

Pedestrian and Bicycle Countermeasures

California Division Office

Cove at Julia Pfeiffer Burns State Park

March 17, 2021

Maria Bhatti

Safety and Traffic Operations Engineer

Maria.Bhatti@dot.gov

916-498-5002

Steve Pyburn

Senior Traffic Safety and ITS Engineer

Steve.Pyburn@dot.gov

916-498-5057



Learning Objectives

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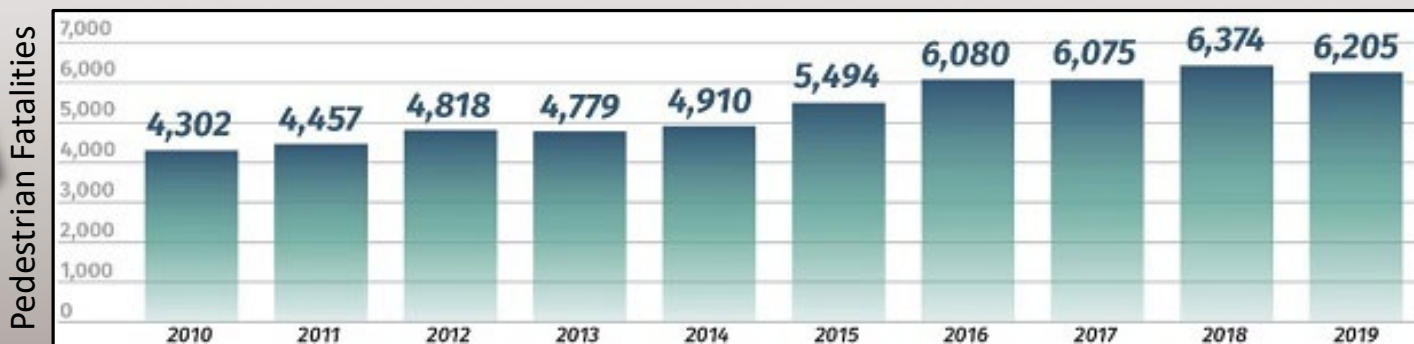
- **Why this is an Area of Concern**
- **Proven Safety Countermeasures (PSCs) that:**
 - Enhance Ped/Bike Safety at Intersections
 - Enhance Ped/Bike Safety at Uncontrolled Crossing Locations
 - Enhance Ped/Bike Safety with well designed Walkways/Bikeways
- **Resources**
- **Q&A**



Pedestrian and Bicycle Fatalities

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NHTSA's Data Visualization Tool

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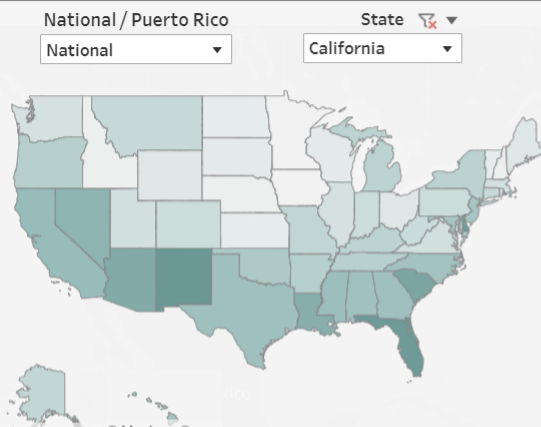
Click menu icon for more dashboards



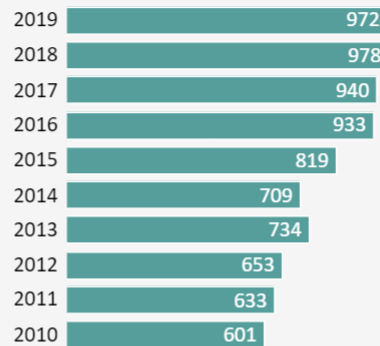
Click info icon for more information



Pedestrians



Pedestrian fatalities per 100,000 population



Note: Select one year or consecutive years only

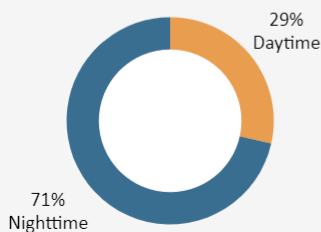
California Pedestrian Fatalities, 2010-2019

7,972



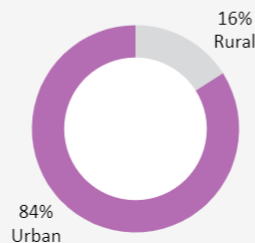
Pedestrian fatalities by month

Day and Night

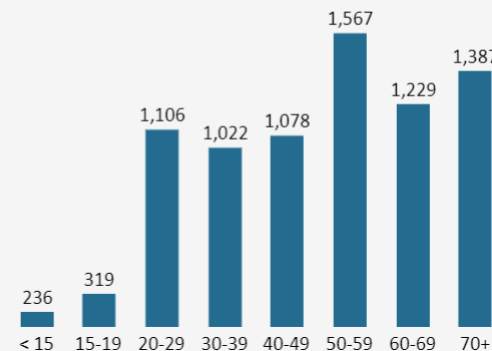


Daytime: 6 a.m.–5:59 p.m. Nighttime: 6 p.m.–5:59 a.m.

Rural and Urban



Age Groups

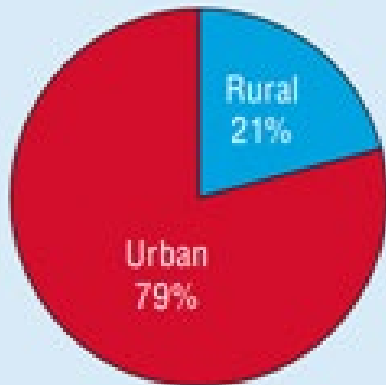


Bicycle Fatalities in 2018

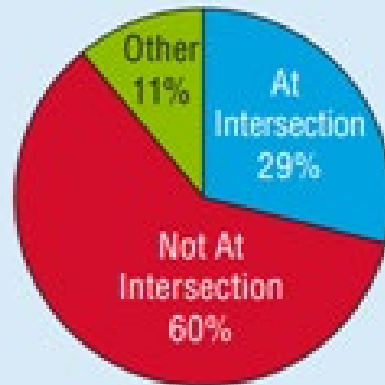
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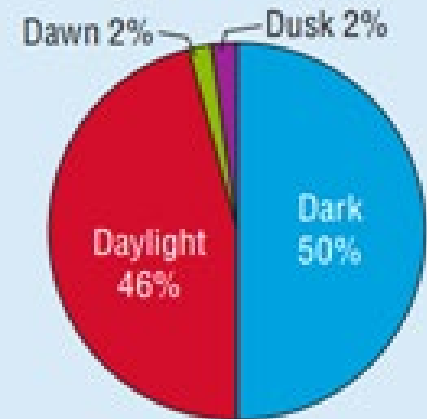
Land Use



Pedalcyclist Location*



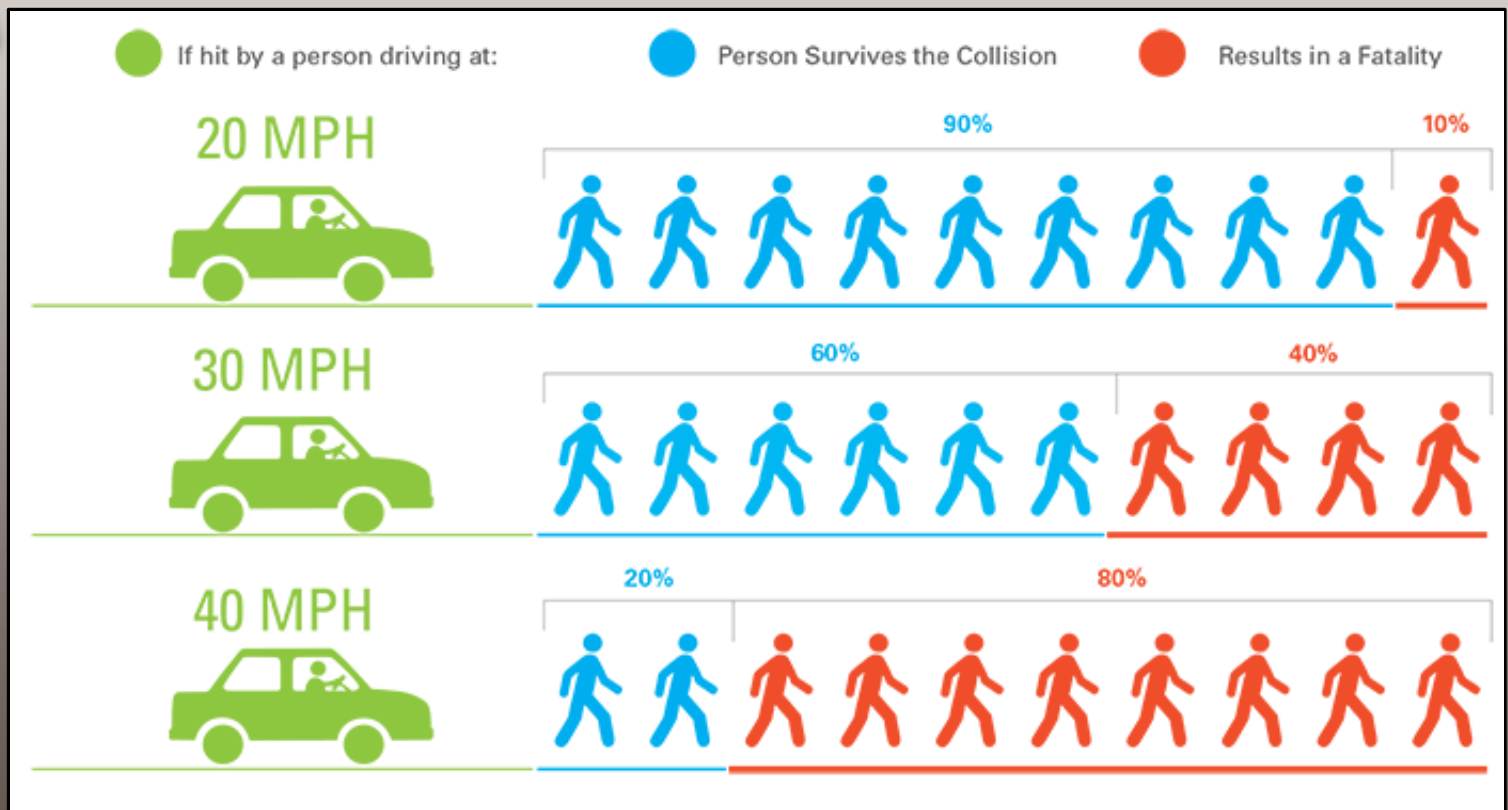
Light Condition



Effects of Speed

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Ways to Prevent Pedestrian and Bicycle Crashes

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- 1) Enhance Ped/Bike Safety at Intersections
- 2) Enhance Ped/Bike Safety at Uncontrolled Crossing Locations
- 3) Well Designed Walkways/Bikeways





Ways to Prevent Pedestrian and Bicycle Crashes

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- 1) Enhance Pedestrian/Bicycle Safety at Intersections**
- 2) Enhance Ped/Bike Safety at Uncontrolled Crossing Locations
- 3) Well Designed Walkways/Bikeways

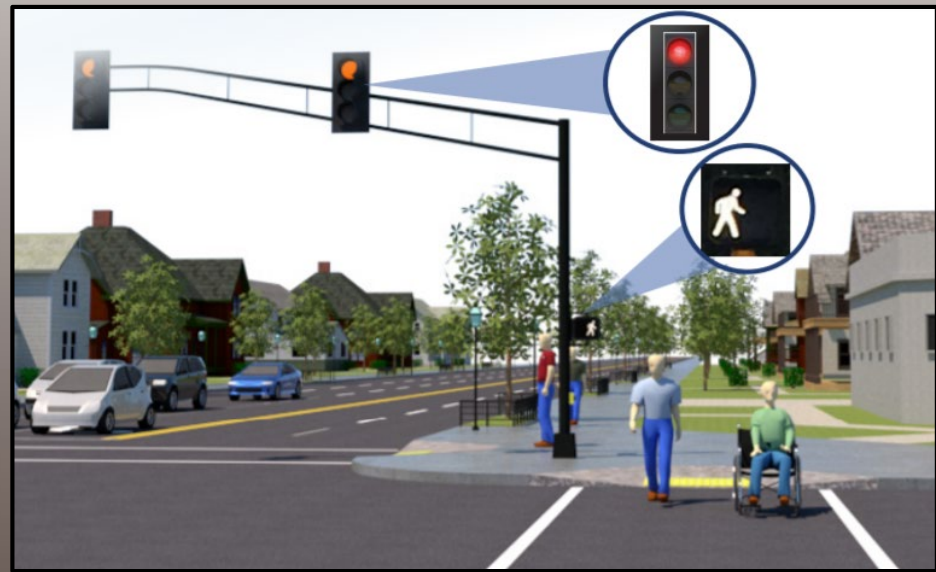


Leading Pedestrian Interval (LPI)

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- 3 – 7 seconds head start
- Low Cost Improvement
- Works Better with:
 - Right Turn on Red (RTOR) Restrictions
 - Accessible Pedestrian Signals (APS)
 - Parallel Vehicular Green Extension Interval



LPI Safety Benefits

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- **59% Reduction in Pedestrian Crashes**
- **Increases Visibility**
- **Reduces Vehicle v. Pedestrian Conflicts**
- **Increases Yielding**
- **Enhances Safety for Slower Moving Pedestrians**



An LPI allows a pedestrian to establish presence in the crosswalk before vehicles are given a green indication.

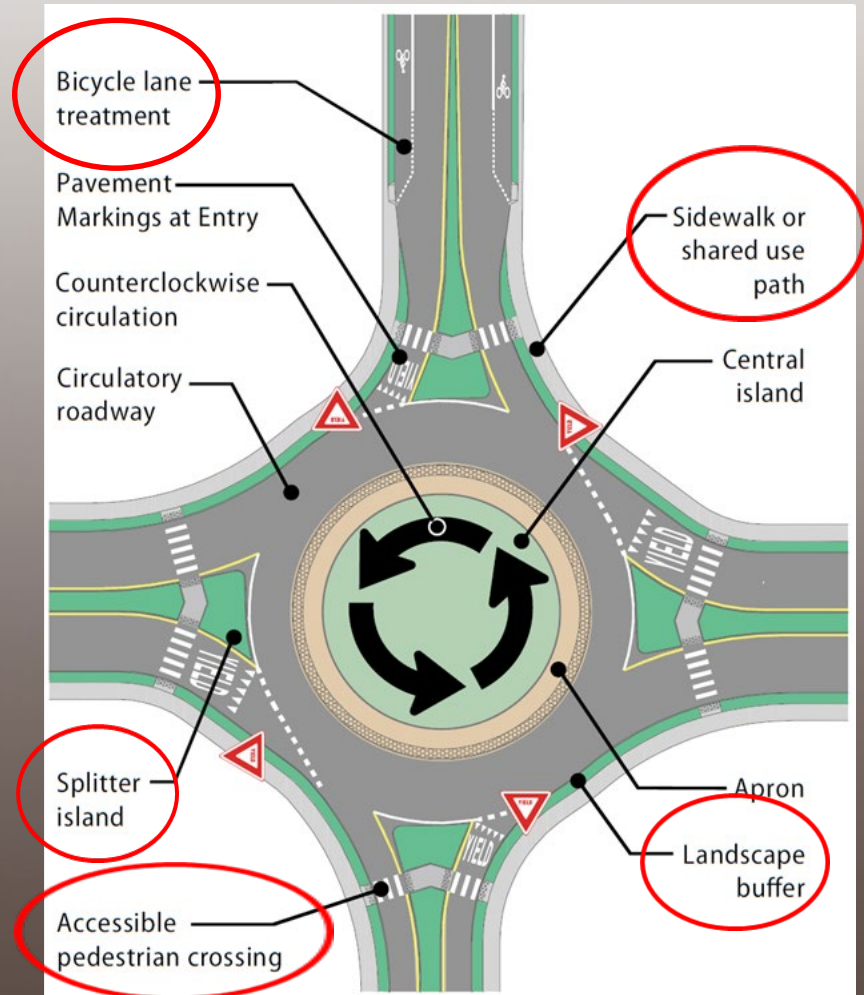


Roundabouts Ped/Bike Safety Benefits

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- **Enhanced Visibility**
- **Lower Speeds**
- **Fewer Conflict Points**
- **Simplify Ped/Bike Crossing**



Ways to Prevent Pedestrian and Bicycle Crashes

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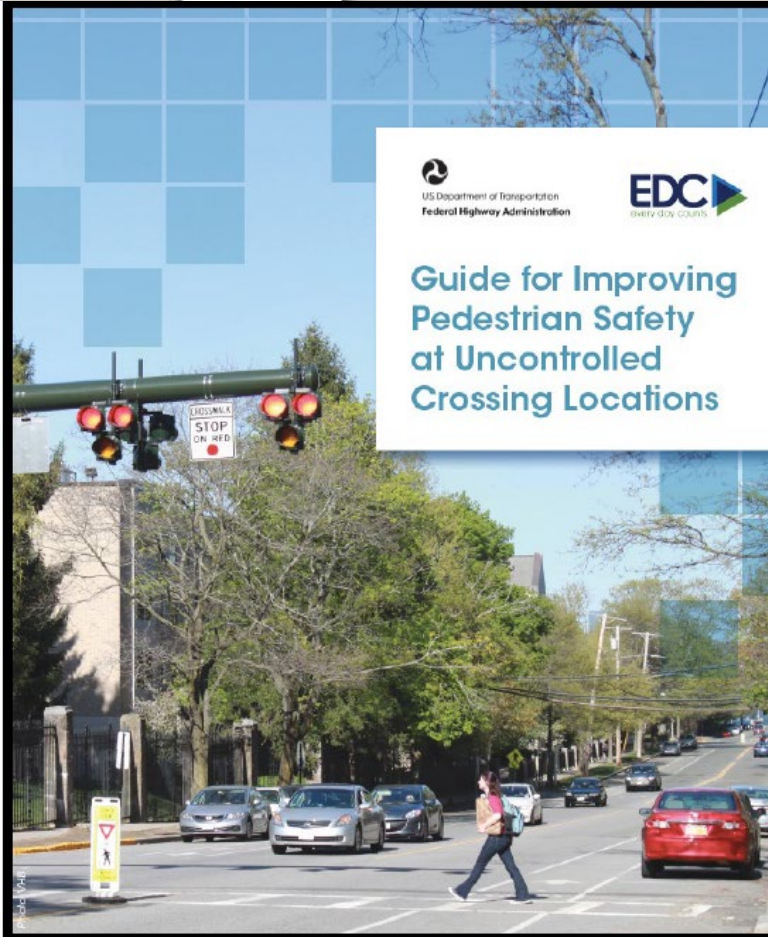
- 1) Enhance Ped/Bike Safety at Intersections
- 2) Enhance Ped/Bike Safety at Uncontrolled Crossing Locations**
- 3) Well Designed Walkways/Bikeways



Guide for Improving Pedestrian Safety at Uncontrolled Crossing Locations

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Guide for Improving Pedestrian Safety at Uncontrolled Crossing Locations

Table 1. Application of pedestrian crash countermeasures by roadway feature.

Roadway Configuration	Posted Speed Limit and AADT								
	Vehicle AADT <9,000			Vehicle AADT 9,000–15,000			Vehicle AADT >15,000		
	≤30 mph	35 mph	≥40 mph	≤30 mph	35 mph	≥40 mph	≤30 mph	35 mph	≥40 mph
2 lanes (1 lane in each direction)	1 2 4 5 6	1 7 9	1 5 6 7 9	1 4 5 6	1 7 9	1 5 6 7 9	1 4 5 6	1 7 9	1 5 6 7 9
3 lanes with raised median (1 lane in each direction)	1 2 3 4 5	1 3 7 9	1 3 5 6 7 9	1 3 4 5	1 3 7 9	1 3 5 6 7 9	1 3 4 5	1 3 7 9	1 3 5 6 7 9
3 lanes w/o raised median (1 lane in each direction with a two-way left-turn lane)	1 2 3 4 5 6 7 9	1 3 5 6 7 9	1 3 5 6 7 9	1 3 4 5 6 7 9	1 3 5 6 7 9	1 3 5 6 7 9	1 3 4 5 6 7 9	1 3 5 6 7 9	1 3 5 6 7 9
4+ lanes with raised median (2 or more lanes in each direction)	1 3 5 7 8 9	1 3 5 7 8 9	1 3 5 8 9	1 3 5 7 8 9	1 3 5 7 8 9	1 3 5 8 9	1 3 5 7 8 9	1 3 5 8 9	1 3 5 8 9
4+ lanes w/o raised median (2 or more lanes in each direction)	1 3 5 6 7 8 9	1 3 5 6 7 8 9	1 3 5 6 8 9	1 3 5 6 7 8 9	1 3 5 6 7 8 9	1 3 5 6 8 9	1 3 5 6 7 8 9	1 3 5 6 8 9	1 3 5 6 8 9

Given the set of conditions in a cell,

- # Signifies that the countermeasure is a candidate treatment at a marked uncontrolled crossing location.
- Signifies that the countermeasure should always be considered, but not mandated or required, based upon engineering judgment at a marked uncontrolled crossing location.
- Signifies that crosswalk visibility enhancements should always occur in conjunction with other identified countermeasures.*

The absence of a number signifies that the countermeasure is generally not an appropriate treatment, but exceptions may be considered following engineering judgment.

- 1 High-visibility crosswalk markings, parking restrictions on crosswalk approach, adequate nighttime lighting levels, and crossing warning sign
- 2 Raised crosswalk
- 3 Advance Yield Here To (Stop Here For) Pedestrians sign and yield (stop) line
- 4 In-Street Pedestrian Crossing sign
- 5 Curb extension
- 6 Pedestrian refuge island
- 7 Rectangular Rapid-Flashing Beacon (RRFB)**
- 8 Road Diet
- 9 Pedestrian Hybrid Beacon (PHB)**

*Refer to Chapter 4, "Using Table 1 and Table 2 to Select Countermeasures," for more information about using multiple countermeasures.

**The PHB and RRFB are not both installed at the same crossing location.

Countermeasures for Uncontrolled Crossing Locations

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1. **Crosswalk Visibility Enhancements**
2. **Raised crosswalk**
3. **Rectangular Rapid-Flashing Beacon (RRFB)**
4. Pedestrian Hybrid Beacon (PHB)
5. Medians and Pedestrian Crossing/Refuge Islands
6. Road Diets
7. LPI ✓

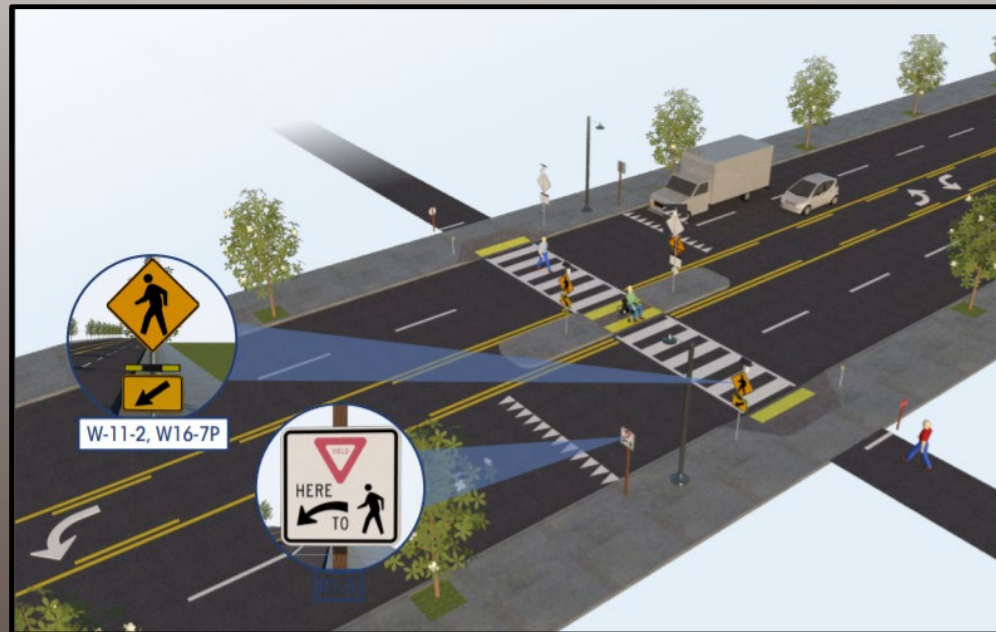


Countermeasures for Uncontrolled Crossing Locations

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1. Crosswalk Visibility Enhancements
2. Raised Crosswalk
3. Rectangular Rapid Flashing Beacon (RRFB)



Crosswalk Visibility Enhancements Safety Benefits

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- Enhanced Visibility
- Reduced Speeds
- Increased Yielding
- Help pedestrians decide where to cross

Crosswalk visibility enhancements can reduce crashes by

23-48%



Raised crosswalks can reduce pedestrian crashes by

45%



RRFBs can reduce pedestrian crashes by

47%



Proven Safety Countermeasures for Uncontrolled Crossing Locations

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1. Crosswalk Visibility Enhancements ✓
2. Raised crosswalk ✓
3. Rectangular Rapid-Flashing Beacon (RRFB) ✓
4. **Pedestrian Hybrid Beacon (PHB)**
5. **Medians and Pedestrian Crossing/Refuge Islands**
6. **Road Diets**
7. LPI ✓



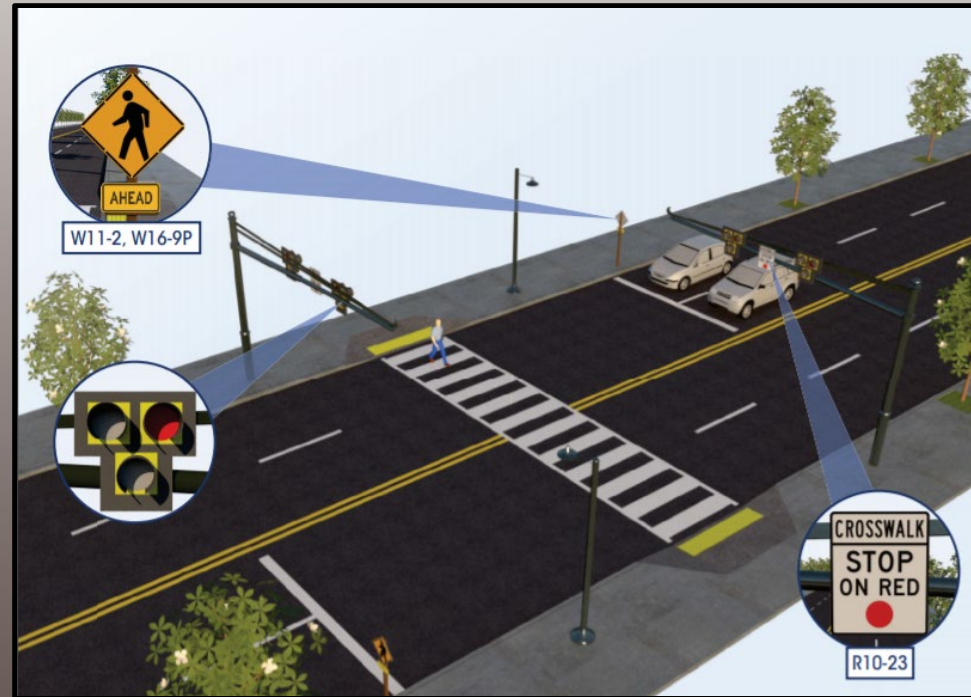
Pedestrian Hybrid Beacons (PHB)

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Often Considered for Locations with

- High Vehicle Speeds or Volumes
- Full Traffic Signal Doesn't Warrant



Pedestrian Hybrid Beacons (PHB) Safety Benefits

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- **Enhanced Crosswalks and/or Pedestrian Visibility**
- **Reduced Speeds**
- **Reduced Vehicle Delays**

PHBs can
reduce
pedestrian
crashes by
55%



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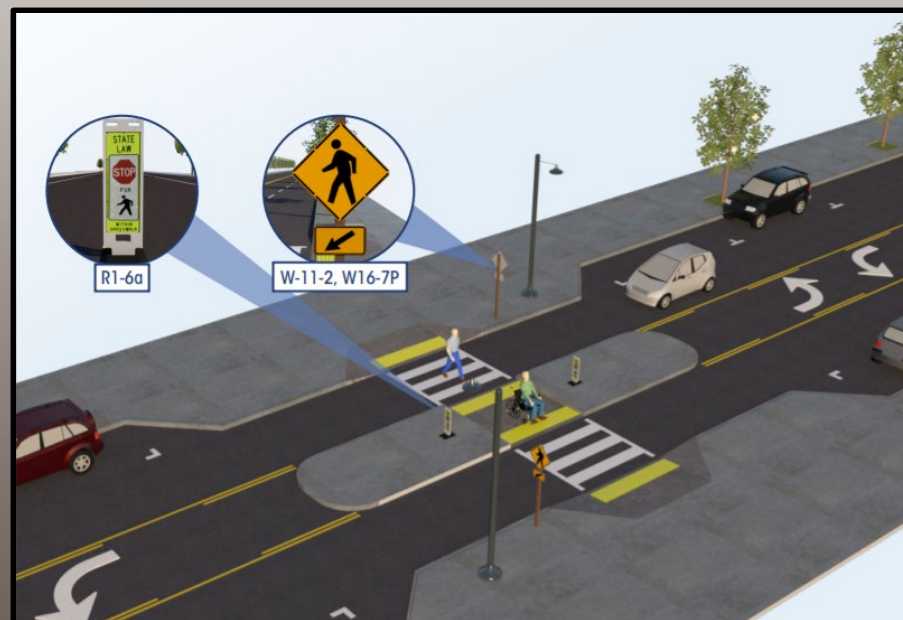
Source: <https://safety.fhwa.dot.gov/provencountermeasures/>

Medians and Pedestrian Crossing/Refuge Islands

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- **Highly Desirable for Locations**
 - Midblock Crossings
 - 4 or More Lanes
 - 35 MPH or Greater Speed Limits
 - AADT >9,000
- **Good Candidate for 2 or 3 lane roadways with high vehicle speeds or volumes.**



Medians and Pedestrian Crossing/Refuge Islands Safety Benefits

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- Improved Pedestrian Safety and Comfort
- Reduced Pedestrian Exposure / Conflict Points
- Enhanced Visibility
- Reduced Speed



Road Diets

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- Promotes Complete Streets
- Promotes Curb Extension
- Promotes Sidewalk Widening
- Promotes Median Refuge Islands
- Creates Space for Bicycles



Road Diets Safety Benefits

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- Reduces Crossing Distance
- Reduces Speed



Road Diets can reduce
total crashes by

19-47%*

*19% in urban areas, 47% in suburban areas.



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

Ways to Prevent Pedestrian and Bicycle Crashes

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- 1) Enhance Ped/Bike Safety at Intersections
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- 3) Well Designed Walkways/Bikeways**



Walkways/Bikeways

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Example of a sidewalk in a residential area.



Paved shoulder used as a walkway.



Example of a shared use path.



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Bikeway Selection Guide

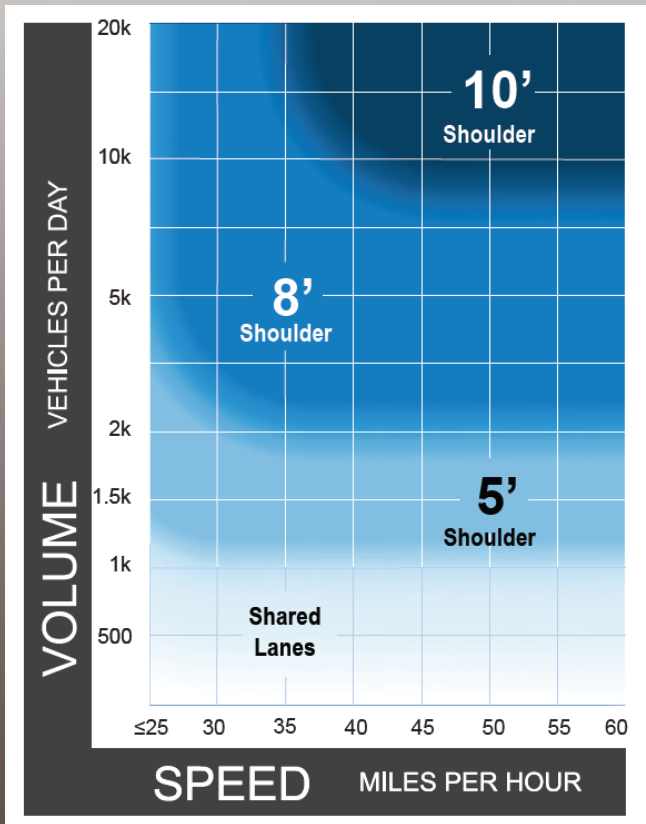
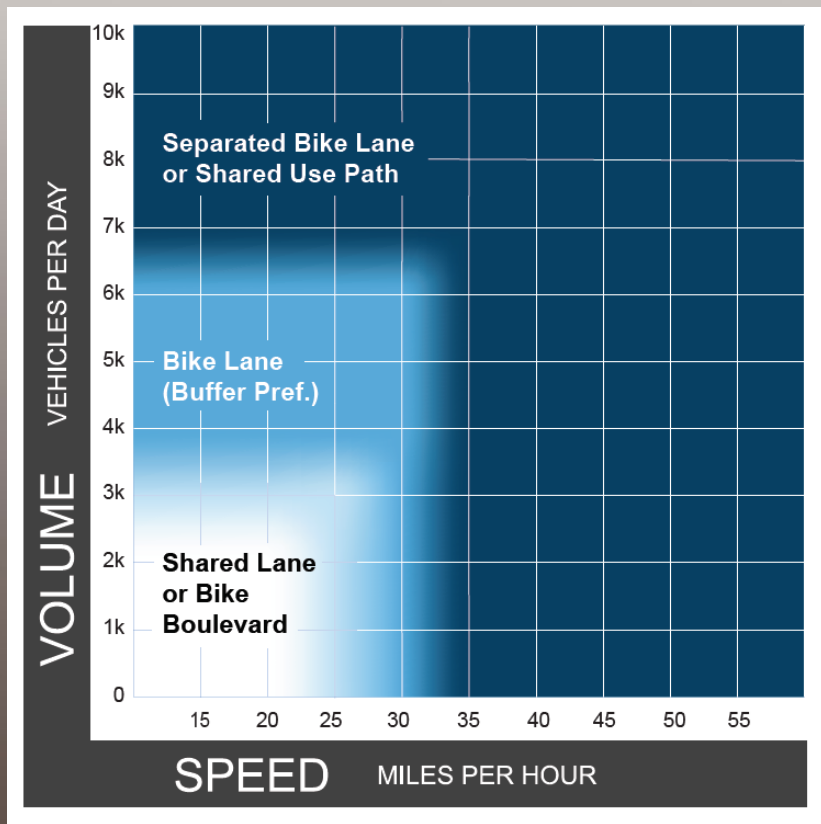
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Preferred Bikeway Types

Urban/Suburban/Small Towns

Rural Roads



Walkways/Bikeways Safety Benefits

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- Improves Visibility
- Reduces Vehicle v. Pedestrian/Bicycle Conflicts



Walkways

SAFETY BENEFITS:

Sidewalks 65-89%

Reduction in crashes involving pedestrians walking along roadways

Paved Shoulders 71%

Reduction in crashes involving pedestrians walking along roadways

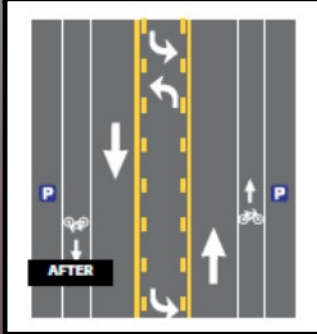
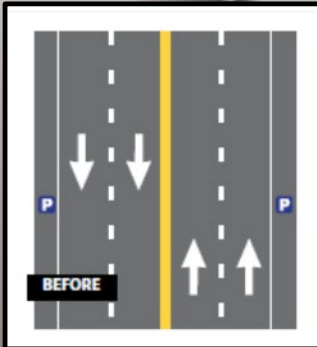


Santa Monica, California

Ocean Park Blvd. Case Study

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Ocean Park Boulevard looking east at 16th Street



Ocean Park Boulevard looking east at 18th Street marked crosswalk and bicycle lane

Objective	Features	Results
<ul style="list-style-type: none"> Improve safety and pedestrian crossing conditions along Ocean Park Blvd from 16th to 18th Streets 	<ul style="list-style-type: none"> School zone Previous safety improvements had little influence on speeding and number of crashes 	<ul style="list-style-type: none"> 65% reduction in collisions 60% reduction in injury collisions Reduction of speeds



Resources

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- [Proven Safety Countermeasures](#)
- [Safe Transportation for Every Pedestrian \(STEP\)](#)
- [NHTSA's Data Visualization Tool](#)
- [Guide for Improving Pedestrian Safety at Uncontrolled Crossing Locations](#)
- [Bikeway Selection Guide](#)
- [Road Diet Informational Guide](#)



Thank You!

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