MILWAUKEE PEDESTRIAN PLAN

July 2019

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DRAFT

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Marissa Meyer, Associate Transportation Planner

Kate Riordan, Associate Transportation Planner

City of Milwaukee

CITY OF MILWAUKEE 1846 DEPT. OF PUBLIC WORKS

Prepared By

Toole Design Group

Kevin Luecke, Project Manager

John Dempsey, PLA

Shailah Handy

Tom Huber

Mike Loughran, PE

Evan Moorman

Frank Proulx

Megan Seib

Brian Tang

University of Wisconsin-Milwaukee

Dr. Robert Schneider

Master of Urban Planning Students: Tony Giron, Kevin Kuschel, Cassandra Leopold, Chris Sandor

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City of Milwaukee Police Department

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1. Introduction

Milwaukee is a great place to walk. Every day, residents and visitors make millions of walking trips to run errands, travel to school and work, access transit and personal vehicles, exercise and stay healthy, and enjoy the outdoors. In many parts of the City, sidewalks are bustling, crosswalks are full, and paths and trails are frequently used by people walking and jogging.

> I love walking in Milwaukee, being outdoors and in control. I can decide for myself where to go, and I don't need anything to do it!
>
> *—Survey Participant*

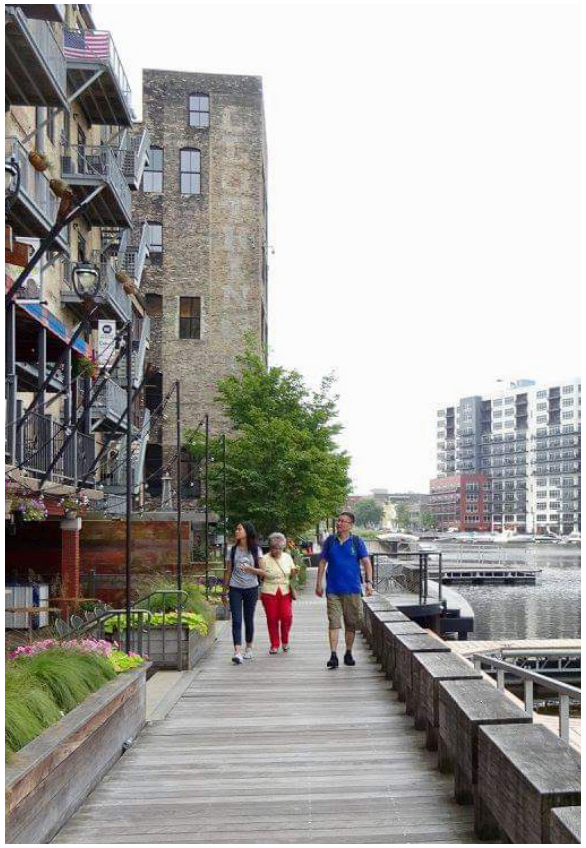
Despite this activity, walking in Milwaukee can be challenging, particularly when crossing streets. People walking are exposed to high vehicle speeds, dangerous and uncomfortable crossings, and drivers that rarely yield. Additionally, in recent years, there has been a significant increase in fatal pedestrian crashes.

These conditions are not unlike those experienced by people bicycling in Milwaukee 25 years ago. However, that began to change in 1993 with the adoption of the City's first bicycle plan. That plan, and a 2010 update, led to a consistent focus on and investment in improving bicycling conditions throughout Milwaukee. This support for bicycling has paid off: there has been a 300 percent increase in the rate of people bicycling in the City, while the rate of bicycle crashes has fallen 75 percent.

Much like the City's first bicycle plan, this Plan presents an opportunity to build on Milwaukee's comprehensive pedestrian network, and improve the safety and comfort of people walking in Milwaukee.

Who is a Pedestrian?

Everyone in Milwaukee is a pedestrian. This includes people walking, running, or using a wheelchair or other mobility device. It includes people going to work and school, jogging, shopping, catching the bus, or walking to their car. The term "walking" as used in this document includes all of these forms of travel, for all purposes, and by all people.



Plan Documents

Substantial research about conditions for people walking in Milwaukee was conducted as part of this planning process. This work is summarized in this document, and is also presented as a series of detailed whitepapers on the following topics:

- Pedestrian Safety in Milwaukee
- Driver Yielding to Pedestrians
- Pedestrian Count Estimation
- Public Engagement and Survey of Public Attitudes Toward Walking in Milwaukee

Results and conclusions from these whitepapers are used throughout this document to support the recommendations of the Plan.

Milwaukee Quick Facts

Incorporated:
January 31, 1846

Area:
96.48 square miles[8]

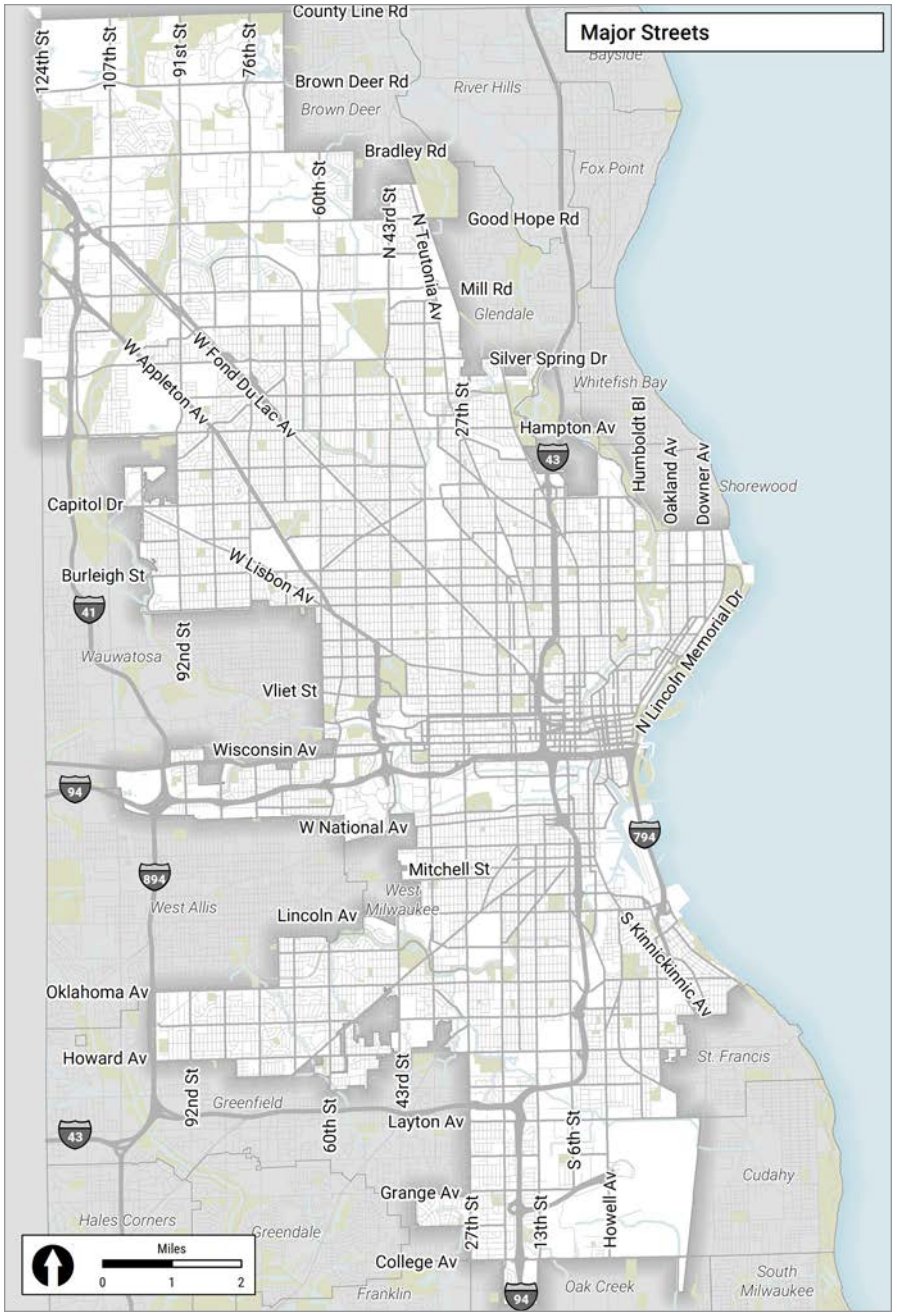
Population:
595,351[9]

Paved Streets:
1,424 miles[10]

National Walk Score Rank:
24 of 100 largest cities[11]

% of Workers Commuting on Foot:
5%

Figure 1. City of Milwaukee major streets



The Americans with Disabilities Act (ADA)

The ADA became law in 1990. The ADA is a civil rights law that prohibits discrimination against individuals with disabilities in all areas of public life, including jobs, schools, transportation, and all public and private places that are open to the general public.

Relevant to this Plan, the ADA provides specific standards for the design of pedestrian facilities including sidewalks and curb ramps to ensure accessibility. These requirements are typically triggered whenever a street or sidewalk has a major repair or reconstruction.

Proposed Guidelines for Pedestrian Facilities in the Public Right-of-Way (PROWAG) - 2011

PROWAG provides accessibility guidelines for the design, construction, and alteration of pedestrian facilities in the public right-of-way. The guidelines ensure that sidewalks, pedestrian street crossings, pedestrian signals, and other facilities for pedestrian circulation are readily accessible to and usable by people with disabilities. PROWAG has not been formally adopted, and its guidance is not required, but it provides best practices for accommodating people with disabilities on pedestrian facilities.

Why Walkability?

Walkability refers to how friendly a place is for walking and includes providing spaces where people feel safe walking, supporting opportunities to make meaningful trips by foot, and creating an environment where people choose to walk because it is convenient, accessible, and enjoyable. Walkability also implies accessibility—the ability of people of various abilities and ages to safely navigate the pedestrian system.

Walkability is important because at some point of each trip, everyone walks. Every trip in a car, on a bus, or by bike starts and ends with a walk. Improving walkability can result in significant improvements in public health, safety, and economic well-being of a community. In recent decades, a large body of research has demonstrated many of the benefits of walking. These benefits are summarized below.

Choice and Mobility

Walking is an essential means of transportation. For many people, it is the most convenient and most reliable form of travel, especially for short trips. Milwaukee's sidewalks present opportunities for people to walk daily and provide generally good access to schools, bus stops, places of employment, and commercial areas. Walking is also the easily combined with other forms of travel such as transit or driving.

People in Milwaukee should have travel and recreational choices. Walking is the most basic means of transportation and people need the option of walking to as many places as possible to capitalize on its benefits. People in the United States are becoming increasingly aware of these benefits and are expressing a preference to live in neighborhoods with walkable connections to local businesses. According to a 2013 survey undertaken by the National Realtors Association, 60 percent of adults in the U.S. favor walkable, mixed-use neighborhoods, and almost two thirds of adults between 18 and 35 report a desire to drive less if other transportation options were available.[1] Because of these preferences, providing mixed-use, walkable neighborhoods can help Milwaukee meet the needs of its residents and compete nationally to attract new residents.

Photo by Amy Oeth

For many people in Milwaukee, walking is the main or exclusive means of travel. Approximately 5 percent of workers in the City of Milwaukee commute by walking.[2] The percentage is likely much higher since it does not include many seniors, children, or people who do not work. In fact, 22 percent of the population of Milwaukee—approximately 133,000 people—is under the age of 15.[3] Additionally, many people choose to walk or do not have access to other forms of transportation. Safe and comfortable places to walk provide independence and allows everyone to reach important destinations such as schools, shopping and employment centers, and places of social interaction such as parks and libraries.

The area along streets provides opportunities to improve the environment for people living nearby

Health

Walking provides substantial health benefits. Many health organizations recommend walking for physical activity because it is widely accessible and relatively low impact. Walking for health can be incorporated into daily activities (such as walking to work, the store, or the library), or can be recreational (such as going for a run or a social walk with a friend or family). According to the City of Milwaukee's 2016 Community Health Assessment, average life expectancy is almost four years lower in Milwaukee than in the State of Wisconsin. According to the same report, 74 percent of Milwaukee adults were overweight in 2015 with approximately 24 percent adults reporting no daily physical activity.[4]

Increased walking, like any physical activity, can help people maintain weight, manage chronic diseases, strengthen bones and muscles, improve mental health and mood, and increase life expectancy.[5] Walking is an excellent way for seniors to socialize with friends and access local services. Similarly, walking provides children with a sense of freedom and access to a wide variety of activities.

Safety

People walking are the most vulnerable users of the street and are at the highest risk for injury in a crash involving a motor vehicle. Investing in a connected and comprehensive pedestrian network, including sidewalks and street crossings, can improve safety for those walking. These improvements can also enhance safety for people in cars or buses as many safety improvements for pedestrians also reduce the frequency and severity of vehicle crashes and can improve drivers' awareness of their surroundings.

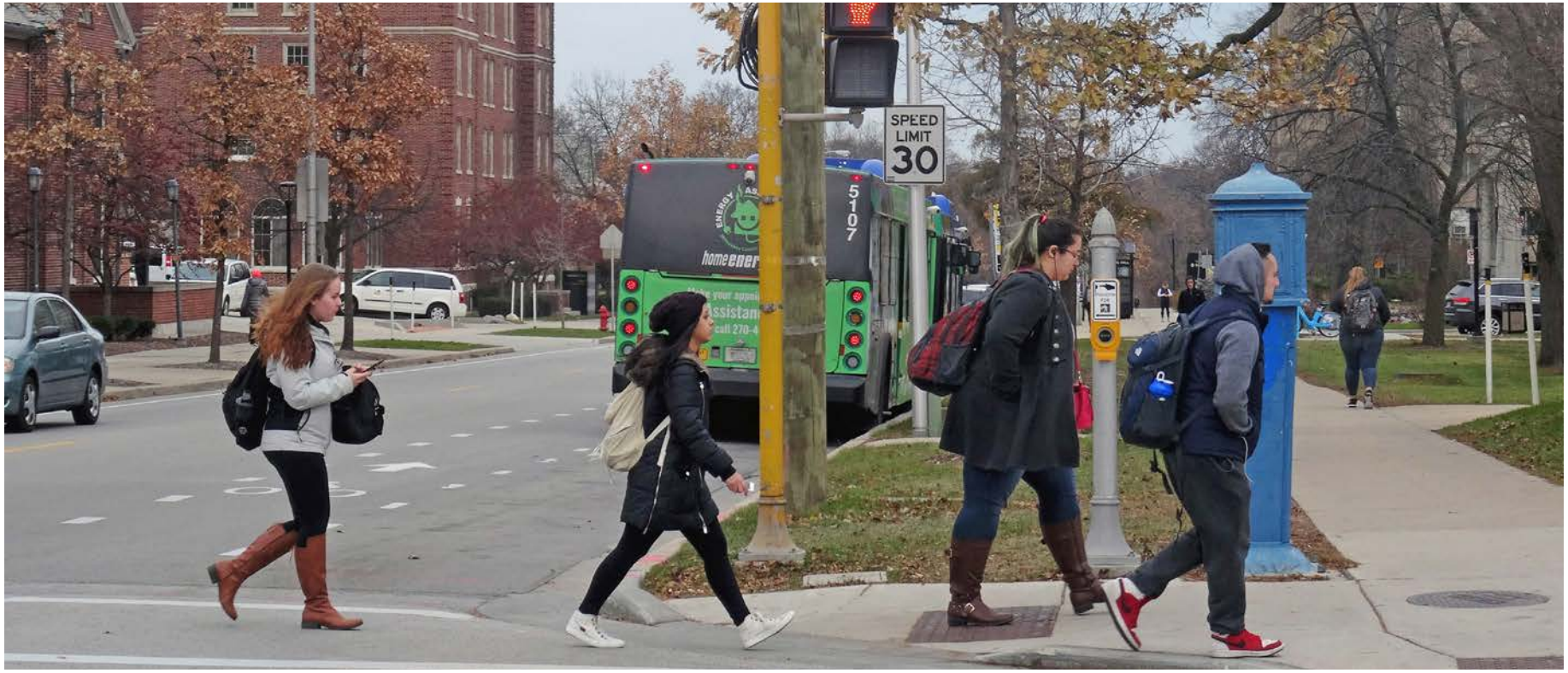
Economic

Improving conditions for walking can have a positive impact on the local economy by reducing household transportation costs, providing access to jobs, increasing property values, and reducing healthcare costs. Walking can significantly reduce people's costs for transportation and increase job opportunities. Transportation costs on average account for 19 percent of total household costs in Milwaukee—an average of over $10,200 each year.[6] Cost savings from driving less or owning fewer vehicles frees up income which can be used for other household needs and purchases, including local goods and services. In addition, a 2014 Harvard University study found that walkable communities that connect residential areas to employment can improve the ability of residents to move up the economic ladder.[7]

Purpose of This Plan

For the reasons above, and many more, it is critical that we continue investing in walkability and achieve the goal of becoming a more walkable city. To prioritize and guide investments in walkability, the Department of Public Works (DPW) undertook this Plan in mid-2017. DPW is the primary agency that manages walking infrastructure in the City and strongly supports providing safe and comfortable places to walk. The services DPW provides directly impact walking in Milwaukee: the department constructs and maintains streets, sidewalks, paths, traffic signals, and crosswalks used by people walking; plants and maintains street trees that shade sidewalks and beautify streets; and clears snow and ice from streets and City sidewalks among other duties. DPW staff managed the development of this Plan; provided expertise about current City practices and policies; coordinated outreach to and input from the public, stakeholder groups, and other City departments; and oversaw the consultant team developing the Plan.

This Plan describes the strong interest expressed by thousands of residents and visitors for Milwaukee to be a safe and comfortable place to walk, the issues confronting walkability in Milwaukee, and recommendations and tools to improve walkability, connectivity, and accessibility. As the City's first Pedestrian Plan, this document recommends programs, policies, and tools that will improve the safety and comfort of people walking, increase connectivity and accessibility, and promote health and quality of life in all Milwaukee neighborhoods.



Where are People Walking?

As part of this planning process, people walking were counted at intersections throughout the City. These counts were used to estimate annual pedestrian counts for all major intersections in the City based on the characteristics of each intersection. The estimates are useful because they paint a picture of where people are currently walking in Milwaukee. Not surprisingly, the estimates show very high numbers of people walking Downtown, near the Marquette University and University of Wisconsin-Milwaukee campuses, and in the Lower East Side, as shown in Figure 2. However, the map also shows higher levels of walking in neighborhood business districts throughout Milwaukee, and substantial numbers of people walking in all neighborhoods of the City. Detailed information about the pedestrian count estimation process is provided in the accompanying whitepaper, *Milwaukee Pedestrian Count Estimation*.

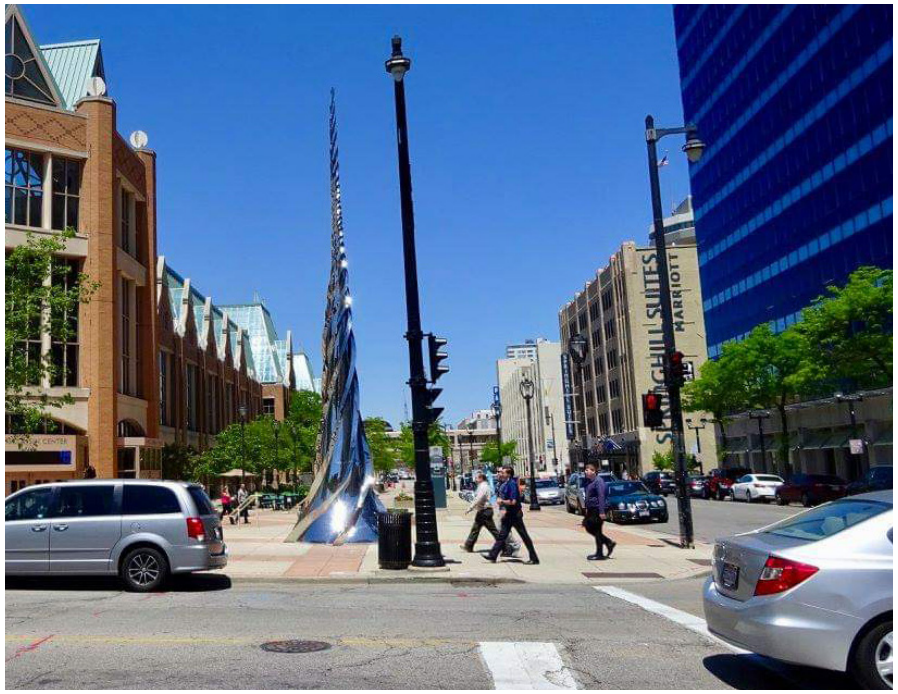
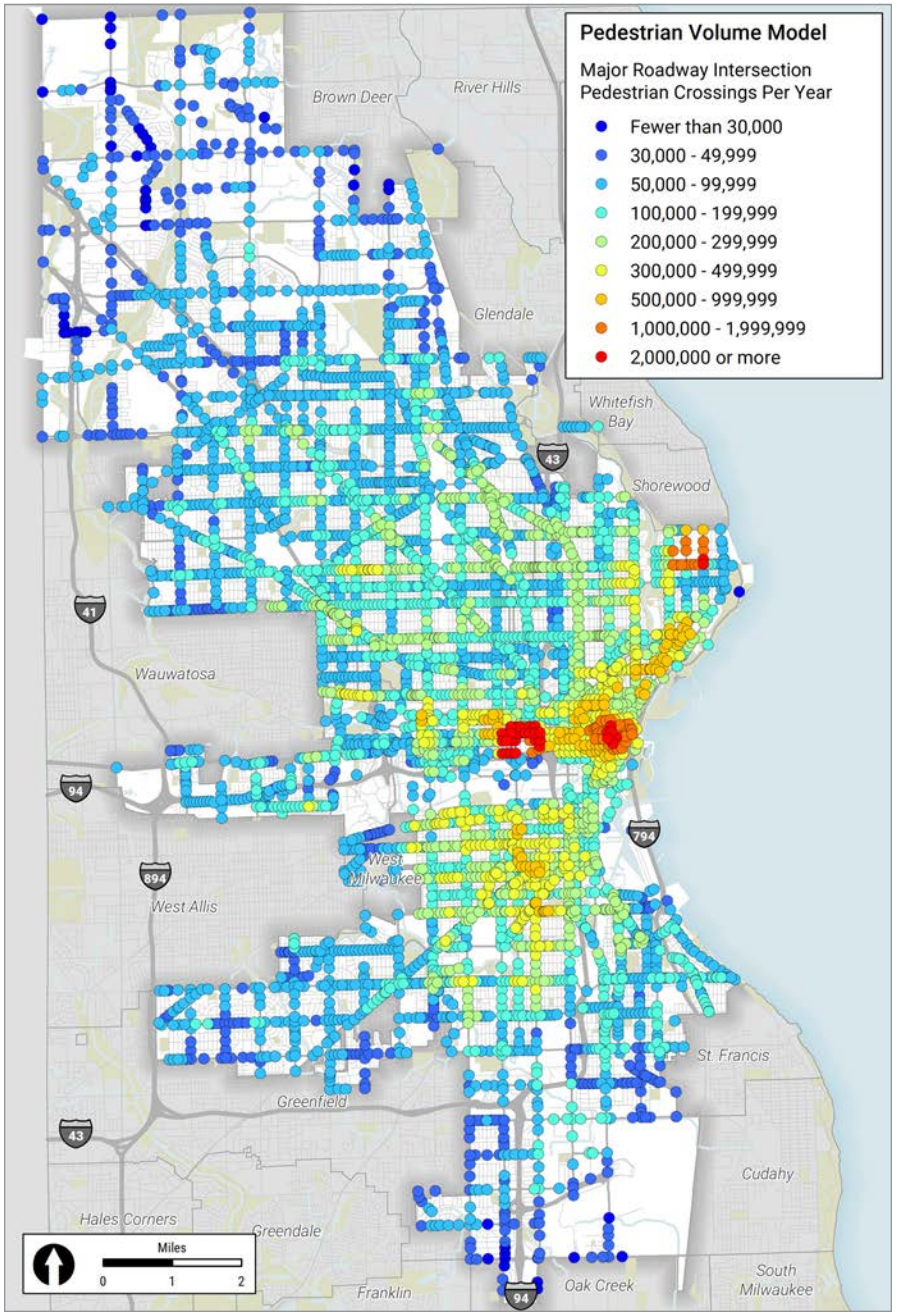


Figure 2. Estimate of annual pedestrian crossings at major intersections



Guiding Principles

Community input and analysis of existing conditions revealed common themes to make Milwaukee a safer, more comfortable, and more convenient place to walk. These themes have been summarized into the following three Guiding Principles and associated actions to achieve each principle. These provide the framework for the remainder of this plan.

Improve Safety

- Improve the safety and convenience of walking through street and sidewalk designs and improvements at intersections and crossings.
- Promote safe travel behaviors through partnerships with local agencies and organizations with similar missions.

Increase Connectivity and Accessibility

- Provide a system that makes walking convenient and attractive for people of all abilities.

Build for Livability & Health

- Use Milwaukee's pedestrian network to support vibrant streets and neighborhoods.
- Provide a pedestrian system that promotes healthy, active lifestyles and addresses existing health disparities.

Photo by Tom Winter

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2. What We Heard

Listening to people who live, work in, or visit Milwaukee about their experiences walking in the City was a critical step in understanding the issues facing people walking. Throughout late 2017 and 2018, City and consultant staff used a variety of methods to interact with a wide range of community members. This chapter briefly describes the various activities for engaging with and listening to people, as well as key themes that emerged from these interactions. The *Public Engagement and Survey of Public Attitudes Toward Walking in Milwaukee* whitepaper provides additional detail about the feedback received through this process.

Public Involvement Meeting participants note concerns about walking on a map of the city

Community Engagement

A variety of opportunities were provided for community members to contribute input on conditions for people walking, and desired project goals; these opportunities are summarized below.

Public Involvement Meeting

A Public Involvement Meeting was held in October 2017 at the Milwaukee Public Library – Central Library. Meeting participants provided feedback on the project goals and vision, various types of pedestrian facilities and treatments, and concerns with walking in Milwaukee. Participants also had the opportunity to identify locations and provide comments about specific issues facing pedestrians on City maps.

Bicycle & Pedestrian Task Force

Three presentations were given to the City's Bicycle & Pedestrian Task Force to update the group on the status of the project and seek input on the content of the Plan.

Focus Groups

Four focus groups were held in February and March 2018 to discuss walking as it related to specific neighborhoods or topic areas. The focus groups provided an opportunity to have more in-depth, detailed discussions on specific issues than was possible at the Public Involvement Meeting. The focus groups engaged:

- People interested in accessibility issues;
- People interested in access to transit;
- Representatives of the City's Neighborhood and Business Improvement Districts (NIDs and BIDs); and
- Choice Neighborhood / Westlawn Neighborhood residents.

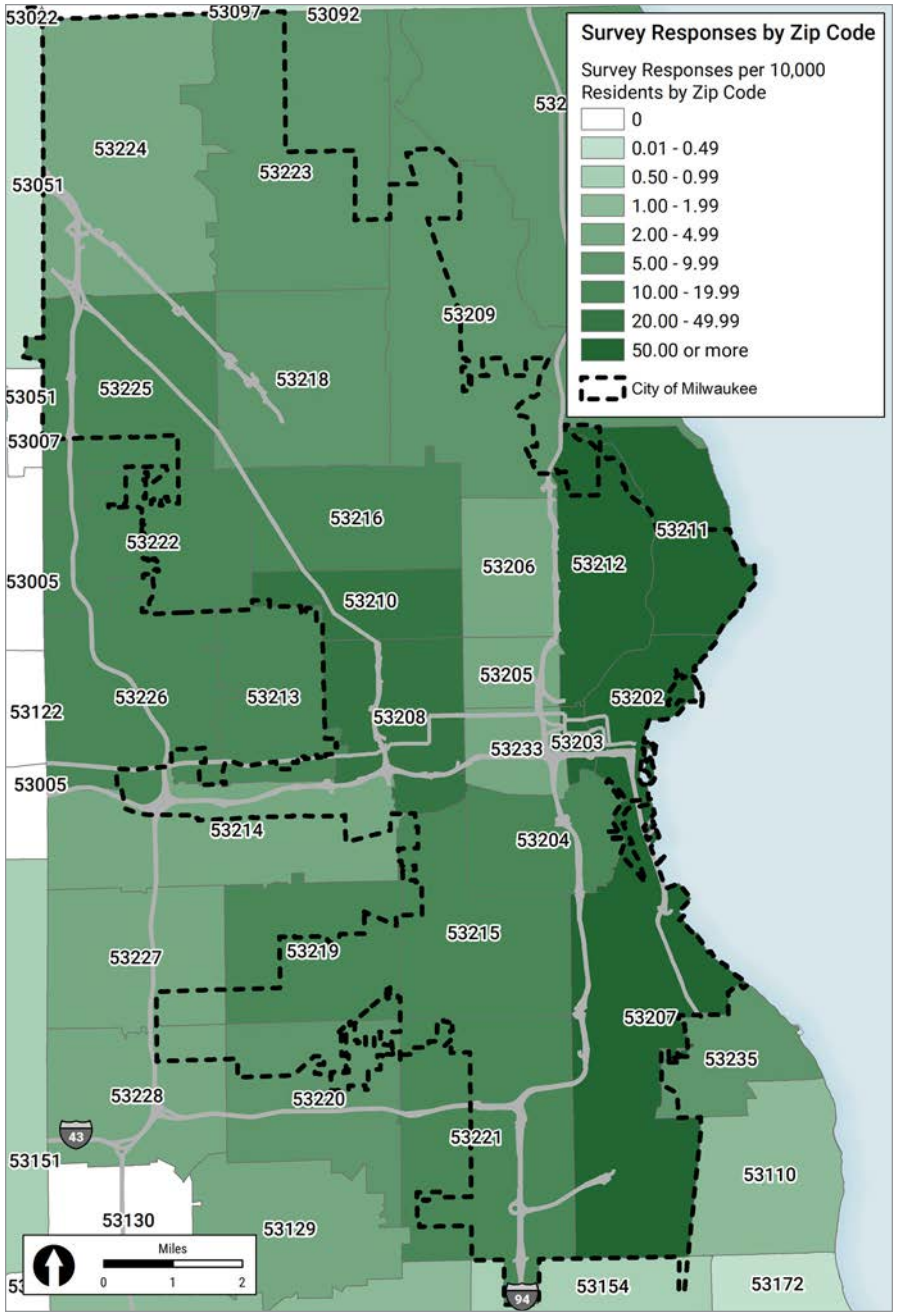
The focus groups ranged in size from six to twelve participants. Discussions were initially focused on topics specific to each focus group, but often became more wide-ranging as each discussion progressed.

Online and In-Person Surveys

A survey was developed for people to provide input on walking conditions in Milwaukee. The survey was primarily online, and a paper version of the survey was distributed door-to-door to households located on 30 blocks throughout the City of Milwaukee. This ensured that people without internet access could provide input. The paper survey was distributed to two randomly selected residential blocks in each of the 15 Alder Districts in December 2017 and January 2018. Both the online and in-person surveys were available in English and Spanish.

Overall, 1,720 completed Pedestrian Plan survey responses were received: 1,538 were submitted in response to the online survey link, 161 were submitted from door-to-door distribution, and 21 were submitted in paper form at the first Pedestrian Plan public meeting. As shown in Figure 3, residents from all zip codes in the City of Milwaukee were represented, while 44 responses were received from zip codes outside of the City of Milwaukee.

Figure 3. Survey responses per 10,000 residents by zip code



Common Themes

Several themes emerged throughout the public engagement opportunities; these themes are summarized below and form the basis for the Plan's recommendations.

Safety

People are very concerned about their safety when walking in Milwaukee. While some people expressed safety concerns related to crime (harassment, assault, or robbery), the overwhelming safety threat cited by people is the risk of being struck by a motor vehicle. Deep concern was expressed about driver behavior and impacts on the safety and comfort of people walking. Speeding, failure to yield to people walking, reckless driving, unsafe passing, and failure to observe stop signs and traffic signals were frequently cited as common behaviors that present significant pedestrian safety hazards.

> "There is a lot of danger from really bad drivers. They turn right on red and do not watch for pedestrians, and there is a lot of speeding and running through stop signs and ignoring traffic lights."
>
> *—Survey Participant*

Accessibility

Accessibility—ensuring persons with disabilities have access to public spaces—was another topic of concern among people providing input for the plan. In recent years, there have been great strides in making walking accessible for all Milwaukeeans, primarily through building ADA-compliant pedestrian curb ramps at street corners. However, remaining accessibility issues include lack of curb ramps, concerns over the time needed to cross at signalized intersections, sidewalk gaps in select locations, and work zones without accessible detours.

> "Pushing a wheelchair is difficult. I almost dumped my mother twice. I fell this fall where uneven sidewalks created an inch-plus tripping hazard."
>
> *—Survey Participant*

Light poles and other obstructions can present significant accessibility challenges in some parts of the City

Livability and Health

People love to walk in Milwaukee for exercise, socialization, or relaxation. A vibrant pedestrian realm, including sidewalks, trails, parklets, and sidewalk cafes, adds to the attractiveness and enjoyment of many City neighborhoods. At the same time, some streets do not have attractive pedestrian spaces and people walking often feel intimidated by traffic. In many of the door-to-door interviews, people shared very positive messages on the importance of walking in their neighborhoods and having attractive places to walk. Neighborhoods and streets with vibrant street life add to the livability of Milwaukee and encourage people to walk more often, which in turn contributes to better health.

> I love walking in the city. It's healthier than driving. It's safer than driving. It allows me to actually enjoy my neighborhood and connect to the people and places around me.
>
> *—Survey Participant*

Maintenance and Operations

The condition of Milwaukee's pedestrian network is generally good; however, concerns were expressed about sidewalk conditions in select locations, and winter snow removal practices throughout the City.

> People don't shovel their sidewalks. It makes walking very difficult and sometimes dangerous.
>
> *—Focus Group Participant*

These four core themes—safety, accessibility, livability, and maintenance—guide the analysis and recommendations that comprise the remainder of this plan. Public input is included throughout this plan in the form of quotes from individuals and survey results. A detailed description of all public input is available in the supporting whitepaper, Milwaukee Pedestrian Plan Public Input Summary.

Accessible pedestrian detours must be provided when construction blocks existing pedestrian facilities

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3. What are the Issues?

People walking in Milwaukee face a variety of issues. Some, such as difficulties crossing busy streets, are easily identified while others, such as construction detours lacking an accessible route for people using wheelchairs or other mobility devices, may only be apparent to a few people. This chapter builds on the public input described in Chapter 2 and describes many of the issues facing people walking in the City, while Chapter 4 provides recommendations to address these concerns.

Safety

Traffic safety is the most pressing issue facing people walking in Milwaukee. Seventy-five percent of survey respondents shared safety concerns when walking. In some cases, respondents voiced concern about crime while walking, although the overwhelming worry was being struck by a vehicle. This section highlights information about the safety of people walking in Milwaukee; more information can be found in the accompanying whitepapers *Pedestrian Safety in Milwaukee*, and *Motorist Yielding to Pedestrians in Milwaukee.*

Crash Statistics

People walking in Milwaukee are disproportionately at risk of being struck by a motor vehicle compared to people walking in other parts of the state. According to a report issued by MilWALKee Walks and the Wisconsin Bike Fed, "The City of Milwaukee has 10.4 percent of the state population and 29.1 percent of the state [pedestrian] crashes…. From 2011-2015 every [aldermanic] district had at least one pedestrian killed, most frequently due to people driving failing to yield [to pedestrians]."[12]

Figure 4. People walking in Milwaukee are disproportionately at risk of being involved in a crash

People walking in Milwaukee are also disproportionately likely to suffer a severe or fatal injury in the event of a crash: approximately 5% of commuters in Milwaukee walk, but pedestrians represented 25 percent of severe injuries and 27 percent of fatalities in crashes in Milwaukee between 2011 and 2017 (Figure 5).[13] Even allowing for the fact that commutes only represent a portion of all walking trips in Milwaukee, people walking are significantly more at risk for severe or fatal injury than people traveling in vehicles.

Figure 6 displays the total number of reported pedestrian crashes from 2011 to 2017, including those on private property and in parking lots, while Figure 7 displays the total reported pedestrian crashes resulting in a severe injury or fatality to the pedestrian. These figures only represent crashes that were reported to the police; a large number of relatively minor crashes are also often not reported to the police.

Over the past 20 years, the number of crashes involving pedestrians has significantly declined. Between 1997 and 2017, crashes involving someone walking decreased by over 50%. Despite this reduction, the total number of reported pedestrian crashes has remained relatively consistent between 2011 and 2017, with a modest decrease in crashes in 2016 and 2017.

While total crashes decreased slightly over this period, the number of severe and fatal crashes increased significantly with 2017 having the highest number of severe and fatal crashes in the period.[14]

Figure 5. People walking in Milwaukee are disproportionately at risk of being involved in a fatal crash

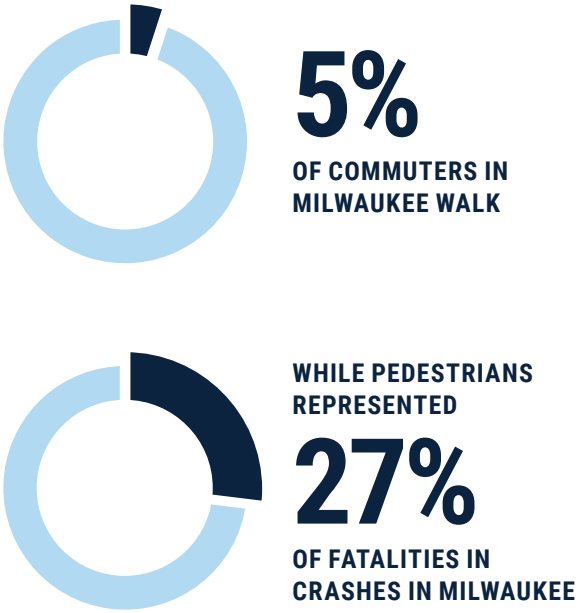


Figure 6. Total reported pedestrian crashes, 2011-2017

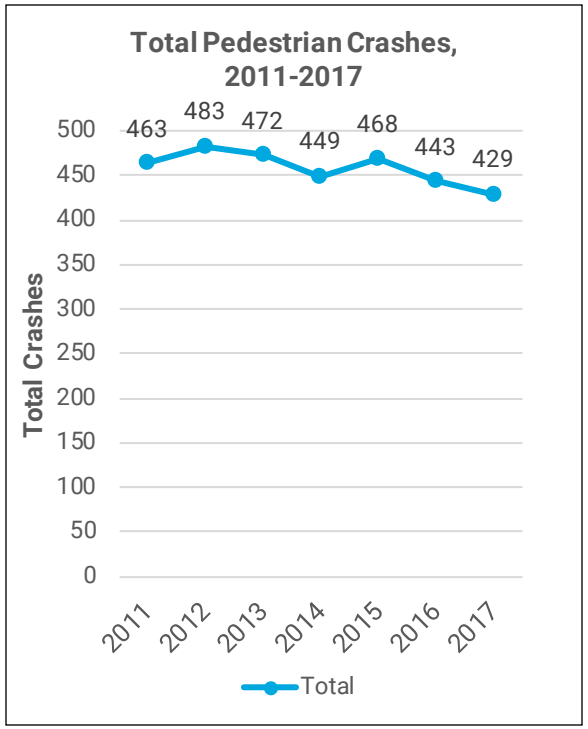
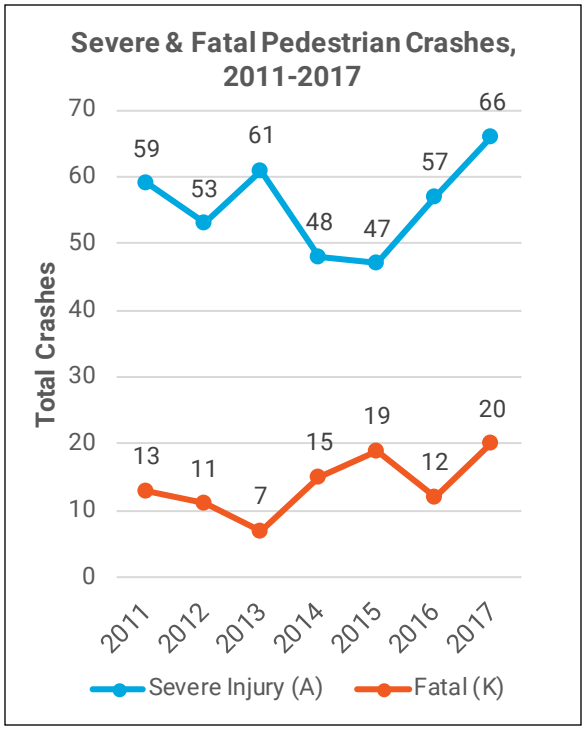


Figure 7. Total severe injury and fatal pedestrian crashes, 2011-2017



Crash Locations

Pedestrian crashes occur throughout Milwaukee, but there are clear concentrations of crashes in select locations. There are three ways of analyzing reported pedestrian crash locations:

1. Where crashes occur;
2. The rate of crashes adjusted for pedestrian volumes; and
3. Where severe and fatal crashes occur.

Crash Corridors

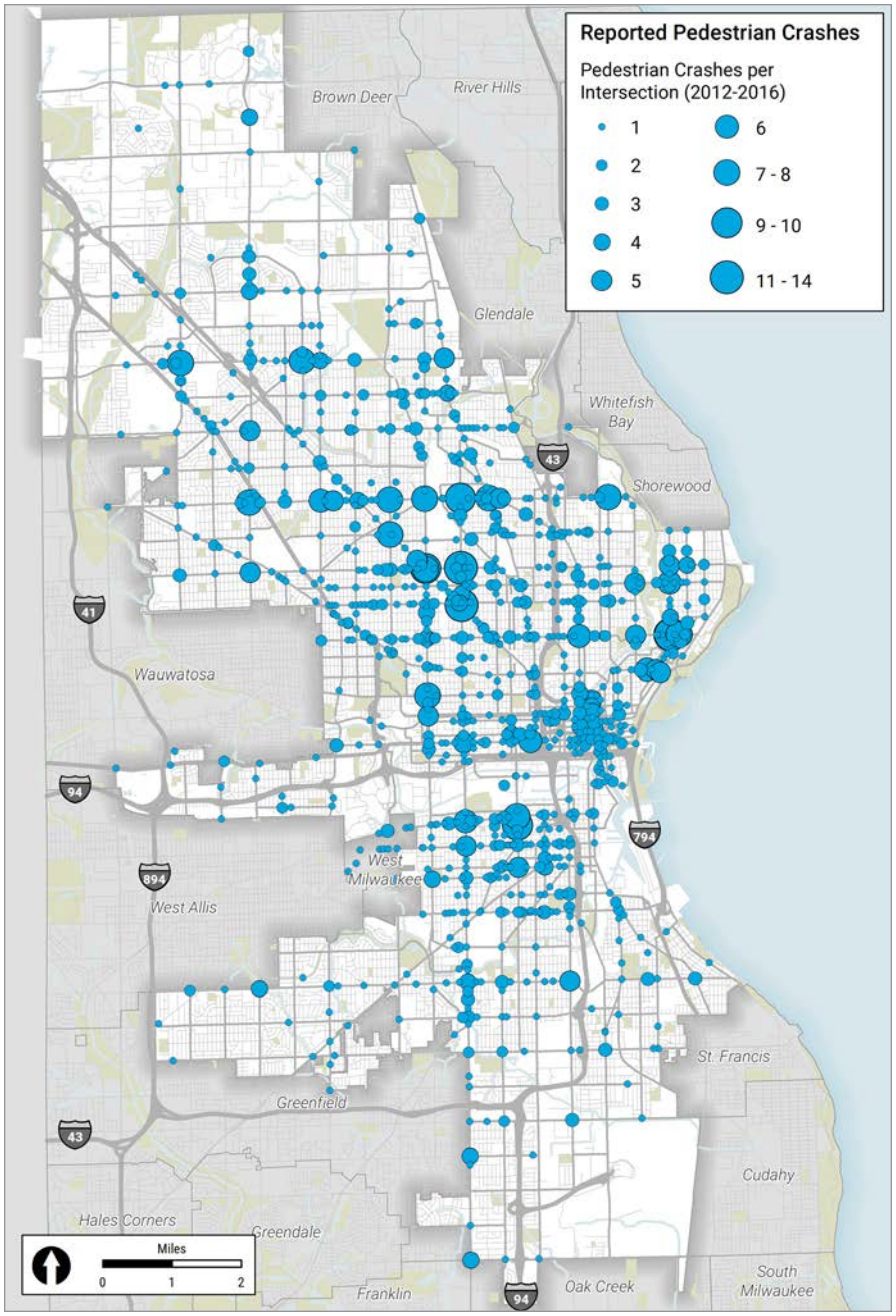
Pedestrian crashes tend to be clustered in Downtown Milwaukee and along major streets throughout the City. Figure 8 displays the location of all pedestrian crashes reported within 80 feet of an intersection from 2012 to 2016. The highest density of pedestrian crashes is generally found along the following corridors:

Capitol Drive	North 92nd Street to Milwaukee River
North 35th Street	West St. Paul Avenue to West Capitol Drive
North 27th Street	Interstate 94 to West Capitol Drive
Fond du Lac Avenue	Interstate 43 to West Silver Spring Avenue
North Avenue	West Lisbon Avenue to North Prospect Avenue
Water Street	West Cherry Street to East St. Paul Avenue
Cesar Chavez Drive	West Forest Home Avenue to West National Avenue
National Avenue	South 35th Street to South 1st Street
Greenfield Avenue	South 27th Street to South 6th Street
Layton Boulevard/South 27th Street	West Loomis Road to West National Avenue
West Oklahoma Avenue	South 76th Street to South 92nd Street
West Silver Spring Drive	West Appleton Avenue to North Teutonia Avenue

These corridors have several characteristics in common:

- Most have posted speed limits of 30 miles per hour or higher;
- Most are multi-lane streets (with four or more total travel lanes);
- Most have traffic volumes of more than 10,000 motor vehicles per day; and
- All are transit routes.

Figure 8. Reported pedestrian crashes in the City of Milwaukee, 2012-2016



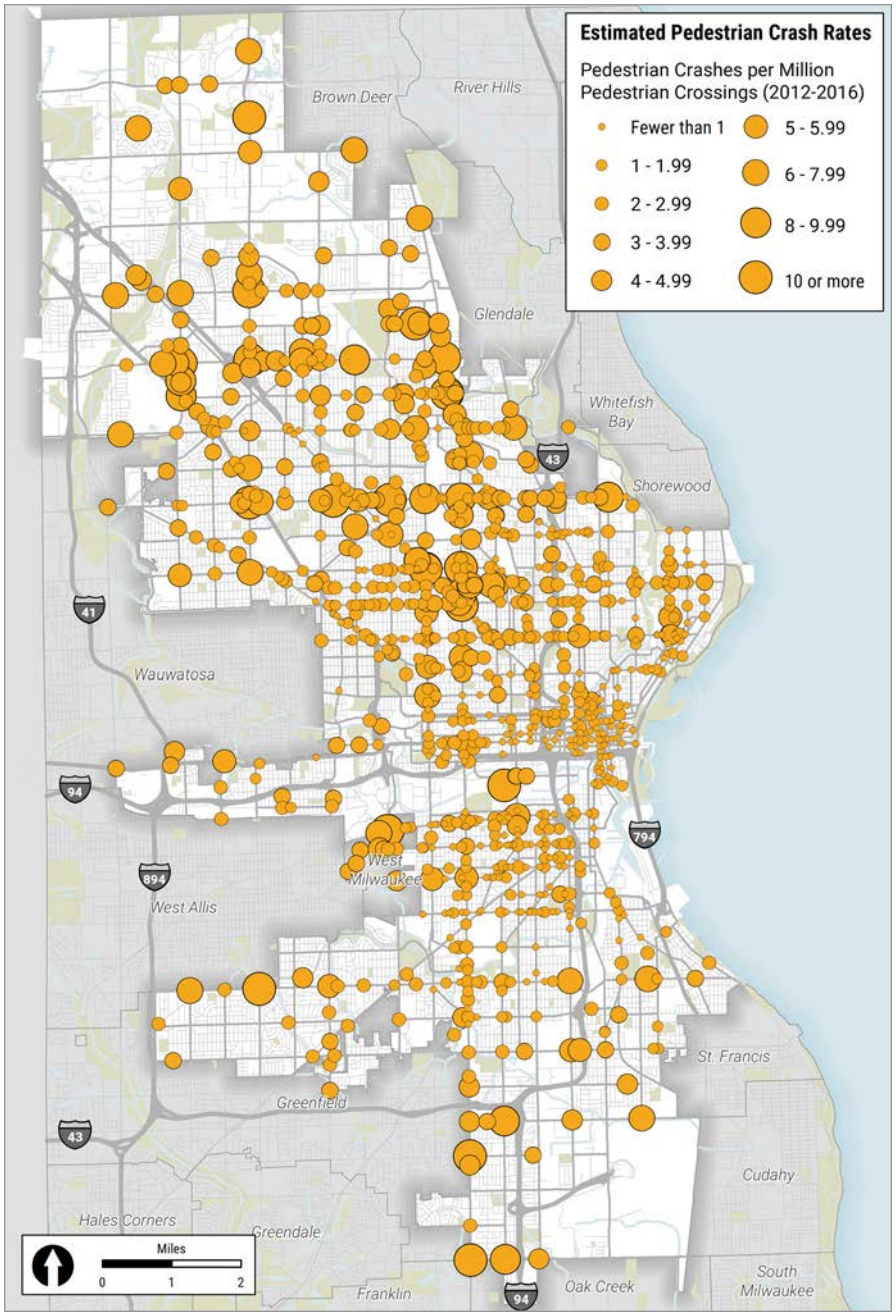
Pedestrian Crash Risk

Crashes involving pedestrians are often more likely to occur where pedestrians are present. Comparing the map of estimated pedestrian counts (Figure 2) with the map of pedestrian crash locations (Figure 8), it is clear that many locations with high levels of walking also have high numbers of crashes involving people walking. However, this does not necessarily mean that it is more dangerous to walk in a high-crash location like Downtown than to walk in another location with fewer crashes, but also fewer people walking; more crashes can be expected where more people are walking. Combining these two maps provides an estimate of pedestrian crash rates (that is, the risk each individual faces when crossing the street). These crash rates are expressed in terms of pedestrian crashes per million pedestrian crossings and are shown in Figure 9.

A close comparison of Figures 8 and 9 shows that many high crash locations actually have relatively low crash rates, while many areas with lower numbers of people walking have higher crash rates. Examining the 50 intersections with the highest crash rates yields particularly high-risk streets for people walking (listed alphabetically):

East and West Capitol Drive	North Holton Street to North 76th Street
North 27th Street	West Walnut Street to West Capitol Drive
North 35th Street	West Vliet Street to West Capitol Drive
North 76th Street	West Burleigh Street to North Industrial Road
North 91st Street	West Appleton Avenue to West Silver Spring Drive
North Teutonia Avenue	West Atkinson Avenue to West Silver Spring Drive
South 27th Street	West National Avenue to West College Avenue
West Fond du Lac Avenue	North 27th Street to North Sherman Boulevard
West Layton Avenue	I-94 to South 27th Street
West National Avenue	South 16th Street to South 44th Street
West Oklahoma Avenue	South 76th Street to South 92nd Street
West Silver Spring Drive	West Appleton Avenue to North Teutonia Avenue

Figure 9. Estimated pedestrian crash rates in the City of Milwaukee, 2012-2016

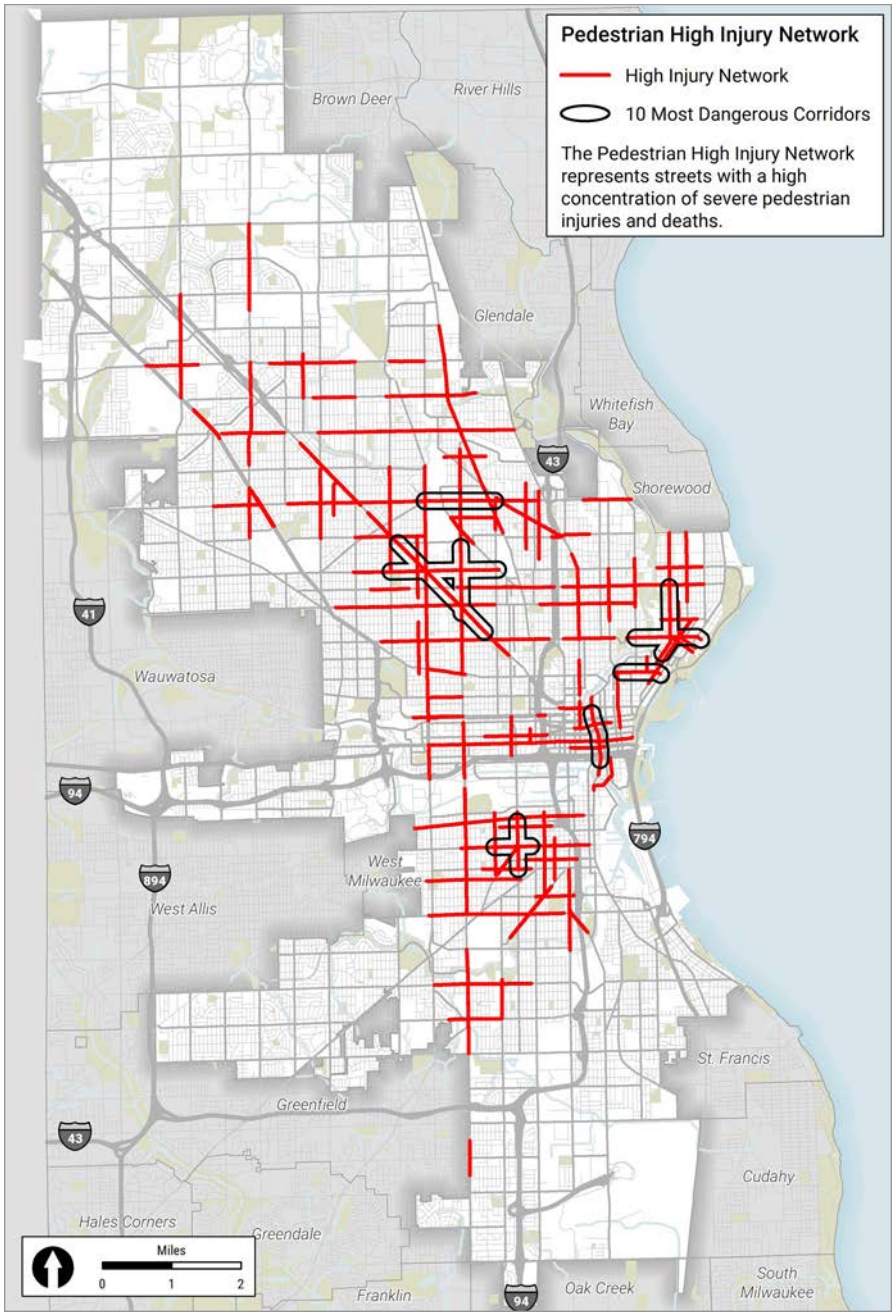


High Injury Network (HIN)

Yet another way to look at pedestrian crashes is examining where the most severe crashes are occurring. It is important to focus on locations where crashes result in serious injury or death as these crashes have the greatest impact on people's lives and well-being. These crashes also have significant economic impacts, including personal economic losses, long-term healthcare costs, and spending on emergency response. Figure 10 displays the pedestrian high-injury network—the most dangerous streets citywide. The pedeestrian high-injury network was determined by mapping all pedestrian crashes along a street, with severe and fatal crashes receiving three points, and non-severe crashes receiving one point; points were then totaled in half-mile segments to produce the heat map. The pedestrian high injury network represents approximately 106 miles of streets, or 7 percent of all City streets. Using this measure, the most dangerous corridors for people walking include the following (listed alphabetically):

East Brady Street	North Prospect Avenue to North Van Buren Street
East North Avenue	North Terrace Avenue to North Humboldt Avenue
North Oakland Avenue	East Irving Place to East Hartford Avenue
North 27th Street	West North Avenue to West Hope Avenue
North Water Street	West St. Paul Avenue to West Cherry Street
South Cesar E Chavez Drive	West National Avenue to West Lapham Boulevard
West Burleigh Street	North 20th Street to North Sherman Boulevard
West Capitol Drive	North 20th Street to West Fond du Lac Avenue
West Fond Du Lac Avenue	West North Avenue to West Townsend Street
West Greenfield Avenue	South 14th Street to South 22nd Street

Figure 10. Pedestrian high-injury network



Crash Types

In 2016, the Department of Public Works (DPW) conducted a study using two methods to categorize a sample of pedestrian crashes in the City of Milwaukee. Figure 11 displays the most common types of pedestrian crashes in Milwaukee overall, while Figure 12 displays the most common types of severe and fatal pedestrian crashes based on this sample. Notably, 4 of the 5 most common crash types, and 3 of the 4 most serious crash types, occur when a pedestrian is in a crosswalk.

Figure 11. Most Common Pedestrian Crash Types in Milwaukee

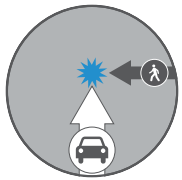
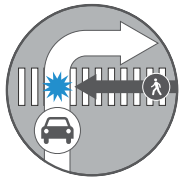
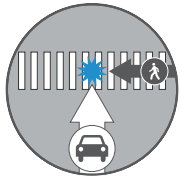
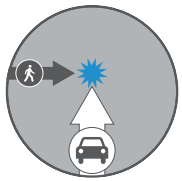
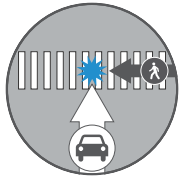
Rank	Depiction	Description[15]
1		Left-turning motorist strikes pedestrian traveling from opposite direction (relative to motorist's direction before turning) in far crosswalk
2		Straight-traveling motorist on right side of street strikes pedestrian approaching from the right (not in crosswalk)
3		Left-turning motorist strikes pedestrian traveling from same direction (relative to motorist's direction before turning) in far crosswalk
4		Right-turning motorist strikes pedestrian approaching from right in near crosswalk
5		Straight-traveling motorist strikes pedestrian approaching from right in near crosswalk

Figure 12. Most Common Fatal and Severe Pedestrian Crash Types in Milwaukee, 2011-2015

Rank	Depiction	Description
1		Straight-traveling motorist on right side of street strikes pedestrian approaching from left (not in crosswalk)
2		Straight-traveling motorist strikes pedestrian approaching from left on far side of intersection
3		Straight-traveling motorist strikes pedestrian approaching from right on far side of intersection
4		Straight-traveling motorist strikes pedestrian approaching from right on near side of intersection

Failure to Yield

In Wisconsin, a legal crosswalk exists anywhere that a sidewalk intersects with a street, even if the crosswalk is not marked with paint. Additionally, a legal crosswalk exists even where the sidewalk does not continue on the other side of the street. Wisconsin law requires drivers to yield to people walking at all crosswalks that do not have a traffic signal or stop sign even if the crosswalk is not marked.

Drivers in Milwaukee rarely yield to people trying to cross the street. Figure 13 displays locations where driver yielding was observed as part of this plan. Yielding rates ranged from zero to 61 percent, with drivers at most locations yielding less than 33 percent of the time. The lack of driver yielding represents a serious threat to the safety of pedestrians and makes it challenging for people to cross streets on foot.

Drivers rarely yield to people walking, even when crosswalks are highly visible

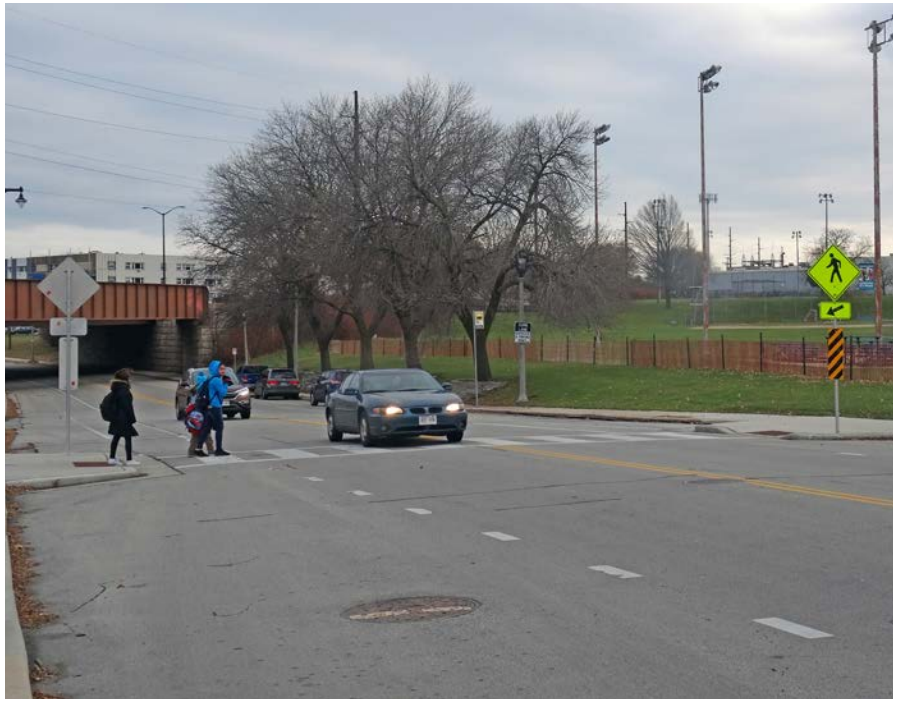
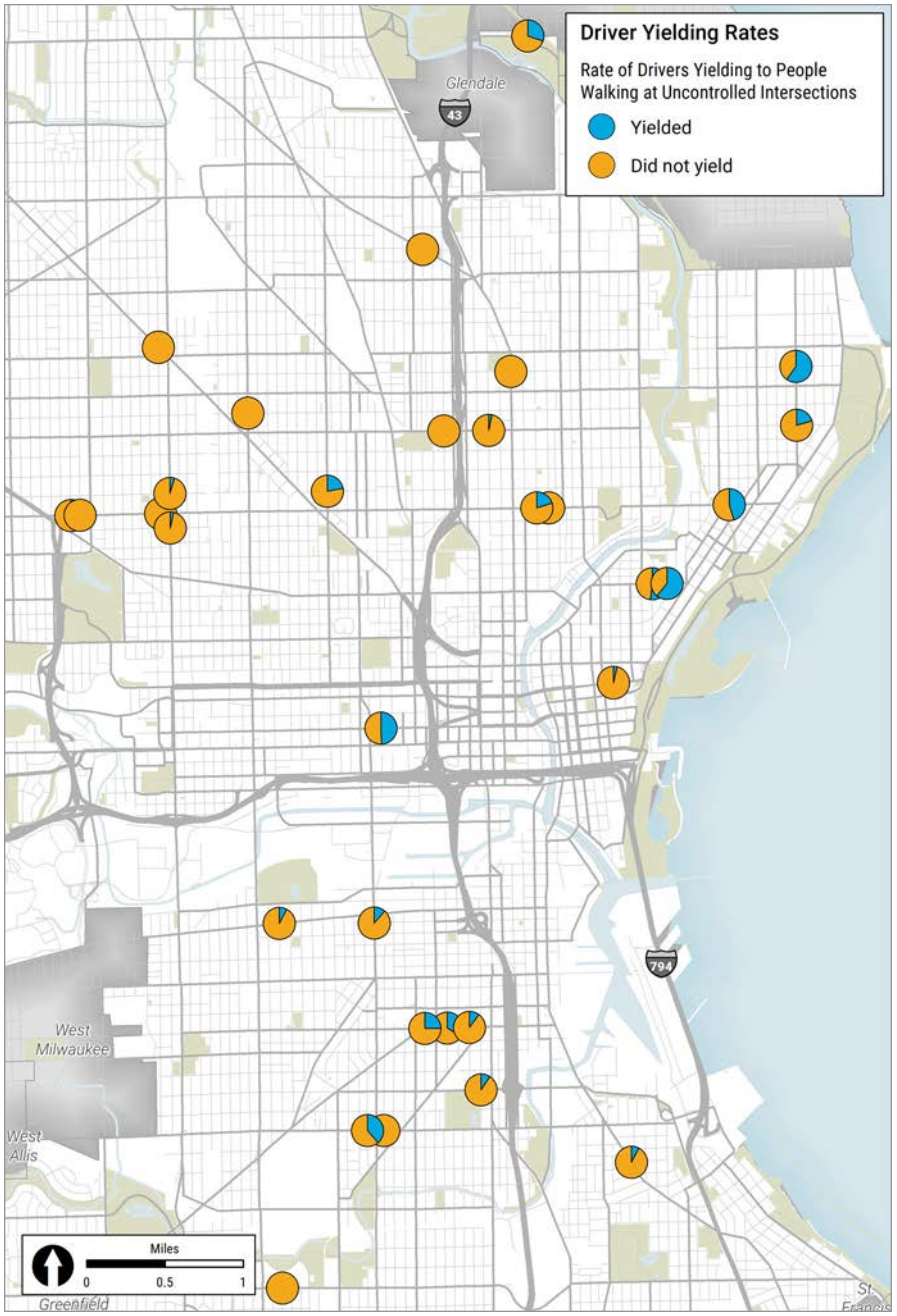


Figure 13. Driver yielding rates at select intersections



Speeding

A review of speed studies showed that it is common for drivers to exceed the posted speed limit by at least ten miles per hour on many major streets. This conclusion is supported by comments collected through public engagement for the Plan. Speeding is a critical factor in pedestrian safety because the risk of severe injury or death to a person struck by a motorist increases exponentially as vehicle speeds increase.

Several streets have a particularly severe speeding problem:

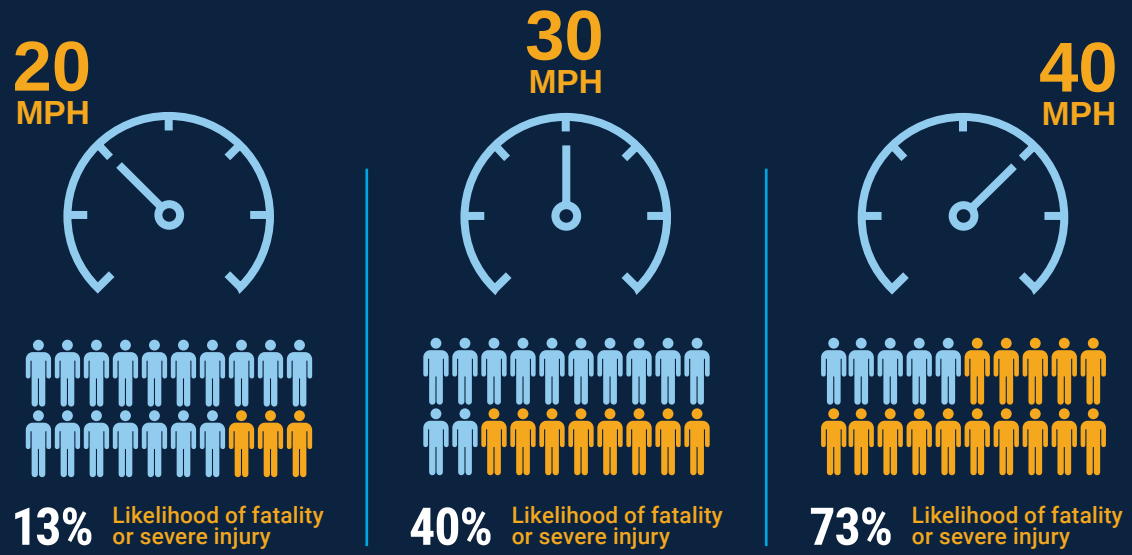
- South 35th Street near West Arthur Avenue had more than 750 vehicles per day traveling at least 50 miles per hour in a 30 mile per hour zone. This location is a four-lane street in a mixed residential, office, and industrial area.
- West Capitol Drive near North 39th Street had more than 950 vehicles per day traveling at least 50 miles per hour in a 30 mile per hour zone. This location is a six-lane street in a mixed residential and commercial area.
- North 68th Street near West Glendale Avenue had more than 120 vehicles per day traveling at least 50 miles per hour in a 30 mile per hour zone. This location is a two-lane street in a residential neighborhood.

The high rate of speeding puts people who are walking in Milwaukee at risk of serious injury or death if a crash occurs. Not surprisingly, some of the highest-speed roadways correspond with high concentrations of pedestrian crashes with severe and fatal injuries. Reducing vehicle speeds is critical for improving the safety of people walking in Milwaukee and making neighborhoods more livable.

The importance of reducing speed in pedestrian safety

There is a clear relationship between motor vehicle speeds and pedestrian safety. Higher motor vehicle speeds decrease the probability of drivers yielding to pedestrians in crosswalks and increase the likelihood of severe injuries or death when a crash does occur.[17, 18] Speeding also gives both people walking and people driving less time to avoid a crash. As shown in Figure 14, the risk of a pedestrian being seriously injured or killed in a crash increases dramatically as speeds increase from 20 to 40 miles per hour or more.

Figure 14. Likelihood of pedestrian fatality or severe injury by vehicle speed



Source: Tefft, Brian C. Impact speed and a pedestrian's risk of severe injury or death. Accident Analysis & Prevention. 50. 2013

Sidewalks and Connectivity

Sidewalks are more than just the space for people to walk. They improve the safety and comfort of people walking and provide places for people of all ages to run, skate, ride bikes, socialize, and play. Sidewalks also improve mobility for people walking and provide access and connectivity for all types of trips: to and from home, work, parks, schools, shopping areas, transit stops, and personal vehicles.

Milwaukee has sidewalks on both sides of most streets under its jurisdiction. The denser parts of the City and neighborhoods developed before 1950 have sidewalks on almost all streets. All of Milwaukee's commercial districts, such as Brady Street, North Avenue, Downer Avenue, Center Street, Dr. Martin Luther King Jr. Drive, Mitchell Street, Kinnickinnic Avenue, and Cesar Chavez Drive have sidewalks, many of which have decorative streetscape elements. Additionally, millions of dollars have been invested in streetscapes to make the sidewalks more walkable and pleasant to travel upon.

However, there are areas of the City where people walking face connectivity challenges for a variety of reasons, which are summarized below.

Lack of sidewalks in some locations

As previously noted, sidewalks are present in most of the City, especially when compared to many other large cities. However, some streets and neighborhoods are missing sidewalks or have sidewalks in poor condition, which forces people to walk in the street or avoid making walking trips altogether. The City's subdivision regulations require that sidewalks be installed on both sides of residential streets in new subdivisions. However, some developed areas of the City were annexed without sidewalks, or had the sidewalk requirement waived.

Curb ramps

Curb ramps are crucial for people of all abilities to navigate the sidewalk system. Curb ramps provide access for people using wheelchairs and other mobility devices, reduce tripping hazards, and improve conditions for people pushing strollers and children biking on the sidewalk. Since 1975, the City of Milwaukee has programmatically constructed and replaced pedestrian curb ramps. However, while curb ramps have been installed at almost every corner throughout the City, at many locations the design and subsequent construction no longer meet the standards of the Americans with Disabilities Act (ADA).

Sidewalk condition

The City's sidewalks are generally in good condition, with 60 percent of survey participants rating the City's sidewalk conditions as "Very Good" or "Good" and only 15 percent of participants rating sidewalk conditions as "Very Bad" or "Bad." However, sidewalk conditions vary throughout the City, and sidewalks in some neighborhoods are in poor condition. This presents safety and accessibility issues and limits the usefulness of the sidewalk system for some people. Tripping hazards are particularly concerning for seniors since falls among this population can lead to broken bones with lengthy recovery periods or permanent disability.

City of Milwaukee Sidewalk Repair, Replacement, and Installation Programs

Repair and Replacement

Sidewalks are repaired or replaced through a variety of methods in Milwaukee:

- **Street Resurfacing and Reconstruction Projects:** Where needed, sidewalks are repaired or replaced to bring them up to city standards during nearly all street resurfacing and reconstruction projects. An exception to this is the High Impact Paving program, which only addresses curb ramps that do not meet current standards.
- **Area-Wide Sidewalk Replacement Program:** This program focuses on assessing the condition of sidewalks within specific areas of the city each year and repairing or replacing sidewalks that do not meet city standards. The program covers different areas of the city each year, over time covering the entire city.
- **Scattered Sites Sidewalk Replacement:** This program repairs or replaces sidewalks that have been cited as problematic by property owners or in response to complaints or tripping hazards.

For each of these programs, the city and the adjacent property owners share the cost of sidewalk replacement equally. The only exception is for sidewalks damaged by city trees, which the city funds 100%.

New Sidewalk Installations

In addition to existing sidewalks being repaired and replaced when needed, new sidewalks are installed on streets without them under a variety of conditions:

- **New Developments and New Streets:** Sidewalks are required to be constructed by city policy when subdivisions or planned unit developments are approved.
- **Street Resurfacing and Reconstruction Projects:** When streets without sidewalks are resurfaced or reconstructed, sidewalks are added per city policy.
- **Small Spot Improvements:** Very small segments of missing sidewalks are added to connect existing sidewalk segments. This is done through the Scattered Sites Replacement program.

These methods for installing new sidewalks typically require developers to pay for 100 percent of the installation cost in new developments. When sidewalks are added to existing city streets without sidewalks, adjacent property owners pay the same cost as if the sidewalks were being replaced (50 percent cost share with city).

Livability & Health

Numerous City departments have long worked to make Milwaukee's streets more livable, vibrant, and attractive. For example:

- DPW has partnered with community organizations to enhance streetscapes during street reconstruction projects, repaving projects, and other opportunities to activate streets. For example, decorative crosswalks can be installed on many residential streets, open street events are encouraged (such as Ciclovía), and many streets can be designed with wider sidewalks (such as S. 5th Street in Walker's Point).
- DPW's Forestry Services works to manage and enhance over 200,000 street trees, as well as boulevard plantings, green spaces, and other landscaping.
- In coordination with DPW, the Office of the City Clerk permits sidewalk cafes that add interest, vitality, and economic opportunities to the City's commercial districts.
- The Department of City Development works with residents, business owners, and developers to plan for and create properties and corridors that are attractive and support walking and bicycling.

DPW's Forestry Services maintains trees throughout the City that contribute to the livability of neighborhoods

Additionally, the vision of the City's Community Health Improvement Plan—*MKE Elevate*—is to "Support Safe and Healthy Neighborhoods" by addressing physical and social environmental factors. One of the top priorities is to "enhance community connectedness," which encourages the establishment of places for Milwaukeeans to meet and interact. Although the health plan does not call for specific walking initiatives or investments, many of the actions called for in this Plan will support the goals and recommendations of *MKE Elevate*.

Despite these efforts, issues persist that have limited the ability of some neighborhoods to reach their potential as vibrant and healthy parts of the City.

Neighborhood Livability

Every neighborhood in Milwaukee is served by one of more major streets. While it is common for residents to be satisfied with the quiet neighborhood street they may live on, they consider livability and walkability of the neighborhood to encompass a much wider area, including these busier streets which they visit and cross by foot and bicycle. When walking, people place a premium on safety, livability, and neighborhood health. Conditions that affect safety, such as speeding and unsafe crossings, have already been summarized as a leading

concern of residents that impact livability. The appearance of streets, including landscaping, street trees, public art, lighting, and other features, also impacts the livability of streets and neighborhoods.

Health

Traffic safety is a significant public health issue. Every year thousands of people walking, bicycling, and in vehicles are involved in crashes in the city, with hundreds sustaining severe injuries, and too many losing their lives. Reducing this traffic violence will positively and directly impact the health of many people throughout the City, particularly pedestrians, who are the most vulnerable users of the street.

In addition to the direct health impacts of reducing crashes, providing walkable neighborhoods can improve the health of residents as they are more likely to walk for short trips, leisure, and to make connections to transit. These short walking trips measurably improve resident health. National physical activity guidelines recommend 150 minutes of moderate physical activity for adults and 450 minutes for children per week. Walking is particularly important for seniors, people with disabilities, and people with lower incomes who have fewer opportunities to participate in sports or formal exercise programs.[16] Walking as a part of everyday transportation can help people meet these goals, yet less than half of Americans get the recommended amount of activity. A vibrant pedestrian realm, including sidewalks, trails, parklets, and sidewalk cafes, creates an environment where walking is easy, convenient, and attractive.

There are many aspects to maintaining and creating healthy and walkable neighborhoods. Certainly, having a mix of land uses and densities supports walkability, and the City's comprehensive and neighborhood plans support this goal. Designing and maintaining facilities to make it easy and comfortable to walk along and across streets is essential to the creation and support for a healthy Milwaukee. Supporting livability involves going beyond safety and building essential pedestrian facilities; it includes the construction and upkeep of important amenities such as street trees, lighting, and public spaces for people to congregate, socialize, and recreate.

Funding and City Processes

While much progress on pedestrian safety, comfort, and accessibility has been achieved in Milwaukee, challenges remain, particularly relating to funding and putting policies into action. Challenges include:

- lack of funding for pedestrian infrastructure,
- safety improvements are often made only after a serious crash,
- inadequate processes to effectively use data in decision making,
- conflicting sources of street design guidance related to pedestrian safety interventions, and
- streets that often prioritize motor vehicles instead of people walking, biking or using transit.

Reactive Process to Safety Improvements

DPW has made countless improvements for pedestrian safety and accessibility. However, in many cases these improvements are in response to a serious crash, or at the request of a Common Council member or neighborhood to address a known safety issue. Without readily available data and clearly identified priorities for pedestrian safety improvements, projects are not always prioritized where there is the greatest need.

Streets Prioritize Driving

Complete Streets are streets that are designed for users of all ages, abilities and choices for getting around, including walking, bicycling, using transit, and driving. In 2018, the City Council adopted the City's first Complete Streets policy to ensure that streets are built to accommodate the needs of the surrounding community. Similar to many American cities, streets throughout Milwaukee have traditionally been built primarily to prioritize the movement and storage of cars and trucks with less regard for non-motorized forms of travel the needs of the surrounding community, and Complete Streets principles. Many streets include overly wide travel and parking lanes, and speed limits that are higher than desirable in an urban setting. Additionally, many major streets were built or expanded during the years following World War II when the City's population was almost 150,000 people more than it is today, car ownership was expanding, and significant changes in the location of commercial and employment areas caused shifts in travel patterns in the City. These factors have resulted in many major streets with more travel lanes than necessary, which increases pedestrian crossing distances and makes it easier for people to drive faster than the speed limit. Complete Streets initiatives consider these changes and attempt to find solutions, which include removing or narrowing travel lanes and related improvements in pedestrian crossing infrastructure.

Streets like Capitol Drive prioritize driving at the expense of other users of the street

Inadequate Funding to Address Street and Sidewalk Needs

DPW has made gains in recent years in addressing the City's backlog of maintenance needs for streets and sidewalks. However, substantial deferred maintenance still exists: at the current pace of repair, it will take years to repair all of the City's streets and sidewalks, even without addressing necessary safety improvements. To be accessible and safe, streets and sidewalks require ongoing seasonal maintenance (snow and ice removal, sweeping, landscaping, etc.) in addition to capital maintenance (repair and limited replacement of existing sidewalks and ramps due to damage). DPW currently clears over 7,000 lane miles of streets and 460 miles of City-owned sidewalks of snow and ice; however, a lack of funding prevents the Department from clearing snow more quickly from sidewalks and curb ramps. Limited funding also decreases the staffing available for tasks such as inspection of work zones and private construction projects for adequate pedestrian accommodations.

There are limited options to address low funding levels for DPW (and other departments). In 2011, the State Legislature imposed strict limits on the taxes Wisconsin cities could impose. Because of this, the City's budget can only incrementally increase in any given year. Any new or expanded initiatives, such as an expanded program to repair streets and sidewalks, must be funded using this small incremental increase or by decreasing funding for another budget item. This issue has been partially addressed by using funding sources other than the general levy to improve pedestrian infrastructure (for example, Tax Incremental Financing (TIF) and state/federal funding programs). However, these funding sources are difficult to use for on-going maintenance of pedestrian facilities.

Lack of Data for Decision Making

Many pedestrian safety improvements only occur after a serious crash or to address concerns from a persistent alder or resident. While the City maintains and uses pedestrian crash and count data to address known issues, there are not policies, procedures, or staff in place to use existing data proactively to improve pedestrian safety. Additionally, data is lacking in some critical areas: there is no comprehensive inventory of sidewalk locations or conditions, pedestrian safety treatments, or ADA-compliant curb ramps in the City. These factors make it difficult to use data to aid decision-making and make it challenging to evaluate the impacts of pedestrian safety investments.

Lack of Direction on How to use Tools

Many DPW staff members are aware of treatments, tools, and best practices to improve pedestrian safety and livability. However, there is not a preferred reference or tool to guide planners, engineers, designers, and other decision makers in implementing pedestrian safety improvements. There is also no standard process to resolve conflicting guidance among the many available design resources. This results in inconsistent use of pedestrian safety enhancements in Milwaukee.

Photo by Tyler Armbruster

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4

Recommendations

This chapter provides a blueprint for improving pedestrian safety, connectivity, accessibility, and comfort in the City of Milwaukee over the months and years ahead. The recommendations are based on public and staff input during the planning process, best practices from peer cities, and national guidance related to pedestrian safety and facilities.

The recommendations are divided into four themes:

Safety

Accessibility and Connectivity

Livability and Health

Maintenance and Operations

Many of the recommendations embrace more than one of these themes, and all of the recommendations support making the City more walkable, vibrant, and safer.

Each recommendation includes a brief description, rationale, and a list of action items needed to implement. Each recommendation concludes with a list of agencies whose involvement is necessary for successful implementation of specific actions or the overall recommendation.

While many of the action items can be implemented within a year or two, some of the recommendations may take longer to complete or may continue indefinitely. This plan is a blueprint to improve conditions for walking in Milwaukee, and it will require incremental progress each year to achieve its goals. To aid the City in achieving these goals and evaluating progress, the Complete Streets Committee and Bicycle and Pedestrian Task Force will play a vital role in annually developing priorities and evaluating progress.

While all of the recommendations in this chapter are important, not all of them have to be implemented in concert for significant benefits to be achieved. Progress in pedestrian safety and improved walkability will be achieved through the steady and consistent adoption of many of these recommendations.

Implementation Partners

The following abbreviations or acronyms are used to identify implementation partners:

- **BIDs:** Business Improvement Districts
- **DCD:** City of Milwaukee Department of City Development
- **DER:** City of Milwaukee Department of Employee Relations
- **DNS:** City of Milwaukee Department of Neighborhood Services
- **DOA:** City of Milwaukee Department of Administration
- **DPW:** City of Milwaukee Department of Public Works
- **MCDOT:** Milwaukee County Department of Transportation
- **MCP:** Milwaukee County Parks Department
- **MCTS:** Milwaukee County Transit System
- **MHD:** City of Milwaukee Health Department
- **MPD:** City of Milwaukee Police Department
- **MPS:** Milwaukee Public Schools
- **NIDs:** Neighborhood Improvement Districts
- **WisDOT:** Wisconsin Department of Transportation

Safety

Provide consistent guidance to DPW staff for street design that improves the safety of all street users.

Description: Street design directly impacts how people travel and the safety of streets for people walking, biking, using transit, and driving. DPW lacks a preferred resource that guides the design of all street elements and prioritizes those walking, biking, taking transit, and finally, driving, in that order. Additionally, treatments that slow motor vehicle speeds and improve pedestrian safety should be included in all new street construction and reconstruction.

Rationale: Street design impacts all users. Motorist speeds and willingness to yield to people walking are heavily influenced by design, and the design of pedestrian crossings has a direct safety and accessibility effect on pedestrians. City staff does not have a single point of reference for street design that is focused on making streets safer for all users, nor a process for resolving conflicts between different sources of design guidance.

Actions

Endorse National Association of City Transportation Officials (NACTO) Design Guidance as the primary source for street design guidance.

Develop and adopt a Complete Streets Handbook that includes a process for reconciling differences in available design guidance.

Use the FHWA Safe Transportation for Every Pedestrian (STEP) program for enhanced crossings.

Provide regular staff training on adopted design guidance and current best practices for designing safe streets.

Partners

DPW, DCD

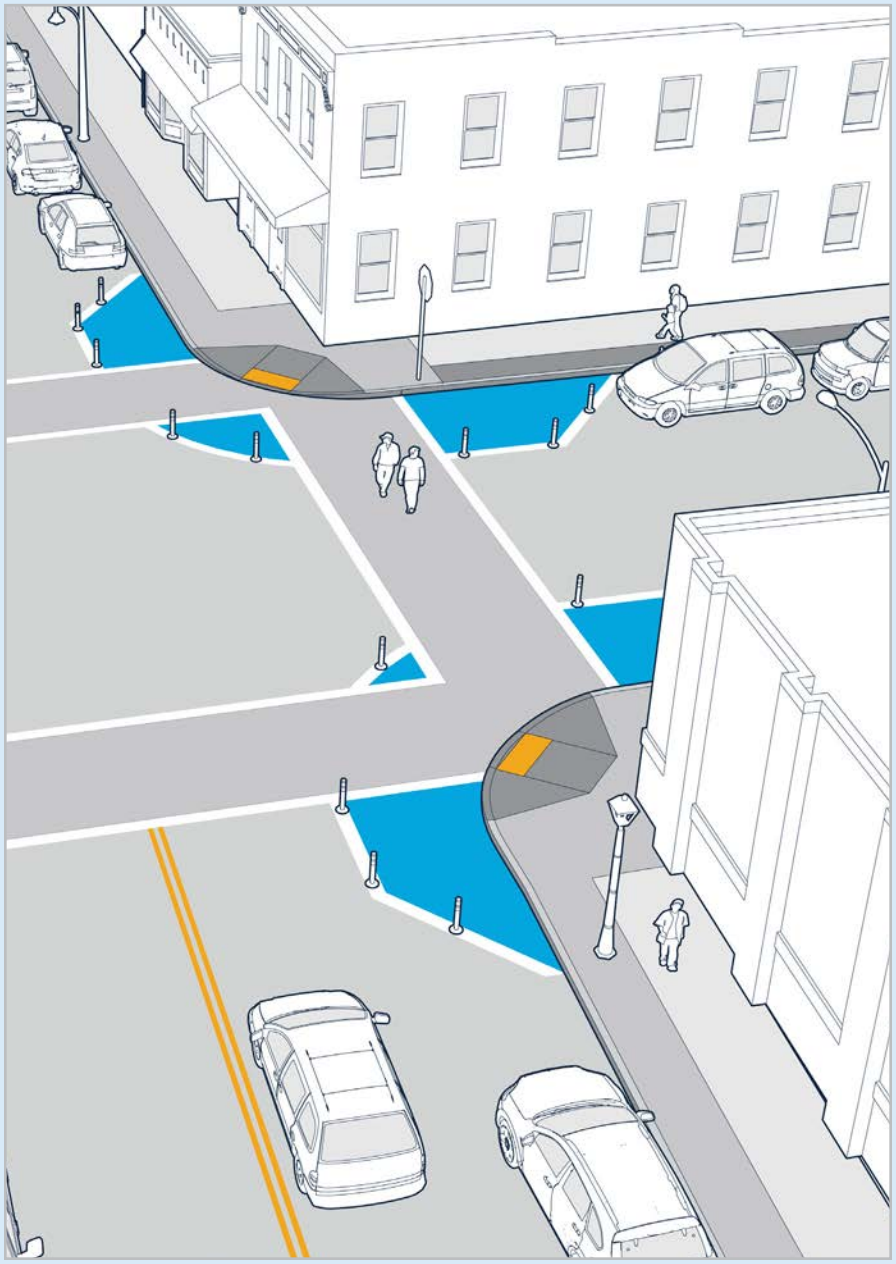
Rapid Implementation Projects

Most pedestrian safety enhancements require changes to existing streets and sidewalks, which can take years to design, fund, and construct. However, many of these projects can be tested on a interim basis in short amounts of time and at low cost by using cost effective materials to construct the project. Known as “rapid implementation,” these projects can be quickly installed and provide opportunities to change the design of a street before more permanent facilities are installed.

For example, curb extensions are typically constructed by removing existing curb and constructing a new curb with a pedestrian area behind it. This process can be time consuming and expensive, particularly if sewer drains need to be relocated with the curb. However, curb extensions can also be constructed by painting the curb extension on the street and providing flexible posts where the new curb would be located. This temporary installation can be observed and adjusted as needed to ensure that it is achieving the project goals before a permanent curb extension is installed.

A wide variety of projects can be undertaken through rapid implementation, but the technique works particularly well to convert streets to places for people.

Action items with this icon can be implemented using Rapid Implementation practices.



Example of rapid implementation curb extensions installed using paint and flexible delineators

Systematically and proactively install pedestrian safety improvements.

Description: Many improvements for pedestrian safety are only installed when a larger street project is occurring. While this is a cost-effective way to improve pedestrian safety, it is also important to systematically and regularly install pedestrian safety improvements before serious crashes occur and as stand-alone projects.

Rationale: Pedestrian crash risk can be reduced by identifying street designs and specific locations that may lead to crashes or have a documented history of crashes. By implementing pedestrian safety improvements at potentially dangerous locations across the City, risks to people walking can be reduced.

Actions

Conduct annual walk-audits of the top ten streets on the Pedestrian High Injury Network and propose rapid implementation solutions to reduce crashes.

Apply for WisDOT safety funds for improvements along state highway corridors.

Reduce speed limits on prioritized streets to reduce the frequency and severity of crashes.

Implement a “quick reaction” team composed of key DPW and MPD staff to visit the site of severe and fatal pedestrian crashes and recommend short-term safety improvements after MPD’s investigation.

Utilize the Pedestrian Safety Toolbox to select appropriate infrastructure improvements.

Make curb extensions and median islands a standard part of all construction and reconstruction projects in areas of high pedestrian activity including, but not limited to, schools, parks, senior centers, community centers, business districts, and major transit hubs.

Evaluate the effectiveness of the Neighborhood Traffic Management Program on slowing traffic and improving pedestrian safety. Expand the types of traffic calming treatments used throughout the City.

Design projects for a target speed and not a design speed.

Work with MCTS to optimize bus stop locations, including bus stop consolidation and relocating bus stops from near side to far side, where appropriate.

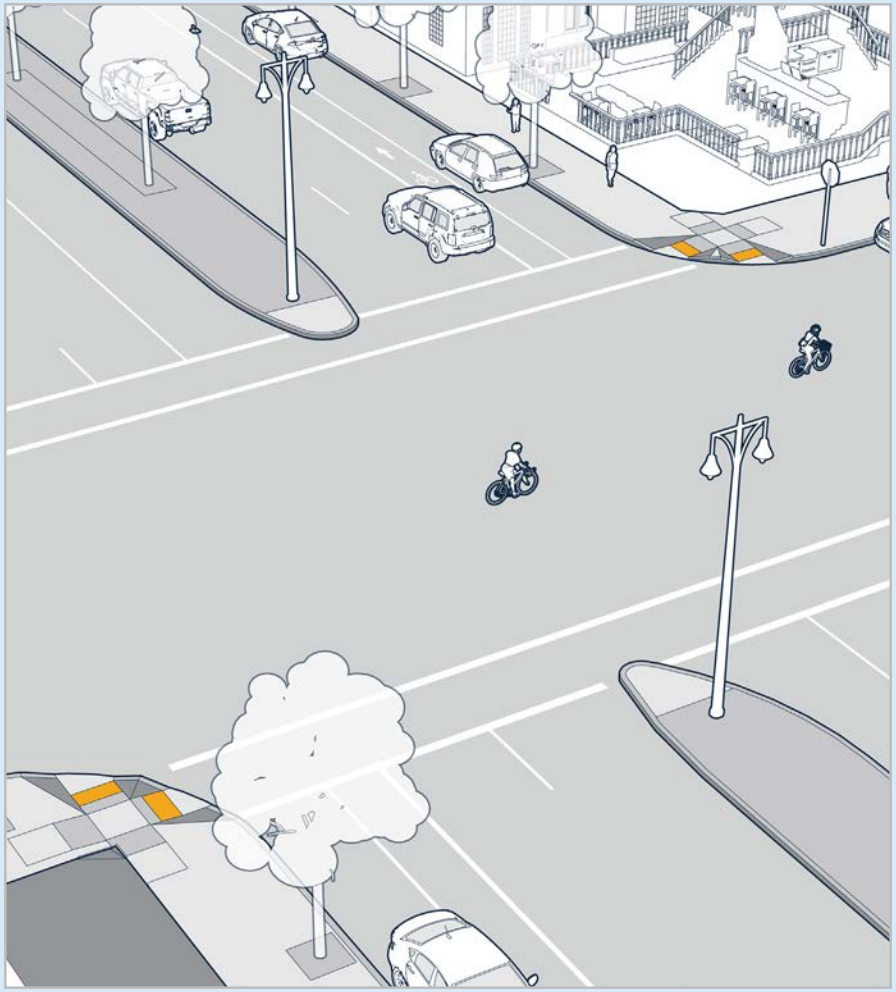
Partners

DPW, MPD

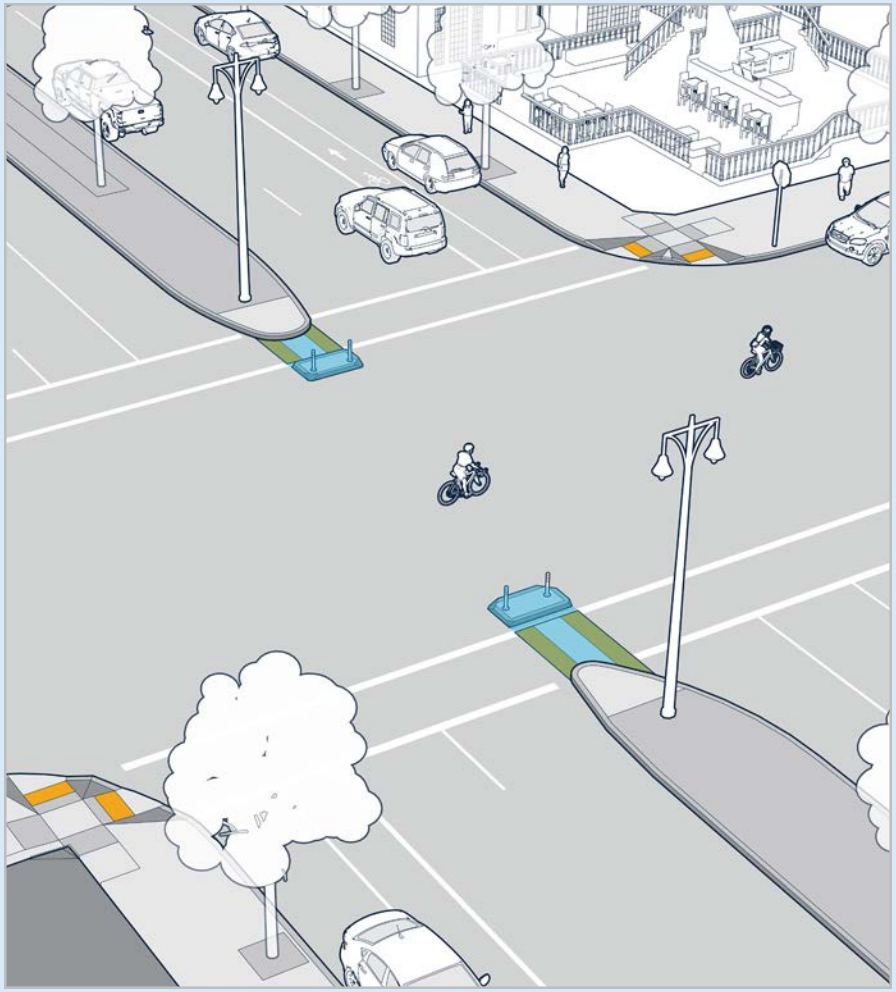
Median and Pedestrian Island Design

Medians and pedestrian islands provide a place of refuge for people crossing streets. This limits people's exposure to vehicle traffic and allows them to only cross one direction of traffic at a time. All medians and pedestrian islands should include a "nose" which extends past the crosswalk. This nose protects people waiting on the median and also slows drivers turning across the median. Islands should be added to medians without noses (below left) to better protect people waiting on medians (below right). Median noses may include features such as bollards to provide additional protection to people waiting on the median.

Example of medians without a protective "nose."



Example of a retrofit median "nose" to better protect people walking.



Provide rapid implementation of pedestrian safety improvements using cost effective materials.

Description: Pedestrian safety improvements do not need to be expensive or take years to design. Low-cost materials can be used to rapidly implement pedestrian safety improvements and test designs before more permanent improvements are made.

Rationale: Pedestrian safety projects can be quickly installed using paint and flexible delineators. This allows safety improvements to be rapidly deployed, without the additional time needed for permanent improvements. Rapid implementation also provides flexibility and can be adjusted as needed to address the original issue.

Actions

Use paint, flexible delineators, and other inexpensive materials to install interim or trial pedestrian safety improvements.

Gather data and evaluate the effectiveness of new pedestrian safety treatments through rapid implementation projects before installing more permanent solutions.

Identify and work with community partners (for example, Neighborhood Improvement Districts, Business Improvement Districts, business associations, neighborhood associations, etc.) to fund, evaluate, and maintain rapid implementation projects.

Establish a system to prioritize locations where pedestrian improvements are needed.

Establish an annual budget to carry out installation and evaluation of pedestrian improvements.

Partners

DPW, DCD

Improve pedestrian safety at signalized intersections

Description: Intersections with traffic signals are often the most obvious places for pedestrians to cross busy streets. Traffic signals and associated signs and markings should make crossing streets safe and comfortable for people walking. Specifically, intersection signal design and timing should be adapted to improve safety and comfort for pedestrians of all abilities.

Rationale: Signalized intersections have some of the highest numbers of pedestrian crashes in Milwaukee. People walking are particularly likely to be hit by drivers turning around a corner because the drivers may not notice pedestrians with enough time to stop safely. Signals in areas of high pedestrian activity should prioritize pedestrian movements, and signals in all parts of the City should provide enough crossing time for pedestrians.

Actions

Implement Leading Pedestrian Intervals (LPIs) in areas where many people walk, including, but not limited to, schools, parks, senior centers, community centers, business districts, and major transit hubs, and intersections where many drivers are turning right.

Consider implementing “No Turn on Red” restrictions where LPIs are installed.

Mark crosswalks and advance stop lines at all signalized intersections to reduce vehicle encroachment into crosswalks.

Ensure that pedestrian signals provide enough time for people walking to cross the street. Consider reducing typical walking speed assumptions to 2.8-3.0 feet per second as recommended by engineering guidelines, particularly in areas near schools, community centers, and senior housing.

Partners

DPW

Implement a citywide marked crosswalk policy and crosswalk safety countermeasures.

Description: Marked crosswalks and associated countermeasures can significantly improve pedestrian safety. While not all crosswalks need to be marked, the City should have a clear and consistent policy for when crosswalks are marked, the types of marking used, and when crosswalks require additional enhancements to improve safety.

Rationale: Marking crosswalks can improve pedestrian safety and improve crosswalk visibility for drivers. A comprehensive policy for marking crosswalks will help the City be consistent with where crosswalks and other pedestrian safety countermeasures are installed.

Actions

Develop criteria for determining where crosswalks should be marked using national best practices; criteria should indicate conditions where new marked crosswalks are not recommended without additional crossing enhancements. Establish a table and flowchart to simplify crosswalk placement and use of additional crossing enhancements.

Monitor the policy and process for the installation of decorative crosswalks and evaluate any benefits for improving conditions for walking.

Mark advanced stop and yield bars ahead of marked crosswalks throughout Milwaukee to indicate where drivers should stop at intersections.

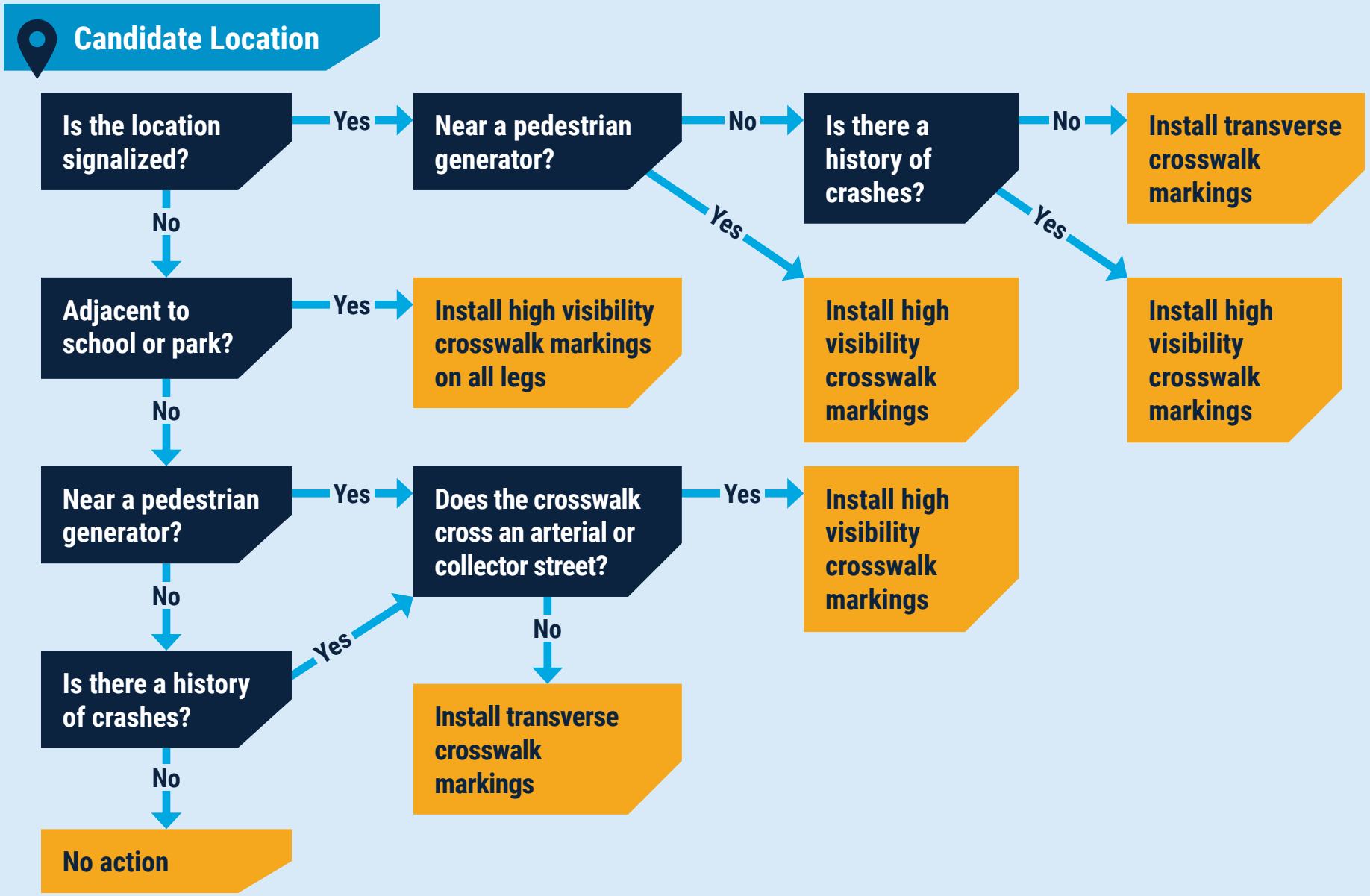
Assess overhead lighting at marked crosswalks and improve lighting if necessary.

Partners: DPW

DPW

Crosswalk Marking Policy

The flowchart below should be used to determine when a crosswalk should be marked in Milwaukee and the type of markings to use.



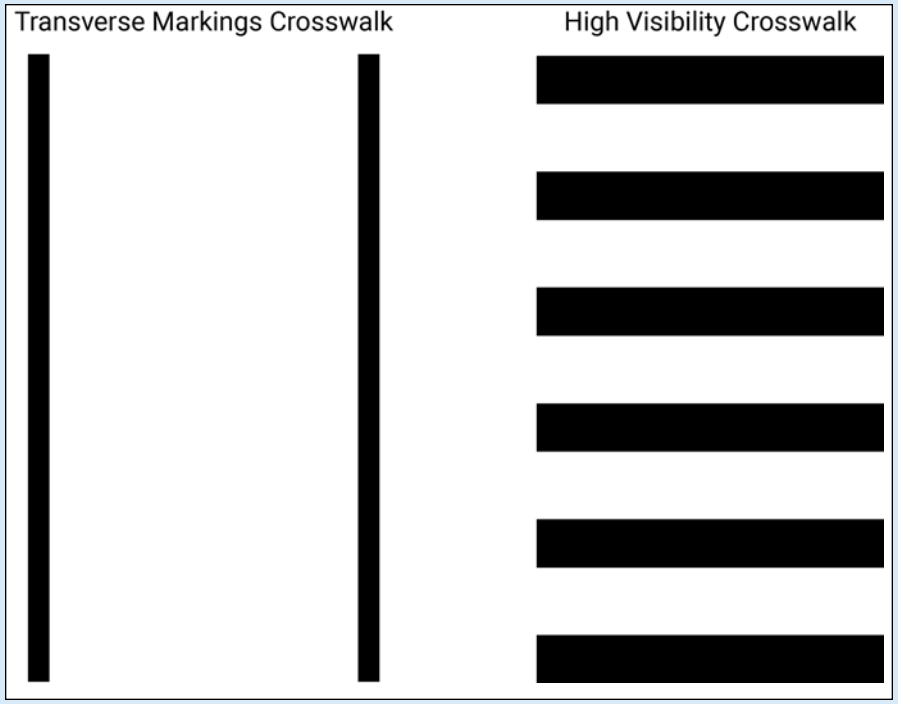
Crosswalk Marking Policy Notes

- All new marked crosswalks across streets of four lanes or more shall not be signed and marked only, but must include curb extensions, refuge islands, roadway reconfiguration, beacons, or signalization.
- Refer to the FHWA Guide for Improving Pedestrian Safety at Uncontrolled Crossing Locations for guidance on selection of additional crossing safety enhancements.
- Existing marked crosswalks that do not meet this guidance should not be removed, but should be considered for additional enhancement to meet the guidance.
- Major pedestrian generators include, but are not limited to, schools, parks, senior centers, community centers, business districts, and major transit hubs.

Crosswalk Marking Maintenance

- Continental crosswalks shall consist of 12-inch bars with 24-inch spacing.
- Stop bars shall be marked at all controlled locations where crosswalks are marked.
- DPW shall update the annual maintenance program for marking crosswalks on residential streets to ensure crosswalks near schools and parks are maintained. This update should consider the lifespan of pavement markings on low-volume streets to determine geographic zones throughout the City that are maintained on a regular basis (i.e. if pavement markings last three years, split the City into three zones and maintain one zone each year).
- DPW shall evaluate crosswalks on arterial and collector streets on an annual basis and refresh the markings as needed.
- All new or refreshed midblock crosswalks shall be marked with continental markings.

Standard City of Milwaukee crosswalk markings



Integrate Vision Zero principles into Complete Streets policy implementation.

Description: Vision Zero is an international, multidisciplinary approach to reducing and eventually eliminating crashes that result in serious injuries and fatalities for all street users, including pedestrians. Vision Zero combines a variety of engineering, enforcement, education, and emergency response strategies to prioritize traffic safety. As noted in the City's Complete Streets policy, safety is imperative, with pedestrian safety having the highest priority. As the City works to implement its Complete Streets policy, Vision Zero principles and strategies will guide our efforts to make Milwaukee streets safe and enjoyable for all users.

Rationale: Crashes that result in serious injuries or fatalities are unacceptable and largely preventable. Eliminating these crashes on Milwaukee's streets means a comprehensive approach to traffic safety (with pedestrian safety being an important aspect). This bold, but achievable, goal will draw attention to the importance of eliminating traffic-related serious injuries and fatalities.

Actions

Develop clear timelines for reducing and eventually eliminating crashes that result in serious injury or death.

Include the pedestrian safety actions in this Plan for the pedestrian components of Vision Zero; add similar strategies for the other modes of travel.

Prioritize improvements that will address identified safety concerns and enhance safety for all street users, including infrastructure, education, enforcement, and encouragement programs.

Partners

DPW, MHD, MPD

Provide community-supported traffic enforcement and education to improve pedestrian safety.

Description: Traffic enforcement can improve safety for all street users and reduce dangerous driving behaviors. It is important to explain to the community why traffic enforcement is important, focus enforcement on behaviors most likely to result in serious crashes, and have support from the public for enforcement. Campaigns to educate the public through public service announcements, general outreach, and focused enforcement practices (such as crosswalk enforcement in a high-risk area) can improve the safety for everyone using City streets.

Rationale: Anecdotal reports and speed data indicate that illegal and dangerous driving behavior is commonplace in Milwaukee. High speeds, illegal passing, and failure to yield to pedestrians often results in serious and fatal crashes. Law enforcement agencies should continually target behaviors most likely to lead to serious crashes. Enforcement and education campaigns should be focused at locations with the highest rates of crashes and risky behaviors. This approach optimizes the limited resources that MPD has to spend on pedestrian safety campaigns.

Actions

Conduct targeted education and enforcement efforts in high crash corridors throughout the City.

Educate the public on the importance of traffic safety of all street users through PSAs, earned media, and community events.

Educate the public that it is illegal for adults to bicycle on sidewalks in Milwaukee and provide selective enforcement as necessary.

Record and summarize the effectiveness of enforcement efforts and share this information with the Common Council and community groups.

Partner with Milwaukee Public Schools to implement pedestrian safety education and to distribute information to parents.

Work with community partners to ensure education and enforcement is culturally appropriate.

Develop educational materials and identify opportunities to partner with the disability rights community as needed.

Continue to work with the Wisconsin DOT's Bureau of Transportation Safety for safety training and mini-grants for education and enforcement efforts directed at pedestrian safety.

Integrate education into enforcement actions by distributing pedestrian safety pamphlets with—or in place of— citations.

Seek authority to automate traffic enforcement.

Partners

MPD, DPW, WisDOT, MHD, MPS

Accessibility and Connectivity

Ensure accessibility for persons of all ages and abilities.

Description: A pedestrian network is not complete or inclusive if it is not accessible to people with disabilities. The public right of way should be barrier-free and easily accessed by all people, regardless of ability.

Rationale: Under Title II of the Americans with Disabilities Act, most public entities are required to have a plan for how they will make public spaces accessible to people with disabilities. The City has made substantial efforts to make the pedestrian network more accessible, but the City does not have a formal transition plan guiding these efforts.

Actions

Finalize an ADA Transition Plan for the public right of way.

Develop a prioritization tool for the installation of Accessible Pedestrian Signals (APS).

Implement ADA-compliant curb ramps to the maximum extent feasible at all crosswalks citywide and ensure that all exceptions are comprehensively documented.

Use perpendicular curb ramps as the standard ramp design and ensure that all exceptions are comprehensively documented (see Curb Ramp Design sidebar).

Use durable (i.e. cast iron) detectable warning fields to minimize long-term maintenance.

Develop and maintain a database of all curb ramps, including locations and level of compliance with ADA.

Partners

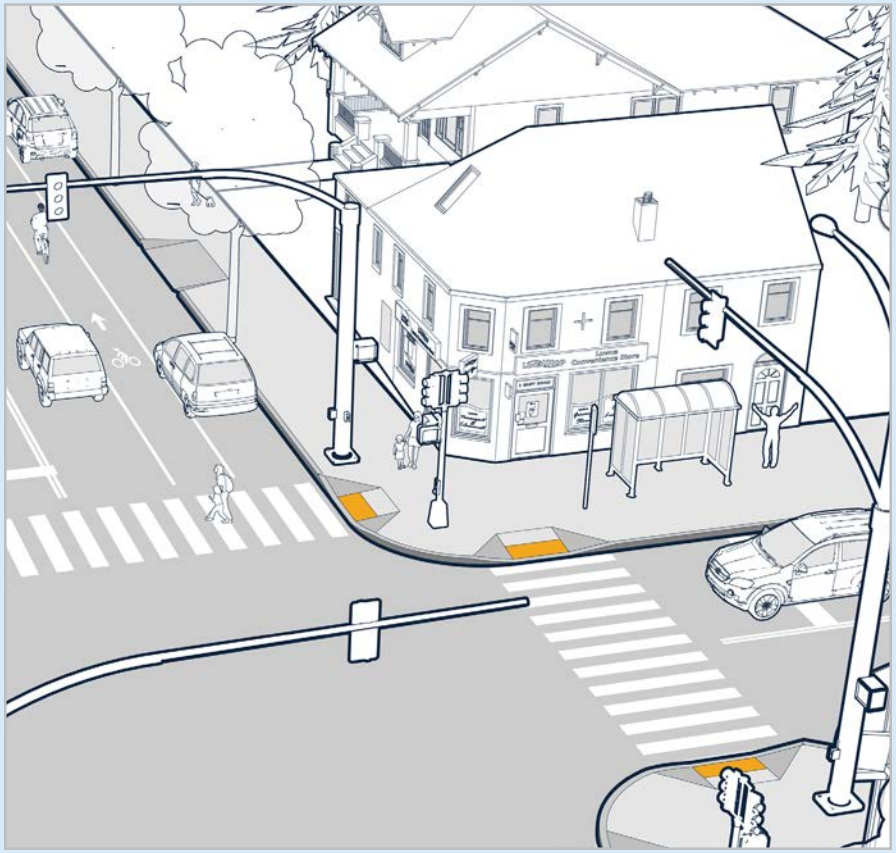
DPW, DOA, DNS

Curb Ramp Design

Pedestrian curb ramps improve the accessibility of sidewalks and are required under the ADA. Curb ramps allow access by people using mobility devices, reduce tripping hazards, and make it easier for all people to use the sidewalk system. The two most common types of curb ramps are diagonal and perpendicular. Diagonal ramps are commonly found at the corners of intersections along the curve and often serve more than one crosswalk. Diagonal ramps are not preferred because they direct people to walk into the intersection away from the most direct path. Perpendicular ramps are typically perpendicular to the street and direct people in the direction they wish to travel. Perpendicular curb ramps should be the standard design for all curb ramps as they better maintain a straight route for people walking and direct users into the crosswalk. When perpendicular ramps cannot be constructed due to design constraints, diagonal ramps are acceptable, but the justification for using a diagonal ramp shall be documented.

Example of a diagonal curb ramp

Example of a perpendicular curb ramp



Proactively address gaps in the sidewalk network.

Description: The City has an existing policy that sidewalks should be installed on both sides of all new and reconstructed streets. This policy should continue to be implemented, while existing gaps in the sidewalk network are also identified and completed.

Rationale: Sidewalks are a proven means of reducing pedestrian crashes. While the city has an excellent sidewalk network, gaps do exist. The best opportunity to fill these gaps is to construct sidewalks when new streets are built and existing streets are reconstructed. The City also needs the ability to address sidewalk gaps outside of a construction project.

Actions

Conduct an analysis to identify gaps in the sidewalk system and prioritize locations that need to be proactively addressed (as opposed to waiting for street reconstruction projects).

Provide additional funding for the area-wide sidewalk replacement program. Include funding for addressing gaps in the sidewalk system.

Collaborate with WisDOT, Milwaukee County Parks, and MCDOT to ensure that the City's policy of providing sidewalks on both sides of all streets is achieved.

Partners

DPW, MCP, MCDOT, WisDOT

Ensure clear pedestrian routes on sidewalks.

Description: For pedestrian routes to be accessible and usable, they must be free of obstructions. Construction detours, newspaper and vending boxes, utilities, and amenities such as sidewalk cafes, while often desirable, can create barriers on sidewalks. Current City efforts to maintain barrier-free sidewalk corridors should be continued and expanded, especially through construction zones.

Rationale: Short- and long-term closures of pedestrian routes for construction projects can have significant impacts on pedestrian accessibility and connectivity. This is particularly true when alternate pedestrian routes are not provided on the same side of the street and people walking are required to cross major streets. Additionally, new mobility systems, such as dockless bike share bikes, present new challenges to providing clear walkways. These obstructions are particularly problematic for people who are blind, have low vision, or use a wheelchair or other mobility device.

Actions

Require that accessible pedestrian routes are established and maintained through construction areas and work zones, regardless of the duration of obstruction.

Require temporary bus stops and alternative paths of travel that are accessible during construction detours.

Develop clear guidelines for temporary accommodations during construction. Prioritize these temporary accommodations over complete sidewalk closure.

Enforce the City's requirements that a pedestrian path be kept clear of obstructions, including newspaper and vending boxes, sidewalk cafes, etc.

Develop clear requirements for the placement of docked and dockless mobility systems.

Require that all entities (private or public) obstructing a sidewalk or path for more than 24 hours submit a formal plan to accommodate pedestrians through or around the work area.

Partners

DPW, DNS

Ensure that all transit stops are ADA compliant and are served by accessible routes.

Description: High-quality pedestrian access to transit stops should be a priority to ensure accessibility of the transit system.

Rationale: Transit in Milwaukee provides access to jobs, entertainment, recreation, retail areas, and services. Transit also reduces traffic congestion and expands choice in mobility. Nearly all transit trips begin and end with a walk. That walk should be pleasant, safe, and accessible for people of different abilities to ensure that transit is a viable and attractive transportation options for Milwaukeeans.

Actions

Develop policies and procedures to assess pedestrian access to all MCTS bus stops regarding safety, accessibility, and directness.

Prioritize the funding of pedestrian projects at heavily-used transit stops.

Construct ADA-compliant bus stop boarding areas during street reconstruction and as sidewalks are replaced or new sidewalks are built.

Prioritize pedestrian safety enhancements that also help transit function efficiently, such as curb extensions that also serve as bus boarding areas (see Chapter 5).

Partners

DPW, MCTS

Provide multiple ways for people to report pedestrian facility and accessibility issues.

Description: People who regularly walk are in the best position to report accessibility and maintenance issues to the City. Multiple means of reporting, including online and via phone, should continue to be available and updated as needed. All reported issues should continue to be digitally recorded and tracked through their resolution; any issues not addressed should include documentation of why the issue does not need to be addressed.

Rationale: Pedestrians are the first to notice most breakdowns in sidewalk accessibility (i.e. new tripping hazards). It should be easy for people to communicate these issues to City staff, and for staff to reply with how the issue will be addressed in a timely manner. Frequent reporting of issues, and correction of those issues by the City, can reduce liability as well as make the pedestrian network safer and more accessible.

Actions

Promote reporting of snow and ice issues, damaged sidewalks, and inaccessible transit stops via phone and electronic reporting.

Compile an annual report summarizing complaints and responses and providing metrics that track the efficiency of responses to complaints.

Partners

DPW, DOA Information & Technology Management Division

Livability & Health

Support and encourage placemaking in neighborhoods throughout Milwaukee.

Description: Many City agencies and departments have a role in making Milwaukee's streets vibrant and attractive. These agencies and departments should ensure a high-quality pedestrian environment by supporting creative use of public spaces and the streetscape.

Rationale: Placemaking and streetscaping both refer to the design of streets, amenities provided along a street, and the overall attractiveness of the street. For example, providing decorative lighting, trees that shade the sidewalk, pocket parks, and sidewalk cafes all make neighborhoods and public spaces more desirable and walkable than streets that lack those features. Placemaking improvements in the public right-of-way, such as parklets and public art, contribute to an attractive streetscape environment, while also separating people walking from street traffic. These benefits make for a more attractive walking environment, can encourage people to walk more, and have positive health outcomes.

Actions

Provide street trees that will form a tree canopy along City streets whenever possible.

Provide seating for people in the public way in the form of benches, parklets, pocket parks, and other features.

Provide pedestrian wayfinding signs in areas of high pedestrian traffic, particularly tourist areas, to guide people to parks, museums, business districts, and other destinations.

Integrate art into pedestrian spaces, including intersections and crosswalks where appropriate, and work with community groups such as the City of Milwaukee Arts Board to identify opportunities for art in public and pedestrian spaces.

Identify street corridors that should be targeted for enhanced pedestrian design when the street is next reconstructed or when funding becomes available. These streets typically include commercial areas with high pedestrian volumes.

Create and improve quality connections to areas with many attractions—including the lakefront, county parks, parkway and trail systems, and commercial districts.

Review neighborhood and area-wide planning efforts—including the City's area plans and neighborhood-led quality of life plans—to ensure that plans address pedestrian needs and the goals of the Complete Streets policy.

Encourage and support the MPS's Safe Routes to School program as an element of placemaking and neighborhood enhancement.

Partners

DPW, DCD, MPS, MCP

Use streets and public spaces for programmed events.

Description: Support on-going events for streets, public spaces, and commercial spaces to encourage walking, placemaking, and vibrant neighborhoods. Events may include street fairs, neighborhood block parties, “open streets” events, and other activities.

Rationale: Streets and public spaces represent a large portion of Milwaukee. These spaces can be programmed for events that encourage walking, bicycling, and neighborhood vibrancy and highlight connections across neighborhoods.

Actions

Support temporary closure of residential streets for street or neighborhood events.

Sponsor Open Streets events that feature different neighborhoods throughout the City.

Support planned activities in public spaces such as recreational programs in parks.

Support formal and informal walking events through coordination with other departments and sponsorship.

Partner with neighborhood associations, Neighborhood Improvement Districts (NIDs), Business Improvement Districts (BIDs), business groups, and other community organizations to program new pedestrian spaces.

Train City staff and consultants on placemaking principles.

Partners

DPW, MCP, MHD, DCD

Maintenance & Operations

Maintain pedestrian facilities for safety and accessibility.

Description: Sidewalks, curb ramps, median islands and other pedestrian facilities require regular maintenance to ensure that they are in a good state of repair that allows access for all users and does not present hazards (such as tripping issues).

Rationale: Ongoing regular maintenance involves addressing tripping hazards on sidewalks, repairing damaged sidewalk sections, and evaluating the need for sidewalk replacements. By addressing small issues as they arise, major replacements of sidewalk can be avoided. This routine maintenance reduces or eliminates tripping hazards and decreases injury risk for people walking, all while reducing potential liability claims against the City. The existing area-wide sidewalk repair program addresses these issues but does not cover the entire City in a timely manner.

Actions

Ensure multiple ways of identifying and reporting sidewalk or crossing problems (online reporting, phone reporting, City staff identification).

Ensure that pedestrian facilities are never replaced with lesser facilities (i.e. replacing a 6-foot wide sidewalk with a 5-foot wide sidewalk).

Fund the area-wide sidewalk repair program to ensure that the condition of every sidewalk in the City is assessed at least every ten years, with repairs made as needed.

Expand the existing program of horizontal cutting to address minor tripping hazards on sidewalks.

Identify and fund any key gaps in the sidewalk system that must be prioritized for safety.

Partners

DPW

Maintain the pedestrian network for year-round access.

Description: Conduct day-to-day maintenance of sidewalks, curb ramps, and transit stops including sweeping, vegetation removal, and snow and ice removal, to ensure that the pedestrian network is safe and usable year-round.

Rationale: Adjacent property owners are relied upon to conduct day-to-day maintenance of sidewalks, curb ramps, and transit stops. The City ultimately has the responsibility to ensure that this work is performed, but under ordinance, has delegated that responsibility to property owners.

Actions

Educate property owners about their responsibilities for sidewalk maintenance, particularly snow removal.

Actively enforce sidewalk clearance rules for snow, ice, and other debris.

Train municipal drivers to watch and report sidewalks not cleared within 24 hours of snowfall.

Work with outside entities to clear sidewalks of snow, ice, and overgrown brush along vacant lots and other locations where there is not a clearly responsible adjacent property owner.

Encourage NIDs and BIDs to remove snow and perform other seasonal maintenance of sidewalks and curb ramps within their districts.

Prioritize sidewalk snow removal at City buildings.

Clear trails of snow, ice, and overgrown brush.

Identify transit stops, intersections, curb ramps, and median cut-throughs for priority snow and ice removal by City staff or contractors to ensure accessibility.

Partners

DPW, DNR, DCD, NIDs, BIDs, MCTS, MCP, WisDOT

Establish an annual funding source to implement pedestrian safety and traffic calming measures.

Description: Many pedestrian safety measures can be implemented as a part of street projects, but others will require a dedicated funding source to install safety and traffic calming actions as independent projects.

Rationale: A dedicated funding source and budget is required to systematically install pedestrian safety treatments. A consistent budget will allow staff to prioritize improvements from year to year and ensure timely project implementation. This funding source should not rely on assessing nearby property owners for the cost of treatments, which has the effect of prioritizing safety improvements in wealthier areas of the City.

Actions

Identify a dedicated funding source for pedestrian safety projects on an annual basis.

Allocate a portion of federal Surface Transportation Program funds for pedestrian infrastructure projects.

Prioritize projects that include pedestrian safety elements using existing funding sources.

Discontinue the practice of assessing nearby property owners for traffic calming improvements.

Partners

DPW, DOA

Case Study: City of Madison, Wisconsin Sidewalk Repair Program

The City of Madison has a comprehensive system for maintaining and expanding the sidewalk network. This sidewalk repair and replacement program has several components:

Revolving Sidewalk Repair Program: Each year two of the city's 20 aldermanic districts are targeted for sidewalk replacement. During the first year of the program, city staff walk all sidewalks in the designated districts and mark all cracked, heaved, or settled sidewalks for repair or replacement. Property owners are then notified of necessary repairs and the associated cost for the repair. In the second year, a contractor completes all of the repairs and replacements, while staff assess sidewalks in the next two selected districts. In this way, the program covers the entire city over a 10-year period. The city will identify the problem segments, hire a contractor, and pay for 50% of the replacement cost. The property owner has an option of hiring a contractor, but they will pay 100% of the costs under this arrangement.

Addressing Sidewalk Hazards: When sidewalk issues are reported and confirmed by city staff as being in need of repair, the city will either replace the sidewalks or, if possible, use a horizontal saw-cutting machine to level off a heaved sidewalk joint. The city will address these hazards in a timely fashion and generally not wait until the district-by-district repair program matches up with the district where the identified repair is located. Asphalt ramps (shims) are occasionally used to address trip hazards, but only as a temporary measure to eliminate the hazard until a permanent repair can be made. This component of the Madison program also includes sidewalk repair work requested by various city agencies (Streets, Water Utility, Parks, Parking Utility, and Traffic Engineering). The city will pay for 50% of the replacement cost, but will not assess costs to adjacent property owners for horizontal saw-cutting.

Replacement on Street Resurfacing and Reconstruction Projects: Sidewalks that are in need of repair are included as part of street reconstruction projects and are replaced as part of the street project. The city will pay 50 percent of the costs to replace sidewalks in substandard condition. Sidewalks are also often replaced as part of street resurfacing projects when the street work involves sanitary and/or water services work. Some smaller segments of sidewalks may be replaced when curb ramps are replaced or added. If sidewalks are replaced to meet ADA accessibility standards, the city will pay for 100 percent of the costs.

Horizontal Cutting: Another aspect of the sidewalk repair program involves annual contracts with specialized contractors where raised sidewalk segments are cut down at the joint to eliminate tripping hazards. There is no cost to the adjacent property owner. These city-wide saw-cuts most often are done in response to the city's "report-a-problem" website or have been identified by city staff working on reconstructions or resurfacing projects outside of the designated districts for that year.

Funding Levels

2019 through 2024 – $1,825,000 to $2,326,000 per year without special assessments and $2,810,000 to $3,586,000 per year with special assessments included. This does not include funding of sidewalks tied to reconstruction projects. Costs associated with sidewalk replacement are rolled into the cost of the overall project.

Evaluate the staffing necessary to systematically improve pedestrian safety and access.

Description: Systematically improving pedestrian safety and access requires adequate staffing for a wide variety of tasks including planning, engineering, maintenance operations, snow removal, inspections, and other tasks.

Rationale: DPW staff currently carries out the tasks detailed above but may not have the time necessary to fully address the issues they face. This Plan also recommends new activities that will require additional staff time. Departmental roles and responsibilities should be evaluated to ensure that staff is allocated efficiently, with additional staff being added as necessary.

Actions

Provide additional inspectors to assess work zone pedestrian access and respond to maintenance complaints.

Provide additional staff to conduct the expanded area-wide sidewalk inspection program.

Provide additional maintenance staff for snow removal from pedestrian areas.

Provide additional staff to manage or prepare plans and studies and conduct data analysis.

Partners

DPW, DOA, DER

Use data about walking and the pedestrian network to evaluate and prioritize projects.

Description: Data about walking, pedestrian safety, and facilities should inform future pedestrian projects. This data may include pedestrian counts, a geospatial inventory of sidewalks, crosswalks, other pedestrian treatments and curb ramps; crash data, issues reported by the public, and other data associated with the pedestrian network. Once collected, data should be stored digitally and be readily accessible by staff and the public for analysis and to guide decisions.

Rationale: Substantial data about the pedestrian network is already collected, but it is not always readily accessible or analyzed to inform future projects. Additionally, data about key pieces of the pedestrian network and its use are not currently collected. Collecting and using data to support on-going actions and to help with decision-making is critical to efficiently prioritize projects that improve pedestrian safety.

Actions

Collect speed data that can be used in project prioritization.

Require pedestrian and bicycle counts whenever staff or consultants are conducting motor vehicle counts. Consider collecting other data on travel behaviors whenever conducting counts.

Continue to collect and analyze crash data to help determine priorities and locations for pedestrian safety improvements. Work with MPD to improve the accuracy of crash data and completeness of crash reports.

Create an inventory and digital map of all pedestrian facilities in the City, with information on general conditions and ADA compliance.

Conduct annual pedestrian counts along the City's high-injury network.

Collect and analyze pedestrian count and crash data before and after project implementation to assess the effectiveness of projects.

Partners

DPW, MPD

Provide annual pedestrian safety training for City staff and encourage other fleet operators to provide similar training.

Description: All City staff who operate publicly-owned vehicles should undergo annual training in pedestrian safety, and, in particular, the requirement to yield to pedestrians. Other agencies and businesses operating large vehicle fleets in Milwaukee should be encouraged to provide similar training to their staffs.

Rationale: City, County, and other fleet operators, as well as transit drivers, represent a significant portion of day-to-day Milwaukee traffic and can serve as role models for safe driving behavior. It is important that staff undergo regular training on pedestrian laws to ensure they are knowledgeable about how to behave when driving near pedestrians.

Actions

Require annual pedestrian safety training for all City staff who drive a municipal vehicle.

Encourage annual pedestrian safety training for MCTS drivers.

Encourage annual pedestrian safety training for staff of agencies and businesses that operate large fleets in Milwaukee including Milwaukee County, We Energies, Waste Management and others.

Partners

DPW, MPD, MCTS, MCP, DER

5

Pedestrian Safety Toolbox

This chapter provides information on a series of improvements that make walking safer, more accessible, and more enjoyable. The improvements featured here are not an extensive list of every available option to improve the pedestrian experience, but rather a tailored list of tools that have a demonstrated history of improving pedestrian safety and access. Importantly, nearly all of the tools featured here are already in use in Milwaukee. The tools can be used together, and often greater safety gains can be expected when more than one tool is used. Examples of how the tools can be applied to actual locations in Milwaukee are provided after the toolbox.

The Toolbox provides a brief description of each tool, including its benefits, and information about application of the tool. The majority of the tools target improving pedestrian crossings since crossings are where most crashes occur. The tools can be grouped into the following categories:

Capital Improvements

- Sidewalks
- Curb Extensions
- Pedestrian Islands
- Raised Crosswalks & Intersections
- Right-Turn Redesign

Signs and Markings

- Lane Widths
- Road Diets
- Marked Crosswalks
- Yield to Pedestrian Signs
- Speed Feedback Signs

Signals

- Leading Pedestrian Intervals
- Accessible Pedestrian Signals (APS)
- Protected Left Turns
- Right Turn on Red Restrictions
- Pedestrian Beacons

Crash Reduction Factor (CRF)

A crash reduction factor (CRF) is the percentage crash reduction that might be expected after implementing a given improvement at a specific site. Where applicable, CRFs are included for improvements in the Toolbox.

For more information, see: https://safety.fhwa.dot.gov/tools/.

Proven Safety Countermeasures

Proven Safety Countermeasures are specific treatments highlighted by the Federal Highway Administration for their safety effectiveness and benefits. The Toolbox notes which tools are Proven Safety Countermeasures.

For more information, see: https://safety.fhwa.dot.gov/provencountermeasures/

Guidance and requirements for use of the tools is available from numerous resources, many of which are summarized at the end of this chapter.

Pilot to Permanent Implementation

The typical project development process for pedestrian and street projects can take many years from the initial concept development through construction. During this time, momentum for the project can decrease, as can political will, and community engagement.

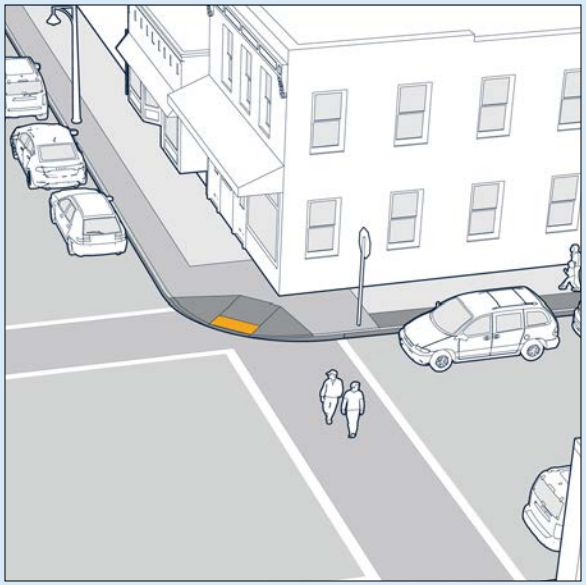
To overcome this and to speed implementation, many of the tools featured in this Toolbox can be implemented rapidly on an interim basis. By constructing pedestrian safety improvements using paint, signs, flexible delineators, and other low-cost materials, projects can be rapidly installed prior to permanent construction. The use of temporary materials is also beneficial as it allows changes to the design based on actual use prior to final construction.

Conventional versus Phased/Interim Project Development

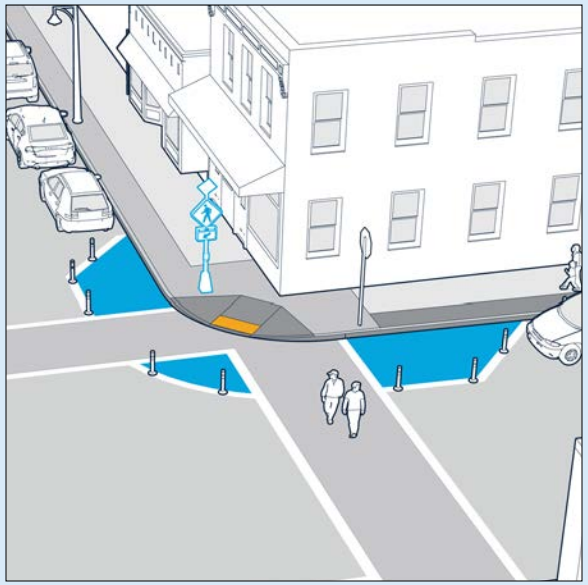
Year	Conventional Project Development	Phased/Interim Design Project Development
Year 1	Concept Plan/Outreach	Concept Plan/Outreach
Year 2		Interim Installation Impacts Analysis
Year 3	Design	Design
Year 4		
Year 5	**Construction**	**Construction**

Adapted from the NACTO Urban Street Design Guide

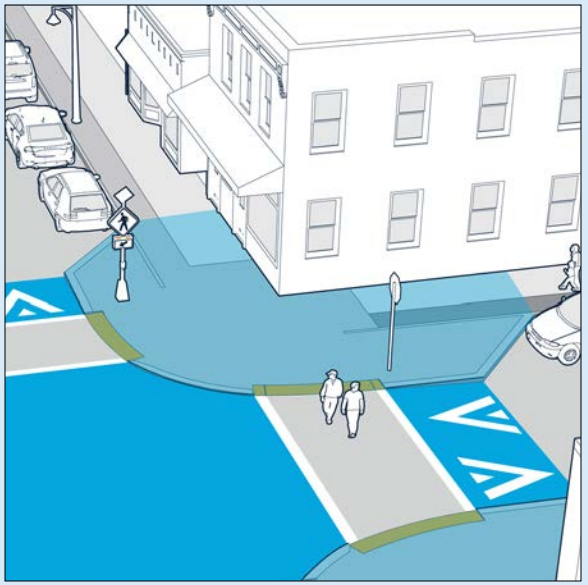
Existing condition



Interim curb extension (paint and flexible delineators)



Permanent curb extension and raised intersection



Sidewalks

DESCRIPTION

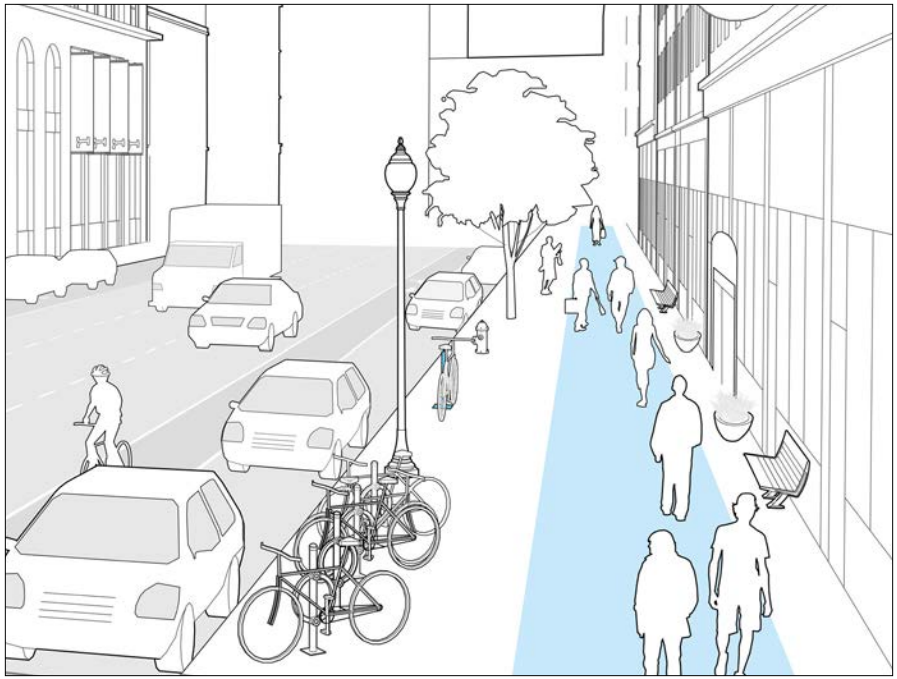
Sidewalks provide space along a street for pedestrian travel. For sidewalks to function, they must be kept clear of any obstacles and be wide enough to comfortably accommodate expected pedestrian volumes (as anticipated by density and adjacent land use), and different types of pedestrians, including those using mobility assistance devices, pushing strollers, or pulling carts.

BENEFITS

- Sidewalks make walking an easy choice between destinations since they create a network for pedestrian travel throughout the city.
- Sidewalks and their buffers provide space for utilities, signs, and amenities such as bus shelters or waiting areas, bicycle parking, public seating, public art, newspaper stands, trash and recycling receptacles, and greenscape elements.
- Sidewalks are not only used for transportation, but for social walking, exercise, lingering, commerce, recreation, and as public social space—all activities that contribute to a vibrant and lively street.
- Sidewalks make access to transit possible since the majority of transit users walk between their destination and transit stops.
- Sidewalks are a Proven Safety Countermeasure with a 65% to 89% reduction in crashes involving pedestrians walking along streets.[19]

TYPICAL APPLICATION

- Sidewalks should be present along all Milwaukee streets.
- The widths of sidewalks will vary based on context and expected pedestrian volumes. Widths may range from 5 feet along residential and industrial streets to 12 feet or wider downtown and in areas of high use.
- Sidewalks must include an accessible pathway that is free of obstructions, such as light poles, traffic signals, trees, utilities, and furniture. ADA guidelines allow a minimum accessible pathway of 4 feet where there are major constraints. The City of Milwaukee uses a minimum width of 5 feet for the accessible pathway.
- Sidewalks that are replaced for maintenance reasons should not be narrower than the sidewalk being replaced (e.g. a 6-foot wide sidewalk should not be replaced with a 5-foot wide sidewalk).



CONSIDERATIONS

- All new sidewalks and curb ramps shall comply with ADA regulations.
- Sidewalks should be clear of any obstructions including utilities, traffic control devices, trees, and furniture.
- The width and design of sidewalks will vary depending on street type, demand, and available right-of-way.
- Sidewalks should, as much as possible, follow the natural path of pedestrian travel parallel to the street. Crosswalks should be aligned with sidewalks to maintain the most direct path of travel.

Curb Extensions

DESCRIPTION

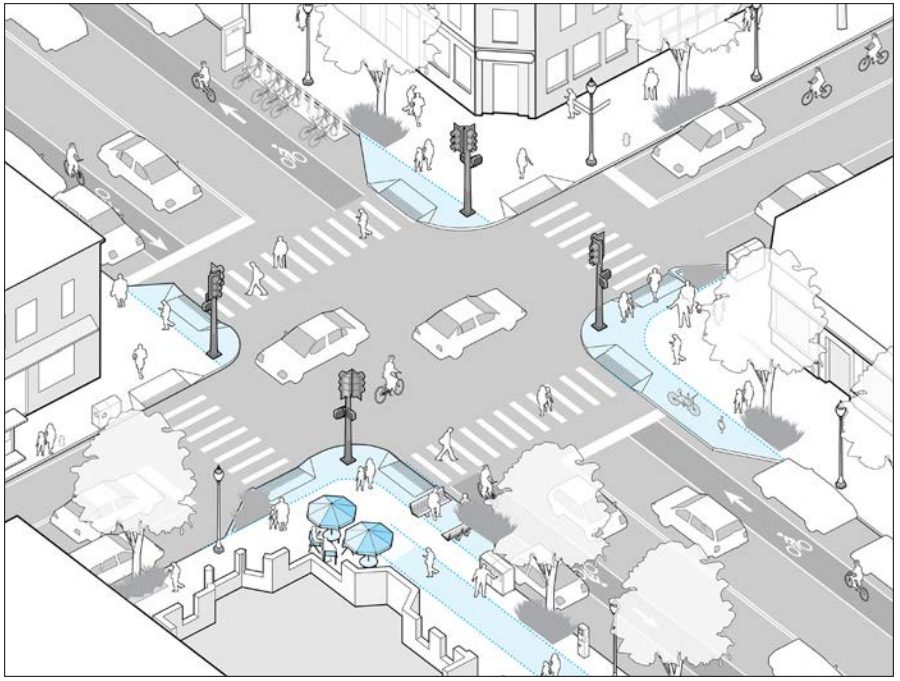
Curb extensions, also known as push-outs, bulb-outs, or bump-outs, are created by reducing the width of the street. This is done by extending the sidewalk at corners or mid-block. Curb extensions are intended to improve visibility, calm traffic, and provide extra space on sidewalks for walking and gathering. In addition to shortening crossing distances, curb extensions create more compact intersections, resulting in smaller corner radii and slower turns by people driving.

BENEFITS

- Provide additional space for pedestrians.
- Slow motorists by reducing the width of streets.
- Reduce the distance required for people to cross the street, resulting in less potential conflict with motorists.
- Slow the speed of motorists making turns at intersections.
- Create additional space for ADA compliant curb ramps.
- Provide opportunity to create accessible parking spaces.
- Improve visibility between pedestrians and other street users.
- Prevent people from parking too close to or on crosswalks.
- Create space for utilities, signs, and amenities such as bus shelters or waiting areas, bicycle parking, public seating, street vendors, and greenscape elements.
- Reduce crashes by up to 30%.[20]

TYPICAL APPLICATION

- Curb extensions should be considered only where parking is present or where other curbside uses like bike share stations and parklets already prevent anyone from using the space as a driving lane.
- Curb extensions are particularly valuable in locations with high volumes of pedestrian traffic, near schools, at unsignalized pedestrian crossings, or where there are demonstrated pedestrian safety issues.
- A typical curb extension extends about 6 feet from the curb, or no further into the street than the parking lane.
- The minimum width of a curb extension should match the existing NO PARKING requirements. The length of a curb extension can vary depending on the intended use (i.e., stormwater management, bus stop waiting areas, restricted parking).



- Bus bulbs are curb extensions that are lengthened to provide space for a transit stop.
- NO PARKING signs or yellow curb should be used to deter parking.
- Temporary curb extensions may be created using paint, flexible delineators, and other temporary materials to speed installation or as a pilot project before permanent construction.

CONSIDERATIONS

- Consider the turning needs of emergency and larger vehicles in curb extension design.
- Maintain direct routes across intersections by aligning pedestrian desire lines on either side of the sidewalk.
- Consider providing a 20-foot long curb extension to restrict parking within 20 feet of an intersection and enhance visibility.
- When curb extensions conflict with turning movements, reducing the width and/or length of the curb extension should be prioritized over elimination.
- Utilities or pedestrian amenities may need to be relocated.

Pedestrian Islands

DESCRIPTION

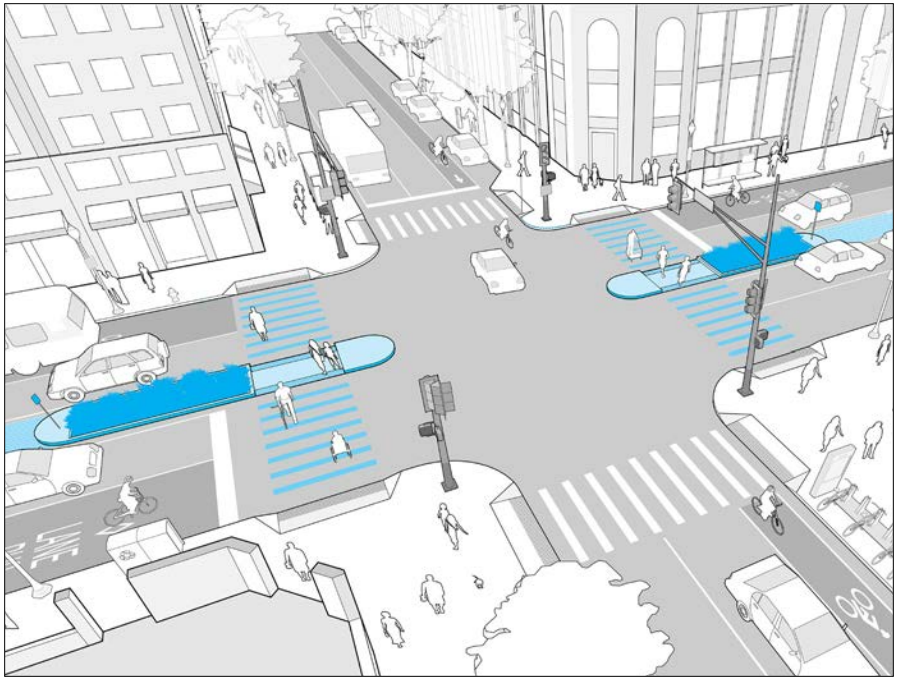
Pedestrian islands are raised medians placed in the middle of a street that provide a protected space for people trying to walk across the street. Pedestrian islands improve safety by reducing conflicts with motorists. They are particularly valuable when used at unsignalized crossings along multilane streets because they make it easier for pedestrians to find gaps in traffic and allow pedestrians to cross one direction of traffic at a time.

BENEFITS

- Allow pedestrians to cross only one direction of traffic at a time by enabling them to stop partway across the street and wait for an adequate gap in traffic before crossing the second half of the street.
- Provide space for trees and other landscaping that can help change the character of a street and reduce motorist speeds.
- Medians have benefits for motorist safety when they replace center turn lanes, as they eliminate mid-block left turning traffic.
- Are effective at reducing crashes at uncontrolled locations on busy multi-lane streets, particularly for slower pedestrians, such as people with disabilities, seniors, and children.
- Pedestrian islands are a Proven Safety Countermeasure with up to 56% pedestrian crash reduction.[21]

TYPICAL APPLICATION

- Pedestrian islands should include at-grade pedestrian cut-throughs as wide as the connecting crosswalks, detectable warnings, and gentle slopes to ensure proper drainage.
- Pedestrian islands should be at least 6 feet wide, and preferably at least 8 feet wide, to provide adequate refuge for pedestrians, especially those using mobility aids or devices, strollers, or bicycles.
- Pedestrian islands should extend beyond both sides of the crosswalk at intersections.
- Signalized intersections with pedestrian islands are generally designed to allow pedestrians to cross the entire street without stopping at the island.
- Temporary pedestrian islands may be created using paint, flexible delineators, and other temporary materials as a pilot project before permanent construction.



CONSIDERATIONS

- Pedestrian islands should be considered at locations on busy 2-lane streets and on any street with more than two lanes.
- If there is enough width, pedestrian islands and curb extensions can be used together to create a highly visible pedestrian crossing and calm traffic.
- Where possible, stormwater management techniques should be utilized on pedestrian islands with adequate space, as long as a clear path for pedestrians is maintained. Plantings should be short to maximize visibility, and ideally involve minimal maintenance.

Raised Crosswalks & Intersections

DESCRIPTION

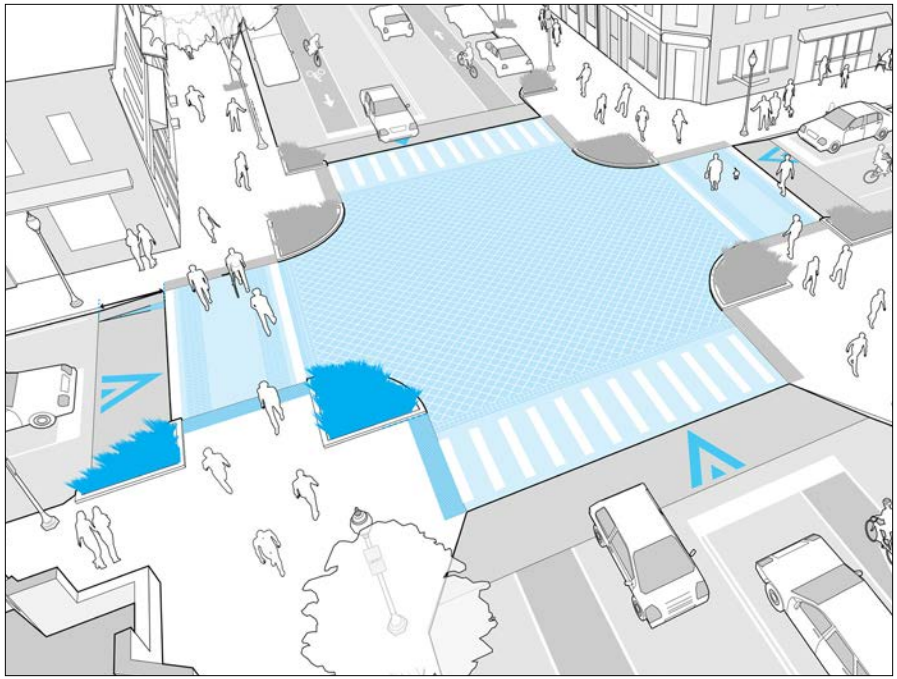
Raised crosswalks and intersections are created by raising the street to the same level as the sidewalk. These treatments provide many benefits, especially for people with mobility impairments, because there are no vertical transitions to navigate.

BENEFITS

- Encourage motorists to travel through crosswalks at safe speeds.
- Improve motorists' awareness by prioritizing pedestrian crossings and helping define locations where pedestrians are expected.
- Reduce turning speeds of motorists at intersections and driveways.
- Increase visibility between drivers and pedestrians by raising pedestrians in the motorists' field of view and giving pedestrians an elevated vantage point from which to look for oncoming traffic.
- Create pedestrian crossings which are more comfortable, convenient, and accessible since transitioning between the sidewalk and roadway does not require negotiating a curb ramp.
- Raised crosswalks may reduce fatal and injury crashes by up to 36%.[22]

TYPICAL APPLICATION

- Raised crosswalks and intersections are appropriate in areas with high pedestrian activity. They should also be considered at locations where poor pedestrian visibility and low motorist yielding have been identified.
- Raised crosswalks can be provided along side streets of major thoroughfares to slow traffic exiting the main street and make crossings more visible to drivers.
- Raised crosswalks should include pavement markings for motorists and appropriate signage at crosswalks, per the MUTCD.
- High-visibility or textured paving materials can be used to enhance the contrast between the raised crossing or intersection and the surrounding street.
- Raised crosswalks and intersections require detectable warnings at the curb line for people who are blind or have low vision.
- Raised crosswalks and intersections can be useful in placemaking where slow traffic speeds and decorative treatments are desirable.



CONSIDERATIONS

- Care should be taken to maintain direct routes across intersections where pedestrians are most likely to walk.
- Raised crosswalks are particularly valuable at unsignalized mid-block locations, where drivers are less likely to expect or yield to pedestrians.
- Design speeds and emergency vehicle routes must be considered when designing raised crosswalks and intersections; these treatments may not be appropriate for high-speed streets.
- Installation of raised crosswalks and intersections may affect snow removal operations. Snow plow operators should be adequately warned and trained.
- Raised intersections and crosswalks can be used as gateway treatments to signal to drivers when there are transitions to a slower speed, pedestrian-oriented environment.
- Designs should ensure proper drainage.

Right-Turn Lane Redesigns

DESCRIPTION

The design of right-turn lanes at intersections must consider the needs of pedestrians. Exclusive right-turn lanes might be desirable at busy intersections, but the design and control of these can have a significant impact on safety for pedestrians. Intersections with right-turns slip lanes (see illustration) are almost always candidates for redesign in urban areas.

Opportunities for the redesign of right turns include modifying traffic controls, reducing the turning radius of corners, and eliminating right turn slip lanes. When slip lanes are eliminated, they reduce the overall crossing distance for pedestrians and slow the speeds of turning traffic which in turn improve pedestrian safety.

BENEFITS

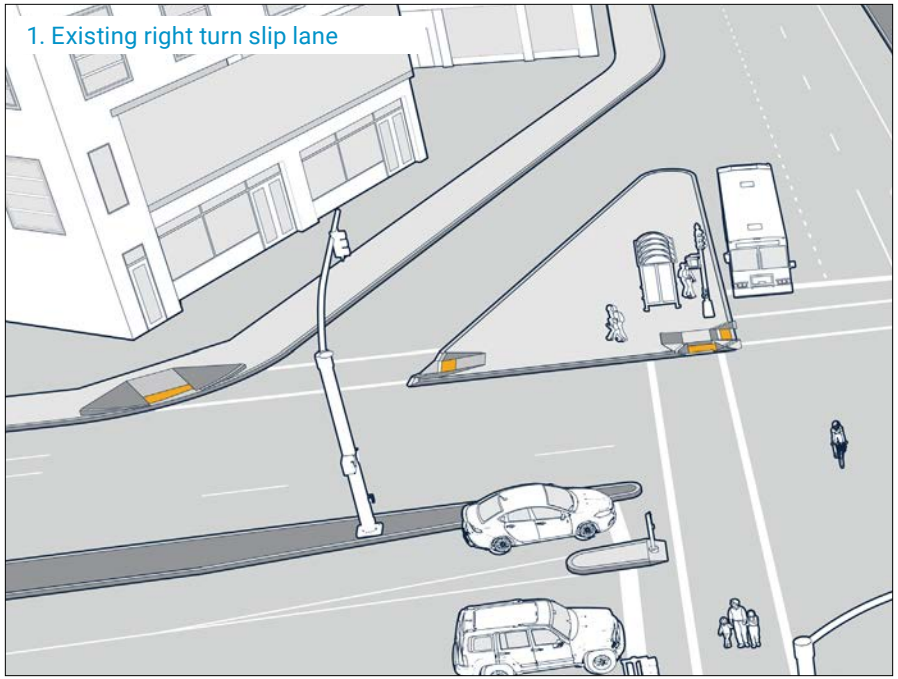
- Slower motorist turning speeds.
- Improved visibility of pedestrians and clearer sight lines for motorists.
- Reduced crossing distance and pedestrian exposure to motorists.
- Opportunity to incorporate streetscape elements.

TYPICAL APPLICATION

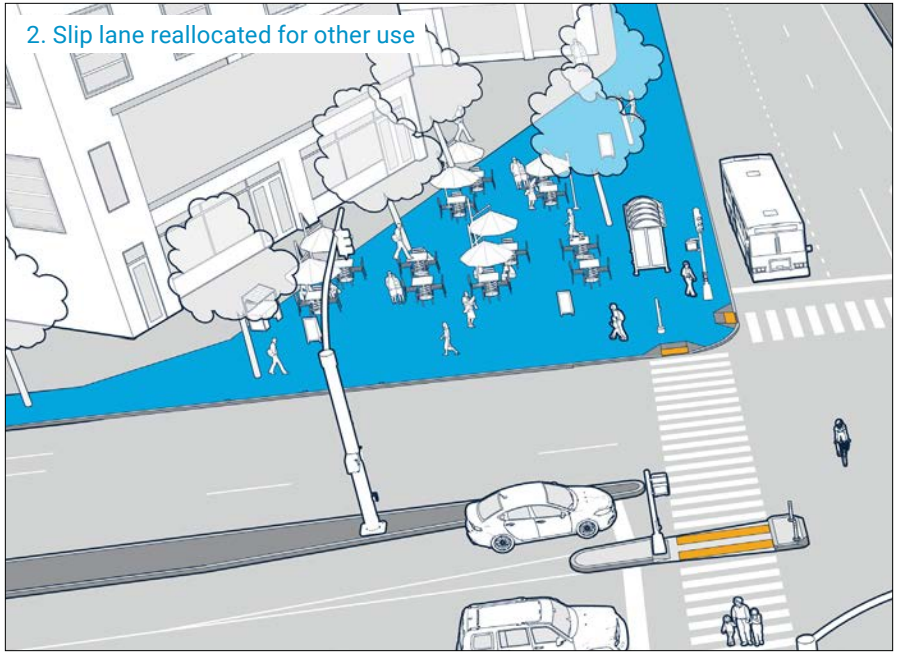
- Redesign should be considered at all locations with right-turn slip lanes and other locations with a high number of crashes involving turning motorists.
- Slip lanes may be redesigned using rapid implementation treatments that allow evaluation of the redesign in a low-cost, temporary manner.
- Where slip lanes cannot be removed, crosswalks should be relocated for maximum visibility to a spot where the driver is looking ahead, at least one car length back from the intersecting street. Crosswalks should also be oriented at a 90 degree angle to the right turn lane to improve sight lines and reduce crossing distance. Raised crosswalks may be used to improve yield compliance at the pedestrian crossing where slip lanes are used.

CONSIDERATIONS

- Elimination of right-turn slip lanes should result in a corner radius of less than 40 feet.
- To accommodate large vehicle turning movements, painted buffers or truck aprons may be used.



1. Existing right turn slip lane



2. Slip lane reallocated for other use

Lane Widths

DESCRIPTION

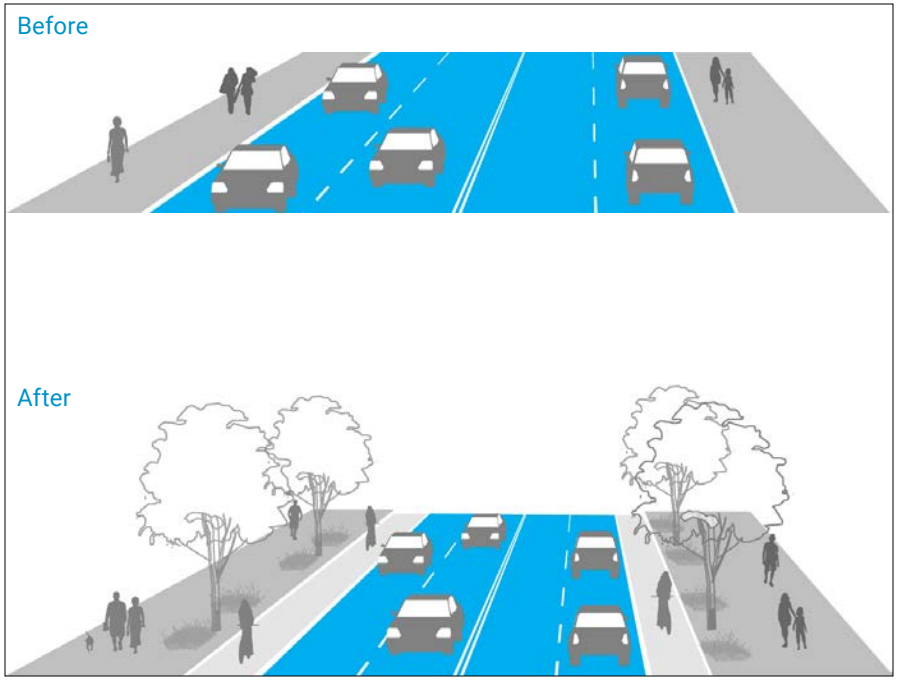
Narrowing lanes slows traffic and creates space that can be reallocated to other modes, in the form of wider sidewalks, bike lanes, and improved transit accommodations.

BENEFITS

- Provide space for features such as curb extensions and pedestrian islands that shorten crossing distances and improve pedestrian safety.
- Reduce speeding.
- Shorten the distance that a pedestrian needs to cross lanes of active traffic.
- Create opportunities to reallocate underused street space for other uses such as pedestrian islands, turn lanes, bike lanes, etc.
- Provide a positive impact on the safety of a street without impacting traffic operations.
- Narrowing motor vehicle lanes does not increase crash frequencies under most urban and suburban conditions.[23]

TYPICAL APPLICATION

- Lane narrowing candidates include streets with travel lanes that are more than 10 feet wide, streets with parking lanes that are more than 7 feet wide, and streets with wide center turn lanes.
- Lane widths of 10 feet are appropriate on most Milwaukee streets; for designated truck or transit routes, one travel lane of 11 feet may be used in each direction.
- Lane narrowing can be implemented when a street is being resurfaced or reconstructed, or as a standalone marking and signing project.



CONSIDERATIONS

- Excess space on a street should be allocated to bike lanes, bike lane buffers, or parking lanes before travel lanes.
- On streets with on-street parking and bicycle lanes, it is advantageous to provide a buffer between the parking lane and the bike lane, particularly in areas with high parking turnover, to reduce the likelihood that a person opening their car door will strike a person riding their bike.

Road Diets

DESCRIPTION

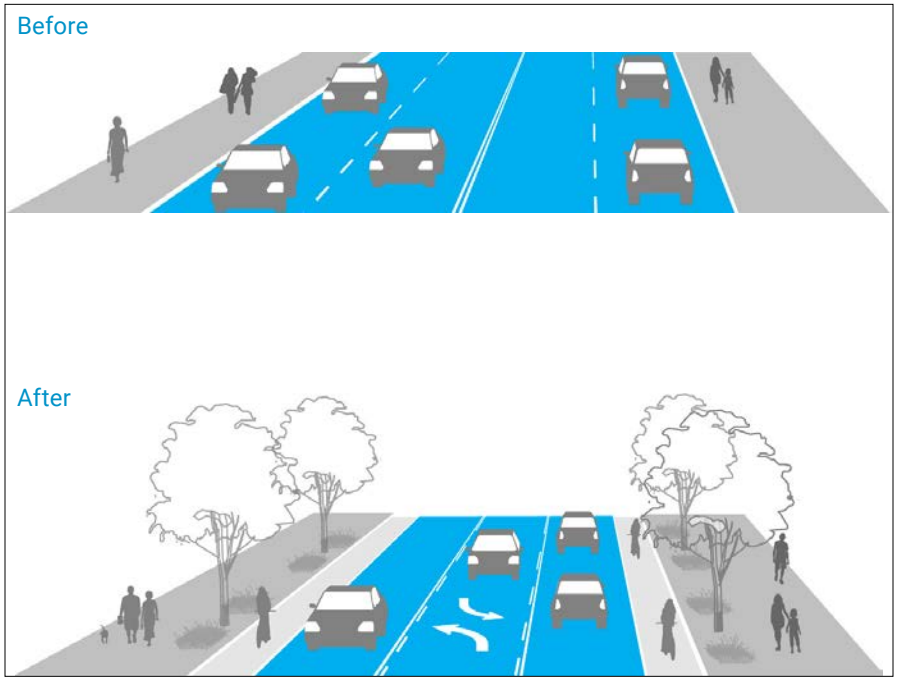
Road diets, also known as lane reconfiguration or right-sizing streets, repurpose travel lanes to provide more space for people walking, biking, and using transit. Road diets are typically done on streets where traffic volumes do not support the need for additional motor vehicle lanes.

BENEFITS

- Provide space for features such as curb extensions and pedestrian islands that shorten crossing distances and improve pedestrian safety.
- Better organize movements and operations along and across the street.
- Eliminate or reduce the risk of multiple threat crashes where a motorist in one lane stops while the motorist in the adjacent lane continues to move and hits another street user.
- Provide turn lanes to reduce conflicts between street users.
- Reduce the severity and frequency of rear-end and right-angle crashes between motorists.
- Reduce speeding.
- Make it easier for pedestrians to cross the street by shortening crossing distances and reducing exposure to motorists.
- Create opportunities to reallocate underused street space for other uses such as pedestrian islands, turn lanes, bike lanes, etc.
- Road diets are a Proven Safety Countermeasure with an overall crash reduction factor of 19% to 47% for all modes.[24]

TYPICAL APPLICATION

- Road diet candidates include four-lane undivided roadways, which can be converted to a three-lane cross section (one lane in each direction with a center turn lane or center median), and multi-lane streets with extra capacity where one or more lanes can be removed.
- Road diets can be implemented when a street is being resurfaced or reconstructed, or as a standalone marking and signing project.



CONSIDERATIONS

- Outreach should be conducted to determine if a candidate street is meeting the needs of the community.
- A traffic study may be necessary to determine if high-traffic streets are candidates for removing one or more parking or travel lanes.
- Retaining or adding turn lanes at intersections and adjusting signal timing can reduce delays for people driving.
- Excess space on a street should be allocated to bike lanes, bike lane buffers, or parking lanes before travel lanes.
- On streets with on-street parking and bicycle lanes, it is advantageous to provide a buffer between the parking lane and the bike lane, particularly in areas with high parking turnover, to reduce the likelihood that a person opening their car door will strike a person riding their bike.

Marked Crosswalks

DESCRIPTION

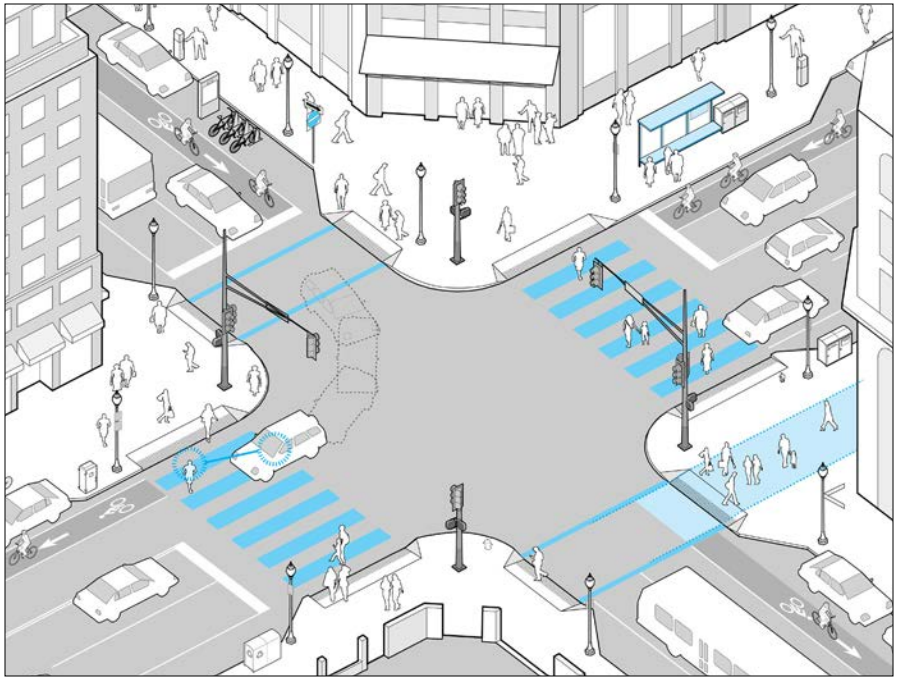
Legal crosswalks exist at all locations where sidewalks meet the street, regardless of whether a crosswalk is marked or not. Drivers are legally required to yield to pedestrians at intersections with crosswalks, even where there is no marked crosswalk. Providing marked crosswalks communicates to drivers that pedestrians may be present and helps guide pedestrians to locations where it is best to cross the street.

BENEFITS

- Enhance the visibility of crossing locations.
- Encourage people to use most comfortable and visible crossing locations.
- Guide the path of pedestrian travel.
- High visibility crosswalks may provide up to 48% reduction in pedestrian crashes.[25]

TYPICAL APPLICATION

- Marked crosswalks should be at least 8 feet wide or the width of the approaching sidewalk, whichever is greater. In areas of heavy pedestrian volumes, crosswalks can be up to 25 feet wide.
- Crosswalks should provide a slip-resistant, level, and accessible surface, and should not include stamped pavements or pavers. If a decorative treatment is desired, stamped pavements or pavers may be used in the intersection itself.
- Crosswalks should directly connect the approaching sidewalks and should be located to maximize the visibility of pedestrians.
- Perpendicular crosswalks minimize crossing distances and therefore limit pedestrian exposure to motorists.
- Continental crosswalk bars should be installed parallel to the direction of traffic.
- ADA-compliant curb ramps should align directly with the crosswalk. The bottom of the ramp should lie within the crosswalk.
- Stop lines at stop-controlled and signalized intersections should be located at least 8 feet in advance of crosswalks.
- New marked crosswalks on streets with multiple lanes in each direction, higher speeds, or higher volumes should include additional treatments such as raised crossings, Rectangular Rapid Flashing Beacons, or Pedestrian Hybrid Beacons to create an enhanced crossing.



CONSIDERATIONS

Continental crosswalks (wide bars parallel to the direction of travel, as shown for the left and right crosswalks in illustration) are more visible to drivers than standard crosswalks. Continental crosswalks should be used at:

- Midblock crossings;
- Unsignalized intersections adjacent to schools and parks;
- Unsignalized crossings of arterial and collector streets near major pedestrian generators;
- Signalized intersections near a major pedestrian generator; and
- Signalized intersections with a history of pedestrian crashes.

In all other controlled locations, transverse style crosswalks may be considered.

Crosswalk markings should consist of non-skid, retroreflective material. On new pavement, markings should be embedded into the pavement when possible so that the surface of the marking is flush with the pavement to reduce maintenance needs and provide a smooth, accessible surface.

Yield to Pedestrian Signs

DESCRIPTION

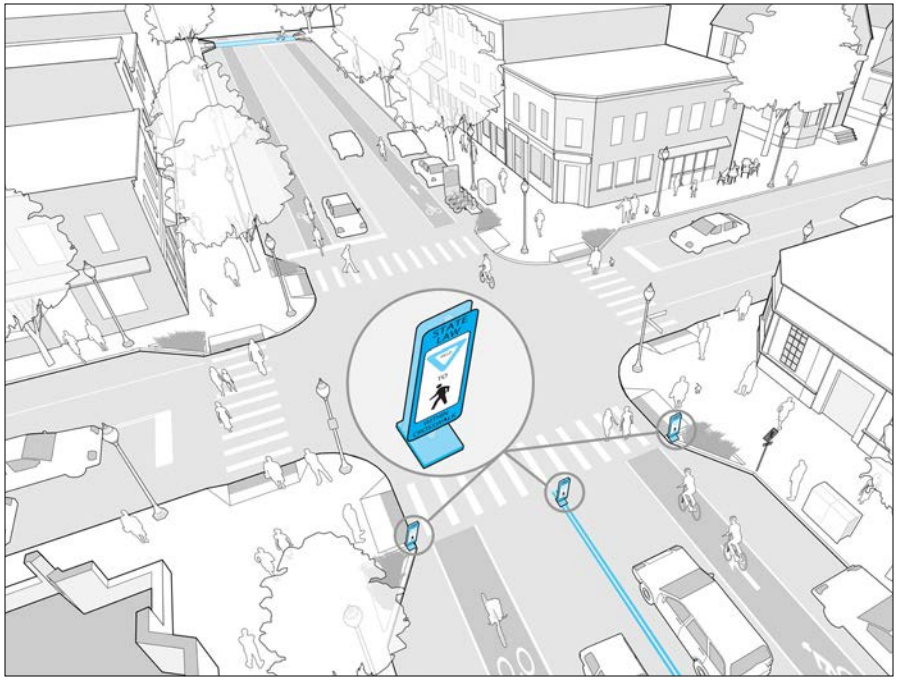
In-street **YIELD TO PEDESTRIAN** signs (MUTCD R1-6) are placed in the street at crosswalks to remind motorists to comply with the state law requiring they yield to pedestrians in crosswalks. They also increase awareness and visibility of pedestrian crossings. They are often used in commercial districts; school crossings; locations with children, seniors, or persons with disabilities; or where high pedestrian volumes occur. In-street signs can be used in conjunction with advanced warning signs and pedestrian crossing signs at crosswalks.

BENEFITS

- Can improve yielding behavior of motorists to pedestrians.
- Improve visibility of pedestrian crosswalks.
- May reduce motorist speeds.
- Increase motorist compliance with pedestrian laws.
- **YIELD TO PEDESTRIAN** signs deployed in a gateway configuration have been shown to increase motorist yielding to pedestrians from less than 10 percent to over 90 percent, and to decrease traffic speeds between 4 and 10 miles per hour.[26]

TYPICAL APPLICATION

- In-street **YIELD TO PEDESTRIAN** signs shall only be used at uncontrolled intersections or midblock locations.
- In-street **YIELD TO PEDESTRIAN** signs should be placed at the crosswalk on the center line or on a median island, but they should not obstruct the crosswalk. In-street signs should also be placed outside the path of turning motorists, and should be installed on a flexible delineator to ensure they bounce back if struck.
- In-street **YIELD TO PEDESTRIAN** signs work best on two lane streets with speed limits of 35 miles per hour or less.
- **YIELD TO PEDESTRIAN** signs are most effective when deployed in a "gateway" configuration with signs installed at both ends of the crosswalk and between travel lanes (see illustration).
- **YIELD TO PEDESTRIAN** signs may also be placed above the street; this position avoids the risk of signs being struck by motorists.
- **YIELD TO PEDESTRIAN** signs should be installed 1.5 to 50 feet in advance of the crosswalk; no portion of the sign should be in the crosswalk.[27]



CONSIDERATIONS

In-street signs:

- May be permanent or temporary. It may be preferable to remove them during winter for snow removal operations.
- Require regular monitoring and should be replaced when damaged.
- Are typically not used at yield-controlled intersections.
- May be used in combination with pedestrian warning signs placed on the right side of the street, on the sidewalk, or mounted on a mast arm above the crosswalk.

Speed Feedback Signs

DESCRIPTION

Speed feedback signs provide a dynamic message to drivers exceeding a specified speed threshold. The signs alert motorists of their current speed or display a message to slow down to encourage speed limit compliance. Speed feedback signs should be used in areas with high volumes of pedestrians and areas where the speed limit is reduced. Speed feedback signs can be mounted to an existing pole or portable (mounted on a trailer).

BENEFITS

- Display targeted messages to drivers who are speeding.
- Moderately reduce motorist speeds including speeds that far exceed the posted speeds.
- Reduce crashes in select applications.
- Studies demonstrate speeds are reduced 1.5 to 5 miles per hour on average, with a greater effectiveness in reducing very high speeds.[28]

TYPICAL APPLICATION

Speed feedback signs are best deployed:

- At speed zone transitions, to reaffirm the change in posted speeds;
- In advance of key pedestrian crossings or where high motorist speeds make it difficult for pedestrians to cross the street;
- In school zones; and
- In work zones.

Signs should be installed in conjunction with a **SPEED LIMIT** sign.

When signs are deployed on a portable trailer, care should be taken to ensure that the signs do not interfere with people walking, biking, or driving.

Signs may display **SLOW DOWN** instead of the actual measured speed for motorists traveling more than 15 miles per hour over the posted speed limit (to discourage reckless motorists from seeing how high a speed they can record).

CONSIDERATIONS

- Studies have indicated that speed feedback signs may be most effective in reducing high speeds.
- Deploy portable speed signs in conjunction with high-visibility enforcement events conducted by the police department.
- May not have a continuous speed-reducing impact once motorists have passed the sign.

Leading Pedestrian Intervals

DESCRIPTION

Leading Pedestrian Intervals (LPI) initiate the pedestrian WALK signal three to seven seconds before motorists traveling in the same direction are given the green indication. This allows pedestrians to enter the intersection prior to turning motorists, increasing visibility between all modes. LPIs give pedestrians a head start to establish themselves in the intersection before the green phase. LPIs especially benefit slower pedestrians, including people with disabilities, seniors, and children.

BENEFITS

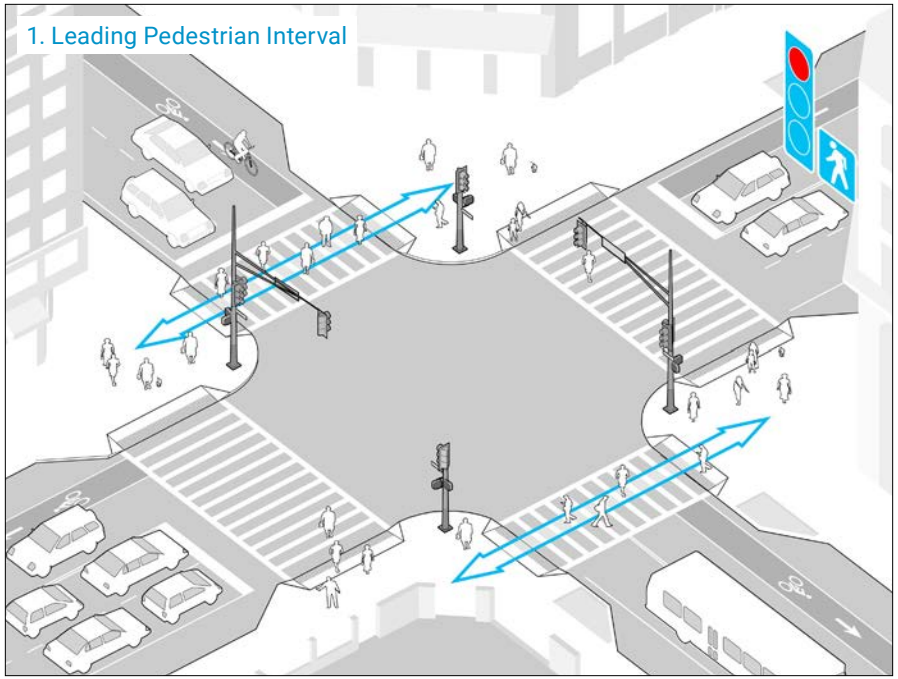
- Prioritize pedestrian safety and convenience at intersections.
- Increase visibility of crossing pedestrians.
- Reduce conflicts between pedestrians and motorists.
- Increase compliance of motorists yielding to pedestrians.
- Enhance safety for pedestrians who need more time to cross the intersection
- Leading Pedestrian Intervals are a Proven Safety Countermeasure with up to 60% pedestrian crash reduction.[29]

TYPICAL APPLICATION

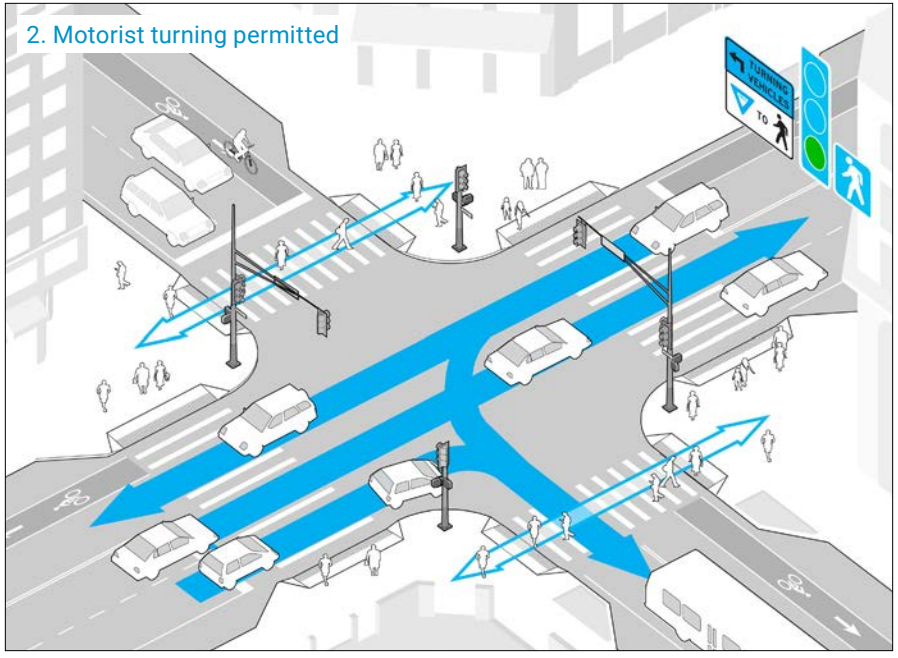
- Used at intersections with high volumes of pedestrians and conflicting motorist turning movements.
- Locations with seniors or school children who tend to walk slower.
- When needed, a left turn arrow shall be provided after the through green signal at locations with a LPI.

CONSIDERATIONS

- **NO TURN ON RED** signs should be considered with LPIs.
- Concurrent pedestrian phasing should appropriately match the motorist signal phasing.



1. Leading Pedestrian Interval



2. Motorist turning permitted

Accessible Pedestrian Signals

DESCRIPTION

Accessible pedestrian signals (APS) and accessible detectors are devices that communicate information in non-visual formats about the pedestrian crossing to people with visual and/or hearing disabilities. APS and detectors may include features such as audible tones, speech messages, detectable arrow indications, and/or vibrating surfaces.

BENEFITS

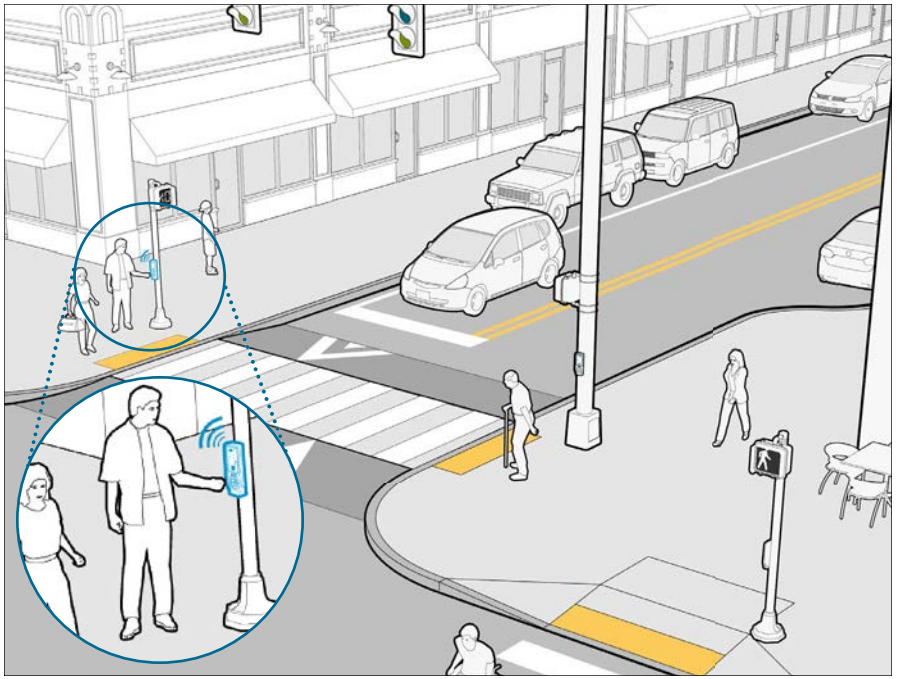
Provide people with vision and/or hearing disabilities information about:

- Location of pushbuttons, if used;
- Beginning of WALK interval;
- Direction of crosswalk;
- Location of destination sidewalk;
- Intersection street name in Braille or raised print;
- Intersection signalization with speech messages; and
- Intersection geometry through detectable maps or diagrams, or through speech messages.

Improve safety for pedestrians with vision and/or hearing disabilities.

TYPICAL APPLICATION

- When used, two pedestrian pushbuttons should be provided on each corner per the MUTCD. Pushbuttons should be separated by 10 feet and located between 1.5 and 6 feet from the edge of curb.
- Audible tones can be set as high as 100 decibels, although most installations do not need to be set this high. Audible tone volumes should be set based on ambient noise levels at each location.
- At locations where the pedestrian WALK signal automatically displays during every signal cycle, accessible push buttons are only used to initiate the accessible features, not the WALK signal.



CONSIDERATIONS

- Audible walk indications should have the same duration as the pedestrian walk indication or should be provided in the first 7 seconds of the walk interval, whichever is shorter.
- For detailed information on accessible signals and pushbuttons, please refer to the United States Access Board's website.

Right Turn on Red Restrictions

DESCRIPTION

Right turn on red restrictions prevent motorists from turning right (or left on intersecting one-way streets) while the traffic signal is red. Restricting this movement eliminates conflicts with pedestrians crossing in front of turning motorists.

BENEFITS

- Reduce conflicts between motorists and pedestrians.
- Prioritize pedestrian safety and convenience at intersections.
- Right turn on red restrictions can significantly increase the portion of motorists who stop at marked stop lines and decrease the number of motorists who turn right on red without stopping.[30]

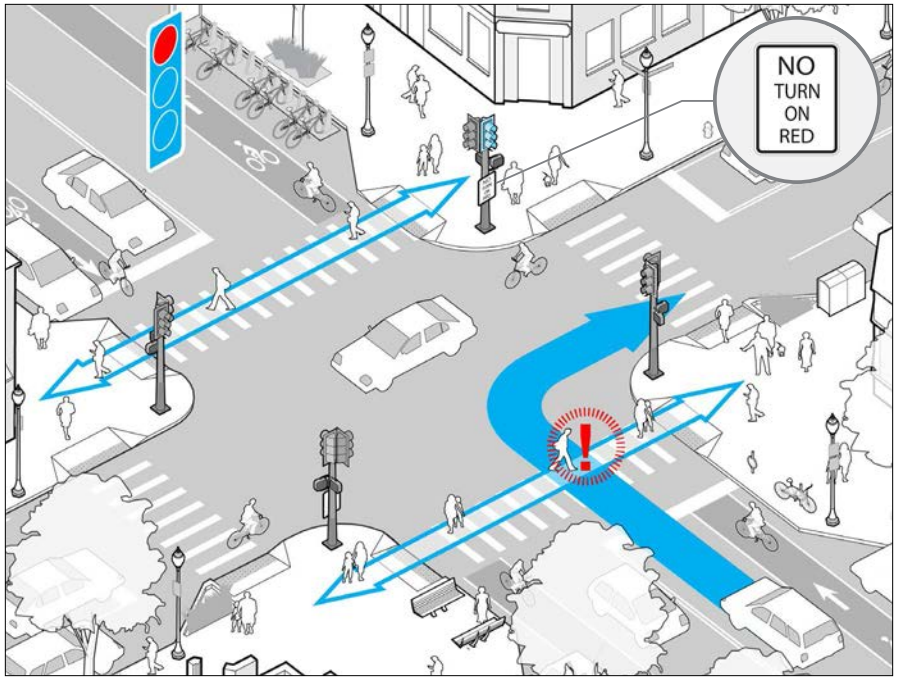
TYPICAL APPLICATION

Right turn on red restrictions should be considered when one or more of the following conditions apply:

- An exclusive pedestrian phase;
- An LPI;
- High volumes of pedestrians
- Where bicycle two-stage turn queue boxes are installed;
- Poor sight distances and visibility;
- Locations where poor intersection geometry causes unexpected conflicts; or
- Locations with a reported crash history.

CONSIDERATIONS

- Should be implemented all hours of the day, but can be considered by time of day in some circumstances.
- Can be used in conjunction with LPIs or bicycle signals that allow through movements when turning vehicular traffic is stopped.



Protected Left Turns

DESCRIPTION

A protected left turn provides a green arrow for left turning motorists while stopping both on-coming traffic and pedestrians to eliminate conflicts. A lagging left turn is a protected left turn in which the left-turn arrow displays at the end of a green phase after motorists traveling straight have passed through the intersection. Lagging left turns allow pedestrians to cross the intersection at the beginning of a signal cycle, reducing conflicts between pedestrians and motorists.

BENEFITS

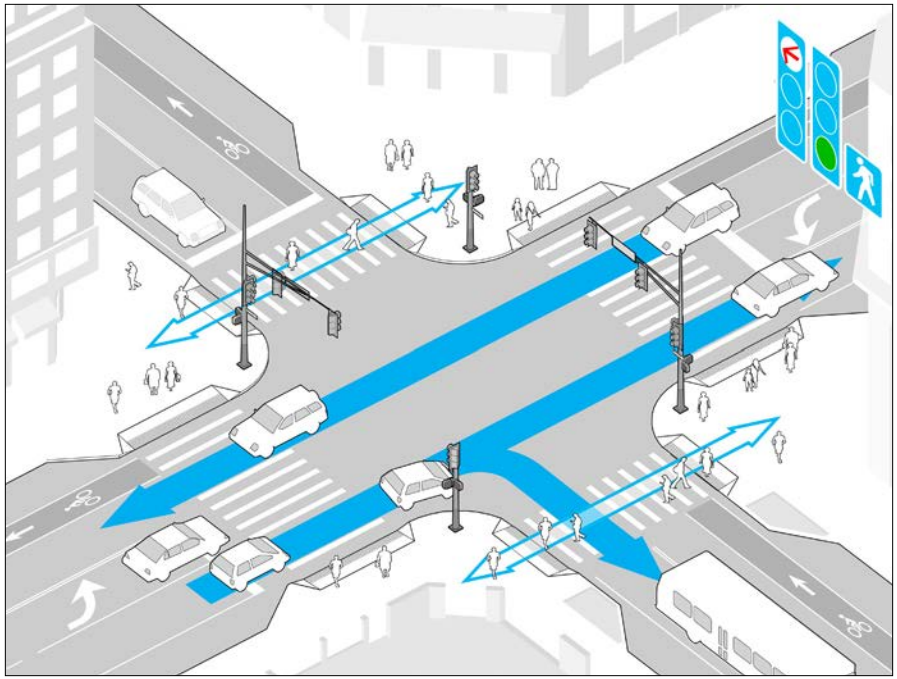
- Reduce conflicts between pedestrians and turning motorists by allowing pedestrians to cross the street separately from left-turning motorists.
- Reduce motorist-motorist collisions.
- Reduce all left-turn crashes up to 99%.[31]

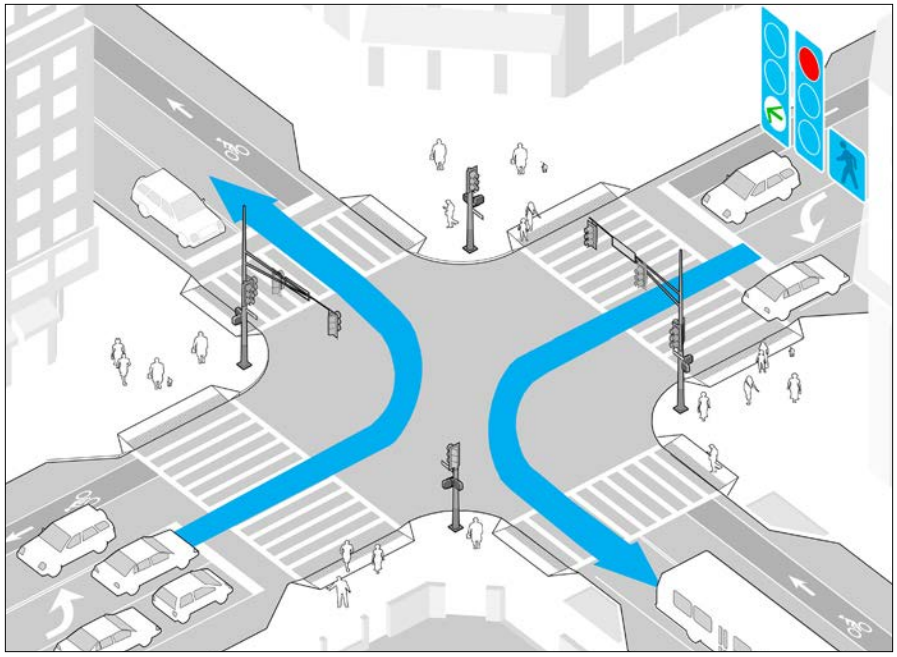
TYPICAL APPLICATION

- Protected left turns should be used where there are conflicts between left turning motorists, opposing traffic, and people walking.
- Use should be considered at intersections with visibility concerns.

CONSIDERATIONS

- Dedicated left turn lanes shall be installed in conjunction with protected left turn arrows.





Pedestrian Beacons

DESCRIPTION

At some unsignalized crossings, particularly those with four or more lanes, it can be very challenging for pedestrians to cross the street. At these locations pedestrian-activated beacons may assist pedestrians crossing the street.

Rectangular Rapid Flash Beacons (RRFBs) are LEDs that supplement pedestrian warning signs at unsignalized intersections or mid-block crosswalks. They are activated by pedestrians manually by a push button or passively by a pedestrian detection system. RRFBs use an irregular flash pattern that is similar to emergency flashers on police vehicles. RRFBs may be installed on either two-lane or multi-lane streets.

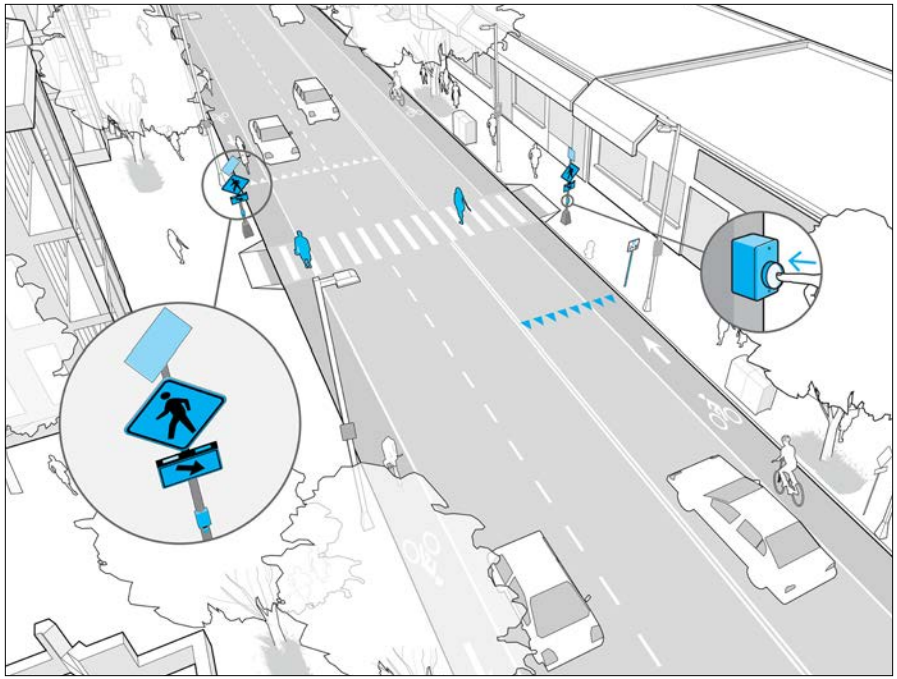
Pedestrian hybrid beacons (PHB) help pedestrians safely cross busy or higher-speed streets at midblock crossings and uncontrolled intersections. The beacon head consists of two red lights above a single yellow light. The lights remain "dark" until a pedestrian wanting to cross the street pushes the call button to activate the beacon. The signal then initiates a yellow to red lighting sequence consisting of steady and flashing lights that directs motorists to slow and come to a stop. The pedestrian signal then flashes a WALK display to the pedestrian. Once the pedestrian has safely crossed, the hybrid beacon again goes dark after going through an alternating flashing sequence.

BENEFITS

- Increased yielding behavior by motorists at pedestrian crossings.
- Requirements to install PHBs are less than for full traffic signals.
- RRFBs may reduce pedestrian crashes up to 47 percent.[32]
- Pedestrian hybrid beacons are a Proven Safety Countermeasure with up to 69% pedestrian crash reduction.[33]

TYPICAL APPLICATION

- RRFBs can be used when a signal is not warranted at an unsignalized crossing.
- RRFBs are installed on both sides of the street at the edge of the crosswalk. If there is a pedestrian refuge or other type of median, an additional beacon should be installed in the median.
- PHBs are an interim option between a flashing beacon and a full signal.
- RRFBs and PHBs are not appropriate at intersections with signals or STOP signs.



CONSIDERATIONS

- RRFBs are considerably less expensive to install than mast-arm mounted signals. They can also be installed with solar-power panels to eliminate the need for a power source.
- RRFBs should be limited to locations with safety concerns, and should not be installed in locations with sight distance constraints that limit the driver's ability to view pedestrians on the approach to the crosswalk.
- RRFBs should be used in conjunction with advance yield pavement marking and signs.
- PHBs are not widely implemented, so agencies should consider an education and outreach effort when implementing a PHB within a community.

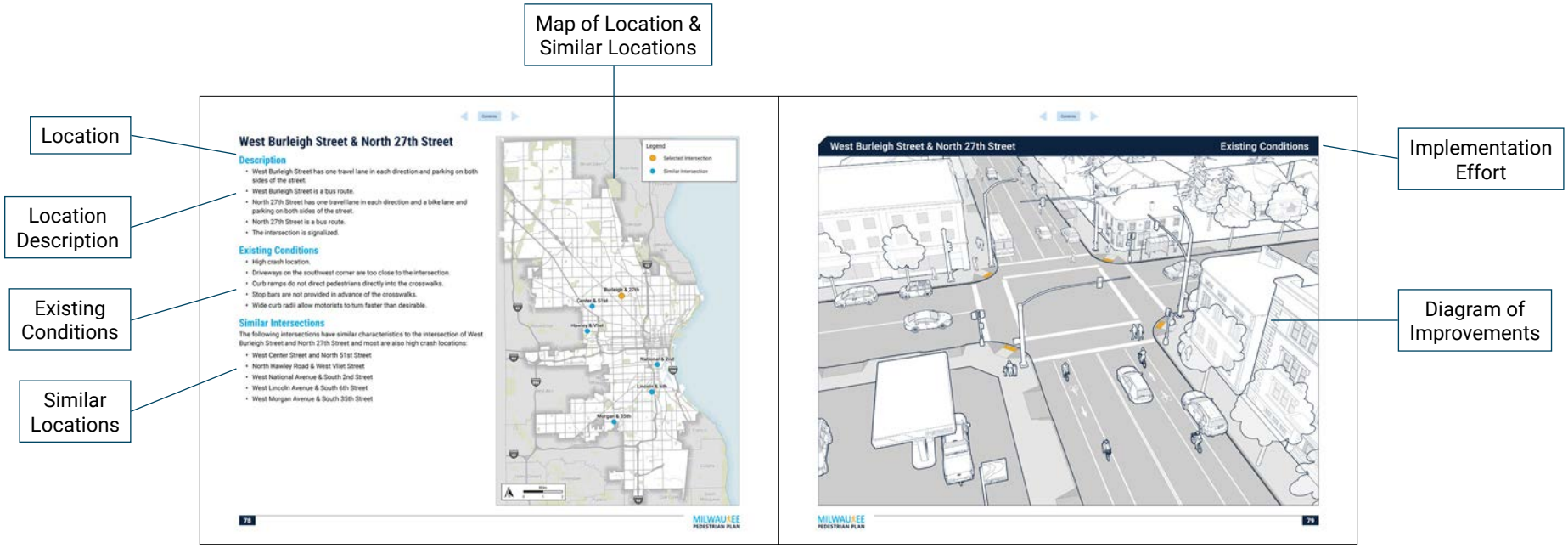
Using the Tools

The following pages apply many of the treatments detailed in this toolbox to actual locations in Milwaukee. The example locations were selected because they are high crash locations and represent common intersection types seen throughout Milwaukee. Each example location includes an illustration of the existing conditions and illustrations of potential short- and long-term improvements. The illustrations are not necessarily recommendations for that specific location. Each location also includes a map displaying similar locations throughout Milwaukee, although not all similar intersections are included.

Implementation

Low-Effort: Actions can be carried out at relatively low cost and with minimal infrastructure work; actions typically are limited to markings and signs.

High-Effort: Actions involve infrastructure work that is most efficiently implemented as part of a street resurfacing or reconstruction.



West Burleigh Street & North 27th Street

Description

- West Burleigh Street has one travel lane in each direction and parking on both sides of the street.
- West Burleigh Street is a bus route.
- North 27th Street has one travel lane in each direction and a bike lane and parking on both sides of the street.
- North 27th Street is a bus route.
- The intersection is signalized.

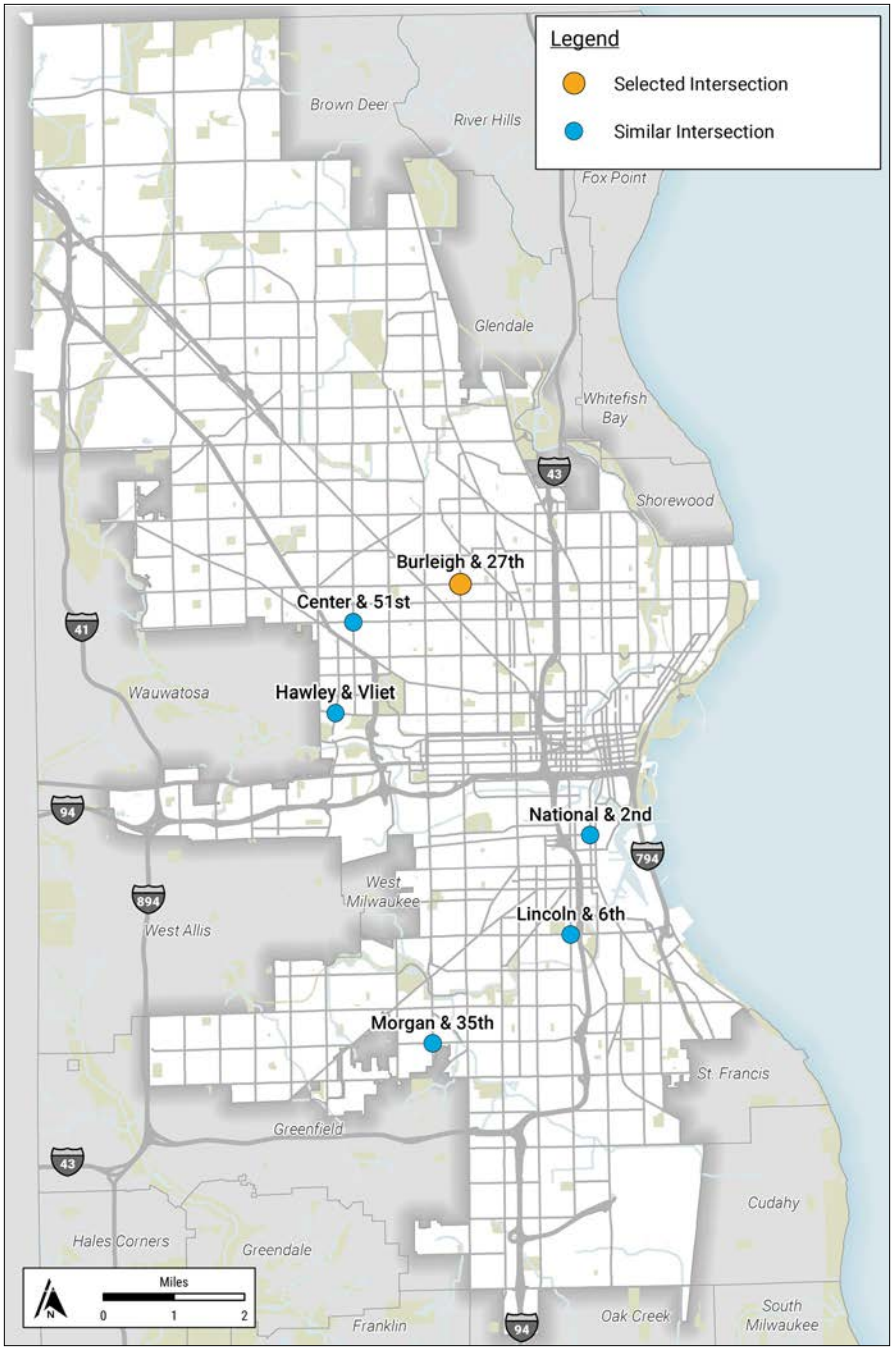
Existing Conditions

- High crash location.
- Driveways on the southwest corner are too close to the intersection.
- Curb ramps do not direct pedestrians directly into the crosswalks.
- Stop bars are not provided in advance of the crosswalks.
- Wide curb radii allow motorists to turn faster than desirable.

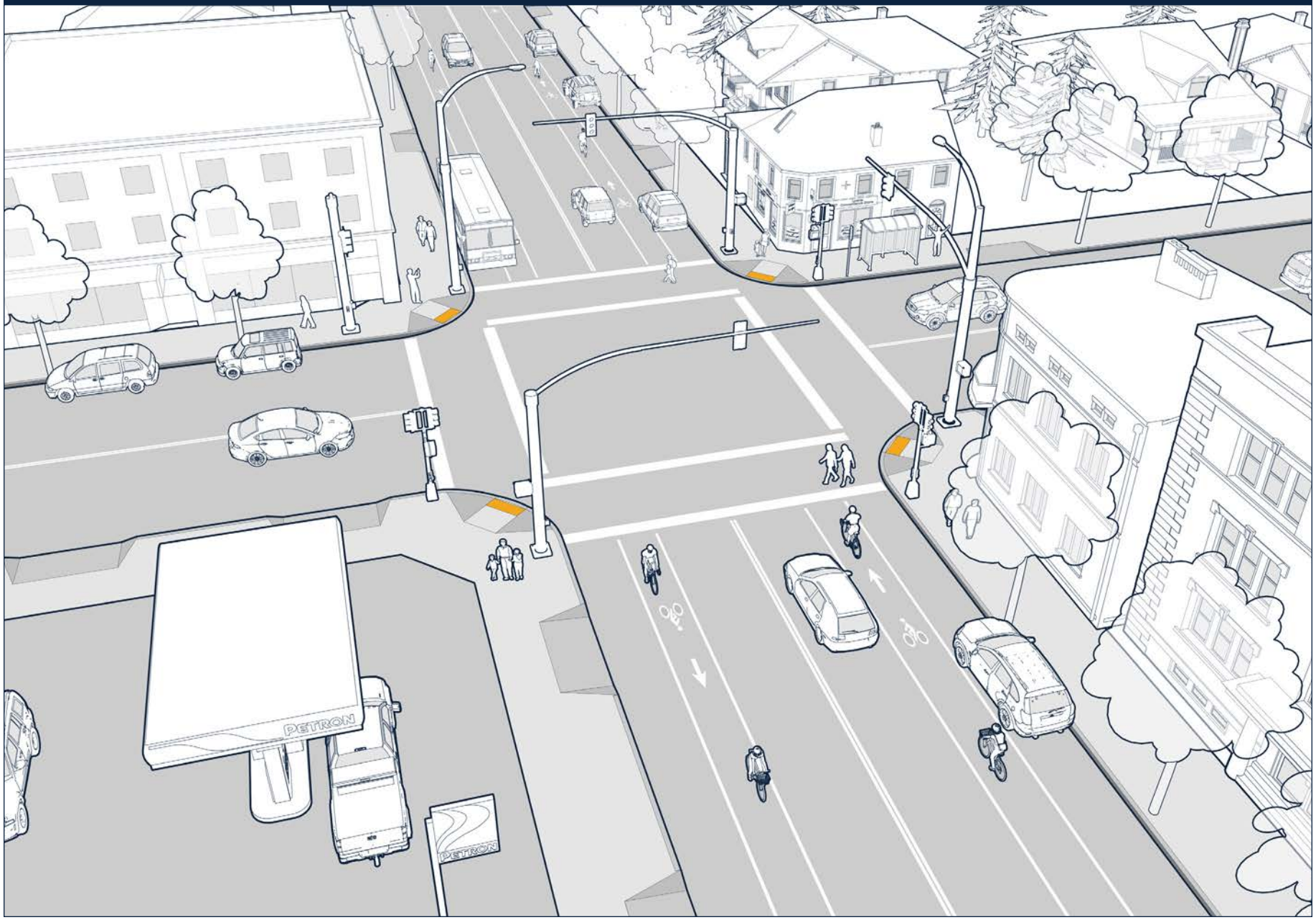
Similar Intersections

The following intersections have similar characteristics to the intersection of West Burleigh Street and North 27th Street and most are also high crash locations:

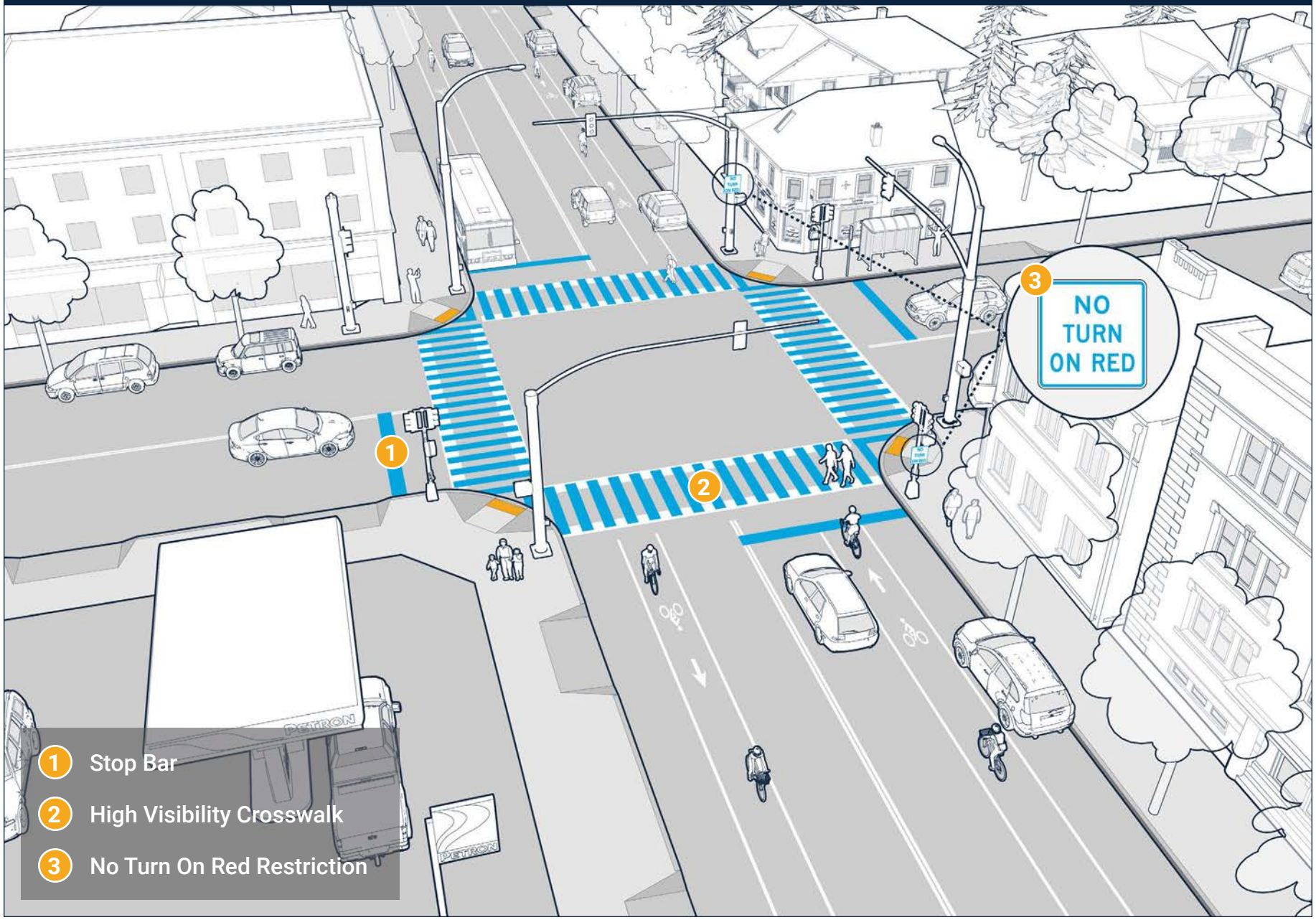
- West Center Street and North 51st Street
- North Hawley Road & West Vliet Street
- West National Avenue & South 2nd Street
- West Lincoln Avenue & South 6th Street
- West Morgan Avenue & South 35th Street



West Burleigh Street & North 27th Street — Existing Conditions

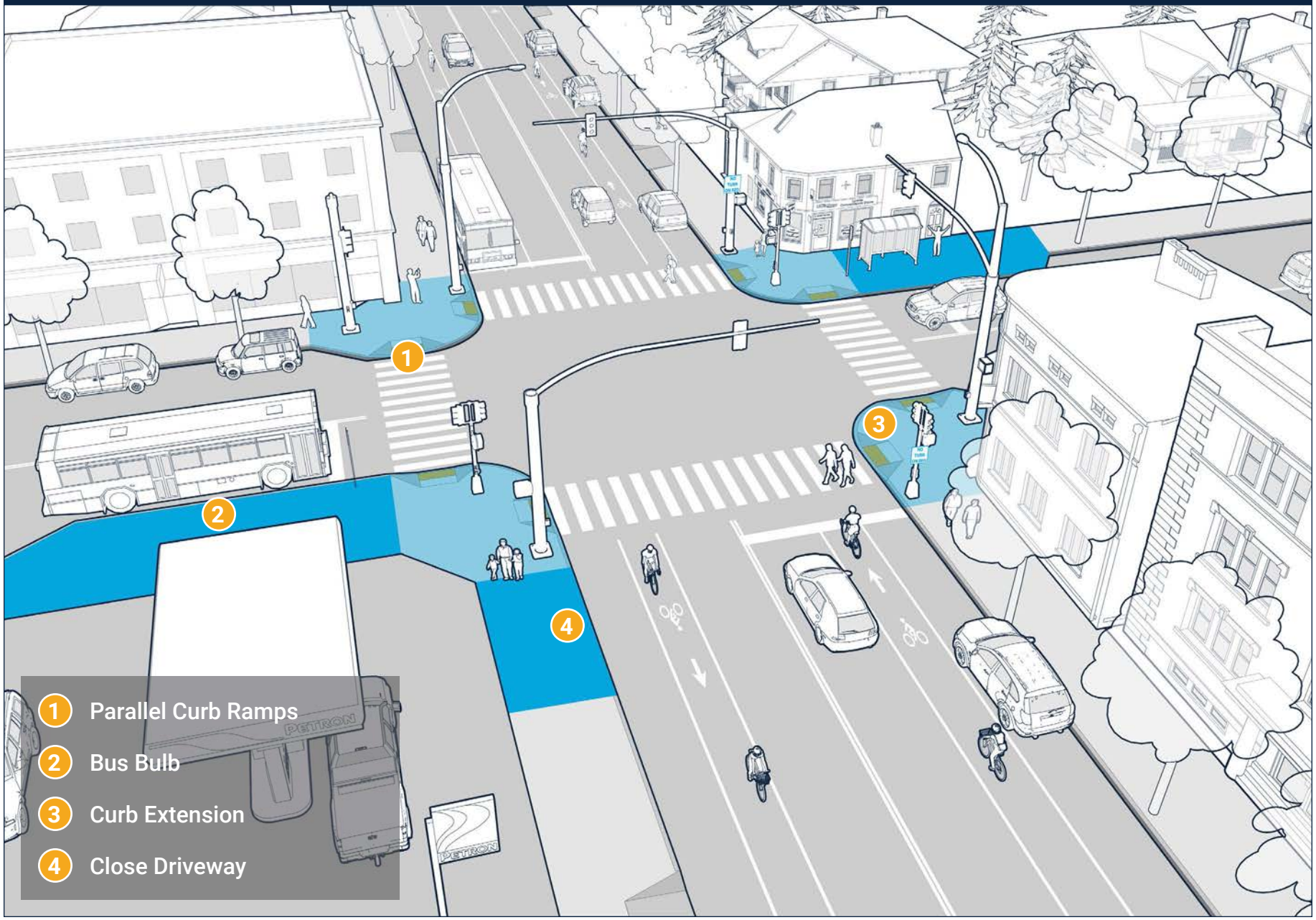


West Burleigh Street & North 27th Street — Low-Effort Improvements



1. Stop Bar
2. High Visibility Crosswalk
3. No Turn On Red Restriction

West Burleigh Street & North 27th Street — High-Effort Improvements



West Capitol Drive & North 76th Street

Description

- West Capitol Drive is median-divided state highway; the street has two travel lanes and a parking lane in each direction; the parking lane is designated as a third travel lane during peak periods.
- West Capitol Drive is a bus route.
- North 76th Street is median-divided and has two travel lanes in each direction and a bike lane and parking on both sides of the street.
- North 76th Street is a bus route.
- The intersection is signalized.

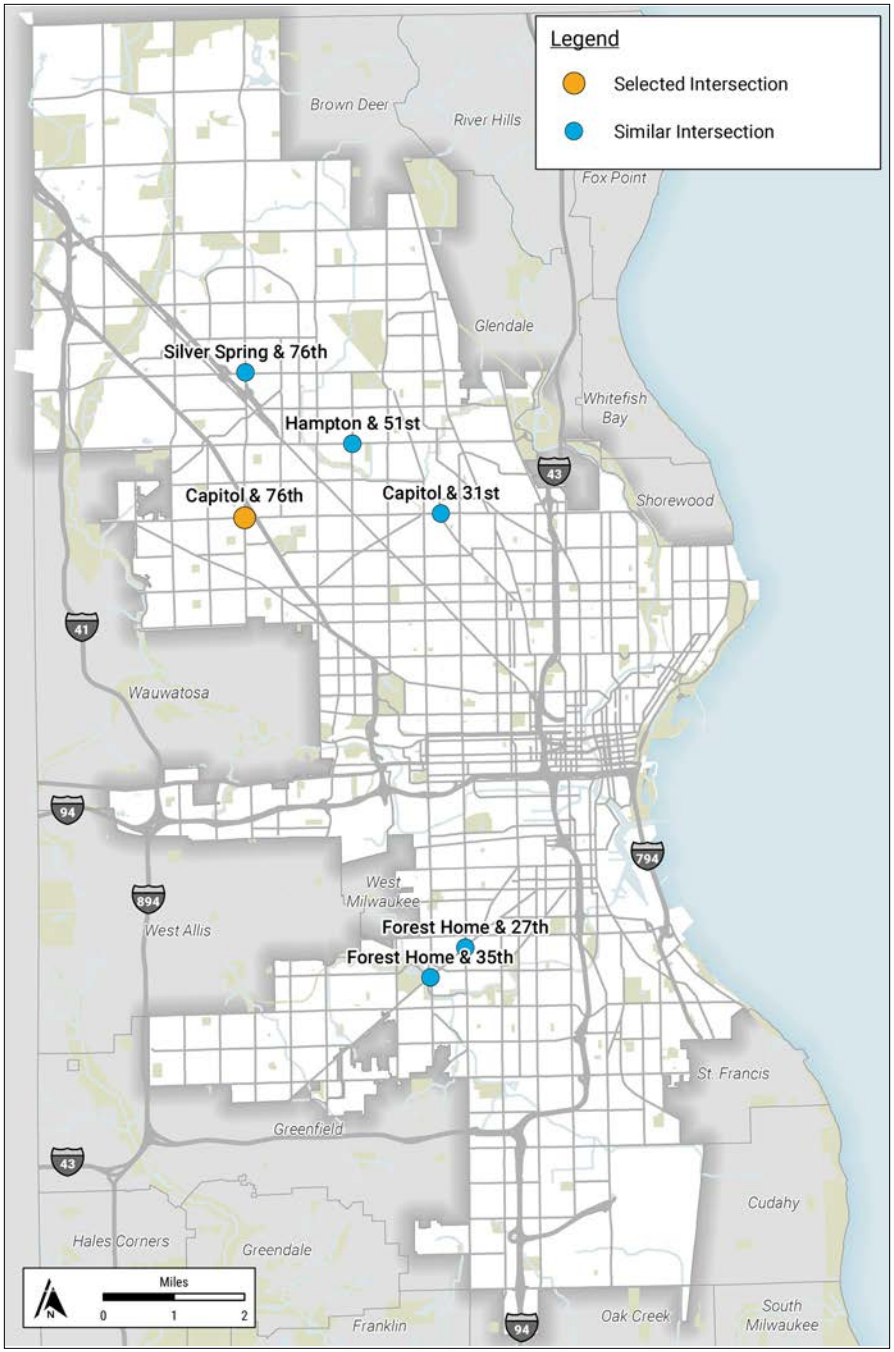
Existing Conditions

- High crash location.
- Driveways on the northwest, southwest, and southeast corner are too close to the intersection.
- Curb ramps do not direct pedestrians directly into the crosswalks.
- Median islands do not extend through the crosswalks.
- Right turn slip lanes and wide curb radii allow motorists to turn at high speeds.
- Pedestrian crossing distances are long.

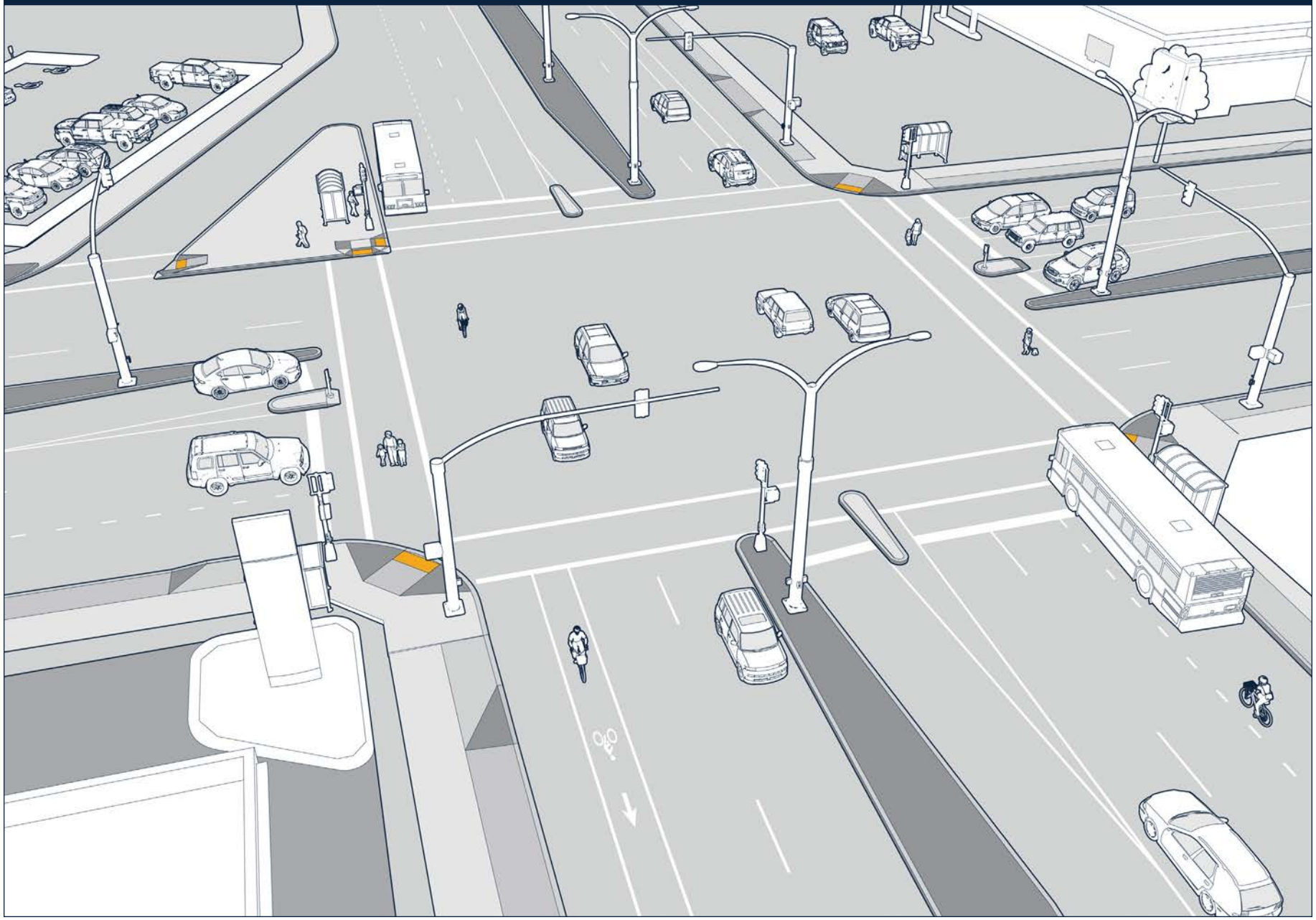
Similar Intersections

The following intersections have similar characteristics to the intersection of West Capitol Drive and North 76th Street and most are also high crash locations:

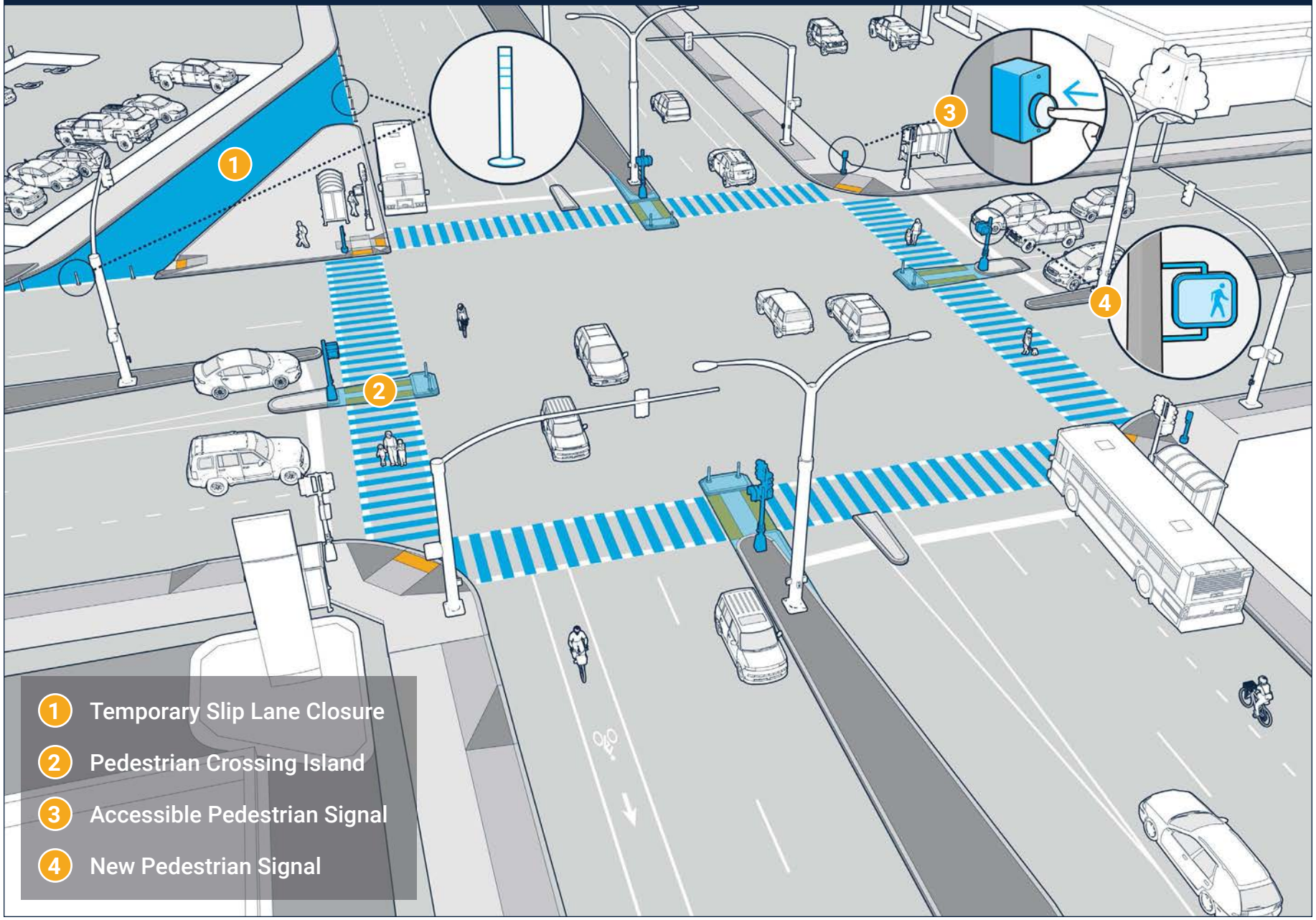
- West Silver Spring Drive & North 76th Street
- West Hampton Avenue & North 51st Street
- West Capitol Drive & North 31st Street
- West Forest Home Avenue & South 27th Street
- West Forest Home Avenue & South 35th Street



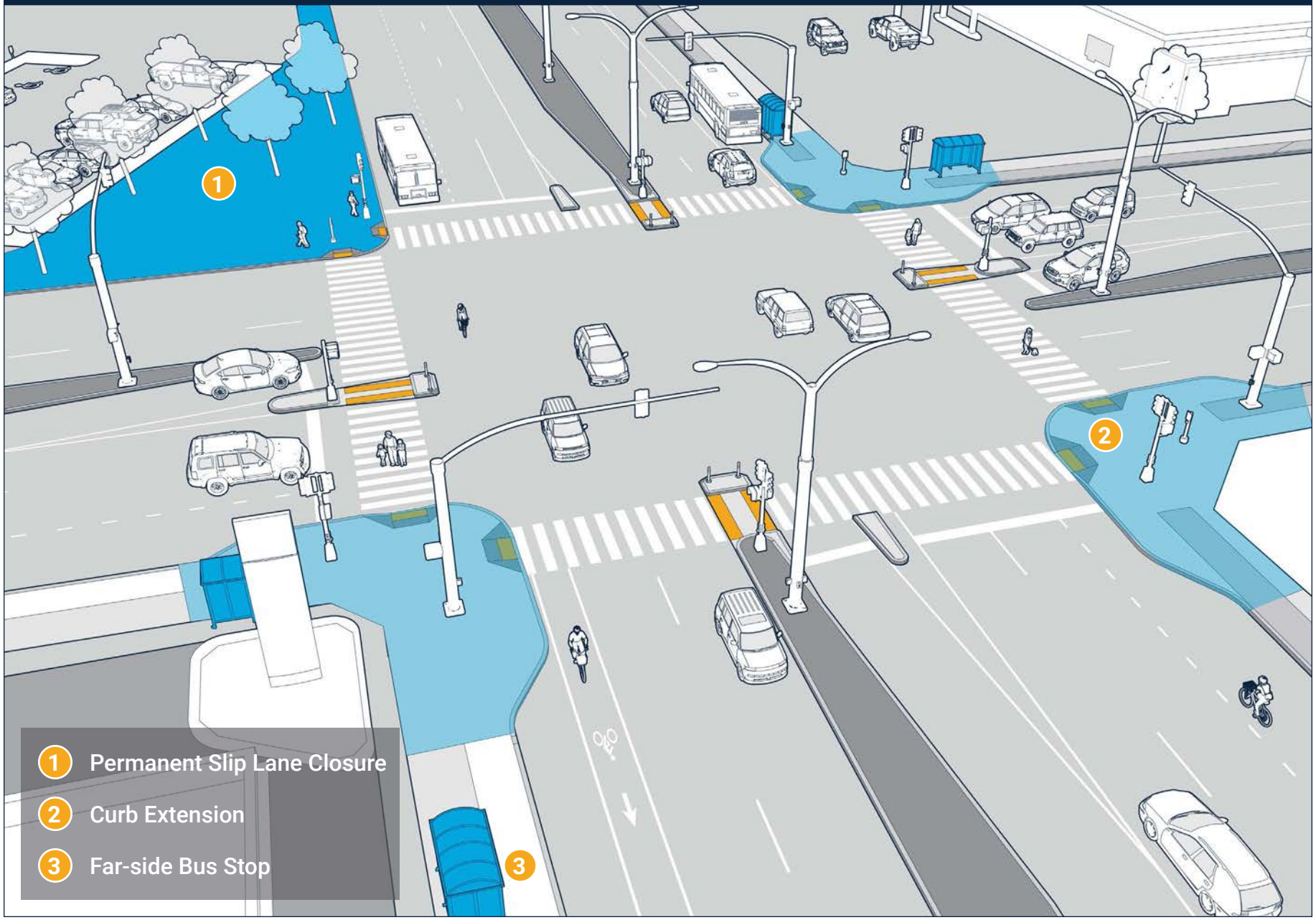
West Capitol Drive & North 76th Street — Existing Conditions



West Capitol Drive & North 76th Street — Low-Effort Improvements



West Capitol Drive & North 76th Street — High-Effort Improvements



West Walker Street & South Cesar Chavez Drive

Description

- West Walker Street is a local street with one travel lane and a parking lane in each direction.
- South Cesar Chavez Drive has one travel lane and a parking lane in each direction; during peak hours the parking lane is designated as a travel lane.
- South Cesar Chavez Drive is a bus route.
- West Walker Street has a stop sign at South Cesar Chavez Drive, which is uncontrolled at the intersection.

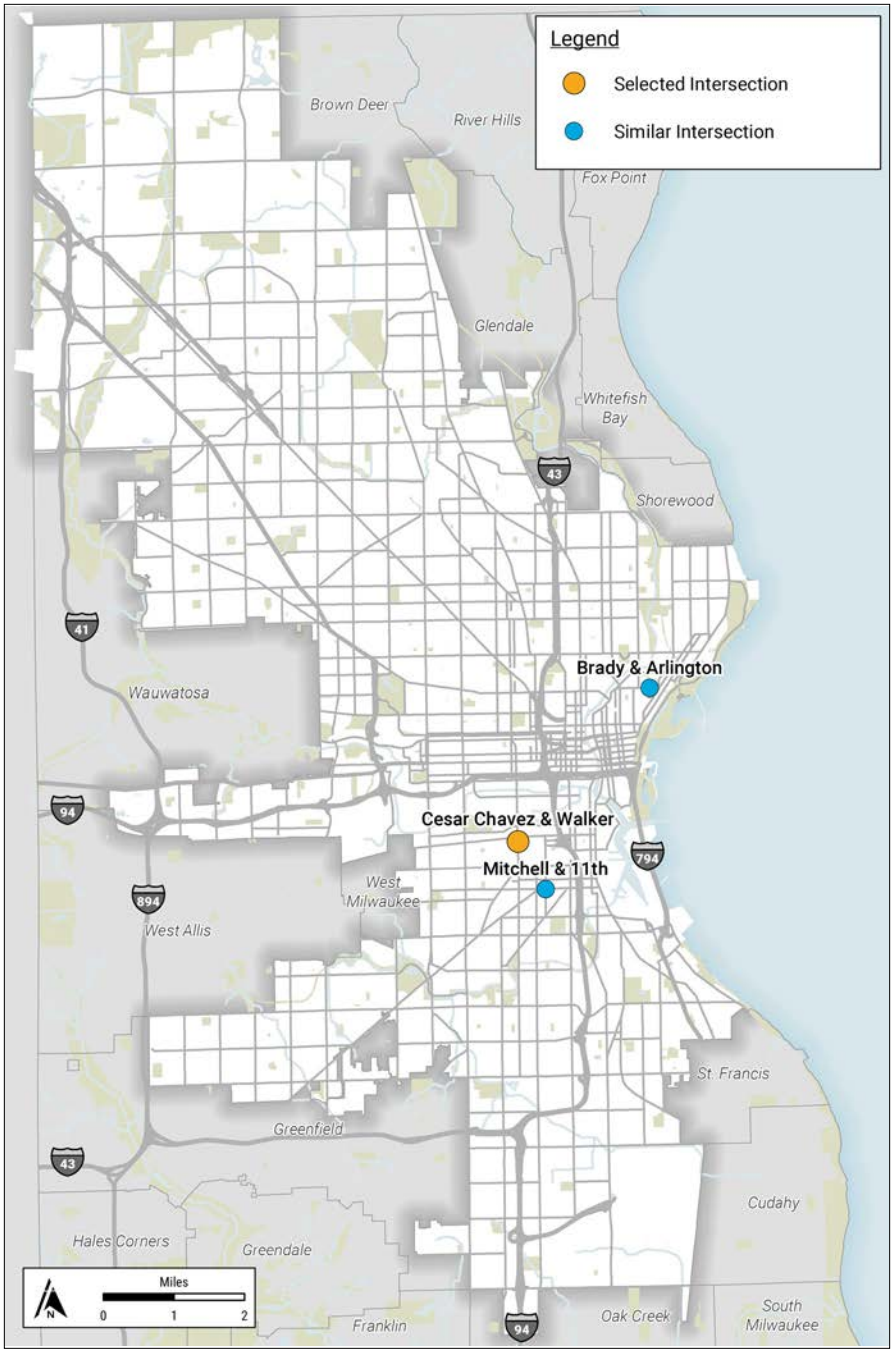
Existing Conditions

- High crash location.
- Curb ramps do not direct pedestrians directly into the crosswalks.
- During peak hours, there is a multiple threat crash risk on South Cesar Chavez Drive where a motorist in one lane stops for a person crossing the street, but a motorist in the next lane does not stop.
- Parking is restricted to provide a northbound travel lane during the morning peak hour.

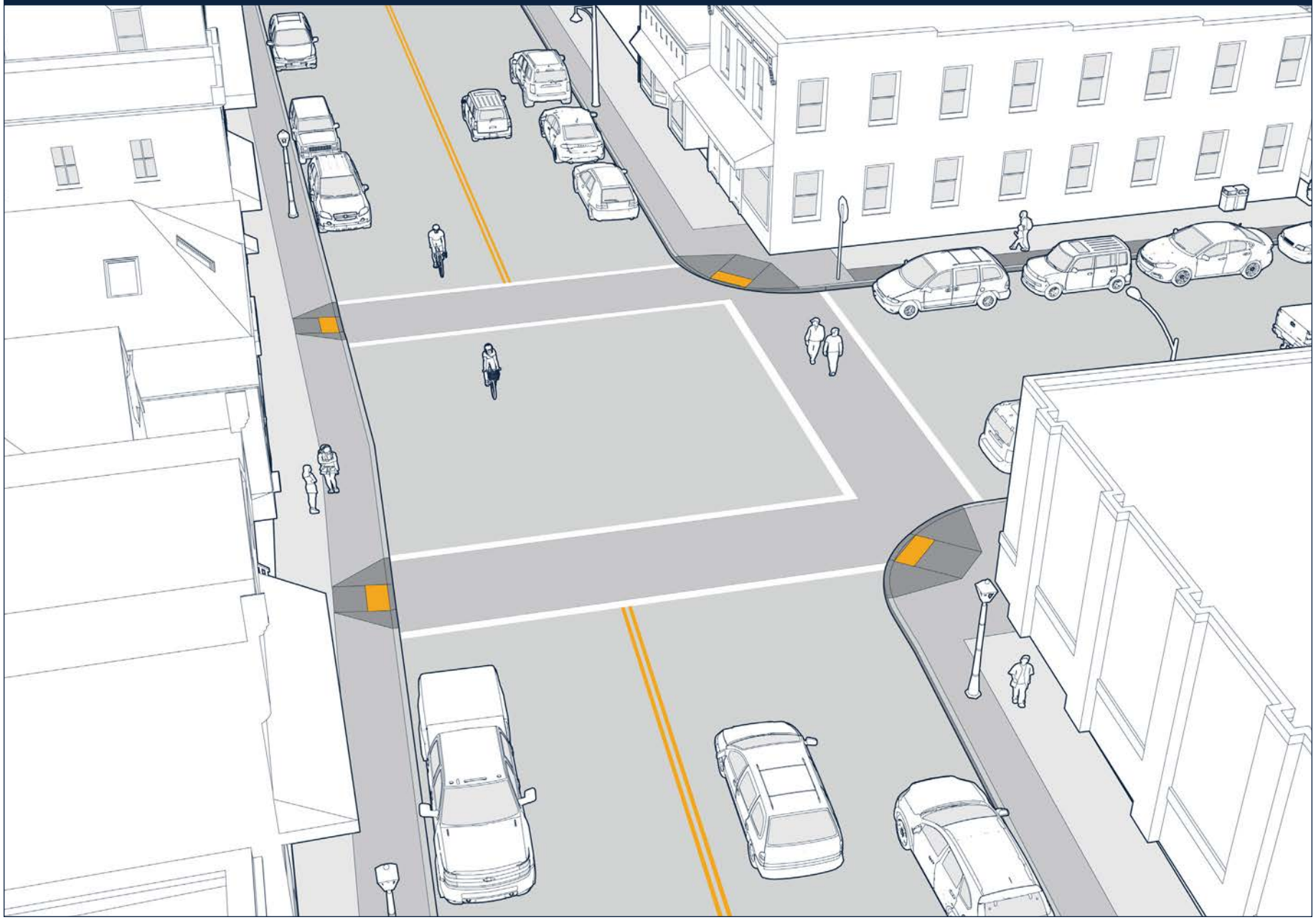
Similar Intersections

The following intersections have similar characteristics to the intersection of West Walker Street and South Cesar Chavez Drive and most are also high crash locations:

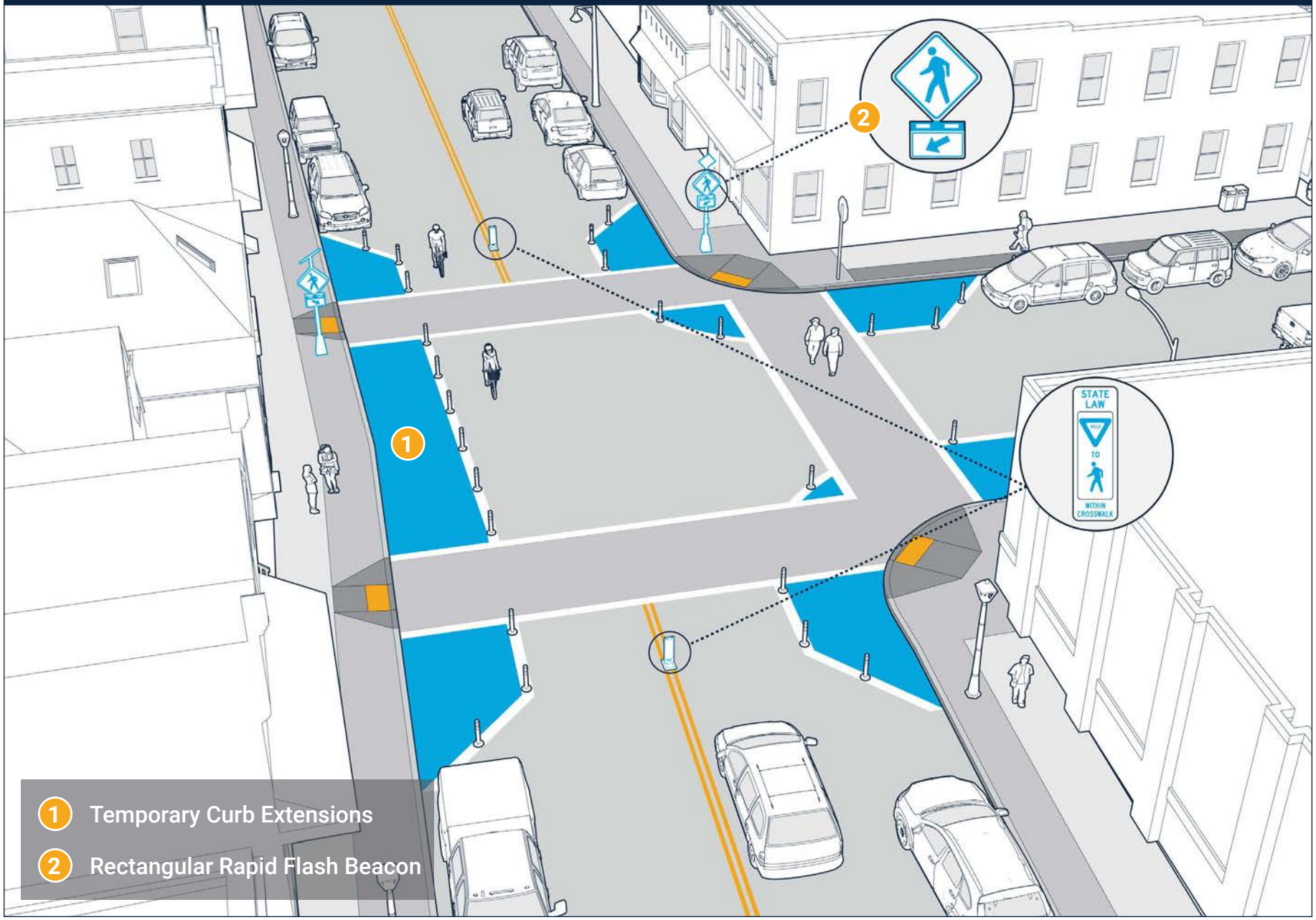
- East Brady Street & North Arlington Place
- West Mitchell Street & South 11th Street



West Walker Street & South Cesar Chavez Drive — Existing Conditions

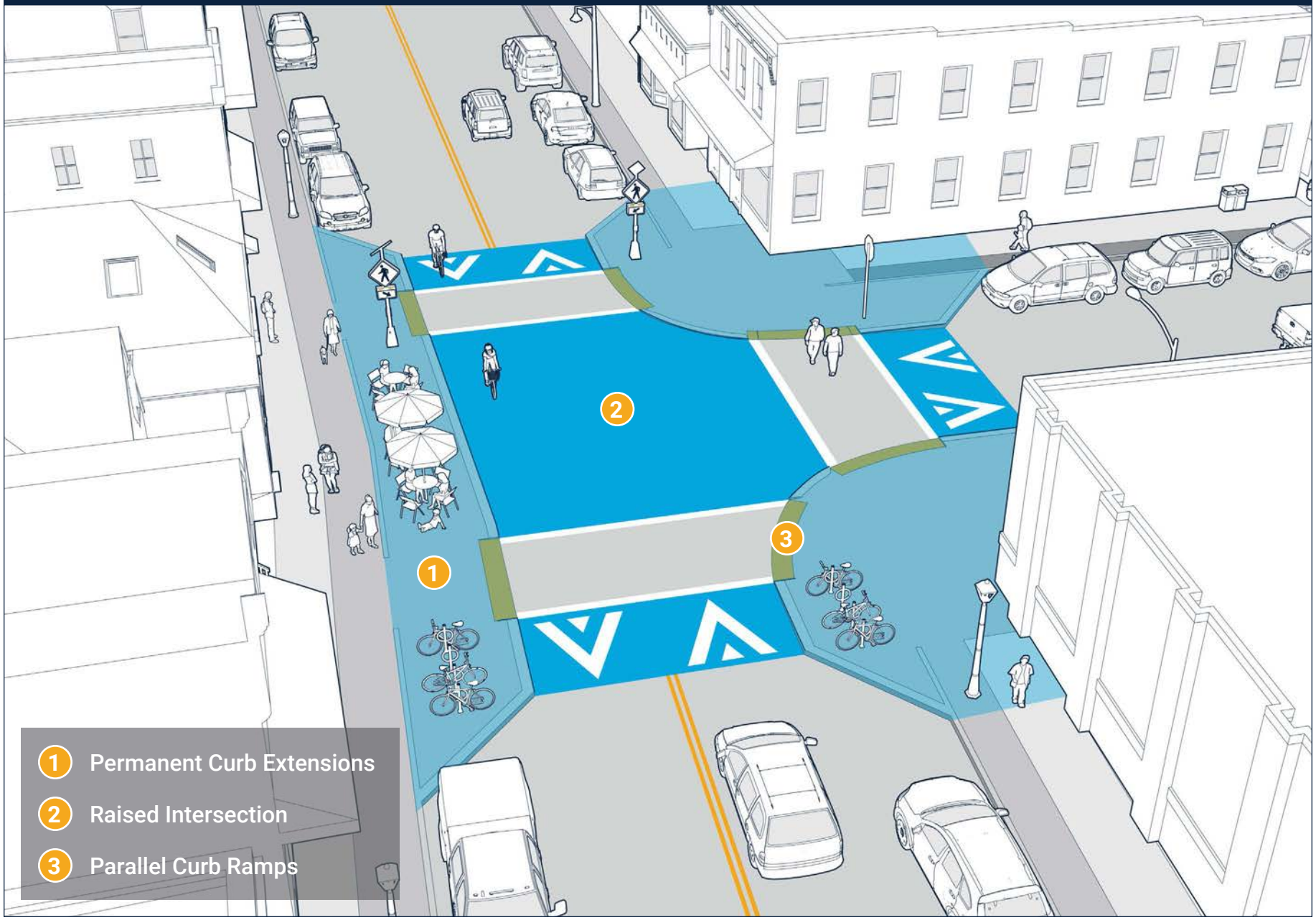


West Walker Street & South Cesar Chavez Drive — Low-Effort Improvements



1. Temporary Curb Extensions
2. Rectangular Rapid Flash Beacon

West Walker Street & South Cesar Chavez Drive — High-Effort Improvements



East Highland Avenue & North Water Street

Description

- East Highland Avenue is a local street with one travel lane and a parking lane in each direction; west of North Water Street, East Highland Avenue has diagonal parking on one side of the street.
- North Water Street is median-divided and has two travel lanes, a bike lane, and a parking lane in each direction; there are left turn lanes at the intersection; the street is a bus route.
- East Highland Avenue has a stop sign at North Water Street, which is uncontrolled at the intersection.

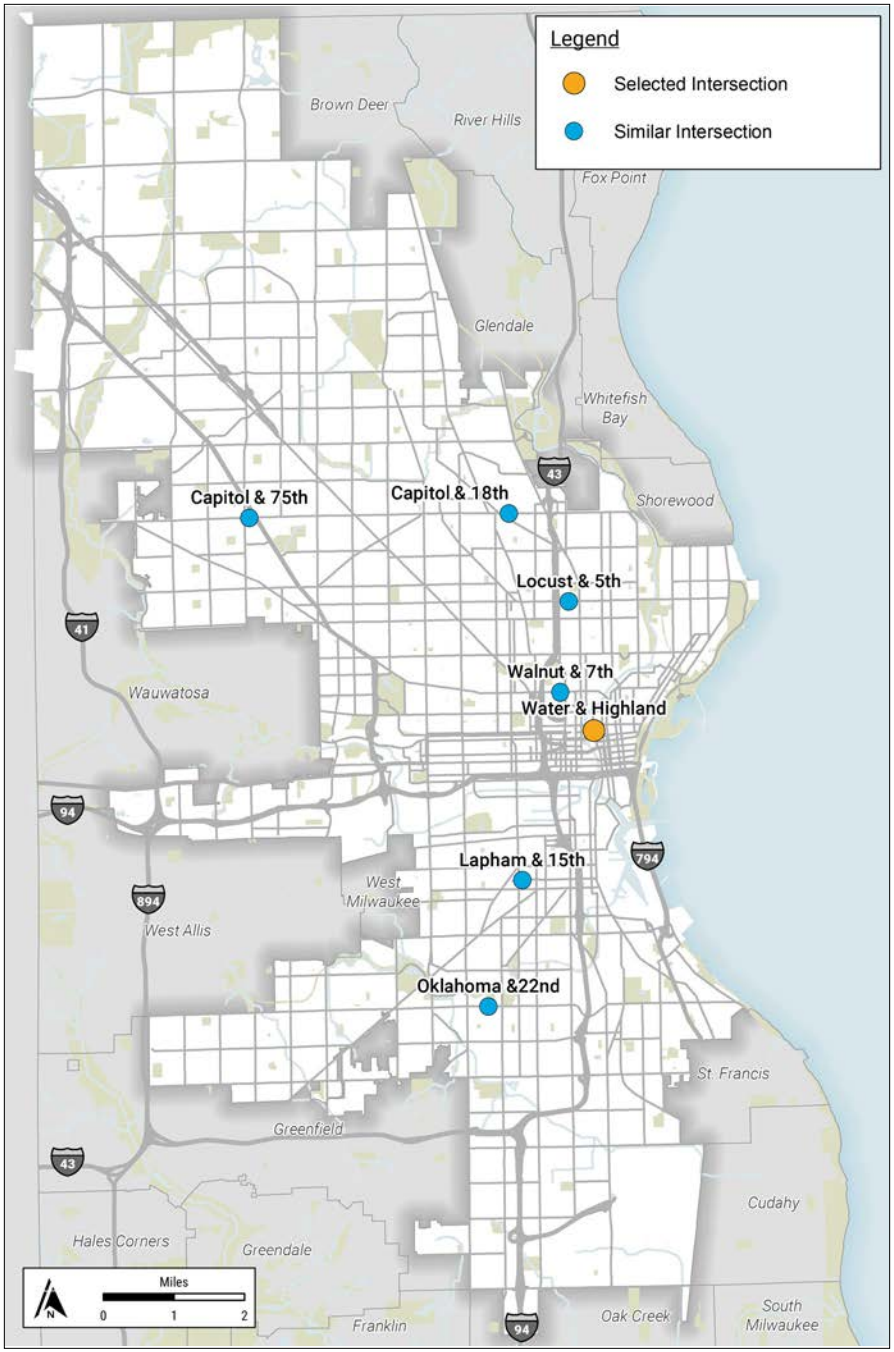
Existing Conditions

- High crash location.
- Crosswalks are not marked on East Highland Avenue.
- Some curb ramps do not direct pedestrians directly into the crosswalks.
- Median islands do not protect the crosswalks.
- There is a multiple threat crash risk on North Water Street.

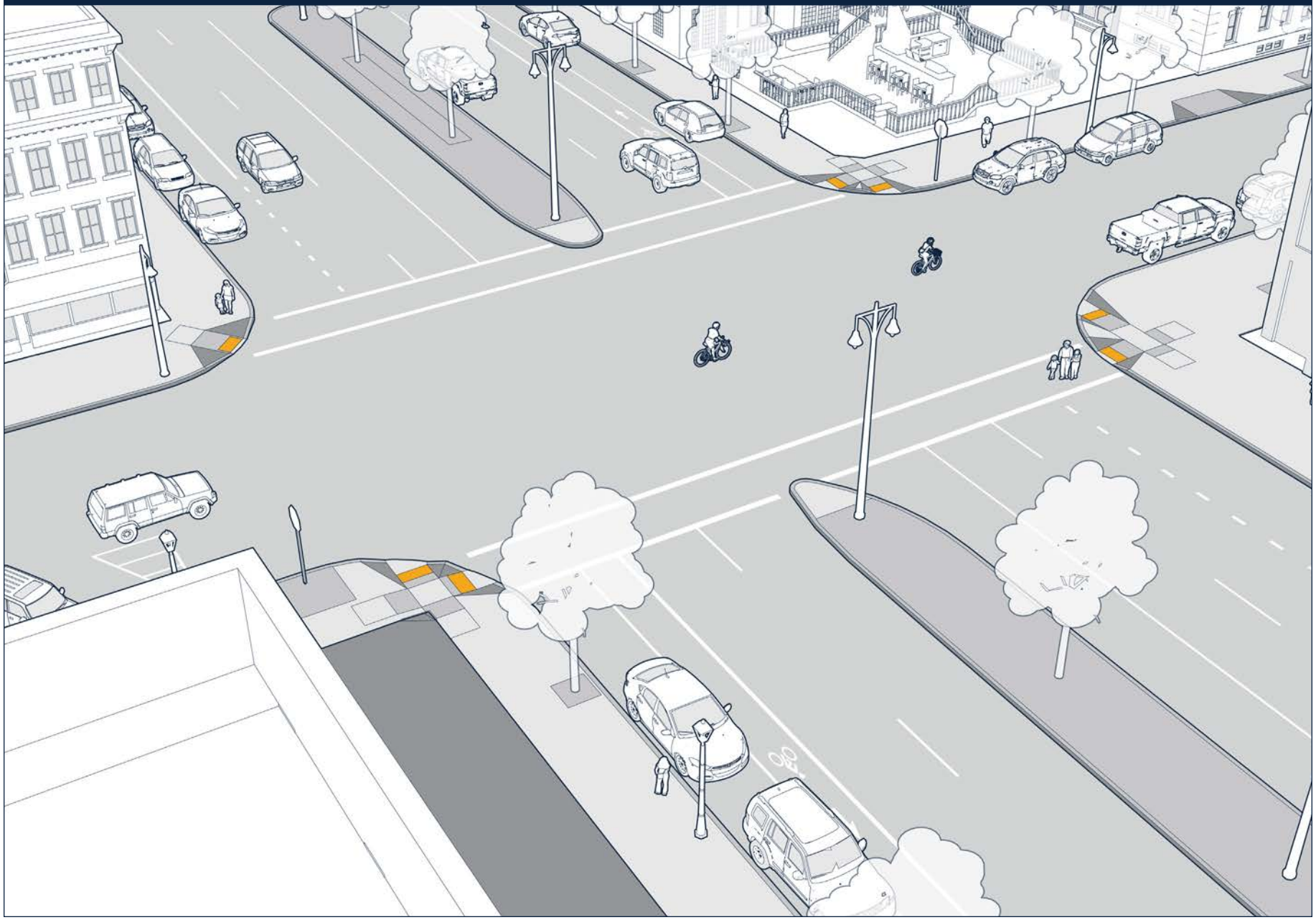
Similar Intersections

The following intersections have similar characteristics to the intersection of East Highland Avenue and North Water Street and most are also high crash locations:

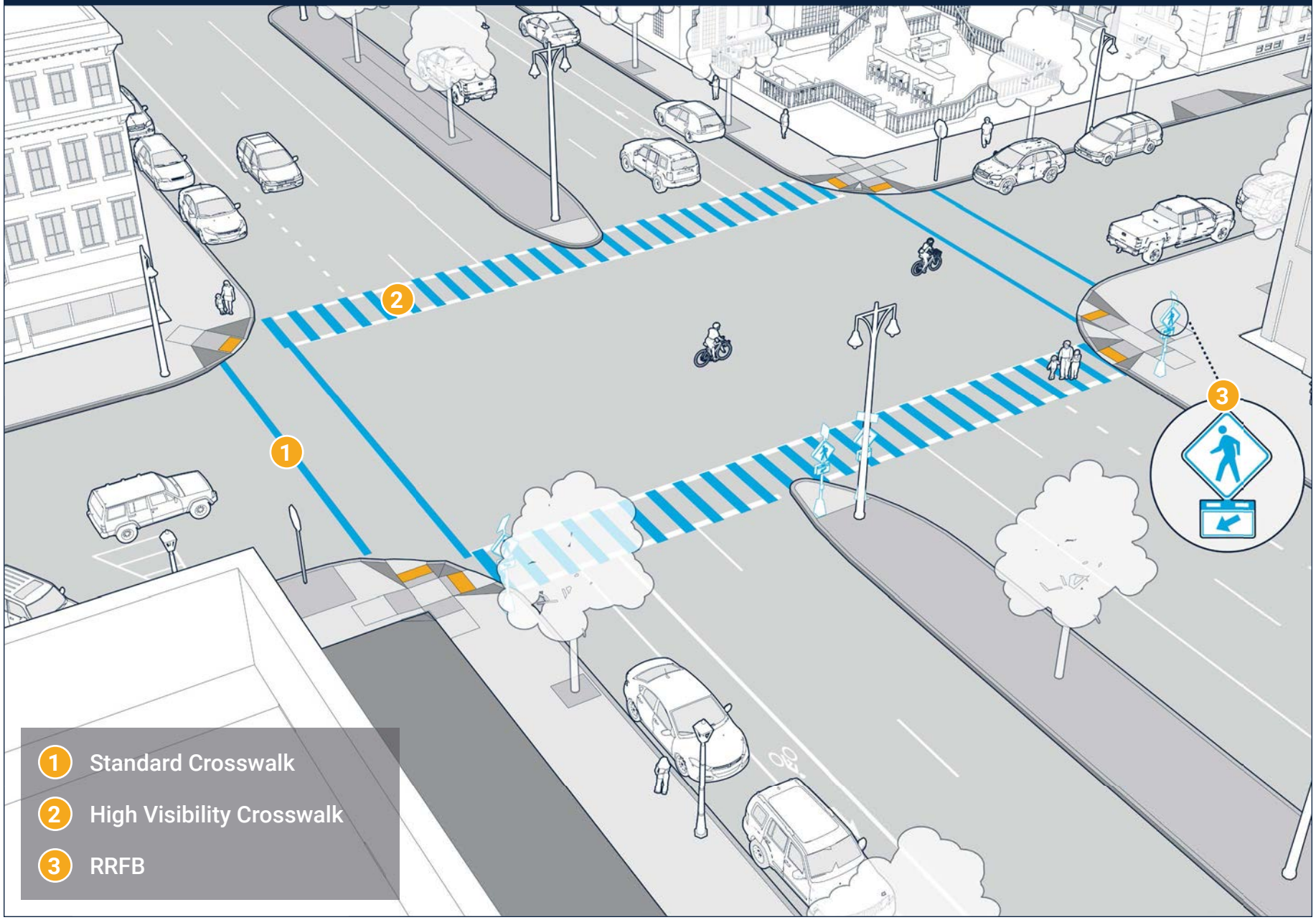
- West Capitol Drive & North 75th Street
- West Capitol Drive & North 18th Street
- West Locust Street & North 5th Street
- West Walnut Street & North 7th Street
- West Lapham Boulevard & South 15th Street
- West Oklahoma Avenue & South 22nd Street



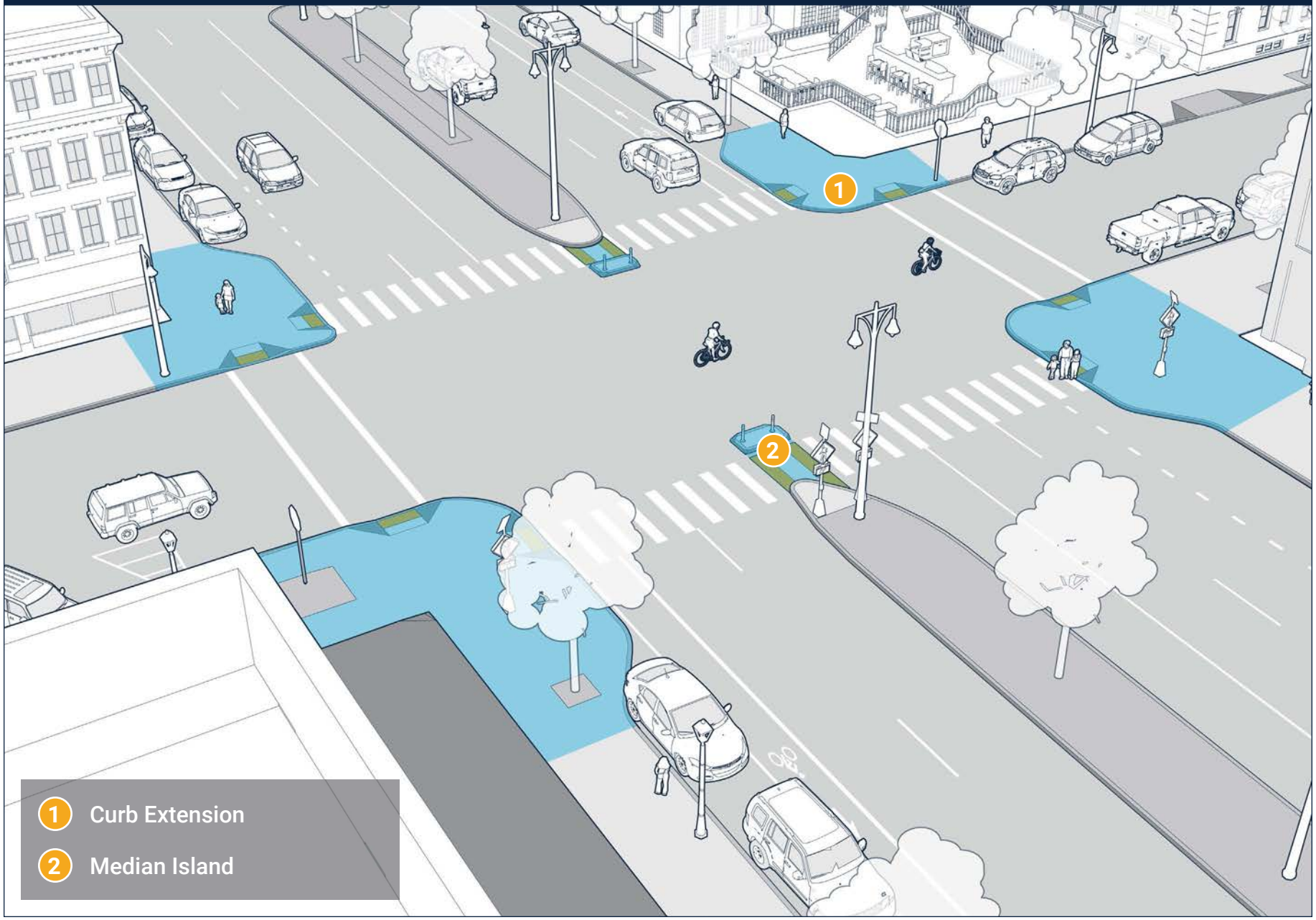
East Highland Avenue & North Water Street — Existing Conditions



East Highland Avenue & North Water Street — Low-Effort Improvements



East Highland Avenue & North Water Street — High-Effort Improvements

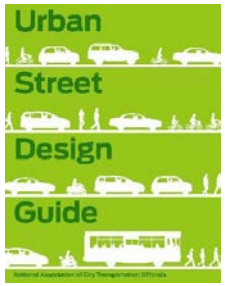


Standards and Guidelines

Guidelines—such as the NACTO suite of design guides—are intended to help implement innovative designs. The most relevant standards and guidelines are described below. Guidelines focused on bicycle and transit design are included because street designs for people bicycling and using transit often also benefit people walking.

Pedestrian Guidelines

NACTO Urban Street Design Guide – 2013

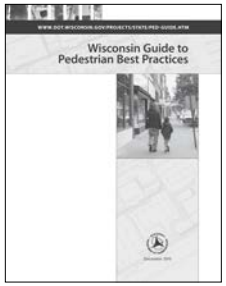


The purpose of the NACTO Urban Street Design Guide is to provide cities with state-of-the-practice solutions that can help to design complete streets in urban settings. The NACTO Urban Street Design Guide recognizes the direct relationship between street design and economic development and emphasizes safety for all traffic modes. The NACTO Urban Street Design Guide is not intended to be a comprehensive guide for the geometric design of the street, rather it covers design principles to meet the complex needs of cities. The NACTO Urban Street Design Guide references the MUTCD.

FHWA Achieving Multimodal Networks – 2016

Achieving Multimodal Networks is a resource for practitioners seeking to build multimodal transportation networks. The publication highlights ways to apply the design flexibility found in current national design guidance to address common street design challenges and barriers. It focuses on reducing multimodal conflicts and achieving connected networks so that walking and bicycling are safe, comfortable, and attractive options for people of all ages and abilities.

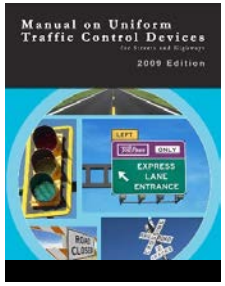
Wisconsin Guide to Pedestrian Best Practices – 2010



Chapter 5 of the Wisconsin DOT's Guide to Pedestrian Best Practices features the most complete guidance in Wisconsin on designing pedestrian facilities. It includes guidance on pedestrian facility design as well as how streets can be designed to positively impact pedestrian accommodations. It reinforces the guidance from the 2004 Guide for the Planning, Design, and Operation of Pedestrian Facilities with additional depth and detail on nearly all topics in that guide.

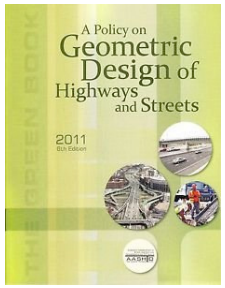
Other Guides

Manual on Uniform Traffic Control Devices (MUTCD) – 2009



The MUTCD is issued by the Federal Highway Administration of the U.S. Department of Transportation to specify the standards by which traffic signs, road surface markings, and signals are designed, installed, and used. These specifications include the shapes, colors, fonts, sizes, etc., used in pavement markings and signs. All traffic control devices must generally conform to these standards. The manual is used to ensure traffic control devices conform to the national standard.

AASHTO Green Book – 2011

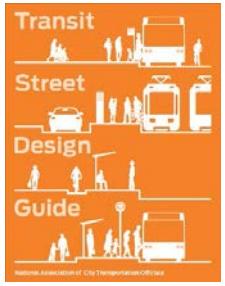


The American Association of State Highway and Transportation Officials' (AASHTO) Policy on Geometric Design of Highways and Streets, 6th Edition, 2011, commonly referred to as the "Green Book," contains current design research and best practices for highway and street geometric design. The document provides guidance for arterials, collectors, and local streets in both urban and rural locations.

Wisconsin Facilities Development Manual (FDM) – 2018

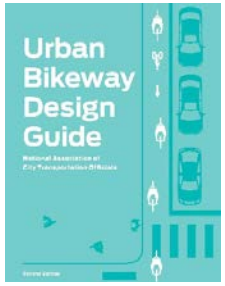
The Wisconsin FDM provides policy, procedural requirements, and guidance encompassing the facilities development process within the Wisconsin Department of Transportation, Division of Transportation Systems Development (DTSD). It is applicable to all types of improvements on the state trunk highway system and other street/highway systems where federal or state funds may be used for improvements. Adherence to the FDM's requirements provides for the uniform development of transportation systems and plans that reflect sound engineering practice and sensitive environmental concern. Chapter 11, Section 46 of the FDM details design requirements for bicycle and pedestrian accommodation.

NACTO Transit Street Design Guide – 2016



The NACTO Transit Street Design Guide provides guidelines on developing transit facilities and designing city streets to prioritize transit, improve transit service quality, and support other goals related to transit. The guide also includes recommendations on integrating transit with other modes and the design of specialized transit street elements.

NACTO Urban Bikeway Design Guide – 2012



The NACTO Urban Bikeway Design Guide provides cities with state-of-the-practice solutions to create complete streets that are safe and enjoyable for people riding bikes. The NACTO Urban Bikeway Design Guide is not intended to be a comprehensive guide for the geometric design of bikeways. The guide covers certain types of on-street bikeway designs, specifically bike lanes and several new and innovative types of on-street bikeway design treatments, but does not cover shared use paths, signal design, and other relevant topics. In most cases, the NACTO Urban Bikeway Design Guide should be used in tandem with the AASHTO Bike Guide.

FHWA Separated Bike Lane Planning & Design Guide – 2015

The Separated Bike Lane Planning and Design Guide is issued by the Federal Highway Administration (FHWA) and provides guidelines for one- and two-way separated bike lanes. The guide provides case studies to aid in implementation. The guide also identifies data to collect before and after separated bike lane projects and potential future research to refine and improve the practice.

Endnotes

1 National Realtors Association 2013 Community Preference Survey.

2 U.S. Census American Community Survey, 2016.

3 U.S. Census American Community Survey, 2016.

4 City of Milwaukee Community Health Assessment: Understanding the Health Needs of Our Community. 2016.

5 Centers for Disease Control and Prevention. "Physical Activity and Health: The Benefits of Physical Activity." 2011.

6 Center for Neighborhood Technology. "Housing and Transportation Affordability Index." 2012

7 Chetty, R. et al. "Where is the Land of Opportunity? The Geography of Intergenerational Mobility in the United States." Harvard University and the National Bureau of Economic Research. 2014.

8 "2016 U.S. Gazetteer Files." United States Census Bureau. Retrieved January 11, 2019.

9 "American FactFinder". United States Census Bureau. Retrieved January 11, 2019.

10 "DPW Statistics". City of Milwaukee. Retrieved January 11, 2019.

11 (US cities with population over 200,000) ("2017 City Ranking". Walk Score. Retrieved January 11, 2019.

12 Milwaukee Walk and Bike Report. Wisconsin Bike Fed. 2017.

13 American Community Survey, Means of Transportation to Work. 2016 5-Year Estimate.

14 In 2017, Wisconsin agencies began using an updated form for reporting crashes to the Wisconsin Department of Transportation. The updated form has a broader definition of "severe" injury that may have impacted the reported number of severe injury crashes reported in 2017.

15 The descriptions provided for each crash type are based on standardized crash types.

16 Litman, Todd. Economic Value of Walkability. Victoria Transportation Policy Institute. February 2011. http://www.vtpi.org/walkability.pdf

17 Bertulis, T. and Dulaski, D. "Driver Approach Speed and Its Impact on Driver Yielding to Pedestrian Behavior at Unsignalized Crosswalks." 2014.

18 Tefft, Brian C. "Impact of Speed and a Pedestrian's Risk of Severe Injury or death." Accident Analysis & Prevention. 2013.

19 U.S. Department of Transportation Federal Highway Administration. "Proven Safety Countermeasurers: Walkways." 2018.

20 Intersection Crash Reduction Factors. Michigan Department of Transportation. https://www.michigan.gov/documents/mdot/mdot_Crash_Reduction_Factors_303744_7.pdf

21 U.S. Department of Transportation Federal Highway Administration. "Proven Safety Countermeasurers: Medians and Pedestrian Crossing Islands in Urban and Suburban Areas." 2018.

22 U.S. Department of Transportation Federal Highway Administration. Toolbox of Countermeasures and Their Potential Effectiveness for Pedestrian Crashes. https://safety.fhwa.dot.gov/ped_bike/tools_solve/ped_tctpepc/

23 Potts, I., Harwood, D. and Richard, K. "Relationship of Lane Width to Safety for Urban and Suburban Arterials." 2007.

24 U.S. Department of Transportation Federal Highway Administration. "Proven Safety Countermeasurers: Road Diets." 2018.

25 Chen, L., Chen, C., and Ewing, R. "The Relative Effectiveness of Pedestrian Safety Countermeasures at Urban Intersections: Lessons from a New York City Experience." 2012.

26 Bennett, M., Manal, H., and Van Houten, R. "A Comparison of Gateway In-Street Sign Treatment to other Driver Prompts to Increase Yielding to Pedestrians at Crosswalks." 2014.

27 AASHTO. "Pedestrian Gateway Treatment Technical Memo. http://aii.transportation.org/documents/pedestrian_gateway_technical_memo_final.pdf

28 Veneziano, D., Hayden, L., and Ye, J. "Effective Deployment of Radar Speed Signs." 2010.

29 U.S. Department of Transportation Federal Highway Administration. "Proven Safety Countermeasurers: Leading Pedestrian Intervals." 2018.

30 Retting, R., Nitzburg, M. Farmer, C.; Knoblauch, R. "Field Evaluation of Two Methods for Restricting Right Turn on Red to Promote Pedestrian Safety." ITE Journal. January 2002.

31 Safety Source: Desktop Reference for Crash Reduction Factors. Federal Highway Administration.

32 Fitzpatrick, K. and Park, E. S. "Safety Effectiveness of the HAWK Pedestrian Crossing Treatment., 2010.

33 U.S. Department of Transportation Federal Highway Administration. "Proven Safety Countermeasurers: Pedestrian Hybrid Beacon." 2018.

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MILWAUKEE
PEDESTRIAN PLAN