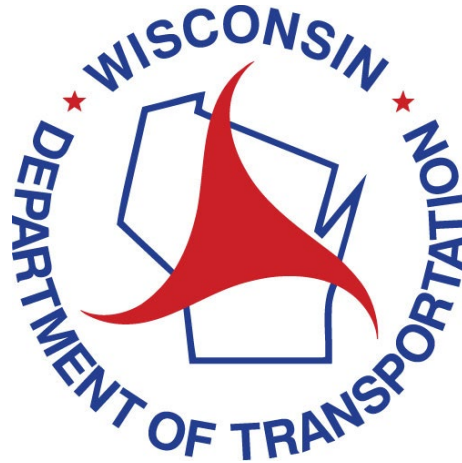




Strategic Highway Safety Plan

2023 – 2027

Published by the Wisconsin Department of Transportation

Craig Thompson, Secretary

David Pabst, Chair

Wisconsin DOT Traffic Safety Council





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December 5, 2023

Glenn Fulkerson, Division Administrator
Wisconsin Division- Federal Highway Administration
525 Junction Road, Suite 8000 S
Madison, Wisconsin 53717

Dear Mr. Fulkerson,

The purpose of this letter is to share an amended Wisconsin Strategic Highway Safety Plan (SHSP 2023-2027) with the Federal Highway Administration for approval.

The Vulnerable Road User (VRU) assessment conducted pursuant to the stipulation of 23 U.S.C. 148(I) and defined by the Infrastructure Investment Act (IIJA) was undertaken by the Wisconsin Highway Safety Improvement Program (HSIP). The VRU assessment provided valued feedback that will enhance the emphasis areas of the SHSP. The implementation of these efforts will continue through our partnerships with local governments, the private sector, community organizations, and private citizens.

A total of six new tasks were added to the SHSP. Three were added to the Improve Safety Culture, Safety Data, and Safety Technology emphasis area; and three were added to the Improve Non-Motorist Safety emphasis area. The tasks focus on education, policy, design, adoption of technology, and advocacy. The VRU Assessment will be added as an appendix to the SHSP 2023-2027 as a detailed reference. The emphasis areas have been updated to reflect the recommendations.

Thank you for the ongoing partnership in this process. Please contact our Bureau of Transportation Safety if you require additional information.

Sincerely,

A handwritten signature in black ink, appearing to read "Craig Thompson".

Craig Thompson
Secretary

cc: Dave Jolicoeur

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Introduction

Wisconsin is proud to have one of the best highway safety records in the United States. The traffic fatality rate which has been below the average national rate for more than a generation and has remained near or below 1.0 deaths per 100 million vehicle miles of travel (VMT) since 2009. Despite its low fatality rates, Wisconsin strives to further reduce these numbers. Any preventable death on Wisconsin's streets and highways is one too many.

Traffic crashes are not "accidents;" they are, with few exceptions, avoidable. They can be caused by a single factor or a chain of factors. Most often, these factors are human behavior, road condition, and reaction of the vehicle operator, pedestrian, or bicyclist.

Wisconsin's total fatalities has risen to 614 in 2020 since its low of 506 in 2014 according to the Fatality Analysis Reporting System (FARS). Wisconsin is working to reduce traffic fatalities by enforcing laws, changing the behavior of roadway users and improving roadway engineering.

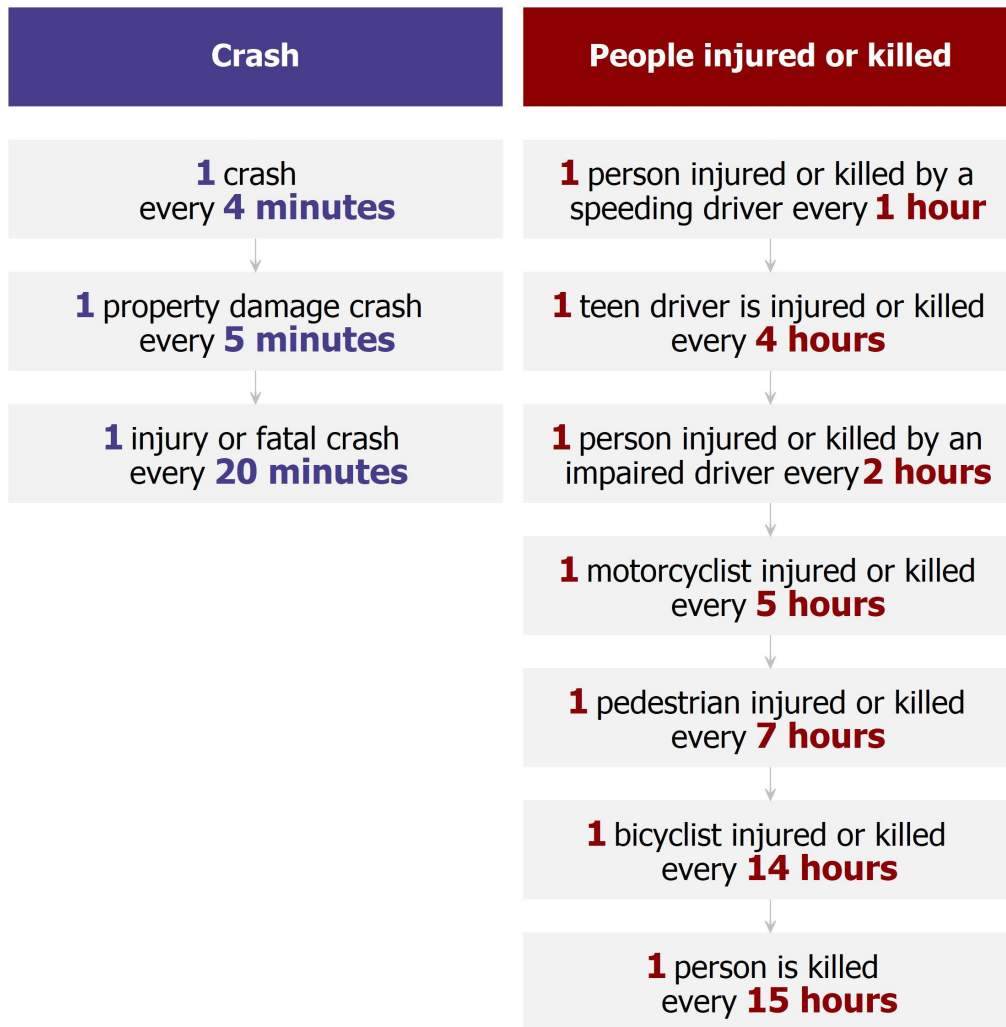
In 2021, Wisconsin vehicle occupants, pedestrians, and bicyclists suffered 35,676 non-fatal injuries. However, 3,473 (9.7% of all injuries were serious injuries) of those injuries were serious and incapacitating. Injuries can be physically, and, in most cases, emotionally traumatic. Far too many of them translate to permanent disability and a dramatically changed quality of life. Wisconsin is making improvements to reduce this through the work of the Strategic Highway Safety Plan.

Despite its low fatality rates, Wisconsin strives to further reduce these numbers.

Background

Scope of Wisconsin's Highway Safety Challenge

Thanks in part to its many safety partners, Wisconsin has a notable highway safety record. However, far too many people still lose their lives or suffer an injury every year on Wisconsin roadways, as seen in Figure 1: Wisconsin's Highway Safety Clock.



1 - Figure 1: Wisconsin's Highway Safety Clock

In 2021 there were:

- 128,296 police-reported traffic crashes – an average of 353 per day.
- 595 persons were killed in 546 fatal traffic crashes – an average of three lives lost every two days on Wisconsin roadways.
- 35,676 persons suffered non-fatal injuries – an average of 98 people per day.

In 2021,

- Of the 595 persons killed, 28% (166) died in alcohol-involved crashes and 31% (186) died in speed-related crashes.
- Of the 595 persons killed, 8% were either pedestrians (50) or bicyclists (9), and 20% (120) were motorcycle drivers or passengers.
- When safety belt use could be determined by the investigating officer, 51% of persons killed in passenger car and light truck crashes were not using safety restraints.

- When helmet use could be determined by the investigating officer, 70% of all motorcyclists killed in crashes were not wearing helmets.
- Roads and streets under local jurisdiction (i.e., non-State trunk or Interstate highways) accounted for 63% (81,002) of all crashes in 2021.
- There were 614,4327 registered vehicles in 2021 – a 5.5% decrease from 2020.
- There were 4,361,931 licensed drivers in 2021 – a 1.07% increase from 2020.
- There were 65,002 million vehicle miles of travel in 2021 – a 12.9% increase from 2020.
- The fatality rate in 2021 was 0.92 deaths per 100 million vehicle miles of travel.
- The 2016-2020 average fatality rate per 100 million vehicle miles traveled on rural roads in Wisconsin was 1.21 compared to 1.18 for the 2011-2015 average.

Where We Need to Go

To reach the overall strategic goal of reducing traffic fatalities, injuries, and crashes on Wisconsin roadways, partners need to know the goal for each performance measure.

By 2027,

- **5% reduction in number of fatalities (2% reduction each year)**
- **5% reduction in the rate of fatalities per 100 million VMT (2% reduction each year)**
- **5% reduction in number of serious injuries (2% reduction each year)**
- **5% reduction in the rate of serious injuries per 100 million VMT (2% reduction each year)**
- **5% reduction in number of non-motorized fatalities and non-motorized serious injuries (2% reduction each year).**

Bringing Safety Partners Together

One of the most important functions of the Strategic Highway Safety Plan (SHSP) is to develop statewide goals and safety initiatives to help WisDOT and other state and local highway safety partners work together to better leverage resources and effectively meet common highway safety objectives.

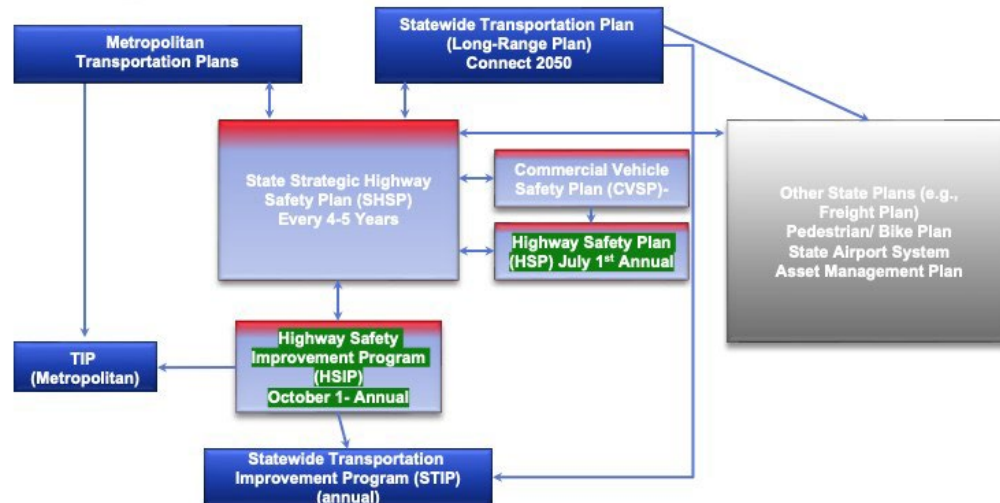
The 2023-2027 SHSP will provide the framework for several WisDOT highway safety planning and program documents that are submitted annually to the United States Department of Transportation to guide allocation of federal funds provided to Wisconsin, as shown in the Figure 2. Some of these include:

- Highway Safety Plan (HSP),
- Highway Safety Improvement Program (HSIP),
- Traffic Safety Information Systems Strategic Plan, and
- Motor Carrier Safety Assistance Program (MCSAP) Commercial Vehicle Safety Plan.

In addition, strategies and activities articulated in the 2023-2027 SHSP will be shared with other state and local entities to help guide their development and implementation of various annual and long-term plans and programs, including:

- State Transportation Improvement Plan (STIP) and
- Metropolitan Planning Organization (MPO) urbanized area transportation improvement plans.

Integration of SHSP



2 - Figure 2 - A figure depicting how all the various safety plans fit together

The 2023-2027 SHSP is the sixth edition of a formally adopted strategic highway safety plan. Like its five multi-year predecessors starting in 2001, the current plan was developed under the sponsorship of WisDOT's Traffic Safety Council (TSC).

The TSC is a multi-disciplined group of WisDOT staff, each with individual responsibility for some facet of highway safety programming or policy development and highway safety professionals and advocates outside the department. TSC members meet monthly to share information, establish consensus on highway safety policy direction for the Department, and, when appropriate, sponsor major highway safety planning, programming, or policy initiatives, such as the multi-year SHSP.

The 2023-2027 SHSP was developed by the TSC in partnership with external highway safety partners. The active involvement of external partners in the process is a critical element to ensure not only an appropriately-focused SHSP, but also successful implementation of various initiatives articulated in the plan.

The 2023-2027 SHSP satisfies [federal requirements](#) for state allocation of highway safety funds.

Local Participation

Implementation at the local level will largely be carried out through local county traffic safety commissions. Wisconsin has a unique opportunity through current law, which requires each county to have a community-level, multi-disciplinary traffic safety commission. Wisconsin continues to empower this opportunity for a grassroots approach to traffic safety.

A county traffic safety commission is required to include the following from the county:

- Chief traffic law enforcement officer (or designated representative)
- Highway safety coordinator (if there is one)
- Highway commissioner (or designated representative)
- WisDOT representatives:
 - A highway engineer
 - Regional Program Manager (RPM) or Law Enforcement Liaison (LEL)
 - State Patrol trooper/inspector
- Representative from education (e.g., driver education instructor, superintendent, high school principal)
- Representative from medical field (e.g., doctor, nurse, emergency medical services (EMS) provider).
- Representative from the legal community (e.g., District Attorneys' office, municipal prosecutor).
- Additional members appointed to the commission might include county highway committee members, county and/or town board supervisors, civic leaders, safety advocates, and the local news media.

Commissions must meet at least quarterly. State law specifies the following duties:

- Review local crash data and other traffic safety-related matters.
- Prepare "spot maps" showing crash locations on county and town roads and on city/village streets for places with populations under 5,000.
- For municipalities of 5,000 or more, spot maps are not required, but a traffic safety commission must look at the crash data. Based on their review of this data and reports of citizens' concerns, traffic safety commissions can recommend corrective action to WisDOT, the county board or highway committee, or any other appropriate branch of government. Providing recommendations to government and responding to citizens often takes considerable initiative. WisDOT provides commissions with crash and citation data for rural, county, and state highways, and the Bureau of Transportation Safety and Technical Services (BOTSTS) Regional Program Manager or Law Enforcement Liaison provides legislative updates and information on traffic safety initiatives and grant funding opportunities. Additional tools have been developed in recent years by the BOTSTS and the University of Wisconsin Madison Traffic Operations and

Safety Laboratory (UW TOPS Lab) to support traffic safety commissions with data and information. These include [Community Maps](#), [County Profiles](#), and [traffic safety commissions guidelines](#). County traffic safety commissions can also:

- Ask the State Patrol or local law enforcement to increase patrols in areas of need.
- Ask WisDOT to review possible engineering concerns and advise WisDOT on planned work zones or detour routes.
- Review proposals for local traffic safety improvements.
- Review fatal or other high-profile crashes, usually via in-squad video or in-person by a site visit.
- Foster public awareness of traffic safety issues and initiatives (e.g., by working with local news media).
- Encourage/sponsor local activities (e.g., bike rodeos, Safe Routes to School campaigns).
- Coordinate and plan for upcoming quarters by leveraging all disciplines participating in the meeting.

[The SHSP Prioritization Process](#)

Wisconsin's 2023-2027 SHSP was modeled on the conceptual framework used for the 1998 National Strategic Highway Safety Plan, which was developed by a multi-disciplinary coalition of organizations, under the leadership of the American Association of State Highway and Transportation Officials (AASHTO). For the 2023-2027 SHSP, 25 significant highway safety topics (shown in Table 1) were included in a structured group evaluation process.

Table 1: 2023-2027 Strategic Highway Safety Plan Topics

Ensure Drivers are Licensed and Competent	Improve Teen Driver Performance
Improve Traffic Incident Management	Improve Driver Alertness
Improve Safety at Intersections	Improve Traffic Safety Culture
Improve Child Safety Seat Use	Improve Work Zone Safety
Enhance EMS to Increase Survivability	Reduce Driver Distraction
Improve Pedestrian Safety	Sustain Proficiency in Older Drivers
Reduce Deer & Other Animal Crashes	Increase Safety Belt Use
Curb Aggressive Driving	Reduce Alcohol & Drug-Impaired Driving
Improve Timeliness and Accuracy of Safety Data and Associated Analysis/Tools	Improve Safety Technology (Vehicle, Infrastructure, and Personal Devices)
Improve Bicyclist Safety	Improve Safety for Large Truck Travel
Reduce the Incidence and Severity of Motorcycle Crashes	Reduce Speed Related Crashes
Reduce Weather Related Crashes	Reduce Vehicle-Train Crashes
Reduce Lane Departure Crashes	

The first phase of the SHSP prioritization process involved an online survey to determine the emphasis areas by stakeholders across the state. The Traffic Operations and Safety Laboratory (TOPS Lab) at the University of Wisconsin-Madison developed and hosted a survey on its website. Over 2,000 highway safety professionals and advocates, including WisDOT staff and a variety of state and local partners, were invited to access the website during a four-week period in mid-2020 to complete the survey. All respondents remained anonymous. In total, 1,567 respondents, including engineers, planners, law enforcement professionals, elected officials, medical professionals, academics, safety experts, and concerned citizens, participated in the survey.

The second phase of the SHSP prioritization process involved a virtual peer exchange spanning a week. Participation in the event, which was held in March 2021, brought together safety professionals with backgrounds from multiple disciplines and covering numerous jurisdictions statewide. A total of 75 highway safety professionals and advocates participated in the event; about 2/3 of them were WisDOT staff, and the other 1/3 were external partners. Figure 3 is a screenshot of some of the virtual participants. Figure 4 shows a word cloud of the themes from the peer exchange.

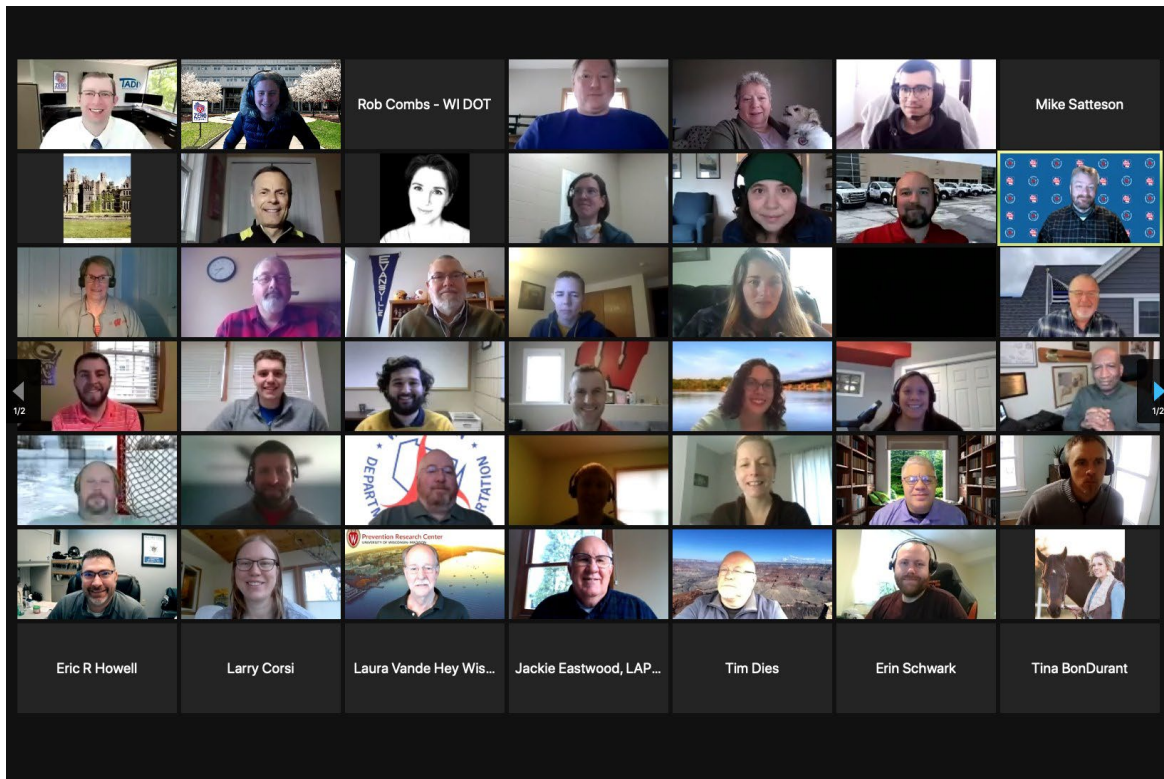
The 25 topics listed in the survey were organized into 11 emphasis areas. Participants chose breakout rooms based on their experience and interest areas. In the discussion, participants identified successes, concerns and barriers within the emphasis area and suggested ways to solve or mitigate them. The participants were encouraged to sign up for work groups for each emphasis area. They were then responsible for compiling the observations and solutions into strategies for each emphasis area to be incorporated into the 2023-2027 SHSP.

All the emphasis areas had similar challenges and needs. These include the following:

- Data/information and decision support
- Knowledge development, knowledge sharing, and participation in related training
- Concept implementation
- Increased targeted enforcement and strengthen the efficiency of prosecutions
- Increased innovative education and outreach
- Implementation of sound engineering practices as a defense against unsafe driving behavior

A common theme from the peer exchange is to create a toolbox for each emphasis area. The working group for each emphasis areas will meet regularly to review crash data and review any concerns. The toolbox could include:

- Information about data sources that may be useful in identifying areas of concerns;
- Visualization/analysis tools that can aid local and state practitioners as they identify possible locations for countermeasures
- Information about different countermeasures that can be implemented through a Safe System Approach
- Tools for public outreach



3 - Figure 3: Screenshot of virtual peer exchange participants.

[illegible]

Federal Initiatives

The Federal Highway Administration is promoting the Safe System Approach. Reaching zero deaths requires the implementation of a Safe System Approach, which was founded on the principles that humans make mistakes and that human bodies have limited ability to tolerate crash impacts. The Safe System Approach aims to design and operate our vehicles and infrastructure to anticipate human error to minimize the risk of fatal and serious injuries. This is accomplished by having redundancies in place so that if a crash takes place the impact energy on the human body occurs at a tolerable level. It also seeks to expand the availability of vehicle systems and features that prevent and minimize the impact of crashes. The Safe System Approach also aims to enhance survivability of crashes with prompt emergency medical care, while also facilitating a safe work environment for first responders via effective incident management.

- deaths and serious injuries are unacceptable,
- humans make mistakes,
- humans are vulnerable,
- responsibility is shared,
- safety is proactive, and
- redundancy is crucial.

Making a commitment to zero traffic deaths means addressing all aspects of safety through the following five Safe System elements that, together, create a holistic approach with layers of protection for all road users: safe road users, safe vehicles, safe speeds, safe roads, and post-crash care.

The Safe System Approach requires a supporting safety culture that places safety first and foremost in road system investment decisions. To achieve our zero deaths vision, everyone must accept that fatalities and serious injuries are unacceptable and preventable.



5 - Figure 5: [The Safe System Approach six guiding principles](#) and five elements.

Safe Roads Measures: Systematic, Systemic and Spot Infrastructure Improvements, Design, Education, Training, Awareness, Technology, Legislation, Data

Safe Road Users Measures: Education, Training, Awareness, Enforcement, Technology, Data, Legislation

Safe Vehicles Measures: Technology, Legislation, Education

Safe Speeds Measures: Design/Target Speed, Education, Training, Awareness, Enforcement, Infrastructure Improvements, Technology, Data, Legislation

Post-Crash Care Measures: Quick Crash Scene Clearance, Quick Emergency Response, Crash Analysis, Education

[High-Risk Rural Roads Special Rule](#)

The United States Code establishes a [High-Risk Rural Roads Special Rule](#), which requires states to track their fatality rate on rural roads. A high-risk rural road means any roadway functionally classified as a rural major or minor collector or a rural local road with significant safety risks. These risks are determined by the WisDOT Bureau of State Highway Programs and are based on the documentation of potential for non-intersection crashes. This is identified through data analysis of crash reports, roadway

characteristics, or other information such as field reviews, safety assessments, road safety audits, and local knowledge or experience.

State Implementation of the Older Drivers and Pedestrians Special Rule

The Moving Ahead for Progress in the 21st Century (MAP-21) Act created a new Special Rule for older drivers and pedestrians under 23 USC 148(g)(2), which was continued under the Fixing America's Surface Transportation (FAST) Act and the Bipartisan Infrastructure Law (BIL). If the rate per capita of traffic fatalities and serious injuries for drivers and pedestrians over the age of 65 in a state increases over the most recent 2-year period, this Special Rule requires a State to include strategies to address the increases in those rates in their State Strategic Highway Safety Plan (SHSP). FHWA issued the [HSIP Special Rules Guidance](#) in February 2022, and a set of [Questions and Answers](#) in February 2013 to provide guidance and information on how to determine if the Special Rule applies in a state.

The proportion of Wisconsin population age 65 and over will increase significantly in the coming decades. The effects of aging on people as drivers and pedestrians are highly individual. Challenges that may impact people as they age include declining vision, decreased flexibility and psychomotor performance, and changes in perceptual and cognitive performance. Design practices that explicitly recognize these changes will better serve this growing segment of Wisconsin's population.

To determine whether the Special Rule applies in a state, the state will consider older drivers and older pedestrians collectively. Beginning with the 2017 HSIP annual reports, states will report fatalities and serious injuries involving older drivers and pedestrians 65 years of age and older, consistent with the most current version of the [HSIP Special Rules Guidance](#). States should provide seven years of data, ending with the year prior to the most current full year of data. For example, in the 2017 HSIP report, states should report older driver and pedestrian data for the years 2009 through 2015.

States will report the number of fatalities for drivers and pedestrians 65 years of age and older from the National Highway Traffic Safety Administration (NHTSA) [Fatality Analysis Reporting System \(FARS\)](#) and the number of serious injuries from a state's data system for drivers and pedestrians 65 years of age and older. Population figures for persons 65 years of age and older per 1,000 total population will be obtained from the U.S. Census. The FHWA will use the information to calculate the older driver and pedestrian fatality and serious injury rate per capita and determine if the Special Rule applies to each state.

If the rate of traffic fatalities and serious injuries for drivers and pedestrians 65 years of age and older in a state increases during the most recent 2-year period for which data is available, then the Older Drivers and Pedestrians Special Rule applies. If the Special Rule applies, the state must include strategies to address the increase in the older driver and older pedestrian fatal and serious injuries rate in its next update to their SHSP. The state should also conduct a secondary analysis to determine whether the increase is attributable to older driver fatalities and serious injuries, older pedestrian fatalities and serious injuries, or a combination of the two. This helps a State determine whether the emphasis on safety programs and countermeasures should be focused on older drivers and/or older pedestrians. The FHWA encourages States to take into account the treatments listed in the 2014 FHWA publication, "[Handbook for Designing Roadways for the Aging Population](#)".

Provision of research and data to support sound policy to the Traffic Safety Council (TSC) will shepherd the SHSP and will monitor the implementation with an informal annual check-in when the 2022, 2023, and 2024 crash data become available. At the conclusion of this SHSP (2027), the performance measures will be summarized in 2026 as soon as the 2025 crash data are finalized. The following WisDOT divisions will be responsible for their respective emphasis areas:

Top 11 Emphasis Areas

Wisconsin's Strategic Highway Safety Plan (SHSP) is a statewide, comprehensive, and data-driven plan that implements the framework for supporting the safety goals. The SHSP examines a variety of emphasis areas that affect highway safety in Wisconsin. The 25 safety topics listed in Table 1 were combined into 11 emphasis areas. Key tasks were identified within the emphasis area to address potential hindrances or identify opportunity for process improvements to achieve safety goals. Within each emphasis area, Safe System Approach elements were identified.

The 11 Emphasis Areas are listed in Table 2.

Improve Safety Culture, Safety Data, Safety Technology	Increase Occupant Protection
Reduce Driver Distraction/ Improve Driver Alertness	Improve Safety of Intersection
Reduce Alcohol & Drug-Impaired Driving	Reduce Lane Departure Crashes
Reduce the incidence and Severity of Motorcycle Crashes	Improve Work Zone Safety
Improve Non-Motorist Safety	Curb Aggressive Driving/ Reduce Speed-Related Crashes
Improve Driver Performance (Teens, Older, and Competent)	

6 - Table 2: 11 Emphasis Areas

Improve Safety Culture, Safety Data, and Safety Technology

Task #1: Continue improving the Traffic Records Coordinating Committee and other work groups

Task #2: Change driver behavior through community engagement, education, and public outreach

Task #3: Improve data collection and availability

Task #4: Utilize innovative technology to increase safety

Task #5: Ensure adequate Safety and Weight Enforcement Facilities (SWEF) and Rest Areas throughout the state to properly enforce equipment standards, carrier performance standards, driver fitness standards, and check for human trafficking.

Task #6: Investigate necessary policy changes to automate enforcement through camera and data recording technology through fixed or mobile platforms.

Task #7: Consideration of a dashboard to share successful programs, strategies and projects that others can duplicate in Wisconsin.

Task #8: Advocacy through national organization memberships and directly to manufacturing to improved pedestrian detection and emergency autobraking, forward collision warning, auto braking and backing warnings to improve crash outcomes for bicycle and pedestrian crashes.

Emphasis Area	Tasks	Safe Roads	Safe Users	Safe Speeds	Safe Vehicles	Post-Crash Care
Improve Safety Culture, Safety Data, Safety Technology	Continue improving the Traffic Records Coordinating Committee and other work groups	✓	✓	✓	✓	✓
	Change driver behavior through community engagement, education, and public outreach		✓			
	Improve data collection and availability	✓	✓	✓	✓	✓
	Utilize innovative technology to increase safety	✓	✓	✓	✓	✓
	Investigate necessary policy changes to automate enforcement through camera and data recording technology through fixed or mobile platforms.		✓	✓		
	Consideration of a dashboard to share successful programs, strategies and projects that others can duplicate in Wisconsin.	✓	✓	✓	✓	✓
	Advocacy through national organization memberships and directly to manufacturing to improved pedestrian detection and emergency auto braking, forward collision warning, auto braking and backing warnings to improve crash outcomes for bicycle and pedestrian crashes.		✓		✓	

Reduce Driver Distraction/Improve Driver Alertness

Task #1: Continue to focus on the use of rumble strips to address the issue of driver alertness

Task #2: Promote public safety measures to deter distracted driving

Task #3: Create education campaigns with direct outreach to age specific campaigns

Task #4: Review the effectiveness of Wisconsin's texting ban and the ability of law enforcement to enforce and properly report distracted driving

Task #5: Explore appropriate safety messaging and signage (through Dynamic Message Signs) on roadways to remind drivers to stay alert and not to text and drive

Task #6: Keep abreast of research on the effects of different types of roadway signage, stationary billboards, vehicle technology, and mobile billboards on drivers' visual and cognitive attention

Task #7: Explore the possibility of creating incentives for motorists with safe driving records

Task #8: Create a multi-disciplined distracted driving work group that meets quarterly

Emphasis Area	Tasks	Safe Roads	Safe Users	Safe Speeds	Safe Vehicles	Post-Crash Care
Reduce Driver Distraction/ Improve Driver Alertness	Continue to focus on the use of rumble strips to address the issue of driver alertness	✓				
	Promote public safety measures to deter distracted driving		✓			
	Create education campaigns with direct outreach to teen/young adult drivers and adult drivers		✓			
	Review the effectiveness of Wisconsin's texting ban and the ability of law enforcement to enforce and properly report distracted driving		✓			
	Explore marketing and signage on roadways to remind drivers to stay alert and not to text and drive	✓				
	Keep abreast of research on the effects of different types of roadway signage, stationary billboards, vehicle technology, and mobile billboards on drivers' visual and cognitive attention	✓	✓			
	Explore the possibility of creating incentives for motorists with safe driving records		✓			
	Create a multi-disciplined distracted driving work group that meets quarterly	✓	✓	✓	✓	

Reduce Alcohol & Drug-Impaired Driving

Task #1: Improve data collection, sharing, and distribution

Task #2: Continue the communication program

Task #3: Focus on the prevention of impaired driving

Task #4: Promote transportation alternatives

Task #5: Continue overtime enforcement

Task #6: Streamline the OWI process

Task #7: Improve drugged driving recognition

Task #8: Continue to support Traffic Safety Resource Prosecutors

Task #9: Support the Intoxicated Driver Program

Task #10: Research lower allowable blood alcohol concentration (BAC)

Task #11: Increase compliance with ignition interlock devices (IIDs)

Task #12: Increase education related to impairment

Task #13: Continue quarterly impaired driving work group meetings

Tasks	Safe Roads	Safe Users	Safe Speeds	Safe Vehicles	Post-Crash Care
Improve data collection, sharing, and distribution		✓			
Continue the communication program		✓			
Focus on the prevention of impaired driving		✓			
Promote transportation alternatives				✓	
Continue overtime enforcement		✓			
Streamline the OWI process		✓			
Improve drugged driving recognition		✓			
Continue to support Traffic Safety Resource Prosecutors					✓
Support the Intoxicated Driver Program		✓			
Research lower allowable blood alcohol concentration (BAC)		✓			
Increase compliance with ignition interlock devices (IIDs)				✓	
Increase education related to impairment		✓			
Continue quarterly impaired driving work group meetings		✓			

Reduce the Incidence and Severity of Motorcycle Crashes

Task #1: Continue to develop and display public service announcements (PSAs) about motorcyclist safety

Task #2: Reduce the number of unlicensed riders

Task #3: Provide courses for riders to refresh their skills

Task #4: Market refresher courses to make them more desirable

Task #5: Quantify data to share information with riders and law enforcement agencies

Task #6: Involve law enforcement in reaching out to the public

Task #7: Continue quarterly meetings of the Motorcycle Safety Advisory Council (MoSAC)

		Safe Roads	Safe Users	Safe Speeds	Safe Vehicles	Post-Crash Care
Emphasis Area	Tasks					
Reduce the incidence and Severity of Motorcycle Crashes	Continue to develop and display PSAs about motorcyclist safety	✓	✓	✓	✓	
	Reduce the number of unlicensed riders		✓			
	Provide courses for riders to refresh their skills		✓		✓	
	Market refresher courses to make them more desirable		✓			
	Quantify data to share information with riders and law enforcement agencies	✓	✓	✓	✓	
	Involve law enforcement in reaching out to the public	✓	✓	✓	✓	
	Continue quarterly meetings of the Motorcycle Safety Advisory Council (MoSAC)	✓	✓	✓	✓	✓

Improve Non-Motorist Safety

Task #1: Use infrastructure and engineering treatments to improve the safety of non-motorist users

Task #2: Increase education for both motorists and non-motorists

Task #3: Use enforcement strategies to protect non-motorists

Task #4: Support public information campaigns

Task #5: Utilize road reconfigurations (i.e., road diets), speed reduction methods, and stop laws (yield vs. stop at crosswalks)

Task #6: Evaluate countermeasures for older pedestrians

Task #7: Create a work group that meets quarterly regarding non-motorist safety

Task #8: Develop "Road User" education for all modes aimed at improving knowledge of how to interact with other forms of transportation safety.

Task #9: Roll call training and education for Emergency Medical Services and Law Enforcement Agencies regarding pedestrian and bicycle safety.

Task #10: Develop a design/build VRU Safety audit team that can quickly design and construct VRU solutions.

Emphasis Area	Tasks	Safe Roads	Safe Users	Safe Speeds	Safe Vehicles	Post-Crash Care
Improve Non-Motorist Safety	Use infrastructure and engineering treatments to strengthen the safety of non-motorist users	✓				
	Increase education for both motorists and non-motorists		✓			
	Use enforcement to protect non-motorists		✓			
	Support public information campaigns	✓	✓	✓		
	Utilize road diets, speed reduction methods, and stop laws	✓		✓		
	Implement countermeasures for older pedestrians	✓	✓	✓		
	Create a work group that meets quarterly regarding non-motorist safety	✓	✓	✓	✓	✓
	Develop "Road User" education for all modes aimed at improving knowledge of how to interact with other forms of transportation safety.		✓			
	Roll call training and education for Emergency Medical Services and Law Enforcement Agencies regarding pedestrian and bicycle safety.					✓
	Develop a design/build VRU Safety audit team that can quickly design and construct VRU solutions.	✓	✓	✓		✓

Increase Occupant Protection

Task #1: Improve data and decision support

Task #2: Support knowledge development and knowledge sharing

Task #2: Continue Click It or Ticket and other High-Visibility Mobilization initiatives

Task #3: Develop best practice on occupant protection

Task #4: Continue the participation of external partners in the Seat Belt and Child Safety Seat Work Group

Task #5: Continue the federally required annual field observation safety belt use survey

Task #6: Work with child safety seat advocates to improve education for individuals and agencies that transport children

Task #7: Continue to have quarterly meetings of the occupant protection work group

		Safe Roads	Safe Users	Safe Speeds	Safe Vehicles	Post-Crash Care
Emphasis Area	Tasks					
Increase Occupant Protection	Improve data and decision support		✓		✓	
	Support knowledge development and knowledge sharing		✓		✓	
	Continue Click It or Ticket and other High-Visibility Mobilization initiatives		✓			
	Develop best practice on occupant protection		✓			
	Continue the participation of external partners in the Seat Belt and Child Safety Seat Work Group		✓		✓	
	Continue the federally required annual field observation safety belt use survey		✓			
	Work with child safety seat advocates to improve education for individuals and agencies that transport children		✓		✓	
	Continue to have quarterly meetings of the occupant protection work group		✓		✓	✓

Improve Safety of Intersections

Task #1: Improve data and decision support

Task #2: Support knowledge development and knowledge sharing

Task #3: Implement cutting-edge design and engineering countermeasures

Task #4: Implement proven intersection countermeasures

Task #5: Create a multi-disciplined work group on intersection safety

		Safe Roads	Safe Users	Safe Speeds	Safe Vehicles	Post-Crash Care
Emphasis Area	Tasks					
Improve Safety of Intersection	Improve data and decision support	✓	✓	✓		
	Support knowledge development and knowledge sharing	✓	✓	✓		
	Implement cutting-edge design and engineering safety inventions	✓				
	Implement intersection countermeasures focusing on older drivers	✓	✓			
	Create a multi-disciplined work group on intersection safety	✓	✓	✓	✓	✓

Reduce Lane Departure Crashes

Task #1: Develop and improve data and decision support systems for county/municipal and state engineering to reduce the incidence and severity of lane departure crashes

Task #2: Develop and implement a comprehensive program to reduce the incidence and severity of lane departure crashes

Task #3: Analyze and develop roadside and pavement strategies focusing on low-cost treatment for rural highways

Task #4: Evaluate lane departure countermeasures focusing on older drivers

Task #5: Create a multi-disciplined work group on lane departure crashes

Emphasis Area	Tasks	Safe Roads	Safe Users	Safe Speeds	Safe Vehicles	Post-Crash Care
Reduce Lane Departure Crashes	Develop and improve data and decision support systems for county/municipal and state engineering to reduce the incidence and severity of lane departure crashes	✓	✓	✓	✓	
	Develop and implement a comprehensive program to reduce the incidence and severity of lane departure crashes	✓				
	Analyze and develop roadside and pavement strategies focusing on low cost treatment for rural highways that are not state trunk highways	✓				
	Implement lane departure countermeasures focusing on older drivers	✓	✓			
	Create a multi-disciplined work group on lane departure crashes	✓	✓	✓	✓	✓

Improve Work Zone Safety

Task #1: Improve data and decision support

Task #2: Support knowledge development and knowledge sharing

Task #3: Implement cutting-edge design and engineering safety interventions. Expand use of smart work zone devices.

Task #4: Create a multi-disciplined work group on work zone safety

Emphasis Area	Tasks	Safe Roads	Safe Users	Safe Speeds	Safe Vehicles	Post-Crash Care
Improve Work Zone Safety	Improve data and decision support	✓	✓	✓	✓	✓
	Support knowledge development and knowledge sharing	✓	✓			
	Implement cutting-edge design and engineering safety interventions	✓				
	Create a multi-disciplined work group on work zone safety	✓	✓	✓	✓	✓

Curb Aggressive Driving/Reduce Speed-Related Crashes

Task #1: Increase targeted enforcement and strengthen the efficiency of prosecutions

Task #2: Increase innovative education and outreach

Task #3: Implement sound engineering practices as a defense against unsafe driving behavior

Task #4: Provide research and data to support sound policy making

Task #5: Evaluate speed limits on state and local roads

Task #6: Continue to have quarterly meetings of the aggressive driving work group

Emphasis Area	Tasks	Safe Roads	Safe Users	Safe Speeds	Safe Vehicles	Post-Crash Care
Curb Aggressive Driving/ Reduce Speed-Related Crashes	Increase targeted enforcement and strengthen the efficiency of prosecutions		✓	✓		
	Increase innovative education and outreach		✓	✓		
	Implement sound engineering practices as a defense against unsafe driving behavior	✓		✓		
	Provide research and data to support sound policy making	✓	✓	✓	✓	✓
	Establish rational speed limits on state and local roads	✓		✓		
	Continue to have quarterly meetings through the aggressive driving work group	✓	✓	✓	✓	✓

Improve Driver Performance (Teens, Older, and Competent)

Task #1: Examine driver licensing options and map the mobile and fixed sites

Task #2: Compare driver performance metric with other states

Task #3: Create a multi-disciplined work group to meet quarterly on driver performance

- Updated material
- Videos for training

Emphasis Area	Tasks	Safe Roads	Safe Users	Safe Speeds	Safe Vehicles	Post-Crash Care
Improve Driver Performance (Teens, Older, and Competent)	Examine driver licensing options and map the mobile and fixed sites		✓			
	Compare driver performance metric with other states		✓			
	Create a multi-disciplined work group to meet quarterly on driver performance	✓	✓	✓	✓	✓

Conclusion

Successful implementation of the SHSP requires the coordination of highway safety efforts at the federal, state, and especially local levels. Partnerships with local governments, the private sector, community organizations, and individual citizens. It will remain a critical component of WisDOT's highway safety efforts.

Appendix

November 2, 2023

Vulnerable Road User Safety Assessment October 5, 2023

Pursuant to the stipulations delineated in 23 U.S.C. 148 (I), as refined by the Infrastructure Investment and Jobs Act (IIJA), Public Law 117-58, also known as the “Bipartisan Infrastructure Law” (BIL), this document serves to outline the Vulnerable Road User Safety Assessment to be undertaken with in the purview of the Wisconsin Highway Safety Improvement Program (HSIP). This assessment critically evaluates the resent conditions of vulnerable road user safety in the state of Wisconsin and devises a forward -looking plan to bolster the safety of these individuals.

As defined by the Federal Highway Administration (FHWA) under the clauses of 23 U.S.C. 148 (a) and 23 CFR 490.205, a “vulnerable road user” encompasses non-motorists classified within the Fatality Analysis Reporting System (FARS) person attribute codes, namely pedestrians, bicyclists, other cyclists, and individuals utilizing personal conveyances. Highway workers on foot in work zones, Emergency First Responders are included in this categorization, attributed to their pedestrian status. It is imperative to note, however, that motorcyclists are explicitly excluded from this classification. Hence, vulnerable road users primarily consist of individuals who are walking, biking with or without electric motor assistance, or using other non-motorized or motorized means of transportation.

The Strategies Moving Forward from the assessment report, have been given due consideration by the Wisconsin DOT HSIP Program and incorporated into the SHSP section on Improving Non-Motorist Safety.

Vulnerable Road User Safety Assessment

FINAL REPORT, SUBMITTED 11-15-23



Acknowledgments

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Wausau MPO

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East-Central Wisconsin RPC

Tribal Organizations

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Ho-Chunk Nation
Sokaogon Chippewa Community
- Mole Lake Band
Menominee Indian Tribe of Wisconsin

Cities/Villages/Townships

City of Green Bay
City of Janesville
City of Madison
City of Milwaukee

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Wisconsin Bike Fed

Background

This document was prepared in support of the Wisconsin Department of Transportation Vulnerable Road User Safety Assessment. It contains previously compiled information about pedestrian safety in the state of Wisconsin, as well as new research conducted specifically for this assessment.

Information contained in this document is for planning purposes and should not be used for final design of any project. All results, recommendations, concept drawings, and commentary contained herein are based on limited data and information, and on existing conditions that are subject to change.



Preface

Background

Pursuant to the stipulations delineated in 23 U.S.C. 148(l), as refined by the Infrastructure Investment and Jobs Act (IIJA), Public Law 117-58, also known as the "Bipartisan Infrastructure Law" (BIL), this document serves to outline the Vulnerable Road User Safety Assessment to be undertaken within the purview of Wisconsin's Highway Safety Improvement Program (HSIP). This assessment critically evaluates the present conditions of vulnerable road user safety in the state of Wisconsin and devises a forward-looking plan to bolster the safety of these individuals. The assessment will be included as an appendix in the Wisconsin Strategic Highway Safety Plan.

Definition of Vulnerable Road User

As defined by the Federal Highway Administration (FHWA) under the clauses of 23 U.S.C. 148(a)(15) and 23 CFR 490.205, a "vulnerable road user" encompasses non-motorists classified within the Fatality Analysis Reporting System (FARS) person attribute codes, namely pedestrians, bicyclists, other cyclists, and individuals utilizing personal conveyances. Highway workers on foot in work zones are included in this categorization, attributed to their pedestrian status. It is important to note, however, that motorcyclists and horse drawn carriages are excluded from the VRU classification in this safety assessment. Hence, vulnerable road users primarily consist of individuals who are walking, biking with and without electric motor assistance, or using other non-motorized means of transportation.

Collaborative Approach

The preparation of this assessment involved consultations with stakeholders throughout Wisconsin, including numerous bureaus within the Wisconsin Department of Transportation, Metropolitan Planning Organizations, Regional Planning Commissions, cities, agencies, Tribal Governments, and participants involved in the development of Wisconsin's Active Transportation Plan. Together, we are striving for the ultimate goal of zero serious injuries and fatalities on Wisconsin's roadway network.



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Glossary (Acronyms)

<u>Acronym:</u>	<u>Term:</u>
ATP	Active Transportation Plan
EMS	Emergency Medical Services
ETC	USDOT Equitable Transportation Community Explorer
FARS	Fatality Analysis Reporting System
FHWA	Federal Highway Administration
FY	Fiscal Year (State of Wisconsin)
GIS	Geographic Information System Mapping
HIN	High-Injury Network
HISP	Highway Safety Improvement Program
KABCO	Crash Severity Index
MPO	Metropolitan Planning Organization
MUTCD	Manual on Uniform Traffic Control Devices
PHB	Pedestrian Hybrid Beacon
RPC	Regional Planning Commission
RRFB	Rectangular Rapid Flashing Beacon
RSA	Road Safety Audits
SHSP	Strategic Highway Safety Plan
SRTS	Safe Routes to School
SSPF	Safer Streets Priority Finder
STH	State Trunk Highway
STN	State Trunk Network
TOPS	Wisconsin Traffic Operations and Safety Laboratory
TSC	County Traffic Safety Commission
USDOT	United States Department of Transportation
VRU	Vulnerable Road User
VRU-SA	Vulnerable Road User Safety Assessment
WisDOT	Wisconsin Department of Transportation

SEE PAGE 70 FOR A COMPLETE
GLOSSARY OF TERMS

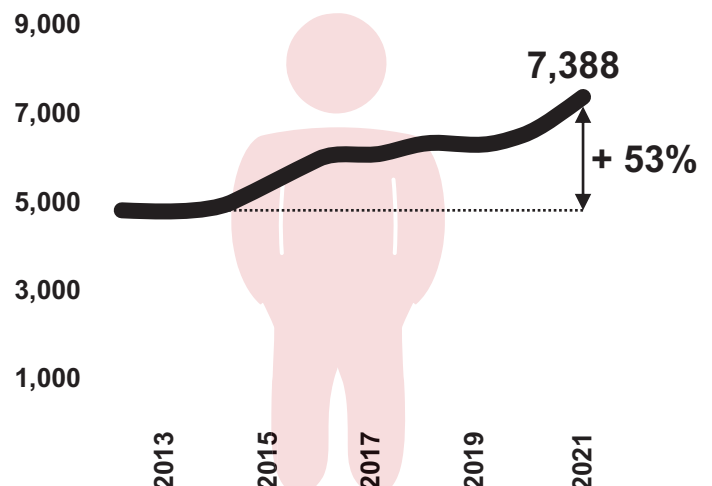
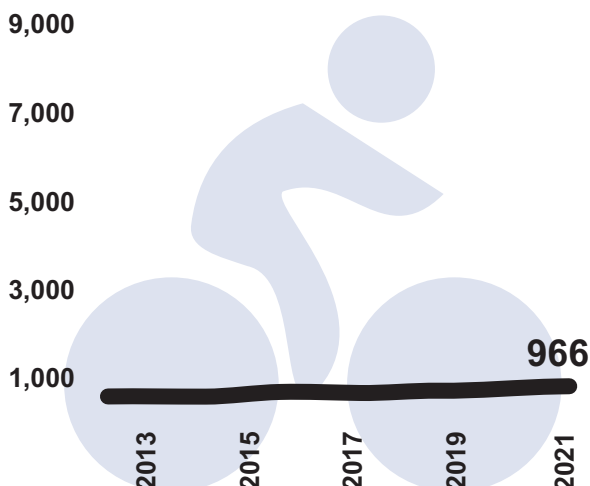
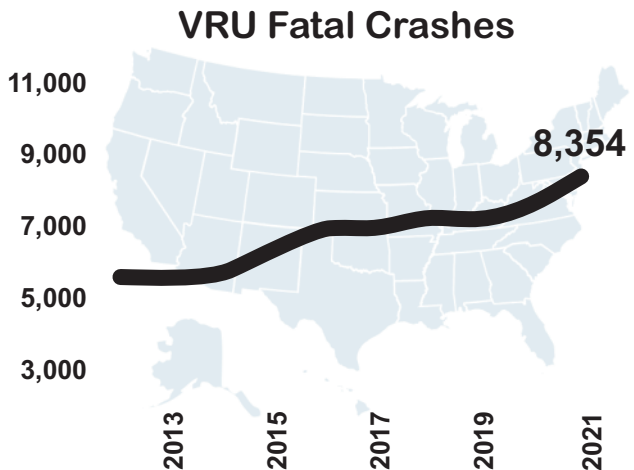
Introduction

Over the past decade, vulnerable road user (VRU) fatal crashes in the United States have exhibited a concerning upward trend.

Nationwide in 2012, there were 5,552 fatalities, and the number escalated to 8,354 in 2021. This persistent increase highlights the urgent need for comprehensive safety measures and collaborative efforts to reverse this alarming trend. In total, there have been 67,099 VRU fatalities in the United States in the past ten years.

In 2021, VRU fatalities made up 19.5% of all traffic fatalities nationwide, marking the third-highest percentage in the past decade, which is 0.2% less than the highest percentage in 2018. This included 7,388 pedestrian fatalities and 966 cyclist fatalities.

VRU fatalities are trending upwards for both pedestrians and cyclists, but is especially pronounced for pedestrians which have seen an increase in fatalities of 53% since 2012 nationwide.



Objective of Assessment

This page outlines the objectives and requirements of the completed Vulnerable Road User Safety Assessment (VRU-SA) in the state of Wisconsin. The purpose of this assessment was to comprehensively evaluate the safety of vulnerable road users and devise an equitable plan of strategies aimed at enhancing their safety. This assessment was guided by a data-driven approach that incorporated the principles of the Safe System Approach, as mandated by federal statutory and regulatory requirements (23 U.S.C. 148).

Data-Driven Approach:

The assessment utilized a data-driven process to identify areas with a high risk for vulnerable road users. This included performing a quantitative analysis of vulnerable road user fatalities and serious injuries, considering critical data points such as location, roadway functional classification, design speed, speed limit, and time of day. Demographic factors like race, ethnicity, income, and age were also considerations for a comprehensive evaluation.

Consultation of Stakeholders:

Consultation with stakeholders was a crucial component of the Vulnerable Road User Safety Assessment. The process included engaging with local governments, Metropolitan Planning Organizations (MPOs), and Regional Transportation Planning Commissions (RPCs). Tribal Governments, organizations affiliated with vulnerable road users, and various other stakeholders were also consulted regarding vulnerable road user safety.

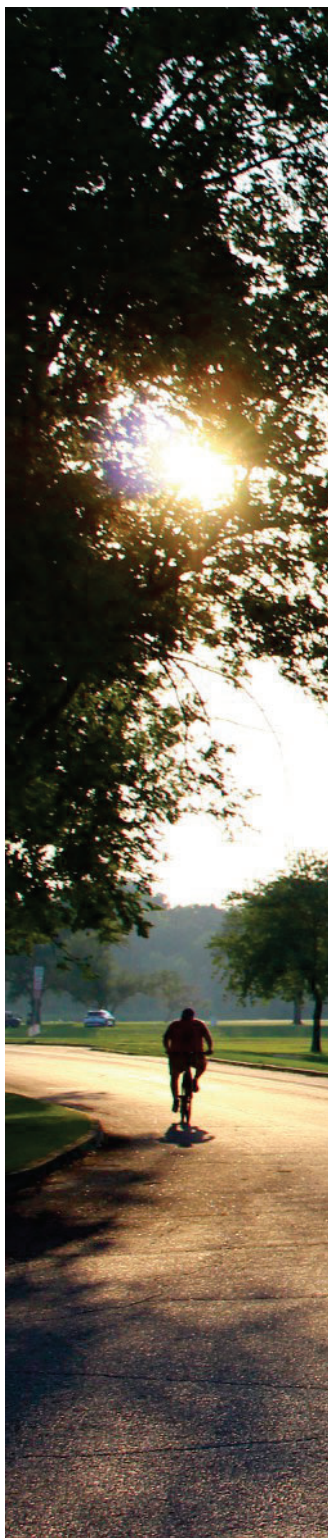
Components of Assessment:

The VRU-SA is comprised of several key components, including presenting historical trends in vulnerable road user fatalities and serious injuries, disaggregating trends by user type, comparing vulnerable road user safety performance to overall safety performance, assessing progress towards safety performance targets for non-motorized users, summarizing the outcomes of the consultation process, and providing a list of high-risk areas identified based on data and demographics.

This document outlines the comprehensive approach that Wisconsin undertook to assess and improve the safety of vulnerable road users. It adhered to federal statutory and regulatory requirements, emphasizing collaboration, data-driven analysis, and equity considerations to achieve safer roadways for vulnerable road users.



Structure of Document

**Chapter 2****Wisconsin VRU Crash Trends**

Historical review of the past ten years of VRU crash data in Wisconsin from 2013-2022.

Chapter 3**Fatal and Serious Injury Trends**

Fatal and serious injury VRU crash trends in Wisconsin from 2013-2022.

Chapter 4**Crash Type Investigation**

Detailed analysis of the types of crashes resulting in serious injury and fatalities for VRUs.

Chapter 5**Safe System Review**

A review of 2,048 serious injury and fatal VRU crash through the lens of the Safe System Approach.

Chapter 6**Stakeholder Consultation**

A summary of the various stakeholder consultations in this assessment ranging from surveys to meetings.

Chapter 7**VRU High-Risk Areas in Wisconsin**

Methodology and findings of the identification of High-Risk Areas for VRUs in the state of Wisconsin.

Chapter 8**Progress Towards Safety Targets**

Ongoing strategies and activities in Wisconsin for meeting safety targets.

Chapter 9**Strategies Moving Forward**

Recommended strategies to reduce the likelihood of serious injury and fatal VRU crashes in Wisconsin.

Wisconsin VRU Crash Trends

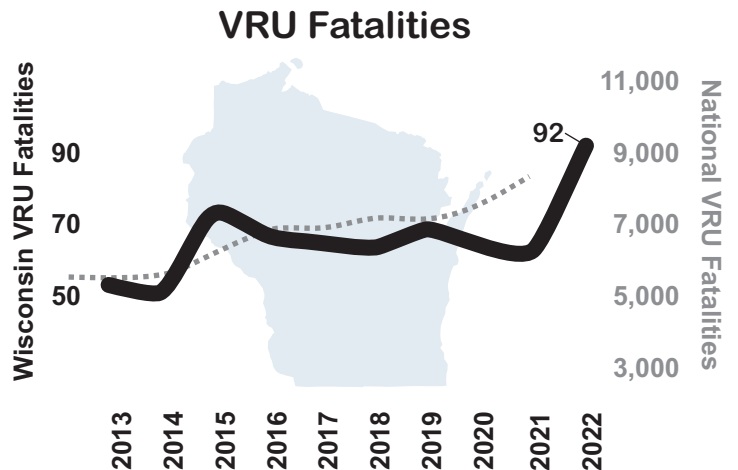


Over the past decade, Wisconsin vulnerable road user (VRU) fatal crashes have exhibited a concerning upward trend. Starting at 53 fatalities in 2013, the number escalated to 92 in 2022. This increase highlights the urgent need for comprehensive safety measures and collaborative efforts to reverse this alarming trend. In total, there have been 658 VRU fatalities in Wisconsin in the past ten years.

In 2021, VRU fatalities made up 15.6% of all Wisconsin traffic fatalities, marking the highest percentage in the past decade. This included 52 pedestrian fatalities and nine bicyclist fatalities.

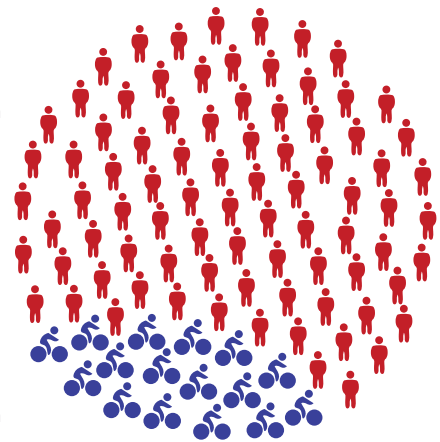
Eighty-four percent of VRU fatalities were pedestrians compared to 16% who were bicyclists.

VRU fatalities continue trending upwards, particularly due to the increased number of pedestrian fatalities over the past 10 years.

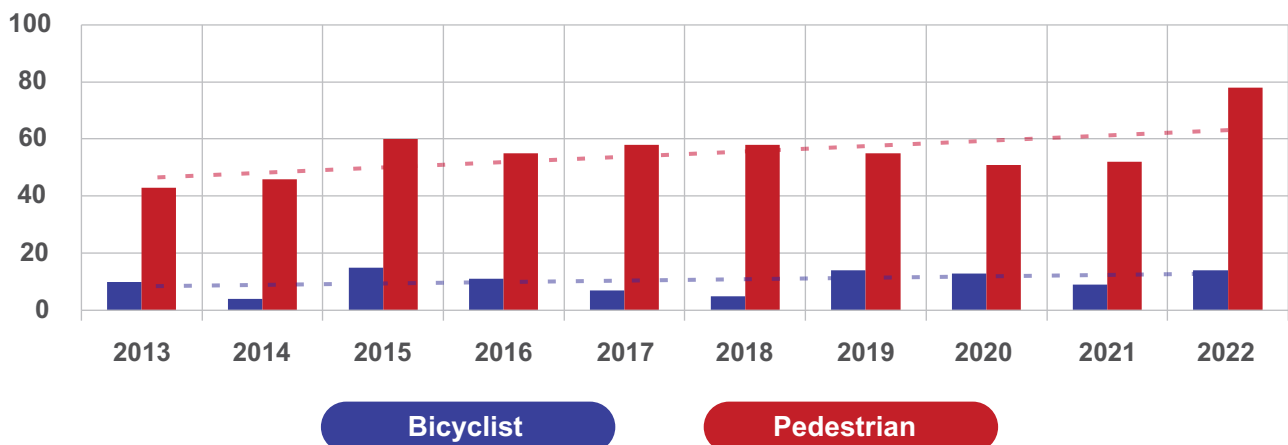


84%
Pedestrian
Total pedestrian
fatal crashes from
2013 thru 2022.

16%
Bicyclist
Total bicyclist
fatal crashes from
2013 thru 2022.



Bicyclist and Pedestrian Fatalities in Wisconsin

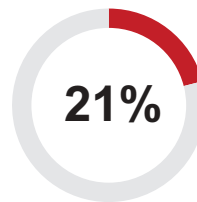


VRU Crash Severity

In the past 10 years, Wisconsin has observed a noticeable reduction in crashes involving VRUs. However, this positive trend is tempered by a persistent number of serious injury crashes and an increase in fatal crashes. VRU crashes are less likely to occur but the likelihood of severe injury or fatality is trending upward.

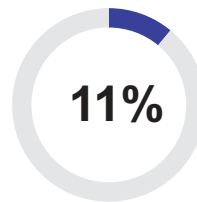
The data shows pedestrians involved in crashes are more likely to sustain serious injuries or fatalities compared to bicyclists.

Serious Injuries and Fatalities



Pedestrian

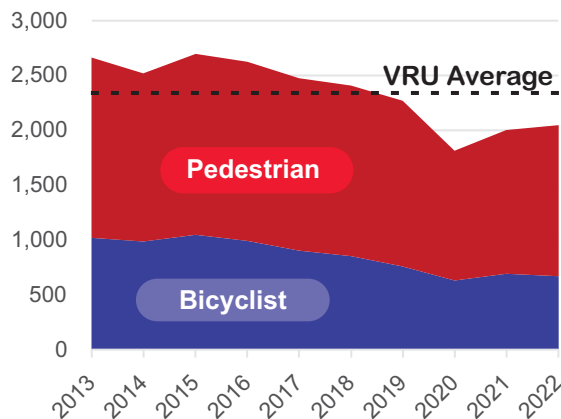
Of the 14,989 pedestrian crashes in the past 10 years, 21% resulted in serious injuries or fatalities.



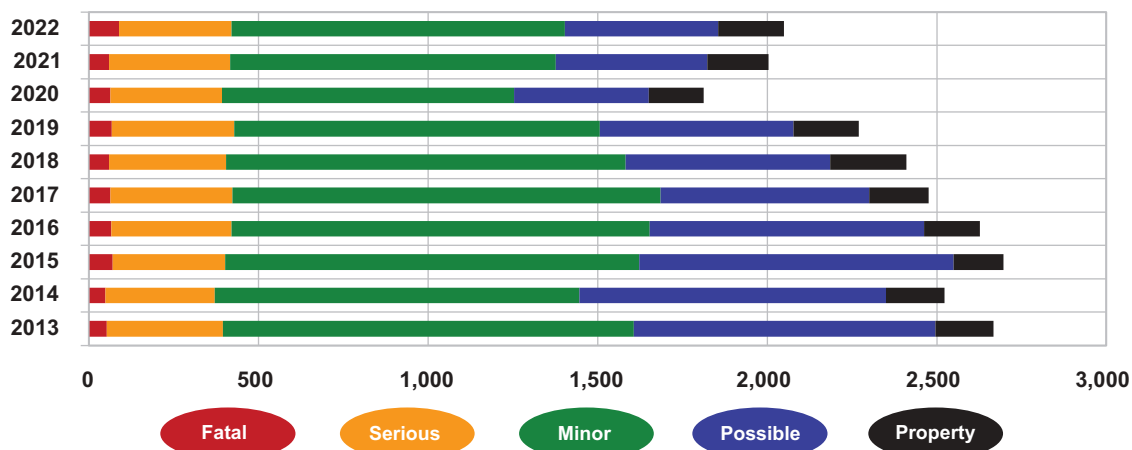
Bicycle

Of the 8,547 bicycle crashes in the past 10 years, 11% resulted in serious injuries or fatalities.

10 Year VRU Crash Totals



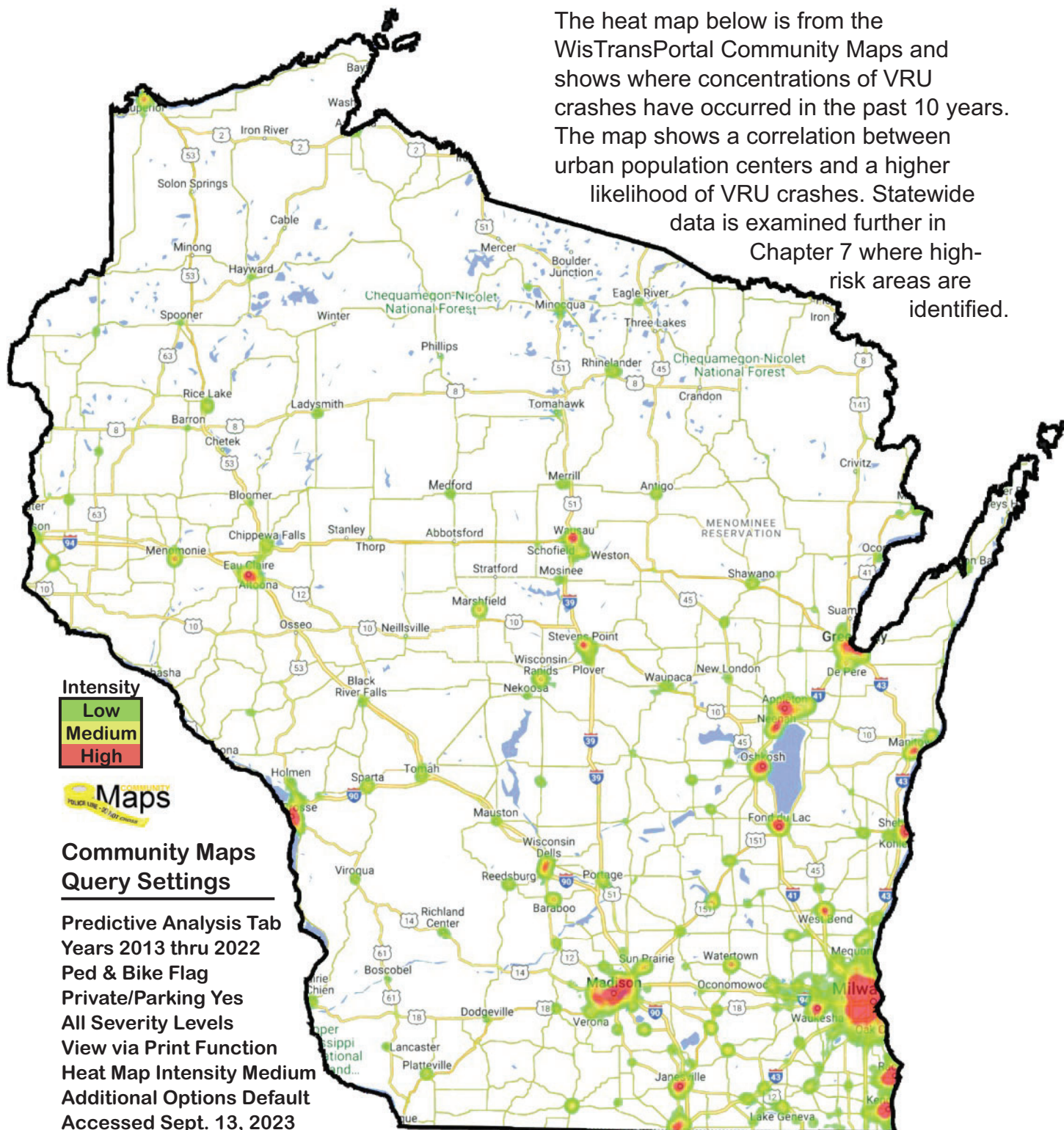
Wisconsin VRU Crash Severity Levels 2013 thru 2022





VRU Crash Locations

The heat map below is from the WisTransPortal Community Maps and shows where concentrations of VRU crashes have occurred in the past 10 years. The map shows a correlation between urban population centers and a higher likelihood of VRU crashes. Statewide data is examined further in Chapter 7 where high-risk areas are identified.

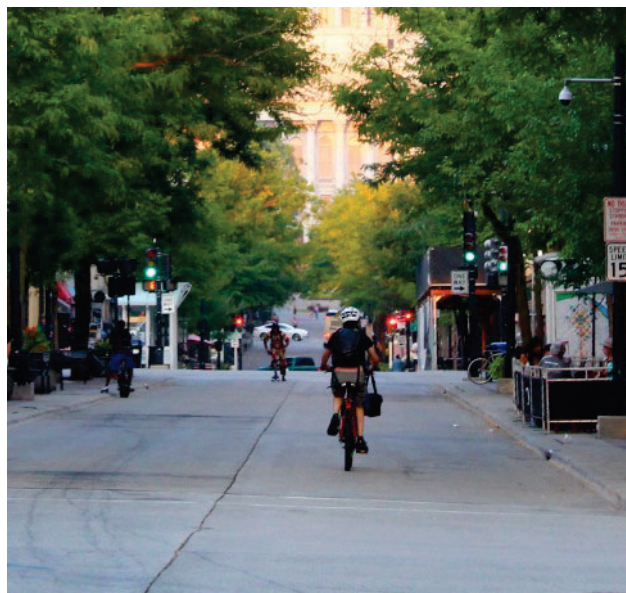
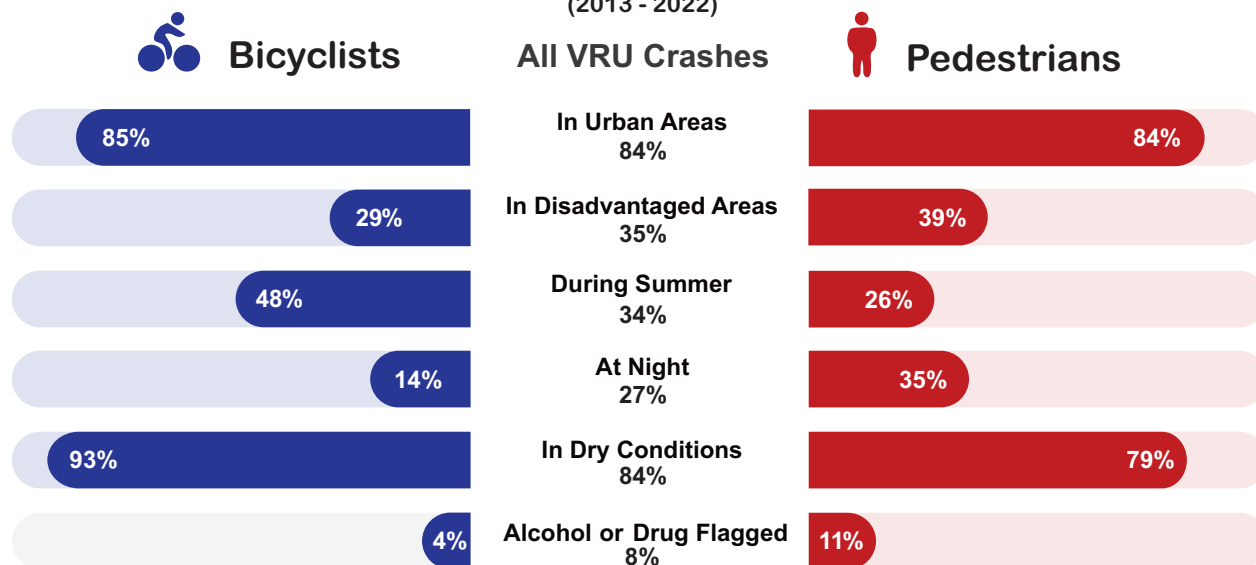


VRU Mode Comparison

In Wisconsin, 8,547 bicycle crashes were reported in the ten years from 2013 thru 2022. At least 3,470 of these crashes required medical transport for the injured person(s). Bicycle crashes tended to occur in urban areas and nearly half occurred during summer months. In comparison,

there were 14,989 pedestrian crashes. More than 8,000 required medical transports and compared to bicycle crashes, were more likely to occur at night, to occur during adverse weather conditions, and to be alcohol or drug related. A comparison graphic is provided below.

VRU Crash Characteristics (2013 - 2022)



In the next chapter, trends involving fatal and serious injury VRU crashes are explored and summarized.

Fatal and Serious Injury Trends

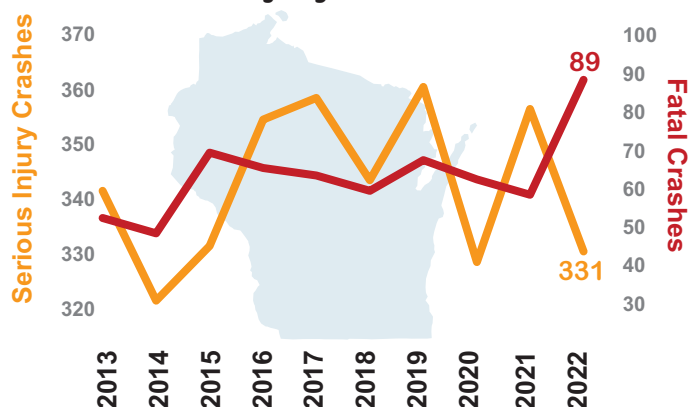
In the last 10 years, out of a total of 23,536 VRU crashes, 4,073 of the crashes were fatal (K-Level) or serious injury (A-Level) VRU crashes (17%). A breakdown showed a total of 641 fatal and 3,432 serious injury VRU crashes.

In 2022, K-Level crashes had a one-year increase of over 50% with a total of 89 pedestrian fatalities. On the other hand, A-Level crashes decreased in 2022.

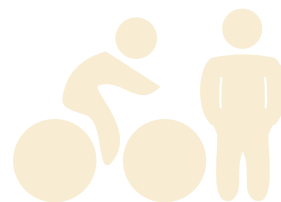
Compared to serious injury VRU crashes, fatal VRU crashes occurred more frequently at night and had a higher percentage of alcohol or drug involvement.

Serious injury crashes are more frequent in urban areas, and in dry conditions. In the past decade, 41.5% of the alcohol/drug flagged crashes resulted in K- or A-Level injuries, whereas only 17.3% of all crashes resulted in K- or A-Level injuries.

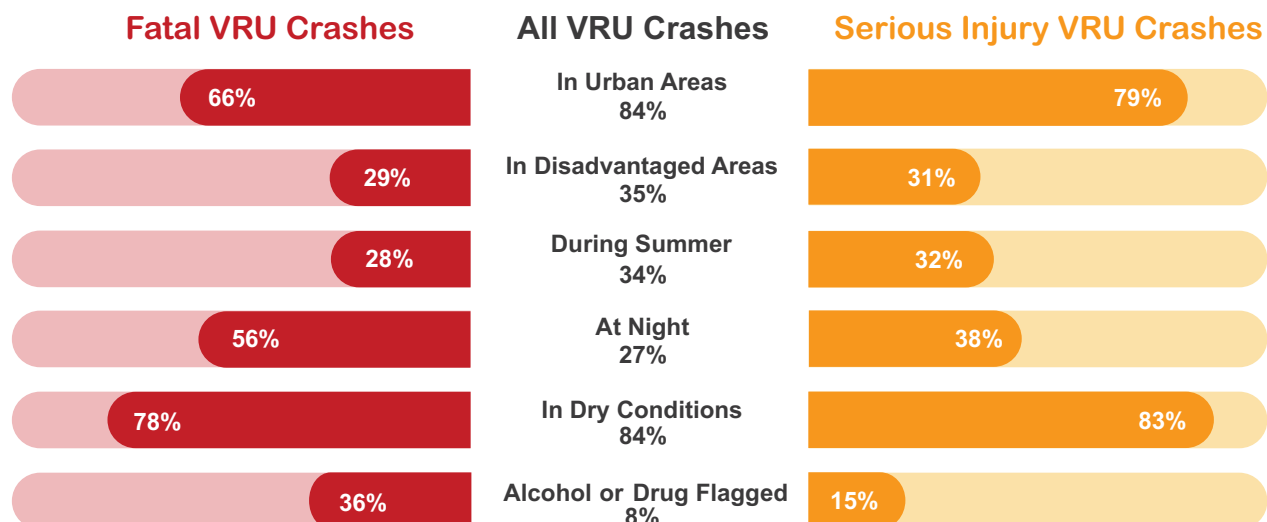
Wisconsin VRU Fatal & Serious Injury Crashes



The data shows that roadway type, demographics, crash location, speed, time of day, and alcohol/drugs all have a part of the likelihood of both K- and A-Level crashes. These categories will be further explored in the following pages in this chapter.



VRU Crash Characteristics
(2013 - 2022)



Roadway Type

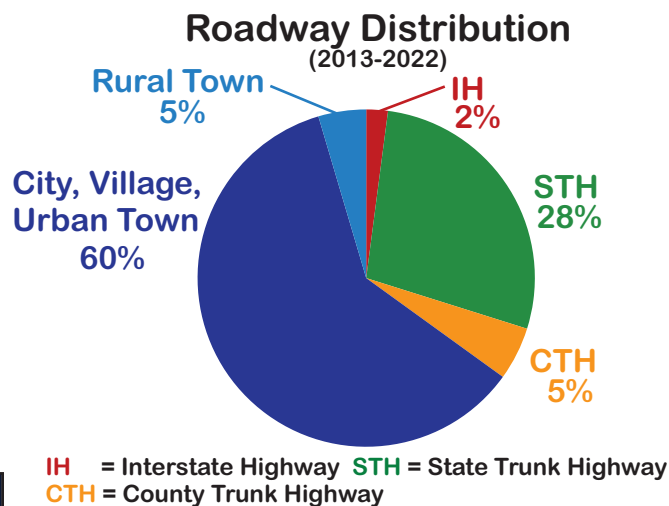
In Wisconsin, fatal and serious injury VRU crashes occur on all types of facilities ranging from private driveways to interstate highways. On public roadways, the largest proportion of such crashes are on city, village and urban town roads, which observed 60% of fatal and serious injury VRU crashes. State trunk highways (STHs) also observed a large proportion of fatal and serious injury VRU crashes with 28%.

(2013 - 2022)			
Jurisdiction	%	Fatal	Serious Injury
Urban - City	56.3%	247	1,768
Urban - STH	19.4%	145	550
Rural - STH	8.4%	86	213
Rural - CTH	4.8%	64	109
Rural - Town	4.6%	28	136
Rural - City	4.1%	12	136
Urban - IH	1.1%	15	26
Rural - IH	0.9%	20	13
Urban - CTH	0.3%	4	6
Total	100%	621	2,957

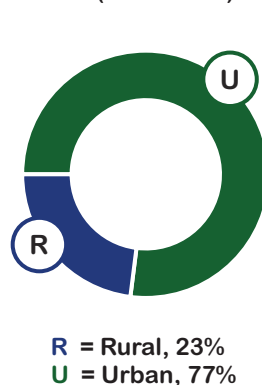
Beyond roadway classification, the state's fatal and serious injury VRU crashes occurred:

- 49% at non-intersections
- 39% at intersections
- 12% collectively at parking lots and private driveways

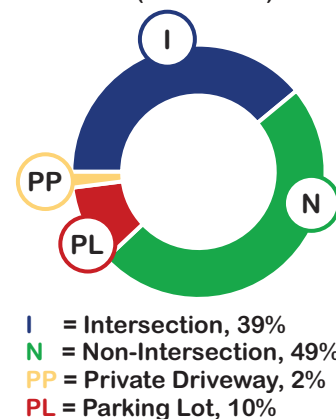
More than 75% of fatal and serious injury VRU crashes occurred in urban areas.



Urban vs Rural (2013-2022)



Location (2013-2022)



*Statistics are based on crash report data fields.



Demographics

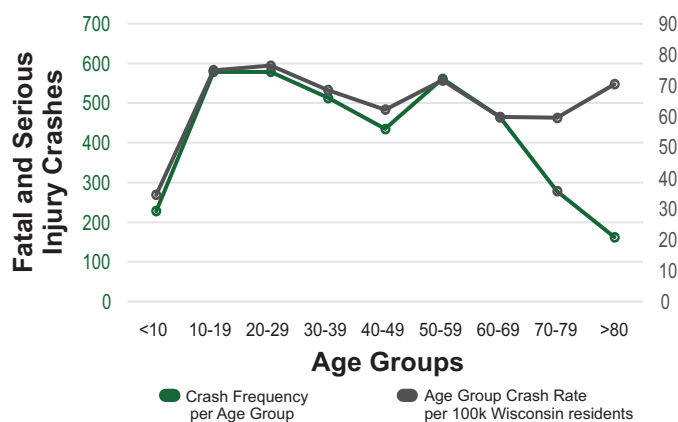
Demographically, analysis was completed to determine gender and age of VRU crash trends and is summarized on this page. Later in the assessment, disadvantaged area data is included in high-risk area analysis for VRUs and discussed in more detail (see Chapter 7).

Fatal & Serious Injury VRU Age Groups (2013-2022)

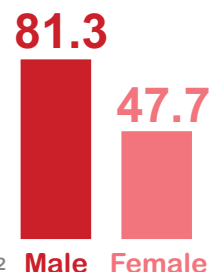
N/A (7%)	<10 (6%)	10-19 (14%)	20-29 (14%)	30-39 (13%)
40-49 (11%)	50-59 (14%)	60-69 (11%)	70-79 (7%)	>80 (4%)

Analyzing fatal and serious injury VRU crashes by age revealed the 10 to 29 year old age group to be the most likely individuals involved in such crashes and 30-59 year olds were not far behind. Also, while the frequency of individuals 70 years old or older involved in VRU crashes diminished, the crash rate increased, particularly for ages 80 or older, as shown below.

Fatal & Serious Injury (2013 - 2022)

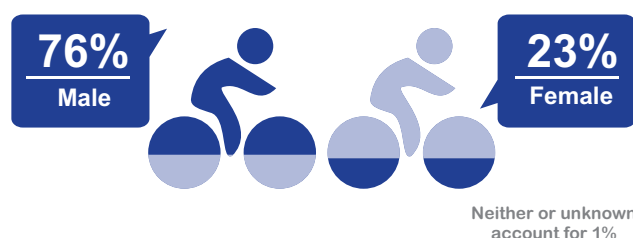


Fatal & Serious Injury Crash Rate

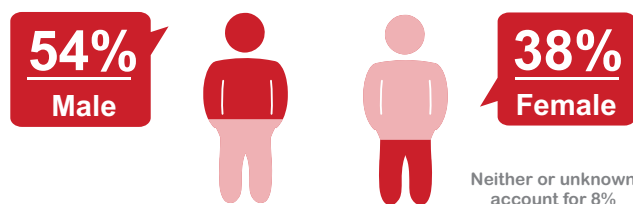


Overall, males were more likely to be involved in VRU crashes in Wisconsin both from a crash rate and crash frequency perspective. Males observed a crash rate 70% higher than that of females. From a mode split perspective, 76% of fatal and serious injury bicycle crashes involved a male bicyclist and at least 54% of fatal and seriously injured pedestrians were male.

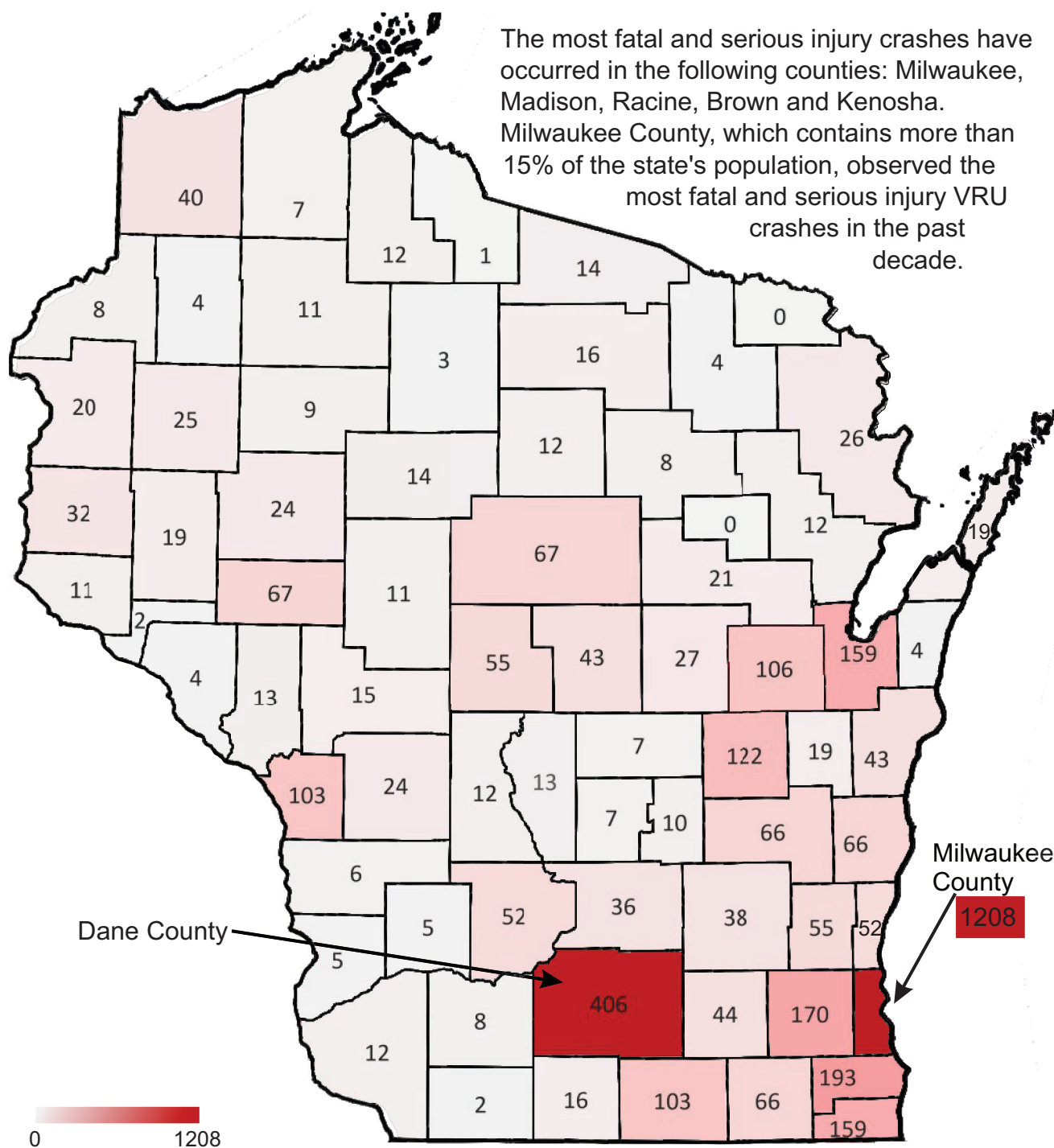
Fatal & Serious Injury Bicyclist Gender (2013-2022)



Fatal & Serious Injury Pedestrian Gender (2013-2022)



Fatal and Serious Injury VRU Crashes by County (2013 - 2022)



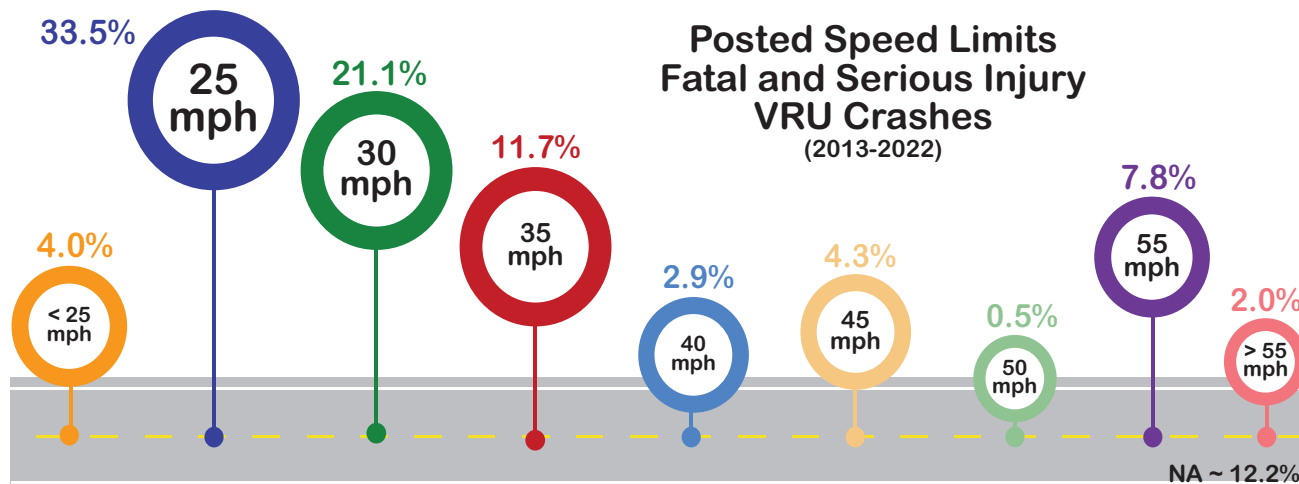
Speed

Vulnerable road users are in danger of being more severely injured as vehicle speed increases. Part of the increased risk is due to basic physics: if a vehicle's speed doubles, the kinetic energy of that vehicle quadruples. Twelve percent of fatal VRU crashes were coded as speed-related compared to 6% of serious injury VRU crashes.

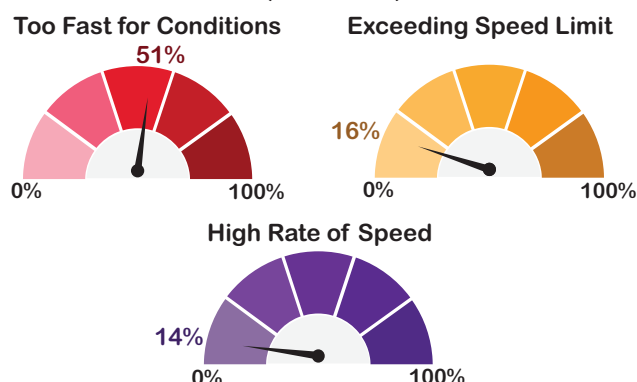
Speed-Related Fatal and Serious Injury VRU Crashes (2013-2022)



As for the posted speeds of roadways where VRU crashes occurred, the majority of fatal and serious injury VRU crashes occur on roadways posted 35 mph or less. These types of roadways tend to have more pedestrian and bicycle activity and direct interaction with motor vehicles. Thus, even on lower-speed facilities, VRUs are very susceptible to serious injuries and fatalities when struck by motor vehicles.

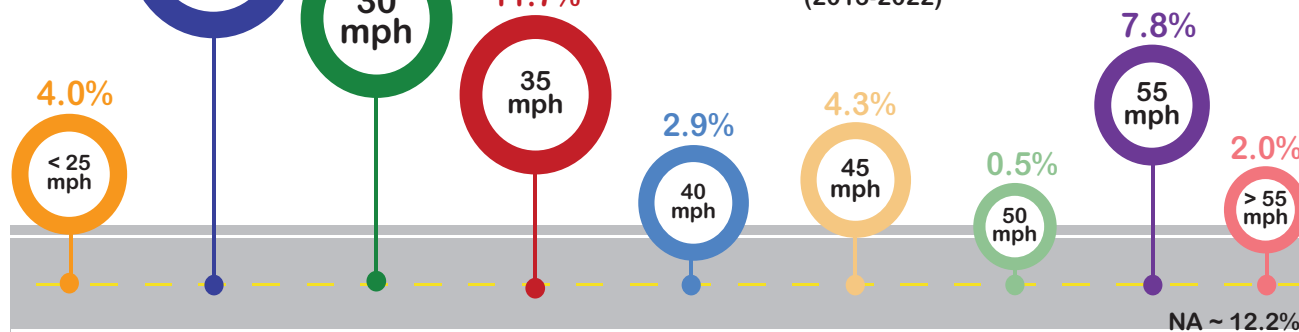


Motor Vehicle Speed-Related Fatal and Serious Injury VRU Crashes (2018-2022)



Drivers involved in speed-related VRU serious injury and fatal crashes were identified as driving too fast for conditions in 51% of crashes. Drivers exceeding the speed limit were noted in 16% of crashes, though this number is likely underreported due to the challenges of proving a driver in a crash was exceeding the speed limit. Regardless, the data shows drivers exceeding the appropriate speed for conditions is certainly a contributing factor in speed-related VRU fatal and serious injury crashes.

Posted Speed Limits Fatal and Serious Injury VRU Crashes (2013-2022)



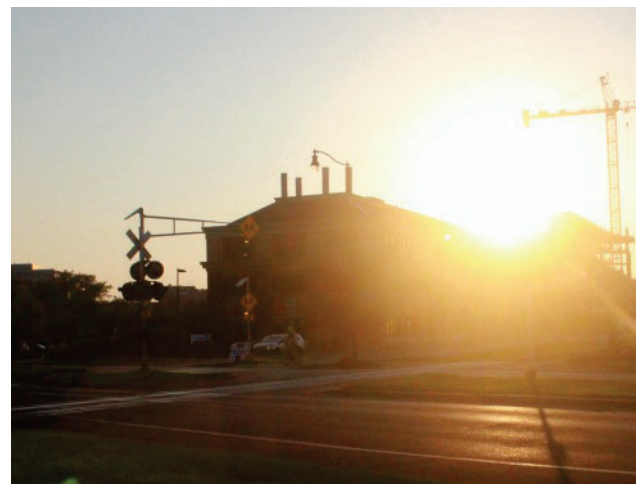
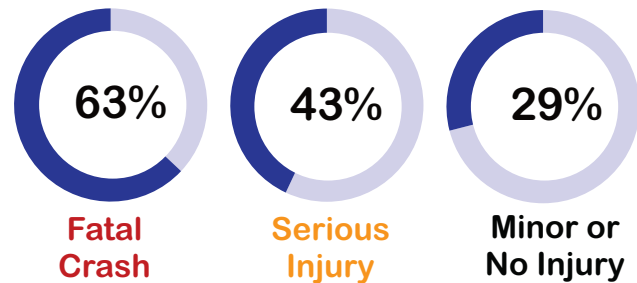
Time of Day

In general, motor vehicle volumes tend to be less during night-time hours as do VRU volumes. Thus, the high proportion of fatal and serious injury VRU crashes occurring at night is only partially indicative of the rates at which VRUs are killed or seriously injured in low-light and night-time conditions. A detailed chart is provided below showing the proportion of fatal and serious injury crashes during different light conditions.

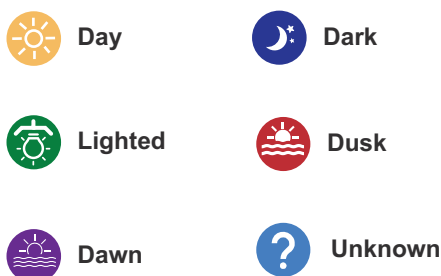
Time of day substantially correlates to the likelihood of fatal and serious injury outcomes in VRU crashes. Sixty-three percent of fatal VRU crashes, for instance, occurred during low-light or nighttime conditions compared to 29% of minor or no-injury crashes. Low-light or nighttime conditions include dusk, dawn, and both lit and unlit roadways at night.

There is a much larger risk of fatal crashes than serious injury or minor injury in non-daytime conditions. Below is a detailed breakdown of the light conditions.

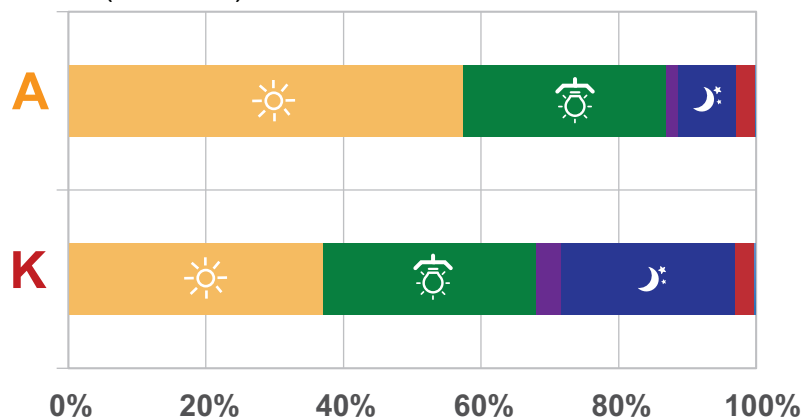
Percentage of Crash Type Crashes in Low-Light and Nighttime Conditions (2013-2022)



VRU Fatal (K) & Serious Injury (A) Crashes by Light Condition (2013-2022)



Note: A crash has "Lighted" conditions when it occurs night, but the roadway or intersection is lighted.



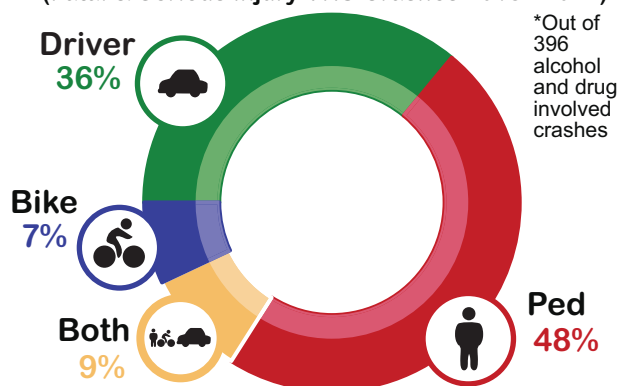
Alcohol / Drugs Overview

The involvement of alcohol and drugs in VRU crashes was thoroughly examined through a review of 2,048 fatal and serious injury VRU crash reports from 2018 through 2022. Directly from the reports, information on driver and VRU alcohol confirmation, alcohol suspicion, drug confirmation, and drug suspicion were found and tabulated.

For the purposes of this assessment, alcohol or drug “involved” refers to any crash where alcohol and/or drugs were either confirmed or were noted as being suspected whether over the legal limit or not.

Overall, 19% of fatal or serious injury VRU crashes involved alcohol and/or drugs. Of the 396 fatal and serious injury VRU crashes involving alcohol or drugs, nearly two-thirds of these crashes noted VRUs having alcohol and drug involvement. Drivers had alcohol or drug involvement in 45% of these crashes, meaning that nearly 10% of alcohol or drug involved crashes had both a driver and a VRU with alcohol and/or drugs involved.

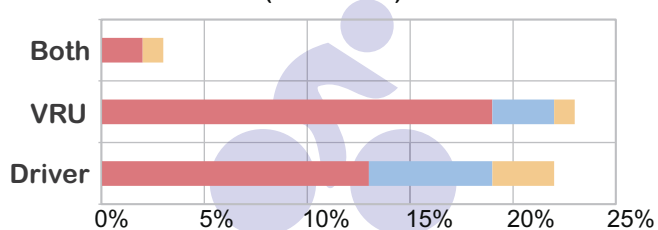
Total Alcohol & Drug Confirmations & Suspensions (Fatal & Serious Injury VRU Crashes 2018 - 2022)



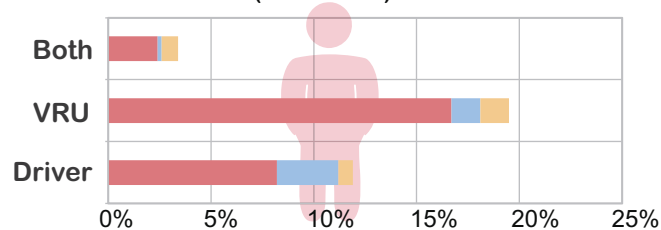
When looking specifically at pedestrian and bicyclist data for all VRU serious injury and fatal crashes, bicyclists had over 20% of drug or alcohol involvement and pedestrians had just less than 20%. Drivers were more likely to have drug or alcohol involvement in crashes with bicyclists than in crashes with pedestrians.

In numerous crashes, both the VRU and the driver had alcohol and drugs both suspected and/or confirmed.

Bicyclist Fatal & Serious Injury Crashes (2018-2022)



Pedestrian Fatal & Serious Injury Crashes (2018-2022)



01 Alcohol Confirmed or Suspected 02 Drug Confirmed or Suspected 03 Alcohol and Drug

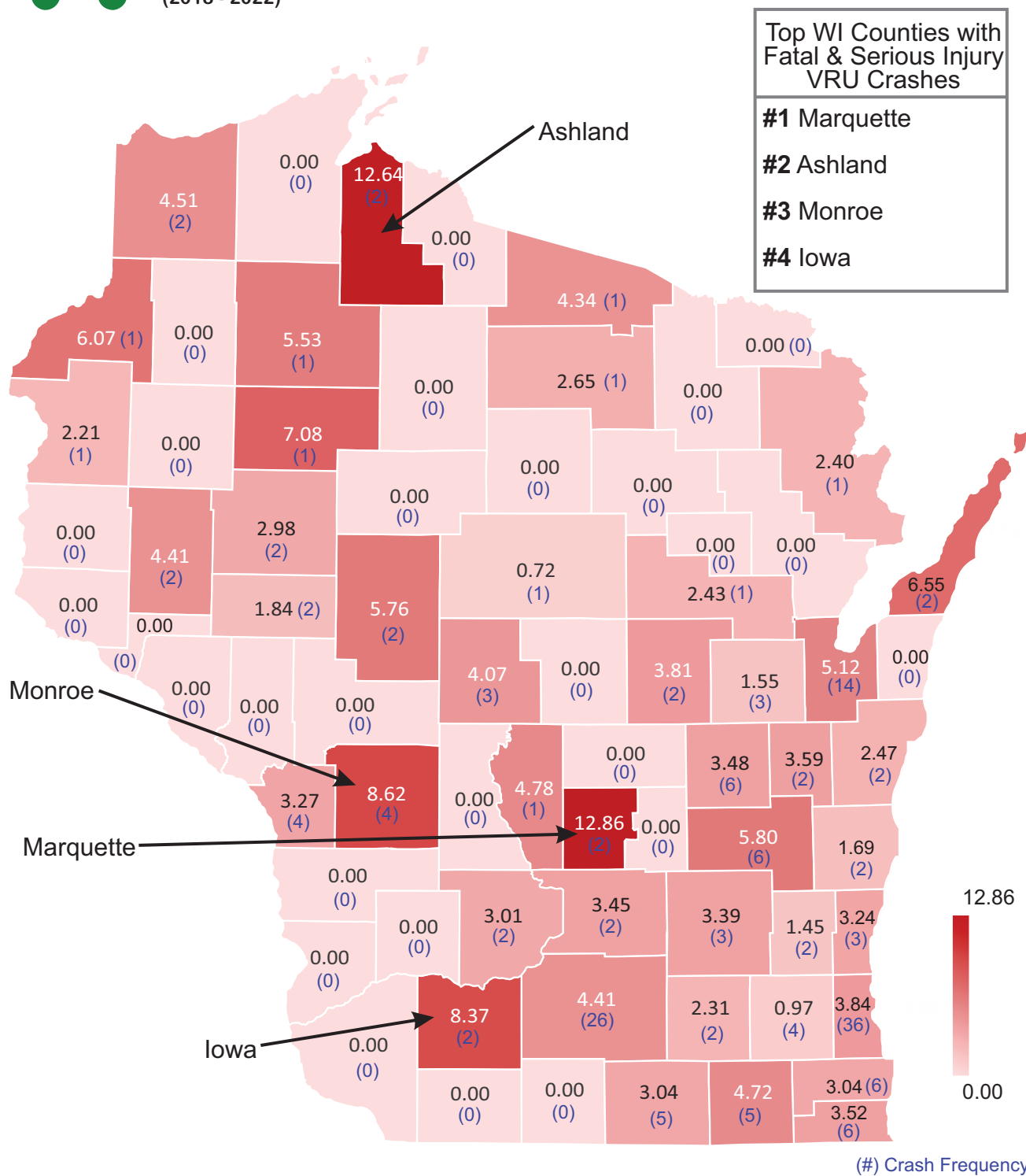
01 Alcohol Confirmed or Suspected 02 Drug Confirmed or Suspected 03 Alcohol and Drug

Alcohol / Drugs (Drivers)

Includes both suspected and confirmed cases of alcohol and/or drug use



Driver Alcohol / Drug
K- and A-Level Crashes per 100k Population in County
 (2018 - 2022)



Includes both suspected and confirmed cases of alcohol and/or drug use



Crash Type Investigation

The 2,048 fatal (K-Level) and serious injury (A-Level) VRU crashes occurring in Wisconsin from 2018 through 2022 were reviewed and classified as one of 114 crash type categories. The categories were based upon crash types cited in a previous study done in 2015.¹ Categories included crashes at intersections, non-intersections, parking lots (private property), and driveways.

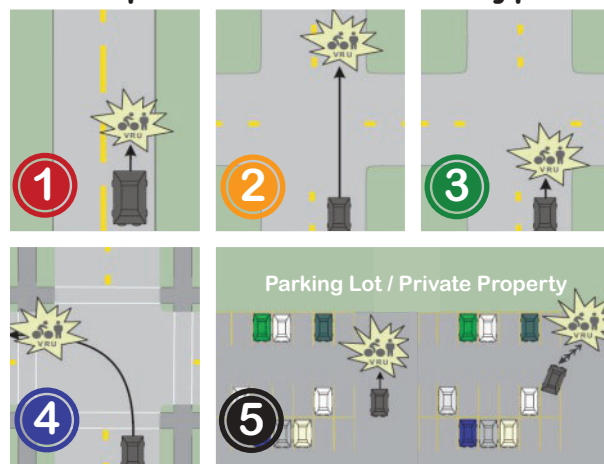
Graphical representations of the 114 categories are provided in Appendix A along with crash statistics and rankings by category.

The 114 categories are very granular (e.g. includes what direction the VRU was moving). Therefore, to identify broader improvement strategies, the crash types were grouped into 15 core categories and ranked by fatal and serious injury (K/A) crash frequency. The top five core crash types collectively observed 1,388 KA injury VRU crashes, or 65% of crashes reviewed.

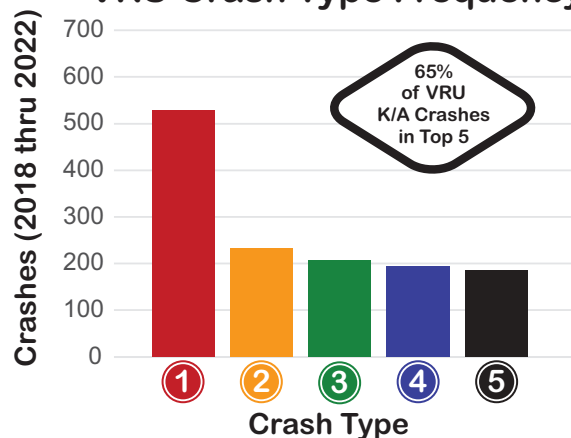
Crash type #1 was the most frequent crash type, encompassing more than one-quarter of all fatal and serious (K/A) injury VRU crashes in the past five years. The majority of crashes in this category occurred in low-light conditions with alcohol/drugs involved.

Failure to yield or disregarding traffic control contributed to many of the top crash types. Each of these five crash types is explored in further detail in this chapter.

Top 5 VRU K/A Crash Types



VRU Crash Type Frequency



#1 Straight-traveling motorist collides with VRU in right lane of roadway.

#2 Straight-traveling motorist collides with VRU in roadway on far side of intersection.

#3 Straight-traveling motorist collides with VRU in roadway on near side of intersection.

#4 Left-turning motorist collides VRU traveling in far crosswalk.

#5 Forward or backing motorist collides with VRU in parking lot / private property.

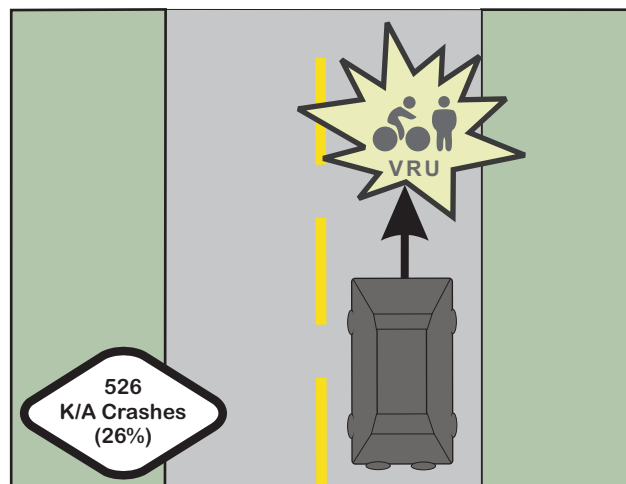
1

Schneider, Robert, Ph.D., AICP, and Joseph Stefanich. *Wisconsin Pedestrian and Bicycle Crash Analysis: 2011-2013*. University of Wisconsin-Milwaukee; Wisconsin Department of Transportation, Bureau of Transportation Safety, FINAL DRAFT, 1 Oct. 2015.

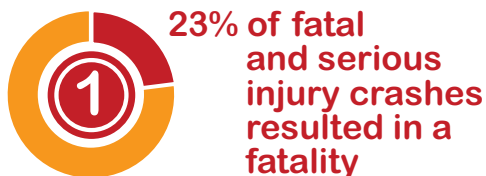
Predominant Crash Type #1

1 Straight-traveling motorist collides with VRU in right lane of roadway.

The most common VRU crash type was when VRUs were struck by straight-traveling motor vehicles in the travel lane. This crash type was more likely to result in a fatality than other VRU crash types that were reviewed. The higher fatality risk is partially due to the speeds of vehicles on roadways being higher than at intersections or parking lots.



Crash Type #1 Fatal & Serious VRU Injuries

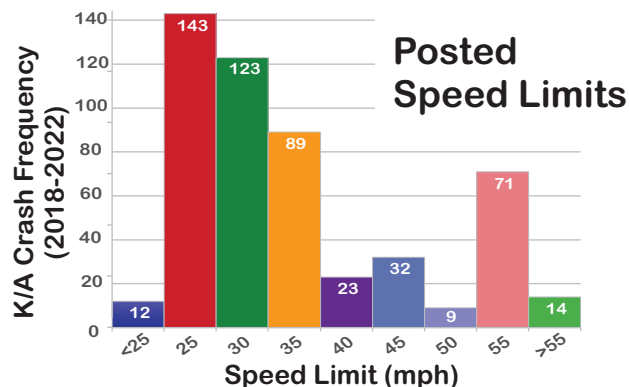


Crash Type #1 occurred in nighttime conditions in 60% of crashes which is 20% more often than other VRU crash types. Crashes in this category were also more likely to occur in rural areas.

VRU Did Not Appear to Have ROW

Crash Type #1 46%

In nearly half of the crashes, it appeared from the crash reports the VRU did not have the legal right-of-way (ROW). In this assessment, an attempt to cross without the legal right-of-way is referred to as an unauthorized crossing. More information about legal definitions is provided in the glossary under VRU Crossing Without Right-of-Way.



For Crash Type #1, the data shows that even on lower speed facilities, VRUs are experiencing high levels of serious injury and fatalities. Nearly 70% of the crashes were on roadways with a speed limit of 35 miles per hour (mph) or less.

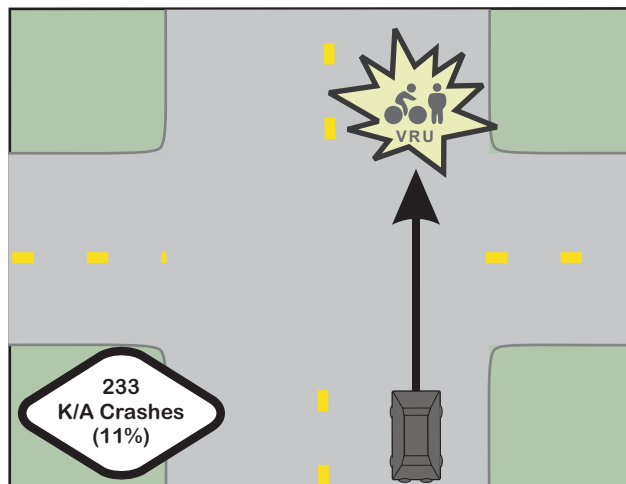
Nighttime crashes, lower speed limit facilities, and VRU roadway crossing in situations without the legal ROW are contributing factors to Crash Type #1. Potential countermeasures include more frequent crossings or directing VRUs to crossings with physical channelization, traffic calming, and improved street lighting.

Predominant Crash Type #2

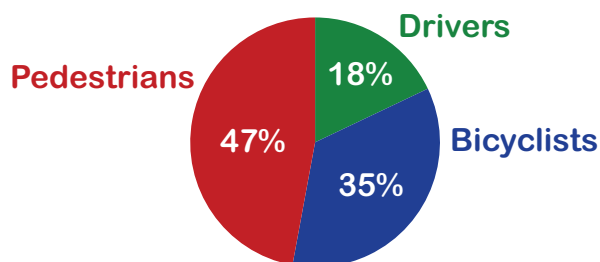
② Straight-traveling motorist collides with VRU in roadway on far side of intersection.

Crash Type #2 involves motor vehicle collisions with VRUs on the far side of an intersection. This crash type occurred 233 times from 2018 thru 2022.

Disregarding traffic control was a common occurrence in this crash type, occurring in nearly 40% of the crashes. This statistic includes VRUs crossing without the right-of-way and times when drivers or bicyclists ran stop signs or red lights.



Disregarded Traffic Control 106 Crashes (2018 - 2022)



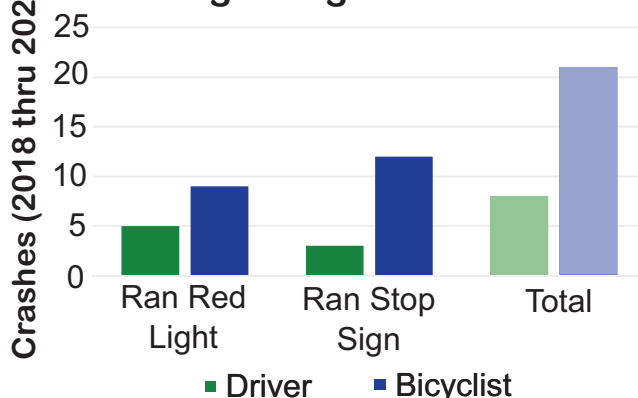
66 times
50 Pedestrians
16 Bicyclists
Crossing without right-of-way

21 times
Ran stop sign or red light

19 times
Ran stop sign or red light

Out of the 106 crashes, VRUs (pedestrians and bicyclists) disregarded the traffic control 82% of the time with drivers disregarding traffic control 18% of the time. In 66 instances, either a pedestrian or bicyclist crossed when they did not have the right-of-way, predominantly at traffic signals during Do-Not-Walk phases.

Bicyclist Crashes Involving Disregarding Traffic Controls



In vehicle versus bicycle crashes categorized as Crash Type #2, bicyclists disregarded traffic control 2.6 times more often than vehicle drivers. Bicyclists ran more stop signs, while drivers more frequently ran red lights. The intersection types were mostly traffic signals and stop signs.

Crash Type #2 is a crash type that has numerous countermeasures spanning education, training, enforcement, vehicle technology, and infrastructure.

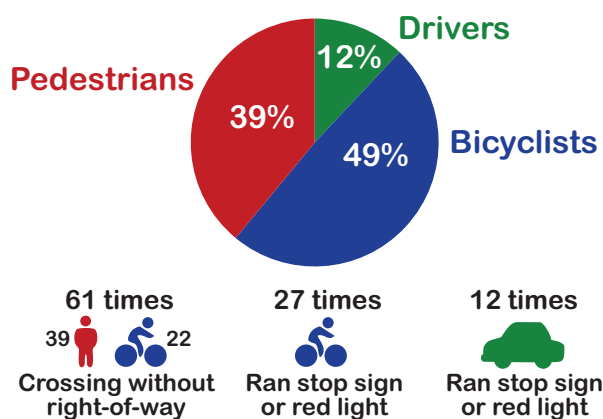
Predominant Crash Type #3

③ Straight-traveling motorist collides with VRU in roadway on near side of intersection.

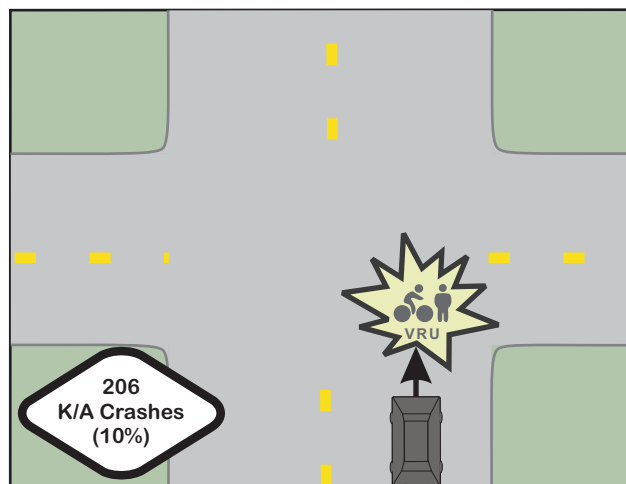
Crash Type #3 involves motor vehicle collisions with VRUs on the near side of an intersection. Crash Type #3 occurred 206 times from 2018 thru 2022.

As was the case with Crash Type #2, disregarding traffic control was a common occurrence for Crash Type #3. Disregarding traffic control was noted in 49% of all Crash Type #3 crashes. This statistic includes VRUs crossing without the right-of-way and times when bicyclists or drivers ran stop signs or red lights.

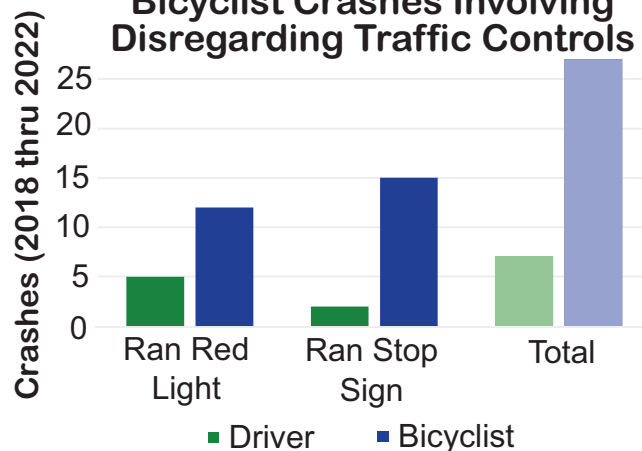
Disregarded Traffic Control 100 Crashes (2018 - 2022)



In Crash Type #3 crashes, 61 times either a pedestrian or bicyclist crossed when they did not have the right-of-way. This generally occurred at traffic signals during Do-Not-Walk phases.



Bicyclist Crashes Involving Disregarding Traffic Controls



On average 20% of all fatal and serious injury VRU crashes involved a bicyclist. However, Crash Type #3 was particularly hazardous with 39% of K/A crashes involving a bicyclist. Due to the near-side location of the crashes, there may have been less reaction time for drivers and bicyclists to avoid collisions.

There are numerous countermeasures that can be used to mitigate Crash Type #3: education/training, enforcement, vehicle technology, and improved infrastructure.

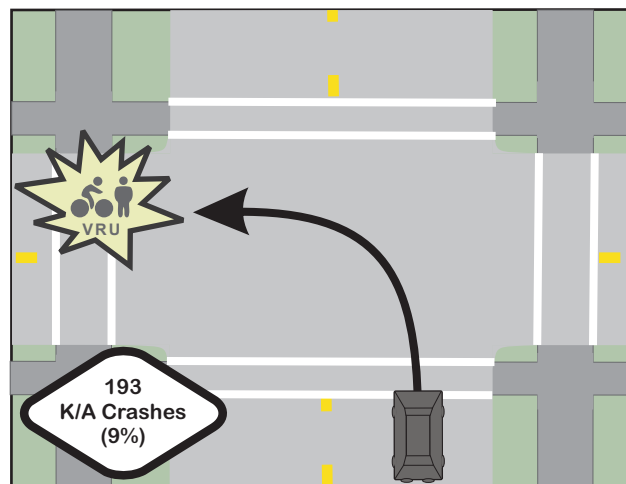
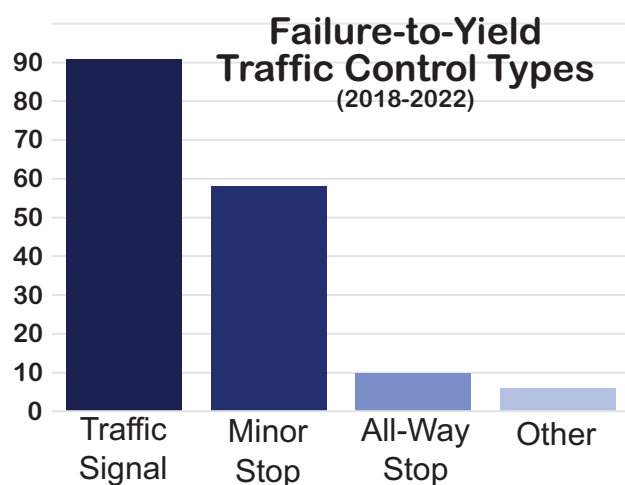
Predominant Crash Type #4

④ Left-turning motorist collides with VRU traveling in far crosswalk.

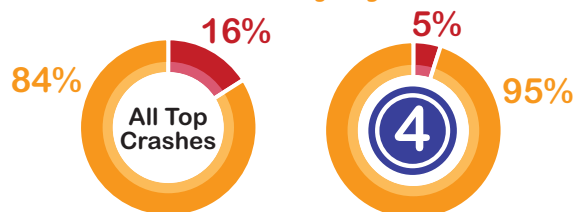
Crash Type #4 involves left-turning motor vehicle collisions with VRUs in the far crosswalk. This crash type resulted in K/A outcomes 193 times from 2018 thru 2022.



In this crash type, 165 out of 193 drivers failed-to-yield while turning left. Failure to yield can be a common occurrence at traffic signals with permissive left-turn movements, but also occurs at stop controlled intersections. The 165 failure-to-yield crashes were categorized by traffic control type in the graphic below.



Fatal & Serious Injury VRU Crashes



Crash Type #4 crashes had proportionally fewer fatalities than the average VRU crash. This may be due to the lower speeds of left-turning traffic as opposed to other VRU crash types which might involve vehicles traveling at, or higher than, the posted speed limit.

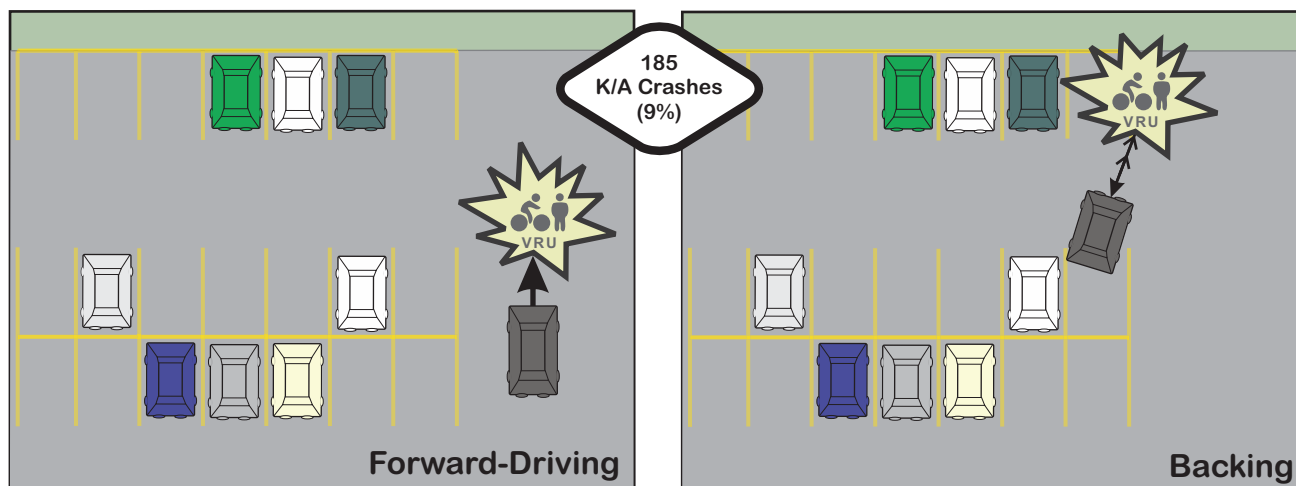
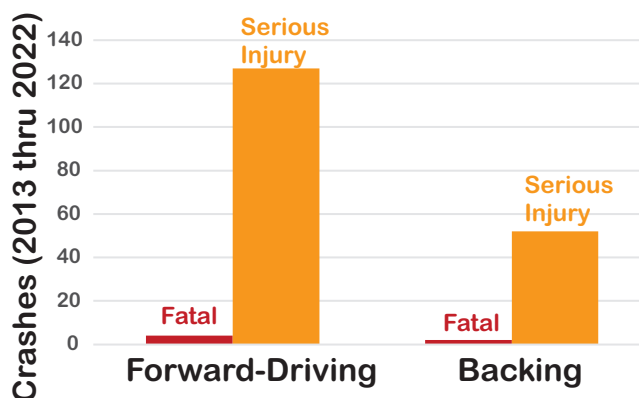
At traffic signals, there are options to reduce the likelihood of left-turn conflicts with VRUs in the far crosswalk through signal infrastructure or signal timing changes. Stop-controlled intersections present different challenges since road users largely control the movements. However, improving crosswalks (e.g., high-visibility markings or curb extensions) and street lighting improvements can help mitigate Crash Type #4 at stop-control intersections.

Predominant Crash Type #5

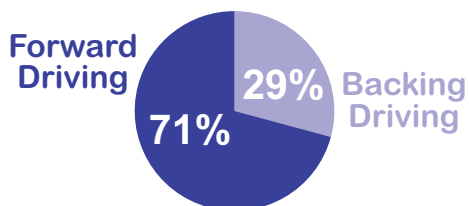
⑤ Forward-traveling or backing motorist collides with VRU in parking lot or on private property.

Crash Type #5 involves collisions with VRUs in parking lots or private property by forward traveling or backing motorists. In this crash type, A-Level crashes occurred 97% of the time with the remaining 3% resulting in fatalities. The majority of these crashes took place in the daytime and involved forward driving-vehicles.

Parking Lot/Private Property Crashes



Driver Actions
(2018-2022)



Seventy-one percent of the parking lot and/or private property crashes were from forward-traveling vehicles, and 29% of the drivers were traveling backward.

Light Conditions
(2018-2022)



The light condition data shows only 8% of Crash Type #5 crashes occurred where no or poor lighting was a contributing factor. This might be indicative of less activity and potentially better lighting on private property during nighttime hours.

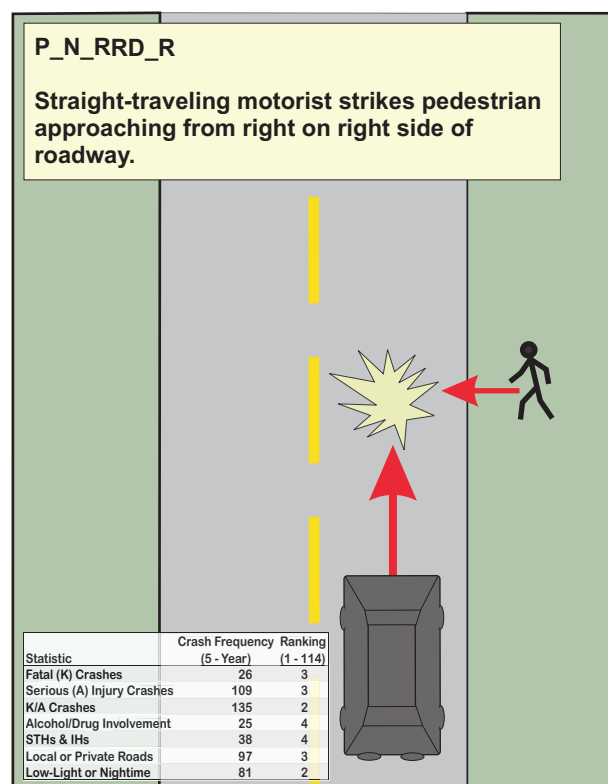
Specific Crash Types

As discussed previously, a very specific examination was performed regarding crash type with a total of 114 individual categories. The previous pages discussed the top five core categories but did not discuss the individual specific categories.

On this page, the top pedestrian and top bicyclist crash categories are discussed and illustrated below.

The top VRU categories are:

- pedestrians (P_N_RRD_R)
- bicyclists (B_I_NS_ST_L).

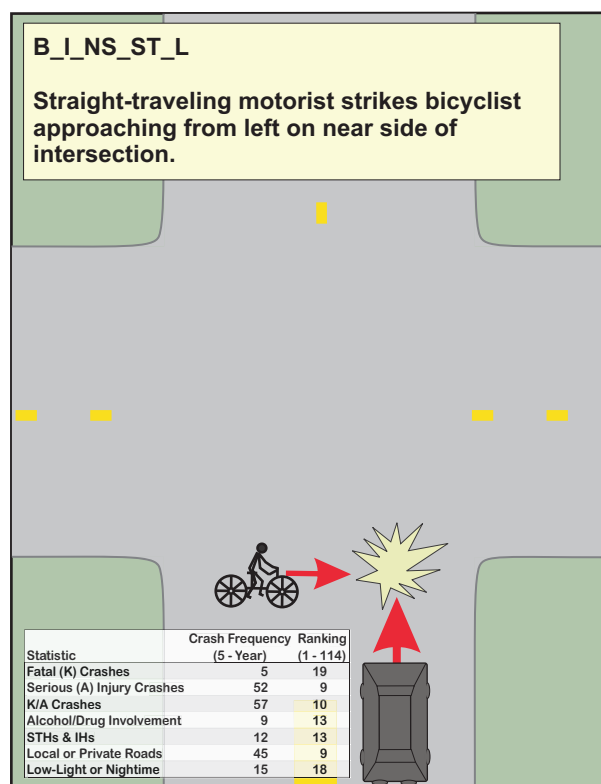


The most common crash type for pedestrians was collisions on a roadway where the pedestrian was approaching from the right side of the road. This crash type was a high-ranking category for fatal crashes, serious injury crashes, alcohol and drug involvement, and nighttime conditions.

The P_N_RRD_R category also commonly occurred on both state highway facilities and local roads.

The most frequently occurring bicycle crash was category B_I_NS_ST_L, which was a collision between a straight-traveling motorist at the near-side of an intersection with a bicyclist approaching from the left.

This crash type was more likely to occur on local roads (45 of 57 B_I_NS_ST_L crashes occurred on local roads).



The most common crash types were discussed in this chapter. Appendix A contains a complete listing of crash types and crash frequency statistics. In the next chapter, a detailed look at fatal and serious injury VRU crashes is provided through the lens of the Safe System Approach.

Safe System Review

The Federal Highway Administration's (FHWA) principles of pursuing the goal of eliminating deaths and serious injuries on our nation's roads recognize the Safe System Approach as integral to reaching this goal. The Safe System Approach is predicated on six key principles:

1. Death/serious injuries are unacceptable.
2. Humans make mistakes
3. Humans are vulnerable.
4. Responsibility is shared.
5. Safety is proactive.
6. Redundancy is critical.

Based on these principles, the Safe System Approach includes five major objectives: safe road users, safe vehicles, safe speeds, safe roads, and better post-crash care.

The safe road users objective prioritizes the ability of those who use the road to reach their destination unharmed. It also focuses on people driving and acting responsibly.

The safe roads objective aims to design roadway environments to mitigate human mistakes and account for injury tolerances, encourage safer behaviors, and facilitate safe travel by the most vulnerable users. Improved visibility, designated pedestrian and bicycle facilities, and improved geometric design are examples of roadway safety improvements.

Safe vehicles can be described as expanding the availability of vehicle systems and features that help prevent crashes and minimize the impact of crashes on both occupants and non-occupants.



Source: FHWA

Safe speeds can be reached through a combination of thoughtful, context-appropriate roadway design, appropriate speed-limit setting, targeted education, outreach campaigns, and enforcement.

Post-crash care can be enhanced through timely access to emergency medical care, a safe environment for vital first responders and prevention of secondary crashes. Post-crash care includes the time it takes to contact emergency personnel after a crash occurs to the care received in a medical facility if necessary.

In this study, over 2,000 crash reports involving fatal (K-level) or serious injuries (A-level) to VRUs in Wisconsin from 2018 through 2022 were reviewed through the lens of the Safe System Approach. Both deficiencies and countermeasures within the Safe System Approach were explored. The remainder of Chapter 5 discusses the findings of this analysis.

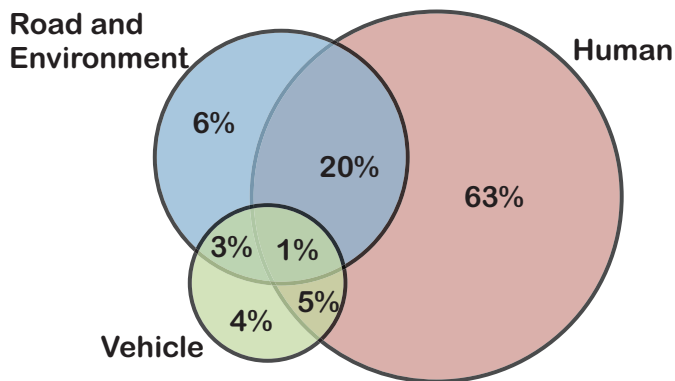
Overview of Results

The results of the crash report review show a variety of factors contributing to crashes, which are grouped into three major categories:

1. Human factors,
2. Road/Environment factors, and
3. Vehicle factors.

The Wisconsin 2017-2020 Strategic Highway Safety Plan (SHSP) discusses the contributing factors to all vehicle crashes and provides an example Venn diagram illustrating how the factors interact.

Contributing Factors to Traffic Fatalities



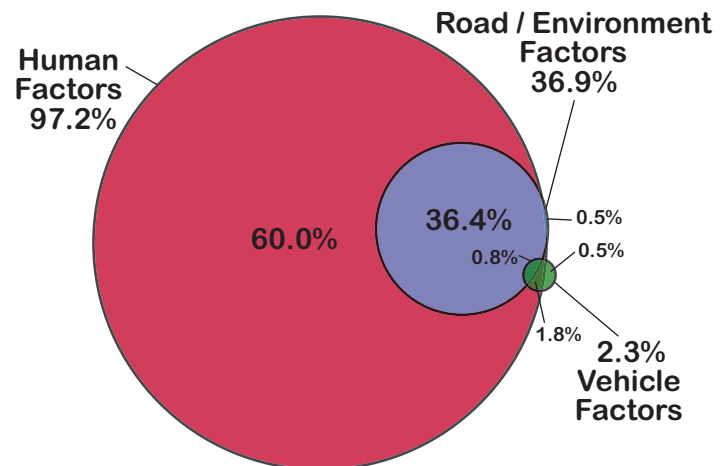
Source: Wisconsin 2017-2020 Strategic Highway Safety Plan

As displayed in the graphic above, traffic crashes resulting in fatalities tend to have more human contributing factors than road/environmental and vehicle factors. But, in many cases, these factors overlap as is the case with humans and road/environment, which were both factors in 20% of crashes.

Understanding these relationships can help lead to more effective strategies for reducing the number and severity of crashes.

In this VRU safety assessment, over 2,000 fatal and serious injury VRU crash reports were thoroughly reviewed. This review of VRU crashes enabled the creation of a Venn diagram with contributing factors for fatal and serious injury VRU crashes in Wisconsin. The main difference between the VRU Venn diagram and the all-crash Venn diagram from the SHSP is that human and roadway / environmental factors tended to play a larger role in VRU crashes than in fatal crashes in general.

Contributing Factors to Serious Injury and Fatal VRU Crashes (2018 - 2022)



In VRU crashes, there were comparatively fewer crashes where the road/environment was the sole factor. There was also more overlap of road/environmental factors with human factors.

The remainder of this chapter explores the contributing factors leading to serious injury and fatal VRU crashes in Wisconsin through the lens of the Safe System Approach.

Overview of Results (Cont.)

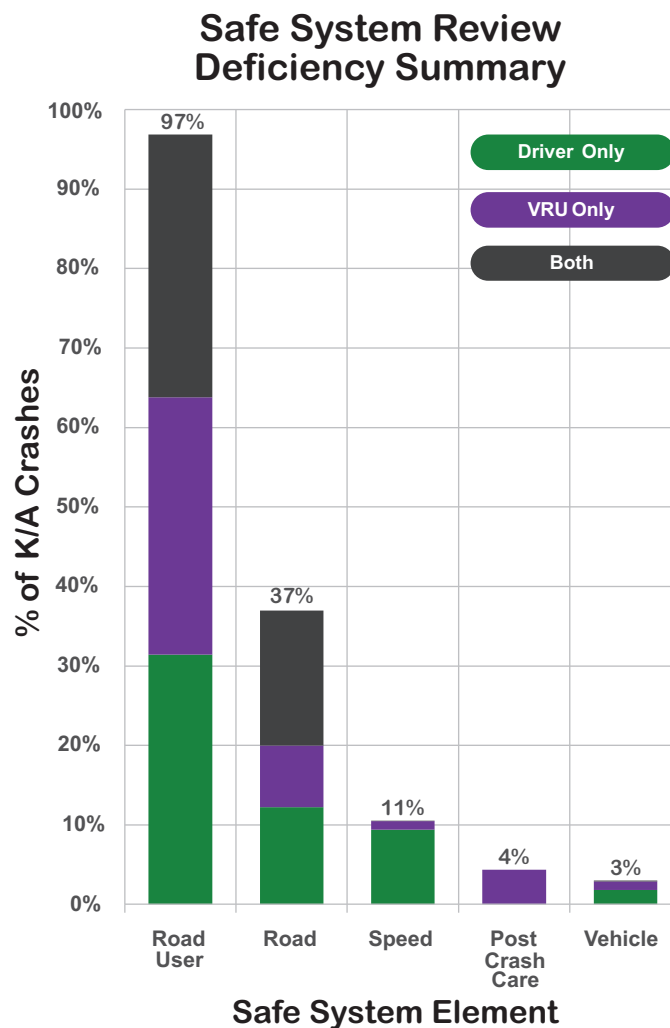
As the 2,048 VRU fatal and serious injury crash reports were reviewed, the reviewers identified deficiencies (i.e., failures) and countermeasures (i.e., solutions) for each crash. In a majority of crashes, there were numerous deficiencies and numerous countermeasures. Some crashes had multiple deficiencies in one category, such as “Road User” whereas other crashes had deficiencies that spanned multiple categories. Some crashes had deficiencies by drivers while others had deficiencies by VRUs or both VRUs and drivers.

Furthermore, there are interrelationships between the Safe System Approach categories. For instance, is a “Speed” deficiency also a “Road User” deficiency? The short answer is, “maybe”. The review team was given the discretion to choose any contributing factors provided they contributed to the occurrence of the crash or the severity of the outcomes.

The resulting analysis provides a unique insight into the extent to which these contributing factors are involved in VRU crashes when viewed through the lens of the Safe System Approach.

The “Road User” category had more entries than any other Safe System category, appearing in 97% of crashes. One-third of those deficiencies were drivers, 1/3 were VRUs, and 1/3 were both drivers and VRUs.

The “Road” category was noted as a deficiency in 37% of crashes and had a higher proportion of driver-related deficiencies than the “Road-User” category.

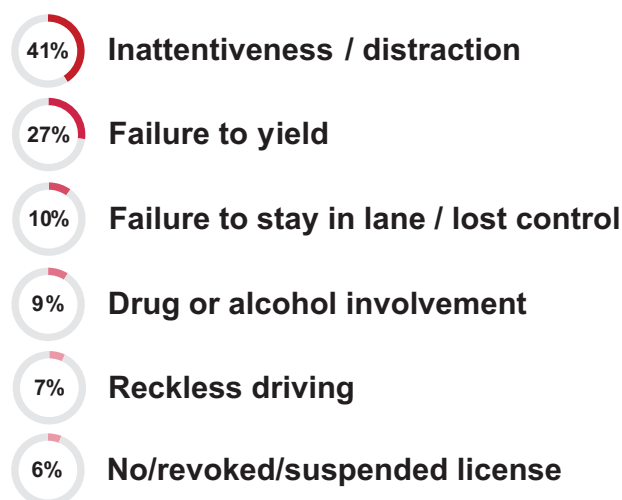


“Speed”, “Post Crash Care”, and “Vehicle” categories had substantially fewer deficiencies compared to “Road” and “Road User”. However, crash reports often do not tell the whole story about these categories. Speed can be difficult to prove, post crash care is rarely discussed, and vehicle malfunctions may or may not be noted. With that said, there are opportunities to improve the outcomes in all of these categories. The remaining pages discuss each category.

Safe Road Users (Drivers)

The first component of the Safe System reviewed was “Road User”. In the 2,048 fatal and injury VRU crashes reviewed, the motor vehicle driver/human factor deficiencies showed many behaviors were contributing factors in crashes.

Top Driver Deficiencies



Driver inattentiveness and/or distraction were contributing factors in 41% of crashes and include errors in judgment, inattentiveness or lack of awareness of surroundings, and distractions within the vehicle.

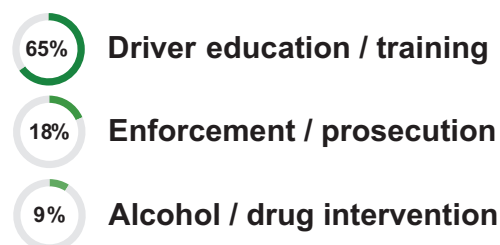
Failure to yield was the second most populous category with 27% of the crashes having it selected as a deficiency.

Since these two deficiencies were so prevalent, examples are provided on the next page verbatim from the crash reports.



Other top driver deficiencies included failure to stay in lane or maintain control of the vehicle, drug or alcohol involvement, reckless driving, and revoked/suspended or no driver's license.

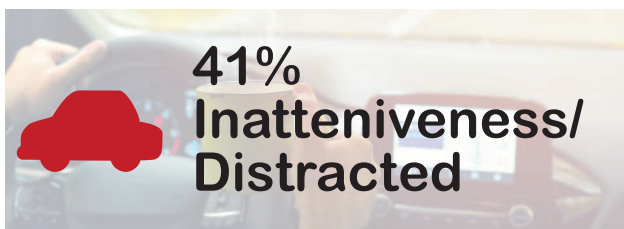
Top Driver Countermeasures



Addressing the deficiencies of this “Road User - Driver” category can be done directly through targeted countermeasures and indirectly through the holistic Safe System Approach and improvements to other categories.

Top countermeasures identified to directly target “Road User - Driver” deficiencies include driver education and training, enforcement/prosecution, and alcohol/drug intervention.

Driver Deficiency Examples



Crash #4RL092T5SD

9/15/22 8:27 AM – Sturgeon Bay

“Driver stated he was turning left from Jefferson Street, onto 5th ave, when he struck the pedestrian. Driver stated he was looking at a coffee shop on the corner during the crash.”

Crash #1ML14GK1J6

10/10/22 6:57 AM – West Allis

“She called her friend who she then put on speaker phone and set her phone down in her front passenger seat. She then began to get onto the freeway and looked over her shoulder, she then saw the bicyclist and was unable to stop in time.”

Crash 1012 #0BL15CPTJV 7/31/20

3:13 PM – Oshkosh

“The full size pick up truck was traveling north bound in the curb lane in the 300 Blk of Ohio Street in the City of Oshkosh at a high rate of speed. The driver was seen on video looking down at a cell phone just prior to approaching 4th Ave. A pedestrian was walking in the cross walk area from west to east at 4th Ave and Ohio St. The pedestrian was just crossing over the curb lane on the east side of the northbound lane when the truck struck the pedestrian with the driver side mirror.”



Crash #91L089CGJH

1/9/18 3:42 PM – West Milwaukee

“Unit 1 was W/B on National approaching S. 41st Street. Pedestrian was westbound in the south crosswalk, crossing S. 41st St on W. National Ave. Unit 1 made a left turn and struck the pedestrian with the front passenger side of vehicle.”

Crash #01L0CR2KRW

3/21/18 8:14 AM – Madison

“Unit 1 minibus stopped for stop sign NB on S Brooks St at Erin St. Unit 1 entered the intersection. Unit 2 bicycle was traveling east on Erin St in the eastbound lane of travel with the right of way. Unit 1 collided with the bicycle in the intersection.”

Crash #04L0DQPGFK

3/25/18 12:37 PM – Green Bay

“Unit 1 was traveling north through the intersection of S. Oakland Av. And W. Walnut Street from a stop sign. Unit 2 (bicycle) was traveling west on W. Walnut Street. Unit 1 struck Unit 2 at the northeast corner of the intersection. Unit 2 ended up at rest on the right side of S. Oakland.”

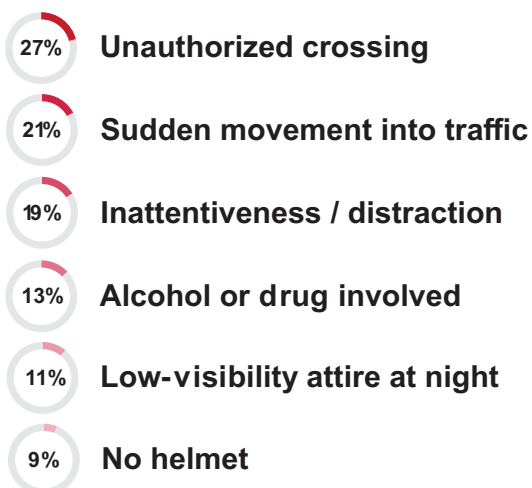
Safe Road Users (VRUs)

In the “Road User” category, there are drivers and VRUs. This page summarizes the findings of the Safe System review of VRUs in the “road user” category.

The top VRU deficiencies are listed below. Unauthorized crossing, which includes crossing roadways when VRUs don’t have the legal right-of-way, either at an intersection or mid-block, was a contributing factor in 27% of VRU crashes.



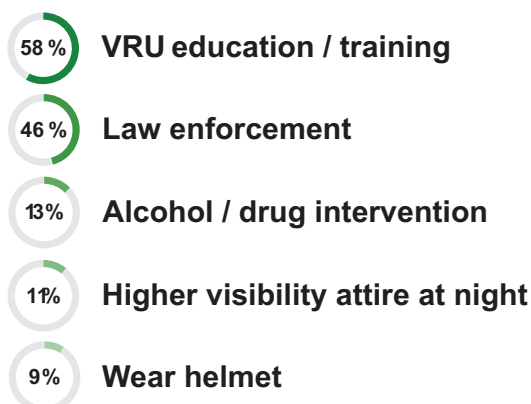
Top VRU Deficiencies



Sudden movement into traffic and inattentiveness/distraction were also leading VRU deficiencies. Examples verbatim from crash reports of the top three VRU deficiencies are on the next page.

Alcohol and drug involvement, low-visibility attire at night, and lack of a helmet were also common contributing factors.

Top VRU Countermeasures



Addressing these human behavior-related deficiencies includes VRU education and training and law enforcement. There appears to be a lack of understanding of traffic laws about VRUs based on the crashes and the survey in Chapter 6.

Alcohol/drug intervention, higher visibility attire at night, and consistently wearing a helmet while bicycling are other countermeasures.

VRU Deficiency Examples



27% Crossing Mid-Block/ No Right-of-Way

Crash #7LL18CTJQ4

8/11/18 12:48 PM – Kenosha

“Unit 1 (motor vehicle) was traveling north on Sheridan Rd (free-flow) approaching 116th St. Unit 2 was stopped at a stop sign on 116th St at Sheridan Rd westbound. Unit 2 (bicyclist) entered the intersection into the path of Unit 1. Unit 1 was unable to slow or avoid striking Unit 2. Unit 1 collided with Unit 2. Both units were damaged in the collision.”

Crash #M5L0TJN00R

8/1/20 12:36 AM – Milwaukee

“Unit #1 westbound on W Capitol Dr. Unit #2 crossing W Capitol Dr from north to south mid-block not in a crosswalk. Unit #1 strikes Unit #2. Unit #2 was conveyed to Froedtert hospital and sustained severe head trauma.”

Crash #07L0SGK1GQ

8/6/21 2:13 PM – Fond du Lac

“U1 was attempting to cross W. Johnson in the area of 511 W. Johnson St with her grandson... Traffic in the WB curb lane was stopped because of the red traffic light at N. Seymour/W. Johnson St. U2 was traveling WB in the “Center/Fast lane”. U1 crossed into the path of U2. U2 tried to stop but hit U1. U1 crossing outside the crosswalk and failing to yield to U2 caused this accident.”



21% Sudden Movement into Traffic

Crash #CKL0TNC3BP

2/19/18 5:44 PM – Racine

“... Unit 2 was not in a crosswalk at the time of the accident. Rapids Food and Liquor, located at ... showed video of Unit 1 with a green traffic signal and Unit 2 suddenly moving into traffic not within a crosswalk.”

Crash #J9L02XVN5D

11/15/18 5:31 PM – Milwaukee

“Unit 1 was traveling northbound on the 2300 block of N 20th St. Mid-block, a pedestrian ran unexpectedly into traffic where a witness vehicle was able to avoid the pedestrian. However, Unit 1 struck the pedestrian just outside of 2364 N 20th...”



19% Inattentiveness/ Distracted

Crash #07L0RW8HP4

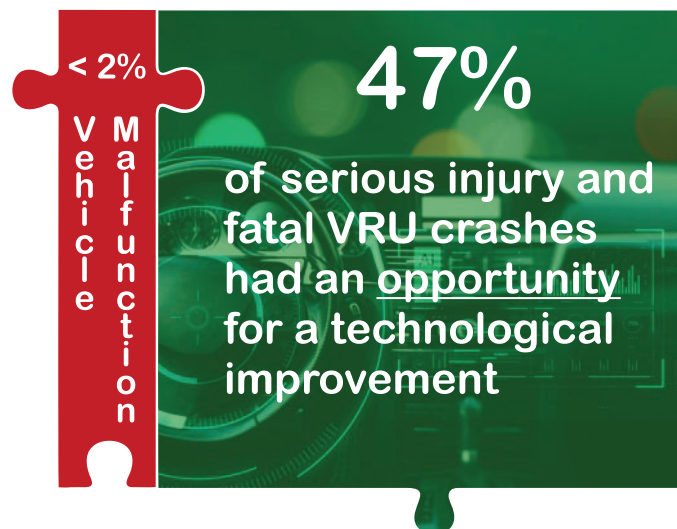
11/21/18 6:00 PM – Fond du Lac

“I spoke with Unit 2 who said she doesn’t blame Unit 1 for hitting her because she knew she was wearing camouflage and had headphones on. She was then taken to St. Agnes Hospital to get her head and left side checked out. Unit 1 operator wasn’t cited due to the intersection not being lighted very well as well as the fact Unit 2 was wearing camouflage and headphones.”

Safe Vehicles

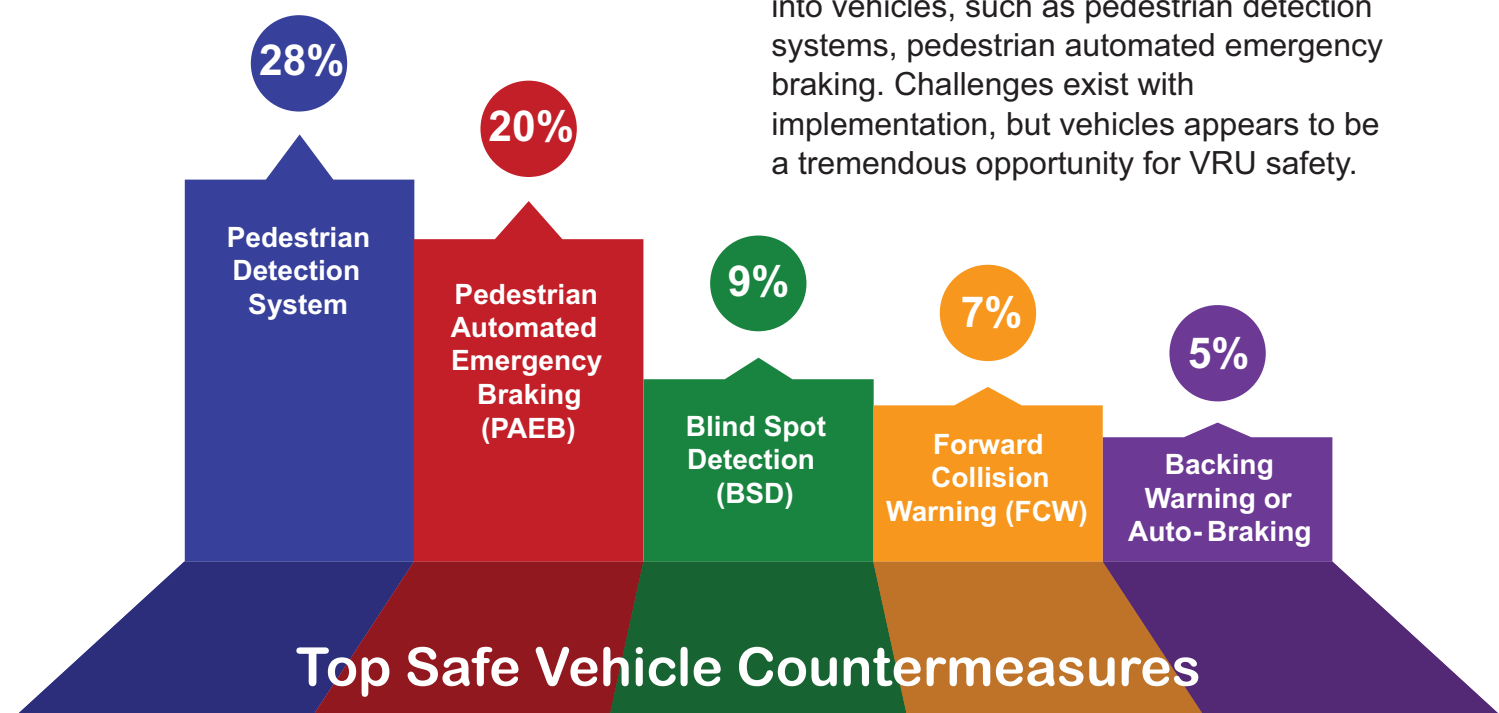
Motor vehicle deficiencies include mechanical failures such as brake failures and tire failures. VRU vehicle deficiencies included malfunctions of bicycles, scooters, or other mobility devices. In fatal and serious injury VRU crashes, vehicle malfunctions occurred in less than 2% of crashes and were rarely the sole contributing factor. While increased vehicle maintenance could help, other “Safe Vehicle” opportunities exist that could have a much larger impact on VRU safety.

Perhaps the single most impactful opportunity for VRU safety is not addressing the small number of vehicle malfunctions that occur, but rather improving the vehicle fleet to have advanced technologies to mitigate VRU crash risk and the severity of the crash



In 47% of the serious injury and fatal VRU crashes reviewed, reviewers concluded there was an opportunity for a technological improvement to the motor vehicle to either prevent the crash or reduce its severity.

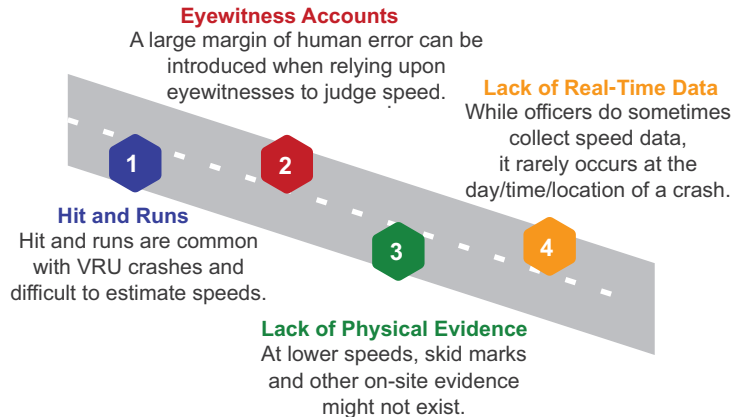
Numerous technologies can be integrated into vehicles, such as pedestrian detection systems, pedestrian automated emergency braking. Challenges exist with implementation, but vehicles appears to be a tremendous opportunity for VRU safety.



Safe Speeds

VRUs are particularly susceptible to serious injury and fatalities in collisions with motor vehicles due to the weight and corresponding kinetic energy transferred to VRUs in crashes. Furthermore, VRUs often have zero physical protection.

Identifying speed issues from crash reports can be challenging for the following reasons:



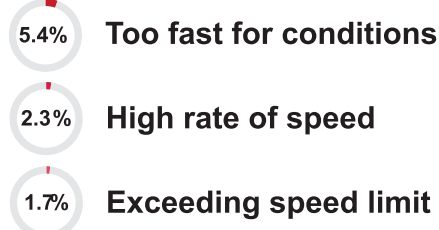
Therefore, speed-related issues are often underreported as is likely reflected in the small percentage of VRU crashes with speed deficiencies noted.

Even if speed isn't noted as an issue, considering the average curb weight of vehicles in the U.S. is over 4,000 pounds an impact for a VRU at modest speeds can be deadly. The AAA Foundation for Traffic Safety published a report estimating the risk of death to a pedestrian at an impact speed of 23 mph to be 25%, and 90% at 46 mph.

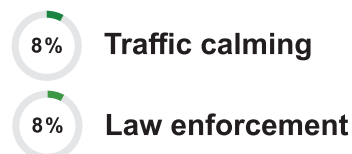
Mitigating travel speeds, especially where VRUs are present, is an important



Top Speed Deficiencies



Top Speed Countermeasures



component in reducing the risk of serious injury and fatal outcomes to VRUs. Strategies such as traffic calming and targeted law enforcement are two potential countermeasures to reduce speeds.

2

United States Environmental Protection Agency. "The 2022 EPA Automotive Trends Report." United States Environmental Protection Agency, EPA-420-R-22-029, December 2022.

3

Tefft, Brian C. "Impact Speed and a Pedestrian's Risk of Severe Injury or Death." AAA Foundation for Traffic Safety, September 2011, 607 14th Street NW, Suite 201, Washington, DC 20005.

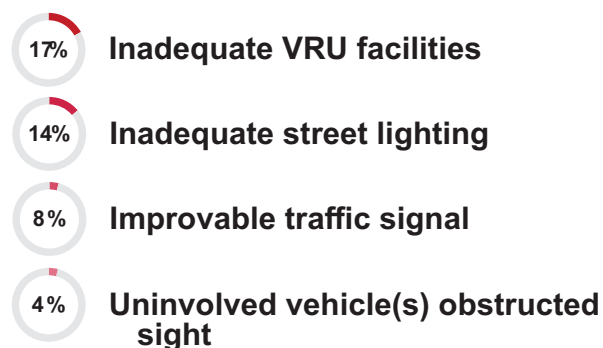
Safe Roads

“Safe Roads” in the Safe System Approach had the second most deficiencies in the review of serious injury and fatal VRU crashes.

The most common roadway deficiency, which was noted by the review team in 17% of the crashes was inadequate VRU facilities. Inadequate VRU facilities is a general category that includes undefined crossings at intersections, multi-lane crossings without a refuge, lack of VRU facilities, and inadequate separation between driving lane and VRU facilities.

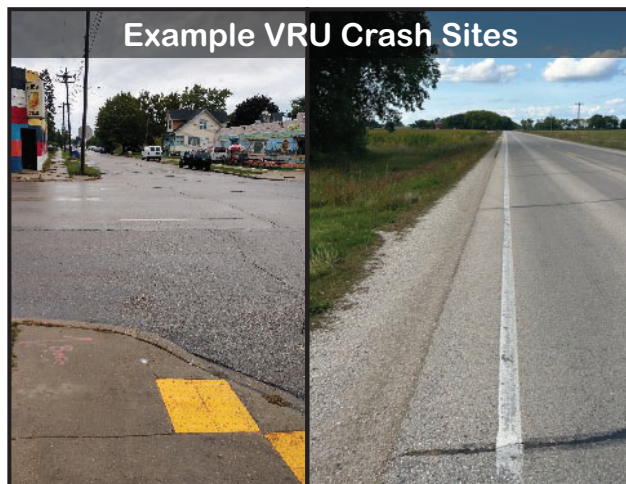


Top Roadway Deficiencies

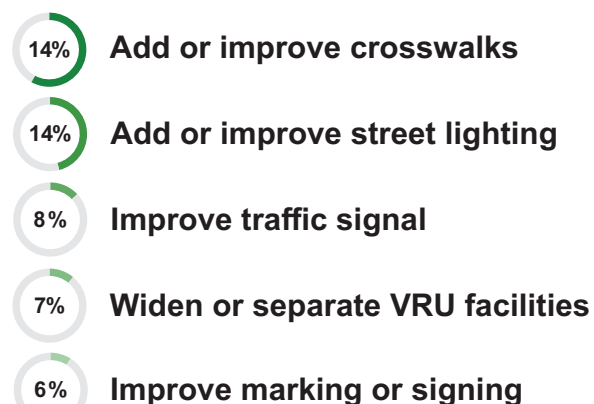


Other deficiencies included inadequate street lighting in 14% of the crashes (1/3 no lighting and 2/3 poor lighting). In many cases, some street lighting existed but was considered poor if there were opportunities to improve the lighting. Many locations were partial lit with 1-2 luminaries.

Traffic signals were a top deficiency with opportunities to improve features such as leading pedestrian intervals, protected left-turns, restricting right-turns-on-red, etc.



Top Roadway Countermeasures



The top countermeasures focus on potential improvements to the roadway that would enhance the safety of VRU users. This could be accomplished through improving existing VRU facilities or adding more VRU facilities to reduce distances between crossing opportunities. Drawing additional attention to VRUs and/or providing facilities that would be better at separating and protecting VRUs from motor vehicles are also effective countermeasures.

Post Crash Care

Crash reports have limited information about “Post Crash Care”. Time from contact to the time of emergency response arrival was available, but if the response time was greater than 10 minutes, it was often difficult to interpret the cause for delay. There were many times when there was a delay in the time between the crash and notification to emergency responders. Again, the reasons were often unknown.

“Post Crash Care” information can be found in WisDOT existing data sources below for injury control/EMS, but were not included in this study. Future analysis may be warranted.

- Wisconsin Ambulance Run Data System (WARDS) (DHS)
- Wisconsin Emergency Department Visit Data (through Richard Miller DHS/DPH)
- Wisconsin Hospital Inpatient Discharge Data (Richard Miller Department of Health Service Department of Public Health)
- State Trauma Care System Registry
- CasePoint Coroner Data System (Department of Health Services, Division of Public Health, Bureau of Community Health Promotion)
- Crash Outcome Data Evaluation System (CODES) (housed at the Center for Health Systems Research and Analysis, College of Engineering at UW-Madison)

While likely underreported due to the limitations of crash reports, “Post Crash Care” was identified as a deficiency in 4.4% of crashes.



4.4%

Post Crash Care Deficiencies

1. Delay reason unknown
2. Delayed call to police/emergency vehicles
3. Delay due to inability to find crash site
4. Previous crash caused law enforcement to be in vulnerable spot

4.4%

Post Crash Care Countermeasures

1. Education (for public on what to do)
2. Improve availability and quality of EMS
3. Provide officers with temporary traffic control devices
4. Traffic Incident Management (TIM) training and technology deployment

Given the susceptibility VRUs have to serious injury and/or fatality, the ability to quickly respond to VRU crashes and provide proper care is very important.

The next chapter discusses stakeholder consultation.

Stakeholder Consultation

A systematic consultation process was undertaken to incorporate insights from pertinent stakeholders in the VRU-SA. This initiative was grounded with three distinct surveys, each addressing a specific group of stakeholders participating in varying facets of road safety.

The initial survey, targeted at entities involved in the Active Transportation Plan currently under development by WisDOT, concentrated on gathering data on pedestrian and bicycle behavior, received 159 responses. Subsequently, a second survey was disseminated to organizations within Wisconsin that are focused on VRU safety, inquiring about their organizational structure and their contributions to VRU safety through a series of 10 questions. This endeavor was followed by a third survey, which was distributed to several agencies including MPOs, RPCs, and Tribal Governments across the state. This survey emphasized the analysis of high-injury networks and the existing challenges in VRU safety. There were a total of 13 responses recorded.

Upon the completion of the surveys, strategic follow-up meetings were conducted with selected MPOs and municipalities. Follow-up meetings were supplemented by engagement with the Inter-Tribal Task Force (ITTF) meeting held on September 18, 2023, in Mole Lake. This meeting facilitated discussions on tribal VRU safety concerns, and advancing the unified effort towards realizing the state's road safety targets.



Active Transportation Plan Survey

WisDOT recognizes the importance of active transportation, which encompasses any travel method primarily powered by human effort. Active transportation modes play a pivotal role in connecting trip origins and destinations, offering a broader range of mobility options and increased access for a significant portion of Wisconsin's population.



WisDOT is currently developing the Wisconsin Active Transportation Plan (ATP) 2050, which consolidates and updates previous Bicycle Transportation and Pedestrian Policy Plans. The Wisconsin ATP 2050 will provide a holistic long-term statewide strategy, outlining policies and initiatives to bolster human-powered transportation in alignment with Connect 2050, Wisconsin's primary long-term transportation system development framework.

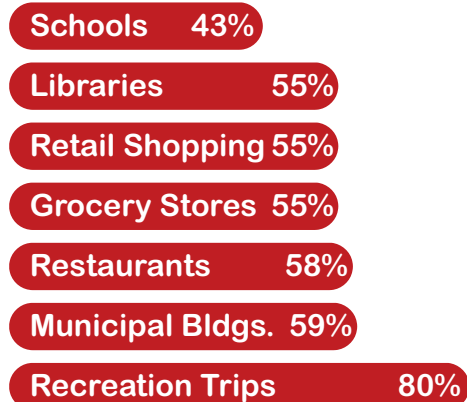
As part of the Wisconsin ATP 2050 update effort, WisDOT conducted a stakeholder survey during the summer of 2023 to evaluate the safety concerns of vulnerable road users. Surveys were completed and returned from 159 participating stakeholders.

The findings from this survey are outlined as follows.

1. Survey participants were questioned about their comfort level using active transport modes to reach various destinations from their residences.

A significant portion (54.7%) expressed discomfort while commuting to their places of work. The sentiment was echoed when asked about other destinations:

Feel Unsafe Traveling to:



Regarding school commutes, 43.4% of the participants expressed feeling unsafe while traveling on foot or bicycle. The relatively lower unsafe sentiment towards school travel could be influenced by successful initiatives like "Safe Routes to School" which may have cushioned the prevalent unease reported for other trip destinations.

The largest concern was associated with recreational trips, where 80% of respondents labeled those trips as unsafe.

Active Transportation Plan Survey

2. Most survey respondents (45.0%) reported using a flashlight for nighttime travel. In terms of other safety precautions taken during the night:

20% Wore Small Amount of Reflective Gear

13% Wore Significant Amount of Reflective Gear

12% Opted for Bright, Non-Reflective Attire

Only 10.7% of the respondents stated they did not use a flashlight or any kind of reflective or bright clothing when traveling on foot or bike during nighttime hours.

For those who opted to not use flashlights or safety clothing during nighttime travel, the primary reasons given were believing it wasn't necessary, finding it too inconvenient, or simply forgetting.



3. Respondents reported a high tendency to yield to pedestrians crossing roads when driving. A majority (83%) stated they yielded to pedestrians either consistently or most of the time. It's reasonable to infer that individuals who often travel by foot would be acutely conscious of the risks posed by motor vehicles and are likely over represented in this particular survey.

4. Finally, the survey sought to better understand respondent's knowledge of laws and ordinances related to active transport movement. Scenarios and responses are indicted below:



True or False Results



54%

Correctly answered that if there is not a sidewalk, a pedestrian is legally required to walk on the left side of the roadway facing approaching traffic.

63%

Correctly answered that during the hours of darkness, bicycles are legally required to have a white lamp visible at a distance of 500 feet or more.

47%

Correctly answered that a person operating an electric mobility device on a sidewalk is legally required to yield to pedestrians.

60%

Correctly answered that if a pedestrian crosses a roadway at a location other than at a legal crosswalk, the pedestrian is legally required to yield to motor vehicles.

Of the four questions asked, the percentage of correct answers ranged from 47% to 63%, which indicates a general lack of knowledge regarding laws pertaining to active transportation modes.

The data gathered from the survey of ATP stakeholders highlights multiple challenges that need addressing to make active transportation a more attractive and safe option. Organization and agency surveys and consultations are discussed next.

Organization Survey

A survey was sent to numerous organizations or groups with knowledge of VRUs. The most comprehensive response received was from the Wisconsin Bike Fed.

Wisconsin Bike Fed is a statewide education and advocacy non profit organization. They educate people of all ages on bike and walk safety and usage encouragement. The group advocates for improved facilities and support in various ways locally and statewide.

Additionally, Wisconsin Bike Fed runs public service announcements, puts messages out for people driving to give care and respect to VRUs, and collaborates with public entities about VRU safety.

The group has collaborated with WisDOT, BOTS, Milwaukee Department of Public Works (DPW), Madison DPW, Southeastern Wisconsin Regional Planning Commission and other RPCs as well as local transit authorities. One notable transit collaboration was in 2008 with Wisconsin Bike Fed working with the Milwaukee County Transit System to advocate for bike racks on buses. The bike racks were installed in June 2009 using federal grant funds.

Wisconsin Bike Fed is familiar with the Safe System Approach and has been involved with community outreach programs. Although they do not perform studies within their organization, they have partnered with MilWALKee Walks, neighborhood organizations and community partners in the city of Milwaukee. Outreach has included Crosswalk Actions at street corners to raise awareness of the law to Yield for Pedestrians and how speeding and reckless driving endangers VRUs.



**WISCONSIN
BIKE FED**

Wisconsin Bike Fed feels the biggest challenge to achieving their goals is that current roadway designs optimize travel for motor vehicles rather than VRUs. The group believes that distracted drivers are as dangerous as reckless drivers. They would like driver's education classes to have lessons for those choosing to use active transportation modes on the roadway.

The group stated that another challenge for safety advocates in communities is present in the limited dollars available to improve pedestrian and bicycle facilities through the WisDOT TAP program as well as a relatively high 20% local funding match requirement. A 10% match would allow more communities to apply for the funds. Also, HSIP funds are typically available for reactive projects but it can be more challenging for proactive projects to qualify.



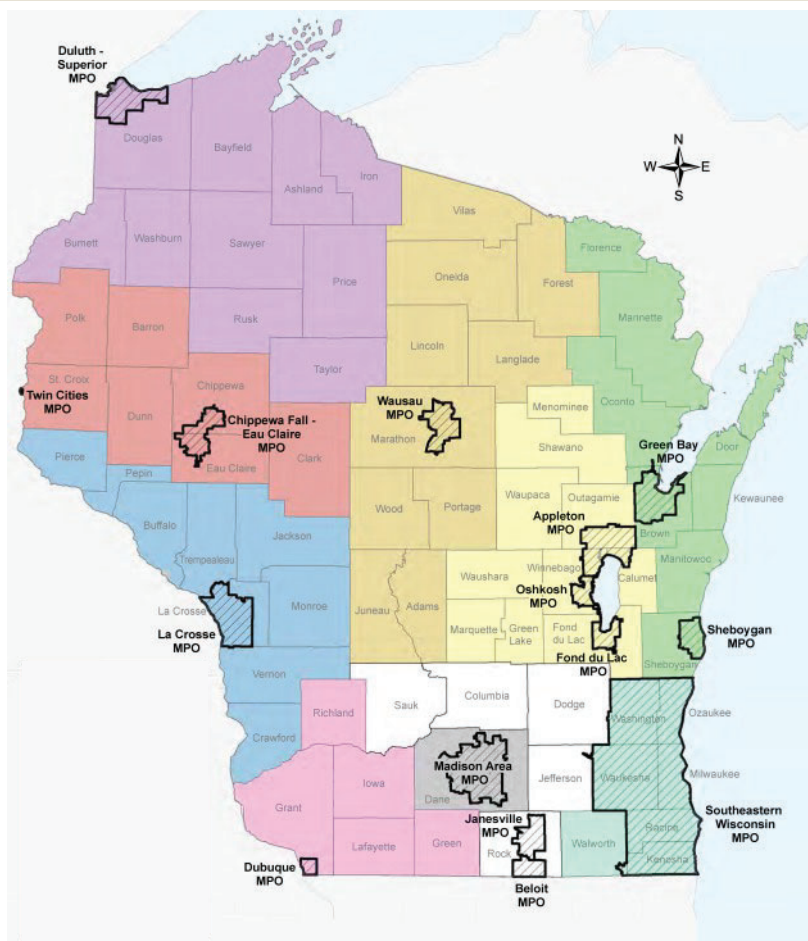
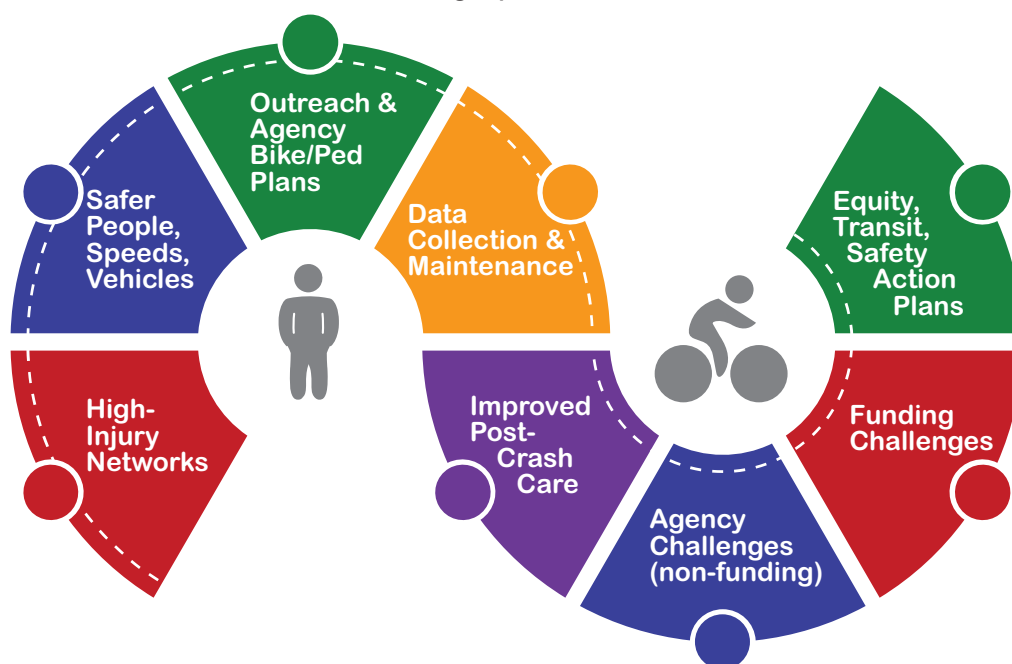
Agency Survey

Wisconsin has nine (9) Regional Planning Commissions (RPCs) and 14 Metropolitan Planning Organizations (MPOs).

Both RPCs and MPOs are involved in planning and coordinating activities for defined geographic areas, usually related to transportation, land use, and development. While both RPCs and MPOs have regional focuses, MPOs have a more specific mandate related to transportation planning in metropolitan areas, and their existence and operations are tied closely to federal requirements and funding. Conversely, the scope of RPCs can be more varied, and their establishment and operation might be more influenced by state or local considerations.

Key Survey/Follow-up Meeting Themes:

Several themes were evident from the survey responses and follow-up meeting discussions as shown in the graphic below.



Map of Wisconsin RPCs and MPOs

Survey / Consultation Participating Agencies

MPOs

La Crosse
Madison
Wausau
Janesville
Appleton/Oshkosh
Fond du Lac

RPCs

East Central WI
Bay Lake

Tribal Gov.

Menominee
Mole Lake
Ho-Chunk Nation

Agency Survey (Cont.)

High-Injury Networks (HIN)

While MPOs did not appear to have prioritized plans for specific safety improvements on a VRU HIN, implementing traffic calming measures was a predominate feature in their VRU safety improvement recommendations.

- Three MPOs responded they do not have an up-to-date HIN.
- Four MPOs are in the process of developing regional safety plans, including identification of HINs and/or intersection safety hot spots with separate sections dedicated to VRUs.

Several MPOs indicated they collaborated with local units of government when creating their regional safety plans.

- MPOs member cities with identified HINs: Milwaukee & Madison.
- Over 20 municipalities have bicycle/pedestrian plans.

Example HIN



Safer People, Safer Speeds, Safer Vehicles

As planning agencies, MPOs do not directly implement safety projects, but most indicated they collaborate with member jurisdictions and state agencies to improve VRU transport systems. Some provide funding programs targeting VRU safety improvements. Tribal representatives noted they have conducted road safety audits and work with law enforcement to address transportation safety issues in their jurisdictions.

For example, MPOs stated they work with local units of government in advisory roles to encourage safer motor vehicles speeds through:

- Safe routes to schools
- Radar enforcement,
- Crosswalk education/enforcement
- Madison's "20 is Plenty" campaign

Several agencies mentioned the need to set rational speed limits on roadways within their jurisdictions and use traffic management devices such as flashing speed limit signs. Many MPOs noted that traffic calming measures for speed control use, as well as driver behavior modification were included in their safety toolbox.

Most respondents did not indicate being involved in "safer vehicle" programs. Those that did identified:

- Carbon reduction programs
- Climate change awareness programs
- Installation of advanced safety systems on government owned vehicles

Agency Survey (Cont.)

Outreach and Agency Bike/Ped Plans

- Only one agency noted they conducted VRU outreach initiatives within the past 10 years, which were pop-ups at community events.
- All MPOs said they have a bicycle and pedestrian plan, although some were outdated.
- No Tribal Government responders indicated having a bike/ped plan. Most of the RPC/Tribal Governments who didn't have a specific bike/ped plan or VRU component in their comprehensive plans indicated interest in developing one.

Data Collection and Maintenance

Agencies were asked if they collected and/or maintained data on several parameters. The results are shown in the table below.

Key

Never
As Needed



Partially/Occasionally

Comprehensive/Continuously



	La Crosse MPO	Madison MPO	Wausau MPO	Janesville MPO	Appleton/Oshkosh MPOs	Fond du Lac MPO	Bay Lake RPC
Pedestrian Volumes							
Bicycle Volumes							
Motor Vehicle Volumes							
Speed Limits							
Sidewalks/Paths Existence							
Existing Safety Features							
Intersection Turning Movement Counts	—						—
Multi-use Path Counts							—
Big Data for VRUs	—	—	—	—	—	—	—
Non-MPO Data Sources	WisDOT, Cities, Aerial Photos	Streetlight Analytics	UW-Madison TOPS Lab				

Improved Post-Crash Care

Generally, MPOs responded that post-crash care was not something they were involved in beyond receiving crash data and using that data to inform their plans.

Specific responses included:

- Level One trauma centers are active within the county's traffic safety commission, but limited EMS involvement.
- Creating a new addressing system to ensure proper identification of locations when 911 calls are being made.
- Installing radio towers for better communications for emergency vehicles.

Additionally, other needs were identified including: post-crash care improvements in response times, adding/upgrading trauma centers, conducting response training specific to VRU crashes, and tracking final outcomes of injuries.

Agency Survey (Cont.)

Agency Challenges (non-funding)

MPOs stated they would like to see a data-driven approach to safety improvements.

- Faster, turnkey improvements
- More education (cyclists and walkers need to follow the “rules of the road” too)
- Established criteria and staffing to implement safety improvements
- Having a common vision and guidance for member municipalities.

Funding Challenges to Improvement Implementation

MPOs were quick to note that they are not implementing agencies but noted the following as agency funding challenges.

- More proactive (not reactionary) funding in the state's HSIP program
- The expense of off-street bike/ped paths
- Lack of local funding for safety projects (i.e., zero sum budgeting)
- The lag between project requests and safety program fund availability
- Local member grant writing assistance



Equity, Transit, and Safety Action Plans

Only one agency reported that they did not consider demographics and social equity information when evaluating VRU safety needs.

Five MPOs said they coordinated with their local transit authorities regarding VRU safety, but three did not. Bus stop locations, sidewalk locations, snow removal, meeting ADA requirements, and rider comfort were cited as areas of interagency transit coordination.

Specific responding agency Safety Action Plans are lacking; only one reported their intention of completing a plan in 2023, including a section focused on VRUs.

Concluding Survey Thoughts:

“Not a lot of specific VRU safety work. Most is incorporated into other planning efforts.”

“As rural and small communities become more populous and urbanized, a mindset shift is needed to motivate leaders to build safer infrastructure and implement programs that do not rely on personal vehicle use.”

Consultation Meetings

From August to September 2023, guided discussions with agency stakeholders were held to gather their thoughts, observations, and opinions on VRUs issues within their jurisdictions. The meetings were preceded by a detailed review of the returned written surveys and focused on the analysis of high-injury networks and highlighted the prevailing challenges associated with VRU safety across the state.

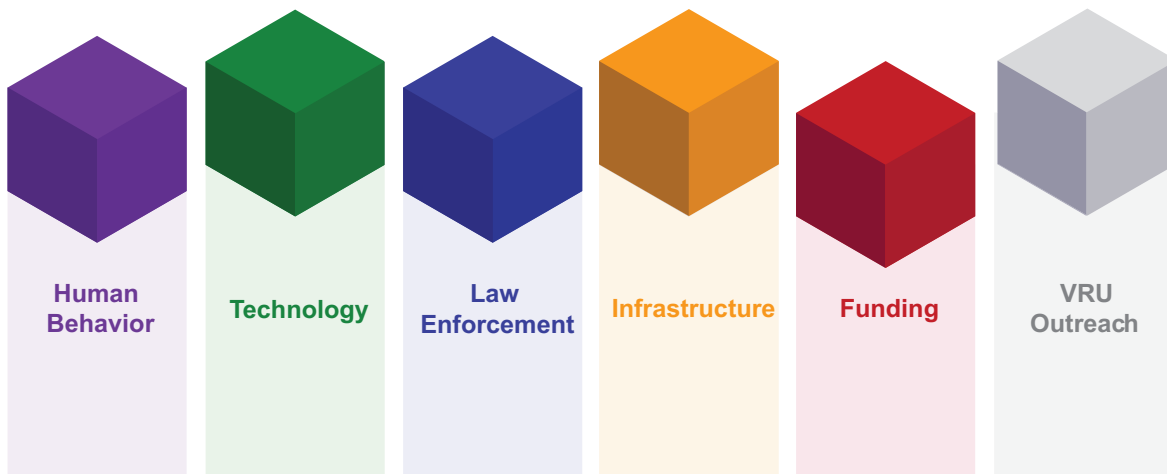
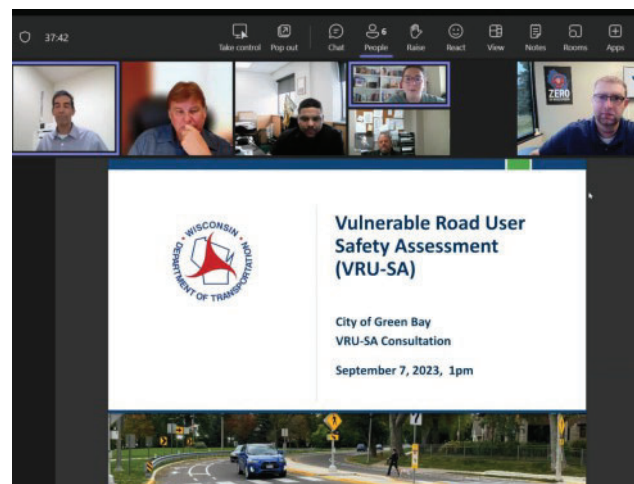
Agency consultation discussions included survey topics and the items listed here:

- High-Injury Networks currently in use or being planned
- VRU Safety Issues
- Potential VRU Safety Solutions
- Consideration of Equity and Demographics when prioritizing improvements
- Obstacles in enhancing VRU safety, implementing projects, altering human behavior, and securing funding

Agency Stakeholder Discussion Themes:
Several themes were evident during meeting discussions.

2023 Consultation Meetings

June 21 Governor's Bicycle Coordination Council
 June 29 UWM Pedestrian Exposure Model Discussion
 July 24 Wisconsin Pedestrian and Bicyclist Safety Program Assessment
 August 10 WisDOT Traffic Safety Engineering Workgroup
 August 21 City of Madison
 August 22 City of Milwaukee
 August 24 WisDOT Tribal Liaisons
 August 25 Madison MPO
 September 5 City of Janesville
 September 6 East Central Wisconsin Regional Planning Commission
 September 7 City of Green Bay
 September 18 Mole Lake Inter-Tribal Task Force



Consultation Meetings (Cont.)

Human Behavior

- More people are driving distracted, as well as faster.
- Faster speeds are being reported in the urban areas, particularly on four-lane arterial highways.
- Residents and pedestrians, for the most part, feel concerned and even fearful of crossing some streets.
- Driver's mindsets need to be changed.
- Educational programs are needed that focus on moving people because it's not all about the automobile.
- Bicyclists and pedestrians with headphones are on the rise, which increases the risk for the VRU.

Technology

- Known countermeasures are usually approved for implementation (i.e., pedestrian islands).
- Many new technological solutions exist for a given safety issue, but the MUTCD does not keep pace with allowing the new features. Jurisdictions are very reluctant to deploy the technology due to uncertainty and fear of not following the MUTCD.

Law Enforcement

- Targeted enforcement is used periodically. An officer on bike or walking in a crosswalk is deployed, and drivers are pulled over for not yielding. Warning tickets are issued, and the events are publicized in the local media.
- Reported VRU injuries appear low. Many bike/ped injuries go unreported.

Infrastructure

- The pace of infrastructure safety upgrades has not kept pace with the rising use of modern e-bike and other VRU modalities.
- Older road/street infrastructure is not bike friendly.

Funding

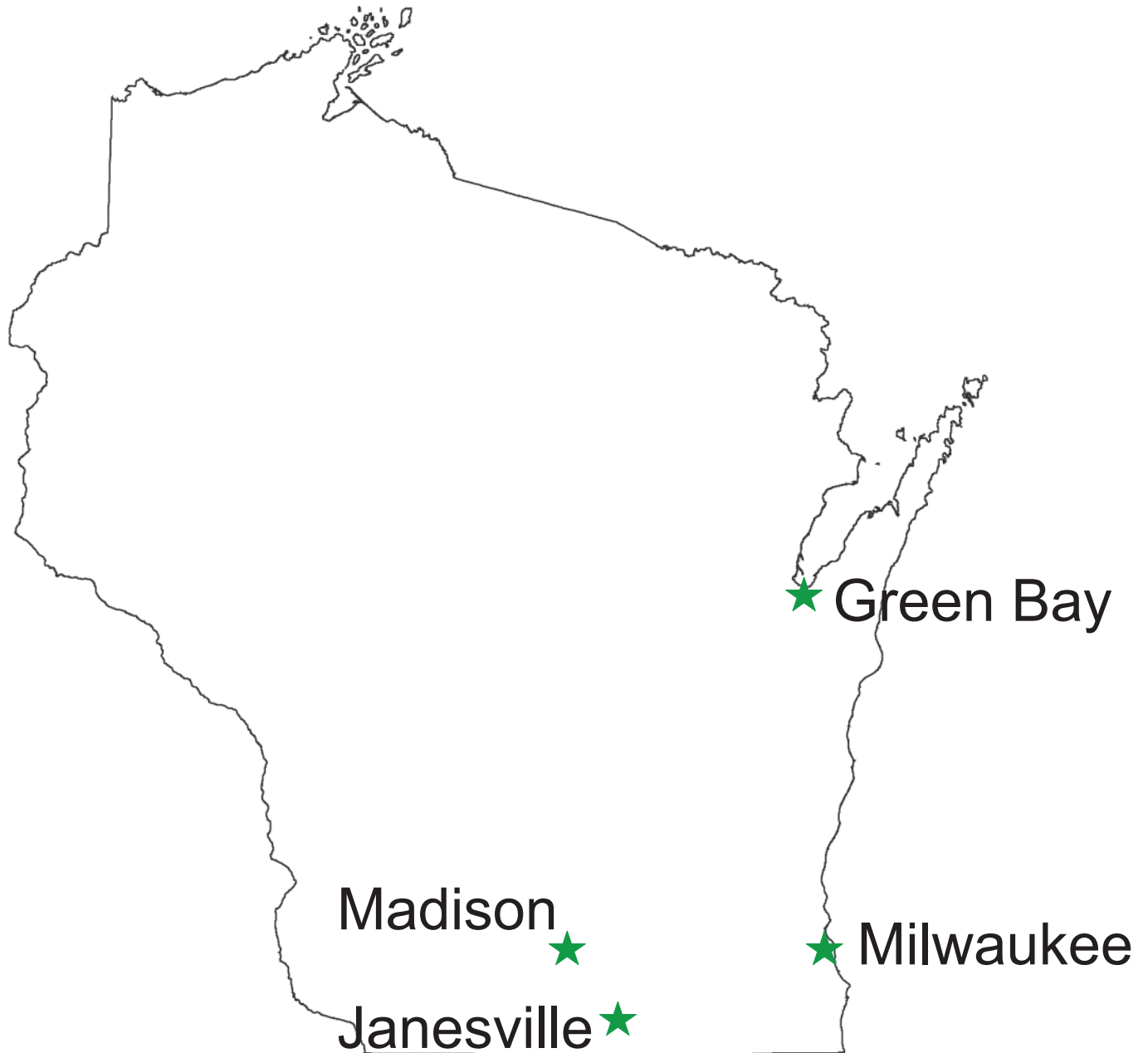
- Stakeholders expressed that project funding rules – such as key programs that rely on safety data to demonstrate highly unsafe hot spots to be eligible for safety funding – is a problem in and of itself. VRU safety improvement projects are more reactive than proactive.
- The biggest challenge to project implementation is lack of available funding.
- Safety information is used in applying for block grants, requiring more coordination with local units of government.

VRU Outreach

- Input is gathered case-by-case as opportunities arise for upcoming projects.
- Only the downtown area seems to have pedestrian-heavy traffic.
- Kids going to school account for most pedestrian activity.
- Demographics must be kept in mind when doing safe walking and biking planning. VRU demographic characteristics can be an afterthought.
- Decision makers do not want to talk about user equity programs.

In the next chapter, the development of statewide VRU High-Risk Areas is covered.

City Consultation Meetings



City Consultation Meetings (Cont.)

During August and September 2023, guided discussions with City stakeholders from Green Bay, Janesville, Madison and Milwaukee were held to gather their thoughts, observations, and opinions on VRU issues within their jurisdictions.

There was much discussion about what each community was working on specifically regarding VRU safety, who they are collaborating with to achieve their goals, and what their biggest challenges are to create solutions for VRU safety.

Each community was eager to express their accomplishments toward VRU and each had different methodologies for approaching the improvements. Although the conversations cannot fully be discussed in this document, the insights and interest in VRU safety was encouraging.

Ongoing Activities for VRU Safety

All cities:

1. Work with advocacy groups within their community to engage with the public and educate them regarding VRU safety.
2. Possess a Pedestrian and Bicycle Plan (some are not current).
3. Engage law enforcement in targeted enforcement and education efforts; specifically Yield to Pedestrian campaigns.
4. Implement low-cost solutions such as signing improvements, pavement markings and continental crosswalks.

Challenges to Implementing VRU Safety Solutions

All cities:

Mindset/Behavior:

There is a mindset that roads are for cars, so there is not much room for bicyclists to share the road. In some cases, pedestrians cross mid-block without yielding to vehicles, and in other cases, pedestrians do not take advantage of the pedestrian push buttons to cross an intersection.

Infrastructure:

After low cost solutions have been implemented, the city will have to look to implement infrastructure solutions such as more sidewalks and bike paths, traffic calming, improved lighting and complete streets.

Funding:

One of the biggest challenges is funding for infrastructure improvements. Current funding, particularly with regards to the HSIP program, is generally for reactive projects and harder to attain for proactive countermeasures. The local match requirement can also be an issue to funding.

Regulations/Road Ownership:

Trying innovative solutions while meeting the current MUTCD standards is difficult, since permission must be acquired. When roadways are owned by the state or are connecting highways, permission must be granted from WisDOT to implement any changes made to those roadways. This is just another hurdle to overcome.

City Consultation Meetings (Cont.)

Specific VRU Safety Projects

Green Bay:

1. Installation of 64 RRFBs near schools.
2. Summer Yield to Pedestrians events with local law enforcement.
3. Monthly pedestrian risk assessment and prediction utilizing LexisNexis Risk Solutions.

Janesville:

1. Road Safety Plan with pedestrian risk assessments.
2. There is a long-range plan - a Bicycle and Pedestrian Plan that will include a guide for bicycle infrastructure and a sidewalk corridor plan.
3. The city worked with the Public Health Department to spearhead a walking school bus program.

Milwaukee:

1. Created a VRU High Injury Network (HIN) and a Neighborhood Revitalization Strategy Areas plan.
2. Improving street lighting for pedestrian high injury locations.
3. Area-wide projects that include curb extensions, pedestrian refuge islands, and protected bike lanes.

Madison:

1. Have a dedicated Pedestrian Bicycle Administrator and created a HIN within their Vision Zero Plan and plan to create a VRU HIN in 2024.
2. Installed lane reductions, leading pedestrian intervals and right-turn on red restrictions at various locations.
3. In the process of lowering speed limits. Implemented “20 is Plenty” for a 20 mph speed limit in residential neighborhoods.

Stakeholders Suggested Solutions

More education regarding the rules of the road for both motorists and VRUs.

Gather more information about demographics, zero-vehicle households, WisDOT’s Non-Driver Application and elderly residences, and use that data before making changes that could impact those communities.

Continue to work with Wello who uses social media and public outreach campaigns like Yield to Your Neighbor to help with public awareness in hopes that behaviors will change. Wello is a non-profit organization that supports community well-being initiatives in the Green Bay area.

Law enforcement would like the no “texting” law expanded to include no using your phone while driving. Also address headphone (especially noise-cancelling) usage.

Address speeding with traffic calming measures and infrastructure to separate bikes/peds from motorist traffic.

A systematic way of prioritizing the reliability of streetlights at high-risk locations.

Alcohol and drug education and intervention.

More EMT training specific to ped/bike injuries for example concussions. Concern for higher speed crashes with e-bikes. Rural areas have the challenge of local trauma units being far away.

All vehicles should have standardized pedestrian safety features.

VRU High-Risk Areas in Wisconsin

As part of this VRU safety assessment, High-Risk Areas throughout the state were identified based on VRU crash data and demographics information. High-risk areas are important to identify because they show areas with the highest risk for severe crashes to occur. Serious injury and fatal crashes have the largest impact on the lives and well-being of those involved. Identifying high-risk locations for VRU crashes will help prioritize countermeasures to help mitigate future crashes.

Crash data from the 10 years from 2013 through 2022 were obtained from the Wisconsin Traffic Operations and Safety Laboratory (TOPS Lab) in electronic form. In total, 23,536 VRU crashes occurred during this period. All parking lot and private property crashes were removed to contain the High-Risk Area development to the public roadway network. A total of 19,616 VRU public road crashes remained. To identify the High-Risk Areas, the crashes were mapped with latitudinal and longitudinal coordinates.

To improve the accuracy of the analysis, serious injury (A-level) and fatal (K-level) crashes with missing coordinates were identified. One hundred and nineteen of these crashes were missing coordinates.

Each of these crashes was reviewed and coordinates were assigned. The resulting data set used for High-Risk Area development, which is based on K-level, A-level, and B-level VRU crashes, contained 12,437 crashes.

Developing VRU High-Risk Areas can be done in a variety of ways. The assessment team explored available options ranging from heatmaps to proactive measures based on VRU crash risk attributes.

Heat-map options had limitations with the level of detail available, challenges with linking directly to roadway data, and subjectivity in color and size parameters.

Proactive measures are currently a work in progress at WisDOT and were not ready in time for this assessment, but have high potential for future editions of this assessment.

The tool and methodology chosen for this assessment relied upon historic crash data and used an advanced sliding window crash density analysis. By using 10 years of data and overlaying disadvantaged community data, the High-Risk Area development was robust, thorough, and incorporated equity considerations.

VRU Crash Data Overview for High-Risk Area Development Public Roads (2013 - 2022)

Before validating K/A crash locations

	Blank Coords.		Coords.	Total
K	22	4%	599	621
A	97	3%	2,860	2,957
B	359	4%	8,859	9,218
C	186	4%	5,125	5,311
PDO	45	3%	1,464	1,509
Total	709	4%	18,907	19,616

After validating K/A crash locations

	Blank Coords.		Coords.	Total
K	0	0%	621	621
A	0	0%	2,957	2,957
B	359	4%	8,859	9,218
C	186	4%	5,125	5,311
PDO	45	3%	1,464	1,509
Total	590	3%	19,026	19,616

Used in High-Risk
Area Development

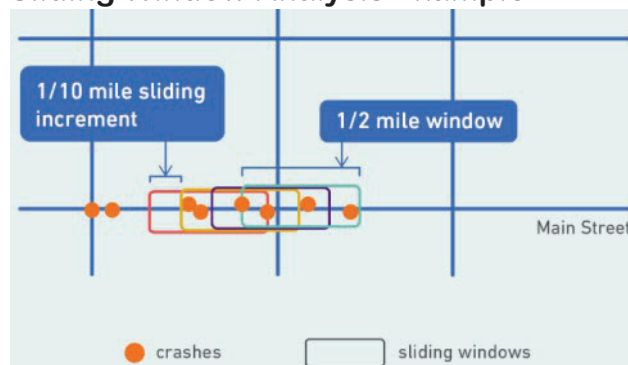
K = Fatal, A = Suspected Serious Injury, B = Suspected Minor Injury, C = Possible Injury, PDO = No Apparent Injury

Safer Streets Priority Finder

The Safer Streets Priority Finder (SSPF) is the tool chosen for the development of Wisconsin's VRU High-Risk Areas. SSPF was developed through a USDOT-funded project which enables the user to analyze the risk to VRUs on vast roadway networks.

According to the SSPF methodology, the tool's Sliding Windows Analysis “creates crash density estimates along street corridors throughout the study area, weighted by crash severity, which enables the highest crash-density sections to be identified for each mode individually. Crash density corridors are identified by applying a 1/2-mile moving window aggregation to the street network in the study area. The 1/2-mile moving windows are created to form corridors using the roadway street name. In this approach, a virtual ‘window’ is moved along each street in 1/10-mile increments, counting the number of crashes by severity and mode that occurred within each successive 1/2-mile segment.”

Sliding Window Analysis Example



In the SSPF tool analysis, K-level and A-level crashes are scored with a value of three and B-level crashes are weighted with a value of one. C-level and PDO crashes

are not included in the analysis. Only VRU crashes that took place on the roadway network were used in the analysis because, during sliding window analysis, crashes were assumed to have occurred on the nearest roadway segment. Parking lot and private property crashes could skew results and were removed from the analysis.

The SSPF has numerous outputs that can be imported into other software for use in analysis. A shapefile with location and scores for each segment in the sliding window analysis was imported into Geographic Information System (GIS) software and then the segments were filtered by a total score threshold of seven* to identify high-risk areas. For reference, a score of seven equates to two K/A-level crashes and one B-level crash or one K/A-level and four B-level crashes occurring within the 1/2-mile window in a 10-year period.

Due to the nature of the sliding window analysis, many corridors have short breaks between identified high-risk segments. To make a more cohesive network and reduce the frequency of short, isolated segments, connections were made between segments if two ends of segments are within 0.6 miles or if an arterial roadway exists between two segments which are within 0.6 miles. Using the outlined methodology of the SSPF tool analysis and connections, Wisconsin VRU High-Risk Areas were identified.

* A memorandum was provided to WisDOT BTO on Sept. 6, 2023 providing several threshold options. BTO concurred with the suggestion to use seven as the threshold for the 2023 edition of the VRU-SA.

Demographic Considerations

Transportation equity is an important factor to consider when identifying High-Risk Areas. The Justice40 initiative, created by the Biden-Harris Administration through Executive Order 14008 Tackling the Climate Crises at Home and Abroad, is a key component in USDOT's efforts to confront and address decades of underinvestment in disadvantaged communities.

The USDOT Equitable Transportation Community (ETC) Explorer is an interactive map that uses census tracts and data from five components (Transportation Insecurity, Climate and Disaster Risk Burden, Environmental Burden, Health Vulnerability, and Social Vulnerability) to identify disadvantaged areas within the USA. Scores for each census tract are calculated based on the five components. Those in the zero percentile are the least disadvantaged and those in the 100th percentile are the most disadvantaged. To be consistent with other tools' methodologies, USDOT considers a census tract to be disadvantaged if it is 65th percentile or higher.

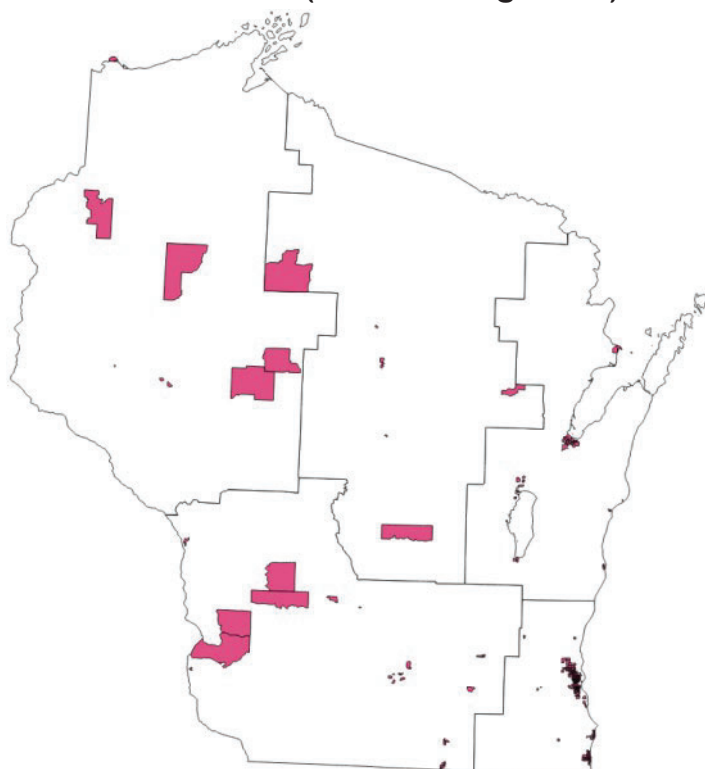
A shapefile containing the ETC Explorer information for each census tract was obtained from Justice40 and imported into GIS software. The image to the right shows the census tracts within the state of Wisconsin that are in the 65th percentile or higher and are considered disadvantaged. As shown, there are disadvantaged census tracts in all five regions of the state.

Of the 19,026 crashes that occurred on the public roadway network and had latitudinal and longitudinal coordinates and could be mapped, 6,931, or 36%, occurred in disadvantaged census tracts.

Based on the census tract information within the shapefile obtained from Justice40 with the latest ETC Explorer data, the disadvantaged census tracts make up approximately 4% of the total land area of Wisconsin and contain approximately 14% of the total population.

Therefore, a disproportionate amount of VRU-related crashes are occurring in the disadvantaged areas of Wisconsin.

**Disadvantaged Communities
in Wisconsin (ETC tool Aug. 2023)**



Results

As mentioned previously, a total pedestrian/bike score of seven was used as the threshold to identify the VRU High-Risk Areas and connections were made between segments where short breaks were observed. After following the outlined methodology, approximately **227 roadway miles** were identified as VRU High-Risk Areas.

VRU High-Risk Areas are present in:

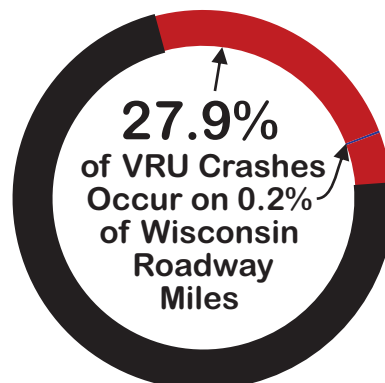
- All five WisDOT regions
- 25 counties
- 45 municipalities

The five counties with the most high-risk areas are:

1. Milwaukee County (142.2 miles)
2. Dane County (31.6 miles)
3. Racine County (9.1 miles)
4. La Crosse County (7.2 miles)
5. Kenosha County (6.0 miles)

Of the 19,026 mapped crashes that occurred on the public roadway network, **27.9%** or **5,308 VRU-related** crashes occurred within the High-Risk Areas. According to WisDOT's Year 2021 Road Mileage and Annual VMT in Wisconsin publication, there are 115,682 total roadway miles in the state. Therefore, 27.9% of the VRU-related crashes occurred on just 0.2% of the state's roadway network.

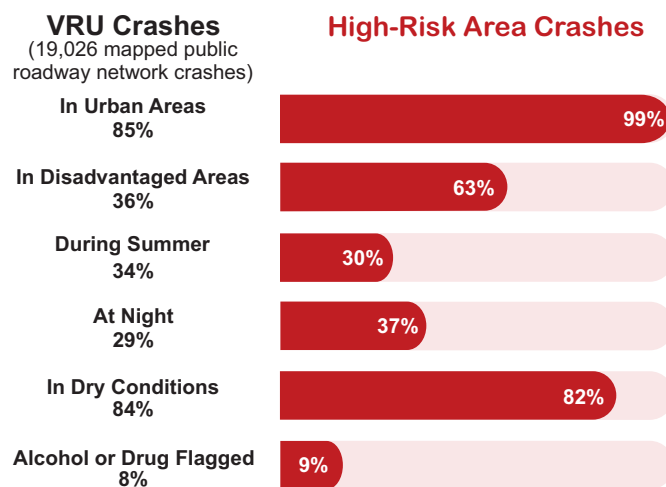
Of the 5,308 VRU-related crashes that occurred in the High-Risk Areas, 3,365, or 63%, occurred in disadvantaged tracts. This correlates directly with 149 miles of the 227 high-risk roadway miles (66%) occurring in disadvantaged tracts.



The five counties with the most high-risk areas in disadvantaged tracts are:

1. Milwaukee County (102.9 miles)
2. Dane County (12.8 miles)
3. Racine County (7.6 miles)
4. Fond du Lac County (6.0 miles)
5. Kenosha County (5.8 miles)

More statistics comparing high-risk area crashes to all crashes are shown:



Maps showing all of the High-Risk Areas throughout the state are included in Appendix B. A GoogleEarth KMZ file can be downloaded at the following link for interactive viewing of the High-Risk Areas and disadvantaged tracts: [Download Link](#)

Progress Towards Safety Targets

The Wisconsin 2023-2027 Strategic Highway Safety Plan (SHSP) is a multi-year plan that identifies the foremost highway safety problems in the state, and recognizes opportunities and processes to address those problems. The SHSP determines the appropriate approaches and countermeasures.

The plan embraces and encompasses the Safe System Approach and is a holistic and comprehensive approach to provide a guiding framework to make all modes of transportation safer.

The goal set forth for improving VRU safety is to reduce non-motorist fatalities and serious injuries by 5% by the year 2027. This means a 2% reduction each year is needed to stay on target.

There are seven tasks identified in the SHSP to improve non-motorist safety:

Task #1: Use infrastructure and engineering treatments to improve the safety of non-motorist users.

Task #2: Increase education for both motorists and non-motorists.

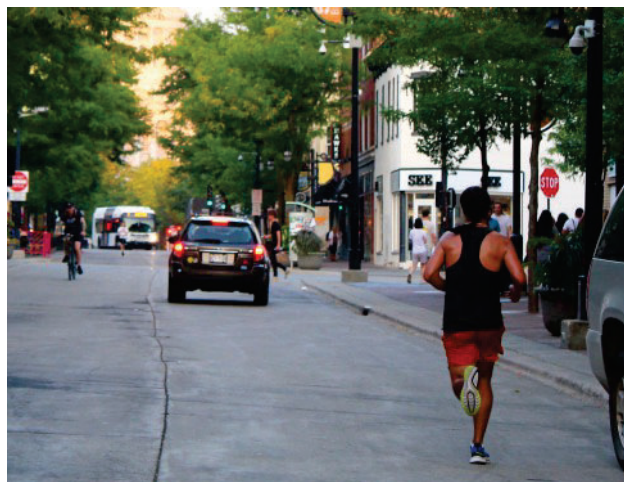
Task #3: Use enforcement strategies to protect non-motorists.

Task #4: Support public information campaigns.

Task #5: Utilize road reconfiguration (i.e., road diets), speed reduction methods, and stop laws (yield vs. stop at crosswalks).

Task #6: Evaluate countermeasures for older pedestrians.

Task #7: Create a work group that meets quarterly regarding non-motorist safety.



It is too soon to report on the progress of the VRU tasks in the current SHSP, but the base for the identified tasks has been laid with the *State of Wisconsin Federal Fiscal Year 2022 Highway Safety Plan (HSP)*. This plan defines a Pedestrian and Bicyclist Safety Program with 8 tasks to promote safety that has begun in earnest.

On the following pages, the Tasks identified in the 2022 HSP will be evaluated for progress toward reducing non-motorist fatalities and serious injuries.



Progress

Pedestrian and Bicyclist Safety Program Tasks (2022 HSP)

1. Hire Bicyclist and Pedestrian Program Manager

The Bicyclist and Pedestrian Program Manager position is currently filled as of April 2022.

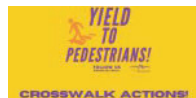
2. Teaching Safe Bicycling



Bicycle courses are offered through a partnership with WisDOT and include community bicycle rodeos, on-bicycle instruction through parks and recreation or school/other educational programs, Effective Cycling Instructors through the Bicycle Federation of Wisconsin (BFW) and the League of American Bicyclists. Some schools offer Basics of Bicycling (BOB), a course developed by the Bicycle Federation of America. The BFW also offers both beginner and advanced courses for adults.

A grant was provided to the Stockbridge School District to supply the school district with a fleet of kids' bikes to enable them to teach bike safety classes and hold bike rodeos in the area. The school district will share these bicycles with other local schools.

3. MilWALKee Walks



The City of Milwaukee represents 10.4% of the population of Wisconsin but accounts for 29.1% of pedestrian crashes.

A grant was given to this pedestrian advocacy group in the City of Milwaukee for outreach in minority communities to focus on increasing yielding to pedestrians at marked and unmarked crosswalks. Crosswalk Actions demonstrations are one tool used to increase pedestrian awareness.

4. Implementation of Exposure Data Pilot Study



The University of Wisconsin - Milwaukee researchers completed several projects in 2021-2022.

UWM applied a model they had previously created in the WisDOT Southeast Region provide initial annual pedestrian crossing volume estimates for all four-way intersections along the State Highway System.

Ultimately, this data could be used by safety analysts to prioritize intersections that have experienced the highest crash rates (e.g., pedestrian crashes per million crossings) and identify types of intersection designs that have higher levels of underlying risk.

A 2023 UWM follow-up grant will focus on collecting and analyzing long-term data, estimating annual volumes at short-term count sides, comparing volumes to the pedestrian volume model and continuing to meet with pedestrian and bicyclist exposure data stakeholders.

In 2019, WisDOT implemented the Safety Certification Process with a focus on 3R (resurfacing, reconditioning, and reconstructing) projects.. This process identifies high-risk crash locations and includes network screening tools to flag locations on the state roadway system with pedestrian/ bicyclist crashes for further study.

Another endeavor by WisDOT is the current development of a tool that considers 19 factors to identify areas of potential inequity and the need for bicycle and pedestrian accommodations. The tool will be converted to ArcGIS Online to provide better access to users.

Progress (Cont.)

5. Offer Designing for Pedestrian courses to WisDOT and local government employees

In 2023, WisDOT secured the following courses:

- Designing for Pedestrian Safety, February 2023
- Curb Ramp Design Updates, March 2023
- FHWA ADA Basics Class, June 2023
- FHWA Designing Pedestrian Facilities for Accessibility, October 16th and 17th

To advance improving pedestrian accommodations, WisDOT is also planning to update 1,000 curb ramps per year beyond those currently programmed for a replacement to meet ADA standards in the current 6-year program. In addition, WisDOT is updating its bicycle and pedestrian guidance documents to include safety treatments such as separate bike lanes, Rectangular Rapid Flash Beacons (RRFB), and Pedestrian Hybrid Beacons (PHB).

6. High Visibility Enforcement Programs

This countermeasure involves promoting traffic safety laws to enhance the safety of bicyclists, including those laws expected of bicyclists and drivers around them. This includes communications and outreach campaigns and training law enforcement officers about the laws, the safety benefits of obeying the laws, and how to enforce bicycle safety-related laws. The purpose of targeted enforcement is to increase compliance with appropriate traffic laws by both bicyclists and motorists through the enforcement of traffic laws for all operators.



6. High Visibility Enforcement Programs (Continued)

In both fiscal years (FY) 2022 and FY 2023, WisDOT's Bureau of Transportation Safety received grants for implementing the enforcement strategies. In FY 2022, \$105,000 was reimbursed and it is estimated that \$170,00 will be reimbursed in 2023.

7. Pedestrian-Bicycle Law Enforcement Training

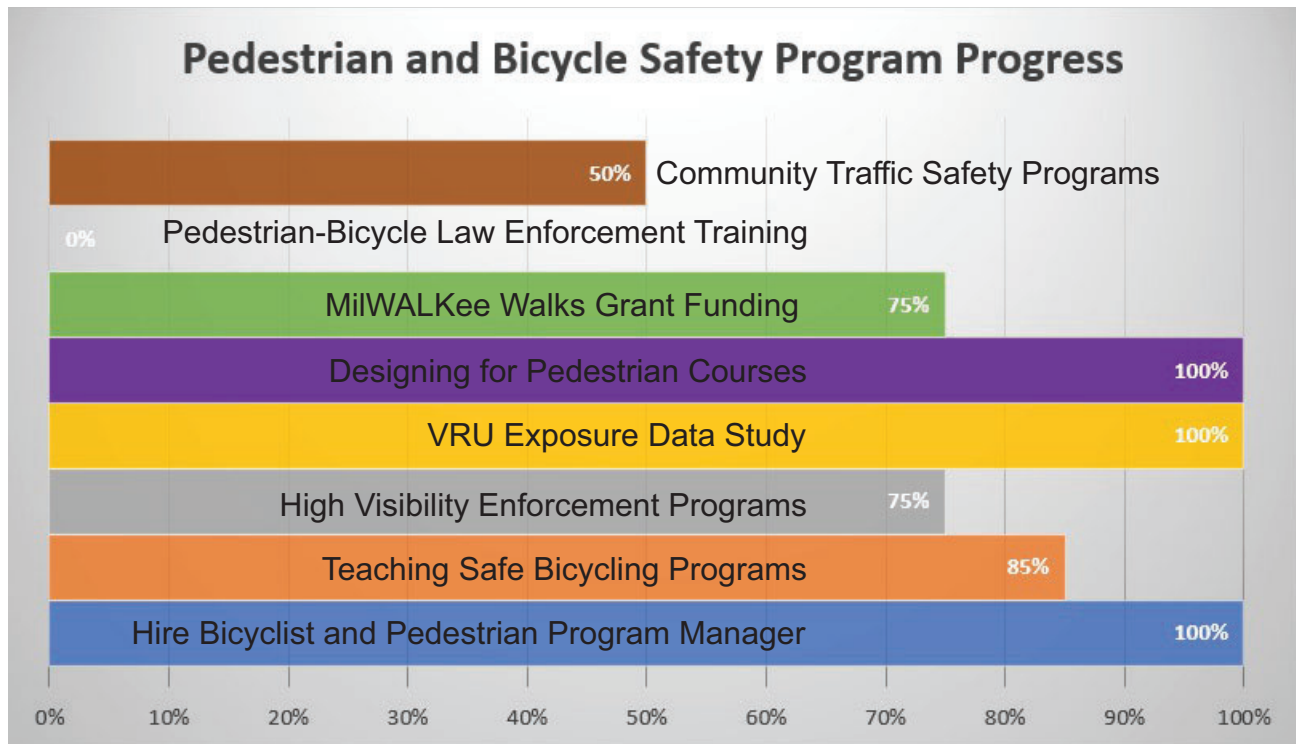
Due to an instructor retiring and a replacement not yet being found, this task has been moved to the FY 2024 HSP.

8. Community Traffic Safety Outreach and Media Programs

In 2022, the Law Enforcement Liaison (LEL) Program started to return to an increased state of normalcy. By the end of the year, most of Wisconsin's County Traffic Safety Commissions (TSC) resumed both their quarterly meetings through a mixture of in-person and hybrid virtual meetings. The LEL program continued to support these traffic safety forums, either in-person or virtually.

The LELs also spearheaded efforts at the local level to pilot a series of targeted traffic safety efforts based on Predictive Analytics, a new enhancement of Community Maps. In twelve counties chosen for their interest in serious crash reduction, this proof-of-concept pilot project expanded on previous work conducted by the State Patrol which targeted high crash locations through enhanced enforcement.

Summary



Although not all of the tasks have been completed, the work is ongoing. Law enforcement VRU training had to be postponed due to staffing issues. The law enforcement liaisons who work to engage the community and implement traffic safety in local communities have come back to work together in 2022 and will continue this work moving forward.

Research on pedestrian and bicyclist risk exposure will be continued in 2023 by UWM, and WisDOT will be releasing its risk assessment tool later this year.

High visibility enforcement programs have already been implemented and will continue.

Some bicycle safety training has been completed and local communities have been provided with bicycles to teach students safe use of the bicycle and how to ride it safely on the roadways.

WisDOT will work to improve safety in the pedestrian and bicyclist environment utilizing techniques from the design classes taken.

Reflecting the State of Wisconsin's continuous drive to be a national leader, WisDOT will continue efforts to increase awareness of VRUs and help them to create safe situations for themselves. Work on these programs will continue to move 'Forward'.

Strategies Moving Forward

Background and Context

Consistent with federal rules from the Infrastructure Investment and Jobs Act, this conclusion summarizes Wisconsin's Vulnerable Road User Safety Assessment (VRU-SA). This assessment is part of Wisconsin's Highway Safety Improvement Program (HSIP) and will be included in the state's Strategic Highway Safety Plan (SHSP). Its main goal is to evaluate current road safety conditions for vulnerable users and outline future safety plans.

Who Are Vulnerable Road Users?

According to FHWA guidelines for this assessment, vulnerable road users (VRUs) are people who are pedestrians, bicyclists, other cyclists, or individuals using a personal conveyance. Motorcyclists and horse drawn carriages not classified as VRUs in this assessment.

Data Analysis

The assessment used a combination of two data sets (10-years) and (5-years) to evaluate VRU safety in Wisconsin. Trends and High-Risk Areas were identified using the 10-year data set. A detailed review of fatal and serious injury VRU crashes was performed using the 5-year data set.

Consultation of Stakeholders

Numerous groups in Wisconsin, such as local governments, WisDOT departments, planning agencies, Tribal Governments, and advocacy groups were contacted via surveys and/or follow-up meetings. Their input was crucial for understanding the broader picture of VRU safety in Wisconsin.



Key Components of Assessment

Wisconsin VRU Crash Trends

Historical review of the past ten years of VRU crash data in Wisconsin from 2013 - 2022.

Fatal and Serious Injury Trends

Fatal and serious injury VRU crash trends in Wisconsin from 2013 - 2022 and 2018 - 2022.

Crash Type Investigation

Detailed analysis of the types of crashes resulting in serious injury and fatalities for VRUs from 2018 - 2022.

Safe System Review

A review of 2,048 serious injury and fatal VRU crashes from 2018 - 2022 through the lens of the Safe System Approach.

Stakeholder Consultation

A summary of the various stakeholder consultations in this assessment ranging from surveys to meetings.

VRU High-Risk Areas in Wisconsin

Methodology and findings of the identification of High-Risk Areas for VRUs in Wisconsin.

Progress Towards Safety Targets

Ongoing strategies and activities in Wisconsin for meeting safety targets.

Strategies Moving Forward

The remainder of Chapter 9 contains recommended strategies to reduce the likelihood of serious injury and fatal VRU crashes in Wisconsin.

High-Risk Areas

VRU-High Risk Areas

VRU High-Risk Areas were developed in this assessment using advanced analysis overlaid with demographic information regarding disadvantaged communities.

In total, approximately 227 miles of roadway were identified as VRU High-Risk Areas. Collectively, these roadways observed 151 fatal and 852 serious injury VRU crashes in the past 10 years.

Strategies to reduce VRU crash risk and severity outcomes in VRU High-Risk Areas are a microcosm of the strategies outlined on the subsequent pages. These strategies, if they were to be targeted specifically at the VRU High-Risk Areas, could substantially reduce VRU crash risk.

VRU High-Risk Areas contain 0.2% of the miles of roadway on Wisconsin's public roadway network. However, that 0.2% of roads observed almost 28% of the VRU crashes that occurred in the past ten years.

Thirty-six percent of the roadway miles in the VRU High-Risk Areas reside within disadvantaged communities.

Ideas



High-Risk Area Maintenance

Consider creative strategies to ensure the maintenance of VRU facilities in High-Risk Areas.



High-Risk Area Design Standards

Consider VRU-focused design standards in VRU High-Risk Areas (e.g. street lighting, signing, etc.).

High-Risk Area Strategies



High-Risk Area Updates

Regularly update VRU High-Risk Areas, and as resources become available, use proactive techniques.



Infrastructure

Implement systemic countermeasures in High-Risk Areas to achieve greatest infrastructure improvement impacts.



Training and Education

Target areas in and surrounding High-Risk Areas with education and training opportunities for road-user safety.



Law Enforcement

Targeted enforcement in and surrounding High-Risk Areas to combat high-risk driving and VRU behaviors.



Post Crash Care

Ensure adequate infrastructure to ensure easy mobility for EMS vehicles through the High-Risk Areas.



Stakeholder Collaboration

Regularly engage with communities with High-Risk Areas to ensure they are at the forefront of improvements.



Vehicle Technology

Advocate for vehicle technology inclusion in vehicles, particularly in areas near High-Risk Areas.

Infrastructure

Transportation infrastructure, meant for the safe and efficient travel of people and goods, is a contributing factor in many VRU crashes. In the review of causes of crashes in Chapter 5, 37% of fatal and serious injury VRU crashes had “road” infrastructure as a contributing factor. Numerous opportunities exist to improve roadway infrastructure to reduce the likelihood and severity of crashes involving VRUs. Key strategies are provided on this page for improving roadway infrastructure for VRUs.

Roadway Improvements

1

Crosswalks Improvements

Improve function of crosswalk to better serve VRUs and reduce exposure to potential motor vehicle conflicts.

2

Street Lighting Improvements

Add, but mostly improve street lighting to better illuminate VRUs and VRU facilities.

3

Traffic Signal Improvements

Update traffic signal timing, operations, and infrastructure to better accommodate VRUs.

4

Widen/Separate/Protect VRUs

Reduce conflicts between VRUs and motor vehicle traffic through improvements to VRU facilities.

5

Pavement Marking / Signing

Add or improve pavement marking / signing, (e.g., advanced yield lines, high-visibility crosswalks, etc.).

6

Parking Lots / Private Driveways

Encourage the use of the MUTCD in design/maintenance/construction of parking lots / private driveways.

Policy Considerations

1

Proactive VRU Treatments

Enact policies that enable proactive VRU treatments based on systemic, risk-based criteria.

2

Eminent Domain Restrictions

Explore options to expand the ability to construct VRU facilities outside of existing right-of-way.

3

Faster Implementation

Explore options to implement construction projects quicker, including temporary traffic calming measures.

4

Maintenance of VRU Facilities

Explore options to maintain VRU facilities. Pavement marking and signing have short life spans.

5

Equity / Consistency

Provide more consistent facilities from the state level down to local roadways, including disadvantaged communities.



Ideas



Design/Build VRU Safety Audit Team

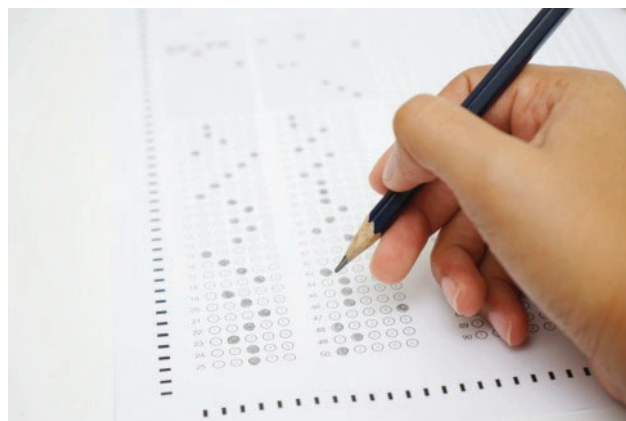
Consider a design/build VRU safety audit team that can quickly design and construct VRU solutions.

Training and Education

Training and education are vital components of a transportation system. Human behavior is interlaced with nearly all aspects of moving people and goods on public facilities. People make mistakes and in many cases, such mistakes are a contributing factor in VRU crashes.

In the review of crashes in Chapter 5, 97% of crashes had a “road user” related contributing factor. About 1/3 of these were attributable to the driver, 1/3 to the VRU, and 1/3 to both the driver and VRU.

Recommendations for education and training to improve VRU safety are provided.



Education / Training

1

Road/VRU Laws

The ATP survey results in Chapter 4 reiterated there is a need to improve people's understanding of laws.

2

The Impact of Vehicle Speed

The risks of serious injury and death are very high for VRUs and the public could be educated more about this.

3

Nighttime VRU Risk

63% of fatal VRU crashes occurred at night/low-light conditions. Public education of solutions could help.

4

New Traffic Technologies

What's a RRFB? Does traffic have to stop when its flashing? Education about new devices could help.

5

Reoccurring Driver Education

Several states (CA, NY, & VA) have reoccurring driver education programs. Could be considered in Wisconsin.



Ideas

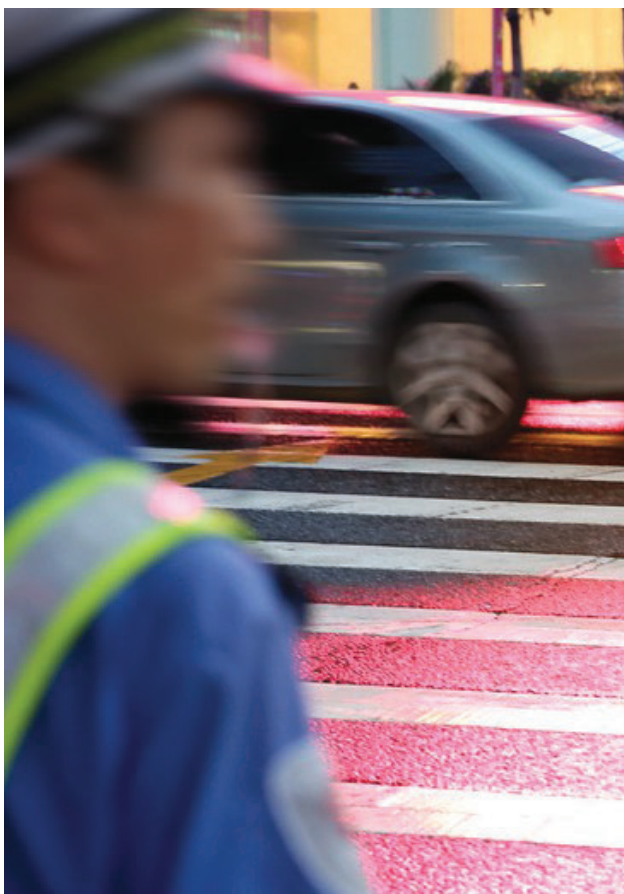


Rethink “Driver” Education

Consider “Road User” education aimed at all road users of all modes. Drivers and VRUs both make errors.

Law Enforcement

As was discussed with the training and education recommendations, human factors were a contributing factor in 97% of the fatal and serious injury VRU crashes reviewed in this assessment. Law enforcement, in many ways, is another mechanism for road user education and training. The following recommendations include strategies for reducing VRU crash risk through the means of law enforcement.



Law Enforcement

- 1 Driver Behavior**
Enforcement aimed at correcting driver behavior, particularly with regards to VRUs (e.g., yielding compliance)
- 2 VRU Behavior**
Enforcement aimed at correcting VRU behavior, specifically regarding VRU crossings without right-of-way.
- 3 Speed**
Targeted speed enforcement in areas with high levels of VRU activity, and particularly in High-Injury Areas.
- 4 Drug / Alcohol**
Road users consistently are using the transportation network under the influence of drugs and/or alcohol.
- 5 Nighttime VRU Safety**
Enforcement aimed at driver and VRU behaviors during nighttime conditions.
- 6 Targeted Strategies**
Continue pursuit of funding to perform targeted enforcement strategies for VRU safety.
- 7 Consistency**
Consistent enforcement of road laws from state to local jurisdictions, and throughout various regions of state.
- 8 Continued Collaboration**
Continue collaboration with WisDOT, MPOs, RPCs, local governments etc. to reduce VRU crash risk.

Ideas



Automated Enforcement

While not a new idea, automated enforcement & policies/laws governing it could be evaluated / modified.



Law Enforcement Education

Additional law enforcement staff education regarding pedestrian/bicyclist safety and issues.

Post Crash Care

Wisconsin's crash reports offer restricted insights into post crash care notably time lapses between crash occurrence and emergency response. When response times exceeded 10 minutes, discerning reasons for delay proved challenging. Moreover, 4.4% of reported crashes indicated deficiencies in post crash care.

Given the heightened risk VRUs face for severe injury or fatality, rapid and effective post-crash care becomes imperative for minimizing adverse outcomes.

The recommendations underscore the need for further research into countermeasures to enhance post crash care in Wisconsin, especially for VRUs.

Post Crash Care Strategies

1

Emergency Vehicle Preemption

Add emergency vehicle preemption in areas with high VRU activity.

2

EMS Vehicle Equipment

Outfit EMS vehicles with tailored equipment for injuries commonly sustained by VRU crash victims.

3

Specialized Training

Enhance training for Emergency Medical Services and other first responders for VRU crash victims.

4

Public Training

Add training in drivers education on what to do after VRU crash (i.e. calling 911, exchange info, etc.)

5

Integration of Data

Continue to integrate post-crash care data with WisDOT data resources and databases.



Stakeholder Collaboration

Wisconsin has an active community of stakeholders interested in VRU safety. Many stakeholders were involved in the development of this assessment through surveys, follow-up meetings, and targeted questioning.

Continued stakeholder involvement will be a key to success in reducing the number and severity of VRU crashes. Below are recommendations regarding stakeholder collaboration:

Collaboration

1

Public Involvement

Personal VRU needs are not an input on crash reports. A proactive understanding of needs is important.

2

Consistency

Improved consistency statewide for VRU safety strategies will help provide equitable treatment of VRUs.

3

Funding Discussions

Continue sharing knowledge about potential funding sources for VRU safety improvements.

4

Tribal Involvement

Continue to build relationships and establish trust with Tribal Governments regarding VRU safety.

5

Accelerate Improvements

Continue to discuss strategies to quickly implement VRU safety treatments, both permanent and temporary.

Ideas



Share Success Stories

Creative strategies are present throughout Wisconsin; continue to share success stories with others.



Vehicle Technology

Vehicle technology appears to have the potential to be a very impactful countermeasure for VRU safety (noted in 47% of fatal and serious injury VRU crashes). It was the second most common countermeasure, trailing only driver education/training.

Since much of the technology already exists, if there was a means to integrate it quickly, it could reduce VRU crashes in the near to mid-term.

Ideas



VRU-Specific Crash Testing

Add vulnerable road user collision tests to CIREN Engineering Center and/or other testing centers.



Vehicle VRU Crash Design

Many vehicles are built to protect the occupants, but may not have the features to protect VRUs in collisions.



Inform Public of Benefits

As government agencies produce research supporting the benefits of technology; share with public.

Vehicle Technology

1

Advocate for Safety Features

Advocate for vehicle technology features that would reduce collisions with VRUs, such as:

- Pedestrian Detection Systems
- Pedestrian Auto Emergency Braking
- Blind Spot Detection
- Forward Collision Warning
- Backing Warning / Auto Braking

2

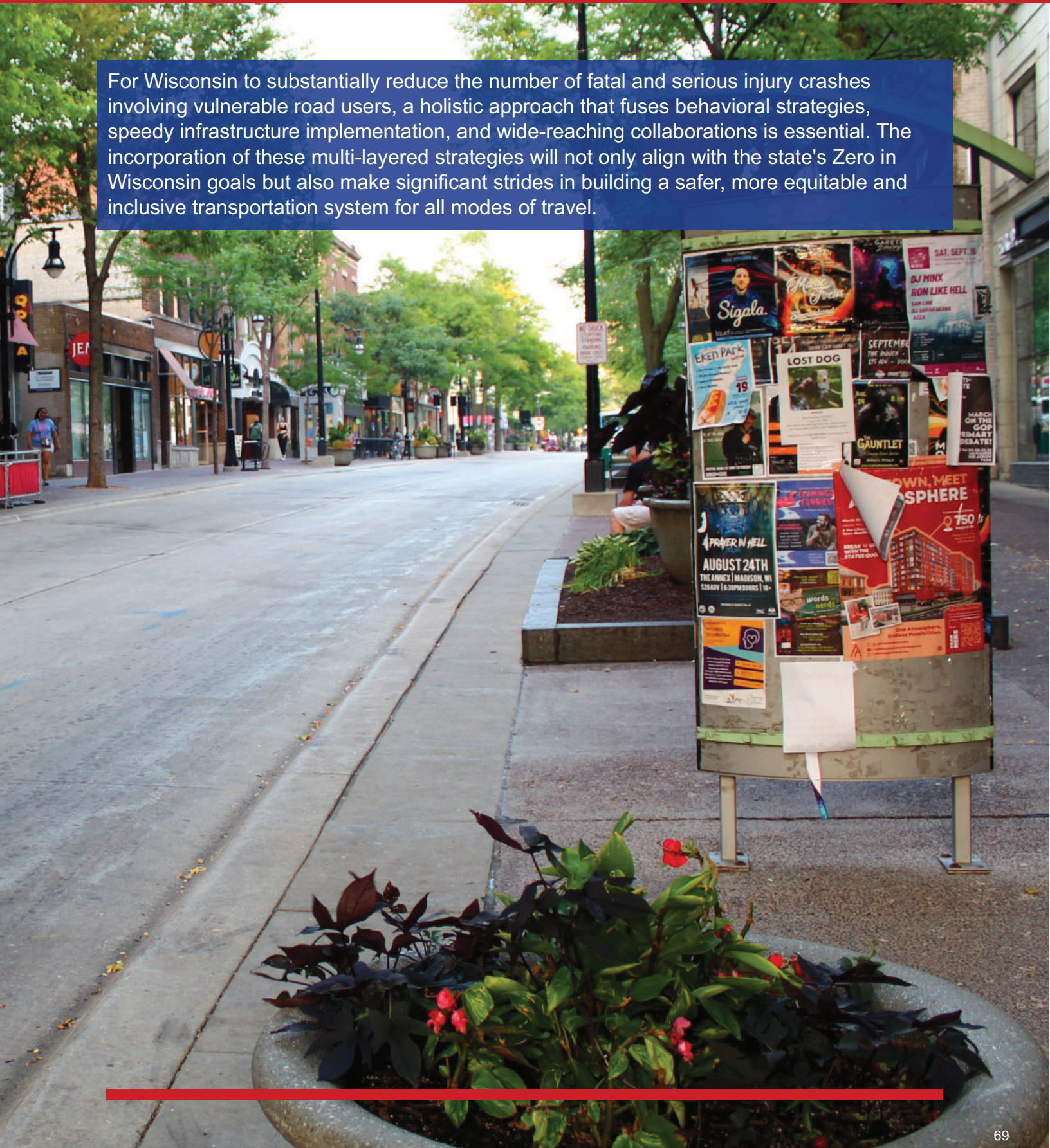
Response to Distracted Driving

Enhance technology for phone-blocking technology and other distracted-driving crashes.



Final Thoughts

For Wisconsin to substantially reduce the number of fatal and serious injury crashes involving vulnerable road users, a holistic approach that fuses behavioral strategies, speedy infrastructure implementation, and wide-reaching collaborations is essential. The incorporation of these multi-layered strategies will not only align with the state's Zero in Wisconsin goals but also make significant strides in building a safer, more equitable and inclusive transportation system for all modes of travel.



Glossary of Terms

Glossary of Terms

Term - Definition:

Active Transport - A means of getting around, powered by human energy, primarily walking and bicycling.

Active Transportation Plan - A document that provides a roadmap for improved walking and bicycling conditions.

Alcohol or Drug Involved - A crash where one or more parties involved is suspected to have or has been tested and is positive for having alcohol or drugs in their system.

A-Level Injury - A suspected serious injury - Any injury other than fatal which results in one or more of the following: Severe laceration resulting in exposure of underlying tissues/muscle/organs or resulting in significant loss of blood, broken or distorted extremity (arm or leg), crush injuries, suspected skull, chest or abdominal injury other than bruises or minor lacerations, significant burns (second and third degree burns over 10% or more of body), unconsciousness when taken from the crash scene, or paralysis.

Bicyclist - One who rides a bicycle, particularly one who does so regularly, or as an enthusiast. A bicycle, also called a pedal cycle, bike, push-bike or cycle, is a human-powered or motor-powered assisted, pedal-driven, single-track vehicle, having two wheels attached to a frame, one behind the other.

Census Tract (ETC Explorer tool) - Census tracts are small, relatively permanent statistical subdivisions of a county.

Community Maps - Community Maps provides Wisconsin's law enforcement agencies and county Traffic Safety Commissions with a statewide map of all police reported motor vehicle crashes from 2010 to the current year. Fatal crashes are included from 2001.

Complete Streets Design Model - Roadways where adjacent land use suggests that trips could be served by varied modes, and to achieve complete travel networks for various types of road users. A Complete Streets Design Model prioritizes safety, comfort, and connectivity for all users of the roadway, including but not limited to pedestrians, bicyclists, motorists, and transit riders of all ages and abilities.

Countermeasure - An action taken against an unwanted action or situation or put in place to mitigate a future unwanted action or situation.

County Traffic Safety Commission - These commissions are intended to bring local and state expertise to minimize the incidence and severity of traffic crashes. TSC membership creates a collaboration of stakeholders dedicated to reducing injuries and death on their roadways locally, regionally and statewide.

Crash Density Corridor (in SSPF) - Crash density corridors are identified by applying a 1/2-mile moving window aggregation to the street network in the study area. The 1/2-mile moving windows are created to form corridors using the roadway street name.

Crash Severity Index - The severity of a crash is based on the most severe injury to any person involved in the crash. KABCO injury severity scale: Fatal (K), suspected serious injury (A), suspected minor injury (B), possible injury (C) property damage only (O).

Crosswalk - means either a marked crosswalk or unmarked crosswalk. (See Marked Crosswalk and Unmarked Crosswalk definitions).

Data-Driven Approach - Data-driven safety analysis (DDSA) employs newer, evidence-based models that provide state and local agencies with the means to quantify safety impacts. The analyses provide scientifically sound approaches to identifying high-risk roadway features and executing the most beneficial projects with limited resources to achieve fewer fatal and serious injury crashes.

Glossary of Terms (Cont.)

Term - Definition:

Deficiency - Lacking some necessary quality or element; error in judgement or action causing unwanted result.

Disadvantaged Area - Communities most impacted by climate change, pollution, and environmental hazards.

Emergency Medical Services - A system that responds to emergencies providing a coordinated response and emergency medical care involving numerous people and agencies.

Equity - Refers to fairness and justice, recognizing that we do not all start from the same place and must acknowledge and make adjustments to imbalances. Work to ensure the inclusion of project elements that proactively address racial equity, access for elderly people and people with disabilities, workforce development, and economic development, and that remove barriers to opportunity and accessibility, including automobile dependence in both rural and urban communities, and which redress prior inequities and barriers to opportunity.

Fatality Analysis Reporting System - Contains data derived from a census of fatal traffic crashes within the 50 States, the District of Columbia, and Puerto Rico. To be included in FARS, a crash must involve a motor vehicle traveling on a trafficway customarily open to the public and must result in the death of at least one person (occupant of a vehicle or a non-motorist) within 30 days of the crash.

Federal Highway Administration - An agency within the U.S. Department of Transportation that supports state and local governments in the design, construction, and maintenance of the Nation's highway system.

Fiscal Year - A fiscal year is a one-year period that companies and governments use for financial reporting and budgeting. Wisconsin's state fiscal year is from July 1-June 30.

Geographic Information System Mapping - A system that creates, manages, analyzes, and maps all types of data. GIS connects data to a map, integrating location data (where things are) with all types of descriptive information (what things are like there).

Heat Map - A two-dimensional representation of data in the form of a map or diagram in which data values are represented as colors.

High-Injury Network - Identify stretches of roadways where the highest concentrations of collisions resulting in fatal or serious injuries occur on the transportation network.

High-Risk Area - Parts of the state where it is considered that there is a high level of exposure to safety and life risks on the transportation system based on the results of quantitative analysis using the required data and demographics information, as well as consideration of the Safe System Approach.

Highway Safety Improvement Program - A core Federal-aid program with the purpose to achieve a significant reduction in traffic fatalities and serious injuries on all public roads, including non-State-owned roads and roads on tribal land.

Justice40 Initiative - Initiative to confront and address decades of underinvestment in disadvantaged communities. The initiative will bring resources to communities most impacted by climate change, pollution, and environmental hazards.

K-Level Crash - Fatal injury - Any injury from a traffic crash which results in death within 30 days of the crash.

Glossary of Terms (Cont.)

Term - Definition:

Manual on Uniform Traffic Control Devices - A manual put out by FHWA that by sets minimum standards and provides guidance, ensuring uniformity of traffic control devices across the nation.

Marked Crosswalk - Any portion of a highway clearly indicated for pedestrian crossing by signs, or pavement markings.

Metropolitan Planning Organization - MPOs are designated for urbanized areas of 50,000 or more in population to carry out the metropolitan transportation planning process and to provide a forum for local decision-making on transportation issues of a regional nature.

Non-motorist - A non-motorist is any person other than a motorist, and includes: A person on foot, a person walking, running, jogging, hiking, sitting or lying within the trafficway or on private property, etc., persons in buildings, a person on personal conveyance.

Pedestrian - All those who move along sidewalks, adjacent to roadways, along roadways, crossing a roadway at a standing, walking or running pace, including those in wheelchairs and scooters.

Pedestrian Hybrid Beacon - A traffic control device designed to help pedestrians safely cross higher-speed roadways at midblock crossings and uncontrolled intersections. The beacon head consists of two red lenses above a single yellow lens. The lenses remain "dark" until a pedestrian desiring to cross the street pushes the call button to activate the beacon, which then initiates a yellow to red lighting sequence consisting of flashing and steady lights that directs motorists to slow and come to a stop, and provides the right-of-way to the pedestrian to safely cross the roadway before going dark again.

Predictive Analytics - One of the advanced features of Community Maps outside of the data keeping and mapping functions is called Predictive Analytics. This feature, available to users with credentials, is a proactive look at high crash probability locations within a jurisdiction. Utilizing historical crash data, Predictive Analytics applies algorithms to produce crash "hots spots". While these tools were originally developed to support law enforcement resource allocation, the ability to predict with reasonable certainty where crashes will re-occur can be utilized by numerous other traffic safety stakeholders in support of the Safe System Approach.

Rational Speed Limit - A speed limit that helps drivers choose a reasonable and prudent speed that is appropriate for normal traffic, weather and roadway conditions. They encourage more drivers to travel at about the same speed.

Rectangular Rapid Flashing Beacon - A device to accompany a pedestrian warning sign and consists of two, rectangular-shaped yellow indications, each with a light-emitting diode (LED)-array-based light source. RRFBs flash with an alternating high frequency when activated to enhance conspicuity of pedestrians at the crossing to drivers.

Regional Planning Commission - RPCs provide intergovernmental planning and coordination for the physical, social and economic development of a region. A board, typically appointed by county boards and the governor, directs commission activities.

Right-of-Way (Wisconsin) - Right-of-way and rules-of-the-road for pedestrians are summarized [here](#) and for bicyclists [here](#). A complete list of the rules of the road in Wisconsin is provided at this [link](#).

Road Safety Audits - Proactive, formal safety performance examination of an existing roadway or future roadway project and its surrounding area. RSAs are performed by a multidisciplinary team independent of the project and use an established process. RSAs consider all road users, account for human factors and road user capabilities, document findings and recommendations in a formal report, and require a formal response from the road owner.

Glossary of Terms (Cont.)

Term - Definition:

Rollers - A person using conveyance that rolls such as a skateboard, roller skates, roller blades, scooters, wheel chairs, mobility scooter, personal transporter, etc.

Safe Routes to School - An approach that promotes walking and bicycling to school through infrastructure improvements, enforcement, tools, safety education, and incentives to encourage walking and bicycling to school.

Safe System Approach - A roadway design that emphasizes minimizing the risk of injury or fatality to road users; aiming to eliminate death and serious injury for all road users; anticipating and accommodating human errors; keeping crash impact energy on the human body within tolerable levels; proactively identifying safety risks in the system; building in redundancy through layers of protection so if one part of the system fails, the other parts provide protection; and sharing responsibility for achieving the vision zero goal of zero deaths and serious injuries among all who design, build, manage, and use the system.

Safer Streets Priority Finder - A tool that takes into consideration areas where a disproportionate share of fatal and serious injury crashes have occurred and identifies areas that are at risk for future crashes.

Safety Action Plan - Comprehensive safety plans aimed at reducing and eliminating serious injury and fatal crashes.

Safety Certification Process (SCP) - WisDOT utilizes the Safety Certification Process (SCP) to implement a performance-based practical design approach to roadway safety. This process adopts the American Association of State Highway and Transportation Officials (AASHTO) Highway Safety Manual (HSM) analysis methods and economic appraisal process. WisDOT's SCP uses network screening tools to identify locations that experience more crashes than similar sites; therefore, they have a higher potential for safety improvement. These "safety sites of promise" are then subject to a crash vetting process, predictive crash modeling, and economic appraisal (benefit-cost) methodologies, to quantify the safety benefits of potential countermeasures. By quantifying safety, independent of other factors, it allows WisDOT to target and prioritize investments with more confidence which can reduce severe injury crashes.

Sliding Windows Analysis (in SSPF) - This analysis creates crash density estimates along street corridors throughout the study area, weighted by crash severity, which enables the highest crash-density sections to be identified for each mode individually.

Stakeholder - A person/group with an interest or concern in something.

State Trunk Highway - This system of highways, which includes the National System of Interstate and Defense Highways (Interstate System) and the U S numbered highways, constitutes the primary intercounty and intercity highways in Wisconsin.

State Trunk Network - Network of all of the roadways belonging to the State Trunk Highway System.

Strategic Highway Safety Plan - A major component and requirement of the Highway Safety Improvement Program (HSIP) (23 U.S.C. § 148). It is a statewide-coordinated safety plan that provides a comprehensive framework for reducing highway fatalities and serious injuries on all public roads.

Systemic Safety Analysis - Risk-based models, which use crash and roadway data in combination to identify high-risk roadway features that correlate with particular crash types. Systemic analysis identifies locations that are at risk for severe crashes, even if there is not a high crash frequency at these locations.

Glossary of Terms (Cont.)

Term - Definition:

Traffic Control Device - Traffic control devices are markers, signs and signal devices used to inform, guide and control traffic, including pedestrians, motor vehicle drivers and bicyclists. These devices are usually placed adjacent to, over, or along the highways, roads, traffic facilities and other public areas that require traffic control.

federal government and is responsible for planning and coordinating federal transportation projects. It also sets safety regulations for all major modes of transportation.

Underserved Communities - Populations sharing a particular characteristic, as well as geographic communities, that have been systematically denied a full opportunity to participate in aspects of economic, social, and civic life. Underserved communities include Black, Latino, and Indigenous and Native American persons, Asian Americans and Pacific Islanders, and other persons of color; members of religious minorities; lesbian, gay, bisexual, transgender, and queer (LGBTQ+) persons; persons with disabilities; persons who live in rural areas; and persons otherwise adversely affected by persistent poverty or inequality.

United States Department of Transportation - One of the executive departments of the U.S.

Unmarked Crosswalk - In the absence of signs or pavement markings, that part of a roadway, at an intersection, which is included within the transverse lines which would be formed on such roadway by connecting the corresponding lateral lines of the sidewalks on opposite sides of such roadway or, in the absence of a corresponding sidewalk on one side of the roadway, that part of such roadway which is included within the extension of the lateral lines of the existing sidewalk across such roadway at right angles to the center line thereof, except in no case does an unmarked crosswalk include any part of the intersection and in no case is there an unmarked crosswalk across a street at an intersection of such street with an alley.

USDOT Equitable Transportation Community Explorer - Interactive map that uses census tracts and data from five components (Transportation Insecurity, Climate and Disaster Risk Burden, Environmental Burden, Health Vulnerability, and Social Vulnerability) to identify disadvantaged areas within the USA.

VRU Crossing Without Right-of-Way - Crossing at place other than crosswalk. Every pedestrian, bicyclist, or rider of an electric scooter or an electric personal assistive mobility device crossing a roadway at any point other than within a marked or unmarked crosswalk shall yield the right-of-way to all vehicles upon the roadway.

Vulnerable Road User - Encompasses non-motorists classified within the Fatality Analysis Reporting System (FARS) person attribute codes, namely pedestrians, bicyclists, other cyclists, and individuals utilizing personal conveyances. Highway workers on foot in work zones are included in this categorization, attributed to their pedestrian status. A vulnerable road user may include people walking, biking, or rolling. It is imperative to note, however, that motorcyclists and horse drawn carriages are explicitly excluded from this classification.

Wisconsin Traffic Operations and Safety Laboratory - A unique organization developed with a mission to, "improve traffic operations and safety in Wisconsin and across the Midwest through a diverse balance of service partnerships, research and training."

Wisconsin Department of Transportation - A governmental agency of the U.S. state of Wisconsin responsible for planning, building and maintaining the state's highways.

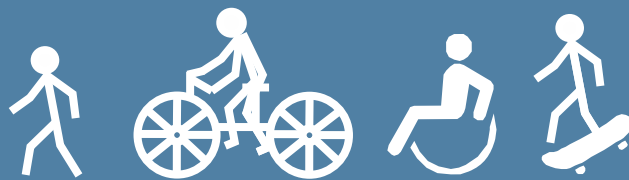
WisTransPortal - Serves the computing and data management needs of the Wisconsin Traffic Operations and Safety (TOPS) Laboratory. The project scope includes support for ITS data archiving, real-time traffic information services, transportation operations applications, and transportation research.

Appendix

Appendix A

VRU Crash Types

Vulnerable Road User Crash Types



Vulnerable Road User Crash Types

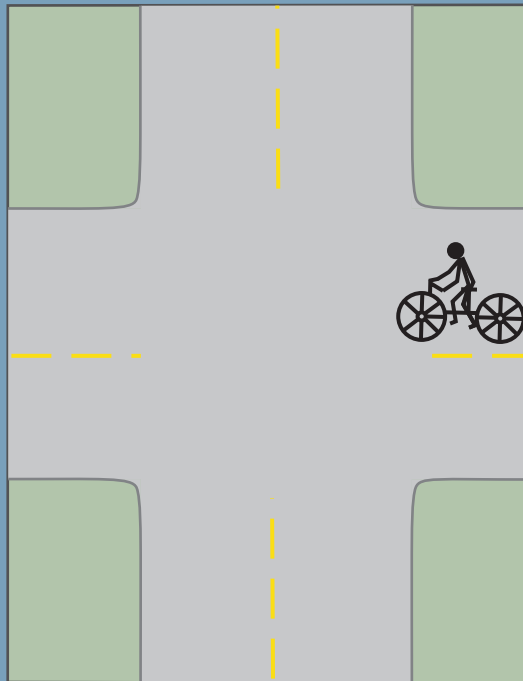
Categories

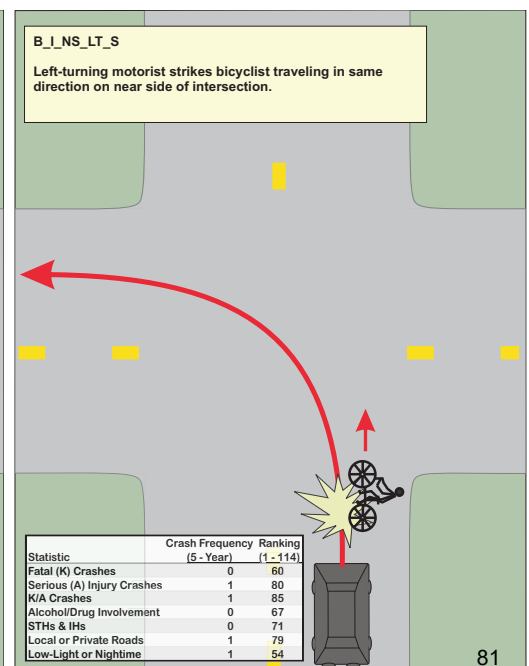
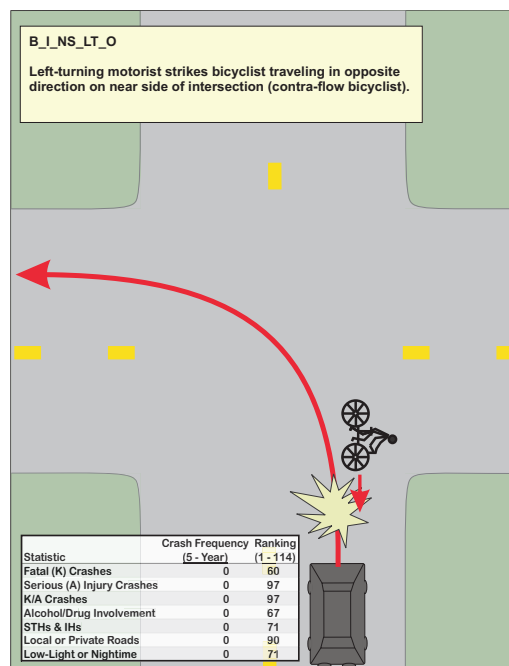
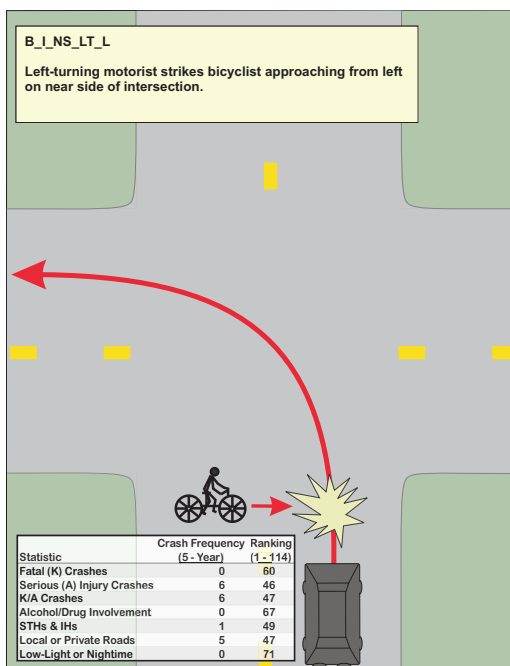
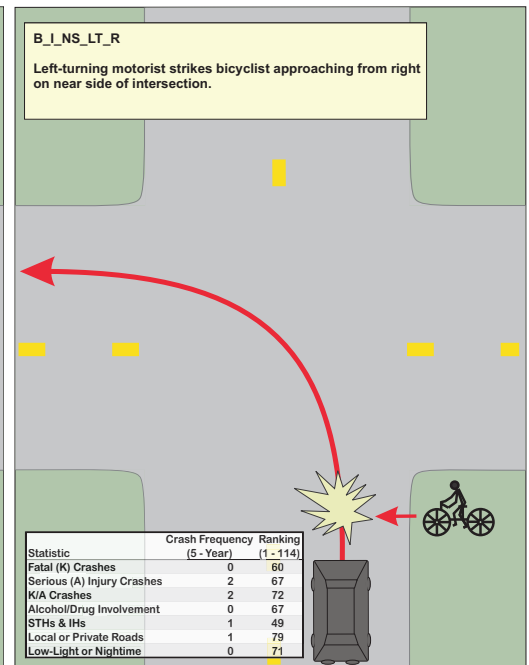
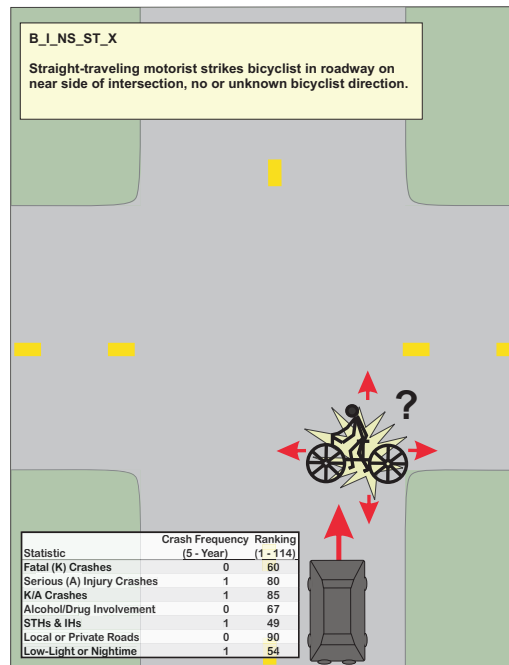
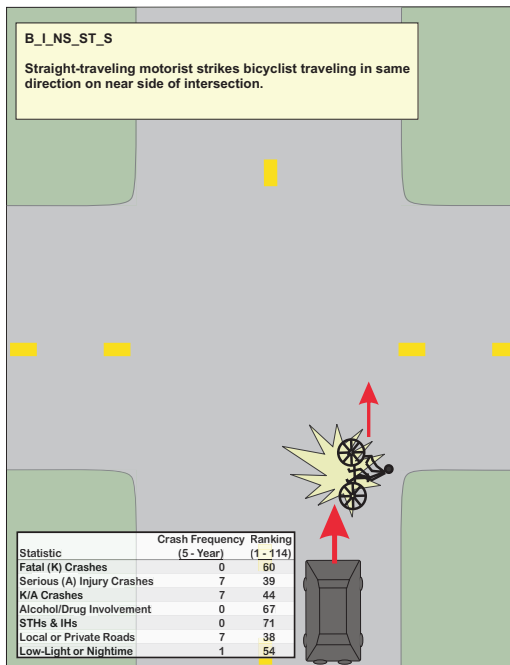
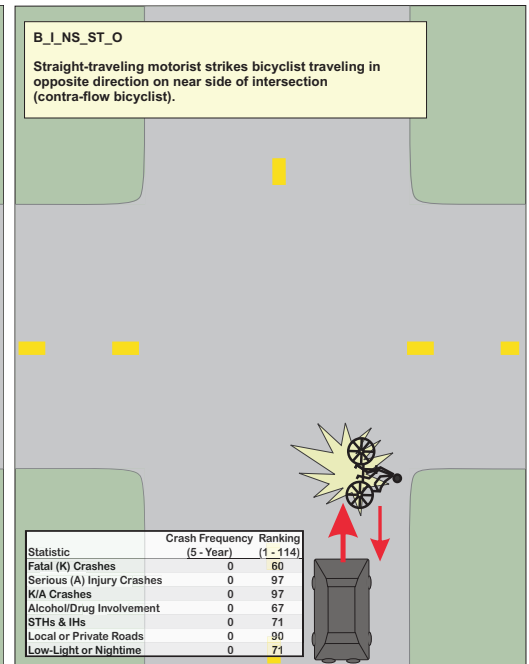
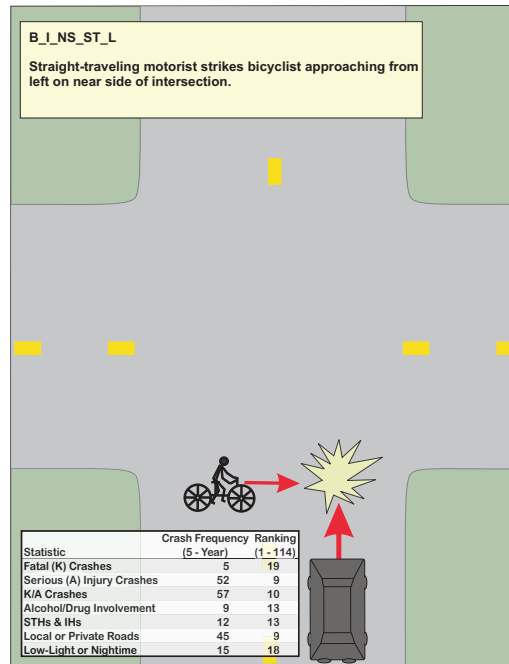
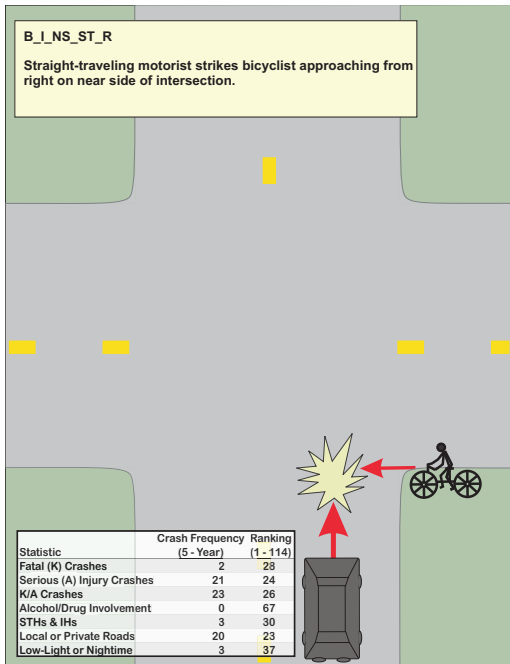
Bicyclist Intersection Crash Types
Bicyclist Non-Intersection Crash Types
Bicyclist Non-Intersection Parking Lot/Private Property Crash Types
Pedestrian Intersection Crash Types
Pedestrian Non-Intersection Crash Types
Pedestrian Non-Intersection Parking Lot/Private Property Crash Types

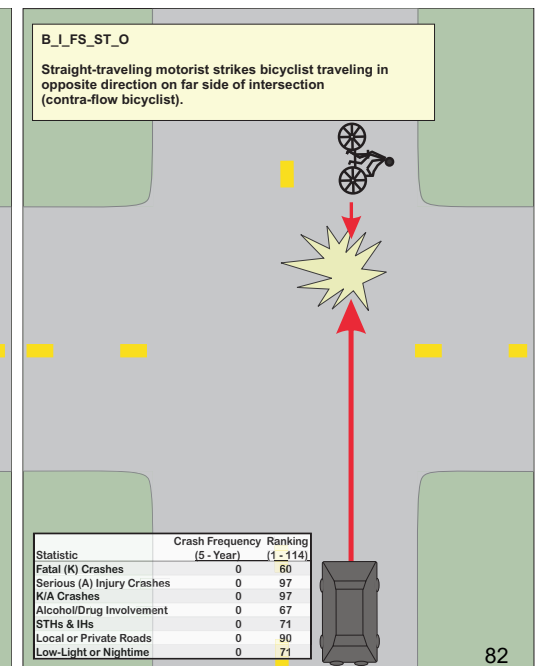
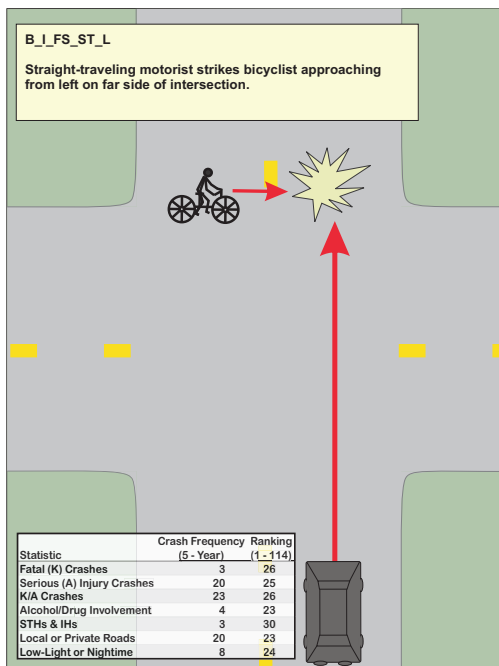
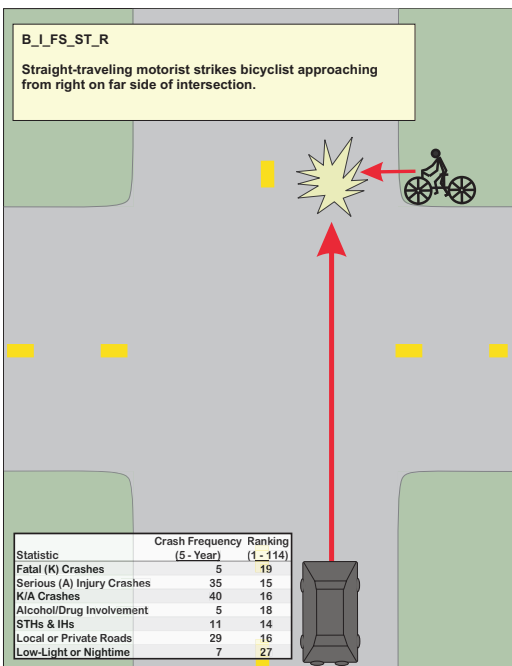
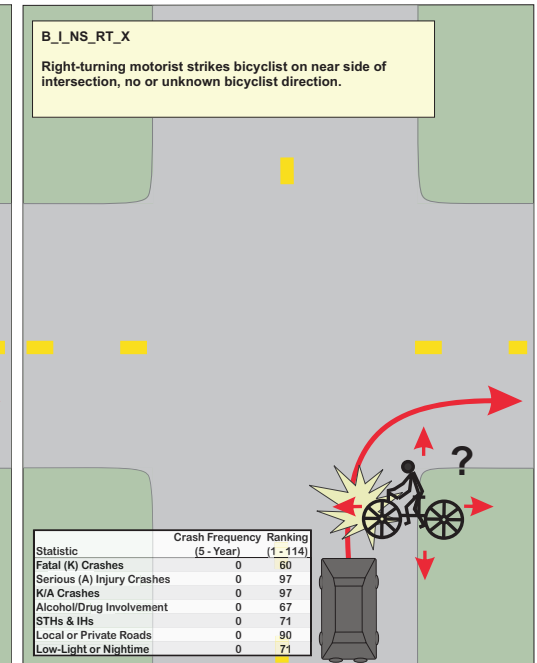
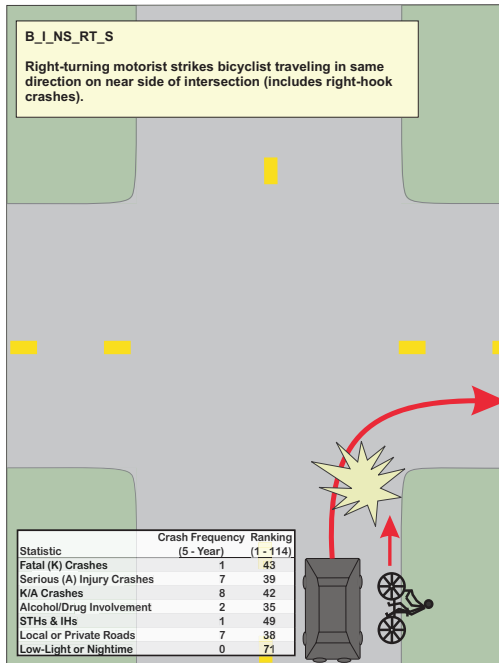
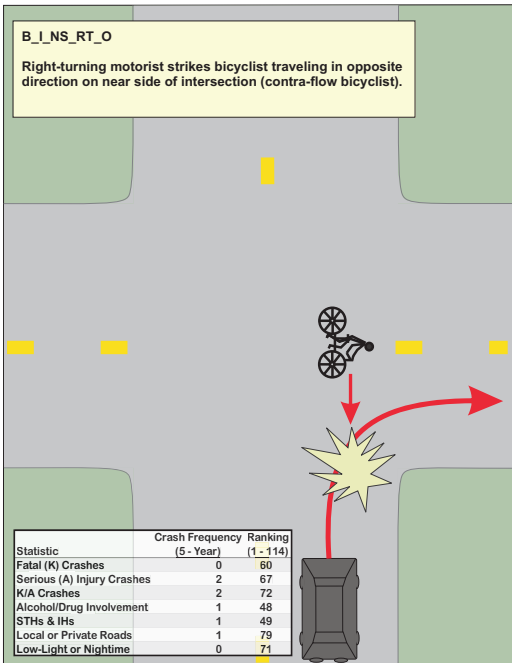
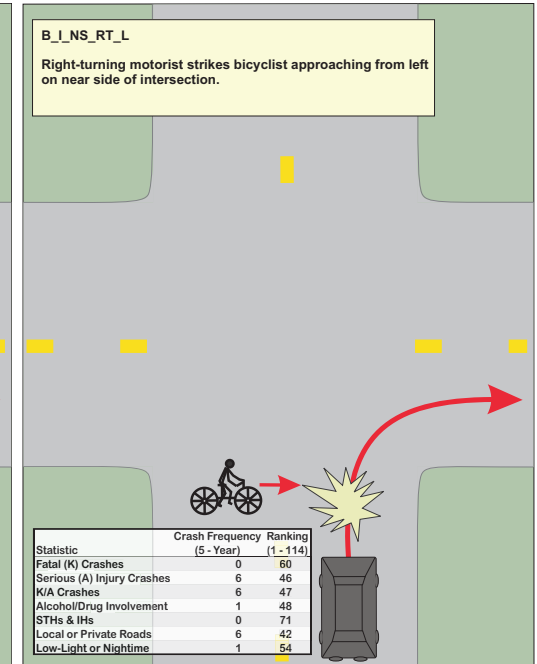
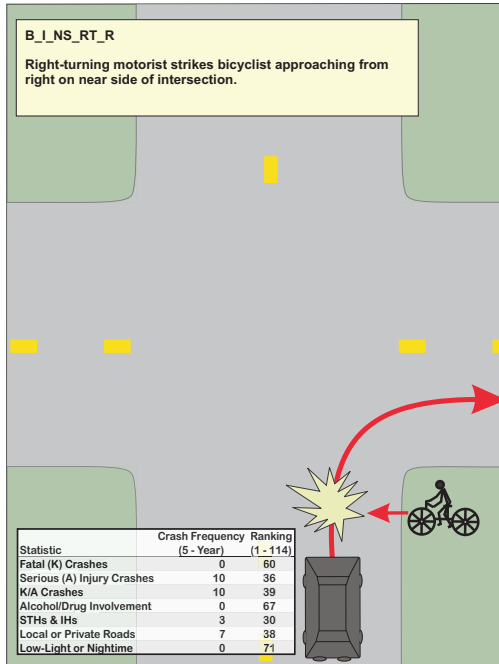
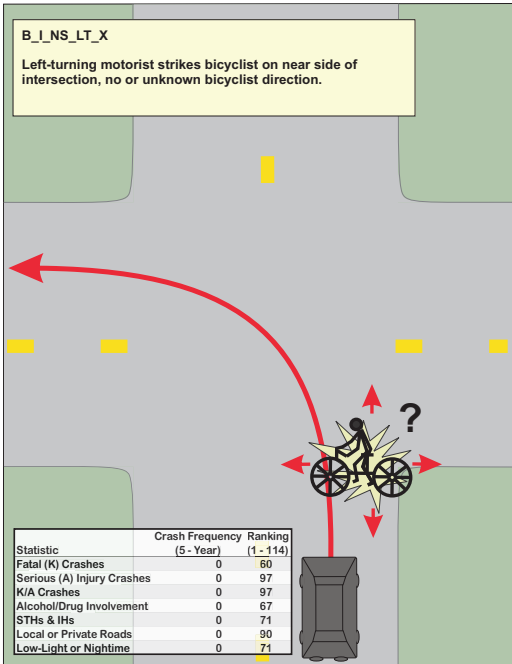


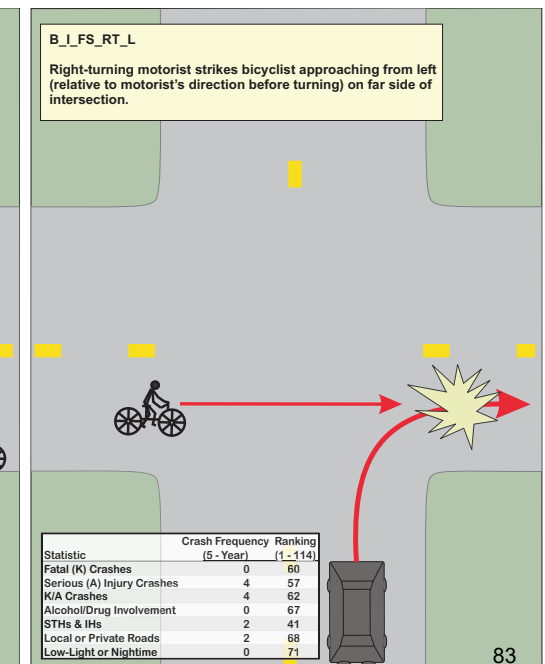
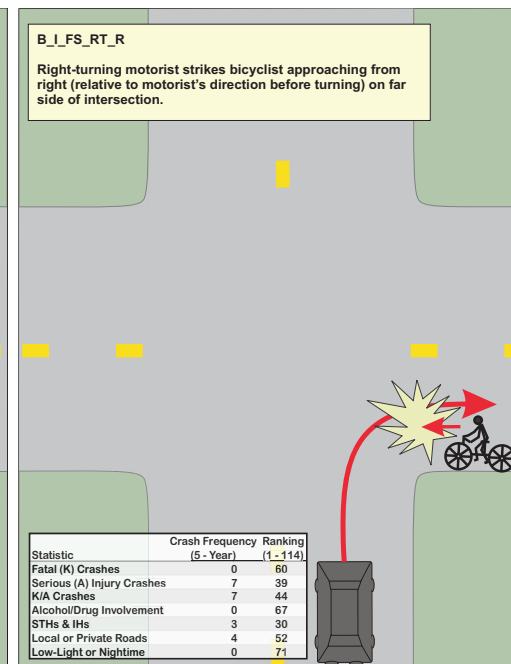
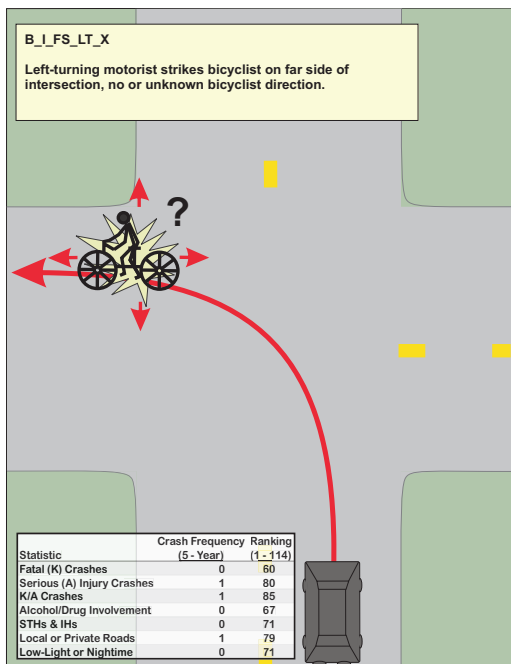
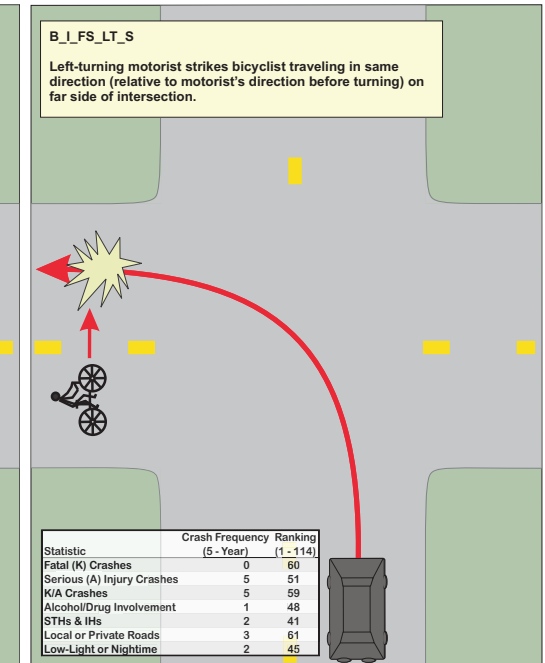
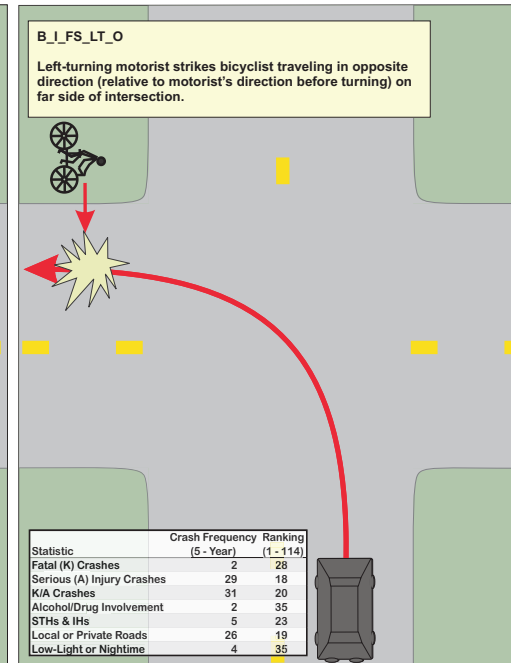
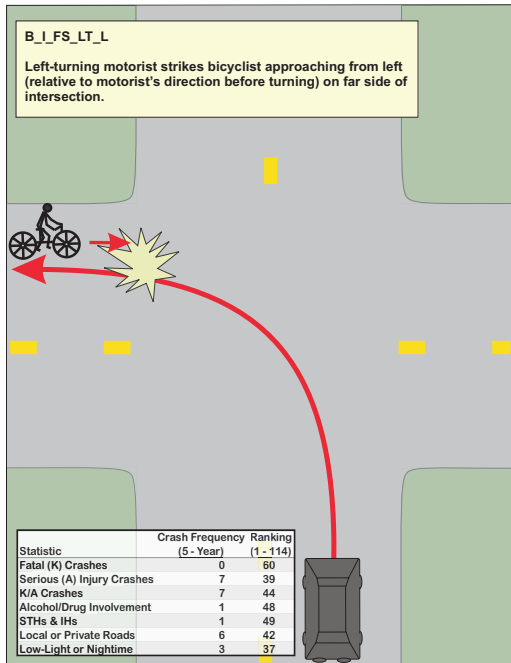
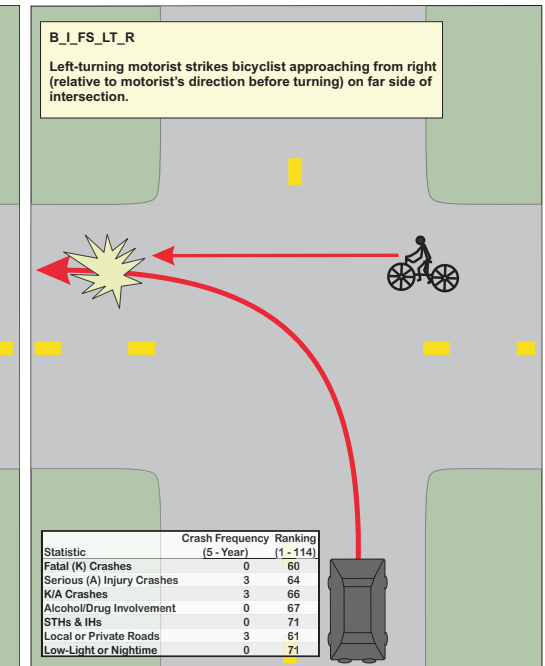
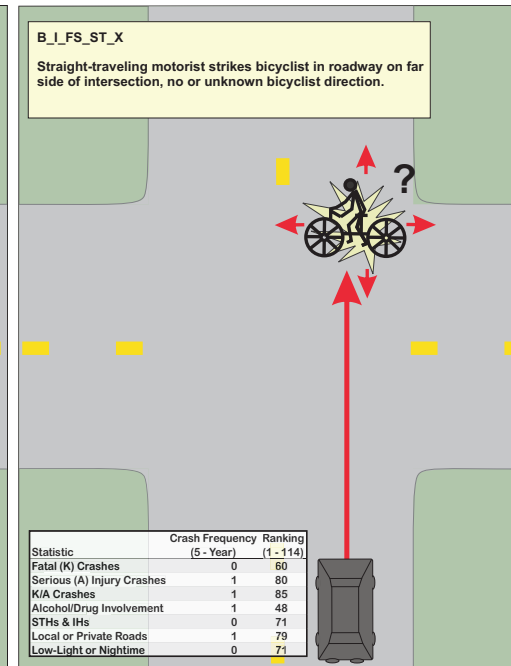
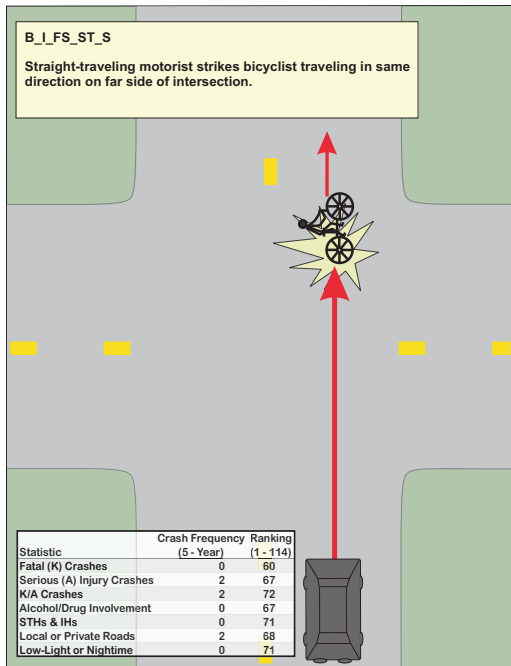
Bicyclist Intersection Crash Types

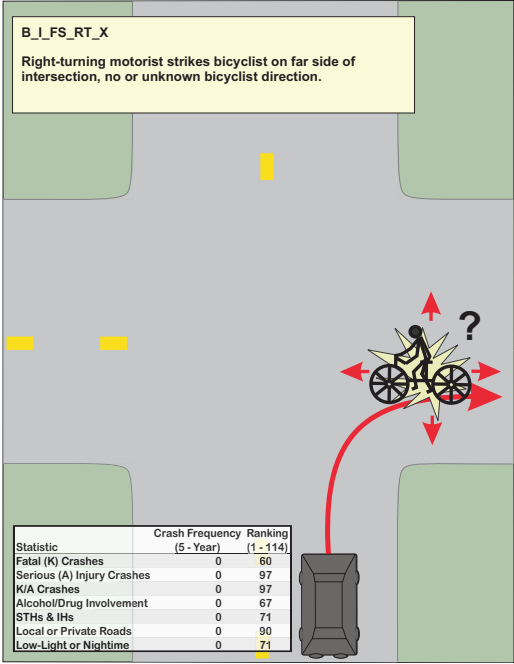
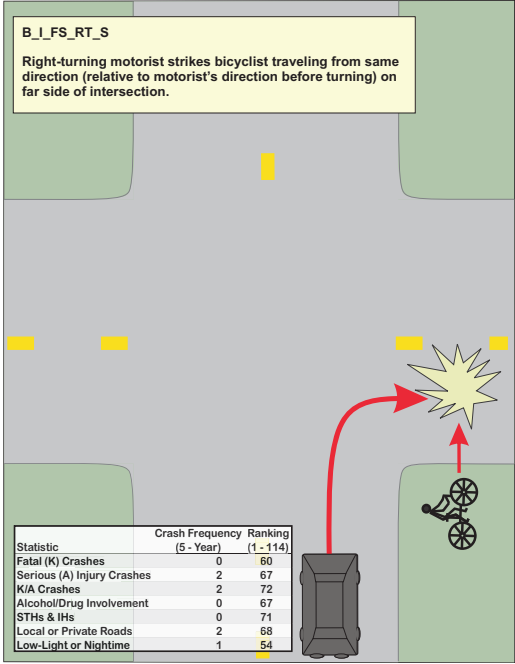
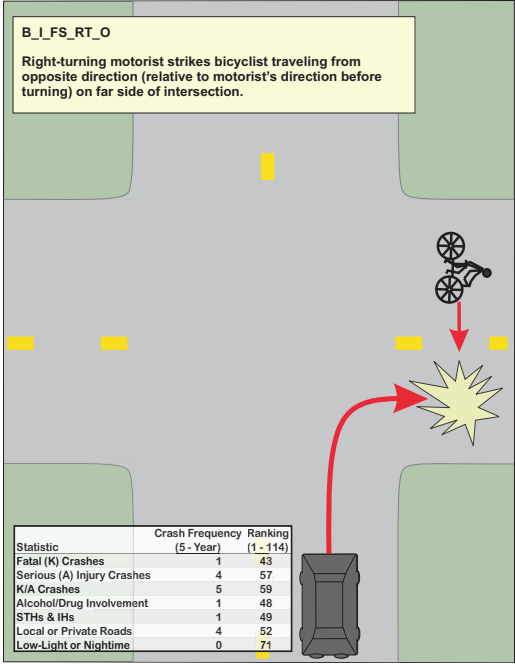
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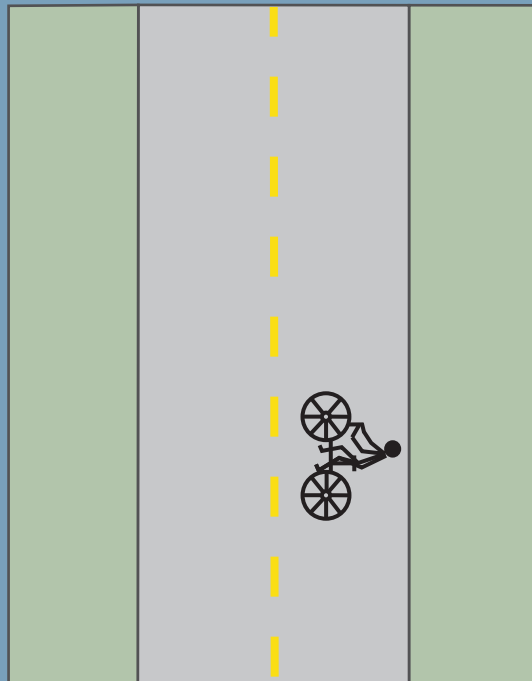


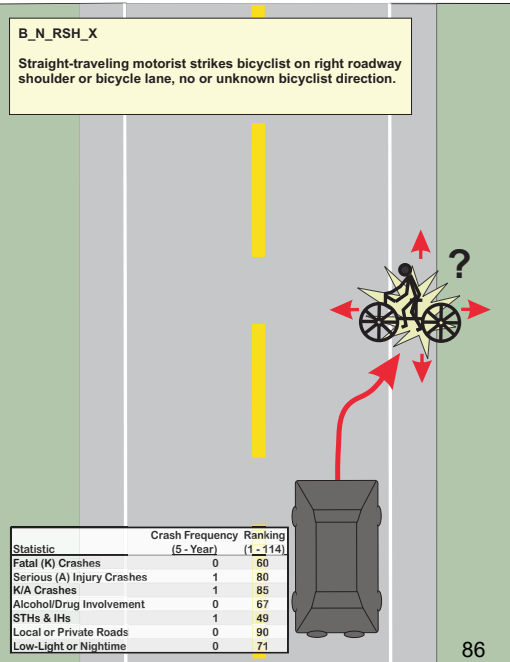
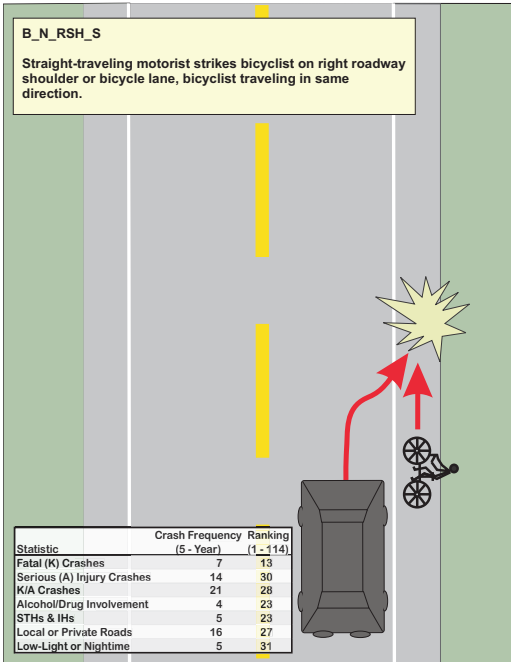
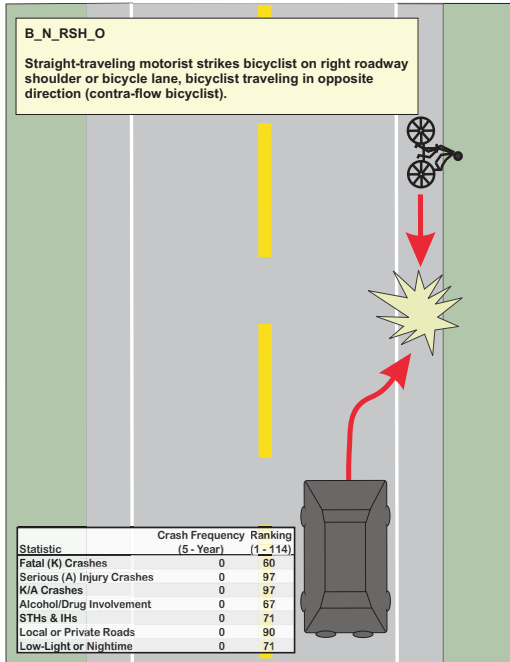
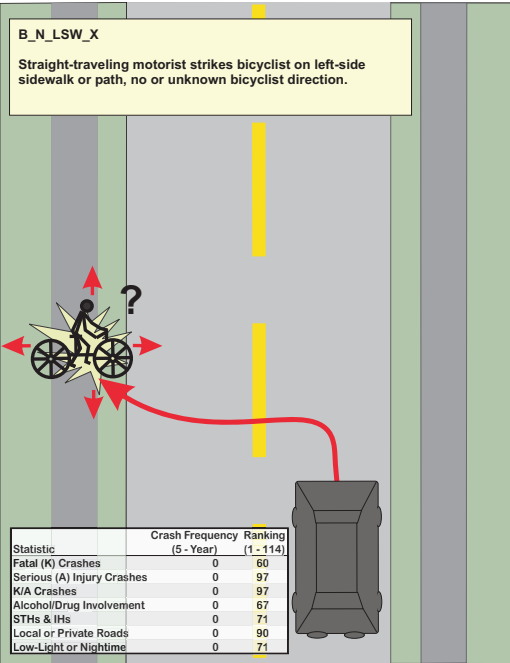
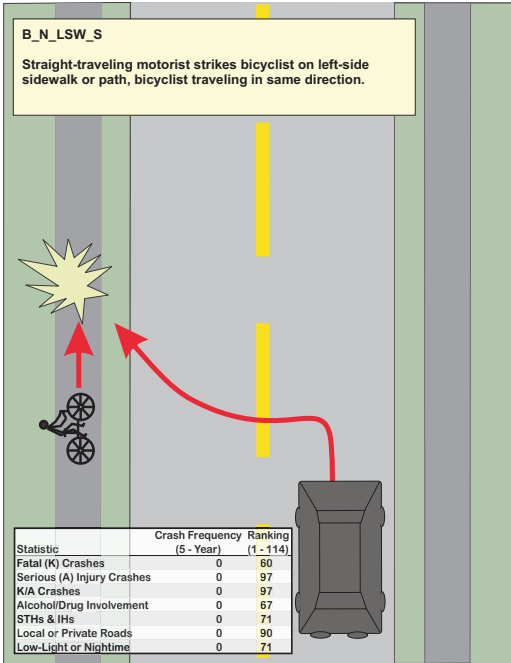
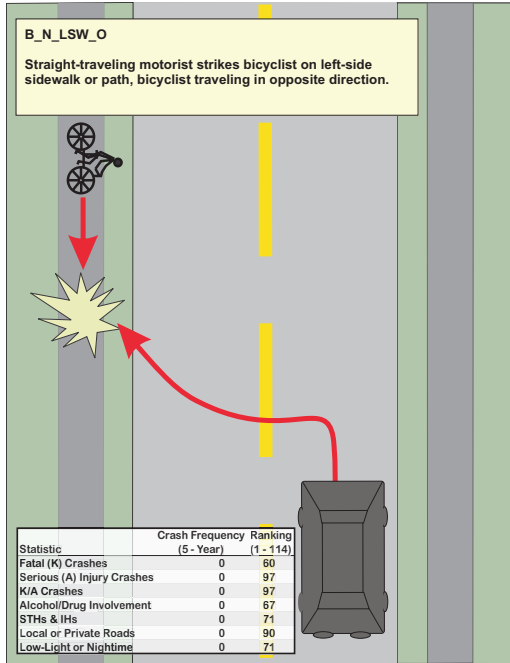
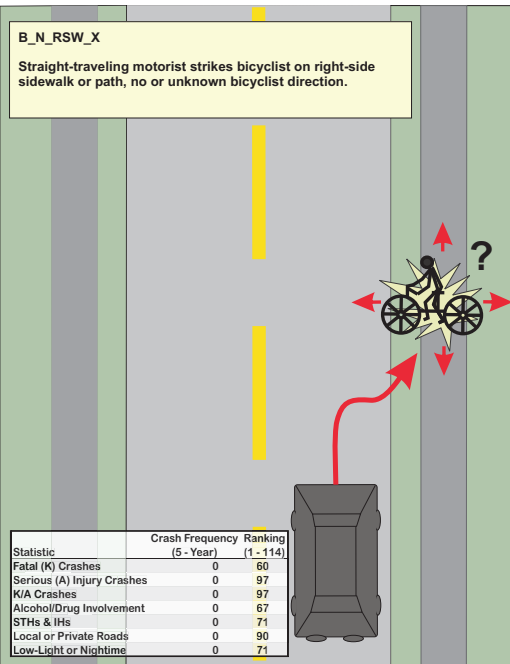
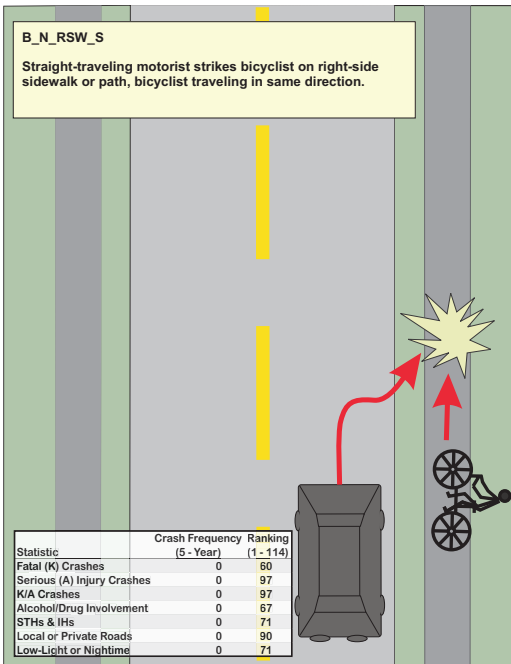
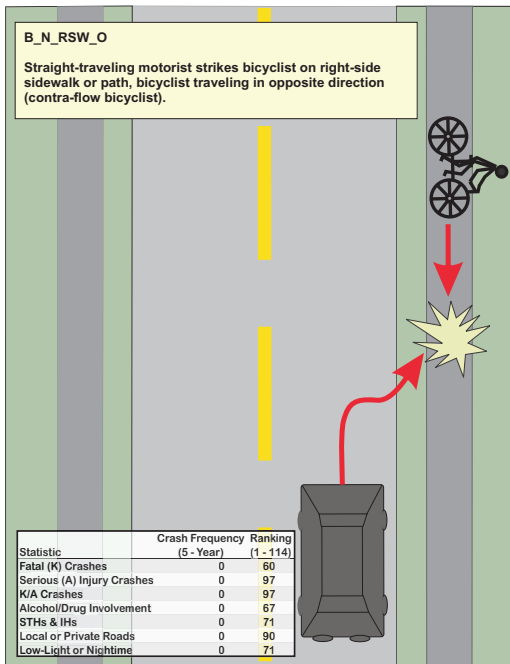


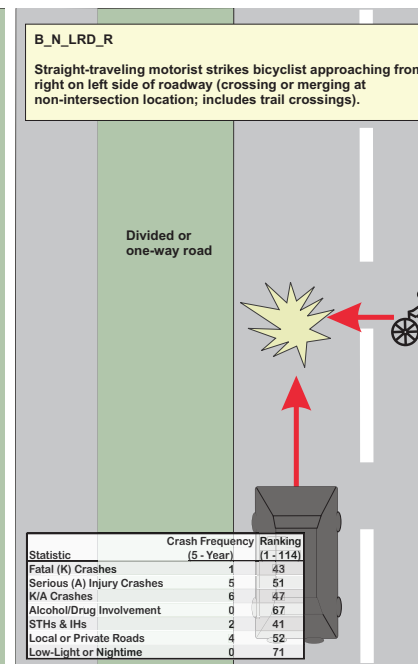
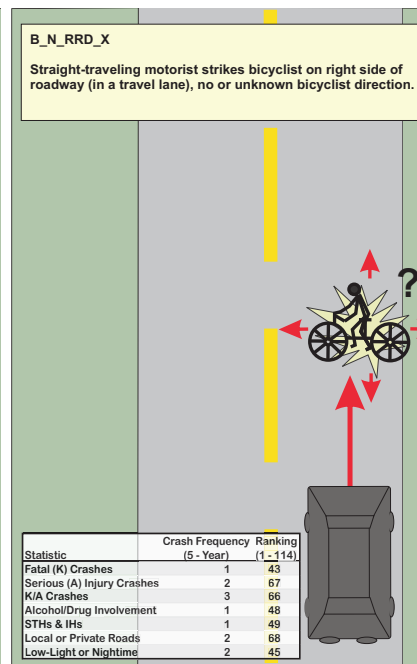
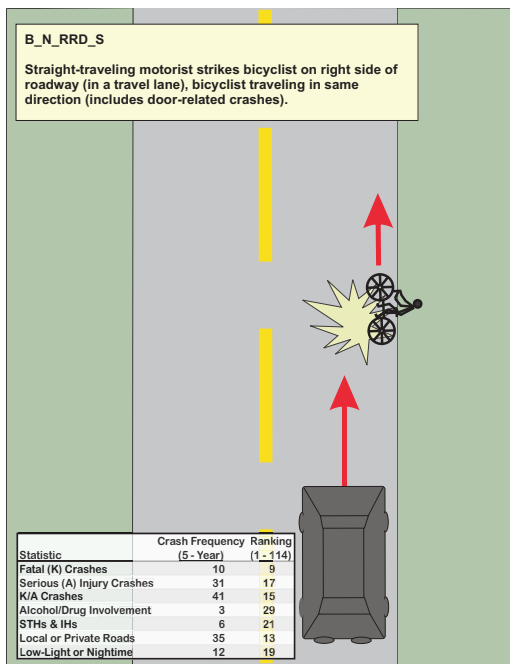
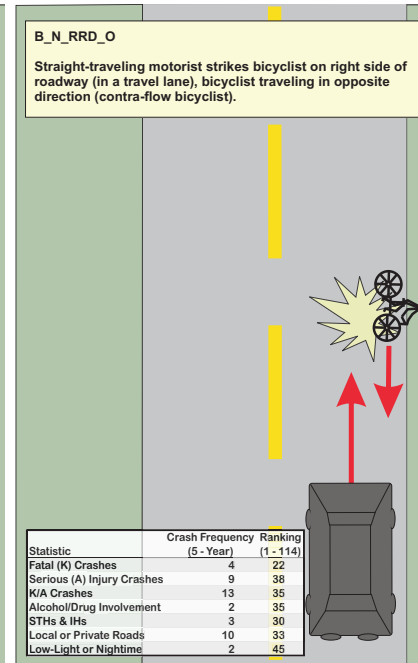
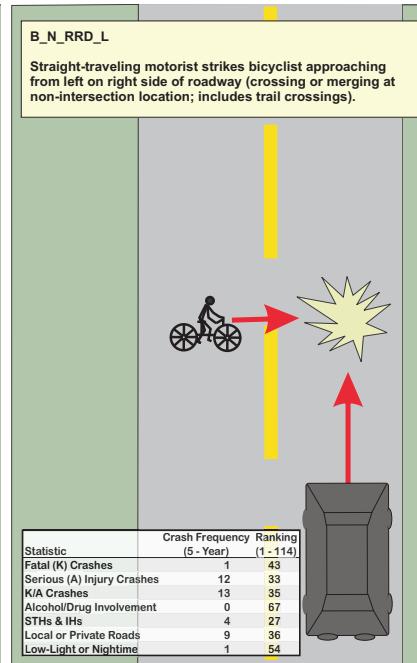
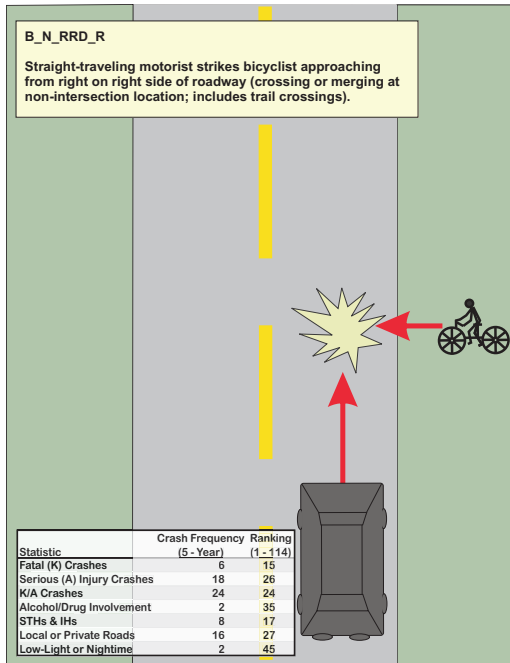
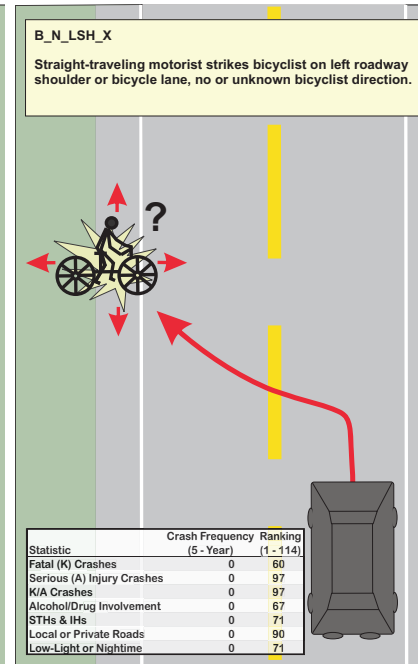
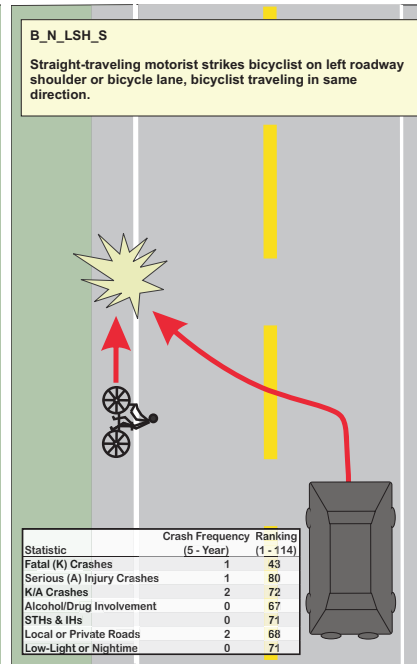
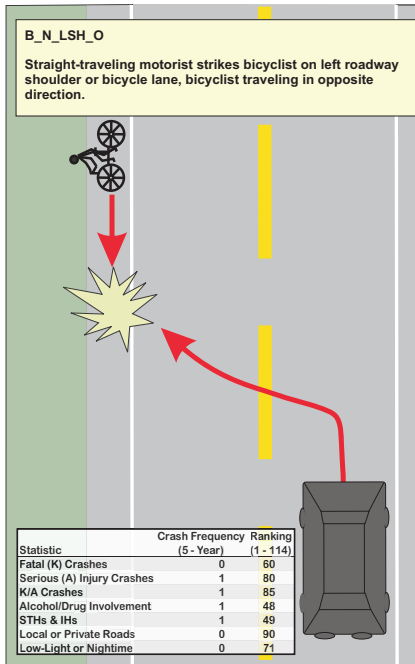




Bicyclist Non-Intersection Crash Types

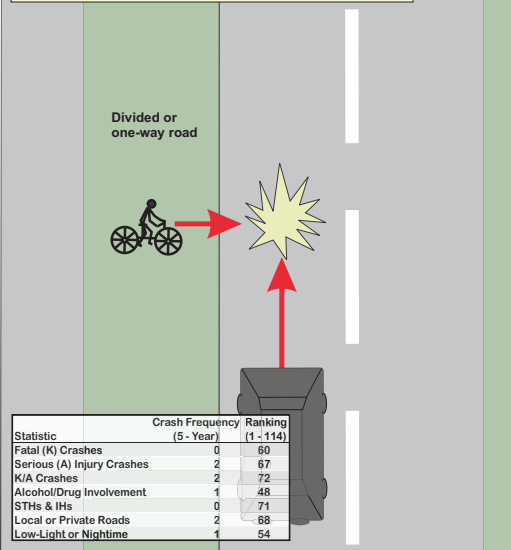






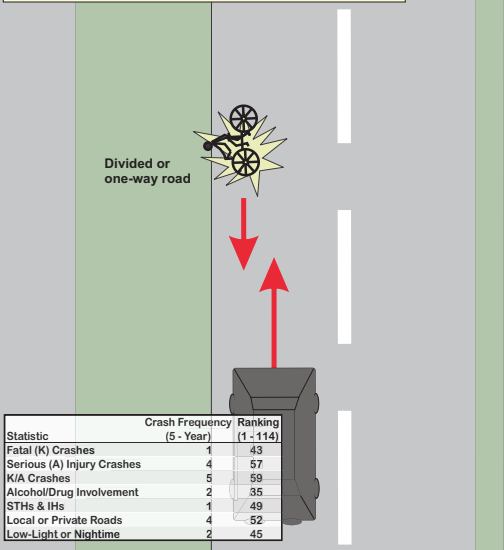
B_N_LRD_L

Straight-traveling motorist strikes bicyclist approaching from left on left side of roadway (crossing or merging at non-intersection location; includes trail crossings).



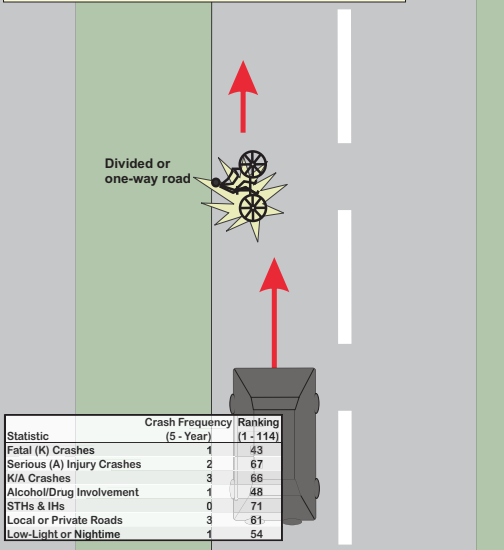
B_N_LRD_O

Straight-traveling motorist strikes bicyclist on left side of roadway (in a travel lane), bicyclist traveling in opposite direction.



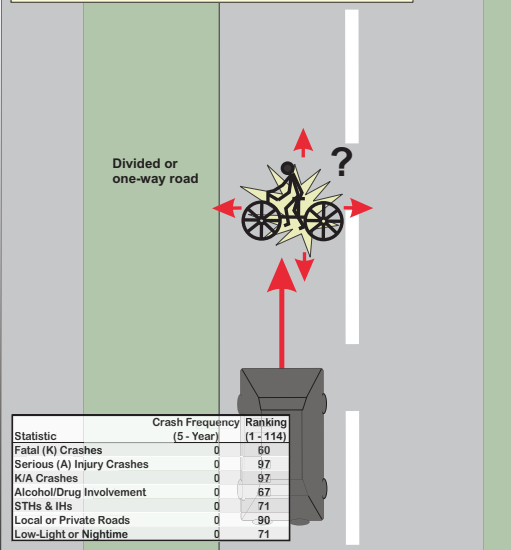
B_N_LRD_S

Straight-traveling motorist strikes bicyclist on left side of roadway (in a travel lane), bicyclist traveling in same direction.

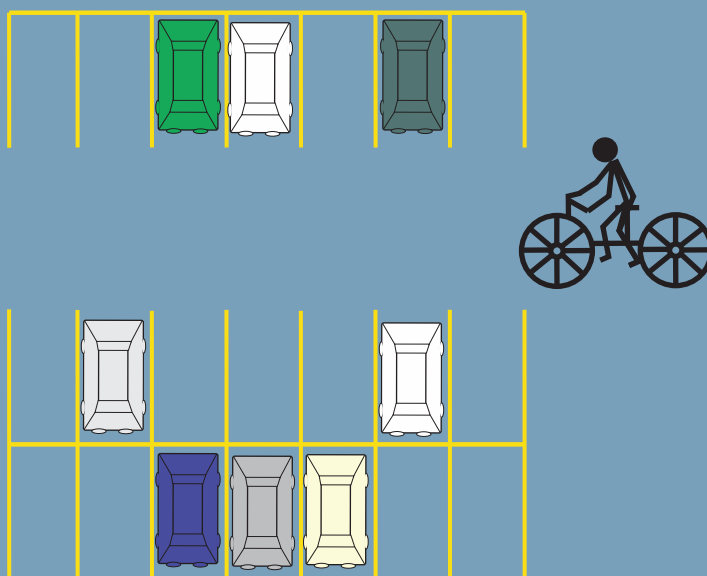


B_N_LRD_X

Straight-traveling motorist strikes bicyclist on left side of roadway (in a travel lane), no or unknown bicyclist direction.

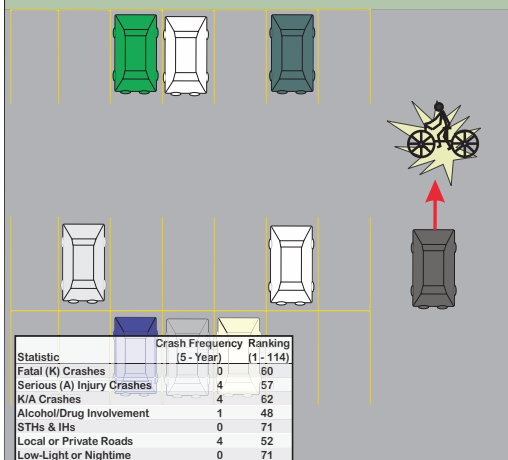


Bicyclist Non-Intersection Parking Lot / Private Property Crash Types

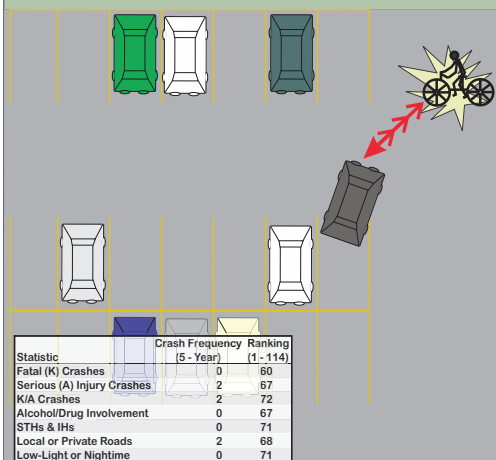


B_P_F

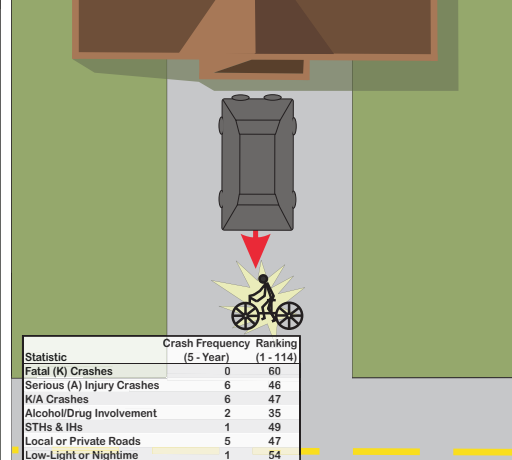
Forward-traveling motorist strikes bicyclist in parking lot/on private property.

**B_P_B**

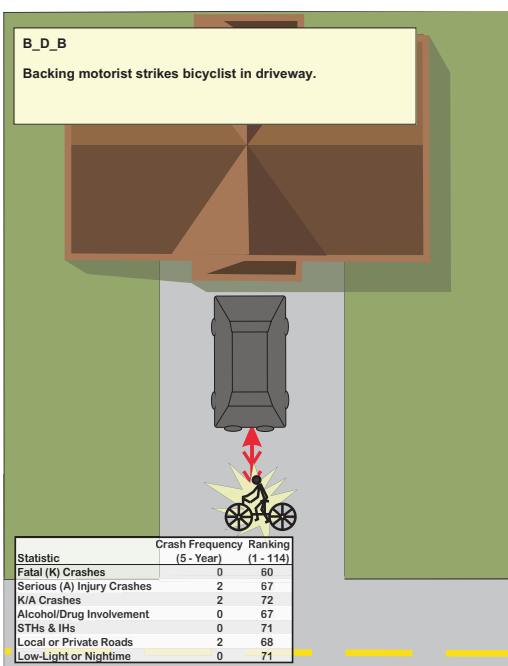
Backing motorist strikes bicyclist in parking lot/on private property.

**B_D_F**

Forward-traveling motorist strikes bicyclist in driveway (outside of public right-of-way).

**B_D_B**

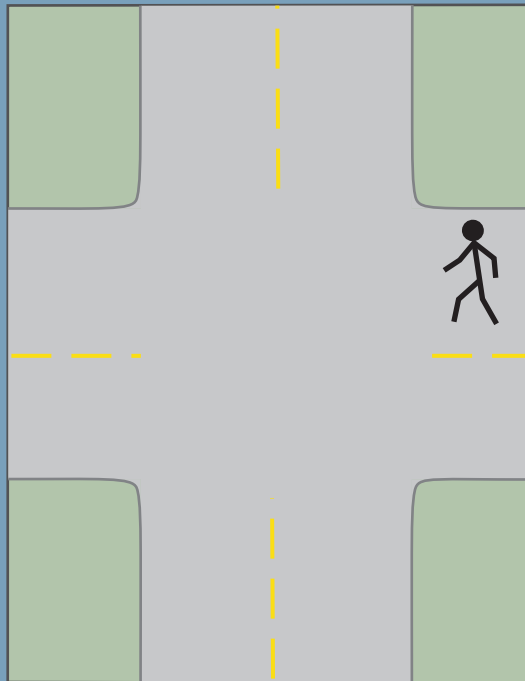
Backing motorist strikes bicyclist in driveway.

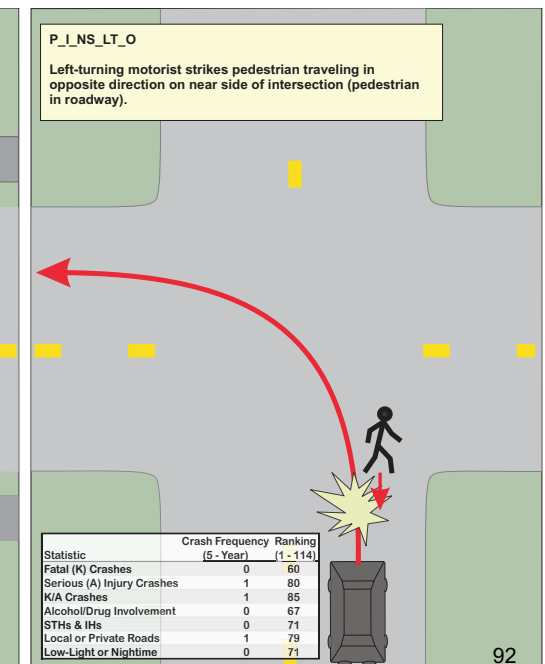
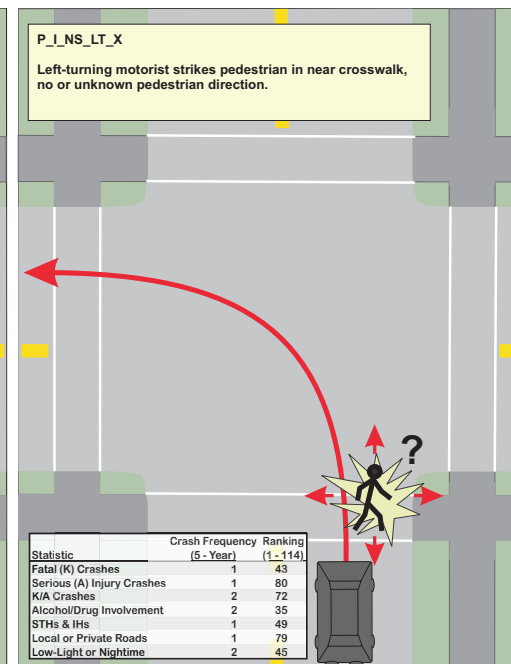
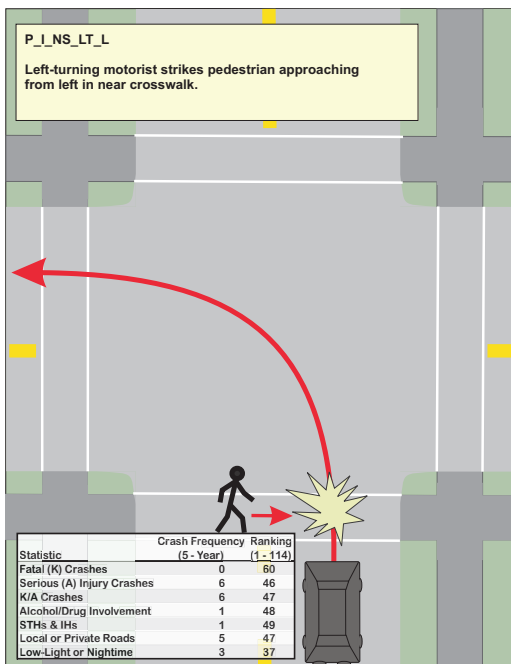
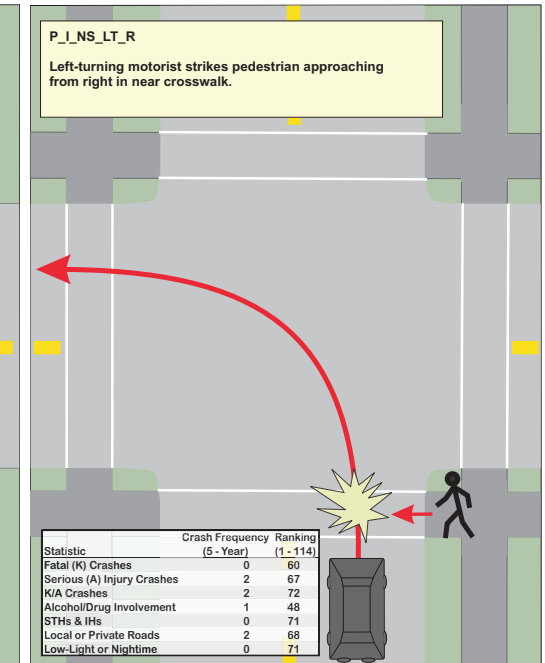
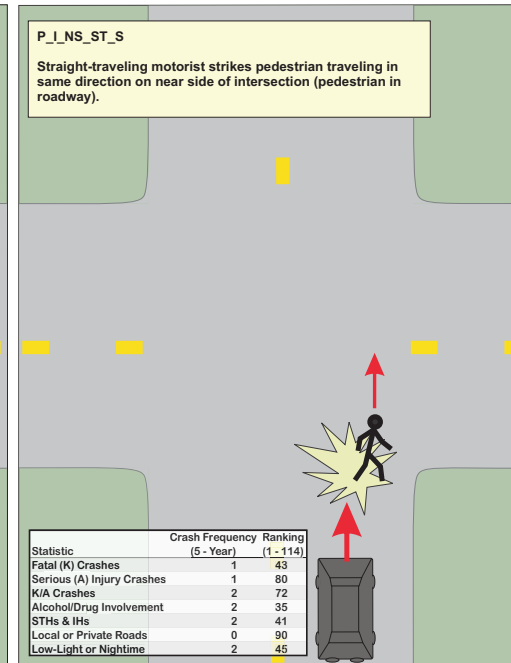
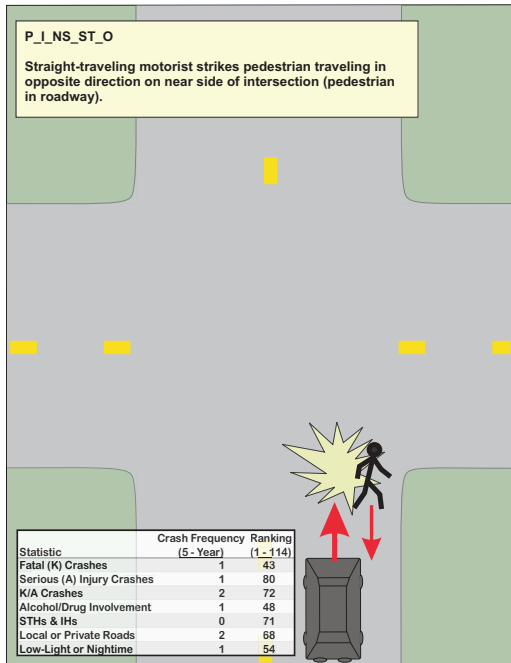
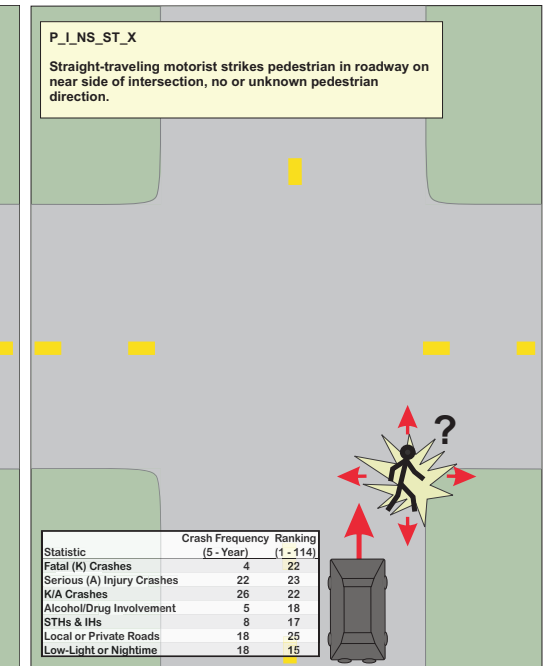
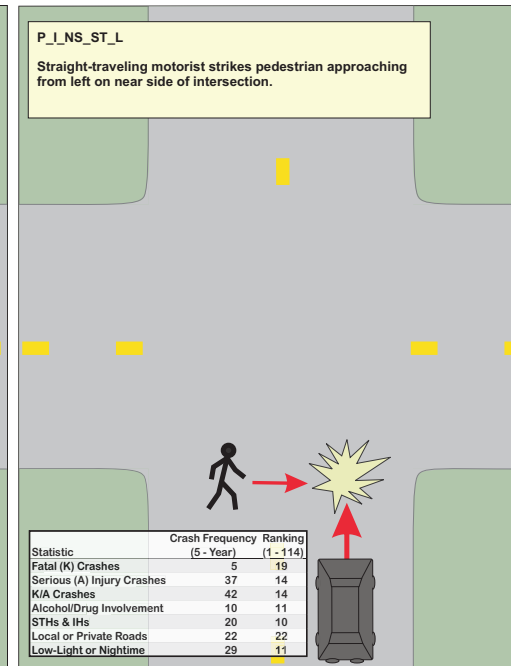
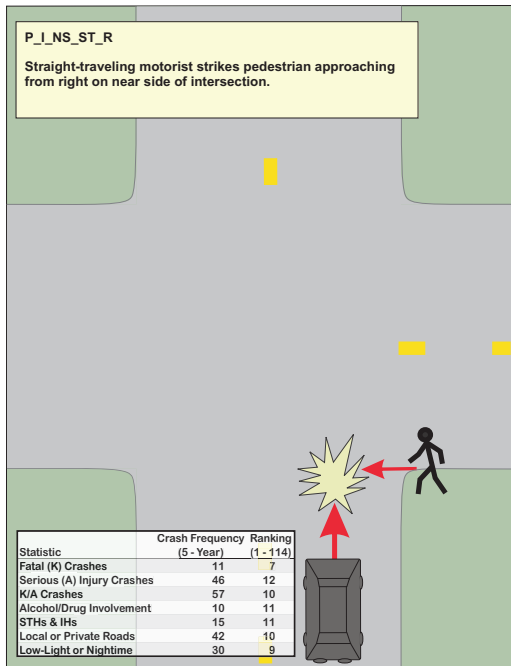
**B_OTH**

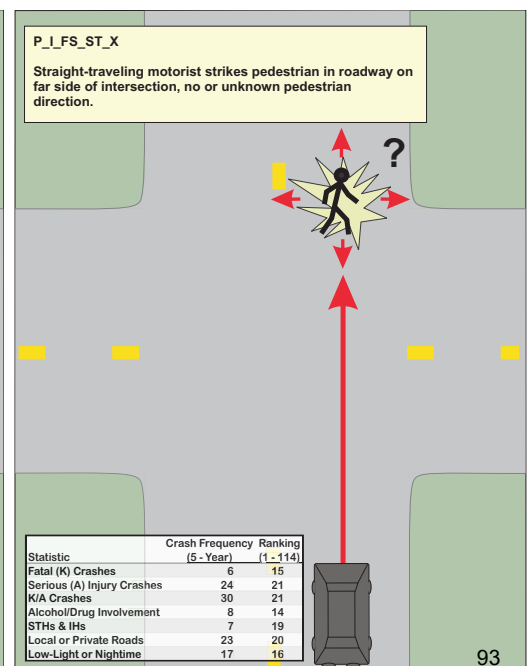
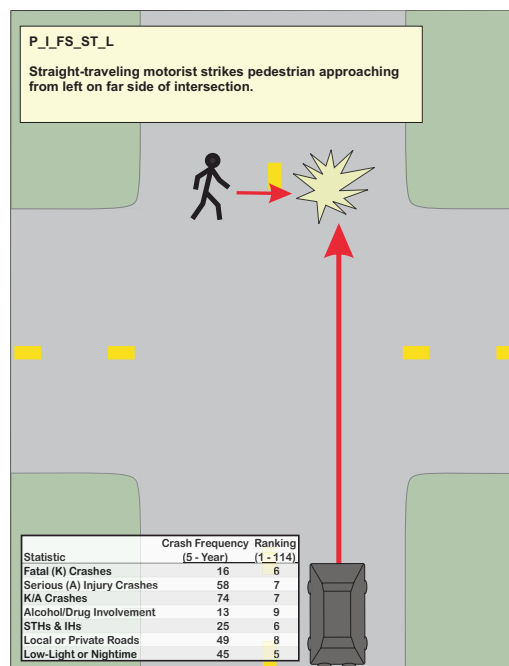
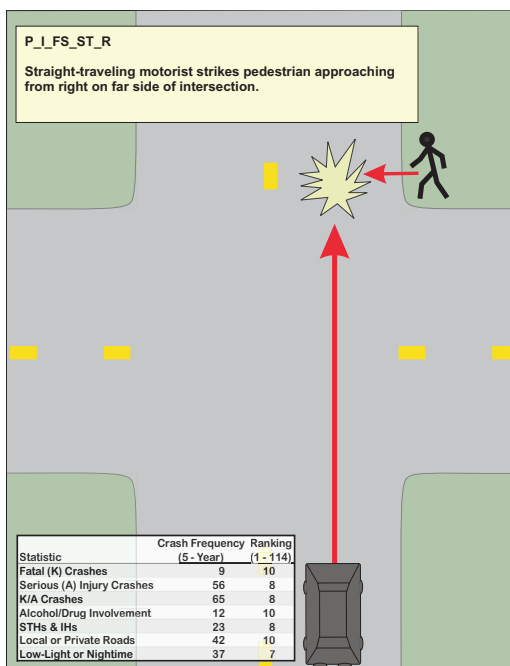
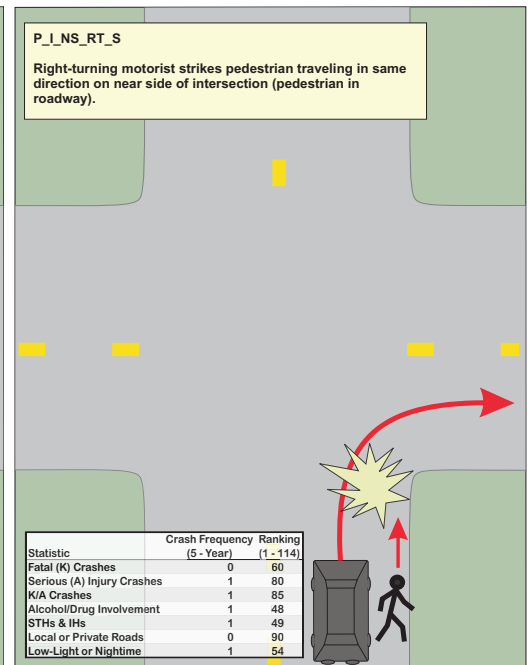
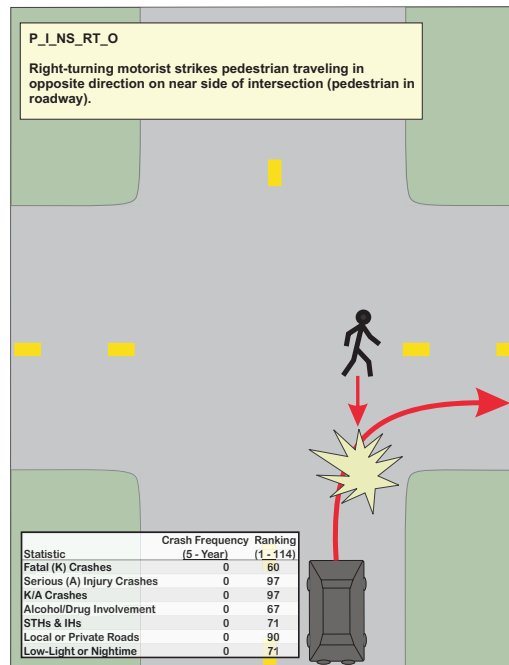
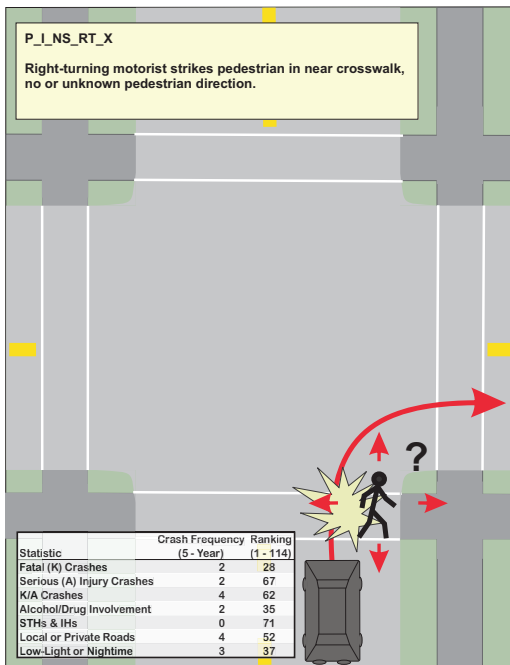
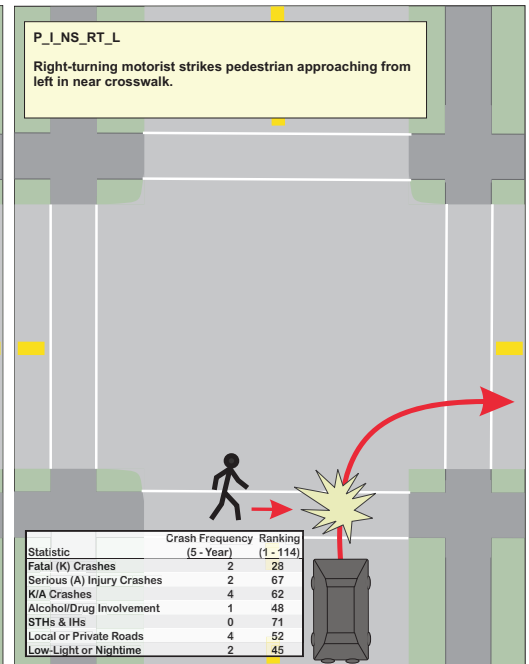
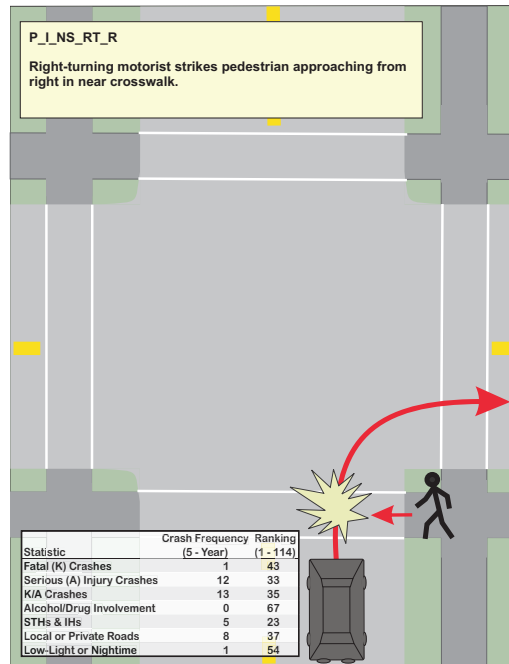
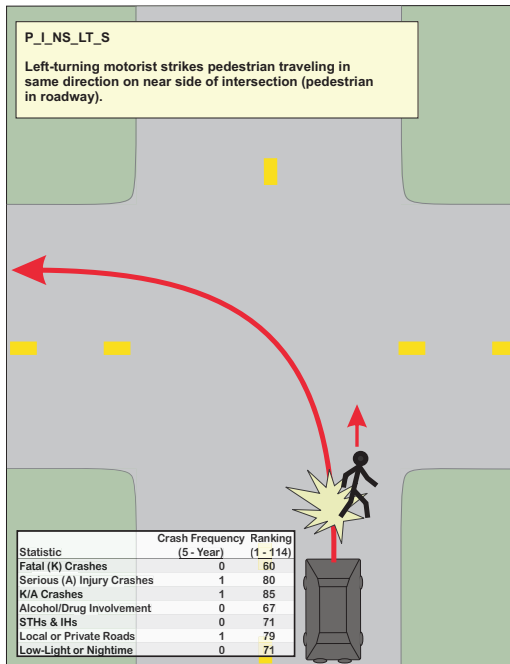
Other movements that do not fit into the categories above, including train crashes, driverless vehicle crashes, multi-unit crashes where the bicyclist crash was due to a bicyclist being struck by a vehicle that had already been struck by another vehicle.

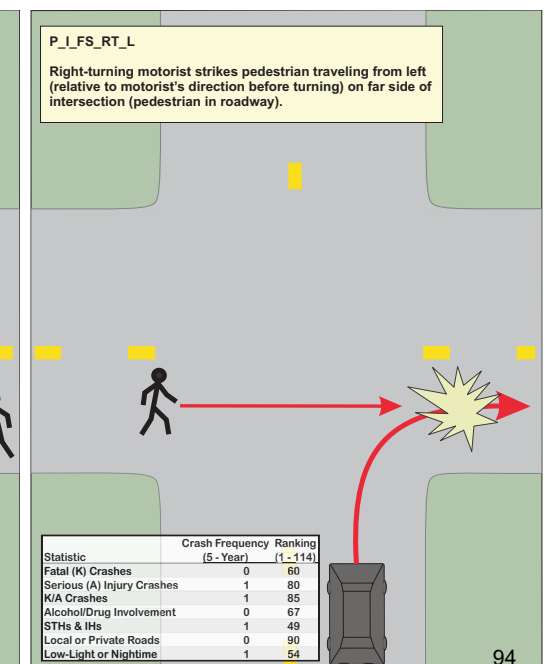
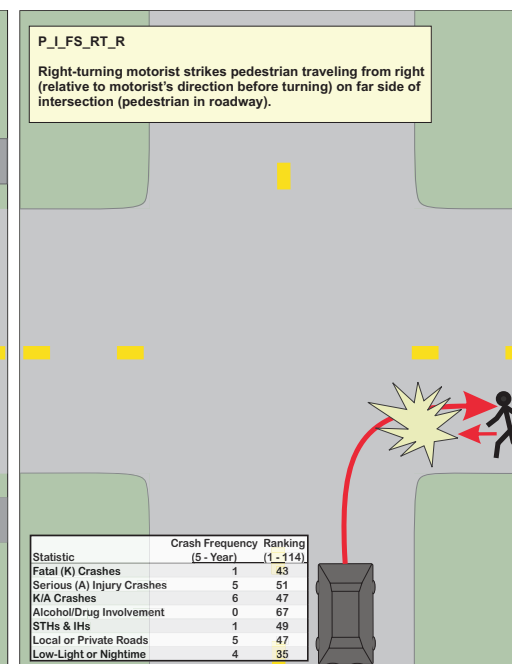
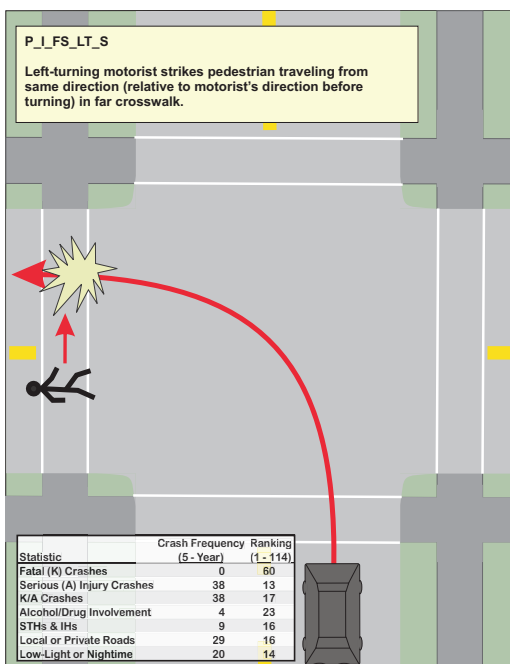
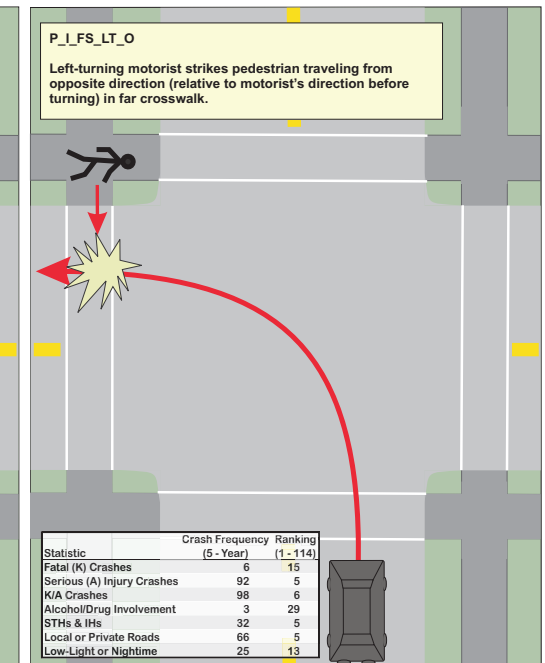
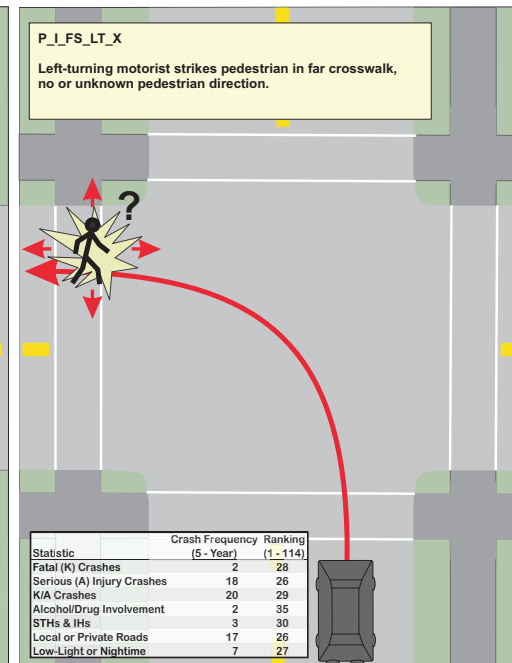
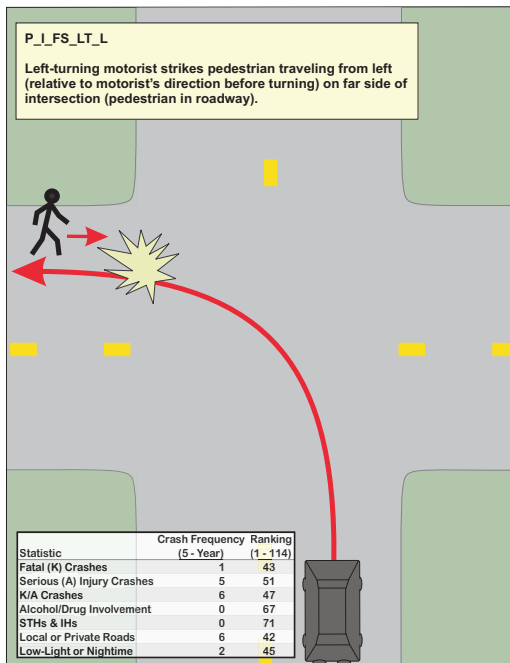
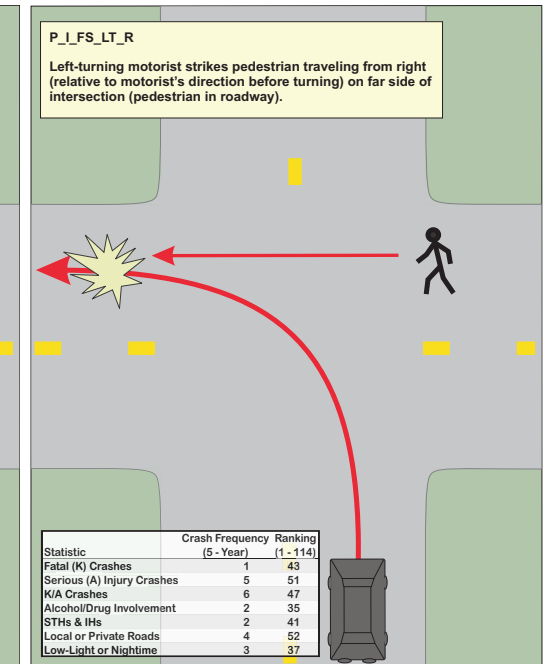
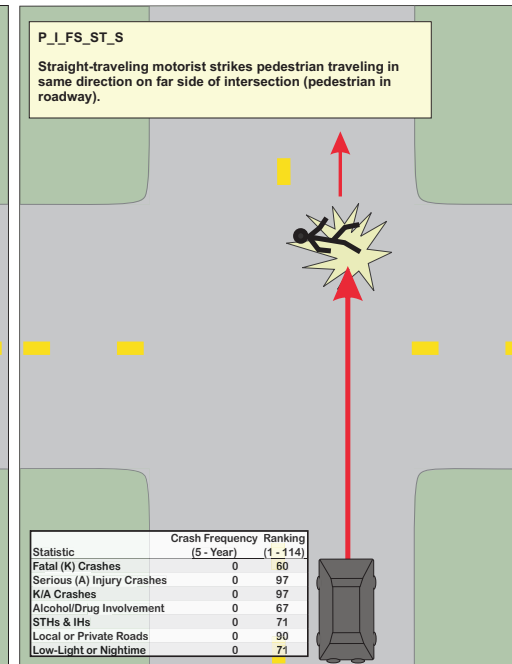
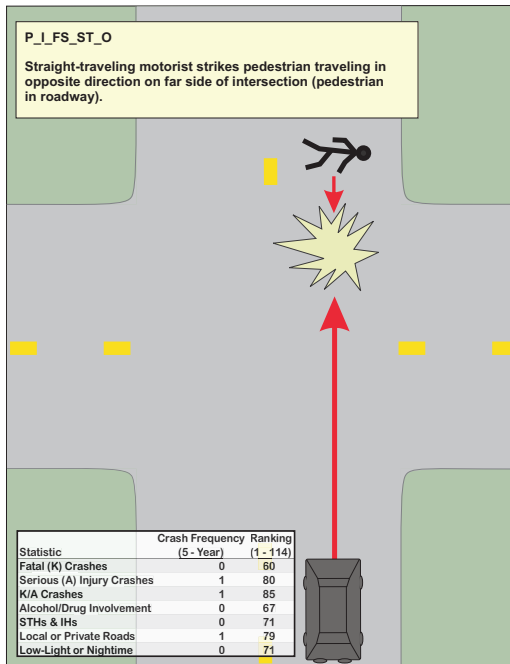
Statistic	Crash Frequency Ranking	
	(5 - Year)	(1 - 114)
Fatal (K) Crashes	0	60
Serious (A) Injury Crashes	14	30
K/A Crashes	14	32
Alcohol/Drug Involvement	0	67
STHs & I/Is	4	27
Local or Private Roads	10	33
Low-Light or Nighttime	1	54

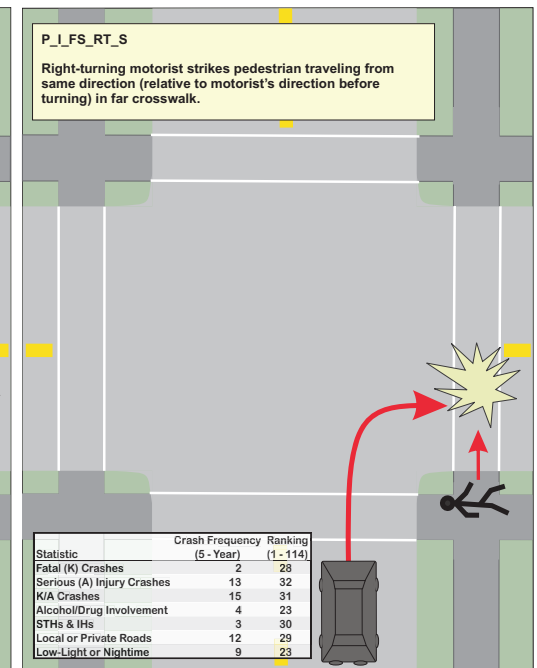
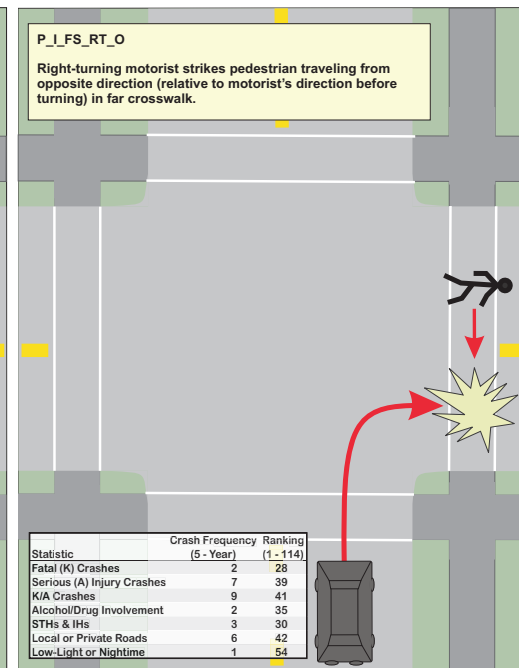
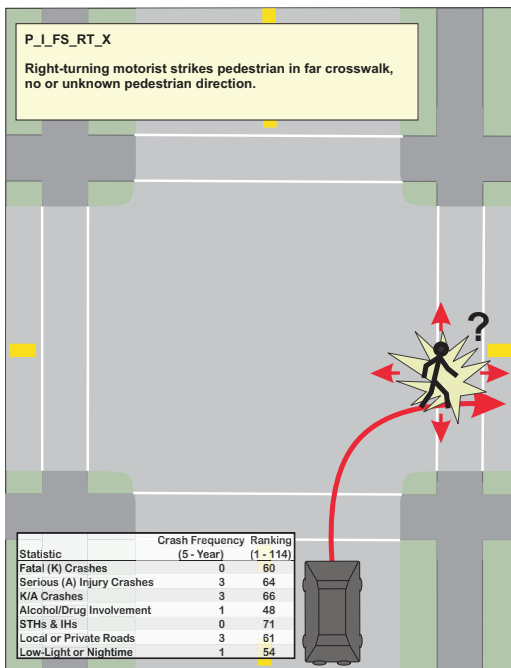
Pedestrian Intersection Crash Types



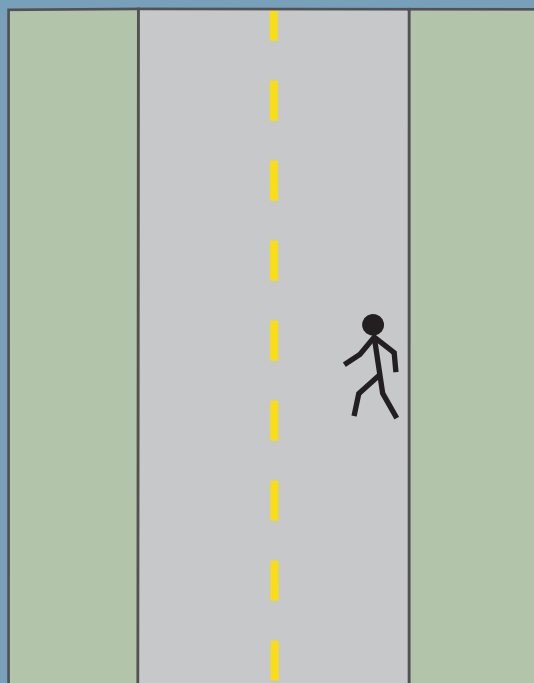




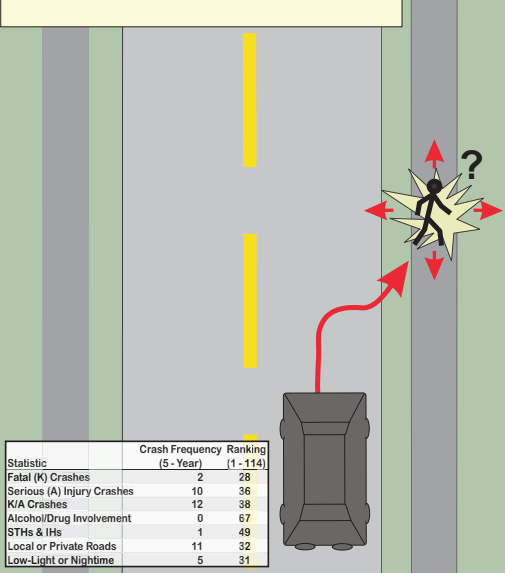




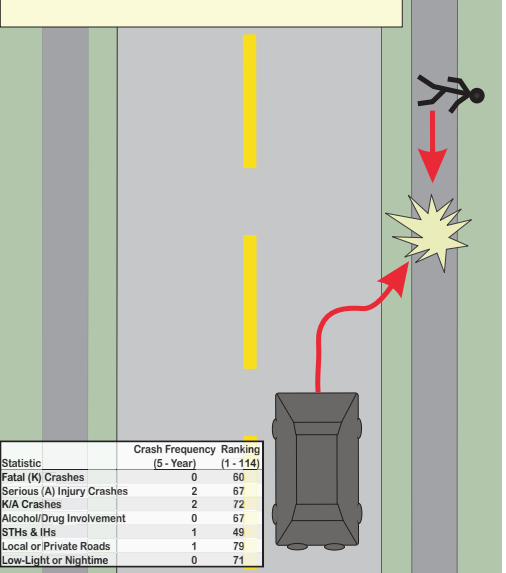
Pedestrian Non-Intersection Crash Types



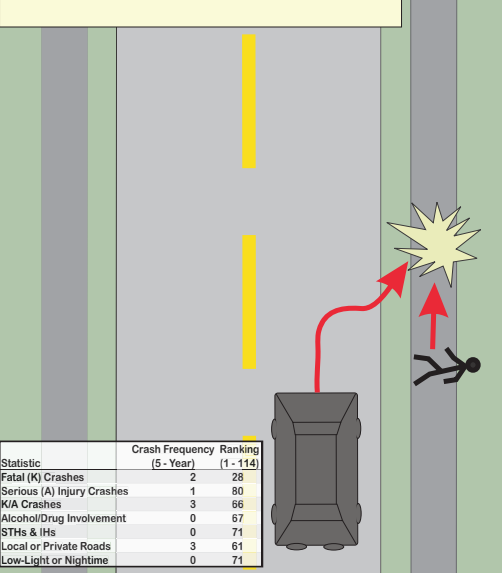
P_N_RSW_X
Straight-traveling motorist strikes pedestrian on right-side sidewalk, pedestrian not moving or direction unknown).



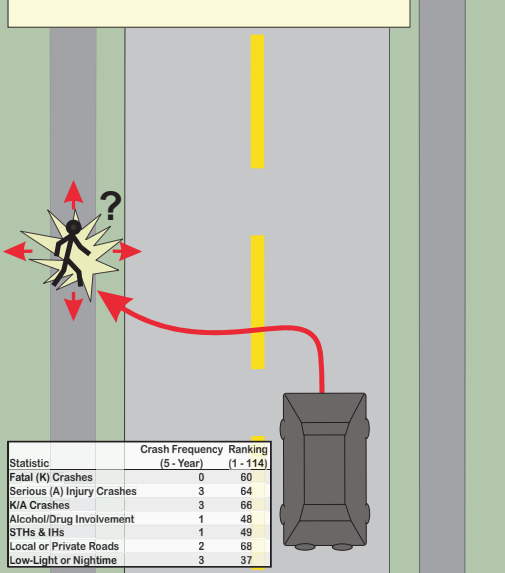
P_N_RSW_O
Straight-traveling motorist strikes pedestrian traveling in opposite direction on right sidewalk.



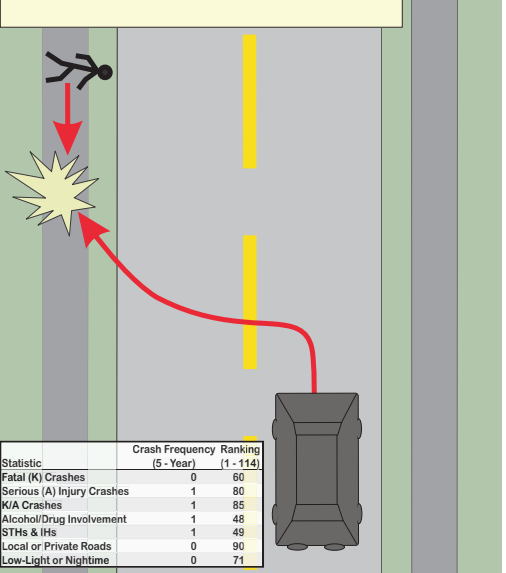
P_N_RSW_S
Straight-traveling motorist strikes pedestrian traveling in same direction on right sidewalk.



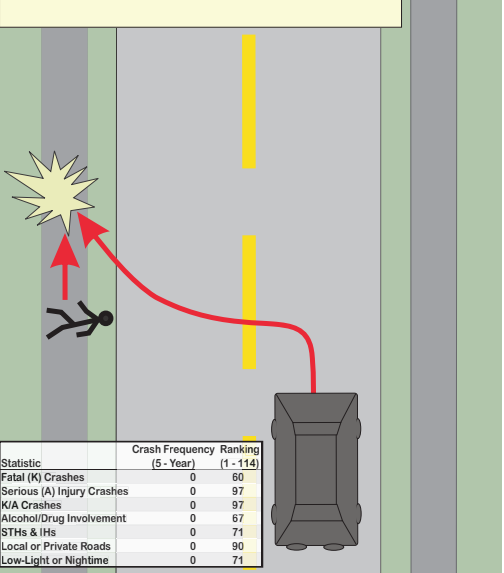
P_N_LSW_X
Straight-traveling motorist strikes pedestrian on left-side sidewalk, pedestrian not moving or direction unknown).



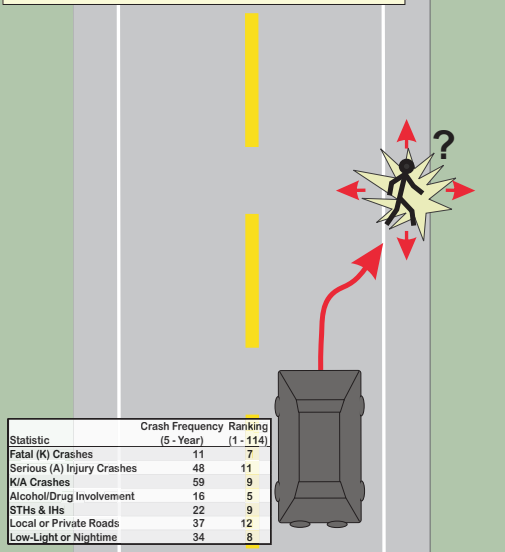
P_N_LSW_O
Straight-traveling motorist strikes pedestrian traveling in opposite direction on left sidewalk.



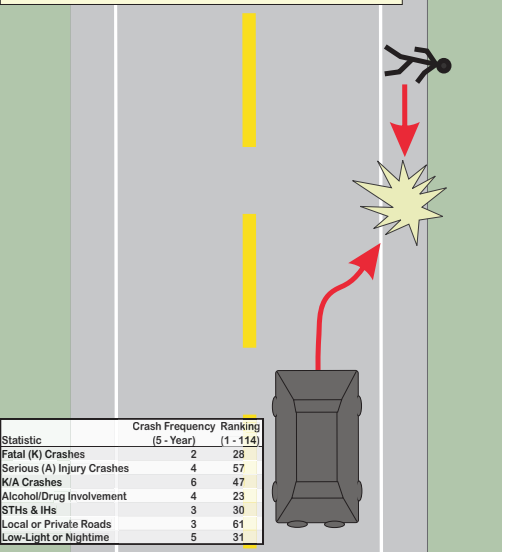
P_N_LSW_S
Straight-traveling motorist strikes pedestrian traveling in same direction on left sidewalk.



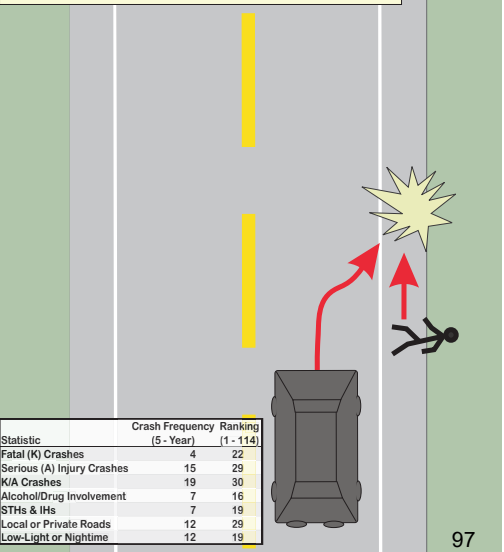
P_N_RSH_X
Straight-traveling motorist strikes pedestrian on right roadway shoulder, pedestrian not moving or direction unknown).

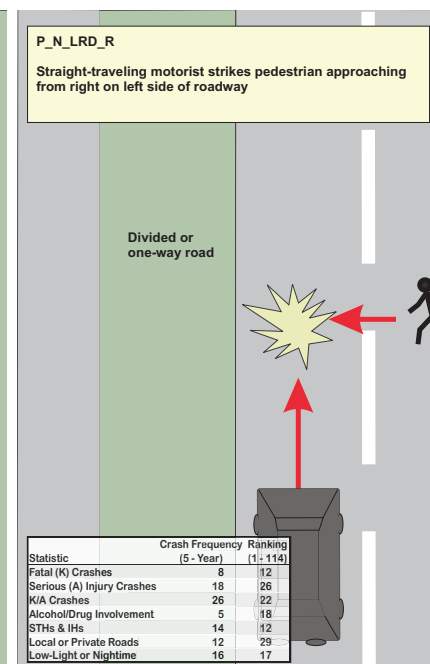
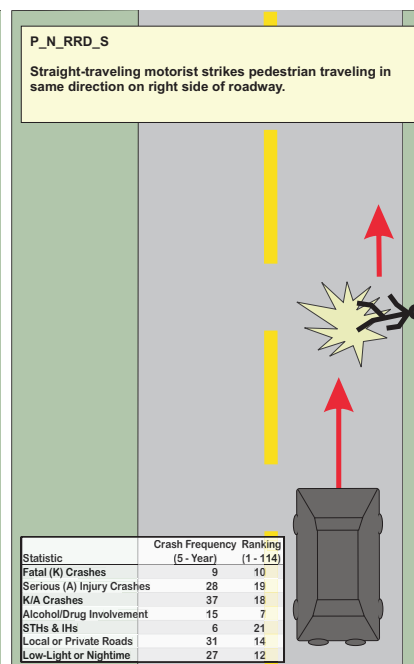
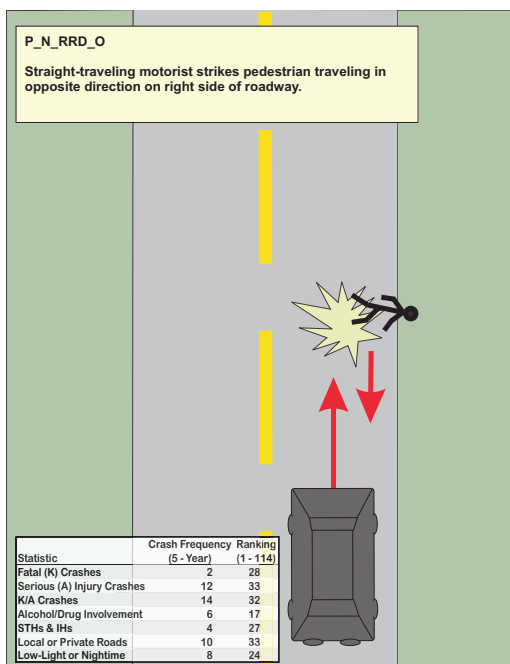
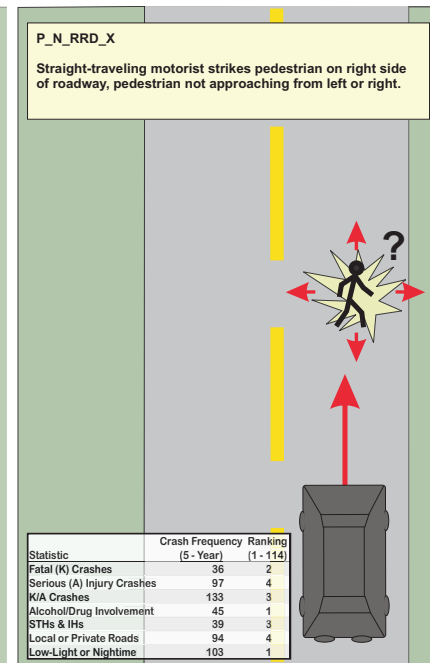
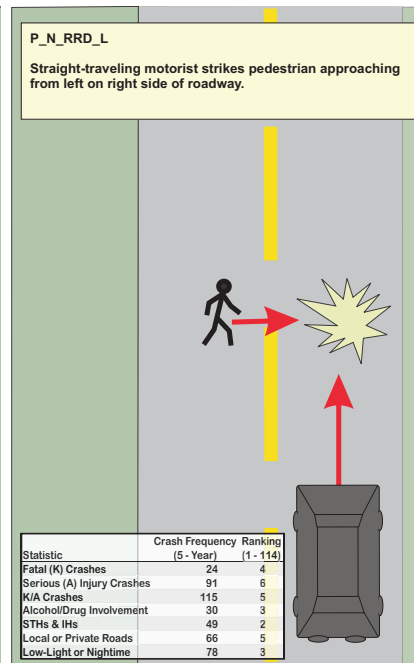
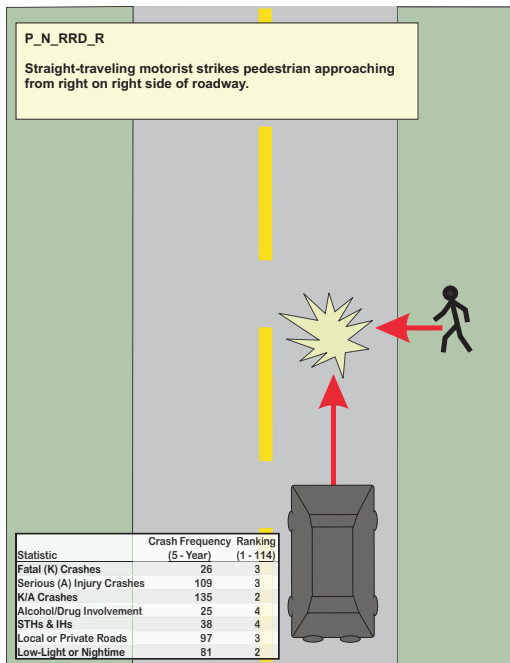
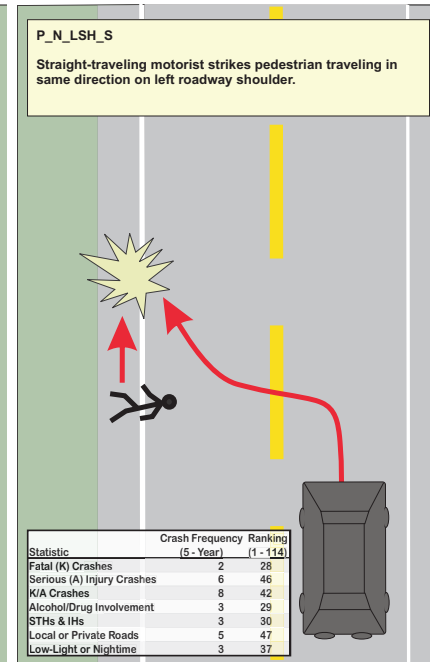
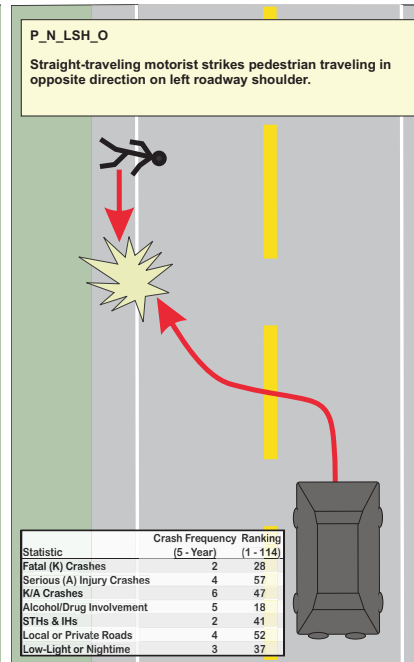
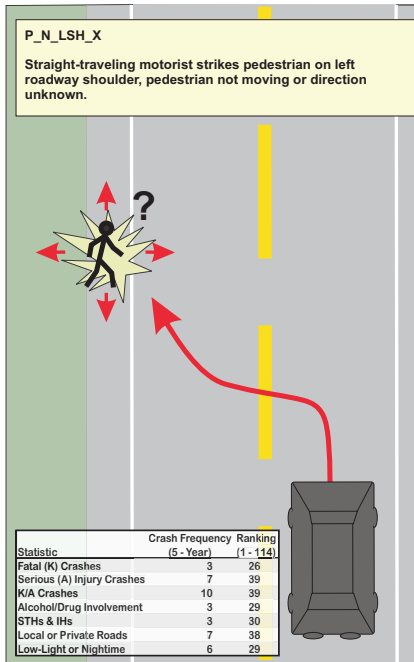


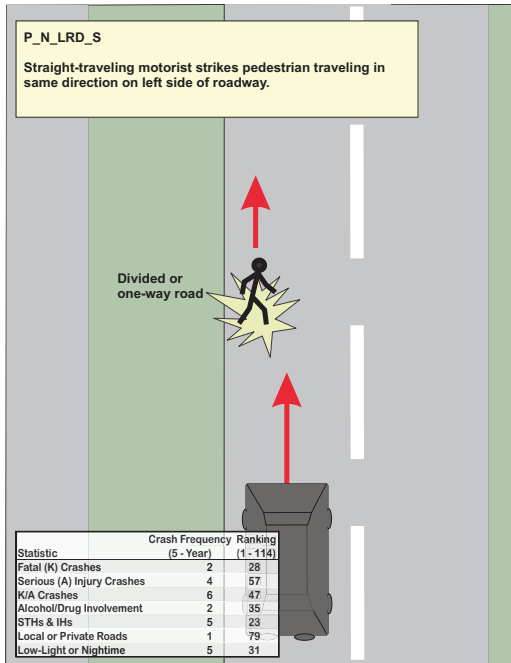
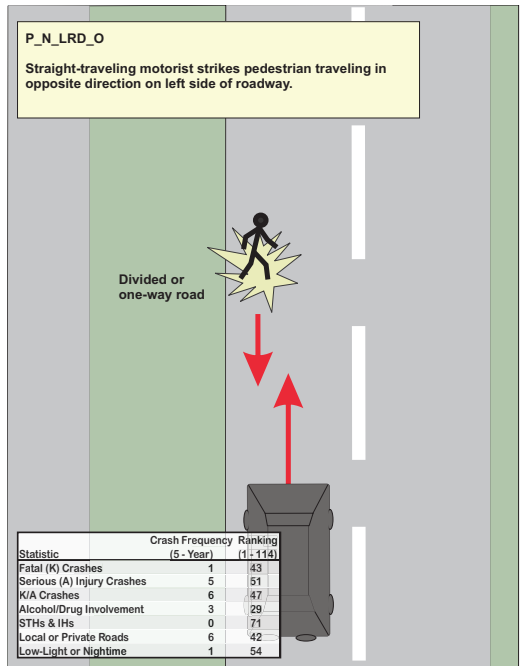
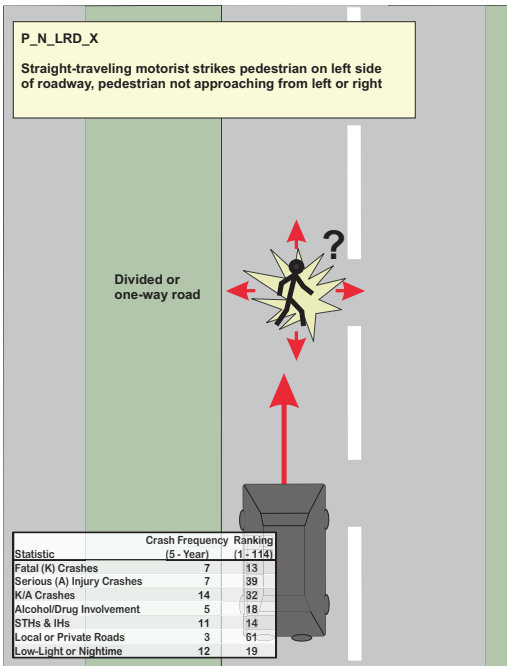
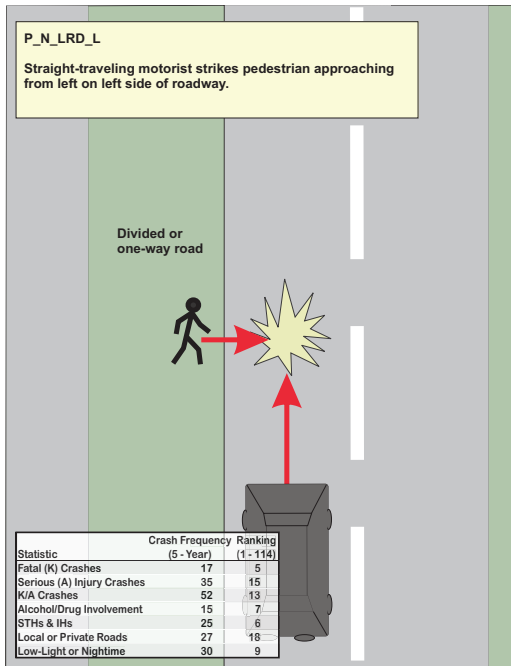
P_N_RSH_O
Straight-traveling motorist strikes pedestrian traveling in opposite direction on right roadway shoulder.



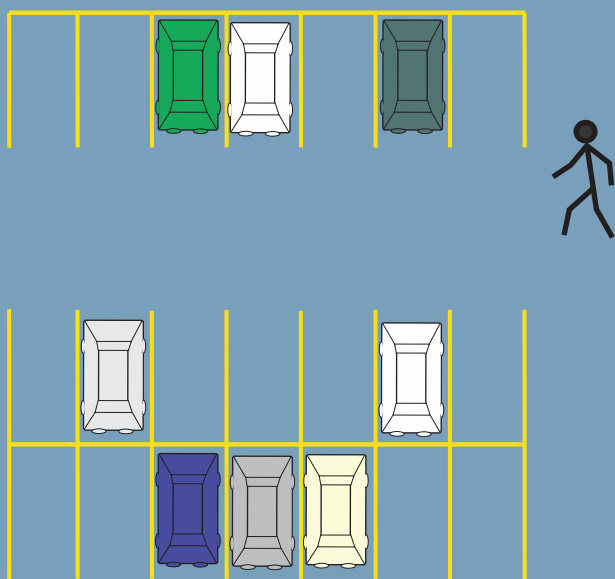
P_N_RSH_S
Straight-traveling motorist strikes pedestrian traveling in same direction on right roadway shoulder.





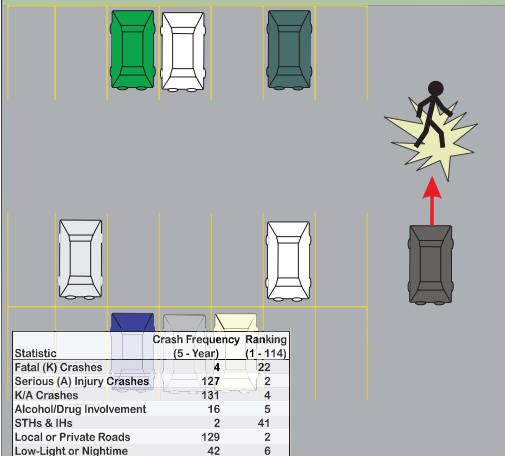


Pedestrian Non-Intersection Parking Lot / Private Property Crash Types



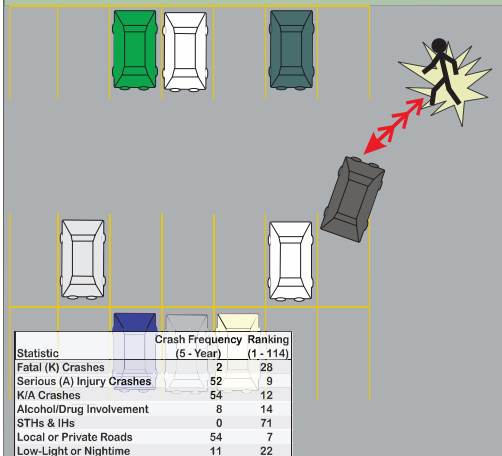
P_P_F

Forward-travelling motorist strikes pedestrian in parking lot/on private property.



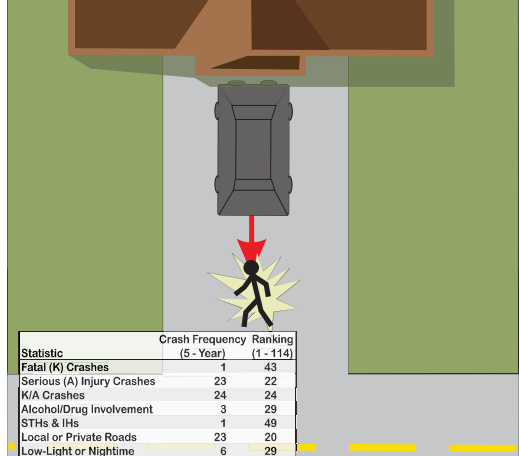
P_P_B

Backing motorist strikes pedestrian in parking lot/on private property.



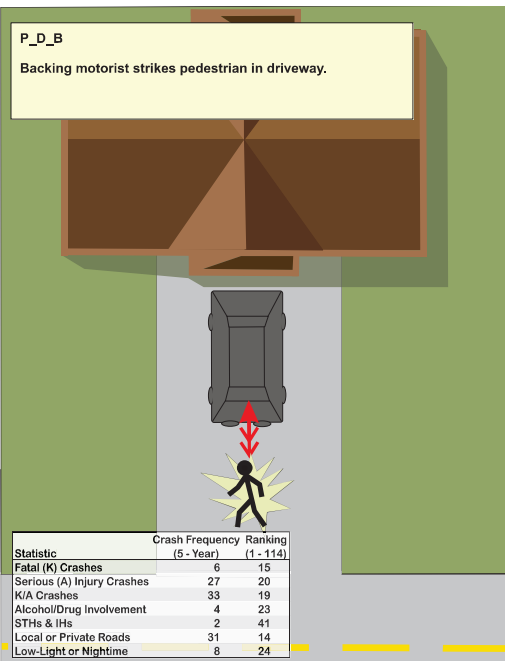
P_D_F

Forward-travelling motorist strikes pedestrian in driveway (outside of public right-of-way).



P_D_B

Backing motorist strikes pedestrian in driveway.



P_OTH

Other movements that do not fit into the categories above, including train crashes, driverless vehicle crashes, multi-unit crashes where the pedestrian crash was due to the pedestrian being struck by a vehicle that had already been struck by another vehicle.

Statistic	Crash Frequency Ranking (5 - Year) (1 - 114)	
Fatal (K) Crashes	37	1
Serious (A) Injury Crashes	150	1
K/A Crashes	187	1
Alcohol/Drug Involvement	39	2
STHs & I/Is	52	1
Local or Private Roads	135	1
Low-Light or Nighttime	78	3

Appendix B

VRU High-Risk Areas

High-Risk Area VRU Crash Summary

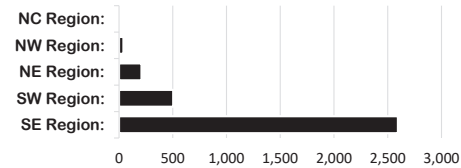


Location: Statewide
Counties Included: Brown, Calumet, Columbia, Dane, Douglas, Dunn, Eau Claire, Fond Du Lac, Green Lake, Kenosha, La Crosse, Langlade, Marathon, Milwaukee, Outagamie, Ozaukee, Racine, Rock, Sauk, Shawano, Sheboygan, Walworth, Waukesha, Winnebago, Wood

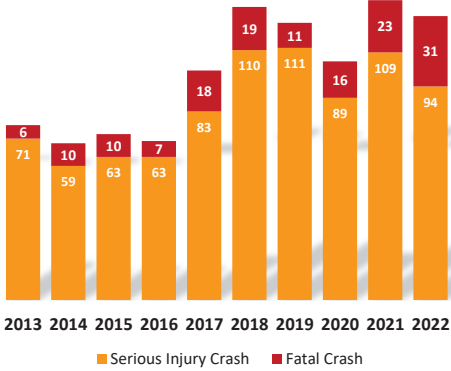
From: 1/1/2013
To: 12/31/2022
Duration: 10 Years
0 Months
High-Risk Area Mileage: 227.3 miles

OVERVIEW

Total Crashes:	5,308
Crashes/Year:	531
Fatal Crashes:	151
Fatal Crashes per Year:	15
Serious Injury Crashes:	852
Serious Injury Crashes per Year:	85
Intersection Crashes:	3,518 (66%)
Disadvantaged Tract Crashes:	3,365 (63%)



FATAL & SERIOUS INJURY TRENDS



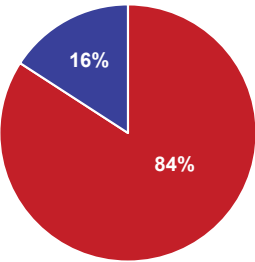
CRASH SEVERITY BY YEAR

YEAR	K	A	B	C	PDO	TOT.
2013	6	71	227	210	46	560
2014	10	59	211	218	49	547
2015	10	63	230	216	40	559
2016	7	63	235	185	30	520
2017	18	83	231	139	42	513
2018	19	110	273	146	56	604
2019	11	111	263	155	54	594
2020	16	89	191	97	32	425
2021	23	109	230	106	39	507
2022	31	94	216	104	34	479
Total	151	852	2,307	1,576	422	5,308
AVERAGE	15	85	231	158	42	531

K = Fatal, A = Suspected Serious Injury, B = Suspected Minor Injury, C = Possible Injury, PDO = No Apparent Injury

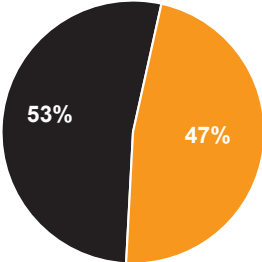
FATAL & SERIOUS INJURY STATISTICS

Pedestrian vs. Bicycle



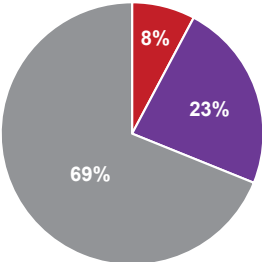
■ Pedestrian ■ Bicycle

Darkness Crashes



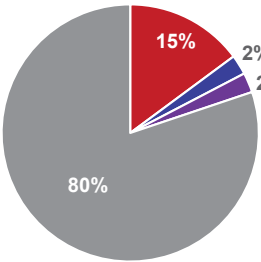
■ Dark ■ Day

Disregard Traffic Control & Failure to Yield Crashes



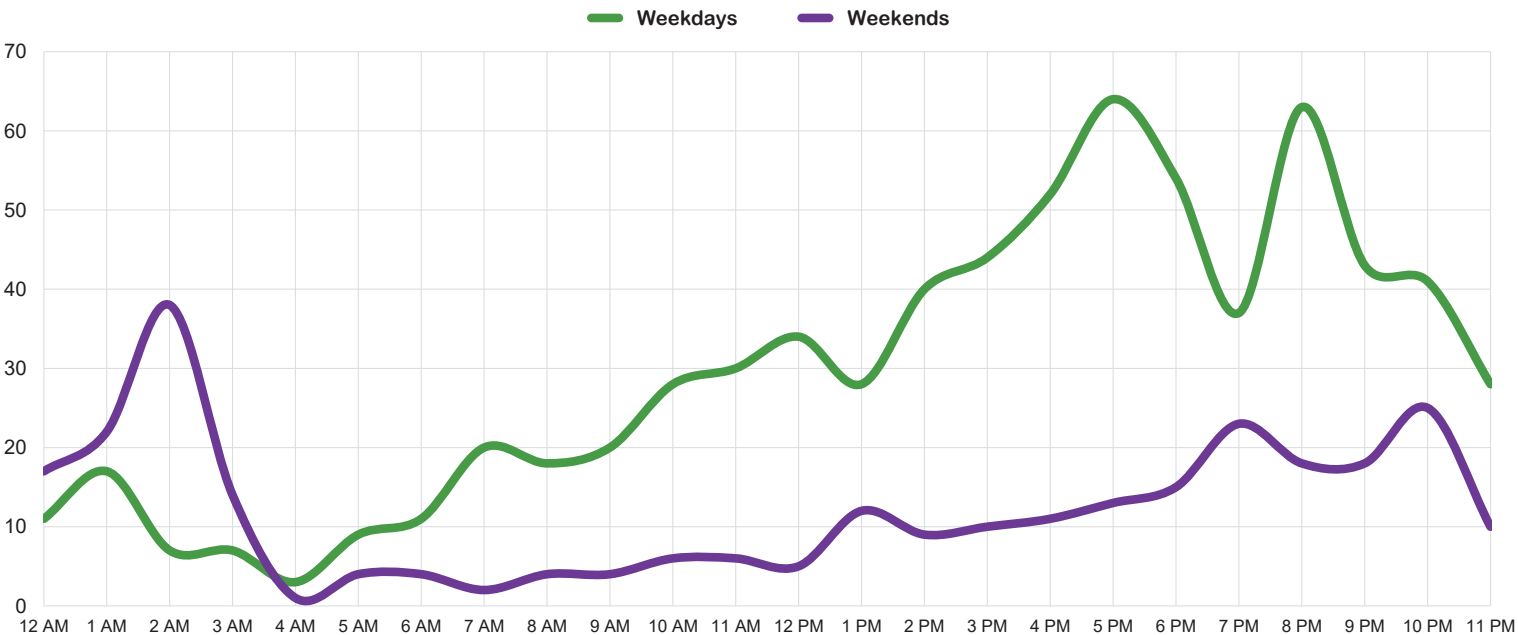
■ DTC ■ FTY ■ Other

Alcohol & Drug Related Crashes



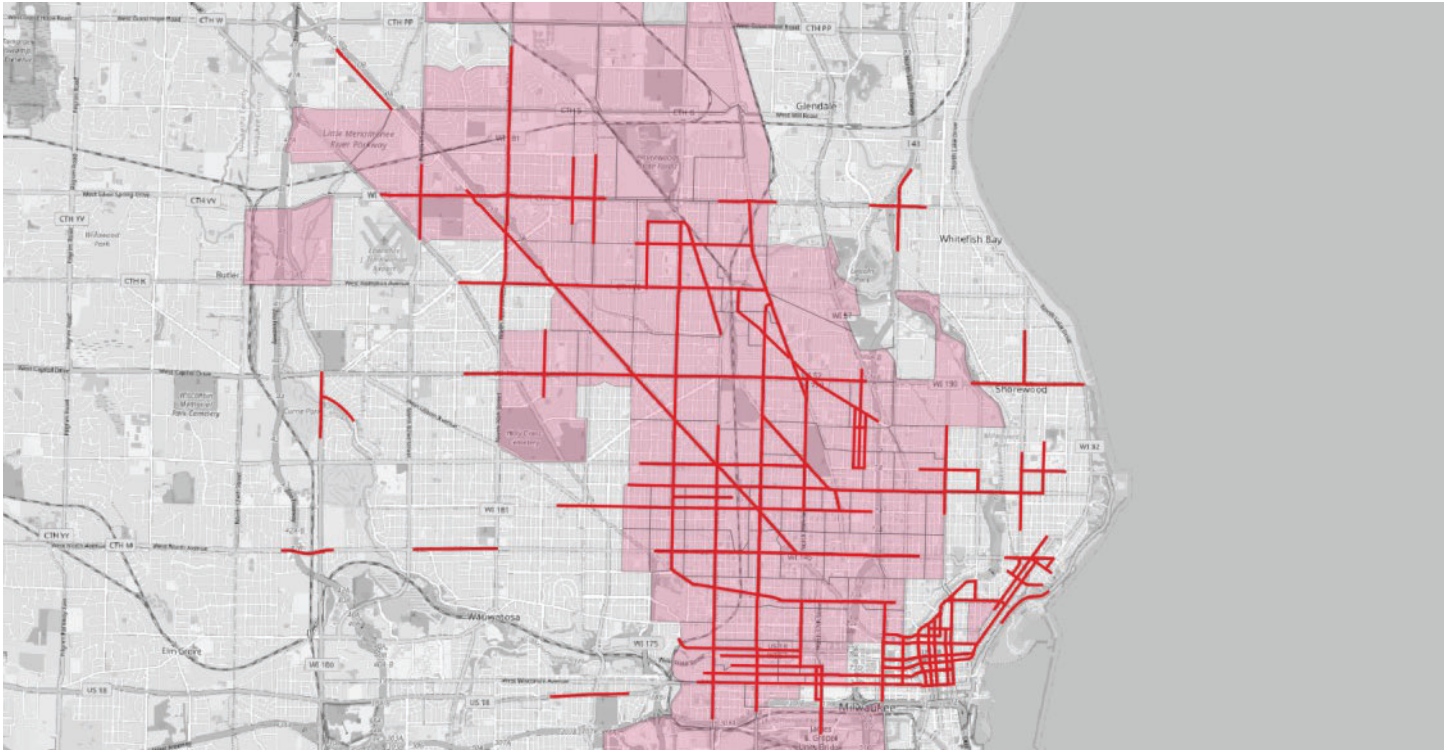
■ Alcohol ■ Drugs ■ Both ■ None

Fatal & Serious Injury VRU Crash Frequency by Time / Day (2013 - 2022)

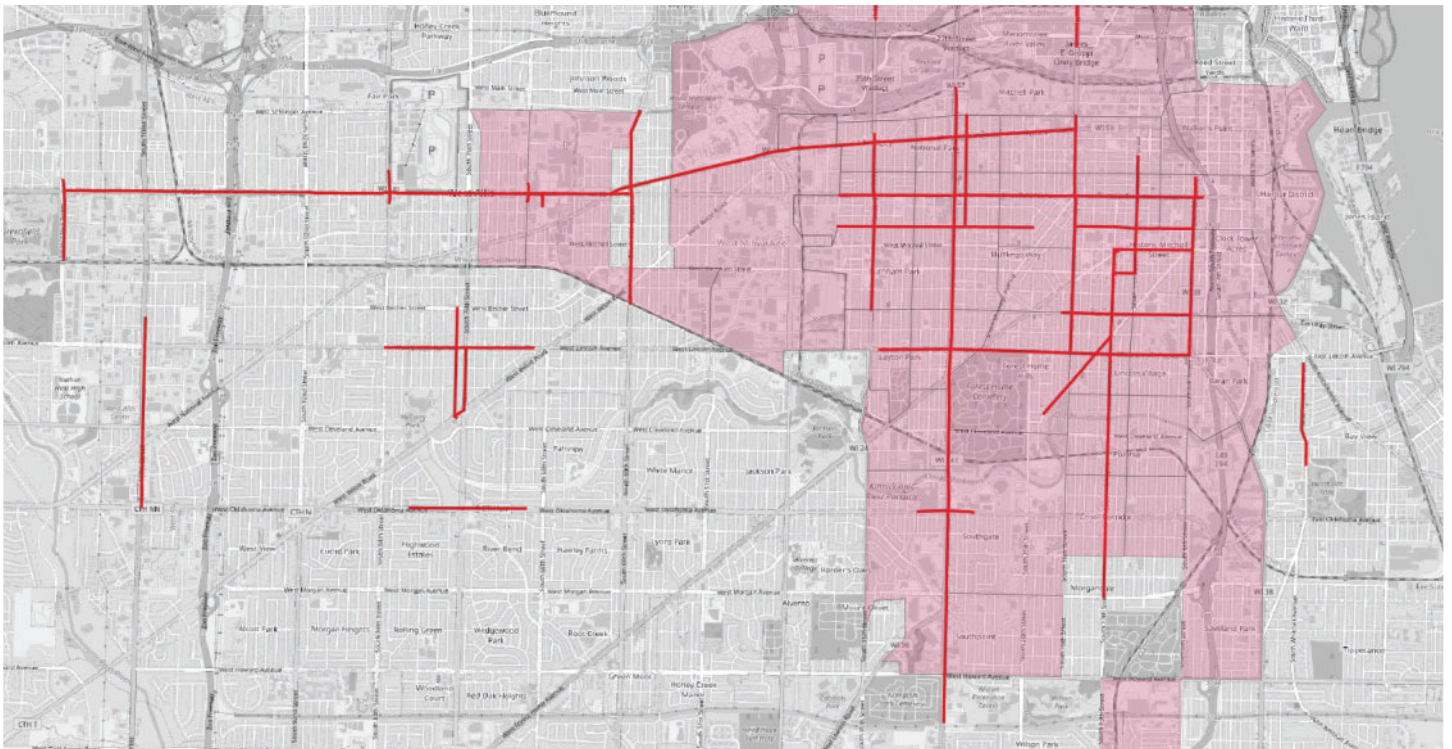


Milwaukee County

Northern Milwaukee Area



Southern Milwaukee Area



Legend



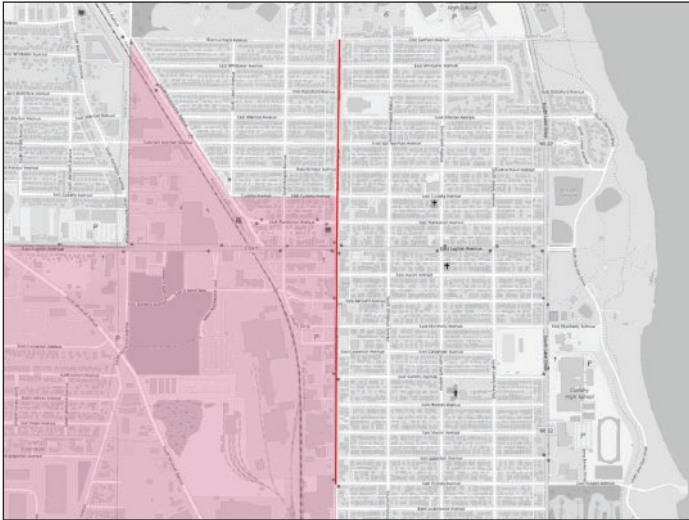
VRU High-Risk Area



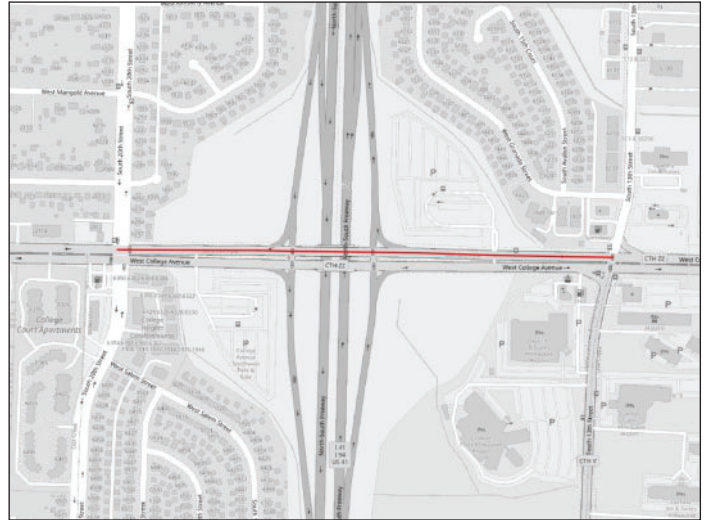
Disadvantaged Tract per ETC Explorer tool

Milwaukee County

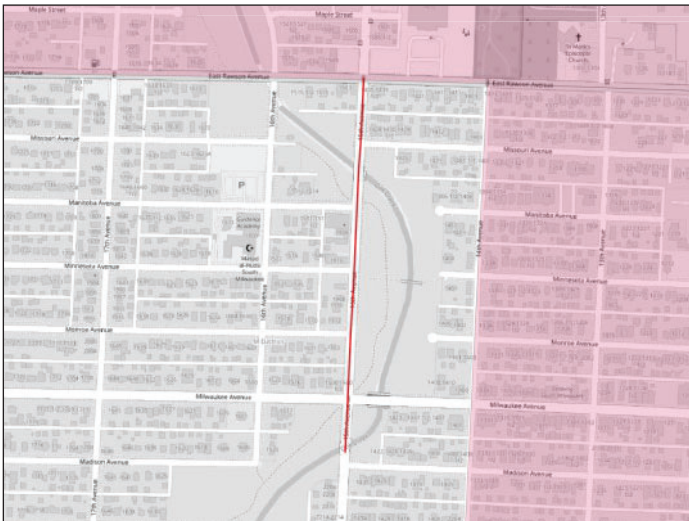
Cudahy



Oak Creek



South Milwaukee



Greenfield



Legend



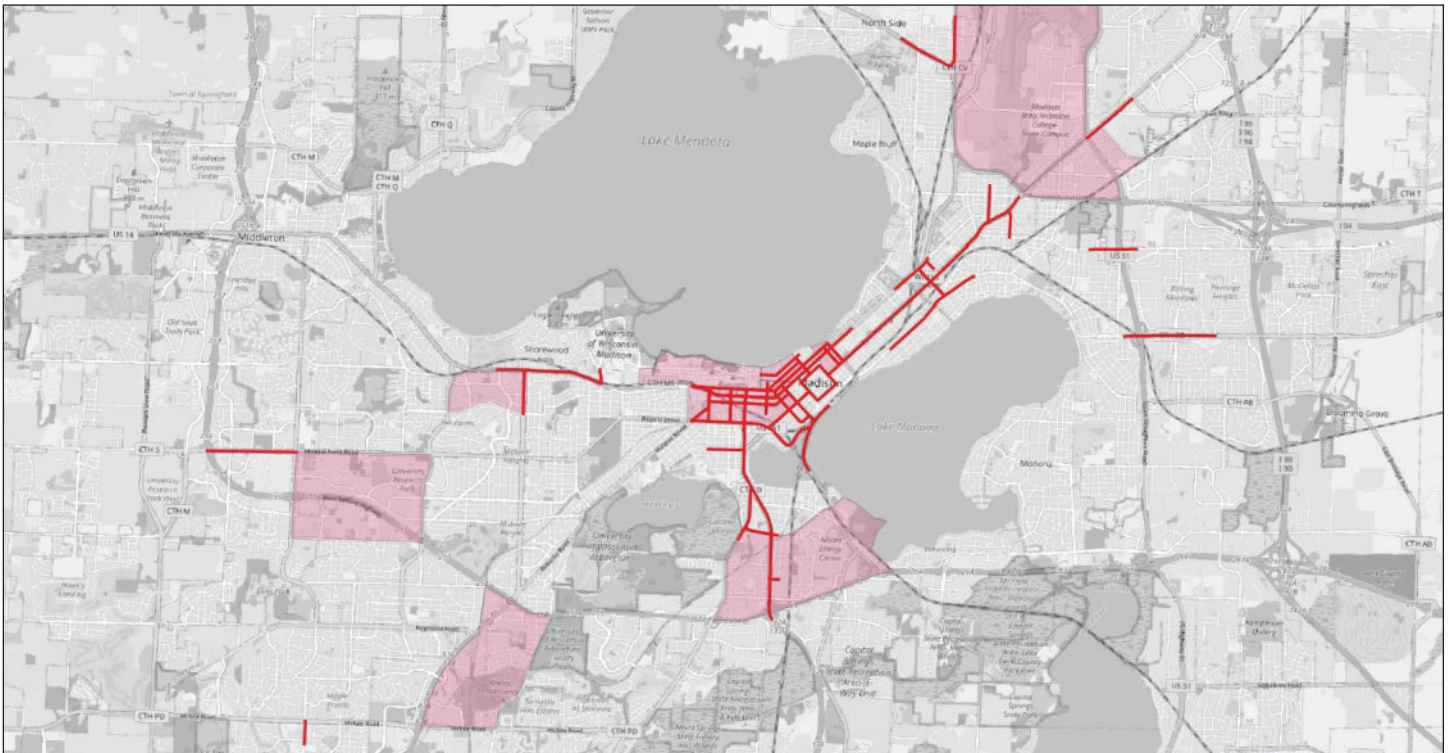
VRU High-Risk Area



Disadvantaged Tract per ETC Explorer tool

Dane County

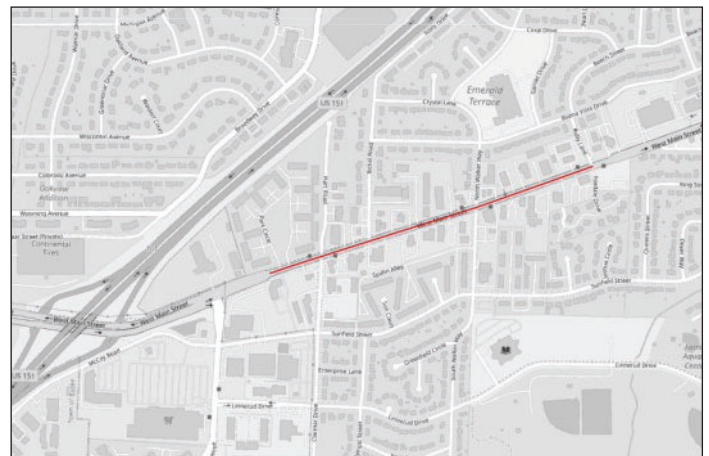
Madison, Fitchburg, Verona



Waunakee



Sun Prairie



Legend

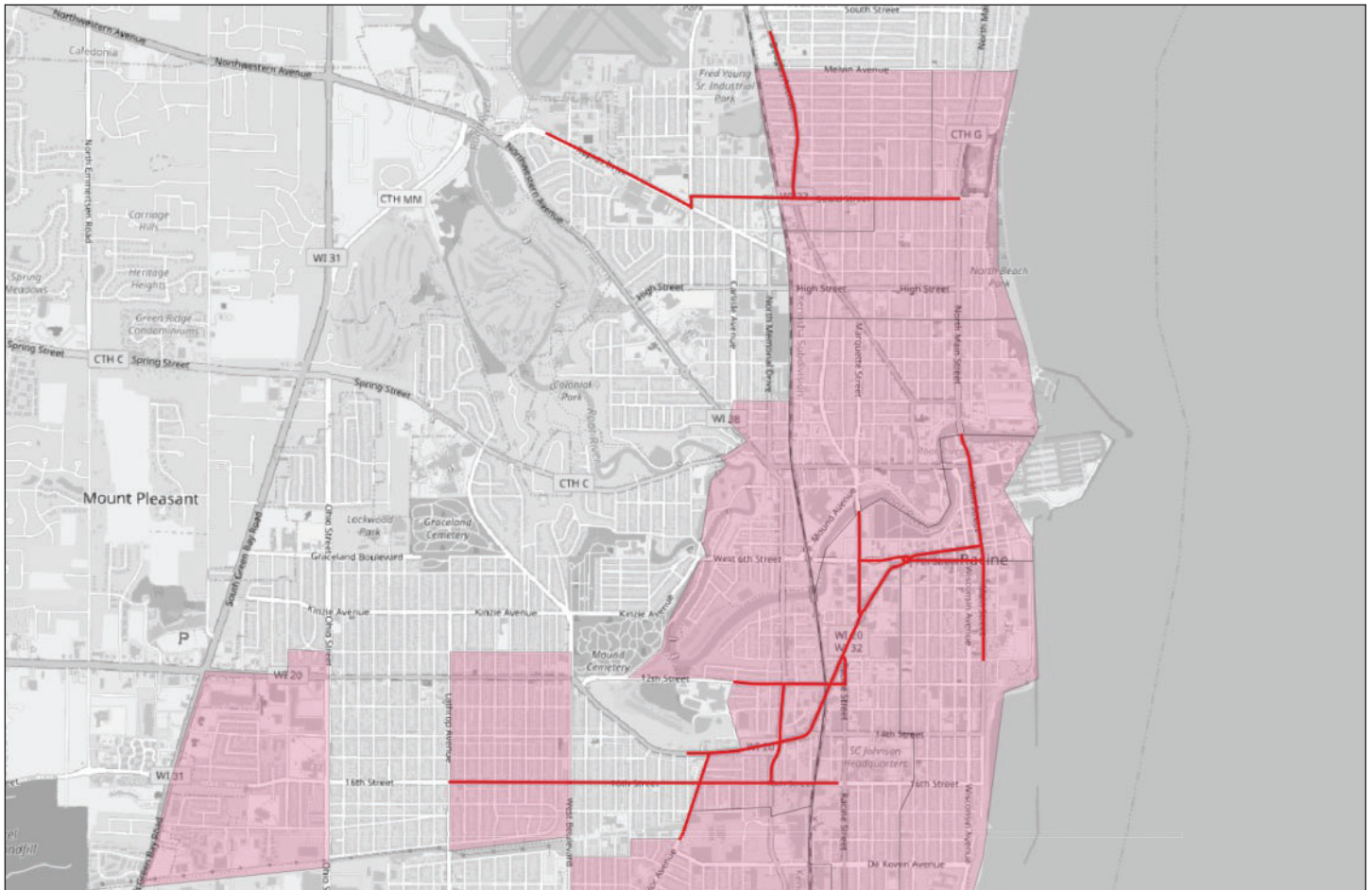


VRU High-Risk Area

Disadvantaged Tract per ETC Explorer tool

Racine County

Racine



Legend



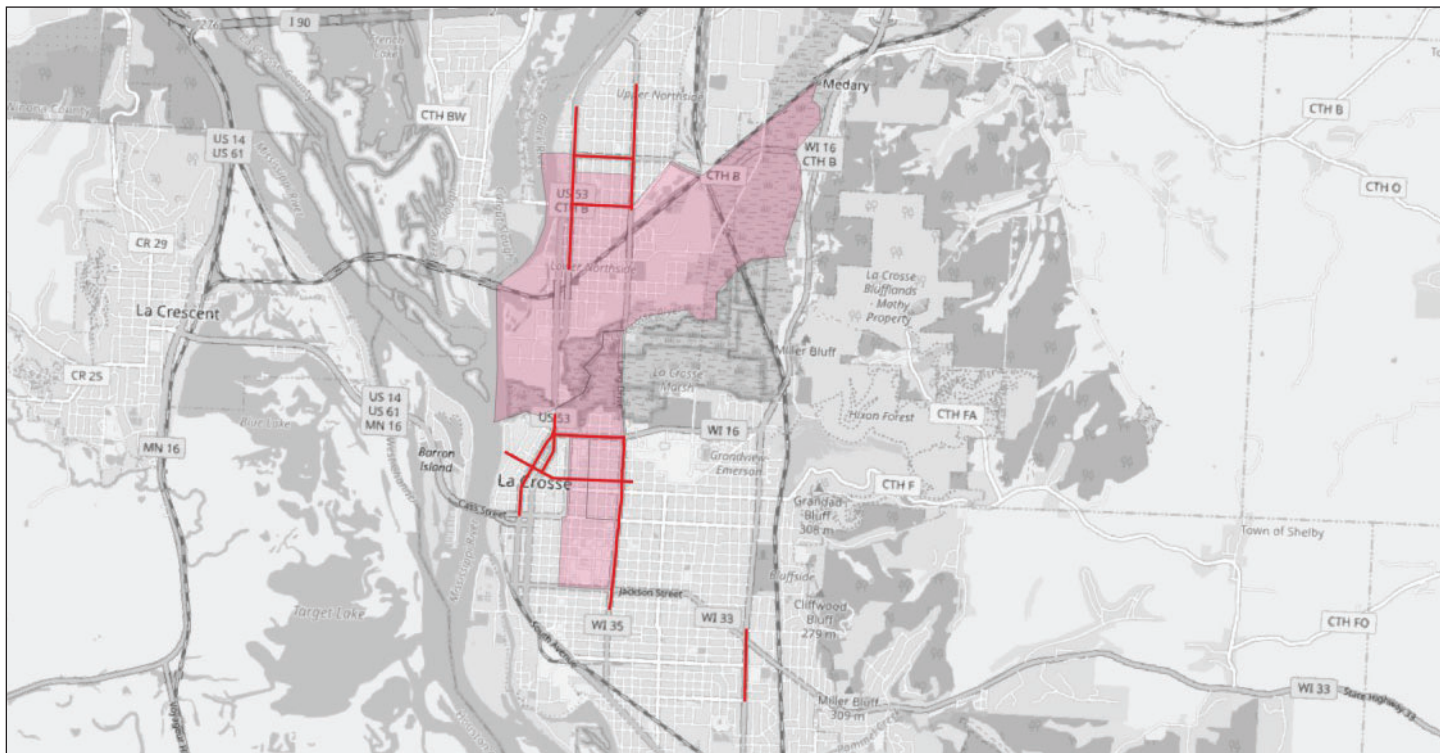
VRU High-Risk Area



Disadvantaged Tract per ETC Explorer tool

LaCrosse County

LaCrosse



Legend



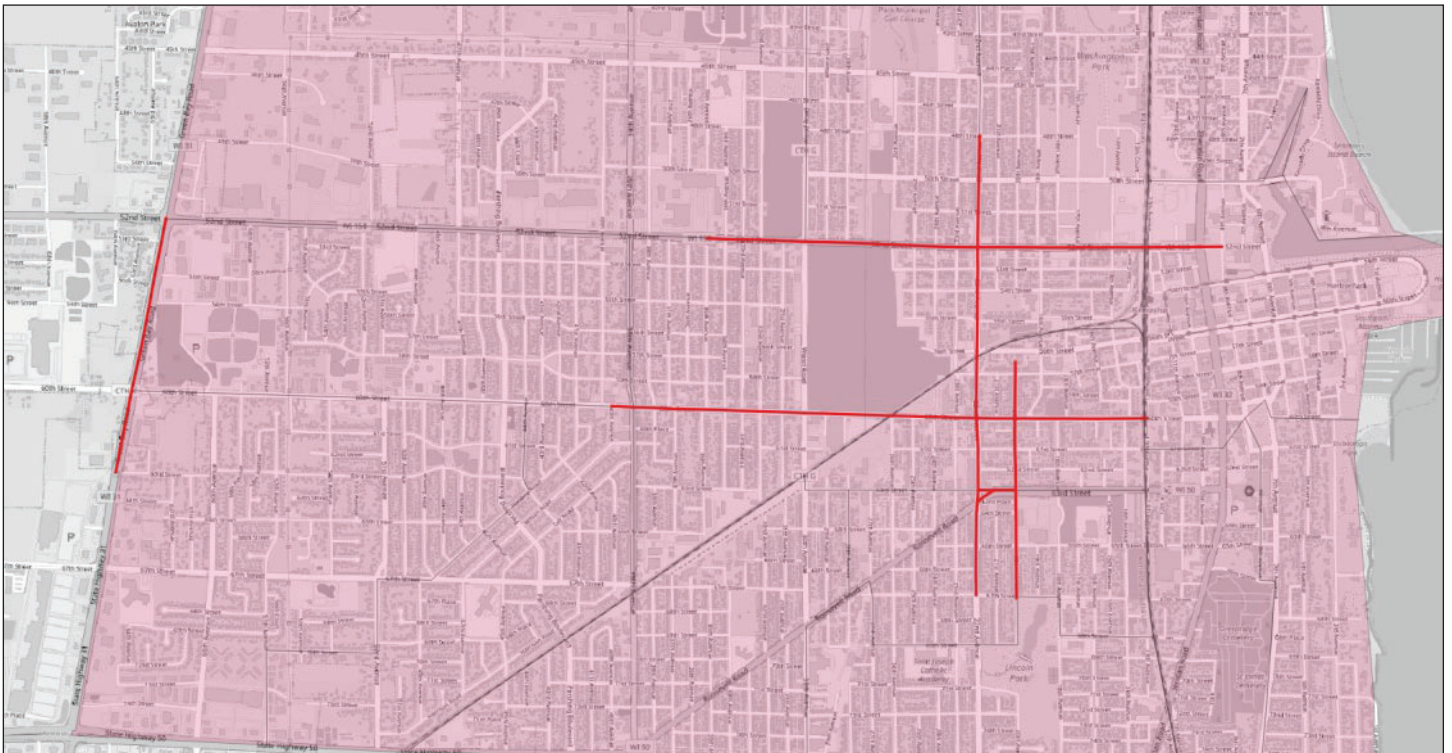
VRU High-Risk Area



Disadvantaged Tract per ETC Explorer tool

Kenosha County

Kenosha



Legend



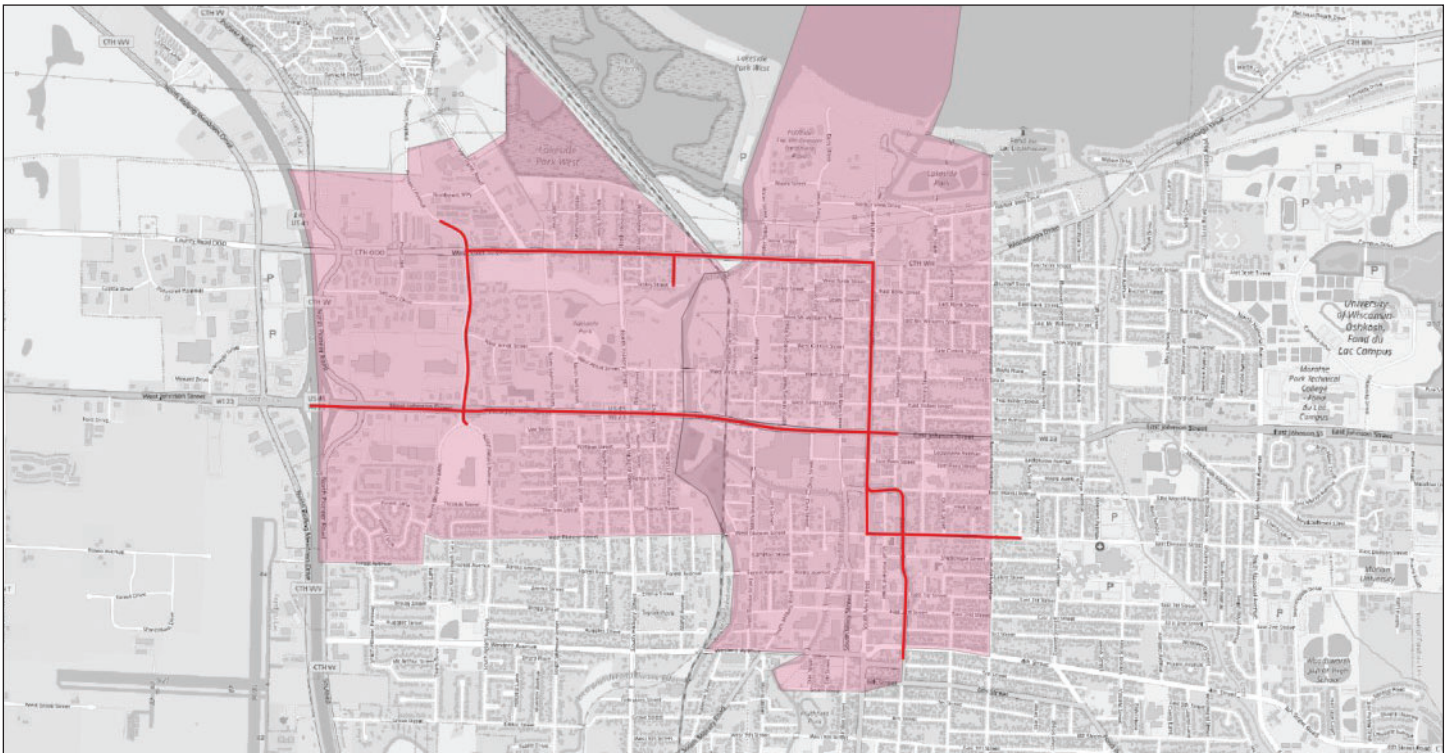
VRU High-Risk Area



Disadvantaged Tract per ETC Explorer tool

Fond du Lac County

Fond du Lac



Legend



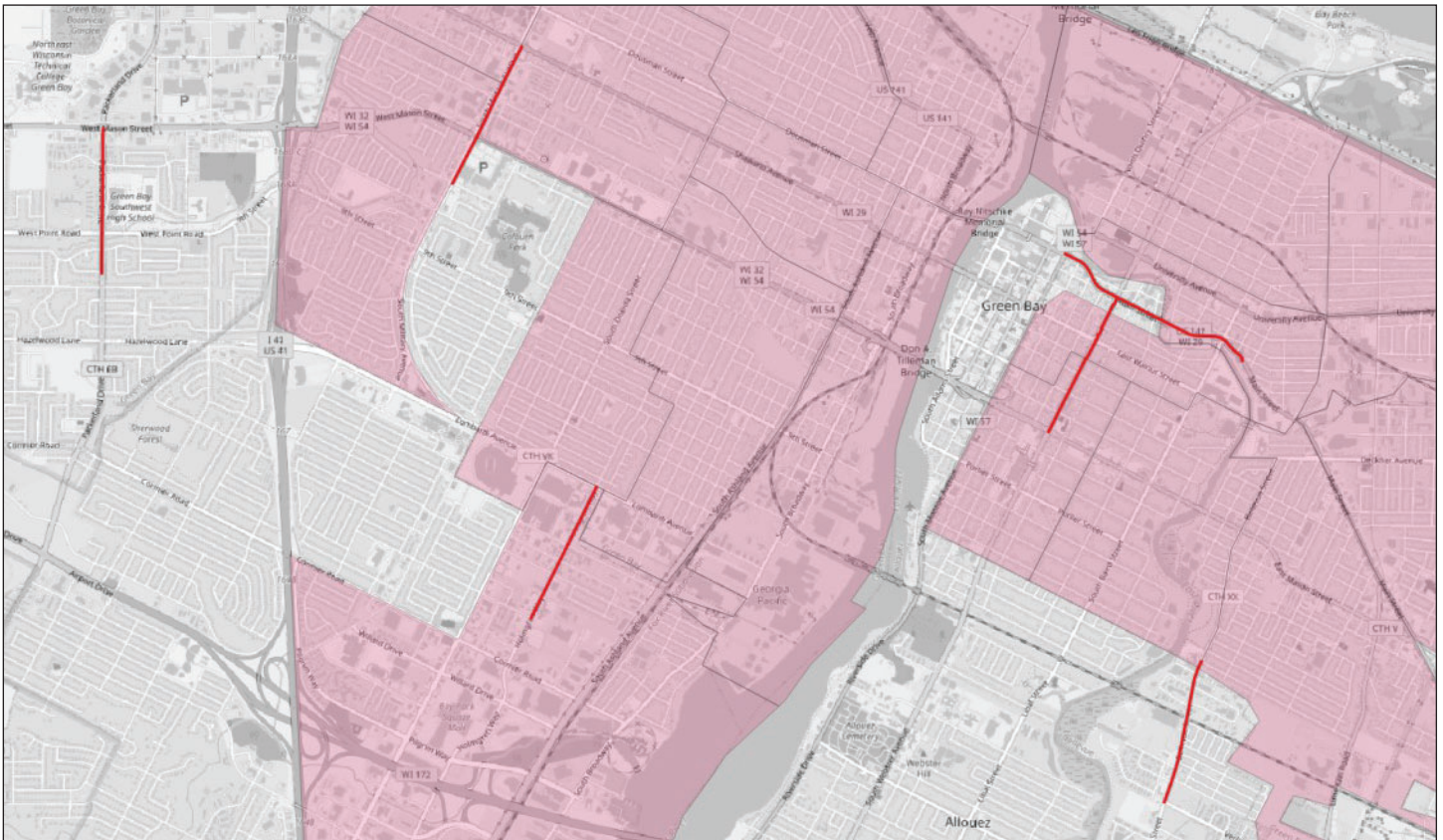
VRU High-Risk Area



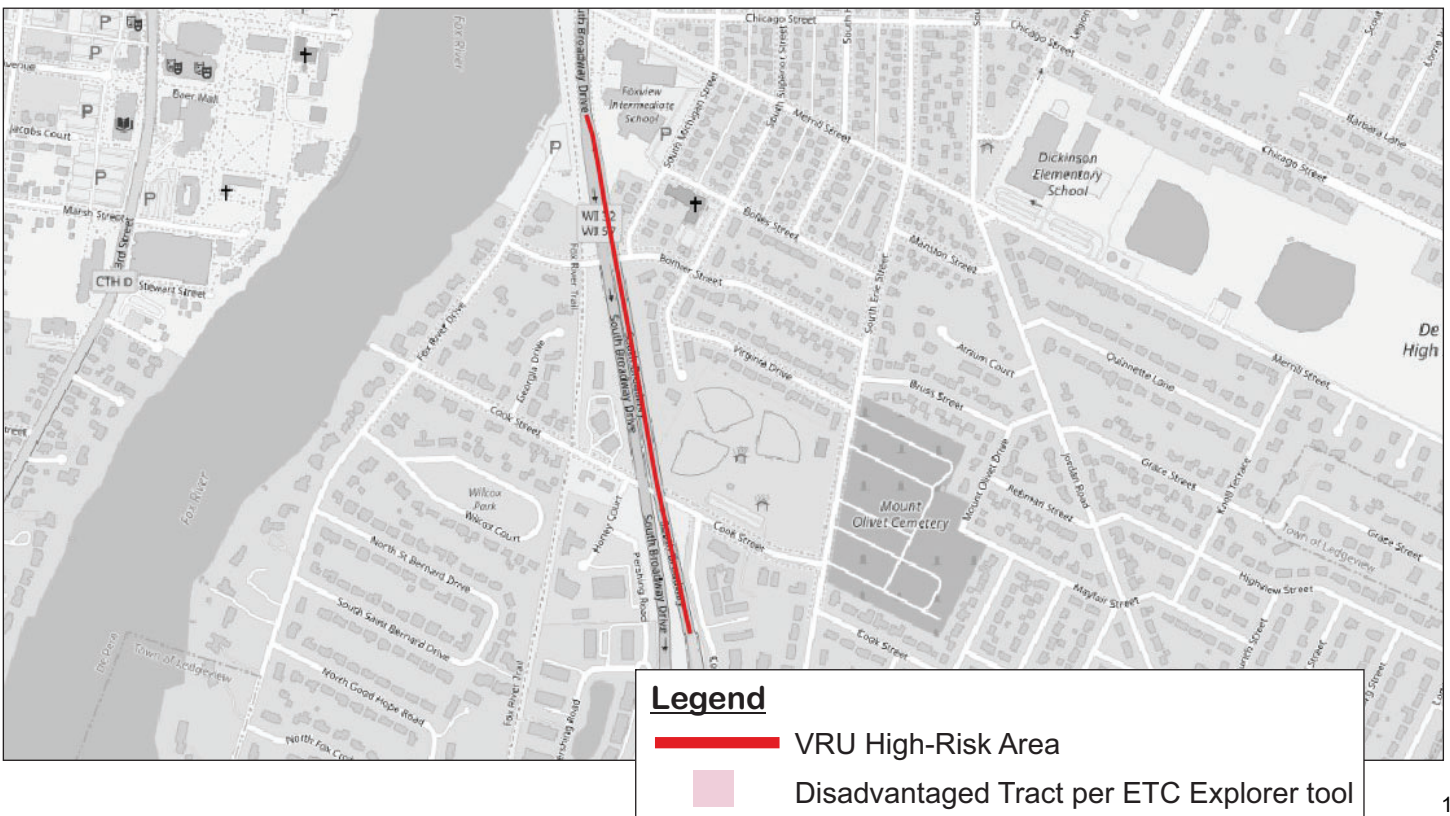
Disadvantaged Tract per ETC Explorer tool

Brown County

Green Bay

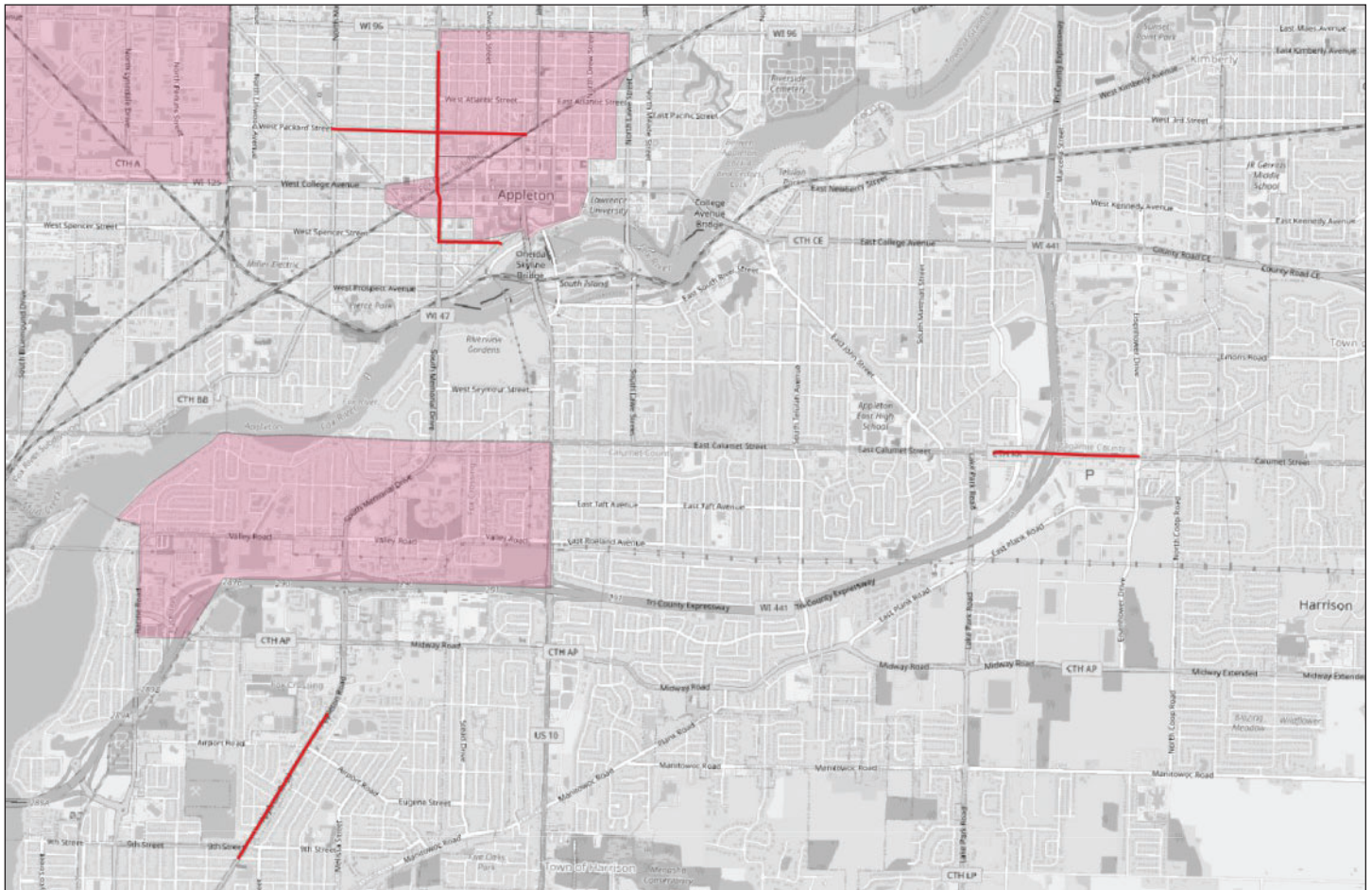


DePere



Outagamie County/Calumet County

Appleton



Legend

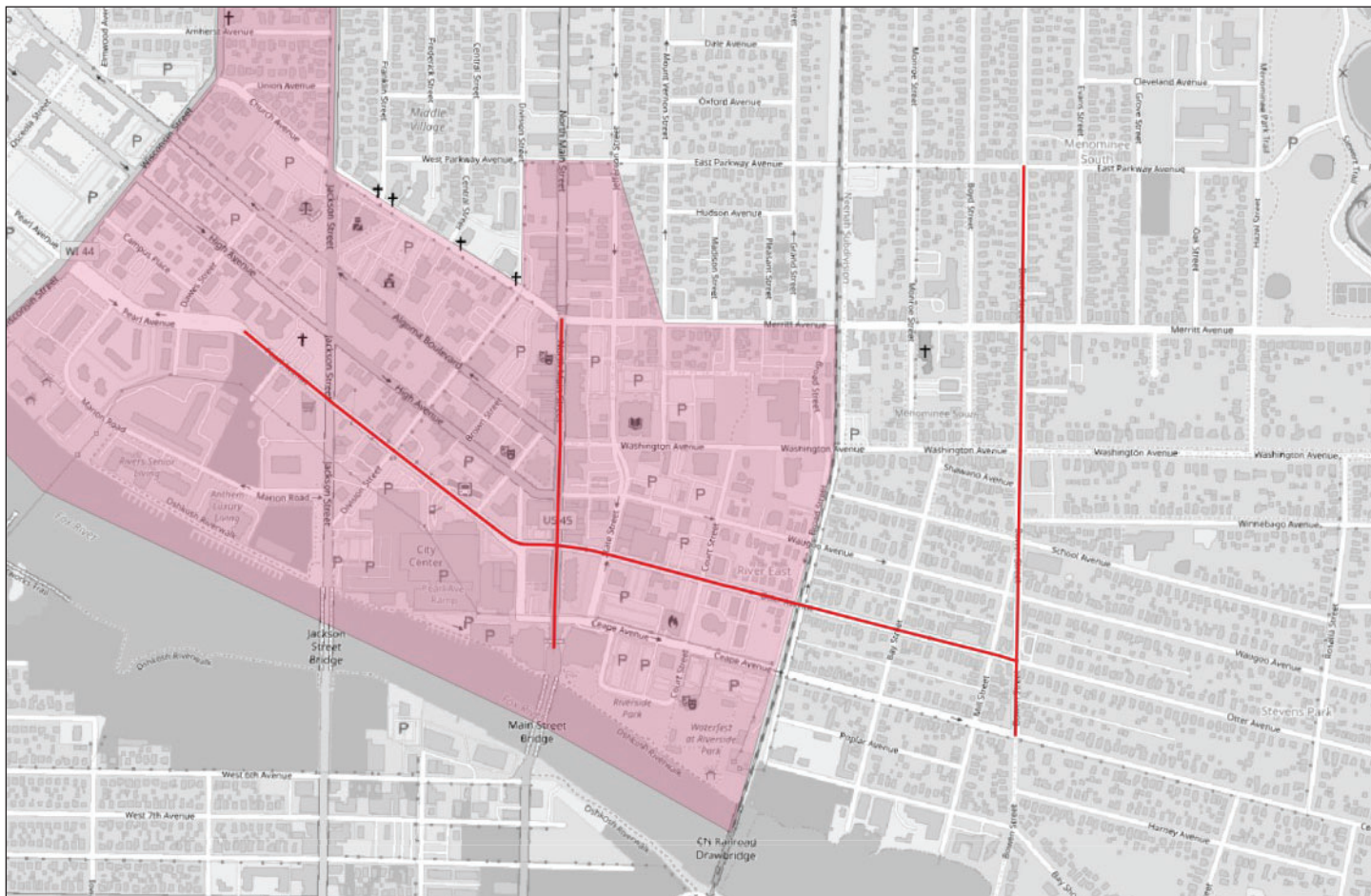


VRU High-Risk Area

Disadvantaged Tract per ETC Explorer tool

Winnebago County

Oshkosh



Legend

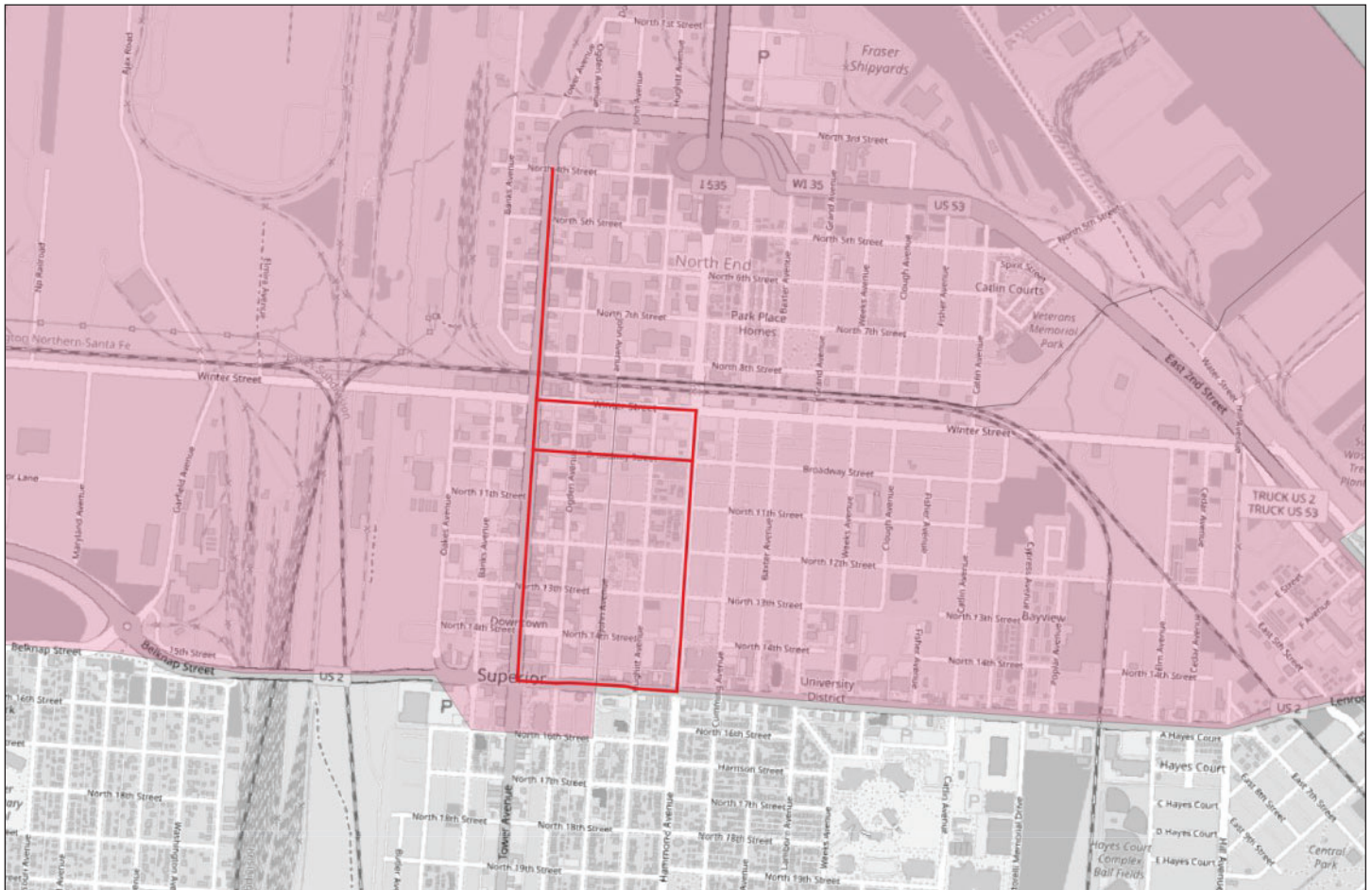


VRU High-Risk Area

Disadvantaged Tract per ETC Explorer tool

Douglas County

Superior



Legend

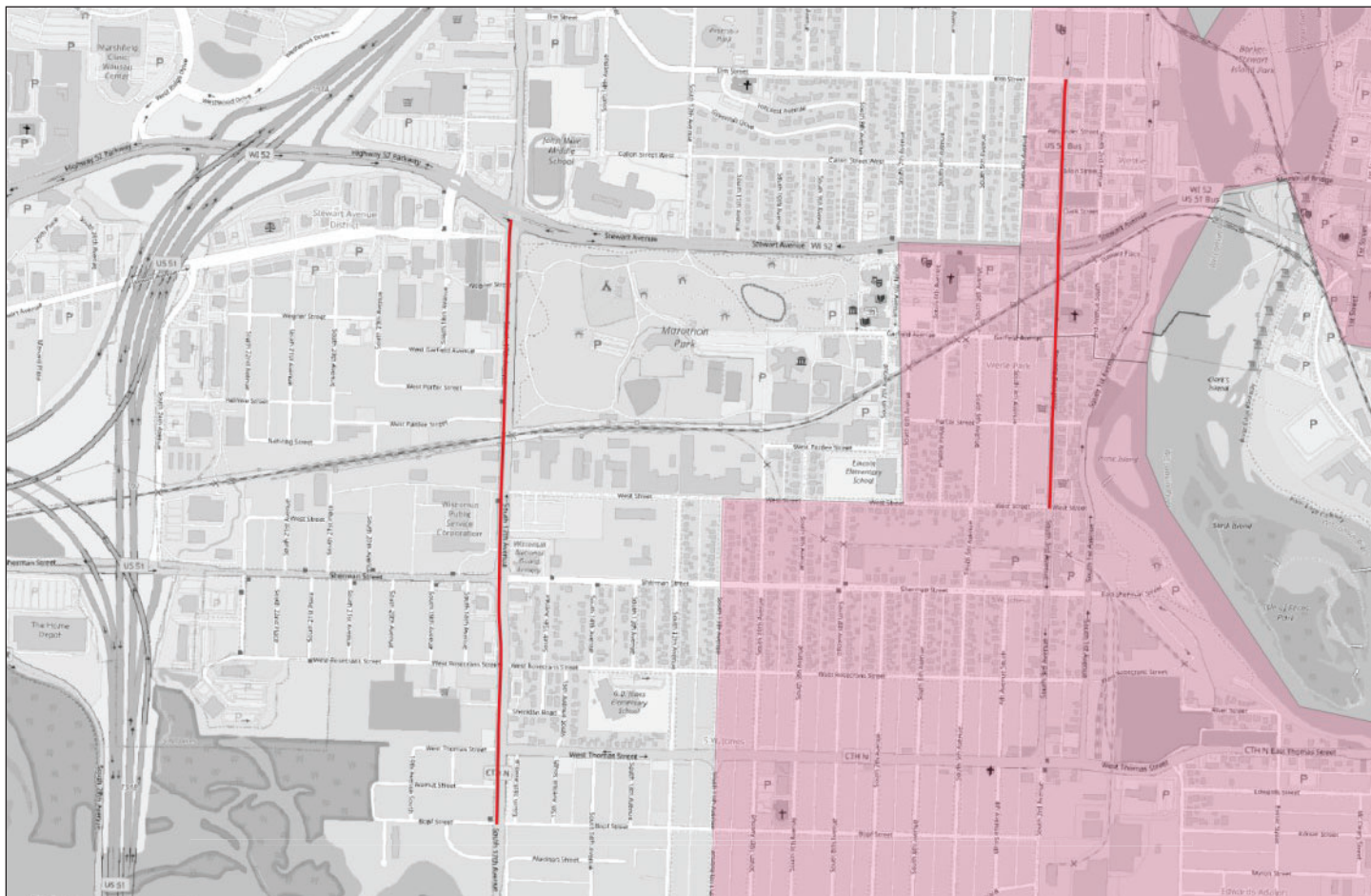


VRU High-Risk Area

Disadvantaged Tract per ETC Explorer tool

Marathon County

Wausau



Legend



VRU High-Risk Area



Disadvantaged Tract per ETC Explorer tool

Wood County

Marshfield



Legend



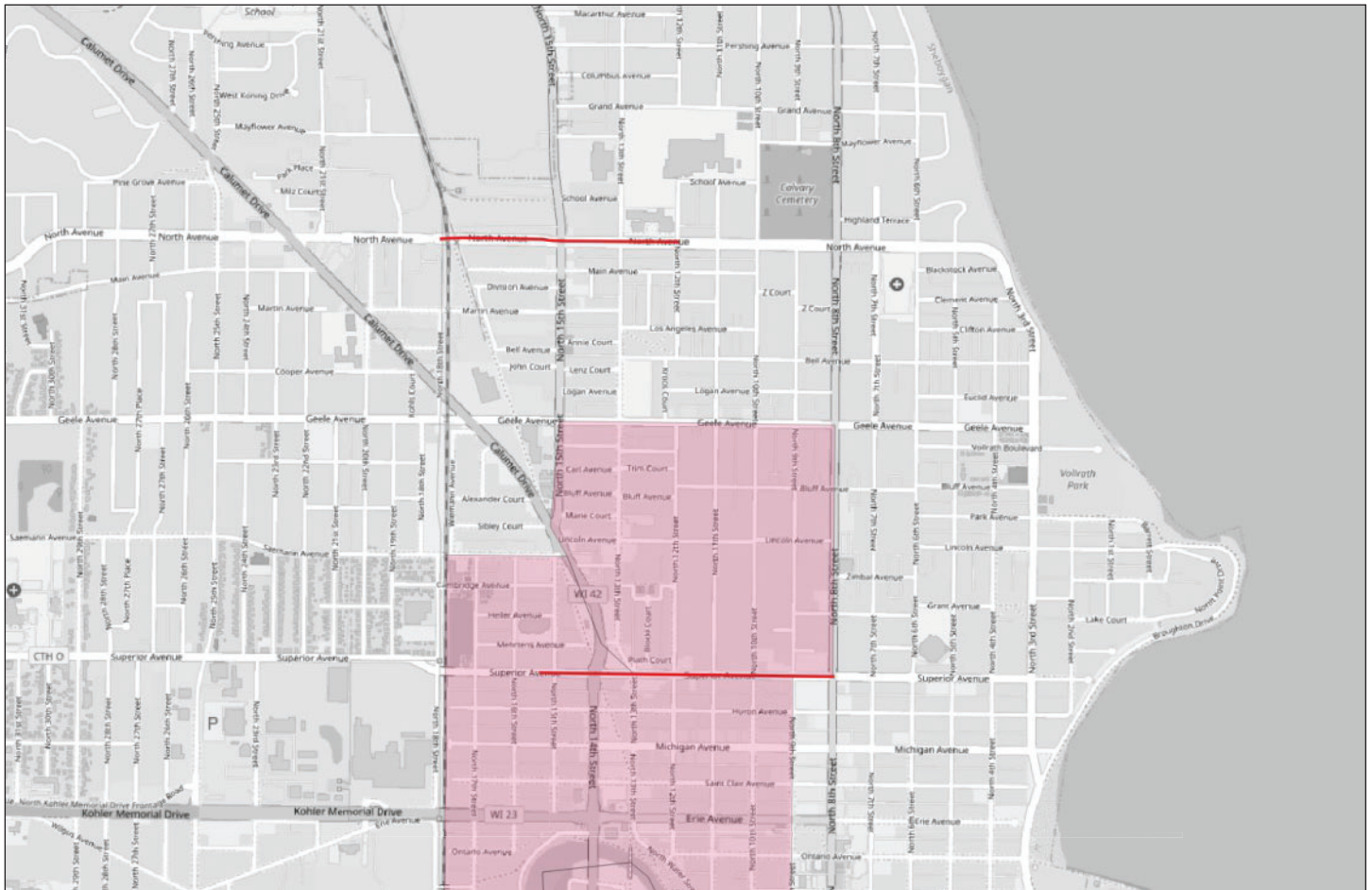
VRU High-Risk Area



Disadvantaged Tract per ETC Explorer tool

Sheboygan County

Sheboygan



Legend



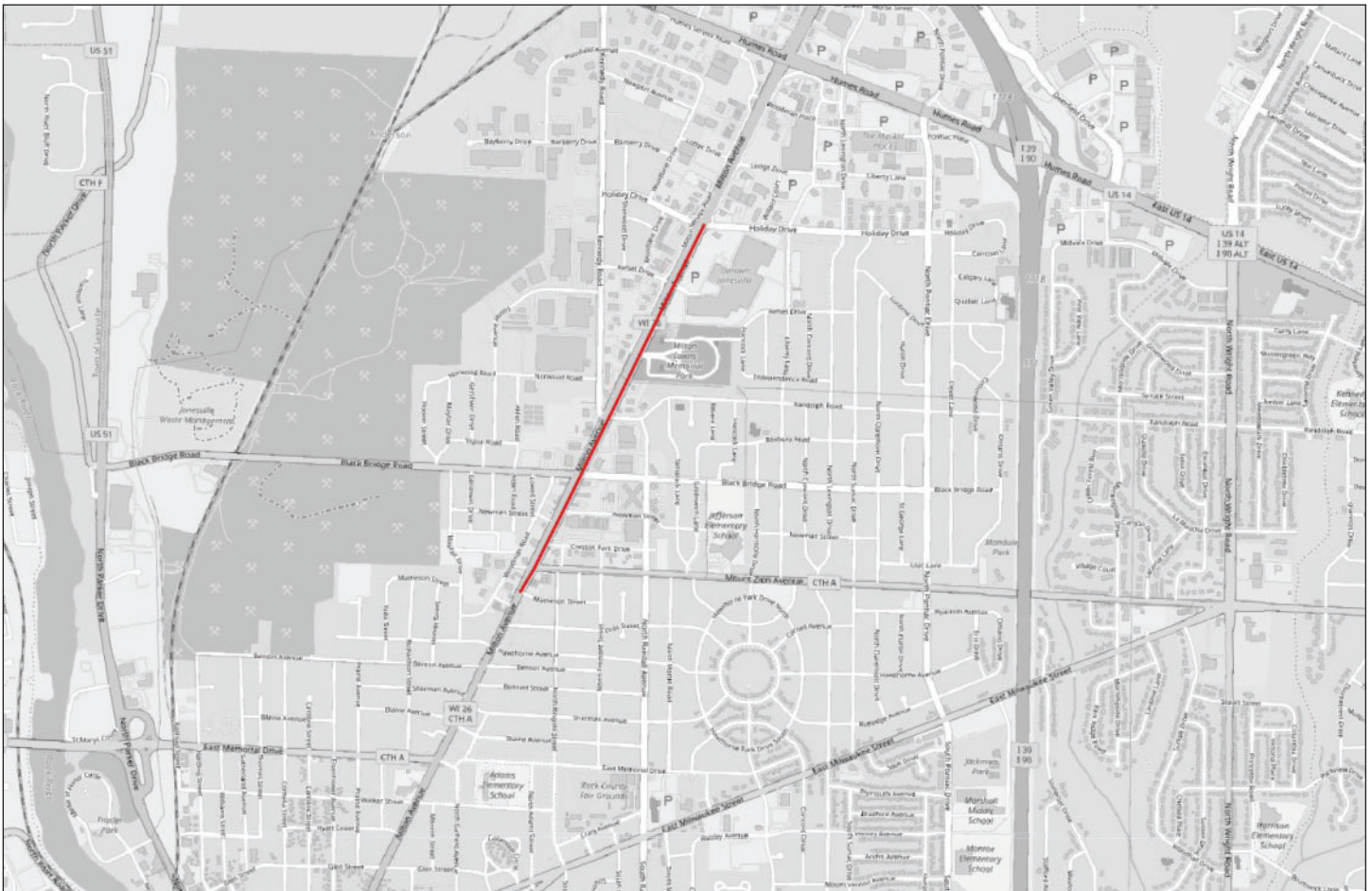
VRU High-Risk Area



Disadvantaged Tract per ETC Explorer tool

Rock County

Janesville



Legend



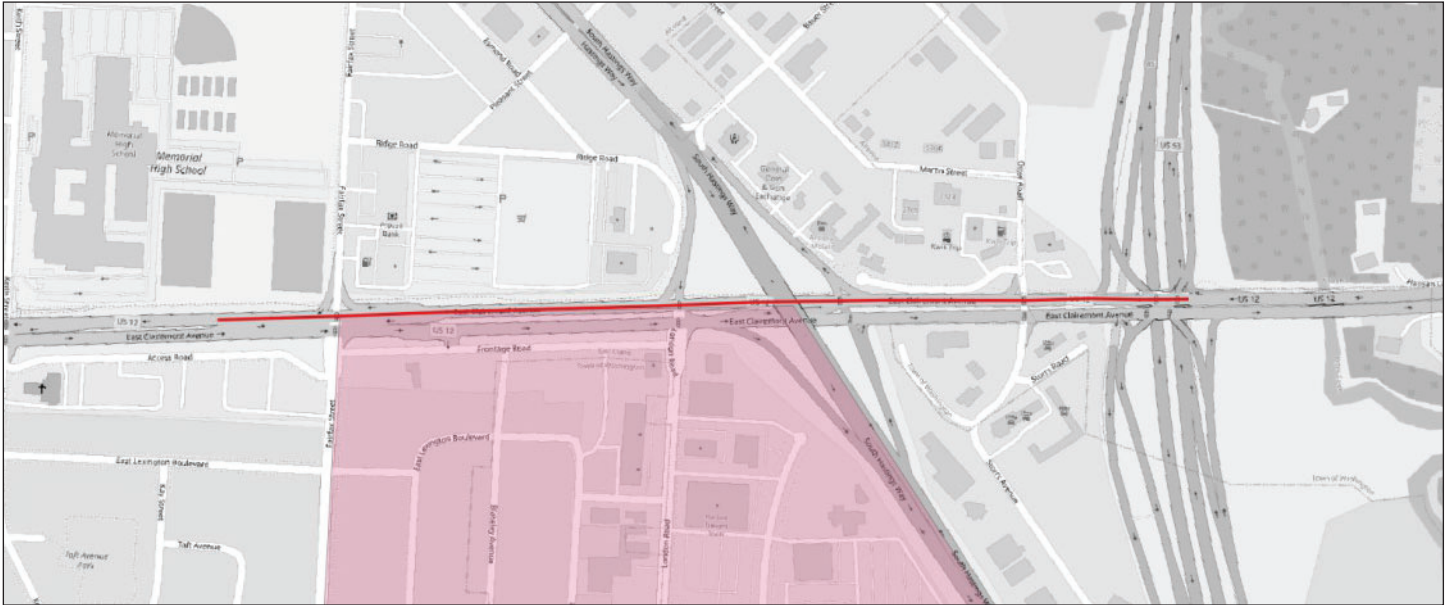
VRU High-Risk Area



Disadvantaged Tract per ETC Explorer tool

Eau Claire County

Eau Claire



Legend



VRU High-Risk Area



Disadvantaged Tract per ETC Explorer tool

Columbia County

Wisconsin Dells



Legend

VRU High-Risk Area

Disadvantaged Tract per ETC Explorer tool

Waukesha County

Brookfield



Legend



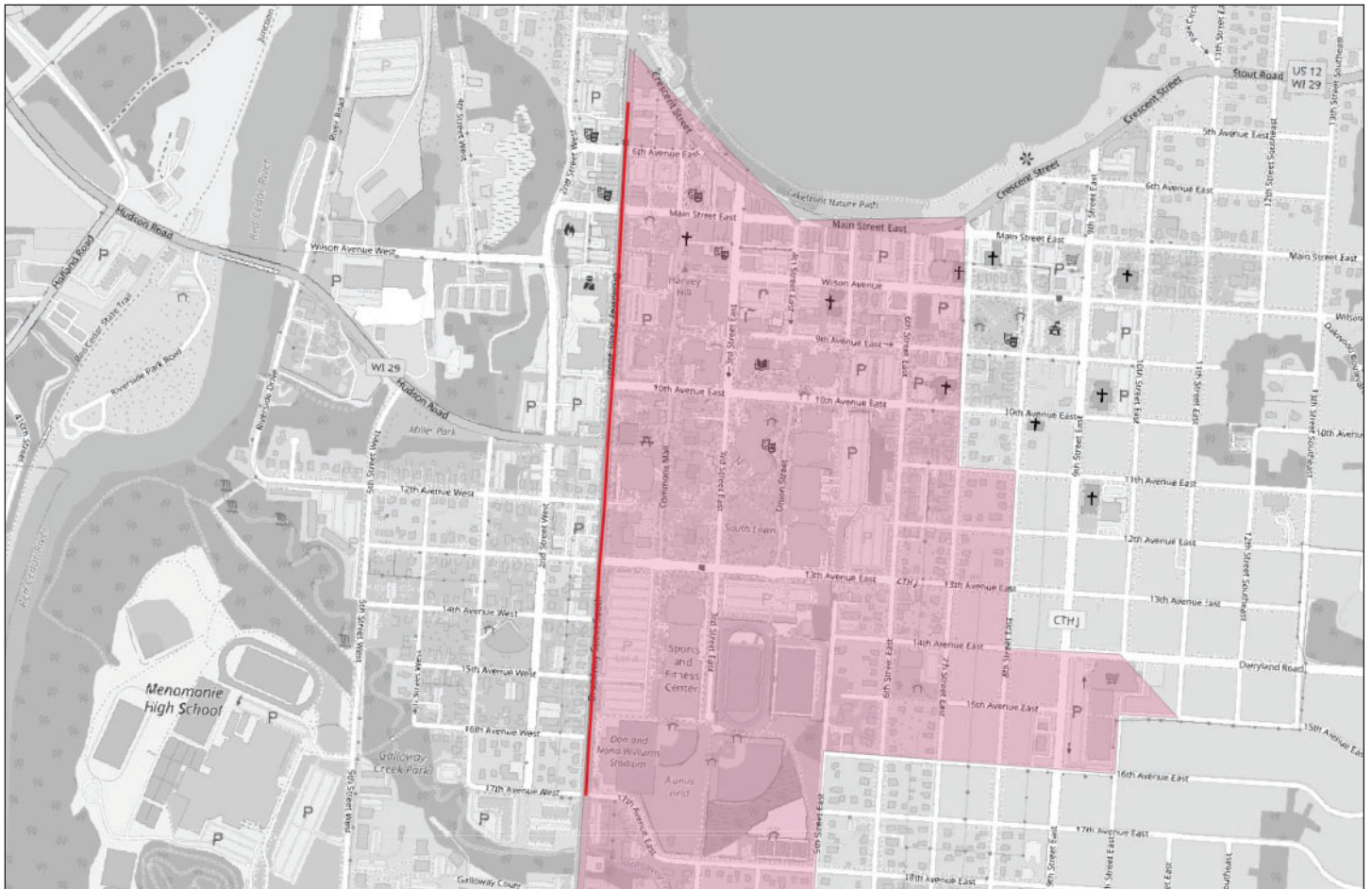
VRU High-Risk Area



Disadvantaged Tract per ETC Explorer tool

Dunn County

Menomonie



Legend



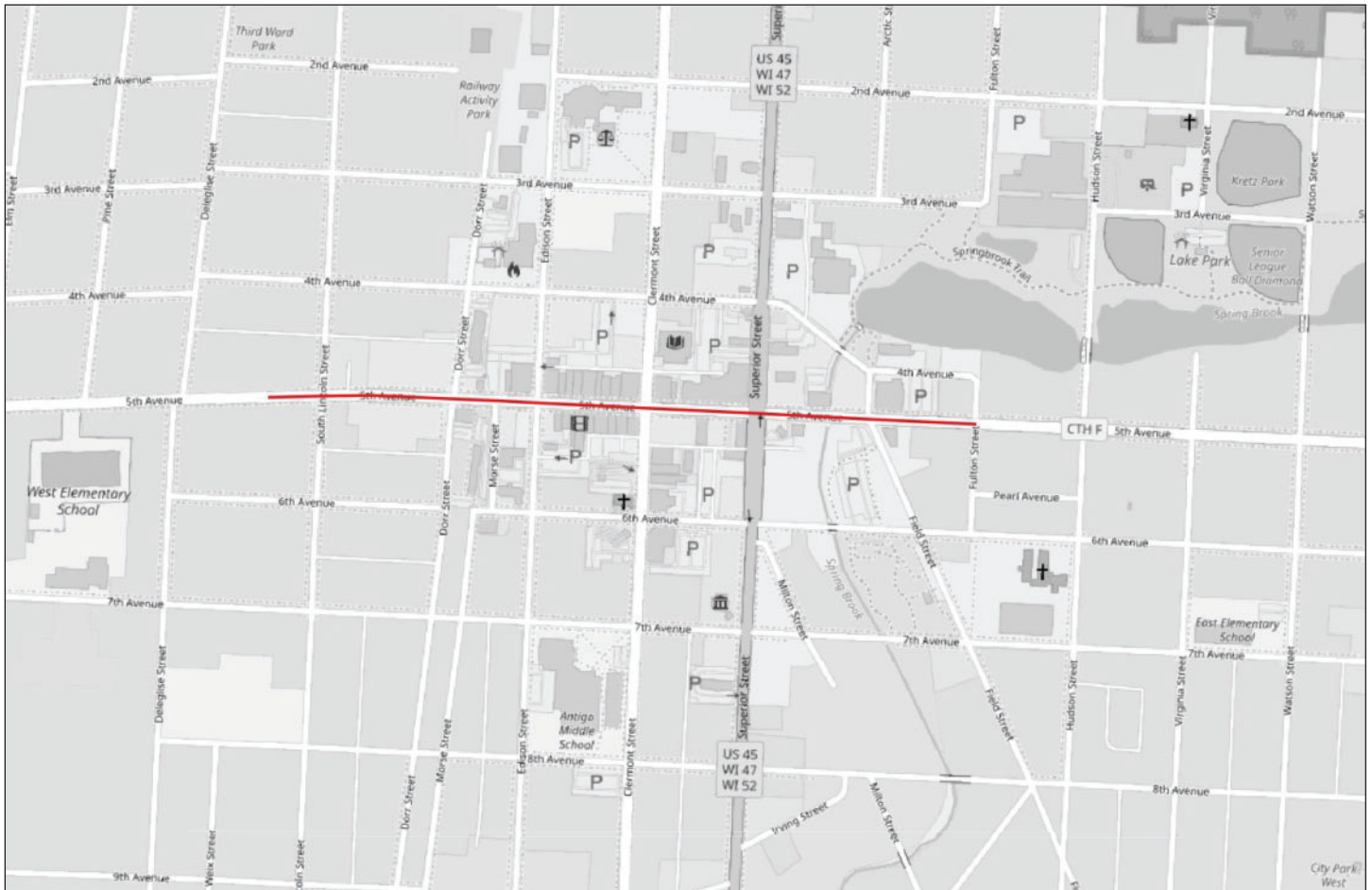
VRU High-Risk Area



Disadvantaged Tract per ETC Explorer tool

Langlade County

Antigo



Legend



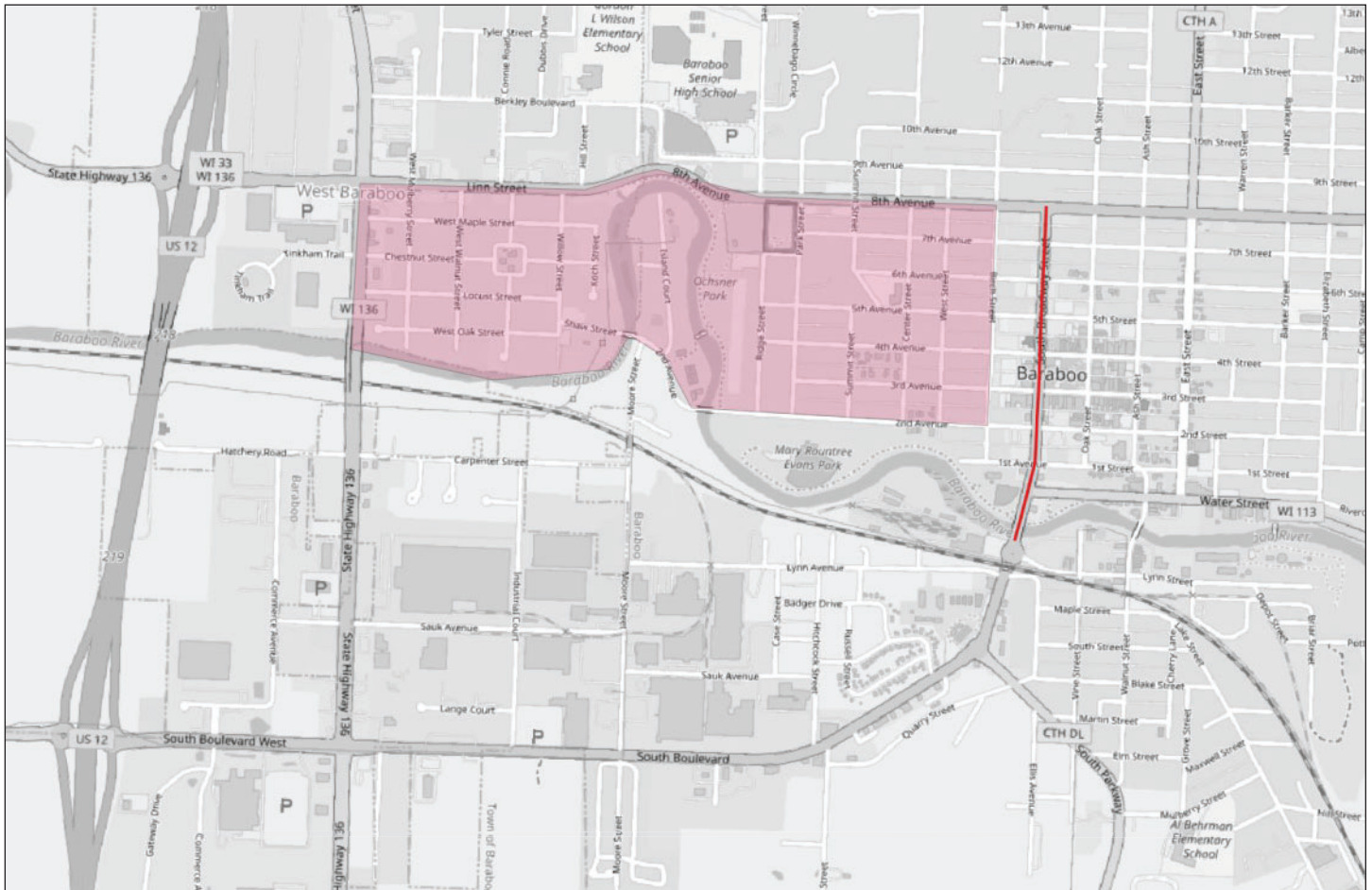
VRU High-Risk Area



Disadvantaged Tract per ETC Explorer tool

Sauk County

Baraboo



Legend



VRU High-Risk Area



Disadvantaged Tract per ETC Explorer tool

Walworth County

Lake Geneva



Legend



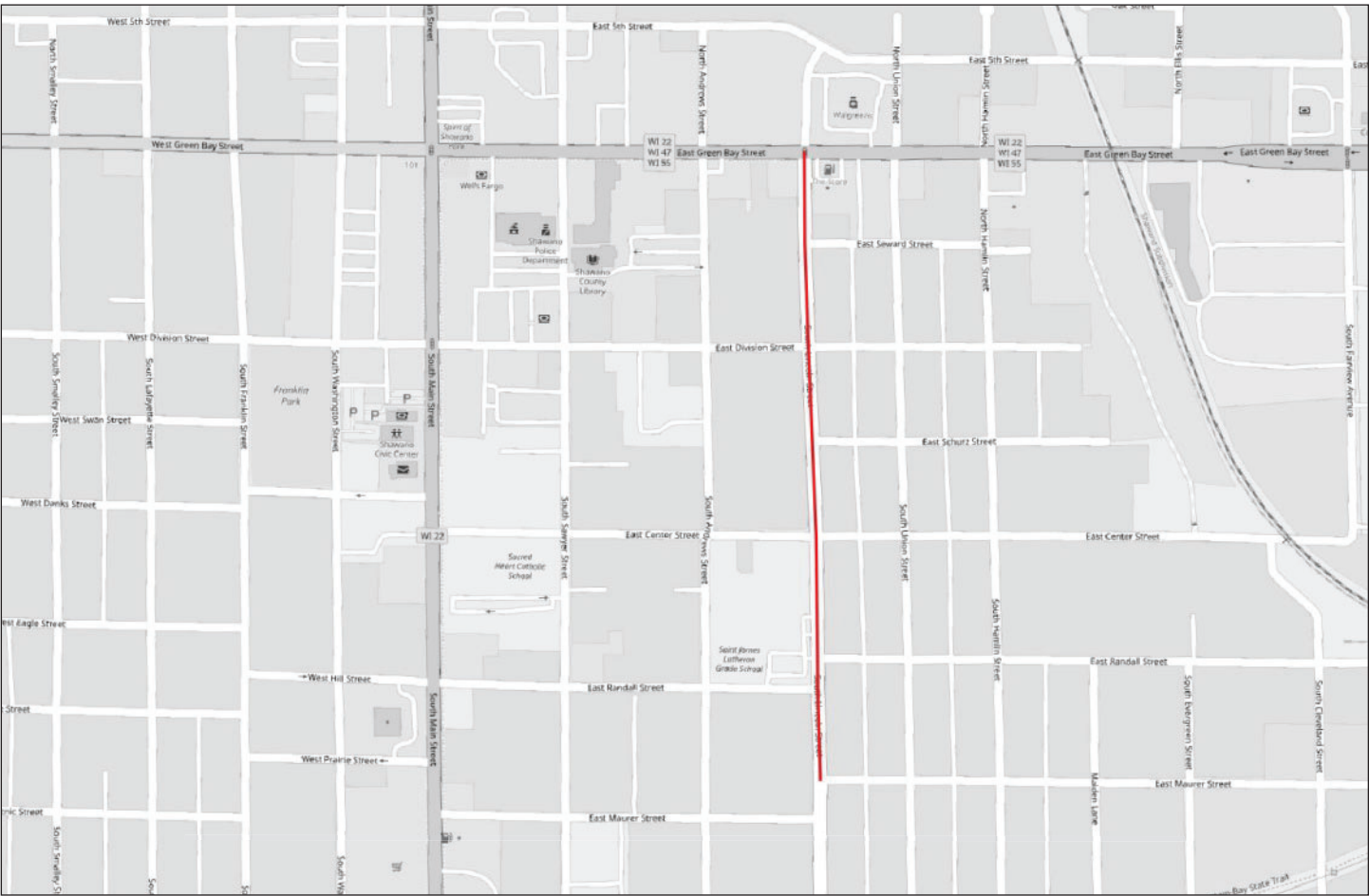
VRU High-Risk Area



Disadvantaged Tract per ETC Explorer tool

Shawano County

Shawano



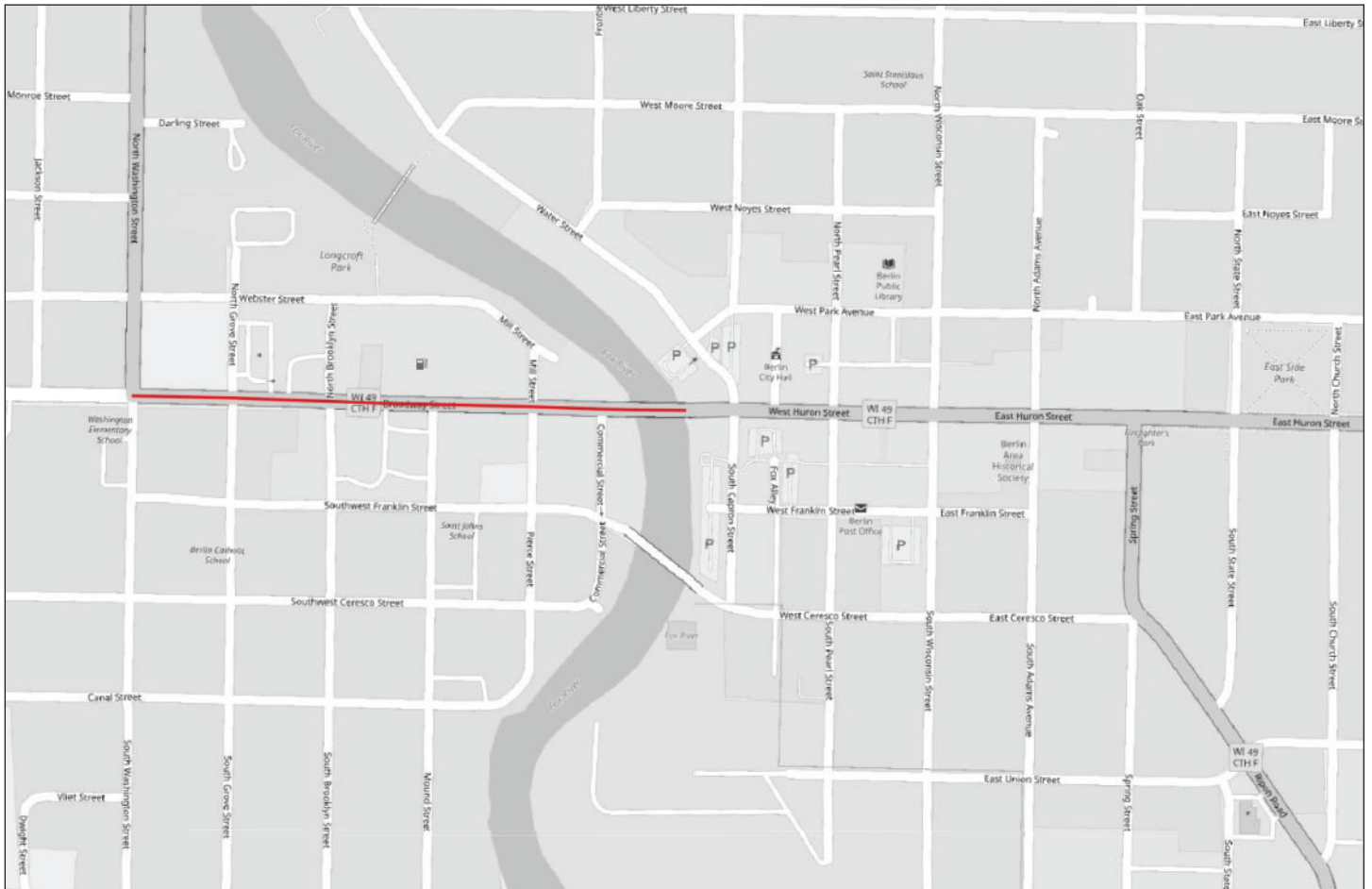
Legend

VRU High-Risk Area

Disadvantaged Tract per ETC Explorer tool

Green Lake County

Berlin



Legend



VRU High-Risk Area



Disadvantaged Tract per ETC Explorer tool