



New SHSP 2024-2028 & Vulnerable Road Users Assessment

Meeting West Region
September 1, 2023

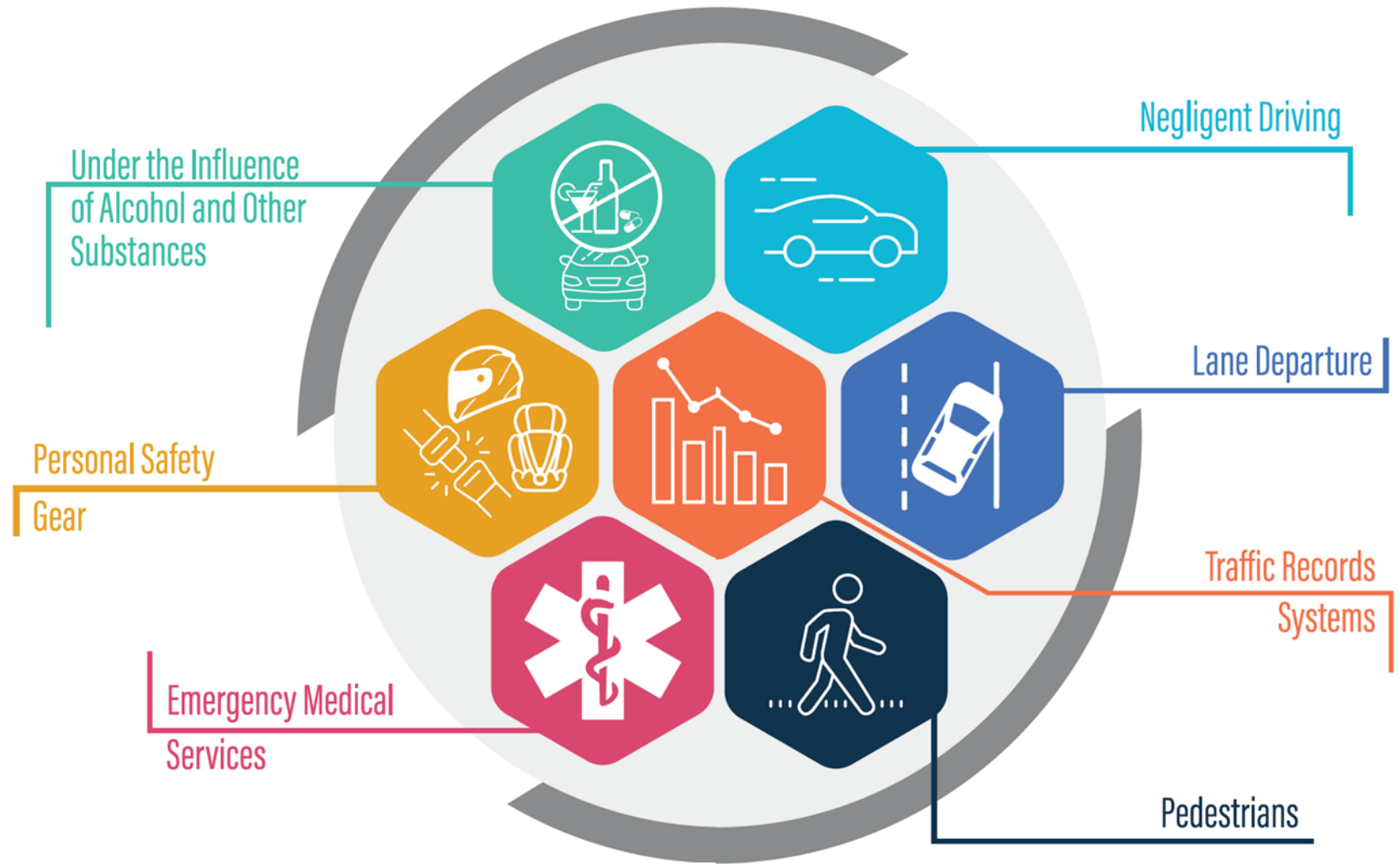


SHSP
STRATEGIC HIGHWAY SAFETY PLAN

1

SHSP 2024-2028 Overview

Current 2019-2023 Emphasis Areas



New Emphasis Areas (2024-2028)

High Priority Areas

- Vulnerable Road Users
- Speed Management
- Impaired Driving
- Occupant Protection
- Lane Departure
- Communication Integration

Focus Areas

- Traffic Records Systems
- Motorcyclists
- Aging Drivers (65+)
- Legislations & Procedures

The Safe System Approach

THE SAFE SYSTEM APPROACH



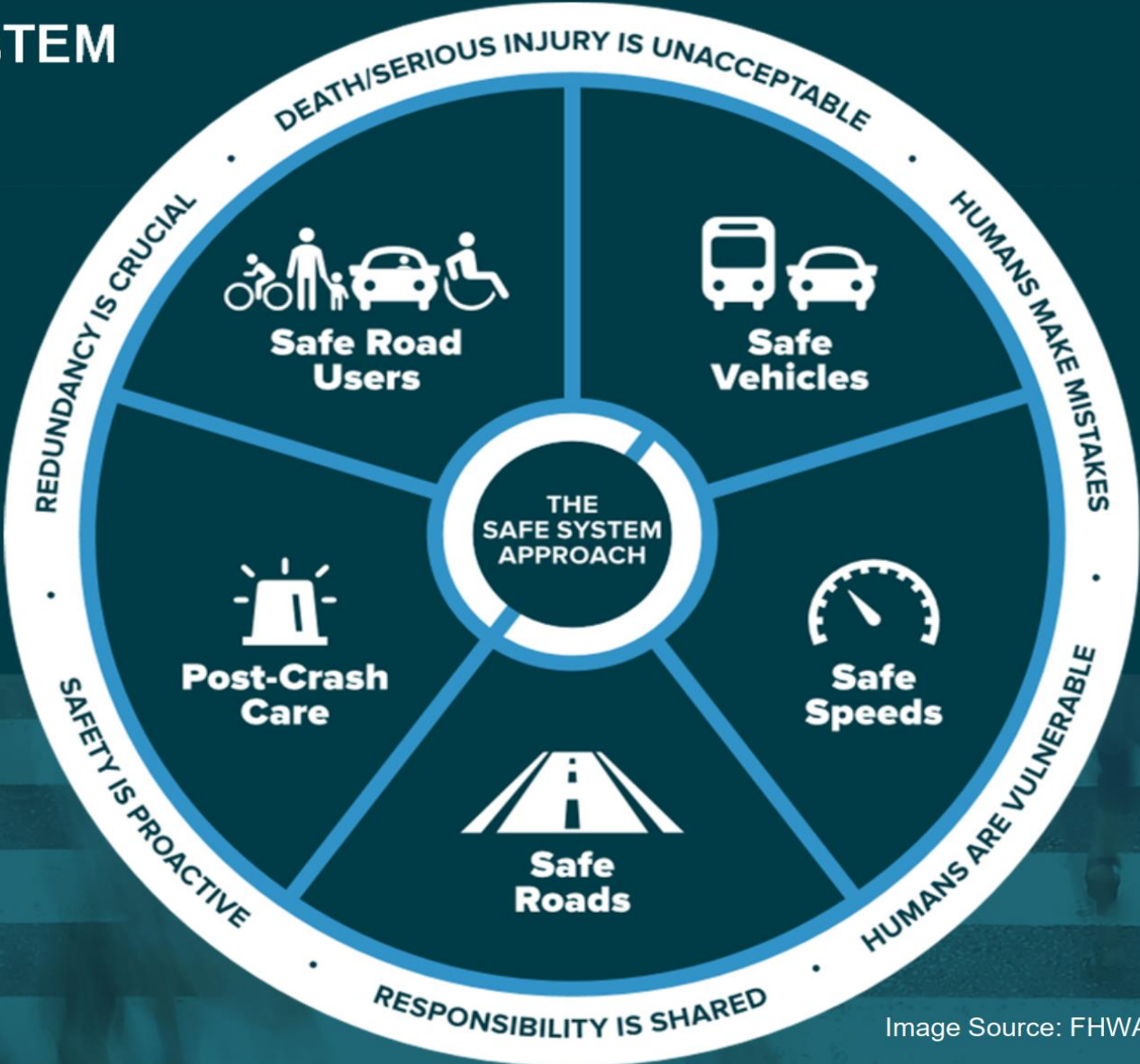
Death/serious injury is unacceptable




Humans make mistakes




Humans are vulnerable



Responsibility is shared



Safety is proactive



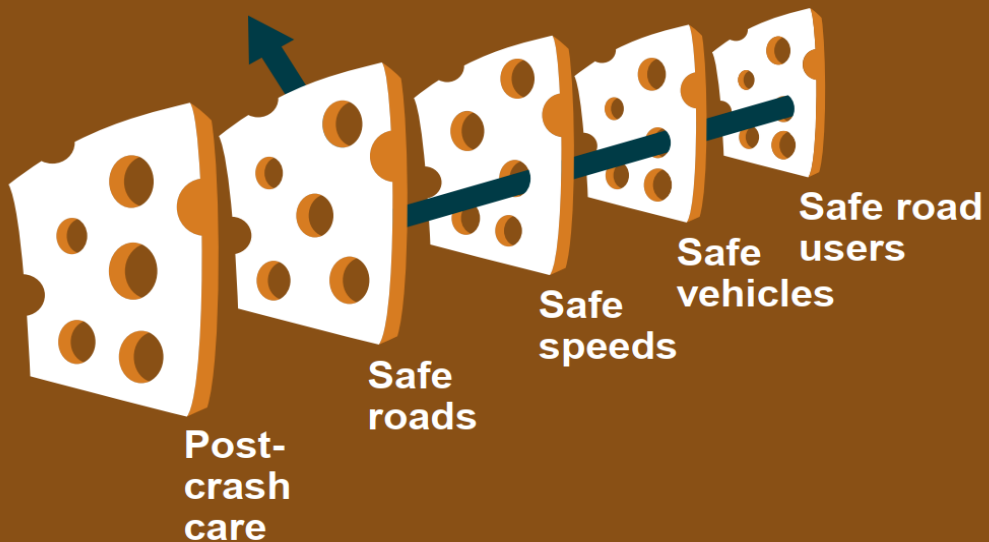
Redundancy is crucial

Image Source: FHWA

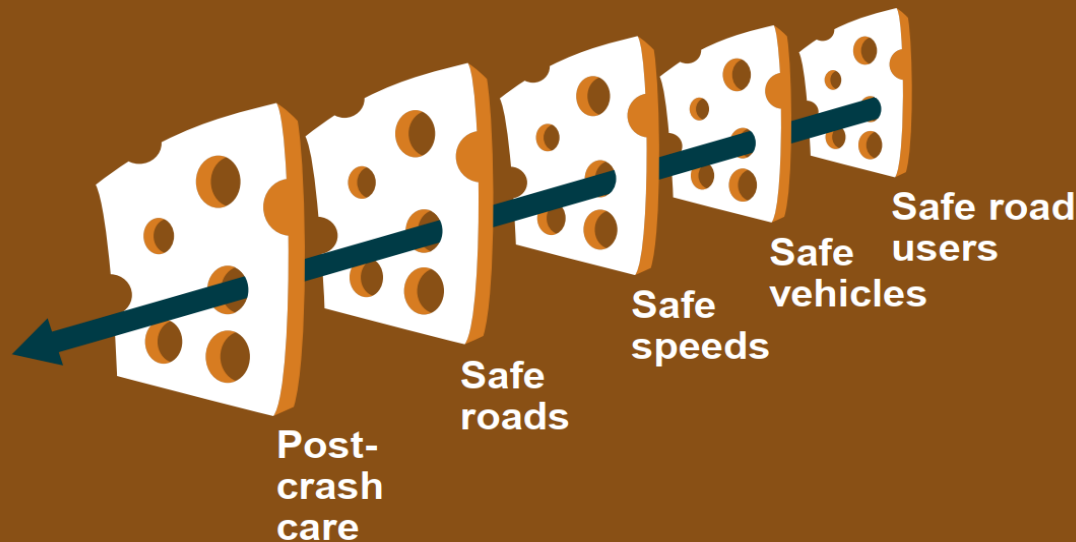
The Safe System Approach (Cont.)

THE 5 SAFE SYSTEM ELEMENTS CREATE REDUNDANCY

The “Swiss Cheese Model” of redundancy creates layers of protection



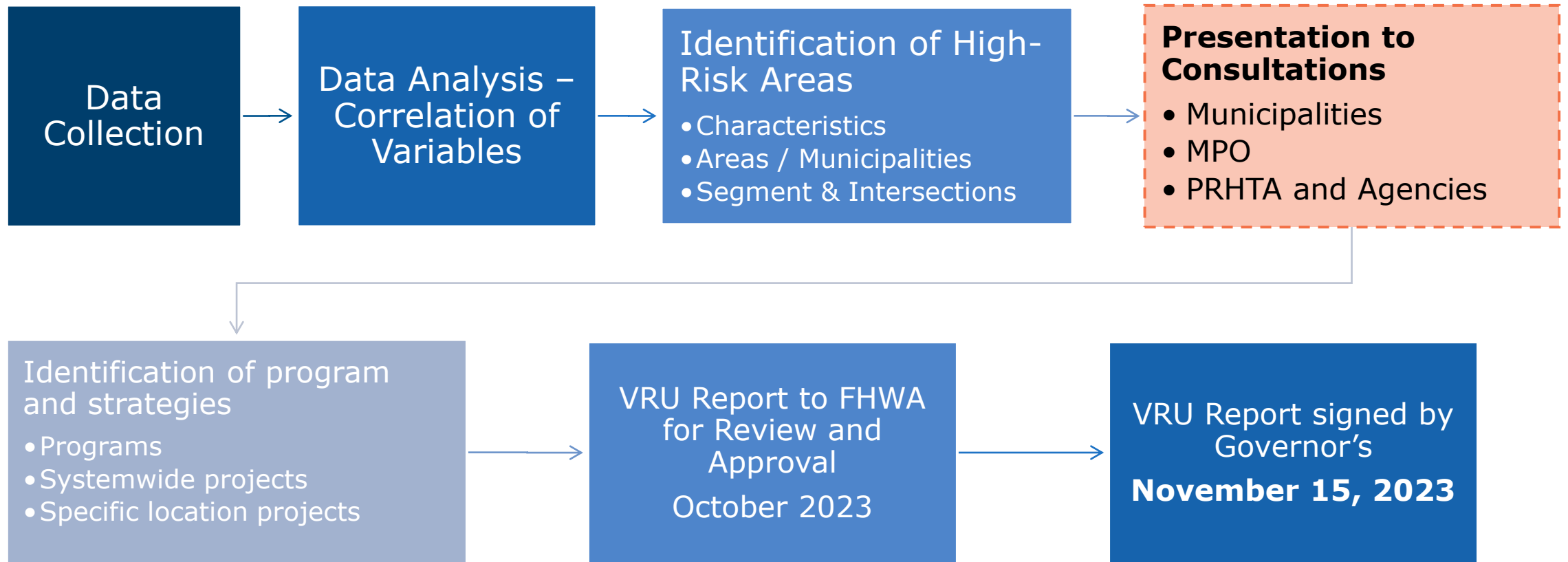
Death and serious injuries only happen when all layers fail



2

VRU Assessment: Development Process

Development Process



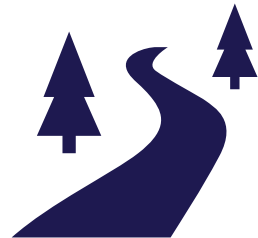
PR VRU Assessment Data

Data Base

Crash Data
(Observatorio de Seguridad Vial OSV)



Highway Performance
Monitoring System
(HPMS)



2019 to 2022

Fatal and Severe Injury

Pedestrian and Bikes

Age of Victim

Time of Day

Month

Location

Intersection vs Non intersection

Functional Classification

Speed

Annual Average Daily Traffic (AADT)

Number of Lanes

Kilometers of road by area

PR VRU Assessment Data (Cont.)

Data
Base

Geographic
Area 

Urban vs Rural

PRHTA Regional Areas

DTPW Areas

Municipalities

Transit



Bus routes (AMA) and stop locations

Transit route (TU) and stop locations

Census



Population

Ethnicity and Race

Income

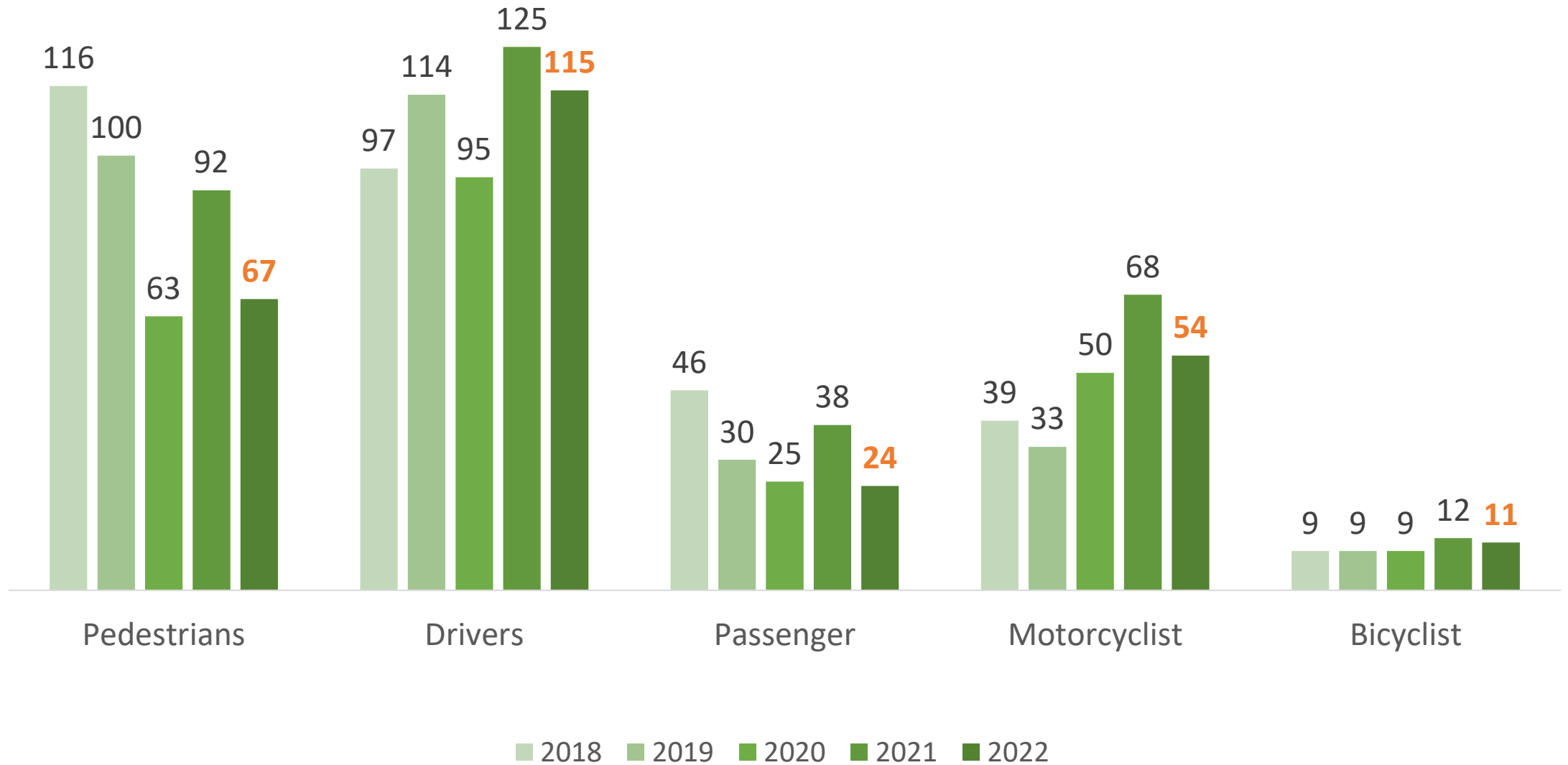
Zero Car Households

Disability

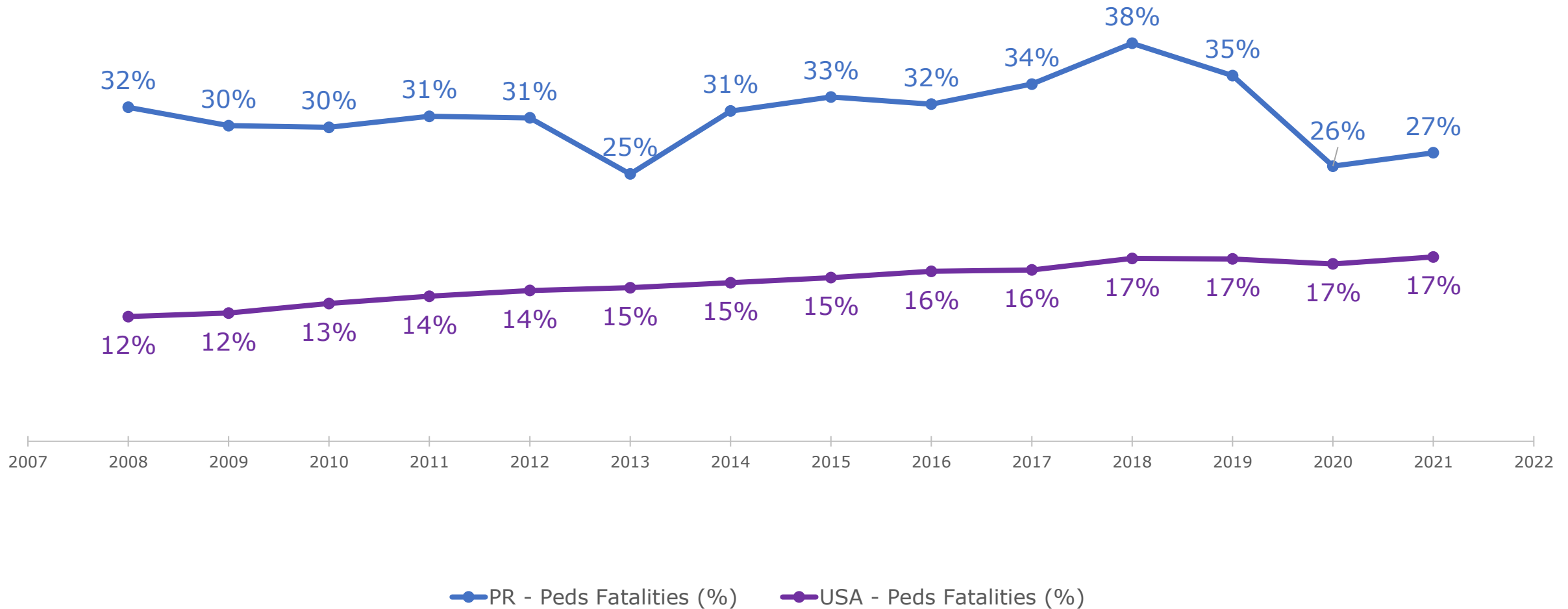
3

VRU Assessment: Preliminary Results

PR Fatalities by Users



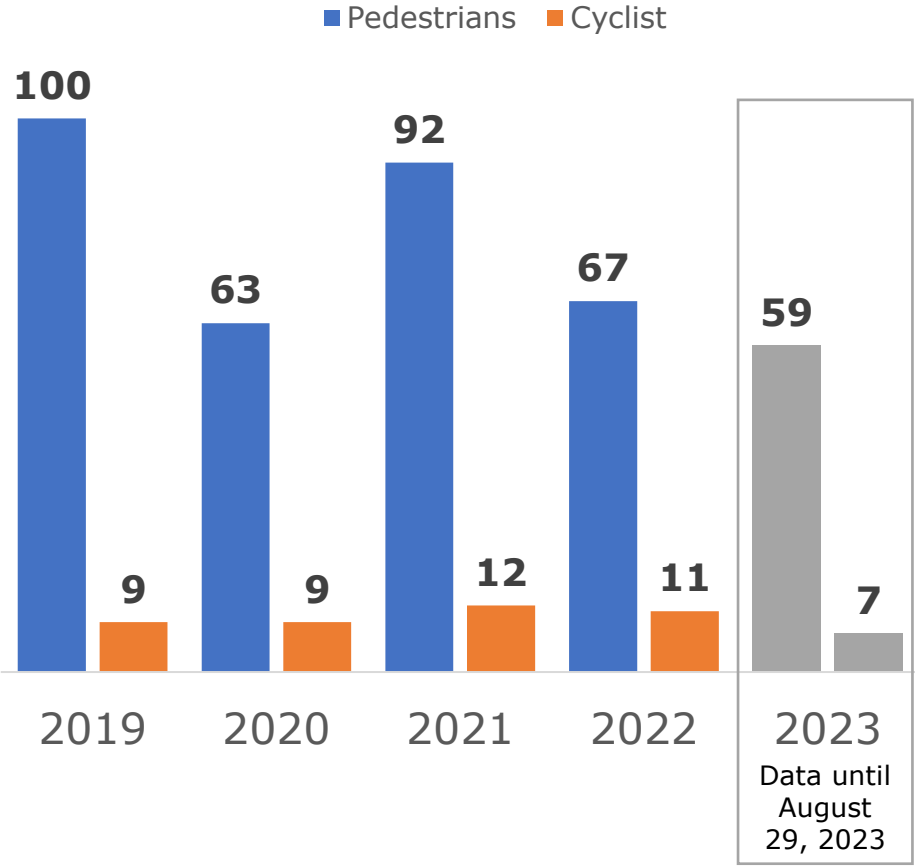
Pedestrian Fatality Percent (PR vs US)



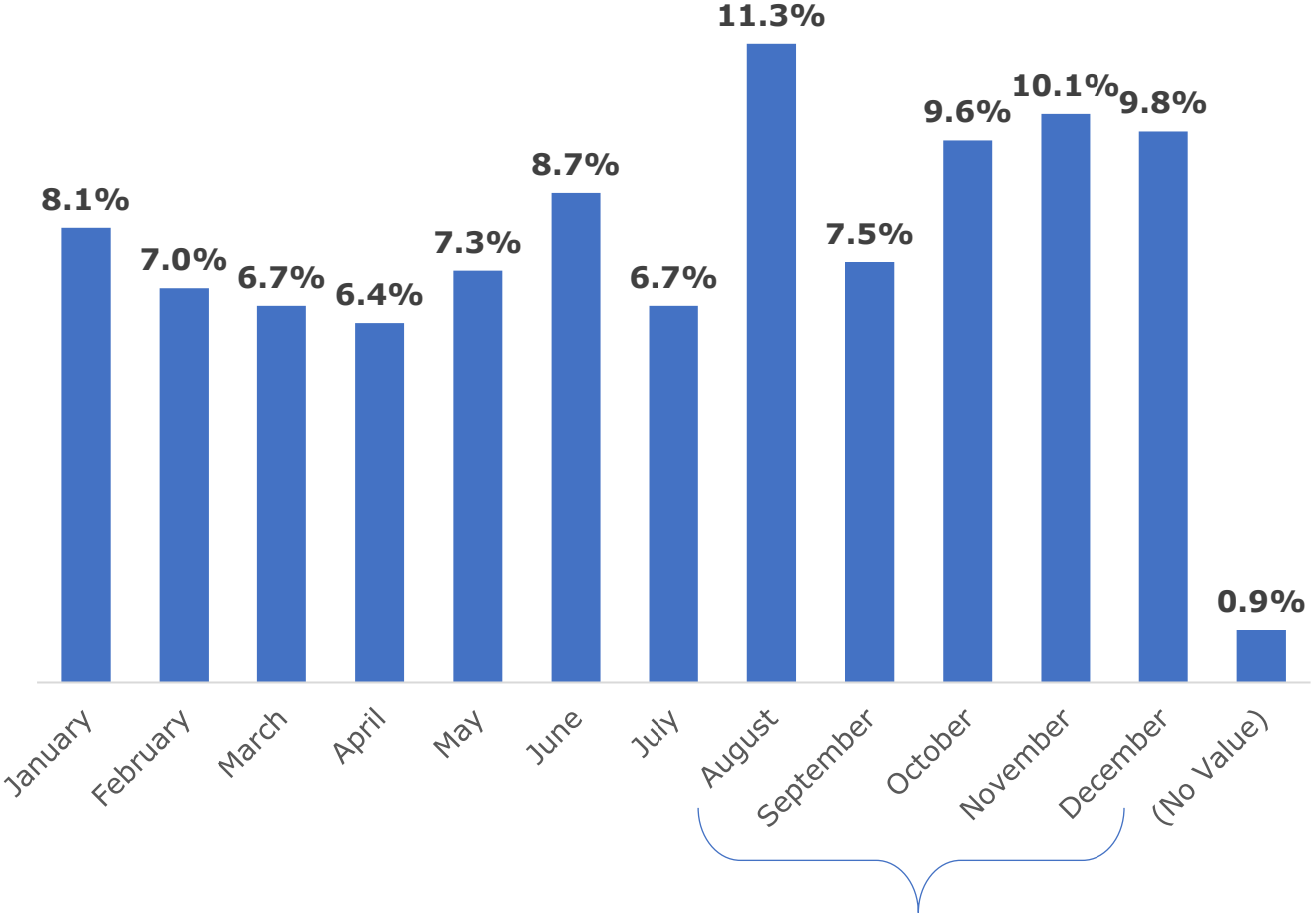
PR VRU Data Results

Fatal & Severe

VRU Fatalities by Year



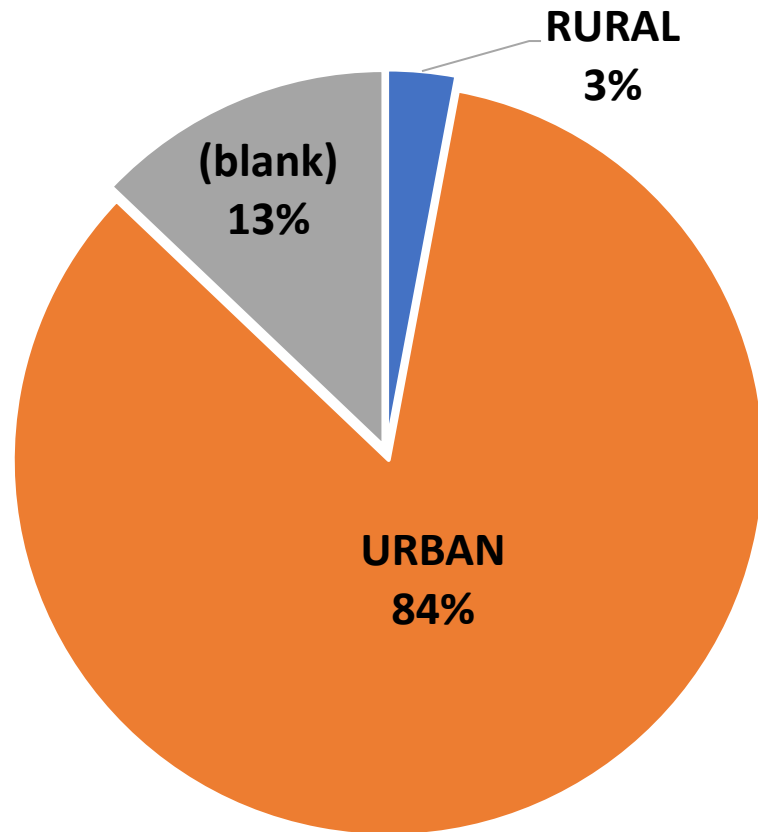
VRU Crash Data by Month



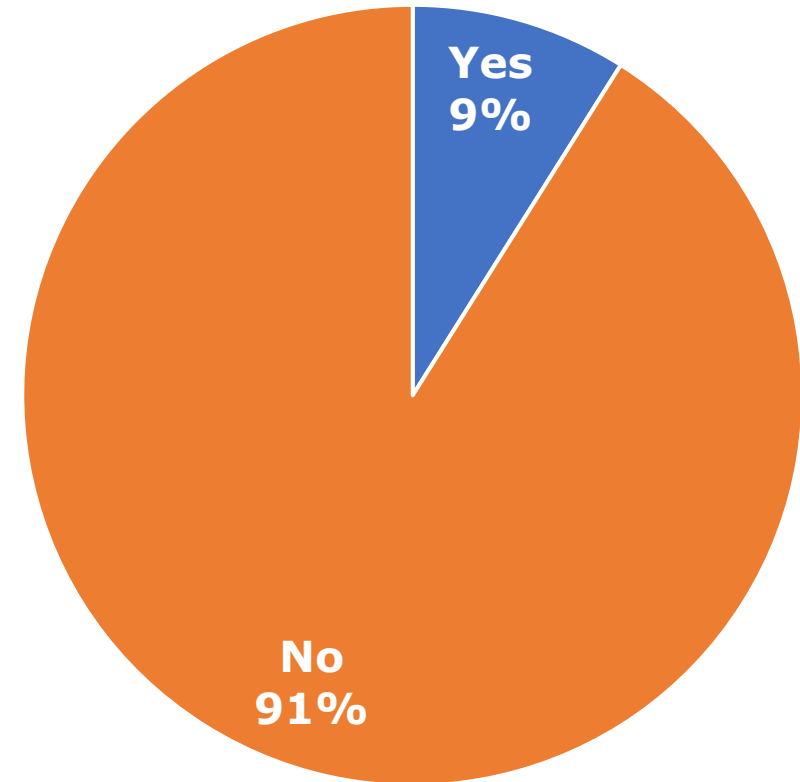
**August to December
48.3%**

Urban vs Rural and Intersection

VRU Crashes Urban vs Rural

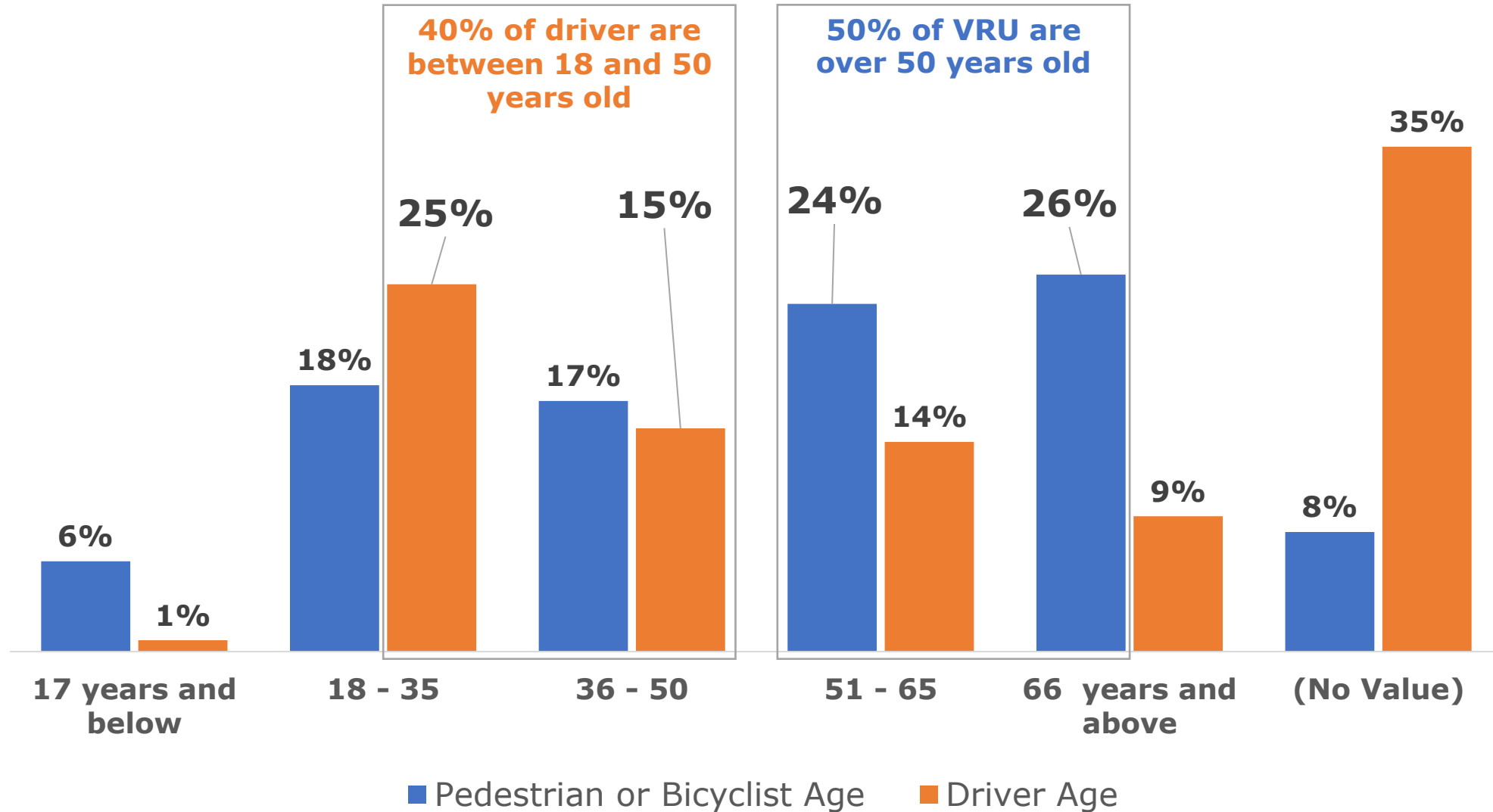


Intersection Related Crashes



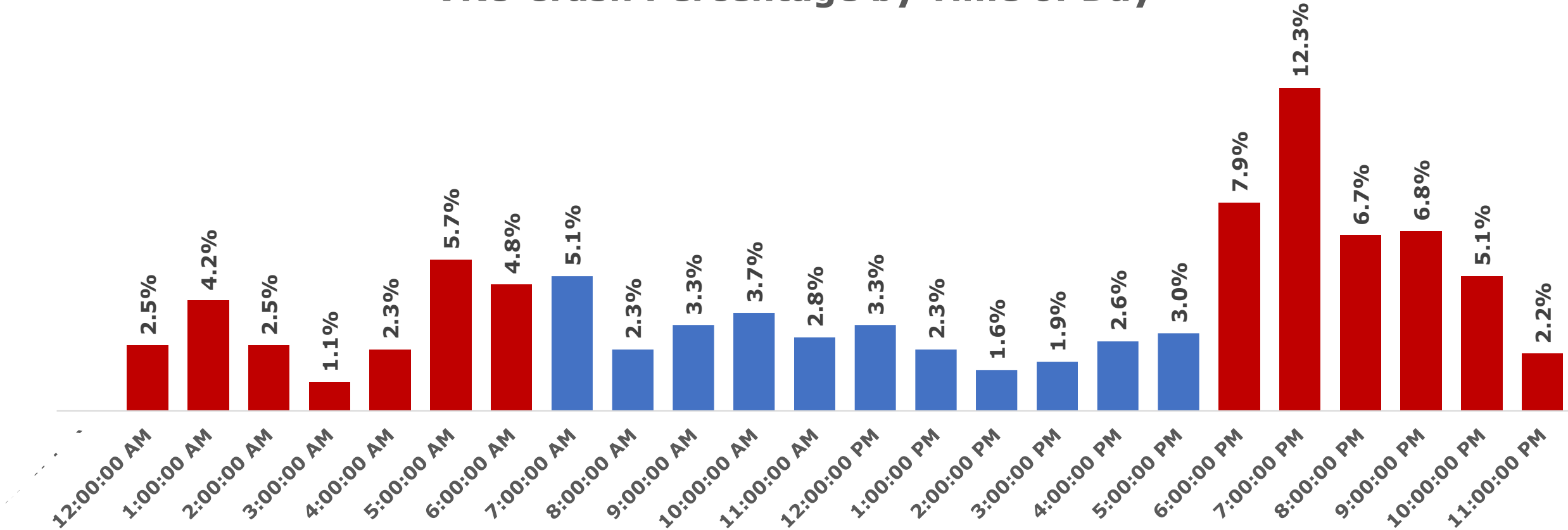
VRU Age vs. Driver Age

Fatal & Severe



Time of Day

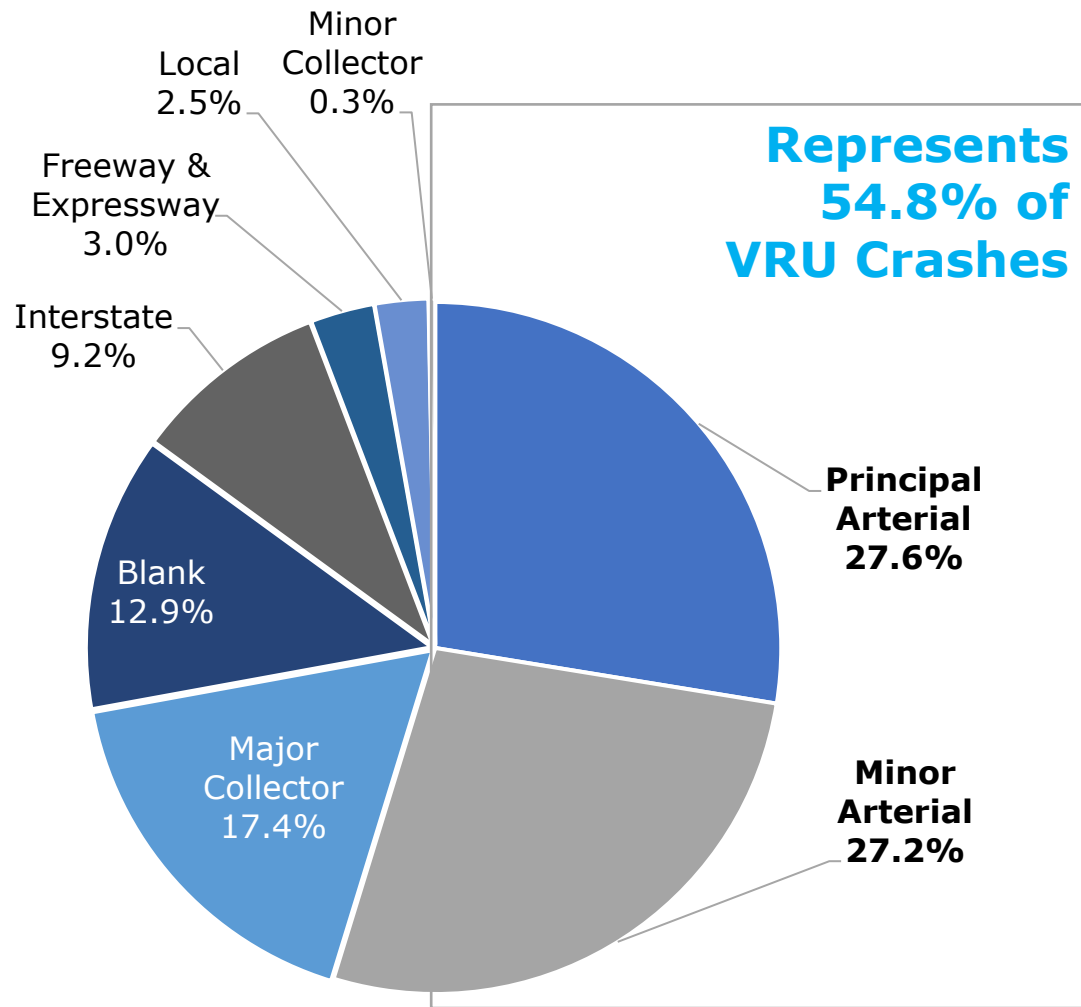
VRU Crash Percentage by Time of Day



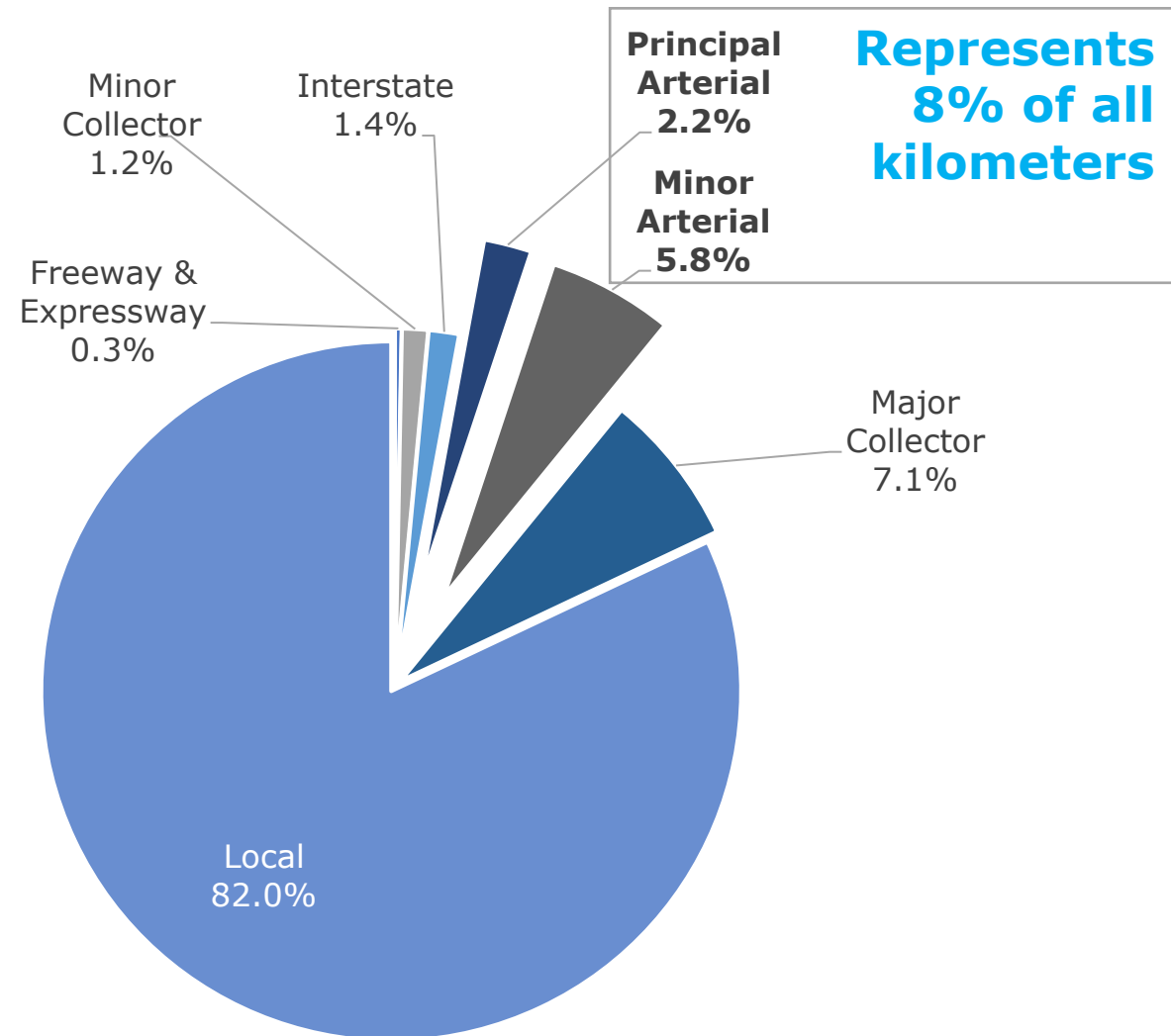
59% of VRU Fatal and Severe occurred from 6:00pm to 6:00am (i.e., nighttime conditions)

Roadway Functional Classification

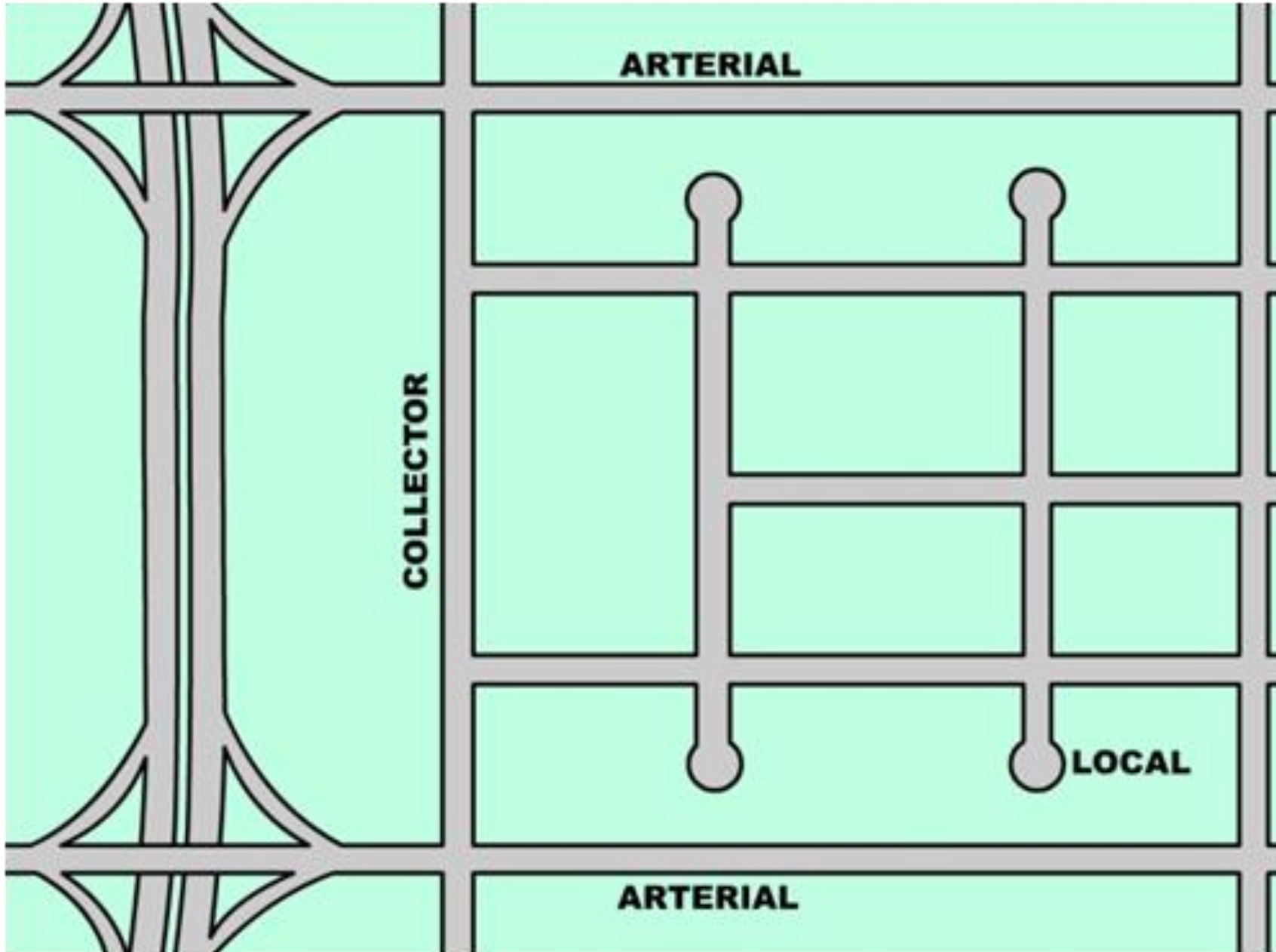
VRU Crash Percentage vs Functional Classification



Kilometers % vs Functional Classification



Roadway Functional Classification



Principal and Minor Arterials:

- Mid-high volume roads
- 2 or more lanes
- Major intersections some with signal controlled
- Direct vehicular access to properties from the road
- Some sidewalk presence
- No cycling infrastructure

Roadway Functional Classification



PR 107 – Aguadilla Source: RSA PR-107



PR2R (239) – Mayagüez Source: Google Maps



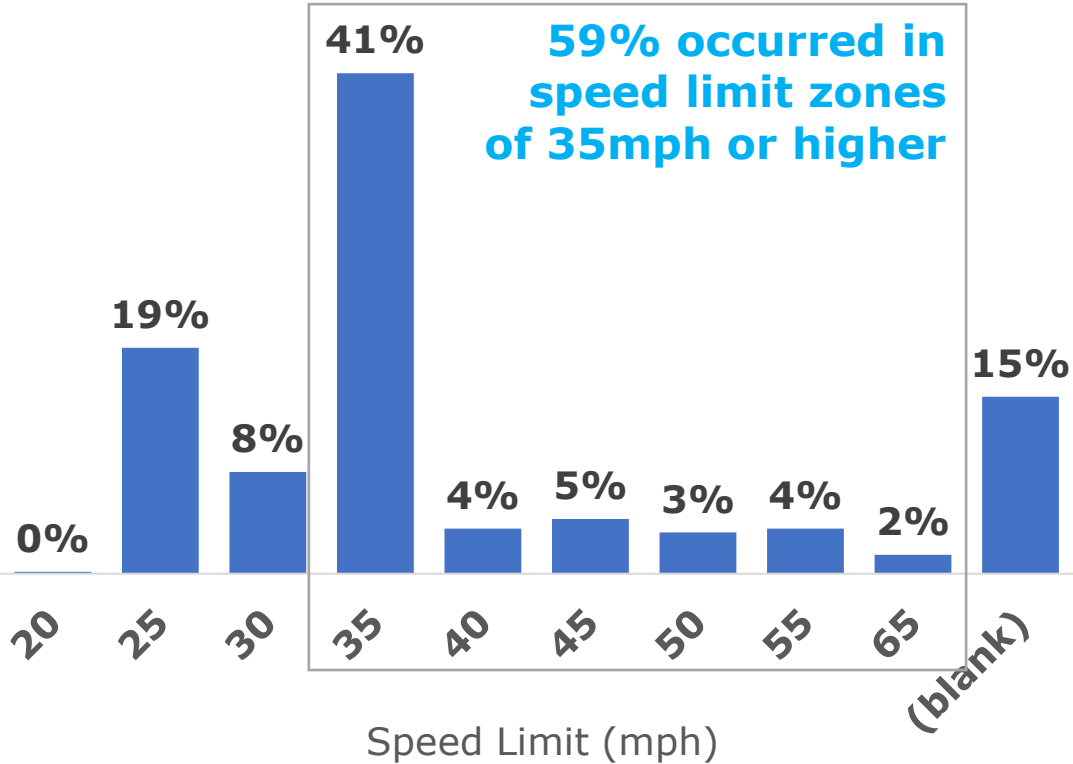
PR 115 – Rincón Source: Google Maps



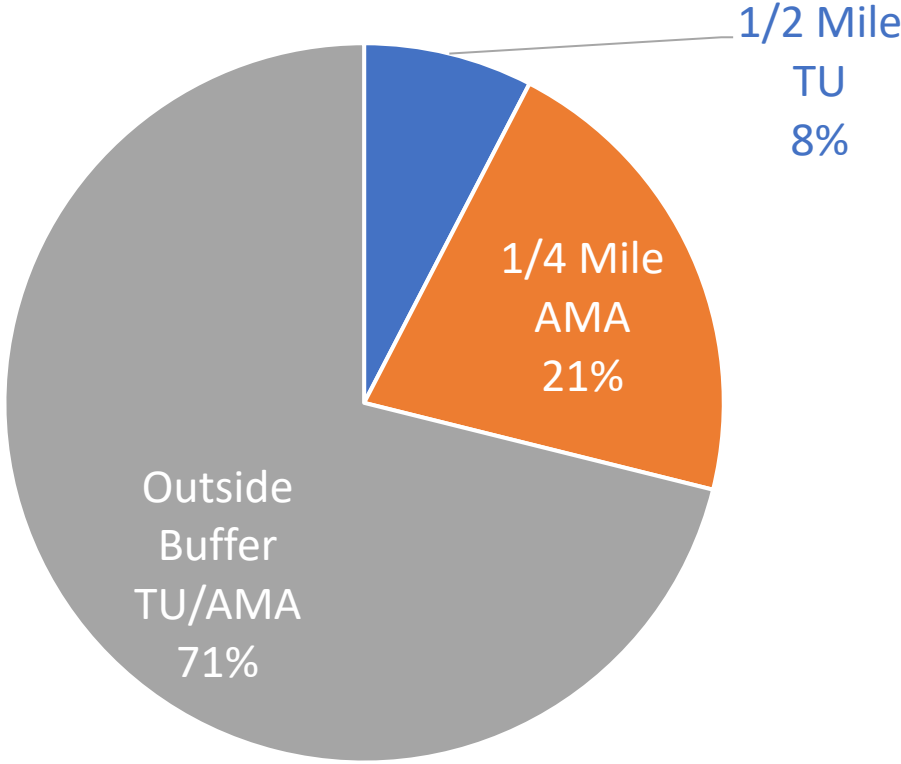
PR 402 – Añasco Source: Google Maps

Speed Limit and Transit

VRU Crash Percentage by Speed Limit



VRU Crashes and Transit Stops



VRU High-Risk Areas

SHSP VRU Assessment Interactive Map



Areas

- By PRHTA Region
- Population
- Kilometers
- Hundred Million Vehicle Miles Travel

8/9/2023

VRU Crash Corridors by Weight

1

2.5

5

7.5

10

PRHTA_OFFICIAL_REGIONS

East

Metro

North

South

West

Low

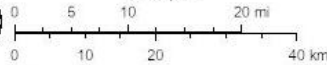
High

World Imagery



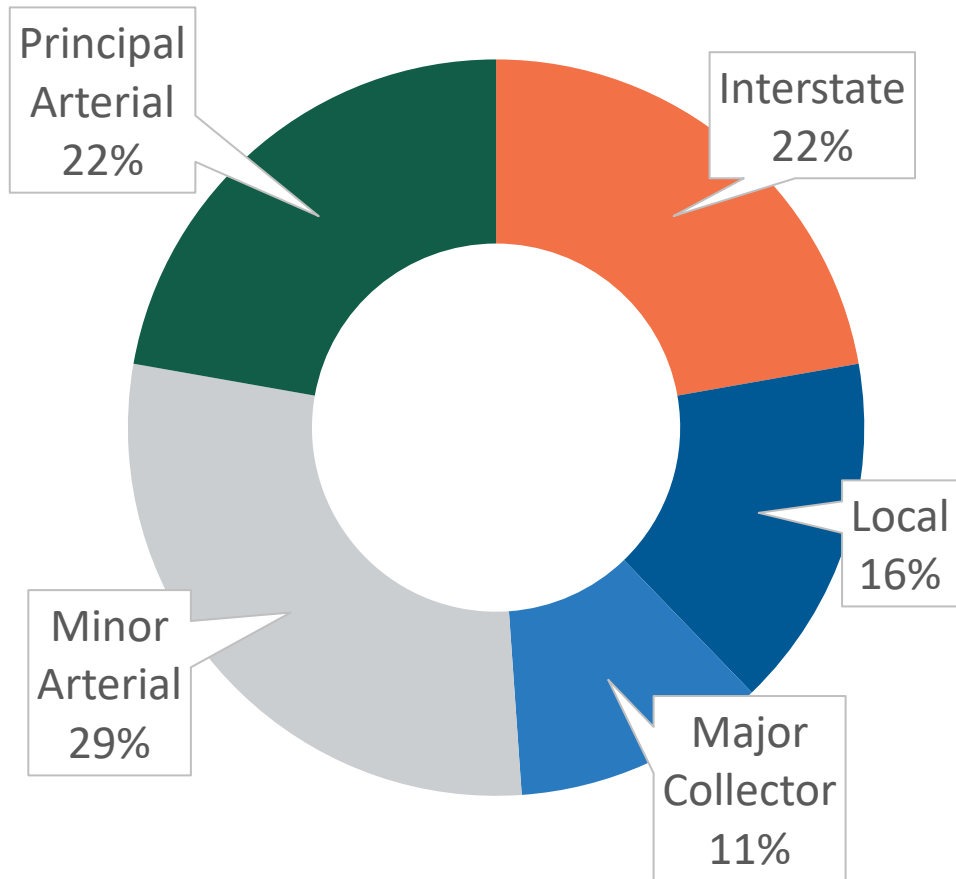
Earthstar Geographics

1:777,791

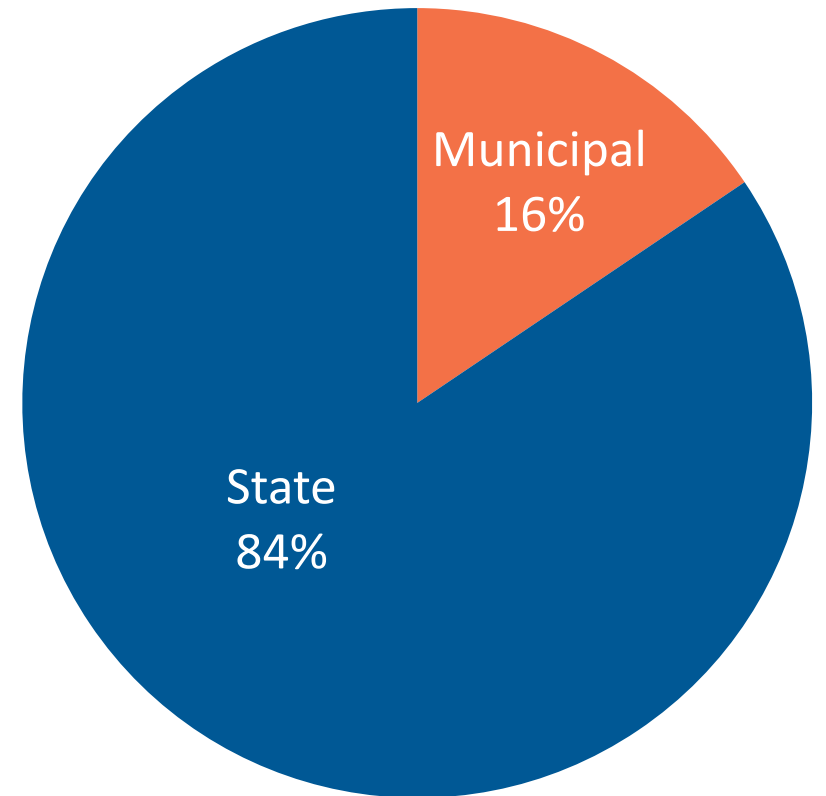


VRU West Region

PRHTA West Region Functional Classification

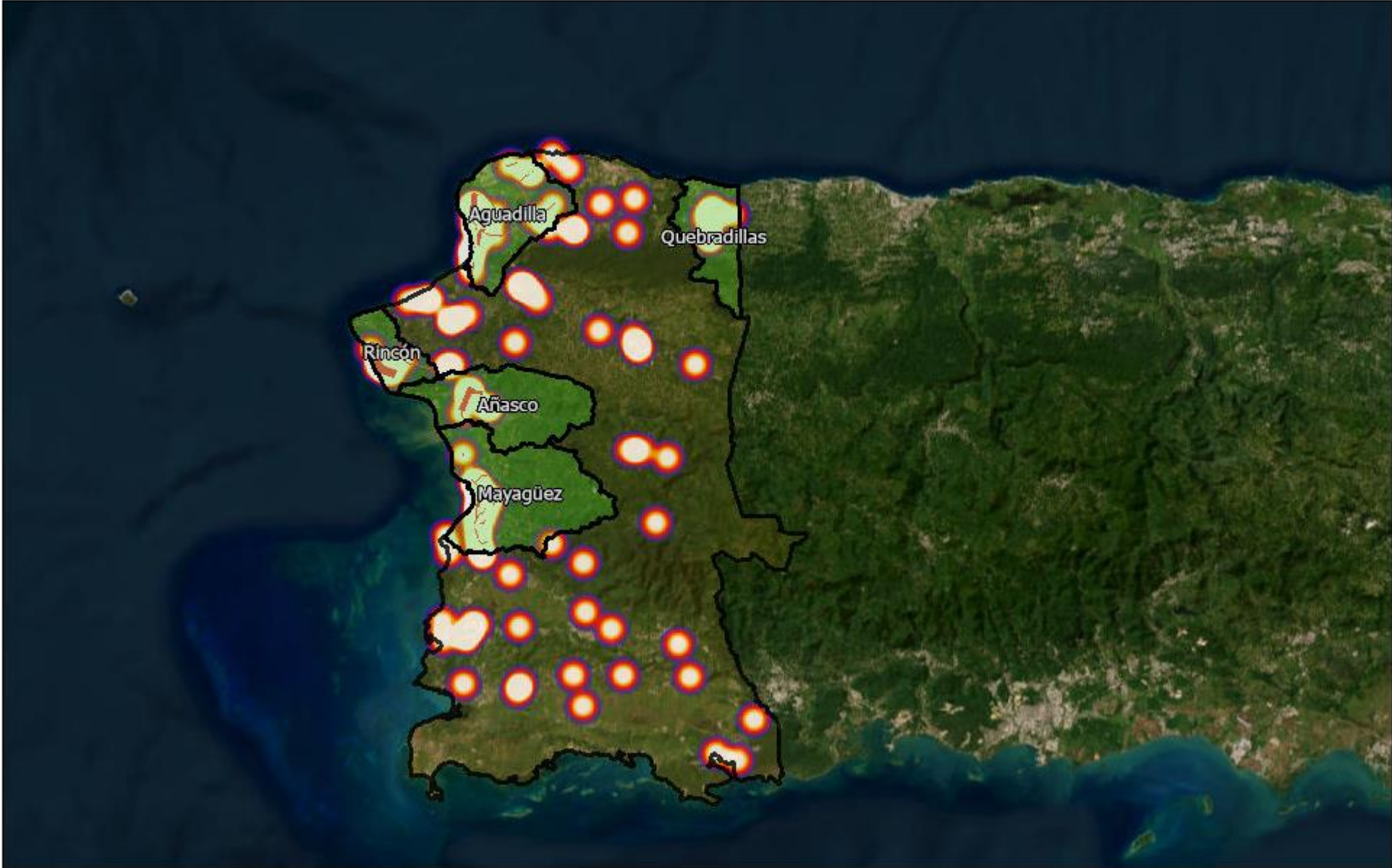


PRHTA West Region Jurisdiction



SHSP VRU Assessment Interactive Map

**VRU
West
Region**



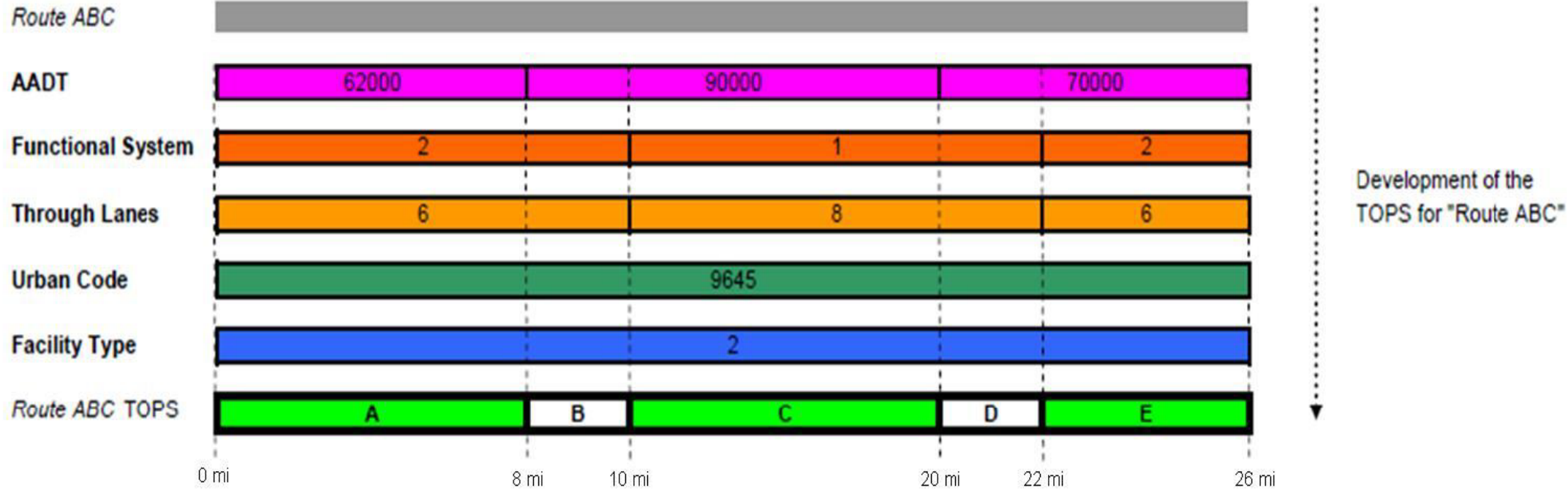
[SHSP VRU
Assessment
Interactive Map
\(arcgis.com\)](#)

VRU Corridor Selection - HPMS

Chapter 6

HPMS Field Manual
December 2016

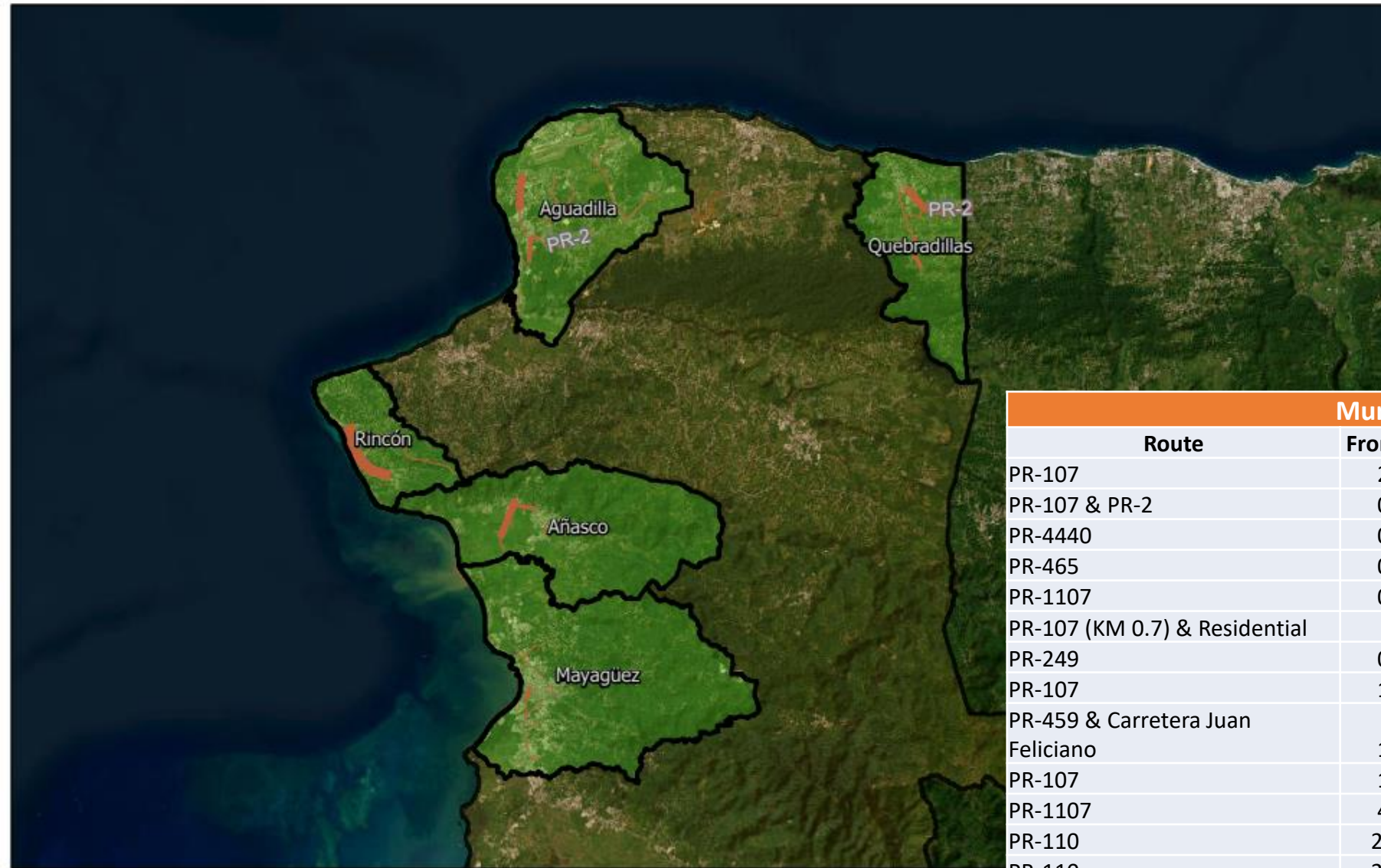
Figure 6.1 TOPS Development Process



SHSP VRU Assessment Interactive Map

VRU West Region

[SHSP VRU
Assessment
Interactive Map
\(arcgis.com\)](#)



Municipality of Aguadilla						
Route	From KM	To Km	Length KM	Fatal	Severe	
PR-107	2.0	4.1	2.1		3	
PR-107 & PR-2	0.0	0.2	0.2	1	1	
PR-4440	0.0	1.2	1.2		1	
PR-465	0.0	2.5	2.5		1	
PR-1107	0.3	0.6	0.3	1		
PR-107 (KM 0.7) & Residential					1	
PR-249	0.6	0.9	0.2		1	
PR-107	1.0	1.4	0.5	1		
PR-459 & Carretera Juan Feliciano	1.0	4.0	3.0		1	
PR-107	1.4	2.0	0.5	1		
PR-1107	4.7	6.3	1.5		1	
PR-110	23.0	27.1	2.9		1	
PR-110	27.1	30.3	3.2		1	
PR-110	30.3	32.9	1.2		1	
PR-2	121.6	125.1	3.5	1		
Avenida General Ramey			0.2		1	
Calle Rogelio Castro			0.2		1	
PR-110	19.7	23.0	3.3		1	

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VRU Assessment: Strategies, Implementation Examples and Potential Projects

SAFE ROADS: AVOIDING CRASHES

Elements of the Safe System Approach



Avoiding crashes involves:



Separating users in space



Separating users in time



Increasing attentiveness and awareness

SAFE ROADS: CRASH KINETIC ENERGY

Elements of the Safe System Approach



Managing crash kinetic energy involves:



Managing speed



Managing crash angles



Managing crash energy distribution

Safety Countermeasures

Pedestrian/Bicyclist



[Bicycle Lanes](#)



[Crosswalk Visibility Enhancements](#)



[Leading Pedestrian Interval](#)



[Medians and Pedestrian Refuge Islands in Urban and Suburban Areas](#)



[Pedestrian Hybrid Beacons](#)



[Rectangular Rapid Flashing Beacons \(RRFB\)](#)



[Road Diets \(Roadway Configuration\)](#)



[Walkways](#)

References: [Proven Safety Countermeasures | FHWA \(dot.gov\)](#)
[Pedestrian Safety Guide and Countermeasure Selection System \(pedbikesafe.org\)](#)

Pedestrian/Bicyclist



Bicycle Lanes



Cycle Track

Safety Countermeasures

Traffic Delineator

Pavement Marking



Pavement Marking

Raised Island



Additional reference: [Pedestrian Safety Guide and Countermeasure Selection System \(pedbikesafe.org\)](https://pedbikesafe.org)

Safety Countermeasures



Crosswalk Visibility Enhancements

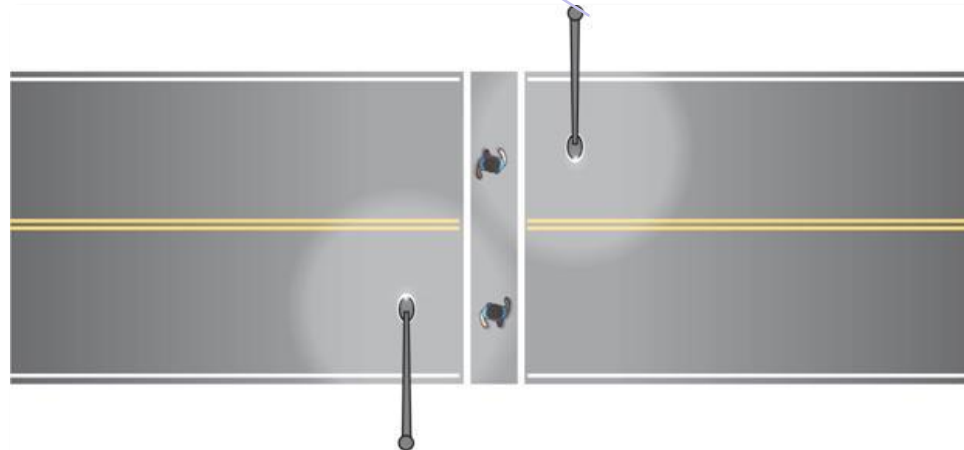


Pavement Marking

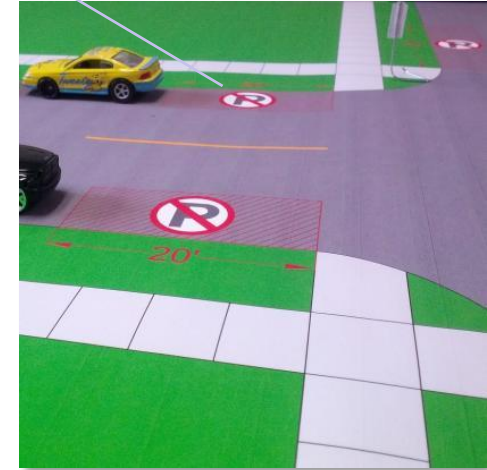
Curb Extension



Pedestrian Lighting



Limit Parking at Intersections



Signage "Stop here for pedestrians"



Safety Countermeasures



Leading Pedestrian Interval



Traffic Signals APS and Peds Signals





Medians and
Pedestrian Refuge
Islands in Urban and
Suburban Areas

Safety Countermeasures





Pedestrian Hybrid
Beacons



Rectangular Rapid
Flashing Beacons
(RRFB)

Safety Countermeasures



PHB

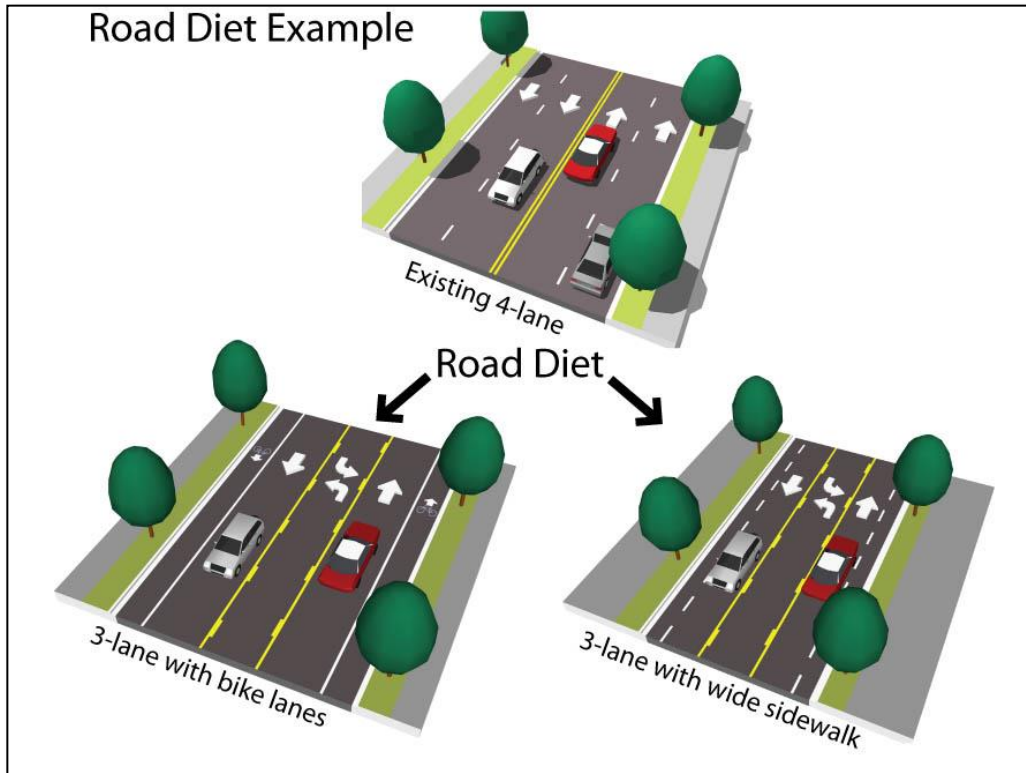
RRFB



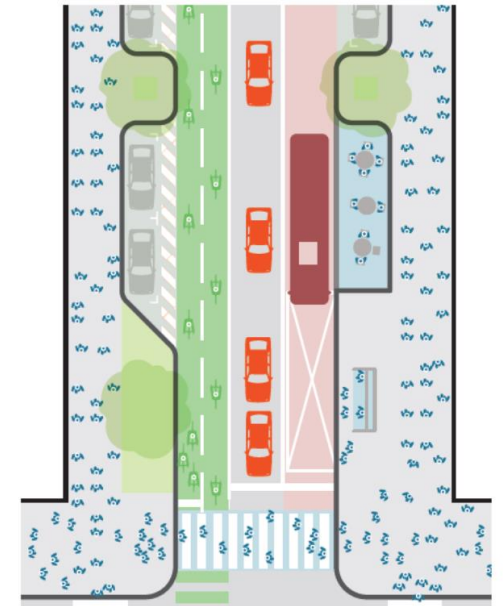
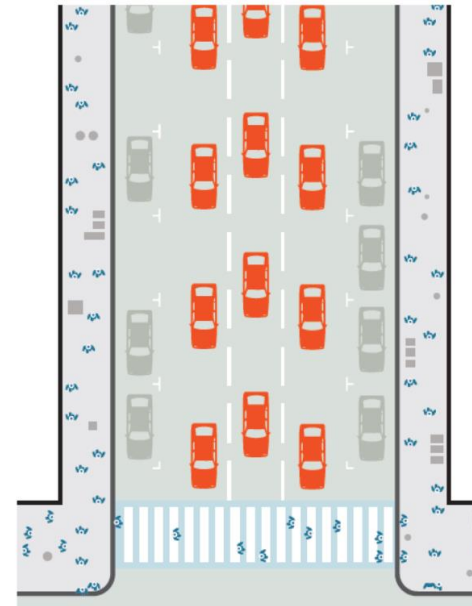
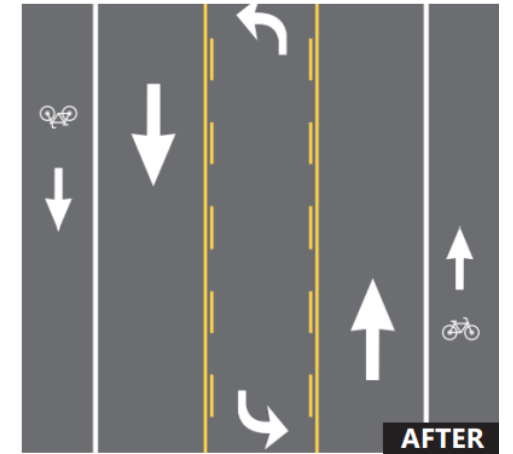
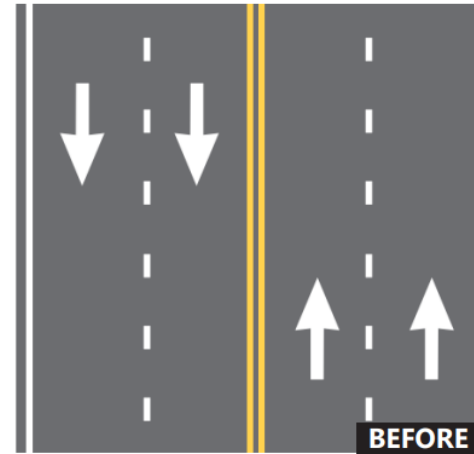


Road Diets (Roadway Configuration)

Road Diet Example



Safety Countermeasures





Walkways

Safety Countermeasures

Pedestrian Crossings & Walkways



VRU Assessment Strategies



Source: PR Complete Streets Plan & Design Guidelines

Comprehensive Bicycle and Pedestrian Plan for Puerto Rico

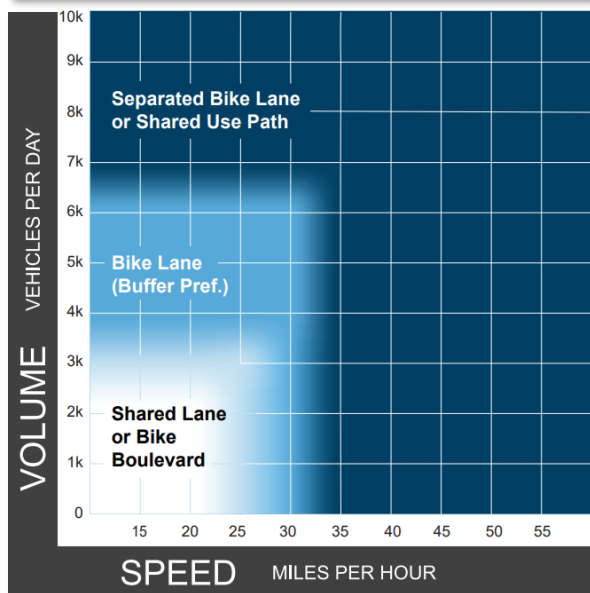
Prepared for DTPW and PRHTA by Steer Davies Gleave

FINAL DOCUMENT
SEPTEMBER 2018

PUERTO RICO COMPLETE STREETS

PLAN & DESIGN GUIDELINES
 FINAL DOCUMENT
 September 2018

Prepared for DTPW and PRHTA By Steer Davies Gleave



Source: FHWA bikeway selection guide

Complete Street Vision

Successful urban roads should provide reliable major routes through cities with vibrant, safe, secure and well maintained urban environments, and make shops and services easily accessible. Urban Streets Complete Street vision includes:

- Maintain automobile priority but improve provisions for other modes;
- Reduce width of travel lanes where appropriate;
- Comfortable and sheltered waiting areas for transit users;
- Comfortable sidewalk width of 1.5 - 2.1 meters /5-7 feet;
- Crossings to match wider pedestrian network, including at mid-block where appropriate;
- Buffered, separated or off-road bikeways (Class I, II or IV - for Class definitions see Bikeways, Section 3 Part B);
- High quality landscape character;
- Provide shade trees along sidewalks and bikeways; and
- Provide street lighting that relates to pedestrians and cyclists.

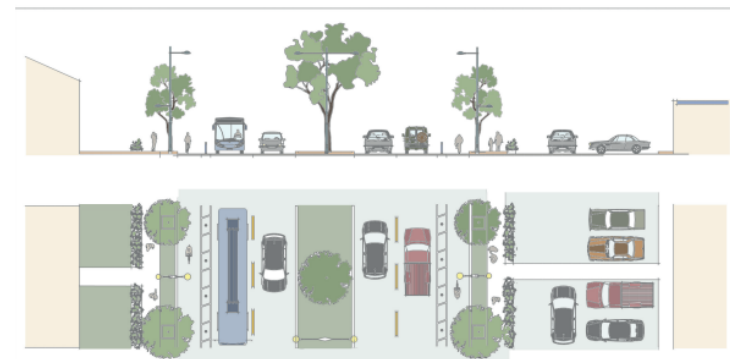
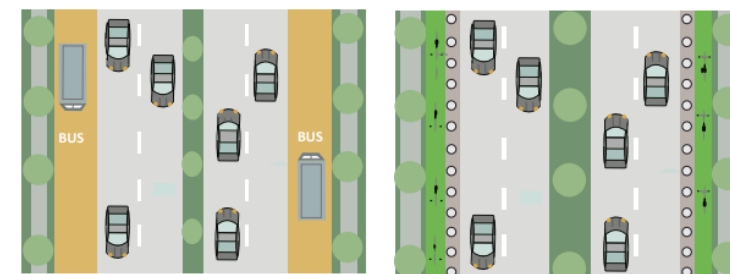


Figure 2.5: Urban Road Complete Street Vision

Source: SDG



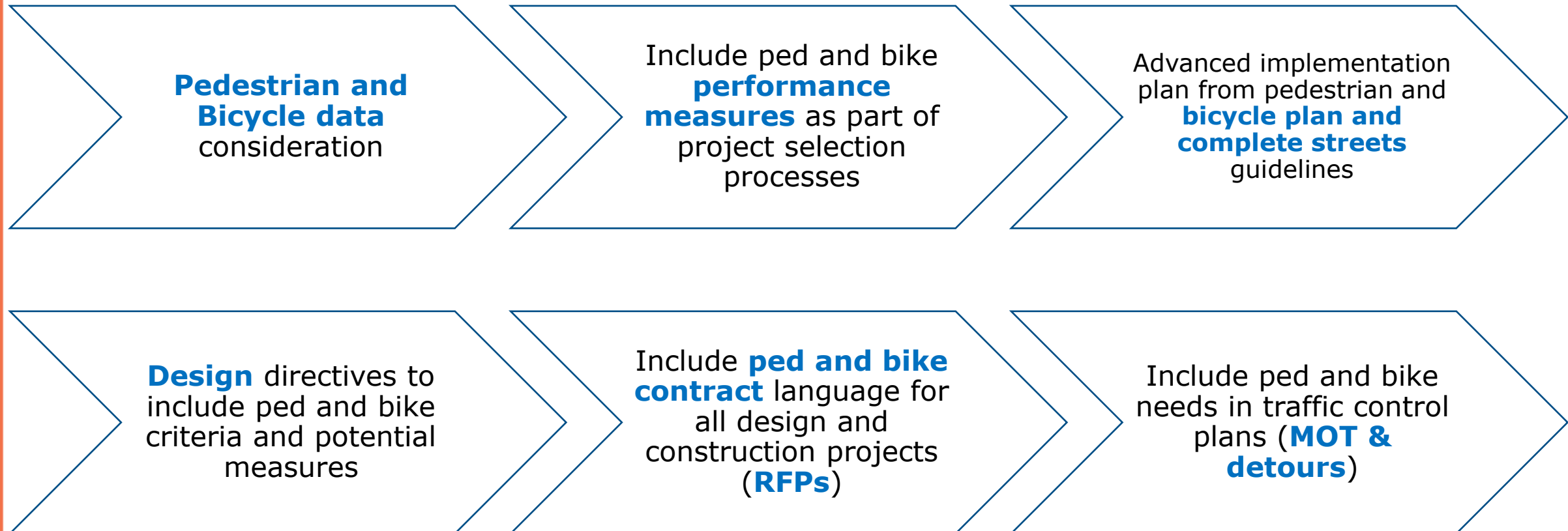
Transit priority

Non-motorized priority

VRU Assessment Strategies

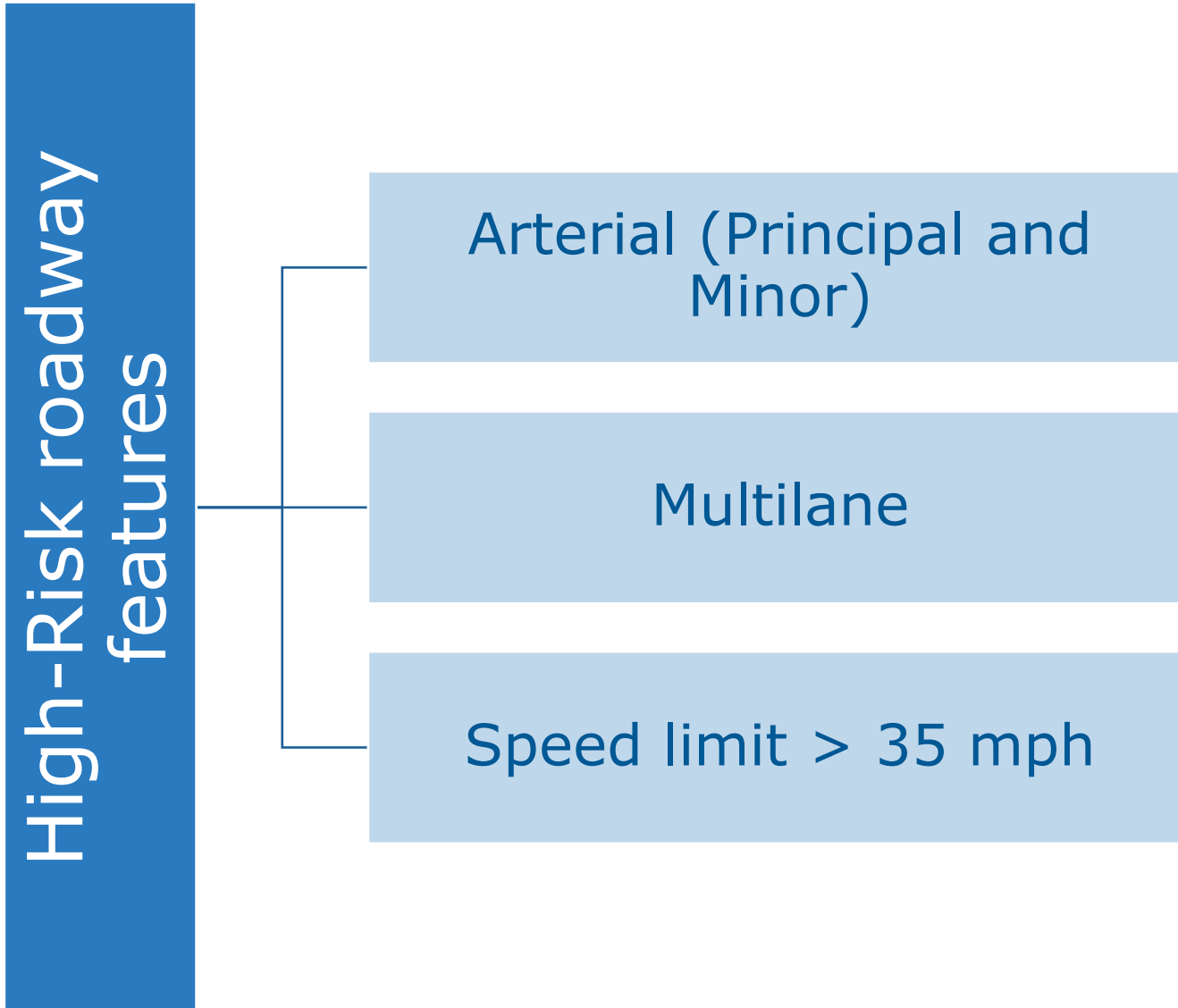
Project Development

Bicycle and pedestrian considerations a full component of Puerto Rico project planning and development.



VRU Assessment Strategies

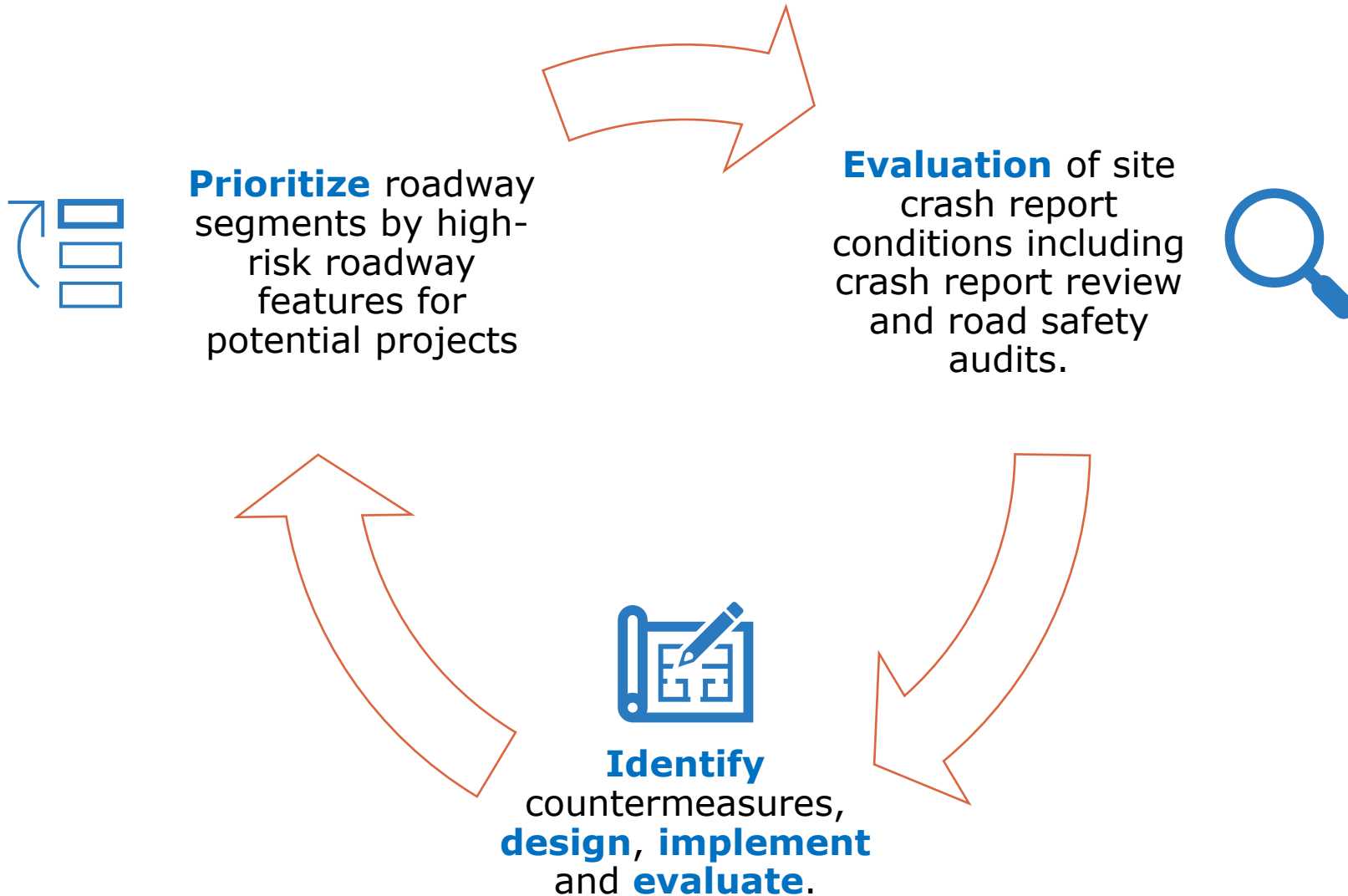
Systemic approach



Intersection – (i.e., pedestrian push buttons and proper time to cross, ADA ramps, sidewalks)

Segments – Road diets, speed management such as traffic calming, roundabouts, mid block crossings, sidewalks repairs, protected bike lanes, shared use path, and pedestrian and bikes signage

VRU Potential Projects



The Safe System Approach

THE SAFE SYSTEM APPROACH



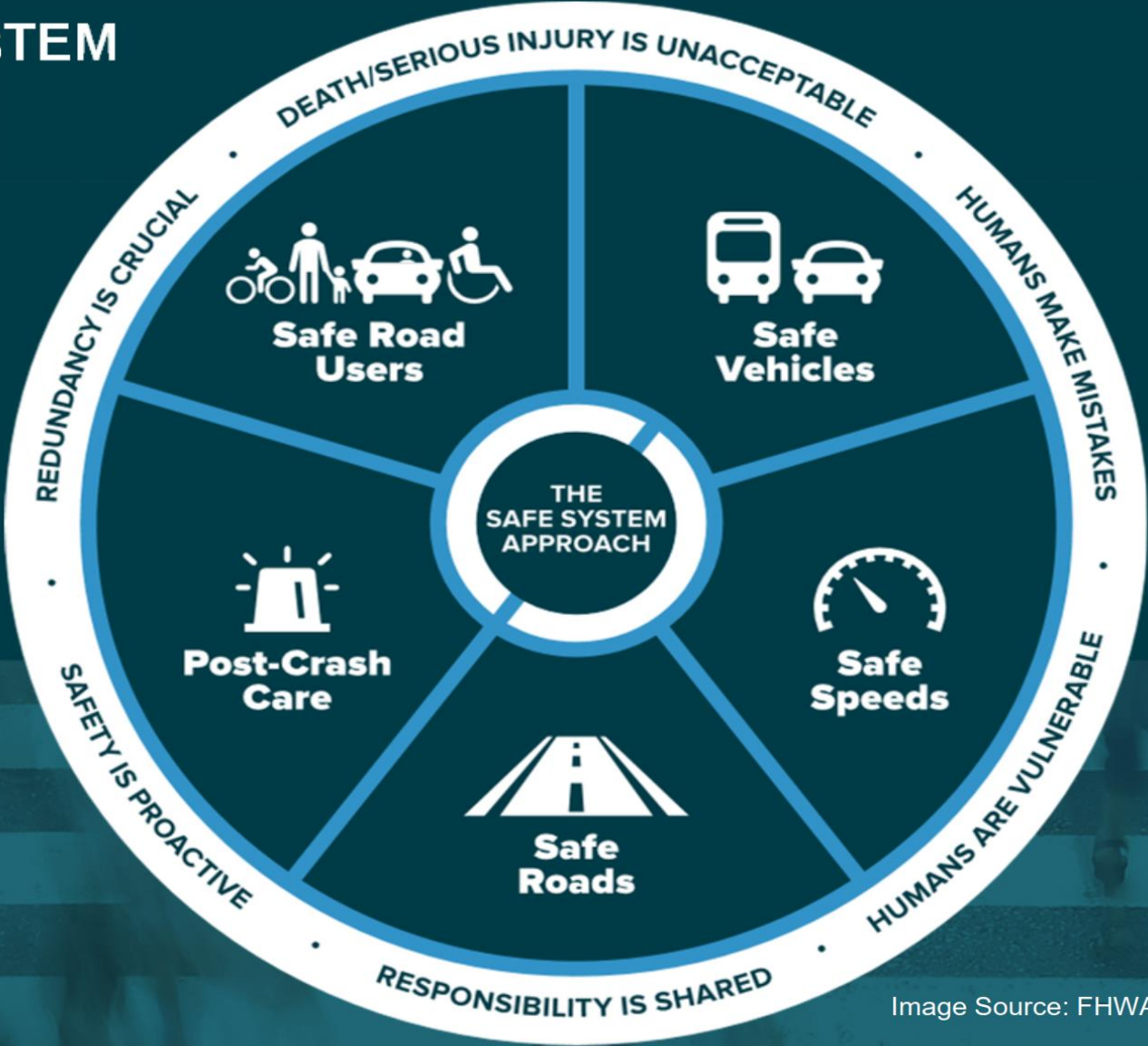
Death/serious injury is unacceptable




Humans make mistakes



Humans are vulnerable



Responsibility is shared



Safety is proactive



Redundancy is crucial

Image Source: FHWA

Responsibility is Shared



LLEGA SEGURO. SÉ UN PEATÓN RESPONSABLE.

Evita distracciones mientras estás caminando

PEATÓN RESPONSABLE

COMISIÓN PARA LA SEGURIDAD EN EL TRÁNSITO

GOBIERNO DE PUERTO RICO



¡PIENSA EN EL PEATÓN!

NO REBASES UN VEHÍCULO QUE ESTÉ CEDIENDO EL PASO A UN PEATÓN.

PONTE EN SUS ZAPATOS.

Detente antes del cruce peatonal. Evite ser multado.

SOMOS RESPONSABLES

COMISIÓN PARA LA SEGURIDAD EN EL TRÁNSITO

GOBIERNO DE PUERTO RICO

15 MINUTES BREAK

Encuesta - Grupos consultivos en seguridad vial (Región Oeste)



Thank You!

