US 67 CORRIDOR
MASTER PLAN

FEBRUARY 2020

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Introduction

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1.0 Introduction

US 67 between Interstate 10 (I-10) west of Fort Stockton and the Presidio Port of Entry (POE) is one of the most distinct highway corridors in the state of Texas, with unique and varied landscapes, long travel distances between towns, and travel patterns driven by tourism and the growth of the Permian Basin energy industry. To ensure that the US 67 corridor continues to enjoy high levels of safety and mobility, the US 67 Corridor Master Plan was developed by the Texas Department of Transportation (TxDOT) in close collaboration with communities and counties. **Figure 1.1** shows an overview of the key outcomes of the US 67 Corridor Master Plan.

US 67 CORRIDOR MASTER PLAN

US 67 CORRIDOR MASTER PLAN

Newsletter | Spring 2018

Overview

The US 67 corridor stretches 142-miles from Interstate 10 west of Fort Stockton to the Presidio/Ojinaga Port of Entry on the U.S./Mexico border. US 67 provides access to the towns of Marfa, Alpine, Presidio, and surrounding communities. It serves multiple communities with diverse needs and priorities. This rural area has experienced significant growth in recent years, and TxDOT in partnership with communities is developing a corridor master plan to help determine the current and future transportation needs to best serve the communities along US 67.

Corridor Working Group

Meeting 1, held January 23 at the Historic USO Building in Marfa.

The Corridor Working Group (CWG) was assembled to advise TxDOT and consultant staff on the direction and approach for the study. The CWG is comprised of local elected officials, government agency staff, and other groups with an interest in the US 67 corridor. Its role is to provide input on the study approach, help plan effective public participation, communicate study recommendations to the public, and assist with plan implementation.

MEETING 1

The CWG held its first meeting on January 23, 2018 at the Historic USO Building in Marfa. Approximately 54 people attended the meeting, where participants were briefed on study goals and objectives, reviewed initial crash/safety data for the corridor, shared information on preliminary issues relevant to the corridor, and discussed public involvement plans for the study. Key issues discussed by the CWG included safety, cellular and radio communications and emergency response, passing lanes and speed limits, the need to accommodate bicyclists and pedestrians in future improvements, and concerns about truck traffic in local communities.

MEETING 2

The CWG held another meeting on April 5, 2018 at the Alpine Civic Center. This meeting was a roundtable format where CWG members were given a series of questions on corridor issues and provided their thoughts on needs and potential solutions for the corridor. The four topics discussed included safety (both vehicular and bicycle/pedestrian), emergency response, balancing traffic growth related to tourism with community quality of life, and top priorities for the corridor plan that CWG members felt needed to be addressed. The group also discussed public meetings; the second bus tour, tentatively scheduled for Summer 2018; and one-on-one and focus group interviews.

Meeting 2, held April 5, 2018 at the Alpine Civic Center.

For more information go to www.txdot.gov Search: US 67 Corridor Master Plan

1 **Policy guide** that not only considers immediate needs and concerns of the communities, but also highlights possible short-, mid-, and long-term multimodal transportation improvements.

2 Result of a **28-month planning process** that involved local officials, a variety of interest groups, and the general public–conducted from August 2017 to December 2019.

3 Assists TxDOT in **prioritizing projects** along the corridor based on needs, analysis, and recommendations derived from the US 67 Corridor Master Plan.

4 Recommendations for **safety enhancements** targeting vehicles, pedestrians, and cyclists.

5 Provides a **framework for continuing dialogue** around the US 67 corridor and in decision making about short-, mid-, and long-term multimodal transportation improvements that will benefit the communities along the US 67 corridor for years to come, helping the communities to leverage funds and/or support various projects and concepts outlined in the US 67 Corridor Master Plan.

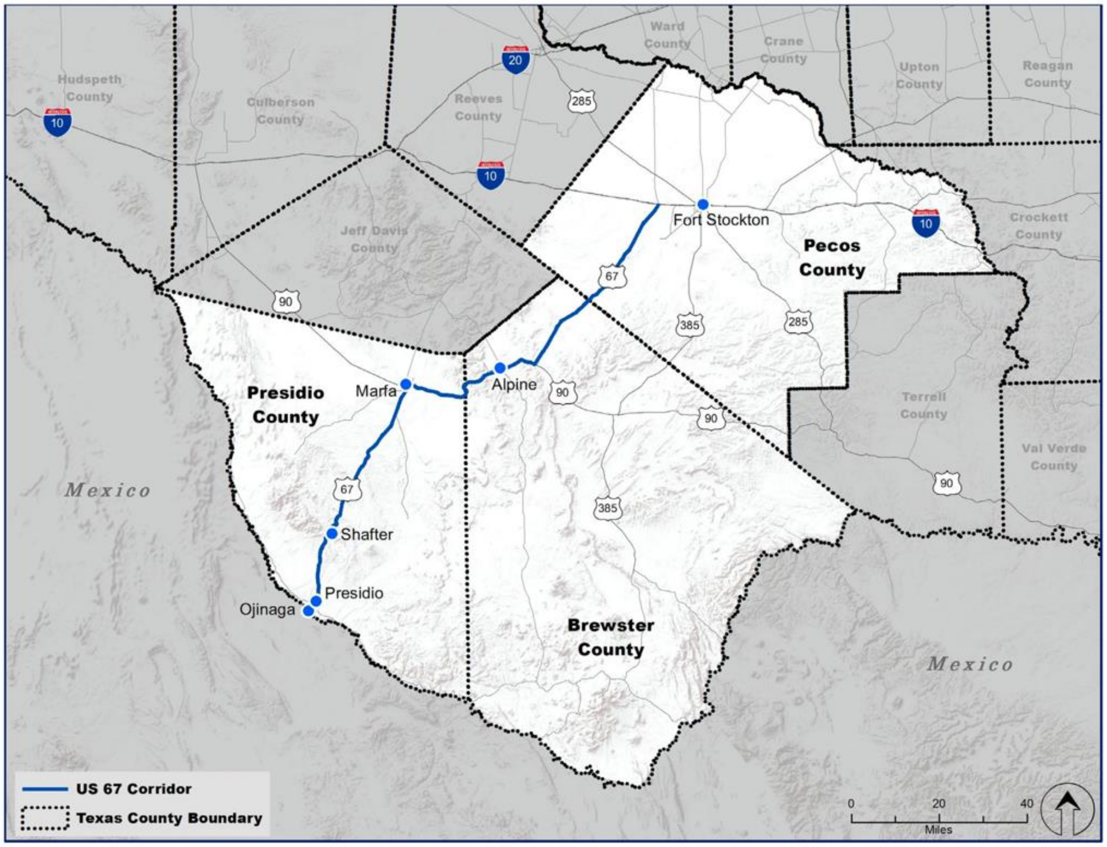
US 67 Corridor Master Plan defines existing transportation challenges and opportunities and considers, evaluates, and provides possible solutions.

Figure 1.1: US 67 Corridor Master Plan Summary

Potential improvements proposed in the US 67 Corridor Master Plan have been characterized as short-term, mid-term, and long-term. Short-term improvements will be implemented within the first five years after the adoption of the US 67 Corridor Master Plan, while mid-term improvements will be implemented between five and 10 years after the adoption of the master plan, and long-term improvements will be implemented 10 years or longer after the adoption of the master plan. The improvements were identified based on technical analyses that considered study goals and objectives, existing conditions, freight, safety, and multimodal considerations, as well as feedback collected from three series of public meetings, study coordination meetings, focus group meetings, corridor-wide bus tours, steering committee, and corridor working group (CWG) meetings. More details on public involvement can be found in **Appendix A – Public Involvement Plan**.

1.1 Study Area and Key Trends

The US 67 corridor study area stretches 142 miles from I-10 west of Fort Stockton to the POE on the U.S./Mexico border in Presidio. The corridor runs north to south through Pecos, Brewster, and Presidio counties and provides access to the cities of Alpine, Marfa, and Presidio as well as Big Bend National Park, Sul Ross State University, the Marfa Lights viewing area, Big Bend Ranch State Park, Fort Leaton State Park, and Fort Davis. Most of the US 67 corridor was built in the 1930s and 1940s, and the section of the corridor in Presidio County was reconstructed in the 1960s and 1970s. The US 67 corridor is shown in **Figure 1.2**. A picture taken of the US 67 roadway is shown in **Figure 1.3.**



Source: CDM Smith, 2018

Figure 1.2: US 67 Corridor Location

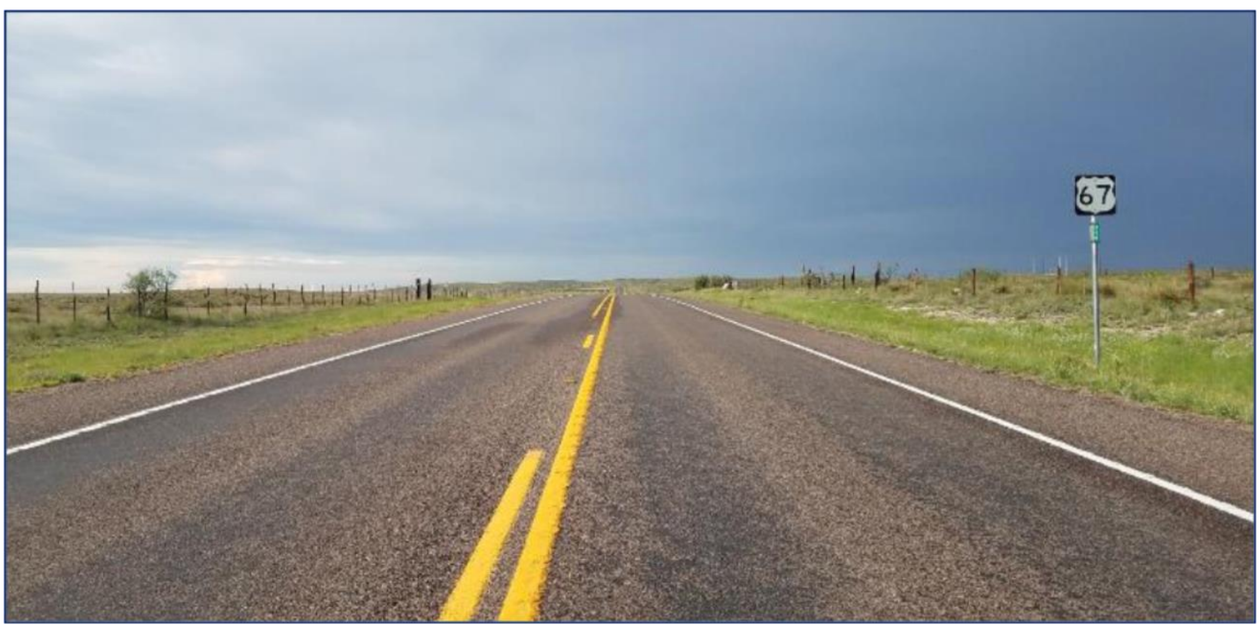


Figure 1.3: US 67 Corridor Configuration

The US 67 corridor is experiencing growth in traffic caused by multiple factors, including population growth, increased tourism, growth in truck traffic, and the development of the Permian Basin oil fields north and west of the US 67 corridor. Due to the low population along the US 67 corridor, traffic volumes are relatively low but growing, with average weekday vehicles per day in 2017 ranging from 1,700 to 3,000 outside of the three communities (Alpine, Marfa and Presidio), between 2,400 and 4,200 in Presidio, 4,500 in Marfa, and between 4,000 and 15,900 in Alpine. Crashes over the nine-year period from 2010 to 2018 are shown in **Figure 1.4**. Because the US 67 corridor experiences more crashes than comparable roadways in the state, the US 67 Corridor Master Plan aims to increase safety and improve mobility along the corridor. Information on travel conditions can be found in **Appendix B – Define Existing Conditions and Demand**.

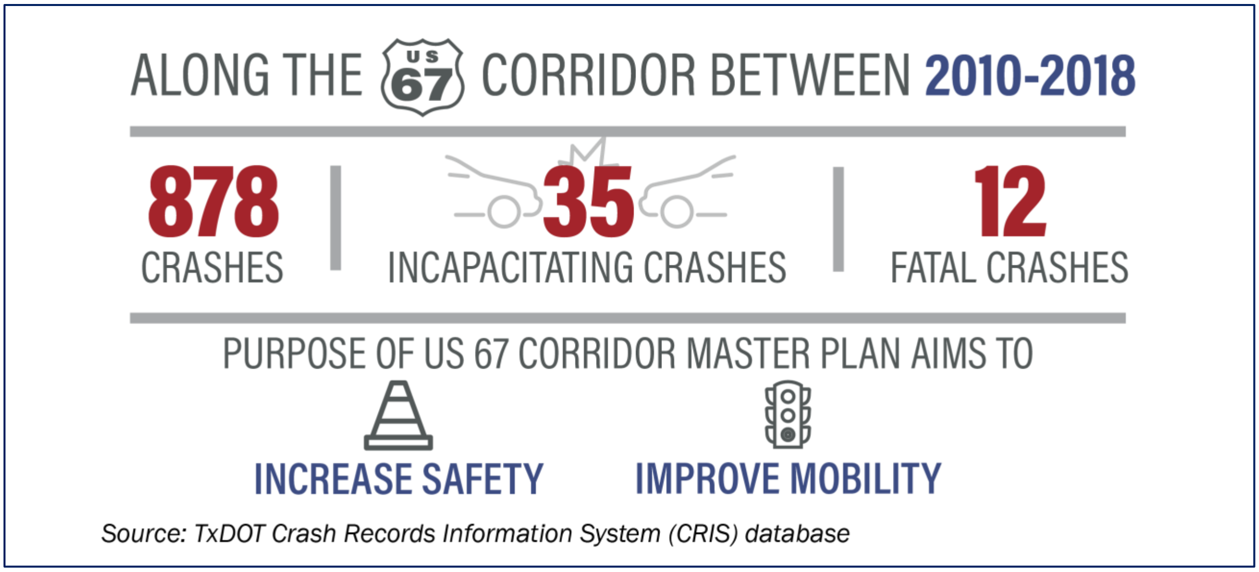


Figure 1.4: Crashes along the US 67 Corridor, 2010-2018

1.2 Study Purpose and Approach

The purpose of the US 67 Corridor Master Plan was to define existing transportation challenges and opportunities, evaluate possible solutions to the problems facing US 67, and to document the communities' vision of travel along the US 67 corridor. The US 67 Corridor Master Plan is unprecedented in scope and a study of this kind has never been done on the US 67 corridor. A multi-disciplinary team of transportation planners, engineers, landscape architects, and economic specialists was assembled to create a collaborative and integrated approach to evaluate potential conceptual transportation projects. The US 67 Corridor Master Plan study approach is shown in **Figure 1.5**. Further details on the process of defining goals and objectives can be found in **Appendix C – Development of Goals and Objectives**.

The objectives of the US 67 Corridor Master Plan focused on enhancing efficiency, safety, and mobility along the corridor by recommending transportation strategies and conceptual alternatives for implementation on short-, mid-, and long-term time frames.

The major tasks of the study included:

The division of the US 67 corridor into seven corridor segments, each with identified short-, mid-, and long-term improvements with associated implementation plans.

Coordination with TxDOT and other project stakeholders to identify necessary transportation improvements throughout the study corridor and other potential redevelopment opportunities.

The development and implementation of a public involvement program using a variety of outreach mechanisms, including public meetings, to collect public input on the problems facing the US 67 corridor and on possible solutions.

A safety analysis and traffic projections, traffic analysis, and simulation models that identify existing and future mobility issues and recommend potential improvements.

Coordination with survey studies assisting the development and refinement of potential corridor improvements.

Provide technical assistance and prepare technical memoranda documenting the US 67 Corridor Master Plan's methodology, results, and conclusions.

Figure 1.5: US 67 Corridor Master Plan Study Approach

The timeline for the US 67 Corridor Master Plan's development is shown in **Figure 1.6**.

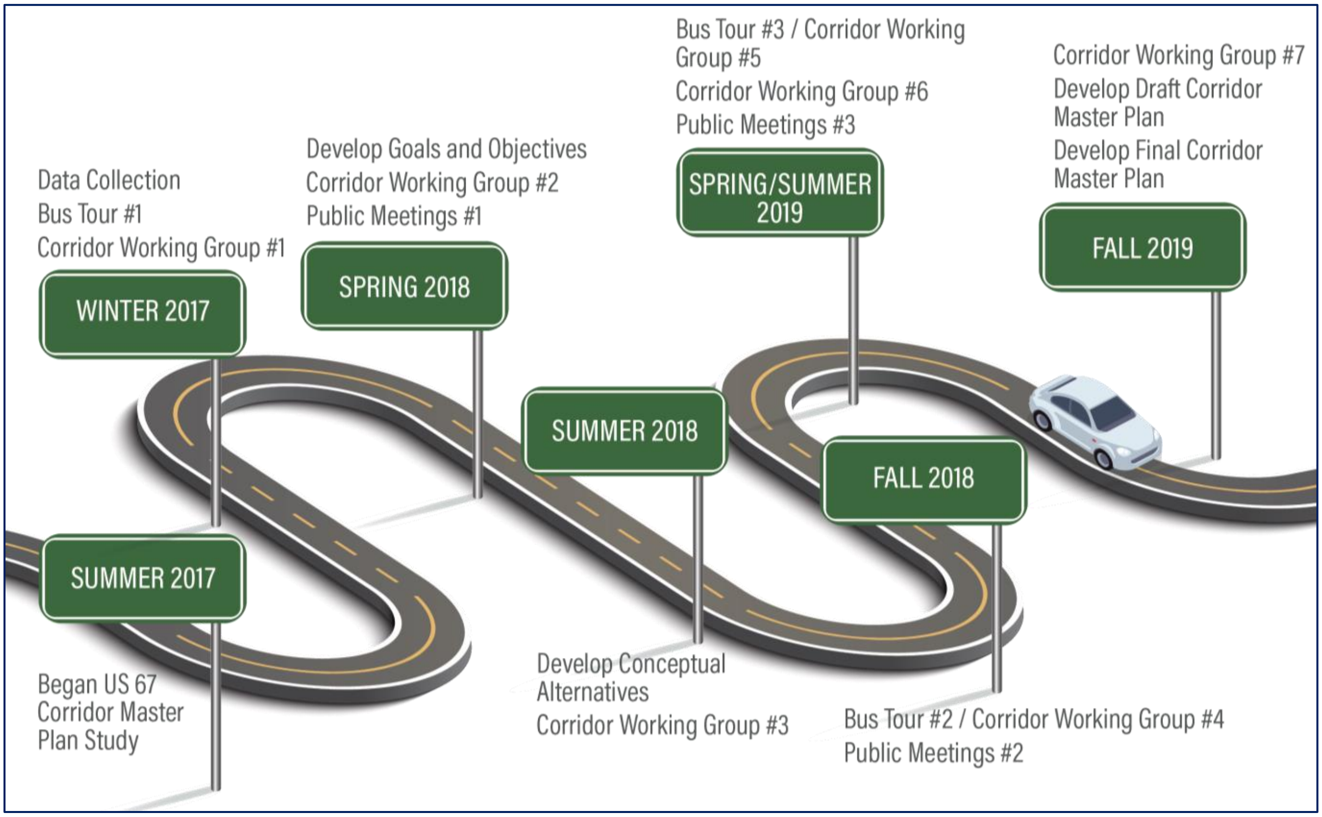


Figure 1.6: US 67 Corridor Master Plan Study Timeline

1.3 Plan Organization

The US 67 Corridor Master Plan is organized into eight chapters that together comprise the goals and objectives of the study. They are shown in **Figure 1.7**.

Introduction introduces the US 67 Corridor Master Plan and its purpose and describes the US 67 corridor.

CHAPTER 1

Public Involvement describes the techniques and strategies used to engage elected officials, stakeholders, and members of the public throughout the US 67 corridor study area and summarizes the process by which the public feedback was incorporated into the US 67 Corridor Master Plan.

CHAPTER 2

Goals and Objectives reviews federal, state, and regional goals for the US 67 corridor and the process by which public input and safety and traffic analyses informed the development of the US 67 Corridor Master Plan goals and objectives, as well as the process by which those goals and objectives were used to develop performance measures for conceptual improvements along the US 67 corridor.

CHAPTER 3

Existing Conditions describes the current travel conditions along the US 67 corridor and the factors affecting them, including safety of travel along the corridor, existing and future traffic, intelligent transportation system (ITS) capabilities along the corridor, the hydrology of the area around the US 67 corridor, and the management of transportation assets.

CHAPTER 4

Freight Conditions, Tourism, and Economic Development describes existing and future freight conditions along the US 67 corridor, including an assessment of regional freight infrastructure, a summary of freight volumes and travel patterns, a discussion of tourism and employment trends, and a truck traffic forecast.

CHAPTER 5

Multimodal and Complete Streets describes the complete streets solutions that were developed in response to overwhelming public and agency requests for improved bicycle and pedestrian infrastructure along the US 67 Corridor. It also includes detailed solutions for Alpine, Marfa and Presidio.

CHAPTER 6

Alternatives Analysis describes the process by which conceptual improvements for the US 67 corridor were developed, screened, and evaluated. It explains how concepts were developed as detailed "core concepts" and "alternative concepts" and layer screened into recommended alternatives. Additionally, it explains the impact of the proposed improvements on the health of residents and users of the US 67 corridor.

CHAPTER 7

Implementation reviews the process by which recommended improvements identified in the US 67 Corridor Master Plan can be funded and constructed. It describes the Category 4, 11, and 12 allocation categories in TxDOT's Unified Transportation Program (UTP) which respectively consider mobility and added capacity projects on major state highway corridors, connectivity and on corridors serving the energy sector, and projects with specific importance to the state specifically.

CHAPTER 8

Figure 1.7: US 67 Corridor Master Plan Chapters

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Chapter 2

Public Involvement

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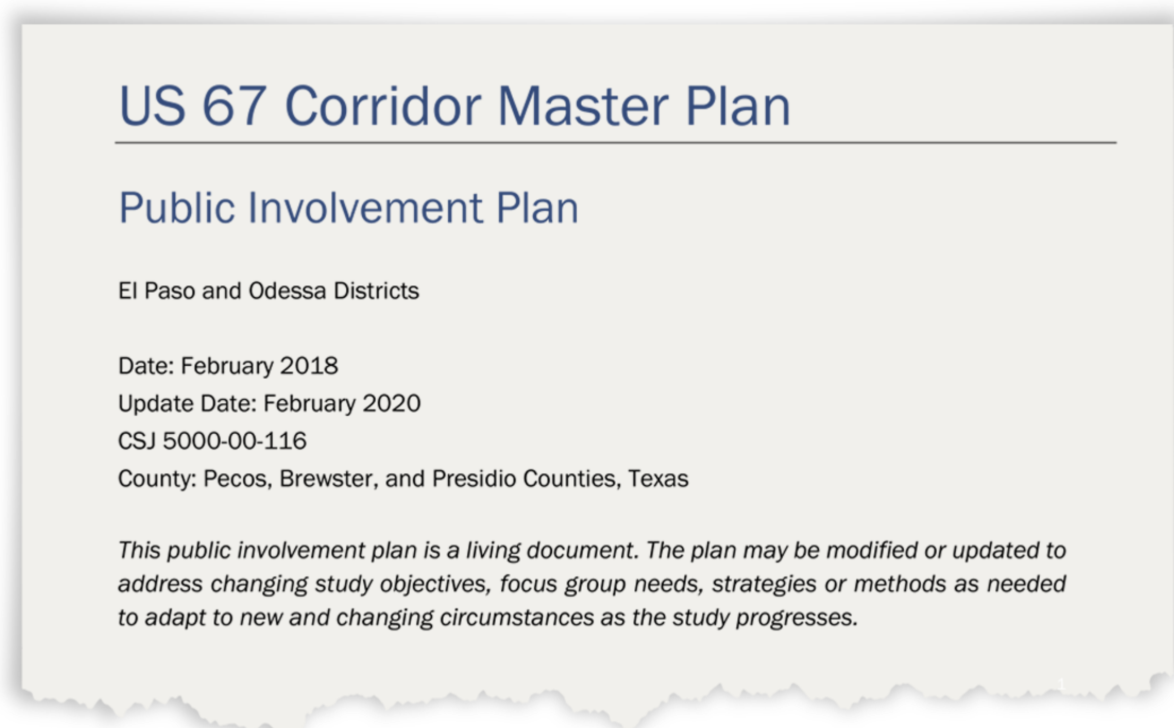
2.0 Introduction

The US 67 Corridor Master Plan study limits stretch 142 miles from I-10 west of Fort Stockton to the Presidio/Ojinaga POE on the U.S./Mexico border. The corridor crosses Pecos County, Brewster County, and Presidio County and provides access to the cities of Alpine, Marfa, Presidio, and surrounding communities. Based on the length of the corridor, the distance between cities, the number of residents who primarily speak Spanish, and the reception of prior studies within the corridor, the study team (TxDOT and their consultants) created a robust public outreach effort in English and Spanish, as outlined below.

2.1 Public Involvement Plan

The study's public outreach effort was outlined in **Appendix A – Public Involvement Plan**. The Public Involvement Plan included strategies and tools to create public awareness of the US 67 Corridor Master Plan and achieve meaningful public input regarding corridor needs and concerns. The study team implemented these strategies and tools throughout the course of the study and tailored the Public Involvement Plan to suit the context and character of the corridor. The Public Involvement Plan was a proactive and collaborative process consistent with federal and statewide planning regulations and was a "living" document that was updated continuously throughout the study to include revised strategies and new contacts. The cover sheet for the Public Involvement Plan is shown in **Figure 2.1**.



US 67 Corridor Master Plan

Public Involvement Plan

El Paso and Odessa Districts

Date: February 2018
Update Date: February 2020
CSJ 5000-00-116
County: Pecos, Brewster, and Presidio Counties, Texas

This public involvement plan is a living document. The plan may be modified or updated to address changing study objectives, focus group needs, strategies or methods as needed to adapt to new and changing circumstances as the study progresses.

Figure 2.1: US 67 Corridor Master Plan Public Involvement Plan

In addition to the considerations listed in the introduction above, the study team created the Public Involvement Plan with the knowledge that a previous study conducted in the area, **La Entrada al Pacifico (La Entrada)**, was met with broad public disfavor. La Entrada was a proposed trade corridor along US 67 with limits from Mexico to Lamesa, Texas that would increase capacity along US 67 from a two-lane facility to a four-lane facility. In the 2000s, a feasibility study was conducted for La Entrada, and the public was generally against the project. As a result, the No-Build alternative was chosen, but this led the locals to mistrust proposed transportation projects. The US 67 study team's goal was to reassure the public from the beginning that local corridor needs, not just freight concerns, would be central to study considerations. Because the branding of the study was so important (i.e. keep it separate from other studies), the study team created branding options and allowed stakeholders to vote on which they favored. This gave the stakeholders an early sense of ownership in the study, and the team utilized this branding on all outreach items and documentation throughout the duration of the study. The chosen US 67 logo is shown in **Figure 2.2**.

Figure 2.2: US 67 Corridor Master Plan Logo

Based on the Public Involvement Plan, the study team conducted multiple public outreach activities between 2017 and 2019. These activities included creating a Master Contact List and holding numerous Focus Group interviews, seven Corridor Working Group (CWG) meetings, three Bus Tours, nine Steering Committee Meetings, and three series of Public Meetings (totaling 12 Public Meetings). **Figure 1.6** shows the timeline and relationship of the public involvement activities to the progression of the US 67 Corridor Master Plan. Provided below is a more detailed discussion of these activities.

The public involvement activities described below, which were promoted and facilitated by the TxDOT area engineer (TxDOT El Paso District) and community leaders in the US 67 study area, were used to develop and inform the alternatives proposed in the US 67 Corridor Master Plan. The contributions of the area engineer, community leaders, and other stakeholders in terms of participation in the public involvement process were invaluable in obtaining useful public input.

2.1.1 US 67 Master Contact List

Early in the process, a Master Contact List was prepared. This list included names and contact information for interested individuals including public officials, elected officials, local governments, emergency responders, civic leaders, landowner representatives, agency and organization representatives, media outlets, key members of the public, and others who expressed an interest in the study. As the study progressed, the database was continually updated to include additional interested parties, as and when noted or when requested to be added to the study.

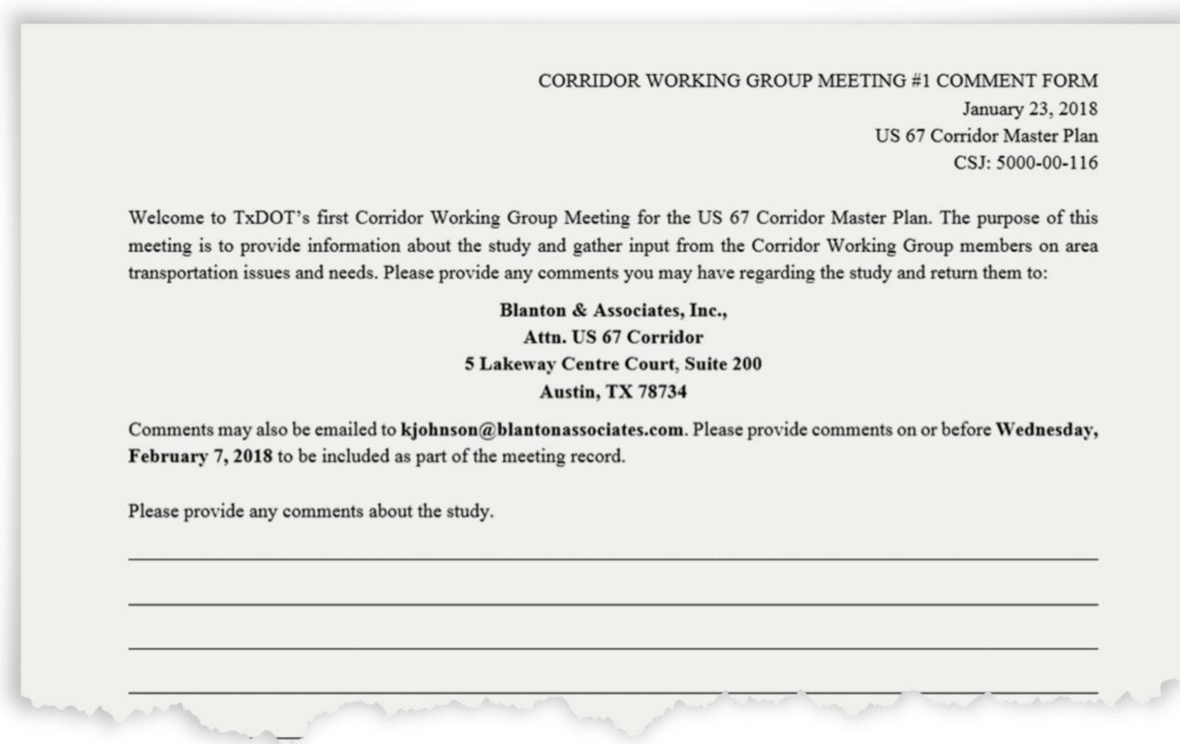
2.1.2 Focus Groups

As outlined in the Public Involvement Plan, the team created various Focus Groups using the Master Contact List. Because Focus Group meetings were smaller meetings that included individuals with similar interests, it was easier for attendees to voice their concerns. This also resulted in a more pointed discussion on potential solutions. Focus group meetings and interviews were held throughout the study. Focus Groups included representatives from utility companies, property owners, representatives from groups focused on the following sub-areas: Environmental/Natural Resources, Economic Development/Business, Private Landowners, Community Organizations/Non-Profits, Local Media and Press, Safety, School Districts, Border Trends and Issues, and Regional and International Coordination. The list of Focus Groups is shown in **Figure 2.3**.

Figure 2.3: US 67 Public Involvement Focus Groups

2.1.3 Corridor Working Group (CWG)

The CWG was a larger stakeholder group that was created to provide a thorough cross-section of local views and opinions. CWG input helped guide the direction of the study before presenting to the general public. The CWG consisted of agency representatives, Focus Group members, elected officials, and members of the public. The members of the CWG were originally selected from the Master Contact List, however, the list grew as additional individuals and organizations expressed interest in the study. A comment form from CWG Meeting #1 is shown in **Figure 2.4**.



CORRIDOR WORKING GROUP MEETING #1 COMMENT FORM
January 23, 2018
US 67 Corridor Master Plan
CSJ: 5000-00-116

Welcome to TxDOT's first Corridor Working Group Meeting for the US 67 Corridor Master Plan. The purpose of this meeting is to provide information about the study and gather input from the Corridor Working Group members on area transportation issues and needs. Please provide any comments you may have regarding the study and return them to:

Blanton & Associates, Inc.,
Attn. US 67 Corridor
5 Lakeway Centre Court, Suite 200
Austin, TX 78734

Comments may also be emailed to **kjohnson@blantonassociates.com**. Please provide comments on or before **Wednesday, February 7, 2018** to be included as part of the meeting record.

Please provide any comments about the study.

Figure 2.4: CWG Meeting #1 Comment Form

2.1.4 Online Tools

The main objectives of the online tools used in the US 67 Corridor Master Plan were to:

- Provide early and ongoing engagement with the public
- Keep the public up to date with study developments, including new information and findings
- Give the public opportunities for meaningful feedback

One method used to meet these objectives was the use of online tools, such as MindMixer and ViewPro. ViewPro, also referred to as the "Corridor Planning Tool" by the study team, is an online map viewer that contained visual information about crashes, traffic, and infrastructure, and other information. The tool allowed the public to add location-specific photos and comments.

In addition, MindMixer is a website that provided an ongoing forum for community dialogue, idea generation, and information exchange. Topics for discussion were created and modified throughout the course of the study. Comments received through both ViewPro and MindMixer were documented in the various public meeting summaries. This input was valuable in matching priorities and needs as stated by the public to specific areas along the corridor. The Corridor Planning Tool and MindMixer interfaces are shown in **Figure 2.5**.

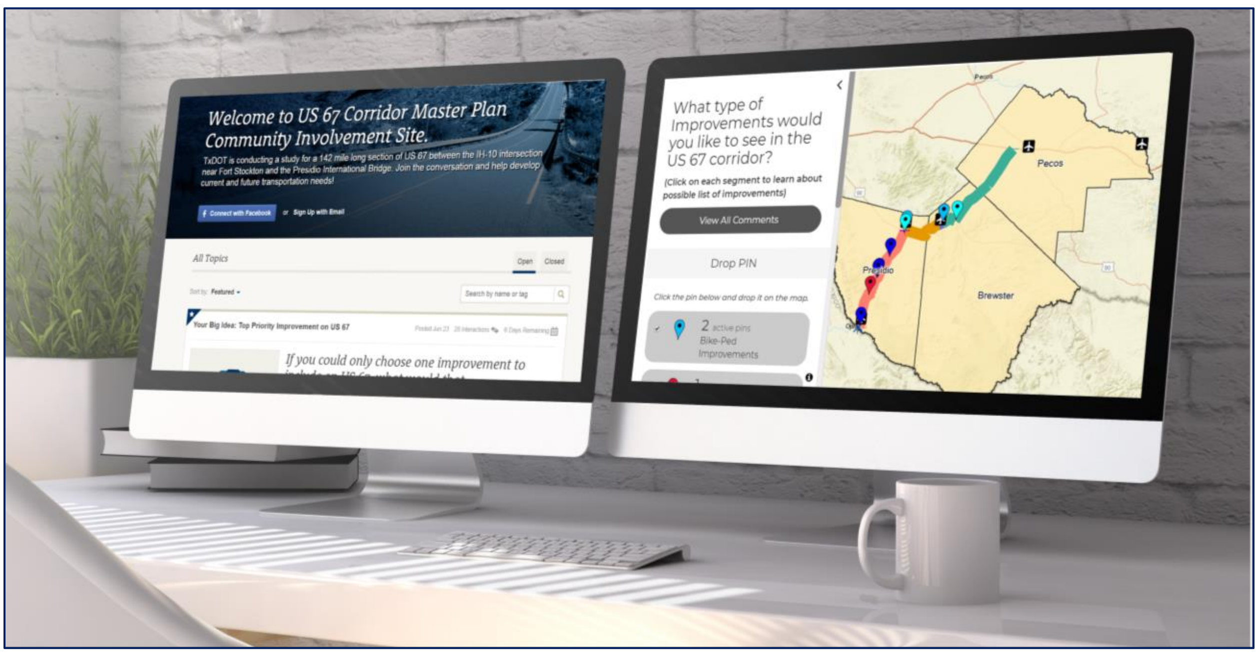


Figure 2.5: Corridor Planning Tool and MindMixer Interface

2.1.5 Bus Tours

Three stakeholder Bus Tours were held along the corridor during different times of the study. The Bus Tours included stops at various locations and points of interest along the corridor to identify and discuss potential opportunities for improvement. The Bus Tours included various attendees in order to discuss location-specific safety and traffic issues, identify additional community concerns, and to provide collaborative discussions on how to resolve some of the issues. Attendees included members of the study team, focus groups, elected officials, the media, and members of the communities. A map of Bus Tour #1 is shown in **Figure 2.6**.

Figure 2.6: Route of Bus Tour #1

2.1.6 Virtual Public Meetings

Given the rural nature of the expansive 142-mile corridor, one of the study team's goals was to reach as many people as possible. To fulfill this goal, the study team created Virtual Public Meetings for each meeting series. Virtual Public Meetings were an effective tool because they allowed members of the public who could not attend a meeting in person to access a full narrative of each meeting series on the TxDOT website. The narrative began with a walk-through of the meeting stations starting at the sign-in station and ending at the comment station. After viewing all the materials and information available, the public had an opportunity to provide comments through the various online tools and/or a link to a comment form. Links and photographs of the virtual Public Meetings can be found within the respective Public Meeting summaries on the TxDOT website at https://www.txdot.gov/inside-txdot/projects/studies/el-paso/us67-i10-presidio.html. The web page for the virtual Public Meeting is shown in **Figure 2.7**.

Figure 2.7: Virtual Public Meeting

2.1.7 Visualization Demonstration

The study team provided 3-D demonstrations to assist the public in visualizing various conceptual alternatives that were recommended throughout the corridor. The locations used in the visualization demonstrations were selected based on input received from the public on major intersections or areas of concern, as well as through coordination with elected officials. 3-D videos using Infraworks models were created for the existing conditions, and the 3-D demonstrations were created using HoloLens technology, including a combination of aerial mapping, annotated graphics, and design features. The 3-D demonstrations/HoloLens tool provided a fully immersive experience using interactive virtual reality and mixed reality. A member of the public using the HoloLens is shown in **Figure 2.8**.

Figure 2.8: HoloLens Demonstration

2.2 Public Outreach

The public involvement process was split into three distinct outreach phases, each consisting of CWG meetings, a Bus Tour, and Public Meetings. The study area where outreach was conducted included the entire 142 miles of US 67 as described above and a buffer of 1,500 feet from the edge of the prescribed right-of-way (ROW) (based on the County Appraisal District parcel boundary information) in all directions. The buffer was included to be sure that studies did not only look at resources within the existing ROW, but also considered resources adjacent to the corridor.

The number of people who attended the public meetings in-person decreased over time while the number of people engaging with the virtual public meetings stayed consistent. The ratio of virtual public meeting participants to in-person public meeting participants rose from 4:10 for Public Meeting Series No. 1 to 6:10 for Public Meeting Series No. 2 to 7:10 for Public Meeting Series No. 3. The benefits of having concurrent physical and virtual public meetings included having a wider portion of the public participate in the outreach efforts.

Public outreach for the US 67 Corridor Master Plan is summarized in **Figure 2.9.**

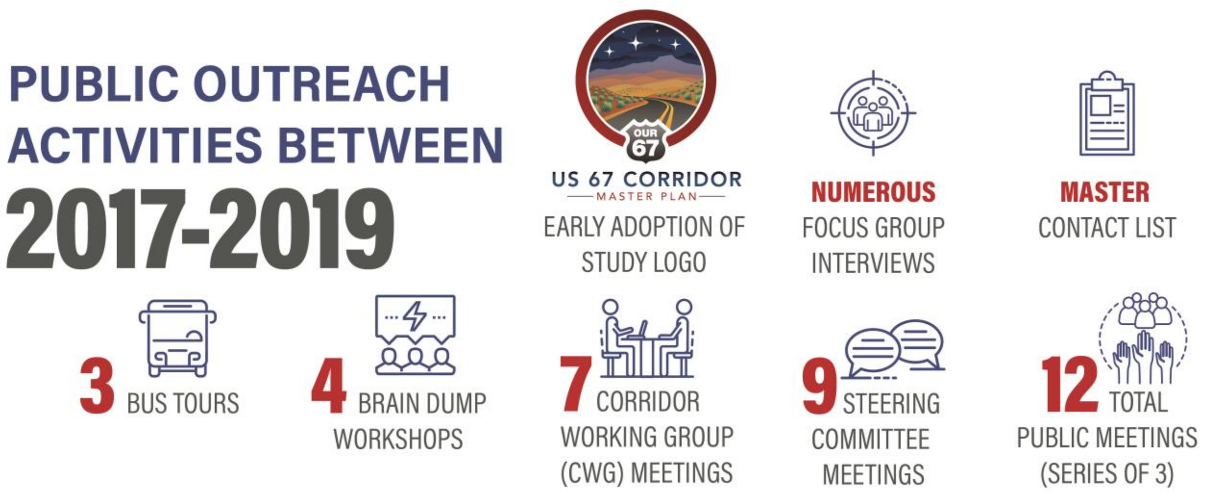


Figure 2.9: Summary of Public Outreach

2.2.1 Public Outreach Effort #1

The first outreach phase was broad, focusing on collecting general input, insight, and comments from the public on the transportation needs within the study area.

2.2.1.1 Bus Tour #1

The first Bus Tour was held on December 12, 2017, effectively kicking off the US 67 Corridor Master Plan study. The study team and members of the community traveled along the 142-mile stretch of the corridor, getting a big picture view of the existing corridor conditions and issues. Bus Tour participants emphasized that there is a strong need for safety improvements along the corridor, and discussed crashes, issues with line of sight at certain curves, speeding, lack of passing/climbing lanes, and concerns over signage. A stop on Bus Tour #1 is shown in **Figure 2.10**.

Figure 2.10: Bus Tour #1

2.2.1.2 Corridor Working Group Meetings #1 and #2

There were two CWG meetings held during the first outreach phase. CWG Meeting #1, held in January 2018, provided an explanation of the Corridor Master Plan process and the function of the CWG to the attendees as well as input solicited on the corridor. Safety was discussed as a key focus at this meeting, with discussions centering around improved signage, both for roadway conditions and for improvements at pedestrian crossings, as well as the need for crosswalks, pedestrian signals, and bicycle lanes. CWG members also expressed concerns about the increase in truck traffic along the corridor and congestion the trucks can cause along the corridor. The purpose of CWG Meeting #2, held in April 2018, was to solicit input on the presentation materials for the first series of Public Meetings. CWG Meeting #1 is shown in **Figure 2.11**.

Figure 2.11: Corridor Working Group Meeting

2.2.1.3 Public Meeting Series #1

Four open-house-format Public Meetings were held in May 2018 in Alpine, Fort Stockton, Marfa, and Presidio. Meetings were held at the various locations to reach the largest number of attendees throughout the corridor. Public Meeting Series #1 explained the Corridor Master Plan process and invited the public to provide input, insight, and comments on the study area.

Figure 2.12 shows a summary of the attendance and comments received during the Public Meeting Series #1. The comments were received via online tools, video comments, comment cards, comments written on study area maps, emails, mail, and through the Virtual Public Meeting. The public indicated that they would like to see general improvements along the corridor, including alternate routes, rest areas, passing lanes, bicycle paths and sidewalks, and general maintenance improvements. A copy of the Public Meeting Series #1 Summary can be found on the TxDOT website at http://ftp.dot.state.tx.us/pub/txdot/get-involved/elp/us-67/051418-summary.pdf.

Figure 2.12: Public Meeting Series #1 Summary

Members of the communities along the US 67 study corridor expressed both an opinion against alternate routes and an interest in looking at alternate routes as part of the study. The public expressed concerns about how an alternate route could affect their local economies, the environment, property values, and property owners through land acquisition. However, they also noted that an alternate route could benefit towns by taking heavy truck traffic off US 67 within each town, which would benefit pedestrians and tourists and would potentially reduce noise and air pollution. Alleviation of congestion by commercial traffic, specifically the hauling of Solitaire Mobile Homes and oil and gas industry trucks, was also cited as a main reason for proposing an alternate route. Some members of the public proposed that the alternate route be limited to commercial trucks, which would reduce through-traffic from the middle of town and therefore eliminate the stress of commercial traffic on their communities.

After noting the interest in alternate routes within the communities, TxDOT reiterated in meetings with elected officials and the public that the objective of the US 67 Corridor Master Plan was to study the existing US 67 corridor and to provide recommendations/solutions within the vicinity of the corridor. Because alternate routes would likely be located outside of the study area, they would not be considered as improvement options within the US 67 Corridor Master Plan study. Given the interest on this topic, however, TxDOT provided a "Roadmap" of the alternate route process to inform local officials and the public about the concept of alternate routes. The roadmap provides high-level steps involved in the process and provides a summary of several case studies on alternate routes as shown in **Appendix T – Alternate Route Roadmap.** The meeting from Public Meeting Series #1 in Marfa is shown in **Figure 2.13**. A graphic showing the virtual public meeting interface is shown in **Figure 2.14**.

Figure 2.13: Public Meeting Series #1 (Marfa)

Figure 2.14: Virtual Public Meeting

2.2.2 Public Outreach Effort #2

During the second outreach effort, the study team gathered the results from the first outreach effort, documented what they heard, and drafted various solutions to help shape the future transportation vision of the local stakeholders along the US 67 Corridor.

2.2.2.1 Bus Tour #2

The second Bus Tour was held on September 20, 2018. Like the first Bus Tour, the study team and members of the community traveled along the corridor, stopping at various locations to showcase unique and diverse development as well as to discuss potential transportation opportunities and challenges. Bus Tour participants re-emphasized that safety is a key factor along the corridor. Bicycle and pedestrian facilities, landscaping, and the protection of viewsheds were also discussed.

2.2.2.2 Corridor Working Group Meetings #3, and #4

There were two CWG meetings held during the second public outreach phase. CWG Meeting #3, held in August 2018, was a webinar meeting. The purpose of CWG Meeting #4, held in September 2018, was to update the CWG members on the results of Public Meeting Series #1 and to gather input on the theme and materials for the second series of Public Meetings. Based on feedback received during the first series of Public Meetings, the study team drafted various preliminary improvement options by specific locations (e.g. intersection improvements in Presidio, larger radii for truck turning in Marfa). The public was asked to rank the top five options per area to assist the study team in determining which types of improvements were the most desired among local communities. General comments focused on pedestrian needs and education for new and international drivers.

2.2.2.3 Public Meeting Series #2

Four open-house-format Public Meetings were held in November 2018 in Marfa, Presidio, Fort Davis, and Alpine. Public Meeting Series #2 presented the public feedback received from the first series of public meetings, including feedback from CWG Meeting #4. Members of the public were provided a survey with preliminary improvement options that were developed based on input from the previous public outreach effort. The public was asked to rank their top three options in each area, which helped the study team determine which options were favored.

Figure 2.15 shows a summary of the attendance and comments received during the Public Meeting Series #2. A copy of the Public Meeting Series #2 Summary and the final rankings of the preliminary improvement options can be found on the TxDOT website at http://ftp.dot.state.tx.us/pub/txdot/get-involved/elp/us-67/110718-meeting-summary.pdf.

Figure 2.15: Public Meeting Series #2 Summary

2.2.3 Public Outreach Effort #3

The third and final outreach phase focused on the input received from the second outreach phase. This information coupled with the results from the technical analyses of the corridor guided the study team in the development of the recommended alternative concepts.

2.2.3.1 Brain Dump Workshop

The concept of the Brain Dump Workshop is an open forum between the study team and local officials and stakeholders to share ideas and to react to each other's ideas. At the beginning of the study, one brain dump workshop was held in April 2018 in Alpine. In March 2019, three brain dump workshops were held with the communities of Alpine, Marfa, and Presidio. At each brain dump workshop, the study team provided detailed information on current conceptual alternatives, and local participants provided feedback and had the opportunity to ask questions. The feedback from the brain dump workshops informed and shaped further development of potential conceptual alternatives.

2.2.3.2 Bus Tour #3

The third and final Bus Tour was held on April 23, 2019. Based on public input gathered up to that time, the study team prepared recommended conceptual alternatives for various locations along the study area. This Bus Tour stopped at these locations and the study team explained the alternative concepts designed for those locations. Participants provided feedback on the concepts. The participants brought up safety as a major concern.

2.2.3.3 Corridor Working Group Meetings #5, #6, and #7

There were three CWG meetings held during the third outreach phase. CWG Meetings #5 and #6, held in April 2019 and May 2019 respectively, updated the CWG members on results of Public Meeting Series #2, and gave the CWG members an opportunity to see and provide feedback on the recommended alternative concepts. CWG Meeting #6 also provided a first look at the HoloLens Visualization Demonstration. CWG Meeting #7 was held on

October 17, 2019 to discuss the recommended alternatives to be included in the Corridor Master Plan.

2.2.3.4 Public Meeting Series #3

Four open-house-format Public Meetings were held in June 2019 in Fort Davis, Marfa, Alpine, and Presidio. Public Meeting Series #3 presented the results of the first two series of Public Meetings and the feedback from CWG Meetings #5 and #6. In addition, a survey was provided to get input on the conceptual alternatives. As part of the survey, the public was asked to rank or prioritize alternatives within Presidio, Marfa, Alpine, and rural areas. **Figure 2.16** shows a summary of the attendance and comments received during the Public Meeting Series #3. A total of 208 people attended Public Meeting Series #3, including the study team, members of the public, media, and elected officials. Twenty-five people attended the meeting in Fort Davis, 50 people attended the meeting in Marfa, 64 people attended the meeting in Alpine, and 69 people attended the meeting in Presidio. A total of 47 surveys/comments were received by survey, comment forms, emails, mail, and through the Virtual Public Meeting. There were 153 visits to the Virtual Public Meeting recorded. A copy of the Public Meeting Series #3 Summary and the results of the survey can be found on the TxDOT website at http://ftp.dot.state.tx.us/pub/txdot/get-involved/elp/us-67/062419-meeting-summary.pdf.

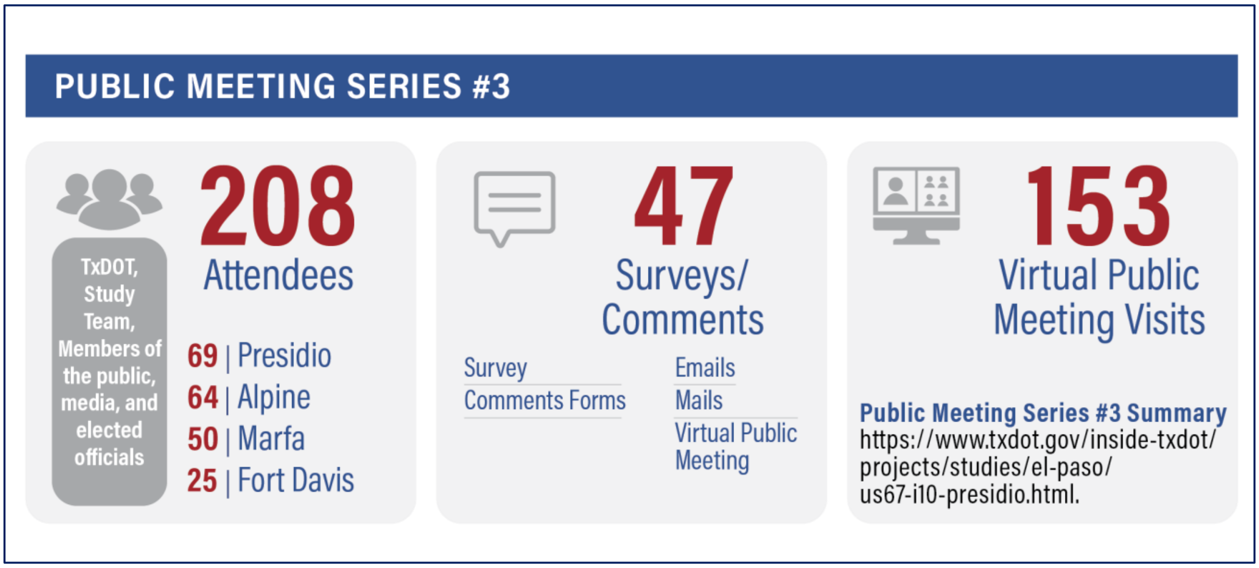


Figure 2.16: Public Meeting Series #3 Summary

2.3 Public Feedback on the Outreach Effort

To obtain feedback from the public on the effectiveness of the US 67 public outreach effort, a survey was distributed to CWG members at CWG Meeting #5 and to the public during Public Meeting Series #3. The results are provided below:

- The CWG and the public agreed that the purpose of the study was clear and that their time was well spent by attending meetings
- The public agreed that their input would influence the final recommendations

- The public strongly agreed that the study team was receptive to input and new ideas and would present recommendations that are best for the community
- The CWG and public indicated that they were satisfied with the public involvement effort and the study

2.4 Conclusion

The information obtained from the Public Involvement Plan summarized above was utilized in the selection of recommended alternatives, as presented in this Corridor Master Plan. The draft version of the Corridor Master Plan was published on the TxDOT study website from November 7, 2019 through December 9, 2019 for public review. The study team received 8 total comments during this time, via email and others noted during city council and county commissioner meetings. The comments received and the corresponding responses can be found in Appendix U – Public Review Period Comment-Response Matrix. These comments were considered in the finalization of the Corridor Master Plan.

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Texas Department of Transportation

Chapter 3

Goals and Objectives

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3.0 Overview

This chapter presents the goals and objectives of the US 67 Corridor Master Plan, which established the framework for evaluating the potential short-, mid-, and long- term improvements proposed for the US 67 corridor. The development of these goals and objectives was informed by the transparent and robust public engagement process as described in **Chapter 2 – Public Involvement**. This chapter provides a summary of the federal, state, and regional policies and plans that inform these goals and objectives; presents the goals and objectives formulated by the study team; and identifies the methods used to develop performance measures for recommended alternatives, to ensure that all alternatives are in keeping with the plan's goals and objectives. Further details on the US 67 Corridor Master Plan's goals and objectives can be found in **Appendix C – Development of Goals and Objectives**.

3.1 Federal, State, and Regional Goals

The US 67 Corridor Master Plan is one of several documents that guide the improvement prioritization and funding for the US 67 corridor. Federal, state, and regional transportation goals are outlined in the Fixing America's Surface Transportation (FAST) Act, the U.S. Department of Transportation (USDOT) Strategic Plan, the TxDOT Strategic Plan, the Texas Transportation Plan 2040, the Texas Rural Transportation Plan, the Texas Strategic Highway Safety Plan, and the Texas Freight Mobility Plan. Taken together, these plans delineate nine main goal areas that improvements in the US 67 Corridor Master Plan should fulfill. They are shown in **Figure 3.1**.

Figure 3.1: US 67 Goal Areas

The common goal areas from state and federal policies and plans are shown in **Table 3.1**. Safety emerged as the overwhelming priority from state and federal plans and policies.

Table 3.1: Common Goals from State and Federal Policies and Plans

		Economy	Safety	Security	Accessibility & Mobility	Environment, Energy, Conservation, Quality of Life, Consistency	Integration & Connectivity	Preservation	Resiliency & Reliability	Travel & Tourism
State & Federal Plans and Legislation	USDOT Strategic Plan	✓	✓		✓			✓		
	TxDOT Strategic Plan		✓			✓		✓	✓	
	Texas Transportation Plan 2040		✓		✓	✓	✓	✓	✓	
	Texas Rural Transportation Plan		✓		✓	✓				
	Texas Strategic Highway Safety Plan		✓							
	Texas Freight Plan 2017	✓	✓		✓	✓	✓	✓	✓	

3.2 Draft and Final Goals and Objectives

Based on a combination of guidance from state and federal policies and plans, combined with public input collected during the May 2018 public meetings, Corridor Working Group meetings, and online public input platforms, the US 67 study team developed draft goals and objectives for the US 67 Corridor Master Plan. The main goal areas used to guide the development of improvements directly informed the final US 67 goals and objectives. These goals and objectives were presented to the public for feedback during the second round of public meetings held in November 2018. The public had the opportunity to comment on the draft goals and objectives during this second public comment period, which provided an opportunity for further refinement of the plan's goals and objectives. The final goals and objectives are presented in **Table 3.2**. After the development of goals and objectives, the third and final round of public meetings was held in June 2019 in Fort Davis, Marfa, Alpine and Presidio.

Table 3.2: Final US 67 Goals and Objectives

Goal	Objectives
Improve Safety	Reduce fatalities and serious injuries Eliminate conflicts between modes wherever possible Increase bicycle and pedestrian safety through improvements to existing facilities, and design and construction of new facilities
Improve Emergency Response	Coordinate with emergency management to enhance incident response mechanisms Improve incident response time Use technology to improve emergency response mechanisms
Promote Sustainability	Recognize quality-of-life concerns for all system users and future generations Minimize impacts to natural resources, cultural resources, and historic resources and promote sustainability in project design and delivery Promote and enable public participation in project planning and development
Maintain a State of Good Repair	Achieve a state of good repair for pavement assets, keeping pavement smooth and pothole-free Identify and mitigate risks associated with system and infrastructure failure Identify existing and new funding sources and innovative financing techniques for all modes of transportation

Table 3.2: Final US 67 Goals and Objectives (continued)

Goal	Objectives
Support Economic Development	Promote and enable public participation by local businesses in project planning and development Assess the impact of transportation planning on land use and community character Reduce project delivery delays Support strategic investments that improve and maintain multimodal freight infrastructure and connectivity
Enhance Multimodal Connectivity	Provide transportation choices and improve system connectivity for all passenger and freight modes Provide and improve access to jobs, transportation choices, and services Support efficient and coordinated movement of goods and services between freight modes to facilitate commerce Provide active transportation options in demand areas
Improve Mobility	Improve operations within existing right-of-way (ROW) Increase travel options and accessibility for all, especially elderly, disabled, and disadvantaged populations Increase freight and passenger travel time reliability Leverage technology to improve management and operations of the existing transportation system, including the development and deployment of Intelligent Transportation Systems (ITS)

3.3 Evaluation Criteria Linked to Goals

The goals and objectives as shown in **Table 3.2** were used to develop evaluation criteria for both core concepts (proposed conceptual improvements that have no alternative for any given location except for No-Build) and alternative concepts (proposed conceptual improvements that have multiple alternatives at one location). Each proposed conceptual improvement was rated as Poor (-1), Fair (0), Good (+1), or Excellent (+2) based on the matching of their alignment with plan goals and objectives. The process by which conceptual improvements were developed, evaluated, and recommended is described in greater detail in **Chapter 7 – Alternatives Analysis** of the US 67 Corridor Master Plan.

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Texas Department of Transportation

Chapter 4

Existing Conditions

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4.0 Introduction

Understanding existing conditions helps identify key issues, constraints, and opportunities on the US 67 corridor and can help address many questions and concerns expressed by the public. By assessing existing corridor conditions and constraints, opportunities for potential short-, mid-, and long-term projects can be identified to improve corridor safety, mobility, and efficiency. This chapter describes the existing conditions along the US 67 study corridor. This includes:

- Land use and development patterns, corridor demographics, and environmental factors
- Safety conditions, including corridor safety features, crash trends, types of crashes, and severity
- Existing and future traffic volumes and travel patterns
- Opportunities to use Intelligent Transportation Systems to solve corridor issues
- Drainage conditions on the corridor including drainage issues identified by the public
- Overall infrastructure conditions including pavement and bridge conditions and potential issues or constraints for transportation improvements

To better analyze some aspects of the existing corridor conditions, and to facilitate discussions with the stakeholders on grouped discussion items, the study team split the US 67 study corridor into seven segments encompassing the three main communities and major interchanges as shown in **Figure 4.1**.

4.1 Land Use, Environment, and Demographics

The US 67 Corridor Master Plan limits stretch 142 miles from I-10 west of Fort Stockton in the north to the southern terminus at the Presidio/Ojinaga Port of Entry (POE) on the U.S./Mexico border; these limits define the length of the study area. The study area included the entire 142 miles of US 67 as described above and a buffer of 1,500 feet from the edge of the prescribed right-of-way (based on the County Appraisal District parcel boundary information) in all directions. This study area is not an indication of future roadway expansion; rather, it is an effort to include adjacent constraints that are not within the existing corridor limits but may still have an impact on the corridor. Such constraints include historic structures, sensitive habitats, floodplains, and points of public interest. More details on these features can be found in **Appendix B – Define Existing Conditions and Demand.**

4.1.1 Land Use

An important first step in determining the needs and challenges of the US 67 corridor is understanding the current land use patterns and potential for future development in the study area. The corridor passes through several political boundaries, including two TxDOT Districts (Odessa and El Paso), three counties (Pecos, Brewster, and Presidio), and three cities (Alpine, Marfa, and Presidio).

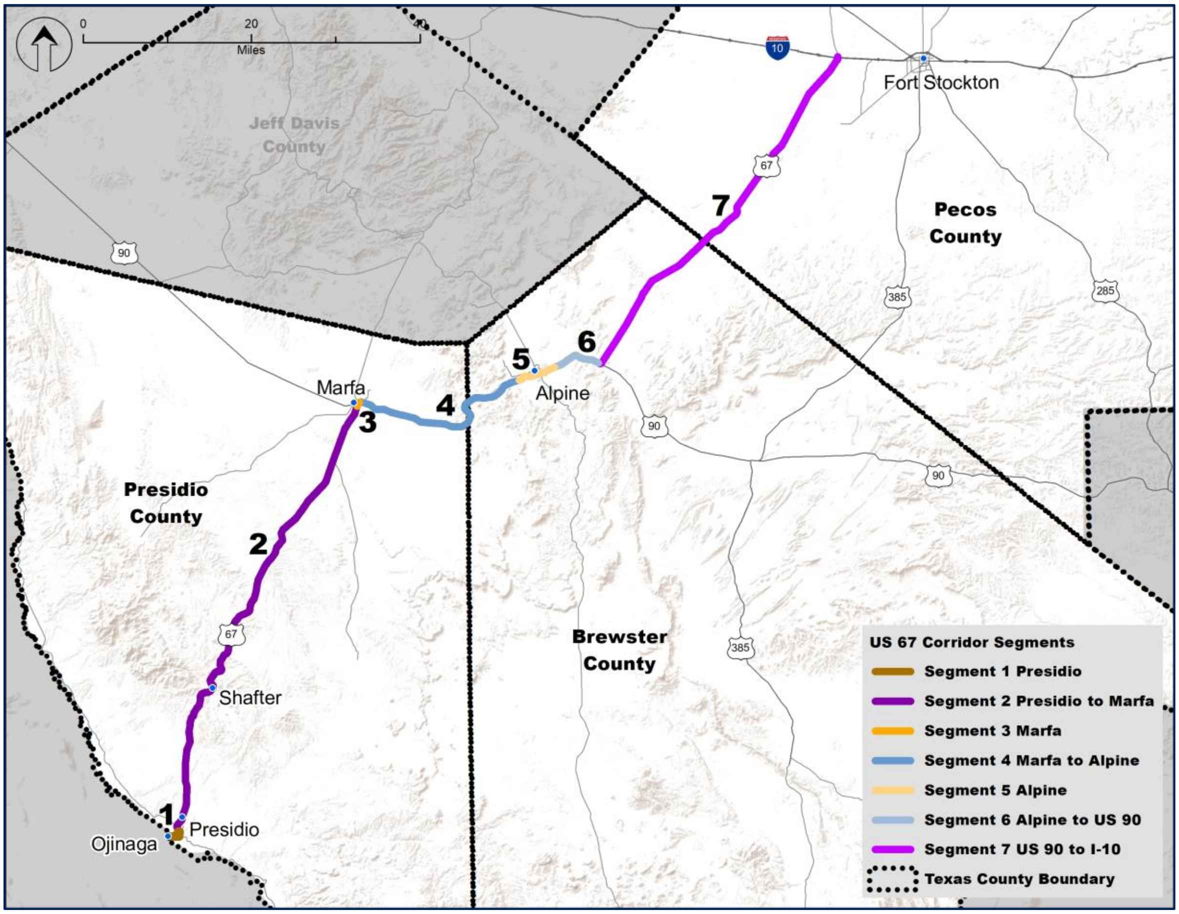

Figure 4.1: US 67 Corridor Segmentation

Land along the US 67 corridor is predominantly undeveloped, except within the three communities where land use is mostly commercial and low-density residential. Of the three main corridor communities, Alpine is the only urbanized area based on Federal Highway Administration's (FHWA's) definition of Urban and Rural areas[1], with a population over 5,000. US 67 provides one of the main access points to this community. US 67 is a major arterial for local and regional commutes for all the communities in the study area. **Figure 4.2** depicts existing land use designations in Alpine, Marfa, and Presidio.

In addition to residential and commercial development, there are a small number of community facilities, such as churches and schools, located along the corridor. These community facilities are primarily found in Alpine, Marfa, and Presidio. Due to the schools on or near US 67, school bus traffic is present on the corridor near the town limits during weekdays. Other built environment features that generate trips along the corridor and could potentially cause constraints for future transportation improvements include government offices, the Alpine Amtrak Passenger Station, Sul Ross State University, art installations, and other points of interest.

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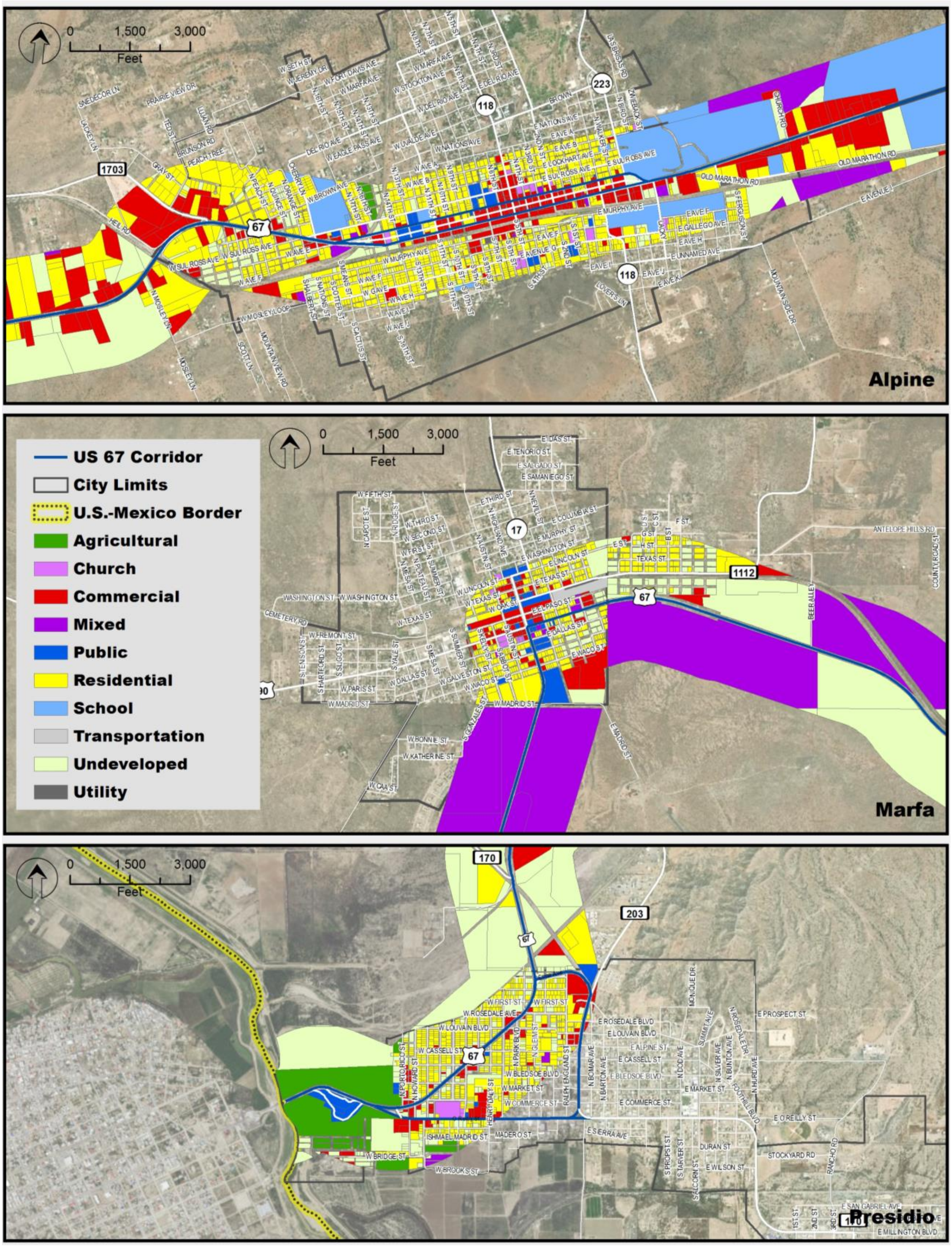
[1] https://www.fhwa.dot.gov/policyinformation/hpms/fieldmanual/page11.cfm



Source: Blanton and Associates, 2018

Figure 4.2: Land Use along Alpine, Marfa, and Presidio Communities

Although no parks are located along the study corridor, several state and national parks that generate tourist traffic on US 67 are located within the region. These include Big Bend Ranch State Park, Big Bend National Park, Marfa Lights Viewing Area, Elephant Mountain Wildlife Management Area, Chinati Mountains State Natural Area, Mount Livermore, the McDonald Observatory, and Davis Mountains State Park. These tourist attractions are a major economic driver for the US 67 corridor study area, with more than 400 hotel rooms, along with restaurants, shopping centers, and grocery stores in the communities of Alpine, Marfa, and Presidio supporting tourist activity. **Figure 4.3** shows the parks and other major trip generators in the region.

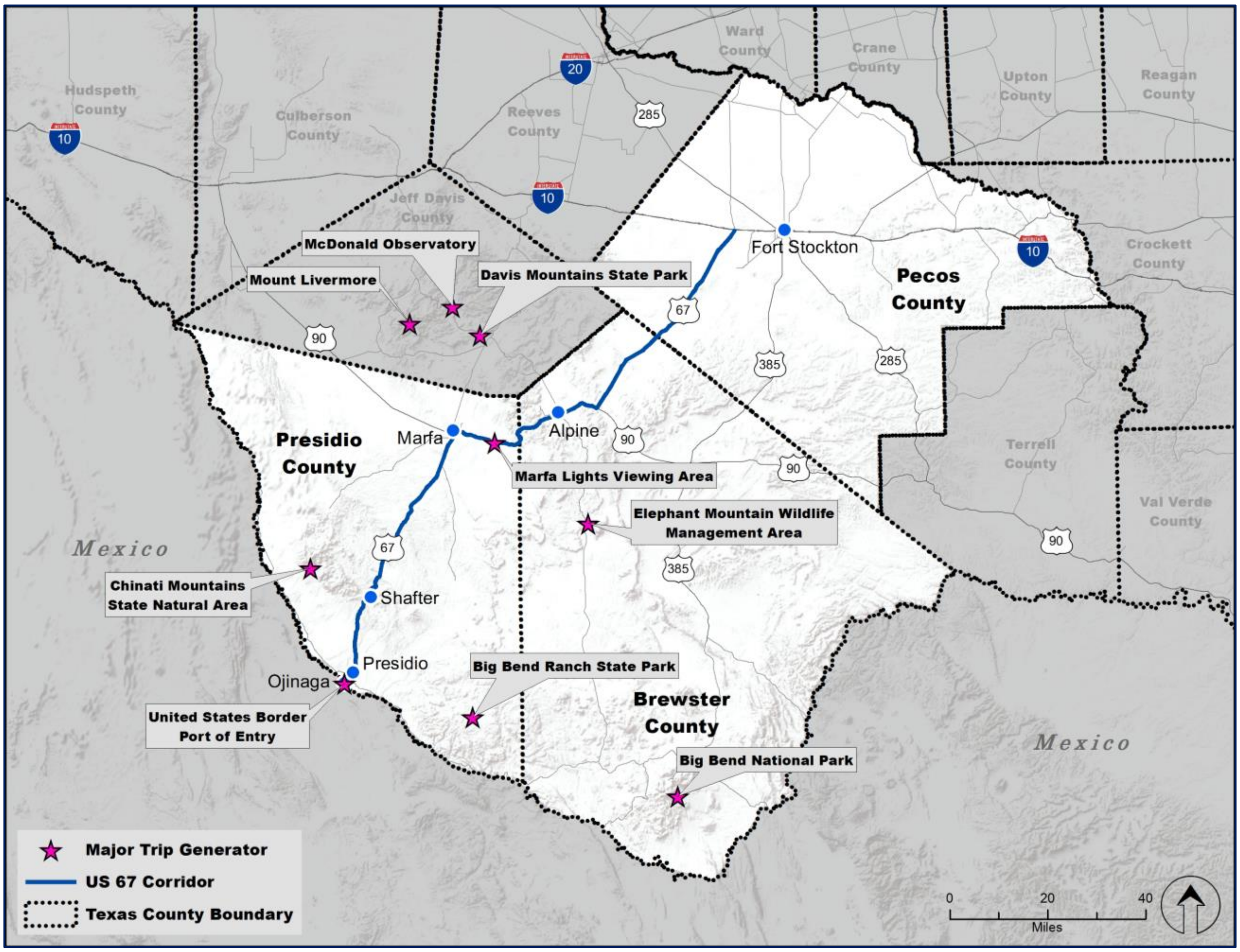


Figure 4.3: Major Trip Generators

4.1.2 Environment

Natural and culturally historic environmental features in the study area were identified to help guide the development of transportation improvement alternatives along the corridor. This process included a review of the study area's topography, floodplains, wetland areas, air quality, critical habitats, hazardous materials sites, and cultural-historic resources.

Several key findings included:

- The US 67 corridor study area is approximately 3,600 feet to 5,000 feet above sea level. Geographically, this region is characterized by plateaus, basins, and deserts.
- Current floodplain data available for the study corridor is limited. However, many potential water features are found along the US 67 corridor. The closest water feature is approximately 50 feet east of the corridor in Presidio County. Heavy rains can cause flooding or flash flooding on or near the corridor.
- Parts of the Rio Grande are currently designated National Wild and Scenic Rivers by the National Park Service.
- The US 67 Corridor traverses the Trans-Pecos Ecoregion. Within this Ecoregion, the Texas Parks and Wildlife Department (TPWD) has developed a pronghorn translocation program, which moves pronghorn from the Texas Panhandle to areas within and adjacent to the US 67 corridor. On October 17, 2019, at US 67 Corridor Working Group Meeting #7, a representative from the TPWD gave a presentation on the pronghorn program. In addition, TPWD provided a similar presentation to the El Paso District and Environmental Affairs Division of TxDOT on August 28, 2019. During the presentations, and based on GPS data resulting from the program, TPWD noted that highways and fences act as barriers to pronghorn movement and requested the addition of fence modifications and wildlife crossings for projects resulting from the US 67 Corridor Master Plan. TPWD will provide pronghorn tracking data to determine the most appropriate locations for crossings based on pronghorn activity concentration. TxDOT will consider these additions on a project-by-project basis.
- All the counties along the study corridor are in attainment for National Ambient Air Quality Standards[2].
- No listed National Register of Historical Places are located within 1,500 feet of the US 67 corridor.
- The corridor crosses two historical districts: Shafter Historic Mining District and Fort D. A. Russell Historic District.
- Four cemeteries and 22 historical markers are close to the US 67 corridor.

4.1.2.1 Additional Constraints

There are several hazardous material sites as well as new industrial sites in the study area. The United States Environmental Protection Agency notes several regulated material sites and commercial sites that use and potentially dispose of flammable substances or hazardous chemicals, such as gas stations, cleaners, manufacturing, and paint stores. The Trans-Pecos Natural Gas pipeline crosses the corridor at three locations. Eight sites with

[2] National Ambient Air Quality Standards are the maximum permissible levels of certain air pollutants set by the Environmental Protection Agency per the requirements of the Clean Air Act.

underground petroleum storage tanks are located along the corridor. No brownfield sites on the Environmental Protection Agency registry are located along the US 67 corridor.[3] A 50-Megawatt solar project, Solaire Holman, is located on the west side of US 67, 12 miles northeast of Alpine. The project site is 360 acres and is the largest solar project in Texas. A silver mine, La Mina Grande, is operated by Aurcana Corporation in the town of Shafter in Presidio County, within 750 feet of the study corridor.

4.1.3 Demographics

Because the corridor is the main arterial for local and regional commutes, population and employment growth will affect the kind of transportation improvements that are best suited to meet the current and future needs of the corridor.

The US 67 corridor study area only experienced modest population growth from 2010 to 2017, but the population of all three counties is forecasted to increase by 2040. Most of this will occur along the southern end of the corridor in Presidio County, which is projected to grow by 47 percent by 2040. However, Brewster and Pecos counties are also expected to grow (29 and 16 percent, respectively). **Table 4.1** shows historical and forecasted population by county with compound annual growth rates.

Table 4.1: Historical and Forecasted Population Growth

	2010	2017	2040	Compound Annual Growth Rate (2010-2017)	Compound Annual Growth Rate (2017-2040)
Presidio County	7,818	7,191	10,548	-1.2%	1.7%
Brewster County	9,232	9,220	11,920	0.0%	1.1%
Pecos County	15,507	15,804	18,333	0.3%	0.6%
Texas	**24,311,981**	**27,419,612**	**40,458,796**	**1.7%**	**1.7%**

Source: U.S. Census, 2010; American Community Survey, 2017; Statewide Analysis Model, 2014

Figure 4.4 compares annual population growth rates from 2010-2017 and 2017-2040 across the three counties and for Texas. Brewster and Pecos counties will continue lagging the rest of the state, while Presidio County will match the statewide average.

[3] Brownfield sites are defined as real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant.

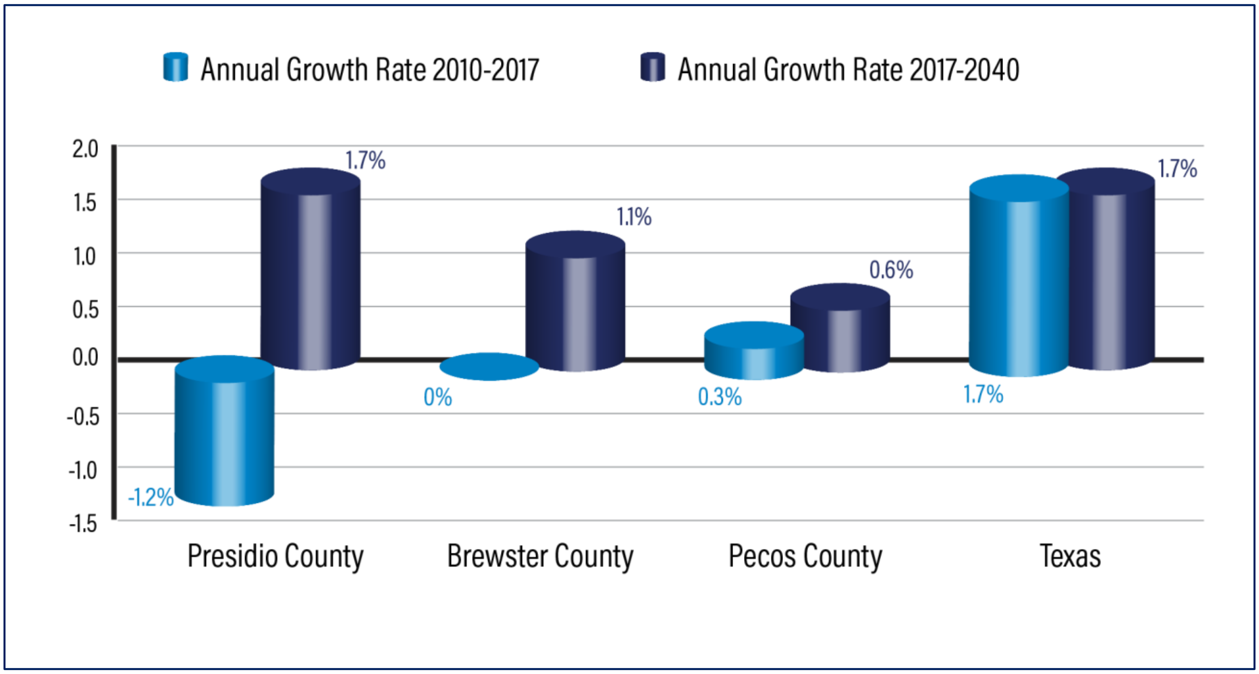


Figure 4.4: Historical and Forecasted Population Growth Rates

Similarly, all three counties are expected to see significant employment growth by 2040, with Presidio County again leading the region. According to employment projection data from Woods & Poole Economics, Inc., Presidio County employment is projected to grow by 1.2 percent annually leading to a 32 percent increase by 2040. Brewster and Pecos counties will both experience about 1 percent annual growth (24 percent total growth) as shown in **Table 4.2**.

Table 4.2: Employment Growth

	2010	2016	2040	Compound Annual Growth Rate (2010-2017)	Compound Annual Growth Rate (2017-2040)
Presidio County	3,030	3,220	4,240	0.9%	1.2%
Brewster County	6,670	5,960	7,410	-1.6%	1.0%
Pecos County	8,260	8,020	9,940	-0.4%	0.9%
Texas	**14,272,930**	**16,644,170**	**25,130,200**	**2.2%**	**1.8%**

Source: Woods & Poole Economics, Inc., 2018

Figure 4.5 compares annual employment growth rates from 2010-2017 and 2017-2040 across the three counties and for Texas. All three counties are expected to lag the rest of the state in job growth, with Presidio County growing the fastest.

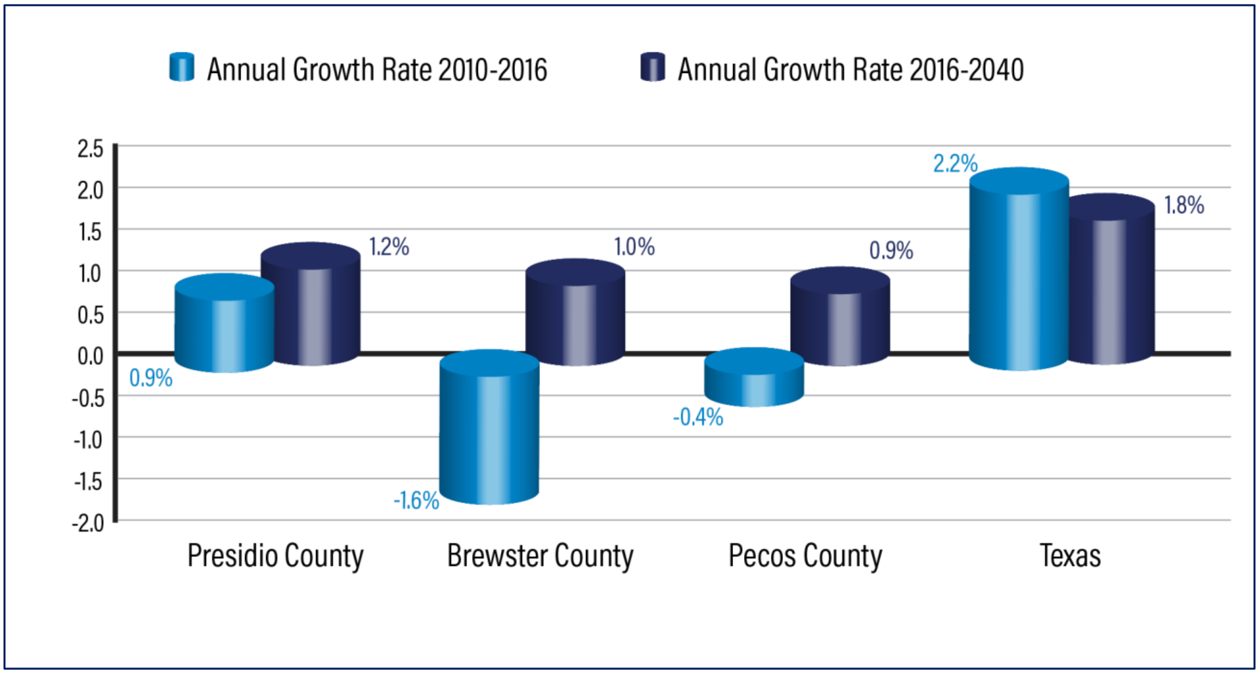
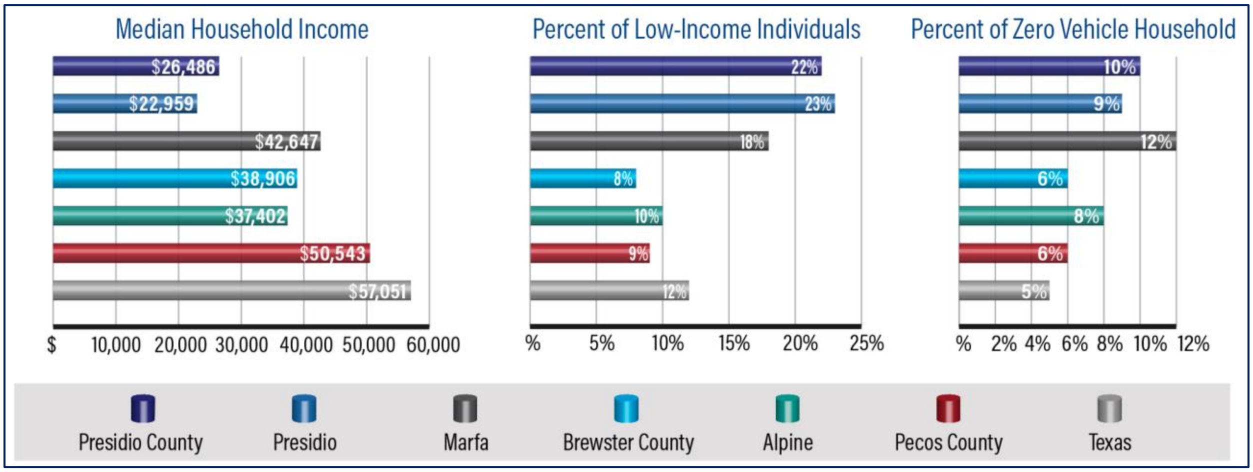


Figure 4.5: Historical and Forecasted Employment Growth Rates

According to the 2017 American Community Survey (ACS), the median household income for the US 67 corridor study area is below the Texas state average of $59,206. Poverty levels in corridor counties are higher than the rest of the state. These higher poverty rates and lower household incomes are reflected in the level of vehicle ownership along the corridor. The percentage of zero-vehicle households for the US 67 corridor study area ranges from 6 to 12 percent (**Figure 4.6**), which is higher than the statewide average of 5 percent**.**



Source: American Community Survey, 2017

Figure 4.6: Income and Poverty Level

Compounding this decreased mobility is a lack of public transit access. According to the Federal Transit Administration, no public transit agencies provide transit service within the US 67 corridor study area. However, ALL ABOARD AMERICA! provides regular intercity bus service twice a day between Presidio on the Mexican border and the Midland International Air and Space Port (approximately 101 miles northeast of the northern limit of the corridor study area). Amtrak also provides passenger rail service in the study region. There is an Amtrak station in Alpine.

4.2 Safety

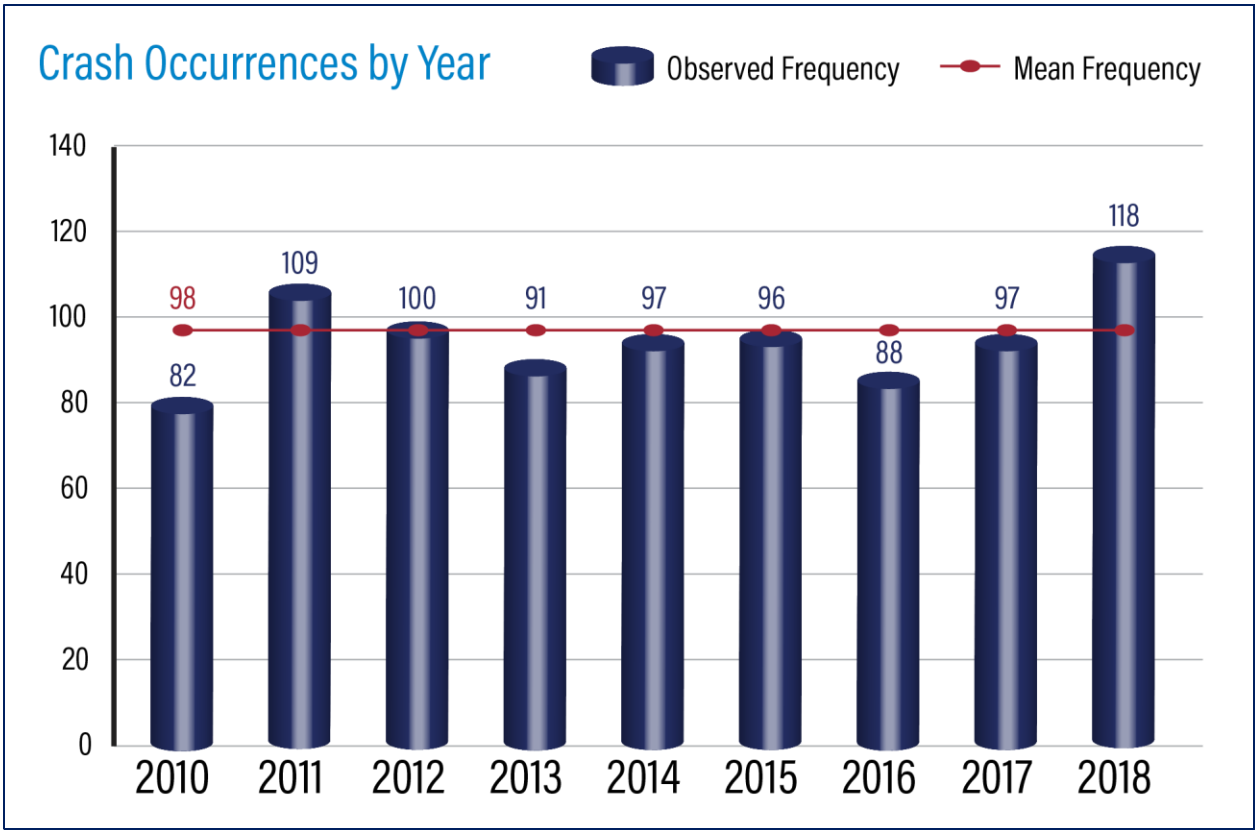
Safety is one of the main priorities of the US 67 Corridor Master Plan, which reflects the broader regional, state, and federal transportation goals that affect the corridor master planning process. In order to improve corridor safety for travelers and residents, it is critical to determine where safety issues currently exist.

Safety concerns that were identified as part of this corridor study include roadway departure crashes (cars running off the road); high speeds at curves in mountainous areas; weather-related issues; unsignalized community intersections; and lack of cell phone service that prevents timely incident reporting and inhibits emergency response. This subsection provides an overview of the safety analysis conducted for this corridor master plan. More details on corridor safety issues and potential solutions can be found in **Appendix D – Safety Analysis**.

4.2.1 Crash Analysis

To better understand traffic safety in the study corridor, the study team conducted a thorough safety analysis using the most recent crash data (2010 to 2018) from TxDOT Crash Records Information System (CRIS). Over this nine-year period, there were 878 reported crashes in the corridor, with 869 vehicular crashes, eight pedestrian crashes, and one bicycle crash. Out of the 878 crashes, 12 were fatal crashes and 135 crashes resulted in severe injuries (severe injuries can be incapacitating or non-incapacitating).

During the nine-year timeframe, the annual number of crashes on the corridor ranged from 82 (in 2010) to 118 (in 2018), with an annual average of 98 crashes. Actual crash numbers each year have been fluctuating above and below this average (**Figure 4.7**).



Source: TxDOT Crash Records Information System, 2010 - 2018

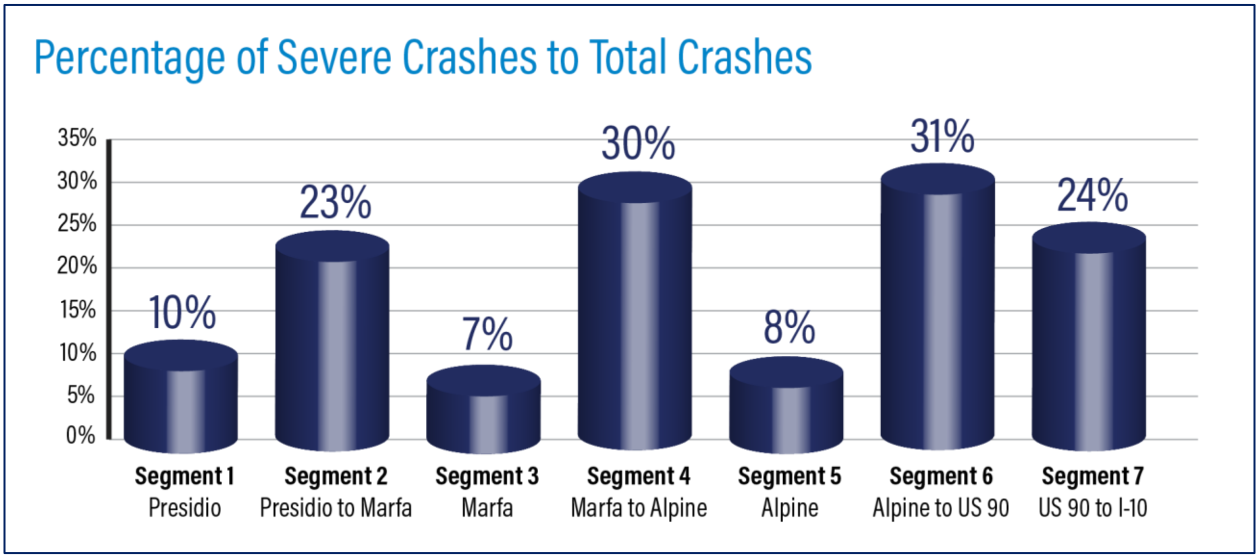
Figure 4.7: Crash Trend

Some areas of the corridor were more prone to crashes than others. The corridor communities had 49 percent (433) of the total crashes, even though lengthwise they are only 6 percent of the total study corridor (8.7 miles). Most crashes within the communities were intersection-related crashes. Currently, all intersections within the three communities are unsignalized with either stop control or no control.

In contrast, the corridor segments outside of the communities accounted for 51 percent of all crashes despite being 94 percent of the corridor length. Weather played a larger factor in some of these crashes, especially in Segment 4 between Marfa and Alpine. During the first series of public meetings, some attendees expressed safety concerns about icy, snowy, and slushy pavement between Marfa and Alpine during severe weather (**Figure 4.8**).

Figure 4.8: Foggy Weather Condition between Marfa and Alpine

Despite having fewer crashes, rural crashes tend to be more severe than urban crashes. According to 2001 National Highway Traffic Safety Administration[4] traffic safety statistics, 61 percent of traffic fatalities occurred in rural areas even though rural areas account for only 40 percent of the vehicle miles traveled and 21 percent of the population. The same is true on US 67, with 75 percent of severe crashes[5] occurring in rural corridor segments outside of the communities. All 12 fatal crashes over the nine-year period occurred on these segments outside city limits. **Figure 4.9** summarizes crash severity by corridor segment.



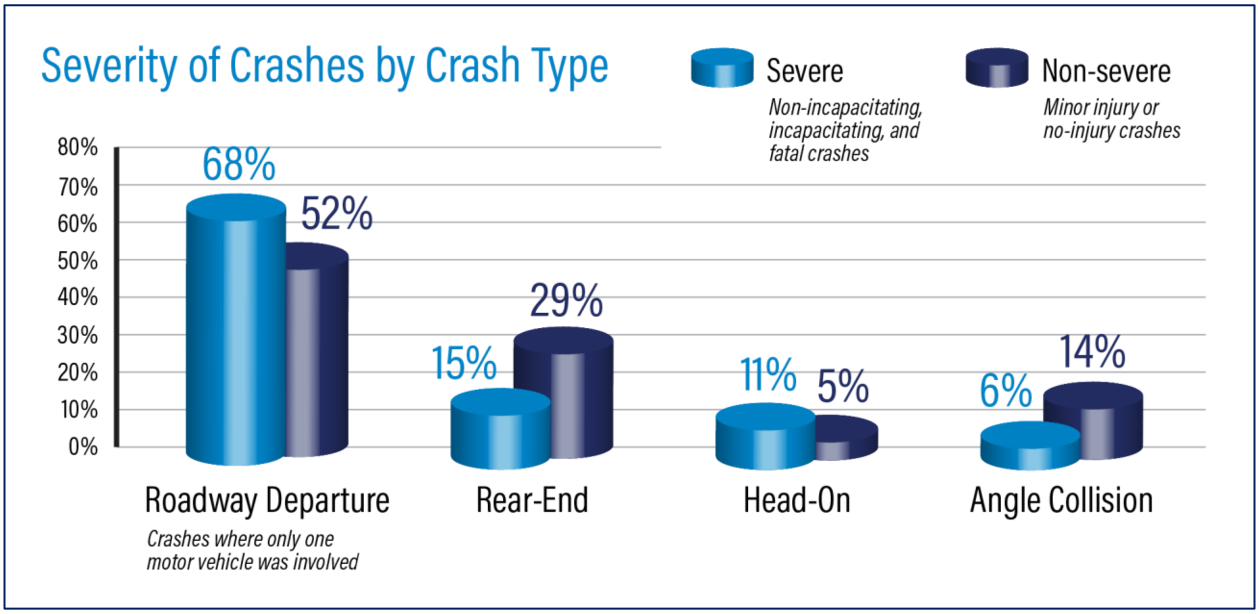
Source: TxDOT Crash Records Information System, 2010 – 2018

[4] National Highway Traffic Safety Administration. Traffic safety facts 2001: rural/urban comparison. Washington, DC: National Center for Statistics and Analysis, US Department of Transportation, December 2002; (20590).

[5] Severe crashes are any crash involving one or more fatality or severe injury.

Figure 4.9: Percentage of Severe Crashes to Total Crashes by Segment

The increased severity of rural crashes is correlated with the kind of crashes occurring in those segments. 'Roadway departure' (cars running off the road) crashes accounted for over half of all crashes on the corridor (478) and were more common in segments outside the communities. **Figure 4.10** shows the severity of the different kinds of roadway crashes. Generally, 'roadway departure' and 'head-on' crashes were more severe.



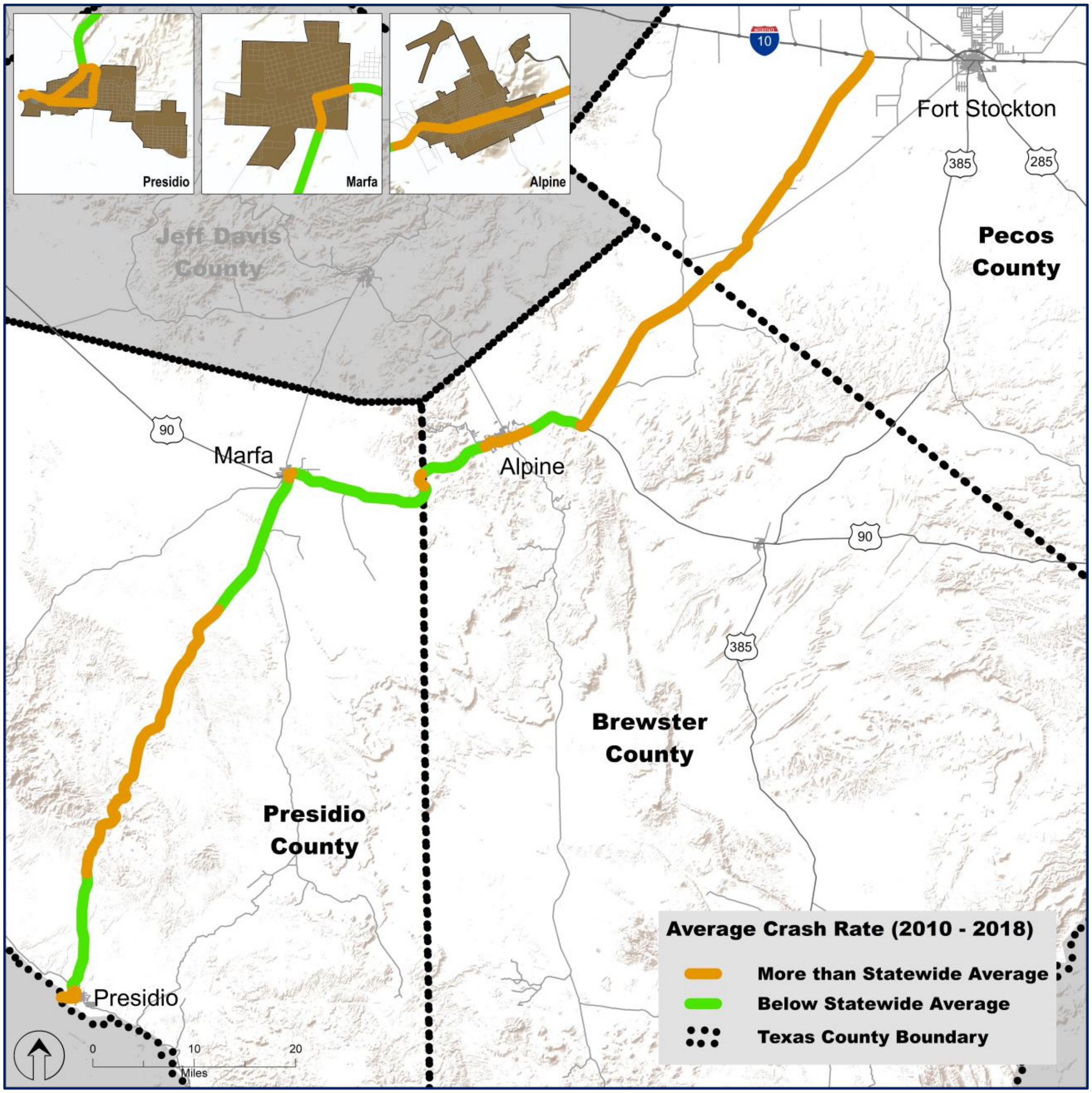
Source: TxDOT Crash Records Information System, 2010 – 2018

Figure 4.10: Severe and Non-Severe Crash Distribution by Crash Type

Overall, the US 67 corridor crash rate was higher than the statewide average from 2010 to 2018. Looking at the corridor crash rate by location, almost two-thirds (61%) of the corridor has a crash rate higher than the statewide average. **Figure 4.11** shows the crash rate by location along the US 67 corridor:

- Crash rates within the towns of Marfa, Presidio, and Alpine are higher than the statewide average.
- The section between the I-10 interchange and the US 67/US 90 interchange east of Alpine has had many crashes resulting from high speeds and distracted driving.
- The Paisano Pass (on the Presidio/Brewster county line between Marfa and Alpine) is prone to poor weather including fog, ice, and snow which sometimes leads to dangerous conditions.
- There are many curves with deficient superelevations between Marfa and Presidio, especially in the mountains around Shafter. (Superelevation is the amount of cross slope or "bank" provided on a curve to help keep vehicles on the roadway as they navigate the curve.)

Roadway departure crashes are an issue throughout the corridor.



Source: TxDOT Crash Records Information System, 2010 – 2018

Figure 4.11: Crash Rates Comparison

Some intersections along the corridor may require safety improvements based on historical crash data and known risk factors. Intersections that might need safety improvements are listed in **Table 4.3** and shown in **Figure 4.12** (the identification numbers in the table correspond to the numbers on the map). Potential solutions to safety problems at these locations include: Intelligent Transportation Systems (using technology applications that improve safety), improving intersection geometry (e.g., making cross streets meet at a 90-degree angle), and improving or maintaining signage, striping, and pavement markings.

Table 4.3: Intersections for consideration of potential safety improvements

No.	Intersection - Location
1	BUS 67/ O'Reilly St and Howard Street – Presidio
2	BUS 67/O'Reilly St and Tremont Street – Presidio
3	US 67 and Old Rd 170 and Utopia Road – North of Presidio
4	US 67 and Cibolo Creek Rd – Shafter
5	Highland Avenue and San Antonio Street – Marfa
6	US 67 and FM 1703 – Alpine
7	US 67 and Orange Street – Alpine
8	Holland Avenue and 13th Street – Alpine
9	Holland Avenue and 5th Street – Alpine
10	Holland Avenue and Phelps Street – Alpine
11	Holland Avenue and Harrison Street – Alpine
12	E Avenue and Harrison Street - Alpine
13	E Avenue and Bird Street – Alpine
14	US 67 and Lackey Street – Alpine
15	US 67 and Harmon Street – Alpine
16	US 67 and US 90 Interchange – East of Alpine
17	US 67 at Old Alpine Highway – Railway Crossing North of US 90 interchange
18	US 67 and I-10 Interchange – West of Fort Stockton

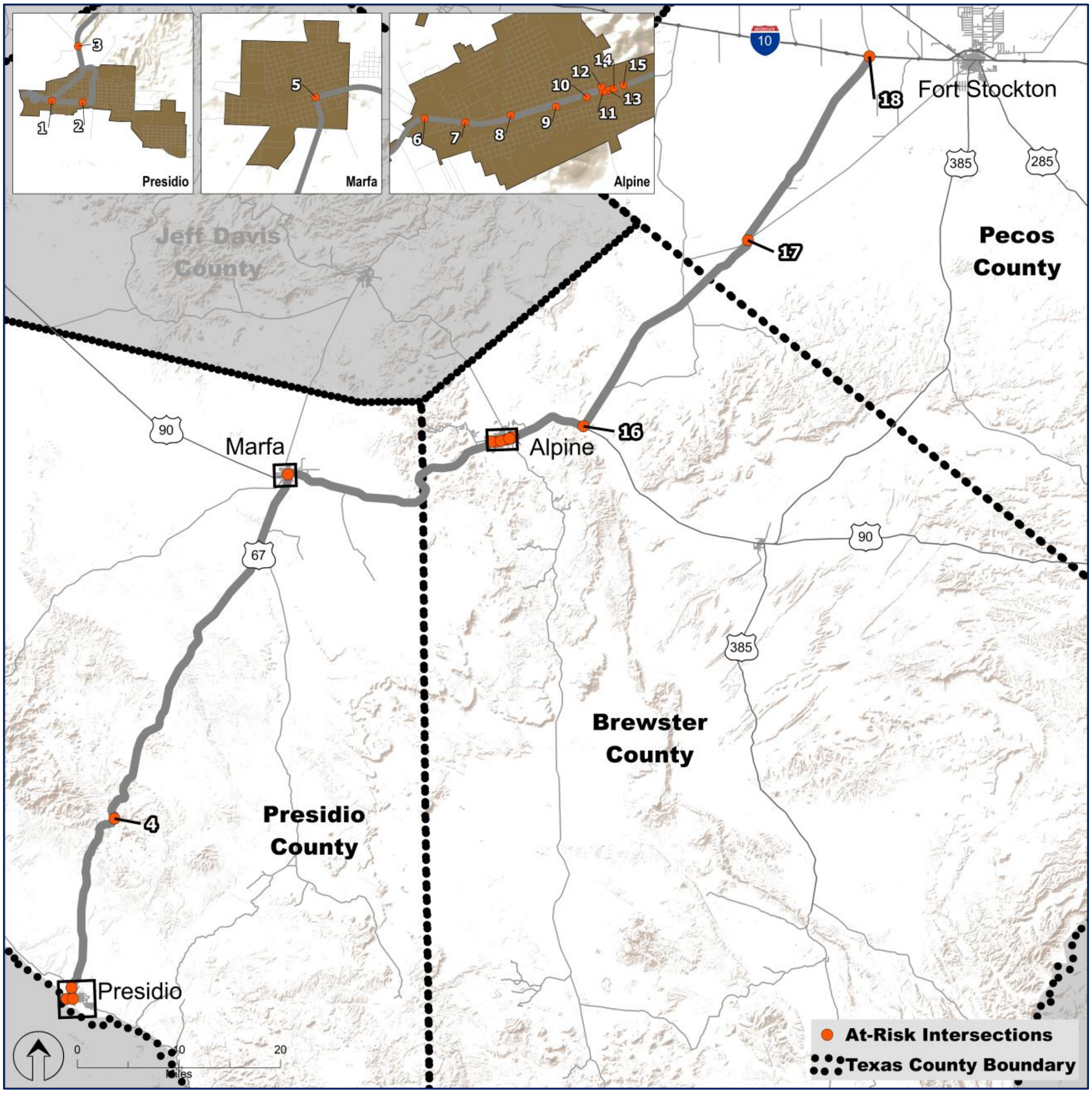


Figure 4.12: Key Intersections for Safety

4.2.2 Rumble Strips

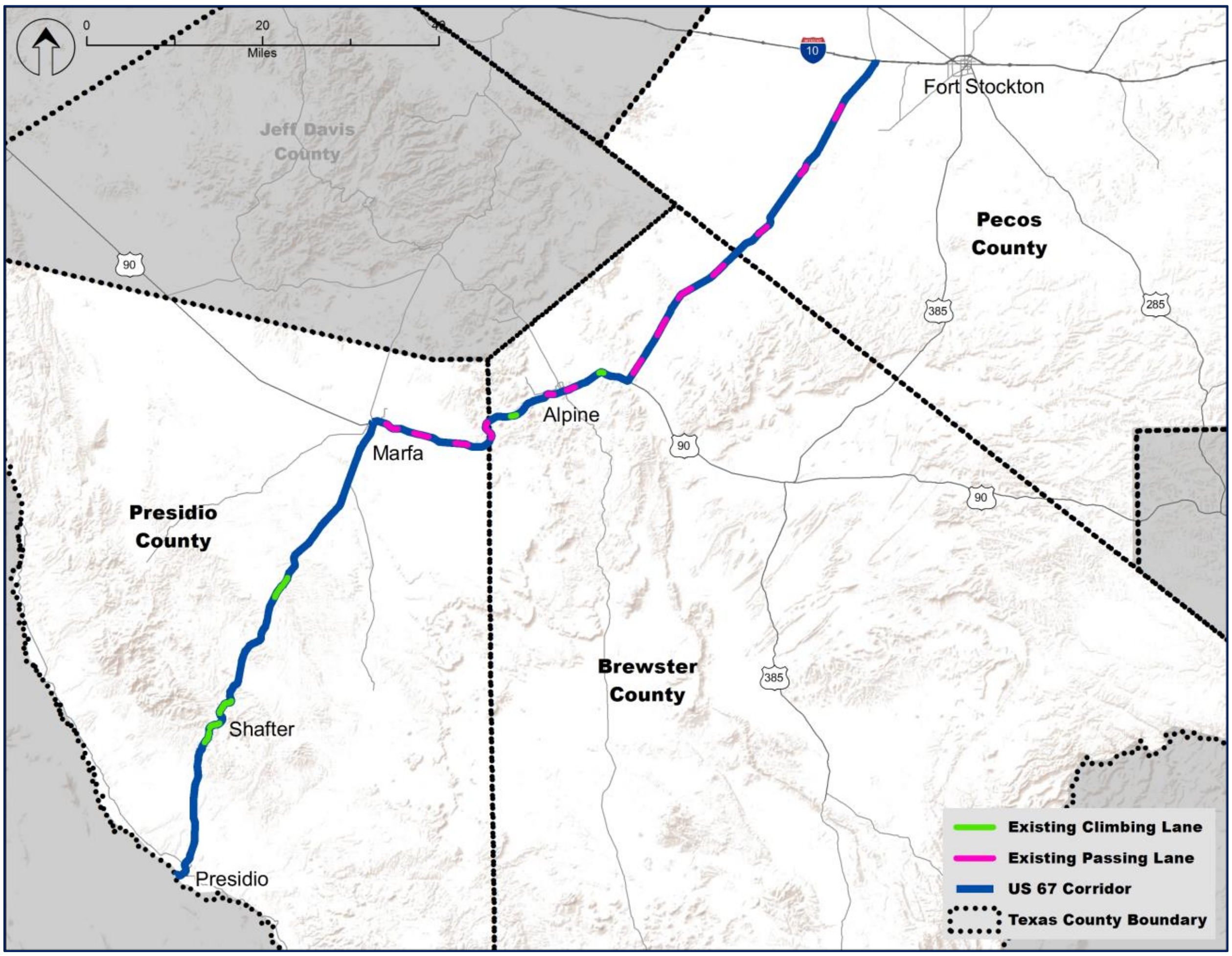
The study team also evaluated the presence of shoulder rumble strips along the corridor. Shoulder rumble strips are a series of milled or raised elements installed along the shoulder that alert drivers (through vibration and sound) that their vehicles have left the travel lane. Shoulder rumble strips are one of the proven countermeasures identified by the Federal Highway Administration to reduce the risks of roadway departure crashes[6], which are the most

[6] A roadway departure crash is defined as a crash which occurs after a vehicle crosses an edge line or a center line, or otherwise leaves the traveled way.

common kind of crashes along the US 67 corridor. Only 30 percent of the US 67 corridor has shoulder rumble strips, limited to Segments 4 and 7. Many of the comments received during the public involvement period also suggested a need to install shoulder rumble strips throughout the US 67 corridor to reduce roadway departure crashes.

4.2.3 Climbing and Passing Lanes

Because the corridor is primarily a two-lane, rural highway, climbing and passing lanes are important safety features that can help reduce head-on collisions occurring along the corridor. As shown in **Figure 4.13,** the US 67 corridor has only 22 miles of passing lanes, concentrated between I-10 and Marfa (Segments 4-7). The corridor has 9 miles of climbing lanes, mostly in the mountainous area where roadway elevation changes (Segment 2). Corridor residents and stakeholders would like more passing and climbing lanes along the corridor, in addition to more signage for existing climbing/passing lanes.



Source: TxDOT Open Data Portal

Figure 4.13: US 67 Climbing Lanes and Passing Lanes

4.2.4 Speed

The US 67 corridor has a speed limit of 70 miles per hour (mph) to 75 mph except in the corridor communities, where the speed limit ranges from 30 mph to 55 mph, and near Shafter and the US 90 interchange, where the speed limit is between 55 mph and 70 mph. Currently, the sharp curves in the mountainous areas near Shafter and west of Alpine near the Presidio county line have a posted speed limit as high as 70 mph, as shown in **Figure 4.14**. High speed limits at sharp curves cause a safety concern that is addressed in this Corridor Master Plan.

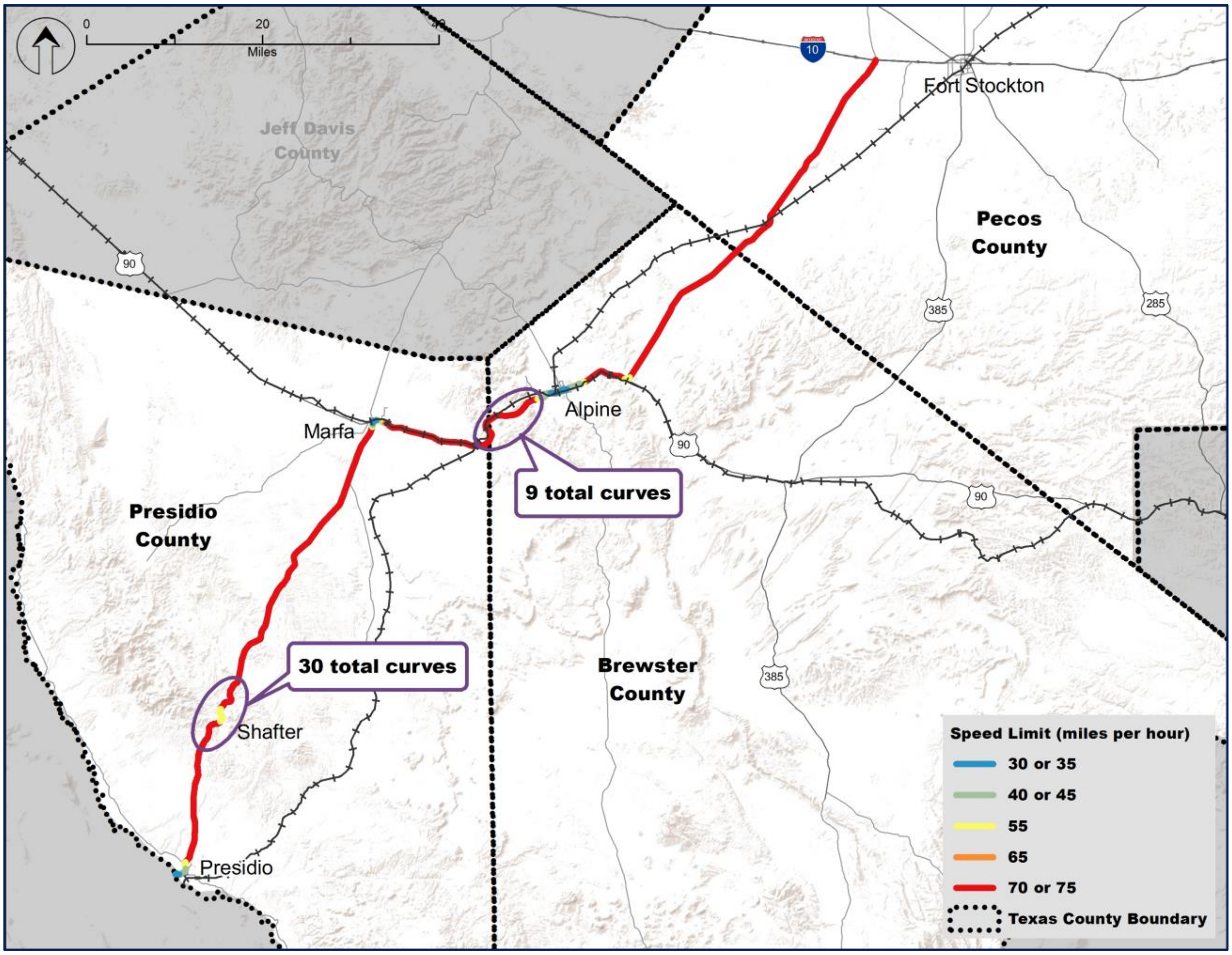


Figure 4.14: Speed Limits and Curves

4.2.5 Superelevation

Curves in the roadway, particularly in mountainous areas, can pose a safety risk for drivers. One metric for evaluating the safety of a curve is the maximum rate of superelevation[7] (or

[7] Superelevation is the amount of cross slope or "bank" provided on a curve to help keep cars on the roadway as they navigate the curve. Sufficient superelevation allows higher speeds on tighter curves making them safer and reduces the need for advisory speed limit signs.

“emax”). For rural highways like the US 67 corridor, TxDOT Roadway Design Manual[8] recommends maximum emax rates of 6 to 8 percent for a 70-mph design speed. Out of 112 curves, 88 curves did not meet criteria for required superelevation at 8 percent. Figure 4.15 shows the deficient curves according to the emax of 8 percent methodology along the corridor. The map highlights the section close to Shafter, where most of the curves are deficient by more than 1 percent.

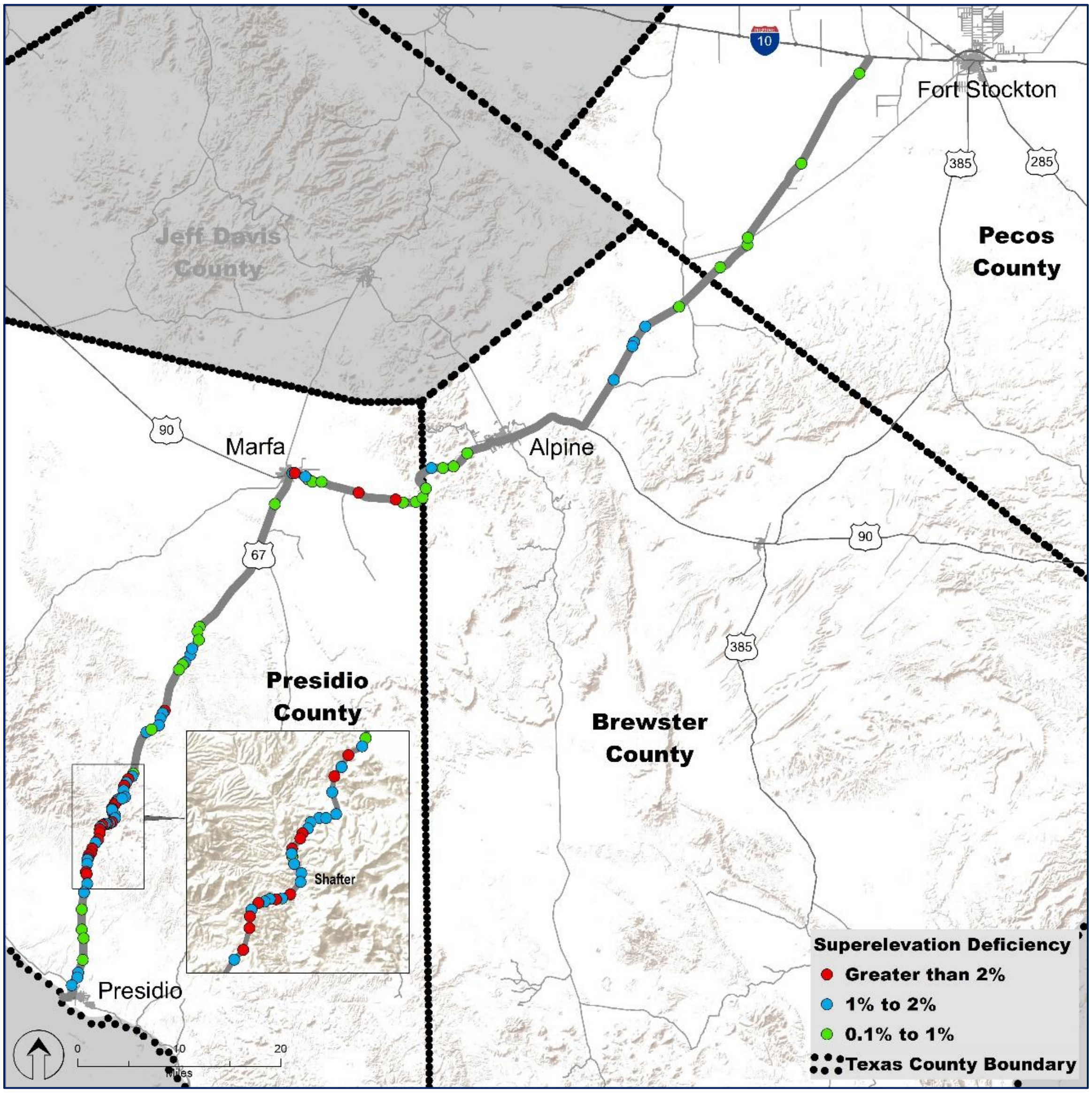


Figure 4.15: Curves with Superelevation Deficiency according to emax=8 percent Methodology

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8 http://onlinemanuals.txdot.gov/txdotmanuals/rdw/index.htm

4.2.6 Utilities

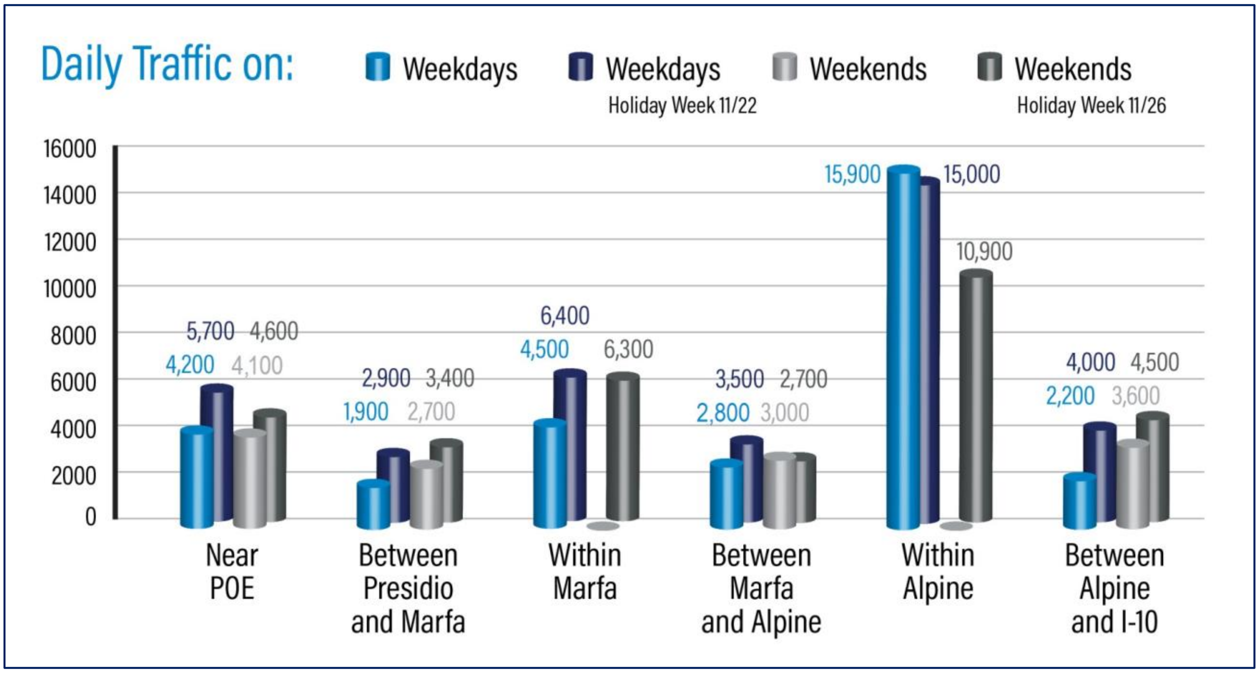
Most of the US 67 corridor is covered by cell phone service. However, 13 percent (18.6 miles) of the corridor is without cell phone service. The sections without cell phone service are concentrated at the mountainous areas near Shafter and west of Alpine at Paisano Pass, both of which are prone to crashes. The lack of cell phone coverage in these areas prevents drivers from reporting roadway emergency situations such as flat tires, crashes, fire, and flooding. Public meeting comments also expressed emergency safety and security concerns due to the poor cell phone coverage within the US 67 corridor study area.

4.3 Existing and Future Traffic

US 67 is characterized by generally low traffic volumes, though traffic has grown in recent years due to increased tourism and economic trends like the Permian Basin oil boom creating more travel demand. This increase in traffic has been felt by local stakeholders, who commented on traffic delays during holiday and special event periods when more border crossings and increases in international trade occur. Regional, national, and global trends, such as expansion in certain business sectors, along with improvements made or planned at the Presidio/Ojinaga POE, may lead to increasing freight traffic on the corridor in the future. Communities along US 67 have expressed concern about the potential safety, traffic operations, and quality of life associated with such growth. Therefore, it is important to understand current and future traffic levels to plan for corridor improvements. More details on current traffic levels, the forecast methodology, and projected future volumes are provided in Appendix E – Traffic Projections.

Existing traffic count data was sourced from TxDOT Statewide Traffic Analysis and Reporting System (STARS II) database and a comprehensive traffic count program undertaken at several strategic locations within the US 67 Corridor Master Plan study area in October and November of 2017.

Traffic counts selected to represent various segments of the study corridor in 2017 show that during the weekend, the corridor has daily volumes between 2,700 to 3,600 vehicles per day except near the POE, which has a slightly higher volume of 4,100 vehicles per day. During the weekday, the corridor has daily volumes between 1,900 to 2,800 vehicles per day except near the POE, within Marfa, and in Alpine. Alpine has the highest weekday traffic along the corridor with 15,900 vehicles per day. All weekday traffic volumes are lower than weekend volumes, other than the corridor segment near the Presidio/Ojinaga POE. In contrast, truck traffic volumes were higher on weekdays than the weekends. The corridor also experienced a boost in traffic volumes over the Thanksgiving holiday week in 2017 as many people traveled to and from Mexico for the holidays. These traffic volumes are shown in Figure 4.16.



Note: Counts were not taken in Alpine or Marfa during a typical weekend.

Figure 4.16: Daily Traffic During Different Dates

The study team developed projections of future traffic to better plan potential corridor improvements. According to historical TxDOT traffic data, annual average daily traffic (AADT) grew at a linear annual growth rate of -1.3 percent to 2.4 percent from 1996 through 2016.[9] However, it is important to identify the worst traffic conditions along the corridor to ensure the transportation infrastructure can adequately accommodate future growth and meet future needs. Accordingly, a growth rate of at least two percent per year was used for traffic projections along US 67 through all communities and along rural segments. This minimum growth rate is consistent with TxDOT standard practices.

By 2045, weekday traffic is expected to grow as high as 6,600 vehicles per day near the Presidio/Ojinaga POE, 3,900 vehicles in Presidio, 7,000 in Marfa, and 24,800 in Alpine. This growth will cause nine intersections in Alpine to experience significant delays and unstable traffic flows in the future (**Figure 4.17**).

[9] The historical traffic analysis did not consider TxDOT 2017 traffic counts due to inconsistencies in the data compared to 2016. For details on the traffic projections methodology and results, refer to **Appendix E – Traffic Projections**.

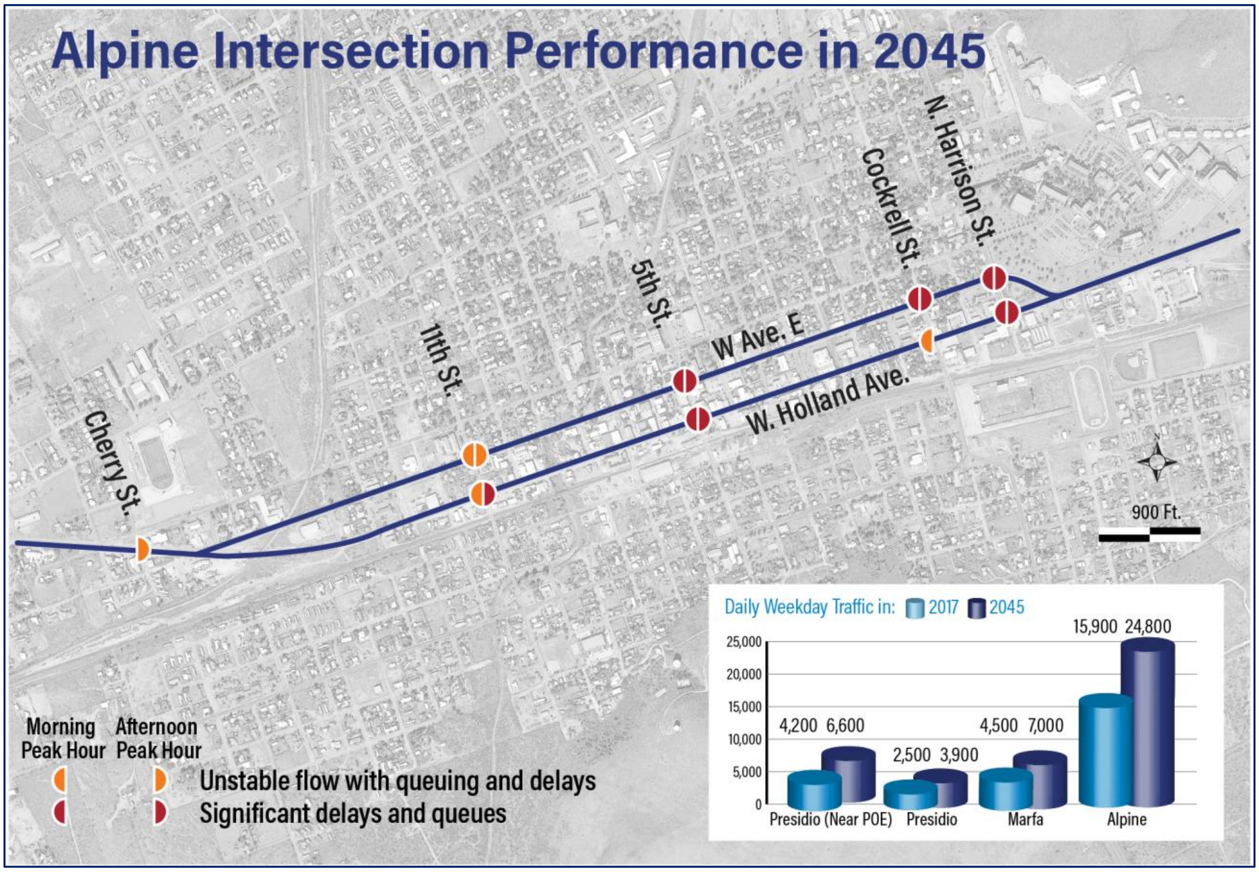


Figure 4.17: Forecast 2045 Morning and Afternoon Peak Hour Performance of Alpine Intersections

4.4 Intelligent Transportation Systems

Intelligent Transportation Systems (ITS) apply advanced technology and high-speed digital communication systems to address transportation challenges. Instead of physical improvements to the infrastructure, ITS uses technology to better manage existing facilities and the traffic that uses them. ITS is usually associated with deployments in congested urban areas where major infrastructure expansion may be cost-prohibitive. However, the need can be even greater in rural areas, especially for safety and emergency response, which are persistent issues on US 67. In the US 67 corridor, ITS provides opportunities to enhance safety and improve operations. Figure 4.18 is a conceptual diagram of how a traditional centralized ITS server might work by combining multiple data streams, then disseminating information via different methods.

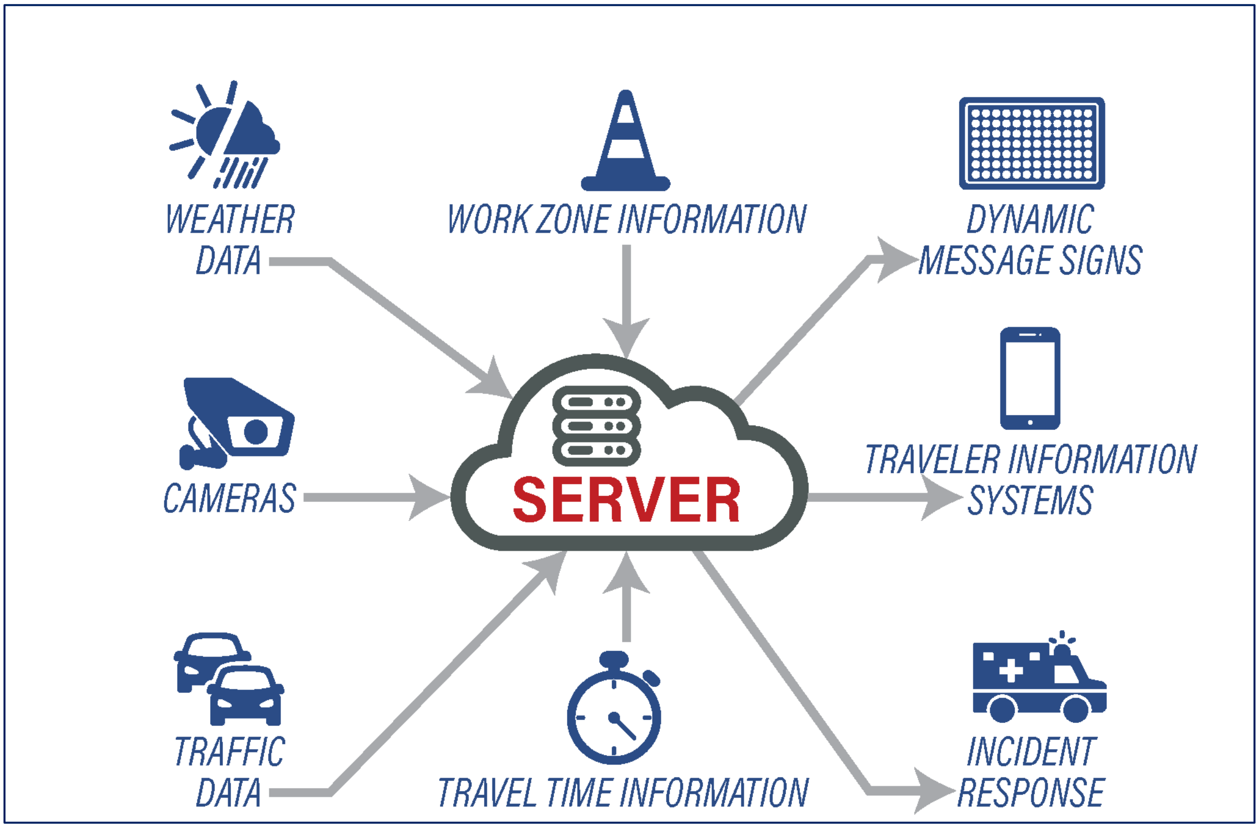


Figure 4.18: ITS Conceptual Diagram

The US 67 study corridor is rural in nature, typified by relatively low traffic and sparse urbanized areas. As a result, the corridor has limited ITS assets. No active warning, traffic surveillance, or safety-related ITS solutions exist on the roadway or at adjacent rest areas. However, the airports at Presidio, Marfa, and Alpine have Automated Weather Observing Systems that could be useful for future ITS applications. Big Bend Telephone Company owns fiber optic cable and telephone lines that could facilitate ITS communications. Access requires a subscription as these lines are not publicly owned. The Presidio POE and Marfa Border Patrol station have surveillance cameras, but they are not available for public ITS use. In an ITS application, cameras would be used only for traffic management, rather than identifying vehicles or drivers.

Study outreach and technical analysis uncovered many corridor needs, some of which may have ITS solutions. Although most of these needs are better treated with physical improvements, ITS may be suitable for some, such as intersections with persistent safety issues or providing travel information in a timely manner. ITS may be applicable to the following corridor needs:

- Locations with high crash frequencies or fatalities – ITS provides opportunities to reduce run off the road crashes, improve work zone safety, and reduce conflicts between automobile, freight, and bicycle/pedestrian traffic in towns. ITS may be especially useful for locations where safety issues persist after physical improvements have been made.

- Sudden stop at the Texas-Pacifico Railroad crossing – Buses must make a complete stop at the Texas-Pacifico crossing northeast of Alpine whether or not a train is present, creating a safety hazard since there are curves on either side of the crossing and cars (which do not have to stop) are typically going 75 miles per hour or more. An advance warning system could notify drivers of sudden stops at this location and needs to be evaluated as future traffic volumes increase.
- Low bridges – Overheight detection and warning systems could prevent trucks from striking the two low-clearance rail bridges in Alpine.
- Weather – Fog, ice, and snow create weather hazards either along portions of the corridor or more frequently at certain locations, such as the Paisano Pass. The four proposed Roadway Weather Information Systems (RWISs) on the corridor could be used to warn travelers of upcoming bad weather.
- Traveler Information – ITS could be used to inform travelers about tourism- and weather-related events, abrupt speed limit changes, incidents on their route, and upcoming work zones that might impact their travel planning.
- Incident response – Timely emergency response to crashes is a persistent issue in many rural corridors including US 67. ITS can reduce incident notification time for first responders.

Looking further into the future, emerging transportation technologies such as Connected and Autonomous Vehicles could fundamentally change the way people and goods move. Connected Vehicle technology will enable vehicles to "talk" to each other and the infrastructure sharing important safety and mobility information. Autonomous vehicles use technology to eliminate the need for a human driver. Adoption of these technologies will be mostly private sector-driven, but TxDOT may wish to include appropriate communication technologies when planning ITS improvements for US 67.

Additional information about corridor ITS needs and solutions can be found in **Appendix F - Intelligent Transportation Systems (ITS) Needs Assessment** and **Appendix G - Intelligent Transportation Systems (ITS) Plan**. More details about Connected and Autonomous Vehicles and their potential impacts on the corridor may be found in **Appendix H – Intelligent Transportation Systems (ITS) Connected and Autonomous Vehicles**.

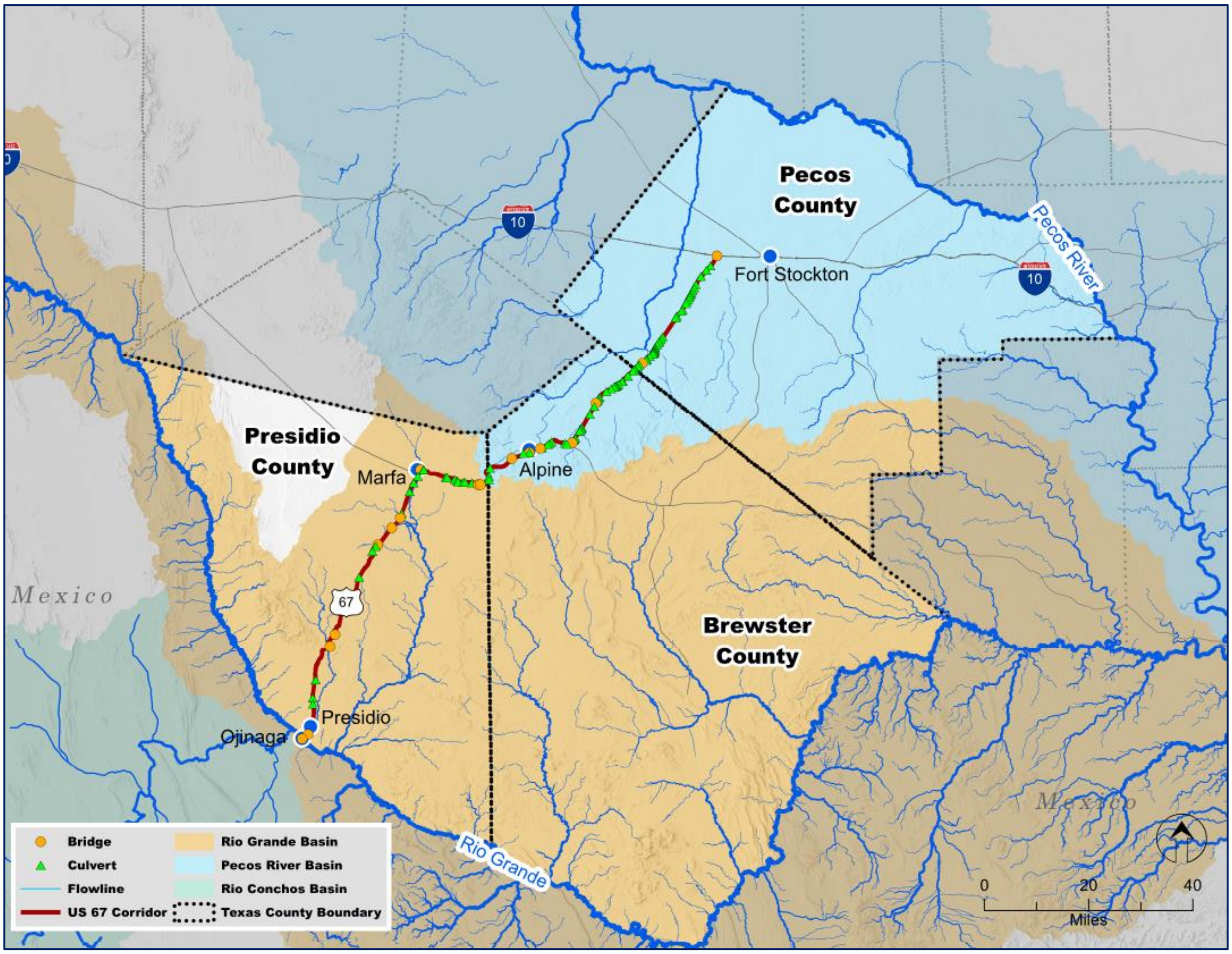
4.5 Hydrology

Hydrology is the branch of science concerned with the movement, distribution, and management of water. US 67 is crisscrossed with streams and arroyos[10] that convey storm water under the road during storms. As shown in **Figure 4.19**, these streams drain to either the Pecos River or the Rio Grande. Water is conveyed under the roadway via bridges and

[10] An arroyo is a steep-sided gully formed by the action of fast-flowing water in an arid or semi-arid region.

culverts[11], most of which were built in the 1930s and 1940s when US 67 was constructed. Evaluating the volume of water that can be accommodated by these structures during various potential floods is important, to make sure the corridor remains resilient during heavy rain events. Understanding the potential drainage impacts of corridor improvements is also important.

The structures along the US 67 corridor in Presidio County drain directly to the Rio Grande, while the structures in Brewster and Pecos Counties drain north towards the Pecos River. The areas drained by these structures range between 6 and 174,722 acres.



Source: Texas Natural Resources Information System and National Bridge Inventory, 2018

Figure 4.19: US 67 Corridor Location and Hydrology

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[11] Culverts support a roadway over a waterbody by means of a complete pipe or box embedded in fill.

Public outreach identified some drainage and flooding concerns in corridor communities:

- Alpine Creek (**Figure 4.20**) floods occasionally and has overtopped its banks at least once in the last 50 years. The creek crosses US 67 at two locations near 9th Street, on the one-way pair through Alpine.
- The northbound lane of US 67 at the Union Pacific (UP) railroad bridge west of Alpine is prone to flooding caused by debris buildup in the drainage grates below the bridge.
- A culvert west of Alpine in Brewster County is eroding; this issue has also been noted by TxDOT.
- The public reported some pooling water on the corridor and high-water levels in Cibolo Creek near Shafter (**Figure 4.21**).
- Stormwater bypasses the retention pond in front of the UETA Duty Free Building in Presidio and flows onto Lovett Street. This may be caused by vegetation growing in front of the culvert under US 67 which feeds the retention pond (**Figure 4.22**).
- Silt builds up after storms in front of Porters on Business 67 in Presidio.

Improvements to the corridor arising from this Master Plan may impact drainage, especially those that increase impervious cover such as adding bicycle lanes, rest stops, passing lanes, end treatments for guardrails which are added to absorb energy from impact, and widening highway shoulders. Specific drainage impacts depend on the location and design of the improvements. Further hydrologic studies are required to determine impacts of specific improvements and any required mitigation measures.

Figure 4.20: Alpine Creek at Holland Avenue

Figure 4.21: Cibolo Creek Bridge Near Shafter

Figure 4.22: Vegetative Overgrowth Near Retention Pond in Presidio

Complete details on corridor hydrology, drainage issues, and potential mitigation strategies are detailed in **Appendix I – Hydrologic Studies**.

4.6 Infrastructure Conditions

Effective planning and management of the US 67 corridor relies on a full accounting of infrastructure conditions and performance to identify needs. This also provides the basis for an asset management strategy based on performance criteria that can be monitored over time. This section summarizes transportation assets and their existing condition along the US 67 corridor to help develop high-level transportation improvement needs. Complete details on corridor roadway infrastructure conditions can be found in **Appendix J – Field Reconnaissance, Appendix K – Pavement Evaluation**, and **Appendix L – Mobile LiDAR Survey Procedure and Findings**.

4.6.1 Infrastructure Overview

The US 67 corridor study area includes:

- 142 miles of TxDOT-owned roadway with associated bridges and culverts
- The Union Pacific and Texas-Pacifico Railroads, which cross US 67 at five points on the study corridor, three of which are grade separated and two are at-grade
- The Trans-Pecos Pipeline, a 42-inch natural gas pipeline that runs from the Permian Basin to Presidio
- The Presidio/Ojinaga Port of Entry (POE), which links the area to Mexico

The remainder of this section focuses on road infrastructure conditions since that is the part of the corridor that TxDOT directly controls.

US 67 connects corridor communities to the rest of the country as part of the National Highway System. However, it is also the key route for local and regional trips taken by residents. As such, the corridor provides a high degree of regional mobility but also direct property access. The corridor consists almost entirely of two lanes but has sections of three or four lanes within the communities and where passing and climbing lanes exist. Speed limits range from 30 mph in Alpine, Marfa, and Presidio to 75 mph in the rural segments. Typical corridor widths (including sidewalks and other non-highway infrastructure) are 120 feet in rural segments and range from 100 to 200 feet in the communities.

4.6.2 US 67 Roadway and Bridge Conditions

The pavement on US 67 is generally in very good condition. According to TxDOT's Pavement Management Information System, 73 percent of corridor pavement is in very good condition (the highest rating), 25 percent is in good condition, and 2 percent is in fair condition. This means the corridor generally features a smooth road with good ride quality. There are localized areas of early stage alligator cracking[12] along the corridor. TxDOT has been applying seal coats and overlays to segments in the corridor, and both appear to be performing well. (Seal coats apply a protective coating to the pavement to protect against the elements; overlays apply new concrete or asphalt over the existing pavement.)

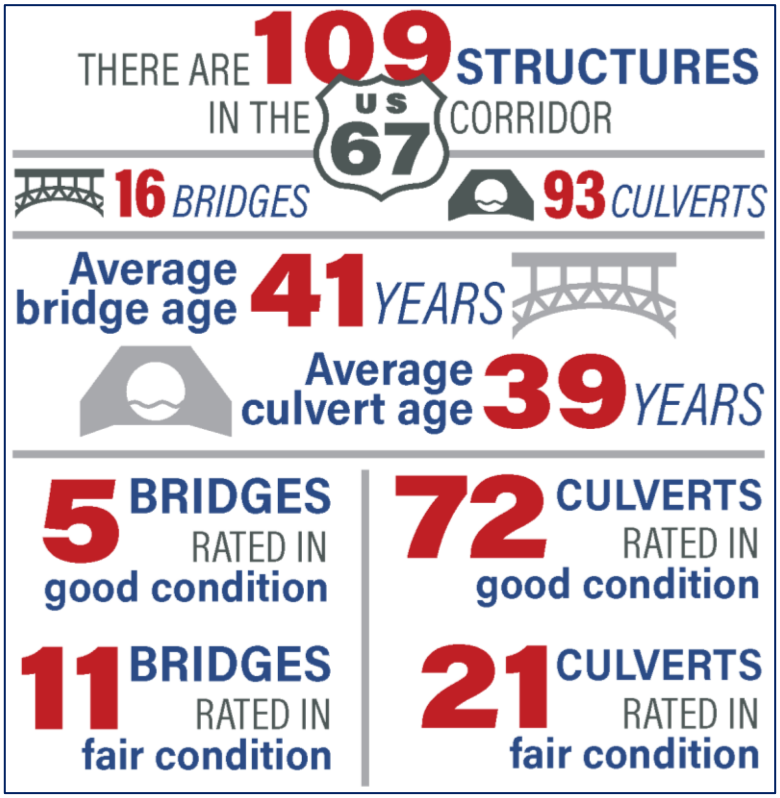

Figure 4.23: US 67 Structure Inventory

As shown in **Figure 4.23**, there are 109 structures (16 bridges, 93 culverts and 2 grade separation bridges) on the corridor. Some of these structures show minor deterioration but all are in good or fair condition and none are structurally deficient.

4.6.3 US 67 Safety Features

Guardrails are an important safety feature in the corridor as they can help prevent run off the road crashes. The corridor contains over 82,000 feet of guardrail, some of which may require safety upgrades based on current TxDOT standards (**Figure 4.24**).

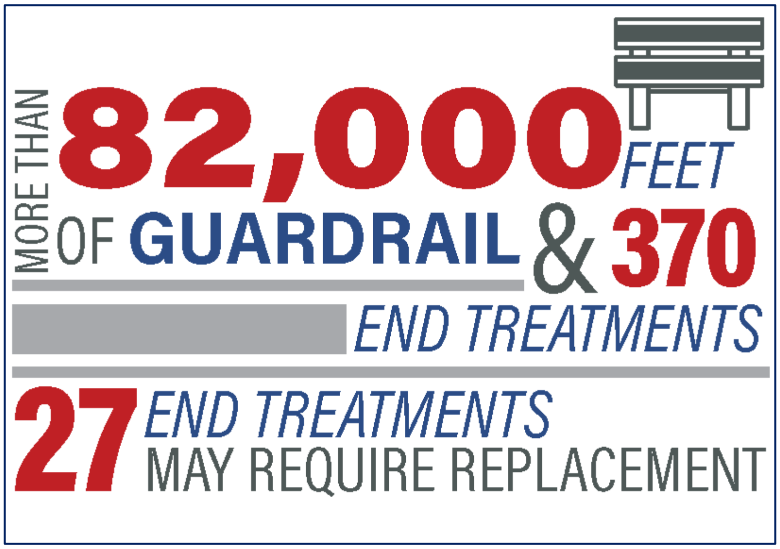

Figure 4.24: Guardrails along US 67

4.6.4 Corridor Constraints

Corridor analysis and public input uncovered the following issues and constraints:

- The Union Pacific and Texas-Pacifico

[12] Alligator cracking refers to small cracks in the pavement forming a pattern that looks like reptile scales.

railroad bridge over US 67 west of Alpine do not meet current TxDOT vertical clearance standards. These bridges are an obstacle for some trucks on US 67. At 13 feet 7 inches high, the UP bridge is below the 14-foot Texas legal limit for non-permitted loads.

- Options for roadway improvements may be limited in some places due to:
  - Residential and commercial facilities edging the corridor, which presents difficulties for improvements that require additional land
  - Rocky edges and steep terrain in mountainous sections of the corridor, which can make certain improvements more challenging and costly
  - Privately owned fiber optic infrastructure next to the road, which might require relocation if the road is improved
  - Railroad crossings and bridges, which will require coordination with the affected railroads when any improvements are undertaken to minimize impacts to their operations

4.7 Conclusion

The existing conditions analysis provides a foundation for developing and evaluating potential corridor improvement alternatives accounting for known issues, constraints, and opportunities. Combined with public input, this information formed the basis for identifying alternative project concepts, evaluating them, and selecting recommended alternatives. More details on this process and the results are detailed in **Chapter 7 – Alternatives Analysis**.

US 67 CORRIDOR
MASTER PLAN

Texas Department of Transportation

Chapter 5

Freight Conditions, Tourism, and Economic Development

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5.0 Introduction

US 67 is a minor freight corridor, which supports goods movement necessary to supply consumers and businesses in Alpine, Marfa, and Presidio. It also accommodates freight that is moving through the area and connects the region to an international Port of Entry (POE) in Presidio. Various freight improvements including the POE bridge widening and the reconstruction of the Texas-Pacifico rail bridge and track may impact corridor freight traffic in the future. US 67 is also the main route visitors use to access Big Bend area attractions, and tourism is a major driver of the regional economy. Therefore, understanding freight trends and needs to develop effective policy responses is important. Balancing freight needs with community goals that emphasize the importance of tourism and the preservation of community character is equally important.

This chapter describes existing and future freight and tourism conditions along the US 67 corridor. It includes an assessment of regional freight infrastructure, a summary of freight volumes and travel patterns, discussion of tourism and employment trends, and a summary of freight trends that may impact the corridor with a truck traffic forecast. The chapter concludes with key findings and recommended approaches to plan for freight on US 67.

5.1 Freight Infrastructure in the US 67 Corridor

Freight infrastructure in the US 67 study corridor includes highway and rail components, as well as the Presidio/Ojinaga POE. This section describes the key multimodal freight infrastructure in the study area, including recent state and national freight network designations and planned freight projects.

5.1.1 Freight Network Designations

There are several state and national freight network designations that affect the US 67 corridor, as shown in **Figure 5.1** and **Figure 5.2**:

The Texas Multimodal Freight Network was designated by TxDOT to implement the Fixing America's Surface Transportation Act, which is the most recent federal transportation bill. The Texas Highway Freight Network is the highway component of the Texas Multimodal Freight Network. US 67, the Presidio/Ojinaga POE, and the Texas-Pacifico Railroad are all part of the Texas Multimodal Freight Network.

The National Multimodal Freight Network was created by USDOT to help states direct resources towards freight projects, inform freight planning efforts, and help prioritize federal freight investments. The National Highway Freight Network is the highway portion of the National Multimodal Freight Network, to which both Interstate 10 and Union Pacific Railroad belong. Union Pacific also owns the Amtrak station in Alpine. The Union Pacific bridge over US 67 is 13 feet, 7 inches high, presenting an obstacle for some trucks.

Figure 5.1: Freight Designation Definitions

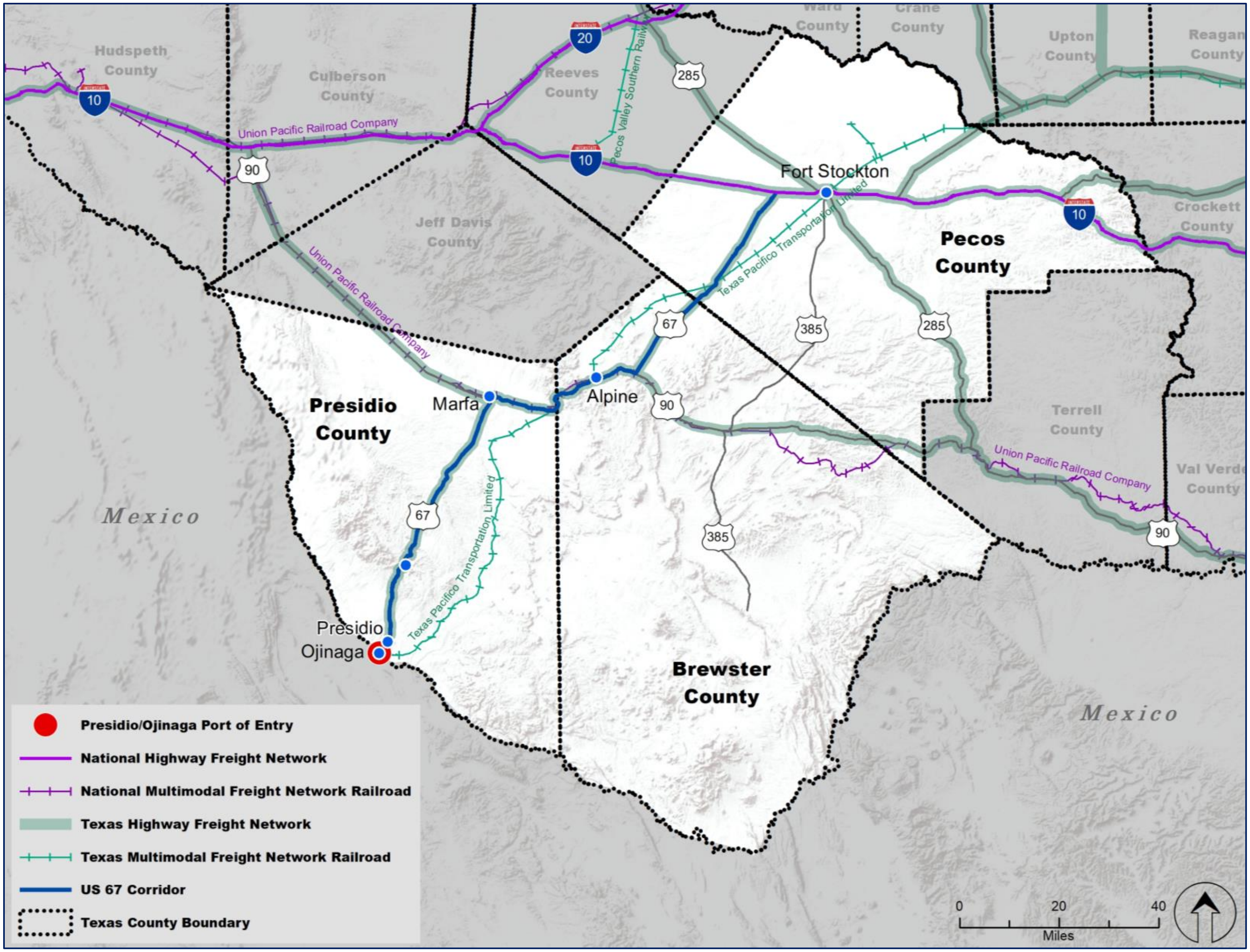


Figure 5.2: US 67 Study Area Freight Network Designations

5.1.2 Presidio/Ojinaga Port of Entry (POE)

The Presidio/Ojinaga POE (**Figure 5.3**) handles comparatively little freight compared to other Ports of Entry on the U.S.-Mexico border. For example, the Laredo POE handled more than $227.4 billion worth of trade in 2019, compared to $346 million (about 0.15 percent of Laredo's trade worth) for Presidio. Still, the POE provides a trade link to Mexico via US 67, handling shipments of agricultural products, mobile homes, livestock, and heavy machinery. Understanding trends and developments on both sides of the border is important. Recent and ongoing developments at the Presidio/Ojinaga POE that may impact freight patterns on US 67 include:

Figure 5.3: Aerial View of Presidio/Ojinaga POE

- The international bridge will soon be widened to include one southbound lane and two northbound lanes. This project, expected to be complete in the fall of 2020, will permit continuous operations while oversize/overweight vehicles are using the bridge; previously, officials had to close the bridge temporarily to accommodate such loads.
- Texas-Pacifico is rebuilding the Presidio-Ojinaga International Rail Bridge using mostly private funds (**Figure 5.4**). This project will restore the international rail link at Presidio, which had not been operating for about a decade. TxDOT is also rehabilitating 72 miles of railroad track from the border to Alpine.

Figure 5.4: Rail Bridge Reconstruction

- The Mexican government recently completed major renovations to the POE infrastructure on the Mexican side. Renovations included the construction of several new facilities for transit and light-duty vehicles, as well as additional capacity for cargo operations, including a new area for export inspections.

5.2 Freight Volumes and Travel Patterns

In 2015, approximately 62 million tons of cargo worth about $151 billion moved to, from, within, and through Brewster, Pecos, and Presidio counties (available commodity data do not include information for the US 67 corridor specifically). This is expected to grow to about 142 million tons valued at $390 billion by 2045 (**Figure 5.5**). However, more than 95 percent of these movements are through freight with no origin or destination point within the study area. These through movements have a minimal relationship to economic activity in the three counties.

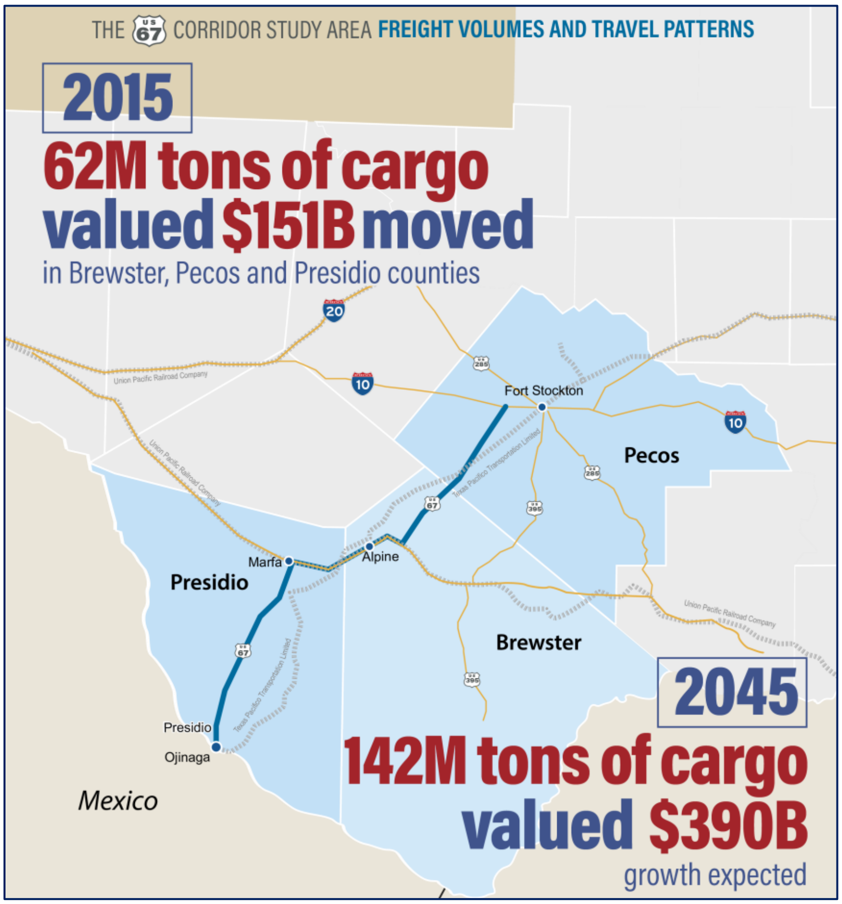
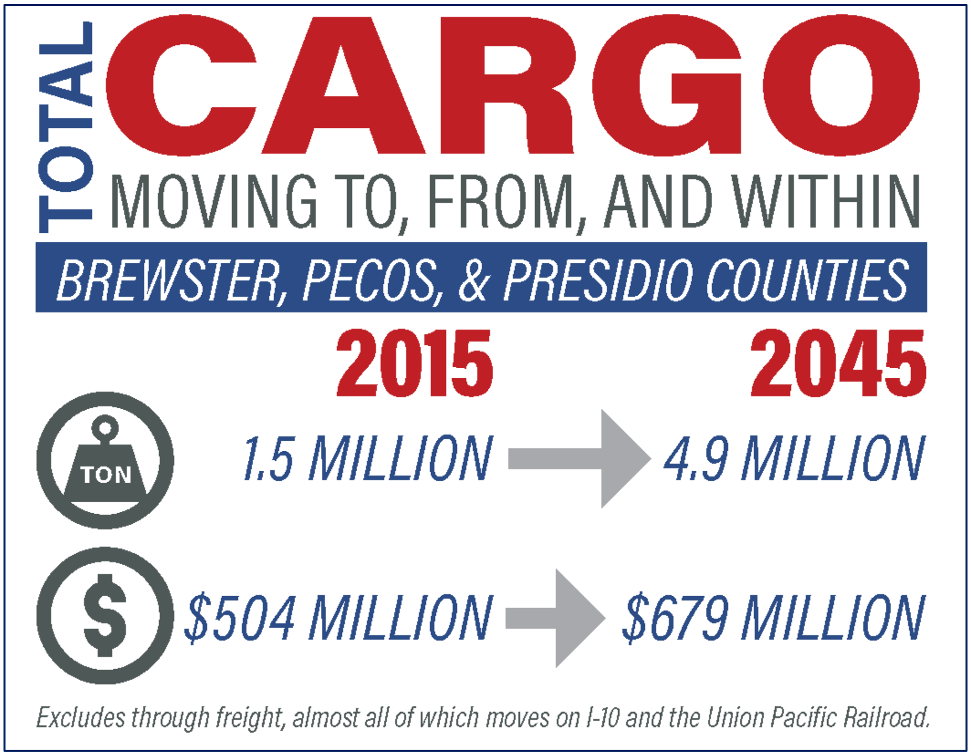


Figure 5.5: Freight Volumes and Travel Patterns

Excluding through shipments, 1.5 million tons of freight valued at $504 million moved to, from, and within the study region in 2015 (**Figure 5.6**). Trucks carried three-quarters of this freight by weight; 96 percent by units; and 69 percent by value. By 2045, non-through freight in the three-county region will reach about 4.9 million tons valued at $679 million (222 percent and 35 percent growth respectively). The difference in tonnage growth rate compared to cargo value growth is because most of the freight growth will come from minerals, a high weight but low value commodity. Trucks will remain the dominant mode.

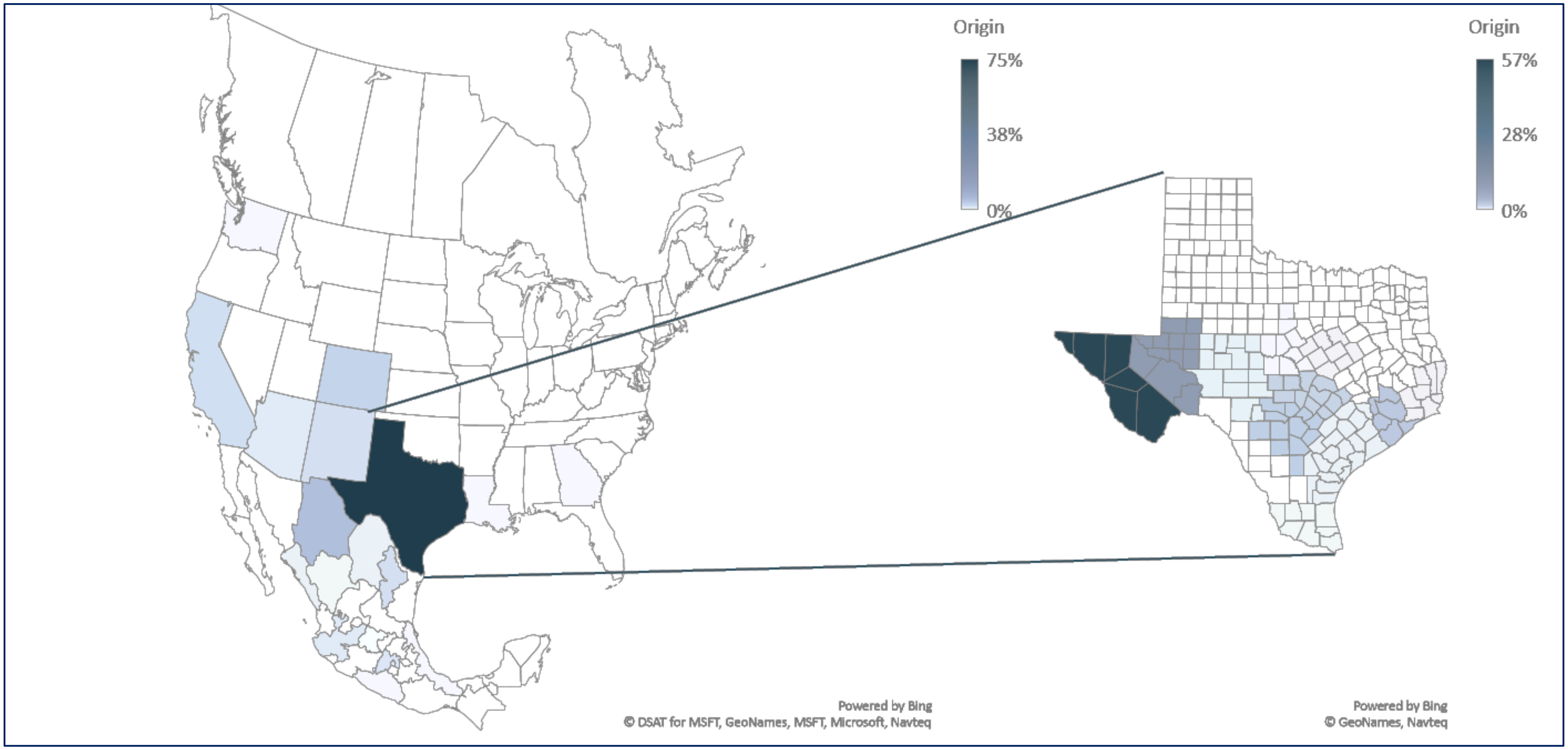
The major commodities moving in the region reflect its economic makeup. For instance, in 2015 the top three truck commodities by weight were minerals, waste and scrap, and farm products; by value, they were transportation equipment, farm products, and secondary traffic (empty containers). Detailed freight analysis can be found in **Appendix M – Freight Conditions.**



Source: TRANSEARCH

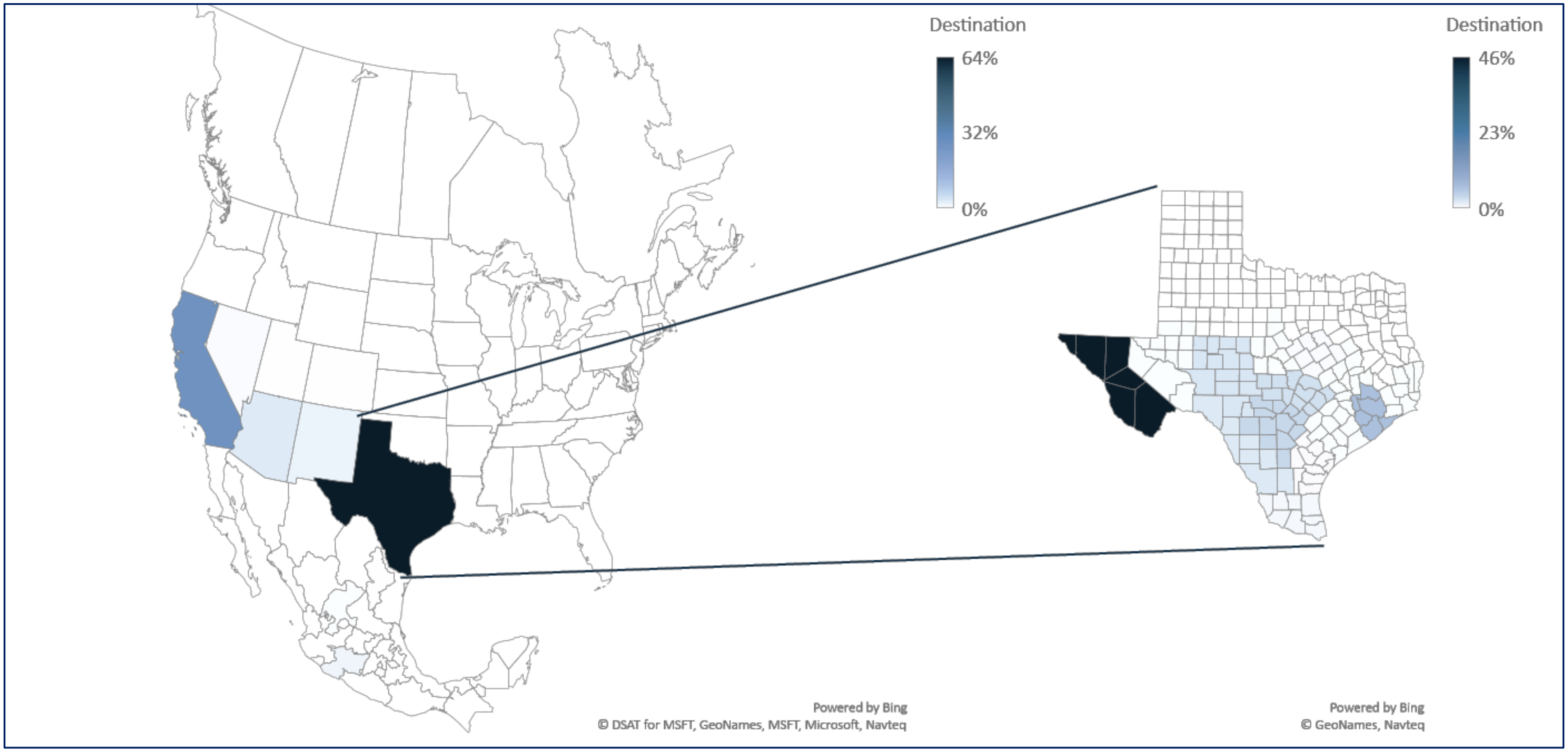
Figure 5.6: 2015 and 2045 Freight Tonnage and Value Excluding Through Movements

Given the importance of truck flows to the region and to US 67, it is important to understand truck travel patterns on US 67. **Figure 5.7** and **Figure 5.8** show top origins and destinations respectively of truck freight that uses US 67, broken down by states and TxDOT Districts. US 67 truck freight mostly serves regional or local markets; more than three-quarters of the truck tonnage on US 67 originated elsewhere in Texas, mostly from the El Paso and Odessa Districts. Chihuahua, Mexico was the second most common origin state. More than 64 percent of US 67 truck tonnage is destined for other parts of Texas, primarily the El Paso District but also the Houston and San Antonio Districts. California is the second most common destination for US 67 truck freight at slightly over 27 percent.



Source: TRANSEARCH

Figure 5.7: Origins of Truck Freight on the US 67 Study Corridor



Source: TRANSEARCH

Figure 5.8: Destinations of Truck Freight on the US 67 Study Corridor

5.3 Freight Trends and Future Truck Volumes

There are a few trends that will impact freight and passenger traffic on US 67 in the future. These trends should be considered when planning corridor improvements.

- ‘Transmigrantes’ are people from Central America who travel to the U.S., purchase several used vehicles, and tow them back to the southern border and through Mexico for resale in Central America. About 10,000 southbound export vehicles per month currently cross at Brownsville, but the Mexican government may reroute them through a different POE due to security concerns in Tamaulipas. Presidio may be designated as an alternate crossing. Presidio/Ojinaga POE officials have been planning for transmigrantes activity possibly rerouting through Presidio and/or Del Rio, but this additional traffic would impact US 67 since all of it would end up on the corridor at some point. A potential side effect of this development would be additional business for Presidio since there is a 72-hour export/waiting process for vehicles and transmigrantes would require services while waiting.

- Solitaire currently ships about four mobile homes per weekday across the international bridge at Presidio, and it is estimated that production will double to eight homes per day by the end of 2019, thus doubling the number of mobile homes moving on the US 67 study corridor. Solitaire will also double inbound shipments of lumber, steel, and other supplies that go into manufactured home production to approximately seven to nine trucks per day, all of which will use US 67.

- In December of 2015, the United States lifted the longstanding ban on most U.S. crude oil exports. Since then, crude oil exports have more than doubled, reaching 2 million barrels per day in 2018.[13] Crude oil supply growth is mostly being met by output from the Permian Basin in Texas and New Mexico, where the International Energy Agency expects output to double by 2023.[14] This increase in production has two potential implications for the US 67 study corridor. First, the current shipments of heavy equipment through the Presidio POE—some of which consists of oil field equipment heading to Mexico for repairs—are likely to continue and may grow. Secondly, although not related to freight volumes, a considerable share of passenger traffic on US 67 consists of oil field workers from Mexico heading to and from jobs in the Permian Basin, and growth in oil field production will probably lead to more such traffic in the future.

- On October 1, 2018, the U.S., Mexico, and Canada agreed to a revised version of NAFTA known as the U.S.-Mexico-Canada Agreement, or USMCA. The USMCA makes key changes to policies governing auto manufacturing, environmental standards, and intellectual property while addressing new developments in the digital economy that were not applicable when the original deal was enacted 25 years ago. Specifically, the new deal requires automobile makers to source 75 percent of vehicle

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[13] U.S. Energy Information Administration, ‘U.S. Exports of Crude Oil,’ accessed April 15, 2019 at https://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=MCREXUS2&f=M

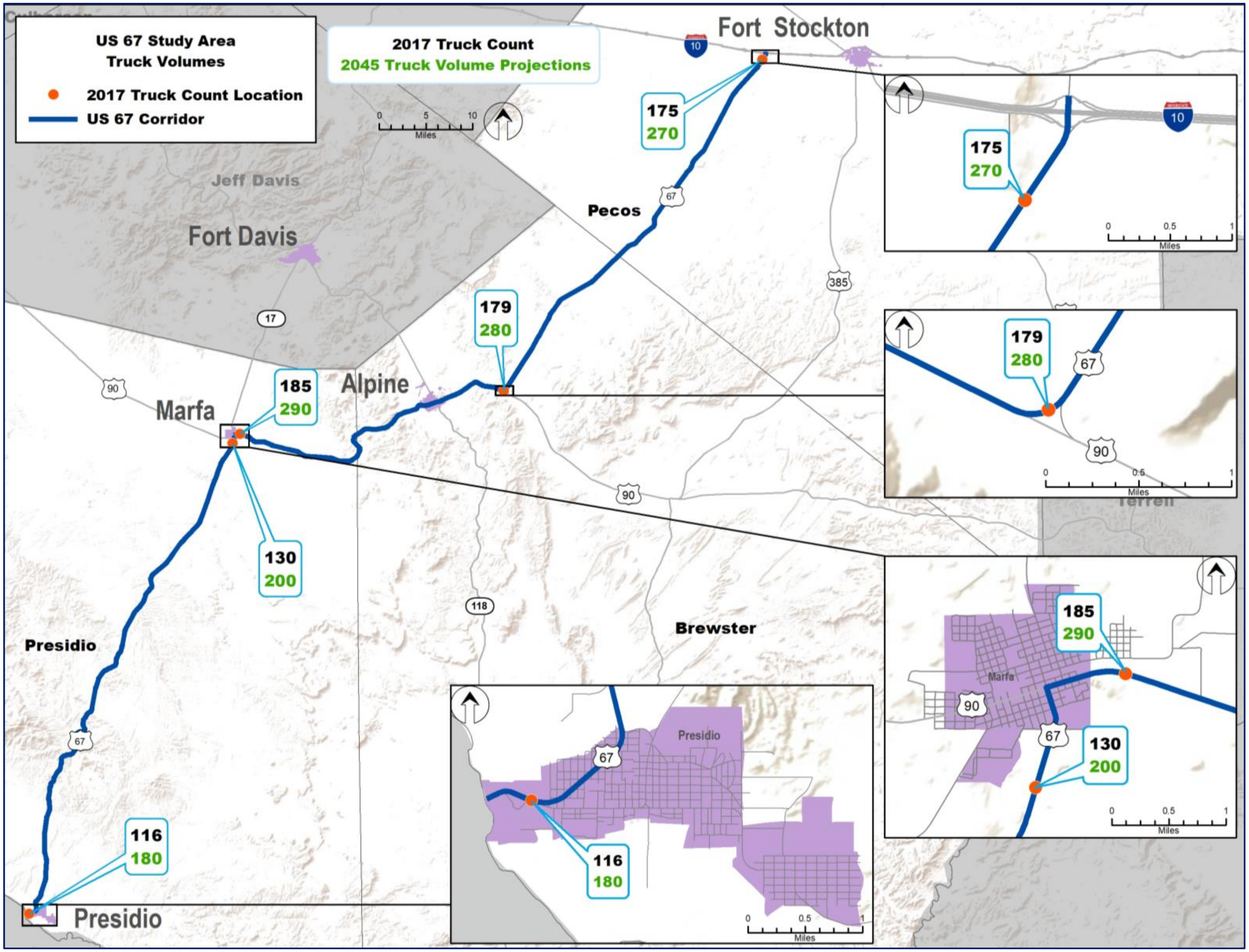
[14] Davis, C. ‘Permian-Led U.S. Oil to Satisfy 80% of Global Demand for Next Three Years, Says IEA,’ Natural Gas Intelligence, March 5, 2018.

components from Canada, the U.S., or Mexico to qualify for zero tariffs (up from 62.5 percent under NAFTA), and that 40 to 45 percent of auto parts are made by workers making at least $16 per hour by 2023. The agreement also includes a “sunset clause” whereby the terms of the agreement would expire after 16 years unless extended by the U.S., Mexico, and Canada. With respect to U.S.-Mexico trade, the largest effects of the USMCA are likely to be felt in the automotive sector, since many of the deal’s provisions are intended to shift automobile and component manufacturing to the U.S. However, it is unclear how the changes might affect the Presidio/Ojinaga POE specifically. In any event, the deal still requires ratification by all three countries, followed by several years of implementation.

- The expansion of the international bridge at the Presidio/Ojinaga POE may make the area more attractive for industrial development, but public and private sector investment may be required to fully realize this potential. Limited border crossing hours and the lack of cold storage and USDA inspection facilities are restricting agricultural trade development.
- The Texas-Pacifico rail bridge reconstruction and track rehabilitation are unlikely to attract much corridor truck freight to rail. Texas-Pacifico expects the improvements to draw cargo away from other rail crossings rather than taking market share from trucks in the corridor. Trucks offer speed and reliability advantages over rail, and some corridor commodities like mobile homes and cattle are not amenable to rail shipment. Rail typically becomes more competitive over longer distances (more than 500 miles), but most US 67 truck freight does not travel that far.

Overall, the analysis and these trends suggest that trucks are the dominant freight mode for the region and will continue to be for the foreseeable future. Moreover, truck traffic is a key concern for corridor communities. Hence, it is important to understand how truck freight growth will manifest itself on the US 67 corridor. The study team therefore developed a truck traffic forecast for US 67 based on the freight trends discussed above and standard TxDOT traffic forecasting methods.

Figure 5.9 shows corridor truck counts in 2017 (collected by the study team) and forecasted volumes in 2045. Daily truck volumes will range from 180 in Presidio to 290 in Marfa, with most locations getting between 200 and 300 trucks per day. These forecasts were developed using a 2 percent annual growth rate, following standard TxDOT practice. The results suggest that some truck traffic growth is to be expected from known developments like the Solitaire expansion, but growth will likely be in line with general traffic growth in the corridor. Nonetheless, most trucks will likely continue to use the study corridor to get to and from I-10 and/or access businesses in corridor communities that rely on truck shipments. This travel pattern suggests that communities along the corridor should consider ways to mitigate the impacts of truck traffic in towns. More passing and climbing lanes outside of communities would improve traffic flows and safety along the corridor. Feasibility studies may be needed to study potential alternative routings. This Corridor Master Plan study team has provided an Alternative Route Roadmap (Appendix T) for communities wishing to explore this option.



Source: CDM Smith

Figure 5.9: 2017 Base Year Truck Counts and 2045 Truck Volume Forecast

5.4 Tourism and Employment Trends

Tourism is a major economic driver for the US 67 corridor study area. With more than 400 hotel rooms, along with restaurants, shopping, and groceries, Alpine, Marfa, and Presidio are major hubs for tourists visiting Big Bend National Park as well as other attractions and annual events such as the Marfa Lights, McDonald Observatory, Gallery Night, and the Cowboy Poetry Gathering. Visitors frequently stop at scenic or natural attractions on the corridor like Elephant Rock and the Profile of Lincoln. Tourism in these three counties has increased consistently from 2010 to 2015. Tourism is one of the top three industry clusters by employment in the three-county region[15].

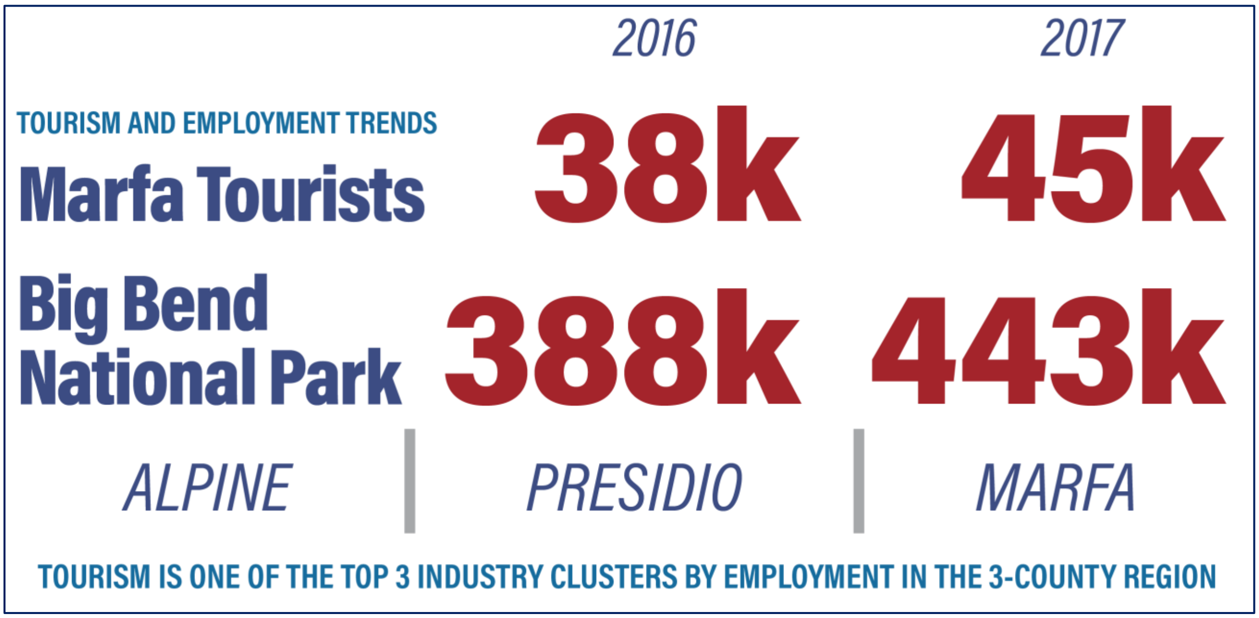


Figure 5.10: Tourism and Employment Trends

In 2016, 38,000 tourists visited Marfa and the number increased by 18 percent to 45,000 in 2017[16]. Since the minimalist artist Donald Judd moved to Marfa in 1979, the city has become internationally recognized for its art scene. In 2016, Big Bend National Park attracted 388,290 visitors, increasing by 14 percent to 442,641 visitors in 2017, the busiest year on record (**Figure 5.10**).[17] Alpine is the largest city in the study region and acts as a stopping point for visitors to Big Bend National Park. Short-term rental home options are provided by homeowners through services like Airbnb. Given increasing awareness of the region within and outside of Texas, continued tourism growth is likely. Forecasted employment growth will also generate more traffic on the US 67 corridor and nearby roads.

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[15] 2016-2020 Comprehensive Economic Development Strategy for El Paso, Hudspeth, Culberson, Jeff Davis, Presidio, and Brewster Counties.

[16] https://www.city-journal.org/html/best-little-art-colony-texas-14737.html

[17] https://www.nps.gov/bibe/learn/news/big-bend-national-park-has-record-visitation.htm

Increases in both population and employment likely would be supported by an increase in freight to provide household goods for growing populations, transport supplies for new businesses, and move manufacturing inputs and finished products for distribution.

5.5 Key Findings and Conclusions

US 67 is clearly not a major freight corridor, but freight is part of the traffic mix. The Presidio/Ojinaga POE, US 67, and the Texas-Pacifico railroad are part of the Texas Multimodal Freight Network. I-10 and the Union Pacific Railroad are part of the National Multimodal Freight Network. Businesses on US 67 rely on the corridor to receive supplies and merchandise and to get products to market. As a public highway, US 67 needs to accommodate these users. Therefore, freight must be considered when developing improvement options.

Still, freight is not the only corridor user, and US 67 must also accommodate the visitors and tourists upon which the regional economy largely depends. Corridor communities have expressed concern about potential negative safety, emissions, and traffic impacts of increasing truck flows on US 67. Alpine and Marfa have seen tremendous tourism growth and wish to retain their small-town feel. Presidio is experiencing traffic backups at the POE driven not by freight but by larger economic trends like the Permian Basin shale boom. This requires solutions that strike the appropriate balance between accommodating commercial needs while preserving quality of life and community character.

Trucks are likely to remain the primary freight mode in the region. Many truck operators and customs brokers interviewed for the study expressed safety concerns along the corridor, especially in the mountains north of Presidio and near tourist attractions like Elephant Rock and the Profile of Lincoln. TxDOT has already provided safe pull-off areas in some of these locations based on input from this study. Additional passing and climbing lanes and wider shoulders with safe places to pull over could improve the travel experience for both freight and passenger traffic.

Some stakeholders also desire additional rest areas with basic services such as bathrooms and drinking water. These facilities should be designed with reasonable accommodations for freight such as truck parking spaces. Larger rest areas with more car and truck parking can be considered if and when demand justifies them.

Alternate routes are an option to reduce through trucks in communities, especially through Presidio and Alpine. However, the need for an alternate route must be balanced with community concerns about other (non-freight) traffic bypassing towns and the potential for undesirable development patterns along the route. Any proposed alternate route would also require careful coordination with affected landowners. Planning or constructing an alternate route would require a feasibility study with local input separate from this US 67 Corridor Master Plan. Pursuing such a solution is therefore a policy decision for consideration starting with individual communities. A key product of this US 67 Corridor Master Plan is an Alternative Route Roadmap (**Appendix T**) to guide communities through this process.

The freight analysis findings informed development and evaluation of many corridor improvement concepts. For example, since trucks will continue to use US 67 to move most freight in the corridor, intersection and Complete Streets alternatives were designed to accommodate wider truck turning radii. Streetscape improvements such as roundabouts are provided with mountable curbs since large vehicles sometimes have difficulty navigating such intersections. Rest areas may include parking spaces for trucks, so drivers have a safe place to pull over to get required rest.

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Chapter 6

Multimodal and Complete Streets

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6.0 Overview

Complete Streets meet the travel needs of all users regardless of travel mode, including pedestrians, bicyclists, drivers, public transit users, and freight. Complete Streets provide a wide variety of options for safe, comfortable movement of both goods and people of all ages and abilities. The purpose of this chapter is to highlight the Complete Streets alternatives that were developed as part of the US 67 Corridor Master Plan in response to overwhelming public and agency input expressing a need for bicycle and pedestrian infrastructure for their communities. Complete Streets alternatives were developed for Alpine, Marfa, Presidio, and rural segments of the corridor.

6.1 Need for Multimodal Principles and Solutions

One of the goals of this study is to increase travel options and accessibility for all, especially elderly, disabled, and disadvantaged populations. According to the 2017 American Community Survey, approximately 20 percent of the people in the corridor fall under the poverty line[18], which is higher than the state average of 12 percent (**Figure 6.1**). In addition, the percentage of zero-vehicle households for the US 67 corridor study area is nearly 10 percent, which is higher than the state average of 5 percent (**Figure 6.2**).

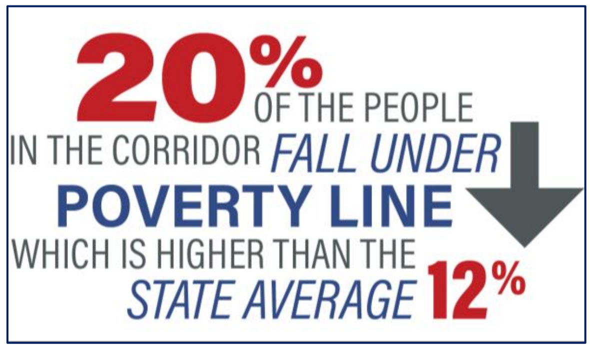

Figure 6.1: Poverty Line

Because of the high poverty levels and relatively low automobile ownership levels, improving nonmotorized transportation options along the corridor for residents and workers is important. This was reinforced during the public involvement process.

Figure 6.2: Zero-Vehicle Households

6.1.1 Driven by Community Input

The public expressed great concern for the safety and mobility of pedestrians and bicyclists in three rounds of public meetings in Alpine, Marfa, Presidio, and Fort Davis/Fort Stockton. The need for Complete Streets improvements was also echoed in focus groups, meetings with community officials, and Corridor Working Group meetings. Furthermore, web surveys and virtual public meetings conducted during the public engagement process revealed similar needs along the corridor.

[18] https://aspe.hhs.gov/poverty-guidelines

Community input highlighted the need to improve pedestrian/bicycle mobility and safety for the corridor. This increased emphasis led the study team to implement a Complete Streets approach for the corridor masterplan and the individual communities.

Because Complete Streets solutions are driven by community and roadway context, there is no single cookie-cutter approach. Each of the communities has unique needs so residents of each town were asked for their input in the creation of these Complete Streets concepts.

To aid in the discussion of these concepts, the project team developed Complete Streets alternatives illustrations to help stakeholders visualize these treatments within their communities.

Figure 6.3 shows the proposed solutions to create Complete Streets along with bicycle and pedestrian facilities which were discussed. These solutions are discussed or shown in figures in the sections which follow.

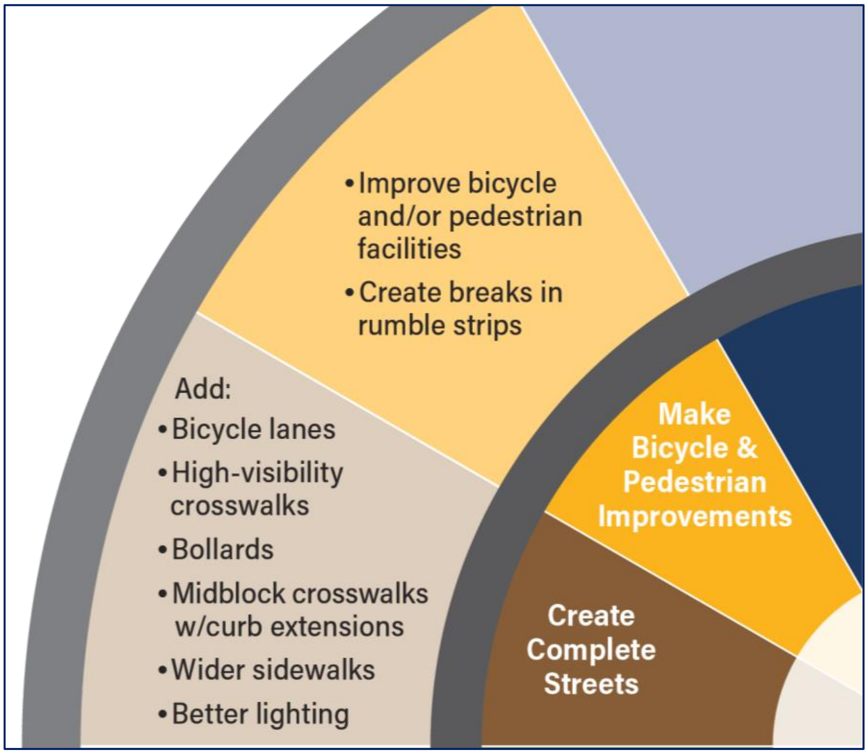

Figure 6.3: Complete Streets Treatments

6.1.2 Principles

The key principles behind Complete Streets center on providing the best roadway facility to serve the needs of the users in a specific location. If the primary role of a street is to facilitate large truck movements in an industrial area with little pedestrian activity, the street should have wide lanes and corners with large radii to allow trucks to maneuver easily. On the other hand, if the primary role of the street is to be a downtown “main street” where visitors park their cars and then reach their final destination on foot, then the street needs to be designed at a human scale with low speeds, midblock crossings, and shaded places while facilitating limited freight delivery. When these two examples must coexist, then efforts must be made to separate these competing uses. The range of design solutions illustrate different methods of separating and accommodating pedestrians, bicycles, automobiles, and trucks. In addition, the existing street environment influences the solutions ultimately chosen. An example is the City of Alpine, which recently implemented several large-scale streetscape improvements. The streetscape improvements include sidewalks, curb and gutters, and curb extensions to shorten pedestrian crossings and keep parked cars from blocking intersections. This built environment limits the space available for additional Complete Streets treatments.

6.1.3 Urban Solutions

The urban Complete Streets solutions ranged from a No-Build alternative to fully separated shared use paths, sidewalks, and cycle tracks or protected bicycle facilities. These alternatives were tempered by available right-of-way on US 67, the level of accommodation requested by the community, and the priorities for each of the modes in each project location.

6.1.3.1 Timeframe for Improvements

Some of the solutions recommended were intended to be implemented quickly without great expense. Others require greater planning, design, and funding efforts. To that end, improvements are categorized as short-, mid-, and long-term. Details on the timeframe and funding requirements are shown in Chapter 7 – Alternatives Analysis.

6.1.3.2 Network vs. Facility Solutions

The US 67 Corridor Master Plan is a holistic study of the mobility needs of the communities along the corridor rather than just roadway itself. In some cases, the separation of motorized users and nonmotorized users on nearby or parallel facilities is beneficial. Providing facilities for nonmotorized users off US 67 contributes to a more comfortable travel environment that avoids mixing bicyclists and pedestrians with large freight trucks and heavy automobile traffic on portions of the corridor. In each of the three communities, an example network approach was included in the alternatives to ensure that key connections for nonmotorized users were made between schools, parks, universities, retail areas, housing, and other land uses.

6.1.4 Level of Nonmotorized Accommodation

The following sections discuss the level of accommodation for bicyclists and pedestrians. They range from the existing conditions to providing exclusive facilities for bicyclists and pedestrians.

6.1.4.1 No-Build – Utilize Existing Paved Shoulders for Bicycle and Pedestrian Travel

This illustration for Presidio shows a No-Build approach. The existing condition includes 8-foot paved shoulders on US 67 which could accommodate bicyclists. For much of US 67 in Presidio, there are sidewalks for pedestrians. The existing condition of a wide shoulder and sidewalks becomes the base case alternative which is illustrated in **Figure 6.4**.

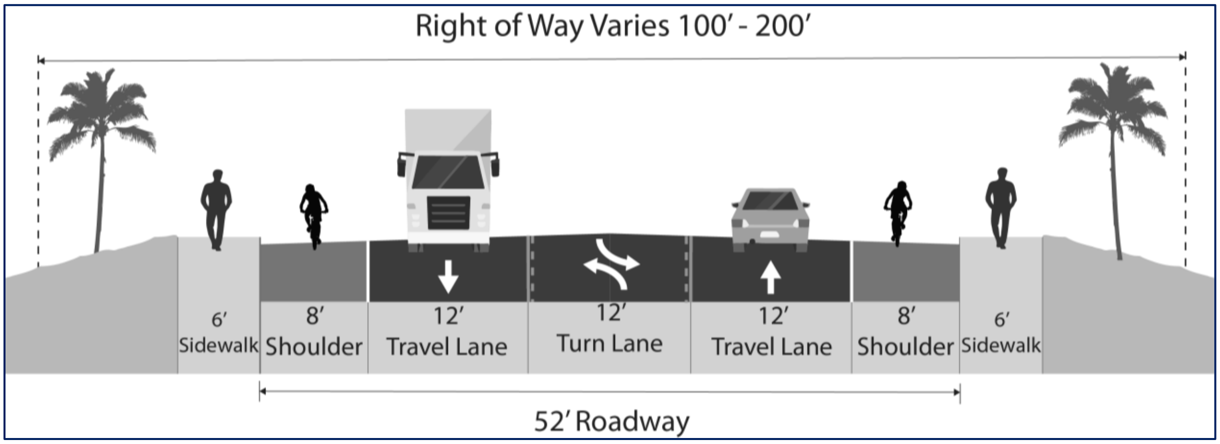

Figure 6.4: No-Build Alternatives: "Existing Conditions"

6.1.4.2 Add Bicycle Lane with Striped Buffer

A relatively inexpensive improvement for bicyclists would be to paint a designated bicycle lane with a striped buffer on the existing paved shoulder, to convey to all users that the space is designated right-of-way for bicyclists. The bicycle lane also provides directional guidance to discourage wrong-way riding. Motorists do not expect wrong-way riding and they typically are not looking for bicyclists coming toward them when making turning movements on or off the US 67 roadway. A striped buffer is included in this design to provide additional separation between the bicyclist and motorized traffic. Typically, there is enough right-of-way available on the US 67 shoulders to allow for the buffer in these communities. An example of the buffered bicycle lane in Presidio is shown in **Figure 6.5**.

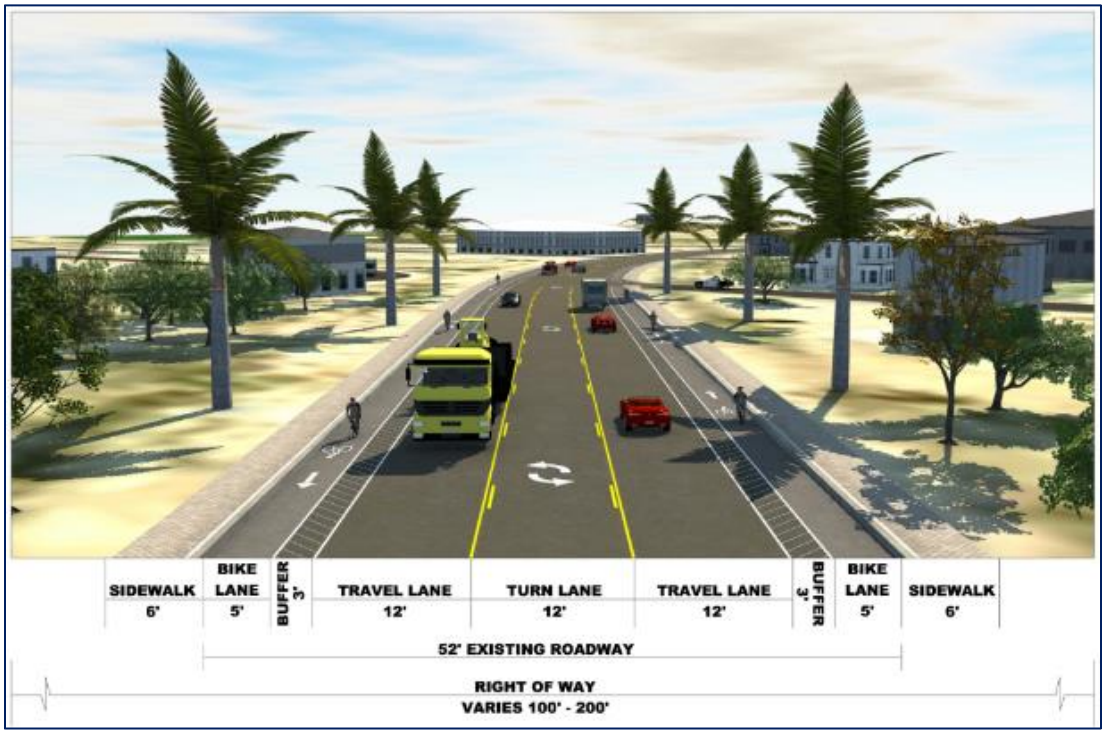

Figure 6.5: Bicycle Lane with Striped Buffer

6.1.4.3 Dangers of Sidewalk Riding

Providing separate right-of-way for bicyclists encourages them not to ride on sidewalks where they can create a safety hazard for pedestrians. Sidewalk riding can also violate motorist expectations because bicyclists travel faster than pedestrians. A motorist looking for pedestrians before crossing the sidewalk at a driveway or turning at an intersection may not see the bicyclist on the sidewalk and potentially collide with them. This is because the motorist is expecting a pedestrian to cover less distance than a bicyclist and only focuses on an area close by and misses seeing the bicyclist further off in the distance.

6.1.4.4 Bicycle Improvements off of US 67

Because public input identified the need for bicycle and pedestrian infrastructure throughout the communities, a network approach was included in the alternatives to connect parks, universities, retail areas, housing, and other land uses in each community. One use of this plan is to guide communities seeking funding for Complete Streets improvements. The rich network of streets in Alpine, Marfa, and Presidio connecting key destinations off US 67 allows for bicycle and pedestrian routes on lower-speed, lower-volume roadways which provide children, older adults, and less experienced bicyclists a safer travel environment.

To help locate popular cycling areas, an analysis of heat maps from Strava was performed to show the extent of recreational activities, such as hiking, walking, and bicycling, happening in the communities. Strava is a mobile phone application used by recreational cyclists, runners, and walkers to track their activity and compete with other Strava users. These maps only reflect people bicycling, running, or walking with the app being turned on and in record mode, thus it does not provide a complete picture of all these activities within the communities. However, the heat map does provide a snapshot of relative activity and can be a useful data point in understanding bicycling, running, and walking in the communities. The more intense the red line, the higher the level of activity. An example heat map for Presidio is shown in **Figure 6.6**.

Figure 6.7 illustrates bicycle network improvements off US 67 in Presidio. It shows the US 67 corridor in blue, along with programmed improvements in purple and potential network connections in yellow. Several of the potential network connections are already utilized by Strava users as shown in **Figure 6.6**.

Figure 6.6: Strava Heat Map for Presidio

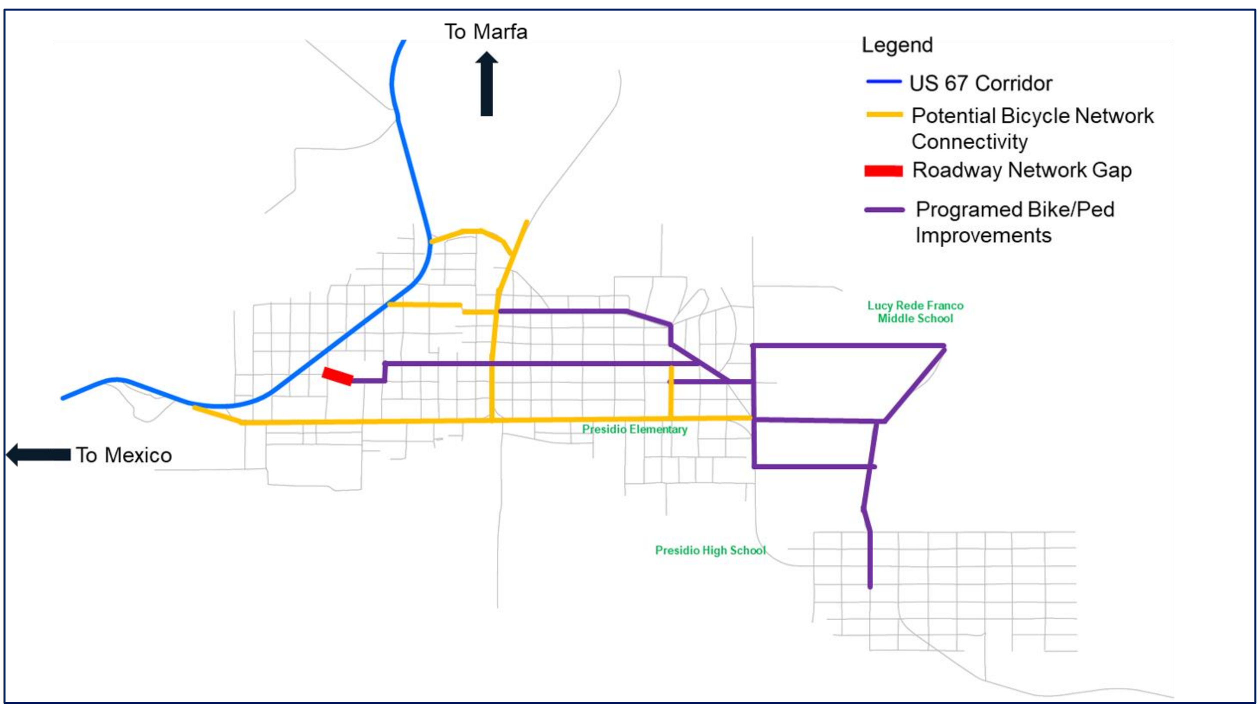

Figure 6.7: Bicycle Network Improvements in Presidio

6.1.4.5 Bicycle Lane with Striped Buffer with Angled Parking

Marfa has a strong reliance on tourism due to its reputation as a community of artists and its unique attractions such as the Chinati Foundation (a contemporary art museum) and El Cosmico (a nomadic-style hotel and campground). The community values easily accessible parking in the downtown area, particularly the existing angled parking on Highland Street and head-in parking at the courthouse. As a result, there was a desire to balance the town's parking needs with bicycle and pedestrian mobility. To accomplish this balance, a design was developed which combines angled parking with a striped separated bicycle lane. This design is illustrated in **Figure 6.8.**

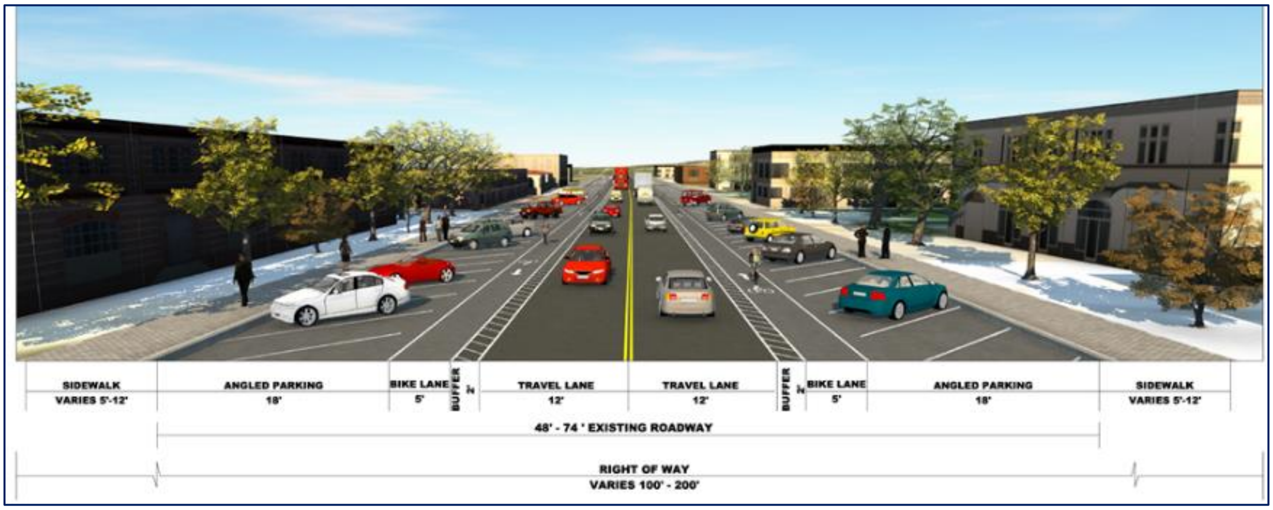

Figure 6.8: Bicycle Lane with Striped Buffer and Angled Parking

A potential hazard of this design is that backing motorists may not see bicyclists approaching in the bicycle lane behind them, resulting in a collision. A proposed variation uses reverse angled parking, which provides clearer visibility for both motorists and bicyclists. This is illustrated in **Figure 6.9**. There was some opposition to reverse angled parking because it is a new concept and would require some education for drivers and bicyclists. This type of design is frequently cited as a best practice in other cities including Austin, Texas. Currently, TxDOT does not permit any new angled parking on the state highway system, so an exception to this rule would be needed to implement any new angled parking.

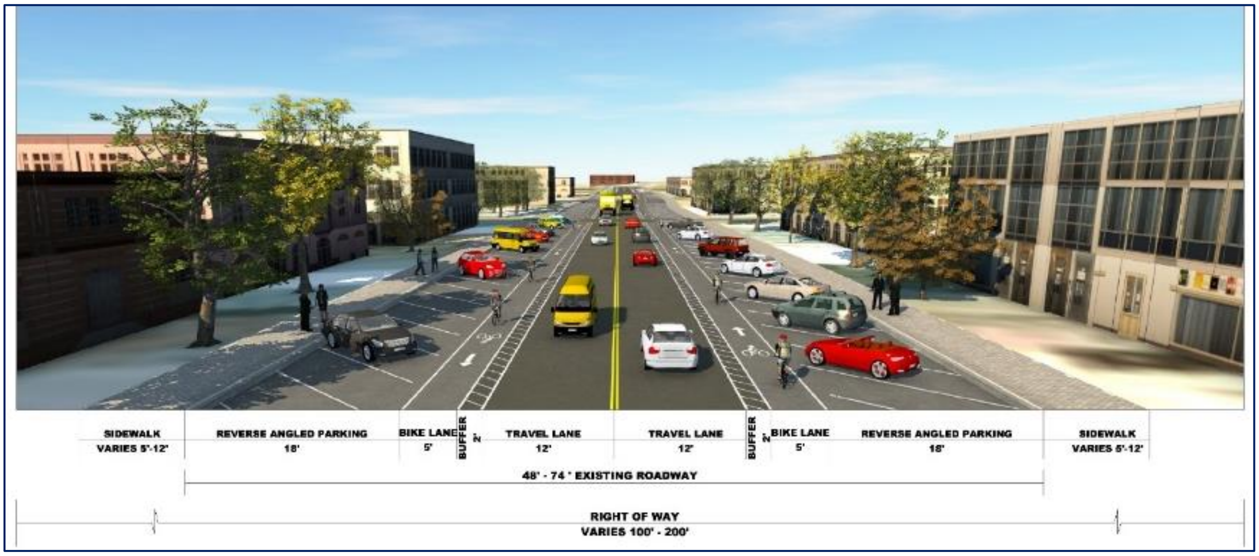

Figure 6.9: Bicycle Lane with Striped Buffer and Reverse Angled Parking

6.1.4.6 Add Protected Bicycle Lanes – Two-Way Cycle Track with Flexible Delineators in Marfa

Marfa encourages bicycling more than the other communities along the corridor. The city has a bicycle share system, Bike Marfa, that provides rental bicycles to both visitors and residents (see Figure 6.10). Because of this enthusiasm for bicycling, recommendations intended for Marfa include additional dedicated, separated space for bicyclists. Figure 6.11 shows a rendering of a two-way cycle track, which is separated from the roadway by a striped buffer with flexible delineator posts. The cycle track is further separated from the adjacent roadway with a parking lane. The intent of this design is to provide a safe environment for bicyclists away from automobile traffic. This design requires extra pavement width; however, this is not a concern since Marfa has very wide streets. This design has the added benefit of organizing some of the existing extra pavement space, which is currently undesignated and creates confusion.

Figure 6.10: Bike Marfa Bikeshare Bicycles Available to Rent

Figure 6.11: Two-way Cycle Track with Flexible Delineators and Parking Lane

6.1.4.7 Shared Use Paths

A shared use path is a 10-foot to 12-foot two-way bicycle and pedestrian facility that is fully separated from automobile traffic either with a raised curb and gutter much like a sidewalk or with a shoulder and drainage ditch. Shared use paths typically provide bicyclists and pedestrians the greatest sense of comfort out of the bicycle facility types discussed in this chapter. For the facilities to be safe, there needs to be enough separation distance from the roadway and intersections with cross-streets and driveways need to be kept to a minimum. In addition, shared use paths require greater sight distances than sidewalks because bicycles travel at a higher speed than pedestrians. As a result, they are not ideal in all situations. The recommendations included this type of facility in both Marfa and Alpine as illustrated in **Figure 6.12** and **Figure 6.13**.

Figure 6.12: Marfa Shared Use Path

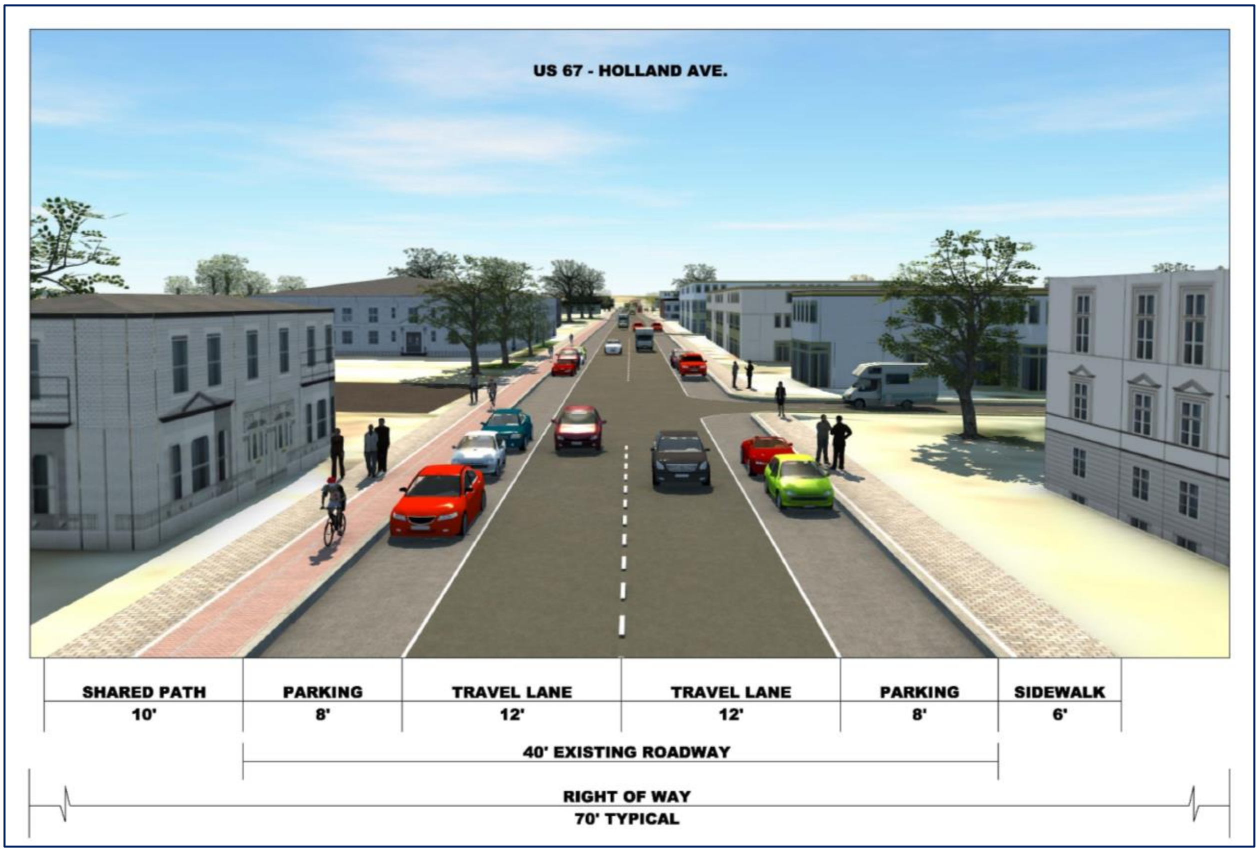

Figure 6.13: Alpine Shared Use Path

6.1.4.8 Pedestrian Facilities

In urban areas along US 67, sidewalks are suggested for implementation on both sides of the roadway. In addition, sidewalks should connect commercial areas, restaurants, schools, libraries, medical facilities, universities and other land uses, giving residents and visitors a safe and inviting place to walk. In addition, at roadway crossings with traffic signals, crosswalks, lighting, and pedestrian signals should be installed. To maintain dark skies at night, pedestrian-level lighting should be included at key crossings. This type of lighting is lower to the ground and intended to illuminate pedestrian facilities, not roadways. An example of this is shown in **Figure 6.14**. All roadway crossings should include Americans with Disabilities Act (ADA) compliant curb ramps and follow TxDOT standards.

Figure 6.14: Pedestrian Level Lighting – Source: CDM Smith, Wilmington, Delaware

In Alpine, a location-specific option studied at the request of the public was a pedestrian-only street for two blocks on Holland Avenue between N. 4th and N. 6th Streets. Motorized traffic would be routed from Holland Avenue north on N. 6th St. to Ave. E and then south on N. 4th St. back to Holland Avenue. The rationale behind this proposal was to facilitate walking between downtown Alpine and the Alpine Amtrak Station. Currently, crossing is difficult for pedestrians and was the site of a pedestrian fatality in 2019. Ultimately this option was dropped out of the list of priorities because of lack of public support.

6.1.5 Trade-offs

Like all planning considerations, there are trade-offs associated with Complete Streets. In Marfa, the community is weighing the pros and cons of separated bicycle lanes and shared use paths as opposed to standard bicycle lanes. Both shared use paths and protected bicycle lanes require additional space. This additional space would limit angled or head-in parking. Another trade-off which requires deliberation is whether to facilitate easier turning for trucks or shorter pedestrian crossings, particularly at the intersections of US 67 and Highland Street. When a turning radius is increased to allow for easy truck movements, it results in longer distances between corners for pedestrians to cross, increasing the risk of conflict between pedestrians and vehicles.

6.1.6 Rural Solutions

In addition to urban solutions, the public identified a need for rural area solutions for non-motorized transportation users traveling in between the towns. One of the safety strategies recommended to reduce roadway departure crashes for motor vehicles is to include rumble strips on paved shoulders to alert drivers when they begin departing their lane. Though these treatments can provide protection for bicyclists and pedestrians, they need to be installed in accordance with the TxDOT Design Manual and include a 12-foot-wide gap every 40 to 60 feet. This gap provides bicyclists access to the roadway lane and allows them to avoid hazards and debris in the shoulder. Because the rumble strip pavement depressions can cause a bicyclist to fall, the gaps are needed. An example of this design is shown in **Figure 6.15**.

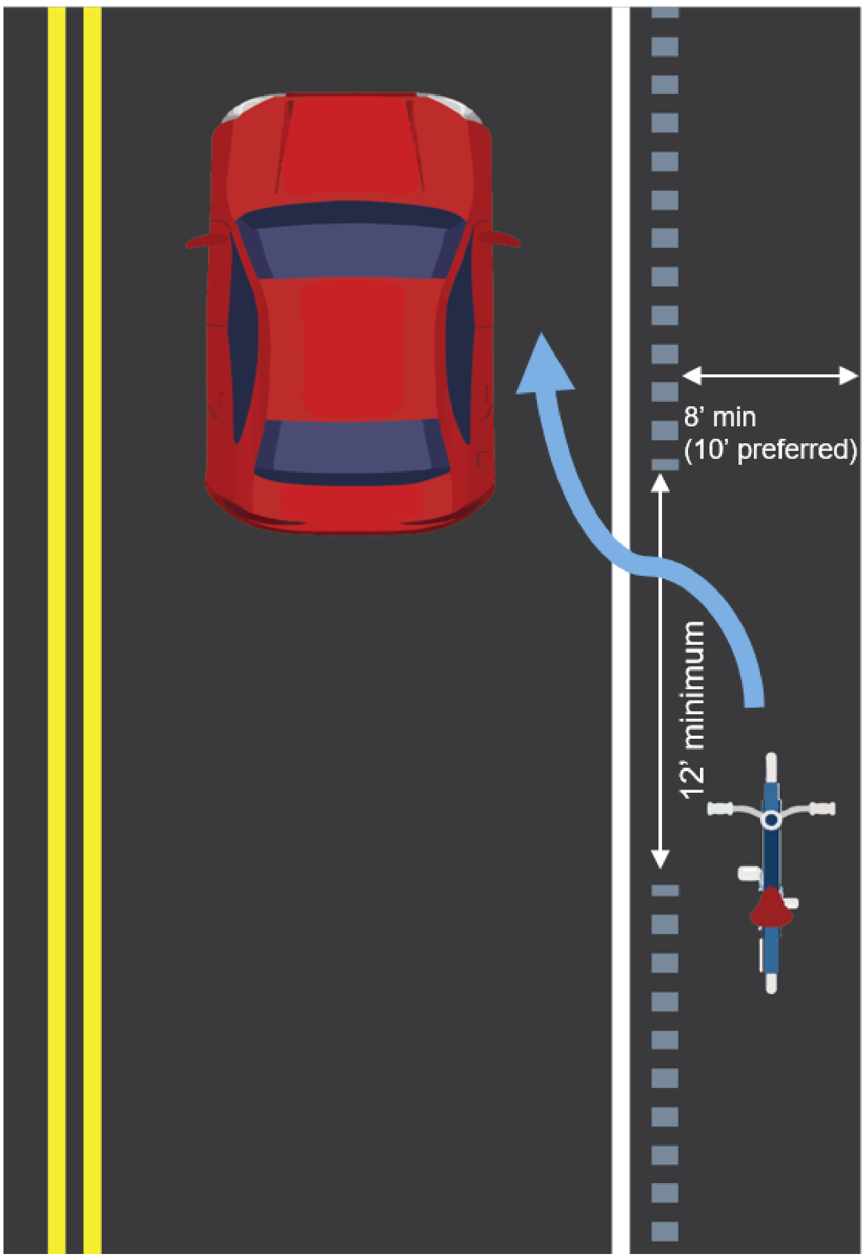

Figure 6.15: Bicycle Friendly Rumble Strips with Enhanced Shoulder

6.1.6.1 Off-Road Trail Options Between Communities

The concept of an off-road trail bicycle and pedestrian trail connecting the communities was studied. There were two concepts explored which used utility and railroad right-of-way and shown in **Figure 6.16**. One (shown on the left) was a Rails with Trails concept which places a shared use path within railroad right-of-way yet separated from the tracks. The other option (shown on the right) was to place a shared use path on a pipeline or powerline easement. There are examples of these concepts elsewhere in the state and U.S. This is a long-range option that was not studied in detail but could be considered in the future with local champions taking the lead.

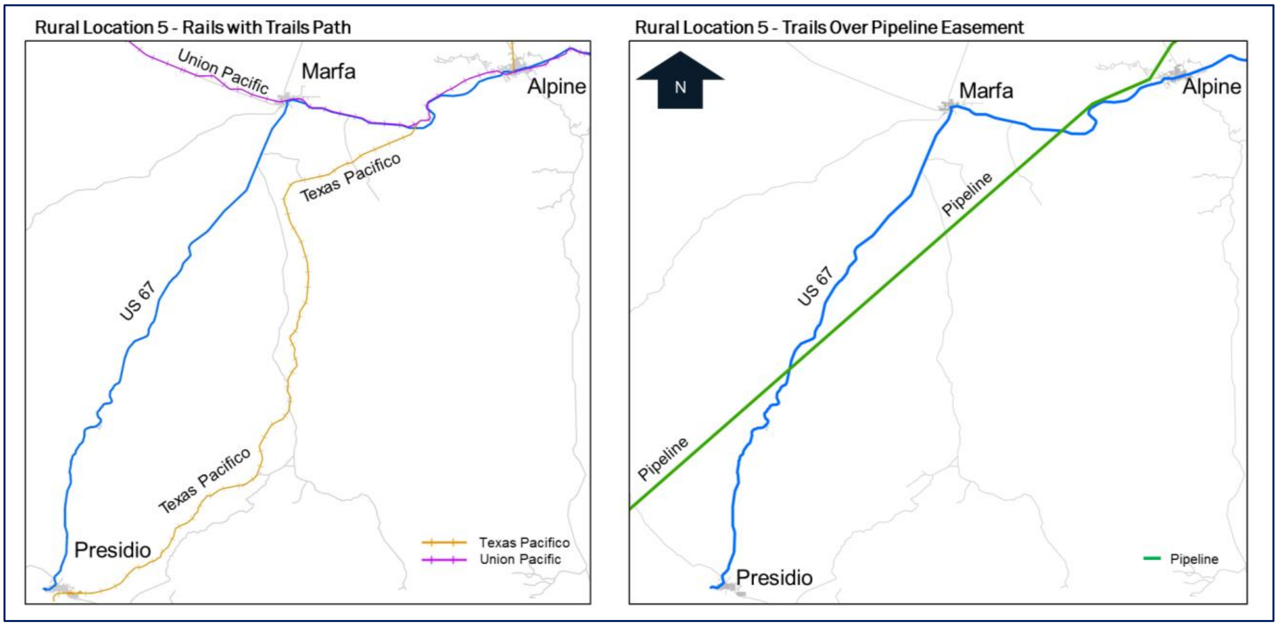

Figure 6.16: Rural Location Trail Options off of US 67

6.2 Conclusion

This chapter described the process of developing a Complete Streets recommendation for the US 67 corridor in response to the strong demand for bicycle and pedestrian infrastructure from both the general public and local elected officials. These recommendations provide a holistic approach to consider the needs of all users of the US 67 corridor and the best strategies to accommodate these needs. The Complete Streets alternatives were customized for the communities and rural areas along the corridor and examples have been provided for the implementation of any proposed treatments.

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Texas Department of Transportation

Chapter 7

Alternatives Analysis

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7.0 Concept Development

The planning process for the US 67 Corridor Master Plan involved several layers of technical analyses focused on key areas such as existing conditions, freight conditions and needs, safety, Intelligent Transportation Systems (ITS), pavement, and intersection improvement needs. These data driven technical analyses were coupled with a high degree of public engagement at each step of the planning process. Solutions to these needs were developed through both the technical analyses and public input. Figure 7.1 below shows how identified needs were paired with potential solutions identified through public input, technical analyses, and best practices. This chapter describes the recommended solutions, or concepts, developed throughout this planning process.

Figure 7.1: Alignment of Needs with Solutions

For the purposes of the US 67 Corridor Master Plan, concepts are defined as individual corridor improvements developed throughout the planning process. Concepts represent a variety of options that could improve corridor safety, mobility, operations, or conditions if implemented. Concept types considered during this process are shown in **Figure 7.2** below. Refer to **Chapter 6 – Multimodal and Complete Streets** for concepts related to Complete Streets.

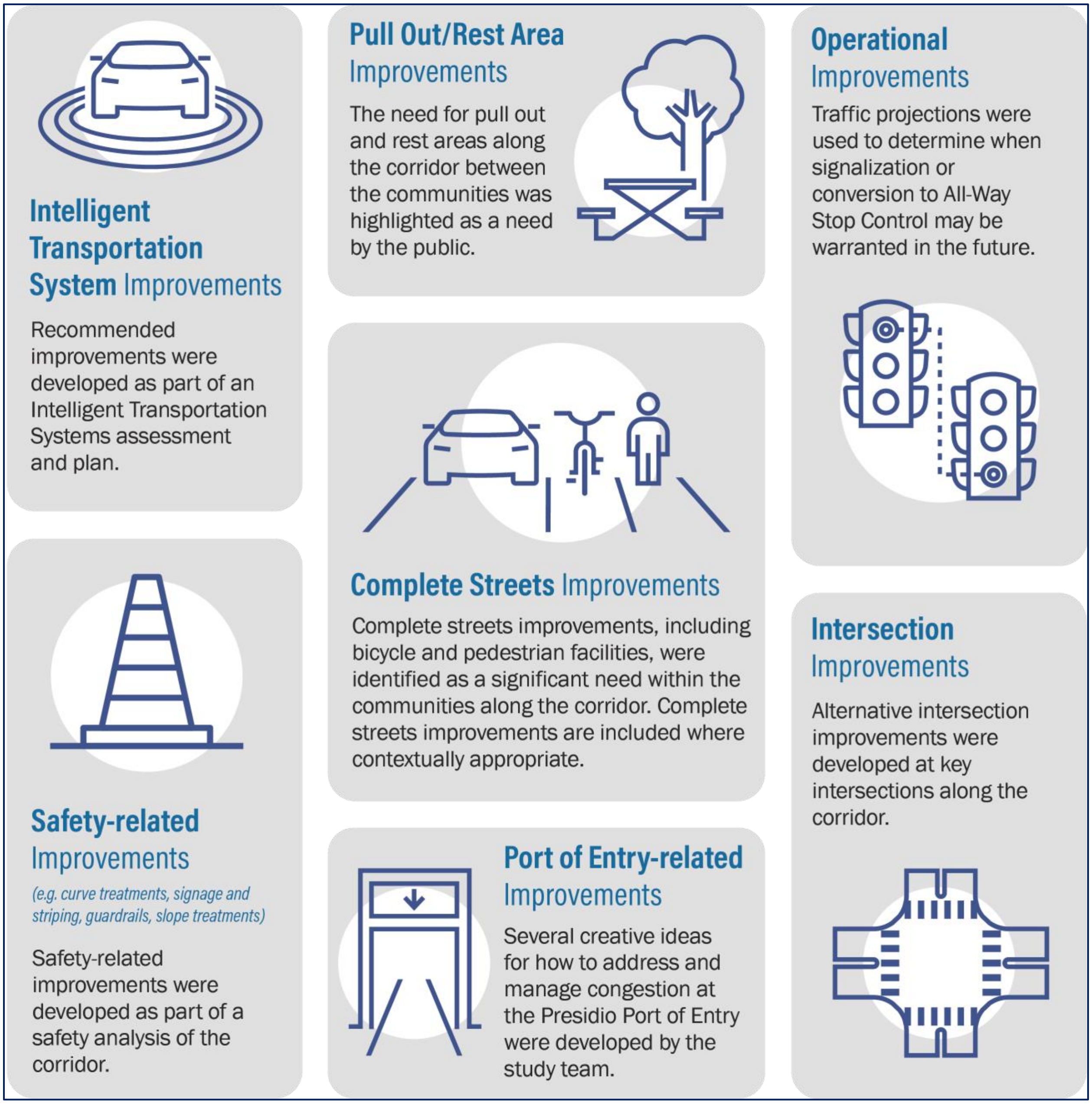


Figure 7.2: Types of Concepts Developed

Figure 7.3 shows a summary of the concept development process. As a transparent, public-driven planning process, many concepts were identified through public outreach and engagement activities conducted at Steering Committee meetings, Corridor Working Group (CWG) meetings, Focus Group meetings, stakeholder meetings, and public meetings.

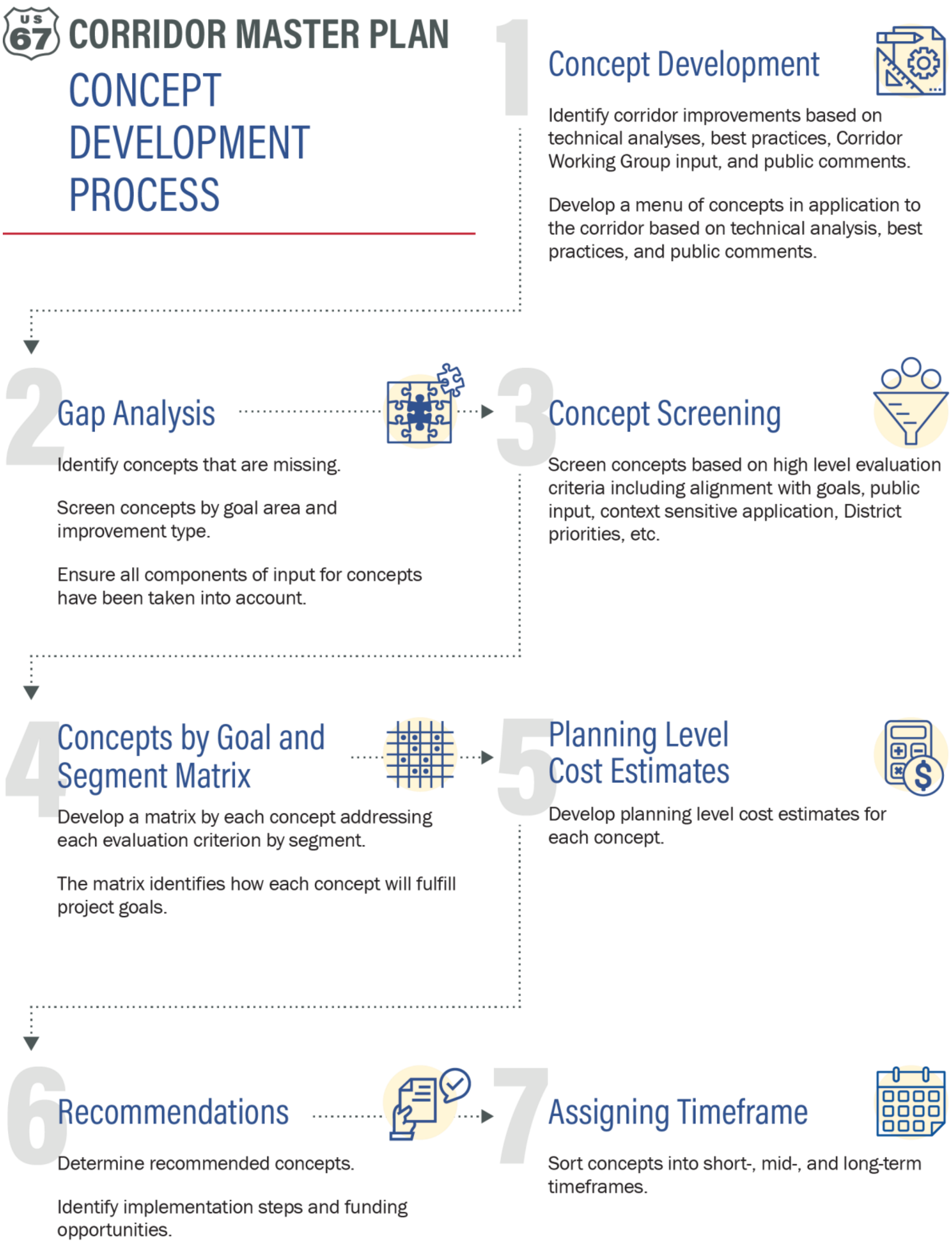


Figure 7.3: Concept Development Process

Through technical analyses and public input from outreach activities, a menu of corridor concepts was developed. To determine if any solutions to identified needs were absent from the menu of corridor concepts, the study team then conducted a gap analysis on the concepts. The gap analysis attempted to determine if there were any improvement types missing, if there was a geographic gap in where improvements were located, or if there were gaps in improvement types that met a certain goal area.

The gap analysis was conducted by categorizing all concepts by goal area and improvement type through a series of matrices. Gaps were identified by finding goal areas or improvement types with no associated concepts. The team conducted additional technical analysis and best practices review to define concepts to fill such gaps. For example, if the matrices showed that no concepts were identified to fulfil the study goal “Promote Sustainability”, then the study team would develop concepts to fulfill this goal area based on technical analysis and best practices.

Following the gap analysis, a complete menu of conceptual alternatives was identified for the corridor. In January 2019, TxDOT El Paso District hosted a workshop to review the complete menu of concepts with District staff. All concepts were mapped on roll plots of the entire corridor to ensure that every public and stakeholder input and every concept identified by the technical analysis was included. **Figure 7.4** shows an example of the roll plot exercise.

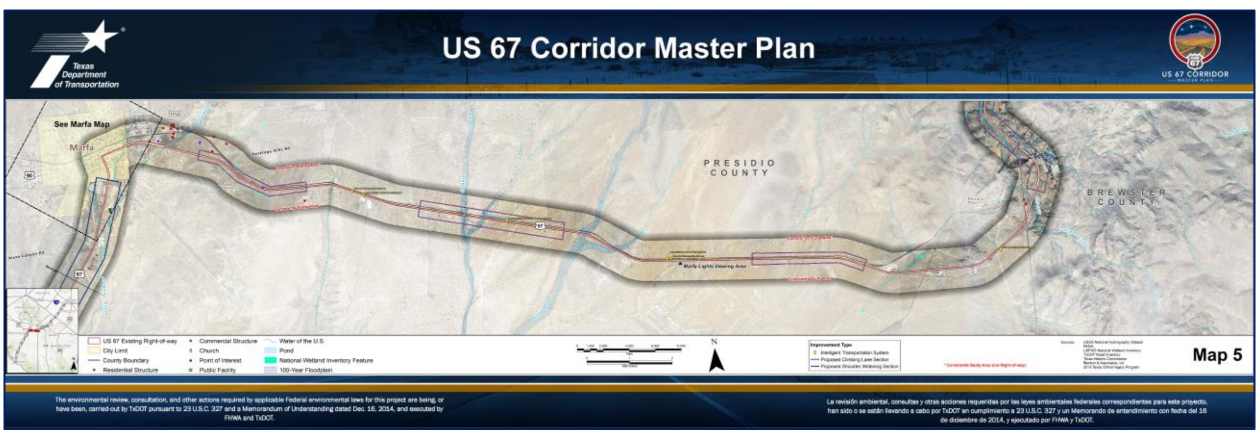


Figure 7.4: Example Roll Plot Used in TxDOT Workshop

Concepts were then screened based on evaluation criteria. Evaluation criteria included cost, source, goal area satisfied, and the amount of right-of-way (ROW) required for the proposed concepts and were presented to the public and stakeholders throughout the outreach process. The evaluation criteria determined the concepts that are most fitting for the corridor from environmental, engineering, and economic perspectives and that best meet the goals and objectives of the US 67 Corridor Master Plan. Concepts that encountered broad public disfavor for reasons such as cost, environmental impact, impact on traffic circulation, engineering or design obstacles, and other considerations were excluded from further consideration in the study. See **Appendix N – Alternatives Analysis** for additional details.

7.1 Developing Cost Estimates

The Study Team created planning level cost estimates for all concepts identified. Planning level cost estimates are meant to provide a high-level assessment of a project cost for planning purposes only. If the project continues into the design phase, a more refined and accurate cost estimate would be developed. All planning estimates were made in year 2019 dollars and would rise with inflation if concepts are constructed in the future. The planning level cost estimates can be reviewed in **Appendix D – Safety Analysis**, **Appendix G – Intelligent Transportation Systems (ITS) Needs Assessment**, and **Appendix O – Preliminary Cost Estimates.** The total cost of all of the recommended alternatives as noted in this master plan total $620 million**.** A summary of the breakdown of the total planning cost estimates by concept type are shown in **Table 7.1.**

Table 7.1: Summary of Cost Estimates by Concept Type as Recommended in the Plan

Concept Type	Planning Level Cost Estimate
Intelligent Transportation Systems Core Concepts	$29,000,000
Safety Core Concepts	$332,100,000
Core Intersection Concepts	$6,500,000
Pavement	$232,100,000
Complete Streets	$6,500,000
Alternative Intersection Concepts	$13,600,000
TOTAL (rounded)	$620,000,000

7.2 Using Advanced Technology to Develop Alternatives

TxDOT employed HoloLens as an advanced technology tool to visualize design alternatives, produce more efficient designs and for seeking collaborative ideas from the stakeholders. HoloLens is a pair of mixed virtual reality smart glasses developed and manufactured by Microsoft. HoloLens uses a head-mounted display running the Windows Mixed Reality platform with the Windows 10 operating system.

The US 67 planning and design team used InfraWorks, a planning and design platform that enables real-world, three-dimensional renderings of concepts. These three-dimensional renderings of alternatives were imported into HoloLens. HoloLens enabled the user to experience the alternatives at real-world scale within the mixed virtual reality environment. InfraWorks and HoloLens was used to visualize three-dimensional renderings of proposed conceptual improvements at five locations:

- Marfa: San Antonio St and Highland Ave (Alternative Intersection Concept Marfa Location 1) as shown in **Figure 7.5**.
- Marfa: Lincoln St and Highland Ave (Alternative Intersection Concept Marfa Location 2) as shown in **Figure 7.6**.

Figure 7.5: InfraWorks Rendering in Marfa at San Antonio and Highland Ave

Figure 7.6: InfraWorks Rendering in Marfa at Lincoln St and Highland Ave

- Alpine: 5th St and US 67 (Core Concept Based on One-Way streets in Alpine) as shown in **Figure 7.7**.
- Alpine: Sul Ross University and US 67 (Alternative Intersection Concept Alpine Location 1) as shown in **Figure 7.8**.
- O'Reilly and Erma Avenue intersection in Presidio as shown in **Figure 7.9**.

Figure 7.7: InfraWorks Rendering in Alpine at 5th St and US 67

Figure 7.8: InfraWorks Rendering in Alpine at Sul Ross University and US 67

Figure 7.9: InfraWorks Rendering in Presidio at O'Reilly St and Erma Ave

HoloLens allowed designers to identify design elements to alter for real world application, cost savings measures, and efficiency improvements. HoloLens was also used to educate the public on conceptual improvement options. The visualizations allowed the public to truly experience conceptual alternatives at a real-world scale. Use of the HoloLens at a public meeting demonstration is shown in **Figure 7.10**.

Figure 7.10: HoloLens Demonstration at a Public Meeting

7.3 Recommended Core Concepts

A generalized screening and fatal flaw analysis identified up to three alternatives for each identified intersection location along the corridor. Several of the concepts developed during the concept generation process, have either global applications throughout the corridor or no competing alternative for application at the intersection location. These concepts are referred to as "core concepts". Core concepts were generally identified through technical analyses for:

- Intelligent Transportation Systems (ITS);
- Safety;
- Intersection Analysis; and
- Pavement

A timeframe of short-, mid-, or long-term was assigned to each recommendation based on applicability to the US 67 study corridor cost estimates and ease of implementation. Short-term concepts (up to 5 years from the adoption of the US 67 Corridor Master Plan) are generally focused on specific locations, costs are low to medium, and they provide the most benefit in terms of safety and operations. Projects that could be addressed in other ways or where the benefit is not substantial or requires more time for additional planning and funding, are recommended for mid-term implementation (5 to 10 years from the adoption of the US 67 Corridor Master Plan). Other projects that require higher capital costs, require studies before implementation, or that would benefit the US 67 study corridor in future applications, can be implemented in the long term (10 or more years from the adoption of the US 67 Corridor Master Plan).

7.3.1 Intelligent Transportation Systems (ITS) Core Concepts

Intelligent Transportation Systems (ITS) incorporate modern telecommunications and computational technology into existing transportation infrastructure to enhance safety and enhance the driver experience. A list of recommended ITS core concepts was developed through technical analysis. Table 7.2 provides a summary of the recommended ITS core concepts. A visual glossary for all recommended ITS concepts within the US 67 corridor including written descriptions with images is shown in Table 7.3. Details are included in both Appendix D and Appendix G.

Table 7.2: Recommended Intelligent Transportation Systems (ITS) Core Concepts

Category	Tool Name/Description	Implementation Term
Crash Countermeasures	Animal Warning Systems	Mid-term
	Automated Visibility Warning Systems*	Short-term
	Bicycle Safety Systems	Short-term
	Pedestrian Safety Systems	Short-term
	Highway-Rail Crossing Safety Systems	Long-term
	Road Geometry Warning System	Short-term
	Speed Warning Systems	Short-term
	Work Zone Safety Systems	Short-term
Traffic Management	Variable Speed Limit (VSL)*	Long-term
	Vehicle Detection**	Mid-term
	Planned Special Event Management Systems	Mid-term
Operations and Maintenance	Site Management During Rockslides	Short-term
Emergency Services	Next Generation 911	Long-term
	Smartphone Applications for First Responders	Mid-term
Surface Transportation and Weather	Integrated Weather Monitoring/Prediction Systems*	Long-term
Tourism and Traveler Information	Dynamic Message Sign (DMS)	Short-term
	Integrated Traveler Information Systems	Mid-term
Other	Power and Communication	Long-term
	Traffic Surveillance Cameras*	Long-term
	Port of Entry Smart Parking and Other ITS Projects	Long-term
	Incident Management Support Truck	Short-term
	Traffic Incident Management Training	Short-term
	Establish Corridor Coordination Groups	Short-term

* The equipment and location of these systems are rolled into the Total Station concept.

** TM5 and TT14 are folded into one project. The recommendation is to procure third-party real time travel time for public dissemination.

7.3.1.1 Total Station Concept

Power and communication are critical to ITS systems in rural corridors. Many of the systems proposed are in or adjacent to communities with easy access to power and communications or are relatively stand-alone systems that can be solar-powered and use cellular dial-up connections. However, with long stretches of the study corridor between communities, it is not practical to have frequent access to power and communications. Each connection is expensive. Therefore, to best take advantage of these connections when they are established, the consolidation of many of the recommended system into one total station is recommended. The Total Station concept include the following: Automated Visibility Warning Systems, Variable Speed Limits, Roadway Weather Information Systems, and Traffic Surveillance Cameras. **Figure 7.11** shows a total station.

Figure 7.11: Total Station Concept

Table 7.3: Summary of Recommended ITS Improvements

Crash Countermeasures

Animal Warning Systems – Helps to mitigate vehicle collisions with large animals using electronic sensors to detect animals. The animal warning system is a signboard that activates flashing lights when an animal is detected.

Image Source: http://tranbc.ca/wp-content/uploads/2016/02/H3-WDP-Sign-ACTIVATED.jpg

Automated Visibility Warning Systems – Warns drivers by providing severe weather conditions information like fog, snow, dust, smoke, etc. The system requires Dynamic Message Signs (DMS), flashing lights and a traffic management center. Flashing lights will activate or messages will display on the DMS when severe weather conditions are detected. DMS is also coordinated with the traveler information system to spread the message.

Image Source: https://encryptedtbn0.gstatic.com/images?q=tbn:ANd9GcRWR7hdeL6IRoOgDdSJhV5KINUZM25SKQ-X3TbjOCE3jkoY_HO7yw

Bicycle Safety Systems – Helps to identify/detect the presence of a bicycle and increases the safety and visibility of a bicyclist. This system can be installed at crossings as an automated or pushbutton device.

Image Source: https://nacto.org/wpcontent/uploads/gallery/2012_detectionactuation/videodetection_portlandor.jpg

Pedestrian Safety Systems – Alert motorists of the presence of pedestrians to improve pedestrian safety while crossing roads.

Image Source: http://www.floriance.eu/wp-content/uploads/2017/08/APL-Smart.gif

Highway-Rail Crossing Safety Systems – Notifies the train operator of a delayed vehicle on the tracks and informs motorists of an oncoming train using a DMS.

Image Source: https://www.mobility.siemens.com/mobility/global/SiteCollectionImages/rail-solutions/rail-automation-new/level-crossing-protection-systems/simis-lc-large.jpg

Road Geometry Warning System – Warns road users of ramp rollover risks, sharp curves, steep downhills and heights of structures/over-height of vehicles.

Image Source: https://bloximages.chicago2.vip.townnews.com/cumberlink.com/content/tncms/assets/v3/editorial/4/87/487d676d-a385-5f39-b537-f3c978d2b21b/5705385f83974.image.jpg?resize=500%2C505

Table 7.3: Summary of Recommended ITS Improvements (continued)

Crash Countermeasures

Speed Warning Systems – Informs motorists about the speed of their vehicles, weather conditions, road geometry, and other factors.

Image Source: https://www.streetsmartrental.com/wp-content/uploads/2013/06/Wanco-Speed-Trailer-Full-Matrix-Display-designed-for-neighborhoods-and-highways.jpg

Work Zone Safety Systems – Enhances safety in and around work zones by alerting construction workers of any vehicle coming nearby and alerting motorists about the ongoing changes on a roadway such as a lane configuration change, congestion, alternative routes, and change in speed limit.

Image Source: https://www.srfconsulting.com/wp-content/uploads/2016/02/intelligent-work-zone.jpg

Traffic Management

Variable Speed Limit (VSL) – A tool used to lower the speed of vehicles traveling at high speed. VSL can be used in special circumstances (e.g. school zones, inclement weather conditions, poor pavement conditions, high traffic volume and operation speeds) and allows the operating agency to balance between the needs of safety and efficiency.

Image Source: https://www.canadianunderwriter.ca/wp-content/uploads/2016/06/variable3.jpg

Vehicle Detection – Allows agencies to identify vehicle presence, speed, weight, direction, and occupancy.

Image Source: https://cdn-images-1.medium.com/max/1200/0*D00EZ6px0y-ss4dd.pnghttps://www.verc.com/imports/medias/produits/photos/pcms-1210-portable-changeable-message-sign-ver-mac.jpg

Planned Special Event Management Systems –Tool allows road users to obtain information about upcoming events through social media, traveler information systems, DMS.

Image Source: https://www.verc.com/imports/medias/produits/photos/pcms-1210-portable-changeable-message-sign-ver-mac.jpg

Table 7.3: Summary of Recommended ITS Improvements (continued)

Operations and Maintenance

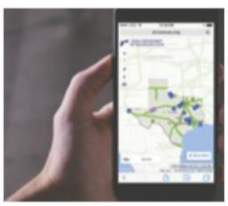
Site Management During Rockslides – Informs the authorities and public of rock slide conditions within the rock slide prone areas.

Image Source: http://www.littlepicklepress.com/wp-content/uploads/2016/07/ger_hazards_landslide_slidearea.jpg

Emergency Services

Next Generation 911 – An updated version of 911 services. In addition to 911 services, it allows the public to send photos, videos, and text messages.

Image Source: http://www.fedeng.com/images/911-mobile-phone.jpg



Smartphone Applications for First Responders – Improves the communication between the hospital and the Emergency Medical Technicians (EMTs) in the field when an incident occurs. EMTs can send photos, videos, and audio files to the nearest hospitals from the incident and can also receive the patient's records from the hospital.

Image Source: Driving Texas DOT

Surface Transportation and Weather

Integrated Weather Monitoring/Prediction Systems – A combination of technologies that collect, transmit and disseminate weather and road condition information. This tool is also coordinated with the National Weather Service to predict inclement weather conditions.

Image Source: http://media2.govtech.com/images/940*704/VAISALA_IDAHO_RWIS_TOWER.JPG

Table 7.3: Summary of Recommended ITS Improvements (continued)

Tourism and Traveler Information

Dynamic Message Sign (DMS) – Displays short information on roadway conditions to motorists using a large electronic screen either installed as a portable, semi-permanent or permanent sign along the road.

Image Source: http://www.skylineproducts.com/wp-content/uploads/2016/07/Walk-In.jpg

Integrated Traveler Information Systems – Helps travelers plan their trip before it begins or en route from origin to destination with more efficiency and safety. It collects all types of roadway information (e.g., road and weather conditions, congestion, tourism, real-time transit information) through various devices and transmits the information to the public using various means such as websites, 511, DMS, social media, and radio.

Image Source: https://ruralsafetycenter.org/resources/rural-its-toolkit/

Other

Power and Communication – All ITS depends on power and communications. Fiber optic cable is a technology that allows for the transmission of communications over large distances. Fiber optic infrastructure is generally used as the backbone for CCTV surveillance cameras, DMS, traffic sensors, and other ITS devices.

Traffic Surveillance Cameras – A major part of most intelligent transportation systems. On surface roads, they are typically mounted on high poles or masts, sometimes along with street lights. Cameras permit the operating agency to view traffic conditions, such as congestion, crashes and other events.

Image Source: https://www.cctvcamerapros.com

Incident Management Support Truck – Provides positive protection for emergency responders at the scene of an incident and provides alerts to motorists of an incident or major event.

Image Source: https://cdn.firehouse.com/files/base/cygnus/fhc/image/2018/01/960w/Irving_Blocker_Fire_Apparatus_4.5a5f6ce434c38.jpg

Traffic Incident Management Training – Training from FHWA or other sources for all incident responders in the study corridor including police, fire, and towing/recovery firms.

Image Source: http://www.montana.edu/ltap/resources/tim/index.html

Establish Corridor Coordination Groups – Organizing and managing corridor working groups and recurring meetings with agencies to coordinate planning and operations.

Image Source: TxDOT

Port of Entry Smart Parking System – Uses ITS infrastructure to divert drivers along US 67 to a parking space in a parking lot that would be located at one of several potential candidate sites near the port of entry.

Image Source: https://ccsearch.creativecommons.org/photos/5e4e5e6f-8588-442c-8731-66f73d39e2f0

Table 7.4 and **Figure 7.12** show the planning level cost estimates for recommended ITS concepts by ITS category, meaning that each category includes several individual projects with specific cost estimates. Please refer to **Appendix G** for the full project list with planning level project cost estimates.

Table 7.4: Planning Level Cost Estimates for Recommended ITS Concepts by Category

Capital Projects	Number of Projects	Total Cost Estimates (2019 Dollars)
Crash Countermeasures and Surface Transportation and Weather	25	$12,200,000
Traffic Management	1	$500,000
Operations and Maintenance	2	$1,500,000
Emergency Services	3	$8,300,000
Tourism and Traveler Information	3	$1,400,000
Communications and Power	3	$1,300,000
Total Station	3	$1,700,000
POE Smart Parking and Other ITS projects	4	$2,100,000
Total ITS Estimated Cost (rounded to the nearest million)	44	$29,000,000

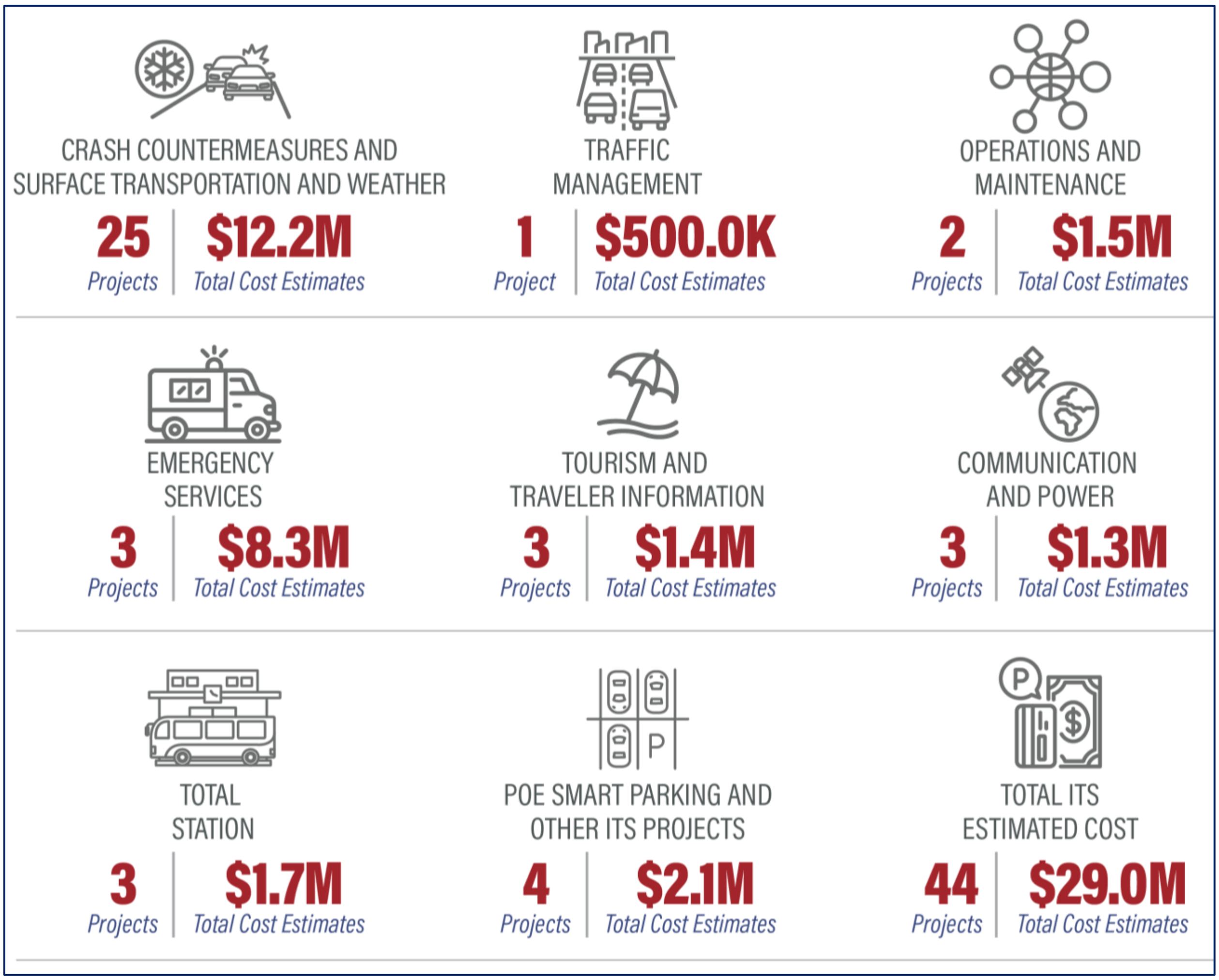


Figure 7.12: Planning Level Cost Estimates for Recommended ITS Concepts by Category

The ITS projects were developed in close coordination with the safety projects. In the Shafter area several ITS projects are recommended including a rockslide warning system and a total station between Presidio and Shafter. In addition, flashing beacons are recommended south and north of Shafter for the curves.

If more traditional approaches do not adequately address the safety issues, an ITS system could be developed to provide warnings for US 67 traffic of vehicles entering or leaving the highway around Shafter. Treatments would include detectors tied to flashing beacons, signs, or smart lighting for nighttime illumination when vehicles are present on the minor approaches.

The same charging infrastructure that would power ITS improvements on the US 67 Corridor would also serve to support connected vehicle and autonomous vehicle (CV/AV) infrastructure. Assuming that this infrastructure is installed, the US 67 Corridor could become an early staging area for the development of these technologies.

7.3.2 Safety Core Concepts

Safety core concepts were developed through research and technical analyses. Additional details on the safety analysis are provided in Appendix D. The following includes the key recommended safety core concepts. A visual dictionary of concepts discussed below is provided in Table 7.5.

Striping changes within existing pavement can resolve safety and operational issues at challenging intersections by changing the width and direction of lanes. Striping changes are recommended at the following intersections:

- BUS 67/O'Reilly Street and Howard Street in Presidio;
- BUS 67/O'Reilly St and Tremont Street in Presidio;
- US 67 and Old Road 170 and Utopia Road north of Presidio;
- US 67 and FM 1703 in Alpine; and
- Holland Avenue and 5th Street in Alpine.

Pavement marking improvements can improve safety by delineating lanes and crosswalks at intersections where lane, crosswalk, and other markers have faded. Pavement marking improvements are recommended at the following intersections:

- BUS 67/O'Reilly Street and Tremont Street in Presidio;
- US 67 and Old Road 170 and Utopia Road north of Presidio;
- US 67 and Orange Street in Alpine;
- US 67/W Holland Avenue and N 13th Street in Alpine;
- US 67/W Holland Avenue and 5th Street in Alpine;
- US 67/E Holland Avenue and Harrison Street in Alpine;
- US 67/W Avenue E and Harrison Street in Alpine; and
- US 67 and US 90 interchange located east of Alpine.

Signage changes on and around challenging intersections to improve compliance with speed limits and decision points around challenging intersections can lead to safer travel for vehicles traveling through intersections. Signage changes are recommended at the following intersections:

- BUS 67/O'Reilly Street and Howard Street in Presidio;
- BUS 67/O'Reilly Street and Tremont Street in Presidio;
- US 67 and Old Road 170 and Utopia Road in Presidio;
- US 67/W Holland Ave and 13th Street in Alpine;
- US 67/W Holland Avenue and 5th Street in Alpine
- US 67/E Holland Avenue and N Phelps Street in Alpine;
- US 67/E Holland Avenue and N Harrison Street in Alpine;
- US 67/E Avenue E and Bird Street in Alpine;
- US 67/E Avenue E and N Harrison Street in Alpine;
- US 67/Lackey Street in Alpine;
- US 67 and Harmon Street in Alpine; and
- US 67 and I-10 interchange located west of Fort Stockton.

Shoulder widening places more space between the edge of the road and the travel lanes. Shoulder widening is recommended throughout the US 67 corridor at all areas where shoulder width is currently less than 10 feet.

Centerline and shoulder rumble strips increase safety by alerting a driver to imminent departure from the travel lane and lowering the risk of a roadway departure crash. Centerline and shoulder rumble strips are recommended on every rural segment of the corridor where they do not already exist.

Passing lanes allow fast traveling vehicles to overtake slower vehicles in traffic. Passing lanes are recommended in the US 67 corridor at locations north of Shafter, between Paisano Pass and Alpine, and south of I-10.

Slope treatment can improve safety by removing non-recoverable slopes, which are defined by the Federal Highway Administration as a slope where a motorist cannot retain or regain control of their vehicle. Slope treatments are recommended on all non-recoverable slopes in the corridor.

Guardrails alert drivers of dangerous slopes and might prevent cars from departing the roadway. Guardrails are suggested throughout the US 67 corridor at roadway segments with steep side slopes and deficient clear zones.

Tree trimming/brush removal to increase visibility for road users is recommended throughout the US 67 corridor.

Raised medians separating opposite directions of traffic are recommended for segments located with the corridor communities.

Adequate lighting improvements are recommended at all intersections.

Table 7.5: Visual Dictionary of Safety Concepts

Countermeasures

Intersectional Striping Changes- within existing pavement can resolve safety and operational issues at challenging intersections by changing the width and direction of lanes.

Image Source: https://ssepl.com.sg/car-park-painting/

Pavement Marking Improvements – Delineates lanes and crosswalks at intersections where lane, crosswalk, and other markers have faded.

Image Source: https://advancedpavementmarking.com/wp-content/uploads/2017/01/BCRC-1.jpg

Shoulder Widening – Increases space between the edge of the pavement and the travel lanes.

Image Source: https://www.titaniumcontracting.com/portofolio/oshawa-harbour-phytohydraulic-barriers/#prettyPhoto[fairway-road-extension]/0/

Signage Changes- Can improve compliance with speed limits and decision points around challenging intersections can lead to safer travel for cars traveling through intersections.

Image Source: https://www.itsinternational.com/sections/nafta/features/putting-a-stop-to-intersection-indecision/

Rumble Strips – Alerts a driver to imminent departure from the travel lane and lowering the risk of a roadway departure crash.

Image Source: https://safety.fhwa.dot.gov/roadwaysafetyawards/2015/

Passing Lanes – Allows fast traveling vehicles to overtake slower vehicles in traffic

Image Source: https://azdot.gov/adot-blog/work-new-climbing-lane-along-sr-95-underway

Table 7.5: Visual Dictionary of Safety Concepts (continued)

Countermeasures

Slope Treatment – Removes slopes where motorists can not recover control of their vehicles

Image Source: https://www.wikiwand.com/en/Geometric_design_of_roads

Guardrails– Alerts drivers of dangerous slopes and may prevent cars from departing the roadway

Image Source: https://www.commonwealthfund.org/sites/default/files/guardrails%20in%20place%20by%201332%20waivers_21x9.jpg

Brush Removal– Increases visibility for road users

Image Source: https://commons.wikimedia.org/w/index.php?sort=relevance&search=lumber+trees&title=Special%3ASearch&profile=advanced&fulltext=1&advancedSearch-current=%7B%7D&ns0=1&ns6=1&ns12=1&ns14=1&ns100=1&ns106=1#/media/File:Cut_trees_for_lumber_in_Kharv_-_Nishapur_-_2014-03-13_-_03.JPG

Raised Medians – Separates opposite directions of traffic, preventing head on collisions

Image Source: https://safety.fhwa.dot.gov/intersection/other_topics/corridor/cam_tech/images/sa15005_img6.jpg

Lighting Improvements –Increases visibility.

Image Source: https://safety.fhwa.dot.gov/older_users/handbook/images/fig_36lg.jpg

The implementation timeframe expected for corridor wide safety improvements are shown in **Table 7.6** below.

Table 7.6: Safety Recommended Improvements with Timeframe and Cost Estimates

Time	Improvements	Unit	Quantity	Planning Level Cost Estimate
Short	Horizontal Curve Warning Signs	Each	54	$33,000
	Chevrons	Each	144	$87,000
	Advisory Speed Limit Signs	Each	58	$35,000
	Vertical Grade Signs	Each	72	$44,000
	Curve Blocks View Sign	Each	19	$12,000
	Install centerline rumble strip	Mile	83	$166,000
	Install shoulder rumble strip	Mile	153	$123,000
	Passing lane ahead and lane ends merge left sign	Each	100	$60,000
	No passing zone signs	Each	213	$128,000
	Tree Trimming/Brush Removal	Mile	26	$52,000
	Install Weather Warning Sign	Each	33	$20,000
	Install advanced warning signs for railroad crossing	Each	2	$2,000
	Flashing beacon for railroad crossing	Each	2	$12,000
	Total Short-term Projects (rounded with 45% Mobilization, Contingency, Construction Engineering, and Traffic Control)			**$1,123,000**
Mid	Improve design and application of barrier systems	Each	91	$273,000
	Add/Extend Guardrail	Mile	20	$3,340,000
	Provide Guardrail end treatment	Each	246	$738,000
	Flashing Beacon Signs	Each	26	$260,000
	Sequential Dynamic Curve Warning Sign	Each	7	$182,000
	Provide adequate sight distance	Cubic Yard	35,310	$7,062,000
	Provide lighting at intersections	Each	56	$560,000
	Raised Pavement Markers	Each	11,985	$1,199,000
	Design safer slopes when fill height is less than 5 feet	Cubic Yard	141,228	$14,123,000
	Provide Turnouts	Square Yards	55,860	$11,172,000
	Superelevation Improvement	Tons	21,500	$2,150,000
	High Friction Surface Treatment	Square Yards	227,256	$11,363,000
	Provide dynamic speed feedback system	Each	4	$40,000
	Add left turn lanes to existing rest area	Each	1	$396,000
	Highway Rail Grade Crossing Safety System	Each	2	$20,000
	Provide Rest Area	Each	2	$2,000,000
	Total Mid-term Projects (rounded with 45% Mobilization, Contingency, Construction Engineering, and Traffic Control)			**$79,574,000**
Long	Widen Shoulders (From 6 to 10 feet)	Mile	66	$49,500,000
	Widen Shoulders (From 4 to 10 feet)	Mile	21	$22,050,000
	Construct Texas Super 2	Mile	46	$96,600,000
	Grade Separation at Old Alpine Highway	Each	1	$5,200,000
	Total Long-term Projects (rounded with 45% Mobilization, Contingency, Construction Engineering, and Traffic Control)			**$251,358,000**
Total for All Safety Projects (rounded)				**$332,100,000**

Safety improvements were developed on a project basis for each TxDOT control section of the corridor. Control sections are used by TxDOT to reference segments along state roadways throughout the state. Project details including planning level cost estimates are detailed in **Appendix D**.

7.3.3 Core Intersection Concepts

Core intersection concepts were developed for one-way streets in Alpine, rest areas along the corridor, the interchange at US 67 and I-10, and traffic operational improvements. The overall planning level cost estimates for these core concepts are shown in **Table 7.7.**

Table 7.7: Core Intersection Concepts with Planning Level Cost Estimates

Core Concept	Planning Level Cost Estimate
Alpine One-Way Streets	$2,300,000
Rest Areas	$1,600,000
Interchange at US 67 and I-10	$1,000,000
Traffic Operational Improvements	$1,600,000
Total	**$6,500,000**

7.3.3.1 Alpine One-Way Streets

In addition to the global safety core concepts identified above, the safety analysis identified locations in downtown Alpine that experience significant crashes. These locations are:

1) US 67 and 15th, 14th, 13th, and 12th Streets, and
2) US 67 and 6th, 5th, and 4th Streets.

As shown in the figures below, the improvements at these Downtown Alpine locations include sidewalk improvements, pedestrian crossings at key locations, a mid-block pedestrian crossing (example in **Figure 7.13**) on W Holland Avenue between 15th St and 14th St, channelized turns with raised medians, increased turning radii for large freight truck movements, and converting the street system into one-way pairs. Additional ROW is required for full implementation. The planning level cost estimate for 1) the Alpine One-Way Streets with Pedestrian Improvements at US 67 and 15th, 14th, 13th, and 12th Streets (**Figure 7.14**) is $1,400,000 and the planning level cost estimate for 2) the Alpine One-Way Streets with Pedestrian Improvements at US 67 and 6th, 5th, and 4th Streets (**Figure 7.15**) is $900,000 (rounded).

Source: NACTO

Figure 7.13: Mid-block Pedestrian Crossing

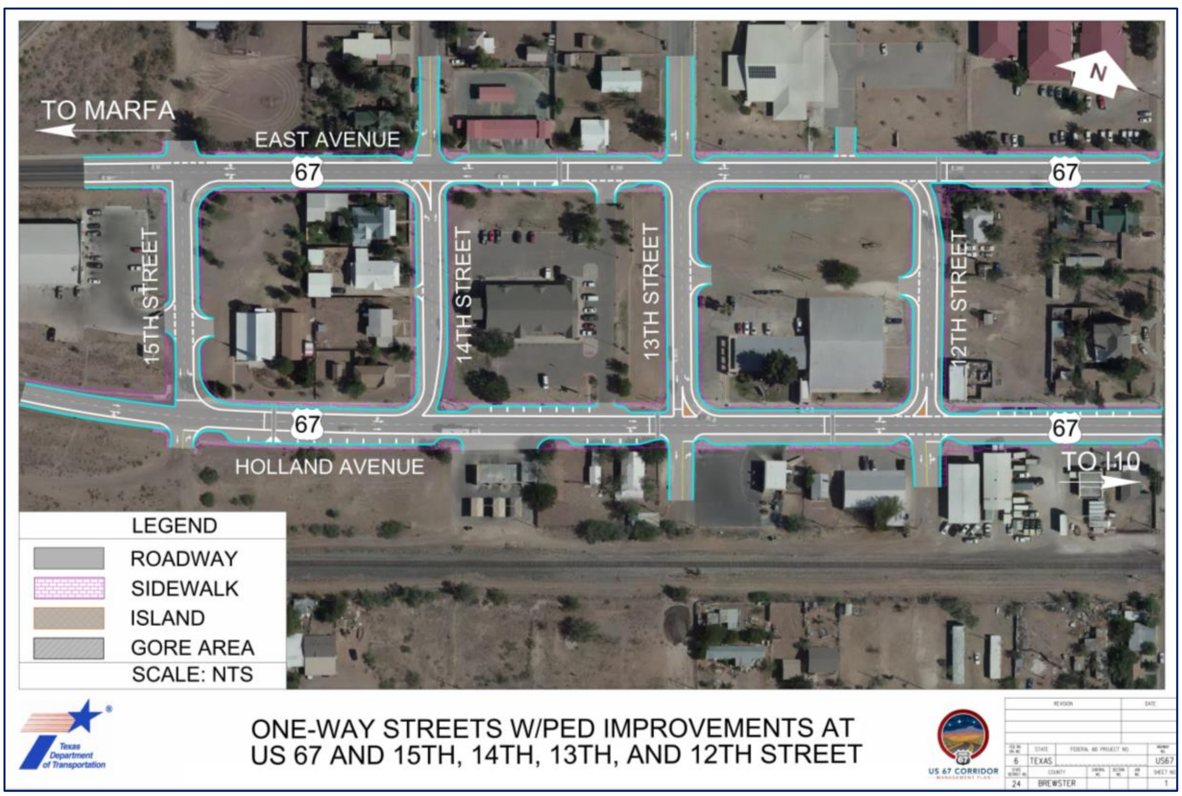


Figure 7.14: Alpine One-Way Streets with Pedestrian Improvements at US 67 and 15th, 14th, 13th, and 12th Streets

Figure 7.15: Alpine One-Way Streets with Pedestrian Improvements at US 67 and 6th, 5th, and 4th Streets

7.3.3.2 Rest Areas

Through the public and stakeholder outreach process, rest areas or pull outs was identified as a need along the corridor. Due to the long distance between the corridor communities, driver fatigue is a safety concern. **Figure 7.16** shows the locations of existing and proposed rest areas. These rest areas are locations where drivers can safely exit the roadway to take a rest from driving. The amenities of these facilities can vary. Major elements include parking spaces, benches, tables, and restrooms. Many are existing or proposed at sites of scenic significance like the Profile of Lincoln and Elephant Rock.

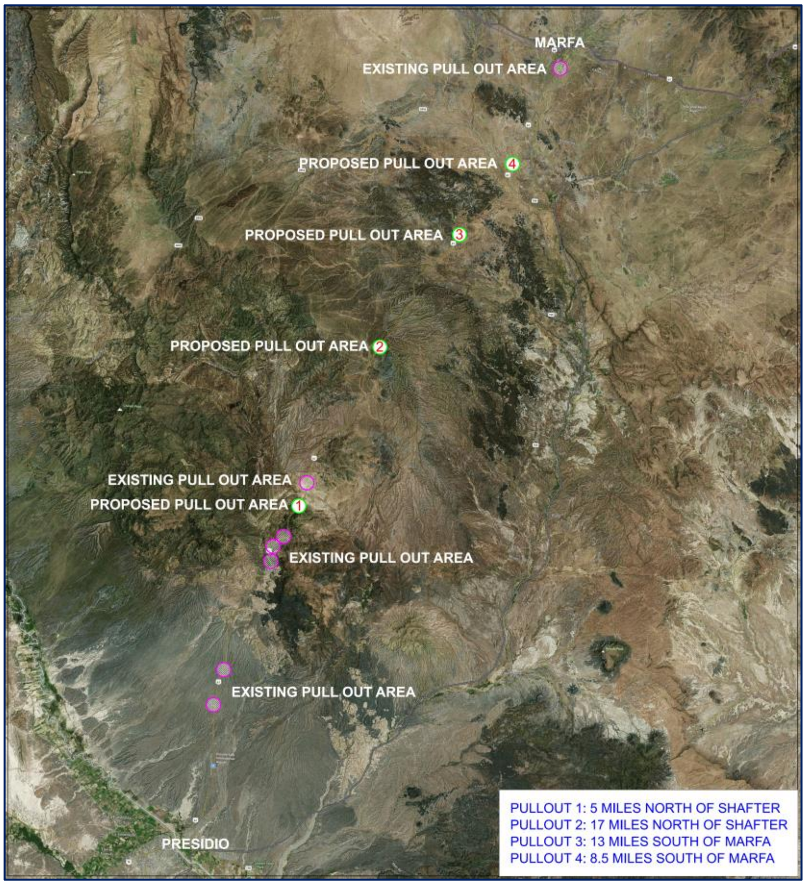
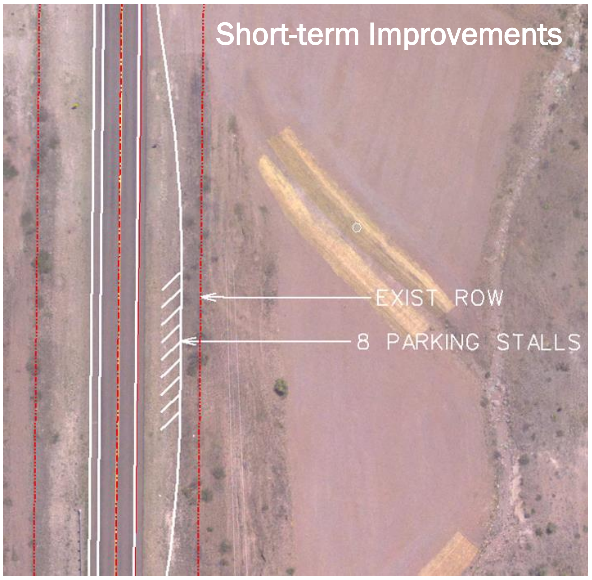


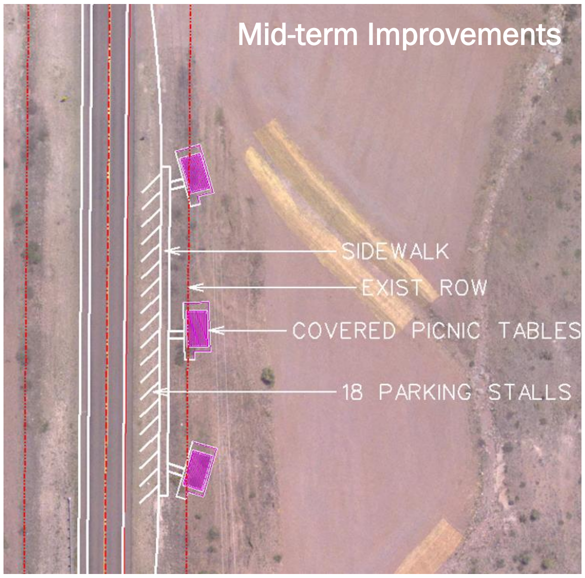
Figure 7.16: Existing and Proposed Rest Area Locations

Figure 7.17 shows how a proposed rest area could be incrementally implemented from a short-, mid-, and long-term process. Pull outs could be implemented in the short-term and additional amenities could be added over time, transitioning into a full rest area. Rest areas and turnouts are recommended between Marfa and Presidio and between the US 67/US 90 intersection and the I-10 interchange where there is an abundance of distraction-related crashes, such as texting while driving. **Table 7.8** shows the associated total planning cost estimates for the short-, mid-, and long-term implementation of a general rest area totaling $1.6 million (rounded).

Table 7.8: Planning Level Cost Estimates for Rest Areas

Timeframe	Planning Level Cost Estimate (with 40% Contingency)
Short-term	$75,000
Mid-term	$225,000
Long-term	$1,300,000





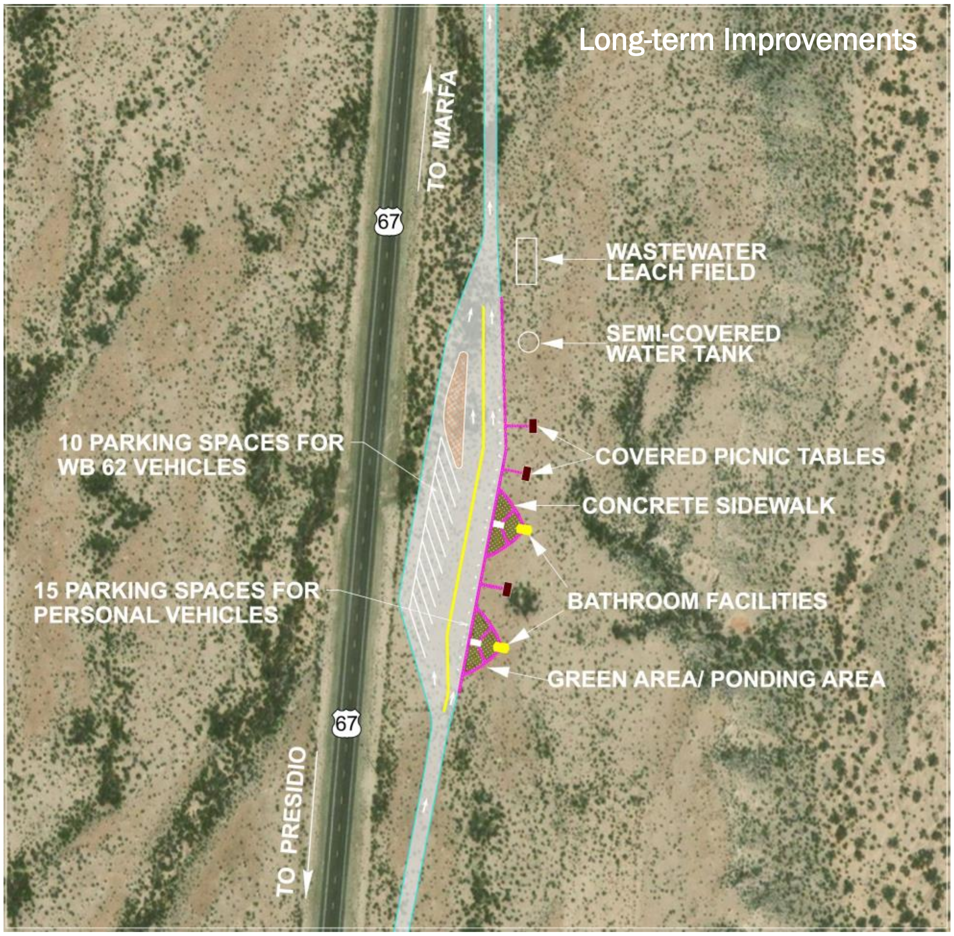


Figure 7.17: Phasing of Pull Outs and Rest Area Implementation

7.3.3.3 Interchange at US 67 and I-10

Through public input activities, a need was identified for clarifying the movements for the I-10 and US 67 interchange. Public comments highlighted the interchange as confusing and unsafe. In response to public input, improvements are recommended to address these issues as shown in **Figure 7.18**. The exit and entrance ramps from I-10 to US 67 in all directions are recommended to be extended to a longer length to improve safety. The northbound exit ramp from US 67 to I-10 is recommended to be improved to remove a confusing link. Safety lights are recommended at all exit and entrance ramps to improve visibility during the night. No additional ROW is required for implementation. The planning level cost estimate for all of these improvements at this interchange total $1,000,000.

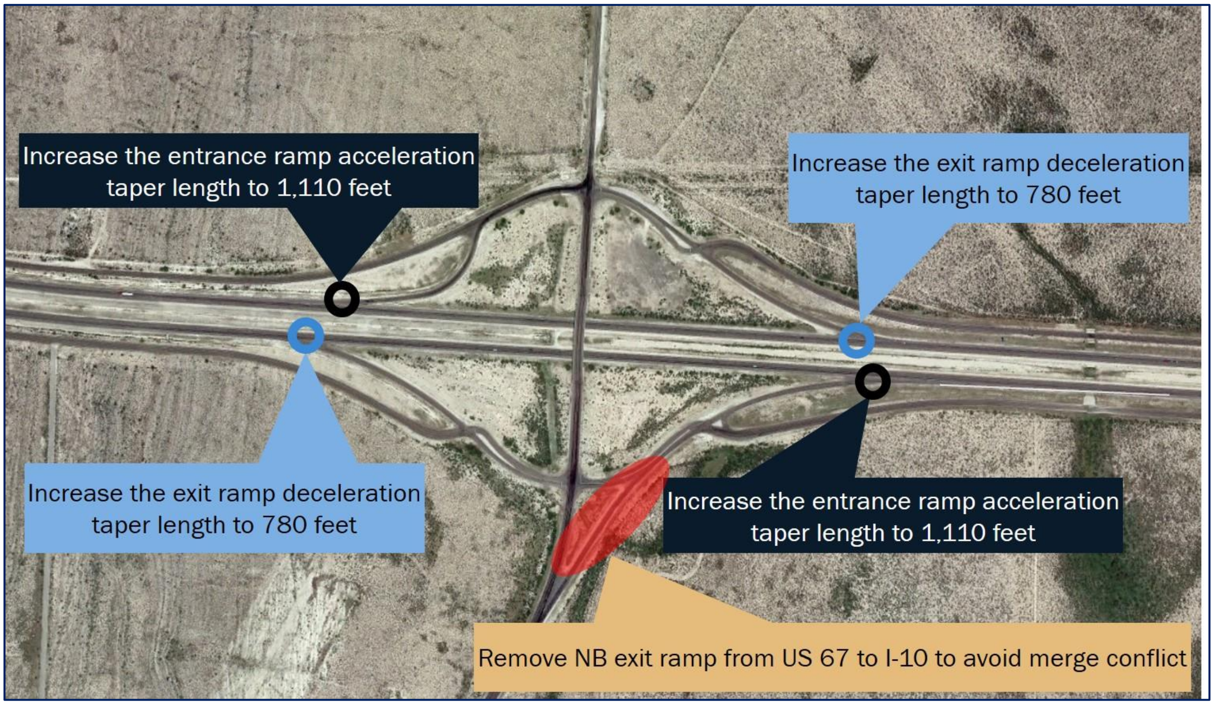


Figure 7.18: I-10 and US 67 Interchange Core Concept

7.3.3.4 Traffic Operations Improvements

Congestion at an intersection can be indicated by the level of service (LOS) of the intersection. LOS is a quantitative measure of traffic operations ranging in values from A to F, based on the average control delay experienced at an intersection. All intersections along the study corridor currently operate at a LOS of C or better. An operational analysis based on 2045 traffic projections was conducted for all intersections along the corridor (refer to **Chapter 4 – Existing Conditions**, Section 4.3 Existing and Future Traffic). Based on projected traffic growth through 2045, nine intersections all located in Alpine will worsen to a failing LOS of E or F.

Concepts were developed to improve the LOS at these locations in the future. **Table 7.9** displays the improved LOS with these concepts compared to 2045 No-Build. The table also shows planning level cost estimates with a 40 percent contingency.

Table 7.9: Operational Analysis Results

Main Street	Cross street	Improvement	Planning Level Cost Estimate	Implement Year	2045 No-Build				2045 Build			
					AM		PM		AM		PM	
					Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS
US 67	Cherry St	Add Southbound Left Turn and Westbound Right Turn Lane	$400,000	2045	25	D	38.5	E	23.5	C	33.6	D
W Avenue E	11th St	Add Northbound Left Turn Lane	$200,000	2040	36.7	E	44.5	E	27.5	D	31.7	D
W Holland Ave	11th St	Add Southbound Left Turn Lane		2040	42.9	E	54.8	F	23.2	C	30	D
Avenue E	5th St	Signalize	$304,000	2035	65.8	F	64.7	F	15.9	B	14.1	B
Holland Ave	5th St	Signalize	$304,000	2035	65.9	F	57	F	22.9	C	13.6	B
E Avenue E	Cockrell St	Convert to All Way Stop Control	$10,000	2025	97.7	F	268.5	F	27.9	D	25.3	D
E Holland Ave	Cockrell St	Signalize	$304,000	2040	47.5	E	30.5	D	9.9	A	9.5	A
E Avenue E	Harrison St	Convert to All Way Stop Control	$10,000	2030	233.7	F	81.8	F	30.5	D	22	C
E Holland Ave	Harrison St	Convert to All Way Stop Control	$10,000	2035	112.3	F	64.6	F	23.2	C	15.2	C
Total Planning Level Cost Estimate (rounded)			$1,600,000									

The table also includes the estimated implementation year, based on an estimated annual two percent growth rate of traffic, to prevent the intersections from reaching a failing LOS. Drawings for these recommended core alternatives can be viewed in **Appendix N**.

7.3.4 Pavement Maintenance Core Concepts

A network-level pavement evaluation was performed as part of the US 67 Corridor Master Plan using data provided by the TxDOT Pavement Information Management System, a TxDOT database that is updated annually with pavement distress ratings, ride quality, and rutting measurements for state roadways. All pavement along the US 67 corridor was found to have condition scores ranging from “Good” to “Very Good,” with most of the pavement in “Very Good” condition. Localized areas of early stage alligator cracking and roughness were observed along the corridor. TxDOT has been applying seal coats and localized overlays to segments in the corridor, and both appear to be performing well.

Recommended pavement improvements in the short-, and long-term with planning level cost estimates are shown in **Table 7.10**.

Table 7.10: Recommended Pavement Improvements by Project Type with Cost Estimate

Project Type	Length in Miles	Timeframe	Planning Level Cost Estimates
Localized Patching (Surface Treatment)	3.66	Short-term	$468,718
Localized Patching (Asphalt Concrete Pavement)	9.59	Short-term	$2,916,016
Resurfacing	0.90	Short-term	$735,639
Base Rehabilitation and Resurfacing	143.22	Long-term	$161,621,634
Sub Total			165,742,007
40% contingency			66,296,803
Grand Total *(rounded)*			$232,100,000

7.4 Recommended Complete Streets Alternative Concepts

Based on significant public input identifying the need for bicycle and pedestrian improvements within the communities along US 67, several Complete Streets alternatives were assessed in application to the US 67 corridor. Complete Streets are streets designed to accommodate all users of the roadway – vehicles, pedestrians, bicyclists, and even freight. They are designed for people of all ages to safely use the roadway, from young to old. The study team developed Complete Streets alternatives for Presidio, Marfa, and Alpine. These alternatives are intended to provide the corridor communities with a set of varying bicycle and pedestrian treatments that fit community context and support the demands in the short-term of bicycle and pedestrian travel. Refer to **Chapter 6 – Multimodal and Complete Streets** for additional details. Recommended Complete Streets options with cost estimates are shown in **Table 7.11.**

Table 7.11: Complete Streets Cost Estimates

City	Recommended Complete Streets Concept	Total Cost
Alpine	Bicycle Lane with Striped Buffer	$2,500,000
Marfa	Shared Use Path	$2,000,000
Presidio	Bicycle Lane with Striped Buffer	$2,000,000
Total		$6,500,000

7.5 Recommended Intersection Alternative Concepts

Alternative concepts are concepts for which two or more concepts exist for the same improvement location. Alternative concepts were developed for 11 intersection locations in the US 67 Corridor. These 11 intersections were determined by issues identified through public and stakeholder input and technical analyses; mainly locations where safety concerns were present. Three alternatives were considered for each intersection. The recommended intersection alternative concept for each location was determined by considering cost (see **Appendix O** for detail), public favor (average score from survey responses), scope of improvement (short-, mid-, and long-term), and many other factors specific to technical analysis at the individual locations. Planning level cost estimates are provided for each recommended alternative intersection concept. See **Appendix N** for additional detail on all alternative concepts and tradeoffs listed for consideration into the recommended alternative.

During the third series of public meetings held in Fort Davis, Marfa, Alpine, and Presidio, and virtually, the public used a survey to rank the alternatives for each improvement location. This feedback was heavily considered for determining the recommended alternative for each location. The intersection alternative concept process is described in **Figure 7.19.**

Figure 7.19: Intersection Alternatives Development Process

While the recommended alternatives are identified in this plan, all of these alternatives are only at conceptual level of design. Should any of these recommended alternatives receive funding and move towards implementation, further design would be required, thus altering the conceptual design demonstrated in this plan. A summary of the estimated implementation timeframe (short-, mid-, and long-term) and planning level cost estimates is shown in **Table 7.12**.

Table 7.12: Recommended Alternative Intersection Concepts Implementation Term and Planning Level Cost Estimates[19]

Concept Location	Recommended Intersection Concept	Implementation Term	Planning Level Cost Estimate
Presidio Location 1: US 67 and BUS 67 Intersection	T-Intersection (Alternative A)	Short-term	$500,000
Presidio Location 2: O'Reilly St and Erma Ave Intersection	Y-Intersection (Alternative A)	Mid-term	$900,000
Presidio Location 3: FM 170 and Utopia St at US 67 Intersection	Two-Way Left-Turn Lane (Alternative B)	Long-term	$500,000
Presidio Location 5: Port of Entry (POE) Congestion Relief	Parking Capacity at POE (Alternative A)	Mid-term	$6,800,000
Marfa Location 1: San Antonio St and Highland Ave Intersection	With Bicycle Lanes Alternative (Alternative A)	Mid-term	$600,000

[19] Presidio Location 4 is not included since the "No-Build Alternative" was the most highly ranked alternative by members of the general public. For more information, please refer to **Appendix N – Alternatives Analysis**.

Marfa Location 2: Lincoln St and Highland Ave Intersection at Presidio County Courthouse	Roundabout (Alternative A)	Short-term	$200,000
Alpine Location 1: FM 1703 and US 67 Intersection	Two-Way Left-Turn Lane Alternative (Alternative A)	Mid-term	$650,000
Alpine Location 2: Orange St and Sul Ross Ave Intersections at US 67	Closing Orange St and Sul Ross Ave Alternative (Alternative A)	Short-term	$450,000
Alpine Location 3: Intersection at Sul Ross University and US 67	Pedestrian Ring (Alternative A)	Short-term	$850,000
Rural Location 1: US 67/US 90 Intersection	Free Flow Y-Intersection (Alternative A)	Short-term	$2,100,000
Total (Rounded)			**$13,600,000**

7.5.1 Presidio Intersection Alternative Concepts

7.5.1.1 Presidio Location 1: US 67 and BUS 67 Intersection

The recommended alternative concept for Presidio Location 1: US 67 and BUS 67 Intersection is the "T-Intersection" (Alternative A) as shown in **Figure 7.20**. The T-Intersection maintains the existing roadway geometry (physical roadway layout) while introducing safety features including a channelizing island to separate turning movements and raised medians along US 67. The "gore area" in the figure is the striped area where travel movements are prohibited. The recommended alternative provides clearly defined space for through movements along US 67 and separated space for turning movements between BUS 67 and US 67. The planning level cost estimate is $500,000. No additional right-of-way (ROW) is required.

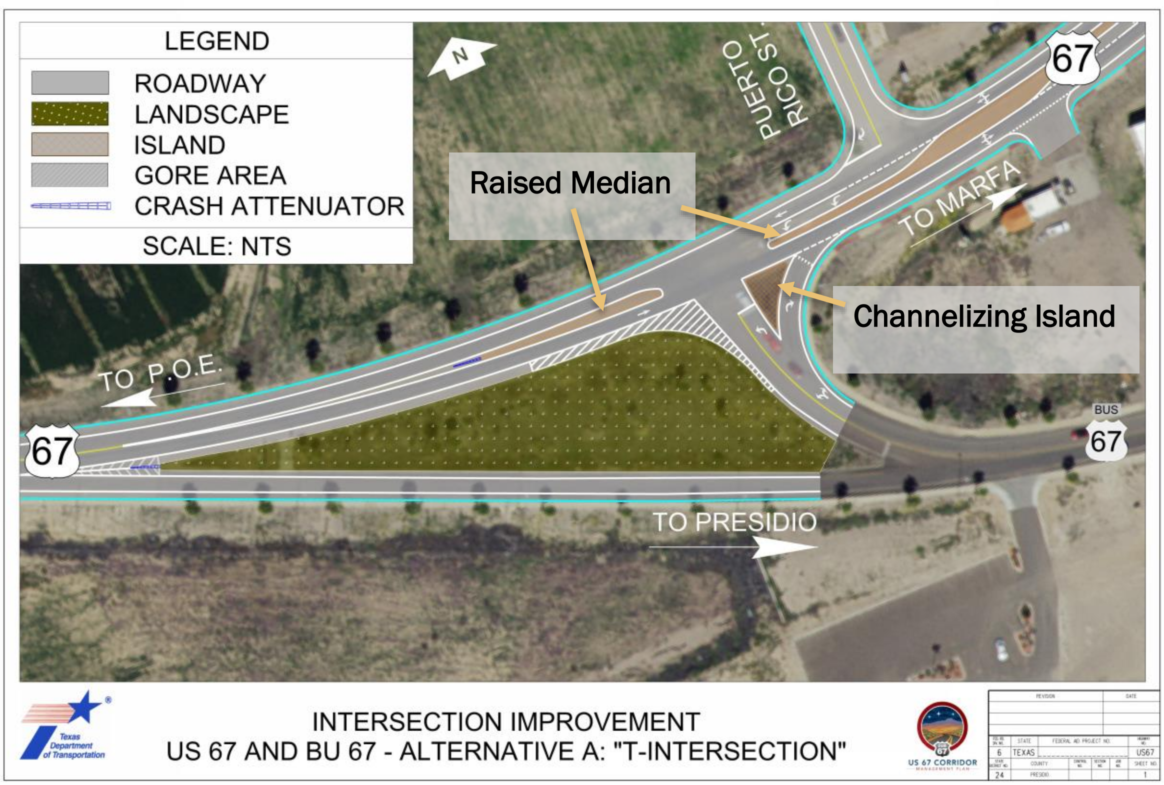


Figure 7.20: Presidio Location 1: US 67 and BU 67 Intersection Recommended Alternative

7.5.1.2 Presidio Location 2: O’Reilly St and Erma Ave Intersection

The recommended alternative concept for Presidio Location 2: O’Reilly St and Erma Ave Intersection is the “Y-Intersection” (Alternative A) as shown in **Figure 7.21**. The Y-Intersection addresses existing safety concerns by providing a three-way stop-controlled intersection with free flow right turns. This description means that a stop sign is placed at the intersection to control left turn movements from Erma Ave onto O’Reilly St and to control through movements both east and west along O’Reilly. Raised medians separate and control turning movements. Sidewalks and crosswalks improve safety for pedestrian travel and enhance the walkable character of the intersection. The planning level cost estimate is $900,000. No additional ROW is required for implementation.

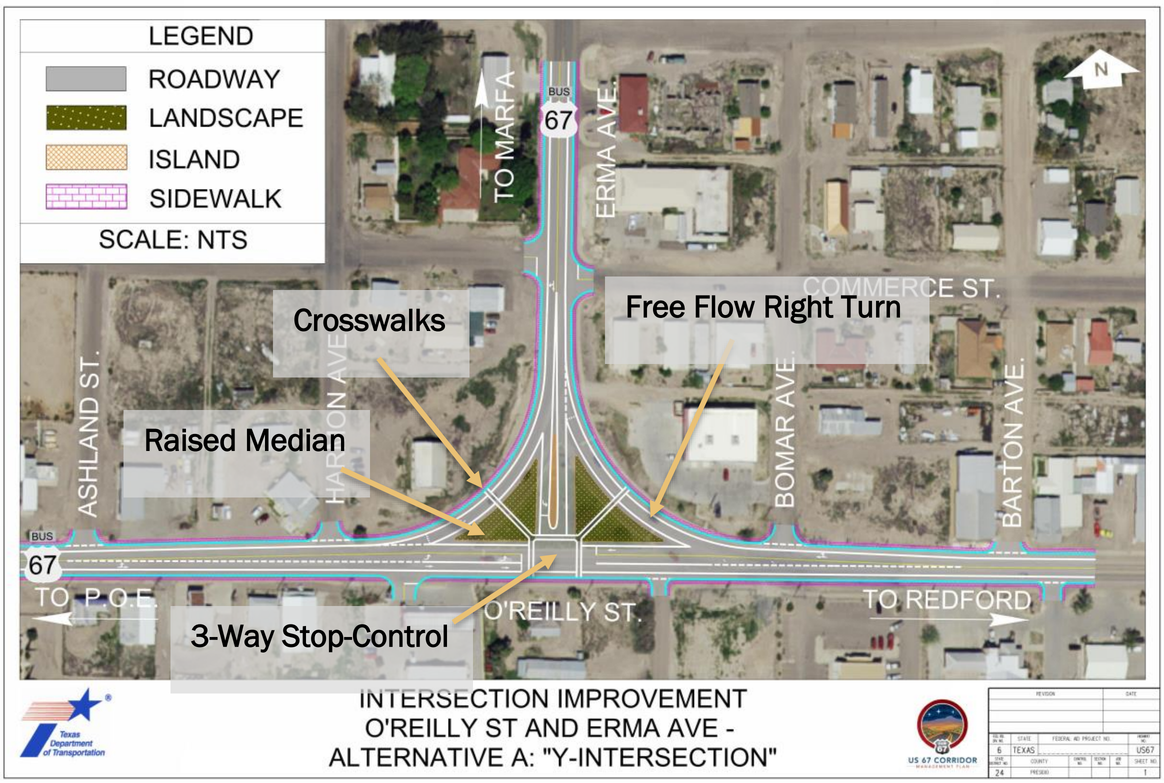


Figure 7.21: Presidio Location 2: O’Reilly St and Erma Ave Intersection Recommended Alternative

7.5.1.3 Presidio Location 3: FM 170 and Utopia St at US 67 Intersection

The recommended alternative concept for Presidio Location 3: FM 170 and Utopia St at US 67 Intersection is the “Two-Way Left-Turn Lane” (Alternative B) as shown in **Figure 7.22**. The Two-Way Left-Turn Lane addresses existing mobility concerns by realigning the intersecting roadways together. The west portion of FM 170 is brought to a T-intersection with US 67, providing better visibility to drivers. The eastern portion of FM 170 is aligned across US 67 with Utopia St. The new T-intersection of the western portion of FM 170 with US 67 provides a larger turning radius for trucks. Increased turning radii provides for space for large trucks to easily make turns. Raised medians and striping control turning movements. A two-way left turn lane down the middle of US 67 is provided. The planning level cost estimate is $500,000. Additional ROW is required for implementation.

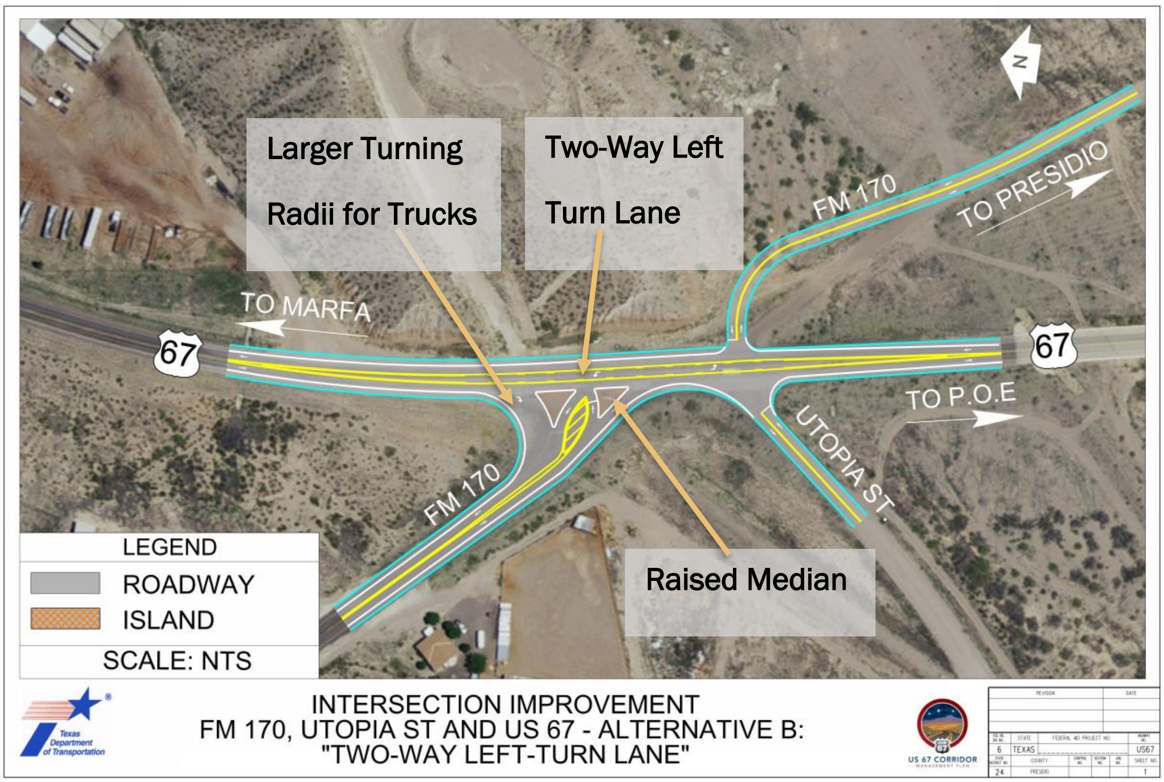


Figure 7.22: Presidio Location 3: FM 170 and Utopia St at US 67 Intersection Recommended Alternative

7.5.1.4 Presidio Location 5: Port of Entry (POE) Congestion Relief

The recommended alternative concept for Presidio Location 5: Port of Entry (POE) Congestion Relief is the “Parking Capacity at POE” (Alternative A) as shown in **Figure 7.23**. The Parking Capacity at POE addresses the severe congestion that is experienced in Presidio at peak border crossing times throughout the year. The recommended alternative involves constructing a parking lot and integrated smart parking system designed for short term vehicle storage when queues develop at the Presidio POE. Vehicle operators would be directed to the parking lot and provided with a group identification and call the groups. Implementation could alleviate approximately four miles of congestion on US 67. The Parking Capacity at POE alternative concept will require multi-jurisdictional collaboration for successful implementation and operation. The planning level cost estimate is $6,800,000. A site for the parking facility and potential ROW is required for implementation. In order to implement this concept, Federal Agencies would need to take the lead as this is out of the jurisdiction of TxDOT.

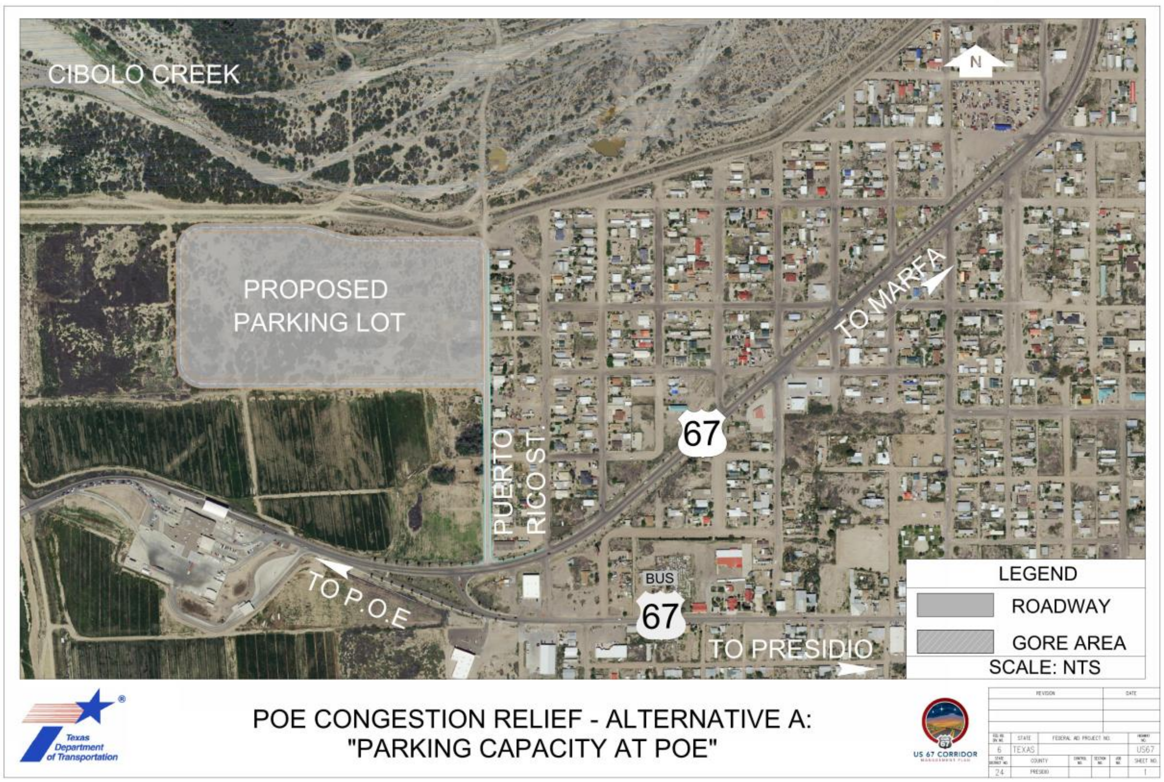


Figure 7.23: Presidio Location 5: Port of Entry (POE) Congestion Relief Recommended Alternative

7.5.2 Marfa Intersection Alternative Concepts

7.5.2.1 Marfa Location 1: San Antonio St and Highland Ave Intersection

The recommended alternative concept for Marfa Location 1: San Antonio St and Highland Ave Intersection is the "With Bicycle Lanes" Alternative (Alternative A) as shown in **Figure 7.24**. This alternative provides larger turning radii for freight trucks and improved bicycle and pedestrian facilities. San Antonio Street remains a two-lane street, and Highland Ave is upgraded to a four-lane street. Bicycle lanes and designated parallel parking spaces are striped along both San Antonio and Highland Ave. Along San Antonio Ave, space is available to include a striped buffer with the bicycle lanes.

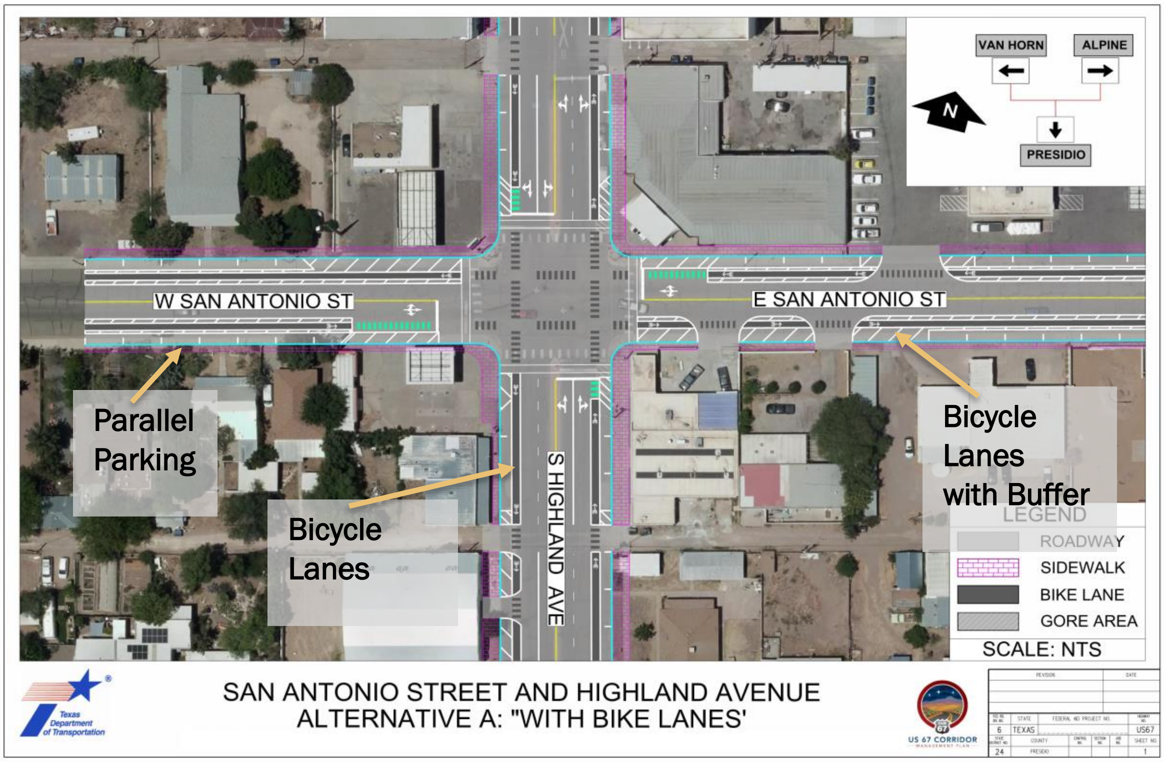


Figure 7.24: Marfa Location 1: San Antonio St and Highland Ave Intersection Recommended Alternative

Source: NACTO

Figure 7.25: Example of Bicycle Lane with Buffer

An example of a bicycle lane with a striped buffer is shown in **Figure 7.25**. The planning level cost estimate is $600,000. No additional ROW is required.

7.5.2.2 Marfa Location 2: Lincoln St and Highland Ave Intersection at Presidio County Courthouse

The recommended alternative concept for Marfa Location 2: Lincoln St and Highland Ave Intersection at the Presidio County Courthouse is the “Roundabout” (Alternative A) as shown in **Figure 7.26**. The Roundabout addresses existing safety and freight mobility concerns by providing larger turning radii for freight trucks in addition to bicycle and pedestrian improvements. The roundabout reduces conflict points to improve safety. The design also provides designated parking spaces, maintains angled parking along Highland St, and provides head-in parking spaces in front of the Presidio County Courthouse. The center of the roundabout is traversable to allow for large truck turning movements. The planning level cost estimate is $200,000. No additional ROW is required.

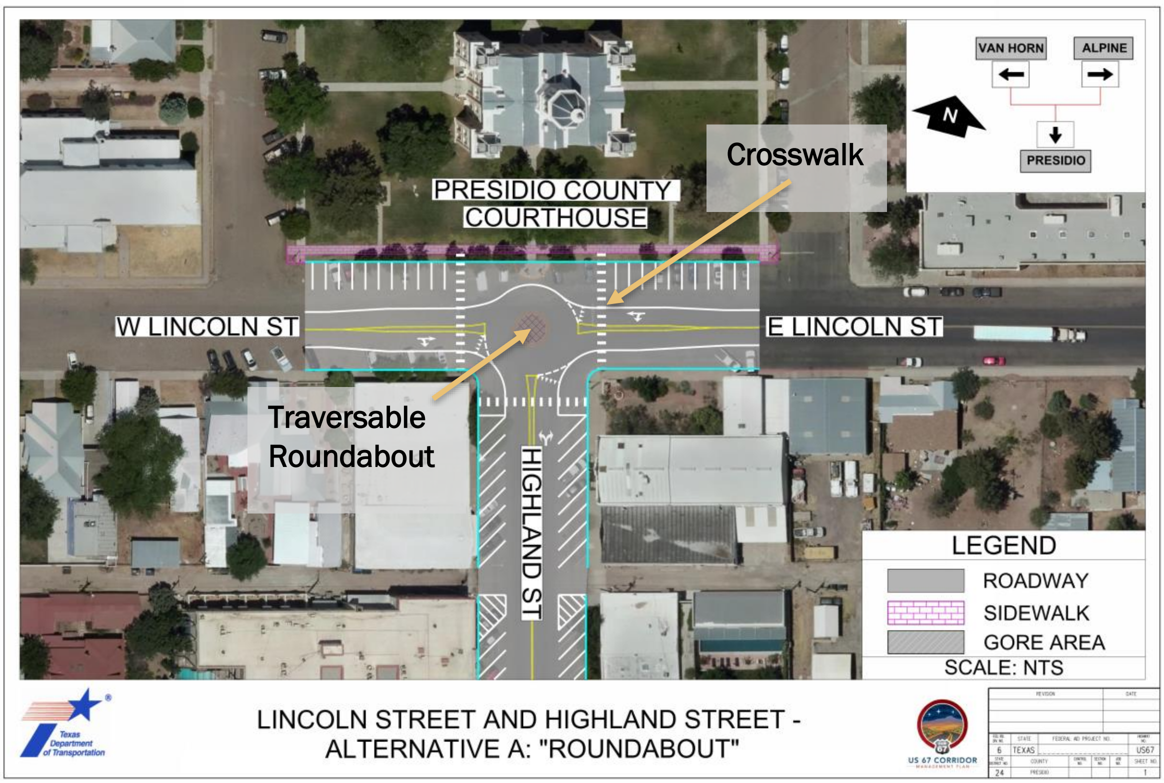


Figure 7.26: Marfa Location 2: Lincoln St and Highland Ave Intersection at the Presidio County Courthouse Recommended Alternative

7.5.3 Alpine Intersection Alternative Concepts

7.5.3.1 Alpine Location 1: FM 1703 and US 67 Intersection

The recommended alternative concept for Alpine Location 1: FM 1703 and US 67 Intersection is the "Two-Way Left-Turn Lane" Alternative (Alternative A) as shown in **Figure 7.27**. The Two-Way Left-Turn Lane addresses safety concerns by adding a center turn lane to US 67 and reconfiguring the intersection of US 67 and FM 1703. The center turn lane provides a safe vehicle refuge area for left turning vehicles while maintaining free flow for through travel along US 67. The intersection with FM 1703 is reconstructed slightly to the west of the existing intersection, requiring the addition of ROW. The new intersection includes right turn only and left turn only lanes with raised medians and striped gore areas to delineate and control turning movements. The design preserves access to existing businesses along FM 1703. The planning level cost estimate is $650,000.

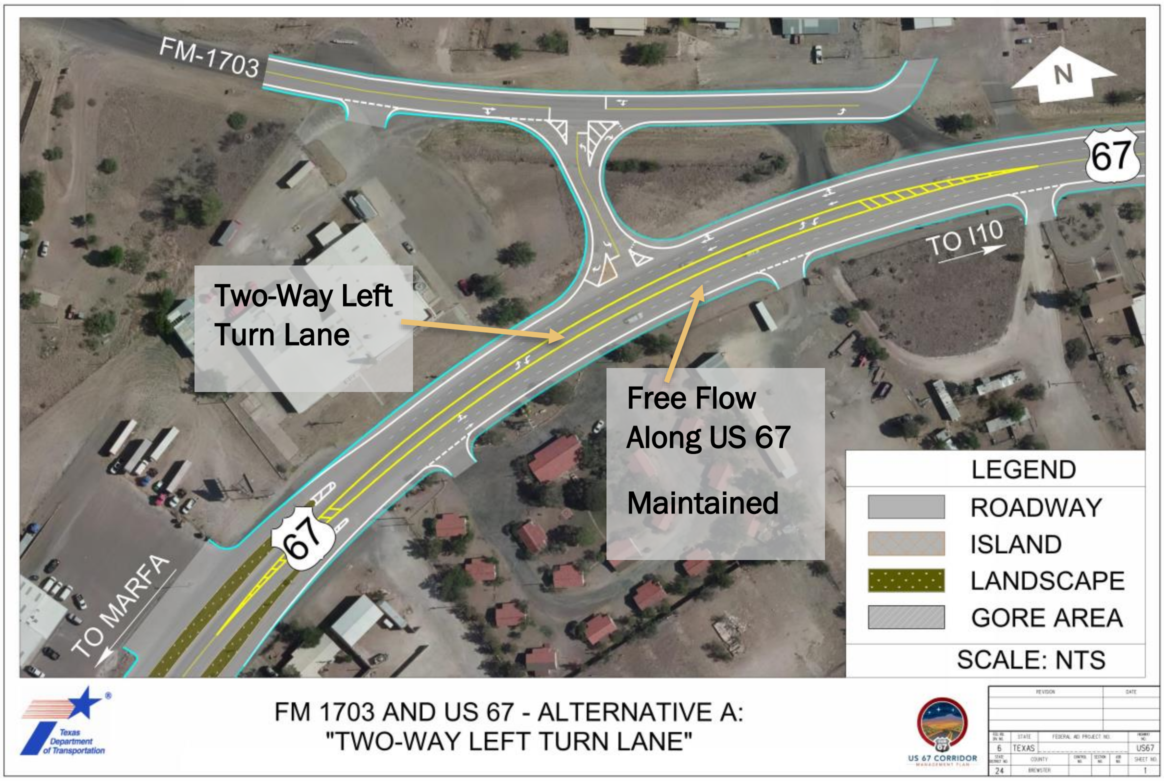


Figure 7.27: Alpine Location 1: FM 1703 and US 67 Intersection Recommended Alternative

7.5.3.2 Alpine Location 2: Orange St and Sul Ross Ave Intersections at US 67

The recommended alternative concept for Alpine Location 2: Orange St and Sul Ross Ave Intersections at US 67 is the “Closing Orange St and Sul Ross Ave” Alternative (Alternative A). The recommended alternative addresses safety concerns by limiting access and channelizing turning movement to US 67 from Sul Ross Ave and Orange St. As shown in **Figure 7.28**, westbound Sul Ross Ave is closed at US 67, and north bound Orange St is closed at US 67. Eastbound Sul Ross Ave is realigned to a T-intersection with US 67 and includes channelized turn movements with a striped gore area. Southbound Orange St at US 67 is provided an intersection with channelized turn movements with a striped gore area. Cherry Street is striped with gore areas for channelized movements. The planning level cost estimate is $450,000. No additional ROW is required.

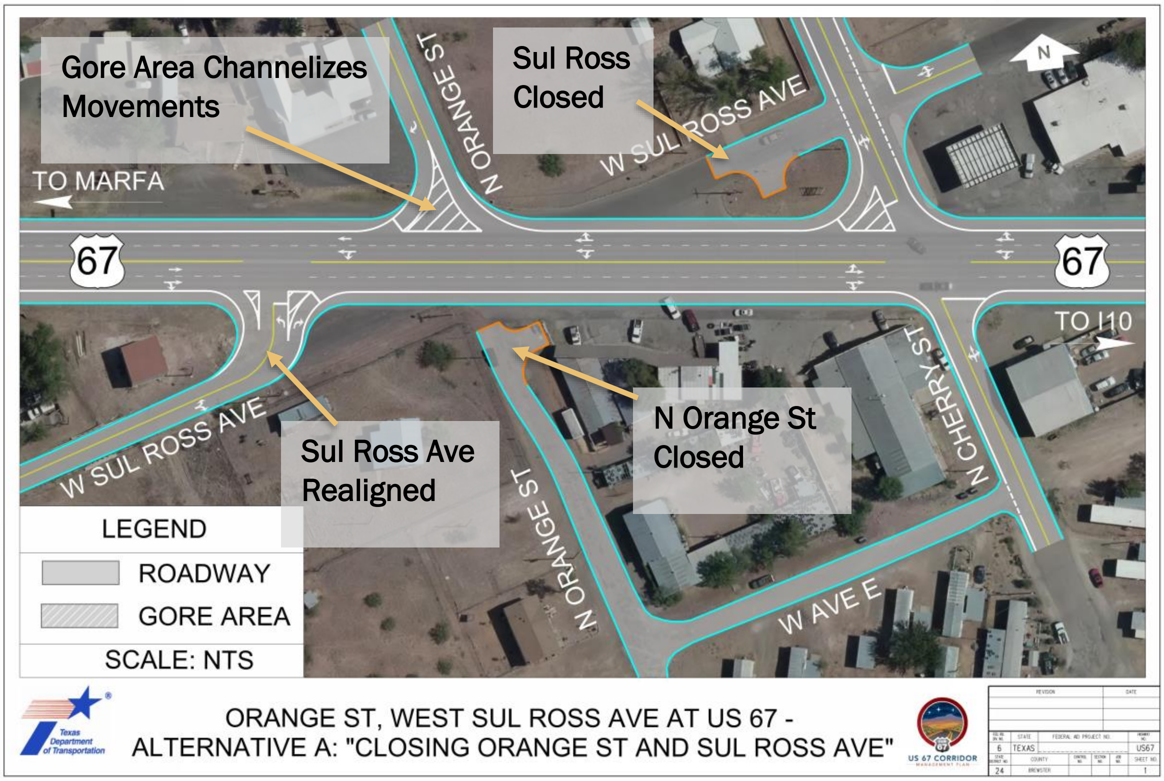


Figure 7.28: Alpine Location 2: Orange St and Sul Ross Ave Intersections at US 67 Recommended Alternative

7.5.3.3 Alpine Location 3: Intersection at Sul Ross University and US 67

The recommended alternative concept for Alpine Location 3: Intersection at Sul Ross University and US 67 is the “Pedestrian Ring” (Alternative A) as shown in **Figure 7.29**. The Pedestrian Ring addresses existing safety and mobility concerns by converting Harrison St into a one-way street and incorporating pedestrian facilities. The design features raised medians and striped gore areas at intersections to channelize movements. The eastbound intersection of E Holland Ave (US 67) and Bird St includes an all-way stop control. The public land central to the intersection is an opportunity for landscaping and placemaking features. The planning level cost estimate is $850,000. No additional ROW is required.

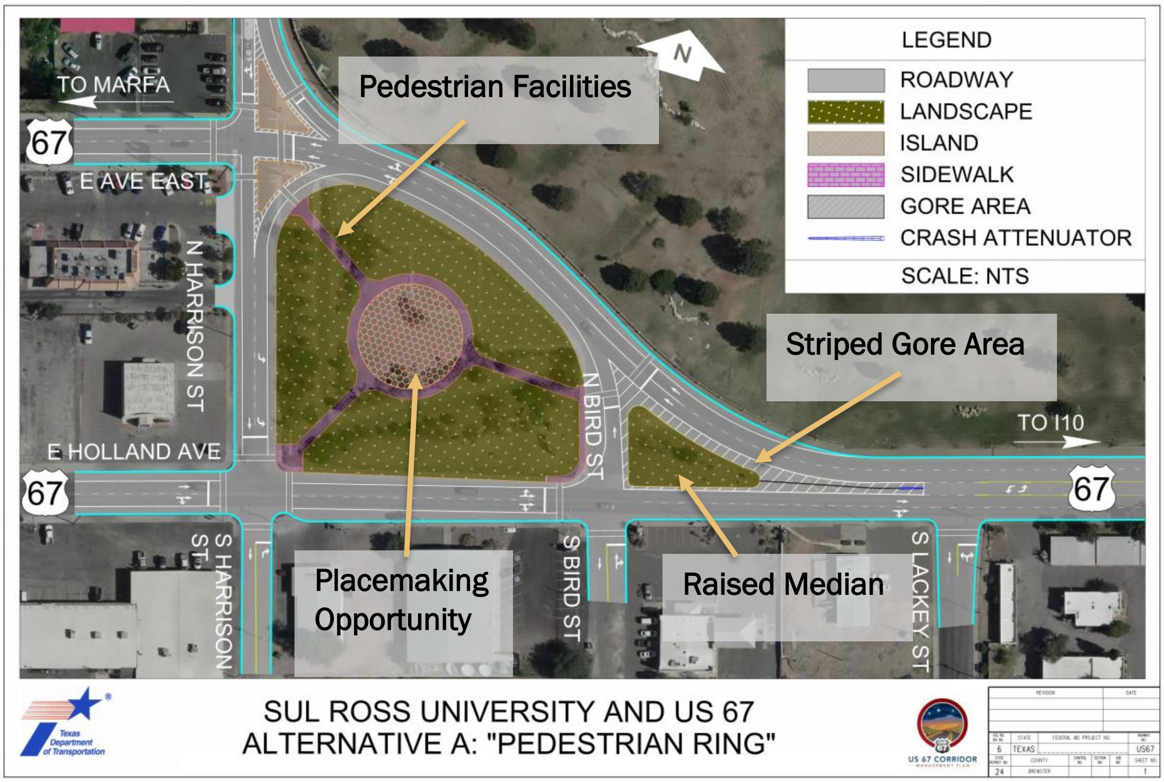


Figure 7.29: Alpine Location 3: Intersection at Sul Ross University and US 67 Recommended Alternative

7.5.4 Rural Alternative Concept

7.5.4.1 Rural Location 1: US 67/US 90 Intersection

The recommended alternative concept for Rural Location 1: US 67/US 90 Intersection is the “Free Flow Y-Intersection” (Alternative A) as shown in **Figure 7.30**. The Free Flow Y-Intersection addresses existing roadway geometry and safety concerns by providing free flow through movements for right turns southbound along US 67 onto US 67 westbound and for right turns westbound along US 90 onto US 67 northbound. Those vehicles wanting to continue onto US 67 coming from Marathon or Alpine will come to a 3-way stop at the T-intersection and then make a left. If a vehicle needs to continue towards Marathon, either coming from Fort Stockton or Alpine, it will also need to come to a 3-way stop and then make a left or continue straight respectively. The planning level cost estimate is $2,100,000. This alternative will not require additional ROW.

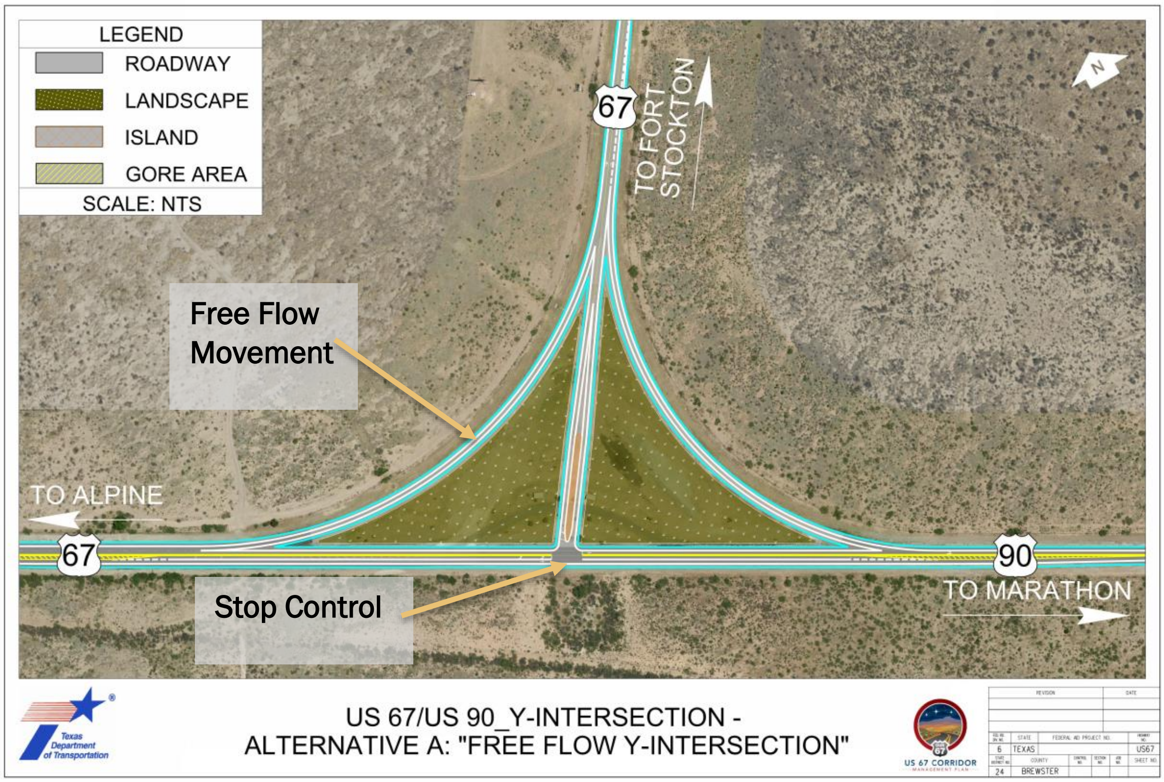


Figure 7.30: Rural Location 1: US 67/US 90 Intersection Recommended Alternative

7.6 Conclusions

Alternative improvements were developed for the US 67 Corridor through a concept development process based on public and stakeholder input, technical analyses, and best practices. Implementation timeframes and planning level cost estimates were developed for the concepts considered. Recommended alternatives are the result of a public driven evaluation, technical analyses, and screening process. The identification of funding opportunities is needed to carry these improvements forward from plans to projects for implementation.

Chapter 8

Implementation

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8.0 Introduction

The US 67 Corridor Master Plan was developed based on focused public outreach techniques and strategies that engaged elected officials, stakeholders, and members of the public. In tandem with regional, state, and federal targets, this process produced a set of goals and objectives for alternatives considered for inclusion in the plan. Conceptual improvements were identified by evaluating public input, Steering Committee and Corridor Working Group feedback, coupled with analysis of corridor existing conditions, safety needs, traffic volumes and patterns, freight demand, infrastructure conditions, intersection improvement needs, and Intelligent Transportation System needs. Finally, each conceptual improvement for the US 67 corridor was categorized as "core" (the concept is applicable throughout the corridor, or there is no competing alternative other than the No-Build) and "alternative" (more than one improvement alternative exists) and screened to develop recommended alternatives.

Funding and other implementation actions are required to bring a concept to fruition. This chapter reviews potential funding sources for the recommended conceptual improvements along with needed implementation activities.

8.1 TxDOT Unified Transportation Program

TxDOT's Unified Transportation Program (UTP) is a 10-year plan that guides statewide transportation investments. The program defines 12 funding categories based on the specific type of work being done and authorizes distribution of construction dollars expected to be available in the next 10 years. The funding categories are shown in Figure 8.1.

FUNDING CATEGORIES

Category 1 – Preventative Maintenance and Rehabilitation funds projects to preserve existing transportation assets or repairing existing main lanes, structures, and frontage roads rather than add new improvements.

Category 2 – Metropolitan and Urban Area Corridor Projects funds projects to improve mobility and capacity on urban corridors to mitigate traffic congestion, improve safety, and maintain and rehabilitate the roadway.

Category 3 – Non-Traditionally Funded Transportation Projects funds transportation projects that qualify for funding from sources other than the State Highway Fund, including bond financing, the Texas Mobility Fund, local funding, and other types.

Category 4 – Statewide Connectivity Corridor Projects funds projects to improve mobility on major state highway system corridors, providing connectivity between urban areas and statewide corridors. Projects must be on the Texas Highway Trunk System, National Highway System (NHS), National Freight Network (NFN), connect urban areas to major seaports or border crossings, or on hurricane evacuation routes.

Category 5 – Congestion Mitigation and Air Quality funds projects to attain the National Ambient Air Quality Standards in non-attainment areas.

Category 6 – Structures Replacement and Rehabilitation funds bridge improvements through the Highway Bridge Program, railroad grade separation projects, bridge maintenance programs, and other structure improvement programs.

Category 7 – Metropolitan Mobility and Rehabilitation funds projects to address needs within the boundaries of MPOs with populations of 200,000 or greater known as transportation management areas (TMAs).

Category 8 – Safety funds highway safety improvements through the Highway Safety Improvement Program (HSIP), the Safety Bond Program, the Systemic Widening Program, the Federal Railway Set Aside, and the Road to Zero.

Category 9 – Transportation Alternatives Set-Aside Program (TASA) funds the construction of sidewalks, pedestrian and bicycle infrastructure, traffic calming techniques, lighting and safety infrastructure, safe-routes-to-schools programs, and transportation projects to ensure compliance with the Americans with Disabilities Act (ADA) with the goal of creating transportation alternatives for non-drivers. The conversion of abandoned railroad corridors to trails for pedestrians, bicyclists, and K-12 students is prioritized as well.

Category 10 – Supplemental Transportation Programs funds variety of supplemental programs including Coordinated Border Infrastructure (CBI), Federal Supplemental Transportation Projects, Federal Lands Access Programs, Texas Parks and Wildlife Department, Green Ribbon Program, the ADA, Landscape Incentive Awards, Railroad Grade Crossing and Replanking Programs, and the Railroad Signal Maintenance Program.

Category 11 – District Discretionary Funds address TxDOT district transportation needs through district discretionary, energy sector, and border infrastructure programs.

Category 12 – Strategic Priority Funds address projects with specific importance to the state's interests in decreasing congestion, increasing connectivity, expanding economic opportunity, increasing energy sector access and border and port connectivity, efficiency of military routes, and emergency response.

Figure 8.1: TxDOT UTP Funding Categories

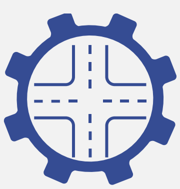
8.2 US 67 Funding Landscape

The US 67 corridor's characteristics influence the way transportation improvements can be funded. Except for the portions of the corridor in Alpine, Marfa, and Presidio, the corridor is rural and, in many sections, almost completely uninhabited. The US 67 corridor is part of the Statewide Connectivity Corridor, the Texas Trunk System, and the National Highway System. The section of the US 67 corridor in Pecos County (from I-10 to the Pecos County – Brewster County line) is also an important corridor for truck traffic generated by the energy industry.

Due to these characteristics, funding for Corridor Master Plan projects would most likely come from TxDOT Category 4, Category 8, Category 9, Category 11, and Category 12 funding Categories. More detailed information on TxDOT funding categories can be found in **Appendix P – Development of Funding Forecasts**.

8.2.1 Category 4 – Statewide Connectivity Corridor Projects

TxDOT districts select Category 4 – Statewide Connectivity Corridor Projects in consultation with the Transportation Planning and Programming Division using a performance-based prioritization process assessing mobility needs on designated connectivity corridors in the district. The designated connectivity corridors projects funded in Category 4 include three corridor types, shown in **Figure 8.2**.



- **Mobility corridors** – High traffic routes with potential need for additional roadway capacity.
- **Connectivity corridors** – Two-lane roadways requiring upgrade to four-lane divided.
- **Strategic corridors** – Routes that provide unique statewide connectivity, such as Ports-to-Plains.

Figure 8.2: Statewide Connectivity Corridor Categories

Because the US 67 corridor is designated as a statewide connectivity corridor by TxDOT, potential improvements could be funded under Statewide Connectivity Corridor Projects. While connectivity corridors could potentially be upgraded from two-lane to four-lane roadways, a wide variety of mobility improvements receive funding under Category 4 and a four-lane upgrade is not a requirement.

8.2.2 Category 8 – Safety

Category 8 – Safety funds highway safety improvements through four sub-programs. Eligible improvements are shown in **Figure 8.3**.

- New medians and shoulders.
- Signals.
- Lighting and signs,
- Guard rails.
- Rumble strips.

Figure 8.3: Safety Funding Categories

Safety funding is allocated to TxDOT's Traffic Safety Division, which selects projects on a statewide basis. Because increasing safety is the primary goal of the US 67 Corridor Master Plan, it is likely that at least some of the funding for recommended alternatives will come from Safety Funding allocations.

8.2.3 Category 9 – Transportation Alternatives Set-Aside Program

Category 9 – Transportation Alternatives Set-Aside Program provides funds for locally sponsored bicycle and pedestrian improvements in communities with under 200,000 residents. These funds are allocated at the discretion of the Texas Transportation Commission and project eligibility is determined by TxDOT and the Federal Highway Administration (FHWA). Of these funds, 50 percent are designated for flexible distribution around the state, and 50 percent are distributed by population size. **Figure 8.4** shows the type of projects awarded with the Transportation Alternatives Set-Aside funds.

- Construction of multimodal infrastructure like sidewalks, bicycle lanes and paths, bicycle and pedestrian signals, traffic calming, lighting, and Americans with Disabilities Act compliant infrastructure.
- Infrastructure to provide safe routes for non-drivers, including "Safe Routes to School."

Figure 8.4: Transportation Alternatives Set-Aside Funding Categories

Because the US 67 Corridor Master Plan proposes improvements like bicycle lanes, sidewalks, and automated warning systems along certain sections of the corridor, it is possible for these improvements to be added to the list of projects eligible for Transportation Alternatives funding.

In September 2015 and October 2017, TxDOT called for projects under the Transportation Alternatives Program for communities with under 200,000 residents and recommended funding bicycle and pedestrian improvements and safe routes to school projects in the US 67 corridor area on the stated needs of the City of Presidio and Presidio County. These projects are listed in **Table 8.1**.

Table 8.1: Category 9 Funding Projects on the US 67 Corridor

Proposed Project	Project Sponsor	Year of Recommendation	TASA Funding Requested	Status
Bledsoe Boulevard Shared Use Path and Sidewalks	City of Presidio	2015 and 2017	$1,482,393	Funded
Presidio High/Middle School Connection	City of Presidio	2015 and 2017	$890,132	Funded
Louvain Boulevard & Foothill Boulevard Safe Routes to School	City of Presidio	2015 and 2017	$1,435,004	Funded
Bagley Avenue, Silver Street, & Wilson Street Safe Routes to School	Presidio County	2015 and 2017	$298,731	Funded
Marfa – US 67 Shared Use Path	Presidio County	2015 and 2017	$280,490	Funded

8.2.4 Category 11 – District Discretionary Projects

TxDOT districts select Category 11 – District Discretionary Projects at their discretion in three subcategories, 11a for energy sector or district discretionary minimum projects and 11b for border infrastructure. Category 11a can allocate funding for projects on highways impacted by energy sector traffic based on weighted factors shown in **Figure 8.5**.

40% three-year average pavement condition score

25% number of well completions

25% oil and gas production taxes collected

10% volume of oil and gas waste injected

Figure 8.5: Energy Sector Direct Discretionary Project Weighted Factors

Project selection criteria for Category 11b Projects pertaining to Border Infrastructure are shown in **Figure 8.6**. Category 11 also encompasses a provision in the FAST Act that designates 5 percent of the state's Federal Surface Transportation Block Fund for highway projects within 50 miles of a Port of Entry (POE).

- Number of land border Ports of Entry,
- Number of incoming commercial trucks and railcars,
- Number of incoming personal motor vehicles and buses,
- Weight of incoming cargo by commercial trucks.

Figure 8.6: Border Infrastructure District Discretionary Project Selection Criteria

Because the US 67 corridor in the Odessa District is impacted by growing energy sector traffic caused by growing oil production in the Permian Basin and the southernmost 50 miles of the US 67 corridor encompasses the Presidio POE, potential improvements could be funded under Category 11 – District Discretionary Projects.

8.2.5 Category 12 – Strategic Priority

Category 12 – Strategic Priority addresses projects of strategic importance to the state and funding is awarded to specific projects at the discretion of the Texas Transportation Commission, selecting from candidate projects nominated by TxDOT districts and Metropolitan Planning Organizations (MPOs).

Because the US 67 corridor in the Odessa District is impacted by energy sector traffic, the Presidio POE provides access to the U.S.–Mexico border, and the need for greater emergency access along the corridor, potential improvements identified in this plan could be funded by Category 12 – Strategic Priority funds.

8.3 Previously Funded Projects

Previous studies and projects along the US 67 corridor are shown in Figure 8.7.

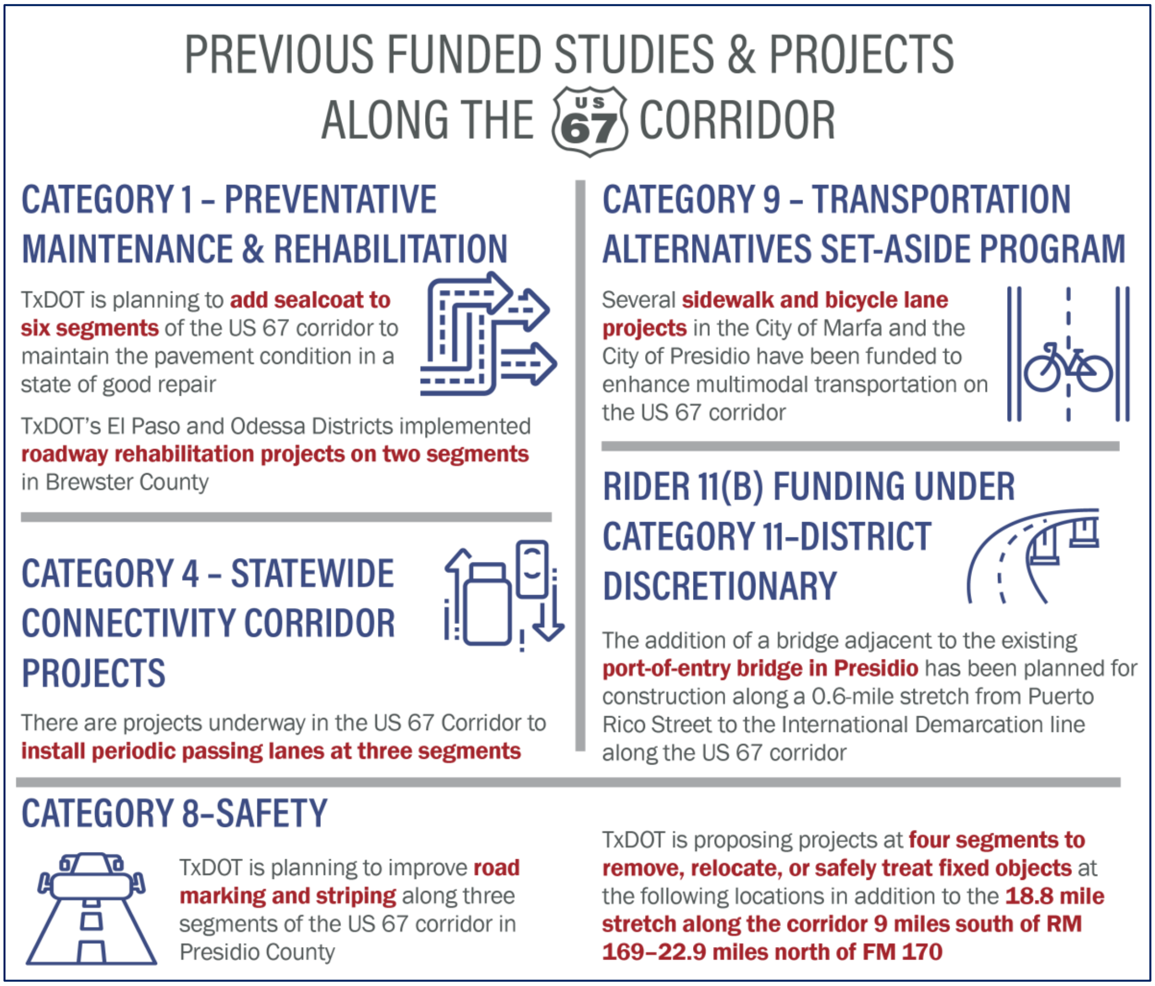


Figure 8.7: Previously Funded Projects along the US 67 Corridor

8.4 Potential Funding Levels

Because the amount of monies available in the Federal Highway Trust Fund is currently declining and due to the passage of Proposition 1 (which allocates a portion of existing oil and natural gas production taxes to the State Highway Fund) and Proposition 7 (which allocates a portion of sales and use taxes and a smaller portion of motor vehicle sales and rental taxes to the State Highway Fund), this study will focus on the recent history of the 2018, 2019, and 2020 Unified Transportation Programs for estimating potential funding. Total Category 4, 11, and 12 funding is shown in **Figure 8.8**. Allocations to the El Paso and Odessa Districts from the 2018, 2019, and 2020 Unified Transportation Programs are shown in **Table 8.2**. A percentage of the total funds shown in **Table 8.2** can be requested for approval to fund improvements recommended in the US 67 Corridor Master Plan.

The US 67 corridor's designations as an important strategic roadway and growing energy sector traffic means that future funding for US 67 Corridor Master Plan improvements will mostly come from Categories 4, 11, and 12 funding categories, described in **Table 8.2**. While there are other potential sources of funding, including Category 8, 9 and 10, Categories 4, 11, and 12 could provide the largest share of funding. For example, there are eligible Category 9 projects recommended on US 67 and five projects outlined in **Table 8.1** have been funded through Category 9 funds. Additional opportunities to seek Category 9 funding should be pursued. It should be noted that funding information for Category 8 – Safety is only available on a statewide basis, not a district basis. Statewide Category 8 – Safety funding was $3.3 billion in 2018 and 2019 and will be $4 billion in 2020.

FORMULA AND DISTRICT DISCRETIONARY DISTRICTS HAVE SOME LATITUDE TO SELECT PROJECTS

Category 4 - Urban and Regional Connectivity
Category 11 - District Discretionary

EL PASO DISTRICT	ODESSA DISTRICT	TOTAL
$286.5M	$766.5M	$1.1B

COMMISSION DISCRETIONARY ALLOCATED BY THE TEXAS TRANSPORTATION COMMISSION

Category 12 - Strategic Priority

EL PASO DISTRICT	ODESSA DISTRICT	TOTAL
$116.1M	$227.2M	$343.3M

Figure 8.8: Average 10-year Category 4, 11, and 12 Funding in the El Paso and Odessa Districts

Because the US 67 corridor is a relatively small section of total roadway in the El Paso and Odessa Districts, only a small fraction of the total allocations of slightly over $1 billion may be allocated to projects recommended by the US 67 Corridor Master Plan. TxDOT allocates funding based on formulae that vary depending on which of the 12 funding categories a proposed project falls under. Depending on when US 67 Corridor Master Plan projects are proposed to be let for construction, coordination with TxDOT’s Transportation Planning and Programming Division will be required to ensure funding is available for project execution. Detailed information on funding availability over the next 10 years can be found in **Appendix P**.

Table 8.2: Unified Transportation Program Allocations in the El Paso and Odessa Districts, 2018-2029

El Paso District							
UTP Year	10-Year Period	As of Date	Category 4	Category 4	Category 11	Category 11	Category 12
			Urban Connectivity	Regional Connectivity	Riders 11a and 11b	Energy Sector	Strategic Priority
2018	2018 thru 2027	12/14/2017	$152,690,000	$31,300,000	$55,300,000	$39,090,000	$63,930,000
2019	2019 thru 2028	8/30/2018	$166,780,000	$31,298,776	$45,700,000	$47,410,000	$63,930,000
2020	2020 thru 2029	8/29/2019	$148,560,000	$31,300,000	$56,010,000	$54,010,000	$220,320,000
		Average	$156,010,000	$31,299,592	$52,336,667	$46,836,667	$116,060,000
		Totals	Category 4	$187,309,592	Category 11	$99,173,334	
		Total Categories 4, 11, and 12 Avg	$402,542,926				

Odessa District							
UTP Year	10-Year Period	As of Date	Category 4	Category 4	Category 11	Category 11	Category 12
			Urban Connectivity	Regional Connectivity	Riders 11a and 11b	Energy Sector	Strategic Priority
2018	2018 thru 2027	12/14/2017	$77,390,000	$221,400,000	$36,270,000	$392,270,000	$140,010,000
2019	2019 thru 2028	8/30/2018	$74,540,000	$200,213,200	$35,900,000	$378,050,000	$136,200,000
2020	2020 thru 2029	8/29/2019	$75,000,000	$240,730,000	$37,960,000	$529,870,000	$405,450,000
		Average	$75,643,333	$220,781,067	$36,710,000	$433,396,667	$227,220,000
		Totals	Category 4	$296,424,400	Category 11	$470,106,667	
		Total Categories 4, 11, and 12 Avg	$993,751,067				

Total El Paso and Odessa Districts	$1,396,293,992

8.5 Other Funding Sources

Federal loans and grants may also be available through for example, the U.S. Department of Transportation (USDOT); the Economic Development Administration (EDA) Public Works Program; and the U.S. Department of Agriculture Community Facility Development Loans and Grants. The USDOT continues to distribute Better Utilizing Investments to Leverage Development (BUILD) grants and Infrastructure for Rebuilding America (INFRA) grants for transportation projects across the U.S. The evaluation criteria, minimum and maximum amounts of the grants and rules for applying are outlined in a Notice of Funding Opportunity (NOFO). In order for the US 67 to be competitive for these grant programs, some work needs to be done in advance of the NOFO as the time to respond is relatively short compared to the work needed to be done. Advance work includes project planning and development work and benefit-cost analysis work to highlight the value that can be brought to a region if a particular project is implemented within the time frames described in the application.

Prior to fiscal year 2019, the EDA Public Works Program provided grant funds to help distressed communities expand, revitalize and upgrade their infrastructure to attract and retain businesses, expand the availability of job opportunities, diversify the local economic base, and assist in the acquisition and development of land and infrastructure to locate or expand private sector industry and business operations. EDA Public Works Program grants are competitive, non-disaster infrastructure projects ranging from $1.5 million to $5 million. Although the fiscal year 2018 NOFO remains open and several Public Works Program projects have been funded in fiscal year 2019, most public works projects funded by EDA Public Works Program in 2019 are through disaster recovery funds for communities impacted by disasters in 2016 through 2018. The EDA Public Works Program could provide financial resources for US 67 of a project that would directly benefit economic development in a community served by US 67 that might include partial funding for an interchange or a corridor connecting an industrial park or new industry.

USDA Community Facility Development Loans and Grants provide funding, primarily for utility infrastructure, through a NOFO, however the maximum grant available in this fiscal year is $300,000 and only $40 million was appropriated for the entire program.

No other funding agencies or private sources of funds for US 67 Corridor Master Plan conceptual improvements have been identified in this plan – however, it is possible that others could be identified in the future. The Center for Disease Control (CDC) and the Department of Housing and Urban Development (HUD) fund bicycle and pedestrian improvements through programs such as the CDC's Racial and Ethnic Approaches to Community Health (REACH) program and HUD's Community Development Block Grant (CDBG) program. National Highway Traffic Safety Administration (NHTSA) funds flow through the Governor's Highway Safety programs and fund driver and bicyclist education programs as well.

8.6 Health Impacts of Corridor Improvements

Transportation improvements can affect the health of nearby communities. These impacts can be positive or negative depending on the scope of the improvements and the communities' current health profile. A Health Impact Assessment (HIA) was conducted as part of the US 67 Corridor Master Plan to estimate the likely health impacts of recommended improvements and suggest ways to mitigate potential negative health outcomes. HIA identifies health indicators based on community and corridor profiles and provides recommendations to maximize positive health impacts and minimize negative ones. The HIA process followed five major steps outlined in **Figure 8.9.**

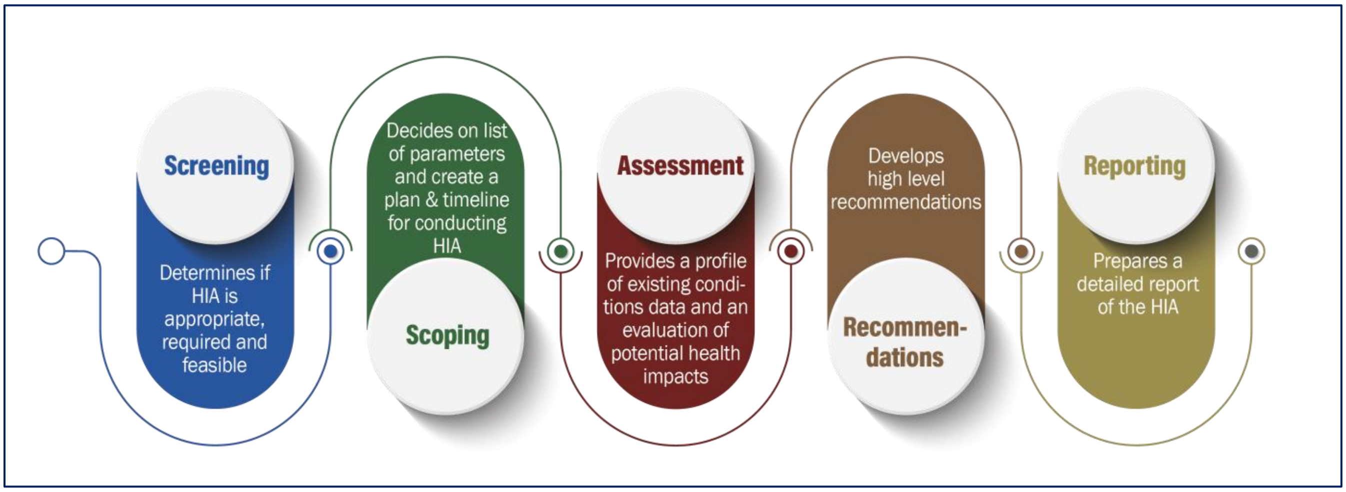
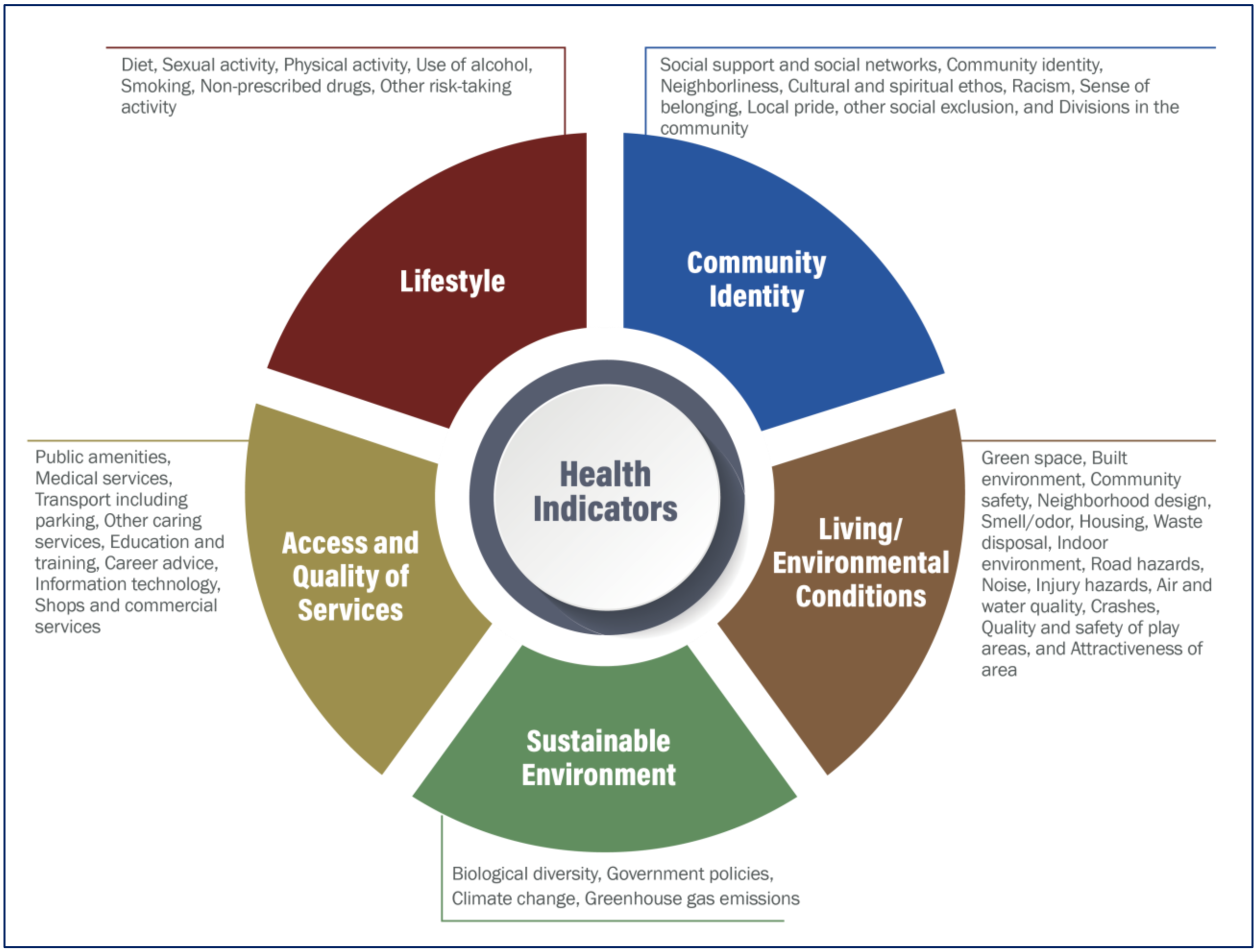


Figure 8.9: Overview of HIA Process

Five community health indicators were identified to develop the analysis; these indicators are based on the list of recommended improvements, the health-related outcomes, and the goals of the US 67 Corridor Master Plan. The five health indicators are shown in **Figure 8.10.**



Source: Adapted from "A Health Impact Assessment Toolkit A Handbook to Conducting HIA, 3rd Edition"

Figure 8.10: Factors of Health Indicators

The study team prepared a list of recommended improvements for the following Master Plan geographies:

- Presidio
- Marfa
- Alpine
- Between communities

For each geographical area, the draft recommended improvements were analyzed to prepare a list of immediate outcomes which were linked to the health-related outcomes. All health outcomes were related to the above five health indicators.

The immediate outcomes from the recommended improvements are reduced vehicular crashes, animal crashes, and bicycle/pedestrian crashes; increased access to medical services; and increased safety. The impacts from the recommended improvements are mostly positive and recommendations are provided to mitigate predicted negative impacts.

The benefits and impacts in the Presidio, Marfa, and Alpine communities are increased walking/bicycling; reduced injury crashes; increased nonmotorized corridor usage which leads to increased physical fitness, reduced stress, cardiovascular and chronic diseases; and increased social connections. The benefits and impacts to areas between the communities are reduced roadway departure crashes; increased traffic flow; increased access to medical services; better information provided to travelers; and reduced traffic congestion. These benefits can lead to increased overall safety, reduced stress, and better mental or behavioral health.

Table 8.3 describes the Health Impact Assessment recommendations for each recommended improvement with potential negative health impacts by geographical area. These recommendations can be considered during plan implementation as inputs to final design decisions.

More details on the Health Impact Assessment are provided in Appendix Q – Health Impact Assessment.

Table 8.3: Health Impact Assessment Recommendations

Geographical Areas	List of Proposed Improvements with Potential Impacts	Health Impact Assessment Recommendations
Presidio	Parking Capacity at POE	• Planting trees, green spaces to reduce heat • Reduce vehicle speeds • Provide sidewalks for pedestrians • Provide shade or electrification, so vehicles don't have to idle when parked • Implement non-idling ordinances which results in reduced emissions, improved air quality, and improved health outcomes • Use solar energy or wind energy to run the parking lot infrastructure which aims to minimize carbon footprint
	Complete Streets	• Consider additional bicycle improvements off US 67 to link with programmed shared use path network which will increase overall health of the residents by encouraging people who are not comfortable on US 67 to ride for fitness, errands, school, etc. • Conduct public meetings, and identify locations for the development of green and open spaces • Conduct community meetups or events to encourage people to get involved and increase social interaction
Marfa	Roundabout at Lincoln St & Highland St	• Make sure there is adequate handicapped parking to allow those with disabilities to access key destinations, due to parking reductions
	Complete Streets	• Consider additional bicycle improvements off US 67 to link with programmed shared use path network which will increase overall health of the residents by encouraging people who are not comfortable on US 67 to ride for fitness, errands, school, etc.
	Intersection of San Antonio St & Highland Ave ▪ Bicycle accommodations ▪ Shared Use Path ▪ ADA compliant sidewalks and curb returns	• Enhanced streetscapes like trees, plants with flowers, streetlights and sculptures can potentially provide multiple health benefits like better air quality, reduced heat-related illness and improved traffic safety • Provide shade trees, watering and maintenance on both sides of the road • Provide shade, places to sit, water and trash receptacles
Alpine	The Pedestrian Ring at Sul Ross University	• To create a sense of place, provide green space, wayfinding and educational signage, sculpture, etc.
	TWTL at FM 1703 & US 67	• To offset increased pedestrian crossing distance, provide clear signage to alert motorists for pedestrian crossing
	Complete Streets	• Consider additional bicycle improvements off US 67 to link with programmed shared use path network which will increase overall health of the residents by encouraging people who are not comfortable on US 67 to ride for fitness, errands, school, etc. • Provide adequate signage for vehicles and pedestrian guidance
	One-Way Complete Streets with Pedestrian Improvements at US 67 and 6th, 5th, and 4th Streets	• Provide adequate signage for vehicles, bicycles and pedestrian guidance • Consider reducing speed limit to allow additional motorist reaction time to avoid increased numbers of bicycles and pedestrians
Between communities	Bicycle Lane with Striped Buffer (Complete Streets)	• Adequate signage indicating to drivers that bicyclists may also be present
	Centerline rumble strips and shoulder rumble strips	• Because shoulder rumble strip depressions can cause a bicyclist to fall, ensure that there is a 12-foot-wide gap in the shoulder rumble strips every 40 to 60 feet to provide bicyclists better access to the roadway lane and to avoid debris

8.7 TxDOT Project Development Process

Several steps must be taken to implement a project other than identifying and programming funding. TxDOT has a process for taking a project concept through planning, design, environmental, and construction phases. The general process follows these steps:

- **Planning and Programming** consists of identifying and documenting project needs; ensuring compliance with local, regional, state, and federal transportation plans and policies; and completing required planning studies. Much of this work has been accomplished by the US 67 Corridor Master Plan.

- **Preliminary Design** includes data collection to support project need, design changes based on public comment, and preliminary drawings. Concepts developed in the US 67 Corridor Master Plan will inform the Preliminary Design stage once a project has secured funding and the project development process begins.

- **Environmental Documentation** includes all required environmental clearance documents, such as those required by the National Environmental Policy Act (NEPA) and other state and local environmental laws. It also includes any required environmental permits.

- **Right-of-Way and Utilities** includes collecting data on the existing right-of-way for potential right-of-way acquisition (if required) as well as utilities such as sewer and electrical lines that might need to be relocated.

- **Plans, Specifications, and Engineering Development** is the process by which each separate element of the project concept is designed and engineered. This step results in a plan set for the construction contractor to follow.

- **Letting** is the process by which a construction contract is awarded to build the project.

- **Construction** is the final step where the winning contractor makes the improvements following the design developed in prior steps.

Depending on the scope of the project, completing all these steps may take anywhere from two to 30 years. After the planning and programming stages are complete, the selection of preferred alternatives will take place, and design, environmental, right-of-way/utilities, engineering, letting, and construction work will follow.

8.8 Conclusion

The US 67 Corridor Master Plan was developed over 28 months from August 2017 to December 2019 to consider community needs and concerns and identify possible short-, mid-, and long-term transportation improvements. Every recommended improvement has been vetted by corridor communities and key officials. This effort has therefore done much of the planning and programming portion of the project development process. Once conceptual improvements are chosen for implementation, they will move through the rest of the project development process, including environmental permitting, design, right-of-way appraisal and acquisition, utility realignment, letting, and construction.

This Master Plan has established a framework for creating a corridor that is safe, serves all users, and preserves the unique character and scenery of West Texas. By working to implement the projects included in this plan, TxDOT and its partners will improve corridor safety and mobility for years to come.

In addition to continuous monitoring of the implementation of plan recommendations, there may be a need to update the Corridor Master Plan in the future. TxDOT discussed the ideal time to revisit the plan with the Corridor Working Group and the general consensus was that this should take place 5 years after the initial plan was completed.

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THE CITY OF MARFA
MARFA, TEXAS
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