Center for Accelerating Innovation

Safe Transportation for Every Pedestrian (STEP)
Where you walk, what do you see?

OR

Source: FHWA
“On average, a pedestrian was killed nearly every 1.5 hours in traffic crashes in 2016.”

- 2016 FARS Data
- Photo Source: North Carolina Vision Zero, ncvisionzero.org
Pedestrian fatalities increased 27% from 2007-2016, while all other traffic deaths decreased by 14%.

Source: NHTSA Fatality Analysis Reporting System
“Every Day Counts” (EDC)

**State-based model to identify and rapidly deploy proven, but underutilized innovations**

- shorten the project delivery process
- **enhance roadway safety**
- reduce congestion
- improve environmental sustainability

Initiating 5th Round (2019-2020) - 10 innovations

**STEP**
Safe Transportation for Every Pedestrian
The Spectacular Seven
Rectangular Rapid Flashing Beacon

47% Reduction in Pedestrian Crashes
PLAC EHOLDER for Tech Sheet: Leading Pedestrian Interval

Gives pedestrians a 3+ second head start to enter the crosswalk at an intersection.

Helpful for older and disabled pedestrians who are slower to start crossing.

60% Reduction in Pedestrian Crashes

Source: FHWA
Crosswalk Visibility Enhancements

23-48% Reduction in Pedestrian Crashes
Raised Crosswalks

45% Reduction in Pedestrian Crashes
Pedestrian Refuge Islands

56% Reduction in Pedestrian Crashes
Pedestrian Hybrid Beacons (PHB)

69% Reduction in Pedestrian Crashes
Road Diet: After

19-47% Reduction in Total Crashes
Safety Effects of Marked Versus Unmarked Crosswalks at Uncontrolled Locations
Final Report and Recommended Guidelines

FFWA Publication Number: HRT-04-100

September 2005

Guide for Improving Pedestrian Safety at Uncontrolled Crossing Locations

2005

2018
## Select countermeasures

The table below provides guidance on the selection of pedestrian crash countermeasures by roadway feature, based on the posted speed limit and annual average daily traffic (AADT).

<table>
<thead>
<tr>
<th>Roadway Configuration</th>
<th>Posted Speed Limit and AADT</th>
<th>Vehicle AADT &lt;9,000</th>
<th>Vehicle AADT 9,000–15,000</th>
<th>Vehicle AADT &gt;15,000</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>≤30 mph</td>
<td>35 mph</td>
<td>≥40 mph</td>
<td>≤30 mph</td>
</tr>
<tr>
<td>2 lanes (1 lane in each direction)</td>
<td>①</td>
<td>②</td>
<td>③</td>
<td>④</td>
</tr>
<tr>
<td>3 lanes with raised median (1 lane in each direction)</td>
<td>①</td>
<td>②</td>
<td>③</td>
<td>④</td>
</tr>
<tr>
<td>3 lanes w/o raised median (1 lane in each direction with a two-way left-turn lane)</td>
<td>①</td>
<td>②</td>
<td>③</td>
<td>④</td>
</tr>
<tr>
<td>4+ lanes with raised median (2 or more lanes in each direction)</td>
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</tr>
</tbody>
</table>

### 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, 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.
Example

AADT = 14,000

Posted Speed = 40 mph; Actual speeds = average 45 mph

2 Lanes each direction, with two-way center turn lane

Poll: What countermeasures may be good options for this example?

Source: Virginia DOT
<table>
<thead>
<tr>
<th>Roadway Configuration</th>
<th>Posted Speed Limit and AADT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Vehicle AADT &lt;9,000</td>
</tr>
<tr>
<td></td>
<td>≤30 mph 35 mph ≥40 mph</td>
</tr>
<tr>
<td>2 lanes (1 lane in each direction)</td>
<td>1 2 1 2</td>
</tr>
<tr>
<td></td>
<td>4 5 6 5 6</td>
</tr>
<tr>
<td>3 lanes with raised median</td>
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<td>(1 lane in each direction with a</td>
<td>4 5 6 4 5 6</td>
</tr>
<tr>
<td>two-way left-turn lane)</td>
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*Refer to Chapter 4, Using Table 1 and Table 2 to Select Countermeasures,* for more information about using multiple countermeasures.

- Advance Signs and Markings
- Refuge Island
- Pedestrian Hybrid Beacon
Today’s Guests

Wayne Emington, FHWA Maine Division

Patrick Adams, Maine DOT

Mark Cole, Virginia DOT
Pedestrian Safety – Where STEP meets Heads Up!

Patrick Adams
MaineDOT Manager of Bicycle and Pedestrian Programs

Wayne Emington, PE
FHWA Safety & Operations Engineer
Where STEP meets Heads Up!

Safe Transportation for Every Pedestrian (STEP)
<table>
<thead>
<tr>
<th>Baseline 5-Year Average (2012-2016)</th>
<th>Trend 2012-2016 (Desired trend: ↓)</th>
<th>Target 5-Year Average (2014-2018)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-Motorized Fatalities and Serious Injuries</td>
<td>92.0</td>
<td>Non-Motorized Fatalities and Serious Injuries</td>
</tr>
<tr>
<td>All Public Roads</td>
<td></td>
<td>All Public Roads</td>
</tr>
</tbody>
</table>
Collaboration Early and Often

MaineDOT -
- Bureau of Planning
- Creative Services
- Safety Office
- Bicycle and Pedestrian Program

Maine Department of Public Safety
- Maine Bureau of Highway Safety
- Maine State Police

Maine DOL’s Division of the Blind and Visually Impaired

Federal Highway Administration

Maine’s Municipal Planning Organizations

Bicycle Coalition of Maine

Safe Routes to School Program

Maine Developmental Disabilities Council

City of Portland

NL Partners

American Automobile Association
**Vision: Institutionalized**

| Institutionalized: The state/locals have adopted the STEP countermeasures as a standard practice and use them regularly at uncontrolled crossing locations to improve pedestrian safety. There is a formal guidance, policy and/or a process in place to advance the STEP countermeasures. | • Is there an inventory of locations with STEP countermeasures?  
• State/Locals implement/install STEP countermeasures using a systemic process.  
• The State has a process in place to deploy STEP Countermeasures (Crosswalk Visibility Enhancements, Pedestrian Refuge Islands, Raised Crosswalks, Rectangular Rapid Flashing Beacon (RRFB), Pedestrian Hybrid Beacon (PHB) or Road Diets) to improve pedestrian safety at uncontrolled crossing locations.  
• Included STEP countermeasures in Complete Streets Manual, Project Development Manual, and/or design guidance and is standard practice to improve uncontrolled crossing locations.  
• No special permission is needed to deploy STEP countermeasures. |
Pedestrian Fatalities in the News

Baby Boy Killed by Truck in Alton, Maine

By Alexandra Parks
Published at 11:11 PM EDT on May 15, 2017 | Updated at 11:42 PM EDT on May 15, 2017

An 18-month-old boy was killed Friday after being run over by a pickup truck in Alton, Maine, state police said.

Augusta man, 81, killed after leaving church supper Saturday night

Emile Morin of Augusta was an active member of St. Augustine Catholic Church on Sand Hill.

BY CHARLES EICHACKER KENNEBEC JOURNAL AND KEITH EDWARDS KENNEBEC JOURNAL

Maine sets 24-year record for pedestrian fatalities in 2017

BY KATHLEEN MCKINLEY

State DOT, Bicycle Coalition of Maine talk pedestrian rules in Winslow

BY MAURICE J. ABBOTT

Fatal accidents spur safety campaign

BY MAURICE J. ABBOTT

Maine sets 24-year record for pedestrian fatalities in 2017
Maine's Pedestrian Crash Experience
Maine's Data Driven Strategy
Part of a National Trend
(From GHSA 2017 Report)

Pedestrian fatalities increased 27% from 2007-2016, while all other traffic deaths decreased by 14%.

The estimated number of pedestrians killed in 2017 is 5,984. In 2016, that number was 5,987.

States that legalized recreational marijuana between 2012 and 2016 had a collective 16.4% increase in pedestrian fatalities in the first 6 months of 2017 compared to the prior year.

All other states experienced a 5.8% decrease.

Source: GHSA
The three E’s

- Education and behavior change – (media, brochures, forums, outreach to specific groups)
- Engineering – (lights, crosswalks, signs)
- Enforcement – (positive & punitive)
Current Maine Efforts

- Multi-Agency team meets regularly to develop action plans
- Outreach out to select communities
- Local Roads Program’s Crosswalks, Sidewalks, & ADA Compliance Workshops
- Focus on hard to reach groups
- Crosswalk reviews and upgrades
Current Maine Efforts

- RRFB initiative
- Portable Speed Feedback signs
- Higher Visibility Crosswalks - Demonstration Projects
- Building a web resource that everyone can use
HEADS UP!
SAFETY IS A TWO-WAY STREET.
NEXT “STEPs”
VDOT’s Efforts to Ensure Safe Transportation for Every Pedestrian

Mark A. Cole, P.E.
Assistant Division Administrator – Highway Safety
Traffic Engineering Division

September 2018
Virginia Pedestrian and Bicycle Safety Projects

Currently, over 90 bicycle and pedestrian HSIP Projects are underway. Valued at $75 Million
Pedestrians made up about 16% of Virginia highway fatalities in 2016.
In 2017, 234 vulnerable road users died, 27% of all traffic deaths.

Vulnerable Road User Deaths are Increasing

Virginia Traffic Deaths By Roadway User Type (2011-2016)

- Pedestrians: 12%
- Bicyclists: 2%
- Motorcyclists: 10%
- Other Motorists: 76%
Virginia Pedestrian Crash Assessment

Virginia Pedestrian Crash Assessment
Analysis of Pedestrian Crashes Occurring Between 2012 and 2016

Crash Report

+ Google Street View

distraction
workzone
speed
refuge
rural

signs
weather
severity
pushbuttons
midblock

ramps
lighting
urban

alignment
global
statewide
landuse
Where Pedestrian Crashes Occur

Fatal
- Signalized Intersection: 282 (66%)
- Unsignalized Intersection: 57 (14%)
- Mid-Block: 30 (7%)
- Other: 56 (13%)

Injury
- Signalized Intersection: 134 (7%)
- Unsignalized Intersection: 431 (22%)
- Mid-Block: 1012 (52%)
- Other: 383 (19%)
Ped Crashes By Crosswalk Presence

Fatal
- 364, 86%
- 39, 9%
- 22, 5%

Injury
- 1440, 74%
- 438, 22%
- 61, 3%
- 21, 1%

Legend:
- Marked Crosswalk Present, Pedestrian Struck In Crosswalk
- Marked Crosswalk Present, Pedestrian Not Struck In Crosswalk
- Marked Crosswalk Present, Unclear If Pedestrian Was Struck In Crosswalk
- No Marked Crosswalk Present
Pedestrian Crashes By Land Use

- **Pedestrian Fatal Crashes**
  - Residential/Commercial/Recreational Land: 20%
  - Rural/Industrial Land Uses: 80%

- **Pedestrian Injury Crashes**
  - Residential/Commercial/Recreational Land: 13%
  - Rural/Industrial Land Uses: 87%
Ped Crashes By Posted Speed Limit (mph)

Fatal

- 115 (25%)
- 60 (13%)
- 131 (29%)

Injury

- 320 (16%)
- 171 (8%)
- 493 (25%)
- 1009 (51%)

Legend:
- ≤ 25
- 30 - 35
- 40 - 45
- ≥ 50

VDOT
Ped Crashes And Posted Speed Limit

- **25 MPH or less**: 94% of pedestrians survive
- **30 to 35 MPH**: 79% of pedestrians survive
- **40 MPH or greater**: 65% of pedestrians survive
# Pedestrian Injury Crashes By Type of Road

<table>
<thead>
<tr>
<th>Type of Road</th>
<th>Private</th>
<th>One-way or Transition</th>
<th>Divided, Partial Or Full Control of Access - 2 or 3 Lanes</th>
<th>Divided, Partial Or Full Control of Access - 4+ Lanes</th>
<th>Divided, No Control of Access - 2 or 3 Lanes</th>
<th>Divided, No Control of Access - 4+ Lanes</th>
<th>Two-way, Non-divided - 2 or 3 Lanes</th>
<th>Two-way, Non-divided - 4+ Lanes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Private</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>One-way or Transition</td>
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<td></td>
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<td>Divided, Partial Or Full Control of Access - 2 or 3 Lanes</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Divided, Partial Or Full Control of Access - 4+ Lanes</td>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Divided, No Control of Access - 2 or 3 Lanes</td>
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<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **Signalized Intersection**
- **Unsignalized Intersection**
- **Mid-Block**
- **Parking Lot**
- **Other**

- **0% 20% 40% 60% 80% 100%**
Pedestrian Crashes in Limited Light Conditions

- Pedestrian Fatal Crashes:
  - Daylight: 74%
  - Limited Light: 26%

- Pedestrian Injury Crashes:
  - Daylight: 36%
  - Limited Light: 44%
Driver and Pedestrian Actions in Fatal Crashes

Driver Action
- Making a Left Turn, 21%, 5%
- Going Straight Ahead, 361, 79%
- Other, 14, 4%
- Crossing not at intersection, 33, 2%
- Lying in roadway, 18, 5%

Pedestrian Action
- Crossing at intersection against signal, 35, 34%
- Lying in roadway, 4, 1%
- Standing in roadway, 9, 5%
- Walking in roadway with traffic - sidewalks not available, 45, 12%
- Not in roadway, 29, 18%
- Other, 19, 12%
- Standing in roadway, 1, 5%
- Crossing at intersection no signal, 35, 12%
- Crossing at intersection with signal, 32, 9%

Other Actions
- Other, 2, 9%
- Standing in roadway, 1, 5%
- Walking in roadway with traffic - sidewalks available, 6, 29%
- Crossing not at intersection - urban, 3, 14%
- Other, 7, 12%
Pedestrian Crash Heat Map Example

### CATEGORICAL HEAT MAP
Salem Pedestrian Injury Crashes (2012-2016)

<table>
<thead>
<tr>
<th>Category</th>
<th>Functional Classification</th>
<th>Funding</th>
<th>Roadway Type</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Interstate</td>
<td>Arterial</td>
<td>Collector</td>
</tr>
<tr>
<td>Total Crashes</td>
<td>220</td>
<td># 2</td>
<td>107</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Category</th>
<th>Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Season</td>
<td></td>
</tr>
<tr>
<td>Spring (March - May)</td>
<td>55</td>
</tr>
<tr>
<td>Summer (June - August)</td>
<td>48</td>
</tr>
<tr>
<td>Autumn (September - November)</td>
<td>67</td>
</tr>
<tr>
<td>Winter (December - February)</td>
<td>50</td>
</tr>
<tr>
<td>Location</td>
<td></td>
</tr>
<tr>
<td>Signalized Intersection</td>
<td>38</td>
</tr>
<tr>
<td>Unsignalized Intersection</td>
<td>50</td>
</tr>
<tr>
<td>Mid-Block</td>
<td>116</td>
</tr>
<tr>
<td>Parking Lot</td>
<td>9</td>
</tr>
<tr>
<td>Other</td>
<td>7</td>
</tr>
<tr>
<td>Crosswalk</td>
<td></td>
</tr>
<tr>
<td>Crosswalk Present, Pedestrian Struck In Crosswalk</td>
<td>45</td>
</tr>
<tr>
<td>Crosswalk Present, Pedestrian Not Struck In Crosswalk</td>
<td>2</td>
</tr>
<tr>
<td>Crosswalk Present, Unclear If Pedestrian Was Struck In Crosswalk</td>
<td>1</td>
</tr>
<tr>
<td>No Crosswalk Present</td>
<td>172</td>
</tr>
</tbody>
</table>
Virginia Pedestrian Safety Action Plan (PSAP)

Goals

• Understand Virginia’s pedestrian safety concerns and identify solutions to address them

• Make policy, procedure, and practice changes to help ensure safe pedestrian travel

• Consider the relationship between land development and pedestrian safety

• Consider maintenance issues for pedestrian access and safety

• Identify HSIP pedestrian safety projects
PSAP Steps

Step 1: Policy Review

Step 2: Crash and Data Analysis

Step 3: Countermeasure Selection
Step 1: Policy Review

Summarize and assess current VDOT policies:

- Roadway Design
- Traffic Engineering
- Permitting and land use
- Speed setting procedures
- Pedestrian planning and policy
- Research (countermeasure guidance)
- Project prioritization
## Policy Gap Analysis

<table>
<thead>
<tr>
<th>Policy Type</th>
<th>Tier</th>
<th>Strengths</th>
<th>Weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complete Streets</td>
<td>●</td>
<td>VDOT accepts responsibility for maintenance of eligible sidewalks; includes list of accepted exceptions for providing sidewalks and pedestrian accommodations.</td>
<td>VDOT does not track implementation; exceptions listed in policy are subject to widely varied interpretation.</td>
</tr>
<tr>
<td>Crosswalk Marking</td>
<td>★</td>
<td>VDOT updated guidance as part of TE-384. Considers speed, AADT, and land use context.</td>
<td>Complexity of guidance may lead to less-than-optimal implementation.</td>
</tr>
<tr>
<td>Signalized Intersection Countermeasures</td>
<td>●</td>
<td>Northern Virginia Region guidance considers signal phasing, crossing distance, and turning conflicts for installing pedestrian signals.</td>
<td>No existing guidance statewide.</td>
</tr>
<tr>
<td>Uncontrolled Crossing Countermeasures</td>
<td>★</td>
<td>TE-384 includes multiple countermeasures, such as PHBs and RRFBs.</td>
<td>Does not specifically address refuge islands and does not offer VDOT-specific criteria for PHBs.</td>
</tr>
<tr>
<td>Speed Setting</td>
<td>●</td>
<td>Engineering judgment provides opportunity to consider pedestrian safety.</td>
<td>No guidance or process available for pedestrian activity besides school zone speed setting.</td>
</tr>
<tr>
<td>Design Standards</td>
<td>●</td>
<td>Includes references to refuge islands (medians), crosswalk markings, and signs.</td>
<td>Unclear guidance for assembly of beacons and signs for PHBs and RRFBs.</td>
</tr>
<tr>
<td>Road Diets</td>
<td>●</td>
<td>Northern Virginia Region reviews resurfacing for road diet opportunities.</td>
<td>No existing statewide guidance.</td>
</tr>
</tbody>
</table>

### Key
- ● No Specific Policy Applicable
- ○ Incomplete Guidance or Irregular Application
- ★ Clear Policy and Consistent Application
Example Policy Recommendations

- Consider VDOT-specific installation guidance for pedestrian safety countermeasures not currently in roadway design manual
- Update Traffic Impact Analysis - Pedestrian Levels of Service - per length or duration of pedestrian crossing
- Develop road diet design criteria
- Create guidance for Pedestrian Priority Zones
- Develop a checklist for land development review to consider pedestrian mobility and safety
Step 2: Crash and Data Analysis

Crash Clusters
- smaller scale
- focus on crash types

Priority Pedestrian Corridors
- larger scale
- selected per criteria evaluating risk for crashes
Example Crash Cluster Map
Example Crash Cluster Site: Arlington
Radford: Tyler Avenue (SR 177)

- 5 out of 6 crashes occurred on a two-way, 2-lane median divided roadway.
- All crashes occurred in a 25 mph zone
- 4 out of 6 crashes involved improper or illegal action by the driver.

Community: Radford
VDOT District: 2 (Salem)
Priority Pedestrian Corridors: Criteria Considered

LAND USE FACTORS
✓ Pedestrian destinations (parks, trails, and schools)
✓ MPO urban area/land use data layer
☐ Bus stops and transit/passenger rail stations

SPEED FACTORS
✓ Posted speed limits
☐ Operational speeds

VISIBILITY FACTORS
☐ N/A: Lighting
☐ N/A: Pavement markings and crossing

DESIGN/INFRASTRUCTURE FACTORS
☐ Signal density
☐ Intersection locations
☐ N/A: Sidewalk and path accommodations maintained by VDOT
☐ N/A: Crossing distance

VOLUME/OTHER FACTORS
✓ Pedestrian crash data
✓ Vehicle traffic volumes
✓ Population and employment density (US Census)
✓ Vehicle ownership (US Census)
✓ Poverty levels (US Census)
✓ Prevalence of impaired (alcohol) citations
Corridor Selection and Aggregation

- Eliminate all access controlled highways

- Minimum 1000 foot-length
- Same corridor name/ID
- Within same jurisdiction

Top 1% Scored Segments

Identify nearby segments within top 10%

Aggregate segments into priority corridors
Priority Corridors Statewide
Corridor Scoring Example
Priority Corridor Example: Chesapeake Blvd, Norfolk (VA 194)
Williamson Road (US 11)

Community: Roanoke
VDOT District: 2 (Salem)

- 4-lane undivided roadway with moderate density of commercial and institutional land uses. AADT: ~15,000; Speed Limit: 35

- Minimal crosswalk markings between adjacent residential and commercial land uses.
Step 3: Countermeasure Selection

- Focus on FHWA Proven Safety Countermeasures
- Review other research and guidance: PEDSAFE and NCHRP reports
- Existing VDOT policies
Countermeasure Selection

- Number of travel lanes
- Speed limit
- ADT (i.e. 10,000-15,000 vpd threshold)
- Presence of median or signalized crossing
- Estimated pedestrian activity (per land use context)
- Presence of existing crosswalk markings
- Crash types & prevalence
  - Time of day: Day versus Night
  - At intersection
  - Driver compliance
2018 FHWA Guidance

July 2018 update including RRFB

Describes 6-step process for collecting and analyzing data to identify countermeasure options
Table 1. Application of pedestrian crash countermeasures by roadway feature.

<table>
<thead>
<tr>
<th>Roadway Configuration</th>
<th>Posted Speed Limit and AADT</th>
<th>( \leq 30 \text{ mph} )</th>
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<tbody>
<tr>
<td>2 lanes (1 lane in each direction)</td>
<td></td>
<td>1</td>
<td>2</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td>3 lanes with raised median (1 lane in each direction)</td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>3 lanes w/o raised median (1 lane in each direction with a two-way left-turn lane)</td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>4+ lanes with raised median (2 or more lanes in each direction)</td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>4+ lanes w/o raised median (2 or more lanes in each direction)</td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
</tr>
</tbody>
</table>

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.

- High-visibility crosswalk markings, parking restrictions on crosswalk approach, adequate nighttime lighting levels, and crosswalk warning signs
- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10

1. High-visibility crosswalk markings, parking restrictions on crosswalk approach, adequate nighttime lighting levels, and crosswalk warning signs
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)**
### Table 2. Safety issues addressed per countermeasure.

<table>
<thead>
<tr>
<th>Pedestrian Crash Countermeasure for Uncontrolled Crossings</th>
<th>Safety Issue Addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Conflicts at crossing locations</td>
</tr>
<tr>
<td>Crosswalk visibility enhancement</td>
<td>![ ]</td>
</tr>
<tr>
<td>High-visibility crosswalk markings*</td>
<td>![ ]</td>
</tr>
<tr>
<td>Parking restriction on crosswalk approach*</td>
<td>![ ]</td>
</tr>
<tr>
<td>Improved nighttime lighting*</td>
<td>![ ]</td>
</tr>
<tr>
<td>Advance Yield Here To (Stop Here For) Pedestrians sign and yield (stop) line*</td>
<td>![ ]</td>
</tr>
<tr>
<td>In-Street Pedestrian Crossing sign*</td>
<td>![ ]</td>
</tr>
<tr>
<td>Curb extension*</td>
<td>![ ]</td>
</tr>
<tr>
<td>Raised crosswalk</td>
<td>![ ]</td>
</tr>
<tr>
<td>Pedestrian refuge island</td>
<td>![ ]</td>
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<tr>
<td>Pedestrian Hybrid Beacon</td>
<td>![ ]</td>
</tr>
<tr>
<td>Road Diet</td>
<td>![ ]</td>
</tr>
<tr>
<td>Rectangular Rapid-Flash Beacon</td>
<td>![ ]</td>
</tr>
</tbody>
</table>
Countermeasures: Signage & Pavement Markings

Rectangular Rapid Flashing Beacon (RRFB)

A high-frequency blinking pedestrian warning sign used in tandem with a pedestrian cross sign. The beacon can be activated with pushbuttons or automated pedestrian detection. CRF: 47%

Addresses:
- Visibility
- Crossing
- Awareness

Pedestrian Hybrid Beacon (PHB)

A beacon to warn and control traffic at unsignalized marked crosswalks. Key design components include: overhead beacons, overhead “CROSSWALK STOP ON RED” signs, a crosswalk, and countdown pedestrian signal heads. CRF: 18–37%

Addresses:
- Visibility
- Crossing
- Awareness
A pedestrian signal head that begins a visible and possibly audible countdown at the beginning of the walk phase or clearance (i.e., DON’T WALK) interval to ensure safe crossing.

CRF: 55-70%
Addresses: Crossing Time

A signal timing improvement where pedestrians are given an advance walk signal before motorists get a green signal. Makes pedestrians more visible to motorists and improve yielding

CRF: Unknown
Addresses: Visibility Yielding Behavior
Next Steps for VDOT and Local Agencies

View PSAP Report and Online Map
- ArcGIS Online map showing crash clusters and priority corridors
- Corridor and crash cluster “cut sheet” maps linked

Coordinate review with VDOT staff / local agency
- Review local plans, crash reports, and site conditions
- Discuss refined countermeasures

Develop and submit HSIP and/or SMART SCALE projects
- Project nominations due November 1, 2018
- $8 Million in HSIP funding for PSAP Phase 1 Projects

VDOT is also moving policy recommendations forward
Thanks!

For more information:

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FHWA Technical Assistance

**STEP Workshops**

**Road Safety Audits/Assessments**

**Scan Tours**

**Peer Exchange**

**Conference Presentations**

**STEP Action Plans**

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Arkansas – Tennessee Scan Tour
Source: FHWA
State-Based Innovation Deployment -
The STIC Network is about establishing a group of representatives from various levels of the highway community in each State to comprehensively and strategically consider all sources of innovation.

Read more >>

STIC Incentive Program

Offers technical assistance and funds—up to $100,000 per STIC per year—to support the costs of standardizing innovative practices in a state transportation agency or other public sector STIC stakeholder.

Click here for a list of Projects Awarded »

STIC Network

Get involved with your STIC or contact a member within your state.

State Innovation Accomplishments

The Power of the STIC (videos)
EDC-5 Funding Opportunities:

- **State Transportation Innovation Council (STIC) Incentive**
  - Up to $100,000 per STIC per year to standardize an innovation
  - [https://www.fhwa.dot.gov/innovation/stic/](https://www.fhwa.dot.gov/innovation/stic/)

- **Accelerated Innovation Deployment (AID) Demonstration**
  - Up to $1 million available per year to deploy an innovation not routinely used
  - [https://www.fhwa.dot.gov/innovation/grants/](https://www.fhwa.dot.gov/innovation/grants/)
Innovation Deployment News

Weekly newsletter

To Subscribe:
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Text: Send “FHWA Innovation” to 468311
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During these 90 minutes... we’ve lost another pedestrian and life.