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MEMORANDUM

DATE: August 27, 2020
TO: Andrew Canon
CC: Luis Diaz
FROM: JD Allen
RE: RGVMPO 2045 MTP: Active Transportation Needs Analysis

Introduction

The active transportation existing conditions and deficiencies analysis provides policy makers and the public with a better understanding of how the transportation network serves the mobility of persons relying on non-motorized transportation throughout the region.

This memo looks at three primary aspects in gauging active transportation network performance. Existing conditions are examined by reviewing an inventory of existing facilities as well as policies and programs throughout the region that have an effect on active transportation. Safety data is examined in order to detail the regional trends in crashes for active transportation users using the Texas Department of Transportation's (TxDOT) Crash Records Information System (CRIS) for Cameron and Hidalgo Counties for the five-year period from 2015-2019. And third, an analysis of the network is performed to review travel patterns, accessibility, level of stress, and proximity to transit in order to perform a gap analysis. The existing conditions analysis and needs assessment explore the current state of the transportation system for those who walk and bike and identifies deficiencies and safety concerns within the network.

As this analysis was conducted in support of the development of both the Metropolitan Transportation Plan, and Active Transportation Plan, the contents of this memo reflect a higher level of detail in analysis than is typically contained in an active transportation needs analysis for the MTP alone.

Existing Conditions

The Rio Grande Valley Metropolitan Planning Organization (RGVMPO) has a mixture of on street and off-street facilities within the Rio Grande Valley Metropolitan Area Boundary (RGVMAB). As urban areas in the Rio Grande Valley continue to densify and grow, walking and bicycling become an increasingly vital component of the transportation system.

Existing Bicycle Facilities

Within the RGVMAB there are nearly 178 miles of on-street bike facilities, consisting of bike lanes, cycle tracks or shared lanes with either a shared lane marking or signage. Protected bikeways, which are the most comfortable for the broad range of people using the facility, make up about 2 miles or 1% of the total on-street bike facilities. **Figure 1** displays examples of the on-street facility types commonly found throughout the RGVMAB today.

Figure 1: Example On-Street Bike Facilities in RGVMAB

Bike Lane – N. Main St. | Shared Lane – N. Coria St. | Protected Bike Lane – E. Jackson St.

Off-Street facilities are located outside of the traffic lanes, where users are not directly interacting with vehicle traffic. The RGVMAB contains about 114 miles of off-street facilities, often referred to as Hike and Bike trails. **Table 1** below shows the total mileage for bike facilities within the RGVMAB. Brownsville, Edinburg, Harlingen, McAllen, and Pharr make up the largest portion of urban bike facilities throughout the RGVMAB, while bike facilities outside of the urban centers comprise 14% of the total 292 miles.

Table 1: Miles of Bike Facilities within RGVMAB by City

City	On-Street Miles	Off-Street Miles	Total Miles	Percent of Total RGVMAB Bike Facilities
Alamo	1.3	0.0	1.3	0%
Brownsville*	71.2	26.2	97.4	33%
Donna	1.1	0.0	1.1	0%
Edinburg*	26.2	3.9	30.1	10%
Harlingen*	6.3	13.7	20.0	7%
Hidalgo	7.1	1.8	8.9	3%
Los Fresnos	1.6	0.0	1.6	1%
McAllen*	17.4	33.3	50.7	17%
Mission	3.7	3.7	7.4	3%
Palmview	0.3	0.4	0.6	0%
Pharr*	12.7	6.3	19.1	7%
San Benito	0.9	3.2	4.1	1%
San Juan	2.1	0.5	2.5	1%
Weslaco	5.9	1.1	7.0	2%
Primera	0.0	0.2	0.2	0%
Rio Hondo	0.0	0.4	0.4	0%
Outside of City*	20.6	18.9	39.5	14%
Grand Total	178.3	113.6	292.0	100%

*Communities represent the highest proportion of bike facility mileage

Existing Sidewalk Facilities

Sidewalk facilities in the RGVMAB are prevalent within urban areas**.** The total miles of sidewalk were found for each city within the RGVMAB. In addition to the quantity of sidewalks, the sidewalk network coverage was calculated by selecting roadways within each city with a speed limit of less than 60 miles per hour (mph) because roadways with speeds at or above 60mph do not commonly contain sidewalks and are not conducive to walking.

To calculate for a full coverage sidewalk network, with sidewalks on both sides of a road, the selected roadway miles were doubled.

To measure the coverage of the sidewalk network, total miles of existing sidewalk were divided by the doubled roadway miles, for roadways under 60mph, as show in the formula below.

Table 2 shows the number of miles of sidewalk within each city, along with the coverage of the sidewalk network.

$$\frac{Sidewalk\ Miles}{(Roadway\ Miles\ under\ 60mph * 2)} = \%\ of\ Sidewalk\ Coverage$$

Table 2: Sidewalk Mileage and Coverage by City

City	Miles of Sidewalk	Sidewalk Coverage
Alamo	31.4	18%
Alton	21.5	19%
Brownsville	412.9	30%
Combes	1	2%
Donna	43.2	24%
Edcouch	3.6	10%
Edinburg	238.1	34%
Elsa	6.9	13%
Granjeno	2	43%
Harlingen	159.7	20%
Hidalgo	30.1	26%
La Feria	10.3	12%
La Joya	12.6	26%
La Villa	2.8	11%
Los Fresnos	18.1	33%
Los Indios	1.2	4%
McAllen	533.7	45%
Mercedes	39.2	21%
Mission	263.3	35%
Palm Valley	0.8	5%
Palmhurst	3.8	7%

City	Miles of Sidewalk	Sidewalk Coverage
Palmview	4.4	7%
Penitas	7.2	24%
Pharr	162	32%
Primera	3.9	10%
Progreso	2.6	6%
Progreso Lakes	0.4	2%
Rancho Viejo	0.3	1%
Rio Hondo	2.2	8%
San Benito	48.4	17%
San Juan	60	24%
Santa Rosa	0.6	2%
Sullivan City	0.3	1%
Weslaco	83.8	22%
Total	**2,212.20**	--

Figure 2, Figure 3 and **Figure 4** show both on- and off-street bike facilities, along with sidewalks in each of the major urban areas within the RGVMAB.

Figure 2: Bike Facilities in McAllen & Edinburg Area

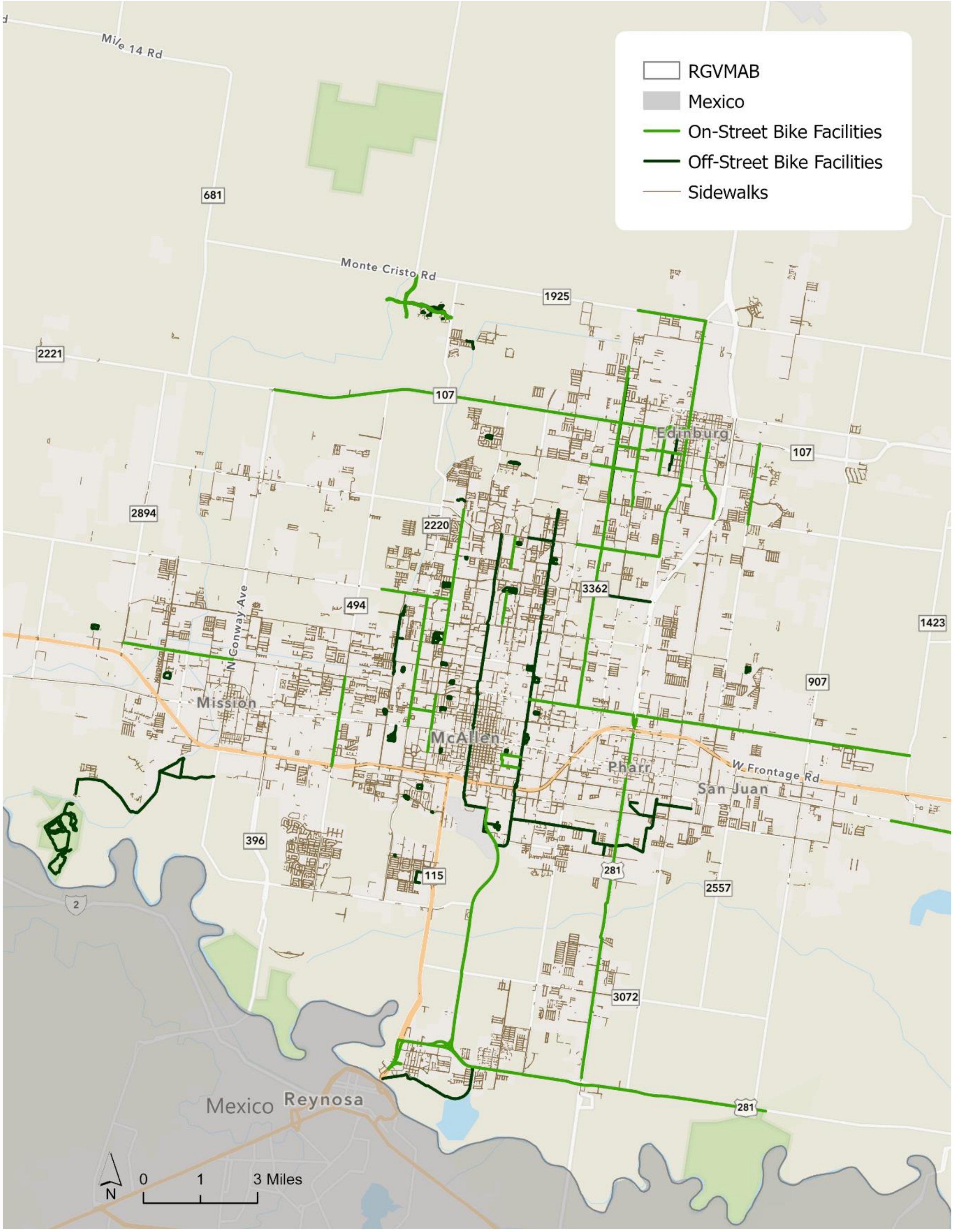


Figure 3: Bike Facilities in the Harlingen & San Benito Area

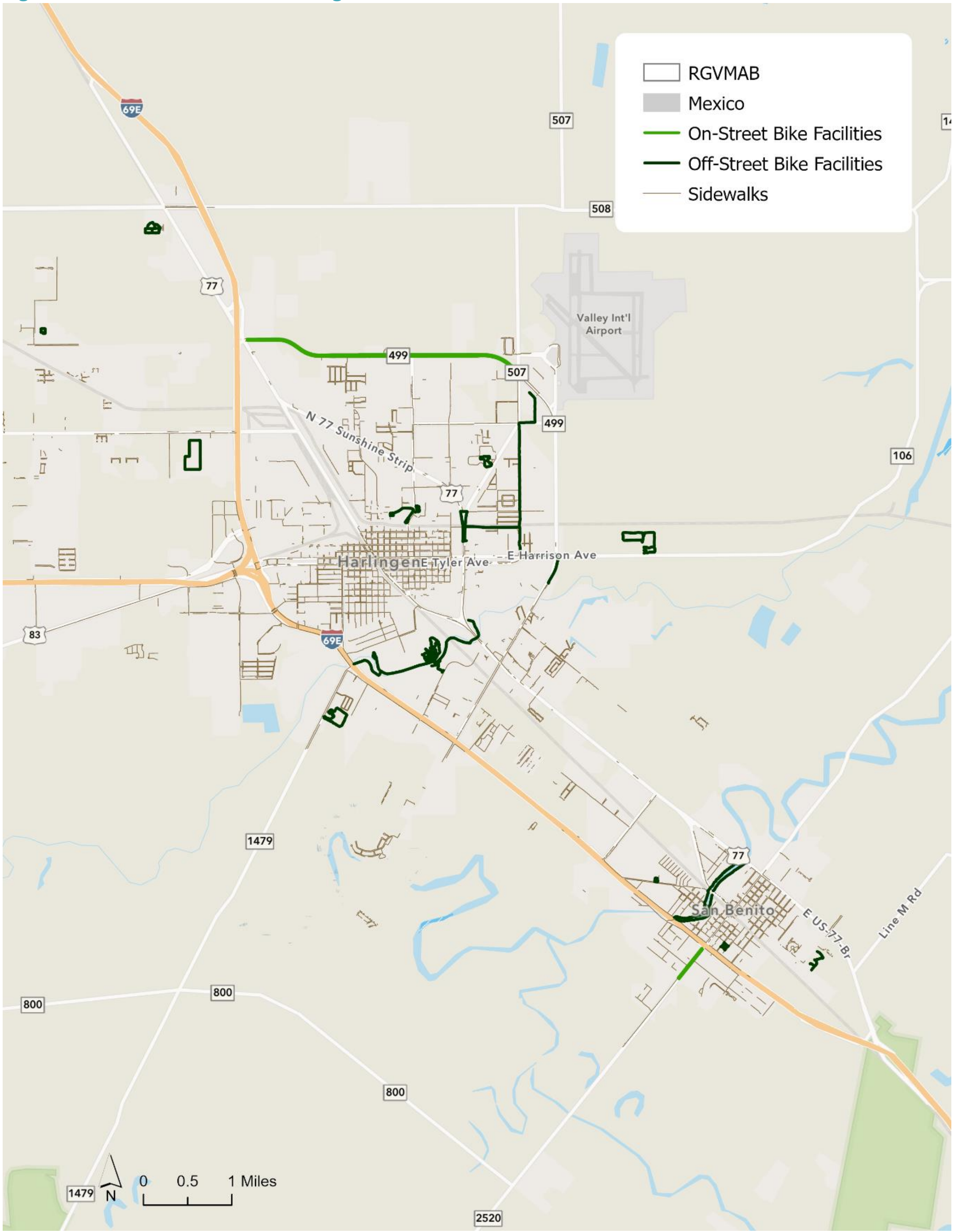
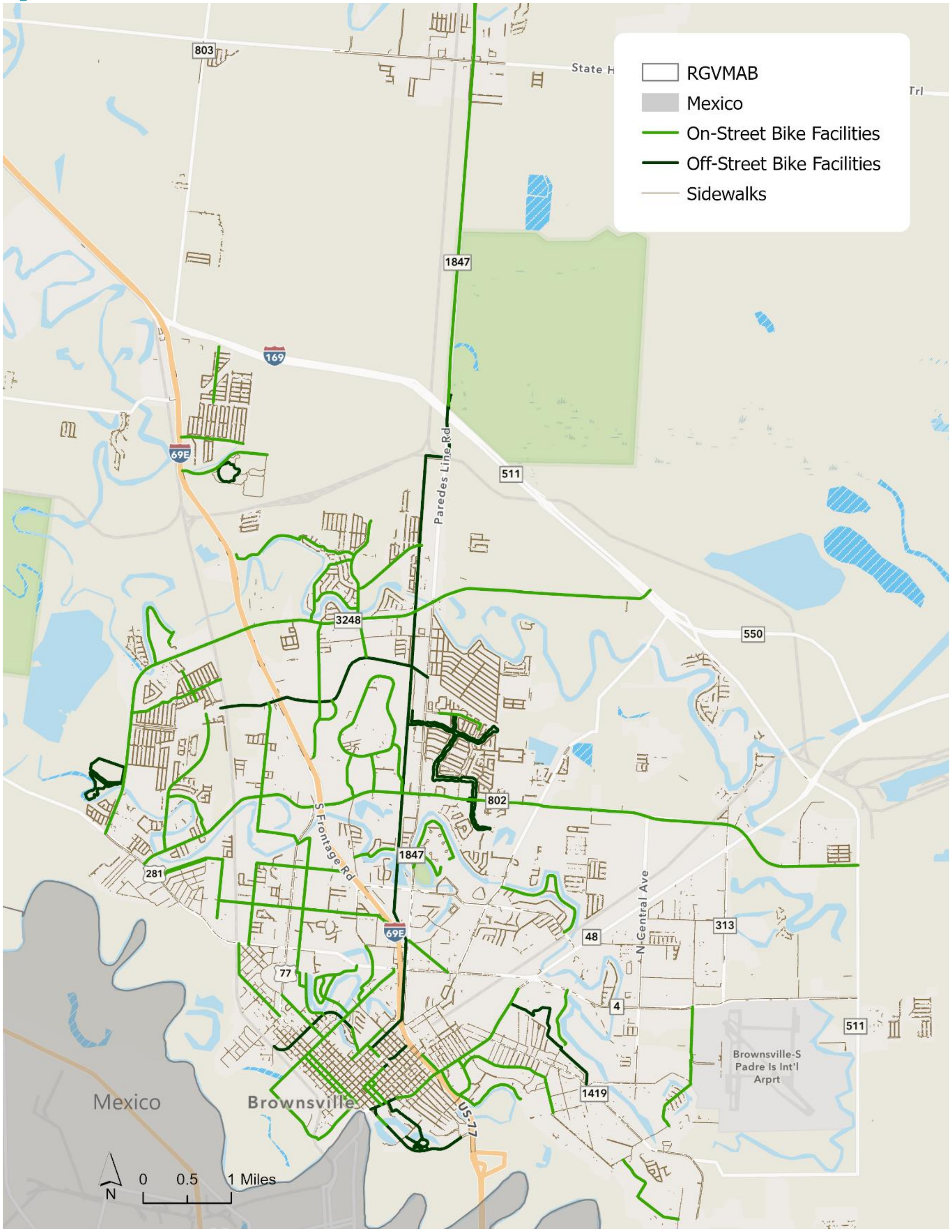


Figure 4: Bike Facilities in the Brownsville Area



Policy and Program Review

Policies, programs, and ordinances are powerful tools that governments use to shape how the transportation system serves its residents. If a government aims to support people who move by active transportation modes like walking and biking, its funding priorities, policies, ordinances, and codes must also reflect the same outcome. There are many policies and ordinances that support and shape active transportation within communities. A few key policies and practices have been selected for review in major cities within the RGVMAB. While many smaller communities can also benefit from such policies and programs, they are not commonly found. The policies, programs and ordinances described below were reviewed.

Complete Streets

Complete Streets Policies are a collection of goals, design standards, ordinances, or performance measures that ensure streets are safe for people of all ages and abilities, regardless of how the travel. Complete Streets Policies also tend to the needs of local economies, cultures, and the environment in an equitable manner.

Open Streets Events

Open Streets events or initiatives temporarily close significant lengths of street to people using automobiles and encourage use for people walking, biking, rolling, playing, dancing, or nearly any other non-automobile activity. Open Streets events in North America are modeled closely after the events starting in the 1970’s in Colombia called ciclovías, though similar events occurred in major cities in the United States, as early as the 1960’s.

Parking Enforcement

Parking ordinances or municipal city codes that restrict automobiles parking, stopping, or standing in a bike facility are an important aspect of providing safe access for people of all ages and abilities. Automobiles in bike facilities may necessitate unsafe maneuvers for people in a bike lane, such as merging into an adjacent travel lane with automobiles travelling at high speeds. Enforcement is a key component of such an ordinance.

Safe Passing Ordinance

For a person using a bicycle, sharing lanes with automobile traffic, or using a narrow bike lane adjacent to high speed traffic can cause significant stress or possible erratic reactions to a close encounter. A safe passing ordinance dictates that people driving a car must allow a specified distance between their vehicle and someone riding a bicycle. Typical that distance is 3 feet or more.

Safe Routes to School

Safe Routes to School (SRTS) is a program to encourage and assist children and families getting to and from elementary, middle, and high schools. There is a shared focus on infrastructure improvements and programs to encourage kids and families to walk and bike to school.

Planning Goals

One of the first steps to improving the transportation system for people who walk, and bike is setting goals that clearly prioritize and necessitate change. Goals can often be found in planning reports or documents like comprehensive plans, master plans or similar resources.

Transportation Demand Management (TDM)

TDM aims to reduce the negative impacts of typical peak AM and PM single occupancy car trips by spreading the demand across the entire day and encouraging the use of alternative modes including walking, biking, and transit. Strategies may include shifting commute times or incentivizing alternative work schedules, encouragement programs surrounding active transportation use, or parking policy.

Vision Zero

Vision Zero takes a clear and unrelenting stance on eliminating traffic fatalities. Vision Zero policies clearly state that no death or serious injuries in our transportation systems are acceptable. A Vision Zero policy takes a multifaceted approach to reducing deaths and serious injuries such as reducing speeds and rethinking the street design process.

Policy Review Summary

The review in **Table 3** indicates several active measures communities within the RGVMAB are taking to support people to use active modes of transportation. For example, nearly all of the cities reviewed have ordinance requires safe passage of vulnerable road users, and several more enforce a no parking ordinance within bike facilities.

However, the review also shows areas where these major cities can improve. Complete Streets policies are only present in the city of Mission. Complete Streets can be a building block policy to help shape the roadway system to safety accommodate all users.

Table 3: Active Transportation Policy and Program Review

Region	Complete Streets	Open Streets Events	Parking Enforcement	Safe Passing Ordinance	Safe Routes to School	Planning Goals	TDM Programs	Vision Zero
State of Texas								
RGVMPO								
Cameron County								
Hidalgo County								
Brownsville								
Edinburg								
Harlingen								
McAllen								

Region	Complete Streets	Open Streets Events	Parking Enforcement	Safe Passing Ordinance	Safe Routes to School	Planning Goals	TDM Programs	Vision Zero
Mission	■			■				
Pharr			■	■				
San Benito						■		
San Juan			■	■				
Weslaco	◧			■		■		

■ = Policy or Program present ◧ = Progress towards Policy or Program but not fully present

Active Transportation Needs Analysis

In addition to the review of the existing conditions for active transportation, a granular analysis was conducted to review the safety, level of stress, transit proximity, and expected travel patterns as part of the deficiencies, or needs analysis for non-motorized travel choices. The following sections represent in depth narratives of these portions of the needs analysis.

Safety Analysis

One of the most important steps in planning for the future of active transportation in a region is to determine the region's specific modal needs so that these needs can be addressed accordingly. One type of needs identification comes in the form of a safety analysis, which involves examining how safe the regional environment is for active transportation users. This type of analysis can pinpoint current safety issues and challenges, allowing the region to implement measures to mitigate or prevent crashes over time to address the existing and future safety needs of active transportation users.

As mentioned in the introduction to this memo, in order to identify and assess patterns of active transportation safety in the RGVMAB, crash data was gathered from the Texas Department of Transportation's (TxDOT) Crash Records Information System (CRIS) for Cameron and Hidalgo Counties for the five-year period from 2015-2019. Using this data, active transportation (AT) crashes were identified and isolated, then evaluated based on various characteristics such as time, severity, contributing factors, and location. For this analysis, AT crashes are defined as crashes involving at least one pedestrian bicyclist or person using another mobility device. (no individual crash involved both pedestrians and bicyclists).

Regional Active Transportation Crash Trends by Attribute

Attributes contained in the CRIS data were first used to analyze trends in crash frequency and severity separately from the location of the crash in order to gain a deeper understanding of how severe active transportation crashes tend to be, how frequently and at what time of the day these crashes are occurring, and to better understand possible contributing factors.

Total Crashes & Crashes by Mode

Over the course of the five-year period, a total of 2,238 AT crashes occurred in Cameron and Hidalgo Counties. 71% of these crashes involved pedestrians, while 29% involved bicyclists. In all, AT crashes accounted for only 1.6% of all crashes in the RGVMAB (involving all modes of transportation) for the same five-year period. **Table 4** shows a breakdown of total crashes involving pedestrians or bicyclists.

Table 4: Total Active Transportation Crashes and Crashes by Mode

Crash Types	Crash Count	Percent of All AT Crashes	As a Percent of Total Crashes (All Modes)
Pedestrian Crashes	1,582	71%	1.1%
Bicyclist Crashes	656	29%	0.5%
All AT Crashes	2,238	100%	1.6%

Figure 5 shows the locations of AT crashes throughout the region symbolized by mode (i.e. whether bicyclists or pedestrians were involved). It is important to note that 622 of the 2,238 AT crash records did not include latitude and longitude data and therefore were not mapped.

Figure 5: RGVMAB Crashes by Mode

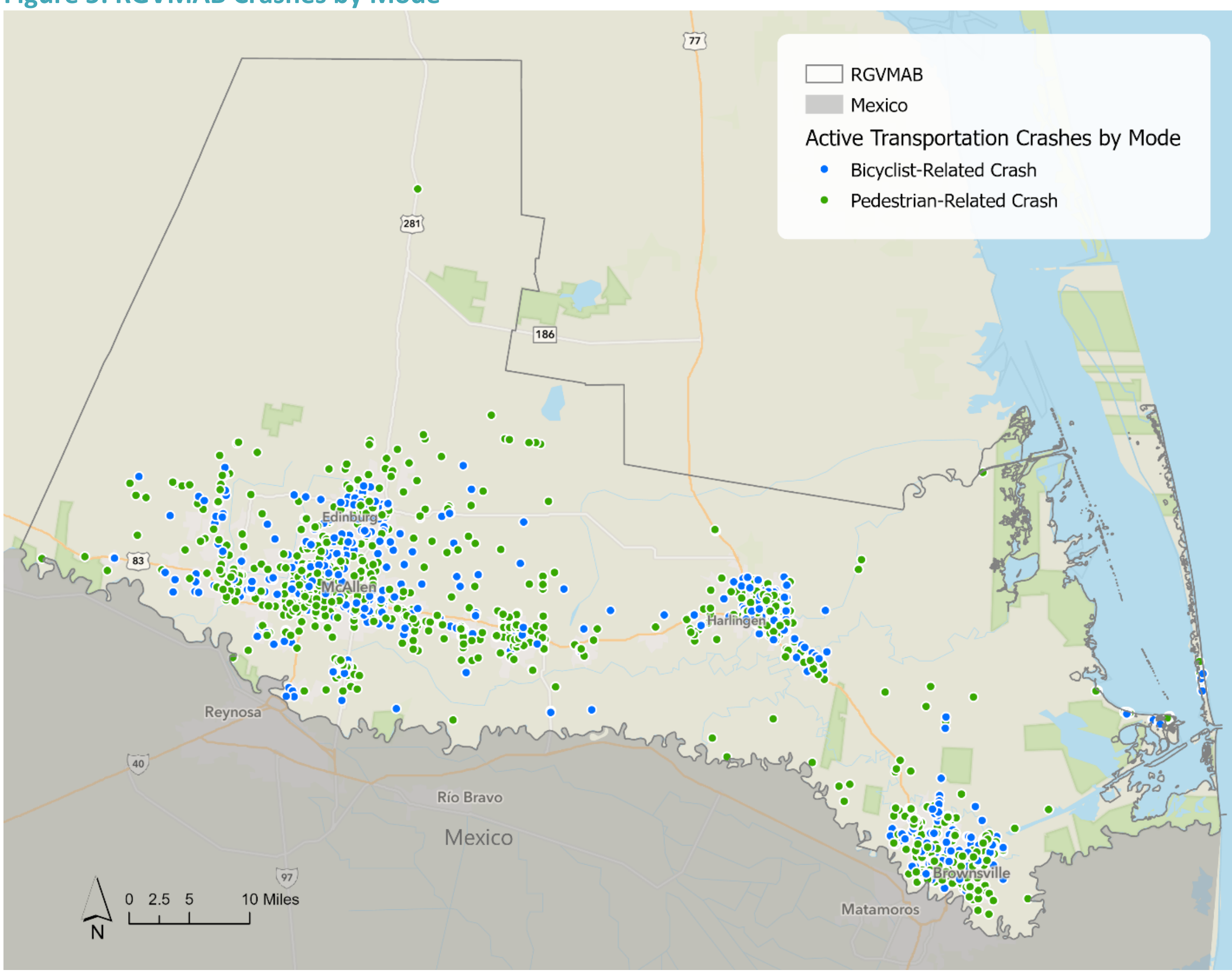
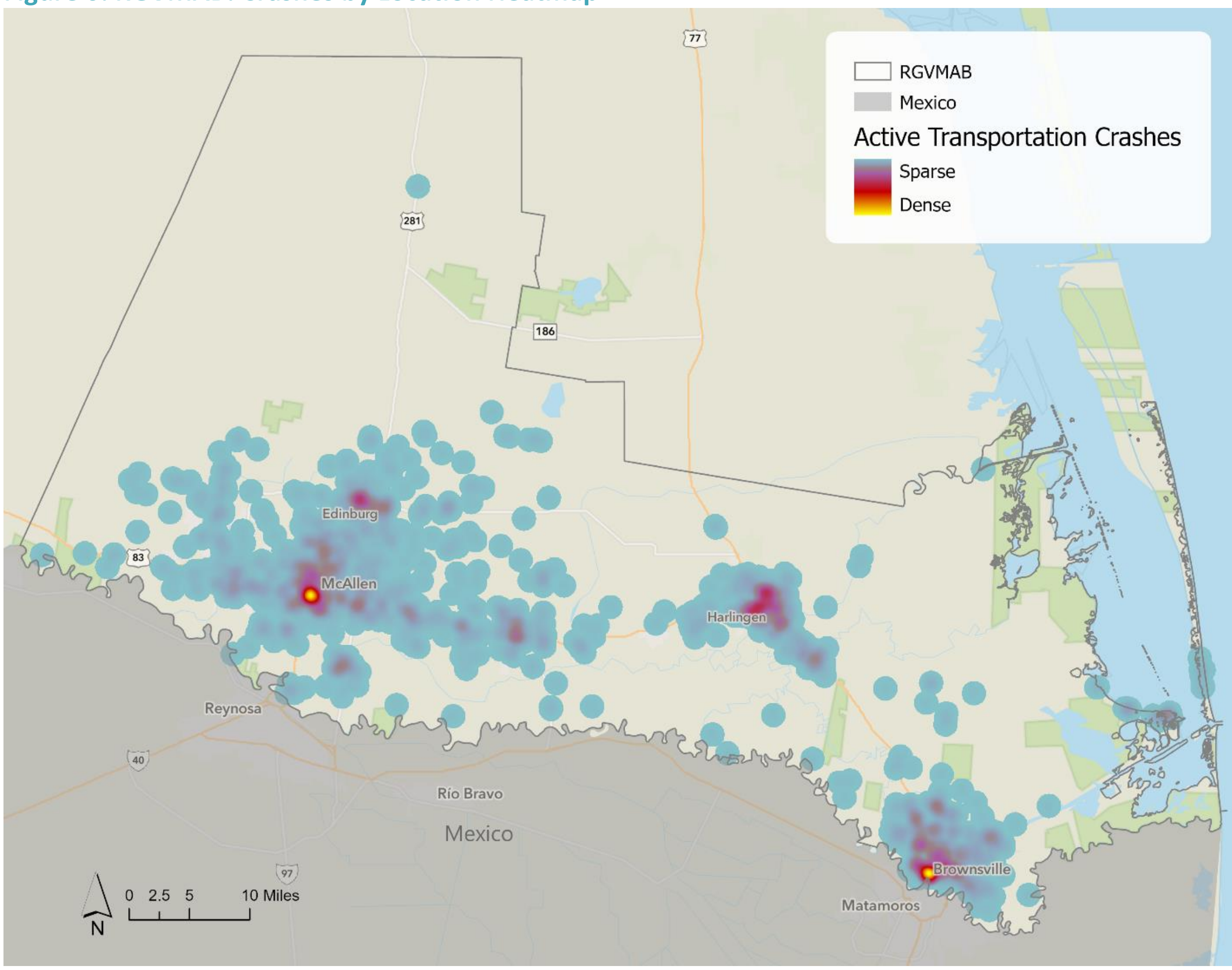


Figure 6 represents a heat map that illustrates concentrations of AT crashes within the region. The map indicates that higher densities of AT crashes occur in the larger urban areas, correlating with the levels of traffic in these areas.

Figure 6: RGVMAB: Crashes by Location Heatmap



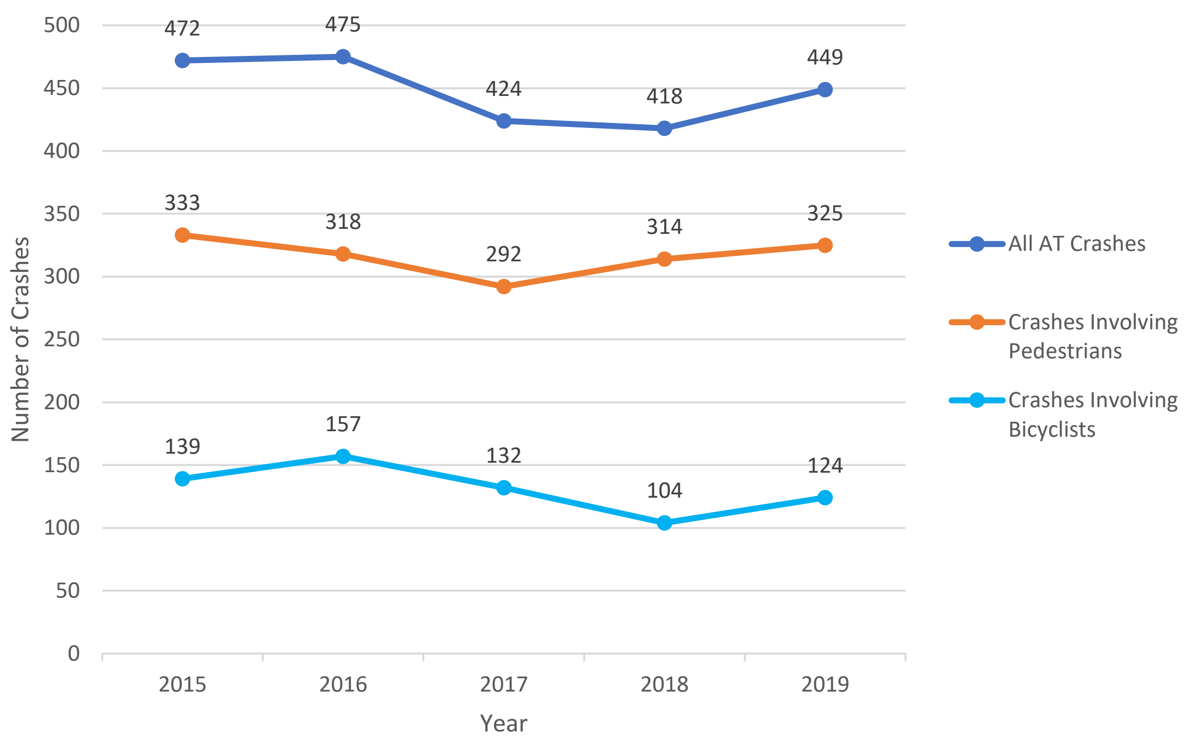
When broken out by year, as shown in **Table 5**, the data can reveal potential trends in AT crashes over time. **Table 5** also reveals that, within the past five years, there has been a slight decrease in crashes involving pedestrians, crashes involving bicyclists, and all AT crashes. However, the data also shows that occurrences of these types of crashes have begun to increase again within the past 1-2 years.

Table 5: Active Transportation Crashes by Year (2015-2019)

Year	Number of AT Crashes	Percent of All AT Crashes	As a Percent of Total Crashes (All Modes)	Number of Pedestrian Crashes	Percent of All Pedestrian Crashes	Number of Bicyclist Crashes	Percent of All Bicyclist Crashes
2015	472	21%	1.7%	333	21%	139	21%
2016	475	21%	1.6%	318	20%	157	24%
2017	424	19%	1.6%	292	18%	132	20%
2018	418	19%	1.5%	314	20%	104	16%
2019	449	20%	1.5%	325	21%	124	19%
Total	2,238	100%	1.6%	1,582	100%	656	100%

Figure 7 shows the increases and decreases in the number of crashes over time for all AT crashes, all crashes involving pedestrians, and all crashes involving bicyclists.

Figure 7: Active Transportation Crashes Over Time (2015-2019)



Crashes by Severity

CRIS data provides information about severity, which represents the impact of each crash. Severity is broken into six levels, including crashes resulting in fatality, serious injury, non-serious injury, possible injury, and no injury, as well as unknown severity. **Table 6** shows the distribution of AT crashes across the six severity levels for the five-year period of 2015-2019.

Table 6: Active Transportation Crashes by Severity

Crash Severity	Number of AT Crashes	Percent of All AT Crashes	Number of Pedestrian Crashes	Percent of Pedestrian Crashes	Number of Bicyclist Crashes	Percent of Bicyclist Crashes
Fatality	123	5%	107	7%	16	2%
Serious Injury	268	12%	219	14%	49	8%
Non-Serious Injury	695	31%	468	29%	227	35%
Possible Injury	930	42%	660	42%	270	41%
No Injury	219	10%	126	8%	93	14%
Unknown	3	0.1%	2	0.1%	1	0.1%
Total	**2,238**	**100%**	**1,582**	**100%**	**656**	**100%**

The pie chart shown in **Figure 8** illustrates the portions of all AT crashes that fall into the various severity levels (unknown severity was excluded because its portion is less than 1%). The pie chart reveals that less than a fifth of all AT crashes resulted in either fatality (5%) or serious injury (12%). Just over 40% of all AT crashes resulted in possible injury, over 30% resulted in non-serious injury, and 10% resulted in no injury.

Figure 8: All Active Transportation Crashes by Severity

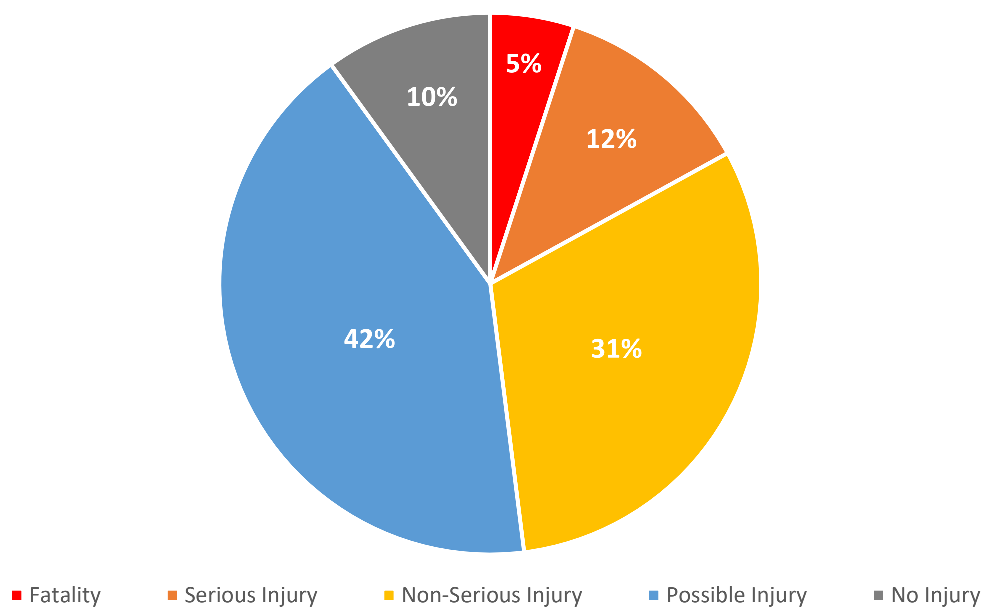


Table 7 focuses on AT crashes that resulted in fatality, breaking these crashes out by year and counting the number of fatalities resulting from these crashes, while **Table 8** does the same with AT crashes resulting in serious injury. These tables show that more than a fourth (28%) of all crashes resulting in fatality were AT crashes, while 14% of all crashes resulting in serious injury were AT crashes. These results are significant because although AT crashes make up only 1.6% of all crashes in the region for the five-year period, they comprise a much larger portion of all crashes that resulted in fatality or serious injury. This information implies that active transportation users bear a disproportionate amount of risk of injury or fatality and that planning for the safety of these users is of the utmost urgency.

Table 7: Active Transportation Crashes Resulting in Fatality by Year (2015-2019)

Year	Number of AT Crashes that Resulted in Fatality	Percent of All AT Crashes that Resulted in Fatality	As a Percent of Total Crashes (All Modes) that Resulted in Fatality	Number of Fatalities Resulting from AT Crashes
2015	25	20%	28%	25
2016	30	24%	26%	30
2017	26	21%	28%	27
2018	23	19%	29%	24
2019	19	16%	31%	19
Total	123	100%	28%	125

Table 8: Active Transportation Crashes Resulting in Serious Injury by Year (2015-2019)

Year	Number of AT Crashes that Resulted in Serious Injury	Percent of All AT Crashes that Resulted in Serious Injury	As a Percent of Total Crashes (All Modes) that Resulted in Serious Injury	Number of Serious Injuries Resulting from AT Crashes
2015	64	23%	17%	66
2016	55	20%	13%	56
2017	49	18%	12%	53
2018	45	16%	13%	51
2019	63	23%	15%	64
Total	276	100%	14%	290

Figure 9 illustrates the changes in the number of AT crashes resulting in fatality or serious injury over the five-year period. From 2015-2016, there was a slight increase in the number of AT crashes resulting in fatality, while from 2016-2019 these crashes gradually decreased. Crashes resulting in serious injury decreased over time from 2015-2018, but then experienced a sharp increase from 2018-2019, putting the count of these crashes back up to the 2015 level.

Figure 9: Active Transportation Crashes by Severity Over Time (2015-2019)

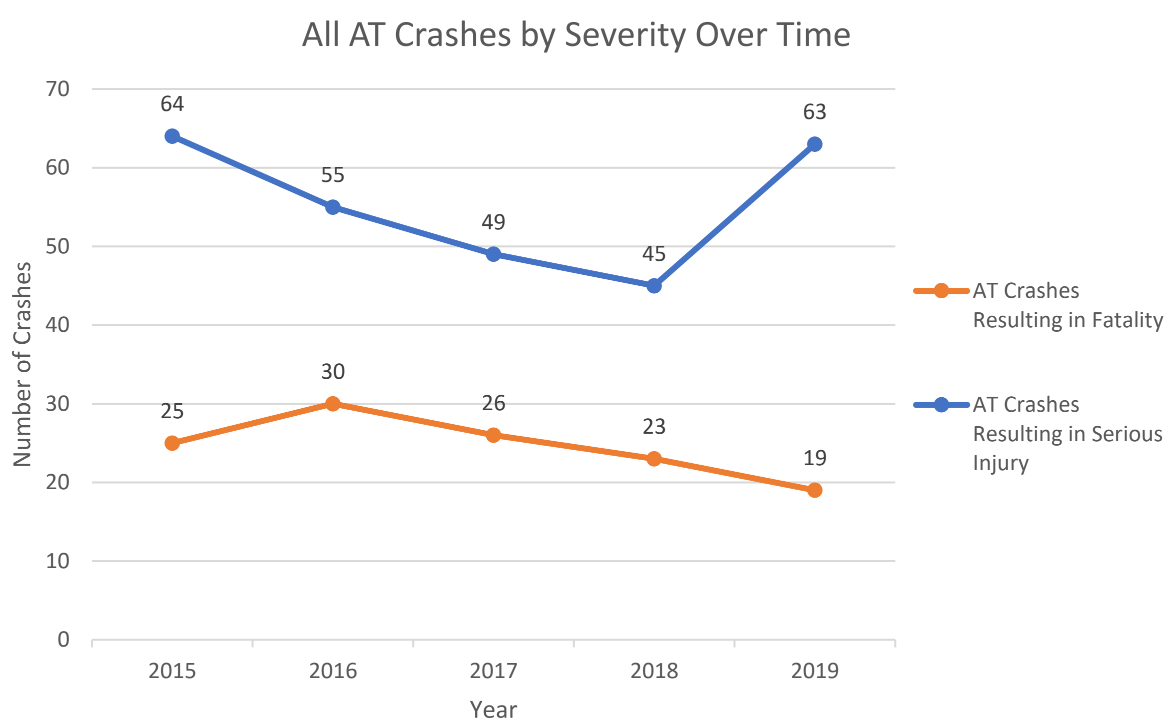


Figure 10 shows the locations of AT crashes that resulted in fatality or serious injury throughout the region.

Figure 10: Active Transportation Crashes by Severity

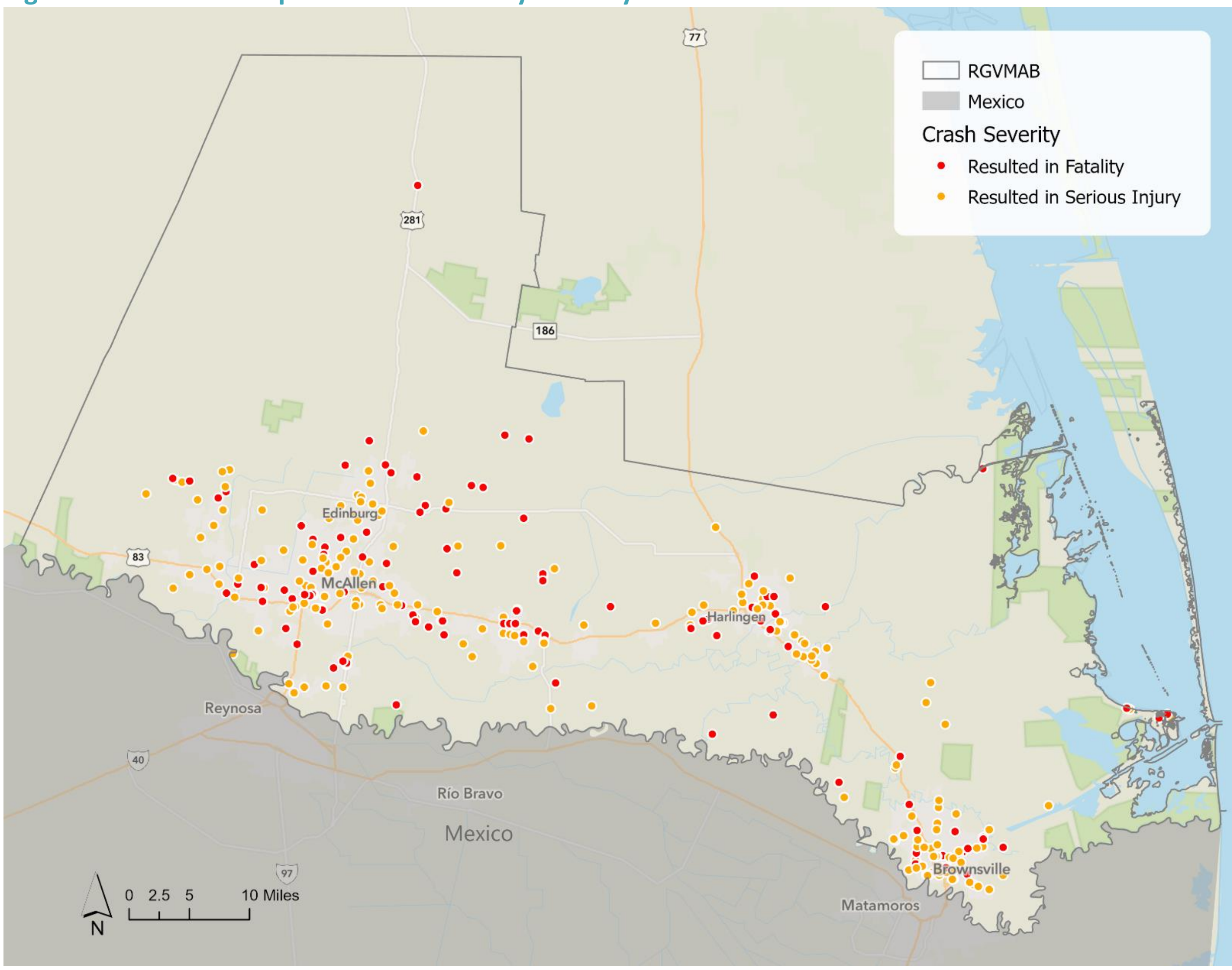


Table 9 shows the total number of AT crashes over the five-year period that resulted in any injury whatsoever, including serious and non-serious injuries. These values reveal that over the course of the period from 2015-2019, 85% of AT crashes resulted in an injury of some type.

This means that there is a high chance that pedestrians and bicyclists will sustain an injury if they are involved in accidents with automobiles. In addition, the bicyclists and pedestrians involved in the 2,238 AT crashes from 2015-2019 were much more likely to sustain an injury than the people in the automobiles that were involved in these crashes.

Over the five-year period, a total of 2,143 injuries were sustained by people involved in AT crashes, and 2,013 (94%) of these injuries were sustained by the bicyclists and pedestrians involved. This information illustrates why proactive implementation of measures to improve the safety of the active transportation network is critical for the health and safety of these users.

Table 9 also compares the total number of AT crashes that resulted in injury to the total number of injuries that resulted from these crashes. The comparison reveals that the number of AT crashes that resulted in injury over the five-year period does not have a one-to-one relationship with the number of people that sustained an injury due to these crashes, because multiple people may be injured in the same crash.

This information illustrates how the number of people impacted by crashes can be much higher than the number of crashes itself.

Table 9: Active Transportation Crashes Resulting in Any Injury by Year (2015-2019)

Year	Number of AT Crashes that Resulted in Any Injury	Percent of All AT Crashes that Resulted in Any Injury	As a Percent of All AT Crashes	Number of Injuries Resulting from AT Crashes
2015	403	21%	85%	443
2016	400	21%	84%	456
2017	357	19%	84%	396
2018	360	19%	86%	420
2019	387	20%	86%	428
Total	1,907	100%	85%	2,143

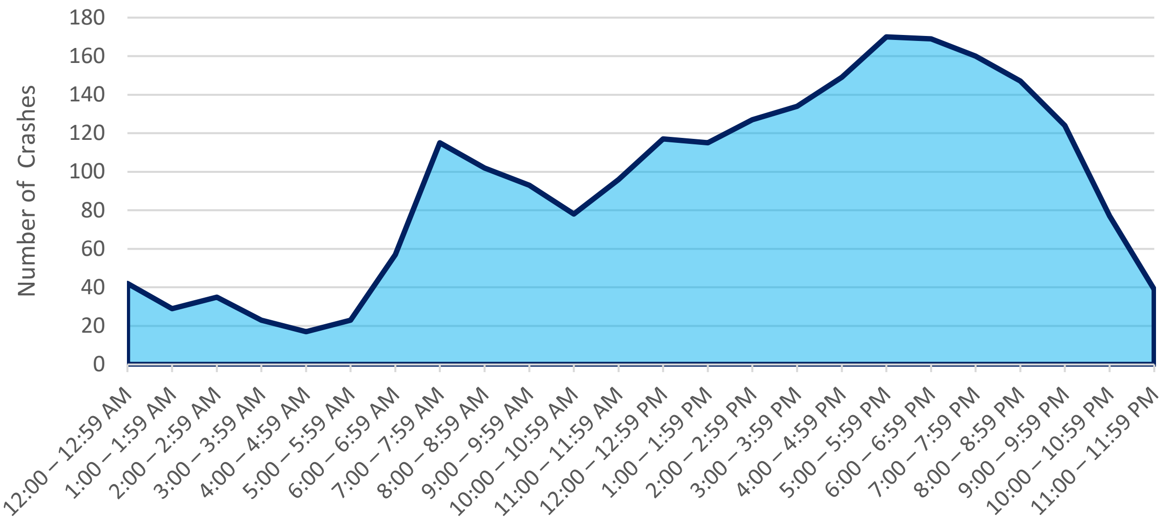
Time of Day

The primary purpose for reviewing crashes by time of day is to identify peaks when more crashes happen and compare these peaks to other daily patterns to understand potential correlations that may explain why crashes occur more frequently at certain times. **Figure 11** shows the number of AT crashes that occurred during each hour of the day by year and for the five-year period overall.

Figure 11 also illustrates the trends of increasing and decreasing occurrences of AT crashes from hour to hour for the 24 hours within a day. The trend of the line from hour to hour reflects a pattern similar to that of the common pattern of traffic congestion that occurs throughout a given day in many urban areas – over the five-year period, the total number of crashes that occurred between the 11:00 PM hour and the 5:00 AM hour is relatively low, but there is a morning rush hour spike from the 5:00 AM hour to the 7:00 AM hour, after which the number of crashes decreases a small amount until the 10:00 AM hour.

At the 10:00 AM hour, the number of crashes begins to increase again as the lunchtime rush starts, and the number of crashes continues to increase throughout the afternoon and into the evening rush hour. After the 5:00 PM hour, the number of crashes begins a gradual decrease until the 9:00 PM hour, and from the 9:00 PM hour to the 11:00 PM hour the crash count dips back down quickly. This pattern indicates that AT crash trends within the RGVMAB are generally correlated with daily peak traffic periods.

Figure 11: Active Transportation Crashes by Time of Day



Potential Contributing Factors

When a region takes the time to examine and evaluate some of the factors that have potentially contributed to crashes, it is able to identify solutions that can mitigate or eliminate these factors so that the safety needs of active transportation users can be met for both the short term and long term.

CRIS data provides a contributing factor attribute for crashes at the unit level rather than at the crash level (cars, bicyclists, pedestrians, etc. are all considered to be individual units that could be involved in the same crash). Using the crash identification numbers attributed to each crash in the database, the project team aggregated the contributing factors attribute up to the crash level to assess which contributing factors occurred the most frequently for AT crashes over the five-year period.

While a contributing factors attribute would theoretically provide the clearest insight into why crashes are happening in a region, the majority of AT crashes did not have contributing factor data recorded, so for this particular analysis, evaluating the contributing factor attribute is more useful as supporting information for why crashes might be occurring.

Table 10 shows the various contributing factors and the number of AT crashes to which each factor applies.

Table 10: Active Transportation Crashes by Contributing Factor

Contributing Factors	Number of AT Crashes	Percent of All AT Crashes
Wrong Side - Not Passing	15	1%
Disregard Stop and Go Signal	16	1%
Disregard Stop Sign or Light	16	1%
Failed to Yield Right of Way - Open Intersection	17	1%
Failed to Yield Right of Way - Private Drive	23	1%
Failed to Yield Right of Way - Stop Sign	26	1%
Wrong Way - One Way Road	30	1%
Wrong Side - Approach or Intersection	38	2%

Contributing Factors	Number of AT Crashes	Percent of All AT Crashes
Additional Factors*	72	3%
Other Factor	223	10%
Pedestrian Failed to Yield Right of Way to Vehicle	495	22%
No Contributing Factor Data	1,267	56%
Total	2,238	100%

*Combined remaining factors that individually have less than 1% occurrence.

This information reveals that, for crashes with known contributing factor data, the most frequent contributing factor for AT crashes is "pedestrian failed to yield right of way to vehicle." This type of crash occurs when pedestrians are attempting to cross a street at a time or in a location where they do not have the right of way.

When crashes like this occur frequently, it may be an indicator that the street network and built environment do not provide pedestrians with sufficient crossing opportunities, times, or infrastructure, or do not provide crossing opportunities in the places where they are most needed/desired. Further studying the travel patterns of pedestrians in conjunction with the existing pedestrian infrastructure network could reveal areas where issues currently exist as well as areas where there are opportunities to make improvements.

Speed-Related Crashes

The speed of the various vehicles and people involved in a crash is another potential contributing factor that can help explain why a crash occurred. The CRIS data gathered for Cameron and Hidalgo Counties for the period of 2015-2019 showed that only about 1% of all AT crashes over the five-year period were considered to be speed related. Additionally, just over half of the speed-related crashes occurred in areas where the posted speed limit was 30 miles per hour. These findings imply that speed may not be as significant of an indicator for AT crashes as it is for automobile crashes, and that areas with relatively low automobile speed limits can still create unsafe environments for pedestrians and bicyclists. These areas could be candidates for additional safety measures, such as designated bicycle facilities, road diets, and other treatments. **Table 11** breaks out the number of speed-related AT crashes by year.

Table 11: Speed-Related Active Transportation Crashes by Year (2015-2019)

Year	Speed-Related AT Crashes	As a Percent of All AT Crashes
2015	7	1.5%
2016	7	1.5%
2017	4	0.1%
2018	3	0.7%
2019	2	0.4%
Total	23	1%

Manner of Collision

Manner of collision relates to the specific movements of the vehicle(s) involved at the time of the accident. This information can provide insight into what types of physical situations or environments might be most hazardous for people using active transportation modes. As shown in **Table 12**, the most common type of collision related to AT crashes involves a single motor vehicle colliding with either pedestrians or bicyclists.

AT crashes involving more than one vehicle were infrequent, representing only 2% of all AT crashes over the five-year period.

The data shows that, by far, the most frequent type of collision for AT crashes is "one motor vehicle – going straight." This could imply that most AT crashes occur when the motor vehicle involved is traveling straight and the pedestrian(s) or bicyclist(s) involved are also traveling straight, but in a direction perpendicular to the motor vehicle.

This type of scenario could occur either at an intersection or mid-block, and – similar to how "pedestrian failed to yield right of way to vehicle" was the most frequent contributing factor to AT crashes – this information provides an opportunity to assess how areas where active transportation users and automobiles make conflicting movements raise both challenges and opportunities for safety in the transportation system of the region.

Table 12: Active Transportation Crashes by Manner of Collision

Manner of Collision	Number of AT Crashes	Percent of All AT Crashes
One Motor Vehicle - Backing	256	11%
One Motor Vehicle - Going Straight	1,443	65%
One Motor Vehicle - Turning Left	303	14%
One Motor Vehicle - Turning Right	181	8%
Other Manners of Collision*	55	2%
Total	2,238	100%

*Combined remaining manners of collision that individually have less than 100 occurrences over the five-year period.

Other Factors

Other, secondary, factors that contributed to AT crashes can provide additional information on the conditions of each accident and increase understanding of why a crash occurred. **Table 13** presents AT crashes categorized by secondary factors that contributed to crashes. This information reveals that, for crashes where a secondary factor was reported, "attention diverted from driving" was the most prominent category. Issues of driver inattention could potentially be addressed in part by street environment design choices that naturally encourage drivers to pay closer attention to their surroundings, such as flashing light beacons or reflective materials at pedestrian crossings, painted pavement along bicycle facilities, and other techniques.

Table 13: Active Transportation Crashes by Other Factors

Other Factors	Number of AT Crashes	Percent of All AT Crashes
Open Door or Object Projecting from Vehicle	10	0.5%
One Vehicle Forward from Parking	11	0.5%
One Vehicle Parked Improper Location	16	1%
Vision Obstructed by Headlight or Sun Glare	16	1%
One Vehicle Entering Driveway	42	2%
Additional Other Factors*	88	4%
One Vehicle Backward from Parking	139	6%
One Vehicle Leaving Driveway	166	7%
Attention Diverted from Driving	228	10%

Not Applicable	1,522	68%
Total	2,238	100%

*Combined remaining factors that individually have less than 10 occurrences over the five-year period.

Roadway Type

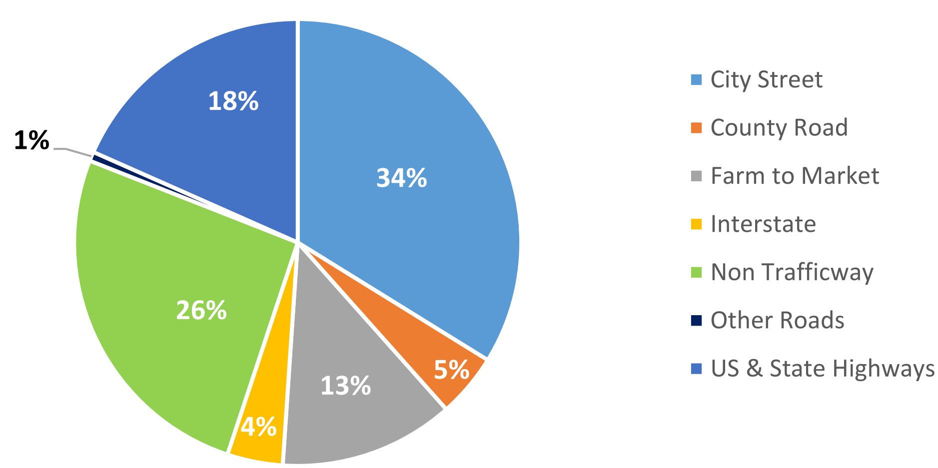
Identifying patterns in the frequency of AT crashes based on the type of roadway facilities where they occur is another technique that can help RGVMPO focus their efforts to improve safety by exposing which types of facilities may pose higher risks for active transportation users. Normally, this comparison of crashes to the facilities on which they occur would be conducted based on roadway functional classifications. The CRIS database does provide functional classification information, however, for the AT crashes examined in this safety analysis, 68% were not assigned functional class attributes. So, the project team used the roadway type attribute instead, which provides similar information but grouped into slightly different categories. **Table 14** shows these roadway types, as well as the number of AT crashes experienced in relation to each.

Table 14: Active Transportation Crashes by Roadway Type

Roadway Type	Number of AT Crashes	Percent of All AT Crashes
Other Roads	15	1%
Interstate	90	4%
County Road	103	4%
Farm to Market	283	13%
US & State Highways	411	18%
Non Trafficway	579	26%
City Street	757	34%
Total	2,238	100%

Figure 12 illustrates that, for the period from 2015-2019, just over a third of AT crashes occurred on city streets, just over a fourth occurred on non-trafficways (such as parking lots), just under a fifth occurred on US & State highways, and 13% occurred on Farm to Market facilities.

Figure 12: Active Transportation Crashes by Roadway Type



Regional Active Transportation Crash Trends by Location

In addition to understanding crash patterns based on attributes such as time, severity, and contributing factors, it is also crucial to understand locational patterns of crashes over time so that the RGVMPO and its member jurisdictions can address safety needs on a geographic basis using targeted solutions and strategies that are appropriate to specific locations and areas.

Intersection-Related Crashes

Intersections can be some of the most dangerous locations within a transportation system because they create points of interaction where various forms of transportation such as cars, bicyclists, pedestrians, and other modes make conflicting movements. Intersections can be particularly dangerous for bicyclists and pedestrians because when collisions happen, these transportation system users are unprotected from the speed and strength of moving motor vehicles. CRIS data provides attributes to determine whether a crash was intersection related, and this information can help RGVMPO understand whether these features of its transportation network create notable safety issues for active transportation users. **Table 15** compares the total number of intersection-related AT crashes in the region to the total amount of AT crashes overall, as well as to the total amount of all intersection-related crashes in the region, regardless of the modes of transportation involved. This information shows that a third of all AT crashes are also intersection related, while the 747 intersection-related AT crashes make up only 1% of all intersection-related crashes in the region.

Table 15: Intersection-Related Active Transportation Crashes Compared to Other Crash Figures

Number of All Intersection-Related AT Crashes*	As a Percent of All AT Crashes	As a Percent of Total Intersection-Related Crashes* (All Modes)
747	33%	1%

*Intersection-related crash information was gathered through the pre-defined filter available from the CRIS Query Builder. The filter returns any crashes that are in any way related to an intersection or occurring within an intersection.

Table 16 breaks out the number of all intersection-related AT crashes per year over the five-year period, as well as the number of intersection-related pedestrian crashes and intersection-related bicycle crashes for the same period. The involvement of pedestrians versus the involvement of bicyclists within the total number of intersection-related crashes is almost exactly equal, with 374 crashes being intersection-related pedestrian crashes and 373 being intersection-related bicyclist crashes.

Table 16: Intersection-Related Active Transportation Crashes

Year	Number of All Intersection-Related AT Crashes	Percent of All Intersection-Related AT Crashes	Number of Intersection-Related Pedestrian Crashes	Percent of Intersection-Related Pedestrian Crashes	Number of Intersection-Related Bicyclist Crashes	Percent of Intersection-Related Bicyclist Crashes
2015	159	20%	77	21%	82	22%
2016	161	21%	68	18%	93	25%
2017	136	18%	70	19%	66	18%
2018	135	18%	80	21%	55	15%
2019	156	23%	79	21%	77	20%
Total	747	100%	374	100%	373	100%

Locations of Top AT Crash Intersections

In addition to understanding whether intersections create safety hazards for active transportation users in the region, identifying specific intersections that experienced the most AT crashes over the five-year period can help RGVMPO further fine-tune any potential solutions to its active transportation safety issues and distribute resources more efficiently.

A two-step methodology was used to identify the top AT crash intersections in the region. The first step was an Excel analysis in which the intersection flag attribute of the CRIS data was used to identify any crashes that occurred at intersections. Once the data was filtered down to include only crashes that occurred at intersections, the information in the street name and intersecting street name fields was counted to determine the number of times each specific intersection appeared in the filtered data. The second step was a GIS spatial analysis that used latitude and longitude information from the CRIS database to examine the proximity of crash points to intersection points. A buffer of 50 feet was created around each intersection in the network, and the number of AT crash points that fell within each intersection buffer was counted to determine the intersections with the most crashes in close proximity.

The intersections resulting from this two-step methodology are shown in **Table 17**, along with the broader location of each intersection and the number of AT crashes counted there for the five-year period. To determine which intersections were considered to be "top" crash intersections, the project team used a threshold of 4 or more crashes from 2015-2019.

Table 17: Top Active Transportation Crash Intersections

Intersection	Location	Crash Count
International Blvd. (SH 4) @ Southmost Blvd. (FM 1419)	Brownsville	11
Spur 206 @ IH-69E	Harlingen	8
Jackson St. (FM 3362) @ W. University Dr. (SH 107)	Edinburg	6
Paredes Line Rd. (FM 1847) @ E. Alton Gloor Blvd. (FM 3248)	Brownsville	6
16th St. @ W. US Business 83	McAllen	6
15th St. @ W. US Business 83	McAllen	6
Sugar Rd. @ W. University Dr. (SH 107)	Edinburg	6
N. 10th St. (SH 336) @ Pecan Blvd. (SH 495)	McAllen	5
N. Ware Rd. (FM 2220) @ Pecan Blvd. (SH 495)	McAllen	5
IH-69E @ Boca Chica Blvd. (SH 48)	Brownsville	5
Beaumont Ave. @ S. 15th St.	McAllen	5
E. 12th St. @ US Business 77	Brownsville	5
Spur 206 @ US Business 77 (S. 77 Sunshine Strip)	Harlingen	4
N. 7th St. @ US Business 77 (N. 77 Sunshine Strip)	Harlingen	4
E. 7th St. @ E. Jackson St.	Brownsville	4
SH 100 @ Padre Blvd. (PR 100)	South Padre	4
10th St. (SH 336) @ W. US Business 83	McAllen	4
N. McColl Rd. (FM 2061) @ Nolana Ave. (FM 3461)	McAllen	4
1st St. @ Jackson St.	Harlingen	4

Figure 13 shows the top AT crash intersections identified throughout the region using the two-step methodology. **Figure 14, Figure 15, Figure 16**, and **Figure 17** provide closer looks at the areas where these top crash intersections are concentrated within the RGVMAB.

Figure 13: : Active Transportation Top Crash Intersections - Regionwide

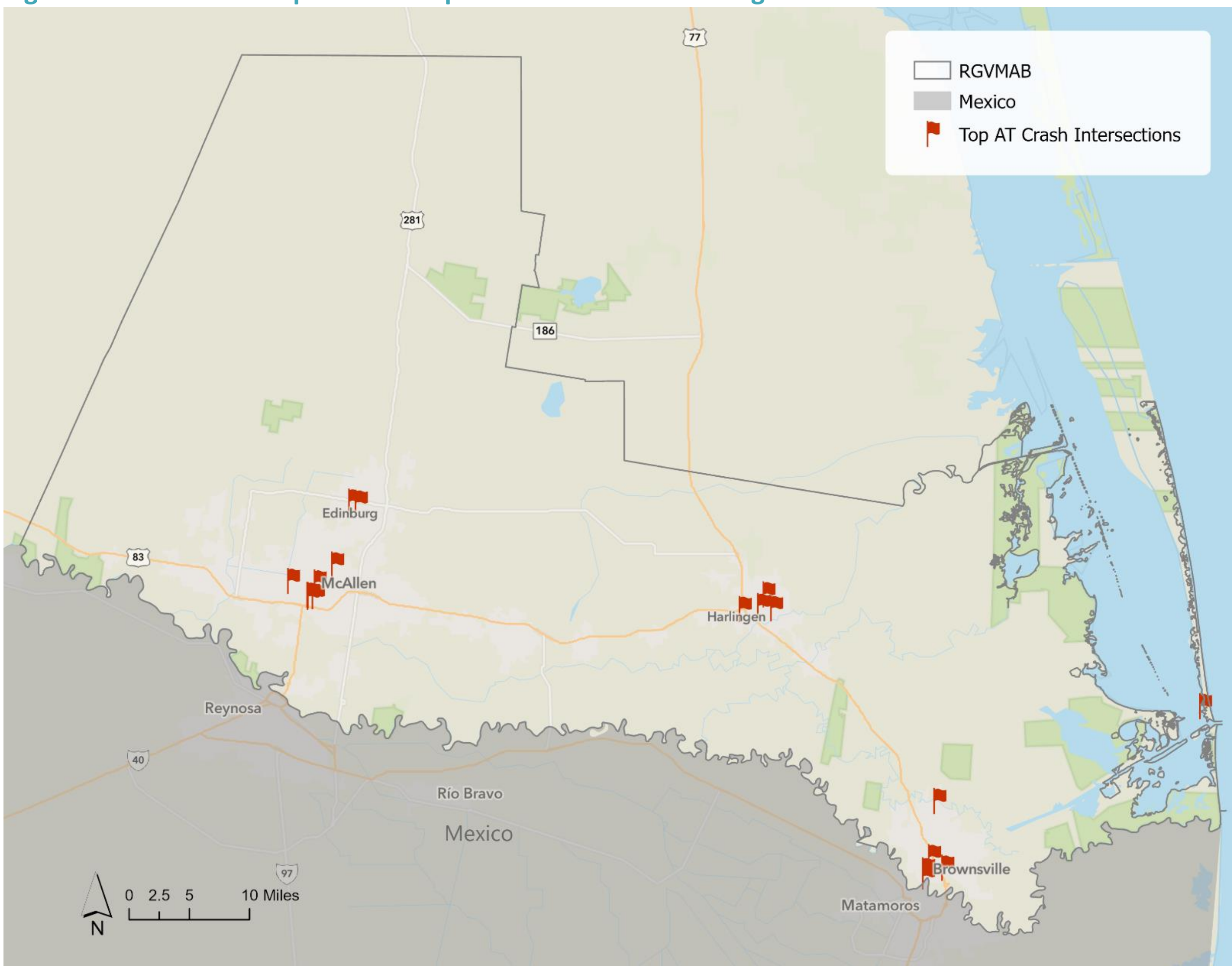


Figure 14: Active Transportation Top Crash Intersections – McAllen & Edinburg

Figure 15: Active Transportation Top Crash Intersections - Harlingen

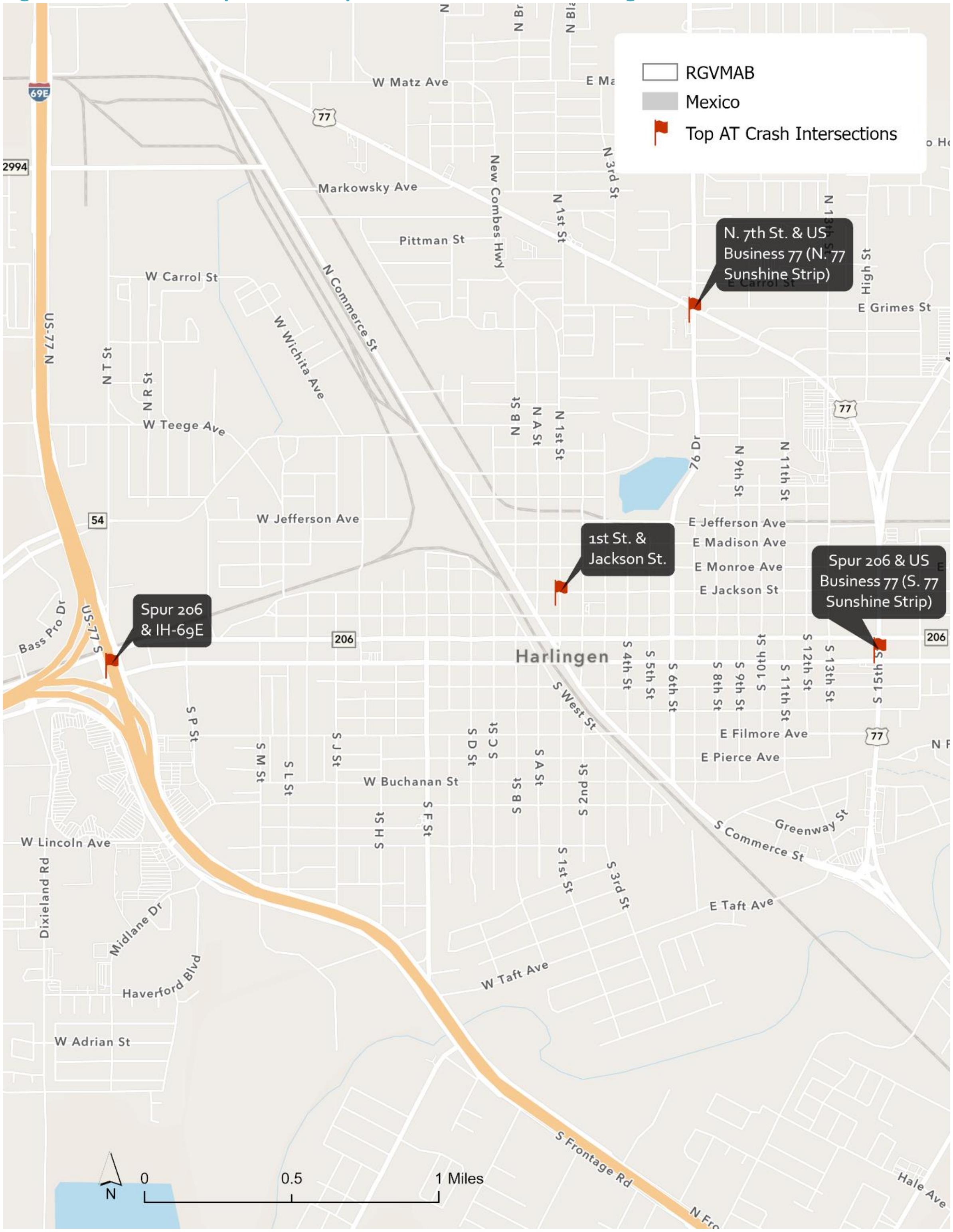


Figure 16: Active Transportation Top Crash Intersections - Brownsville

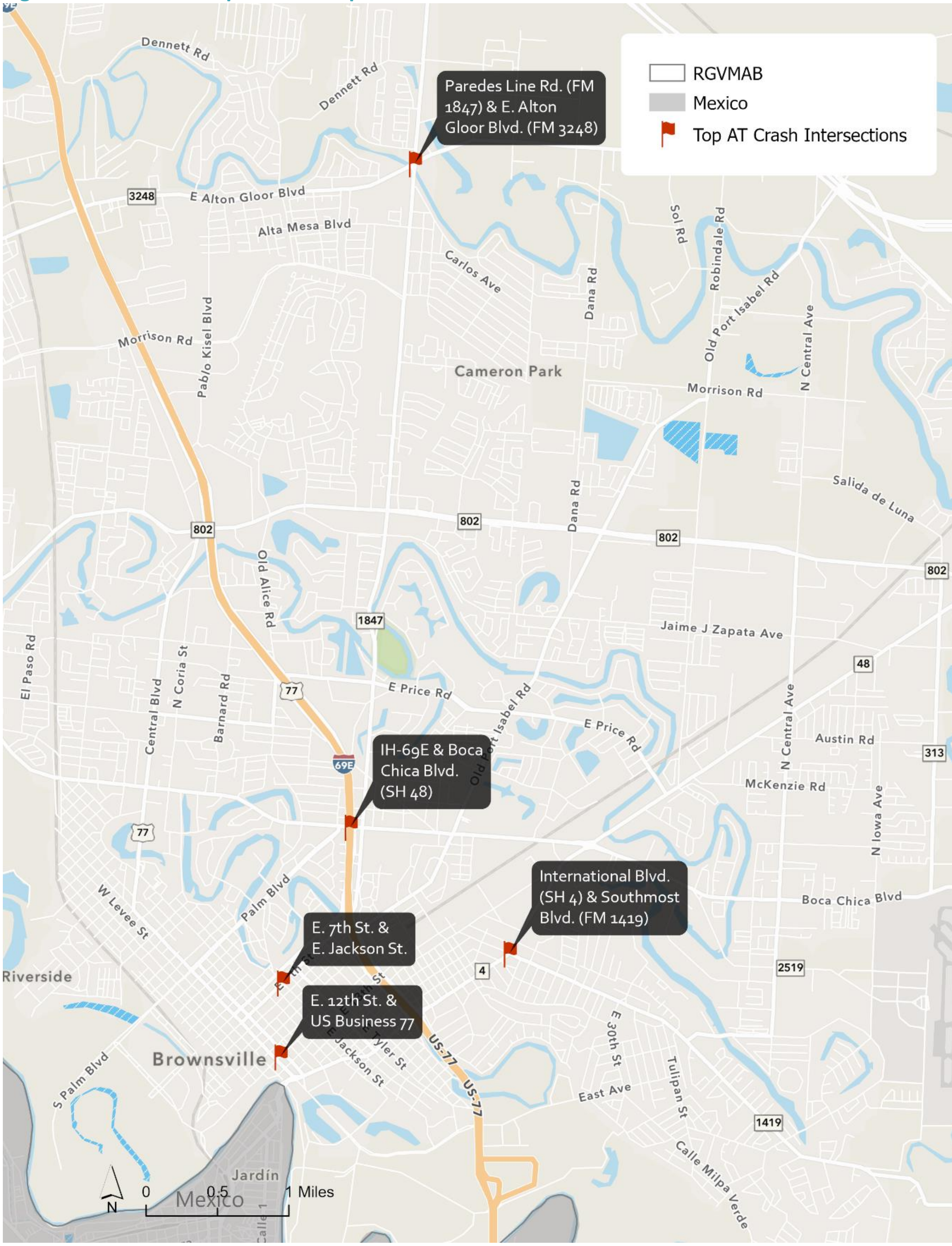


Figure 17: Active Transportation Top Crash Intersection - South Padre Island

Network Analysis

Bicycle Level of Traffic Stress

A Bicycle Level of Traffic Stress analysis (LTS) used roadway characteristic factors to estimate how an average person would feel while using a bicycle on a given segment of roadway. Roadway characteristics that influence a decision to cycle include high vehicle speed, high traffic volumes, wide roads, or lack of designed space for bicycles. Roadway factors that contribute to comfort include, low speeds, presence of a bike facility, especially those separated from traffic, and traffic calming measures.

The LTS analysis identified gaps/deficiencies in the region's roadway network where bicyclists do not have comfortable travel options. It also provided a look at opportunities for safe comfortable roadways, produced updated LTS data inventories for the region and provided an inventory to guide the region's discussions on future facility upgrade alternatives.

Methodology

The methodology for this analysis was conducted using a method modified from a 2012 report by the Mineta Transportation Institute (MTI) titled, *Low-Stress Bicycling and Network Connectivity*[1], which is widely credited in similar analysis from other existing condition analysis reports. The project team used a data-driven process considering the following factors to better understand how they relate to perceptions of bicycle comfort:

- Posted speed limits
- Number of travel lanes; and
- Presence of bicycle facility by type

All measures were attributed to RGVMPO travel demand model roadway segments within the RGVMAB. Staff used the four bicycle LTS categories defined in the MTI report and accordingly, a network was produced, flagging roadways that matched. Each of the four designated levels of comfort, are described in **Table 18.**

Table 18: Level of Traffic Stress (LTS) Descriptions

Level of Stress	Description
1 (Low Stress)	Presents little traffic stress and is comfortable for most all users, including children and families.
2	Presents little traffic stress and is suitable for many adult users or those with some cycling experience.
3	Presents some traffic stress and is suitable for only those who are confident or possess significant cycling experience.
4 (High Stress)	Only comfortable for the most confident bicyclist and not suitable for the average user.

**Due to variability and gaps in data, not all segments with given LTS scores may reflect real life conditions.*

As with all bicycle LTS and similar bicycle comfortability/safety perception analyses, the dispersion of metrics (e.g. facility design, traffic volumes, and automobile speeds) into categories and outcomes were highly dependent upon data availability. The project team used MTI's LTS methodology as a guide for choosing applicable metrics and determining how to best apply them to the analysis. to the LTS category range. It is important to note that roadway shoulder width was not considered in this analysis as it does

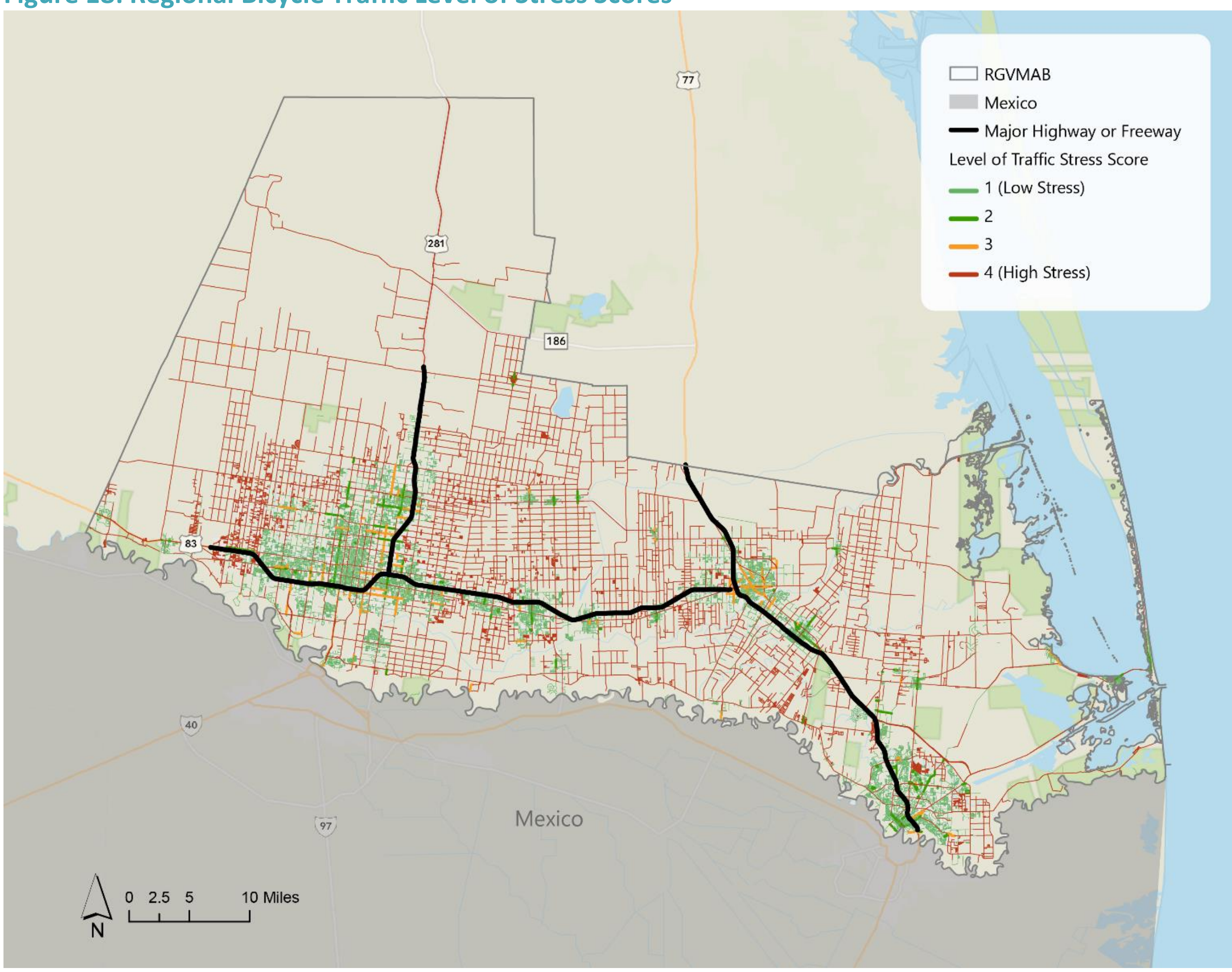
[1] (Mineta Transportation Institute, 2012)

not necessarily make a high speed or high-volume roadway comfortable for bicycling for the average user. Shoulder width is also not incorporated in the MTI methodology however, it is important to recognize that wide shoulders are valuable for confident users and act as important connections, especially in recreational riding networks. Roadways with wide shoulders will be analyzed in the Network Development and Recommendations section of this plan. It should be noted that the data for a few specific rural roadways that serve as local streets did not contain speed limit information. Without speed limit data for some rural roadways the LTS score for these roadways may be skewed and reported as higher stress than is experienced in the field.

Results

Figure 18 shows LTS scores across the RGVMAB. Many rural roadways are classified as LTS 4 or the highest level of stress. Speed limits on many of these roadways are the main contributing factor, as even small increases of speed by 5-10 miles per hours can result in a large jump in stress by a person biking. Urban areas in the RGVMAB contain a larger concentration of low stress roadways.

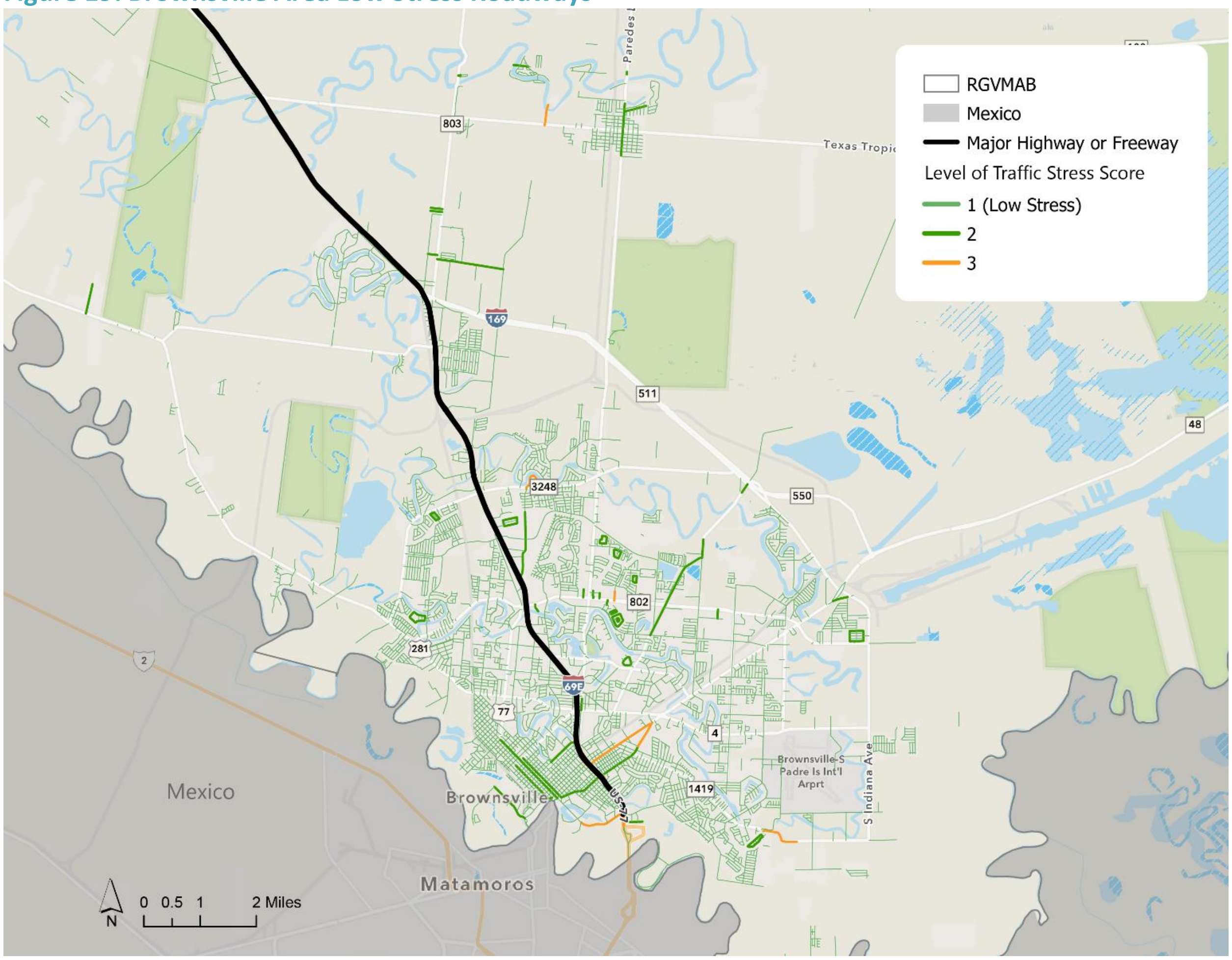
Figure 18: Regional Bicycle Traffic Level of Stress Scores



On the following pages, **Figure 19**, **Figure 20**, and **Figure 21** show only the LTS scores 1 to 3 in each urban area within the RGVMAB. This shows a high-level estimate of the low stress roadways potentially available for use in the active transportation network.

In the Brownsville area, there are many local streets for low stress riding, however connections to other low stress routes may wane as the gridded roadway network dissipates further from the urban core.

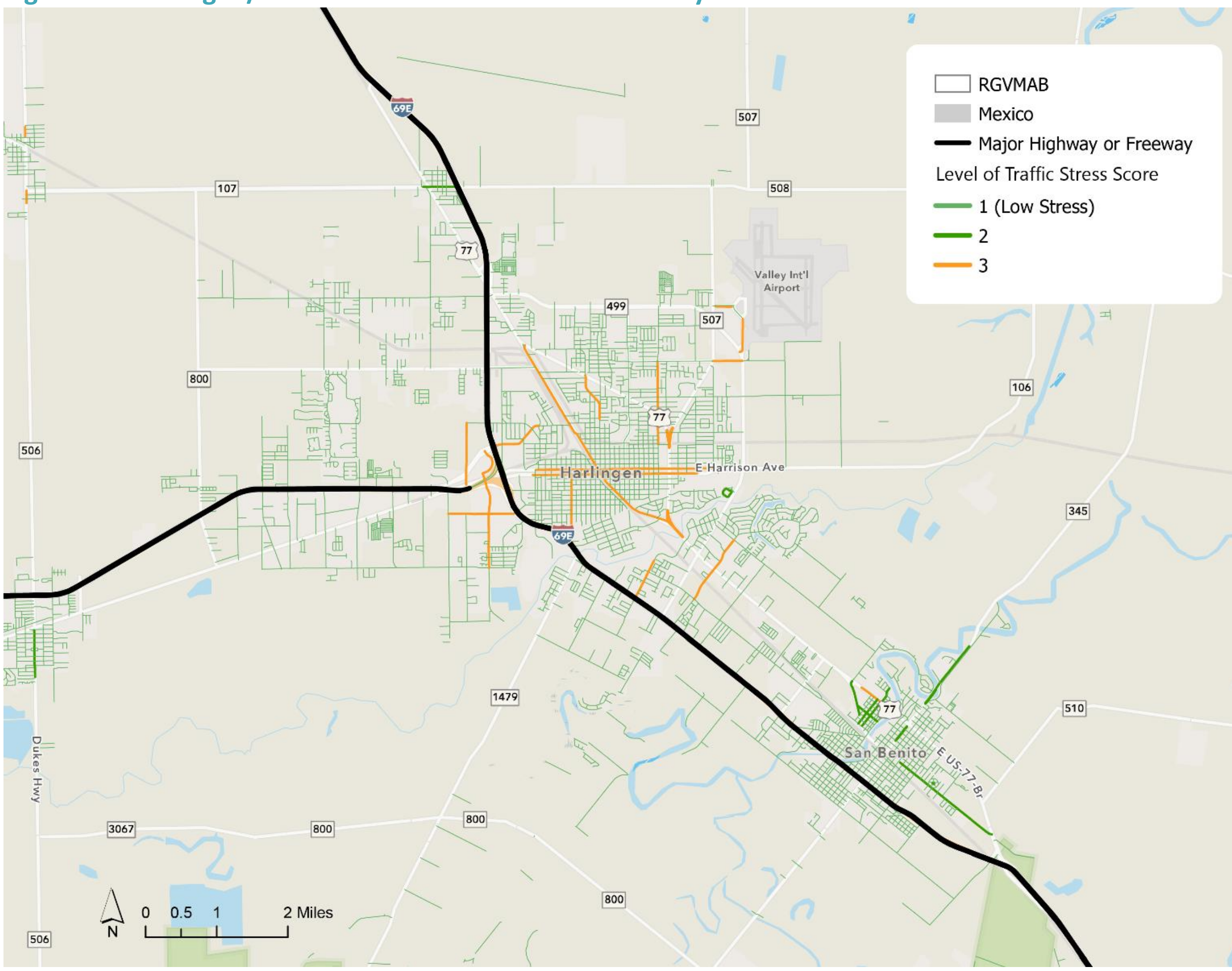
Figure 19: Brownsville Area Low Stress Roadways



*LTS 4 not included at this scale

In the Harlingen and San Benito areas much of the gridded roadway network provides low stress connectivity for active transportation users. Additionally, Hale St. and Shafer Rd. may provide low stress connection between the two communities.

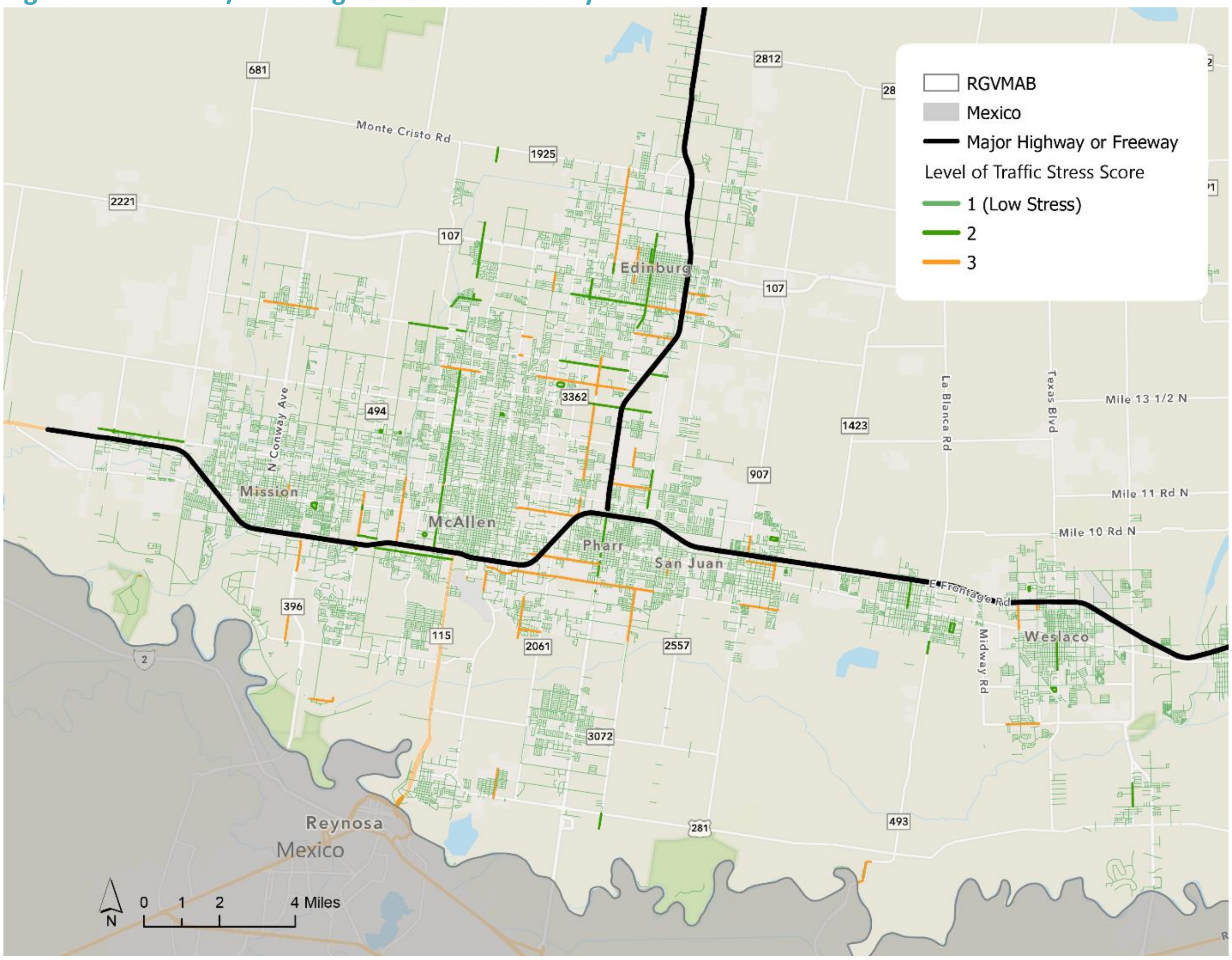
Figure 20: Harlingen/San Benito Area Low Stress Roadways



*LTS 4 not included at this scale

In the urban region of McAllen and Edinburg, each of the communities presents options for low stress connectivity. However, connections between each community are more limited. This is especially true for east to west connections along the major transportation thoroughfares, appearing to make travel using a bike difficult for most users.

Figure 21: McAllen/Edinburg Low Stress Roadways



* LTS 4 not included at this scale

To summarize the findings for the analysis at a regional level, low stress connections are available in many communities however, connectivity for all users is limited, especially east to west along the major interstate corridor. This may be an opportunity for regional collaboration on an off-street trail system.

Pedestrian Accessibility

The pedestrian network consists of sidewalks or Hike and Bike trail facilities. Sidewalk facilities are the backbone of this network and present mobility options for short trips so people can reach their destinations. Sidewalks, however, are bound to the location of the roadway network. A denser, more connected street network will typically indicate lower vehicle speeds, shorter walking trip distances and a greater concentration of destinations. Intersection density is a measure of how many intersections exist per square mile. Intersection density is a major factor to the propensity for people to walk or bike, along with other supporting factors like, sidewalk setback, safe crossings, placemaking, and trees or shade. Intersection density was chosen to analyze as it is the building block for all other factors. In a poorly connected street network with low intersection density, walkability can greatly suffer and only be encouraged to an extent with mentioned supporting factors.

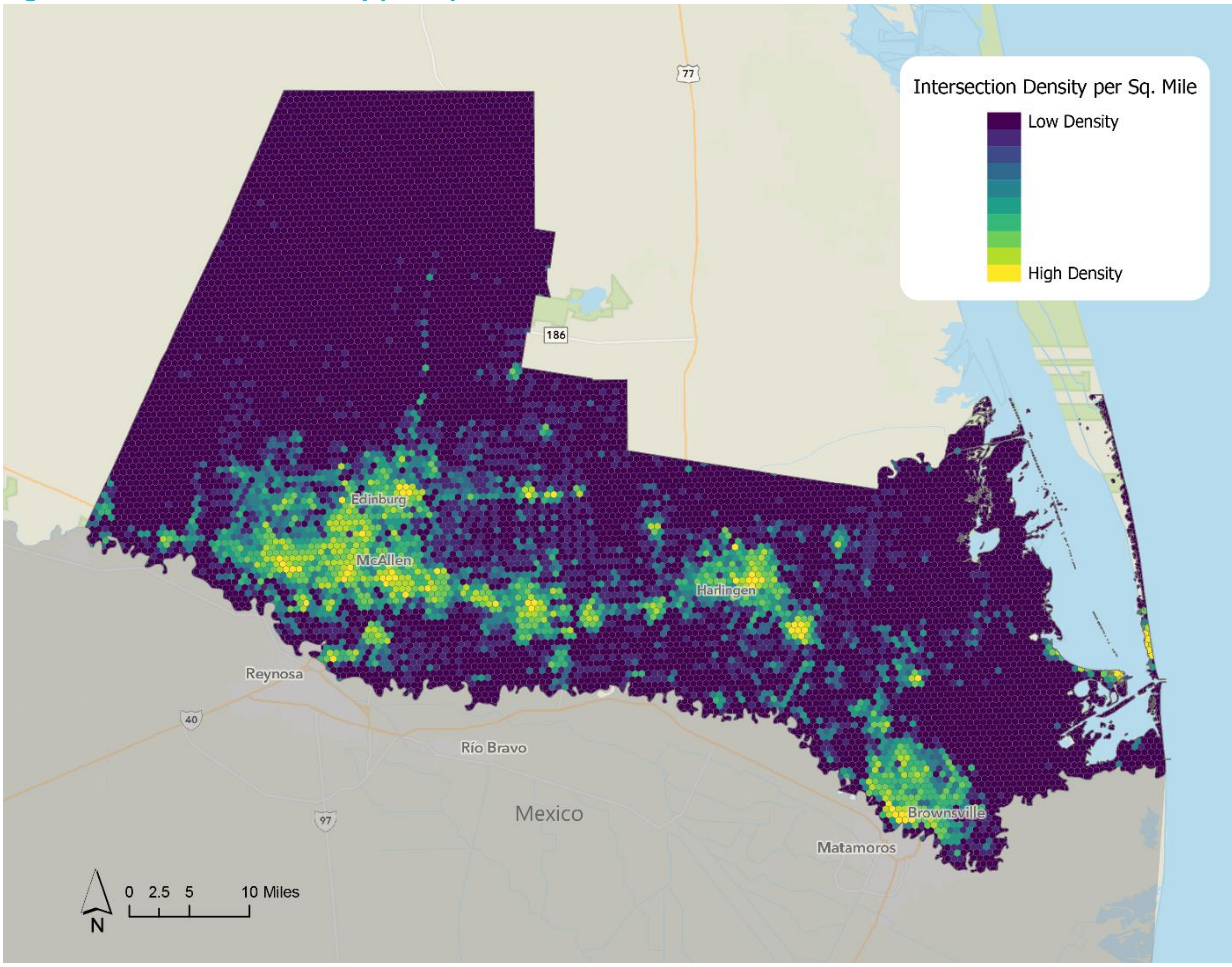
Methodology

Intersection density was calculated using roadways provided by the RGVMPO to identify intersections, or where more than one roadway crosses. To map the density of intersections per square mile, the project team opted to use a ¼ square mile hexagonal layer to show the distribution of intersection points. This method allows for an equal visual representation of density throughout the region, displaying both the more rural areas and urban areas with a standard unit. This allows for representation that more closely aligns with roadway locations and shapes over other displays such as a census block group which varies in size and is often divided along roadways. The number of intersections were spatial joined to the hexagons, to display the density of intersections per square miles.

Results

Figure 22 shows high intersection density in larger urban centers like Edinburg and Brownsville, but also captures high intersection density in smaller communities like Elsa and Edcouch. Intersection density ranged from 0 on the low end, in the purple areas, to 442 per square mile on the high end, in the yellow areas. If sidewalks are present in the areas with high intersection density, this would support a higher propensity for walking. Conversely, if sidewalks are not present, it may indicate a missed opportunity or unmet need for people who desire to walk. A major takeaway from this analysis is the supportive urban network that exists for walking, even outside of urban areas in the RGVMAB.

Figure 22: Intersection Density per Square Mile



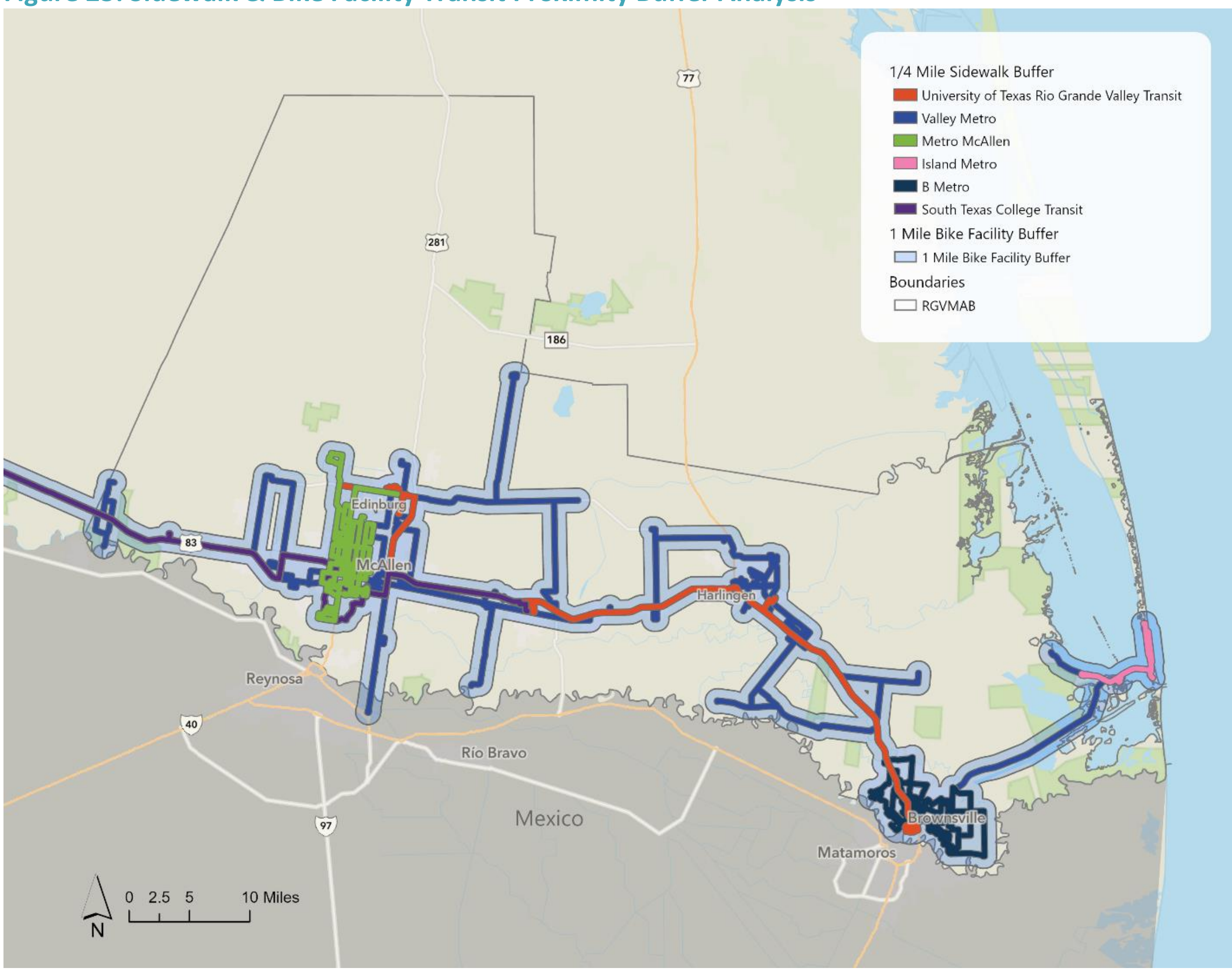
Transit Proximity

There are six (6) transit agencies within the RGVMAB, which provide service to the densest areas of the region and to Rio Grande City and Roma, just to the west of the RGVMAB. These routes should be accompanied by the proper infrastructure that allows pedestrians and bicyclists to travel safely from the origin to the nearest bus stop and from the bus stop to their destination. In addition, getting to the transit station may not be enough. End of trip facilities should also be provided to allow people to lock up their bike, take their bike on the front of the bus, and to wait in relative shade. Proper infrastructure in many cases means ADA compliant sidewalks to accommodate people who walk or use a mobility devise, and bike facilities (on- or off-street bike facilities) to accommodate those who use a bike. This type of infrastructure in place not only ensures a safe trip from origin to destination, but increases overall connectivity within the transportation network, and helps provide a solution to the first-last mile dilemma. In addition, it encourages forms of active transportation which have a variety of positive impacts (environmental, health, economic, etc.).

Methodology

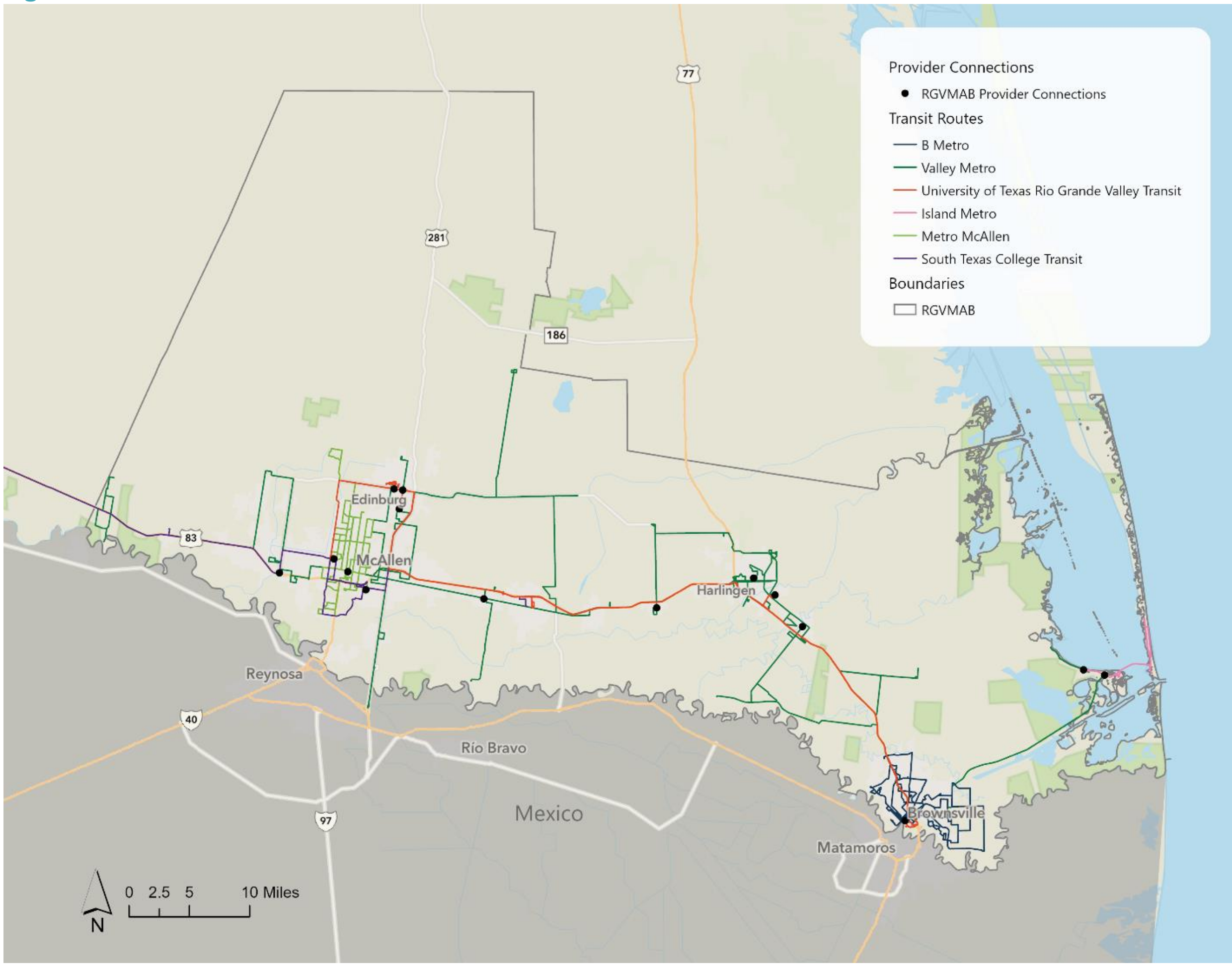
To better understand what connections transit riders, have available to walk or bike to a stop, a review was completed to inventory all active transportation facilities within walking or biking distance of transit. All of the transit routes that service the RGVMAB were reviewed in the analysis. A buffer of ¼ mile was placed on each route to review the sidewalk infrastructure that exists within ¼ mile. Within a ¼ mile is the general distance transit users are willing to walk to access transit services. A one-mile buffer was applied to each route to review the existing bike facilities within a mile of each route, as transit users are typically willing to ride up to a mile to access transit services. **Figure 23** gives a regional visual representation of the two buffers used to analyze the walking (¼ mile buffer) and the bicycling (1-mile buffer) infrastructure within the RGVMAB, while differentiating between the six transit providers.

Figure 23: Sidewalk & Bike Facility Transit Proximity Buffer Analysis



Additionally, this analysis incorporated bike and pedestrian facilities that were within close proximity to provider connections within the region. **Figure 24** shows the location of each provider connection. Major transit activity areas generally incentivize transit users to travel slightly farther distances due to the amenities they provide or the route connections available. To better understand conditions near the provider connections, an inventory of the percent of roads with no sidewalks and the road distance (miles) without sidewalks within ½ miles rather than ¼ mile, of each Provider Connection was created. This analysis was performed by comparing the length of roadways to the length of sidewalks within the ½ mile buffer.

Figure 24: Overview of RGVMAB Provider Connections



Results

When analyzing bicycle and pedestrian infrastructure within a large region, such as the RGVMAB, it is important to pinpoint the regional connection points within the transportation network. These areas usually correspond with the urban centers of a region, which require the most attention when taking an inventory of sidewalk and bike infrastructure, as active transportation activities such as biking and walking occur most frequently in the urban core. Additionally, the majority of transit trips take place within the urban core, which indicates a higher need for the proper infrastructure to increase access to transit. In the case of the RGVMAB, the three major urban areas are Brownsville, Harlingen-San Benito, and McAllen-Edinburg. **Figure 25, Figure 27,** and **Figure 30** detail a local and regional inventory of the active transportation facilities within close proximity to the transit services available within the RGVMAB.

The following **Table 20, Table 21,** and **Table 22** along with **Figure 26, Figure 28, Figure 29, Figure 31** and **Figure 32** display sidewalks within 1/2mile of each Provider Connection. The analysis shows which Provider Connections may lack adequate facilities for people to walk to the transit stop, which may help prioritize future sidewalk improvements in these areas. The analysis indicates that Weslaco Transit Center, is the Provider Connection that could most use additional sidewalks.

Table 19: Sidewalk Coverage at Provider Connections

Provider Connection	Percent of roads with sidewalks	Road distance with sidewalks (miles)
Weslaco Valley Metro Transit Center	11%	0.5
San Juan Station	15%	2.0
Foy's Supermarket	18%	2.2
La Feria City Hall	25%	3.1
Edinburg Transit Terminal	35%	4.7
Donna City Square Park	35%	4.7
UTRGV Visual Arts Building	36%	3.2
UTRGV Regional Academic Health Center	40%	3.3
UT Rio Grande Valley	42%	3.4
South Texas College Pecan Campus	43%	4.7
San Benito City Hall	44%	7.1
Hidalgo County Court	46%	8.3
Harlingen Terminal and Greyhound Bus Station	56%	9.4
STC Nursing Center	56%	2.9
La Plaza Brownsville	60%	8.3
McAllen Central Station	61%	11.0

Brownsville

Figure 25: Brownsville Active Transportation Facilities within Close Proximity of Transit Routes

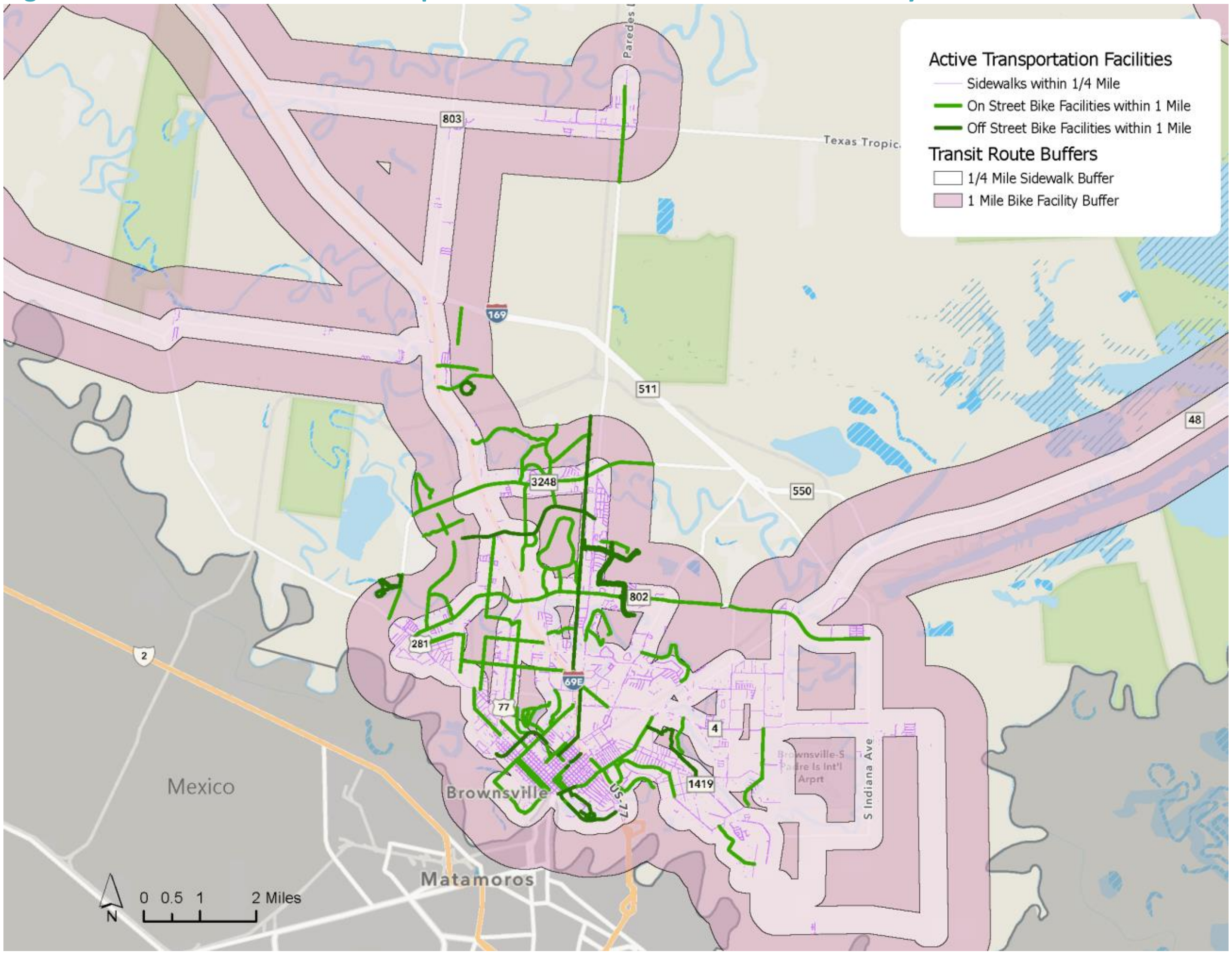
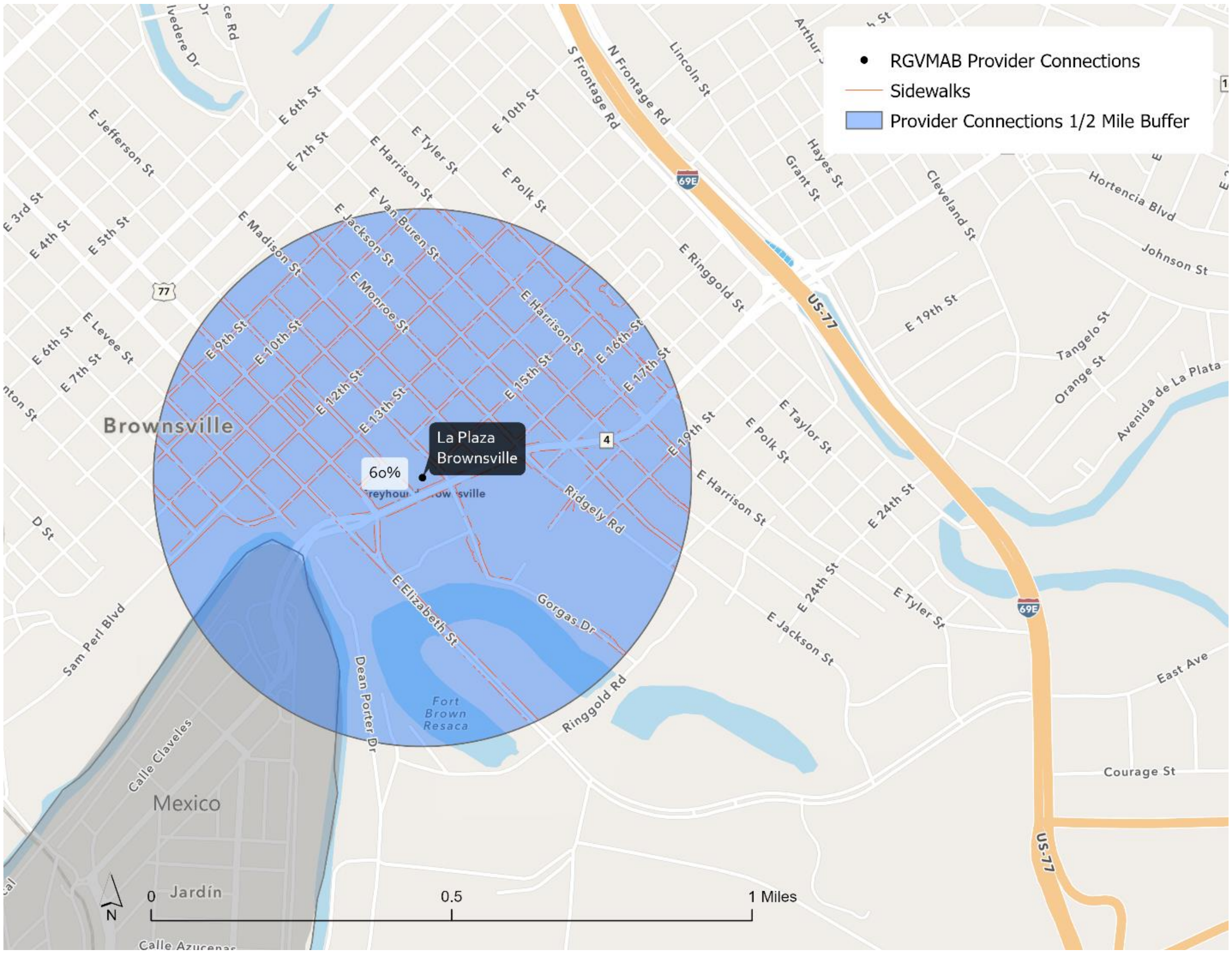


Table 20: Inventory of Brownsville Sidewalk Facilities within 1/2 Mile of Provider Connections

Provider Connection	Percent of roads with sidewalks	Road distance with sidewalks (miles)
La Plaza Brownsville	60%	8.3

Figure 26: Percent of Roadways within 1/2 Mile of Brownsville Provider Connections with Sidewalks Present



Harlingen-San Benito

Figure 27: Harlingen-San Benito Active Transportation Facilities within Close Proximity of Transit Routes

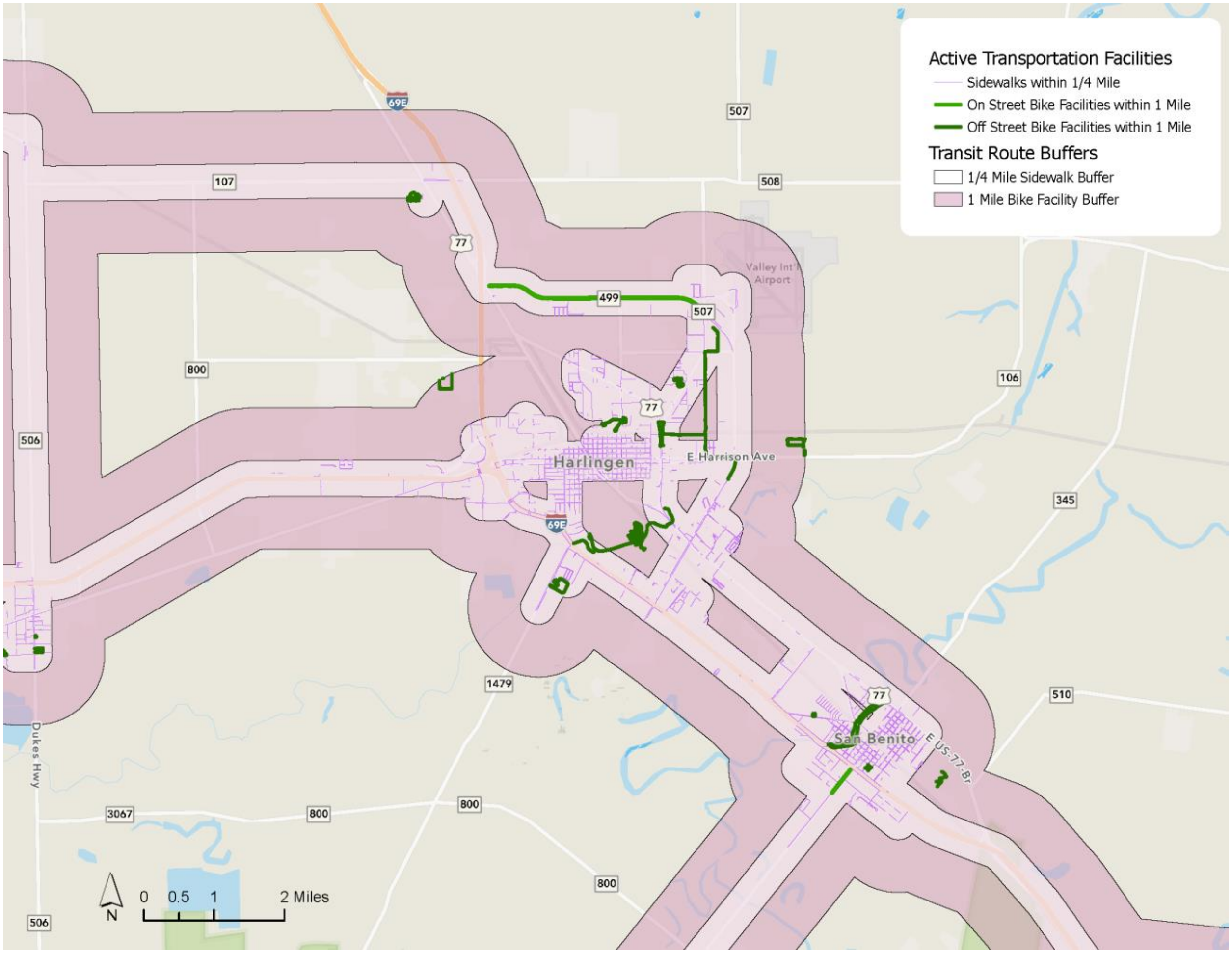


Table 21: Inventory of Harlingen-San Benito Sidewalk Facilities within 1/2 Mile of Provider Connections

Provider Connection	Percent of roads with sidewalks	Road distance with sidewalks (miles)
Weslaco Valley Metro Transit Center	11%	0.5
La Feria City Hall	25%	3.1
Donna City Square Park	35%	4.7
UTRGV Regional Academic Health Center	40%	3.3
San Benito City Hall	44%	7.1
Harlingen Terminal and Greyhound Bus Station	56%	9.4

Figure 28: Percent of Roadways with Sidewalks Present within 1/2 Mile of Harlingen Provider Connections

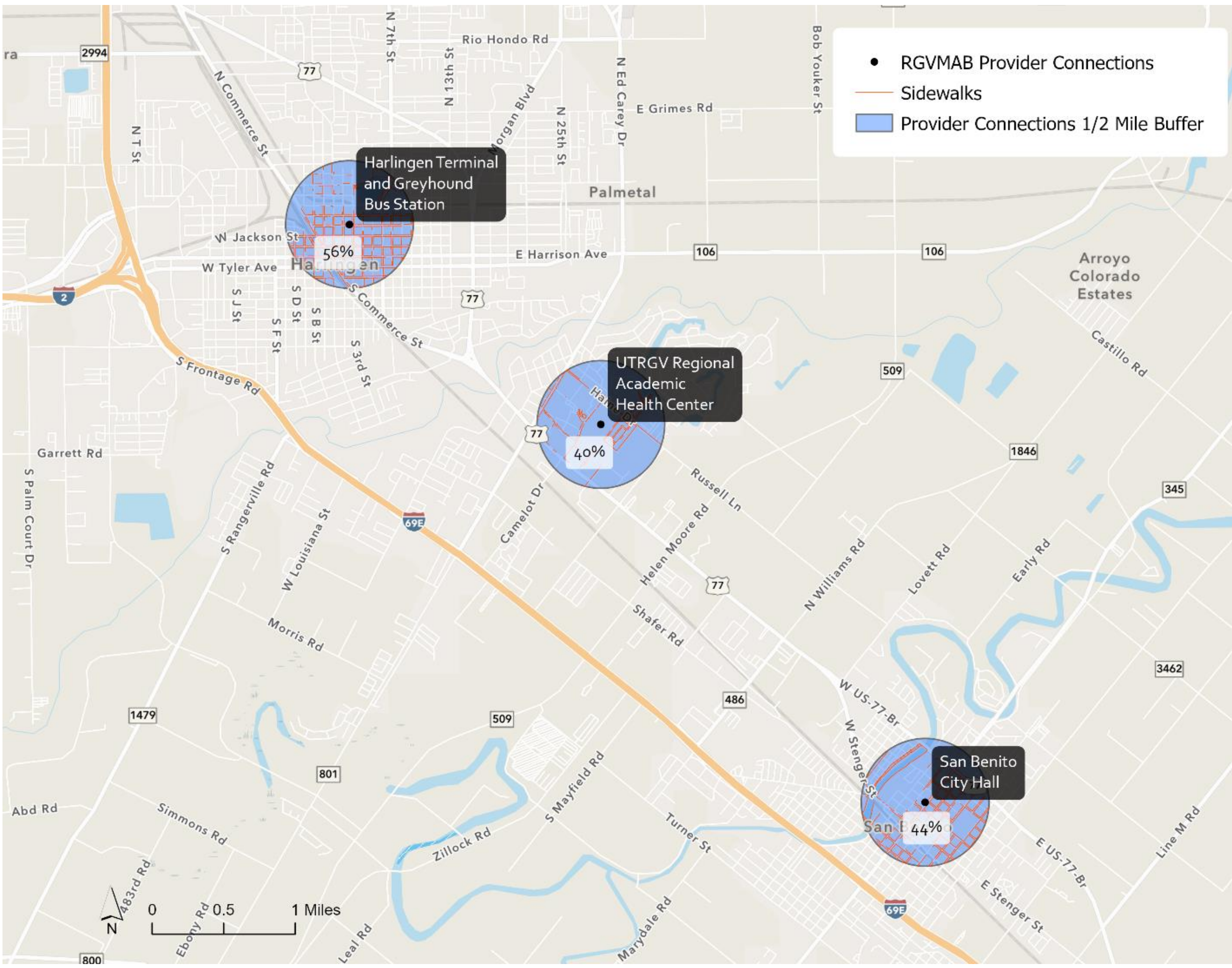
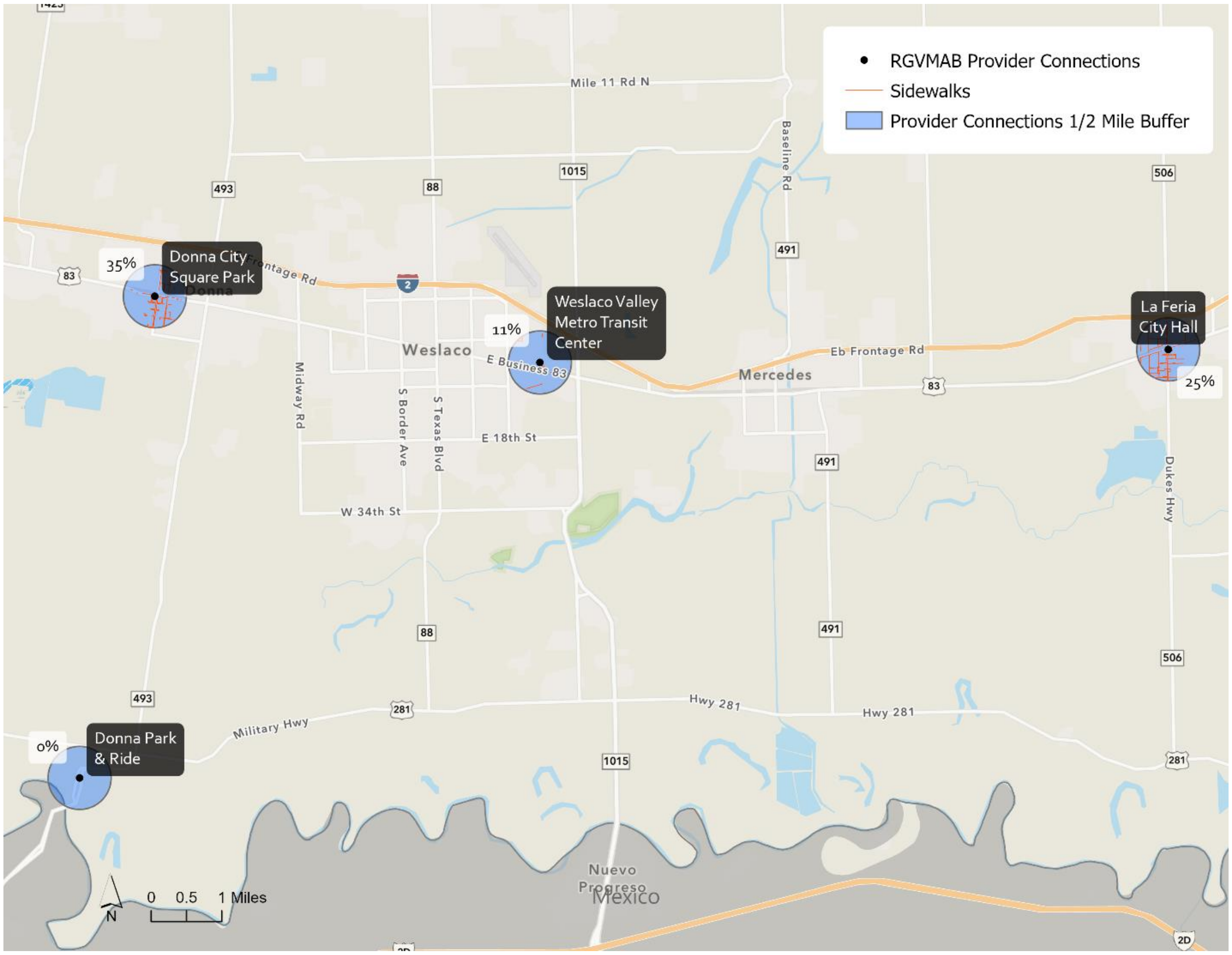


Figure 29: Percent of Roadways with Sidewalks Present within 1/2 Mile of Weslaco Provider Connections



McAllen-Edinburg

Figure 30: McAllen-Edinburg Active Transportation Facilities within Close Proximity of Transit Routes

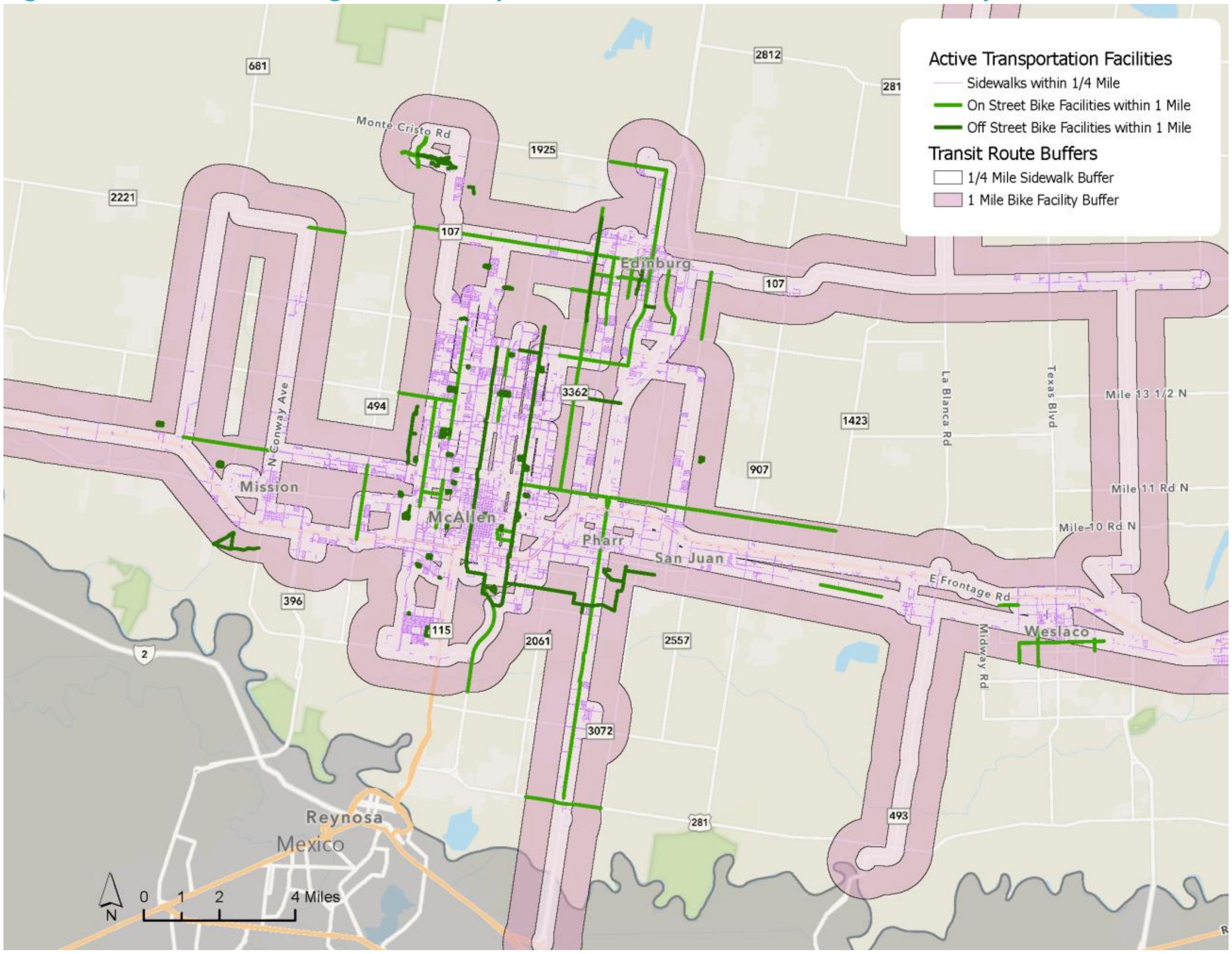


Table 22: Inventory of McAllen-Edinburg Sidewalk Facilities within 1/2 Mile of Provider Connections

Provider Connection	Percent of roads with sidewalks	Road distance with sidewalks (miles)
San Juan Station	15%	2.0
Foy's Supermarket	18%	2.2
Edinburg Transit Terminal	35%	4.7
UTRGV Visual Arts Building	36%	3.2
UT Rio Grande Valley	42%	3.4
South Texas College Pecan Campus	43%	4.7
Hidalgo County Court	46%	8.3
STC Nursing Center	56%	2.9
McAllen Central Station	61%	11.0

Figure 31: Percent of Roadways within 1/2 Mile of McAllen Provider Connections with Sidewalks Present

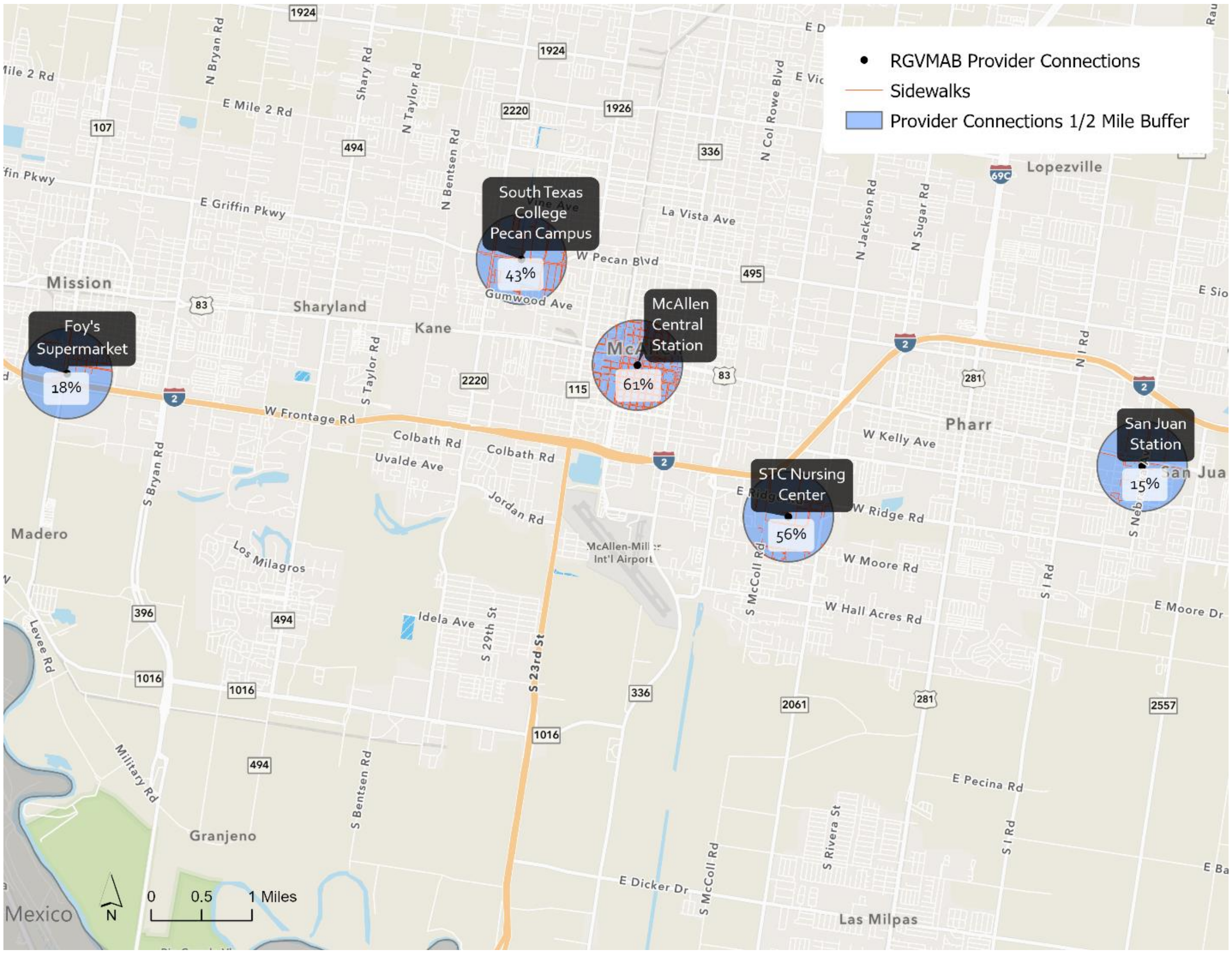


Figure 32: Percent of Roadways within 1/2 Mile of Edinburg Provider Connections with Sidewalks Present

Travel Patterns

Short trips, trips less than 2 miles, in urban areas can often be made by modes other than a car, such as walking, biking, or using transit. Most urban areas support these modes because of the dense land use that lends to shorter distances between trip origins and destinations, as compared to rural or suburban areas.

Methodology

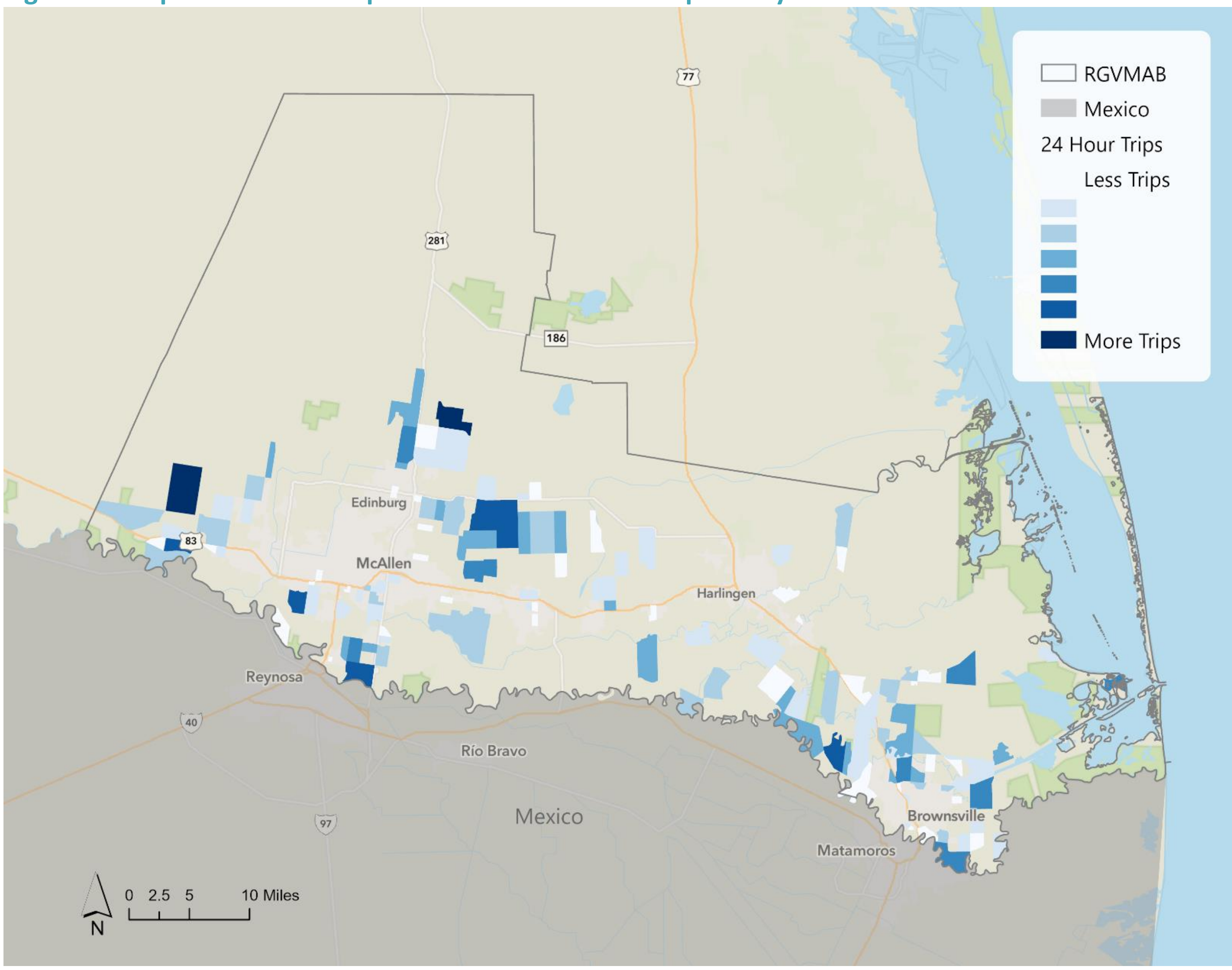
To see where short trips occur, the project team used RGVMPO travel demand model data for 24-hour trip estimates. The travel demand model does not capture trips made by active transportation modes. It only captures trips made in motorized vehicles. The unit of geography used in the TDM is a traffic analysis zone (TAZ). TAZs where the top 250 short trips under 2 miles occur were identified.

Results

Figure 33 shows the location of top trip TAZs. The data points out that locations with the most trips under 2 miles occur predominantly outside of the urban areas within the RGVMAB. The analysis suggests two things. Firstly, facilities for walking and biking are relatively vacant from the top trip TAZs, so residents in those areas may not have any other mode choices than to use a personal vehicle.

Secondly, while urban areas show fewer short top trip TAZs, this may signal that residents are able to use modes not captured in the travel demand model data. For example, McAllen and Brownsville have pockets in their densest areas where there are no top trip TAZs, however, these areas contain facilities for walking and biking to accomplish daily needs. In summary, those top trip TAZs may benefit from additional active transportation facilities to support short trips by active modes.

Figure 33: Top TAZs Where Trips Under 2 Miles Occur Gaps Analysis



Gap Analysis

To better understand where disparities within the RGVMAB occur between demand and supply for active transportation facilities, a gap analysis was conducted. Current walking and biking facilities were overlaid with a map of relative demand, based on seven criteria described in the methodology below. Creating a comprehensive view of existing supply and demand for active transportation facilities allows gaps to be identified and discussed with the community, which provides solutions tailored towards community needs.

Methodology

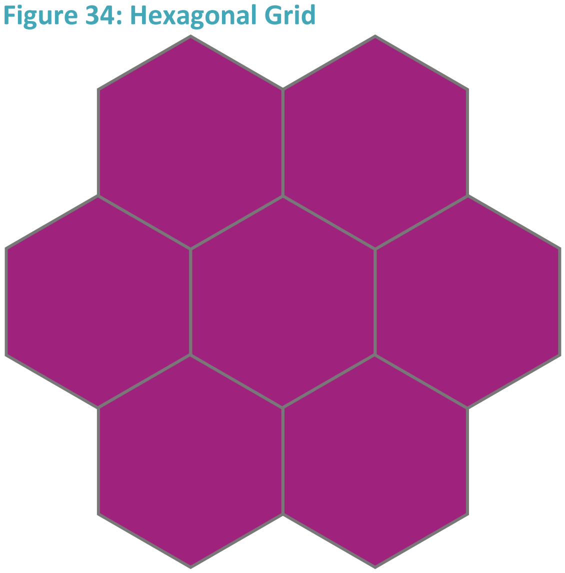
Demand was determined using seven characteristics that are driving factors that indicate a need for trips using active modes, such as walking and biking. Data was collected from Longitudinal Employer-Household Dynamics data by the US Census (LEHD), CRIS, US Census 2019 American Community Survey data (ACS), ArcGIS Business Facilities Search Tool (ArcGIS), and TxDOT's GIS roadway inventory. **Table 23** describes each of the seven factors.

Table 23: Gap Analysis Criteria

Criteria	Description	Geography	Data Source
Population & Employment	Total count of people and jobs per square mile.	Census Block Groups	ACS & LEHD
Population with a Disability	Percent of total population with a disability.	Census Block Groups	ACS
Population in Poverty	Percent of total population in poverty.	Census Block Groups	ACS
No Vehicle Households	Percent of total household without access to vehicle.	Census Block Groups	ACS
Crashes	Number of crashes	Point Data	CRIS
Key Destinations	Number of key destinations including: Schools, Grocery Stores, Medical Facilities, Civic Amenities, and Recreation Facilities	Point Data	ArcGIS
Intersections	Number of Intersections	Point Data	TxDOT

To make it easier to draw uniform comparisons between these criteria the data was standardized. The first method for creating a standard unit of measurement was to develop one identical unit of geography as the analysis compares datasets with different geographies (i.e. polygon and point data). This step allowed the project team to locate active transportation gaps that may not appear only using census polygon geographies. For example, the needs of small communities located in rural areas may not be accurately represented within a large Census block group, and thus a gap may not be identified. One method of standardizing geography is to use hexagonal grids to aggregate and compare data. This helps reveal patterns in the data and is suitable for both shape-based and point-based data. For this analysis, the region was divided into hexagons that are 0.125 or 1/8th square miles each (**Figure 34**).

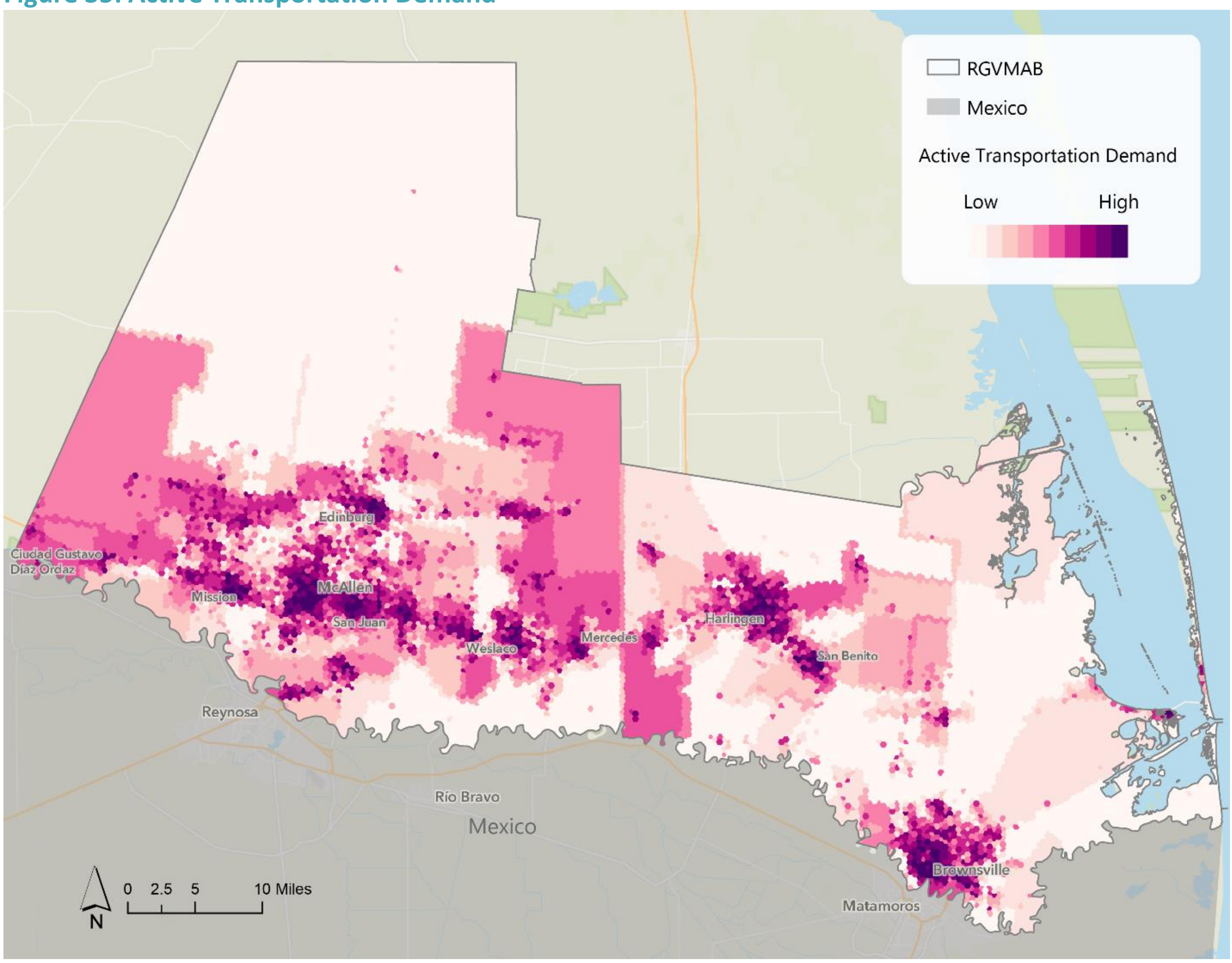
Figure 34: Hexagonal Grid



Each criterion was aggregated to the hexagonal grid, using a spatial join in GIS. For shape-based data like the Census block groups, a criterion was averaged where a hexagon overlapped more than one shape.

To finalize the standardization process, the project team converted the criteria to a 100-point scale. Each measure was normalized through scoring assignments based on a scale of 0 - 100 for each hexagon. Hexagons with the highest scores contain a value of 100, while the lowest contain a value of 0. For example, a hexagon with a value that is higher than 90% of other propensity hexagons is assigned a value of 90 out of 100. Once each measure was scaled from 0 -100, the measures were aggregated to generate final combined scores. Final scores were then normalized on a scale from 0 -100. This final combined score indicates the relative demand for active transportation options occurring in each hexagon, based on the criteria. **Figure 35** shows demand dispersed across the RGVMAB.

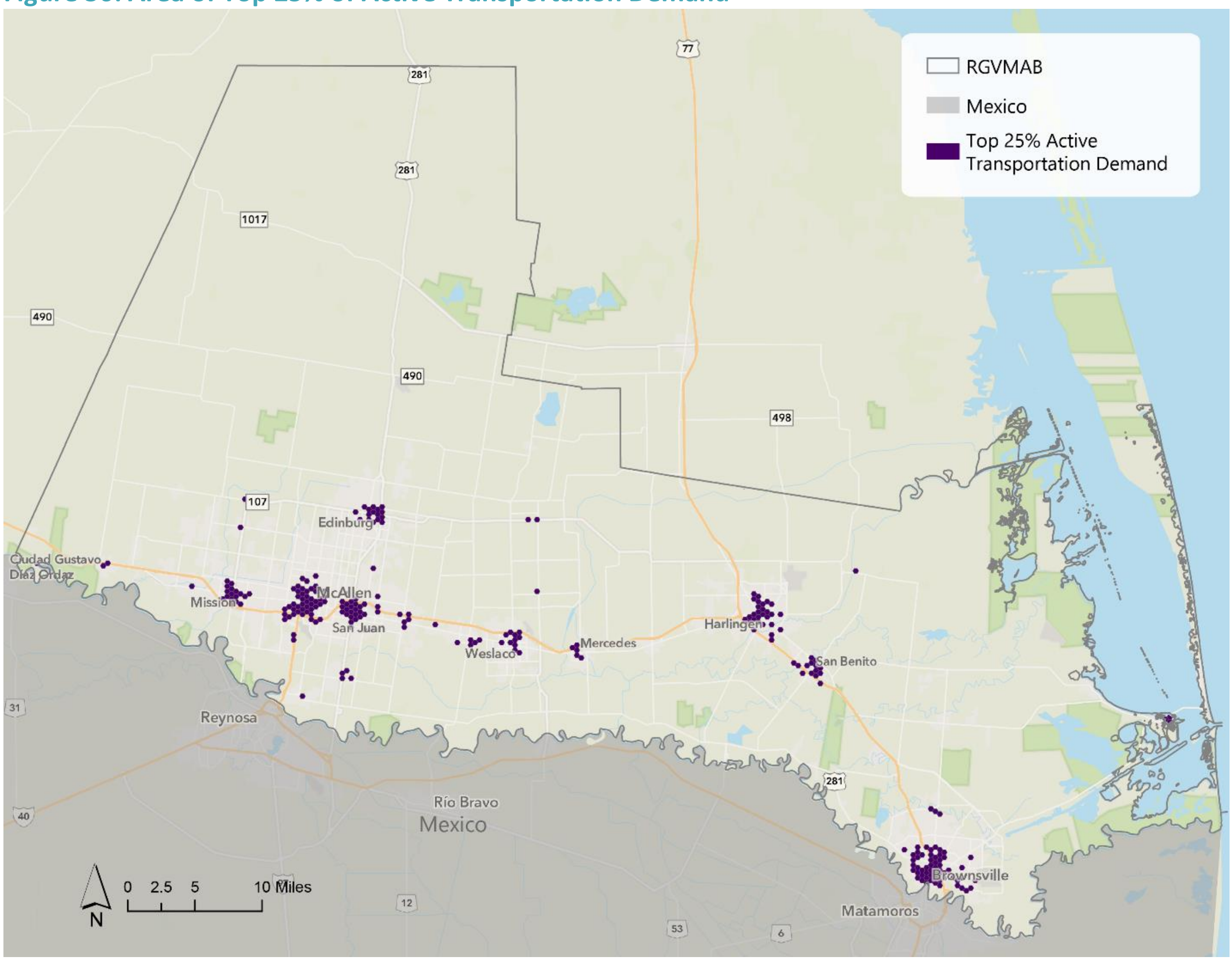
Figure 35: Active Transportation Demand



Results

Current supply of active transportation facilities (sidewalks, bike lanes, and hike & bike trails) were overlaid on the top 25% of demand scores to identify where areas of high demand have insufficient facilities. Below, **Figure 36** shows those areas with the top 25% of demand. The analysis showed many gap areas occurring in rural or semi-rural areas, many of which contain gridded street networks, but lack adequate sidewalk facilities. The section below summarizes four key gap areas.

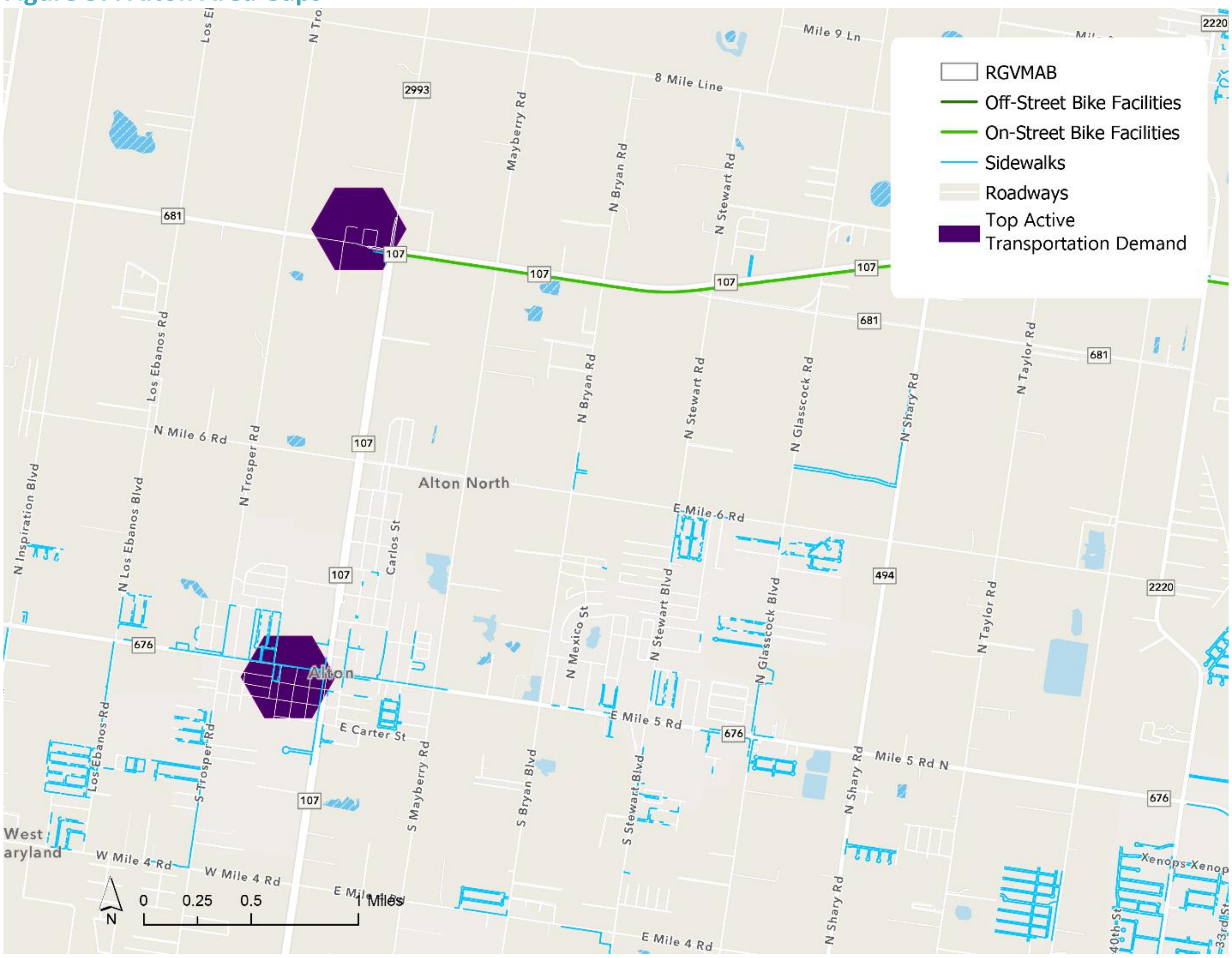
Figure 36: Area of Top 25% of Active Transportation Demand



Alton

In **Figure 37** the Alton community northwest of McAllen contains two high demand areas with very little access to sidewalks. A bike lane runs along SH 107; however, it may not be comfortable for all users due to traffic speed.

Figure 37: Alton Area Gaps



Donna

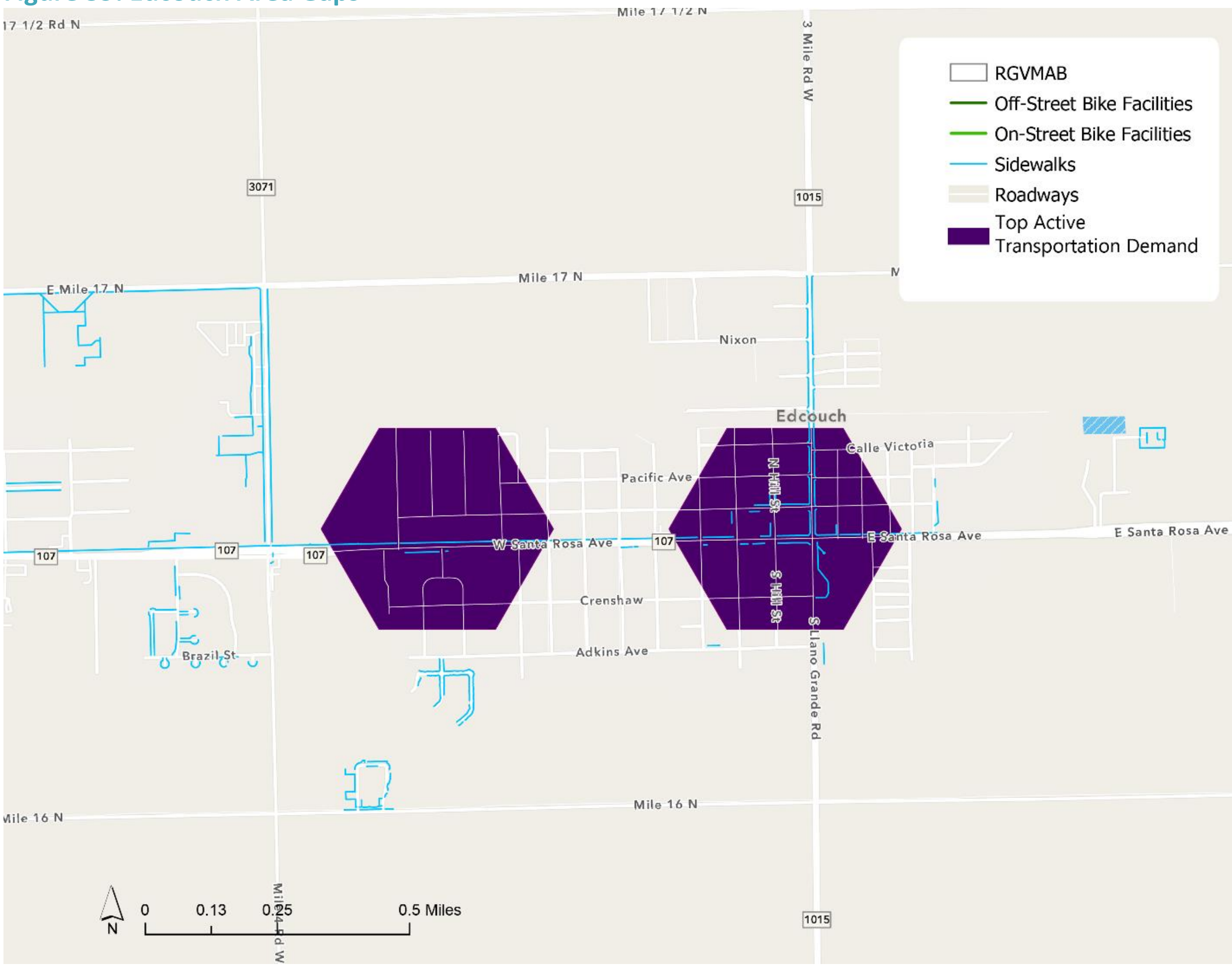
In **Figure 38** the Donna area, south of SH 83 BUS, a pocket of high demand has no access to bicycle facilities and lacks complete sidewalks, despite a well-connected street network. Improved sidewalk connections could improve access to nearby sports parks, schools, and local businesses.

Figure 38: Donna Area Gaps

Edcouch

In **Figure 39** along the SH 107 corridor in the Edcouch area, two high demand hexagons have little access to sidewalk, except for along main thoroughfares. No bike facilities are present. Facilities to nearby Elsa may benefit residents in both communities.

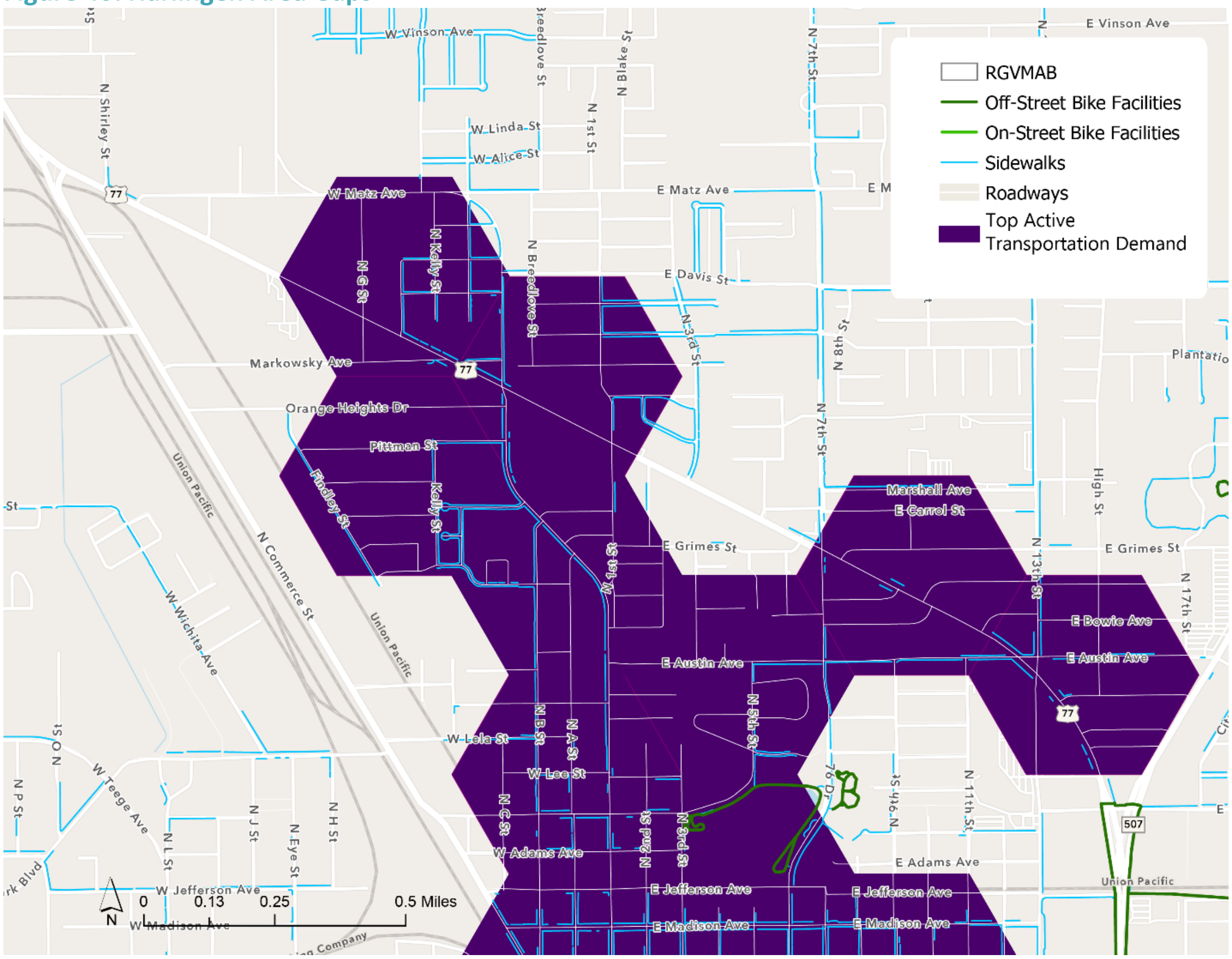
Figure 39: Edcouch Area Gaps



Harlingen

In **Figure 40,** on the north side of Harlingen on N. Commerce St. a large cluster of high demand areas lack complete sidewalk networks in residential areas and contains no bike facilities. Bike facility connections south may connect residents to downtown employment and amenities, while connections to the east may provide direct connection to Pendleton Park and Harlingen High School.

Figure 40: Harlingen Area Gaps



Conclusion

The Rio Grande Valley is a rich and intricate region with a blend of urban and rural communities coming together to weave a unique experience, and set of needs, for those using, or wanting to use modes of active transportation. Whether that be for recreation, commuting, business, or sport.

To identify the current state of the transportation network for the people who walk and bike, a comprehensive analysis identified current conditions and need within the RGVMAB. This technical and data driven analysis is inclusive of all communities within the RGVMAB and aims to provide direction for prioritizing and implementing solutions that help residents improve their day to day lives.

Within the RGVMAB, many communities have well connected, gridded street networks that create an opportunity to implement or expand facilities for people to walk and bike. However, connections between communities that are comfortable for all users are more limited.

To summarize key takeaways from each analysis, findings have been listed below in **Table 24**.

Table 24: Key Takeaways

Analysis	Key Takeaway
Policy Review	• Opportunities for additional policy and program elements can be made in all the major cities throughout the RGVMAB. • Consistent policy on safe passing is found in almost every city reviewed.
Safety	• AT crashes happen most often during PM peak travel times. • Although AT crashes make up only 1.6% of all crashes in the region for the five-year period, they comprise a much larger portion of all crashes that resulted in fatality or serious injury. This information implies that active transportation users bear a disproportionate amount of risk of injury or fatality and that planning for the safety of these users is of the utmost urgency. • The intersections with the most crashes were identified throughout the RGVMAB. The following were the highest two intersections: o International Blvd. (SH 4) @ Southmost Blvd. (FM 1419) o Spur 206 @ IH-69E
Bicycle Level of Stress	• Many urban areas in the RGVMAB have an array low stress roadway for all users, especially where the gridded roadway network is present. • Low stress connections between urban areas are limited, especially along major roadway thoroughfares, such as the I-2 corridor.
Pedestrian Accessibility	• Intersection Density supports walking propensity throughout the dense urban areas of the RGVMAB, as well as in several smaller communities with well-connected street networks.
Transit Proximity	• Identifies the transit Providers Connections in most need of additional sidewalk connections within ½ mile. The following Providers connections were identified as having the lowest sidewalk coverage. o Weslaco Valley Metro Transit Center o San Juan Station o Foy's Supermarket
Travel Patterns	• The highest number of trips under 2 miles occurs in TAZs that are predominantly in rural areas. Those TAZ may benefit from increased facilities for walking and biking. • Travel demand model does not capture nonvehicle trips, which may not fully account for short urban trips made by active modes.
Gaps	• Demand for active transportation facilities through the RGVMAB was mapped and areas within the top 25% of demand were identified. • In the top demand areas, current active transportation facilities were lacking in the following areas: o Alton o Donna o Edcouch o Harlingen