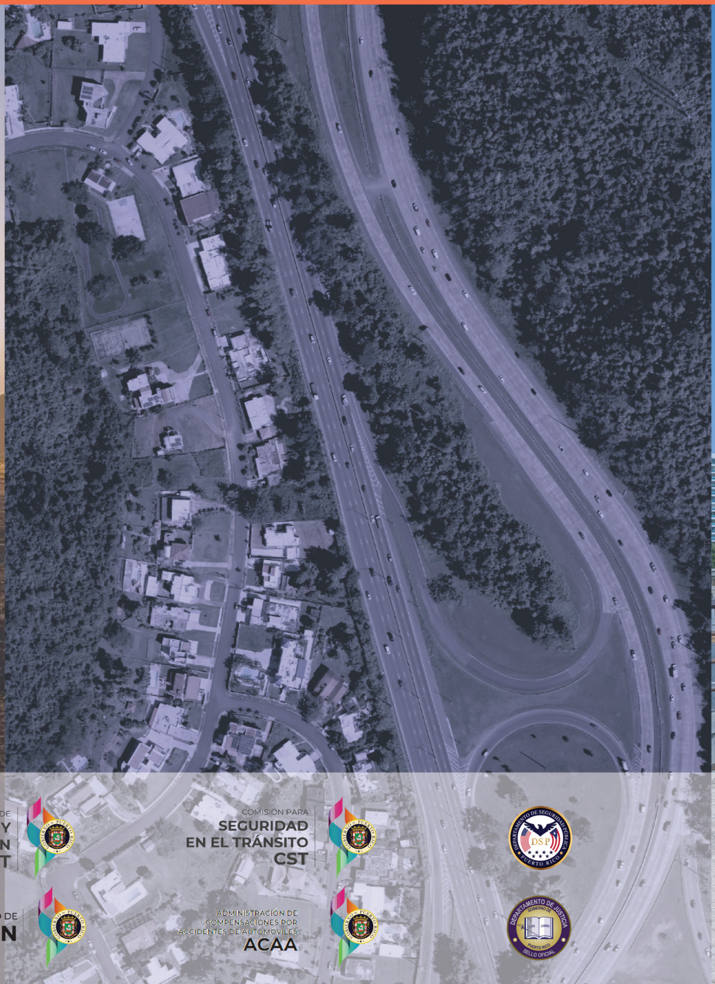
SHSP

STRATEGIC HIGHWAY SAFETY PLAN

PUERTO RICO
2024-2028



DEPARTAMENTO DE TRANSPORTACIÓN Y OBRAS PÚBLICAS DTOP

AUTORIDAD DE CARRETERAS Y TRANSPORTACIÓN ACT

COMISIÓN PARA SEGURIDAD EN EL TRÁNSITO CST

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ADMINISTRACIÓN DE COMPENSACIONES POR ACCIDENTES DE AUTOMÓVILES ACAA

U.S. Department of Transportation Federal Highway Administration

U.S. Department of Transportation Federal Motor Carrier Safety Administration

NTSP

NHTSA

Credits

In Puerto Rico, we have an outstanding group of road safety delegates from all sectors, representing the 4 Es of road safety: 1. Education, 2. Enforcement, 3. Engineering, and 4. Emergency. These delegates are dedicated to reducing fatalities and serious injuries resulting from traffic incidents. Their commitment has been and continues to be a fundamental pillar for the successful implementation of the Strategic Highway Safety Plan (SHSP).

For years, the participation of these delegates has been crucial in defining the SHSP for the 2024-2028 period. Their recommendations and experiences have shaped the strategies that will guide road safety efforts in Puerto Rico over the next five years. It is imperative to recognize the agency representatives who strive to improve safety on our roads. As a token of our gratitude, we have included their names to honor their invaluable contributions:

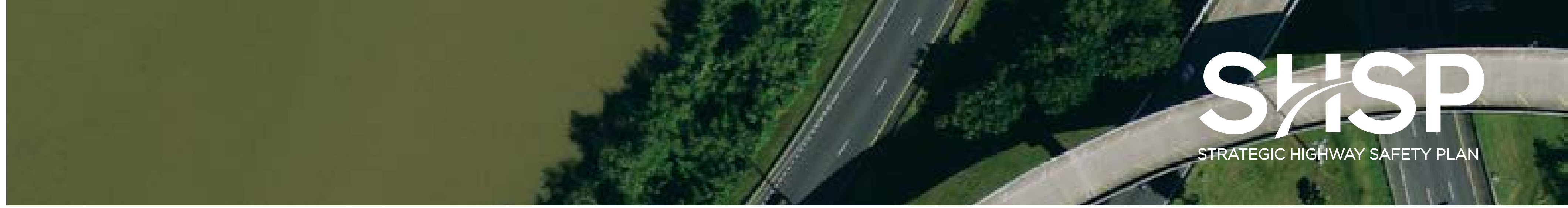
Year of publication: 2024

- **Highway and Transportation Authority**
- **Department of Transportation and Public Works**
- **Traffic Safety Commission**
- **Puerto Rico Police Bureau**
- **Integrated Transportation Authority**
- **Metropolitan Planning Organization**
- **Transportation Technology Transfer Center**
- **Federal Highway Administration**
- **Federal Motor Carrier Safety Administration**

Contents

Acronyms and Abbreviations

Acronym	English
4 Es	Education, Enforcement, Engineering and Emergency Response
5 Es	Education, Enforcement, Engineering, Emergency Response and Emerging Technology
AASHTO	American Association of State Highway and Transportation Officials
AMA	Metropolitan Bus Authority
AV	Autonomous Vehicles
BAC	Blood alcohol content
CAV	Connected and Autonomous Vehicles
CCF	Crash Cost Factor
CVSP	Commercial Vehicles Safety Plan
DADSS	Driver Alcohol Detection System for Safety
DTPW	Department of Transportation and Public Works
DUI	Driving Under the Influence
EA	Emphasis Areas
EPM	Evaluation Process Model
F	Fatalities
FARS	Fatality Analysis Reporting System
FHWA	Federal Highway Administration
FMCSA	Federal Motor Carrier Safety Administration
HCL	High Crash Location
HG	Serious Injuries
HPMS	Health Plan Management System
HRRR	High-Risk Rural Roads
HSIP	Highway Safety Improvement Program
HSP	Highway Safety Plan
ITS	Intelligent Transportation System
KABCO	K: Fatal Injury, A: Suspected Serious Injury, B: Suspected Minor Injury, C: Possible Injury, O: No Apparent Injury
LTAP	Local Technical Assistance Program
MADD	Mothers Against Drunk Drivers
MCSAP	Motor Carrier Safety Assistance Program
MIRE-FDE	Model Inventory of Road Elements - Fundamental Data Elements
MLRTP	Multimodal Long Range Transportation Plan
MMUCC	Model Minimum Uniform Crash Criteria
MOT	Maintenance of Traffic
MOU	Memorandum of Understanding
MPO	Metropolitan Planning Organization
NHTSA	National Highway Traffic Safety Administration
NMEAD	Bureau for Emergency Management and Disaster Administration
NOAA	National Oceanic Atmospheric Administration
PCMS	Portable Variable Message Signs
PRHTA	Highways and Transportation Authority
PRITA	Puerto Rico Integrated Transportation Authority
PRPB	Puerto Rico Police Bureau
PTASP	Public Transportation Agency Safety Plan
RSA	Road Safety Audit
RSO	Road Safety Observatory
SEGURO	United Free Emergency Response and Operation Service
SHSP	Strategic Highway Safety Plan
SIPA	Safety Improvement Project Application
SMART	Specific, Measurable, Achievable, Relevant and Time-bound
SSA	Safe System Approach
STIP	Statewide Transportation Improvement Program
SWOT	Strengths, Weaknesses, Opportunities, and Threats
TIM	Transportation Incident Management
TMA	Maritime Transportation Authority
TMC	Transportation Management Center
TMP	Transportation Management Plans
TRCC	Traffic Records Coordinating Committee
TSC	Traffic Safety Comission
TSM&O	Transportation Systems Management and Operation
TSSMC	Traffic Signal Systems Management Center
VMT	Vehicle Miles Traveled
V2I	Vehicle-to-Infrastructure
V2V	Vehicle-to- Vehicle
V2X	Vehicle-to-Everything
VMT	Vehicle Miles Traveled



Message from the Secretary

Road safety in Puerto Rico is the essence of all the programs, projects, and initiatives of the Department of Transportation and Public Works (DTOP). It is the driving force that propels us every step of the way and our reason for being. Since 1952, DTOP has pursued the vision and mission of developing an integrated transportation system that, along with road infrastructure and service, facilitates economic development in harmony with the environment.

However, in recent years, factors such as the impact of climate change with its deteriorating effects on road infrastructure, as well as the COVID health crisis, which resulted in a drastic change in driver behavior, have caused variations in the positive statistics Puerto Rico once enjoyed in reducing roadway fatalities.

Over the years, the implementation of the **Strategic Highway Safety Plan (SHSP)** has shown that joint efforts to improve road safety are possible and have an undeniable impact on the external factors that affect it.

The SHSP not only has a direct impact on the safety of drivers and pedestrians, but it also impacts and contributes to the social and economic well-being of Puerto Rico. Its implementation continues to be the centralized and proven tool to channel and group collaborative initiatives aimed at reducing fatalities and crashes in our island, while we work on the historic recovery of road infrastructure and the changes, we face due to our geographic location in the Caribbean.

This third review of the SHSP 2024-2028 guarantees the ontinuation of collaborative efforts between various state and federal government agencies, as well as other ongovernmental entities. We know that through awareness and the establishment of educational and community programs, we can reduce crashes and fatalities on our roads.

It is important to note that Puerto Rico has many ongoing maintenance, rehabilitation, and reconstruction projects on state roads, which are the result of a historic allocation of state and federal funds designated to improve infrastructure and mobility on the island. However, these projects may cause congestion and temporary discomfort for drivers, requiring effective communication from DTOP to the public and always emphasizing the responsibility of drivers to protect the lives of work crews on the roadway. Protecting our employees and others working on our roads is also a crucial part of guiding drivers in road safety.

Along with the infrastructure recovery, we must always remember the four (4) pillars of road safety: education, engineering, law enforcement, and emergency medical response. Through this formula, we can see how the participation of all sectors makes sense and becomes crucial when joining efforts. Additionally, in this equation, each person is important, and we all must contribute to awareness and respect for traffic laws.

As Secretary of DTOP, I have focused, and it has been one of my priorities, on promoting road safety in all forums, both in the construction industry and in school and community programs, and with the media in Puerto Rico. Several key initiatives in the implementation of public policy have included: advancing rehabilitation and modernization projects for roads and signage to contribute to mobility and intermodal systems, for pedestrians, cyclists, and drivers alike. Collaboration with the Department of Education has allowed us to educate children and teens by focusing on the importance of seatbelt use, not driving under the influence, respect for traffic signalization, and construction zones. Another priority has been fostering collaboration between different state and federal government agencies, as well as non-governmental organizations such as AARP, AASHTO, and private entities. The collection and analysis of data on traffic accidents have directed strategic projects on signage and traffic regulation to develop effective mitigation strategies.

It is worth mentioning that in 2022, DTOP received the "Find a Way" award from the International Road Federation (IRF) in recognition of the implementation of the SHSP from its inception in 2014 until 2019. This global recognition highlights DTOP's efforts to improve road safety through comprehensive strategies aimed at reducing crashes and fatalities on the roads, and we share this with all past DTOP Secretaries, as well as the hundreds of DTOP employees, the Highway and Transportation Authority (ACT), the Traffic Safety Commission, and the Integrated Transportation Authority (ATI), and all government and private entities that have been part of the SHSP.

At DTOP, we have made road safety a priority and public policy, not only to reduce crashes and fatalities but also to promote a culture of responsibility and respect on the roads through collaborative efforts, including legislative and educational efforts, to achieve the global vision of **"Zero Fatalities"** on our roads.

Our commitment is to continue focusing on our role as leaders in road safety and ensuring success through collaboration and the commitment of the entire community. **Together, we save more lives!**

Eileen M. Vélez-Vega, PE
Secretary
Department of Transportation and Public Works of Puerto Rico

Letter from the Executive Director

Dear Safety Stakeholder,

The safety of everyone traveling across our beautiful island is our top priority. At the Puerto Rico Highway and Transportation Authority (PRHTA), we are firmly committed to protecting every user of our roads, and we work tirelessly to ensure that every journey is safe and reliable.

Your unwavering commitment has been essential in maintaining the strategies and actions of the Strategic Highway Safety Plan (SHSP). Your dedication has been key in providing innovative ideas and sustained efforts that have continued to improve the mobility and accessibility of our transportation network, benefiting all Puerto Ricans.

Thanks to your effort and commitment, the PRHTA is pleased to present the new SHSP 2024-2028, marking the beginning of the third implementation cycle of this crucial initiative. This plan brings together various state and federal agencies, as well as representatives from the public and private sectors, all united by a common goal: safeguarding lives and well-being on our roads. The SHSP 2024-2028 introduces the adoption of the Safe System Approach (SSA), an innovative framework that recognizes and incorporates human error into the design and operation of our road infrastructure. This approach is based on the premise that no road death is acceptable, and we must design a system that protects all users, even when human errors occur.

The unity of the 4 Es of road safety is fundamental to the success of this plan. Engineering, education, law enforcement, and emergency medical services are represented by agencies such as the PRHTA, the Traffic Safety Commission (TSC), and the Puerto Rico Police Bureau (PRPB), among many other agencies. Together, we can make a significant difference. I urge all drivers to be more cautious, slow down, and respect and protect VRUs. To transportation professionals, I urge you to plan and implement engineering designs that use long-term data trends and accommodate human error.

Every action counts to keep our roads safe for everyone. For this reason, join this call to action to eradicate fatalities and serious injuries on our roads. If we all do our part, we will achieve it.

Sincerely,

Edwin Gonzalez, PE
Executive Director
Puerto Rico Highway and Transportation Authority

01 Introduction

At the crossroads of innovation and responsibility, Puerto Rico's Strategic Highway Safety Plan (SHSP) 2024-2028 emerges as an essential guide toward a safer future on our roads. Meeting the requirements set forth by the Federal Highway Administration (FHWA) and serving as a cornerstone of the Highway Safety Improvement Program (HSIP), this five-year (5) plan is dedicated to the noble cause of reducing fatalities and serious injuries on all public roads nationwide.

Developed by the Puerto Rico Highways and Transportation Authority (PRHTA) through a cooperative and multidisciplinary effort, the SHSP 2024-2028 marks the third implementation cycle of this critical initiative. It brings together road safety stakeholders, including state and federal agencies, as well as representatives from the public and private sectors, all united by a common goal: safeguarding the lives and well-being of Puerto Ricans on public roads.

This cycle of SHSP introduces the adoption of the Safe System Approach (SSA), a revolutionary framework that recognizes and incorporates human error into the design and operation of our road infrastructure. By integrating key elements of engineering, education, law enforcement, and emergency medical services, the SHSP 2024-2028 aims not only to align objectives and maximize resources but also to transform how we collectively address road safety challenges in Puerto Rico.

This introduction symbolizes our dedication to continuous improvement in road safety and our unwavering commitment to protecting every road user. Moving forward, the SHSP 2024-2028 will serve as a beacon, guiding our actions toward a future where Puerto Rico's roads are the equivalent of safety, resilience, and respect for human life.

Background

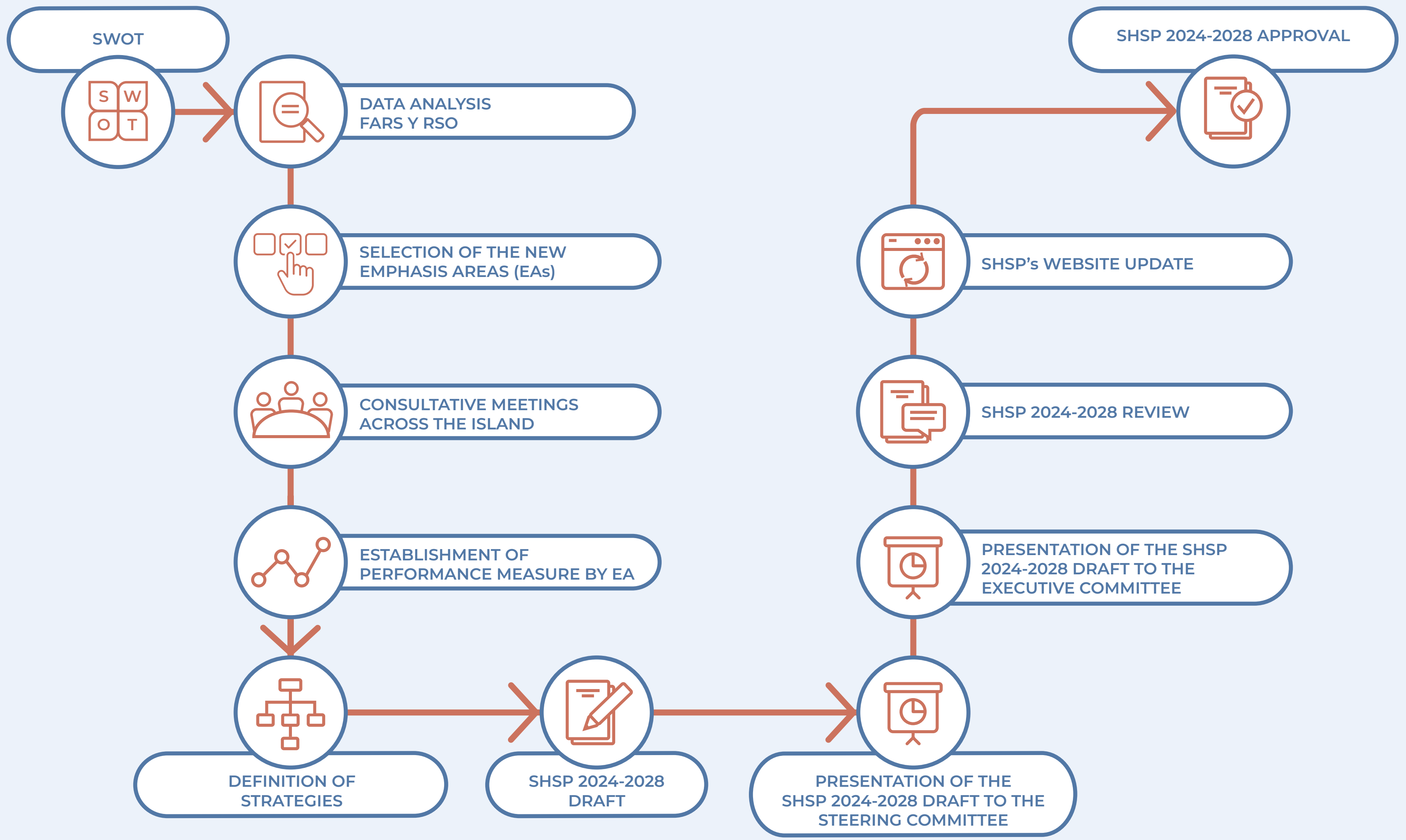
The SHSP is a requirement of the FHWA and a key component of the HSIP (23 U.S.C. 148). It is a state-coordinated safety plan that provides a comprehensive framework for reducing fatalities and serious injuries on roads across all public highways over a five-year (5) duration. A SHSP identifies the primary safety needs within a state and guides investment decisions toward prevention strategies and measures with the highest potential to save lives and prevent injuries.

Puerto Rico's SHSP 2024-2028 corresponds to the third implementation cycle and is developed by the PRHTA through a cooperative process involving road safety stakeholders, including state and federal agencies, and incorporation of representatives from the public and private sectors. It integrates engineering, education, law enforcement, and emergency medical services, enabling road safety stakeholders to work together to align objectives, maximize resources, and collectively address the country's road safety challenges.

Update Process

Figure 01 illustrates how the update process for the new SHSP 2024-2028 began with a Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis. This analysis enabled the PRHTA team to identify strategies and actions for better coordination and implementation of the SHSP. Subsequently, data from the Fatality Analysis Reporting System (FARS) and crash data from the Road Safety Observatory (RSO) were utilized and analyzed to select the new Emphasis Areas (EAs).

Figure 01
Update Process of the New SHSP 2024-2028



To complete the update process of the Plan, four (4) consultative meetings were held in the municipalities of Caguas, Mayagüez, Toa Baja, and Juana Díaz, as shown in Illustration 01. Safety delegates were invited to these meetings, which had two (2) main objectives: 1) To explain the SHSP 2024-2028 and its new EAs, and 2) to present the findings from the safety assessment on Vulnerable Road Users (VRUs). These activities formed the basis for the development of the new official document of the SHSP 2024-2028. Furthermore, the input obtained from the safety delegates was used for the selection of strategies and actions in the SHSP and the final VRUs report.

Illustration 01. Dates and Locations of Road Safety Consultative Group Meetings During the Year 2023

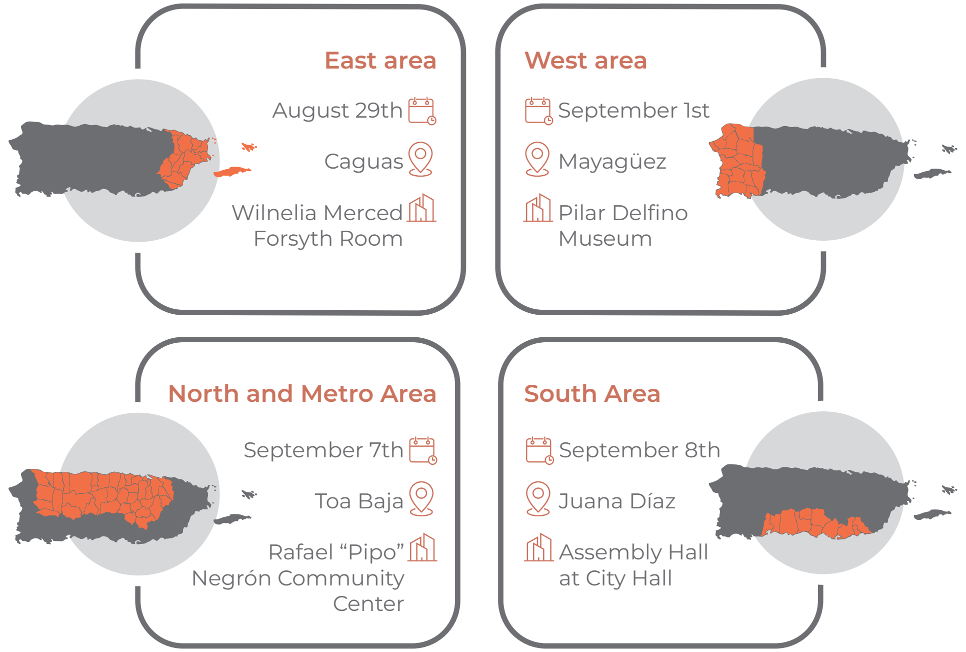


Figure 02
Mission, Vision and Goal

Mission

To design and operate Puerto Rico's road system in a way that accepts and accommodates human error while ensuring the safety of all users.

Vision

A future where fatalities and serious injuries related to traffic crashes in Puerto Rico are reduced.

Goal

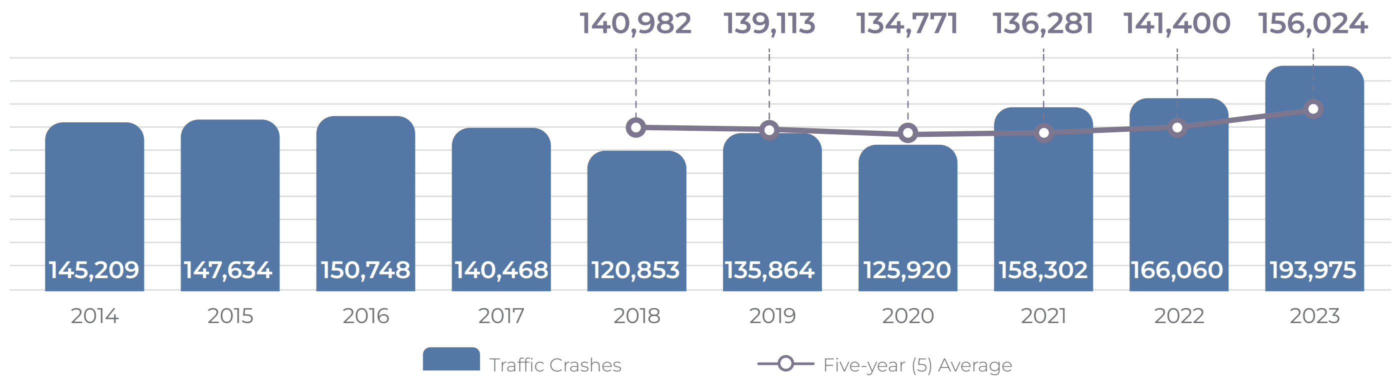
To promote that traffic crashes, when they occur, do not result in fatalities or serious injuries.

Road Safety Trends in Puerto Rico

It is important to understand current trends before presenting the new SHSP 2024-2028. This section provides a general overview of these trends and information on the factors influencing traffic crashes in Puerto Rico.

Between 2014 and 2022, nearly 1.3 million traffic crashes occurred, averaging more than 140,000 crashes per year. Illustration 02 shows that from 2016 to 2020, there was a 16.5% reduction in the total number of crashes. After 2020, crashes increased by 5.0%, 10.2%, and 28.7% for the years 2021, 2022, and 2023, respectively, compared to the number of crashes in 2016, which was the highest before 2021. The overall trend of the five-year (5) moving average shows a gradual increase in the number of traffic crashes towards the end of the observed period.

Illustration 02. Traffic Crashes in Puerto Rico 2014-2023



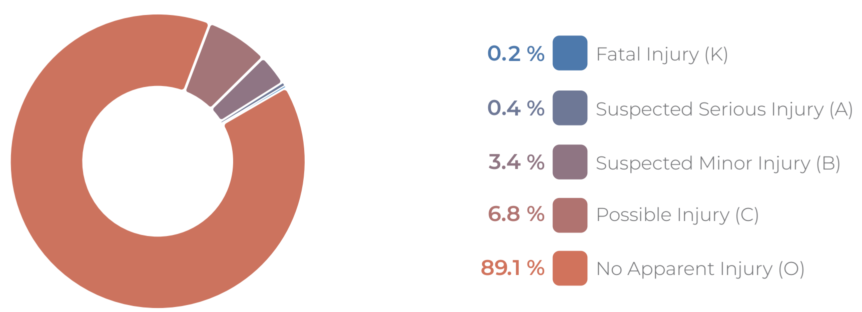
Source: Data from CARE 2014-2018 and RSO 2018-2022

Since 2019, the RSO has been able to obtain data on the severity of crashes according to the KABCO[1] scale, as a result of the digitalization of the PPR-621.4 crash form. Illustrations 03 and 04 show the distribution of crash severity according to this scale, where 89.1% of crashes resulted in property damage only, 10.6% involved various severities of injuries, and 0.2% were fatal crashes. Additionally, the social cost by severity of crashes occurring between 2019 and 2022 is represented.
This expenditure amounted to $34,832,843,493.00 over the course of four years, or $8.7 billion per year.

1 According to the guidelines of the Model Minimum Uniform Crash Criteria (MMUCC) by the National Highway Traffic Safety Administration (NHTSA), KABCO is a functional measure of injury severity for anyone involved in a crash. K-Fatal Injury, A-Suspected Serious Injury, B-Suspected Minor Injury, C-Possible Injury, and O-No Apparent Injury.

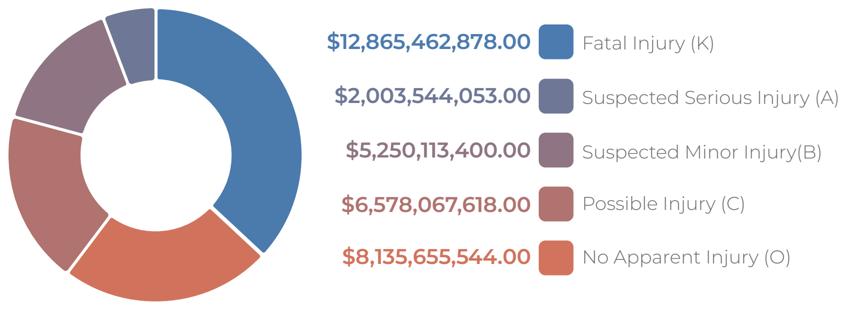
Old San Juan
Metric PR

Illustration 03. Severity of Crashes According to the KABCO Scale



Source: Data from RSO 2019-2022

Illustration 04. Crash Social Costs by Severity

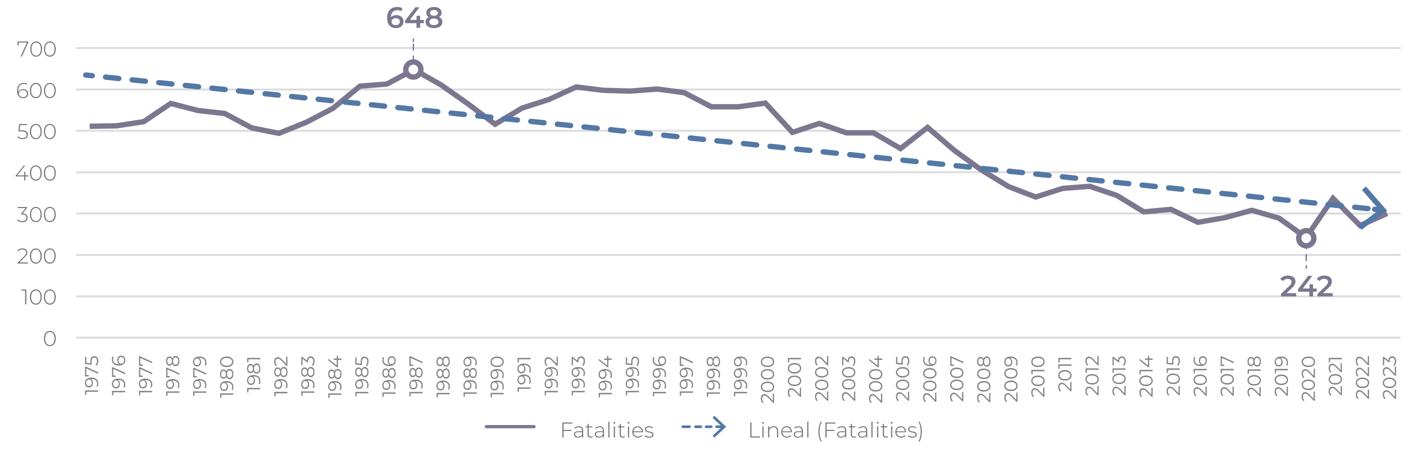


Source: Data from RSO 2019-2022; Crash Cost For Highway Safety Analysis FHWA 2018

Over the past decades, Puerto Rico has achieved a significant reduction in fatalities from traffic crashes, as shown in Illustration 05. The reduction from 1975 to 2023 is 43%, demonstrating proactive efforts in road safety. However, even one death on the roads is too many, and the SHSP aims to eliminate fatalities entirely in the coming decades.

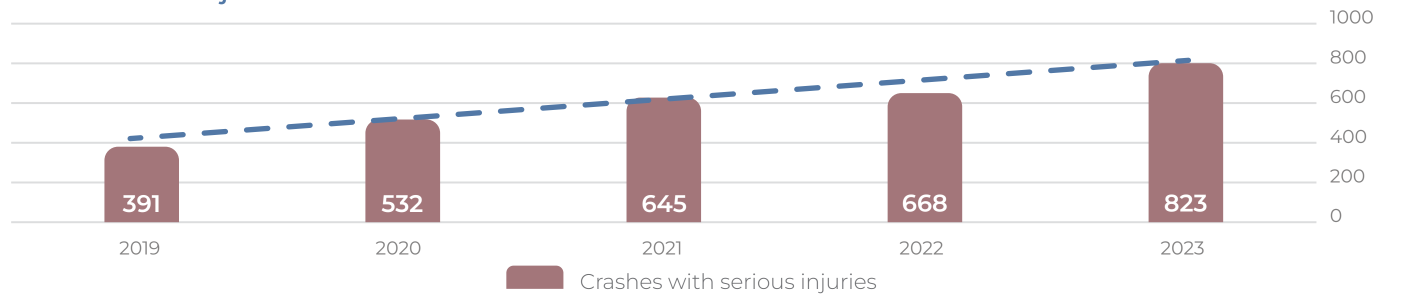
Since 2019, police officers have had the option to classify crashes involving injuries according to severity. Illustration 06 displays crashes with serious injuries from 2019 to 2023. Analysis of these types of crashes during this period shows an average annual increase of 21%. This rise will be addressed by the SHSP through its various EAs.

Illustration 05. Fatalities from Traffic Crashes in Puerto Rico 1975-2023



Source: Data from TSC 1975-2023

Illustration 06. Crashes with Serious Injuries in Puerto Rico 2019-2023



Source: Data from RSO 2019-2022

02

Emphasis Areas (EA)

Safe System Approach

The SHSP has adopted the Safe System Approach (SSA) from the Federal Highway Administration (FHWA) as the foundation/core for identifying EAs and mitigating each of them. This approach has been successfully implemented in various nations and cities worldwide and is now being implemented in the United States.

The goal of this approach is to reduce fatalities and serious injuries for all road users through a comprehensive vision of the road system. It anticipates human errors, considers human vulnerability to impact energy levels, promotes shared responsibility for safety, advocates for proactive safety measures, and emphasizes the importance of redundancy in the process. Figure 03 presents the principles that will be followed by the EAs identified as having the greatest opportunities for reducing roadway fatalities and serious injuries, along with the four (4) principles they pursue.

Additionally, FHWA developed a report on integrating SSA into the HSIP, recommending a design hierarchy as a tool to help agencies and professionals identify and prioritize measures and strategies when developing transportation projects. This hierarchy includes four levels organized from highest to lowest alignment with Safe System principles, as shown in Illustration 07 (see page 19).

Levels 1 to 3 include solutions to eliminate potential conflicts on the road and separate moving users, aiming to reduce kinetic energy in case of a crash. Meanwhile, strategies at Level 4 provide crucial information to users to enable them to take appropriate actions. Thus, physical changes in the system are more effective when supported by user decision-making.

Figure 03
Principles of the EAs

01 Educating About a New Paradigm

- Accommodating human erros in planning, design, and construction
- Maintaining injuries to the human body at tolerable levels

02 Principles of the EAs

- Integrating equity
- Doubling efforts that work
- Accelerating technological advances
- Implementing the SSA

03 Promoting the 6 Principles of SSA

- Deaths and serious injuries are unacceptable
- Humans make errors
- Humans are vulnerable
- Responsibility is shared
- Road safety is proactive
- Redundancy is crucial

04 Addressing the 5 Elements of SSA

- Safe road users
- Safe vehicles
- Safe speeds
- Safe roads
- Post-crash care

Level 1 recommends separating users into different physical spaces, while Level 2 promotes speed reduction and management to decrease the kinetic energy of a crash and maintain injuries to the human body at tolerable levels. Level 3 involves managing conflicts in time, assuming that users may need to occupy the same space but can be separated in time using traffic control devices. Level 4 encourages increased awareness and alerts road users about potential hazards so they can take appropriate and safe actions.

Illustration 07. Examples of Actions for Each Level of Hierarchy

Level	Action	Examples
L1	Separating users in a physical space.	Sidewalks Installations for bike and public transportation users
L2	Keeping injuries to the human body tolerable.	Speed reduction Context-appropriate speeds and land use classification
L3	Separating users in time.	Pedestrian signal timing Signal phases dedicated to turns and vulnerable road users
L4	Alerting users about possible hazard.	Removing parking near intersections Roadway lighting

Similarly, strategies are organized following the 5 main approaches recognized among safety professionals as having potential impact on safety. These are known as the 5 Es of road safety:

01 Education

02 Enforcement

03 Engineering

04 Emergency respose

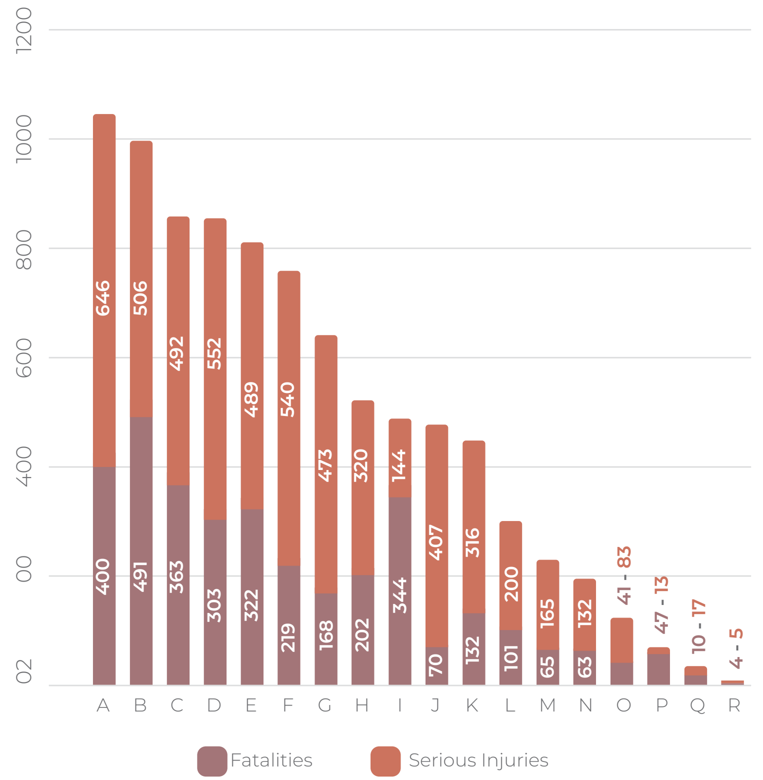
05 Emerging technology

While these continue to be fundamental approaches, we are also adopting a broad and inclusive perspective where all actions for each EA must be SMART: Specific, Measurable, Achievable, Relevant, and Time-bound.

Prioritization of EAs

The 22 EAs established by American Association of State Highway and Transportation Officials (AASHTO) national SHSP were analyzed. The following EAs were excluded from the analysis due to lack of data: licensing information, distracted or fatigued drivers, horizontal curves, and non-signalized intersections. Illustration 08 shows the comparison of fatalities and serious injuries for the remaining 18 EAs.

Illustration 08. Fatalities and Serious Injuries by EA According to AASHTO



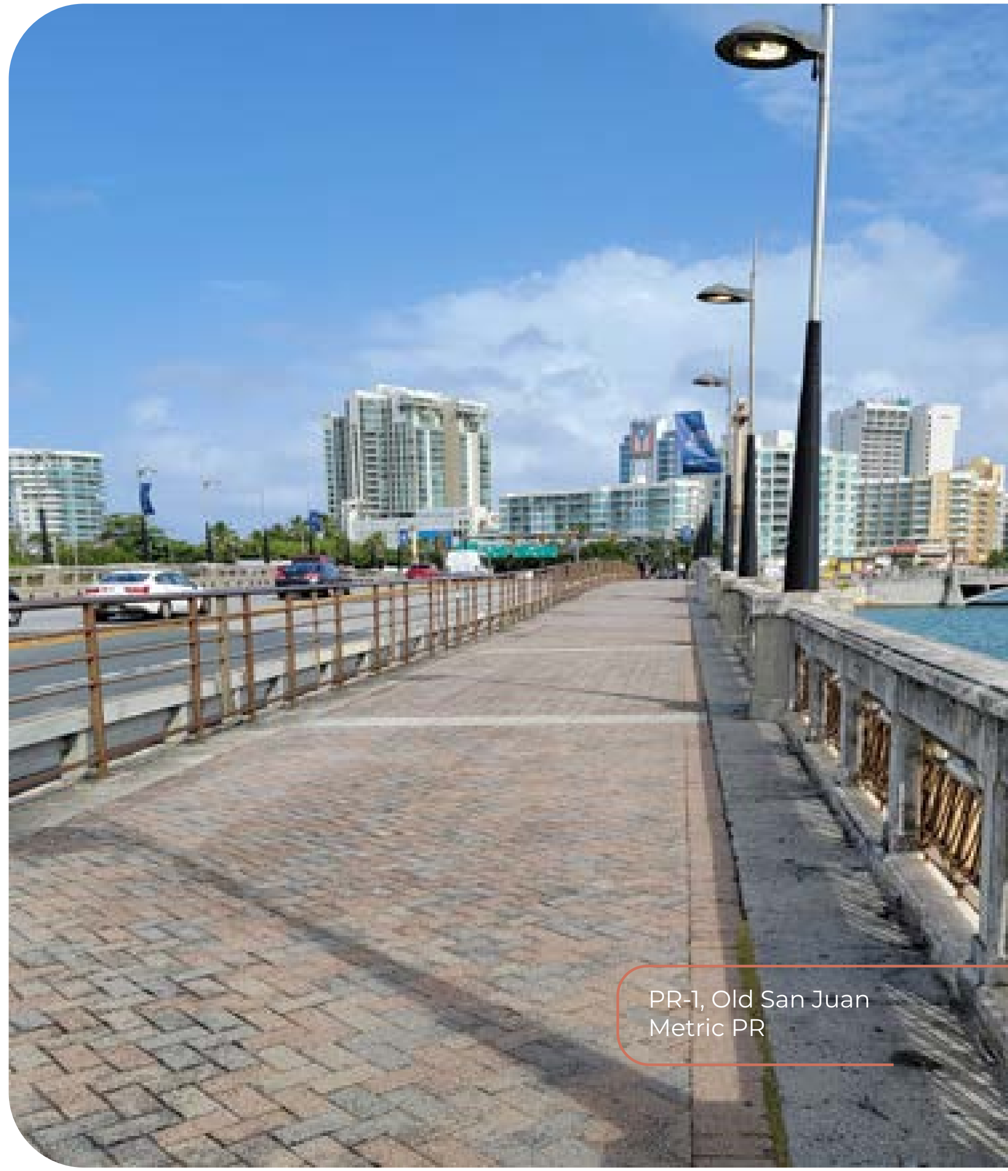
A. Lane or Road Departure
B. Occupant Protection
C. Speed-related Crashes
D. Crashes with Fixed Objects
E. Pedestrians
F. Older Drivers
G. Frontal Collisions
H. Motorcyclists
I. Drunk Drivers
J. Young Drivers
K. Rainy Conditions
L. Intersections
M. Utility or Lighting Pole
N. Tree
O. Cyclists
P. Heavy Vehicles
Q. Head-on Collisions on Highways
R. Construction Zones

Source: Data from FARS 2014 - 2022 and RSO 2019 – 2022

General description of EAs

The EAs were analyzed based on the number of fatalities (F) and crashes with serious injuries (HG). Data from 2019 to 2022 were used, as since 2019, the digital crash form PPR-621.4 started including the KABCO severity scale. Table 01 (see page 22) presents the classification of the EAs. The column labeled "EA Selected" identifies which EAs are key for the new SHSP, representing more than 30% of total fatalities. The column "For Strategies and Actions" identifies EAs representing more than 50% of crashes with serious injuries that were not selected as part of the key EAs. These will be used as strategies or actions within the key EAs.

Illustration 09 (see page 23) highlights with asterisks (*) the selected EAs deemed key or prioritized. Currently, no EAs have been selected for Safe Vehicles in Post-Crash Care.



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Metric PR

Table 01
Classification of EAs

Final Classification	Emphasis Areas	F	HG	Total	CCF* (in millions)	EA Selected (More than 30%)	For Strategies and Actions	Safe System Classification
1	Occupant Protection	491	506	997	$ 5.9	43%	23%	Safe users
2	Run-off-road Crashes	400	646	1046	$ 4.9	35%	29%	Safe roads
3	Vulnerable Road Users	363	572	935	$ 4.5	32%	26%	Safe users
4	Speed-related Crashes	366	492	858	$ 4.5	32%	22%	Safe speeds
5	Crashes with Fixed Objects	303	552	855	$ 3.8	27%	25%	Safe roads
6	Older Drivers	219	540	759	$ 2.8	19%	24%	Safe users
7	Impaired Drivers (Drunk Drivers)	344	144	488	$ 4.0	30%	6%	Safe users
8	Motorcyclists	202	320	522	$ 2.5	18%	14%	Safe vehicles
9	Head-on Collisions	168	473	641	$ 2.2	15%	21%	Safe roads
10	Rainy Conditions	132	316	448	$ 1.7	12%	14%	Safe roads
11	Young Drivers	70	407	577	$ 1.1	6.1%	18%	Safe users
12	Intersections	101	200	301	$ 1.3	8.9%	8.9%	Safe roads
13	Utility Pole or Lighting Pole	65	165	230	$ 0.84	5.7%	7.4%	Safe roads
14	Tree	63	132	195	$ 0.80	5.5%	5.9%	Safe roads
15	Heavy Vehicles	57	13	70	$ 0.65	5.0%	0.6%	Safe vehicles
16	Highway Frontal Crashes	18	17	35	$ 0.21	1.6%	0.8%	Safe roads
17	Construction Zones	4	5	9	$ 0.05	0.4%	0.2%	Safe roads

* CCF: Crash Cost Factor

Illustration 09. Percentage of Fatalities Attributed to Each AE, Broken Down into Elements of the SSA

Safe Roads

*Lane departure or roadway departure (35%)
Collisions with fixed objects (27%)
Head-on collisions (15%)
Rainy conditions (12%)
Intersections (9%)
Utility or lighting pole (6%)
Tree (6%)
Highway frontal crashes (2%)
Construction zones (1%)

Safe Users

*Occupant protection (43%)
*Vulnerable road users (32%)
*Impaired drivers (30%)
Elderly drivers (19%)
Young drivers (6%)

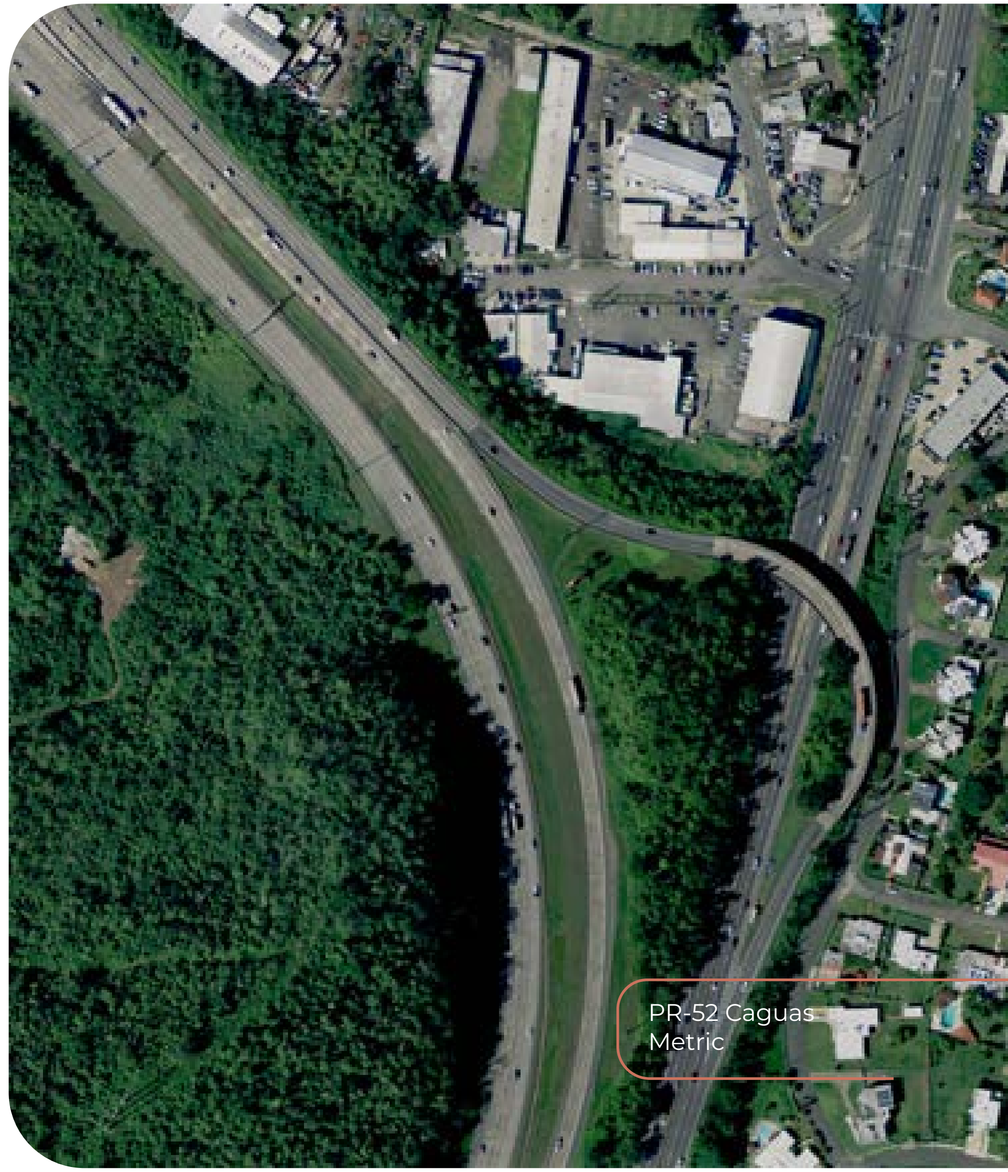
Safe Vehicles

Motorcyclists (18%)
Heavy vehicles (5%)

Safe Speeds

*Speed-related Crashes (32%)

* Key or prtiozed EA



Key EAs

The EAs will serve as a discussion space among road safety delegates with the aim of finalizing and incorporating ideas and actions for the next five (5) years. To achieve this goal, each EA should include fundamental strategies addressing the Safe System Approach, the concept of Complete Streets, the incorporation of proven safety countermeasures from FHWA, and specific actions from the Integrated Transportation Authority (PRITA), as shown in Illustration 10.

Illustration 10. Fundamental Strategies of the EAs

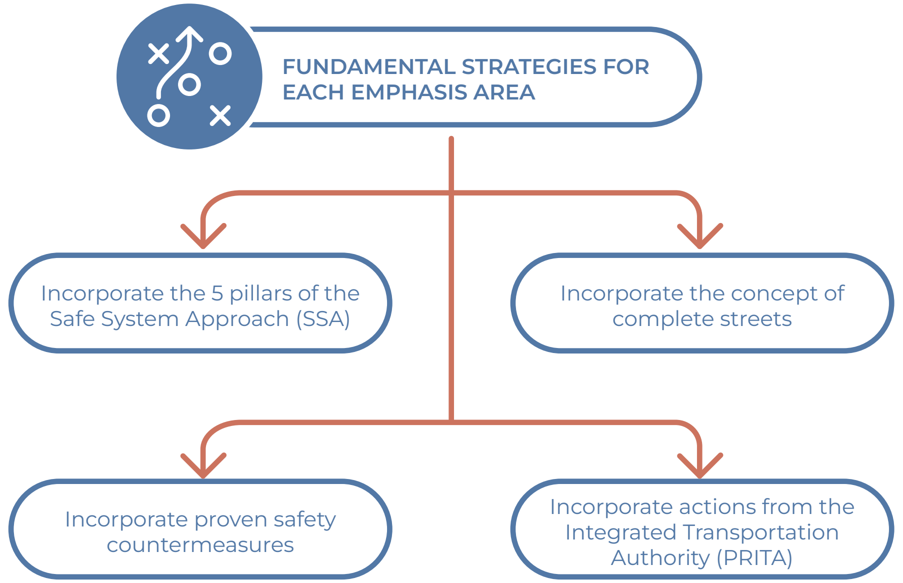
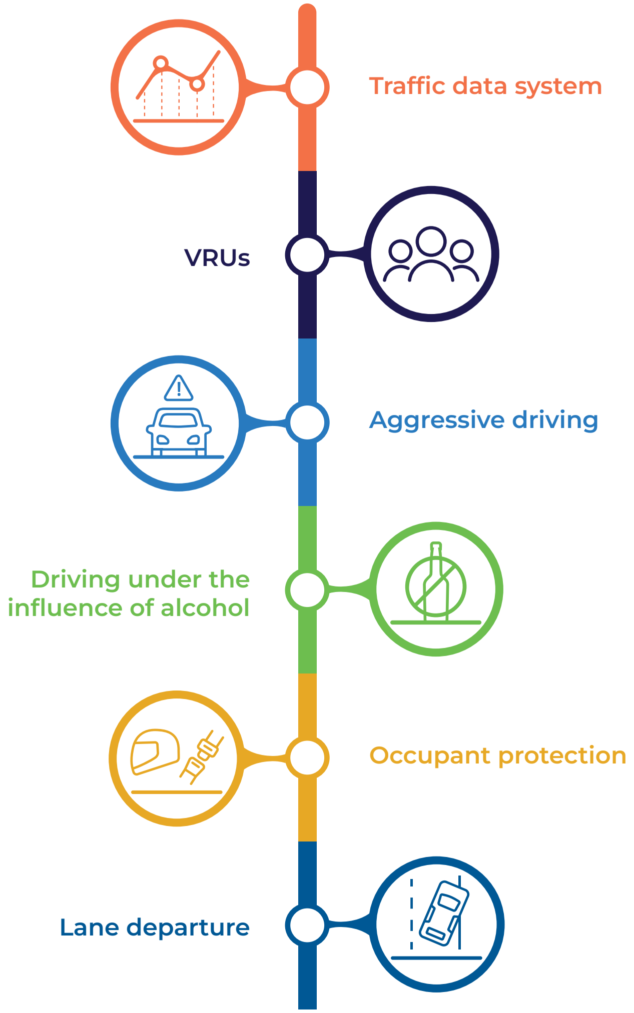


Illustration 11 presents the key EAs of the SHSP 2024-2028.

Illustration 11. EAs SHSP 2024-2028



Traffic Data System

The planning, implementation, and evaluation of road safety critically depend on the availability of up-to-date and accurate traffic data. These data enable managers at various levels and sectors to make strategic and operational adjustments that contribute to reducing traffic crashes.

Integrating information from different systems significantly enhances the capacity to make informed and effective decisions. In this regard, the SHSP 2024-2028 aims to enhance accessibility and integration of six (6) traffic data bases:

01 Crash data
02 Citation/adjudication
03 Emergency medical services system
04 Driver's license/driver history
05 Vehicle registration
06 Roadway data

The PRHTA recognizes the need to provide guidance on data-driven road safety analysis for design processes. Therefore, this area of emphasis will focus on providing clear and proven processes on how to use traffic data to achieve measurable outcomes.

Strategies

01 Develop a technical guide on how to use traffic data from Puerto Rico to integrate and execute applicable methodologies for road safety analysis in the project development processes of the PRHTA and other agencies. i.e., Safety Improvement Project Applications (SIPAs), Before & After Studies, Road Safety Audits (RSAs).

02 Support efforts to develop the Model Inventory of Roadway Elements - Fundamental Data Elements (MIRE - FDE).

03 Support all strategies of the Traffic Records Coordinating Committee (TRCC) work plan.

Objective: Develop a technical guide for road safety processes and procedures on Puerto Rico's highways, to be adopted by the PRHTA for projects funded through the HSIP.

Vulnerable Road Users

A vulnerable road user is defined in the FARS as a non-motorist, including pedestrians, cyclists, and/or individuals using personal transportation devices. Historically, Puerto Rico has faced an issue with fatal crashes involving theSse users. Illustration 12 (see page 27) shows the fatalities of vulnerable road users per year, representing an average of 34%.

Strategies

Safe Users

01 Empower government officials, private sectors, academia, and various road safety organizations to spread messages and promote a culture of safe mobility.

02 Create a culture of road safety and understanding within all agencies concerned with safety.

Safe Vehicles

01 Enhance existing technological innovations focused on mobility and micromobility.

02 Promote and coordinate efforts to enhance the role of public transportation in creating a safer transportation system.

Safe Speeds

01 Update codes, manuals, and guides to support speed reduction.

02 Reduce posted speeds and implement road designs to achieve speeds appropriate to the context and adjacent property use.

03 Collaborate with the Police Department to inform and support speed reduction efforts.

Safe Roads

01 Create safer streets for all road users through improved planning, design, and operation.

02 Expand Puerto Rico's network of pedestrian, cyclist, and public transportation infrastructure.

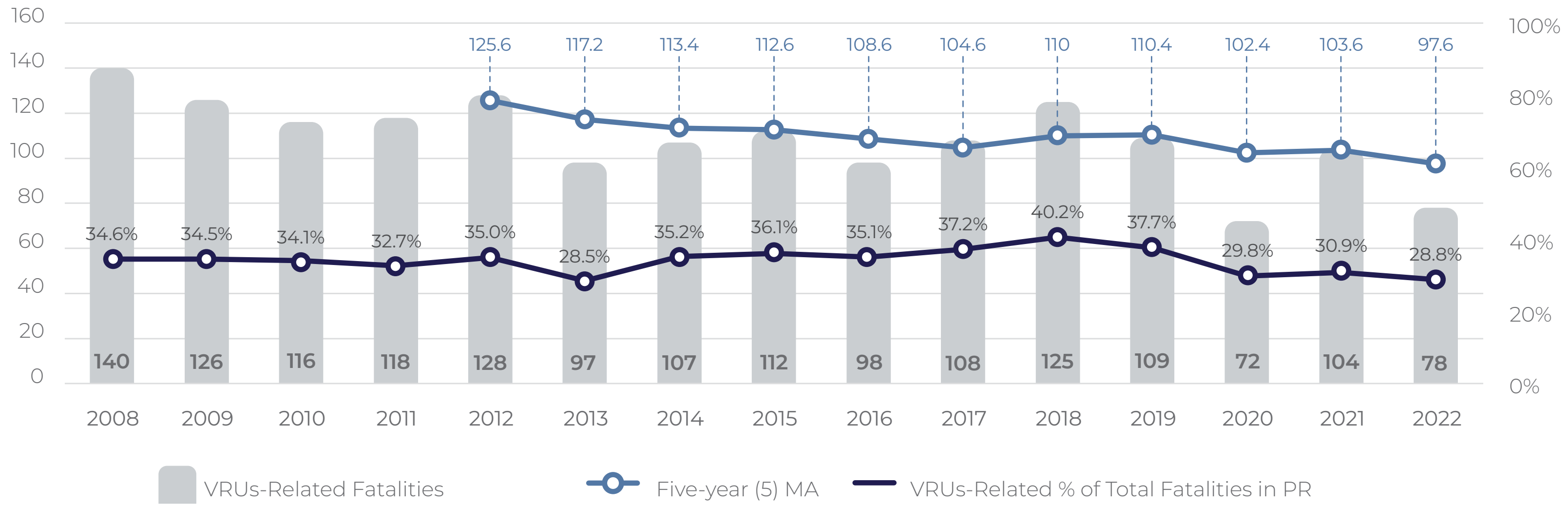
Emergency Medical Response

01 Collaborate with medical emergencies and emergency management to enhance crash and emergency response through education, coordination, and technology.

Campaign "Ponte en sus zapatos y evita ser multado" Traffic Safety Commission

Objective: Reduce the Five-year (5) Average of Fatalities Among VRUs to Seventy-Seven 77 or Fewer by 2028

Illustration 12. Fatalities of VRUs 2008 – 2022



Source: Data from FARS 2008-2022 and RSO 2008-2022

Aggressive Driving

Aggressive driving is defined by crashes related to speeding. Higher speeds result in less vehicle control, reduced reaction time, increased kinetic energy, and a higher likelihood of severe crashes, posing greater risks to all road users. Illustration 13 (see page 29) shows that 36% of fatalities in Puerto Rico are related to speeding. Of these, 60% involved drivers under the influence of alcohol, 67% had occupants without proper protective equipment, 61% involved lane departure, and 12% were related to VRUs.

Strategies

01 Perform a selection process to determine which roads would benefit from speed control measures considering functional classification.

02 Incorporate the concept of complete streets into road designs to reduce speeds, including roundabouts, central islands, traffic calming elements, among others.

03 Implement proven road safety measures for speed control, such as Intelligent Transportation Systems (ITSs), variable speed limits in case of crashes, congestion, work zones, or inclement weather, and assign appropriate and consistent speed limits based on current road usage.

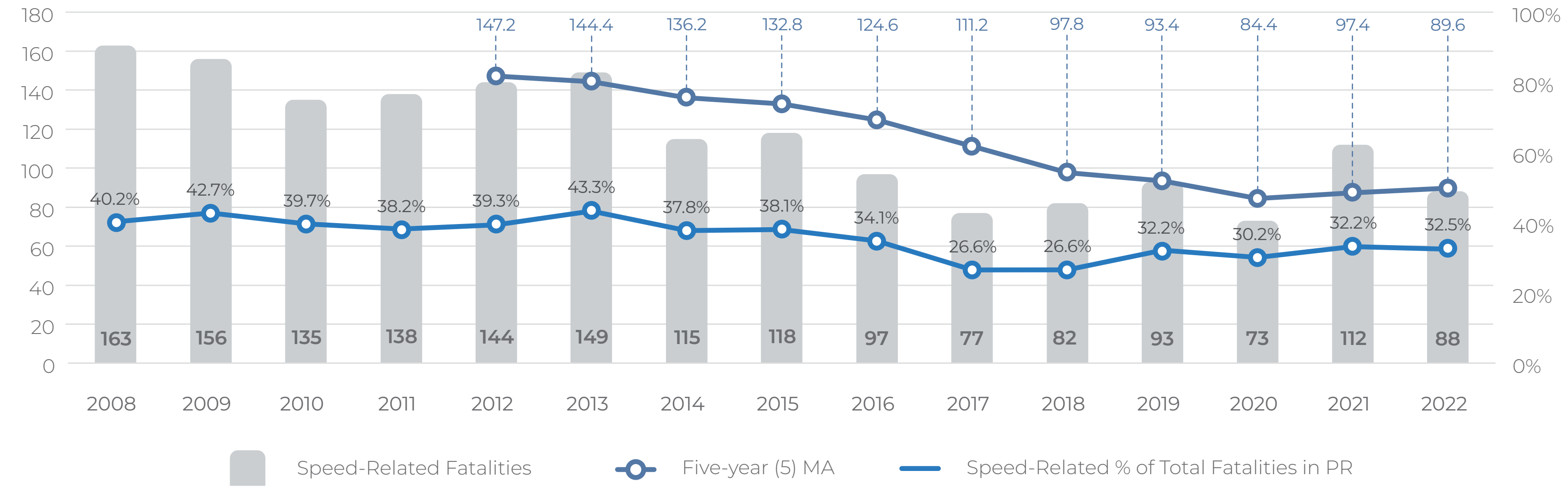
04 Coordinate preventive patrolling in areas prone to aggressive driving.

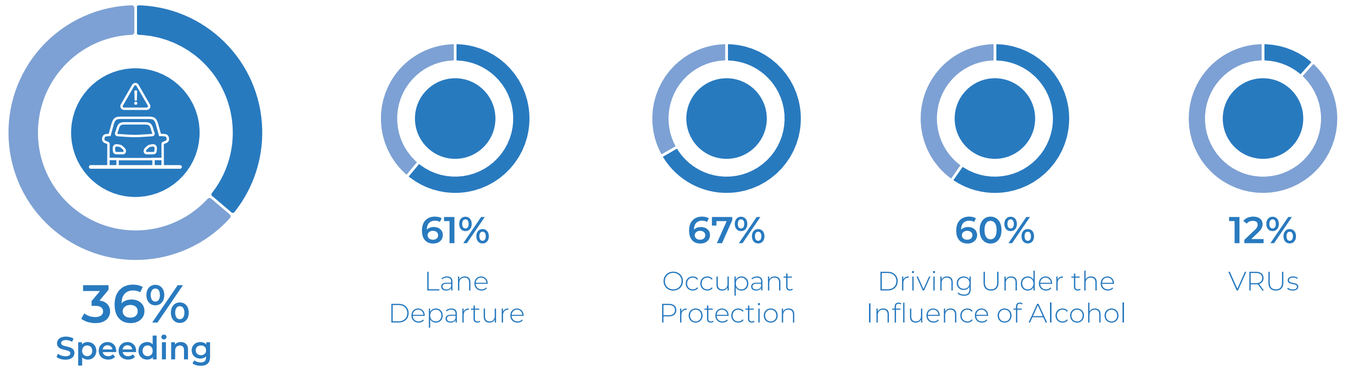
05 Educate about the impact of aggressive driving.

PR-2 Mayagüez Metric PR

Objective: Reduce the Five-year (5) Average of Fatalities Due to Speeding to Seventy-Eight (78) or Fewer by 2028.

Illustration 13. Fatalities Due to Aggressive Driving 2008 – 2022





Source: Data from FARS 2008-2022

Driving Under the Influence of Alcohol

According to the Puerto Rico Vehicles and Traffic Law (Law 22, 2000), a driver is considered to be under the influence of alcohol when the Blood Alcohol Concentration (BAC) exceeds the limits shown in the following illustration.

BAC Limit	0.00%	0.02%	0.02%	0.08%
Driver Type	Vehicles	Vehicles	Heavy vehicles and motorcycles	Vehicles
Ages	16-17 years	18-20 years	+18 years	+21 years

Illustration 14 (see page 31) shows that 38% of traffic crash fatalities have involved drivers under the influence of alcohol. Among these alcohol-related fatalities, 56% involved lane departure, 57% involved speeding, and 72% did not use any form of protection (seat belt, protective seat, or helmet).

Strategies

01 Provide technical support to the Traffic Safety Commission (TSC) in the program area of impaired driving.

02 Evaluate the implementation of integrated vehicle technologies such as alcohol interlock or the Driver Alcohol Detection System for Safety (DADSS) in vehicles of repeat offenders.

03 Implement policies and technologies to control vehicle speed, especially in areas where alcohol-related crashes are more frequent, as the risk and severity of crashes increase with speed.

04 Adapt designs to include better lighting, clear signage, and geometric designs that accommodate common errors of drunk drivers.

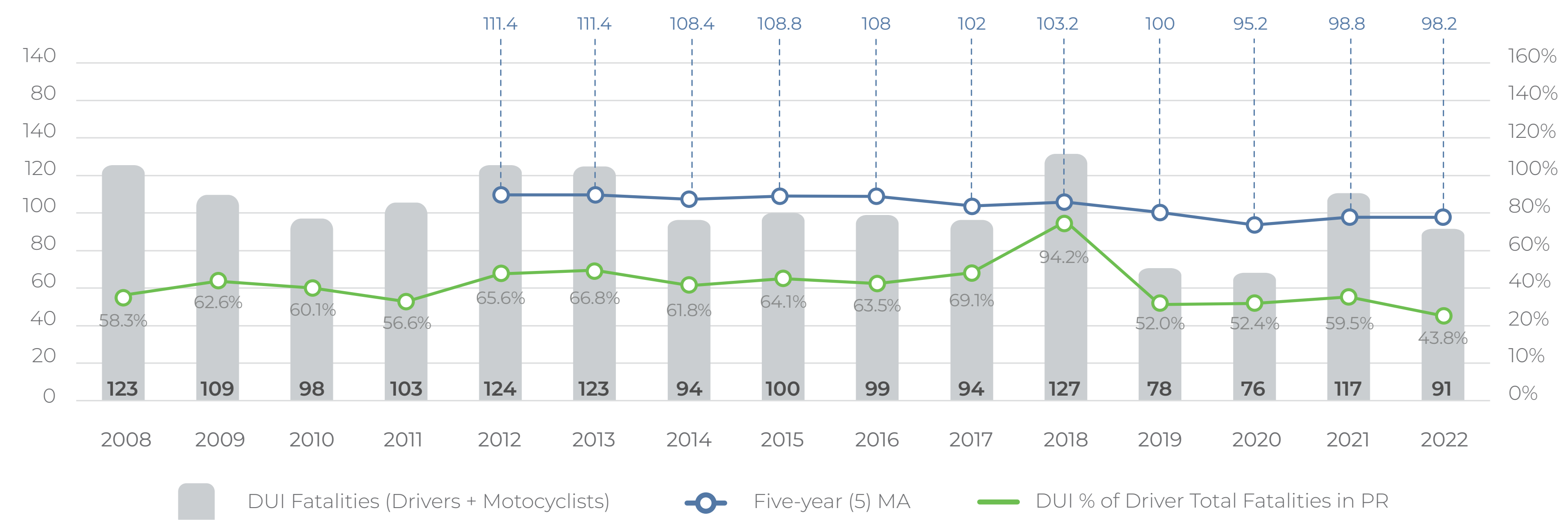
05 Identify entertainment districts with high alcohol consumption to establish low-speed zones.

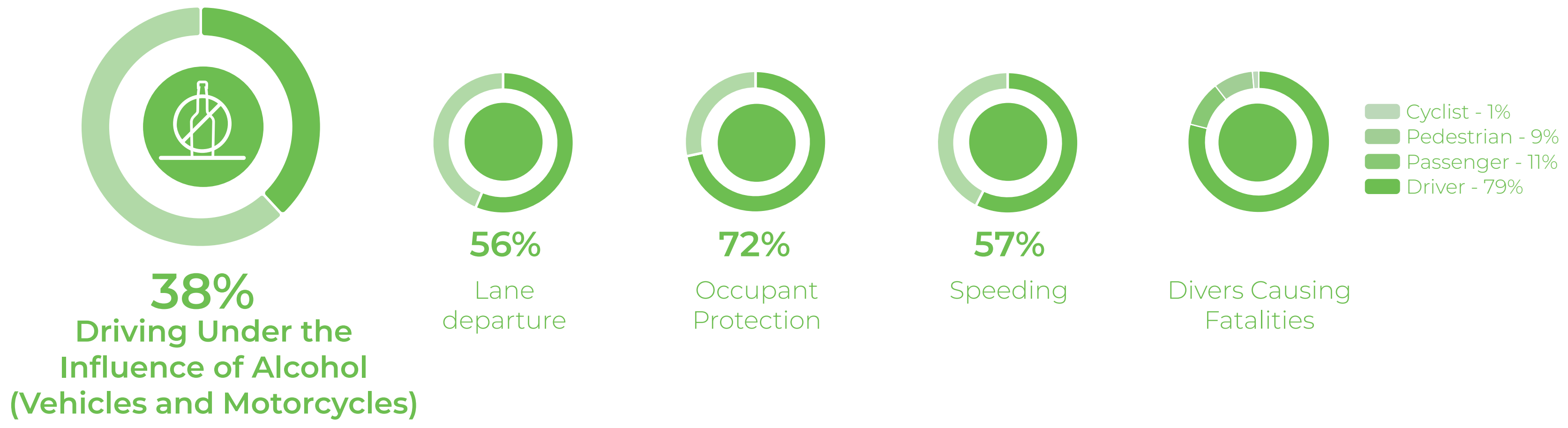
06 Identify entertainment districts with high alcohol consumption to improve access to public transportation systems.

Objective: Reduce the five-year (5) average of fatalities due to drunk driving to eighty-four (84) or less by 2028.

Campaign "Pasa la llave"
Traffic Safety Commission

● Illustration 14. Fatalities of Drivers Under the Influence of Alcohol (DUI) 2008 – 2022





Source: Data from FARS 2008-2022

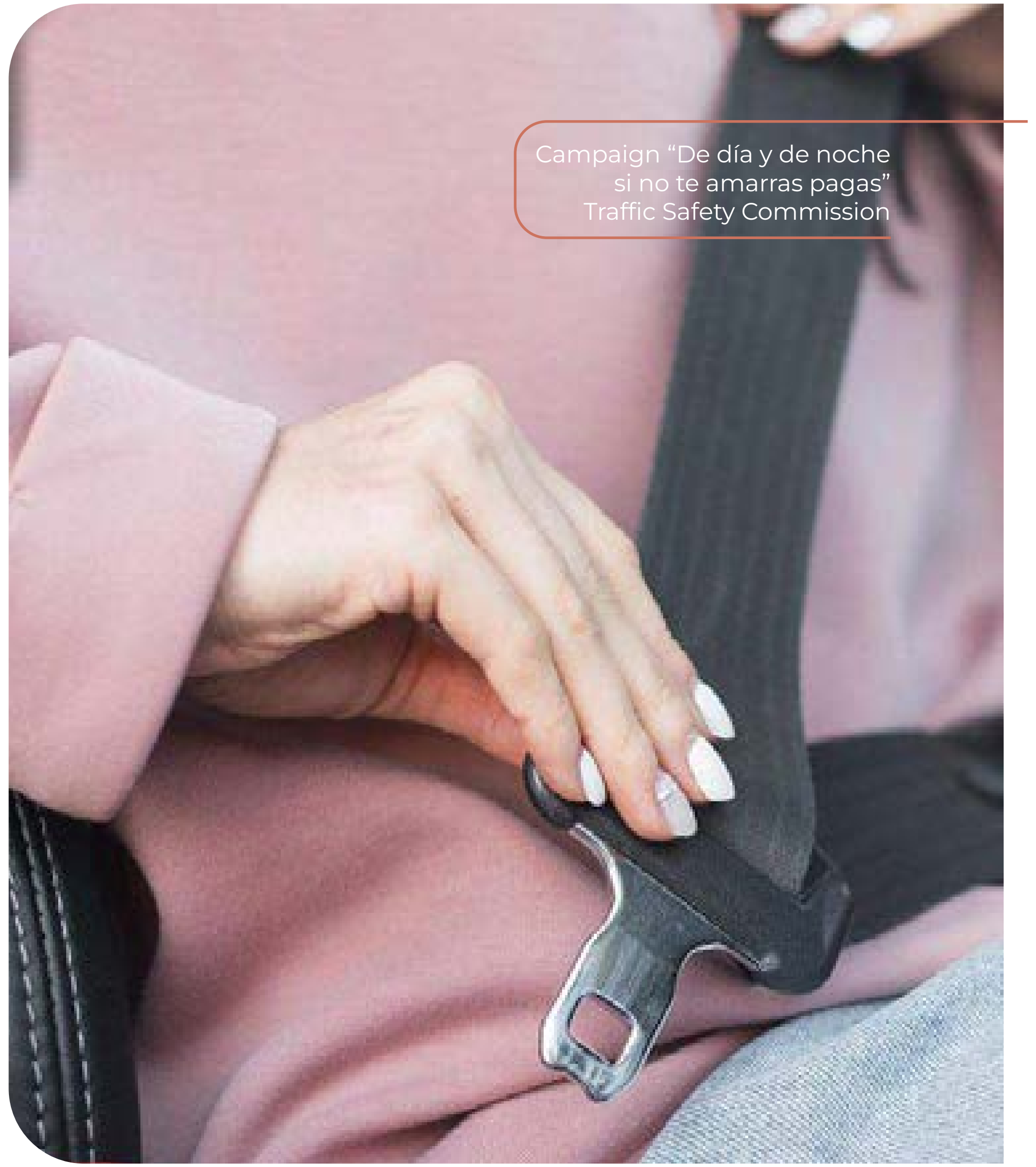
Occupant Protection

In Puerto Rico, Law 22 of 2000 requires that every driver and passenger of vehicles, motorcycles, and trucks use appropriate protective equipment (i.e., seat belts, protective seats, or helmets) at all times.

Occupant Protection: Vehicles

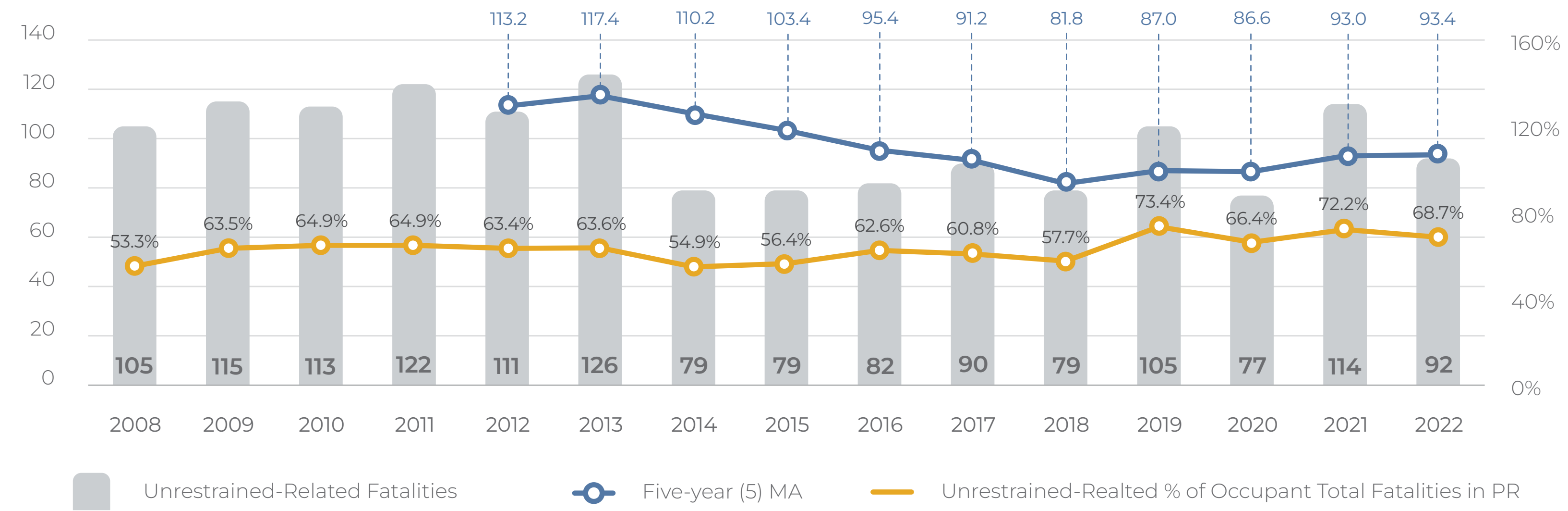
Illustration 15 (see page 33) shows that 63% of drivers and passengers in cars who died in traffic crashes were not wearing seat belts and/or protective seats. Among these fatalities, 58% involved lane departure, 45% involved driving under the influence of alcohol, and 54% involved speeding.

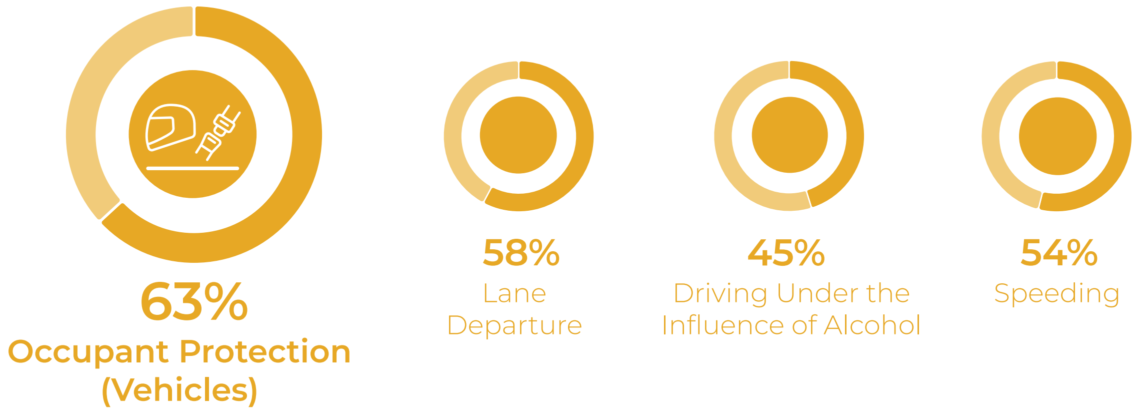
Objective: Reduce the five-year (5) average of fatalities of occupants without seat belts to eighty-one (81) or fewer by 2028.



Campaign "De día y de noche si no te amarras pagas"
Traffic Safety Commission

● Illustration 15. Fatalities of Drivers and Passengers without Protection (Seat Belt and Protective Seat) 2008 - 2022





Source: Data from FARS 2008-2022

Campaign "Motocilcista seguro"
Traffic Safety Commission

Occupant Protection: Motorcycles

Illustration 16 (see page 35) shows that 67% of motorcycle fatalities occurred when the rider was not wearing a protective helmet. Additionally, among these fatalities, 27% involved lane departure, 40% involved driving under the influence of alcohol, and 43% involved speeding.

Objective: Reduce the five-year (5) average of fatalities of motorcyclists without helmets to twenty-seven (27) or fewer by 2028.

Strategies

01 Provide technical support to the TSC in the program areas of occupant protection and motorcycle safety.

02 Promote correct use of protective equipment through education campaigns.

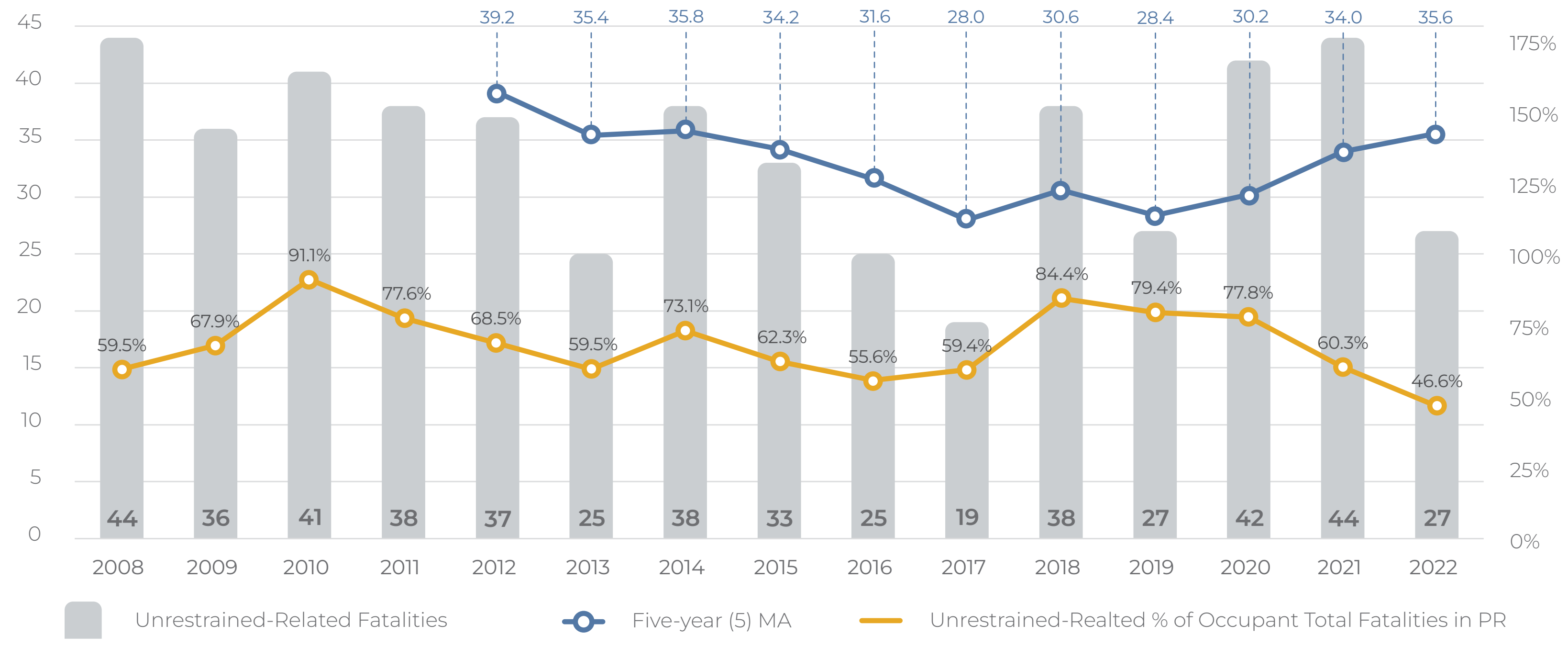
03 Implement speed reduction measures on major and minor arterial roads and high-use motorcycle corridors.

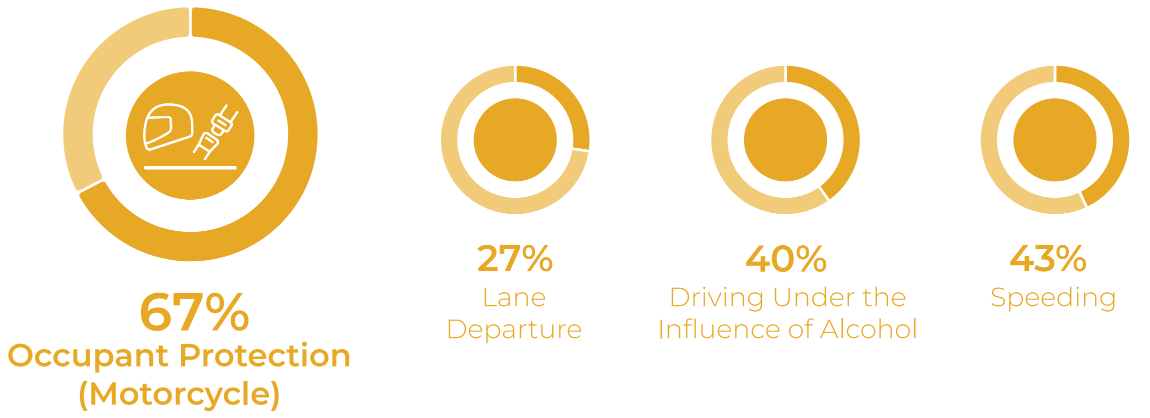
04 Support the implementation of child protective seat inspection stations.

05 Support the development and maintenance of motorcycle polygons.

06 Promote the presence of emergency equipment (e.g., cones, vests, lamps, triangles) in every vehicle.

● Illustration 16. Fatalities of Motorcycle Drivers and Passengers without Protection (Helmet) 2008 - 2022





Source: Data from FARS 2008-2022

Lane Departure

A crash classified as lane departure occurs when a driver veers off the roadway into another lane or onto the roadside/green area. Contributing factors to this action could include distraction, irregular surface/defect in the lane, loss of vehicle control, weather conditions, fixed object, animal on the road, driver condition, speed, mechanical defect, among others. According to Illustration 17 (see page 37), lane departure represents an average of 35% of fatalities in Puerto Rico. Among these incidents, 68% involved drivers without personal protective elements, 63% occurred at speeds exceeding the limit, 46% involved drivers under the influence of alcohol, and 13% were related to VRUs.

Objective: Reduce the five-year (5) average of fatalities related to lane departure to eighty (80) or fewer by 2028.

Strategies

01 Evaluate and select corridors on major and minor arterial roads with the highest incidence of lane departure crashes using RSO data and conduct systematic road safety technical assessments.

02 Develop a systematic pavement marking program for major and minor arterial roads over the next five (5) years.

03 Develop a systematic program for removal and/or protection of fixed objects (e.g., safety barriers, clearing roadside zones) on major and minor arterial roads over the next five (5) years.

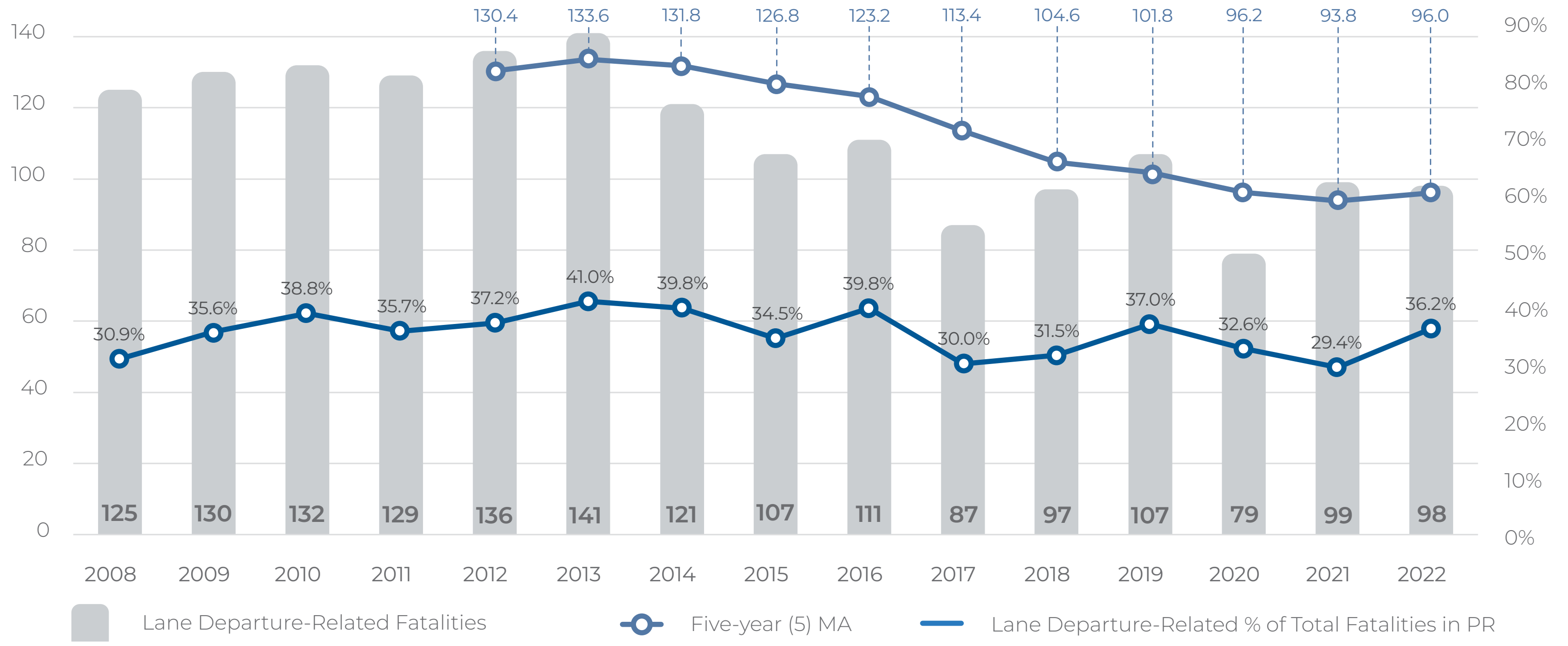
04 Implement proven road safety measures in the design stage of projects by PRHTA, Department of Transportation and Public Works (DTPW), and municipalities (e.g., rumble strips, wider markings, SafetyEdge®, median barriers, delineation, and improved design for horizontal curves).

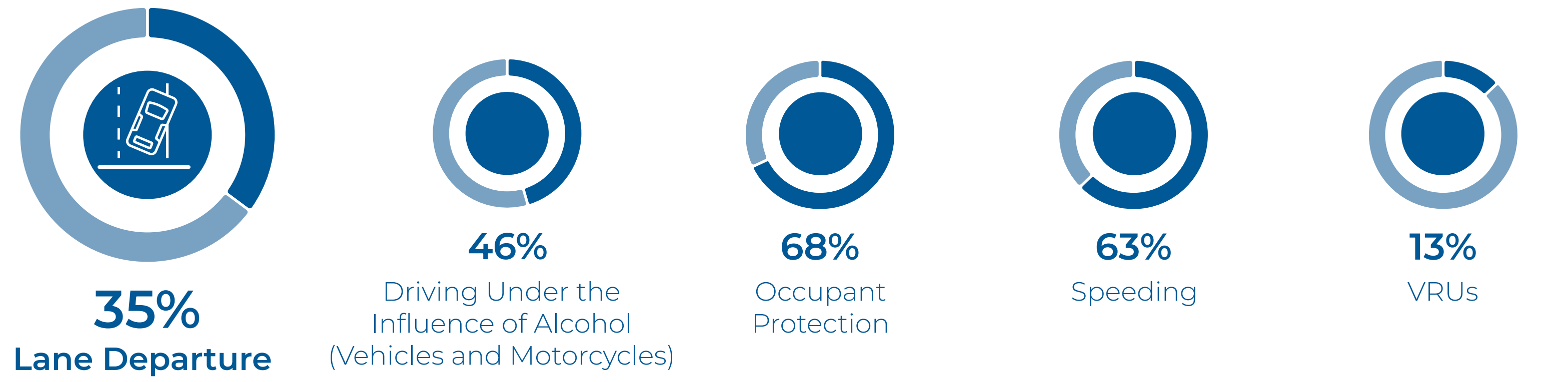
05 Recommend complete streets concepts to reduce speeds.

06 Educate drivers on safe methods to regain control of their vehicle in case of lane departure.

PR-5523 Utuado
Metric PR

Illustration 17. Fatalities of Drivers Due to Lane Departure 2008 - 2022





Source: Data from FARS 2008-2022

Focus Areas

Focus areas include some classifications that were not defined as EAs because they do not directly influence significant issues on the island's roads, or because they were not supported by crash or fatality data.

However, these focus areas will be part of the discussions of the key EAs teams, as they have a direct impact on road safety and must be continuously monitored.

Legislation and Procedures

Urban development and technological evolution in transportation are driving significant changes in how public roads are conceived and used. Among these changes, micromobility, integration of complete streets, autonomous and connected vehicles, and regulation of driver's licenses represent critical areas that require detailed attention from policymakers and legislators to ensure a safe, efficient, and accessible road environment for everyone.

Micromobility

This refers to the use of small and light vehicles such as bicycles, electric scooters, and skateboards, typically used for short trips. This phenomenon responds to the need for more flexible, economical, and sustainable transportation options. To encourage their safe use, states must implement policies that promote the creation of dedicated infrastructure, such as bike lanes and electric vehicle charging stations, as well as clear regulations on the use of these devices in urban areas, including permitted maximum speeds and restricted operation zones.

Integration of Complete Streets Concept

Complete streets are designed to allow safe and comfortable mobility for all users, regardless of mode of transportation, age, or ability. Integrating this concept involves reconsidering road design, including cycling infrastructure, wide sidewalks, safe pedestrian crossings, rest areas, and effective traffic management. State policies should guide and support institutions in reconfiguring their streets to promote equitable use of public space and improve road safety.

Autonomous and Connected Vehicles (ACV)

The introduction of autonomous and connected vehicles has the potential to transform the transportation landscape by improving traffic efficiency, reducing crashes caused by human errors, and optimizing mobility for people with disabilities. However, this transition requires a robust regulatory framework that addresses issues of safety, data privacy, and liability in case of crashes. States must collaborate with manufacturers, technology experts, and other relevant stakeholders to develop standards that ensure the safe integration of these vehicles into existing traffic.

Regulation of Driver's Licenses

As the road environment becomes more complex with the introduction of new modes of transport and technologies, the regulation of driver's licenses must adapt to ensure that all drivers have the necessary skills and knowledge to drive safely. This involves reviewing evaluation procedures to include components on interacting with autonomous vehicles and micromobility users, as well as promoting road education that emphasizes respect and shared responsibility among all road users.

Implementing these areas requires a collaborative and multidisciplinary approach, where dialogue between government, industry, road safety delegates, and the general public plays a central role in developing inclusive and effective policies. Only through proactive adaptation to these emerging trends will Puerto Rico achieve a future of transportation that is safe, accessible, and sustainable for all.

Integration of Communications

Communications play a crucial role in the success of any SSA-based road safety strategy. This is because it facilitates awareness, engagement, education, and the necessary support to achieve crash reduction goals and improve road safety. The integration of communications in Puerto Rico is added to the focus areas of the SHSP 2024-2028 with the aim of discussing and aligning road safety communication strategies over the next five (5) years. Public, private, and non-profit entities with dedicated communication departments or offices will be spokespersons for this focus area. Some of these strategies are shown in Figure 04.

Figure 04
Strategy for Integration of Communications

Promote Shared Responsibility

Utilize various communication channels of entities associated with the SHSP to emphasize that road safety is a shared responsibility among all components of the transportation system.

Foster a Culture of Proactive Safety

Create and distribute informative and educational materials that highlight the importance of being proactive in identifying and mitigating road risks before crashes occur.

Implement Communication Redundancy

Ensure that road safety messages are communicated through multiple platforms and media to reinforce the message and reach a broader audience. For example, interagency coordination of an annual media calendar on road safety topics, collaborations with local influencers, among others.

Use of Data Analysis in Communication

Develop communications based on data analysis that highlight specific risk areas and how interventions based on the SSA are addressing these issues.

Success Stories and Testimonials

Share success stories and testimonials from communities or areas that have successfully implemented road safety strategies based on the SSA.

Elderly Population

Crashes involving the elderly population (65 years and older) in Puerto Rico have been increasing in recent years. According to Figure 18 (see page 41), between 2019 and 2022, total crashes involving elderly individuals increased by 37%, crashes with serious injuries increased by 74%, and fatal crashes decreased by 19%. This demographic group presents specific challenges and needs in terms of mobility and road safety, making it essential to address these concerns proactively to ensure their well-being and autonomy through the SHSP 2024-2028.

Distracted Drivers

The use of cell phones while driving is a significant road safety issue because it distracts the driver, reducing their ability to react in time to potential dangers on the road. This distraction can lead to fatal and serious injury crashes. Additionally, the main challenge in identifying crashes involving distracted drivers is underreported crash data, as it is difficult to attribute the cause of the crash to cell phone use or any other distraction.

Using available data, Figure 19 (see page 41) shows that between 2019 and 2022, total crashes involving distracted drivers decreased by 15%, crashes with serious injuries decreased by 13%, and fatal crashes decreased by 38%.

The safe system approach can help address this issue from multiple angles:

01 Promoting better technologies to identify drivers using cell phones.

02 Promoting training for police officers to identify these types of drivers.

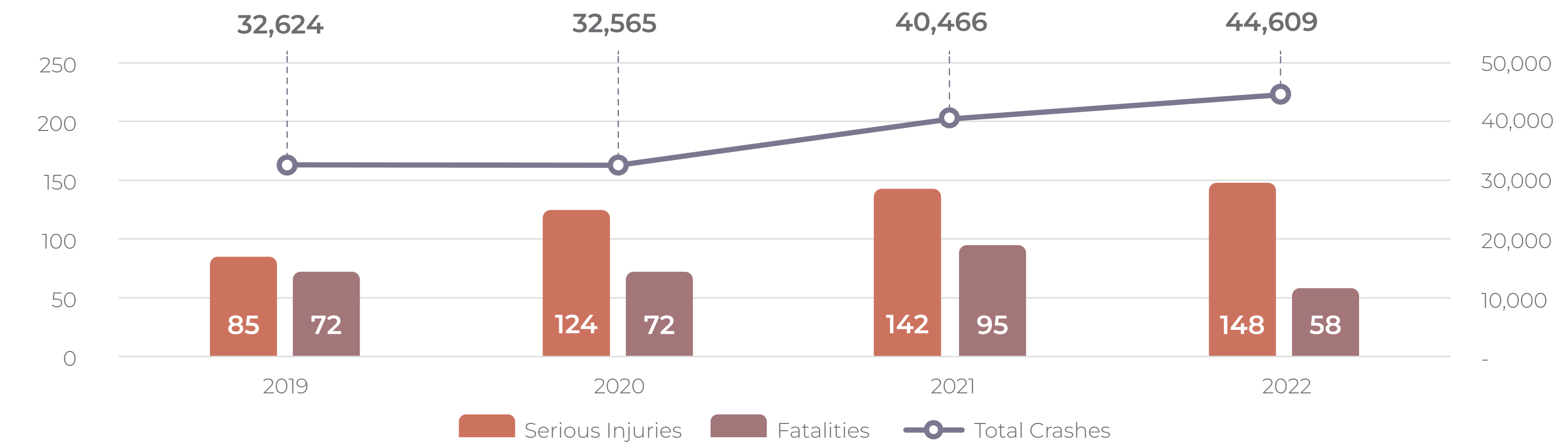
03 Promoting laws and regulations prohibiting cell phone use while driving.

04 Encouraging the design of vehicles with technology that limits cell phone use while driving.

05 Conducting awareness campaigns about the dangers of this practice.

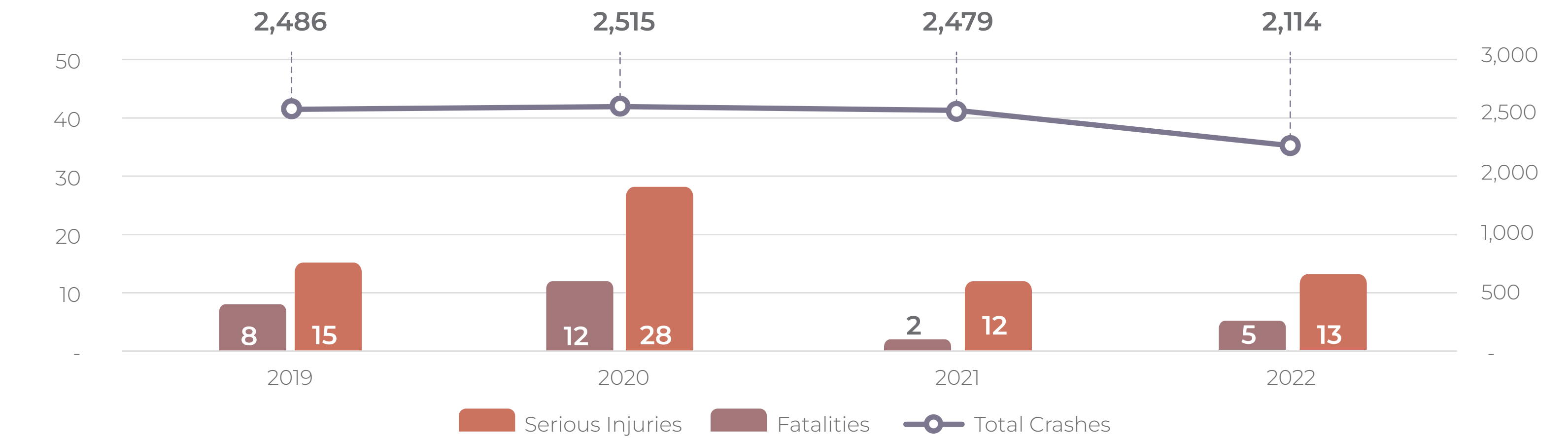
By integrating these measures, the SSA aims to create a safer and more forgiving traffic environment, thereby reducing the likelihood of crashes related to distracted driving caused by cell phone use.

Illustration 18. Crashes with Serious Injuries, Fatalities, and Total Crashes Involving Elderly Persons 2019 - 2022



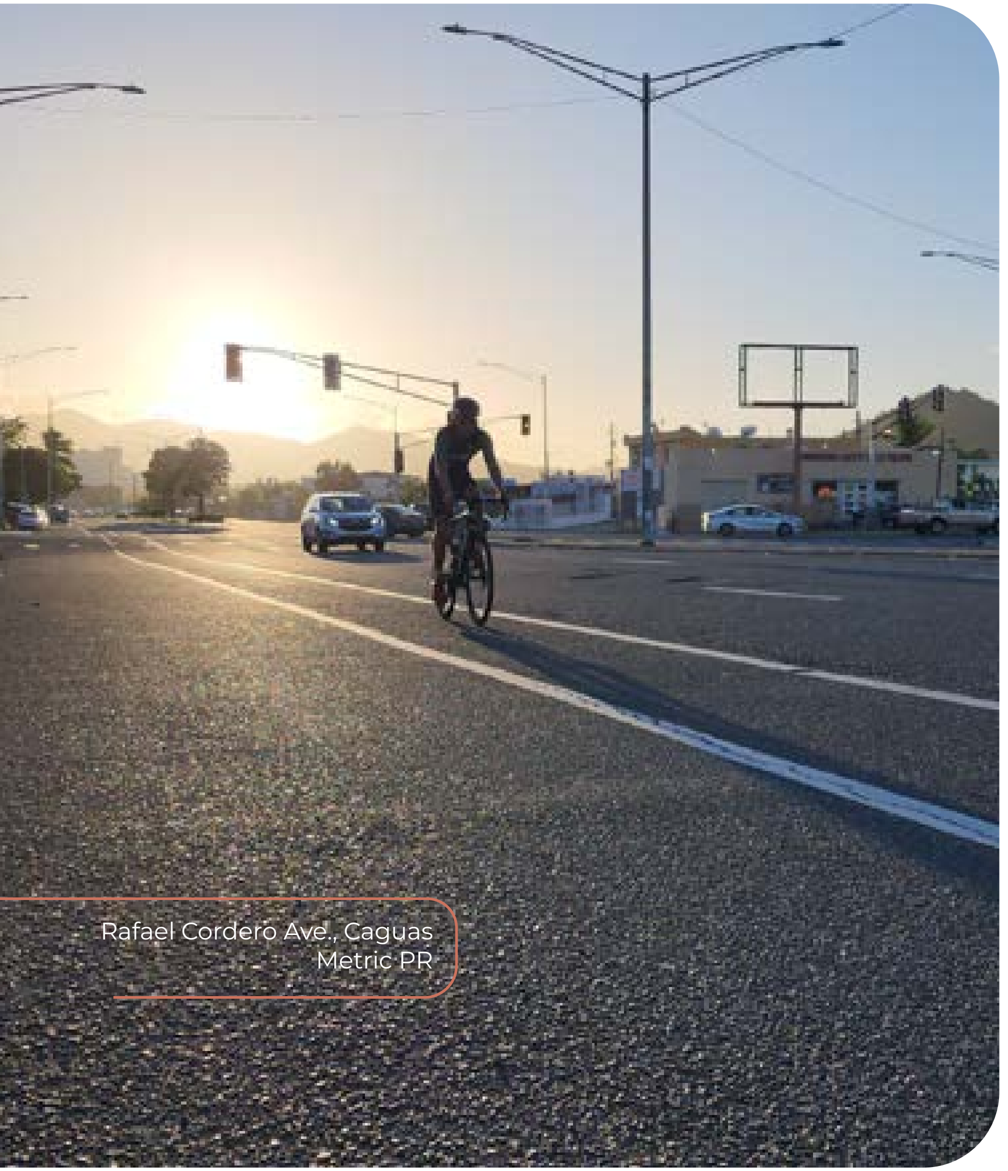
Source: FARS 2008-2022 data and RSO 2008-2022

Illustration 19. Crashes with Serious Injuries, Fatalities, and Total Crashes Involving Distracted Drivers 2019 - 2022



Source: FARS 2008-2022 data and RSO 2008-2022

02. Emphasis Areas (EA)



Rafael Cordero Ave., Caguas
Metric PR

Commercial Vehicles

The number of commercial and/or heavy vehicles involved in traffic crashes should be monitored and discussed as part of the focus areas. Using available data, Illustration 20 (see page 43) shows that between 2019 and 2022, the average number of serious, fatal, and total injury crashes was 7, 8, and 826, respectively. This data will provide agencies targeted to address commercial vehicles, such as FMCSA, with a better understanding of roadway safety issues and, with the help of the SHSP, improve their action plans.

Work Zones on Highways

Puerto Rico's Safety and Mobility Policy in Construction Zones, updated in 2019, will serve as a platform to gather road safety delegates related to construction zones. This policy has contributed to increasing the importance of safety practices in construction by the PRHTA. Also, includes the evaluation of the previous Action Plan, process and needs of the enphasis areas/ technical offices of the PRHTA, highlights the principal issues found in the project inspection reports and the industrial safety trainings, and the evaluation of the two (2) working zones in the metropolitan area.

The review of the Safety and Mobility Policy in Construction Zones highlighted the following important elements:

01 Need to increase staff and resources to the PRHTA technical offices.

02 Institutionalize consistent security training (general and specific) for technical staff.

03 Develop different databases to improve accountability in Maintenance of Traffic (MOT) implementation (i.e. field inspections, project evaluations).

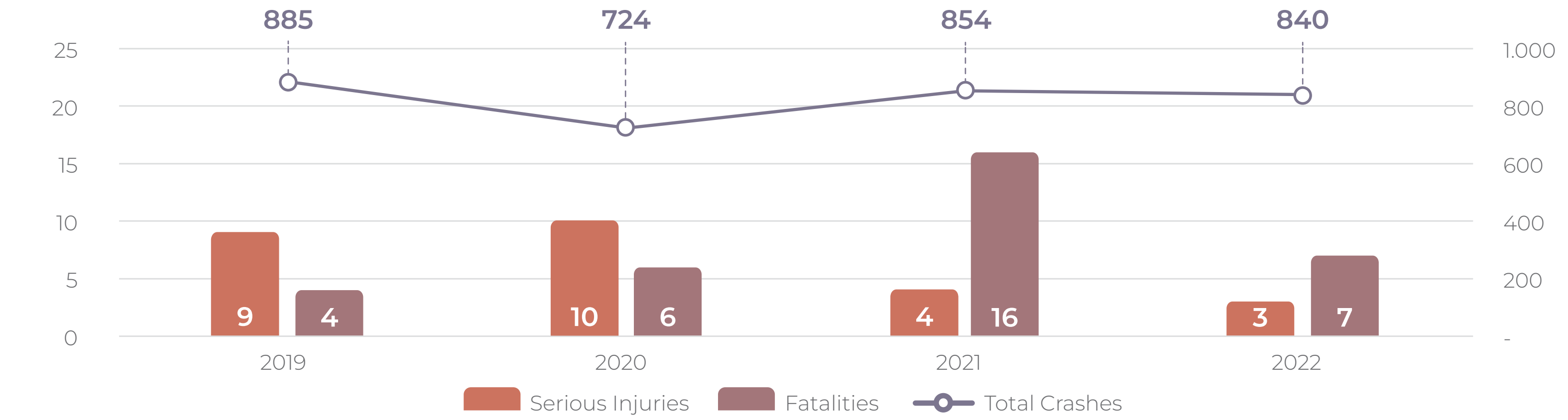
04 Modify, evaluate and develop current guidelines and procedures, such as Transport Management Plans (TMPs), typical applications and use of Portable Variable Message Signs (PCMS).

05 Maintain continuous communication between PRHTA directors, the general public and the Work Zone Safety Committee as a recurring feature.

Finally, an Action Plan distributed in four (4) categories was recommended: executive communication strategies, safety training, pre-construction processes and procedures, and work zone databases.

Puerto Rico
iStock

Illustration 20. Crashes with Serious Injuries, Fatalities, and Total Crashes Involving Commercial Vehicles 2019 - 2022



Source: FARS 2008-2022 data and RSO 2008-2022

03

Evaluation & Implementation

The vision and mission of the SHSP must be implemented through coordinated, intentional, and well-thought-out efforts to achieve the goal of eradicating fatalities and serious injuries, and to include human error in decision-making processes.

Leadership within the SHSP must commit to incorporating individuals who address and understand the concepts of safe users, safe vehicles, safe speeds, safe roads, and post-crash care. This is to ensure proactive implementation, share responsibility among road safety delegates, and ensure redundancy in the system.

Implementation Process

Using as a basis the components of implementation and evaluation models recommended by FHWA, the SHSP will also be evaluated through the SSA. These components are as follows:

01 Ensure adequate leadership with collaboration and communication

02 Adopt a performance-based approach

03 Use data-driven problem identification

04 Employ proven and effective strategies and countermeasures

05 Include the 4 Es

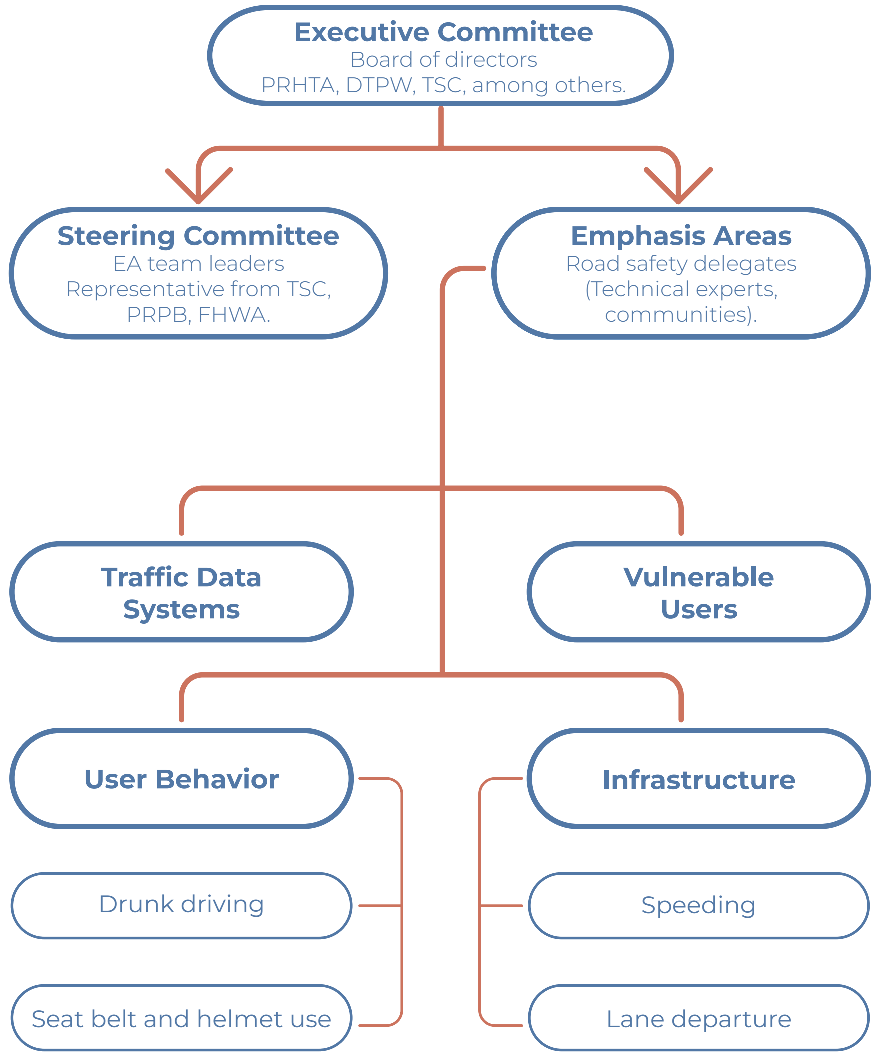
Leadership, Collaboration, and Communication

Leaders within the SHSP have the responsibility to influence policies, set priorities, and establish performance expectations within agencies. They also influence how associated agencies meet SHSP requirements, manage the allocation of time and resources, handle inter-agency relationships, and ensure accountability for actions and results.

Illustration 21 (see page 47) depicts the organizational structure of SHSP 2024-2028. It shows the Executive Committee representing the leadership of each associated organization such as PRHTA, DTPW, TSC, Puerto Rico Police Bureau (PRPB), Puerto Rico Integrated Transportation Authority (PRITA), Bureau for Emergency Management and Disaster Administration (NMEAD), among others. This committee will provide oversight, set policy guidelines, legislate, and facilitate collaborations between agencies. It will also appoint personnel to the Steering Committee and EAs. Additionally, the Executive Committee must meet at least twice a year to ensure progress towards the vision and mission of the SHSP.

The Steering Committee will consist of professionals who inspire others to follow, act as catalysts for action, and are known for their credibility and accountability. They are distinguished by their enthusiasm, constant support, and extensive knowledge in their areas of expertise. This Steering Committee will provide recommendations to the Executive Committee on how to achieve the goals of each EAs. It will be composed of team leaders from EAs and official representatives from PRHTA, DTPW, PRITA, TSC, FHWA, among others.

Illustration 21: Organizational Structure of SHSP 2024-2028



In addition, the Steering Committee must meet at least three (3) times a year to receive updates from focal area leaders, identify potential challenges and solutions, and explain the public policies that the Steering Committee intends to implement.

The EA teams are the pillars of SHSP implementation. These teams will focus on collaboration and coordination efforts with road safety delegates (technical experts and communities). Their main responsibilities include facilitating discussions among work teams, documenting measurable objectives and performance for each focal area, identifying necessary data for each performance measure, and identifying resources and actions needed for strategy implementation.

Collaboration and communication among the Executive Committee, the Steering Committee, and road safety delegates (technical experts and communities) are essential for the success of SHSP 2024-2028. Relationships are crucial because the responsibility for managing the diversity of programs and disciplines required to enhance road safety is shared. Some of the collaborative strategies to be implemented include:

01 Collaborative agreements among agencies (e.g., DTPW, PRHTA, TSC, PRITA, MPO, PRPD, FHWA, FMCSA, Long Technical Assistance Program (LTAP)) aimed at institutionalizing processes.

02 Incorporate these agencies within the executive committee.

03 Incorporate SHSP goals, mission, and objectives into the priorities of road safety delegates.

04 Establish collaborative relationships with other states to learn from their experiences.

Collaboration is facilitated when the vision, mission, and objectives of the SHSP are communicated clearly and consistently to all road safety delegates. Communication doesn't need to be complicated; however, maintaining regular updates is crucial to keep all delegates informed about the progress of the SHSP and aware of the role of road safety delegates in achieving the objectives. This SHSP will apply the communication methods shown in Illustration 22.

Illustration 22: Communication Methods

Formal Methods

Meeting reports
Official media events
Informative and educational newsletters
Presentations at road safety conferences

Informal Methods

Website
Emails
Social media
Phone calls
Informative videos
Surveys

Action Plan for EAs

The primary tool for the SHSP implementation will be an Action Plan, which will be updated annually and led by the EAs teams. This action plan will adopt a data-driven and measurable objective approach, and the Steering Committee will be responsible for monitoring the progress and/or modification of each action, addressing the needs and priorities of different agencies. This will provide coherence and direction across all plans and programs and help align objectives among road safety delegates.

This action plan will include specific actions for each of the strategies defined in the EAs. As shown in Illustration 09, each EA should, as much as possible, include the four (4) fundamental strategies promoted in this new SHSP 2024-2028. The actions developed within these strategies will be:

01 Tailored according to the focal area and its needs

02 Data-driven to ensure measurability

03 Part of road safety improvements recommended by the HSIP

Integration with other Transportation and Safety Plans

The SHSP serves as the primary framework guiding road safety policies in Puerto Rico. This plan establishes the guidelines that other local safety programs and plans must follow, ensuring alignment with federal regulations and established road safety objectives. It is crucial for road safety delegates to have a deep understanding of the strategies, actions, and performance measures of the SHSP to effectively contribute to its implementation. Integrated or developing transportation plans are depicted in Figure 05 (see page 49).

Figure 05
Integration with Other Transportation Plans

2050 MLRTP

2050 Multimodal Long Range Transportation Plan

In December 2023, the Metropolitan Planning Organization (MPO) Board Committee approved HSIP performance measures and was briefed on the new SHSP 2024-2028. Additionally, SHSP performance measures and implementation strategies were incorporated into the approved 2050 MLRTP in December 2023.

2024-26 HSP

2024-2026 Highway Safety Plan

HSP addresses crucial aspects related to driver behavior, including occupant protection, prevention of negligent driving, and optimization of traffic law implementation, among others. In 2023, HSP approved a triennial implementation cycle, with SHSP collaborating in the development of performance measures submitted and approved by NHTSA.

HSIP

Highway Safety Improvement Program

HSIP planning by the PRHTA is closely coordinated with the SHSP. This strategic collaboration facilitates the identification of HCLs, evaluation of interventions through before-and-after studies, and detailed justification of projects aimed at enhancing overall road safety. Through this process, HSIP systematically prioritizes projects designed to elevate safety standards on roadways.

PTASP

Public Transportation Agency Safety Plan

PRITA implements public policy for planning, managing, and operating public transportation services. Transportation systems within PRITA include the Metropolitan Bus Authority (AMA), Maritime Transportation Authority (TMA), Intermodal Bus Services, and Urban Train. In 2021, PTASP was adopted to develop, certify, and implement processes and procedures necessary for Safety Management System implementation. SHSP will collaborate with PRITA in fulfilling performance measures through the development of strategies and actions.

23-26 STIP

Statewide Transportation Improvement Program

These programs focus on selecting projects and allocating funds that directly respond to mobility, operational, and safety needs of the population. Alignment with SHSP allows for inclusion of safety initiatives and specific projects. This collaborative approach is crucial for the review and updating of STIP, adapting it as needed to encompass such projects. Implementation through SHSP ensures that the program addresses not only current needs but also anticipates and prepares for future challenges.

CVSP

Commercial Vehicles Safety Plan

This plan attends to some of the safety elements that are addressed in the SHSP. One of the conditions for Puerto Rico to receive Motor Carrier Safety Assistance Program (MCSAP) funds is that the CVSP is in coordination with the HSIP and the SHSP.

Evaluation Process

The SHSP 2024-2028 will use FHWA's Evaluation Process Model (EPM) as the basis for developing its evaluation process. Through this process, the Executive Committee and Steering Committee will determine the impact of the SHSP, allowing for recognition of successes, identification of challenges in strategy implementation or goal achievement, and identification of opportunities for improvement.

The evaluation will be conducted through the Action Plan of the EAs, annual reports submitted to FHWA, and a SWOT analysis. Additionally, some recommendations from the EPM will be incorporated, following the procedures outlined in Figure 06.

Performance Measures of the HSIP

The SHSP is evaluated annually using the following five (5) performance measures:

- **A** Number of fatalities
- **B** Fatality rate per 100 million VMT (Vehicle Miles Traveled)
- **C** Number of serious injuries
- **D** Serious injury rate per 100 million VMT
- **E** Number of fatalities and serious injuries for non-motorized users

Figure 06

Recommendations from the EPM for the Evaluation Process

Analyze the composition and performance of SHSP committees, as well as local, regional, and district-level teams and EAs, to assess their contribution to the SHSP, as well as their access to leadership and resources.

Evaluate the frequency and effectiveness of SHSP leadership and committee meetings to ensure they are conducted as planned or determine if they require additional support.

Examine the organizational structure of the SHSP to assess the support provided to delegates in local and regional coalitions.

Contrast the current functions of the SHSP committees, teams, and/or groups with the original expectations established, identifying possible deviations or areas for improvement.

Review and align key documents such as the HSP, CVSP, HSIP, MLRTP, and STIP with the goals of the SHSP.

Identify potential deficiencies in data collection that may hinder the proper evaluation of performance measures.

Ensure that the vision, mission, and objectives of the SHSP are communicated clearly and consistently to all delegates involved in traffic safety.

Verify the existence and effectiveness of mechanisms that promote active and productive collaboration, such as Memorandums of Understanding (MOUs).

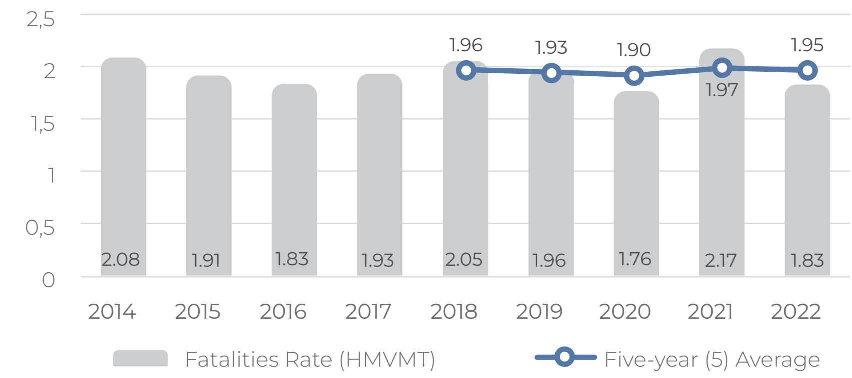
Compare the performance measures results with initial baseline data and specific EAs to assess progress and establish areas for improvement.

Puerto Rico must establish these performance measures based on data from fatal and serious injury traffic crashes. FHWA, using its methodology, determines whether the island has met or made significant progress towards the goals. If not, it is obligated to allocate a portion of its funds to projects under the HSIP and submit an annual implementation plan describing the actions it will take to achieve them. Illustration 23 shows the trends for each performance measure.

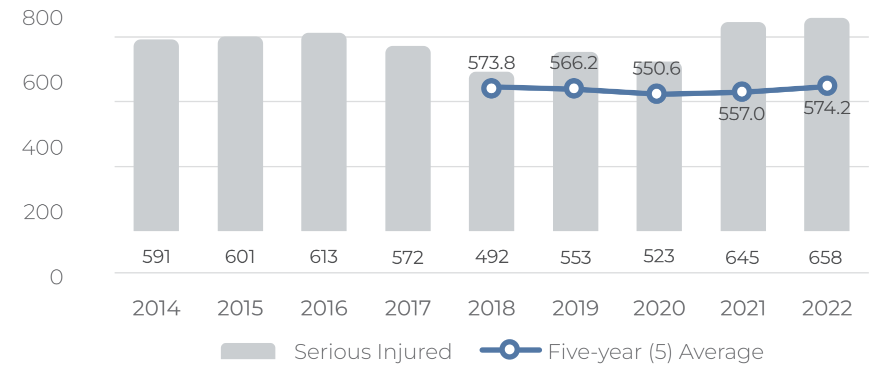
Illustration 23: Trends for Each Performance Measure

A. Number of Fatalities

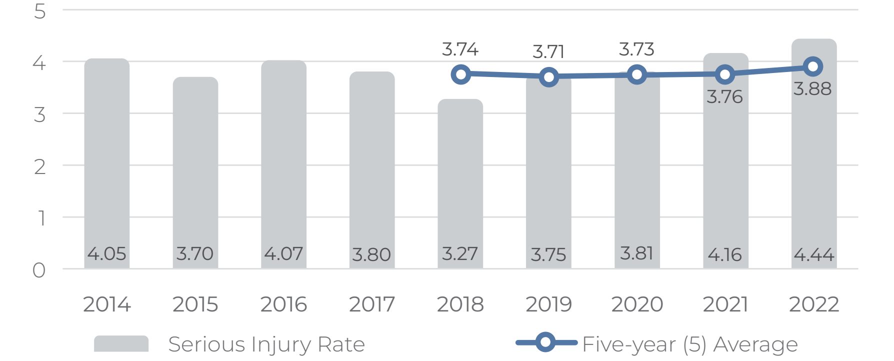
B. Fatality Rate per 100 Million VMT



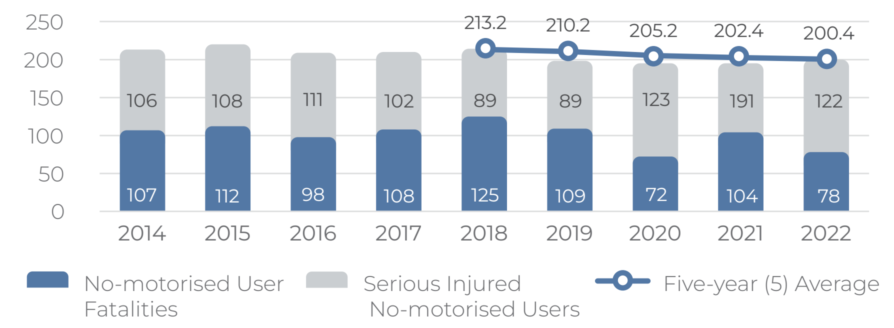
C. Serious Injuries



D. Serious Injury Rate per 100 Million VMT



E. Number of Fatalities and Serious Injuries for Non-motorised Users



Source: FARS, Health Plan Management System (HPMS), and RSO 2014 - 2022 Data

Evaluation of HSIP Special Rules

FHWA has three (3) Special Rules under HSIP that apply to high-risk rural roads, older drivers and pedestrians, and VRUs. When these Special Rules apply to the island, FHWA requires Puerto Rico to take specific actions to reduce fatalities and serious injuries within areas affected by increasing crash trends.

High-Risk Rural Roads

The special rule for high-risk rural roads (HRRs) (23 U.S.C. 148(a)(1)) is defined as any road functionally classified as a major or minor rural collector or a rural local road with significant safety risks, as defined by a state according to its SHSP. The SHSP 2019-2023 defined high-risk rural roads as: "major rural, minor rural collector, or segments of local rural roads - segments (500 meters) or corridors (more than 3 km) - included in rural areas according to the latest census data and classified within high crash locations (HCLs) using criteria and methodology established by the PRHTA to determine high incidence locations within each functional road classification." This special rule currently does not apply to Puerto Rico, and PRHTA does not receive funds, although roads located in rural areas are addressed through HSIP.

Older Drivers and Pedestrians

According to 23 U.S.C. 148(g)(2), if the fatality and serious injury rate for drivers and pedestrians aged 65 and older increases during the most recent two-year period, then the Special Rule for Older Drivers and Pedestrians applies. If the rule is activated, Puerto Rico must include strategies to address older drivers and pedestrians in the next SHSP and must conduct an analysis to determine whether the emphasis on safety programs and promoted countermeasures should focus on older drivers and pedestrians.

Illustration 24 (see page 53) shows fatalities of older drivers and pedestrians. It also shows the fatality rate, where there has been no increase in the past two years. Even so, the five-year (5) average shows a slight increase during 2014 and 2019, and as shown in Table 1 (see page 22), older adults account for approximately 20% of total traffic crash fatalities. Considering this information, in the next five (5) years of the SHSP 2024-2028, there will be an emphasis on including actions and countermeasures addressing older adults. Some recommended strategies will be:

01 **Improve accessibility and ease of use of public transportation**

02 **Promoting and educating about assisted technology in vehicles**

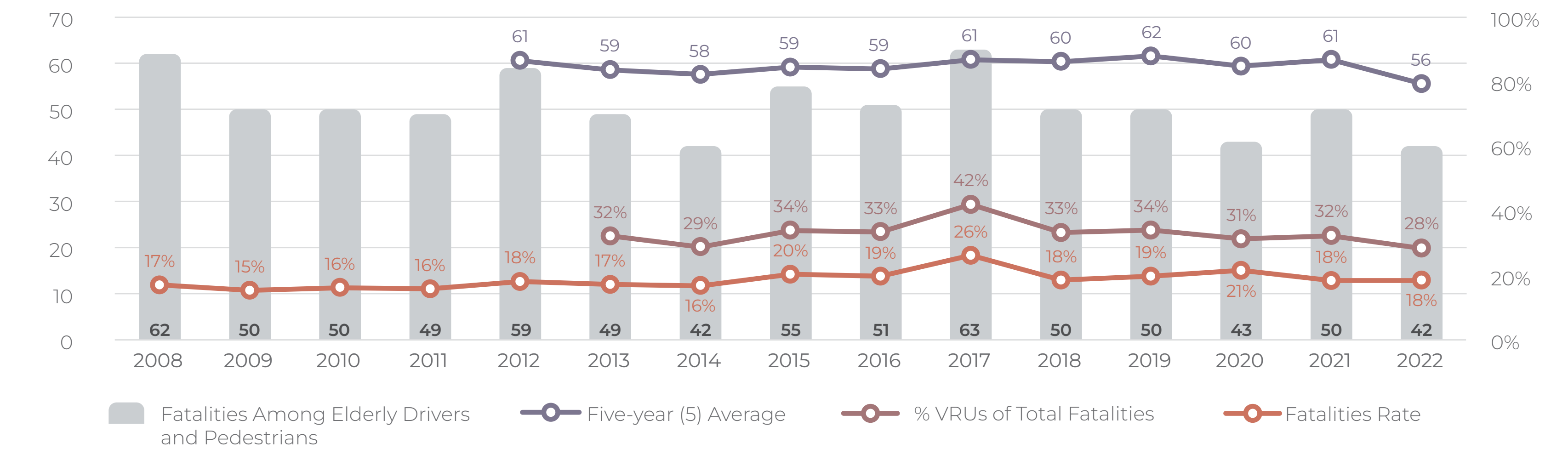
03 **Improving lighting at intersections, pedestrian crossings, and destinations with high pedestrian flow (e.g., pharmacies, clinics, hospitals, public transport stations, etc.)**

Safety for Vulnerable Road Users

VRUs, as defined by the FARS, include pedestrians, cyclists, and/or individuals using personal mobility vehicles.

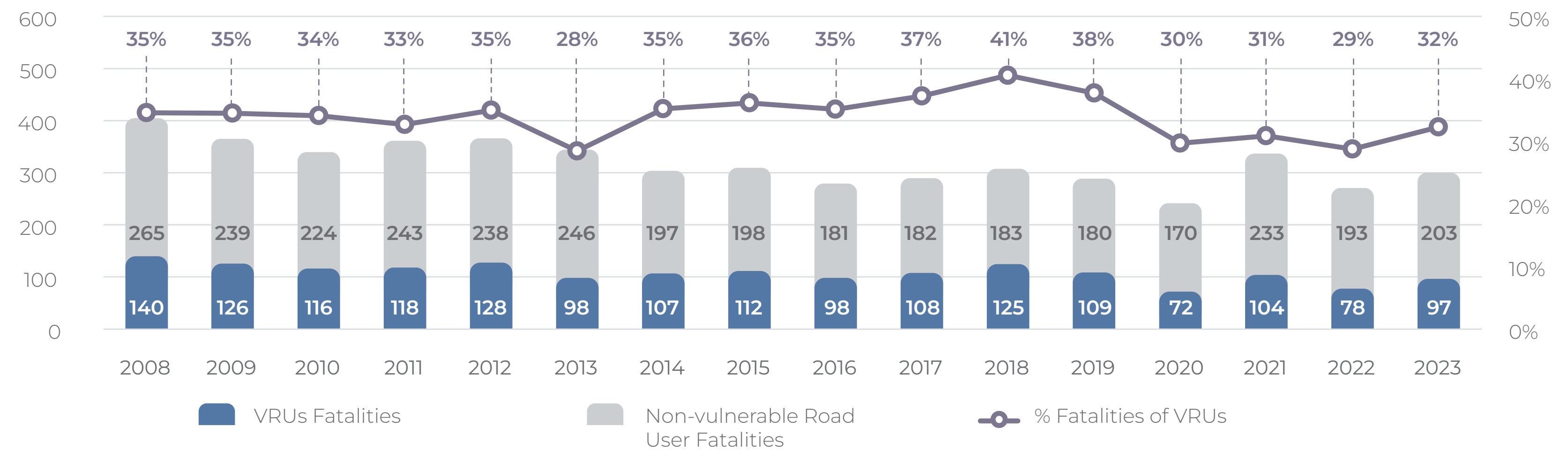
03. Evaluation & Implementation

● Illustration 24: Fatalities of Older Drivers and Pedestrians 2008 – 2022



Source: FARS 2008-2022 Data

● Illustration 25: Fatalities of Vulnerable Road Users 2008 - 2022



Source: FARS 2008-2022 Data

According to 23 U.S.C. 148(g)(3), if the total annual fatalities of VRUs constitute 15% or more of the total annual fatalities in a state, the state is required to allocate at least 15% of its funds allocated under section 104(b)(3) for the following fiscal year to projects focused on improving their safety.

Over the past 30 years, fatalities of VRUs in Puerto Rico have averaged more than 30% of the total annual fatalities from traffic crashes, as shown in Illustration 26 (see page 53). For this reason, with Puerto Rico activating the special rule and committing to comply with it, the SHSP has dedicated a focus area to VRUs.

Future Initiatives

Beyond the strategies identified in this plan, the PRHTA along with federal and state agencies are committed to proactively addressing safety through existing and future initiatives in Puerto Rico, especially given the significant period of road infrastructure reconstruction the island is currently undergoing. The Figure 07 shows a list of programs, projects, and technologies that could have a positive impact on the future of road safety in Puerto Rico, aiming to improve not only current conditions but also ensure sustainable and safe advancements in mobility and transportation.

Figure 07
Relationship between CAV Technology and the Safe System Pillar

Improving Vehicle Safety

Autonomous vehicles (AVs) are equipped with advanced safety features that can prevent crashes, including automatic braking, lane-keeping assistance, and the ability to detect and respond to obstacles and road conditions faster than a human driver. Within the SSA, AVs ensure vehicles are equipped with technologies that mitigate the severity and frequency of crashes.

Enhancing Road Usage

Connected vehicles communicate with each other and with infrastructure (Vehicle-to-Vehicle - V2V and Vehicle-to-Infrastructure - V2I communications) to share information about road conditions, traffic, and potential hazards. This capability relates to the pillar of safe roads by informing drivers about optimal speeds, warning them of imminent dangers, and potentially controlling vehicle speed and movements in hazardous situations.

Promoting Safe Roads and Edges

By utilizing data from connected vehicles, road engineers and planners can identify hazardous road sections, understand traffic flow patterns, and improve road design. This data-driven approach enhances the pillar of safe roads by enabling more informed decisions that lead to safer road environments.

Facilitating Safe Speeds

Connected and Autonomous Vehicles (CAVs) can be programmed to respect and follow speed limits, adjusting their speed according to traffic, weather conditions, and types of roads. This capability directly supports the pillar of safe speeds, ensuring that vehicles travel at safe speeds for road conditions and urban or rural contexts.

Improving Post-Crash Response

Connected vehicles can immediately notify emergency services in the event of a crash, providing accurate information about the location and potentially details about the severity of the crash and likely injuries. This capability supports the post-crash care pillar by ensuring that medical emergency responses are quick and informed, potentially saving lives and reducing crash severity.

03. Evaluation & Implementation

Connected and Autonomous Vehicle (CAV) Technology

CAV technology is significantly tied to the SSA, particularly within the Safe Vehicles pillar, as shown in Figure 07 (see page 54).

The integration of CAV technology within the SSA requires careful planning and coordination across all pillars. This involves not only technological innovation but also updates to road infrastructure, legal and regulatory frameworks, and public education campaigns to ensure that its benefits are realized in a way that enhances road safety for all users.

The objective of the SHSP is to develop an initial guide with the basic elements for sustainable development of CAV technology. This guide should assist the executive committee in establishing an ad-hoc committee and making the best decisions according to available funds, current and future laws and regulations, and the development of this technology. Some possible basic elements of the implementation guide may include:

01 Develop a Vision and Objectives: Establish clear goals for integrating CAV technology that guide policy and investment decisions at the local level.

02 Technology and System Architecture: Puerto Rico must identify the types of sensors, processors, and necessary hardware; develop software, including perception, decision-making, planning, and control algorithms, as well as aspects of artificial intelligence and machine learning; and address connectivity and communication by acquiring various communication technologies (Vehicle-to-Everything (V2X), Vehicle-to-Vehicle (V2V), and Vehicle-to-Infrastructure (V2I)), and align with operational processes such as Transportation Systems Management and Operation (TSM&O).

03 Establishment of Tests and Pilot Projects: Initiate small-scale pilot projects to gain practical experience, understand local implications, and refine approaches based on real and measurable data.

04 Workforce Development: Invest in training and developing the local workforce (e.g., engineers, contractors, suppliers) to ensure they acquire the necessary skills to manage CAV technologies.

TSM&O and TIM

Transportation Systems Management and Operations (TSM&O) includes the Traffic Incident Management (TIM) program within its strategies. Both programs are integral components of the SHSP and play crucial roles in improving road safety and mitigating the impact of incidents on the road network, through the optimization of transportation infrastructure usage. This is achieved by managing and operating the road network in real time, using key programs such as the Traffic Management Center (TMC), the Traffic Signal Systems Management Center (TSSMC), and support from the Unified Free Emergency Response and Operation Service (SEGURO), thus enhancing road fluency and safety.

The TSM&O program in Puerto Rico focuses on identifying and executing strategies aimed at reducing traffic congestion and optimizing traffic flow. This includes:

01 **Implementation of ITSs.**

02 **Effective coordination with various quick-response agencies to facilitate safe and agile management of traffic incidents.**

03 **Traffic signal synchronization and real-time traffic operation.**

The main objective of TIM is based on detection, response, and swift clearance of incidents on the road network. This not only helps minimize the impact on traffic flow but also reduces the risk of secondary incidents occurring.

The SHSP emphasizes the critical need for interagency coordination to ensure agile and effective responses to incidents and emergencies, with a focus on developing a road safety culture that prioritizes the well-being of road users. In this context, the TSM&O and TIM programs emerge as fundamental pillars, significantly contributing to safety by reducing congestion, lowering the likelihood of crashes, and optimizing response times to incidents. These efforts closely align with SHSP principles, enabling not only continuous evaluation of implemented strategies but also facilitating ongoing improvement and calibration of road safety plans.

Through systematic data collection and lessons learned from the management and operation of the road network, TSM&O and TIM strengthen the foundation upon which SHSP builds its effectiveness. Looking ahead, PRHTA aims to expand roadside assistance patrol coverage and advance the implementation of ITSs, thereby enhancing capacity to manage traffic and safety on roads more effectively. Additionally, the integration of signalized corridors operated from TSSMC will continue, ensuring more coordinated and efficient traffic management. These initiatives represent decisive steps toward realizing a road infrastructure that is not only safer and less congested but also smarter and adaptive to the changing needs of road users.

PR-26 San Juan Metric PR

04

Challenges and Opportunities

It is crucial to define and understand the challenges, limitations, and opportunities that the new SHSP will face. This detailed analysis is essential to provide road safety delegates with a clear and strategic vision. By understanding how to align their efforts with the strategies established in each EA, delegates will be better equipped to meet the proposed objectives. In this way, not only is greater compliance with what is established in this SHSP ensured, but also the impact of their actions on crash prevention and saving lives is maximized.

Figure 08

Challenges

Continuity and Commitment of Delegates with Decision-Making Power

As a five-year (5) plan, the SHSP is subject to turnover among road safety delegates. Typically, delegates with voice and vote in decision-making are elected or appointed officials, who have a maximum term of four (4) years. This dynamic naturally affects the continuity of processes and established commitments.

Lack of Governmental Power to Comply with the SHSP

The SHSP does not have any official power to mandate funding or implement security processes; it only has the opportunity to influence public policies. Despite being a federal requirement that secures HSIP funds for Puerto Rico.

Weak and Under Reconstruction Road Infrastructure

Following hurricanes Irma, María (2017) and Fiona (2022), and earthquakes (2020), road infrastructure across the island became fragile and vulnerable.

Communication Among Executive Directors and their Agencies

Coordination and communication among executive directors (e.g., PRHTA, Department of Transportation and Public Works (DTOP), TSC, among others) have been challenging in recent years due to factors such as PRHTA bankruptcy, the arrival of the Fiscal Control Board, agency restructurings, among others, which keep directors focused and fully occupied within their agencies.

Lack of Priority and Support for Road Safety Issues and Public Policies

The absence of training, specialized seminars, and opportunities for continuous education and certifications in road safety for PRHTA personnel and contractors makes challenging, understanding and applying the SSA. Additionally, there is a lack of support and implementation of aggressive public policies favoring road safety.

Recognizing Road Safety as a Public Health Issue

In Puerto Rico, similar to many places, there is still a lack of recognition that fatalities and injuries caused by traffic crashes have a significant impact on human health, including medical expenses, loss of productivity, and costs related to long-term care.

Figure 09

Opportunities

Accelerating Processes for the Design and Construction of Road Safety Projects

Projects selected through systematic analysis and/or risk-based criteria stand out by applying consistent road safety measures across different locations with similar characteristics. Therefore, processes for designing and constructing these road safety projects need improvement to ensure their benefits and outcomes are promptly implemented.

Institutionalization of Road Safety in Planning, Design, and Construction Phases

Current standard drawings and design guidelines can be reviewed and updated to align with the new SSA. This way, the SSA will have an institutionalized minimum design standard.

Public Education Opportunities

The SHSP has the opportunity to collaborate with road safety education authorities in the country to provide data-driven information to ensure the public is well-informed with accurate data.

Collaboration with road safety delegates

The turnover of road safety delegates within the SHSP brings opportunities, such as new individuals with innovative ideas and different perspectives on road safety issues.

Opportunities to Collaborate with Academia

The SHSP has the opportunity to collaborate with road safety education authorities in the country to provide data-driven information to ensure the public is well-informed with accurate data.

Education in Primary Schools on Road Safety Topics

Through the SHSP, it is possible to collaborate in developing a road safety course for students in the country's primary education system in conjunction with the Puerto Rico Department of Education and the Traffic Safety Commission. Additionally, programs like Power of Youth from the Non-Profit Mothers Against Drunk Drivers (MADD), where they visit schools to raise awareness about the risks of drunk driving, could be emulated and supported. It has been shown that educating young people at an early age helps them make better decisions and has a multiplier effect.

Educating Engineers in Specialized Road Safety Topics

The SHSP promotes and has the capacity to develop specialized road safety courses for engineers, utilizing the technical knowledge and expertise of the road safety delegates.

Old San Juan
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Limitations in database

The main databases used by the SHSP are:

01 Fatality Analysis Reporting System (FARS): Managed by the National Highway Traffic Safety Administration (NHTSA), FARS is responsible for collecting and investigating all fatalities resulting from traffic crashes in Puerto Rico. The TSC handles this through their evaluation analyst and statistical data, reporting these data quarterly to NHTSA.

02 Road Safety Observatory (RSO): All traffic crashes in Puerto Rico are investigated by the Puerto Rico Police using the digital crash form PPR-621.4. Data collected through this digital form are then processed by the RSO team managed by TSC for quality control and assurance, with assistance from the DTOP Accident Analysis Office. After this process, the RSO team publishes crash data through their web-based application at www.observatoriovial.net .

There are other databases useful for road safety analysis, such as data from the U.S. Census Bureau, the National Oceanic and Atmospheric Administration (NOAA), and ArcGIS applications.

Figure 10 (on the next page) describes the most significant limitations of these databases. Therefore, the SHSP recognizes that local databases are continually evolving, and using their data for road safety analysis in Puerto Rico has its constraints. It is crucial to identify these database limitations to understand the scope of road safety analyses and make informed decisions and calculated risks.

Figure 10

Most Important Limitations of the Databases

Application of Validation Rules in the PPR-621.4 Crash Form

The digital crash form PPR-621.4 currently lacks aggressive validation rules. Without these rules, issues may arise for those processing the information and those completing the form. Some consequences include: incorrect data entry, incomplete information, lack of standardization, increased manual work, decisions based on incorrect data, difficulties in data integration, and a general lack of trust in the system.

Availability of Crash Location Data

While the identification of crash locations has improved, it is currently not possible to download or access crash locations that occur in places without kilometer posts through the RSO digital platform.

Discrepancies in the Crash Database

Within the RSO database, there are discrepancies in the total number of crashes shown in the “charts,” “map,” and “crosstab” categories. These discrepancies make it difficult to verify the accuracy of the data through different methods, and data analysis relies more on general proportions than numerical accuracy.

Blood Alcohol Content Data

The fatality database has limited data on blood alcohol content, even in cases where drivers tested negative.

Distracted Driving

Since January 2013, it has been illegal to use cell phones while driving in Puerto Rico. Currently, it is a challenge for the reporting officer to attribute cell phone use as the main cause of the crash.

05

Appendices

VRU Safety Assessment
Metric PR

Puerto Rico Vulnerable Road User Safety Assessment

The safety assessment on vulnerable road users can be accessed via the following link:

Carreterasegurapr.com/wp-content/uploads/2023/11/Final-VRU-Safety-Assessment-and-Appendix_-Signed.pdf

2024 Action Plan

The SHSP Preliminary Action Plan 2024-2028 can be accessed through the following link:

Carreterasegurapr.com/wp-content/uploads/2024/07/PR-SHSP-2024-2028_Plan-de-Accion-Preliminar.pdf

2024 Action Plan
Metric PR

SHSP Performance Measures 2024 - 2028

Performance Measures	2022	2028	Reduction Percentage
Fatalities	289.4	276.3	4.5%
Serious injured	574.2	565.6	1.5%
Fatalities rate	1.956	1.875	4.1%
Serious injured rate	3.889	3.831	1.5%
Fatalities and serious injured non-motorised users	200.4	184.8	7.8%

Note: All the values are five-year (5) averages.

Source: FARS 2008-2022 Data

Objectives of the AEs of the SHSP 2024-2028

Areas of Emphasis	2022	2028	Reduction Percentage
Vulnerable road users	97	77	20.6%
Drive aggressively	90	78	13.3%
Drive under the influence of alcohol	98	87	11.2%
Ocuppant protection (belt and protector seat)	93	81	12.9%
Occupant protection (helmet)	36	27	25.0%
Lane departure	96	80	16.7%

Note: All the values are five-year (5) averages.

Source: FARS 2008-2022 Data

05. Appendices

Tree Diagrams

Figure A
Vulnerable Road Users

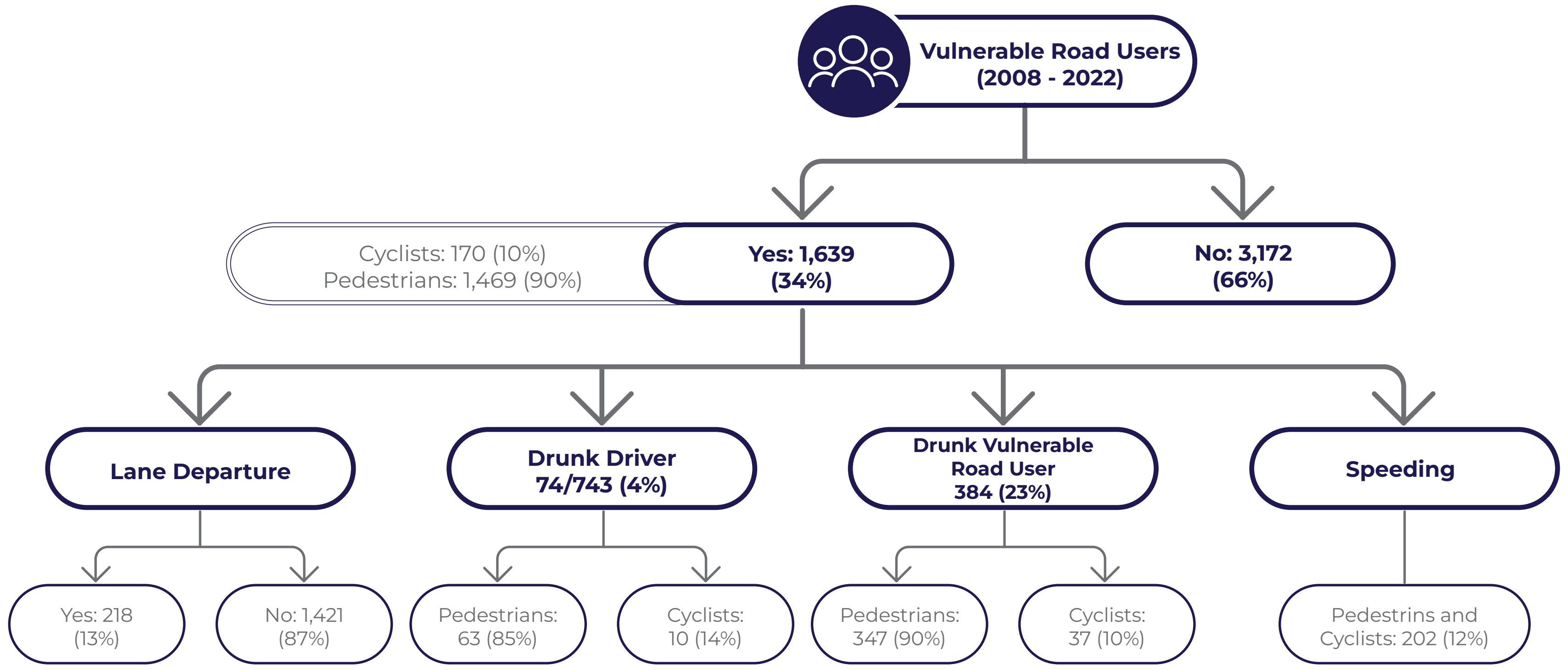


Figure B

Agressive Driving

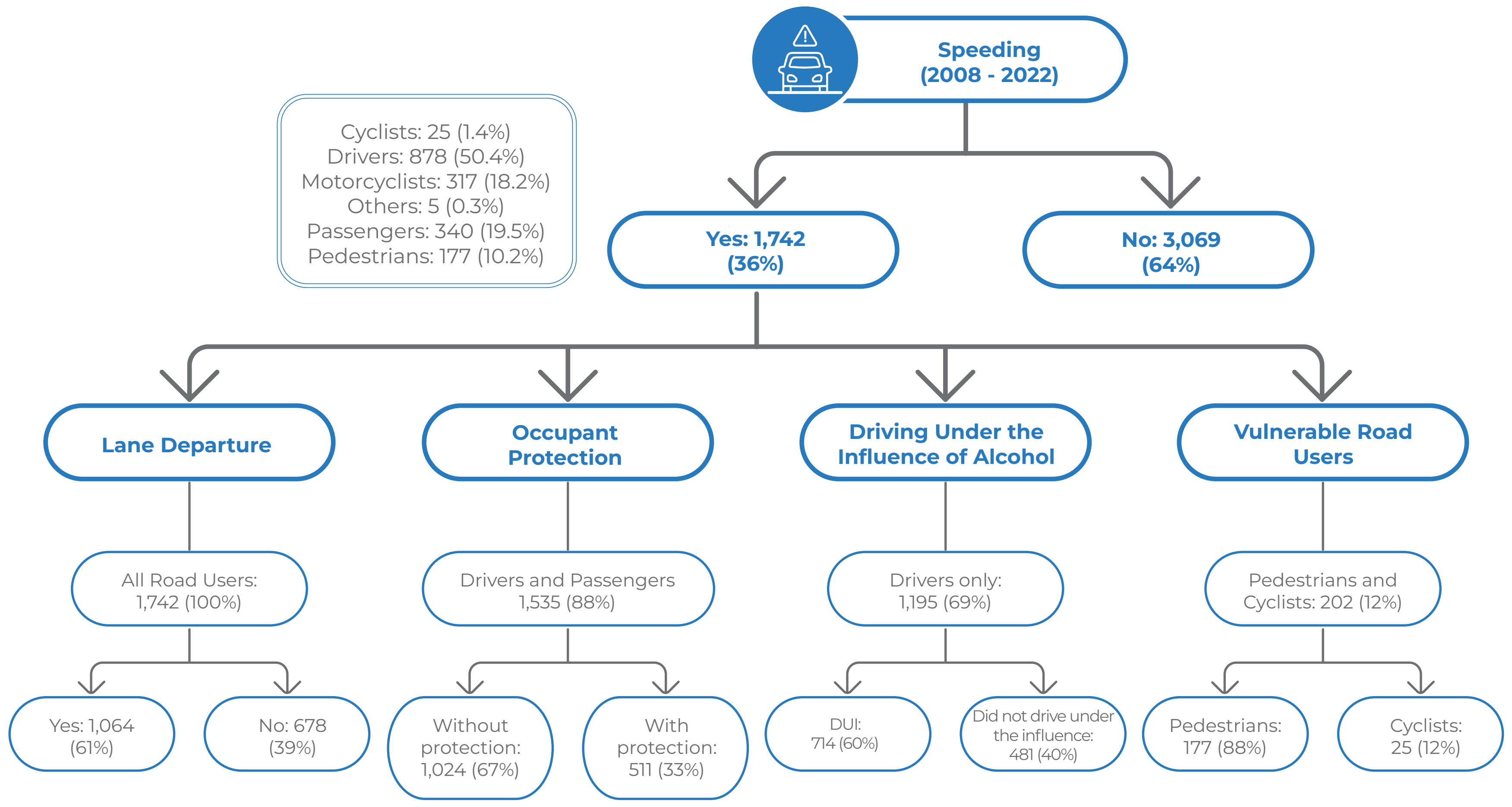


Figure C

Driving under the influence of alcohol

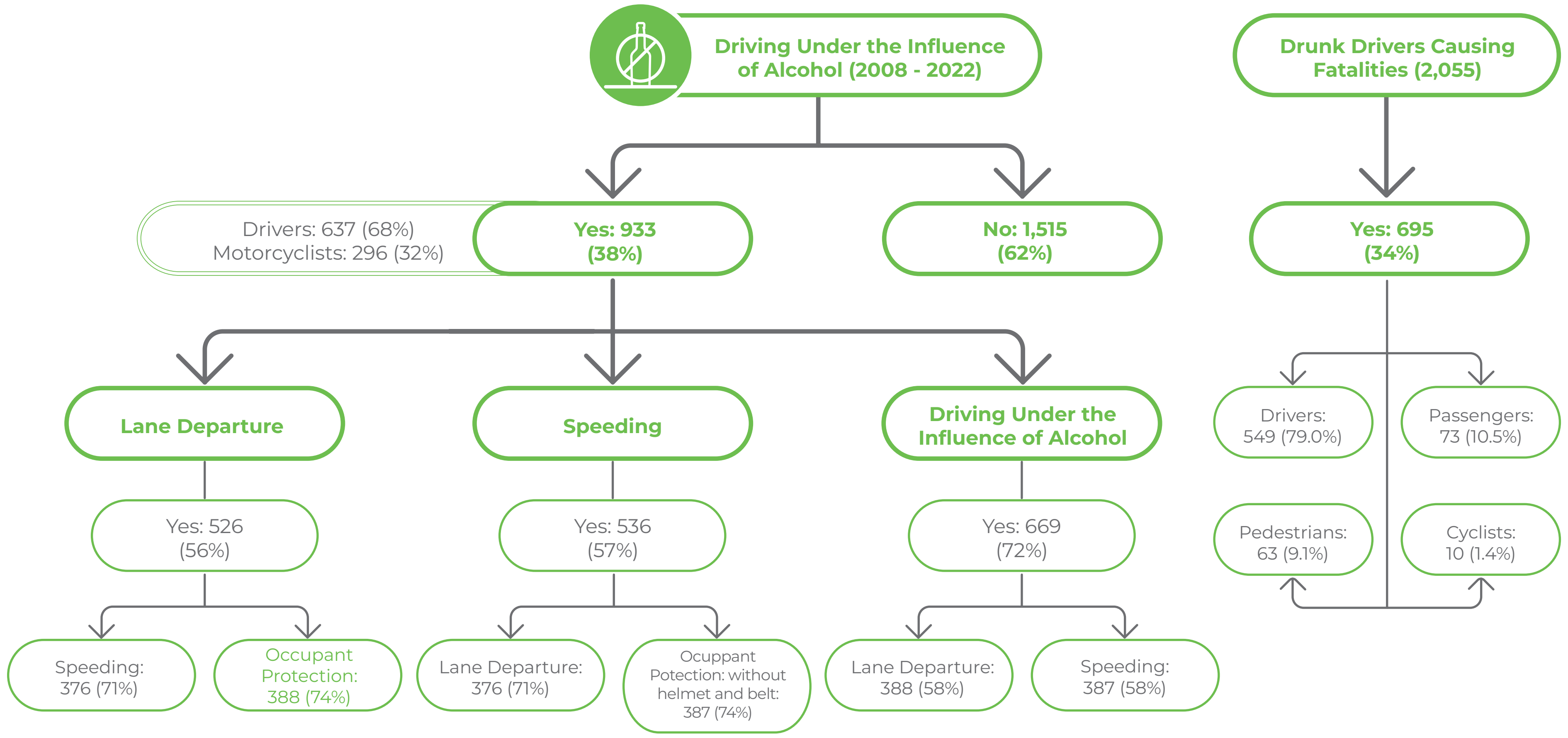


Figure D

Occupant Protection

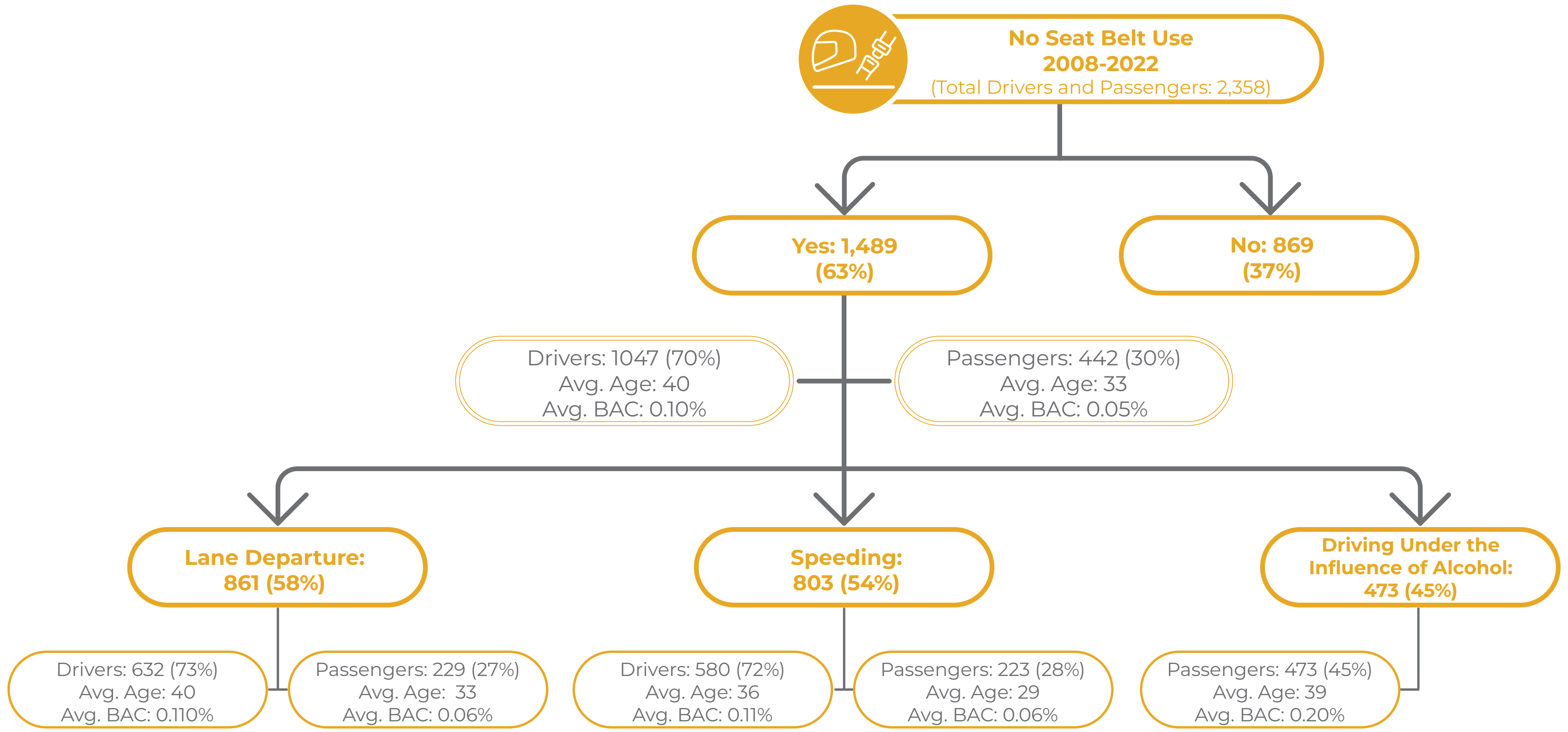


Figure E

Occupant Protection

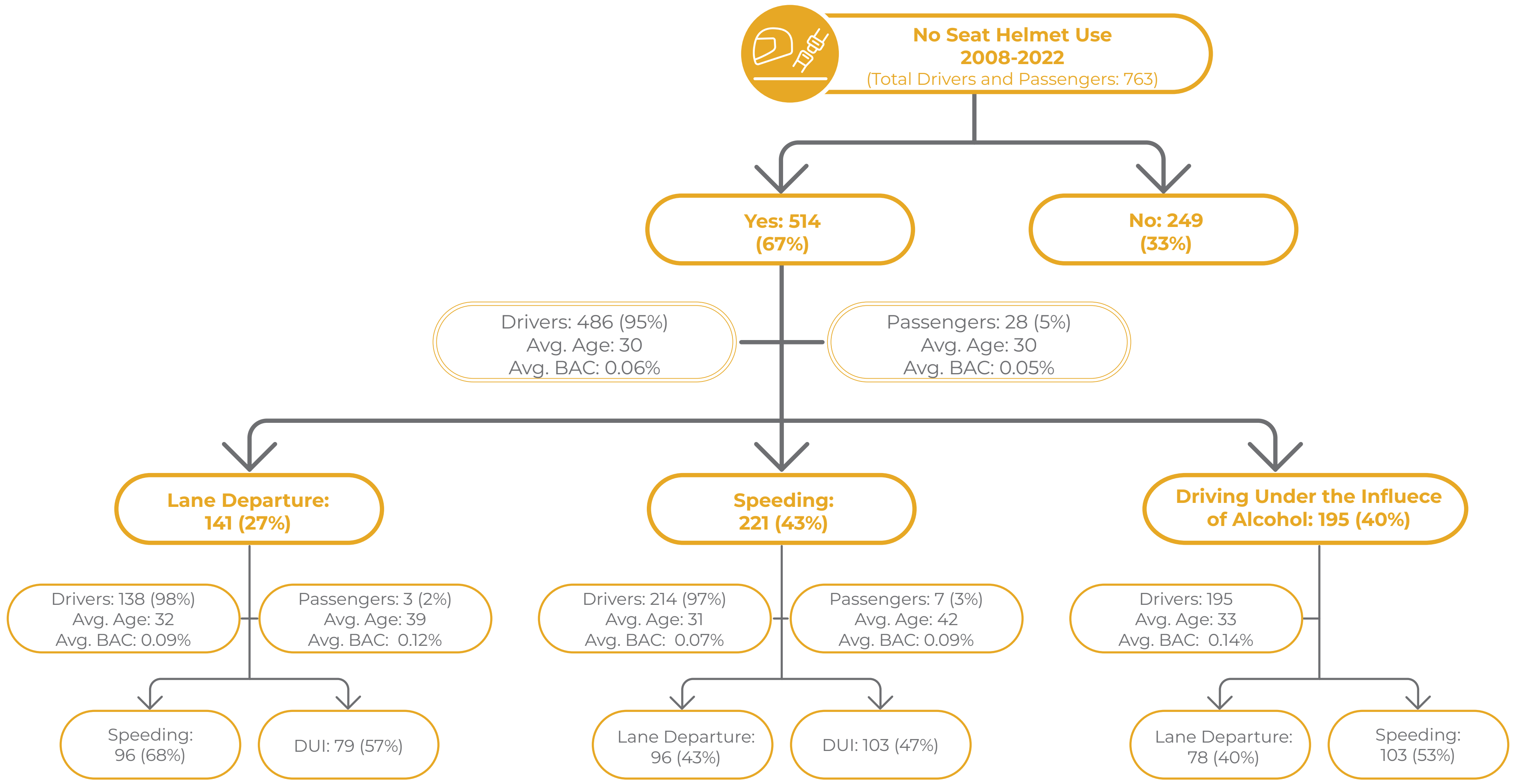
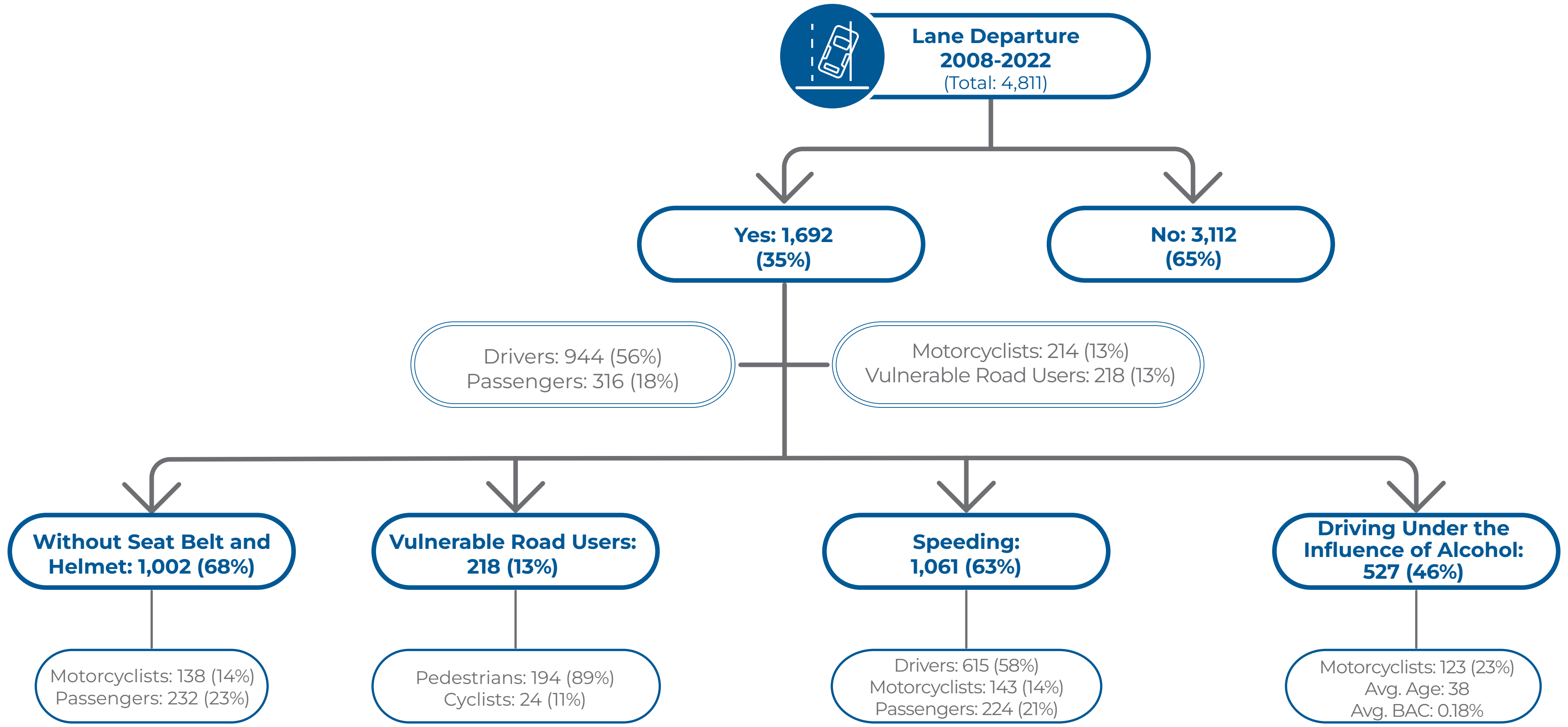
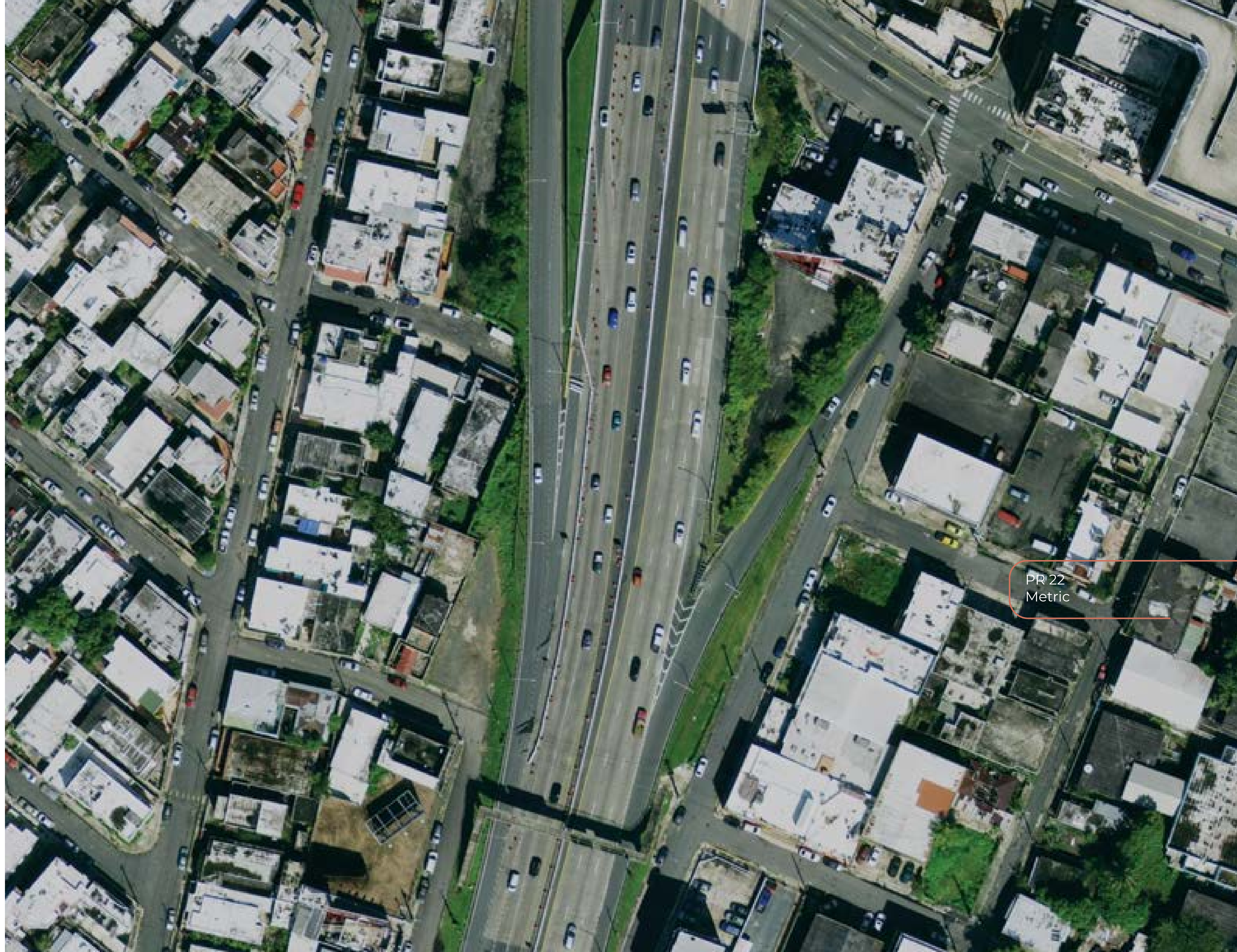


Figure F
Lane Departure





PUERTO RICO

SHSP

STRATEGIC HIGHWAY SAFETY PLAN

2024-2028

PUERTO RICO HIGHWAYS & TRANSPORTATION AUTHORITY

metric Puerto Rico

steer