



Stepping Up for Local Road Safety

Actionable Guidance for Safer Streets



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UNH Technology Transfer Center



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HEB Engineers, Inc.

Agenda

- Introduction to Traffic & Road Safety in NH
- Rural Roadway Departures
- Intersections
- Non-Motorized
- Technical Resources & Training
- Funding
- Questions



CRASHES ARE NOT
“ACCIDENTS”

New Hampshire Driving Toward Zero



2022-2026 New Hampshire Strategic Highway Safety Plan

Driving Toward Zero

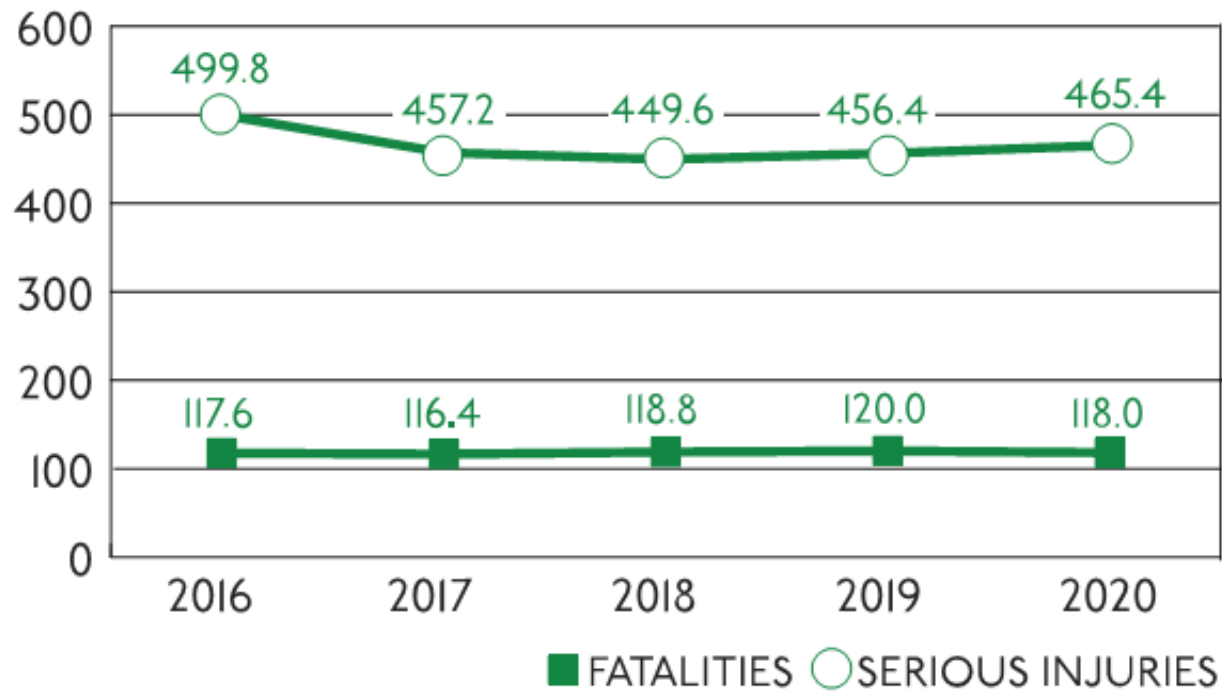
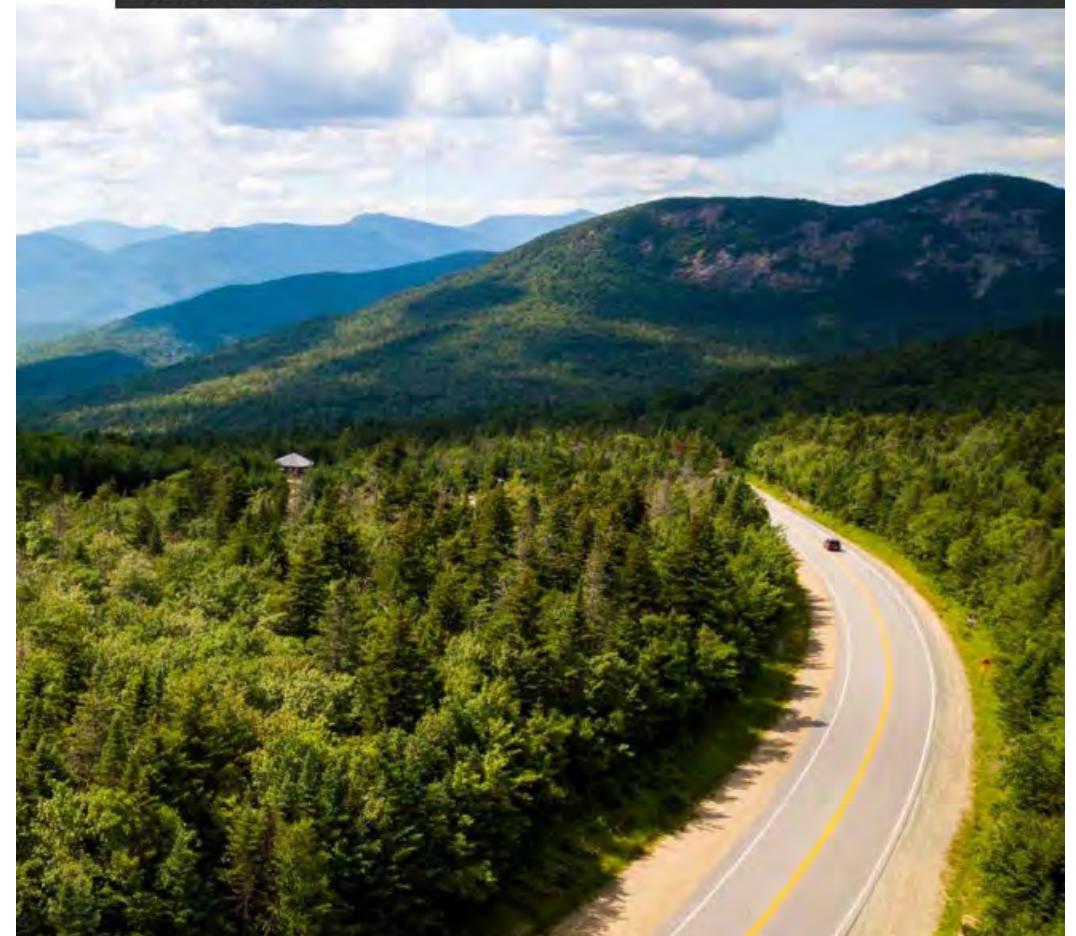


Figure 1. 5-Year Serious Injury & Fatality Trend.



New Hampshire's Goal

Reduce the number of roadway fatalities and serious injuries 50 percent by 2035

2035

2050

Until there are ZERO roadway deaths and serious injuries by 2050.

VISION ZERO

TRADITIONAL APPROACH

Traffic deaths are **INEVITABLE**

PERFECT human behaviour

Prevent **COLLISIONS**

INDIVIDUAL responsibility

Saving lives is **EXPENSIVE**

VS

VISION ZERO

Traffic deaths are **PREVENTABLE**

Integrate **HUMAN FAILING** in approach

Prevent **FATAL AND SEVERE CRASHES**

SYSTEMS approach

Saving lives is **NOT EXPENSIVE**

Began in Sweden 1997 has since gained traction around the globe.



FHWA: “[...] fully supports the vision of zero deaths and serious injuries on the Nation’s roads.”



SAFE SYSTEMS APPROACH

- "Drive Toward Zero" Approach
- Principles Based
- Achieving a Safe System requires all five elements to be strengthened
- Safe Roads is a continuum, not an absolute



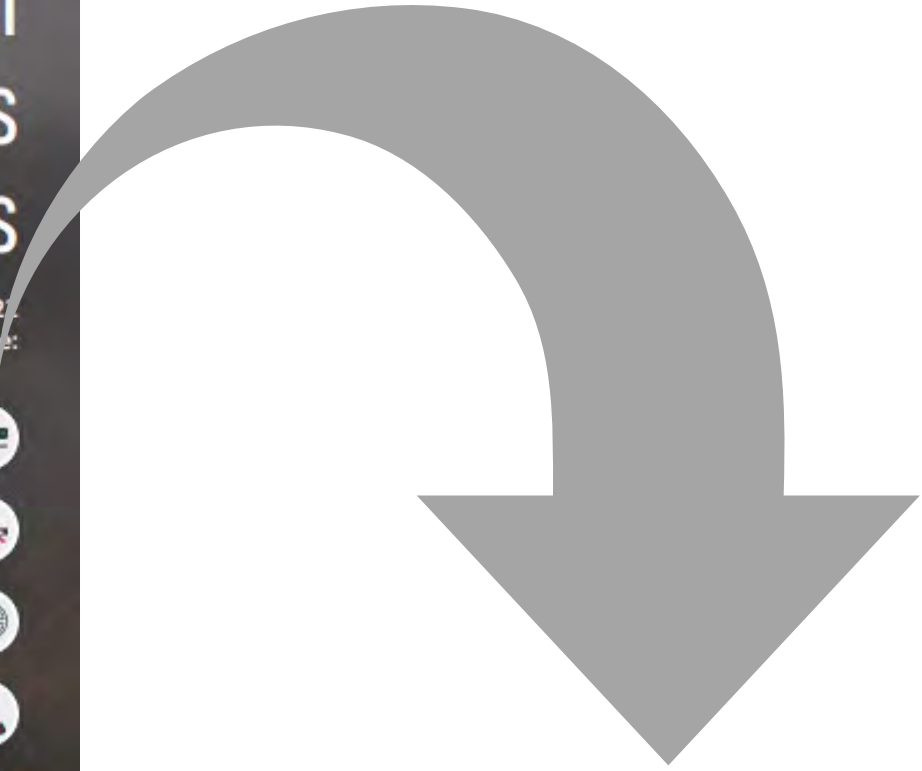
Source: FHWA



Critical Emphasis Areas

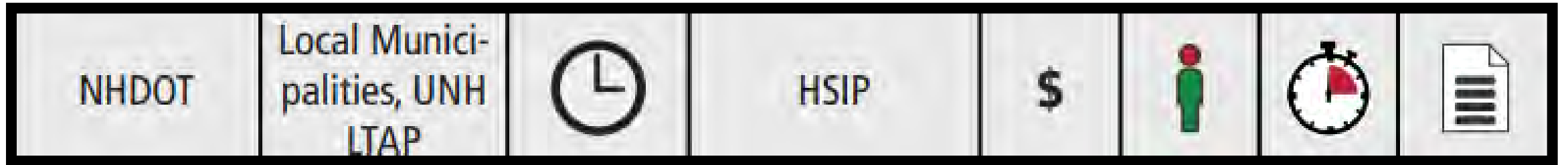
The CEAs in the 2022 New Hampshire SHSP include:

- Intersections 
- Roadway Departure 
- Distracted Driving 
- Impaired Driving 
- Speed and Aggressive Driving 
- Vehicle Occupant Protection 
- Older Drivers 
- Teen Traffic Safety 
- Vulnerable Road Users Motorized: Motorcycles and Mopeds 
- Vulnerable Road Users Non-Motorized: Pedestrians and Bicyclists 



**Roadway Departures
Intersections
Non-Motorized**

SHSP Appendix B – Be a part of the solution



Roadway Departure Action Plan

Strategy and Supporting Action:
Evaluate, standardize, install and maintain delineation, signing and pavement markings on curves

- Low resource needs
- Low cost
- 1-2 staff
- Less than a week

TIERS	Highway Tiers		Centerline Miles
	Roads are grouped by similarities, such as connectivity, regional significance, and operations requirements to help in strategizing resource investments	Statewide	Divided Highway System (Tier 1)
Corridors		Statewide Corridors (Tier 2)	1,431
Regional Corridors and Local Connectors		Regional Corridors (Tier 3)	1,439
		Local Connectors (Tier 4)	891
		Sub-Total State Highway System	4606
Local		Local Roads (Tier 5)	12,052
Total – Public Highway and Roads			16,658

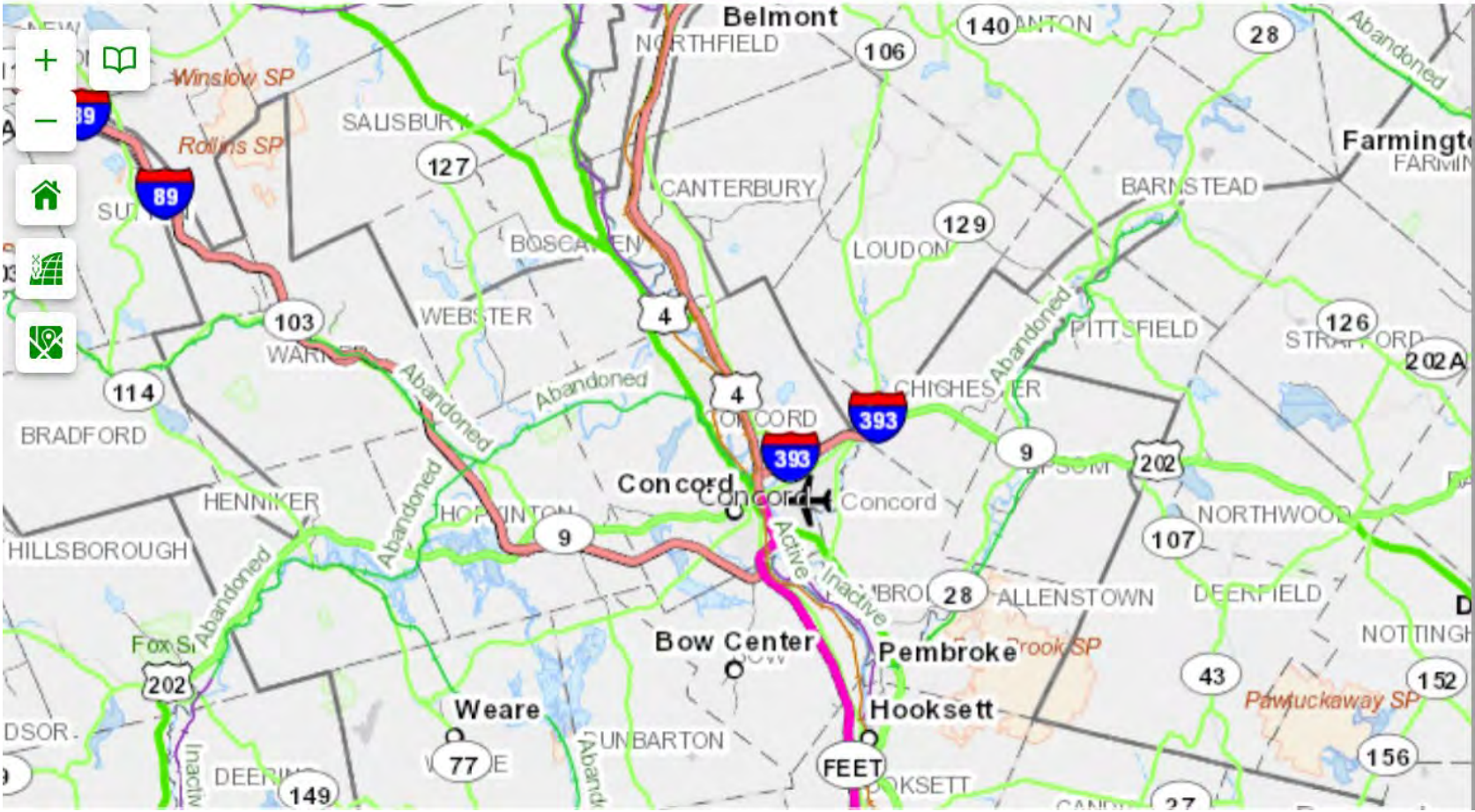
Source: <https://www.nh.gov/dot/org/projectdevelopment/planning/gis-data-catalog/documents/FactsandFigures-2021.pdf>



NH DOT Roads and Projects

[Project Information Center](#)

- Identify
- Drawings
- Pan/Zoom
- Measurements
- Print



- Home
- Layers
- Legend

[NH DOT Roads and Projects "Walk-Thru"](#)
[NH DOT Roads and Projects "Viewer Reference"](#)

Search for a street address:

-
-

Zoom to Region

- Search and Highlight Roads
- Search and Highlight Projects

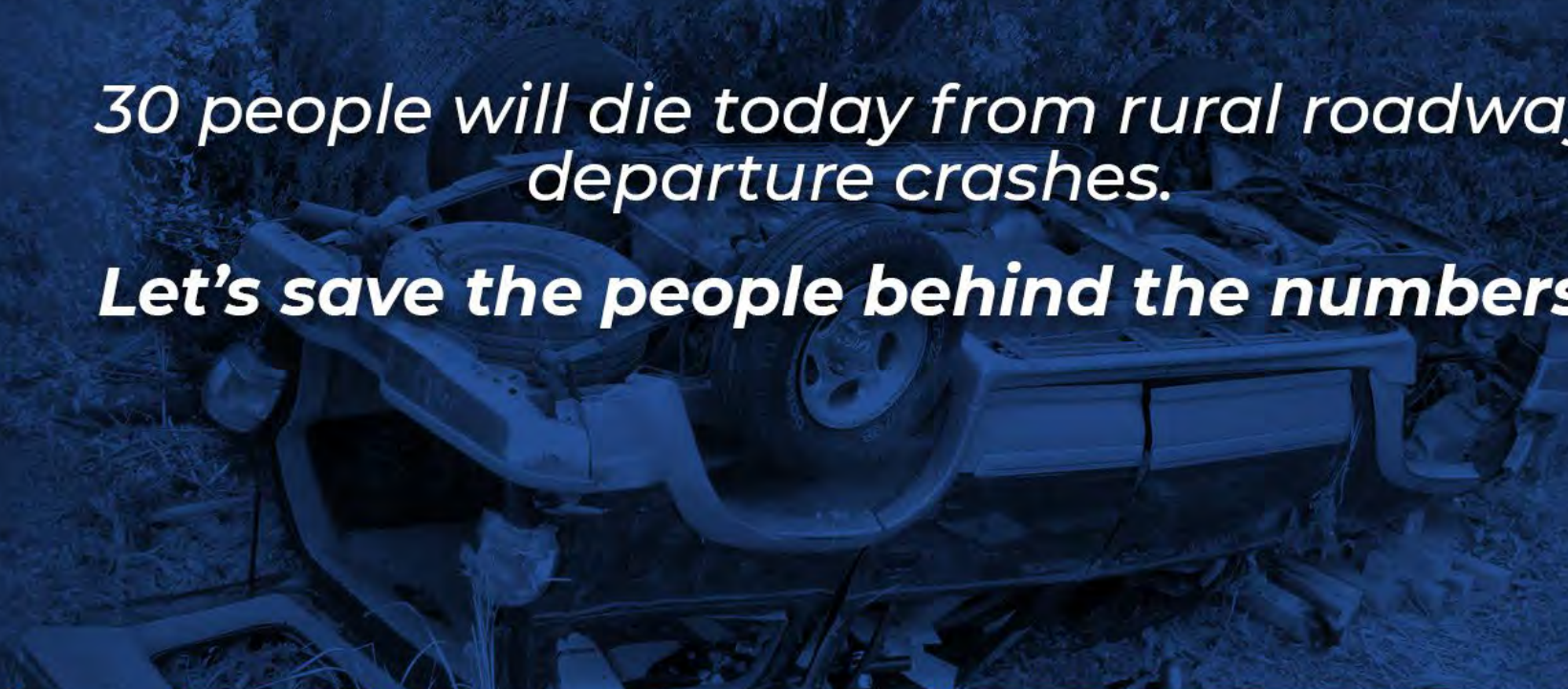
Roadway Departures

Critical Emphasis Area (CEA)



*30 people will die today from rural roadway
departure crashes.*

Let's save the people behind the numbers.



Concord Monitor

Road fatalities continued surge in New Hampshire in 2022 – the year-end numbers

By DAVID BROOKS
Monitor staff

Published: 2/18/2023 10:00:05 AM

More motorcyclists died on New Hampshire roads in 2022 than in any year in recent memory as overall fatal traffic accidents rose sharply, but the state bucked national trends by seeing no rise in pedestrian and bicyclist deaths.

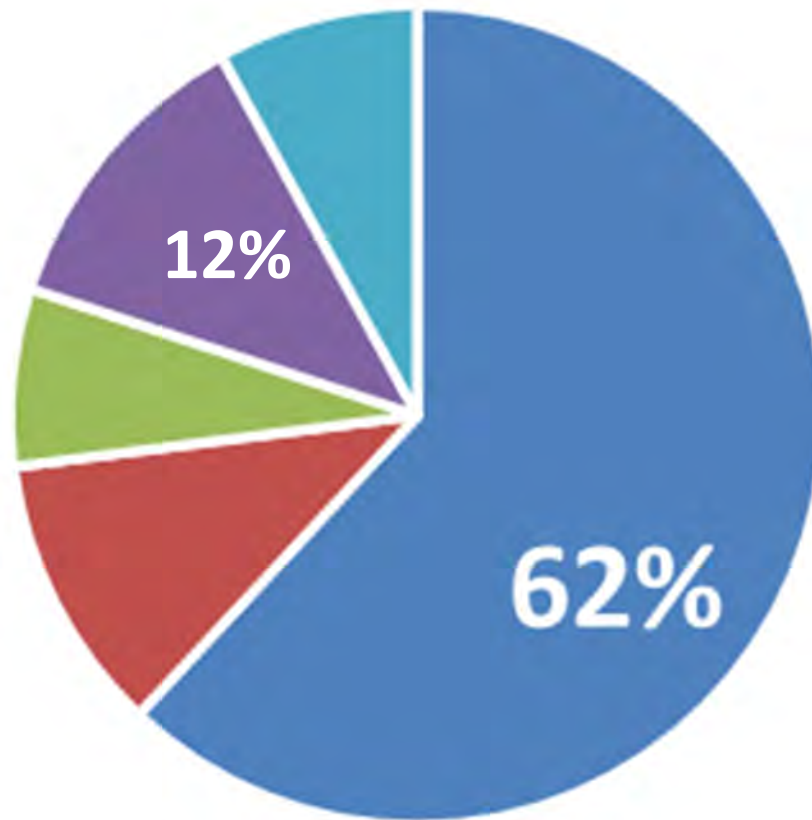
According to the New Hampshire Department of Safety, 31 operators and one passenger died in motorcycle crashes last year. That's the highest number of deaths dating back to 2012, when the state's current tallying system began.

Fatalities from all New Hampshire highway crashes rose 20% last year to 141, resulting from 132 different fatal crashes. Both those figures are almost the highest on record; only 2018, which saw 134 people die in New Hampshire crashes, was worse.

<https://www.concordmonitor.com/road-pedestrian-fatalities-2022-new-hampshire-49884048>

What percent of NH's
roadway fatalities involve a
roadway departure?

Poll



■ Roadway Departure Only

■ Intersection Only

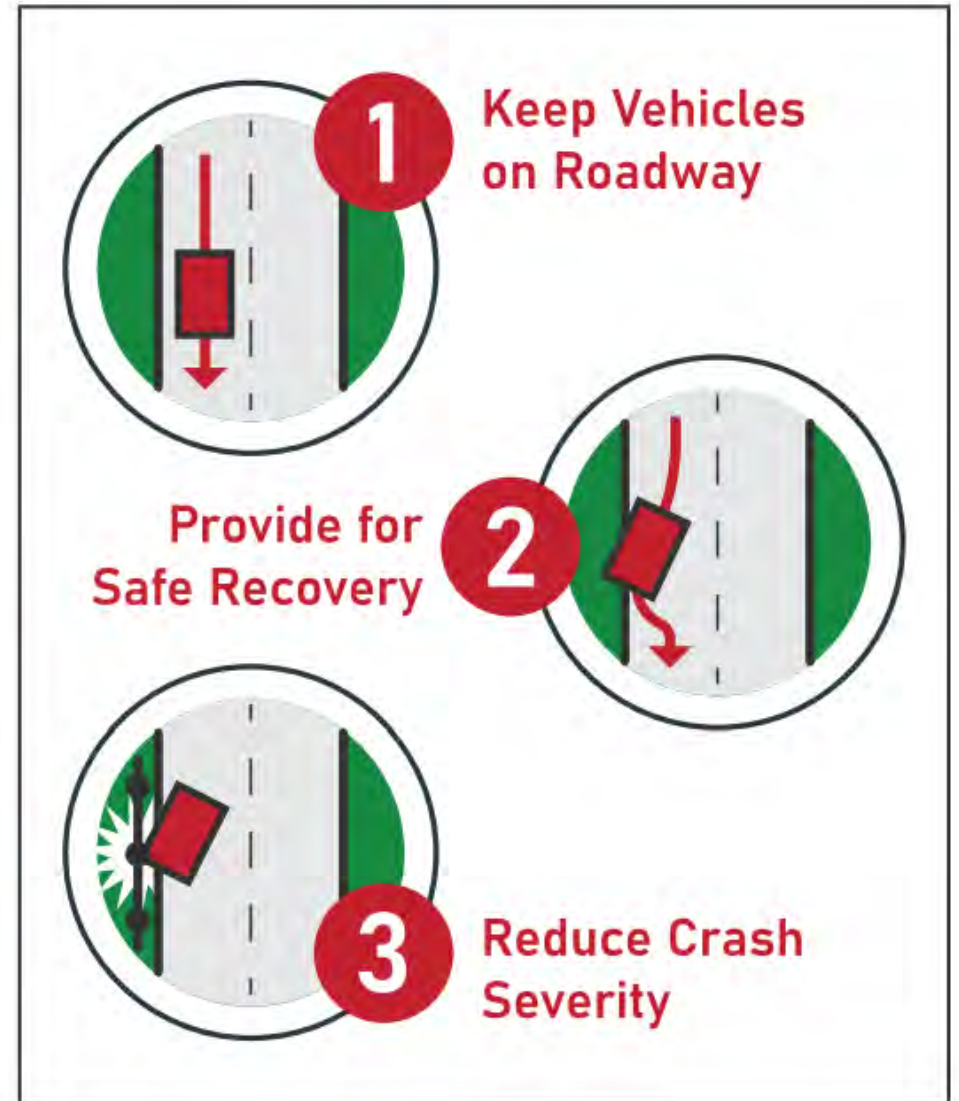
■ Pedestrian/Bicycle Only

■ Multiple Focus Areas

■ Crashes not involving a Focus Area

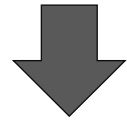
Think about the safety issues
that can occur in rural areas...

70% of NH's roadway fatalities involve roadway departure



The strategy – and the *proven* safety countermeasures

1st - Keep vehicles on the road



2nd - Reduce the potential for crashes



3rd - Minimize the severity

- **Curve Signing**
- Delineators or Barriers
- Pavement Markings
- Friction Treatments
- Rumbles

- **Shoulders**
- SafetyEdge_{SM}
- Center Line Buffer
- **Clear Zone**
- **Traversable Slopes**

- Breakaway Devices
- Barriers



Rural Roadway Departure Countermeasure Pocket Guide

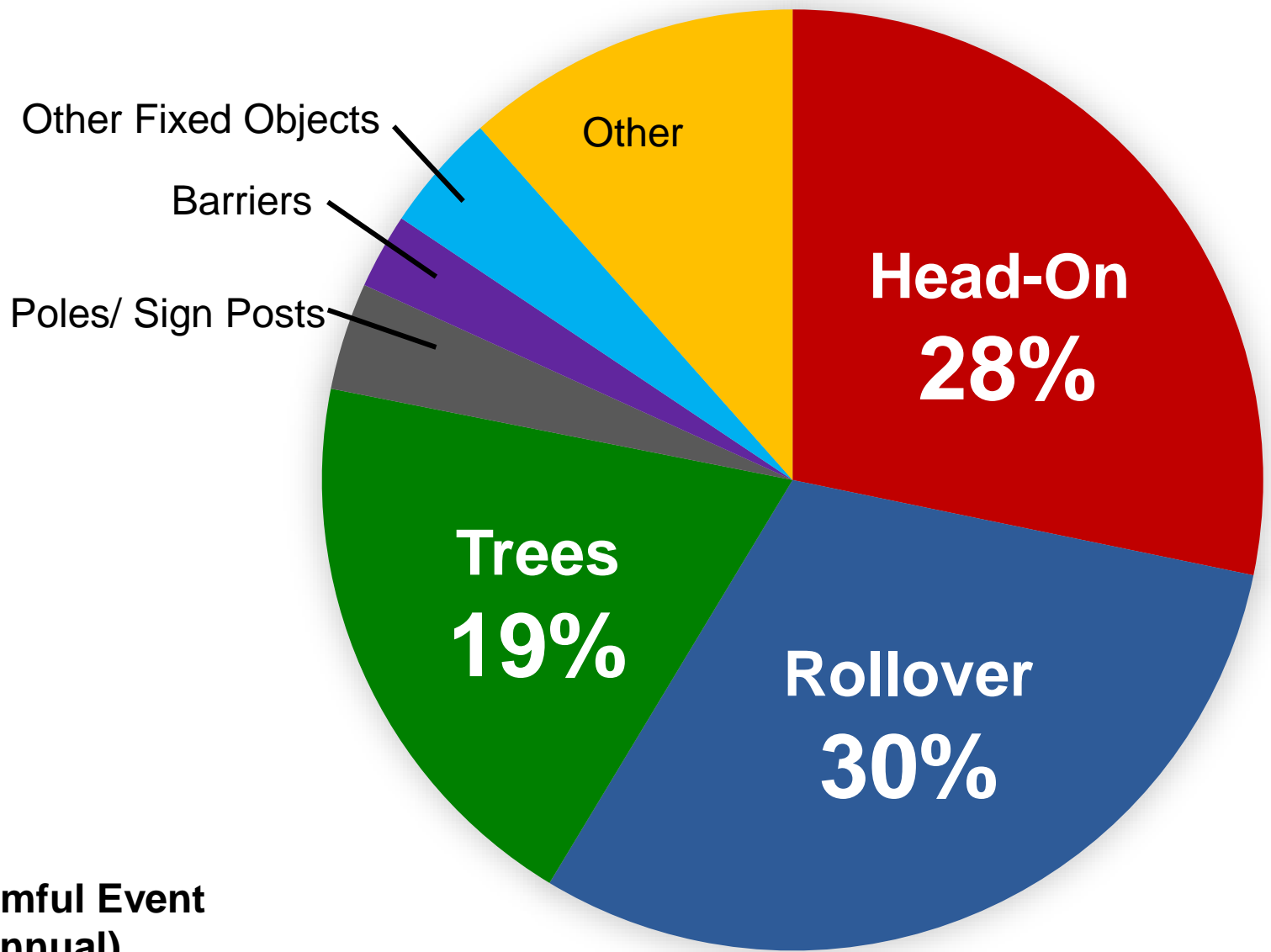


U.S. Department of Transportation
Federal Highway Administration



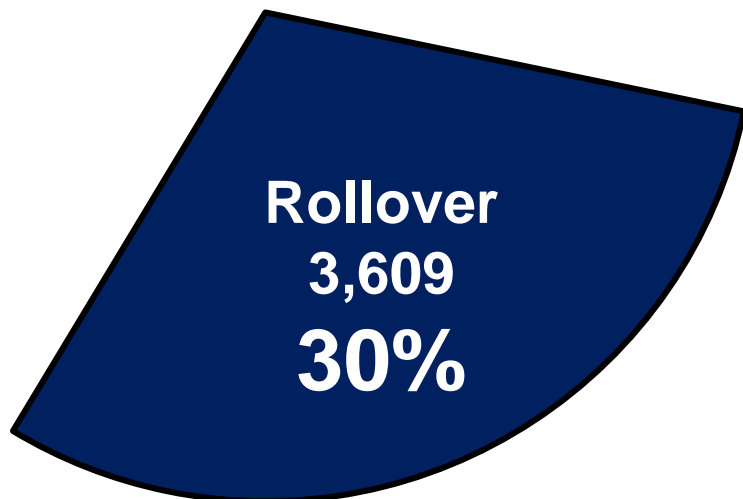
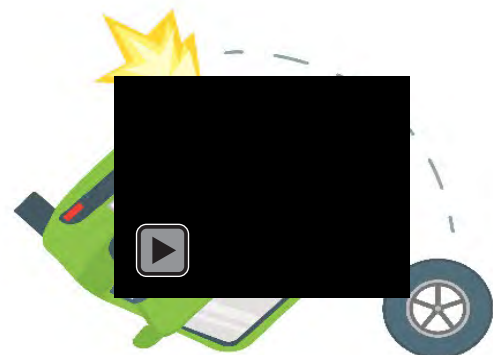
Want a copy? Marilee.Enus@unh.edu
<https://safety.fhwa.dot.gov/FoRRRwD/RwDPocketGuide.pdf>

Over 75% of Rural Roadway Departure deaths are due to 3 crash types



Rural Rwd Fatalities by Most Harmful Event (FARS 2014-2016 - average annual)

Rollover Crashes



Rural Rwd ROLLOVER Fatalities (FARS 2014-2016)

≥ 55 MPH, 78%

Curves, 44%

Collector & Local Road, 49%

2-way undivided, 76%

2 lane roadway, 93%

Slope Flattening

- Traversable and Recoverable
- Traversable but Non-Recoverable
- Avoid “barn roof” design

Source: [Low-Cost Treatments for Horizontal Curve Safety 2016 - Safety | Federal Highway Administration \(dot.gov\)](#)

Potential strategies that can be implemented in advance of or within curves, in combination, or individually.

Potential Strategies	In advance of curve	Within curve
Pavement markings (standard width or wider)	X	X
In-lane curve warning pavement markings	X	
Retroreflective strips on sign posts	X	X
Delineators		X
Chevron signs		X
Enhanced Conspicuity (larger, fluorescent, and/or retroreflective signs)	X	X
Dynamic curve warning signs (including speed radar feedback signs)	X	
Sequential dynamic chevrons		X





Rumble Strips: The Sweet Sound of Safety



Watch later

Share

Rumble Strips

Reduce Severe
Lane-Departure Crashes
up to

50%

MORE VIDEOS

Source: NCHRP Report 641



0:31 / 1:12



YouTube



Tree Crashes



Trees
2,312
19%

Rural Rwd TREE Fatalities

(FARS 2014-2016)

≥50 mph, 63%

35-45 mph, 31%

Curves, 50%

Collector & Local Road, 62%



Clear Zones

Area alongside the road that is free from fixed objects or dangerous slopes

Treatment of Clear Zone Hazards

1. Is the potential hazard dangerous?
2. Can you remove it?
3. Can you relocate it?
4. Can you reduce the severity if the hazard is hit?
5. No on above? Will guardrail improve safety?
6. Would delineation guide drivers around the hazard?

Work Zones

In chat pod- why are roadway departures prevalent in work zones?

Intersections

Critical Emphasis Area (CEA)

CRITICAL EMPHASIS AREA: INTERSECTIONS

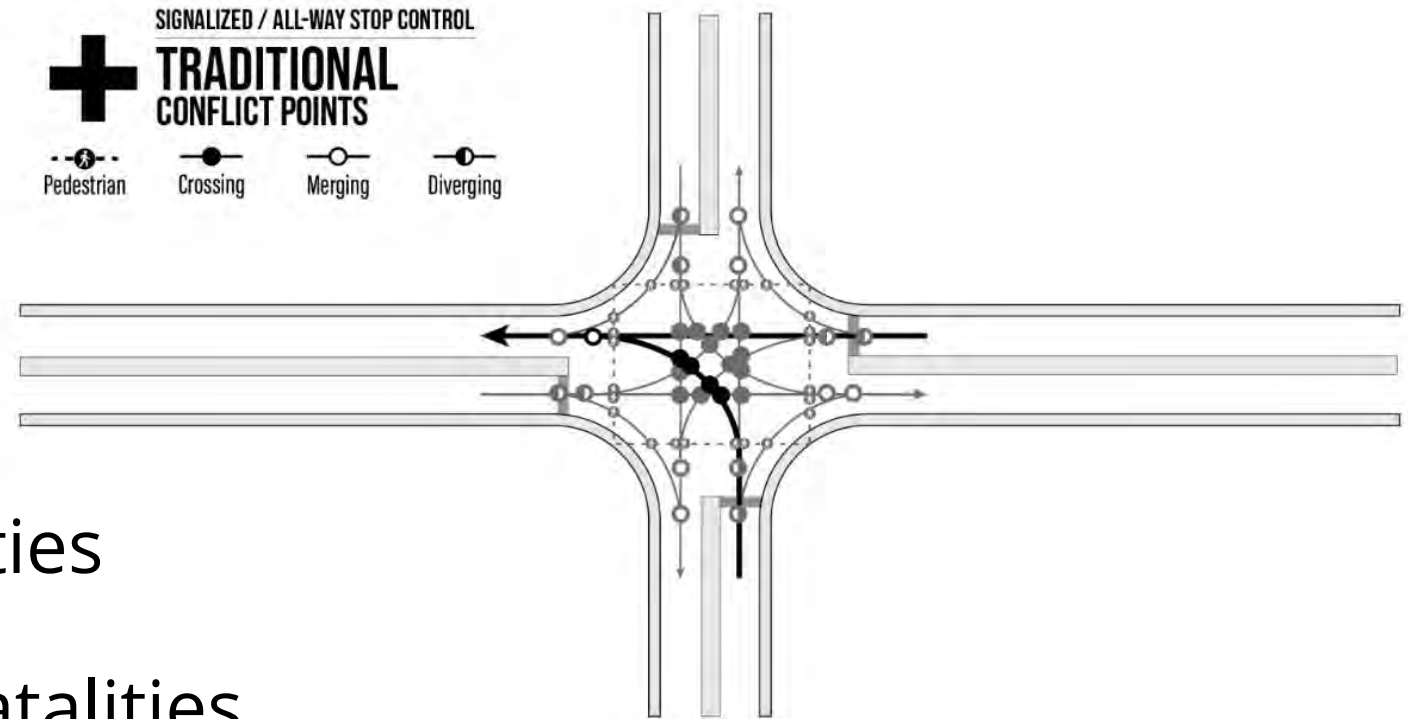


Intersections 5-Year Fatalities and Serious Injury Graph



INTERSECTION CRASHES

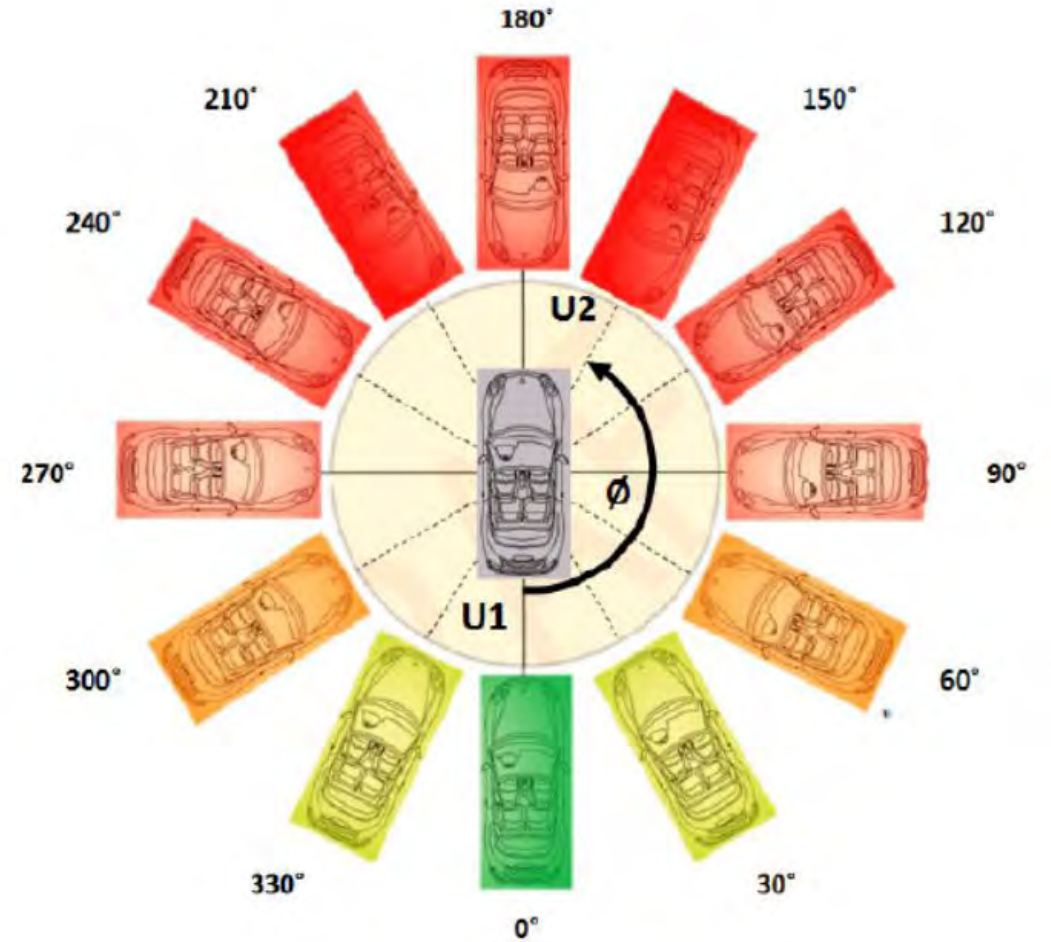
- Conflict Points
- Crash Angle
- Speed Differential
- 55% of NH bicycle fatalities
- 20% of NH pedestrian fatalities



Source: FHWA

INTERSECTION CRASHES

- Conflict Points
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- 55% of NH bicycle fatalities
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© Austroads 2017

INTERSECTION CRASHES - VISIBILITY

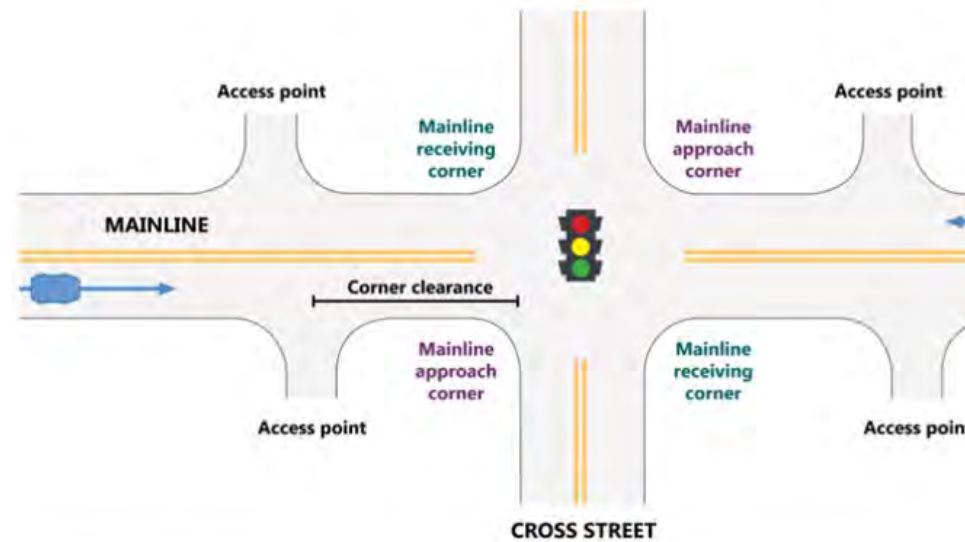
- Clear Sight Lines
 - Vegetation
 - Obstructions
- Signage
- Pavement Markings
- Illumination



Source: FHWA.

INTERSECTION CRASHES – ACCESS MANAGEMENT

- Reduce Curb Cuts
 - Eliminate Conflict Points
 - Combine Driveways
- Corner Clearance
- NHDOT Driveway Permit



Schematic of an intersection and adjacent access points. Source: FHWA



Safety Benefits:

Reducing driveway density

5-23%

reduction in total crashes along 2-lane rural roads.³

25-31%

reduction in fatal and injury crashes along urban/suburban arterials.⁴

https://safety.fhwa.dot.gov/provencountermeasures/corridor_access_mgmt.cfm

<https://www.nh.gov/dot/org/operations/highwaymaintenance/documents/drivewaypolicy.pdf>

MODERN ROUNDABOUT VS. OLD ROTARY

Smaller Circle = Slower Speeds

Rotary conversion to Roundabout
Kingston, NY



Difference in Size Between Roundabouts vs. Traffic Circles.

Roundabouts in NH		Traffic Circles in NH	
Location	Diameter (feet)	Location	Diameter (feet)
Pembroke	110	Lee Circle	250
Nashua	120	Massabesic Circle	260
Nashua	130	Epsom Circle	300
Plymouth	110	Portsmouth Circle	500
Meredith	130	Plymouth Circle	300' per side
Rye	104		
Conway	124		

Photo: New York State DOT

Source: NH DOT Roundabout Information
North-South Road Roundabouts ~124 feet

MODERN ROUNDABOUT VS. OLD ROTARY

Smaller Circle = Slower Speeds

Rotary conversion to Roundabout
Kingston, NY



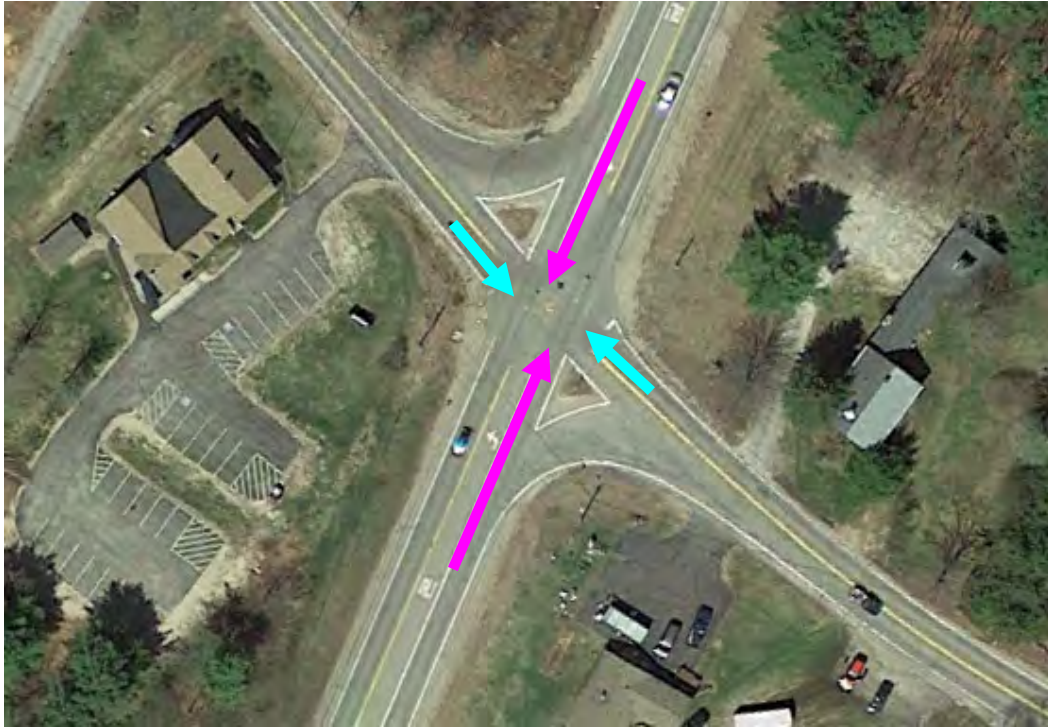
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Rye	104		
Conway	124		

Photo: New York State DOT

Source: NH DOT Roundabout Information
North-South Road Roundabouts ~124 feet

WHY ARE ROUNDABOUTS SAFER? SLOWER SPEEDS!



NH Routes 28/171 at Courthouse Square
Ossipee, NH



Photo: New Hampshire DOT
Designer: GM2

HOW MUCH SAFER ARE MODERN ROUNDABOUTS?

35% Reduction in all crashes
76% Reduction in injuries
90%+ Reduction in fatalities



Modern Roundabouts are essential to reducing injuries and fatalities

Sources:

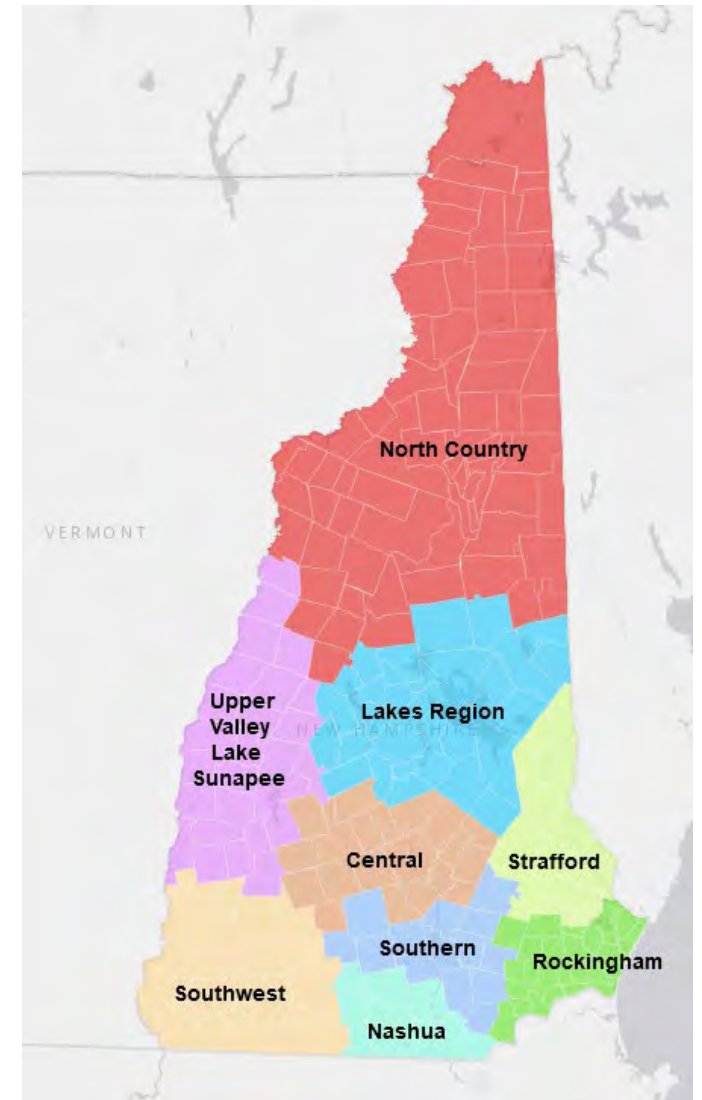
Safety Effect of Roundabout Conversions in the United States (TRB 2001)

NCHRP Report 572 Roundabouts in the United States (TRB 2007)

NHDOT Roundabout Page - Keene, NH

Resource: Road Safety Audits

- NHDOT new semi-annual deadlines
 - 6/1 and 12/31
- Apply for specific problem to be addressed
 - Traffic Control
 - Sight Distance
 - Pedestrians
- Documented crash history
 - At least 1 fatal or serious injury in past 10 years



<https://www.nh.gov/dot/org/projectdevelopment/highwaydesign/hwysafetyimprovements/index.htm>

Vulnerable Users Non-Motorized

Critical Emphasis Area (CEA)

NON-MOTORIZED

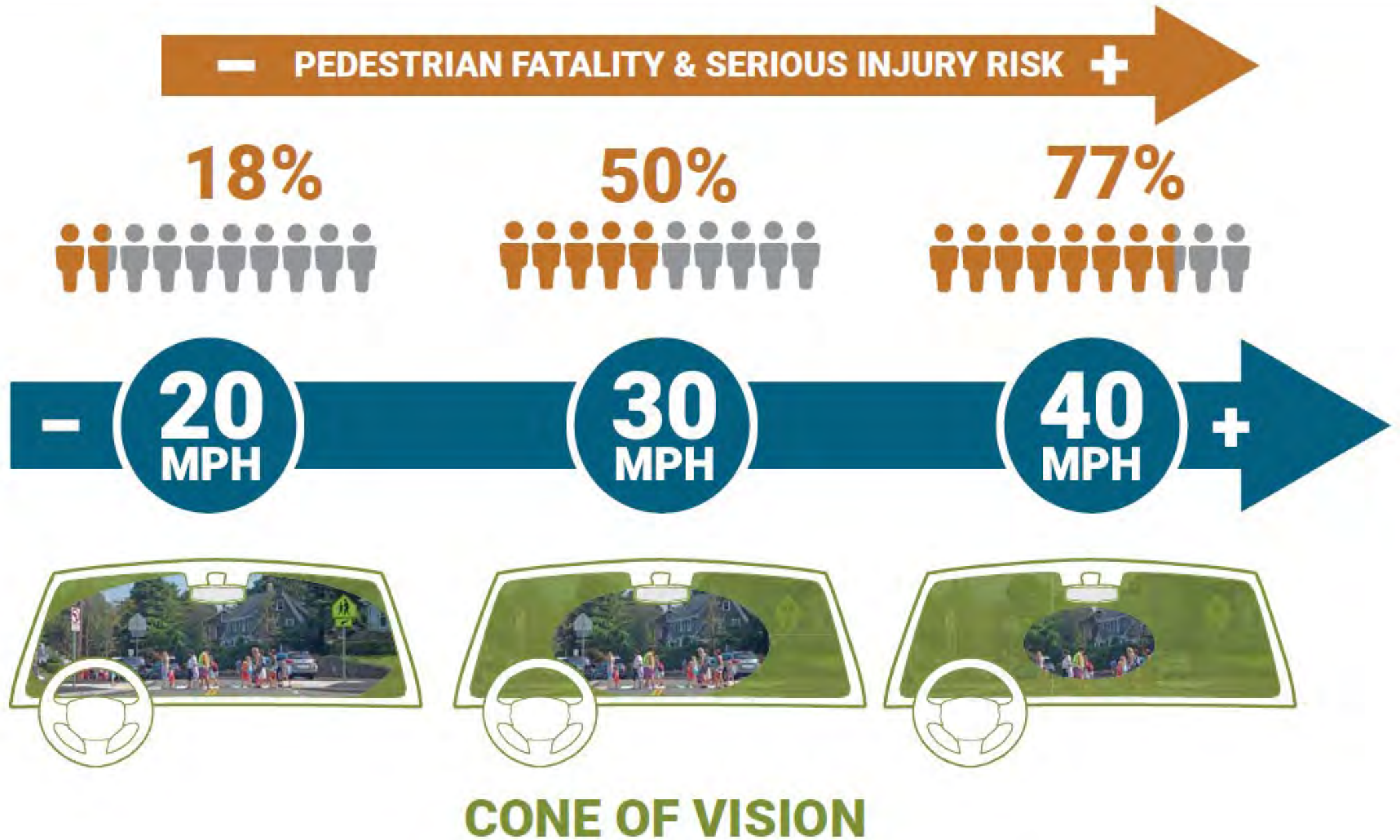


Pedestrians 5-Year Fatalities and Serious Injury Graph



Bicyclists 5-Year Fatalities and Serious Injury Graph





Source: FHWA, *Achieving Multimodal Networks* <https://rosap.ntl.bts.gov/view/dot/51731>, August 2016

STEP STUDIO

Tools for selecting and implementing countermeasures
for improving pedestrian crossing safety




U.S. Department of Transportation
Federal Highway Administration





U.S. Department of Transportation
Federal Highway Administration



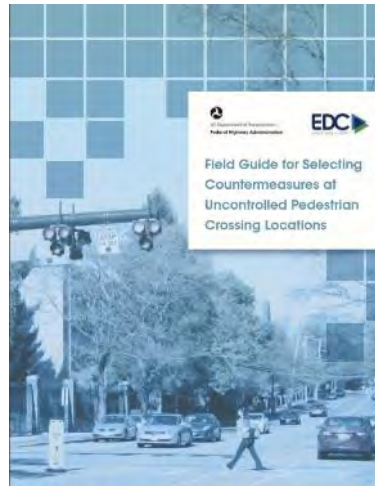
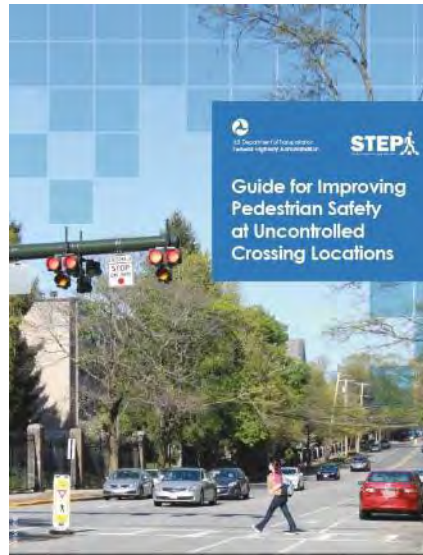
Field Guide for Selecting Countermeasures at Uncontrolled Pedestrian Crossing Locations

https://safety.fhwa.dot.gov/ped_bike/step/resources/docs/fhwasa18018.pdf

Spectacular Seven

-  Crosswalk Visibility Enhancements
-  Raised Crosswalks
-  Pedestrian Refuge Island
-  Rectangular Rapid Flashing Beacon (RRFB)
-  Pedestrian Hybrid Beacon (PHB)
-  Road Diets
-  Leading Pedestrian Interval (LPI)

STEP Guides and Tech Sheets



Crosswalk Visibility Enhancements

SAFE TRANSPORTATION FOR EVERY PEDESTRIAN
COUNTYWEAVERS TECH SHEET

Key lighting conditions: Poor lighting conditions, poor maintenance of streetlights, and poor maintenance of crosswalks can reduce visibility of crosswalks, especially at night.

Countermeasures: High-visibility crosswalk markings, reflective crosswalk markings, and reflective crosswalk signs.

Benefits: Crosswalk visibility enhanced by 22-48%.

Features: High-visibility markings, reflective crosswalk markings, and reflective crosswalk signs.

Other Used Items: High-visibility crosswalk markings, reflective crosswalk markings, and reflective crosswalk signs.

Raised Crosswalk

SAFE TRANSPORTATION FOR EVERY PEDESTRIAN
COUNTYWEAVERS TECH SHEET

Level crosswalks: Level crosswalks are more difficult to see than raised crosswalks, especially at night.

Countermeasures: Raised crosswalks, reflective crosswalk markings, and reflective crosswalk signs.

Benefits: Raised crosswalks can reduce pedestrian crashes by 45%.

Features: Raised crosswalks, reflective crosswalk markings, and reflective crosswalk signs.

Other Used Items: Raised crosswalks, reflective crosswalk markings, and reflective crosswalk signs.

Pedestrian Refuge Island

SAFE TRANSPORTATION FOR EVERY PEDESTRIAN
COUNTYWEAVERS TECH SHEET

Countermeasures: Pedestrian refuge islands, reflective crosswalk markings, and reflective crosswalk signs.

Benefits: Pedestrian refuge islands can reduce pedestrian crashes by 32%.

Features: Pedestrian refuge islands, reflective crosswalk markings, and reflective crosswalk signs.

Other Used Items: Pedestrian refuge islands, reflective crosswalk markings, and reflective crosswalk signs.

Rectangular Rapid-Flashing Beacon (RRFB)

SAFE TRANSPORTATION FOR EVERY PEDESTRIAN
COUNTYWEAVERS TECH SHEET

High speeds and high traffic volume: High speeds and high traffic volume can reduce visibility of crosswalks, especially at night.

Countermeasures: Rectangular rapid-flashing beacons, reflective crosswalk markings, and reflective crosswalk signs.

Benefits: RRFBs can reduce pedestrian crashes by 47%.

Features: Rectangular rapid-flashing beacons, reflective crosswalk markings, and reflective crosswalk signs.

Other Used Items: Rectangular rapid-flashing beacons, reflective crosswalk markings, and reflective crosswalk signs.

Road Diet

SAFE TRANSPORTATION FOR EVERY PEDESTRIAN
COUNTYWEAVERS TECH SHEET

Multiple lanes: Multiple lanes can reduce visibility of crosswalks, especially at night.

Countermeasures: Road diets, reflective crosswalk markings, and reflective crosswalk signs.

Benefits: Road diets can reduce pedestrian crashes by 19-47%.

Features: Road diets, reflective crosswalk markings, and reflective crosswalk signs.

Other Used Items: Road diets, reflective crosswalk markings, and reflective crosswalk signs.

Pedestrian Hybrid Beacons (PHBs)

SAFE TRANSPORTATION FOR EVERY PEDESTRIAN
COUNTYWEAVERS TECH SHEET

High speeds and high traffic volume: High speeds and high traffic volume can reduce visibility of crosswalks, especially at night.

Countermeasures: Pedestrian hybrid beacons, reflective crosswalk markings, and reflective crosswalk signs.

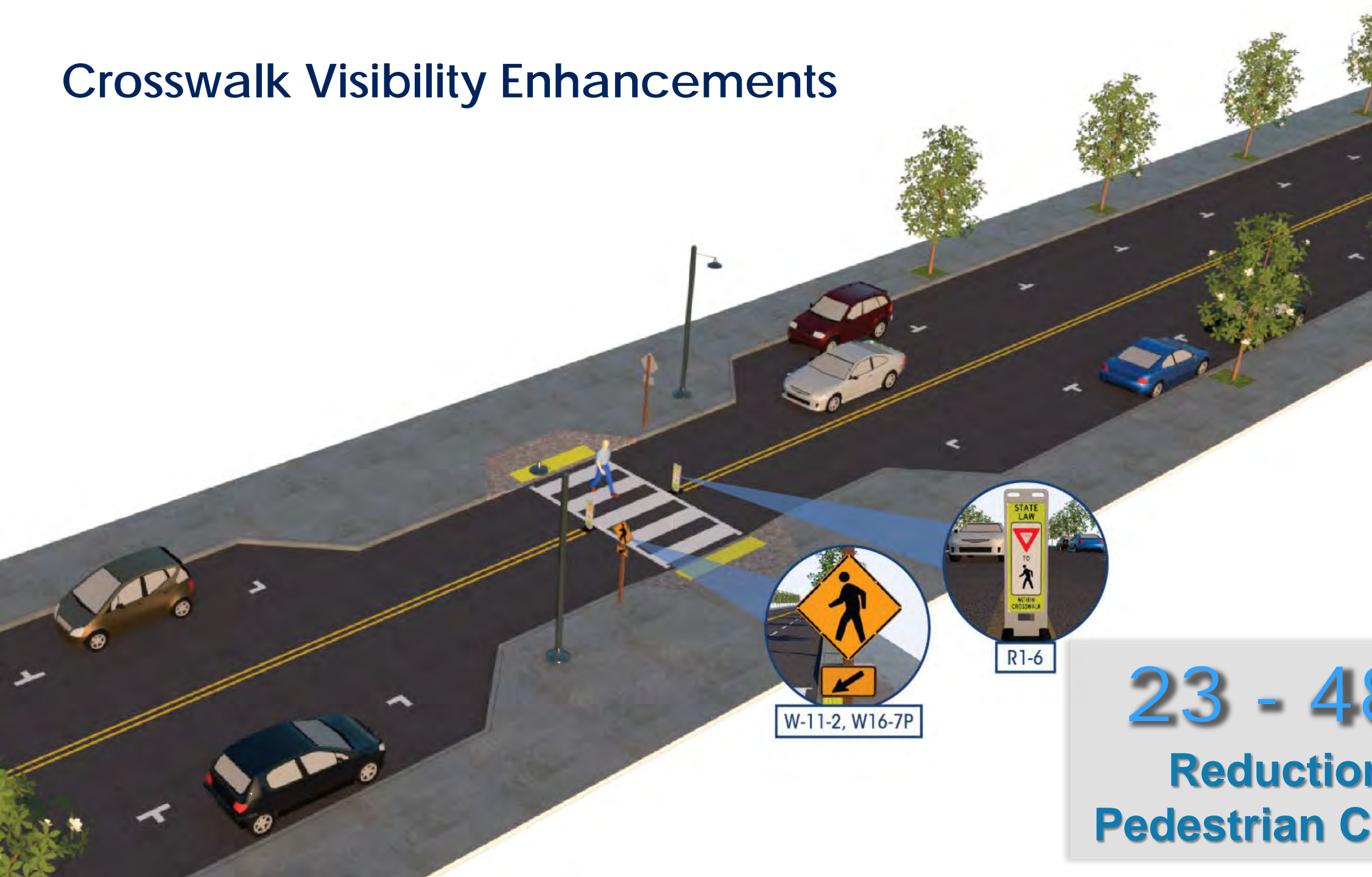
Benefits: PHBs can reduce pedestrian crashes by 55%.

Features: Pedestrian hybrid beacons, reflective crosswalk markings, and reflective crosswalk signs.

Other Used Items: Pedestrian hybrid beacons, reflective crosswalk markings, and reflective crosswalk signs.

https://safety.fhwa.dot.gov/ped_bike/step/resources/

Crosswalk Visibility Enhancements



W-11-2, W16-7P

R1-6

23 - 48%
Reduction in
Pedestrian Crashes

Raised Crosswalks

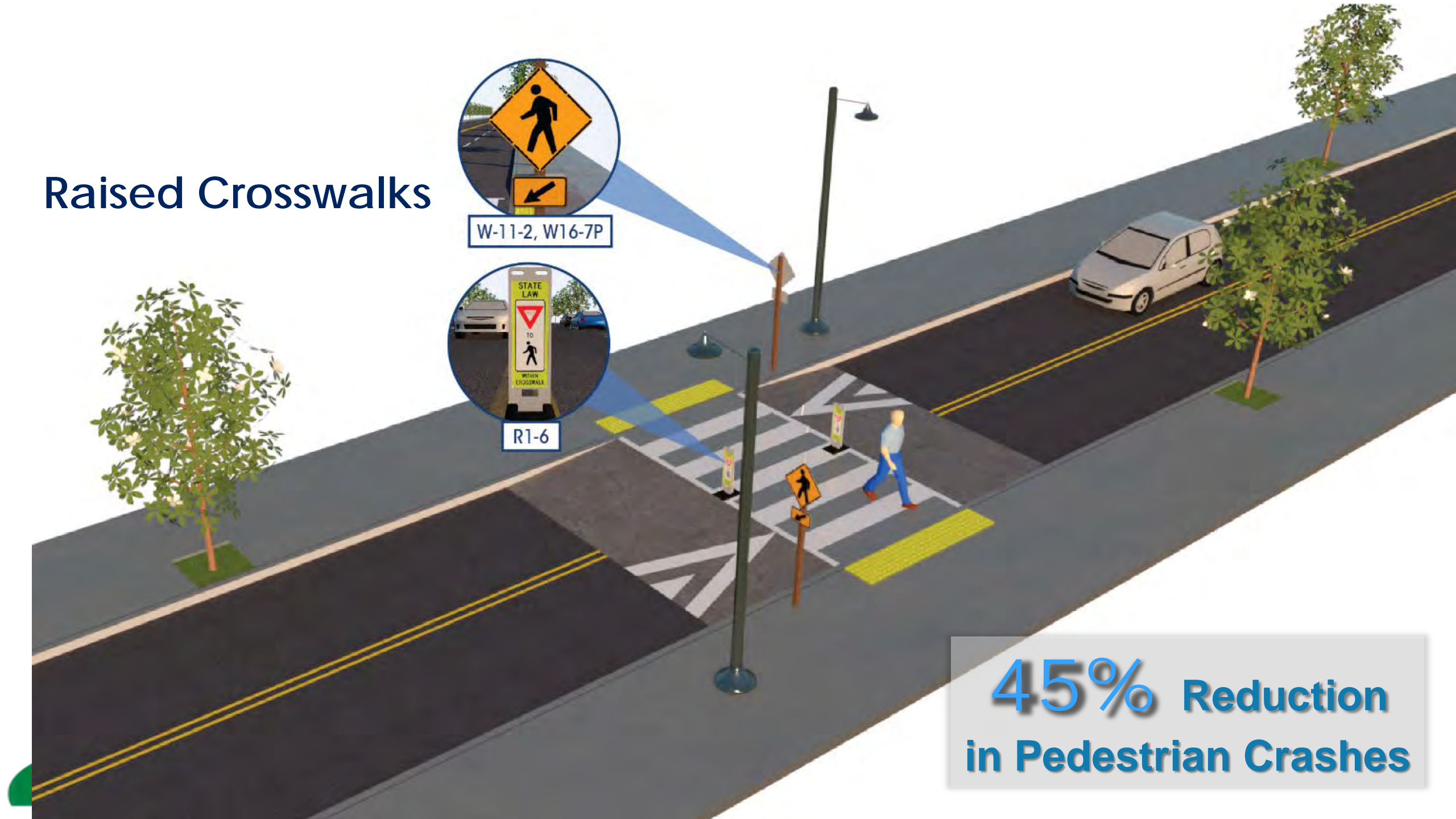


W-11-2, W16-7P



R1-6

**45% Reduction
in Pedestrian Crashes**



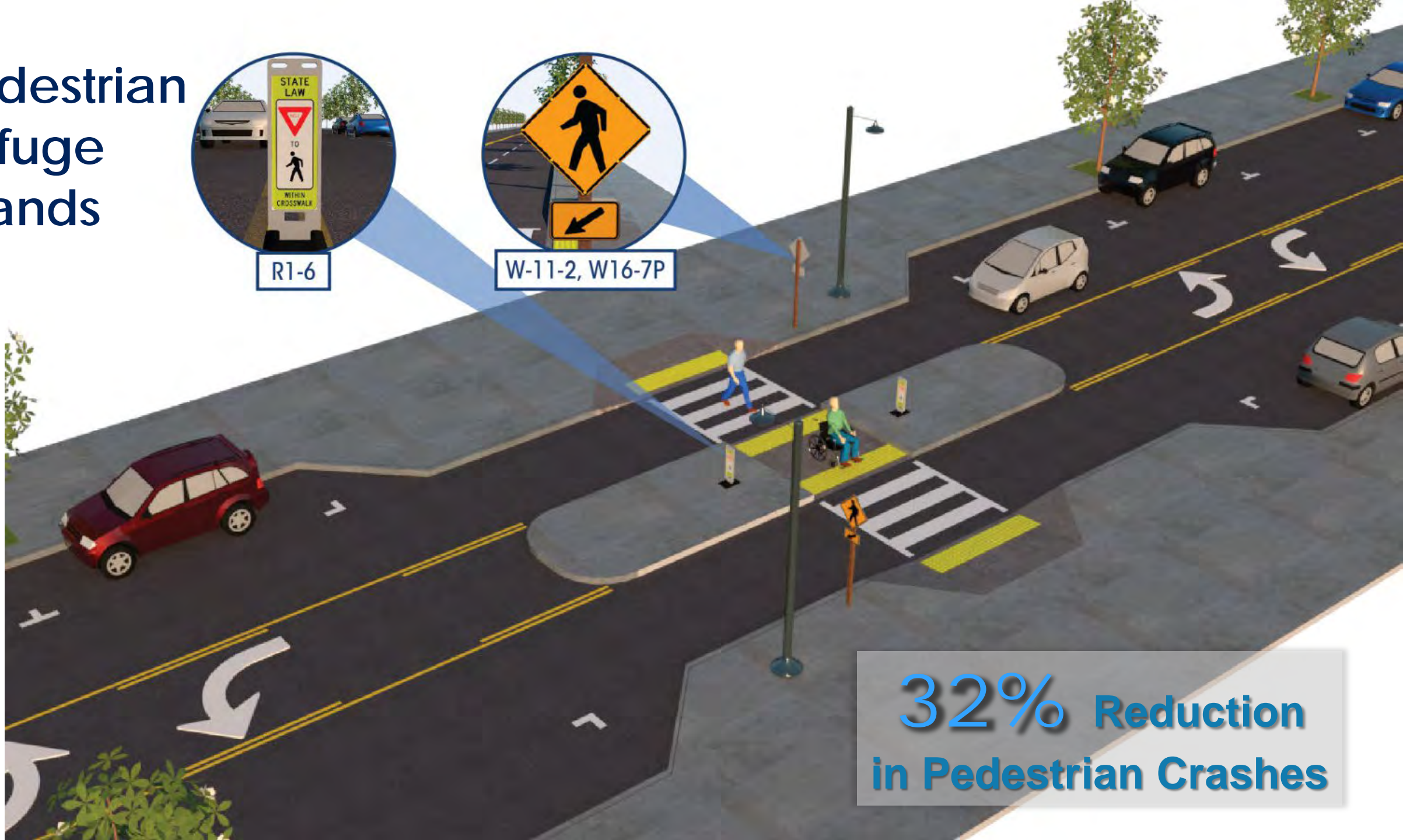
Pedestrian Refuge Islands



R1-6



W-11-2, W16-7P



**32% Reduction
in Pedestrian Crashes**

Rectangular Rapid Flashing Beacon (RRFB)

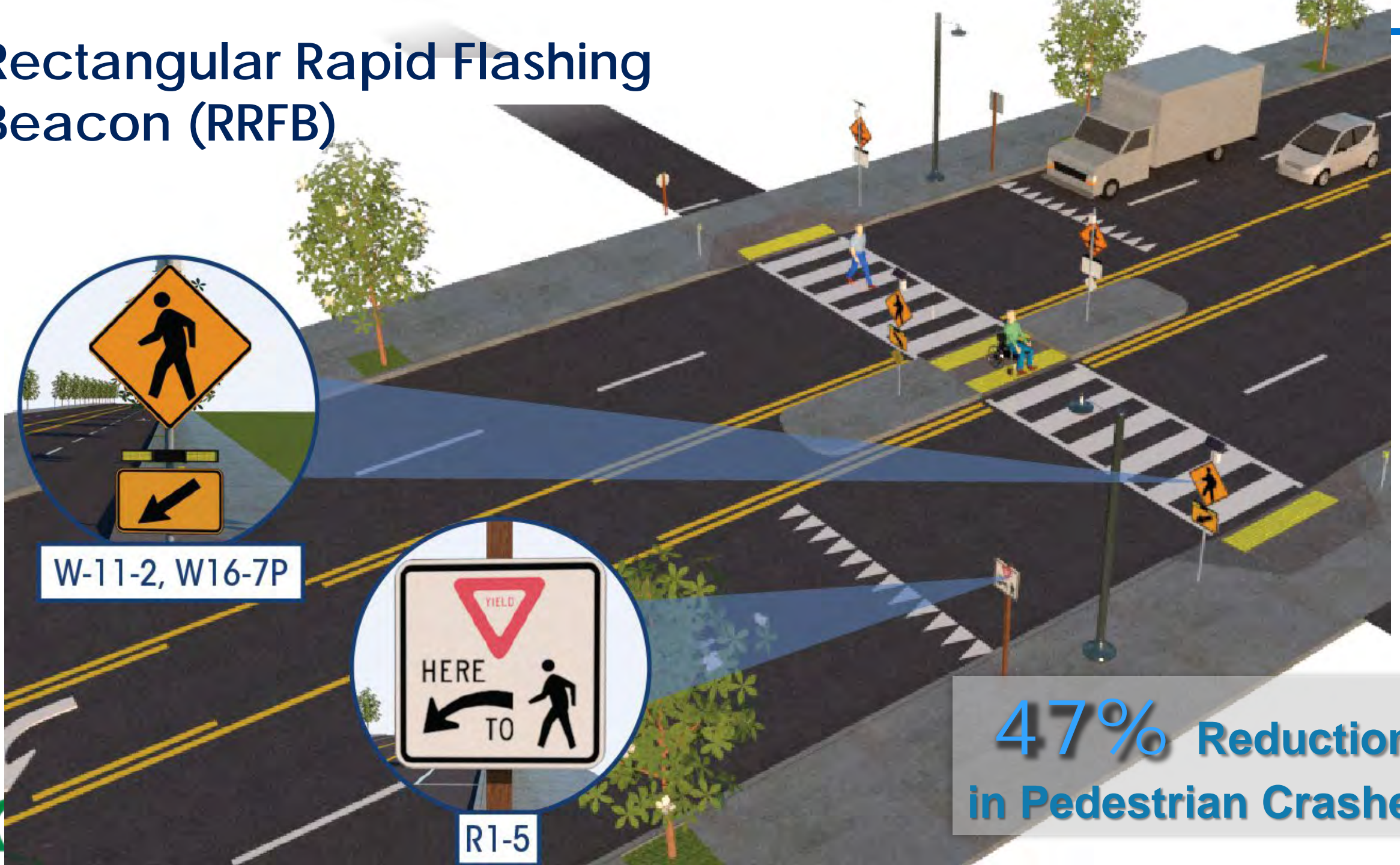


W-11-2, W16-7P



R1-5

**47% Reduction
in Pedestrian Crashes**



Pedestrian Hybrid Beacons (PHB)



55%
**Reduction in
Pedestrian
Crashes**



Road Diet / Roadway Reconfiguration

19 - 47%
Reduction in Total Crashes



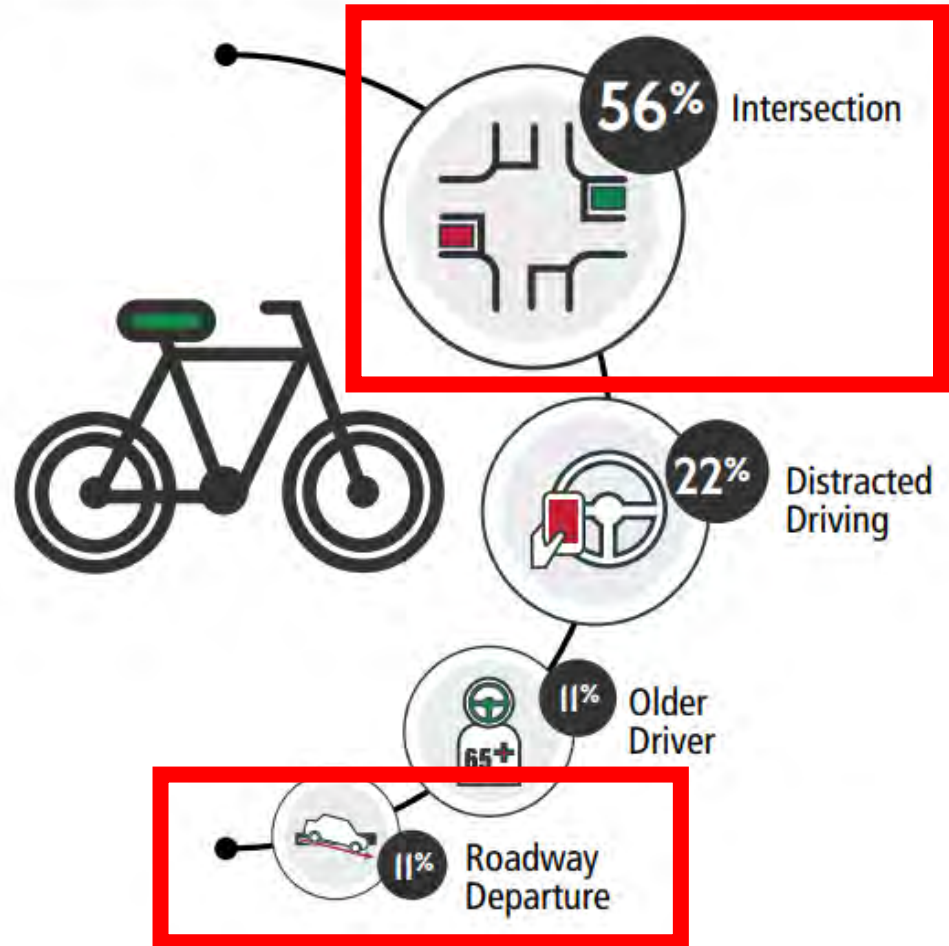


Leading Pedestrian Interval (LPI)

59%
**Reduction in
Pedestrian
Crashes**

VULNERABLE USERS – BICYCLISTS

These four emphasis areas are the top overlaps with Bicyclists:



VULNERABLE USERS – COMPLETE STREETS

- Begin by thinking of people first
- Re-purposing our ROW
- Doesn't mean add bike lanes every street





Rectangular Rapid Flashing Beacons (RRFB)
Town of Derry, NH



Enhance pedestrian visibility
Broadway and East Broadway

Source: Alan Côté



Student Parking Lot (800 spaces)

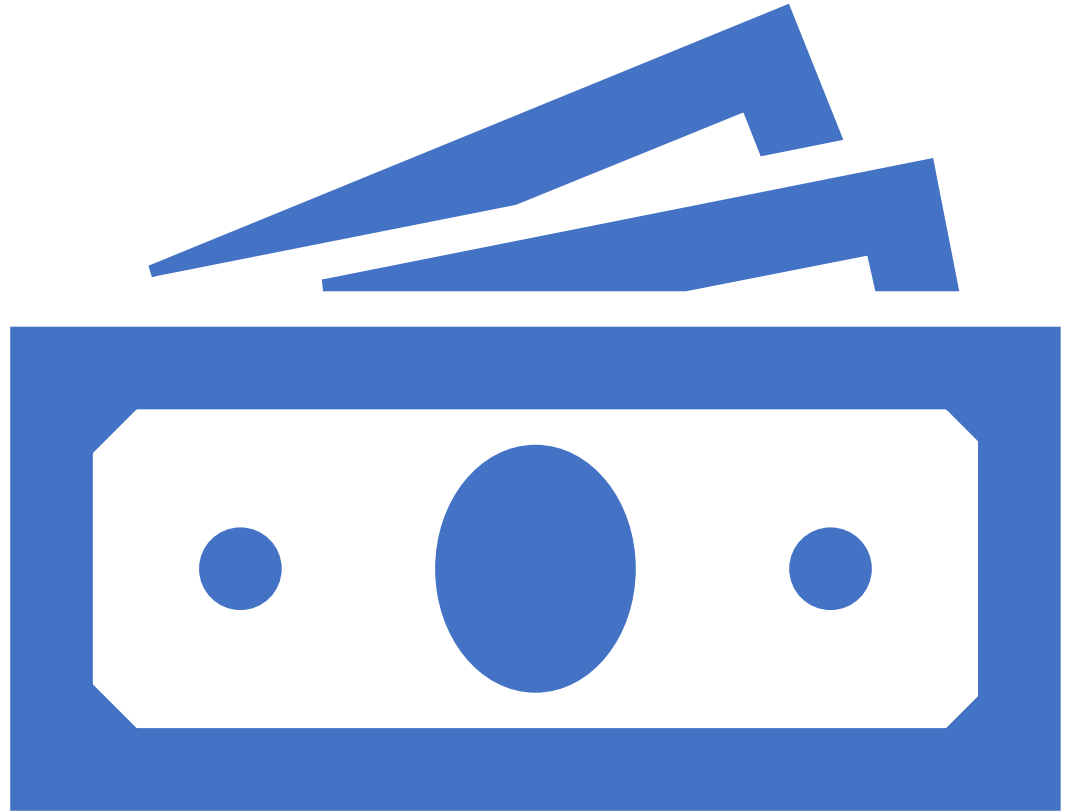
ADT 8,500 & 11,000

ENHANCED MULTI-USE TRAIL XING





Funding for Roadway Safety



FUNDING RESOURCES FOR MUNICIPALITIES

Federal and State funds directed through NHDOT

- Regional Ten-Year Plan Projects
- Highway Block Grant
- HSIP

Safe Streets and Roads for All (SS4A)

Poll

<https://www.transportation.gov/dot-navigator>



U.S. Department of Transportation

ABOUT DOT ▾

PRIORITIES ▾

CONNECT ▾



DOT Navigator

The DOT Navigator is a new resource to help communities understand the best ways to apply for grants, and to plan for and deliver transformative infrastructure projects and services.

[LEARN MORE ABOUT THE DOT NAVIGATOR](#)



<https://www.nh.gov/dot/programs/stic/index.htm>



Every Day Counts

Innovation for a Nation
on the Move

A State-based model that identifies and deploys proven, yet underutilized innovations — saving time, money and resources that can be used to deliver more projects.

Learn more about Every Day Counts >>



Find Proven Innovations

Explore innovations >>



Learn from Others

Explore success stories >>



Fund Innovation Deployment

Explore funding opportunities >>



Transportation Alternatives Program (TAP)

**WATCH
FOR THE
FUTURE...**

RAISE Grant

Congressional
Directed Spending
(CDS)

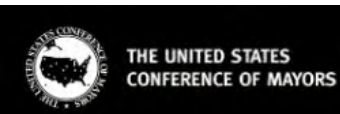


Financing Infrastructure to Move America Forward

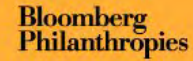
Working with the Build America Bureau



<https://localinfrastructure.org/application-bootcamp/>



WITH
SUPPORT
FROM



Local Infrastructure Hub

SUPPORT ▾

FUNDING

NEWS

RESOURCES

ABOUT

Grant Application Bootcamp

Submitting competitive applications for federal infrastructure money can be challenging for small and mid-sized cities, towns, and villages. To assist these often-underserved communities, NLC and the Local Infrastructure Hub offer bootcamps for local governments with 150,000 or fewer residents.

Think about the common challenges you encounter to improving road safety. What have we missed?



Technical Resources & Partners

LOCAL ROAD SAFETY PLANS

Exact process details may vary, but generally...





MAKING OUR ROADS SAFER

One Countermeasure at a Time

28 Proven Safety Countermeasures that offer significant and measurable impacts to improving safety

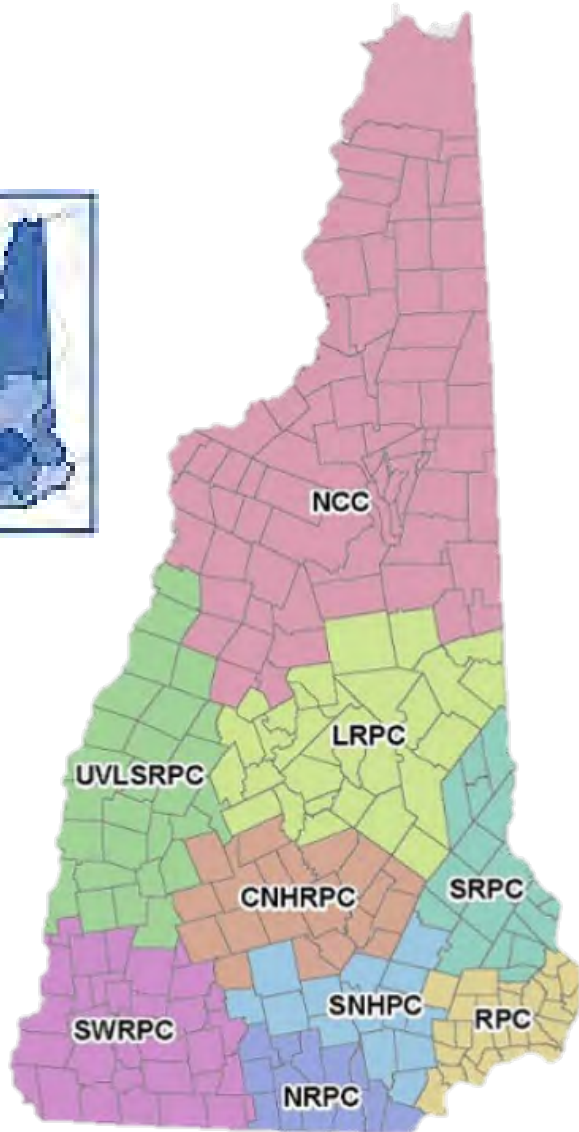


U.S. Department of Transportation
Federal Highway Administration

ZERO IS OUR GOAL

A SAFE SYSTEM IS HOW WE GET THERE

<https://safety.fhwa.dot.gov/>



RPCs

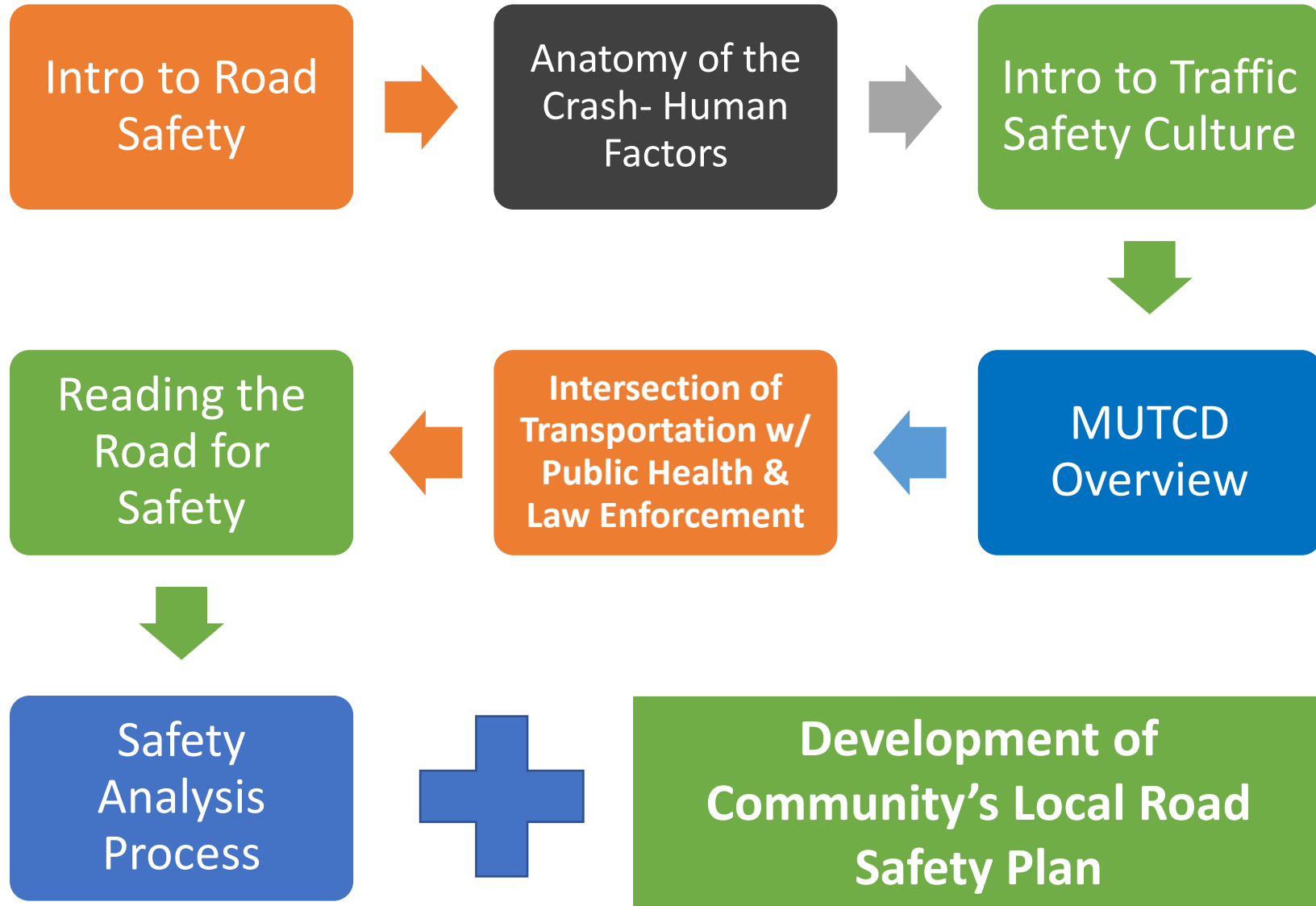
- Newsletters
- Opportunities
- Shared proposals
- Crash data



UNH TECHNOLOGY TRANSFER CENTER (T2) AND NH LOCAL TECHNICAL ASSISTANCE PROGRAM (LTAP)

- [Resource Section: https://t2.unh.edu/resources](https://t2.unh.edu/resources)
- PW.net Public Works Email Group for public works professionals in NH
- Upcoming courses
- Technical Assistance

ROAD SAFETY ADVOCATE CERTIFICATE PROGRAM



- Free
- Virtual
- Starts soon!



THE CONSULTING COMMUNITY

- Civil Engineering Firms

- Professional Traffic Operations Engineer (PTOE)
- NHDOT Pre-Qualified Firms: <https://www.nh.gov/dot/org/projectdevelopment/planning/lpa.htm>



ADDITIONAL PARTNERS & RESOURCES FOR MUNICIPALITIES ON ROADWAY SAFETY

- NHDOT
- SHSP – Appendix B
- FHWA Office of Safety and Resource Center
- NHMA

Parting thoughts from Jordan

Parting thoughts from Marilee



Questions?

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