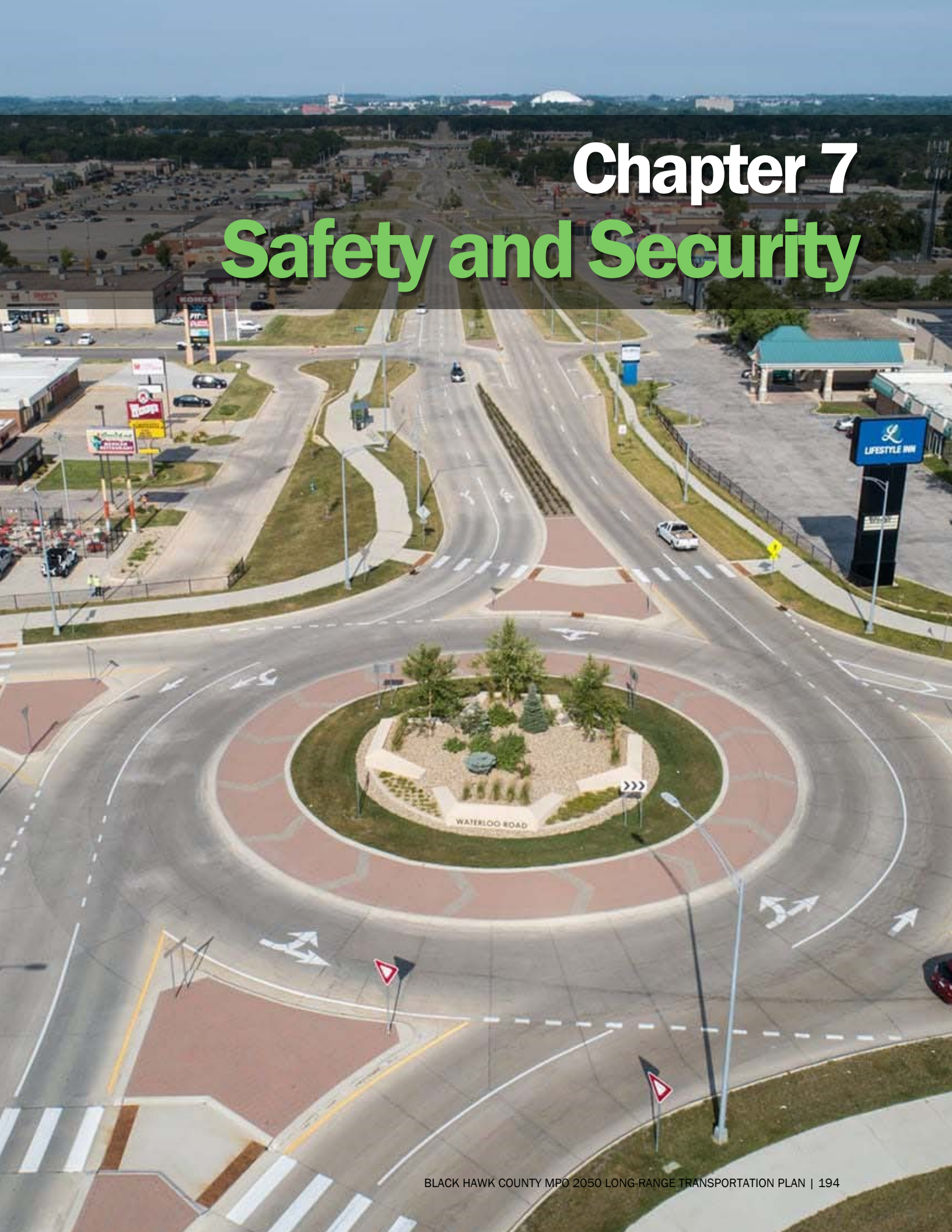


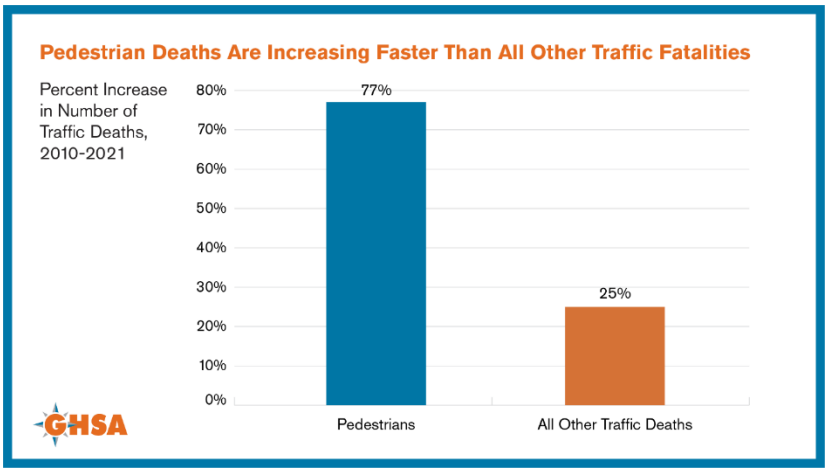
Chapter 7
Safety and Security

Chapter 7 – Safety and Security

National Crash Background

Over the past five years, traffic fatalities in the United States have remained a significant concern. While there have been efforts to improve road safety, the statistics paint a troubling picture. According to the National Highway Traffic Safety Administration (NHTSA), there has been a concerning upward trend in traffic fatalities since 2018 (36,560 and 42,939 fatalities in 2018 and 2022). In 2020, despite the pandemic-induced reduction in traffic volume, there were 38,800 traffic deaths, which represents a 7.5% increase from the previous year. While innovations in vehicle safety technology and public awareness campaigns have aimed to address these issues, it is evident that significant work is required to effectively reduce traffic fatalities and create safer roadways across the nation.

Several factors contributed to the overall high number of traffic fatalities in 2022. Distracted driving remained a significant concern, with the use of electronic devices, such as smartphones, continuing to be a leading cause of accidents. Additionally, impaired driving due to alcohol and drugs remained a persistent issue, contributing to a significant number of fatalities. Speeding, reckless driving behaviors, and failure to wear seat belts were also key factors leading to fatal crashes.



Pedestrians and cyclists continue to face significant risks on US roads. The Governors Highway Safety Association annual report, *Pedestrian Traffic Fatalities by State: 2022 Preliminary Data*, projects that drivers struck and killed at least 7,508 people walking in 2022 – the highest number since 1981 and an average of twenty deaths every day. There were 2.37 pedestrian deaths per billion vehicle miles traveled (VMT) in 2022, up yet again and continuing a troubling trend of elevated rates that began in 2020. The growing popularity of electric scooters and the rise in micromobility options also added to the vulnerability of non-motorized road users. Ensuring the safety of pedestrians and cyclists demands enhanced infrastructure, education, and awareness campaigns.

Metro Stats

7
People killed in crashes each year[1]

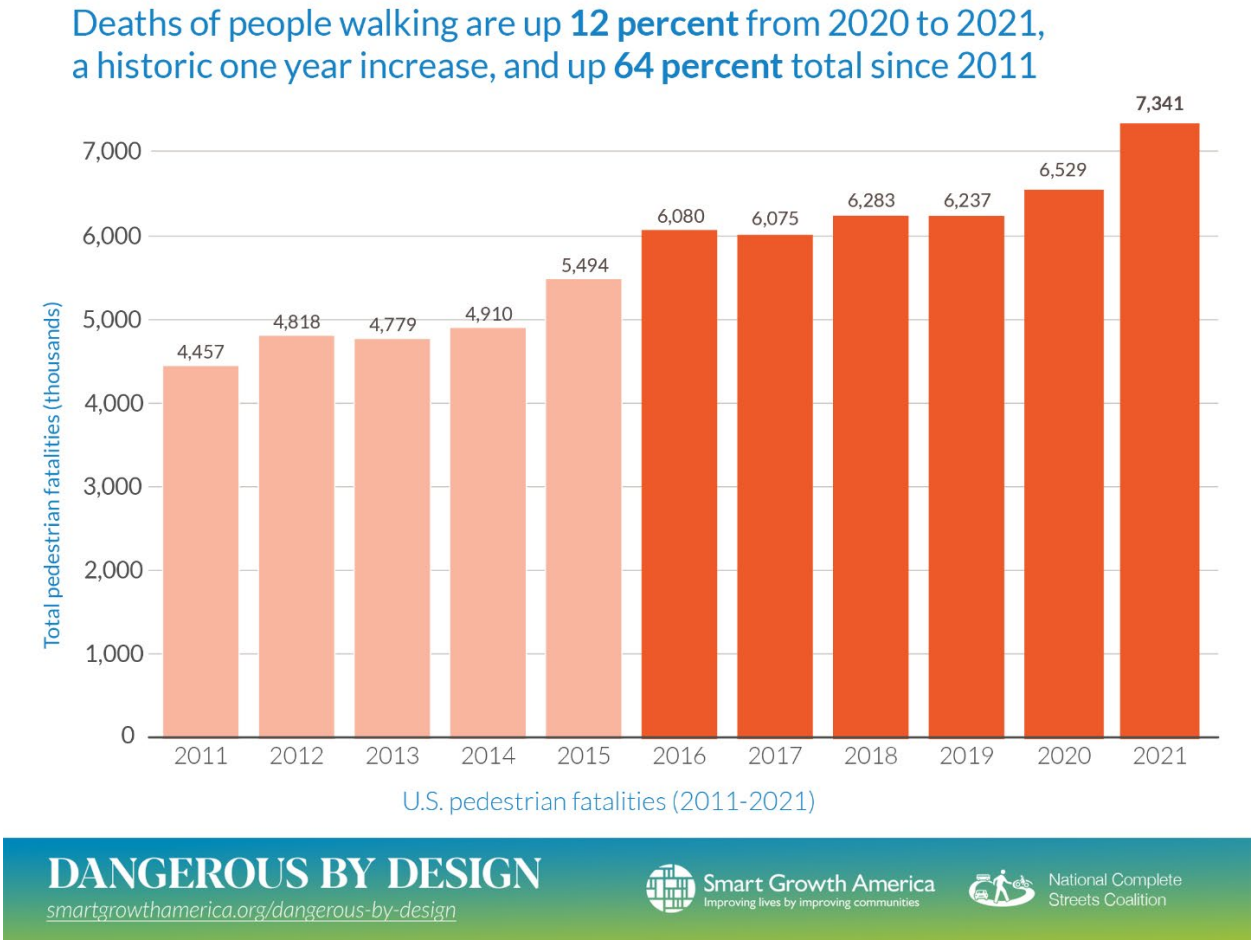
40
People suffer serious injuries from crashes each year[1]

5.5
Crashes occur each day[1]

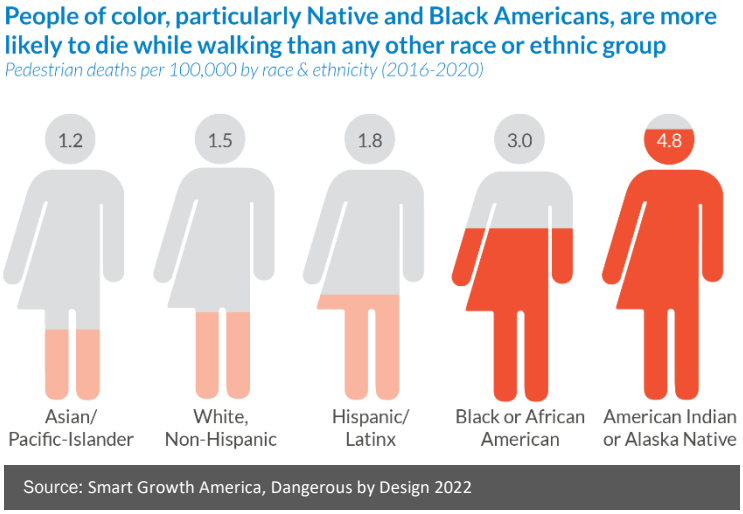
$12.2M
In property damage each year[1]

Every 9.4 days
A crash occurs involving a non-motorist[1]

Sources:
[1]Iowa DOT, Iowa Crash Analysis Tool, 2013-2022



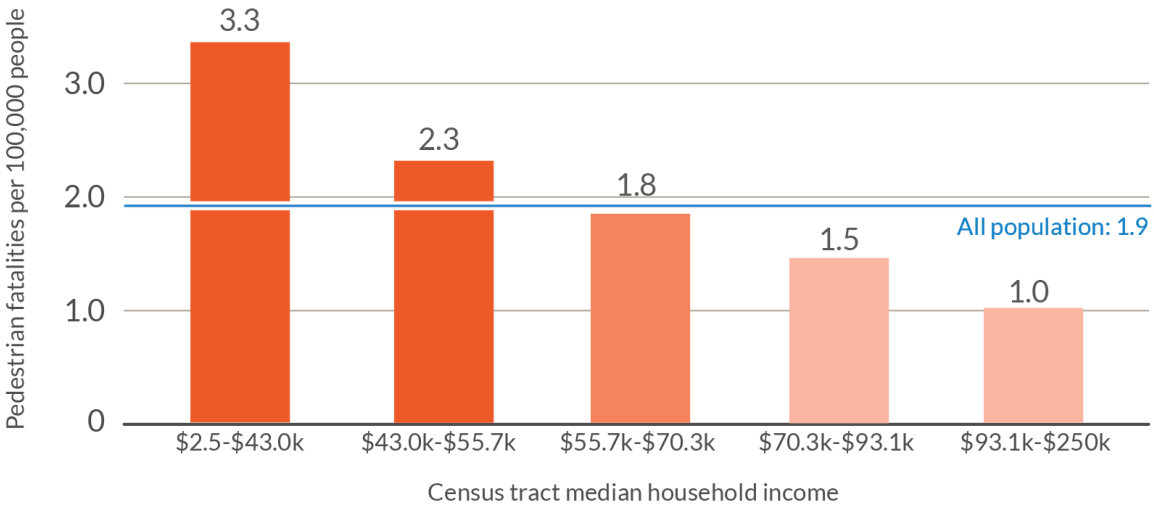
The COVID-19 pandemic had a profound impact on many aspects of society, including pedestrian fatalities. The pandemic exacerbated existing disparities in pedestrian fatalities, particularly among vulnerable communities. As lockdowns and restrictions were imposed, people relied more on walking and bicycling for transportation and exercise. However, disadvantaged neighborhoods often lack proper infrastructure and pedestrian-friendly amenities, forcing residents to navigate hazardous conditions. Additionally, essential workers from marginalized communities faced heightened exposure to risks while commuting on foot, as they had limited access to private vehicles and were more likely to rely on public transportation. The pandemic served as a stark reminder of the inequities in pedestrian safety, highlighting the urgent need for targeted interventions and equitable distribution of resources to address these disparities and create safer environments for all pedestrians.



Despite the alarming statistics, multiple efforts were made in 2022 to improve road safety and reduce traffic fatalities. Law enforcement agencies increased their vigilance in enforcing traffic laws and impaired driving regulations. States also worked to enhance infrastructure, implementing traffic calming measures, improving signage, and building protected bike lanes. Furthermore, the automotive industry continued to make advancements in safety technology, including lane departure warning systems, automatic emergency braking, and pedestrian detection systems.

People walking in lower-income areas are killed at far higher rates

Pedestrian fatalities per 100k people by census tract income



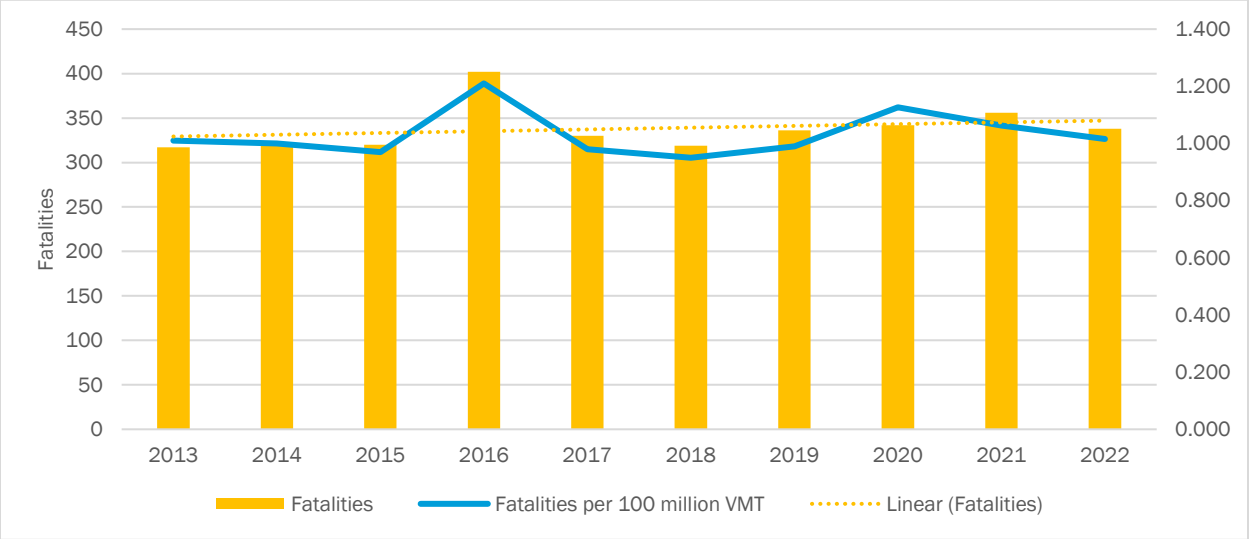
Source: Smart Growth America, Dangerous by Design 2022

The year 2022 marked a distressing increase in US traffic fatalities, emphasizing the need for comprehensive measures to address this pressing issue. Distracted driving, impaired driving, speeding, and other risky behaviors remained significant contributing factors. Furthermore, the safety of vulnerable road users, such as pedestrians and cyclists, continued to be a growing concern. Despite these challenges, efforts to improve road safety through law enforcement, infrastructure enhancements, and technological advancements persist. By prioritizing road safety and implementing a multi-faceted approach, it is possible to reduce traffic fatalities and create safer roads for everyone in the United States.

Iowa Crash Statistics

Traffic fatalities in Iowa have gradually decreased over the past two decades. However, the state is still averaging 339 traffic fatalities per year over the past ten years, with 338 fatalities reported in 2022. Figure 7.1 shows the historical trend for traffic fatalities in Iowa.

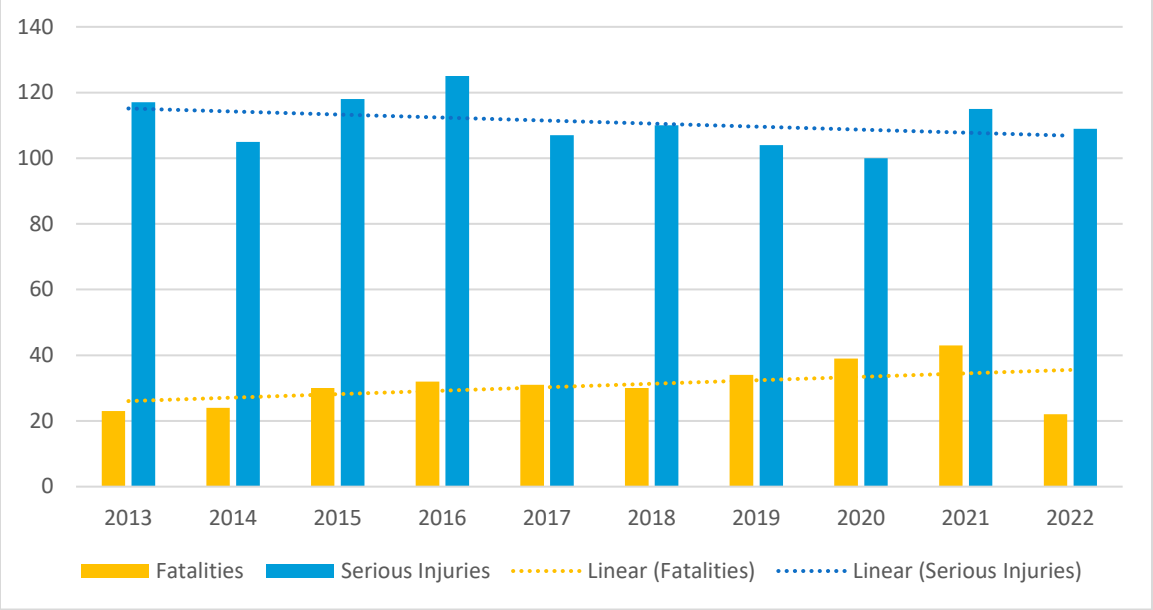
Figure 7.1: Traffic Fatalities in Iowa



Source: Iowa DOT, Crash Analysis Tool

Like nationwide trends, Iowa has witnessed a troubling rise in bicycle and pedestrian fatalities. From 2017 to 2022, the state has averaged 770 crashes, 31 fatalities, and 111 serious injuries involving vulnerable non-motorized road users. Rural areas continue to experience a disproportionate number of traffic fatalities, with 70 percent of fatalities in 2022 occurring on rural facilities. These statistics reveal a somber reality, highlighting the imperative for ongoing efforts to improve road infrastructure, implementing stricter traffic laws, and promoting responsible driving behaviors.

Figure 7.2: Crash Statistics for Non-Motorized Users in Iowa



Source: Iowa DOT, Crash Analysis Tool

MPO Crash Statistics

Over the past ten years, the total number of crashes, fatalities, and serious or major injuries (defined as any injury, other than a fatality, which prevents the injured person from walking, driving, or normally continuing the activities the person was capable of before the injury occurred) have been on the decline. In 2022, the metropolitan area experienced a ten-year low of 1,798 crashes (excluding 2020 data). Another method to measure fatalities is to consider them within the context of total travel. There is a direct relationship between the amount of travel and the probability of a crash involving a fatal injury. Figure 7.4 shows the fatality rate per 100 million vehicle miles traveled. The fatality rate has been trending upward since 2015.

Though the area has made significant progress, an average of **7 people die and 40 are seriously injured in traffic accidents in the MPO each year**.

Map 7.1: Crash Density of Fatalities and Serious Injuries (2013-2022)

Source: Iowa DOT, Crash Analysis Tool

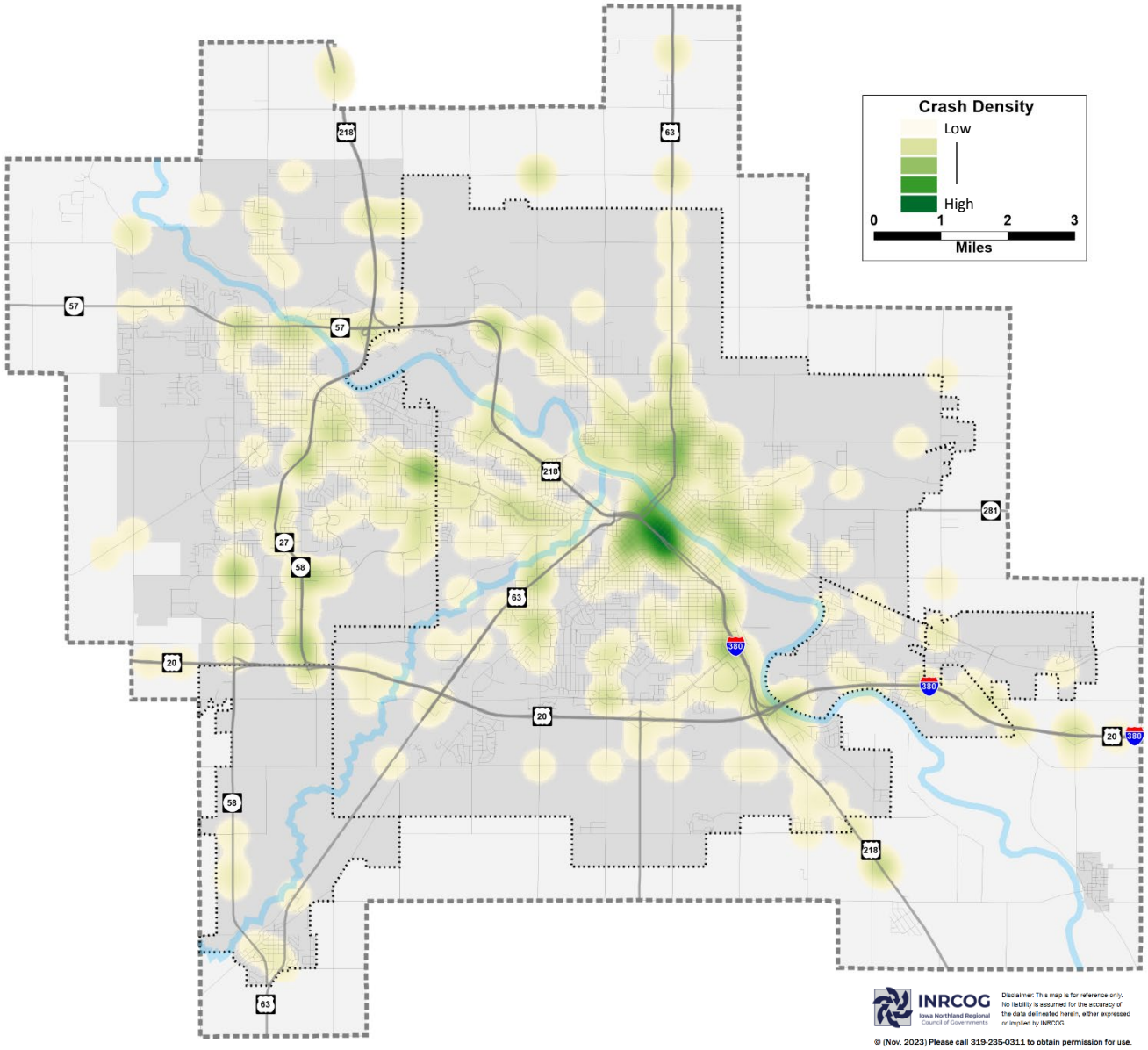


Figure 7.3: Traffic fatalities in the MPO

Source: Iowa DOT, Crash Analysis Tool

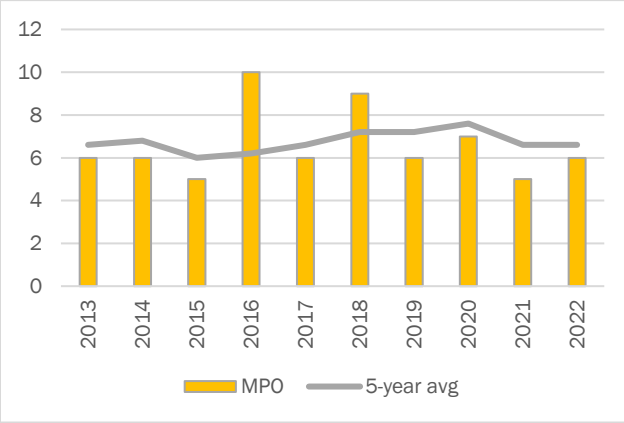


Figure 7.4: Fatality rate per 100 million VMT

Source: Iowa DOT, Crash Analysis Tool

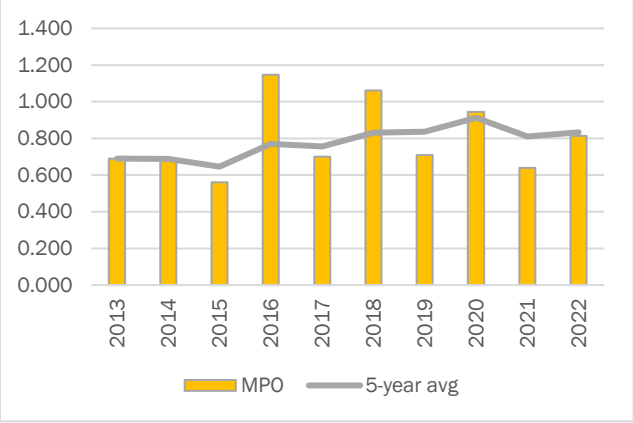


Figure 7.5: Serious Injuries in the MPO

Source: Iowa DOT, Crash Analysis Tool

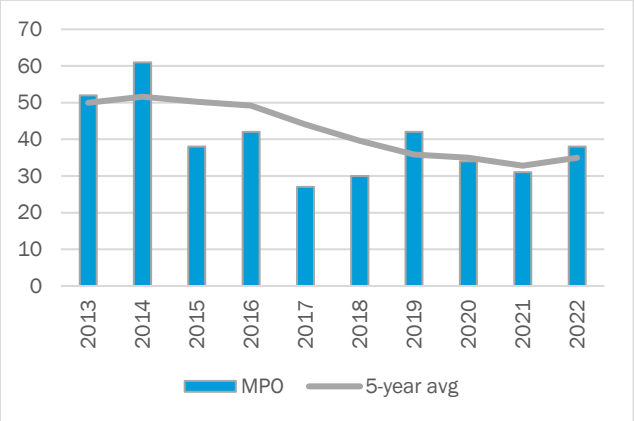
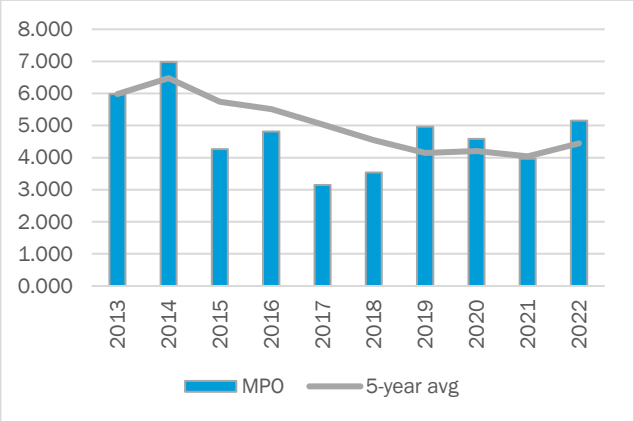


Figure 7.6: Serious injury rate per 100 million VMT

Source: Iowa DOT, Crash Analysis Tool



Like state and nationwide trends, bicycle and pedestrian fatalities and serious injuries in the metropolitan area have been on the rise. From 2018 to 2022, the metro area averaged 37 crashes, 2 fatalities, and 5 serious injuries involving vulnerable non-motorized road users. Though the overall number of bicycle and pedestrian crashes may be decreasing, the number of fatalities and serious injuries are trending upward, presenting a concerning challenge.

Figure 7.7: Non-motorized fatalities and serious injuries

Source: Iowa DOT, Crash Analysis Tool

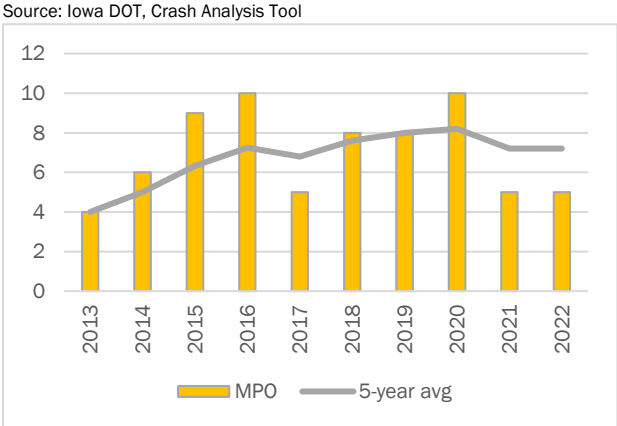
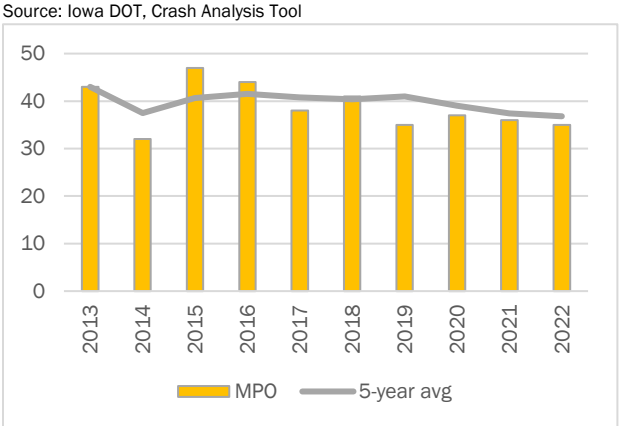
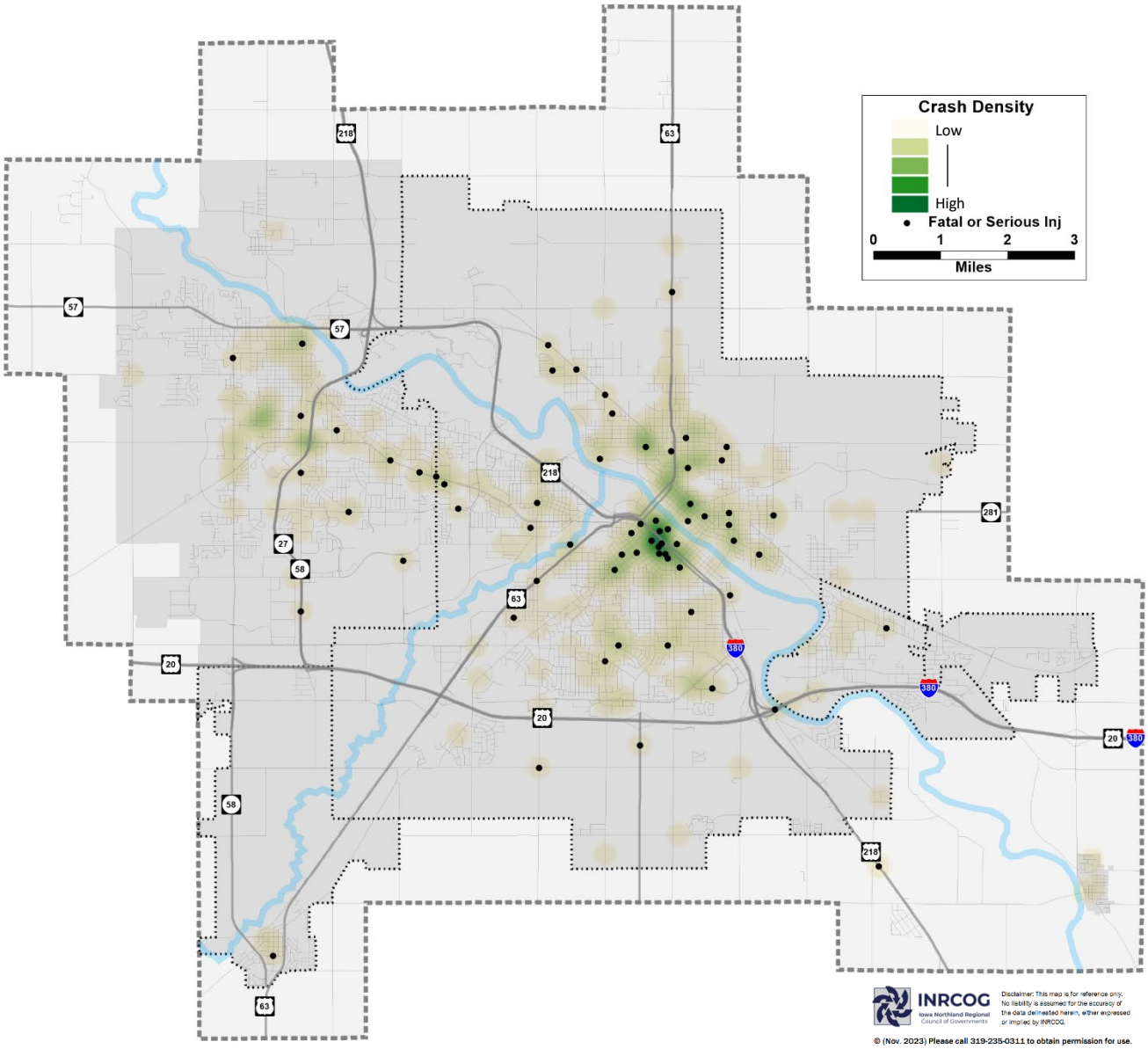


Figure 7.8: Non-motorized traffic accidents

Source: Iowa DOT, Crash Analysis Tool



Map 7.2: Non-Motorized Crash Density and Fatal and Serious Injury Crashes (2013-2022)
Source: Iowa DOT, Crash Analysis Tool



Several factors could be contributing to this troubling scenario. One explanation is the increase in vehicular traffic, which raises the potential for severe injuries or fatalities in the event of a collision. Additionally, distractions from mobile devices, both for drivers and pedestrians, can lead to more severe accidents due to reduced reaction times. Furthermore, the lack of proper infrastructure, such as dedicated bike lanes or pedestrian-friendly crossings, may contribute to the higher fatality and serious injury rate as vulnerable road users are exposed to increased risks. To address this issue, it is crucial to not only continue efforts to decrease the number of crashes but also intensify measures to improve safety conditions for bicyclists and pedestrians, including enhancing infrastructure, educating all road users, and implementing stricter enforcement of traffic laws. By taking a comprehensive approach, we can strive to reverse the alarming trend of increasing fatalities and ensure the safety and well-being of all those who choose to travel by foot or bicycle.

Figures 7.9 and 7.10 provide a heat chart of the major cause of all crashes and fatal and serious injury crashes in the MPO. The top five major causes of all crashes over the past decade have been as follows:

1. Following too close
2. Failure to yield to right of way from a stop sign
3. Driver distraction
4. Driving too fast for conditions
5. Failure to yield to the right of way making a left turn.

For fatal and serious injury causes, the top five major causes (excluding “No improper action”) have been as follows:

1. Running off the road to the right
2. Exceeding authorized speed
3. Failure to yield to the right of way making a left turn
4. Running a traffic signal
5. Losing control, and Driving too fast for conditions (tie)

Addressing fatal and serious injury crashes caused by various factors requires a multifaceted approach that encompasses education, enforcement, engineering, and collaboration among stakeholders. Firstly, raising awareness through targeted public education campaigns is crucial. Providing information about the risks and consequences of speeding, driving too fast, and distracted driving can help change driver behavior. Reinforcing the importance of defensive driving, responsible decision-making, and adherence to traffic laws is essential.

Secondly, enforcement of traffic laws is vital to deter reckless behaviors. Law enforcement agencies should prioritize monitoring and issuing citations for offenses such as speeding, failure to yield, and running traffic signals. Strict enforcement sends a clear message that such violations will not be tolerated and encourages compliance.

Thirdly, engineering measures can play a significant role in preventing crashes. Road design improvements, such as clear signage, rumble strips, bike lanes, high visibility crosswalks, and better delineation of curves and intersections, can help alert drivers and enhance roadway safety. Implementing traffic calming measures and designing roads with appropriate speed limits can also contribute to reducing crash severity.

Finally, leveraging technology can assist in preventing crashes. Advanced Driver Assistance Systems (ADAS) and Intelligent Transportation Systems (ITS) are two interconnected systems that revolutionize the way we approach transportation. ADAS focuses on enhancing vehicle safety and improving driver convenience using advanced sensors and artificial intelligence. It encompasses technologies such as adaptive cruise control, lane-keeping assist, and collision warning systems, which work together to reduce the risk of accidents and improve overall road safety. On the other hand, ITS involves the integration of information and communication technologies into transportation infrastructure, vehicles, and traffic management systems. ITS aims to optimize traffic flow, reduce congestion, and enhance the efficiency of transportation networks. By combining ADAS and ITS, communities can create a seamless and intelligent transportation ecosystem that provides real-time information to drivers, warns them about hazardous conditions, and even intervenes to prevent collisions, resulting in safer roads, reduced travel times, and improved sustainability.

Figure 7.9: Major cause of crashes in the MPO

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Avg
Followed too close	181	162	171	189	203	183	155	82	130	134	159.0
FTYROW: From stop sign	127	154	165	149	138	146	145	88	107	104	132.3
Driver distraction: All Categories	42	52	154	136	141	119	143	135	156	146	122.4
Driving too fast for conditions	170	160	111	112	68	113	151	74	86	87	113.2
FTYROW: Making left turn	159	131	121	143	115	96	89	65	89	102	111.0
Lost control	120	97	122	104	108	123	146	83	93	88	108.4
Ran traffic signal	128	124	119	129	128	113	97	65	88	85	107.6
Animal	90	91	109	126	121	117	110	99	83	104	105.0
Ran stop sign	71	96	91	89	87	88	127	76	96	122	94.3
Ran off road - right	75	83	72	62	72	62	50	50	56	48	63.0
Made improper turn	71	86	57	56	54	53	62	34	52	40	56.5
Operating vehicle recklessly	40	27	36	41	35	32	36	36	62	44	38.9
FTYROW: From yield sign	36	33	28	27	24	49	41	30	37	37	34.2
Ran off road - left	36	36	42	37	38	34	38	24	33	24	34.2
Improper or erratic lane changing	20	28	33	35	38	38	37	33	36	37	33.5
FTYROW: From driveway	45	33	35	31	34	27	33	18	26	27	30.9
FTYROW: Other	53	48	31	27	23	33	26	13	21	23	29.8
Swerving/Evasive Action	67	76	28	16	18	22	14	10	12	16	27.9
FTYROW: At uncontrolled intersection	34	36	33	33	23	33	19	24	22	19	27.6
Exceeded authorized speed	21	19	21	27	23	25	32	31	28	25	25.2
Improper backing	24	36	18	13	21	8	10	13	11	12	16.6
Crossed centerline (undivided)	67	72	5	1	3	1	5	0	3	2	15.9
Failed to keep in proper lane	0	0	20	17	12	17	15	24	13	14	13.2
Passing: All categories	0	0	22	18	18	14	19	13	9	9	12.2
Ran off road - straight	9	6	9	15	13	6	12	13	9	3	9.5
FTYROW: Making right turn on red signal	11	11	12	10	11	9	9	3	7	7	9.0
Traveling wrong way or on wrong side of road	11	9	5	9	8	3	11	2	10	6	7.4
FTYROW: From parked position	13	6	5	3	8	9	6	7	7	5	6.9
FTYROW: To pedestrian	11	4	8	2	5	6	3	5	7	3	5.4
Aggressive driving/road rage	0	0	9	4	8	4	2	4	6	2	3.9
Operator inexperience	0	0	4	2	2	3	7	6	1	10	3.5
Over correcting/over steering	7	9	3	1	1	4	2	3	0	4	3.4
Illegally parked/unattended	6	6	0	1	4	4	4	1	4	3	3.3
Failed to yield to emergency vehicle	0	0	7	4	3	2	5	4	1	5	3.1
Equipment failure	6	8	4	1	2	3	1	2	1	1	2.9
Cargo/equipment loss or shift	1	1	2	2	2	1	3	2	0	0	1.4
Disregarded RR Signal	0	3	0	1	1	1	2	1	0	0	0.9
Separation of units	4	2	0	0	0	1	0	0	1	1	0.9
Crossed median (divided)	0	0	1	0	3	1	1	0	0	0	0.6
Drove around RR grade crossing gates	0	0	1	0	0	1	0	0	0	3	0.5
Failure to signal intentions	0	0	0	1	0	0	1	0	2	1	0.5
Downhill runaway	2	0	0	0	1	0	0	0	1	0	0.4
Traveling on prohibited traffic way	0	0	1	0	0	1	1	1	0	0	0.4
Failure to dim lights/have lights on	0	0	0	1	0	1	0	0	1	0	0.3
Driving less than the posted speed limit	0	0	1	0	0	1	0	0	0	0	0.2
Oversized load/vehicle	1	0	0	0	0	0	0	1	0	0	0.2
Improper starting	0	0	0	0	0	0	0	0	0	1	0.1
Towing improperly	0	0	0	0	0	1	0	0	0	0	0.1
Vehicle stopped on railroad tracks	0	0	0	0	0	0	0	1	0	0	0.1

Source: Iowa DOT, Crash Analysis Tool

Figure 7.10: Major cause of fatal and serious injury crashes in the MPO

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Avg
Ran off road - right	6	3	3	5	6	0	3	5	2	2	3.5
Other: No improper action	0	4	6	6	2	3	3	4	1	2	3.1
Exceeded authorized speed	3	3	2	7	1	2	3	4	3	2	3.0
FTYROW: Making left turn	5	4	6	2	3	1	1	1	1	3	2.7
Ran traffic signal	5	2	1	5	3	4	0	2	0	2	2.4
Lost control	6	3	4	2	0	0	3	3	0	2	2.3
Driving too fast for conditions	4	3	1	1	1	3	2	1	3	2	2.1
FTYROW: From stop sign	1	4	3	1	2	2	2	1	2	3	2.1
Ran stop sign	3	3	2	3	1	1	1	2	2	2	2.0
Operating vehicle recklessly	0	1	3	1	2	4	2	1	1	0	1.5
Followed too close	2	4	0	1	1	2	0	1	0	3	1.4
Ran off road - left	0	0	1	3	2	0	2	0	2	1	1.1
Crossed centerline (undivided)	3	5	1	0	0	0	1	0	0	0	1.0
Swerving/Evasive Action	3	4	1	0	0	1	1	0	0	0	1.0
FTYROW: To pedestrian	0	1	0	1	1	2	0	1	1	0	0.7
Driver Distraction: Other interior distraction	0	0	0	1	1	0	1	0	1	2	0.6
FTYROW: At uncontrolled intersection	1	0	0	3	0	0	0	0	0	1	0.5
Driver Distraction: Exterior distraction	0	0	0	0	0	0	1	0	2	1	0.4
FTYROW: Other	0	0	0	0	0	0	2	0	1	1	0.4
Crossed median (divided)	0	0	1	0	1	1	0	0	0	0	0.3
FTYROW: From driveway	0	0	0	1	0	0	0	2	0	0	0.3
Improper or erratic lane changing	1	0	1	0	0	0	0	0	0	1	0.3
Made improper turn	0	1	0	0	0	0	0	1	1	0	0.3
Ran off road - straight	0	0	1	0	0	0	2	0	0	0	0.3
Animal	1	0	0	0	0	0	0	1	0	0	0.2
Cargo/equipment loss or shift	0	0	1	0	0	1	0	0	0	0	0.2
Driver Distraction: Reaching for object(s)	0	0	1	0	0	0	0	1	0	0	0.2
FTYROW: From yield sign	0	0	0	0	0	0	1	0	1	0	0.2
Other: Improper operation	0	0	0	0	0	0	1	0	1	0	0.2
Other: Vision obstructed	0	0	0	0	0	0	1	0	0	1	0.2
Traveling wrong way or on wrong side of road	1	1	0	0	0	0	0	0	0	0	0.2
Aggressive driving/road rage	0	0	0	0	0	0	0	0	0	1	0.1
Driver Distraction: Adjusting devices	0	0	0	0	1	0	0	0	0	0	0.1
Driver Distraction: Inattentive/lost in thought	0	0	0	1	0	0	0	0	0	0	0.1
Driver Distraction: Talking on a hand-held device	0	0	0	0	0	0	0	1	0	0	0.1
Failed to keep in proper lane	0	0	0	0	1	0	0	0	0	0	0.1
Failed to yield to emergency vehicle	0	0	0	0	0	0	0	1	0	0	0.1
FTYROW: Making right turn on red signal	1	0	0	0	0	0	0	0	0	0	0.1
Illegally parked/unattended	0	0	0	1	0	0	0	0	0	0	0.1
Over correcting/over steering	0	1	0	0	0	0	0	0	0	0	0.1
Passing: With insufficient distance	0	0	0	1	0	0	0	0	0	0	0.1

Source: Iowa DOT, Crash Analysis Tool

Safety Plans and Efforts

The Iowa DOT has been involved in several initiatives related to improving safety. There is an abundance of crash information and several tools for users located on the Iowa DOT website, as well as documents and plans outlining safety efforts.

Iowa Strategic Highway Safety Plan 2019

One method a state uses to conduct safety planning is through the development of a highway safety plan. A Strategic Highway Safety Plan (SHSP) is a statewide-coordinated safety plan that provides a comprehensive framework for reducing highway fatalities and serious injuries on all public roads. The SHSP establishes statewide goals, objectives, and key emphasis areas developed in consultation with federal, state, local, and private sector safety stakeholders. The 2019 SHSP is the fourth statewide safety plan to be adopted in Iowa.

The 2019 SHSP was developed in consultation with the SHSP Implementation Team which is comprised of individuals representing the E's of safety – education, emergency medical services, enforcement, and engineering. These representatives provide updates on programs, policies, and education campaigns for their respective organizations, as well as data on the latest research for their area of expertise. For this update, the prioritization of Iowa's 19 safety emphasis areas was supported by an analysis of crash data and an extensive statewide input process involving Iowa's traffic safety stakeholders. The result of these efforts was the prioritization of eight of the safety emphasis areas that are now considered priority safety emphasis areas. For each of the priority safety emphasis areas, the Implementation Team identified strategies that provide the greatest opportunity to reduce fatalities and serious injuries. The eight priority safety emphasis areas are as follows:

- Lane departures and roadside collisions
- Speed-related
- Unprotected persons
- Young drivers
- Intersections
- Impairment involved
- Older drivers
- Distracted or inattentive drivers

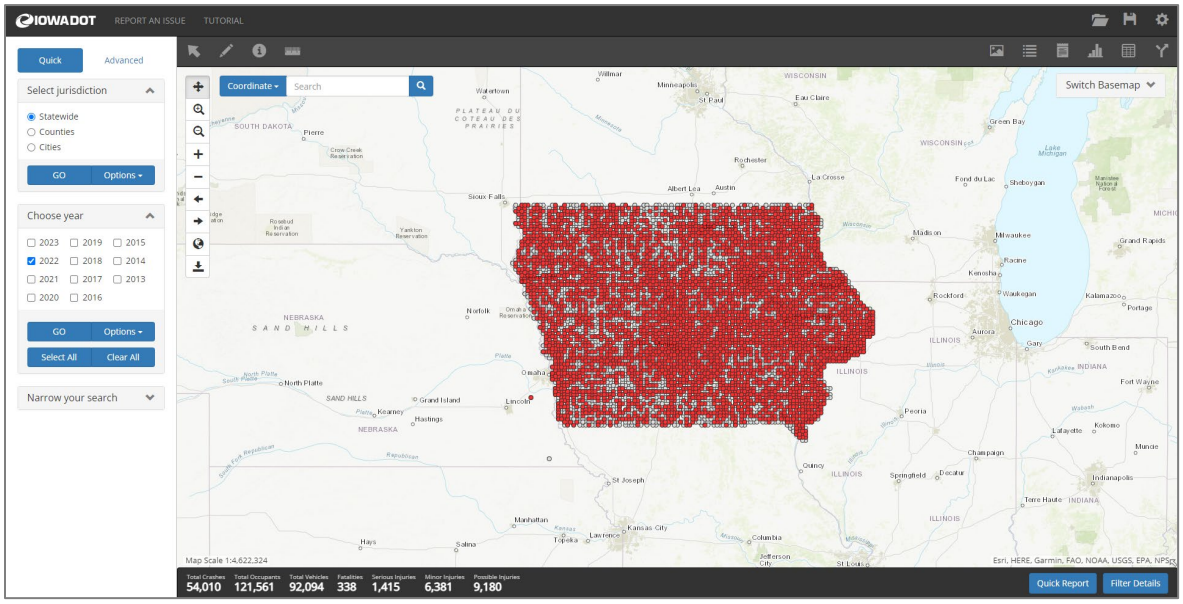
Implementation of the priority safety emphasis areas and strategies will be conducted by the SHSP Implementation Team and broadly supported by traffic safety professionals from around the state. The implementation and progress of the plan will be evaluated on an annual basis for the five-year planning period ending December 2023. The goal of this plan is **Zero Fatalities**, however, interim annual goals aligning with the Highway Safety Improvement Program performance measures will be developed during the plan period. Although the Implementation Team is fully committed to reducing the number of fatalities and serious injuries on Iowa's roadways, it recognizes that commitment pales in comparison to the cumulative impact **every driver** (fifth "E") can have on the safety of Iowa's roadways.

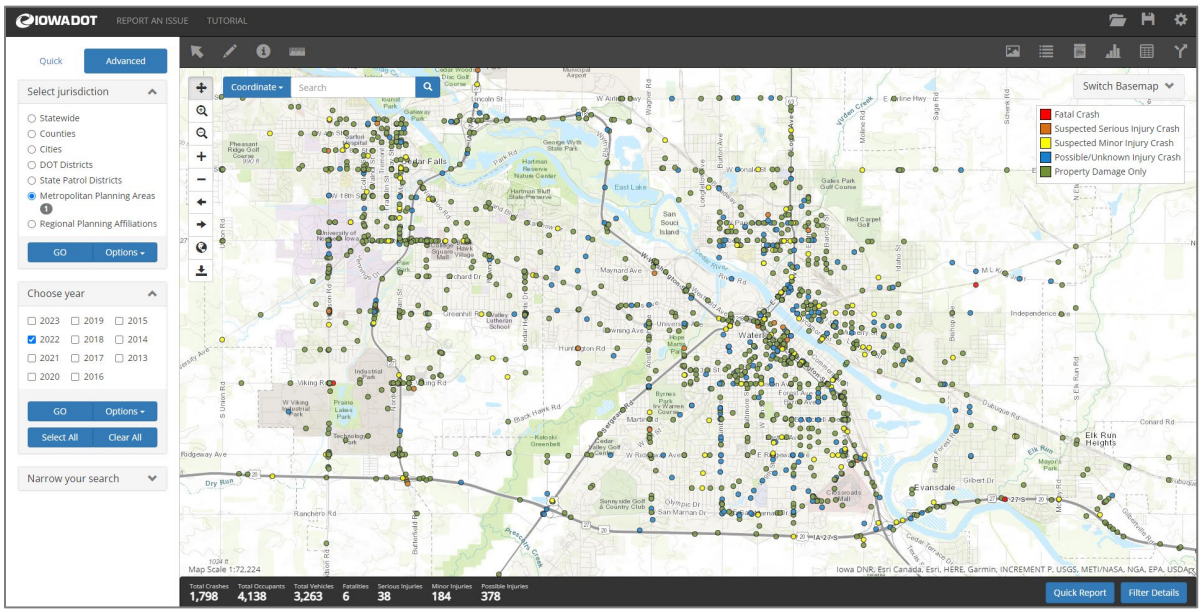
Although Zero Fatalities is Iowa's long-term vision, the state also recognizes the need to establish short-term goals in pursuit of this vision. In 2016, FHWA published the Highway Safety Improvement Program (HSIP) and Safety Performance Management Final Rules. As part of these rules, states are required to develop statewide targets annually for five safety performance measures. These targets serve as the short-term goals for the state.

www.iowadot.gov/traffic/shsp/home

Iowa Crash Analysis Tool

The Iowa DOT provides public access to a web-based Iowa Crash Analysis Tool featuring quick, user-friendly functionality to review and analyze ten-years of crash data. Through the online interface, users can select geographic boundaries, query crash records, export crash data, and produce summary charts and reports.





www.icat.iowadot.gov

Multidisciplinary Roadway Safety Series

The Iowa State University Institute for Transportation (InTrans) holds a series of workshops (formerly called the Local Road Safety Workshops) to provide the most current information and advice for improving safety on local agencies' roads and streets in terms of planning, law enforcement, education, and engineering. These workshops are presented annually across the state in collaboration with the Iowa DOT, FHWA, Governors Traffic Safety Bureau (GTSB), and the Iowa Local Technical Assistance Program (LTAP).

Potential for Crash Reduction (PCR)

The Iowa DOT created a tool to analyze and compare data from similar intersections to aid in identifying the potential for crash reduction. Using models for different data points, the tool predicts the average number of crashes per year per intersection. The difference between the predicted and observed number of crashes is the intersection potential for crash reduction. If the predicted number of crashes is lower than the observed crashes during a specific time, the intersection is a priority for safety funds. Intersections are classified into one of three tiers: high, medium, and negligible potential for crash reduction. Using this new way of analyzing data, Iowa DOT's Traffic and Safety Bureau staff are working with Iowa DOT district staff to determine priorities for each district on state and U.S. highways and interstates. **In 2023, there were five intersections with a high PCR and 51 intersections with a medium PCR in the metropolitan area**. Table 7.1 shows the top twenty intersections in the metro area with the highest potential for crash reduction.

https://arcg.is/1bTSPz

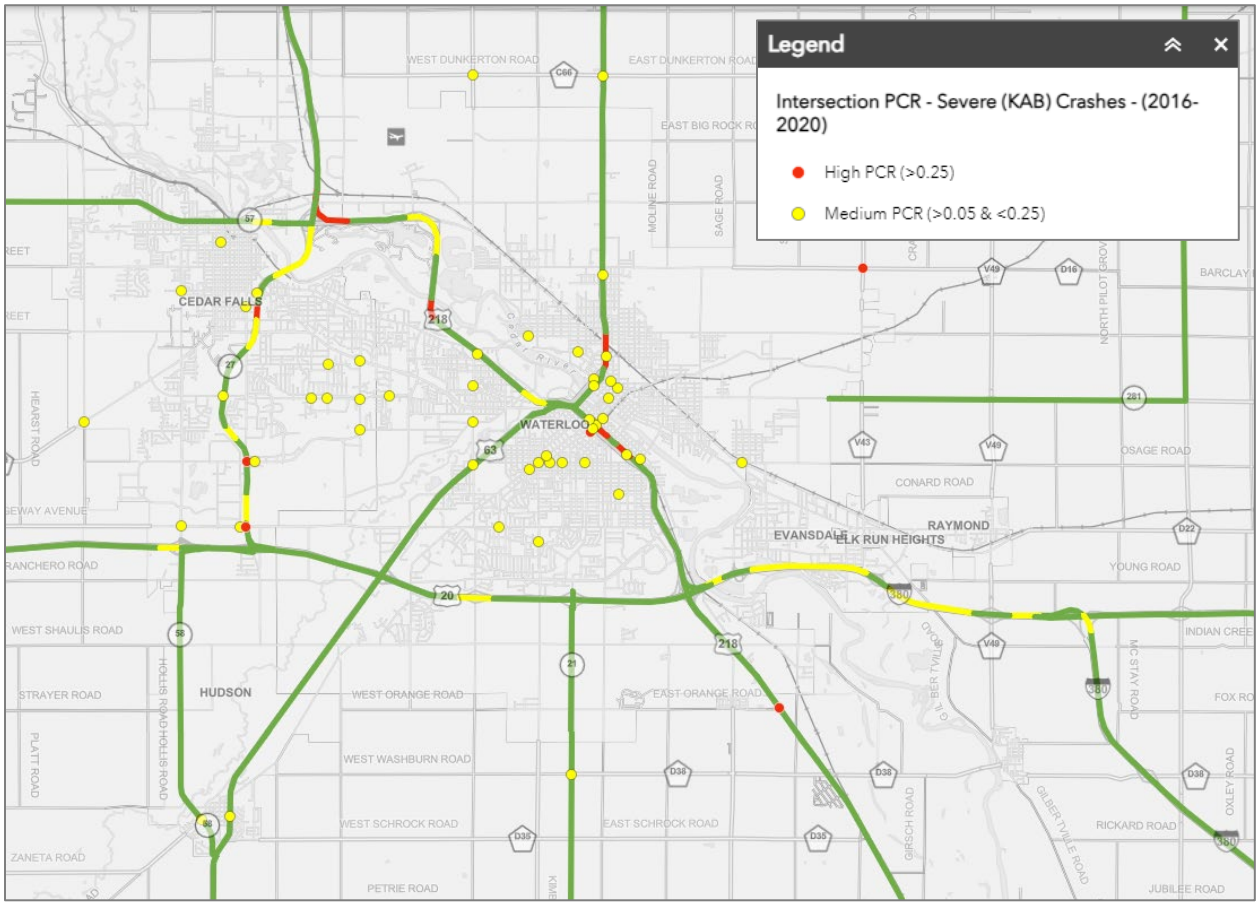


Table 7.1: Metro area intersections with the highest potential for crash reduction (2016-2020)

PCR	City	Intersection	Category Ranking	Statewide Ranking	Mitigation Efforts
H	Cedar Falls	IA 58/27 & Viking Rd	1	12	Interchange constructed (2019
H	Cedar Falls	IA 58/27 & W Ridgeway Ave	4	46	Additional turn lanes constructed (2023)
H	Waterloo	W 6th St & South St	18	142	
H	Waterloo	Donald St (V43) & N Elk Run Rd (V43)	29	147	
H	Waterloo	U.S. 218 & E Orange Rd	1	158	
M	Cedar Falls	W Ridgeway Ave & Hudson Rd	15	187	
M	Waterloo	U.S. 218 SB & W 6th St	66	244	
M	Cedar Falls	Orchard Dr & Rownd St	38	270	
M	Cedar Falls	Nordic Dr & W Ridgeway Ave	2	292	
M	Waterloo	Washington St & W 6th St	84	293	
M	Waterloo	U.S. 63 & Sycamore St	85	295	
M	Cedar Falls	IA 58/27 & Greenhill Rd	24	316	Interchange funded (2028)
M	Cedar Falls	6th St & Walnut St	51	353	
M	Cedar Falls	Greenhill Rd & Cedar Heights Dr	59	389	Roundabout constructed (2023)
M	Cedar Falls	Hudson Rd & 18th St	60	390	
M	Cedar Falls	University Ave & Cedar Heights Dr	4	438	Roundabout constructed (2018)
M	Waterloo	E 4th St & Franklin St	109	448	
M	Waterloo	W 4th St & Bayard St	114	453	
M	Waterloo	Kimball Ave/Frontage Rd & W Park Ln	124	468	
M	Waterloo	U.S. 63 & Ansborough Ave	76	474	

Source: Iowa DOT, Potential for Crash Reduction Tool

SS4A Comprehensive Safety Action Plan

The Bipartisan Infrastructure Law established a discretionary grant program called Safe Streets and Roads for All (SS4A) to implement the goal of zero deaths. Funds are to be awarded on a competitive basis to support planning, infrastructure, behavioral, and operational initiatives to improve roadway safety by significantly reducing or eliminating roadway fatalities and serious injuries through safety action plan development and refinement and implementation focused on all users. On February 1, 2023, the MPO received a SS4A Action Plan grant award to complete a Comprehensive Safety Action Plan for Waterloo's Central Business District in the downtown area where a disproportionate percentage of fatal and serious injury crashes are occurring. Following completion, the Plan will provide an opportunity for the city of Waterloo to seek SS4A Implementation funding to implement strategies or projects that will improve and enhance safety.

Local Road Safety Plan

Fatal and serious injury crashes disproportionately occur on the local system. To address this challenge, counties in Iowa have been developing local road safety plans (LRSP) since 2014. LRSPs provide a systemic approach to transportation safety improvements. LRSPs screen the roadway network for high-risk roadway features before they become crash sites. The result is a prioritized list of curves, intersections, and segments where proactive countermeasures may save lives. Black Hawk County is part of a 97-county multi-jurisdictional SS4A awarded project to update or adopt new LRSPs by 2025.

State Safety Legislation

Iowa's traffic safety culture is supported by policy and legislation that is focused on reducing the number and severity of vehicle crashes on Iowa's roadways. This section provides a brief overview of the legislation related to traffic safety that has been passed since 2017, and future legislative strategies to further improve safety on our roads.

Ignition Interlock

In 2018, the Iowa Legislature passed House File 2338 which requires first-time OWI offenders who seek a temporary restricted license to install an ignition interlock device on all vehicles owned and driven by the offender. An ignition interlock device requires a driver to blow into a mouthpiece, and the device prevents the vehicle from starting if it detects the presence of alcohol. Beyond reducing the number of alcohol-related traffic fatalities and serious injuries, the passage of the ignition interlock law also means that Iowa is eligible for federal grants from the National Highway Traffic Safety Administration (NHTSA).

Statewide Sobriety and Drug Monitoring Program

Senate File 444, passed in 2017, established a Statewide Sobriety and Drug Monitoring Program that can be used by participating jurisdictions within Iowa. This program requires OWI offenders, under condition of bond, pretrial release, sentence, probation, parole, or a temporary restricted license, to be subject to twice-daily testing to determine whether alcohol and/or a controlled substance is present in the person's body. Offenders are also required to install an approved ignition interlock device on all motor vehicles owned or operated by the offender.

Homicide-by-vehicle

Senate File 444 also expanded Iowa's homicide-by-vehicle statute. Those drivers who are using a device such as a cell phone and are involved in a vehicle crash that results in a fatality can now face felony charges. These charges carry a sentence of up to 10 years in prison and a fine of up to $10,000.

Use of Electronic Communication

Senate File 234, passed in 2017, banned the "use of hand-held electronic communication device to write, send or view an electronic message while driving a motor vehicle unless the vehicle is at a complete stop off the traveled portion of the roadway." This use is now a primary offense and includes drivers viewing text messages, instant messages, e-mail, internet sites, social media applications, or games while driving.

Backseat Safety Belt

Iowa has maintained a primary safety belt law since July 1, 1986. In 2018, the Iowa Legislature passed a law requiring all passengers under the age of 18 riding in the backseat of a vehicle to be properly belted.

Blue and White Lights

Senate File 2163, passed in 2018, allows for the permanent use of amber, white, or blue reflector lights for Iowa DOT equipment that is being used for snow and ice treatment or removal on public roadways. This law made permanent an existing law that had a repeal date of July 1, 2019. The addition of the white and blue lights makes the snowplows more visible to vehicles approaching them from behind. During the two years of piloting this project, Iowa DOT snowplows were involved in 10 crashes compared to 29 during the two years before the project.

Move Over or Slow Down

All 50 states have a version of the "Move Over" law which requires motorists to change lanes or slow down when approaching a stationary emergency vehicle with flashing lights. In 2018, Iowa expanded its original 2002 "Move Over" law to include any vehicle with flashing hazard lights. This expansion is designed to protect not only emergency personnel or those who maintain roadways, but all motorists who might find themselves on the side of the road.

Future Legislative Strategies

Although Iowa has made great strides in passing legislation that supports reducing the number of severe crashes on its roadways, there are still opportunities to improve traffic safety. Initial legislative strategies that the Iowa Strategic Highway Safety Plan Implementation Team will undertake in the coming years include the following:

- Reducing distracted, drowsy, and impaired driving
- Hands-free cell phone requirements
- All-passenger primary seatbelt requirements
- Strengthening or enhancing graduated driver's license (GDL) requirements
- Requiring drivers to change lanes when passing bicyclists

Proven Safety Countermeasures

FHWA's Proven Safety Countermeasures (PSC) initiative is a collection of 28 countermeasures and strategies effective in reducing roadway fatalities and serious injuries on our Nation's highways. Transportation agencies are strongly encouraged to consider widespread implementation of PSCs to accelerate the achievement of local, State, and National safety goals. These strategies are designed for all road users and types of roads. Each countermeasure addresses at least one safety focus area—speed management, intersections, roadway departures, or pedestrians/bicyclists—while others are crosscutting strategies that address multiple safety focus areas.

highways.dot.gov/safety/proven-safety-countermeasures

Speed Management: Appropriate Speed Limits for All Road Users

There is broad consensus among global roadway safety experts that speed control is one of the most important methods for reducing fatalities and serious injuries. Speed is an especially important factor on non-limited access roadways where vehicles and vulnerable road users mix.

A driver may not see or be aware of the conditions within a corridor and may drive at a speed that feels reasonable for themselves but may not be for all users of the system, especially vulnerable road users, including children and seniors. A driver traveling at 30 miles per hour who hits a pedestrian has a 45 percent chance of killing or seriously injuring them. At 20 miles per hour, that percentage drops to 5 percent. Several cities across the United States, including New York, Washington, Seattle, and Minneapolis, have reduced their local speed limits in recent years to reduce fatalities and serious injuries, with most having to secure State legislative authorization to do so.

States and local jurisdictions should set appropriate speed limits to reduce the significant risks drivers impose on others—especially vulnerable road users—and on themselves. Addressing speed is fundamental to the Safe System Approach to making streets safer, and a growing body of research shows that speed limit changes alone can lead to measurable declines in speeds and crashes. Based on international experience and implementation in the United States, the use of 20 mph speed zones or speed limits in urban core areas where vulnerable users share the road environment with motorists may result in further safety benefits.

Safety Benefits:

Traffic fatalities in the City of Seattle decreased 26 percent after the city implemented comprehensive, city-wide speed management strategies and countermeasures inspired by Vision Zero. This included setting speed limits on all non-arterial streets at 20 mph and 200 miles of arterial streets at 25 mph.[5]

One study found that on rural roads, when considering other relevant factors in the engineering study along with the speed distribution, setting a speed limit no more than 5 mph below the 85th-percentile speed may result in fewer total and fatal plus injury crashes, and lead to drivers complying closely with the posted speed limit.[6]

When setting a speed limit, agencies should consider a range of factors such as pedestrian and bicyclist activity, crash history, land use context, intersection spacing, driveway density, roadway geometry, roadside conditions, roadway functional classification, traffic volume, and observed speeds. To achieve desired speeds, agencies often implement other speed management strategies concurrently with setting speed limits, such as self-enforcing roadways, traffic calming, and speed safety cameras.

Speed Management: Speed Safety Cameras

Agencies can use speed safety cameras as an effective and reliable technology to supplement more traditional methods of enforcement, engineering measures, and education to alter the social norms of speeding. Speed safety cameras use speed measurement devices to detect speeding and capture photographic or video evidence of vehicles that are violating a set speed threshold.

Agencies sould conduct a network analysis of speeding-related crashes to identify locations to implement these devices. Speed safety cameras can be deployed as fixed units, point-to-ponit units, or mobile units.

Table of selection considerations for SSC deployment

Considerations for Selection	Fixed	P2P	Mobile
Problems are long-term and site-specific.	X	X	
Problems are network-wide, and shift based on enforcement efforts.			X
Speeds at enforcement site vary largely from downstream sites.		X	X
Overt enforcement is legally required.	X	X	X
Sight distance for the enforcement unit is limited.	X	X	
Enforcement sites are multilane facilities.	X	X	

As of 2023, the City of Waterloo has implemented 23 fixed units, 1 P2P unit, and 1 mobile unit; and the City of Hudson has implemented 4 fixed units.

Safety Benefits:

Fixed units can reduce crashes on urban principal arteries up to: [4]

54%

for all crashes.

47%

for injury crashes.

P2P units can reduce crashes on urban expressways, freeways, and principal arterials up to:

37%

for fatal and injury crashes.[2]

Mobile units can reduce crashes on urban principal arterials up to:

20%

for fatal and injury crashes.[5]

Pedestrian/Bicyclist: Bicycle Lanes

Most fatal and serious injury bicyclist crashes occur at non-intersection locations. Nearly one-third of these crashes involve overtaking motorists; the speed and size differential between vehicles and bicycles can lead to severe injury. To make bicycling safer and more comfortable for most types of bicyclists, State and local agencies should consider installing bicycle lanes. These dedicated facilities for the use of bicyclists along the roadway can take several forms. Providing bicycle facilities can mitigate or prevent interactions, conflicts, and crashes between bicyclists and motor vehicles, and create a network of safer roadways for bicycling. Bicycle Lanes align with the Safe System Approach principle of recognizing human vulnerability—where separating users in space can enhance safety for all road users.

Bicycle lanes can be included on new roadways or created on existing roads by reallocating space in the right-of-way. In addition to the paint stripe used for a typical bicycle lane, a lateral offset with painted buffer can help to further separate bicyclists from vehicle traffic. State and local agencies may also consider physical separation of the bicycle lane from motorized traffic lanes through the use of vertical elements like posts, curbs, or vegetation.

Pedestrian/Bicyclist: Leading Pedestrian Interval

A leading pedestrian interval (LPI) gives pedestrians the opportunity to enter the crosswalk at an intersection 3-7 seconds before vehicles are given a green indication. Pedestrians can better establish their presence in the crosswalk before vehicles have priority to turn right or left.

LPIs provide the following benefits:

- Increased visibility of crossing pedestrians
- Reduced conflicts between pedestrians and vehicles
- Increased likelihood of motorists yielding to pedestrians
- Enhanced safety for pedestrians who may be slower to start into the intersection

Pedestrian/Bicyclist: Crosswalk Visibility Enhancements

Poor lighting conditions, obstructions such as parked cars, and horizontal or vertical roadway curvature can reduce visibility at crosswalks, contributing to safety issues. For multilane roadway crossings where vehicle volumes are more than 10,000 AADT, a marked crosswalk alone is typically not sufficient. Under such conditions, more substantial crossing improvements could prevent an increase in pedestrian crash potential.

Three main crosswalk visibility enhancements help make crosswalks and the pedestrians, bicyclists, wheelchair and other mobility device users, and transit users using them more visible to drivers. These include **high-visibility crosswalks, lighting, and signing and pavement markings**. These enhancements can also assist users in deciding where to cross. Agencies can implement these features as standalone or combination enhancements to indicate the preferred location for users to cross.

High-visibility crosswalks use patterns (i.e., bar pairs, continental, ladder) that are visible to both the driver and pedestrian from farther away compared to traditional transverse line crosswalks. They should be considered at all midblock pedestrian crossings and uncontrolled intersections. Agencies should use materials such as inlay or thermoplastic tape, instead of paint or brick, for highly reflective crosswalk markings.

The goal of improved crosswalk lighting should be to illuminate with positive contrast to make it easier for a driver to visually identify the pedestrian. This involves carefully placing the luminaires in forward locations to avoid a silhouette effect of the pedestrian.

On multilane roadways, agencies can use “YIELD Here to Pedestrians” or “STOP Here for Pedestrians” signs 20 to 50 feet in advance of a marked crosswalk to indicate where a driver should stop or yield to pedestrians, depending on State law. To supplement the signing, agencies can also install a STOP or YIELD bar (commonly referred to as “shark’s teeth”) pavement markings. In-street signing, such as ”STOP Here for Pedestrians“ or ”YIELD Here to Pedestrians“ may be appropriate on roads with two or three lanes where speed limits are 30 miles per hour or less.

Pedestrian/Bicyclist: Medians and Pedestrian Refuge Islands in Urban and Suburban Areas

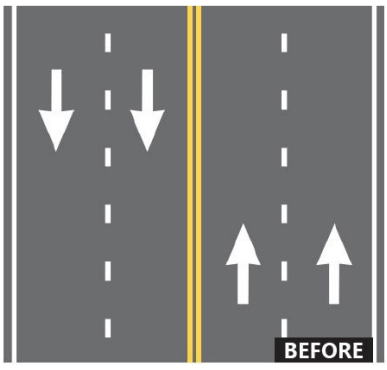
A *median* is the area between opposing lanes of traffic, excluding turn lanes. Medians in urban and suburban areas can be defined by pavement markings, raised medians, or islands to separate motorized and non-motorized road users.

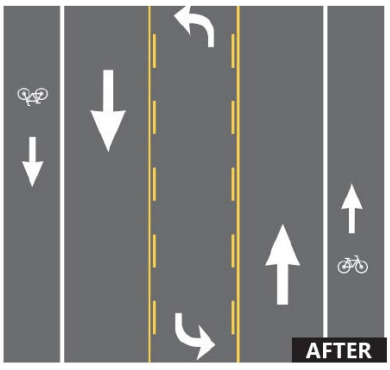
A *pedestrian refuge island* (or crossing area) is a median with a refuge area that is intended to help protect pedestrians who are crossing a road.

Pedestrian crashes account for approximately 17 percent of all traffic fatalities annually, and 74 percent of these occur at non-intersection locations. For pedestrians to safely cross a roadway, they must estimate vehicle speeds, determine acceptable gaps in traffic based on their walking speed, and predict vehicle paths. Installing a median or pedestrian refuge island can help improve safety by allowing pedestrians to cross one direction of traffic at a time.

Pedestrian/Bicyclist: Road Diets (Roadway Reconfiguration)

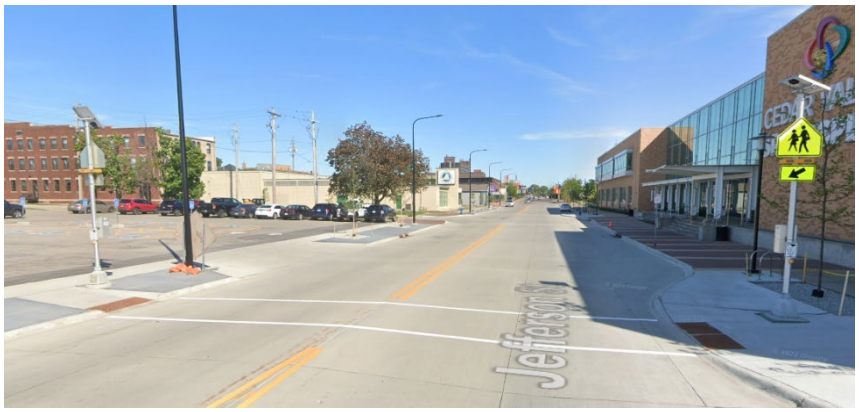
A Road Diet, or roadway reconfiguration, can improve safety, calm traffic, provide better mobility and access for all road users, and enhance overall quality of life. A Road Diet typically involves converting an existing four-lane undivided roadway to a three-lane roadway consisting of two through lanes and a center two-way left-turn lane (TWLTL). Benefits may include reduction of rear-end and left-turn crashes, reduced right-angle crashes, fewer lanes for pedestrians to cross, opportunity to install pedestrian refuge islands and bike lanes, traffic calming and more consistent speeds, and a roadway that better accommodates the needs of all road users.





Pedestrian/Bicyclist: Rectangular Rapid Flashing Beacons (RRFB)
A marked crosswalk or pedestrian warning sign can improve safety for pedestrians crossing the road, but at times may not be sufficient for drivers to visibly locate crossing locations and yield to pedestrians. To enhance pedestrian conspicuity and increase driver awareness at uncontrolled and marked crosswalks, transportation agencies can install a pedestrian actuated RRFB to accompany a pedestrian warning sign. RRFBs consist of two, rectangular-shaped yellow indications, each with an LED-array-based light source. RRFBs flash with an alternating high frequency when activated to enhance the conspicuity of pedestrians at the crossing to drivers.

The RRFB is applicable to many types of pedestrian crossings but is particularly effective at multilane crossings with speed limits of less than 40 miles per hour. Research suggests RRFBs can result in motorist yielding rates as high as 98 percent at marked crosswalks, but vary depending on the location, posted speed limit, pedestrian crossing distance, one- versus two-way road, and the number of travel lanes. RRFBs can also accompany school or trail crossing warning signs. Agencies should reserve the use of RRFBs for locations with significant pedestrian safety issues, as over-use of RRFB treatments may diminish their effectiveness.



Safety Benefits:

RRFBs can reduce crashes up to:

47%

for pedestrian crashes.[4]

RRFBs can increase motorist yielding rates up to:

98%

(varies by speed limit, number of lanes, crossing distance, and time of day).[3]

Pedestrian/Bicyclist: Walkways
A walkway is any type of defined space or pathway for use by a person traveling by foot or using a wheelchair. These may be pedestrian walkways, shared use paths, sidewalks, or roadway shoulders.

With the staggering numbers of pedestrian fatalities and injuries occurring in roadway crashes annually, it is important for transportation agencies to improve conditions and safety for pedestrians and to integrate walkways more fully into the transportation system. Research shows people living in low-income communities are less likely to encounter walkways and other pedestrian-friendly features.

Safety Benefits:

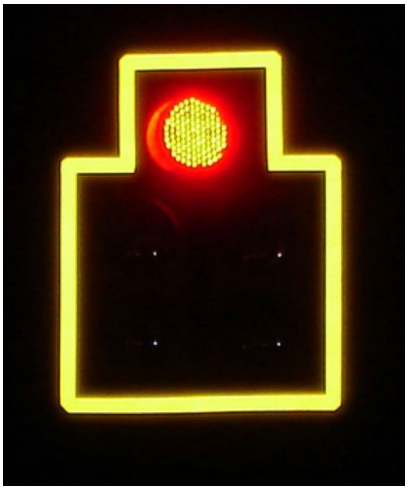
Sidewalks

65-89%

reduction in crashes involving pedestrians walking along roadways.[3]

Intersections: Backplates with Retroreflective Borders

Backplates added to a traffic signal head improve the visibility of the illuminated face of the signal by introducing a controlled-contrast background. The improved visibility of a signal head with a backplate is made even more conspicuous by framing it with a 1- to 3-inch yellow retroreflective border. Signal heads that have backplates equipped with retroreflective borders are more visible and conspicuous in both daytime and nighttime conditions.



This treatment is recognized as a human factor enhancement of traffic signal visibility, conspicuity, and orientation for both older and color vision deficient drivers. This countermeasure is also advantageous during periods of power outages when the signals would otherwise be dark, providing a visible indicator for motorists to stop at the intersection ahead.

Transportation agencies should consider backplates with retroreflective borders as part of their efforts to systematically improve safety performance at signalized intersections. Adding a retroreflective border to an existing signal backplate is a very low-cost safety treatment. This can be done by either adding retroreflective tape to an existing backplate or purchasing a new backplate with a retroreflective border already incorporated. The most efficient means of implementing this proven safety countermeasure is to adopt it as a standard treatment for signalized intersections across a jurisdiction or State.

Intersections: Yellow Change Intervals

At a signalized intersection, the yellow change interval is the length of time that the yellow signal indication is displayed following a green signal indication. The yellow signal confirms to motorists that the green has ended and that a red will soon follow.

Since red-light running is a leading cause of severe crashes at signalized intersections, it is imperative that the yellow change interval be appropriately timed. Too brief an interval may result in drivers being unable to stop safely and cause unintentional red-light running. Too long of an interval may result in drivers treating the yellow as an extension of the green phase and invite intentional red-light running. Factors such as the speed of approaching and turning vehicles, driver perception-reaction time, vehicle deceleration, and intersection geometry should all be considered in the timing calculation.

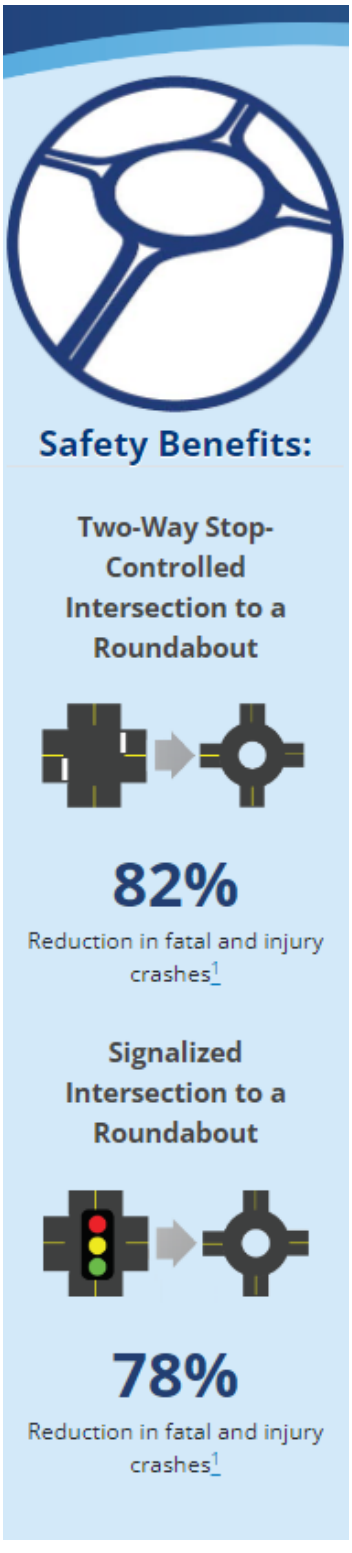
Transportation agencies can improve signalized intersection safety and reduce red-light running by reviewing and updating their traffic signal timing policies and procedures concerning the yellow change interval.

Intersections: Roundabouts

The modern roundabout is an intersection with a circular configuration that safely and efficiently moves traffic. Roundabouts feature channelized, curved approaches that reduce vehicle speed, entry yield control that gives right-of-way to circulating traffic, and counterclockwise flow around a central island that minimizes conflict points. The net result of lower speeds and reduced conflicts at roundabouts is an environment where crashes that cause injury or fatality are reduced.

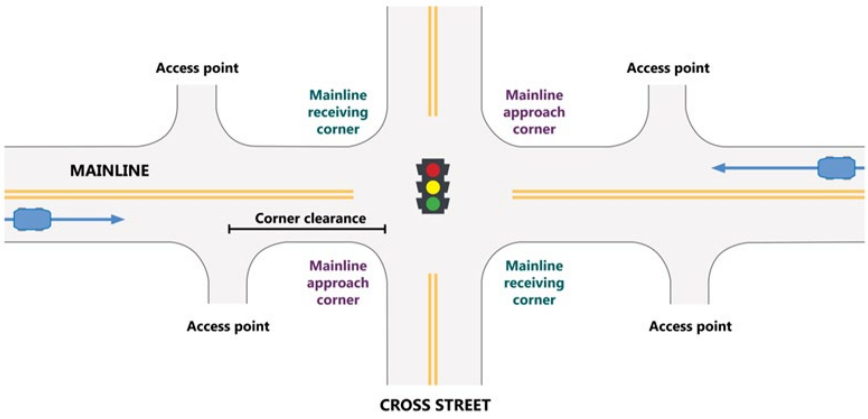
Roundabouts are not only a safer type of intersection; they are also efficient in terms of keeping people moving. Even while calming traffic, they can reduce delay and queuing when compared to other intersection alternatives. Furthermore, the lower vehicular speeds and reduced conflict environment can create a more suitable environment for walking and bicycling.

Roundabouts can be implemented in both urban and rural areas under a wide range of traffic conditions. They can replace signals, two-way stop controls, and all-way stop controls. Roundabouts are an effective option for managing speed and transitioning traffic from high-speed to low-speed environments, such as freeway interchange ramp terminals, and rural intersections along high-speed roads.



Intersections: Corridor Access Management

Access management refers to the design, application, and control of entry and exit points along a roadway. This includes intersections with other roads and driveways that serve adjacent properties. Thoughtful access management along a corridor can simultaneously enhance safety for all modes, facilitate walking and biking, and reduce trip delay and congestion.



Every intersection, from a signalized intersection to an unpaved driveway, has the potential for conflicts between vehicles, pedestrians, and bicyclists. The number and types of conflict points—locations where the travel paths of two users intersect—influence the safety performance of the intersection or driveway. FHWA developed corridor-level crash prediction models to estimate and analyze the safety effects of selected access management techniques for different area types, land uses, roadway variables, and traffic volumes.

The following access management strategies can be used individually or in combination with one another:

- Reduce density through driveway closure, consolidation, or relocation.
- Manage spacing of intersection and access points.
- Limit allowable movements at driveways (such as right-in/right-out only).
- Place driveways on an intersection approach corner rather than a receiving corner, which is expected to have fewer total crashes.
- Implement raised medians that preclude across-roadway movements.
- Utilize designs such as roundabouts or reduced left-turn conflicts (such as restricted crossing U-turn, median U-turns, etc.).
- Provide turn lanes (i.e., left-only, right-only, or interior two-way left).
- Use lower speed one-way or two-way off-arterial circulation roads.

Successful corridor access management involves balancing overall safety and mobility for all users along with the needs of adjacent land uses.

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

This systemic approach to intersection safety involves deploying a package of multiple low-cost countermeasures, including enhanced signing and pavement markings, at many stop-controlled intersections within a jurisdiction. These countermeasures increase driver awareness and recognition of the intersections and potential conflicts.

There are several benefits to systemically applying multiple low-cost countermeasures at stop-controlled intersections, including the following:

- Resources are maximized because the treatments are low cost.
- A high number of intersections can receive treatment.
- Improvements are highly cost-effective, with an average benefit-cost ratio of 12:1, even assuming a conservative 3-year service life.

The low-cost countermeasures for stop-controlled intersections consist of the following treatments:

On the Through Approach

- Doubled-up (left and right), oversized advance intersection warning signs, with supplemental street name plaques (can also include flashing beacon)
- Retroreflective sheeting on signposts
- Enhanced pavement markings that delineate through lane edge lines

On the Stop Approach

- Doubled-up (left and right), oversized advance "Stop Ahead" intersection warning signs (can also include flashing beacon)
- Doubled-up (left and right), oversized Stop signs
- Retroreflective sheeting on signposts
- Properly placed stop bar
- Removal of vegetation, parking, or obstructions that limit sight distance
- Double arrow warning sign at stem of T-intersections

Safety Benefits:

10%
reduction of fatal and injury crashes at all locations/types/areas.

15%
reduction of nighttime crashes at all locations/types/areas.

27%
reduction of fatal and injury crashes at rural intersections.

19%
reduction of fatal and injury crashes at 2-lane by 2-lane intersections.

Average Cost-Benefit Ratio

12:1

Intersections: Dedicated Left- and Right-Turn Lanes at Intersections

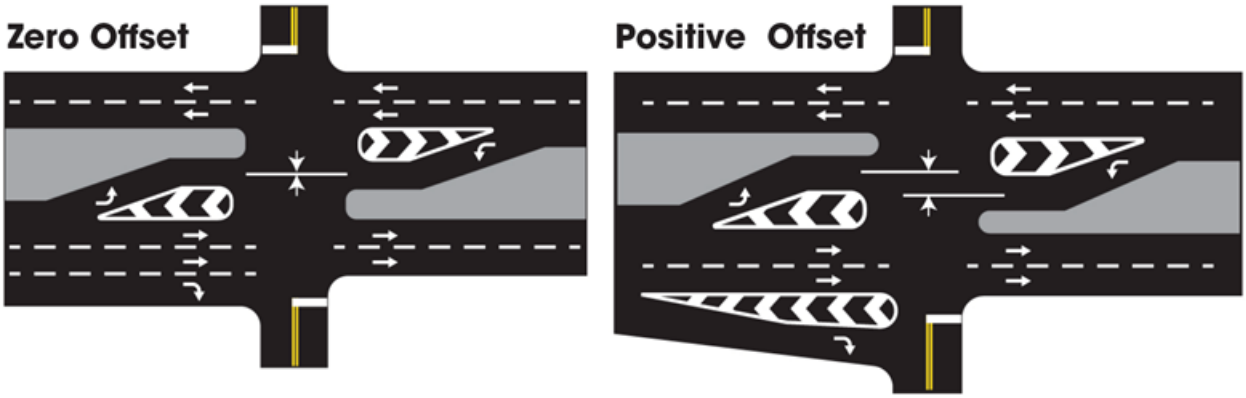
Auxiliary turn lanes—either for left turns or right turns—provide physical separation between turning traffic that is slowing or stopped and adjacent through traffic at approaches to intersections. Turn lanes can be designed to provide for deceleration prior to a turn, as well as for storage of vehicles that are stopped and waiting for the opportunity to complete a turn.

While turn lanes provide measurable safety and operational benefits at many types of intersections, they are particularly helpful at two-way stop-controlled intersections. Crashes occurring at these intersections are often related to turning maneuvers. Since the major route traffic is free flowing and typically travels at higher speeds, crashes that do occur are often severe. The main crash types include collisions of vehicles turning left across opposing through traffic and rear-end collisions of vehicles turning left or right with other vehicles following closely behind. Turn lanes reduce the potential for these types of crashes.

Installing left-turn lanes and/or right-turn lanes should be considered for the major road approaches for improving safety at both three- and four-leg intersections with stop control on the minor road, where significant turning volumes exist, or where there is a history of turn-related crashes. Pedestrian and bicyclist safety and convenience should also be considered when adding turn lanes at an intersection. Specifically, offset left- and right-turn lanes will lengthen crossing distances for pedestrians.

Providing an offset of left- and right-turn lanes to increase visibility can provide added safety benefits, and is preferable in many situations, particularly at locations with higher speeds, or where free-flow or permissive movements are possible.

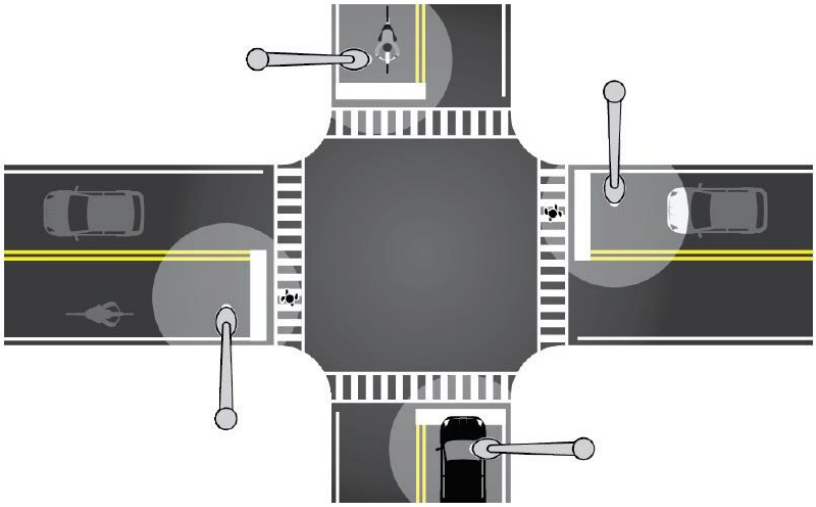
At turn lanes with zero or negative offset, turning vehicles can block sightlines. For left-turn lanes, this usually involves opposing left-turning vehicles occupying the turn lanes at the same time. For right-turn lanes, this typically involves right-turning vehicles from the major road and vehicles entering the intersection from the minor road. In both scenarios, adding positive offset to turn lanes enhances the sight distance to approaching vehicles that conflict with the turning movement. Offset turn lanes should be considered when there is a high frequency of these types of conflicts to reduce the likelihood of a severe crash.



Crosscutting: Lighting

The number of fatal crashes occurring in daylight is about the same as those that occur in darkness. However, the nighttime fatality rate is three times the daytime rate because only 25 percent of vehicle miles traveled (VMT) occur at night. At nighttime, vehicles traveling at higher speeds may not have the ability to stop once a hazard or change in the road ahead becomes visible by the headlights. Therefore, lighting can be applied continuously along segments and at spot locations such as intersections and pedestrian crossings to reduce the chances of a crash.

Adequate lighting (i.e., at or above minimum acceptable standards) is based on research recommending horizontal and vertical illuminance levels to provide safety benefits to all users of the roadway environment. Adequate lighting can also provide benefits in terms of personal security for pedestrians, wheelchair and other mobility device users, bicyclists, and transit users as they travel along and across roadways.



Safety Benefits:

Lighting can reduce crashes up to:

42%

for nighttime injury pedestrian crashes at intersections.[1]

33-38%

for nighttime crashes at rural and urban intersections.[1]

28%

for nighttime injury crashes on rural and urban highways.[1]

Research indicates that continuous lighting on both rural and urban highways (including freeways) has an established safety benefit for motorized vehicles. Agencies can provide adequate visibility of the roadway and its users through the uniform application of lighting that provides full coverage along the roadway and the strategic placement of lighting where it is needed the most.

Increased visibility at intersections at nighttime is important since various modes of travel cross paths at these locations. Agencies should consider providing lighting to intersections based on factors such as a history of crashes at nighttime, traffic volume, the volume of non-motorized users, the presence of crosswalks and raised medians, and the presence of transit stops and boarding volumes.

Most new lighting installations are made with breakaway features, shielded, or placed far enough from the roadway to reduce the probability and/or severity of fixed-object crashes. Modern lighting technology gives precise control with minimal excessive light affecting the nighttime sky or spilling over to adjacent properties. Agencies can equitably engage with underserved communities to determine where and how new and improved lighting can most benefit the community by considering their priorities, including eliminating crash disparities, connecting to essential neighborhood services, improving active transportation routes, and promoting personal safety.

Crosscutting: Pavement Friction Management

Friction is a critical characteristic of a pavement that affects how vehicles interact with the roadway, including the frequency of crashes. Measuring, monitoring, and maintaining pavement friction—especially at locations where vehicles are frequently turning, slowing, and stopping—can prevent many roadway departures, intersection, and pedestrian-related crashes.

Pavement friction treatments, such as High Friction Surface Treatment (HFST), can be better targeted and result in more efficient and effective installations when using continuous pavement friction data along with crash and roadway data.

Friction data for safety performance is best measured with Continuous Pavement Friction Measurement (CPFM) equipment. Spot friction measurement devices, like locked-wheel skid trailers, cannot safely and accurately collect friction data in curves or intersections, where the pavement polishes more quickly and adequate friction is so much more critical. Without CPFM equipment, agencies will assume the same friction over a mile or more.

CPFM technology measures friction continuously at highway speeds and provides both network and segment level data. Practitioners can analyze the friction, crash, and roadway data to better understand and predict where friction-related crashes will occur to better target locations and more effectively install treatments.

HFST consists of a layer of durable, anti-abrasion, and polish-resistant aggregate over a thermosetting polymer resin binder that locks the aggregate in place to restore or enhance friction and skid resistance. Calcined bauxite is the aggregate shown to yield the best results and should be used with HFST applications.

HFST should be applied in locations with increased friction demand, including:

- Horizontal curves
- Interchange ramps
- Intersection approaches
    - Higher-speed signalized and stop-controlled intersections
    - Steep downward grades
- Locations with a history of rear-end, failure to yield, wet-weather, or red-light running crashes
- Crosswalk approaches

Automated application of HFST.
Source: FHWA

Crosscutting: Road Safety Audit

While most transportation agencies have established traditional safety review procedures, a road safety audit (RSA) or assessment is unique. RSAs are performed by a multidisciplinary team independent of the project. RSAs consider all road users, account for human factors and road user capabilities, are documented in a formal report, and require a formal response from the road owner.

Multi-disciplinary team performs field review during an RSA.
Source: FHWA

RSAs provide the following benefits:

- Reduced number and severity of crashes due to safer designs.
- Reduced costs resulting from early identification and mitigation of safety issues before projects are built
- Increased opportunities to integrate multimodal safety strategies and proven safety countermeasures
- Expanded ability to consider human factors in all facets of design
- Increased communication and collaboration among safety stakeholders
- Objective review by independent multidisciplinary team

RSAs can be performed in any phase of project development, from planning to construction. Agencies may focus RSAs specifically on motorized vehicles, pedestrians, bicyclists, motorcyclists, or a combination of these roadway users. Agencies are encouraged to conduct an RSA at the earliest stage possible, as all roadway design options and alternatives are being explored.

Security Planning

Transportation planning for the security of the transportation system is a primary concern nationwide due to its critical role in ensuring public safety, economic stability, and social well-being. The transportation system is essential for the movement of people, goods, and services across the country. Any disruption or security breach within this system can have severe consequences, including the potential for terrorist attacks, accidents, or the spread of illegal activities. Natural disasters and humanmade accidental or intentional incidents can cause serious disruption to the system and pose danger to the public. Conversely, the transportation system is also what provides a means for exit during an emergency evacuation. By prioritizing transportation planning for security, authorities can implement measures such as enhanced surveillance, infrastructure protection, and emergency response protocols to mitigate risks and safeguard the integrity of the transportation system, thereby ensuring the smooth functioning of society.

U.S. DOT Strategic Plan

The FY 2022-2026 U.S. DOT Strategic Plan establishes the DOT's strategic goals and objectives. This document is a roadmap for transformative investments that will modernize the infrastructure to deliver safer, cleaner, and more equitable transportation systems. Strategic Goals and Objectives tied to security planning include the following:

Strategic Goal	Strategic Objectives
Safety: Make our transportation system safer for all people. Advance a future without transportation-related serious injuries and fatalities.	Critical Infrastructure Cybersecurity
Climate and Sustainability: Tackle the climate crisis by ensuring that transportation plays a central role in the solution. Substantially reduce greenhouse gas emissions and transportation-related pollution and build more resilient and sustainable transportation systems to benefit and protect communities.	Infrastructure Resilience

www.transportation.gov/dot-strategic-plan

National Response Framework and National Incident Management System

The National Response Framework (NRF) is a guide to how the Nation responds to all types of disasters and emergencies. It is built on scalable, flexible, and adaptable concepts identified in the National Incident Management System to align key roles and responsibilities across the Nation. The document describes specific authorities and best practices for managing incidents that range from the serious but purely local to large-scale terrorist attacks or catastrophic natural disasters.

The National Incident Management System (NIMS) is a comprehensive, national approach to incident management. NIMS provides a consistent nationwide framework, approach, and command structure to enable government at all levels, the private sector, and non-governmental organizations to work together to prepare for, prevent, respond to, recover from, and mitigate the effects of incidents. The document uses the Incident Command System (ICS) as a basis for organization structure.

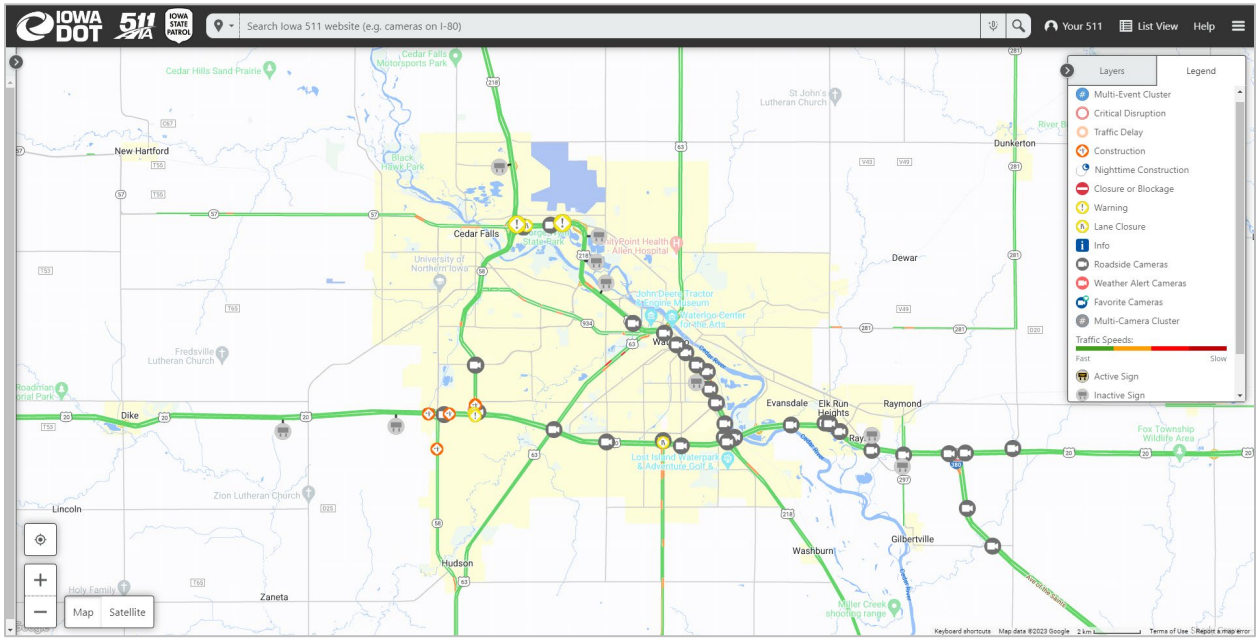
www.fema.gov/emergency-managers/national-preparedness/frameworks/response

Iowa Statewide Traffic Management Center (TMC)

The TMC located in Ankeny is a 24/7 center located used to proactively manage the transportation system by addressing recurring and nonrecurring congestion in real-time. Using advanced technology, the TMC proactively monitors the transportation system, mainly on the primary roadway system, for disruptions in traffic flow. When disruptions occur, the TMC coordinates with internal and external partners to provide safe and quick clearance, detour routing, traffic control, and accurate and timely information to the public. The TMC uses tools such as Iowa 511, social media, and Dynamic Message Signs (DMS) to help protect on-scene responders and to prevent secondary crashes when disruptions occur.

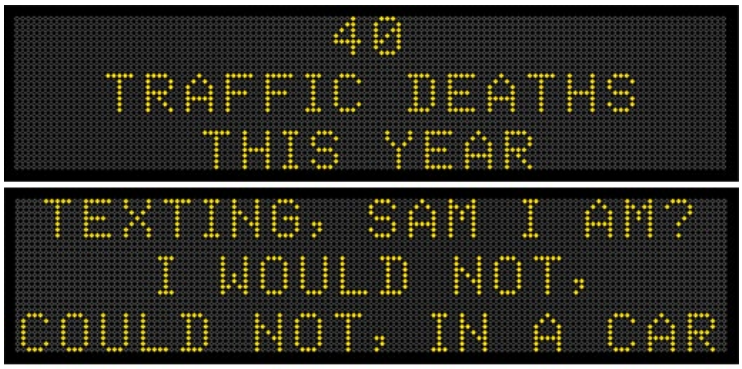
Intelligent Transportation Systems (ITS)

There are several ITS safety and security activities undertaken by the Iowa DOT. This includes the Iowa 511 Traveler Information System which provides citizens with real-time information on roadway travel conditions, incidents, and construction activities. The 511 system can be accessed via phone, web, or mobile application and provides a way to quickly communicate with the traveling public. Many metropolitan areas have cameras on major routes and speed sensors that monitor congestion. The first installation of cameras and speed sensors in the Black Hawk County metropolitan area was part of the Interstate 380 reconstruction project in 2012. Since then, the Iowa DOT has expanded the system to include U.S. 218 and U.S. 20.



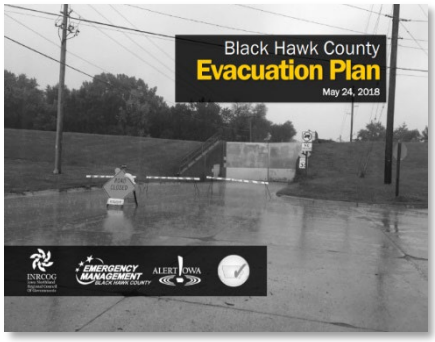
Another ITS activity undertaken by the Iowa DOT is the use of dynamic message signs. Large overhead signs can be found throughout the state on many interstates and primary highways. These signs can be used to communicate information to drivers on weather, incidents, diversions, Amber Alerts, public reminders, and other topics. DMS have been installed in the Waterloo and Cedar Falls metropolitan area on U.S. 218, U.S. 20, and Interstate 380.

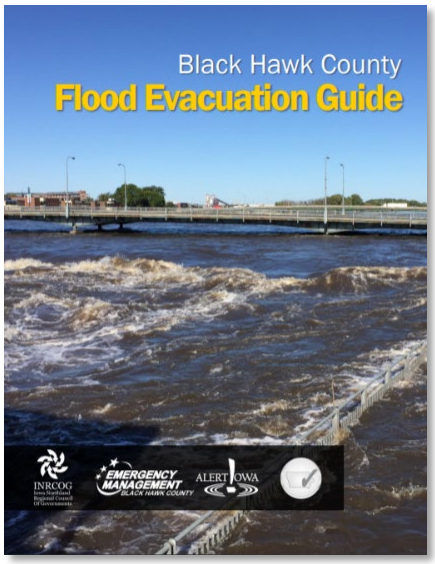
Every Monday since 2013, the Iowa DOT has been utilizing dynamic message signs across the state to provide a safety message and the number of people who have been killed on Iowa's roads so far in the year. "Message Monday" is meant to increase awareness, change driver behavior, and reduce accidents and fatalities. To make messages more memorable, movie quotes, song lyrics, and puns are used. The Iowa DOT also has a Transportation Matters Blog where each Message Monday is discussed and additional information and tips for motorist safety are provided.



2018 Black Hawk County Evacuation Plan

The purpose of the Evacuation Plan is to provide the Black Hawk County Emergency Management Agency and responders with an initial framework of information to be used for an orderly and coordinated evacuation in the event of a disaster. The Plan does not address normal day-to-day emergencies or procedures used in coping with such emergencies. The concept of operations reflected in the document focuses on potential large-scale disasters that were identified in the *Black Hawk County Multi-Jurisdictional Hazard Mitigation Plan* and provides a framework for addressing emergency situations. The Black Hawk County Evacuation Plan is designed to be implemented under NIMS. In addition to the Plan, a Flood Evacuation Guide was developed to aid the public in preparing for an evacuation due to flooding which is one of the most likely natural disasters to impact the county.





Multi-Jurisdictional Hazard Mitigation Plan

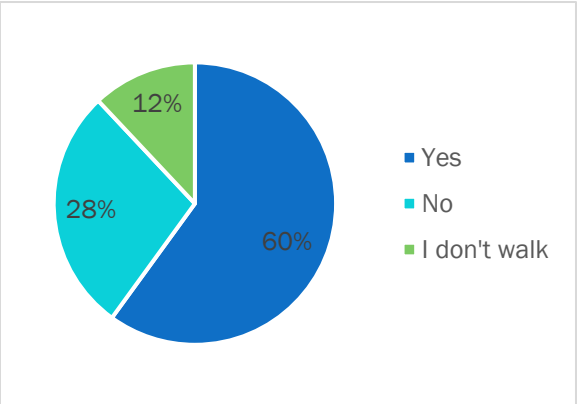
The 2020 Black Hawk County Multi-Jurisdictional Hazard Mitigation Plan outlines the potential for natural and humanmade disasters and the potential impact of those disasters. The plan identifies local community policies, actions, and tools for ongoing, short-, mid-, and long-term implementation to reduce risk and potential future losses of property and lives. The development of the document involved a local planning committee reviewing potential hazards and threats from these hazards. Reviews included a hazards and risk assessment of the transportation network itself due to the potential for vehicular and other types of crashes or events.

2022 Public Input Survey

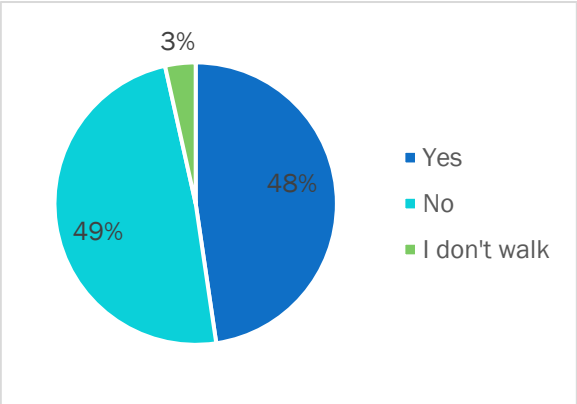
In September 2022, the personnel of the MPO conducted a pair of internet-based surveys. These surveys were aimed at collecting feedback from residents within the jurisdictions of the MPO. The subsequent details provided here highlight survey responses that hold significance within the context of this chapter.

Figure 7.11: Public Input Survey, Rounds One and Two asking respondents if they feel like they can safely walk to their preferred destination (in terms of existing infrastructure, speed limits, protected intersections, lighting, etc.):

Answered: 25



Answered: 86



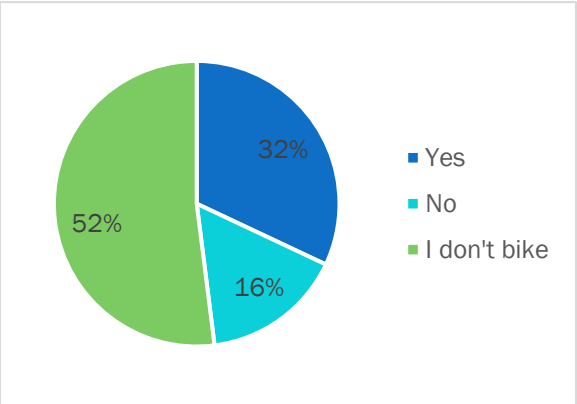
Summary of Worded Responses (Both Rounds):

- Lack of Sidewalks and Connectivity
  - Concerns about missing sidewalks in various areas.
  - Frustration with gaps in the sidewalk system.
  - Desire for sidewalks in older neighborhoods and on busy streets.
  - Calls for considering pedestrian pathways and safety in road projects.
  - Desire for more emphasis on pedestrian-friendly infrastructure and connectivity.
  - Calls for requiring sidewalks in new developments and adding sidewalks to older neighborhoods.
- Road Safety and Pedestrian Crossings
  - Safety concerns while crossing roads, especially busy intersections.
  - Desire for more pedestrian crossings and safer intersections.
  - Issues with drivers not yielding to pedestrians.
- Road Conditions and Infrastructure
  - Issues with broken roads and narrow sidewalks.
  - Calls for wider sidewalks and better maintenance.
- Traffic Behavior
  - Concerns about reckless driving and speeding, particularly near pedestrians.
  - Frustration with drivers not respecting pedestrians' right of way.
- Neighborhood Walkability
  - Desires for walkable neighborhoods and better connections to destinations.
  - Suggestions for prioritizing pedestrians over cars in urban planning.
  - Some respondents mention that their destinations are too far for walking.
- Lighting and Safety
  - Requests for more streetlights and pedestrian-scale lighting.
  - Safety concerns related to lack of lighting during evening and dawn.
  - Need for more streetlights in neighborhoods.

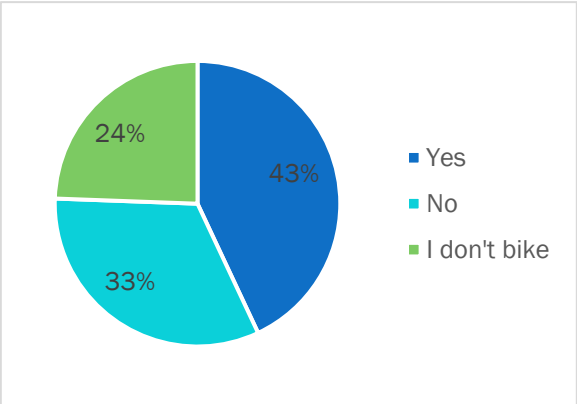
- Public Safety and Behavior
  - Concerns about public safety and undesirable behavior in certain areas.
  - Instances of feeling unsafe while walking, encountering homeless individuals, and facing attacks.
  - Concerns about misuse of walking trails by individuals engaging in illegal activities.
- Specific Locations
  - Feedback on certain intersections (e.g., Hudson Road, San Marnan Dr, Crossroads) and neighborhoods.
  - Mention of specific areas with no sidewalks or safe shoulders for walking.
  - Frustration with the layout of downtown streets and traffic patterns for pedestrians.

Figure 7.12: Public Input Survey, Rounds One and Two asking respondents if they feel like they can safely bike to a destination instead of taking a car or bus (in terms of existing infrastructure, speed limits, protected intersections, lighting, etc.):

Answered: 25



Answered: 86



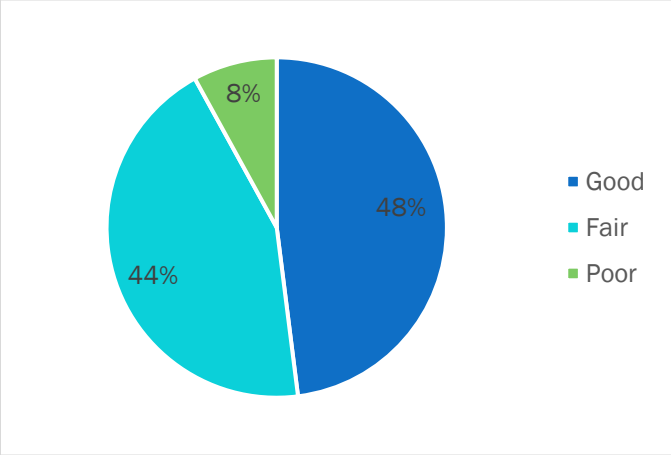
Summary of Worded Responses (Both Rounds):

- Infrastructure and Accessibility
  - Concerns about older neighborhoods lacking sidewalks and bike trails.
  - Desire for safer routes to destinations and workplaces.
  - Need for well-designed on-road bicycle accommodations.
  - Lack of connectivity between neighborhoods and destinations.
  - Difficulty accessing trails from residential areas.
- Safety and Awareness
  - Perceived dangers of biking on roads due to motorists' behavior.
  - Intersections feeling unsafe for cyclists and pedestrians.
  - Lack of awareness and respect from drivers towards cyclists and pedestrians.
- Bike Trails and Connectivity
  - Appreciation for existing bike trails.
  - Desire for more accessible and connected trails.
  - Trails often closed near downtown areas.
  - Challenges in getting to trails from residential neighborhoods.
- Concerns and Barriers
  - Distance and practicality of biking to certain locations.
  - Lack of bike lanes on main roads.
  - Limited accessibility to downtown areas due to various factors.

  - Maintenance issues such as glass on trails and bridges being out.
- Positive and Hopeful Outlook
  - Acknowledgment of progress in infrastructure.
  - Optimism about potential attitude change among drivers.
  - Positive experiences on some routes and trails.

Figure 7.13: Public Input Survey, Rounds One and Two asking respondents how they would rate the overall safety of our streets:

Answered: 25



Answered: 86