Permian Basin Regional Planning Commission

Comprehensive Safety Action Plan

Final Draft June 2025

PERMIAN BASIN

Safety Action Plan

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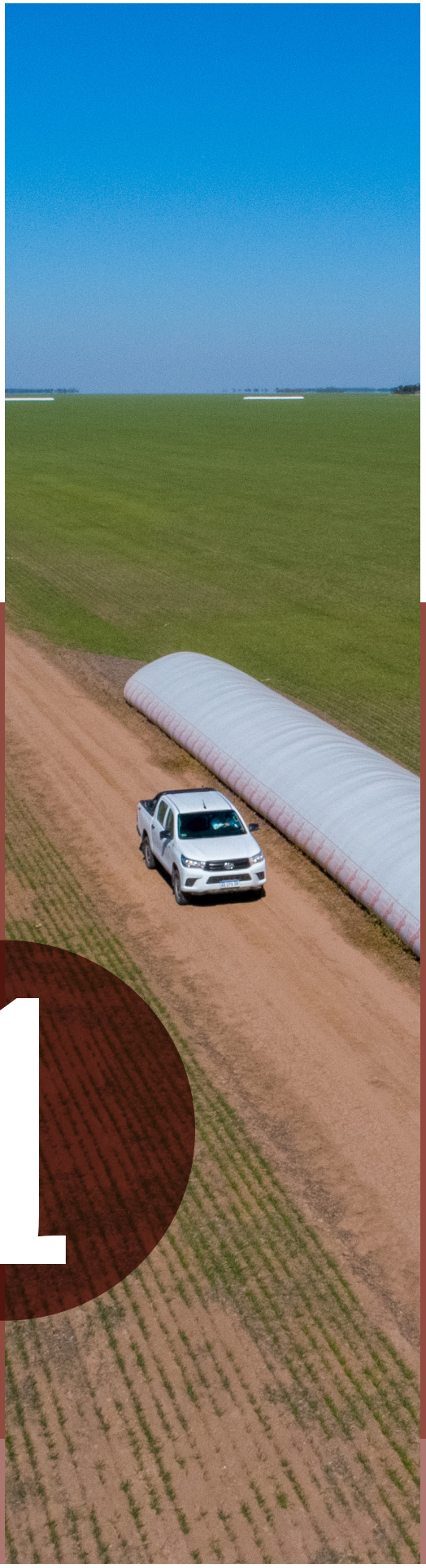

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The Case for a Safety Action Plan

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Introduction

The Permian Basin Regional Planning Commission (PBRPC) Comprehensive Safety Action Plan (CSAP) was developed using four guiding principles. This chapter lays the foundation for the CSAP through examining the guiding principles and the different roles they played in the development of this Plan. The Plan's mission statement and project timeline are also detailed in Chapter 1.

Project Overview

The Permian Basin Regional Planning Commission (PBRPC) Comprehensive Safety Action Plan aims to create a safe transportation network for all ages and abilities. Through the development of this plan, PBRPC is acknowledging that safety should be a cornerstone of its communities. Data driven analysis on all roadways was completed in an effort to better understand the problem and assist in the identification of countermeasures and policy recommendations that could help increase safety. This CSAP is meant to help coordinate resources among cities, towns, and organizations in the region to towards one shared goal: eliminating all traffic deaths and serious injuries in the Permian Basin.

Together with the Regional Safety Steering Committee (RSSC), PBRPC staff will work with local governments and other partners in the region to prioritize transportation projects that will support the creation of a safer transportation system for all users. This chapter details the plan's purpose, process, and the benefits of creating a Plan (CSAP).

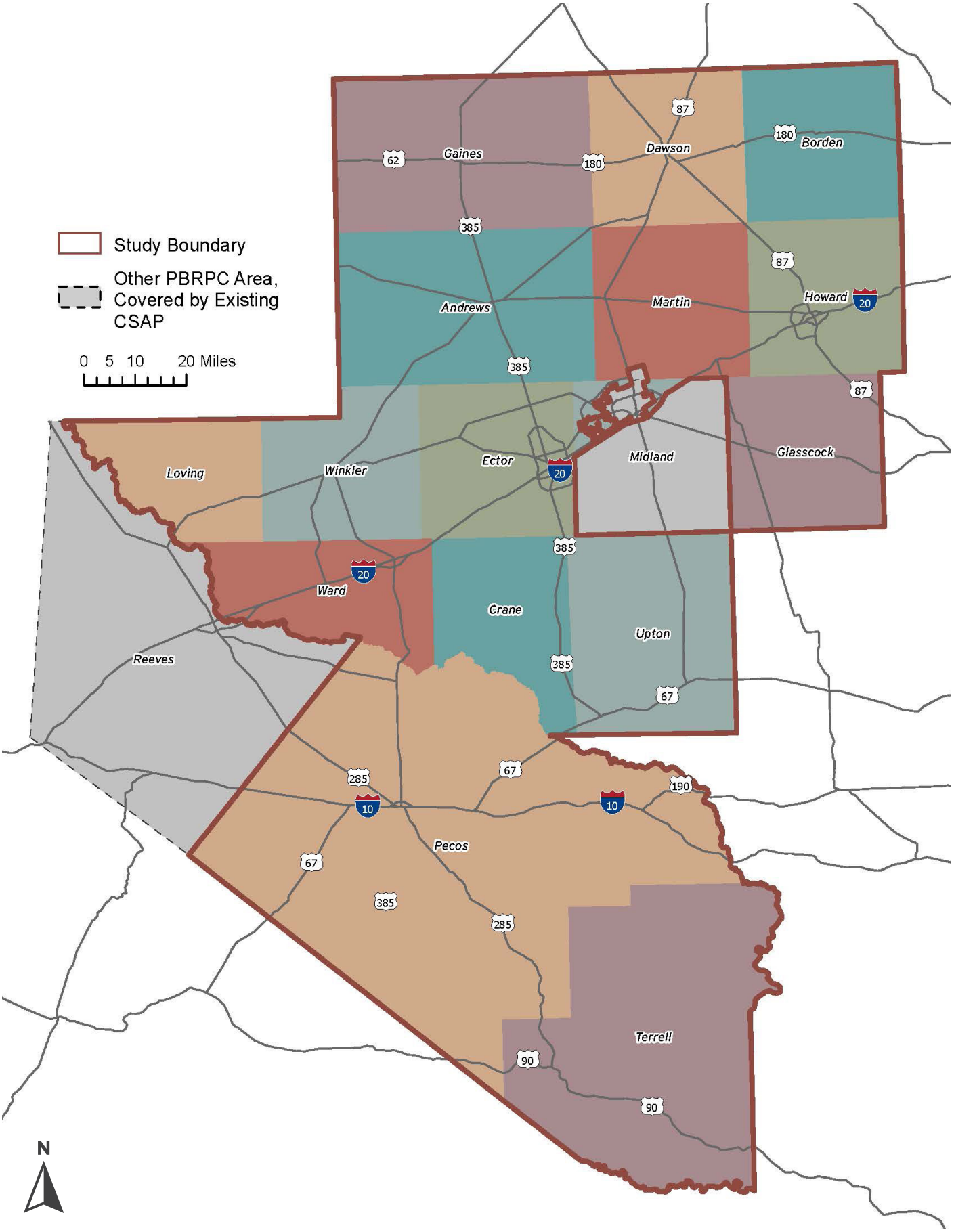
This CSAP was developed from the Safe Streets for All (SS4A) grant program beginning June 2024 to May 2025. Over the past decades, PBRPC has worked closely with the cities, counties, and other organizations of the region to tackle common issues facing all residents and safety is no different. While PBRPC serves 17 counties, not all areas were included in the Plan as shown in **Exhibit 1** on page 11. The study area encompasses a total of 15 counties with parts of Midland County being included. In the following reports, all mentions of the "region" is referring to the study area of the PBRPC CSAP. Reeves County, the City of Midland, and the southern portion of Midland County all have existing Comprehensive Safety Action Plans or are creating one independently, so they were not included in the analysis for this Plan.

Mission Statement

Diligently support safe and friendly roadways by promoting shared responsibility, improving street safety, and partnering with community, governmental and industry stakeholders to ensure everyone's safety.

The Regional Safety Steering Committee collaborated with one another to develop a mission statement to articulate the core purpose, values, and goals for this action plan by reflecting on the strengths and weaknesses of the Region. Through this collaboration, the following mission statement was created for the PBRPC CSAP.

Exhibit 1 Counties within the Study Area



Project Timeline

The project launched in June 2024 and spanned ten months, concluding in May 2025. In collaboration with the PBRPC, northwestern Texas cities, and various stakeholders, PBRPC has led the initiative to enhance roadway safety across the region. **Table 1** below outlines the timeline for the PBRPC CSAP meetings and engagement efforts.

Table 1 PBRPC CSAP Timeline of Meetings and Engagement Efforts

	2024						2025				
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
RSSC Meetings	■		■		■		■		■		
Pop-Up Meetings				■	■				■	■	
Data Analysis		■	■	■	■	■	■	■			
Stakeholder Interviews							■	■	■		
Draft & Final CSAP									■	■	■
County Commissioners Court Presentations										■	■

Guiding Principles

SAFE STREETS & ROADS FOR ALL (SS4A)

The SS4A program is a primary driving force behind the development and funding of the CSAP, guided by the Federal Highway Administration (FHWA) Safe System Approach. The principles of this plan are seen through a Vision Zero lens, which aims to eliminate all traffic fatalities and severe injuries. This approach prioritizes safe road design, enforcement, education, and community engagement to achieve its goals.

A Comprehensive Safety Action Plan (CSAP) is a strategic document aimed at reducing and eliminating serious injury and fatal crashes. It uses data analysis to identify roadway safety issues and enhances a community's approach with targeted projects and strategies to address the most significant risks. Comprehensive Safety Actions Plans created as part of the SS4A programs must have the eight components listed in **Figure 1** below.

Figure 1 Components of a Comprehensive Safety Action Plan

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- **Leadership Commitment & Goal Setting:** An official public commitment by a high-ranking official and/or governing body to achieve zero roadway fatalities and serious injuries. The commitment must include a specific goal and timeline, which can be achieved by either:

  1) Setting a target date for achieving zero roadway fatalities and serious injuries, or

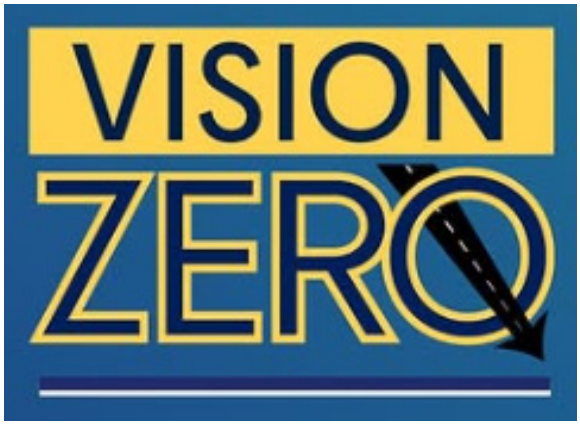
  2) Establishing an ambitious percentage reduction of roadway fatalities and serious injuries by a specific date, with the goal of eliminating them.

- **Planning Structure:** A committee, task force, implementation group, or similar body responsible for overseeing the development, implementation, and monitoring of the Action Plan.
- **Comprehensive Safety Analysis:** Analysis of existing conditions and crash trends to establish a baseline of fatalities and serious injuries across a jurisdiction. This includes crash locations, severity, contributing factors, and road user types. It assesses systemic and specific safety needs, considering high-risk road features, public health, demographics, and the built environment. Whenever possible, all roadways are analyzed regardless of ownership, enabling geospatial identification of high-risk areas (such as a High-Injury Network or equivalent).
- **Engagement and Collaboration:** Strong public and stakeholder engagement, including the private sector and community groups, ensures representation and feedback. This input is analyzed and incorporated into the Action Plan, with coordination across overlapping jurisdictions and alignment with other governmental plans where feasible.
- **Equity Considerations:** The plan development follows inclusive processes, identifying underserved communities through data and collaboration. The analysis considers population characteristics, and the initial equity impacts of proposed projects and strategies.
- **Policy & Process Changes:** Evaluation of existing policies, plans, and standards to identify opportunities for enhancing transportation safety. The Action Plan outlines implementation through updated or new policies and guidelines as needed.
- **Strategy & Project Selections:** A comprehensive set of projects and strategies is identified using data, best practices, stakeholder input, and equity considerations to address safety issues. These strategies follow a Safe System Approach, include multidisciplinary activities, and account for data limitations. Projects and strategies are prioritized with timelines (short-, mid-, and long-term) and focus on infrastructure, behavioral, and operational safety, with clear criteria for prioritization.
- **Progress and Transparency:** A method to track progress over time, including outcome data and transparency measures for residents and stakeholders. Requires at least annual public reporting on efforts to reduce fatalities and serious injuries, along with online access to the Action Plan.

VISION ZERO

Vision Zero is an initiative aimed at creating a transportation network with zero traffic fatalities and severe injuries while promoting safe, healthy, and equitable mobility for all. Achieving the Vision Zero goal requires **prioritizing safer road design**, enforcement, education, and increased community engagement. A holistic approach to transportation safety is necessary to enhance the quality of life, safety, and mobility within communities by reducing fatal and severe injuries. Vision Zero is not a slogan, tagline, or merely a program; it represents a fundamentally different approach to traffic safety. The Vision Zero is not only a regional effort, but a national one; **Figure 2** shows the FHWA's Vision Zero logo.

Figure 2 Vision Zero Logo for FHWA



SAFE SYSTEM APPROACH

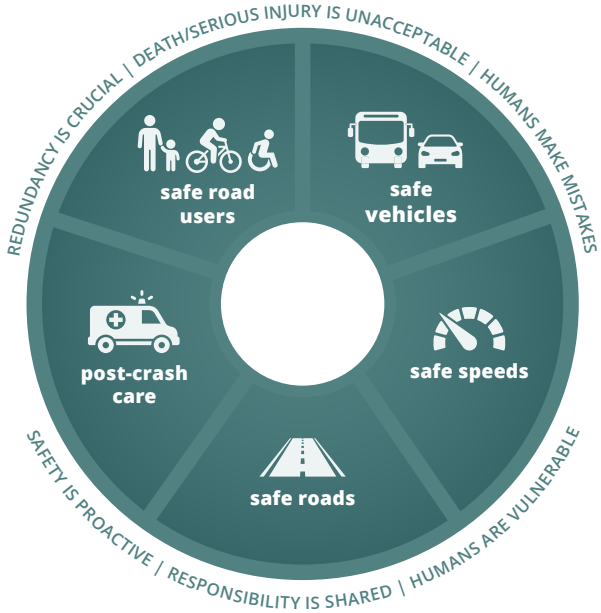
The Safe Systems Approach was introduced in the 1990s by Swedish road safety expert, Claes Tingvall. The Safe System Approach is the framework and mechanism by which this Safety Action Plan can be implemented. **Figure 3** depicts the six key principles that can be utilized to implement the elements of the Safe Systems Approach:

Figure 3 Six Key Principles of the Safe Systems Approach

Death or Serious Injury is Unacceptable	Humans Make Mistakes	Humans Are Vulnerable	Responsibility is Shared	Safety is Proactive	Redundancy is Crucial
Focusing attention on preventing fatal and sever crashes over minor crashes so residents are better protected on the public roads.	Human error is inevitable, inevitably leading to crashes, but a roadway system that accounts and accommodates for this fact can mitigate the effects (avoiding serious injury or death).	Human tolerance to crashes is a recognized and measurable benchmark (kinetic energy transfer can be measured) and should be incorporated into design considerations.	No single party is responsible for crash prevention alone, but collectively all parties are responsible. This includes transportation designers and engineers, users, law enforcement, vehicle manufacturers, and publicly appointed decisionmakers.	Rather than responding to tragedy, measures should be taken beforehand to identify and mitigate potential risks.	Affecting change requires strengthening of all Safe Systems elements. In the case that one element fails, redundancy prevents systemwide failure, ensuring people are protected.

The Safe Systems Approach is a principled strategy aimed at eliminating serious and fatal injuries. This approach considers human errors and strives to reduce their impact on the human body. By accommodating human mistakes through roadway design features and technological advancements in vehicles, such as lane departure assist and autonomous emergency braking, safety can be significantly enhanced. There are five complementary objectives outlines by the U.S. Department of Transportation (USDOT) that correspond and support the implementation of the Safe Systems Approach, as shown in **Figure 4**. The five objectives are as follows:

Figure 4 Five Complementary USDOT Objectives Supporting the Safe Systems Approach



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1. Safe road users bear the burden of responsibility for complying with rules and regulations of the roadway.

2. Safe vehicles play a key role in minimizing or preventing crash impacts. Active safety technologies work to avoid crashes, while passive safety features lessen the severity of crashes when they do occur.

3. Safe speeds are directly correlated with higher survival rates in crashes. Reducing speeds decreases the impact force, improves visibility, and provides drivers with more braking time.

4. Safe roads are not defined solely by their design. Instead, the collaborative efforts of road design, construction, maintenance, operation, and countermeasures work together to improve safety.

5. Post-crash care involves the actions taken by responders to a crash, including emergency services, law enforcement, and cleanup crews.

THE SIX E'S OF SAFETY

The six E's of safety form a comprehensive and integrated framework. Although each community has unique characteristics and perceptions of safety, the six E's can be effectively applied across all levels to enhance user experience and improve safety. This report's Safety Action Plan utilizes each of the six E's as a guiding framework for implementation.

ENGINEERING

Engineering projects and interventions supporting Vision Zero can be implemented through the built environment to enhance safety. The primary goal is to calm traffic and improve safety for all users. Proven examples include the implementation of safety countermeasures and traffic calming measures to reduce speeding.

EDUCATION

Education can enhance safety by raising awareness of transportation choices, highlighting the benefits of multimodal transportation, and teaching the proper use of the system, ultimately reducing the margin of error.

EVALUATION

Evaluation can support both proactive and responsive measures. Understanding the when, where, and why of crashes allows us to address historical trends and enhance future safety. Similarly, thorough evaluation can help identify and mitigate potential issues before they become more severe.

EQUITY

Equity efforts must acknowledge and address the imbalances and additional burdens faced by disadvantaged populations. These vulnerable and historically hard-to-reach groups deserve the same access to information and infrastructure as everyone else.

ENFORCEMENT

Enforcement ensures that traffic laws and regulations are followed by all users, while preventing profiling. Enforcement can also prioritize addressing problematic behaviors, such as speeding and other dangerous actions, over minor infractions.

ENCOURAGEMENT

Encouragement within the community to further their knowledge and understanding of safety principles can be fun and interactive. Events and activities can support and promote better behavior.

2

Engaging the Region

Introduction

The PBRPC CSAP was developed with the people it is impacting in mind. This attentiveness to the region's needs was an integral part of the Plan's development. Chapter 2 describes the public engagement methods utilized by the planning committee as well as the resulting feedback from this engagement and how it was implemented into the CSAP.

Regional Safety Steering Committee

Stakeholders from throughout the Permian Basin region representing various counties, sectors, and professions have come together to form The Regional Safety Steering Committee (RSSC). Members of the Steering Committee serve as champions of the Safety Action Plan providing key feedback at major milestones throughout the development of the project. This stakeholder committee was established to provide guidance for the plan and ensure the priorities of the communities within the Permian Basin Regional Planning Commission boundaries are being served. The Regional Safety Steering Committee was tasked with attending five progress meetings to set goals for the plan, assist in public engagement, identify boundaries of study corridors based on historical data, and aid in implementation efforts. **Figure 5** presents photographs from the RSSC Crash History and High Injury Network Results meeting.

Regional Safety Steering Committee Meetings

- Meeting 1: Kick-off and Goal Setting – July 16th, 2024
- Meeting 2: Public Engagement and Existing Conditions – September 17th, 2024
- Meeting 3: Crash History and High Injury Network Results – November 5th, 2024
- Meeting 4: Project Recommendations & Implementation Plan – January 9th, 2025
- Meeting 5: Draft Plan Review & Annual Reporting – March 4th, 2025

Figure 5 Photos from RSSC Meeting #3 in November 2024

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Public Engagement

Public Engagement for the PBRPC CSAP consisted of online engagement via the project website, pop-up events hosted in each of the participating counties, and distribution of promotional materials highlighting the prioritization of safety for all road users throughout the region.

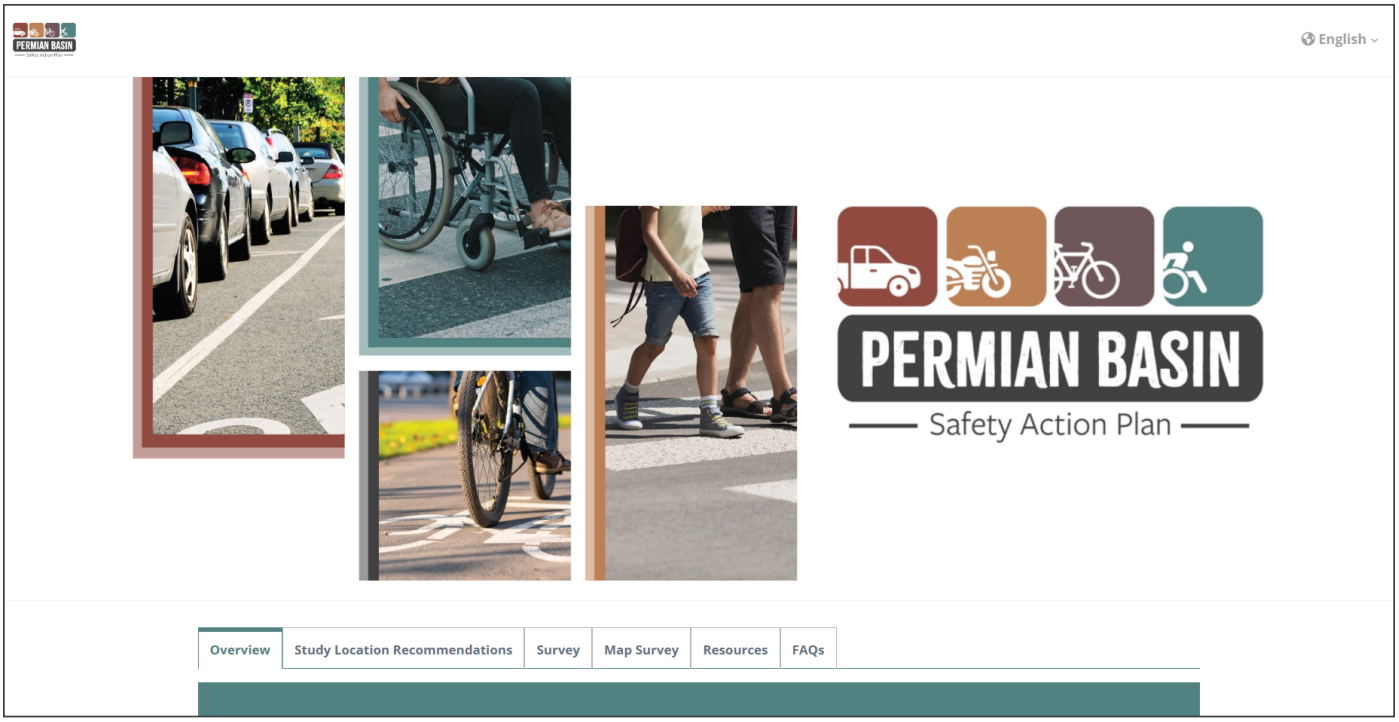
PROJECT WEBSITE

Social Pinpoint was used for three main purposes related to the project:

- Define a Comprehensive Safety Action Plan and its relevance to the community
- Serve as a data collection agent for the online survey
- Collect citizen's feedback via an interactive map depicting traffic safety concerns in the region

The project website was an integral component of the plan development process providing the project team with insights into the concerns of the community (**Figure 6**). The website also offered information regarding upcoming public events, frequently asked questions, links to relevant resources, and contact information. This effort resulted in 620 site views and 210 total contributions.

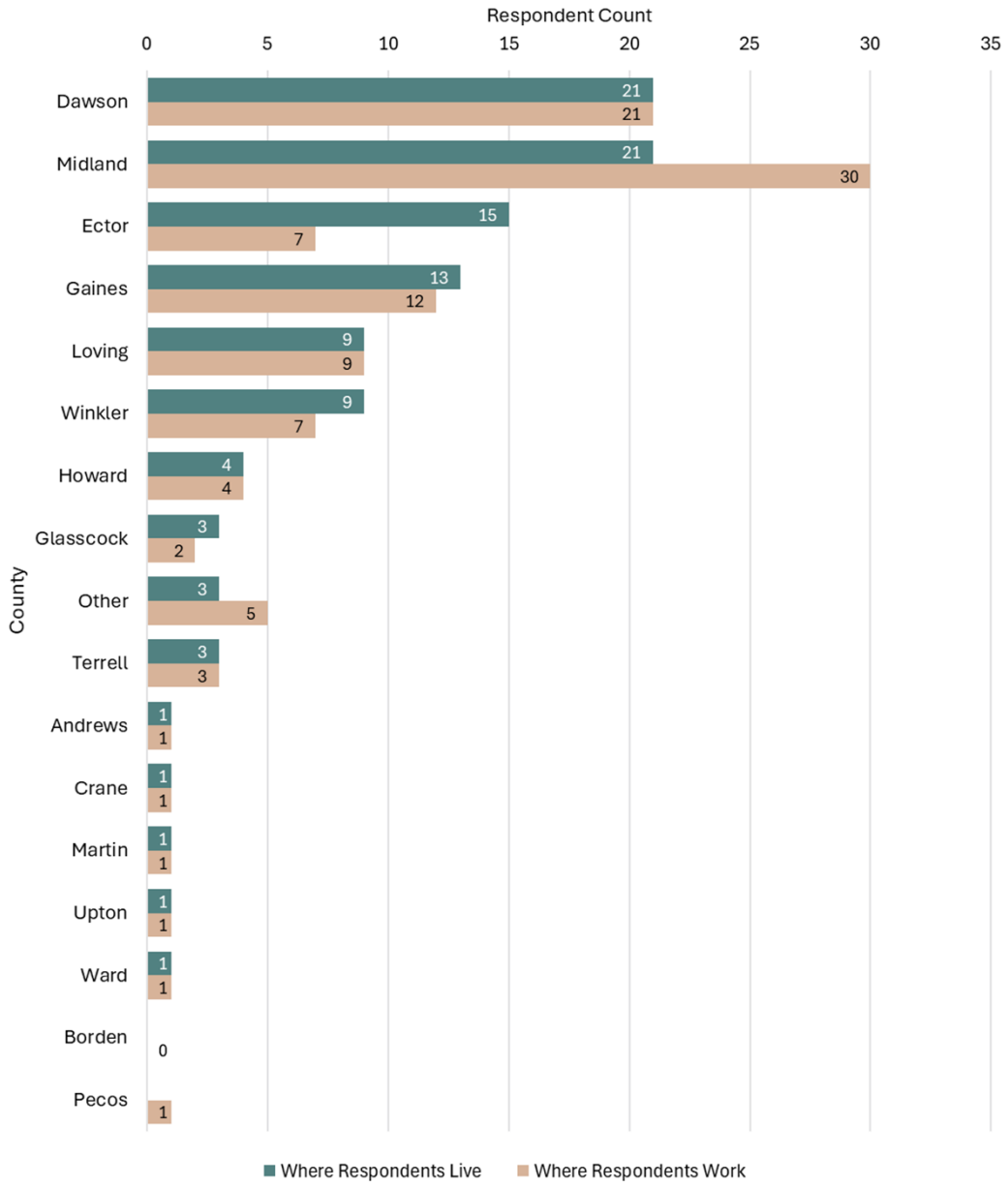
Figure 6 Project Website



SURVEY

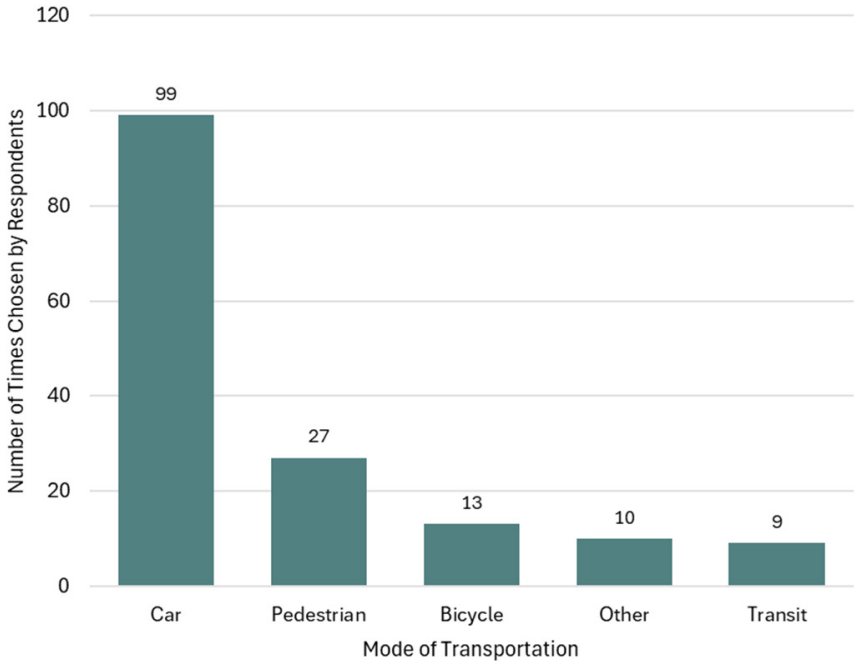
The project team utilized an online survey to collect data from the community. The survey was available to the public from July 2024 to March 2025 and received 106 contributions. It contained 31 questions used to collect demographic information, transportation mode choice, and roadway safety concerns. Of the 106 respondents to the survey, 73% of them identified as 'a resident not involved in an action group'. Survey respondents primarily reside in Dawson (19%), Midland (19%), and Ector (14%) counties as shown in Figure 7. Although only 19% of respondents stated they live in Midland, 28% of respondents stated they worked in Midland; Midland was the most cited county regarding where respondents worked (Figure 7). This implies that residents from other counties in the study area, are travelling to Midland for work.

Figure 7 County Where Respondents Live and Work



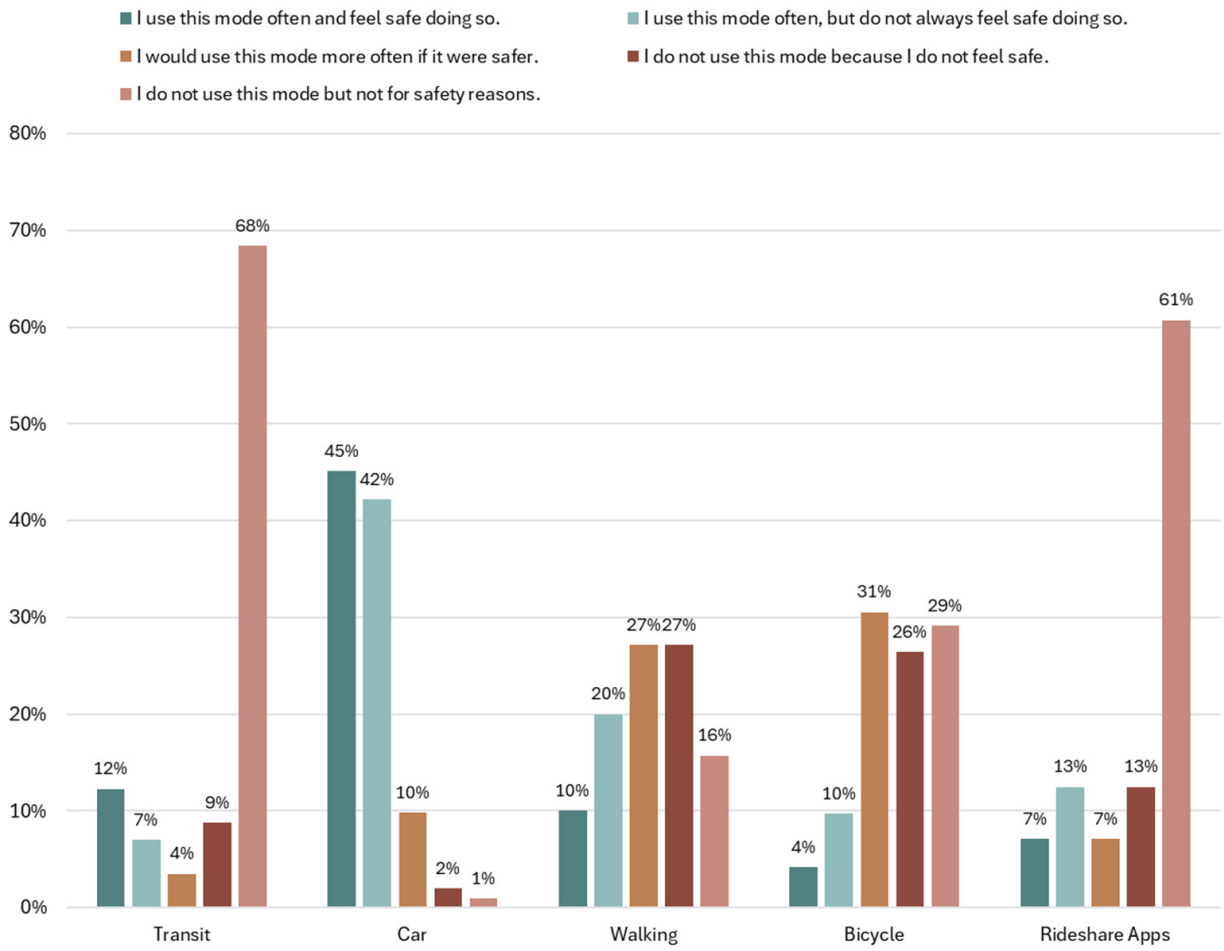
While a car was overwhelmingly the most used mode of transportation by respondents, the next most chosen mode of transportation was walking with this mode being selected 27 times (Figure 8).

Figure 8 Most Used Modes of Transportation within the Last 2 Years



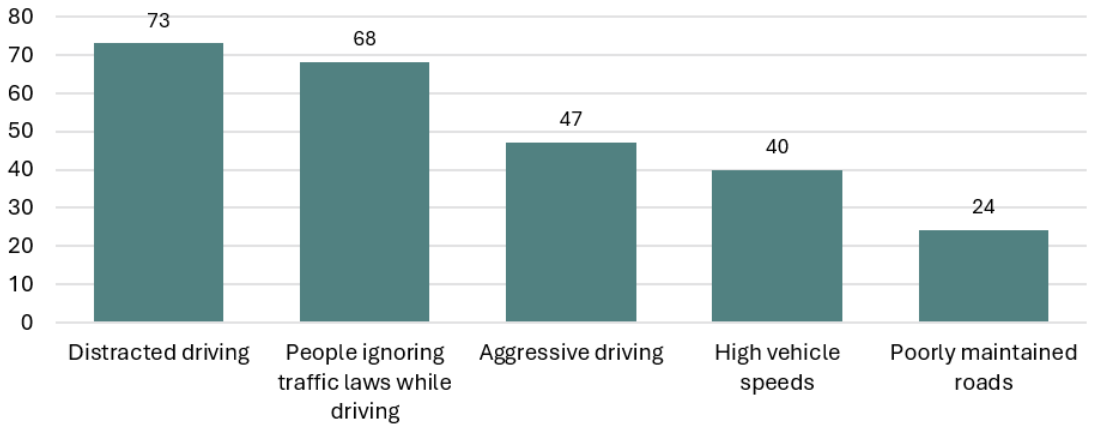
Driving a car was the most cited mode of transportation used by respondents in the past 2 years, but approximately 42% of those respondents also stated they 'use this mode often, but do not always feel safe doing so' (**Figure 9**). While driving is part of everyday life, a large portion of drivers do not always feel safe doing so; the main purpose of this plan is to address these concerns to ensure safer roads for all. Additionally, **Figure 9** shows that walking and bicycling are not commonly used modes of transport by respondents but could be if they were safer. Approximately 27% and 31% of respondents stated they 'would use this mode more often if it were safer' regarding walking and bicycling, respectively. If walking and bicycling were made safer either through the addition of dedicated facilities or more driver education, walking and bicycling could increase in the study area.

Figure 9 Residents Usage and Safety Opinions per Mode of Transportation



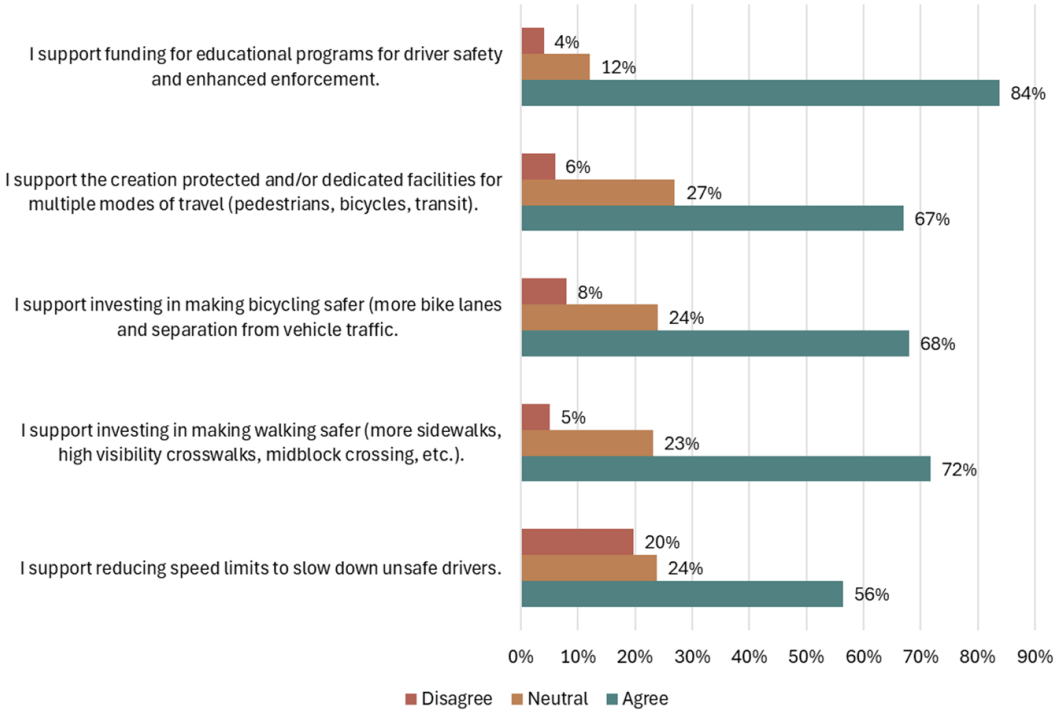
Through the survey, respondents were also able to cite specific traffic safety concerns that could be contributing to unsafe roadways in their communities. The most cited traffic safety concerns were: 'distracted driving', 'people ignoring traffic laws while driving', 'aggressive driving', 'high vehicle speeds', and 'poorly maintained roads' (**Figure 10**). These traffic concerns were also common concerns expressed by residents of the study area at public pop-up events. Engineering solutions and policies/programs that could remedy the concerns listed above should be prioritized.

Figure 10 Top 5 Traffic Safety Concerns



In addition to gathering information about safety concerns respondents have, the survey also asked respondents if they would support specific policies and programs that aim at increasing safety for all users. Respondents overwhelmingly support the funding of education programs for driver safety and enhance enforcement (84%). To increase safety for vulnerable road users, respondents support investing and creating dedicated spaces for both pedestrians and bicyclists (**Figure 11**).

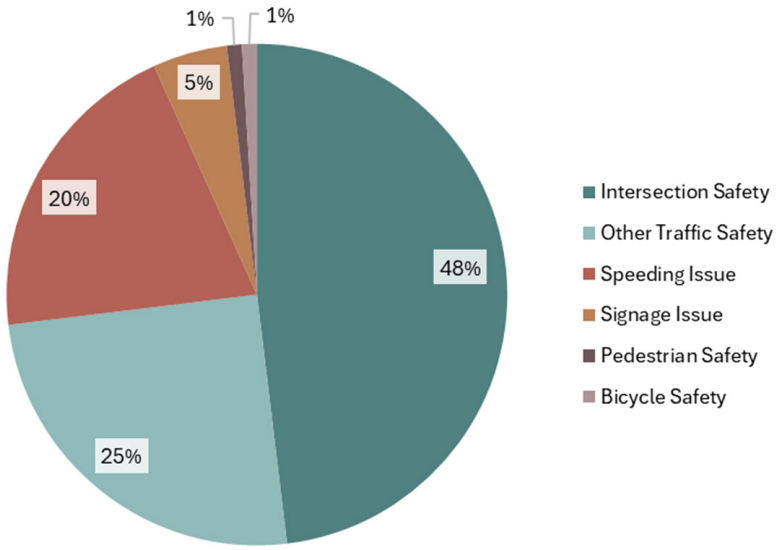
Figure 11 Respondents Support of Different Actions to Improve Traffic Safety



INTERACTIVE MAP SURVEY

Visitors to the online interactive map survey were able to provide feedback attached to a pin that could be dropped at specific locations. Respondents have the choice between adding their own comment or upvoting a previous respondent's contribution. These data points allowed the project team to gain a better understanding of the prioritized concerns of the traveling public. The comments received addressed concerns including intersection safety, speeding issues, and signage issues as shown in Exhibit 2. The online interactive map survey received 106 total contributions, broken down by type in **Figure 12**.

Figure 12 Breakdown by Comment Type

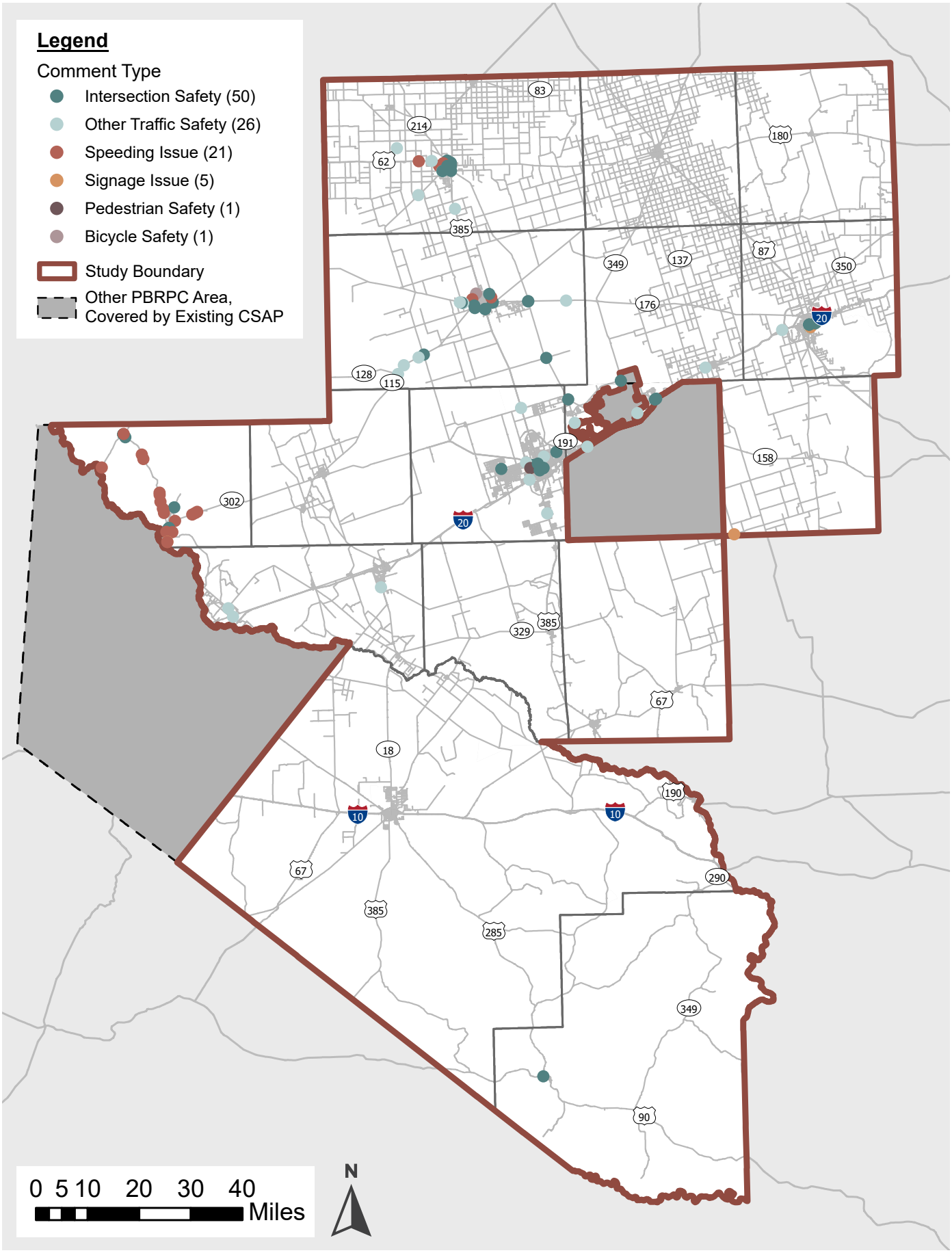


The top concerns by location are:

Intersection Safety (50)	Other Traffic Safety (26)	Speeding Issue (21)
Gaines County	Gaines County	Gaines County
Andrews County	Andrews County	Andrews County
Ector County	Ector County	Loving County

Signage Issue (5)	Pedestrian Safety (1)
Glasscock County	Ector County
Howard County	

Exhibit 2 Interactive Map Survey



Pop-Up Events

In an effort to extend the public outreach and awareness of the CSAP, two rounds of public pop-up events were hosted. As a strategy to meet the public where they are, during the first round of pup-up events the project team deployed to each county to participate in already planned community events. This allowed the team to leverage sizable events to spread the word about the plan development process and gain valuable feedback from the public regarding their personal experience of safety issues on local roadways. At each pop-up event, the project team had a booth set up with displays containing crash statistics relevant to the county we were present in at that time. The booth was complete with activities, promotional items, and surveys to gather integral feedback (**Figure 13**). In total, the project team attended 26 total public events across 15 of the counties in the study area (**Table 2**).

Stakeholder Interviews

Table 2 Pop-Up Events Attended for the Safety Action Plan

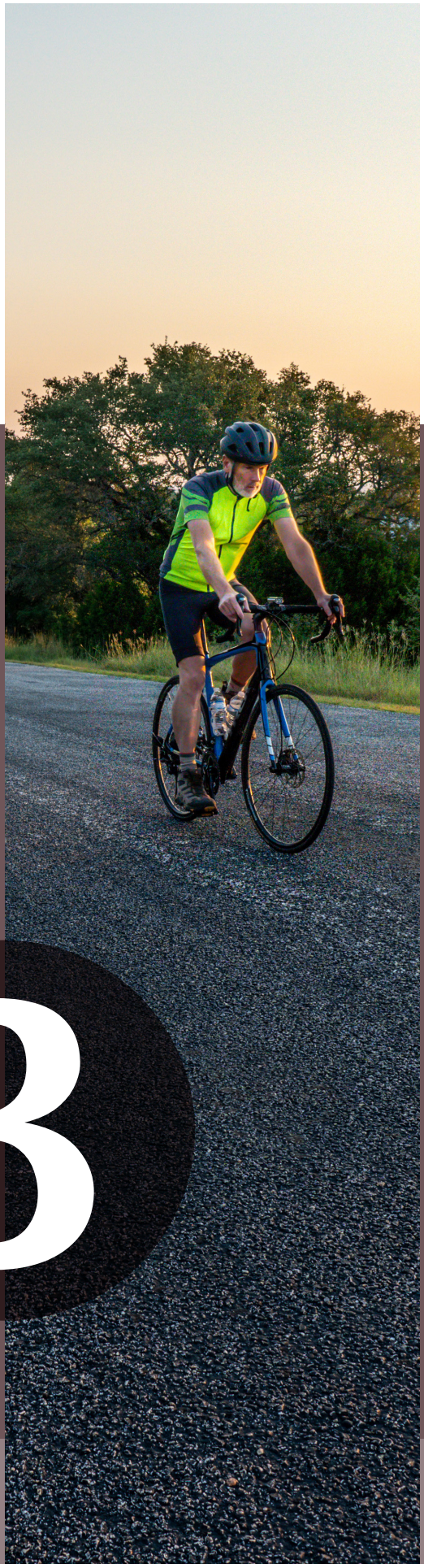
County	Event	Date
Dawson	Homecoming Football Game	Friday, September 20, 2024
Winkler	Kermit Celebration Days	Saturday, September 21, 2024
Howard	Big Spring Trade Days	Saturday, September 28, 2024
Ector	Odessa First Fridays	Friday, October 4, 2024
Andrews	2024 Oktoberfest	Saturday, October 5, 2024
Glasscock	St. Lawrence Fall Festival	Sunday, October 6, 2024
Gaines	Community Garage Sale	Friday, October 11, 2024
Midland	Midland Fall Festival and Resource Fair	Saturday, October 12, 2024
Martin	Old Sorehead Trade Days	Sunday, October 13, 2024
Upton	Eagles vs. Badgers Football Game	Friday, October 18, 2024
Borden	Borden County Trade Show	Saturday, October 19, 2024
Ward	County BBQ Bash	Saturday, October 19, 2024
Pecos	Fort Stockton Trade Days	Sunday, October 20, 2024
Terrell	Halloween Fall Fest	Saturday, October 26, 2024
Loving	Election Day	Tuesday, November 5, 2024
Winkler/Loving	Wink-Loving vs. Midland	Friday, February 28, 2025
Ward	Track Sandhills Relays	Friday, February 28, 2025
Midland	PB Water in Energy Conference	Wednesday, March 5, 2025
Ector	First Friday	Friday, March 7, 2025
Howard	Big Spring Trade Days	Sunday, March 23, 2025
Upton	Upton vs. Ozona Softball Game	Friday, March 28, 2025
Dawson/Crane	Dawson vs. Crane Baseball Game	Saturday, March 29, 2025
Gaines/Pecos	Gaines vs. Pecos Baseball Game	Monday, March 31, 2025
Martin	Old Sorehead Days	Saturday, April 12, 2025
Terrell	Coffee and Conversation/Open House	Thursday, April 17, 2025
Andrews	Wild Wild West Fest	Friday, April 18, 2025
Borden	Borden vs. Forsan Baseball Game	Friday, April 25, 2025

Figure 13 PBRPC CSAP Pop-Up Meetings

The project team hosted virtual interviews with each county within the Permian Basin Regional Planning Commission boundary to provide an update on the project concerning the individual counties. One of the benefits of hosting the stakeholder interviews is to offer a more granular approach and review of the project data. The project team was able to share information regarding corridors on the high injury and high risk networks, and confirm that the limits of the study corridors matched the local priorities of the key stakeholders. Hearing the first-hand stories and experiences of stakeholders provided the project team with insights and additional data points to consider during the corridor analysis phase of the plan development. The input received during the Stakeholder Interviews influenced additions to the policy recommendations and countermeasures outlines in the Action Plan.

County Commission

The project team visited all 15 county commissions within the Permian Basin Regional Planning Commission boundary to provide a project presentation and a draft version of the Comprehensive Safety Action Plan. The goal of the project team is to have all county commissions adopt the finalized version of the Comprehensive Safety Action Plan enabling the respective counties or Planning Commission to apply for Implementation funding pursuant to the Safe Streets and Roads For All (SS4A) grant program. The implementation funding will be used to construct projects identified by the Comprehensive Safety Action Plan to ultimately reduce and eliminate fatalities and serious injury crashes throughout the Permian Basin region.



3

Safety Needs in the Permian Basin Region

Introduction

The analysis of safety needs in the region was a primary factor in the development of the CSAP. To make the biggest impact on safety in the region, the team analyzed crash data from 2019-2023 to determine which roadways posed the highest risk to the community. This chapter examines the societal cost of crashes, crash history, safety emphasis areas, and the number of disadvantaged census tracts in the study area. Chapter 3 is the foundation for the rest of this plan since it provides a comprehensive look at the current state of safety in the study area; the results from this chapter directly impact the development of Chapters 4 to 6.

Crash Analysis

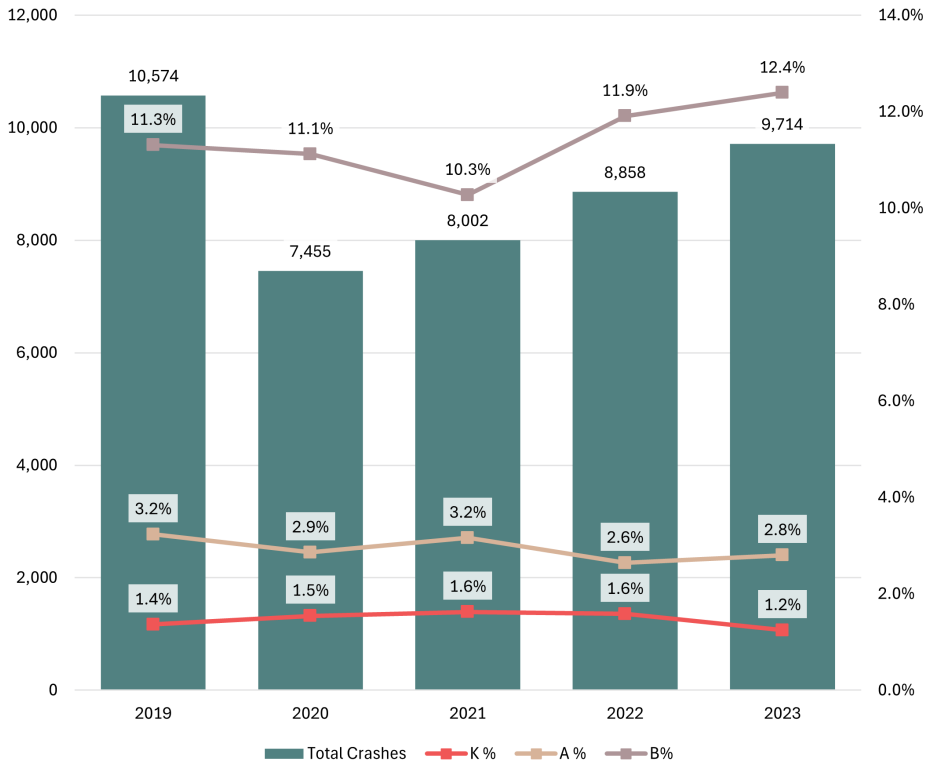
This section will highlight the crash history and safety deficiencies in the study area. This analysis was conducted utilizing crash data from 2019 – 2023 gathered from the Texas Department of Transportation's Crash Records Information System. The results of this crash analysis were vital to understanding where in the region safety concerns were present and guided decision-making in the planning process.

Over the five-year study period, the study area experienced 44,603 crashes, 650 of which were fatal crashes, as shown in **Table 3**. The highest number of crashes in the study period were in 2019, with 10,574 crashes recorded. In 2020, there was a large decrease in the number of crashes, as seen in **Figure 14** on page 31, but since then there has been a steady increase in the number of crashes in the region. While the number of crashes in the study area is steadily increasing to reach pre-2020 numbers, the number of fatal crashes has stayed consistent throughout the years with the lowest number of fatal crashes occurring in 2020. It should be noted that 2022 and 2023 has the two highest percentages of fatal and injury crashes with 16.1% and 16.3%, respectively.

Table 3 PBRPC Study Area Crash Trends (2019-2023)

Year	Total Crashes	K-Fatal	A - Suspected Serious Injury	B - Suspected Minor Injury
2019	10,574	144 (1.4%)	342 (3.2%)	1,194 (11.3%)
2020	7,455	115 (1.5%)	213 (2.9%)	829 (11.1%)
2021	8,002	130 (1.6%)	253 (3.2%)	822 (10.3%)
2022	8,858	140 (1.6%)	234 (2.6%)	1,055 (11.9%)
2023	9,714	121 (1.2%)	270 (2.8%)	1,203 (12.4%)
Total	44,603	650 (1.5%)	1,312 (2.9%)	5,103 (11.4%)

Figure 14 PBRPC Study Area Crash Trends (2019-2023)



Crash Heat Map & Severities

Exhibit 3 on page 32 displays a crash heat map that identifies areas within the study area that experience high amounts of crashes. This map visualizes the pure density of crash counts.

The most crash dense areas in the study area occur in more populated cities most of which are in the North and Central part of the region. The cities with hot spots are:

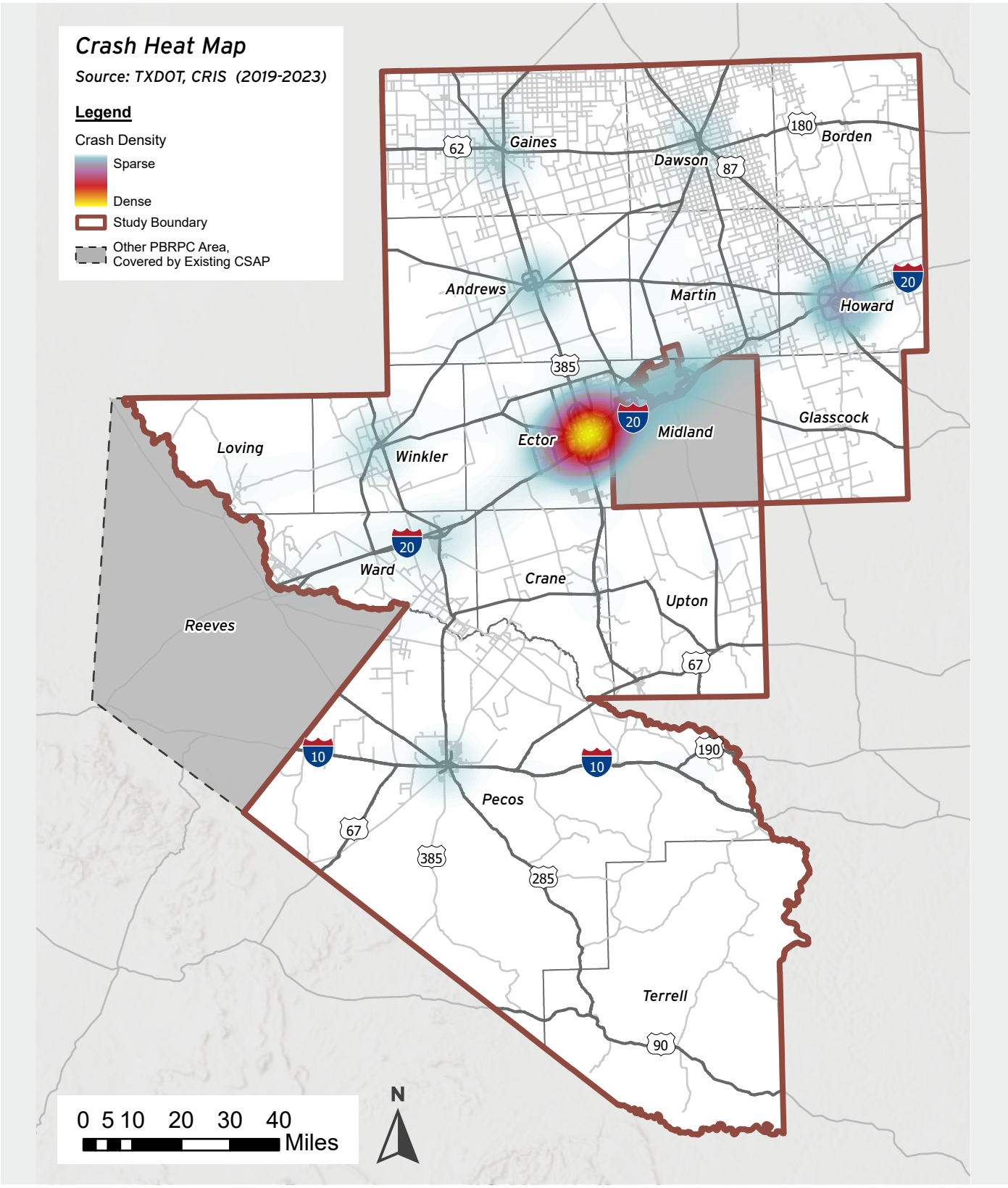
- Andrews (Andrews County)
- Big Spring (Howard County)
- Fort Stockton (Pecos County)
- Kermit (Winkler County)
- Lamesa (Dawson County)
- Monahans (Ward County)
- Odessa (Ector County)
- Seminole (Gaines County)

Although these cities experience crash hot spots, the location with the highest number of crashes in the entire study area is the Midland-Odessa area as shown in **Exhibit 3** on page 32. It is important to note that these areas could be experiencing high numbers of crashes since these areas are more populous. Additionally, the five counties with the largest number of crashes are Ector, Midland, Howard, Andrews, and Pecos (**Table 4**).

Table 4 Total Crash Count by County

County	Total Crashes
Ector	24,393
Midland	4,312
Howard	3,879
Andrews	1,954
Pecos	1,911
Ward	1,549
Gaines	1,369
Martin	1,362
Winkler	1,228
Dawson	1,091
Crane	374
Loving	363
Upton	356
Glasscock	246
Terrell	120
Borden	96

Exhibit 3 Crash Heat Map



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Societal Cost of Crashes

Another trend that sheds light on the impact crashes have on communities is the societal cost of crashes. Societal cost is determined by assigning a monetary value on the impact of crashes by its severity. These costs are a blend of economic costs and the monetized value of intangible impacts. The values used in this analysis are from the Highway Safety Benefit-Cost Analysis Guide from the Federal Highway Administration (FHWA) Safety Program.

The total cost of the crashes that occurred in the study area between 2019 – 2023 is approximately $10.43 billion with fatal crashes making up 72% of the total cost. The cost breakdown by severity is shown below (**Table 5**).

Table 5 Total Societal Cost of Crashes in the Study Area (2019 - 2023)

Crash Severity	Societal Cost per Crash*	Study Area Crashes	Societal Cost of Crashes
K - Fatal Injury	$11,637,947	650	$7,564,665,550
A - Suspected Serious Injury	$674,353	1,312	$884,751,136
B - Suspected Minor Injury	$204,143	5,103	$1,041,741,729
C - Possible Injury	$129,001	4,171	$538,063,171
Non-injury and Unknown	$12,108	33,367	$404,007,636
	Total Societal Cost of Crashes in the Study Area:		**$10,433,229,222**

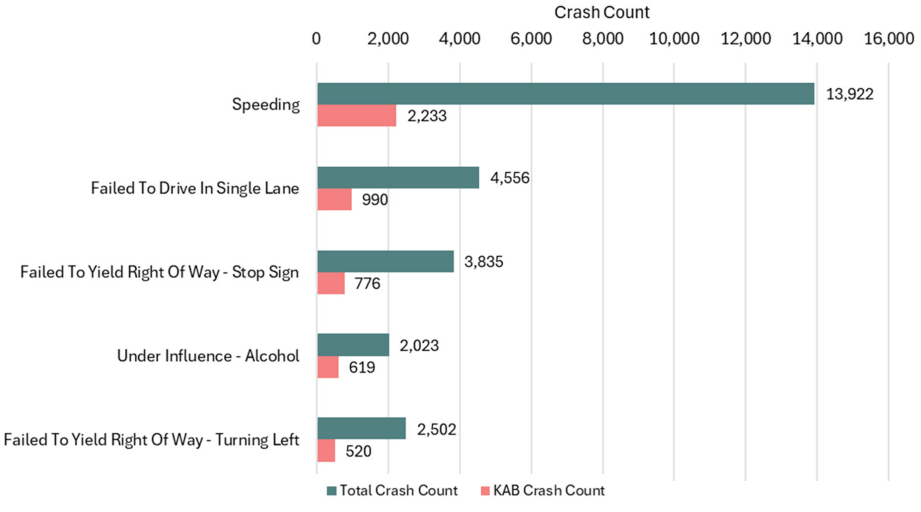
** https://highways.dot.gov/safety/hsip/highway-safety-benefit-cost-analysis-guide-0*

Top Contributing Factors

Crashes can occur because of several different factors such as being distracted, speeding, being impaired, or an animal being on the roadway. Understanding what contributed to the crash occurring is pivotal to safety planning because they show what safety issues exist for drivers. For example, if an area has a large number of severe crashes attributed to 'disregard stop sign or light', this means safety efforts should prioritize ending red light and stop sign running.

The most common contributing factors of crashes in the study area are shown in **Figure 15**. Speeding was by far the highest contributing factor in the study area, attributed to 13,922 total crashes and 2,233 fatal and injury-related crashes. The other 4 most contributing factors to fatal, serious injury, and minor injury crashes are: 'Failed to Drive in Single Lane' (990), 'Failed to Yield Right of Way – Stop Sign' (776), 'Under the Influence – Alcohol' (619), and 'Failed to Yield Right of Way – Turning Left' (520). These contributing factors show that some safety concerns to prioritize in the planning process were unsafe speeding habits, roadway and lane departures, yielding at intersections, and impaired driving.

Figure 15 Top Contributing Factors



Top Contributing Factor by County

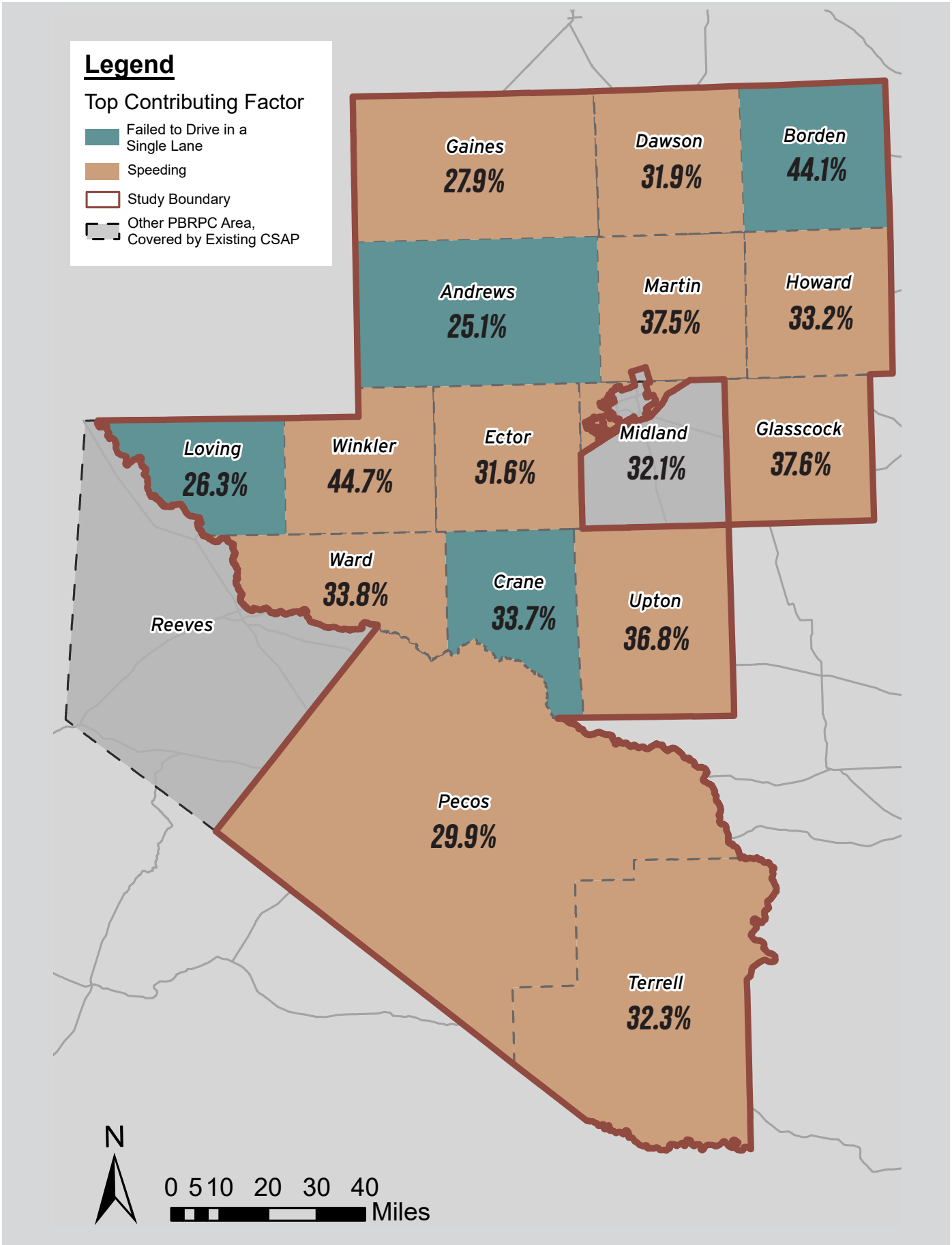
The primary contributing factor for each County was determined by identifying the most common factors in fatal, severe injury, and minor injury crashes. (**Table 6**). Each county's top contributing factor was either 'Failed to Drive in a Single Lane' or 'Speeding' which were also the two most contributing factors for crashes in the entire region as shown in **Exhibit 4** on page 35. While speeding and failing to drive in a single lane are two separate contributing factors, speeding is usually a large factor as to why drivers may depart their designated lane or the roadway.

Table 6 Top Contributing Factor by County

County	Safety Emphasis Area	% of Total KAB Crashes	Total KAB Crashes
Andrews	Failed To Drive in a Single Lane	25.1%	311
Borden	Failed To Drive in a Single Lane	44.1%	34
Crane	Failed To Drive in a Single Lane	37.7%	77
Dawson	Speeding	31.9%	188
Ector	Speeding	31.6%	3231
Gaines	Speeding	27.9%	344
Glasscock	Speeding	37.6%	85
Howard	Speeding	33.2%	650
Loving	Failed To Drive in a Single Lane	26.3%	76
Martin	Speeding	37.5%	380
Midland*	Speeding	32.1%	685
Pecos	Speeding	29.9%	394
Terrell	Speeding	32.3%	31
Upton	Speeding	36.8%	106
Ward	Speeding	33.8%	287
Winkler	Speeding	44.7%	190

** Only crashes within the Study Area were included in the analysis.*

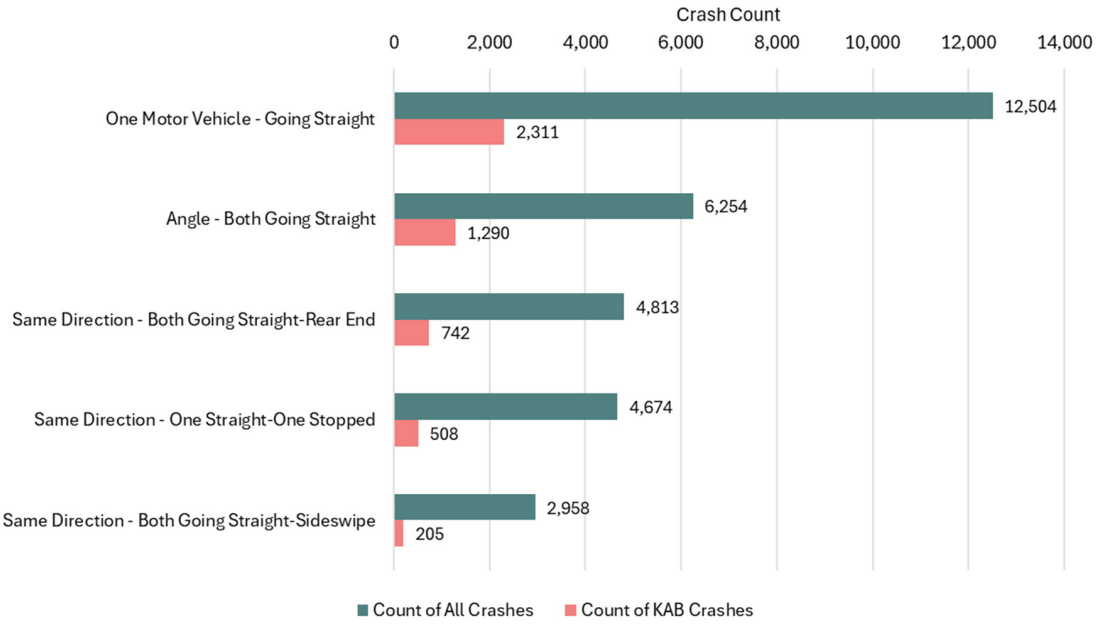
Exhibit 4 Top Contributing Factor by County Map



Top Manners of Collision

While contributing factors give an insight on why a crash may have occurred, manners of collision describe how the crash occurred. The top manner of collision is 'One Motor Vehicle Going Straight' as shown in **Figure 16**; this further shows the need for roadway and lane departures to be prioritized through this planning process. Additionally, one motor vehicle going straight (12,504) accounts for almost double the number of fatal, serious injury, and minor injury crashes than the second most cited manner of collision, angle both vehicles going straight (6,254).

Figure 16 Top Manners of Collision



Top Manner of Collision by County

Similarly to the Safety Emphasis Area analysis, the top manner of collision associated with fatal, severe injury, and minor injury crashes for each county. The results are summarized in **Table 7** on page 38 and **Exhibit 5** on page 37. Every county except for Loving cited 'One Motor Vehicle' as the top manner of collision which is consistent with the 'One Motor Vehicle – Going Straight' being the most common manner of collision in the entire study area. This suggests that roadway and lane departure crashes, which involves only one motor vehicle, is a safety concern for the region as a whole. While all the counties cited 'One Motor Vehicle' as their most common manner of collision, Loving did have tie between 'One Motor Vehicle' and 'Opposite Direction – Both Going Straight', also known as a head-on collision. Although a head-on collision does involve two vehicles, this is caused by the vehicles both departing their lane further solidifying the need to prioritize roadway and lane departures.

Exhibit 5 Top Manner of Collision by County Map

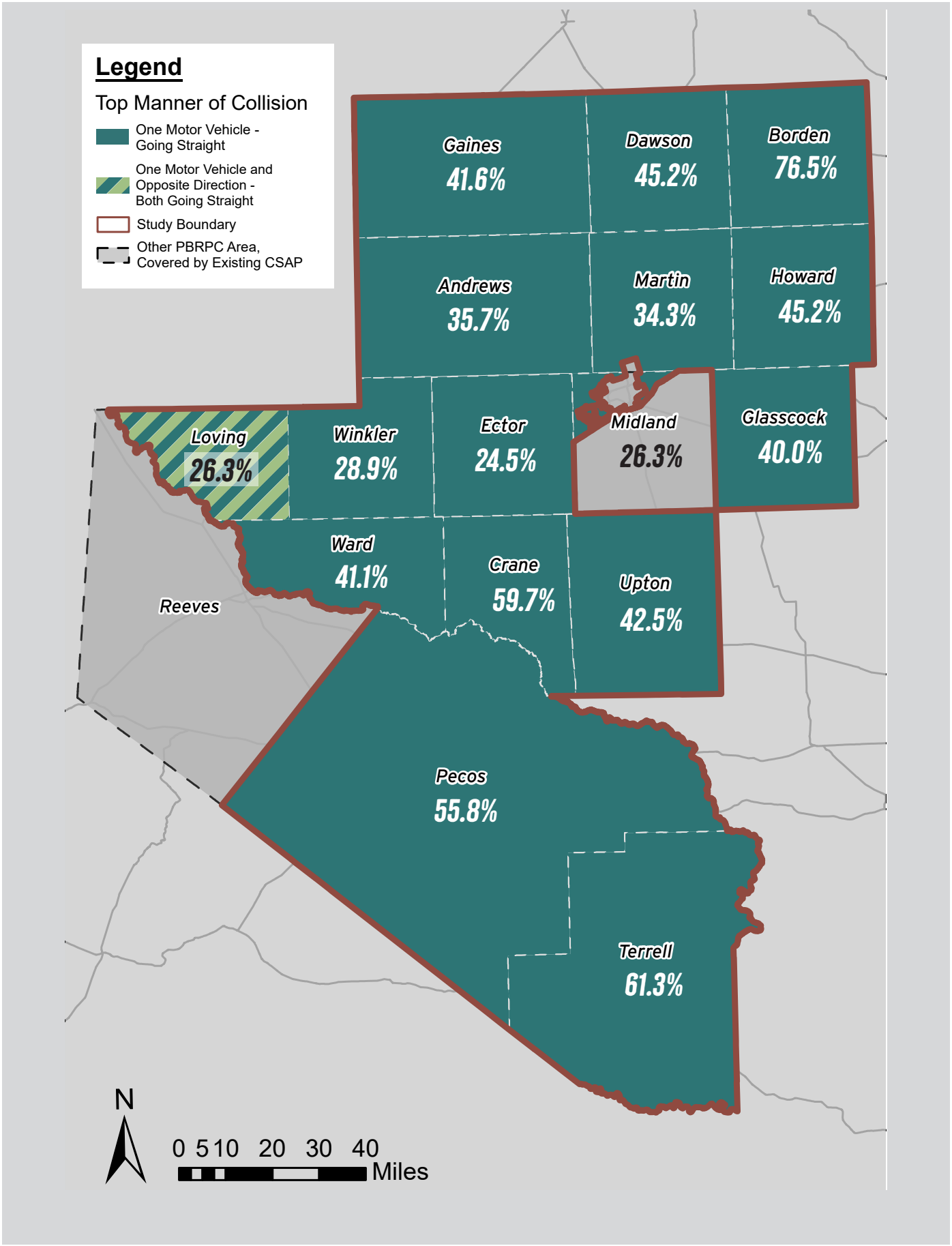


Table 7 Top Manner of Collision by County

County	Safety Emphasis Area	% of Total KAB Crashes	Total KAB Crashes
Andrews	One Motor Vehicle	35.7%	311
Borden	One Motor Vehicle	76.5%	34
Crane	One Motor Vehicle	59.7%	77
Dawson	One Motor Vehicle	45.2%	188
Ector	One Motor Vehicle	24.5%	3231
Gaines	One Motor Vehicle	41.6%	344
Glasscock	One Motor Vehicle	40.0%	85
Howard	One Motor Vehicle	45.2%	650
Loving	One Motor Vehicle and Opposite Direction - Both Going Straight	26.3%	76
Martin	One Motor Vehicle	34.3%	380
Midland*	One Motor Vehicle	26.3%	685
Pecos	One Motor Vehicle	55.8%	394
Terrell	One Motor Vehicle	61.3%	31
Upton	One Motor Vehicle	42.5%	106
Ward	One Motor Vehicle	41.1%	287
Winkler	One Motor Vehicle	28.9%	190

** Only crashes within the Study Area were included in the analysis.*

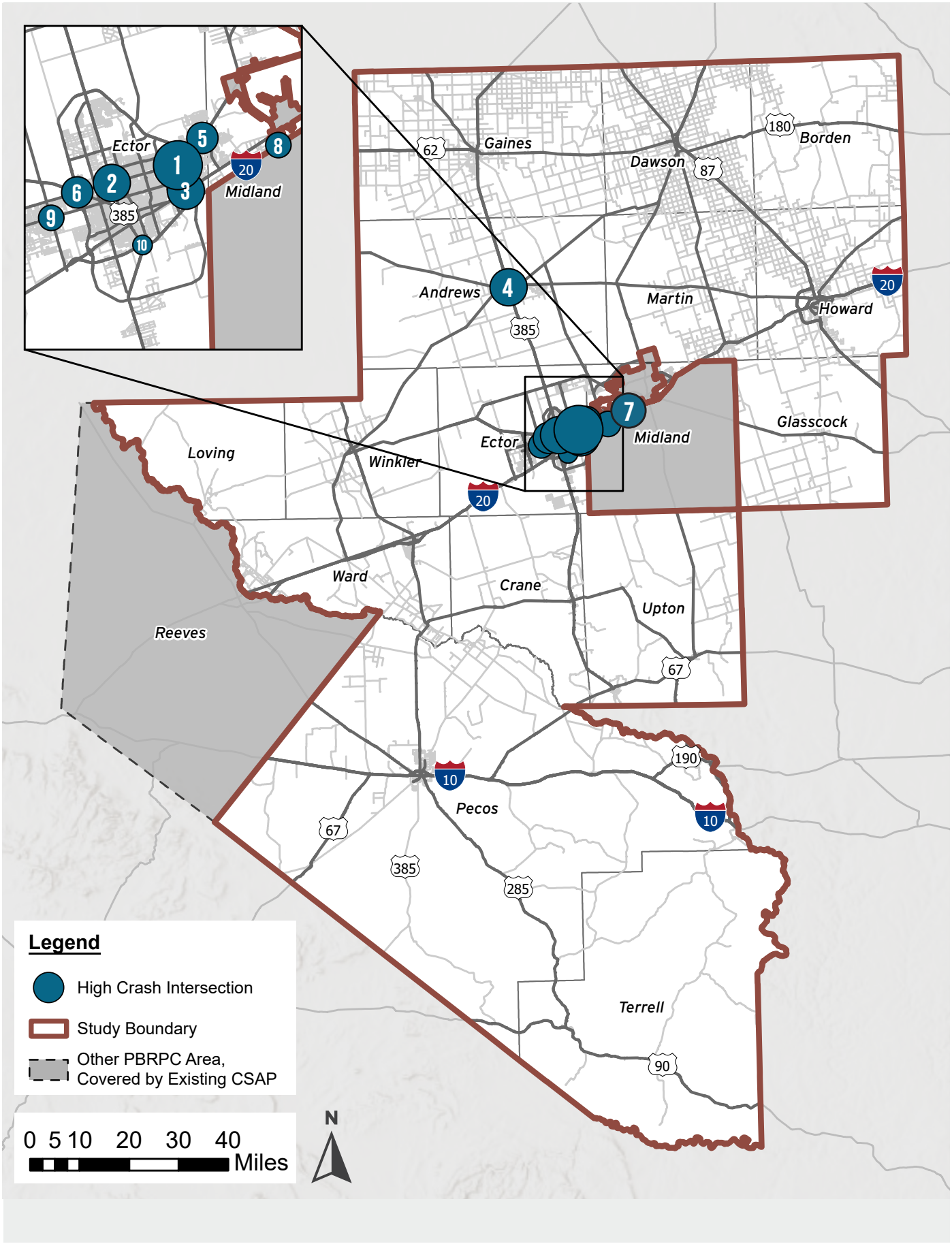
High Crash Intersections

As intersection related crashes are a safety emphasis area for the Texas Department of Transportation (TxDOT), the same is true for the study area (**Exhibit 6** on page 39). Approximately, 40.2% of crashes in the study area are intersection or intersection related, slightly higher than the state with 37% of its crashes attributed to intersections (**Table 8**).

Table 8 Intersection Crashes in Texas vs. the Study Area

Relation to Intersection	Crashes in Texas	Crashes in Study Area
At Intersection	656,827 (21.2%)	10,075 (22.6%)
Intersection – Related	489,364 (15.8%)	7,842 (17.6%)
Total Crashes	3,103,482	44,603

Exhibit 6 High Crash Intersections



The highest crash intersections in the study areas are all located within three counties: Ector, Midland, and Andrews (**Exhibit 6** on page 39). These 10 intersections all have more than 100 crashes recorded at them within the 5-year study period (2019-2023). The majority of these intersections (7 out of 10) are located in Ector County and the City of Odessa (**Table 9**). The intersection with the most crashes is the intersection between State Highway (SH) 191 and SH 338 Loop with 268 crashes occurring here.

Table 9 High Crash Intersection (2019 - 2023)

Rank	County	Intersection Name	Intersection Type (Control)	Crash Count
1	Ector	SH 191 & TX 338 Loop	Interchange	268
2	Ector	SH 191 & US 385	Signal	197
3	Ector	I-20 Business Loop & TX 338-Loop	Interchange	172
4	Andrews	US 385 & SH 115	Signal	170
5	Ector	SH 191 & TX 588 Spur	Interchange	155
6	Ector	TX 450 Spur & SH 302	Signal	151
7	Midland	I-20 & SH 158	Interchange	143
8	Midland	I-20 & SH 349	Interchange	128
9	Ector	FM 1936 & FM 2020	Signal	123
10	Ector	I-20 & US 385	Interchange	101

Freight Related Crashes

Within the study area, there were approximately 7,898 freight related crashes that occurred within the 5-year study period. This large number of freight related crashes could be due to the region's connection to the oil industry and the industry's need for movement in and out of the Permian Basin. As a state, only 0.9% of crashes are fatal or high injury freight crashes, but in the study area this number is approximately three times higher (3.4%). Freight related crashes account for 17.7% of all crashes in the study area and are approximately 22% more severe than other crashes that occur. **Exhibit 7** on page 41 shows the location of all freight related crashes in the study area, and it shows that most of these crashes occur on the Texas Freight Network. The most severe crashes appear to occur on stretches of I-20, SH 302, SH 176, and SH 349.

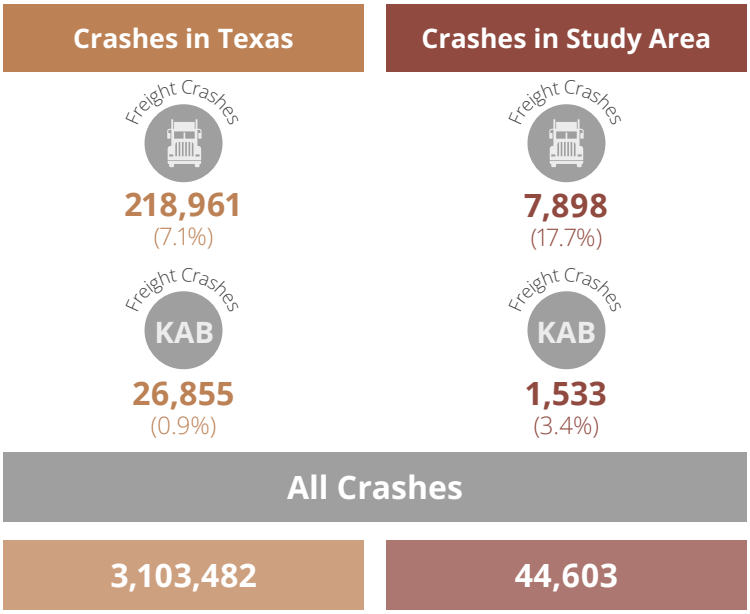


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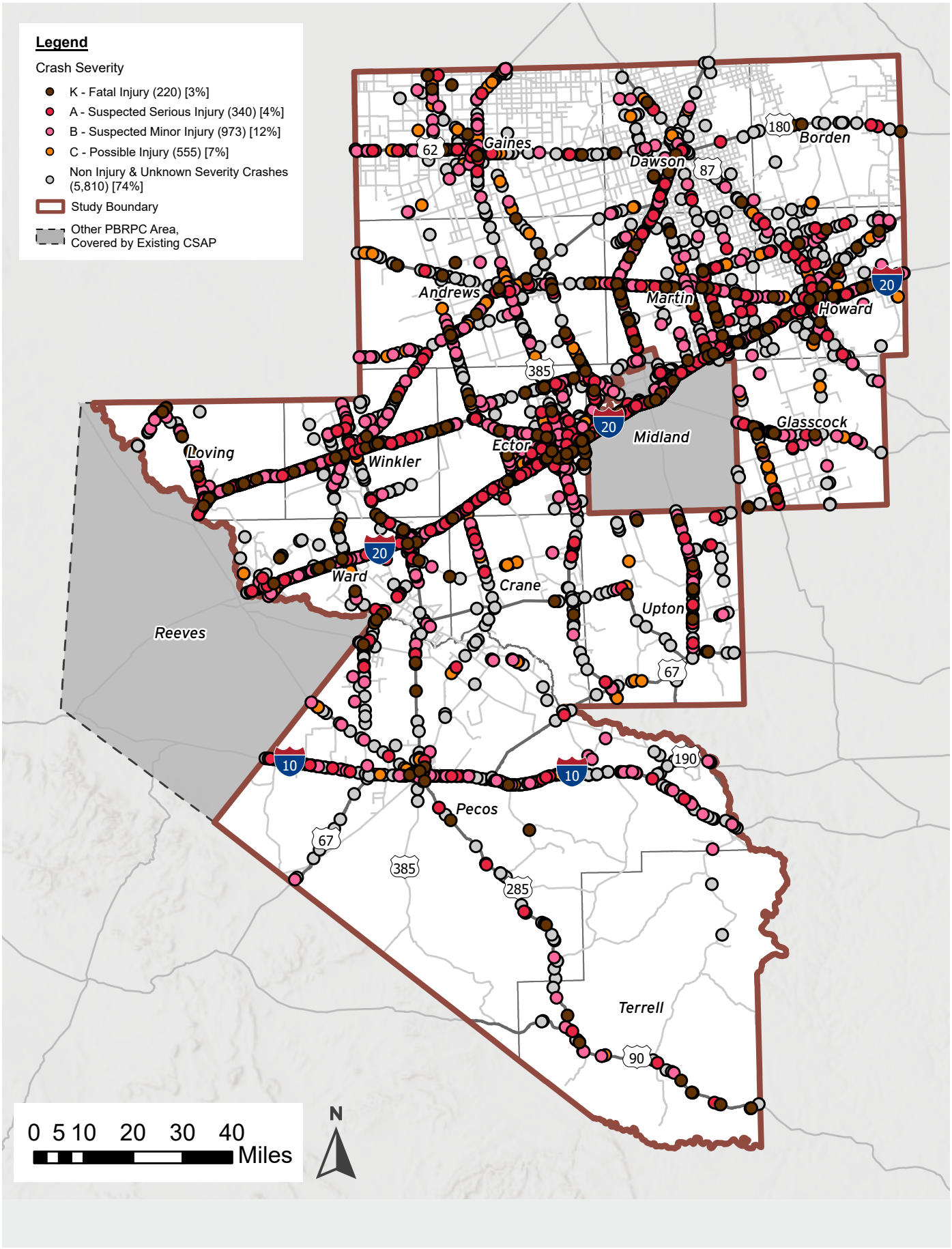
Exhibit 7 Freight Crash Map



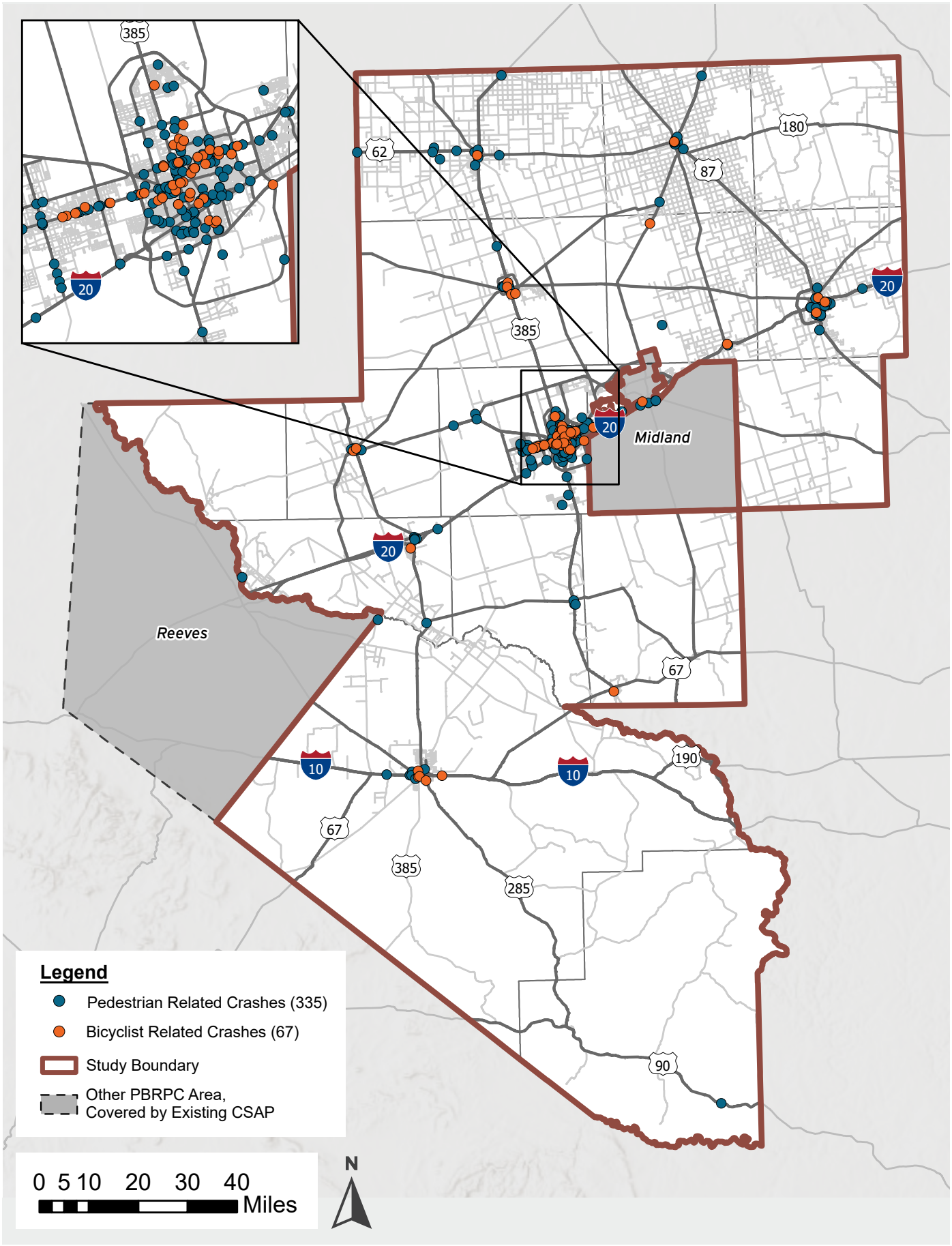
Vulnerable Road Users

Although within the study area there is a significantly smaller number of pedestrians and bicyclists, these crashes are significantly more severe than other crashes. Within the 5-year study period, there were only 335 pedestrian crashes and 67 bicyclist crashes (**Table 10**). Crashes involving vulnerable road users were 3 to 4 times more likely to result in a fatality, severe injury, or minor injury compared to vehicle only crashes. **Exhibit 8** on page 43 shows the locations of each pedestrian and bicyclist crash in the study area. While bicyclist crashes mostly occurred within the cities, pedestrian crashes seemed to be occurring in both cities and more rural areas although not as frequently. Vulnerable road user crashes were also slightly lower than the state of Texas as shown in **Table 10**.

Table 10 Pedestrian and Bicyclists Crash Data (2019 - 2023)

	Crashes in Texas	Crashes in Study Area
Pedestrian Crashes	34,791 (1.1%)	335 (0.8%)
High Injury (KAB) Pedestrian Crashes	22,786 (0.7%)	239 (0.5%)
Bicyclist Crashes	14,173 (0.5%)	67 (0.2%)
High Injury (KAB) Bicyclist Crashes	8,132 (0.3%)	40 (0.1%)
All Crashes	3,103,482	44,603

Exhibit 8 Pedestrian and Bicyclist Crash Map



Top Safety Emphasis Area by County

The Texas Department of Transportation (TxDOT) Strategic Highway Safety Plan (SHSP) identified eight safety areas that should be prioritized in the planning process to better traffic safety in Texas; they are listed below:

Roadway and Lane Departures

Intersection Safety

Occupant Protection

Impaired Driving

Speed-Related

Distracted Driving

Vulnerable Road Users

Post-Crash Care (does not involve crash data)

These safety emphasis areas were utilized to identify what safety issue should be prioritized in each county in the study area. Although the counties in the Permian Basin have similarities, safety concerns and needs can be widely varied. To ensure that specific needs and concerns of each county were identified, an analysis was done to identify the most common type of severe crash that occurs in the county. **Table 11** shows the result of this analysis and the percentage of fatal, severe injury, and minor injury crashes were associated with the safety emphasis area. **Exhibit 9** on page 45 also displays each counties top safety emphasis area on a map. All the counties were one of three safety emphasis areas: Intersection Safety, Roadway and Lane Departures, or Speed-related.

Table 11 Top Emphasis Area by County

County	Safety Emphasis Area	% of Total KAB Crashes	Total KAB Crashes
Andrews	Intersection Safety	46.3%	311
Borden	Roadway/Lane Departure	64.7%	34
Crane	Roadway/Lane Departure	42.9%	77
Dawson	Intersection Safety	45.7%	188
Ector	Intersection Safety	50.2%	3231
Gaines	Intersection Safety	41.6%	344
Glasscock	Speed-related	37.6%	85
Howard	Intersection Safety	37.8%	650
Loving	Speed-related	25.0%	76
Martin	Speed-related	37.2%	380
Midland*	Intersection Safety	44.4%	685
Pecos	Roadway/Lane Departure	45.4%	394
Terrell	Roadway/Lane Departure	51.6%	31
Upton	Speed-related	36.8%	106
Ward	Roadway/Lane Departure	37.3%	287
Winkler	Speed-related	44.7%	190

** Only crashes within the Study Area were included in the analysis.*

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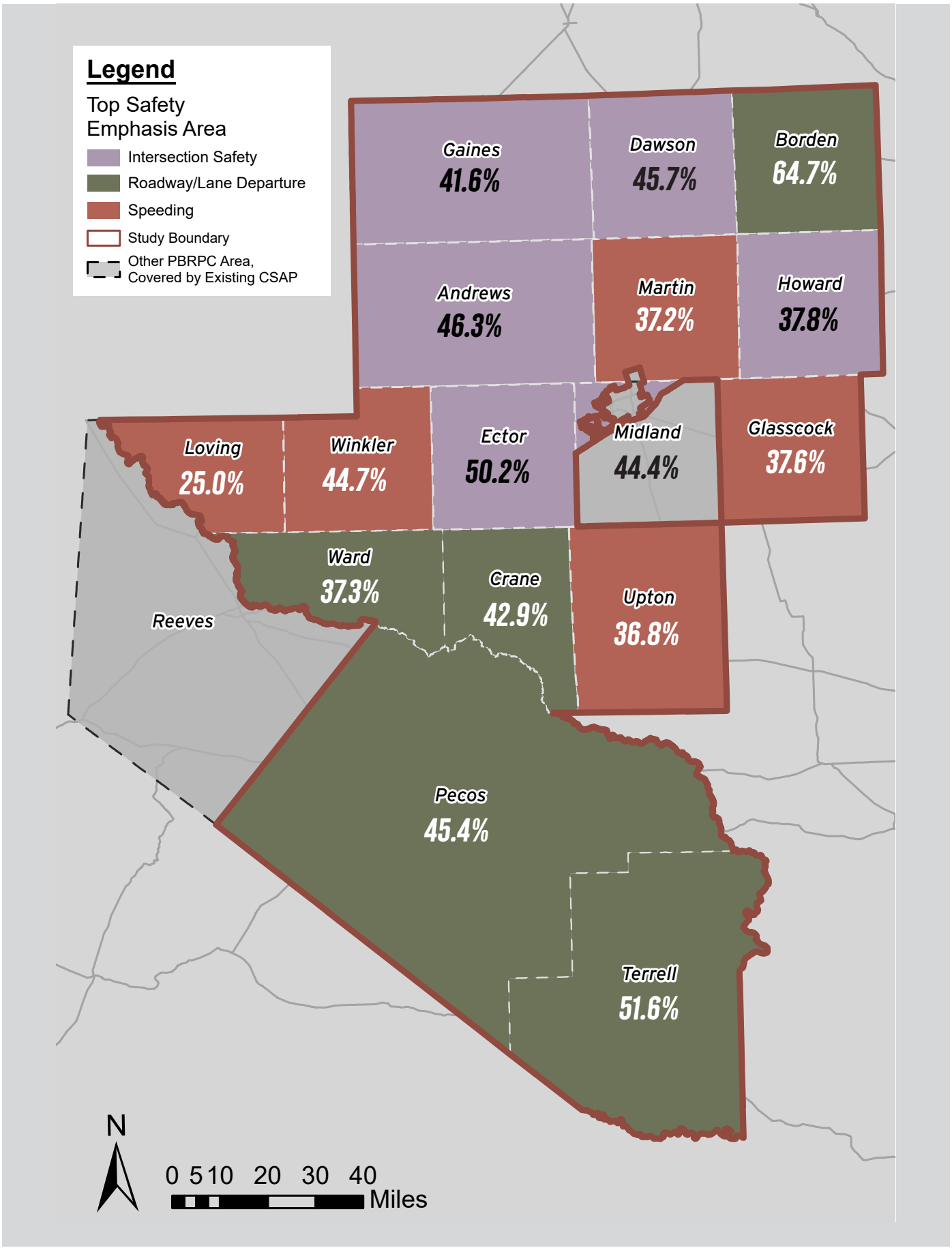
Exhibit 9 Top Emphasis Area by County Map



Equity Considerations

Equity is an important consideration when prioritizing and selecting future transportation investment opportunities for the region. Equity involves shaping resources and interventions to meet the specific needs of all people, ensuring that vulnerable communities have the necessary support and investments to achieve similar safety goals. By prioritizing equity, the Permian Basin Regional Planning Commission is recognizing and addressing access to safety measures among diverse populations, leading to more effective and inclusive safety countermeasures.

The U.S. Department of Transportation (USDOT) defines disadvantaged census tracts as communities that score at the 65th percentile based on national scoring data; scoring is conducted through an assessment on the following criteria:

+ **Transportation Insecurity:** Lack of reliable transportation options for users to get to their desired destination, which includes access to public transportation.
+ **Environmental Burden:** Environmental characteristics such as pollution, hazardous material exposure, or the built environment that contribute to health disparities, negative educational outcomes, and economic hardships.
+ **Social Vulnerability:** Socioeconomic factors such as poverty rates contribute to a larger burden on individuals
+ **Health Vulnerability:** Assess the increased prevalence of health conditions that may result from air, noise, water pollution, and other lifestyle factors such as poor walkability and long commute times.
+ **Climate and Disaster Risk Burden:** Measures the current and future risks to communities from climate and natural disasters, based on potential losses from existing hazard exposure and vulnerability.

Disadvantaged census tracts may also experience higher rates of traffic crashes while having inadequate infrastructure for vulnerable road users. Identifying these tracts played a crucial part in the analysis of corridors for the plan and allows the project identification process to incorporate equity opportunities as well as crash history in the region.

DISADVANTAGED CENSUS TRACTS

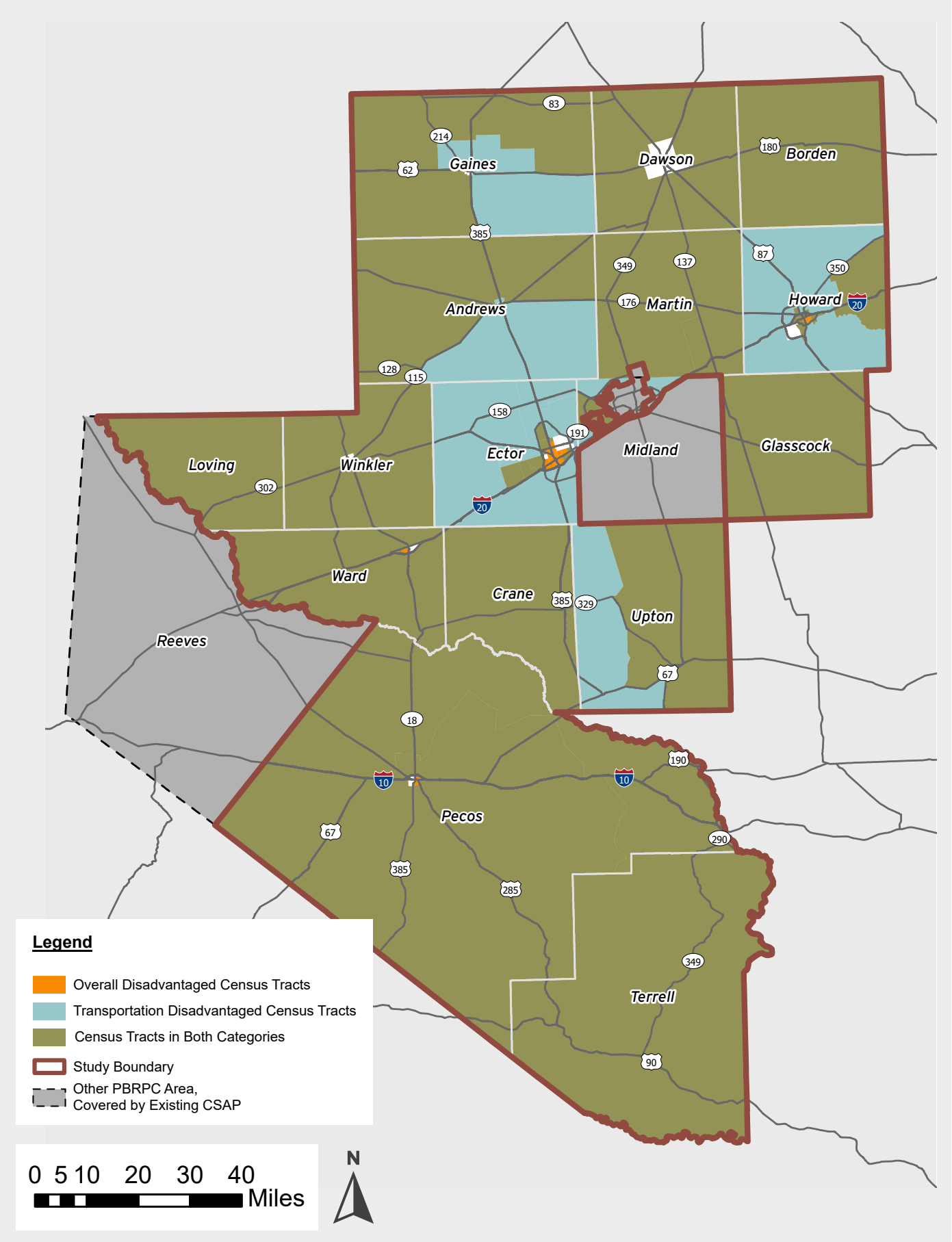
Exhibit 10 on page 47 displays the disadvantaged census tracts in the study area. According to the USDOT Equitable Transportation Community (ETC) Explorer, approximately 190,000 study area residents reside in disadvantaged census tracts; that is slightly under half of the study area's population. While 49% of the study area population lives in overall disadvantaged census tracts, 51% of the population lives in specifically transportation disadvantaged census tracts, one of the 5 scoring criteria for disadvantaged census tracts. As shown in **Exhibit 10** on page 47, most of the study area falls within a transportation disadvantaged census tract except for the more urban communities in the study area, typically the county seat in each county.

To gather a deeper understanding of the safety issues in overall disadvantaged census tracts, a comparison of the crash severities of overall disadvantaged census tracts to the region was performed. Overall, crashes occurring in overall disadvantaged census tracts were more severe compared to the region (**Table 12**). Identifying the location of disadvantaged census tracts and understanding their safety deficiencies were a crucial factor when selecting study corridors in the planning process. Moving forward it is encouraged that future safety considerations in the region use the results of the equity analysis as a scoring criterion during project prioritization and selection in order to help close the gap in severities currently present in the region.

Table 12 Region vs. Disadvantaged Census Tracts Crash Severity Breakdown

Crash Severity	PBRPC Region	Disadvantaged Census Tracts	Percent Difference
K - Fatal Injury	1.5%	1.7%	**13.3%**
A - Suspected Serious Injury	2.9%	3.1%	**6.9%**
B - Suspected Minor Injury	11.4%	12.1%	**6.1%**
C - Possible Injury	9.4%	9.9%	**5.3%**
N - Not Injured	69.8%	68.9%	-1.3%
99 - Unknown	5.0%	4.2%	-16.0%

Exhibit 10 Overall vs. Transportation Disadvantaged Census Tracts



4

High Injury Network & High Risk Network

Introduction
High Injury Network
High Risk Network

Introduction

As a companion to Chapter 3's analysis, Chapter 4 will provide details on decision making tools created to aid in project selection and prioritization. The crash analysis shows there is an issue with traffic safety in the region and specific safety emphasis areas of concern, and so the following chapter dives into where these specific issues are occurring.

To aid in identifying specific problem locations, PBRPC has conducted two data-driven analyses on the region's roads to create the high injury network (HIN) and high risk network (HRN) were developed. Each analysis utilized different methods to identify what a problem location is. **Table 13** summarizes the key differences between both networks. The biggest difference between the two networks is that the HIN relies on crash history while the HRN relies on the design attributes of a roadway. Roadways on the HRN may not be experiencing high amounts of crashes, but its design could put it at risk of developing a severe crash issue.

Both reactive and proactive approaches to safety are necessary, depending on the situation and project priorities. Ultimately, both networks are meant to aid in the decision-making process by providing information about what roadways should be prioritized when making transportation improvements. Cities and Counties in the region should use the network that best fits its needs when making selecting transportation improvement projects.

Table 13 Differences Between High Injury and High Risk Networks

High Injury Network		High Risk Network
Safety Planning Approach	Reactive – only roads where crashes have previously occurred	Proactive – roads that have similar characteristics with high crash roadways
Methodology Source	High Safety Manual - critical crash rate method	Utilizes the Federal Highway Administration's systemic safety planning process
Data Inputs	Crashes, road classification, traffic volumes	Crash data, roadway design characteristics (such as lane width, number of lanes, median type)

High Injury Network

The high injury network (HIN) is a network of road segments in the region that experience a higher-than-average rate of crashes resulting in fatal, severe, and minor injuries (KABs). This network is meant to assist the Permian Basin Regional Planning Commission (PBRPC), cities, and counties in the study area in prioritizing future transportation projects and investments. Identifying road segments with the most severe and frequent crashes is the first step in developing countermeasures and policy recommendations to improve safety for all.

CRITICAL CRASH RATE METHOD

Calculating critical crash rates involves comparing roadway segments with similar functional classes and contexts, normalized by vehicle miles traveled (VMT). If the observed crash rate on a segment exceeds the expected crash rate, this means the segment has a critical crash rate and is added to the HIN. These steps are further detailed in Chapter 4 of the Highway Safety Manual.

Since the critical crash rate method requires several intermediate calculations to arrive to the final crash rate, an ArcGIS Pro model was created to complete these calculations for each segment on the region's network. The model assigns crashes, weighted by crash severity, to an adjacent road segment and performs calculations outlined by the Federal Highway Administration (FHWA) as shown in the Appendix.

The critical crash rate was calculated for each segment in the region's network using the following three steps:

1 Assigning Data to Road Segments

Calculating the critical crash rate requires four data inputs: roadway functional classification, context, daily traffic volumes, and weighted crash counts. Due to Permian Basin being such an expansive area with varying land contexts, roads were categorized as "Urban", "Small Urban", and "Rural" based on TxDOT's designation. Additionally, crashes were weighted by severity to ensure that areas with fatal crashes were prioritized in the development of the HIN.

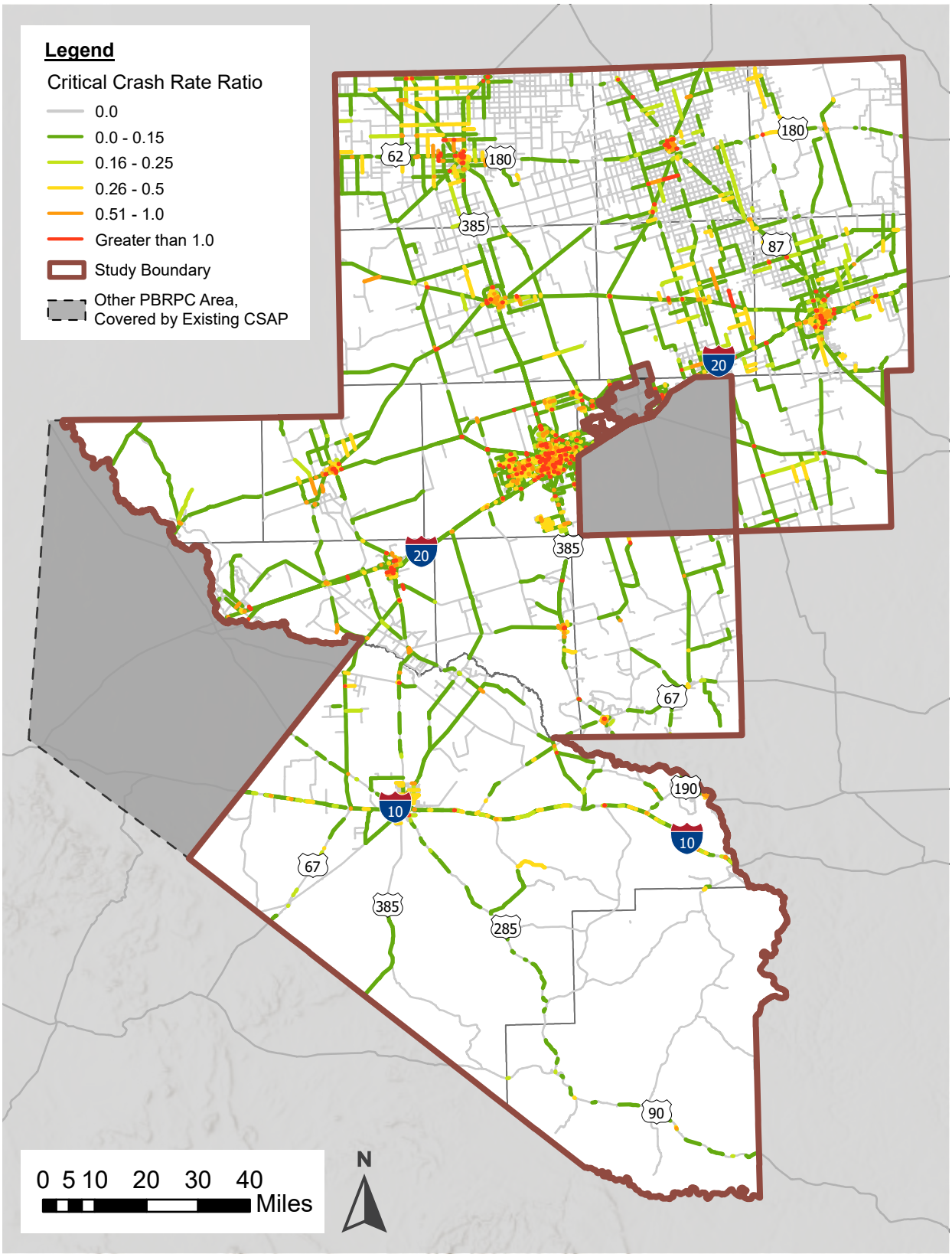
2 Calculate Variables of Critical Crash Rate

The variables of the critical crash rate were calculated using the equations specified in the FHWA Highway Safety Manual (Appendix). The critical crash rate compares the difference between the observed crash rate and the expected crash rate. The observed crash rate is determined using the existing crashes at each segment per 100 million vehicle-miles traveled. The expected average crash rate per 100 million vehicle-miles traveled normalized the daily volumes for each functional class per context. After both values are calculated for a segment, the equation highlights segments that experience a higher crate rate than what is expected for a segment of its functional classification, context, traffic volume, and weighted crash counts.

3 Calculate Critical Crash Rate Ratio

Once all variables are input, a ratio is calculated to identify segments experiencing higher-than-average rates of fatal, serious, and minor injury crashes. If the ratio is greater than 1.0, or the observed critical crash rate is higher than the critical crash rate, then the segment's crash history was higher than other road segments of similar function classification and context. Segments with a ratio of 1.0 or more were considered for HIN inclusion. **Exhibit 11** on page 52 displays the results of the critical crash rate analysis.

Exhibit 11 Critical Crash Rate Ratio Map



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HIGH INJURY NETWORK RESULTS

Creating the finalized HIN requires both a qualitative and quantitative approach. While the critical crash rate method (as described in Appendix A) does produce results that identify segments with higher-than-average crash rates, to create a network as shown in **Exhibit 12** on page 54 post processing must be done. To refine and clean the initial model results, segments with only one crash were removed from the results to prioritize segments with more of a history of incidents. Additionally, gaps between the remaining segments were connected to create a consistent and continuous HIN. Ultimately, the goal of the HIN selection process is to maximize the total fatal, severe, and minor injury crashes on the least mileage of roads on the network.

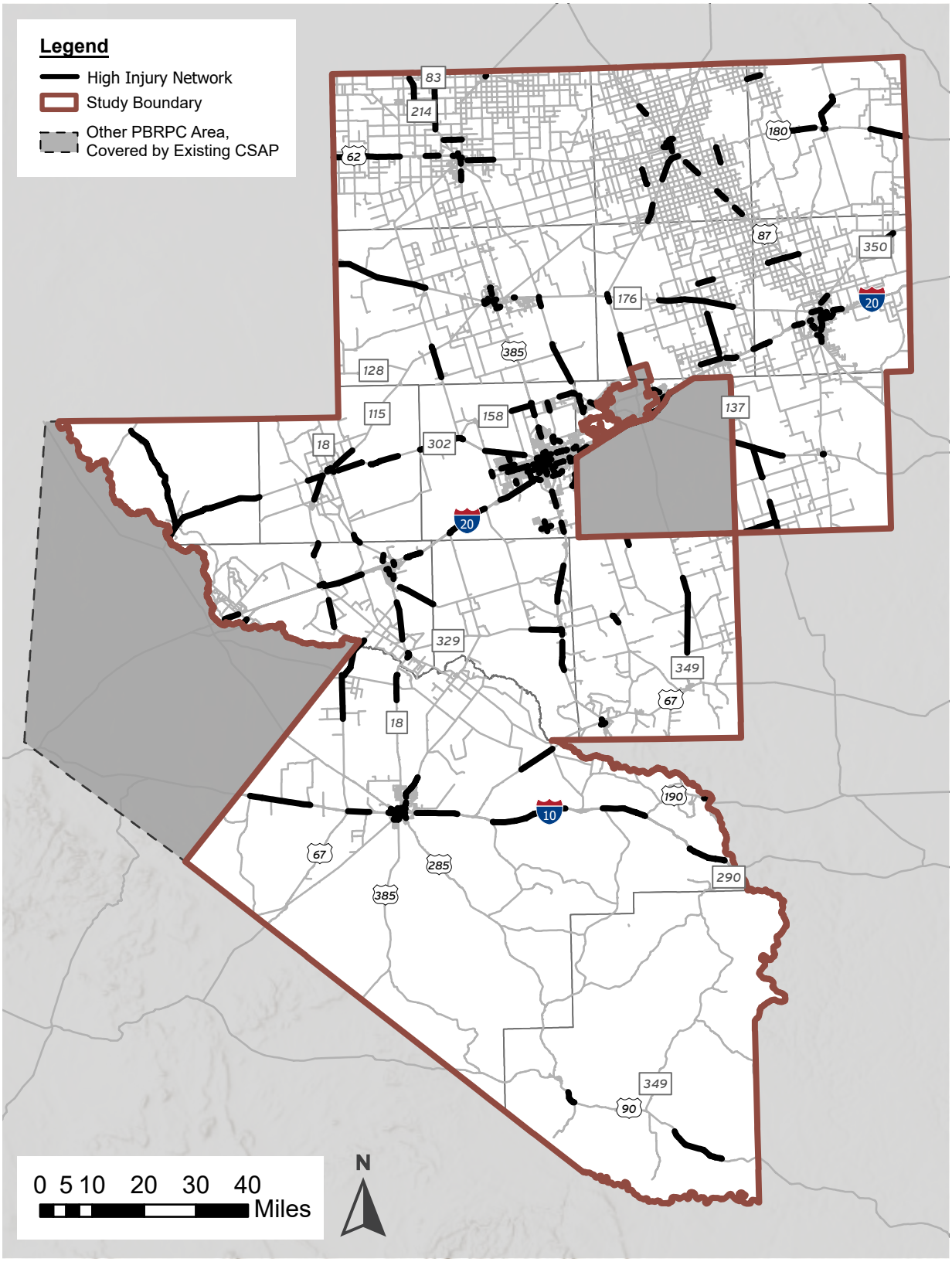
The final HIN for the region was comprised of only 5% of the total road network while capturing 64.5% of all fatal crashes and 42.4% of fatal, suspected serious, and suspected minor injury crashes. **Exhibit 12** on page 54 shows the finalized HIN for the study area with the addition of the HINs for Midland County and the City of Midland which were not completed through their own independent CSAPs (adopted in 2024). Since the cleaning process was done per County, **Table 14** shows the HIN statistics for each County.

Table 14 HIN Statistics by County

County	Percent of Roadways	Fatal Crashes on HIN	Fatal and Severe Injury Crashes on HIN
Andrews	4.6%	20 (55.6%)	142 (45.7%)
Borden	5.3%	5 (83.3%)	15 (44.1%)
Crane	6.7%	6 (60.0%)	30 (39.0%)
Dawson	2.0%	12 (60.0%)	99 (52.7%)
Ector	5.7%	141 (66.2%)	1330 (41.2%)
Gaines	2.6%	25 (67.6%)	134 (39.0%)
Glasscock	7.1%	12 (91.7%)	43 (50.6%)
Howard	2.5%	27 (50.0%)	214 (32.9%)
Loving	48.3%	11 (91.7%)	56 (73.7%)
Martin	4.8%	35 (70.0%)	156 (41.5%)
Midland*	7.1%	38 (59.4%)	323 (47.2%)
Pecos	6.2%	23 (62.2%)	208 (52.8%)
Terrell	5.6%	4 (50.0%)	11 (35.5%)
Upton	4.1%	9 (56.3%)	37 (34.9%)
Ward	7.1%	26 (65.0%)	152 (53.0%)
Winkler	7.8%	22 (84.6%)	84 (44.2%)

** Only crashes within the Study Area were included in the analysis.*

Exhibit 12 High Injury Network Map



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High Risk Network

In addition to the high injury network, a high risk network (HRN) was developed for the region to serve as another tool in the decision-making process. The HRN consists of roadways that share design attributes associated with a specific crash type. Since this network is dependent on similarities to high crash roadways, the HRN can aid in proactive prioritization and decision-making regarding future transportation projects and investments.

PROCESS

The creation of the HRN was a quantitative process outlined by the Federal Highway Administration's (FHWA) Systemic Safety Planning Process Methodology. The following five steps were taken to achieve the finalized HRN:

- Identifying Focus Crash Types
- Identifying Focus Facilities
- Identifying and Evaluating Potential Risk Factors
- Scoring the Network
- Selecting the High Risk Network Segments

Identifying Focus Crash Types

Based on the guidance from FHWA, focus crash types should be selected from the safety emphasis areas outlined in the state or regional strategic highway safety plan (SHSP) therefore the potential crash types were:

- Distracted Driving
- Impaired Driving
- Intersection Safety
- Occupant Protection
- Roadway & Lane Departures
- Speed-related
- Vulnerable Road Users
- Post Crash Care (no crash data)

Since the study area encompassed 16 counties, each with different safety needs, the top safety emphasis area for each county was identified by determining the percentage of fatal, severe, and minor injury (KAB) crashes associated with each emphasis area (**Exhibit 8** as seen in Chapter 3). The final focus crash types were roadway and lane departures, speed-related, and intersection crashes. **Table 15** displays the top emphasis areas for each county in the study area.

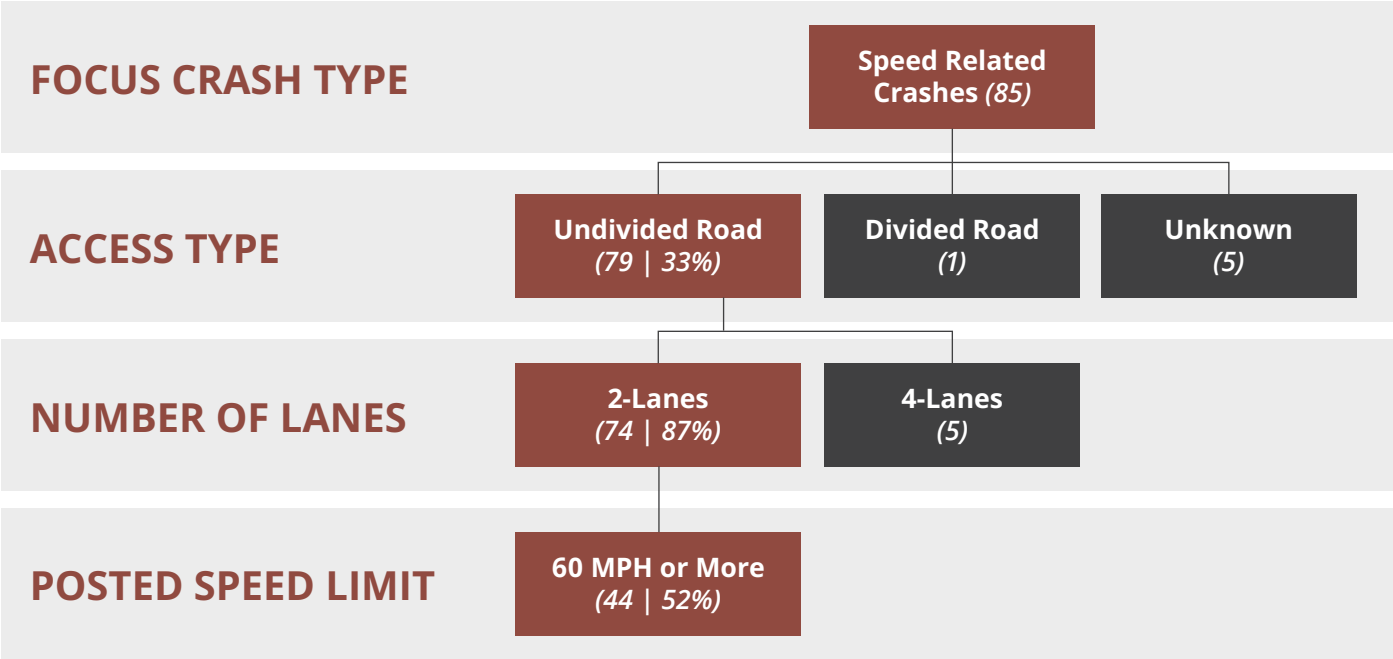
Table 15 Top Emphasis Area for Each County

County	Top Emphasis Area
Andrews	Intersection Related
Borden	Roadway & Lane Departure
Crane	Roadway & Lane Departure
Dawson	Intersection Related
Ector	Intersection Related
Gaines	Intersection Related
Glasscock	Speed-Related
Howard	Intersection Related
Loving	Speed-Related
Martin	Speed-Related
Midland*	Intersection Related
Pecos	Roadway & Lane Departure
Terrell	Roadway & Lane Departure
Upton	Speed-Related
Ward	Roadway & Lane Departure
Winkler	Speed-Related

Identifying Focus Facilities

After identifying the focus crash types, focus facilities had to be identified; focus facilities being roadways in which more than 50% of focus crashes in the county occurred on. To identify focus facilities, crash tree diagrams were utilized with the total number of KAB focus crash types were at the highest level and each subsequent level separated the crashes by facility type. The crash trees included separation based on land area context, access, number of lanes, posted speed limit, and traffic control type for crash trees regarding intersection crashes (**Figure 17**).

Figure 17 Example Crash Tree Result from Winkler County



Crash trees such as the one shown above were created for each county to determine their focus facilities based on their emphasis areas. **Table 16** lists the focus facilities by County as a result of the analysis.

Table 16 Focus Facilities for Each County

County	Focus Facility
Andrews	+ Rural, 2-lane roadways with stop sign controlled intersections and speed limits between 60-75 MPH + Small urban, 2-lane roadways with signal controlled intersections and speed limits of 75 MPH
Borden	+ Rural, 2-lane undivided roadways with speed limits of 75 MPH
Crane	+ Rural, 2-lane roadways with speed limits of 75 MPH
Dawson	+ 4- lane roadways with stop sign controlled intersections + 4-lane roadways with signal controlled intersections + 4-lane roadways with marked lanes at intersections
Ector	+ Urban, 2-lane roadways with stop sign controlled intersections + Urban, 4-lane roadways with signal controlled intersections
Gaines	+ 2-lane roadways with stop sign controlled intersections + 4-lane roadways with signal controlled intersections + 2-lane roadways with marked lanes at intersections
Glasscock	+ Rural, undivided roadways with speed limits of 75 MPH

County	Focus Facility
Howard	+ Small urban roadways with stop sign controlled intersections and speed limits between 30 – 40 MPH + Small urban roadways with signal controlled intersections and speed limits between 40 – 45 MPH
Loving	+ Rural, undivided, 2-lane roadways with speed limits of 55 MPH
Martin	+ Rural, undivided roadways with speed limits of 75 MPH
Midland*	+ Urban, 4-lane roadways with intersections controlled by signals, stop signs, or that have marked lanes
Pecos	+ Rural, 2-lane undivided roadways with speed limits of 75 MPH + Rural, 4-lane divided roadways with speed limits of 80 MPH
Terrell	+ Rural, 3-lane undivided roadways with speed limits of 75 MPH
Upton	+ Rural, 2-lane undivided roadways with speed limits of 75 MPH
Ward	+ Rural roadways with speed limits between 75 – 80 MPH
Winkler	+ 2-lane, undivided roadways with speed limits between 60 – 75 MPH

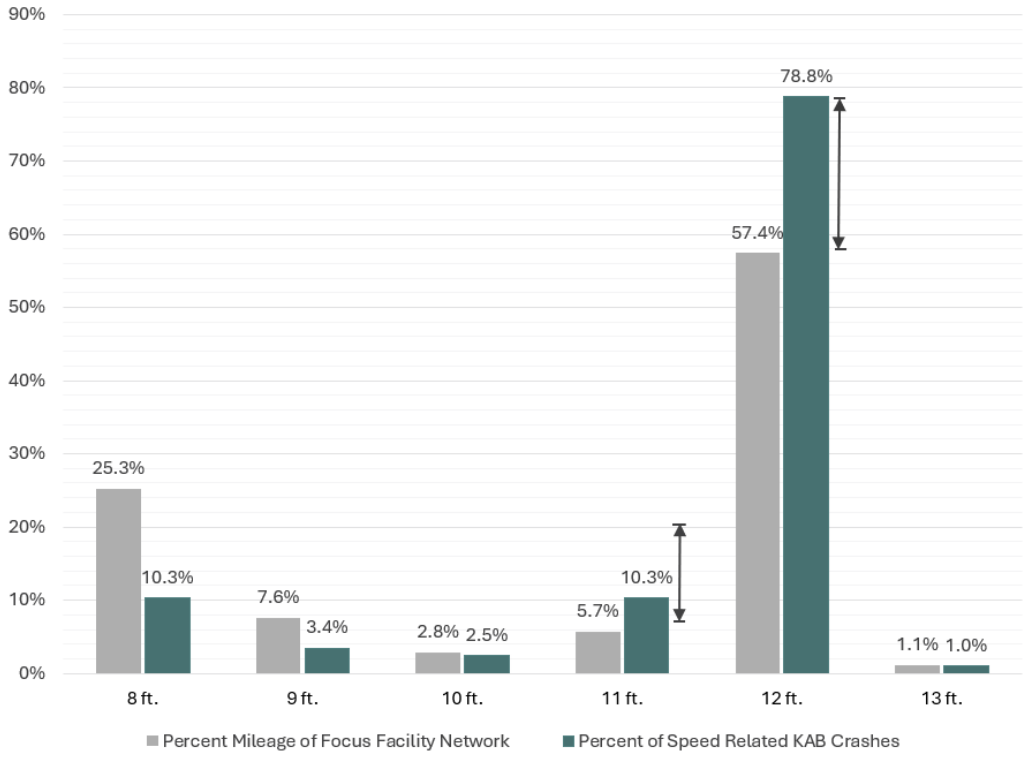
Identifying and Evaluating Potential Risk Factors

This portion of the HRN analysis identifies if focus facility crashes were overrepresented on focus facilities with specific design attributes. Design features were chosen to be included in this analysis based on their association with the chosen focus crashes. The design features used in the analysis were:

- Median Type
- Median Width
- Shoulder Type
- Roadway Alignment
- Volume (AADT)
- Lane Width
- Truck % AADT
- Shoulder Width

To determine if a potential risk factor was overrepresented, the percent mileage of focus facilities with that attribute was compared to the percent of focus crashes occurring in those locations. **Figure 18** shows an example of this comparison for lane width in Winkler County. By graphing these values, the overrepresentation of focus crash types on specific roadway types was easily identifiable.

Figure 18 Potential Risk Factor of Lane Width for Speed-Related KAB Crashes



As shown in **Figure 18** on page 57, both 11 ft. and 12-foot lanes are risk factors for severe speed related crashes in Winkler County, but the level of overrepresentation is different. While lane widths of 11 feet are overrepresented by 4.6 percent, lane widths of 12 feet are overrepresented by 21.4 percent. Based on the level of overrepresentation, risk factors were weighted differently; overrepresentation by 2 or more percentage points received 0.5 points while overrepresentation through 15 or more percentage points received 1 point.

Scoring the Network

All roadway segments were scored using one of the three scoring tables shown below (**Tables 17–19**) depending on their top emphasis area. For example, roadways in Winkler County were scored using the criteria listed in **Table 17** since Winkler County's safety emphasis area was speeding.

Table 17 Speeding Risk Factors and Point Allocation

Roadway Characteristics	High Correlation Risk Factors (1 pt)	Medium Correlation Risk Factor (0.5)
Shoulder Type	Asphalt, paved	-
Shoulder Width	6-12 ft	-
Volume	5,000 - 12,500	2,500 - 5,000
Lane Width	12 ft	11 ft
Truck % AADT	20 - 25%, 30 – 45%	-
	Total Possible Risk Factor Points	**5.0 points**

Table 18 Intersection Risk Factors and Point Allocation

Roadway Characteristics	High Correlation Risk Factors (1 pt)	Medium Correlation Risk Factor (0.5)
Median Type	-	Unprotected, Curbed
Median width	-	12 - 18 ft, 24 - 48 ft, 250 ft or Greater
Shoulder Type	-	Asphalt, Paved
Shoulder Width	18 - 24 ft	12 - 18 ft
Volume	12,500 - 25,000	2,500 - 5,000,
Truck % AADT	5 - 15%	20 - 25%, 30 - 55%
Lane Width	12 ft	11 ft, 13 ft, 15 ft
	Total Possible Risk Factor Points	**5.5 points**

Table 19 Roadway & Lane Departure Risk Factors and Point Allocation

Roadway Characteristics	High Correlation Risk Factors (1 pt)	Medium Correlation Risk Factor (0.5)
Median Type	Unprotected	-
Median Width	54 - 102 ft	30 - 42 ft.
Shoulder Type	-	Asphalt, Paved
Shoulder Width	6 - 18 ft	-
Volume	5,000 - 12,500	12,500 - 25,000
Roadway Alignment Type	-	Curve, Level
Truck % AADT	25 - 60%	-
Lane Width	-	11 ft
	Total Possible Risk Factor Points	**6.5 points**

Selecting the High Risk Network Segments

After the appropriate scoring table was selected for grading, risk points were allocated to a roadway segment based on its design attributes. A segment's final risk score was calculated using the equation below:

$$Risk\ Score\ (\%) = \left(\frac{Total\ Number\ of\ Assigned\ Risk\ Factor\ Points}{Maximum\ Possible\ Number\ of\ Risk\ Factor\ Points}\right) * 100$$

Segments were added to the HRN if their risk score met one of the two conditions listed below:

- Risk score was greater than or equal to 50%.
- Risk score was greater than or equal to the county average risk score.

HIGH RISK NETWORK RESULTS

Exhibit 13 on page 60 shows the final high risk network for the region. Additionally, **Exhibit 14** on page 61 demonstrates how the HRN acts as an extension of the HIN. This is because roadways on the HRN share similar attributes to roadways with severe crash histories which are attributes held by roadways on the HIN. The final HRN is only 17.1% of the total roadway network but encompasses 64.2% of the HIN.

Exhibit 13 High Risk Network Map

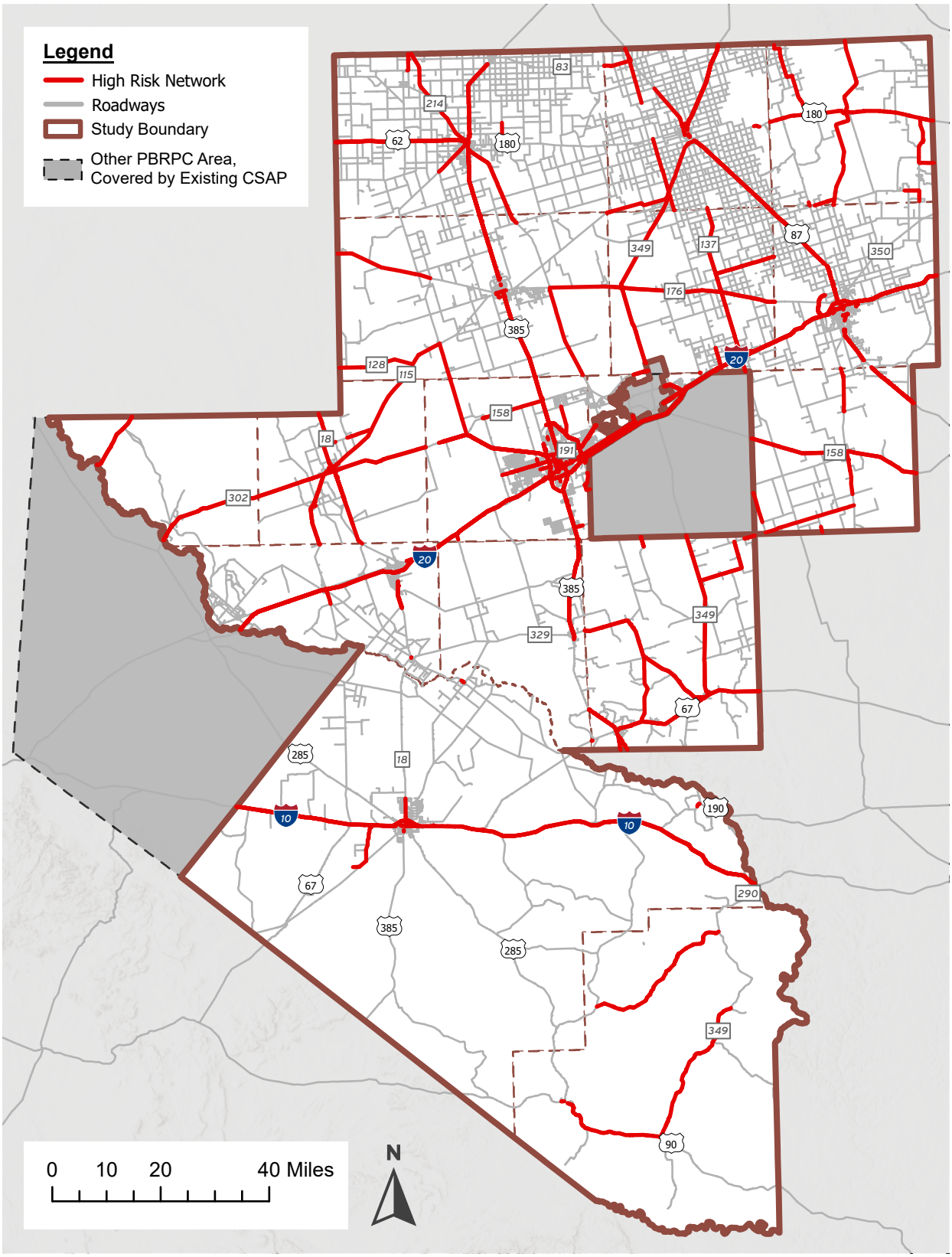


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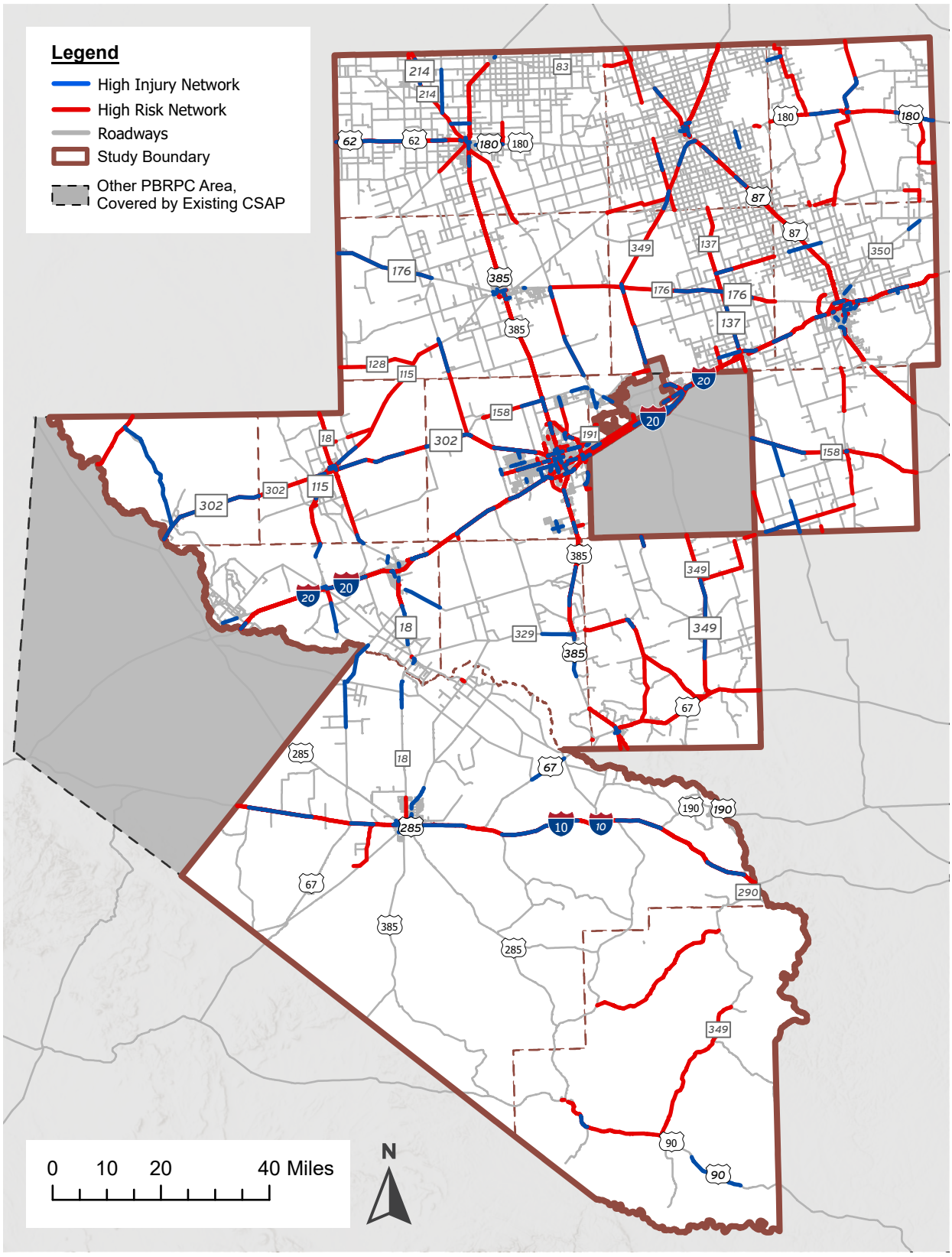
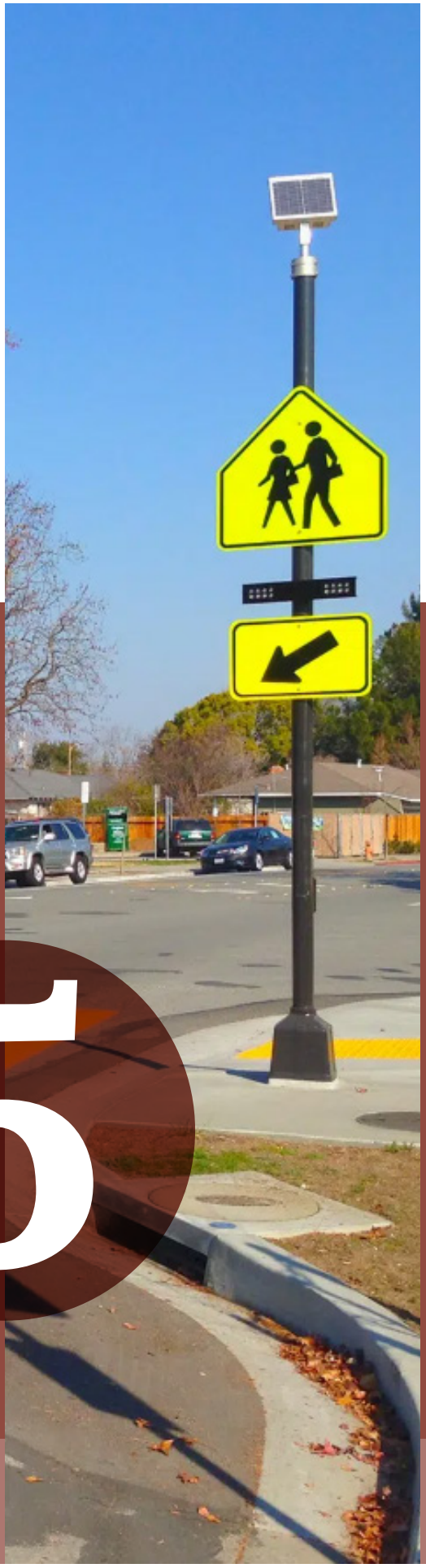
Exhibit 14 High Injury Network vs. High Risk Network





5

Creating a Safer System

Introduction

Systemic Countermeasure Toolbox

Targeted Recommendations

Introduction

Chapter 5 outlines the countermeasure-based recommendations for the CSAP. During the planning process, each county in the study area was examined individually to identify a location with the highest potential for improvement by safety countermeasures. In total, 18 locations were recommended based on crash history roadway geometry, existing intersection control, and context. In addition to the targeted recommendations for the 18 corridors and intersections, a Systemic Countermeasures Toolbox was developed. This toolbox consists of a variety of roadway countermeasures that can be used by member cities and counties to enhance safety on their roadways. Member organizations are encouraged to use this document and its countermeasures as the foundation for improving traffic safety throughout the study area and eliminating roadways deaths and severe injuries.

Systemic Countermeasure Toolbox

This section of the plan details specific countermeasures that can be implemented in all cities and counties in the region that can improve safety. Due to the varying roadway environments in the region, the PBRPC systemic countermeasure toolbox is organized by context: rural, urban, or both. This will aid in selecting the appropriate countermeasure based on the context of the area the roadway is in. Countermeasures in the toolbox can be applied to any roadway in the study area, but roads that are within disadvantaged census tracts or on the high injury or high risk networks should be prioritized. Additionally, all countermeasures in the toolbox are also recommended in the FHWA's Proven Safety Countermeasures list. Implementing countermeasures on these specific roads can have a significant impact on the number of severe crashes in the region. The systemic countermeasures toolbox shown in **Table 20** is a comprehensive collection of strategies and countermeasures designed to address specific traffic safety issues.

Table 20 Systemic Countermeasure Toolbox

Context	Countermeasures	Cost Rating	Safety Rating	Crash Modification Factor (CMF)	Page Number
Urban	Leading Pedestrian Interval	Low	Medium	0.81	65
	Medians and Pedestrian Refuge Islands	Medium	High	0.685	66
	Pedestrian Hybrid Beacons	Medium-High	Medium	0.883	67
	Roadway Reconfiguration	Low	High	0.53	68
Rural	Enhanced Delineation for Horizontal Curves	Low	Medium	0.63-0.652*	69
	Longitudinal Rumble Strips and Stripes on Two-Lane Roads	Low	Medium	0.80	70
	Wider Edge Lines	Low	Low	0.635	71
Both	Appropriate Speed Limits	Low	Medium	0.856	72
	Bike Lanes	Medium	High	0.435	73
	Crosswalk Visibility Enhancements	Low	High	0.60	74
	Rectangular Rapid Flashing Beacons (RRFB)	Medium	High	0.31	75
	Sidewalks	High	High	0.598	76
	Median Barriers	Medium	High	0.29	77
	Retroreflective Backplates	Low	Medium	0.85	78
	Corridor Access Management	Medium-High	Low	0.93	79
	Dedicated Left- and Right-Turn Lanes at Intersections	Low-Medium	Medium-High	0.52 – 0.74*	80
	Reduced Left-Turn Conflict Intersections	High	Medium	0.633 – 0.8*	81
	Roundabouts	High	High	0.59	82
	Systemic Application of Multiple Low-Cost Countermeasures at Stop-Controlled Intersections	Low	Medium	0.734	83
	Yellow Change Intervals	Low	Low	0.99	84
	Targeted Lighting	Medium	High	0.68	85

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** Depending on Context*

URBAN CONTEXT COUNTERMEASURES

Leading Pedestrian Interval

A leading pedestrian interval (LPI) gives pedestrians an opportunity to enter a crosswalk at an intersection 3 to 7 seconds before vehicles are given a green indication (**Figure 19**). Giving vulnerable road users this extra time, allows them to establish their presence on the crosswalk so drivers are clearly aware of their presence. LPI's reduce pedestrian crashes by 13% by increasing the visibility of crossing pedestrians, reducing conflicts between drivers and pedestrians, increasing the likelihood of drivers to yield to pedestrians, and allowing extra time for people who may need it to cross (FHWA).

Figure 19 Leading Pedestrian Interval

CMF: 0.81 (vehicle/pedestrian)
Recommended Context: Urban
Cost Rating: Low
Safety Rating: Medium
Safety Emphasis Area Addressed:
+ Intersection Safety
+ Vulnerable Road Users

Source: FHWA

Medians and Pedestrian Refuge Islands

For pedestrians to cross a roadway safely, they must consider many factors such as vehicle speed, acceptable gap distance, and vehicle paths. Installing medians or pedestrian refuge islands can help improve safety by allowing pedestrians to cross one direction of traffic at a time (**Figure 20**). Medians are areas between opposing lanes of traffic and are typically defined in urban and suburban areas by pavement markings or raised islands. Pedestrian refuge islands are medians with a refuge area that gives pedestrians a protected area to wait before crossing the other part of the road. These countermeasures should be considered in areas with a significant mix of pedestrian vehicle traffic, volumes over 9,000 vehicles per day, and travel speeds greater than 35 MPH. Each one of these countermeasures significantly decreases the number of pedestrian crashes; medians with marked crosswalks reduce by 46% while pedestrian refuge islands reduce by 56% (FHWA).

Figure 20 Median and Pedestrian Refuge Island

Source: FHWA

CMF: 0.29

Recommended Context: Urban

Cost Rating: Medium

Safety Rating: High

Safety Emphasis Area Addressed:

+ Roadway & Lane Departures
+ Impaired Driving
+ Speed-Related
+ Occupant Protection
+ Vulnerable Road Users

Pedestrian Hybrid Beacons

A pedestrian hybrid beacon (PHB) is a traffic control device designed to aid pedestrians in crossing at midblock locations and uncontrolled intersections (**Figure 21**). The PHB is the intermediate option between a flashing beacon and a full pedestrian signal since it assigns the right of way to pedestrians and provides positive stop control. These are the most effective at locations where 3 or more lanes will need to be crossed, traffic volumes exceed 9,000 AADT, and travel speeds exceed 35 MPH. If PHBs are not already familiar with the community, agencies should conduct educational campaigns and outreach efforts as part of the implementation. With proper implementation, PHBs can reduces up to 55% of pedestrian crashes or 29% of all crashes (FHWA).

Figure 21 Pedestrian Hybrid Beacon

Source: City of San Luis Obispo

CMF: 0.432 (vehicle/pedestrian)

Recommended Context: Urban

Cost Rating: Medium-High

Safety Rating: Medium

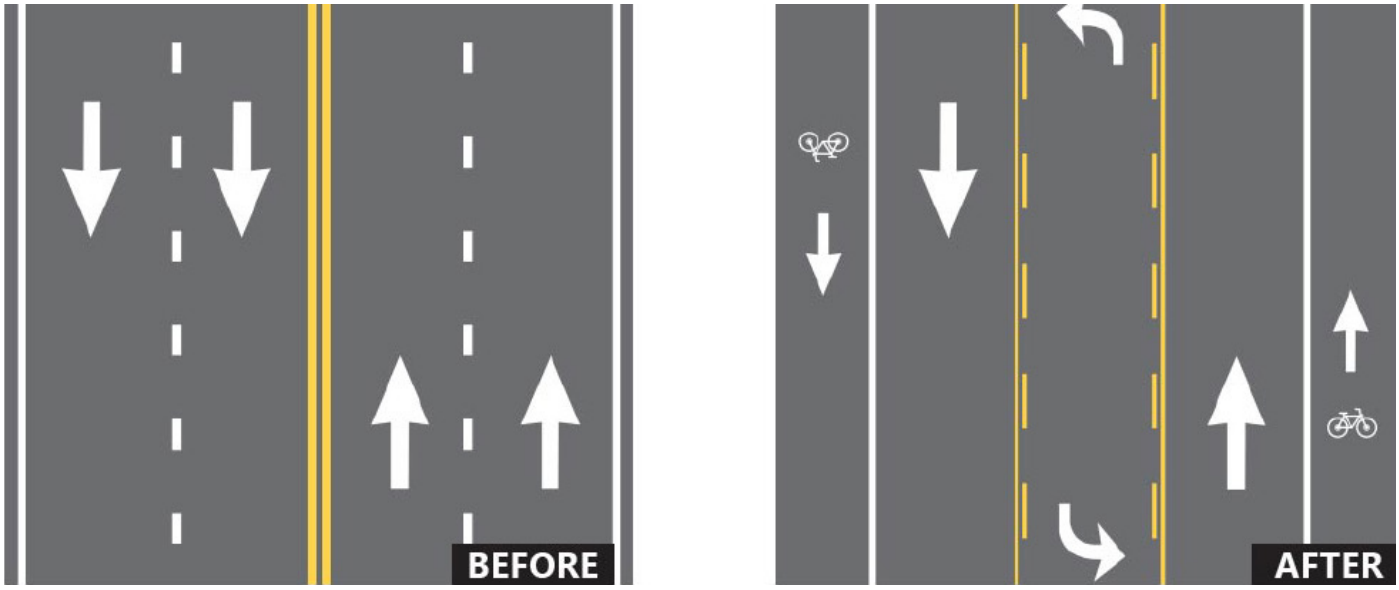
Safety Emphasis Area Addressed:

- Roadway & Lane Departures
- Distracted Driving
- Speed-Related
- Vulnerable Road Users

Roadway Reconfiguration

Roadway reconfigurations, also known as road diets, can improve safety by calming traffic, providing better mobility and access for all road users, and enhancing overall quality of life within a community. This countermeasure typically involves converting an existing four-lane undivided roadway into a three-lane roadway that has two through lanes and a center two-way left turn lane (**Figure 22**). Roadway reconfigurations can be a low-cost safety countermeasure if planned alongside a pavement overlay. In the context of a 4-lane to 3-lane roadway reconfiguration, a road segment can experience a 19 – 47% reduction in crashes.

Figure 22 Median and Pedestrian Refuge Island



Source: FHWA

CMF: 0.53

Recommended Context: Urban

Cost Rating: Low

Safety Rating: High

Safety Emphasis Area Addressed:

+ Roadway & Lane Departures
+ Distracted Driving
+ Speed Related
+ Vulnerable Road Users
+ Occupant Protection

RURAL CONTEXT COUNTERMEASURES

Enhanced Delineation for Horizontal Curves

Enhanced delineation for horizontal curves includes a variety of implementation strategies including pavement markings, in-lane curve warning pavement markings, retroreflective strips on signposts, delineators, chevron signs, enhanced conspicuity, dynamic curve warning signs, and sequential dynamic chevrons (**Figure 23**). Enhanced delineation can improve safety by alerting drivers of upcoming curves. Enhanced delineation methods can be used in both in advance of curves and within curves. Sequential dynamic warning signs are one of the most effective forms of enhanced delineation for horizontal curves reducing fatal and injury crashes by up to 60% (FHWA).

Figure 23 Enhanced Delineation

Source: FHWA

CMF: 0.63-0.652 (depending on what strategy used and context)

Recommended Context: Rural

Cost Rating: Low

Safety Rating: Medium

Safety Emphasis Area Addressed:

- Roadway & Lane Departure
- Distracted Driving
- Speed Related

Longitudinal Rumble Strips and Stripes on Two-Lane Roads

Longitudinal rumble strips and stripes on two-lane roads are milled or raised elements created to alert drivers in the case that they leave the traveled way through creating a noise and vibration in the case that the vehicle travels over them (**Figure 24**). This relatively low-cost countermeasure is used to prevent against lane departure collision. A two-lane road can experience a 44-64% reduction of head-on fatal and injury crashes with the installation of center line rumble strips (FHWA).

Figure 24 Longitudinal Rumble Strips

Source: FHWA

CMF: 0.80 (All)

Recommended Context: Rural

Cost Rating: Low

Safety Rating: Medium

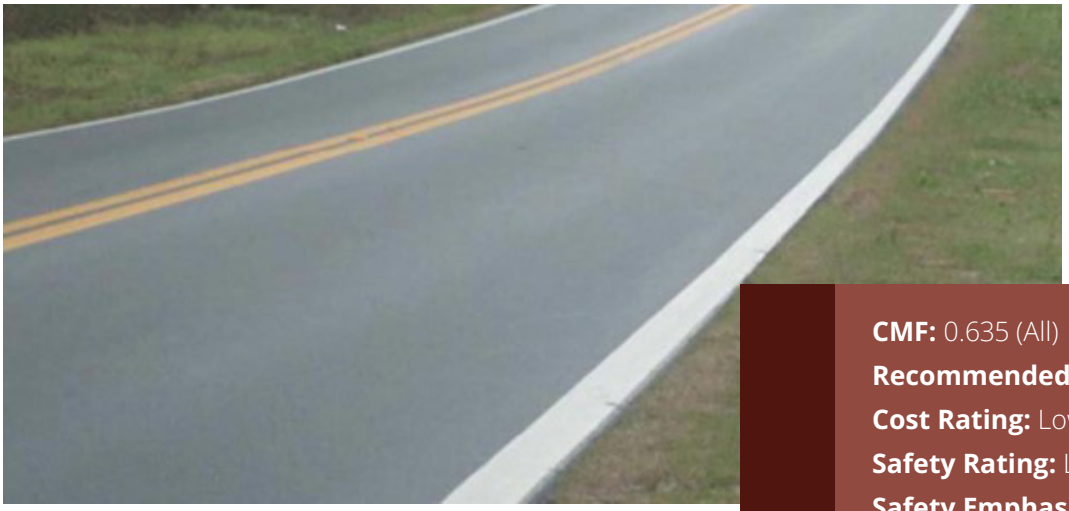
Safety Emphasis Area Addressed:

+ Roadway & Lane Departures
+ Impaired Driving
+ Occupant Protection
+ Speed Related
+ Vulnerable Road Users

Wider Edge Lines

Wider edge lines are defined as increasing the edge striping from the minimum normal width of 4-inches to the maximum normal width of 6-inches (**Figure 25**). Wider edge lines can improve roadway safety by increasing visibility and reducing lane departure crashes. Wider edge lines are an effective low-cost strategy to reduce roadway departure crashes for all facility types. Wider edge lines installed on rural two-lane roads can lead to a 37% reduction in non-intersection related fatal and injury crashes (FHWA).

Figure 25 Wider Edge Lines



Source: FHWA

CMF: 0.635 (All)

Recommended Context: Rural

Cost Rating: Low

Safety Rating: Low

Safety Emphasis Area Addressed:

+ Roadway & Lane Departure
+ Impaired Driving

ALL CONTEXT COUNTERMEASURES

Appropriate Speed Limits

While posted speed limits are typically the same as legislative statutory speed limits, agencies with the power to set speed limits can establish non-statutory speed limits or designated reduced speed zones (**Figure 26**). According to FHWA, reducing speed is one of the most important methods for reducing fatalities and serious injuries. Although drivers may feel that their speed feels reasonable, it may not be when considering the details of the entire corridor; this could include roadway conditions and all other users of the system such as children and seniors. A driver travelling at 30 miles per hour (MPH) who hits a pedestrian has a 45% chance of killing or seriously injuring them, but at 20 MPH that percentage drops to 5%. To protect all users of the roadway system, not only drivers, the FHWA strongly supports the reduction of speed limits where appropriate.

Figure 26 Speed Limit Sign

CMF: 0.856

Cost Rating: Low

Safety Rating: Medium

Safety Emphasis Area Addressed:

- Occupant Protection
- Unsafe Speed
- Vulnerable Road Users

Source: FHWA

Bike Lanes

A bike lane is a designated area of roadway that is reserved for bicycles, typically marked with pavement marking and signage (**Figure 27**). Similarly to pedestrian crashes, most bicyclist related crashes do not occur at intersections usually due to motorists overtaking bicyclists. Bike lanes provide a dedicated space for bicyclists to ride in which improves safety by reducing the interaction with vehicles and encourages more people to choose bicycling as their mode of transportation. Since there are several types of bike lanes that can be implemented, FHWA's Bikeway Selection Guide and the Incorporating On-Road Bicycle Network into Resurfacing Projects documents can assist agencies in determining which facility provides the most benefit based on the roadway and land use context. In urban settings, bike lanes can reduce crashes by up to 49% for total crashes on 4-lane undivided collectors and local roads or 30% for total crashes on 2-lane undivided collectors and local roads (FHWA).

Figure 27 Bike Lane

Source: Adobe Stock

CMF: 0.435 (All Crashes)

Cost Rating: Medium

Safety Rating: High

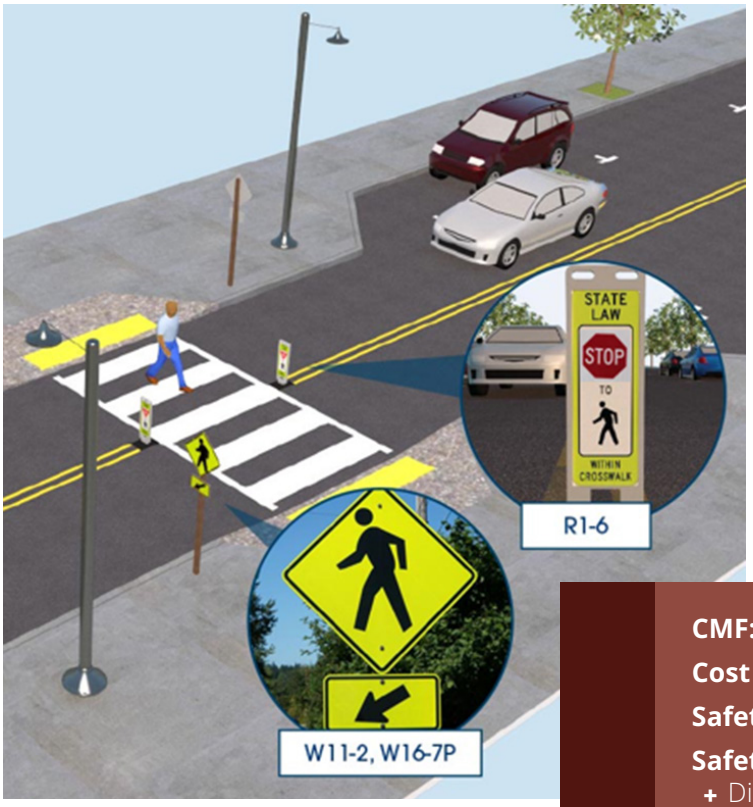
Safety Emphasis Area Addressed:

+ Impaired Driving
+ Distracted Driving
+ Occupant Protection
+ Unsafe Speed
+ Vulnerable Road Users

Crosswalk Visibility Enhancements

For multilane roadway crossings where vehicle volumes exceed 10,000 Average Annual Daily Traffic (AADT), a marked crosswalk alone is typically not sufficient. Under these circumstances, visibility enhancements should be implemented to prevent potential pedestrian crashes. Crosswalk visibility enhancements encompass multiple strategies that can be used together or alone (**Figure 28**). The three main visibility enhancements are high visibility crosswalks, increased lighting, and pavement markings and signing. Out of these enhancements, intersection lighting produces the greatest reduction in pedestrian crashes with up to a 42% reduction according to the FHWA.

Figure 28 Crosswalk Visibility Enhancements



Source: FHWA

CMF: 0.6

Cost Rating: Low

Safety Rating: High

Safety Emphasis Area Addressed:

+ Distracted Driving
+ Intersection Safety
+ Vulnerable Road Users

Rectangular Rapid Flashing Beacons

To enhance driver awareness of pedestrians at uncontrolled, marked crosswalks, rectangular rapid flashing beacons can be installed. Rectangular Rapid Flashing Beacons (RRFB) are pedestrian-activated traffic control device that consist of two-rectangular shaped yellow indications, each with a LED light source, that flash with an alternating high frequency (**Figure 29**). This countermeasure is particularly effective at multilane crossings with speed limits less than 40 MPH. According to FHWA, RRFBs can increase motorists yielding rates up to 98% and decrease pedestrian crashes by 47%.

Figure 29 Rectangular Rapid Flashing Beacons

Source: Kimley-Horn

CMF: 0.31 (pedestrian/vehicle)

Cost Rating: Medium

Safety Rating: High

Safety Emphasis Area Addressed:

- Intersection Related
- Distracted Driving
- Speed Related
- Vulnerable Road Users

Sidewalks

Sidewalks provide a designated pathway for vulnerable road users that is separate from motorists (**Figure 30**). Sidewalks can improve pedestrian safety, encourage modes of active transportation, and improve quality of life. Installation of sidewalks is particularly beneficial in areas of increased pedestrian activity such as near schools, parks, and transit locations. Creating physical separation between vulnerable road users and motorists through installation of sidewalks can cause a 65-89% reduction in crashes involving pedestrians walking along roadways (FHWA).

Figure 30 Sidewalks

Source: communityimpact.com

CMF: 0.598 (vehicle/pedestrian)
Cost Rating: High
Safety Rating: High
Safety Emphasis Area Addressed:
+ Vulnerable Road Users

Median Barriers

Median barriers are longitudinal barriers separating opposing traffic. These barriers are intended to prevent against and limit collisions involving oncoming traffic crossing over the median. Median barriers can come in various forms, cable barriers, metal-beam guardrails, and concrete barriers (**Figure 31**). Head on collisions on divided highways have an 8% fatality rate, if median barriers are installed on rural four-lane freeways cross-median crashes can experience up to a 97% reduction (FHWA).

Figure 31 Median Barriers

Source: Missouri Department of Transportation

CMF: 0.29 (All)

Cost Rating: Medium

Safety Rating: High

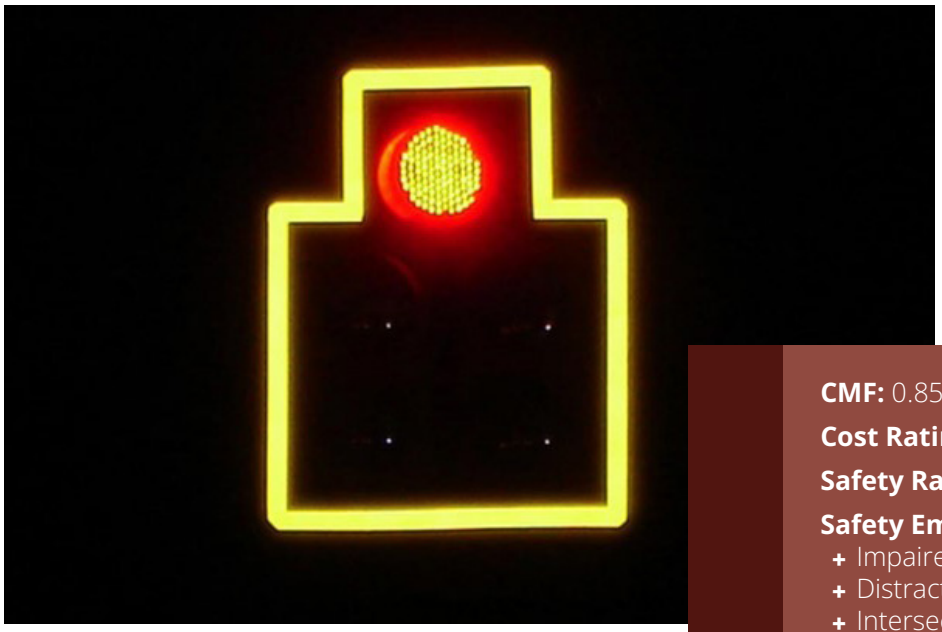
Safety Emphasis Area Addressed:

- Roadway & Lane Departures
- Impaired Driving
- Occupant Protection
- Speed Related
- Vulnerable Road Users

Retroreflective Backplates

Retroreflective backplates are backplates with a 1- to 3-inch yellow retroreflective border (**Figure 32**), these backplates are installed on signal heads to improve signal head visibility during both day and nighttime conditions. Installing a retroreflective backplate to an existing signal head or installing retroreflective tape to the border of existing backplate is a low-cost method of improving roadway safety by increasing visibility. Intersection related crashes can experience up to a 15% reduction in total crashes with this cost-effective countermeasure (FHWA).

Figure 32 Retroreflective Backplates



Source: FHWA

CMF: 0.85

Cost Rating: Low

Safety Rating: Medium

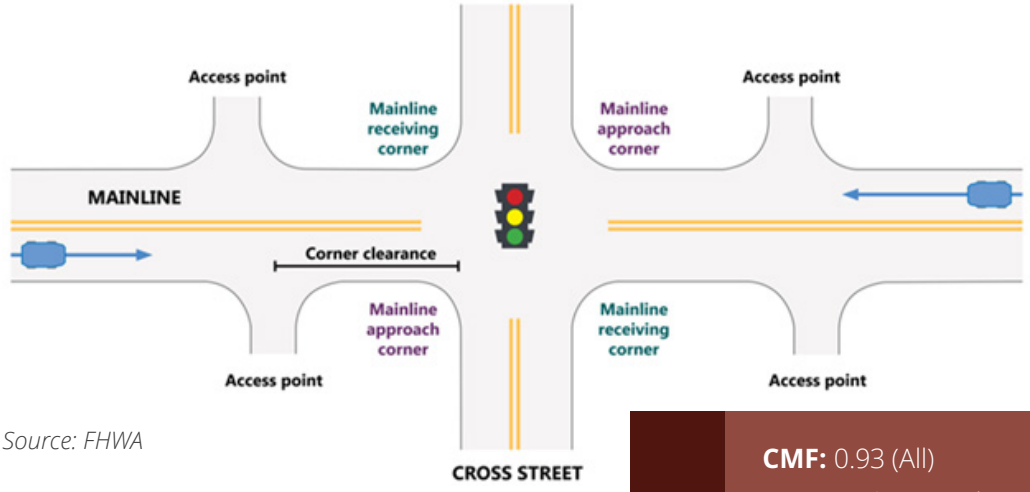
Safety Emphasis Area Addressed:

+ Impaired Driving
+ Distracted Driving
+ Intersection Safety

Corridor Access Management

Corridor access management pertains to the control of entry and exit points along a roadway (**Figure 33**). Proper corridor access management can improve safety for roadway users of all modes throughout the corridor through limiting the number of points of conflict. Access management can also reduce congestion and improve bicycling and walking conditions. Urban and Suburban arterials benefit greatly from corridor access management implementation and can experience a 25-31% reduction in fatal and injury crashes (FHWA).

Figure 33 Corridor Access Management



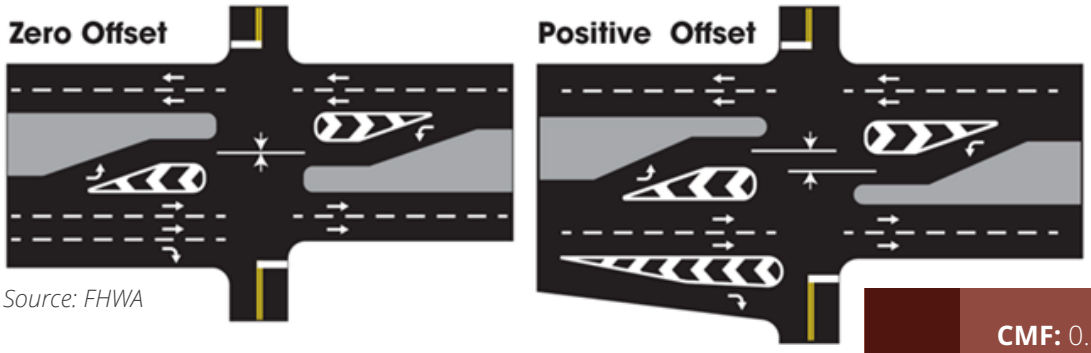
Source: FHWA

CMF: 0.93 (All)
Cost Rating: Medium-High
Safety Rating: Low
Safety Emphasis Area Addressed:
+ Intersection Safety

Dedicated Left- and Right-Turn Lanes at Intersections

Dedicated left-and right-turn lanes at Intersections improve traffic safety by separating turning traffic and through traffic allowing a space for vehicles turning to safely decelerate as well as wait for a safe turning opportunity (**Figure 34**). Dedicated turning lanes are particularly beneficial at reducing turning and rear-end collisions at two-way stop-controlled intersections. Installing dedicated right-turn lanes can reduce crashes by 14-26% while installing dedicated left-turn lanes can have an even greater impact, reducing crashes 28-48% (FHWA).

Figure 34 Dedicated Left-and Right-Turn Lanes



Source: FHWA

CMF: 0.52 – 0.74 (All)

Cost Rating: Low-Medium

Safety Rating: Medium-High

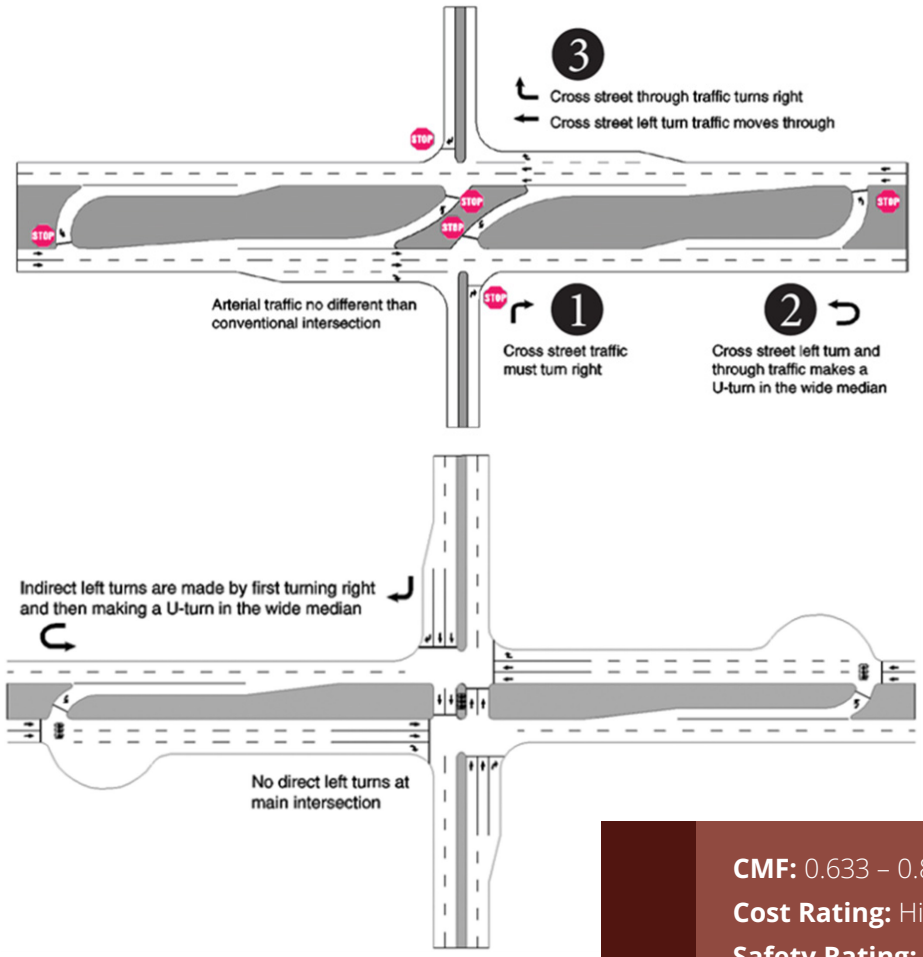
Safety Emphasis Area Addressed:

+ Intersection Safety

Reduced Left-Turn Conflict Intersections

Reduced left-turn conflict intersections are intersections designed change how drivers make left-turn movements through simplifying decision making at intersections. The two methods used are both involving U-Turns to complete certain left-turn movements (**Figure 35**). The methods used are the restricted crossing U-turn (RCUT) and the median U-turn (MUT). Reduced left-turn conflict intersections improve traffic safety through reducing points of conflict and simplifying turning movements. An unsignalized intersection converted into an unsignalized MUT can experience a 30% reduction in intersection related injury crashes. Converting an unsignalized intersection into an unsignalized RCUT can create a bigger reduction in intersection related fatal and injury crashes, reducing crashes up to 63% (FHWA).

Figure 35 RCUT (top) and MUT (bottom) Intersections



Source: FHWA

CMF: 0.633 – 0.8 (All)

Cost Rating: High

Safety Rating: Medium

Safety Emphasis Area Addressed:

+ Intersection Safety
+ Vulnerable Road Users

Roundabouts

Roundabouts are an intersection configuration in which traffic circulates in a circular pattern around a central island (**Figure 36**). Traffic entering the circular flow of traffic must yield to traffic already circulating within the intersection. Roundabouts safely and efficiently move traffic, reducing points of conflict, congestion, and speed resulting in reduced crash severity. According to FHWA conversion of a two-way stop-controlled intersection into a roundabout can cause up to an 82% reduction in fatal and injury crashes.

Figure 36 Roundabouts

Source: Tippah County, MS News

CMF: 0.59 (All)

Cost Rating: High

Safety Rating: High

Safety Emphasis Area Addressed:

- Intersection Safety
- Speed Related
- Distracted Driving
- Vulnerable Road Users

Systemic Application of Multiple Low-Cost Countermeasures at Stop-Controlled Intersections

This countermeasure involves the application of multiple low-cost countermeasures. Examples include enhancing signage and pavement markings at stop-controlled intersection throughout a corridor (**Figure 37**). Through implementing multiple low-cost methods at stop-controlled intersections resources can be maximized, and a high number of intersections can be treated with these highly cost-effective methods. Rural intersections can particularly benefit from being treated with multiple low-cost countermeasures and can experience as much as a 27% decrease in fatal and injury crashes (FHWA).

Figure 37 Systemic Application of Multiple Low-Cost Countermeasures at Stop-Controlled

Source: Pennsylvania Department of Transportation

CMF: 0.734 (All)

Cost Rating: Low

Safety Rating: Medium

Safety Emphasis Area Addressed:

+ Intersection Safety
+ Distracted Driving
+ Speed Related

Yellow Change Intervals

Yellow Change Intervals refer to the length of the yellow change indicator (**Figure 38**). Yellow Change Intervals are important due to the impact they can have on the number of instances of red-light running at intersections. Poorly timed Yellow Change Intervals, whether too short or too long, can cause confusion for drivers and increase chances of intersection related collisions. With proper timing of Yellow Change Intervals red-light running can be decreased 36-50% decreasing total crashes by 8-14% (FHWA).

Figure 38 Yellow Change Intervals

CMF: 0.99 (All)

Cost Rating: Low

Safety Rating: Low

Safety Emphasis Area Addressed:

+ Intersection Safety
+ Speed Related
+ Vulnerable Road Users

Source: driveincontrol.org

Targeted Lighting

Targeted Lighting refers to the installation of lighting to bring illumination up to or above recommended standards. Through improving visibility drivers can safely navigate roadways at night allowing drivers to see roadway conditions at distances not allowable by headlights alone (**Figure 39**). Proper Lighting improves safety for roadway users of all modes through improving visibility and comfortability. Installation of Targeted Lighting can reduce pedestrian related nighttime crashes by up to 42%.

Figure 39 Targeted Lighting

CMF: 0.68 (All)

Cost Rating: Medium

Safety Rating: High

Safety Emphasis Area Addressed:

+ Roadway & Lane Departures
+ Intersection Safety
+ Vulnerable Road Users

Source: Pheonix Lighting

Targeted Recommendations

Projects and recommendations that would enhance safety were chosen after conducting in-field observations to ensure a wholistic understanding of the existing conditions and crash history at those locations. A memorandum summarizing the in-field observations, field photos, and preliminary recommendations can be found in the Appendix. The following section summarizes the existing conditions, crash history, corridor recommendations, and intersection recommendations for each of the study locations.

STUDY CORRIDORS

Eighteen roadway segments and intersections were selected from the high injury and high risk networks to be priority corridors. The chosen corridors and intersections received targeted recommendations that will improve safety on some of the most unsafe roads in the study area. The 18 study locations were selected based on the following criteria:

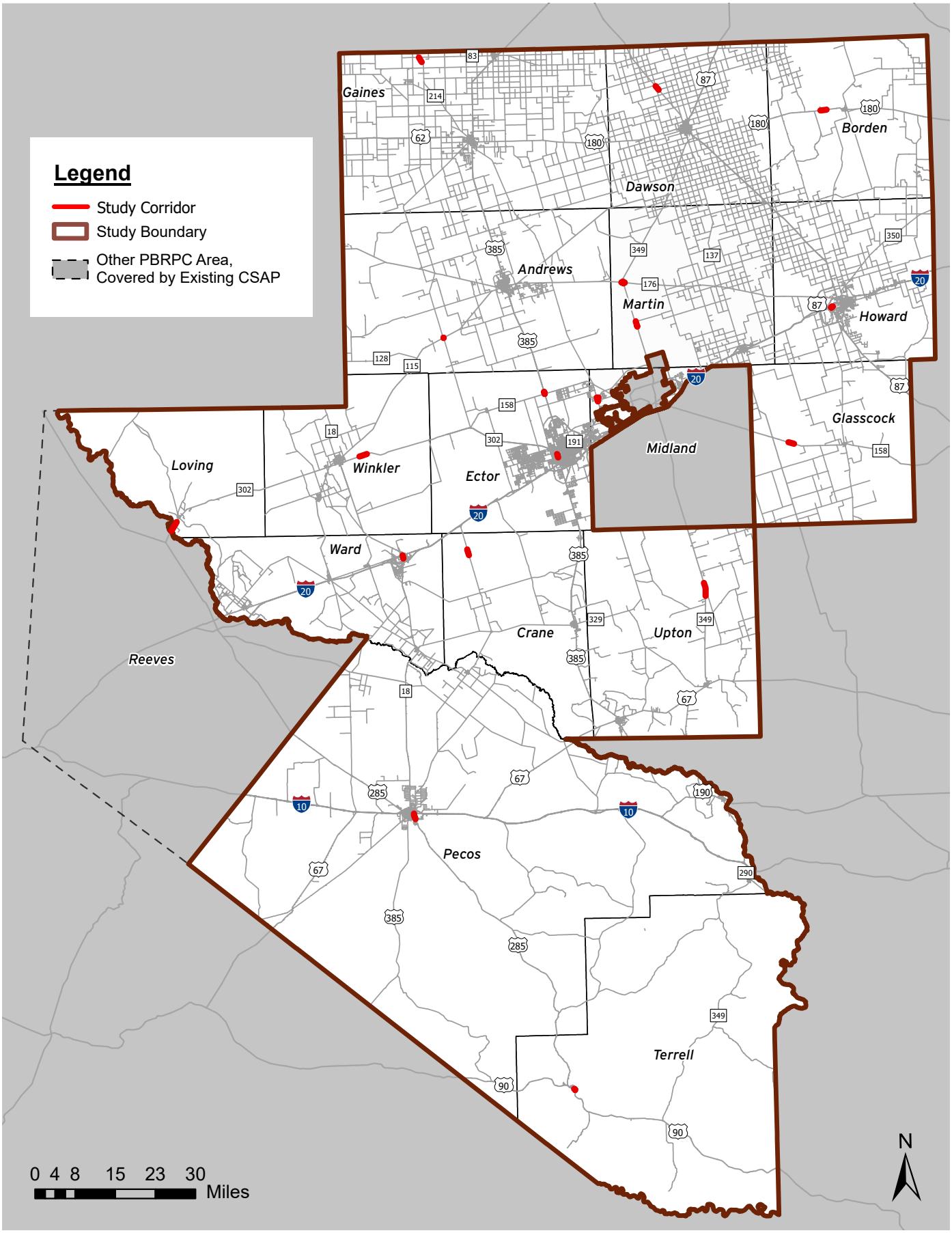
Equity	Engagement	Feasibility	Priority Corridor
Disadvantaged Areas (USDOT ETC Explorer) Transportation Disadvantaged Areas (USDOT ETC Explorer)	Social Pinpoint Map Survey Comments RSSC Study Area Comments (from Meeting 2) RSSC Priority Corridor Selection (from Meeting 3)	Current Roadway Projects TxDOT On/Off System	Located on the HIN Located on the HRN

The eighteen study locations are summarized below in **Table 21**. The study locations together compose of 15.6 miles of roadway and capture 189 KAB crashes. A study location was selected for each county in the study as shown in **Exhibit 15** on page 87.

Table 21 Study Corridors

Study Corridor	County	Limits			Crashes	
		From	To	Length (mi)	KAB Count	County Crash Count
SH 115 & FM 181	Andrews	Intersection			28	1,954
US 180	Borden	Private Drive	6,200 ft East from Private Drive	1.17	3	96
FM 1053	Crane	Private Drive	5,900 ft South of Private Drive	1.13	5	374
SH 137	Dawson	CR 8	CR H	0.86	2	1,091
North County Road West	Ector	West 16th Street	West 24th Street	0.67	36	24,393
US 385	Ector	SH 158	2,000 ft North of SH 158	0.37	11	24,393
SH 214	Gaines	5,280 ft South of FM 2056	FM 2056	1.00	8	1,369
SH 158	Glasscock	16,400 ft East of SH 137	5,700 ft East from Starting Point	1.04	5	246
IH 20 Business Loop	Howard	Frazier Street	FM 700	0.34	6	3,879
SH 302	Loving	500 ft East from the County Border	10,400 ft North of the Starting Point	1.95	4	363
SH 349	Martin	5,200 ft South of CR 3200	400 ft North of CR 3200	1.08	22	1,362
SH 176 & SH 349	Martin	Intersection			10	1,362
FM 1788 & SH 349	Midland	Intersection			27	4,312
US 285	Pecos	Old Cemetary Road	East Dickerson Boulevard	1.08	7	1,911
US 90	Terrell	Legion Street	Georgia Avenue	0.35	2	120
US 349	Upton	1,000 ft South of CR 115	2,500 ft North of CR 205	2.48	7	356
SH 18	Ward	West 10th Street	IH 20 Business Loop	0.64	8	1,549
SH 302	Winkler	14,500 ft East of CR 313	7,300 ft East of Starting Point	1.47	7	1,228

Exhibit 15 Study Locations



RECOMMENDATIONS FOR STUDY LOCATIONS

For each study location, targeted recommendations were given that would apply for either the entire study location or at specific intersection along the corridor. **Table 22** summarizes the recommended countermeasures for each study location by county. Detailed summary sheets with the study location's existing conditions, crash history, and targeted recommendations are in the Appendix for reference.

Table 22 Recommendations for Each Study Location

County	Location	Recommended Countermeasures	
Andrews	SH 115 & FM 181	+ Before/After Study to Evaluate Recent Improvements	
Borden	US 180 from Private Drive to 6,200 ft East of Private Drive	+ Lighting + Appropriate Speed Limits + Longitudinal Rumble Strips	+ Centerline Widening + Improved Signage + "No Passing" Zone Visibility Improvements
Crane	FM 1053 from Private Drive to 5,900 ft South of Private Drive	+ Lighting + Longitudinal Rumble Strips + Centerline Widening + Improved Signage	+ Low-Cost Countermeasures at Stop-Controlled Intersections + Dedicated Left- and Right- Turn Lanes Shoulder + Shoulder Expansion
Dawson	SH 137 from CR 8 to CR H	+ Longitudinal Rumble Strips + Low-Cost Countermeasures at Stop-Controlled Intersections	+ Add a "No Passing" Zone and All Required Markings and Signage + Add a Wide Edge Line
Ector	North County Road West from West 16th Street to West 24th Street	+ Sidewalks + Refresh Pavement Markings + Low-Cost Countermeasures at Stop-Controlled Intersections	+ Retroreflective Backplates + Access Management + Leading Pedestrian Intervals
Ector	US 385 from SH 158 to 2,000 ft North	+ Appropriate Speed Limits + Low-Cost Countermeasures at Stop-Controlled Intersections	+ Install Transverse Rumble Strips + Install Raised Pavement Markings
Gaines	SH 214 from FM 2056 to 5,280 ft South	+ Lighting + Improved Signage + Low-Cost Countermeasures at Stop-Controlled Intersections + Dedicated Left- and Right- Turn Lanes	+ Extend Acceleration or Deceleration Lane + Add Striped Island + Install Transverse Rumble Strips
Glasscock	SH 158 from 16,400 ft East of SH 137 to 5,700 ft East	+ Lighting + Add Speed Limit Signs	+ Add Speed Feedback Signs + Install "Left Lane for Passing Only" Signage
Howard	IH-20 Business Loop from Frazier Street to FM 700	+ Sidewalks + Refresh Pavement Markings + Install Traffic Signal at Airbase Rd.	+ Intersection Realignment at Airbase Rd. + Advance Traffic Signal Warning Signage + Access Management
Loving	SH 302 from 500 ft East of County Border to 10,400 ft North	+ Lighting + Add Two-Way Left Turn Lane + Improved Signage	

County	Location	Recommended Countermeasures	
Martin	SH 349 from 5,200 ft South of CR 3200 to 400 ft North of CR 3200	+ Lighting + Appropriate Speeds + Widen Paved Shoulders + Targeted Enforcement + Dedicated Right-Turn Lanes at Frequently Used Private Drives and Intersections	+ Speed Feedback Signs + Road Widening at CR 3200 + Dedicated Right- and Left-Turn Lanes at CR 3200 + Add Acceleration and Deceleration Lanes at CR 3200
Martin	SH 176 & SH 349	+ Install Traffic Signal + Refresh Pavement Markings + Appropriate Speed Limit	+ Add Advance Traffic Signal Warning Signs + Install Transverse Rumble Strips
Midland	FM 1788 & SH 349	+ Pave Existing Roadways + Lighting + PHB + Refresh Pavement Markings + Add Yield Pavement Markings + Longitudinal Rumble Strips	+ Low-Cost Countermeasures at Stop-Controlled Intersections + Access Management + Install Transverse Rumble Strips + Install Acceleration or Deceleration Lanes + Extend Acceleration or Deceleration Lane
Pecos	US 285 from Old Cemetary Road to East Dickerson Boulevard	+ Lighting + Appropriate Speed Limits + Install Traffic Signal at E. Dickinson Blvd. + Extend Raised Median to E. 7th St. + Right-In, Right-Out at E. 7th St. + Roundabout at 5th St. + Pedestrian Hybrid Beacon at 5th St.	+ Low-Cost Countermeasures at Stop-Controlled Intersections + Close Driveway Entrance on US 285 at Old Cemetery Rd. Intersection + Realign Offset Intersection with Striping Enhancements
Terrell	US 90 from Legion Street to Georgia Avenue	+ Install Two-way Left Turn Lane + Lighting + Sidewalk + Access Management + Travis St. Realignment	+ Pave Baseball Field Parking Lot + Low-Cost Countermeasures at Stop-Controlled Intersections at Avenue C + Midblock Crossing at Existing Pedestrian Sign
Upton	US 349 from 1,000 ft South of CR 115 to 2,500 ft North of CR 205	+ Appropriate Speed Limits + Lighting + Widen Paved Shoulders	+ Enhanced Delineation at Horizontal Curves + Speed Feedback Signs + Install Acceleration or Deceleration Lanes at CR 137
Ward	SH 18 from West 10th Street to IH 20 Business Loop	+ Sidewalk + ADA Compliant Ramps + Retroreflective Backplates at Current and New Traffic Signals + Crosswalks + Crosswalk Visibility Enhancements throughout the Corridor	+ Traffic Signal Rebuild at W. 4th St. + Install Pedestrian Signal at W. 4th St. + Add Flashing Yellow Arrow into Signal Timing Plans + Intersection Control Evaluation at SH 18 & E. 8th St. Intersection
Winkler	SH 302 from 14,500 ft East of CR 313 to 7,300 ft East of Starting Point	+ Lighting + Low-Cost Countermeasures at Stop-Controlled Intersections + High Contrast Lane Markings	

6

Promoting a Culture of Safety

Introduction

Action Plan Structure

Recommended Actions by Emphasis Area

Annual Reporting & Transparency

Introduction

Chapter 6 focuses on the implementation of the CSAP according to the action plan. The action plan is organized by the eight safety emphasis area and includes details for each of the 29 actions pertaining to proper implementation. These details include context, six E's of safety, timeframe, implementation partners, and funding sources. Improving road safety in the region requires prioritization of all users, because of this the action plan includes actions to improve transportation safety for all users and modes. Each action item is intended to fill a particular gap in the current state of safety. Through utilizing a variety of methods and implementing a multifaceted approach it will ensure that if one piece of the system fails there are other measures in place to protect users and minimize consequences.

Action Plan Structure

SAFETY EMPHASIS AREAS AND SIX E'S OF SAFETY

The Action Plan was created with. While the policy and program recommendations are organized by safety emphasis area addressed, the Six E's of Safety describe the methods used to address the area; each listed in **Table 23**.

Table 23 Safety Emphasis Areas and Six E's of Safety

Safety Emphasis Areas	Six E's of Safety
+ Roadway and Lane Departures + Intersection Safety + Occupant Protection + Speed-Related + Distracted Driving + Impaired Driving + Vulnerable Road Users + Post Crash Care	+ Engineering + Education + Evaluation + Equity + Enforcement + Encouragement

TIMEFRAME

To ensure progress towards the region's vision zero goals, an estimated timeframe for implementation is provided for each recommended action. These timeframes aid in the decision-making process by providing information on which actions should be prioritized based on expected completion dates. The timeframes assigned for the actions are as follows:

+ **Short (< 2 years):** This action is a priority and can be completed quickly
+ **Medium (2- 5 years):** This action could take more time to complete but could still be completed by the next CSAP update
+ **Long (> 5 years):** This action will have a significant impact but will require many years to complete
+ **Ongoing:** This action does not have a set timeframe but should be an ongoing effort

IMPLEMENTATION PARTNERS

Various departments and organizations in the region have been identified as having a crucial role in the implementation of the PBRPC CSAP. Within each matrices containing actions, the column labeled "Partner" includes a list of agencies and organizations that should be included in the implementation of the action alongside PBRPC. Below is a list of key regional partners included in the action matrices:

- **PBRPC RS:** PBRPC Regional Services Department
- **PBRPC CH:** PBRPC Criminal Justice & Homeland Security Department
- **PBRPC 911:** PBRPC 911 Emergency Communications
- **PBRPC TI:** PBRPC Transportation Information
- **AAA:** Area Agency for Aging
- **TxDOT:** Texas Department of Transportation
- **DPS:** Department of Public Safety
- **County:** County Departments
- **City:** City Departments
- **ISD:** Independent School Districts
- **PD/SO:** Police Departments and Sheriff's Offices
- **Private:** Private Organizations
- **CoC:** Chamber of Commerces

FUNDING SOURCES

Identifying funding sources is a vital part in the implementation of the action plan for the PBRPC CSAP. For each action in the plan, a potential funding source has been identified. Funding sources have been categorized into one of the following three options:

- Existing Funds (**Existing**)
- Reallocation of Funds (**Reallocate**)
- Grant Acquisition (**Grants**)

Recommended Actions by Emphasis Area

Texas has not had a deathless day on its roadways since November 7th, 2000. In an effort to eliminate fatalities on Texas roads, TxDOT adopted the of Road to Zero in 2019. This initiative's goal is to make Texas roads safer for all by eliminating roadway deaths by 2050. The Texas Strategic Safety Plan (SHSP) is the key planning document that outlines Texas's path towards achieving the state's goal. From the SHSP, 8 safety emphasis were identified based on the most common contributing factors associated with fatal and severe crashes in the State. The eights safety emphasis areas in Texas are:

- Roadway & Lane Departures
- Intersection Safety
- Occupant Protection
- Speed-Related
- Distracted Driving
- Impaired Driving
- Vulnerable Road Users
- Post Crash Care

ACTIONS ADDRESSING ALL EMPHASIS AREAS

Although most of the recommended actions for this plan fall into one of the safety emphasis areas, the five actions in **Table 24** have the capacity to address all the safety emphasis areas. These actions use a variety of methods to enhance traffic safety such as education, engineering, and evaluation.

Table 24 Recommendations Covering All Safety Emphasis Area

ID	Action	Context	Which of the Six E's	Timeframe	Partners	Funding
A1*	Establish a road safety section in regular messaging campaigns (online or email-based) that highlight educational materials on safe driving.	Both	Education	Short (<2 yrs.)	PBRPC TI	Reallocate
A2*	Create an online education resource hub connecting member agencies to existing TxDOT and NHTSA materials that enhance traffic safety.	Rural	Education	Short (<2 yrs.)	PBRPC RS	Existing
A3*	Develop a Safety Countermeasures Toolbox guidance document for member agencies to implement on city- and county-owned roadways.	Both	Engineering	Short (<2 yrs.)	PBRPC RS	Existing
A4*	Connect local agencies with TxDOT to advocate for stronger public involvement when preparing roadway maintenance, rehabilitation, and design projects.	Rural	Engineering	Ongoing	TXDOT, Counties, Cities	Existing, Reallocate
A5	Connect local agencies to grant funding opportunities that support the creation of long-range mobility plans for their jurisdictions.	Rural	Evaluation	Ongoing	PBRPC RS	Grants
A6	Create an example policy document for municipal or other publicly purchased vehicles to meet higher safety standards.	Both	Evaluation	Short (<2 yrs.)	PBRPC RS	Existing
A7*	Enhance funding opportunities for projects submitted to PBRPC that fall on the region's high-injury and/or high-risk networks.	Both	Evaluation	Ongoing	PBRPC RS	Grants

**Indicates an action that is high impact and low cost*

A1. Road Safety Messaging Campaigns

By including road safety information in regular messaging campaigns such as newsletters and public advertisements, PBRPC will be dispersing road safety information regularly to the public and its own organizations. PBRPC could also add a "Road Safety Corner" in the "News & Resources" section of their website where road safety tips and other information could reside (**Figure 40**). Integrating roadway safety education materials into already existing campaigns either for internal use or the public would show the commitment PBRPC has to creating a culture in which road safety is in the forefront of all minds.

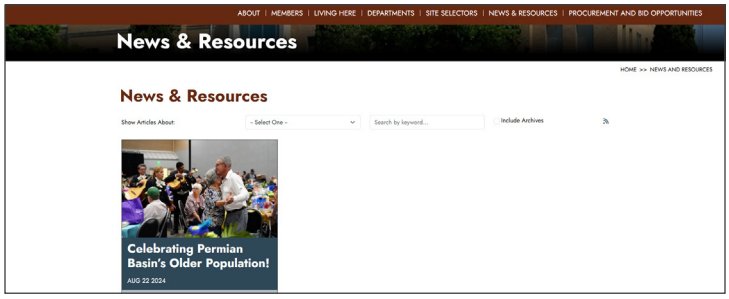
A2. Online Hub for Safety Campaign Materials

Educational campaigns are a great method of disseminating important safety information regarding a plethora of topics. Since the Permian Basin is made up of several counties each with their own safety needs and issues, it is recommended that PBRPC host an online education resource hub on their "News & Resources" webpage. This online education resource hub should host links to various websites that have traffic safety education materials. These resources should include TxDOT's traffic safety campaigns, NHTSA's traffic safety marketing, and others, such as the national sleep foundation's (NSF) drowsy driving prevention week campaign. Offering these resources in a centralized locations will give member agencies easy access to educational materials for several traffic safety. This gives each member agency or organization the opportunity to select campaign materials that specifically address the traffic issues in those jurisdictions. The materials included in these resources range from social media posts to billboard advertisements (**Figure 41**).

A3. Safety Countermeasures Toolbox

A crucial part of creating safer roadways is the engineering of the system; safety should be at the forefront of all improvement efforts. To aid in future design choices, it is recommended that a guidance document for the safety countermeasures toolbox (as shown in Chapter 5) is developed so member agencies may implement safety countermeasures on city- and county-owned roads. Since the document will include several countermeasures, member agencies will have the freedom to choose the countermeasures that best fit the context of their roads and their specific safety needs. This guidance document will contain information about each countermeasure, its crash modification factor, and in which context (rural or urban) it would be most useful in. Ultimately, the purpose of the guidance document is to inform member agencies of the

Figure 40 PBRPC's "News & Resources" Webpage



Source: PBRPC

Figure 41 Campaign Materials from NHTSA and TxDOT

Source: TxDOT, NHTSA

proven engineering countermeasures available that would increase traffic safety for all residents. **Figure 42** shows an example of sidewalks, which are an FHWA proven safety countermeasure, added near a residential area to the safety of vulnerable road users.

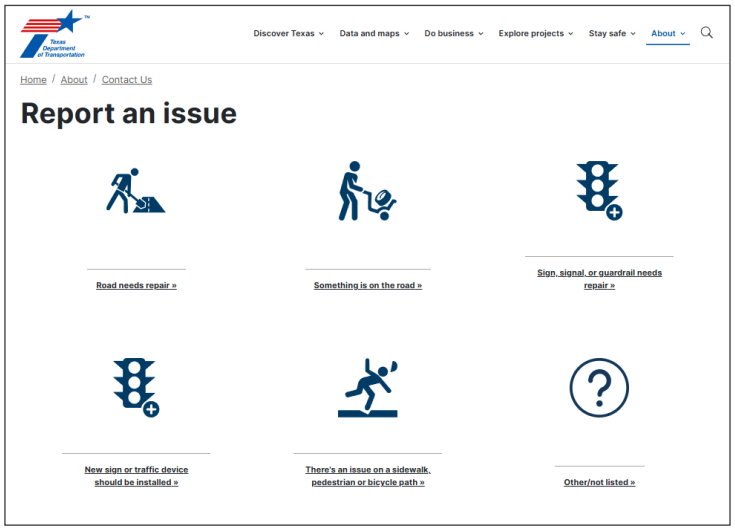
Figure 42 Example of a Complete Street

Source: FHWA

A4. Public Involvement Advocacy with TxDOT

Partnerships will be an integral part of achieving the region's goal of zero traffic deaths by 2050, therefore, it is imperative that strong relationships be built between local agencies and TxDOT. Although TxDOT is responsible for maintaining and improving Texas's roads, local agencies and stakeholders may have greater knowledge on where issues in the network are. TxDOT currently operates a ***"Report an Issue"*** webpage (**Figure 43**) that allows anyone to report a maintenance issue encountered, but connecting local agencies directly to TxDOT officials would take these efforts further. Through a direct connection, local agencies and stakeholders would have an opportunity to advocate for specific maintenance, rehabilitation, and design projects based on issues currently present or developing within those communities.

Figure 43 TxDOT's "Report an Issue" Webpage



Source: TxDOT

A5. Long-Range Mobility Plan Funding

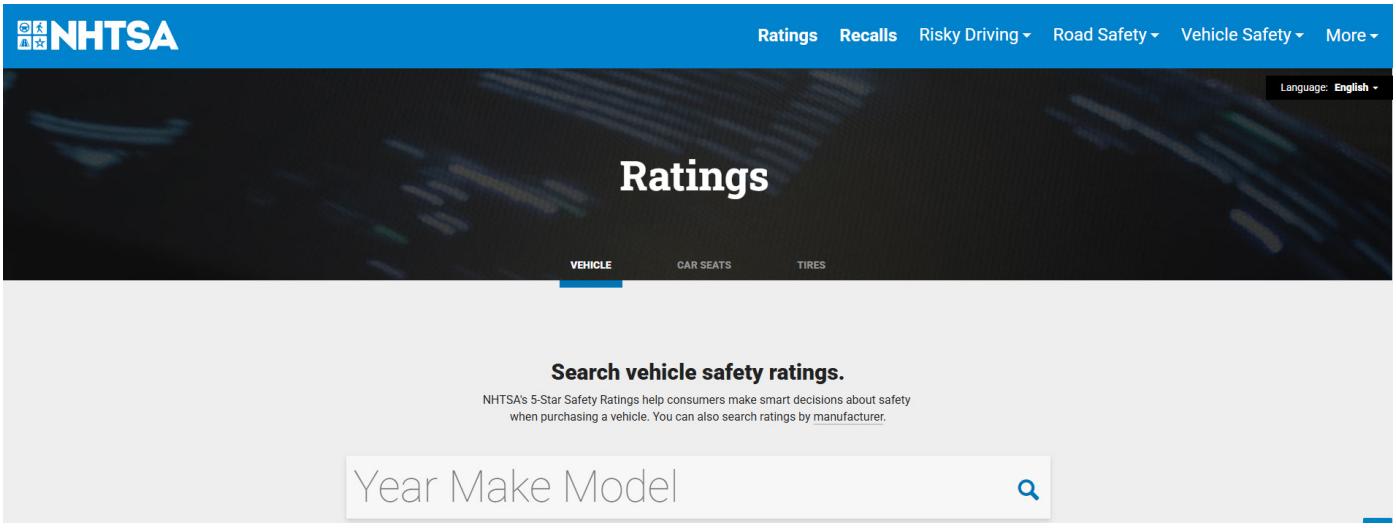
As member communities continue to grow and industries expand into the region, long-range mobility plans could help mitigate any safety issues that could arise from while helping plan safety improvement projects. Since each county and city may have different needs, each member agency should strive to complete their own long range mobility plan. This would allow these plans to outline a transportation network that best fits its future needs based on population growth, economic development, environmental factors, safety needs, and available project funds. To fund the creation of these long range mobility plans, PBRPC should make member agencies aware of any grant funding opportunities. This could be done through posting links to available grants on a centralized location on the organization's website.

A6. Publicly Owned Vehicle Safety Policy

Although improving human behavior and engineering design can increase safety in the existing transportation system, the use of safer vehicles can play a large role in keeping roadway users safe, especially those whose work requires them to be on the road. NHTSA's ***"5-Star Safety Ratings"*** program evaluates how vehicles perform in crash tests; specifically, the tests look at how vehicles bear frontal, side, and rollover crashes. Additionally, vehicles with driver assistance technologies (such as lane departure warning, crash imminent braking, or dynamic brake support) that have met NHTSA performance tests can increase the safety rating with the highest rating being 5 stars. The 5-Star Safety Ratings Database (**Figure 44**) compiles all available NHTSA ratings in a centralized location where any user can find a vehicles rating.

Creating an example policy document for member cities, counties, agencies, and organizations could aid in these stakeholders implementing the use of safer vehicles in their organizations. The example policy document should outline what the minimum safety rating fleet vehicles are required to meet as well as if fleet vehicles should have any recommended driver assistance technologies. Making an example policy such as this one available to all member agencies and organizations shows a dedication towards safety efforts by beginning with key stakeholders. Safer vehicles not only have the potential to prevent crashes from occurring, but also offering extra protection to drivers and passengers if one were to occur.

Figure 44 NHTSA's "5-Star Safety Ratings" Database



Source: NHTSA

A7. Prioritize HIN & HRN Segments

To aid in member cities and counties' safety improvement efforts, PBRPC should enhance funding opportunities for projects submitted that fall on the region's high injury or high risk networks. The HIN and HRN are both tools meant to identify problem locations in the study area to help inform decisionmakers, like PBRPC, as to where funding should be allocated and what projects should be a priority. Safety improvement projects on the HIN and HRN should be prioritized due to the significant impacts improvements can have on the number of severe crashes occurring in the study area.

ROADWAY & LANE DEPARTURE ACTIONS

Roadway and lane departure crashes are one of the most common type of crashes in the region resulting in fatal, severe, and/or minor injury crashes. Approximately 26% of fatal, severe, and minor injury crashes in the region are from roadway or lane departures. These crashes are typically either a single motor vehicle that ran off the road or head-on collisions that occurred after one or more motor vehicles left their designated travel lanes. Roadway and lane departure crashes occur for a variety of reasons such as the environment (weather or animal crossings), human error (inattention or drowsiness), roadway design (substandard curves, narrow travel lanes, inadequate shoulder), or a combination of factors as stated by FHWA. While the systemic countermeasures toolbox provides engineering solutions to roadway and lane departures in the region, the following actions attempt to address this issue from a policy and programs standpoint (**Table 25**).

Table 25 Roadway and Lane Departure Policy Recommendations

ID	Action	Context	Which of the Six E's	Timeframe	Partners	Funding
LD1*	Work with County Commissions to implement closed range policies that help decrease animal (livestock)-related collisions.	Rural	Enforcement	Long (>5 yrs.)	Counties, Cities	Reallocate
LD2	Partner with TxDOT to identify potential locations for new rest stops throughout the region.	Rural	Evaluation	Medium (2-5 yrs.)	PBRPC RS, TXDOT	Reallocate, Grants
LD3	Partner with TxDOT to identify locations for wildlife crossing feasibility studies and apply for funding through the FHWA's Wildlife Crossings Program	Rural	Evaluation/ Engineering	Short (<2 yrs.)	PBRPC RS, TXDOT, Counties, Cities	Grants

**Indicates an action that is high impact and low cost*

LD1. Closed Range Policies

While the Permian Basin is best known for its oil and energy industries, the livestock industry remains a strong presence within the region. Animal related crashes (either wild or domestic) in the study area accounted for 1.5% of all fatal, severe, and minor injury crashes. Although the percentage of animal-related severe crashes is small, rural residents of the region expressed concern about the risk livestock pose to roadway users if they enter highway areas or are allowed to roam on the highways. Many residents cited near miss collisions with livestock when travelling on the more rural roadways in the region.

To aid in reducing the risk of animal related crashes, specifically regarding livestock, it is recommended that counties in the region move towards becoming "closed range". Since 1876, the Texas Legislature has allowed the passage of local stock laws that modify the common law rule of open range. "Open range" being when property owners

are required to build and maintain a fence that is sufficient to keep livestock off their property (Texas Agriculture Code, Chapter 143), however, livestock are not permitted to cross or traverse along U.S. or state highways unattended. This does not apply to numbered farm-to-market, county, or local roadways. Counties becoming "closed range" means livestock owners are responsible for fencing in their livestock (**Figure 45**). As of this report, 5 counties in the study area are closed range. Enacting stock laws would help reduce the risk of livestock related crashes in the region while also ebbing the concerns of roadways users.

Figure 45 Cattle Ranch Fencing

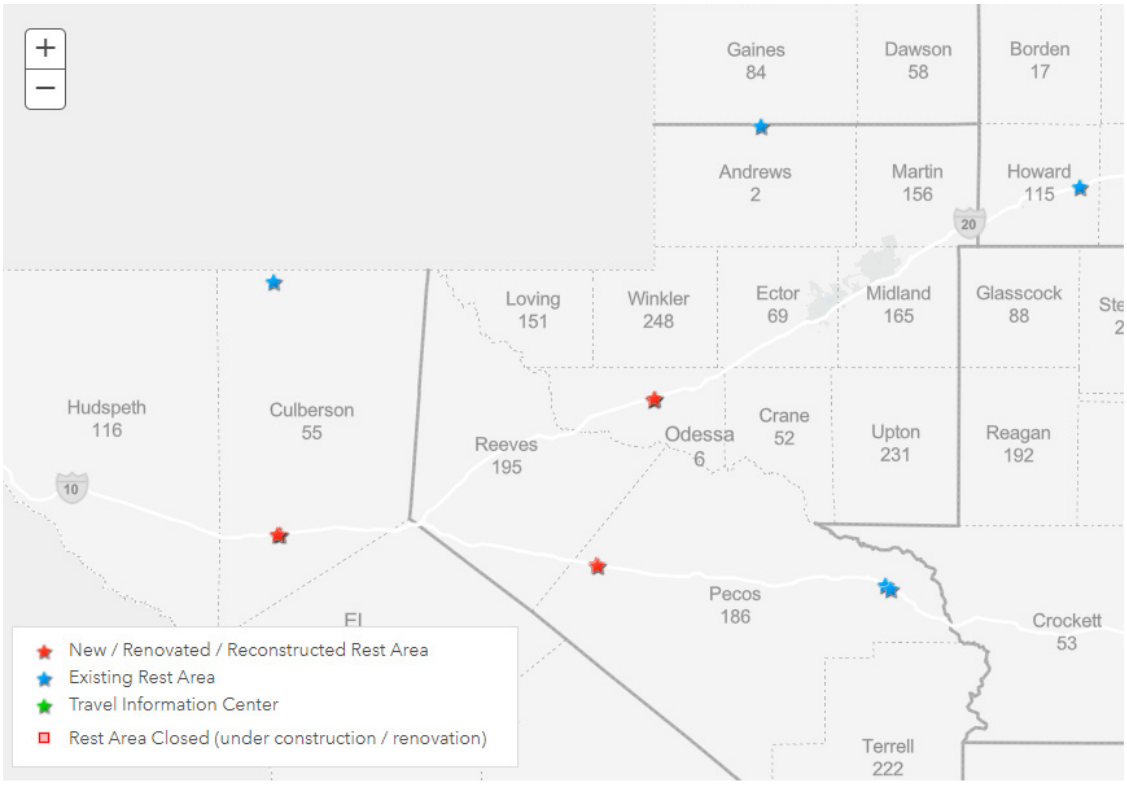
Source: Adobe Stock

LD2. Rest Stops

One of the most common contributors to roadway and lane departure crashes is drowsy driving. To decrease the number of drowsy drivers, the addition of rest stops in the region should be considered. Currently there are only seven rest areas within the region with the majority being in the southern portion of the study area (**Figure 46**). The addition of safe rest areas in the region, would not only encourage drivers to rest if drowsy, but would also provide much needed truck parking for commercial truck drivers.

In April 2020, TxDOT completed a Statewide Truck Parking Study that focused on finding solutions for safe truck parking in the El Paso and Odessa Districts. Due to TxDOT's efforts with this plan, it is recommended that PBRPC partner with TxDOT to identify locations in the study area that would benefit from rest areas. The potential locations could be identified by determining where TxDOT sees a need for truck parking and where the region experiences large amounts of severe roadway departure crashes as well as freight crashes. This partnership could lead to creating a safer transportation system for all while also helping to protect commercial truck drivers while they work.

Figure 46 Texas Safety Rest Areas Map



Source: TxDOT

LD3. Wildlife Crossings

Being cautious of elk or deer is a common warning by residents of the study area. Approximately 1,040 (2.3%) crashes during the study period were animal related. Although animal related crashes only comprise 2.3% of crashes in the study area, this number is only derived from crashes that are reported to police; the number of animal-related crashes may be higher due to under reporting. Residents of the study area have expressed concerns regarding the crossing behaviors of various animal in the region, but especially elk in the southern part of the study area. To aid in creating a safer transportation environment for people and animals, it is recommended that local governments partner with TxDOT and PBRPC to acquire grant funding to identify locations for wildlife crossing feasibility studies.

The ***FHWA's Wildlife Crossing Program*** provides funding for construction and non-construction projects that aim to reduce the number of wildlife vehicle collisions (WVCs) while improving habitat connectivity for terrestrial and aquatic species. Construction projects include engineering, design, permitting, right-of-way acquisition and other activities related to infrastructure improvements such as wildlife crossing overpasses and/or underpasses (**Figure 47**). Non-construction projects include planning, research, and educational activities that are not directly related to construction of infrastructure improvements. The application period for FY 2026 will open on May 1st, 2025 and close on August 1st, 2025.

Figure 47 Wildlife Crossing in San Antonio, TX

Source: texasmonthly.com | Justin Moore Airborne Aerial Photography

INTERSECTION SAFETY ACTIONS

In the study area, intersection-related crashes comprised approximately 42% of all fatal, severe, and minor injury crashes - slightly higher than in the state overall of 41%. Intersection safety was also the most common safety emphasis with six counties identifying it as the largest contributor to severe crashes in their county. Since intersections are where roads intersect and paths cross, the resulting number of conflict points and mixing of travel modes creates multiple opportunities for crashes to occur. Designing with the safety of all road users explicitly in mind will result in intersections that facilitate safety, accessibility, and convenience for all. The following action highlights the use of proven safety countermeasures at intersections in the region (**Table 26**).

Table 26 Intersection Safety Policy Recommendations

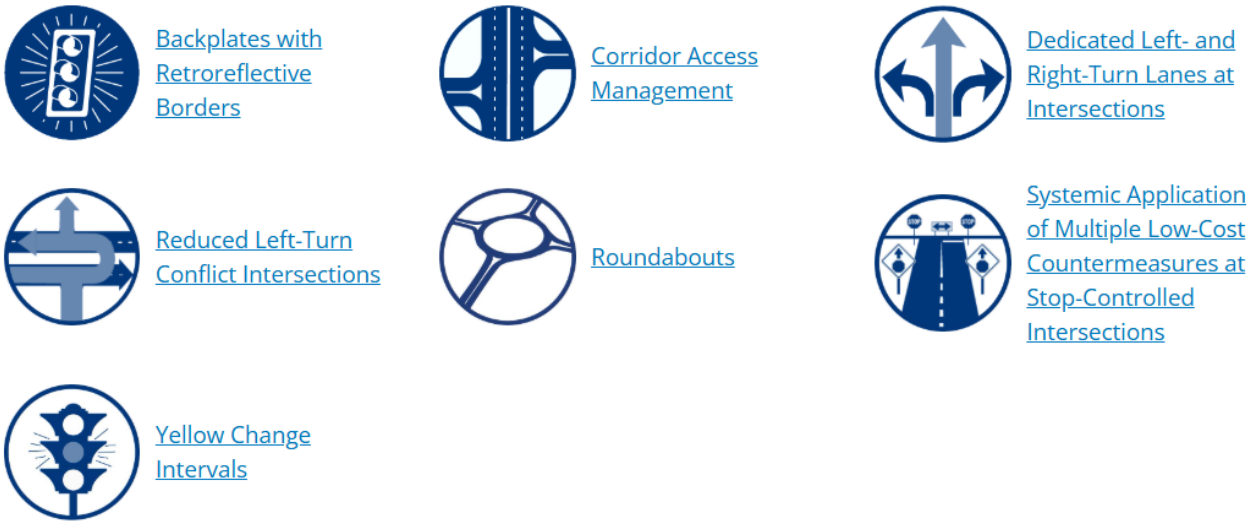
ID	Action	Context	Which of the Six E's	Timeframe	Partners	Funding
IN1*	Meet and present with City Councils and County Commissioner Courts to spread awareness on the toolbox as a resource.	Both	Engineering	Short (<2 yrs.)	Counties, Cities	Existing

**Indicates an action that is high impact and low cost*

IN1. Toolbox Awareness

As part of this plan, a systemic countermeasures toolbox has been developed (Chapter 5) which contains several countermeasures that can be applied at intersections to enhance safety as shown in **Figure 48**. Informing member city councils and county commissioner courts about the existing toolbox will allow these community stakeholders to learn about possible engineering solutions that could be applied in their communities to decrease the number of crashes. These meetings will also give stakeholders an opportunity to ask questions regarding any of the countermeasures. Ultimately, this action aims to educate city councils and county commissioners courts about the systemic countermeasure toolbox, so it can be used as a resource in their communities when decisions are made regarding the future improvements or design of intersections. Building safety into the design of intersections will ensure that a safer transportation network is being created.

Figure 48 Proven Safety Countermeasures for Intersections



Source: FHWA

OCCUPANT PROTECTION ACTIONS

In the Texas SHSP, "occupant protection" refers crashes that involve unrestrained people. A crash is identified associated with occupant protection if anyone in the vehicle was not wearing a seatbelt. As a state, only 9% of all fatal, severe, and minor injury crashes had a driver or passenger not wearing a seatbelt. Although as a state there is high seatbelt usage rate, in the study area 15% of fatal, severe, and minor injury crashes show a factor of unrestrained persons; 66 times higher than the state. The following actions aim to increase the use of seatbelts in the region by creating a culture that recognizes the importance of buckling up (**Table 27**).

Table 27 Occupant Protection Policy Recommendations

ID	Action	Context	Which of the Six E's	Timeframe	Partners	Funding
OP1	Champion the return of driver's education classes back to the independent school districts.	Both	Education	Long (>5 yrs.)	PBRPC RS, ISDs, Cities	Grants
OP2*	Create a program guidance document on how local law enforcement can organize a targeted enforcement plan for unrestrained drivers and passengers.	Rural	Enforcement	Short (<2 yrs.)	PBRPC CH, DPS, SO, CPD	Existing

**Indicates an action that is high impact and low cost*

OP1. Drivers' Education Courses in Schools

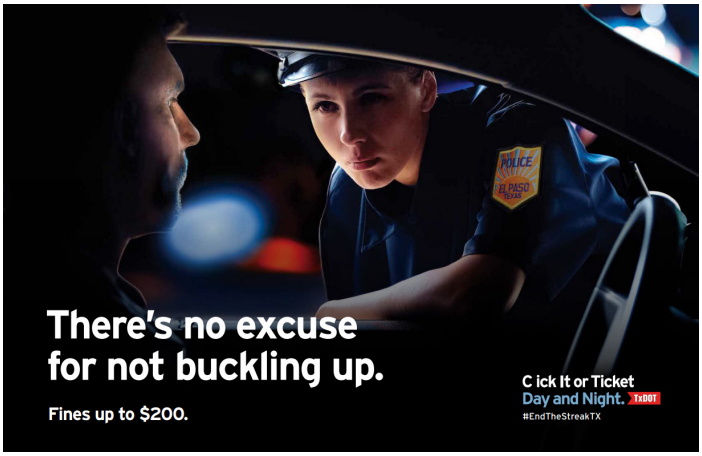
Part of creating a culture of safety is ensuring roadway users learn safe habits from an early stage. During several engagement events, residents and key stakeholders expressed concerns about the level of driver education available to young drivers. For people under the age of 18, driver education is a requirement for obtaining a driver license. Young people can fulfill this requirement through attending a private driving school, a paid online course, being parent taught, or taking a drivers education class at a high school (Texas DPS); high school driver education though is not available everywhere.

Championing the return of driver education back to the independent school districts (ISD) would ensure that all students receive the same level of driver education (**Figure 49**). Bringing driver education back into the public schools could offer administrators an opportunity to develop a lesson plan with local police departments that would include an emphasis on the reason for certain safe driving habits. By offering driver education in public schools again, the education of young drivers can be standardized throughout the region and ensure all drivers have the same level of driving knowledge. This would be one large step towards creating a culture of safety in the region with one of its most vulnerable populations.

Figure 49 Student During Driver Education

Source: Adobe Stock

Figure 50 Click It or Ticket Campaign for Texas



Source: TxDOT

OP2. Targeted Enforcement Plans for Seatbelt Usage

Targeted enforcement efforts would act in tandem with educational efforts by reminding drivers and passenger of the financial consequences of not wearing a seatbelt. According to NHTSA, a correlation exists between fines and seatbelt usage; larger fines were associated with increased usage due to the financial disincentive. With the highest fines in the country at $200 for first time offenders, not wearing a seatbelt can bring both safety risk and financial consequences.

To aid local police departments and sheriff offices in implementing targeted enforcement for seatbelt usage, a guidance document should be developed that would outline how local enforcement could organize a targeted enforcement plan (**Figure 50**). This document should outline how local law enforcement can utilize the ArcGIS dashboard developed for this plan to identify locations where there are high frequencies of unrestrained person crashes. By focusing enforcement on these locations, law enforcement resources could be used more efficiently. While increased enforcement can be inconvenient for both residents and law enforcement professionals, it is one part of increasing seatbelt usage in an effort to decrease severe crashes in the region.

SPEED-RELATED ACTIONS

In the region, approximately 32% of all severe crashes are contributed to speeding; this is only slightly more than the state of Texas with 30%. Although only slightly more severe than the state, speed-related crashes was one of the most common safety emphasis areas exhibited in the region. While it is widely known speeding dramatically increases both the frequency and severity of crashes, it is a norm within drivers. Speeding endangers not only the life of the speeder, but all roadway users like pedestrians, bicyclists, and other vulnerable road users. To change the general acceptance of speeding as the norm in the region, the following actions aid in reducing speeds and encouraging safer driving habits through various methods (**Table 28**).

Table 28 Speed-Related Policy Recommendations

ID	Action	Context	Which of the Six E's	Timeframe	Partners	Funding
SP1*	Partner with PRSC to champion the inclusion of sand mining companies as members in the Coalition.	Both	Encouragement	Ongoing	PBRPC RS, Private	Existing
SP2	Partner with Chambers of Commerce and ISDs to encourage insurance agencies to advertise safe driving discounts for their services.	Both	Encouragement	Ongoing	CoC, ISDs	Reallocate, Grants
SP3*	Create a program guidance document on how local law enforcement can organize a targeted enforcement plan for speeding violations.	Both	Enforcement	Short (<2 yrs.)	PBRPC CH, DPS, SO, CPD	Existing
SP4	Educate business owners and law enforcement on the English proficiency requirements in place in Texas for CDL drivers.	Both	Equity	Short (<2 yrs.)	PBRPC RS, Private	Reallocate

**Indicates an action that is high impact and low cost*

SP1. PRSC and Sand Mining Companies

The Permian Road Safety Coalition is a steering committee made up of government officials and industry leaders in West Texas that seek to improve traffic safety for all; they have been an integral part in the creation of this Comprehensive Safety Action Plan. The PRSC with its strong connections to industry leaders in the region has worked with many companies to teach best practices during their coaching lessons with their employees. Although the list of PRSC members is large, it is encouraged that there be a renewed effort to include more local sand mining and hauling companies. These industries have grown exponentially within the region in recent years and need to be included in roadway safety conversations increase their influence on the creation of a safer transportation network for themselves and others. **Figure 51** shows an example of a sand truck.

Figure 51 Sand Hauling Truck

Source: Bold Logistics | gfhlogistics.com

SP2. Safe Driving Insurance Discounts

To encourage the use of safer driving habits, it is recommended that PBRPC partners with local Chambers of Commerce and ISDs to encourage insurance agencies to advertise policies that reward safe driving. Most auto insurance companies have "usage-based policies" which use either a phone-based app or a device that plugs into the car's computer to monitor driving behavior. Insurance companies then analyze factors such as speed, braking, acceleration habits, and when driving among others to determine the cost of the insurance (Texas Department of Insurance). Increasing the awareness of these programs could aid in creating a safer transportation network for all users by offering a financial incentive for safe driving habits, such as not speeding or using appropriate speeds.

SP3. Targeted Enforcement Plan for Speeding

Similarly to the guidance document on how to organize a targeted enforcement plan for seatbelt compliance, this document would serve the same purpose but would target speeding violations. Not only do targeted enforcement plans deter unsafe speeding behaviors due to increased presence, but they also serve as an opportunity for law enforcement officers to remind residents of local speed limits (**Figure 52**). To create the largest awareness possible, law enforcement agencies in the area should partner with one another during the planning of these enforcement efforts and the selection of locations. These targeted enforcement efforts can encourage safer speed practices by providing a financial deterrent and targeted awareness efforts.

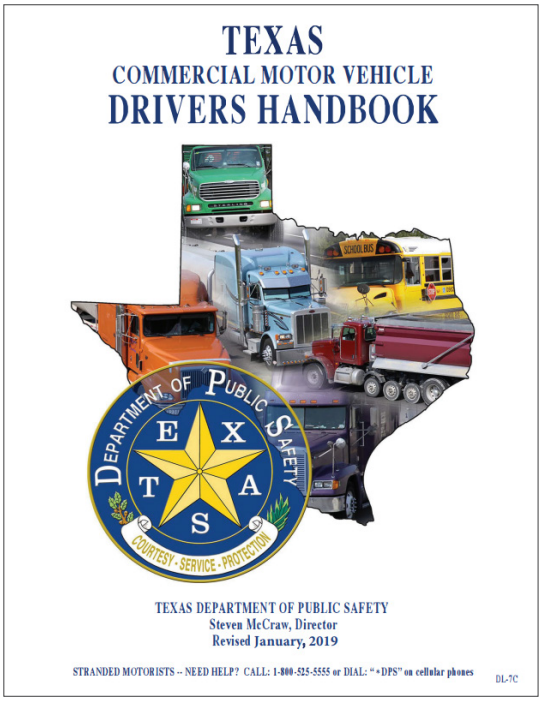
Figure 52 Police Traffic Stop

Source: Adobe Stock

SP4. CDL English Proficiency Education

To obtain a CDL, several requirements must be met by applicants, but depending on the type of trips being taken requirements can be reduced, especially in Texas. For interstate travel (typically referring to trips across state lines) in the U.S., CDL applicants must meet several health and skill requirements as well as a language requirement. Applicants must be able to read and speak English well enough to: converse with the general public, understand traffic signs and highway signals, respond to official inquiries, and make entries on reports and records (Federal Motor Carrier Safety Administration). Although a requirement for interstate travel is being able to read and speak English, this is not a requirement in the state of Texas if the applicant will only be doing intrastate trips (trips only within a state). More information about the different in this requirement can be found in the Texas Commercial Motor Vehicle Driver Handbook (**Figure 53**).

Figure 53 Texas Commercial Motor Vehicle Drivers Handbook



Source: Texas DPS

DISTRACTED DRIVING ACTIONS

Distracted Driving is one of least cited contributing factors in severe crashes in the region. Approximately 10% of fatal, severe, and minor injury crashes list distracted driving as a contributing factor; this is significant less than Texas with 17%. While the crash data shows distracted driving is not a major issue in the region, it is important to note that distracted driving often goes underreported due to the difficulty associated with proving a driver was distracted. Additionally, distractions can come from various avenues like texting, eating, grooming, or having a conversation – all though equally as dangerous. If crash data were the only method used to identify safety issues, distracted driving could be disregarded, but stakeholder engagement highlighted the region's concern with the number of distracted drivers especially given the roadway environment. **Table 29** summarizes the recommended actions to aid in reducing the number of distracted drivers in the region.

Table 29 Distracted Driving Policy Recommendations

ID	Action	Context	Which of the Six E's	Timeframe	Partners	Funding
DD1*	Create an example ordinance for member agencies that would prohibit cell phone use while the vehicle is in motion.	Both	Enforcement	Short (<2 yrs.)	PBRPC RS, Cities, Counties	Existing
DD2*	Encourage companies to implement and enforce policies to prevent distracted driving when using fleet vehicles.	Both	Encouragement / Enforcement	Ongoing	PBRPC CH, Private	Existing

**Indicates an action that is high impact and low cost*

DD1. Example Ordinance for Prohibiting Cell Phone Use

Since September 1, 2017, it has been illegal to read, write, or send a text while driving in the state of Texas with a fine up to $200. While texting while driving is illegal throughout the state, cities and towns can pass stricter ordinances; some Texas cities like El Paso have banned all cellphones while driving. Although distractions when driving can come from anywhere, by banning the use of cellphones when driving cities could eliminate one of the biggest possible distractions when driving. To make the passing of these ordinances easier and faster for cities in the region, it is recommended that PBRPC provide an example ordinance that cities could easily use as a base for their own ordinances. If all member cities work to pass ordinances banning all cell phone use when driving, the region could become a leader in distracted driving reduction.

DD2. Distracted Driving Policies for Freight Companies

With the large amount of freight traffic in the region, it is important that commercial truck drivers avoid distracted driving not only for their own safety but for all others on the road. In the study area, there were a total of 7,898 freight crashes of those 9.5% cited distracted driving as a contributing factor, furthermore, 20.5% of freight crashes contributed to distracted driving resulted in a fatality, severe, or minor injury. To ensure the protection of these essential workers as well as other road users, it is recommended that companies with vehicle fleets implement and enforce policies to prevent distracted driving when employees are using them. These policies should clearly outline what distracted driving violations are for employees. Additionally, with the rollout of such policies awareness efforts need to be made within the companies to ensure all employees are aware of the new policy and how it will affect their day-to-day. These awareness efforts can also serve as educational opportunities where information regarding the dangers of distracted and tips on how to avoid distracted driving.

IMPAIRED DRIVING ACTIONS

Approximately 14% of severe crashes during the study period were attributed to some form of impaired driving – either from alcohol or drugs. While 14% is not as high as other of the safety emphasis areas, it is higher than the percentage of severe crashes associated with impaired driving (10%). These number could suggest that the region has a unique problem with impaired driving. If a driver is impaired, they cannot drive safely which put them and others at risk. Impaired driving is not a safety emphasis area that can be wholly solved through engineering solutions, but rather requires a shift in the cultural mindset that deems any level of impaired driving as unacceptable. **Table 30** summarizes the recommended actions aimed at increasing awareness on the dangers of impaired driving, rewarding safe driving practices, and exploring enforcement options.

Table 30 Impaired Driving Policy Recommendations

ID	Action	Context	Which of the Six E's	Timeframe	Partners	Funding
ID1	Support addiction service organizations to treat patients.	Both	Encouragement	Short (<2 yrs.)	PBRPC RS, Private	Existing, Grants
ID2*	Establish an incentive for Chambers of Commerce that integrate safe ride programs into community events.	Both	Encouragement	Medium (2-5 yrs.)	PBRPC RS, CoC	Grants
ID3*	Partner with the Area Agency for Aging to expand their existing voucher program.	Both	Encouragement	Long (>5 yrs.)	PBRPC RS, AAA	Grants
ID4	Partner with PRSC to get connected with legislative resources to determine the eligibility of jurisdictions to establish sobriety checks.	Both	Evaluation	Short (<2 yrs.)	PBRPC CH, SO, CPD, Private	Existing
ID5*	Develop a partnership with MADD to increase their presence and influence in the region.	Both	Education	Medium (2-5 yrs.)	PBRPC RS, Private	Existing

**Indicates an action that is high impact and low cost*

ID1. Support Addiction Treatment Services

Reducing access to drugs and alcohol can be extremely difficult therefore another possible solution is to target the root of the impaired driving problem; the irresponsible use of substances. Supporting organizations that provide substance abuse and mental health help resources could help reduce the number of impaired driving crashes by helping community members who struggle with irresponsible substance use. PBRPC and member agencies should partner with local organizations, like United Way, to identify the best ways to support them to ensure help resources can be available to all who need them (**Figure 54**). Having PBRPC, member cities, counties, and other organizations support organizations who provide these types of care and support will show the region's dedication to reducing the number of impaired crashes with empathy and care.

Figure 54 Areas of Focus for United Way of Midland

Source: United Way | https://www.uwmidland.org/

ID2. Safe Ride/Designated Driver Program Incentives

A strong reducer of impaired driving is alternate transportation options such as public transit or shared rides (Uber, Lyft). In more rural areas, though, alternative transportation options are not always available, but safe ride programs can be a solution to this problem. In the City of Andrews during the Oktoberfest Event the Chamber of Commerce offered safe rides for any person who needed a ride after drinking. The rides were all given by Chamber of Commerce members who volunteered to be designated drivers. Official and unofficial programs such as these exemplify the culture of safety that already exists in the region, and it should be rewarded. To encourage more programs such as these, it is recommended that PBRPC find an incentive they could provide to other Chambers of Commerce to encourage the deployment of these programs at local events.

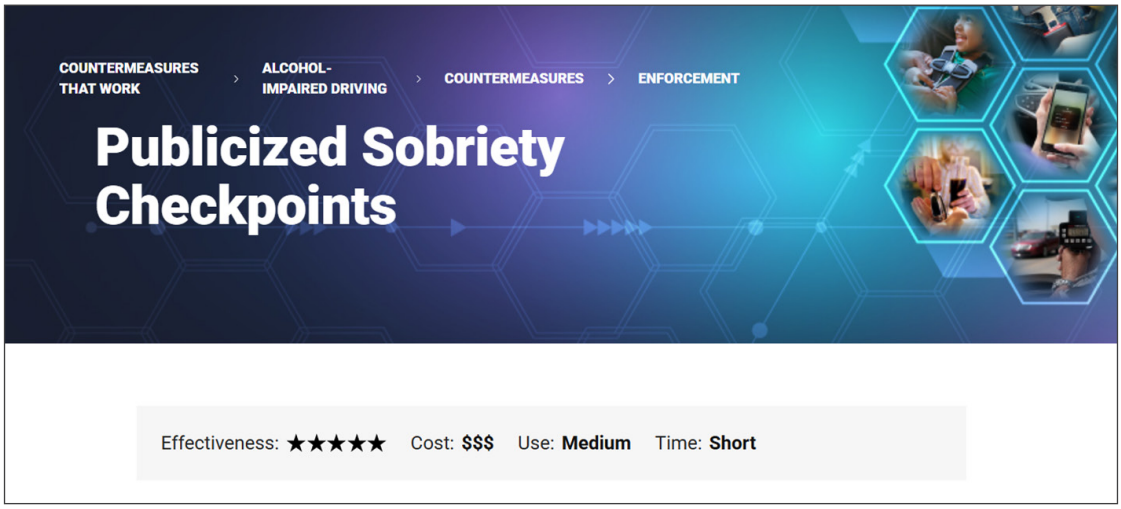
ID3. Expand Ride Voucher Programs

The Area Agency for Aging (AAA) of the Permian Basin not only serve as advocates for older individuals, but also provide a wide range of services for seniors and their caregivers. One such service is their nonemergency medical transportation program that offers free transportation to doctor's offices, dentist's offices, hospitals, drug stores, and any other locations that provide covered health care services. This program aids one of the most vulnerable populations within communities by ensuring that seniors continue to have access to healthcare while not requiring them to drive. Although this program does not specifically contribute to the reduction of impaired driving, it would be beneficial for PBRPC to partner with AAA to determine how to start an on-demand service like AAA's but dedicate it to aiding impaired drivers to offer more alternative transportation options in the region.

ID4. Sobriety Checks

In Texas, as well as 11 other states in the Country, prohibit the use of DUI/DWI (sobriety) checkpoints by law enforcement due to its violation of an individual's fourth amendment right. This means law enforcement officers are not allowed to set up random sobriety checkpoints to check for impaired driving rather they must have reasonable suspicion of a driver's impairment before pulling them over and conducting sobriety tests. Although prohibited in the state, sobriety checkpoints are listed as a highly effective countermeasure for impaired driving according to NHTSA (**Figure 55**). Sobriety checkpoints increased the perceived likelihood that impaired driving will be identified and penalized which leads to a reduction in impaired driving. Allowing sobriety checkpoints in Texas would give law enforcement another tool to aid in the decrease of impaired driving crashes therefore it is recommended that PBRPC partner with PRSC to use their legislative resources to determine how difficult it will be to change legislation in Texas or if there are any ways sobriety checkpoints could be legal in Texas. Ultimately though it is important to note that even if sobriety checkpoints become legal in the state random sobriety checkpoints are not as effective as publicized sobriety checkpoints paired with educational campaign efforts (NTSA).

Figure 55 NHTSA's "Countermeasures That Work" for Alcohol-Impaired Driving

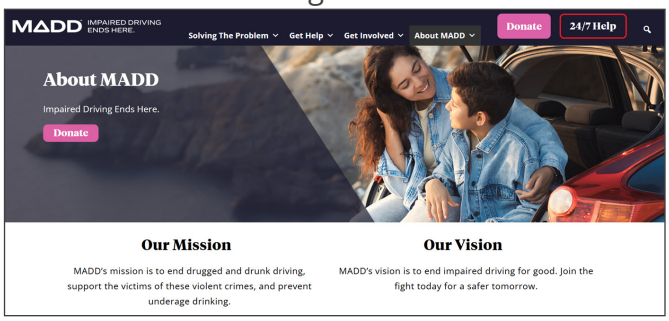


Source: NHTSA

ID5. Establish a Permian Basin MADD Chapter

Mothers Against Drunk Driving (MADD) is a nationally recognized non-profit organization that works to end impaired driving (**Figure 56**). Developing a partnership with MADD would be a strong step towards eliminating impaired driving in the region due to the network and resources the organization could provide. As of this report, MADD's only office in West Texas is in El Paso, but through a strategic partnership MADD could open an office within the boundaries of the study area to establish a more local presence. Brining MADD into the region, could increase the amount of local support and efforts towards ending impaired driving; the goal of MADD and PBRPC.

Figure 56 Mothers Against Drunk Driving Website



Source: MADD | https://madd.org/about-madd/

POST-CRASH CARE ACTIONS

Post-crash care is a critical part of a safe roadway system because it is the final opportunity to prevent a fatality. To ensure all victims have the best chance of survival, timely arrival of emergency services and law enforcement is vital. This is especially true for rural communities, where response times are longer, and emergency medical service resources can be limited. Although post-crash care typically refers to medical treatment after a crash, post-crash care also includes first responders, crash investigation, traffic incident management, and the resulting judiciary elements of a crash investigation. The following actions aim to enhance access to emergency medical care while creating a safe working environment for first responders through a focus on traffic incident management strategies (**Table 31**).

Table 31 Post-Crash Care Policy Recommendations

ID	Action	Context	Which of the Six E's	Timeframe	Partners	Funding
PC1	Champion participation in the State to State (S2S) Program (REAL ID).	Both	Encouragement	Short (<2 yrs.)	PBRPC CH, DPS	Existing
PC2	Partner with local hospital systems or insurance companies to educate the public on the importance of seeking medical care post-crash.	Both	Encouragement	Medium (2-5 yrs.)	PBRPC CH, Private	Existing
PC3*	Acquire a STEP grant to support funding overtime of traffic law enforcement.	Both	Enforcement	Ongoing	PBRPC CH, SO, CPD	Grants
PC4*	Partner with DPS and local law enforcement to encourage the acquisition of vehicles for the sole purpose of facilitating lane closures during the crash-clearing process.	Both	Enforcement	Ongoing	PBRPC CH, PBRPC RS, DPS	Reallocate, Grants
PC5	Establish more emergency service districts to increase coverage in the region.	Rural	Equity	Long (>5 yrs.)	PBRPC CH, PBRPC 911, Counties	Reallocate
PC6	Create or expand on the network's inventory of dynamic message boards to communicate closures or slowdowns of traffic due to crash incidents.	Rural	Evaluation	Short (<2 yrs.)	PBRPC CH, Cities, Counties	Existing, Grants

**Indicates an action that is high impact and low cost*

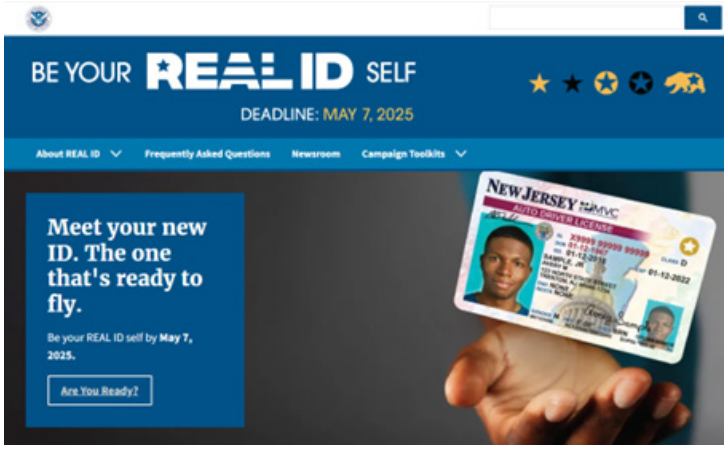
PC1. State to State Program & REAL ID

The State to State (S2S) program is Texas's initiative designed to meet the requirements of the REAL ID Act. Aside from preventing fraud, the S2S program aids in improving traffic safety. Participating in the program allows for the easy transfer of driver information and history to ensure that ineligible drivers cannot obtain a license therefore keeping them off the roadway. Although the deadline for obtaining a REAL ID is May 7th, 2025, PBRPC should encourage residents in the region to participate if they have not already and continue to support any further efforts similar to the REAL ID Act. **Figure 57** shows an example of a valid REAL ID for the state of Texas.

PC2. Encourage Voluntary Medical Treatment Post-Crash

PBRPC should partner with local hospital systems and insurance companies to help educate the public on the importance of seeking medical care post-crash, even if injuries do not seem too severe. Injuries can be serious while not being immediately obvious such as internal bleeding or concussions. Additionally, early treatment can help prevent any medical complications that could lead to long-term damage (**Figure 58**). While the cost of medical care is a large deterrent to receiving care, local hospital systems, insurance companies, and EMS should partner with PBRPC to determine the best ways to educate and encourage the public on the importance of receiving care.

Figure 57 US DHS Real ID Message



Source: US Department of Homeland Security

Figure 58 First Responders Administering Medical Care

Source: Adobe Stock

PC3. STEP Grant for Law Enforcement Overtime

Throughout this plan, the participation of law enforcement is a critical part of achieving zero roadway deaths by 2050. Law enforcement officers play a significant part in reducing unsafe driving behaviors through the targeted enforcement programs suggested in this plan. To ensure there is enough funding to cover the extra vigilance conducted, it is recommended that a Selective Traffic Enforcement Program (STEP) grant is acquired to cover these expenses. The STEP grant provides grant funding to law enforcement agencies to allow an increase in traffic enforcement activities aimed at reducing crashes and severe injuries; key focus areas covered by the grant are speeding, impaired driving, distracted driving, and seatbelt compliance. **Figure 59** shows the available STEP Resources webpage that offers more information about the grant and how to apply.

Figure 59 STEP Resources Webpage

Source: Texas Law Enforcement Liaison Program

PC4. Crash Clearing Vehicle Acquisition

After a crash, adequate traffic incident management is essential to avoiding a secondary crash (a crash that occurs because of the original crash within the crash scene) usually involving first responders and EMS staff. Approximately 20% of all crashes in the nation are secondary crashes caused by improper traffic incident management. Since traffic incident management is not only meant to protect the public but also on-scene responders, an innovative tool is suggested to help with the securing of a scene and protecting first responders.

In October 2017, the City of Irving, TX put its first blocker pumper, pictured in **Figure 60** on page 112, into service with at least four more being added after. This blocker pumper is a decommissioned pumper truck that was scheduled to be auctioned by the City but was retained to be used as a blocker truck for traffic incident management. The pumper truck was stripped of its equipment while keeping its water tank full to provide weight and adding signage to inform the public of the trucks use. The blocking trucks have helped increase the safety at crash scenes for both first responders and drivers by giving sufficient space for first responders to work and for drivers to be made aware of an incident. Although refurbishing retired pump trucks may not be possible for member cities and counties, PBRPC should still encourage the acquisition of blocking trucks when possible. These blocking trucks will increase the safety of all first responders post crash and can decrease the risk of a secondary crash.

PC5. Expand Emergency Service District Coverage

The timely arrival of emergency respondents and well-trained EMS staff is a major factor in ensuring an injured person receives the proper medical care needed to survive a crash. This can be especially difficult in rural areas though due to lengthy distances needed to travel to get to crashes. Due to the expansiveness and rural context of the study area, response times to crashes can be lengthy especially when resources are limited. To potentially increase the number of resources and lower response times, it is recommended that more emergency service districts (ESD) are established in member counties. Emergency service districts are political subdivisions, similar to school districts, established by public vote to provide fire protection and/or emergency medical services within specific areas. Increasing ESDs would create more dedicated coverage within the study area leading to shortened response times to crashes, increasing survivability.

PC6. Expand Access and Deployment of Dynamic Message Boards

Dynamic message boards are another tool that can be used post-crash to manage the scene of a crash. **Figure 61** shows an example of a portable dynamic message board. Boards such as these can be a large aid to traffic incident management by conveying messages to drivers alerting them to stopped traffic, slow traffic, or closed lanes ahead due to a crash allowing them time to prepare for what is ahead. Portable dynamic message boards can be especially useful in traffic incident management because of their ability to be moved to different locations. Due to the usefulness of dynamic messaging boards, it is recommended that an inventory of these boards be conducted to determine how many exist in the region and where they reside. Determining the number of boards that exist and where they are stored, will allow for quick deployment, if needed, to crashes.

Figure 60 Refurbished Apparatus as a Block Vehicle from the City of Irving, TX

Source: Fire Apparatus Magazine | fireapparatusmagazine.com

Figure 61 Example of a Dynamic Message Board

Source: Wanco | wanco.com

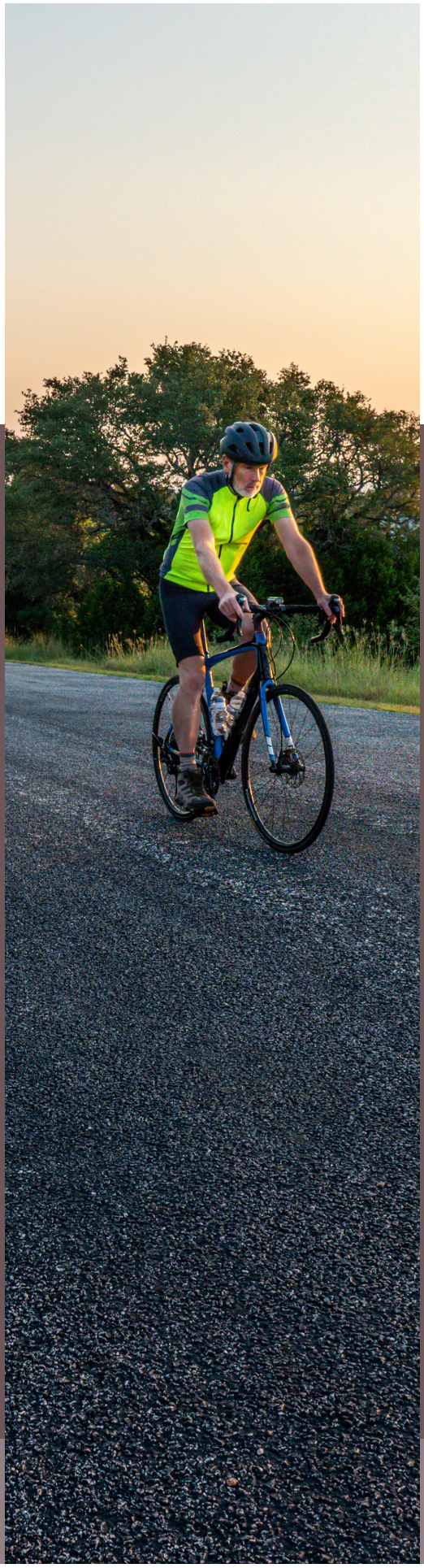
Annual Reporting & Transparency

The regional Safety Steering Committee is responsible for implementing the actions recommended in this plan with special consideration for maintaining transparency through the production of an annual Vision Zero Progress Report. Annual progress reporting procedures are established in the Vision Zero Resolution passed by the executive board on May 14, 2025. **Table 32** details the procedures by how often each task is expected to be completed by the RSSC.

Table 32 Post-Crash Care Policy Recommendations

Plan Update Level	Recommended Frequency	Approval By
Minor Revision – text or wording changes, not affecting the recommendations	As needed	Regional Safety Steering Committee
Major Revision – any change that substantively changes a recommendation	As needed	Regional Safety Steering Committee
Vision Zero Implementation Progress Report	Annual	PBRPC Executive Board
Full Plan Update	Every five years	PBRPC Executive Board

Overall, the annual reporting of Vision Zero efforts plays a crucial role in ensuring transparency, accountability, and effectiveness in the use of public resources allocated for community safety and improvement initiatives. In addition to the online publication of this plan, a dashboard is in development to also host on PBRPC's website to make crash data and progress on projects publicly available.



Appendix

A. Vision Zero Resolution
B. Social Pinpoint Engagement Report
C. HIN Memo
D. HRN Memo
E. Field Observations Memo
F. Study Corridor Summary Sheets

Appendix A. Vision Zero Resolution

PERMIAN BASIN
Safety Action Plan

Appendix B. Social Pinpoint Engagement Report

Appendix C. HIN Memo

PERMIAN BASIN
Safety Action Plan

Appendix D. HRN MEMO

Appendix E. Field Observations Memo

PERMIAN BASIN
Safety Action Plan

Appendix F. Study Corridor Summary Sheets

Permian Basin Regional Planning Commission
P.O. BOX 60660 • 2910 LAFORCE BOULEVARD • MIDLAND, TEXAS 79711-0660 • (432) 563-1061 • FAX (432) 563-1728

Executive Director

August 10, 2022

Office of the Secretary of Transportation
U.S. Department of Transportation
1200 New Jersey Avenue SE
W84-322
Washington, DC 20590

RE: USDOT SS4A Application, Permian Basin Regional Planning Commission

Dear Secretary of Transportation,

The Permian Basin Regional Planning Commission (PBRPC) Board of Directors representing seventeen counties and twenty-eight cities in the Permian Basin region in the western area of Texas is pleased to write a letter of support as well as a statement of commitment of leadership to the Executive Director and staff as the lead institution for the U.S. Department of Transportation Safe Streets and Roads for All (SS4A) Discretionary Grant Program, Action Plan Grant.

The Permian Basin will benefit immensely from this proposal and the objectives are vital to our region and the community, which continues to experience the unprecedented rate of highway accidents and fatalities. Local officials are committed to engage in stakeholder activities as the project is implemented to ensure an adequate action plan is finalized.

The Permian Basin Regional Planning Commission is committed to a Vision Zero plan to work toward a goal of reducing the number of deaths by half in 2035 and zero fatalities by 2050.

A focus of engagement and collaboration, equity considerations, goal setting and safety analysis will be the driving factor of the leadership and committee that has already been established for the SS4A grant.

Thank you for providing this opportunity, and we appreciate your consideration.

Sincerely,

Charles Wolf
Chairman, PBRPC Board of Directors