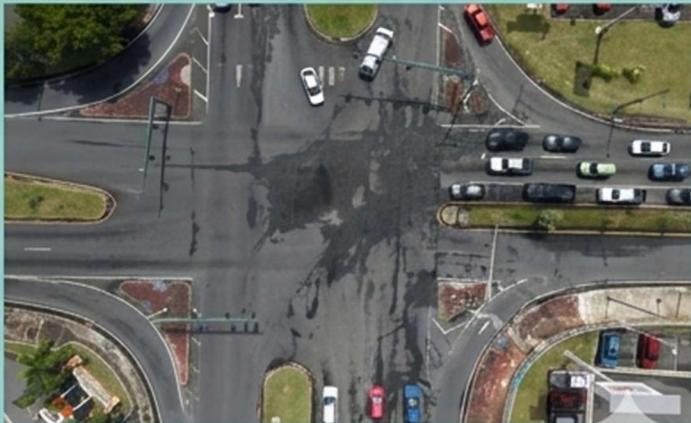


PHASE 1 REPORT: COMPREHENSIVE SAFETY ACTION PLAN

MUNICIPALITY OF TOA BAJA
MANAGEMENT AND TECHNICAL CONSULTING GROUP



The Phase 1 Report of the Comprehensive Safety Action Plan (CSAP) for the Municipality of Toa Baja outlines the foundations of the municipality's effort to confront rising roadway collisions, fatalities, and serious injuries. The document presents the local and global context of the roadway safety crisis, demonstrating the increasing trend of traffic crashes in Toa Baja from 2020 to 2024 and emphasizing the need for decisive action. It introduces the Safe Systems Approach as the guiding framework for the CSAP — an evidence-based, multidisciplinary philosophy that focuses on preventing severe harm rather than eliminating all crashes, recognizing human error, and promoting shared responsibility across local agencies. The report also highlights key municipal actors, including Planning and Land Use, Transportation and Public Works, Municipal Police, Emergency Response and Disaster Management, the Project Management Office, Economic Development, Culture and Tourism, and the Municipal Institute for Cooperativism and Citizen Participation, detailing their roles, challenges, and opportunities within the safety planning process.

The report further documents the municipality's formal adoption of the Safe Systems Approach through Executive Orders 8 and 15 (Series 2025–2026), and the creation of a multi-departmental Steering Committee for Roadway Safety. It describes the committee's initial meetings, the identification of critical roadway safety issues, and the collaborative process for establishing project-selection criteria based on safety impact, community equity, technical complexity, costs, and multimodal benefits. Together, these first-phase activities establish the institutional structure, shared priorities, and analytical framework that will guide Toa Baja's development of actionable strategies and capital projects aimed at reducing fatalities and serious injuries on its roadway network.

This document is divided into four chapters:

1. Background
2. Safe Systems Approach
3. Adoption of the Safe Systems Approach
4. Steering Committee for Roadway Safety

Background

The startup for the Comprehensive Safety Action Plan began in May 2025 at the Planning and Land Use Department of the Municipality of Toa Baja.

The Need for Action

Roadway safety is a public health issue with worldwide effects, impacting all economies across the globe. At the beginning of the millennium, road traffic injuries and deaths had become a major global public-health crisis, especially among low- and middle-income countries. After a multi-year international effort led by the World Health Organization (WHO), the United Nations and a growing coalition of governments and road-safety organizations like the International Road Federation (IRF), the World Bank and WHO published the World Report on Road Traffic Injury Prevention (2004). The report highlighted the urgent need for coordinated global action and laid out recommendations for governments and international agencies.

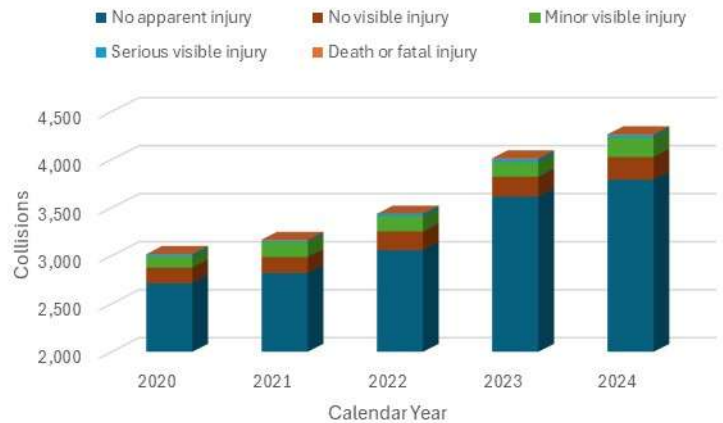
While the call for action is global, the implementation of road safety initiatives is local. In Puerto Rico, there are on average more than 140,000 crashes annually. In the post pandemic years, crashes have increased notably from 134,771 (2020) to 156,024 (2024), an increase of more than 15 percent from 2020.

At the municipality of Toa Baja, there were 17,862 collisions reported in the municipality’s roads during the 2020 to 2024 period. Of the 17,862 collisions, there were 148 severe collisions, of which 31 were fatal collisions and 117 were serious injuries.

The traffic crash data for Toa Baja also showed an increasing trend of roadway collisions, fatalities and serious injuries. In 2020 there were 3,018

collisions reported. In 2024, there were 4,264 collisions reported – an increase of 36.5 percent from 2020. Between 2020 and 2024, each year finished with more crashes than the previous

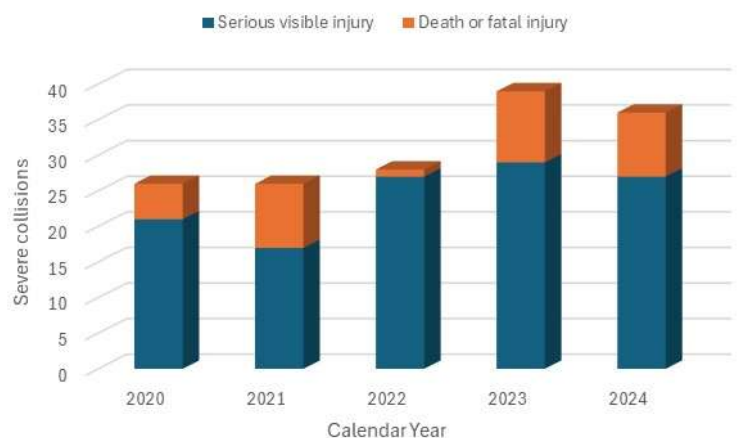
Figure 1 Traffic Collisions in Toa Baja, 2020 to 2024



year, as Figure 1 shows.

Figure 2 shows the severe collisions in Toa Baja during the 2020 to 2024 period. The three-year average of severe collisions per year – which includes severe injury collisions and fatal collisions – increased from 27 per year (2022) to 34 per year (2024).

Figure 2 Severe collisions in Toa Baja, 2020 to 2024



The roadway safety problems playing out in Toa Baja are not exclusive to the municipality and are also playing out across Puerto Rico and in the US.

In the US, roadway fatalities and the fatality rates had been decreasing consistently from 1990 to 2020. However, since 2020, roadway fatalities increased by 7.3 percent from 2019 levels, followed by a 10.8 percent increase in 2021 (43,230 fatalities)¹.

The Key Actors

The key actors for the development of the Comprehensive Safety Action Plan include the local government, the communities and external stakeholders.

This section presents a description of each actor, including their role and responsibilities, the challenges and opportunities presented by the development of this plan.

Local Government

The local government is the key enabler of actions and strategies to create safer streets for road users. The local government of Toa Baja is based on the legal framework described by the Municipal Code of 2020². Toa Baja has a local form of government composed by an executive branch and a legislative body.

The Executive Branch is organized as a community-responsive organization where units of the local government are in direct contact with the communities. The executive branch is organized into four areas:

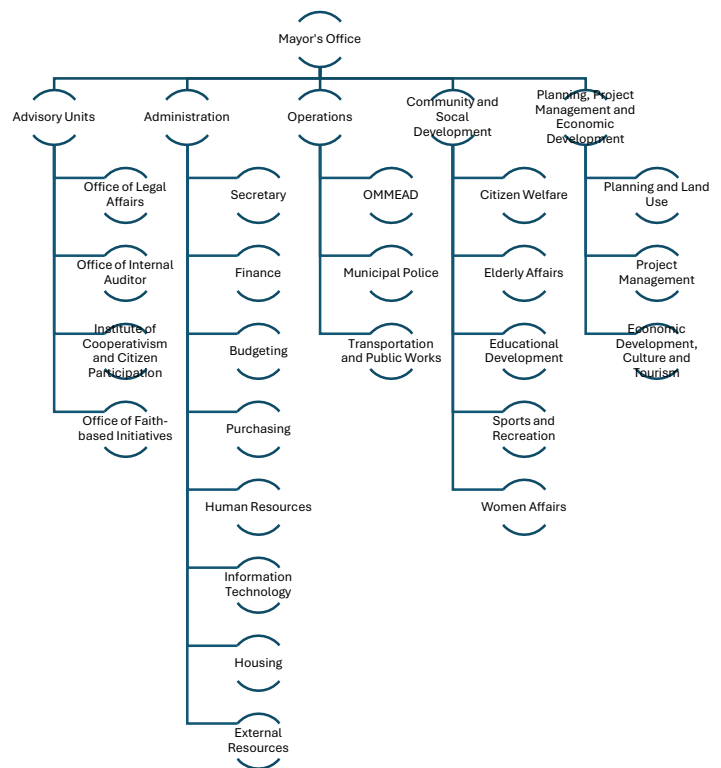
- Operations
- Administration
- Social and Community Development
- Planning, Project Management and Economic Development

The Mayor’s Office includes four municipal units which provide advisory services in its operations. These units are:

- 1) Office of Legal Affairs
- 2) Office of Internal Audit
- 3) Municipal Institute for Cooperativism and Citizen Participation
- 4) Office of Faith-based Initiatives

Figure 3 includes an organizational diagram of the organization of the executive branch.

Figure 3 Municipal Organization



The structure of the municipal government provides opportunities to develop the safety action plan with collaboration from the Operations Area and the Planning, Project

¹ Source: <https://www.transportation.gov/NRSS/SafetyProblem>

² Public Law 107-2020. 21 L.P.R.A. §7001 - §8351

Management and Economic Development branch. The six municipal departments in these two areas are expected to become involved in the development of the safety action plan. The following section outlines each of these local government units and outlines their anticipated roles in the development of the safety action plan.

Planning, Project Management and Economic Development

A Comprehensive Safety Action Plan aims to reduce fatalities and serious injuries on roadways. This process requires data-driven planning, project delivery capacity and economic alignment.

The Planning, Project Management and Economic Development area of the municipal government is responsible for promoting the economic development of the municipality by regulating the permitting process, managing urban growth, ensuring code compliant development, supporting stakeholder involvement and by guiding capital investments and public expenditures.

Planning and Land Use

The Municipal Department for Planning and Land Use is responsible for the development of the Comprehensive Safety Action Plan and for managing and accessing program funds. This department plays a crucial role in the process by acting as the Administrator for the development of the plan, acting as the main point of contact with the Consultant, as well as reporting activities to the Federal Highway Administration.

The Planning and Land Use Office engages in the process of urban planning, zoning, permitting, and management of planning activities. The office is staffed by 5 licensed planners and supporting staff. The Planning of the Land Use

Office is directed by Mrs. Anilda Fernández Vega, PPL.

The Planning and Land Use Office has won awards and recognitions for their work, including *How to Build a Better Mousetrap Challenge* by FHWA. The Planning and Land Use Office is tasked with the development of the Comprehensive Safety Action Plan and its execution. Its role is limited to program administration and coordination between the participants.

Opportunities

The organization and technical preparation of the personnel at the Planning and Territorial Office presents the office with many opportunities to improve roadway safety. The staff think strategically and outside the norm when compared to other municipal planning departments.

There are several opportunities that can be developed by the Planning and Land Use Office, including

- Improving the data collection methods for safety analysis.
- Developing and implementing a robust data-driven safety analysis.
- Implement city-wide speed limit program to simplify speed limit settings.
- Develop a city-wide traffic calming program which communities can use as a reference for their local speed management programs.
- Update form-based zoning to eliminate road safety hazards that are dangerous by design.
- Develop and implement an access management program to eliminate private driveways near intersections.
- Develop and implement a Safe Routes to School Program for its public school system.

Project Management Office

The Project Management Office is tasked with the execution of the Municipality's capital improvement program. The Project Management Office was created in 2021 to manage the multitude of capital projects funded by FEMA and by HUD through their disaster recovery, mitigation, and city revitalization programs. The Project Management Office relies on contractors who perform directly the project management activities for the municipality, and the office performs its role as a Program Manager.

Some of the capital projects under the direction of the Project Management Office include safety related activities, including pedestrian lighting projects and the construction of sidewalks.

The Project Management Office is directed by Mrs. Diana Vázquez.

While the Project Management Office has a technically skilled workforce, it is limited by its size and therefore relies on external contractors to support the project management activities. The contractors may not specialize in roadway safety if these are involved in non-transportation projects. The Project Management Office must ensure that external capabilities on work zone safety and roadway safety are required of contractors.

Opportunities

The Project Management Office will be a key figure in the implementation of the Comprehensive Safety Action Plan. Every major infrastructure project from the plan will likely be assigned to the Project Management Office.

The Project Management Office can build its roadway safety capabilities with assistance from the Center for Technology Transfer in

Transportation, also known as the Local Technical Assistance Program (LTAP).

The Project Management Office will also play an influential role in ensuring that its contractors take the road safety certifications provided by the Center for Technology Transfer in Transportation, including the Road Safety Champion (RSC) certification.

Economic Development, Culture and Tourism

The third unit is the Department for Economic Development, Culture and Tourism engages with municipal stakeholders to align the municipal activities with the interests of business organizations and cultural organizations.

The office of Economic Development, Culture and Tourism provides a link to entrepreneurs and business owners located in Toa Baja to the city government's services. The role of the office is to promote the creation of businesses, to facilitate the permitting process, and to facilitate compliance with business owners with the municipality's permitting requirements, ordinances and regulations.

The office is also responsible for promoting the local culture and for promoting the development of microbusinesses that enhance the local culture through arts and crafts. The office is responsible for managing and executing the tourism and visitor campaigns through many of its festivals, including *Fiestas de la Boulevard* and *Fiestas Patronales* during the summer months. The Economic Development, Culture and Tourism Office is also tasked with organizing and promoting the sport of long-distance running – hosting several marathons annually as well as Iron Man competitions, 10k races and 5k races which also bring visitors to the municipality.

The Economic Development, Culture and Tourism Office can ensure that safety initiatives support economic growth, investment, equity and long-term competitiveness. Its ties with the business community can help to open the discussion on which safety projects can help to increase business activity. This office can represent the business organizations when evaluating safety projects to ensure that their interests are represented in the decision-making processes.

The Economic Development, Culture and Tourism Office is directed by Mr. James Ramos Santiago, a former business owner from Levittown and municipal legislator.

The office does not directly collect information on roadway safety. However, it is engaged with business owners who are aware of the impact that road safety and hazards can have on areas of high commercial activity, and how road safety conditions can impact the perception of safety from customers.

Operations

The operations branch of the local government of Toa Baja includes the Department of Transportation and Public Works, the Municipal Police and the Municipal Office of Emergency Response and Disaster Management.

The three department units play a pivotal role in managing day-to-day operations and safety related incidents – whether it is by keeping roads clear of hazards, responding to traffic collision incidents to provide first aid to injured parties, or providing law enforcement.

Transportation and Public Works

The Municipal Department of Transportation and Public Works is the largest department in the

Municipality of Toa Baja. The department is an operational arm of the municipality tasked with

- Recycling
- Public Transportation
- Fleet Maintenance
- Facilities Maintenance
- Street and gutter cleaning
- Maintenance of roads
- Signage and wayfinding
- Treatment of septic tanks

The department is responsible for managing roadway safety activities.

The Director of the department is Mrs. Wilda Reyes.

Despite having the largest workforce in the municipal government, there are few workers specialized in roadway design and operations. There is a need to develop workers in vocational skills associated with transportation infrastructure, such as using machinery needed to dig, compact, and lay out reinforced concrete for sidewalks. In addition, there is also a need to train the workforce on lane markings and pavement markings consistent with the Manual of Uniform Traffic Control Devices, including the Puerto Rico Addendum.

Opportunities

One area of opportunity for the Department of Transportation and Public Works involves workforce development through the Local Technical Assistance Program to develop skills associated with installation of highway signs, general roadway maintenance, maintenance-of-traffic design, planning and execution.

Municipal Police

The Municipal Police is tasked with the safety and security of the population of Toa Baja and its

visitors. The roadway safety responsibilities include managing congestion at several high congestion intersections, responding to traffic collisions on local and state roads, carrying out campaigns against speeding and against alcohol-related impaired driving, conducting two-way single lane operations on route PR-867 and closing traffic for non-motorized activities on route PR-165. These responsibilities are in addition to those associated with security, including crime prevention campaigns, responding to domestic disturbances, responding to criminal incidents, ensuring public safety during special events, maintaining vigilance and coordination with the State Police and Federal authorities.

The Municipal Police have a force of 70 officers. The Commissioner of the Municipal Police is Mr. Ismael Agosto Ayala. The Municipal Police is organized into seven (7) major areas: Administration, Marine Unit, Information, Motorcycle Unit, Traffic Unit, Transportation Unit and Special Units. The Traffic Unit is composed by six (6) officers and is responsible for managing traffic during peak congestion periods.

The biggest challenge faced by the police currently is insufficient staffing. The current staffing levels are insufficient for covering three regular shifts, which results at times unable to attend roadway safety incidents.

Opportunities

While the main challenge for the Municipal Police is the size of the workforce, there are opportunities for the Department. With the help of technology, several tasks that are assigned to the municipal Police can be automated to relieve resources from repetitive tasks associated with roadway safety.

First is the introduction of Adaptive Traffic Signal Controls at key intersections in Toa Baja. Adaptive Traffic Signal Controls provide a dynamic adjustment of intersection traffic signals based on changing demand patterns across the day. Adaptive Traffic Control Signals eliminate the need to have Police officers operating the signal heads manually and can even be controlled remotely from a traffic controls center.

The second opportunity is the integration of speed safety cameras to adjust used behavior to drive at or below the designated speed limits. Speed safety cameras would automate enforcement on speed limits and relieve officers time to conduct other duties. Speed safety cameras can be installed permanently at a location with a chronic speeding problem, or these can be mobile so these can be installed at locations based on temporal conditions.

Emergency Response and Disaster Management

The Municipal Office for Emergency Response and Disaster Management (OMMEAD, for its Spanish acronym) is a first-responder organization responsible for providing emergency medical response to health-related incidents as well as safety-related incidents that take place on roadways of Toa Baja.

OMMEAD is directed by Mr. Miguel Ortiz. Mr. Edwin Estrada is the Administrative Coordinator responsible for the day-to-day operations of the office. OMMEAD has four (4) Cat-3 ambulances. However, there are six (6) paramedics on payroll. Because ambulances need to operate with pairs of paramedics, the office does not have enough paramedics to cover only one (1) full shift.

The Deputy Director for Operations, Mr. Julio Olivera, is responsible for coordinating the emergency response. The municipality is a participant of the national 911 emergency

management program, which dispatches the calls to the municipal response team through a Computer-Aided Dispatch (CAD) system.

Like other municipal departments, Municipal Office for Emergency Response and Disaster Management has low staffing levels due to budgetary constraints. There are six (6) paramedics on payroll and are not enough to cover every shift. When there is no availability from the municipality to respond to an emergency, the municipal Operations Director coordinates with private ambulance services to respond to the incident.

Another challenge is coordination with private ambulances. Most of the private ambulance services are not allocated within a municipal jurisdiction. There are no standard collaboration agreements between private ambulance services and the municipality to cover gaps in service when municipal resources are unavailable.

Within the ranks of municipal paramedics, another challenge is keeping their credentials up-to-date. Paramedics take continuous education courses to maintain their licenses and these are paid out of their pocket.

During peak congestion periods, responding to incidents can also be a logistical challenge. Access time to an emergency in San José, for example, is hampered by afternoon traffic congestion on route PR-2 near La Virgencita.

Opportunities

While there are many challenges faced by the Emergency Response and Disaster Management Office, there are areas of opportunity. Some of the opportunities lie in establishing formal collaborations with neighboring municipalities within the region and with private ambulance carriers.

A regional consortium of emergency response services with the municipalities of Toa Alta, Bayamón, and Cataño could benefit the communities of Toa Baja by improving response times to incidents that occur on the southern and eastern parts of Toa Baja. These areas are characterized as densely developed areas mixed with industrial and warehousing activities. Many of the communities in the northern areas of Toa Alta, and in the northwestern areas of Bayamón are accessible from Toa Baja and could have better response times during certain times of day. A similar effort could be conducted with Cataño in relation to the communities of Palo Seco.

Another opportunity for the municipality is predictive stationing of ambulances. Armed with years of data collected from Police Reports, advanced data analysis can shape how the municipality activates its emergency teams and where it stations its services, much the same way as how the Police would deploy traffic units to catch speeding motorists.

Technological opportunities also abound, with traffic signal prioritization for emergency vehicles. The use of traffic signal prioritization equipment on ambulances, firetrucks, Police vehicles on the municipal network of traffic signals help to cut response times to incidents by bypassing the signal programming to assign the green interval to the approaching emergency vehicle. Traffic signal prioritization also reduces the exposure of emergency responders to traffic collisions. Other technologies such as incident detection, fleet management with AVL and GIS tools not only help to locate incidents faster but also improve access times to the incident by using real-time routing algorithms.

Advisory

Within the advisory branch of the local government, the Municipal Institute for Cooperativism and Citizen Participation is a key organization that is responsible for promoting public participation and engagement in the municipal planning processes.

Municipal Institute for Cooperativism and Citizen Participation

The Municipal Institute of Cooperativism and Citizen Participation of Toa Baja is an organization responsible for the direct engagement with community leaders and communities to foster collaboration and civic engagement in the municipal decision-making processes. It also plays an important role in assisting citizens in accessing various publicly funded programs and programs organized by non-profit organizations.

The Municipal Institute for Cooperativism and Citizen Participation was created in 2017 as a conduit to foster community participation and cooperativism as guiding principles of municipal government activities. The mission of the institute is to promote cooperativism as a social and economic engine for the communities of Toa Baja by developing the skills of community leaders and by providing local government supporting local projects.

As a local government arm, the Institute has enabled communities to improve their resilience to natural disasters. The creation of the community hubs located throughout the municipality provides closer coordination to

communities and access to resources in the event of future emergencies.

The Institute also plays a key role in fostering citizen enterprises. The Institute facilitates mentoring programs for youth as well as for older individuals who are interested in organizing cooperatives. It enables participants to access support networks and enrichment opportunities.



The Institute's role in the road safety process involves coordinating public participation activities, community outreach, and executing the communications campaign. The Institute is directed by Mrs. Yausamet Soto. The Institute relies on four regional facilitators leaders whose responsibility involves coordinating the regional outreach campaigns and meeting logistics.

Opportunities

The personnel of the Institute play a key role in helping the Municipality develop their safety plans. One particular area of opportunity for the Institute is in the creation and execution of road safety audits (RSAs). A road safety audit is a multidisciplinary approach to evaluating hyper-

local road safety issues on a specific stretch of road, at a particular intersection or a group of contiguous intersections. Road safety audits evaluate the hazards and risks on a road from multiple perspectives, including road users, pedestrians, cyclists (if applicable), planners, community members and business owners (if applicable). Non-engineering perspectives in an RSA allow the group to come up with potential solutions which may not need to incur in high capital expenditures.

The RSAs present an opportunity for the Institute to work with the Planning and Land Use team, as well as with the Municipal Transportation and Public Works team to serve as a bridge between communities and municipal personnel in the organization and conduct of these activities.

Communities

The Comprehensive Safety Action Plan also considers the extent to which communities and stakeholders are impacted, including loss of lives, loss of personal independence, and loss of economic productivity caused by severe collisions. The human toll associated with traffic collisions caused by dangerous roads and unsafe motorist behavior is a social component that can also be captured with non-engineering techniques.

The communities of Toa Baja play a crucial role as stakeholders in roadway safety because they are both the primary users of the transportation network and the most affected by its risks and outcomes. Their lived experience—how they walk, bike, drive, ride transit, and access everyday destinations—provides insight that engineers and planners cannot obtain from crash data alone. Residents can identify near-miss

locations, confusing intersections, dangerous speeding corridors, or places where children and older adults feel unsafe. When community members participate in planning workshops, safety audits, and public meetings, they help shape solutions that better reflect local realities and ensure that investments align with actual needs rather than assumptions.

Beyond feedback, communities influence roadway safety through their collective priorities and advocacy. With the Municipal Institute for Cooperativism and Citizen Participation as a conduit, the communities are able to advocate for traffic-calming projects, safer school zones, improved transit access, or better lighting and sidewalks. Their voices help to accelerate political commitments and hold agencies accountable for equitable implementation.

Communities also help to execute campaigns to promote safe driving behaviors, host awareness campaigns, and support speed-management initiatives. In essence, when communities are active stakeholders, roadway safety becomes a shared responsibility and a co-created system—one that is more resilient, more equitable, and more responsive to the people it serves.

Other Stakeholders

In addition to the communities, there are other stakeholders that play a role in roadway safety.

Business owners can play a direct role in roadway safety because their operations influence how people travel to, from, and around their establishments. They can support safety by advocating infrastructure improvements—such as safer crossings, traffic calming, or better lighting—that reduce crash risk near their storefronts.



workers' compensation claims, and legal exposure. At a community scale, higher crash rates reduce foot traffic and make commercial districts feel less welcoming, limiting economic activity.

In Toa Baja, the Business Association of Levittown (Asociación de Empresarios de Levittown) represents the business owners of Avenida Boulevard and Avenida Olga Tañón (formerly known as Avenida Los Dominicos). Discussions with members of the organization have highlighted several road safety

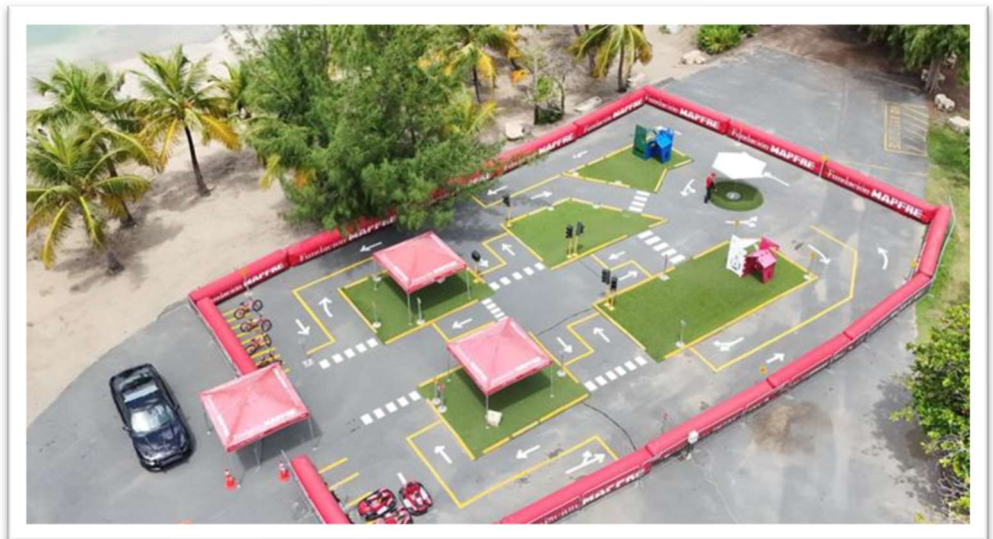
Many businesses also manage fleets, delivery schedules, or loading operations; adopting safe speed policies, requiring driver training, and creating designated loading zones can significantly reduce conflicts with pedestrians and other road users. Even simple actions like maintaining clear sightlines near driveways, encouraging employees to commute by safer modes, or partnering with the Municipality on safety campaigns – Villa Segura by MAPFRE being one example – help strengthen the protective layers envisioned in the Safe System Approach.

problems

- Pedestrian crossings not clearly marked
- Inadequate lighting at intersections
- Parking supply inadequate for business demand
- Speeding on the four-lane road

In addition to the problems stated by business owners, potential solutions have also been proposed by this group. Some of these potential solutions are:

Traffic collisions also have measurable financial impacts on businesses, affecting both day-to-day operations and long-term profitability. Crashes near a business can deter customers, delay deliveries, and increase insurance premiums for the businesses. A single severe collision involving an employee—whether driving a company vehicle or commuting—can create substantial productivity losses,



- Creating parking pockets along Avenida Boulevard and Avenida Olga Tañón by clearing abandoned parcels.
- Reconfiguring Avenida Boulevard to a two (or three) lane road.
- Installing raised pedestrian crossings.
- Building a multi-story parking facility on Avenida Olga Tañón and implementing an integrated trolley to shuttle customers to businesses on Avenida Boulevard and Avenida Olga Tañón.

Safe Systems Approach

The Safe Systems Approach is the philosophy that guides the development of Comprehensive Safety Action Plans. The Safe Systems Approach is a comprehensive, ethical, evidence-based framework developed to eliminate fatalities and serious injuries on roadways.

The Safe Systems Approach was enacted originally in 1997 in Sweden as a strategy to eliminate roadway fatalities in their Vision Zero strategy. By early 2000, global safety organizations began promoting the principles aligned with the Safe Systems Approach, emphasizing kinetic energy management, safe speed design, and shared responsibility. In 2014, New York City became the first jurisdiction within the US to adopt the Safe Systems Approach. In 2021, the Infrastructure and Investment Jobs Act³ enabled the creation of the Safe Streets for All Program which included the adoption of the Safe Systems Approach as a prerequisite for jurisdictions, townships and municipalities

The approach represented a change in paradigm from the existing relationships between road users and the roadways. In the old paradigm, the road user is responsible for all the decisions made on the road. Road design is assumed to be adequate without regard for context and types of users. In the Safe Systems Approach, the goal is not to prevent crashes, but to prevent deaths and serious injuries. Instead of attempting to improve human behavior with regulatory actions, speeding campaigns, and fines, the goal is to design roads to accommodate lapses in human behavior.

Figure 4 highlights the change in paradigm.

Figure 4 Change in Roadway Safety Paradigm



The Safe Systems Approach is a comprehensive multidisciplinary approach to address roadway fatalities by addressing the following:

- a. how different road users interact,
- b. the speed differentials among different road users,
- c. vehicle design and safety features,
- d. how road design influences motorist behavior,
- e. and the timeliness of post-crash care

The Safe Systems Approach follows the National Roadway Safety Strategy (NRSS) objectives for:

- Safer Streets
- Safer Users
- Safer Speeds
- Safer Vehicles
- Post Crash Care

While ideally, the main goal for any transportation department is to have no roadway crashes, the Safe Systems Approach recognizes that traffic collisions happen. While some collisions happen due to errors of human judgement. Even the most responsible motorists can make a mistake that results in a roadway collision. Therefore, while it may be acceptable to commit an error, the outcome of an error on the road should not be a death or a serious injury. To prevent these outcomes, several layers of safety are needed to

³ Public Law No. 117-58, November 15, 2021

ensure that road users are protected from fatal outcomes.

The Safe Systems Approach is based on six (6) core tenets:

- Fatalities and serious injuries are unacceptable
- Responsibility is shared
- Humans make mistakes
- Humans are vulnerable
- Safety is proactive
- Redundancy is crucial

Figure 5 The Safe Systems Approach



Fatalities and serious injuries are not acceptable

One of the most important principles from the Safe Systems Approach is that severe collisions are an unacceptable outcome from traffic crashes. The Safe Systems Approach works towards Vision Zero, a global vision towards eliminating all roadway deaths. The Safe Systems Approach recognizes that while accidents may happen, we can control the potential consequences of the accident through a

combination of strategies and activities aimed at creating a safer environment for all road users.

Responsibility is shared

The Safe Systems Approach recognizes that the responsibility for reducing traffic collisions is not exclusive to the road users. As stated, humans make mistakes when using the roads, but the consequences of an error can be mitigated when road safety is viewed as a system. The new paradigm shifts responsibility from the road user and distributes it across the system of actors involved in design, operations, planning, and response.

There are many actors involved in safety planning and in the execution of safety programs. Road design considers operations at safe speeds. Signage and pavement markings are intended to provide the road users with clarity on where they are headed, what maneuvers are allowed, the types of potential hazards that users may expect, and what are the regulations regarding the use of the roadway. As a first responder, the Police is responsible for documenting and collecting information on traffic collisions. Paramedics are another type of first responder, and their role is providing first aid to individuals involved in traffic collisions and transporting seriously injured individuals to emergency care. Public works personnel are responsible for keeping the roads clear of debris and obstructions. They are also responsible for keeping regulatory signage, warning signage, and wayfinding signage up to date and relevant, and to ensure that signage is not a distraction. Finally, road users have a responsibility to use the roads at safe operating speeds and ensure that their activities do not jeopardize the safety of other road users.

Humans make mistakes

As humans, we tend to make mistakes on the road. As children, we are taught to look both ways before crossing a street, to obey traffic signs and to ride a bicycle on the right side of the road. But we also make mistakes along the way. As motorists, we may forget to look in the rearview mirror when changing lanes and crash against a vehicle occupying the lane. We may misjudge a gap while making a left turn into the entrance of a parking lot. We may fail to recognize a pedestrian on a crossing due to poor visibility on the roadway.

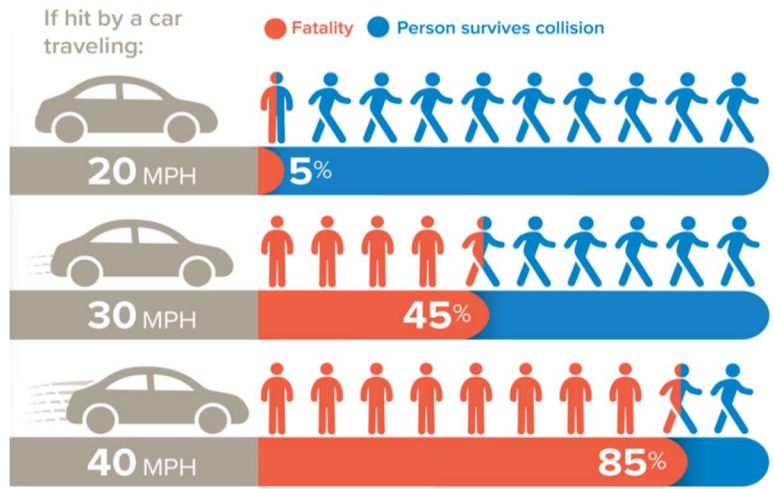
The Safe Systems Approach focuses on mitigating the most serious consequences of a collision. When viewed as a system, the transportation systems should have multiple levels of redundancy to mitigate the worst consequences of a traffic collision: fatalities and serious injuries.

Humans are vulnerable

The human body is only able to withstand a limited force of impact. By mitigating the force exerted from an impact on a human, the chance for survival in a collision will increase. The advent of the airbag in vehicles has been one of the greatest advancements in reducing the transfer of the force of impact onto occupants of vehicles involved in collisions.

In the case of pedestrians, interactions with vehicles on crossings will become deadlier as vehicle speeds increase, as Figure 6 shows. Studies have shown that 1 out of 20 pedestrians will not survive a vehicle-pedestrian collision when the vehicle speed is 20 mph. An increase of

Figure 6 Probability of Pedestrian Survival in Vehicle-to-Pedestrian Collisions



National Traffic Safety Board (2017) Reducing Speeding-Related Crashes Involving Passenger Vehicles. Available from: <https://www.ntsb.gov/safety/safety-studies/Documents/SS1701.pdf>

10 mph – from 20 mph to 30 mph – increases the probability of a fatality to 9 out of 20 pedestrians, and an additional increase of 10 mph – 30 mph to 40 mph – increases the fatality rate to 17 out of 20 pedestrians.

⁴The change in paradigm from controlling vehicle speeds to reducing kinetic energy recognizes that vehicle speeds are not the only factor in severe and fatal collisions. The energy exerted by a collision is a function of the mass of objects and the velocity of these, so the vehicle’s size and mass also an effect on the collision even though its effect is proportional to the energy exerted.

Safety is proactive

In the old paradigm, severe collisions caused engineers and designers to analyze the causes of a collision and implementing countermeasures that would address a particular roadway vulnerability. In the new paradigm, predictive methods are applied to address systemic

⁴ Source: National Transportation Safety Board Publication: Reducing Speeding-Related Crashes Involving Passenger Vehicles (2017).

vulnerabilities on a road network. The Highway Safety Manual (HSM) presents the methodologies and techniques used to predict collision rates on a road network using common attributes from roadways with high collision rates.

Redundancy is crucial

Redundancy is central to roadway safety because human error is both occasional and unpredictable. A redundant safe system implies providing multiple layers of mitigation — such as speed management, forgiving roadsides, protected intersections, and vehicle technologies — so that no single mistake has the power to produce severe consequences. For example, a driver drifting slightly out of their lane shouldn't immediately result in a severe crash. Providing longitudinal rumble strips, adequate shoulder widths, vehicle lane departure warnings and barrier systems all work together to reduce the likelihood of a severe consequence in a potential collision by warning the motorist, providing adequate reaction time and preventing the vehicle from running off the road onto a fixed object.

Even when road design is strong, roadway users may still face risks if vehicles lack crash-avoidance features, or if operating speeds remain too high for human bodies to tolerate in the event of a collision. Conversely, safe vehicle technology cannot overcome a roadway environment designed with excessive conflict points or high-speed mixing. Each layer is intentionally designed to compensate for the limitations of another, acknowledging that humans will always have lapses in attention, misjudge gaps, or react imperfectly to unexpected situations. The system remains resilient by ensuring that each element reinforces the others, meaning a breakdown in

one area does not lead directly to serious injury or death.

Adoption of the Safe Systems Approach

The Comprehensive Safety Action Plan is prepared using the Safe Systems Approach as the guiding principle. The Safe Systems Approach emphasizes the concept of systemic safety, for which there are many actors. The formal adoption of the Safe Systems Approach is therefore a requirement for jurisdictions and towns. By adopting the Safe Systems Approach, the public entities show commitment to addressing the roadway safety problematic using a wide net of resources.

During this initial phase of the project, the Planning and Land Use Office and its team of consultants, laid out the work and justifications for the adoption of the Safe Systems Approach as part of the Comprehensive Safety Action Plan.

Using crash data from the Police Reports, it was noted that there were 17,862 collisions within Toa Baja during the 2020 to 2024 period. Within this universe of collisions, there were 148 severe collisions which involved serious injuries or deaths. Most concerning was the fact that the collision rates in Toa Baja were in an upward trajectory. Clearly, action is needed to reverse the trend.

On November 2025, Honorable Mayor Bernardo “Betito” Márquez García signed Executive Order 8 Series 2025-2026, to adopt the Safe Systems Approach. In adopting the Safe Systems Approach, the municipality commits to base the decisions on roadway safety on the guiding principles of the Safe System Approach.

In adopting the Safe System Approach, the municipality uses an all-hands-on-deck approach and creates a steering committee to improve roadway safety that is made up of the directors of the following municipal departments:


- Planning and Land Use
- Municipal Transportation and Public Works
- Municipal Police
- Project Management Office
- Municipal Emergency Response and Disaster Management
- Economic Development, Culture and Tourism

Figure 7 shows Executive Order 8 Series 2025-2026.


Executive Order 15 Series 2025-2026, signed in January 22, 2026, includes the Municipal Institute of Cooperativism and Citizen Participation as a member of the Steering Committee for Roadway Safety to ensure that public participation is a key component of the safety planning processes.

Figure 8 shows Executive Order 15 Series 2025-2026.

Figure 7 Executive Order 8 Series 2025 - 2026



Gobierno de Puerto Rico
Municipio Autónomo de Toa Baja
Oficina del Alcalde



ORDEN EJECUTIVA NÚMERO: 08 SERIE: 2025-2026

ORDEN EJECUTIVA DEL ALCALDE DEL MUNICIPIO AUTÓNOMO DE TOA BAJA, HON. BERNARDO "BETITO" MÁRQUEZ GARCÍA, PARA ADOPTAR LA FILOSOFÍA DE SISTEMAS SEGUROS Y ESTABLECER EL COMITÉ TIMÓN PARA EL DESARROLLO DEL PLAN INTEGRAL DE SEGURIDAD VIAL CON EL COMPROMISO DE REDUCIR LOS ACCIDENTES FATALES GRAVES EN LAS CALLES DEL MUNICIPIO AUTÓNOMO DE TOA BAJA Y PARA OTROS FINES.

1^{ER} POR CUANTO: La Ley 107-2020, según enmendada, conocida como el "Código Municipal de Puerto Rico", en su Artículo 1.018, describe las Facultades, Deberes y Funciones Generales del Alcalde.

2^{DO} POR CUANTO: La Ley 107-2020, supra, dispone en su Artículo 1.018, en los incisos (a), (b) y (h) que el Alcalde podrá organizar, dirigir y supervisar todas las funciones y actividades administrativas del municipio, coordinar los servicios municipales entre sí, para asegurar su prestación integral y adecuada en la totalidad de los límites territoriales del municipio, velar por que la población tenga acceso, en igualdad de condiciones, al conjunto de los servicios públicos mínimos de la competencia o responsabilidad municipal, y, además, realizar de acuerdo a la ley todas las gestiones necesarias, útiles o convenientes para ejecutar las funciones y facultades municipales con relación a obras públicas y servicios de todos los tipos y de cualquier naturaleza.

3^{ER} POR CUANTO: En la jurisdicción del Municipio Autónomo de Toa Baja se han experimentado más 17,875 choques en sus vías de tránsito en un periodo de cinco (5) años. De estos, treinta y un (31) choques provocaron fatalidades y ciento diecisiete (117) tuvieron heridos graves, conllevando un total de ciento cuarenta y ocho (148) accidentes severos, contados desde el 1 de enero de 2020 hasta el 31 de diciembre de 2024.

4^{TO} POR CUANTO: Durante los pasados cinco (5) años, se ha registrado un aumento alarmante en la cantidad de accidentes vehiculares en Toa Baja, que debe ser detenido para garantizar la seguridad de los transeúntes de nuestras calles. Este aumento refleja una crecida del veintisiete por ciento (27%) durante este periodo de tiempo.

5^{TO} POR CUANTO: Entendiendo que esta situación amenaza la seguridad de nuestros ciudadanos, el Municipio se encuentra desarrollando un Plan Integral de Seguridad Vial, con la asistencia de ingenieros y planificadores, mediante la asignación de fondos del programa *Safe Streets for All (SS4A)* del Departamento de Transportación Federal, el cual tiene como fin prevenir muertes y accidentes graves en las carreteras, calles y caminos, orientado a todo transeúnte o conductor, entiéndase, peatones, ciclistas, vehículos

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de motor y otros, a que puedan desplazarse con mayor seguridad. Ello, porque se parte de la premisa comprobada de que muchos accidentes fatales son prevenibles si se cuenta con un sistema seguro de tránsito. Es decir, mediante la filosofía de Sistemas Seguros se busca anticipar errores humanos.

6^{TO} POR CUANTO: Los principios de seguridad de los Sistemas Seguros son:

1. Las muertes y las heridas de gravedad resultado de accidentes en las carreteras son inaceptables.
2. Como seres humanos, cometemos errores cuando manejamos en las carreteras.
3. Los seres humanos somos vulnerables. Los sistemas de transporte deben diseñarse pensando en las limitaciones y vulnerabilidades humanas para reducir muertes y lesiones graves.
4. La responsabilidad de lograr la reducción de accidentes graves y fatales es compartida. Los funcionarios públicos, los policías municipales y estatales, los paramédicos y personal de manejo de emergencias, así como los empresarios, las comunidades y la población general tiene una responsabilidad en lograr este objetivo.
5. La seguridad vial es proactiva. Se deben utilizar herramientas proactivas para identificar y mitigar riesgos latentes en el sistema de transporte, en lugar de esperar a que ocurran choques y reaccionar después.
6. La redundancia es crucial. Reducir los riesgos requiere que todas las partes del sistema de transporte se fortalezcan, de modo que si una parte, las demás partes aún protejan a las personas.

En ese sentido, el desarrollo del Plan Integral de Seguridad Vial se debe basar en estos conceptos y de acuerdo con los siguientes componentes: usuarios seguros; vehículos seguros; velocidades seguras; carreteras seguras; y respuesta médica rápida luego de un accidente.

7^{MO} POR CUANTO: El desarrollo del Plan Integral de Seguridad Vial considera la importancia de tener un grupo multidisciplinario en la identificación de problemas de seguridad vial, así como en el desarrollo de estrategias y soluciones para reducir la severidad de los accidentes y salvar vidas. El grupo multidisciplinario estará compuesto por funcionarios municipales que tengan un grado de responsabilidad e injerencia en el mejoramiento del sistema de transportación, métricas de seguridad, manejo de emergencias, planificación, desarrollo de proyectos, y los componentes de un sistema seguro.

8^{VO} POR CUANTO: De conformidad con lo expuesto, resulta necesario establecer un organismo de trabajo municipal, que incluya distintos componentes municipales y que identifique los problemas de seguridad vial, desarrolle soluciones y asista en la implementación de estas para garantizar la seguridad de nuestro pueblo y de las personas que transitan por nuestras calles.

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POR TANTO: Yo, Bernardo "Betito" Márquez García, en virtud de las facultades que me confiere el Código Municipal de Puerto Rico, según enmendado, y la reglamentación aplicable, DISPONGO Y ORDENO LO SIGUIENTE:

1ª SECCIÓN: Se crea el Comité Timón del Plan Integral de Seguridad Vial con el propósito de identificar, diseñar, desarrollar e implementar medidas estratégicas de seguridad vial, utilizando el enfoque de la filosofía de Sistemas Seguros, teniendo como fin la reducción de accidentes severos en nuestra jurisdicción.

2ª SECCIÓN: El Comité Timón del Plan Integral de Seguridad Vial ("Comité Timón"), se compondrá por representantes de las siguientes dependencias municipales:

1. Oficina de Planificación y Ordenación Territorial
2. Policía Municipal
3. Oficina Municipal para el Manejo de Emergencias y Administración de Desastres (OMMEAD)
4. Departamento de Obras Públicas Municipal
5. Gerencia de Proyectos
6. Oficina de Desarrollo Económico

El Director(a) de cada dependencia mencionada formará parte del Comité Timón. Este(a) podrá delegar en un empleado(a) de su confianza que le represente en los asuntos del Comité Timón.

El Comité Timón será presidido por el Director(a) de la Oficina de Planificación y Ordenación Territorial, quien deberá informar mensualmente al Alcalde sobre el desarrollo de los trabajos del ente y próximos pasos a seguir.

El Comité Timón deberá reunirse, como mínimo, una (1) vez al mes para llevar a cabo sus trabajos delegados por esta Orden Ejecutiva, y aquellos en cumplimiento de las regulaciones aplicables, disponiéndose que el presidente podrá citar reuniones cuando lo entienda necesario.

El Comité Timón trabajará de la mano con todo recurso interno o externo disponible durante el desarrollo e implementación del Plan Integral de Seguridad Vial.

2ª SECCIÓN: Se adopta como política pública del Municipio Autónomo de Toa Baja la integración de la filosofía de Sistemas Seguros, no solo como parte del Plan Integral de Seguridad Vial, sino también para asegurar que los proyectos de mejoras viales, las iniciativas de mantenimiento de calles, aceras, la operación de los sistemas de transportación y la respuesta a emergencias médicas como consecuencia de accidentes y choques se ejecuten utilizando este enfoque.

3ª SECCIÓN: Esta Orden Ejecutiva comenzará a regir inmediatamente sea firmada por el suscribiente, en mi capacidad de Alcalde.

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4ª SECCIÓN:

Copia de esta Orden Ejecutiva será remitida a la Legislatura Municipal de Toa Baja y a las Dependencias Municipales, para su conocimiento y acción correspondiente.

EN TESTIMONIO DE LO CUAL, expido la presente Orden Ejecutiva bajo mi firma, en la Ciudad de Toa Baja, Puerto Rico, hoy, ____ de noviembre de 2025.

Bernardo "Betito" Márquez García
Alcalde

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Steering Committee for Roadway Safety

The role of the Steering Committee is to identify, design, develop, and implement actions and strategies to reduce severe collisions.

Composition

The Steering Committee includes the following municipal departments:

- Planning and Land Use
- Municipal Police
- Municipal Office for Emergency Response and Disaster Management
- Municipal Department of Transportation and Public Works
- Project Management Office
- Economic Development, Tourism and Culture
- Municipal Institute of Cooperativism and Citizen Participation

The directors of these municipal departments are permanent members of the Steering Committee.

Charter

The Charter document of the Steering Committee for Roadway Safety describes the mission of the committee, its scope and the authority.

Figure 9 shows the charter document approved by the committee.

Mission

The mission of the Steering Committee for Roadway Safety is to direct, advice and implement the Comprehensive Safety Action Plan (CSAP) of Toa Baja. The mission is to ensure that projects and strategies borne from the CSAP are reflective of the community needs and based

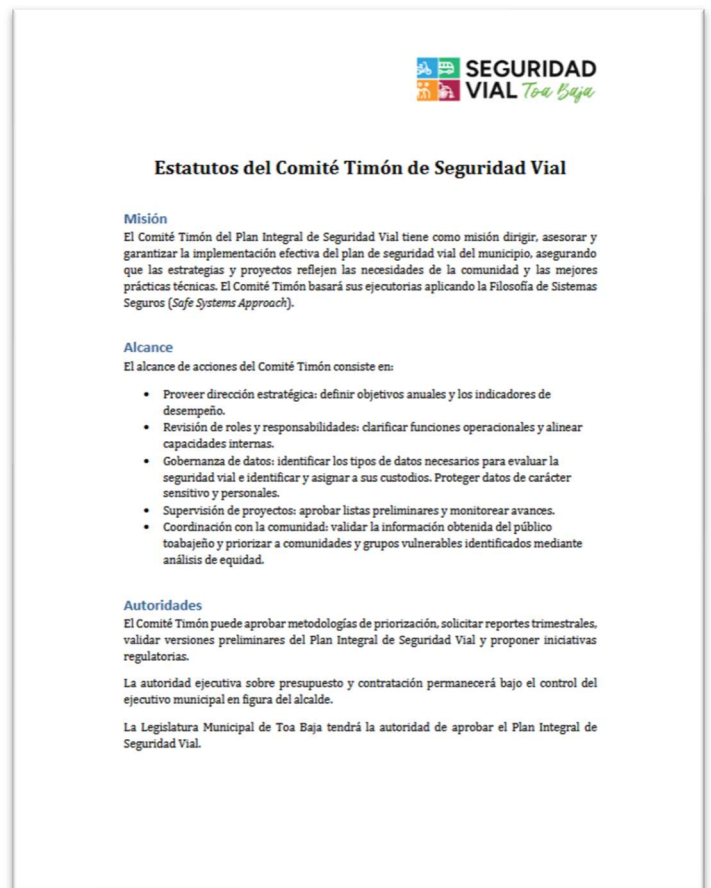
on best practices. The Committee will base its works on the Safe Systems Approach.

Scope

The range of actions and activities of the Steering Committee on Roadway Safety are limited to the following:

- Provide strategic direction
- Revision of roles and responsibilities
- Data governance
- Project oversight
- Coordination with communities

Figure 9 Charter of the Steering Committee for Roadway Safety



Authority

The Steering Committee on Roadway Safety is an advisory organization within the executive branch of the local government.

Within its authorities, the Steering Committee can approve methodologies to evaluate potential safety projects, solicit quarterly reports, approve interim versions of the CSAP and propose local ordinances and regulatory initiatives.

The Mayor of Toa Baja has the authority to approve budgets and the processes of the committee.

The adoption of the CSAP befalls on the legislative branch of the local government.

Rules and Procedures

The Steering Committee has a process for establishing the rules and procedures for meetings which was approved by unanimity by the members of the Steering Committee. The rules and procedures of the Steering Committee are included in a document titled *Manual Operacional del Comité Timón de Seguridad Vial*.

Quorum

Meetings of the Steering Committee for Roadway Safety are legitimate when quorum is achieved. To ensure that the decisions made by the committee are known to all members of the Steering Committee, quorum is defined by the attendance of one (1) representative of every department that is a member of the Steering Committee.

Motions

The use and call for a motion is regulated similarly to Robert's Rules of Order. The Meeting Chairperson is the only person allowed to recognize a motion presented by any member of the Steering Committee.

Similarly, amendments to a motion can be presented by any member of the committee.

Approvals to motions are based on majority vote.

Meetings

Meetings of the Steering Committee are announced by the Committee Chair. Meeting announcements are made no later than 21 days before the meeting date.

As an exception to this rule, extraordinary meetings may be called by the Committee Chair to address urgent situations for which a 21-day period is not possible.

Coordinating Committee

The coordinating committee is composed by three (3) members of the Steering Committee. The coordinating committee is responsible for announcing the meetings, selecting the site and date, drafting the agenda for the meetings and coordinating the availability of the members of the Steering Committee.



The coordinating committee is composed of:

- Committee Chair
- Meeting Chairperson
- Secretary

The Committee Chair is the member with the highest rank in the Steering Committee. The Committee Chair is responsible for preparing,

organizing and announcing the meetings of the Steering Committee for Roadway Safety. The Committee Chair is also responsible for drafting the agenda for each meeting and directing the activities of the Steering Committee. The Committee Chair is responsible for representing the Steering Committee in public events and external events. The Committee Chair will be the main link with the municipality and is the municipality's representative with external organizations when the mayor is not available.

The Meeting Chairperson is responsible for directing the meetings of the Steering Committee. The Meeting Chairperson is responsible for managing the meeting agenda and the time allocated to each item. The Meeting Chairperson is responsible for moderating debate and discussions, and ensures that every member of

the Steering Committee has an active participation.

The Secretary is responsible for documenting the meetings of the Steering Committee, recording the minutes of the meetings, tracking motions and maintaining records.

The roles of the Meeting Chairperson and the Secretary are assigned by members of the Steering Committee through a voting process. The eligible members must be willing to accept the role voluntarily.

The roles of the Meeting Chair and the Secretary are assigned for a duration of one (1) year.

The role of the Committee Chair is a permanent assignment of the Director of Planning and Land Use.

Initial Assignment of Coordinating Committee

The coordinating committee was appointed by the members of the Steering Committee. The assignments for the initial coordinating committee are:

- Committee Chair: Mrs. Anilda Fernández Vega, Director of Planning and Land Use
- Meeting Chairperson: Mr. James Ramos Santiago, Director of Economic Development, Culture and Tourism
- Secretary: Mrs. Yausamet Soto, Municipal Institute for Cooperativism and Citizen Participation.

Project Selection

The philosophy for project selection followed the procedures of the Steering Committee with respect to participation, allowed debate, and approval of criteria by the voting committee members.



The criteria selected for project evaluation were:

1. Impact on safety
 - a. Effectiveness in reducing severe collisions.
 - b. Relevance to the problem
 - c. Systemic safety benefit
2. Impact on community and social equity
 - a. Location in underserved communities
 - b. Disproportionate reduction in risk
 - c. Community acceptance
3. Technical and operational complexity
 - a. Right of way needs
 - b. Conflicts with utilities
 - c. Compatibility with existing road design
 - d. Maintenance requirements
 - e. Interagency coordination
 - f. Readiness for implementation
 - g. Complexity of project design
4. Costs and financing eligibility
 - a. Installation costs
 - b. Eligibility for SS4A or other federal assistance
 - c. Safety return on investment
5. Effect on speed and user behavior
 - a. Effectiveness in managing speed
 - b. Ability to change user behavior
 - c. Effect on tsunami and flood evacuation routes
6. Multimodal and accessibility benefits.
 - a. Improves safety of cyclists and pedestrians
 - b. Improves universal accessibility
 - c. Improves access to public transportation.

collisions. Table 1 shows the weights for each project selection criterion.

Table 1 Safety Project Selection Criteria and Weight

| Criteria | Weight |
|--|--------|
| Impact on safety | 40% |
| Impact on communities | 15% |
| Technical and operational complexity | 20% |
| Cost and financing eligibility | 10% |
| Effect on speed and user behavior | 10% |
| Multimodal and accessibility benefits | 5% |

The six criteria for project selection were assigned weights based on the anticipated impact of a criteria in the selection process. The first criteria – impact on safety – was assigned the most weight because the primary goal is to reduce and eliminate roadway fatalities and severe