

Permian Basin Regional Planning Commission

COMPREHENSIVE SAFETY ACTION PLAN



DRAFT MARCH 2025

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TABLE OF CONTENTS

Chapter 1: The Case for a Safety Action Plan	8
Introduction.....	9
Project Overview.....	10
Mission Statement.....	10
Project Timeline.....	12
Guiding Principles.....	12
Chapter 2: Engaging the Region	16
Introduction.....	17
Regional Safety Steering Committee	18
Public Engagement.....	19
Pop-Up Events	26
Stakeholder Interviews	27
County Commission	27
Chapter 3: Safety Needs in the Permian Basin Region	28
Introduction.....	29
Crash Analysis.....	30
Crash Heat Map & Severities	31
Societal Cost of Crashes	33
Top Contributing Factors.....	33
Top Contributing Factor by County.....	34
Top Manners of Collision.....	36
High Crash Intersections.....	38
Top Manner of Collision by County.....	38
Freight Related Crashes.....	40
Vulnerable Road Users.....	42
Top Safety Emphasis Area by County	44
Equity Considerations	46
Chapter 4: High Injury Network & High Risk Network	48
Introduction.....	49
High Injury Network	50
High Risk Network.....	55
Chapter 5: Creating a Safer System.....	62
Introduction.....	63
Systemic Countermeasure Toolbox.....	64
Targeted Recommendations.....	85
Chapter 6: Promoting a Culture of Safety	90
Introduction.....	91
Action Plan Structure	92
Recommended Actions by Emphasis Area.....	93
Annual Reporting & Transparency	113

LIST OF EXHIBITS

Exhibit 1 Counties within the Study Area.....	11
Exhibit 2 Interactive Map Survey.....	25
Exhibit 3 Crash Heat Map.....	32
Exhibit 4 Top Contributing Factor by County Map.....	35
Exhibit 5 Top Manner of Collision by County Map.....	37
Exhibit 6 High Crash Intersections.....	39
Exhibit 7 Freight Crash Map.....	41
Exhibit 8 Pedestrian and Bicyclist Crash Map.....	43
Exhibit 9 Top Emphasis Area by County Map.....	45
Exhibit 10 Overall vs. Transportation Disadvantaged Census Tracts.....	47
Exhibit 11 Critical Crash Rate Ratio Map.....	52
Exhibit 12 High Injury Network Map.....	54
Exhibit 13 High Risk Network Map.....	60
Exhibit 14 High Injury Network vs. High Risk Network.....	61
Exhibit 15 Study Locations.....	87

DRAFT

LIST OF TABLES

Table 1 PBRPC CSAP Timeline of Meetings and Engagement Efforts	12
Table 2. Pop-Up Events Attended for the Safety Action Plan.....	26
Table 3 PBRPC Study Area Crash Trends (2019-2023)	30
Table 4 Total Crash Count by County	31
Table 5 Total Societal Cost of Crashes in the Study Area (2019 - 2023)	33
Table 6 Top Contributing Factor by County	34
Table 7 Top Manner of Collision by County	38
Table 8 Intersection Crashes in Texas vs. the Study Area.....	38
Table 9 High Crash Intersection (2019 - 2023)	40
Table 10 Pedestrian and Bicyclists Crash Data (2019 - 2023)	42
Table 11 Top Emphasis Area by County.....	44
Table 12 Region vs. Disadvantaged Census Tracts Crash Severity Breakdown	46
Table 13 Differences between High Injury and High Risk Networks	50
Table 14 HIN Statistics by County	53
Table 15 Top Emphasis Area for Each County.....	55
Table 16 Focus Facilities for Each County	56
Table 17 Speeding Risk Factors and Point Allocation.....	58
Table 18 Intersection Risk Factors and Point Allocation.....	58
Table 19 Roadway & Lane Departure Risk Factors and Point Allocation	59
Table 20 Systemic Countermeasure Toolbox.....	64
Table 21 Study Corridors.....	86
Table 22 Recommendations for Each Study Location.....	88
Table 23 Safety Emphasis Areas and Six E's of Safety	92
Table 24 Recommendations Covering All Safety Emphasis Area.....	94
Table 25 Roadway and Lane Departure Policy Recommendations.....	98
Table 26 Intersection Safety Policy Recommendations	100
Table 27 Occupant Protection Policy Recommendations.....	101
Table 28 Speed-Related Policy Recommendations.....	103
Table 29 Distracted Driving Policy Recommendations.....	105
Table 30 Impaired Driving Policy Recommendations	106
Table 31 Post-Crash Care Policy Recommendations.....	109
Table 32 Post-Crash Care Policy Recommendations.....	113

LIST OF FIGURES

Figure 1 Components of a Comprehensive Safety Action Plan.....	12
Figure 2 Vision Zero Logo for FHWA.....	13
Figure 3 Six Key Principles of the Safe Systems Approach.....	14
Figure 4 Five Complementary USDOT Objectives Supporting the Safe Systems Approach.....	14
Figure 5 Photos from RSSC Meeting #3 in November 2024.....	18
Figure 6 Project Website.....	19
Figure 7 County Where Respondents Live and Work.....	20
Figure 8 Most Used Modes of Transportation within the Last 2 yrs.....	21
Figure 9 Residents Usage and Safety Opinions per Mode of Transportation.....	22
Figure 10 Top 5 Traffic Safety Concerns.....	23
Figure 11 Respondents Support of Different Actions to Improve Traffic Safety.....	23
Figure 12 Breakdown by Comment Type.....	24
Figure 13 PBRPC CSAP Pop-Up Meetings.....	27
Figure 14 PBRPC Study Area Crash Trends (2019-2023).....	31
Figure 15 Top Contributing Factors.....	33
Figure 16 Top Manners of Collision.....	36
Figure 17 Example Crash Tree Result from Winkler County.....	56
Figure 18 Potential Risk Factor of Lane Width for Speed-related KAB Crashes.....	57
Figure 19 Leading Pedestrian Interval.....	65
Figure 20 Median and Pedestrian Refuge Island.....	66
Figure 21 Pedestrian Hybrid Beacon.....	67
Figure 22 Median and Pedestrian Refuge Island.....	68
Figure 23 Enhanced Delineation.....	69
Figure 24 Longitudinal Rumble Strips.....	70
Figure 25 Wider Edge Lines.....	71
Figure 26 Speed Limit Sign.....	72
Figure 27 Bike Lane.....	73
Figure 28 Crosswalk Visibility Enhancements.....	74
Figure 29 Rectangular Rapid Flashing Beacons.....	75
Figure 30 Sidewalks.....	76
Figure 31 Median Barriers.....	77
Figure 32 Retroreflective Backplates.....	78
Figure 33 Corridor Access Management.....	79
Figure 34 Dedicated Left-and Right-Turn Lanes.....	80
Figure 35 RCUT (top) and MUT (bottom) Intersections.....	81
Figure 36 Roundabouts.....	82
Figure 37 Systemic Application of Multiple Low-Cost Countermeasures at Stop-Controlled Intersections.....	83
Figure 38 Yellow Change Intervals.....	84
Figure 39 Targeted Lighting.....	85
Figure 40 PBRPC's "News & Resources" Webpage.....	95
Figure 41 Campaign Materials from NHTSA and TxDOT.....	95
Figure 42 Example of a Complete Street.....	96

Figure 43 TxDOT’s “Report an Issue” Webpage.....96

Figure 44 NHTSA’s “5-Star Safety Ratings” Database 97

Figure 46 Texas Safety Rest Areas Map.....99

Figure 45 Cattle Ranch Fencing.....99

Figure 47 Student during Driver Education 100

Figure 48 Proven Safety Countermeasures for Intersections 101

Figure 49 Student during Driver Education 102

Figure 50 Click It or Ticket Campaign for Texas.....102

Figure 51 Sand Hauling Truck.....103

Figure 52 Police Traffic Stop.....104

Figure 53 Texas Commercial Motor Vehicle Drivers Handbook.....104

Figure 54 Areas of Focus for United Way of Midland 107

Figure 55 NHTSA’s “Countermeasures That Work” for Alcohol-Impaired Driving.....108

Figure 56 Mothers Against Drunk Driving Website.....108

Figure 57 US DHS Real ID Message.....110

Figure 58 First Responders Administering Medical Care.....110

Figure 59 STEP Resources Webpage 111

Figure 60 Refurbished Apparatus as a Block Vehicle from the City of Irving, TX 112

Figure 61 Example of a Dynamic Message Board.....112

3



Safety Needs in the Permian Basin Region

Introduction
Crash Analysis
**Crash Heat Map &
Severities**
**Societal Cost of
Crashes**
**Top Contributing
Factors**
**Top Contributing
Factor by County**
**Top Manners of
Collision**

**Top Manner of
Collision by County**
**High Crash
Intersections**
**Freight Related
Crashes**
**Vulnerable Road
Users**
**Top Safety Emphasis
Area by County**
**Equity
Considerations**

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

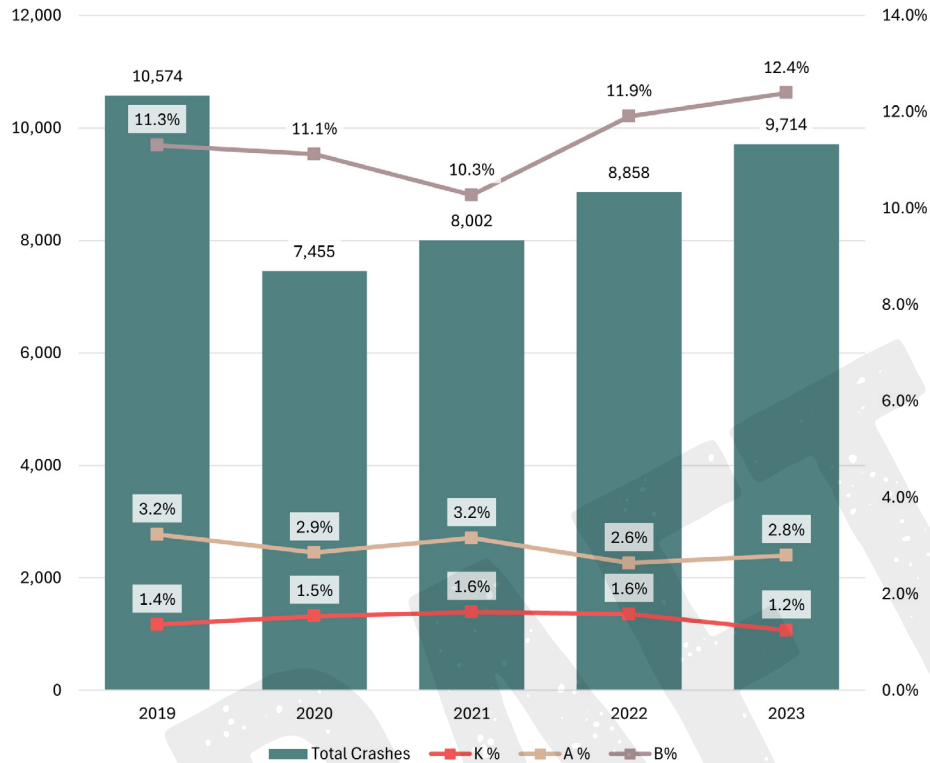
This section will highlight the crash history and safety deficiencies in the study area. This analysis was conducted utilizing crash data from 2019 – 2023 gathered from the Texas Department of Transportation's Crash Records Information System. The results of this crash analysis were vital to understanding 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:

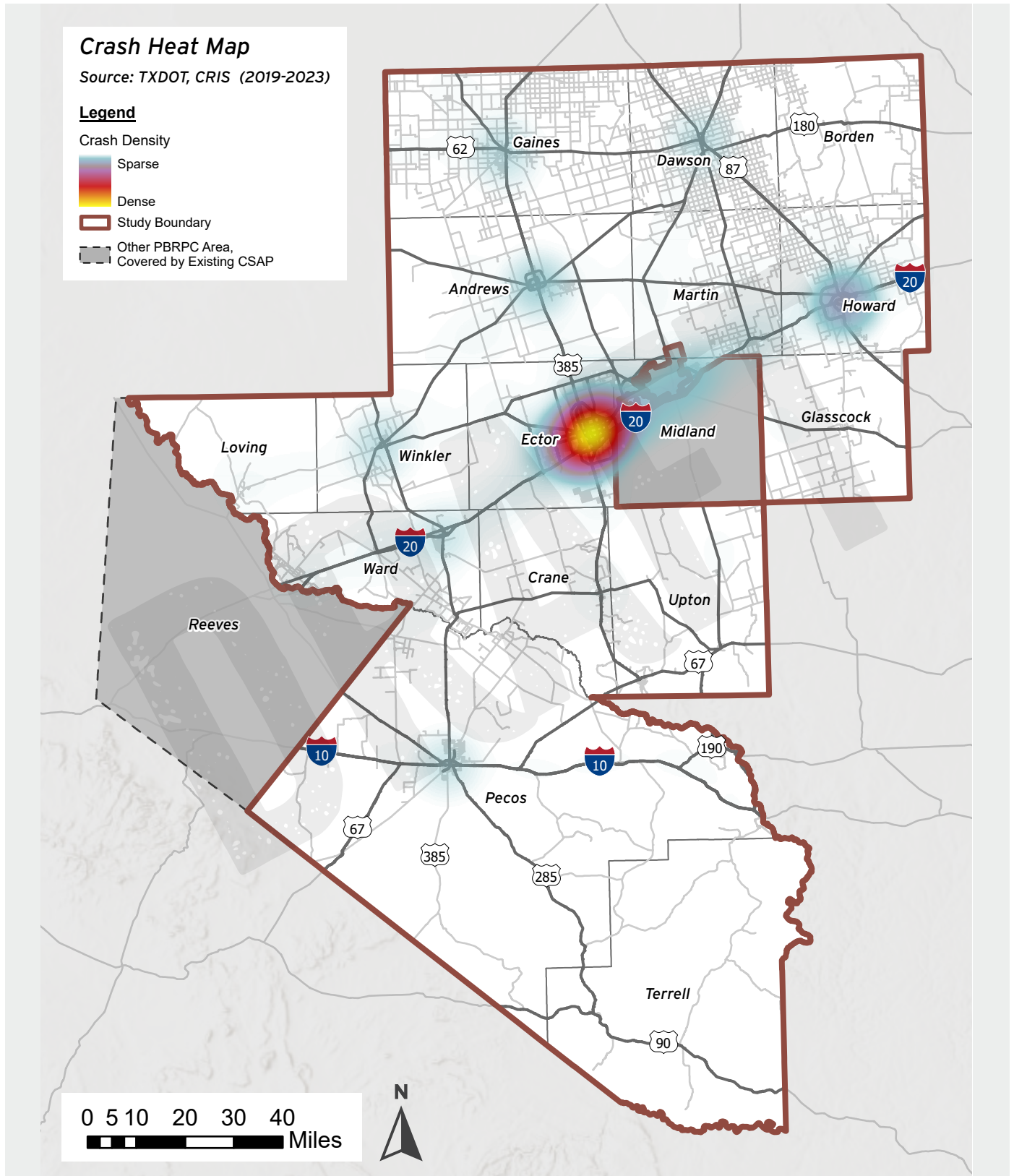
- + Andrews (Andrews County)
- + Big Spring (Howard County)
- + Fort Stockton (Pecos County)
- + Kermit (Winkler County)
- + Lamesa (Dawson County)
- + Monahans (Ward County)
- + Odessa (Ector County)
- + Seminole (Gaines County)

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



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

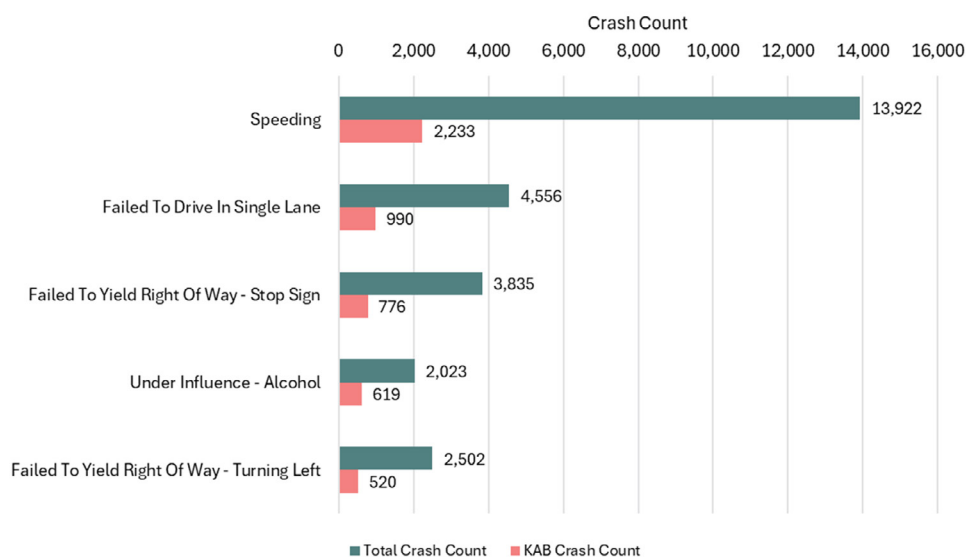
* <https://highways.dot.gov/safety/hsip/highway-safety-benefit-cost-analysis-guide-0>

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. As an 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

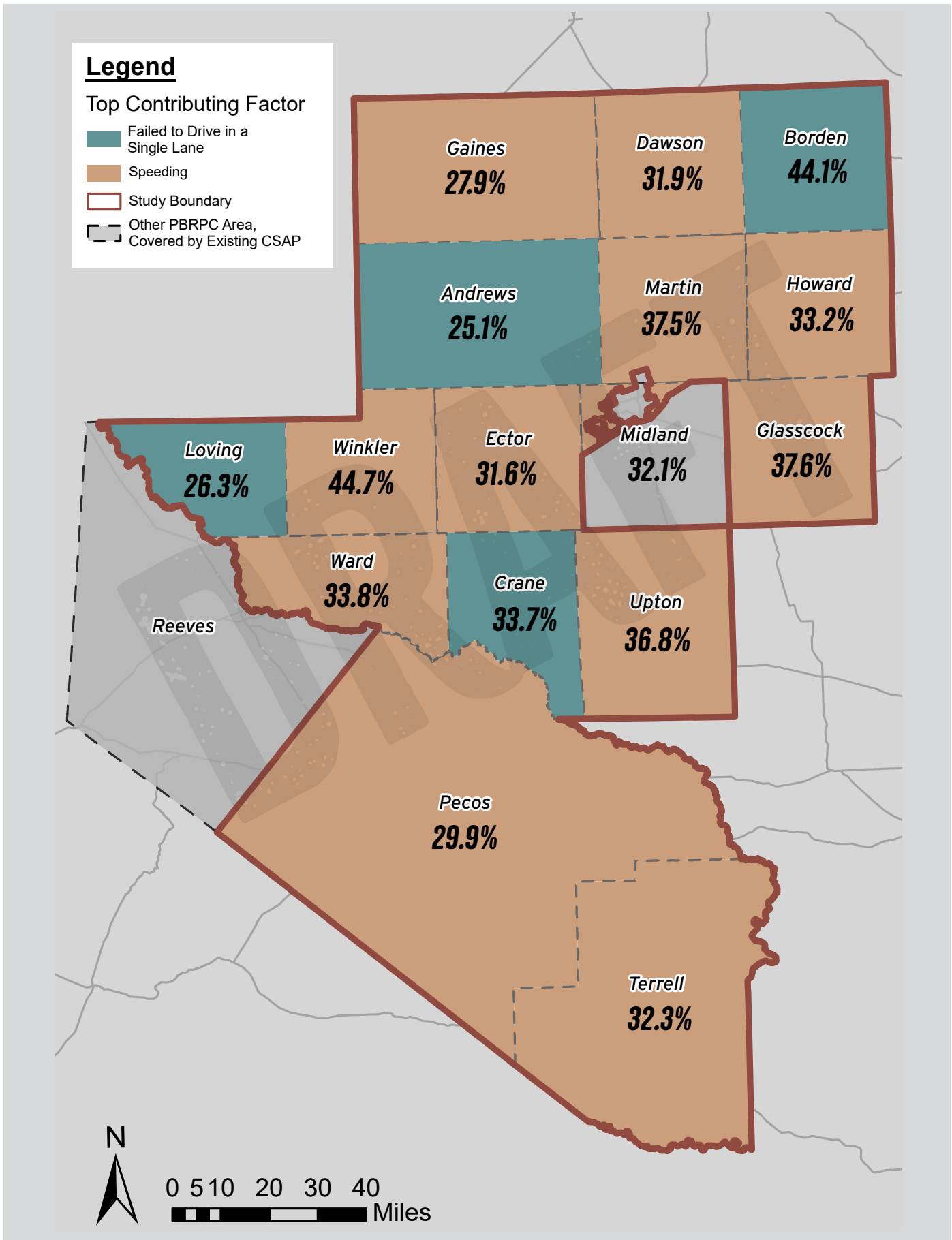
The most common contributing factor for each County was identified by identifying the most common contributing factor for fatal, severe injury, and minor injury crashes (**Table 6**). Each county's top contributing factor was either 'Failed to Drive in a Single Lane' or 'Speeding' which were also the 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.

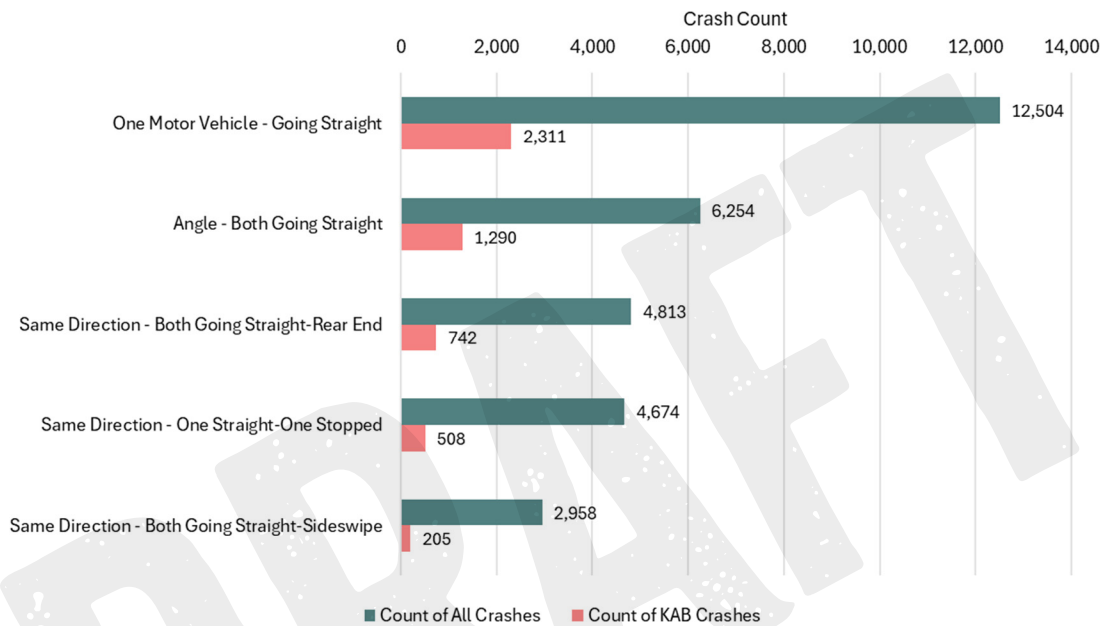
Exhibit 4 Top Contributing Factor by County Map



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

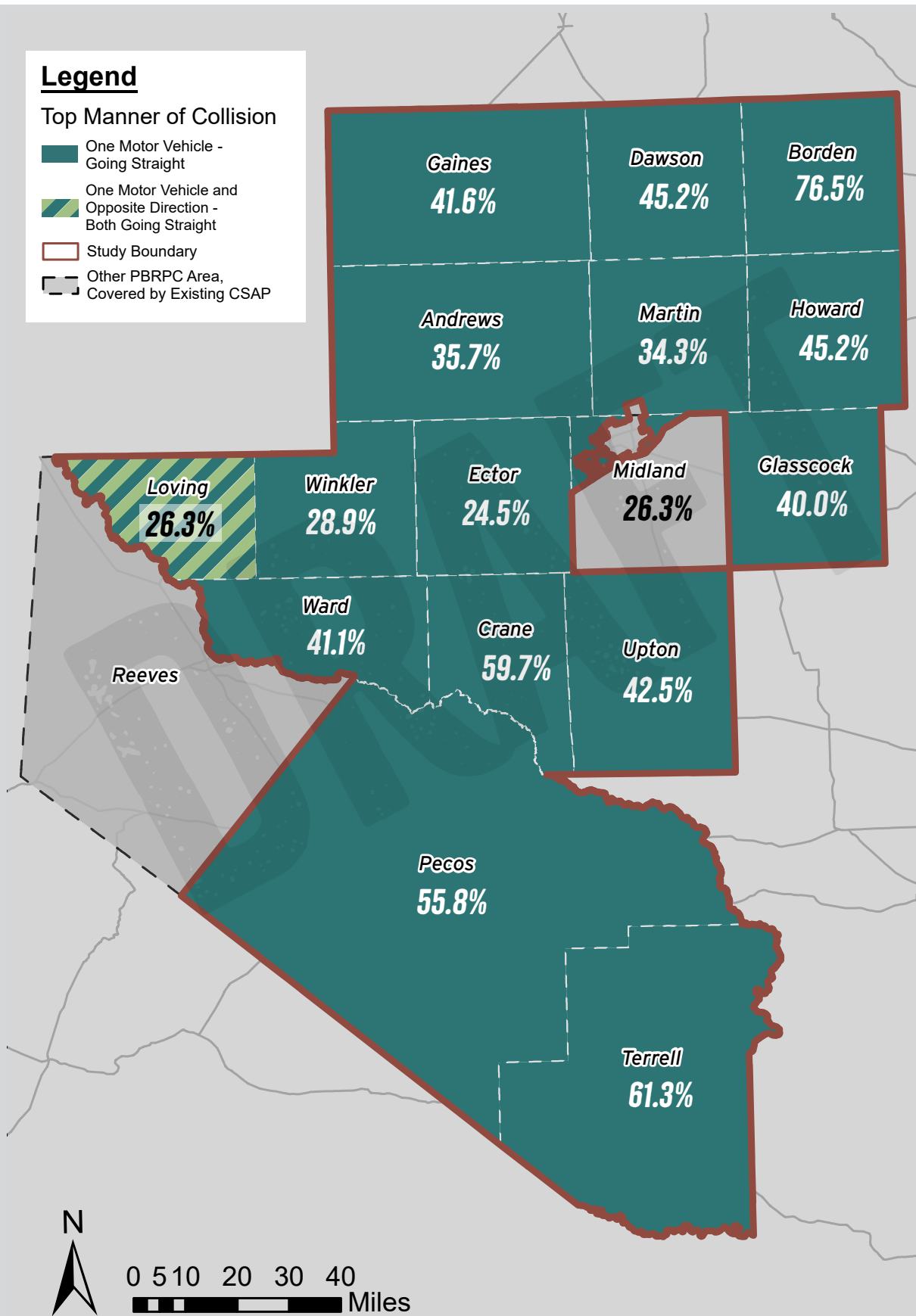


Table 7 Top Manner of Collision by County

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.

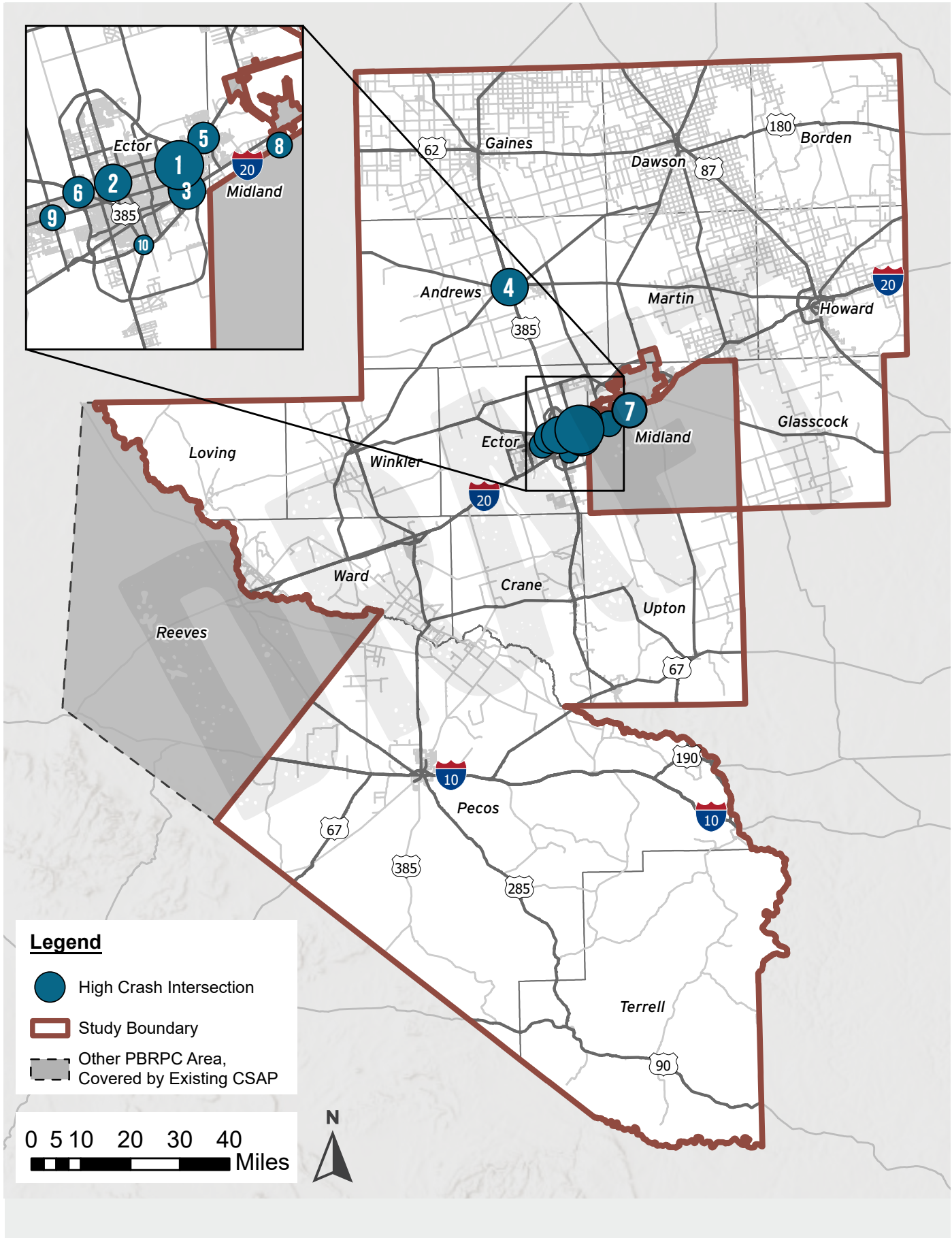
HIGH CRASH INTERSECTIONS

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 in 3 counties: Ector, Midland, and Andrews County (**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 3 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.

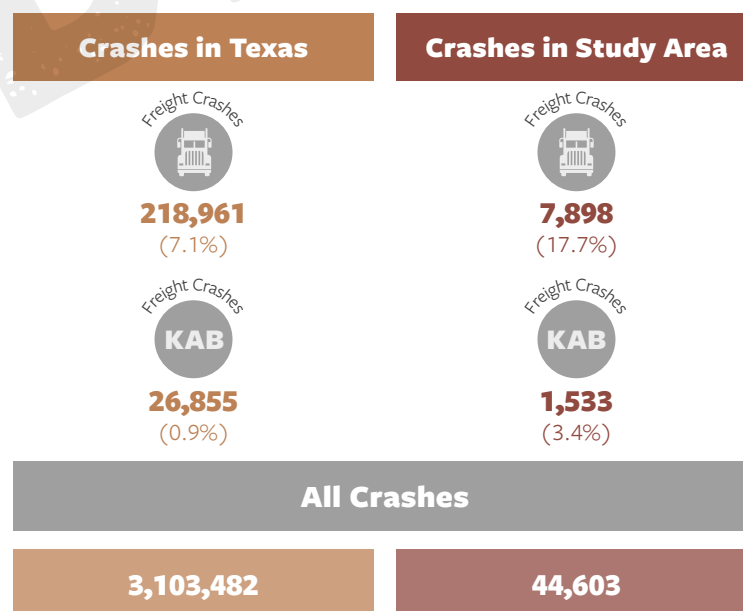
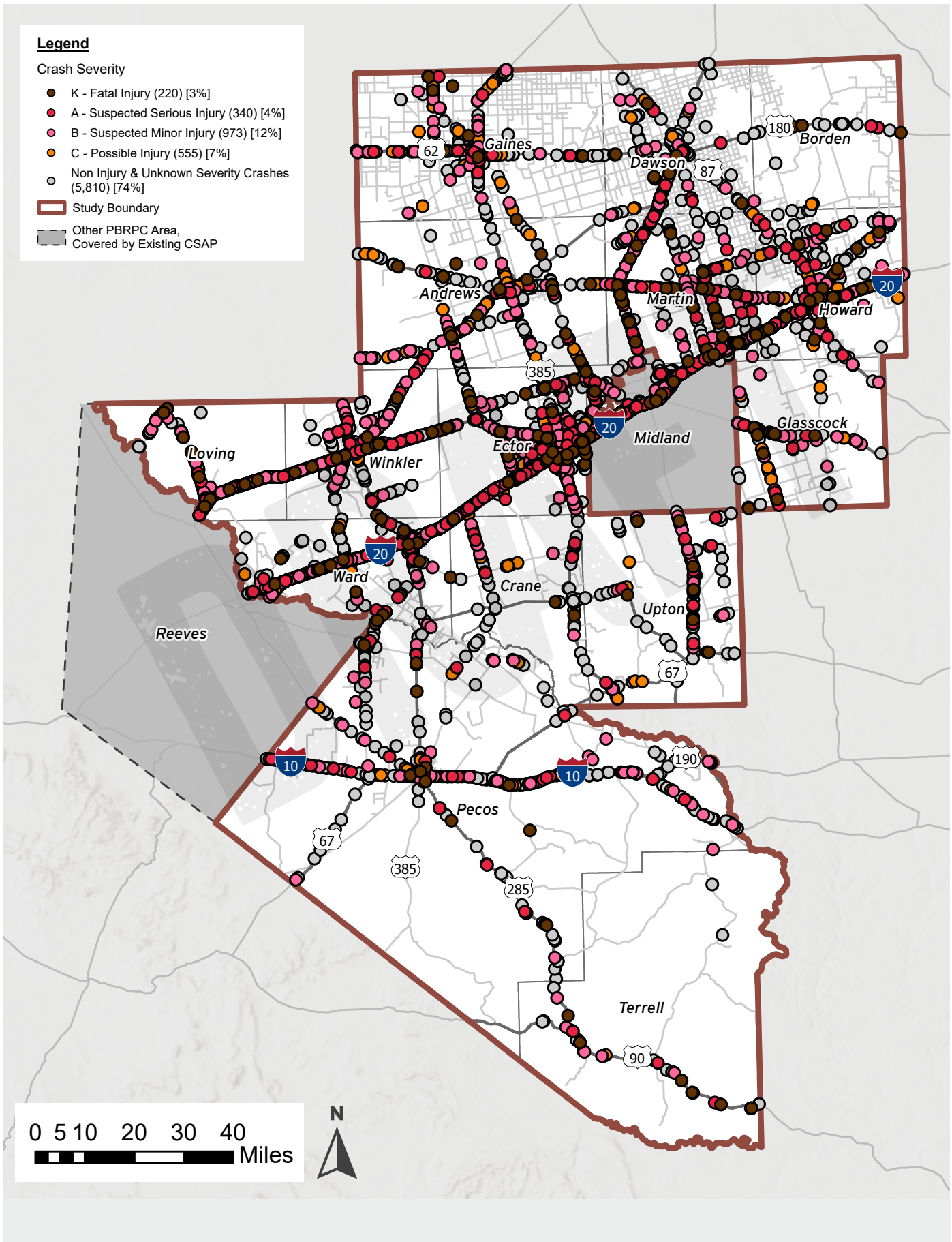


Exhibit 7 Freight Crash Map



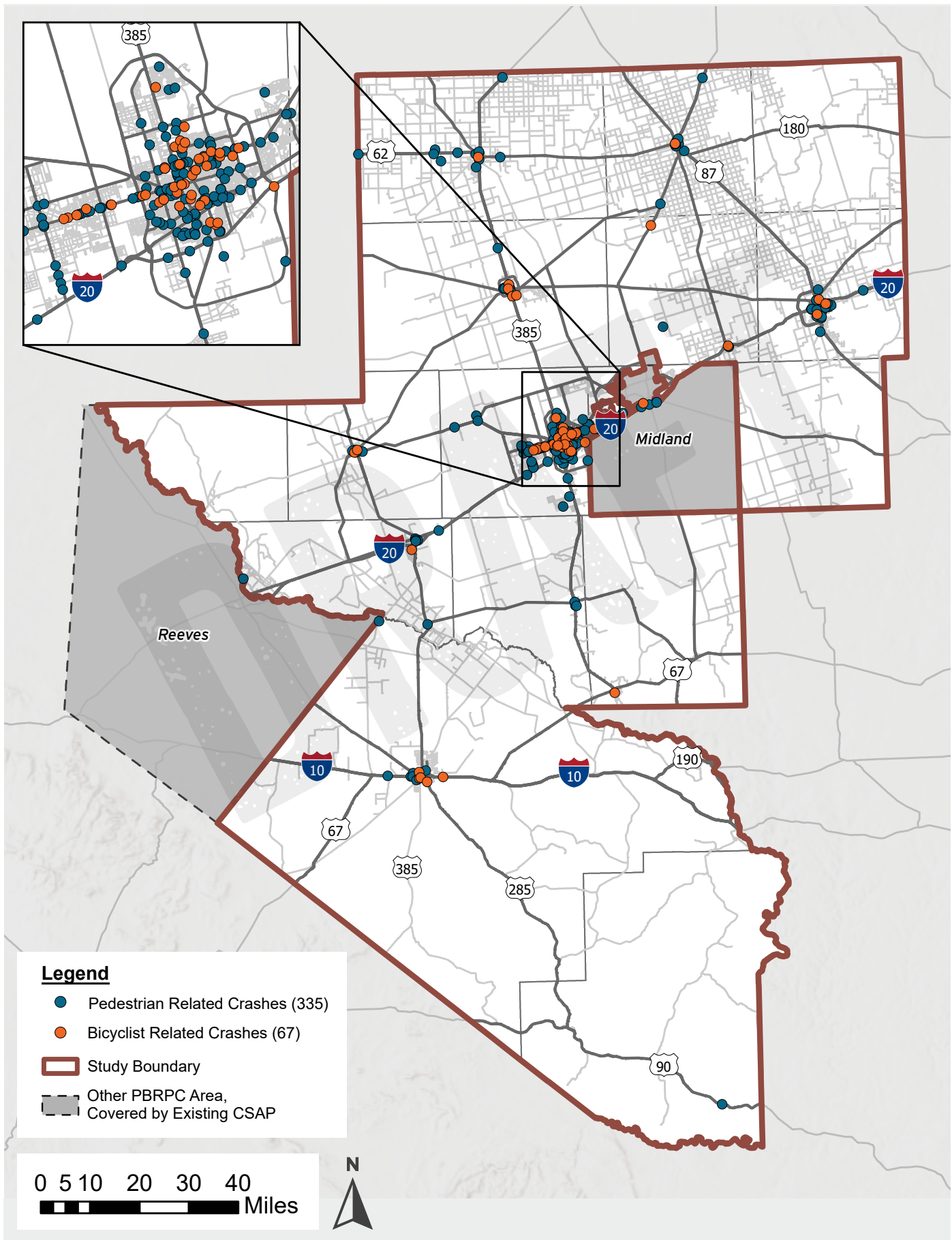
VULNERABLE ROAD USERS

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 – 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:



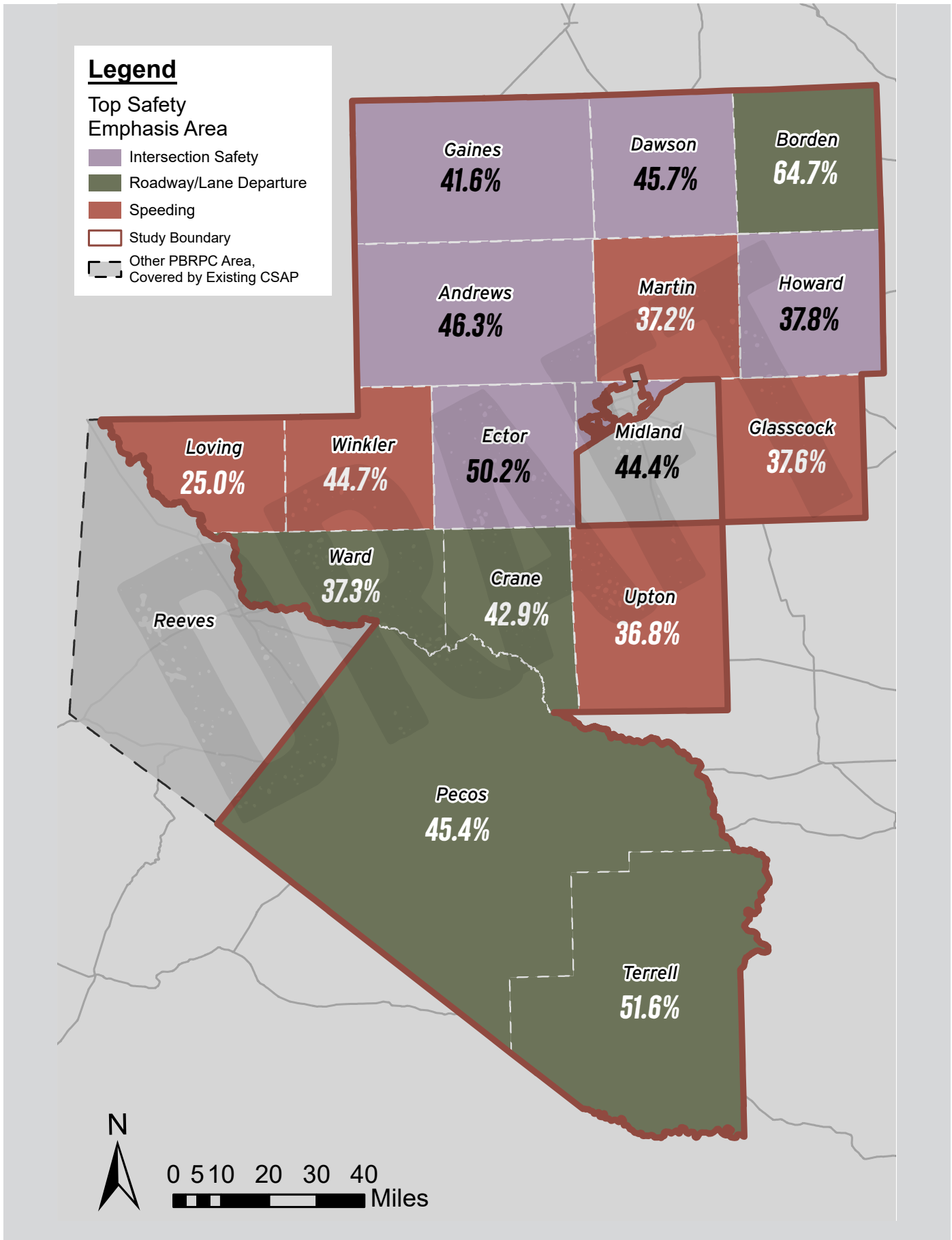
These safety emphasis areas were utilized to identify what safety issue should be prioritized in each County in the study area. Although the counties in the Permian Basin have similarities, safety concerns and needs can be widely varied. To ensure that specific needs and concerns of each County were 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.

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

