# US 67 CORRIDOR MASTER PLAN

## APPENDIX Q

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 Health Impact Assessment (HIA) Technical Memorandum*

# 1.0 Introduction

The purpose of this technical memorandum is to report the Health Impact Assessment (HIA) conducted as part of the US 67 Corridor Master Plan. The HIA identifies health indicators based on the community and corridor profiles. The HIA provides recommendations to modify the US 67 Corridor Master Plan draft recommended improvements to maximize the positive health impacts and minimize the negative health impacts to the public along the US 67 corridor. Five community health indicators were identified to develop the HIA; these indicators were identified based on the list of recommended improvements, the health-related outcomes and the goals of the US 67 Corridor Master Plan.

This technical memorandum has been divided into six sections. The first section introduces the US 67 corridor, the goals of the HIA, and the data collection methods. The second section explains the screening and scoping process, including the level of HIA chosen, the timeline of the HIA process, and the identified health indicators. The third section presents the baseline community conditions of the corridor. The fourth section provides the list of draft recommended improvements defined in the US 67 Corridor Master Plan. The fifth section describes the analyses of each community health indicator with recommendations. The sixth and final section summarizes the findings, impact level, focused population, and recommendations.

## 1.1 Study Area

The US 67 corridor 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. The US 67 corridor provides access to the towns of Alpine, Marfa, Presidio, and between communities (or rural segments). **Figure 1** shows the study corridor.

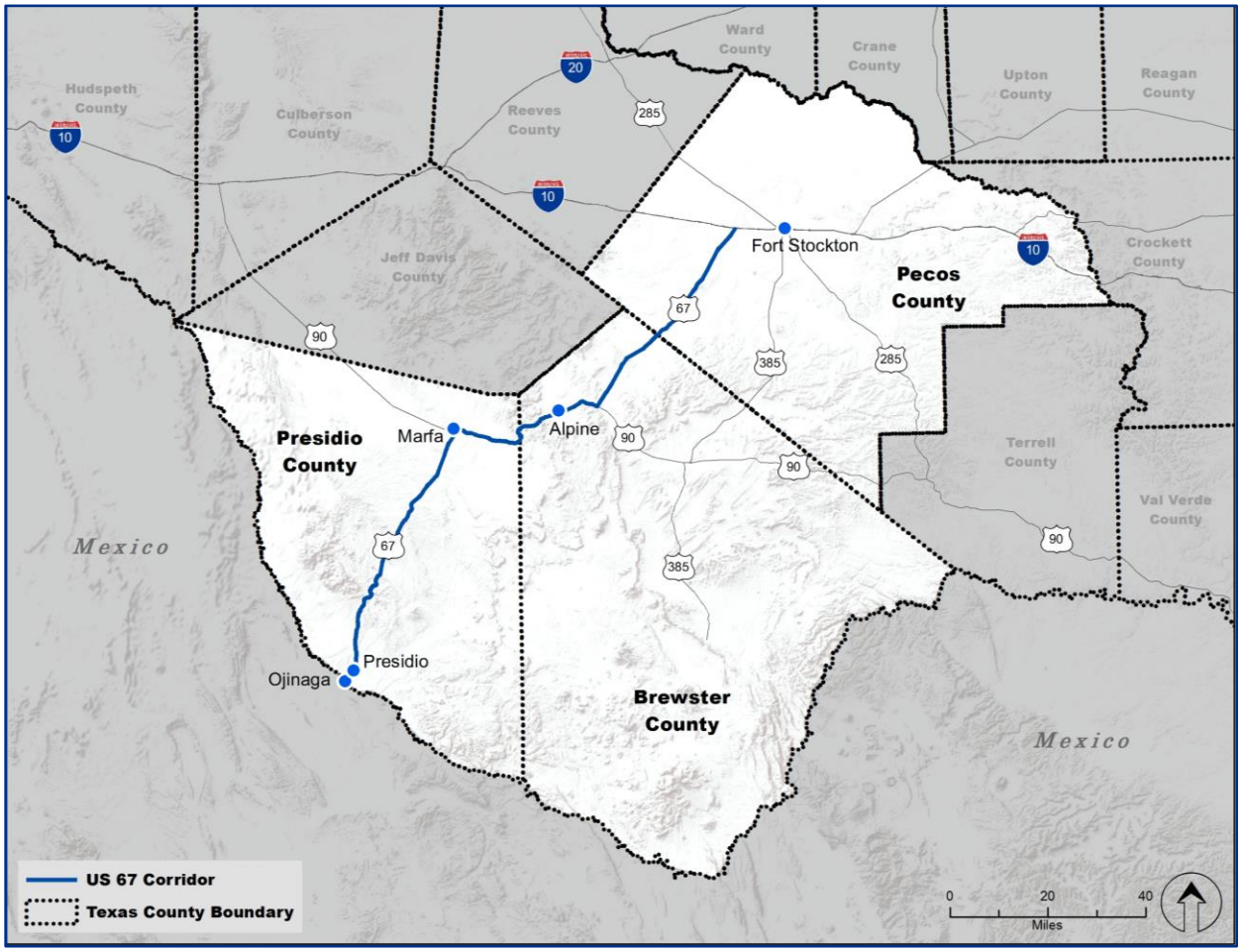



**Figure 1: US 67 Corridor Master Plan Study Corridor**

## 1.2 What is an HIA?

The HIA is a systematic process of identifying the health impacts[1] of a plan, policy, or project. It uses an array of data sources, analytical methods and inputs from community members, health experts, and decision-makers to identify the health impacts. The goal of an HIA is to modify the draft proposals (i.e. corridor improvements) to promote and improve public health and to reduce health inequalities experienced by the public (1). The HIA analyzes the draft proposals and identifies the vulnerable

[1] Health impacts are also known as health outcomes (positive or negative impact) from a planned improvement.

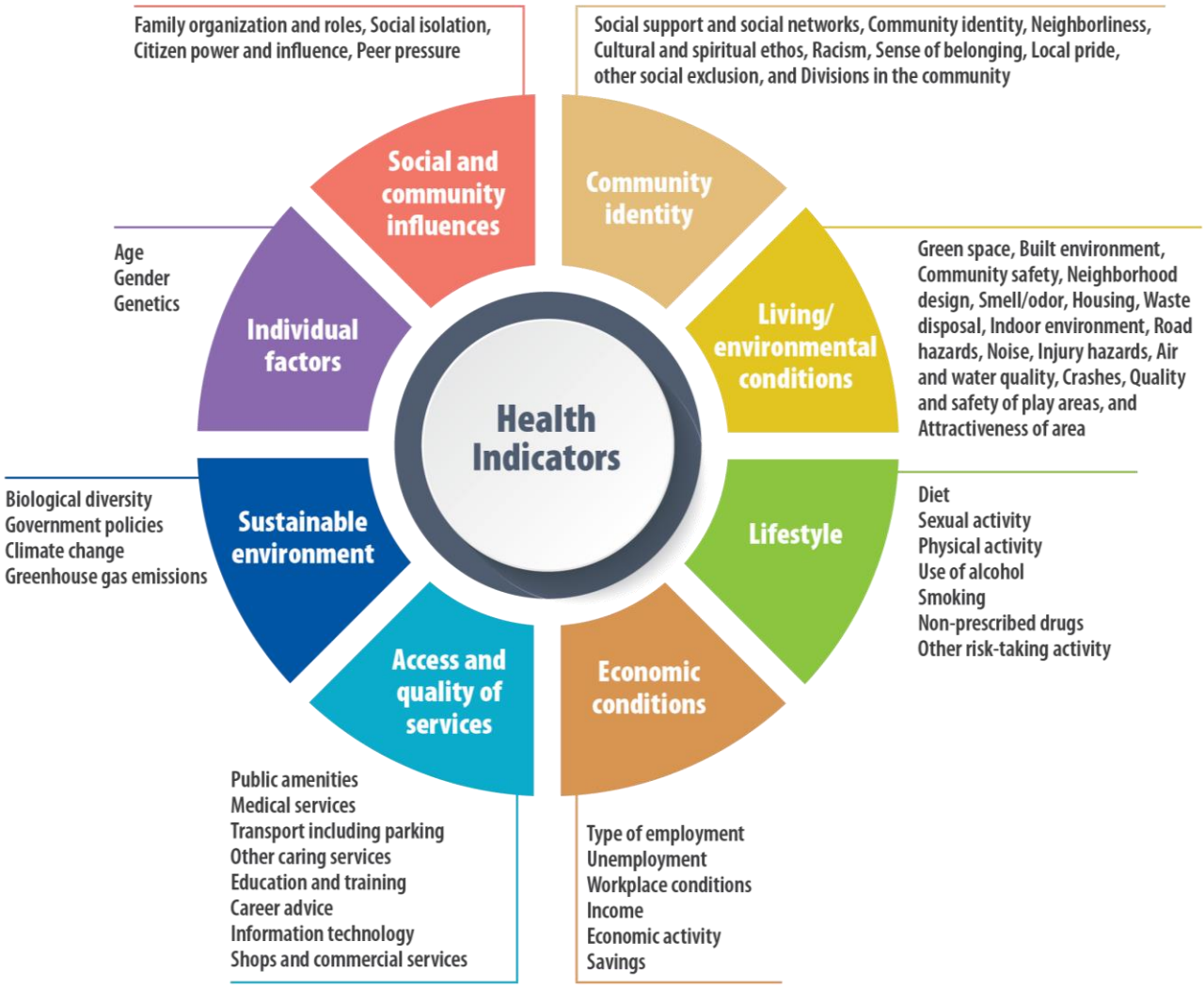
population[2]. There are five steps needed to complete the process of creating a successful HIA. These steps are described in **Figure 2.**

**Figure 2: HIA process**

## 1.3 What is health and how is it defined?

Health is not limited to a disease, health services, or biological factors (i.e. age) (2). Health is defined as the overall well-being of a human life (2). There are multiple factors that determine the health of an individual or a community. These are termed as health indicators. Health can be determined by social or environmental conditions, lifestyle, economic and political factors, public services and infrastructure, or individual behavior factors (3). A summary of the factors that can influence health indicators is shown in **Figure 3**.

[2] Specific population who are the most affected




*Source: Adapted from "A Health Impact Assessment Toolkit A Handbook to Conducting HIA, 3rd Edition"*
**Figure 3: Factors of Health Indicators**

## 2.0 Screening and Scoping Process

The screening process is a critical first step in an HIA and determines if the HIA is appropriate and feasible. For the US 67 corridor, TxDOT and the study team agreed to conduct an HIA, considering it essential to identify the impacts on public health due to changes in the built environment. The HIA will inform the public and decision-makers about the potential impacts on public health derived from the implementation of the proposed potential improvements. HIA recommendations will be incorporated into the US 67 Corridor Master Plan. As the plan is implemented, transportation improvement designs may be modified based on potential health outcomes.

The HIA scoping process was initiated in August 2018. The group of agencies involved in the HIA decision-making process is comprised of the Corridor Master Plan focus groups (Stakeholders), the Corridor Working Group, and TxDOT. Stakeholders include representatives from communities, towns, counties, state and federal congressional delegations, community and non-profit organizations, government agencies, educational, first responders, healthcare, and the private sector. A detailed list of members can be found in **Appendix A – Public Involvement Plan**.

The scoping process is the second step in the HIA development process which helps decide on a list of parameters and create a plan and timeline for conducting the HIA. The objectives of the scoping process are:

- Select the HIA level of analysis
- Set the scope of gathering the data and data sources
- Set the parameters and identify five community health indicators

As per direction from TxDOT, an intermediate level of analysis was selected to conduct the HIA with a timeline of four to six months. It was also determined that existing data would be gathered through focus groups, interviews, and public inputs. No new data or surveys would be collected or conducted. A baseline community profile would be analyzed and documented to understand the community's demographic, economic, social, and housing characteristics. Additionally, a qualitative analysis would be conducted to assess the health-related outcomes. Summaries from focus groups, interviews, public input, lists of recommended improvements, influence diagrams, and goals of the US 67 Corridor Master Plan would be used as parameters to identify the health indicators. To better understand the impacts of the US 67 Corridor Master Plan recommended potential improvements on the overall health of the communities, the study corridor would be divided into four study areas according to the geographical areas and assessed individually. The four study areas are shown below in **Figure 4.**

**Figure 4: HIA study areas**

# 3.0 Baseline Community Profile

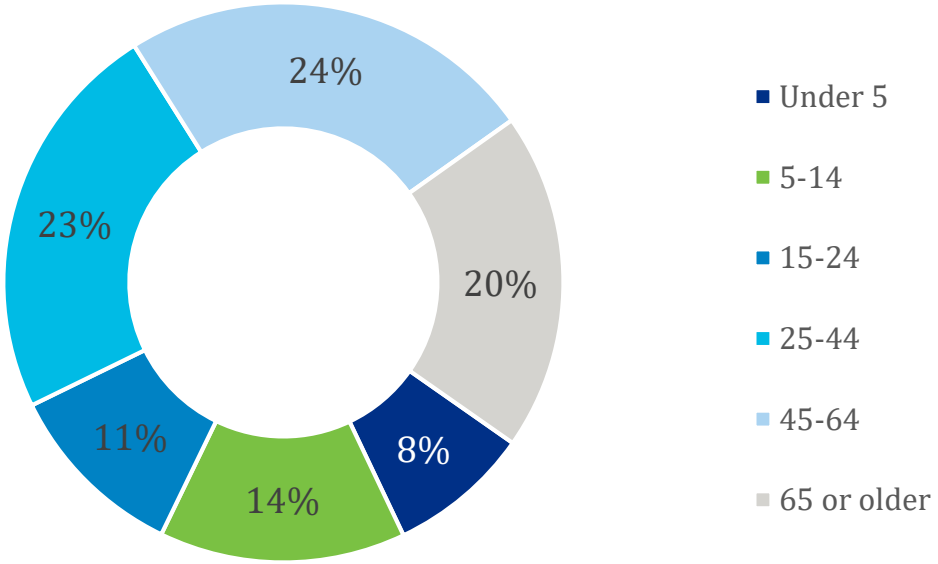
The baseline community profile includes a comparison of Alpine, Marfa, and Presidio with the state for demographic and neighborhood characteristics, public health data, and crash history along the US 67 corridor. This section is divided into three parts. The first section explains the demographic and neighborhood characteristics of the three communities. The second section lists the available public health data. The third and final section provides the history of crashes and crash types along the US 67 corridor.

## 3.1 Demographics and Neighborhood Characteristics

This part of the memorandum describes the demographics, housing, social, and economic characteristics of the three communities and compares them to the same indicator at the state level.

### 3.1.1 Demographic Characteristics

Demographic characteristics include population, race, sex, and age (**Table 1**) for the three communities of Alpine, Marfa, and Presidio. Alpine is the biggest city in terms of population and area followed by Presidio and Marfa. The total population in the three communities is 11,847 (according to the US Census 2012-2016 ACS 5-year estimates). Applying a weighted average, approximately 68 percent of the population in the three communities is Hispanic or Latino, and 32 percent are non-Hispanic. About one third (33 percent) of community residents are young (under 25 years), 47 percent are middle-aged (25 to 64 years), and 20 percent are elderly (65 or older) as shown in **Figure 5.**




*Source: US Census 2012-2016 ACS 5-year estimates*

**Figure 5. Age groups (combined for all three communities)**

**Table 1: Demographic Characteristics**

| | Alpine | Marfa | Presidio | Texas |
|---|---|---|---|---|
| **Population** | 5,973 | 1,823 | 4,051 | 26,956,435 |
| **Male (in percentage %)** | 46.7% | 49.8% | 48.2% | 49.6% |
| **Female (in percentage %)** | 53.3% | 50.2% | 51.8% | 50.4% |
| **Median Age** | 38.9 | 42.8 | 39.9 | 34.2 |
| **Hispanic or Latino** | 50.1% | 70.1% | 94.5% | 38.6% |
| **Not Hispanic or Latino** | 49.9% | 29.9% | 5.5% | 61.4% |
| **White** | 47.5% | 29.8% | 2.1% | 43.4% |
| **Black or African American** | 0.4% | 0.0% | 0.0% | 11.6% |
| **American Indian and Alaska Native** | 0.0% | 0.0% | 0.0% | 0.2% |
| **Asian** | 1.5% | 0.1% | 3.4% | 4.3% |
| **Native Hawaiian and other Pacific Islander** | 0.0% | 0.0% | 0.0% | 0.1% |
| **Some other race** | 0.00% | 0.00% | 0.00% | 0.1% |
| **Total Area** | 4.7 sq. mi | 1.6 sq. mi | 2.6 sq. mi | 268,581 sq. mi |

*Source: US Census 2012-2016 ACS 5-year estimates*

### 3.1.2 Housing Characteristics

Housing characteristics include housing and the number of vehicles for the three communities of Alpine, Marfa, and Presidio. There are 6,333 housing units in the three communities of which 76 percent are occupied (lower than the state average) and 24 percent are vacant (higher than the state average). The average household size is 2.58. Presidio and Marfa residents have less access to cars (although higher than the state average) than those in Alpine. **Table 2** shows detailed data for each community.

**Table 2: Housing Characteristics**

| | Alpine | Marfa | Presidio | Texas |
|---|---|---|---|---|
| **Total housing units** | 3,269 | 1,143 | 1,921 | 10,441,643 |
| **Occupied housing units** | 82.1% | 58.4% | 74.3% | 89.0% |
| **Vacant housing units** | 17.9% | 41.6% | 25.7% | 11.0% |
| **Average Household size** | 2.19 | 2.72 | 2.83 | - |
| **Total households** | 2,683 | 668 | 1,428 | - |
| **Zero Vehicle Household** | 8% | 12% | 9% | 5% |

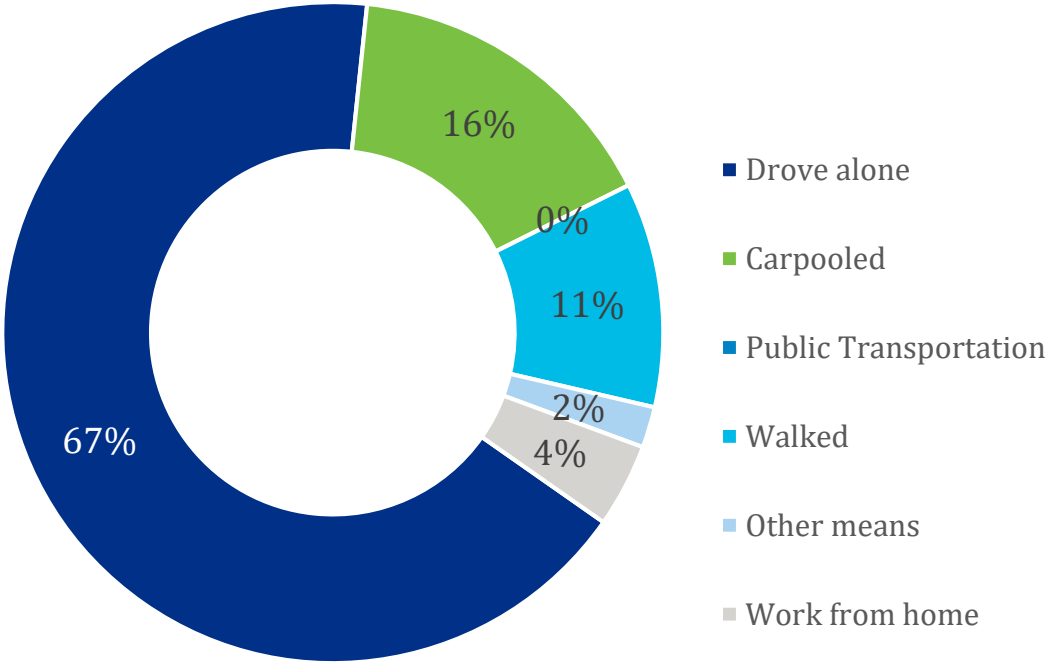
*Source: American Community Survey, 2017; US Census 2012-2016 ACS 5-year estimates*

### 3.1.3 Economic Characteristics

Economic characteristics include means of transportation, income, and employment. When commuting to work, applying a weighted average, 67 percent of the working population drove alone (less than state average of 80 percent), 16 percent carpooled (higher than state average of 10.6 percent), 4 percent worked from home, 11 percent walked (much higher than state average of 1.6 percent), and 2 percent used other means (**Figure 6**). There is no public transportation reported in the 2012-2016 ACS 5-year estimates in Alpine, Marfa, and Presidio. Presidio has the highest population of people working from home.

According to the 2017 American Community Survey (ACS), the median household income for Texas was $59,206. Median household income for the US 67 corridor study area is below this average. Alpine, Marfa, and Presidio are further below the state average with median household income ranging from $22,959 to $42,647. Approximately 29 percent of people in Presidio, and 21 percent in Marfa fall in the poverty levels[3], which is higher than the state average of 16 percent. **Table 3** provides details for the three communities.

For the recent employment status, county data has been used to analyze the unemployment rate. Presidio County has an unemployment rate of 7.0 (higher than the state average 3.9), and Brewster County with 3.4 (lower than the state average 3.9) (4).




*Source: US Census 2012-2016 ACS 5-year estimates*
**Figure 6. Commute by Mode of Transportation (combined for all three communities)**

[3] Poverty Guidelines from US Department of Health and Human Services. https://aspe.hhs.gov/poverty-guidelines

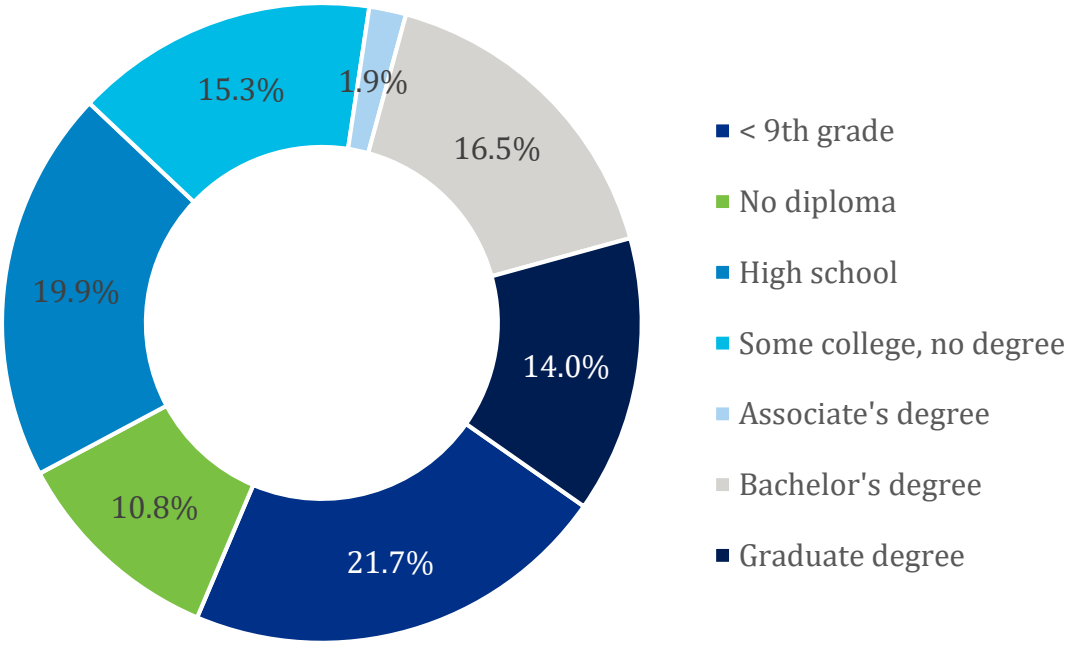
**Table 3: Economic Characteristics**

| | Alpine | Marfa | Presidio | Texas |
|---|---|---|---|---|
| **Individuals Below Poverty Level (2017)** | 13% | 21% | 29% | 16% |
| **Median Household Income (2017)** | $ 37,402 | $ 42,647 | $ 22,959 | $ 59,206 |
| **Employed** | 93.7% | 90.6% | 88.2% | 93.6% |
| **Unemployed** | 6.3% | 9.4% | 11.8% | 6.4% |

*Source: American Community Survey, 2017; US Census 2012-2016 ACS 5-year estimates*

### 3.1.4 Social Characteristics

Social characteristics include educational attainment, language, and disability. Most of the people in these three communities speak Spanish (61 percent) followed by English (37 percent) and Other Languages (2 percent). The study area has a higher percentage of Spanish-speaking people than the state average. Presidio has 95 percent of Spanish-speaking people and Alpine has 63 percent English-speaking people, making them the highest percentage among the three communities. On average, the percentage of people with a disability is 55 percent for the elderly population, 3 percent under 18 years, and 42 percent between 18-64 years of age (**Table 4**). Applying a weighted average, Marfa has the highest number of bachelor's and graduate degree holders and Presidio has the lowest. The education attainment status for all three communities combined indicate that 32.5 percent of the population has less than 9th grade or no diploma (**Figure 7**).




*Source: US Census 2012-2016 ACS 5-year estimates*

**Figure 7: Education attainment (combined for all three communities)**

**Table 4: Social Characteristics**

| | Alpine | Marfa | Presidio | Texas |
|---|---|---|---|---|
| **LANGUAGE SPOKEN AT HOME** | | | | |
| **English only** | 63.00% | 30.50% | 1.50% | 64.80% |
| **Spanish** | 35.10% | 68.00% | 94.90% | 29.50% |
| **Other Indo-European languages** | 1.90% | 1.40% | 0.90% | 2.10% |
| **Asian and Pacific Islander languages** | 0.00% | 0.10% | 2.70% | 2.80% |
| **With a disability** | | | | |
| **Under 18 years** | 2.00% | 10.60% | 2.30% | 6.30% |
| **18 to 64 years** | 19.80% | 11.50% | 19.70% | 16.20% |
| **65 years and over** | 49.80% | 39.90% | 77.60% | 77.00% |

*Source: US Census 2012-2016 ACS 5-year estimates*

## 3.2 Public Health

As public health data is not available at a neighborhood or city level, county-level data has been used to estimate the study area's public health. This section focuses on the counties of Presidio (includes Presidio and Marfa communities) and Brewster (includes Alpine community). Pecos County has been excluded from the analysis because it does not have any communities within the study area. Therefore, Presidio and Brewster County data were used to estimate and analyze the existing US 67 corridor health risks using the available data. The available data is from the secondary source which includes data from various websites, reports, and journals.

According to the community health assessments (CHA) report, the population of both Presidio and Brewster counties are facing major health challenges including hypertension, diabetes, obesity, asthma, cardiovascular problems, cancer, aging population, and vehicular injuries (5). According to the 2018 US Health Resources & Services Administration (HRSA) program grantee data report, 5,771 patients were treated for medical conditions in 2018. Of the adult patients treated 29 percent have hypertension, 13 percent of the adult patients treated have diabetes, and 2 percent of the adult patients treated have asthma in Presidio county (6). The other major issue is vehicular injury crashes and unintentional injuries (6).

**Behavioral and mental health issues**

Both counties are facing mental health issues like depression or anxiety, and stress. According to the CHA survey, 21 percent of household members in Presidio County and 34 percent in Brewster county reported depression or anxiety. Further, 20 percent of household members in Presidio county and 38 percent in Brewster county reported stress (5).

The root causes of behavioral and mental health issues are mentioned below (5):

- Lack of community services

- High cost of mental health services
- Long travel distances to medical centers

**Health promotion**

Both counties are facing issues like poor nutrition and lack of physical activity. According to the CHA survey, 27 percent of household members in Presidio County and 31 percent in Brewster County reported a lack of physical activity. Brewster county has less access to exercise opportunities with only 60 percent access compared to the state average of 81 percent (7). **Table 5** describes the 2018 county health rankings.

The root causes of health promotion are mentioned below (5):

- Lack of community recreation programs
- Lack of time
- Lack of sidewalks/trails/parks/open spaces
- General lack of knowledge about nutrition
- High cost of healthier nutrition habits
- Lack of handicap accessibility

**Table 5: County health rankings**

| | Presidio County | Brewster County | Texas |
|---|---|---|---|
| **Adult obesity** | 27% | 29% | 28% |
| ***Food environment index** | 5.1 | 7.2 | 6 |
| **Physical inactivity** | 27% | 31% | 24% |
| **Excessive drinking** | 13% | 17% | 19% |
| **Percent of fatal crashes (alcohol-related)** | 20% | 38% | 28% |
| ****Violent crime** | 58 | 142 | 408 |

*0 (worst) to 10 (best)
**violent crime offenses per 100,000 population
*Source: County Health Rankings, 2018*

**Environmental issues**

Overall health and quality of life can be impacted by many environmental issues. The major issues faced by the residents of these counties are air, water, and noise pollution (5). According to the CHA survey, 18 percent of household members in Presidio County and 8 percent in Brewster County reported poor outdoor air quality (dust, feedlot organic materials, smoke from grass fires, etc.). Five

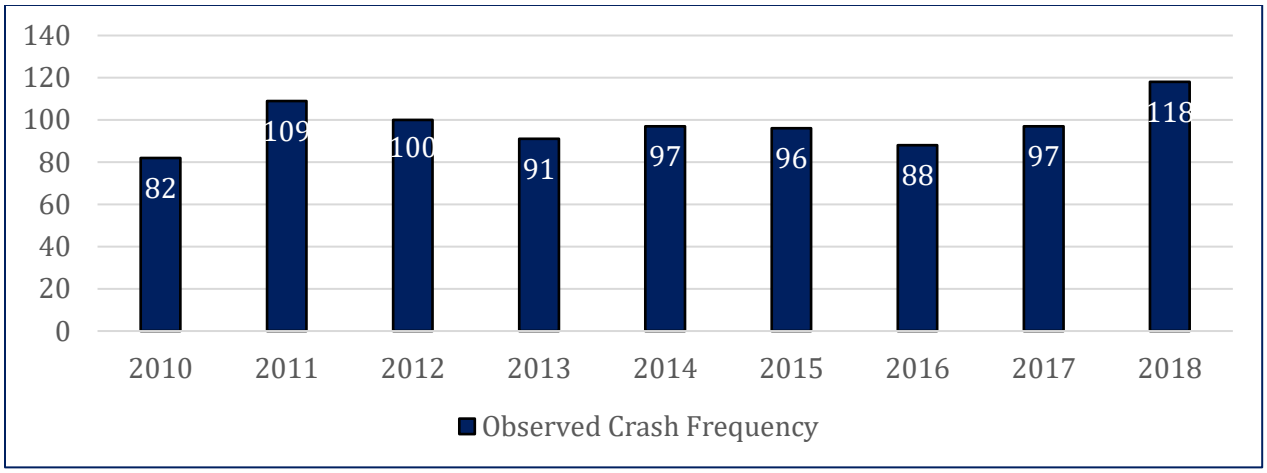
percent of the survey respondents in both counties reported poor water quality and noise pollution (5). The root causes of environmental issues are the operation of two coal-fired power plants in the adjacent communities across the Mexican border.

## 3.3 Crash Data

Vehicular and pedestrian injuries are one of the major health issues in the corridor. The summary of the detailed analysis of all crashes is presented below. For more detailed information on crashes along the US 67 corridor, please refer to **Appendix D – Safety Assessment**.

**Vehicular injuries**: Vehicle injuries are also known as unintentional injuries. According to the 2012 CHA, 51.7 deaths per 100,000 population were registered in Presidio county and 41.2 in Brewster county, which is considerably higher than the national average[4] (14.6 deaths per 100,000) (5).

**Crash Overview:** There were 878 crashes over the nine years of crash data available. The year-by-year crashes on the US 67 corridor are shown in **Figure 8**.




*Source: TxDOT Crash Records Information System Data*

**Figure 8: Total Crashes by Year**

The urban areas (Alpine, Marfa, and Presidio) account for 49 percent of crashes and the areas between communities account for 51 percent of the crashes. Over the nine years of available data, 478 (54 percent) were roadway departure crashes, 127 were animal crashes, 50 were commercial motor vehicles crashes, nine were bicycle/pedestrian crashes, and two were train-related crashes.

Findings:

- During the 9-year period, there were 878 crashes on the corridor, an average of 98 per year. Of these, 12 crashes were fatal and 135 resulted in incapacitating and non-incapacitating

[4] State average was not available

injuries. Nine crashes involved bicyclists and pedestrians which were in urban areas. More than half of the crashes involved a single vehicle running off the road, which was the most common crash type along the corridor. Although the crashes were evenly split between rural and urban areas, all fatal crashes occurred in the areas between communities.

- The corridor crash rate per 100 million vehicle miles traveled was slightly higher than the statewide average for similar rural routes in Texas. Since this measure accounts for differences in traffic levels between routes, this means the US 67 study corridor experiences more crashes compared to similar roadways elsewhere in the state.

# 4.0 US 67 Corridor Master Plan Draft Recommended Improvements

As part of the US 67 Corridor Master Plan, the study team prepared a list of draft recommended improvements and classified them into short-, mid-, and long-term projects/concepts. The recommended improvements are divided into two types: core concepts and preferred alternatives[5]. Detailed analysis of the recommended improvements can be found in **Appendix N – Alternatives Analysis**. **Table 6** shows the list of recommended improvements for the communities of Alpine, Marfa, Presidio, and the areas between these communities.

**Table 6: Recommended Improvements**

| Communities | Serial Number | Concepts |
|---|---|---|
| **ALPINE** | 1 | Two-Way Left-Turn Lane at FM 1703 & US 67 |
| | 2 | Closing Orange St and Sul Ross Ave |
| | 3 | Pedestrian Ring at Sul Ross University & US 67 |
| | 4 | One-Way Complete Streets with Pedestrian Improvements at US 67 and 6th, 5th, and 4th Streets |
| | 5 | Road geometry warning system at two low bridge crossings (southwest side of Alpine) |
| | 6 | Add Left Turn Lanes on 11th Street at US 67 |
| | 7 | Bicycle Lane with Striped Buffer (Complete Streets) |
| | 8 | Add Turn Lanes - Close Angled Intersection at Cherry Street and US 67 |

[5] Preferred alternatives come under alternative concepts. For each intersection, there are three alternatives and the highest ranked one is called the preferred alternative.

**Table 6: Recommended Improvements (continued)**

| Communities | Serial Number | Concepts |
|---|---|---|
| ALPINE | 9 | Intersection Improvements |
| | | • ADA compliant sidewalks and curb returns, raised intersections & medians, curb improvements, bollards, and pedestrian refuges |
| | | • Signage, lighting, striped crossings, and striping changes |
| | 10 | Pavement marking |
| MARFA | 11 | Roundabout at Lincoln St & Highland St |
| | 12 | Intersection of at San Antonio St. & Highland Ave. bicycle accommodations |
| | 13 | Shared Use Path (Complete Streets) |
| | 14 | Bicycle/pedestrian warning systems at S Highland Avenue / E San Antonio Street |
| | 15 | Intersection Improvements |
| | | • ADA compliant sidewalks and curb returns, raised intersections & medians, curb improvements, striped crossings, and pedestrian refuges |
| PRESIDIO | 16 | T-Intersection at US 67 & BU 67 |
| | 17 | Y-Intersection at O'Reilly St & Erma Ave |
| | 18 | Two-Way Left-Turn Lane at FM 170 & Utopia St at US 67 |
| | 19 | Parking Capacity at POE |
| | | Smart Parking |
| | 20 | Bicycle Lane with Striped Buffer (Complete Streets) |
| | 21 | Intersection Improvements |
| | | • ADA compliant sidewalks and curb returns, raised intersections & medians, curb improvements, bollards, and pedestrian refuges |
| | | • Signage, lighting, striped crossings, and striping changes |
| BETWEEN COMMUNITIES | 22 | I-10/US 67 Interchange Concept |
| | 23 | Animal warning systems |
| | | • 12-mile stretch between Fort Stockton and Alpine |
| | | • 20-mile stretch between Marfa and Shafter |
| | 24 | Highway-rail crossing warning system (north of Alpine) |

**Table 6: Recommended Improvements (continued)**

| Communities | Serial Number | Concepts |
|---|---|---|
| BETWEEN COMMUNITIES | 25 | Rockslide warning systems at Shafter and Paisano Pass |
| | 26 | Traffic Management |
| | | • Variable speed limit, Vehicle detection, and Planned special event management systems |
| | 27 | Emergency Services |
| | | • Next generation 911 |
| | | • Smartphone application |
| | | • Automatic crash notification systems |
| | 28 | Automated visibility warning systems/Integrated Weather Monitoring and Prediction Systems at Paisano Pass/DMS |
| | 29 | Rest Area/Pull Outs |
| | 30 | Centerline rumble strips and shoulder rumble strips |
| | 31 | Advanced warning signs |
| | 32 | Passing lanes |
| | 33 | Slope treatment |
| | 34 | Guardrails |
| | 35 | Shoulder widening |
| | 36 | Tree trimming/brush removal |
| | 37 | Speed warning systems |
| | 38 | Sequential dynamic curve warning systems |
| | 39 | Work zone safety systems |

# 5.0 Assessment

This section explains how the draft potential improvements from the US 67 Corridor Master Plan impact public health along the US 67 corridor. Suggested improvements have been thoroughly assessed: to identify its immediate outcomes (safety, mobility, and health); outline both positive and negative health impacts; and provide HIA recommendations (provide recommendations for the US 67 list of draft potential improvements to maximize the positive health and minimize the negative health impacts.). The study team conducted the following steps to complete this assessment and reviewed with the stakeholders:

- Prepared a final list of draft recommended improvements for the US 67 corridor.

- Organized the list of draft recommended improvements according to the HIA study areas based on geographical areas (Alpine, Marfa, Presidio, and rural areas between the communities).
- Prepared influence diagrams based on the US 67 Corridor Master Plan draft recommended improvements. The influence diagrams are presented in **Section 5.1** and include:
  - Identified immediate and long-term outcomes, listed as "OUTCOMES"
  - Identified health-related outcomes, listed as "HEALTH OUTCOMES"
- Identified health indicators by using summaries from focus groups, interviews, and public input as well as the list of recommended improvements, influence diagrams and goals of the US 67 Corridor Master Plan as parameters. The following are the five health indicators identified. **Section 5.2** describes the impact type, vulnerable population, impact level, and recommendations for each health indicator.
  - Lifestyle
  - Community identity
  - Living/environmental conditions
  - Access and quality of services
  - Sustainable environment
- Linked the health outcomes with the health indicators. **Table 7** shows the impacts on health determinants for the communities.

**Table 7: Identified Five Health Indicators**

| Health Indicators | Alpine | Marfa | Presidio | Between communities |
|---|---|---|---|---|
| **Lifestyle** | ✓ | ✓ | ✓ | × |
| **Community identity** | ✓ | ✓ | ✓ | × |
| **Living/environmental conditions** | ✓ | ✓ | ✓ | ✓ |
| **Access and quality of services** | ✓ | ✓ | ✓ | ✓ |
| **Sustainable environment** | × | × | ✓ | × |

## 5.1 Influence diagrams

Influence diagrams are also known as causal models or pathway diagrams. These diagrams (shown in **Figure 9** through **Figure 12)** help to describe how environmental, social, and built conditions and factors influence health outcomes. These diagrams form a basis for research questions, identify the baseline data to be measured and predict the health outcomes through the proposed improvements (8). A detailed health outcome from each proposal is available in **Attachment A.**

The immediate outcomes from the US 67 Corridor Master Plan draft recommended improvements are enhanced opportunities for walking and bicycling; reduced vehicular crashes, animal crashes,

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 the predicted negative impacts.

The impacts in the Alpine, Marfa, and Presidio communities are increased walking/bicycling, reduced injury crashes, and increased nonmotorized travel in the corridor area. These benefits can lead to increased physical fitness, reduced stress, cardiovascular and chronic diseases, and increased social connections. The impacts of areas between these 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.

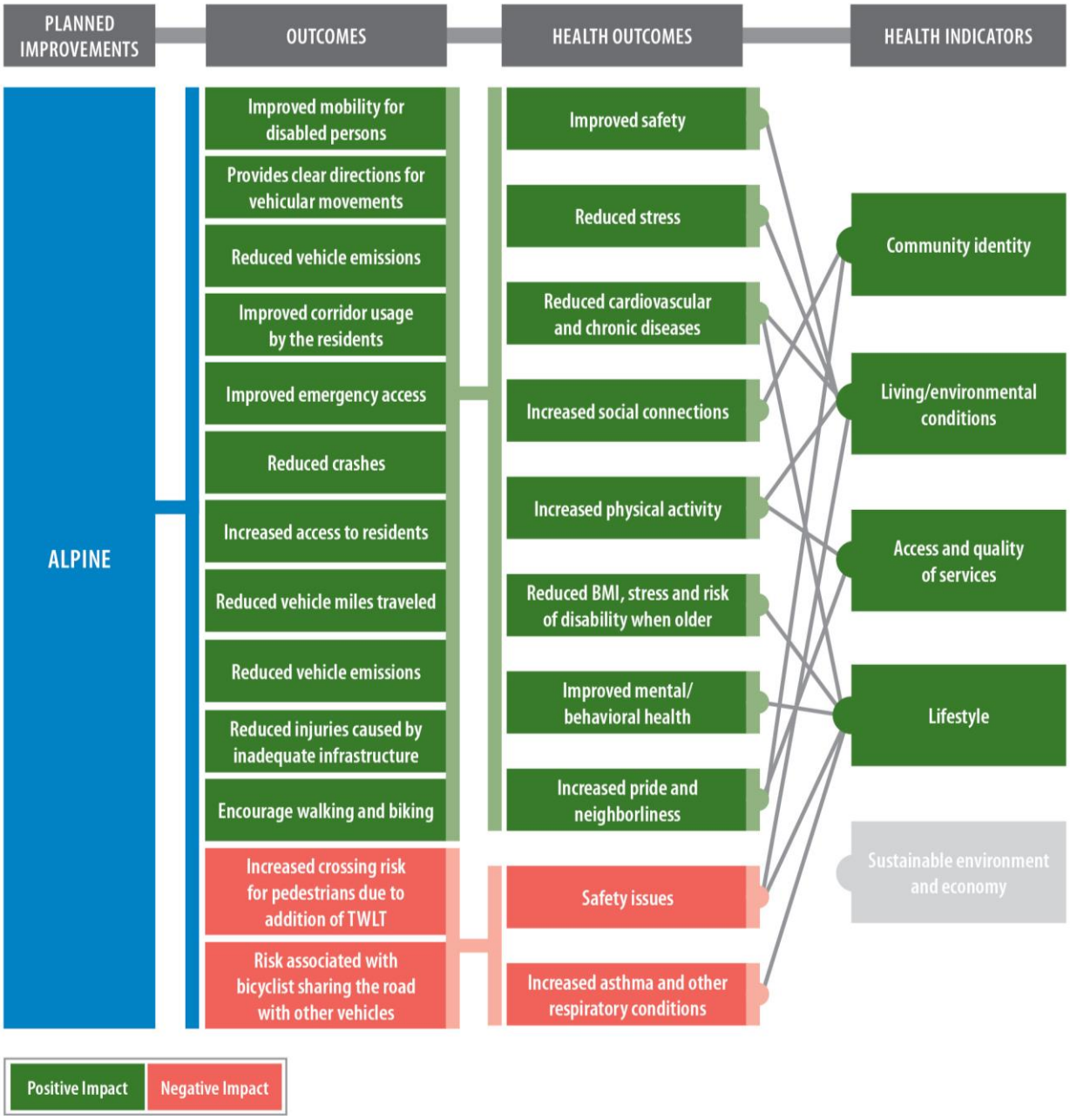



**Figure 9: Alpine Influence Diagram**

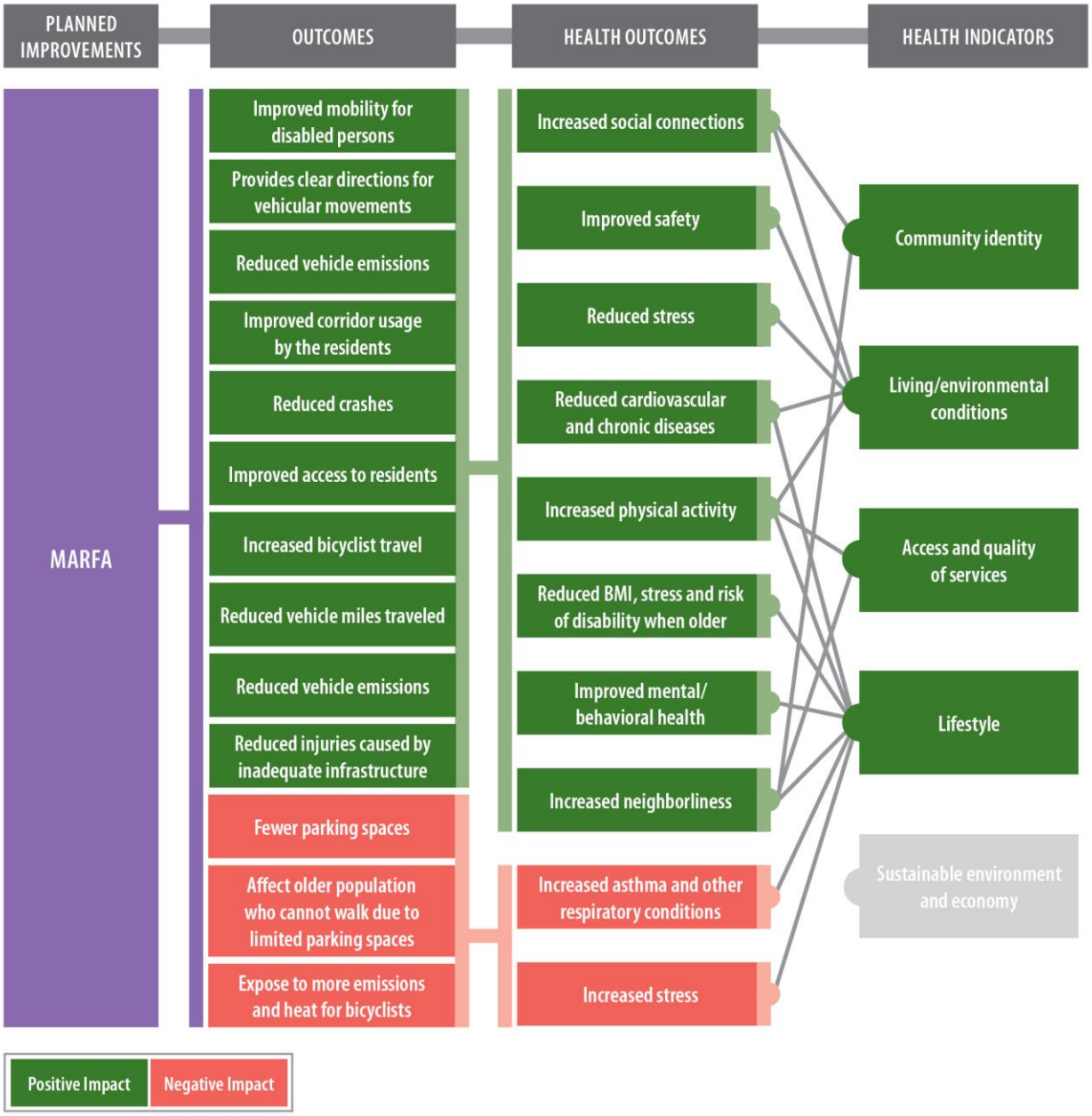



**Figure 10: Marfa Influence Diagram**

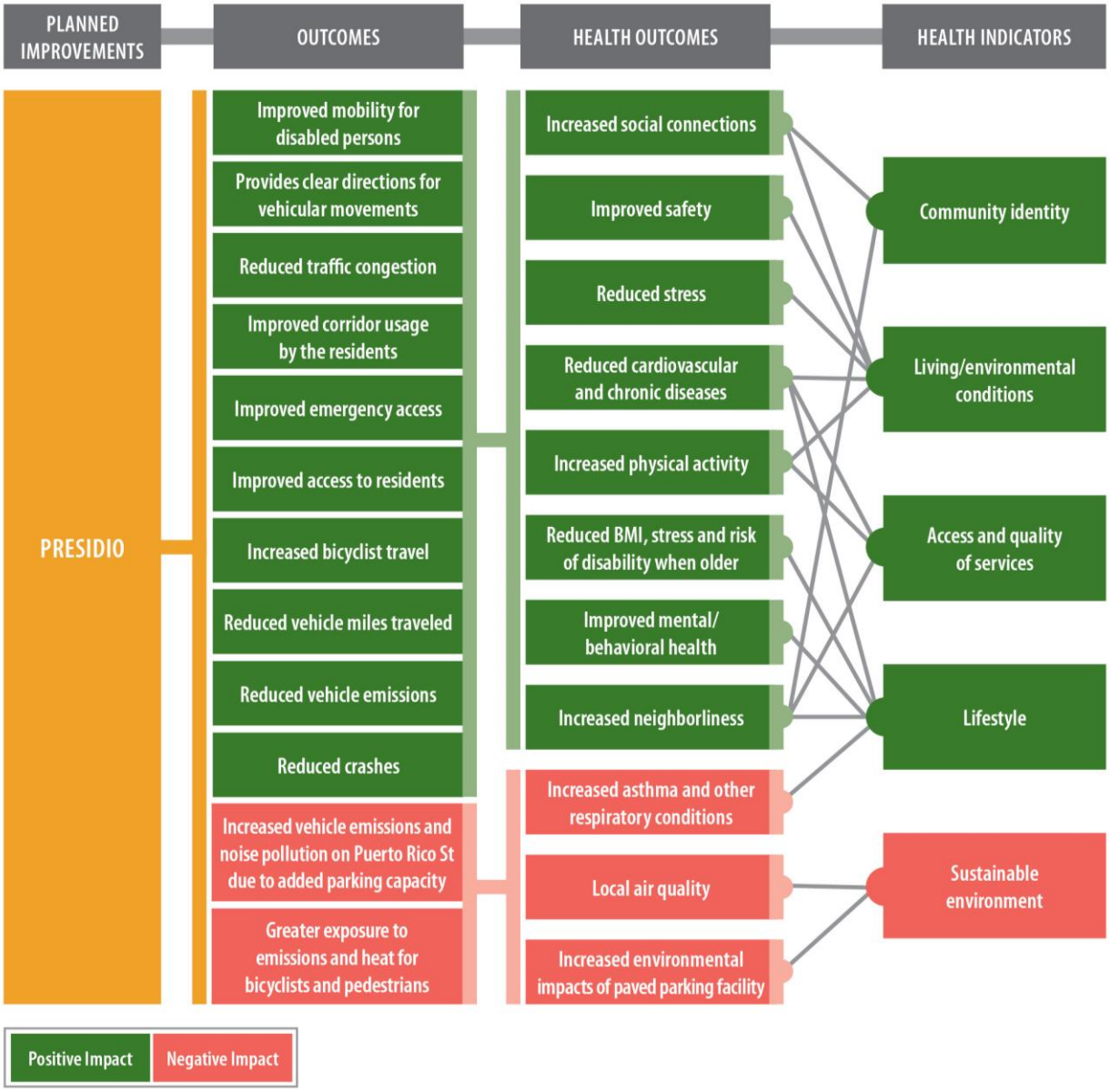



**Figure 11: Presidio Influence Diagram**

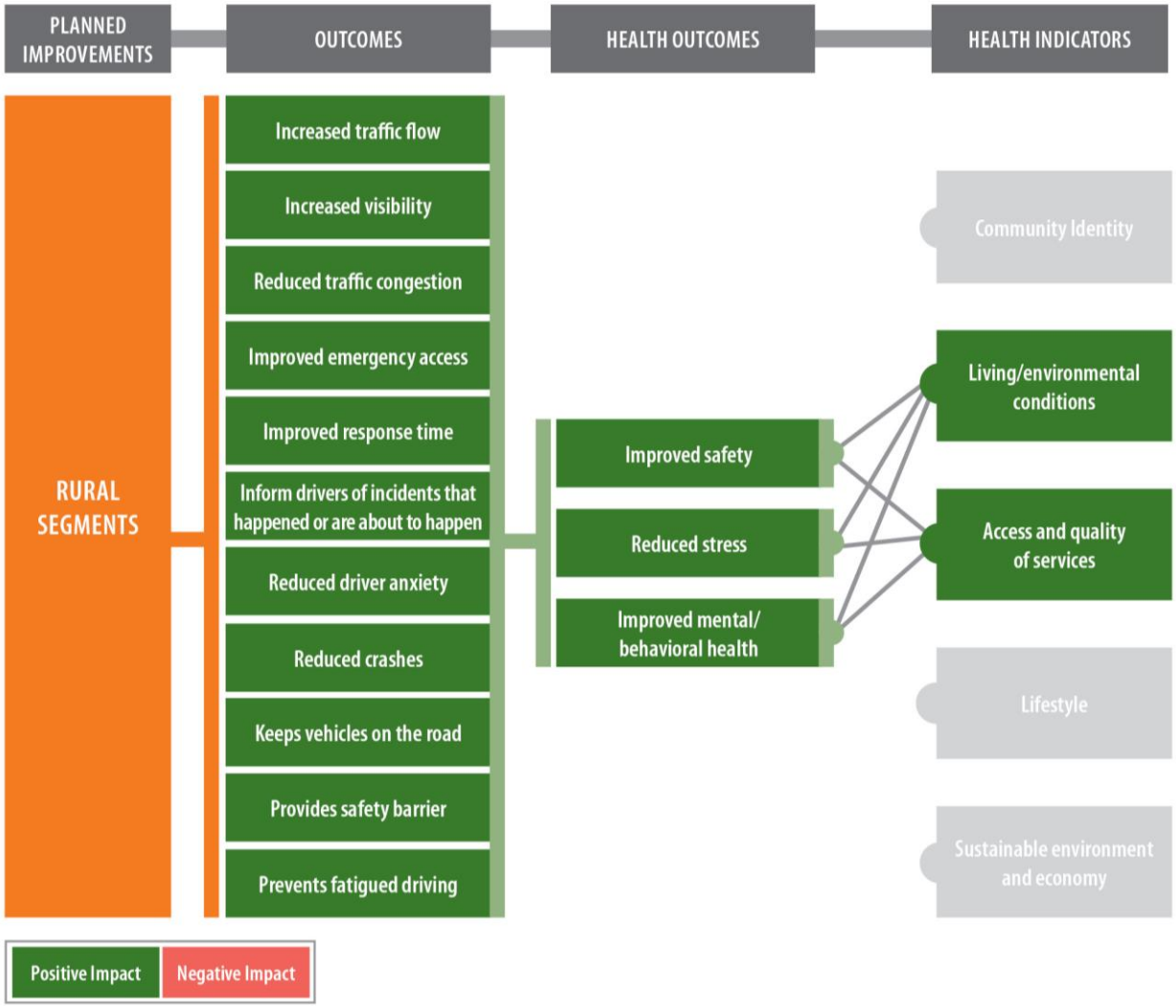



**Figure 12: Between Communities/ Rural Segments Influence Diagram**

## 5.2 Health Indicators

In this sub-section, each identified health indicator is explained in detail on how it is being influenced by the recommended improvements. Each health indicator has been measured using the available data, literature data, and supporting data.

### 5.2.1 Lifestyle

Lifestyle defines how an individual or a group follow their day to day behaviors and purposes in job, activities, sleep, study, recreation, exercise, and diet (9). A healthy lifestyle such as daily exercise, walking or bicycling, choosing healthy food, reduced smoking or drinking, and managing stress may

reduce health risks such as cardiovascular, musculoskeletal, immune and other body systems and helps the individual to stay fit and healthy (10).

Most of the draft recommended improvements from the US 67 Corridor Master Plan may positively impact people's lifestyles by potentially increasing physical activity. Physical activity can improve health and reduce the risk of developing several diseases like cancer, diabetes, cardiovascular problems, and obesity, and can have immediate and long-term health benefits (11). Physical activity also helps to reduce stress levels and is a natural mood lifter. It also helps to maintain a healthy weight, improves blood flow, increases life span, and boosts self-confidence (12). Some of the draft proposed improvements would potentially improve access to outdoor activities, enhance bicycle and pedestrian infrastructure such as sidewalks, bicycle lanes, shared use paths, and increase traffic safety, which in turn would encourage physical activity (13).

**Facts**

- Some of the major health issues faced by these communities are hypertension, diabetes, obesity, asthma, cardiovascular problems, and cancer (5).
- Adult obesity rates in Presidio county (includes Presidio and Marfa) and Brewster county (includes Alpine) are 27 percent and 29 percent respectively (7).
- Lack of physical health was reported in 27 percent of household members in Presidio county and 31 percent in Brewster county (7).
- People in Brewster county have less access to exercise opportunities (60 percent) when compared with the 81 percent state average (7).

Walkscore.com measures the extent to which neighborhoods or communities are walk-friendly. Walkability is measured using the score from 0 to 100 (0-49 car dependent; 50-69 somewhat walkable; 70-89 very walkable; and 90-100 walker's paradise). The three communities subject of this study (Alpine, Marfa, and Presidio), have walk scores of 71, 60 and 23, respectively (14). Alpine is the most walkable, with the most complete sidewalk network and where most errands can be completed by foot. Marfa is a city with a discontinuous sidewalk network and fewer errands can be completed by foot. Presidio is less walkable and more car-dependent, consequently, most errands must be completed by car.

**Improvements by the Communities**

The US 67 Corridor Master Plan prepared a draft list of recommended improvements for the corridor which will potentially have positive impacts on the lifestyle of the people who live in these three communities. These recommended improvements are mentioned in **Table 8**. It should be noted that the positive impacts far outweigh the negative impacts.

**Table 8: List of Improvements Impacting Lifestyle**

| List of Improvements | Impact | Alpine | Marfa | Presidio | Between communities |
|---|---|---|---|---|---|
| **Bicycle Lane with Striped Buffer (Complete Streets)** | Positive/ Negative | ✓ | ✓ | ✓ | - |
| **Shared Use Path (Complete Streets)** | Positive/ Negative | - | ✓ | - | - |
| **Bicycle/Pedestrian Warning Systems at S Highland Avenue / E San Antonio Street** | Positive | - | ✓ | - | - |

### Impacts of Proposed Improvements

New bicycle lanes with striped buffers (complete streets) separate bicyclists from the adjacent motor vehicles, providing safety to bicyclists and encouraging them to bicycle more (15) (16) (17). Bicycling helps to improve health, favors the environment by reducing greenhouse gas emissions, saves money spent on vehicles and reduces congestion (16). Complete streets are streets that are 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. **Appendix N** includes more information on complete streets projects.

Bicycle and pedestrian warning systems warn vehicular traffic about the presence of bicycles and pedestrians crossing the road, this increases safety to the public and may reduce crashes (17). Due to increased physical activity, the proposed recommended improvements have positive impacts on the residents of the three communities especially on those with no vehicles and on the lower income levels.

There is a minor negative health impact or risk associated with bicyclists sharing the road with other vehicles and that is the increased potential exposure to crashes and emissions and heat from the vehicles. This negative impact can be mitigated by following the below safety tips by both bicyclists and vehicular traffic (18) (19) (20).

### Recommendations

- Create informational material in print and social media which includes these points
  - Stop for stop signs and red lights
  - Do not use mobile phones while bicycling, driving or crossing the street
  - Follow the posted speed limit, traffic signs, and traffic laws
  - Drive in the dedicated lanes, use a helmet, be visible, and wear retroreflective clothing
  - Use front and rear lights and signal turns while bicycling

- When possible, avoid peak traffic times and if necessary, wear masks to minimize exposure to emissions

- Complement the roadway improvements with streetscaping
  - Enhanced streetscapes like trees, plants with flowers, streetlights and sculptures can potentially provide multiple health benefits such as better air quality, reduced heat-related illness, and improved traffic safety
  - Provide shade, benches, water, and trash receptacles for pedestrians and bicyclists

### 5.2.2 Community Identity

Community identity influences the health and well-being of the communities. Factors influencing the community identity are social support and social networks, neighborliness, cultural and spiritual ethos, sense of belonging, local pride, as well as racial recognition and other social exclusions and divisions in the community.

All of the recommended improvements from the US 67 Corridor Master Plan potentially have a positive impact on the identity of the communities. Some of the factors positively impacted are neighborliness, sense of belonging, and local pride. Neighborliness or friendliness encourages people to interact, speak, trust, exchange favors, and believe it is a place to look out for one another. This is beneficial to public health both physically and mentally (21). Providing a good place (the reason for people to visit, feel safe and comfortable, welcoming and accessible to everyone and making them feel like staying there once they arrived) will benefit the communities' health by improving the sense of community pride and ownership. It will also improve the livability and quality of life and will increase equity (22).

**Improvements by the Communities**

The US 67 Corridor Master Plan prepared a draft list of the recommended improvements that will positively impact the identity of the communities. These are mentioned in **Table 9**.

**Table 9: List of Improvements Impacting Community Identity**

| List of Improvements | Impact | Alpine | Marfa | Presidio | Between communities |
|---|---|---|---|---|---|
| **Complete Streets** | Positive | ✓ | ✓ | ✓ | - |
| **Intersection Improvements** | Positive | ✓ | ✓ | ✓ | - |

**Impacts of Proposed Improvements**

One of the proposed improvements for the three communities from this study is the construction of complete intersections. Complete intersections include sidewalks, bicycle lanes with striped buffers, shared use paths, and bicycle/pedestrian warning systems. The presence of these elements will

potentially increase corridor usage by bicycling and walking, improve access to residents, and encourage physical activity. They will also lead to increased social connections, neighborliness, and improved physical and mental health. Intersection improvements such as signage, lighting, striping, the pedestrian ring at Sul Ross State University, and the US 67/roundabout at Lincoln Street and Highland Street will enhance community features and encourage people to use the corridor. The pedestrian ring at Sul Ross University provides a placemaking opportunity by providing green space for the public to use, and additional infrastructure such as crosswalks to enhance public safety. Neighborliness and social interactions in the community can also be increased by the addition of features like sidewalks, green space, and traffic-calming measures (22). Lastly, parks and public places to sit, provide places for people to congregate which can help reduce isolation for senior adults.

**Recommendations**

The following recommendations would help to maximize the positive impacts on public health:

- Develop a plan to identify, prioritize, and implement parks and open spaces projects based on public input
- Identify funding sources and create an action plan for the development of new parks and open spaces
- Increase access to parks and open spaces
- Start small with the addition of landscaping, shade, benches, public art, trash receptacles, and water fountains in the existing right of way and public land
- Pass regulations to mandate the inclusion of green spaces and interactive spaces into private and public projects
- Conduct community meetups or events to encourage people to get involved and increase social interaction

### 5.2.3 Living/Environmental Conditions

Living/environmental conditions influence the health and well-being of the communities. Factors influencing the living/environmental conditions are green space, built environment, community safety, neighborhood design, smell/odor, housing type, waste disposal, indoor environment, road hazards, noise, injury hazards, air and water quality, crashes, quality and safety of play areas, and attractiveness of the area.

Some of the living/environmental conditions of the communities that would be positively impacted by the draft improvements are built environment, community safety, reduced road hazards, reduced vehicular crashes, and attractiveness of the area. An improved built environment directly or indirectly encourages healthier lifestyles, and influences physical, mental, and social health and well-being. There is strong evidence that built environment improvements can reduce chronic diseases,

and improve health through promoting active lifestyles, proper nutrition, and by reducing exposure to toxic pollutants (23).

**Facts**

- According to 2018 county health rankings, Presidio and Marfa communities in Presidio county have a lower food environment index[6], 5.1 less than the state average of 6. Additionally, Presidio County is lacking in access to exercise opportunities i.e. 34 percent (less than the recommended state average of 81 percent) (7).
- Both counties are facing issues like poor nutrition and lack of physical health mostly related to lack of sidewalks/trails/parks/open spaces, general lack of knowledge about nutrition, high cost of healthier nutrition habits, and lack of handicapped accessibility (24).
- The other major issues faced by these two counties are vehicular injury crashes or unintentional injuries. The vehicle injury crashes (70.8 - Age-adjusted Rate per 100,000 population) is double the state average of 33.2 (6).
- Over the nine years of crash data, there were 878 crashes. Nearly 41 percent of crashes are intersection related. The three communities combined account for the highest number of crashes that occurred throughout the corridor.
- Approximately 29 percent of people in Presidio and 21 percent in Marfa fall below the poverty levels, which is higher than the state average of 16 percent. **Table 3** provides details for the three communities.

**Improvements by the Communities**

The US 67 Corridor Master Plan prepared a draft list of recommended improvements for the corridor which will potentially have positive impacts on the lifestyle of the people who live in these three communities. These are mentioned in **Table 10.**

[6] Index of factors that contribute to a healthy food environment, 0 (worst) to 10 (best)

**Table 10: List of Improvements Impacting Living/Environmental Conditions**

| List of Improvements | Impact | Alpine | Marfa | Presidio | Between communities |
|---|---|---|---|---|---|
| **Intersection improvements** | Positive | ✓ | ✓ | ✓ | - |
| **Parking capacity at Port of Entry (POE)** | Positive | - | - | ✓ | - |
| **Complete streets** | Positive | ✓ | ✓ | ✓ | - |
| **Warning systems** | Positive | ✓ | ✓ | ✓ | ✓ |
| **Road treatments/ Passing lanes** | Positive | - | - | - | ✓ |
| **Shoulder widening/ Rest areas/ Rumble strips** | Positive | - | - | - | ✓ |

## Impacts of Proposed Improvements

Some of the intersection improvements proposed in the three communities include sidewalks and curb returns compliant with the Americans with Disabilities Act (ADA), raised intersections and medians, curb improvements, pedestrian refuges, signage, lighting, striped crossings, and striping changes. ADA compliant sidewalks allow people with disabilities to have equal access to services and facilities, encouraging them to use the corridor (25). Raised intersections, medians, striped crossings, pedestrian refuges, and striping changes work in a similar manner to speed humps and inform the drivers to slow down and yield to pedestrians at crosswalks (24). Complete streets/intersection improvements in the three communities will encourage more walking and bicycling which will potentially reduce air pollution, reduce crashes, and help children and seniors use the streets for walking/bicycling (26).

Warning systems such as animal warning systems, highway-rail crossing warning systems, rockslide warning systems, etc. will inform drivers/motorists about a situation/condition that has taken place or is about to take place. These also help drivers plan trips in advance, choose a better path or time to travel, and help in decision making to avoid travel delays and crashes (17). Road treatment and widening projects improve road safety, reduce roadway departure crashes, and maintain pavement quality (27).

In addition to the above improvements, the following are other recommendations that could be implemented to maximize positive impacts on the community.

## Recommendations

- Increase access to fresh fruits and vegetables, grocery stores, or farmers markets

- Implement awareness programs in schools about the importance of nutrition to improve health, and promote new channels, social media, and live radio to share knowledge
- Enhance streetscapes such as trees, plants with flowers, street lights and sculptures to potentially provide multiple health benefits like better air quality, reduced heat-related illness and improved traffic safety (28)
- Increase access to green spaces and open spaces

### 5.2.4 Access and Quality of Services

Access and quality of services influence the health and well-being of the communities. Factors influencing the access and quality of services are public amenities, medical services, transportation infrastructure including parking, other caring services (nursing, home health care, medical), education and training, careers advice, information technology, shops and commercial services, and economic development.

All of the draft recommended improvements can potentially have a positive impact on access and quality of services on the communities. Some of these positive impacts are access to public amenities, ITS solutions for access to medical service or increased emergency response, and economic development. Public amenities provide benefits to the public through direct consumption of specific aspects of land, human activity and natural resources such as streetlights, sidewalks, bicycle lanes, and improved access (29). Amenities are defined as "nonmarketed potentials of a neighborhood that make it an attractive place to live and work" (29). Increased emergency response will inform clinics and ambulances about incidents that will help save lives using ITS solutions (17). Economic development is considered as one of the main determining factors of health. Increased economy leads to increased quality of life, better health access, and better nutrition (30).

**Facts**

- From public meeting series #1, it was noted that there is a lack of reliable cellphone service along the corridor which makes it difficult for residents to contact emergency responders.
- The lack of cell phone coverage in these areas prevents drivers from reporting roadway emergency situations such as a flat tire, crashes, fire, and flooding.
- Residents also noted the need to increase the number of public amenities like parks, green spaces, and open spaces. At present, there are two parks in Presidio, 17 parks and recreation centers in Alpine, and one park in Marfa.

**Improvements between the Communities**

The US 67 Corridor Master Plan prepared a draft list of recommended improvements for the corridor which positively impacts access and quality of services of the people who live in these three communities and between communities. They are mentioned below in **Table 11.**

**Table 11: List of Improvements Impacting Access and Quality of Services**

| List of Improvements | Impact | Alpine | Marfa | Presidio | Between communities |
|---|---|---|---|---|---|
| **Complete Streets** | Positive | ✓ | ✓ | ✓ | - |
| **Intersection improvements** | Positive | ✓ | ✓ | ✓ | ✓ |
| **ITS Solutions (Emergency/ Medical services)** | Positive | - | - | - | ✓ |

## Impacts of Proposed Improvements

Implementation of complete streets and intersection improvements in the three communities will encourage more walking and bicycling by providing increased access to businesses and residential areas, which in return will lead to increased economic development (26). ITS solutions provide improved access to emergency services through next generation 911, smartphone applications, and automatic crash notification systems will allow the public to send photos, videos, and text messages of emergency situations to report accidents to inform the emergency services or nearby clinics/hospitals for the service. This allows dispatchers to identify the caller's location and to send response teams, improving response times (17).

The following are some additional recommendations to help communities maximize the positive impacts of the improvements.

## Recommendations

- Develop a plan to identify, prioritize, and implement parks and open spaces projects based on public input
- Identify funding sources and create an action plan for the development of new parks and open spaces
- Increase access to parks and open spaces
- Start small with the addition of landscaping, shade, benches, public art, trash receptacles, and water fountains in the existing right of way and public land
- Start an awareness program in schools about using emergency services apps to improve emergency response times, and promote new channels, social media, and live radio to share knowledge

### 5.2.5 Sustainable Environment

A sustainable environment influences the health and well-being of the communities. Factors influencing sustainable environment are biological diversity, government policies, climate change, greenhouse gas (GHG) emissions, and local air pollution. Sustainability is defined as the responsibility in saving the earth resources from depletion, saving and using them for the future generations interacting with the environment (31). Sustainability is becoming a growing concern among communities across the United States (32). Transportation accounts for 33 percent of the emissions in the United States. Improving transportation systems can reduce GHG emissions and improve public health (31).

The draft improvements will have both positive and negative impacts on sustainable environment factors i.e. local air pollution. Local air pollution includes pollutants (Particulate matter (PM) 10 and PM 2.5), Ozone (O3), Nitrogen dioxide (NO2), Carbon monoxide (CO), and Sulphur dioxide (SO2) and air toxics (benzene, formaldehyde, toluene, xylenes, and benzo (a) pyrene) (33). The sources of local air pollution are motor vehicles, wood burning heaters, industries, gas-heaters, and gas stovetops (33). Motor vehicles release toxic and carcinogenic compounds such as air toxins and pollutants which affect human health such as problems related to lungs and respiratory diseases especially in very young, elderly, and asthmatic people (34).

**Improvements by the Communities**

The US 67 Corridor Master Plan included a draft list of recommended improvements for the corridor which have both positive and negative impacts on the sustainable environment for people who live in the Presidio community. They are mentioned below in **Table 12**.

**Table 12: List of Improvements Impacting Sustainable Environment**

| List of Improvements | Impact | Alpine | Marfa | Presidio | Between communities |
|---|---|---|---|---|---|
| **Complete Streets/ Intersection Improvements** | Positive | ✓ | ✓ | ✓ | - |
| **Parking Capacity at Port of Entry (POE)** | Positive/ Negative | - | - | ✓ | - |

**Impacts of Proposed Improvements**

The implementation of complete streets/intersection improvements in the three communities will encourage more walking and bicycling which will lead to reduced vehicle miles traveled, reduced crashes, and reduced air and noise pollution (35). Parking capacity at Presidio POE could significantly alleviate traffic backups from US 67 into Puerto Rico St in Presidio.

The long traffic backups on US 67 block the access to residents of Presidio both entering and leaving the community. This also blocks access to residents who cannot cross to the opposite side of the US 67 corridor and equally limiting access to emergency service vehicles. Instead of traffic queueing on US 67 for miles, vehicles could be parked in vacant land near the POE. This would remove traffic from US 67, allow drivers to turn off their vehicles saving fuel and improving air quality, and eliminate the issues with employee access to POE.

Residents who live on Puerto Rico St will have negative impacts due to the sudden shift of vehicles, increased noise pollution, increased emissions from motor vehicles, and increased environmental effects of the paved parking facility. All the negative impacts are linked with other health indicators like lifestyle and community identity. These negative impacts can be mitigated by the following steps.

**Recommendations**

- Include sidewalks for residents to access the street
- Provide shade or electrification, so vehicles don't have to idle when parked
- Implement non-idling ordinances which result in reduced emissions, improved air quality, and improved health outcomes (36)
- Reduce vehicle speeds
- Enhance streetscapes like trees, plants with flowers, street lights and sculptures which can potentially provide multiple health benefits like better air quality, reduced heat-related illness and improved traffic safety (28)
- Use solar energy or wind energy to run the parking lot infrastructure which aims to minimize carbon footprint (37)

# 6.0 Findings and Recommendations

This section is focused on the HIA recommendations to modify the US 67 draft recommended improvements to enhance the positive health benefits and to minimize the negative health impacts of the public along the corridor. In **Table 13**, HIA recommendations are provided for each health indicator, provided the impact type whether it is a positive or negative impact, magnitude (impact level), and distribution (affected or target population). **Table 14** describes sample HIA recommendations for each recommended improvement according to the geographical areas.

**Table 13: Recommendations by Health Indicators**

| Health Indicators | Impact (+/-) | Magnitude | Distribution | Recommendations |
|---|---|---|---|---|
| **Lifestyle** | + | Medium | People with no vehicles and lower-income population | • Stop for stop signs, yield signs, and red lights<br>• Don't use mobile phones while bicycling<br>• Follow the posted speed limit, traffic signs, and traffic laws<br>• Drive in the dedicated lanes, use helmets, and be visible<br>• Use lights and arm turn signals while bicycling to inform cars<br>• Provide bicycle racks and signage for bicycle routes<br>• Avoid peak traffic times and wear masks to minimize exposure to the emissions<br>• Provide trees, shades, watering, and maintenance on both sides of the road |
| **Community Identity** | + | Medium | Affects the population in all three communities | • Develop a plan to identify, prioritize, and implement parks and open spaces projects based on public input<br>• Identify funding sources and create an action plan for the development of new parks and open spaces<br>• Increase access to parks and open spaces<br>• Start small with the addition of landscaping, shade, benches, public art, trash receptacles and water fountains in the existing right of way and public land<br>• Pass regulations to mandate the inclusion of green spaces and interactive spaces into private and public projects<br>• Conduct community meetups or events to encourage people to get involved and increase social interaction |

**Table 13: Recommendations by Health Indicators (continued)**

| Health Indicators | Impact (+/-) | Magnitude | Distribution | Recommendations |
|---|---|---|---|---|
| **Living/ environmental conditions** | + | High | Affect the population in all three communities, tourists, and freight traffic | • Increased access to fresh fruits & vegetables and grocery stores<br>• Implement awareness program in schools about the effects of nutrition to improve health, and promote new channels, and live radio to share knowledge<br>• Enhanced streetscapes like trees, plants with flowers, street lights and sculptures can potentially provide multiple health benefits like better air quality, reduced heat-related illness, and improved traffic safety<br>• Increase access to green spaces and open spaces |
| **Access and quality of services** | + | Medium/ High | Immediate and stronger influence on people who require medical support | • Develop a plan to identify, prioritize, and implement parks and open spaces projects based on public input<br>• Identify funding sources and create an action plan for the development of new parks and open spaces<br>• Start an awareness program in schools, news channels, and live radio to share knowledge on using emergency services apps to improve emergency response times. |
| **Sustainable environment** | -/+ | Low | Relatively lower effect on residents | • Include sidewalks for residents to access the street<br>• Reduce vehicle speeds<br>• Enhanced streetscapes like trees, plants with flowers, street lights and sculptures can potentially provide multiple health benefits like better air quality, reduced heat-related illness, and improved traffic safety<br>• Provide shade or electrification, so vehicles don't have to idle when parked<br>• Implement non-idling ordinances which result in reduced emissions, improved air quality, and improved health outcomes<br>• Use solar energy or wind energy to run the parking lot infrastructure which aims to minimize carbon footprint |

A sample of some of the recommendations from the HIA illustrating how they would apply to the specific communities is included in **Table 14** below.

**Table 14: Recommendations by Geographical Areas**

| Geographical Areas | List of Proposed Improvements with potential negative impacts | HIA Recommendations |
|---|---|---|
| **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 the 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 limits to allow additional motorist reaction time to avoid increased numbers of bicycles and pedestrians |
| **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 the 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 | • 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 |
| | • Bicycle accommodations | • Provide shade trees, watering, and maintenance on both sides of the road |
| | • Shared Use Path | • Provide shade, places to sit, water and trash receptacles |
| | • ADA compliant sidewalks and curb returns | |

**Table 14: Recommendations by Geographical Areas (continued)**

| Geographical Areas | List of Proposed Improvements with potential negative impacts | HIA Recommendations |
|---|---|---|
| **Presidio** | Parking Capacity at POE | • Provide shade, so vehicles don't have to idle |
| | | • 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 result 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 the 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 |
| **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 rumbles every 40 to 60 feet to provide bicyclists better access to the roadway lane and to avoid debris. |

## Conclusion

The HIA identifies health indicators based on the community and corridor profiles and provides HIA recommendations to modify the US 67 Corridor Master Plan draft recommended improvements to maximize the positive health impacts and minimize the negative health impacts to the public along the US 67 corridor. Five community health indicators are identified in the HIA; these indicators are identified based on the outcomes of the list of recommended improvements, the health-related outcomes and the goals of the US 67 Corridor Master Plan. Specific recommendations are provided by community health indicator, by project and by community.

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# ATTACHMENT A

| Communities | S.NO | Planned Improvements | Outcomes | Health Outcomes | Target Population (PROS) | Target Population (CONS) | Seriousness (beneficial or loss) | Magnitude | Recommendations |
|---|---|---|---|---|---|---|---|---|---|
| ALPINE | 1 | Two-Way Left-Turn Lane at FM 1703 & US 67 | -Reduced crashes<br>-Provides clear directions for vehicular movements | -Improved Safety<br>-Reduced Stress | Residents with cars, Tourists, and Freight traffic | - | - | - | • To offset increased pedestrian crossing distance, provide clear signage to alert motorists for pedestrian crossing |
| | 2 | Closing Orange St and Sul Ross Ave | -Reduced crashes<br>-Provides clear directions for vehicular movements | -Improved Safety<br>-Reduced Stress | Residents | - | - | - | - |
| | 3 | Pedestrian Ring at Sul Ross University & US 67 | -Reduced crashes<br>-Provides clear directions for vehicular movements<br>-Encourage walking | -Improved Safety<br>-Reduced Stress<br>-Increase in Pride and Neighborliness | Residents, Tourists, and Freight traffic | - | - | - | • To create a sense of place, provide green space, wayfinding, and educational signage, sculpture, etc. |
| | 4 | One-Way Complete Streets with Pedestrian Improvements at US 67 and 6th, 5th, and 4th Streets | -Improved mobility for disabled persons<br>-Improved corridor usage by the residents<br>-Reduced injuries caused by inadequate infrastructure<br>-Reduced crime and crashes | -Improved Safety<br>-Increased Mental/ Behavioral Health<br>-Increased Neighborliness | Residents of Alpine | | Low | Low | • Provide adequate signage for vehicles, bicycles and pedestrian guidance<br>• Consider reducing speed limits to allow additional motorist reaction time to avoid increased numbers of bicycles and pedestrians |
| | 5 | Road Geometry Warning System at two low bridge crossings (Southwest side of Alpine) | -Reduce crashes<br>-Inform drivers | -Improved Safety | Freight Traffic | - | - | - | - |
| | 6 | Add Left Turn Lanes on 11th Street at US 67 | -Improved Safety<br>-Increased access<br>-Reduced congestion | -Reduced emissions<br>-Increased Economic Development | -Residents, Tourists, and businesses<br>-Reduced Cardiovascular disease and Cancer | -Increased crossing risk for pedestrians due to addition of TWLT | Low | Low | Provide clear signage |
| | 7 | Bicycle Lane with Striped Buffer (Complete Streets) | -Increased bicyclist travel<br>-Reduced VMT<br>-Reduced emissions | -Increased physical activity<br>-Reduced BMI, Reduced stress and Reduced risk of disability when older<br>-Increased Neighborliness | Residents of Alpine | -Risk associated with bicyclist sharing the road with other vehicles | Medium | Medium | • Consider additional bicycle improvements off US 67 to link with programmed shared use path network which will increase the overall health of the residents by encouraging people who are not comfortable on US 67 to ride for fitness, errands, school, etc.<br>• Provide adequate signage for vehicles and pedestrian guidance |
| | 8 | Add Turn Lanes - Close Angled Intersection at Cherry Street and US 67 | -Increased bicyclist travel<br>-Reduced VMT<br>-Reduced emissions | -Reduced emissions<br>-Increased Economic Development | Residents, Tourists, and businesses | N/A | - | - | - |
| | 9 | Intersection Improvements<br>-ADA compliant sidewalks and curb returns, raised intersections & medians, curb improvements, bollards, and pedestrian refuges<br>-Signages, lighting, striped crossings, and striping changes | -Improved mobility for disabled persons<br>-Improved corridor usage by the residents<br>-Reduced injuries caused by inadequate infrastructure<br>-Reduced crime and crashes | -Improved Safety<br>-Increased Mental/ Behavioral Health<br>-Increased Neighborliness | Residents of Alpine | N/A | - | - | - |

| Communities | S.NO | Planned Improvements | Outcomes | Health Outcomes | Target Population (PROS) | Target Population (CONS) | Seriousness (beneficial or loss) | Magnitude | Recommendations |
|---|---|---|---|---|---|---|---|---|---|
| MARFA | 10 | Roundabout at Lincoln St & Highland St | -Reduced crashes<br>-Provides clear directions for vehicular movements | -Improved Safety<br>-Reduced Stress | Residents, Tourists, and Freight traffic | -Fewer parking spaces<br>-Affect older population who cannot walk due to limited parking spaces<br>- Increased stress | Medium | Low | • Make sure there is adequate handicapped parking to allow those with disabilities to access key destinations, due to parking reductions |
| | 11 | With Bicycle Lanes at San Antonio St & Highland Ave | -Increased bicyclist travel<br>-Reduced VMT<br>-Reduced vehicle speeds<br>-Reduced Emissions | -Improved Safety<br>-Increased physical activity<br>-Reduced BMI, Reduced stress and Reduced risk of disability when older<br>-Increased Neighborliness | Residents of Marfa | - Expose to more emissions and heat for bicyclists for pedestrians | Low | Low | • Enhanced streetscapes like trees, plants with flowers, street lights and sculptures can potentially provide multiple health benefits like better air quality, reduced heat-related illness and improved traffic safety<br>• Provide shade trees, watering and maintenance on both sides of the road<br>• Provide shade, places to sit, water and trash receptacles |
| | 12 | Shared Use Path (Complete Streets) | -Increased bicyclist travel<br>-Reduced VMT<br>-Reduced vehicle speeds<br>-Reduced Emissions | -Improved Safety<br>-Increased physical activity<br>-Reduced BMI, Reduced stress and Reduced risk of disability when older | Residents of Marfa | - | - | - | • Consider additional bicycle improvements off US 67 to link with programmed shared use path network which will increase the overall health of the residents by encouraging people who are not comfortable on US 67 to ride for fitness, errands, school, etc. |
| | 13 | Bicycle/Pedestrian Warning Systems at S Highland Avenue / E San Antonio Street | -Reduced crashes | -Improved Safety | Residents of Marfa | - | - | - | - |
| | 14 | Intersection Improvements<br>-ADA compliant sidewalks and curb returns, raised intersections & medians, curb improvements, bollards, striped crossings, and pedestrian refuges | -Improved mobility for disabled persons<br>-Improved corridor usage by the residents<br>-Reduced injuries caused by inadequate infrastructure<br>-Reduced crime and crashes | -Improved Safety<br>-Increased Mental/ Behavioral Health<br>-Increased Neighborliness | Residents of Marfa | - | - | - | - |
| PRESIDIO | 15 | T-Intersection at US 67 & BU 67 | -Reduced crashes<br>-Provides clear directions for vehicular movements | -Improved Safety<br>-Reduced Stress | Residents with cars, and freight traffic | - | - | - | - |
| | 16 | Y-Intersection at O'Reilly St & Erma Ave | -Reduced crashes<br>-Provides clear directions for vehicular movements | -Improved Safety<br>-Reduced Stress | Pedestrians, Residents, Tourists, and Freight traffic | - | - | - | - |

| Communities | S.NO | Planned Improvements | Outcomes | Health Outcomes | Target Population (PROS) | Target Population (CONS) | Seriousness (beneficial or loss) | Magnitude | Recommendations |
|---|---|---|---|---|---|---|---|---|---|
| | 17 | Two-Way Left-Turn Lane at FM 170 & Utopia St at US 67 | -Reduced crashes<br>-Provides clear directions for vehicular movements | -Improved Safety<br>-Reduced Stress | Industrial park | - | - | - | - |
| | 18 | -Parking Capacity at Port of Entry (POE)<br>-Smart Parking | -Reduced traffic congestion<br>-Reduced vehicle emissions<br>-Improved emergency services<br>-Improved access to residents | -Reduced Cardiovascular diseases<br>-Increased Environmental effects of paved parking facility | Residents, Tourists, and Freight traffic | -Increased vehicle emissions and noise pollution on Puerto Rico St due to added parking capacity<br>- Increased environmental impacts of paved parking facility | Low | Low | • Use solar energy or wind energy to run the parking lot which aims to minimize carbon footprint<br>• Provide shade, so vehicles don't have to idle<br>• Planting trees, green spaces to reduce heat<br>• Reduce vehicle speeds<br>• Provide sidewalks for pedestrians |
| | 19 | Bicycle Lane with Striped Buffer (Complete Streets) | -Increased bicyclist travel<br>-Reduced Vehicle Miles Traveled (VMT)<br>-Reduced Emissions | -Increased physical activity<br>-Reduced BMI, stress and risk of disability when older<br>-Increased Social connections<br>-Increased Asthma and other Respiratory Conditions | -Residents of Presidio | - Greater exposure to emissions and heat for bicyclists and pedestrians | Low | Low | • Consider additional bicycle improvements off US 67 to link with programmed shared use path network which will increase the overall health of the residents by encouraging people who are not comfortable on US 67 to ride for fitness, errands, school, etc.<br>• Conduct public meetings, and identify locations for the development of green and open spaces<br>• Conduct community meetups or events to encourage people to get involved and increase social interaction |
| | 20 | Intersection Improvements<br>-ADA compliant sidewalks and curb returns, raised intersections & medians, curb improvements, bollards, and pedestrian refuges<br>-Signages, lighting, striped crossings, and striping changes | -Improved mobility for disabled persons<br>-Improved corridor usage by the residents<br>-Reduced injuries caused by inadequate infrastructure<br>-Reduced crime and crashes | -Improved Safety<br>-Increased Mental/ Behavioral Health<br>-Increased Neighborliness | -Residents of Presidio | - | - | - | - |
| **Between communities** | 21 | I-10/US 67 Interchange Concept | -Increased traffic flow<br>-Increased visibility | -Reduced Stress<br>-Improved Safety | Residents, Tourists, and Freight traffic | N/A | - | - | - |
| | 22 | Pavement Marking | -Increased visibility | -Improved Safety | | N/A | - | - | - |
| | 23 | Tree trimming/brush removal | | | | N/A | - | - | - |
| | 24 | Animal Warning Systems<br>-A 12-mile stretch between Fort Stockton and Alpine<br>-A 20-mile stretch between Marfa and Shafter | -Reduced crashes<br>-Inform drivers of incidents which happened or about to happen<br>-Reduced traffic<br>-Speed control of vehicles | -Improved Safety<br>-Reduced Stress<br>-Increased Mental/ Behavioral Health | | N/A | - | - | - |
| | 25 | Highway-Rail Crossing Warning System (North of Alpine) | | | | N/A | - | - | - |
| | 26 | Rock Slide Warning Systems at Shafter and Paisano Pass | | | | N/A | - | - | - |

| Communities | S.NO | Planned Improvements | Outcomes | Health Outcomes | Target Population (PROS) | Target Population (CONS) | Seriousness (beneficial or loss) | Magnitude | Recommendations |
|---|---|---|---|---|---|---|---|---|---|
| | 27 | Traffic Management<br>-Variable speed limit, Vehicle detection, and Planned special event management systems | | | | N/A | - | - | - |
| | 28 | Advance warning signs | | | | N/A | - | - | - |
| | 29 | Automated Visibility Warning Systems/Integrated Weather Monitoring and Prediction Systems at Paisano Pass | | | | N/A | - | - | - |
| | 30 | Speed Warning Systems | | | | N/A | - | - | - |
| | 31 | Sequential Dynamic Curve Warning Systems | | | | N/A | - | - | - |
| | 32 | Work Zone Safety Systems | | | | N/A | - | - | - |
| | 33 | Passing Lanes | -Reduced driver anxiety<br>-Increased traffic flow | -Reduced Stress<br>-Increased Mental/ Behavioral Health | | N/A | - | - | - |
| | 34 | Slope treatment | -Keeps vehicle on the road<br>-Provides safety barrier | -Improved Safety<br>-Increased Mental/ Behavioral Health | Residents, Tourists, and Freight traffic | N/A | - | - | - |
| | 35 | Guardrails | | | | N/A | - | - | - |
| | 36 | Centerline and Shoulder rumble strips | | | | N/A | - | - | • Because shoulder rumble strip depressions can cause a bicyclist to fall, ensure that there is a 12-foot-wide gap in the shoulder rumbles every 40 to 60 feet to provide bicyclists better access to the roadway lane and to avoid debris |
| | 37 | Shoulder Widening | | | | N/A | - | - | - |
| | 38 | Emergency Services<br>-Next generation 911<br>-Smartphone application<br>-Automatic crash notification systems | -Increased access to health care<br>-Improved response time | -Improved Safety<br>-Increased mental behavior | Residents, Tourists | N/A | - | - | - |
| | 39 | Rest Area/Pull Outs | -Prevents fatigue driving<br>-Reduce crashes | -Improved Safety<br>-Reduced Stress<br>-Increased Mental/ Behavioral Health | Freight traffic | N/A | - | - | - |

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