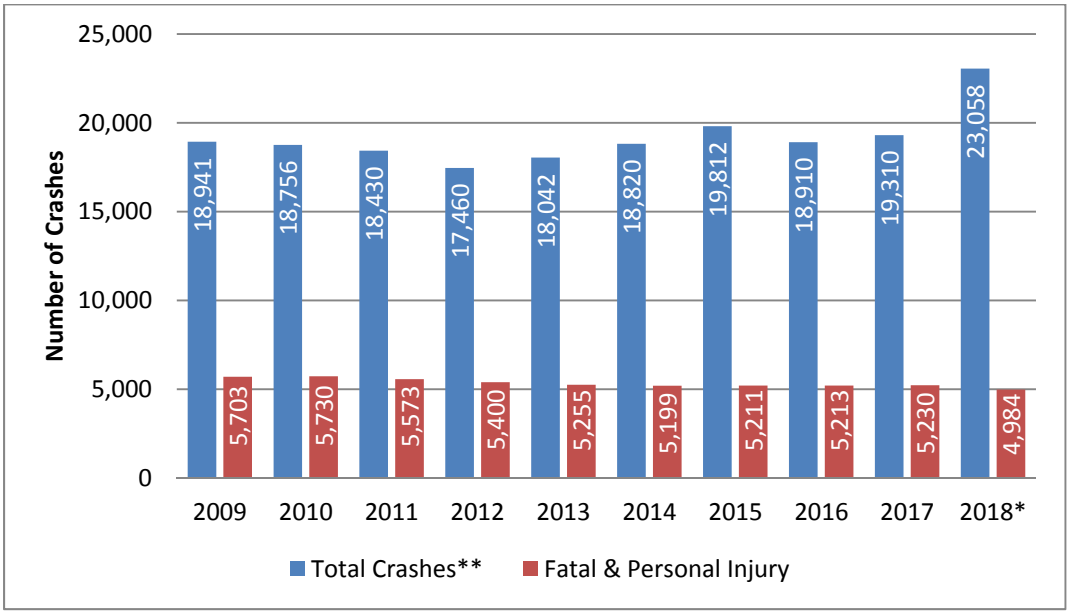
Data sources include the Institute for Traffic Safety Management and Research's (ITSMR) Traffic Safety Statistical Repository (TSSR), the New York State Department of Transportation's (NYSDOT)

Accident Location Information System (ALIS) and the National Highway Traffic Safety Administration's (NHTSA) Fatality Analysis and Reporting System (FARS). This chapter presents a brief summary of regional crash data, highlighting key facts and crash types that may be overrepresented in the data. More comprehensive reviews of crash data are available in CDTC's Local Road Safety Action Plan, the NYSDOT Strategic Highway Safety Plan and the NYS Pedestrian Safety Action Plan and other safety plans discussed in Chapter 4.

Fatal and personal injury crashes have declined but flattened out.
CDTC's region has seen the total number of crashes, defined as all police reported fatal, personal injury and property damage crashes, vary over time. Between 2015 and 2017, fatal and personal injury crashes increased while in 2018 these types of crashes have declined as shown in Figure 12. While the data also shows a large increase in total crashes in 2018, that data is skewed by a change in the crash report form used by law enforcement, resulting in a significant increase in the number of property damage crashes being reported. This additional data could provide planners and engineers with more information on the number of crashes occurring, their locations and potential causes. Looking only at the most serious injury and fatal crashes, serious injury crashes increased between 2014 and 2017 until 2018 when they declined as shown in Figure 13.

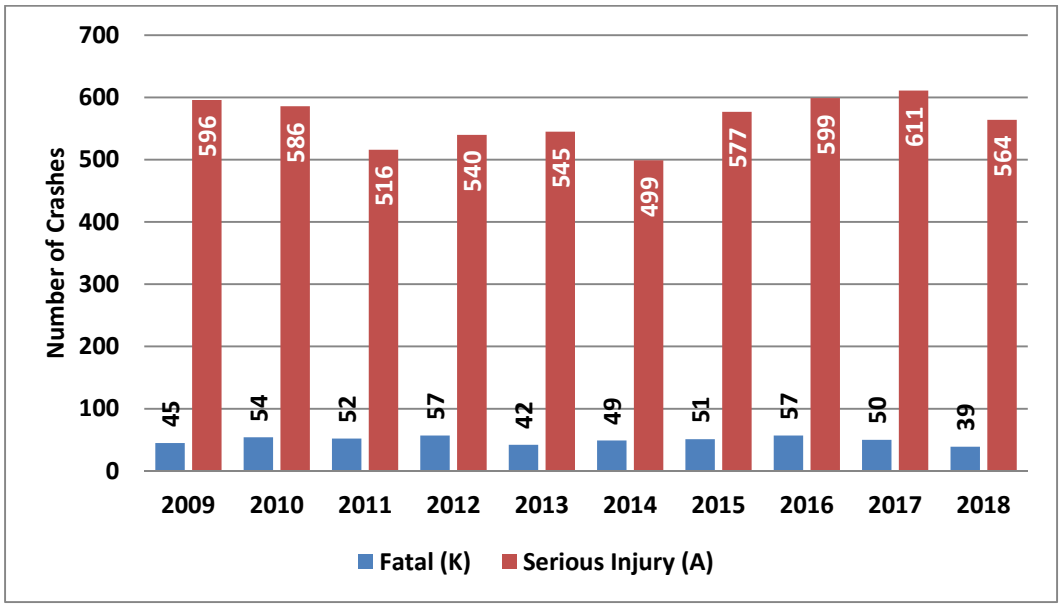
Fatalities can happen anywhere. Figure 14 shows the geographic distribution of fatal crashes in the region. Although some high volume traffic corridors can be observed, fatalities are random in nature and can happen anywhere at any time.

Figure 12: Regional Crash Data by Year



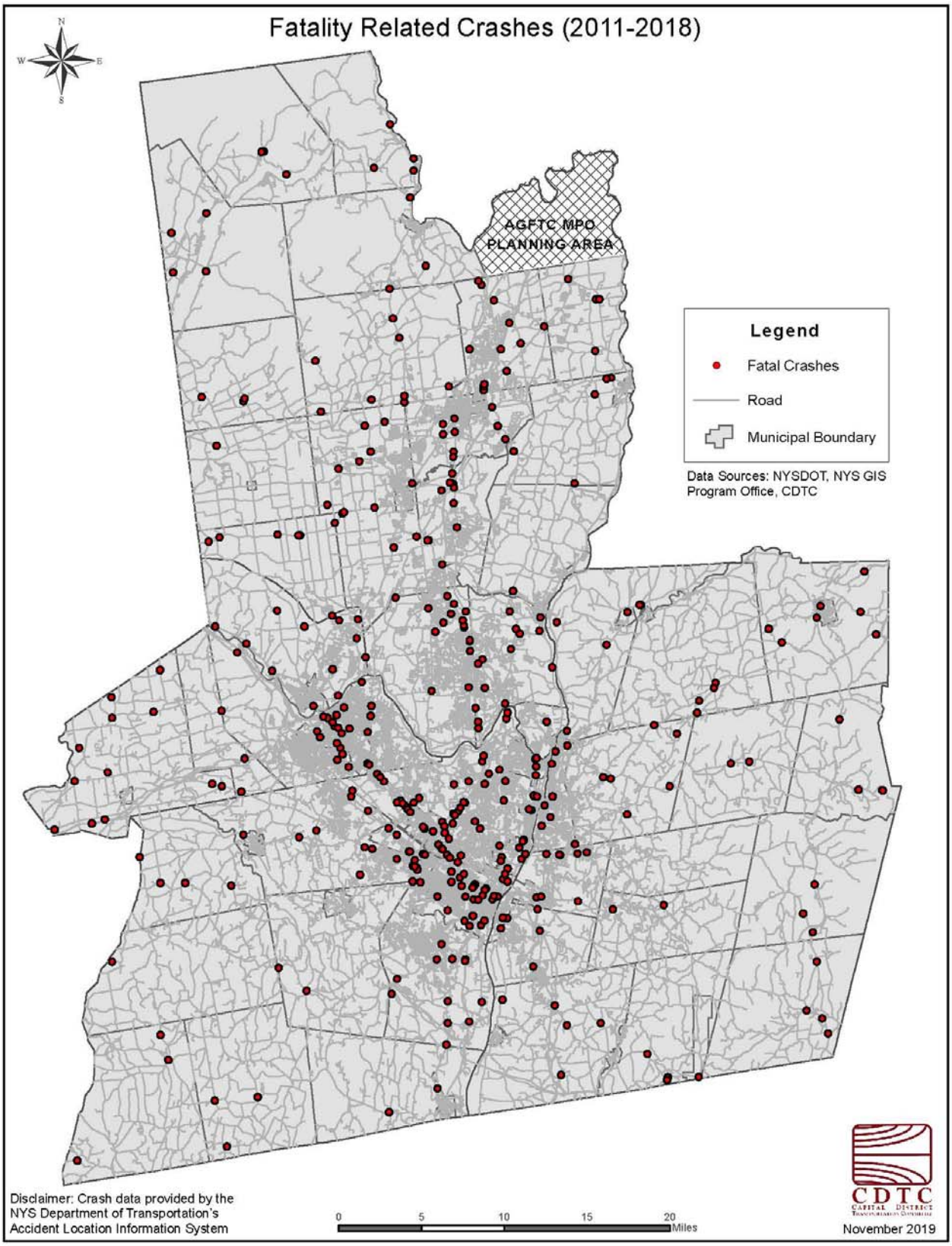
Data Source: ITSMR TSSR.
**Recent changes to the Police Crash Report form regarding reporting property damage crashes significantly increased property damage crashes in 2018, compared to previous years.*
***Total crashes are police reported fatal, personal injury and property damage crashes.*

Figure 13: Fatal and Serious Injury Crashes by Year



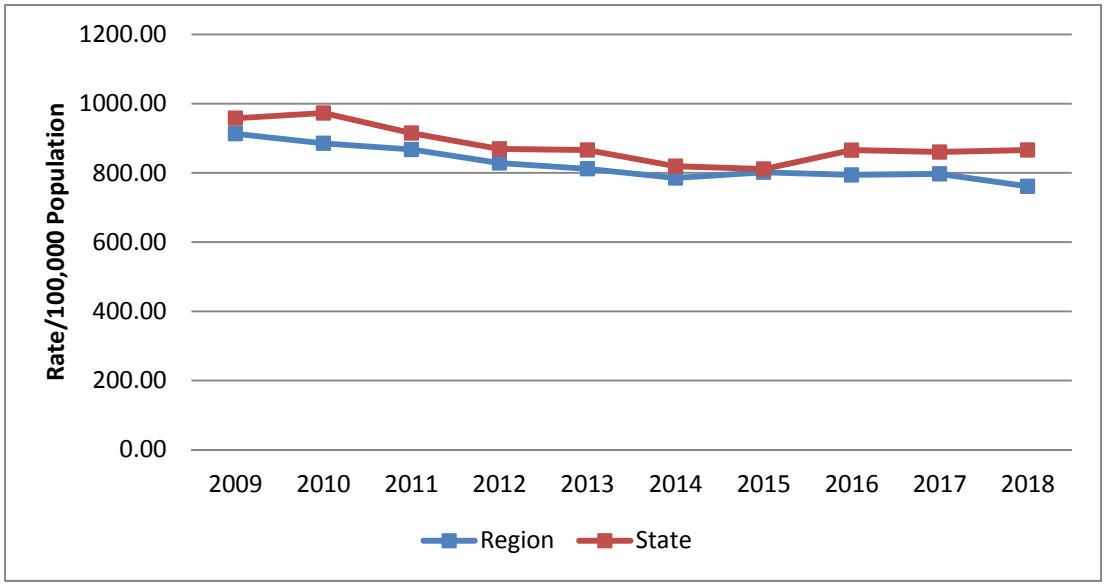
Data Source: ITSMR TSSR

Figure 14: Fatality Related Crashes



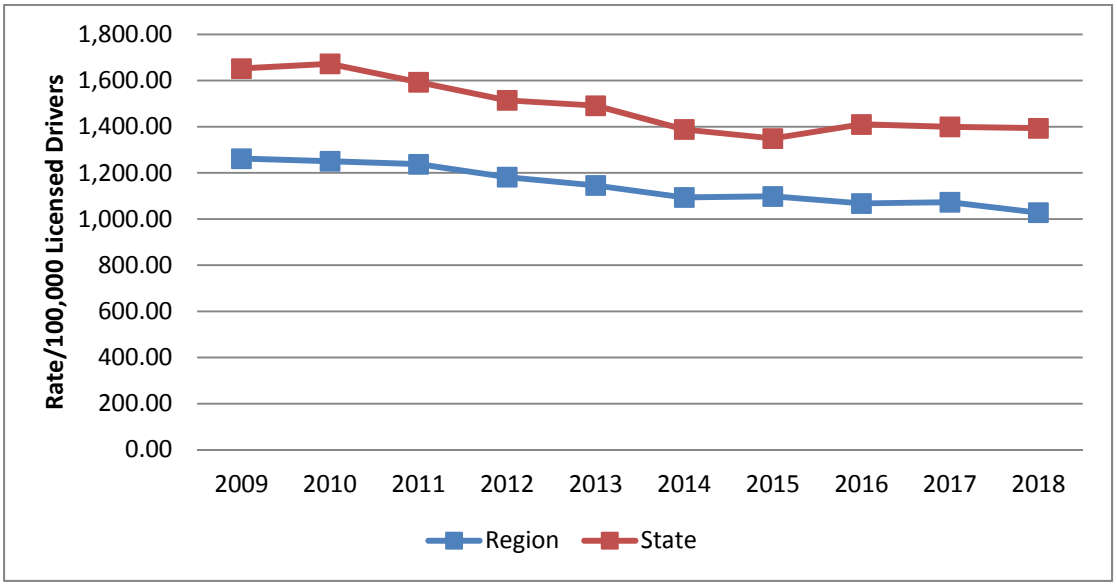
Death and injury rates have declined. The regional death and injury rate by 100,000 in population (Figure 15) and by 100,000 licensed drivers (Figure 16) was compared to the state rates from 2011 to 2018. In both cases, the regional rates showed a downward trend over time and were lower overall than the state rates. The gap between the state and regional rates was larger per licensed driver than the per capita rate which showed the region closely mirroring the state over time, with the gap between the two increasing in 2018.

Figure 15: Death and Injury Rate/100,000 Population



Source: ITSMR TSSR

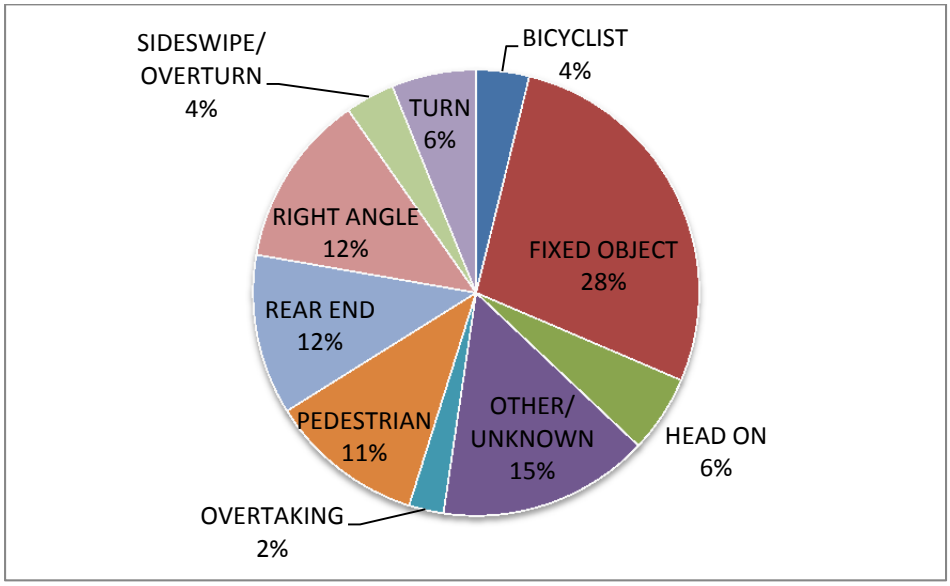
Figure 16: Death and Injury Rate/100,000 Licensed Drivers



Source: ITSMR TSSR

Fixed object (lane departure) is the most common fatal and serious injury crash type. Fixed object crashes are the result of one vehicle striking a fixed or other object on or off the roadway and account for 28% of fatal and serious injury crashes in the region (Figure 17). Fixed object crashes include a wide range of lane departure crashes with the three most common being collisions with trees, earth elements/rock cuts/ditches and guiderail.

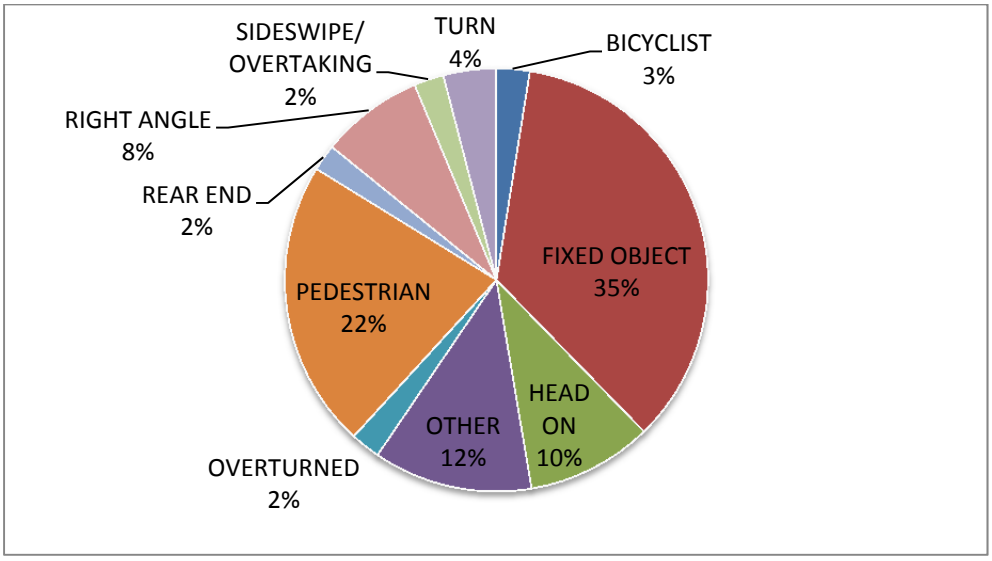
Figure 17: Fatal and Serious Injury Crash Types (2011-2018)



Source: ALIS

The most common fatal crash types are pedestrian and fixed object (lane departure). Pedestrian and fixed object crashes account for approximately 57% of the region's fatal crashes (Figure 18). A pedestrian crash results when the first harmful event is any impact between a motor vehicle in traffic and a pedestrian. It does not include crashes where a pedestrian is injured after the initial vehicle impact. Pedestrian crashes are more likely to be fatal as they are the most vulnerable roadway user.

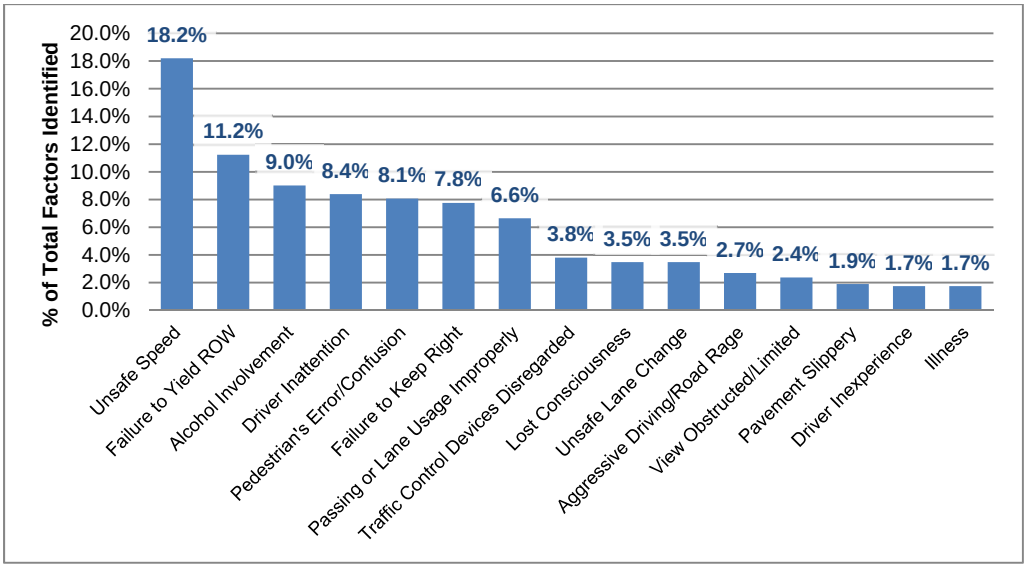
Figure 18: Fatal Crash Types (2011-2018)



Source: ALIS

Unsafe speed is the most cited factor in fatal crash police reports. Crash reports in New York allow for up to two contributing factors to be noted for each "vehicle" involved in a crash. The vehicle can be the motor vehicle itself, the pedestrian, the bicyclist, etc. Data was reviewed for contributing factors noted for fatal crashes between 2011 and 2018 as shown in Figure 19. While the data evaluated was only based on police reports in which the box was checked for factors such as unsafe speed or alcohol involvement, the most commonly cited factor was unsafe speed.

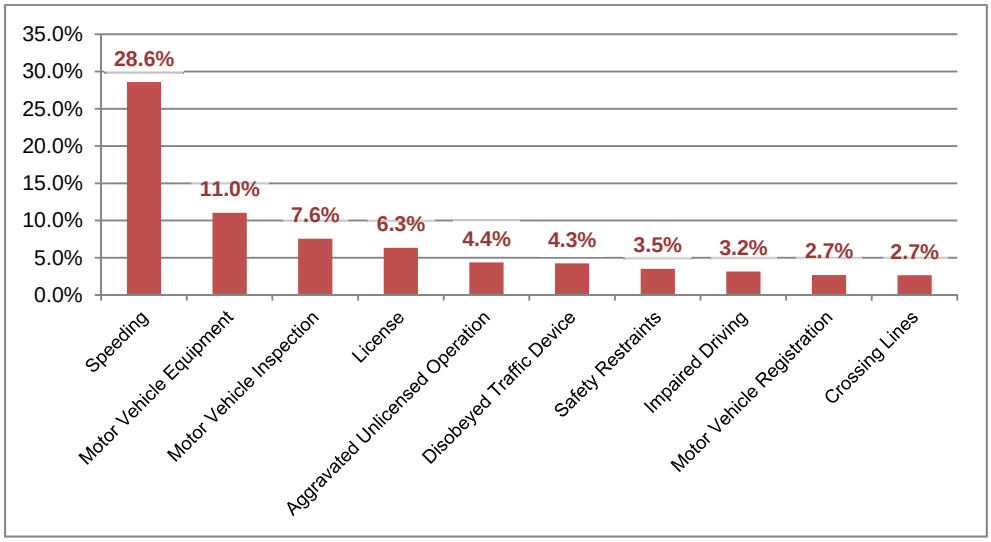
Figure 19: Police Reported Contributing Factors to Fatal Crashes (2011-2018)



Data Source: ITSMR TSSR

Speeding tickets are common. Ticket data was reviewed to highlight the most common types of tickets issued to motorists in the region. The data reflects tickets issued to motorists for violations of the state's Vehicle & Traffic Law. In 2018, over 170,000 tickets were issued to motorists with speeding representing 28.6% or nearly 50,000 of those tickets. Although only 2018 data was provided (see Figure 20), the top 10 violations have remained consistent over the last five years.

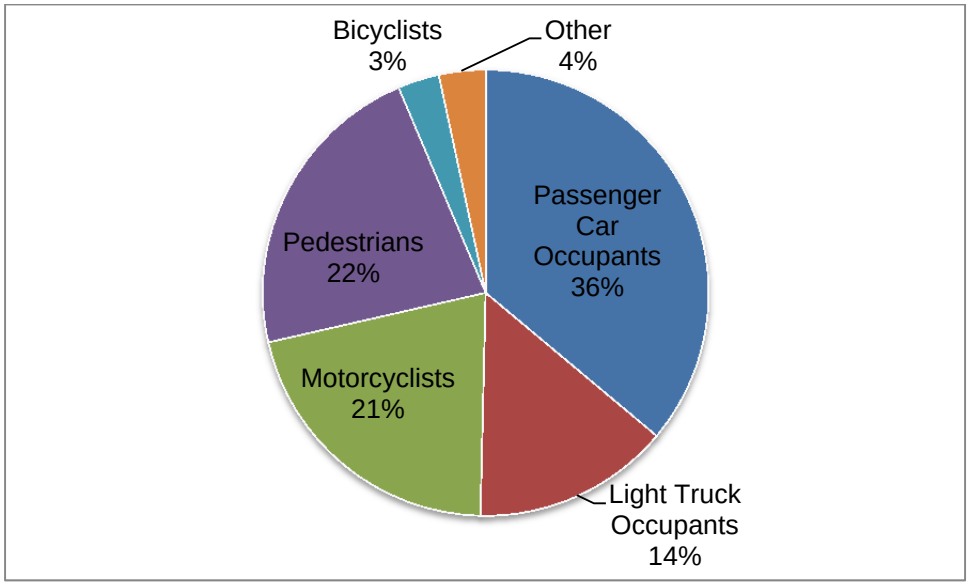
Figure 20: Top 10 Tickets Issued in 2018



Data Source: ITSMR TSSR

Vulnerable users are at greater risk. A review of who is being killed in motor vehicle crashes revealed that 22% of fatalities are pedestrians, 21% are motorcycle drivers and 3% are bicyclists, representing 46% of all fatalities between 2014 and 2018 (Figure 21). Passenger car and light truck fatalities represent 50% of all fatalities in the region. These vulnerable roadway users are at greatest risk of being killed on the roadway particularly where motor vehicle speeds are higher.

Figure 21: Fatalities by Person/Crash Type (2014-2018)



Source: NHTSA FARS

Pedestrian and bicycle crashes are far more common in urban areas, especially cities. The geographic distribution of pedestrian related crashes shown in Figure 22 indicates that the Cities of Albany, Rensselaer and Troy have higher concentrations of pedestrian crashes. Several other areas of the region, typically characterized as having concentrated development or land uses that generate pedestrian activity, are also experiencing pedestrian crashes.

As with pedestrians, the geographic distribution of bicycle related crashes as shown in Figure 23 indicates that the same concentration of bicycle crashes in the three largest cities. The maps provide some clear information on where some crashes for some of the region's most vulnerable road users are occurring, indicating the need for special attention to these crash types in these areas.

Pedestrian crashes and sidewalks may be loosely correlated on local, low volume roads. Most of the pedestrian crashes are located on major roadways with higher traffic volumes and higher crash volumes which can also be said for where sidewalks are located. However, there may be a correlation between pedestrian crashes on local, low volume roads without sidewalks which seems to be true in urban, suburban and rural areas (Figure 24). Far more analysis will need to be undertaken to confirm this but 60% of crashes indicating the pedestrian was along highway against traffic did not have a sidewalk. This percentage was much higher (closer to 80%) for pedestrian along highway with traffic but no or partial sidewalks. Additional data related to the presence of crosswalks would need to be collected to confirm a more specific relationship of pedestrians crossing at intersections or midblock.

Figure 22: Geographic Distribution of Pedestrian Related Crashes (2011-2018)

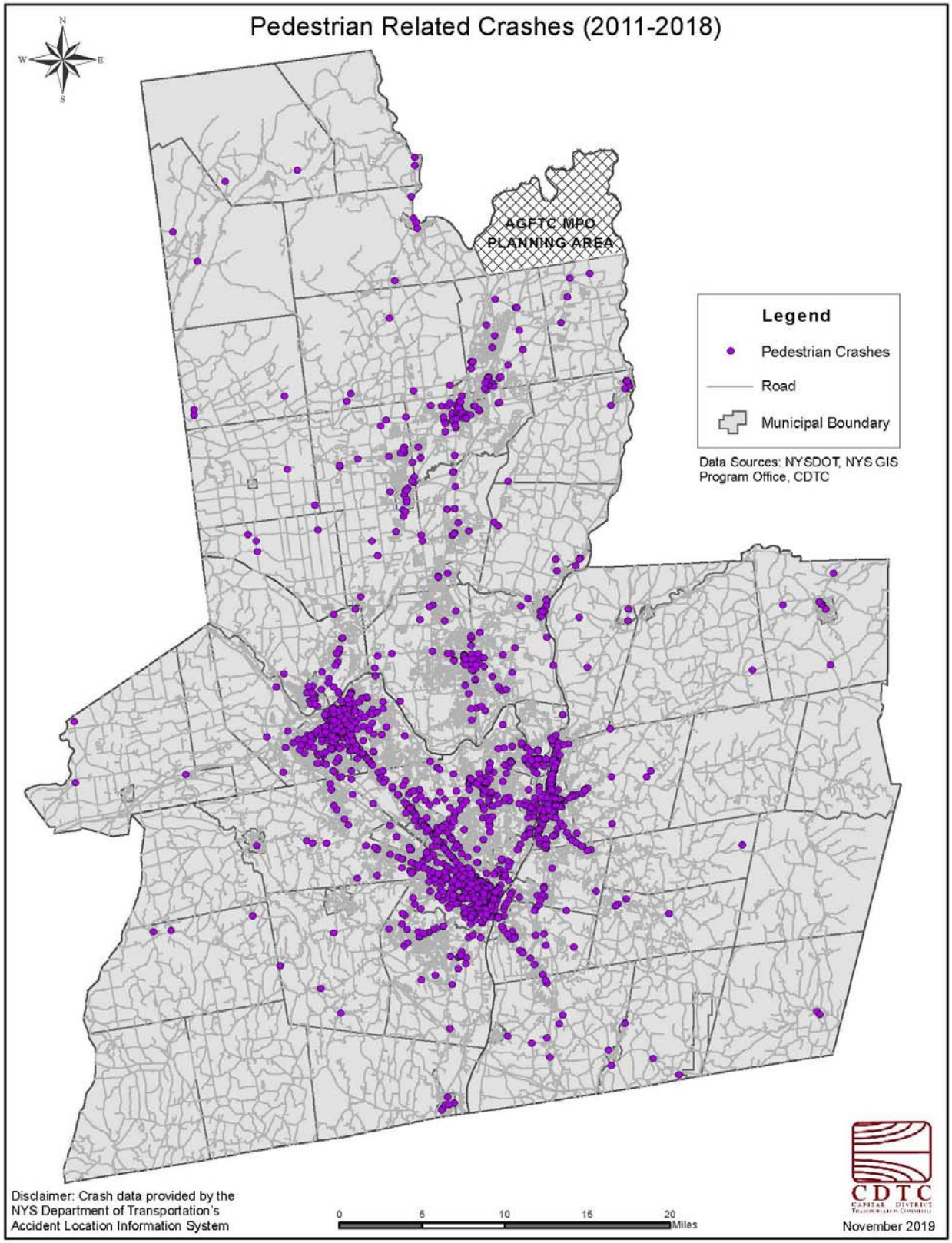


Figure 23: Pedestrian Related Crashes (2011-2018) Relative to Sidewalk Presence

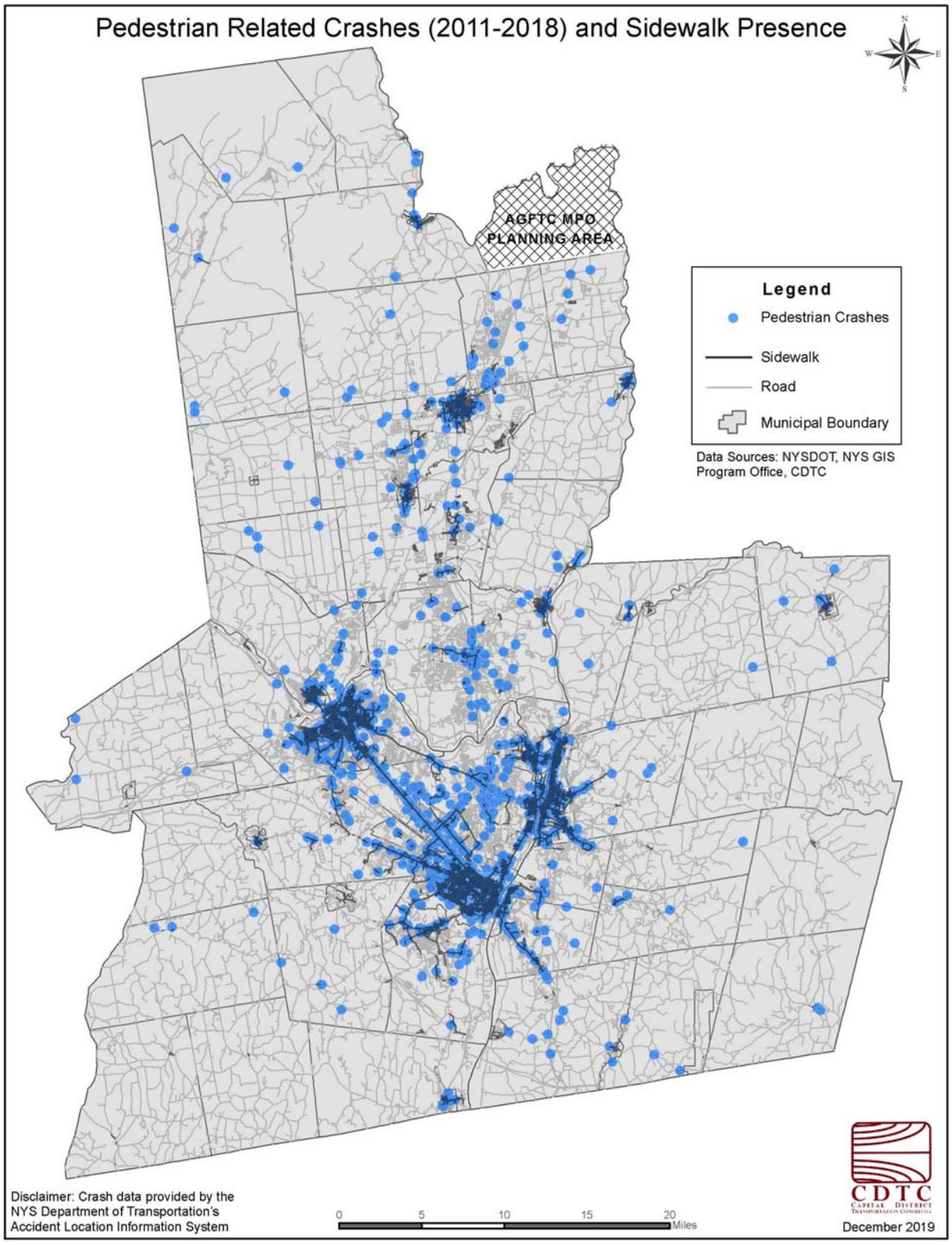
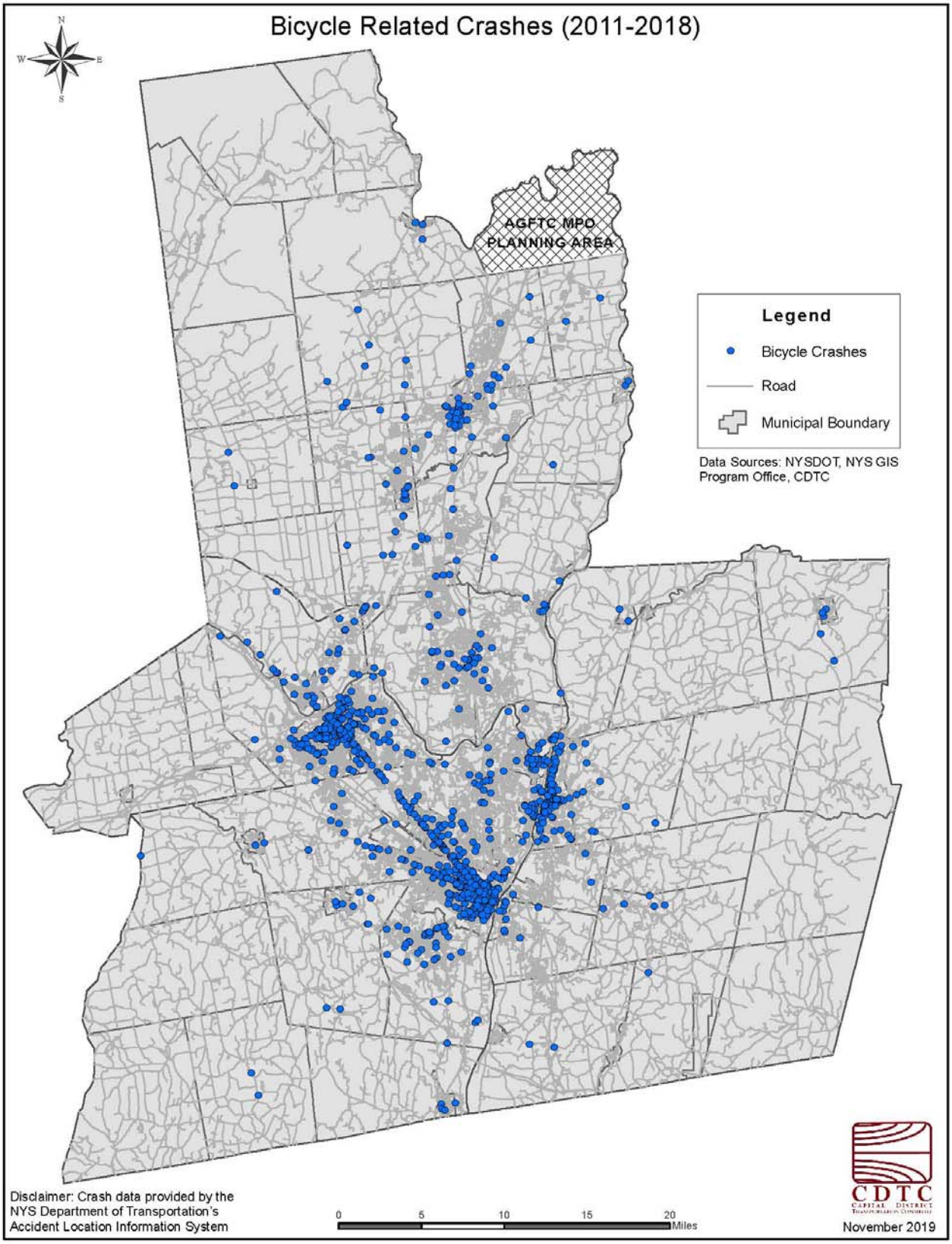


Figure 24: Geographic Distribution of Bicycle Related Crashes (2011-2018)



Younger pedestrians and young male bicyclists are at even greater risk. A review of pedestrian and bicyclist age indicates that the younger age ranges of 10-19 and 20-29 are at higher risk of a fatal or personal injury crash (See Table 7). This risk is significantly higher for male bicyclists as 85% of the bicyclists involved in these crashes were identified as male (Table 8). National research has found women's rates of bicycle use to be less than men's as women feel less comfortable cycling in mixed traffic environments where there is greater risk[1]. Small vehicles such as scooters, etc. are also generally used more frequently by young men than women.

Table 7: Pedestrian and Bicyclist Age in Fatal and Personal Injury Crashes

Age Range	Number of Pedestrians	% of Total	Number of Bicyclists	% of Total
0-9	199	6.6%	53	4.2%
10-19	509	16.9%	444	35.4%
20-29	682	22.6%	251	20.0%
30-39	400	13.3%	115	9.2%
40-49	366	12.1%	134	10.7%
50-59	408	13.5%	153	12.2%
60-69	266	8.8%	84	6.7%
70-79	127	4.2%	22	1.8%
80+	60	2.0%	0	0.0%

Source: ITSMR TSSR

Table 8: Sex of Pedestrians and Bicyclists in Fatal and Personal Injury Crashes

Sex	Number of Pedestrians	% of Total	Number of Bicyclists	% of Total
Female	1,466	47.7%	190	14.9%
Male	1,596	51.9%	1,085	85.0%
Unknown	13	0.4%	1	0.1%

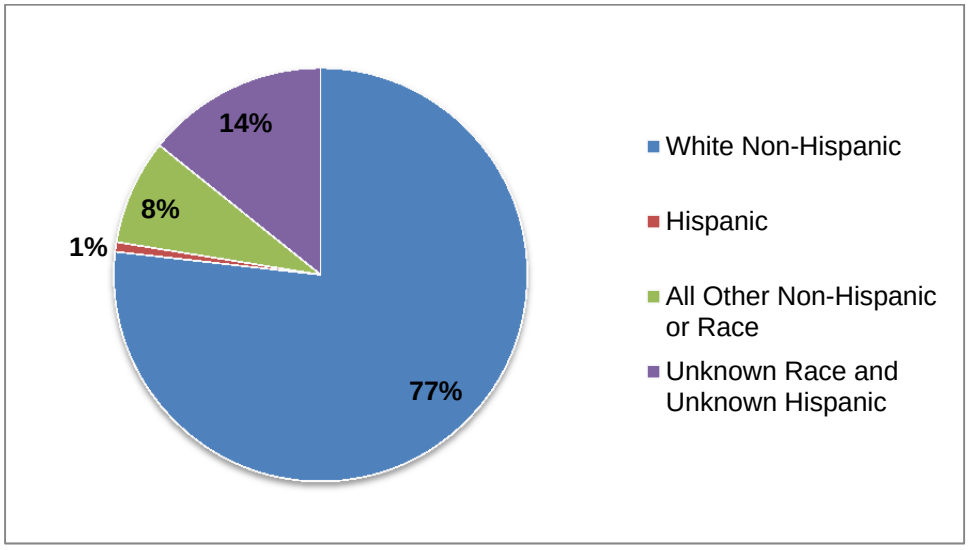
Non-Hispanic, Non-White individuals are at greater risk as pedestrians and bicyclists. Fatality data was reviewed between 2013 and 2017 for race/hispanic origin. While there was a high percent of unknown race and unknown hispanic origin in this data, 9% of all fatalities involved someone who was non-white, non-hispanic while the overwhelming majority of fatalities (77%) were white, non-hispanic (Figure 25). However, when the data was further reviewed based on vehicle occupants versus non-occupants (bicyclists and pedestrians), 15% of all fatalities involved someone who was non-white, non-hispanic while 67% were white, non-hispanic (Figure 26). Crash data for personal injury crashes by race/hispanic origin is not available.

Pedestrian and bicycle crashes occur in areas with higher densities of minorities and low income people. Figure 27 illustrates the relationship between where pedestrian crashes are occurring and where the region has a higher density of minorities. This relationship exists with bicycle crashes as well. There is a higher density of minorities in the region's three largest cities which correlates closely with the concentration of bicycle and pedestrian crashes in these areas. The highest densities of low income persons are also concentrated in the three cities where the larger numbers of pedestrian and bicycle crashes occur. For those with limited english proficiency, the

[1] Krizek, Kevin J., and Nancy McGuckin. 2019. "Shedding NHTS Light on the Use of 'Little Vehicles' in Urban Areas." Transport Findings, November.

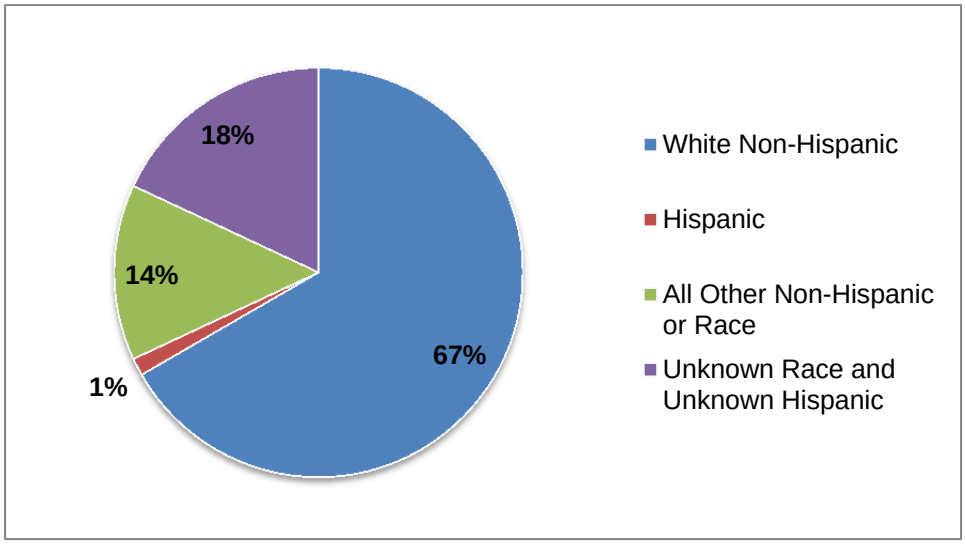
higher density populations are more prevalent in suburban locations where there are less pedestrian and bicycle crashes occuring overall.

Figure 25: All Fatalities by Race/Hispanic Origin (2013-2017)



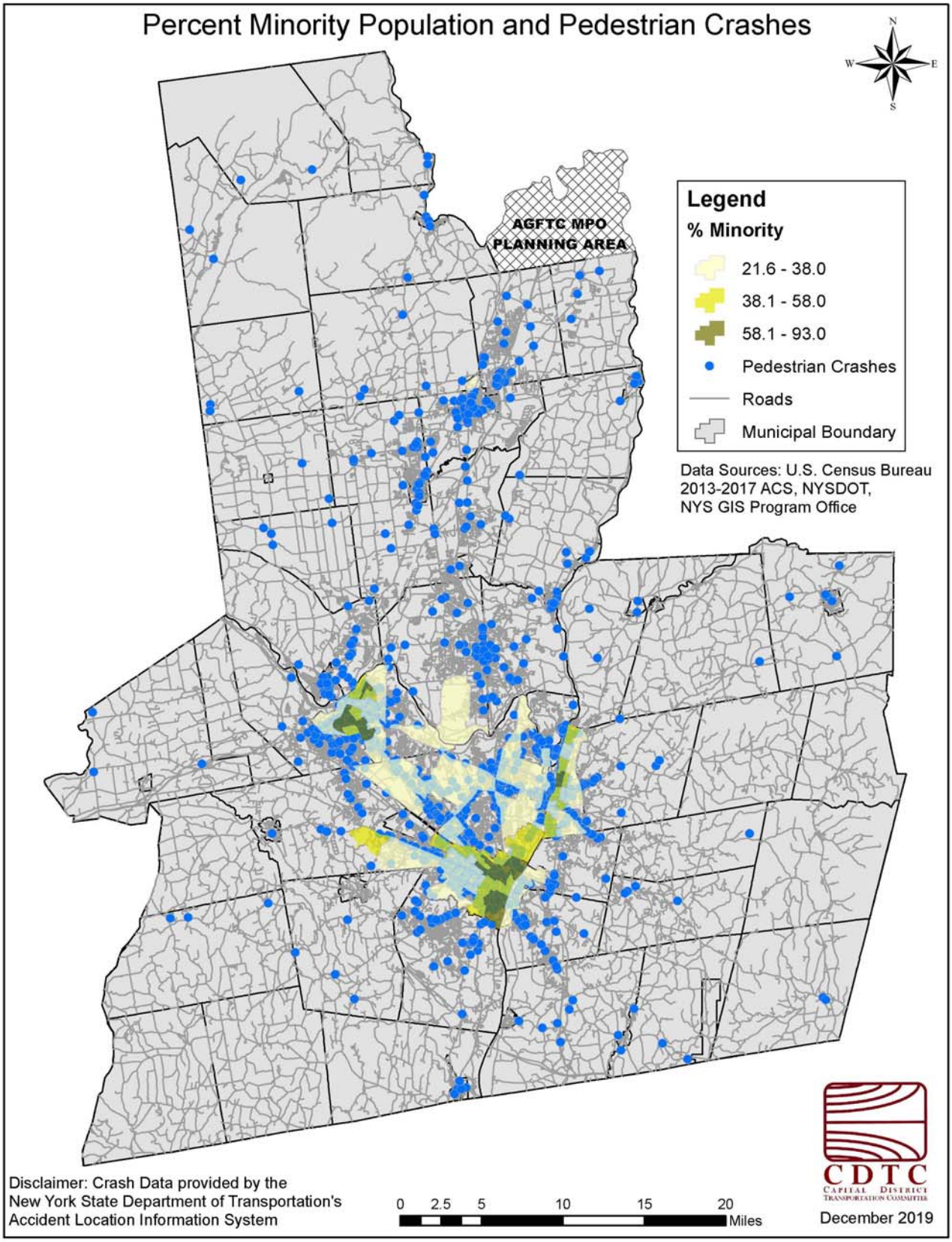
Source: NHTSA FARS

Figure 26: Pedestrian and Bicyclist Fatalities by Race/Hispanic Origin (2013-2017)



Source: NHTSA FARS

Figure 27: Concentration of Pedestrian Crashes and Minority Population



7. Capital Project Funding

The FAST Act requires CDTC to link its investment of federal transportation funds into projects and programs that support the achievement of safety performance targets. CDTC's Transportation Improvement Program identifies federally funded transportation projects, all of which have in some way considered safety in their development. For some projects, addressing a high crash location is the primary purpose while others may be proactively implementing low cost safety countermeasures to reduce crash risk. This section primarily focuses on federal funding available through the Highway Safety Improvement Program however there are many other resources being poured into not only engineering strategies at all levels of government but into education and enforcement initiatives that work together to keep the transportation system safe and secure.

Highway Safety Improvement Program (HSIP)

The HSIP is a core Federal-aid program with the purpose of achieving a significant reduction in fatalities and serious injuries on all public roads. HSIP funds are dedicated to safety projects with a small portion of funding reserved for the state's Railway-Highway Crossings Program. NYSDOT generally allocates HSIP funds to projects based on the SHSP emphasis areas. The NYSDOT Main Office administers 50% of the funding for statewide safety programs while the remaining 50% is provided to NYSDOT's regions through a formula based on crashes, miles of roadway and population. CDTC works with NYSDOT, CDTC's member agencies and the region's communities to evaluate and program HSIP projects on the Transportation Improvement Program (TIP).

The FAST Act specifies that projects funded through the HSIP be data driven, be consistent with the state SHSP and correct or improve a hazardous road location or address a highway problem (i.e. driver behavior). For its part, NYSDOT undertakes a data driven network screening process to identify sections of the State Highway System where the roadway displays unusual crash experience or exhibits risk factors for specific crash types. Each year the NYSDOT regions perform highway safety investigations and recommend safety improvements on state roadway sections that are investigated through an Annual Regional Work Program (ARWP). NYSDOT's HSIP program guidance prioritizes the use of HSIP funds on the following categories of projects:

- New York State identified high crash locations on state owned roads.
- Systemic treatments focused on pedestrian improvements at uncontrolled crosswalks or signalized intersections.
- Systemic treatments to reduce lane departure crashes through centerline and shoulder rumble strips (any roadway).
- New York State identified special high crash locations such as wet road or other overrepresented crash types.
- Other regionally identified safety need locations including those off the state highway system.

States are required to report annually on the progress being made to implement the HSIP. The HSIP report summarizes State progress in implementing HSIP projects, progress in achieving safety outcomes and performance targets and the effectiveness of the improvements.

The NYSDOT Main Office allocation of HSIP funds are primarily used to support local road safety projects and the development of Strategic Highway Safety Plan Action Plans such as the Pedestrian Safety Action Plan. In the last five years, NYSDOT has issued two statewide calls for local safety projects. In 2015, NYSDOT issued a Statewide Safety Project solicitation for all public roads (both state and local projects), reserving approximately $90-$100 million in HSIP funds for projects. Five projects in CDTC's region were funded through this solicitation: NYSDOT CARDS (centerline audible

roadway delineators a/k/a rumble strips), Lark/Washington Safety Improvements (CDTA sponsored) and Madison Avenue Road Diet in the City of Albany, Brandywine Avenue Safety Improvements in the City of Schenectady and Safety Widening on Carman Road in the Town of Guilderland.

Pedestrian Safety Action Plan (PSAP) Implementation

To implement the New York State PSAP, NYSDOT set-aside approximately $110 million in statewide HSIP funds for pedestrian safety engineering projects. The Pedestrian safety program was larger than just the engineering portion as funds were set aside through other sources to finance programs through the Governor's Traffic Safety Committee (enforcement) and the New York State Department of Health (education). The engineering projects funded through this program were designed to increase conspicuity of crossings and encourage drivers to yield.

NYSDOT committed to the investigation and treatment of high crash locations for pedestrians as well as low cost systemic improvements at roughly 2,400 signalized intersection and roughly 1,350 uncontrolled/midblock crosswalks on the state system in urban areas outside of New York City. Approximately $40 million was also targeted to local government PSAP projects since only 24% of the pedestrian crashes occur on New York state owned roads. State roads comprise 14% of the public road mileage in New York. Within NYSDOT Region 1 as of September 2019, 130 uncontrolled and 489 signalized locations have been treated with low cost pedestrian safety countermeasures, most of which have been implemented in CDTC's four county region. The local project solicitation funded the projects listed in Table 9 along with the 2019-2024 TIP set-aside for the NYSDOT PSAP projects.

Table 9: Pedestrian Safety Action Plan HSIP Projects in 2019-2024 TIP

TIP ID #	Project Name	Description	Total Cost
RG140	New York State Pedestrian Safety Action Plan, State Roads, Phase 2	Improvements can include high visibility crosswalk markings, enhancing signals with extended crossing times, countdown timers, leading pedestrian intervals, pavement markings, signs, pedestrian refuge islands and light beacons.	$2.889 M in HSIP
A590	City of Albany PSAP	Pedestrian safety improvements at 20 uncontrolled crosswalks & 12 signalized intersections	$1.486 M in HSIP
R327	City of Rensselaer PSAP	Pedestrian safety improvements at 6 signalized intersections	$0.500 M in HSIP
SA312	Clifton Park PSAP	Pedestrian safety improvements at three uncontrolled crosswalks & five signalized intersections	$0.405 M in HSIP (total cost is $0.467 M)
S257	City of Schenectady PSAP	Pedestrian safety improvements at: 10 signalized intersections	$1.055 M in HSIP
		Total HSIP:	$6.335 M

CDTC Transportation Improvement Program

To implement the New Visions 2040 plan, CDTC worked with its regional partners to fund several safety and security specific capital projects in the 2016-2021 Transportation Improvement Program (TIP). Some of these projects were funded through the federal Highway Safety Improvement Program and completed in the last three years. They are listed in Table 10. To evaluate these projects, CDTC adopted a new scoring system for the 2016-2021 TIP that more strongly considers the non-quantifiable benefits of proposed transportation projects, including safety benefits. The new TIP project evaluation process consists of a benefit/cost ratio calculation (a quantitative score with a

maximum of 50) and a merit evaluation score (a qualitative score with maximum of 50) for a total maximum score of 100 for each project. The higher the total candidate project score, the higher the probability that the project will be awarded TIP funding.

Safety is a primary consideration in the selection of TIP projects at CDTC. The quantitative score (benefit/cost ratio) includes safety measured as a dollar value of the projected reduction in crashes per year with the project. The methodology for this calculation is consistent with NYSDOT's Highway Safety Improvement Program Procedures and Techniques and relies on existing crash data and proposed countermeasures for implementation in the project to calculate the safety benefit.

For the merit score, "Safety & Security" is a category worth 5 points and includes two components: an "Additional Safety Benefit Beyond Crash History" (3 points) and "Security and Resiliency to Natural Hazards and Human Caused Events" (2 points). Safety points are earned if a project pro-actively incorporates proven safety countermeasures that are known to reduce the risk of a fatal or serious injury crash. Security points are earned if a project implements an initiative identified in a county, state, or other hazard/security/emergency plan (i.e. improving a vulnerable evacuation route, enhancing access to hospitals, etc.) or if it makes a facility identified in a vulnerability assessment more resilient.

Table 10: 2016-2021 Transportation Improvement Program HSIP Projects Completed

TIP ID #	Project Name	Description	Total Cost
RG139	New York State Pedestrian Safety Action Plan, State Roads, Phase 1	Improvements can include high visibility crosswalk markings, enhancing signals with extended crossing times, countdown timers, leading pedestrian intervals, pavement markings, signs, pedestrian refuge islands and light beacons.	$2.979 M in HSIP
A549	Madison Avenue Road Diet: North Allen Street to Partridge Street	Signal upgrades & coordination, roadway configuration and bicycle/pedestrian improvements for a road diet.	$0.206 M in HSIP (total cost is $0.476 M)
A564	Madison Avenue: Partridge St. to Lake Ave./Delaware Ave.	Road diet, traffic signals and pedestrian improvements from Partridge St. to Lake Ave., mill & fill, sidewalk replacement and curb replacement and/or resetting from Lark St. to Lake Ave., ADA ramps and high visibility crosswalks from Lark St. to Lake Ave.	$2.726 M in HSIP (total cost is $3.961 M)
S223	Schenectady City Pavement Preservation	Guilderland Avenue from Broadway to Schenectady City Line and Broadway from State Street to Millard Street: mill & fill, crosswalks, ADA ramps & pedestrian signals.	$0.914 M in HSIP (total cost is $1.700 M)
S229	Hamburg Street (NY 146): roundabout to the City Line	Install a median turning lane and sidewalks and intersection improvements.	$5.000 M in HSIP (total cost is $14.771 M
T109	Washington/Western BRT Phase 1: Dove Street to Lexington Avenue	Bus stop work, enhanced lighting, raised medians, turn lanes, on-street parking, signalized mid-block pedestrian crossings, curb extensions and bump outs.	$0.770 M in HSIP (total cost is $2.120 M)
		Total HSIP:	$12.595 M

CDTC adopted a 2019-2024 Transportation Improvement Program in June 2019 that includes funding for targeted HSIP projects as well as funding for projects that have a proactive impact on safety. The projects were selected based on the same evaluation criteria used in the 2016-2021 TIP. The HSIP projects in the 2019-2024 TIP are listed in Table 11.

Table 11: HSIP Projects on the 2019-2024 Transportation Improvement Program (non-rail)

TIP ID #	Project Name	Description	Cost	Project Source
RG15	Durable Pavement Markings Set-Aside	Set-aside to support NYSDOT's pavement marking program. Numerous locations are treated as needed.	$1.400 M in HSIP (total project cost is $10.500 M)	State Set-aside
RG136	State Miscellaneous Pavement Maintenance Set-Aside	This includes but is not limited to crack sealing single course overlays, mill & fill, and limited related work for bundled work on several roads.	$2.000 M in HSIP (total project cost is $30.050 M)	State Set-aside
RG140	New York State Pedestrian Safety Action Plan, State Roads, Phase 2	Improvements can include high visibility crosswalk markings, enhancing signals with extended crossing times, countdown timers, leading pedestrian intervals, pavement markings, signs, pedestrian refuge islands and light beacons.	$2.889 M in HSIP	State Set-aside
A583	Carman Road Safety Improvements: Jessamine Lane to Old Carman Road	Two-way turn lane, new sidewalks & pedestrian accommodations.	$1.206 M in HSIP	State Solicitation
A590	City of Albany PSAP	Pedestrian safety improvements at 20 uncontrolled crosswalks & 12 signalized intersections.	$1.486 M in HSIP	State PSAP Solicitation
A602	I-87 Exit 6 Interchange Safety Improvements	Add a merge lane on both on-Ramps to I-87 from NY 7.	$1.998 M in HSIP	CDTC Solicitation
A603	Albany Shaker Road (CR 151), Wolf Road to Everett Road: Safety Improvements	Speed limit reduction, additional pedestrian improvements at select intersections & a new traffic signal at Shaker Elementary.	$0.575 M in HSIP (total project cost is $0.860 M)	CDTC Solicitation
R327	City of Rensselaer PSAP	Pedestrian safety improvements at 6 signalized intersections.	$0.500 M in HSIP	State PSAP Solicitation
R340	Intersection of US Route 4 and I-90	Intersection safety improvements, roundabout anticipated.	$4.434 M in HSIP	CDTC Solicitation
SA304	NY 146/NY 146A Intersection	Safety improvements at the intersection, possible roundabout.	$4.356 M in HSIP (total project cost is $4.391 M)	CDTC Solicitation
SA312	Clifton Park PSAP	Pedestrian safety improvements at three uncontrolled crosswalks & five signalized intersections.	$0.405 M in HSIP (total project cost is $0.467 M)	State PSAP Solicitation
SA319	Intersection of NY 146 and Clifton Country Road	Intersection reconstruction, signal rebuild, improved pedestrian accommodations, resurface and restripe from Tallow Wood to Plank Road.	$4.849 M in HSIP	CDTC Solicitation
S247	Brandywine Avenue, I-890 to State Street: Safety Improvements	Signal upgrades, pedestrian improvements, & lane reconfiguration (modification to striping).	$1.134 M in HSIP	State Solicitation
S249	Nott Street/Balltown Road Intersection: Safety Improvements	Redesign intersection with new turn lane. Includes mill and fill of Nott Street: Balltown Road to Clifton Park Road.	$1.103 M in HSIP (total project cost is $1.353 M)	CDTC Solicitation
S257	City of Schenectady PSAP	Pedestrian safety improvements at 10 signalized intersections.	$1.055 M in HSIP	State PSAP Solicitation
		Total HSIP:	$29.390 M	

Railway-Highway Crossing Program

The Highway-Rail Grade Crossing Safety Program, as it is referred to in New York State, is administered by NYSDOT and aims to reduce the frequency and severity of crashes involving vehicles and pedestrians at grade crossings. The federal government has dedicated HSIP funding to States to improve safety and eliminate the hazards of highway-railroad grade crossings. New York's program primarily focuses on the installation of warning devices such as signs, pavement markings, crossing gates, flashers, pedestrian crossing safety and interconnecting crossings with highway traffic signals. CDTC's 2019-2024 TIP includes 10 railway-highway grade crossing projects for construction summarized in Table 12.

Table 12: 2019-2024 TIP Highway-Rail Grade Crossing Safety Projects

TIP Number	Description	Cost
R324	Howland Avenue (formerly Depot Hill Road): Grade Crossing Signal Upgrade	$0.305 M
R325	Old Schaghticoke Road: Grade Crossing Signal Upgrade	$0.625 M
SA308	Ashdown Road Grade Crossing Signal Upgrade	$0.290 M
SA309	Blue Barns Road (CR 110) Pan AM Railways Grade Crossing Signal Upgrade	$0.365 M
SA311	NY 9N Grade Crossing Signal Upgrade	$0.450 M
S251	Air National Guard Road: Grade Crossing Signal Upgrade	$0.295 M
S252	Van Buren Lane: Grade Crossing Signal Upgrade	$0.285 M
S253	Sacandaga Road (NY 147) Grade Crossing Signal Upgrade	$0.360 M
S254	Vley Road Grade Crossing Signal Upgrade	$0.360 M
S255	Freeman's Bridge Road (NY 911F) Grade Crossing Signal Upgrade	$0.295 M
	HSIP Rail Total:	$3.630 M

Security Projects

Although capital funding for projects with a primary purpose of security are limited in the 2019-2024 TIP, one project funded by CDTA does directly address security. TIP Project #T72: CDTA Safety and Security assigns $200,000 in FTA facilities funds annually to CDTA to incorporate FTA's top 20 Security Program Action Items for Transit Agencies and recommendations from CDTA's Facilities Study. Examples of security program actions include written security and emergency management plans that reflect antiterrorist measures and current threats, establishment and use of a threat and vulnerability resolution process, employee background checks, ongoing safety, security and emergency procedures training.

Non-HSIP Safety Projects

As previously stated, CDTC has made safety its top priority and all projects funded in CDTC's TIP improve safety in some manner. Some examples of projects that consider safety are bicycle and pedestrian projects, pavement projects, bridge projects and many others that are funded with resources other than HSIP funds. Table 13 provides a list of projects that received high safety benefit scores when evaluated and reflect the range of projects that are likely to improve the safety and security of the transportation system.

Table 13: 2019-2024 TIP Projects with Significant Safety Benefits

TIP ID #	Project Name	Description	Cost
A295	NY 155/CR 157 New Karner Road Corridor Rehabilitation	Corridor improvements including safety and complete streets improvements from US 20 to Watervliet Shaker Road.	$5.521 M
A593	Henry Johnson Boulevard, Sheridan Avenue to Livingston Avenue	Mill & fill, ADA-compliant pedestrian amenities for all sidewalks and crosswalks. Replace 1,000 square feet of sidewalk.	$0.965 M
A594	Lark Street Rehabilitation	Mill & fill with ADA-compliant pedestrian amenities for all sidewalks and crosswalks. Replace 1,200 square feet of sidewalk.	$0.743 M
A596	Everett Road Bridge over I-90	Element specific repairs including widening shoulders and adding sidewalks.	$10.654 M
A597	I-787 Exit 3B to Exit 7 (NY 378)	Pavement corrective maintenance	$4.677 M
A601	Delaware Avenue, Elsmere Avenue to Normans Kill Bridge	Complete Streets & Road Diet Project	$3.640 M
R339	NY 2 (Congress and Ferry Streets) from 11th Street to the Congress Street Bridge Ramps	Corridor improvements including mill & fill, restriping to one driving lane each, repair 50% of sidewalks, add curb extensions and bike lanes	$4.035 M
SA321	I-87 Exits 11-13	Resurfacing	$4.370 M
SA322	Saratoga Springs Sidewalk Missing Links Program	Add concrete sidewalk, ADA crosswalks, amenities and some curbing and drainage in several locations.	$1.900 M

8. Future Considerations

There are many proven engineering, education and enforcement countermeasures that improve safety for road users. However, as safety issues change and new issues emerge, there is a need to adapt existing countermeasures and develop new approaches to address these issues. The following are areas to continue to monitor in support of the goals to continually reduce the potential for fatal and serious injury crashes.

Safe Systems

Safe systems assume that no death is acceptable, humans are prone to injury and all parts of the transportation “system” (road design, vehicle technology, occupant protection, etc.) must work together to create a culture of safety. It recognizes that humans will make mistakes and the transportation system should be designed to reduce the risk of death or injury when a mistake is made. The responsibility for developing and implementing safe systems is shared and is not solely the responsibility of traffic engineers to make roads safer or for vehicle designers to install more technology to keep drivers alert and on the roadway. Transportation system users are equally responsible by making good decisions. Education and enforcement is necessary to reinforce good behaviors and eliminate poor behaviors.

The safe system approach doesn’t replace traditional approaches to identify safety problems but seeks to complement them by viewing the transportation system more holistically. The safe system approach is being employed by NYSDOT through its Pedestrian Safety Action Plan and NYSDOT plans to expand that approach to other major crash types including roadway departure and

intersection. By consistently using safe system designs by all levels of government in all project types, large and small, the safety of the regional transportation system will incrementally improve over time. CDTC should continue to monitor safe systems approaches for their effectiveness over time and could consider develop more programs that address safety at a system level rather than just correcting high crash locations. Appendix B contains additional details on safe systems from the Institute of Transportation Engineers

Figure 28: Safe System Principles

Vision Zero

Vision Zero is defined as a strategy to eliminate all traffic fatalities and serious injuries while increasing safe, healthy, equitable mobility for all. More than 30 cities in the United States have committed to Vision Zero, including New York City and Ithaca. Safe Systems is closely tied to Vision Zero since one of the 9 components of a strong commitment to Vision Zero is prioritizing a systems-based approach. The systems-based approach focuses on the built environment and policies that influence the built environment and behavior. Vision Zero promotes safe streets, safe speeds, safe vehicles and safe people. As a safety framework, adopting Vision Zero principles, or those of similar programs such as Toward Zero Deaths or the Road to Zero, can commit the region to thinking about safety more holistically and embracing both new and old approaches to reduce fatalities and serious injuries. Monitoring what works will be key as Vision Zero programs expand across the country.

Crash Data

Currently, the NYSDOT is working on a project to update the existing crash analysis system used in New York State to be completed by the end of 2020. The new system will be referred to as the Crash Location and Engineering Analysis Repository (CLEAR) system and will replace the current system known as ALIS (the Accident Location Information System). The CLEAR system will consist of a series of spatially enabled web applications with mapping and geospatial functionality. One of those applications will be known as CLEAR Safety and will support the planning, implementation, and evaluation of safety projects on both the state and local roadway systems consistently which is not possible today in ALIS.

Ultimately, CLEAR Safety will only be useful to local road owners if the data needed to undertake detailed crash analysis is present including detailed roadway characteristics, traffic volumes, crash reports and accurate location coding. With complete input data, CLEAR Safety will be a critical tool in network screening for location specific or system level crash problems and the identification of countermeasures that could reduce crashes on all public roads

Vehicle Technology

Vehicle technology has historically been one of the most significant factors in reducing the severity of crashes. Occupant protection systems (i.e. seat belts, child safety seats and air bags, etc.), driver assist systems (i.e. automatic braking, lane departure warning, blind spot monitoring, etc.) and vehicle design that improves crashworthiness (i.e. laminated windshields, crumple zones, padding, etc.) work together to significantly reduce the chance of a collision and improve the survivability of a crash. If these systems were in every vehicle on the road today and were turned on while the vehicle was in operation, significantly safety benefits would be seen. Unfortunately, it will take many years for the vehicle fleet to turn over, to get currently optional safety features mandated and to control the cost of new vehicles with state of the art safety systems so they are accessible to all.

A long-term technology that could significantly improve safety is fully automated vehicles. Automated vehicles are discussed in detail in the Environment and Technology White Paper but have as one of their primary benefits the possibility of near zero crash related fatalities and injuries by removing the influence of human error (i.e. distracted, impaired and other poor driving behaviors) on crashes. Driver assist technologies (i.e. adaptive cruise control) available today are considered automation Level 1 and there are a few vehicles currently available with automation Level 3, automated driving systems that perform all aspects of the driving task with a human driver available to take over when needed. There are no automated vehicles with Level 4 or 5 technology (fully automated), on the road today. While they are being tested, they have yet to prove that they can detect vulnerable users such as pedestrians and bicyclists, can operate in all climates, especially areas that receive snow and can operate in complex driving environments like New York City.

Connectivity is an important input to realizing the full potential benefits and broad-scale implementation of automated vehicles. Connected vehicles are currently one of the main areas of focus of the U.S. Department of Transportation's Intelligent Transportation Systems Joint Program Office (JPO). Connected vehicle safety applications will enable drivers to have 360-degree awareness of hazards and situations they cannot even see. Through in-car warnings, drivers will be alerted to imminent crash situations, such as merging trucks, cars in the driver's blind side, or when a vehicle ahead brakes suddenly.

The likelihood of automated and connected vehicles (CAVs) to reach their full potential is dependent on the bandwidth capacity over the airwaves for vehicles to communicate information to each other or to other infrastructure without interference. The federal government had been reserving the 5.9 GHz band for transportation communications deemed critical for public safety. In 2019, the Federal Communications Commission changed its policy on this issue, potentially allowing private companies to gain access to the 5.9 GHz band. This concern, along with concerns over cybersecurity, the protection of personal data, hackers and terrorism are creating new problems for future researchers to resolve before these vehicles become widely available to the public.

E-Scooters and E-Bikes

New York State continues to discuss legalizing the use of e-bikes and e-scooters. A recent proposal would require that the local municipalities would authorize their use by local law. Small vehicles are most common in large urban areas for trips too far to walk but too short to justify the use of a personal car, ride hailing service, or transit. CDPHP Cycle!, the region's bike share program, is currently the only small vehicle transportation option available, limited primarily to the largest four cities. Research on the use of small vehicles indicate that while they are used for a variety of trip purposes, social and recreation purposes are most common. For e-scooters and e-bikes to be effective and supportive modes of transportation, they need infrastructure to operate safely. CDTC should monitor the effects

of e-bikes and e-scooters to learn more about what is working and what is not in terms of safety as these users could increase the number of vulnerable users on the transportation system.

Many emergency rooms have reported leaps in e-scooter injuries, causing several municipalities to ban their use. There's an increased acknowledgement that safety concerns present a major barrier to mass adoption, as companies face fresh regulatory pushback and litigation risk amid reports of vehicle malfunctions and deaths. This has led to debates over requiring helmets on shared services, Safety advocates urge decreasing speed caps and changing scooter designs, lowering the center of gravity to make them more stable — and visible — by adding a seat. As riders can drop them anywhere when they're done with them, scooters create fall hazards, especially for the blind and visually impaired, as well as those using wheelchairs or similar mobility devices. Geofenced drop-off corrals near known user destinations — easily sited by using scooter GPS data — can make pedestrians safer. Riding on sidewalks is illegal in most American cities, but, anecdotally, a large number of scooter collisions with pedestrians take place on sidewalks.

Automated Enforcement

Automated enforcement has the potential to support a safe transportation system. New York currently allows limited use of these technologies, but red light and speed camera systems have shown that they can be a deterrent to poor driving behaviors.

Marijuana Legalization

New York State continues to evaluate the potential impacts of legalizing recreational marijuana. CDTC should continue to monitor the status of this issue as it pertains to impaired driving. In addition, CDTC should monitor the efforts of GTSC in working with law enforcement on this issue with respect to crash reporting and future development of a roadside test.

Cybersecurity

Cybersecurity is a new and growing need in transportation due to the increasing use of digitally connected and automated systems, along with mobile devices. Hacking is always a risk with these systems and everything from traffic signals with Bluetooth devices to transportation data in the cloud can be vulnerable. Increasing cybersecurity awareness to those purchasing transportation system hardware and for protecting data is important and will remain important for the foreseeable future. Passenger and customer privacy must be protected by safeguarding sensitive data and reviewing and revising open-records statutes and policies to ensure personal data is kept private. The way traveler information is transferred to the public also needs to be safeguarded.

Flooding

Regardless of the root cause, the region has experienced increased frequency and duration of heavy rain events, flooding local roadways. This change in weather is expected to continue which is likely to increase flooding events. Extreme events like Hurricane's Sandy, Lee and Irene have increased in the last 20 years and have awakened the region to an increased vulnerability that may require additional attention in the years to come.

9. Principles, Strategies and Actions

The safety of the region's transportation system will remain CDTC's top priority. It is possible that technology in 2050 will greatly contribute toward reducing if not nearly eliminating fatalities and injuries but the region should not wait for these technologies to become widely available and should instead support changes in the safety culture to design safe streets, encourage safe transportation system user behavior and to improve the security of the transportation system for all. Therefore, CDTC's Regional Safety and Operations Advisory Committee is recommending the following new principles, strategies and actions for safety and security.

Safety Principle:

Our region will move toward eliminating transportation related deaths and serious injuries by 2050.

- Create a travel environment for all users that reduces risk and considers the context of communities
- Encourage best safety practices
- Evaluate safety related data
- Monitor the effectiveness of implemented countermeasures
- Encourage a long-term commitment at all levels of government
- Shift policy and transportation infrastructure design to support a cultural change in how our transportation system is used and operatedSecurity Principle:

Security Principle:

Protection of critical transportation infrastructure from natural disasters, acts of terrorism and cyberattack is of increasing concern. Scenario planning and computer modeling will support regional security planning efforts.

CDTC will support regional security planning efforts through modeling transportation system related scenarios, encouraging resiliency planning and providing technical support to all levels of government as they develop security plans. Through these efforts, CDTC will be available to assist with the reduction of threats to the regional transportation system, transportation facilities and transportation system users.

Safety and Security Planning:

1) **Provide more options for transportation network users by planning for complete streets**. By developing safe, efficient, and multimodal street networks, the region's transportation system users might select non-auto modes for their trip if they feel safe and secure on the regional street network. The context of streets is an important consideration as the design needs for users of the interstate system are different that residential or community main streets. All modes and users of the transportation system should be considered providing safe accessibility for all segments of the population, with particular attention to the very young, the very old and those with disabilities. Increasing the range of safe transportation options may help increase the number of affordable transportation alternatives.

2) **Further develop the regional crash profile**. CDTC should continue to review the region's crash data to look for common themes and risk factors to strategically allocate resources to safety problems. Integrate non-traditional data into the profile to further explore causes and risk factors and to highlight

ensure equitable analysis of data across communities. Continue to track progress on improvements with the region's safety performance.

3) **Encourage local governments to adopt Safe Systems or Vision Zero policies.** The key finding of CDTC's Local Road Safety Action Plan is that a systems approach to safety works best at the local level. CDTC should encourage local governments, as an implementation action of that plan, to adopt vision zero policies. Vision Zero policies can be tailored to the community context and the crashes occurring in those communities. As a starting point, communities should consider establishing an interdisciplinary task force to discuss engineering, enforcement, and policy changes.

4) **Continue CDTC's collaborations with numerous safety and security partners**. CDTC should continue to coordinate with the Metropolitan Planning Organizations throughout the state and the nation on safety and security best practices. CDTC staff involvement on various state and local working groups and associations should also be continued including the NYS Association of Traffic Safety Boards, the Traffic Records Coordinating Council, Local Emergency Planning Committees, the NYSDOT Pedestrian Safety Action Plan Implementation Team and the Roadway Departure Action Plan development team. CDTC's involvement with these initiatives ensures that local government concerns about the safety and security of the regional transportation system are represented.

5) **Support the state with the development and implementation of state action plans.** The NYSDOT will be developing state action plans for lane departure and intersection crashes over the next few years. CDTC should coordinate with NYSDOT to assist local governments regarding the implementation of those plans on locally owned roads.

6) **Coordinate with Other Local Road Safety Plan Sponsors.** Local Road Safety Action Plans are being implemented throughout the United States. CDTC should continue to coordinate with and monitor the implementation and effectiveness of the other LRSPs. This continued coordination and review will ensure that the Local Road Safety Action Plan remains current with future best practices and implementation measures. One way to stay current with best practices is to monitor the FHWA Office of Safety Local Road website and Noteworthy Practices database.

7) **Create an Incident Management Committee**. Facilitate an incident management committee to improve communication and coordination between operating agencies in the region, improve incident detection, particularly at intersections, and improve traffic incident response and clearance practices. Continue to improve safety in work zones.

8) **Develop a Road Safety Assessment (Audit) Program.** Following the FHWA Road Safety Audit NYSDOT SAFETAP and the NYSAMPO Safety Assessments procedures, develop a CDTC supported road safety audit program. CDTC would provide technical support, develop and maintain prompt lists with state and local partners and provide the planning funds to support an annual program. Sites and corridors would be selected based on data and through a competitive solicitation process.

9) **Encourage land use planning that supports safety and security**. CDTC should continue its long history to encourage planning for new development and redevelopment that considers safety and security measures at the time a project is being reviewed, positively impacting community safety. Mixed land use zoning can reduce vehicle trips and increase the viability of transit and non-auto transportation modes. More compact development can also influence vehicle speeds and the number and severity of crashes. Site design should consider driveway placement, access control, sidewalk infrastructure (along the streets and to/from the building), bicycle parking and access, transit stations and even the placement of a building on a site which can all affect the safety and security of the transportation system. This can lead to a safer and more secure environment, which, in turn, encourages more people to walk, ride bicycles, and use transit.

10) **Support the creation of a more secure transportation system**. CDTC should continue to support the Local Emergency Planning Committees and other security and emergency management coalitions in the region with data and resources to enhance the security of the regional transportation system. CDTC should facilitate a regional discussion around transportation cyber security and to identify transportation system risks and vulnerabilities. CDTC should also compile data on transportation system vulnerabilities and undertake emergency/hazardous route planning or other transportation scenario planning for emergency management entities. Flooding and low-rise water crossings are of increasing concern.

Safety Engineering:

1) **Encourage safety in all transportation projects**. Recipients of federal, state and local transportation funding should continue making safety a priority in all maintenance, repaving, rehabilitation, reconstruction and construction projects for all transportation modes. The state should continue and enhance its long standing safety practices by adding new information from current initiatives such as the State Strategic Highway Safety Plan and the emphasis area safety action plans (i.e. Pedestrian Safety Action Plan). Local road owners should consider the low-cost safety treatments identified in CDTC's Local Road Safety Action Plan to pro-actively address safety and support state safety plans. Particular attention should be paid to the six emphasis areas for the region: intersections, road user behavior, lane departure, age-related, vulnerable users and speed.

2) **Design streets for safety over speed**. Support local and state speed management efforts by designing streets for safety over speed. This work includes considering lane reductions, traffic calming measures, bicycle and pedestrian infrastructure, roundabouts and other initiatives as appropriate to the roadway context. Move community roadway design policy away from designing to the 85th percentile speed, which emphasizes the car over pedestrians, bicyclists and transit riders, toward target speeds. While high speeds make sense on interstates and other limited access roadways, but speed should not be a top consideration for other roadway types. Safety should be the primary consideration. Designing local streets for safety over speed will improve the survivability of a crash.

3) **Prioritize safety in all funding decisions**. CDTC should support the state and local governments with prioritizing safety in the Transportation Improvement Program decision making process. The state may be updating its long standing Highway Safety Improvement Program procedures in the next few years and CDTC should consider how those changes might impact the Transportation Improvement Program project evaluation process for both the calculation of safety benefits and in the identification of pro-active safety treatments that reduce the risk of a crash.

4) **Support state efforts to improve crash data systems**. NYSDOT is currently working on a project to update the existing crash analysis system expected to be completed in late 2020. The new system will include a custom suite of applications that will be referred to as the Crash Location and Engineering Analysis Repository (CLEAR) system. The CLEAR system will consist of a series of spatially-enabled web applications with mapping and geospatial functionality to review and analyze crash and roadway data. CLEAR Safety will be the cornerstone of the application, supporting the planning, implementation, and evaluation of safety projects on the state and local system. The analysis that can be undertaken in CLEAR will only be as good as the data contained within the system including roadway characteristics, detailed crash reports and accurate location coding which will require multiple partners to build over time.

5) **Encourage regional implementation of State and Regional Systemic Countermeasures**. Coordinate with local governments to ensure information on state approved countermeasures, currently limited to centerline and shoulder rumble strips, pedestrian safety action plan treatments and pedestrian countdown timers, is available so that they can be routinely integrated into local practices.

Work with the state to identify new pre-approved countermeasures based on the Local Road Safety Action Plan emphasis areas.

6) **Continue to identify and address high risk locations**. Through data analysis, CDTC should continue to work with the state and local partners to identify locations currently experiencing serious crashes and to identify locations with risk factors that contribute to serious crashes. Proactive approaches have the best chance to address safety and security concerns before they become problems.

7) **Begin to plan for fully Connected/Automated Vehicles (CAVs)**. Identification of needed transportation infrastructure that will support full CAV will be of increased interest in the next five to ten years. These changes may be more important to transit and freight vehicles as CAV is likely to be deployed in those vehicles more quickly for than for passenger vehicles.

8) **Continue funding for the Transportation Management Center and ITS technologies**. CDTC should continue to support funding for the Transportation Management Center and new strategies, technologies or projects that can help reduce the impact of transportation related events.

Safety Education and Enforcement:

1) **Develop Capital Coexist into CDTC's comprehensive safety education and awareness program**. Historically, Capital Coexist focused on the vulnerable user crash type for education and awareness programs. Given the need for similar programs in the five other emphasis areas for the region, CDTC should expand Capital Coexist to include initiatives that focus on all six emphasis areas and include a training program on all the available safety data, tools and resources. The more information CDTC can provide to local governments through Capital Coexist, the more they can integrate that information into their ongoing operations and maintenance practices, into capital project development and into law enforcement awareness campaigns.

2) **Provide law enforcement with data, educational tools and training to impact road user behavior**. Use the data in the local road safety plan to inform law enforcement on the types of crashes occurring in the region and to encourage them to apply for safety grants through the Governor's Traffic Safety Committee. Provide education tools and training when needed to law enforcement agencies which often serve as the first point of contact for community engagement on transportation safety in communities.

3) **Expand CDTC's collaborations with advocacy groups, schools and other transportation safety stakeholders.** Collaborations with advocacy groups, schools, and other stakeholders to educate the public about traffic safety are essential. Transportation advocacy groups are easily the most effective stakeholders because they can lobby public officials on projects and deploy volunteers to survey residents at their homes or at transit stations. Public school systems which transport thousands of kids twice a day on local roads are also a potential key safety stakeholder and well as those representing healthy and safe communities. CDTC's mini-grant program should be expanded, as resources allow, to the support transportation safety related efforts of these groups in the community.