US 67 CORRIDOR MASTER PLAN

APPENDIX J

FEBRUARY 2020

US 67 CORRIDOR
MASTER PLAN

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Memorandum

To: *Rebecca Reyes, TxDOT Project Manager*
Christopher Weber, TxDOT Alpine Area Engineer

From: *CDM Smith*

Date: *February 2020*

Subject: *US 67 Corridor Master Plan Field Reconnaissance Technical Memorandum*

1.0 Introduction

1.1 Study Overview

This technical memorandum summarizes the field reconnaissance conducted along the US 67 corridor. The study limit stretches 142 miles from Interstate 10 (I-10) west of Fort Stockton to the Presidio/Ojinaga Port of Entry (POE) on the United States (U.S.)/Mexico border. US 67 provides access to the towns of Alpine, Marfa, Presidio, and surrounding communities, as well as Big Bend National Park, Sul Ross State University, the Marfa Lights, Big Bend Ranch State Park, Fort Leaton State Park, and Fort Davis attractions. The US 67 Corridor Master Plan aims to enhance the mobility and safety of the US 67 corridor for the traveling public with the identification of short-, mid-, and long-term mobility and safety solutions.

1.2 Purpose and Organization of Memorandum

The main purpose of this memorandum is to supplement and verify the existing data necessary to develop conceptual alternatives for improvements to the US 67 corridor. In addition, this memorandum includes:

- Overview of Existing Conditions along the corridor which includes:
  - Topography, Physiography, Climate, and Demographics
  - Major Facilities and Developments
  - Railroad Infrastructure
  - Roadway Attributes
  - Key Intersections for Safety
  - Pavement Condition
  - Highway Structures
- Evaluation of corridor issues to address for improvement which includes:
  - Existing Issues to Improve

- Potential Impediments to Roadway Improvements
- Basic Bridge Requirements at Stream and River Crossings
- Potential Grade Separation and Intersection Improvements

The field reconnaissance information in this memorandum is based on site visits conducted during Spring 2018, Light Detection and Ranging (LiDAR) survey conducted in April 2019, review of Google Earth images, and a review of the video of the US 67 corridor captured in May 2018. Additional information related to bridge structures and culverts were obtained from the Federal Highway Administration (FHWA) National Bridge Inventory (NBI) database.

1.3 Study Area

The US 67 Corridor Master Plan study limits reach 142 miles from I-10 west of Fort Stockton to the Presidio/Ojinaga POE at the U.S./Mexico border. The study area is limited to the corridor right-of-way (ROW). The US 67 corridor is located within the Texas Department of Transportation's (TxDOT's) Odessa and El Paso Districts. The corridor passes through three counties – Pecos, Brewster, and Presidio; and passes through the cities of Alpine, Marfa, and Presidio. **Figure 1** shows the study corridor.

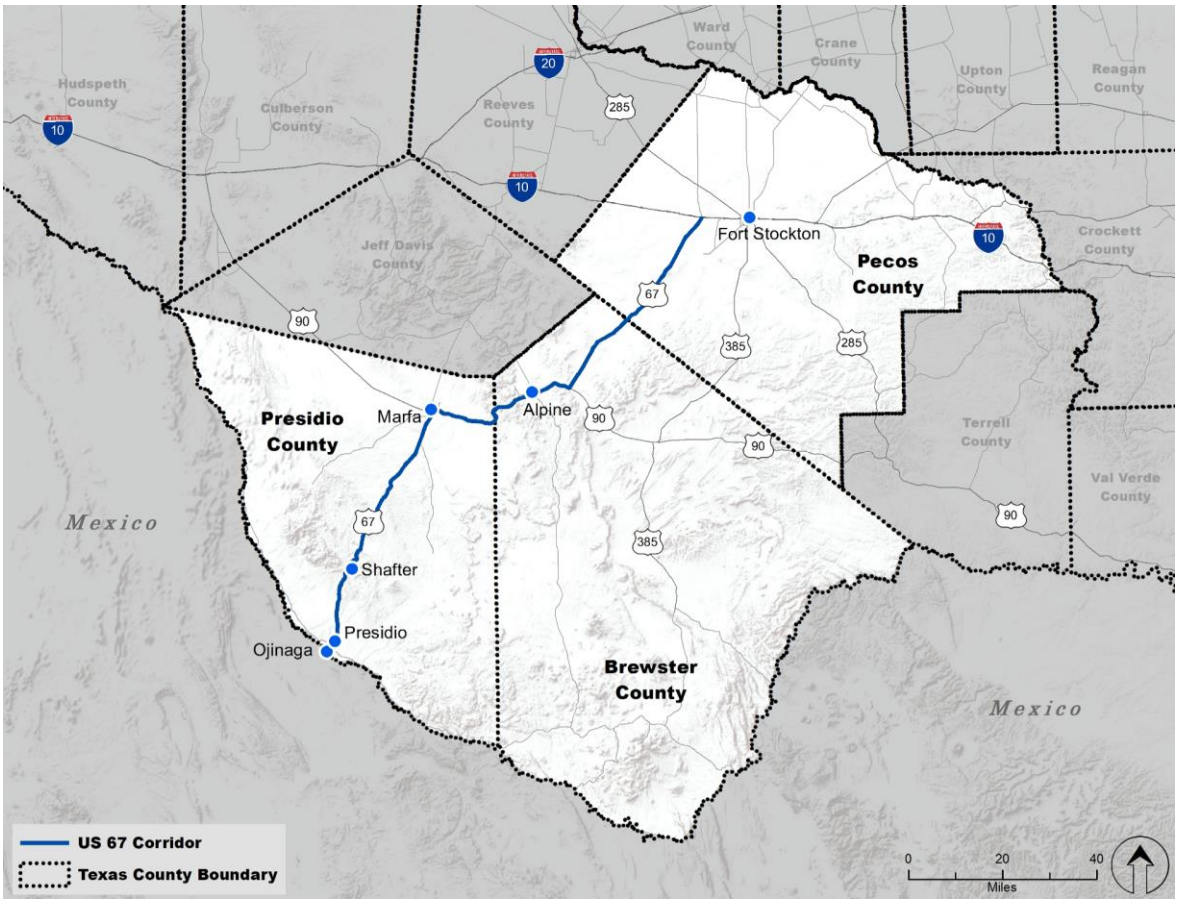

Figure 1: US 67 Study Corridor

For this memorandum, the US 67 corridor was split into seven segments as follows:

- Segment 1- Presidio: US 67 corridor within Presidio city limits
- Segment 2 - Presidio to Marfa: between Presidio city limits and Marfa city limits
- Segment 3 - Marfa: US 67 corridor within Marfa city limits
- Segment 4 - Marfa to Alpine: between Marfa city limits and Alpine city limits
- Segment 5 - Alpine: US 67 corridor within Alpine city limits
- Segment 6 - Alpine to US 90: between Alpine city limits and the US 90 east interchange
- Segment 7 - US 90 to I-10: from the US 90 east interchange to I-10

Figure 2 shows the segmentation of the US 67 corridor.

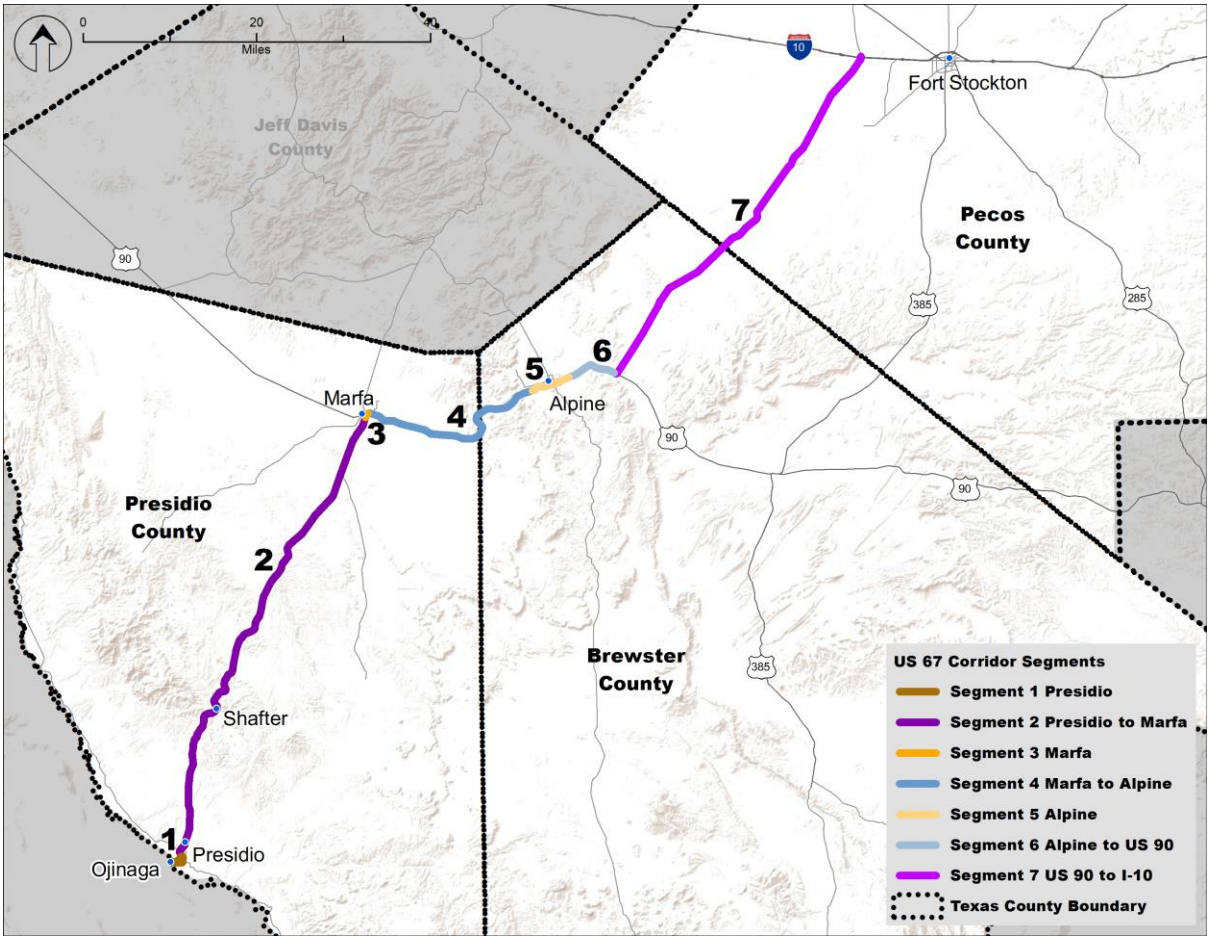

Figure 2: US 67 Corridor Segments

2.0 Existing Conditions along the Corridor

2.1 Topography, Physiography, Climate, and Demographics

The US 67 corridor is in the Trans-Pecos region of Texas, which is considered the northern extension of the Mexican Chihuahuan Desert. Geographically, this region is characterized by plateaus, basins, and deserts. The Trans-Pecos basins sit at an elevation of about 4,000 feet above mean sea level (MSL) and are crossed by numerous, widely-spaced mountain ranges that rise an additional 2,000 to 3,000 feet above MSL. Significant portions of Segment 2 around Shafter passes through especially rugged mountainous terrain of the Trans-Pecos and the Diablo Plateau[1]. The northern end (near I-10) and southern end (Presidio) of the US 67 corridor have altitudes of about 3,000 feet to 2,500 feet above MSL. The middle portion of the alignment near Alpine and Marfa (Segments 3, 4, 5, and 6) rises to altitudes of approximately 4,500 to 5,000 feet above MSL. The topography of Segment 7 is best described as Toyah Basin[1] which is a broad, flat remnant of an old sea floor. There are scattered fault-block mountains and outcrops of ancient volcanic rocks to the northwest of Segment 5 (Alpine).

The Trans-Pecos region is the most arid portion of Texas. Annual precipitation in the main cities along the US 67 corridor (Presidio, Marfa, and Alpine) is about 8 to 20 inches annually, with the higher precipitation occurring in the high-altitude areas[2]. The annual temperature along the corridor averages 64 degrees Fahrenheit. The average maximum temperature is about 90 degrees in July, and the average lowest temperature is about 34 degrees Fahrenheit in January.

The US 67 study corridor encompasses Pecos, Brewster, and Presidio Counties. Brewster and Pecos Counties are the largest two counties in Texas by total area, and Presidio County is ranked number four in Texas by total area. The three counties, however, are among the least populated counties in the state, with a population density on the order of one inhabitant per square mile compared to the state average of 50 inhabitants per square mile. The southern portion of the US 67 corridor from Presidio to Marfa connects the Presidio/Ojinaga POE to I-10 through SH 17. The Presidio-Ojinaga International bridge and the international rail bridge going across the Mexican border from Presidio are the only international bridges owned by the state of Texas. TxDOT is expanding the Presidio-Ojinaga International bridge by building a new bridge adjacent to the existing POE bridge. The existing POE bridge was originally completed and opened in 1985 as a two-lane bridge but the POE is now being expanded to add another two lanes, one lane in each direction. TxDOT has partnered with Texas-Pacifico Transportation, Ltd. (Texas-Pacifico) to rebuild the international rail bridge in Presidio. Texas-Pacifico is funding the reconstruction of the rail bridge. TxDOT has also received a federal grant to rehabilitate 72 miles of rail tracks and additional bridges in Presidio County.

2.2 Major Facilities and Developments

Within the communities of Alpine, Marfa, and Presidio, US 67 serves as a major route for local trips. Some of the notable community facilities and services located along US 67 include churches,

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[1] Texas State Historical Association. Physical Regions of Texas. Retrieved August 2018 from https://texasalmanac.com/topics/environment/physical-regions-texas

[2] PRISM. 30-Year Normals. Retrieved September 2018 from http://prism.oregonstate.edu/normals/

government offices, museums, library, the Alpine Amtrak Passenger Station, and Sul Ross State University.

The US 67 corridor also serves as a critical regional and long-distance freight movement route. Some of the major freight generators along the corridor include the Presidio POE, Biad Chili Company, Solitaire Manufactured Homes, Tri-County Concrete and Steel, CSA Materials, and Presidio Stockyards.

Tourism is a major driver of the regional economy; therefore, many developments along the corridor are tourist attractions. Some of the major attractions include Big Bend National Park, Big Bend Ranch State Park, Elephant Mountain Wildlife Management Area, the Marfa Lights, Chinati Mountains State Natural Area, Mount Livermore, the McDonald Observatory, and Davis Mountains State Park.

Other major facilities include the Acacia solar plant, Solaire Holman solar plant, Shafter silver mine (currently inactive), and the Trans-Pecos pipeline. Acacia solar plant is a 12.8-Megawatt (MW) solar plant located four miles northeast of Presidio. Solaire Holman solar plant is a 50-MW solar plant located 15 miles northeast of Alpine. Shafter silver mine is located in the town of Shafter in south-central Presidio County. The Trans-Pecos pipeline is a 42-inch diameter pipeline that transports natural gas from Pecos, Brewster, and Presidio Counties to the U.S.-Mexico boundary near Presidio, TX. The pipeline crosses the US 67 corridor study limits at two locations, one at Shafter and another between Marfa and Alpine.

Figure 3 shows some of the major developments, tourist attractions, and other trip generators along the corridor.

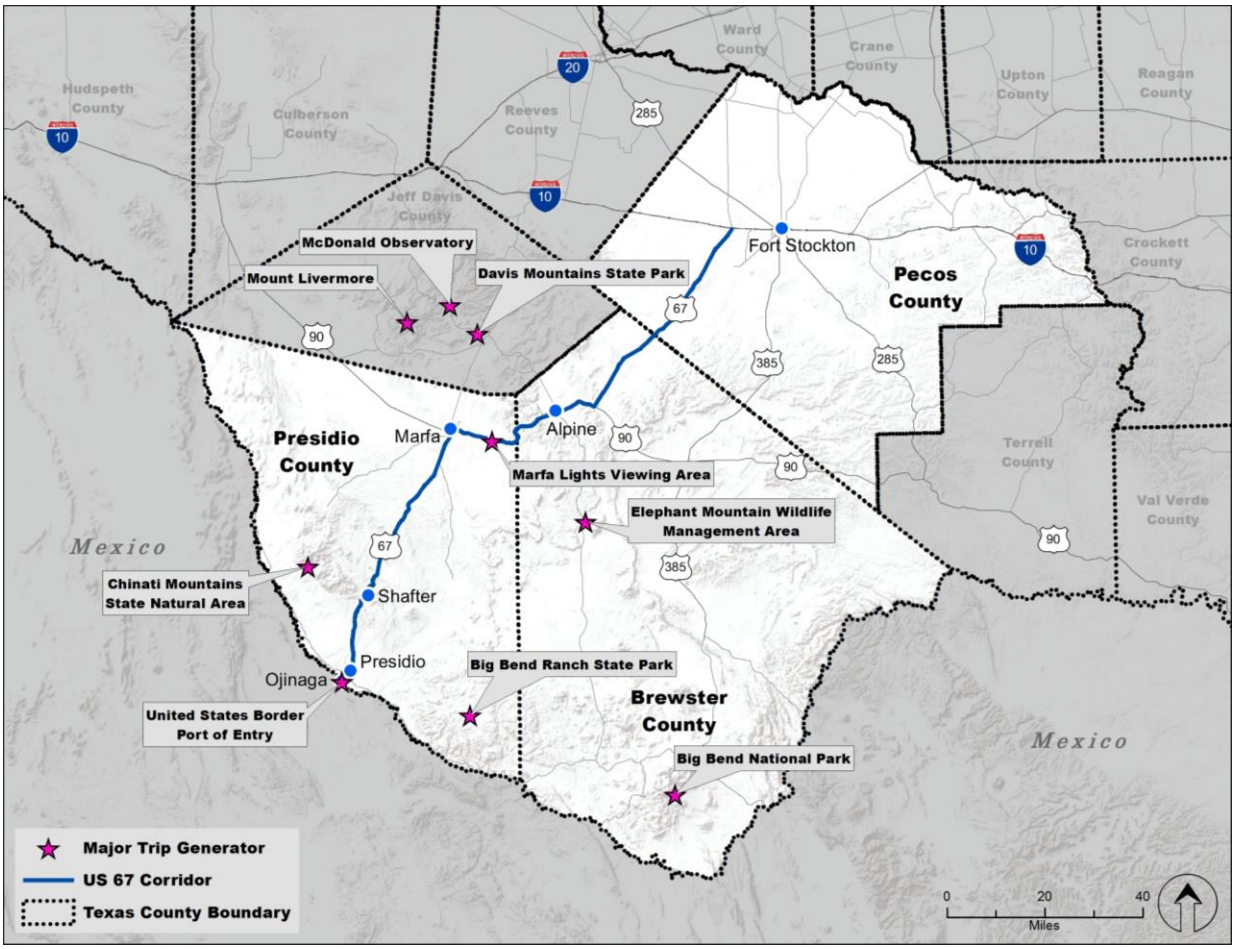


Figure 3: Major Trip Generators Along US 67 Corridor

2.3 Railroad Infrastructure

Railroad lines exist in the vicinity of the US 67 corridor within approximately 16 miles of the corridor alignment. They are operated by two companies – Texas-Pacifico Transportation, Ltd. (Texas-Pacifico), and Union Pacific Railroad (UP). As shown in **Figure 4**, the railroad crosses the US 67 corridor at five different locations. The first railroad crossing is located approximately 13.5 miles southwest of Alpine. At this location, US 67 travels over the railroad. The second and third railroad bridge crossings are located approximately 1.8 miles and 0.8 miles west of Alpine respectively. At both locations, the railroad passes over US 67. The fourth railroad crossing is located approximately 0.8 miles west of Alpine where the railroad crosses US 67 at-grade. The fifth railroad crossing is located approximately 33.5 miles northeast of Alpine. Here, the railroad also crosses US 67 at-grade.

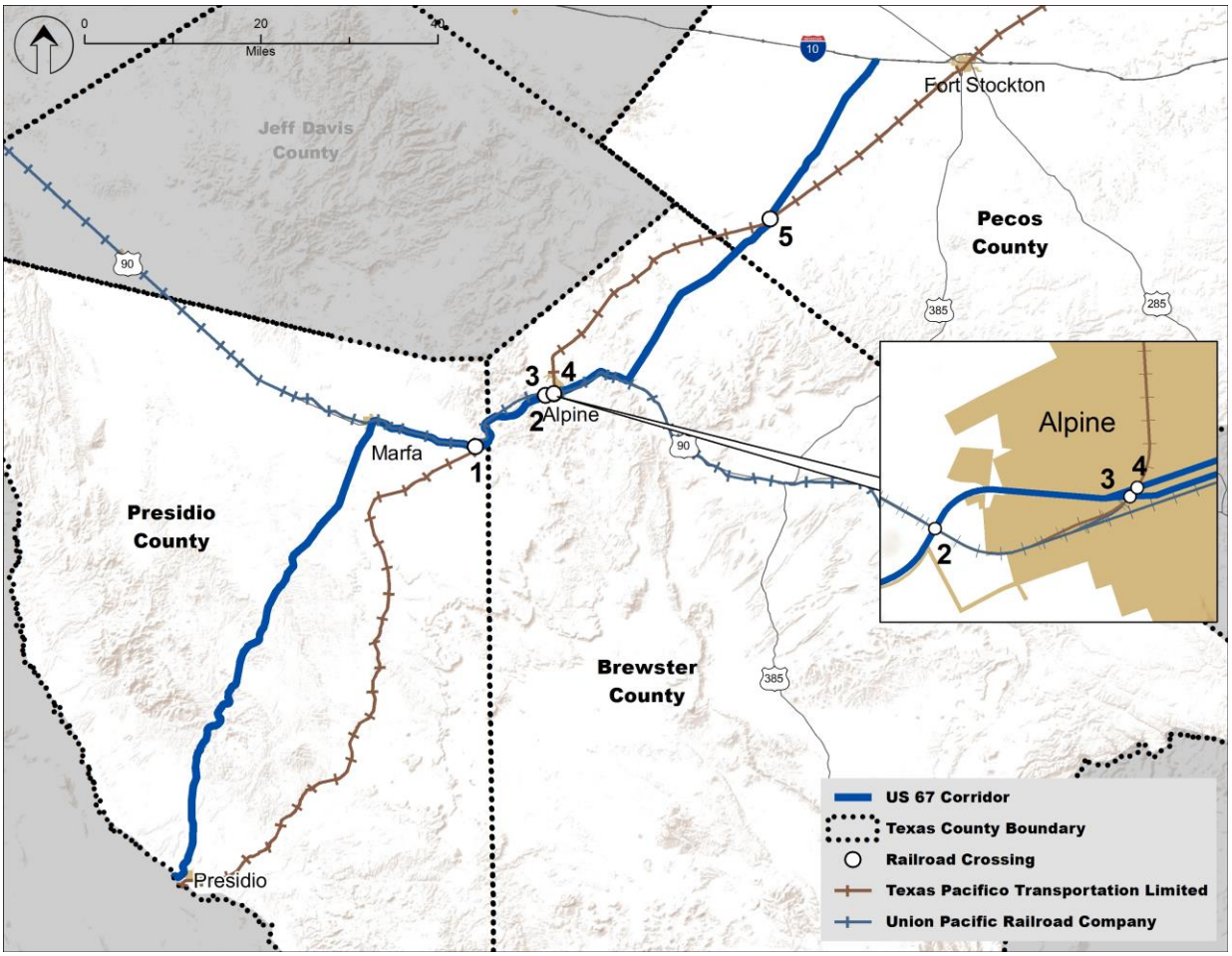


Figure 4: Railroad Tracks along US 67 Corridor

2.4 Roadway Attributes

2.4.1 Functional Classification

The US 67 corridor is classified into two main roadway functional classifications – rural principal arterial and small urban principal arterial. Within Segments 1 through 4, 6, and 7, US 67 travels through rural areas. Presidio and Marfa lie within Segments 1 through 4 and have populations of 4,426 and 1,981 people, respectively[3]. Within these segments, the road is classified as a rural principal arterial. Alpine lies in Segment 5 of the corridor and has a population of 5,905 people[3]; hence Segment 5 is classified as a small urban principal arterial.

[3]United States Census Bureau. American Fact Finder. *Community Facts*. Retrieved August 2018 from https://factfinder.census.gov/faces/nav/jsf/pages/community_facts.xhtml

2.4.2 Number of Lanes

Within the study limits, most of the US 67 corridor consists of two travel lanes with some areas being three or four lanes as summarized in **Table 1**.

Table 1: Number of Lanes Variation Along US 67 Corridor

Number of Lanes	Approximate Length (miles)	Percentage
Two Lanes	126	89%
Three Lanes	2	1%
Four Lanes	14	10%

Source: TxDOT Roadway Inventory OnSystem, 2018

Within Alpine, US 67 splits into two one-way highway. Each one-way highway has two lanes. Within Marfa, US 67 is a two-lane highway with one lane in each direction, and within Presidio, US 67 is a two-lane highway with a two-way left-turn lane.

In rural areas, US 67 is mostly a two-lane facility changing to three-lane and four-lane sections where climbing or passing lanes exist. **Figure 5** shows the climbing and passing lanes located on the US 67 corridor. US 67 corridor has approximately 31 miles of climbing and passing lanes which accounts for about 22 percent of the corridor distance.

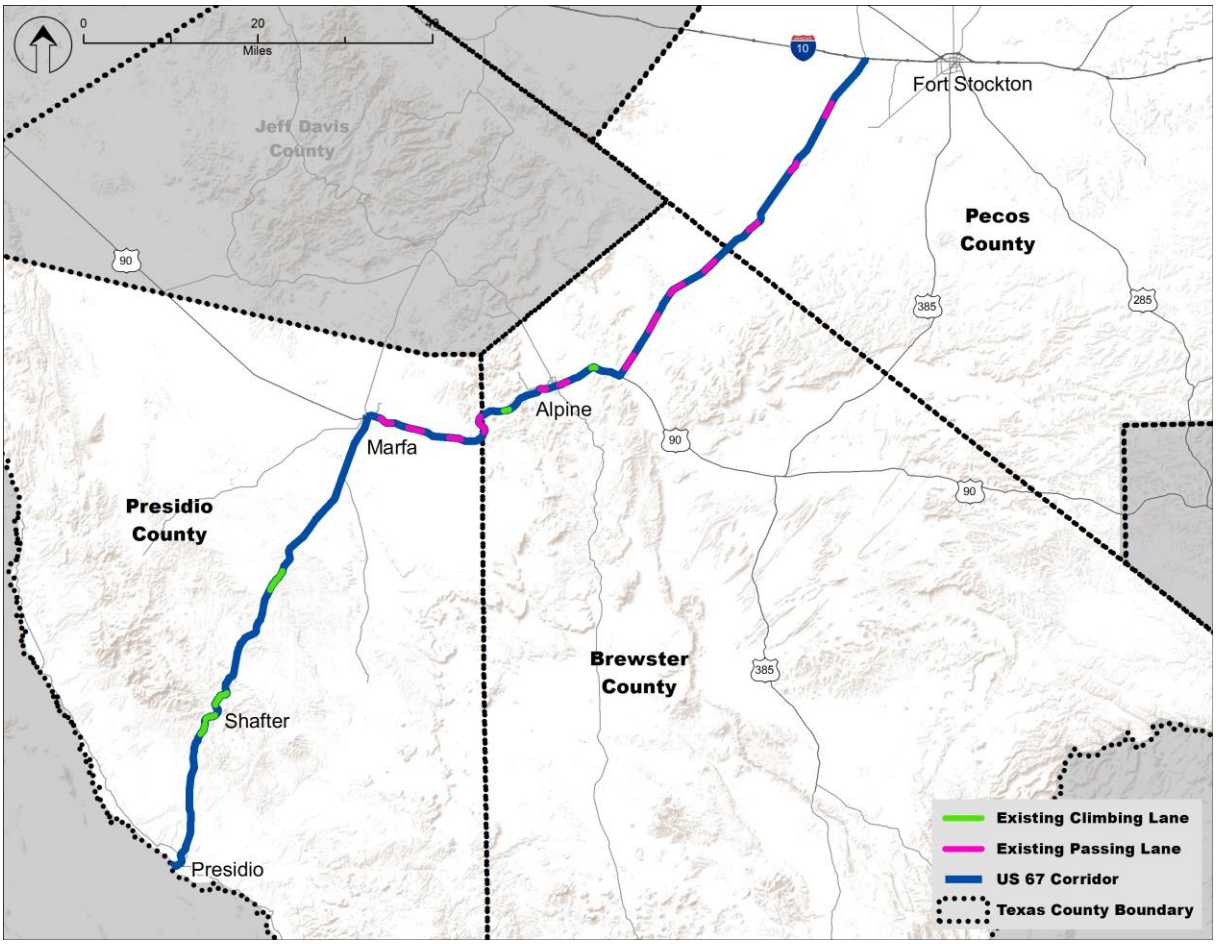


Figure 5: US 67 Corridor Climbing and Passing Lanes

2.4.3 Speed Limit

The US 67 corridor has a speed limit of 70 miles per hour (mph) to 75 mph except near Shafter and US 90 interchange where the speed limit is between 55 mph and 70 mph. The speed limit decreases to 30 mph and 55 mph within the city limits of Alpine, Marfa, and Presidio. **Figure 6** shows the speed limit variations along the US 67 corridor.

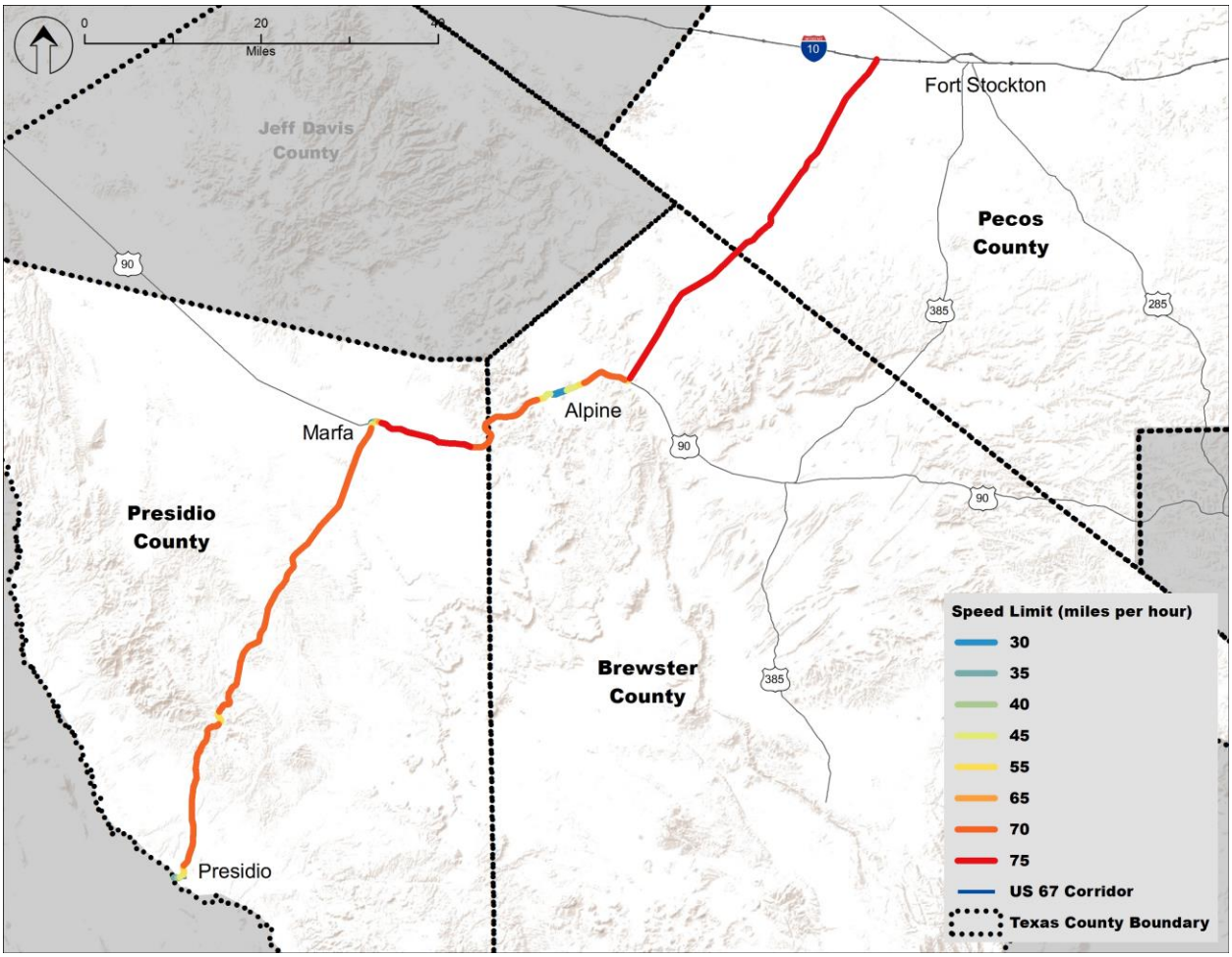


Figure 6: US 67 Corridor Speed Limits

2.4.4 Right-of-Way (ROW) Width

The width of the ROW within the US 67 corridor changes infrequently. Along the rural areas, the US 67 ROW is typically 120 feet wide. In urban communities, the ROW varies from 100 feet to 200 feet wide. **Figure 7** shows existing typical sections and ROW widths along the corridor.

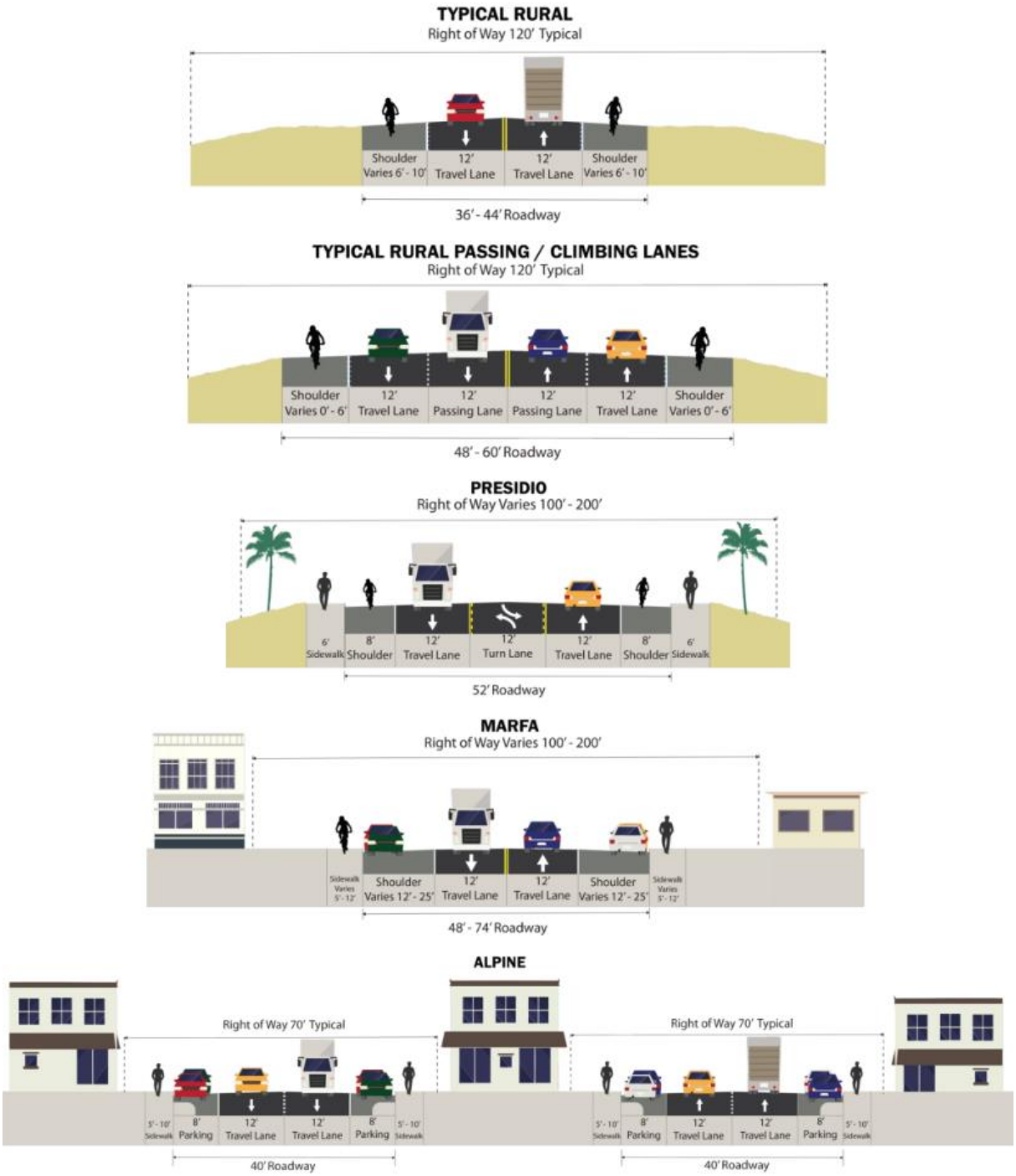


Figure 7: US 67 Corridor Existing Typical Sections and their ROW

2.4.5 Guardrail

Guardrails are one of the most important safety features along the US 67 corridor. Based on the TxDOT Guardrail End Treatment Inventory OnSystem 2019 database, LiDAR Survey conducted by the study team in April 2019, Google Earth images, and US 67 corridor field videos, the US 67 corridor has a total guardrail length of approximately 82,261 feet and 370 guardrail end treatments installed along bridges, culverts, steep side slopes, and rocky edge risks. There are 210 Sequential Kinking Terminal (SKT) 350, 99 ET Plus, 54 Turndown, 3 Driveway Terminal Anchor Sections, and 4 Downstream Anchor Terminal guardrail end treatments along the corridor. **Attachment A** provides a list of all the guardrail end treatments and their locations along the corridor. **Table 2** identifies all the guardrail end treatments where potential replacement may be required. There are 27 Turndowns guardrail end treatments that may require replacement. The guardrail end treatments identified for potential replacement are based on the following TxDOT guidelines:

1. For upstream traffic, turndown guardrail end treatments are never acceptable on any speed roadways.[4]

2. For downstream traffic, turndown guardrail end treatments are only acceptable when located outside the clear zone of opposing traffic.[4]

Table 2: Guardrail End Treatments Along US 67 Corridor that Potentially Needs Replacement

End Treatment	Roadbed Side[5]	Latitude	Longitude	Direction	Potentially Needs Replacement
Turndown	Left	30.30616258	-104.0193463	Downstream	x
Turndown	Left	30.3103072	-104.006022	Downstream	x
Turndown	Right	30.31058324	-104.0064825	Downstream	x
Turndown	Left	30.30991014	-104.0046803	Downstream	x
Turndown	Left	30.2986078	-103.9653074	Downstream	x
Turndown	Right	30.29882302	-103.9656547	Downstream	x
Turndown	Right	30.28352178	-103.9058464	Downstream	x
Turndown	Left	30.28321077	-103.9053873	Downstream	x
Turndown	Left	30.27910383	-103.8978041	Downstream	x
Turndown	Right	30.2794425	-103.8981132	Downstream	x
Turndown	Right	30.35752065	-103.6652274	Upstream	x
Turndown	Left	30.35736948	-103.6653166	Upstream	x
Turndown	Left	30.35543035	-103.6717967	Upstream	x

[4] TxDOT. *Metal Beam Guardfence Transition and End Treatment Identification Guide*. Retrieved on August 2018 from https://ftp.dot.state.tx.us/pub/txdot-info/des/guides/metal-beam.pdf

[5] The Roadbed Side is based on traveling on US 67 corridor from Interstate 10 (I-10) west of Fort Stockton to the Presidio/Ojinaga Port of Entry (POE) on the United Stated (U.S.)/Mexico border.

Table 2: Guardrail End Treatments Along US 67 Corridor that Potentially Needs Replacement (continued)

End Treatment	Roadbed Side[5]	Latitude	Longitude	Direction	Potentially Needs Replacement
Turndown	Left	30.50522924	-103.4413823	Downstream	x
Turndown	Right	30.50501634	-103.4417704	Downstream	x
Turndown	Right	30.50901569	-103.4384469	Downstream	x
Turndown	Left	30.50924301	-103.4380504	Downstream	x
Turndown	Right	30.60344073	-103.300814	Downstream	x
Turndown	Left	30.60401373	-103.2985155	Downstream	x
Turndown	Left	30.61188684	-103.2878647	Downstream	x
Turndown	Right	30.61162805	-103.2883504	Downstream	x
Turndown	Left	30.63375489	-103.2601179	Downstream	x
Turndown	Right	30.63336615	-103.2605051	Downstream	x
Turndown	Left	30.76886075	-103.157236	Downstream	x
Turndown	Right	30.76812026	-103.1578826	Downstream	x
Turndown	Right	30.89908536	-103.0555366	Downstream	x
Turndown	Left	30.90204217	-103.0551646	Downstream	x

Source: TxDOT Guardrail End Treatment Inventory OnSystem, 2019

2.5 Key Intersections for Safety

The study team conducted a safety analysis to identify the at-risk intersections along the study corridor. The safety analysis considered several risk factors to identify at-risk intersections. For intersections outside Presidio, Marfa, and Alpine city limits, the risk factors are:

- Each occurrence of a severe intersection-related crash
- Skewed minor approaches (greater than 15 degrees)
- Proximity to curves (within 150 feet)
- Proximity to railroad crossing (within 150 feet)

For intersections within Presidio, Marfa, and Alpine city limits, the risk factors are:

- Occurrence of a severe right-angle/head-on collision
- Occurrence of a severe pedestrian crash
- Presence of speed limit change within 1,000 feet of the intersection
- Presence of skewed intersection leg with skew angle being greater than 15 degrees

- Presence of curve within 150 feet of the intersection

Based on the safety analysis technical memorandum, there are potentially 18 at-risk intersections which are identified in **Table 3.**

Table 3: Potential At-Risk Intersections along US 67 Corridor

No.	Intersection Name	County	Segment
1	BU 67/ O'Reilly St and Howard Street	Presidio	1
2	BU 67/O'Reilly St and Tremont Street	Presidio	1
3	US 67 and Old Rd 170 and Utopia Road	Presidio	2
4	US 67 and Cibolo Creek Rd	Presidio	2
5	Highland Avenue and San Antonio Street	Presidio	3
6	US 67 and FM 1703	Brewster	5
7	US 67 and Orange Street	Brewster	5
8	Holland Avenue and 13th Street	Brewster	5
9	Holland Avenue and 5th Street	Brewster	5
10	Holland Avenue and Phelps Street	Brewster	5
11	Holland Avenue and Harrison Street	Brewster	5
12	E Avenue and Harrison Street	Brewster	5
13	E Avenue and Bird Street	Brewster	5
14	US 67 and Lackey Street	Brewster	5
15	US 67 and Harmon Street	Brewster	5
16	US 67 and US 90 Interchange	Brewster	6
17	US 67 at Old Alpine Highway	Pecos	7
18	US 67 and I-10 Interchange	Pecos	7

Figure 8 shows the 18 potential at-risk intersections along the US 67 study corridor.

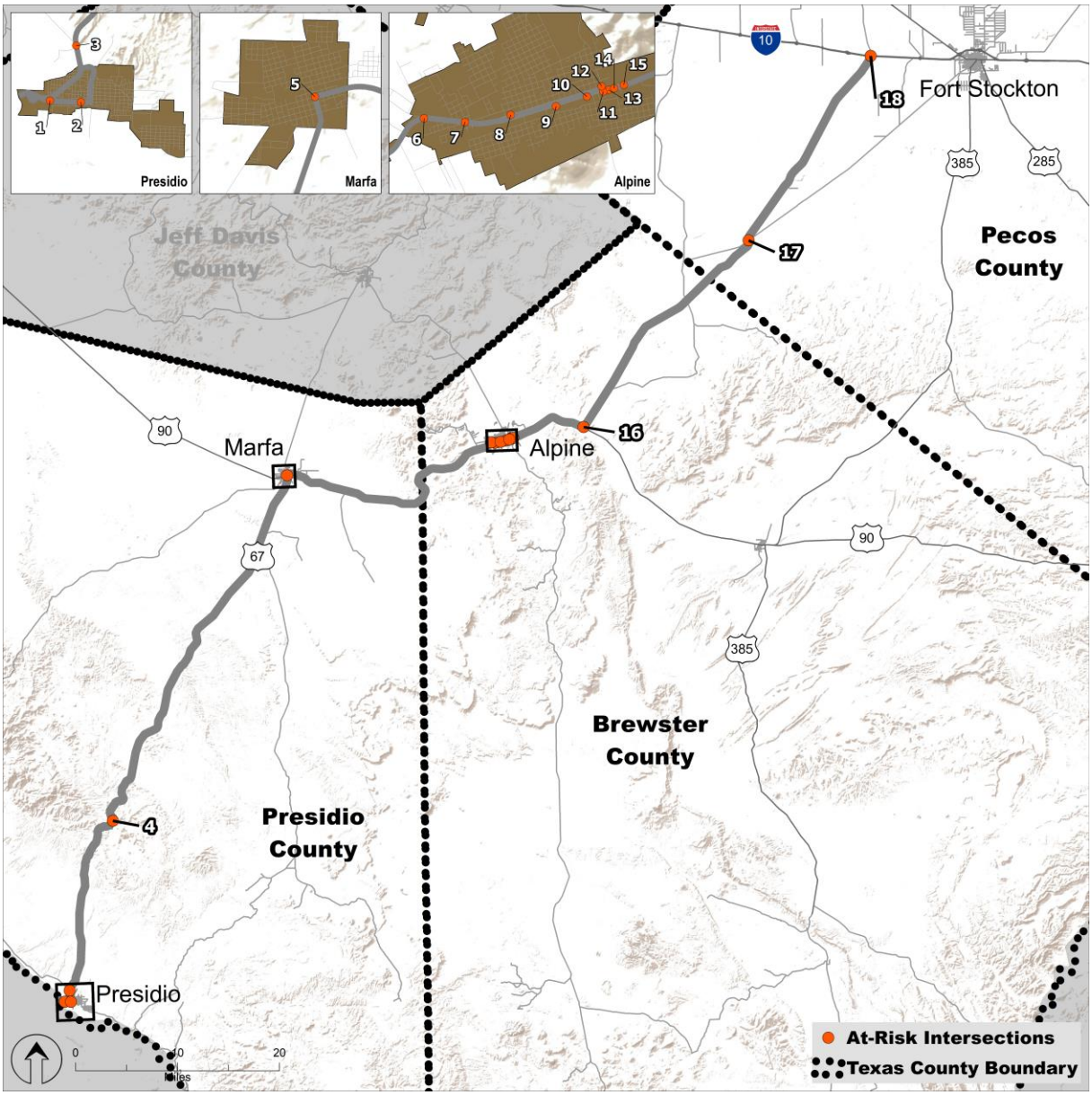
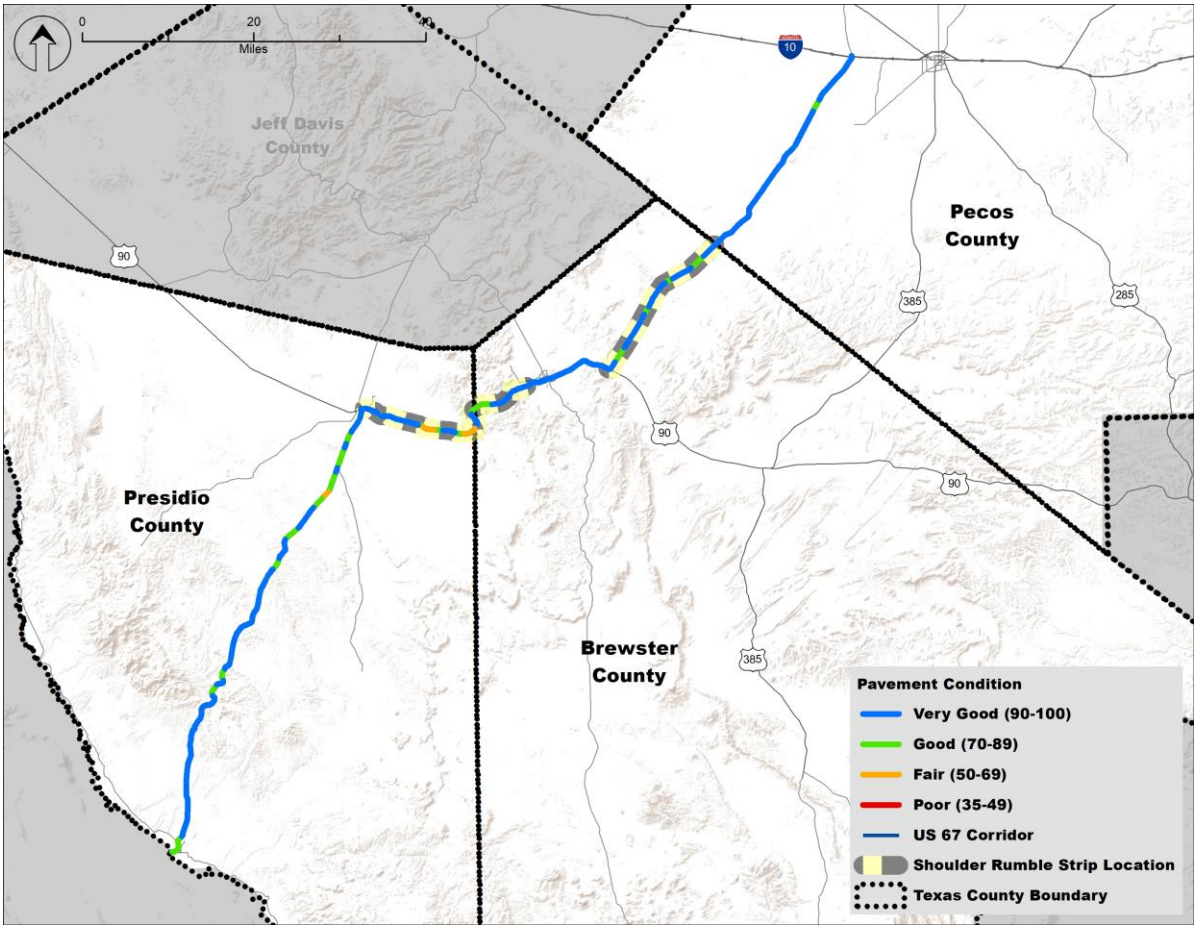


Figure 8: US 67 Corridor Potential At-Risk Intersections

2.6 Pavement Condition

The existing driving surface of the US 67 corridor is generally asphaltic concrete with 0 to 10-feet wide shoulders on both sides of the road. Within the three communities, the road features curb and gutter systems for drainage. The team used the TxDOT Pavement Management Information System (PMIS) survey that identifies pavement distress types, quantities, and severities to analyze the existing pavement condition. The PMIS survey also accounts for ride quality or roughness as part of the overall pavement performance evaluation.

According to the TxDOT 2019 PMIS survey, 73 percent of the pavement is in very good condition, 25 percent is in good condition, and 2 percent is in fair condition. Thirty percent of the US 67 corridor has shoulder rumble strips. **Figure 9** shows the existing pavement condition and rumble strips along the US 67 corridor.



Source: TxDOT Pavement Management Information System, 2019

Figure 9: Pavement Conditions Along US 67 Corridor

Some of the areas where the existing pavement condition is in fair condition include a 2,649 feet section along US 67 on segment 2 located 10.5 miles south from Marfa, a 2,646 feet section along US 67 on segment 4 located 7.6 miles east of Marfa, a 2,645 feet section along US 67 corridor on segment 4 located 8.6 miles east of Marfa, a 2,645 feet section along US 67 corridor on segment 4 located 12.6 miles east of Marfa, a 2,645 feet section along US 67 corridor on segment 4 located 13.6 miles east of Marfa, and a 58 feet section along US 67 corridor on segment 7 located at the intersection of I-10 and US 67.

As part of US 67 Corridor Master Plan Safety Analysis Technical Memorandum (**Appendix D – Safety Analysis**) and Mobile LiDAR Survey Procedure and Findings Technical Memorandum (**Appendix L -**

Mobile LiDAR Survey Procedure and Findings), superelevation analysis was performed for the 112 horizontal curves along the US 67 corridor to identify the curves that do not meet the current minimum required superelevation rate based on the TxDOT Roadway Design Manual (April 2018). Superelevation analysis was performed using TxDOT provided TIN files, Mobile LiDAR data, curve radius, length, and speed. The curve radius and length were obtained from TxDOT provided as-builts.

Based on the findings in Appendix L - Mobile LiDAR Survey Procedure and Findings , it was concluded that out of the 112 curves, 89 curves do not meet the minimum required superelevation standards and can be considered for improvements.

Based on the information in Appendix D – Safety Analysis, it was concluded that out of the 112 curves, 88 curves do not meet the minimum required superelevation standards and can be considered for improvements.

Out of the 88 curves identified in Appendix D – Safety Analysis, 85 curves match with the curves identified in Appendix L - Mobile LiDAR Survey Procedure and Findings that do not meet the minimum required superelevation standards. A table of curves that do not meet the minimum required superelevation from LiDAR Superelevation Analysis are presented in Appendix L - Mobile LiDAR Survey Procedure and Findings.

2.7 Highway Structures

2.7.1 Bridge and Bridge Channel

The study team used the FHWA NBI to evaluate bridge conditions along the corridor. According to the NBI, the US 67 corridor has a total of 16 bridges within the study limits. **Table 4** provides a list and pertinent information on the 16 bridges.

Table 4: List of Bridge Structures Along US 67 Corridor

Structure Number	Description	Latitude	Longitude
061860044107087	US 67 over I-10	30.9004	-103.0555
061860007502033	US 67 over Burnt House Creek	30.6038	-103.2996
240220007501071	US 67 over Antelope Draw	30.4936	-103.4503
240220007501061	US 67 over Ramsey Draw	30.3836	-103.5273
240220002101046	US 67 over Moss Creek	30.3684	-103.6301
240220002011160	US 67 SB/US 90 WB over Alpine Creek	30.3574	-103.6654
240220002011159	US 67/90 over McIntyer Creek	30.3407	-103.7219
241890002008046	US 67/90 over South Orient RR	30.3109	-104.0152
241890002008156	US 67/90 over McIntyer Creek	30.2686	-103.8301
241890002008157	US 67/90 over Alamito Creek	30.2685	-103.8234
241890010406016	US 67 over Big Trestle Draw	30.1768	-104.0808
241890010406017	US 67 over Saucita Creek	30.1492	-104.1080
241890010407018	US 67 over Perdiz Creek	30.1025	-104.1526

Table 4: List of Bridge Structures Along US 67 Corridor (continued)

Structure Number	Description	Latitude	Longitude
241890010408049	US 67 over Aquaita Creek	29.8519	-104.2896
241890010408052	US 67 over Cibolo Creek	29.8191	-104.3063
241890010409057	US 67 over Cibolo Creek	29.5738	-104.3762

Source: FHWA National Bridge Inventory, 2018

The bridge and bridge channel conditions for these bridges were obtained from the NBI database. The bridge and channel condition rating codes as described in **Table 5** and **Table 6** were obtained from the FHWA.[6] As shown in the tables, a higher bridge condition rating and channel condition rating represents a better condition while a lower rating represents a worse bridge condition.

Table 5: Bridge Condition Rating

Code	Condition Based Performance Measure	Condition - Description
N	Not Applicable	NOT APPLICABLE
9	Good	EXCELLENT CONDITION
8	Good	VERY GOOD CONDITION - no problems noted.
7	Good	GOOD CONDITION - some minor problems.
6	Fair	SATISFACTORY CONDITION - structural elements show some minor deterioration.
5	Fair	FAIR CONDITION - all primary structural elements are sound but may have minor section loss, cracking, spalling, or scour.
4	Poor	POOR CONDITION - advanced section loss, deterioration, spalling, or scour.
3	Poor	SERIOUS CONDITION - loss of section, deterioration, spalling, or scour have seriously affected primary structural components. Local failures are possible. Fatigue cracks in steel or shear cracks in concrete may be present.
2	Poor	CRITICAL CONDITION - advanced deterioration of primary structural elements. Fatigue cracks in steel or shear cracks in concrete may be present or scour may have removed substructure support. Unless closely monitored, it may be necessary to close the bridge until corrective action is taken.
1	Poor	"IMMINENT" FAILURE CONDITION - major deterioration or section loss present in critical structural components or obvious vertical or horizontal movement affecting structure stability. Bridge is closed to traffic, but corrective action may put back in light service.
0	Poor	FAILED CONDITION - out of service - beyond corrective action.

Source: FHWA Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges, 1995

[6] Federal Highway Administration. *Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges*. Retrieved on August 2018 from https://www.fhwa.dot.gov/bridge/mtguide.pdf

Table 6: Channel Condition Rating

Code	Description
N	Not applicable. Use when bridge is not over a waterway (channel).
9	There are no noticeable or noteworthy deficiencies that affect the condition of the channel.
8	Banks are protected or well vegetated. River control devices such as spur dikes and embankment protection are not required or are in a stable condition.
7	Bank protection is in need of minor repairs. River control devices and embankment protection have a little minor damage. Banks and/or channel have minor amounts of drift.
6	Bank is beginning to slump. River control devices and embankment protection have widespread minor damage. There is minor stream bed movement evident. Debris is restricting the channel slightly.
5	Bank protection is being eroded. River control devices and/or embankment have major damage. Trees and brush restrict the channel.
4	Bank and embankment protection is severely undermined. River control devices have severe damage. Large deposits of debris are in the channel.
3	Bank protection has failed. River control devices have been destroyed. Streambed aggradation, degradation or lateral movement has changed the channel to now threaten the bridge and/or approach roadway.
2	The channel has changed to the extent the bridge is near a state of collapse.
1	Bridge closed because of channel failure. Corrective action may put back in light service.
0	Bridge closed because of channel failure. Replacement necessary.

Source: FHWA Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges, 1995

The team also used sufficiency ratings to evaluate the structures. Sufficiency rating of a bridge is a numerical value obtained using four separator factors (structural adequacy and safety, serviceability and functional obsolescence, essentiality for public use, and special reductions) and it is indicative of bridge sufficiency to remain in service. A 100 percent sufficiency rating would represent an entirely sufficient bridge and zero would represent an entirely insufficient or deficient bridge.[7]

Table 7 provides a summary of bridge condition ratings, channel condition ratings, and sufficiency ratings for all 16 bridges.

Table 7: US 67 Corridor Bridge and Bridge Channel Conditions

Structure Number	Length (feet)	Deck Rating	Super Structure Rating	Sub Structure Rating	Bridge Condition	Channel Condition Rating	Sufficiency Rating
061860044107087	359.9	7	7	6	Fair	N	95.9
061860007502033	518.0	7	6	5	Fair	7	85.5
240220007501071	679.1	7	7	7	Good	7	99
240220007501061	334.0	5	7	5	Fair	6	77
240220002101046	180.1	6	6	6	Fair	7	79.8

[7] Federal Highway Administration. *Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges*. Retrieved on August 2018 from https://www.fhwa.dot.gov/bridge/mtguide.pdf

Table 7: US 67 Corridor Bridge and Bridge Channel Conditions (continued)

Structure Number	Length (feet)	Deck Rating	Super Structure Rating	Sub Structure Rating	Bridge Condition	Channel Condition Rating	Sufficiency Rating
240220002011160	105.0	6	6	6	Fair	7	91
240220002011159	131.9	7	6	7	Fair	7	96
241890002008046	170.9	6	6	5	Fair	7	85
241890002008156	79.1	7	7	7	Good	6	85.2
241890002008157	106.0	7	7	7	Good	N	91.1
241890010406016	200.1	7	6	6	Fair	8	98.7
241890010406017	170.9	7	7	6	Fair	7	99.3
241890010407018	113.8	7	7	6	Fair	7	96.8
241890010408049	65.9	7	7	7	Good	8	79.9
241890010408052	399.9	7	7	7	Good	7	86.8
241890010409057	1,470.1	6	7	7	Fair	7	100

Source: FHWA National Bridge Inventory, 2018

Out of the 16 bridges, 11 of the bridges show some minor structural element deterioration. Out of the 17 bridge channels, banks on 2 of the channels are beginning to slump and potential improvements may be required. However, the sufficiency rating indicates that all 16 bridges are in relatively good condition as they are all above 70 percent. None of the bridges are structurally deficient as the bridge deck, super structure, and sub structure condition ratings are all above 4, and bridge appraisal rating and water adequacy rating are above 2.[8]

2.7.2 Culvert, Culvert Channel, and Other Major Drainage Structures

The team used NBI data and Google Earth imagery to identify culverts along the study corridor. In total, the team identified 191 culverts along the study corridor, but the NBI only had data on 93 of the culverts. So, for this memorandum, the team has only analyzed those 93 culverts. **Table 8** provides a list and pertinent information on these culverts.

Table 8: List of Culvert Structures Along US 67 Corridor

Structure Number	Location	Latitude	Longitude
61860007503059	2.30 MI SW OF I-10	30.87251667	-103.07696667
61860007503058	3.45 MI SW OF I-10	30.86000556	-103.09041667
61860007503057	5.00 MI SW OF I-10	30.84360000	-103.10805833
61860007503056	6.85 MI SW OF I-10	30.82070278	-103.12487222
61860007503055	7.60 MI SW OF I-10	30.81174444	-103.13048056
61860007503054	8.15 MI SW OF I-10	30.80401389	-103.13532500

[8] Federal Highway Administration. Bridges & Structures. *Tables of Frequently Requested NBI Information*. Retrieved on August 2018 from https://www.fhwa.dot.gov/bridge/britab.cfm

Table 8: List of Culvert Structures Along US 67 Corridor (continued)

Structure Number	Location	Latitude	Longitude
61860007503053	8.70 MI SW OF I-10	30.79713889	-103.13962500
61860007503052	9.10 MI SW OF I-10	30.79201667	-103.14286944
61860007503051	9.20 MI SW OF I-10	30.79023611	-103.14395278
61860007503050	9.60 MI SW OF I-10	30.78557500	-103.14686944
61860007503049	10.0 MI SW OF I-10	30.78033889	-103.15014722
61860007503048	10.5 MI SW OF I-10	30.77393889	-103.15415556
61860007503047	11.0 MI SW OF I-10	30.76850556	-103.15755833
61860007503070	15.20 MI NE BREWSTER COUNTY LINE	30.75095556	-103.16859444
61860007503046	12.7 MI SW OF I-10	30.74690278	-103.17254722
61860007503045	14.0 MI SW OF I-10	30.73311667	-103.18786111
61860007503044	14.3 MI SW OF I-10	30.72906389	-103.19015833
61860007502043	8.70 MI NE OF BREWSTER COUNTY LINE	30.67642222	-103.23340278
61860007502069	8.15 MI NE OF BREWSTER COUNTY LINE	30.67022778	-103.23854444
61860007502042	7.65 MI NE OF BREWSTER COUNTY LINE	30.66402222	-103.24369167
61860007502068	7.30 MI NE OF BREWSTER COUNTY LINE	30.66017500	-103.24688611
61860007502067	6.65 MI NE OF BREWSTER COUNTY LINE	30.65341667	-103.25248889
61860007502041	6.15 MI NE OF BREWSTER COUNTY LINE	30.64656111	-103.25816667
61860007502040	5.30 MI NE OF BREWSTER COUNTY LINE	30.63548056	-103.25952222
61860007502065	5.47 MI NE OF BREWSTER COUNTY LINE	30.63825556	-103.25957222
61860007502066	5.90 MI NE OF BREWSTER COUNTY LINE	30.64389722	-103.25963611
61860007502039	5.15 MI NE OF BREWSTER COUNTY LINE	30.63353889	-103.26018611
61860007502038	4.96 MI NE OF BREWSTER COUNTY LINE	30.63146389	-103.26183056
61860007502037	4.84 MI NE OF BREWSTER COUNTY LINE	30.63006667	-103.26380000
61860007502036	4.70 MI NE OF BREWSTER COUNTY LINE	30.62841389	-103.26627222
61860007502035	3.90 MI NE OF BREWSTER COUNTY LINE	30.62187778	-103.27603611
61860007502003	3.10 MI NE OF BREWSTER COUNTY LINE	30.61421944	-103.28559167
61860007502034	2.85 MI NE OF BREWSTER COUNTY LINE	30.61177222	-103.28811389
61860007502064	1.30 MI NE OF BREWSTER COUNTY LINE	30.59900278	-103.30984722
61860007502063	0.85 MI NE OF BREWSTER COUNTY LINE	30.59486944	-103.31482500
61860007502032	0.15 MI NE OF BREWSTER COUNTY LINE	30.58742500	-103.32378889
240220007501031	19.5 MI N OF US 90	30.58506944	-103.32670278
240220007501030	19.1 MI N OF US 90	30.58176667	-103.33073333
240220007501029	17.8 MI N OF US 90	30.56829167	-103.34692778
240220007501028	16.4 MI N OF US 90	30.55423889	-103.36373889
240220007501027	16.2 MI N OF US 90	30.55260556	-103.36574444
240220007501026	15.4 MI N OF US 90	30.54476111	-103.37629444
240220007501025	15.0 MI N OF US 90	30.54194722	-103.38210556

Table 8: List of Culvert Structures Along US 67 Corridor (continued)

Structure Number	Location	Latitude	Longitude
240220007501024	14.8 MI N OF US 90	30.54068889	-103.38476667
240220007501023	14.7 MI N OF US 90	30.53963611	-103.38690000
240220007501022	14.5 MI N OF US 90	30.53872222	-103.38882778
240220007501021	14.45 MI N OF US 90	30.53742222	-103.39149167
240220007501020	13.8 MI N OF US 90	30.53291389	-103.40080833
240220007501019	12.7 MI N OF US 90	30.52539444	-103.41644444
240220007501018	10.8 MI N OF US 90	30.50922778	-103.43828611
240220007501017	10.6 MI N OF US 90	30.50515556	-103.44158333
240220007501016	10.2 MI N OF US 90	30.50139444	-103.44474722
240220007501015	9.90 MI N OF US 90	30.49818611	-103.44741389
240220007501013	8.80 MI N OF US 90	30.48395278	-103.45571944
240220007501012	7.10 MI N OF US 90	30.46244167	-103.46995000
240220007501011	4.10 MI N OF US 90	30.42541944	-103.49584722
240220007501010	3.9 MI N OF JCT US 90	30.42222500	-103.49825000
240220007501009	3.7 MI N OF JCT US 90	30.41977778	-103.50005556
240220007501008	3.30 MI N OF US 90	30.41511944	-103.50358889
240220007501007	1.8 MI N OF JCT US 90	30.39688056	-103.51735833
240220007501006	1.50 MI N OF US 90	30.39284722	-103.52035000
240220007501005	1.2 MI N OF JCT US 90	30.38948611	-103.52292222
240220002101083	0.70 MI W OF US 67	30.38001944	-103.54488611
240220002101089	1.10 MI W OF US 67	30.38242222	-103.55093889
240220002101050	4.6 MI E OF SH 118	30.38642500	-103.59329167
240220002101049	4.0 MI E OF SH 118	30.38208889	-103.60048333
240220002101048	3.6 MI E OF SH 118	30.37851944	-103.60661944
240220002101047	2.4 MI E OF SH 118	30.37050833	-103.62446944
240220002011147	0.25 MI W OF SH 118	30.35649722	-103.66527778
240220002011043	0.3 MI E OF FM 1703	30.35513333	-103.68439722
240220002011039	7.1 MI W OF FM 1703	30.31422500	-103.79183333
240220002009037	9.3 MI W OF FM 1703	30.28146667	-103.79584167
240220002009158	10.0 MI W OF FM 1703	30.29094167	-103.79604167
241890002008033	10.6 MI E OF SH 17	30.27345833	-103.85051389
241890002008154	9.3 MI E OF SH 17	30.27497778	-103.87172778
241890002008153	8.9 MI E OF SH 17	30.27541111	-103.87799167
241890002008152	8.0 MI E OF SH 17	30.27711944	-103.89429444
241890002008151	7.7 MI E OF SH 17	30.27918611	-103.89790000
241890002008031	7.2 MI E OF SH 17	30.28316111	-103.90513056
241890002008030	5.7 MI E OF SH 17	30.28871667	-103.92947500

Table 8: List of Culvert Structures Along US 67 Corridor (continued)

Structure Number	Location	Latitude	Longitude
241890002008029	5.4 MI E OF SH 17	30.28950556	-103.93381111
241890002008028	0.95 MI E OF SH 17	30.30991389	-104.00498333
241890002008027	0.90 MI E OF SH 17	30.31029167	-104.00625833
241890010406012	1.20 MI S OF US 90	30.29188333	-104.02400833
241890010406013	2.80 MI S OF US 90	30.27393889	-104.03741111
241890010406014	4.60 MI S OF US 90	30.24937778	-104.05065000
241890010406015	8.9 MI S OF US 90	30.18920833	-104.07572778
241890010407019	17.2 MI S OF US 90	30.09731667	-104.15956944
241890010407020	18.4 MI S OF US 90	30.08358056	-104.17035833
241890010407021	24.2 MI S OF US 90	30.01145000	-104.21271389
241890010409023	10.4 MI N OF FM 170	29.72548889	-104.35195833
241890010409025	5.8 MI N OF FM 170	29.65842222	-104.36084444
241890010409024	6.8 MI N OF FM 170	29.67489722	-104.36105556

Source: FHWA National Bridge Inventory, 2018

Table 9 was obtained from FHWA and describes the condition ratings used for culverts.[9] A higher culvert condition rating represents a better condition while a lower rating represents a worse culvert condition. The channel condition rating and sufficiency rating system for culverts are the same as for bridges.

[9] Federal Highway Administration. *Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges*. Retrieved on August 2018 from https://www.fhwa.dot.gov/bridge/mtguide.pdf

Table 9: Culvert Condition Rating

Code	Condition Based Performance Measure	Description
N	Not Applicable	Not applicable. Use if structure is not a culvert.
9	Good	No deficiencies.
8	Good	No noticeable or noteworthy deficiencies which affect the condition of the culvert. Insignificant scrape marks caused by drift.
7	Good	Shrinkage cracks, light scaling, and insignificant spalling which does not expose reinforcing steel. Insignificant damage caused by drift with no misalignment and not requiring corrective action. Some minor scouring has occurred near curtain walls, wingwalls, or pipes. Metal culverts have a smooth symmetrical curvature with superficial corrosion and no pitting.
6	Fair	Deterioration or initial disintegration, minor chloride contamination, cracking with some leaching, or spalls on concrete or masonry walls and slabs. Local minor scouring at curtain walls, wingwalls, or pipes. Metal culverts have a smooth curvature, non-symmetrical shape, significant corrosion or moderate pitting.
5	Fair	Moderate to major deterioration or disintegration, extensive cracking, and leaching, or spalls on concrete or masonry walls and slabs. Minor settlement or misalignment. Noticeable scouring or erosion at curtain walls, wingwalls, or pipes. Metal culverts have significant distortion and deflection in one section, significant corrosion or deep pitting.
4	Poor	Large spalls, heavy scaling, wide cracks, considerable efflorescence, or opened construction joint permitting loss of backfill. Considerable settlement or misalignment. Considerable scouring or erosion at curtain walls, wingwalls or pipes. Metal culverts have significant distortion and deflection throughout, extensive corrosion or deep pitting.
3	Poor	Any condition described in Code 4, but which is excessive in scope. Severe movement or differential settlement of the segments, or loss of fill. Holes may exist in walls or slabs. Integral wingwalls nearly severed from culvert. Severe scour or erosion at curtain walls, wingwalls or pipes. Metal culverts have extreme distortion and deflection in one section, extensive corrosion, or deep pitting with scattered perforations.
2	Poor	Integral wingwalls collapsed, severe settlement of roadway due to loss of fill. Section of culvert may have failed and can no longer support embankment. Complete undermining at curtain walls and pipes. Corrective action required to maintain traffic. Metal culverts have extreme distortion and deflection throughout with extensive perforations due to corrosion.
1	Poor	Bridge closed. Corrective action may put back in light service.
0	Poor	Bridge closed. Replacement necessary.

Source: FHWA Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges, 1995

Table 10 provides a summary of the culverts and channel condition for all 93 culverts. Out of the 93 culverts, 21 show signs of deterioration or initial disintegration, and banks on 18 of the culvert channels are beginning to slump or erode; therefore, some potential improvements may be required. The sufficiency rating indicates that all 93 culverts are in relatively good condition as they are all above 70 percent. None of the culverts are structurally deficient as all of the culvert ratings are above 4, and bridge appraisal rating and water adequacy rating are above 2.[10]

Table 10: Culvert and Culvert Channel Conditions Along US 67 Corridor

Structure Number	Length (ft)	Culvert Rating	Culvert Condition	Channel Condition Rating	Sufficiency Rating
61860007503059	40.0	7	Good	8	84.3
61860007503058	101.0	6	Fair	7	84.3
61860007503057	23.0	7	Good	8	84.3
61860007503056	34.1	7	Good	7	84.3
61860007503055	67.9	7	Good	7	84.3
61860007503054	23.0	7	Good	7	84.3
61860007503053	23.0	7	Good	7	84.3
61860007503052	56.1	6	Fair	7	84.3
61860007503051	40.0	6	Fair	7	84.3
61860007503050	34.1	6	Fair	7	84.3
61860007503049	26.9	7	Good	7	84.3
61860007503048	26.9	7	Good	8	84.3
61860007503047	138.1	7	Good	6	89.4
61860007503070	23.0	7	Good	7	85.6
61860007503046	33.1	7	Good	7	86.4
61860007503045	28.9	7	Good	6	86.4
61860007503044	23.0	7	Good	7	86.4
61860007502043	44.9	7	Good	8	86.4
61860007502069	39.0	7	Good	7	85.6
61860007502042	34.1	7	Good	7	86.4
61860007502068	40.0	7	Good	7	86.4
61860007502067	24.0	7	Good	7	86.4
61860007502041	28.9	7	Good	8	86.4
61860007502040	46.9	7	Good	7	86.4
61860007502065	35.1	7	Good	7	95.2
61860007502066	22.0	7	Good	7	95.2
61860007502039	91.9	7	Good	7	88.4

[10] Federal Highway Administration. Bridges & Structures. *Tables of Frequently Requested NBI Information*. Retrieved on August 2018 from https://www.fhwa.dot.gov/bridge/britab.cfm

Table 10: Culvert and Culvert Channel Conditions Along US 67 Corridor (continued)

Structure Number	Length (ft)	Culvert Rating	Culvert Condition	Channel Condition Rating	Sufficiency Rating
61860007502038	30.8	7	Good	8	86.4
61860007502037	30.8	7	Good	7	86.4
61860007502036	23.0	7	Good	7	86.4
61860007502035	60.0	7	Good	7	87.4
61860007502003	49.9	7	Good	7	86.4
61860007502034	80.1	7	Good	7	87.4
61860007502064	33.1	7	Good	6	86.4
61860007502063	23.0	7	Good	5	86.4
61860007502032	73.2	7	Good	7	86.4
240220007501031	23.0	7	Good	8	75.3
240220007501030	28.9	7	Good	8	75.3
240220007501029	167.0	6	Fair	6	78.3
240220007501028	99.1	6	Fair	8	77.3
240220007501027	86.0	7	Good	6	77.3
240220007501026	214.9	6	Fair	7	76.3
240220007501025	30.8	7	Good	7	75.3
240220007501024	35.1	7	Good	7	75.3
240220007501023	62.0	7	Good	7	78.3
240220007501022	131.9	7	Good	7	78.3
240220007501021	47.9	7	Good	7	75.3
240220007501020	97.1	7	Good	7	75.3
240220007501019	26.9	7	Good	7	75.3
240220007501018	39.0	7	Good	8	78.3
240220007501017	27.9	7	Good	7	78.3
240220007501016	54.1	7	Good	7	78.3
240220007501015	62.0	7	Good	8	75.3
240220007501013	84.0	6	Fair	5	78.3
240220007501012	112.9	7	Good	6	77.3
240220007501011	34.1	6	Fair	8	75.3
240220007501010	35.1	7	Good	8	75.3
240220007501009	34.1	7	Good	8	75.3
240220007501008	169.0	7	Good	8	78.3
240220007501007	59.1	7	Good	8	75.3
240220007501006	59.1	7	Good	7	75.3
240220007501005	41.0	7	Good	7	75.3
240220002101083	76.1	7	Good	8	73.3
240220002101089	34.1	7	Good	4	95

Table 10: Culvert and Culvert Channel Conditions Along US 67 Corridor (continued)

Structure Number	Length (ft)	Culvert Rating	Culvert Condition	Channel Condition Rating	Sufficiency Rating
240220002101050	24.0	7	Good	7	73.3
240220002101049	39.0	7	Good	6	73.3
240220002101048	30.8	7	Good	7	73.3
240220002101047	40.0	7	Good	8	73.3
240220002011147	87.9	6	Fair	6	71.9
240220002011043	40.0	7	Good	6	73.3
240220002011039	28.9	7	Good	7	73.3
240220002009037	41.0	7	Good	5	73.3
240220002009158	39.0	7	Good	5	80
241890002008033	26.9	7	Good	7	72.3
241890002008154	26.9	7	Good	7	95
241890002008153	60.0	7	Good	8	73.3
241890002008152	23.0	6	Fair	7	95
241890002008151	52.2	6	Fair	8	96
241890002008031	74.1	6	Fair	7	74.3
241890002008030	48.9	7	Good	7	73.3
241890002008029	73.2	6	Fair	8	75.3
241890002008028	79.1	6	Fair	7	74.3
241890002008027	79.1	6	Fair	7	74.3
241890010406012	46.9	6	Fair	8	78.3
241890010406013	44.9	6	Fair	7	75.3
241890010406014	106.0	6	Fair	6	75.3
241890010406015	45.9	7	Good	7	75.3
241890010407019	23.0	6	Fair	7	75.3
241890010407020	23.0	7	Good	7	75.3
241890010407021	62.0	6	Fair	6	75.3
241890010409023	36.1	7	Good	8	75.3
241890010409025	37.1	7	Good	5	75.3
241890010409024	27.9	7	Good	5	78.3

Source: FHWA National Bridge Inventory, 2018

3.0 Potential Corridor Issues to Address for Improvements

3.1 Existing Issues to Improve

The second and third railroad bridge crossings are located approximately 1.8 miles and 0.8 miles west of Alpine respectively as shown in **Figure 4**. The railroad bridge crossings travel over US 67 and they do not meet the current TxDOT vertical clearance standards. According to the TxDOT Roadway Design Manual, April 2018, the minimum vertical clearance for a new structure on a two-lane rural highway is 16.50 feet for new construction and for an applicable Texas Highway Freight Network (THFN) bridge, it is 18.50 feet. The existing vertical clearances on the second and third railroad crossing bridges are 13.58 feet and 14.75 feet, respectively. Potential changes may be required to address the vertical clearances for these two bridges, subject to community and local desire to study potential changes.

The fifth railroad crossing is located approximately 33.5 miles northeast of Alpine as shown in **Figure 4**. The railroad crosses US 67 at-grade. The railroad crossing is located between two sharp horizontal curves, each with a radius of 2,865 feet. The speed limit on US 67 traveling through the railroad crossing is 75 mph. Current safety measures at this location include at-grade railroad crossing advanced warning signposts and pavement markings located approximately 1,000 feet before the railroad crossing in both directions. There are no street lights present at this location. Due to the presence of sharp horizontal curves, the high-speed limit and the lack of street lights for night-time visibility, further safety measures along the roadway alignment are potentially required to be evaluated at this location.

Table 7 and **Table 10** list all the bridges, culverts, and channels with their condition rating. Bridges, culverts, and channels with a condition rating of 6 and below show signs of some minor deterioration. Such structures may require potential improvements to limit the deterioration and maintain a good rating. **Table 2** lists all the guardrail end treatments that may require potential replacement. **Figure 9** shows areas where the pavement is in poor condition and might potentially require some improvements.

3.2 Potential Impediments to Roadway Improvements

As stated previously, the study team split the corridor into 7 segments. The team evaluated potential impediments to roadway improvements within each segment. The impediments to improve the roadway along the US 67 corridor are described below for each segment:

- Segment 1 of the US 67 corridor runs north-south within the Presidio city limits and its ROW width ranges from 120 feet to 200 feet. Some residential and commercial facilities along the edge of the existing roadway and the TxDOT ROW line may be of concern for roadway improvements.
- Segment 2 of the US 67 corridor runs north-south from the Presidio city limit to the Marfa city limit and its ROW width is usually 100 feet. Besides the Shafter Silver Mine and Trans-Pecos Pipeline, there are no major facilities along US 67 at this segment, but it does have a lot of rocky

edges and steep slopes along the roadway in both directions. It may be costly to widen the roadway for adding passing/climbing lanes on such terrain. The Big Bend Telephone fiber cable runs along the US 67 ROW for most of the segment length and crosses US 67 at nine locations.

- Segment 3 of the US 67 corridor runs partly east-west and partly north-south within the Marfa city limits and its ROW width ranges from 100 feet to 200 feet. One of the impediments for improving the roadway in this segment is the presence of residential and commercial buildings along the edge of the existing roadway. Further investigation of TxDOT's ROW is required to determine if these residential and commercial buildings lie within the ROW line. The Big Bend Telephone fiber cable runs along the ROW line for a small portion of this segment.

- Segment 4 of the US 67 corridor runs east-west from the Marfa city limits to the Alpine city limits and its ROW width is usually 120 feet. There are not any major facilities along the US 67 ROW at this segment, but it does have some rocky edges and steep slopes along both directions of the roadway, which can make adding climbing/passing lanes costly. Also, the first and second railroad crossings are in this segment. At the first railroad crossing, US 67 travels over the railroad and at the second railroad crossing, the railroad travels over US 67. The two railroad crossings may cause an impediment for improving the roadway. The Big Bend Telephone fiber cable runs along the ROW line and crosses US 67 at three locations.

- Segment 5 of the US 67 corridor runs east-west within the Alpine city limits. At Alpine, US 67 is mostly a one-way, divided highway with two lanes in each direction. The ROW of each divided highway is 70 feet. As in Marfa, the presence of residential and commercial buildings on the edge of the existing roadway is a potential concern for roadway improvements. Further investigation of TxDOT's ROW is required to determine if these buildings are located within the ROW line. The third railroad crossing passes over US 67 at this segment and the railroad bridge columns are situated at the edge of the existing roadway. This causes a concern for improving the roadway at this location. The Big Bend Telephone fiber cable crosses US 67 at one location on Segment 5.

- Segment 6 of the US 67 corridor runs east-west from the Alpine city limit to the US 90 interchange and its ROW is usually 120 feet. Within this segment, there are some rocky edge risks and steep slopes that may cause some issues with roadway improvements. The Big Bend Telephone fiber cable runs along the ROW line on the south side of Segment 6 but the fiber cable does not cross the highway at any point on this segment.

- Segment 7 of the US 67 corridor runs north-south from the US 90 interchange to the I-10 interchange and its ROW is usually 120 feet. Within the ROW of Segment 7, there are no visible impediments to roadway improvements. However, the Big Bend Telephone fiber cable runs along the ROW line on the east side of US 67. The fiber cable line does not cross the highway at any point on Segment 7.

3.3 Basic Bridge Requirements at Stream and River Crossings

Based on the site visits, Google Earth images, and video of the US 67 corridor, there were no locations along the corridor where new bridge structure is imperative. As mentioned previously, the existing bridge and culvert structures along US 67 are in relatively good condition as the sufficiency rating of all the structures is above 70 percent. Further study is required to determine if there is a need for additional bridge or culvert structures along US 67 corridor.

3.4 Grade Separations and Intersection Improvements

The study team performed a detailed safety assessment based on the FHWA Highway Safety Improvement Program (HSIP) to evaluate the safety issues within the study limits. The study team identified risk factors for intersections along the US 67 corridor. Based on the safety assessment, there are potentially 18 at-risk intersections along the US 67 corridor study limits that potentially require improvements. **Figure 8** shows all the at-risk intersections for safety where potential improvements may be required.

Based on the site visits, Google Earth images, and video of the US 67 corridor, there were no locations along the corridor where new grade separation is imperative. Further study is required to determine if there is a need for grade separation along US 67 corridor.

Attachment A: Guardrail Location and End Treatments along US 67 Corridor

End Treatment	Roadbed Side[11]	Latitude	Longitude	Direction	Potentially Needs Replacement
ET Plus	Left	30.18945802	-104.0755524	Downstream	
ET Plus	Left	30.18867748	-104.075868	Upstream	
ET Plus	Right	30.14936717	-104.1077672	Upstream	
ET Plus	Left	30.14928541	-104.1076691	Downstream	
ET Plus	Left	30.1019939	-104.1532055	Upstream	
ET Plus	Left	30.1027733	-104.1521329	Downstream	
ET Plus	Left	30.14831074	-104.1087164	Upstream	
ET Plus	Right	30.29270937	-104.0237377	Upstream	
ET Plus	Right	30.2918698	-104.0240845	Downstream	
ET Plus	Right	30.27309849	-104.0383708	Upstream	
ET Plus	Right	30.27236511	-104.0389451	Downstream	
ET Plus	Right	30.25004441	-104.0503791	Upstream	
ET Plus	Right	30.24905819	-104.0508012	Downstream	
ET Plus	Right	30.18975339	-104.075564	Upstream	
ET Plus	Right	30.18897421	-104.0758819	Downstream	
ET Plus	Left	30.17615335	-104.080981	Upstream	
ET Plus	Left	30.17748385	-104.0804408	Downstream	
ET Plus	Right	30.17791234	-104.0804099	Upstream	
ET Plus	Right	30.17658097	-104.0809517	Downstream	
ET Plus	Right	30.1486929	-104.1084902	Downstream	
ET Plus	Right	30.10312523	-104.1518508	Upstream	
ET Plus	Right	30.10234538	-104.1529234	Downstream	
ET Plus	Right	30.0934411	-104.1651409	Upstream	
ET Plus	Right	30.09308135	-104.1656338	Downstream	
ET Plus	Right	30.05256788	-104.1823806	Upstream	
Turndown	Right	30.05106573	-104.183047	Downstream	
ET Plus	Right	30.04527536	-104.1875248	Upstream	
Turndown	Right	30.04431664	-104.1882645	Downstream	
ET Plus	Right	30.0382093	-104.1948472	Upstream	
ET Plus	Right	30.03698771	-104.1958889	Downstream	
ET Plus	Right	29.94061929	-104.2552327	Upstream	
ET Plus	Right	29.94011664	-104.2556677	Downstream	
ET Plus	Left	29.93971854	-104.2558536	Upstream	
ET Plus	Left	29.9402213	-104.25542	Downstream	

[11] The Roadbed Side is based on traveling on US 67 corridor from Interstate 10 (I-10) west of Fort Stockton to the Presidio/Ojinaga Port of Entry (POE) on the United Stated (U.S.)/Mexico border.

End Treatment	Roadbed Side[11]	Latitude	Longitude	Direction	Potentially Needs Replacement
ET Plus	Left	30.24863412	-104.0508493	Upstream	
ET Plus	Left	30.24968712	-104.050402	Downstream	
ET Plus	Left	30.27202145	-104.0390662	Upstream	
ET Plus	Left	30.2727543	-104.0384915	Downstream	
ET Plus	Left	30.29132489	-104.0242117	Upstream	
ET Plus	Left	30.29234583	-104.0237443	Downstream	
SKT 350	Left	29.57102001	-104.3751963	Upstream	
SKT 350	Left	29.57601643	-104.376575	Downstream	
SKT 350	Left	29.65807461	-104.360648	Upstream	
SKT 350	Left	29.65889313	-104.3607638	Downstream	
SKT 350	Left	29.67479106	-104.3608669	Upstream	
SKT 350	Left	29.6751983	-104.3608696	Downstream	
SKT 350	Left	29.7253715	-104.3517955	Upstream	
SKT 350	Left	29.72597663	-104.3518235	Downstream	
SKT 350	Left	29.73230175	-104.3522695	Upstream	
SKT 350	Left	29.73306808	-104.3523235	Downstream	
SKT 350	Left	29.7407961	-104.3536108	Upstream	
SKT 350	Left	29.74217299	-104.3536788	Downstream	
SKT 350	Left	29.76631172	-104.3489033	Upstream	
SKT 350	Left	29.76896076	-104.3457451	Downstream	
SKT 350	Left	29.77090812	-104.3446506	Upstream	
SKT 350	Left	29.77125959	-104.3445859	Downstream	
SKT 350	Left	29.77922393	-104.3408906	Upstream	
SKT 350	Left	29.77970849	-104.3405664	Downstream	
SKT 350	Left	29.80985388	-104.3225513	Upstream	
SKT 350	Left	29.81016227	-104.3218373	Downstream	
SKT 350	Left	29.8104619	-104.3165381	Upstream	
SKT 350	Left	29.81072384	-104.3152202	Downstream	
SKT 350	Left	29.81151149	-104.3133346	Upstream	
SKT 350	Left	29.81195562	-104.3123405	Downstream	
SKT 350	Left	29.81315292	-104.3107019	Upstream	
SKT 350	Left	29.81413696	-104.3098208	Downstream	
SKT 350	Left	29.8150219	-104.3090259	Upstream	
SKT 350	Left	29.81606136	-104.3080968	Downstream	
SKT 350	Left	29.81675572	-104.3074588	Upstream	
SKT 350	Left	29.81703662	-104.3072075	Downstream	
SKT 350	Left	29.81843777	-104.3062527	Upstream	
SKT 350	Left	29.82013171	-104.3057482	Downstream	

End Treatment	Roadbed Side[11]	Latitude	Longitude	Direction	Potentially Needs Replacement
SKT 350	Left	29.82233163	-104.3061209	Upstream	
SKT 350	Left	29.82279855	-104.3064804	Downstream	
SKT 350	Left	29.82341387	-104.3071899	Upstream	
SKT 350	Left	29.82393267	-104.3078386	Downstream	
SKT 350	Left	29.82775181	-104.310443	Upstream	
SKT 350	Left	29.82850821	-104.3105962	Downstream	
Turndown	Left	29.84183994	-104.3033401	Upstream	
Turndown	Left	29.84644503	-104.2971283	Downstream	
SKT 350	Left	29.84639485	-104.295428	Upstream	
Turndown	Left	29.84651208	-104.2940299	Downstream	
SKT 350	Left	29.84705273	-104.2917265	Upstream	
SKT 350	Left	29.84757101	-104.2905183	Downstream	
SKT 350	Left	29.84851893	-104.289558	Upstream	
SKT 350	Left	29.84921514	-104.2891933	Downstream	
SKT 350	Left	29.8513836	-104.2892835	Upstream	
SKT 350	Left	29.85215436	-104.2896331	Downstream	
SKT 350	Left	29.85838221	-104.2920937	Upstream	
SKT 350	Left	29.85901223	-104.292044	Downstream	
SKT 350	Left	29.86165629	-104.2917139	Upstream	
Turndown	Left	29.86191971	-104.291681	Downstream	
SKT 350	Left	29.8692903	-104.2876014	Upstream	
SKT 350	Left	29.86966938	-104.2873807	Downstream	
SKT 350	Left	29.87049435	-104.2869301	Upstream	
SKT 350	Left	29.87106434	-104.2866198	Downstream	
SKT 350	Left	29.87564079	-104.2828359	Upstream	
SKT 350	Left	29.87608082	-104.2819272	Downstream	
SKT 350	Right	29.87977122	-104.2772585	Upstream	
SKT 350	Right	29.87862929	-104.2778191	Downstream	
SKT 350	Right	29.87636927	-104.2816409	Upstream	
SKT 350	Right	29.8761307	-104.2821354	Downstream	
SKT 350	Right	29.87130957	-104.2866523	Upstream	
SKT 350	Right	29.87086641	-104.2868973	Downstream	
SKT 350	Right	29.87023699	-104.2872366	Upstream	
SKT 350	Right	29.86954333	-104.287617	Downstream	
SKT 350	Right	29.86898313	-104.287988	Upstream	
SKT 350	Right	29.86534128	-104.2911111	Downstream	
SKT 350	Right	29.86404788	-104.2915687	Upstream	
Turndown	Right	29.86200396	-104.2918215	Downstream	

End Treatment	Roadbed Side[11]	Latitude	Longitude	Direction	Potentially Needs Replacement
SKT 350	Right	29.85952041	-104.2921311	Upstream	
SKT 350	Right	29.8585501	-104.2922417	Downstream	
SKT 350	Right	29.85230701	-104.2898372	Upstream	
SKT 350	Right	29.85153304	-104.2894909	Downstream	
Turndown	Right	29.85078921	-104.2892973	Upstream	
SKT 350	Right	29.85019639	-104.2891797	Downstream	
SKT 350	Right	29.84989784	-104.2892018	Upstream	
Turndown	Right	29.84897627	-104.2894704	Downstream	
SKT 350	Right	29.84841802	-104.2898332	Upstream	
Turndown	Right	29.84718878	-104.2919316	Downstream	
SKT 350	Right	29.84503528	-104.3017585	Upstream	
SKT 350	Right	29.84443591	-104.3024227	Downstream	
SKT 350	Right	29.84304564	-104.3031171	Upstream	
SKT 350	Right	29.84058323	-104.3049881	Downstream	
SKT 350	Right	29.83809555	-104.3069954	Upstream	
SKT 350	Right	29.83610044	-104.3083614	Downstream	
SKT 350	Right	29.8351154	-104.3092519	Upstream	
SKT 350	Right	29.83283066	-104.3111475	Downstream	
SKT 350	Right	29.83268669	-104.3112265	Upstream	
SKT 350	Right	29.83097886	-104.3114164	Downstream	
SKT 350	Right	29.83016407	-104.3113	Upstream	
SKT 350	Right	29.82889993	-104.3108779	Downstream	
SKT 350	Right	29.8283442	-104.310727	Upstream	
SKT 350	Right	29.82758898	-104.3105683	Downstream	
SKT 350	Right	29.82643748	-104.3102272	Upstream	
SKT 350	Right	29.82462964	-104.3089314	Downstream	
Turndown	Right	29.82440528	-104.3087251	Upstream	
SKT 350	Right	29.82341748	-104.3074247	Downstream	
SKT 350	Right	29.82274619	-104.3066306	Upstream	
SKT 350	Right	29.82228538	-104.3062674	Downstream	
SKT 350	Right	29.82049027	-104.3058208	Upstream	
SKT 350	Right	29.81872294	-104.3062935	Downstream	
SKT 350	Right	29.81616061	-104.308169	Upstream	
SKT 350	Right	29.81561045	-104.3086647	Downstream	
SKT 350	Right	29.81428829	-104.3098442	Upstream	
SKT 350	Right	29.81310124	-104.3109392	Downstream	
Turndown	Right	29.8108609	-104.315608	Upstream	
Turndown	Right	29.81059592	-104.3166022	Downstream	

End Treatment	Roadbed Side[11]	Latitude	Longitude	Direction	Potentially Needs Replacement
SKT 350	Right	29.81044394	-104.3174402	Upstream	
Turndown	Right	29.81051883	-104.3199413	Downstream	
SKT 350	Right	29.81048161	-104.3211954	Upstream	
Turndown	Right	29.80921045	-104.3242333	Downstream	
SKT 350	Right	29.80890987	-104.3258316	Upstream	
Turndown	Right	29.80845124	-104.3272405	Downstream	
SKT 350	Right	29.80756396	-104.328401	Upstream	
SKT 350	Right	29.80691845	-104.329127	Downstream	
SKT 350	Right	29.80399794	-104.3310117	Upstream	
SKT 350	Right	29.80261795	-104.3311538	Downstream	
SKT 350	Right	29.80055496	-104.3311434	Upstream	
SKT 350	Right	29.79944375	-104.3311211	Downstream	
SKT 350	Right	29.77972877	-104.3407054	Upstream	
SKT 350	Right	29.77924358	-104.3410307	Downstream	
SKT 350	Right	29.77079859	-104.3448018	Downstream	
SKT 350	Right	29.77236973	-104.3445109	Upstream	
SKT 350	Right	29.76741444	-104.348129	Upstream	
SKT 350	Right	29.76617175	-104.3491332	Downstream	
SKT 350	Right	29.76528279	-104.3495459	Upstream	
SKT 350	Right	29.76405391	-104.3498006	Downstream	
SKT 350	Right	29.76244125	-104.3500057	Upstream	
SKT 350	Right	29.76083703	-104.3504451	Downstream	
SKT 350	Right	29.74605004	-104.3531252	Upstream	
SKT 350	Right	29.74481455	-104.3533409	Downstream	
SKT 350	Right	29.7405926	-104.3536875	Upstream	
SKT 350	Right	29.73705578	-104.3527308	Downstream	
SKT 350	Right	29.7344785	-104.3525481	Upstream	
SKT 350	Right	29.73261545	-104.3524174	Downstream	
SKT 350	Right	29.72641554	-104.3519814	Upstream	
SKT 350	Right	29.72550281	-104.3519225	Downstream	
ET Plus	Right	29.675548	-104.3609985	Upstream	
SKT 350	Right	29.67479851	-104.3609947	Downstream	
SKT 350	Right	29.65916756	-104.3609133	Upstream	
SKT 350	Right	29.65839229	-104.3608203	Downstream	
ET Plus	Right	29.58981264	-104.368412	Upstream	
SKT 350	Right	29.58602329	-104.3716399	Downstream	
SKT 350	Right	29.5765251	-104.3768612	Upstream	
SKT 350	Right	29.57125693	-104.3754278	Downstream	

End Treatment	Roadbed Side[11]	Latitude	Longitude	Direction	Potentially Needs Replacement
SKT 350	Right	30.31125437	-104.0141632	Upstream	
SKT 350	Left	30.31102543	-104.0145215	Downstream	
SKT 350	Right	30.31079893	-104.015901	Downstream	
SKT 350	Left	30.31064566	-104.0159559	Upstream	
Turndown	Left	30.30616258	-104.0193463	Downstream	x
ET Plus	Left	30.30533918	-104.01922	Upstream	
Turndown	Left	30.3103072	-104.006022	Downstream	x
SKT 350	Left	30.31052733	-104.0067697	Upstream	
Turndown	Right	30.31058324	-104.0064825	Downstream	x
SKT 350	Right	30.31042888	-104.0059558	Upstream	
Turndown	Left	30.30991014	-104.0046803	Downstream	x
SKT 350	Left	30.31013493	-104.0054415	Upstream	
SKT 350	Right	30.31019635	-104.0051674	Downstream	
SKT 350	Right	30.30996857	-104.0044036	Upstream	
Turndown	Left	30.2986078	-103.9653074	Downstream	x
SKT 350	Left	30.29872459	-103.9659343	Upstream	
Turndown	Right	30.29882302	-103.9656547	Downstream	x
ET Plus	Right	30.29869182	-103.9650355	Upstream	
Turndown	Left	30.28949364	-103.9336018	Downstream	
ET Plus	Left	30.28964284	-103.9342898	Upstream	
Turndown	Right	30.28981109	-103.9342256	Downstream	
ET Plus	Right	30.28966354	-103.9335449	Upstream	
Turndown	Left	30.28856459	-103.9293339	Downstream	
ET Plus	Left	30.28870014	-103.9299557	Upstream	
Turndown	Right	30.28883462	-103.9297662	Downstream	
ET Plus	Right	30.28870078	-103.9291461	Upstream	
Turndown	Right	30.28352178	-103.9058464	Downstream	x
SKT 350	Right	30.28329343	-103.9051808	Upstream	
Turndown	Left	30.28321077	-103.9053873	Downstream	x
SKT 350	Left	30.28343704	-103.9060627	Upstream	
Turndown	Left	30.27910383	-103.8978041	Downstream	x
SKT 350	Left	30.2793749	-103.8982698	Upstream	
Turndown	Right	30.2794425	-103.8981132	Downstream	x
SKT 350	Right	30.27917363	-103.8976466	Upstream	
SKT 350	Left	30.26866561	-103.8296346	Downstream	
ET Plus	Left	30.26869314	-103.8309936	Upstream	
SKT 350	Right	30.26878958	-103.8292037	Upstream	
SKT 350	Right	30.26880567	-103.830564	Downstream	

End Treatment	Roadbed Side[11]	Latitude	Longitude	Direction	Potentially Needs Replacement
SKT 350	Left	30.26859186	-103.8227563	Downstream	
SKT 350	Left	30.2686427	-103.8272776	Upstream	
SKT 350	Right	30.26872314	-103.8224195	Upstream	
SKT 350	Right	30.26876585	-103.8269447	Downstream	
ET Plus	Left	30.34072293	-103.7215955	Downstream	
ET Plus	Left	30.34019905	-103.7229302	Upstream	
ET Plus	Right	30.34100518	-103.7212413	Upstream	
ET Plus	Right	30.34048139	-103.7225763	Downstream	
Turndown	Right	30.35752065	-103.6652274	Upstream	x
Downstream Anchor Terminal	Right	30.35740225	-103.6656227	Downstream	
Turndown	Left	30.35736948	-103.6653166	Upstream	x
Downstream Anchor Terminal	Left	30.35725222	-103.6657036	Downstream	
Turndown	Left	30.35543035	-103.6717967	Upstream	x
Driveway Terminal Anchor Section	Left	30.35509021	-103.6729326	Downstream	
Driveway Terminal Anchor Section	Left	30.35502819	-103.6731428	Upstream	
Turndown	Left	30.35493936	-103.6734312	Downstream	
Downstream Anchor Terminal	Right	30.35454734	-103.6734377	Downstream	
SKT 350	Right	30.35454009	-103.6737664	Upstream	
Downstream Anchor Terminal	Left	30.35445577	-103.6735418	Downstream	
SKT 350	Left	30.35444707	-103.6738724	Upstream	
SKT 350	Left	30.36786566	-103.6311975	Upstream	
SKT 350	Left	30.36847346	-103.6295918	Downstream	
SKT 350	Right	30.3681055	-103.6309716	Downstream	
SKT 350	Right	30.36862016	-103.6295777	Upstream	
SKT 350	Left	30.35198935	-103.6896319	Upstream	
SKT 350	Right	30.35215208	-103.689643	Downstream	
SKT 350	Right	30.35252393	-103.6894072	Upstream	
SKT 350	Left	30.35247923	-103.6893139	Downstream	
SKT 350	Left	30.37053956	-103.624091	Downstream	
SKT 350	Left	30.37007669	-103.6253219	Upstream	
SKT 350	Right	30.37027664	-103.6251664	Downstream	
SKT 350	Right	30.37139038	-103.6221855	Upstream	
SKT 350	Left	30.37306009	-103.6173762	Upstream	
SKT 350	Right	30.37317801	-103.6174376	Downstream	

End Treatment	Roadbed Side[11]	Latitude	Longitude	Direction	Potentially Needs Replacement
SKT 350	Right	30.37377576	-103.6158402	Upstream	
SKT 350	Left	30.37336974	-103.6165416	Downstream	
SKT 350	Right	30.37386771	-103.6155958	Downstream	
SKT 350	Left	30.37397183	-103.6149437	Upstream	
SKT 350	Left	30.37452833	-103.6134563	Downstream	
SKT 350	Right	30.37465241	-103.613489	Upstream	
SKT 350	Right	30.38264151	-103.5995962	Upstream	
SKT 350	Left	30.38217722	-103.6001042	Downstream	
SKT 350	Right	30.3815672	-103.6013855	Downstream	
SKT 350	Left	30.38158984	-103.6010752	Upstream	
SKT 350	Right	30.37969911	-103.6044918	Upstream	
SKT 350	Left	30.37867503	-103.6059351	Downstream	
SKT 350	Right	30.37774621	-103.6077451	Downstream	
SKT 350	Left	30.3773462	-103.6081464	Upstream	
SKT 350	Right	30.38544355	-103.5949357	Downstream	
SKT 350	Right	30.3872026	-103.5920073	Upstream	
SKT 350	Left	30.38523847	-103.5950168	Upstream	
SKT 350	Left	30.38695605	-103.5921529	Downstream	
Driveway Terminal Anchor Section	Right	30.39028244	-103.5865016	Upstream	
SKT 350	Right	30.38847563	-103.5898984	Downstream	
SKT 350	Right	30.38677265	-103.5746077	Downstream	
SKT 350	Left	30.38676995	-103.5749123	Downstream	
SKT 350	Right	30.38875257	-103.5785916	Upstream	
SKT 350	Left	30.38840527	-103.5782125	Upstream	
SKT 350	Left	30.38013559	-103.5455505	Upstream	
SKT 350	Left	30.37978119	-103.5447423	Downstream	
SKT 350	Right	30.37982234	-103.5444498	Upstream	
SKT 350	Right	30.38017722	-103.5452613	Downstream	
SKT 350	Right	30.38251983	-103.5513192	Downstream	
SKT 350	Left	30.38246157	-103.5516881	Upstream	
SKT 350	Right	30.38226053	-103.5503377	Upstream	
SKT 350	Left	30.38219295	-103.5505863	Downstream	
ET Plus	Right	30.3819513	-103.5285598	Downstream	
ET Plus	Right	30.38421517	-103.5268575	Upstream	
ET Plus	Left	30.38389648	-103.5269702	Downstream	
ET Plus	Left	30.38192047	-103.5284567	Upstream	
ET Plus	Left	30.41523486	-103.5033654	Downstream	

End Treatment	Roadbed Side[11]	Latitude	Longitude	Direction	Potentially Needs Replacement
ET Plus	Right	30.41529798	-103.5034745	Upstream	
ET Plus	Right	30.41452583	-103.5040565	Downstream	
ET Plus	Left	30.41446329	-103.5039463	Upstream	
ET Plus	Right	30.46280071	-103.4696865	Upstream	
Turndown	Left	30.46250252	-103.4696439	Downstream	
Turndown	Right	30.46192946	-103.4702592	Downstream	
ET Plus	Left	30.46163275	-103.4702172	Upstream	
ET Plus	Left	30.48408268	-103.4554719	Downstream	
ET Plus	Left	30.48348569	-103.4558656	Upstream	
ET Plus	Right	30.48354261	-103.4559787	Downstream	
ET Plus	Right	30.48413938	-103.4555842	Upstream	
ET Plus	Right	30.4939976	-103.450129	Upstream	
ET Plus	Right	30.49159704	-103.4511358	Downstream	
ET Plus	Left	30.49389926	-103.4500274	Downstream	
ET Plus	Left	30.4914996	-103.4510338	Upstream	
ET Plus	Right	30.50159822	-103.4445856	Upstream	
ET Plus	Right	30.50110158	-103.4449987	Downstream	
ET Plus	Left	30.50153135	-103.4444805	Downstream	
ET Plus	Left	30.50103496	-103.4448944	Upstream	
ET Plus	Left	30.50490228	-103.4416583	Upstream	
Turndown	Left	30.50522924	-103.4413823	Downstream	x
Turndown	Right	30.50501634	-103.4417704	Downstream	x
ET Plus	Right	30.50534462	-103.4414929	Upstream	
ET Plus	Left	30.50891143	-103.4383229	Upstream	
Turndown	Right	30.50901569	-103.4384469	Downstream	x
Turndown	Left	30.50924301	-103.4380504	Downstream	x
ET Plus	Right	30.50935458	-103.4381617	Upstream	
ET Plus	Right	30.5384027	-103.3894635	Downstream	
ET Plus	Right	30.53880055	-103.3886384	Upstream	
ET Plus	Left	30.53827534	-103.3894604	Upstream	
ET Plus	Left	30.53867426	-103.3886355	Downstream	
ET Plus	Left	30.53962504	-103.3866639	Downstream	
ET Plus	Left	30.53932071	-103.3872952	Upstream	
ET Plus	Right	30.5397534	-103.3866688	Upstream	
ET Plus	Right	30.53944805	-103.3872992	Downstream	
ET Plus	Left	30.54474049	-103.3760655	Downstream	
ET Plus	Left	30.54422575	-103.3771342	Upstream	
ET Plus	Right	30.54486788	-103.3760712	Upstream	

End Treatment	Roadbed Side[11]	Latitude	Longitude	Direction	Potentially Needs Replacement
ET Plus	Right	30.544351	-103.3771388	Downstream	
ET Plus	Left	30.55388649	-103.3640445	Upstream	
ET Plus	Right	30.55449419	-103.3636093	Upstream	
Turndown	Right	30.55401962	-103.3641786	Downstream	
Turndown	Left	30.55436202	-103.3634724	Downstream	
ET Plus	Right	30.55278134	-103.3656706	Upstream	
Turndown	Left	30.5526495	-103.3655344	Downstream	
ET Plus	Left	30.55219819	-103.3660754	Upstream	
Turndown	Right	30.5523315	-103.3662124	Downstream	
ET Plus	Right	30.56842697	-103.3467788	Upstream	
ET Plus	Right	30.56780076	-103.3475318	Downstream	
ET Plus	Left	30.56768146	-103.3474887	Upstream	
ET Plus	Left	30.56830475	-103.3467363	Downstream	
Turndown	Right	30.60344073	-103.300814	Downstream	x
SKT 350	Left	30.60327462	-103.3008774	Upstream	
Turndown	Left	30.60401373	-103.2985155	Downstream	x
SKT 350	Right	30.60418357	-103.2984551	Upstream	
SKT 350	Left	30.61147113	-103.2882975	Upstream	
Turndown	Left	30.61188684	-103.2878647	Downstream	x
Turndown	Right	30.61162805	-103.2883504	Downstream	x
SKT 350	Right	30.61203498	-103.2879313	Upstream	
ET Plus	Right	30.62223568	-103.2754514	Upstream	
SKT 350	Right	30.62161915	-103.2763563	Downstream	
SKT 350	Left	30.62184968	-103.2757056	Downstream	
ET Plus	Left	30.62123453	-103.2766119	Upstream	
Turndown	Left	30.63375489	-103.2601179	Downstream	x
SKT 350	Left	30.63322789	-103.2603994	Upstream	
Turndown	Right	30.63336615	-103.2605051	Downstream	x
SKT 350	Right	30.63388098	-103.2602308	Upstream	
Turndown	Left	30.76886075	-103.157236	Downstream	x
SKT 350	Left	30.76800646	-103.1577669	Upstream	
Turndown	Right	30.76812026	-103.1578826	Downstream	x
SKT 350	Right	30.76897079	-103.157354	Upstream	
Turndown	Right	30.89908536	-103.0555366	Downstream	x
SKT 350	Right	30.90213669	-103.0553223	Upstream	
SKT 350	Left	30.89906361	-103.0553708	Upstream	
Turndown	Left	30.90204217	-103.0551646	Downstream	x

Source: TxDOT Guardrail End Treatment Inventory OnSystem, 2019

13 FT 7 IN
Texas Department of Transportation
PRESIDIO TEXAS
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MARFA TEXAS
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