# 2022 - 2027 Texas Strategic Highway Safety Plan

TEXAS TOGETHER
on the Road to Zero

## STRATEGIES & COUNTERMEASURES


The development of the *Texas Strategic Highway Safety Plan* was led by the Traffic Safety Division of the Texas Department of Transportation working in conjunction with the Center for Transportation Safety at the Texas A&M Transportation Institute. Hundreds of safety stakeholders from across the state representing local, regional, and state agencies, law enforcement, industry and advocates, engineers, clinicians, and educators actively participated in the process.

# Texas Strategic Highway Safety Plan

**What do distracted, impaired, and speeding drivers, older road users, pedestrians, and lane departure and intersection crashes have in common?**

They are the seven areas of greatest concern related to Texans dying or being seriously injured on our roadways.

**Who's responsible for doing something about this?**

We all are! Working together as professionals, citizens, drivers, pedestrians, bicyclists, motorcyclists, and passengers is the best way forward.

**What can we do about it?**

By advocating for or implementing strategies and countermeasures from the Texas Strategic Highway Safety Plan, and by understanding how we personally can lower risk by staying alert and sober, buckling up, being visible, wearing gear, and slowing down.

In 2017, about a dozen Texans lost their lives on average each day in traffic crashes. You probably have been affected personally by a traffic crash. As traffic volumes grow in response to our robust economy and the influx of new Texans each day, we need to find ways to decrease the risk for everyone using our roads.

This introductory guide to the *Texas Strategic Highway Safety Plan* (SHSP) provides information on each of the seven areas of greatest concern. Each area also is accompanied by a list of strategies developed through a collaborative process that bridged disciplines, travel modes, and public- and private-sector agencies and organizations across the state.

When you review the SHSP strategies and countermeasures, you will find ways you, your family, your organization, and your community can be involved. We invite you to join us On the Road to Zero, and we urge you to learn more about specific countermeasures you, your agency, or your community can adopt at www.texasSHSP.com.

# Introduction

## Strategies and Countermeasures

The SHSP has seven **emphasis areas**:

- Roadway and lane departures.
- Distracted driving.
- Intersection safety.
- Pedestrian safety.
- Speeding.
- Impaired driving.
- Older road users.

The *Texas Strategic Highway Safety Plan* has seven **emphasis areas**.

Within each emphasis area are **strategies** and more specific **countermeasures**.

Some countermeasures have an **action plan** and **evaluation criteria**.

Within each emphasis area, safety stakeholders developed **strategies** associated with education and training, engineering, enforcement, and evaluating data. Members of the emphasis area stakeholder and management teams then generated more specific **countermeasures.** Participants initially ranked the countermeasures at the 2017 Texas Traffic Safety
Conference, and the Emphasis Area Teams then refined these initial rankings.

Emphasis Area Team members followed a set of principles while developing the countermeasures:

- To the extent possible, select proven effective countermeasures with a known cost benefit.
- Identify countermeasures with a large impact in terms of reducing the number of fatalities and serious injuries.
- Avoid countermeasures not feasible due to the inability to enact specific laws and policies, resource requirements, lack of expertise or sponsors, and unlikely public acceptance.

## Action Plans

**Action plans** were developed for countermeasures based on the following criteria:

- Ensure that all strategies have at least one countermeasure with an action plan.
- Ensure that any additional Emphasis Area Team priorities are addressed.

For each action plan, Emphasis Area Team members identified the steps for implementation and key participants, and characterized each countermeasure's:

- Effectiveness.
- Cost to implement.
- Time to implement.
- Barriers that might affect implementation.

Team members used the following criteria for these evaluations.

## *Effectiveness*

Assume each countermeasure will be implemented vigorously, publicized extensively, and funded satisfactorily. *Effectiveness* describes whether there are demonstrated reductions in crashes. If crash information is not available, are there changes in behavior or knowledge?

| | |
|---|---|
| *** | Demonstrated to be effective by high-quality evaluations with consistent results. |
| ** | Likely to be effective based on the balance of evidence from high-quality evaluations and/or other sources. |
| * | Limited or no high-quality evaluation evidence. |

### *Cost to Implement*

Cost is difficult to measure, so the summary terms are very approximate. This does not include costs of enacting legislation or establishing policies.

| | |
|---|---|
| $$$ | Requires extensive new facilities, staff, equipment, or publicity, or makes heavy demands on current resources. |
| $$ | Requires some additional staff time, equipment, facilities, and/or publicity. |
| $ | Can be implemented with current staff, perhaps with training; limited costs for equipment, facilities, and publicity. |

### *Time to Implement*

The SHSP is a 5-year plan, so a countermeasure that takes longer than 5 years to implement is considered long term. This does not include time required to enact legislation or establish policies.

| | |
|---|---|
| Long | More than 5 years |
| Medium | More than 1 year but less than 5 years |
| Short | Less than 1 year |

### *Barriers*

Identify any barriers or other issues that may arise and thwart countermeasure implementation. For every barrier identified, determine ways to overcome or address the issue.

| Strategy Number | Description |
|---|---|
| 1 | Use the concept of establishing a target speed limit and road characteristics to reduce speeding. |
| 2 | Educate law enforcement on contributing crash factors to improve crash data collection. |
| 3 | Leverage data to improve engineering, education, and enforcement. |
| 4 | Increase and sustain high-visibility speeding enforcement. (Develop, catalog, and disseminate tools and other resources to improve enforcement capabilities.) |
| 5 | Improve the effectiveness of educational techniques, tools, and strategies for speeding (target specific age groups). |

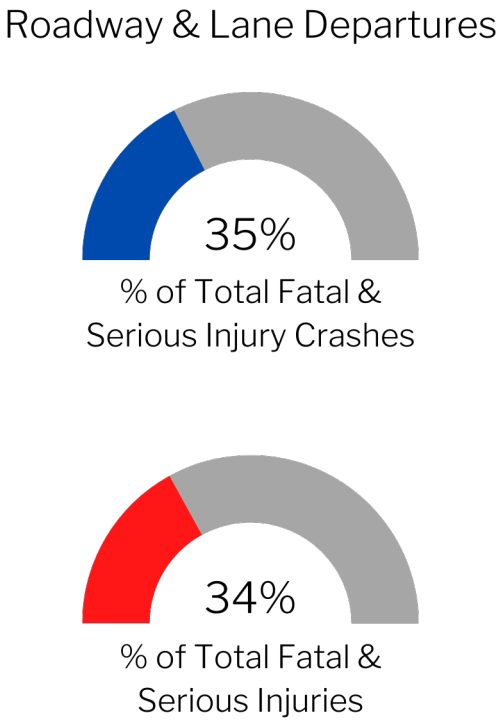
# Section 6.2 Roadway & Lane Departures

## Background

A crash is defined as a roadway/lane departure crash if it involved one of the following two situations:

⇒ A single vehicle crash where the first harmful event occurred in the median, on the shoulder or off the roadway; or

⇒ A crash involving two vehicles both traveling straight in opposite directions, and one was going the wrong way, in the lane, but not trying to pass another vehicle




One of the primary elements of the Safe System Approach is the role of infrastructure safety treatments in decreasing the opportunity for crashes and the severity of injuries. In the case of roadway and lane departure crashes, Safe Systems emphasize the predictability of the road course, forgiveness of the roadway environment and driver behavior. The following strategies address Texas' progress towards a safer system.

Run-off the road crashed are a subset of the roadway/lane departure crashes. The Roadway & Lane Departure EA is made up of run-off the road crashes and head-on, not passing crashes.

## Historical & Trend Crash Data Analysis

The fatal and suspected serious injury crashes related to roadway and lane departures represents 35% of all crashes#. Since 2017, roadway and lane departures fatal crash trend had stayed flat with a small increase in 2021. The suspected serious injury crashes and injuries remained steady, but 2021 saw a large increase that increased the projected trend. It is important to attend to this trend to reach the state goal of zero deaths in 2050. The roadway and lane departures crashes along with the trends are illustrated in Figure 6.2.1. Additionally, this EA's fatal and suspected serious injuries and their trends are summarized in Figure 6.2.2.

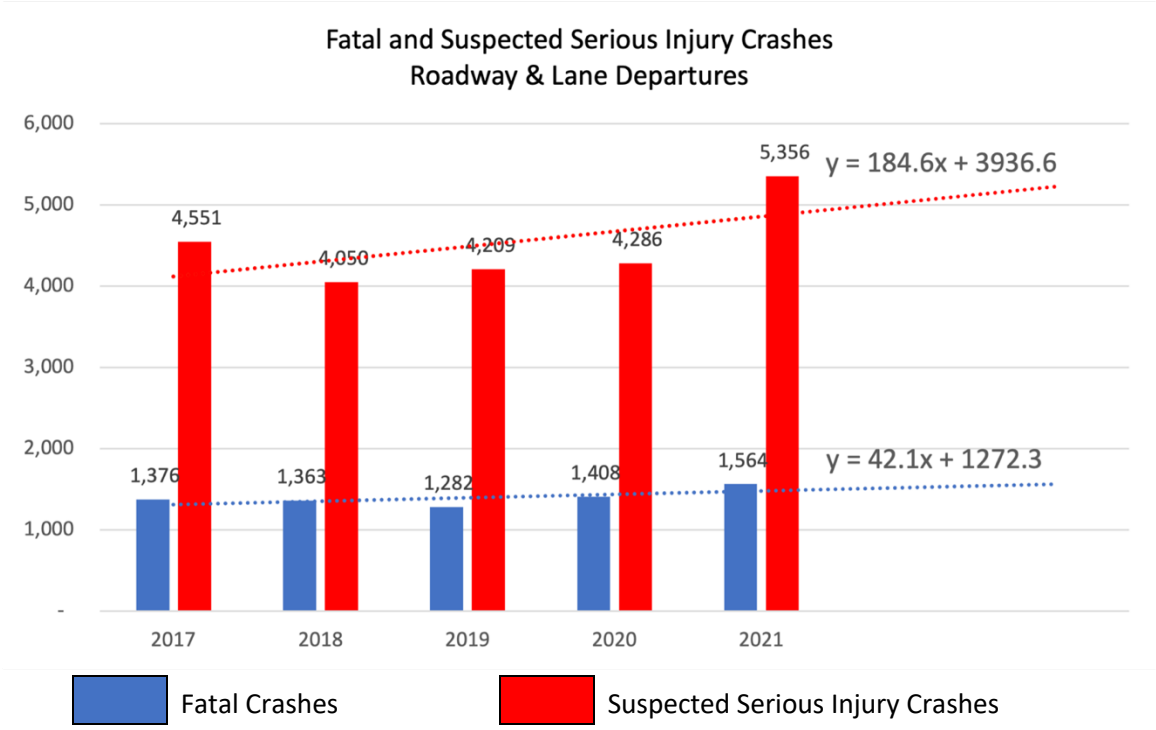



*Figure 6.2.1 Roadway and Lane Departure EA: Fatal and Suspected Serious Injury Crashes (2017-2021)*

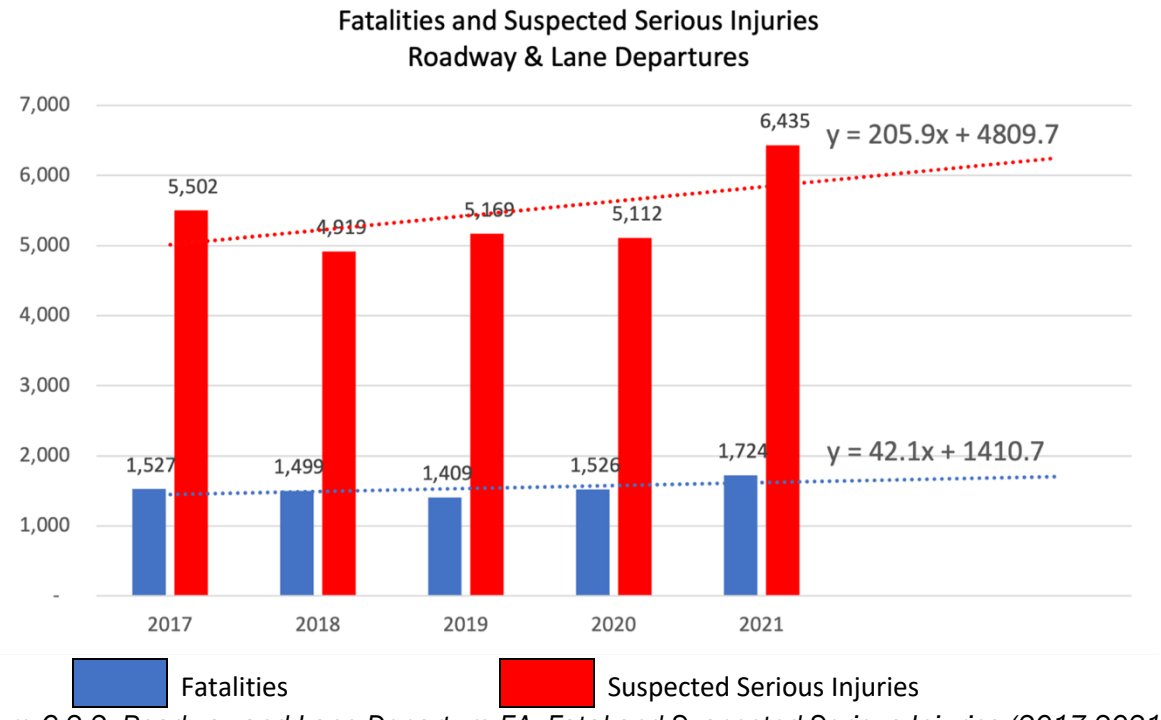
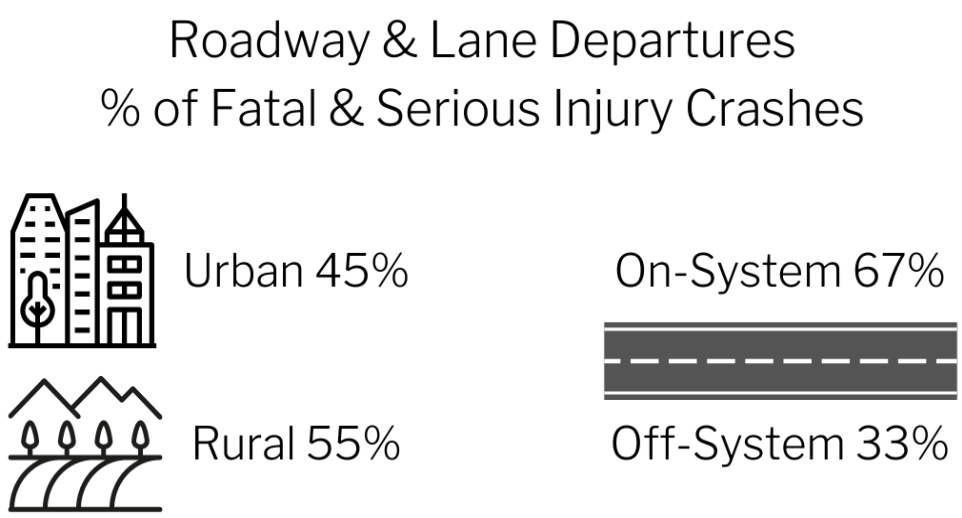



*Figure 6.2.2. Roadway and Lane Departure EA: Fatal and Suspected Serious Injuries (2017-2021)*

Throughout the Strategic Highway Safety Plan (SHSP) process, the Emphasis Area (EA) teams examined the representation of rural and urban as well as on- and off-system in terms of the crash factors associated with the specific EA. Regarding roadway and lane departure factors, 55% of the crashes occurred in areas designated as rural (Figure #) while 67% of these types of crashes happened on roadways considered on-system Figure #.

The EA representatives used this and other data analysis that examined overlapping crash factors, depending on the emphasis area, as they identified strategies and developed implementation plans to address roadway and lane departure related crashes.




From 2017 through 2021, there were 29,445 roadway and lane departure fatal and suspected serious injury crashes. These crashes resulted in 7,685 fatalities and 27,137 additional individuals with suspected serious injuries. Roadway and lane departure is a location type crash factor. Therefore, other factors likely play a role in roadway and lane departure crashes whether it be a behavioral factor or user type. Roadway and lane departure crashes are a significant part of the traffic safety challenges in Texas and represent 40% of the fatal crashes and 40% of the total fatalities. If the state can address the issue of roadway and lane departure crashes, it will have a significant impact on our ability to reach zero deaths. After identifying prevalent crash factors, related to roadway and lane departure crashes, there are several observations that the EA team considered during the identification of strategies and the development of implementation plans. These crash factors include:

- 33% of all fatal and suspected serious injury crashes were run off the road and 32% of all fatalities and suspected serious injuries were run off the road
- 95% of Roadway & Lane Departure crashes were single-vehicle, run-off-the-road
- Run-off-the-road crashes (27,859) – 68% occurred on a roadway section designated as straight and 32% happened on a curved section

- Run-off-the-road crashes that occurred on a curved section of roadway (8,864) – 56% did not have speeding as a factor in the crash
- Run-off-the-road crashes (27,859) – 73% occurred during dark conditions, 25% occurred during daylight, and 2% occurred at dawn or dusk

## Objective for Emphasis Area

Reduce the frequency of fatal and serious injury crashes associated with roadway and lane departures through infrastructure improvements and driver behavior.

## Strategies & Implementation Plans

### Strategy 6.2.1 Keep vehicles from encroaching on the roadside or opposite lane.

| Implementation Action Plan | |
|---|---|
| 6.2.1.1 | Employ available tools along with advanced methods to be more data driven to identify over-representation of run-off-the-road and head-on crashes on segments. Use predictive modeling along with improving data system queries and mapping to identify locations with a high probability of roadway/lane departure crashes cross referenced with road type, geometric characteristics, horizontal curvature, vehicle type and area type. |
| 6.2.1.2 | Revise roadway configuration to provide additional paved recovery area (e.g., convert four-lane roadways to three-lane roadways with design features compatible with surrounding land use context, use of safety edge, etc.). |
| 6.2.1.3 | Provide additional positive guidance (rumble strips, striped lines, raised pavement markings, chevrons including light-emitting diodes [LED], curve delineators, speed feedback signs, edge lines/centerlines, wider edge lines, and other technologies, etc.), and conduct public information campaigns to explain purpose and how to navigate the roadway safely. |
| 6.2.1.4 | Establish target speeds; Use engineering techniques to manage speeds in areas experiencing or susceptible to roadway and lane departures. Establish design speeds that more closely approximate the anticipated operating speed for the roadway. |
| 6.2.1.5 | Provide consistent curve treatments and advisory speeds for similar conditions |
| 6.2.1.6 | Use enforcement and educational approaches to encourage lower speeds in target areas and/or roadway sections. |

| Implementation Action Plan | |
|---|---|
| Facilitator(s) | TxDOT Traffic Safety & Design Divisions |
| Participating Organizations | TxDOT, DPS, Local Law Enforcement Agencies, MPOs, Cities and Counties |
| Effectiveness | *** |
| Cost to Implement | 6.2.1.1 $, 6.2.1.2 $$$, 6.2.1.3 $$$, 6.2.1.4 $$, 6.1.1.5 $$$, 6.2.1.6 $$ |
| Time to Implement | 6.2.1.1 Short, 6.2.1.2 Short, 6.2.1.3 Long, 6.2.1.4 Medium, 6.2.1.5 Medium, 6.2.1.6 Short |
| Barriers | Lack of funding |

### Strategy 6.2.2 Minimize the consequences of vehicles leaving the road.

| Implementation Action Plan | |
|---|---|
| 6.2.2.1 | Implement barriers, median treatments, and forgiving roadside objects (e.g., use median barriers, safety-treat fixed objects, establish safe-clear policies, and improve slopes) with consideration given to land use context. |
| Facilitator(s) | TxDOT (Design Division & Traffic Safety) |
| Participating Organizations | TxDOT (Design Division & Traffic Safety) |
| Effectiveness | *** |
| Cost to Implement | 6.2.2.1 $$ |
| Time to Implement | 6.2.2.1 Medium |
| Barriers | Lack of funding |

### Strategy 6.2.3 Minimize the likelihood of crashing in adverse conditions.

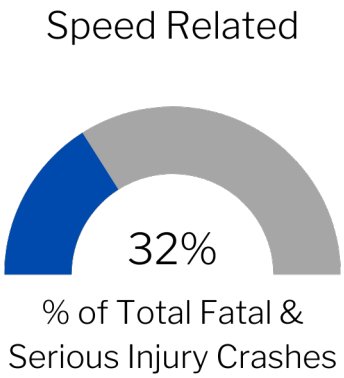
| Implementation Action Plan | |
|---|---|
| 6.2.3.1 | Identify locations that are overrepresented in terms of nighttime crashes. Develop and use screening and systemic crash analysis tools to identify locations, providing additional roadway delineation, and providing roadway lighting. |
| 6.2.3.2 | Identify and address locations subject to wet-weather run-off-the-road crashes. |
| Facilitator(s) | TxDOT (Design Division & Traffic Safety) |
| Participating Organizations | TxDOT, MPOs, Cities and Counties |
| Effectiveness | *** |
| Cost to Implement | 6.2.3.1 $$, 6.2.3.2 $$$ |
| Time to Implement | 6.2.3.1 Short, 6.2.3.2 Short |
| Barriers | Lack of funding |

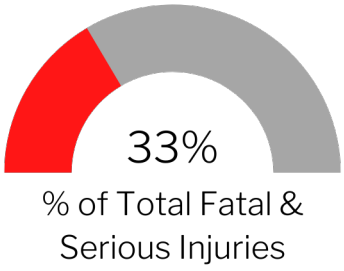
# Section 6.3 Speed Related

## Background

A Safe System Approach underscores the important principle of safe travel speed. Critical speed thresholds depend on the type of crash being assessed as well as other segment characteristics. Driver behavior, including human error and deliberate, unlawful conduct, is an important contributing factor in fatal and serious injury crashes. The strategies in the speed emphasis area employ holistic methods to address engineering, enforcement, and driver behavior to advance a Safe Systems Approach going forward

During the development of the 2022 revision process for the Texas SHSP, the state wanted to ensure that the definitions for each of the emphasis area data were consistent with those in other statewide plans. In the case of speed related crashes, the Texas Highway Safety Plan (HSP) which is required by NHTSA and produced by the TxDOT Behavioral Traffic Safety Section defined speed to include the crash factor *failure to control speed*. Subsequently, the definition for speed related crashes for the 2022 SHSP was amended to include speeding (over the limit), unsafe speed, and failure to control speed (new factor for the 2022 revision).




## Historical & Trend Crash Data Analysis

The Texas SHSP definition for speed-related crashes was amended for the 2022 SHSP revision to include speeding (over the limit), unsafe speed, and failure to control speed (new factor for the 2022 revision). The fatal and suspected serious injury crashes related to speed represents 32% of all crashes#. Since 2017, speed-related crashes have increased, therefore it is important to reverse this trend to reach the state goal of zero deaths in 2050. The speed related crashes are illustrated in Figure 6.3.1 and the fatal and serious injuries are summarized in Figure 6.3.2.

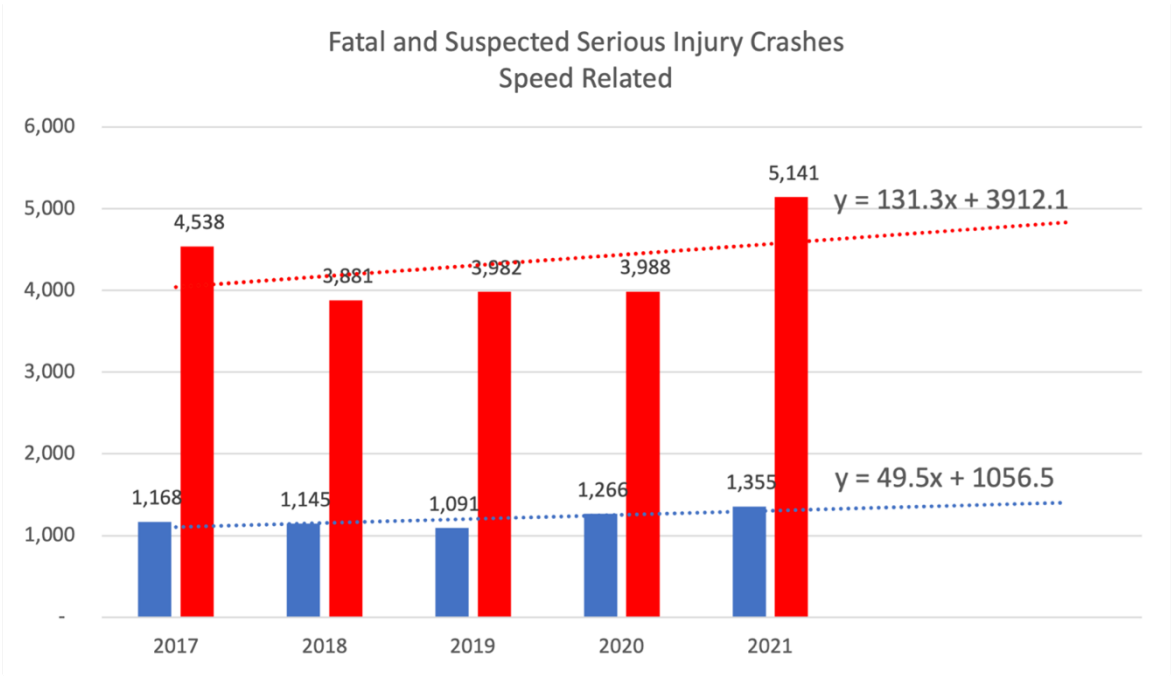



*Figure 6.3.1. Speed Related EA: Fatal and Suspected Serious Injury Crashes (2017-2021)*

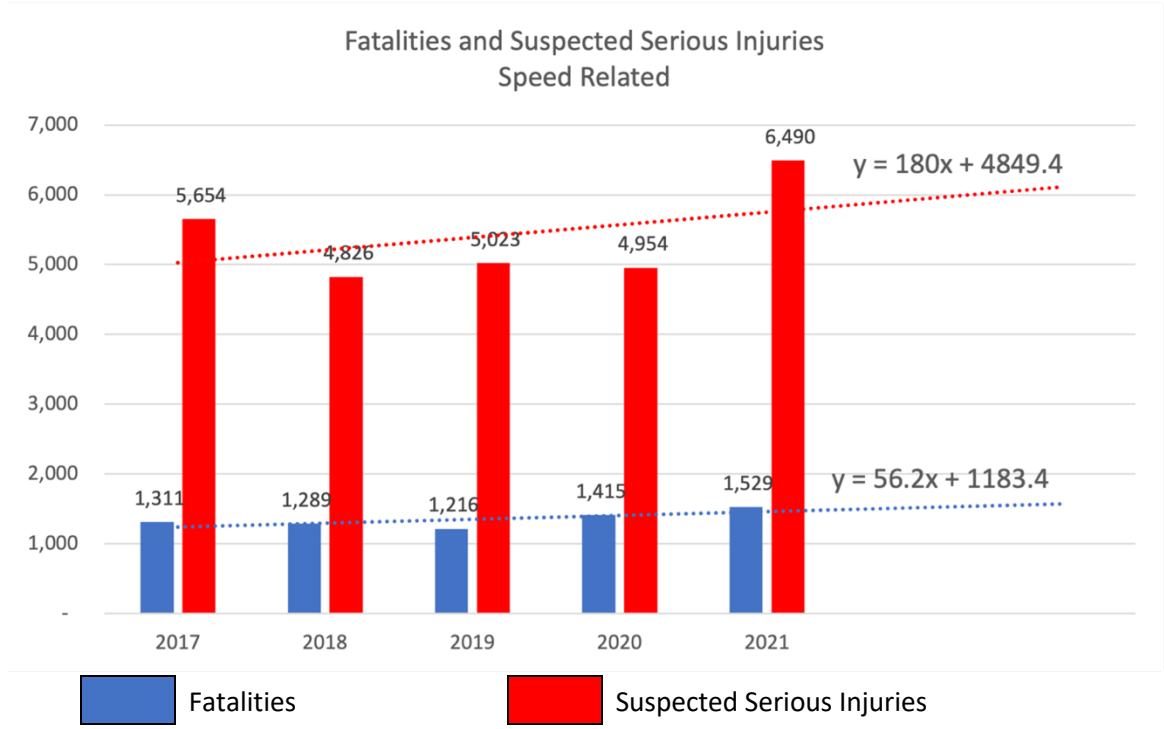



*Figure 6.3.2. Speed Related EA: Fatal and Suspected Serious Injuries (2017-2021)*

Throughout the Strategic Highway Safety Plan (SHSP) process, the Emphasis Area (EA) teams examined the representation of rural and urban as well as on- and off-system in terms of the crash factors associated with the specific EA. Regarding speed related factors, 56% of the crashes occurred in areas designated as urban while 65% of these types of crashes happened on roadways considered on-system.

## Speed Related
## % of Fatal & Serious Injury Crashes

Urban 56%

Rural 44%

On-System 65%

Off-System 35%

⇒ 5.4% (1,498) of speeding crashes were work zone related

⇒ 41% of those crashes occurred in dark conditions

## Ob

Reduce the occurrence of fatal and serious injury crashes by establishing travel speeds that suit the function and level of safety of road segments as well as improve drivers' compliance with speed limits and safe driving based on conditions.

## Strategies & Implementation Plans

**Strategy 6.3.1** **Establish a target speed limits and road characteristics to reduce speeding on state, county & local roadways.**

| Implementation Action Plan | |
|---|---|
| 6.3.1.1 | Implement target speeds for arterial, collector, and local roadways with consideration of design and expected operating speeds; Implement target speeds with pedestrian, land use, and roadway context, including options for target speeds of 35 mph or less on arterials, evaluate existing speeds for appropriate target speeds. |
| 6.3.1.2 | Establish triggers to review segments prior to construction and maintenance projects to address target speed approach. Consider the revision of state procedures for setting limits included in the TxDOT Design Manual. |
| 6.3.1.3 | Establish and/or disseminate procedures for establishing speed zones (regulatory and/or advisory). Coordinate between city, county, and state networks. Identify current best practices and consider adopting new methodologies as appropriate. |
| 6.3.1.4 | Complete a roadway network analysis to identify locations with high frequencies of fatal and severe injury crash frequency. Deploy engineering and/or behavior related countermeasures that are proactive/predictive to address hot spots including work zone. |

| | |
|---|---|
| Facilitator(s) | TxDOT Traffic Safety Division & Design Division |
| Participating Organizations | TxDOT, MPOs, COGs, TTI, Consulting Engineers |
| Effectiveness | *** |
| Cost to Implement | 6.3.1.1 $$, 6.3.1.2 $$, 6.3.1.3 $$, 6.3.1.4 $$ |
| Time to Implement | 6.3.1.1 Medium, 6.3.1.2 Medium, 6.3.1.3 Medium, 6.3.1.4 Medium |
| Barriers | Lack of funding and/or resources |

**Strategy 6.3.2** Improve quality of crash data contributing factors related specifically to speed.

| Implementation Action Plan | |
|---|---|
| 6.3.2.1 | Review options on the CR-3 for detailing the crash characteristics related to speed. Collaborate with law enforcement to revise the CR-3 form to add more options to detail the elements of speed impacting the crash. |
| 6.3.2.2 | Educate law enforcement on the uses of crash data to highlight the need for accurate and comprehensive reporting with special emphasis on speed related characteristics. Include the review definitions for contributing factors & emphasize differences between failure to control speed, speeding over the limit/unsafe for conditions, etc. |
| 6.3.2.3 | Ensure crash analysts understand the difference between speeding-related contributing factors and their association with statutes when analyzing crash data. |
| Facilitator(s) | TxDOT Traffic Safety Division |
| Participating Organizations | Traffic Records Coordinating Committee (TRCC), TxDOT BTS & Crash Records, DPS, Local & County Law Enforcement Agencies |
| Effectiveness | ** |
| Cost to Implement | 6.3.2.1 $, 6.3.2.2 $, 6.3.2.3 $ |
| Time to Implement | 6.3.2.1 Short, 6.3.2.2 Short, 6.3.2.3 Short |
| Barriers | None known at this time |

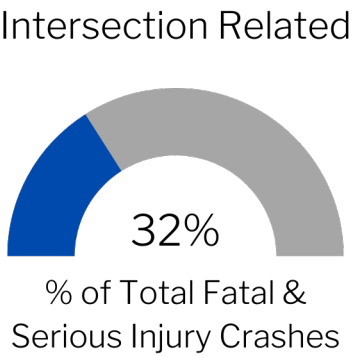
**Strategy 6.3.3** **Leverage data to improve engineering, education, and enforcement.**

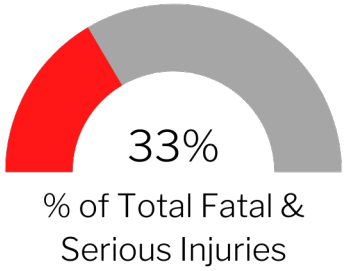
| Implementation Action Plan | |
|---|---|
| 6.3.3.1 | Train law enforcement officers and urge agencies to effectively use CRIS and other data sources during planning and patrols to maximize impact and resources. |
| 6.3.3.2 | Develop case studies to document and communicate how cities implement safe design speeds in various settings. |
| 6.3.3.3 | Establish partnerships between state, county, and local agencies to implement safe streets projects including, but not limited to, Safe Routes to Schools. |
| 6.3.3.4 | Using a data informed approach, deploy awareness and educational campaigns that are proven effective in reducing speeding. |
| Facilitator(s) | TxDOT TRF, BTS, & CRS |
| Participating Organizations | TxDOT, DPS, Sheriffs' Departments, MPOs, Cities & Counties |
| Effectiveness | *** |
| Cost to Implement | 6.3.3.1 $, 6.3.3.2 $, 6.3.3.3 $, 6.3.3.4 $$ |
| Time to Implement | 6.3.3.1 Short, 6.3.3.2 Short, 6.3.3.3 Short, 6.3.3.4 Short |
| Barriers | None known at this time |

# Section 6.4 Intersection Safety

## Background

The Federal Highway Administration's The Safe System Approach states that "Humans are unlikely to survive high-speed crashes. Reducing speeds can accommodate human injury tolerances in three ways: reducing impact forces, providing additional time for drivers to stop, and improving visibility." Intersections are a critical area to address based on this assertion.




Addressing infrastructure to reduce fatal and suspected serious injury crashes is a primary focus of a Safe System. Intersections are particularly problematic since they not only involve vehicles, but also vulnerable road users such as pedestrians and bicyclists. A Safe System approach emphasizes the design of an intersection with consideration of human behavior especially in terms of potential driver errors. The focus of this approach is to reduce risk and, subsequently, death and serious injury related to traffic crashes (vehicle occupants, pedestrians, and bicyclists). The EA team considered behavioral countermeasures as well as engineering solutions addressing conflict points, speed reduction, visibility, and space for vulnerable road users. Some of these approaches are also addressed in the speed related and pedestrian EAs.

Overlapping behavioral factors such as speed, distraction, and impairment exacerbate the intersection issue. Although statutes currently prohibit some of the countermeasures proven effective in other states, Texas is addressing intersection safety with infrastructure and behavioral strategies along with assessing potential options for technology-based interventions on the system and in vehicles.

## Historical & Trend Crash Data Analysis

The fatal and suspected serious injury crashes related to intersections represents 32% of all crashes. Between 2017 and 2020, intersection crashes were decreasing, but there was a sharp increase in both fatal and suspected serious injury crashes in 2021. It is important to reverse this trend to reach the state

goal of zero deaths by 2050. The intersection crashes are illustrated in Figure 6.4.1 and the fatal and suspected serious injuries are summarized in Figure 6.4.2.

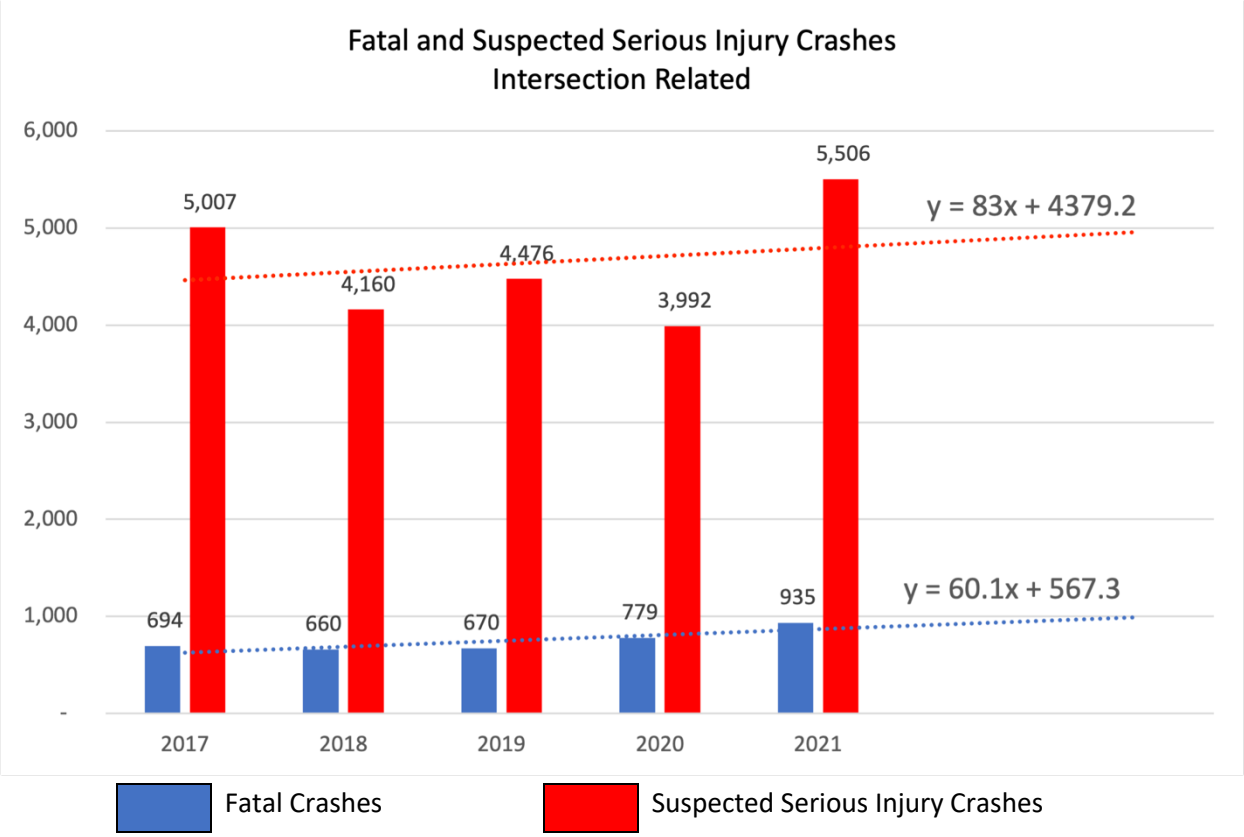



*Figure 6.4.1 Intersection EA: Fatal and Suspected Serious Injury Crashes (2017-2021)*

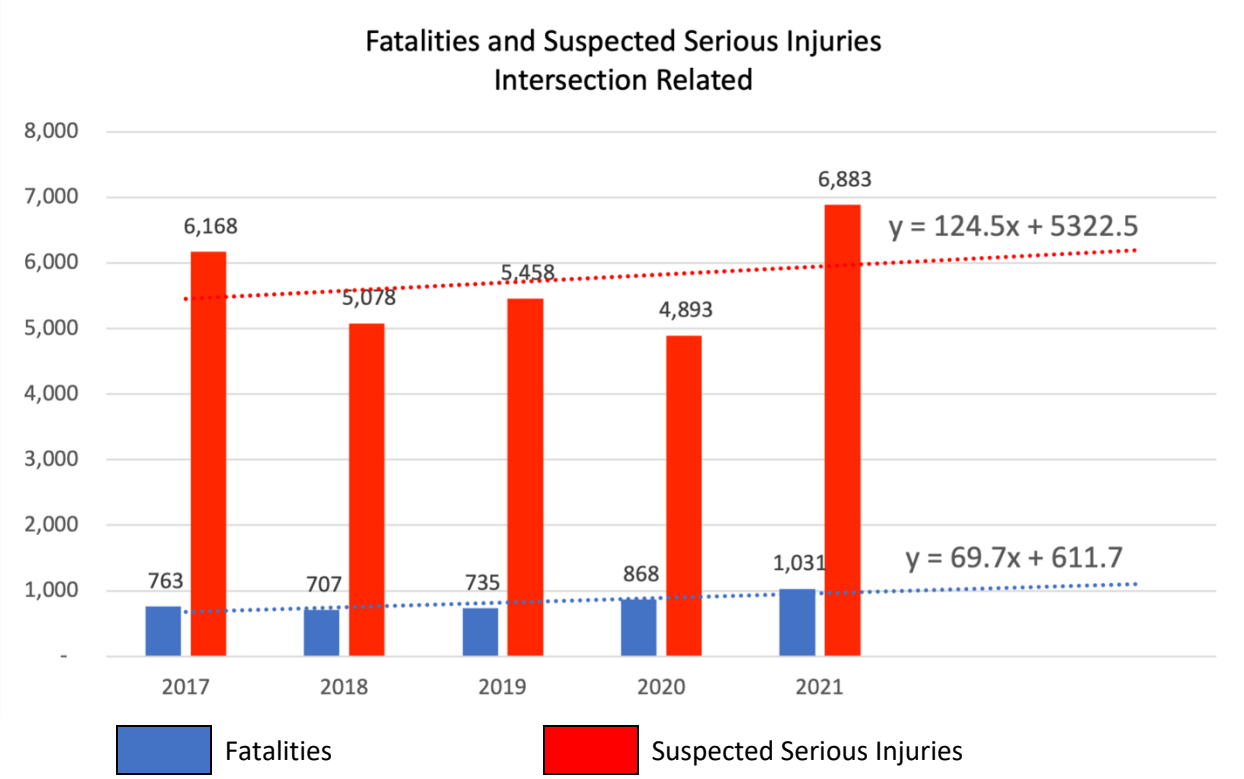
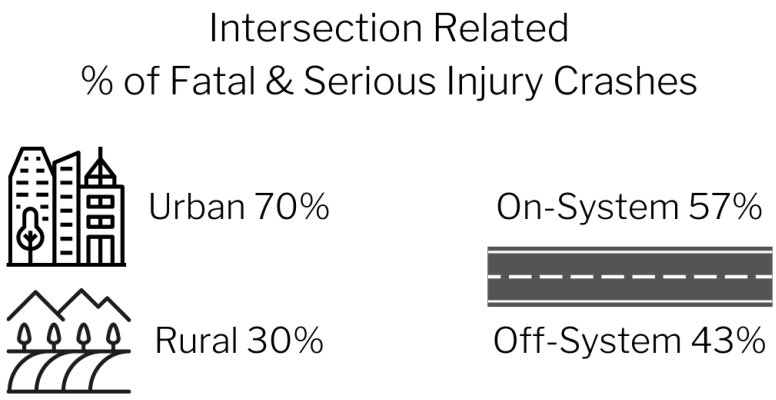



*Figure 6.4.2. Intersection EA: Fatal and Suspected Serious Injuries (2017-2021)*

Throughout the Strategic Highway Safety Plan (SHSP) process, the Emphasis Area (EA) teams examined the representation of rural and urban as well as on- and off-system in terms of the crash factors associated with the specific EA. Regarding intersection related factors, 70% of the crashes occurred in areas designated as urban while 57% of these types of crashes happened on roadways considered on-system.




Since intersection crashes typically involve at least two vehicles that are frequently entering an intersection from different directions and/or vehicles that are changing directions, it was important to look at crash type. When the EA team discussed the crash data, the EA team was able to consider crash type for the strategy identification and implementation plan development. Angle crashes accounted for 35% and left turn crashes accounted for 28%. These crashes can be a prime opportunity for fatal and serious injury since the struck vehicle receives a side impact.

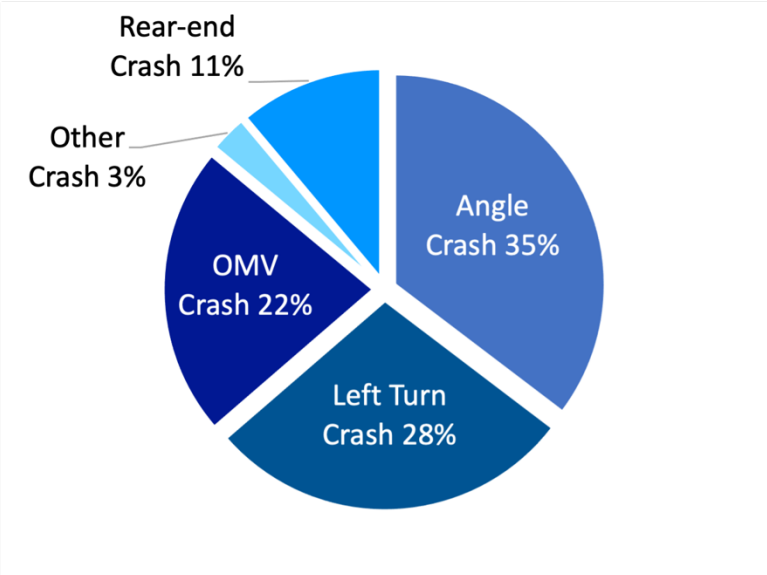



*Figure 6.4.4. Intersection EA: Collision Types*

From 2017 through 2021, there were 26,879 fatal and suspected serious injury crashes that occurred at intersections. These crashes resulted in 4,404 fatalities and 28,480 additional individuals with suspected serious injuries. Intersections are only a location crash factor. Therefore, other factors likely play a role

in intersection. Intersection crashes are a significant part of the traffic safety challenges in Texas and represent 21% of the fatal crashes and 21% of the total fatalities. If the state can address the risk of crashes that occur at intersections, it will have a significant impact on our ability to reach zero deaths. After identifying prevalent crash factors, within intersection crashes, there are several observations that the EA team considered during the identification of strategies and the development of implementation plans. These crash factors include:

- ⇒ 36% (9,561) occurred in dark lighting conditions
  - Of those occurring dark conditions, 11% (1,104) involved a pedestrian
  - Of those occurring dark conditions, 24% (2,280) involved an impaired driver
- ⇒ 16% (4,418) also involved distraction
- ⇒ 23% (6,131) intersection crashes were speed related (over-the-limit, unsafe speed or failure to control speed)
  - 35% (2,133) of speed related crashes at intersections were **rear-end** collisions
  - 18% (1,099) of speed related crashes at intersections were **left-turn** collisions
  - 16% (986) of speed related crashes at intersections were angle collisions

## Objective for Emphasis Area

Reduce the frequency of fatal and serious injury crashes associated with intersections through infrastructure improvements and driver behavior modification.

## Strategies & Implementation Plans

**Strategy 6.4.1** **Expand intersection safety practices through planning, design, and implementation.**

| Implementation Action Plan | |
|---|---|
| 6.4.1.1 | Evaluate intersection controls. Use ICE and other appropriate evaluation processes in project development by TxDOT and local agencies. Coordinate with MPOs, required for projects within districts & statewide. Identify threshold for requirements. |
| 6.4.1.2 | Expand (state and local systems) implementation of low-cost safety improvements at urban and rural intersections. |
| 6.4.1.3 | Identify and develop case studies to illustrate best practices and innovative approaches including alternative intersection designs. |

| Implementation Action Plan | |
|---|---|
| 6.4.1.4 | Provide training to state and local stakeholders including, but not limited to, external webinar on Safety Scoring Tool for Urban Intersections, how to use data dashboards for DES Safety Tools, and road safety planning. |
| Facilitator(s) | TxDOT, MPOs |
| Participating Organizations | TxDOT, MPOs, Cities, Counties |
| Effectiveness | *** |
| Cost to Implement | 6.4.1.1 $, 6.4.1.2 $$$, 6.4.1.3 $$, 6.4.1.4 $ |
| Time to Implement | 6.4.1.1 Short, 6.4.1.2 Short, 6.4.1.3 Short, 6.4.1.4 Short |
| Barriers | Lack of funding |

## Strategy 6.4.2 Reduce intersection violations.

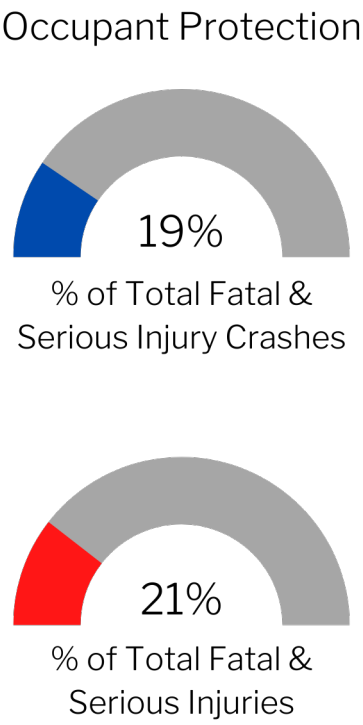
| Implementation Action Plan | |
|---|---|
| 6.4.2.1 | Train law enforcement agencies on effective techniques to use targeted enforcement at high-volume incident locations. Install signal indicator lights to inform law enforcement of red signal onset. |
| 6.4.2.2 | Deploy abbreviated FHWA traffic engineering for law enforcement training. Identify best practices for partnerships between traffic engineering and law enforcement to encourage integrated approach to intersection safety. |
| 6.4.2.3 | Develop safety campaigns to educate public on intersection safety including focus on vulnerable road users, older & younger drivers. Employ evidenced based countermeasures focused on those "causing" the risk. |
| 6.4.2.4 | Develop case studies to illustrate methods on how to utilize technology to focus on targeted intersections to inform/educate state and local agencies. |
| 6.4.2.5 | Improve and expand access to CRIS data through dashboards related to intersection safety. |
| 6.4.2.6 | Address signal timing and assess technology - Interconnect traffic signals, optimize traffic signal timings, and/or implement technology to improve traffic flow, encourage safe travel speed and reduce crashes. Identify how we can we better use mature and exploratory data sets to inform the targeting of problematic intersections. |

| | |
|---|---|
| Facilitator(s) | TxDOT (Design Division & Traffic Safety) |
| Participating Organizations | TxDOT (Design Division & Traffic Safety) |
| Effectiveness | *** |
| Cost to Implement | 6.4.2.1 $, 6.4.2.2 $, 6.4.2.3 $, 6.4.2.4 $, 6.4.2.5 $, 6.4.2.6 $$ |
| Time to Implement | 6.4.2.1 Short, 6.4.2.2 Short, 6.4.2.3, Short, 6.4.2.4, Short, 6.4.2.5 Short, 6.4.2.6 Medium |
| Barriers | Lack of funding, Integration of Resources, Conflicting Priorities |

# Section 6.5 Occupant Protection

## Background

Abundant research has shown correctly using appropriate child restraints or seat belts is the single most effective way to save lives and reduce injuries in crashes. The challenge is to convince all passenger vehicle occupants to buckle up. Despite high observed belt use rates, many unrestrained people die in crashes each year. The most effective strategy for achieving and maintaining restraint use at acceptable levels is well-publicized, High Visibility Enforcement (HVE) of strong occupant restraint use laws. The effectiveness of HVE has been documented repeatedly in the United States and abroad. The strategy's three components – laws, enforcement, and publicity – cannot be separated: effectiveness decreases if any one of the components is weak or missing. (Venkatraman, V., Richard, C. M., Magee, K., & Johnson, K. (2021, July). Countermeasures that work: A highway safety countermeasures guide for State Highway Safety Offices, 10th edition, 2020 (Report No. DOT HS 813 097). National Highway Traffic Safety Administration, pp. 2-2-4).




## Historical & Trend Crash Data Analysis

Despite numerous HVE campaigns and a relatively high seatbelt use rate, the number of people who died in 2020 while not wearing a seat belt increased by 16% over 2019, with 1,073 unrestrained drivers and passengers killed on Texas roadways. (Click It or Ticket (txdot.gov))

In 2021, 27% of the fatally injured drivers and passengers were traveling unrestrained. Of those who suffered a serious injury, 14% were not wearing a seatbelt. Fifty-six percent of unrestrained drivers and passengers were killed or seriously injured in rural areas and about two-thirds crashed on the state road system. Often, traveling unrestrained is coupled with other dangerous driving behaviors. For example, 10% were driving impaired by alcohol or

other drugs and 18% were speeding. Overlapping contribution crash factors included 21% of road users killed or seriously injured in intersections and 62% were involved in run off road crashes.  Being unrestrained and leaving the roadway is a dangerous combination.

The fatal and suspected serious injury crashes related to lack of restraint use represents 19% of all crashes#. Since 2017, lack of restraint use crash trends increased, therefore it is important to reverse this trend to reach the state goal of zero deaths in 2050. The crashes where at least one occupant was found to be unrestrained are illustrated in Figure 6.5.1 and the fatal and serious injuries resulting from those crashes are summarized in Figure 6.5.2.

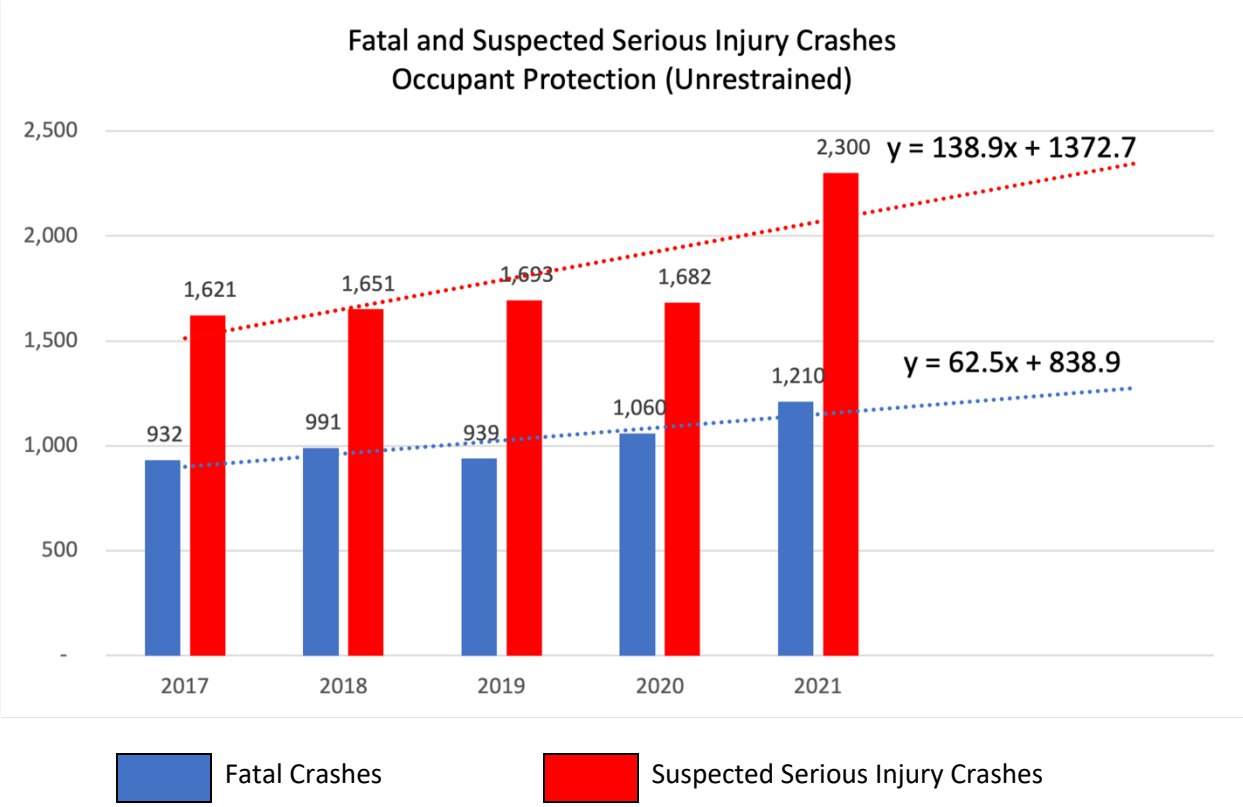



*Figure 6.5.1. Occupant Protection (Unrestrained) EA: Fatal and Suspected Serious Injury Crashes (2017-2021)*

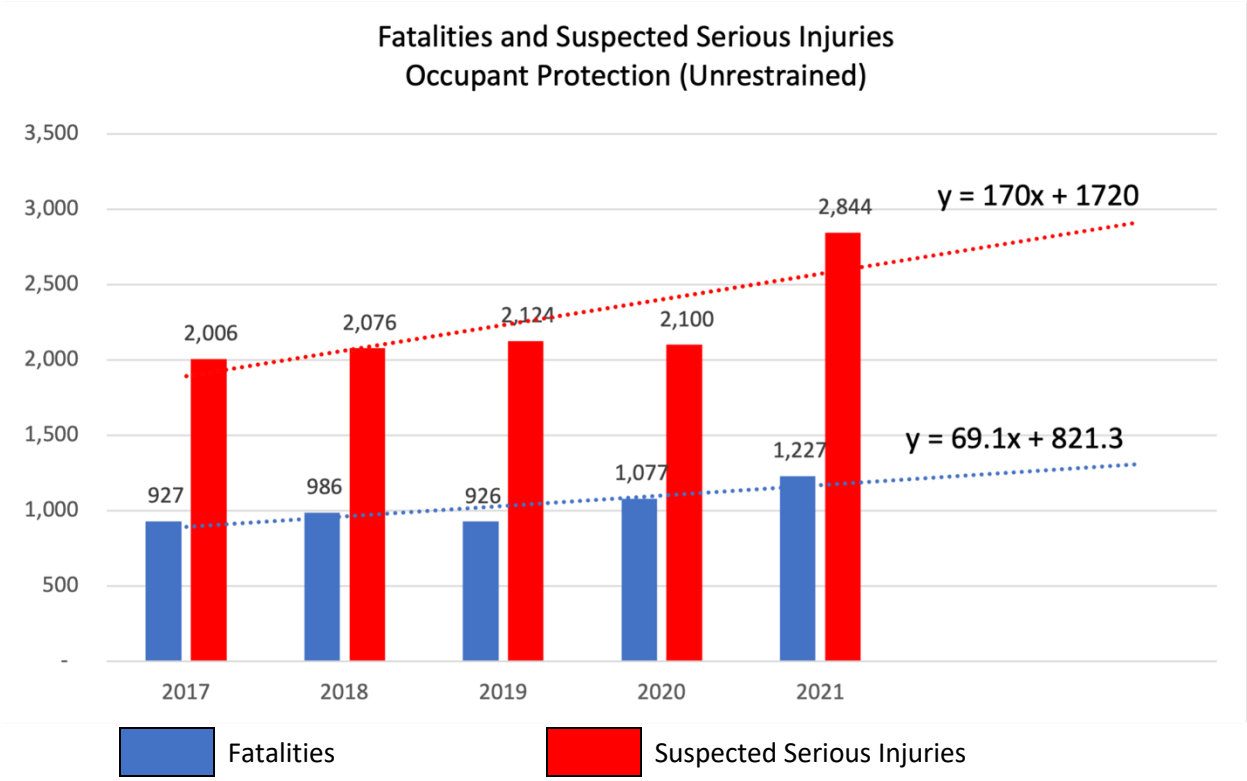
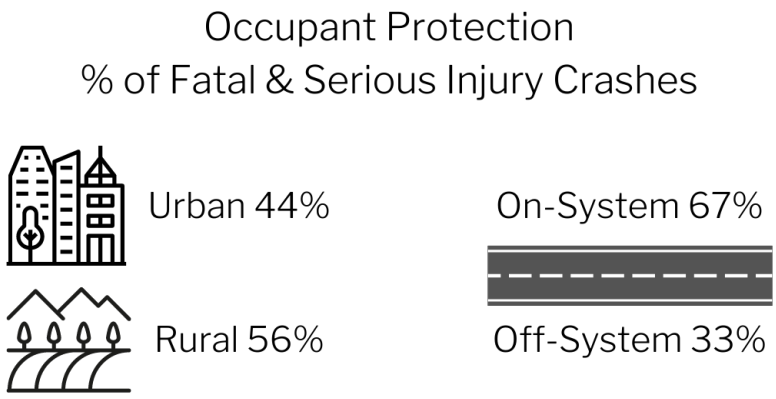



*Figure 6.5.2. Occupant Protection (Unrestrained): Fatal and Suspected Serious Injuries (2017-2021)*

The EA representatives used this and other data analysis that examined overlapping crash factors, depending on the emphasis area, as they identified strategies and developed implementation plans to address occupant protection related crashes.




From 2017 through 2021, there were 14,079 crashes where at least one occupant was not restrained. These crashes resulted in 5,143 fatalities and 11,150 additional individuals with suspected serious

injuries. Although unrestrained may be only one of multiple factors in a fatal crash, it is present in approximately 30% of the fatal crashes and 27% of the total fatalities. If the state can increase the use of occupant protection, it will positively impact on our ability to reach zero deaths by 2050. When lack of restraint use is combined with other overlapping factors, there are several observations that contributed to the identification of strategies and development of implementation plans within the EA team:

- ⇒ 62% (14,078) were one motor vehicle crashes
- ⇒ 57% of crashes (14,078) with at least one unrestrained occupant were single-vehicle, run-off-the-road
- ⇒ 75% of crashes (14,078) with at least one unrestrained occupant were non-intersection related and only 21% were intersection related
- ⇒ 23% of crashes with at least one unrestrained occupant were single-vehicle, run-off-the-road and classified as impaired driving crashes
- ⇒ 18% of crashes with at least one unrestrained occupant were single-vehicle, run-off-the-road and had speed as a factor
- ⇒ 35% of crashes with at least one unrestrained occupant were intersection related and classified as impaired driving crashes
- ⇒ 21% of crashes with at least one unrestrained occupant were intersection related and had speed as a factor

## Objective for Emphasis Area

Utilize a data driven approach to identify and target audiences for enforcement and education efforts designed to increase correctly installed and applied safety belts and child car seats.

## Strategies & Implementation Plans

**Strategy 6.5.1** **Increase occupant restraint use through short term, high-visibility enforcement.**

| Implementation Action Plan | |
|---|---|
| 6.5.1.1 | Deploy high visibility enforcement activities at state and local levels in conjunction with National Click It or Ticket (CIOT) campaigns. |
| 6.5.1.2 | Deploy targeted media activities at state and local levels in conjunction with National Click It or Ticket (CIOT) campaigns. |

| Implementation Action Plan | |
|---|---|
| Facilitator(s) | TxDOT BTS, DPS, local law enforcement agencies |
| Participating Organizations | TxDOT BTS, DPS, local law enforcement agencies, |
| Effectiveness | *** |
| Cost to Implement | 6.5.1.1 $$, 6.5.1.2 $$ |
| Time to Implement | 6.5.1.1 Short, 6.5.1.2 Short, |
| Barriers | Some law enforcement agencies lack resources and/or the desire to engage in campaigns |

## Strategy 6.5.2 Improve education and outreach efforts.

| Implementation Action Plan | |
|---|---|
| 6.5.2.1 | Increase intervention efforts by healthcare professionals, teachers, and safety advocates. |
| 6.5.2.2 | Increase training /retention of child passenger safety (CPS) technicians and instructors. |
| 6.5.2.3 | Develop a consolidated resource tool (website) for advocates to send people for fitting stations, car seats, etc. to assist law enforcement, technicians, health care providers, et al. |
| 6.5.2.4 | Educate younger drivers (under 25) to use occupant protection for themselves and other people in the vehicle through formal driver education and targeted outreach through programs such as Teens in the Driver Seat. |

| | |
|---|---|
| Facilitator(s) | TxDOT BTS, Hospitals, AAA |
| Participating Organizations | TxDOT BTS, Hospitals, AAA, TTI, Agri-Life, First Responders PreK-12 Schools, Driving Schools |
| Effectiveness | *** |
| Cost to Implement | 6.5.2.1 $, 6.5.2.2 $, 6.5.2.3 $, 6.5.2.4 $ |
| Time to Implement | 6.5.2.1 Short, 6.5.2.2 Short, 6.5.2.3 Short, 6.5.2.4 Short (Most Ongoing) |
| Barriers | Lack of funding |

**Strategy 6.5.3** **Prioritize efforts geographically and demographically based on lower use rates.**

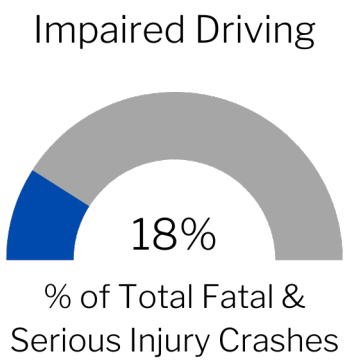
| Implementation Action Plan | |
|---|---|
| 6.5.3.1 | Focus on enforcement, education, and encouragement activities in the geographic areas with lower use rates. |
| 6.5.3.2 | Focus education and outreach activities on demographic groups based on lower use rates and equity. |
| 6.5.3.3 | Identify and evaluate innovative means of reaching target areas and populations. |
| 6.5.3.4 | Maintain CPS (child passenger safety distribution) seat distribution programs for low-income families. |
| Facilitator(s) | TxDOT, TTI, AAA |
| Participating Organizations | TxDOT, TTI, AAA, AgriLife, DPS, First Responders |
| Effectiveness | * |
| Cost to Implement | 6.5.3.1 $, 6.5.3.2 $, 6.5.3.3 $, 6.5.3.4 $$ |
| Time to Implement | 6.5.3.1 Short, 6.5.3.2 Short, 6.5.3.3 Short, 6.5.3.4 Ongoing |
| Barriers | None currently |

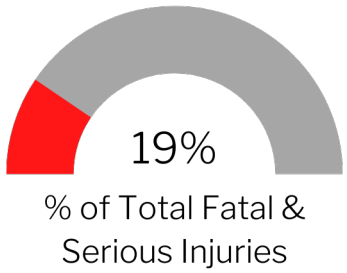
# Section 6.6 Impaired Driving

## Background

The mission of a Safe System is to design and maintain a transportation system that both proactive and redundant. Although much of the Safe Systems language seems to focus on infrastructure, critical parts of redundancy and being proactive are the continued inclusion of behavioral traffic safety to advance the journey towards zero deaths in Texas.

One element of the Safe System is safe road users. Proactively addressing unsafe driving behaviors such as impaired driving through multi-prong behavioral safety countermeasures. As we wait on additional technology to address the element associated with safe vehicles, the state will continue to employ educational and enforcement countermeasures.




Overlapping behavioral factors such as speed, intersections, roadway, and lane departure as well as lack of restraint compound the issue of impaired driving. Although statutes currently prohibit some of the countermeasures proven effective in other states, Texas is addressing impaired driving with infrastructure and behavioral strategies along with assessing potential options for technology-based interventions on the system and in vehicles.

## Historical & Trend Crash Data Analysis

The fatal and suspected serious injury crashes attributed to impaired driving represent 18% of all crashes. Since 2017, crashes attributed to impaired driving have decreased in the frequency of fatal crashes and deaths. The suspected serious injury crashes and injury frequency stayed relatively flat until 2021 crash trend has increased; therefore, it is important

to reverse this trend to reach the state goal of zero deaths in 2050. The fatal and suspected serious injury crashes attributed to impaired driving are illustrated in Figure 6.6.1 and the fatal and suspected serious injuries are summarized in Figure 6.6.2.

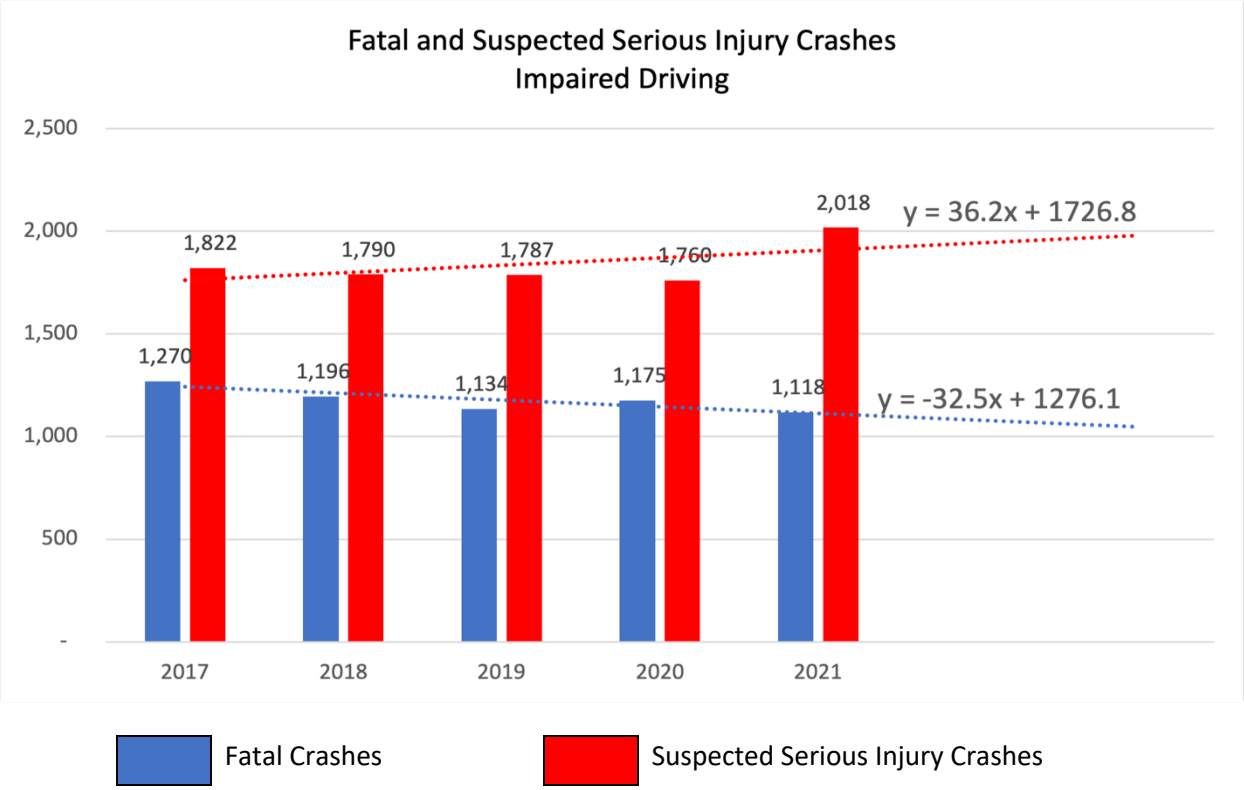



*Figure 6.6.1. Impaired Driving EA: Fatal and Suspected Serious Injury Crashes (2017-2021)*

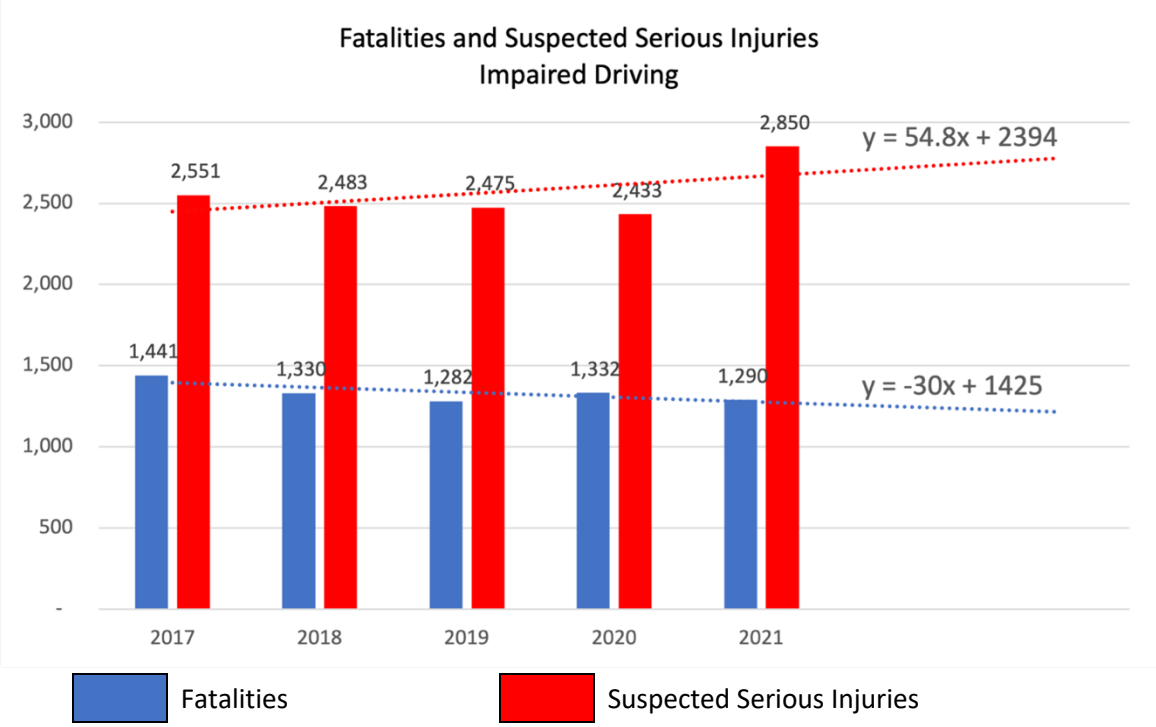
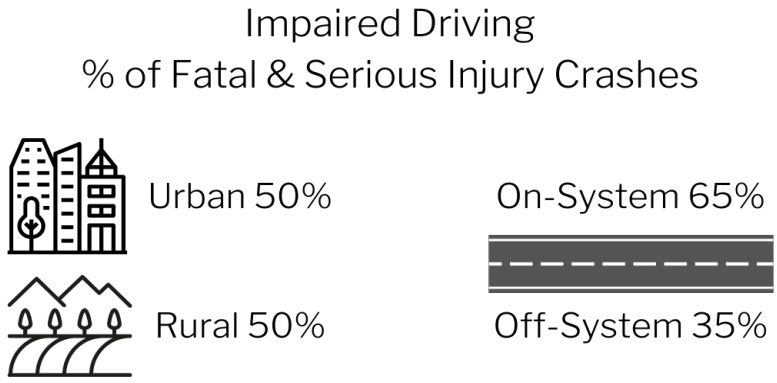



*Figure 6.6.2. Impaired Driving EA: Fatal and Suspected Serious Injuries (2017-2021)*

The EA representatives used this and other data analysis that examined overlapping crash factors, depending on the emphasis area, as they identified strategies and developed implementation plans to address occupant protection related crashes.




Impaired driving crashes do not occur exclusively at night, but as Figure 6.6.4 illustrates below, the greatest concentration of these types of crashes occur between 10pm and 2am.

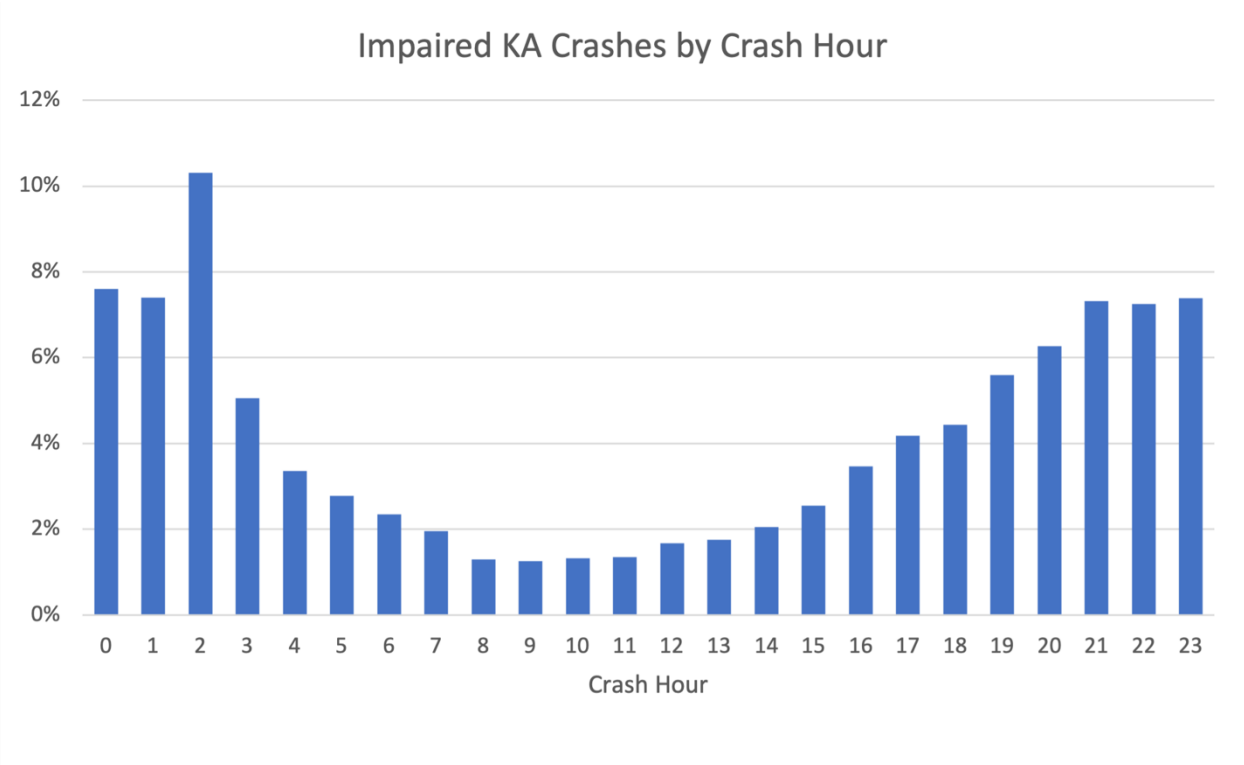



*Figure 6.6.4. Impaired Driving EA: Crashes According to Hour*

From 2017 through 2021, there were 15,085 fatal and suspected serious injury crashes attributed to impaired driving. These crashes resulted in 6,675 fatalities and 12,792 suspected serious injuries. Impaired driving is only a behavioral crash factor. Therefore, other factors likely play a role in impaired driving crashes whether it be a location factor or user type. Impaired driving crashes are a significant part of the traffic safety challenges in Texas and represent 34% of the fatal crashes and 35% of the total fatalities. If the state can address the occurrence of impaired driving crashes, it will have a significant impact on our ability to reach zero deaths. After identifying prevalent crash factors with impaired driving crashes, there were several observations that the EA team considered during the strategy identification and development of implementation plans. These crash factors include:

Impaired driving crashes (15,085) by manner of collision:

- ⇒ 60% Single Vehicle Crash
- ⇒ 14% Same Direction Crash
- ⇒ 16% Opposite Direction Crash

⇒ 10% Angle Crash

Impaired driving crashes (15,085) by overlapping factors:

⇒ 56% of the impaired crashes were also roadway/lane departure crashes

⇒ 28% of the impaired crashes were also speeding related

⇒ 88% of the impaired driving crashes resulted in the impaired driver(s) sustaining a KA

⇒ 4% of the impaired driving crashes resulted in multiple fatalities (1,403 killed)

## Objective for Emphasis Area

Reduce the occurrence of fatal and serious injury crashes attributed to impaired driving (alcohol and/or other drugs).

## Strategies & Implementation Plans

**Strategy 6.6.1** **Increase education for all road users on the impact of impaired driving and its prevention.**

| Implementation Action Plan | |
|---|---|
| 6.6.1.1 | Deploy robust, longitudinal survey activities to measure attitudes related to impaired driving and the impact of educational and/or media *campaigns* on target audiences. Publish results to stakeholders and program partners. |
| 6.6.1.2 | Educate road users on how alcohol and/or other drugs negatively impact driving behavior. |
| 6.6.1.3 | Implement effective countermeasures (education and enforcement) specifically addressing DUI (drivers under 21 with any detectable amount of alcohol) with an emphasis on zero tolerance. |
| 6.6.1.4 | Demonstrate to all types of road users the consequences associated with violations including the magnitude of the impact of impaired-driving crashes on fatality rates by making comparisons with other causes of death (e.g., murder rate). Emphasis on target audience based on data/community. |
| Facilitator(s) | TxDOT Behavioral Traffic Safety (BTS) |
| Participating Organizations | TxDOT BTS, DPS, Sheriffs' Departments, Local law enforcement agencies, Advocacy organizations |
| Effectiveness | *** |
| Cost to Implement | 6.6.1.1 $$, 6.6.1.2 $, 6.6.1.3 $, 6.6.1.4 $ |
| Time to Implement | 6.6.1.1 Medium, 6.6.1.2 Short, 6.6.1.2 6.6.1.3 Short, 6.6.1.4 Short (Currently Ongoing) |
| Barriers | Lack of sufficient funding |

**Strategy 6.6.2** **Increase officer contacts with impaired drivers through regular traffic enforcement.**

| Implementation Action Plan | |
|---|---|
| 6.6.2.1 | Educate the police, community leaders, the public, and traffic safety partners on the role of regular traffic enforcement stops as a primary tool in detecting impaired drivers and encourage their use to reduce impaired crashes. Focus on agency administration and local government entities to establish local priorities. |
| 6.6.2.2 | Use a data-driven approach to optimize areas and timesfor enforcement. Increase the deployment of Data Driven Approaches to Crime and Traffic Safety (DDACTS) training and local implementation. |
| 6.6.2.3 | Educate communities with data through earned media and other means to communicate the impact of impaired driving in the local areas. |
| 6.6.2.4 | Identify training opportunities for law enforcement at the state and local levels in locations with high probability for alcohol and/or other drug use frequently leads to impaired driving (including events, communities, entertainment districts, etc.) |
| Facilitator(s) | TxDOT Behavioral Traffic Safety (BTS) |
| Participating Organizations | TxDOT BTS, DPS, Sheriffs' Departments, Local law enforcement agencies, Advocacy organizations |
| Effectiveness | *** |
| Cost to Implement | 6.6.2.1 $, 6.6.2.2 $, 6.6.2.3 $, 6.6.2.4 $ |
| Time to Implement | 6.6.2.1 Short, 6.6.2.2 Short, 6.6.2.2 6.6.2.3 Short, 6.6.2.4 Short (Currently Ongoing) |
| Barriers | Lack of sufficient funding |

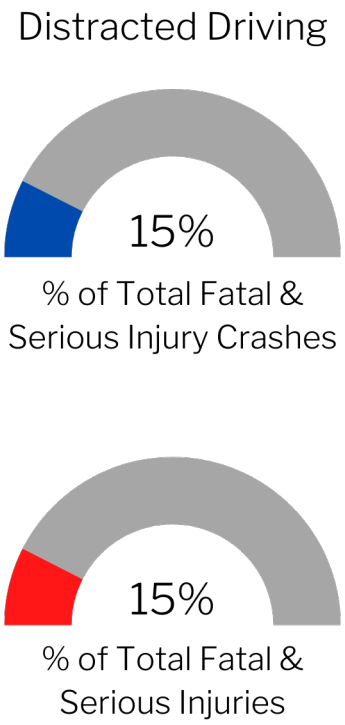
**Strategy 6.6.3** **Increase data, training, and resources for law enforcement officers, prosecutors, toxicologists, judges, and community supervision personnel in the area of alcohol and/or other drugged-driving.**

| Implementation Action Plan | |
|---|---|
| 6.6.3.1 | Train law enforcement in effective DWI detection including Standardized Field Sobriety Testing (SFST), Advanced Roadside Impaired Driving Enforcement (ARIDE) training, and Drug Evaluation and Classification (DEC) Program. Include preparation for testimony. |
| 6.6.3.2 | Train prosecutors in the DWI trial process & presentation of evidence. Implement joint training for law enforcement, prosecutors, and laboratory personnel (forensic toxicologists) to assist in presenting scientific evidence of alcohol and/or drug impairment in court. |
| 6.6.3.3 | Educate Judges on the DWI process with joint training for judges and appropriate court personnel on the impairing effects of alcohol and/or other drugs on driving, DUI processes (under 21), DWI detection process, and monitoring options (ignition interlock devices, testing, etc.). |
| 6.6.3.4 | Train Community Supervision Personnel on the impairing effects of alcohol and/or other drugs on driving and the use of ignition interlock devices/testing (condition of probation). |
| 6.6.3.5 | Provide additional resources for laboratories to address testing capacity for evidence associated with DWIs and availability to provide expert testimony. |
| 6.6.3.6 | Identify methodologies and resources for improving the identification of drugged driving as a contributing factor in impaired-driving crashes. |
| Facilitator(s) | TxDOT Behavioral Traffic Safety (BTS) |
| Participating Organizations | TxDOT BTS, DPS, Sheriffs' Departments, Local law enforcement agencies, Advocacy organizations |
| Effectiveness | *** |
| Cost to Implement | 6.6.3.1 $, 6.6.3.2 $, 6.6.3.3 $, 6.6.3.4 $, 6.6.3.5 $$$, 6.6.3.6 $ |
| Time to Implement | 6.6.3.1 Short, 6.6.3.2 Short, 6.6.3.3 Short, 6.6.3.4 Short, 6.6.3.5 Medium, 6.6.3.6 Short (Currently Ongoing) |
| Barriers | Lack of sufficient funding |

# Section 6.7 Distracted Driving

## Background

NHTSA defines distracted driving as "anything that diverts the driver's attention from the primary tasks of navigating the vehicle and responding to critical events. To put it another way, a distraction is anything that takes your eyes off the road (visual distraction), your mind off the task of driving (cognitive distraction), or your hands off the wheel (manual distraction)". Distracted driving is difficult to measure because it is difficult to observe the behavior, but research shows it is a common practice. Therefore, it can be presumed the data are underreported. (Venkatraman, V., Richard, C. M., Magee, K., & Johnson, K. (2021, July). Countermeasures that work: A highway safety countermeasures guide for State Highway Safety Offices, 10th edition, 2020 (Report No. DOT HS 813 097). National Highway Traffic Safety Administration p. 4-1.)




Even though the data may be underreported, 2021 data show 10.6% of fatalities and 18.6 percent of serious injuries were attributed to distracted driving. These crashes occur more frequently in urban areas (63.2%) than in rural (34.3%) areas, and they are more likely to occur on the state road system (63.2%) rather than off the system (36.8%).

## Historical & Trend Crash Data Analysis

Distracted driving often overlaps with other countermeasure areas where both behaviors and circumstances are evident. For example, in 27% of run off the road crashes and 10.8% of impaired driving crashes distraction was also a factor. In addition, nearly 18% of crashes involving a young driver are attributable to distraction.

The definition for distracted driving is straight forward since there is a specific crash factor on the CR-3 form where an officer can indicate whether they believe distraction may have been a factor in the reported crash. The type of distraction is not codified but may be included in the narrative section of the report. The fatal and suspected serious injury crashes related to a distracted driver(s) represents 15% of all crashes#. Since 2017, the distracted driving crash trend is flat specifically related to fatal crashes, but 2021 saw a sharp uptick in distraction as a reported crash factor. It is important to reverse this to reach the state goal of zero deaths in 2050. The distracted driving crashes are illustrated in Figure 6.8.1 and the fatal and serious injuries are summarized in Figure 6.8.2.

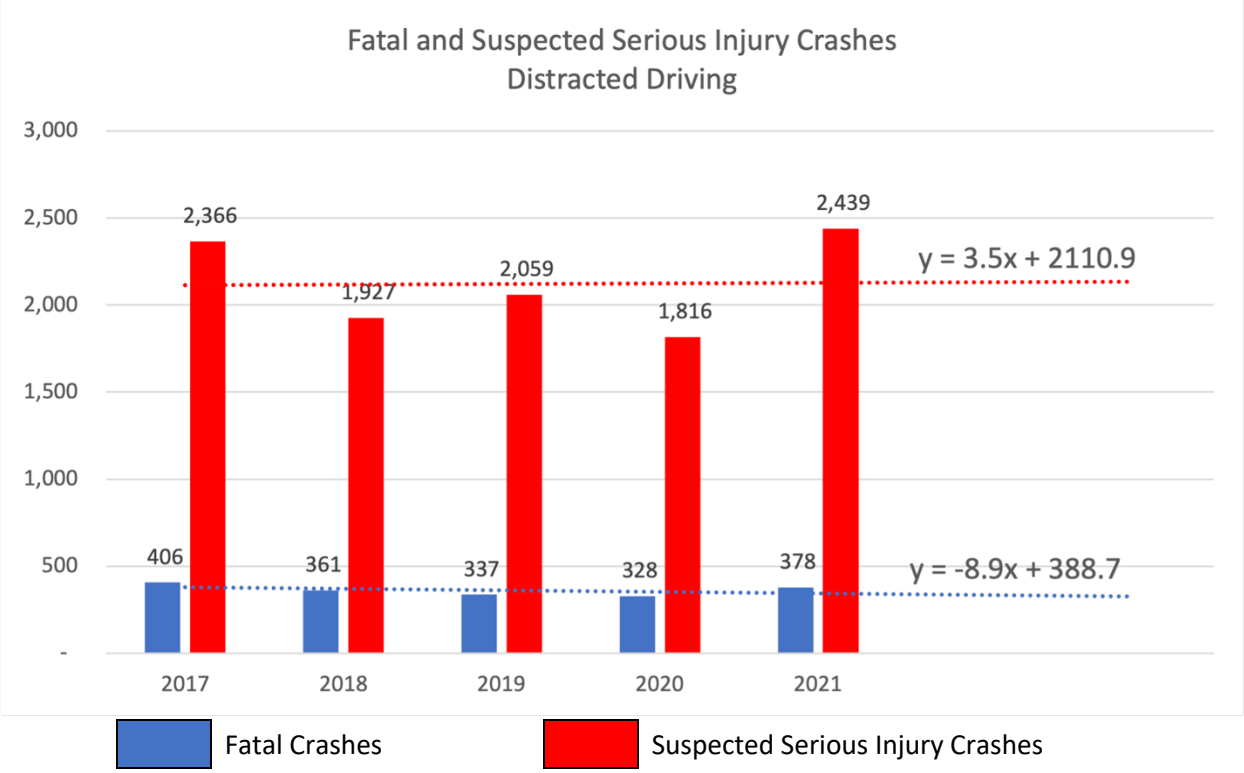



*Figure 6.8.1. Distracted Driving EA: Fatal and Suspected Serious Injury Crashes (2017-2021)*

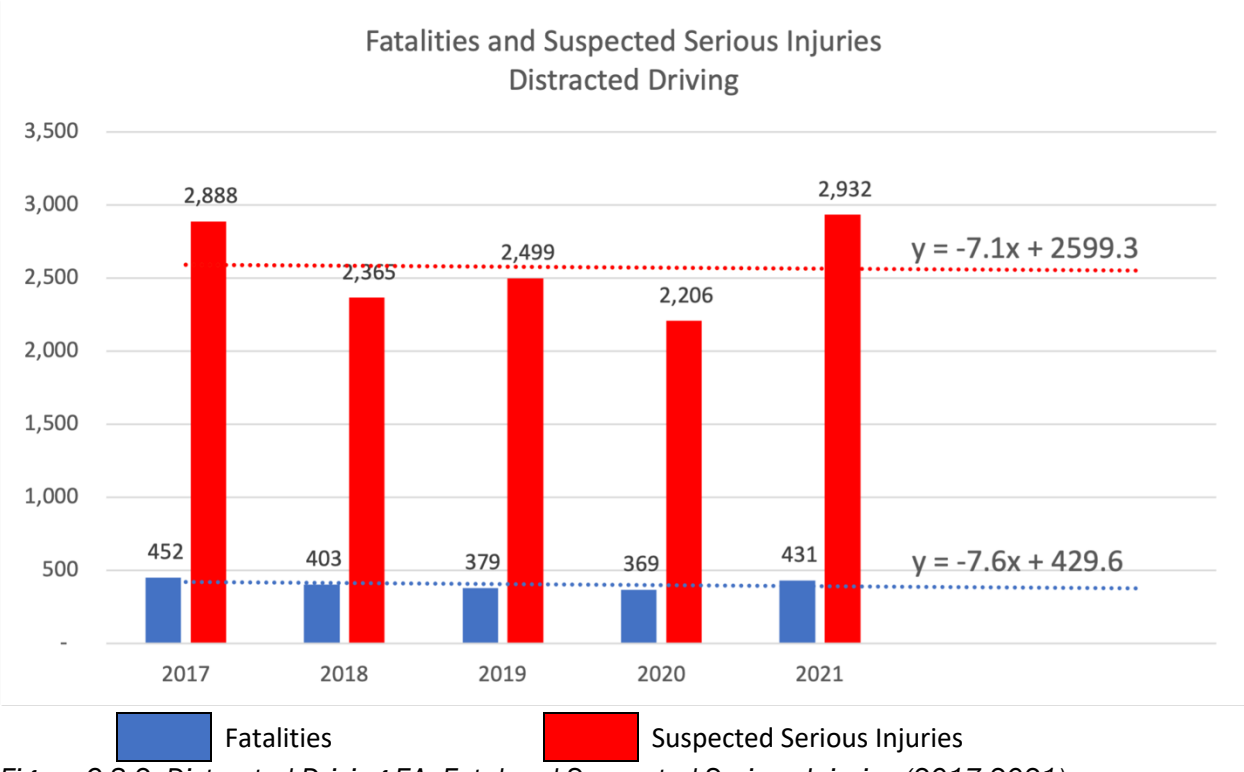
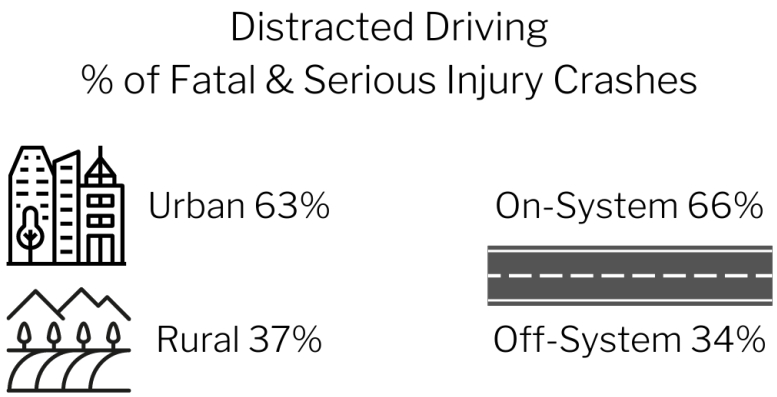



*Figure 6.8.2. Distracted Driving EA: Fatal and Suspected Serious Injuries (2017-2021)*

Throughout the Strategic Highway Safety Plan (SHSP) process, the Emphasis Area (EA) teams examined the representation of rural and urban as well as on- and off-system in terms of the crash factors associated with the specific EA. Regarding distracted driving, 63% of the crashes occurred in areas designated as urban while 66% of these types of crashes happened on roadways considered on-system. From 2017 through 2021, there were 12,417 fatal and suspected serious injury crashes attributed to distracted driving. These crashes resulted in 2,034 fatalities and 12,890 additional individuals with



suspected serious injuries. Distracted driving is a behavioral crash factor. Therefore, other factors likely play a role in distracted driving crashes whether it be a location factor or user type. Distracted driving crashes are a significant part of Texas' traffic safety challenges representing 10% of fatal crashes and 10% of total fatalities. If the state can effectively address distracted driving, it will have a significant impact on our ability to reach zero deaths. After identifying prevalent crash factors, related to distracted driving crashes, the EA team considered those overlapping factors in the identification of strategies and the development of implementation plans. These crash factors include:

- ⇒ Distracted Driving Crashes (12,417) – 27% resulted in a run-off the road crash with 53% of those occurring in areas designated as urban
- ⇒ Distracted Driving Crashes (12,417) – 18% involved young drivers (age 15-20)
- ⇒ Distracted Driving Crashes (12,417) – 11% also involved impaired driving
- ⇒ Distracted Driving & Intersections Crashes (4,418) – 71% occurred in areas designated as urban

## Objective for Emphasis Area

Reduce fatalities and serious injuries by identifying, implementing, and evaluating awareness strategies to reduce distracted driving.

## Strategies & Implementation Plans

**Strategy 6.7.1** **Utilize data and information to communicate the dangers of distracted driving to teens, their parents, employers, public officials, and others.**

| Implementation Action Plan | |
|---|---|
| 6.1.1 | Use crash data and survey results to develop and document a suite of age-specific countermeasures and messages about the dangers of distracted driving. |
| 6.7.1.2 | Educate public officials and employers about the human and economic costs of distracted driving through outreach programs. |
| 6.7.1.3 | Educate teens and their parents on the Graduated Driver Licensing law with specific attention to the provisions designed to address distracted driving such as limiting the number of passengers and disallowing cell phone use. |
| 6.7.1.4 | Implement effective Peer to Peer programs: Teens in the Driver Seat (Junior High and High School) and U in the Driver Seat (College). |
| Facilitator(s) | TxDOT Traffic Safety Division, Behavioral Traffic Safety |
| Participating Organizations | TxDOT, MPOs, TTI, Schools, Driving Schools, AAA, NSC |
| Effectiveness | *** |
| Cost to Implement | 6.7.1.1 $, 6.7.1.2 $, 6.7.1.3 $, 6.7.1.4 $ |
| Time to Implement | Currently Ongoing |
| Barriers | Lack of additional funding and/or resources<br>Some schools unwilling to participate<br>Parents are sometimes too busy or don't take the time to learn about GDL and educate their children |

## Strategy 6.7.2 Improve and increase enforcement capabilities for addressing distracted driving.

| Implementation Action Plan | |
|---|---|
| 6.7.2.1 | Use Selective Traffic Enforcement Program (STEP) grants and high visibility enforcement techniques to enforce distracted driving state laws and local ordinances, especially where the data document crashes where distraction is a contributing factor. |
| 6.7.2.2 | Identify and disseminate model distracted driving policies for law enforcement agencies for guidance on enhancing officer safety. Use the DPS policy as a model that agencies can emulate or revise. |

| | |
|---|---|
| Facilitator(s) | TxDOT Traffic Safety Division, Behavioral Traffic Safety |
| Participating Organizations | TxDOT, DPS, Local Law Enforcement Agencies |
| Effectiveness | *** |
| Cost to Implement | 6.7.2.1 $$, 6.7.2.2 $ |
| Time to Implement | Currently Ongoing |
| Barriers | Some law enforcement agencies lack the resources or the interest in participating |

## Strategy 6.7.3 Increase installation of engineering countermeasures known to reduce distracted driving.

| Implementation Action Plan | |
|---|---|
| 6.7.3.1 | Use network screening techniques to identify and systemically implement engineering countermeasures known to reduce distracted driving, such as edge line, centerline, and transverse rumble strips, wider and brighter striping, and lighting especially in areas associated with distracted driving crashes. |

| Implementation Action Plan | |
|---|---|
| Facilitator(s) | TxDOT Traffic Safety Division |
| Participating Organizations | TxDOT, MPOs |
| Effectiveness | *** |
| Cost to Implement | 6.7.3.1 $$$ |
| Time to Implement | Long |
| Barriers | Insufficient funding |

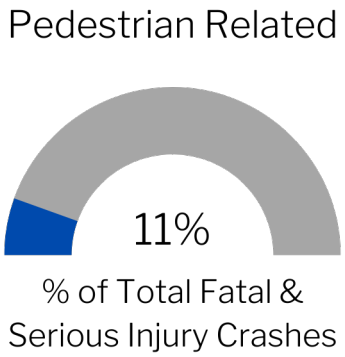
### Strategy 6.7.4 Use technology to reduce distracted driving crashes, serious injuries, and fatalities.

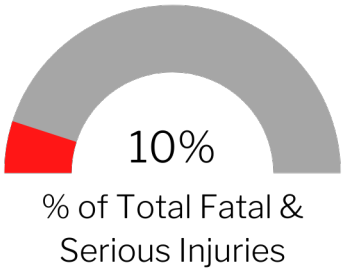
| Implementation Action Plan | |
|---|---|
| 6.7.4.1 | Test and implement apps to encourage distraction-free driving or discourage distracted driving. |
| 6.7.4.2 | Implement an incentive-based app specifically addressing teen drivers. |
| 6.7.4.3 | Educate the consumers, parents, employers, and the public with age-specific messages about vehicle safety technologies mycardoeswhat.org) and tools to encourage distraction-free driving through car dealers, the media, and employers. |
| Facilitator(s) | TxDOT Traffic Safety Division, Behavioral Traffic Safety |
| Participating Organizations | TxDOT, TTI, Schools, Driving Schools, AAA, NSC |
| Effectiveness | ** |
| Cost to Implement | 6.7.4.1 $, 6.7.4.2 $, 6.7.4.3 $ |
| Time to Implement | Currently Ongoing |
| Barriers | Lack of additional funding and/or resources<br>Lack of volunteer leaders |

# Section 6.8 Vulnerable Road Users

## Background

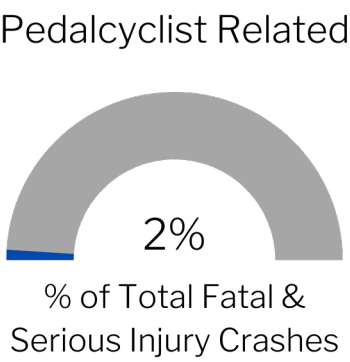
One of the primary tenets of a Safe System Strategy is anticipating human error. Vulnerable road users are more susceptible to fatal or serious injury when they are involved in a crash with a motor vehicle. In the case of pedestrians, pedalcyclists and vulnerable road users, we need to consider separating users in terms of time and/or space. These aspects address both infrastructure and behavior by looking to dedicated transportation space for users moving at different speeds and, subsequently, reduce adverse interactions between users. Ultimately, every road user has a responsibility to use the road safely, whether they are driving, biking, walking, riding, or traveling by other modes and act within the limits of the road system's design (cite ITE).

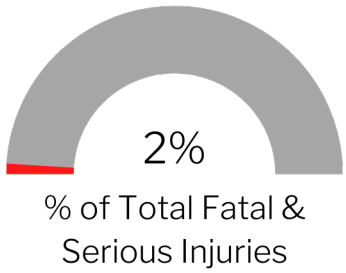



The Federal Highway Administration's The Safe System Approach states that "Humans are unlikely to survive high-speed crashes. Reducing speeds can accommodate human injury tolerances in three ways: reducing impact forces, providing additional time for drivers to stop, and improving visibility." Pedestrians are even more vulnerable road users than those exposed to consequences of speed within the confines of a vehicle, therefore it is critical to consider vulnerable road users.

Addressing infrastructure to reduce fatal and serious injury crashes is a primary focus of a Safe System. Intersections are particularly problematic since they not only involve vehicles, but also vulnerable road users such as pedestrians and bicyclists. Pedestrians use the roadway at intersections as well as other types of infrastructure, so it is important to consider countermeasures that increase visibility through lighting and other approaches proven to be effective. For the part of the driver, there are countermeasures that increase attentiveness so that they can be more aware of the possibility of the presence of pedestrians. The focus of a Safe System is to reduce risk and, subsequently, death and serious injury related to traffic crashes (vehicle occupants, pedestrians, and bicyclists). The EA representatives considered behavioral countermeasures as well as engineering solutions addressing conflict points, speed reduction, visibility, and space for vulnerable road users. Some of these approaches are also addressed in the speed related and intersection areas.




## Pedestrian Historical & Trend Crash Data Analysis

The fatal and suspected serious injury crashes related to pedestrians represents 11% of all crashes. Since 2017, pedestrian crash trend has increased, therefore it is important to reverse this trend to reach the state goal of zero deaths in 2050. The pedestrian related crashes are illustrated in Figure 6.8.1 and the fatal and serious injuries are summarized in Figure 6.8.2.

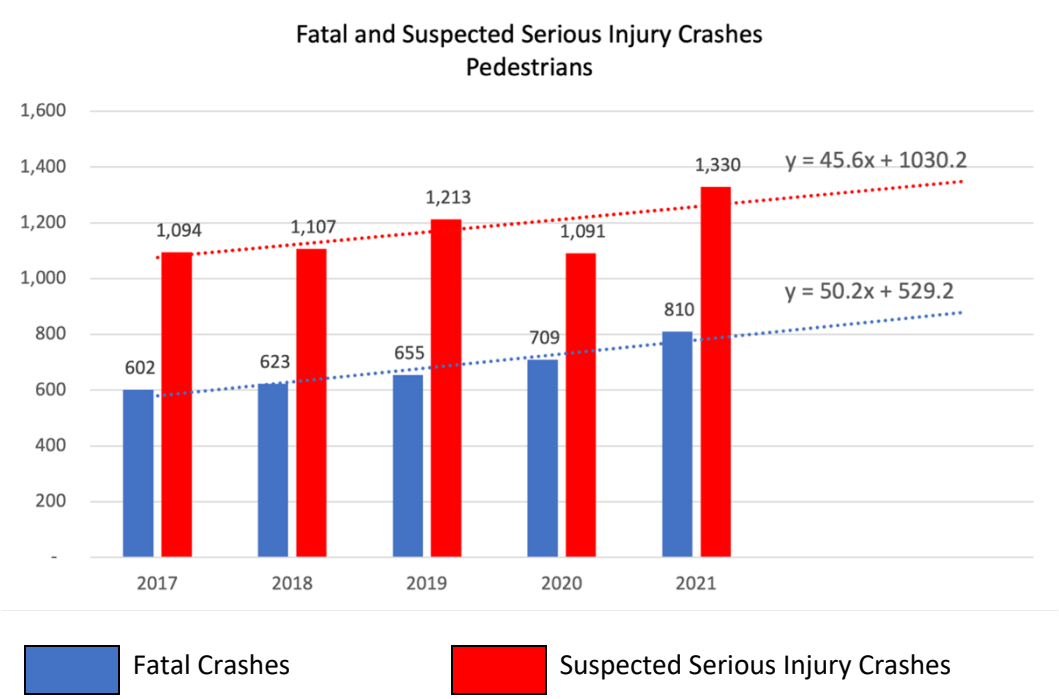



*Figure 6.8.1. Pedestrian EA: Fatal and Suspected Serious Injury Crashes (2017-2021)*

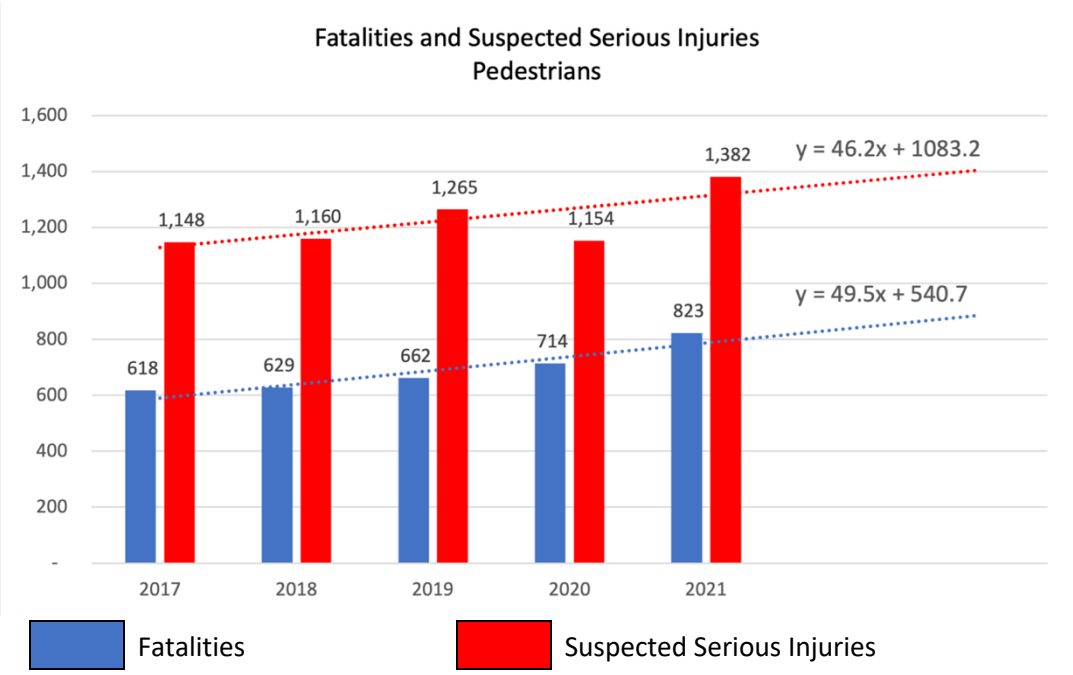
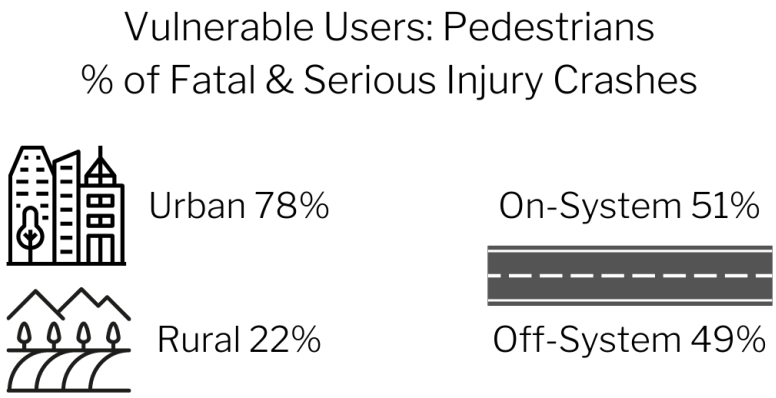



*Figure 6.8.2. Pedestrian EA: Fatal and Suspected Serious Injuries (2017-2021)*

Throughout the Strategic Highway Safety Plan (SHSP) process, the Emphasis Area (EA) teams examined the representation of rural and urban as well as on- and off-system in terms of the crash factors associated with the specific EA. The vulnerable road user data has been separated to provide details

related to pedestrians and pedalcyclists. The following data is only representative of pedestrians involved in fatal or suspected serious injury crashes.




From 2017 through 2021, there were 9,234 fatal or suspected serious injury crashes and 9,555 fatalities and suspected serious injuries. The Pedestrian EA team considered strategies to reduce the number of fatal and serious injury crashes and, subsequently, fatal, and serious injuries that not only addressed infrastructure, but also driver and pedestrian behavior. Of the pedestrian related crashes, one-third (3,399) resulted in at least one fatality while the other two-thirds (5,835) resulted in suspected serious injuries. The same proportions existed when injuries were analyzed with one-third (3,446) of the injuries were fatal and the remaining two-thirds (6,109) were classified as suspected serious injuries.
Pedestrians are especially vulnerable road users and demand specific traffic safety countermeasures to mitigate the risk. The state plans to work on the infrastructure and behavioral aspects of this challenge in partnership with state and local planning organizations as well as advocacy groups (all represented on the Pedestrian EA team). By addressing the occurrence of pedestrian involved crashes, we can have a significant effect on our ability to reach zero deaths. After identifying predominant, overlapping crash factors, related to pedestrian involved crashes, there are several aspects that the EA team considered during the identification of strategies and the development of implementation plans. The overlapping crash factor observations include:

- ⇒ 41% of the crashes involved a pick-up truck or SUV
- ⇒ 23% of the pedestrian involved crashes occurred at an intersection while 75% occurred at a part of the roadway that was not designated as an intersection
- ⇒ 77% of the pedestrian crashes occurred during dark conditions in an urban setting
- ⇒ 12% (1,134) of the pedestrian crashes were also classified as distracted driver crashes
- ⇒ 18% (3,446) of the total fatal injuries and 6,104 suspected serious injuries were attributed to crashes involving at least one pedestrian

## Pedalcyclist Historical & Trend Crash Data Analysis

The fatal and suspected serious injury crashes related to pedalcyclist represents 11% of all crashes#. Since 2017, pedalcyclist crash trend has fluctuated. The number of fatal crashes increased from 57 in 2017 to 91 in 2021 while the number of suspected serious injury crashes was 328 in 2017 and 323 in 2021 with decreases in 2018 and 2020. In terms of the injuries, the number of pedalcyclist fatalities increased from 57 in 2017 to 91 in 2021. The number of suspected serious injuries changed from 334 in 2017 and 332 in 2021 after being lower in the years between (2018-2020). As with the other EA areas, there needs to be significant focus to make an impact on the risks faced by vulnerable road users to achieve the state goal of zero deaths in 2050. The pedalcyclist related crashes are illustrated in Figure 6.8.4 and the fatal and serious injuries are summarized in Figure 6.8.5.

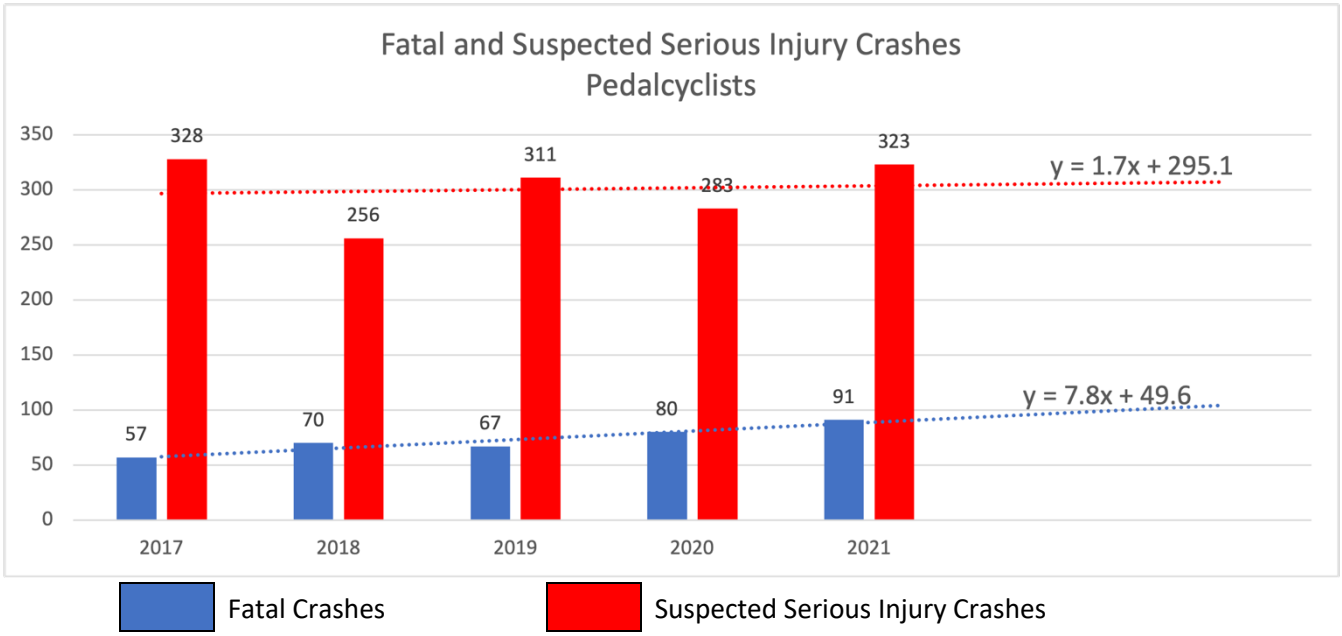



*Figure 6.8.4. Pedalcyclist EA: Fatal and Suspected Serious Injury Crashes (2017-2021)*

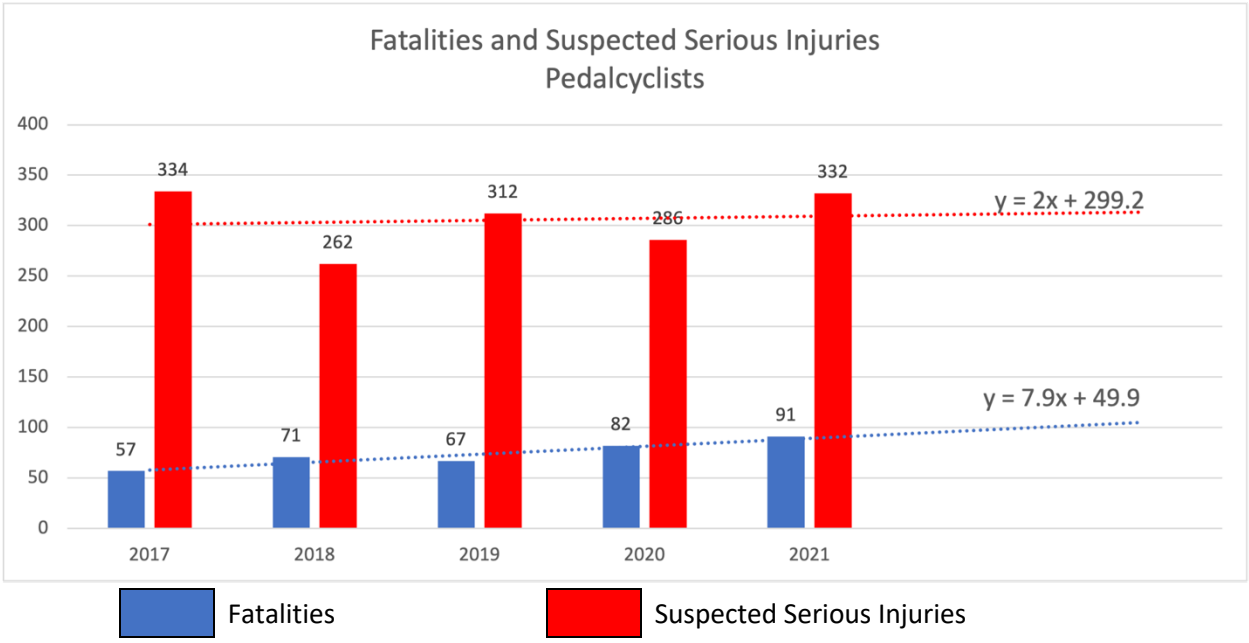
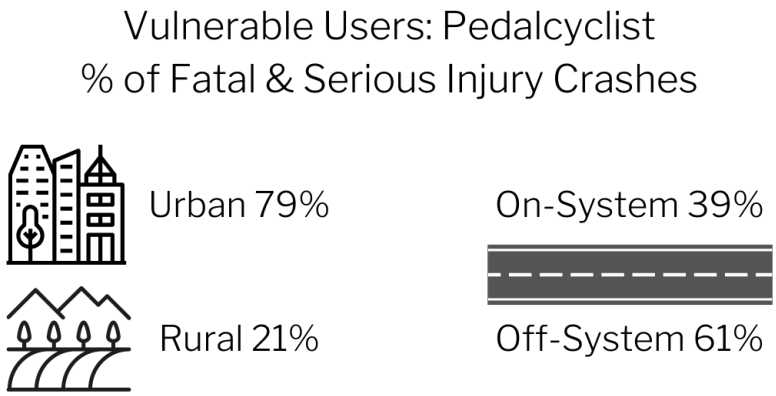



*Figure 6.8.5. Pedalcyclist EA: Fatal and Suspected Serious Injuries (2017-2021)*

Throughout the Strategic Highway Safety Plan (SHSP) process, the Emphasis Area (EA) teams examined the representation of rural and urban as well as on- and off-system in terms of the crash factors associated with the specific EA. The vulnerable road user data has been separated to provide details related to pedestrians and pedalcyclists. The following data is only representative of pedalcyclists involved in fatal or suspected serious injury crashes.




The Vulnerable Road User EA team considered strategies to reduce the number of fatal and serious injury crashes and, subsequently, fatal, and serious injuries that not only addressed infrastructure, but also driver, pedalcyclist, and pedestrian behavior. Of the pedalcyclist related crashes, 19% (365) resulted

in at least one fatality while the other 81% (1,501) resulted in suspected serious injuries. The same proportions existed when injuries were analyzed with 20% (386) of the injuries were fatal and the remaining 80% (1,526) were classified as suspected serious injuries.

In the same way that pedestrian risks are addressed, the state plans to work on the infrastructure and behavioral aspects of this challenge in partnership with state and local planning organizations as well as advocacy groups (all represented on the Vulnerable Road User EA team). By addressing the occurrence of pedalcyclist involved crashes, we can have a significant effect on our ability to reach zero deaths. After identifying predominant, overlapping crash factors, related to pedalcyclist involved crashes, there are several aspects that the EA team considered during the identification of strategies and the development of implementation plans. For fatal and suspected serious injury crashes, the crash factors observations include:

⇒ Intersections present risks for all roadway users and pedalcyclists are especially vulnerable road users due to several factors – the overlapping factors between pedalcyclists and intersection types is detailed in Figure 6.8.6.

⇒ 68% (574 of 846) of the intersection related crashes occurred in daylight conditions

⇒ 53% (485 of 917) of the non-intersection crashes occurred in dark condition

⇒ 78% (1,455 of 1,866) of the pedalcyclist fatal and suspected serious injury crashes occurred in areas designated as urban

⇒ 61% of the pedalcyclist fatal and suspected serious injury crashes occurred on-system

⇒ 43% of the crashes involved a pick-up truck or SUV

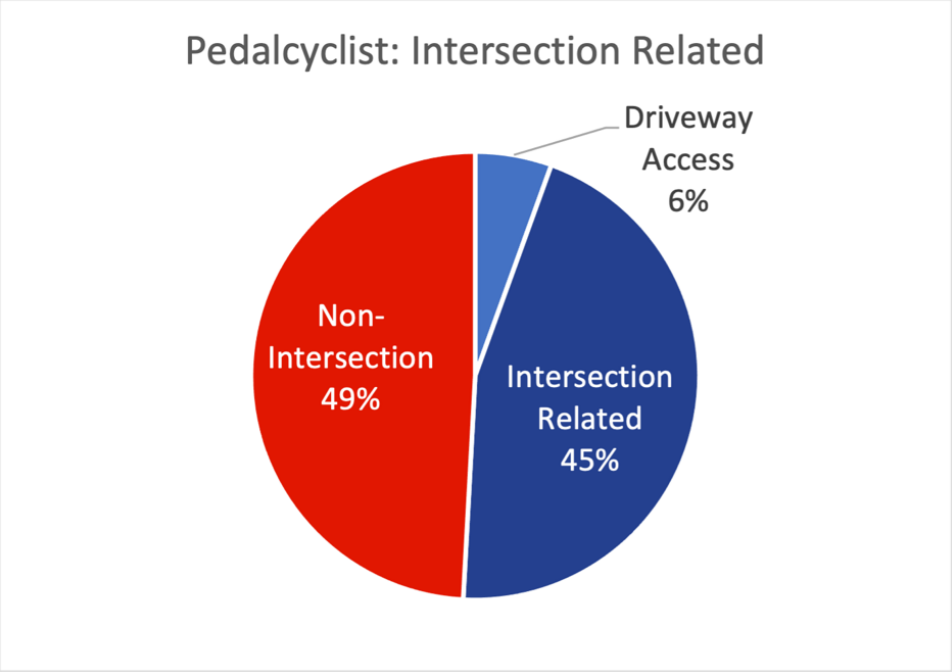



*Figure 6.8.6. Pedalcyclist EA: Intersection Type Crashes*

## Objective for Emphasis Area

Utilize a data driven approach to decrease the number of fatal and serious injuries sustained by vulnerable road users by identifying and targeting audiences for education efforts designed to increase occupant protect usage including correctly installed and applied safety belts and child car seats.

## Strategies & Implementation Plans

**Strategy 6.8.1** **Improve driver and vulnerable road user safety awareness and behavior.**

| Implementation Action Plan | |
|---|---|
| 6.8.1.1 | Educate motorists on appropriate actions if they become stranded on a freeway or high-speed roadway to reduce crashes with unintended pedestrians on roadways. |
| 6.8.1.2 | Provide driver and pedestrian safety messages and education. |
| 6.8.1.3 | Educate vulnerable road users through campaigns like Walk Bike Safe and encourage alternatives such as transit, taxis, and transportation network companies. |
| 6.8.1.4 | Improve nighttime visibility of vulnerable road users using educational programs such as Be Safe. Be Seen. |
| Facilitator(s) | TxDOT, MPOs |
| Participating Organizations | TxDOT, TTI, MPOs, COGs, Advocacy groups |
| Effectiveness | ** |
| Cost to Implement | 6.8.1.1 $$, 6.8.1.2 $$, 6.8.1.3 $, 6.8.1.4 $ |
| Time to Implement | 6.8.1.1 Medium, 6.8.1.2 Long, 6.8.1.3 Long, 6.8.1.4 Short |
| Barriers | Lack of sufficient funding |

**Strategy 6.8.2** **Reduce vulnerable road user crashes on urban arterials and local roadways.**

| Implementation Action Plan | |
|---|---|
| 6.8.2.1 | Complete sidewalk inventory and implement pedestrian-oriented design treatments at high-volume and/or high-risk pedestrian or pedalcyclist locations. |
| 6.8.2.2 | Implement proven countermeasures such as leading or exclusive pedestrian intervals at signalized intersections (i.e., pedestrian walk signals activate prior to parallel green), high-volume pedestrian-use signaled intersections, and pedestrian push-button locations. |
| 6.8.2.3 | Develop and implement a program (i.e. Vision Zero, Road to Zero, Safe Systems, ped action plans) to assist cities, developers and other agencies to develop policies and implement projects that address common pedestrian and pedalcyclist crash types. |
| 6.8.2.4 | Disseminate information and training for traffic safety professionals on the effectiveness and appropriateness of pedestrian traffic control measures. |
| 6.8.2.5 | Provide available protected paths when construction impedes on sidewalk, etc. |
| Facilitator(s) | TxDOT (Design Division & Traffic Safety) |
| Participating Organizations | TxDOT (Design Division & Traffic Safety), MPOs |
| Effectiveness | *** |
| Cost to Implement | 6.8.2.1 $$, 6.8.2.2 $$, 6.8.2.3 $, 6.8.2.4 $, 6.8.2.5 $$ |
| Time to Implement | 6.8.2.1 Medium, 6.8.2.2 Medium, 6.8.2.3, Short, 6.8.2.4, Short, 6.8.2.5 Short |
| Barriers | Lack of funding, Integration of Resources, Conflicting Priorities |

## Strategy 6.8.3 Improve vulnerable road user networks.

| Implementation Action Plan | |
|---|---|
| 6.8.3.1 | Develop policies to analyze vulnerable road user levels of service, delay, and network connectivity as part of project development. Develop and disseminate a complete streets policy support guide with model policy and implementation information for local agencies and MPOs. |
| 6.8.3.2 | Create connected vulnerable road user networks and remove barriers to pedestrian/pedalcyclist travel (pedestrian over/underpasses and crossings to overcome physical barriers). Consider setting standards or guidelines for the distance between safe crossings given land uses, densities, and roadway function. |

| | |
|---|---|
| Facilitator(s) | TxDOT, MPOs |
| Participating Organizations | TxDOT, MPOs, COGs, Cities, Counties |
| Effectiveness | ** |
| Cost to Implement | 6.8.3.1 $$, 6.8.3.2 $$ |
| Time to Implement | 6.8.3.1 Medium, 6.8.3.2 Medium |
| Barriers | Lack of sufficient funding & Priorities |

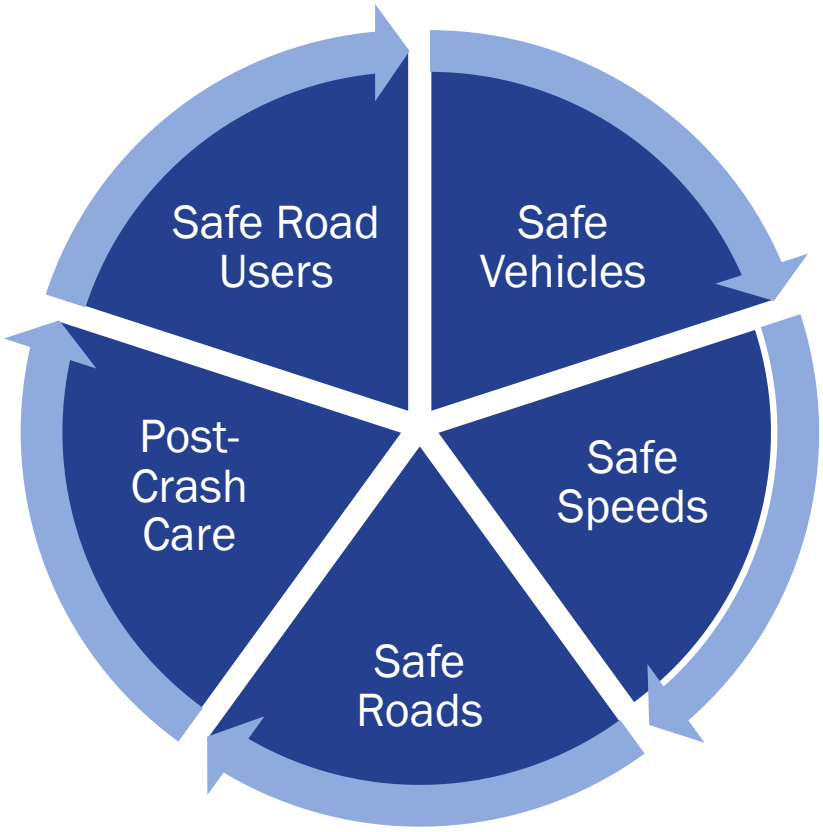
## Strategy 6.8.4 Develop strategic pedestrian safety plans tailored to local conditions.

| Implementation Action Plan | |
|---|---|
| 6.8.4.1 | Develop a statewide inventory of local Pedestrian Safety Action Plans (PSAPs) and a statewide inventory of those PSAPs. |
| 6.8.4.2 | Develop a State Pedestrian Safety Action Plan including how equity is to be addressed. |
| Facilitator(s) | TxDOT, MPOs |
| Participating Organizations | TxDOT, TTI, MPOs, COGs, Advocacy groups |
| Effectiveness | ** |
| Cost to Implement | 6.8.1.1 $$, 6.8.1.2 $ |
| Time to Implement | 6.8.1.1 Medium, 6.8.1.2 Short |
| Barriers | Lack of sufficient funding & Priorities |

# Section 6.9 Post-Crash Care

## Background

One of the critical tenets of a Safe System is the concept of redundancy throughout the system. This approach provides a *Swiss cheese model* of redundancy layers of protection so that if one layer, element of a Safe System, fails another layer will provide the safety stop gap. The idea is that death and serious injury will only occur if all the layers fail.




Post-crash care is a critical part or layer of a safe road system. In the event of a crash, effective post-crash care, involving emergency treatment and trauma care along with rehabilitation, can help reduce the risk of death and serious injuries. CITE However, post-crash care is not confined to medical treatment. The sub-elements of post-crash care include:

- First responders
- Trauma and emergency medical care
- Crash investigation
- Traffic incident management

- Justice (adjudication, probation, treatment)

“

Each State in cooperation with its political subdivisions should have a program which provides for rapid, orderly, and safe removal from the roadway of wreckage, spillage, and debris resulting from motor vehicle accidents, and for otherwise reducing the likelihood of secondary and chain-reaction collisions, and conditions hazardous to the public health and safety.” (NHTSA, Highway Safety Program Guideline No. 16, p. 1)

## Objective for Emphasis Area

Enhance the survivability of crashes through expedient access to emergency medical care, while creating a safe working environment for vital first responders and preventing secondary crashes through robust traffic incident management practices.

## Strategies & Implementation Plans

### Strategy 6.9.1 Improve data collection and analysis techniques.

| Implementation Action Plan | | |
|---|---|---|
| 6.9.1.1 | Develop and implement a revised crash report form to increase and improve data collection, especially data on roadway and incident clearance times, response times secondary crashes, and responder injuries. | |
| 6.9.1.2 | Increase the use of current and emerging technologies to capture information more efficiently for the crash report and clear crash scenes, especially in rural areas. | |
| Facilitator(s) | | 6.9.1.1 TxDOT Crash Data Analysis (CDA),<br>6.9.1.2 TxDOT Traffic Safety Division (TRF), DPS, Sheriffs' Departments, MPOs |
| Effectiveness | | 6.9.1.1 ***, 6.9.1.2 *** |
| Cost to Implement | | 6.9.1.1 $, 6.9.1.2 $$$ |
| Time to Implement | | 6.9.1.1 Short, 6.9.1.2 Short |
| Potential Barrier | | Lack of funding |

Strategy 6.9.2 *Increase and improve emergency responder training.*

| Implementation Action Plan | |
|---|---|
| 6.9.2.1 | Expand TIM basic and refresher training requirements.<br>▪ Work with TDLR to require TIM training for first responders.<br>▪ Work with TCOLE to require TIM refresher training for law enforcement personn<br>▪ Work with TCFP to require TIM refresher training for EMS personnel (every 3-5 y<br>▪ Work with SFFMA to require TIM refresher training for fire/rescue personnel.<br>▪ Work with DSHS and State EMS Director to require TIM refresher training for EM personnel at least every 3-5 years.<br>▪ Expand TIM Train the Trainer training to increase access to training. |
| Facilitator(s) | 6.9.2.1 TXDOT TIM Coordinator,<br>6.9.2.2 TxDOT Traffic Safety Division (TRF) |
| Effectiveness | 6.9.2.1 ** |
| Cost to Implement | 6.9.2.1 $ |
| Time to Implement | 6.9.2.1 Medium |
| Potential Barrier | Partners may be reluctant to commit |

## Strategy 6.9.3 Facilitate current and future State and Metro TIM teams meetings.

| Implementation Action Plan | |
|---|---|
| 6.9.3.1 | Increase first responder participation in existing TIM teams and TIM meetings by so support from the TxDOT District Traffic Safety Specialists (TSS). |
| 6.9.3.2 | Reach out to TSS personnel and enlist their assistance in a) identifying existing TIM and b) starting teams to fill voids, especially in rural areas.<br>▪ Educate TSS personnel on TIM, how they can help, & what TxDOT TIM personne do for them.<br>▪ Increase participation through the TxDOT District Coalitions.<br>▪ Create and distribute a TIM Outreach Toolkit to TSS personnel.<br>▪ Train TSSs on how to deliver TIM training and TIM Train-the-Trainer. |
| Facilitator(s) | 6.9.3.1 TxDOT District Traffic Operations and TIM Coordinator,<br>6.9.3.2 TxDOT District Traffic Safety Specialists |
| Effectiveness | 6.9.3.1 ***, 6.9.3.2 *** |
| Cost to Implement | 6.9.3.1 $, 6.9.3.2 $ |
| Time to Implement | 6.9.3.1 Medium, 6.9.3.2 Medium |
| Potential Barriers | TSS time constraints<br>Partners may be reluctant to commit |

**Strategy 6.9.4** **Utilize technology, policy, and available personnel to investigate and report crashes more efficiently to enable rapid crash scene clearance**

| Implementation Action Plan | |
|---|---|
| 6.9.4.1 | Identify and implement effective technologies designed to more efficiently capture report information and clear crash scenes. |
| 6.9.4.2 | Support an Open Roads Policy statewide supporting quick clearance strategies. |
| 6.9.4.3 | Develop crash investigation training materials for delivery to Sheriffs' deputies and with the Law Enforcement Liaisons and District Traffic Safety Specialists to deliver t training, especially in rural areas. |
| Facilitator(s) | 6.9.4.1 DPS, local law enforcement,<br>6.9.4.2 TxDOT Executive Director, 4.3 TCOLE |
| Effectiveness | 6.9.4.1 **, 6.9.4.2 **, 6.9.4.3 ** |
| Cost to Implement | 6.9.4.1 $$$, 6.9.4.2 $, 6.9.4.3 $ |
| Time to Implement | 6.9.4.1 Short, 6.9.4.2 Short, 6.9.4.3 Medium |
| Potential Barriers | Funding for technology<br>Sheriffs' agencies support<br>Understanding/support for the Open Roads policy |

**Strategy 6.9.5** **Identify and implement engineering solutions where possible to reduce response times.**

| Implementation Action Plan | |
|---|---|
| 6.9.5.1 | Identify and catalog engineering techniques affecting timely response to crashes. |
| 6.9.5.2 | Reach out to the District Traffic Safety Specialists, MPOs, and others with information on engineering solutions that decrease response times. |
| Facilitator(s) | 6.9.5.1 TxDOT Traffic Safety, 6.9.5.2 TxDOT Traffic Safety |
| Effectiveness | 6.9.5.1 *, 6.9.5.2 * |
| Cost to Implement | 6.9.5.1 $, 6.9.5.2 $ |
| Time to Implement | 6.9.5.1 Short, 6.9.5.2 Short |
| Potential Barriers | Lack of funding for a consultant to document information<br>Lack of funding for countermeasures implementation |

# Section 6.10 Other Considerations for Emphasis Areas

In order address the connection that younger and older drivers had to the emphasis areas, it was important to consider those roadway users. There were stakeholder teams formed for each and they met along with the other teams during the SHSP development process. As the Older Drivers and Younger Drivers EAs discussed their specific strategies and countermeasures, it was evident to the team members that the most efficient way to represent these users was integrated into the other EA implementation plans. The exception of a few countermeasures that specifically targeted a user group, all the strategies and implementation activities could apply to all roadway users.

| Emphasis Area | % Total Fatal & Suspected Injury Crashes | % Total Fatalities & Suspected Serious Injuries |
|---|---|---|
| Younger Drivers | 16% | 17% |
| Older Drivers | 13% | 14% |

*Figure 6.10.1 Roadway Users: Younger and Older Drivers*

## Younger Drivers

The average age of a younger driver who was involved in a fatal or suspected serious injury crash was 18 years of age regardless of gender. Two-thirds of the drivers were male. In terms of the most common time of day for a younger driver to be involved in a fatal or suspected serious injury crash, approximately 50% of these crashes occurred between 3pm and 11pm. The number of fatal and suspected serious injury crashes involving younger drivers is represented in Figure 6.10.1. The number of fatal and suspected serious injuries involving younger drivers is detailed in Figure 6.10.2

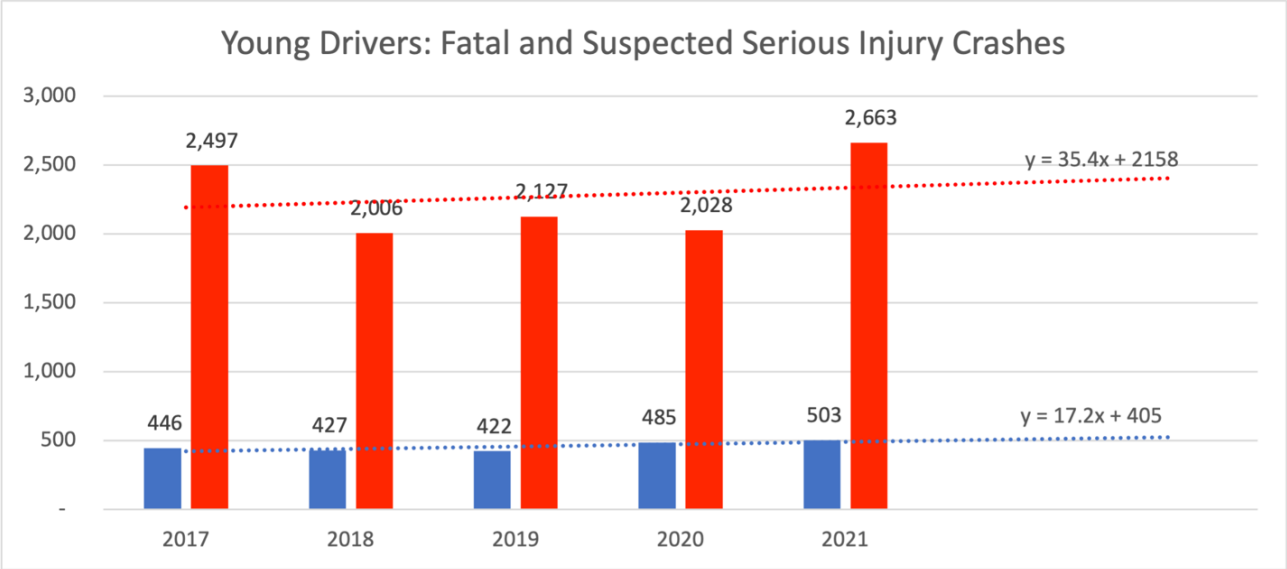



*Figure 6.10.2. Younger Drivers: Fatal & Suspected Serious Injury Crashes*

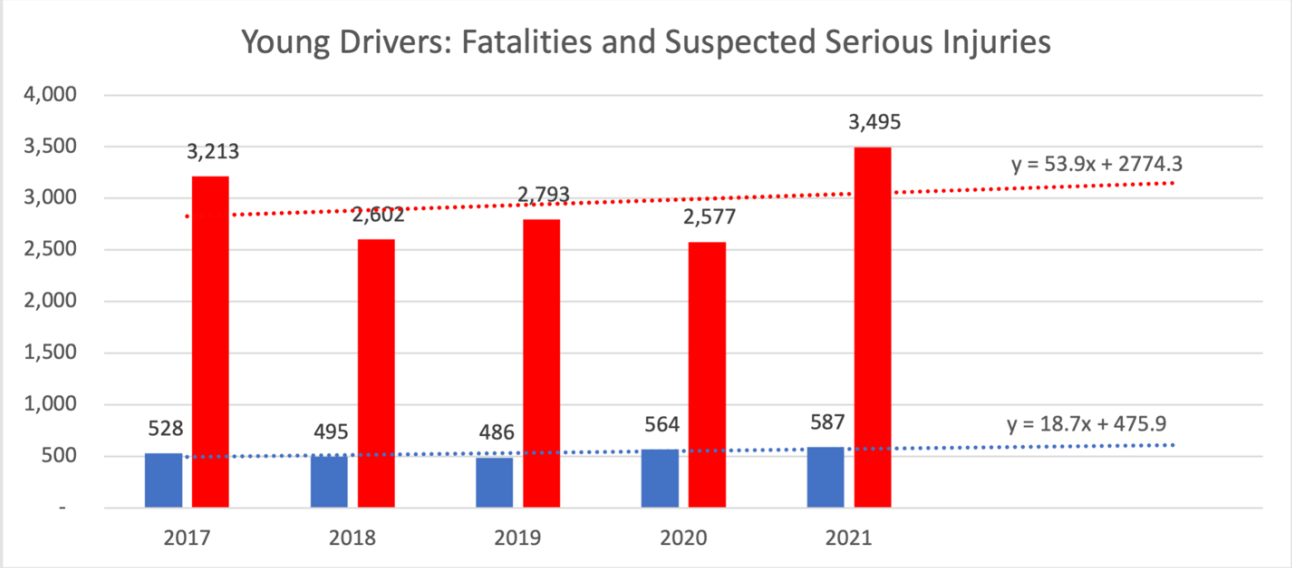



*Figure 6.10.3. Younger Drivers: Fatal & Suspected Serious Injuries*

## Older Drivers

The average age of an older driver who was involved in a fatal or suspected serious injury crash was 72 years of age for males and 73 years of age for females. Two-thirds of the drivers were male. These crashes occurred at intersections 44% of the time and involved a left turn 22% of the total number of

fatal and suspected serious injury crashes that involved at least one older driver. In terms of the most common time of day for an older driver to be involved in a fatal or suspected serious injury crash, approximately 50% of these crashes occurred between 10am and 3pm. The number of fatal and suspected serious injury crashes involving older drivers is represented in Figure 6.10.3. The number of fatal and suspected serious injuries involving older drivers is detailed in Figure 6.10.4.

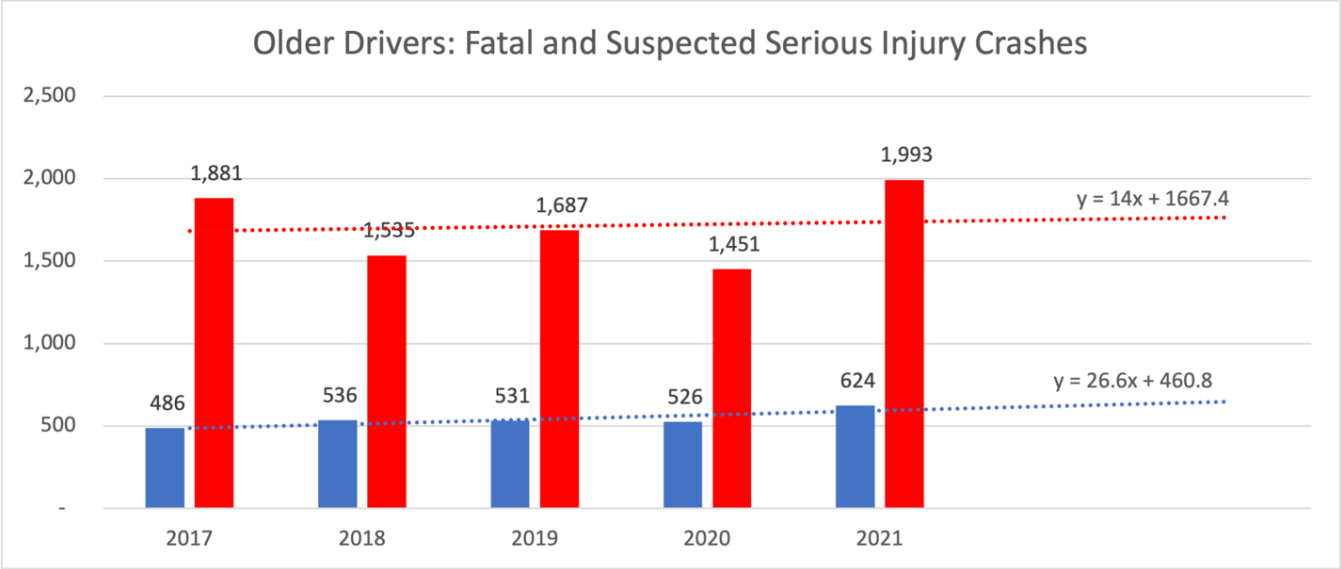



*Figure 6.10.4. Older Drivers: Fatal & Suspected Serious Injury Crashes*

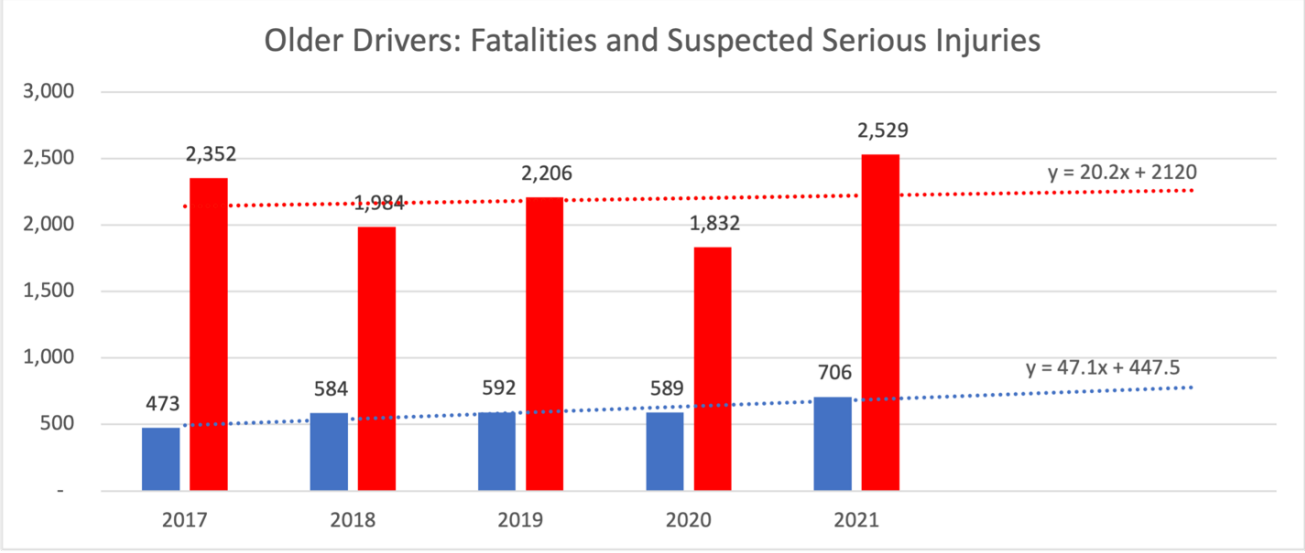



*Figure 6.10.5. Older Drivers: Fatal & Suspected Serious Injuries*

## Summary

The Emphasis Area Teams were productive through the insight their members contributed to the development of strategies and implementation action planning. Although there were only a few individuals who participated in multiple EAs, there was still an interest to ensure that strategies and actions were representing in the appropriate EAs as well as consistent in terms of scope. Texas was fortunate to have existing coalitions and task forces, independent of the EAs, that provided continuity to the EA process as well as carry forward the SHSP beyond the revision process.