DRAFT

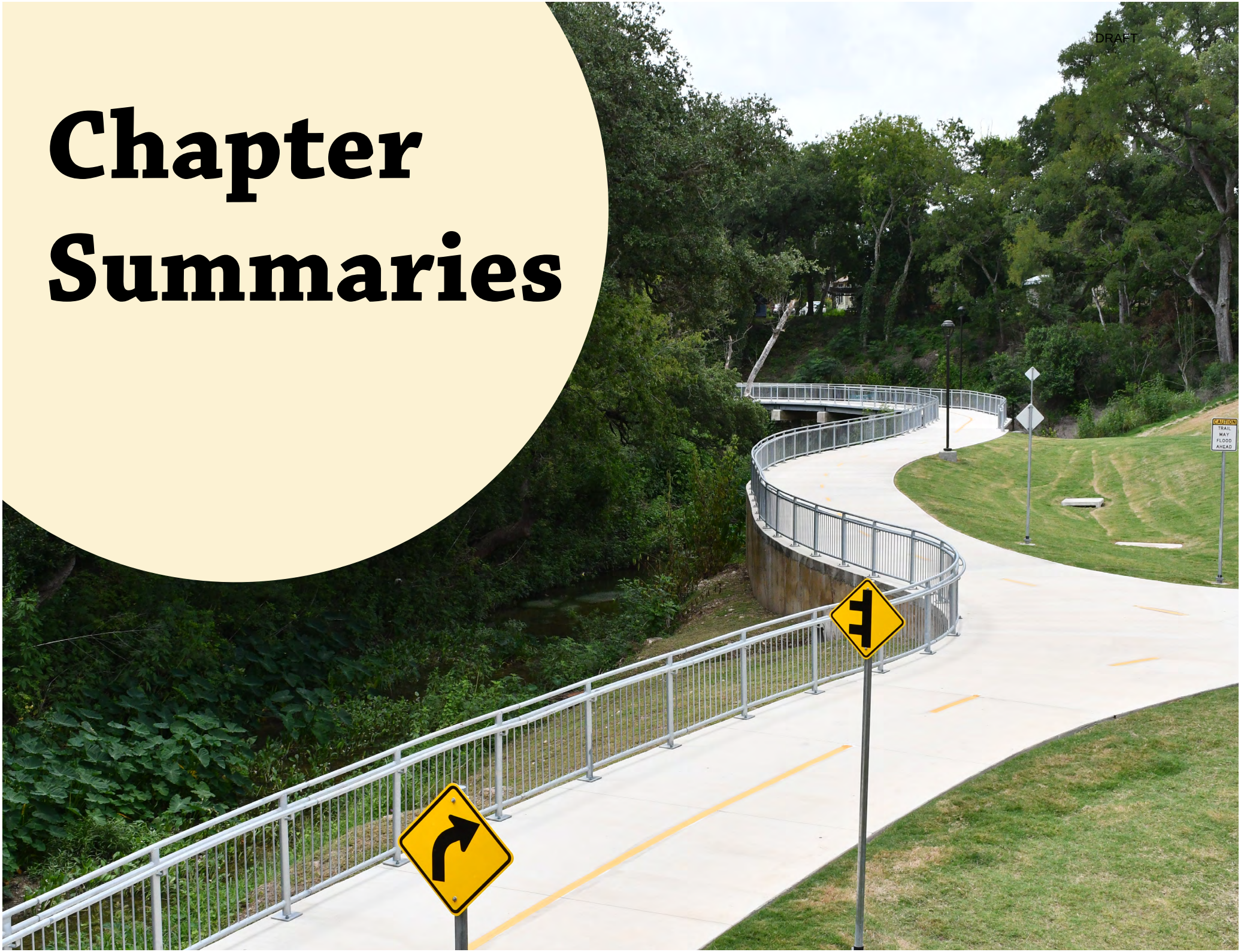

CITY OF

# SEGUIN

## COMPREHENSIVE SAFETY ACTION PLAN

*July 2024*

# Chapter Summaries



XVI EXECUTIVE SUMMARY

3 CHAPTER 1. PURPOSE

8 CHAPTER 2. PROCESS

21 CHAPTER 3. CRASH HISTORY ANALYSIS

41 CHAPTER 4. EQUITY REVIEW

46 CHAPTER 5. HIGH-INJURY NETWORK

55 CHAPTER 6. COUNTERMEASURES

96 CHAPTER 7. CSAP IMPLEMENTATION

110 APPENDIX

# Table of Contents

**LIST OF EXHIBITS** ..... vi

**LIST OF TABLES** ..... vii

**LIST OF FIGURES** ..... viii

**LETTER FROM THE MAYOR** ..... xi

**ACKNOWLEDGMENTS** ..... xii

**PART I: BACKGROUND & PURPOSE** ..... 2

*Introduction* ..... 2

**CHAPTER 1. PURPOSE** ..... 3

*Safety Guiding Principles* ..... 3

**CHAPTER 2. PROCESS** ..... 8

*Project Timeline* ..... 8

*Study Review Committee* ..... 10

*Plan Vision* ..... 12

*Public Engagement* ..... 13

*Leadership Commitment* ..... 17

**PART II: SEGUIN STATE OF SAFETY** ..... 20

*Introduction* ..... 20

**CHAPTER 3. CRASH HISTORY ANALYSIS** ..... 21

*Citywide Crash Trends* ..... 21

*Crash Profiles* ..... 38

**CHAPTER 4. EQUITY REVIEW** ..... 41

*How do we measure Equity?* ..... 41

*Methodology* ..... 44

*Results* ..... 44

**CHAPTER 5. HIGH-INJURY NETWORK** ..... 46
*Critical Crash Rate Method* ..... 46
*Critical Crash Rate Calculation* ..... 47
*HIN Development and Results* ..... 49

**PART III: COMPREHENSIVE SAFETY ACTION PLAN** ..... 54
*Introduction* ..... 54

**CHAPTER 6. COUNTERMEASURES** ..... 55
*Targeted Recommendations* ..... 55
*Systemic Countermeasure Toolbox* ..... 83

**CHAPTER 7. CSAP IMPLEMENTATION** ..... 96
*Implementation Program* ..... 96
*Action Matrix Elements* ..... 98
*Plan Administration* ..... 108

**APPENDIX** ..... 110
*A. CSAP Resolution* ..... 113
*B. Social Pinpoint– Public Engagement Results* ..... 115
*C. Peer Cities Review Memorandum* ..... 117
*D. Equity Review* ..... 119

# List of Exhibits

EXHIBIT 1: SOCIAL PINPOINT COMMENTS ..... 16
EXHIBIT 2: CRASH HEAT MAP ..... 25
EXHIBIT 3: HIGH CRASH INTERSECTIONS MAP ..... 27
EXHIBIT 4: BICYCLE & PEDESTRIAN CRASHES ..... 29
EXHIBIT 5: MOTORCYCLE RELATED CRASHES ..... 31
EXHIBIT 6: IMPAIRED DRIVING CRASHES ..... 33
EXHIBIT 7: DISTRACTED DRIVING CRASHES ..... 35
EXHIBIT 8: FREIGHT RELATED CRASHES ..... 37
EXHIBIT 9: DISADVANTAGED CENSUS TRACTS ..... 43
EXHIBIT 10: VULNERABILITY OF CENSUS TRACTS ..... 45
EXHIBIT 11: CRITICAL CRASH RATE RATIO RESULTS ..... 48
EXHIBIT 12: HIGH-INJURY NETWORK ..... 51
EXHIBIT 13: STUDY CORRIDORS ..... 57
EXHIBIT 14: KINGSBURY STREET RECOMMENDATIONS ..... 62
EXHIBIT 15: TX 123 RECOMMENDATIONS ..... 67
EXHIBIT 16: INTERSECTION 1 RECOMMENDATIONS ..... 70
EXHIBIT 17: INTERSECTION 2 RECOMMENDATIONS ..... 73
EXHIBIT 18: INTERSECTION 3 RECOMMENDATIONS ..... 76
EXHIBIT 19: INTERSECTION 4 RECOMMENDATIONS ..... 79
EXHIBIT 20: INTERSECTION 5 RECOMMENDATIONS ..... 82

# List of Tables

TABLE i: STUDY CORRIDORS AND INTERSECTIONS ..... xxi
TABLE ii: SYSTEMIC COUNTERMEASURE TOOLBOX ..... xxii
TABLE iii: ACTION PLAN STRATEGIES BY GUIDING PRINCIPLE ..... xxiii
TABLE 1: TOTAL CRASHES BY SEVERITY (2018-2022) ..... 22
TABLE 2: CRASH SEVERITY BREAKDOWN ..... 24
TABLE 3: HIGH CRASH INTERSECTIONS ..... 26
TABLE 4: VEHICLES VS BICYCLE & PEDESTRIAN BY CRASH SEVERITY ..... 28
TABLE 5. VEHICLES VS MOTORCYCLE BY CRASH SEVERITY ..... 30
TABLE 6. ALL VS IMPAIRED RELATED CRASHES BY CRASH SEVERITY ..... 32
TABLE 7. ALL VS DISTRACTED DRIVING RELATED CRASHES BY CRASH SEVERITY ..... 34
TABLE 8. VEHICLE VS FREIGHT CRASHES BY CRASH SEVERITY ..... 36
TABLE 9: CITYWIDE VS DISADVANTAGED CRASH SEVERITY ..... 42
TABLE 10: HIGH-INJURY NETWORK SEGMENTS ..... 49
TABLE 11: STUDY CORRIDORS AND INTERSECTIONS ..... 56
TABLE 12: COUNTERMEASURE CRASH MODIFICATION FACTORS FOR KINGSBURY STREET ..... 60
TABLE 13: COUNTERMEASURE CRASH MODIFICATION FACTORS FOR TX 123 ..... 65
TABLE 14: COUNTERMEASURE CRASH MODIFICATION FACTORS FOR INTERSECTION 1 ..... 69
TABLE 15. COUNTERMEASURE CRASH MODIFICATION FACTORS FOR INTERSECTION 2 ..... 72
TABLE 16. COUNTERMEASURE CRASH MODIFICATION FACTORS FOR INTERSECTION 3 ..... 75
TABLE 17. COUNTERMEASURE CRASH MODIFICATION FACTORS FOR INTERSECTION 4 ..... 78
TABLE 18. COUNTERMEASURE CRASH MODIFICATION FACTORS FOR INTERSECTION 5 ..... 81
TABLE 19: SYSTEMIC COUNTERMEASURE TOOLBOX ..... 83

# List of Figures

FIGURE i: SEGUIN TOTAL CRASH SUMMARY (2018-2022) ..... xviii
FIGURE ii. CRASH PROFILES FOR SEGUIN ..... xix
FIGURE 1: THE SAFE SYSTEM APPROACH ..... 5
FIGURE 2: PHOTOS FROM SRC MEETINGS 1–3 ..... 11
FIGURE 3: PROMOTIONAL BUSINESS CARD ..... 13
FIGURE 4: PROJECT WEBSITE ..... 13
FIGURE 5. COMMUTE STATISTICS ..... 14
FIGURE 6: TOP 3 SAFETY CONCERNS ..... 14
FIGURE 7. INTERACTIVE MAP COMMENTS ..... 15
FIGURE 8. BADGES, BIKES, AND TYKES EVENT ..... 17
FIGURE 9: TOTAL CRASH SUMMARY (2018-2022) ..... 21
FIGURE 10: TOP CONTRIBUTING FACTORS (2018-2022) ..... 23
FIGURE 11: TOP MANNERS OF COLLISION (2018-2022) ..... 23
FIGURE 12. CRASH PROFILES FOR SEGUIN ..... 39
FIGURE 13: HIN DATA INPUTS ..... 47
FIGURE 14: RAISED MEDIAN EXAMPLE ..... 84
FIGURE 15: CORRIDOR ACCESS MANAGEMENT EXAMPLE ..... 85
FIGURE 16: DRIVEWAY IN NEED OF CHANGE ..... 86
FIGURE 17: CROSSWALK AND PEDESTRIAN CROSSING EXAMPLE ..... 87
FIGURE 18: RETROREFLECTIVE BACKPLATE EXAMPLE ..... 88
FIGURE 19. FLASHING YELLOW ARROW EXAMPLE ..... 89
FIGURE 20: PHYSICAL COMPONENTS OF A SIGNAL SYSTEM ..... 90

**FIGURE 21: LANE DESIGNATION MARKINGS EXAMPLE** ..... 91
**FIGURE 22: WIDE EDGE LINE EXAMPLE** ..... 92
**FIGURE 23: HIGH CONTRAST LANE MARKINGS EXAMPLE** ..... 93
**FIGURE 24: EXAMPLE OF COUNTERMEASURES AT A STOP CONTROLLED INTERSECTION** ..... 94
**FIGURE 25. EXAMPLE OF IMPROVED GEOMETRY FOR RIGHT-TURN LANES** ..... 95
**FIGURE 26. DASHBOARD** ..... 109


BURNT BEAN
CO.
BARBECUE

# Letter From The Mayor

***Dear Seguin,***

One of the best things that makes Seguin so special is its beautiful outdoor spaces, which is why improving the walkability of our City is critical. Most trips within our square mile can be taken on foot, as well as by bicycle or by transit. Protecting the health and safety of all users remains at the forefront of our minds. That's why in July 2024 (Pending Resolution passing), I signed a Resolution officially supporting Seguin's Comprehensive Safety Action Plan program, joining our neighbors at the Texas Department of Transportation, San Antonio, Bexar County, and New Braunfels to reimagine and prioritize traffic safety.

Over the past year, we have convened a Comprehensive Safety Action Plan Study Review Committee, engaged with our community through meetings, online surveys, pop-up events and performed our most comprehensive analysis of crashes in Seguin to date.

We learned that residents of Seguin desire to become more of a walkable and bikeable community, but safety is a major concern when choosing to drive or participate in other transportation modes. While only one percent of crashes involve people walking or biking, these people account for 30% of all crash-related fatalities. Though crash-related deaths in Seguin may be relatively rare, it's unacceptable that anyone is killed traveling in our community.

Seguin's Comprehensive Safety Action Plan reiterates traffic deaths are preventable, acknowledges that people make mistakes, and focuses on influencing system-wide practices, policies, and designs to lessen the severity of crashes.

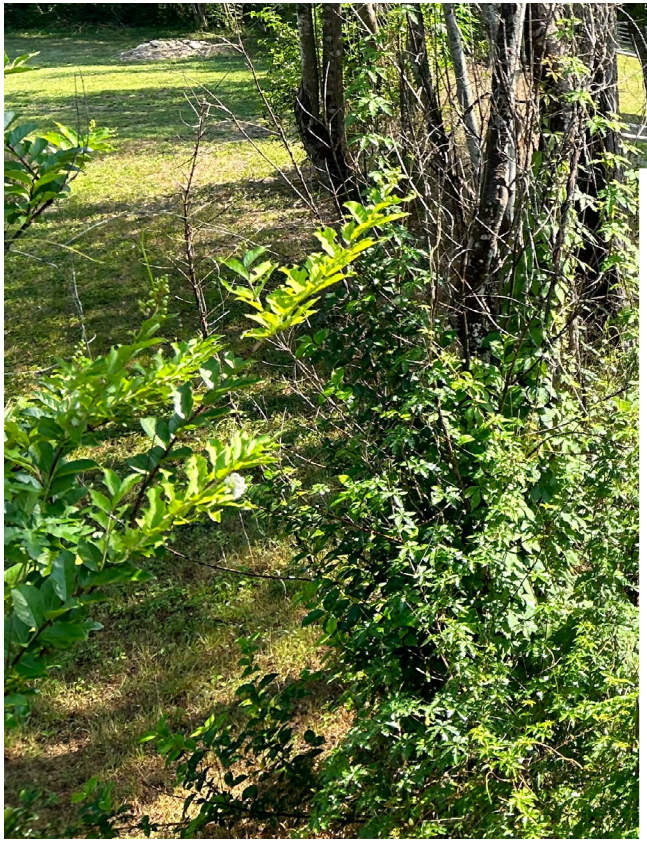
Community is driven by different modes of transportation, including walking from your car to your home, school or office, driving to grocery stores or to events in Seguin's Central Park, or riding a bike through the Walnut Springs Trail. Street improvements, such as the complete street plans for Rudeloff and Cordova, increase safety and improve visibility for people driving, walking, biking, or riding.

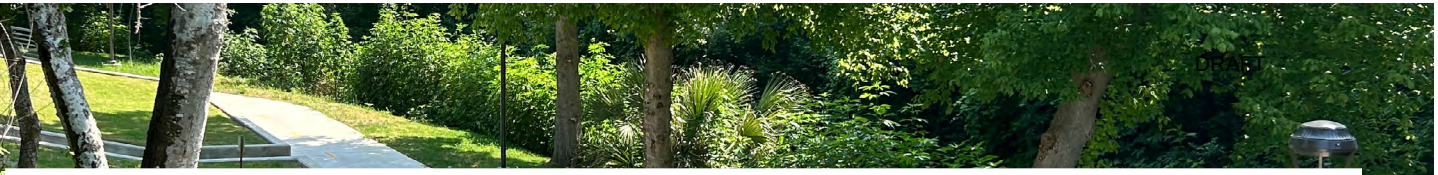
Seguin desires standards and policies to ensure the safe, equitable, and adequate accommodation of all users of our roadways.

I'm proud to introduce Seguin's Comprehensive Safety Action Plan. This document will provide a road map to achieving the elimination of traffic- related injuries and deaths by 2050. Thank you to everyone who participated in the process to bring this plan to fruition. Your continued participation will help ensure progress and accountability in achieving our Road to Zero goal.

*Sincerely,*

Donna Dodgen, Mayor







# Acknowledgments

The Comprehensive Safety Action Plan was developed by the City of Seguin, as well as agencies, organizations, and stakeholders from the Seguin Area. This report documents a comprehensive set of projects and strategies to eliminate roadway fatalities and serious injuries within the City. The information presented herein is at a planning-level only and is not meant to represent the support or commitment of any potential partners.

This material was funded in part through grant(s) from the Federal Highway Administration of the U.S. Department of Transportation. The views and opinions of the authors expressed herein do not necessarily state or reflect those of the U.S. Department of Transportation or the Federal Highway Administration.

## Seguin City Council

- Donna Dodgen, Mayor
- Joe Rea, District 1
- Sonia Mendez, District 2
- Jim Lievens, District 3
- Chris Rangel, District 4
- Paul Gaytan, District 5
- Monica Carter, District 6 & Mayor Pro Tempore
- Jason Biesenbach, District 7
- Bill Keller, District 8

Prepared for:

SEGUIN
COMPREHENSIVE SAFETY ACTION PLAN

Prepared by:

Kimley»Horn
Expect More. Experience Better.

## Study Review Committee

- Robert Gonzales, Seguin ISD Administration
- Robby Castillo, Navarro ISD Administration
- Chester Jenke, Ed.D., CEcD, Seguin Area Chamber of Commerce
- Sean Scott, Alamo Regional Transit (AACOG)
- Greg Dreiss, Seguin EMS
- Kyle Kramm, MPA, Seguin Convention and Visitors Bureau
- Melissa Reynolds, P.E., MPA, CFM, City of Seguin
- Pam Centeno, City of Seguin
- Joshua Ray, Guadalupe County
- Linda O'Connell, Disability Advocate
- Elizabeth McCown, Guadalupe Regional Medical Center Hospital Rep
- Katarina Eberhard, Guadalupe County Community Coalition
- Joe Rea, Hispanic Chamber of Commerce
- Brenda Edwards, Seguin Housing Authority
- Robert Pike, Seguin Veterans Ministry
- Daniel Gaitan, Resident
- Clay Forister, Guadalupe County
- Linda Kessinger, Hispanic Chamber of Commerce
- Jason Brady, City of Seguin
- Kirk Herbold, Texas Lutheran University

## City Staff

- Melissa Reynolds, P.E., MPA, CFM, Director of Engineering and Capital Projects
- Jennifer Shortess, P.E., CFM, Assistant Director of Engineering
- Michael Sharp, CFM, Project Manager
- Kathy Wood, Grants Administrator

## Kimley-Horn

- Jeff Whitacre, P.E., PTP, AICP
- Raul Orozco Jr, AICP
- Monica Powell, AICP, RSP1
- Pete Kelly, P.E.
- Haley Carruthers, AICP
- Adolfo Gonzalez
- Leanne Nunez
- Lizbeth Juarez-Bartolo
- Mason Shoaf
- Wesley Sprott

## Poznecki-Camarillo

- Elizabeth Story
- William Long
- Lianna Ybarra
- Robert Elizondo

# Executive Summary

# ES


# ES

# Executive Summary

The City of Seguin was awarded the Safe Streets and Roads for All (SS4A) grant through the US Department of Transportation to develop a Comprehensive Safety Action Plan (CSAP). The CSAP was developed to provide a framework of innovative strategies and implementation actions intended to reduce transportation-related fatalities and serious injuries. The City desires standards and policies to ensure that all roadway users are accommodated in a safe and equitable manner. The three-phase project approach kicked off in January 2024 and ran through adoption on XXXX X, 2024. A timeline that outlines and describes each phase of the project is included in **Chapter 2**.

This Plan is organized into three parts, each containing a purpose statement and listing of chapters contained within. The parts of the plan correspond to the various phases of the planning process:

- **Part I**: Background and Purpose
- **Part II**: Seguin State of Safety
- **Part III**: Comprehensive Safety Action Plan

The Safe Streets and Roads for All (SS4A) program is a primary driving force behind the CSAP, which is characterized and guided by the Federal Highway Administration's (FHWA) Safe Systems Approach. The guiding principles for this plan are viewed through a safety action lens, which aims to eliminate all traffic fatalities and severe injuries, prioritizing the principles of safe road design, enforcement, education, and community engagement to achieve this goal. The guiding principles of the Safe Systems Approach and this document are detailed in **Chapter 1**, but can more generally be summarized as follows:

**DEATH OR SERIOUS INJURY IS UNACCEPTABLE**

**HUMANS MAKE MISTAKES**

**HUMANS ARE VULNERABLE**

**RESPONSIBILITY IS SHARED**

**SAFETY IS PROACTIVE**

**REDUNDANCY IS CRUCIAL**

With these safety guiding principles in mind, the Study Review Committee (SRC) worked together to establish a mission that clearly communicates the reason for being and declare how this Plan aims to serve the community and stakeholders into the future. This vision for the City of Seguin Comprehensive Safety Action Plans is:

> *Striving for a **SAFER COMMUNITY**, Seguin is dedicated to developing an equitable transportation network that **PRIORITIZES SAFETY, PRESERVES ALL LIVES,** and **MAINTAINS THE EXISTING COMMUNITY CHARACTER**. As regional leaders, our mission is to identify and mitigate vulnerabilities to establish the standard for regional safety and inclusive transportation **FOR ALL USERS**.*

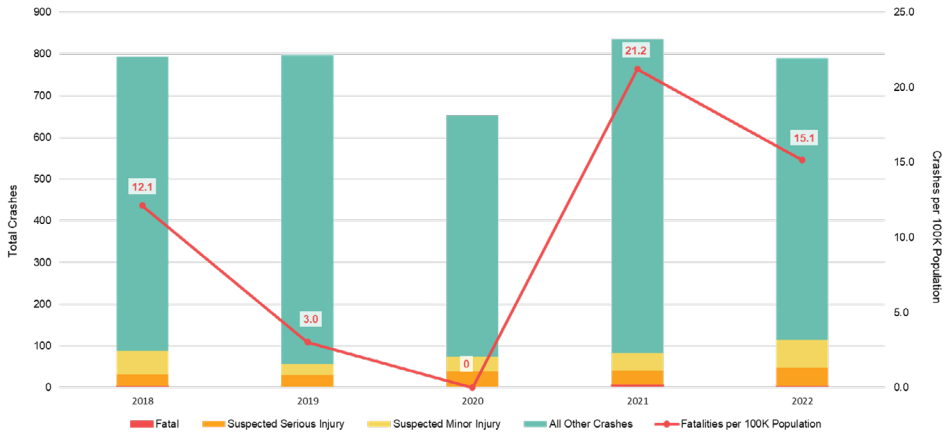
To make this mission a reality, Seguin City Council, along with the Study Review Committee and staff commit to the overall goal of improving safety in Seguin by adopting a Road to Zero Resolution on XXXX, XX, 2024. The Road to Zero Resolution is provided in **Appendix Item A**.

**Part II** of the Plan, Seguin State of Safety, establishes an empirical understanding of existing conditions and key safety considerations, laying the foundation for **Part III** of the Plan. **Chapter 3** analyzes the Citywide crash history through a look into the City's crash trends and characteristics.

Citywide crash trends revealed that the total number of crashes has been stagnant over the past five years except for 2020 and 2021. Due to the COVID-19 pandemic, there was a significant decrease in the number of crashes in 2020 but was followed by the highest number of crashes in a year within the study period. Although total crashes have returned to pre-pandemic numbers, the rate of fatal crashes per 100,000 population has stayed far above the rates seen prior to 2020 (**Figure i**).

To better understand the causative factors of these crashes, crash profiles specific to the City were created. The crash profiles aimed to identify trends in road design and environmental characteristics that influenced the frequency and severity of crashes. The final six crash profiles, as shown in **Figure ii**, summarizes the combinations of characteristics that resulted in the highest frequencies and severities of crashes.

*FIGURE i: SEGUIN TOTAL CRASH SUMMARY (2018-2022)*




***Key takeaways from these crash profiles are:***

**FOUR LANE ROADWAYS WITHIN DISADVANTAGED CENSUS TRACTS CAPTURED *35% OF ALL KAB CRASHES.***

**FOUR LANE ROADWAYS WITH A POSTED *SPEED LIMIT OF 55* MPH OR HIGHER WERE ASSOCIATED WITH *50% OF ALL FATAL CRASHES IN SEGUIN.***

***MEDIUM TO HIGH SPEEDS* WERE LARGELY ASSOCIATED WITH *FATAL AND SEVERE CRASHES.***

*FIGURE ii. CRASH PROFILES FOR SEGUIN*

| CRASH PROFILE 1 | | | CRASH PROFILE 2 | |
|---|---|---|---|---|
| | Posted Speed: 45 – 50 MPH | 4 Lanes | Posted Speed: 55+ MPH | 4 Lanes |
| | Number of Crashes | Percentage | Number of Crashes | Percentage |
| **K** | 1 | 6% | 8 | 50% |
| **A** | 44 | 27% | 51 | 31% |
| **B** | 60 | 27% | 43 | 19% |
| ***Total*** | ***105*** | ***26%*** | ***102*** | ***25%*** |

| CRASH PROFILE 3 | | | CRASH PROFILE 4 | |
|---|---|---|---|---|
| | Disadvantaged Census Tracts | Midblock Intersection | Disadvantaged Census Tracts | 4 Lanes |
| | Number of Crashes | Percentage | Number of Crashes | Percentage |
| **K** | 6 | 38% | 4 | 25% |
| **A** | 52 | 32% | 58 | 35% |
| **B** | 57 | 26% | 79 | 36% |
| ***Total*** | ***115*** | ***29%*** | ***141*** | ***35%*** |

| CRASH PROFILE 5 | | | CRASH PROFILE 6 | |
|---|---|---|---|---|
| | High (25,000+) AADT | Posted Speed: 55+ | Low-Medium (4,000-7,999) AADT | Posted Speed: 45–50 MPH |
| | Number of Crashes | Percentage | Number of Crashes | Percentage |
| **K** | 6 | 38% | 1 | 6% |
| **A** | 33 | 20% | 26 | 16% |
| **B** | 27 | 12% | 32 | 14% |
| ***Total*** | ***66*** | ***16%*** | ***59*** | ***15%*** |

A key part of the crash analysis conducted in Seguin was the Equity Review as discussed in **Chapter 4**. Through the review, the Study Review Committee and City Staff wanted to determine how to prioritize future projects so vulnerable communities were given more adequate support. The equity review aimed to identify underserved communities in the City by utilizing population characteristics for six categories:


The six categories were scored, summed, and the resulting percentiles are ranked to create the final index score for a census tract. Although the review determined the most vulnerable census tract being in the northmost part of Seguin, this tract did not have a large population compared to slightly less vulnerable tracts in central Seguin. Since the large portion of Seguin's population resides closer to the center of Seguin, safety efforts were concentrated in those areas.

A high-injury network (HIN) is a network of roads, intersections, or other transportation infrastructure, which has a higher-than-average rate of crashes resulting in injuries or fatalities. Identifying and prioritizing facilities within the HIN is a crucial step in enhancing road safety to reduce fatal and severe crashes. **Chapter 5** details the methodology used to calculate the following HIN, as well as detailing the individual segments.

**Part III** of the plan details countermeasures and recommendations for study corridors and systemic improvements as part of the Comprehensive Safety Action Plan. This includes policies, programs, and various strategies and actions designed for Seguin's guiding principles. **Chapter 6** presents two roadway segments on the High-Injury Network and five intersections selected as priority locations to make targeted recommendation for that would improve safety on the City's most unsafe roadway locations (**Table i**). These high priority study corridors and intersections were selected with input from City staff and scored based on equity, engagement, and feasibility.

*TABLE i: STUDY CORRIDORS AND INTERSECTIONS*

| STUDY CORRIDOR/ INTERSECTION | LIMITS | | LENGTH (mi.) | CRASHES | | | | DAILY VOLUME |
|---|---|---|---|---|---|---|---|---|
| | From | To | Length (mi.) | K | A | B | Total KABs | Daily Traffic |
| **1. US 90 Alt (Kingsbury St)** | 8th | King | 1.57 | 0 | 7 | 10 | 17 | 13,000 |
| **2. TX 123** | Nolte Farms | Walnut St Turnaround | 1.37 | 0 | 5 | 16 | 21 | 21,500 |
| **3. US 90 Alt & N Austin St** | - | - | - | 0 | 1 | 3 | 4 | 11,800 |
| **4. US 90 Alt & TX 46** | - | - | - | 0 | 3 | 4 | 7 | 10,000 |
| **5. TX 123 & Joe Carrillo Boulevard** | - | - | - | 0 | 3 | 4 | 7 | 11,900 |
| **6. US 90 & Austin** | - | - | - | 0 | 3 | 5 | 8 | 14,300 |
| **7. TX 123/TX 46/FM 407** | - | - | - | 0 | 10 | 4 | 14 | 10,000 |
| | | ***Total*** | ***2.94*** | ***0*** | ***32*** | ***46*** | ***78*** | ***13,214 (Average)*** |

Targeted recommendations at study corridors provide detailed and crafted recommendations for specific areas of the City of Seguin that have varying crash history, road geometry, intersection control, and land use context. Additionally, systemic recommendations are organized by safety emphasis area and provide a countermeasure toolbox to make Citywide improvements wherever needed.

Systemic countermeasures can be implemented in all areas of the city to improve safety, not limited to previous recommendations and study corridors. The corresponding toolbox in **Chapter 6** provides a comprehensive collection of strategies and interventions designed to address specific traffic safety issues and challenges. There is also a summary of these countermeasures in **Table iv**.

*TABLE ii: SYSTEMIC COUNTERMEASURE TOOLBOX*

| SAFETY EMPHASIS AREAS | RAISED MEDIAN | CORRIDOR ACCESS MANAGEMENT | CHANGE DRIVEWAY WIDTH | IMPROVE SIGNING AND VISIBILITY AT SIGNALS | RETROREFLECTIVE BACKPLATES | FLASHING YELLOW ARROW | COORDINATED SIGNAL TIMING | LANE DESIGNATION MARKINGS AND SIGNS | WIDE EDGE LINES | HIGH CONTRAST LANE MARKINGS | IMPLEMENT SYSTEMIC SINGING AND MARKING IMPROVEMENTS | CHANGE RIGHT-TURN LANE GEOMETRY |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CMF** | **0.29** | **0.93** | **0.25** | **0.732** | **0.85** | **0.975** | **-** | **0.75** | **0.635** | **0.75** | **0.734** | **0.558** |
| **Roadway & Lane Departure** | ● | | | | | | | ● | ● | ● | | |
| **Speed-Related** | ● | | | | | | ● | | | | | ● |
| **Intersection-Related** | | ● | ● | ● | ● | ● | ● | ● | | | ● | ● |
| **Vulnerable Road Users** | ● | | | ● | | | ● | | | | | ● |
| **Distracted Driving** | | | | ● | ● | | | ● | ● | ● | ● | |
| **Impaired Driving** | ● | | | ● | ● | | | ● | ● | ● | | |
| **Unrestrained Persons** | ● | | | | | | ● | | | | | ● |

**Chapter 7** outlines the action plan, which is comprised of policies and programs to create solutions for systemic issues and are organized by the six guiding principles. To make goals easier to achieve for each emphasis area, each goal has strategies and actions outlined. The corresponding table provides each strategy outlined in the action plan for each emphasis area (**Table v**). This chapter also expands on the strategies and identifies partners, timeframe, and funding sources into an Implementation Matrix.

Finally, the annual reporting responsibility for Vision Zero and progress on projects made publicly available is outlined.

*TABLE iii: ACTION PLAN STRATEGIES BY GUIDING PRINCIPLE*

| INFRASTRUCTURE ENHANCEMENT |
|---|
| Implement traffic calming measures to aid in reducing speeds |
| Implement an emergency vehicle preemption signal system |
| Improve existing roadway infrastructure to better meet new safety standards |
| Create traffic signal/ traffic signal timing standards that include adding protective left-turn phases, improving clearance intervals, and/or coordinating signals |
| Redesign intersections to meet new safety standards |
| Implement roadway infrastructure that aims to reduce factors that contribute to pedestrian and bicyclist related crashes |
| Update design standards to include the installation of shoulder and centerline rumble strips/stripes to reduce lane departure crashes |
| Include median barrier systems, crash cushions, and guardrail end treatment into roadway designs to aid in reducing lane departure crashes |
| Improve speed management practices in work zones to reduce work zone fatalities |
| Improve signage and marking standards for intersection to aid in increasing driver awareness |
| Improve traffic control device timing standards that help increase pedestrian safety |
| **TRAFFIC ENFORCEMENT AND REGULATION** |
| Utilize a speed feedback sign to make drivers aware of their speed |
| Implement the use of decoy police vehicles |
| Create a targeted enforcement plan to improve speed enforcement |
| Create a targeted enforcement plan to improve red light running monitoring |
| Pass a city ordinance that would ban all cellphones when driving |
| Create and enforce helmet laws that apply to bicyclist of all ages |

*TABLE iv: ACTION PLAN STRATEGIES BY GUIDING PRINCIPLE (CONTINUED)*

| PUBLIC EDUCATION AND AWARENESS |
|---|
| Create an educational program about intersection safety for college students |
| Develop a distracted driving awareness program aimed at high school students |
| Implement a Shattered Dreams Program at the high schools |
| Hold educational events using impaired driving simulators (beer goggles) |
| Create a Car Seat Information Program with the local Hospital/ Fire Department/ Police Department |
| Hold a Mobile Car Seat Information Program Event |
| Encourage drivers to use their car's lane detection feature |
| Launch the "Don't Block the Box" Campaign in school zones |
| Create a Safety City Park for children |
| Create an educational campaign that establishes the dangers of speeding when driving a motorcycle and riding while impaired |
| Run public education campaigns about safe driving practices |
| **DATA ANALYSIS AND MONITORING** |
| Encourage the use of a Safe Driver App to monitor driving behaviors in Seguin |
| Create a public program for car seat inspections |
| Develop a method to determine if a local roadway would benefit from a lower speed |
| Develop an understanding of impaired driving citation patterns through a study |

*TABLE iv: ACTION PLAN STRATEGIES BY GUIDING PRINCIPLE (CONTINUED)*

| COLLABORATION AND PARTNERSHIPS |
|---|
| Develop an educational program or materials about impaired driving with MADD |
| Create a free ride program as an alternative transportation option |
| Promote ride share services as an alternate transportation option |
| Hold Bike Rodeos in partnership with schools in the district |
| Promote crosswalk safety citywide |
| Develop bicycling safety classes with help from the Alamo Area Metropolitan Planning Organization (AAMPO) |
| Include EMS agencies in traffic incident management planning and training |
| **EQUITY AND ACCESSIBILITY** |
| Organize a Helmet Drive Event |
| Distribute helmets received from the Drive to underserved residents |
| Develop a program that makes carseats available for free to underserved residents |
| Acquire funding to create or support existing substance abuse and mental health help resources in the community |
| Create a Safe Routes to School Program for schools in the Seguin Independent School District |

# Background and Purpose

# I


# I

# Part I: Background & Purpose

## Introduction

The City of Seguin's Comprehensive Safety Action Plan (CSAP) was developed over a six-month period to help the City of Seguin achieve their goal of zero traffic-related fatalities on roads in the City. The CSAP for the City of Seguin will assist City Staff, Seguin City Council, and other local partner agencies in making informed decisions when identifying projects that will enhance the safety of all roadway users in the greater Seguin area. This portion of the document (**Part I of III**) includes several chapters that detail the plan's purpose and process.

**Chapter 1: Purpose**

*Comprehensive Safety Guiding Principles*

**Chapter 2: Process**

*Project Timeline*

*Study Review Committee (SRC)*

*Plan Vision*

*Public Engagement*

*Leadership Commitment*

> *Road to Zero represents a* ***paradigm shift*** *in addressing traffic-related fatalities and injuries, by rejecting the notion that injuries and fatalities are an unavoidable byproduct of modern transportation networks, Road to Zero fosters* ***real change and improvement in traffic safety.***

# Chapter 1. Purpose

**Chapter 1** outlines the safety guiding principles and initiatives that drive the City of Seguin's CSAP, and highlights the importance of each principle, and how they will be utilized to create safer streets for all users. To accomplish the vision of the Seguin CSAP, and TxDOT's Road to Zero, the Safe System Approach, Six E's of Safety, and the Texas Strategic Highway Safety Plan Emphasis Areas will each play a vital role.

## Safety Guiding Principles

### TxDOT's Road to Zero to "Preserve All Lives"

TxDOT's Road to Zero is an **initiative whose goal is to eliminate fatalities on our roadways by 2050.** The last day without a death on Texas roadways was November 7, 2000. Since that day, more than 75,000 people have died in crashes on Texas roadways. From 2018- 2022, 18 people lost their lives on Seguin roadways.

Road to Zero represents a paradigm shift in addressing traffic-related fatalities and injuries, by rejecting the notion that injuries and fatalities are an unavoidable byproduct of modern transportation networks, Road to Zero fosters real change and improvement in traffic safety.

## Safe Systems Approach

The Safe Systems Approach was pioneered in the 1990's by Swedish road safety expert, Claes Tingvall. The Safe Systems Approach is the framework and mechanism by which this Vision Zero Action Plan can be implemented. There are six key principles that can be utilized to implement the elements of the Safe Systems Approach, and are as follows:

### DEATH OR SERIOUS INJURY IS UNACCEPTABLE

*Focusing attention on preventing fatal and severe crashes over minor crashes so residents are better protected on the City's roads.*

### HUMANS MAKE MISTAKES

*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).*

### HUMANS ARE VULNERABLE

*Human tolerance to crashes is a recognized and measurable benchmark (kinetic energy transfer can be measured) and should be incorporated into design considerations.*

### RESPONSIBILITY IS SHARED

*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.*

### SAFETY IS PROACTIVE

*Rather than responding to tragedy, measures should be taken beforehand to identify and mitigate potential risks.*

### REDUNDANCY IS CRUCIAL

*Affecting change requires strengthening of all Safe Systems elements. In the case that one element fails, redundancy prevents systemwide failure, ensuring people are protected.*

A principles-based approach intended to eliminate serious and fatal injuries, the Safe Systems Approach relies on accommodating for human mistakes and keeping potential impacts on the human body at tolerable levels. Accommodating for human mistakes can be accomplished through roadway design features and technological advancements in vehicles (lane departure assist, autonomous emergency breaking, etc.). Efforts to mitigate or lessen the physical impacts on the human body include reducing speeds, physically separating automobiles from alternative mode users, as well as technological advancements in vehicles. There are five complementary objectives outlined by the U.S. Department of Transportation (USDOT) that correspond and support implementation of the Safe Systems Approach as provided in **Figure 1**:

1. **Safe road users** bear the burden of responsibility for complying with rules and regulations of the roadway.
2. **Safe vehicles** are responsible for mitigating or preventing the potential impacts of crashes. Active safety measures can help prevent crashes from occurring, while passive measures can lessen the implications of a crash.
3. **Safe speeds** have a direct correlation with increased rate of survival in crashes. Reducing speeds reduce impact, improve visibility, and afford drivers additional braking time.
4. **Safe roads** are not defined by their design alone. Rather, the road design, construction, maintenance, operation, and countermeasures work collaboratively to improve safety.
5. **Post-crash care** accounts for the actions of those that respond to a crash, whether it be emergency services, law enforcement, or clean up.

*FIGURE 1: THE SAFE SYSTEM APPROACH*


*Source: FHWA*

## The Six "E's" of Safety

Similar to how the Safe Systems Approach works, the Six E's of safety are components of an integrated and comprehensive framework. While every community varies in its composition and understanding of safety, the Six E's can be deployed at all levels to enhance the user experience and improve safety. The Safety Action Plan (**Part III**) of this report utilizes each of the Six E's as an organizing approach to implementation.

**ENGINEERING**

*Engineering projects and interventions in support of Vision Zero may be implemented through the built environment to improve safety. Calming traffic and improving safety for all users is the primary goal. Examples of engineering projects proven include the implementation of safety countermeasures, or traffic calming measures that reduce speeding.*

**EDUCATION**

*Education can improve safety by raising awareness of transportation choices, furthering, or establishing the benefits of multimodal transportation, and demonstrating the proper way to utilize the system, thus 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 respond to historical trends and adjust improve future safety. Similarly, careful evaluation can help head off potential issues before they reach greater severity.*

**EQUITY**

*Equity efforts must be made to acknowledge and rectify the imbalance and additional burden that disadvantaged populations carry. Vulnerable and disadvantaged populations are historically hard-to-reach and deserve access to the same information and infrastructure as everyone else.*

**ENFORCEMENT**

*Enforcement can ensure that traffic laws and regulations are being followed by system users, while also ensuring that profiling does not occur. Enforcement can also target and prioritize problem behaviors like speeding and other dangerous behavior over minor infractions.*

**ENCOURAGING**

*Encouraging 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.*

Texas has developed the Texas Strategic Highway Safety Plan (SHSP), a comprehensive document that outlines strategies and initiatives to create a safer transportation network through crash data analysis, identification of high-risk areas, and prioritization of countermeasures. The Texas SHSP highlights eight safety emphasis areas aimed at achieving the goal of zero fatalities. The eight safety emphasis areas are:

**DISTRACTED DRIVING**

Incidents where driver distraction, inattention, or cell phone/mobile use was a contributing factor.

**IMPAIRED DRIVING**

Incidents where at least one driver was identified as having consumed alcohol, taken medication, been under the influence of drugs, had a blood alcohol content greater than zero, or tested positive for drugs.

**INTERSECTION SAFETY**

Crashes that occur within the boundaries of an intersection or where the first harmful event occurred on an approach to or exit from an intersection, related to movement through the intersection.

**OCCUPANT PROTECTION**

Crashes where vehicle occupants were not using appropriate restraints, such as child restraints or seat belts.

**ROADWAY AND LANE DEPARTURES**

Incidents involving single vehicles running off the road or head-on collisions.

**SPEED-RELATED**

Crashes where unsafe speed, whether below or above the speed limit, was a contributing factor.

**VULNERABLE ROAD USERS**

Incidents involving pedestrians and bicyclists, focusing on separating these users in terms of time and/or space.

**POST CRASH CARE**

Enhancing the survivability of crashes through rapid access to emergency medical care, efficient crash investigation, traffic incident management, and justice.

*This chapter details the project timeline and highlights the* ***key takeaways and perspectives gathered from the public engagement*** *efforts throughout the length of the project.*

# Chapter 2. Process

This chapter details the project timeline and highlights the key takeaways and perspectives gathered from the public engagement efforts throughout the length of the project. Additionally, guidance from the Study Review Committee (SRC) and other City leadership was pivotal in the creation of the City' CSAP.

## Project Timeline

The Seguin CSAP's development is divided into three primary phases:


**PHASE I: DISCOVERY**

- Kick-off
- Visioning
- Public Involvement
- Existing Conditions

**PHASE II: DATA ANALYSIS**

- Crash Trends & Statistics
- City High-Injury Network
- Field Observations
- Countermeasure Identification

**PHASE III: PLAN DEVELOPMENT**

- City Safety Action Plan
- Adoption

**Discovery Phase:** This phase of the involved initiation and establishing a strong foundation for subsequent phases. Before the first SRC meeting, data was collected from all relevant parties to ensure all necessary information was available for the upcoming quantitative analysis. The initial SRC meeting was held on February 29, 2024, to develop a qualitative understanding of the project, define roles and responsibilities of the committee and project team members, and establish a unified mission statement. During this phase, a project website was also launched to provide a centralized platform for soliciting feedback and generating awareness for the project and upcoming public engagement events.

**Data Analysis Phase:** This phase of the project involved both qualitative and quantitative analyses. The quantitative analysis included various crash analyses and the creation of the High-Injury Network (HIN) model. The qualitative analysis involved field observations, identification of countermeasures, and input from the SRC and the public.

**Plan Development:** In the final phase, results and key takeaways from the quantitative and qualitative analyses were used to develop an implementation plan aligned with the goals of the SS4A initiative. The SRC and the public reviewed the initial plan and provided input on the direction of the Action Plan throughout this phase. Incorporating feedback from the public, the draft plan was finalized and formally adopted on [date].

The timeline for SRC and Public Meetings for the City's CSAP is shown in the table below:

| PHASE/MEETING | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEPT |
|---|---|---|---|---|---|---|---|---|---|
| **PHASE I: DISCOVERY** | | | | | | | | | |
| ***SRC Meeting 1:*** *Kick-Off & Goal-Setting* | | ● | | | | | | | |
| *Public Engagement Pop-Ups (Vision & Existing Conditions)* | | | ● | | | | | | |
| **PHASE II: DATA ANALYSIS** | | | | | | | | | |
| ***SRC Meeting 2:*** *Safety Analysis (High-Injury Network)* | | | ● | | | | | | |
| ***SRC Meeting 3:*** *Equity Review and Priority Considerations* | | | | ● | | | | | |
| **PHASE III: PLAN DEVELOPMENT** | | | | | | | | | |
| ***SRC Meeting 4:*** *Implementation Plan* | | | | | ● | | | | |
| *Public Engagement Pop-Up* | | | | | ● | | | | |
| *Leadership Support Resolution* | | | | | | | ● | | |
| ***SRC Meeting 5:*** *Public Draft Plan* | | | | | | | | | ● |
| *Public Engagement Pop-Up (Draft City CSAP )* | | | | | | | | | ● |
| *Adoption Celebration* | | | | | | | | | ● |

● ● ● = *Meetings*

## Study Review Committee

The Study Review Committee (SRC) was established to help guide the planning process, build consensus and ownership of the plan, and provide critical feedback at major milestones (**Figure 2**). The SRC was comprised City staff from varying departments and additional public representatives from local organizations. The SRC Meetings were held on the following days:

- **Meeting 1:** Kick-Off & Goal-Setting – February 29, 2024
- **Meeting 2:** Safety Analysis (High-Injury Network) – March 28, 2024
- **Meeting 3:** Equity Review and Priority Considerations – April 25, 2024
- **Meeting 4:** Implementation Plan – May 23, 2024
- **Meeting 5:** City CSAP Draft Plan – September 2024

The SRC served as champions and ambassadors of the plan throughout the process and will continue to raise awareness and educate the public on its implementation. During several work sessions in Phase I with the SRC, a mission statement was developed to articulate the plan's mission and outline its commitment to serving the community and stakeholders in the future.

> ***Striving for a SAFER COMMUNITY, Seguin is dedicated to developing an equitable transportation network that PRIORITIZES SAFETY, PRESERVES ALL LIVES, and MAINTAINS THE EXISTING COMMUNITY CHARACTER. As regional leaders, our mission is to identify and mitigate vulnerabilities to establish the standard for regional safety and inclusive transportation FOR ALL USERS.***

The SRC participated in various exercises, including a SWOT analysis, selection of study corridors, HIN refinement, development of the action matrix, and action prioritization, among others. The SRC also aligned its target of reducing roadway deaths and severe injuries with TxDOT's Road To Zero Initiative. This target is reflected in the City's SS4A resolution stating: "The City aligns with the Texas Department of Transportation's Road to Zero goals by adopting the goal of 50% reduction in traffic deaths and serious injuries by 2035 and zero by 2050, stating that no loss of life or serious injury is acceptable on our streets." After the City Comprehensive Safety Action Plan is adopted, the SRC will reconvene and celebrate their progress and prepare to enter the implementation phase of these plans to continue working towards eliminating deaths and severe injuries on Seguin's roads.

*FIGURE 2: PHOTOS FROM SRC MEETINGS 1–3*


# Plan Vision

## Vision Framework

The overarching plan vision was determined based on all feedback that was shared throughout the engagement process. This vision is what provides the framework for Seguin to guide future decisions and make improvements to the safety of the City's roadway network. It can be broken down into three categories: **Guiding Principles, Goal Statements, and Actions.**

The **Guiding Principles** of the Plan were identified and refined by the SRC and include community safety goal statements that tie to key plan themes. The **Goal Statements** are associated with each Guiding Principle, which are broad statements of intent. Each Goal Statement outlines a series of **Actions** that include recommended policies, operational changes, studies, investments, and partnerships with associated TxDOT Strategic Highway Safety Plan Emphasis area, "E" of Safety, timeframe, potential partners, and potential funding sources.

The goal statements and associated actions are compiled into an implementation program to guide the City and its partners on its road to zero deaths. The program is included in **Chapter 7: CSAP Implementation.**

## CSAP Guiding Principles

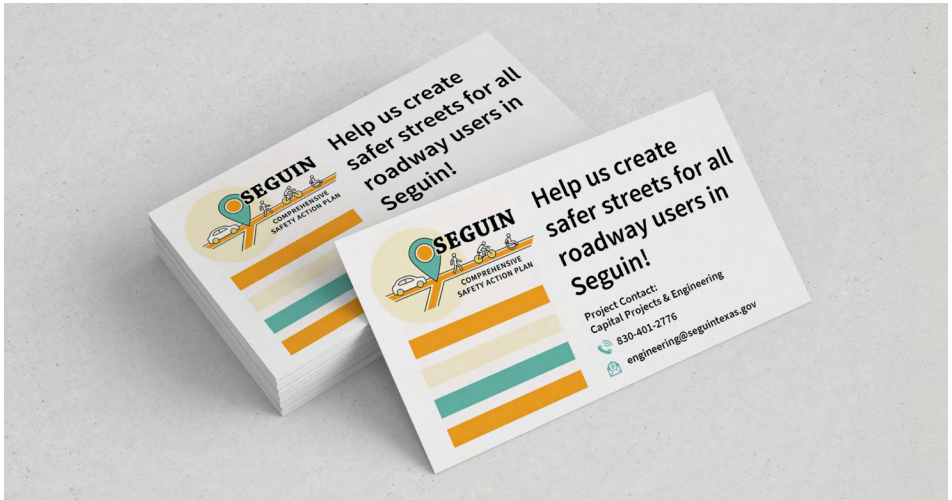
The Guiding Principles and associated Goal Statements are outlined below. The associated actions for each Guiding Principle can be found in **Chapter 7: CSAP Implementation.**

- **Infrastructure Enhancement** | ***Goal:*** Improve road design and infrastructure to prioritize safety for all road users, including pedestrians, cyclists, and motorists.
- **Traffic Enforcement and Regulation** | ***Goal:*** Strengthen enforcement of traffic laws and regulations to deter risky behaviors such as speeding, distracted driving, and driving under the influence.
- **Public Education and Awareness** | ***Goal:*** Increase public awareness about road safety issues and promote safe behaviors through educational campaigns, outreach programs, and community events.
- **Data Analysis and Monitoring** | ***Goal:*** Enhance data collection and analysis capabilities to identify high-risk areas, trends, and contributing factors to traffic accidents, enabling targeted interventions, and monitoring progress.
- **Collaboration and Partnerships** | ***Goal:*** Foster collaboration among various stakeholders, including government agencies, law enforcement, community organizations, and transportation providers, to coordinate efforts and implement effective strategies.
- **Equity and Accessibility** | ***Goal:*** Ensure equitable distribution of resources and prioritize safety improvements in underserved communities and areas with historically high rates of traffic-related injuries and fatalities.

## Public Engagement

Public engagement for the Seguin Comprehensive Safety Action Plan included online opportunities, pop-up events, and the distribution of promotional materials and advertisements. To ensure the plan addressed the safety concerns of all road users in Seguin, residents, community leaders, and other key stakeholders were actively involved. Additionally, all online engagement materials were provided in both English and Spanish to ensure an equitable public engagement experience.

*FIGURE 3: PROMOTIONAL BUSINESS CARD*

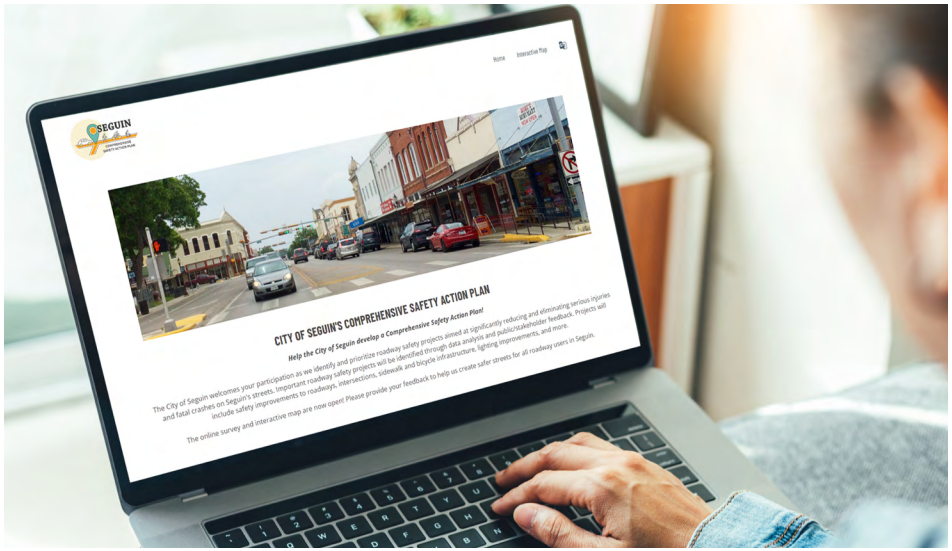



*Over 2,000 Business Cards were distributed throughout the duration of the planning process.*

## Online Engagement

Social Pinpoint was utilized throughout the plan's development, serving as a central online hub for information on upcoming events, survey links, and housing the plan itself. Through online surveys, Seguin residents had two opportunities to share their thoughts on safety within the City. This effort received positive feedback from both residents and stakeholders in Seguin (**Figure 4**).

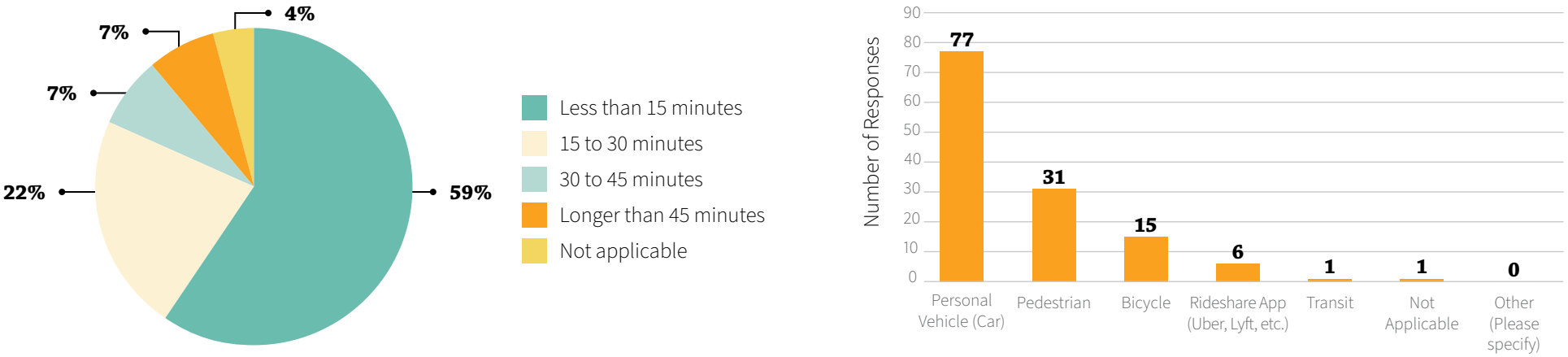
*FIGURE 4: PROJECT WEBSITE*



## Survey

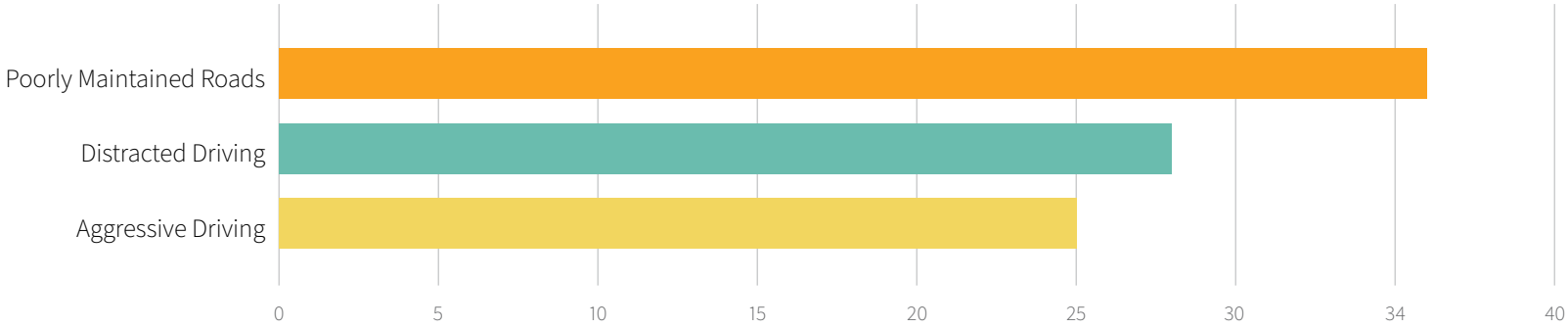
The Seguin CSAP Safety Survey aimed at collecting information on demographics, commute, mode choice, and roadway safety concerns. The survey was comprised of 28 questions, divided into 4 sections. This survey was available on the project website and the in-person public events. In total, the Roadway Safety Survey received 130 responses, 69% of which indicate that they live within Seguin. As summarized in **Figure 5**, personal vehicles are the primary mode of transportation in the City with most residents having a commute of less than 15 minutes (59%) or a commute of 15 to 30 minutes (22%).

*FIGURE 5. COMMUTE STATISTICS*




Additionally, the top three safety concerns for survey participants were poorly maintained roads (16%), distracted driving (12%), and aggressive driving (11%) as shown in **Figure 6**.

*FIGURE 6: TOP 3 SAFETY CONCERNS*



## Interactive Map Survey

Using an interactive map on the Seguin CSAP Project Website, visitors could provide feedback on the safety conditions of existing roadways. This engagement tool allowed users to place a point or line on the map and select from various comment types, such as “Speeding Issue” or “Pedestrian Safety Issue.” These comment types helped organize the information provided by users. Additionally, participants could upvote or downvote other ideas to indicate their agreement or disagreement. **Figure 7** and **Exhibit 1** present a visual summary of the 103 comments received from this activity.

*FIGURE 7. INTERACTIVE MAP COMMENTS*

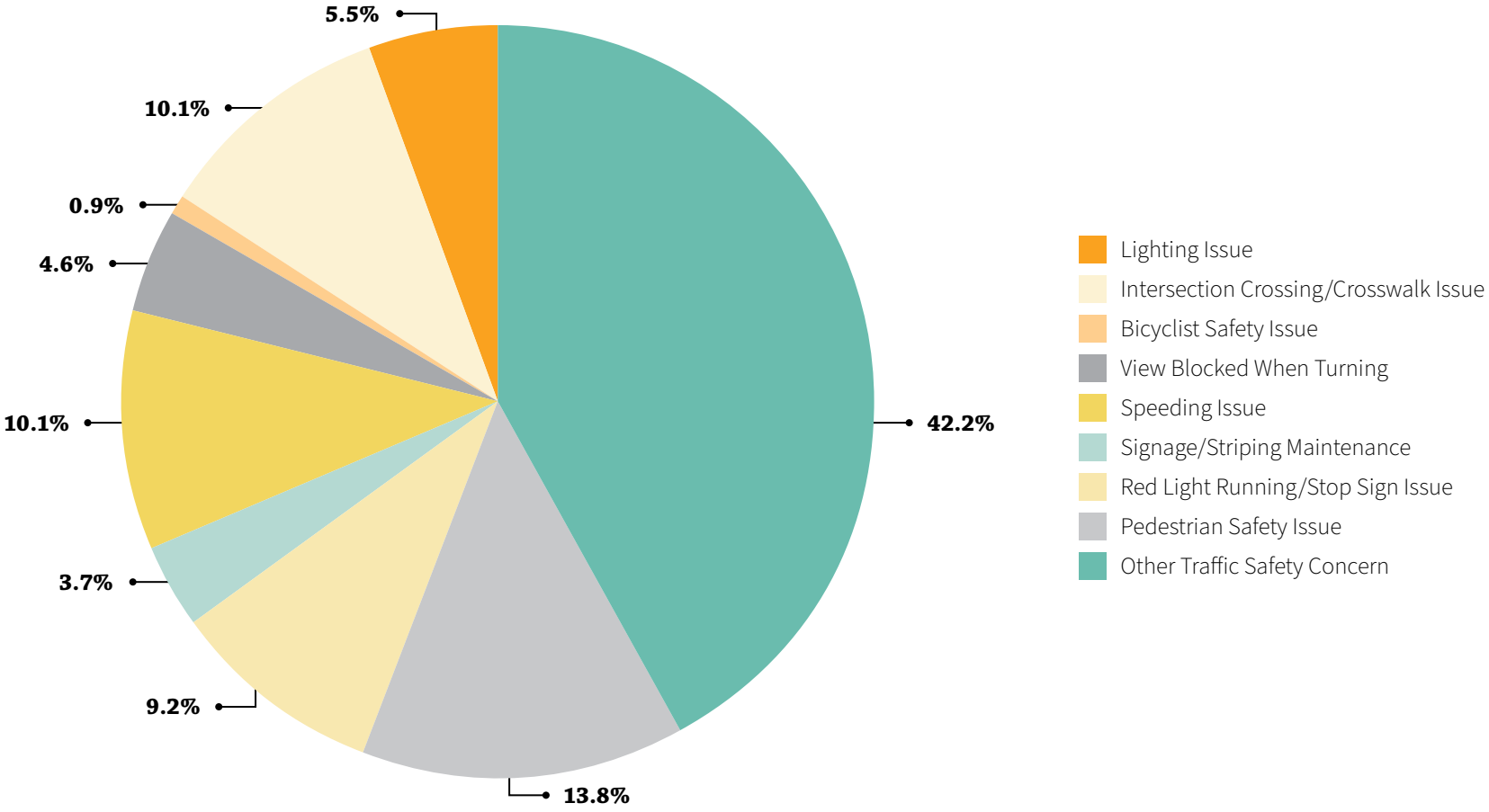
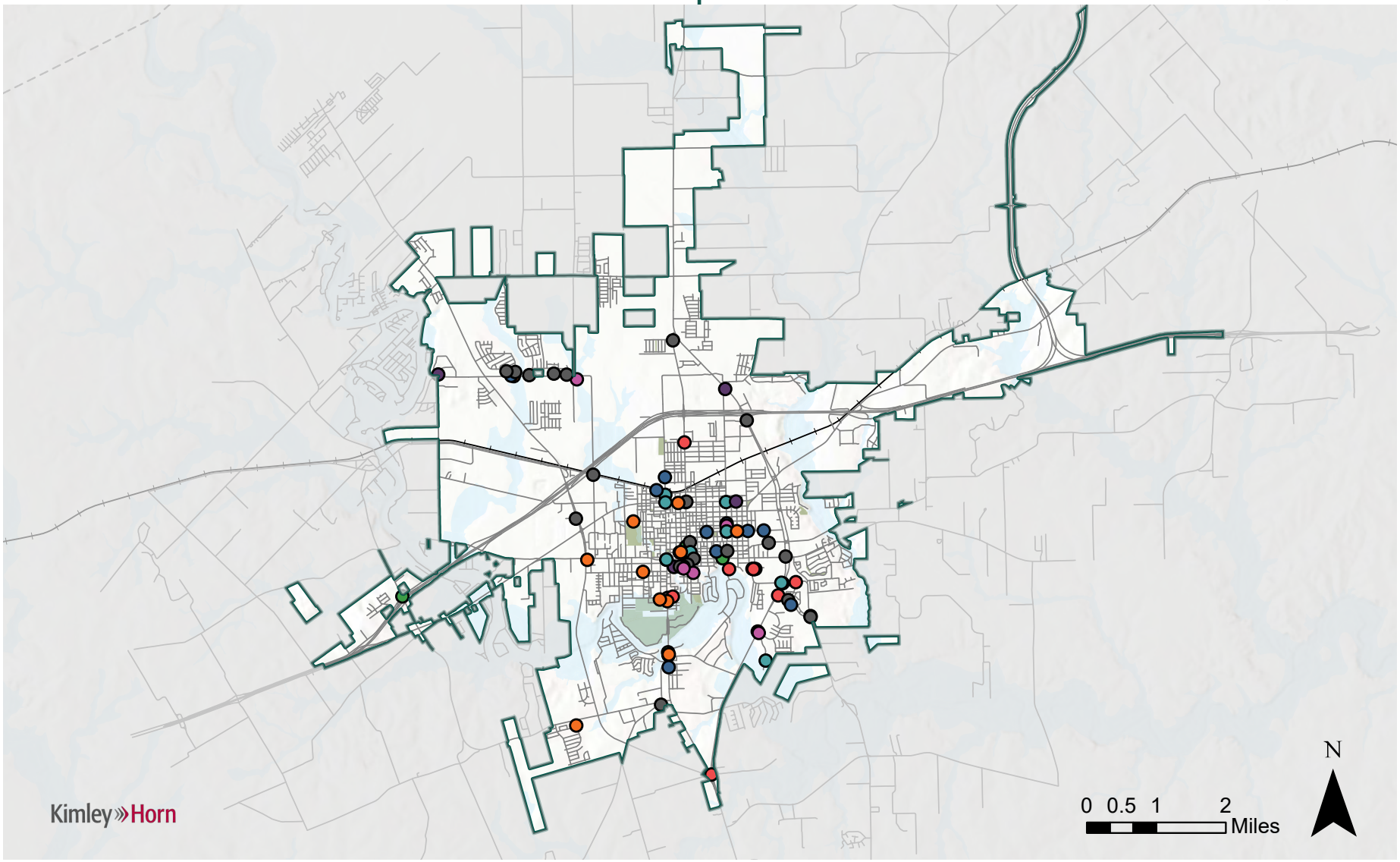


*EXHIBIT 1: SOCIAL PINPOINT COMMENTS*

SEGUIN COMPREHENSIVE SAFETY ACTION PLAN

## Social Pinpoint Comments
## City of Seguin Safety Action Plan



## Public Events

In-person public pop-up events were also used to engage the public in the planning process. The pop-up events gave residents the chance to interact with the project team, understand the importance of safety in the City, and how residents could improve safety locally. These events were held in public settings with the intention to generate awareness about the City's Safety Action Plan

During May 2024, a pop-up event was held at Max Starke Park in conjunction with the Badges, Bikes, and Tykes event. This event primarily served to raise awareness on the City of Seguin's safety efforts. Through This event, the project team was able to engage in valuable discussions with the people of Seguin on their top safety concerns.

The Seguin Badges, Bikes, and Tykes event featured a family-friendly booth spreading awareness about the Safety Action Plan (**Figure 8**). During the Pop-Up, people were directed to the project website, where they could participate in the project survey as well as the interactive web map. Branded giveaway items like stress balls and stickers enticed attendees to visit the booth and participate in engagements. Additionally, iPads were available for attendees to complete surveys in person, and business cards with QR codes were provided for participation on personal devices. A significant spike in traffic to the project website was observed during and after the event.

*FIGURE 8. BADGES, BIKES, AND TYKES EVENT*



placeholder for future pop-up event

placeholder for future pop-up event

## Leadership Commitment

City leadership plays a crucial role in developing a "Vision Zero Targets" for their community by leading the initiative, setting goals, and garnering community support. They commit to eliminating traffic fatalities and severe injuries, allocating resources, and implementing policies that prioritize road safety. Through collaboration with various stakeholders, City leaders create and implement comprehensive strategies that include infrastructure improvements, education campaigns, and enforcement measures, to create safer streets for all users.


# Seguin State of Safety

# II


# II

# Part II: Seguin State of Safety

## Introduction

While **Part I** of this report established that the improvement of safety for all mobility modes in Seguin is a priority for City Staff and Study Review Committee members, **Part II** elaborates on the State of Safety in Seguin. An understanding of the City's State of Safety is gathered through a data-driven review of the crash history, equity considerations, and other contributing elements. **Part II** of the report lays the foundation for **Part III**, the Comprehensive Safety Action Plan, by providing insight into the existing conditions, key safety observations, and input from the public, key stakeholders, and the SRC.

**Chapter 3: Crash History Analysis**

- **Citywide Crash Trends**
- **Crash Profiles**

**Chapter 4: Equity Review**

- **How do we measure Equity?**
- **Methodology**
- **Equity Overview Map**

**Chapter 5: High-Injury Network**

- **Critical Crash Rate Method**
- **Critical Crash Rate Calculation**
- **High-Injury Network Development and Results**

*An understanding of the City's State of Safety is gathered through a **data-driven review** of the crash history, equity considerations, and other contributing elements.*

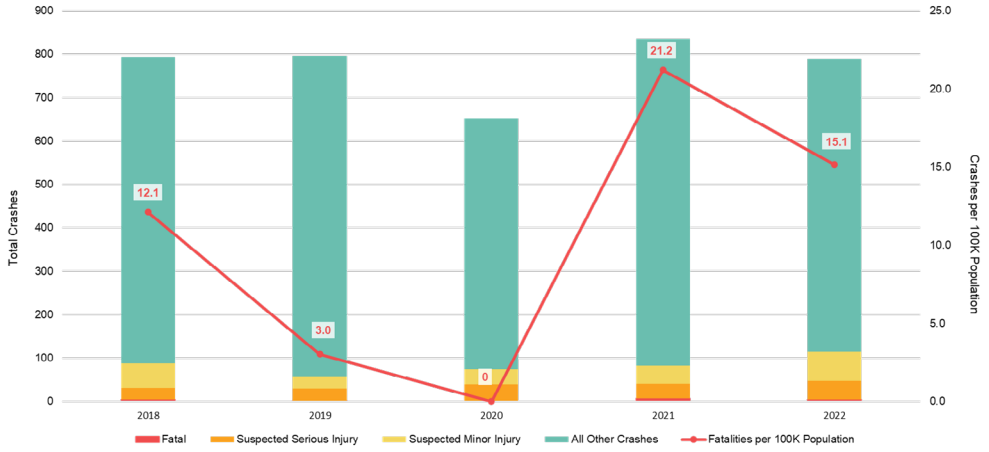
# Chapter 3. Crash History Analysis

**Chapter 3** focuses on the City of Seguin's crash history, performance within the safety emphasis areas, and the state of safety from an equitable perspective. To complete the crash history analysis and creation of the High-Injury Network (HIN), historical crash data for the last five years (2018-2022) from TXDOT's Crash Record Information System (CRIS) was used.

## Citywide Crash Trends

Crash data from 2018 to 2022 was utilized to identify Citywide crash trends, as summarized in Figure 9. Prior to 2020, the total number of crashes per year in Seguin was approximately 800. In the year 2020, there was a significant drop in the number of crashes occurring in the City (652 crashes) which is attributed to the COVID-19 pandemic. The following year had a spike in the total number of crashes (835 crashes), but quickly returned to pre-pandemic numbers in 2022. Conversely, the City of Seguin has seen a dramatic increase in its fatalities per 100,000 population. Before 2020, the fatalities per 100,000 population were decreasing with the highest rate being in 2018 with a rate of 12.1. Since 2020, these rates have been consistently higher than pre-pandemic numbers; fatalities per 100,000 populations was 21.2 in 2021 and 15.1 in 2022. These trends indicate that although the total number of crashes occurring in Seguin have stayed consistent throughout the study period crash fatalities have been dramatically increasing since 2020.

*FIGURE 9: TOTAL CRASH SUMMARY (2018-2022)*



The total number of fatal (K), suspected serious injury (A), and suspected minor injury (B) crashes have all been increasing since 2020 and exceeding previous years' totals as shown in **Table 1**. Fatal crashes reached a total of 13 between 2021 and 2022 which is over doubled compared to the previous 3 years combined (5). Of the 13 fatal crashes, 7 occurred in 2021 and 6 occurred in 2022. Suspected serious and minor injury crashes have not seen a dramatic increase quite like fatal crashes, but these crash types are steadily increasing and are presently higher than previous years. While high severity crashes have been steadily increasing within the last 3 years of the study period, possible and non-injury crashes have stayed consistent throughout.

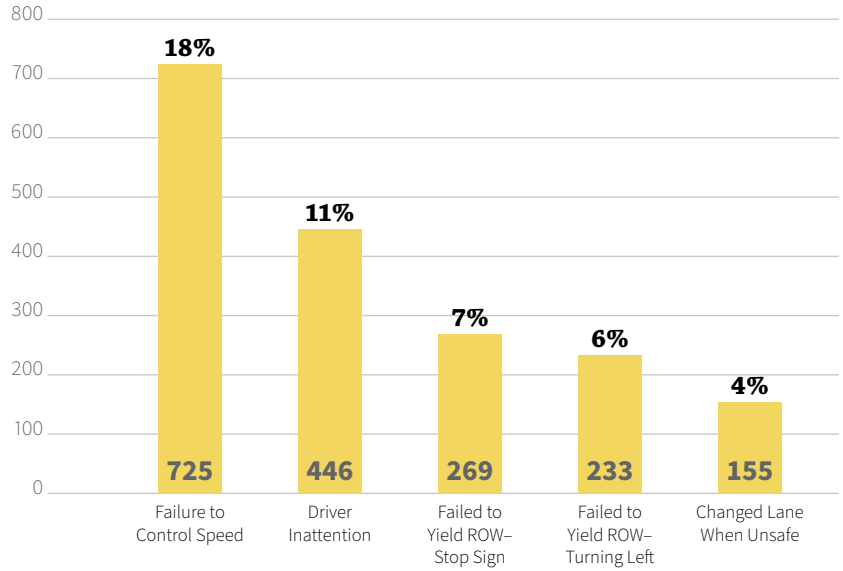
*TABLE 1: TOTAL CRASHES BY SEVERITY (2018-2022)*

| YEAR | K- FATAL INJURY | | A - SUSPECTED SERIOUS INJURY | | B - SUSPECTED MINOR INJURY | | C - POSSIBLE INJURY | | N - NOT INJURED | | 99 - UNKNOWN | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **2018** | 3 | 0.4% | 28 | 3.3% | 60 | 7.1% | 123 | 14.5% | 630 | 74.0% | 7 | 0.8% |
| **2019** | 1 | 0.1% | 32 | 3.8% | 30 | 3.6% | 94 | 11.2% | 676 | 80.9% | 3 | 0.4% |
| **2020** | 1 | 0.1% | 48 | 6.8% | 39 | 5.5% | 74 | 10.4% | 546 | 76.9% | 2 | 0.3% |
| **2021** | 7 | 0.8% | 38 | 4.3% | 47 | 5.3% | 76 | 8.5% | 723 | 80.9% | 3 | 0.3% |
| **2022** | 6 | 0.7% | 43 | 5.1% | 77 | 9.1% | 87 | 10.3% | 617 | 73.1% | 14 | 1.7% |

*Indicates the two highest years by percentage*

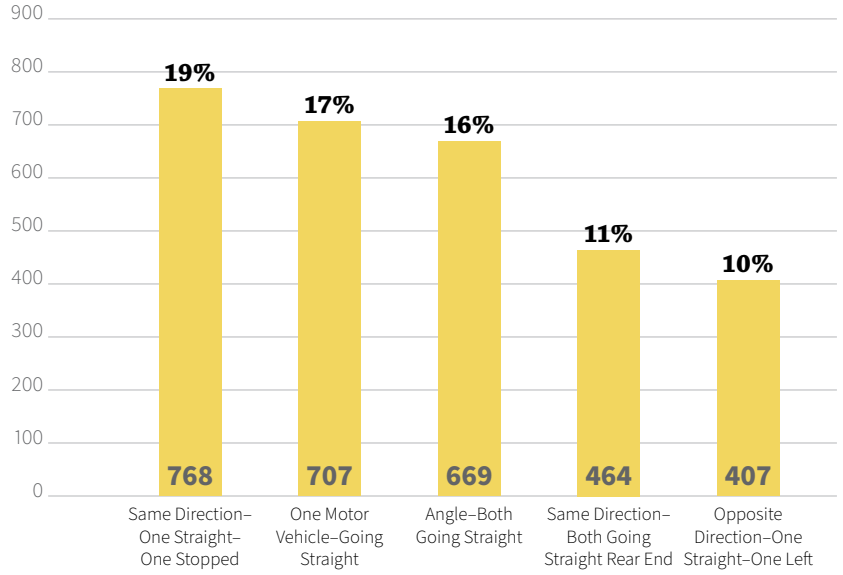
**Figure 10** summarizes the top contributing factors for crashes in the City for the past five years. 'Speeding' or 'Failed to Control Speed' is the most cited contributing factor for crashes in Seguin. This contributing factor was listed in almost double the number of crashes when compared to the second most common contributing factor – driver inattention. These results identify that the City of Seguin has a unique issue with unsafe speeding behaviors since 18% of its crashes involved speeding.

*FIGURE 10: TOP CONTRIBUTING FACTORS (2018-2022)*




The top manners of collision and how the crash occurred between vehicles for Seguin are shown in **Figure 11**. In the City, the top manners of collision were 'Same Direction – One Straight – One Stopped' (19%), 'One Motor Vehicle - Going Straight' (17%), and 'Angle-Both Going Straight' (16%). When the manner of collision is described as 'Same Direction – One Straight – One Stopped' this indicates there was a rear-end crash. 'One Motor Vehicle – Going Straight' refers to crashes in which the vehicle ran off the road or failed to maintain the vehicle in a single travel lane. 'Angle-Both Going Straight' crashes include sideswipe, T-bone, and other intersection-related crashes.

*FIGURE 11: TOP MANNERS OF COLLISION (2018-2022)*



## Crash Heat Map

A crash heat map was created to highlight the density of crashes within the City of Seguin from 2018 – 2022 as seen in **Exhibit 2** on Page 44. This map is a visual representation of the pure density of crash counts at various locations in Seguin. While the crash heat map does not account for traffic volumes, number of lanes, or speed limits, these factors do affect the frequency of crashes.

The highest concentration of crashes occurs along IH-10, US 90 Alternate, and SH 123 with the highest densities at high volume intersections on US 90 Alternate. Two of the largest densities on the crash heat map are near the intersections of SH 123 and US 90 Alternate and Guadalupe St and US 90 Alternate.

Furthermore, **Table 2** details the crash severity breakdown for all the crashes in Seguin. Out of all crashes in Seguin only 10.4% are fatal or severe crashes.

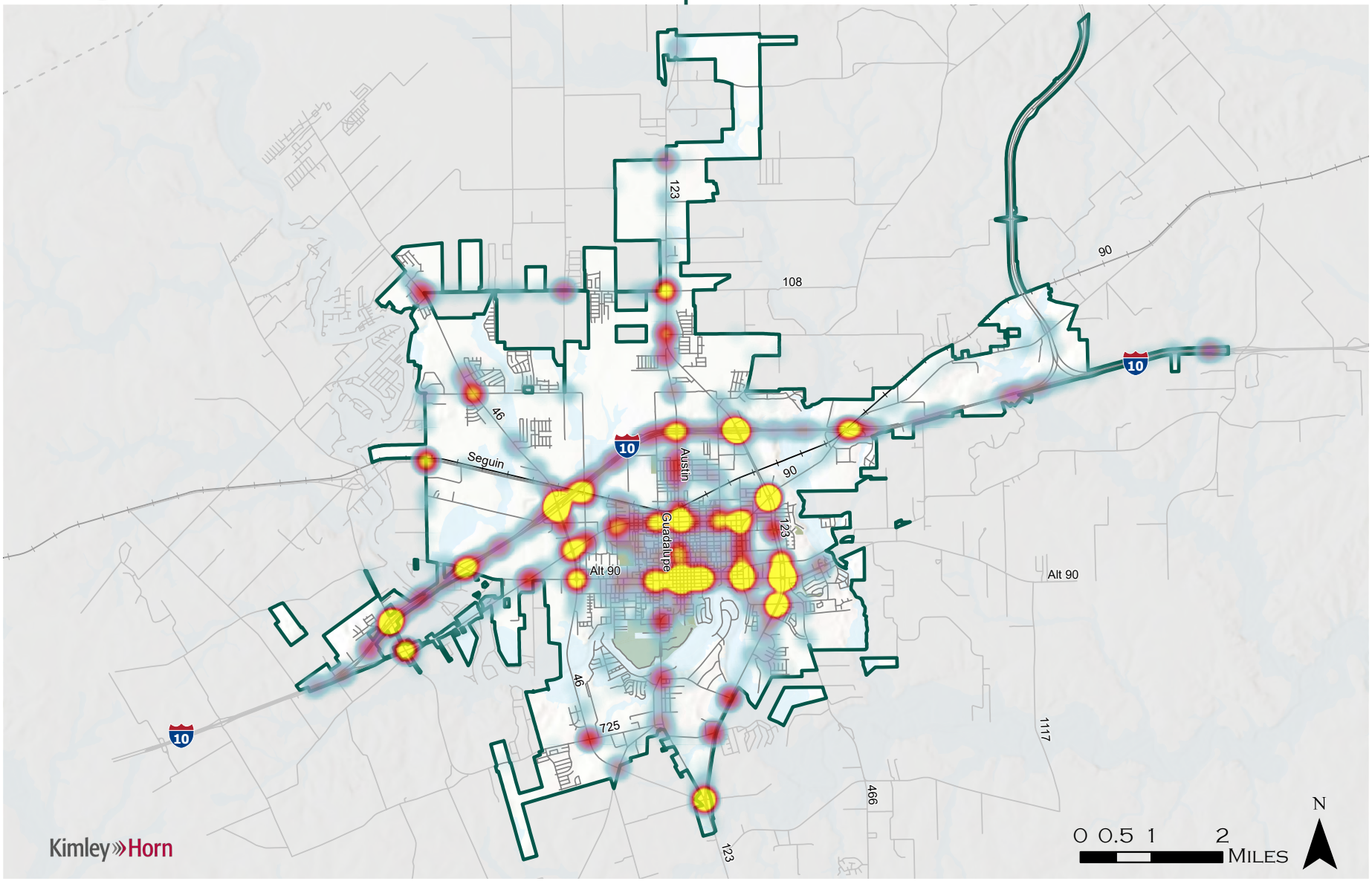
*TABLE 2: CRASH SEVERITY BREAKDOWN*

| CRASH SEVERITY | CRASH COUNT | PERCENTAGE |
|---|---|---|
| K – Fatal Injury | 18 | 0.4% |
| A – Suspected Serious Injury | 189 | 5% |
| B – Suspected Minor Injury | 253 | 6% |
| C – Possible Injury | 454 | 11% |
| N – Not Injured | 3192 | 77% |
| 99 – Unknown | 29 | 0.7% |

*EXHIBIT 2: CRASH HEAT MAP*

SEGUIN
COMPREHENSIVE SAFETY ACTION PLAN

## UPDATED CRASH HEAT MAP (2018-2022)
## CITY OF SEGUIN SAFETY ACTION PLAN



## High Crash Intersections

Approximately 53% of all the crashes in Seguin occur at intersections. Intersections can easily become safety hazards for all roadway users since these are areas where the most conflicts for vehicles, pedestrians, and bicyclists occur. In the City of Seguin, the intersection between SH 123 & US 90 had the most crashes over the five-year study period. The intersection is located at an interchange between SH 123 and US 90; where SH 123 is a 5-lane divided roadway and US 90 is a 4-lane undivided roadway. Of the ten intersections listed in **Table 3**, seven of them involved IH 10, US 90, or US 90 Alternate. **Exhibit 3** on Page 47 contains a map that contains the locations of the high crash intersections in the City.

*TABLE 3: HIGH CRASH INTERSECTIONS*

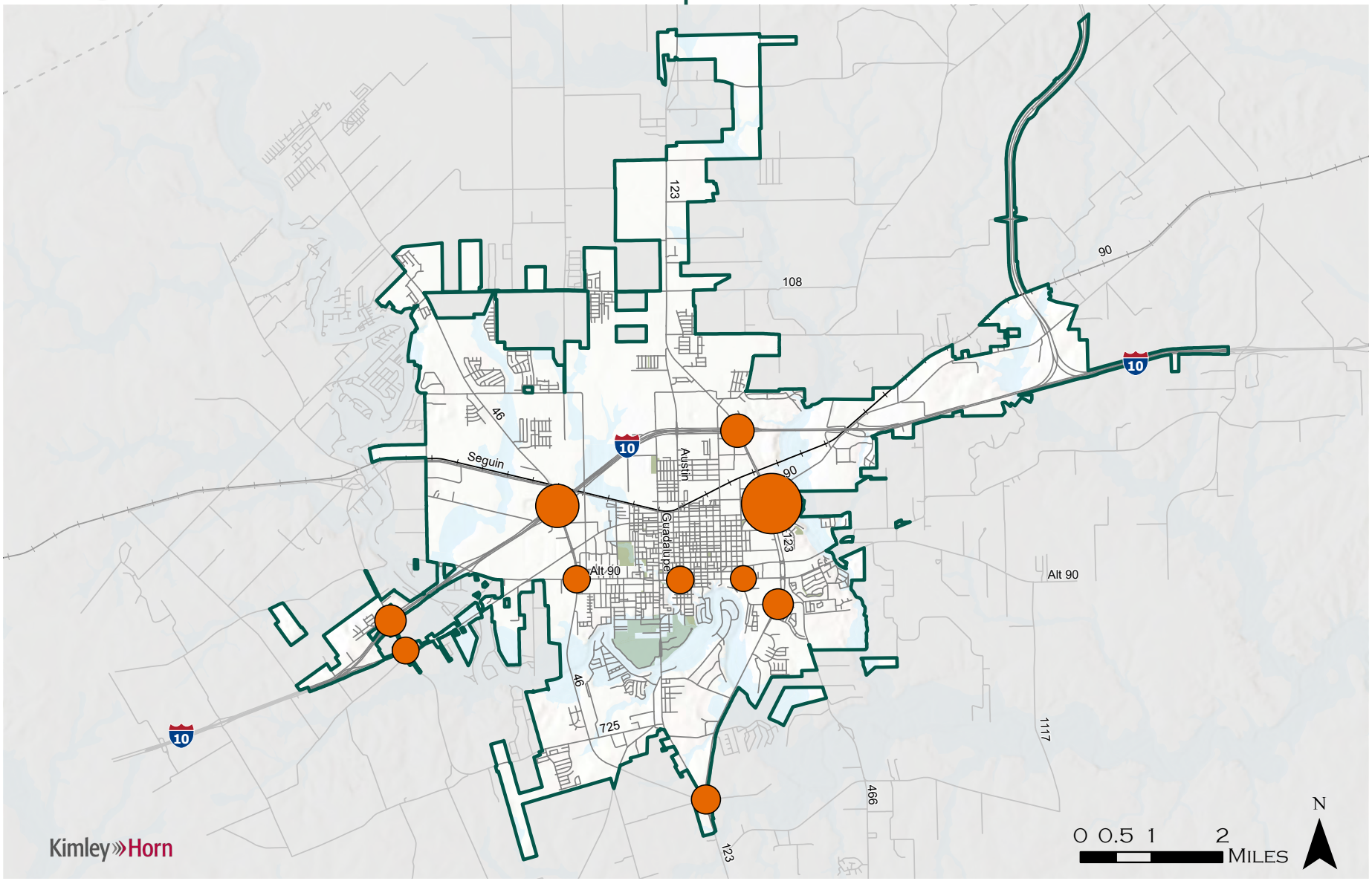
| RANK | INTERSECTION | NUMBER OF CRASHES |
|---|---|---|
| 1 | SH 123 & US 90 | 196 |
| 2 | SH 46 & IH 10 | 121 |
| 3 | SH 123 & IH 10 | 78 |
| 4 | FM 725 & IH 10 | 69 |
| 5 | FM 466 & SH 123 | 66 |
| 6 | BS 123B & SH 123 | 59 |
| 7 | BS 123B & US 90 ALT | 52 |
| 8 | US 90 ALT & SH 46 | 51 |
| 9 | FM 725 & US 90 | 49 |
| 10 | US 90 ALT & FM 466 | 45 |

*EXHIBIT 3: HIGH CRASH INTERSECTIONS MAP*

SEGUIN
COMPREHENSIVE SAFETY ACTION PLAN

## High Crash Intersections (2018-2022)
## City of Seguin Safety Action Plan

Study Area
County Line
Roads
Parks
100-Year Floodplain
Railroads
High Crash Intersection



## Bicycle & Pedestrian Crashes

During a crash involving vulnerable road users, the most vulnerable to fatal or serious injuries are the pedestrian or bicyclist. This fact is further supported by the crash history in Seguin. In the past five years, the City has experienced 36 pedestrian crashes and 7 bicyclist crash as shown in **Exhibit 4** on Page 489. Of the 43 crashes that involved pedestrians or bicyclists, 24 of them resulted in a fatality, suspected serious injury, or suspected minor injury.

On average pedestrian and bicycle crashes are more severe than vehicle-only crashes in the City. While only 11.4% of vehicle-only crashes are fatal, suspected serious, or suspected minor injury crashes, 56% of pedestrian and bicyclist crashes are a KAB crash. A comparison between bicycle/pedestrian and vehicle-only crashes by severity is shown in **Table 4**.

*TABLE 4: VEHICLES VS BICYCLE & PEDESTRIAN BY CRASH SEVERITY*

| CRASH SEVERITY | VEHICLES | BICYCLE/ PEDESTRIAN | DIFFERENCE |
|---|---|---|---|
| **K - FATAL INJURY** | 0.4% | 12% | 11.6% |
| **A - SUSPECTED SERIOUS INJURY** | 5% | 37% | 32% |
| **B - SUSPECTED MINOR INJURY** | 6% | 7% | 1% |
| **C - POSSIBLE INJURY** | 11% | 14% | 3% |
| **N - NOT INJURED** | 77% | 30% | -47% |
| **99 - UNKNOWN** | 0.7% | 0% | -0.7% |

*Vulnerable Road Users disproportionately experience higher-severity Crashes*

There appears to be a concentration of pedestrian and bicycle crashes in Seguin's downtown area. This would suggest that pedestrian facilities should be improved to make walking and biking safer in downtown Seguin. Furthermore, there are numerous pedestrian crashes near the intersection of SH 123 and US 90 Alternate. Aside from these areas with concentrated crashes, the remaining pedestrian and bicyclist crashes occur on other major thoroughfares and principal arterials in the City.

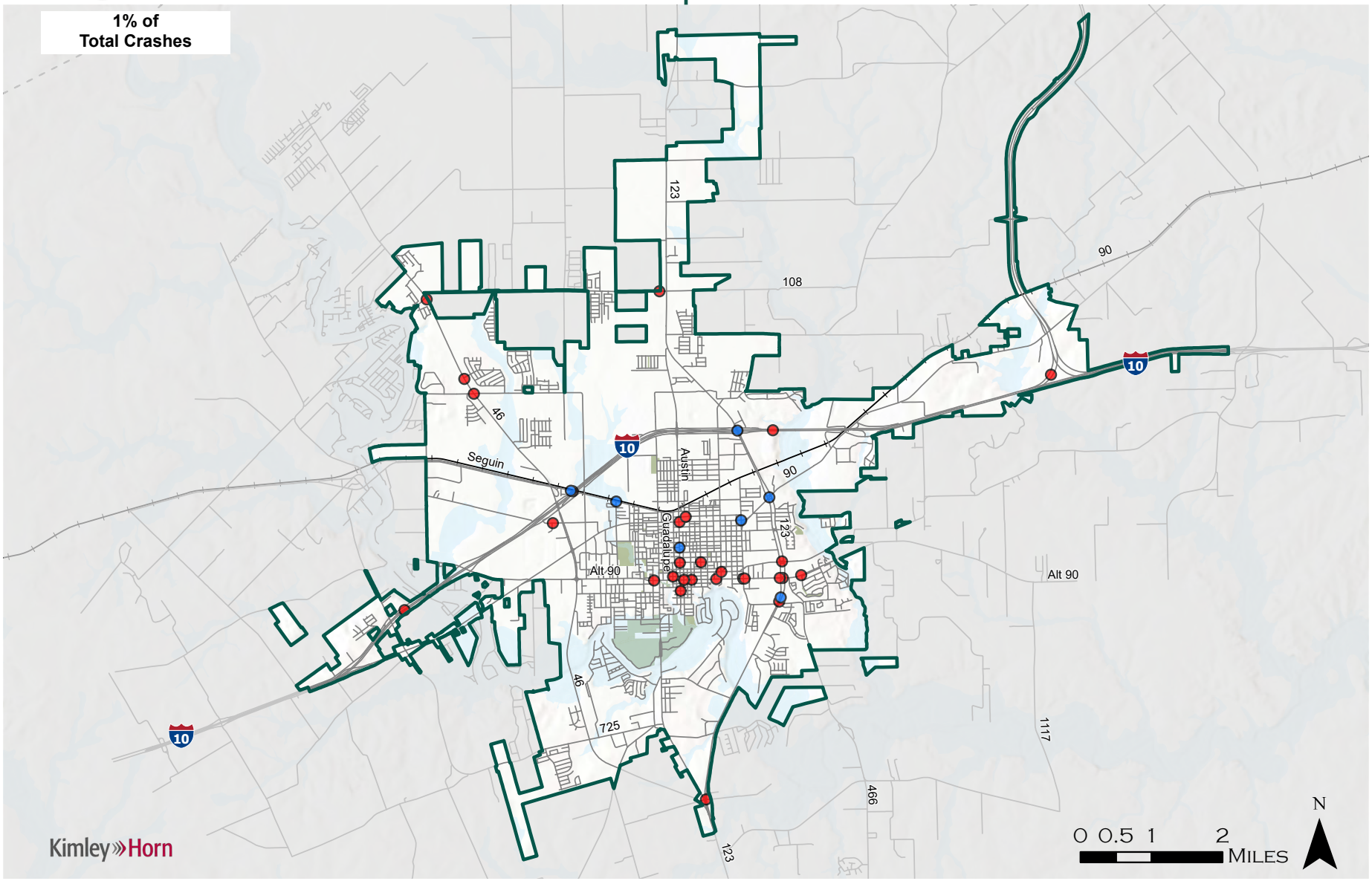
*EXHIBIT 4: BICYCLE & PEDESTRIAN CRASHES*

SEGUIN
COMPREHENSIVE SAFETY ACTION PLAN

## PEDESTRIAN & BICYCLE CRASHES (2018-2022)
## CITY OF SEGUIN SAFETY ACTION PLAN

Study Area
County Line
Roads
Parks
100-Year Floodplain
Railroads
Bicyclist Crashes (7)
Pedestrian Crashes (36)

**1% of Total Crashes**




Kimley»Horn

## Motorcycle Crashes

Similarly to bicycle and pedestrian crashes, motorcycle crashes in Seguin are on average more severe than vehicle only crashes. While motorcycle crashes only comprise 1% of all crashes in Seguin, 65% of motorcycle crashes resulted in a fatality, suspected serious injury, or minor injury. In comparison, 11.4% of vehicle only crashes result in the same crash severities (**Table 5**).

*TABLE 5. VEHICLES VS MOTORCYCLE BY CRASH SEVERITY*

| CRASH SEVERITY | VEHICLES | MOTORCYCLES | DIFFERENCE |
|---|---|---|---|
| **K - FATAL INJURY** | 0.4% | 5% | 5% |
| **A - SUSPECTED SERIOUS INJURY** | 5% | 39% | 35% |
| **B - SUSPECTED MINOR INJURY** | 6% | 21% | 15% |
| **C - POSSIBLE INJURY** | 11% | 7% | -4% |
| **N - NOT INJURED** | 77% | 27% | -50% |
| **99 - UNKNOWN** | 0.7% | 0% | -1% |

*Vulnerable Road Users disproportionately experience higher-severity Crashes*

Although there are some severe crashes occurring near downtown, most of them occur outside of the city center (**Exhibit 5**). The 3 fatal motorcycle crashes are all located near city limits in more rural areas of Seguin.

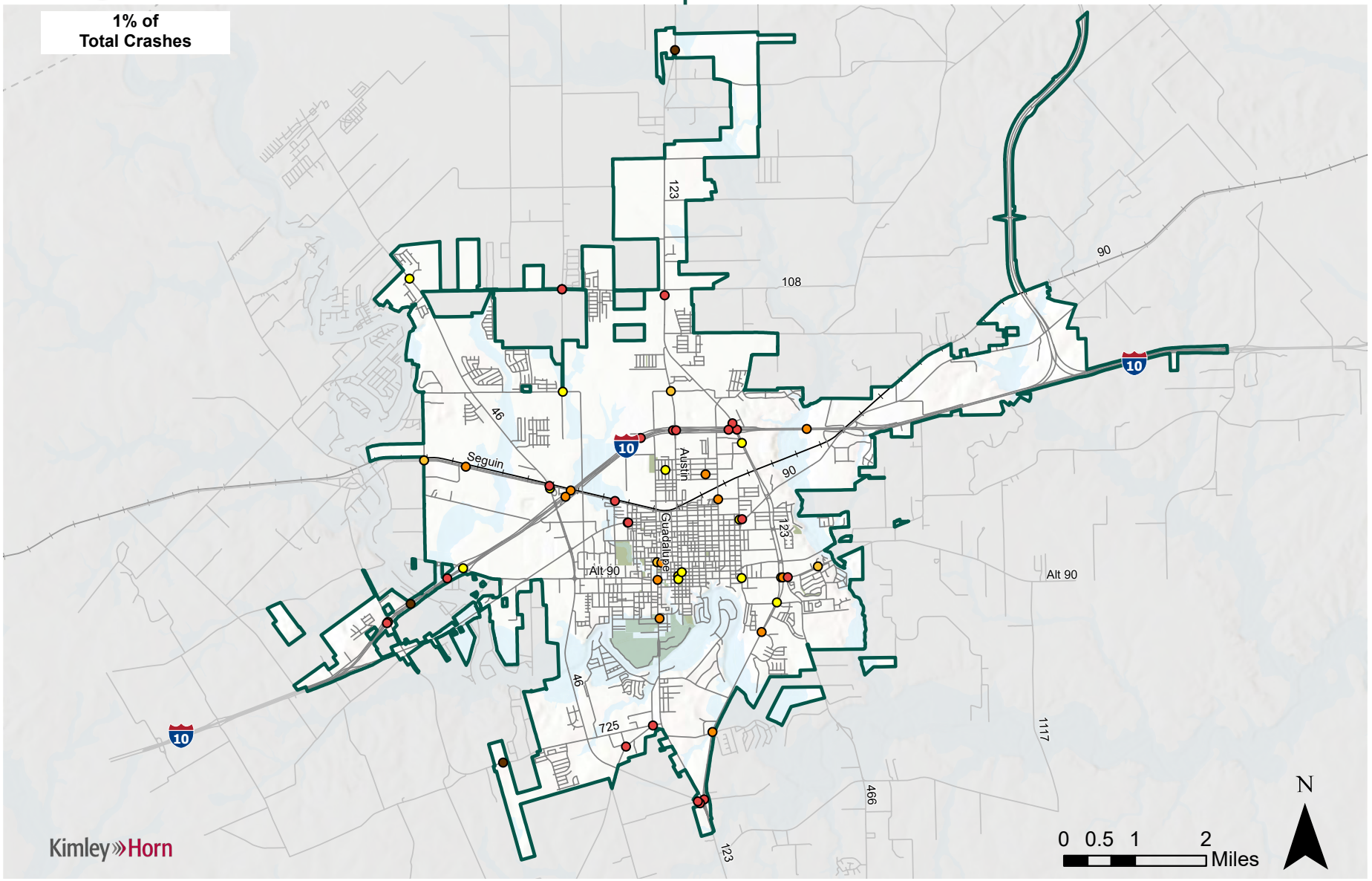
*EXHIBIT 5: MOTORCYCLE RELATED CRASHES*

SEGUIN
COMPREHENSIVE SAFETY ACTION PLAN

## MOTORCYCLE RELATED CRASHES (2018-2022)
### CITY OF SEGUIN SAFETY ACTION PLAN

Study Area
County Line
Roads
Parks
100-Year Floodplain
Railroads

K - Fatal Injury (3) [5%]
A - Suspected Serious Injury (22) [39%]
B - Suspected Minor Injury (12) [21%]
C - Possible Injury (4) [7%]
N - Not Injured (15) [27%]



## Impaired Driving Crashes

Driving after drinking is deadly, and crash trends in Seguin further support this fact. While only 113 (3%) of crashes in Seguin involved impaired driving, approximately 43% of them were severe. This is four times higher than the percentage of severe crashes for all crashes in Seguin. Furthermore, 5 out of the 113 impaired driving crashes were fatal which is approximately a third of the total number of fatal crashes (18) in the City. **Table 6** provides further detail on the crash severity breakdown for impaired driving crashes and how it compares to the Citywide breakdown.

*TABLE 6. ALL VS IMPAIRED RELATED CRASHES BY CRASH SEVERITY*

| CRASH SEVERITY | VEHICLES | MOTORCYCLES | DIFFERENCE |
|---|---|---|---|
| **K - FATAL INJURY** | 0.4% | 4% | 4% |
| **A - SUSPECTED SERIOUS INJURY** | 5% | 15% | 10% |
| **B - SUSPECTED MINOR INJURY** | 6% | 24% | 18% |
| **C - POSSIBLE INJURY** | 11% | 9% | -2% |
| **N - NOT INJURED** | 77% | 46% | -31% |
| **99 - UNKNOWN** | 0.7% | 2% | 1% |

*Vulnerable Road Users disproportionately experience higher-severity Crashes*

**Exhibit 6** shows the location of all the impaired driving crashes in Seguin. While these crashes seem scattered throughout the city, many severe crashes occur close to the city center. Since impaired driving crashes are more severe, it is suggested that there be an increased effort to educate residents on the dangers of impaired driving.

*EXHIBIT 6: IMPAIRED DRIVING CRASHES*

SEGUIN COMPREHENSIVE SAFETY ACTION PLAN

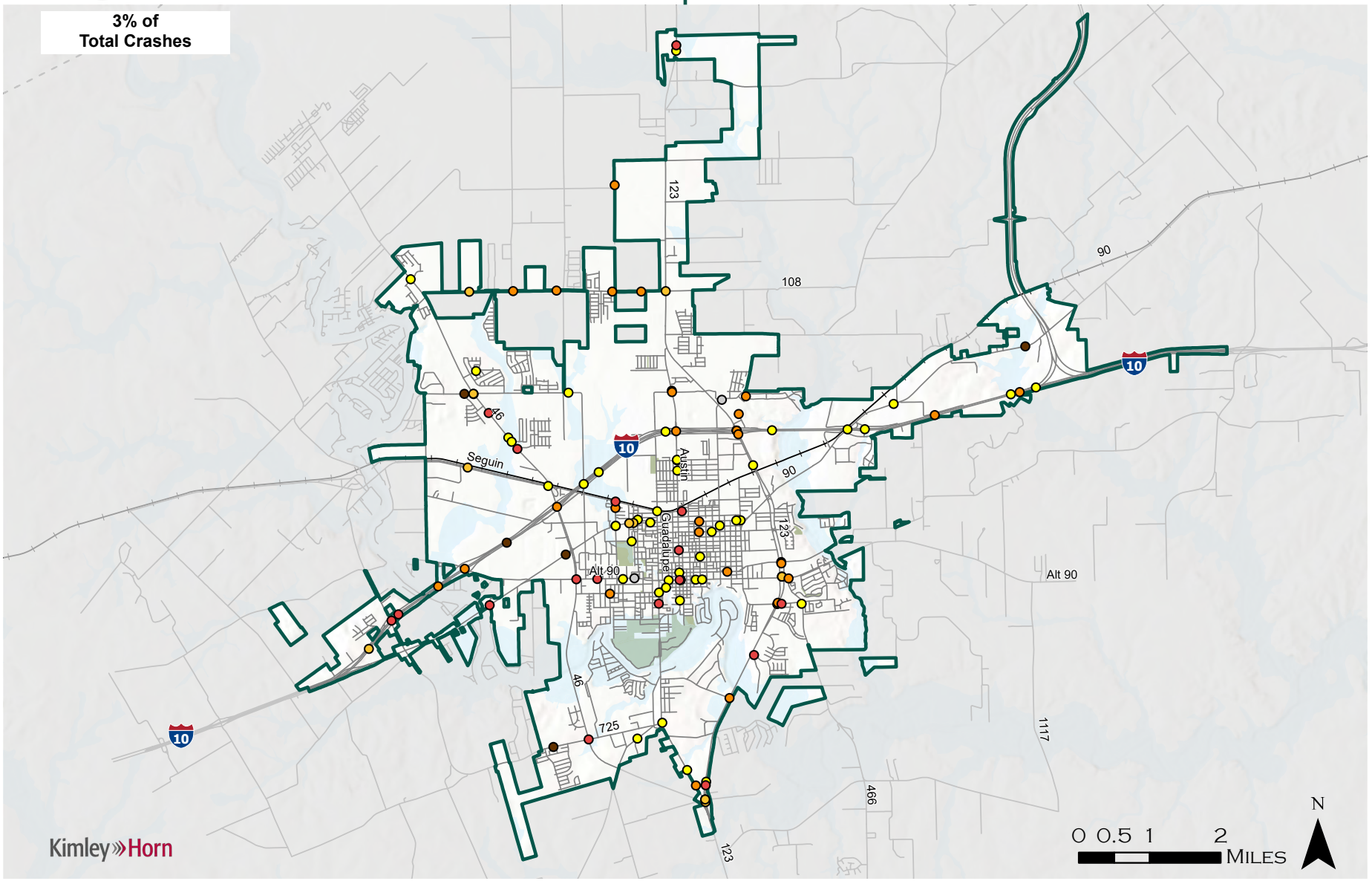
## IMPAIRED DRIVING CRASHES (2018-2022)

### CITY OF SEGUIN SAFETY ACTION PLAN

Study Area
County Line
Roads
Parks
100-Year Floodplain
Railroads

- K - Fatal Injury (5) [4%]
- A - Suspected Serious Injury (17) [15%]
- B - Suspected Minor Injury (27) [24%]
- C - Possible Injury (10) [9%]
- N - Not Injured (52) [46%]
- 99 - Unknown (2) [2%]

**3% of Total Crashes**



## Distracted Driving Crashes

Distracted driving crashes were overall less severe on average in Seguin; 10.1% of distracted driving crashes were severe (KAB) while 11.4% of all crashes were classified the same (**Table 7**). While distracted driving crashes are less severe than average, 27% of all crashes in Seguin are related to distracted driving. This makes distracted driving the most common factor of crashes in the City.

*TABLE 7. ALL VS DISTRACTED DRIVING RELATED CRASHES BY CRASH SEVERITY*

| CRASH SEVERITY | VEHICLES | MOTORCYCLES | DIFFERENCE |
|---|---|---|---|
| **K - FATAL INJURY** | 0.4% | 0.1% | -0.3% |
| **A - SUSPECTED SERIOUS INJURY** | 5% | 3% | -2% |
| **B - SUSPECTED MINOR INJURY** | 6% | 7% | 1% |
| **C - POSSIBLE INJURY** | 11% | 12% | 1% |
| **N - NOT INJURED** | 77% | 78% | 1% |
| **99 - UNKNOWN** | 0.7% | 0.3% | -0.4% |

*Vulnerable Road Users disproportionately experience higher-severity Crashes*

From the mapping of distracted driving related crashes, there appears to be many crashes on I-10, Kingsbury St, and State Highway 90 Alternate, all major corridors in Seguin (**Exhibit 7**). Additionally, distracted driving crashes seem to be concentrated in towards the center of Seguin and decrease closer to city limits. This is especially noticeable in the northern region of the City (**Exhibit 7**).

*EXHIBIT 7: DISTRACTED DRIVING CRASHES*

SEGUIN COMPREHENSIVE SAFETY ACTION PLAN

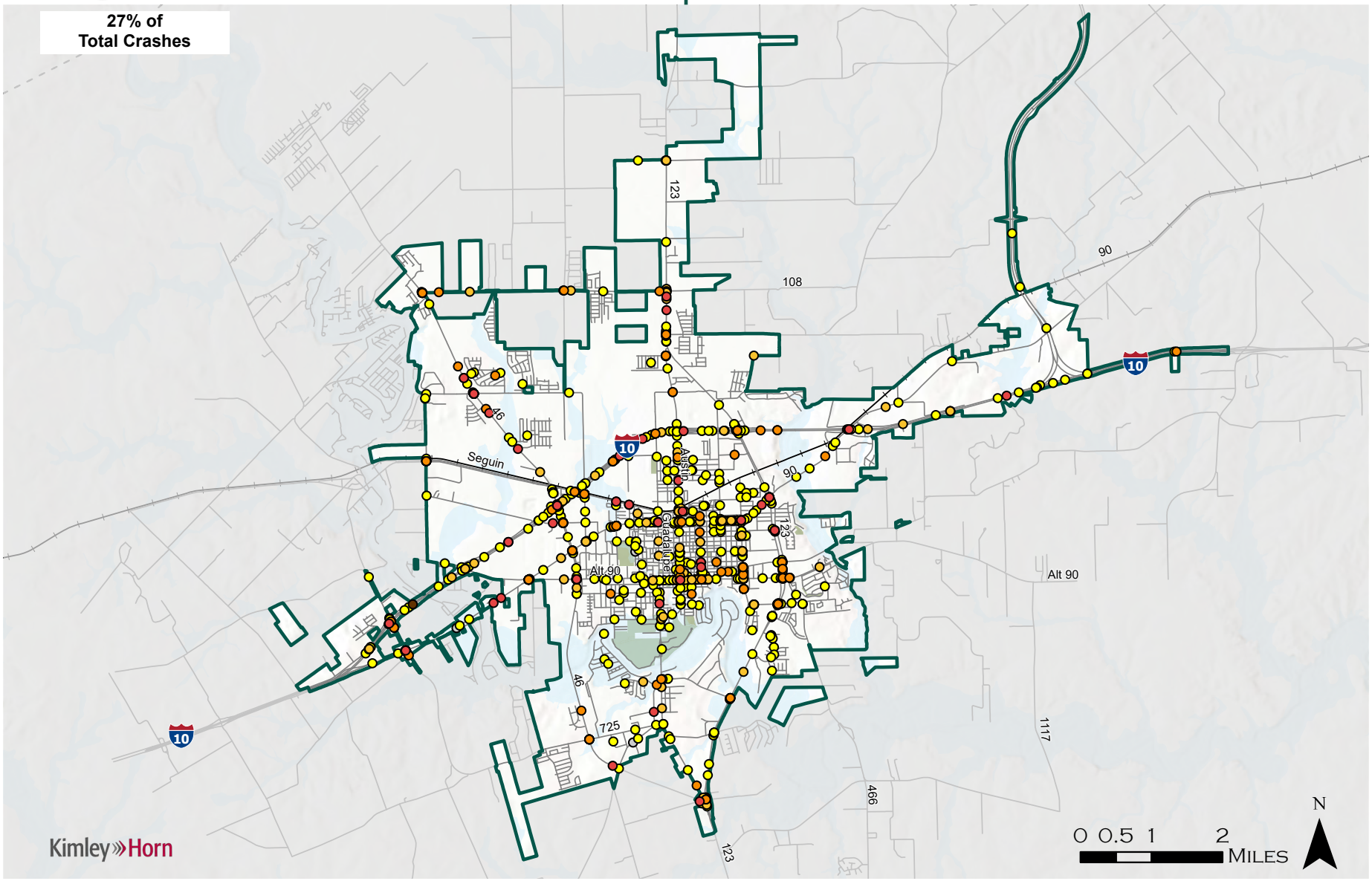
## DISTRACTED DRIVING CRASHES (2018-2022)

### CITY OF SEGUIN SAFETY ACTION PLAN

Study Area
County Line
Roads
Parks
100-Year Floodplain
Railroads

K - Fatal Injury (1) [0.1%]
A - Suspected Serious Injury (37) [3%]
B - Suspected Minor Injury (73) [7%]
C - Possible Injury (130) [12%]
N - Not Injured (874) [78%]
99 - Unknown (3) [0.3%]

**27% of Total Crashes**



## Freight Crashes

Freight related crashes are the second most common factor of crashes with 11% of all crashes in Seguin involving freight. These crashes are also slightly more severe on average with 11.9% of freight crashes categorized as a KAB crash versus the Cities percentage being 11.4%. As shown in **Table 8**, there is a slightly higher percentage of fatal (0.9%) and suspected serious injury (6%) crashes when freight is involved than when the crash only involves passenger vehicles.

*TABLE 8. VEHICLE VS FREIGHT CRASHES BY CRASH SEVERITY*

| CRASH SEVERITY | VEHICLES | MOTORCYCLES | DIFFERENCE |
|---|---|---|---|
| **K - FATAL INJURY** | 0.4% | 0.9% | 0.5% |
| **A - SUSPECTED SERIOUS INJURY** | 5% | 6% | 1% |
| **B - SUSPECTED MINOR INJURY** | 6% | 5% | -1% |
| **C - POSSIBLE INJURY** | 11% | 10% | -1% |
| **N - NOT INJURED** | 77% | 78% | 1% |
| **99 - UNKNOWN** | 0.7% | 0.2% | -0.5% |

*Vulnerable Road Users disproportionately experience higher-severity Crashes*

In Seguin, there are two major freight corridors: State Highway 46 and I-10. State Highway 46 is part of the Critical Urban Freight Corridor and I-10 is part of the Primary Highway Freight System. As expected, most of the freight related crashes in Seguin occur on these corridors as shown in **Exhibit 8**, though there is a noticeable concentration of these crashes on I-10.

*EXHIBIT 8: FREIGHT RELATED CRASHES*

SEGUIN COMPREHENSIVE SAFETY ACTION PLAN

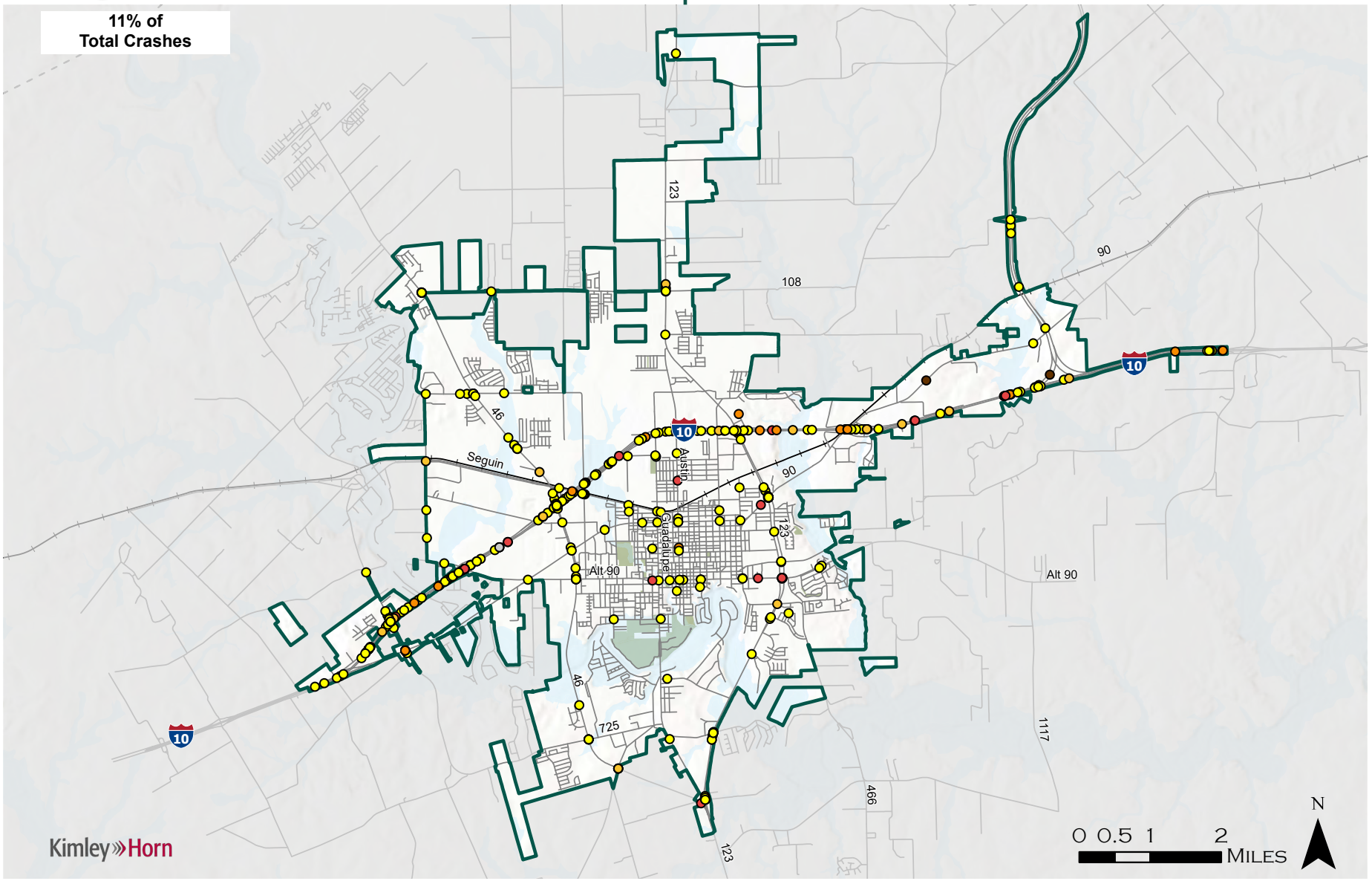
## FREIGHT RELATED CRASHES (2018-2022)

### CITY OF SEGUIN SAFETY ACTION PLAN

Study Area
County Line
Roads
Parks
100-Year Floodplain
Railroads

- K - Fatal Injury (4) [0.9%]
- A - Suspected Serious Injury (25) [6%]
- B - Suspected Minor Injury (22) [5%]
- C - Possible Injury (43) [10%]
- N - Not Injured (345) [78%]
- 99 - Unknown (1) [0.2%]

**11% of Total Crashes**



## Crash Profiles

The crash trends in the previous section established a baseline for further analysis which was expanded upon through the creation of Crash Profiles. These profiles aimed to identify trends in road design and environmental characteristics that may have influenced the frequency or severity of crashes in Seguin. This analysis was achieved by appending various additional datasets to the existing crash data, providing detailed information on road design and environmental factors associated with each crash. The following list includes these datasets:

**NUMBER OF LANES**


**POSTED SPEED**

**INTERSECTION CONTROL**

**ANNUAL AVERAGE DAILY TRAFFIC**

**DEMOGRAPHICS**

**SCHOOLS**

The Crash Profiles were developed by overlaying these design and environmental factors to identify combinations of characteristics that resulted in the highest frequencies and severities of crashes. This analysis produced six combinations outlining multivariate road characteristics that could benefit from further design study to mitigate their impact on crash frequencies and severities. **Figure 12** on Page 45 displays the final six crash profiles and their respective KAB crash totals.

*FIGURE 12. CRASH PROFILES FOR SEGUIN*

| CRASH PROFILE 1 | | | CRASH PROFILE 2 | |
|---|---|---|---|---|
| | Posted Speed: 45 – 50 MPH | 4 Lanes | Posted Speed: 55+ MPH | 4 Lanes |
| | Number of Crashes | Percentage | Number of Crashes | Percentage |
| **K** | 1 | 6% | 8 | 50% |
| **A** | 44 | 27% | 51 | 31% |
| **B** | 60 | 27% | 43 | 19% |
| ***Total*** | ***105*** | ***26%*** | ***102*** | ***25%*** |

| CRASH PROFILE 3 | | | CRASH PROFILE 4 | |
|---|---|---|---|---|
| | Disadvantaged Census Tracts | Midblock Intersection | Disadvantaged Census Tracts | 4 Lanes |
| | Number of Crashes | Percentage | Number of Crashes | Percentage |
| **K** | 6 | 38% | 4 | 25% |
| **A** | 52 | 32% | 58 | 35% |
| **B** | 57 | 26% | 79 | 36% |
| ***Total*** | ***115*** | ***29%*** | ***141*** | ***35%*** |

| CRASH PROFILE 5 | | | CRASH PROFILE 6 | |
|---|---|---|---|---|
| | High (25,000+) AADT | Posted Speed: 55+ | Low-Medium (4,000-7,999) AADT | Posted Speed: 45–50 MPH |
| | Number of Crashes | Percentage | Number of Crashes | Percentage |
| **K** | 6 | 38% | 1 | 6% |
| **A** | 33 | 20% | 26 | 16% |
| **B** | 27 | 12% | 32 | 14% |
| ***Total*** | ***66*** | ***16%*** | ***59*** | ***15%*** |

## Crash Profiles for Seguin

Most of the crash profiles involved roadway design features such as number of lanes, intersection characteristics, or posted speed limits. Half of the crash profiles identified included roadways with 4 lanes within the pair. Furthermore, crash profile 1 and 2 show that roadways with 4 lanes and medium to high speeds contain a large portion of KAB crashes, 26% and 25% respectively. Additionally, Crash Profile 2 which combined high speed and roadway lanes saw the largest number of fatal crashes out of all the identified crash profiles; 50% of fatal crashes occurred on these roadways. This suggests that in future roadway projects and improvements the number of lanes and design speeds should be carefully chosen due to the correlation that exists between those features and KAB crashes.

Apart from posted speed limits and number of lanes, environmental features near the roadways were heavily associated with crash incidences. Roadways being in disadvantaged census tracts, as identified by the United Stated Department of Transportation's (USDOT) Equitable Transportation Community (ETC) Explorer, can be largely associated with KAB crashes. Crash Profiles 3 and 4 captured the two largest percentages of total KAB crashes, 29% and 35% respectively. This analysis suggests that 4-lane roadways and midblock intersections in disadvantage census tracts could be contributing to an unsafe transportation environment, specifically, at midblock intersection where 38% of fatal crashes have occurred. Since the crash profiles suggest more severe crashes occur in disadvantaged census tracts, the transportation network in these tracts should be prioritized.

A combination of high traffic volume (AADT of 25,000) and high speeds (55 MPH or more) was identified aa capturing 38% of fatal crashes in Seguin. Although overall this crash profile only captured 16% of KAB crashes in Seguin, high volumes and speeds could be increasing the risk of crashes. This could be due to the high density of vehicles traveling at speeds too fast to stop abruptly therefore countermeasures should be considered to manage speeding.

*Equity for the comprehensive safety action plan involves **tailoring resources and interventions** to **meet the specific needs** of Seguin, ensuring that **vulnerable communities have the necessary support** to achieve similar safety outcomes.*

# Chapter 4. Equity Review

For the Seguin Comprehensive Safety Action plan, Equity was a key factor in determining how the city should prioritize future investment. Equity for the comprehensive safety action plan involves tailoring resources and interventions to meet the specific needs of Seguin, ensuring that vulnerable communities have the necessary support to achieve similar safety outcomes. In contrast, equality focuses on providing the same resources and opportunities to all individuals, regardless of their unique circumstances, which may not address the disparities in safety needs. By prioritizing equity, the plan recognizes and addresses the varying levels of risk and access to safety measures among diverse populations, leading to more effective and inclusive safety improvements.

## How do we measure Equity?

The U.S. Department of Transportation (US DOT) defines disadvantaged census tracts for the Safe Streets and Roads for All (SSFA) grants based on criteria such as poverty levels, median household income, and access to transportation services. These tracts typically exhibit higher rates of poverty and unemployment, lower median incomes, and limited access to public transit. Additionally, disadvantaged census tracts may experience higher rates of traffic incidents and have inadequate infrastructure for pedestrian and cyclist safety. The identification of these tracts is crucial for directing SSFA grants to areas most in need of safety improvements and equitable resource distribution.

### Disadvantaged Census Tracts

Approximately a third of the city is considered a disadvantaged census tract according to the USDOT's metrics discussed previously. Although most of the disadvantaged census tracts are in the southeastern portion of the City, there are some disadvantaged census tracts located in the northmost and westmost parts of Seguin. The locations of the disadvantaged census tracts in the City according to USDOT's ETC Explorer are pictured in **Exhibit 9** on page 615.

## Disadvantaged Crash History vs. Citywide

Approximately 43% of the City study 's population lives in disadvantaged census tracts. There were 219 total KAB crashes in disadvantaged census tracts over the last five years (2018-2022), representing approximately 48% of all KAB crashes observed in the City over the same period. Additionally, over the last five years, 14 out of the 43 total bicycle and pedestrian crashes were in disadvantaged areas (45%).

Throughout the City, 11.4% of all crashes are KABs, whereas in disadvantaged census tracts, this number is 10.3% (**Table 9**). Although there appears to be less severe crashes occurring in disadvantaged areas of Seguin, it is important to Overall, this data differs from the nationwide trend that fatal and severe crashes are more frequent in disadvantaged areas.

*TABLE 9: CITYWIDE VS DISADVANTAGED CRASH SEVERITY*

| CRASH SEVERITY | VEHICLES | MOTORCYCLES | DIFFERENCE |
|---|---|---|---|
| **K - FATAL INJURY** | 0.4% | 0.3% | -0.1% |
| **A - SUSPECTED SERIOUS INJURY** | 5% | 4% | -1% |
| **B - SUSPECTED MINOR INJURY** | 6% | 6% | - |
| **C - POSSIBLE INJURY** | 11% | 11% | - |
| **N - NOT INJURED** | 77% | 78% | 1% |
| **99 - UNKNOWN** | 0.7% | 0.8% | 0.1% |

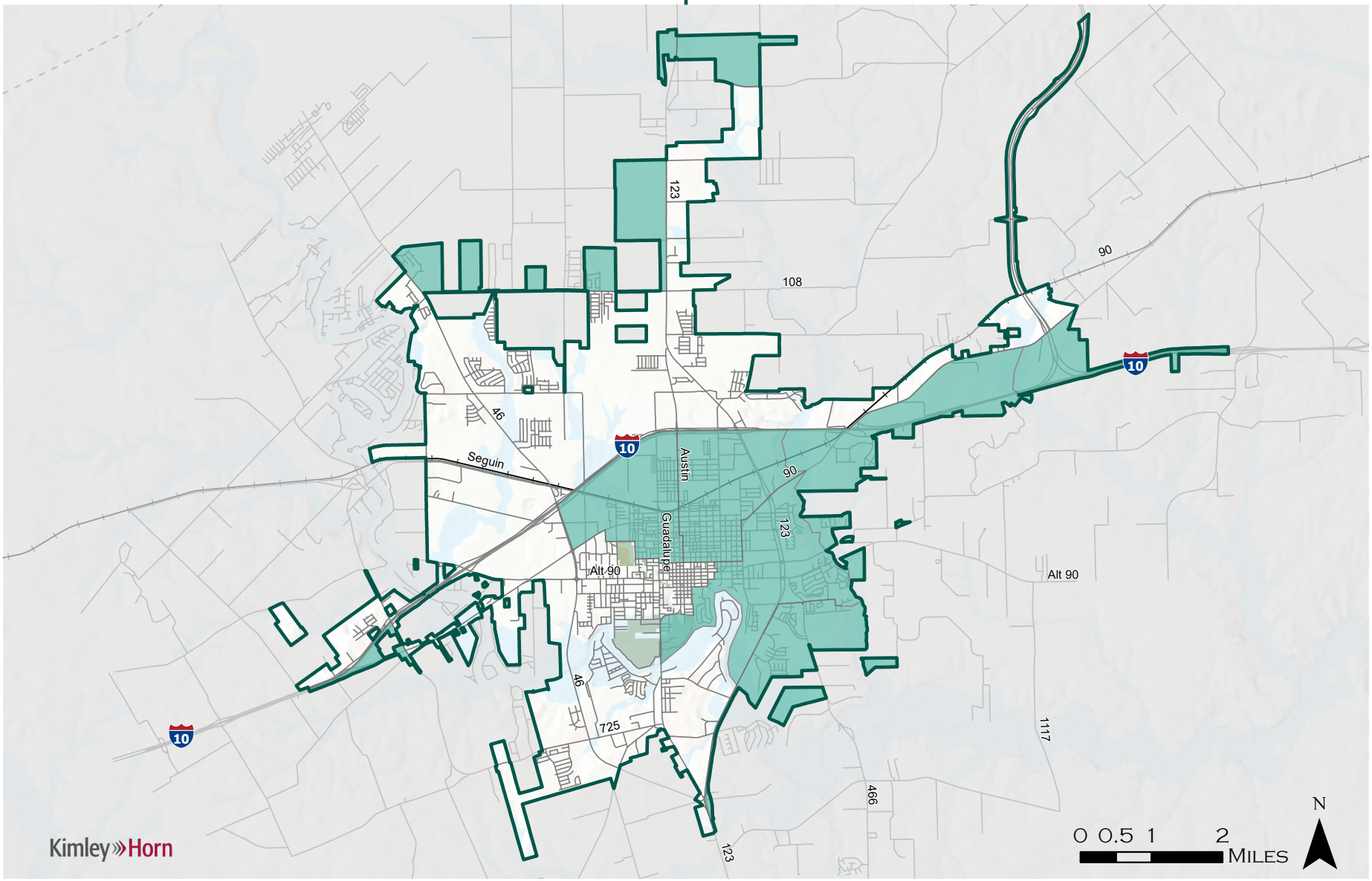
*Vulnerable Road Users disproportionately experience higher-severity Crashes*

*EXHIBIT 9: DISADVANTAGED CENSUS TRACTS*

SEGUIN
COMPREHENSIVE SAFETY ACTION PLAN

## DISADVANTAGED TRACTS (2018-2022)

### CITY OF SEGUIN SAFETY ACTION PLAN



## Methodology

Utilizing data collected from the USDOT's Equitable Transportation Community (ETC) Explorer, underserved communities within Seguin were identified. An integral part of the crash history analysis completed was considering equity and existing disadvantaged areas of the City to better improve safety in underserved parts of the community. This analysis included population characteristics for six categories:


The six categories were scored, summed, and the resulting percentiles are ranked to create the final index score for a census tract. According to USDOT's metrics, a census tract is experiencing disadvantage if the overall score places it at 65% or higher than all census tracts in the United States (US).

## Results

The data analyzed in this study offers a comprehensive understanding of the specific needs of each identified underserved tract within Seguin. This information enables the city, policymakers, and other relevant stakeholders to make well-informed recommendations and decisions based on detailed calculations and assessments. By pinpointing areas of vulnerability, the study guides targeted interventions and resource allocation to improve conditions in these underserved tracts.

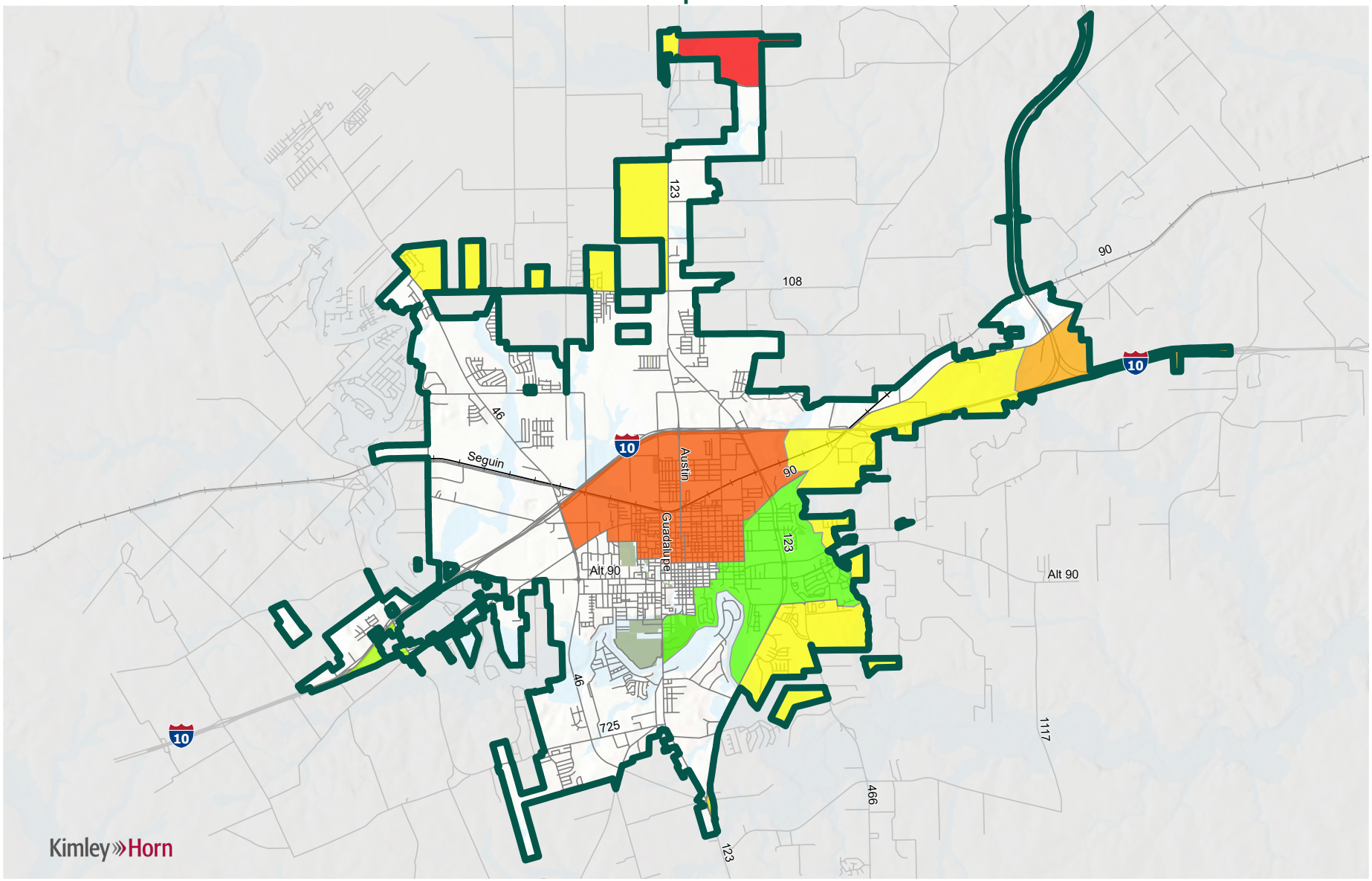
### Equity Overview Map

The overall map assessment of Seguin is a compilation of all scores assigned to the 6 indicators: accessibility, environment, mobility, connectivity, safety, and community. This composite score is visually represented on a gradient scale ranging from red to green, where red signifies higher vulnerability and green indicates lower vulnerability. Compiling all the scores in one map allows us to visualize which tracts are the most vulnerable and would require the most targeted intervention and resource allocation (**Exhibit 10**). The census tracts that have the highest vulnerability in Seguin have high percentage of population community indicator scores and the lowest connectivity scores. According to the findings in the previous chapter, the intersections with the highest crash rates also occur along Interstate 10. This correlation confirms that the most vulnerable census tracts are at high risk for crashes and are likely disadvantaged by common social demographics i.e., high poverty rates, high minority populations, high zero car households, etc. This map can help the city visualize how disadvantaged communities in Seguin face higher safety risks. One outlier in the data is Census Tract C. While this tract has some of the highest crashes, it scored low in the social vulnerability analysis due to the presence of trails and pedestrian infrastructure.

*EXHIBIT 10: VULNERABILITY OF CENSUS TRACTS*

SEGUIN
COMPREHENSIVE SAFETY ACTION PLAN

## VULNERABILITY OF CENSUS TRACTS (2018-2022)
## CITY OF SEGUIN SAFETY ACTION PLAN



*Traffic crash data is used to determine the network by considering factors such as crash frequency and severity. The purpose of the HIN is to* ***help the City prioritize future transportation projects and investments.***

# Chapter 5. High-Injury Network

A high-injury network (HIN) consists of roads, intersections, or other transportation infrastructure with a higher-than-average rate of crashes resulting in injuries or fatalities. Traffic crash data is used to determine the network by considering factors such as crash frequency and severity. The purpose of the HIN is to help the City prioritize future transportation projects and investments.

A crucial step in reducing fatal and severe crashes is identifying and prioritizing facilities within the HIN to improve. Before safety countermeasures for the City can be identified, the HIN must be determined to aid in the decisions regarding roadway safety enhancements.

## Critical Crash Rate Method

The Federal Highway Administration (FHWA) outlines methods to calculate crash rates to prioritize locations where safety improvements are most needed. Outlined in the Highway Safety Manual, Section 4.4.4.5 on Page 4-41, the critical crash rate method identifies crash hotspots by comparing the observed crash rate at a roadway segment to the expected crash rate based on similar functional classification and traffic volumes. If the observed crash rate exceeds the expected crash rate, the roadway segment is considered to have a critical crash rate and is considered for the HIN.

An ArcGIS Pro model was created to calculate the critical crash rate and supporting calculations for each roadway segment in the City. The model assigns crashes to an adjacent segment and performs the calculations in the order outlined by the FHWA. The following section outlines the process used in the calculation of the critical crash rate using fatal and severe crashes from the previous five years (2018-2022) in Seguin.

## Critical Crash Rate Calculation

The following three steps were followed to calculate the critical crash rate for each road segment in Seguin:

1. Assigning Data to Road Segments
2. Calculate Variables of Critical Crash Rate
3. Calculate Critical Crash Rate Ratio

### Assigning Data to Road Segments

Calculating the critical crash rate requires three data inputs: roadway functional classification, daily traffic volumes, and crash counts. Since different factors, such as higher traffic volumes, more travel lanes, and higher speed limits, can inflate crash rates, the normalization and comparison of these rates are crucial. The critical crash rate compares road segments that have similar roadway functional classification and normalizes daily traffic volumes to calculate crashes at a more even level based on their commonalities.

### Calculate Variables of Critical Crash Rate

The critical crash rates were calculated using the equations outlined in the FHWA's Highway Safety Manual. The observed crash rate represents the existing KAB crashes on each road segment per 100 million vehicle-miles traveled. For the expected average crash rate per 100 million vehicle-miles traveled calculations, the daily volumes for each functional class were normalized. Furthermore, roadways were only compared to other roadways that were similar; for example, local roads were only compared to local roads. **Figure 13** outlines the data inputs needed to calculate the critical crash rate.

### Calculate Critical Crash Rate Ratio

A ratio is used to identify the magnitude of difference between the observed and expected crash rates. If the ratio is greater than 1.0 or the observed crash rate is higher than the expected crash rate, then that road segment's crash history was greater than the other road segments that share the same functional classification. Any segments with a ratio of 1 or greater were flagged as potential HIN segments.

*FIGURE 13: HIN DATA INPUTS*

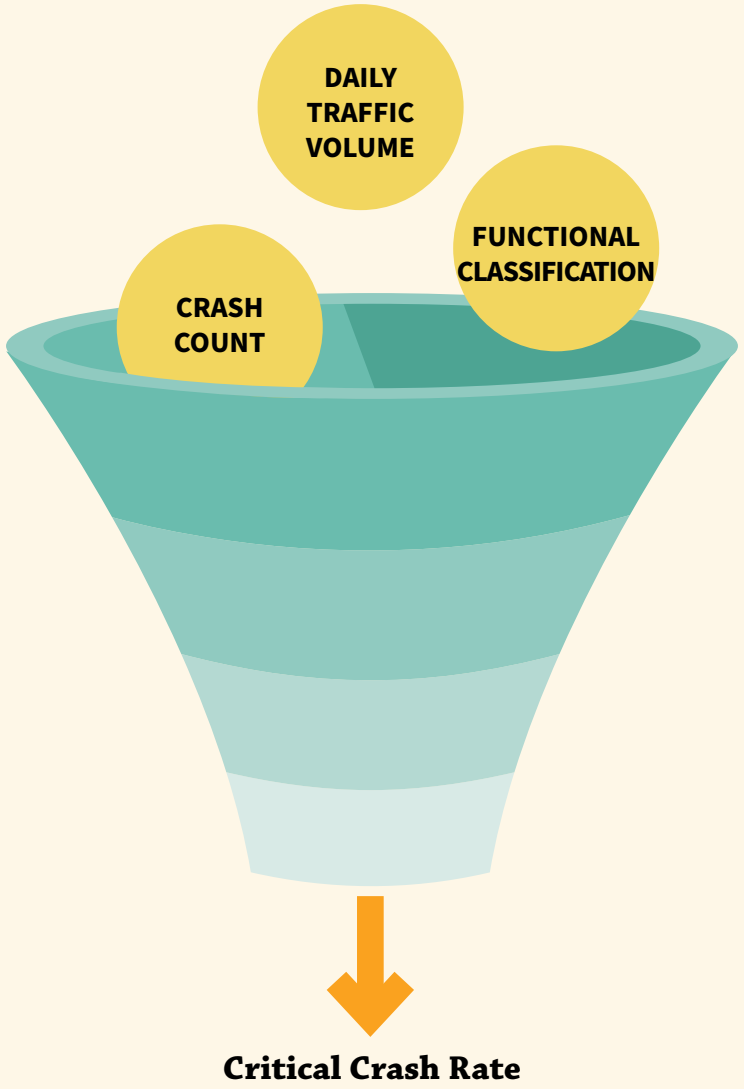
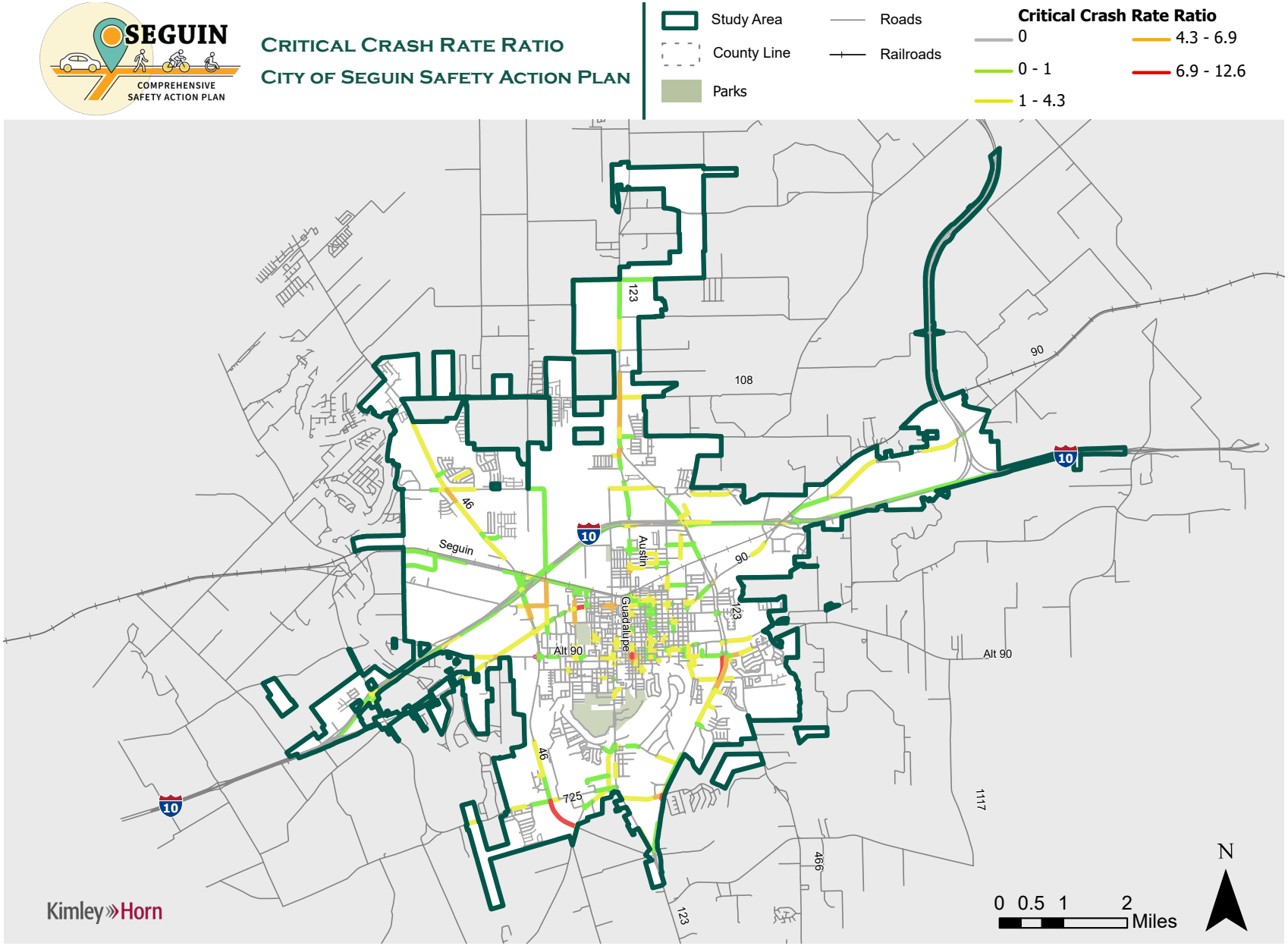


**Exhibit 11** on Page 61 provides a visual summary of all the ratio results.

*EXHIBIT 11: CRITICAL CRASH RATE RATIO RESULTS*



## HIN Development and Results

The HIN was created through the selection of segments based on data-driven criteria combined with qualitative refinement of the model results. The goal of the HIN is to maximize the total vehicle-only KAB crashes and bicycle/pedestrian KAB crashes on the smallest percentage of City roads.

To refine and clean the model results, crash segments that only saw one crash but had a ratio of greater than 1.0 were removed from the model to prioritize segments with more severe crash histories. After this initial cleaning, the remaining segments were those with more than one KAB crash that occurred within the last five years and had a higher-than-expected crash rate. While not all segments experienced a KAB crash, the influence area of the crash typically bleeds over to adjacent segments. To create a coherent and continuous HIN, the gaps between high crash segments were filled.

Following the refinement of the calculated critical crash rates, the HIN for the City of Seguin is determined. Seguin's HIN consists of approximately 19.4 miles of the City's roadways while capturing 61.8% of vehicle-only KAB crashes, 40% of K crashes, and 43.8% of bicycle and pedestrian KAB crashes.

A summary of all segments included in the HIN is shown in **Table 10**, and a map of the City's High Injury Network is shown in **Exhibit 12** on Page 724.

*TABLE 10: HIGH-INJURY NETWORK SEGMENTS*

| HIN SEGMENT | LIMITS | | LENGTH (MI) | CRASHES | | | | DAILY VOLUME |
|---|---|---|---|---|---|---|---|---|
| | FROM | TO | | K | A | B | Total KABs | |
| **US 90** | Turtle Ln | TX 130 | 7.65 | 3 | 30 | 33 | 66 | 11,954 |
| **Court St** | TX 46 | Elmwood Dr | 1.76 | 0 | 19 | 19 | 38 | 12,426 |
| **TX 123** | South Seguin | Walnut St Turnaround | 4.23 | 0 | 9 | 19 | 28 | 28,946 |
| **W New Braunfels St** | Paloma St | 8th St | 1 | 1 | 6 | 8 | 15 | 15,710 |
| **Austin St** | Court St | Kingsbury St | 0.58 | 0 | 4 | 6 | 10 | 170 |
| **San Marcos St** | Court St | Kingsbury St | 0.82 | 0 | 3 | 9 | 12 | 210 |
| **TX 46** | CH Mathies Jr | Court St | 0.58 | 0 | 4 | 4 | 8 | 420 |
| **Stockdale/Sutherland Spr/Tor** | FM 467 | Blue Bonnett St | 0.82 | 0 | 2 | 2 | 4 | 4,800 |
| **E Mountain St** | Heideke St | King St | 0.31 | 0 | 2 | 2 | 4 | 118 |
| **N King St** | Court St | Ireland St | 0.18 | 0 | 5 | 2 | 7 | 1,650 |

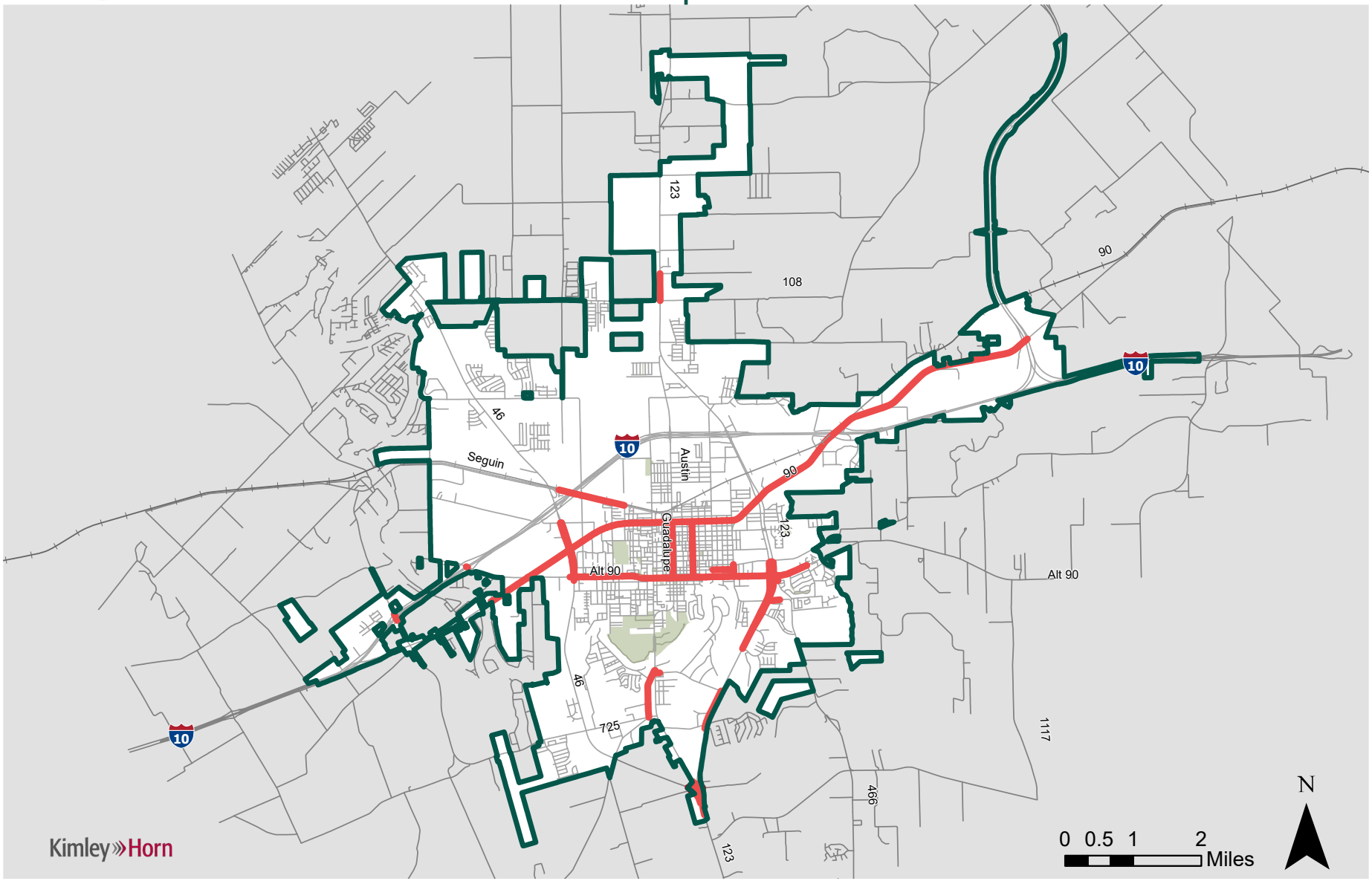
*TABLE 10: HIGH-INJURY NETWORK SEGMENTS (CONTINUED)*

| HIN SEGMENT | LIMITS | | LENGTH (MI) | CRASHES | | | | DAILY VOLUME |
|---|---|---|---|---|---|---|---|---|
| | FROM | TO | | K | A | B | Total KABs | |
| **TX 46** | South Seguin | - | 0.3 | 0 | 4 | 0 | 4 | 10,012 |
| **Pine Meadow Rd** | - | - | 0.18 | 0 | 7 | 4 | 11 | Null |
| **Eastwood Dr** | TX 123 | Countryside Blvd | 0.19 | 0 | 2 | 2 | 4 | 16,132 |
| **FM 725** | IH 10 EB | IH 10 WB | 0.1 | 2 | 6 | 3 | 11 | 9,020 |
| **FM 464** | IH 10 EB | IH 10 WB | 0.02 | 0 | 3 | 1 | 4 | 2,556 |
| **TX 123** | Cordova Rd | FM 111 | 0.4 | 0 | 3 | 3 | 6 | 94 |
| **Preston Dr** | Eastridge Pkwy | Court St | 0.08 | 0 | 1 | 2 | 3 | 50 |

*EXHIBIT 12: HIGH-INJURY NETWORK*

SEGUIN
COMPREHENSIVE SAFETY ACTION PLAN

## High-Injury Network
## City of Seguin Safety Action Plan



DRAFT

# Comprehensive Safety Action Plan

# III


# III

# Part III: Comprehensive Safety Action Plan

## Introduction

**Part III** details countermeasures and recommendations for study corridors and systemic improvements as part of the Comprehensive Safety Action Plan. This includes policies, programs, and various strategies and actions that provide improvements for specific safety emphasis areas in Seguin.

**Chapter 6: Countermeasures**

- **Targeted Recommendations**
- **Systemic Countermeasure Toolbox**

**Chapter 7: CSAP Implementation**

- **Implementation Program**
- **Action Matrix Elements**
- **Plan Administration**

*Targeted recommendations at study corridors and intersections provide* ***detailed and crafted recommendations*** *for specific areas of the City of Seguin that have varying crash history, road geometry, intersection control, and land use context.*

# Chapter 6. Countermeasures

This chapter details the two study corridors and five intersections identified by the HIN and SRC along with their respective targeted recommendations and countermeasures. Targeted recommendations at study corridors and intersections provide detailed and crafted recommendations for specific areas of the City of Seguin that have varying crash history, road geometry, intersection control, and land use context. Additionally, systemic recommendations are organized by safety emphasis area and provide a countermeasure toolbox to make citywide improvements.

## Targeted Recommendations

To select projects and recommendations that would improve safety, in-field observations were made to understand existing conditions and crash locations. The following section summarizes the crash history and highlights corridor and intersection-level recommendations for each of the two selected study corridors.

### Study Corridors and Intersections

Two road segments on the High-Injury Network were selected as priority corridors to make targeted recommendations that improve safety on the City's most unsafe corridors today. The highest priority study corridors were selected with input from City staff and scored based on equity, engagement, and feasibility. The criteria for scoring each road segment were the following:


**EQUITY**

- Disadvantaged Areas (USDOT ETC Explorer)
- Transportation Disadvantaged Areas (USDOT ETC Explorer)
- Equity Review Scorecard

**ENGAGEMENT**

- Social Pinpoint Map Survey Comments
- Review Committee Study Area Comments (from Meeting 2)
- Review Committee Priority Selection (from Meeting 3)

**FEASIBILITY**

- Current City Projects
- TxDOT On/Off System

In coordination with City of Seguin Staff and the SRC, the two study corridors and five intersections selected for targeted recommendations are outlined in **Table 11**. The study corridors add up to 3 miles of roadway and 5 intersections (**Exhibit 13**), capturing 78 KAB crashes within their limits. Each are spread between various parts of Seguin and are located near multiple land use contexts.

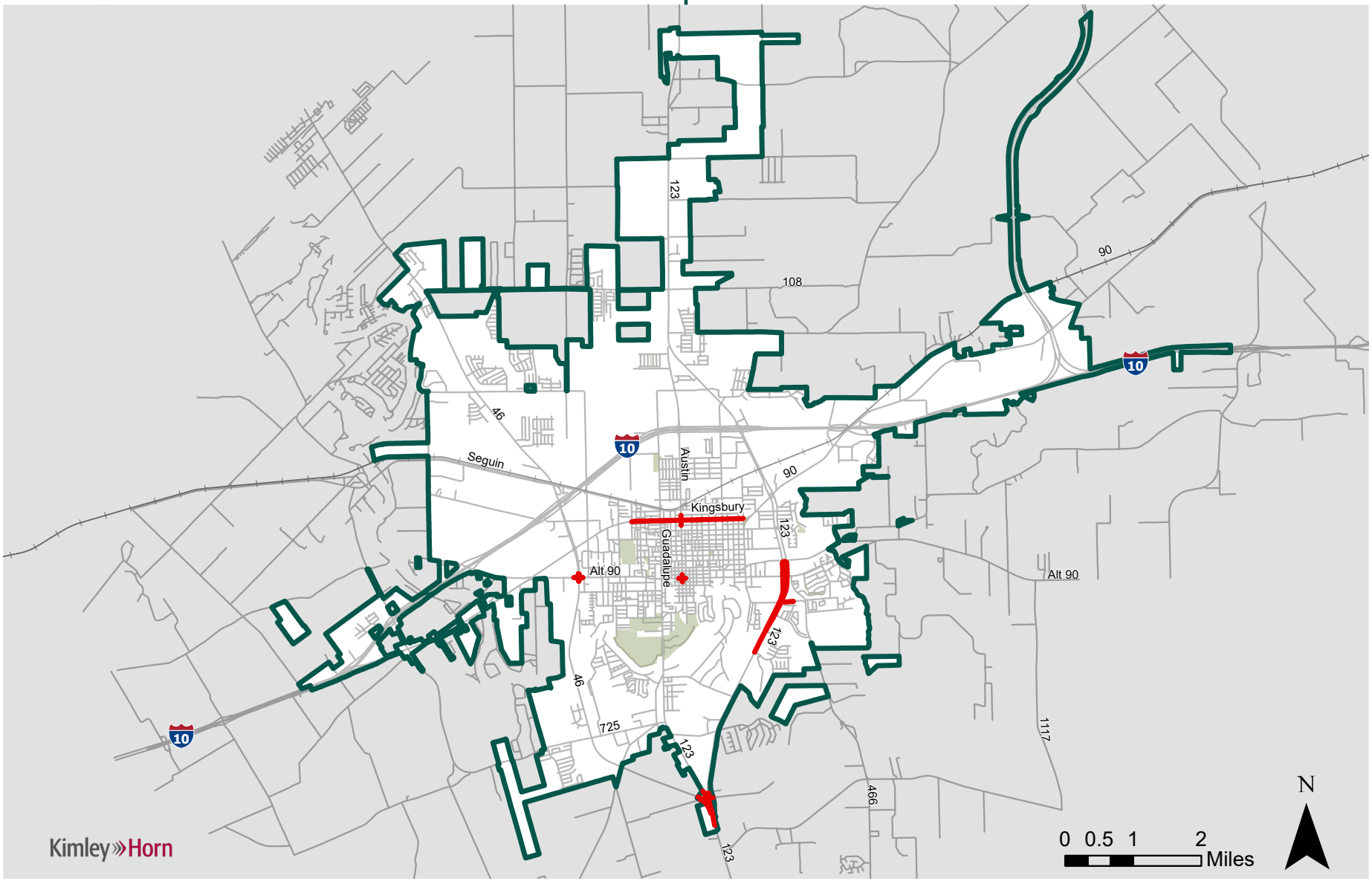
*TABLE 11: STUDY CORRIDORS AND INTERSECTIONS*

| STUDY CORRIDOR/ INTERSECTION | LIMITS | | LENGTH (MI) | CRASHES | | | | DAILY VOLUME |
|---|---|---|---|---|---|---|---|---|
| | From | To | Length (Mi.) | K | A | B | Total KABs | Daily Traffic |
| **1. US 90 Alt (Kingsbury St)** | 8th | King | 1.57 | 0 | 7 | 10 | 17 | 13,000 |
| **2. TX 123** | Nolte Farms | Walnut St Turnaround | 1.37 | 0 | 5 | 16 | 21 | 21,500 |
| **3. US 90 Alt & N Austin St** | - | - | - | 0 | 1 | 3 | 4 | 11,800 |
| **4. US 90 Alt & TX 46** | - | - | - | 0 | 3 | 4 | 7 | 10,000 |
| **5. TX 123 & Joe Carrillo Boulevard** | - | - | - | 0 | 3 | 4 | 7 | 11,900 |
| **6. US 90 & Austin** | - | - | - | 0 | 3 | 5 | 8 | 14,300 |
| **7. TX 123/TX 46/FM 407** | - | - | - | 0 | 10 | 4 | 14 | 10,000 |
| | | ***Total*** | ***2.94*** | ***0*** | ***32*** | ***46*** | ***78*** | ***92,500*** |

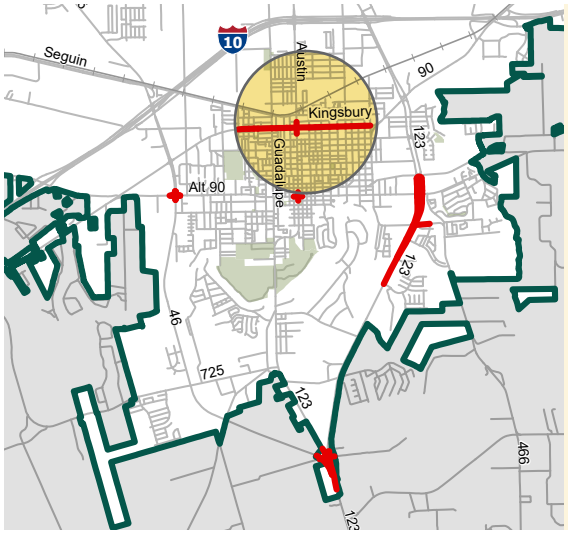
*EXHIBIT 13: STUDY CORRIDORS*

SEGUIN
COMPREHENSIVE SAFETY ACTION PLAN

## STUDY CORRIDORS/INTERSECTIONS
## CITY OF SEGUIN SAFETY ACTION PLAN



## 1 Corridor 1: *Kingsbury Street, From 8th Street to North King Street*




### Context

The Kingsbury St Corridor (Corridor 1) is a section of Kingsbury St, also known as US 90, from 8th St to N. King St that is 1.57 miles in length. Corridor 1 is located in the center of the City and is surrounded by both residential and commercial land uses. This section of Kingsbury St begins as a 4-lane undivided roadway into a 5-lane undivided roadway with a center two-way left turn lane and has volume of approximately 11,970 vehicles per day. Speed limits also vary on this corridor from 45 miles per hour (MPH) to 30 MPH. Furthermore, this corridor had many signalized intersections.

### Crash History

There were 190 total crashes on this section of Kingsbury St between 2018-2022. Of these total crashes, 14 were KABs. Key takeaways for crash trends along Corridor 1 were the following:

**56%**

107 of the 190 total crashes were intersection-related (56%), which included 9 of the 14 KAB crashes (64%)

**18%**

The top manner of collision was 'Angle – Both Going Straight' crashes, which contributed to 34 of the 190 total crashes

**10%**

The top contributing factor of crashes in was 'Driver Inattention', which contributed to 19 of the 190 total crashes

## Corridor Recommendations

It is recommended to install countermeasures along Corridor 1 that would increase driver awareness. These countermeasures include installing raised medians and high contrast lane markings. Raised medians will not only draw drivers' attention to the roadway but are also helpful in reducing speeds. Additionally, high contrast lane markings enhance the visibility of the travel lanes throughout the corridor. This would allow all drivers to easily see where travel lanes being and end.

To enhance the safety and comfortability of vulnerable road users, it is recommended to install sidewalks and relocate overhead utility poles. While there are some sidewalks throughout the Corridor, the facilities are scattered therefore it is recommended to connect existing sidewalks. It was also observed that several utility poles block sidewalks due to their location in the center of these facilities therefore it is recommended to relocate overhead utilities. This would improve the safety and comfortability of vulnerable road users.

## Intersection Recommendations

For all intersections on Corridor 1, it is recommended to evaluate the surrounding areas to determine if there needs to be any driveway consolidation. It was observed throughout the corridor that there were several businesses with very wide driveways in close proximity of intersections. This caused slowdowns on the main lanes of traffic and increased the number of conflicting movements experienced by drivers. It is also recommended to restripe intersection pavement markings at all primary intersections, which include stop bars, turn lanes (if present), and approach lanes. Aside from the recommendations discussed in this section, other intersections along Corridor 1 had additional recommendations as described in their respective sections.

### 8th Street

Currently at this intersection, there are flashing yellow signals on all approaches reminding drivers yield. To decrease the number of intersection crashes that occur at this location, it is recommended to install a traffic signal. Installing a traffic signal would provide safe turning and cross cutting movements at all approaches. Due to the existing infrastructure in place, this improvement could be easily accomplished.

### 7th Street

Recommendations for 7th St align with those suggested for all intersections on Kingsbury St.

### Guadalupe Street

Several traffic signal improvements are suggested for this intersection that include re-evaluating the signal timing, adding a flashing yellow arrow, and adding retroreflective backplates to the existing signals. The signal timing should be re-evaluated to identify a dilemma zones as left-turning crashes were observed in the data. Additionally, there should be a flashing yellow arrow incorporated into the signal timing plan. This would allow drivers turning left to do so during a permissive green light as long as they are yielding the ROW to oncoming traffic. Aside from the traffic signal improvements suggested, it is also recommended to refresh the pavement markings at this intersection.

### Geronimo Street

It is recommended to implement daylighting at the Geronimo St intersection to improve sight distance. This would intel restricting parking near the intersection to reduce blind spots which would give drivers, pedestrian, and bicyclists a better view of the intersection.

### Milam Street

Recommendations for Milam St align with those suggested for all intersections on Kingsbury St.

### San Marcos Street

Recommendations for San Marcos St align with those suggested for all intersections on Kingsbury St.

### Heideke Street

To improve the current infrastructure at the Heideke St intersection, it is recommended to add retroreflective backplates to all traffic signals and add a flashing yellow arrow to the signal timing plan. The retroreflective backplates will create more visible traffic signals for all drivers. Furthermore, the addition of a flashing yellow arrow would allow for safer left turn movements by drivers.

### North King Street

It is recommended to add transverse rumble strips and advances signal warning signs prior to the intersection to the East. Implementing these countermeasures will help remind drivers to reduce their speeds due to the upcoming signalized intersection. Prior to this intersection the speed limit is set to 55 MPH while after the intersection the speed limit decreases to 45 MPH. This would help reduce the number of rear end crashes caused by stopping or slowing down at the intersection.

**Table 12** summarizes the suggested countermeasures and crash modification factors (CMF). **Exhibit 14** summarizes all recommendations and countermeasures along Kingsbury St.

*TABLE 12: COUNTERMEASURE CRASH MODIFICATION FACTORS FOR KINGSBURY STREET*

| ID | LOCATION | RECOMMENDATION | CMF ID | COUNTERMEASURE | CMF |
|---|---|---|---|---|---|
| 1.1 | Corridor | Install a Raised Median | 7792 | Install a Raised Median | 0.76 |
| 1.2 | Corridor | Install Sidewalk | 11246 | Install Sidewalk | 0.6 |
| 1.3 | Corridor | Install High Contrast Pavement Markings | 11280 | Install Contrast Pavement Markings | 0.84 |
| 1.4 | Corridor | Relocate Overhead Utilities | 11198 | Remove/Relocate Utility Poles | 0.87 |
| 1.A.1 | 8th St | Install a Traffic Signal | 7967 | Install A Traffic Signal and Left Turn Lanes | 0.57 |
| 1.B.1 | 7th St | Driveway Consolidation | 9738 | Presence of Driveway on an Intersection Approach Corner | 0.79 |
| 1.C.1 | Guadalupe St | Refresh Pavement Markings | NSO7 | Upgrade Intersection Pavement Markings | 0.75 |
| 1.C.2 | Guadalupe St | Flashing Yellow Arrow | 7730 | Install a Left Turn Flashing Yellow Arrow | 0.86 |
| 1.C.3 | Guadalupe St | Signal Timing | SO3 | Improve Signal Timing | 0.85 |
| 1.C.4 | Guadalupe St | Reflective Backplates* | 1410 | Add 3-inch Yellow Retroreflective Sheeting to Signal Backplates | 0.85 |

** Reflective Backplates are being installed as of the publishing of this report.*

*TABLE 12: COUNTERMEASURE CRASH MODIFICATION FACTORS FOR KINGSBURY STREET (CONTINUED)*

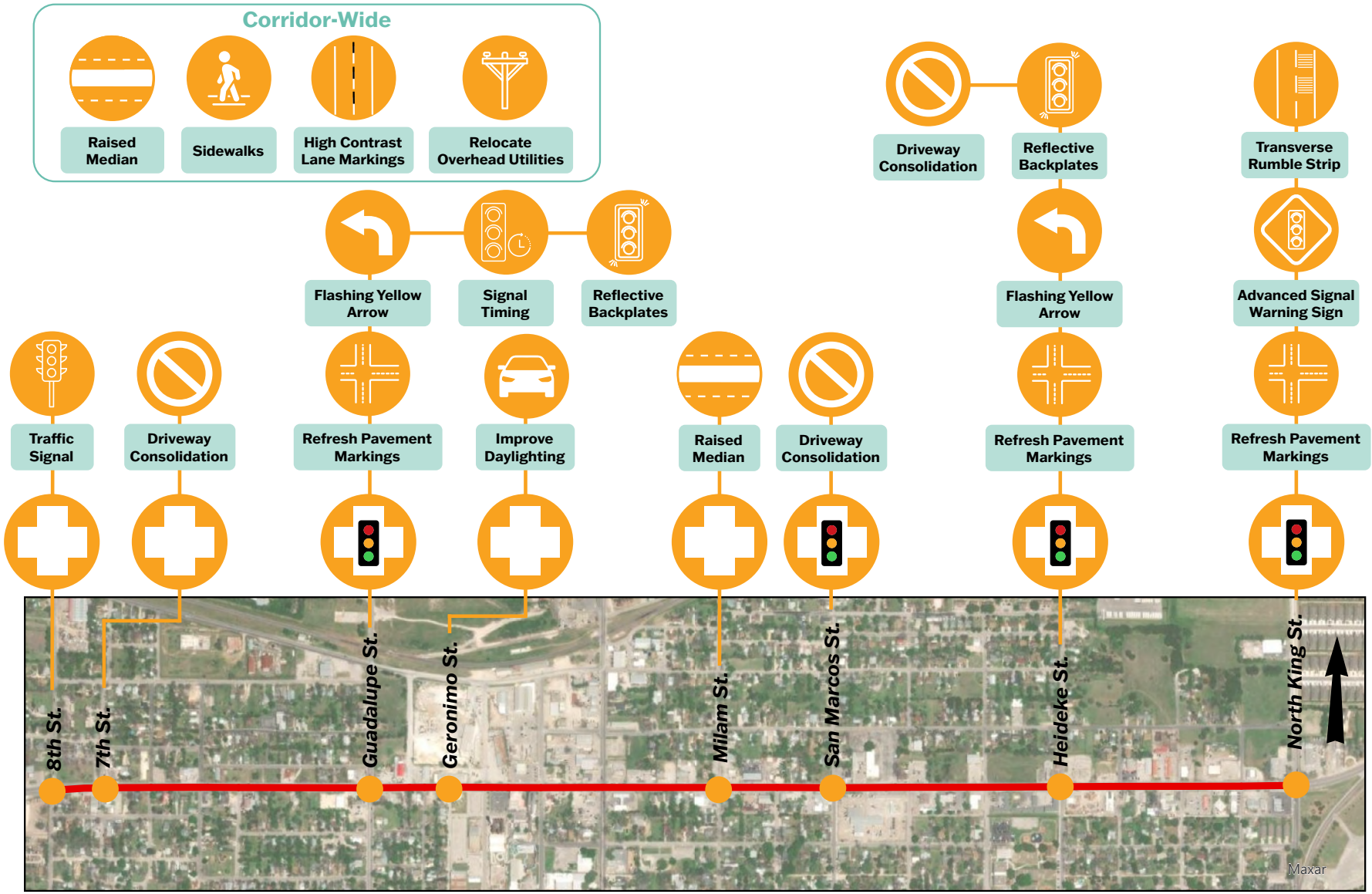
| ID | LOCATION | RECOMMENDATION | CMF ID | COUNTERMEASURE | CMF |
|---|---|---|---|---|---|
| 1.D.1 | Geronimo St | Improve Daylighting | 1752 | Restrict Parking Near Intersections (To Off-Street) | 0.51 |
| 1.E.1 | Milam St | Install a Raised Median | 7792 | Install a Raised Median | 0.76 |
| 1.F.1 | San Marcos St | Driveway Consolidation | 9738 | Presence of Driveway on an Intersection Approach Corner | 0.79 |
| 1.G.1 | Hiedeke St | Refresh Pavement Markings | NSO7 | Upgrade Intersection Pavement Markings | 0.75 |
| 1.G.2 | Hiedeke St | Flashing Yellow Arrow | 7730 | Install a Left Turn Flashing Yellow Arrow | 0.86 |
| 1.G.3 | Hiedeke St | Reflective Backplates* | 1410 | Add 3-inch Yellow Retroreflective Sheeting to Signal Backplates | 0.85 |
| 1.G.4 | Hiedeke St | Driveway Consolidation | 9738 | Presence of Driveway on an Intersection Approach Corner | 0.79 |
| 1.H.1 | North King St | Refresh Pavement Markings | NSO7 | Upgrade Intersection Pavement Markings | 0.75 |
| 1.H.2 | North King St | Advanced Signal Warning Sign | 4198 | Install Dynamic Signal Warning Flashers | 0.81 |
| 1.H.3 | North King St | Transverse Rumble Strip | 138 | Install Transverse Rumble Strips as Traffic Calming Device | 0.66 |

** Reflective Backplates are being installed as of the publishing of this report.*

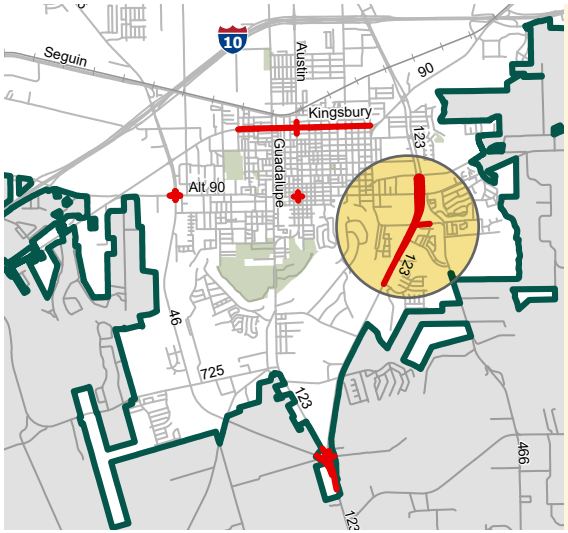
*EXHIBIT 14: KINGSBURY STREET RECOMMENDATIONS*

# Corridor 1: Kingsbury Street

*From 8th Street to North King Street*



## 2 Corridor 2: *TX 123, From Nolte Farm Drive to TX 123 Bypass*




### Context

The segment of TX 123 from Nolte Farm Drive to the TX 123 Bypass is Corridor 2 in this study. The corridor begins as a two-lane undivided roadway and becomes a 4- or 5 – lane divided roadway with a volume of 28,946 vehicles per day. Corridor 2 is approximately 2.5 miles and is located in the southeastern area of Seguin. Similar to Corridor 1, there is a variety of land use surrounding the Corridor with most of it being residential. Additionally, the speed limit changes throughout the Corridor with the speed limit decreasing 55 MPH to 45 MPH towards the middle of the Corridor.

### Crash History

There were 304 total crashes on this section of TX 123 between 2018-2022. Of these total crashes, 25 were KABs. Key takeaways for crash trends exhibited by Corridor 2 were the following:

**68%**

208 of the 304 total crashes were intersection-related (68%), which included 14 of the 25 KAB crashes (56%)

**31%**

The top manner of collision was ‘Same Direction – One Straight – One Stopped’, which contributed to 94 of the 304 total crashes

**16%**

The top contributing factor of crashes in Seguin was ‘Failed to Control Speed’, which contributed to 49 of the 304 total crashes

### Corridor Recommendations

In order to reduce speeds and turning movements throughout the entire Corridor, it is recommended to extend the existing median down to Nolte Farms Drive. In addition, it is recommended to improve the pavement striping on TX 123 to enhance its visibility. These improvements include adding wide edge lines and high contrast lane markings. Both additions would provide a more enhanced view of the travel lane boundaries. Furthermore, a shared use path should be created along Corridor 2. This path would encourage walking and bicycling throughout the Corridor by providing safe and comfortable facilities for residents. Creating safer facilities for pedestrian and bicyclists is specifically important on Corridor 2 because of the many schools in proximity and the mix of residential and commercial land use.

### Intersection Recommendations

Similarly, to Corridor 1, it is recommended to evaluate all driveways near intersections on TX 123 to determine if they should be consolidated. Consolidating driveways should be determined based on their proximity to the intersection, driveway length, and number of entry/exit points. Additionally, dedicated right turn lanes should be considered on minor roadways with a large of right turn movements onto a major roadway.

### Nolte Farms Drive

Recommendations for Nolte Farms Drive align with those suggested for all intersections on TX 123.

### Harry Miller Pass

Transverse rumble strips should be added South of the Harry Miller Pass intersection to aid in slowing drivers' speeds. Prior to this intersection, the speed limit is 55 MPH but decreases immediately after this intersection. Additionally, increased lighting should be implemented at this intersection to enhance visibility. Increasing visibility at intersections is crucial since this is where various modes of transportation cross paths.

### Joe Carrillo Boulevard

Due to this intersection's proximity to Jim Barnes Middle School, sidewalk facilities should be added in the surrounding areas. This would enhance the safety and comfortability for all vulnerable road users in the area. It was also observed at this intersection the lack of a stop bar at the stop sign therefore one should be added.

### Eastwood Drive

On both Eastwood Drive approaches there are existing dedicated right turn lanes with yield signs, it is recommended to add yield pavement markings on these lanes to remind drivers that these lanes are not acceleration lanes and that they do not have the right of way. It is also recommended that left turn lanes be re-constructed to have an offset. Turning the existing turn lane configuration into a positive offset left turn lane would enhance the sight distance to approaching vehicles allowing for safer left turn movements. Furthermore, it is recommended to improve the pedestrian facilities at this intersection. This would consist of refreshing all sidewalk striping and connecting all existing sidewalks.

### East Court Street

It is recommended to improve the existing traffic signal through the addition of retroreflective backplates and updating the signal timing. The signal timing plan should be updated to remove any dilemma zones that may exist and to provide sufficient crossing time for vulnerable road users.

### TX 123 Bypass

At the TX 123 Bypass it is recommended to improve signage prior to the bypass that alerts drivers of the turnaround. Additionally, the existing acceleration lane associated with the turnaround should be extended. This would give more time for vehicles to reach the speed of traffic and help prevent vehicles from crossing all lanes of traffic to reach the businesses on the west side of TX 123. It was also observed that the existing pavement markings have faded therefore it is recommended to refresh all pavements markings at this bypass for better visibility.

**Table 13** identifies the CMFs for all discussed recommendations for TX 123 while **Exhibit 15** summarizes all recommendations and countermeasures along TX 123.

*TABLE 13: COUNTERMEASURE CRASH MODIFICATION FACTORS FOR TX 123*

| ID | LOCATION | RECOMMENDATION | CMF ID | COUNTERMEASURE | CMF |
|---|---|---|---|---|---|
| 2.1 | Corridor | Install High Contrast Pavement Markings | 11280 | Install Contrast Pavement Markings | 0.84 |
| 2.2 | Corridor | Install a Raised Median | 7792 | Install a Raised Median | 0.76 |
| 2.3 | Corridor | Install Wide Edge Lines | 4737 | Install Wider Edge Lines (4 in to 6 in) | 0.64 |
| 2.A.1 | Intersection | Install a Right Turn Lane | 285 | Provide a Right-Turn Lane on One Major-Road Approach | 0.86 |
| 2.B.1 | Intersection | Illumination | 581 | Illumination | 0.73 |
| 2.B.1 | Intersection | Illumination | 577 | Illumination | 0.73 |
| 2.B.2 | Intersection | Transverse Rumble Strip | 138 | Install Transverse Rumble Strips as Traffic Calming Device | 0.66 |
| 2.C.1 | Intersection | Install a Stop Sign and Bar | 9017 | Install Advanced Yield or Stop Markings and Signs | 0.75 |
| 2.C.2 | Intersection | Install Sidewalk | 11246 | Install Sidewalk | 0.6 |
| 2.C.3 | Intersection | Install a Southbound Right Turn Lane | 285 | Provide a Right Turn Lane on One Major Road Approach | 0.86 |
| 2.D.1 | Intersection | Yield Pavement Markings | 9018 | Install Advanced Yield or Stop Markings and Signs | 0.87 |
| 2.D.2 | Intersection | Positive Left Turn Offset | 277 | Introduce Zero or Positive Offset Left-Turn Lane on Crossing Roadway | 0.8 |

*TABLE 13: COUNTERMEASURE CRASH MODIFICATION FACTORS FOR TX 123 (CONTINUED)*

| ID | LOCATION | RECOMMENDATION | CMF ID | COUNTERMEASURE | CMF |
|---|---|---|---|---|---|
| 2.D.3 | Intersection | Install a Right Turn Lane | 285 | Provide a Right-Turn Lane on One Major-Road Approach | 0.86 |
| 2.D.4 | Intersection | Improve Pedestrian Facilities | 8799 | Install a Raised Median with or without Marked Crosswalk | 0.69 |
| 2.D.4 | Intersection | Improve Pedestrian Facilities | 4123 | Install High-Visibility Crosswalk | 0.6 |
| 2.E.1 | Intersection | Signal Timing | SO3 | Improve Signal Timing | 0.85 |
| 2.E.2 | Intersection | Driveway Consolidation | 9738 | Presence of Driveway on an Intersection Approach Corner | 0.79 |
| 2.E.3 | Intersection | Reflective Backplates* | 1410 | Add 3-inch Yellow Retroreflective Sheeting to Signal Backplates | 0.85 |
| 2.E.4 | Intersection | Shared Use Path | 9250 | Install Shared Path | 0.75 |
| 2.F.1 | Intersection | Driveway Consolidation | 9738 | Presence of Driveway on an Intersection Approach Corner | 0.79 |
| 2.F.2 | Intersection | Add additional Pavement Markings & Signage | 280 | Introduce painted left-turn channelization | 0.61 |
| 2.F.3 | Intersection | Extend Acceleration Lane | 474 | Extend Acceleration Lane by Approx. 98 ft. (30 M.) | 0.89 |
| 2.F.4 | Intersection | Install High Contrast Pavement Markings | 11280 | Install Contrast Pavement Markings | 0.84 |

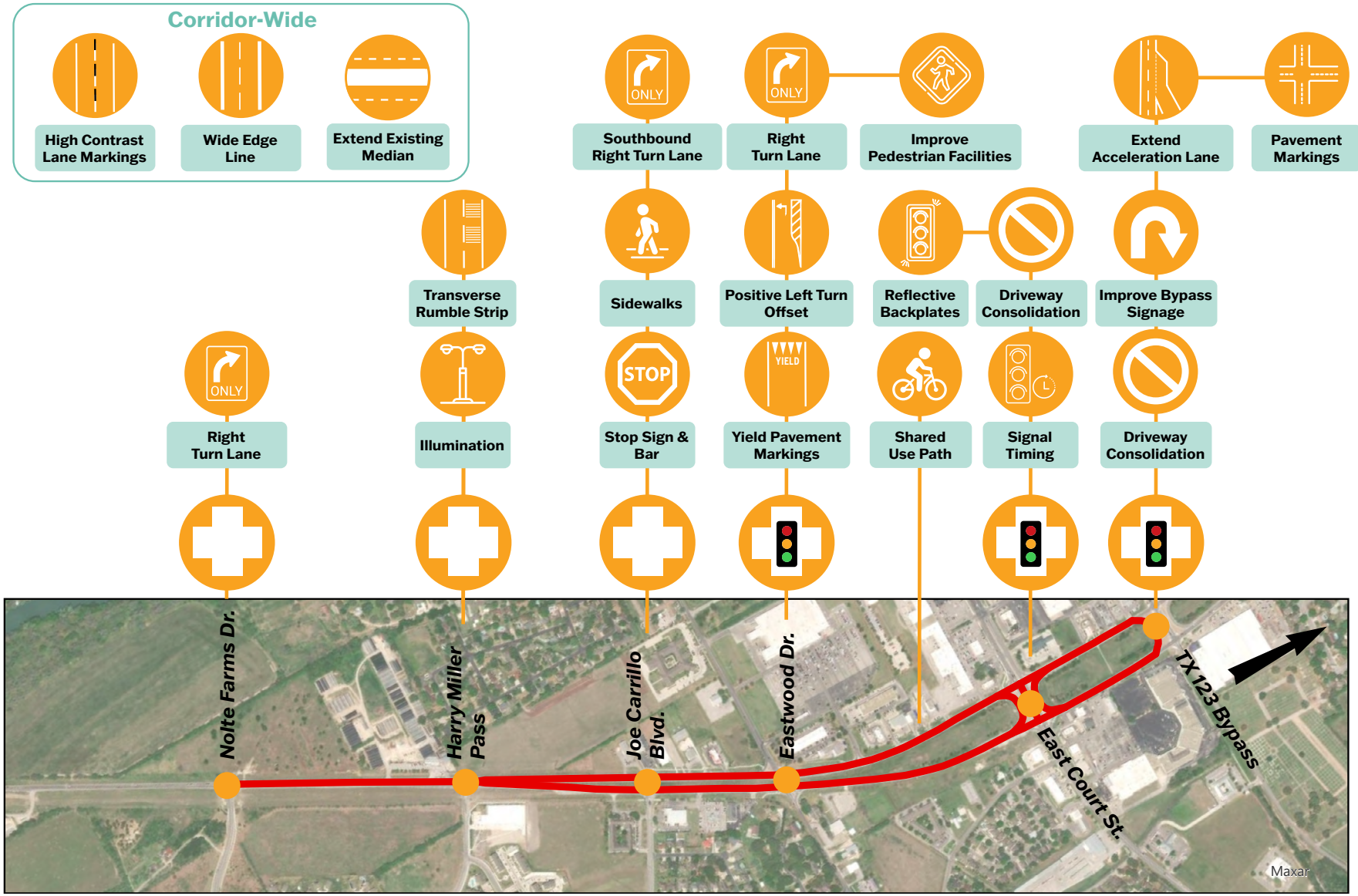
** Reflective Backplates are being installed as of the publishing of this report.*

*EXHIBIT 15: TX 123 RECOMMENDATIONS*

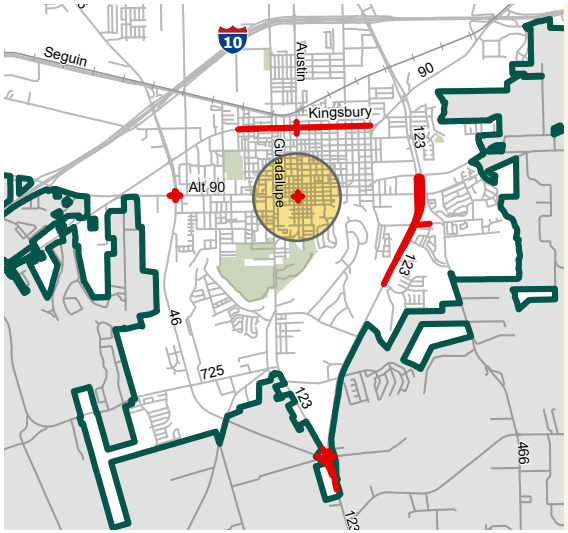
# Corridor 2: TX 123

*From Nolte Farm Drive to TX 123 Bypass*

SEGUIN COMPREHENSIVE SAFETY ACTION PLAN



## 1 Intersection 1: *East Court Street & South Austin Street*




### Observations

The intersection between East Court St and South Austin St is in located in downtown Seguin near the courthouse. Due to its location, area surrounding this intersection is mostly for commercial use. Since the area around this intersection is mostly comprised of local businesses, there is an increased pedestrian volume. Additionally, this intersection is signalized and the speed limits near it are approximately 30 MPH. All approaches except one are 3-lane undivided roadways with a center left turn lane. The east approach on E. Court St is the only approach that is comprised of 4 lanes with a dedicated right turn lane. To enhance pedestrian safety, several recommendations are suggested.

### Crash History

Intersection 1 experienced a total of 46 crashes during the study period. From the 46 total crashes, there were only 2 KAB crashes: one suspected serious injury and one suspected minor injury crash. At this intersection, the top contributing factor of crashes was 'Failed to Control Speed' (speeding); speeding contributed to 13 of the 46 crashes (28%).

### Recommendations

Recommendations for Intersection 1 are as follows:

- No right on red signage
- Increasing turning radii on all approaches
- Adding a leading pedestrian interval to the existing signal timing plan
- Utilize pavers at sidewalks
- Add a yield sign on the dedicated right turn lane on S. Austin St

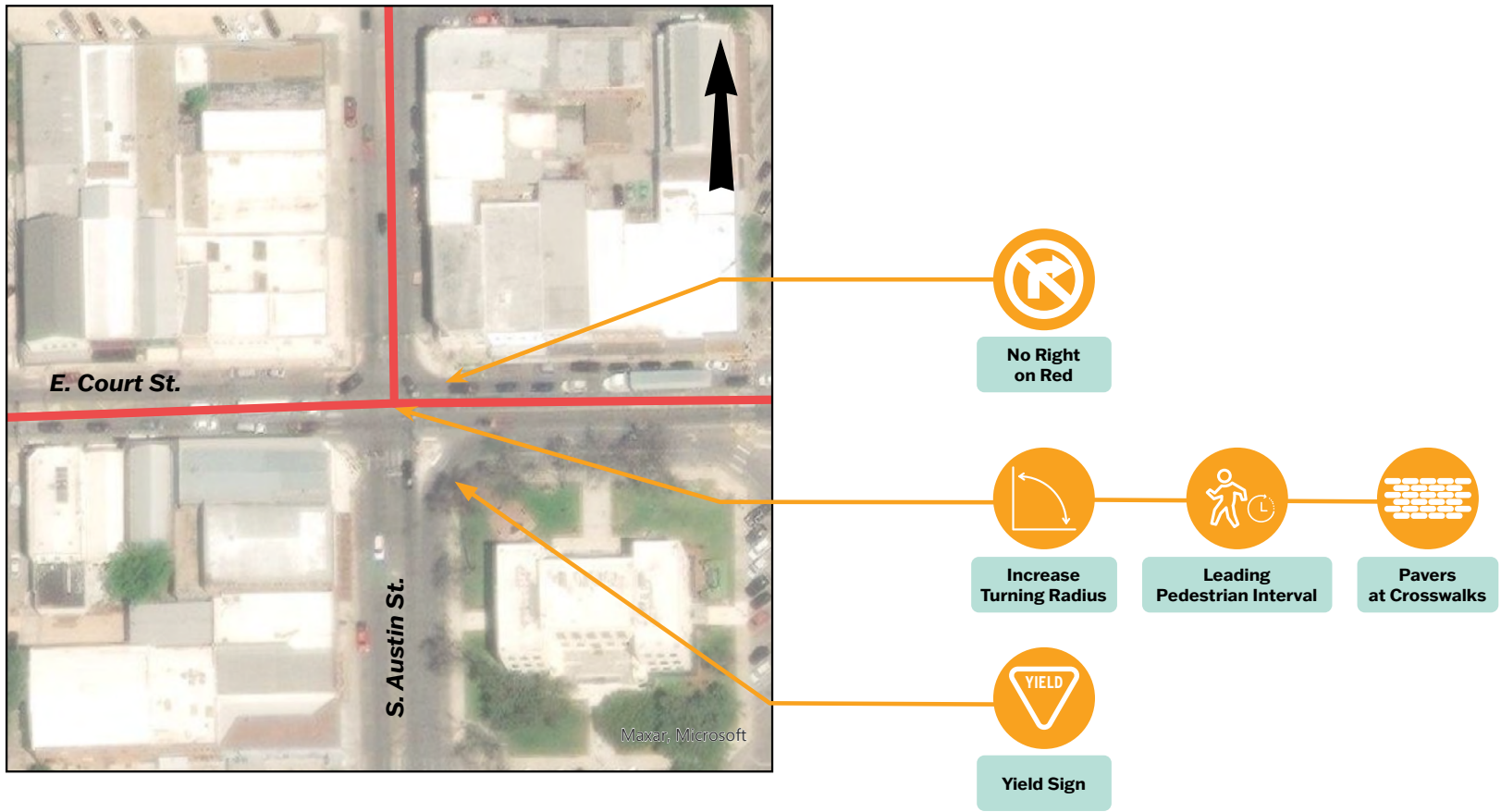
All recommendations are summarized in **Exhibit 16** and their CMFs are listed in **Table 14**.

*TABLE 14: COUNTERMEASURE CRASH MODIFICATION FACTORS FOR INTERSECTION 1*

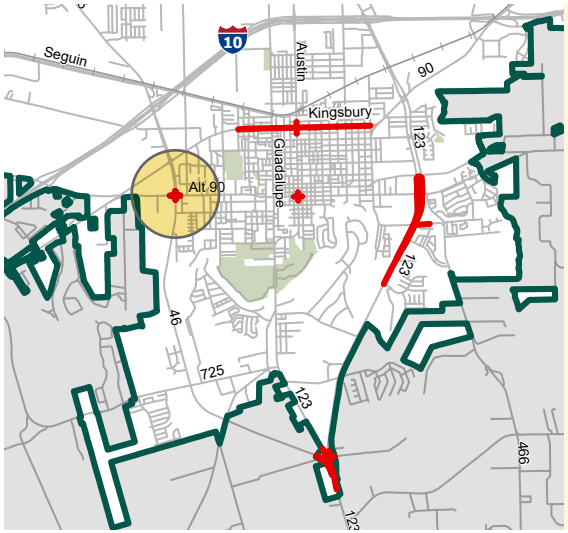
| ID | LOCATION | CMF ID | COUNTERMEASURE | CMF |
|---|---|---|---|---|
| 3.1 | Install No Right on Red Sign | 5194 | Prohibit Right-On-Red | 0.94 |
| 3.2 | Increase Turning Radius | 8496 | Change Right-Turn Lane Geometry to Increase Line of Sight | 0.56 |
| 3.3 | Leading Pedestrian Interval | 9901 | Modify Signal Phasing (Implement a Leading Pedestrian Interval) | 0.9 |
| 3.4 | Install Pavers at Crosswalks | 4123 | Install High-Visibility Crosswalk | 0.6 |
| 3.5 | Install Yield Sign | 9017 | Install Advanced Yield or Stop Markings and Signs | 0.75 |

*EXHIBIT 16: INTERSECTION 1 RECOMMENDATIONS*

# Intersection 1: E. Court St. & S. Austin St.



## 2 Intersection 2: *US 90 Alternate & TX 46*




### Observations

Intersection 2 is at the southwest corner of the Texas Lutheran University and near Rodriguez Elementary School. This intersection is between US 90 Alternate, a 4-lane undivided roadway, and TX 46, a 4-lane divided roadway. Additionally, this intersection is traffic signal controlled and has pedestrian facilities.

### Crash History

There was a total of 47 crashes at Intersection 2 with 3 being suspected serious injury (A) crashes and 4 being suspected minor injury (B) crashes. Intersection 2 had two contributing factors that most contributed to crashes at this intersection – 'Failed to Control Speed' and 'Failed to Yield ROW – Turning Left'. This indicates that improvements at this intersection should aim to lower speeds and create a safer environment for drivers turning left.

### Recommendations

Recommendations for Intersection 2 are as follows:

- Add sidewalks to connect to existing pedestrian facilities
- Add retroreflective backplates to existing traffic signals
- Add turn lane designation markings
- Update existing turn lanes to include a positive offset
- Update existing dedicated right turn lanes to be smart right turn lanes
- Add transverse rumble strips and advance signal warning signs on US 90 Alternate prior to the intersection

All recommendations are summarized in **Exhibit 17** and their CMFs are listed in **Table 15**.

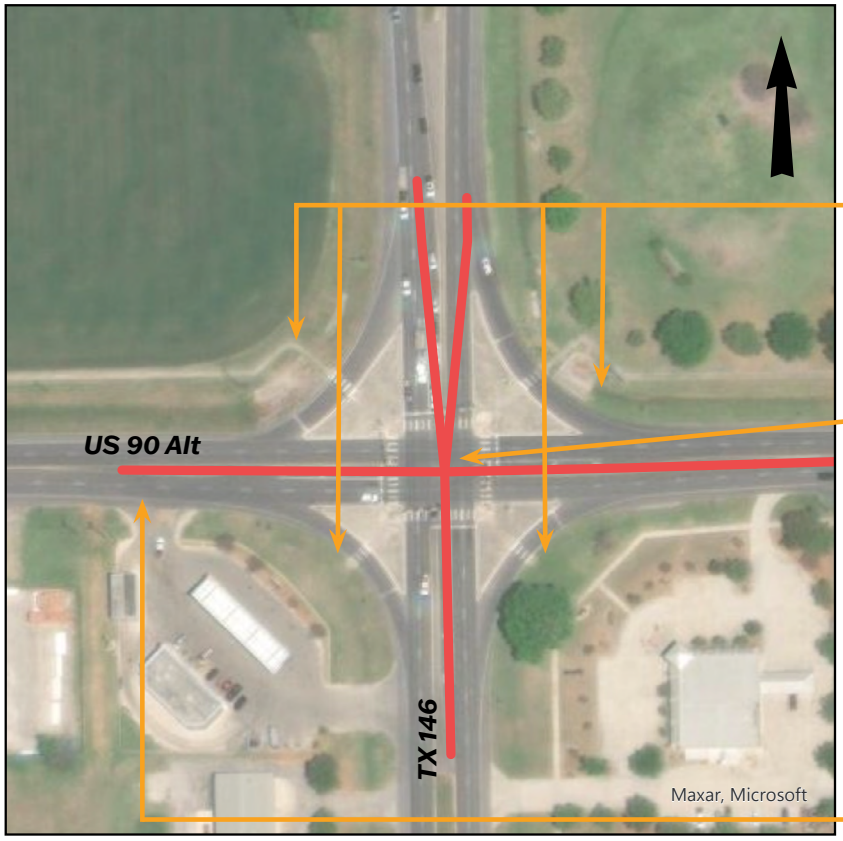
*TABLE 15. COUNTERMEASURE CRASH MODIFICATION FACTORS FOR INTERSECTION 2*

| ID | LOCATION | CMF ID | COUNTERMEASURE | CMF |
|---|---|---|---|---|
| 4.1 | Install Sidewalk | 11246 | Install Sidewalk | 0.6 |
| 4.2 | Positive Left Turn Offset | 277 | Introduce Zero or Positive Offset Left-Turn Lane on Crossing Roadway | 0.8 |
| 4.3 | Add Turn Lane Designation Markings | NSO7 | Upgrade Intersection Pavement Markings | 0.75 |
| 4.4 | Reflective Backplates* | 1410 | Add 3-inch Yellow Retroreflective Sheeting to Signal Backplates | 0.85 |
| 4.5 | Smart Right Turn | 10246 | Change Right-Turn Lane Geometry to Increase Line of Sight (Approach Level) | 0.53 |
| 4.6 | Transverse Rumble Strip | 138 | Install Transverse Rumble Strips as Traffic Calming Device | 0.66 |
| 4.7 | Advanced Signal Warning Sign | 4198 | Install Dynamic Signal Warning Flashers | 0.81 |

** Reflective Backplates are being installed as of the publishing of this report.*

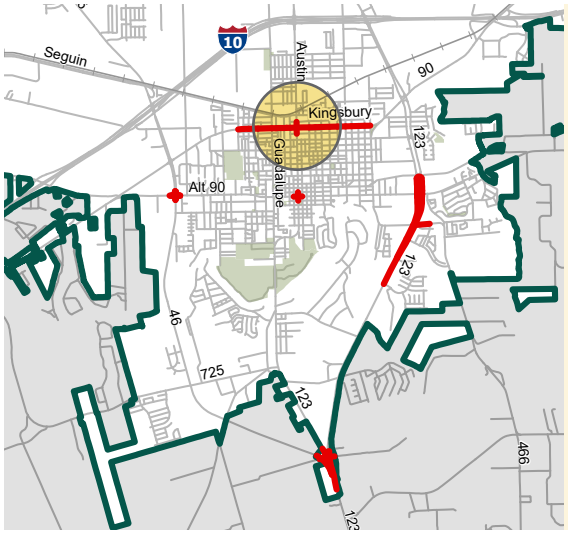
*EXHIBIT 17: INTERSECTION 2 RECOMMENDATIONS*

# Intersection 2: US 90 Alt & TX 46




- Sidewalks
- Smart Right Turns
- Positive Left Turn Offset
- Turn Lane Designation Markings
- Reflective Backplates
- Transverse Rumble Strip
- Advanced Signal Warning Sign

## 3 Intersection 3: *East Kingsbury Street & North Austin Street*




### Observations

The intersection between E. Kingsbury St and N. Austin St is surrounded by residential and commercial land use. While E. Kingsbury St (US 90) is a 5-lane undivided roadway, N. Austin St (TX 123) is a 2-lane undivided roadway with all surrounding speed limits being 35 MPH. Due to the businesses located at each corner of the intersection, there are several driveways located within 150 feet of the intersection. Furthermore, this intersection is also located on Corridor 1.

### Crash History

At this intersection, there were 28 crashes recorded within the study period. Most of the crashes were identified as non-injury crashes with the only severe crashes being a suspected minor injury crash. From the crashes observed at Intersection 3, the most common contributing factor found was driver inattention. This suggests that the intersection improvements planned for Intersection 3 should help revert drivers' attention back to the roadway.

### Recommendations

Recommendations for Intersection 3 are as follows:

- Install a raised median on E. Kingsbury St
- Consolidate driveways near the intersection on all approaches
- Refresh intersection pavement markings
- Add a dedicated right turn lane on N. Austin St

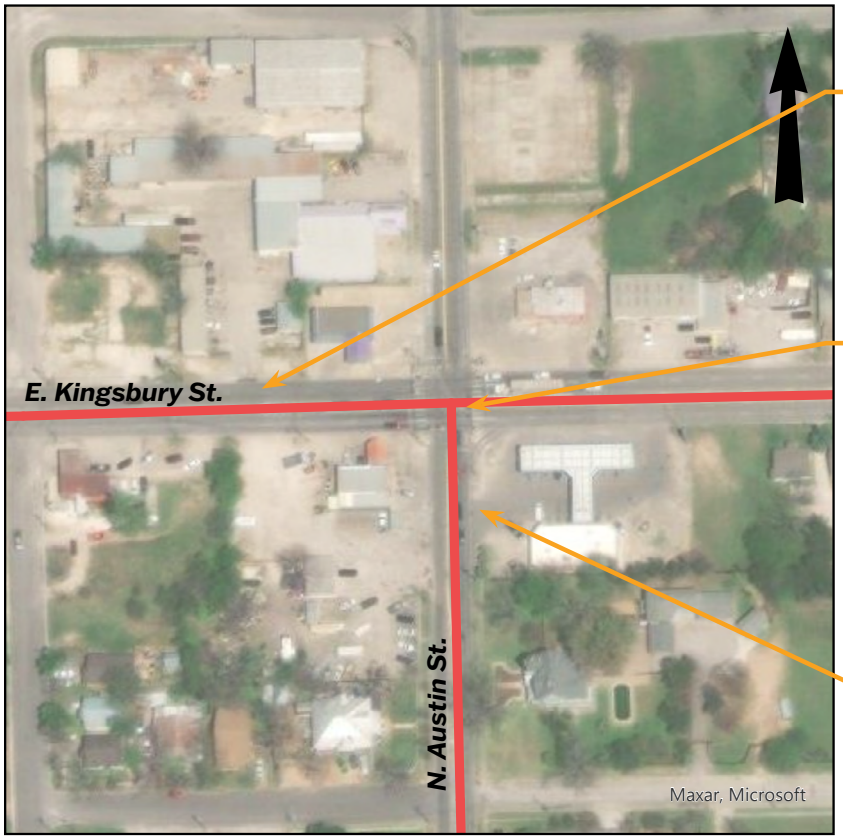
All recommendations are summarized in **Exhibit 18** and their CMFs are listed in **Table 16**.

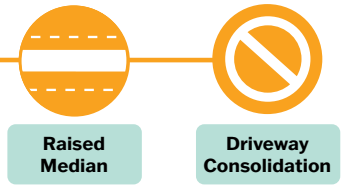
*TABLE 16. COUNTERMEASURE CRASH MODIFICATION FACTORS FOR INTERSECTION 3*

| ID | LOCATION | CMF ID | COUNTERMEASURE | CMF |
|---|---|---|---|---|
| 5.1 | Install a Raised Median | 7772 | Convert a TWLTL (two-way left-turn lane) to a Raised median | 0.67 |
| 5.2 | Driveway Consolidation | 9738 | Presence of Driveway on an Intersection Approach Corner | 0.79 |
| 5.3 | Refresh Pavement Markings | NSO7 | Upgrade Intersection Pavement Markings | 0.75 |
| 5.4 | Driveway Consolidation | 9738 | Presence of Driveway on an Intersection Approach Corner | 0.79 |
| 5.5 | Install a Right Turn Lane | 285 | Provide a Right-Turn Lane on One Major-Road Approach | 0.86 |

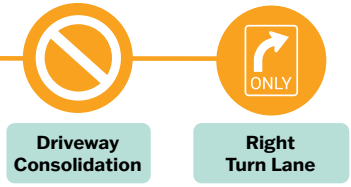
*EXHIBIT 18: INTERSECTION 3 RECOMMENDATIONS*

# Intersection 3: E. Kingsbury St. & N. Austin St.

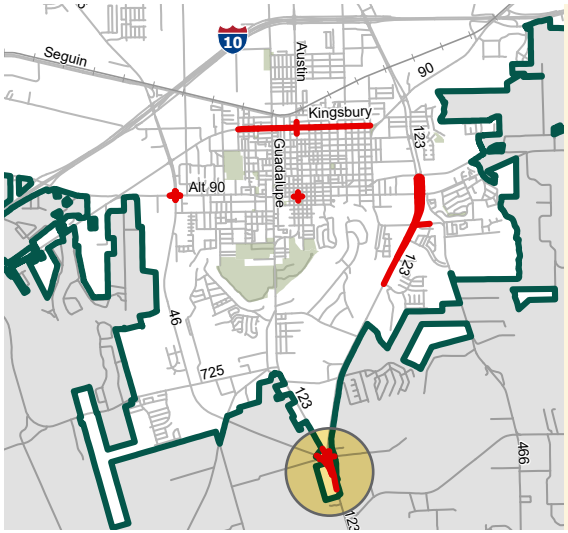






## 4 Intersection 4: *TX 123 & TX 46*




### Observations

Unlike the previous intersections, Intersection 4 is comprised of 4 separate intersections all between TX 123 and TX 46. At this intersection TX 123, 2-lane undivided road, and TX 123 Bypass, 2-lane undivided road, merge and become a 5-lane undivided roadway with a center left turn lane. TX 46 is 3-lane divided roadway at these intersections. All intersection located at Intersection 4 are unsignalized but use an array of yield signs to control the flow of traffic. The intersection between TX 123 and TX 46 is located at the southmost part of the City next to the City limits. Furthermore, this intersection is surrounded by undeveloped land aside from a small number of residential homes. Unlike the rest of the intersections selected for this study, Intersection 4 is the only intersection located in a rural area of Seguin.

### Crash History

Intersection 4 had 69 total crashes occur within the study period with 9 being suspected serious injury crashes and 3 being suspected minor injury crashes. This study location had the most severe crashes compared to the other four intersections selected for analysis. Additionally, failing to yield ROW at yield signs was the most common contributing factor for crashes at this location.

### Recommendations

Recommendations for Intersection 4 are as follows:

- Install a deceleration lane coming off of the TX 123 turnaround
- Install coordinated traffic signals at all the intersections
- Refresh intersection pavement markings
- Add turn lane designation markings
- Install a southbound right turn lane on TX 46
- Install guardrails into TX 123
- Install a yield sign where TX 123 and TX 123 Bypass merge

All recommendations are summarized in **Exhibit 19** and their CMFs are listed in **Table 17**.

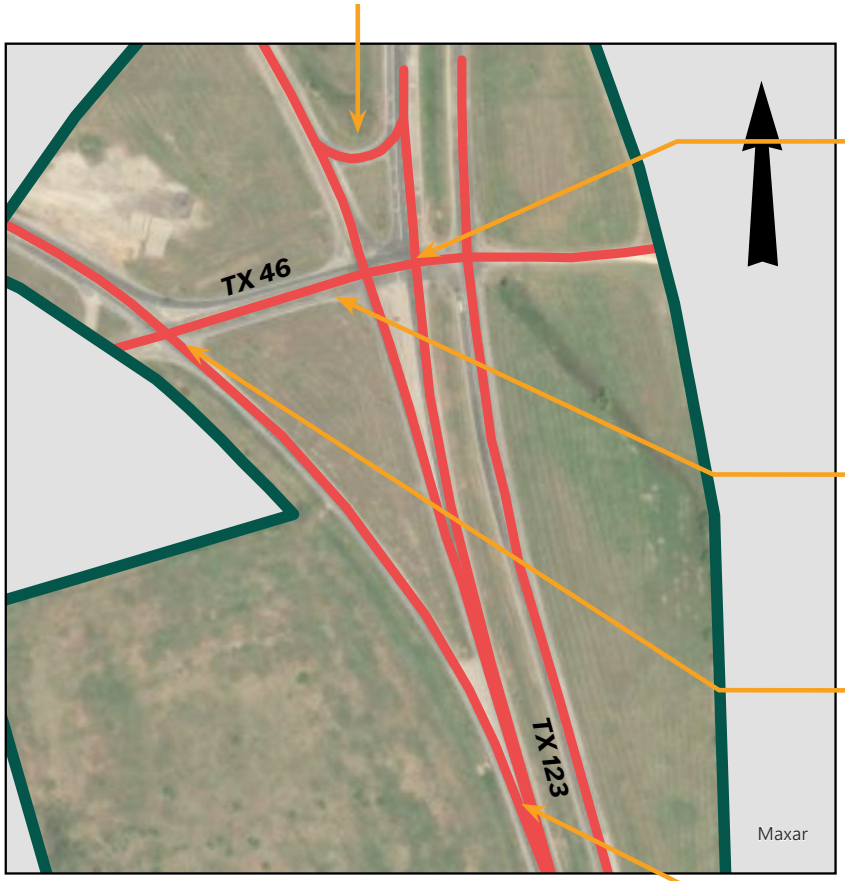
*TABLE 17. COUNTERMEASURE CRASH MODIFICATION FACTORS FOR INTERSECTION 4*

| ID | LOCATION | CMF ID | COUNTERMEASURE | CMF |
|---|---|---|---|---|
| 6.1 | Install a Deceleration Lane | 843 | Install Acceleration/Deceleration Lanes | 0.9 |
| 6.2 | Install Coordinated Traffic Signals | SO3 | Improve Signal Timing | 0.85 |
| 6.3 | Refresh Pavement Markings | NS01 | Upgrade Intersection Pavement Markings | 0.75 |
| 6.4 | Add Turn Lane Designation Markings | NSO7 | Upgrade Intersection Pavement Markings | 0.75 |
| 6.5 | Install a Southbound Right Turn Lane | 285 | Provide a Right Turn Lane on One Major Road Approach | 0.86 |
| 6.6 | Install Coordinated Traffic Signals | SO3 | Improve Signal Timing | 0.85 |
| 6.6 | Install Guardrails | 51 | Install Beam Guardrails on Median of Divided Highway | 0.22 |
| 6.7 | Install Yield Sign | 9017 | Install Advanced Yield or Stop Markings and Signs | 0.75 |

*EXHIBIT 19: INTERSECTION 4 RECOMMENDATIONS*

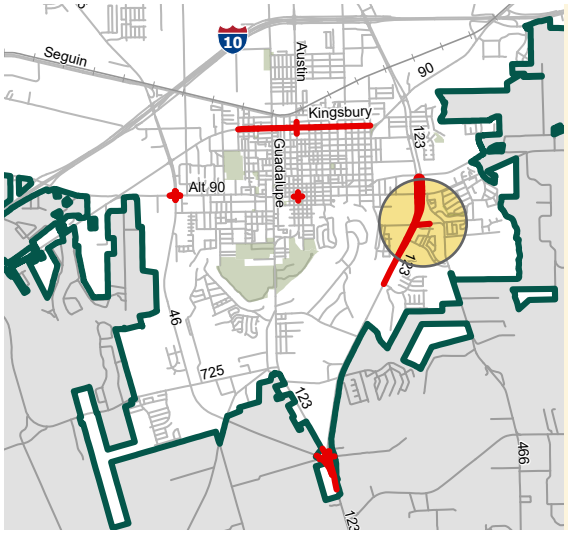
# Intersection 4: TX 123 & TX 46

SEGUIN COMPREHENSIVE SAFETY ACTION PLAN




- Deceleration Lane
- Coordinated Traffic Signal
- Pavement Markings
- Turn Lane Designation Markings
- Southbound Right Turn Lane (ONLY)
- Coordinated Traffic Signal
- Guardrails
- Yield Sign (YIELD)

## 5 Intersection 5: *TX 123 Bypass & Joe Carrillo Boulevard*




### Observations

Although the intersection between TX 123 Bypass and Joe Carrillo Boulevard does not have a high number of crashes, Intersection 5 was chosen for further analysis due to its proximity to Jim Barnes Middle School. Enhancing safety near this intersection was a priority for both SRC and community members to create a safer roadway for students. This intersection is unsignalized but has stop and yield signs controlling traffic. Additionally, the posted speed limits near the intersection are 45 MPH.

### Crash History

There was a total of 9 crashes at Intersection 5 within the study period with only one suspected minor injury crash. At this intersection, the top contributing factor for crashes was identified as driver inattention therefore recommendations should aim to increase driver awareness at this location.

### Recommendations

Recommendations for Intersection 2 are as follows:

- Install sidewalks on Joe Carrillo Boulevard
- Add a stop sign and stop bar at the median of TX 123 Bypass
- Install a right turn lane on TX 123 Bypass

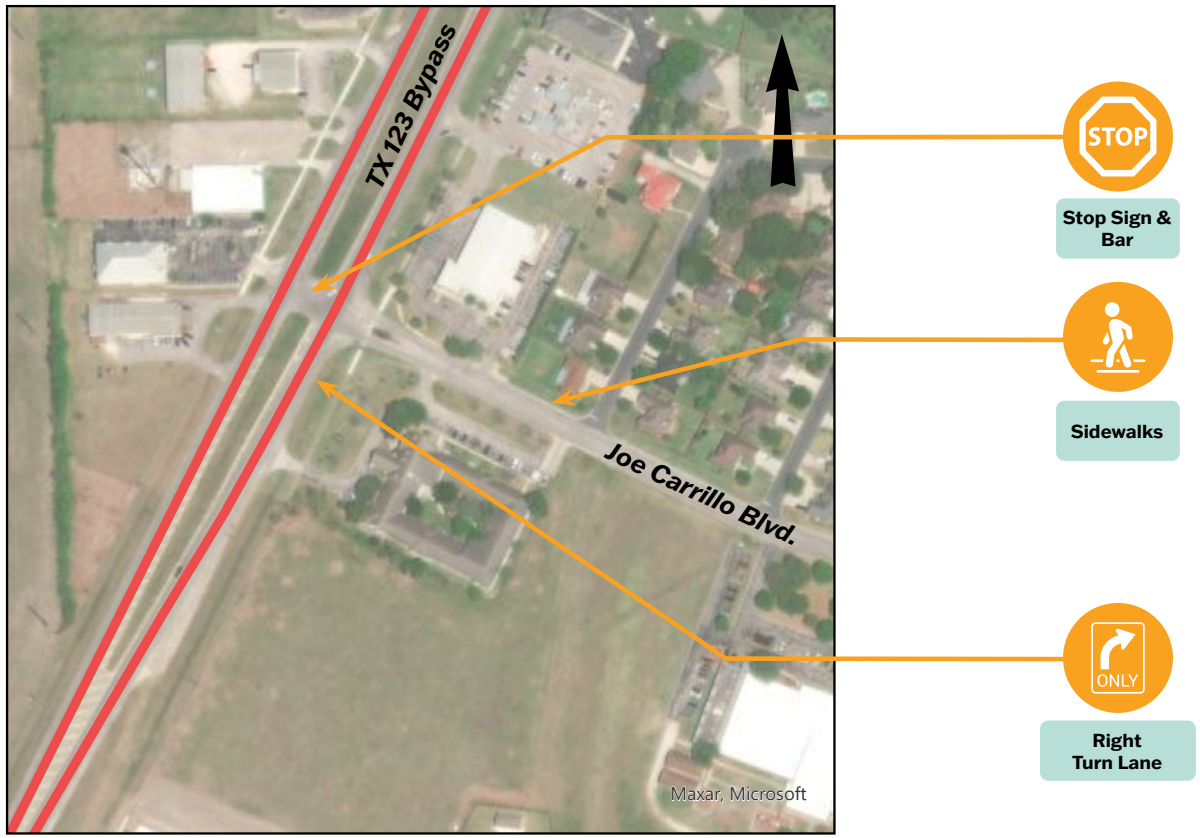
All recommendations are summarized in **Exhibit 20** and their CMFs are listed in **Table 18**.

*TABLE 18. COUNTERMEASURE CRASH MODIFICATION FACTORS FOR INTERSECTION 5*

| ID | LOCATION | CMF ID | COUNTERMEASURE | CMF |
|---|---|---|---|---|
| 5.1 | Install Sidewalk | 11246 | Install Sidewalk | 0.6 |
| 5.2 | Install a Right Turn Lane | 285 | Provide a Right Turn Lane on One Major Road Approach | 0.86 |
| 5.3 | Install a Stop Sign and Bar | 9017 | Install Advanced Yield or Stop Markings and Signs | 0.75 |

*EXHIBIT 20: INTERSECTION 5 RECOMMENDATIONS*

# Intersection 5: TX 123 Bypass & Joe Carrillo Blvd.



## Systemic Countermeasure Toolbox

A countermeasure toolbox is a comprehensive collection of strategies and interventions designed to address specific traffic safety issues and challenges. It provides transportation professionals with a range of options and resources to effectively mitigate risks, improve safety, and enhance the overall performance of roadways and transportation systems.

The following details systemic countermeasures that can be implemented in all areas of the City to improve safety, not limited to previous recommendations and study corridors. Seguin systemic countermeasure toolbox is provided with each categorized by safety emphasis area in **Table 19**. Priority should be given to roads along the HIN and in areas of disadvantaged populations to lessen severity among crashes.

*TABLE 19: SYSTEMIC COUNTERMEASURE TOOLBOX*

| SAFETY EMPHASIS AREAS | RAISED MEDIAN | CORRIDOR ACCESS MANAGEMENT | CHANGE DRIVEWAY WIDTH | IMPROVE SIGNING AND VISIBILITY AT SIGNALS | RETROREFLECTIVE BACKPLATES | FLASHING YELLOW ARROW | COORDINATED SIGNAL TIMING | LANE DESIGNATION MARKINGS AND SIGNS | WIDE EDGE LINES | HIGH CONTRAST LANE MARKINGS | IMPLEMENT SYSTEMIC SINGING AND MARKING IMPROVEMENTS | CHANGE RIGHT-TURN LANE GEOMETRY |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CMF** | **0.29** | **0.93** | **0.25** | **0.732** | **0.85** | **0.975** | **-** | **0.75** | **0.635** | **0.75** | **0.734** | **0.558** |
| **Roadway & Lane Departure** | ● | | | | | | | ● | ● | ● | | |
| **Speed-Related** | ● | | | | | | ● | | | | | ● |
| **Intersection-Related** | | ● | ● | ● | ● | ● | ● | ● | | | ● | ● |
| ***Vulnerable Road Users*** | ● | | | ● | | | ● | | | | | ● |
| ***Distracted Driving*** | | | | ● | ● | | | ● | ● | ● | ● | |
| ***Impaired Driving*** | ● | | | ● | ● | | | ● | ● | ● | | |
| ***Unrestrained Persons*** | ● | | | | | | ● | | | | | ● |

## Access Management

Every intersection, whether signalized or to an unpaved driveway, has the potential for conflicts between vehicles and vulnerable road users therefore thoughtful access management is crucial for creating a safer transportation network. Several countermeasures are recommended in the following section that aim to provide systemic improvements to the access management currently in Seguin.

*FIGURE 14: RAISED MEDIAN EXAMPLE*

*Source: FHWA, City of Charlotte, NC*

### Raised Median

A raised median is a physical barrier or divider that separates opposing lanes of traffic on a roadway. It is most used in urban and suburban areas to enhance safety and traffic flow by preventing vehicles from crossing over into opposing lanes or making certain left-turn movements. Installing a raised median has a CMF of 0.29 for all crash types and severities (CMF ID: 2219). Figure 14 provides an example of a raised median.

***APPLICABLE SAFETY EMPHASIS AREAS:***

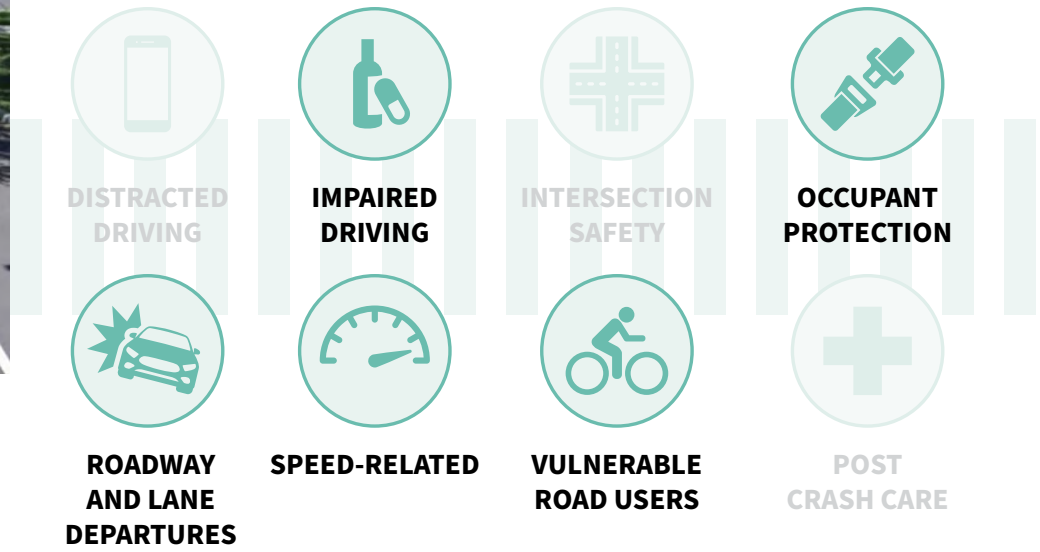
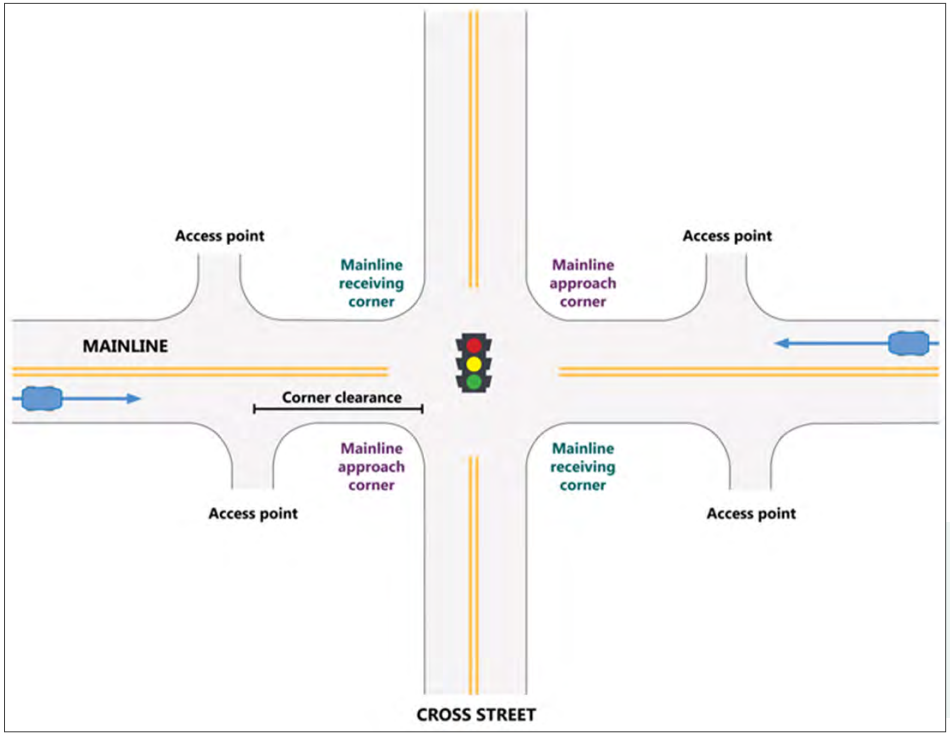


*FIGURE 15: CORRIDOR ACCESS MANAGEMENT EXAMPLE*




*Source: FHWA*

## Corridor Access Management

Access management pertains to the planning, implementation, and regulation of entry and exit locations along a road, encompassing intersections with other roads and driveways serving nearby properties. Thoughtful management of access along a corridor can improve safety for all transportation modes, promote walking and cycling, and alleviate traffic congestion and delays. Closure or relocation of driveways from functional area of intersection has a CMF of 0.93 for all crash types and severities (CMF ID: 442). **Figure 15** provides an example of corridor access management elements and example.

***APPLICABLE SAFETY EMPHASIS AREAS:***

DISTRACTED DRIVING
IMPAIRED DRIVING
**INTERSECTION SAFETY**
OCCUPANT PROTECTION
ROADWAY AND LANE DEPARTURES
SPEED-RELATED
VULNERABLE ROAD USERS
POST CRASH CARE

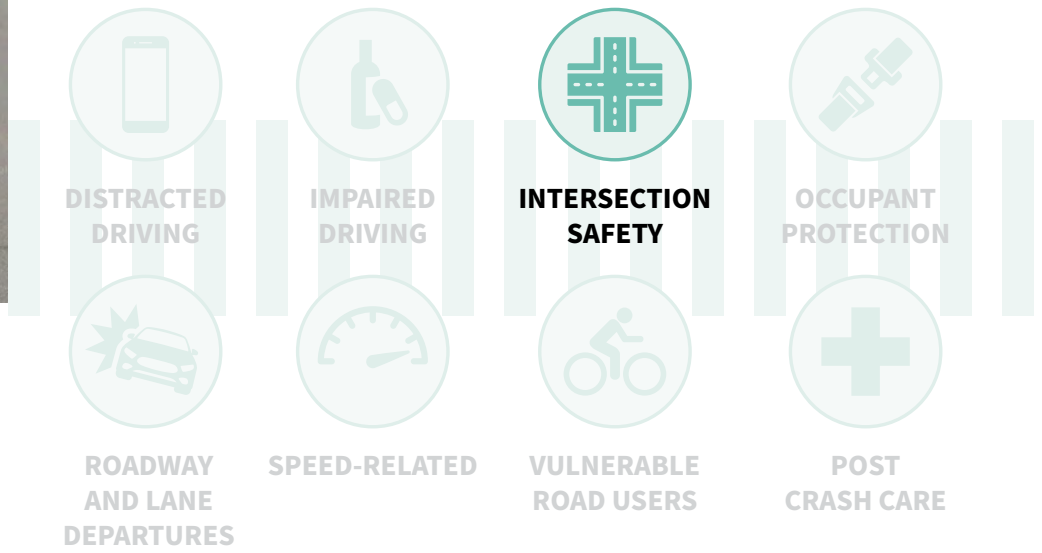
*FIGURE 16: DRIVEWAY IN NEED OF CHANGE*


*Source: Google Earth Pro*

## Change Driveway Width

Changing the width of existing driveways can have a significant impact on decreasing crashes near the location. Through this countermeasure driveways with large widths will not have to be fully closed but rather shortened to enhance intersection safety. Although this countermeasure reduced the degree of access a driveway has, it should be considered when limited sight distance does not allow adequate time to judge traffic, there is proximity to busy intersections, or there is a need to reduce conflicting turning movements. Reducing driveway widths in Seguin could have a CMF of 0.25 (CMF ID: 8202) for all crash severities. **Figure 16** provides an example of and existing driveway that needs change of width.

***APPLICABLE SAFETY EMPHASIS AREAS:***



## Improved Signals

Traffic signals are often implemented for operational reasons such as improving traffic flow but can create new safety issues such as an increased rate of red-light running. To remedy the safety issues that may develop from traffic signal and enhance their effectiveness, several countermeasures have been recommended. Although most of the suggested countermeasures have an assigned CMF value, there is one that does not have sufficient research associated to warrant a CMF value yet.

*FIGURE 17: CROSSWALK AND PEDESTRIAN CROSSING EXAMPLE*

*Source: pedbikeimages.org/ Greg Griffin, AICP*

### Improve Signing and Visibility at Signals

The minimum improvements to the equipment and facilities at signalized intersections should include high contrast crosswalks, pedestrian signal heads and push buttons, ADA compliant curb ramps. When constructed, pedestrians and other vulnerable road users are provided adequate facilities to make safe crossings and motorists are alerted of dedicated crossing areas. Installing a high-visibility crosswalk and pedestrian signals has a CMF of 0.732 for vehicle and pedestrians crashes for all severities (CMF ID: 8967). Figure 17 provides an example high contrast crosswalks with pedestrian signal head and push buttons.

***APPLICABLE SAFETY EMPHASIS AREAS:***

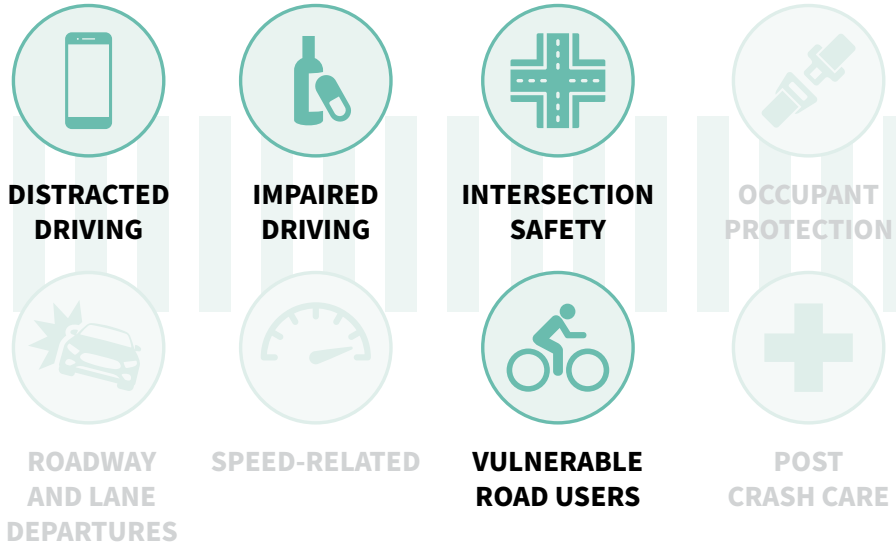
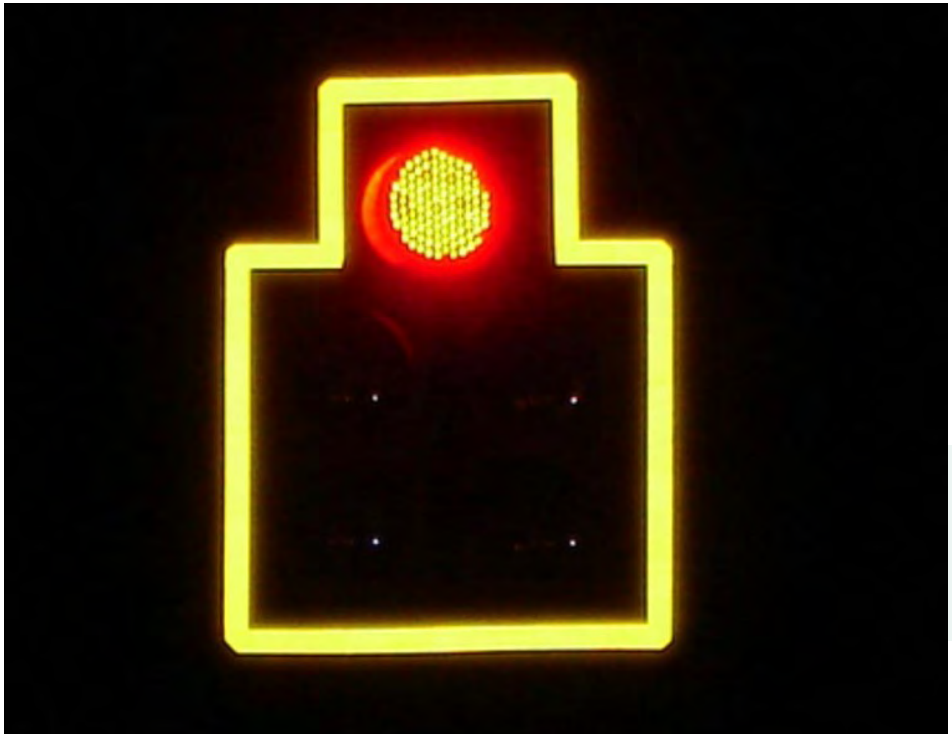


*FIGURE 18: RETROREFLECTIVE BACKPLATE EXAMPLE*



*Source: FHWA*

## Retroreflective Backplates

A retroreflective backplate is a backplate made by framing a signal head with a 1-to-3-inch yellow retroreflective border. They improve the visibility of the illuminated face of the signal by introducing a controlled-contrast background. They are also more visible and conspicuous in both daytime and nighttime conditions. Installing retroreflective backplates has a CMF of 0.85 for all crash types and severities (CMF ID: 1410). **Figure 18** provides an example of a retroreflective backplate installed on a signal head.

***APPLICABLE SAFETY EMPHASIS AREAS:***

**DISTRACTED DRIVING**

**IMPAIRED DRIVING**

**INTERSECTION SAFETY**

OCCUPANT PROTECTION

ROADWAY AND LANE DEPARTURES

SPEED-RELATED

VULNERABLE ROAD USERS

POST CRASH CARE

*FIGURE 19. FLASHING YELLOW ARROW EXAMPLE*


*Source: mntransportationresearch.org*

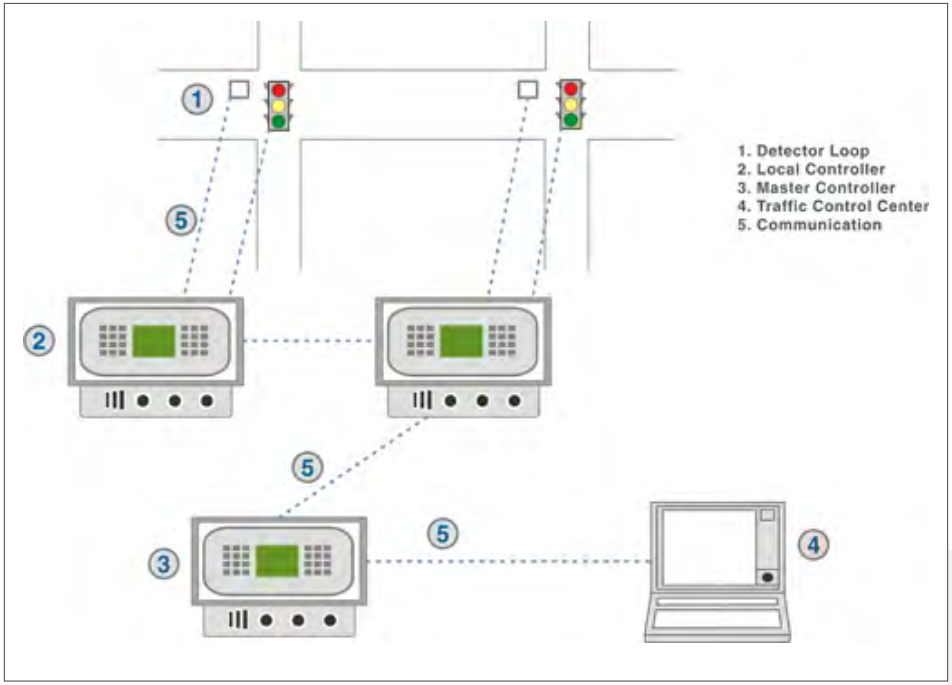
## Flashing Yellow Arrow

A flashing yellow arrow (FYA) indicates that drivers are permitted to turn left but should yield to pedestrians and oncoming traffic during a permissive circular green. This countermeasure is a national standard adopted by the FHWA meant to increase intersection safety. The addition of an FYA is meant to decrease the number of left-turn crashes, especially those that involve a crash between vehicles turning left and those going straight. Installing an FYA has a CMF of 0.975 (CMF ID: 7729). **Figure 19** shows an example of an FYA installed at an intersection.

***APPLICABLE SAFETY EMPHASIS AREAS:***

DISTRACTED DRIVING
IMPAIRED DRIVING
**INTERSECTION SAFETY**
OCCUPANT PROTECTION
ROADWAY AND LANE DEPARTURES
SPEED-RELATED
VULNERABLE ROAD USERS
POST CRASH CARE

*FIGURE 20: PHYSICAL COMPONENTS OF A SIGNAL SYSTEM*

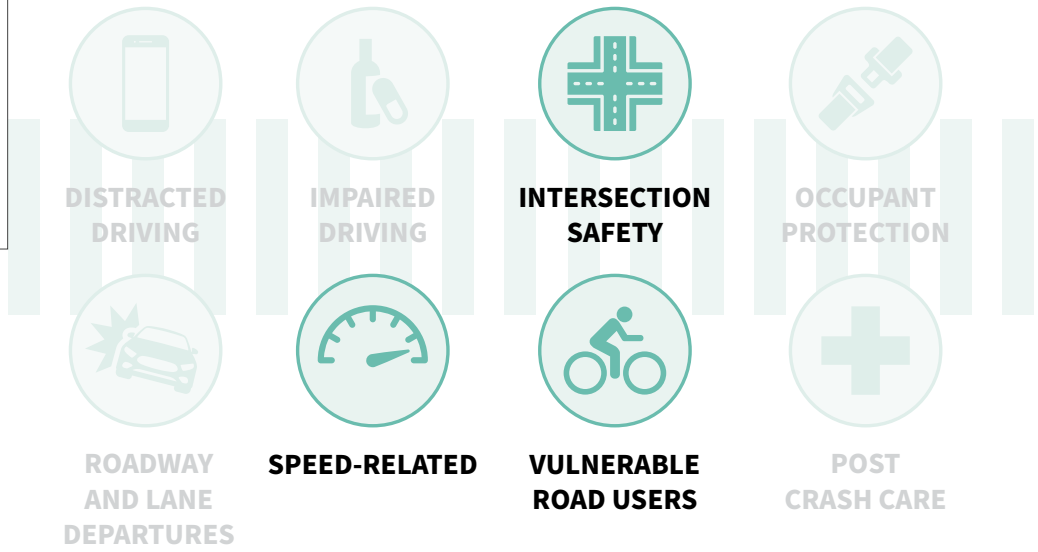



*Source: FHWA*

## Coordinated Signal Timing

Coordinating signal timing phases can synchronize traffic movements and manage the speed of traffic on corridors where uninterrupted flow is wanted. Although coordinated signals are traditionally used to improve traffic flow and reduce delays during peak-hour, coordinated signals can help create a pedestrian and bicyclist friendly environment by optimizing slow speeds. This type of timing is commonly applied on corridors where intersections are closely spaced, typically 0.25 miles or less, and "platooning" (when groups of vehicles travel together) is desired. While this countermeasure can provide benefits for both drivers and other roadway users, there has not been enough research to determine its crash modification factor.

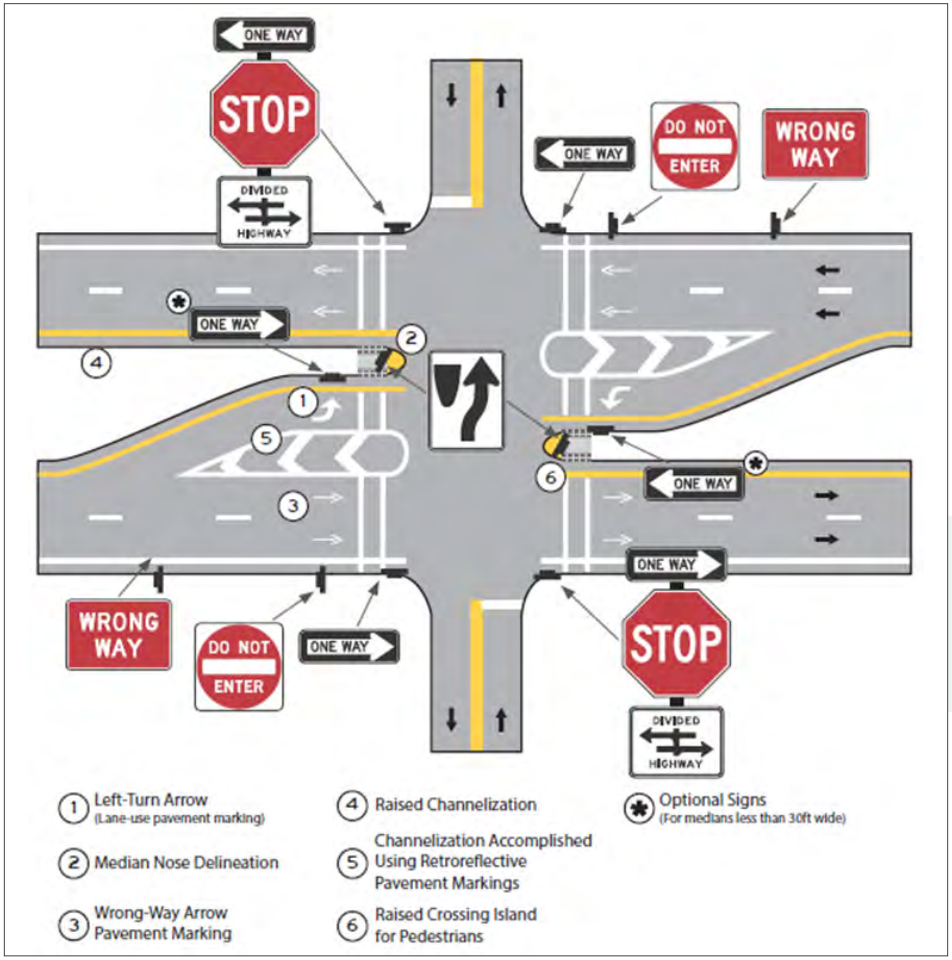
***APPLICABLE SAFETY EMPHASIS AREAS:***



## Improved Striping

Although roadway striping can be easily overlooked, roadway striping, and signage is a pivotal part of safe roadway environments for all. Striping and signage denote lanes, turning signals, pedestrian facilities, and stop locations all important information that drivers should be aware of. When roadway markings are not clearly visible to drivers, it can lead to confusion and crashes therefore countermeasures have been recommended that aim to improve signage and marking practices in Seguin.

*FIGURE 21: LANE DESIGNATION MARKINGS EXAMPLE*




*Source: FHWA*

### Lane Designation Markings and Signs

Pavement markings are painted or applied symbols, lines, and patterns on road surfaces to convey traffic regulations, guidance, and warnings to drivers. They enhance safety by providing clear visual cues for lane delineation, intersection control, and other traffic management purposes. Pavement markings help reduce confusion, improve traffic flow, and minimize the risk of crashes by assisting drivers in navigating roadways effectively and safely. Upgrading pavement markings has a CMF of 0.75 for all crash types and severities (CMF ID: NS01). **Figure 21** provides an example of pavement markings for lane designation.

***APPLICABLE SAFETY EMPHASIS AREAS:***

**DISTRACTED DRIVING**

**IMPAIRED DRIVING**

INTERSECTION SAFETY

OCCUPANT PROTECTION

**ROADWAY AND LANE DEPARTURES**

SPEED-RELATED

**VULNERABLE ROAD USERS**

POST CRASH CARE

*FIGURE 22: WIDE EDGE LINE EXAMPLE*

*Source: FHWA, Texas Transportation Institute*

## Wide Edge Lines

Edge lines are the pavement markings at the edge of travel lanes and are designed to help drivers clearly identify the road alignment ahead. Edge lines are considered "wider" when the marking width is increased from the minimum normal line width of 4 inches to the maximum normal width of 6 inches. Wider edge lines enhance the visibility of travel lane boundaries compared to traditional edge lines. This has a CMF of 0.635 for all crash types and for K, A, B, or C crash severities (CMF ID: 4737). **Figure 22** provides an example of a wide edge line.

***APPLICABLE SAFETY EMPHASIS AREAS:***

**DISTRACTED DRIVING**

**IMPAIRED DRIVING**

INTERSECTION SAFETY

OCCUPANT PROTECTION

**ROADWAY AND LANE DEPARTURES**

SPEED-RELATED

VULNERABLE ROAD USERS

POST CRASH CARE

*FIGURE 23: HIGH CONTRAST LANE MARKINGS EXAMPLE*

*Source: FHWA*

## High Contrast Lane Markings

High contrast lane markings refer to road markings that are designed to be easily distinguishable from the surrounding pavement, typically through the use of contrasting colors or materials. These markings are intended to enhance visibility and clarity for drivers, especially in challenging conditions such as low light, inclement weather, or areas with poor visibility. This has a CMF of 0.75 for all crash types and severities (CMF ID: NS01). **Figure 23** provides an example of high contrast lane markings.

***APPLICABLE SAFETY EMPHASIS AREAS:***

**DISTRACTED DRIVING**

**IMPAIRED DRIVING**

**INTERSECTION SAFETY**

OCCUPANT PROTECTION

**ROADWAY AND LANE DEPARTURES**

SPEED-RELATED

VULNERABLE ROAD USERS

POST CRASH CARE

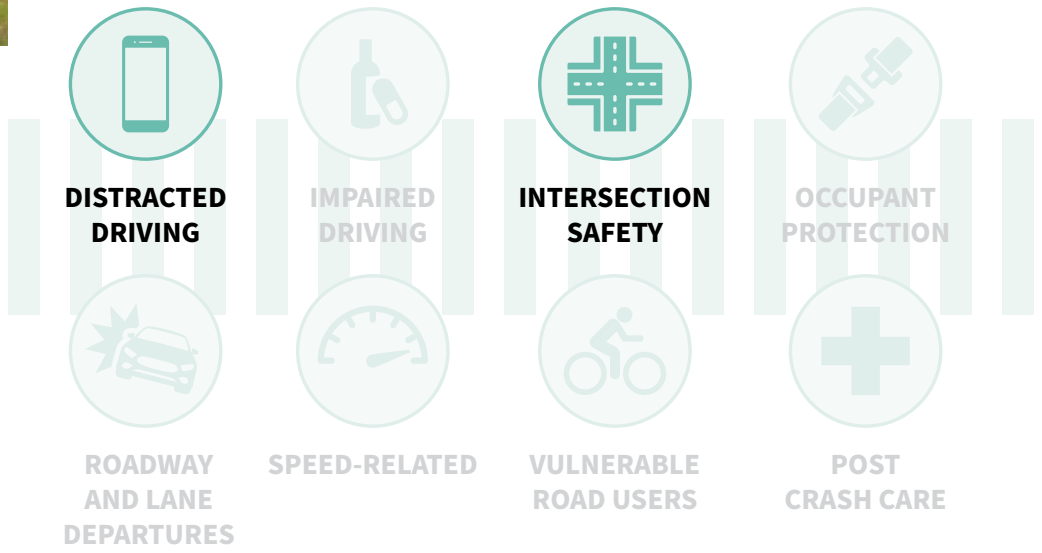
*FIGURE 24: EXAMPLE OF COUNTERMEASURES AT A STOP CONTROLLED INTERSECTION*

*Source: FHWA*

### Implement Systemic Signing and Marking Improvements at Stop-Controlled Intersections

Deploying a variety of low-cost countermeasures at a number of stop-controlled intersection within a jurisdiction can increase overall intersection safety in that location. Countermeasure that could applied to stop-controlled intersections are properly placed stop bars, doubled-up oversized stop signs, doubled up oversized advance “stop ahead” signs, and removal of vegetation. These countermeasures increase driver awareness to the upcoming intersection and any potential conflicts. Implementing signing and marking improvements at stop-controlled intersections through a systemic approach has a CMF of 0.734 (CMF ID: 8874). **Figure 22** provides an example of some low-cost countermeasures that could be utilized.

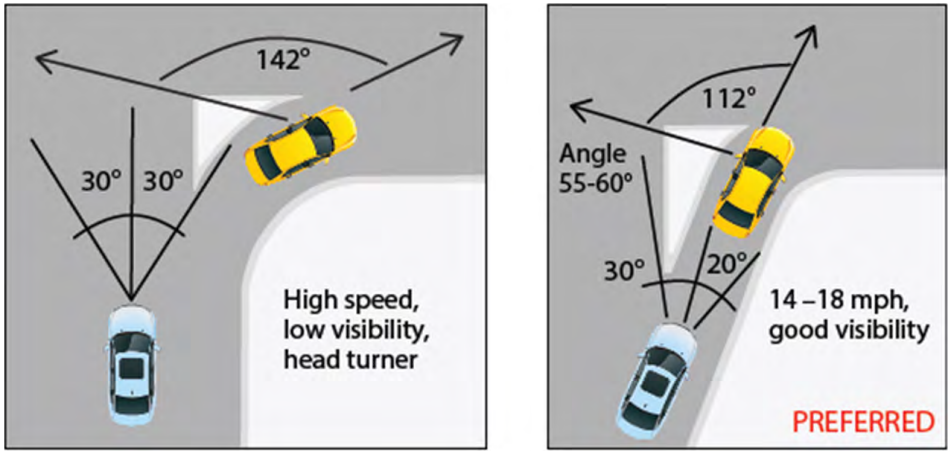
***APPLICABLE SAFETY EMPHASIS AREAS:***



## Operations

The operation and design of a roadway can play a large role in the overall transportation networks safety performance. Roadway geometry alone can impact driving behaviors, so a countermeasure is recommended that would improve the geometry of dedicated right turn lanes in Seguin. This countermeasure is suggested due to the several right turn lanes observed throughout the City.

*FIGURE 25. EXAMPLE OF IMPROVED GEOMETRY FOR RIGHT-TURN LANES*

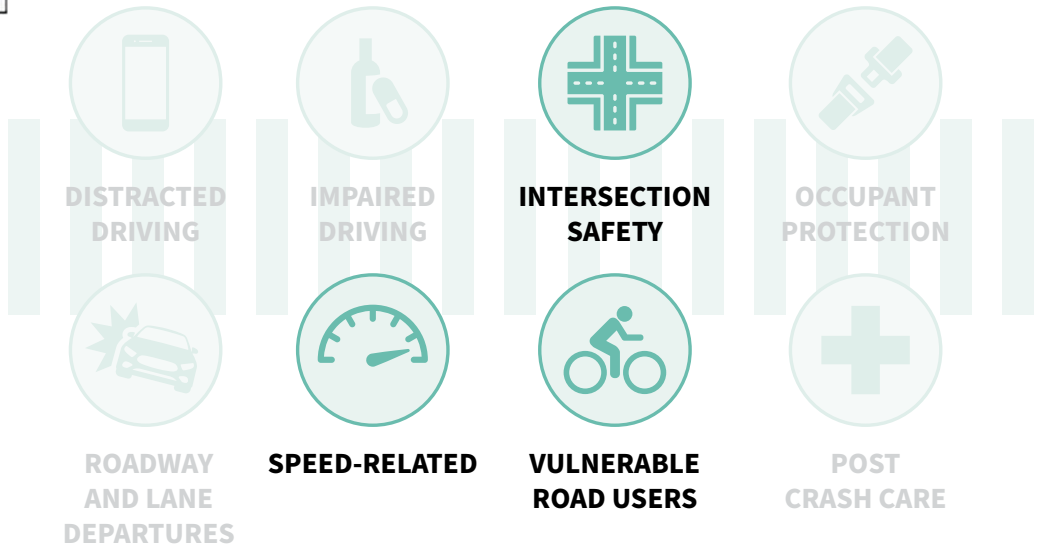



*Source: FHWA*

### Change right-turn lane geometry to increase line of sight (intersection level)

Reducing the turning radii to create a sharper angle of entry onto the cross street on dedicated right-turn lanes will enhance safety at intersection. By reducing the turn radii, the turning path for vehicles is narrowed which causes slower turning speeds, increased sigh distance, and enhances visibility of any vulnerable road users at these intersections. Additionally, this geometry creates a shorter crossing distance for pedestrians and bicyclists. Changing existing geometry to the suggested has a CMF of 0.558 (CMF ID: 8496). **Figure 25** shows an example of what the updated right-turn lane could look like after the improvements.

***APPLICABLE SAFETY EMPHASIS AREAS:***




*Source: FHWA*

*... with Guiding Principle having an associated Goal Statement that focuses on **eliminating deaths** on Seguin roads through the building **complete streets, engaging the community**, and **finding innovative solutions** to protect all road users.*

# Chapter 7. CSAP Implementation

## Implementation Program

This chapter outlines the recommended policies and programs that could aid in achieve the CSAP goals set by the SRC. These policies and programs are meant to help solve the safety deficiencies found in the City's transportation system. The policies and programs are organized by the six CSAP Guiding Principles discussed previously; with Guiding Principle having an associated Goal Statement that focuses on eliminating deaths on Seguin roads through the building complete streets, engaging the community, and finding innovative solutions to protect all road users. To create a clear path towards achieving the CSAP goals, each Guiding Principle has actions that should be done as part of implementation efforts.

The Implementation Program is organized around three main components: Guiding Principles, Goal Statements and Actions. There are six total Guiding Principles, each with an associated Goal statement. Each Goal Statement has a varied number of associated Actions, with a total of 44 Actions.

**MISSION STATEMENT**

*"Striving for a SAFER COMMUNITY, Seguin is dedicated to developing an equitable transportation network that PRIORITIZES SAFETY, PRESERVES ALL LIVES, and MAINTAINS THE EXISTING COMMUNITY character. As regional leaders, our mission is to identify and mitigate vulnerabilities to establish the standard for regional safety and inclusive transportation FOR ALL USERS."*

**GUIDING PRINCIPLE**

**Guiding Principles:** Guiding Principles are broad statements of desired community outcomes/achievements.

**GOAL STATEMENT**

**Goal Statements:** Goal Statements are broad thematic areas of focus that are used to create structure around how an organization can achieve its goals.

**ACTIONS**

**Actions:** Associated polices and strategies that advance the intent of the Goal Statements and are measurable.

# Seguin Comprehensive Safety Action Plan Guiding Principles

**INFRASTRUCTURE ENHANCEMENT**

**TRAFFIC ENFORCEMENT AND REGULATION**



**PUBLIC EDUCATION AND AWARENESS**

**DATA ANALYSIS AND MONITORING**

**COLLABORATION AND PARTNERSHIPS**

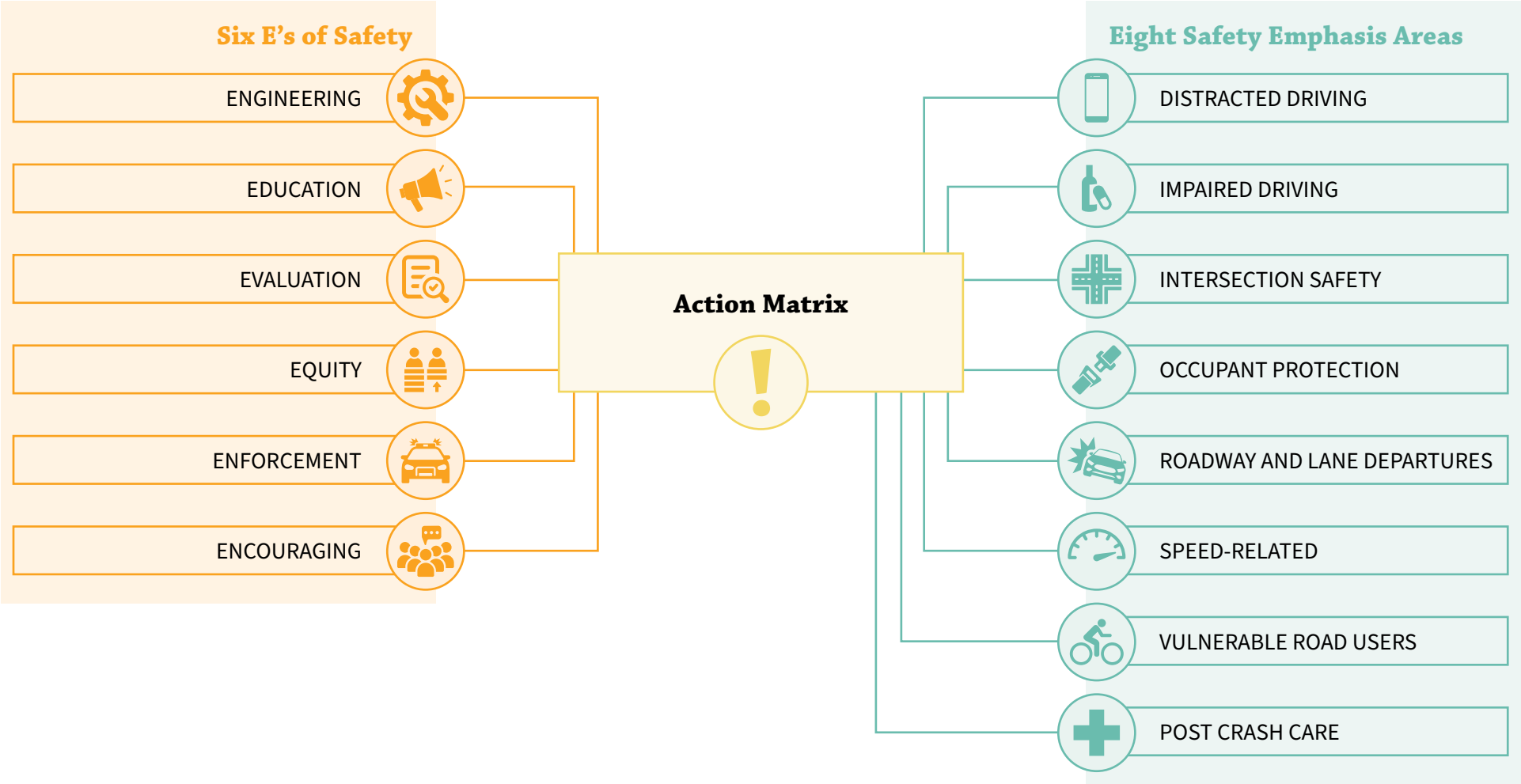


**EQUITY AND ACCESSIBILITY**

## Action Matrix Elements

Texas SHSP Emphasis Areas and Six "E's" of Safety:

The first two elements of the action matrix are the Texas SHSP Emphasis Areas and the Six "E's" of Safety, outlined in **Chapter 1**.



## Timeframe

For every strategy, each action provides an estimated timeframe for implementation. The estimate timeframe for implementation allows for better decision making and allocation of funding to complete the action plan strategies and actions in a timely manner. This is broken out between the following:

| Short (<2 years) | Medium (2 – 5 years) | Long (>5 years) | Ongoing |
|---|---|---|---|
| This action is a top priority and can be a "quick win" for Vision Zero. | This action may take more time but can be accomplished before the next CSAP update. | This action will require many years but will have significant impact when complete. | This action does not have a specified timeframe and should be executed on a continuous basis. |

## Partners

In many instances, collaboration with partner organizations, entities, or stakeholders is crucial for the successful implementation of the recommended actions. These partners play a vital role by contributing resources, expertise, and support to achieve the Plan's goals. The following list identifies internal and external partners that could aid in the implementation process, though it is not exhaustive:

- City Manager's Office (CMO)
- Seguin Economic Development (SEDC)
- Planning and Codes (SPC)
- Seguin Engineering Department (SECP)
- Seguin Grants Office (SGO)
- Seguin Police Department (SPD)
- Seguin Fire Department (SFD)
- Texas Department of Transportation (TXDOT)
- Seguin Independent School District (SISD)
- Seguin Chamber of Commerce (SCC)
- Guadalupe Regional Medical Center (GRMC)
- Mothers Against Drunk Driving (MADD)
- Alamo Area Metropolitan Planning Organization (AAMPO)
- Hispanic Chamber of Commerce (HCC)
- Navarro Independent School District (NISD)
- Guadalupe County (GC)
- Texas Lutheran University (TLU)
- Alamo Area Council of Governments (AACOG)
- Seguin Main Street (SMS)
- Seguin Utilities Department (SUD)
- Seguin Parks & Recreation (SPR)
- Guadalupe County Community Coalition (GCCC)
- Seguin Housing Authority (SHA)
- Seguin Veterans Ministry (SVM)

## Funding

Funding and its source is an important step in implementing the action plan. The matrix also provides the information if the action can be accomplished through three different funding sources:

- Existing Funds
- Reallocation of Funds
- Grant Acquisition

## Guiding Principle: *Infrastructure Enhancement*

***Goal:*** *Improve road design and infrastructure to prioritize safety for all road users, including pedestrians, cyclists, and motorists.*

| ACTION | SAFETY EMPHASIS AREA | WHICH SIX E'S OF SAFETY | TIMEFRAME | PARTNERS | FUNDING |
|---|---|---|---|---|---|
| Implement traffic calming measures to aid in reducing speeds | Speed Related | Engineering | Medium (2-5 years) | SECP, GO, SMS | Grant; Reallocation of Funds |
| Implement an emergency vehicle preemption signal system | Intersection Safety | Engineering | Medium (2-5 years) | SECP, SPD, SFD, GO | Existing Funds; Reallocation of Funds |
| Improve existing roadway infrastructure to better meet new safety standards | - | Engineering | Long (>5 years) | SECP, TXDOT, GO, GC | Grant; Reallocation of Funds |
| Create traffic signal/ traffic signal timing standards that include adding protective left-turn phases, improving clearance intervals, and/or coordinating signals | Intersection Safety | Engineering | Medium (2-5 years) | SECP, TXDOT, GO | Grant; Reallocation of Funds |
| Redesign intersections to meet new safety standards | Intersection Safety | Engineering | Long (>5 years) | SECP, TXDOT, GO, GC | Grant; Reallocation of Funds |
| Implement roadway infrastructure that aims to reduce factors that contribute to pedestrian and bicyclist related crashes | Vulnerable Road Users | Engineering | Ongoing | SECP, GO, GC | Grant; Reallocation of Funds |
| Update design standards to include the installation of shoulder and centerline rumble strips/stripes to reduce lane departure crashes | Roadway and Lane Departures | Engineering | Short (<2 years) | SECP | Existing Funds; Reallocation of Funds |

| ACTION | SAFETY EMPHASIS AREA | WHICH SIX E'S OF SAFETY | TIMEFRAME | PARTNERS | FUNDING |
|---|---|---|---|---|---|
| Include median barrier systems, crash cushions, and guardrail end treatment into roadway designs to aid in reducing lane departure crashes | Roadway and Lane Departures | Engineering | Ongoing | SECP, TXDOT, GO | Grant; Reallocation of Funds |
| Improve speed management practices in work zones to reduce work zone fatalities | Speed Related | Engineering | Ongoing | SECP, TXDOT, GO | Grant |
| Improve signage and marking standards for intersection to aid in increasing driver awareness | Intersection Safety | Engineering | Short (<2 years) | SECP | Existing Funds; Reallocation of Funds |
| Improve traffic control device timing standards that help increase pedestrian safety | Intersection Safety; Vulnerable Road Users | Engineering | Short (<2 years) | SECP | Existing Funds; Reallocation of Funds |

## Guiding Principle: *Traffic Enforcement and Regulation*

***Goal:*** *Strengthen enforcement of traffic laws and regulations to deter risky behaviors such as speeding, distracted driving, and driving under the influence.*

| ACTION | SAFETY EMPHASIS AREA | WHICH SIX E'S OF SAFETY | TIMEFRAME | PARTNERS | FUNDING |
|---|---|---|---|---|---|
| Utilize a speed feedback sign to make drivers aware of their speed | Speed Related | Enforcement | Short (<2 years) | SPD, GO, GC | Grant |
| Implement the use of decoy police vehicles | Speed Related | Enforcement | Short (<2 years) | SPD, CMO | Reallocation of Funds |
| Create a targeted enforcement plan to improve speed enforcement | Speed Related | Enforcement | Medium (2-5 years) | SPD, GO | Grant; Reallocation of Funds |
| Create a targeted enforcement plan to improve red light running monitoring | Intersection Safety | Enforcement | Medium (2-5 years) | SPD, GO, SECP | Grant |
| Pass a city ordinance that would ban all cellphones when driving | Distracted Driving | Enforcement | Short (<2 years) | CMO | Existing Funds |
| Create and enforce helmet laws that apply to bicyclist of all ages | Vulnerable Road Users | Enforcement; Engagement | Short (<2 years) | CMO, SPD, GO, SISD, NISD | Existing Funds; Reallocation of Funds |

## Guiding Principle: *Public Education and Awareness*

***Goal:*** *Increase public awareness about road safety issues and promote safe behaviors through educational campaigns, outreach programs, and community events.*

| ACTION | SAFETY EMPHASIS AREA | WHICH SIX E'S OF SAFETY | TIMEFRAME | PARTNERS | FUNDING |
|---|---|---|---|---|---|
| Create an educational program about intersection safety for college students | Intersection Safety | Education | Short (<2 years) | PIO, TLU, TXDOT, SPD, GO | Grant |
| Develop a distracted driving awareness program aimed at high school students | Distracted Driving | Education; Engagement | Short (<2 years) | PIO, SPD, SISD, NISD, GO, TXDOT | Grant |
| Implement a Shattered Dreams Program at the high schools | Impaired Driving | Education | Short (<2 years) | SISD, NISD, SPD, GO | Grant |
| Hold educational events using impaired driving simulators (beer goggles) | Impaired Driving | Education; Engagment | Ongoing | SPD, GRMC, GO, PIO | Grant |
| Create a Car Seat Information Program with the local Hospital/ Fire Department/ Police Department | Unrestrained Persons | Education | Short (<2 years) | SPD, SFD, CMO, GO | Grant |
| Hold a Mobile Car Seat Information Program Event | Unrestrained Persons | Education; Engagement | Ongoing | PIO, SPD, SFD, GO | Grant |
| Encourage drivers to use their car's lane detection feature | Roadway and Lane Departure | Encouragement | Ongoing | PIO, SPD | Grant |
| Launch the "Don't Block the Box" Campaign in school zones | Vulnerable Road Users; Intersection Safety | Education; Enforcement | Short (<2 years) | PIO, GO, CMO, | Grant |

| ACTION | SAFETY EMPHASIS AREA | WHICH SIX E'S OF SAFETY | TIMEFRAME | PARTNERS | FUNDING |
|---|---|---|---|---|---|
| Create a Safety City Park for children | - | Education; Engagement | Medium (2-5 years) | PIO, GO, SECP, CMO, SPC, SPR, SEDC | Grant; Reallocation of Funds |
| Create an educational campaign that establishes the dangers of speeding when driving a motorcycle and riding while impaired | Vulnerable Road Users; Speed Related; Impaired Driving | Education | Short (<2 years) | PIO, TXDOT, CMO, MADD, GCCC | Grant |
| Run public education campaigns about safe driving practices | All | Education | Ongoing | PIO, TXDOT CMO | Grant; Reallocation of Funds |

## Guiding Principle: *Data Analysis and Monitoring*

***Goal:*** *Enhance data collection and analysis capabilities to identify high-risk areas, trends, and contributing factors to traffic accidents, enabling targeted interventions, and monitoring progress.*

| ACTION | SAFETY EMPHASIS AREA | WHICH SIX E'S OF SAFETY | TIMEFRAME | PARTNERS | FUNDING |
|---|---|---|---|---|---|
| Encourage the use of a Safe Driver App to monitor driving behaviors in Seguin | Distracted Driving | Encouragement | Short (<2 years) | PIO, CMO | Grant; Reallocation of Funds |
| Create a public program for car seat inspections | Occupant Safety | Encouragement; Engagement | Short (<2 years) | PIO, SPD, SFD, GO | Grant; Reallocation of Funds |
| Develop a method to determine if a local roadway would benefit from a lower speed | Speed Related | Engineering | Medium (2-5 years) | CMO, SECP, TXDOT, PIO | Existing Funds; Reallocation of Funds |
| Develop an understanding of impaired driving citation patterns through a study | Impaired Driving | Enforcement | Short (<2 years) | SPD, SECP | Existing Funds; Reallocation of Funds |

## Guiding Principle: *Collaboration and Partnerships*

***Goal:*** *Foster collaboration among various stakeholders, including government agencies, law enforcement, community organizations, and transportation providers, to coordinate efforts and implement effective strategies.*

| ACTION | SAFETY EMPHASIS AREA | WHICH SIX E'S OF SAFETY | TIMEFRAME | PARTNERS | FUNDING |
|---|---|---|---|---|---|
| Develop an educational program or materials about impaired driving with MADD | Impaired Driving | Education | Short (<2 years) | PIO, MADD, GO | Grant |
| Create a free ride program as an alternative transportation option | Impaired Driving | Encouragement | Medium (2-5 years) | SCC, HCC, GO, GC | Grant |
| Promote ride share services as an alternate transportation option | Impaired Driving | Encouragement | Ongoing | SCC, HCC, PIO, GO | Grant; Reallocation of Funds |
| Hold Bike Rodeos in partnership with schools in the district | Vulnerable Road Users | Education; Engagement | Ongoing | SPD, SISD, NISD, GO, CMO | Grant |
| Promote crosswalk safety citywide | Vulnerable Road Users | Education | Ongoing | PIO, CMO, GO, TXDOT | Grant; Reallocation of Funds |
| Develop bicycling safety classes with help from the Alamo Area Metropolitan Planning Organization (AAMPO) | Vulnerable Road Users | Education; Engagement | Short (<2 years) | GO, CMO, SPD, AAMPO, AACOG | Grant; Reallocation of Funds |
| Include EMS agencies in traffic incident management planning and training | Post Crash Care | - | Ongoing | SPD, SFD, CMO, SPC, SECP | Existing Funds |

## Guiding Principle: *Equity and Accessibility*

***Goal:*** *Ensure equitable distribution of resources and prioritize safety improvements in underserved communities and areas with historically high rates of traffic-related injuries and fatalities.*

| ACTION | SAFETY EMPHASIS AREA | WHICH SIX E'S OF SAFETY | TIMEFRAME | PARTNERS | FUNDING |
|---|---|---|---|---|---|
| Organize a Helmet Drive Event | Vulnerable Road Users | Equity | Short (<2 years) | SPD, SFD, GRMC, GO | Grant; Reallocation of Funds |
| Distribute helmets received from the Drive to underserved residents | Vulnerable Road Users | Equity | Short (<2 years) | SPD, SFD, SISD, NISD, GO | Grant; Reallocation of Funds |
| Develop a program that makes carseats available for free to underserved residents | Occupant Protection | Equity | Short (<2 years) | SPD, SFD, GRMC, GO | Grant |
| Acquire funding to create or support existing substance abuse and mental health help resources in the community | Impaired Driving | Equity | Ongoing | GO, GRMC, MADD, SVM | Grant |
| Create a Safe Routes to School Program for schools in the Seguin Independent School District | Vulnerable Road Users | Equity | Medium (2-5 years) | GO, SISD, NISD, SECP, CMO, SPD, SFD, PIO | Grant; Reallocation of Funds |

## Plan Administration

The City of Seguin and its partners are responsible for administering this Plan. City staff will oversee the day-to-day implementation, monitoring, and amendments of the Plan. This section details the administration activities.

### *City Departments*

Through the safe system approach all City of Seguin departments will be involved to some extent, the Engineering and Capital Projects Department will primarily oversee the administration and annual updates to the City Council.

### *City Council*

The City Council will play a pivotal role by providing continuous guidance and direction to staff and other boards and commissions, as well as making decisions on budget allocations and regulatory modifications as specified in the Implementation Program.

### *Other Boards, Committees, & Commissions*

Various boards, committees, and commissions in Seguin are designated to review and guide specific initiatives. They will play a crucial role in implementing the recommendations in the Implementation Program that align with their areas of focus.

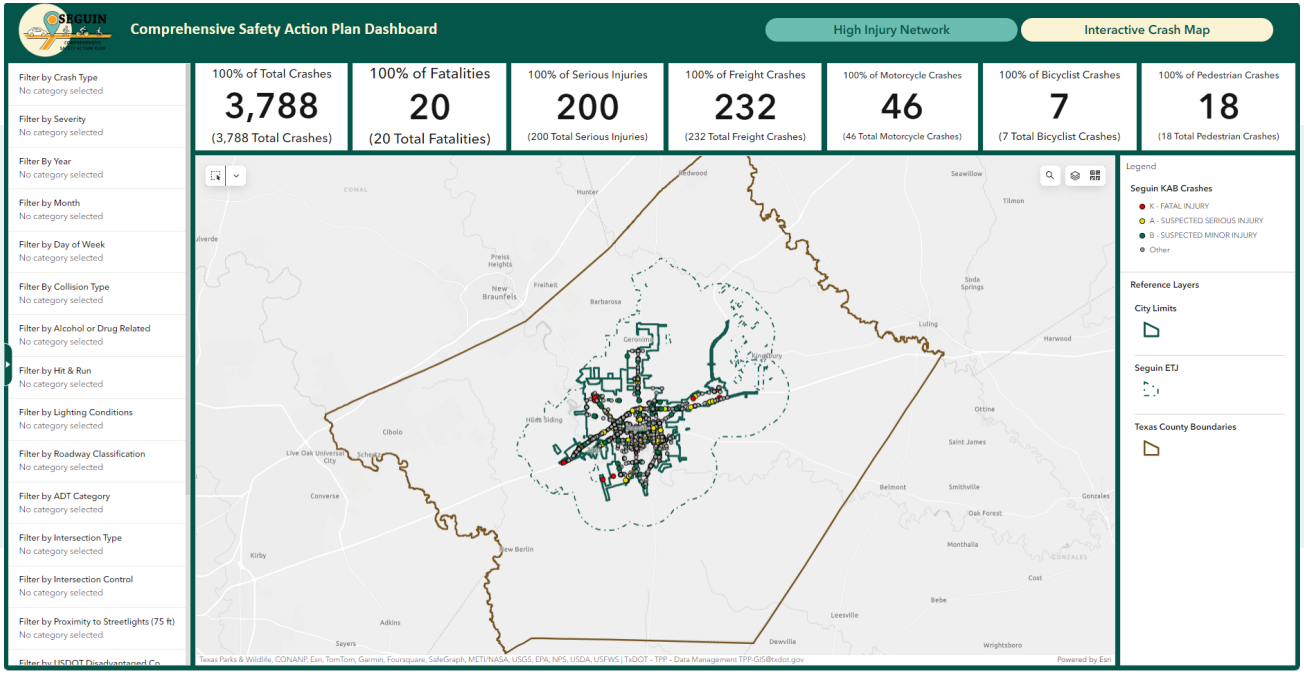
### *Study Review Committee and Other Partners*

The SRC plays a crucial role in implementation by overseeing the plan's actions and initiatives to ensure goals are met efficiently and effectively. The committee provides continuous guidance, supports implementing agencies, monitors progress, and adjusts for emerging challenges. Additionally, the SRC fosters collaboration among stakeholders—including residents, regional entities, and external departments—facilitates communication, and promotes community engagement to maintain momentum and accountability.

## Monitoring Progress

Extensive efforts were dedicated throughout the planning process to engage a wide spectrum of external stakeholders to ensure the Plan aligns with the overarching community vision. To sustain community engagement and enthusiasm, transparency about forthcoming progress in Plan implementation is crucial. An effective approach for conveying this progress is through an annual progress report, which should provide updates on the status of implementation strategies and showcase achievements accomplished in the preceding year. The responsibility of producing the annual progress report will be led by the Engineering and Capital Projects Department and presented to the City Council. Annual reporting will be supported by the Power BI Dashboard, which tracks crash trends and identifies various behavioral, design, and environmental characteristics. As new data is entered, the Dashboard can be used to illustrate and describe these trends.

*FIGURE 26. DASHBOARD*




## Amending the Plan

Seguin's CSAP captures a moment in time, with changes expected as the City grows and matures. To ensure the attainability of the overarching vision, the implementation approach must remain adaptable, capable of accommodating shifts in crash trends. The Engineering and Capital Projects Department will provide annual updates to the City Council on Implementation Program progress, including necessary High-Injury Network revisions due to changes in trends. The Plan should undergo a comprehensive review and update every five years to align with these trends and evaluate the relevance of action plan strategies.

# Appendix

# A



# Appendix

# A. CSAP Resolution



# Appendix

# B. Social Pinpoint– Public Engagement Results



# Appendix

# C. Peer Cities Review Memorandum



# Appendix

# D. Equity Review


DRAFT

# SEGUIN

## COMPREHENSIVE SAFETY ACTION PLAN