HGAC

METROPOLITAN
PLANNING
ORGANIZATION

HOUSTON-GALVESTON REGIONAL SAFETY PLAN

ADOPTED AUGUST 24, 2018

THE HOUSTON-GALVESTON METROPOLITAN PLANNING AREA

The Houston-Galveston Metropolitan Planning Area: Houston-Galveston Regional Safety Plan

8-County Transportation Management Area

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No matter where you are coming from or where you are going, for the millions of people who travel the Houston-Galveston area roads each day, traffic safety is and continues to be of critical importance. People and goods must be able to move about safely and efficiently for our communities and economy to thrive.

While this area has recently seen a remarkable rise in population growth and jobs, subsequently it has meant a rise in traffic congestion, crashes and fatalities as well. Between 2012 and 2016, the total number of crashes have increased by more than 40% and fatalities have risen by more than 20%. These increases coincide with a host of implications, from traffic congestion to poor air quality, lost productivity and increased cost of goods to decreased quality time spent with family and friends. The human toll caused by traffic accidents and the loss of loved ones is incalculable; nevertheless, in 2016 alone, traffic crashes, injuries and fatalities cost the region more than $6 billion dollars.

The Houston-Galveston Area Council has developed a comprehensive plan that addresses our safety issues and offers feasible solutions. It works as a framework for strategies and implementation actions to leverage existing safety programs and resources to the greatest extent possible. The Performance Measure Targets in this plan are tangible goals for the region to work towards to support the State of Texas' crash reduction efforts, and its strategies support the State Highway Safety Plan and Federal safety initiatives.

This plan, however, requires the continued collaboration and cooperation between all jurisdictions and agencies in the greater Houston-Galveston region and the commitment by each of us to make safety an upmost priority each time we travel, however we travel, whether by transit, car, bicycle or on foot.

Mr. Timothy H. Kelly
Chairperson, Regional Safety Council
Executive Vice–President
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Executive Summary

Regionally, motor vehicle crashes increased more than 40 percent from 2012 to 2016 and motor vehicle fatalities increased more than 20 percent during the same period. Although the impact of vehicle crashes on families, businesses and communities across our region cannot be measured only in dollars and cents, vehicle crashes cost the region a staggering **$6.4 billion** in 2016 alone. Measured over time, these costs compare to that of the most severe natural disasters and remain one of the leading causes of death, particularly among persons in their teens and twenties.

In the past, the region's traffic safety has not been addressed in a coordinated, comprehensive manner. State and local governments, schools, employers and safety advocacy groups have worked on their individual priorities with limited resources. In addition, there were no metrics by which to prioritize traffic safety issues or measure success in addressing them.

The Regional Safety Plan (RSP) was developed to expand collaboration across regional safety stakeholders, provide a framework for development of an action plan and the resources to implement the action plan. Using a data-driven approach, this plan identifies the most frequent motor vehicle crash types, demographic information about drivers involved in these crashes, the location of crashes and drivers involved in them. The plan also supports the State Highway Strategic Plan (SHSP) which addresses similar issues on the state level as seen below.

SHSP Emphasis Areas	Regional Safety Plan Focus Areas
Impaired Driving	Impaired Driving
Distracted Driving	Distracted Driving
Speeding	Speeding
Intersection	Intersection
Pedestrian Safety	Bicycle & Pedestrian Safety
Older Drivers	
Roadway Departure	

Traffic safety performance measures have been established to gauge the progress of states and Metropolitan Planning Organizations in achieving crash reduction. These performance measures are listed below.

TRAFFIC SAFETY PERFORMANCE MEASURES:

- Fatality Rate per 100 million Vehicle Miles Traveled
- Serious Injury Rate per 100 million Vehicle Miles Traveled
- Number of Non-Motorized Fatalities and Serious Injuries

The RSP sets measurable targets for crash reduction for each of these safety measures to increase public accountability and transparency while focusing available resources. The plan outlines specific strategies to achieve these targets utilizing existing safety programs to the greatest extent possible. Each goal and supporting action plan is summarized below:

GOAL: Reduce Fatality Rate, Serious Injury Rate, and Non-Motorized Fatalities and Serious Injuries by two percent of projected future increases.

SELECT IMPROVEMENT STRATEGIES AND GOALS (Not all strategies and goals included)

Impaired Driving	
Action	Goal
Ensure that all high frequency DWI/DUI crash areas have at least one local law enforcement agency utilizing a STEP grant	1 new local enforcement agency per year

Distracted Driving	
Action	Goal
Launch Regional Safety Campaign focusing on Distracted Driving	Minimum 10,000 media exposures and distribution of at least 1,500 pieces of educational materials

Speeding/Aggressive Driving	
Action	Goal
Monitor the number of speeding citations issued by H–GAC Regional STEP Grant Agencies	Minimum 100 Speeding Citations per year by H–GAC Regional STEP Grant Agencies

Bicycle & Pedestrian	
Action	Goal
Conduct safety audits at high frequency intersection crash locations	2 audits per year

Intersections	
Action	Goal
Conduct safety audits at high frequency intersection crash locations	2 audits per year

The plan is the first regional safety plan for the Houston-Galveston metropolitan area and will be updated every four years in conjunction with the SHSP. The strategies and goals in this plan are intended to support the collaborative efforts of state and local jurisdictions, businesses and safety advocates to reduce vehicle crashes.

Introduction

The Houston-Galveston Area Council (H-GAC) is a voluntary association of local governments in the Houston-Galveston region, an area of 12,500 square miles and nearly seven million people. H-GAC works to promote efficient and accountable use of local, state, and federal tax dollars and serves as a problem-solving and information forum for local government needs. The 13 counties in H-GAC's service region are Austin, Brazoria, Chambers, Colorado, Fort Bend, Galveston, Harris, Liberty, Matagorda, Montgomery, Walker, Waller, and Wharton. H-GAC departments include community and environmental planning, data services, human services, public services, and transportation.

"The MPO has provided more than $280 million for safety projects in the last 10 years".

H-GAC is designated by the State of Texas as the region's Metropolitan Planning Organization (MPO) for transportation planning in Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, and Waller Counties; also known as a Transportation Management Area (TMA). An MPO is a local decision-making body that is responsible for overseeing the metropolitan planning process and deciding how to spend federal transportation funds for capital projects and planning studies. Decisions on how to spend transportation funds are guided by information and ideas from a broad group of people including elected officials, planners and engineers, transportation agencies, the public, and other interested parties.

The Transportation Policy Council (TPC) is the policy board for the MPO. The TPC provides policy guidance and overall coordination of the transportation planning activities within the region. Additional information about the TPC and other committees can be found in Appendix A.

Traffic safety is of critical importance to the MPO. All the MPO's planning efforts are concerned with moving people and goods safely. The health of our community and the vitality of the region's economy depend on safe and efficient travel. Utilizing relevant information and technology, H-GAC endeavors to provide the guidance needed to ensure the safety of the region's transportation network.

The Regional Safety Plan is a multi-faceted approach for implementing sound strategies to address the Region's safety issues. This document is the first area-wide safety plan for the H–GAC TMA.

Goals
Improve the Safety of the Region's Transportation System
Reduce Crash Rates in the Region
Establish Benchmark Goals and Outcomes
Support the State Highway Safety Plan
Provide Strategies for implementing Safety Improvements
Objectives
Develop Regional Safety Vision
Align with Federal and State plans and guidance
Identify Regional Traffic Safety Issues
Identify Effective Countermeasures
Identify Policy Impacts and Deficiencies
Determine Implementation Strategies and Funding Sources

The paradigms of transportation planning are changing. Today, both regulations and practice are moving toward a data-driven, performance-based planning methodology. Mandated Federal safety performance measures now require data collection, analysis, and performance benchmarking. At the same time, Federal guidance is advocating a data-driven approach to safety planning. As FHWA explains:

> *Traditional crash and roadway analysis methods rely mostly on subjective or limited quantitative measures of safety performance. This makes it difficult to calculate safety impacts alongside other criteria when planning projects. Data-driven safety analysis (DDSA) employs newer, evidence-based models that provide state and local agencies with the means to quantify safety impacts similar to the way they do other impacts such as environmental effects, traffic operations and pavement life.*

This new emphasis has changed the way H–GAC and its regional partners are approaching traffic safety. Using vehicle crash data, traffic safety issues can be assessed and geo-located more quickly. The data will also be used to develop and evaluate performance measure benchmarks, such as Crash Rate per 100 MVMT, Fatality Rate per 100MVMT, and other measures deemed important locally.

This approach will create a new traffic safety framework for identifying, evaluating, and addressing regional safety issues. This approach will also utilize the 5-E Strategies of project and program development where applicable.

1. Evaluation: data evaluation, setting targets and focus areas
2. Engineering: infrastructure investments
3. Education: educational outreach
4. Enforcement: enforcement of safe driving, riding, and walking practices
5. Encouragement and Empowerment: technical tools and training to partners and public

The essence of these ideas is encapsulated in the Regional Safety Plan's vision statement: "Mitigate and reduce crashes in the region through efforts in engineering, education and enforcement".

The Houston-Galveston area has seen a marked increase in vehicle crashes in the last five years. Between 2012 and 2016, the total number of crashes increased by more than 40 percent. Concurrently, fatalities increased more than 20 percent, from 590 in 2012 to 715 in 2016. Serious injuries also increased by nine percent over the same period.

The Regional Crash Summary (Table 1) shows the 2016 total vehicle crashes, percentage of crashes by category, and the percentage change from 2015, as well as fatalities and serious injuries for each category. Of note are sharp increases in motorcycle, bicycle, and pedestrian crashes.

Crash Type	Total Crashes	% of All Crashes	Δ 2015	Fatalities	Serious Injuries
Regional Crashes	170,099	100%	+2%	715	3,390
Speeding	51,212	30%	−1%	155	769
Young Drivers	30,562	18%	−0.03%	62	579
Distracted Driving	18,614	11%	−15%	56	356
Elderly Drivers	19,011	11%	+5%	75	357
Commercial Vehicles	8,625	5%	−5%	68	161
Unrestrained Occupants	6,791	4%	−1%	53	182
Impaired Driving (DUI)	3,418	2%	−7%	318	310
Work Zones	4,029	2%	−0.3%	24	80
Pedestrian	1,983	1%	+3%	189	192
Motorcycles	1,975	1%	+9%	120	377
Bicycle	889	0.5%	+8%	21	102
Railroad-related Crashes	403	0.2%	+5%	2	18

Table 1: 2016 Regional Motor Vehicle Crash Summary

This plan outlines the traffic safety planning framework for the region. Using the data analysis findings listed in this plan for identified focus areas, H–GAC with region-wide programs, were appropriate to address traffic safety issues. Moreover, H–GAC will work with local jurisdictions in focus area locations with high crash frequencies to develop implementation plans based on the countermeasures listed in this plan.

H–GAC will incorporate safety criteria into the TIP/RTP project selection process to ensure that projects developed to address traffic safety issues in high crash frequency locations are given appropriate funding priority. In addition, the Regional Safety Council, the Technical Advisory Committee, and the Transportation Policy Council will be asked to review traffic safety findings and fund and promote programs and projects to address issues identified in this plan.

Finally, H–GAC will monitor future vehicle crash data to determine the effectiveness of implemented programs and projects, as well as identify any new traffic safety issues.

The data analysis findings in the report will serve as a basis for establishing regional targets and outcomes to measure the effectiveness of implemented programs and projects. Such targets also serve to support the State SHSP and other regional transportation plans. Further, these benchmarks can also be incorporated into the overall transportation planning process as selection criteria triggers for project funding.

Regional Safety Trends

The Houston-Galveston region has much to be proud of. A booming economy and steady population growth have made the Region the envy of many other areas in the country. However, vehicle crashes have also grown, as have fatalities and injuries. The charts and tables herein summarize and quantify the regional vehicular crash experience from 2012 to 2016. Virtually all categories of crashes have increased during this five-year period.

The Region's population increased substantially from 2012 to 2016. As shown in Figure 1, regional population increased approximately 10 percent during this period. In fact, the US Census Bureau states that from 2010 to 2016 Texas had the largest annual population growth in the nation. The Houston-Galveston area has been amongst the State's fastest growing metropolitan regions.

The population is also ethnically diverse (Figure 2). In 2012, Houston surpassed New York and Los Angeles, CA as the most ethnically diverse city in the United States (Kinder Institute, 2012).
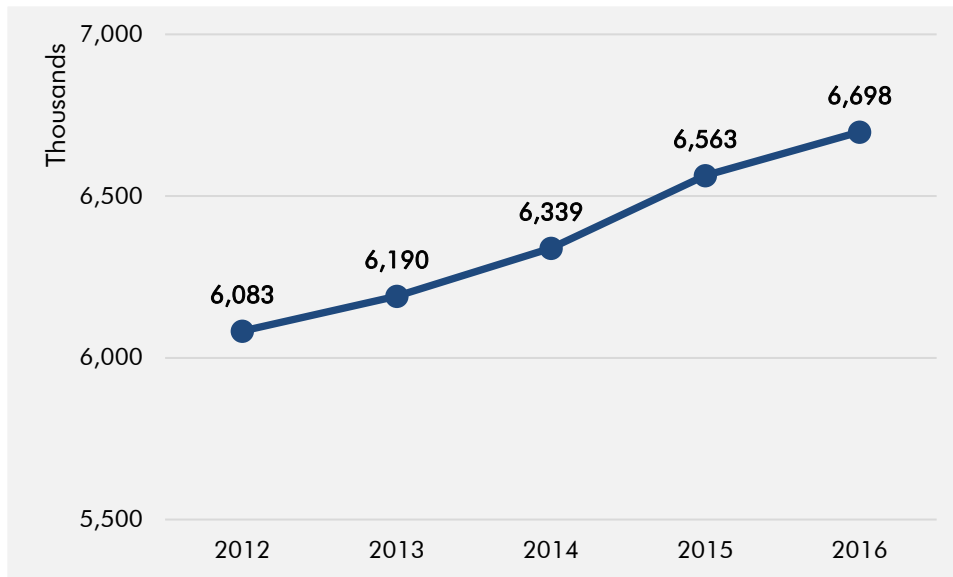
Figure 1: Regional Population 2012-2016 (ACS 2016)
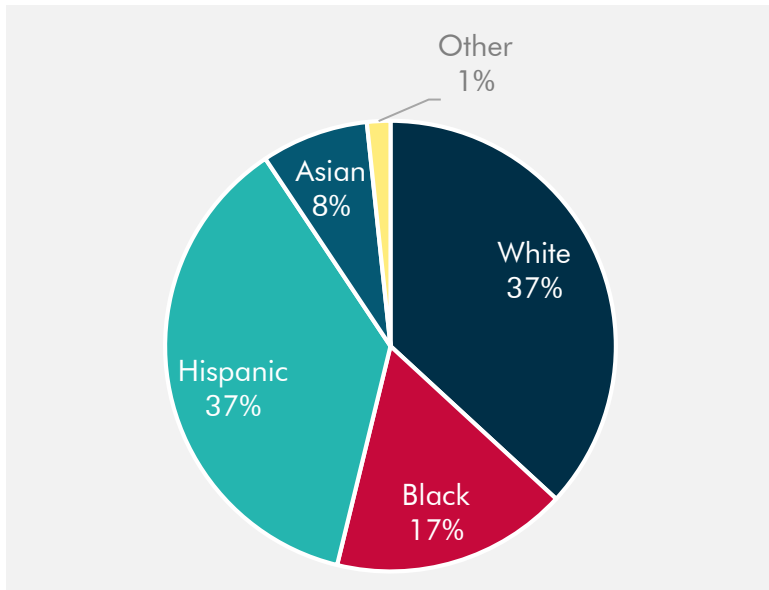
Figure 2: Regional Ethnicity Percentages (ACS 2016)

Annual vehicle miles traveled (VMT) also increased. However, VMT increased more than twice the rate as population grew 21 percent from 2012 to 2016. Annual VMT from 2007 to 2016 is shown in Figure 3.
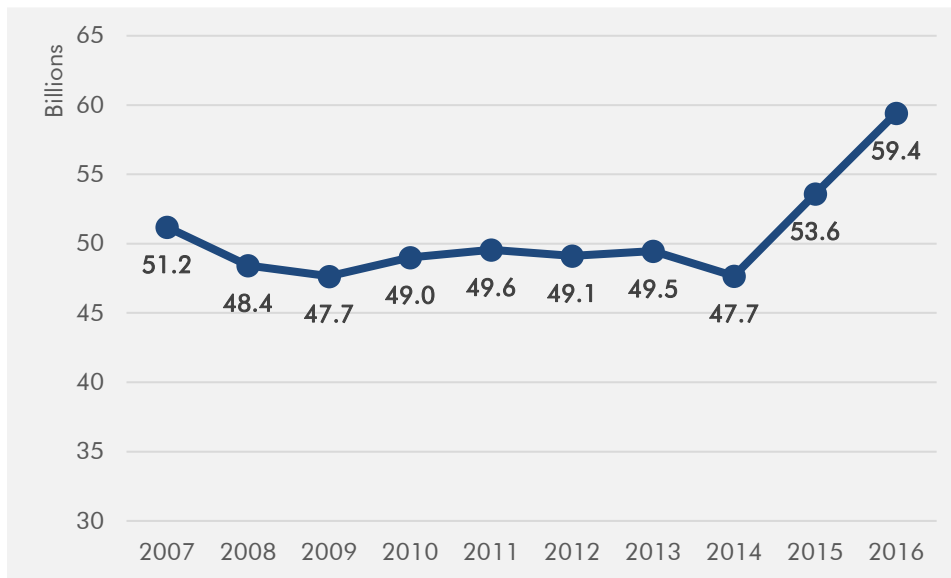
Figure 3: Annual Vehicle Miles Traveled (TxDOT)*

Population growth and increased vehicle miles traveled are undoubtedly factors in the increasing vehicle crashes in region. However, these two factors do not account for the 41 percent increase in vehicle crashes from 2012 to 2016. Figure 4 shows the annual regional vehicle crashes during this period.
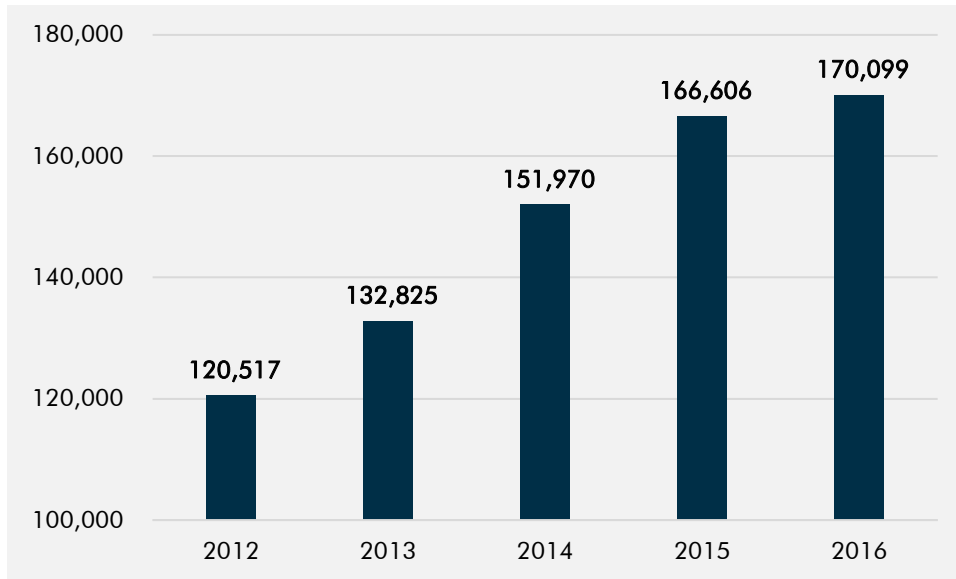
* Annual Vehicle Miles Traveled is the daily number of miles traveled by all vehicles, including trucks, multiplied by 365 days. Starting in 2014, TxDOT began calculating Annual Vehicle Miles Traveled using a different methodology.

** A motor vehicle collision resulting in the injury or death of a person, or that caused property damage in excess of $1,000, that occurred on or near a public roadway (TxDOT)

Figure 4: Annual Motor Vehicle Crashes (TxDOT)**

Likewise, vehicle crash fatalities also increased, rising nine percent during the same period. Fatalities are shown in Figure 5. Serious injuries, shown in Figure 6, also increased over the same period, but showed a marked decrease from 2015 to 2016.
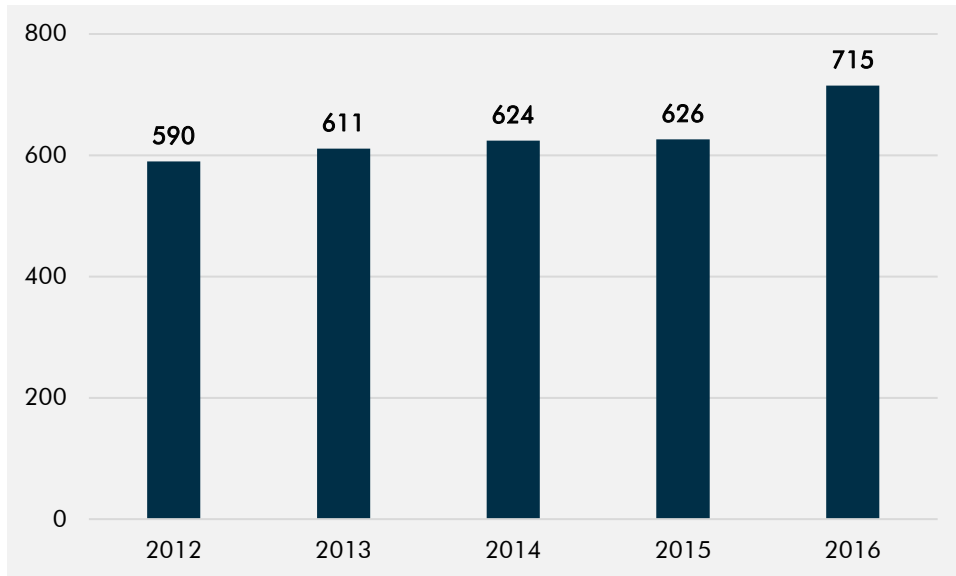
Figure 5: Motor Vehicle Crash Fatalities (TxDOT)
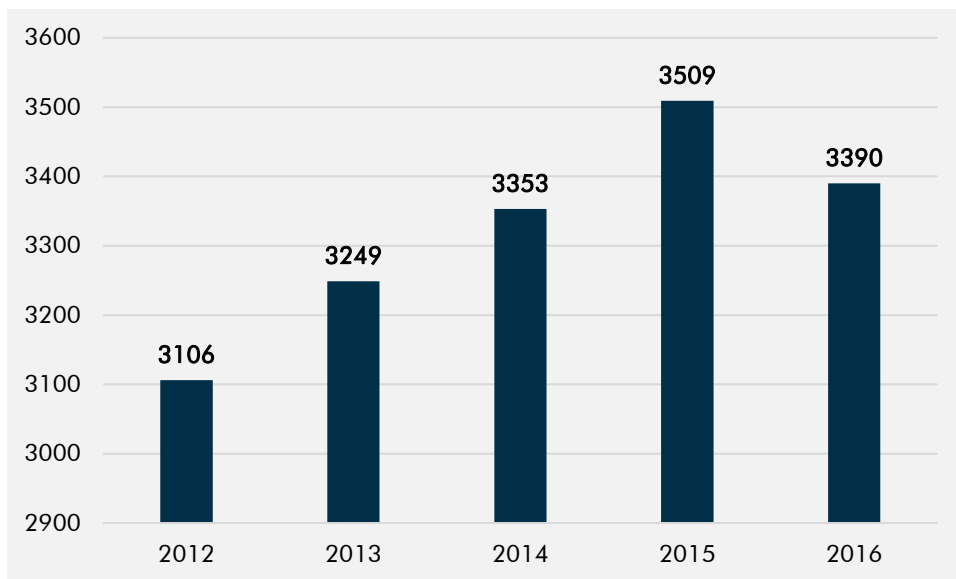
***Footnote: Any injury, other than a fatal injury, which prevents the injured person from walking, driving or normally continuing the activities he was capable of performing before the injury occurred. (TxDOT)

Figure 6: Motor Vehicle Crash Serious Injuries (TxDOT)***
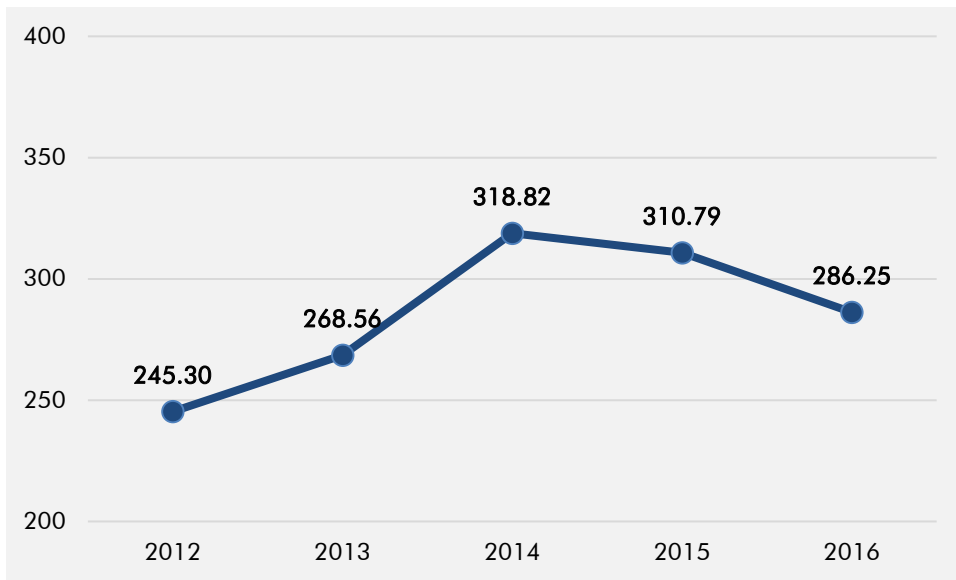
Figure 7: Crash Rate per 100 million Vehicle Miles Traveled

The regional crash rate, shown in Figure 7, has increased approximately 39% in five years. The rate is the number of vehicle crashes in the region for every 100 million miles traveled. Likewise, the Regional Fatalities Rate (Figure 8) shows the number of persons killed in vehicle crashes per 100 million miles traveled. The fatality rate has declined 15 percent since 2014. Both of these rates are a measure of safety of the region's roadways. By comparison, the State vehicle crash rate and fatality rate for 2016 were 210.68*** and 1.44, respectively.
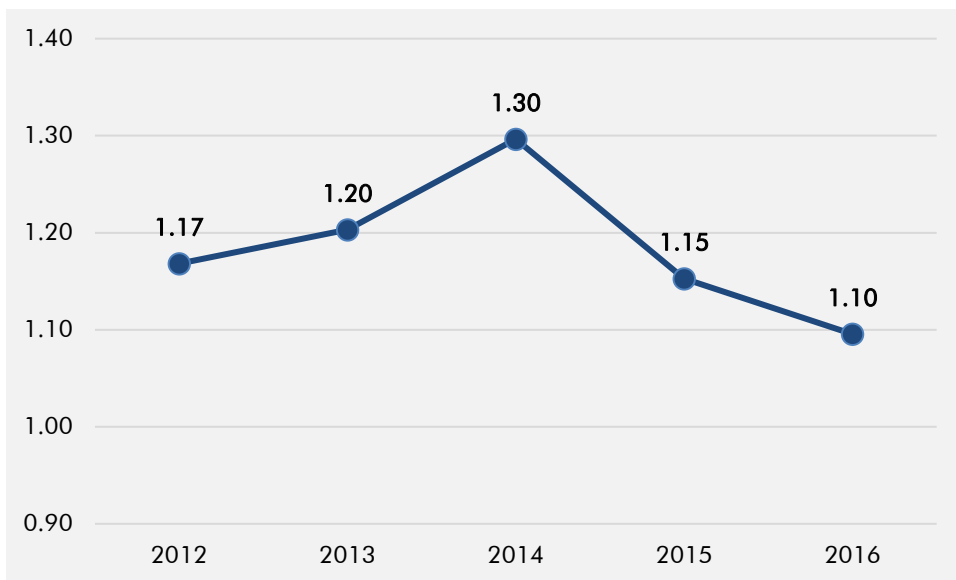
***Footnote: Combined crash rate for all State road types.

Figure 8: Fatality Rate per 100 million Miles Traveled

Regional Crash Characteristics

Table 2 provides a synopsis of region crash type totals and percentages from 2012 to 2016. Regional crash density maps for focus area crash types below are in Appendix B.

Crash Type	Total Crashes	% of Crashes	% of Change	Fatalities	Serious Injuries
All Regional Crashes	742,017	100 %	41 %	3,166	16,607
Speeding	224,798	30 %	45 %	854	4,500
Young Drivers †	140,755	19 %	24 %	124	953
Distracted Driving	93,824	13 %	23 %	312	2,058
Elderly Drivers ††	112,036	15 %	53 %	162	683
Commercial Vehicles	39,007	5 %	40 %	320	955
Unrestrained Occupants	30,283	4 %	34 %	274	862
Impaired Driving (DUI)	17,614	2 %	-3 %	1,412	1,653
Work Zones	17,210	2 %	64 %	82	400
Pedestrian	9,041	1 %	22 %	699	953
Motorcycles †††	9,344	1 %	9 %	731	2,559
Bicycle ††††	4,156	1 %	8 %	120	624
Railroad-related Crashes*	1,801	0.2 %	61 %	18	52

† Youth Driver only

†† Elderly Driver only

††† Motorcycle Driver only

†††† Bicyclist only

*Crashes involving trains, railroad equipment, or railroad devices or infrastructure

Table 2: Regional Crash Type Summary 2012-2016

SPEEDING/AGGRESSIVE DRIVING

The single largest percentage of crashes is speeding or aggressive driving which accounted for 30 percent of the region's crashes. Speeding also caused 27 percent of both the fatalities and serious injuries from 2012 to 2016.

Table 3 shows the percentage of speeding drivers by age group versus their percentage of the driver age population. Adults 20 to 44 years are all over-represented in regional speeding/aggressive driving crashes up by 1.7 times their percentage of the regional driving age population.

As with all the crash types to follow, male drivers dominate the gender percentages of speeding crashes. In the region, males lead females in speeding crashes by a ratio of three to two, as shown in Figure 9.

Figure 10 shows the ethnicity percentages of speeding/aggressive drivers. Whites, Blacks, and Other Races are all over-represented in regional speeding crashes in relation to their percentage of the regional driving age population. Whites are involved eight percent higher than their driver population percentage. For Blacks the overage is seven percent, and for Other Races the over-representation is 100 percent. Asians and Hispanics were under-represented 25 percent and 27 percent respectively in relation to their percentage of the regional driving age population.

In Figure 11, the frequencies of speeding and aggressive driving crashes by hour of day are shown. Nearly half (42 percent) of speeding crashes occurred during AM (6-9 AM) and PM (4-7 PM) peak travel periods.

More than 40 percent of speeding crashes occur Friday thru Sunday. Most speed related crashes however, still occurred Monday thru Thursday (Figure 12). This higher weekday frequency is consistent with the hour of day frequencies in Figure 11.

Almost half (46 percent) of regional speeding crashes happened on highways and tollways. However, roughly half occurred on Farm to Market, county roads, major arterial roadways, and local streets (Figure 13). The nearly even distribution of speeding crashes among at-grade surface roadways and limited access facilities shows that the speeding problem in the region is pervasive.

Age Group	% of Crashes	% of Driving Population
15-19 years	8.6 %	8.9 %
20-24 years	15.1 %	8.7 %
25-29 years	13.9 %	9.7 %
Adults (30-44 years)	32.5 %	28.1 %
Older Adults (45-64 years)	25.2 %	31.2 %
Elderly (65+ years)	4.8 %	13.4 %

Table 3: Speeding Driver Age Percentages
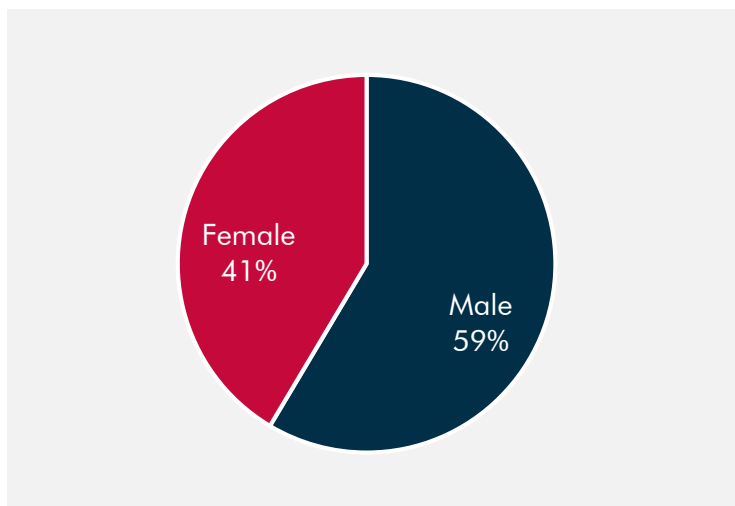
Figure 9: Speeding Driver Gender Percentages
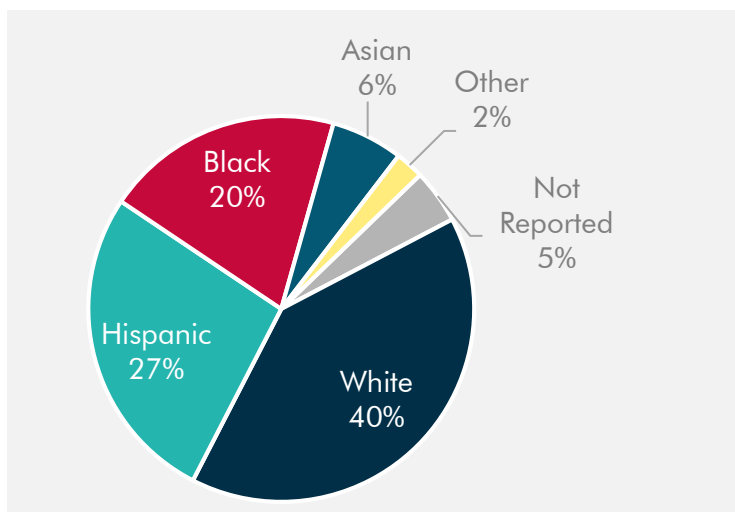
Figure 10: Speeding Driver Ethnicity Percentages
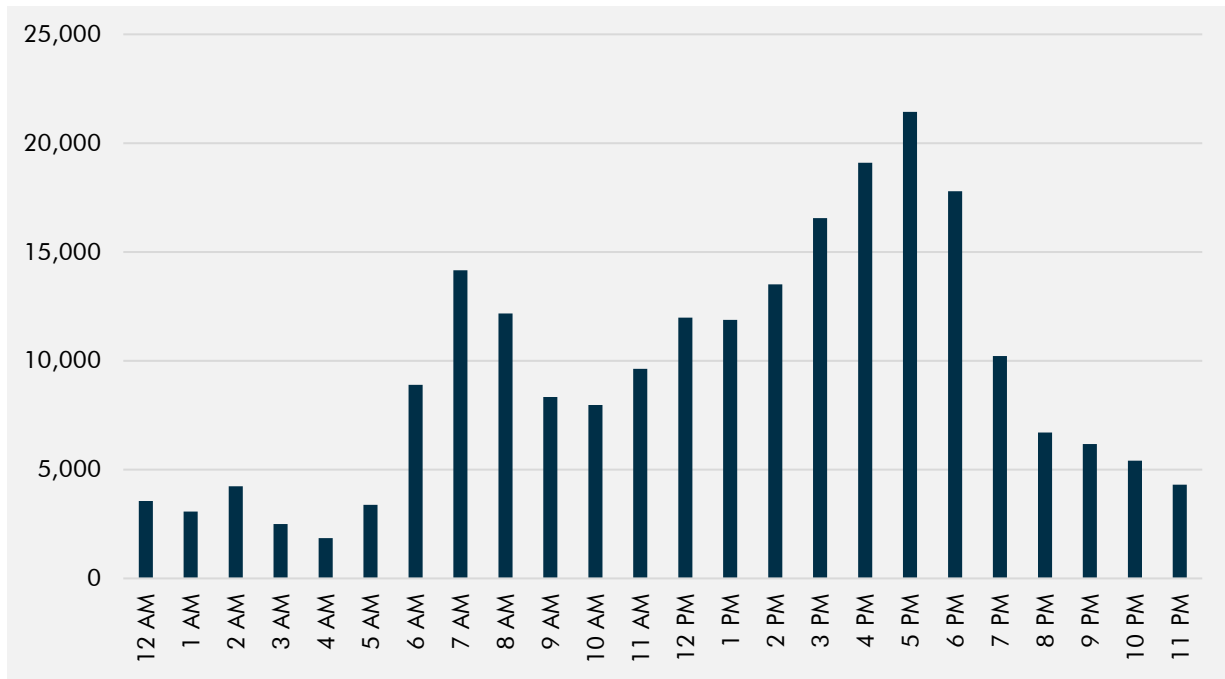
Figure 11: Speeding Crash Frequency by Hour of Day
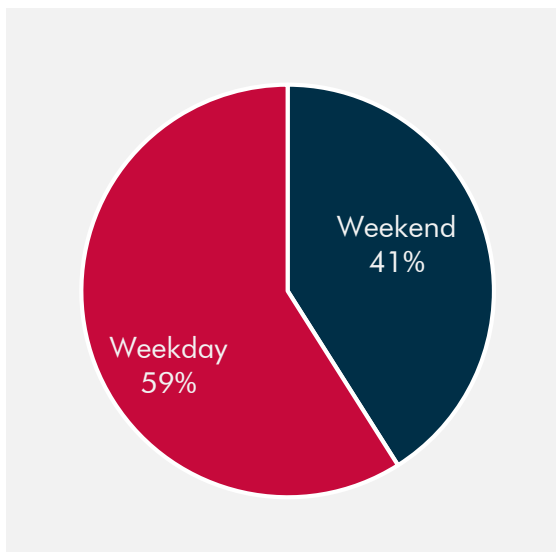
Figure 12: Speeding Crash Weekday Percentages
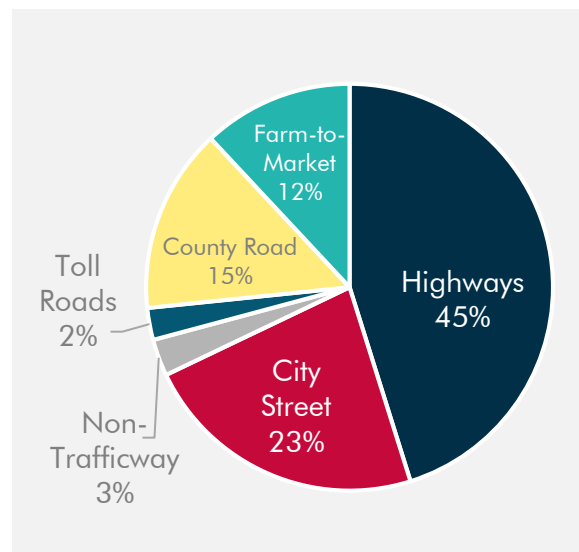
Figure 13: Speeding Crashes by Road Type

IMPAIRED DRIVING

Even though DWI/DUI crashes account for only two percent of all regional crashes (Figure 14), these crashes were responsible for nearly half of the region's motor vehicle crash fatalities (Figure 15). Forty-three percent of impaired driving crashes were DWI crashes. DWI crashes also caused approximately 60 percent of all impaired driving crash fatalities and nearly half of all impaired driving crash serious injuries.

As shown in Figure 16, Hispanics and Other Races are over-represented as drivers involved in impaired driving crashes with respect to their percentage of the regional driving age population. Hispanics are over-represented by 13 percent and Other Races are 100 percent over-represented. Blacks are on par with their driving age population percentage, while Whites and Asains are underrepresented by eight percent and 50 percent respectively.

Like speeding, impaired driving is an overwhelming male problem. Nearly 3 out of 4 impaired crash drivers in the region are male (Figure 17).

Most distributing is the level of driver intoxication in impaired driving crashes. As shown in Figure 18, over 80 percent of intoxicated drivers involved in DWI crashes were from 1 to 3 times over the legal limit of 0.08 Blood Alcohol Content (BAC) at the time of the crash. The regional average BAC level for intoxicated drivers involved in DWI crashes is 0.14 —nearly twice the legal limit (Figure 19). The regional distribution of drivers involved in impaired driving crashes by zip code is shown in Appendix D.
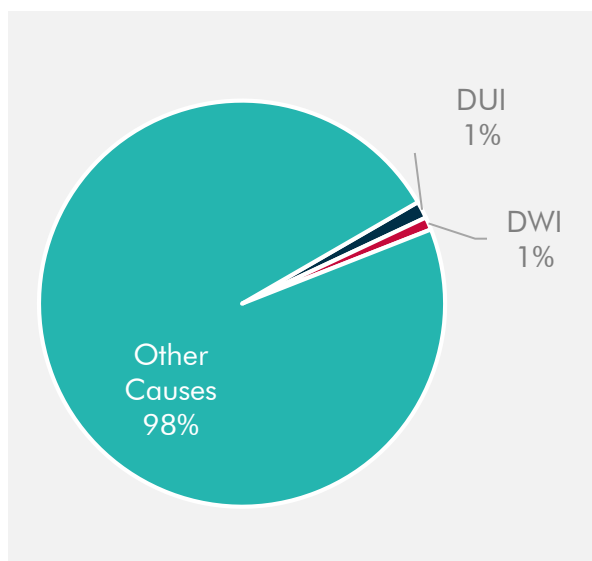
Figures 14: Impaired Driving Crash Percentage Comparison
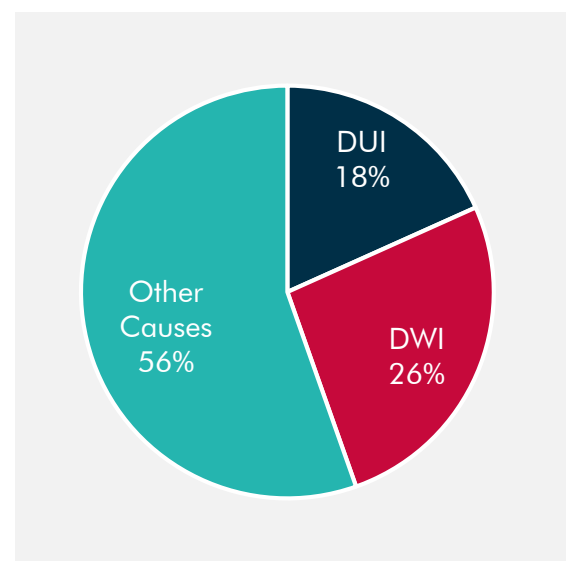
Figure 15: Impaired Driving Crash Fatality Percentage Comparison
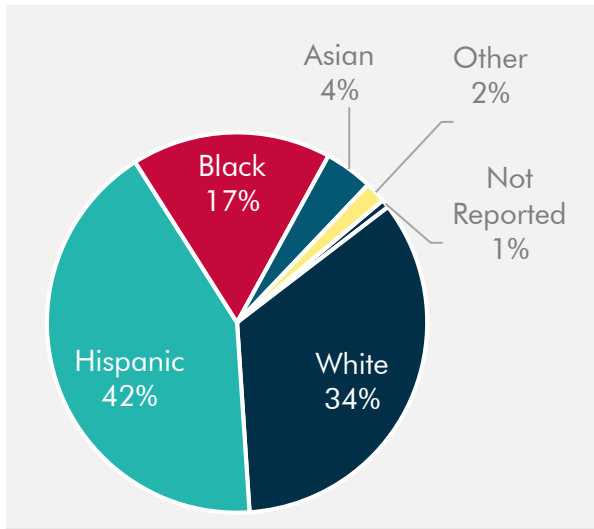
Figure 16: Impaired Crash Driver Ethnicity Percentages
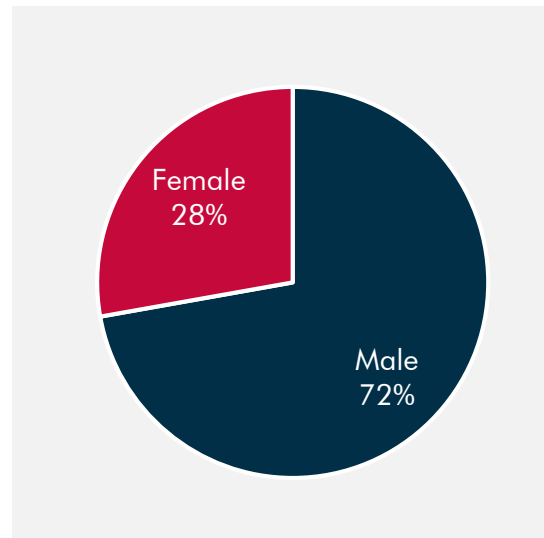
Figure 17: Impaired Driver Gender Percentages
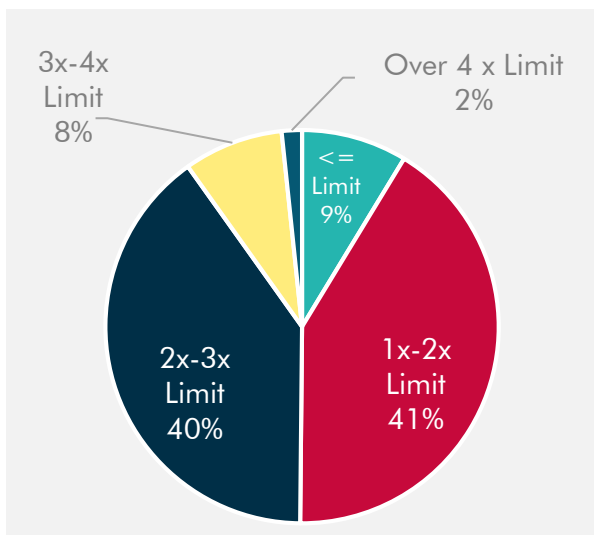
Figure 18: Intoxication Level of Impaired Drivers in DWI Crashes (Legal Limit 0.08 BAC)
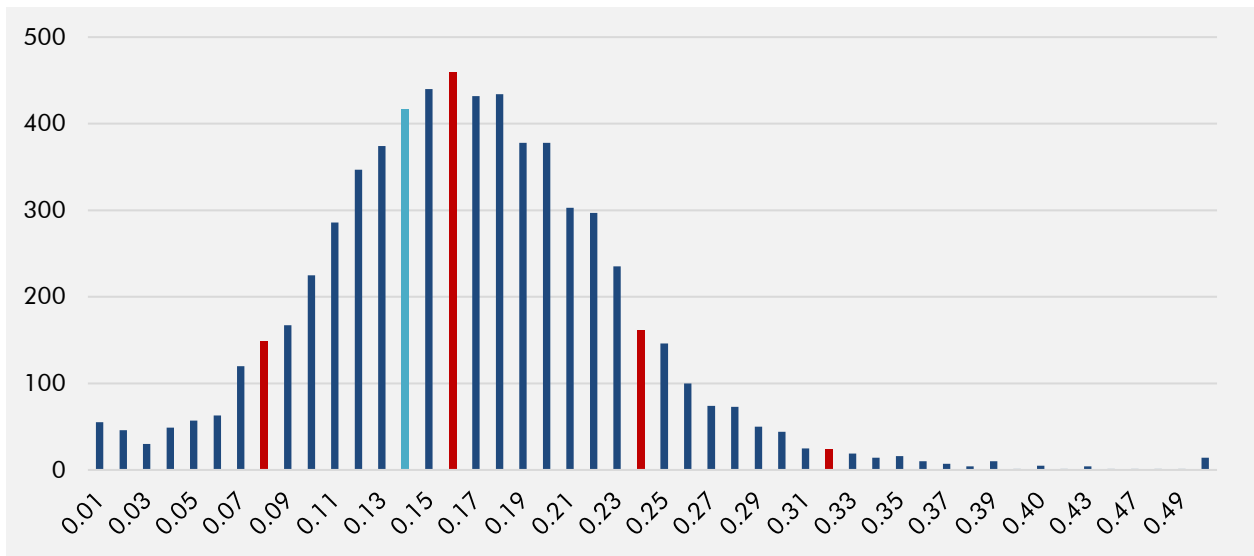
* Red columns are multiples of the legal intoxication limit of 0.08; the teal color column is the regional average BAC level of intoxication for drivers involved in DWI crashes

Figure 19: Impaired Crash Driver BAC Level Distribution*

From 2012 to 2016, there were 559 impaired pedestrians and 86 impaired bicyclists involved in crashes with motor vehicles. These pedestrians and bicyclists had an average BAC level of 0.17.

DISTRACTED DRIVING

Distracted driving crashes are a growing problem regionally. This category of crashes has increased 23 percent in five years, and was responsible for 10 percent of all regional crash fatalities. Mobile phone use was the primary distraction in slightly more than one-third of regional distracted driving crashes (Figure 20). However, these crashes account for approximately two-thirds of all distracted driving fatalities (Figure 21).
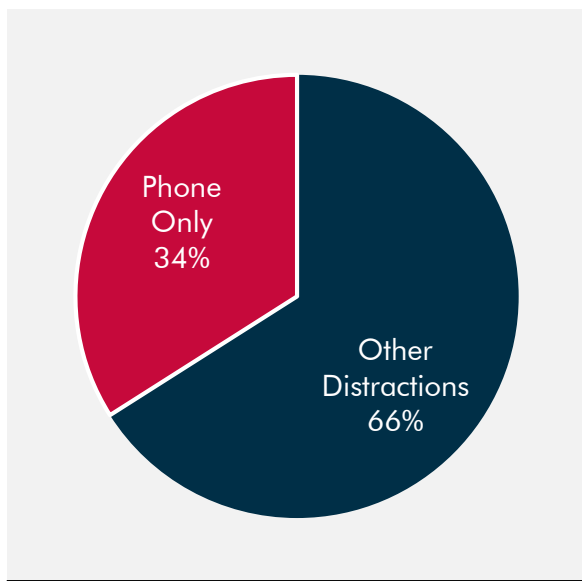
Figure 20: Distracted Driving Crash Primary Cause
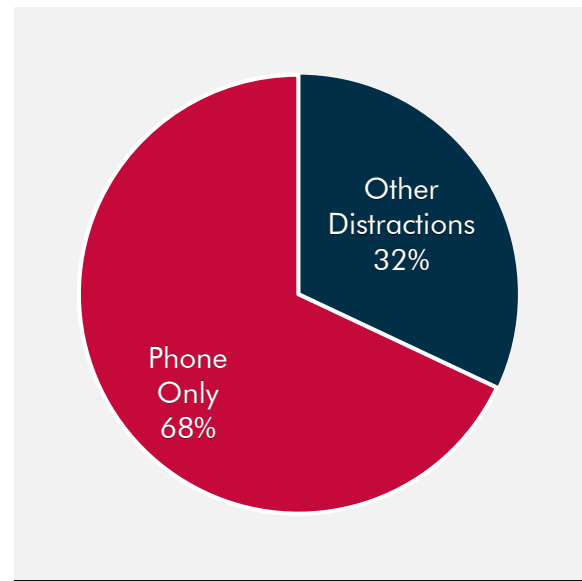
Figure 21: Distracted Driving Fatality Crash Primary Cause

Age Group	% of Crashes	% of Driving Population
15-19 years	9.4 %	8.9 %
20-24 years	14.2 %	8.7 %
25-29 years	12.8 %	9.7 %
Adults (30-44 years)	30.5 %	28.1 %
Older Adults (45-64 years)	26.4 %	31.2 %
Elderly (65+ years)	6.8 %	13.4 %

Table 4: Distracted Driver Age Percentages

Table 4 shows that 20-44 year-old drivers are over-represented in distracted driving crashes in relation to their percentage of the driving age population. The percentage of 20-24 year-old distracted crash drivers is nearly double their percentage of the regional driving age population.

Whites, Blacks, and Other Races are all over-represented in distracted driving crashes in comparison to their percentages of the regional driving age population (Figure 22). Whites are 13 percent higher, Blacks are 12 percent higher, and Other Races are unfortunately, 100 percent higher than their percentage of regional drivers.
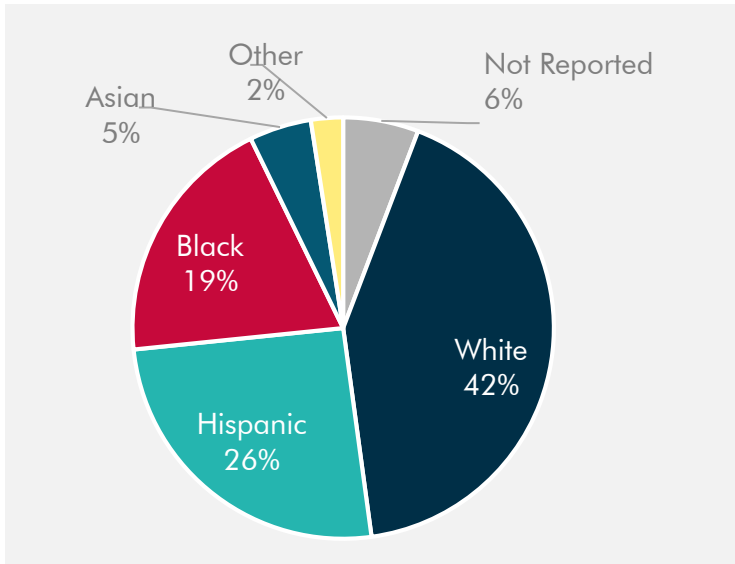
Figure 22: Distracted Driver Ethnicity Percentages

Distracted driving crashes also involve a majority of male drivers. Males are involved in distracted driving crashes over females by a 3 to 2 ratio as shown in (Figure 23). Consistent with other crash types, there is a 3 to 2 ratio of weekday to weekend distracted driving crash occurrences (Figure 24).
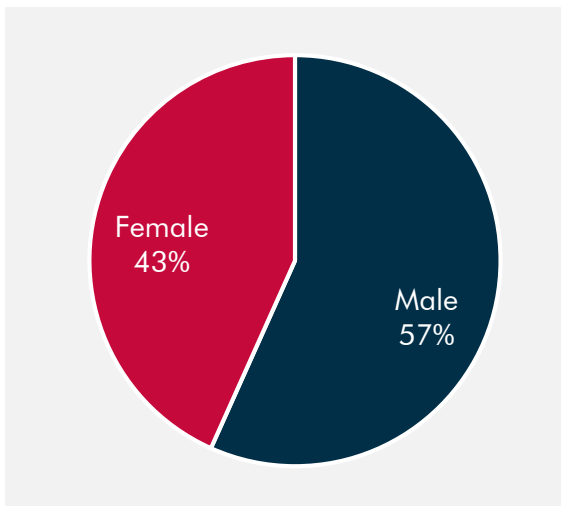
Figure 23: Distracted Driver Gender Percentages
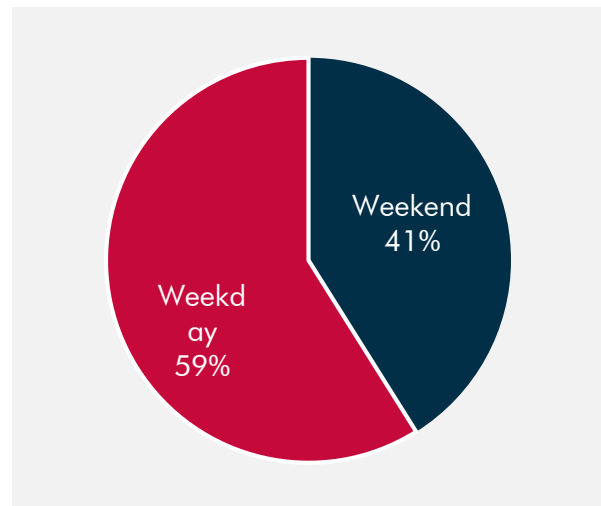
Figure 24: Distracted Driving Crash Weekday Percentages
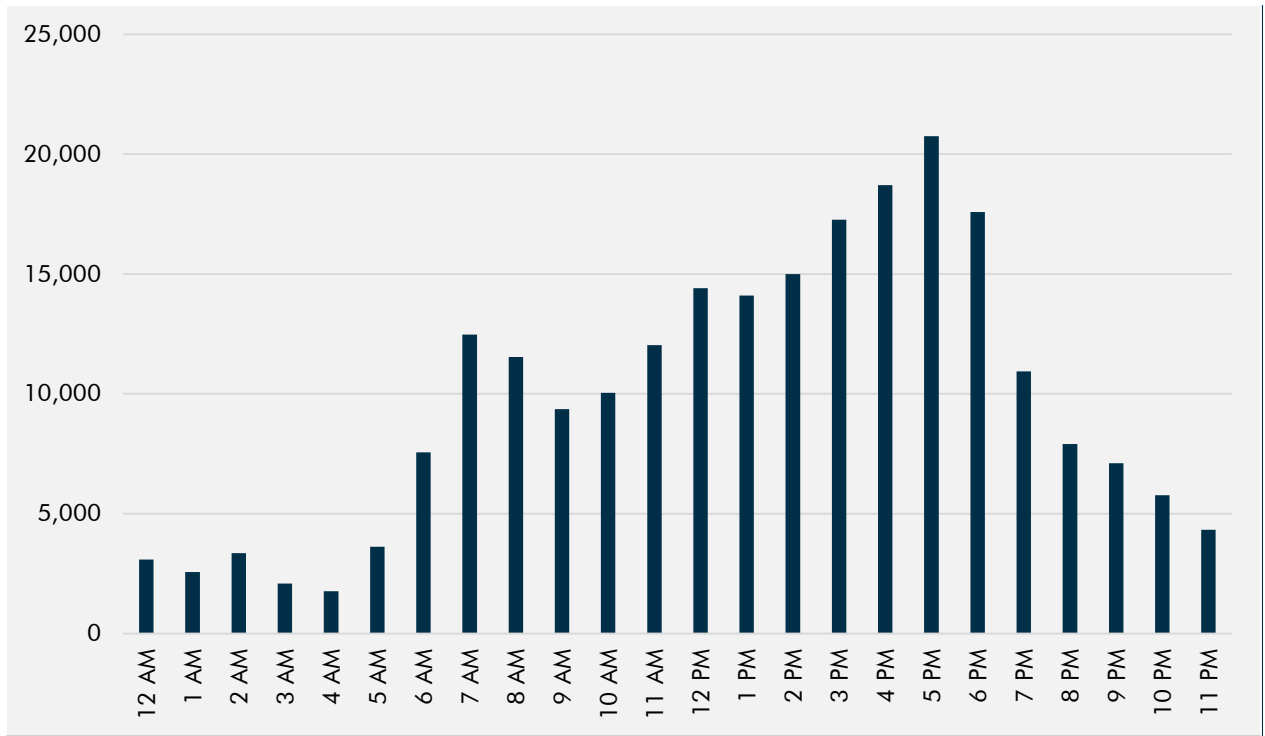
Figure 25: Distracted Driving Crash Frequency by Hour of Day

The hourly frequencies of distracted driving crashes in Figure 25 mirror the histograms of other crash types. More than one-third of distracted driving crashes (38 percent) occur during the AM (6 AM-9 AM) and PM (4 PM-6 PM) peak driving periods. As seen in the chart, distracted driving crash frequencies increase steadily from 1 PM to 5 PM.

BICYCLE & PEDESTRIAN CRASHES

Bicycle and pedestrian crashes are also an area of concern. As illustrated in Figure 26, bicycle and pedestrian crashes together represented only two percent of all regional crashes from 2012 to 2016. However, as shown in (Figure 27), these crashes accounted for more than one quarter of the regional fatalities during the same period.
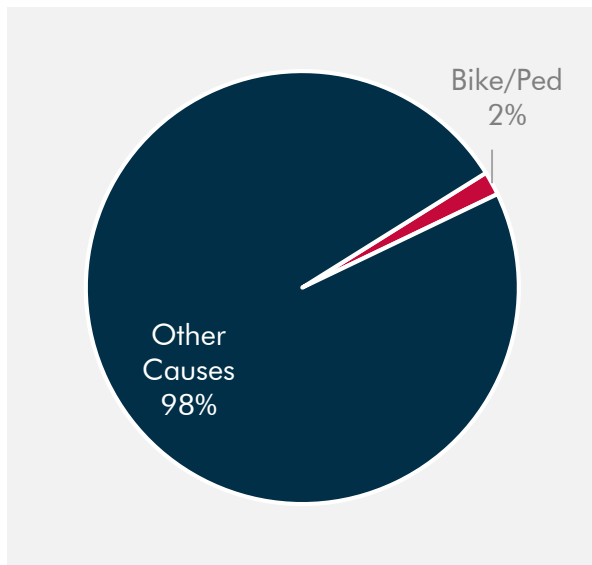
Figure 26: Bicycle & Pedestrian Crash Percentage Comparison
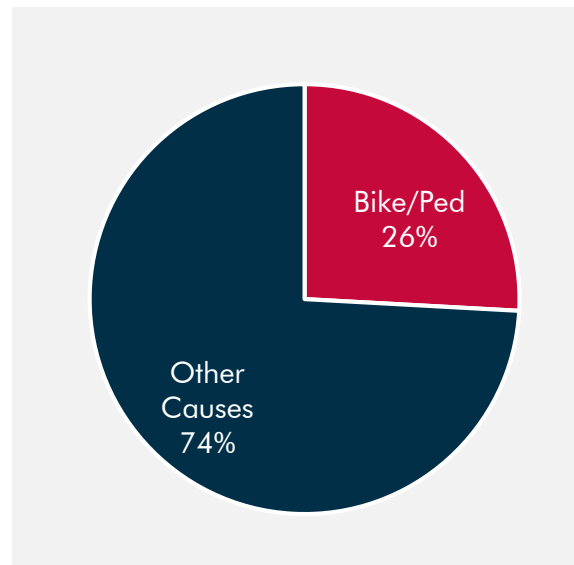
Figure 27: Bicycle & Pedestrian Fatality Percentage Comparison

Analysis of bicycle and pedestrian crashes provides some interesting insights into the characteristics of conditions and persons involved in these types of crashes. The characteristics of these crashes are important for developing effective countermeasure strategies to reduce the number of these types of crashes.

First, the majority of persons involved in bicycle and pedestrian crashes are male. Eight of 10 bicyclists (Figure 28) and six out of 10 pedestrians (Figure 29) involved in crashes are males. Males outpace females in pedestrian involved crashes by a 3 to 2 ratio, and in bicyclist involved crashes by a 4 to 1 ratio.

The most over-represented age group among pedestrian and bicycle involved crashes are 41 to 64 years. As shown in Figures 30 and 31, this age group represents one-third of all bicycle-involved crashes, and nearly one-third of all pedestrian-involved crashes. This age group is involved in bicycle crashes 83 percent more, and pedestrian crashes 72 percent more, than their percentage of the region's population. All other age groups are under-represented with respect to their percentage of regional population.

Ethnically, Blacks and Other Races are at higher risk than other ethnic groups. As shown in Figures 32 and 33, Blacks are nearly one quarter of all bicycle involved crashes, and more than one quarter of all pedestrian involved crashes in the region. Blacks are approximately one and one-third more likely to be involved in a bicycle crash, and one and one-half times more likely to be involved in a pedestrian crash. Other races represent 14 percent of bicycle and pedestrian crashes, respectively. Because the percentage of Other Races in the region is so small (one percent), their percentage of overrepresentation is large. Their involvement in bicycle and pedestrian crashes is 1,300 percent higher than their portion of the population.

In terms of crash locations, more than half of all bicycle-involved crashes occur on city streets (Figure 34). Twelve percent occur along highway frontage roads and shoulders. Another 12 percent happen on non-trafficways. Non-trafficways are typically the entrances to parking lots or facilities. The balance of these crashes (21 percent) happen on county and Farm-to-Market roads.

For pedestrians, the statistics are similar with some important exceptions. As shown in Figure 35, the largest percentage of pedestrian-involved crashes also occurs on city streets. The percentage of crashes on highway frontage roads and shoulders, county roads, and Farm-to-Market roads is also comparable to those of bicycle-involved crashes. However, the percentage of pedestrian-involved crashes on non-trafficways is more than double the percentage for bicyclists.

Like many other crash types, bicycle-involved crashes occur most frequently during morning (6 AM-9 AM) and evening (4 PM-7 PM) peak driving periods. Nearly half of all bicycle-involved crashes occur during these time periods (Figure 36), with the hours between 4 PM to 6 PM having the highest frequencies. This trend is similar to the crash experiences of pedestrians who suffer higher occurrences of crashes around dusk throughout the year, as will be discussed below.

As mentioned in the Impaired Driving section above, 86 bicyclists and 559 pedestrians were intoxicated at the time of the crash with a motor vehicle. These numbers represent two percent of all bicycle-involved crashes and six percent of all pedestrian-involved crashes from 2012 to 2016.
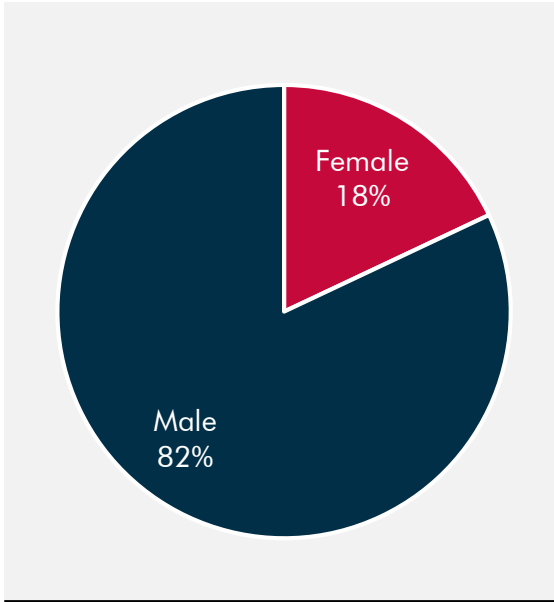
Figure 28: Bicyclist Gender Percentages
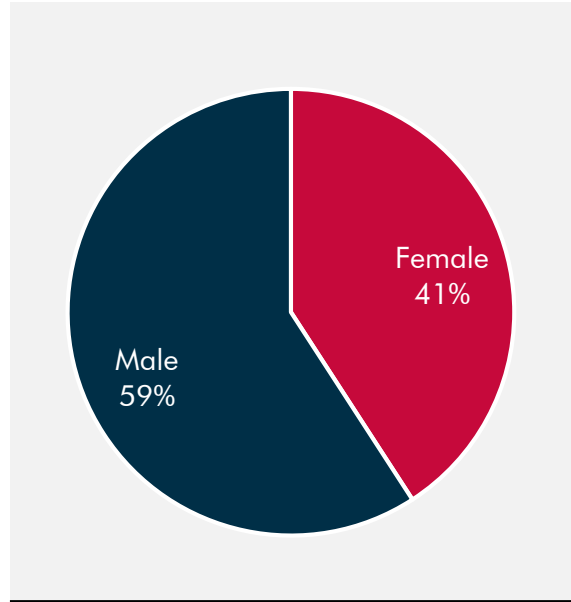
Figure 29: Pedestrian Gender Percentages
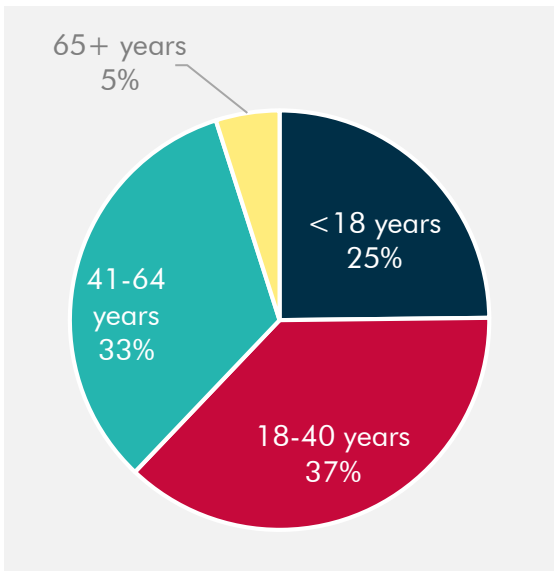
Figure 30: Bicyclist Age Percentages
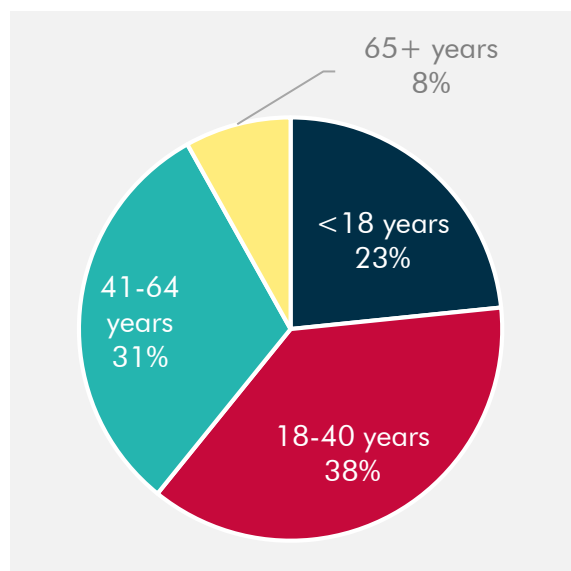
Figure 31: Pedestrian Age Percentages
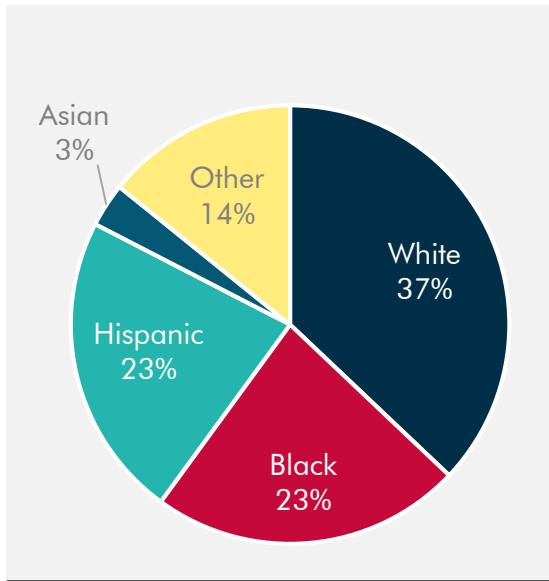
Figure 32: Bicyclist Ethnicity Percentages
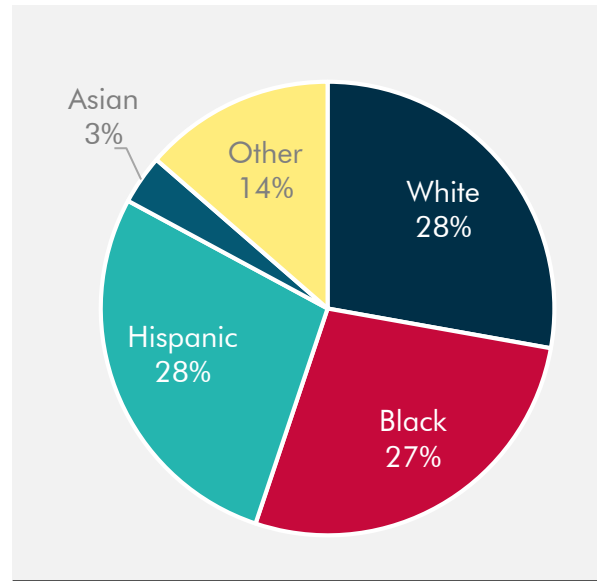
Figure 33: Pedestrian Ethnicity Percentages
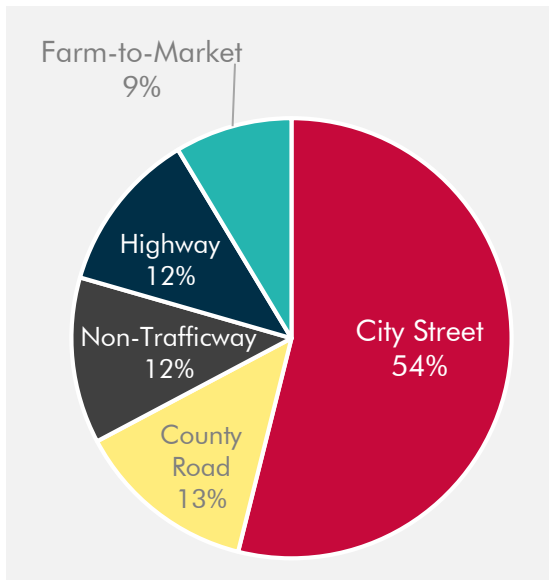
Figure 34: Bicycle Crashes by Road Type
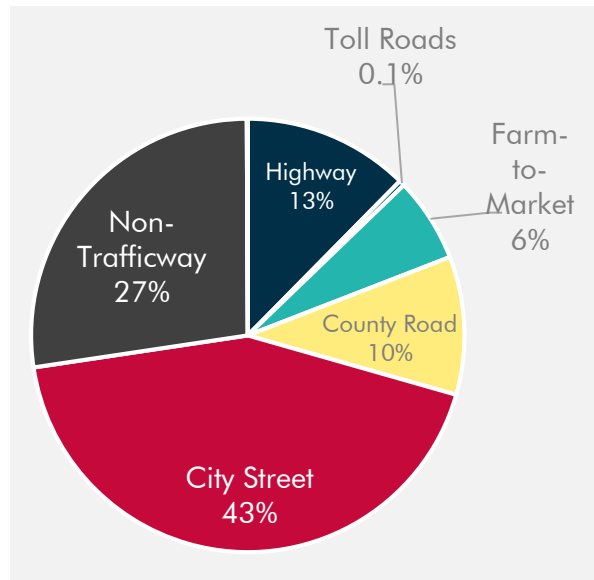
Figure 35: Pedestrian Crashes by Road Type*

*Footnote: Non-trafficway includes private driveways, parking stalls and parking aisles of public parking lots, places away from trafficways, ramps, or roads on airfields, farms, industrial premises, mines, quarries, and private grounds. (TxDOT)
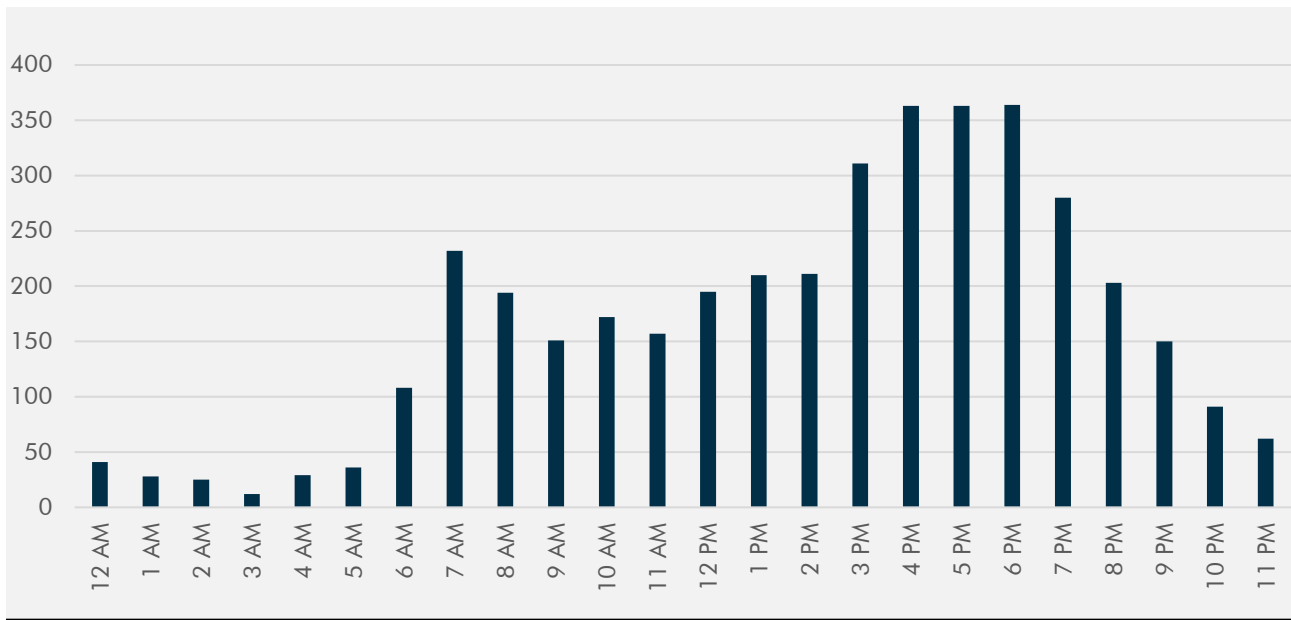
Figure 36: Bicycle Crashes Frequency by Hour of Day

MONTH	12 MID	1 AM	2AM	3 AM	4 AM	5 AM	6 AM	7 AM	8 AM	9 AM	10 AM	11 AM	12 NOON	1 PM	2 PM	3 PM	4 PM	5 PM	6 PM	7 PM	8 PM	9 PM	10 PM	11 PM
January								■	■	■	■	■	■	■	■	■	■	■	●					
February								■	■	■	■	■	■	■	■	■	■	■	●					
March								■	■	■	■	■	■	■	■	■	■	■	■	■	●			
April							■	■	■	■	■	■	■	■	■	■	■	■	●	■	■			
May							■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	●		
June							■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	●		
July							■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	●		
August							■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	●		
September								■	■	■	■	■	■	■	■	■	■	■	■	■	●			
October								■	■	■	■	■	■	■	■	■	■	■	■	●				
November							■	■	■	■	■	■	■	■	■	■	■	■	●					
December								■	■	■	■	■	■	■	■	■	■	■	●					

■ Daylight Hours
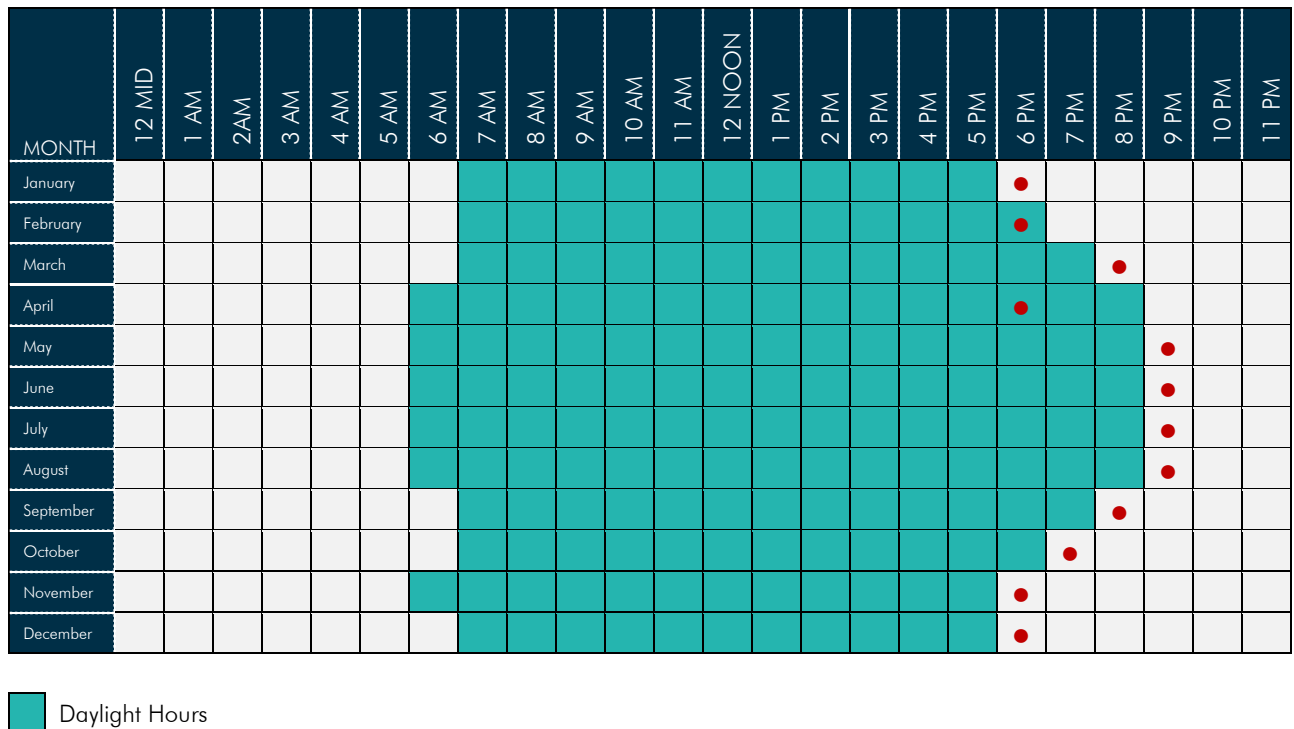
Figure 37: Hour of Day with the Highest Percentage of Pedestrian Crashes by Month

Twilight is the period of the day that occurs between sunset and nightfall. Twilight, can last more than an hour after sunset, depending on the time of year. As shown in Figure 37, with the exception of the months of February and April, twilight is the deadliest time of day for pedestrians in the region throughout the year. The hour after sunset is typically the time with the highest number of pedestrian crashes.

Constantly changing light conditions make driving during twilight more challenging. The mix of diminishing natural light and onset of artificial light use can affect drivers' visual acuity and sight distance. This visual impairment coupled with physical fatigue after the work day can spell disaster for pedestrians who are not alert and highly visible.

State law defines "Daytime" and "Nighttime" [TC 541.401]. In Texas, nighttime legally starts 30 minutes after sunset. The law requires drivers to turn on their vehicles headlights and other legally required illuminating devices at nighttime [TC 547.302], yield the right-of-way to pedestrians [TC 552.003], and exercise due care to avoid collisions with pedestrians [TC 552.008]. However, as the crash experiences in Figure 37 indicate, pedestrians must continue to do their part to remain safe.

Traffic Safety Focus Areas

Based on the crash analysis above, several crash types stand out as problems areas for the Region. These include DUI crashes, Distracted crashes, Speeding and/or Aggressive Driving, as well as Bicycle and Pedestrian crashes. These crashes types account for nearly half of all vehicle crashes in 2016, and well over half of all fatalities during the same period. Addressing these focus areas will have the greatest impact on traffic safety in the near term.

Accordingly, these crash types are the major focus areas of this safety plan. The countermeasures detailed in Section 4—Safety Implementation Strategies specifically address these focus areas. The plan will also provide countermeasures for addressing intersection-related vehicle crashes. Intersection-related crashes account for 37 percent of all regional vehicle crashes during 2016. Besides being an important issue within the Region, H–GAC is also supporting FHWA's initiative to reduce intersection-related vehicle crashes.

Focus Area Category	Percent of All Crashes	Percent of All Fatalities*
Impaired Driving	2%	45%
Bicycle and Pedestrian	2%	26%
Distracted Driving	11%	10%
Aggressive Driving (Speeding)	30%	27%
Intersections	37%	26%

On July 20, 2017, H–GAC hosted the Regional Safety Workshop. The workshop brought together traffic engineers, emergency response personnel, transit providers, bicycle and pedestrian advocates, as well as concerned citizens. The purpose of the workshop was to present the five-year regional crash analysis that identified the focus area crash types and reach consensus on effective countermeasures to address these crashes. In addition, FHWA staff presented information on the intersection safety initiative. The primary focus of the intersection safety countermeasures is low-cost, near-term engineering solutions at high risk locations.

The Regional Safety Council reviewed and endorsed the focus area countermeasures in October 2017. The Regional Safety Council will continue to work with H–GAC staff and regional jurisdictions to fully implement the countermeasures into capital improvement and traffic operation projects.

Regional Safety Programs

H–GAC has a variety of traffic safety programs to address safety issues in the Region. These programs, along with other initiatives developed by H–GAC and regional partners, are some of the means that will be utilized to tackle identified safety issues.

DWI/DUI Task Force

As shown in the crash analysis above, the DUI problem in the Houston-Galveston area continues to plague the region. This region leads the state in alcohol-related traffic fatalities and injuries. Two counties in the 8-county Region had some of the highest DUI crashes in the State in 2016 as shown in Figure 38. In the last several years, increased and enhanced high-visibility DUI enforcement activities have occurred throughout the region when agencies had the funding and resources available.

Since its inception in 2013, H–GAC's Regional DWI Task Force has made 1,087 arrests for intoxicated driving.
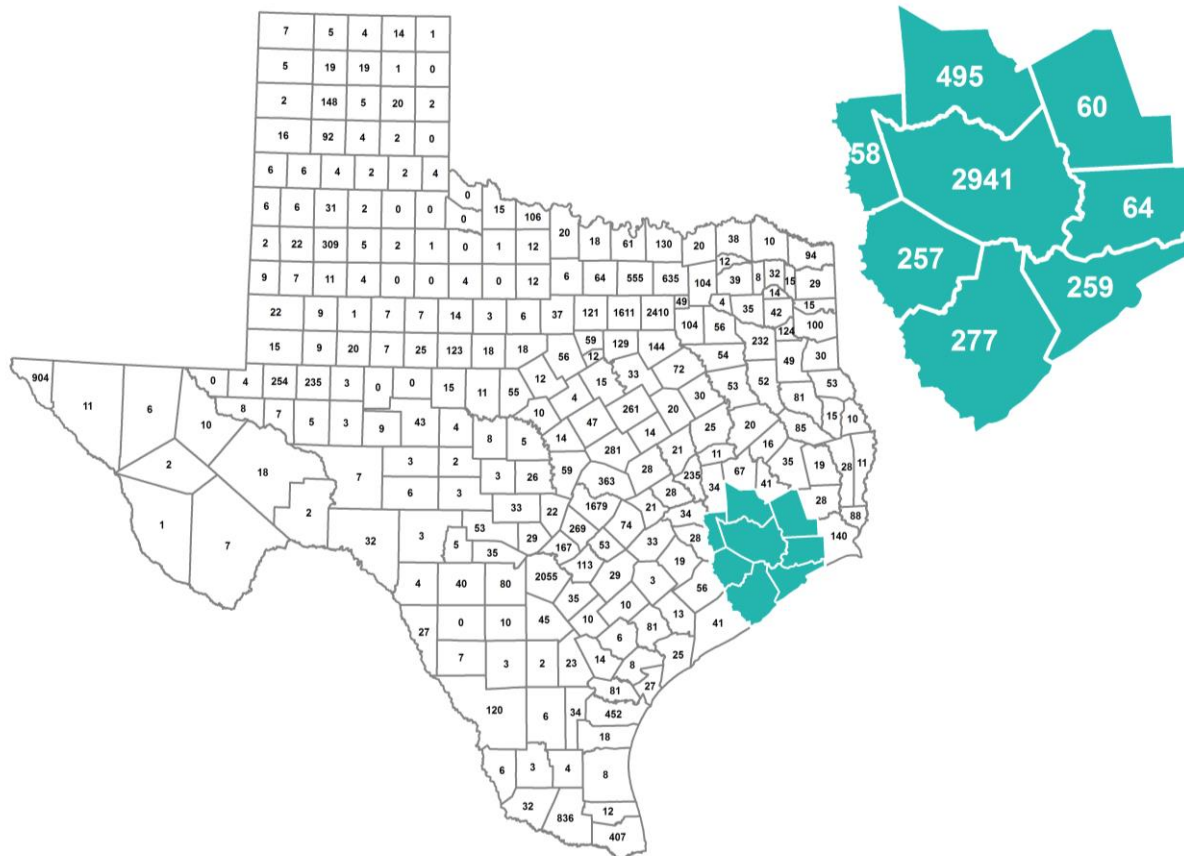
Figure 38: 2016 Statewide DUI Crashes by County (TxDOT)

H-GAC, with the assistance of a TxDOT Selective Traffic Enforcement Program (STEP) grant, is currently in its sixth year of a Regional DWI Task Force that allows officers from smaller agencies to participate in reducing DWI/DUI crashes in the region. This Task Force works alongside other STEP grant operations in the region to maximize the effectiveness of enforcement activities. Currently, 12 agencies participate on the Task Force. Those agencies are listed below and shown in Figure 39 with other regional DWI STEP grant recipients.
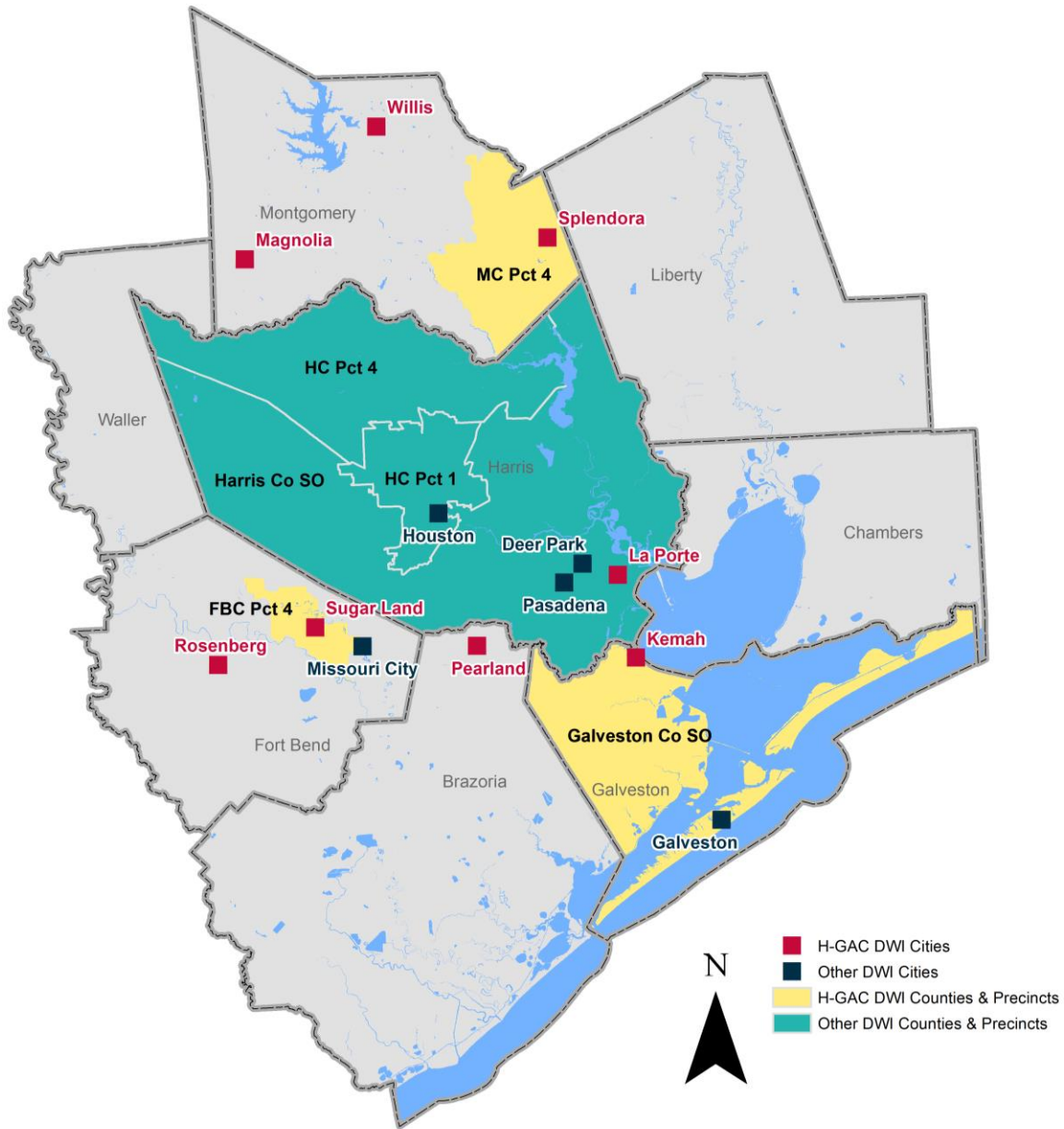
Figure 39: Regional DWI STEP Grant Jurisdictions—FY 2018 (H–GAC/TxDOT)

The overall goals of this effort are to increase DWI enforcement throughout the Houston-Galveston region, to reduce fatalities, injuries and crashes overall due to DWI, and to make the public aware that driving while intoxicated is unacceptable.

REGIONAL DWI TASK FORCE AGENCIES (FY 2018)

- Fort Bend County Constables Precinct 4
- Fort Bend County Sheriff's Office
- Galveston County Sheriff's Office
- City of Kemah Police Department
- City of La Porte Police Department
- City of Magnolia Police Department
- Montgomery County Constables Precinct 4

- City of Pearland Police Department
- City of Rosenberg Police Department
- City of Splendora Police Department
- City of Sugar Land Police Department
- City of Willis Police Department

H-GAC serves as the grant administrator for this Task Force. H-GAC's responsibilities include serving as fiscal agent for the grant, setting up Task Force planning meetings, accepting and processing participating agencies' paperwork, reimbursing participating agencies, and submitting the required documentation to TxDOT. This centralized approach allows participating agencies to spend less time and resources on paperwork and more time on enforcement

Fort Bend County Precinct 4 Constable's Office

Teens in the Driver Seat

Motor vehicle crashes are the leading killer of teenagers in the United States. The Teens in the Driver Seat program, which was conceived by then Texas Transportation Commissioner Esperanza Hope Andrade and the Texas Transportation Institute in 2002, recognizes that teenagers tend to listen more to their peers than to their elders. The program takes a peer-to-peer based approach to reach out to young drivers about safe driving by giving students the tools to craft and deliver their safe driving message to their friends and classmates.

Teens in the Driver Seat students at Memorial High School in Houston speak at a press event to help launch the TxDOT Teen Click it or Ticket Campaign on March 22, 2018.

Regionally, teenage drivers, despite consisting of around seven percent of the population, were responsible for 18 percent of all crashes in the region. To help bring those numbers down, H-GAC has been working with TTI since 2010 to promote and grow the Teens in the Driver Seat program in high schools, middle schools, and now colleges throughout the Houston-Galveston region. Table 5 lists the active schools in the Region in 2017.

Teens in the Driver Seat students at Alief-Taylor High School in Houston focus on impaired driving outreach using a DWI simulator and trivia questions surrounding impaired driving on May 1, 2018.

	High Schools	School or School District
1	Deer Park High School – South	Deer Park ISD
2	Tegeler Career Center	Pasadena ISD
3	Hall Center for Education	Aldine ISD
4	Vistas HS	Klein ISD
5	Tompkins HS	Katy ISD
6	Conroe HS	Conroe ISD
7	Alvin HS	Alvin ISD
8	Memorial HS	Spring Branch ISD
9	Sam Rayburn HS	Pasadena ISD
10	St. Thomas Academy	Private
11	Harmony School of Advancement	Harmony School of Excellence
12	Hightower High School	Fort Bend ISD
13	Conroe High School	Conroe ISD
	Junior Highs	**School or School District**
1	Draw Academy Charter School	Draw Academy
2	Sugar Land MS	Fort Bend ISD
3	Lake Olympia MS	Fort Bend ISD
4	Spring Woods MS	Spring Branch ISD
5	Harmony School of Advancement	Harmony School of Excellence
6	Dean Middle School	Cypress-Fairbanks

Table 5: Regional Teens in the Driver Seat Schools

Teens in the Driver Seat students from Progressive High School in Missouri City pose with motivational speaker Tyson Dever after the entire student body heard his story of how a distracted driver changed his life on April 17, 2018.

Teens in the Driver Seat students and partners from TTI and Memorial Hermann pose together after the safety fair that focused on impaired and distracted driving prevention at Alief-Taylor High School on May 1, 2018.

Regional Incident Management

Safety also means effectively managing current transportation infrastructure and assets. H–GAC has worked with other regional partners to develop and enhance a Traffic Incident Management Program to help alleviate traffic congestion and secondary vehicle crashes caused by disabled automobiles and commercial vehicles. This has been a four-fold effort. First, H–GAC supports the Harris County Sheriff's Office (HCSO) Motorist Assistance Program (M.A.P.). Second, H–GAC has established freeway surveillance for the Region at Houston TranStar. Third, H–GAC is funding the re-implementation of a no-cost disabled vehicle tow program in Houston, TX. Fourth, H–GAC is developing a public outreach campaign to educate the public about the vehicle tow program.

MOTORIST ASSISTANCE PROGRAM

The HCSO Motorist Assistance Program was started in 1986 as a no-cost roadside service along on-system facilities within Harris County. The MAP program helps with the removal of stalled automobiles and crashes, provides traffic control or other support to lessen disruption to traffic flow, and increases safety of traveling public. The MAP Program operates between the hours of 6:00 am. and 10:00 p.m., Monday through Friday, excluding Harris County holidays. MAP personnel currently consists of one (1) Sergeant, one (1) clerk, and eighteen (18) patrol deputies, which operate two shifts a day with nine (9) patrol deputies per shift. Roadways served by MAP are shown in Figure 40.

FREEWAY SURVEILLANCE

HCSO conducts freeway system management monitoring out of Houston TranStar to enhance incident management on the freeway system. Law enforcement and dispatch personnel stationed at Houston TranStar allow for cost-effective monitoring of multiple freeways from one location. Monitoring personnel readily provide initial incident assessment and dispatch of services, such as tow vehicles, Fire/EMSs and law enforcement. Through interagency agreements with participating municipalities, HCSO personnel are

able to conduct remote approvals for non-consent tows of disabled, non-crashed vehicles. While focused on traffic incidents, personnel can also monitor and respond to natural disasters and terrorist acts. Currently, Harris County has TxDOT-camera coverage on approximately 220 miles (75 percent) of Harris County freeways.

QUICK CLEARANCE TOW PROGRAM

To reduce congestion and secondary accidents caused by disabled vehicles, regional incident management agencies decided to reintroduce a quick clearance towing program that would be at no charge to the traveling public. Utilizing the SAFEClear concept introduced by the City of Houston, the Program will partner with and reimburse the towing operators that respond to incidents and quickly remove disabled vehicles not involved in crashes from the system to restore the flow of traffic and rapidly relocate stranded motorists from an unsafe situation.

Unlike the City's original program, which only subsidized vehicle tows from the freeway shoulder, the new program will subsidize tows from all moving lanes (excluding toll roads and Katy Managed Lanes which are handled by HCTRA) to reduce confusion for the public, prevent potential altercations with stranded motorists, and restore mobility to the system as rapidly as possible.

Expansion into Harris County will occur through HCSO. Ultimately, the program will expand into adjacent counties. Enabling legislation (SB 1501, 2017 Regular Session) has already been enacted by the State to allow expansion of the Program.

QUICK CLEARANCE OUTREACH CAMPAIGN

The purpose of the Quick Clearance Outreach Campaign is to educate the driving public about which program services (flats, mechanical issues, stalls) will be no-cost, and which services (crashes, abandonments, and prisoner tows) will result in a fee to the motorist. The campaign will explain how selected tow operators are partners in the solution of public safety and enhanced mobility and how participating tow operators are working in conjunction with law enforcement to ensure the public's safety.

This outreach program would utilize various media outlets and approaches to inform the public about the rights of patrons assisted by the program, the various partners working with the program, and how to receive assistance if needed.
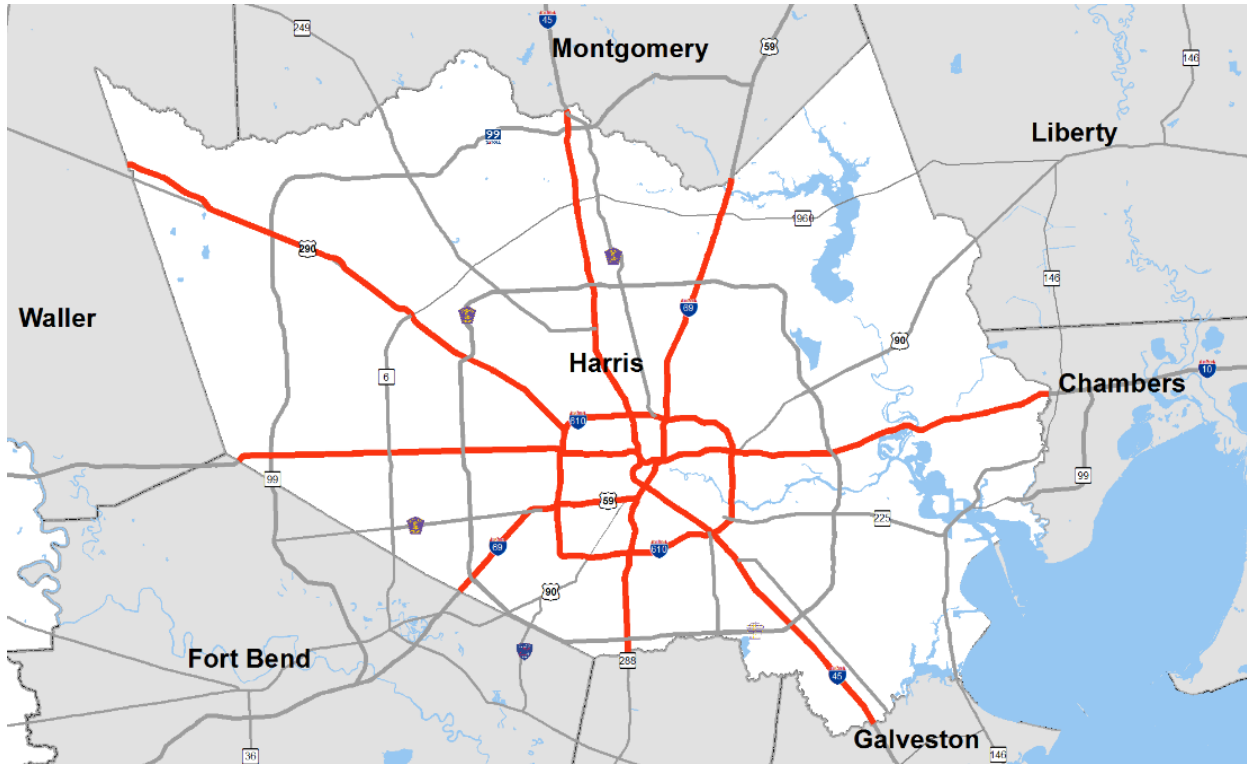
Figure 40: HCSO M.A.P. Service Area Routes

Traffic Incident Management Training

H–GAC has funded Traffic Incident Management (TIM) training since 2015. The program provides monthly training opportunities for first responders and tow operators throughout the region. The TIM training program is an important element of the regional effort to improve incident management response and responder safety.

The comprehensive curriculum uses a common set of practices and engages all responder disciplines – from law enforcement, fire, and emergency medical services, to towing, transportation agencies, and dispatch personnel – all being trained together during the training sessions. Created through the second Strategic Highway Research Program (SHRP2), the training has fundamentally transformed TIM on a national scale, bringing together for the first time a national curriculum in a standardized training format. Training traffic incident responders is vital for achieving the National Unified Goal (NUG) for TIM: Responder Safety; Safe, Quick Clearance; Prompt, Reliable, Interoperable Incident Communications.

Child Safety Outreach Activities

As part of its traffic safety program, H-GAC continues to seek ways to improve the safety of children in relation to motor vehicles. From 2012 to 2016, nearly one-quarter of pedestrian incidents involve

persons under 18 years old. More than 77 percent of bicyclists under age 15 were not wearing helmets. And despite the increase of seatbelt usage, 28 percent of children under eight years of age involved in crashes were not using appropriate child restraints such as booster seats or seatbelts.

In March of 2010, H-GAC contracted with Texas Children's Hospital Center for Childhood Injury Prevention (TCH) and its Safe Kids Coalition to expand its child passenger and bicycle safety outreach assistance. The Safe Kids Coalition is a key provider of education and assistance in the region for proper child safety system installation.

H-GAC'S PARTNERSHIP WITH SAFE KIDS ALLOWED FOR:

- additional training of child seat installation technicians
- expanded bicycle safety education
- provision of bicycle helmets to low-income recipients of new bicycles through the B-Cycle program
- region-wide outreach effort regarding new child restraint laws

Over the last five years of this partnership, Texas Children's Hospital has trained 148 child passenger safety technicians, including 33 spanish-speaking technicians, distributed more than 25,000 bike helmets to economically-disadvantaged children, held more than 50 bike rodeos for child bicycle safety, provided child safety educational materials to more than 600,000 people, and provided 6,404 child seats to economically-disadvantaged families in the region.

Red Bluff Elementary- Bike to School Day, Pasadena, TX.

Students met at O'Dell Harrison Recreation Center in Pasadena, TX on 05/17/18. Red Bluff Elementary students were preparing to ride to school for National Bike to School Day. Every participant had their helmets inspected and assured for safety, and many were in need of helmets. We measured, fit, and distributed 160 helmets and prepared the students for their bike to school event by educating on-bike safety tips and provided reflective bike lights for the bikers to be seen by cars. Students are pictured waiting for the ride to begin after receiving their helmets. They were then led by school administration as they rode a safe route towards school. The event was a great success! School staff and parents expressed interest in making this a yearly event.

The Woodlands Township and Bike the Woodlands Kids Bike Rodeo, The Woodlands, TX.

Participants aged 3-12 years old participated in the Kids Bike Rodeo for National Bike Month in The Woodlands, TX. Pictured is a young resident of the community, being measured and fitted for a properly fitting helmet. After measuring the child's head circumference, we educated on the three rules to fitting a helmet and allowed the child to assist with hands-on practice on fitting their new helmet, we also simultaneously taught parents how to inspect helmets to fit their child. After receiving their helmet, children also received reflective bike lights to ensure visibility on their bike rides.

No Zone Safety Campaign

The "No Zone" Campaign is part of a public education effort by the Federal Motor Carrier Safety Administration (FMCSA) to educate motorists about how to safely share the road with trucks and buses. The Campaign was created in 1994 as a result of the enactment of the Intermodal Surface Transportation Efficiency Act (ISTEA) in 1991.

Although commercial vehicle crashes are only a small percent of regional crashes (five percent), these types of crashes can have a tremendous impact on mobility and public safety. On average, commercial vehicle crashes take more than an hour to be cleared from the roadway. In extreme cases, commercial vehicle crashes can take several hours to be cleared. Moreover, many commercial vehicles carry hazardous cargo. If certain types of hazardous cargo are compromised, the effects could be widespread and may pose health risks to those in the near vicinity.

The goal of the campaign is to teach drivers about the "No Zones" or blind spots around commercial vehicles in which passenger cars can "disappear", thereby increasing the likelihood of crashes and/or fatalities. Educating the driving public about these "No Zones" is one way of reducing accidents, injuries, and deaths involving commercial vehicles.

One aspect of the "No Zone" Campaign is the placement of "No Zone" decals on tractor-trailers and buses. These 2-foot by 4-foot decals, designed by H–GAC staff, illustrate where the blind spots of commercial

Figure 41: No-Zone Decal

vehicles are located and warn other drivers not to linger in these areas. The H-GAC Transportation Department's Traffic Safety Division has modified and enhanced the original "No Zone" decals (See Figure 41) to more effectively convey the message that driving in the blind spots of commercial vehicles is dangerous and should be avoided.

Currently, H-GAC is attempting to implement a "No Zone" Decal Campaign by partnering with local motor carriers in the Region and having them affix these decals on their trailers and/or buses. In addition, other public outreach efforts will be employed in conjunction with the decals to heighten awareness of blind spots around commercial vehicles.

Traffic Safety Improvement Strategies

Overall Strategies

Improving regional traffic safety will be a collaborative effort. While the MPO can provide leadership and some level of funding, it is the local jurisdictions that will do most of the work. In order for this plan to succeed, H–GAC will have to gain the support of local jurisdictions to implement traffic safety improvements that will help reduce the fatalities and injuries that plague our region.

In line with current guidance, H–GAC is taking a data-driven approach to traffic safety. Accordingly, CRIS data will be utilized to the fullest extent to determine the cause and characteristics of vehicle crashes. Moreover, CRIS data will also be used to analyze demographic information to determine where to target public outreach efforts and educational campaigns.

MPO Crash Reduction Targets

In supporting the State of Texas' efforts to meet its traffic safety targets over the next four years, the H–GAC region must work to reduce traffic crashes of all types, but especially focus on area crashes. Accordingly, the following performance targets represent the minimal annual reduction necessary to decrease the region's portion of traffic crashes and crash rates in the state. Table 6 shows annual traffic crash and crash rate reductions for a five-year period, culminating in a two percent reduction by 2022. The calculations use the same methodology used to obtain state traffic safety performance targets.

Year	Crashes	Fatality Rate**	Serious Injury Rate**	Number of Non-Motorized Fatalities & Serious Injuries
2017*	166,748	1.09	5.10	658
2018	198,498	1.19	6.62	650
2019	210,597	1.19	6.63	669
2020	222,592	1.19	6.64	687
2021	234,483	1.20	6.65	706
2022	246,270	1.20	6.65	724

*2017 numbers are actual figures from CRIS for the region as of April 6, 2018
** per 100 million vehicle miles traveled

Table 6: MPO Crash & Performance Measure Reduction thru 2022

Focus Area Countermeasures

The safety countermeasures listed below were developed through collaboration with regional partners at the Safety Workshop in July 2017 or adopted from the State's Texas Strategic Highway Safety Plan and other sources as applicable. These strategies and countermeasures provide a framework of guidance and best practices for addressing the safety focus areas identified in this plan. Specific project-level actions and costs will be developed in Implementation Actions Plans (See below). A complete list of FHWA and State SHSP countermeasures for each focus area are listed in Appendix F.

IMPAIRED DRIVING

Driving under the influence is responsible for the largest percentage of fatalities in the region. This problem must be addressed in a comprehensive and sustained fashion. In addition to supporting the SHSP strategies and countermeasures (See Figure 42 & Appendix F), H–GAC adopts the following countermeasures (Figure 43) to reduce impaired driving in the region.

1. Use data systems to identify alcohol licensed and permitted locations within a community and Alcoholic Beverage Code violation history at these locations to determine any correlation with alcohol related crashes.
2. Increase education for all road users on the impact of impaired driving and its prevention.
3. Increase officer contacts with impaired drivers through regular traffic enforcement.
4. Improve mobility options for impaired road users.
5. Increase data, training, and resources for prosecutors and officers in the area of drugged driving.

Figure 42: State SHSP Impaired Driving Strategies

Enforcement
Continue and expand Selective Traffic Enforcement Program (STEP) grant
Education
Launch Regional Safety Campaign focusing on Impaired Driving
Develop training for prosecutors and regular patrol officers
Continue and expand the Teens in the Driver Seat (TDS) Program

Establish TDS programs at school in or near high frequency crash locations and zip codes with highest number of drivers involved in impaired driving crashes
Demonstrate to all road users the magnitude of the impact of impaired driving crashes
Place signs along roadways showing the number of DWI/DUI crashes in high frequency crash locations
Encouragement and Empowerment
Increase penalties for test refusal, high Blood Alcohol Content (BAC), repeated offenses etc.
Enforce Administrative License Revocation or Suspension
Expand the use of dedicated DWI courts
Limitations on diversion and plea agreements
Enforce restrictions on license (courses, interlock ignition license and suspension, etc.)
Court monitoring programs for citizens to monitor court activities
Monitor repeating offenders
Encourage and expand program for alcoholism/drug abuse assessment and treatment
Provide and promote alternative transportation options
Promote trip planning using technology
Encourage medical professionals to better inform patients about the effects of medications
Evaluation
Continue to evaluate crash data to monitor the magnitude, frequency and location of impaired driving crashes
Develop and maintain data to identify correlations between impaired driving incidents and Alcohol Beverage Control licensing data by road type, corridor, county and region

Figure 43: Regional Impaired Driving Strategies

There are no known crash reduction factors for impaired driving. However, the strategies listed above are among the proven methods for reducing impaired driving crashes according to the Centers for Disease Control.

BICYCLE-PEDESTRIAN

Bicycle and pedestrian fatalities are the second highest category of fatalities in the region. With increasing interest in alternative modes of transportation for commuting as well as recreation and exercise, ensure the safety of bicyclists and pedestrians is paramount.

The State SHSP only identifies pedestrian safety strategies and countermeasures. However, many of the same strategies and countermeasures for pedestrians are applicable to bicyclists. Bicycle and pedestrian countermeasures and crash reduction factors (if known) will be listed separately below.

In addition to supporting the State SHSP strategies, shown in Figure 44, H–GAC will implement the strategies below (Figure 45) to combat bicycle and pedestrian crashes.

1. Improve driver and pedestrian safety awareness and behavior.
2. Reduce pedestrian crashes on urban arterials and local roadways.
3. Improve pedestrians' visibility at crossing locations.
4. Improve pedestrian networks.
5. Improve pedestrian involved crash reporting.
6. Establish vehicle operating speeds to decrease crash severity.
7. Develop strategic pedestrian safety plans tailored to local conditions.

Figure 44: State SHSP Pedestrian Strategies

BICYCLE

Engineering
Lane Reductions (Road Diet) CRF: 19-47%
Bicycle Lanes
Separated Bicycle Lanes
Bike Boulevard
Intersection markings for bicyclists
School Zone Improvements
Wayfinding
Ensure best practices and countermeasures are incorporated into TIP/RTP projects, as well as local engineering projects as applicable
Perform safety audits at high crash locations
Enforcement
Enforce existing laws against bicyclists and drivers
Education
Launch Regional Safety Campaign focusing on Bicycle safety
Support and expand existing bicycle/pedestrian safety programs
Encourage adoption of bicycle helmets laws

Encouragement and Empowerment
Conduct bicycle/pedestrian feasibility studies throughout the region similar to the feasibility study done in the West Houston Mobility Plan (2015)
Conduct or support Safe Routes to School audits in the region
Evaluation
Use crash data to identify relevant geographic and demographic information about bicycle and pedestrian crashes

Figure 45: Regional Bicycle Crash Reduction Strategies

PEDESTRIANS

Engineering
Lane Reductions (Road Diet) CRF: 19-47%
Reduce Lane Width
Intersection Crosswalk Enhancements for pedestrians
Raised medians
Pedestrian Crossing Islands
School Zone Improvements
Signal Timing/Optimization
Pedestrian Signal/Timing
Wayfinding
Ensure best practices and countermeasures are incorporated into TIP/RTP projects, as well as local engineering projects as applicable
Perform safety audits at high crash locations
Enforcement
Enforce existing laws against pedestrians and drivers
Education
Launch Regional Safety Campaign focusing on Pedestrian safety
Support and expand existing bicycle/pedestrian safety programs
Encouragement and Empowerment
Conduct bicycle/pedestrian feasibility studies throughout the region similar to the feasibility study done in the West Houston Mobility Plan (2015)
Conduct or support Safe Routes to School audits in the region

Evaluation
Use crash data to identify relevant geographic and demographic information about bicycle and pedestrian crashes

Figure 46: Regional Pedestrian Crash Reduction Strategies

DISTRACTED DRIVING

Distracted driving has become an increasingly serious traffic safety problem. The rapid proliferation of mobile devices has ushered in a new era of driver inattention not seen since radios were first installed in automobiles in the 1950's. The State and numerous local jurisdictions have enacted laws against distracted driving, yet the problem persists. Curving these types of crashes will take a broad spectrum of countermeasures to constantly remind and encourage the public to abstain from using mobile devices while driving.

1. Reduce fatalities and serious injuries by identifying and implementing education and awareness strategies to reduce distracted driving.
2. Improve the effectiveness of distracted road user educational techniques, tools, and strategies.
3. Improve and increase enforcement capabilities for addressing distracted driving.
4. Increase the installation of engineering countermeasures known to reduce distracted driving.
5. Use technology to reduce distracted driving crashes, serious injuries, and fatalities.

Figure 47: State SHSP Distracted Driving Strategies

Enforcement
Continue and expand Selective Traffic Enforcement Program grant
Education
Continue and expand the Teens in the Driver Seat Program
Encouragement and Empowerment
Launch Regional Safety Campaign focusing on distracted driving
Encourage the use of technologies to block cell phone use and texting while driving
Promote insurance and other incentives for safe driving

Evaluation
Continue to evaluate crash data to monitor the magnitude, frequency and location of distracted driving crashes

Figure 48: Regional Distracted Driving Strategies

AGGRESSIVE DRIVING (SPEEDING)

Unlike distracted driving, speeding and aggressive driving is an old problem. Virtually all vehicle crashes involve speeding in some fashion. Speeding is the most common contributing factor listed for vehicle crashes. Speed-related crashes account for nearly one-third of all regional vehicle crashes.

1. Use the concept of establishing target speed limits 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, catalogue, 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).

Figure 49: State SHSP Speeding Strategies

Engineering
Engineering safety audits of high frequency crash locations
Install traffic calming measures
Enforcement
Continue and expand Selective Traffic Enforcement Program grant
Education
Launch Regional Safety Campaign focusing on aggressive driving
Encouragement and Empowerment

Encourage companies to install speed regulatory and monitoring systems on commercial vehicles
Evaluation
Continue to evaluate crash data to monitor the magnitude, frequency, and location of aggressive driving crashes

Figure 50: Regional Speeding Strategies

INTERSECTIONS

Thirty-seven percentages of all regional vehicle crashes occur at intersections. H–GAC is supporting both the State SHSP strategies and countermeasures as well as the FHWA's Texas Intersection Safety Implementation Program (TISIP).

The purpose of TISIP is to prioritize high crash frequency intersection locations for near-term countermeasure implementation; strengthen partnerships between TxDOT, MPOs, local governments, and FHWA; and, identify opportunities for enhancing Texas' data systems to allow for more robust systemic analyses in the future. TISIP emphasizes implementation of low-cost proven countermeasures to reduce intersection crashes. As FHWA's website states, "In 2008, FHWA began promoting certain infrastructure-oriented safety treatments and strategies, chosen based on proven effectiveness and benefits, to encourage widespread implementation by State, tribal, and local transportation agencies to reduce serious injuries and fatalities…"

1. Improve data systems for identifying specific intersections and intersection types at high probability for serious injury crashes.
2. Consider alternative design strategies for improving intersection safety.
3. Improve pedestrian safety at intersections with high probability of crashes.
4. Increase driver awareness of intersections.
5. Develop educational campaigns incorporating data analysis to improve intersection safety.
6. Reduce red light running.

Figure 51: State SHSP Intersection Strategies

Engineering
Engineering safety audits of high frequency crash locations
Implement appropriate low-cost safety countermeasures at high frequency crash locations
Enforcement

Continue to expand Selective Traffic Enforcement Program grant
Education
Launch Regional Safety Campaign focusing on intersection-related crashes
Encouragement and Empowerment
Promote implementation of TISIP countermeasures where appropriate.
Evaluation
Continue to evaluate crash data to monitor the magnitude, frequency, and location of intersection crashes

Figure 52: Regional Intersection Strategies

Leadership & Coordination

As the Metropolitan Planning Organization for the Region, H–GAC will leverage its position and resources to champion the implementation strategies in this plan. This will be accomplished through working with the Regional Safety Council, Technical Advisory Committee, the Transportation Policy Council and other groups to integrate this plan's strategies into the transportation planning process. Next, by collaborating with local jurisdictions where safety issues addressed in this plan have been identified. Lastly, by continuing to partner with federal and state agencies to secure and leverage resources and expertise.

Implementation Actions & Goals

The strategies and countermeasures outline above are the first step in addressing the traffic safety issues identified in this plan. The next step is to determine how to implement these solutions.

H–GAC will develop project-level engineering implementation plans for the focus area crash types identified in this plan in high frequency crash locations (See Appendix D), along with other locations requested by local jurisdictions. Implementation action plan development will include collaborating with local jurisdictions to determine leadership (who will be responsible for implementation), specific solutions to implement, general costs, identification of funding sources, and TIP/RTP project recommendations.

H–GAC will collaborate with regional organizations and procure consultants to implement education and public outreach countermeasures listed above as appropriate. These efforts include a regional traffic safety public outreach campaign focusing on the crash types identified in this plan in high frequency crash locations and directed towards demographic groups most prone to be involved in such crashes. See Public Outreach below for additional details.

H–GAC will work to ensure that law enforcement agencies in all high crash frequency locations are utilizing STEP grant funding to increase high visibility enforcement efforts. Recent changes in the STEP grant regulations will allow participating agencies to operate 365 days a year and focus on all STEP grant enforcement activities (DWI, Speed, Intersection, Occupant Restraint, and Distracted). These changes will allow participating law enforcement agencies to be more effective and address multiple traffic safety issues simultaneously.

H–GAC will determine options available to provide law enforcement personnel with additional training on completing the Texas Crash Report Form (CRB-3). Such training will improve the quality of data recorded into CRIS, which in turn will help improve traffic crash analysis.

In addition, the following implementation actions and goals will be taken to advance the purpose of this plan. These actions and goals will serves as benchmarks for measuring progress toward reducing motor vehicle crashes, injuries, and fatalities in the region. The actions outlined below are not inclusive of all actions that may be taken to accomplish the strategies put forth by FHWA, the State SHSP, and this plan. The outcomes of any additional actions taken to implement the strategies in the plan or in support of strategies in other plans will be documented as part of the assessment of overall regional traffic safety effort. Actions and goals are generally grouped by focus area. Some actions may apply to more than one focus area and are in each area for clarity.

IMPAIRED DRIVING

Continue and expand Selective Traffic Enforcement Program (STEP) grant	
Action	Goal
Ensure that all high frequency DWI/DUI crash areas have at least one local law enforcement agency utilizing a STEP grant	1 new local enforcement agency per year
Monitor the number of DWI/DUI arrests by H–GAC Regional STEP Grant Agencies	100 DWI/DUI arrests per year by H–GAC Regional STEP Grant Agencies

Launch Regional Safety Campaign focusing on Impaired Driving	
Action	Goal
Track number of media exposures regarding impaired driving	10,000 exposures
Track distribution of printed materials for Regional Safety Campaign	1,500 pieces
Track PI&E Activities for DWI STEP Grant	4 activities per year
Track distribution of printed materials for DWI STEP Grant	1,500 pieces

Continue and expand the Teens in the Driver Seat (TDS) Program	
Action	Goal
Establish TDS programs at school in or near high frequency DWI/DUI crash locations and zip codes with highest number of drivers involved in impaired driving crashes	1 chapter per year

Demonstrate to all road users the magnitude of the impact of impaired driving crashes	
Action	Goal
Place signs along roadways showing the number of DWI/DUI crashes in high frequency crash locations	1 sign per year

Encourage and expand program for alcoholism/drug abuse assessment and treatment	
Action	Goal
Increase the number of treatment programs in the region	1 program every 2 years

Figure 53: Impaired Driving Reduction Actions and Goals

DISTRACTED DRIVING

Continue and expand Selective Traffic Enforcement Program (STEP) grant	
Action	Goal
Ensure that all high frequency distracted driving crash areas have at least one local law enforcement agency utilizing a STEP grant	1 new local enforcement agency per year
Monitor the number of distracted driving citations issued by H–GAC Regional STEP Grant Agencies	50 Distracted Driving Citations per year by H–GAC Regional STEP Grant Agencies

Launch Regional Safety Campaign focusing on Impaired Driving	
Action	Goal
Track number of media exposures regarding distracted driving	10,000 exposures
Track distribution of printed materials for Regional Safety Campaign	1,500 pieces

Continue and expand the Teens in the Driver Seat (TDS) Program	
Action	Goal
Establish TDS programs at school in or near high frequency distracted driving crash locations and zip codes with highest number of drivers involved in distracted driving crashes	1 chapter per year

Figure 54: Distracted Driving Reduction Actions and Goals

SPEEDING/AGGRESSIVE DRIVING

Continue and expand Selective Traffic Enforcement Program (STEP) grant	
Action	Goal
Ensure that all high frequency speeding crash areas have at least one local law enforcement agency utilizing a STEP grant	1 new local enforcement agency per year

Monitor the number of speeding citations issued by H–GAC Regional STEP Grant Agencies	100 Speeding Citations per year by H–GAC Regional STEP Grant Agencies

Launch Regional Safety Campaign focusing on Speeding & Aggressive Driving	
Action	Goal
Track number of media exposures regarding speeding and aggressive driving	10,000 exposures
Track distribution of printed materials for Regional Safety Campaign	1,500 pieces

Continue and expand the Teens in the Driver Seat (TDS) Program	
Action	Goal
Establish TDS programs at schools in or near high frequency speeding and aggressive driving crash locations and zip codes with highest number of drivers involved in speeding and aggressive driving crashes	1 chapter per year

Engineering safety audits of high frequency crash locations	
Action	Goal
Conduct safety audits at speeding crash locations	2 audits per year

Figure 55: Speeding & Aggressive Driving Reduction Actions and Goals

INTERSECTIONS

Continue and expand Selective Traffic Enforcement Program (STEP) grant	
Action	Goal
Ensure that all high frequency intersection crash areas have at least one local law enforcement agency utilizing a STEP grant	1 new local enforcement agency per year
Monitor the number of ITC citations issued by H–GAC Regional STEP Grant Agencies	100 ITC Citations per year by H–GAC Regional STEP Grant Agencies

Promote implementation of TISIP countermeasures	
Action	Goal
Assist with implementing TISIP countermeasures	2 projects per year

Engineering safety audits of high frequency crash locations	
Action	Goal
Conduct safety audits at high frequency intersection crash locations	2 audits per year

Figure 56: Intersection Safety Actions and Goals

BICYCLE/PEDESTRIAN

Identify locations for bicycle/pedestrian infrastructure	
Action	Goal
Conduct bicycle/pedestrian feasibility studies throughout the region similar to the feasibility study done in the West Houston Mobility Plan	1 study per year

Launch Regional Safety Campaign focusing on Bicycle & Pedestrian Safety	
Action	Goal
Track number of media exposures regarding bicycle and pedestrian safety	10,000 exposures
Track distribution of printed materials for the Regional Safety Campaign	1,500 pieces

Promote Adult Bicycle Safety Training	
Action	Goal
Procure a consultant to conduct adult bicycle safety training classes in the region	10 classes per year

Engineering safety audits of high frequency crash locations	
Action	Goal
Conduct safety audits at high frequency intersection crash locations	2 audits per year
Conduct or support Safe Routes to School audits	1 audit per year

Figure 57: Bicycle & Pedestrian Safety Actions and Goals

Public Outreach

Broad, diverse, and sustained public outreach is critical to the success of this plan. The true key to improve traffic safety is changing behavior, and to do that continuous and constant messaging and interaction are required. In that regard, H–GAC will initiate a broad-based safety outreach effort in addition to its traditional public outreach activities, and along with state-wide safety programs.

H–GAC is set to launch a Regional Safety Campaign in 2018. The initial two-year campaign will concentrate on safety messaging for the five focus areas of this plan. The project will fund the creation of a campaign with all necessary materials to convey the message and concepts of transportation safety, including the creation of ads, brochures and flyers, and production of radio and television ads/PSAs, etc. The project's benefits will be multi-faceted. By broadening all citizens' knowledge about the rules of the road, more cooperative and lawful behavior will result.

Funding for the Regional Safety Campaign will also continue to support on-going safety projects with Texas Children's Hospital and TTI. H–GAC will continue promoting other safety campaigns and initiatives, including the Regional DWI Task Force and the NO ZONE commercial vehicle safety campaign.

Data Collection & Analysis

The development and updating of this plan is a data-driven process. Accordingly, H–GAC will continue to utilize the most current and accurate traffic safety data available, information for the TxDOT Crash Record Information System (CRIS), the NTHSA Fatality Analysis Reporting System (FARS), and other reliable data sources.

Alignment with & Support of Other Plans

The regional safety plan was developed in concurrence with the TxDOT Texas Strategic Highway Safety Plan (TSHS). The TSHS is the State's plan for addressing traffic safety issues in Texas. TxDOT developed the first state safety plan in 2006, and the TSHS is updated every four years.

Several of the focus areas in this plan mirror emphasis areas in the TSHS. They include Impaired Driving, Distracted Driving, Speeding, and Pedestrian Safety. A complete list of TSHS Emphasis Areas is shown in Table 7.

1. Distracted driving 2. Impaired driving 3. Intersection safety 4. Older road users 5. Pedestrian safety 6. Roadway and lane departures 7. Speeding	**TSHS Mission Statement** Texans will work together on the road to zero traffic fatalities and serious injuries **TSHS Vision Statement** Texas envisions a future with zero traffic fatalities and serious injuries

TABLE 7: SHSP Emphasis Areas (TxDOT)

In addition to aligning with the State safety plan, this plan seeks to be compatible with other planning efforts at H–GAC. Traffic safety affects every aspect of modern life. Accordingly, incorporating safety goals and implementation strategies into other planning efforts, where appropriate, ensures safety goals will be achieved sooner for the benefit of the public.

This plan will, to the greatest extent possible, align and/or incorporate its goals, objectives, and strategies into other plans such as the Congestion Management Process Plan, RTP, TIP, Homeland

Security planning efforts, Regional Hazard Mitigation Plans, the Regional Transit Coordination Plan, Area Agency on Aging planning efforts, Livable Centers Planning Initiatives, and others.

The intent is to develop confluent goals and objectives, where possible, and utilize similar strategies where applicable. Moreover, seek out opportunities to align and/or co-develop programs and projects with regional partners and private organizations to expedite outcomes and leverage resources.

Evaluation & Feedback

A final, but important aspect of this plan is the evaluation of implementation progresses, completed project effectiveness, and continued validation of the plan's goals and objectives. This feedback will ensure the safety plan is addressing the right issues the right way.

Plan evaluation will become a regular item of consideration for the Regional Safety Council. In addition, H–GAC will seek the input of its other committees and councils, as well as the general public, where appropriate, to ensure the broadest spectrum of stakeholders are consulted regarding the plan direction and effectiveness.

H–GAC will prepare an annual report on the status of implementation efforts and to update traffic safety performance measures. This report will be presented to the Regional Safety Council, the Technical Advisory Committee, and Transportation Policy Council.

Plan Review, Adoption & Update

This plan will be reviewed and updated every four years, typically one year after the state adopts its latest State Highway Safety Plan. The plan will also be reviewed and revised due to changes in federal or state laws and regulations. Moreover, the plan will also incorporate applicable elements from RTP, TIP, and other plans.

This plan, and all future updates and/or modifications, will be reviewed and approved by the following groups in the order listed. Information about each of these groups can be found in Appendix A.

1. Regional Safety Council (Technical and editorial review and approval)
2. Technical Advisory Committee (Review and recommendation to TPC)
3. Transportation Policy Council (Review and formal adoption)
4. TXDOT Transportation Planning and Program Division–Houston District (Courtesy technical review)
5. FHWA Region 6 Safety Section (Courtesy technical review)

Comments from all groups listed will be considered and incorporated into any revisions as appropriate.

Appendix A: MPO Committees

Regional Safety Council

The RSC's purpose is to advise the TPC on the development of its safety program as well as to promote safety coordination with other planning activities. The Council can have up to 25 members for various safety-related backgrounds.

Primary Member	Organization
Tim Kelly, Chairperson	METRO
Bennie Boles	La Porte PD
Lisa Minjares-Kyle	Teens in the Driver's Seat
Kristen Beckworth	Texas Children's Hospital
Mary Blitzer	Bike Houston
Jeff Weatherford, P.E.	City of Houston Public Works
Anita Hollman	City of Houston Public Works
Steven Spears	Houston PD
Alicia Parmley	MADD
Carie Fletcher	BACODA
Isabel Longoria	AARP- Houston
Kevin Barnett	Union Pacific
Ellen Schwaller	Harris County Public Health
Sarah Schimmer	AAA-Texas
Dr. Rohit Shenoi	Baylor College of Medicine
John Hermann	Fort Bend County Constable 4
James Hoss	Fort Bend County Public Transit
Warren Diepraam	Waller County DA
Alison Baimbridge	Harris County DA Office
Sean Wright	Seabrook PD
Keith Dougherty	Baytown PD
Nina Saint	Safeway Driving School

Primary Member	Organization
Steve Davis	Texas TransEastern
Jeff McKinney	JETCO, Inc.
Chris Newport	Super Bowl Committee
James Keener	TxDOT – Ex-Officio
Robert Benz	TxDOT – Ex-Officio

Pedestrian–Bicyclist Subcommittee

The Pedestrian-Bicyclist Subcommittee advises the Technical Advisory Committee in the consideration of pedestrian-bicyclist travel, facility design, safety, and education as part of the regional transportation planning process; reviews and recommends updates to the Regional Pedestrian & Bicycle Plan; reviews TIP submittals, and makes recommendations regarding these submittals to the Technical Advisory Committee; reviews proposals and assists in the selection of Special District Studies; and, serves as a forum to share information and discuss relevant issues.

The subcommittee is comprised of 17 members, each involved with some aspect of pedestrian and bicyclist issues.

Primary Member	Organization
Jessica Wiggins	Bike Houston
Thomas Gall	Houston Parks Board
Jeff Taebel, FAICP	H-GAC
Shawn Johnson	City of Conroe
Tim Tietjens	City of Galveston
(Vacant)	City of Houston
Chien Wei	City of League City
Christopher Orlea	City of Pearland
Monique Johnson	City of Sugar Land
Evan M. DuVall, AICP	City of Webster
Christina Bune	Fort Bend County
Doug Shannon	Harris County
Clark Martinson, AICP, AIA	Energy Corridor District
Louis Jullien, IV	Westchase District
Ana Ramirez Huerta	TxDOT - Houston District
Yuhayna McCoy	METRO
John McGowan	The Woodlands Township

Technical Advisory Committee

The Technical Advisory Committee's purpose is to advise the Transportation Policy Council (TPC) in its development of the Unified Planning Work Program (UPWP) and the Regional Transportation Plan (RTP) as well as promote coordination of other transportation planning activities. The Committee assists with the development of the Transportation Improvement Program (TIP), including the review of and recommendations on candidate projects for the TIP.

The committee consist of 38 members appointed by the TPC from a broad cross-section of government, transportation, advocacy, and industry.

Member	Organization
Richard Stolleis, P.E. (Chairman)	Fort Bend County
Trent Epperson (1st Vice Chair)	City of Pearland
Loyd Smith, P.E. (2nd Vice Chair)	Harris County
Sarah Benavides, P.E.	City of Pasadena
Jose Pastrana	City of Baytown
Dr. Carol Lewis	Texas Southern University (Environmental/Planning)
Augustus Campbell	West Houston Assoc. (Citizen and Business Interests)
Scott Elmer, P.E.	City of Missouri City
Bob Eury	Central Houston, Inc. (Citizen and Business Interests)
Ken Fickes	Harris County Transit (Urban Transit)
Matt Hanks, P.E.	Brazoria County
Clint Harbert	METRO
Lisa Kocich-Meyer, AICP	City of Sugar Land
Jeff Johnson, P.E.	Montgomery County
Yancy Scott, P.E.	Waller County
Doug Kneupper, P.E.	City of Texas City
William Brudnick, P.E.	TxDOT - Houston District
Jeffrey C. Wiley	Fort Bend EDC (Environmental/Planning)
Christopher LaRue	The Woodlands Township (Environmental/Planning)
Adam Jack, P.E.	TxDOT - Beaumont District
Richard Zientek	Union Pacific Railroad (Intermodal Interests)
Michael Shannon, P.E.	Galveston County

Member	Organization
Jimmy E. Gore	Chambers County
Paulette Shelton	Fort Bend County Public Transportation (Rural Transit)
Theresa Rodriguez	BayTran (Environmental/Planning)
Jeff Taebel, FAICP	H–GAC (Regional Planning)
Bruce Mann	Port of Houston Authority (Intermodal Interests)
John Tyler, P.E.	Harris County Toll Road Authority (Intermodal Interests)
Kyle Hockersmith, P.E.	City of Galveston
Patrick Walsh, P.E.	City of Houston (Environmental/Planning)
Alexis Cordora	Liberty County
Jeff Weatherford, P.E.	City of Houston
Mike Wilson	Port of Freeport (Intermodal Interests)
Adam France	City of Conroe
Susan Oyler	City of League City
Bill Zrioka	Houston Airport System (Intermodal Interests)
Dr. James Condrey	Fort Bend County TRA (Intermodal Interests)
Sharon Valiante	City of Fulshear (Smaller Cities)

Transportation Policy Council

The Transportation Policy Council (TPC) serves as the policy board for the Metropolitan Planning Organization (MPO). The TPC provides regular and routine guidance to multimodal transportation planning efforts in the Houston-Galveston Transportation Management Area conducted by entities including, but not limited to, H-GAC, the Texas Department of Transportation, Houston city and county governments, the Metropolitan Transit Authority of Harris County (METRO), special purpose governments, regional planning agencies, and other political subdivisions of the State of Texas.

The TPC examines the adequacy and appropriateness of the continuing transportation planning process and reviews various agreements entered into for the execution of transportation planning and reviews the Unified Planning Work Program (UPWP) and recommends it for inclusion in the H-GAC overall Program Design Budget. The TPC endorses the Transportation Improvement Program (TIP) and recommends its consistency to H-GAC as the Regional Clearinghouse. The TPC reviews annually such other documentation, which requires approval by responsible local officials. The TPC may recommend projects or studies to be implemented by H-GAC.

The H-GAC Board of Directors serves as the contracting agent for the Transportation Policy Council. The TPC advises the H-GAC Board of Directors on transportation programs and issues. The TPC approves region-wide transportation plans and/or revisions thereof, and promotes the adoption and implementation of such plans by the various levels of government. The Council also functions as a forum for public discussion relating to transportation planning in the Houston-Galveston Transportation Management Area.

The council is made up of 28 members representing the counties, cities and intermodal interests in the Region.

Agency Voting Member	Organization
Honorable Robert Hoskins	City of Baytown
Thomas Woolley	City of Conroe
Honorable Craig Brown	City of Galveston
Jeff Weatherford, P.E.	City of Houston
Honorable David W. Robinson (2nd Vice Chair)	City of Houston
Honorable Amanda Edwards	City of Houston
Honorable Larry Millican	City of League City
Scott Elmer, P.E.	City of Missouri City
Honorable Tom Reid (Secretary)	City of Pearland

Agency Voting Member	Organization
Honorable Joe Zimmerman	City of Sugar Land
Honorable Carey Bass	City of Pasadena
Doug Kneupper, P.E.	City of Texas City
Honorable Trisha Pollard	City of Bellaire (Smaller Cities, Harris County)
Honorable Matt Sebesta (Chairman)	Brazoria County
Honorable Rusty Senac	Chambers County
Honorable James Patterson	Fort Bend County
Honorable Kenneth Clark (1st Vice Chair)	Galveston County
Honorable Ed Emmett	Harris County
Honorable Steve Radack	Harris County
Honorable Greg Arthur	Liberty County
Honorable Charlie Riley	Montgomery County
Honorable Justin Beckendorff	Waller County
Carrin Patman	METRO
Charles Wemple	H-GAC
Quincy Allen, P.E.	TxDOT - Houston District
Tucker Ferguson, P.E.	TxDOT - Beaumont District
Honorable Janiece Longoria	Port of Houston Authority (Other Transportation Interests)
Bert Keller	Gulf Coast Rail District
Brenda Mainwaring	Union Pacific Railroad (Freight Rail Interests)
Hugh McCulley	BNSF Railway (Freight Rail Interests)
Honorable Ed Thompson	8-County Region (Texas State Legislator)
Honorable Sylvia Garcia	8-County Region (Texas State Legislator)
Honorable Phillip Spenrath	Wharton County
Paul Reitz, P.E.	TxDOT - Yoakum District

Appendix B: Focus Area Crash Analysis

Regional Crashes, Fatalities, and Serious Injuries

County	2012	2013	2014	2015	2016
Brazoria	4,980	5,156	5,189	5,872	6,114
Chambers	971	1,037	1,071	1,168	1,290
Fort Bend	7,276	8,025	8,977	9,962	10,688
Galveston	6,333	6,359	6,508	7,468	8,082
Harris	91,405	101,715	118,738	129,288	131,156
Liberty	1,206	1,278	1,296	1,238	1,321
Montgomery	7,697	8,636	9,537	10,823	10,536
Waller	649	619	654	787	912
Total	120,517	132,825	151,970	166,606	170,099

Table 8: Annual Vehicle Crashes 2012-2016

County	2012	2013	2014	2015	2016
Brazoria	36	45	29	43	48
Chambers	9	13	20	15	21
Fort Bend	36	51	35	39	38
Galveston	34	27	33	44	44
Harris	375	381	427	399	460
Liberty	22	23	15	18	20
Montgomery	67	52	54	61	77
Waller	11	19	11	7	7
Total	590	611	624	626	715

Table 9: Annual Vehicle Crash Fatalities 2012-2016

County	2012	2013	2014	2015	2016
Brazoria	138	190	176	202	233
Chambers	37	78	43	77	33
Fort Bend	188	224	188	208	192
Galveston	169	154	162	172	158
Harris	2,163	2,119	2,369	2,426	2,341
Liberty	95	111	71	74	77
Montgomery	284	315	310	318	306
Waller	32	58	34	32	50
Total	3,106	3,249	3,353	3,509	3,390

Table 10: Annual Vehicle Crash Serious Injuries 2012-2016

DUI Crashes, Fatalities, and Serious Injuries

County	2012	2013	2014	2015	2016	Grand Total
Brazoria	229	217	180	207	205	1038
Chambers	79	81	58	66	60	344
Fort Bend	234	196	242	214	182	1,068
Galveston	236	204	217	202	188	1,047
Harris	2,181	2,072	2,463	2,415	2,234	11,365
Liberty	44	46	54	51	53	248
Montgomery	456	466	426	511	449	2,308
Waller	54	35	31	29	47	196
Total	3,513	3,317	3,671	3,695	3,418	17,614

Table 11: DUI Vehicle Crashes 2012-2016

County	2012	2013	2014	2015	2016	Grand Total
Brazoria	12	21	9	18	24	84
Chambers	6	6	5	2	5	24
Fort Bend	25	13	12	15	11	76
Galveston	11	7	11	17	16	62
Harris	209	171	215	169	219	983
Liberty	4	3	2	7	3	19
Montgomery	35	28	24	27	39	153
Waller	5	4	0	1	1	11
Total	307	253	278	256	318	1,412

Table 12: Annual DUI Fatalities 2012-2016

County	2012	2013	2014	2015	2016	Grand Total
Brazoria	17	25	10	27	33	112
Chambers	5	10	2	15	3	35
Fort Bend	25	13	20	17	14	89
Galveston	25	10	16	9	12	72
Harris	214	201	202	185	171	973
Liberty	9	14	5	14	9	51
Montgomery	79	54	43	56	60	292
Waller	6	11	1	3	8	29
Total	380	338	299	326	310	1,653

Table 13: Annual DUI Serious Injuries 2012-2016

Speeding (Aggressive Driving)

County	2012	2013	2014	2015	2016	Grand Total
Brazoria	1,606	1,744	1,732	1,993	1,934	9,009
Chambers	268	251	314	334	376	1,543
Fort Bend	2,708	2,857	3,215	3,534	3,635	15,949
Galveston	1,998	1,943	2,051	2,282	2,317	10,591
Harris	25,165	28,751	35,392	38,857	38,469	166,634
Liberty	422	409	436	402	374	2,043
Montgomery	3,027	3,292	3,657	4,090	3,872	17,938
Waller	215	184	214	243	235	1,091
Total	35,409	39,431	47,011	51,735	51,212	224,798

Table 14: Annual Speed-related Vehicle Crashes 2012-2016

County	2012	2013	2014	2015	2016	Grand Total
Brazoria	9	12	11	14	11	57
Chambers	2	1	8	4	4	19
Fort Bend	13	13	13	10	11	60
Galveston	18	12	14	15	11	70
Harris	91	106	117	100	95	509
Liberty	10	5	6	4	6	31
Montgomery	27	17	18	14	16	92
Waller	5	4	5	1	1	16
Total	175	170	192	162	155	854

Table 15: Annual Speed-related Vehicle Crash Fatalities 2012-2016

County	2012	2013	2014	2015	2016	Grand Total
Brazoria	50	61	39	54	53	257
Chambers	7	18	8	24	5	62
Fort Bend	68	83	64	63	58	336
Galveston	73	49	56	46	31	255
Harris	516	561	649	622	509	2,857
Liberty	40	39	17	20	17	133
Montgomery	110	107	108	126	82	533
Waller	12	19	11	11	14	67
Total	876	937	952	966	769	4,500

Table 16: Annual Speed-related Vehicle Crash Serious Injuries 2012-2016

Distracted Driving Crashes, Fatalities, and Serious Injuries

County	2012	2013	2014	2015	2016	Grand Total
Brazoria	954	1,011	1,139	1,117	886	5,107
Chambers	112	175	148	166	143	744
Fort Bend	1,267	1,319	1508	1,236	1,045	6,375
Galveston	1,564	1,760	2044	2,002	1,510	8,880
Harris	9,873	11,114	14353	15,513	13,477	64,330
Liberty	184	188	187	155	176	890
Montgomery	1107	1,316	1522	1,598	1,192	6,735
Waller	117	127	147	187	185	763
Total	15,178	17,010	21,048	21,974	18,614	93,824

Table 17: Annual Distracted Driving Crashes 2012-2016

County	2012	2013	2014	2015	2016	Grand Total
Brazoria	10	7	3	11	5	36
Chambers	0	2	4	1	1	8
Fort Bend	1	5	6	3	4	19
Galveston	7	9	3	6	6	31
Harris	30	27	53	23	32	165
Liberty	0	6	1	1	3	11
Montgomery	9	2	15	9	5	40
Waller	0	0	0	2	0	2
Total	57	58	85	56	56	312

Table 18: Annual Distracted Driving Fatalities 2012-2016

County	2012	2013	2014	2015	2016	Grand Total
Brazoria	28	33	32	41	31	165
Chambers	6	7	5	5	3	26
Fort Bend	26	32	39	28	22	147
Galveston	29	37	49	47	27	189
Harris	196	228	317	293	231	1,265
Liberty	13	8	12	6	7	46
Montgomery	26	42	66	37	28	199
Waller	6	5	0	3	7	21
Total	330	392	520	460	356	2,058

Table 19: Annual Distracted Driving Serious Injuries 2012-2016

Bicycle Crashes, Fatalities, and Serious Injuries

County	2012	2013	2014	2015	2016	Grand Total
Brazoria	26	21	22	12	22	103
Chambers	1	0	3	1	1	6
Fort Bend	48	48	53	74	65	288
Galveston	67	56	40	51	83	297
Harris	625	627	654	635	660	3,201
Liberty	4	5	4	4	2	19
Montgomery	43	41	46	44	52	226
Waller	6	1	2	3	4	16
Total	820	799	824	824	889	4,156

Table 20: Annual Bicycle Crashes 2012-2016

County	2012	2013	2014	2015	2016	Grand Total
Brazoria	0	1	1	2	0	4
Chambers	0	0	0	0	0	0
Fort Bend	0	0	1	4	0	5
Galveston	1	1	1	2	2	7
Harris	9	9	12	9	12	51
Liberty	0	1	0	1	1	3
Montgomery	3	1	0	1	6	11
Waller	1	1	0	0	0	2
Total	14	14	15	19	21	83

Table 21: Annual Bicycle Crash Fatalities 2012-2016

County	2012	2013	2014	2015	2016	Grand Total
Brazoria	2	3	2	1	5	13
Chambers	0	0	0	0	0	0
Fort Bend	3	4	9	13	5	34
Galveston	3	5	5	14	11	38
Harris	67	64	61	60	73	325
Liberty	1	2	1	0	0	4
Montgomery	2	7	4	6	10	29
Waller	3	0	0	0	1	4
Total	81	85	82	94	105	447

Table 22: Annual Bicycle Crash Serious Injuries 2012-2016

Pedestrian Crashes, Fatalities, and Serious Injuries

County	2012	2013	2014	2015	2016	Grand Total
Brazoria	40	36	31	38	46	191
Chambers	3	7	4	9	5	28
Fort Bend	61	62	64	77	73	337
Galveston	69	46	69	68	81	333
Harris	1,388	1,466	1,560	1,662	1,691	7,767
Liberty	8	8	7	6	14	43
Montgomery	55	54	79	66	66	320
Waller	1	7	1	6	7	22
Total	1,625	1,686	1,815	1,932	1,983	9,041

Table 23: Annual Pedestrian Crashes 2012-2016

County	2012	2013	2014	2015	2016	Grand Total
Brazoria	6	5	1	4	8	24
Chambers	0	2	2	1	3	8
Fort Bend	5	3	3	8	6	25
Galveston	9	3	4	10	14	40
Harris	85	87	92	94	130	488
Liberty	0	3	1	1	4	9
Montgomery	4	7	5	12	10	38
Waller	0	4	0	2	2	8
Total	109	114	108	132	177	640

Table 24: Annual Pedestrian Crash Fatalities 2012-2016

County	2012	2013	2014	2015	2016	Grand Total
Brazoria	8	7	7	9	13	44
Chambers	1	3	1	6	0	11
Fort Bend	9	8	9	14	9	49
Galveston	8	9	19	15	17	68
Harris	199	214	255	241	255	1,164
Liberty	3	1	4	1	2	11
Montgomery	7	15	15	8	13	58
Waller	0	1	0	1	3	5
Total	235	258	310	295	312	1,410

Table 25: Annual Pedestrian Crash Serious Injuries 2012-2016

Intersection Crashes, Fatalities, and Serious Injuries

Year	Crashes	Fatalities	Serious Injuries
2012	20,725	51	616
2013	22,853	55	593
2014	25,763	62	625
2015	26,753	67	645
2016	26,256	59	636
Signalized	122,350	294	3,115
Signalized Percent	43 %	36 %	47 %
Unsignalized	163,312	533	3462
Unsignalized Percent	57 %	64 %	53 %
Total Intersection Crashes	285,662	827	6,577

TABLE 26: Annual Intersection Crashes, Fatalities & Serious Injuries 2012-2016

Appendix C: Environmental Justice Characteristics

Federal and State guidance requires the consideration of environmental and social impacts on vulnerable populations. Commonly known as "Environmental Justice," the practice concerns the assessment of equity in transportation planning as it affects communities with predominantly minority or low-income residents. H–GAC includes the analysis of positive and negative impacts on vulnerable populations where appropriate in its planning efforts. H–GAC has also developed and published policies and studies regarding environmental justice.

The MPO includes environmental justice compliance policies in its Public Participation Plan. Further, the MPO has published an Environmental Justice Guidebook detailing the characteristics of vulnerable populations in the region and strategies for assessing the impact of transportation projects on these populations. One of these strategies involves identifying the neighborhoods that are the most burdened by social and economic hardships as a component of the equity assessment.

Below are relevant excerpts and conclusions from the H-GAC Environmental Justice Guidebook.

Regional Characteristics

A "concentration of disadvantage" exists where a predominantly minority or low-income community is beset with other potentially adverse circumstances such as: a large senior population, households without a car, residents without a high school diploma, residents with limited proficiency in the English language, or many female head of households. Neighborhoods where four or more of these socio-economic factors exceed the regional average are considered highly disadvantaged.

As can be seen in Figure 58, environmental justice neighborhoods are typically located close to the central city where the residents have good access to bus stops, transit routes, public amenities, and job opportunities. A spatial review of the local thoroughfare and major transportation improvements programmed in the H-GAC ten-year plan reveals that a disparate level of investments are proposed in the environmental justice sensitive areas compared with the non-target areas. The disparity in proposed transportation related investments is greatest in those environmental justice neighborhoods characterized as the most highly disadvantaged. These highly disadvantaged neighborhoods also have the least access to the region's pedestrian-bicyclist infrastructure. The poor condition of the transportation infrastructure within these communities along with a large immigrant population, some of whom have limited proficiency in the English language, may have a direct impact on transportation safety.
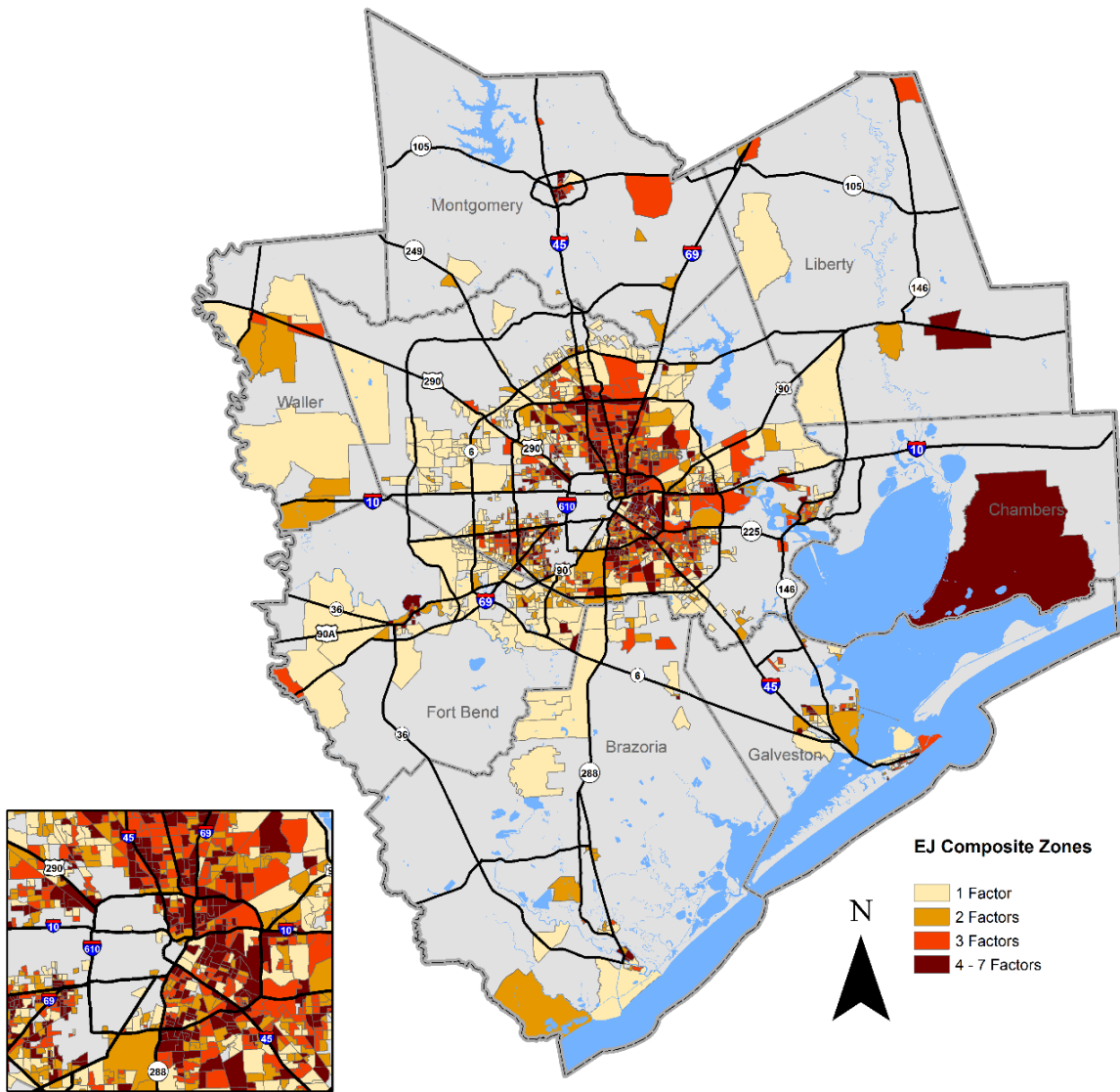
Figure 58: Environmental Justice Composite Zones (H–GAC)

The Houston-Galveston Metropolitan Planning Area: Houston-Galveston Regional Safety Plan

Transportation Safety

Transportation safety is a grave concern for environmental justice neighborhoods. More than one million motor vehicle crashes occurred within the eight-county MPO region between 2007 and 2016. Environmental justice areas are overrepresented in these crashes (Table 27). More than 60% of the crashes occurred in an environmental justice sensitive area even though the environmental justice community is proportionally only 53% of the region's population. One-fifth of all the crashes that occurred within the environmental justice zones occurred in the environmental justice areas identified as high disadvantage. In comparison, 39% of all the motor vehicle crashes in the region occurred in a non-environmental justice area. A similar picture exists for crashes with high severity, in which the environmental justice areas are also overrepresented.

	EJ Zones	Non-EJ Zones	EJ Zones with High Disadvantage*	TOTAL
Population of Area**	3,200,431	2,834,536	611,548	6,034,967
% of Total Population	53 %	47 %	19 %	100 %
Number of Crashes	657,538	425,812	129,717	1,083,350
% of Crash Total	61 %	39 %	20 %	100 %
Crashes per 1000 Population	205	150	212	-
Vehicle Miles Travelled (VMT)	100,879,192	69,193,733	8,775,120	170,072,925
Crashes Per 100 Million Vehicle Miles Travelled (VMT)	179	169	405	-
High Severity Crashes	13,519	10,972	2,542	24,491
% of High Severity Crash Total	55 %	45 %	19 %	100 %
High Severity Crashes per 100,000 Population	422	387	416	-

Source: Geocoded TxDOT Crash Records Information System (CRIS).

* Crash numbers here are a subset of EJ Zone totals. Percentages reflect a share of EJ Zone totals.
** Source: US Census Bureau, 2011-2015 American Community Survey Estimates 5-Year Estimates.

Table 27: Motor Vehicle Crashes in the Eight-County MPO Region (2007 – 2016)

Figure 59 shows that motor vehicle crashes in the planning region are on the rise after a period of gradual decline. Trendlines suggest that vehicle crashes are increasing at a faster rate within the environmental justice areas than in the non-target areas. These areas also experience the highest crash rates per capita. It stands to reason that any strategies to reduce the crash rates in the region must necessarily focus on reducing the crash incidents within the underserved areas.
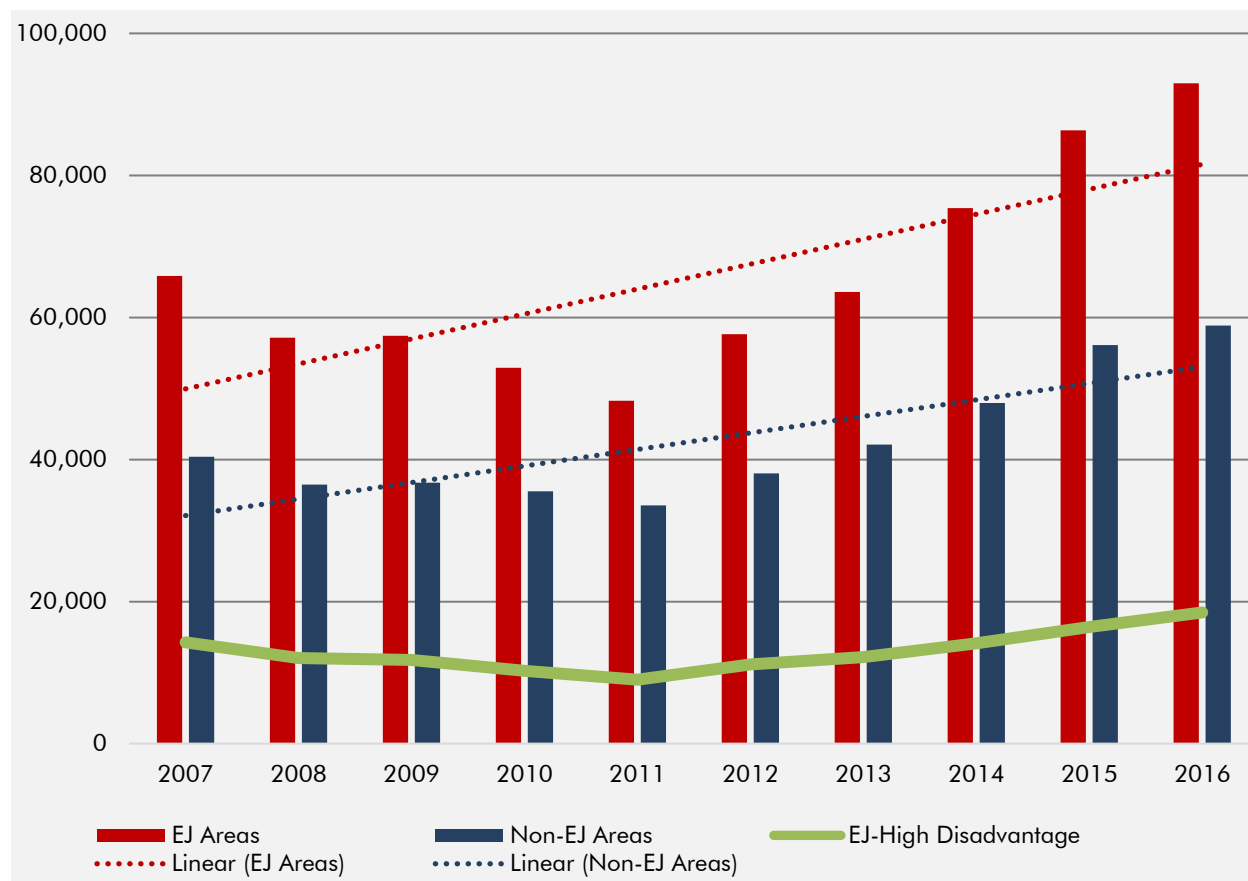
Figure 59: Regional EJ Area Vehicle Crashes 2007-2016 (TxDOT)

It should be noted that the information above in no way establishes, explicitly or implicitly, a direct causation between motor vehicle crash frequencies and environmental justice areas in the region. A variety of factors contribute to motor vehicle crashes. The information provided in this appendix is not intended to oversimplify the complexities surrounding motor vehicle crashes, or cast any community in the region in a bad light. More research is needed to ascertain the actual causes of crashes in these areas.

Additional information about environmental justice in the TMA region is available in the H–GAC *Environmental Justice* report.

Appendix D:
Crash Maps & Driver Zip Code Frequencies

The maps below depict the highest concentration of focus area crash types in the region from 2007 to 2016, and the home address zip code frequency for drivers involved in DWI, distracted and speeding crashes from 2012 to 2016.

Impaired Driving Crash Density
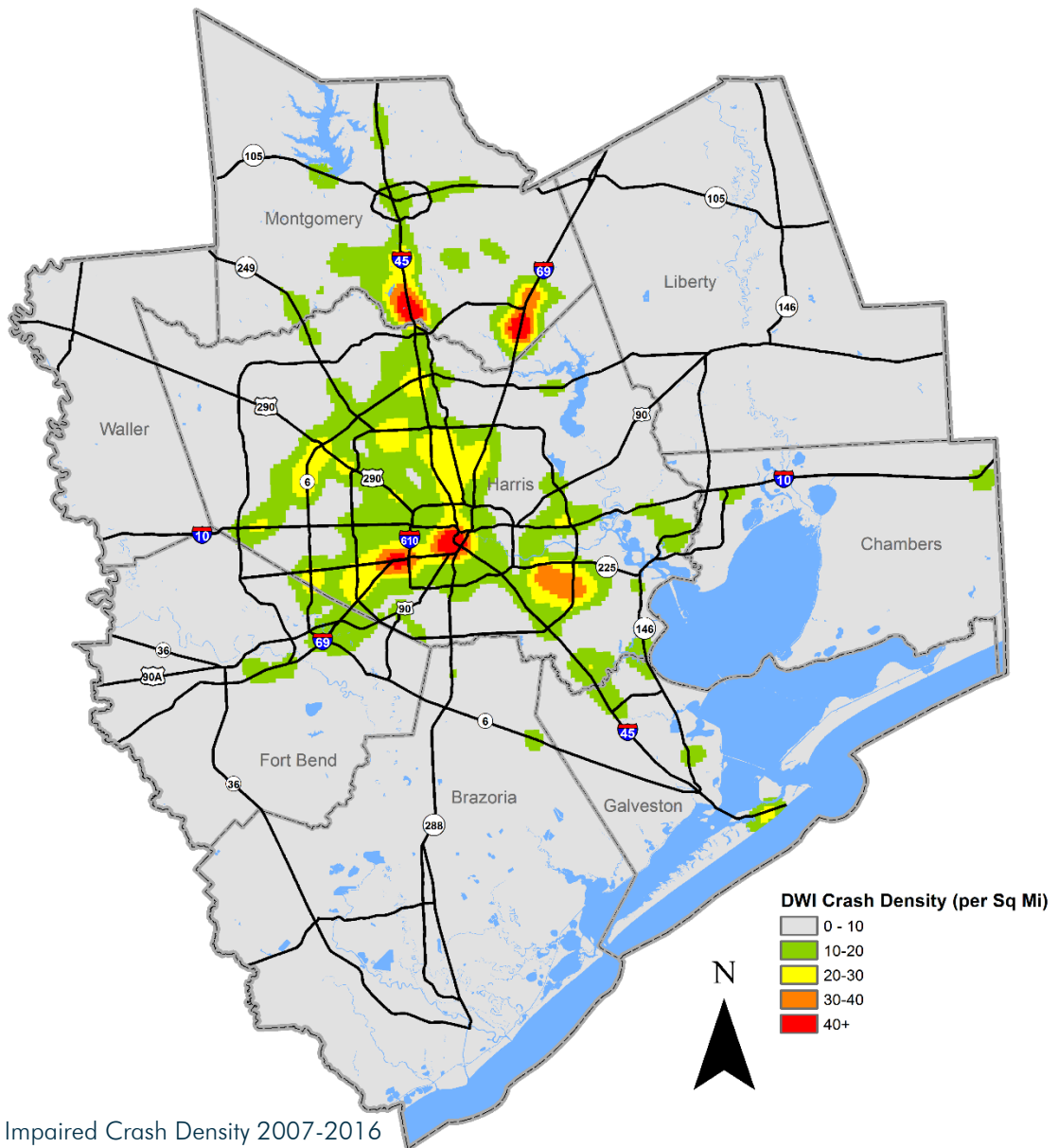
Figure 60: Impaired Crash Density 2007-2016

Impaired Driver Zip Code Frequency
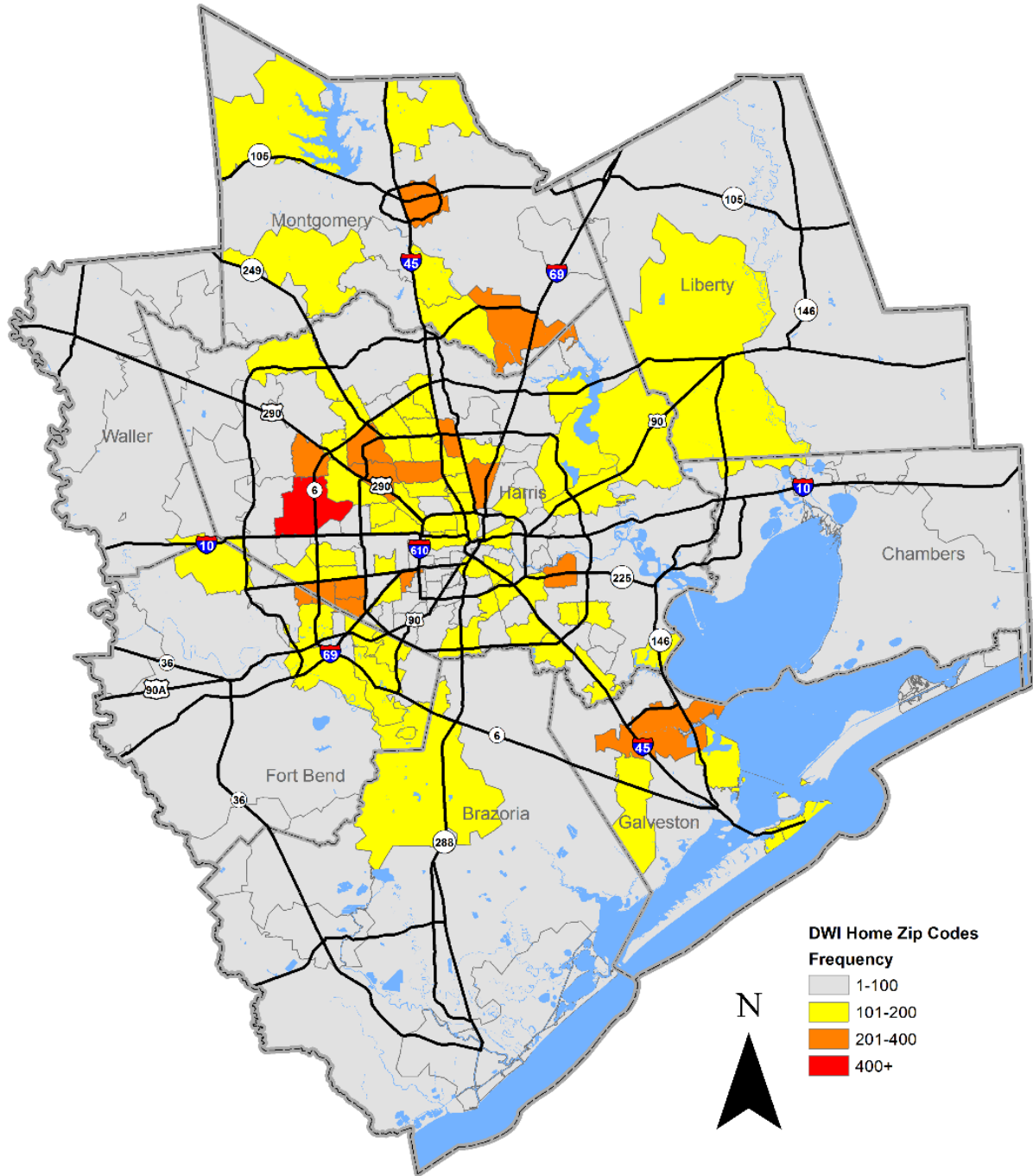
Figure 61: Impaired Driver Home Zip Code Frequency

Distracted Driving Crash Density
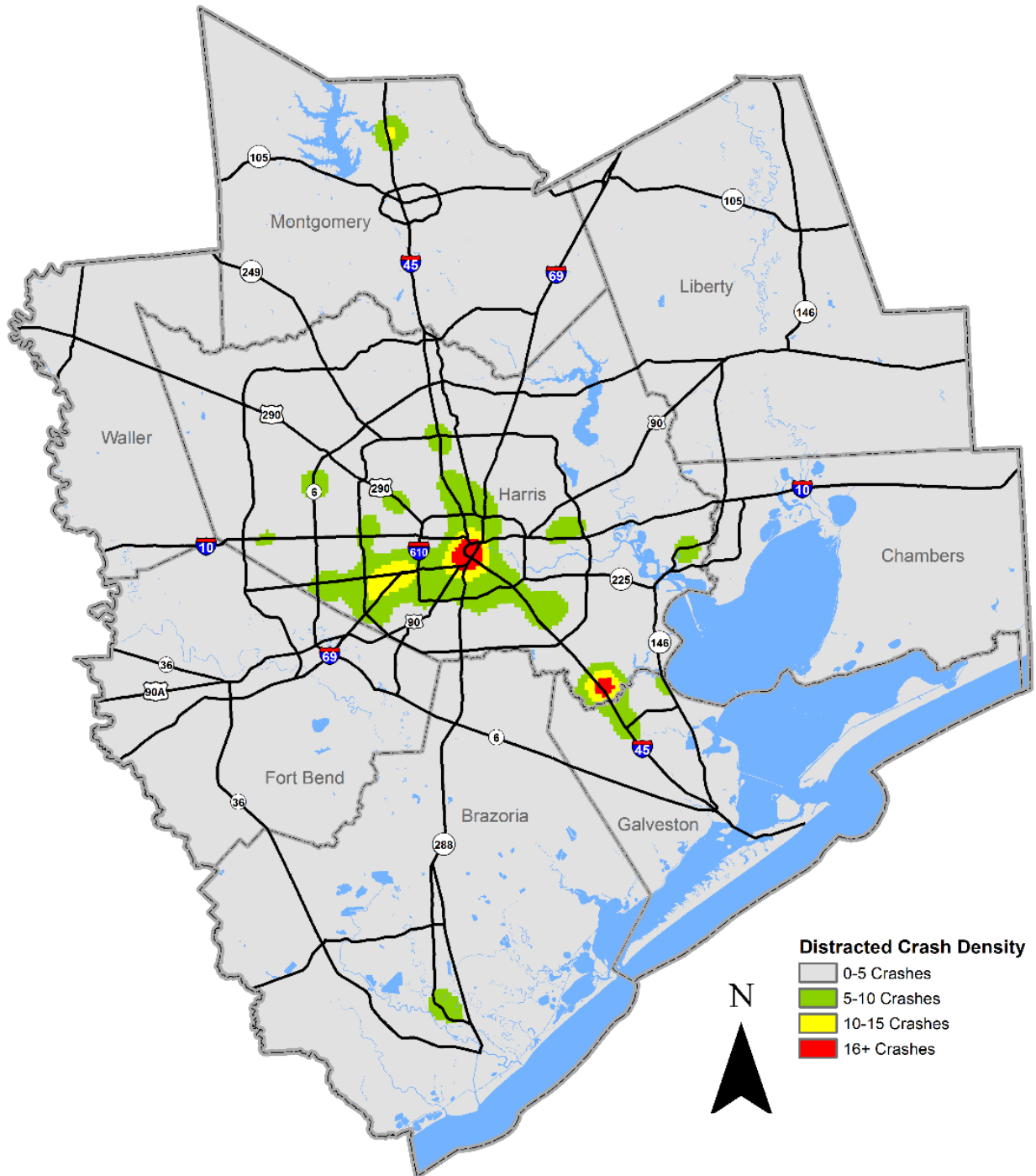
Figure 62: Distracted Driving Crash Density 2007-2016

Distracted Driver Zip Code Frequency
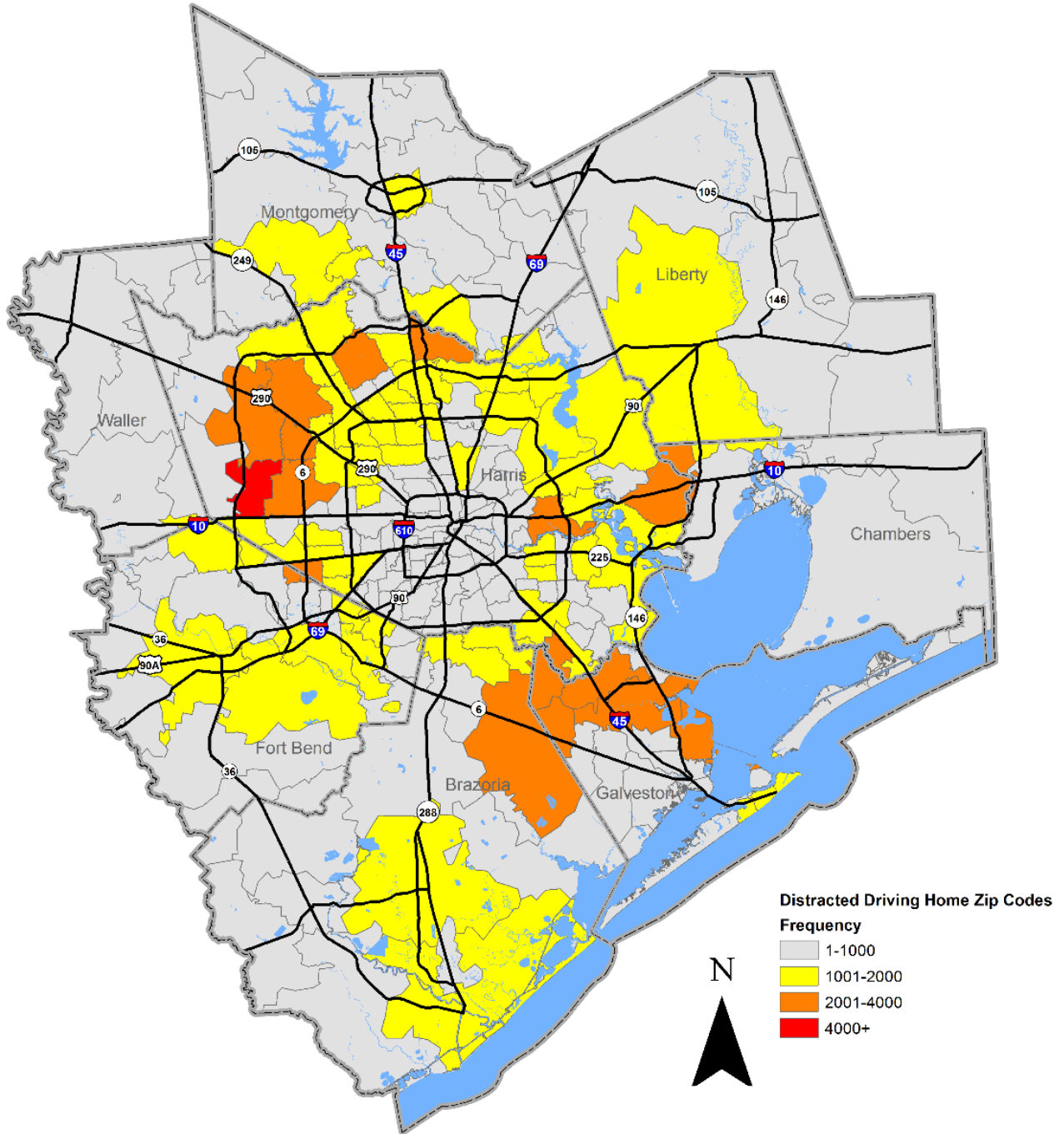
Figure 63: Distracted Driver Home Zip Code Frequency

Speeding Crash Density
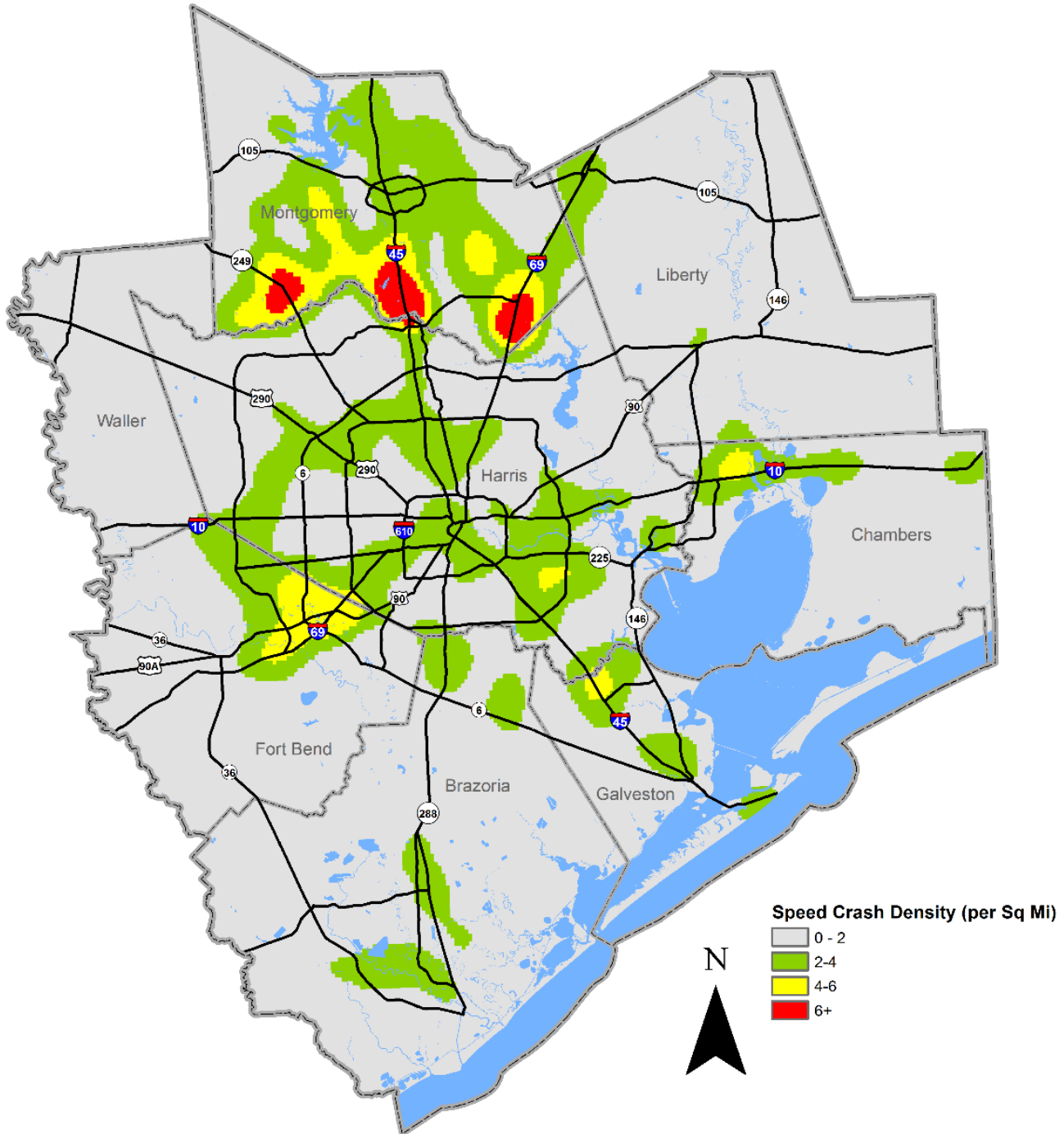
Figure 64: Speed-related Crash Density 2007-2016

Speeding Driver Zip Code Frequency
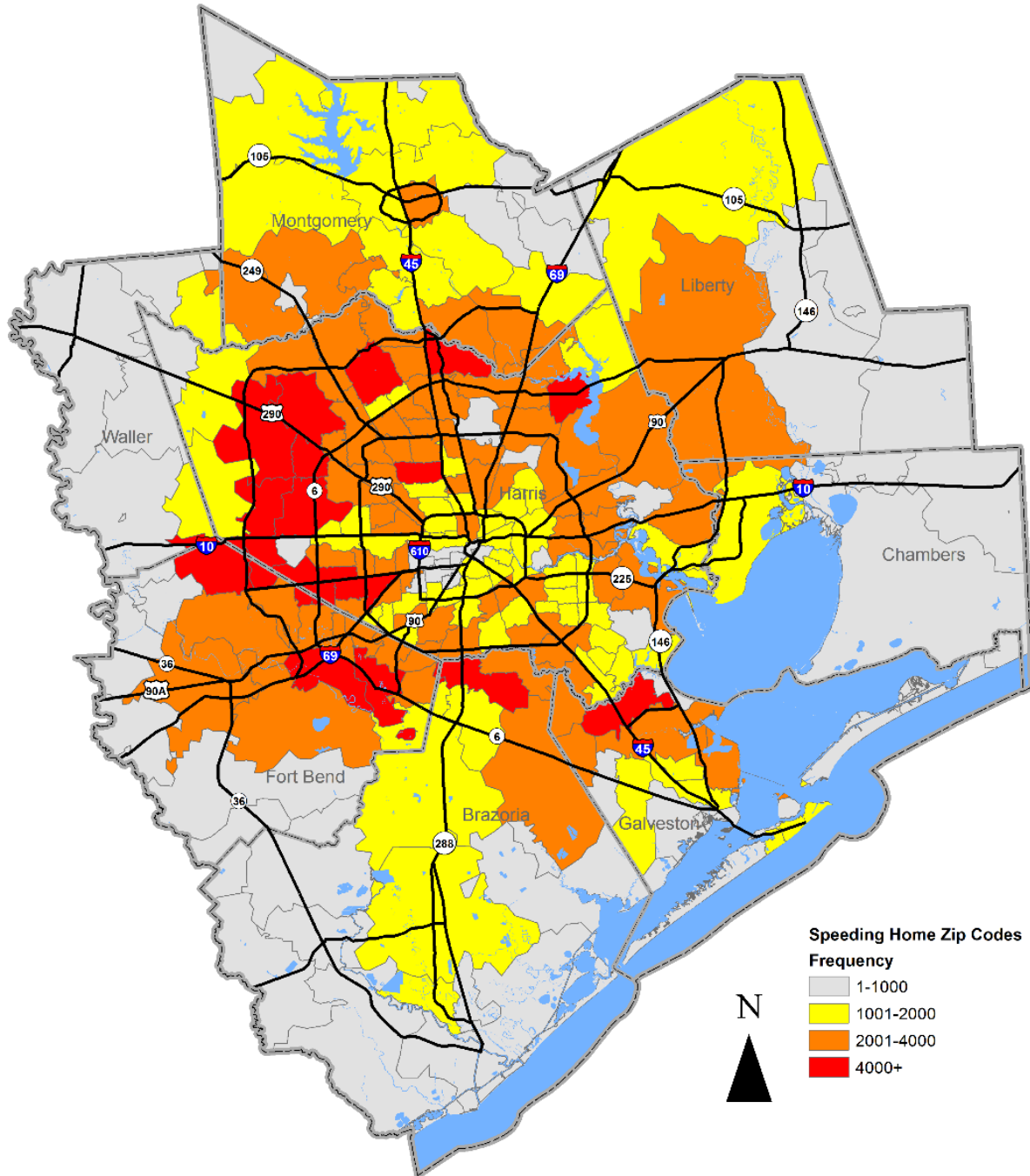
Figure 65: Speeding Driver Home Zip Code Frequency

Bicycle Crash Density
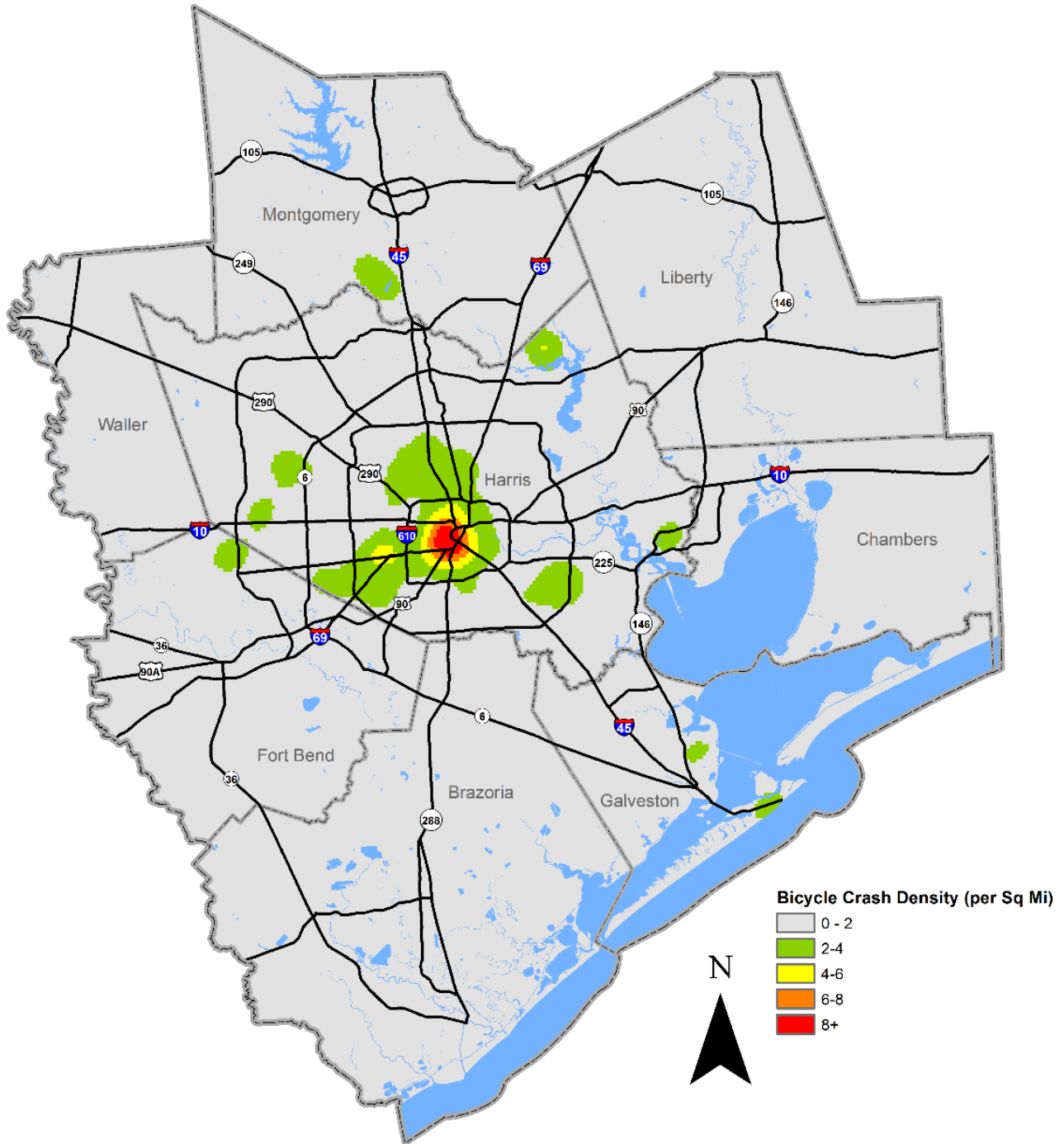
Figure 66: Bicycle Crash Density 2007-2016

Pedestrian Crash Density
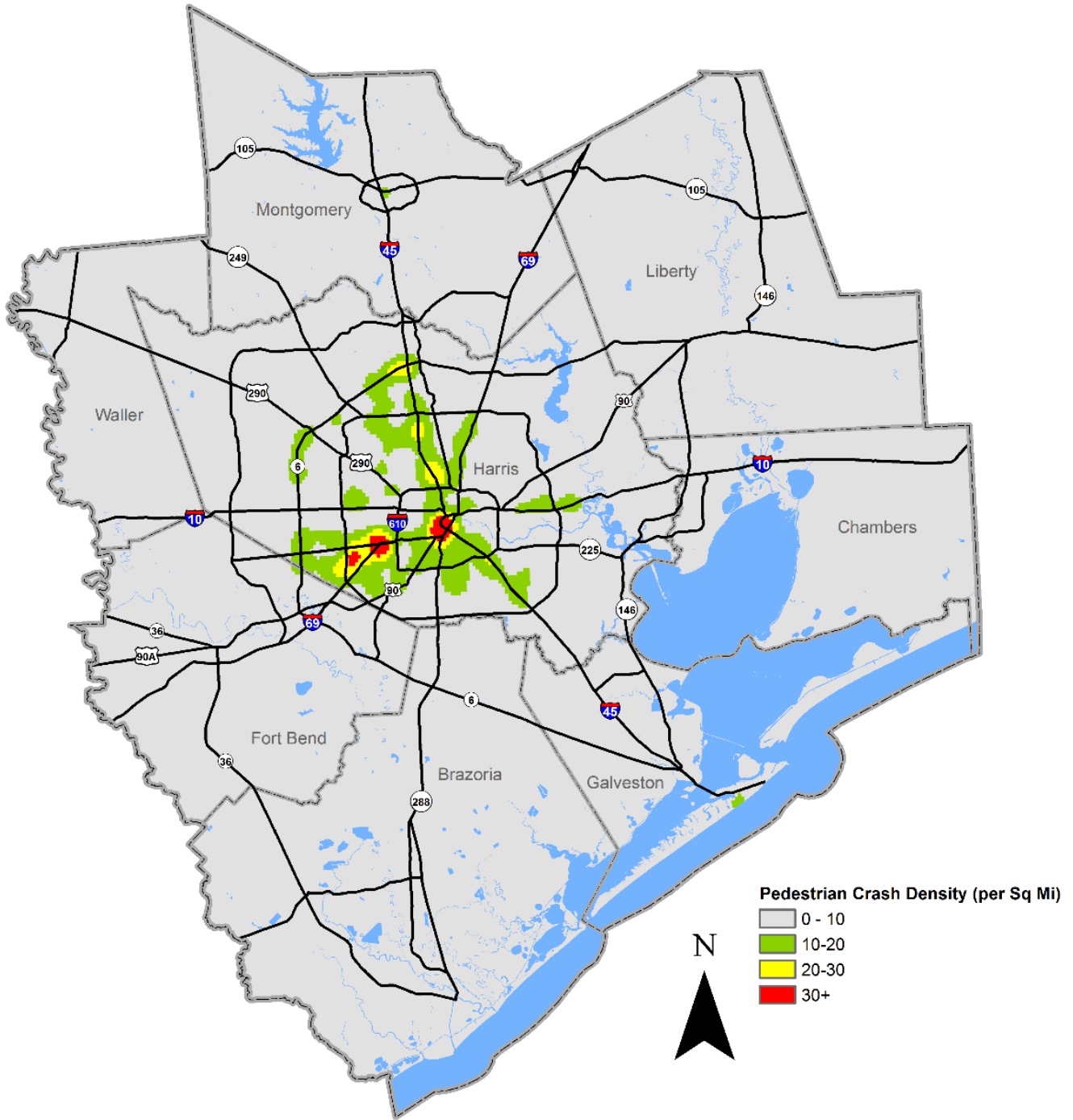
Figure 67: Pedestrian Crash Density 2007-2016

High Crash Intersection Locations
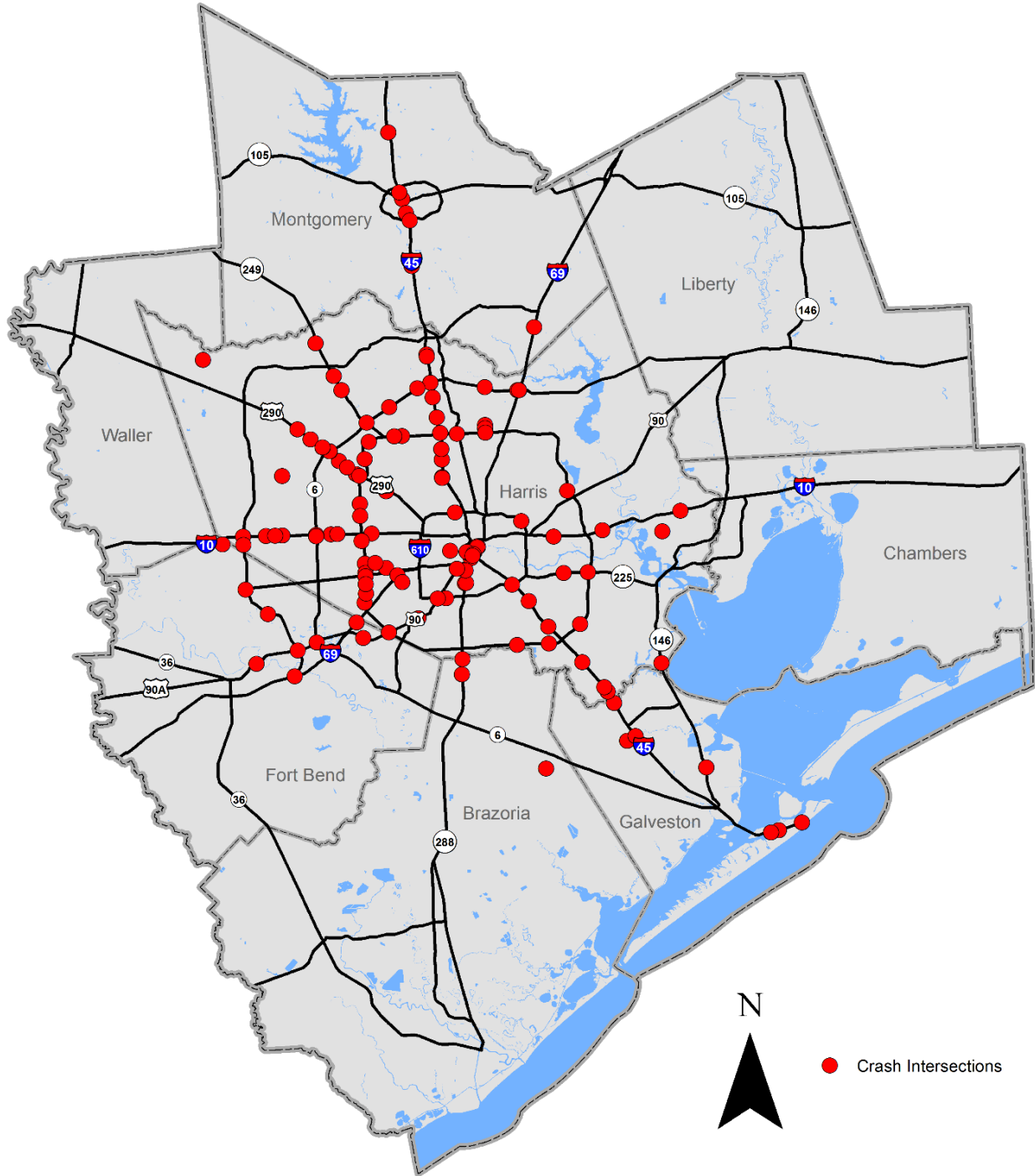
Figure 68: Intersections with 50 or more crashes between 2012 and 2016

Appendix E: Safety Framework

The Regional Safety Plan is an outgrowth of changes in Federal and State laws, as well as the changing expectations of officials and citizens of the Region.

The Moving Ahead for Progress in the 21st Century Act (MAP-21), enacted in 2012, created a performance-based surface transportation program that built upon many transportation policies first established in the Intermodal Surface Transportation Efficiency Act (ISTEA).

MAP-21 made several reforms to the metropolitan and statewide transportation planning processes, including incorporating performance goals, measures, and targets into the process of identifying needed transportation improvements and project selection. The FAST Act includes provisions to support and enhance these reforms. A significant part of the reforms made by MAP-21 included transitioning to a performance-based program, including establishing national performance goals for federal-aid highway programs. The FAST Act supports and continues this overall performance management approach, within which states invest resources in projects that collectively will make progress toward national goals.

A total of 18 performance measures will be implemented under MAP 21 and the FAST Act. Of these, five relate to traffic safety. The traffic safety performance measures are listed below. The State and MPOs are now required to set and meet targets for all safety performance measure targets. MPOs may choose to support the State performance measure targets or set their own targets. H–GAC has chosen to support the State's targets. The current safety performance measure targets for the State of Texas are listed in Table 28.

1. Number of fatalities
2. Rate of fatalities
3. Number of serious injuries
4. Rate of serious injuries
5. Number of non-motorized fatalities and non-motorized serious injuries

FHWA Safety Performance Measures

Executive Summary from the 2017 Texas SHSP

Texas is facing a crisis in road safety. Fatalities have steadily increased from just at 3,000 to more than 3,700 since 2012 despite extensive efforts to improve road user behavior and upgrade roadway conditions. The 2017 Strategic Highway Safety Plan (SHSP), developed through collaboration across disciplines, modes, and public and private sector agencies and organizations, represents an effort to stem the tide and begin reducing traffic fatalities and injuries. The number of stakeholders will grow over time and eventually touch every citizen and visitor in Texas. The state is ready to meet this challenge, and we invite you to join us.

The vision of zero deaths on our roadways is founded on the belief that everyone, no matter how they travel, should be able to arrive at their destinations safely. This document represents a collective aspiration to make Texas travel safer by reducing crashes, fatalities, and injuries. The SHSP draws on the experience, knowledge, and expertise of citizens who represent a multidisciplinary group of government agencies and private sector organizations committed to the vision.

The SHSP is structured around seven emphasis areas (EAs) identified through extensive data analysis and discussion throughout a comprehensive development, implementation, and evaluation structure. This process was overseen by the executive committee (EC) and supported by a stakeholder group (SG), EA teams to address each of the subjects, and a management team. The EAs will ensure resources are used where they can most effectively and efficiently improve road safety. The areas are presented below in alphabetical order rather than prioritized, because each of them is a priority:

- Distracted Driving
- Impaired Driving
- Intersection Safety
- Older Road Users
- Pedestrian Safety
- Roadway and Lane Departures
- Speeding

The EA teams with support from the other working groups met several times to identify and develop strategies and countermeasures or programs with a history of effectiveness.

The stakeholders and executives involved in the SHSP came to a very clear consensus that the long-term aspirational goal for fatalities and serious injuries in Texas is zero, and indeed, the branding being developed for the Texas SHSP will reflect that sentiment. However, several analytic methods used to explore future fatality levels suggest that the risk of fatal and serious injuries crashes on Texas roadways is expected to remain relatively constant in terms of economic influences and behavioral laws. For the purposes of near-term target setting, it was determined that the target

should reflect a realistic assessment of both the likely amount of exposure (travel), and the potential to reduce risk over the five-year SHSP period given expected levels of resources.

2018 Safety Targets	Number of Fatalities	Rate of Fatalities	Number of Serious Injuries	Serious Injury Rate	Total Number of Non-Motorized Fatalities & Serious Injuries
2014	3,536	1.45	17,133	7.05	1,893
2015	3,516	1.36	17,096	6.62	2,023
2016	3,775	1.44	17,578	6.71	2,304
2017	3,801	1.45	17,890	6.68	2,224
2018 Target	3,891	1.46	18,130	6.64	2,309
2018 Target (5 Yr./Avg.)	3,704	1.43	17,565	6.74	2,151

TABLE 28: State Safety Performance Measure Targets

Appendix F:
FHWA & SHSP Strategies & Countermeasures

Impaired Driving
FHWA COUNTERMEASURES

I. DETERRENCE: LAWS

Countermeasure	Effectiveness	Cost	Use	Time
1.1 ALR/ALS	★★★★★	$$$	High	Medium
1.2 Open containers	★★★	$	High	Short
1.3 High-BAC sanctions	★★★	$	Medium	Short
1.4 BAC test refusal penalties	★★★	$	Unknown	Short
1.5 Alcohol-impaired driving law review	★★★	$$	Unknown	Medium

II. DETERRENCE: ENFORCEMENT

Countermeasure	Effectiveness	Cost	Use	Time
2.1 Publicized sobriety checkpoints	★★★★★	$$$	Medium	Short
2.2 High visibility saturation patrols	★★★★	$$	High	Short
2.3 Preliminary Breath Test devices (PBTs)[†]	★★★★	$$	High	Short
2.4 Passive alcohol sensors[††]	★★★★	$$	Unknown	Short
2.5 Integrated enforcement	★★★	$	Unknown	Short

[†] Proven for increasing arrests

[††] Proven for detecting impaired drivers

III. DETERRENCE: PROSECUTION & ADJUDICATION

Countermeasure	Effectiveness	Cost	Use	Time
3.1 DWI courts[†]	★★★★	$$$	Low	Medium
3.2 Limits on diversion and plea agreements[††]	★★★★	$	Medium	Short
3.3 Court monitoring[††]	★★★	$	Low	Short
3.4 Sanctions	★★	Varies	Varies	Varies

[†] Proven for reducing recidivism   [††] Proven for increasing convictions

IV. DETERRENCE: DWI OFFENDER TREATMENT, MONITORING & CONTROL

Countermeasure	Effectiveness	Cost	Use	Time
4.1 Alcohol problem assessment, treatment	★★★★★	Varies	High	Varies
4.2 Alcohol ignition interlocks[†]	★★★★★	$$	Medium	Medium
4.3 Vehicle and license plate sanctions[†]	★★★★	Varies	Medium	Medium
4.4 DWI offender monitoring[†]	★★★★	$$$	Unknown	Varies
4.5 Lower BAC limit for repeat offenders	★★★★	$	Low	Short

[†] Proven for reducing recidivism

V. PREVENTION, INTERVENTION, COMMUNICATIONS & OUTREACH

Countermeasure	Effectiveness	Cost	Use	Time
5.1 Alcohol screening and brief intervention	★★★★★	$$	Medium	Short
5.2 Mass-media campaigns	★★★	$$$	High	Medium
5.3 Responsible beverage service	★★	$$	Medium	Medium
5.4 Alternative transportation	★★	$$	Unknown	Short
5.5 Designated drivers	★★	$	Medium	Short

VI. UNDERAGE DRINKING, & DRINKING & DRIVING

Countermeasure	Effectiveness	Cost	Use	Time
6.1 Minimum drinking age 21 laws	★★★★★	$$$	High	Low
6.2 Zero-tolerance law enforcement	★★★	$	Unknown	Short
6.3 Alcohol vendor compliance checks[†]	★★★	$$	Unknown	Short
6.4 Other minimum legal drinking age 21 law enforcement	★★★	$$	Varies	Varies
6.5 Youth programs	★★	Varies	High	Medium

[†] Proven for reducing sales to underage people

VII. DRUG-IMPAIRED DRIVING

Countermeasure	Effectiveness	Cost	Use	Time
7.1 Enforcement of penalties for drug-impaired driving	★ ★ ★	$$	Unknown	Short
7.2 Drug-impaired driving laws	★	Unknown	Medium†	Short
7.3 Education regarding medication	★	Unknown	Unknown	Long

† Use for drug *per se* laws

TEXAS SHSP STRATEGIES & COUNTERMEASURES

Strategy #1	Use data systems to identify alcohol licensed and permitted locations within a community and Alcoholic Beverage Code violation history at these locations to determine any correlation with alcohol related crashes
	Countermeasures and Programs:
1a	Develop and maintain data to identify correlations between impaired driving crashes and citations, road type, corridor, region, county and community and Texas Alcohol Beverage Control licensing data.
1b	Track frequent driving under the influence (DUI) offenders to identify and address persons with multiple impaired driving arrests and/or crashes. Pursue more intensive interventions.
1c	Partner, where possible, with community groups and task forces to promote a comprehensive action plan to determine and address community hot spots.

Strategy #2	Increase education for all road users on the impact of impaired driving and its prevention
	Countermeasures and Programs:
2a	Identify gaps in knowledge with respect to the impact of illegal behaviors (e.g., specifically prescription drugs, marijuana and substances other than alcohol) on road safety.
2b	Identify gaps in knowledge on the negative consequences of traffic violations among road users (e.g., fines, loss of license, effects of criminal record on future employment).
2c	Demonstrate to all road users the magnitude of the impact of impaired driving crashes on fatality rates by making comparisons with other causes of death (e.g., murder rate).
2d	Demonstrate to all road users the magnitude of the cost and liability exposure associated with impaired driving crashes resulting in injury and/or fatality.
2e	Educate medical professionals to inform patients of the effects of medications on the ability to drive or operate heavy machinery.
2f	Identify the gaps in knowledge of judges and prosecutors about impaired driving and provide messaging or training to close the gaps.

2g	Educate emergency medical professionals about the changes in the Blood Test law, which has been modified from the option to refuse format.

Strategy #3	Increase officer contacts with impaired drivers through regular traffic enforcement
	Countermeasures and Programs:
3a	Educate the police, community leaders, public, and traffic safety partners on the role of regular traffic enforcement as a primary tool in detecting impaired drivers.
3b	Use a data driven approach to optimize areas and times for enforcement.
3c	Identify trends in DUI arrests and compare the data to trends in citations and crashes.
3d	Identify training gaps for police on locations with a high probability for alcohol and drug use that lead to impaired driving (e.g., breaking up/preventing underage drinking parties).
3e	Encourage motorists to safely report potential impaired drivers to law enforcement.
3f	Research and identify strategies to streamline the system of processing impaired drivers.
3g	Conduct surveys to assess public support for sobriety checkpoints and enhanced impaired driving penalties; develop a report on the survey results and impaired driving countermeasure effectiveness; and share the reports with lawmakers and the public.

Strategy #4	Improve mobility options for impaired road users
	Countermeasures and Programs:
4a	Educate the public and community leaders on methods for identifying mobility options at the community level.
4b	Create local task forces to identify local actions.
4c	Promote trip planning, including designated drivers, public transportation, taxis, and alternate transportation service companies.

Strategy #5	Increase data, training, and resources for prosecutors and officers in the area of drugged driving
	Countermeasures and Programs:
5a	Develop training for prosecutors and regular patrol officers on detecting and prosecuting drugged drivers.

5b	Develop joint training for prosecutors and laboratory personnel (Forensic Toxicologist) to assist in presenting scientific evidence of drug impairment in court.
5c	Continue and increase Standardized Field Sobriety Testing (SFST), Advanced Roadside Impaired Driving Enforcement, and Drug Recognition Evaluator (DRE) training.
5d	Identify methodologies and resources for improving the identification of drugged driving as a contributing factor in impaired driving crashes.
5e	Secure additional resources for laboratories.
5f	Continue to monitor the development of roadside drug testing instruments and, as appropriate, investigate deploying them into the field as an additional tool to detect impaired driving.
5g	Encourage adoption of laws that increase penalties for impaired driving.
5h	Encourage adoption of laws that streamline the processing of impaired drivers by law enforcement.
5i	Encourage adoption of laws that allow sobriety checkpoints.

Speeding & Aggressive Driving
FHWA COUNTERMEASURES

I. LAWS

Countermeasure	Effectiveness	Cost	Use	Time
1.1 Speed limits	★★★★★[†]	$	High	Short
1.2 Aggressive driving laws	★	$	Low	Short

[†] When enforced and obeyed

II. ENFORCEMENT

Countermeasure	Effectiveness	Cost	Use	Time
2.1 Automated enforcement	★★★★★	$$$[†]	Medium	Medium
2.2 High visibility enforcement	★★	$$$	Low[††]	Medium
2.3 Other enforcement methods	★★	Varies	Unknown	Varies

[†] Can be covered by income from citations

[††] For aggressive driving, but use of short-term, high visibility enforcement campaigns for speeding is more widespread

III. PENALTIES & ADJUDICATION

Countermeasure	Effectiveness	Cost	Use	Time
3.1 Penalty types and levels	★★	Varies	High	Low
3.2 Diversion and plea agreements	★	Varies	Unknown	Varies

IV. COMMUNICATIONS & OUTREACH

Countermeasure	Effectiveness	Cost	Use	Time
4.1 Public Information supporting	★★★	Varies	Medium	Medium

Texas SHSP Strategies & Countermeasures

Strategy #1	Use the concept of establishing target speed limit and road characteristics to reduce speeding
	Countermeasures and Programs:
1a	Encourage use of target speeds for arterial, collector, and local roadways; encourage use of target speeds with pedestrian, land use and roadway context, including options for target speeds of 35 mph or less on arterials and the evaluation of existing speed limits to appropriate target speeds.
1b	Design and redesign roadways for a target speed appropriate for the adjacent environment (see National Association of City Transportation Officials guidelines). Use speed management techniques as described in ITE Urban Thoroughfares report, such as traffic calming, re-designation of road space (road diets) or other redesign for roads with speeding crash problems.

Strategy #2	Educate law enforcement on contributing crash factors to improve crash data collection
	Countermeasures and Programs:
2a	Educate law enforcement on the use of crash data and the need for accurate information. Examples: Encourage periodic training for officers on crash reporting; better define contributing factors in instructions for law enforcement officers; highlight difference between failure to control speed and speeding over the limit.
2b	Ensure law enforcement and crash analysts understand the difference in speeding related contributing factors and their association with statutes when analyzing crash data.
2c	Encourage electronic submission of CR-3 and citations, with features to ensure all fields completed.
2d	Collaborate with law enforcement to explore methods to add estimated speed of vehicles to crash reports (including when vehicles are traveling at or below speed limit).

Strategy #3	Leverage data to improve engineering, education, and enforcement
	Countermeasures and Programs:
3a	Develop a resource center for assisting law enforcement agencies with data driven development, including high crash (especially injury and fatality) mapping and mapping of contributing factors).
3b	Train and encourage law enforcement agencies to make effective use of data to plan and during patrol.

3c	Require STEP grant-funded enforcement programs to be data driven.
3d	Produce a report on the potential crash, death, and serious injury reduction of shifting all surface streets in urban districts under TxDOT control to a lower operating speed, including feeder/frontage roads.
3e	Encourage cities to implement safe design speed demonstration projects in various settings. This could include involving neighborhoods in community-based traffic calming.
3f	Encourage partnerships of agencies with school districts to implement safe streets projects across the state, while also providing the students with knowledge of the crisis of traffic deaths and the potential solutions that modify their behavior and decisions.

Strategy #4	Increase and sustain high visibility speeding enforcement. (Develop, catalogue, and disseminate tools and other resources to improve enforcement capabilities)
	Countermeasures and Programs:
4a	Develop a best practices guide for speed enforcement techniques.
4b	Conduct a pilot program to test the effectiveness and acceptance of automated speed enforcement.
4c	Explore the effectiveness of Dynamic Display Speed Devices.

Strategy #5	Improve the effectiveness of educational techniques, tools, and strategies for speeding (target specific age groups)
	Countermeasures and Programs:
5a	Redesign ticket dismissal courses and driver's education courses to improve driver behavior.
5b	Disseminate information from cities pursuing Vision Zero (e.g., 20 mph vs. 40 mph crash outcomes).
5c	Revisit parent-taught program design and document benefits of certified instructor training.
5d	Educate the public on the difference between posted speed limit, speed design, and safe driving speed.

Distracted Driving
FHWA COUNTERMEASURES

I. LAWS & ENFORCEMENT

Countermeasure	Effectiveness	Cost	Use	Time
1.1 GDL requirements for beginning drivers	★★★★★[†]	$	High	Medium
1.2 Cell phone and text messaging laws	★★	$	Medium	Short
1.3 High visibility cell phone/text messaging enforcement	★★★★	$$$	Low	Medium
1.4 General drowsiness and distraction laws	★	Varies	High[††]	Short

[†] Effectiveness proven for nighttime and passenger restrictions

[††] Included under reckless driving; use of explicit drowsiness and distraction laws is low

II. COMMUNICATIONS & OUTREACH

Countermeasure	Effectiveness	Cost	Use	Time
2.1 Drowsy driving	★	$$	Unknown	Medium
2.2 Distracted driving	★	$$	High	Medium

III. OTHER COUNTERMEASURES

Countermeasure	Effectiveness	Cost	Use	Time
3.1 Employer programs	★★	$	Unknown	Short
3.2 Education regarding medical conditions and medications	★	Variable	Unknown	Medium

Texas SHSP Strategies & Countermeasures

Strategy #1	Reduce fatalities and serious injuries by identifying and implementing education and awareness strategies to reduce distracted driving
	Countermeasures and Programs:
1a	Develop and document a suite of countermeasures targeting distracted road users by age group.
1b	Educate the consumers, parents, and the public with age-specific messages about car technology and safety options (e.g., mycardoeswhat.org) through car dealers, the media, and employers.
1c	Educate the public with age-specific messages (pre-teen to adult) about the dangers of distracted driving through the media, schools, car dealers, community events, and employers.
1d	Educate public officials and employers about the human and economic costs of distracted driving through outreach programs.
1e	Educate the public with age-specific messages on tools to encourage distraction-free driving (apps, technology, programs) through outreach programs. Examples: Inform adults/parents on tools they can use to limit teen cell phone use while driving. Educate consumers on apps that will disable phones while in a vehicle.
1f	Inform members of the judiciary branch about tools that limit cell phone use and training programs such as Impact Texas Teen Drivers and the Texas Municipal Police Association/TxDOT adult course. Encourage voluntary participation in these courses.
1g	Consider using teens to conduct a public survey to determine level of support for laws restricting distracted driving.
1h	Inform teen drivers about cell phone, texting, and other restrictions under the Texas Graduated Driver Licensing law.
1i	Continue to implement Impact Texas Teen Drivers, an informational tool (2-hour video) designed to educate teens on the dangers of distracted driving.
1j	Target messages to people from other states who move to Texas.
1k	Encourage transit use to avoid distracted driving.

Strategy #2	Improve the effectiveness of distracted road user educational techniques, tools, and strategies
	Countermeasures and Programs:
2a	Test the efficacy of current and future messaging with different age groups to determine which types are effective.

2b	Use age, behavior, and citation data to target messages to specific classes of violators.
2c	Test the effectiveness of using personal stories/tragedies to impact teens and middle school students' behaviors when distracted driving.
2d	Use crash data to target locations for media buys and other distracted driving education and awareness campaign methods.

Strategy #3	Improve and increase enforcement capabilities for addressing distracted driving
	Countermeasures and Programs:
3a	Use Selective Traffic Enforcement Program (STEP) grants and high visibility enforcement techniques to enforce distracted driving state laws and local ordinances.
3b	Use crash data to determine the deployment of distracted driving STEP grants.
3c	Encourage law enforcement personnel to track cell phone use where appropriate state laws and local ordinances do not support a citation; provide distracted driving educational tools for law enforcement.
3d	Catalogue and disseminate state laws and local ordinances on distracted driving.
3e	Encourage the use of phone records to identify and document distracted driving as a contributing crash factor and encourage the use of the narrative to provide additional details.
3f	Encourage adoption of the Model Minimum Uniform Crash Criteria recommendations on distracted driving.
3g	Identify and disseminate model distracted driving policies for law enforcement agencies.
3h	Identify and catalogue strategies used by the judiciary to educate violators on the dangers of distracted driving and effective methods for changing behavior.

Strategy #4	Increase the installation of engineering countermeasures known to reduce distracted driving
	Countermeasures and Programs:
4a	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.
4b	Use network screening techniques to identify distracted driving crash sites and appropriate countermeasures for systemic installation across Texas.

Strategy #5	Use technology to reduce distracted driving crashes, serious injuries, and fatalities
	Countermeasures and Programs:
5a	Test and implement apps to encourage distraction-free driving or discourage distracted driving.
5b	Encourage employers to adapt company vehicles to include the safe-driving apps and encourage use in private employee vehicles.
5c	Team with the National Safety Council to become informed about and use the technology for tracking employee cell phone use while driving.

Bicycle & Pedestrian Strategies & Countermeasures
FHWA PEDESTRIAN COUNTERMEASURES

I. PRESCHOOL-AGE CHILDREN

Countermeasure	Effectiveness	Cost	Use	Time
1.1 Children's safety clubs	★★	Varies	Unknown	Unknown
1.2 Child supervision	★	$	Unknown	Short

II. SCHOOL-AGE CHILDREN

Countermeasure	Effectiveness	Cost	Use	Time
2.1 Elementary-age child pedestrian training	★★★	$	Unknown	Short
2.2 Safe Routes to School (SRTS)	★★	$	High	Short
2.3 Child school bus training	★★	$	High	Short

III. IMPAIRED PEDESTRIANS

Countermeasure	Effectiveness	Cost	Use	Time
3.1 Communications and outreach	★★	Varies	Low	Medium
3.2 "Sweeper" patrols of impaired pedestrians	★	$$	Low	Medium

IV. ALL PEDESTRIANS

Countermeasure	Effectiveness	Cost	Use	Time
4.1 Pedestrian safety zones	★★★★	$$$	Low	Medium
4.2 Reduce and enforce speed limits	★★★	$	High	Varies
4.3 Conspicuity enhancement	★★★	$	Low	Medium
4.4 Targeted enforcement	★★★	$$	Low	Short
4.5 Driver training	★	$	Low	Medium
4.6 Pedestrian gap acceptance training	★	$$	Unknown	Medium
4.7 University educational campaign	★	$	High	Medium

Texas SHSP Pedestrian Strategies & Countermeasures

Strategy #1	Improve driver and pedestrian safety awareness and behavior
	Countermeasures and Programs:
1a	Educate motorists on appropriate actions if they become stranded on a freeway or high speed roadway to reduce crashes with unintended pedestrians on high speed roadways (stay in the vehicle, call for help, Steer It and Clear It).
1b	Consider policies for moving over and encourage motorists to move over away from stranded cars and roadside pedestrians (Safe Passing Law). Examples: expansion of the Move Over/Slow Down Law, safe passing laws such as the San Antonio ordinance and proposed statewide legislation.
1c	Improve driver awareness of pedestrians. Examples: Look Right and Yield to Pedestrian Campaign, Square Your Turns, Rock and Roll in the seat to see pedestrians and bicyclists; educational videos about laws on yielding to pedestrians in crosswalks, targeted education by location, demographics, and other factors.
1d	Reduce crashes involving impaired and distracted pedestrians (adapt impaired driving messages to impaired walking and biking).
1e	Implement a campaign about drugged drunk walking. Identify alternatives to impaired walking such as transit, taxis, and transportation network companies (e.g., Uber/Lyft). Work with Teens in the Driver's Seat (high school age program) and U in the Driver's Seat (college-age program) to create awareness around walking and biking issues for young drivers and pedestrians.
1f	Incorporate pedestrian issues into driver testing and defensive driving courses.

Strategy #2	Reduce pedestrian crashes on urban arterials and local roadways
	Countermeasures and Programs:
2a	Research the distance needed between safe pedestrian crossings; develop criteria for the maximum desirable distances between safe crossing opportunities for different roadway classifications. Use FHWA materials on Safe Transportation for Every Pedestrian; level of service calculations for all users at signalized intersection and retrofit locations to increase safety (narrowing, speed management treatments).
2b	Encourage use of pedestrian compatible target speeds for the design of arterial, collector, and local roadways.

2c	Implement raised crosswalks at high pedestrian activity locations (include: right turn channelization roadways, midblock crossings, and on the approach/departure lanes of roundabouts).
2d	Use leading or exclusive pedestrian intervals at signalized intersections (i.e., pedestrian walk signals activate prior to parallel green), at high pedestrian use signaled intersections, and pedestrian push button locations.
2e	Develop and implement a program to assist cities and other agencies to develop policies and implement projects that address common pedestrian crash types (shorten crossing distances, provide complete sidewalk networks, provide enhanced crossing devices, median islands, etc.).
2f	Disseminate information/training on effectiveness/appropriateness of pedestrian traffic control measures. Examples: pedestrian hybrid beacons, rectangular rapid flash beacon; determine effectiveness of lights embedded in the crosswalk that flash while crossing.
2g	Disseminate information on the connection between urban form (driveway density, setbacks, pedestrian scale frontage, roadway design speeds, etc.) and safety outcomes. Encourage incorporation into local land use planning and review.
2h	Disseminate information on FHWA's Every Day Counts Safe Transportation for Every Pedestrian for countermeasures for improving pedestrian safety.

Strategy #3	Improve visibility of pedestrians at crossing locations
	Countermeasures and Programs:
3a	Improve nighttime visibility of pedestrians. Examples: use of visible/reflective clothing by pedestrians, pedestrian-illuminating lighting on urban corridors, midblock crosswalk lighting in accordance with FHWA guidance, smart lighting to illuminate when pedestrians are detected, identify target audiences for information dissemination.
3b	Minimize the screening of pedestrians by parked or stopped vehicles, vegetation, and other objects (remove on-street parking, encourage Don't Block the Box campaigns) or add bulb-outs.
3c	Deploy bulb-outs, neckdowns, median islands, parking restrictions, advance yield bars, Z crossings, and associated improvements that allow pedestrians to find refuge from, and visibility to, vehicular traffic.

Strategy #4	Improve pedestrian networks
	Countermeasures and Programs:

4a	Incorporate pedestrian considerations in transportation plans. Prioritize pedestrian safety and considerations for mobility and accessibility in the context of land use and roadway environment. Prioritize improvements to fill gaps in networks and crossings within ¼ mile of bus stops and ½ mile of other mass transportation.
4b	Develop policies to analyze pedestrian 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.
4c	Ensure opportunities for crossing arterials/highways safely consider the overall pedestrian network and travel desire lines. Consider setting standards or guidelines for the distance between safe crossings given land uses/densities/roadway function. Provide safe crossings of freeways.
4d	Provide appropriate features along the pedestrian network (wide shoulders, sidewalks, pedestrian crossing treatments, pedestrian refuge islands).
4e	Create connected pedestrian networks and remove barriers to pedestrian travel (Pedestrian over/under passes, crossings to overcome physical barriers).

Strategy #5	Improve pedestrian involved crash reporting
	Countermeasures and Programs:
5a	Work to include crash typing in the pedestrian crash reporting. Use the Pedestrian Crash Analysis Tool (PBCAT) for categories on crash typing.
5b	Add fields to the standard crash report form to better define pedestrian crashes and provide additional detail on the specifics of each crash. This includes those needed to use the PBCAT tool and develop law enforcement roll call videos on the need for and uses of pedestrian crash data.

Strategy #6	Establish vehicle operating speeds to decrease crash severity
	Countermeasures and Programs:
6a	Encourage use of target speeds that consider pedestrians, land use, and the roadway context (e.g., a target speed of 35 mph or less on arterials). Other examples: provide design flexibility guidance for techniques to reduce operating speeds on surface streets; encourage use of tree lined medians, bicycle lanes, safe and attractive pedestrian crossings and walkways; support use of traffic calming for local streets.
6b	Design new roadways for a target speed appropriate for the adjacent environment and safety of all users rather than for a design speed intended to maximize motor vehicle speeds.

Strategy #7	Develop strategic pedestrian safety plans tailored to local conditions
	Countermeasures and Programs:
7a	Develop Pedestrian Safety Action Plans (PSAPs) in urbanized areas.
7b	Identify/create funding sources (i.e., match funding, funding barriers). Other examples: identify barriers which limit use to existing funds; allow for systemic approach (based on site characteristics and not crashes) when implementing countermeasures recommended in PSAPs.

FHWA Bicycle Countermeasures

I. CHILDREN

Countermeasure	Effectiveness	Cost	Use	Time
1.1 Bicycle helmet laws for children	★★★★★	$$	Medium	Short
1.2 Safe Routes to School (SRTS)	★★	$	High	Short
1.3 Bicycle safety education for children	★★	$	Unknown	Short
1.4 Cycling skills clinics, bike fairs, bike rodeos	★	$	Unknown	Short

II. ADULT BICYCLISTS

Countermeasure	Effectiveness	Cost	Use	Time
2.1 Bicycle helmet laws for adults	★★★★	$	Low	Short
2.2 Bicycle safety education for adult cyclists	★	$$	Low	Medium

III. ALL BICYCLISTS

Countermeasure	Effectiveness	Cost	Use	Time
3.1 Active lighting and rider conspicuity	★★★	$	High[†]	Varies
3.3 Promote bicycle helmet use with education	★★	$$$	Medium	Medium
3.3 Enforcement strategies	★	$$	Unknown	Varies
3.4 Motorist passing bicyclist laws	★	$	Medium	Short

[†]High for active lighting laws; unknown for promoting other conspicuity measures

IV. DRIVERS & BICYCLISTS

Countermeasure	Effectiveness	Cost	Use	Time
4.1 Driver training	★	$$	Low	Medium
4.2 Share the Road awareness programs	★	$$	Unknown	Medium

Bicycle crashes are not an emphasis area in the SHSP. However, many of the strategies and countermeasures for pedestrian are applicable to bicyclists.

Intersection Safety
FHWA COUNTERMEASURES
TEXAS SHSP STRATEGIES & COUNTERMEASURES

Strategy #1	Improve data systems for identifying specific intersections and intersection types at high probability for serious injury crashes
	Countermeasures and Programs:
1a	Create a statewide intersection safety and roadway elements database. (incorporate Model Inventory of Roadway Elements format, create a standardized data structure to support GIS applications, create an app for data collection, develop partnerships between TxDOT, MPOs, and local agencies to populate the database, and develop and implement an intersection identifier system for posting at intersections).

Strategy #2	Consider alternative design strategies for improving intersection safety
	Countermeasures and Programs:
2a	Construct roundabouts and create an outreach program to educate the public and public officials about roundabout advantages and safety benefits.
2b	Convert signalized intersections to diverging left intersections.
2c	Encourage use of the Intersection Control Evaluation process for use in project development by TxDOT and local agencies—develop case studies, provide training, and conduct outreach.

Strategy #3	Improve pedestrian safety at intersections with high probability of crashes
	Countermeasures and Programs:
3a	Develop methods to identify and target high pedestrian crash probability locations: systemic methods (i.e., based on characteristics) and screening for locations with above average crash experience.
3b	At targeted intersections: prohibit right on red and permissive left turns at high probability locations, install/improve pedestrian signals, pedestrian crosswalks, lighting, and/or high friction surface treatment on intersection approaches, and ensure pedestrian signals, push buttons, crosswalk markings, etc., meet current requirements or upgrade to current requirements, including signal timing.

3c	Install low to medium cost improvements to increase pedestrian safety: eliminate free flow turn lanes or convert them to angled turn lanes that require stopping/yielding, add turn islands and median islands and curb bulb outs, convert permissive only or protected permissive phasing to protected only (when pedestrian is present or during active times of day), provide enhanced measures—rectangular rapid flash beacon, pedestrian hybrid beacon, lighting, etc., at uncontrolled high risk locations, and pedestrian islands.

Strategy #4	Increase driver awareness of intersections
	Countermeasures and Programs:
4a	Develop Texas specific resources on the use of specific countermeasures, based on roadway types, system ownerships, rural/urban character, etc., as a guide to practitioners.
4b	Install driver speed feedback signs in advance of intersections.
4c	Implement current Texas Intersection Safety Implementation Plan to prepare for the next iteration of the HSIP.

Strategy #5	Develop educational campaigns incorporating data analysis to improve intersection safety.
	Countermeasures and Programs:
5a	Publicize high crash locations and point out the contributing crash factors (e.g., red light running, speeding impaired driving, texting, phone use).
5b	Increase and renew emphasis on safe driving behaviors in driver education.
5c	Create info-graphics and other social media-friendly information.
5d	Develop and implement a young driver educational campaign relating to signalized intersections.

Strategy #6	Reduce red light running
	Countermeasures and Programs:
6a	Use targeted enforcement at high incident locations.
6b	Research, identify, and address the factors contributing to the trend of reduced law enforcement citations for intersection violations.
6c	Educate decision makers and the public on the effectiveness and appropriate use of automated enforcement.
6d	Install automated red light enforcement cameras.

6e	Improve traffic signal timing and interconnect signals to improve efficient traffic flow and encourage a safe travel speed.
6f	Install red light indicator (in most cases, white) lights to inform law enforcement of red signal onset.