INDIANAPOLIS/ MARION COUNTY PEDESTRIAN SAFETY ACTION PLAN

The Indianapolis/Marion County Pedestrian Safety Action Plan (PSAP) is strictly a guidance document and not an adopted element of the Comprehensive Plan for Indianapolis and Marion County

Representatives of the following organizations contributed to the development of this Pedestrian Safety Action Plan:

American Planning Association Indiana Chapter

City of Indianapolis

- Department of Metropolitan Development
- Department of Public Works
- Indianapolis Metropolitan Police Department
- Indy Parks

Federal Highway Administration

Health by Design

Indianapolis Metropolitan Planning Organization

Indiana Department of Transportation

Indiana State Department of Health

Indiana University Public Policy Institute

IndyGo (Indianapolis Public Transportation Corporation)

Marion County Public Health Department

Riley Hospital for Children at Indiana University Health

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THE CITY OF INDIANAPOLIS
MAYOR JOE HOGSETT
EST. 1821

CONTENTS

1 INTRODUCTION

WHY A PEDESTRIAN SAFETY ACTION PLAN?

After recognizing the need to improve walking conditions in Indianapolis, the city's first Pedestrian Plan was completed in 2016 by the City of Indianapolis, Marion County Public Health Department, and Health by Design partners. The Pedestrian Plan outlined clear, equitable, and data-driven priorities for pedestrian investments throughout Indianapolis. Making the walking experience safe was a top goal of the plan. Recognizing the need for specific strategies, activities and measures to improve pedestrian safety, this Pedestrian Safety Action Plan (PSAP) was developed. This plan recognizes that everyone is a pedestrian for at least a portion of their day, whether they're riding transit, walking, using a mobility device, biking, or driving, and can benefit from safer pedestrian conditions.

WHAT'S A PEDESTRIAN SAFETY ACTION PLAN?

The Federal Highway Administration (FHWA) defines a Pedestrian Safety Action Plan as:

> *A plan developed by community stakeholders that is intended to improve pedestrian safety in the community. An objective of the plan is to help state and local officials know where to begin to address pedestrian safety issues. It is also intended to assist agencies in further enhancing their existing pedestrian safety programs and activities, including identifying safety problems and selecting optimal solutions. This plan is primarily a reference for improving pedestrian safety through street redesign and the use of engineering countermeasures, as well as other safety-related treatments and programs that involve the whole community. The plan can be used by engineers, planners, traffic safety and enforcement professionals, public health and injury prevention professionals, and decision-makers who have the responsibility of improving pedestrian safety at the state or local level.*

HOW WILL THE PEDESTRIAN SAFETY ACTION PLAN BE USED?

This plan is to be used primarily by City of Indianapolis staff as a guide for implementing capital improvements, design guidelines, and targeted policies to improve pedestrian safety. This document provides the following contents:


An overview of current pedestrian safety conditions


An overview of the crash analysis that has been done to-date, and how to use that data


An overview of policies and countermeasures currently in use to improve pedestrian safety


Clear targeted goals for how to improve safety using capital improvements, other countermeasures and design guidelines, and policy implementation


A menu of available countermeasures


A guide on how to apply countermeasures to achieve these goals in the top crash zones and across Indianapolis


Policy, process, and design goals to be implemented in the future


Directions on next steps

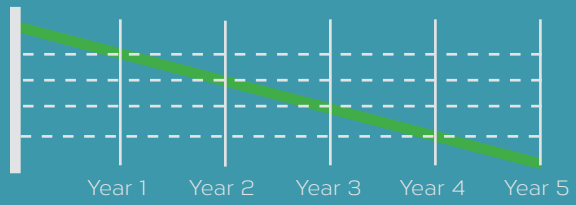

Plan ownership, partnership, and implementation

WHAT ARE THE GOALS OF THE PEDESTRIAN SAFETY ACTION PLAN?

The Pedestrian Safety Action Plan workgroup decided on two overall goals for the City of Indianapolis using combined expertise and referring to other similar plans.

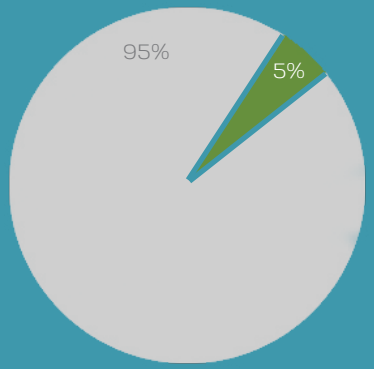
Goal 1:

REDUCE THE NUMBER OF PEDESTRIAN CRASHES BY 2% EACH YEAR FOR THE NEXT 5 YEARS



Goal 2:

FATALITIES WILL NOT EXCEED 5% OF TOTAL PEDESTRIAN CRASHES



2 BACKGROUND AND CONTEXT

PEDESTRIAN SAFETY PARTNERSHIPS

Formed in 2006, the Health by Design coalition has a long-standing partnership with the City of Indianapolis and Marion County Public Health Department. Together they have achieved countless planning, policy and project successes that help to ensure safe, accessible and connected transportation networks for Marion County residents, regardless of age, ability, or income.

That key partnership has led to numerous initiatives at the intersection of public health and the built environment. Some examples of these initiatives include the development of the Sidewalk Ordinance (2008), the Complete Streets Ordinance (2012), the Pedestrian Plan (2016), and the Pedestrian Safety Zones Project.

SIDEWALK ORDINANCE

Health by Design has contributed to many initiatives advocating for more and better sidewalks in Indianapolis, with one of them leading to the 2008 Sidewalk Ordinance Amendment. Prior to the implementation of the adopted amendment, sidewalks were only required for single-family developments. This amendment required the installation of sidewalks for all new developments and additions within multi-family, commercial, industrial and special use zoning districts.

New developments, if no sidewalk existed, were required to provide sidewalks around the perimeter of a site along all public streets from which the development gained access.

Existing developments undergoing conversions, expansions and additions were required to provide a lineal length of sidewalk in relation to the square foot area of proposed additions and improvements.

These overall regulations were carried over in the Indy Rezone process, which resulted in the implementation of the Consolidated Zoning and Subdivision Ordinance (CZCO) in April 2016. Prior to the adoption of the CZSO, only dwelling districts were required to undergo the subdivision process. Now, properties with commercial and industrial zoning, are required to undergo the subdivision process, in which sidewalk installation is inherent. Indy Rezone also requires additional pedestrian connectivity in instances such as cul-de-sac installation, abutting subdivision location, and on both sides of internal drives.

PEDESTRIAN SAFETY PARTNERSHIPS

COMPLETE STREETS ORDINANCE

The City of Indianapolis passed a strong Complete Streets ordinance unanimously in 2012, viewing Complete Streets as integral to everyday transportation decision-making practices and processes. The Indianapolis Complete Street Ordinance was rated the Best Complete Streets Policy in the United States by Smart Growth America in 2013.

The policy states that:

> *The City shall develop a safe, reliable, efficient, integrated and connected multimodal transportation system that will promote access, mobility and health for all users, and will ensure that the safety and convenience of all users of the transportation system are accommodated, including pedestrians, bicyclists, users of mass transit, people of all ages and abilities, motorists, emergency responders, freight providers and adjacent land users.*

The City shall measure the success of this Complete Streets policy using, but not limited to, the following performance measures:

- Total miles of bike lanes
- Linear feet of new pedestrian accommodation
- Number of new curb ramps installed along city streets
- Crosswalk and intersection improvements
- Percentage of transit stops accessible via sidewalks and curb ramps
  Rate of crashes, injuries, and fatalities by mode
- Rate of children walking or bicycling to school

INDIANAPOLIS PEDESTRIAN PLAN

After receiving a 2015 American Planning Association Plan4Health grant, Health by Design led the ambitious process of creating Indianapolis' first Pedestrian Plan.

Three final products were released by Health by Design and Plan4Health project partners in the spring of 2016: The Indianapolis/ Marion County Pedestrian Plan; Appendix A: State of Walkability –A Companion Piece to the Indianapolis/ Marion County Pedestrian Plan; and Appendix B: Prioritization Methodology. Together, these documents provide an accessible, transparent summary of the plan process, reflecting the range of community feedback as well as the comprehensive analysis of data. The City of Indianapolis' first Pedestrian Plan was adopted by the Metropolitan Development Commission on May 4, 2016.

The process of developing this PSAP builds on these existing efforts by Health by Design partners to produce a document outlining how to achieve pedestrian safety in Indianapolis through countermeasures, policy, and procedures.

PEDESTRIAN SAFETY PARTNERSHIPS

ZONE ANALYSIS

This PSAP utilizes data collected for the Pedestrian Safety Zones Project. In early 2013, recognizing the increasing popularity of walking and walkability, but also understanding the inherent risks in increased pedestrian activity due to roadway design and lack of infrastructure, Health by Design partnered with the Marion County Public Health Department, the Indiana Criminal Justice Institute, the City of Indianapolis, and other community partners to analyze pedestrian safety.

The product of this collaboration is the Pedestrian Safety Zones Project, an effort to collect crash information and use it to identify, analyze and address areas with particularly high pedestrian risk.

While data collection and analysis are key components of the Pedestrian Safety Zones Project, they are not the project's highest purpose; instead, they are means to an end, with that end being a better understanding of pedestrian crashes – where, when and why they occur and who is involved – in order to reduce them.

The Pedestrian Safety Zones Project has developed fruitful collaborations with organizations and agencies including the City of Indianapolis, the Marion County Public Health Department, Indiana Department of Transportation, Indianapolis Metropolitan Police Department, and the Federal Highway Administration. The work also has been complemented by outside factors including:

- the U.S. Department of Transportation's launch of its Safer People, Safer Streets initiative in 2015;
- increased interest in Vision Zero, a Swedish strategy for eliminating all traffic fatalities; and a subsequent peer exchange and public event in 2017
- financial support from the Indiana Criminal Justice Institute;
- the designation, in 2015, of Indianapolis and Indiana as a focus city and state through the Federal Highway Administration's "Focused Approach to Safety in the area of Pedestrian and Bicycle Safety" initiative, discussed further below.

This Pedestrian Safety Action Plan has utilized the existing Pedestrian Safety Zones Project data analysis to help target key areas to address through countermeasures, that can be used as typologies for the entire city.

FHWA FOCUS CITIES

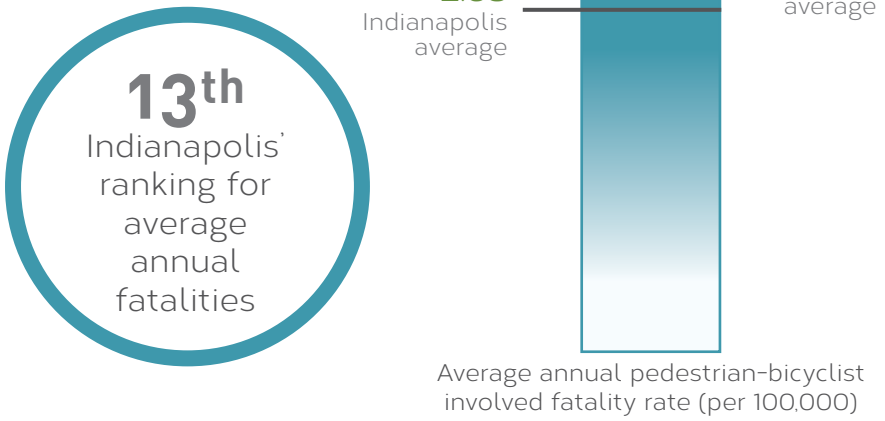
Since 2004, the Focused Approach to Safety (FAS) has allowed FHWA to identify areas of opportunity and to focus its resources to reduce fatalities and serious injuries on the nation's roads.

In the previous iteration of the FAS, focus areas were based solely on pedestrians and one of the selection criteria required the city to be among the top 50 cities in pedestrian fatalities. In 2015, this focus area continued to concentrate on cities, but was adjusted to include bicyclist fatalities. FHWA also changed the selection criteria to include the 20 cities with the largest number of pedestrian/bicyclist fatalities or any city that had a fatality rate per population higher than the average of the top 50 cities. Every state that had at least one Focus City is designated a Focus State. Indianapolis and Indiana were selected as a Focus City and designated Focus State in 2015.

Indianapolis was selected in 2015 due to its average annual total number of pedestrian and bicycle involved fatalities using data from 2011-2013. Indianapolis had 22 average annual fatalities between 2011 and 2013, and ranked 13th out of the 22 cities selected.

The other criteria to be selected as a Focus City was to exceed the average annual pedestrian-bicyclist involved fatality rate (per 100,000 population) for 2011-2013. The average rate was 2.98, and Indianapolis' rate was 2.63. While Indianapolis did not meet the threshold for exceeding the average annual pedestrian-bicyclist involved fatality rate (per 100,000 population) for 2011-2013, it met the other criteria, and was included among the 2015 Focus Cities.

FHWA expects to review these rankings again near 2020, as they generally happen every five years. At that point, FHWA will review another two years of data to see what has changed. Partners in Indianapolis are working towards reducing total and average annual pedestrian fatalities, and removal from the FHWA Focus Cities and Focus State list.

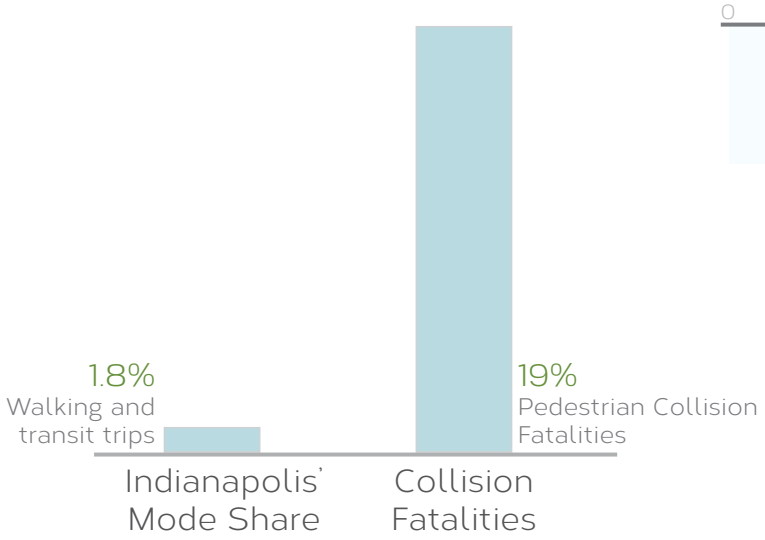


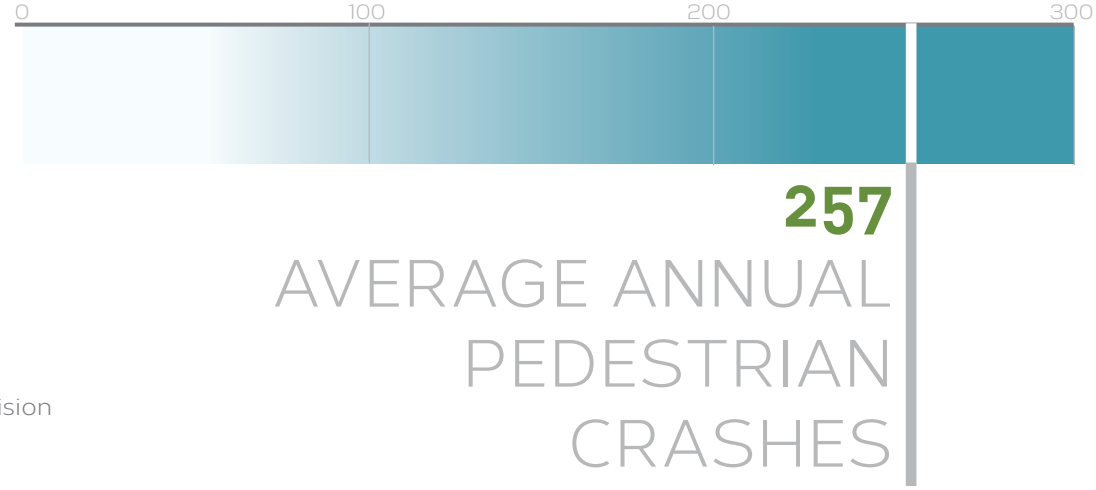
CURRENT STATUS

Of the thousands of vehicle collisions that occur each year in Indianapolis, less than 1% involve pedestrians. Still, enough of those incidents involve people walking that, between 2010 and 2016, there was an average of 257 pedestrian crashes each year*. Pedestrians also accounted for an average of 19% of collision fatalities each year, even though walking and transit trips accounted for only 1.8% of Indianapolis' mode share.

As troubling as that might seem, the data is even worse for Indianapolis' most vulnerable populations: children, older adults and ethnic and racial minorities, who are more likely to experience pedestrian crashes and to suffer related injuries and/or deaths than the general population.

Furthermore, the data offers limited insight into the full impact of pedestrian injuries and fatalities on families, neighborhoods and the economy. The truth is, collisions that result in minor injuries or none-at-all still take a toll on the lives and livelihoods of those involved, ultimately affecting the sense of security and livability in neighborhoods and the overall quality of life for Indianapolis residents.





*Automated Reporting Information Exchange (ARIES) data only


WALK TIME
WALK-INS
Equity

3 METHODOLOGY

ZONE ANALYSIS PROCESS

To prevent pedestrian crashes within Indianapolis, identification of where, when, and how these crashes were happening needed to be identified.

This project adapted a process outlined in the Federal Highway Administration's Zone Guide for Pedestrian Safety. The projects steps include:

1 SUBJECT SELECTION

Identifying crashes to be included in the analysis

2 MAPPING

Mapping those crashes

3 ZONE DEFINITION

Defining general areas, or "zones," to be studied

4 ZONE NARROWING

Assessing "zone efficiency"

5 ZONE EVALUATION

Evaluating those zones and identifying available resources

6 RESPONSE

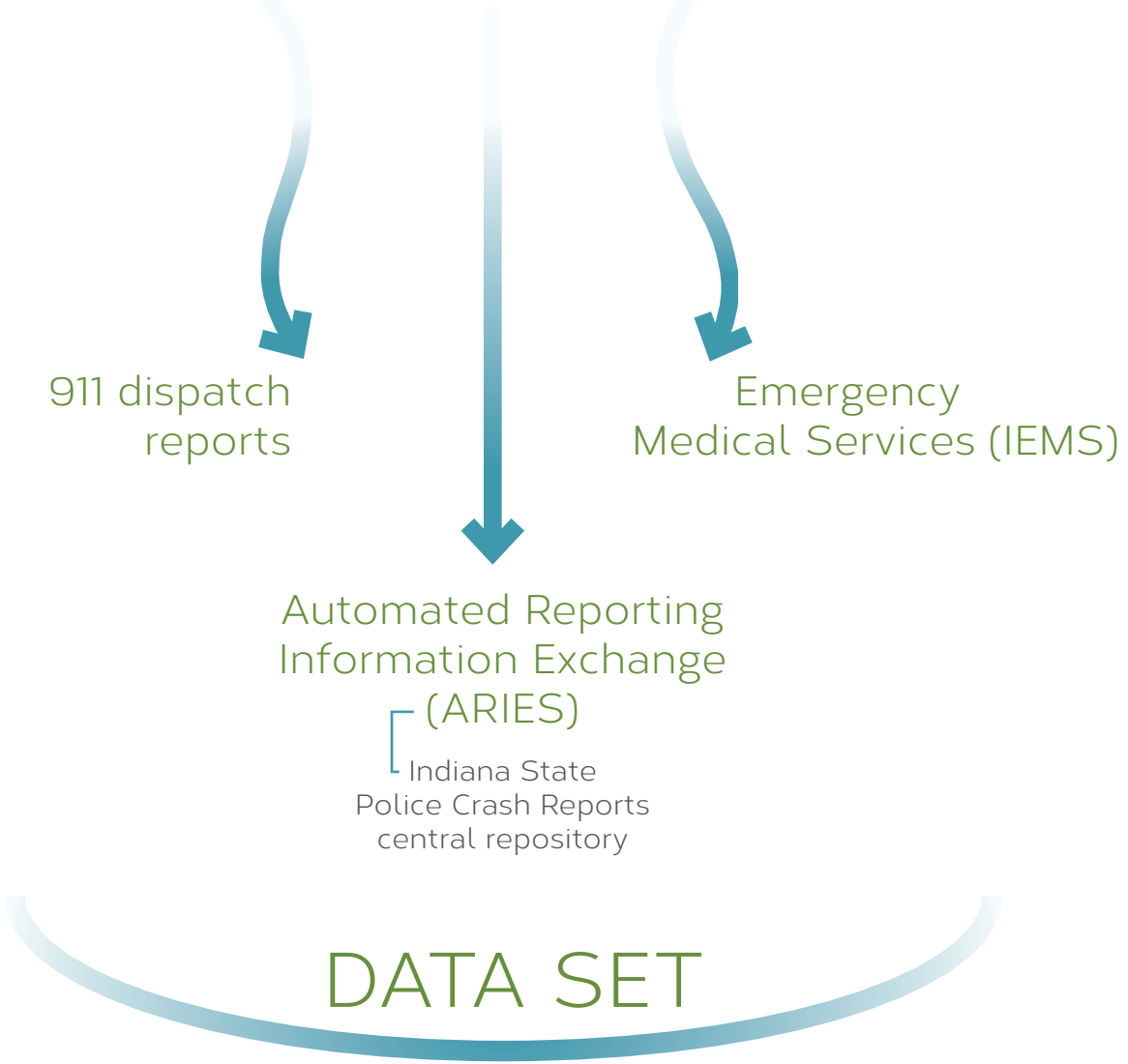
Choosing, implementing and monitoring the best tactics for increasing pedestrian safety

It should be noted that the steps run continuously and at times, concurrently. For example, the collection and analysis of crash data for one zone may be underway while the development and implementation of education, engineering and enforcement countermeasures is happening in another.

ZONE ANALYSIS PROCESS: STEP 1

SUBJECT SELECTION

In order to identify the crashes to be included in the analyses, the Pedestrian Safety Zones Project examined data from three sources to contribute to one data set:



Each crash was reviewed to ensure that it qualified for inclusion in the project based on whether it occurred on a public roadway and offered sufficient information for analysis. Those crashes that fit the criteria were assessed for characteristics and factors, including:

DATA LIMITATIONS

It should be noted that for the years 2010 to 2014, information was available only from ARIES. From 2015 to 2016, 911 and IEMS reports were also used, but, for various reasons, the information conflicted. The Pedestrian Safety Zones Project is working to understand the reasons for those differences.

As data was compiled and analyzed, these challenges were identified:

- First, due to differences in data sources and reporting methods, direct comparisons of records were not always possible.
- Second, data pulled from multiple sources did not always agree.
- Finally, available data did not always allow for a full analysis of the many factors involved in crashes.

While initial steps have been taken to understand the basis for these numbers and the discrepancies among them, the data range indicates inconsistency in reporting,with the liklihood that pedestrian crashes occur more frequently than previously understood when only ARIES data was used.

Also, because IEMS is not the sole provider of emergency services within Marion County, its number surely underrepresent total crashes. Steps are being taken to secure corresponding data from other providers.

On a positive note: A preliminary analysis of IEMS crash records without a corresponding record in ARIES indicated no fatalities. This suggests the possibility that it is the least-severe crashes that lack police reports.

These challenges created limitations in understanding the full scope and negative impact of pedestrian crashes, but did not prevent the identification of problem areas or the development of approaches to address them.

For the crash zone analysis, the only data included are crashes to which pedestrian countermeasures could be applied. This means that crashes involved in a parking lot, a state highway, driveways, or on a bicycle were removed from the data.

Other data considerations include:

- Police coding of pedestrian crashes as "pedestrian action" rarely tells the whole story.
- After 2012, police report coding included more accurate latitudes and longitudes.
- Pedestrian drug and alcohol screening is rarely included with the police report as testing is completed after the report is filed.
- Drivers' blood alcohol levels are tested if an on-site fatality has occurred.
- Severity data is subjective. The planned addition of hospital data will help to normalize this.

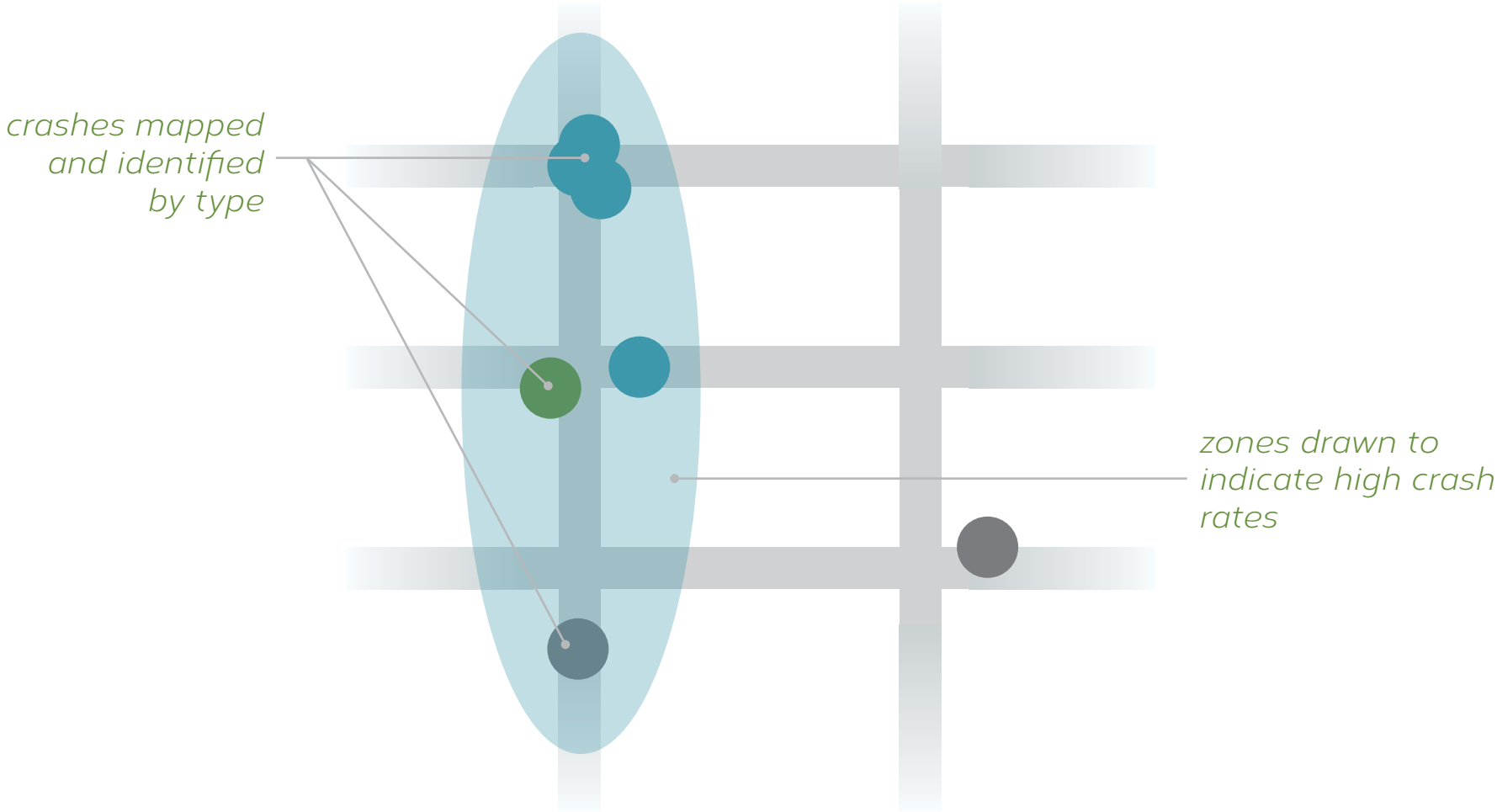
The Pedestrian Safety Zones project team is working to better understand the discrepancies in data and to improve and standardize data collection.

ZONE ANALYSIS PROCESS: STEPS 2 & 3

MAPPING AND ZONE DEFINITION

Crashes that qualified for inclusion in the report were plotted on maps, and then spatial analyses were conducted to provide further insights. Maps were then reviewed, and crash clusters and densities were assessed to identify potential high-crash zones.

This process made it clear that pedestrian crashes typically occur along arterial roadways (long, straight and fast-moving thoroughfares) and at intersections.



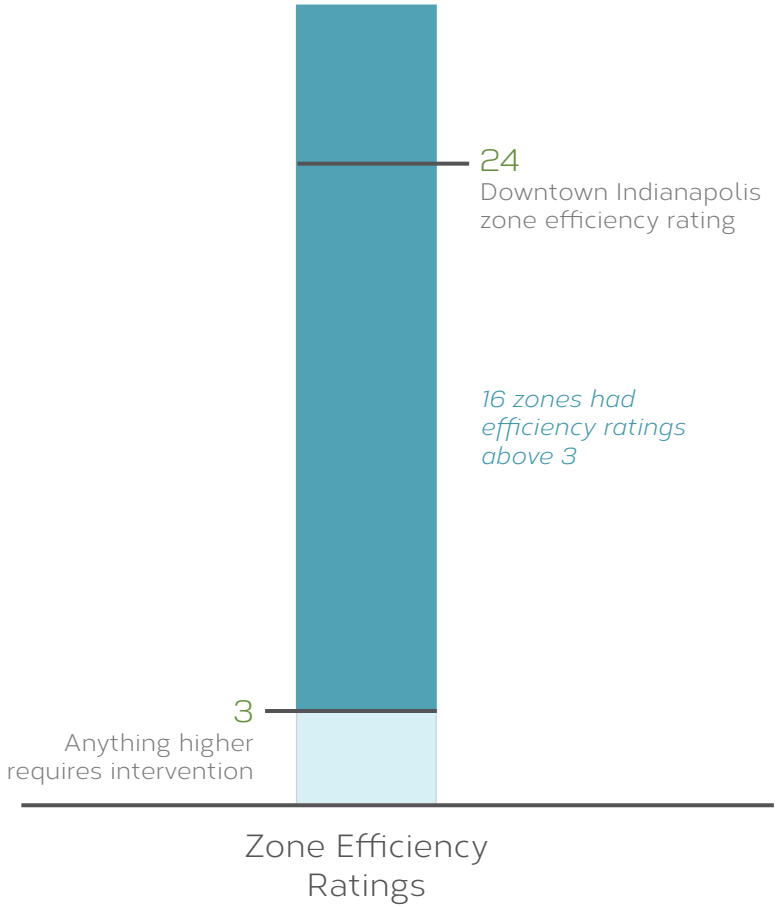
ZONE ANALYSIS PROCESS: STEP 4

ZONE NARROWING

In total, 29 identified zones were assessed using a National Highway Traffic Safety Administration (NHTSA) standard known as "zone efficiency."

Determining an area's "zone efficiency rating" requires a calculation using two variables: the zone's land area as a percentage of the jurisdiction's total land area, and the number of crashes in that zone as a percentage of all crashes in that jurisdiction. The zone efficiency rating is the ratio of those two percentages. For example, if 25% of a city's crashes occurred in a zone representing just 5% of the city's total land area, it would represent a zone efficiency rating of five.

By the NHTSA definitions, zones with an efficiency rating above three require intervention. The Pedestrian Safety Zones Project findings showed that 16 areas in Indianapolis had zone efficiency ratings higher than three. Downtown Indianapolis posted a rating above 24. Overall, these 16 zones accounted for 45% of all crashes county-wide, but represented only 7% of the total land area.



$$\frac{\text{\% of total crashes in zone area}}{\text{\% of total land in zone area}} = \text{ZONE EFFICIENCY}$$

ZONE ANALYSIS PROCESS: STEP 4

ZONE NARROWING

The 16 Zones identified for further study were:

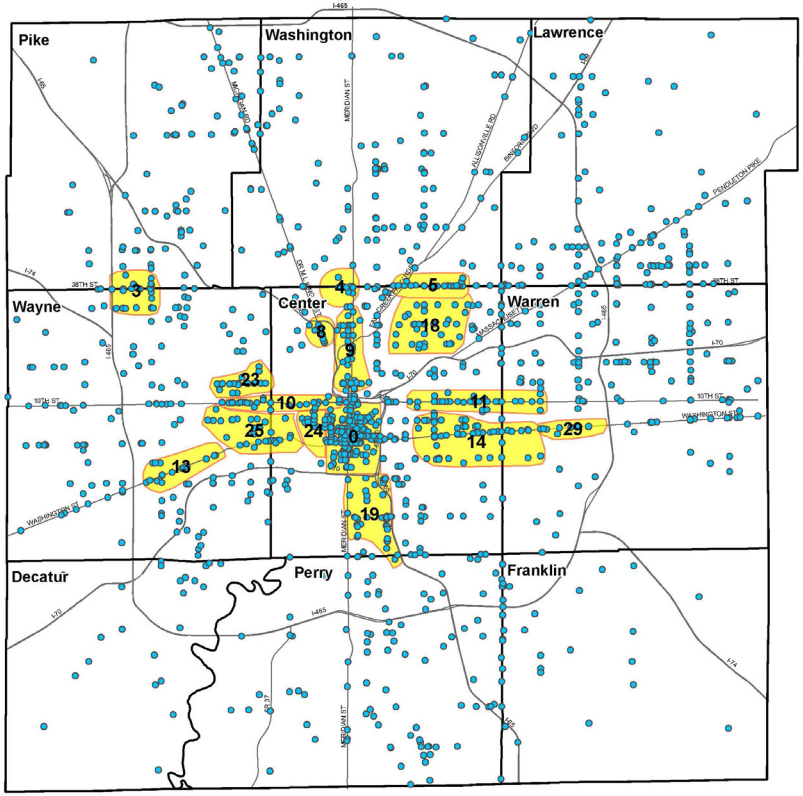
Downtown Indianapolis
Meridian and Illinois streets from 14th to 34th streets, including extended portions of 16th, 28th, 29th, 30th and 32nd streets

East 38th Street from the State Fairgrounds to Sherman Drive

West 38th Street between Boulevard Place and Meridian Street

West 34th and 38th Streets, from Moller Road west to I-465, including portions of High School and Moller roads
Dr. Martin Luther King Jr. Street from 25th to 30th streets
East 10th Street from Woodruff Place to Arlington Avenue
West 10th Street from Tibbs Avenue to Dr. Martin Luther King Jr. Street
East Washington Street from Willard Park to Arlington Avenue, including portions of Michigan, New York and Rural streets and Emerson Avenue
East Washington Street from Campbell Avenue to I-465
Areas extending south of Washington Street and North of Michigan Streets, west of the White River to Olin Avenue
West Washington Street from I-465 to Holt Road, including portions of Oliver Avenue and Morris Street
West 16th Street from Olin Avenue to the White River
Areas near Fountain Square and Garfield Park, including extended portions of Madison Avenue, East, Shelby, Morris and Raymond streets
Areas near Washington Park and Douglas Park/Golf Course, including extended portions of 25th and 30th streets and Keystone Avenue
Areas near IUPUI

2010-2016 ARIES DATA PEDESTRIAN CRASHES



Marion County, Indiana

- 2010-2016 ARIES Crash Site
- Top Crash Zone
- Township
- Marion County
- Major Road

ZONE ANALYSIS PROCESS: STEP 5

ZONE EVALUATION

Having narrowed the zones for study to 16, the process then looked more deeply into each zone to better understand individual crashes and the factors that contributed to each crash.

To compile and assess data on high crash zones over time, the project used an audit tool developed for this project – which allowed assessment of corridors and intersections throughout the zone – as well as general observations about drivers and pedestrians.

Among factors considered were visual limitations at crash sites, activities prior to a crash and negative behaviors.

The results of the audit were reviewed to verify the results, and then high-risk areas were identified and prioritized.

In addition to providing information, the audits offered an opportunity to engage key stakeholders by reaching out to organizations located in each zone. Local, state, and federal public agency staff and elected officials were also routinely invited to participate in the assessments.

Walk audit

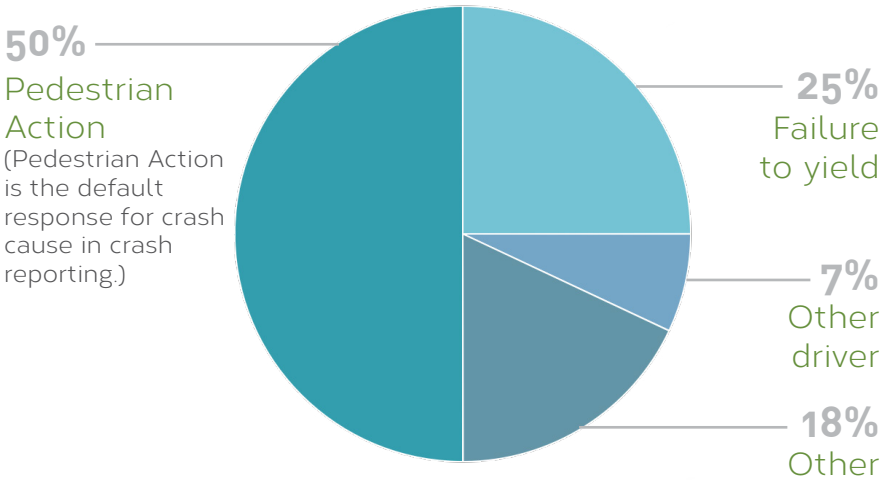
ZONE ANALYSIS PROCESS

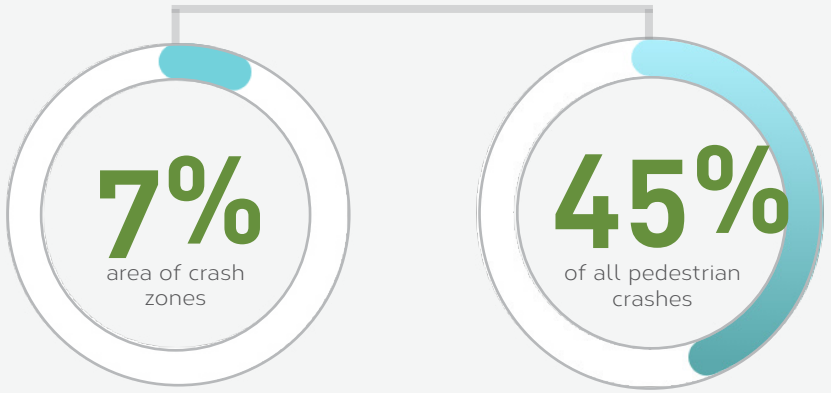
CRASH CONDITIONS AND CHARACTERISTICS

Between 2010-2016, 1,800 pedestrian crashes occurred in Marion County. The 16 identified crash zones accounted for 45% of the pedestrian crashes even though the crash zones themselves only comprised 7% of the total land area of the county.

Most crashes happened during the daylight in dry, clear conditions, at mid-block crossings and intersections.

The three most common causes in crashes are:

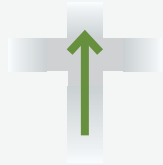




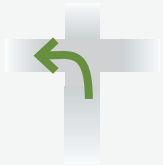
While the crash zones account for only 7% of the total land area of the city of Indianapolis, the pedestrian crashes occuring in those zones account for 45% of all crashes occurring in the city

The three most common types of vehicle actions in crashes:

GOING STRAIGHT
62%



LEFT TURNS
18%



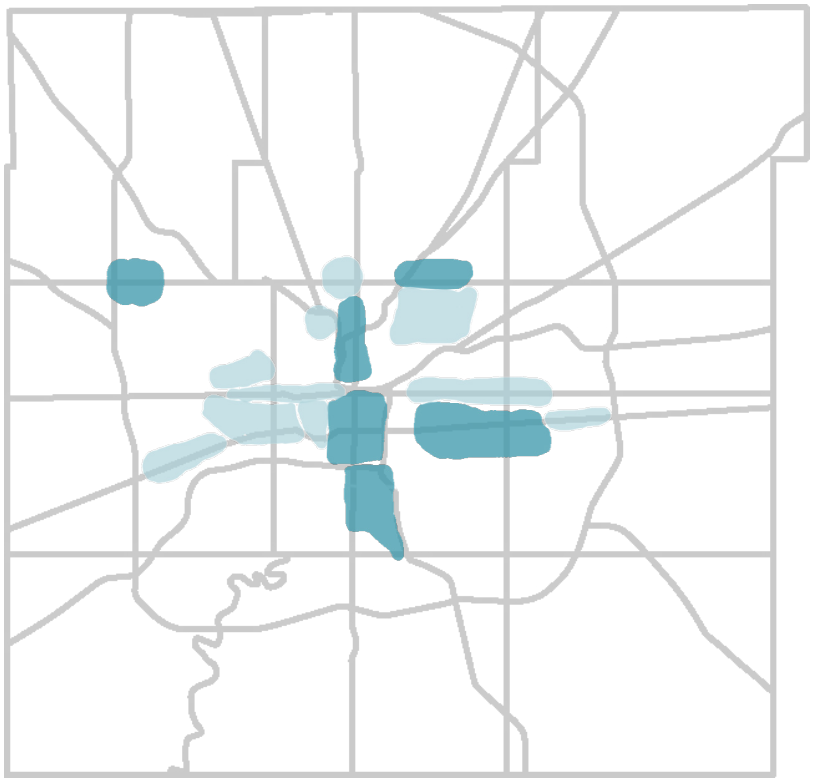
RIGHT TURNS
6%

ZONE ANALYSIS PROCESS: STEP 6

ZONE RESPONSE

From the 16 crash zones, six of the most severe were prioritized based on a combination of the number and density of crashes and crash severity. They received further review, including more detailed examination of police reports, maps and the built environment. These six sites were used to guide citywide targeted goals and as prototypes for prescribing countermeasures for similar situations (Chapter Five). They have also had targeted community outreach, engagement, and education, described further below.

- North Meridian Street
- Garfield Park
- West 38th Street (International Marketplace)
- East 38th Street (Avondale Meadows)
- East Washington Street
- Downtown



High crash zones with most severe crash zones highlighted

4 INTERVENTIONS

THE FIVE Es

The five "Es" can provide a framework for the type of countermeasures that can be applied to improve pedestrian safety. Though the list of Es can be continuously expanded, these five directly apply to the type of countermeasures recommended in this document. The E list can be expanded to include other considerations such as the environment, encouragement, and equity. These countermeasures can be applied to increase both walking and biking safety, though the remainder of this plan will focus on pedestrian safety specifically.

EDUCATION: can include educational materials or other forms of communications on how to walk, bike, or drive safely. This can also include identifying safe routes to bicycle or walk, or overall cultural or word choice shifts such as "crash" versus "accident". Education is often closely tied to Encouragement strategies, another commonly used E.

ENFORCEMENT: countermeasures can include the enforcement of policies that address safety issues such as speeding or failure to yield at intersections. Law enforcement officers can play an important role in both enforcing laws in targeted ways to promote safety, and providing key educational opportunities during this enforcement.

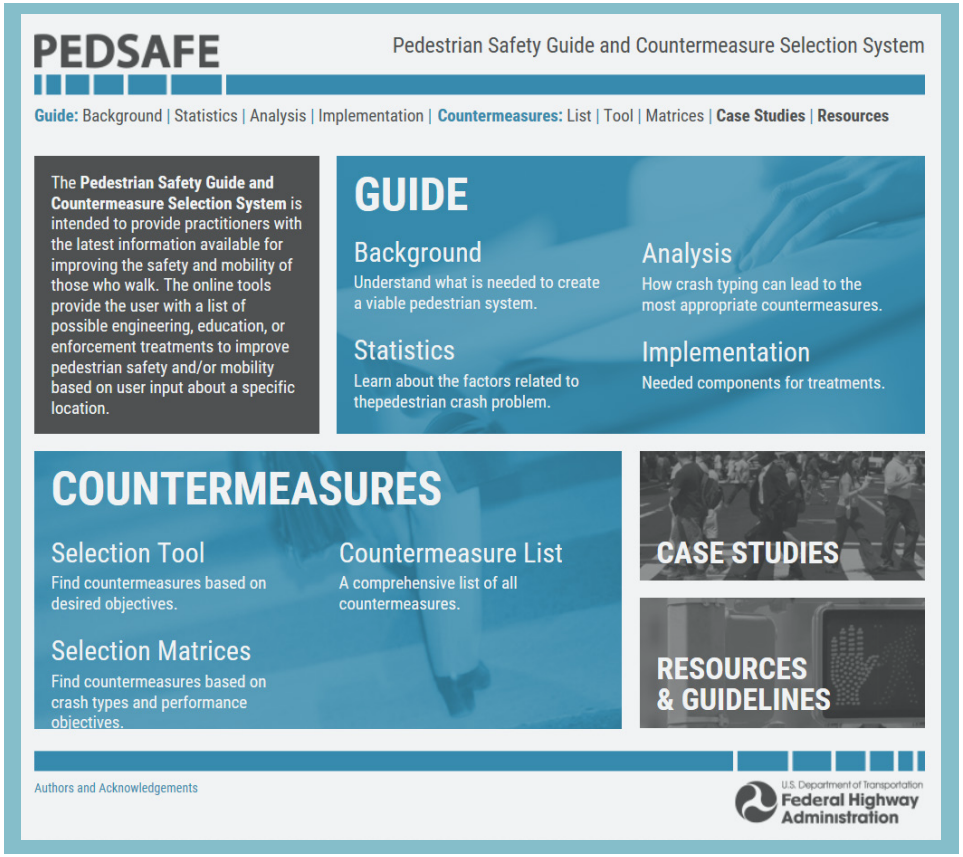
ENGINEERING: is a broad concept used to describe the design, implementation, operation, and maintenance of traffic control devices or physical measures as countermeasures for safety. Partnering engineering elements with other countermeasures has a proven effect on increasing safety for biking and walking.

ENGAGEMENT: refers to community engagement to promote pedestrian and bicycle safety. This can include encouragement activities to promote biking and walking, participation in community meetings, community outreach, and other tactics to directly connect with communities to promote active transportation safety.

EVALUATION: involves collecting data, monitoring outcomes, documenting trends, and identifying next steps for biking and walking safety. This can include strategies for new data collection methods, surveys, biking and walking counts, and data analysis.

CRASH TYPE CAUSES AND CANDIDATE COUNTERMEASURES

The PEDSAFE (Pedestrian Safety Guide and Countermeasure Selection System), a FHWA resource, has provided a crash type categorization method that includes 12 different crash type groups, with definitions. The PEDSAFE website is intended to provide practitioners with the latest information available for improving the safety and mobility of those who walk. The online tools provide the user with a list of possible engineering, education, or enforcement treatments to improve pedestrian safety and/or mobility based on user input about a specific location.



As the PEDSAFE website states:

"For any crash type, there are multiple problems or possible causes that may have led to the crash. The following definitions, are examples of a few possible causes/problems for each crash type and some of the countermeasures within PEDSAFE that may be applicable. Neither the list of problems and possible causes, nor the suggested countermeasures are considered to be comprehensive."

For each crash type, there are possible problems that caused the crash, and a specific list of recommended countermeasures for each of these possible problems. The full list of 67 recommended countermeasures is listed as Appendix A. The full list of applicable countermeasures per each crash type is listed in Appendix B. All non-engineering PEDSAFE countermeasures are listed in Appendix C.

All crash types, possible causes or problems, and recommended countermeasures used in this PSAP come directly from the PEDSAFE website.

CRASH TYPE CAUSES AND CANDIDATE COUNTERMEASURES

APPLYING COUNTERMEASURES PER CRASH TYPE

There are a total of 67 engineering, education, and enforcement countermeasures listed on the PEDSAFE website. Each crash type has a corresponding set of countermeasures that can be used to increase pedestrian safety. To choose the best countermeasure, several things need to be considered:

Categorize the crash type

↓

Analyze the probable crash cause or problem

↓

Select a corresponding countermeasure category

↓

Choose specific countermeasures based on the crash type and countermeasure category matrix

THE 12 CRASH TYPES

1. Dart/dash
2. Multiple threat/trapped
3. Unique midblock (mailbox, parked vehicle)
4. Through vehicle at unsignalized location
5. Bus-related
6. Turning vehicle
7. Through vehicle at signalized location
8. Walking along roadway
9. Working/playing in the road
10. Non-roadway (sidewalk, driveway, parking lot, or other)
11. Backing vehicle
12. Crossing expressway

COUNTERMEASURE CATEGORIES

- Along Roadway
- Crossing Locations
- Transit
- Roadway Design
- Intersection Design
- Traffic Calming
- Traffic Management
- Signals and Signs
- Other

PEDESTRIAN CRASH AND COUNTERMEASURE MATRIX

CRASH TYPE / COUNTERMEASURE CATEGORY	Along Roadway	Crossing Locations	Transit	Roadway Design	Intersection Design	Traffic Calming	Traffic Mgmt.	Signals/ Signs	Other
Dart/Dash	●	●	●	●		●	●	●	
Multiple Threat/Trapped		●	●	●	●	●		●	●
Unique Midblock		●		●		●		●	●
Through Vehicle at Unsignalized Intersection		●	●	●	●	●		●	●
Bus-Related	●	●	●	●				●	●
Turning Vehicle		●	●	●	●	●	●	●	●
Through Vehicle at Signalized Location		●	●	●	●	●	●	●	●
Walking Along Roadway	●	●	●	●				●	●
Working or Playing in Roadway	●	●		●		●	●	●	●
Non-Roadway	●	●		●	●	●		●	●
Backing Vehicle	●	●		●		●			●
Crossing an Expressway		●						●	●

CRASH TYPE CAUSES AND CANDIDATE COUNTERMEASURES

1. DART/DASH

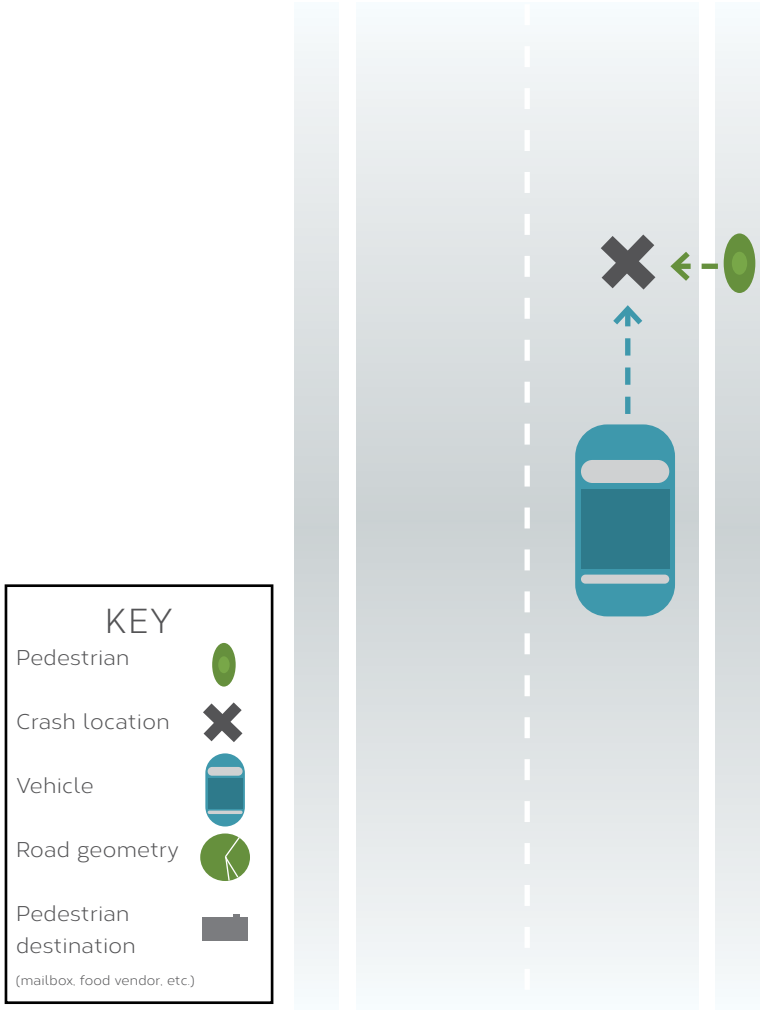
The pedestrian walked or ran into the roadway at an intersection or midblock location and was struck by a vehicle. The motorist's view of the pedestrian may have been blocked until an instant before the impact.

POSSIBLE CAUSE/PROBLEM #1:

Child runs into neighborhood/collector street

CANDIDATE COUNTERMEASURES:

- Provide adequate nighttime lighting.
- Narrow travel lanes.
- Provide curb extensions.
- Install spot street narrowing at high midblock-crossing locations.
- Implement traffic-calming measures such as chicanes, speed humps, or speed tables.
- Provide a raised pedestrian crossing.
- Design gateway to alert motorists that they are entering neighborhood with high level of pedestrian activity.
- Convert street to driveway link/serpentine, shared street, or a pedestrian street.
- Install street diverters, or full or partial street closures, at selected intersection(s).
- Provide adult crossing guard (in school zone).
- Remove or restrict on-street parking.
- Educate children about safe crossing behavior and adults about speeding.
- Add on-street parking enhancements.



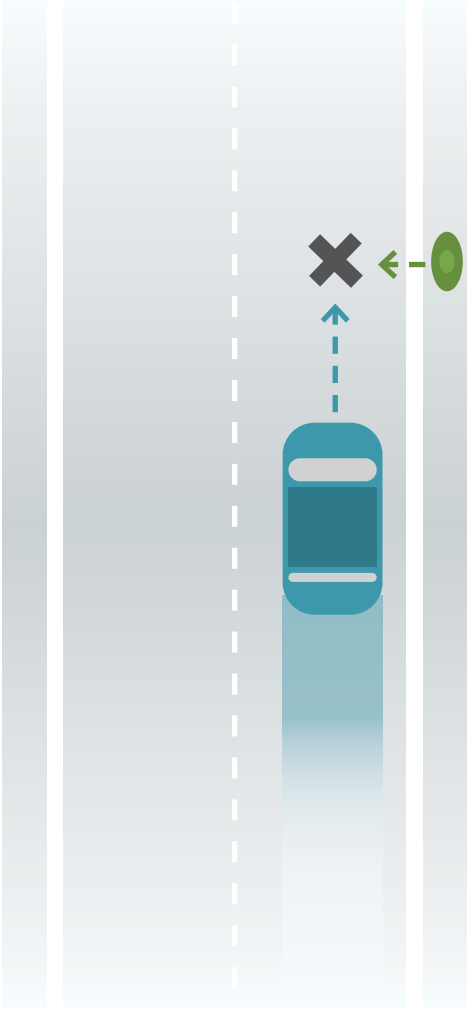
Person is struck after becoming trapped due to a signal change while crossing the roadway.

POSSIBLE CAUSE/PROBLEM #2:

Pedestrian is struck while crossing a high-speed and/or high-volume arterial street.

CANDIDATE COUNTERMEASURES:

- Relocate bus stop.
- Improve/add nighttime lighting.
- Install overpass or underpass.
- Install medians or pedestrian crossing islands.
- Provide curb extensions at intersections or midblock to improve direct line of sight between vehicle and pedestrian.
- Add traffic-calming measures.
- Provide staggered crosswalk through the median (forcing pedestrians to walk and look to the right for oncoming traffic in the second half of street).
- Install midblock traffic signal with pedestrian signals, if warranted.
- Install standard warning sign (see MUTCD) or yellow or fluorescent yellow/green signs to alert drivers to pedestrian crossing area.
- Bus young children across busy streets.
- Adjust school district boundaries.
- Use speed-monitoring trailer.
- Enforce speed limits, pedestrian ordinances.
- Implement driver education program.
- Implement pedestrian education program.



Person is struck when crossing the roadway at a midblock location.

2. MULTIPLE THREAT/TRAPPED

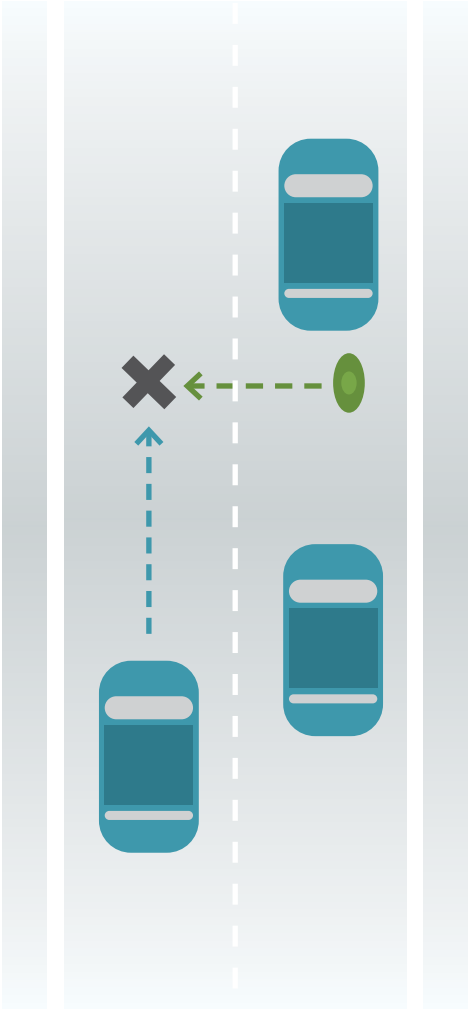
The pedestrian entered the roadway in front of stopped or slowed traffic and was struck by a multiple-threat vehicle in an adjacent lane after becoming trapped in the middle of the roadway.

POSSIBLE CAUSE/PROBLEM #1 (multiple threat):

The pedestrian entered the traffic lane in front of stopped traffic and was struck by a vehicle traveling in the same direction as the stopped vehicle. The stopped vehicle may have blocked the visibility between the pedestrian and the striking vehicle, and/or the motorist may have been speeding.

CANDIDATE COUNTERMEASURES:

- Relocate bus stop to far side of crossing area.
- Improve roadway lighting.
- Provide midblock or intersection curb extensions.
- Install traffic-calming devices such as speed tables or raised pedestrian crossings on local or other neighborhood streets.
- Provide raised crosswalks to improve pedestrian visibility.
- Install traffic signals if warranted, including pedestrian signals.
- Install flashers or advance warning signs.
- Install barriers or signs to prohibit crossings and direct pedestrians to safer crossing locations nearby.
- Enforce crosswalk laws.
- Add on-street parking enhancements.
- Add advance yield/stop lines 20 to 50 feet before intersection.
- Implement driver education program.
- Implement pedestrian education program.



Person is struck by vehicle in adjacent lane when crossing through stopped/slowed traffic.

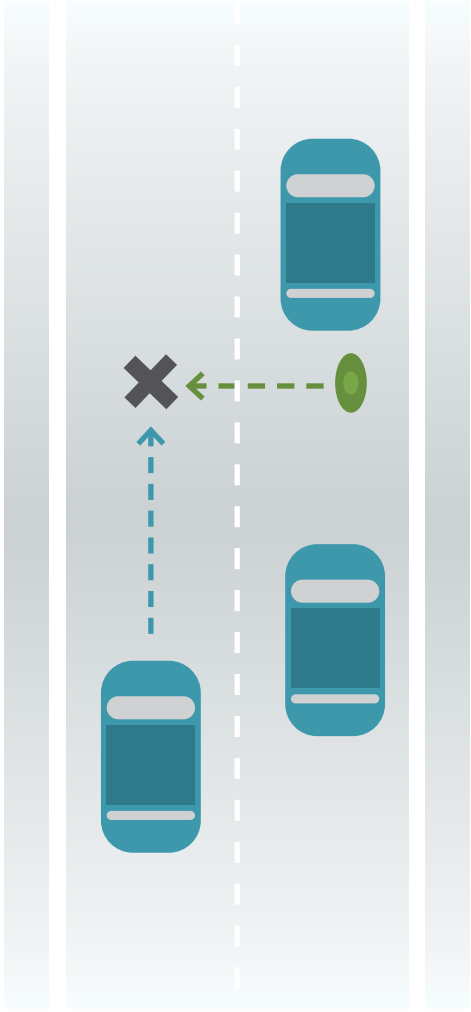
2. MULTIPLE THREAT/TRAPPED

POSSIBLE CAUSE/PROBLEM #2:

Pedestrian is struck while crossing a high-speed and/or high-volume arterial street.

CANDIDATE COUNTERMEASURES:

- Reduce roadway width. For example, add sidewalks and bike lanes to a roadway by narrowing four-lane undivided roadways to two through lanes, plus a center two-way left-turn lane or wide raised median.
- Improve roadway lighting.
- Construct overpass or underpass.
- Narrow travel lanes (e.g., add bike lanes) to slow vehicle speeds and reduce crossing distance.
- Install raised median or pedestrian crossing island.
- Increase police enforcement of speed limit.
- Add advance yield/stop lines 20 to 50 feet before intersection.
- Install pedestrian hybrid beacon (PHB).
- Install rectangular rapid flash beacon (RRFB).
- Install automated enforcement system.
- Implement driver education program.
- Implement pedestrian education program.



Person is struck when crossing the roadway at a midblock location.

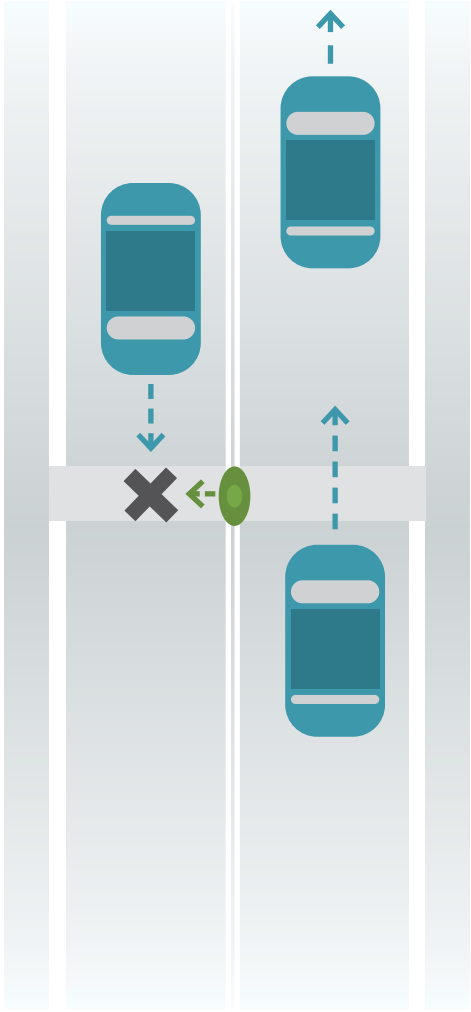
2. MULTIPLE THREAT/TRAPPED

POSSIBLE CAUSE/PROBLEM #3 (trapped):

Pedestrian began crossing on green signal and became trapped in the roadway when the signal changed.

CANDIDATE COUNTERMEASURES:

- Reduce roadway width.
- Provide midblock or intersection curb extensions.
- Install raised pedestrian crossing island.
- Provide raised crosswalk to improve pedestrian visibility.
- Install pedestrian signals.
- Adjust pedestrian signal timing.
- Enforce crosswalk laws.
- Add leading pedestrian interval to traffic signal system.
- Install push button and adjust signal timing.
- Implement driver education program.
- Implement pedestrian education program.



Person is struck after becoming trapped due to a signal change while crossing the roadway.

3. UNIQUE MIDBLOCK (Mailbox, Ice Cream Vendor, Parked Vehicle)

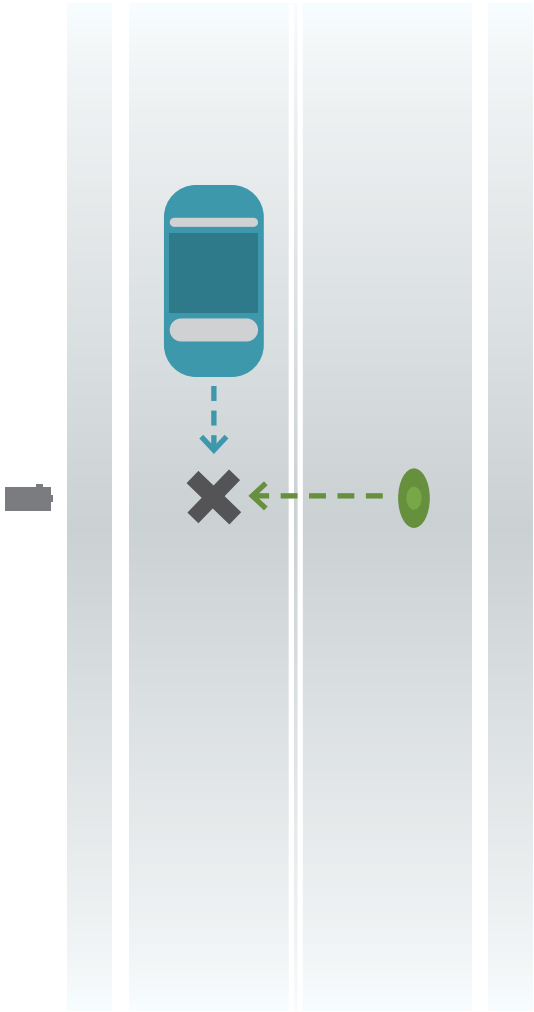
The pedestrian was struck while crossing the road to/from a mailbox, newspaper box, ice-cream truck, similar unique/temporary destinations, or while getting into or out of a stopped vehicle.

POSSIBLE CAUSE/PROBLEM #1:

Pedestrian struck while going to/from a private residence mailbox/newspaper box.

CANDIDATE COUNTERMEASURES:

- Improve lighting.
- Reduce total roadway and lane width.
- Provide raised median on multi-lane arterial street.
- Provide traffic calming measures (e.g., chicanes or raised devices on residential streets).
- Construct gateway or provide signs that identify neighborhood as an area with high levels of pedestrian activity.
- Install pedestrian warning signs (see MUTCD).
- Implement driver education program.
- Implement pedestrian education program.
- Relocate mailboxes to safer crossing area or provide safer crossings at existing location.
- Add on-street parking enhancements.



Person is struck when crossing the roadway at a midblock location.

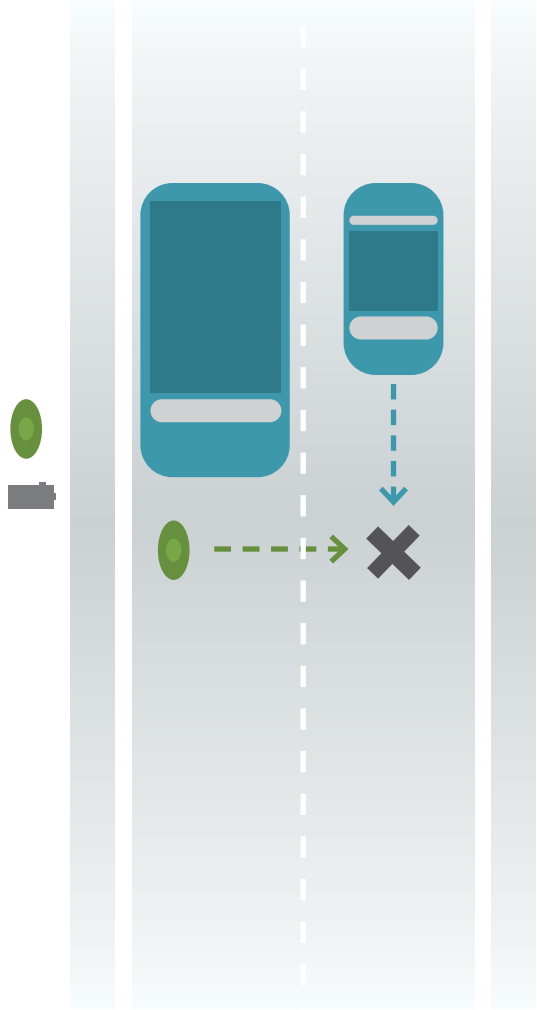
3. UNIQUE MIDBLOCK (Mailbox, Ice Cream Vendor, Parked Vehicle)

POSSIBLE CAUSE/PROBLEM #2:

Pedestrian struck while going to/from an ice-cream vendor or similar destination.

CANDIDATE COUNTERMEASURES:

- Reduce roadway width or remove a lane.
- Provide traffic calming measures on local streets.
- Add pedestrian crossing islands to roadway.
- Create Public Service Announcements (PSAs) to educate parents, children, and drivers.
- Adopt an ice-cream truck ordinance. This ordinance would prohibit motorists from passing a stopped ice-cream truck.
- Trucks would be equipped with flashing lights and a "stop" arm that would extend when the truck stopped to serve children.
- Add on-street parking enhancements.



Person is struck when crossing the roadway at a midblock location.

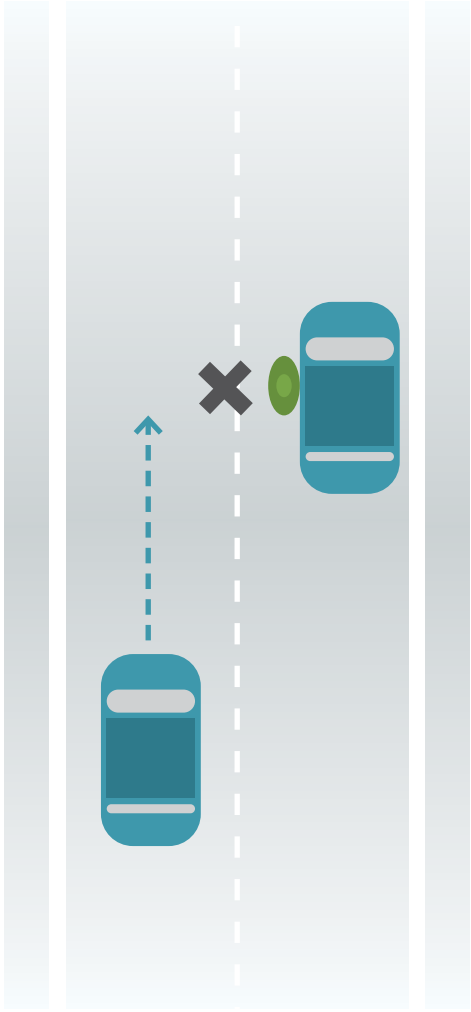
3. UNIQUE MIDBLOCK (Mailbox, Ice Cream Vendor, Parked Vehicle)

POSSIBLE CAUSE/PROBLEM #3:

Pedestrian struck while getting into/out of parked vehicle.

CANDIDATE COUNTERMEASURES:

- Improve roadway lighting.
- Implement traffic-calming measures on local/collector streets.
- Implement speed-reduction measures such as chicanes or speed tables.
- Restrict on-street parking.
- Add on-street parking enhancements.
- Implement driver education program.
- Implement pedestrian education program.



Person is struck when getting into/out of a parked vehicle.

4. THROUGH VEHICLE AT UNSIGNALIZED LOCATION

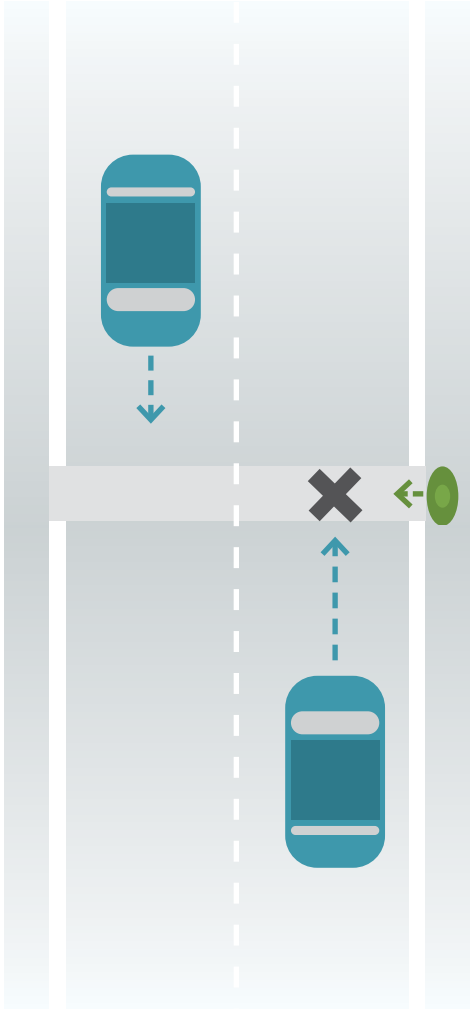
The pedestrian was struck at an unsignalized intersection or midblock location. Either the motorist or the pedestrian may have failed to yield.

POSSIBLE CAUSE/PROBLEM #1:

Motorist fails to yield to pedestrian at two-lane, low-speed road crosswalk (or unmarked crossing).

CANDIDATE COUNTERMEASURES:

- Improve crosswalk marking visibility.
- Improve roadway lighting.
- Reduce curb radius to slow vehicle speeds.
- Install curb extensions or choker.
- Use special paving treatments along street to slow traffic,
- add chicanes, or use serpentine design.
- Construct raised pedestrian crossing island.
- Install speed humps, speed tables, raised intersections, or raised crosswalks.
- Use landscaping that slows vehicle speeds without impeding sightlines.
- Install traffic signal with pedestrian signals, if warranted.
- Install overhead CROSSWALK, school zone, or other warning signs.
- Add on-street parking enhancements.
- Add advance yield/stop lines 20 to 50 feet before intersection.
- Implement driver education program.
- Implement pedestrian education program.



Person is struck when crossing the roadway at a midblock location.

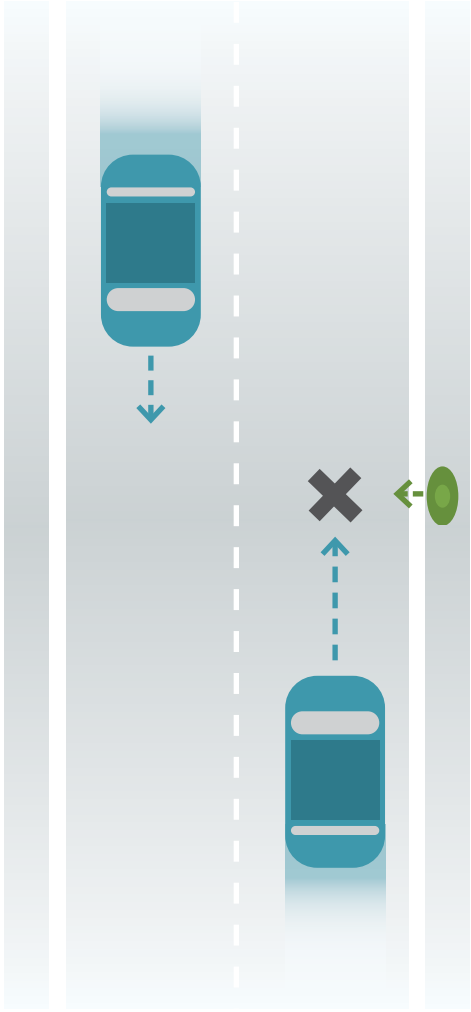
4. THROUGH VEHICLE AT UNSIGNALIZED LOCATION

POSSIBLE CAUSE/PROBLEM #2:

Pedestrian has difficulty crossing multilane road (which may also have high travel speeds and/or high traffic volumes).

CANDIDATE COUNTERMEASURES:

- Ensure that curb ramps are provided to make crossing easier for all pedestrians.
- Place bus stop at far side of intersection.
- Install nighttime lighting.
- Construct overpass or underpass.
- Narrow or reduce the number of roadway lanes.
- Modify four-lane, undivided street to two lanes plus a two-way, left-turn lane (TWLTL) or wide median with turning pockets.
- Install raised medians or pedestrian crossing islands.
- Install traffic signal with pedestrian signals, if warranted.
- Use police speed enforcement.
- Add advance yield/stop lines 20 to 50 feet before intersection.
- Improve access to transit.
- Provide pedestrian accommodations at complex intersections.
- Install pedestrian hybrid beacon (PHB).
- Install rectangular rapid flash beacon (RRFB).
- Install automated enforcement system.
- Implement driver education program.
- Implement pedestrian education program.



Person is struck when crossing the roadway at a midblock location.

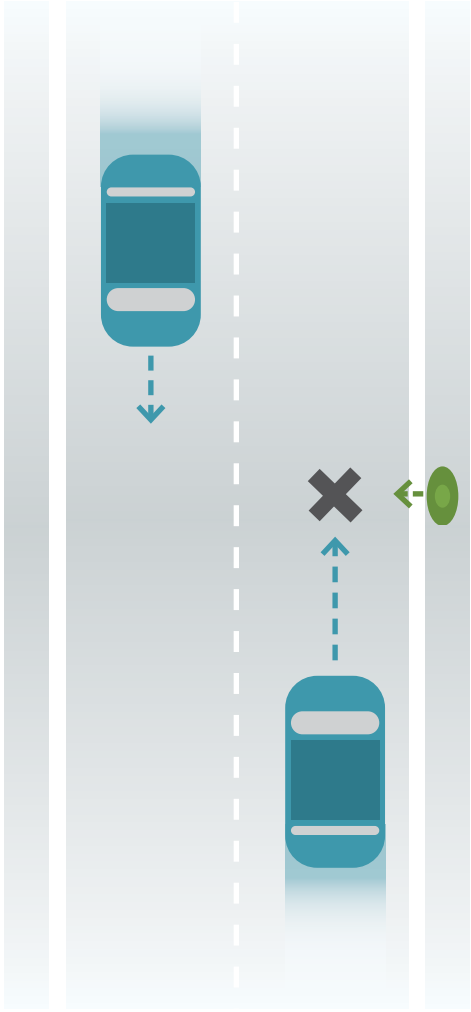
4. THROUGH VEHICLE AT UNSIGNALIZED LOCATION

POSSIBLE CAUSE/PROBLEM #3:

Motorist unwilling to yield due to high motorist speeds or high traffic volumes.

CANDIDATE COUNTERMEASURES:

- Improve crosswalk marking visibility.
- Improve roadway lighting.
- Reduce curb radius to slow vehicle speeds.
- Install curb extensions or choker.
- Use special paving treatments along street to slow traffic, add chicanes, or use serpentine design.
- Construct raised pedestrian crossing island.
- Install speed humps, speed tables, raised intersections, or raised crosswalks.
- Use landscaping that slows vehicle speeds without impeding sightlines.
- Install traffic signal with pedestrian signals, if warranted.
- Install overhead CROSSWALK, school zone, or other warning signs.
- Add on-street parking enhancements.
- Add advance yield/stop lines 20 to 50 feet before intersection.
- Implement driver education program.



Person is struck when crossing the roadway at a midblock location.

5. BUS-RELATED

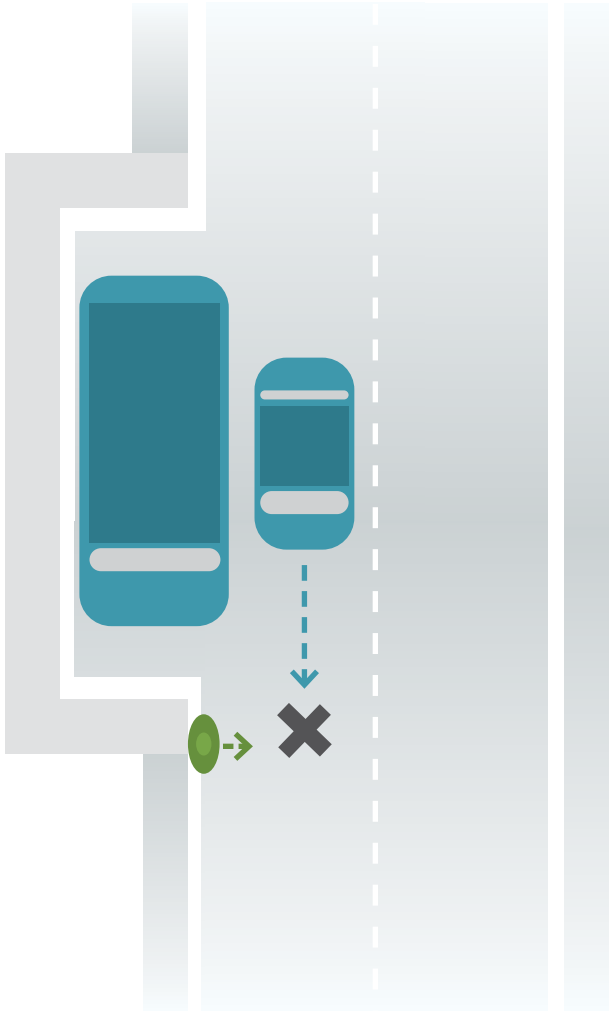
The pedestrian was struck by a vehicle while: (1) crossing in front of a public bus stopped at a bus stop; (2) going to or from a school bus stop; or (3) going to or from, or waiting near a public bus stop.

POSSIBLE CAUSE/PROBLEM #1:

Motorist fails to yield to pedestrian or pedestrian crosses during inadequate gap in traffic due to limited sight distance at intersection.

CANDIDATE COUNTERMEASURES:

- Install crosswalk markings to encourage pedestrians to cross in the crosswalk behind the bus.
- Move bus stop to far side of intersection or crosswalk.
- Consider an alternative bus stop location.
- Mark bus stop area with pedestrian warning signs.
- Install or improve roadway lighting.
- Install pedestrian crossing islands or raised crosswalk.
- Install curb extension.
- Remove parking in areas that obstruct the vision of motorists and pedestrians.
- Add advance yield/stop lines 20 to 50 feet before intersection.
- Improve access to transit.
- Install bus bulb-outs.
- Install pedestrian hybrid beacon (PHB).
- Install rectangular rapid flash beacon (RRFB).
- Implement driver education program.
- Implement pedestrian education program.



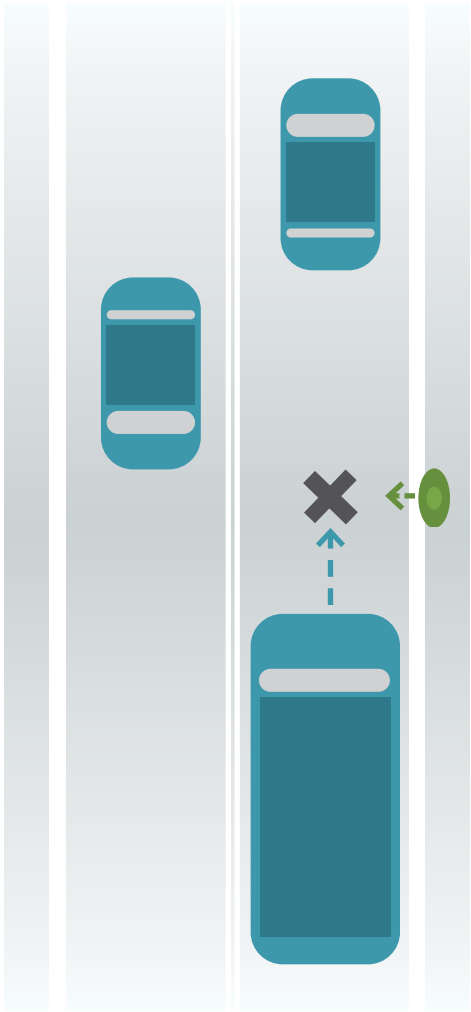
Person is struck before, after or while awaiting a bus trip.

POSSIBLE CAUSE/PROBLEM #2:

Pedestrian has difficulty walking along roadway and crossing at midblock location with high vehicle speeds and/or high volumes.

CANDIDATE COUNTERMEASURES:

- Provide an accessible sidewalk and curb ramps.
- Install sidewalk and/or sidewalk barriers to direct pedestrians to a nearby crossing location.
- Provide bus pull-off area.
- Consider an alternative bus stop location.
- Install or improve roadway lighting.
- Reduce number of roadway lanes.
- Install midblock curb extensions.
- Install traffic and pedestrian signals, if warranted.
- Add recessed stop lines.
- Provide pedestrian education/training.
- Increase police speed enforcement.
- Add advance yield/stop lines 20 to 50 feet before intersection.
- Improve access to transit.
- Install bus bulb-outs.
- Install pedestrian hybrid beacon (PHB).
- Install rectangular rapid flash beacon (RRFB).
- Implement driver education programs.



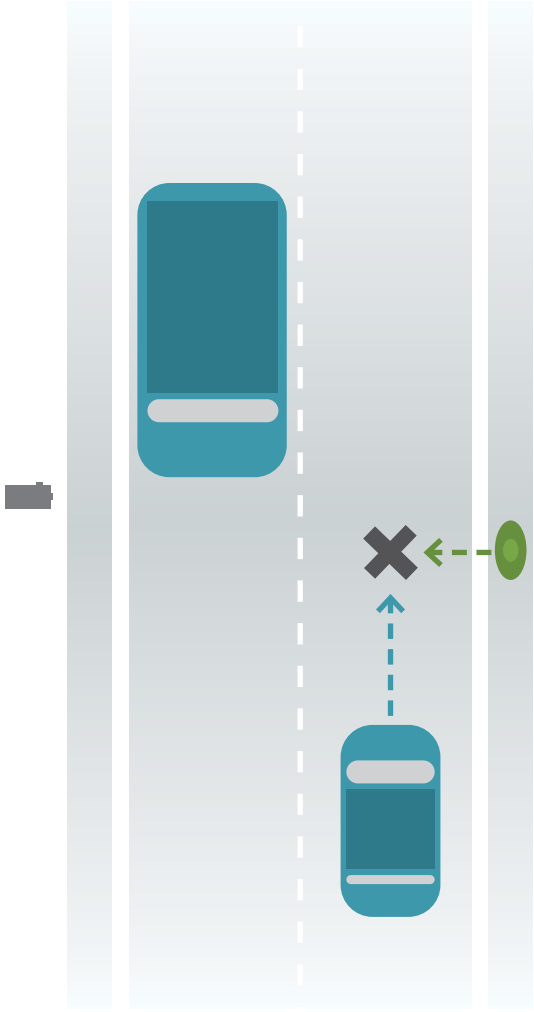
Person is struck by driver of bus when walking along or crossing the roadway.

POSSIBLE CAUSE/PROBLEM #3:

Pedestrian has difficult time crossing, waiting, or walking in the vicinity of school bus stop.

CANDIDATE COUNTERMEASURES:

- Provide an accessible sidewalk and curb ramps.
- Install sidewalk and/or sidewalk barriers to direct pedestrians to a nearby crossing location.
- Provide bus pull-off area.
- Consider an alternative bus stop location.
- Install or improve roadway lighting.
- Reduce number of roadway lanes.
- Install midblock curb extensions.
- Install traffic and pedestrian signals, if warranted.
- Add recessed stop lines.
- Provide pedestrian education/training.
- Increase police speed enforcement.
- Add advance yield/stop lines 20 to 50 feet before intersection.
- Improve access to transit.
- Install bus bulb-outs.
- Install pedestrian hybrid beacon (PHB).
- Install rectangular rapid flash beacon (RRFB).
- Implement driver education programs.



Person is struck when crossing, waiting, or walking near a school bus stop.

6. TURNING VEHICLE

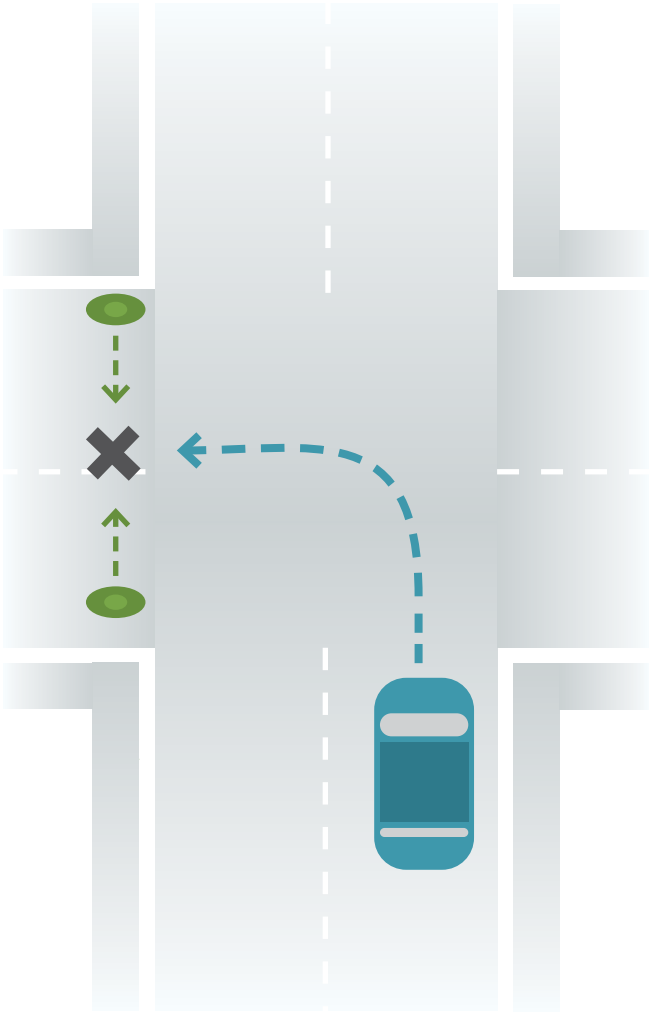
The pedestrian was attempting to cross at an intersection, driveway, or alley and was struck by a vehicle that was turning right or left.

POSSIBLE CAUSE/PROBLEM #1:

Conflict between pedestrian and left-turning vehicle.

CANDIDATE COUNTERMEASURES:

- Add curb ramps or curb extensions.
- Install raised median and pedestrian crossing island.
- Convert to one-way street network (if justified by surrounding area wide pedestrian and traffic volume study).
- Consider using modified T-intersections, intersection median barriers, diverters, or street closures.
- Use traffic-calming devices, such as a raised intersection or raised pedestrian crossing, to reduce vehicle speeds.
- Provide separate left-turn and WALK/DON'T WALK signals.
- Add special pedestrian signal phasing (e.g., exclusive protected pedestrian signal or leading pedestrian interval).
- Prohibit left turns.
- Install warning signs for pedestrians and/or motorists (see MUTCD).
- Develop/provide Public Service Announcement (PSA) safety messages.
- Install automated pedestrian detection system.
- Add leading pedestrian interval to traffic signal system.
- Modify skewed intersections.
- Provide pedestrian accommodations at complex intersections.
- Implement protected left turn phasing.
- Install push button and adjust signal timing.
- Install puffin crossing.
- Implement driver/pedestrian education program.



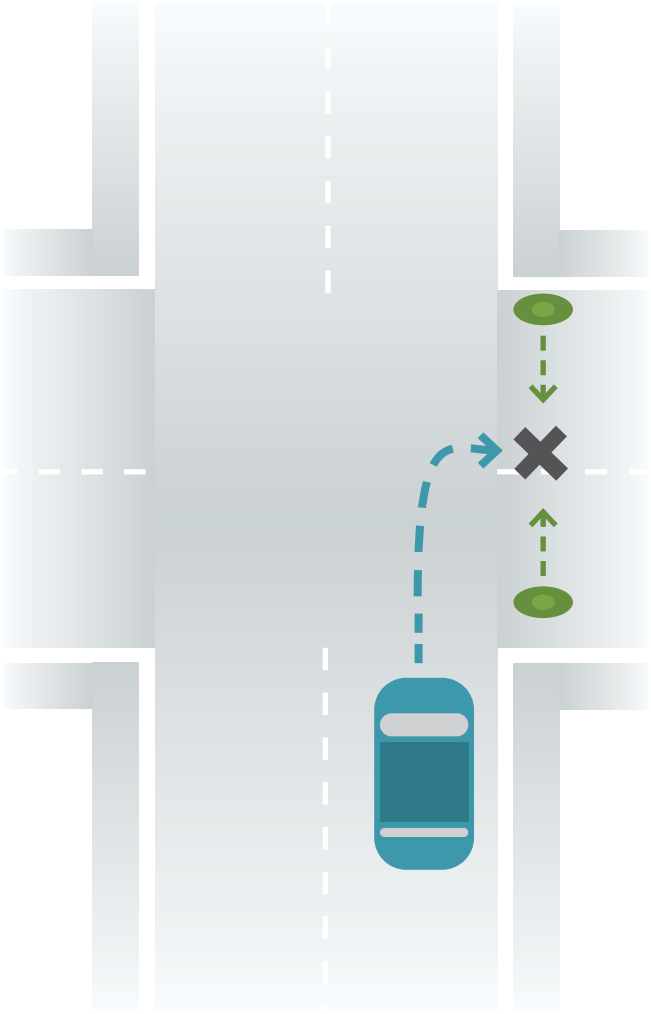
Person is struck by driver of left-turning vehicle.

POSSIBLE CAUSE/PROBLEM #2:

Conflict between pedestrian and right-turning vehicle

CANDIDATE COUNTERMEASURES:

- Provide marked crosswalks and advanced stop lines.
- Improve intersection lighting to improve visibility.
- Remove intersection snow/clutter at the corner to improve visibility and give pedestrian space to stand outside of roadway.
- Install raised median and pedestrian crossing island.
- Reduce right-turn radii.
- Add curb extensions.
- Use a traffic-calming device, such as a raised intersection or raised pedestrian crossing, to reduce vehicle speeds.
- Consider street closure.
- Prohibit right turn on red (RTOR).
- Install warning signs for pedestrians and/or motorists.
- Remove on-street parking from the approaches to crosswalks.
- Install automated pedestrian detection system.
- Add leading pedestrian interval (LPI) to traffic signal system.
- Add advance yield/stop lines 20 to 50 feet before intersection.
- Modify skewed intersections.
- Provide pedestrian accommodations at complex intersections.
- Install push button and adjust signal timing.
- Install puffin crossing.
- Install automated enforcement system.
- Implement driver and/or education program.



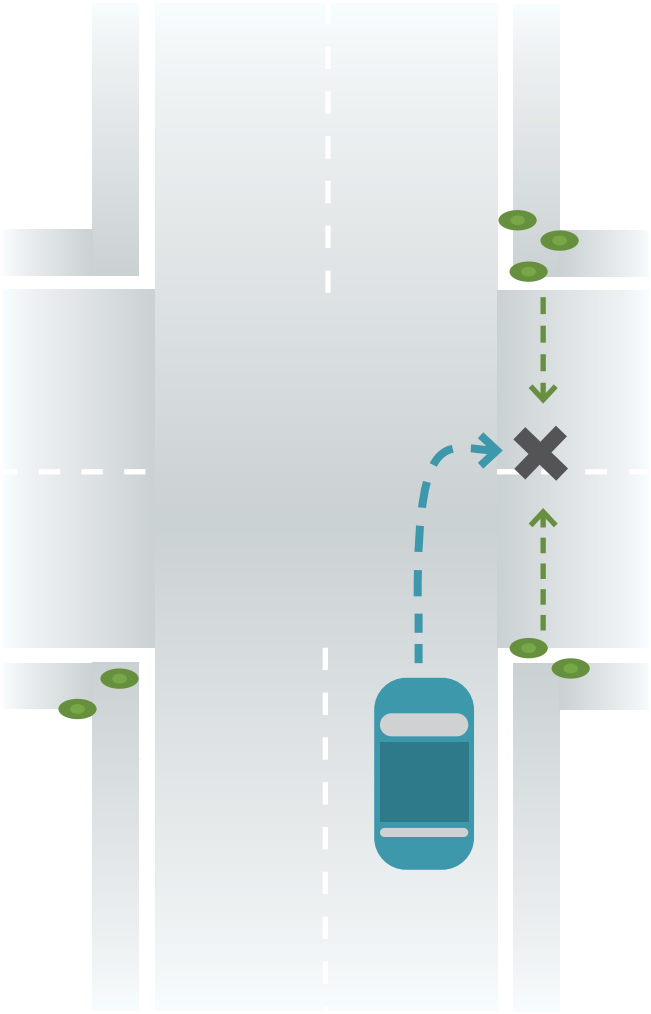
Person is struck by driver of right-turning vehicle.

POSSIBLE CAUSE/PROBLEM #3:

Substantial number of school children crossing and large turning vehicle movement.

CANDIDATE COUNTERMEASURES:

- Install crosswalk markings.
- Improve intersection lighting.
- Consider using modified T-intersections, intersection median barriers, diverters, or street closures.
- Install curb extensions.
- Install pedestrian crossing islands for wide two-way streets.
- Add exclusive pedestrian phase or leading pedestrian interval.
- Restrict right turn on red (RTOR).
- Prohibit left turns.
- Provide adult crossing guards during school crossing periods, or two guards for wide streets.
- Educate motorists.
- Educate children about safe crossing behavior.
- Provide police enforcement at the intersection.
- Install automated pedestrian detection system.
- Add leading pedestrian interval to traffic signal system.
- Add advance yield/stop lines 20 to 50 feet before intersection.
- Modify skewed intersections.
- Prohibit left turns.
- Implement protected left turn phasing.
- Install push button and adjust signal timing.
- Install pedestrian hybrid beacon (PHB).
- Install rectangular rapid flash beacon (RRFB).
- Implement driver and/or education program.



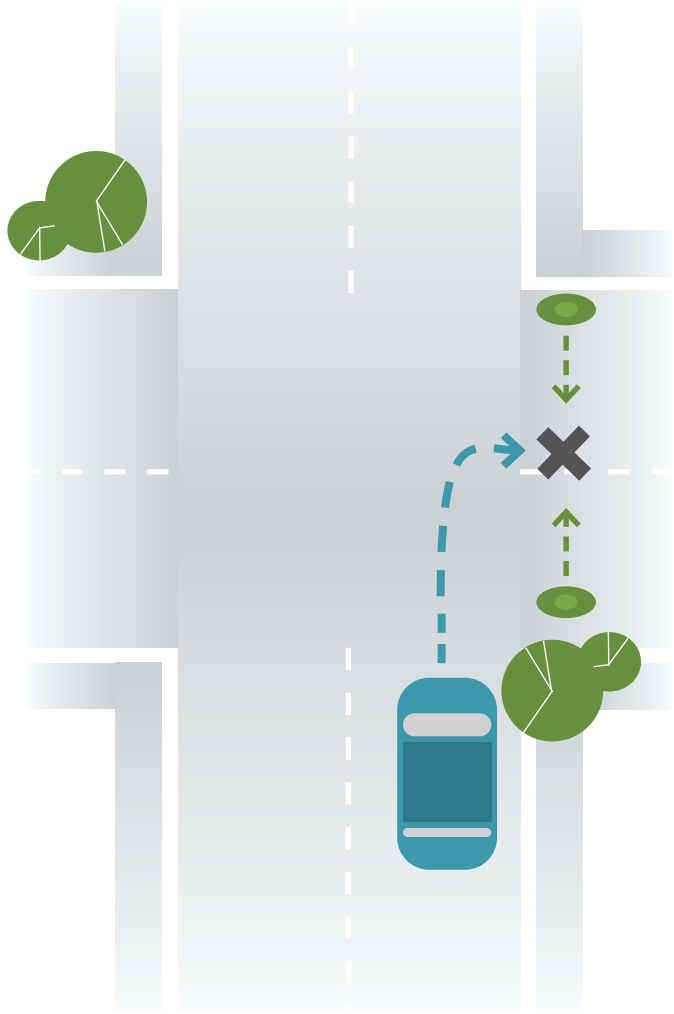
Group of people is struck by driver of turning vehicle.

POSSIBLE CAUSE/PROBLEM #4:

Inadequate sight distance and/or intersection geometrics.

CANDIDATE COUNTERMEASURES:

- Add marking treatments that improve visibility of pedestrian crossing areas.
- Improve intersection lighting.
- Reduce turn radii.
- Install pedestrian crossing islands.
- Remove sight obstructions and/or roadside obstacles (e.g., trees/shrubs, mailboxes, poles, newsstands, trash cans).
- Install motorist regulatory signs and/or pedestrian warning signs (see MUTCD).
- Provide special pedestrian signal phasing (e.g., exclusive protected pedestrian signal interval).
- Prohibit right turn on red (RTOR).
- Prohibit left turns.
- Add on-street parking enhancements.
- Add advance yield/stop lines 20 to 50 feet before intersection.
- Modify skewed intersections.
- Implement protected left turn phasing.



Person is struck by driver of vehicle with poor sight lines and visibility.

7. THROUGH VEHICLE AT SIGNALIZED LOCATION

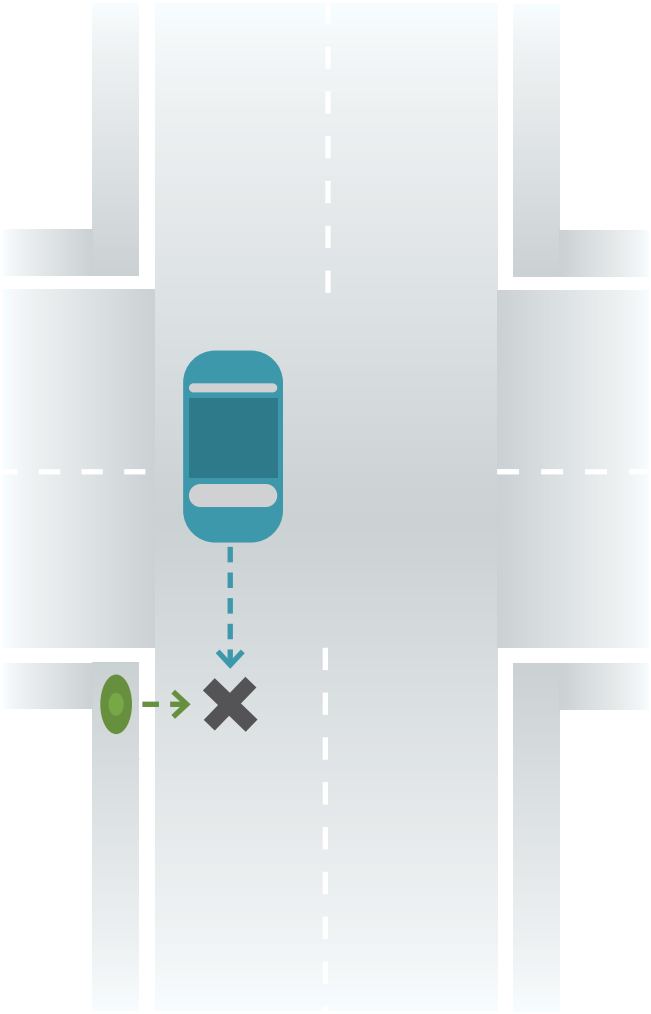
The pedestrian was struck at a signalized intersection or midblock location by a vehicle that was traveling straight ahead.

POSSIBLE CAUSE/PROBLEM #1:

Pedestrian could not see traffic signal.

CANDIDATE COUNTERMEASURES:

- Install new or larger pedestrian WALK/DON'T WALK and/or audible pedestrian signals.
- Add on-street parking restrictions.
- Install automated pedestrian detection system.
- Add leading pedestrian interval to traffic signal system.
- Modify skewed intersections.
- Prohibit left turns.
- Implement protected left turn phasing.
- Install push button and adjust signal timing.
- Install puffin crossing.
- Implement driver and/or pedestrian education program.



Person is struck when crossing the roadway.

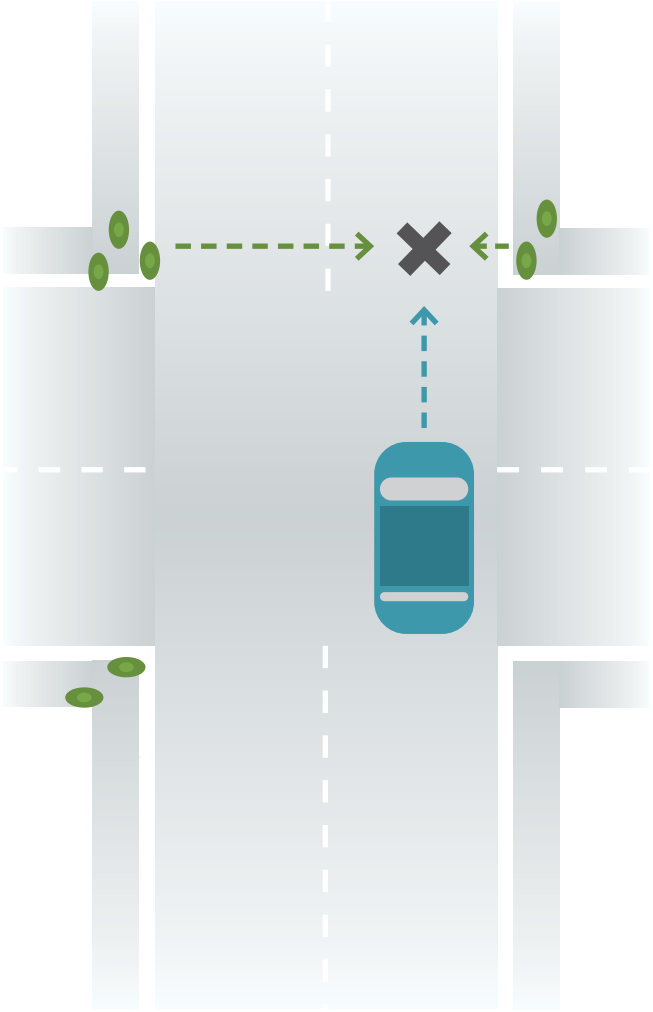
7. THROUGH VEHICLE AT SIGNALIZED LOCATION

POSSIBLE CAUSE/PROBLEM #2:

Children crossing in school zones.

CANDIDATE COUNTERMEASURES:

- Provide pavement markings and school zone signs.
- Convert to one-way street network (if justified by surrounding area-wide pedestrian and traffic volume study).
- Consider using intersection median barriers, diverters, or street closures.
- Provide curb extensions to reduce crossing distance.
- Use traffic calming devices such as mini-circle or raised intersection to reduce vehicle speeds.
- Provide a raised pedestrian crossing.
- Provide advanced stop lines.
- Install pedestrian signals.
- Provide adult crossing guards, or two guards for wide streets.
- Install school regulatory flashers (e.g., SPEED LIMIT 25 MPH WHEN FLASHING).
- Install pedestrian hybrid beacon (PHB).
- Install rectangular rapid flash beacon (RRFB).
- Provide pedestrian education to students and motorists.
- Increase police enforcement.
- Install automated pedestrian detection system.
- Add leading pedestrian interval to traffic signal system.
- Modify skewed intersections.
- Prohibit left turns.
- Implement protected left turn phasing.
- Install push button and adjust signal timing.



Group of persons is struck when crossing the roadway.

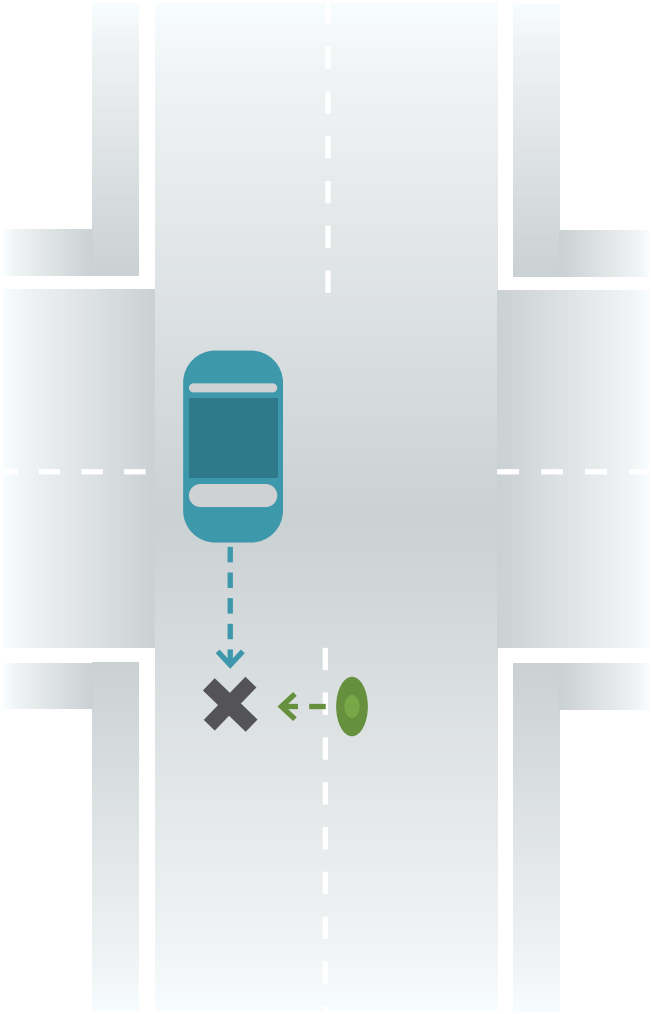
7. THROUGH VEHICLE AT SIGNALIZED LOCATION

POSSIBLE CAUSE/PROBLEM #3:

Excessive delay to pedestrians prior to getting the WALK interval.

CANDIDATE COUNTERMEASURES:

- Provide pedestrian crossing islands.
- Re-time signal to be more responsive to pedestrian needs (e.g., shorter cycle lengths or convert to fixed-time operation).
- Provide quick-response pedestrian push-buttons or automatic (e.g., microwave or infrared) detectors.
- Install automated pedestrian detection system.
- Add leading pedestrian interval to traffic signal system.
- Prohibit left turns.
- Implement protected left turn phasing.
- Install push button and adjust signal timing.
- Provide pedestrian accommodations at complex intersections.



Person is struck when crossing the roadway.

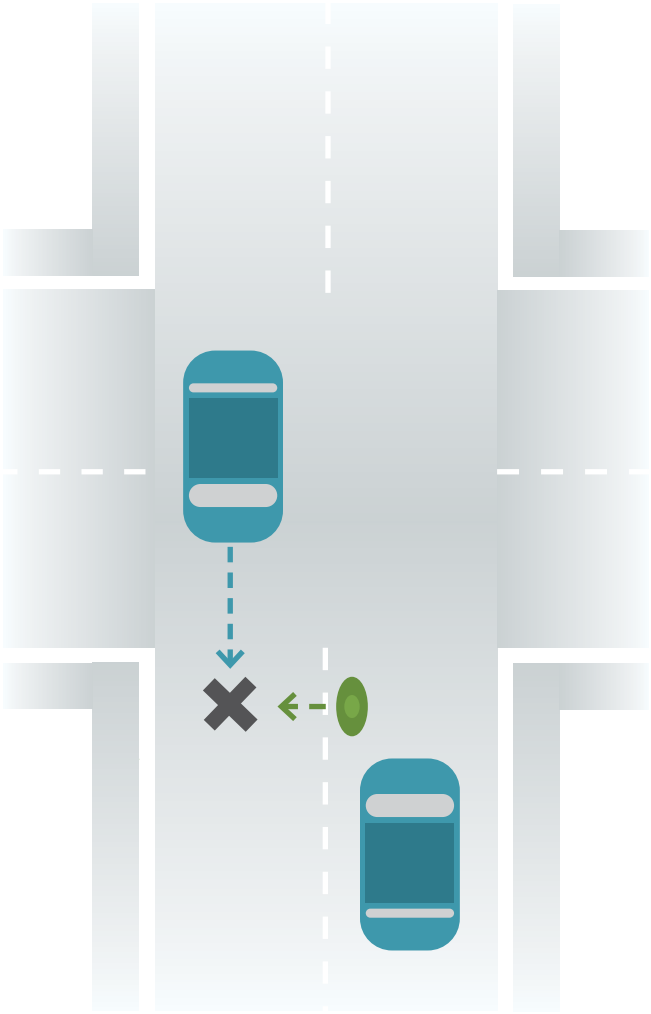
7. THROUGH VEHICLE AT SIGNALIZED LOCATION

POSSIBLE CAUSE/PROBLEM #4:

Lack of pedestrian compliance with WALK phase due to other causes.

CANDIDATE COUNTERMEASURES:

- Re-time signal to be more responsive to pedestrian needs (e.g., shorter cycle length).
- Provide adequate WALK and clearance intervals.
- Provide adult crossing guard at school crossings.
- Provide pedestrian and motorist education.
- Install automated pedestrian detection system.
- Add leading pedestrian interval to traffic signal system.
- Modify skewed intersections.
- Prohibit left turns.
- Implement protected left turn phasing.
- Install automated enforcement system.



Person is struck when crossing the roadway.

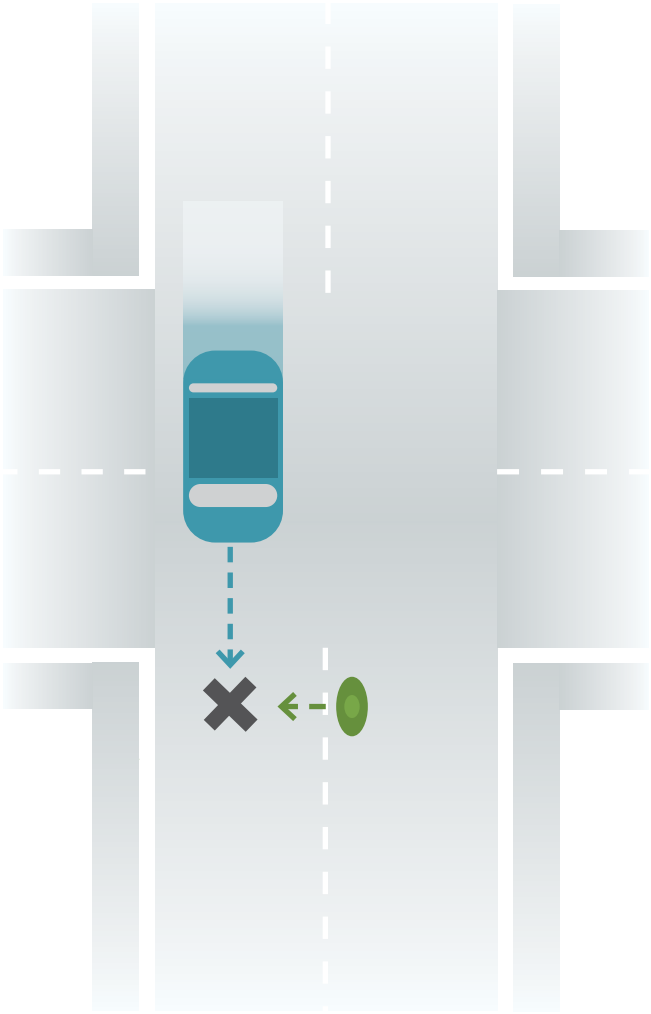
7. THROUGH VEHICLE AT SIGNALIZED LOCATION

POSSIBLE CAUSE/PROBLEM #5:

Motorist did not see pedestrian in time to stop.

CANDIDATE COUNTERMEASURES:

- Add marking treatments that improve visibility of pedestrian crossing areas.
- Move bus stop to far side of intersection.
- Improve nighttime lighting.
- Add curb extensions.
- Add pedestrian crossing islands or raised crosswalk.
- Use traffic-calming devices, such as speed tables or a speed-monitoring trailer on streets approaching the intersection if speed is an issue.
- Construct raised intersection.
- Remove sight obstructions such as mailboxes or parked vehicles.
- Remove on-street parking near intersection (e.g., up to 100 ft).
- Install automated pedestrian detection system.
- Add leading pedestrian interval to traffic signal system.
- Modify skewed intersections.
- Prohibit left turns.
- Implement protected left turn phasing.
- Install push button and adjust signal timing.
- Install automated enforcement system.
- Implement driver education program.



Person is struck when crossing the roadway.

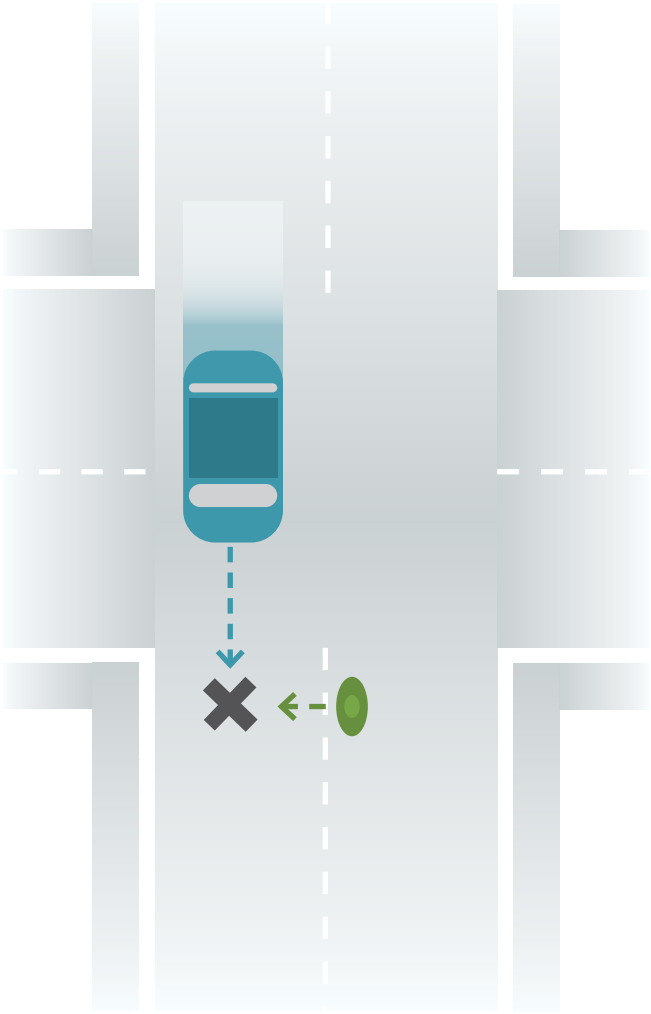
7. THROUGH VEHICLE AT SIGNALIZED LOCATION

POSSIBLE CAUSE/PROBLEM #6:

Motorist ran through a red light at a signalized intersection.

CANDIDATE COUNTERMEASURES:

- Improve lighting.
- Add short all-red interval at signal.
- Increase police enforcement.
- Install camera enforcement.
- Modify skewed intersections.
- Implement driver education program.



Person is struck when crossing the roadway.

8. WALKING ALONG ROADWAY

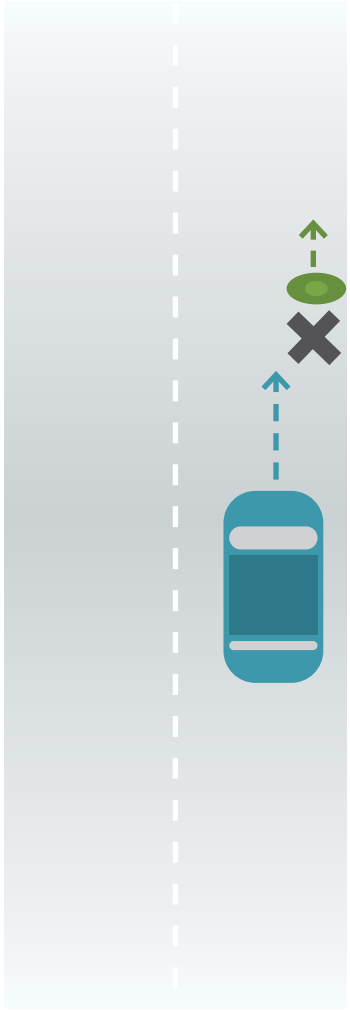
The pedestrian was walking or running along the roadway and was struck from the front or from behind by a vehicle.

POSSIBLE CAUSE/PROBLEM #1:

Inadequate walking area.

CANDIDATE COUNTERMEASURES:

- Provide a sidewalk on both sides of road.
- Provide an asphalt path or paved shoulder.
- Construct and maintain sidewalks and curb ramps to be usable by people with disabilities.
- Add sidewalk, install bicycle lanes or painted shoulders,
- Reduce number of lanes (e.g., four lanes to three lanes), and add planting strips.
- Improve lighting.
- Improve access to transit.
- Provide pedestrian accommodations at complex intersections.
- Implement pedestrian detours in work zones.
- Improve pedestrian safety at railroad crossings.
- Implement driver and/or pedestrian education program.



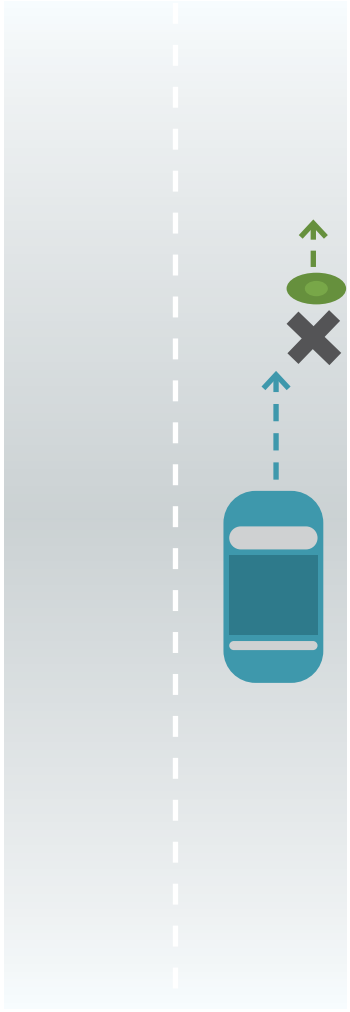
Person is struck when walking along the roadway.

POSSIBLE CAUSE/PROBLEM #2:

High vehicle speeds and/or volume.

CANDIDATE COUNTERMEASURES:

- Add sidewalk or walkway.
- Construct and maintain sidewalks and curb ramps to be usable by people with disabilities.
- Increase lateral separation between pedestrians and motor vehicles (e.g., bike lanes or landscape buffers).
- Provide lighting.
- Construct gateway or install signs to identify neighborhood as area with high pedestrian activity.
- Install "Walk on Left Facing Traffic" signs.
- Use speed-monitoring trailers.
- Increase police enforcement of speed limit.
- Improve access to transit.
- Provide pedestrian accommodations at complex intersections.
- Implement pedestrian detours in work zones.
- Improve pedestrian safety at railroad crossings.
- Implement driver and/or pedestrian education program.



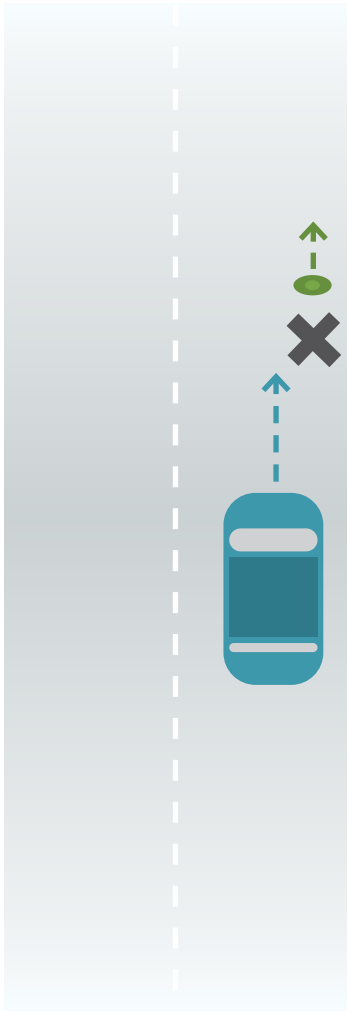
Person is struck when walking along the roadway.

POSSIBLE CAUSE/PROBLEM #3:

Inadequate route to school.

CANDIDATE COUNTERMEASURES:

- Provide sidewalks on both sides of road.
- Construct and maintain sidewalks and curb ramps to be usable by people with disabilities.
- Implement traffic-calming methods at selected sites.
- Provide adult crossing guards.
- Involve school groups and PTA in evaluating safe routes to school and promoting education and enforcement.
- Improve access to transit.
- Provide pedestrian accommodations at complex intersections.
- Implement pedestrian detours in work zones.
- Improve pedestrian safety at railroad crossings



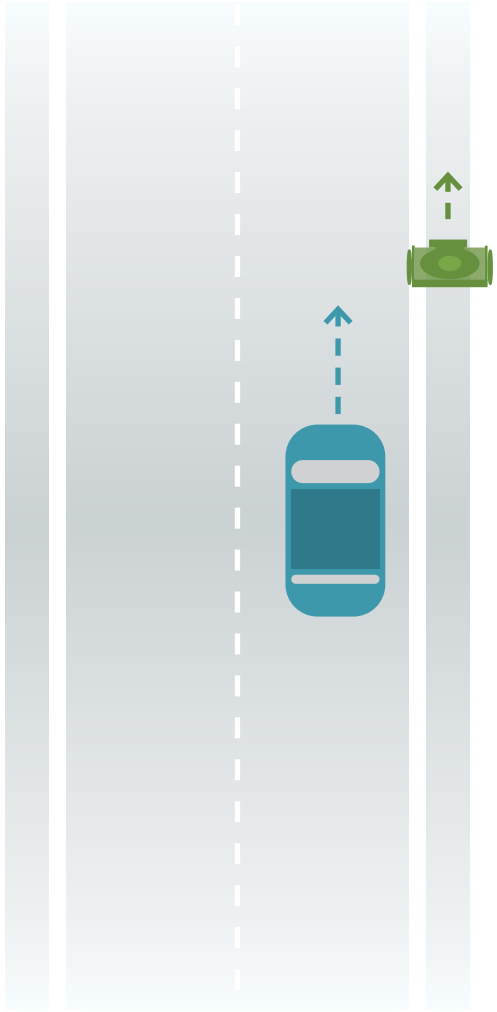
Person is struck when walking along the roadway.

POSSIBLE CAUSE/PROBLEM #4:

Sidewalks are not accessible to all pedestrians.

CANDIDATE COUNTERMEASURES:

- Repair and maintain sidewalks.
- Remove obstacles in sidewalk.
- Build missing sidewalk segments.
- Construct curb ramps.
- Relocate poles and street furniture to provide continuous passage in sidewalk area.
- Enforce parking laws to prevent cars from blocking sidewalks and curb ramps.
- Improve access to transit.
- Implement access management design solutions.
- Provide pedestrian accommodations at complex intersections.
- Implement pedestrian detours in work zones.
- Improve pedestrian safety at railroad crossings.



Person is struck when walking or using a mobility device along the roadway.

9. WORKING/PLAYING IN ROAD

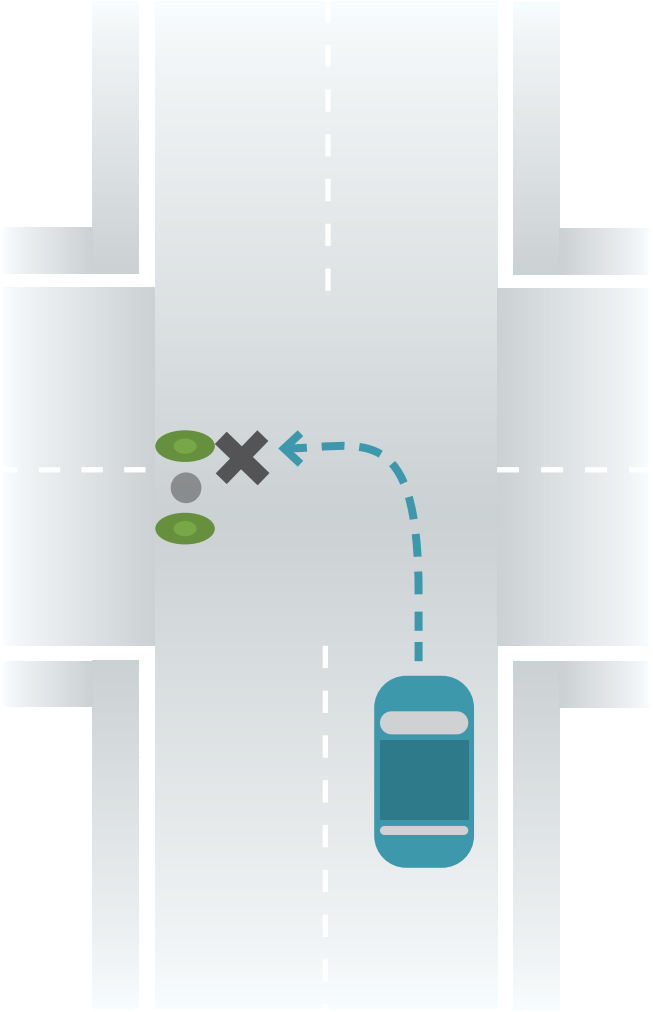
A vehicle struck a pedestrian who was: (1) standing or walking near a disabled vehicle, (2) riding a play vehicle that was not a bicycle (e.g., wagon, sled, tricycle, skates), (3) playing in the road, or (4) working in the road.

POSSIBLE CAUSE/PROBLEM #1:

Worker, policeman, etc, struck in roadway (arterial street).

CANDIDATE COUNTERMEASURES:

- Improve lighting and retroreflective materials on workers.
- Improve traffic control measures (e.g., signs, markings,
- cones, barricades, and flashers) warning motorists of workers' presence.
- Increase worker safety training.
- Increase police enforcement of speed limits in work zones.
- Provide better physical separation/protection from motor vehicles.
- Add on-street parking restrictions.
- Implement pedestrian detours in work zones.



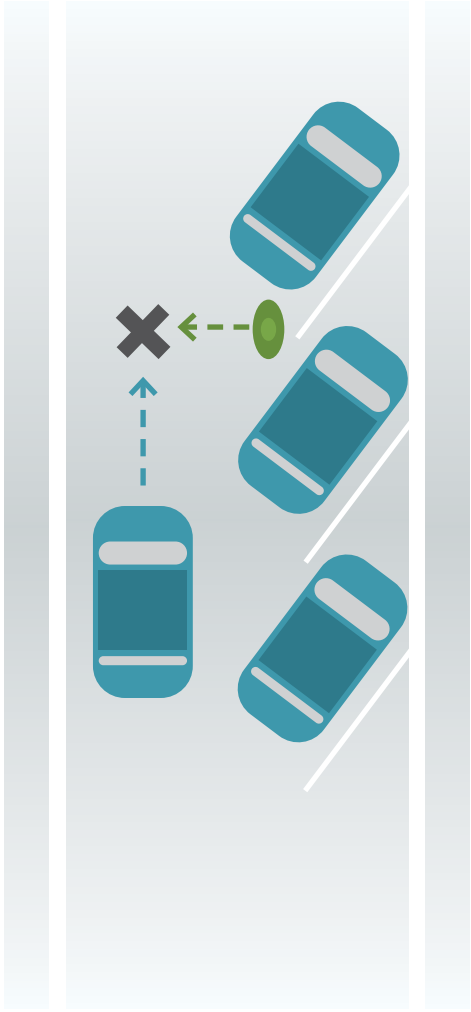
Person is struck when working in the roadway.

POSSIBLE CAUSE/PROBLEM #2:

Pedestrian was struck playing on foot or on play vehicle (e.g., skateboard, wagon, sled, in-line skates) on local/ collector street.

CANDIDATE COUNTERMEASURES:

- Provide accessible sidewalks or walkways on both sides of street.
- Improve lighting.
- Introduce traffic-calming measures (e.g., street narrowing, speed humps).
- Convert streets to a shared street or use signs to identify neighborhood as area with high levels of pedestrian activity.
- Consider street closures (full or partial) or using diverters.
- Implement pedestrian and motorist education programs.
- Provide community park/playground.
- Add on-street parking enhancements.
- Implement access management design solutions.



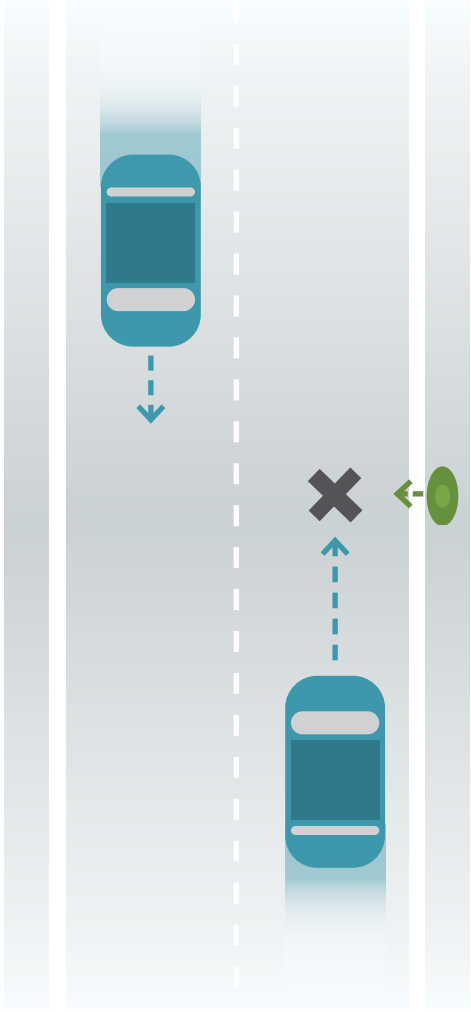
Person is struck when in the roadway.

POSSIBLE CAUSE/PROBLEM #3:

Vehicle speeds are excessive on local street.

CANDIDATE COUNTERMEASURES:

- Narrow streets and/or travel lanes.
- Convert to driveway link/serpentine street.
- Install traffic-calming devices such as chicanes, mini-circles, speed humps, and/or speed tables.
- Use speed-monitoring trailers in conjunction with police enforcement.
- Add on-street parking enhancements.
- Implement access management design solutions.
- Install automated enforcement system.
- Implement driver education program.
- Implement pedestrian education program.



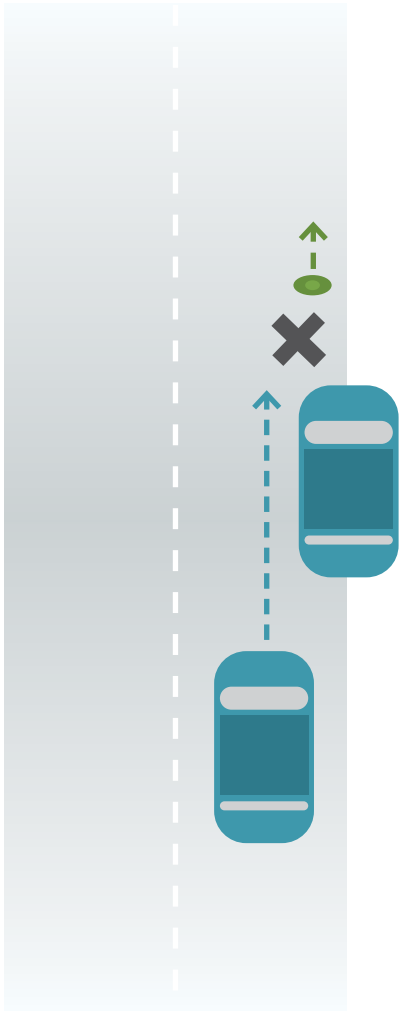
Person is struck when crossing the roadway.

POSSIBLE CAUSE/PROBLEM #4:

Walking to/from disabled vehicle.

CANDIDATE COUNTERMEASURES:

- Provide sidewalks, walkways, or paved shoulders.
- Provide adequate nighttime lighting.
- Educate drivers about what to do if a vehicle becomes disabled.
- Provide motorist assistance program.



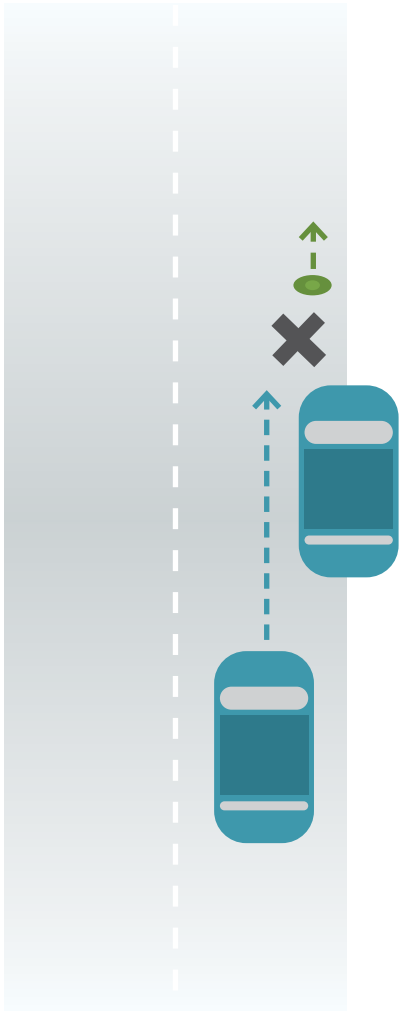
Person is struck when near a disabled vehicle.

POSSIBLE CAUSE/PROBLEM #5:

Working on or standing by a disabled vehicle.

CANDIDATE COUNTERMEASURES:

- Provide paved shoulders.
- Provide adequate nighttime lighting.
- Educate drivers about what to do if a vehicle becomes disabled.
- Provide motorist assistance program.



Person is struck when near a disabled vehicle.

10. NON-ROADWAY (Sidewalk, Driveway, Parking Lot, or Other)

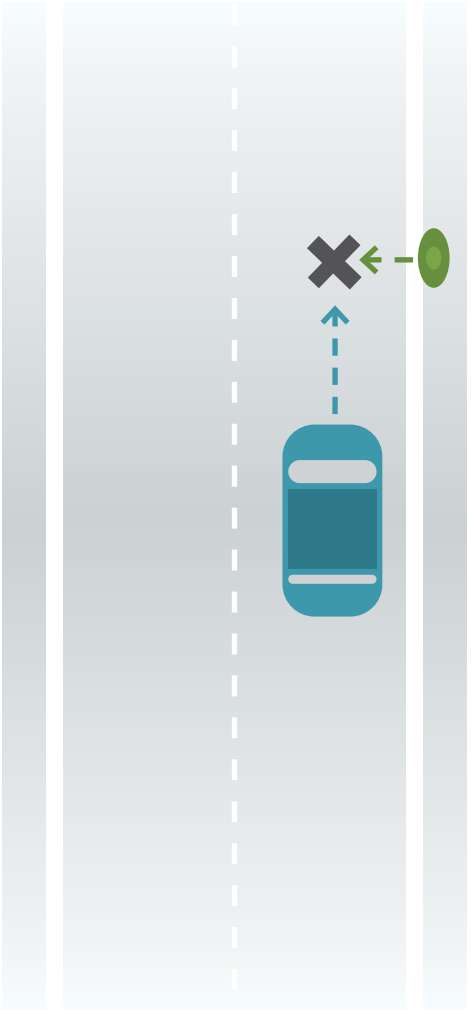
The pedestrian was standing or walking near the roadway edge, on the sidewalk, in a driveway or alley, or in a parking lot, when struck by a vehicle.

POSSIBLE CAUSE/PROBLEM #1:

Pedestrian was struck while waiting to cross roadway, standing at or near curb.

CANDIDATE COUNTERMEASURES:

- Provide accessible sidewalks/walkways and crosswalks.
- Provide sidewalk buffer (bike lane or landscape strip).
- Improve nighttime lighting.
- Reduce curb radii to slow turning cars.
- Use adult crossing guard.
- Implement driver and/or pedestrian education program.
- Increase speed enforcement .
- Implement access management design solutions.
- Provide pedestrian accommodations at complex intersections.
- Prohibit left turns.



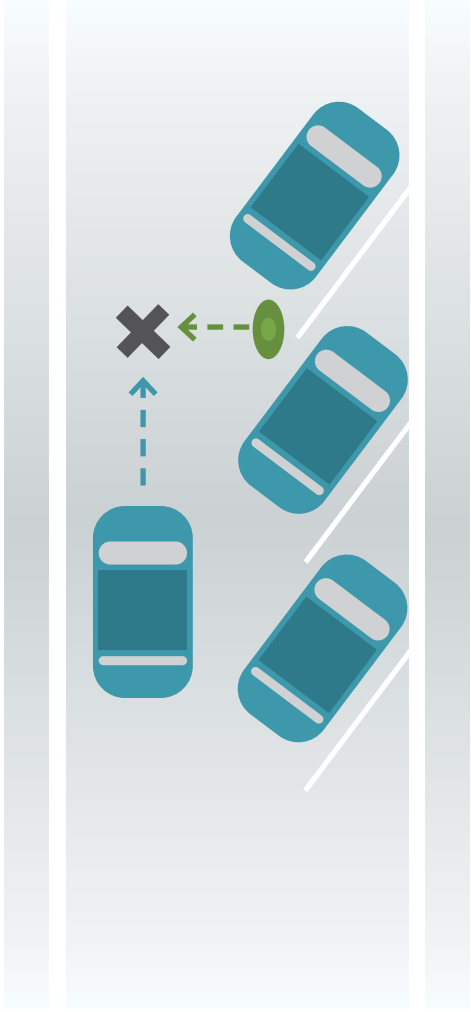
Person is struck by driver of vehicle in/on/near a non-roadway.

POSSIBLE CAUSE/PROBLEM #2:

Pedestrian was struck in parking lot, driveway, private road, gas station, alley, etc.

CANDIDATE COUNTERMEASURES:

- Maintain level sidewalk across driveway area.
- Move sidewalk farther back so that driver will have more time to stop for a pedestrian crossing a driveway.
- Improve nighttime lighting.
- Remove landscaping or other visual obstructions near driveways.
- Implement pedestrian and motorist education programs.
- Redesign or re-stripe parking lot to provide clear pedestrian path across parking lot.
- Build/improve local parks for activities that appeal to children and teens.
- Implement access management design solutions.



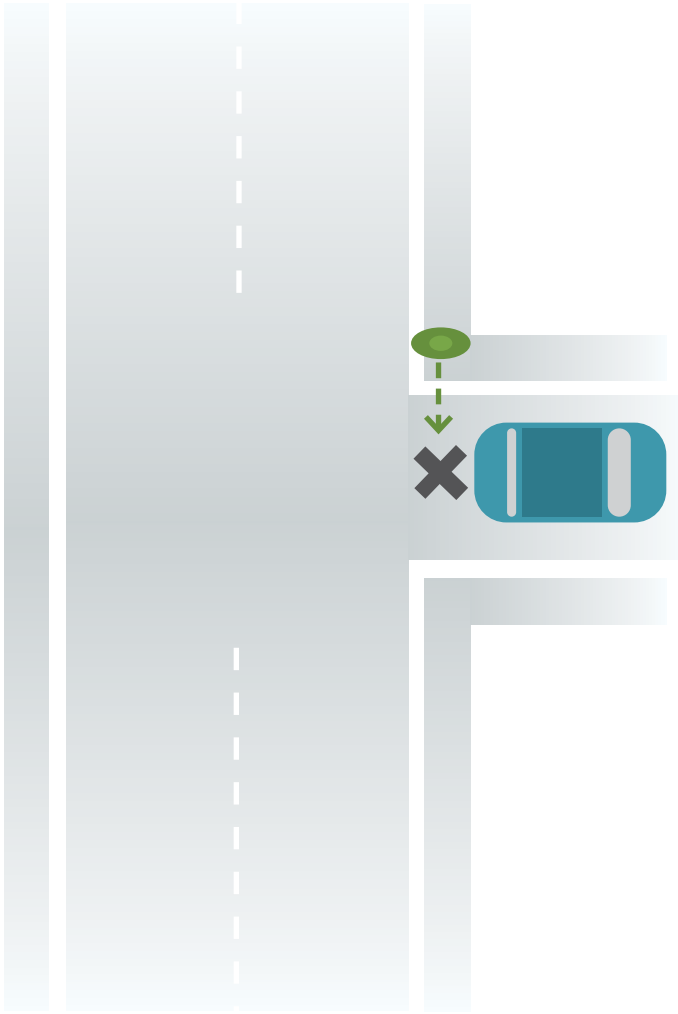
Person is struck by driver of vehicle in/on/near a non-roadway.

POSSIBLE CAUSE/PROBLEM #3:

Vehicle entered or exited a driveway or alley and struck pedestrian.

CANDIDATE COUNTERMEASURES:

- Provide sidewalk or walkway .
- Maintain level sidewalks across driveways or alleys.
- Provide clear walking path across driveway .
- Remove unneeded driveways and alleys.
- Remove sight obstructions (e.g., trim hedges or lower fencing).
- Narrow driveways and reduce turning radii.
- Add adequate planting strip or sidewalk separation.
- Provide advance warning signs for drivers.
- Implement access management design solutions.
- Prohibit left turns.
- Implement driver and/or pedestrian education program.



Person is struck by driver entering/exiting a driveway or alley.

11. BACKING VEHICLE

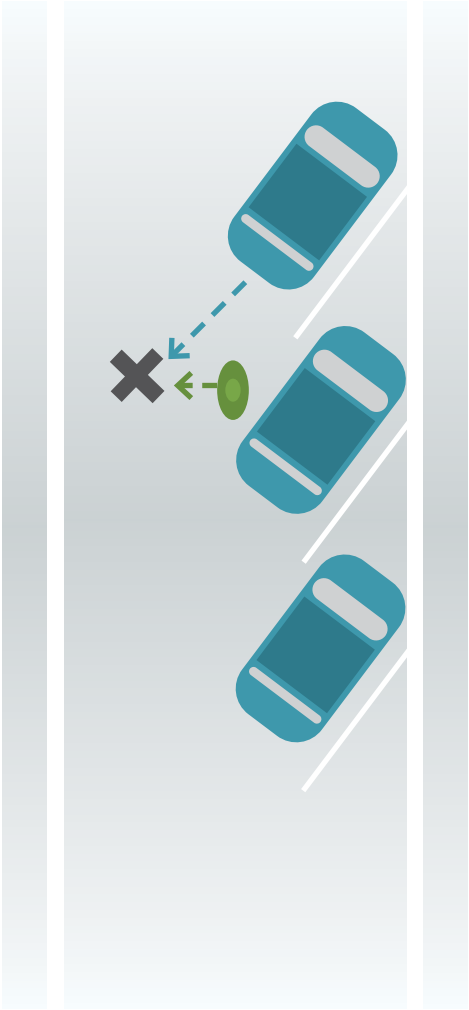
The pedestrian was struck by a backing vehicle on a street, in a driveway, on a sidewalk, in a parking lot, or at another location.

POSSIBLE CAUSE/PROBLEM #1:

Pedestrian struck by backing vehicle.

CANDIDATE COUNTERMEASURES:

- Provide clearly delineated walkways for pedestrians in parking lots.
- Relocate pedestrian walkways.
- Improve nighttime lighting.
- Remove unneeded driveways and alleys.
- Remove landscaping or other sight obstruction near driveways.
- Provide curb extensions or raised pedestrian crossings to improve the visibility of pedestrians to backing motorists.
- Eliminate, modify, or relocate parking if feasible.
- Enhance pedestrian education.
- Enhance motorist education.
- Provide auditory backing alert on vehicles.



Person is struck by driver of backing vehicle.

12. CROSSING EXPRESSWAY

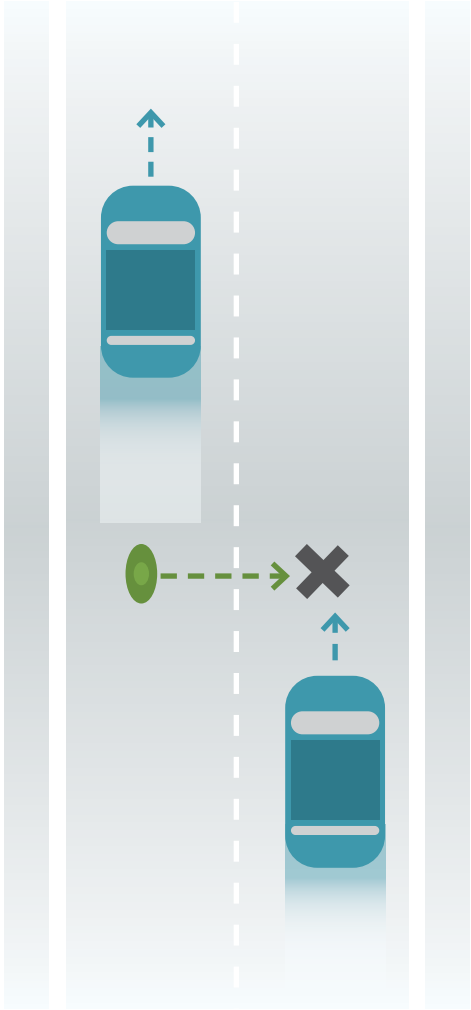
The pedestrian was struck while crossing a limited-access expressway or expressway ramp.

POSSIBLE CAUSE/PROBLEM #1:

Disabled vehicle (pedestrian crosses expressway to seek help).

CANDIDATE COUNTERMEASURES:

- Install/upgrade roadway lighting.
- Educate drivers on what to do if a vehicle is disabled.
- Increase police surveillance.
- Provide motorist assistance program.
- Improve access to transit.
- Provide pedestrian accommodations at complex intersections.



Person is struck when seeking help with a disabled vehicle.

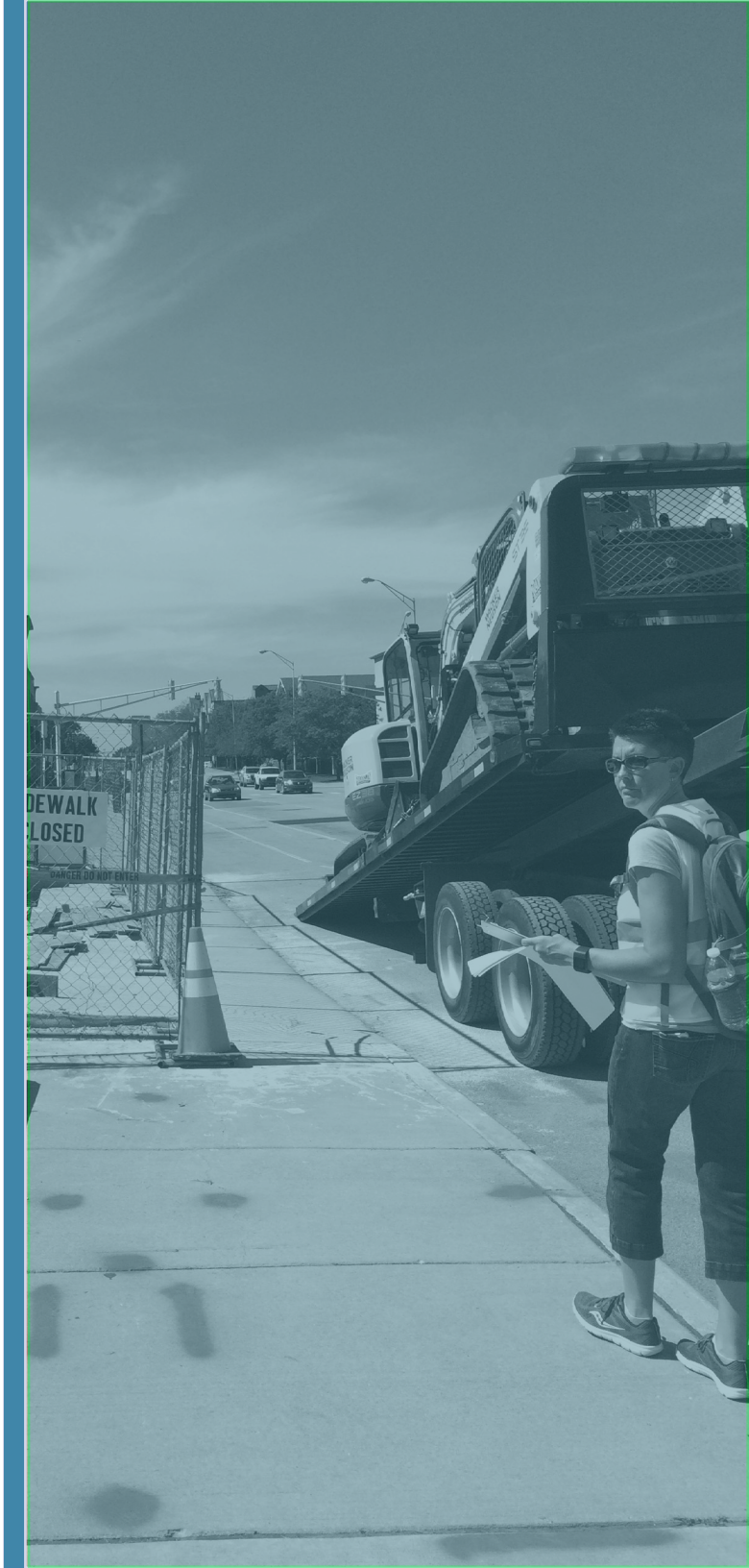
5 APPLYING COUNTERMEASURES

ZONES AS TYPOLOGIES

Six zones were prioritized using the Pedestrian Crash Zone Analysis process. Analysis of the zone's issues were used to create targeted goals and countermeasures. The goals and strategies for the zones can be used as direct examples and typologies of countermeasures that can be used throughout the rest of the city.

The following countermeasures were developed using resources from PEDSAFE and tailoring them to specifically meet the needs of Indianapolis.

By analyzing the crash data to understand the crash causes and conditions, these countermeasures can be applied to targeted goals to make safer pedestrian environments.



ZONE: NORTH MERIDIAN STREET

ISSUES

48
pedestrian crashes;
0 fatalities,
4 incapacitating
(2010-2016)

69% of crashes occurred in the daylight

31% involved youth and young adults between the ages of 0 and 25

40% of those hit were over the age of 51

44% occurred at intersections

33% occurred at mid-block

52% of vehicles were going straight

29% of vehicles were turning left

15% of crashes were hit and runs

CITY-WIDE TARGETED GOALS

Reduce collisions at intersections by 5%

RECOMMENDED COUNTERMEASURES

- Increased patrols for speed and failure to yield or stop violations

- Road diet
- Left turn traffic signal arrows, left turn phasing
- Traffic calming
- Curb extensions
- Marked crosswalks and enhancements
- Advanced stop lines at traffic signals
- Push buttons & signal timing

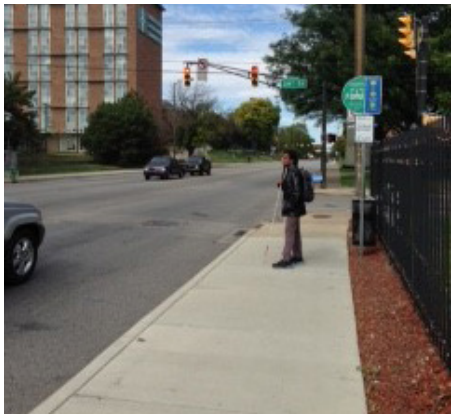
- Driver Education: Yield to pedestrians in crosswalks (marked and unmarked)
- Pedestrian Education: Look before crossing (even when pedestrian has walk signal)
- Community Champion in crash zones: distributing "Tired Faces" materials, talking with local organizations and businesses, facilitating workshops and meetings

LAND USE:

residential

commercial

ZONE: NORTH MERIDIAN STREET

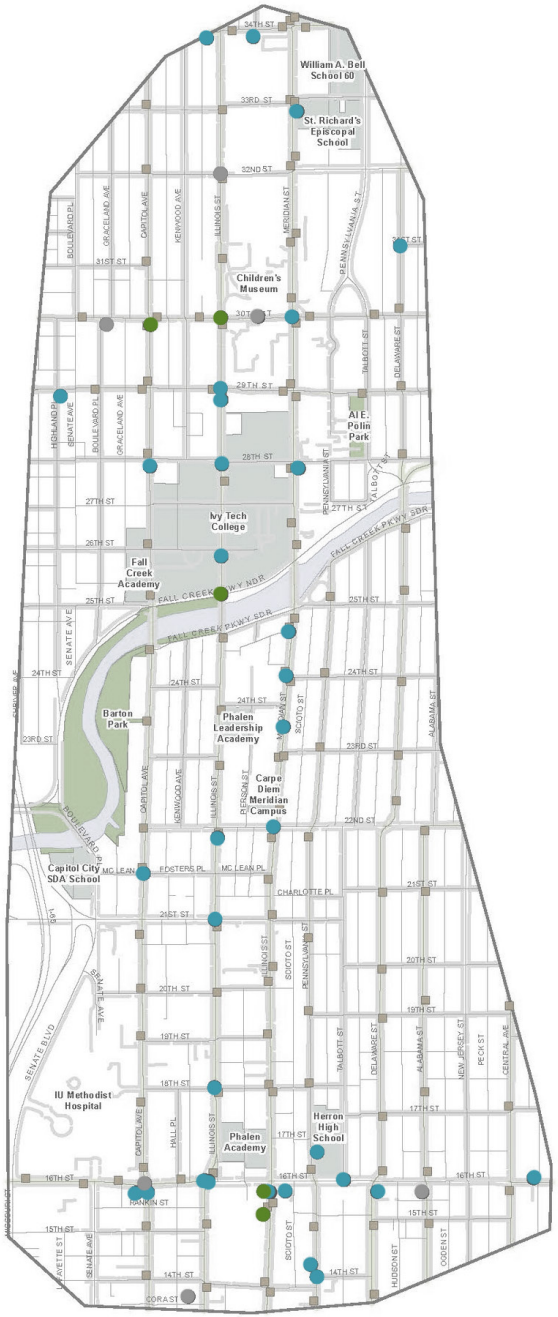


Lack of tactile at curb ramp for people with disabilities

No marked crosswalks

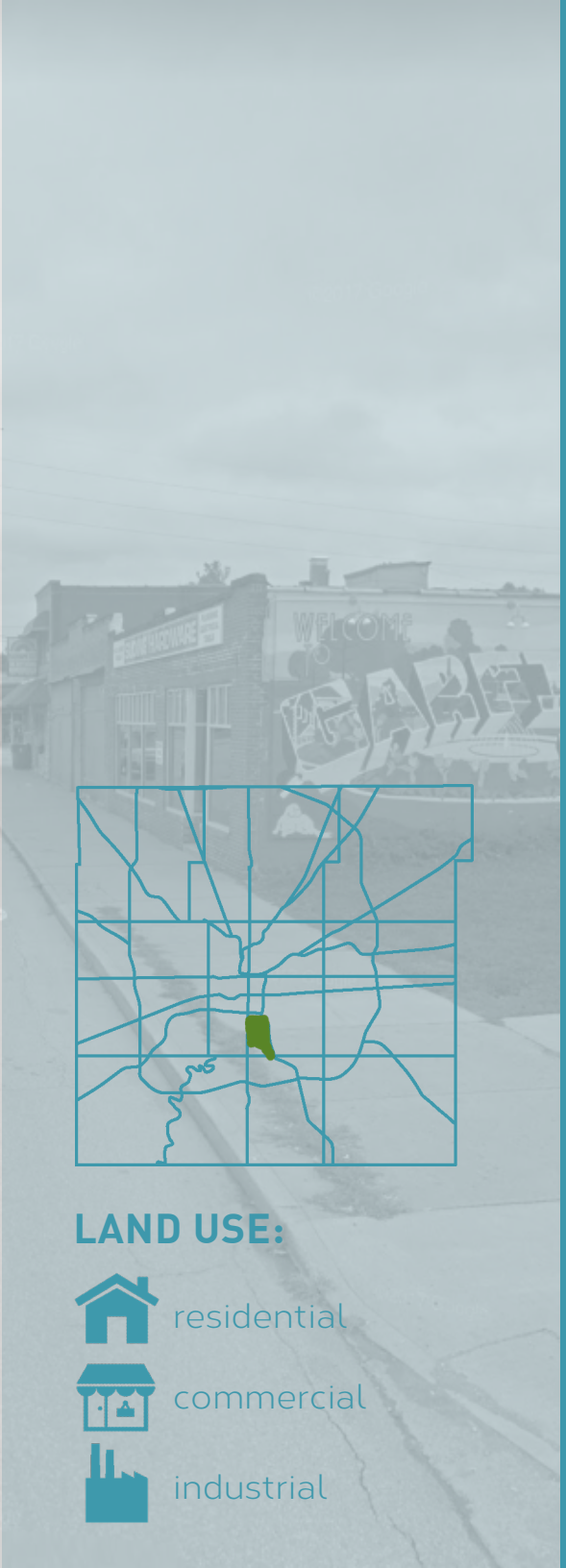
Trash and debris along with obstructions on sidewalk

2010-2016 ARIES DATA PEDESTRIAN CRASHES



- Incapacitating Injury (05)
- Non-Incapacitating Injury (37)
- Unknown Injury (06)
- Bus Stop
- Zone 9
- Street
- Pedestrian Network
- Bus Route
- Waterbody
- School Property
- Park

Created 29JAN2018, Marion County Public Health Department, GIS 160259. Source: IMPD ARIES Database, City of Indianapolis Department of Public Safety, City/County GIS.



ZONE: GARFIELD PARK

ISSUES

52% of crashes occurred in the daylight

42% involved youth and young adults between the ages of 0 and 25

23% of those hit were over the age of 51

40% occurred at intersections

44% occurred at mid-block

69% of vehicles were going straight

10% of vehicles were turning left

31% of crashes were hit and runs

CITY-WIDE TARGETED GOALS

Reduce hit and run collisions by 3%

RECOMMENDED COUNTERMEASURES

- Increased patrols for speed and failure to yield or stop violations
- Increased legal sanctions to deter hit and run collisions

- Road diet
- Lane width reduction
- Median refuge island
- Curb extensions
- Rectangular Rapid Flash Beacon
- Speed table
- Marked Crosswalks and Enhancements

- Pedestrian Education: focus on utilization of crosswalks at intersections
- Community Champion in crash zones: distributing "Tired Faces" materials, talking with local organizations and businesses, facilitating workshops and meetings

LAND USE:

residential

commercial

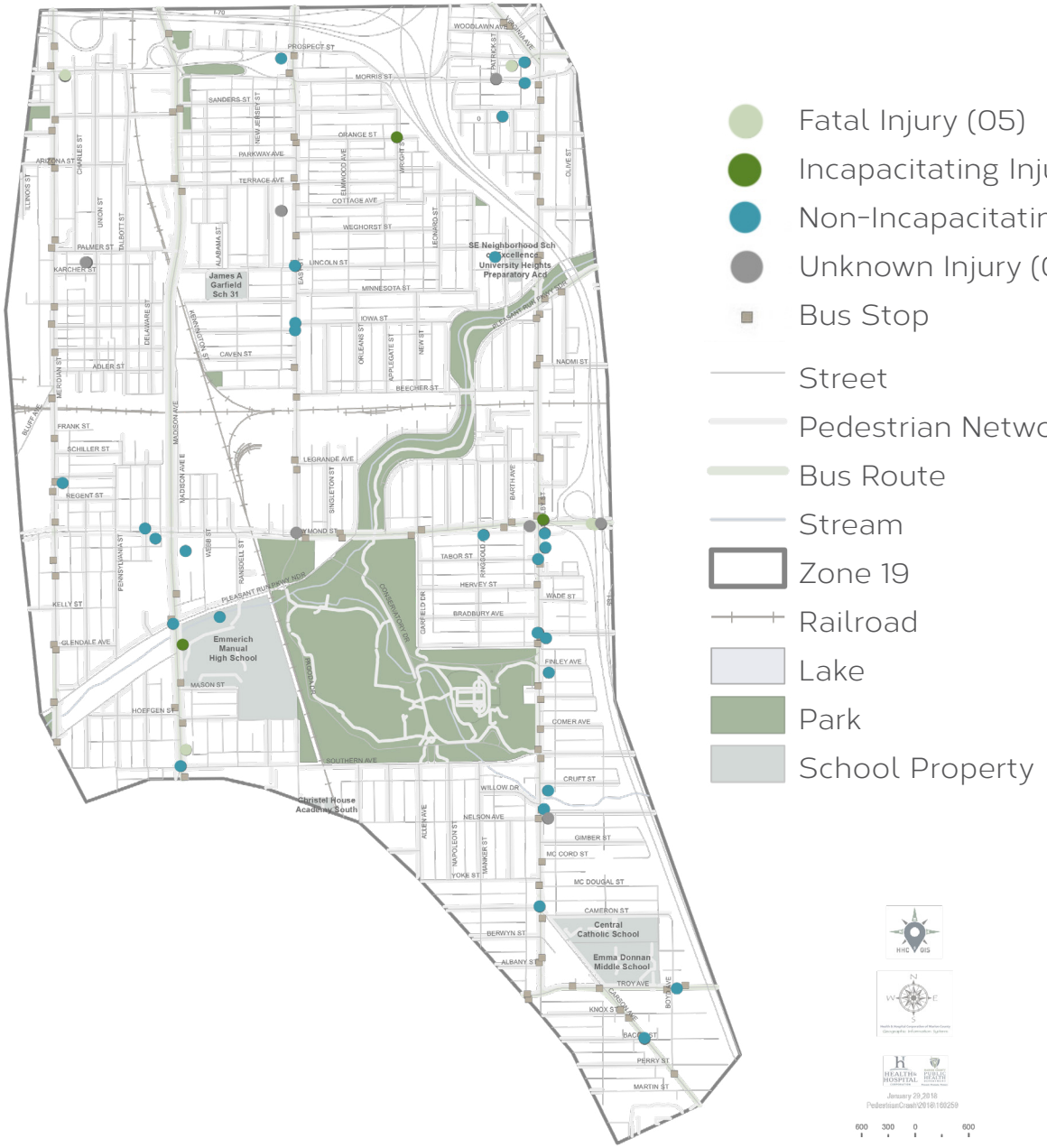
industrial

ZONE: GARFIELD PARK

Buffered sidewalk on Shelby Street at Garfield Park Library

Lack of ADA accessible ramps at Shelby and Conservatory Drive

2010-2016 ARIES DATA PEDESTRIAN CRASHES



Created 29JAN2018, Marion County Public Health Department, GIS 160259. Source: IMPD ARIES Database, City of Indianapolis Department of Public Safe

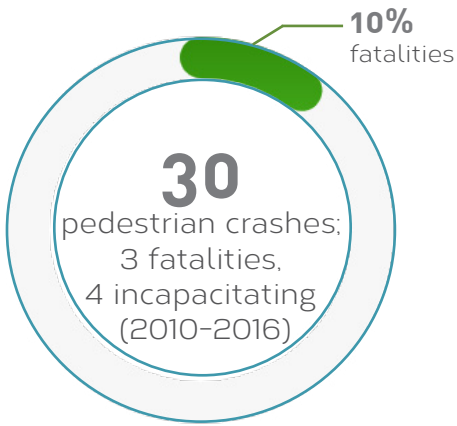
ZONE: INTERNATIONAL MARKETPLACE/W. 38TH

LAND USE:

residential

commercial

ISSUES



56% occurred between 8 p.m. and 8 a.m.

30% involved youth and young adults between the ages of 11 and 25

33% of those hit were over the age of 51

20% occurred at intersections

43% occurred at mid-block

63% of vehicles were going straight

63% Occured in the dark

37% of crashes were hit and runs

CITY-WIDE TARGETED GOALS

Reduce nighttime collisions by 5%

RECOMMENDED COUNTERMEASURES

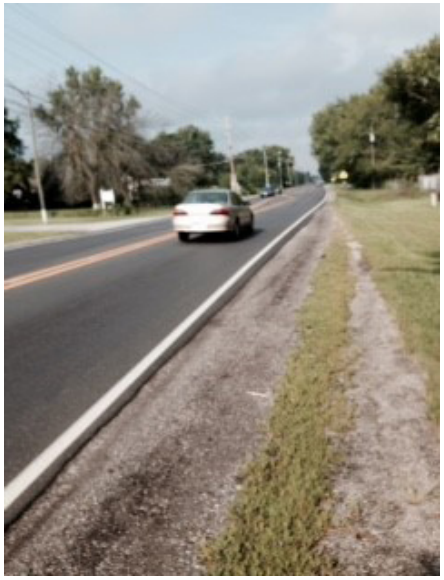
- Increased patrols for speed and failure to yield or stop violations
- Programs for enforcing hit and run crashes

- Increase lighting in the area
- Road diet
- Intersection bump-outs
- Median refuge island
- Curb extensions
- Rectangular Rapid Flash Beacon
- Speed table
- Marked high-visibility crosswalks and enhancements including HAWK
- Examine turning radius
- Landing pads

- Pedestrian Education: Cross at the corner education (utilize crossing and crossing at intersections)
- Community Champion in crash zones: distributing "Tired Faces" materials, talking with local organizations and businesses, facilitating workshops and meetings
- Conduct warrant study to determine pedestrian counts (use Miovision)

ZONE: INTERNATIONAL MARKETPLACE/W.38TH

Overgrowth of vegetation on sidewalk on the south side of 34th Street



Evidence of pedestrian activity and lack of sidewalk on the north side of 34th Street

2010-2016 ARIES DATA PEDESTRIAN CRASHES

Created 29JAN2018, Marion County Public Health Department, GIS 160259. Source: IMPD ARIES Database, City of Indianapolis Department of Public Safety, City/County GIS.

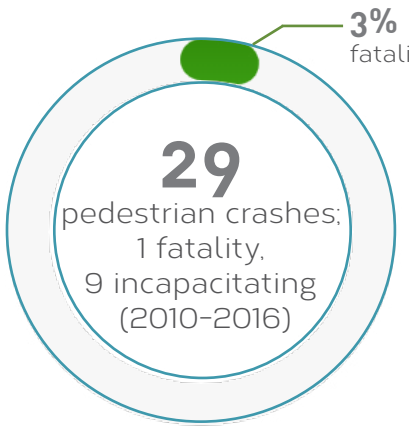
ZONE: E. 38TH ST/MEADOWS

LAND USE:

residential

commercial

ISSUES



65% of crashes occurred in the dark; 56% occurred between 4 and 8 p.m.

44% involved children and youth at or below the age of 20

59% of the crash victims were male

24% occurred at intersections

45% occurred at mid-block

28% of vehicles were turning left

44% involved youth below age 20

CITY-WIDE TARGETED GOALS

Reduce youth crashes by 10%

RECOMMENDED COUNTERMEASURES

- Increased patrols for speed and failure to yield or stop violations

- Road diet
- Turn lane examination
- Median refuge island
- Curb extensions
- HAWK crossing
- Increase lighting in the area
- Speed table
- Marked high-visibility crosswalks and enhancements
- Examine turning radius
- IndyGo bus stop placement examination

- Safe Routes to School
- Pedestrian Education: Cross at the corner education (utilize crossing and crossing at intersections)
  - Target youth in area
- Community Champion in crash zone: distributing "Tired Faces" materials, talking with local organizations and businesses, facilitating workshops and meetings

ZONE: E. 38TH ST/MEADOWS

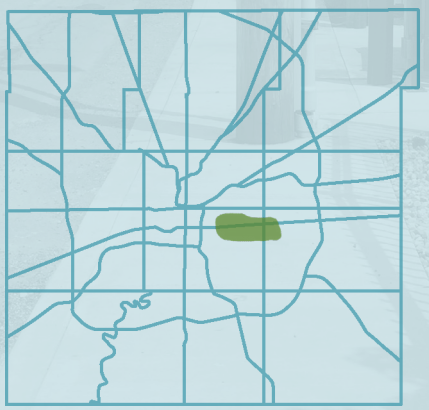
38th Street at Fall Creek Parkway- crosswalk in need of painting; center island present

38th Street east of Meadows Drive showing the sidewalk abutting 4 lanes of traffic and no buffer between the sidewalk and the road; trash and debris blocking the sidewalk forcing people to walk around it

2010-2016 ARIES DATA PEDESTRIAN CRASHES

Created 29JAN2018, Marion County Public Health Department, GIS 160259. Source: IMPD ARIES Database, City of Indianapolis Department of Public Safety, City/County GIS.

ZONE: EAST WASHINGTON

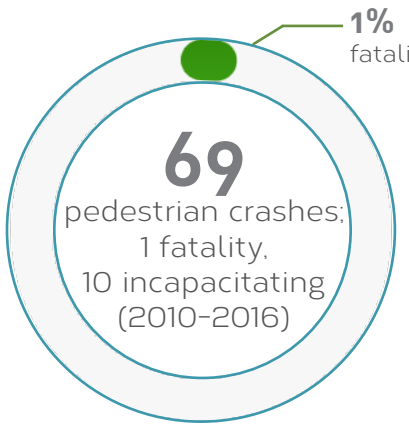


LAND USE:

residential

commercial

ISSUES



64% of crashes occurred in the daylight

35% involved youth and young adults between the ages of 0 and 25

23% of those hit were over the age of 51

33% occurred at intersections

41% occurred at mid-block

68% of vehicles were going straight

22% of vehicles were turning left

29% of crashes were hit and runs

CITY-WIDE TARGETED GOALS

Reduce collisions at mid-block crossings by 5%

RECOMMENDED COUNTERMEASURES

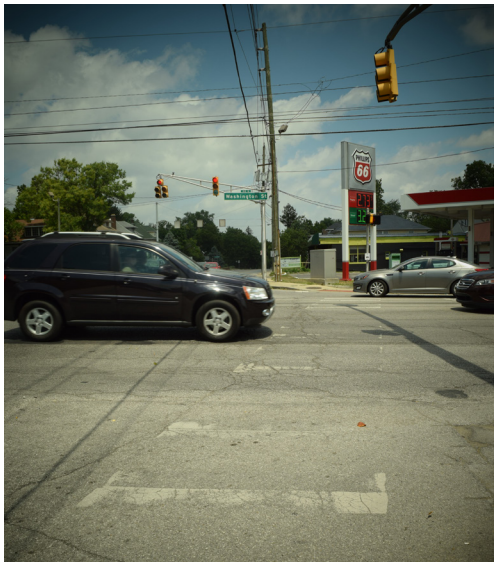
- Increased patrols for speed and failure to yield or stop violations

- Road diet
- Left turn traffic signal arrows, left turn phasing
- Traffic calming
- Curb extensions
- Marked crosswalks and enhancements
- Advanced stop lines at traffic signals
- Push buttons & signal timing

- Driver Education: Yield to pedestrians in crosswalks (marked and unmarked)
- Pedestrian Education: Look before crossing (even when pedestrian has walk signal)
- Community Champion in crash zones: distributing "Tired Faces" materials, talking with local organizations and businesses, facilitating workshops and meetings

ZONE: EAST WASHINGTON

East Washington Street and Shortridge Road



East Washington and Shadeland Avenue

2010-2016 ARIES DATA PEDESTRIAN CRASHES

- Fatal Injury (02)
- Incapacitating Injury (11)
- Non-Incapacitating Injury (47)
- Unknown Injury (09)
- Bus Stop
- Street
- Pedestrian Network
- Bus Route
- Stream
- Zone 14
- Railroad
- Lake
- Park
- School Property

875 437.5 0 875
Feet

Created 29JAN2018, Marion County Public Health Department, GIS 160259. Source: IMPD ARIES Database, City of Indianapolis Department of Public Safety, City/County GIS.

LAND USE:

- residential
- commercial
- industrial

DOWNTOWN

ISSUES

66% of crashes occurred in the daylight

25% involved youth and young adults between the ages of 0 and 25

27% of those hit were over the age of 51

76% occurred at intersections

14% occurred at mid-block

35% of vehicles were going straight

45% of vehicles were turning left

10% of crashes were hit and runs

CITY-WIDE TARGETED GOALS

Reduce left turn crashes by 5%

RECOMMENDED COUNTERMEASURES

- Increased patrols for speed and failure to yield or stop

- Left turn traffic signal
- Restricting turn on red
- Road diet
- Curb extensions
- Marked high-visibility crosswalks and enhancements
- Pedestrian signal improvements (interval timing)
- Stop bars

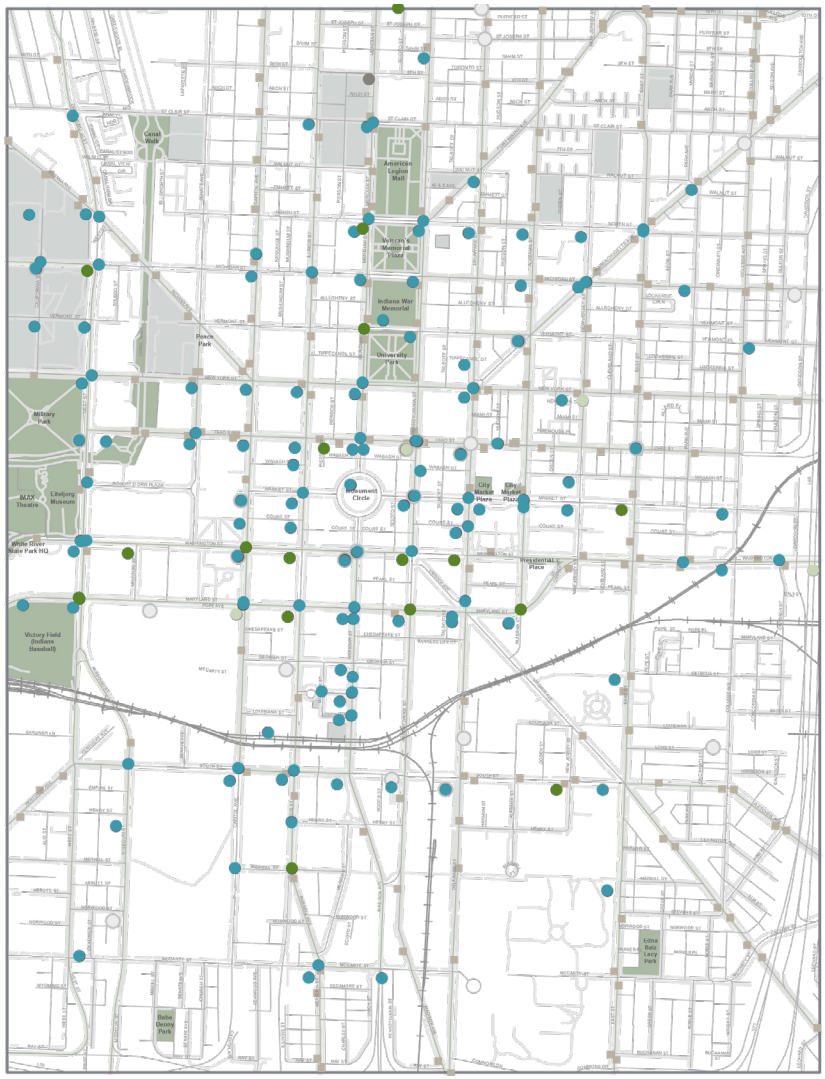
- Driver Education: Yield to pedestrians in crosswalks (marked and unmarked)
- Pedestrian Education: Look before crossing (even when pedestrian has walk signal)
- Community Champion in crash zones: distributing "Tired Faces" materials, talking with local organizations and businesses, facilitating workshops and meetings

Intersection of Market Street and Pennsylvania. Pedestrians walking in crosswalk.

Missing crosswalks near Virginia Avenue and East Street

DOWNTOWN

2010-2016 ARIES DATA PEDESTRIAN CRASHES



- Fatal Injury (04)
- Incapacitating Injury (18)
- Non-Incapacitating Injury (222)
- Unknown Injury (08)
- Bus Stop
- Street
- Pedestrian Network
- Bus Route
- Stream
- Downtown Zone
- Railroad
- Lake
- Park
- School Property

HHC GIS

600 300 0 600

Feet

6 BEYOND THE CRASH TYPOLOGIES

CURRENT INVESTIGATIONS

While partners have successfully advocated for polices such as the Complete Streets and Sidewalk Ordinances and completed the Pedestrian Plan, there are other strategies currently used in Indianapolis to promote pedestrian safety.

ENFORCEMENT POLICIES

The City of Indianapolis' Department of Public Works, Department of Metropolitan Development, and the Indianapolis Metropolitan Police Department (IMPD) created a program, in which fatal pedestrian crashes trigger members from all three departments to do a site visit and investigation of the crash location and to identify needed countermeasures.

Health by Design also worked with IMPD on a targeted enforcement campaign of both speeding and failure to yield compliance in downtown Indianapolis.

COMMUNITY ENGAGEMENT

From the very beginning of the Pedestrian Safety Zones Project, the project team worked to engage a broader group of community stakeholders and educate them on the issues and data, listen to their stories and concerns, solicit their ideas for preventing crashes, and secure their support in ongoing efforts. In this effort, presentations have been made in large and small settings, and focused meetings and discussions have occurred. The project has also generated media attention and provided media content to various outlets.

SAFETY EDUCATION CAMPAIGN

The Pedestrian Safety Zones Project team dedicated significant time and effort to the development of a pedestrian safety education campaign to be used throughout the county. A communications team considered various options before selecting "Tired Faces," an annual public education, awareness and behavioral change campaign the Street Smart initiative for Washington, D.C., suburban Maryland and Northern Virginia. Significant guidance, campaign templates and resources were available at no-cost, as Street Smart has been developed with federal funding.

A high-level communications strategy was initiated and educational materials were developed, customized and purchased. Products included bus tail ads, yard signs, a brochure and window clings for businesses and community spaces.

Finally, public relations and media advocacy strategies were used to raise awareness of the issues and highlight efforts to improve pedestrian safety and access.

Using the Tired Faces Campaign materials and community involvement, Health by Design led a community engagement program in the top Pedestrian Crash Zones. This project involves identifying an anchor institution in the zone and engaging a local "Community Champion" to distribute materials such as yard signs, window clings, and pamphlets, and conduct door-to-door business and neighborhood outreach. The process includes a workshop targeted towards businesses, faith-based institutions, residents, schools, and community partners in the crash zone.

PEDESTRIAN PLAN RECOMMENDATIONS

The Indianapolis Pedestrian Plan made key policy and design recommendations that apply to creating safer and more walkable pedestrian conditions.

These recommendations, outlined below, are taken directly from the Pedestrian Plan:

Complete Streets Checklist

Description

Develop a Complete Streets Checklist and process diagram for construction projects providing inputs for all departments and agencies that have a stake in the public right-of-way

Rationale

- Procedures for effective implementation of Indy's Complete Streets policy are incomplete
- Lack of coordination on Complete Streets design between departments and agencies

Actions

- Formalize the project delivery process into clear steps that assure projects will be completed as designed and according to the Complete Streets Ordinance
- Establish a project charter for all infrastructure projects to document decisions
- Formalize pilot projects as part of the Complete Street process as a way to test alternatives, experiment with designs, striping, and materials, and evaluate options
- Integrate DCE into the Complete Streets implementation process

Partners

- Department of Public Works
- Department of Business and Neighborhood Services
- Department of Metropolitan Development
- Indiana Department of Transportation
- Indianapolis Metropolitan Planning Organization

Indianapolis Vision Zero

Description

Develop and implement an Indy Vision Zero program challenging city staff and the community to eliminate all preventable fatalities and severe injuries from roadway collisions within the next 10 years

Rationale

- Between 2004 and 2014, Indianapolis had roughly one pedestrian collision every day
- While number of pedestrian collisions has remained largely unchanged over the past 10 years, pedestrian fatalities have risen 50 percent

Actions

- Establish program focus areas, including infrastructure, education, data driven enforcement, data standards, internal procedures, knowledge transfer with North American traffic safety leaders, and new technology
- Focus enforcement programs and activities along high crash pedestrian corridors established in the State of Walkability report
- Establish a new traffic stop program dedicated to education and rewarding good behavior
- Seek additional funding to expand programs and increase DUI patrols, targeted along high pedestrian crash corridors
- Work with IMPD to expand the neighborhood enforcement partnership program, hiring more off-duty officers to enforce speed limits on neighborhood streets
- Implement education and outreach campaigns that explain how to use new types of infrastructure (for all modes), helping both people driving and people walking to understand traffic control changes
- Establish pedestrian awareness training for all drivers, including all company and contracted private transportation providers
- Produce a public progress report on Indy Vision Zero every two years
- Analyze and integrate ARIES traffic collision data biannually into the Indy Vision Zero public progress report, using the results to direct enforcement efforts
- Conduct before and after evaluation of key infrastructure projects to determine benefits of pedestrian safety strategies
- Share data with the public and partners like Open Indy Brigade

Partners

- Mayor's Office
- Department of Public Works
- Indianapolis Metropolitan Police Department
- Marion County Public Health Department
- Health by Design

Intersection Level of Service Tolerance Policy

Description

Encourage transit-oriented and walkable infill development by developing an intersection level of service (LOS) tolerance policy

Rationale

- Implementing city priorities related to transit-oriented development and walkability requires new ways to measure success and impacts

Actions

- Coordinate between DPW, BNS, and DMD to establish and codify the relaxed LOS threshold(s)
- Establish target thresholds at LOS E, which is typical for large cities that are building vibrant, transit-oriented centers and corridors
- Focus the intersection LOS tolerance policy in the CBD, maturing and growth villages, and village access corridors

Partners

- Department of Public Works
- Department of Business and Neighborhood Services
- Department of Metropolitan Development

No Turns on Red and Other Turn Restrictions

Description

Develop no turns on red policies in downtown Indianapolis, and additional turn restrictions

Rationale

- People walking in downtown are exposed to potential conflicts with vehicles during dedicated walk phases if turn movements are permitted on red
- Majority of collisions involving pedestrians are at intersections

Actions

- Identify turn on red restriction opportunities in downtown and at skewed signalized intersections
- Analyze traffic impact of right turn on red restrictions (apply LOS thresholds developed in recommendation P2.5)
- Install regulatory signs and stripe advanced stop bars where right turn on red restrictions are applied
- Educate motorists about right turn on red restrictions
- Identify left turn on red restrictions for movements from a one-way street to another one-way street

Partners

- Department of Public Works
- Indianapolis Metropolitan Police Department

Flexible Street Design Standards

Description

Establish flexible street design standards that respond to urban and transit-oriented land use environments in Indianapolis

Rationale

- City, MPO, and INDOT roadway classifications are not aligned, defaulting to INDOT street design standards on city streets
- New street construction and reconstruction requires designing to INDOT standards

Actions

- As part of the Transportation Integration Plan, the city should:
  - Adopt the NACTO Urban Street Design Guide as street design policy, OR
  - Develop new street types by land use, including cross-sections, operational guidance, and other design elements

Partners

- Department of Public Works
- Department of Business and Neighborhood Services

PEDESTRIAN PLAN RECOMMENDATIONS

Low Cost Materials Program

Description
Develop a pilot program that implements and tests interim pedestrian projects using low-cost materials

Rationale
- Walking infrastructure needs are significant and costs are very high
- Indianapolis needs to identify cost-effective and creative construction materials for pedestrian projects

Actions
- Conduct a global scan of low-cost pedestrian infrastructure best management practices
- Identify potential projects that could be constructed with low-cost materials on an interim basis
- Procure and test low-cost materials that can be reused for different construction projects
- Implement at least three (3) walking infrastructure projects using low-cost materials

Partners
- Indianapolis Department of Public Works
- Big Car Collaborative
- Indiana State Health Department
- Health by Design

New Safe Routes Programs

Description
Develop Safe Routes programs for transit, schools, parks, and senior services access infrastructure and programming

Rationale
- Walking routes outside of downtown—such as to neighborhood, regional, and state parks—often lack sidewalks and safe crossings
- Many transit passengers do not have safe or dignified walking access to transit
- IndyGo's effectiveness is largely dependent on pedestrian access since every transit rider is a pedestrian at some point in their journey
- Older adults are likely to meet their daily needs on foot and by transit
- Streets and entire neighborhoods with limited to no walking infrastructure can be intimidating and challenging for older adults to navigate
- Indy needs a program specialist and work plan to address these unique access issues

Actions
- Establish a full-time Safe Routes planner position within the active transportation/public space non-profit corporation (see P3.13) that manages all safe routes services, including Safe Routes to Transit (SRTT), Safe Routes to School (SRTS), Safe Routes to Parks (SRTP), and Safe Routes for Seniors (SRS)
- Reallocate modal funding toward pedestrian programming and projects to focus on transit, park, school, and senior service access improvements and marketing
- Develop multilingual Safe Routes marketing and education materials
- Integrate IndyGo's transit access project list, running these projects through the Pedestrian Plan prioritization framework
- Work with IndyGo to document gaps in existing and future transit access
- Document gaps in access to schools, senior living services, parks, trails, greenways, and other community recreation facilities
- Provide tailored travel training for interested seniors
- Develop an education and promotional campaign and present the campaign at community and senior living centers
- Collaborate with project partners to ensure walking projects reflect the unique needs of older adults
- Identify funding for projects that specifically improve the walking experience for older adults, connecting them to their daily needs

Partners
- Department of Public Works
- IndyGo
- Indianapolis Parks and Recreation Department
- Indianapolis Office of Disability Affairs
- CICOA Aging & In-Home Solutions
- AARP Indiana
- Department of Metropolitan Development
- Health by Design

Traffic Calming Program (over-all Speed Reduction)

Description
Develop a neighborhood traffic calming program

Rationale
- Traffic calming programs for neighborhood streets will manage vehicle speeds and volumes, which is particularly important on streets without sidewalks
- Indy does not have a dedicated traffic calming program

Actions
- Develop an annual work plan for traffic calming projects
- Educate the community on the types, benefits, and tradeoffs of traffic calming projects
- Identify and include traffic calming projects in future pedestrian project lists (prioritized according to the Pedestrian Plan's framework)
- Implement education and outreach campaigns that explain how to use new types of infrastructure (for all modes), helping both motorists and pedestrians to understand traffic control changes

Partners
- Department of Public Works
- Neighborhood liaisons
- Local Initiatives Support Corporation of Indianapolis

Signal Timing

Description
Optimize signal timing, phasing, and hardware tools to separate conflicting pedestrian vehicle movements and reduce exposure

Rationale
- Most pedestrian collisions in Indianapolis are located at signalized intersections and countermeasures are necessary to reduce conflicts and exposure
- City makes limited use of signal treatments that protect pedestrians

Actions
- Build an operational toolkit and establish guidelines for using each tool (toolkit should include split phasing, protected left turn phases, leading pedestrian and bicycle phases, default walk phases at all signalized intersections, flashing yellow permissive left turn phases, and time of day signal adjustments)
- Identify high pedestrian collision intersections to implement special signal treatments
- Adjust walk signal phases to accommodate walking speeds of 2.8-3.0 feet per second from a more traditional 3.5 feet per second in select locations like downtown, villages, transit stops, hospitals, and within a half mile of senior activity and residential centers

Partners
- Department of Public Works

Advanced Stop and Yield Bars

Description
Mark advanced stop and yield bars in front of crosswalks throughout Indianapolis to discourage vehicle encroachment into the crosswalk

Rationale
- Many signalized and stop-controlled intersections do not include the advanced stop and yield bars necessary to provide safe crossings

Actions
- Identify where advanced stop and yield bars are needed throughout the city
- Develop a 10-year striping work plan
- Implement advanced stop and yield bar striping as part of resurfacing and other street paving projects

Partners
- Department of Public Works

ADA Transition Plan

Description
Coordinate the City of Indianapolis' ADA transition plan/ investment strategy with the Pedestrian Plan prioritization process

Rationale
- The city lacks transparent direction on ADA retrofit priorities

Actions
- Identify and update the city's ADA Transition Plan
- Conduct detailed right-of-way accessibility assessments as necessary
- Include all ADA-compliance projects into the Pedestrian Plan project list

Partners
- Department of Public Works
- Department of Metropolitan Development
- Office of Disability Affairs

Cost Effective Materials

Description
Explore and evaluate new materials and pavement treatments that can provide options for faster and more cost effective interim installation of pedestrian projects

Rationale
- Low-cost treatments can extend the city's limited funding for pedestrian projects

Actions
- Test sidewalk and paint materials to balance cost and long-term durability
- Identify potential projects from the high priority area project list that could use lower cost and interim materials

Partners
- Department of Public Works

7 EVALUATION

EVALUATION

To reach the goals for crash reductions set forth in this PSAP, the City of Indianapolis, IMPD, MCPHD, and Health by Design will need to continue their partnership to accomplish the recommended countermeasures. In addition to the specific measures listed below, a combination of quantitative and qualitative data will be gathered to assess and monitor the outputs and impact of interventions related to engineering, education, community engagement, and enforcement.

To effectively evaluate the Pedestrian Safety Action Plan, the set overall and targeted goals will need to be tracked on a yearly basis as new ARIES data is released.

Overall Goals:

- **REDUCE THE NUMBER OF PEDESTRIAN CRASHES BY 2% EACH YEAR FOR THE NEXT 5 YEARS**
- **FATALITIES WILL NOT EXCEED 5% OF TOTAL CRASHES**

Targeted Goals:

- **REDUCE COLLISIONS AT INTERSECTIONS BY 5%**
- **REDUCE COLLISIONS AT MIDBLOCK CROSSINGS BY 5%**
- **REDUCE NIGHTTIME COLLISIONS BY 5%**
- **REDUCE HIT AND RUN CRASHES BY 3 %**
- **REDUCE YOUTH CRASHES BY 10%**
- **REDUCE LEFT TURN CRASHES BY 5%**

MEASURE	BASELINE	DATA YEAR	DATA SOURCE
OVERALL GOALS			
Reduce the number of pedestrian crashes by 2% each year for the next 5 years	260	2016	ARIES
Fatalities will not exceed 5% of total crashes	6%	2016	ARIES
TARGETED GOALS			
Reduce collisions at intersections by 5%	91	2016	ARIES
Reduce collisions at midblock crossings by 5%	81	2016	ARIES
Reduce nighttime collisions by 5%	49%	2010-2016	ARIES
Reduce hit and run crashes by 3%	20%	2010-2016	ARIES
Reduce youth crashes by 10%	25%	2010-2016	ARIES
Reduce left turn crashes by 5%	18%	2010-2016	ARIES

8 NEXT STEPS

This plan provides strategies to support the City of Indianapolis, MCPHD, Health by Design partners, and pedestrian advocates to create safer walking environments for all Indianapolis residents and visitors. The work outlined in this plan will be implemented through the ongoing meetings of Pedestrian Plan Advisory and Complete Streets Advisory Groups.

Through the recommended countermeasure applications, policy and design goals, and strategies to reduce crashes outlined in this plan, Indianapolis has the tools it needs to make walking safe for all.

APPENDICES

APPENDIX A

COMPLETE LIST OF COUNTERMEASURES

Along the Roadway

Countermeasures include:

- Sidewalks, Walkways and Paved Shoulders
- Street Furniture/Walking Environment

At Crossing Locations

Countermeasures include:

- Curb Ramps
- Marked Crosswalks and Enhancements
- Curb Extensions
- Crossing Islands
- Raised Pedestrian Crossings
- Lighting and Illumination
- Parking Restrictions (at Crossing Locations)
- Pedestrian Overpasses/Underpasses
- Automated Pedestrian Detection
- Leading Pedestrian Interval
- Advance Yield/Stop Lines

Transit

Countermeasures include:

- Transit Stop Improvements
- Access to Transit
- Bus Bulb Outs

Roadway Design

Countermeasures include:

- Bicycle Lanes
- Lane Narrowing
- Lane Reduction (Road Diet)
- Driveway Improvements
- Raised Medians
- One-way/Two-way Street Conversions
- Improved Right-Turn Slip-Lane Design

Intersection Design

Countermeasures include:

- Roundabouts
- Modified T-Intersections
- Intersection Median Barriers
- Curb Radius Reduction
- Modify Skewed Intersections
- Pedestrian Accommodations at Complex Interchanges

Traffic Calming

Countermeasures include:

- Temporary Installations for Traffic Calming
- Chokers
- Chicanes
- Mini-Circles
- Speed Humps
- Speed Tables
- Gateways
- Landscaping
- Specific Paving Treatments
- Serpentine Design

Traffic Management:

Countermeasures include:

- Diverters
- Full Street Closure
- Partial Street Closure
- Left Turn Prohibitions

Signals and Signs

Countermeasures include:

- Traffic Signals
- Pedestrian Signals
- Pedestrian Signal Timing
- Traffic Signal Enhancements
- Right-Turn-on-Red Restrictions
- Advanced Stop Lines at Traffic Signals
- Left Turn Phasing
- Push Buttons & Signal Timing
- Pedestrian Hybrid Beacon (PHB)
- Rectangular Rapid Flash Beacon (RRFB)
- Puffin Crossing
- Signing

Other Measures

Countermeasures include:

- School Zone Improvement
- Neighborhood Identity
- Speed-Monitoring
- On-Street Parking Enhancements
- Pedestrian/Driver Education
- Police Enforcement
- Automated Enforcement Systems
- Pedestrian Streets/Malls
- Work Zones
- Pedestrian Detours
- Pedestrian Safety at Railroad Crossings
- Shared Streets
- Streetcar Planning and Design

APPENDIX B

COUNTMEASURE OPTIONS PAIRED WITH CRASH TYPES

Crash Type: Multiple Threat
Countermeasure Type: Signals and Signs
- Sign Improvement
- Traffic Signals
- Pedestrian Signals
- Advanced Stop Lines at Traffic Signals
- Pedestrian Hybrid Beacon (PHB)
- Rectangular Rapid Flash Beacon (RRFB)

Crash Type: Multiple Threat
Countermeasure Type: Other
- School Zone Improvement
- Pedestrian/Driver Education
- Police Enforcement

Crash Type: Unique Midblock
Countermeasure Type: At Crossing Locations
- Curb Extensions
- Lighting and Illuminations
- Parking Restrictions (at Crossing Locations)

Crash Type: Unique Midblock
Countermeasure Type: Traffic Calming
- Temporary Installations for Traffic Calming
- Chicanes
- Speed Humps
- Speed Tables
- Gateways

Crash Type: Through Vehicle at Unsignalized Location Countermeasure Type: Signals and Signs
- Sign Improvement
- Traffic Signals
- Pedestrian Signals
- Advanced Stop Lines at Traffic Signals

Crash Type: Bus Related
Countermeasure Type: At Crossing Locations
- Curb Ramps
- Marked Crosswalks and Enhancements
- Curb Extensions
- Raised Pedestrian Crossings
- Lighting and Illuminations
- Pedestrian Crossing Island

Crash Type: Bus Related
Countermeasure Type: Roadway Design
- Bicycle Lane/Shoulder
- Lane Reduction (Road Diet)

Crash Type: Bus Related
Countermeasure Type: Signs and Signals
- Sign Improvement
- Traffic Signals
- Pedestrian Signals
- Traffic Signal Enhancements
- Advanced Stop Lines at Traffic Signals
- Pedestrian Hybrid Beacon (PHB)
- Rectangular Rapid Flash Beacon (RRFB)

Crash Type: Bus Related
Countermeasure Type: Other
- School Zone Improvement
- On-Street Parking Enhancements
- Pedestrian/Driver Education
- Police Enforcement

Crash Type: Turning Vehicle
Countermeasure Type: At Crossing Locations
- Curb Ramps
- Marked Crosswalks and Enhancements
- Curb Extensions
- Raised Pedestrian Crossings
- Lighting and Illuminations
- Pedestrian Overpasses/Underpasses
- Pedestrian Crossing Island

Crash Type: Turning Vehicle
Countermeasure Type: Roadway Design
- Raised Median
- One-Way/Two Way Street Conversions
- Improved Right-Turn Slip-Lane Design

Crash Type: Turning Vehicle
Countermeasure Type: Other
- School Zone Improvement
- On-Street Parking Enhancements
- Pedestrian/Driver Education
- Police Enforcement
- Automated Enforcement Systems

Crash Type: Through Vehicle at Signalized Intersection
Countermeasure Type: At Crossing Locations
- Curb Ramps
- Marked Crosswalks and Enhancements
- Curb Extensions
- Raised Pedestrian Crossings
- Lighting and Illuminations
- Parking Restrictions (at Crossing Locations)
- Pedestrian Overpasses/Underpasses
- Pedestrian Crossing Island

Crash Type: Through Vehicle at Signalized Intersection
Countermeasure Type: Roadway Design
- Raised Median
- One-Way/Two Way Street Conversions
- Improved Right-Turn Slip-Lane Design

Crash Type: Through Vehicle at Signalized Intersection
Countermeasure Type: Intersection
- Roundabouts
- Intersection Median Barriers
- Modify Skewed Intersections
- Pedestrian Accommodations at Complex Interchanges

Crash Type: Through Vehicle at Signalized Intersection
Countermeasure Type: Signs and Signals
- Sign Improvement
- Traffic Signals
- Pedestrian Signals
- Traffic Signal Enhancements
- Pedestrian Signal Timing
- Turn-on-Red Restrictions
- Advanced Stop Lines at Traffic Signals
- Push Buttons & Signal Timing

Crash Type: Through Vehicle at Signalized Intersection
Countermeasure Type: Other
- School Zone Improvement
- Speed Monitoring
- On-Street Parking Enhancements
- Pedestrian/Driver Education
- Police Enforcement
- Automated Enforcement Systems

Crash Type: Walking Along Roadway
Countermeasure Type: Crossing Locations
- Curb Ramps
- Lighting and Illuminations

Crash Type: Walking Along Roadway
Countermeasure Type: Roadway Design
- Bicycle Lane/Shoulder
- Road/Lane Narrowing
- Lane Reduction (Road Diet)
- Driveway Improvements

Crash Type: Walking Along Roadway
Countermeasure Type: Other
- School Zone Improvement
- Neighborhood Identity
- Speed Monitoring
- On-Street Parking Enhancements
- Pedestrian/Driver Education
- Police Enforcement
- Work Zones Pedestrian Detours
- Pedestrian Safety at Railroad Crossings

Crash Type: Working or Playing in Roadway
Countermeasure Type: Crossing Locations
- Curb Ramps
- Lighting and Illuminations

Crash Type: Working or Playing in Roadway
Countermeasure Type: Roadway Design
- Bicycle Lane/Shoulder
- Road/Lane Narrowing
- Lane Reduction (Road Diet)

Crash Type: Working or Playing in Roadway
Countermeasure Type: Traffic Calming
- Temporary Installations for Traffic Calming
- Chicanes
- Speed Humps
- Speed Tables
- Gateways
- Driveway Link/Serpentine Design
- Mini-Circles

Crash Type: Working or Playing in Roadway
Countermeasure Type: Other
- Neighborhood Identity
- Speed Monitoring
- On-Street Parking Enhancements
- Pedestrian/Driver Education
- Police Enforcement
- Pedestrian Streets/Malls
- Automated Enforcement Systems
- Work Zones Pedestrian Detours
- Shared Streets

Crash Type: Non-Roadway
Countermeasure Type: Crossing Locations
- Curb Extensions
- Lighting and Illuminations
- Parking Restrictions (at Crossing Locations)

Crash Type: Non-Roadway
Countermeasure Type: Roadway Design
- Bicycle Lane/Shoulder
- Driveway Improvements

Crash Type: Non-Roadway
Countermeasure Type: Traffic Calming
- Temporary Installations for Traffic Calming
- Landscaping

Crash Type: Crossing and Expressway
Countermeasure Type: Crossing Locations
- Lighting and Illuminations
- Pedestrian Overpasses/Underpasses
- Ped Recs

APPENDIX C

LIST OF NON-ENGINEERING COUNTERMEASURE OPTIONS

NEIGHBORHOOD IDENTITY

Many neighborhoods or business districts want to be recognized for their unique character. This can enhance the walking environment and sense of community.Treatments used to enhance the identity of a neighborhood include: gateways, traffic calming, welcome signs, flower planters, banners, decorative street lighting, and unique street name signs. Neighborhood identity treatments rarely provide any direct traffic improvements, but they help develop interest in enhancing the community and help create attractive and comfortable walking environments.

Creating a sense of place can help solicit investment in a neighborhood and may lead to the provision of better walking amenities.

Purpose

Neighborhoods can establish their identities and foster a stronger sense of community among residents by using a combination of tools, such as gateways and signage. In doing so, residents can enhance the visibility of a neighborhood or district and support community efforts to define their neighborhood.

PEDESTRIAN/DRIVER EDUCATION

Providing education, outreach, and training is a key strategy in increasing pedestrian and motorist awareness and behavior. While efforts most certainly provide information, the primary goal of an educational strategy is to motivate people to alter their behavior and reduce reckless actions. To implement the strategy, an integrated, multidisciplinary approach that links hard policies (e.g., changes in infrastructure) and soft policies (e.g., public relations campaigns) and addresses both pedestrians and drivers has the greatest chance of success.

There are several broad approaches to education that can be conducted with moderate resources. They include:
1) highlighting pedestrian features when introducing new infrastructure;
2) conducting internal campaigns within the organization to build staff support for pedestrian safety programs;
3) incorporating pedestrian safety messages into public relations efforts;
4) developing relationships with sister state agencies and statewide consumer groups; and
5) marketing alternative travel modes.

There are three specific types of educational campaigns – public awareness, targeted campaigns, and individual campaigns. Public awareness campaigns are a great example of a vehicle used to garner public support. An effective campaign can "lay the groundwork" for subsequent pedestrian safety initiatives and can increase the likelihood of their success. Campaigns to target groups are usually aimed at changing behavior patterns in specific groups of people (e.g., motorists, elderly, school children). Since changing behavior in these groups can be a long and arduous task, these campaigns tend to be ongoing efforts aimed at long-term results. Individual campaigns differ from campaigns at target groups because the audience is reached through an intermediary. Intervention occurs at an individual level through safety guards, doctors and other authority figures. Using these different approaches in concert reaches a broader audience and increases the likelihood of long-term success in changing attitudes and behaviors.

For more information on how to provide education, see "The Maryland Pedestrian and Bicycle Safety Education Program Administrator's Guide."9

Purpose

Pedestrians and/or motorists can be misinformed regarding traffic laws, which may lead to risky or reckless behavior. Pedestrian and driver education can provide information to roadway users and help motivate a change in specific behaviors to reduce the risk of pedestrian injuries.

POLICE ENFORCEMENT

Police enforcement is a primary component in preserving pedestrian right-of-way and maintaining a safe environment for all modes of travel. Well-publicized enforcement campaigns are often effective in deterring careless and reckless driving and encouraging drivers to share the roadway with pedestrians and bicyclists when combined with strategically installed traffic control devices and public education programs. Most importantly, by enforcing the traffic code, police forces implant a sense of right and wrong in the general public and lend credibility to traffic safety educational programs and traffic control devices.

Over the years, police departments around the country have consistently enforced traffic laws pertaining to driving under the influence, speeding, and running red lights. They have developed effective and socially accepted methods for measuring this behavior and apprehending offenders. However, enforcement of right-of-way laws has proven more difficult, as police forces have focused attention on more objective violations and/or not provided appropriate training to police officers. Good enforcement requires enforcing traditional traffic laws as well as ensuring equal protection for drivers as well as pedestrians and bicyclists.

There are a number of actions that municipalities can use to implement enforcement campaigns designed to protect pedestrians. These include increased police presence around school zones, residential neighborhoods, and other areas with high pedestrian activity; "pedestrian stings" involving police officers in civilian clothing; and high profile, hard hitting mass media campaigns to sign-post change and help set the public agenda. Some enforcement campaigns require special legislation to provide a legal basis for stricter crosswalk codes or right of way changes while other campaigns operate under existing ordinances

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Purpose

Even though engineering countermeasures are implemented, the failure of motorists and pedestrians to adhere to traffic laws creates an unsafe environment. Police enforcement can increase driver awareness of the need to share the roadway and reduce pedestrian-related traffic crashes.

Considerations

- Campaigns must be sensitive to the needs of different neighborhoods, age/ethnic groups, etc.
- To avoid PR problems, police officers need to be trained properly beforehand.
- Enforcement should be conducted with the help of staff support and awareness of the courts.
- Enforcement operations should be focused on drivers rather than pedestrians.
- Enforcement operations should begin with warnings and flyers before moving on to issuing citations for violations.

AUTOMATED ENFORCEMENT SYSTEMS

Automated enforcement systems are electronic devices that detect traffic violations and document, through photo evidence, the vehicle at fault. The owner of the vehicle is then notified by mail of their infraction. Two of the most common types of automated enforcement systems are: red light cameras, used to prevent the running of red lights, and automated speed enforcement cameras, used to monitor and enforce posted speed limits.

Studies have found that automated enforcement systems substantially reduce the number of injury crashes, although some studies have noted an increase in rear-end collisions at intersections where red light cameras are installed. The use of speed enforcement cameras has also been found to lower the speed of cars and trucks in work zones and school zones.

The use of automated enforcement systems should be accompanied by an extensive public awareness and information campaign, in order to gain public support and dispel common myths about automated enforcement systems. Engineering improvements can also increase the effectiveness of the systems, such as: increasing the size of traffic signal lamps from 8 to 12 inches; adding additional signal heads; having an all-red clearance interval of 1-3 seconds; having advanced warning signs/flashing lights; adjusting the approach speed; adding a green phase extension for cars in the dilemma zone; removing on-street parking and unwarranted traffic signals; having advanced traffic signals; and having the appropriate timing of yellow interval.

Purpose

The number of motorists speeding and/or running red lights endangers pedestrians and limited resources do not allow for continual manual enforcement of problematic intersections and/or roadways. Automated enforcement systems can help reduce the amount of crashes caused by motorists speeding and/or running red lights and aids enforcement officials in efforts to monitor and enforce traffic laws.

Considerations

- Public opinion regarding the use of automated enforcement systems is mixed, so implementation must coincide with a strong educational effort to inform the public about the benefits of the cameras and the intention to improve motorist and pedestrian safety.
- In certain states specific legislation is required to allow the use of automated enforcement systems.
- The implementation of these systems must also be accompanied with engineering improvements to achieve the desired goal of improving pedestrian and driver safety.

PEDESTRIAN STREETS/MALLS

A pedestrian street or mall as discussed in this section is defined as one that essentially prohibits motor vehicle traffic, aside from emergency access and time-limited essential activities such as trash pick-up and service deliveries. This is different from a shared street or space, which allows motor vehicles to travel at low speeds.

Pedestrian streets that eliminate all motor vehicle traffic have been successful in places that are thriving and have high volumes of pedestrians. Examples of successful pedestrian streets include Church Street in Burlington, VT; the Downtown Mall in Charlottesville, VA; Maiden Lane in San Francisco, CA; Occidental Street in Seattle, WA; Third Street Promenade in Santa Monica, CA; and, Fremont Street in Las Vegas, NV.

Purpose

In an otherwise vibrant and thriving pedestrian commercial area, there is a lack of space for pedestrians to interact, shop, eat, and/or travel. Pedestrian malls can create a significant public space in a downtown district, tourist district, or a special events or marketplace area, which can enhance the experience of people and ease mobility.

Considerations

- Pedestrian streets (those that eliminate motor vehicles) that attempt to attract people in areas that are on the decline have usually been unsuccessful.
- The pedestrian environment can often be enhanced through other measures, such as street narrowing, sidewalk widening, the addition of landscaping, etc.

WORK ZONES – PEDESTRIAN DETOURS

Pedestrian detours can be used to protect the safety of pedestrians in work zones, and ensure they are not led into conflicts with work site vehicles or other motorists. All detours should seek to provide a safe, convenient, and accessible path that as closely as possible replicates the existing sidewalk(s) or footpath(s).

When using detours, advanced notification of the closure/detour should be provided, as well as channelizing devices to delineate the temporary route. This allows pedestrians to make timely decisions about routes through or around the work zone using the detour. The detour should be clearly defined, and minimize any additional time and distance the pedestrian must travel. Signs should be placed at intersections, rather than mid-block, to avoid mid-block crossings. All temporary crosswalks should be clearly marked, and have curb ramps. All detour routes must be compliant with the requirements of the Americans with Disabilities Act (ADA) of 1990. Pedestrians must be protected from all potential work site safety issues, using the arrangement of overhead protection, a boardwalk, and/or barrier separation.12 Finally, exit information should be provided to direct the pedestrian back to the original route.

Purpose

Around 15 percent of fatalities resulting from crashes in work zones involve non-motorists (i.e. pedestrians, workers, and bicyclists). There is a need to provide safe and convenient passage to pedestrians in work zones, particularly with respect to the interactions of work-site vehicles and other motorists.

Considerations

- The detour should replicate as nearly as practical the most desirable characteristics of the existing facility.
- Pedestrian access to businesses should be considered, as well as access to residences and transit stops.
- Any detour must be in compliance with ADA requirements
- Temporary lighting may be needed for the pedestrian walkway detours

PEDESTRIAN SAFETY AT RAILROAD CROSSINGS

There are a number of ways pedestrian safety can be improved at railroad crossings by selectively using passive and/or active devices. Passive devices include: fencing; channelization; swing gates; pedestrian barriers; pavement markings and texturing; refuge areas; and fixed message signs; raising the approaches to the track and the area between the tracks to the level of the top of the rail creating flat level areas to cross; designing crossings so that the pedestrian paths of travel intersect the railroad track at a 90 degree angle, minimizing problems with the flangeway gap width through design and/or an approved flangeway filler; and widening the crosswalk when a perpendicular crossing cannot be provided so that pedestrians have room to maneuver and position themselves to cross the tracks at a 90 degree angle. Active devices include flashers; audible active warning devices; automated pedestrian gates; pedestrian signals; variable message signs; and blank-out signs.17,18 The MUTCD requires the use of railroad crossing "crossbuck" signs whenever railroad tracks intersect a public roadway or pathway.

Crossings being considered for safety improvements should be reviewed by a diagnostic team and undergo an engineering study to select the appropriate warning devices for each crossing. Crossing types that may benefit from such review and study include: crossings with a high volume of pedestrian traffic; frequent and/or high speed trains; extremely wide crossings; complex rail crossings; school zones; inadequate sight distance; and/or multiple tracks. All pedestrian railroad crossings should be designed to minimize the time required for pedestrians to cross, with emphasis on avoiding entrapment of pedestrians on or between sets of tracks.

The implementation of these measures should be accompanied by increased education, through Public Service Announcements, added information in a state's Driver's Education Manual, educational initiatives and school presentations, etc. In addition, rail safety laws that prohibit dangerous actions around rail crossings should be enforced. Operation Lifesaver is a program that promotes safety near rail facilities. More information may be found on this program at: http://oli.org/

Purpose

Railroad crossings can present safety issues for pedestrians, particularly those using wheeled devices such as wheelchairs and scooters. They also pose a risk to pedestrians using headphones and/or who are hearing impaired. Nearly every three hours in the United States, a person or vehicle is hit by a train. Public railroad crossings (per the MUTCD) are required to have certain passive devices; active devices should be installed at those crossings where an engineering study has recommended their use.

Considerations

A combination of audible and visual devices should be used to serve the accessibility needs of hearing-impaired and visually-impaired pedestrians.

SHARED STREETS

A shared street is often referred to as a "pedestrian-priority street," or, in residential areas, as a "home zone." It is an integrated space used to better balance the needs of pedestrians, bicyclists, and low-speed motor vehicles. They are usually local-access, narrow streets without curbs and sidewalks, and vehicles are slowed by placing trees, planters, parking areas, and other obstacles in the street. A clear signal is given to designate entrance into the space, either through signage, narrowing of the roadway, and/or different paving materials. Motorists in these areas are encouraged to travel at much slower speeds – approximately 10-15 mi/h. Rather than relying on traffic controls, street users negotiate right of way in a cooperative manner. The streets often lack signs and markings necessary for the operation of conventional streets, with users instead guided by the physical design of the street. The intended result is that the street and any adjacent commercial businesses are more amenable to bicycle and pedestrian use.

While not technically shared streets, there are also ways streets can be utilized and/or engineered to accommodate a greater variety of street space uses. Many cities are now closing streets during different times of the day or week, such as Winthrop Street in Cambridge, MA, which is closed to vehicle traffic between 11 a.m. and 2 a.m. daily. During the times it is open to vehicles, the street operates as a shared street with vehicle traffic speeds limited to 10 mph. Other cities temporarily close roads on the weekend for local Farmer's Markets, and cities such as New Orleans, LA and Memphis, TN close specific streets nightly. Finally, Portland, OR has created Festival Streets in select areas; one-block streets that function for cars and parking but that do not have curbs, light poles, etc. In doing so, the streets can be converted to public use on weekends or for special events.

Purpose

The speed of motorists on low-volume residential streets and/or in commercial areas makes the use of the street by pedestrians uncomfortable and/or unsafe. Shared streets can improve the safety of pedestrians by removing traditional roadway treatments, encouraging integration, and creating a public space which can be used for social and commercial activities. However, not all streets should be shared by all road users. These should be used only in special situations where all users travel at walking speeds, and there are a nearly equal volume of pedestrians, bicyclists, and motorists.

Considerations

- Shared Streets are generally not appropriate where there is a need to provide nonresident motorists with access to services or through travel.
- As a general rule, streets with greater than 100 vehicles per hour during the afternoon peak should not be considered for Shared Street treatment.
- The design needs to keep vehicle speeds very low in order to make the streets safe for children.
- The street design must still meet current Americans with Disability Act (ADA) standards, and consideration must be given to provide access by fire trucks, sanitation vehicles and other service vehicles (school buses and street sweepers), where applicable.