

The background image shows a suburban street scene with a crosswalk. A white car is driving through the crosswalk, and a person is walking across it. There are trees and a white fence in the background. A large yellow diamond-shaped pedestrian crossing sign is visible on the right side of the image.

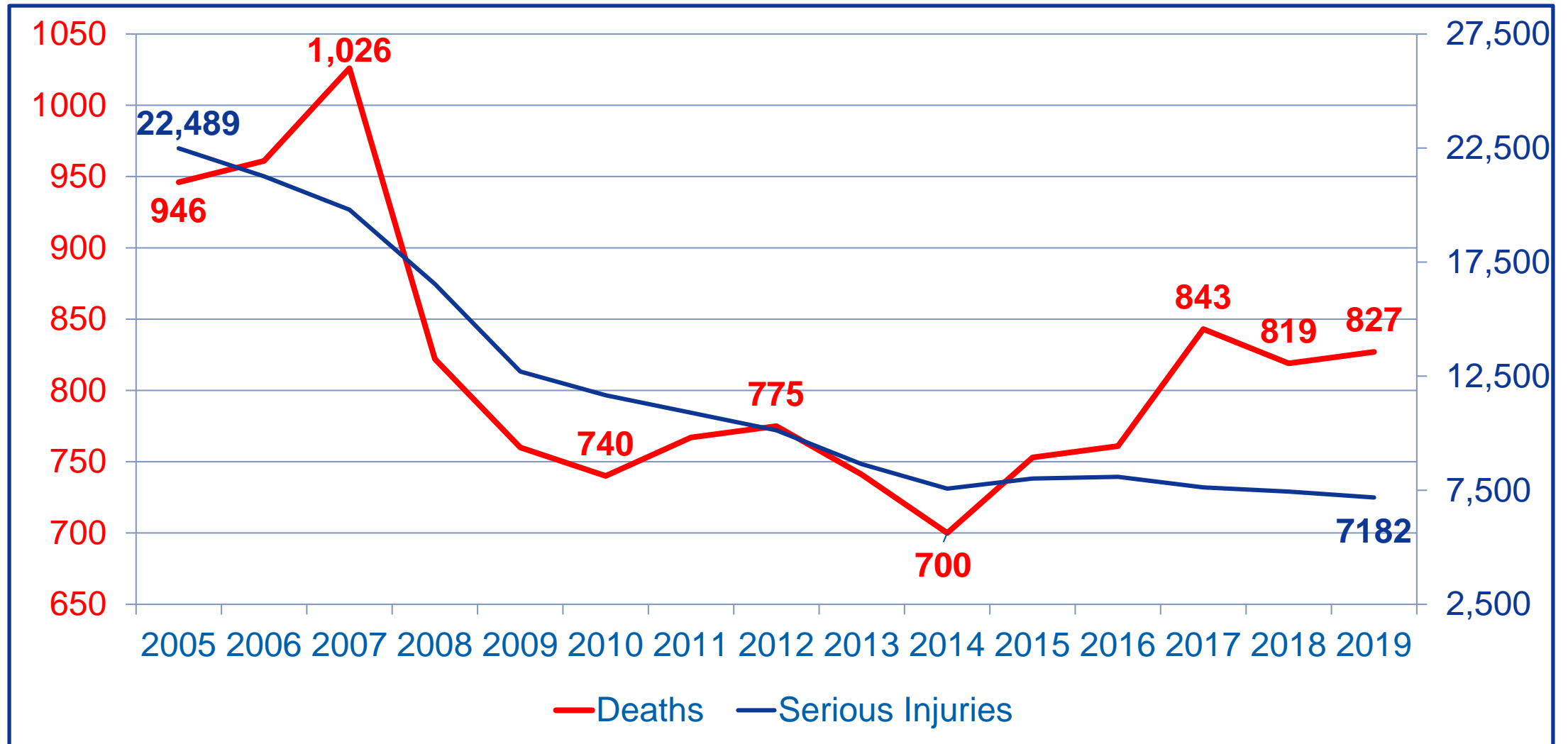
VDOT'S PEDESTRIAN SAFETY EFFORTS ON SUBURBAN ARTERIALS

Vision Zero Arterial Design Webinar

Mark A. Cole, PE, Virginia Department of Transportation

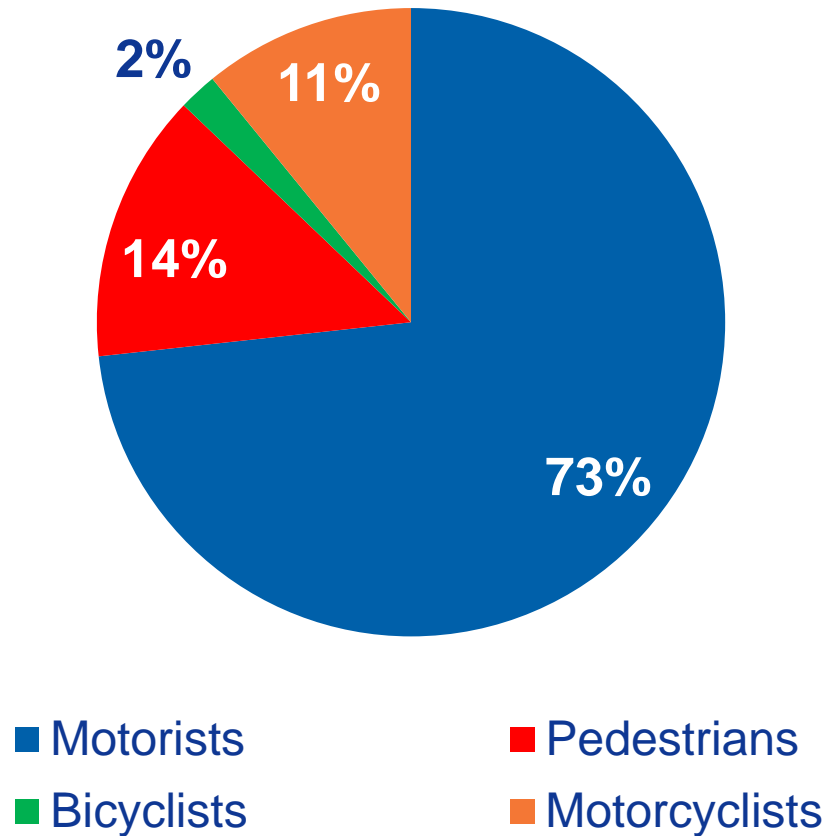
April 23, 2021

Virginia Traffic Deaths and Serious Injuries (2005 - 2019)

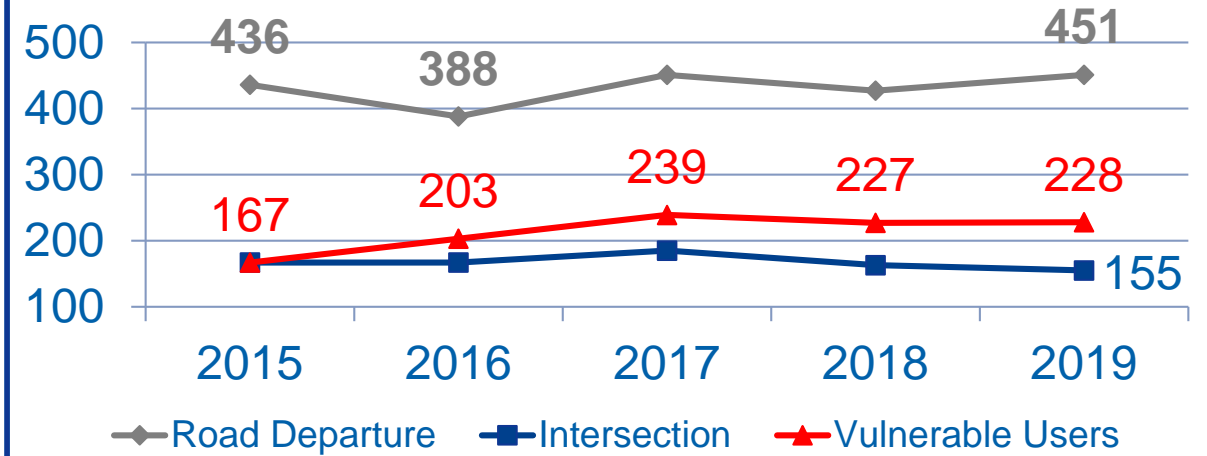


Virginia Traffic Death Trends (2015 – 2019)

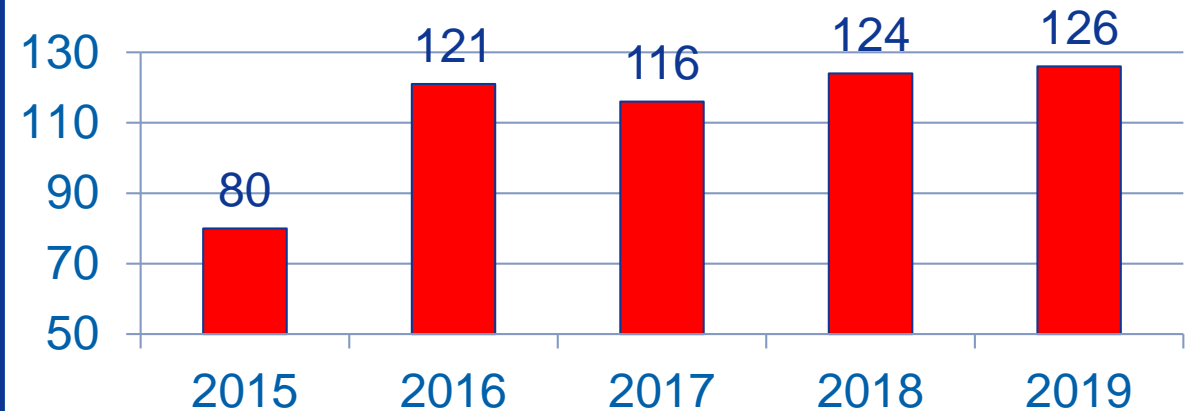
Virginia Traffic Deaths By Traveler Type (%)



Deaths



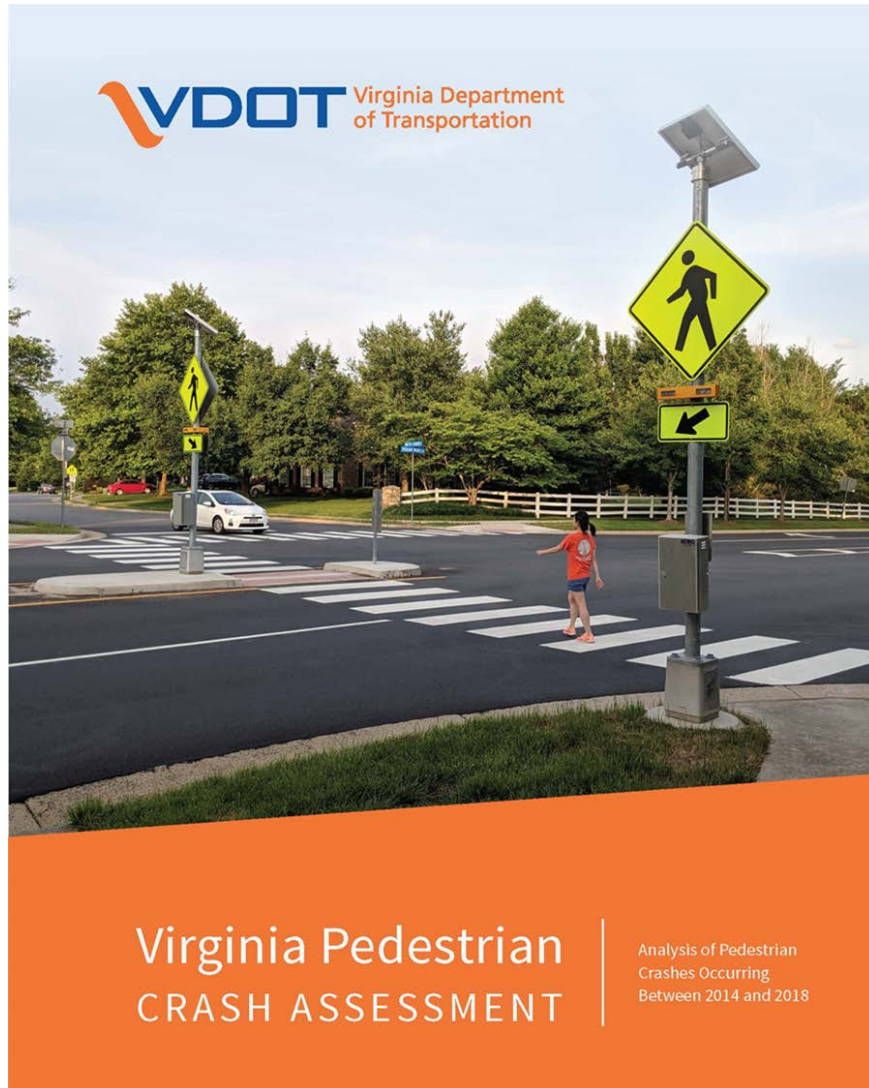
Pedestrian Deaths



Talking Points

- **Virginia Pedestrian Crash Assessment**
- **Pedestrian Crashes on Suburban Arterials**
- **Virginia's Pedestrian Safety Action Plan (PSAP)**
- **Ongoing pedestrian safety infrastructure projects**

Virginia Pedestrian Crash Assessment



- Analyzes pedestrian crashes
- First published in 2016
 - updated in 2017 and 2020
- Uses a variety of data sources to:
 - Understand common factors among crashes
 - Identify crash trends across time



5 Big Things We Learned From the Crash Assessment

1. Over 90% of Pedestrian deaths Occur while Crossing the Street/Road

However, crossing infrastructure is not available most of the time.

2. Land Use Matters

If its urban or suburban, pedestrians will almost always be present and need to cross the road.

3. Speed Can be Deadly

Chance of death increases with speed, especially for pedestrians

4. Visibility is Crucial

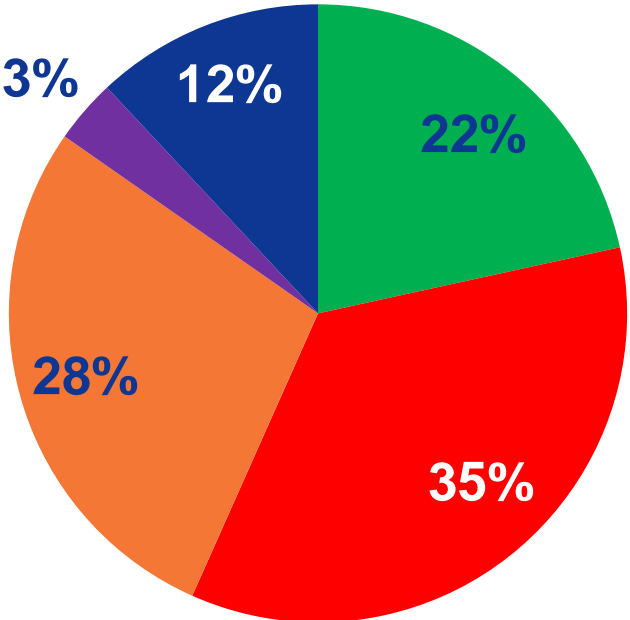
77% of pedestrian deaths occur in limited light conditions.

5. Healthy Communities Have Better Pedestrian Safety Outcomes

60% of pedestrian deaths & injuries occur in locations with low or very low health opportunity

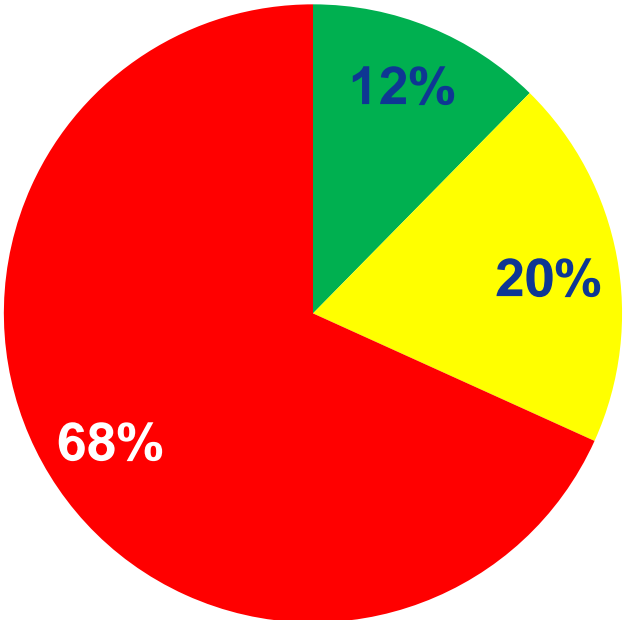
1. Over 90% Of Ped Deaths Occur while Crossing the Road

Where Virginia's Fatal Pedestrian Crashes Happen (%)



- Signalized Intersection
- Mid-Block
- Other
- Unsignalized Intersection
- Intersection/Mid-Block

Virginia's Fatal Pedestrian Crashes & Marked Crosswalk Availability (%)



- Crosswalk Available - Pedestrian Struck In Crosswalk
- Crosswalk Available - Pedestrian Not in Crosswalk
- No Crosswalk Available

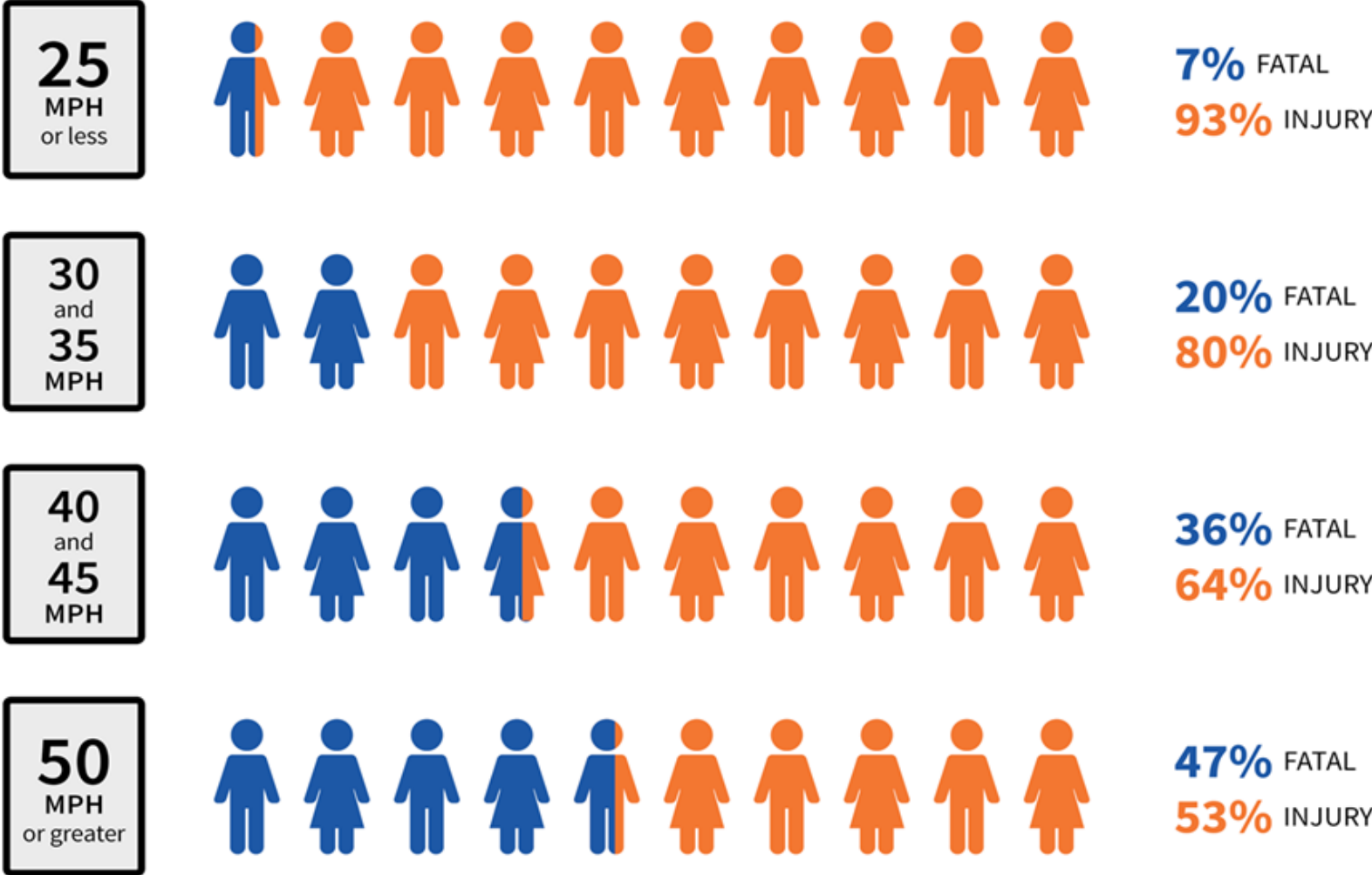
2. Land Use Matters

Pedestrian Crashes By Land Use (2014-2018)



3. Speed Can be Deadly

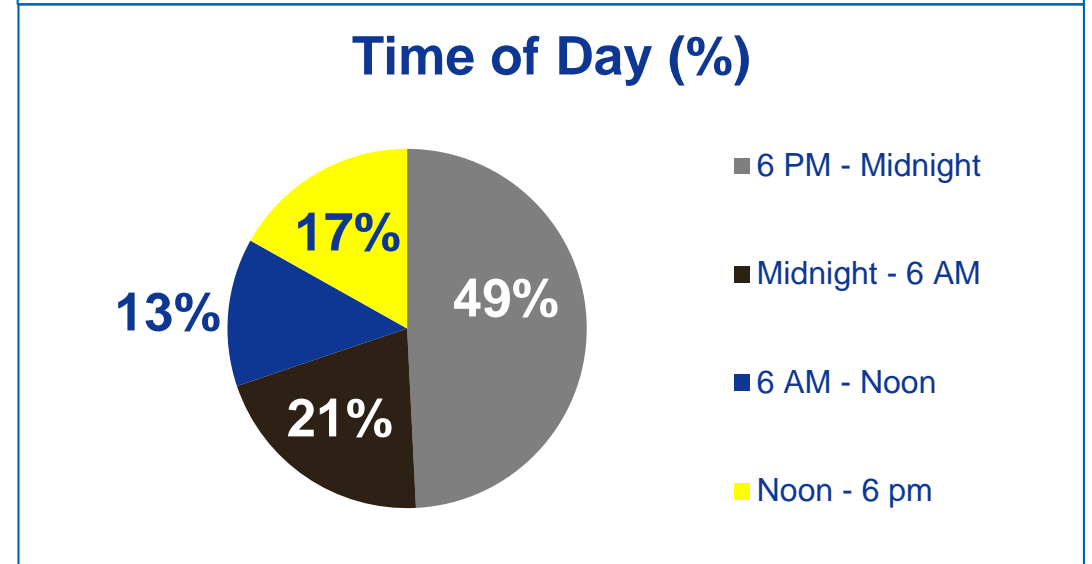
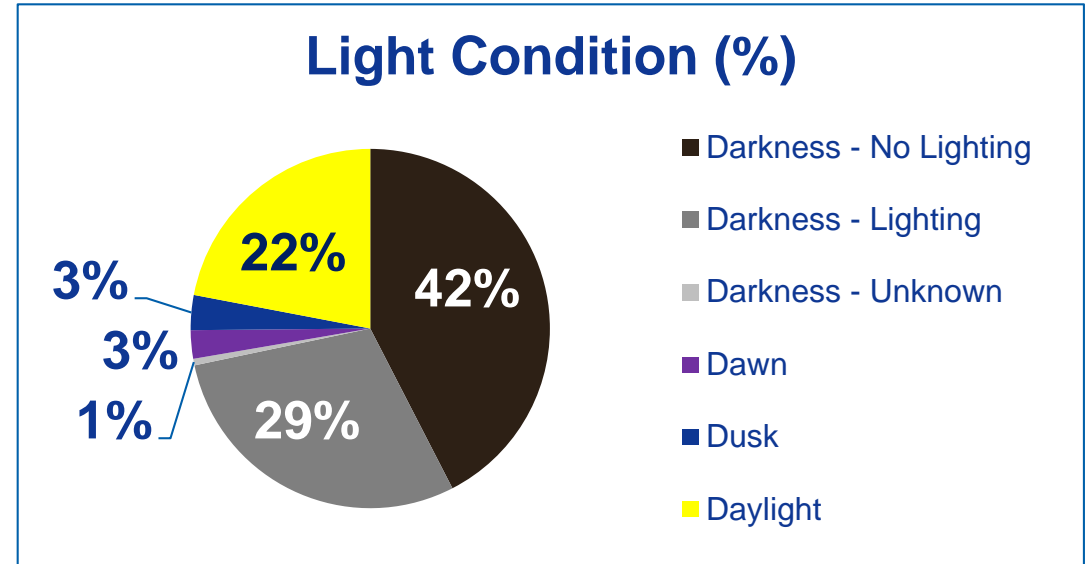
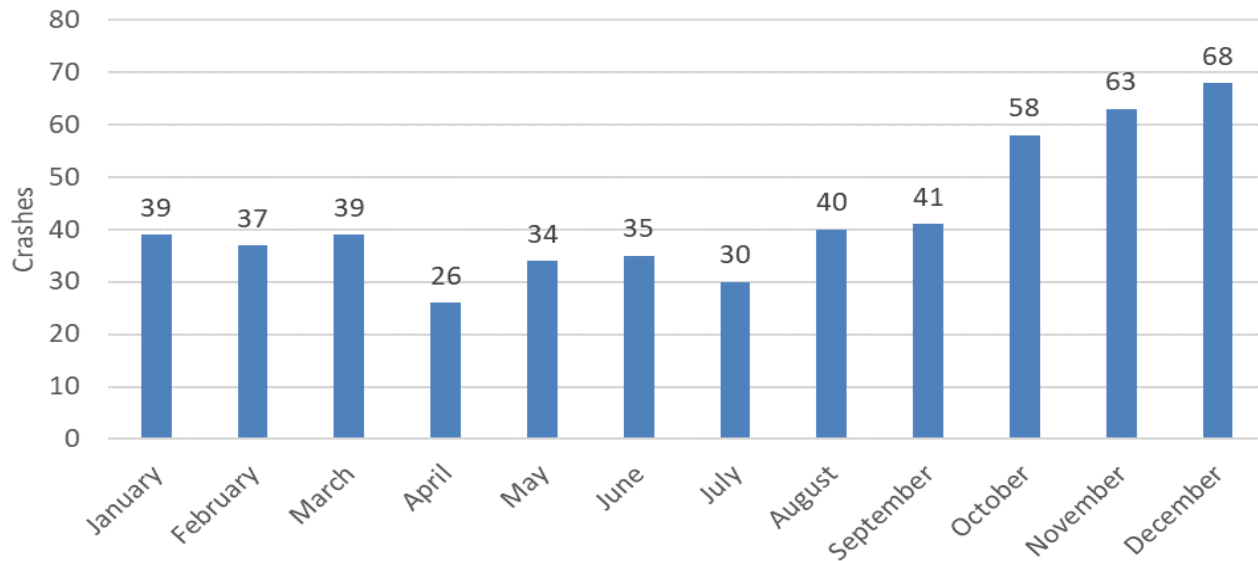
Virginia Pedestrian Crash Severity By Speed Limit (2014-2018)



4. Visibility is Crucial

Pedestrian fatal crashes by:

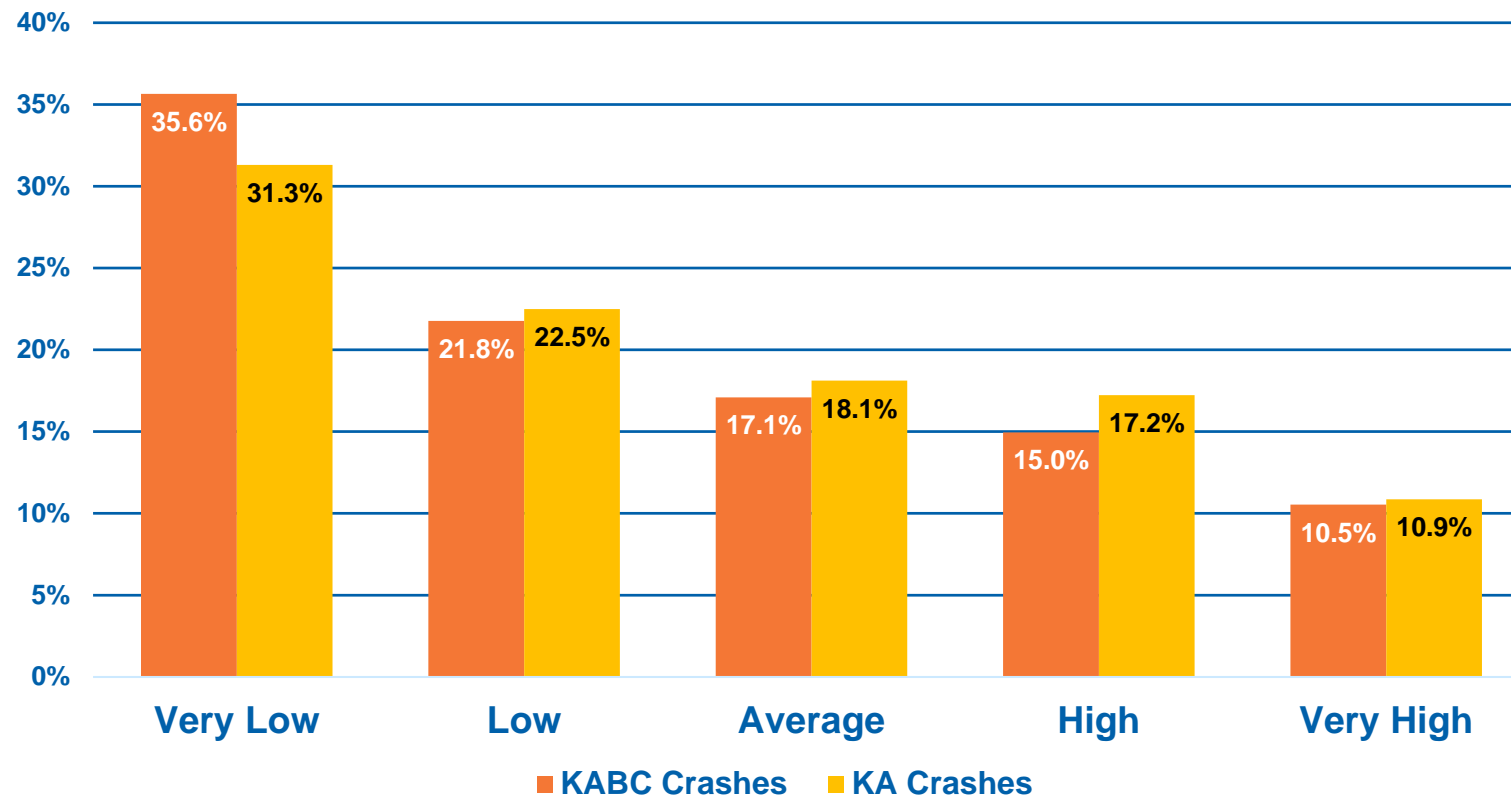
- light condition
- Month
- time of day



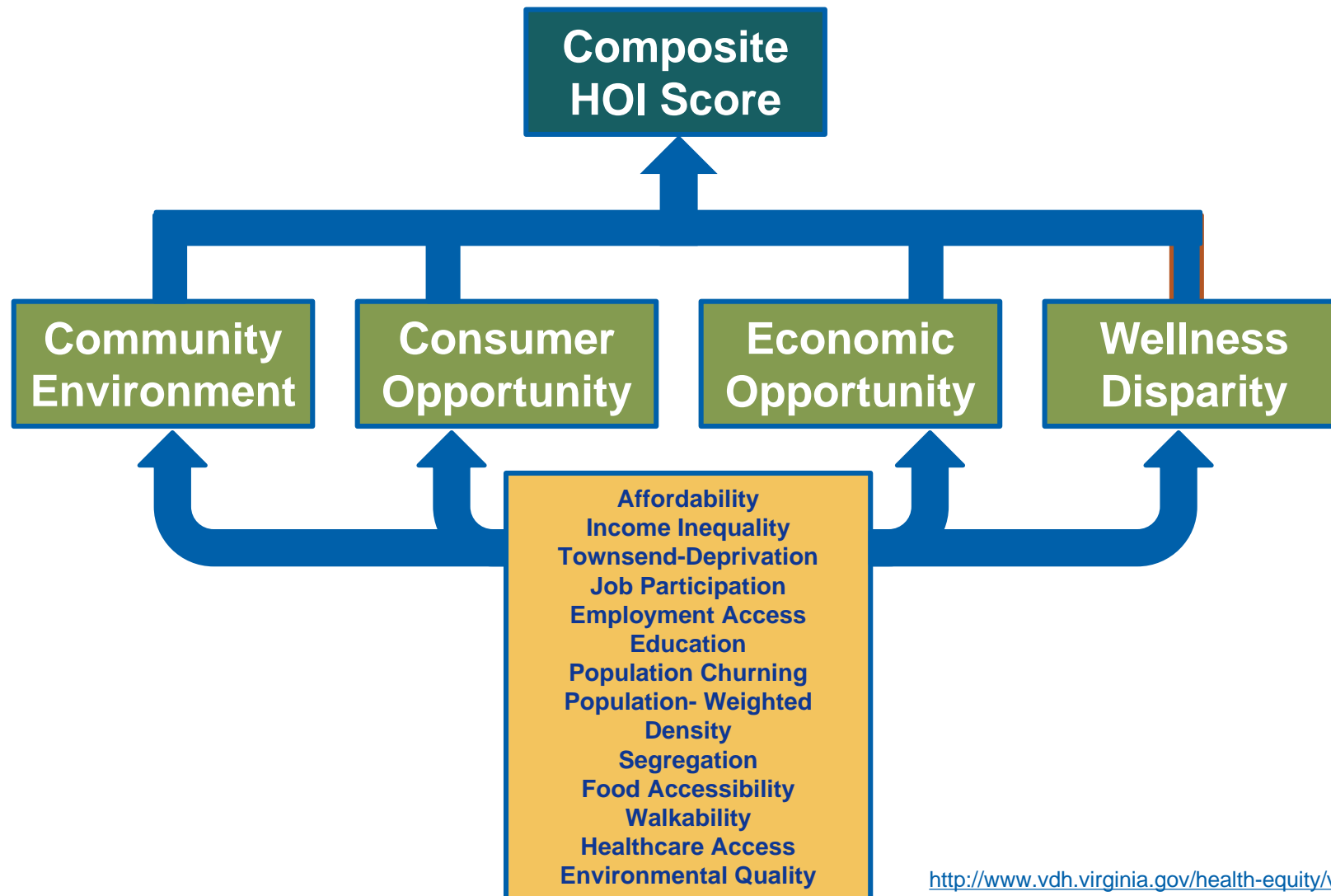
5. Healthy Communities Have Better Pedestrian Safety Outcomes

Almost 60% of deaths and injuries occur in locations with VERY LOW or LOW Virginia Health Opportunity Index (HOI) Scores

Distribution of Pedestrian Crashes by HOI Category
(2014-2018)



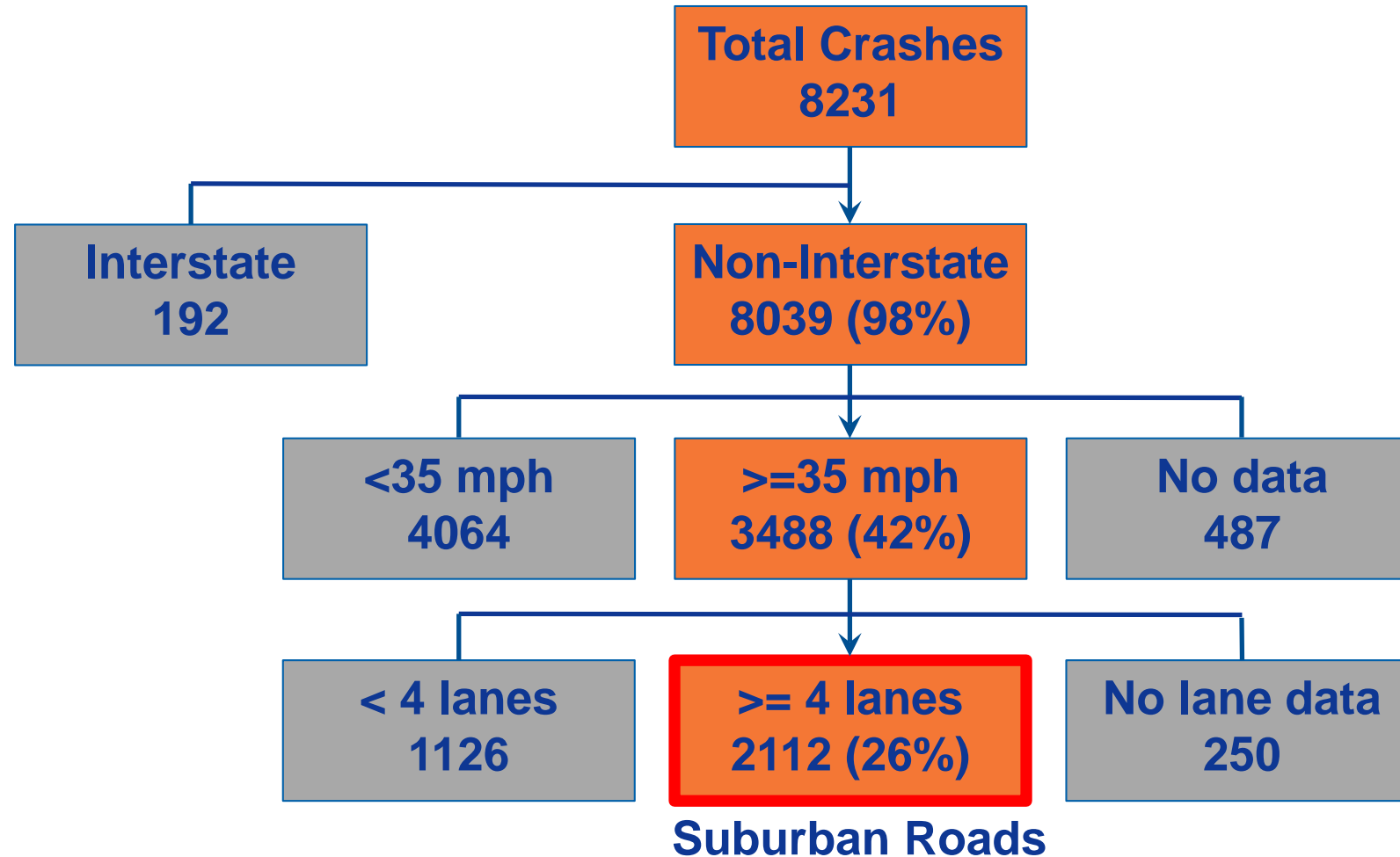
Virginia Health Opportunity Index (HOI)



<http://www.vdh.virginia.gov/health-equity/virginia-health-opportunity-index-hoi/>

Pedestrian Crashes on Suburban Arterials

Virginia Pedestrian Crashes 2014 - 2018



Virginia Suburban Roads and Pedestrian Safety

Suburban road crashes are 26% of all pedestrian crashes BUT...

46% of all pedestrian fatalities

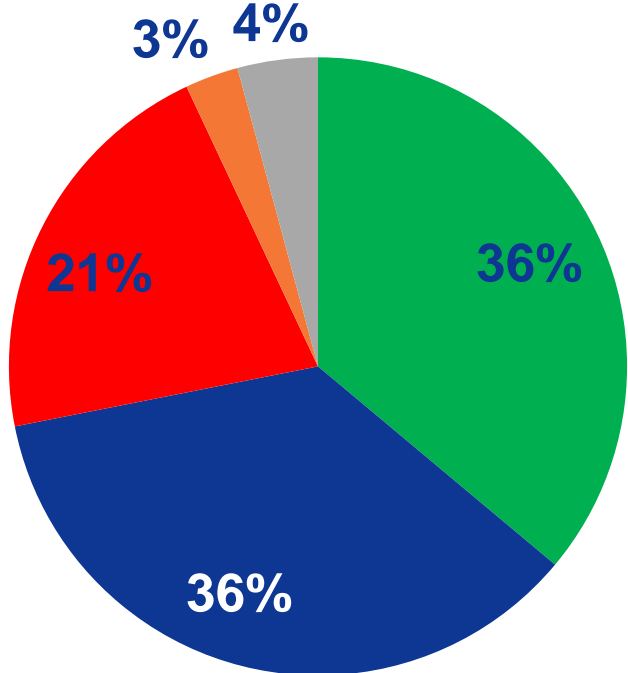
If struck on a suburban road, a pedestrian is

2.5 times more likely to die

when compared to other roads in Virginia.

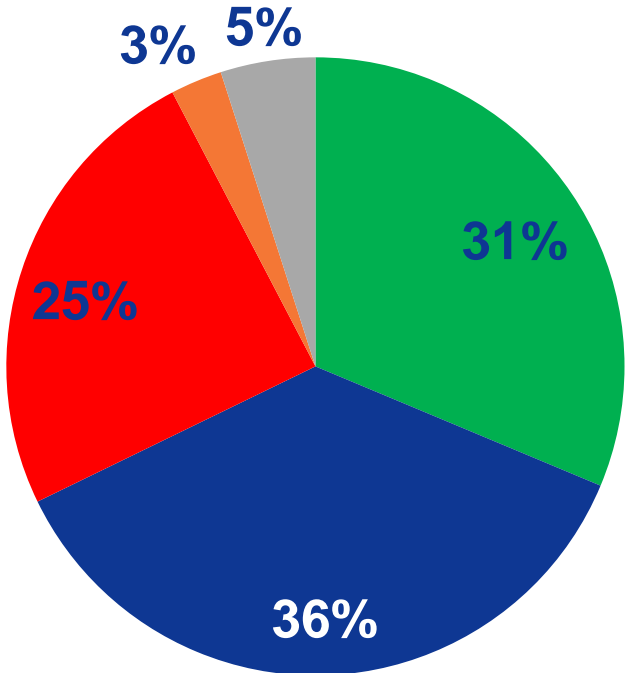
Where Virginia's Suburban Road Pedestrian Crashes Happen

Where Virginia's Suburban Road Pedestrian Crashes Happen (%)



- Signalized Intersection
- Mid-Block
- Other
- Unsignalized Intersection
- Intersection/Mid-Block

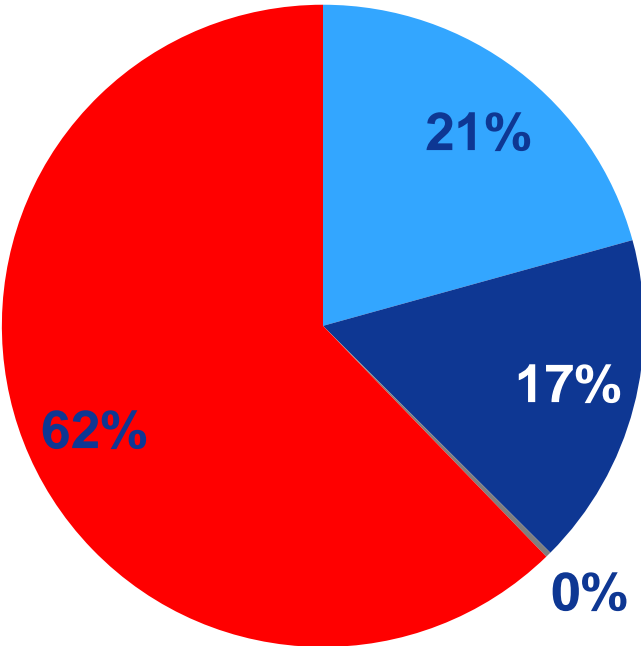
Where Suburban Road K&A Pedestrian Crashes Happen (%)



- Signalized Intersection
- Mid-Block
- Other
- Unsignalized Intersection
- Intersection/Mid-Block

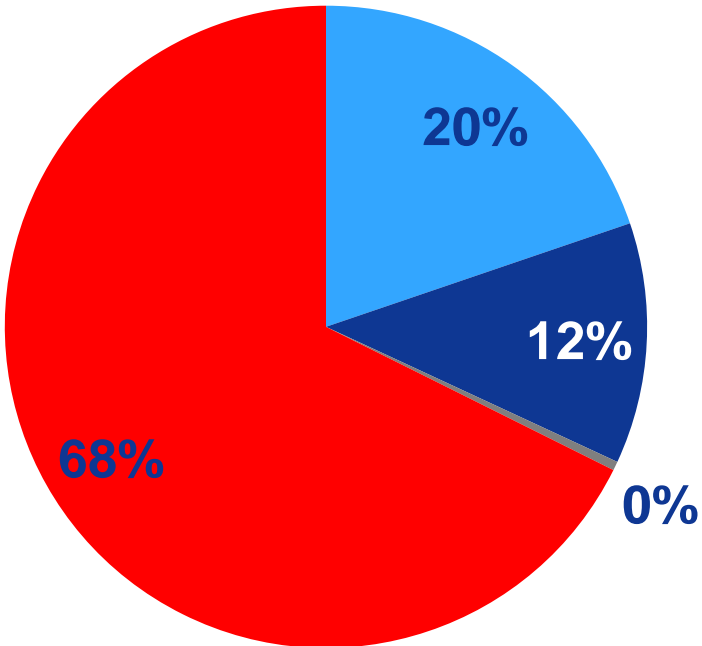
Marked Crosswalk Presence and Suburban Ped Crashes

All Suburban Road Ped Crashes



- Crosswalk Present, Pedestrian Not Struck In Crosswalk
- Crosswalk Present, Pedestrian struck in Crosswalk
- Crosswalk Present, Unclear if Pedestrian Struck in Crosswalk
- No Marked Crosswalk Available

K&A Suburban Road Crashes



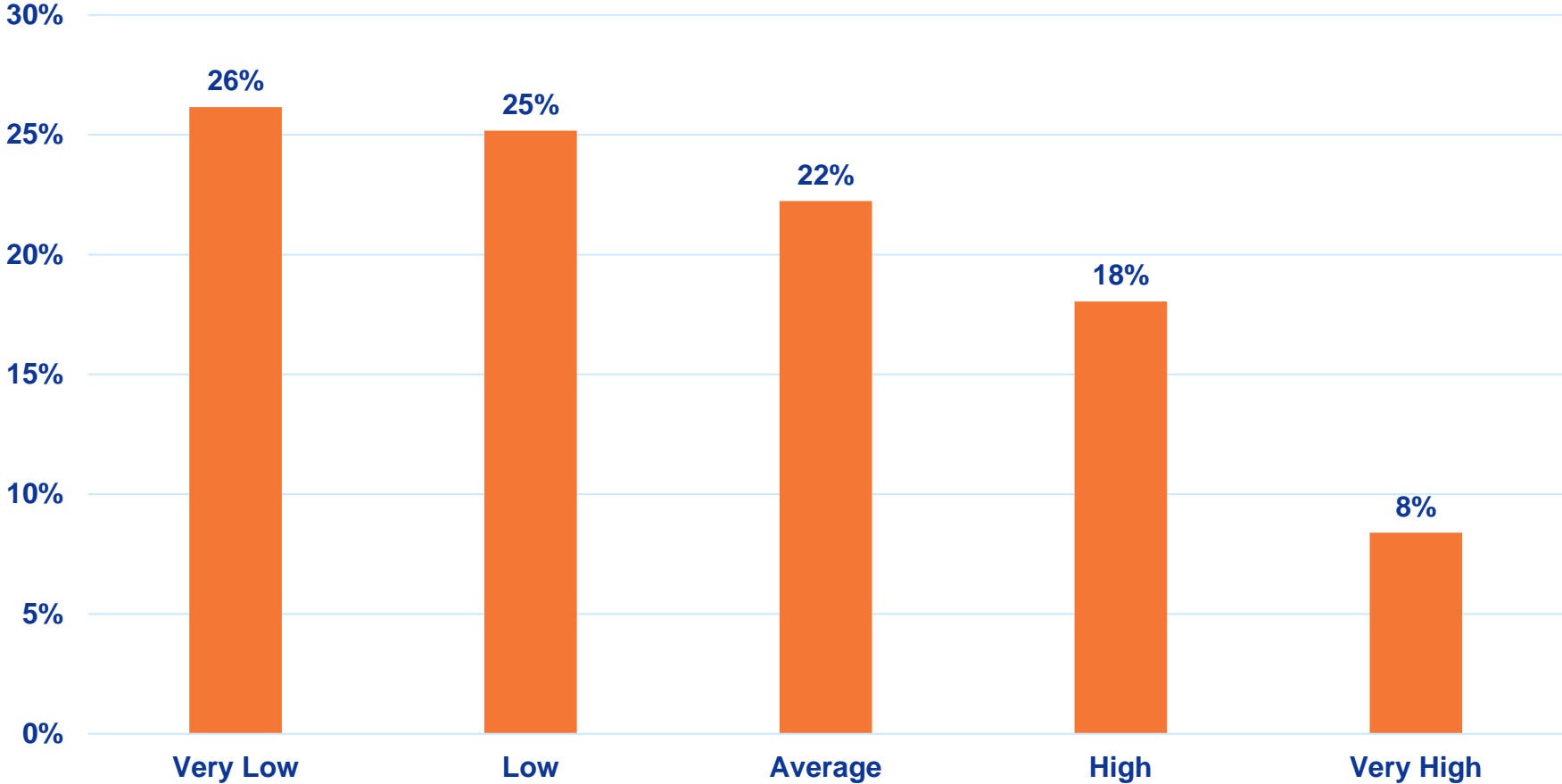
- Crosswalk Present, Pedestrian Not Struck In Crosswalk
- Crosswalk Present, Pedestrian struck in Crosswalk
- Crosswalk Present, Unclear if Pedestrian Struck in Crosswalk
- No Marked Crosswalk Available

Crosswalk presence By Location – K&A Ped Crashes Suburban Roads

Location Type	No Crosswalk Available (%)	Available, Ped Not in Crosswalk (%)	Available, Ped in Crosswalk (%)	Available, Unclear if Ped in Crosswalk (%)
Signalized Intersection	37	29	33	1
Unsignalized Intersection	75	21	4	0
Mid-block	88	11	1	0
Mid-block/Intersection	75	25	0	0
Other	100	0	0	0

Health Opportunity Index (HOI)

Distribution of Pedestrian Crashes on Suburban Roads by HOI Category (2014-2018)*

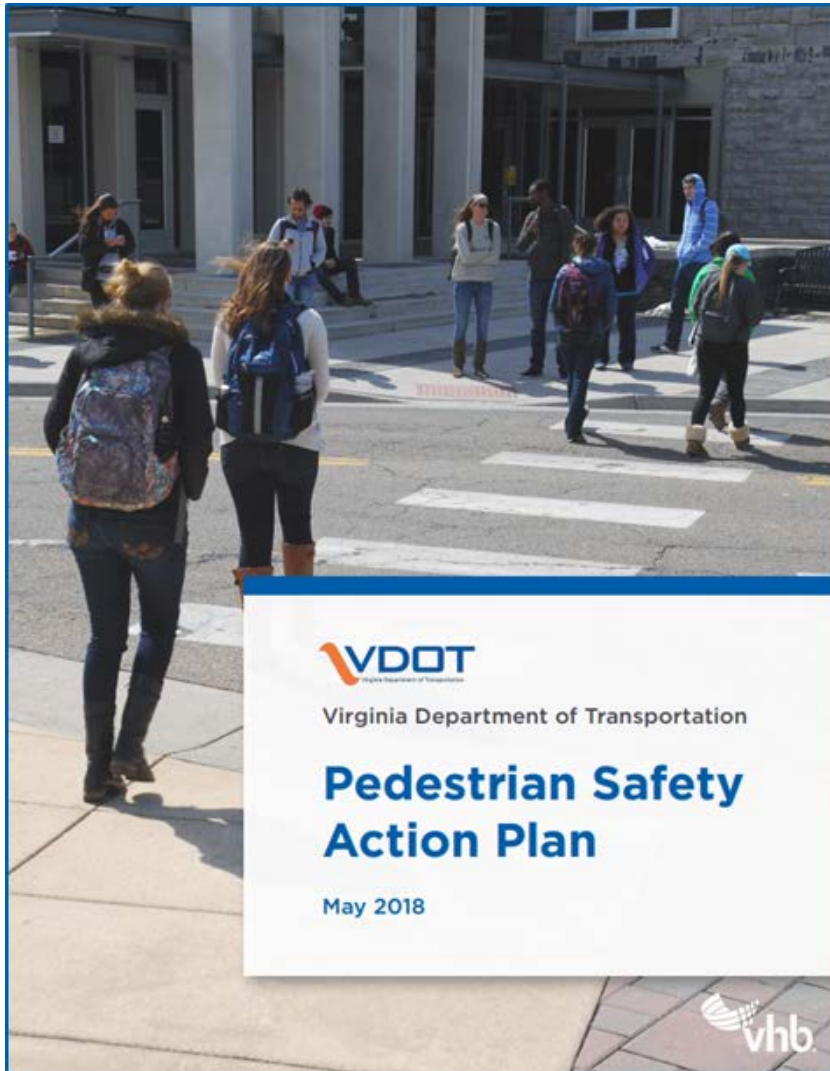


Other Factors in Pedestrian Crashes on VA Suburban Roads

Factor	All Ped Crashes (%)	Fatal Ped Crashes (%)
Pedestrian Land Uses	91	87
Limited Light (Dark, Dusk, Dawn)	67	83
Bus Stop within 500 feet	52	47
Pedestrian Drinking	31	51

Virginia's Pedestrian Safety Action Plan (PSAP)

Virginia Pedestrian Safety Action Plan (PSAP)



3 Major Components:

- 1 – VDOT Policy Recommendations to ensure pedestrian safety
- 2 – Safety Analysis to determine which specific road locations pose the greatest risk for pedestrians
- 3 – Pedestrian safety countermeasure toolbox

Top 5 PSAP Policy Recommendations

1. Update VDOT pedestrian crossing policies – UNDERWAY
2. Incorporate pedestrian safety into maintenance activities – UNDERWAY
3. Develop Virginia Road Diet Guidelines – UNDERWAY
4. Create flowchart for PSAP projects in HSIP program
5. Develop Pedestrian Priority Zone Criteria - UNDERWAY



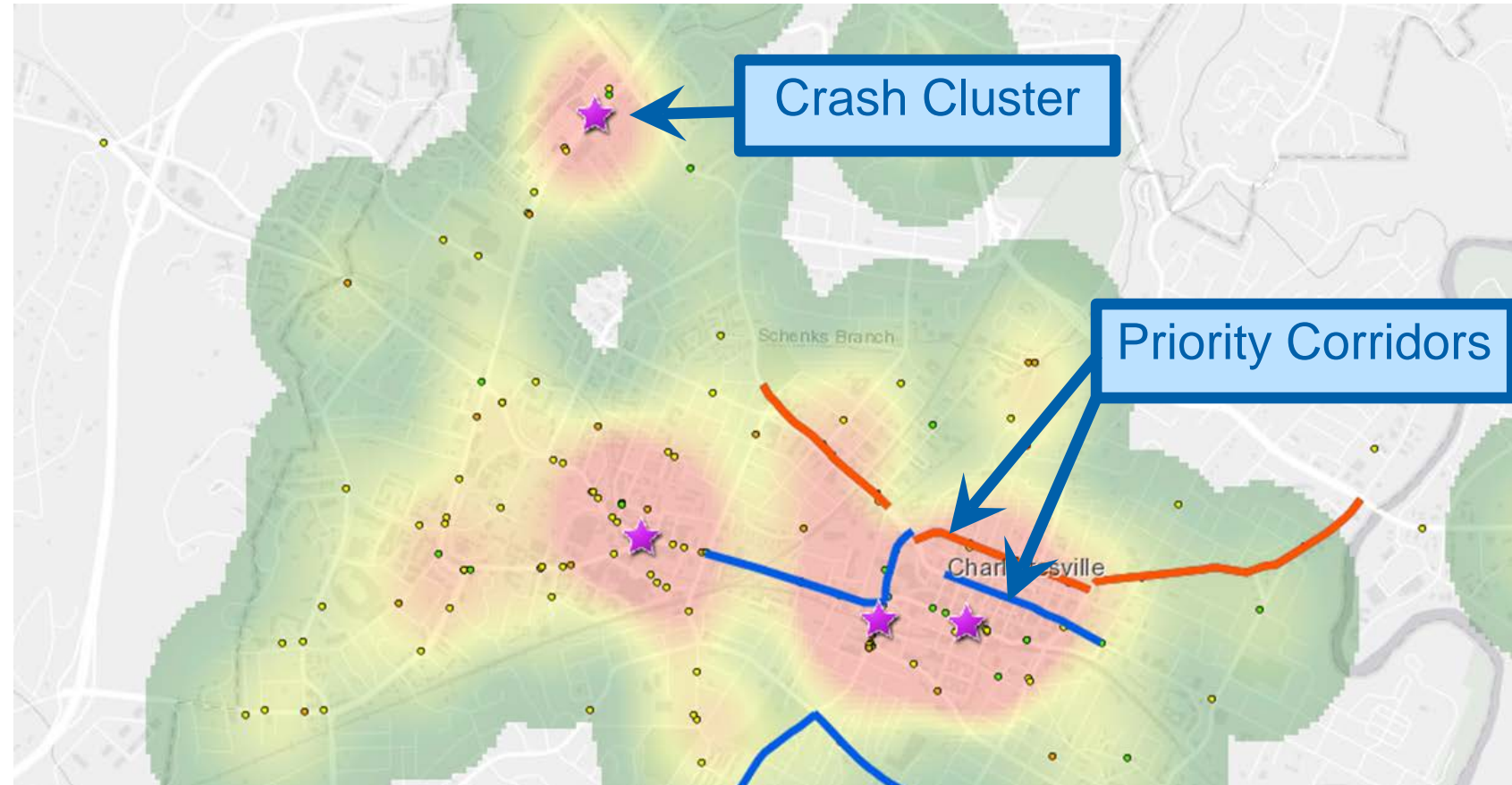
Safety Analysis – Crash Clusters and Priority Corridors

Crash clusters

- Density map of actual crash locations
- Look back

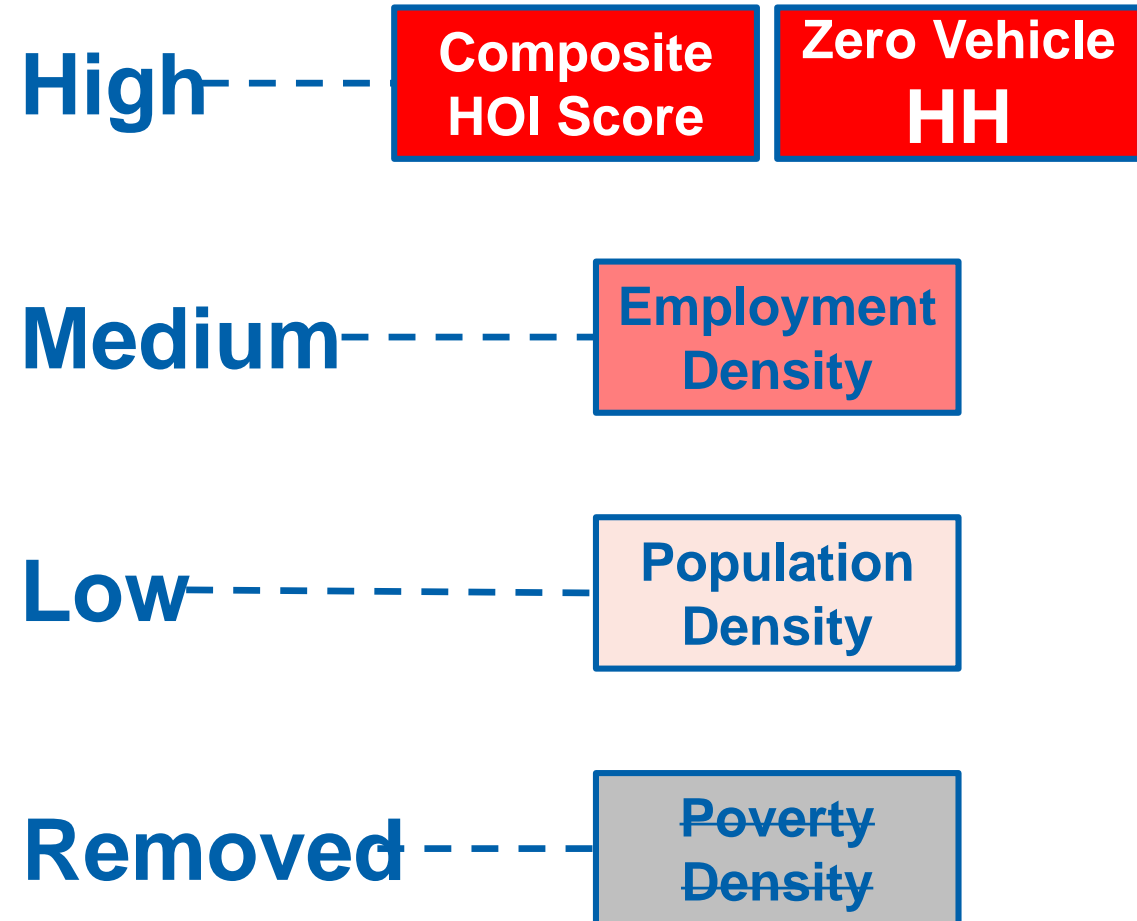
Priority Corridors

- Top ranked corridors based on scoring criteria that used various data sources indicating pedestrian presence or risk
- Predictive



Spatial Bayesian Analysis to Examine Health Opportunity Index

- HOI and zero vehicle households were the strongest indicators of pedestrian crashes – both all injury crashes and fatal/severe only crashes.
- Employment density was another strong indicator
- Population density and density of persons in poverty were poorer performers
 - Poverty alone was dropped in the PSAP scoring



Priority Corridor Criteria – 2019 Update

2019 PSAP Corridor Scoring Factors

High	Medium	Low
<ul style="list-style-type: none"> • Annual average daily traffic (AADT) • Zero-vehicle households • Transit access • Health Opportunity Index (HOI) 	<ul style="list-style-type: none"> • Roadway geometry • Employment density • Proximity to a school • Posted speed limit 	<ul style="list-style-type: none"> • Pedestrian crash history • Proximity to a park • Population density • Urban/rural context • Proportion of alcohol related crashes (by district) • Population living below the poverty line

Pedestrian Safety Countermeasure Toolbox

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

PSAP Online Mapping Tool - https://bit.ly/VDOTPSAP_V2

Welcome to VDOT's Ped Safety Action Plan (PSAP) Map Viewer!

This map works in conjunction with Virginia's award-winning PSAP report, which can be read and downloaded by clicking [HERE](#)

You can also read and download the supporting Virginia Pedestrian Crash Assessment report by clicking [HERE](#)

The map defaults to show Version 2 (the latest version) by default, that includes pedestrian corridors and crash clusters that have been identified as a result of the latest PSAP analysis methods. Version 2 is based on crashes that occurred between 2014 and 2018 and the priority pedestrian corridors are organized into three tiers as follows:

- Priority 1 (P1), shown in red, which represent the corridors that score in the top 0.1% of scored corridors in the state
- Priority 2 (P2), shown in blue, which represent the corridors that score in the top 1% of scored corridors, and
- Priority 3 (P3), shown in green, which represent corridors that score in the top 5% of scored corridors

Version 2 pedestrian crash clusters can be shown by turning the crash clusters layer on. The top crash clusters in each VDOT District are noted by yellow stars.

The original PSAP (Version 1) can still be viewed using this viewer. For a brief video tutorial on how to toggle between Version 1 and Version 2, please click [HERE](#). Finally, to download the underlying GIS data for Version 2, please click [HERE](#)

For more information, please contact:

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OK

Download PSAP

Download Pedestrian Crash Assessment

VDOT Pedestrian Safety Action Plan (PSAP)

Find address or place

PSAP 2.0 - Top Crash Clusters

PSAP 2.0 - Priority Corridors

- Priority 1 - Top 0.1%
- Priority 2 - Top 1%
- Priority 3 - Top 5%

PSAP 2.0 - Heat Map

dens_14_18

PSAP Pedestrian Safety Infrastructure Projects

- **Fall 2018 – Initial \$8M for ped crossing projects at 25 PSAP locations**
- **Fall 2019 – Additional \$25 Million approved for PSAP improvements**
 - **All VDOT signals on PSAP priority corridors will be evaluated to receive crosswalks and ped countdowns over a five –year period (over 370 signals in NOVA)**
- **Summer 2021 – Pedestrian Pilot Project on Suburban Arterials**
 - **5 to 10 locations Total**
 - **Screening Criteria:**
 - PSAP corridors
 - 40 mph plus posted speed
 - 15,000 plus AADT
 - 4 or more lanes



Potential Pilot Treatments

- Dwell on Red
- Side-Mounted Pedestrian Hybrid Beacons
- Pedestrian Gateway Treatments
- Dynamic Crosswalk Lighting
- Left and Right-Turn Hardening
- Danish Offset



Virginia's PSAP

2019 National Roadway Safety Award Winner

2019 National Roadway Safety Awards

NOTEWORTHY PRACTICES GUIDE

WINNERS

Recognizing proven lifesaving achievements by public agencies from across the country

Jointly sponsored by the
Federal Highway Administration
and the Roadway Safety Foundation

WINNER (PPDE) VIRGINIA — 2019 NOTEWORTHY PRACTICES GUIDE

WINNER (PPDE): Virginia's Pedestrian Safety Action Plan (PSAP)

The Safety Concern: Between 2012 and 2016, over 450 pedestrians died and another 8,000 were injured while walking across or along public roads in Virginia.

The Solution: VDOT created a PSAP to better understand Virginia's pedestrian safety concerns, recommend policy changes, and identify and fund locations for pedestrian safety projects.

The Result: The PSAP report and online map were completed in May 2018 and in November 2018, VDOT awarded \$8 million to 25 pedestrian safety projects at PSAP-identified locations.

Pedestrian safety is a major concern in Virginia. Between 2012 and 2016, over 450 pedestrians died and over 8,000 were injured while walking along or across Virginia's public roads. Over 90 percent of Virginia's pedestrian crashes occur when the pedestrian is crossing the street. More than half (62% of crashes) occur at mid-block pedestrian crossings.

In the spring of 2018, the Virginia Department of Transportation (VDOT) released its first statewide Pedestrian Safety Action Plan (PSAP), a national model focusing on sites where safety countermeasures should be considered to improve pedestrian safety. The PSAP process, led by VDOT and a stakeholder team, evaluated all public road segments in Virginia to determine locations with a history of, or potential for, pedestrian safety concerns. This evaluation demonstrated the interaction between the built environment and pedestrian safety.

During the summer of 2018, VDOT hosted a series of workshops across the Commonwealth to walk VDOT, local agency staff and contractors through the final report and interactive website and mapping tool, introducing them to the priority pedestrian corridors and crash clusters in their respective areas.

The educational workshops fostered partnerships with local agencies by quickly identifying low-cost, high-benefit countermeasures. To be funding, proposed project locations on a priority project, a crash cluster identified prioritized projects that quickly, by 2019 or earlier.

Fifty-nine candidate PSAP projects at over \$43 million were within weeks of the funding. After evaluating submissions in 2018, VDOT announced \$8 million to 25 projects. VDOT will monitor projects that the team expects a reduction in pedestrian crashes at locations where PSAP countermeasures are installed.

Agency: Virginia Department of Transportation (VDOT)
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Photo courtesy of VDOT
Pacific Avenue, Virginia Beach PSAP Improvements

Thanks!

For more information, view VDOT's Pedestrian Safety Action Plan (PSAP) report and map tool at:

https://bit.ly/VDOTPSAP_V2

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