4 MULTIMODAL NEEDS ANALYSIS

This chapter provides an overview of the multimodal analysis of existing and future (no-action scenario) conditions conducted as part of the data driven performance-based planning process. This type of analysis helps to identify locations where deficiencies are likely and what type of mobility strategies and investments in the transportation network could best address the current and future needs of the RGVMAB.

This chapter also details, where applicable, the baseline performance measures used to compare to performance targets.

MULTIMODAL NEEDS ANALYSIS

A robust data driven analysis of current and expected future needs is a critical component of informed decision making. This performance-based planning analysis is based on the latest available estimates and assumptions for population, land use, travel, employment, congestion, economic activity, and equity in the RGVMAB.

This process includes an analysis of the current and projected transportation demand of persons and goods in the RGVMAB over the period of the MTP using the latest available estimates and forecasts from the RGVMPO 2045 Travel Demand Model. The analysis is multimodal in nature, providing an assessment of existing transportation facilities that function as an integrated metropolitan transportation system, including:

- Major roadways,
- Public transportation facilities,
- Intercity bus facilities,
- Multimodal and intermodal facilities for both passengers and freight,
- Nonmotorized transportation facilities (e.g. pedestrian walkways and bicycle facilities),
- Intermodal connectors, and
- Existing facilities that serve important international, national, and regional transportation functions.

The multimodal needs assessment conducted for the RGVMPO 2045 MTP helps ensure that mobility strategies and investments recommended by the plan address the needs of the RGVMAB. The needs that drive project recommendations were analyzed for existing conditions (2019), and where applicable, for conditions likely to exist in 2045. To understand and identify transportation and mobility needs within the RGVMAB multimodal network, the analysis included the following general categories:

- Equity
- Demographics
- Roadway
- Freight
- Transit
- Active Transportation
- System Safety

This chapter is a high-level summary of the in-depth information contained in a series of nine needs analysis technical memorandums. All technical memorandums can be accessed through the RGVMPO and provide in depth detail on all analysis conducted and their key findings.

Analysis was also conducted, where applicable, to obtain baseline performance measures used to compare to FAST Act performance targets. These findings are summarized in Chapter 9. The following sections detail the tools, data, and resources used to create the multimodal needs analysis chapter.

Tools & Data Used

Due to the complexity of travel needs and the variety of modal systems available to address them, the project team used various resources and methods to create robust analysis detailing all multimodal aspects of the RGVMAB transportation system. The following sections define the tools and data used for the multimodal need analysis for the RGVMAB.

Federal Data Sources

To ensure a) a complete understanding of existing conditions on the RGVMAB roadway and freight networks and b) a federally compliant MTP, the project team used FHWA's National Performance Management Research Data Set (NPMRDS) to calculate baseline FAST Act system reliability performance measures for the existing system. These values were aggregated from the NPMRDS and joined to the NPMRDS Texas roadway network to spatially analyze and target areas of concern. The results of this analysis provide the RGVMPO with quantitative values for performance measures for use in the evaluation and prioritization of transportation investments. The mobility measures used in the analysis include:

- Level of Travel Time Reliability (LOTTR)
- Truck Travel Time Reliability Index (TTTRI)
- Percent of person-miles traveled on interstate segments that are reliable
- Percent of person-miles traveled on non-interstate NHS segments that are reliable

The project team also used FHWA's National Bridge Index (NBI) dataset and Highway Performance Monitoring System (HPMS) data to complete the operations and maintenance analysis for the RGVMAB roadway network. This in turn produced baseline federal performance measures for the infrastructure condition goal area.

This data was used alongside the FHWA *Computation Procedure for the Bridge Condition Measures* and the Code of Federal Regulations (23 C.F.R 490.409) to determine the condition of each bridge asset, as well as guidance from the Code of Federal Regulations (23 C.F.R. 490.313) to categorize pavement conditions by International Roughness Index (IRI).

TxDOT Data Sources

Data sets from TxDOT were used throughout the multimodal needs assessment. TxDOT's Crash Records Information System (CRIS) was the basis for all regional safety analyses and provided baseline federal performance measures for the safety goal area. CRIS covers the most recent five-year period (2015-2019) of data available in support of the requirements set forward in the Safety Performance Management Measures Final Rule (49 CFR part 490). CRIS is a database that contains a collection of records regarding motor vehicle traffic crashes as submitted by law enforcement officers through a standardized crash report. These reports are processed to exclude personal information but include other crash details relevant to analysis, such as crash severity, contributing factors, time of day, location, and roadway condition.

Further, the Texas Statewide Freight Network and Texas Trunk System from TxDOT were used to define and analyze the RGVMAB freight network.

Transportation Demand Model (TDM)

Using the Lower Rio Grande Valley's (LRGV) Travel Demand Model (TDM) and Traffic Analysis Zones (TAZ) demographic inputs, existing and future population and employment values were developed to inform the needs analysis. Existing demographics are represented by the 2019 milestone year and future demographics by the 2045 forecast year.

Further, a TDM roadway network was generated and used to analyze existing and future roadway network conditions. An existing plus committed (E+C) network was created by coding TIP projects underway or soon to be started to represent the existing roadway network. The E+C network was compared to the 2045 no-build network – a network with no other transportation investments beyond the 2019 E+C network – to highlight deficient areas within the RGVMAB. 2019 E+C values were also compared to the 2045 build scenario to show potential improvements generated by the recommended projects.

The socioeconomic data necessary to run the model was gathered from a mixture of sources. The datasets included public domain data sources, published commercial datasets, stakeholder input via a Delphi Process, table-top GIS analysis, and limited field review of the study area.

Census Demographic Data

Many demographic characteristics were used to determine the location and characteristics of people in the region. The analysis focused on existing populations and their demographic characteristics. The analysis relied primarily on 2014-2018 American Community Survey (ACS) data. ACS data is based on a sample population measured at the block group level. Employment data is derived from the work-based Longitudinal Employer-Household Dynamics Origin-Destination Employment Statistics (LODES) for 2017, which is similarly an aggregate dataset based on the census block group geography.

Destination Data

Data for destinations in the region was collected using the ArcGIS Business Analyst Web Business and Facilities Search Feature. This data is extracted from a comprehensive list of businesses licensed from InfoGroup. The data includes an estimate of total employees and categories for the business locations using North American Industry Classification System (NAICS) codes. The NAICS codes are typically six-digit codes that identify the type of business; however, these codes have been adjusted to 8 digits for this feature set by InfoGroup. The 8-digit codes provide a greater level of detail than the traditional six-digit codes. Business categories were developed from these NAICS codes to provide comparisons for different types of businesses in the RGVMAB. Businesses with no employees were excluded from this analysis. Only a subset of the available business location data (roughly 44%) was complete enough to be categorized for this analysis.

Geographical Information Systems (GIS)

Throughout the RGVMPO 2045 MTP multimodal needs assessment, GIS analysis was used to visualize data spatially, and accordingly generate key findings for all aspects of the transportation system. This quantitative analysis was paired with qualitative findings from public and stakeholder outreach, as well as plan reviews to create an in depth understanding of system deficiencies and needs currently and over the next 26 years. The primary tools used for analysis were ArcGIS Pro and ArcOnline.

Existing Efforts and Resources

Existing planning resources were also used to inform the multimodal needs analysis. Existing plans spanning all levels of government were reviewed to guide analysis. This effort also included plans currently being conducted (e.g. RGVMPO Congestion Management Plan, Active Transportation Plan, Transit Development Plan). Further information from the plan review can be found in Chapter 2.

Figure 1: McAllen South Broadway Park and Ride

ANALYSIS RESULTS

The following sections highlight all multimodal category analyses and their key findings. As previously mentioned, detailed analysis can be found in the RGVMPO 2045 MTP technical memorandums accessible through the RGVMPO.

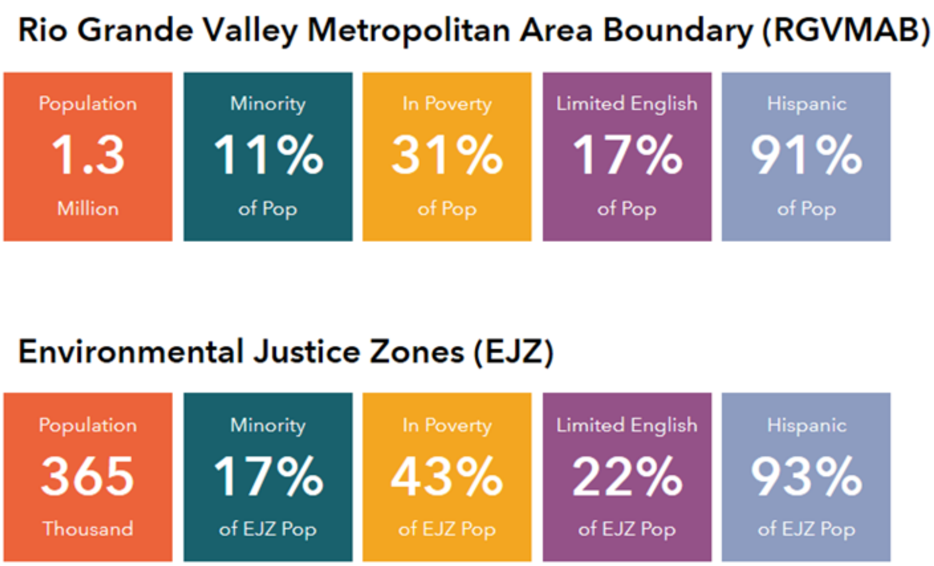
Equity

Equitable implementation of projects and plans takes into consideration historically disenfranchised people to ensure that all people regardless of race, color, national origin, or income are accounted for when planning for a region. This can be achieved analyzing Environmental Justice Zones (EJZs), which are areas that contain a high minority population, high population in poverty, or populations with high limited English proficiency (LEP). These zones are used to evaluate proposed transportation projects for equitable impacts. EJZs were defined as having at least two of the following criteria:

- High Minority Population – Block groups whose percentage of racial minorities is greater than the RGVMAB's total percentage of racial minorities (11%).
- High Population in Poverty – Block groups whose percentage of population in poverty is greater than the RGVMAB's total percentage of population in poverty (31%).
- High LEP Population – The top 10% of block groups with the highest percentage of LEP population.

'High concern' EJZs were also identified. These block groups were identified as high concern due to meeting all three of the above-mentioned criteria. It must be noted that ACS minority data is represented by race subcategories (e.g. White; Black/African-American; American Indian or Alaska Native; Asian; Native Hawaiian or Other Pacific Islander; and other Race) that do not include Hispanic, Latino, or Spanish origin ethnicity populations. Accordingly, Hispanic, Latino, or other Spanish origin ethnicities are also included in this section using overlay analysis of EJZs to identify potentially underserved and underrepresented cohorts within the RGVMAB. Results at the RGVMAB and EJZ level are presented in Figure 4-1 below.

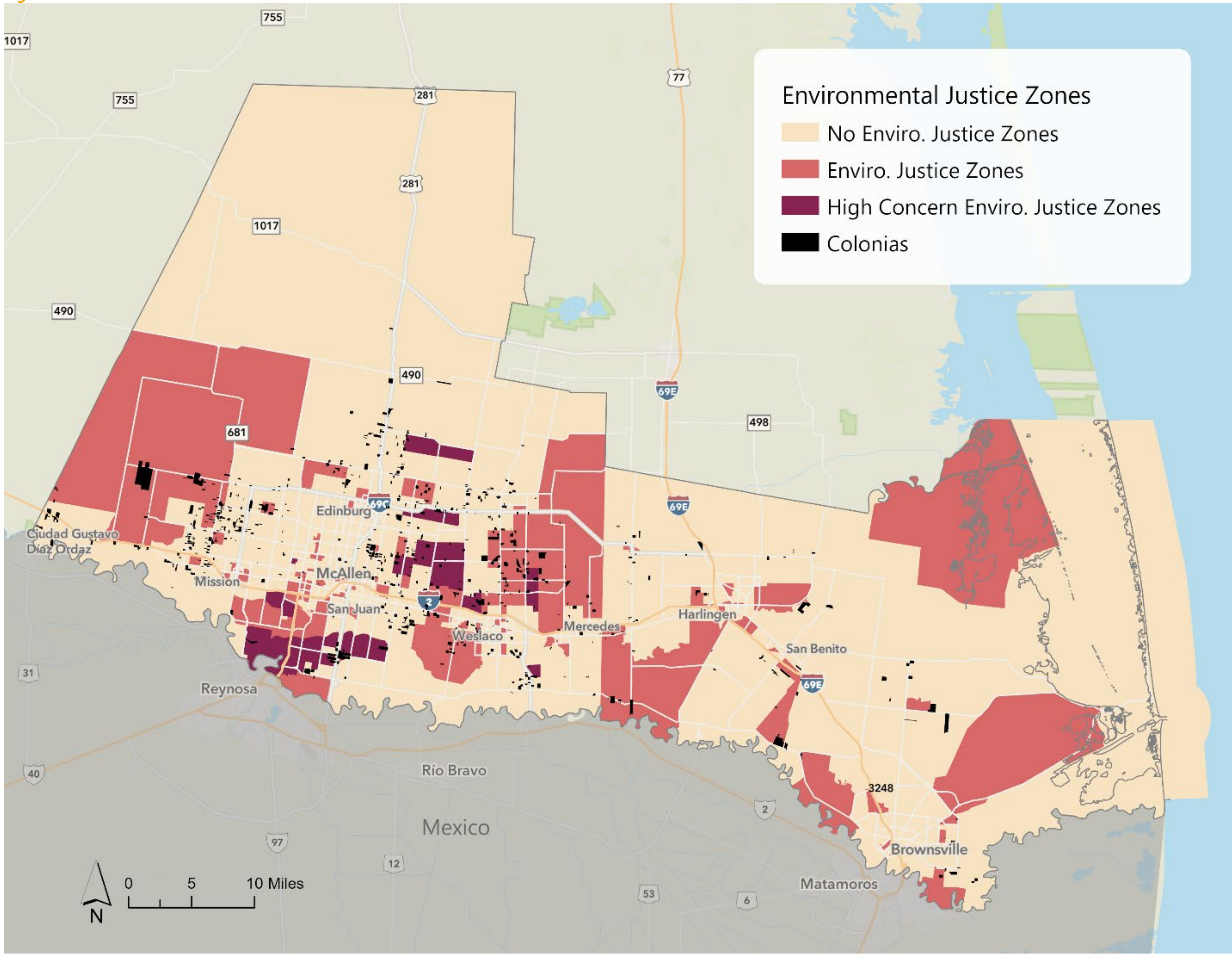
Figure 2: RGVMAB Environmental Justice Results



Analysis shows 28% of the RGVMAB population (Figure 4-2) falling within an EJZ. Within this vulnerable group we see a consistent trend of higher likelihood of each demographic category being redirected to an EJZ. For instance, 11% of the total population in RGVMAB and 17% of EJZs are considered minority population - this means almost 44% of the total minority population in RGVMAB lives within an EJZ. Similar trends are seen for RGVMAB's impoverished population and LEP population where upwards of 40% of these vulnerable populations end up in a defined EJZ.

Figure 4-2 also displays colonias, which are unincorporated border communities that often lack adequate water and sewer systems, paved roads, and safe, sanitary housing. Colonias flourish in counties along the United States - Mexico border which includes the RGVMAB. Overlaying areas identified as colonias with identified EJZs creates a composite image of areas that should represent a priority when future transportation projects are being taken into consideration.

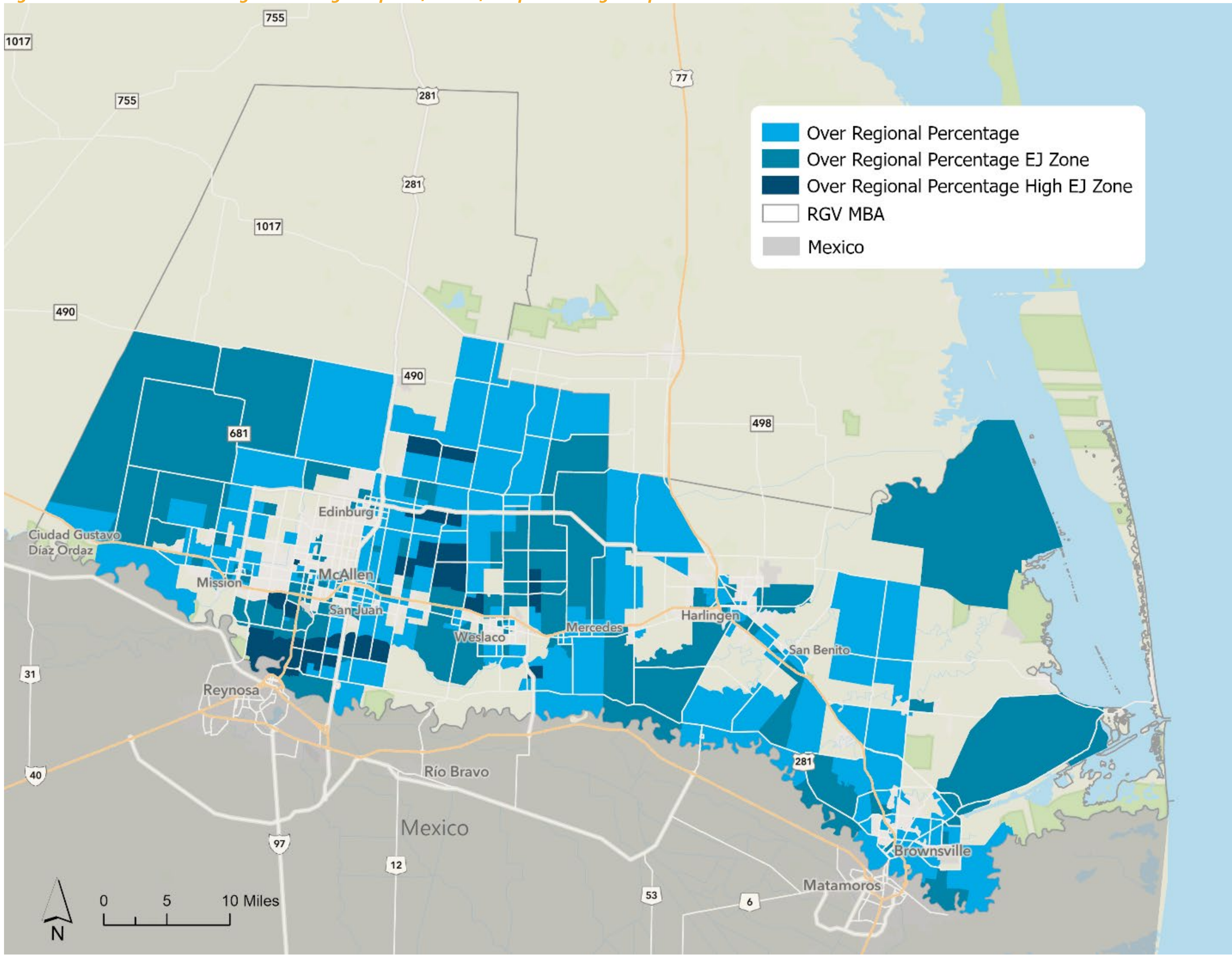
Figure 3: RGVMAB Environmental Justice Zones & Colonias



Due to the substantial amount of population self-reported as Hispanic, Latino, or of Spanish origin in the RGVMAB, there is a tendency for demographic measures to disguise some of the issues that the EJ analysis tries to pinpoint. While this ethnic group makes up 91% of the RGVMAB - and accordingly does not appear to be a minority population - at a national level, this population group is considered historically disadvantaged and must not be left out of the EJ analysis. Similar methods for defining EJ zones were used to find block groups with Hispanic, Latino, or Spanish origin populations greater than the regional average.

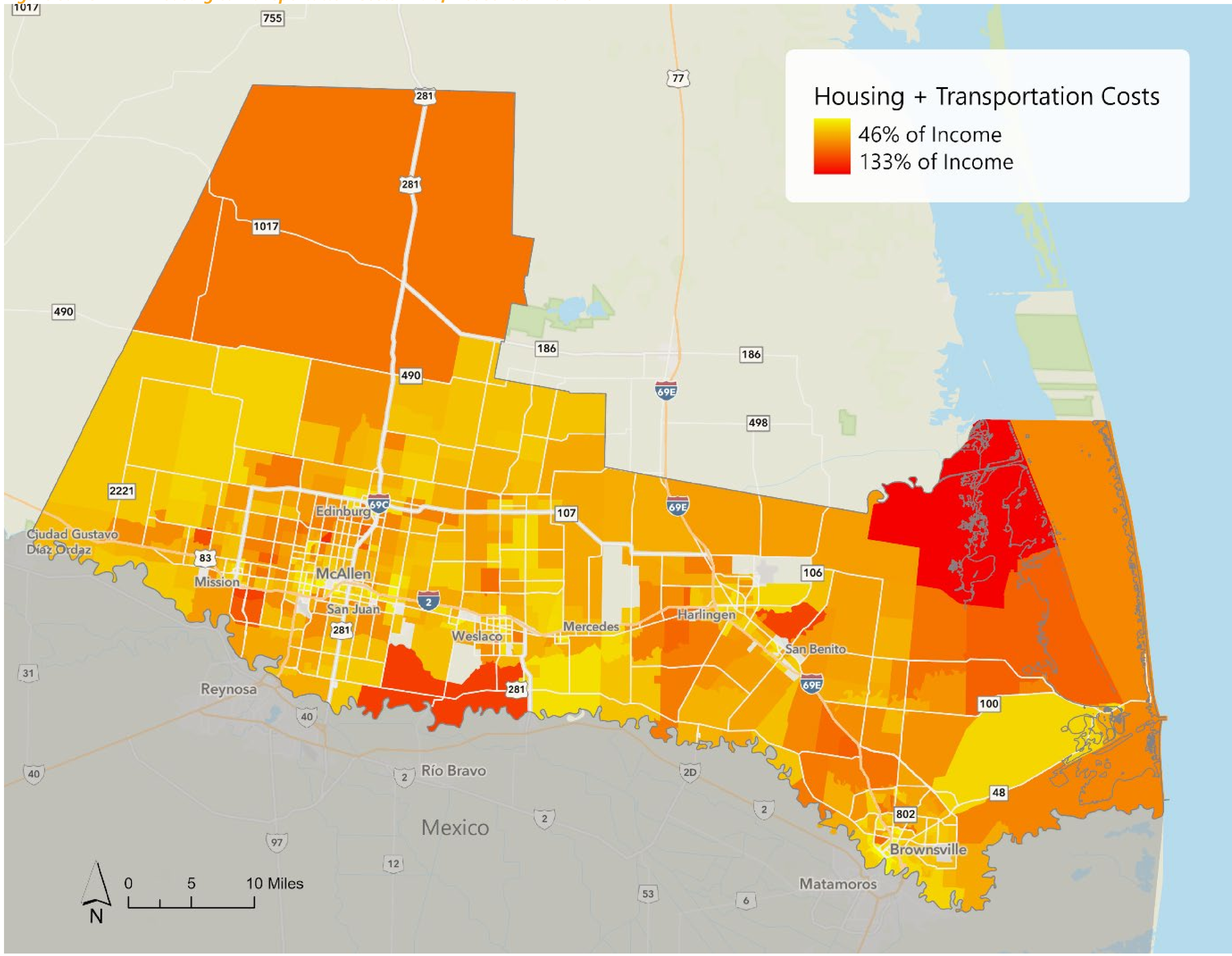
Figure 4-3 displays above average Hispanic/Latino/Spanish origin block groups overlaid with EJZs and high concern EJ zones. Colors represented by darker shades of blue indicate block groups designated as EJZs/high concern EJZs. This overlay analysis further highlights overlap in historically disadvantaged areas within the RGVMAB which can inform decision making necessary later in the planning process.

Figure 4: RGVMAB EJZs and High Percentage Hispanic, Latino, or Spanish Origin Populations



Further, 98% of block groups within the RGVMAB are considered unaffordable when analyzing the Housing and Transportation (H+T) Affordability Index. The index shows what percentage of a household's income is spent on housing and transportation combined, with the unaffordable threshold being 45% of income (Figure 4-4).

Figure 5: RGVMAB Housing & Transportation Costs - % of Household Income



Demographics

When planning for the next 25 years, it is important to understand the population and employment trends within the RGVMAB as these factors greatly impact the transportation network. Demographic analysis was conducted using RGVMPO TDM data to compare the current estimated population and employment in 2019 to the future projections for population and employment in 2045. This analysis provides important insights into where population and employment are concentrated today and where changes are expected to occur in the future. It also helps the RGVMPO prioritize projects to ensure the transportation system is meeting the needs of the community.

Regional Growth

It is critical to understand and visualize where growth is occurring within the region to guide the MTP planning process. The RGVMAB is a dynamic, growing area in terms of both population and employment, with projected growth presented in Figure 4-5.

Figure 6: Projected RGVMAB Population & Employment Growth

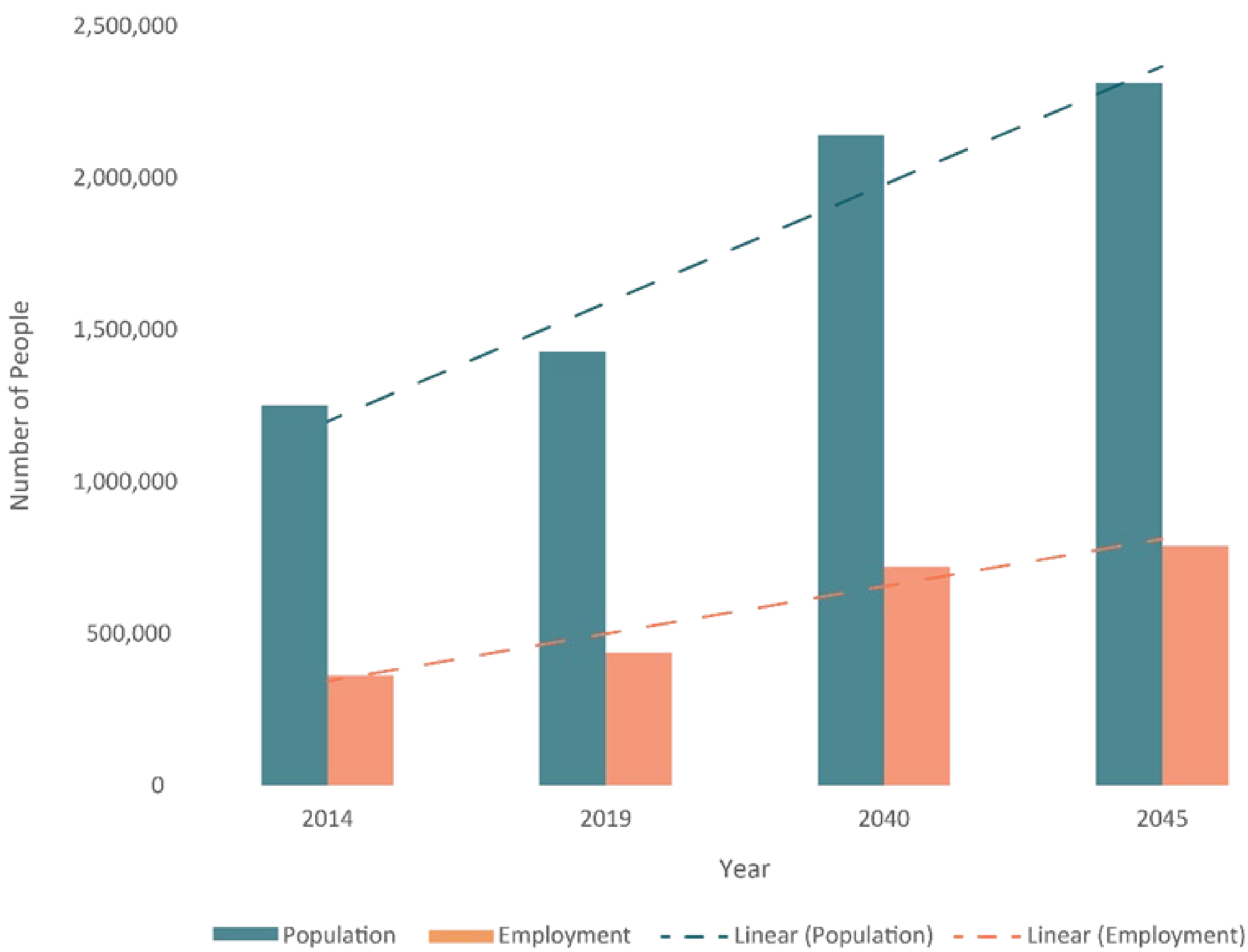


Figure 4-6 presents population growth by density (per acre) at the block group level over the 26-year forecast horizon. High growth is projected near McAllen/Pharr along the I-2 corridor, in Harlingen east of the I-69E corridor, and throughout the Brownsville area.

Figure 7: Projected RGVMAB Population Growth (2019 - 2045)

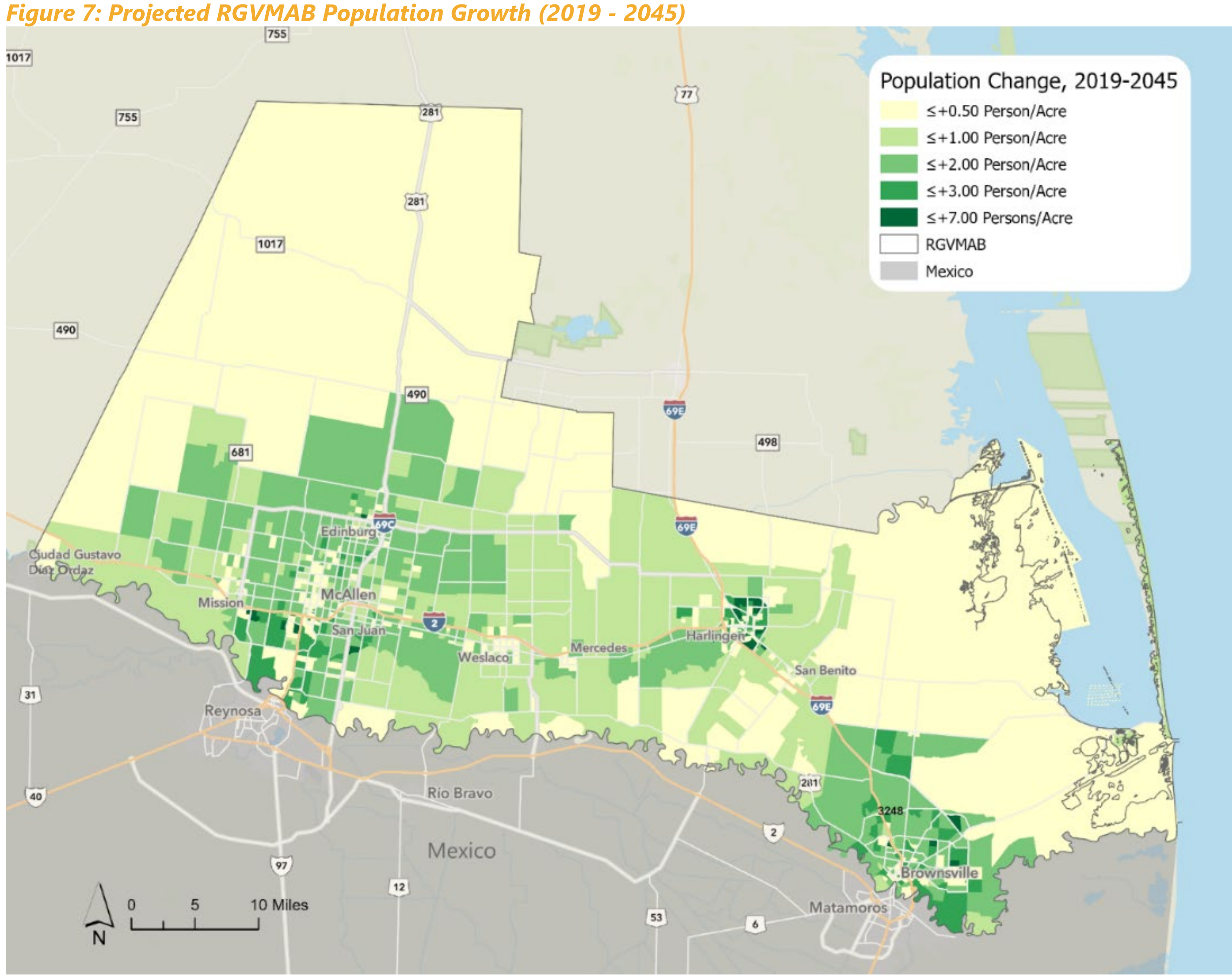
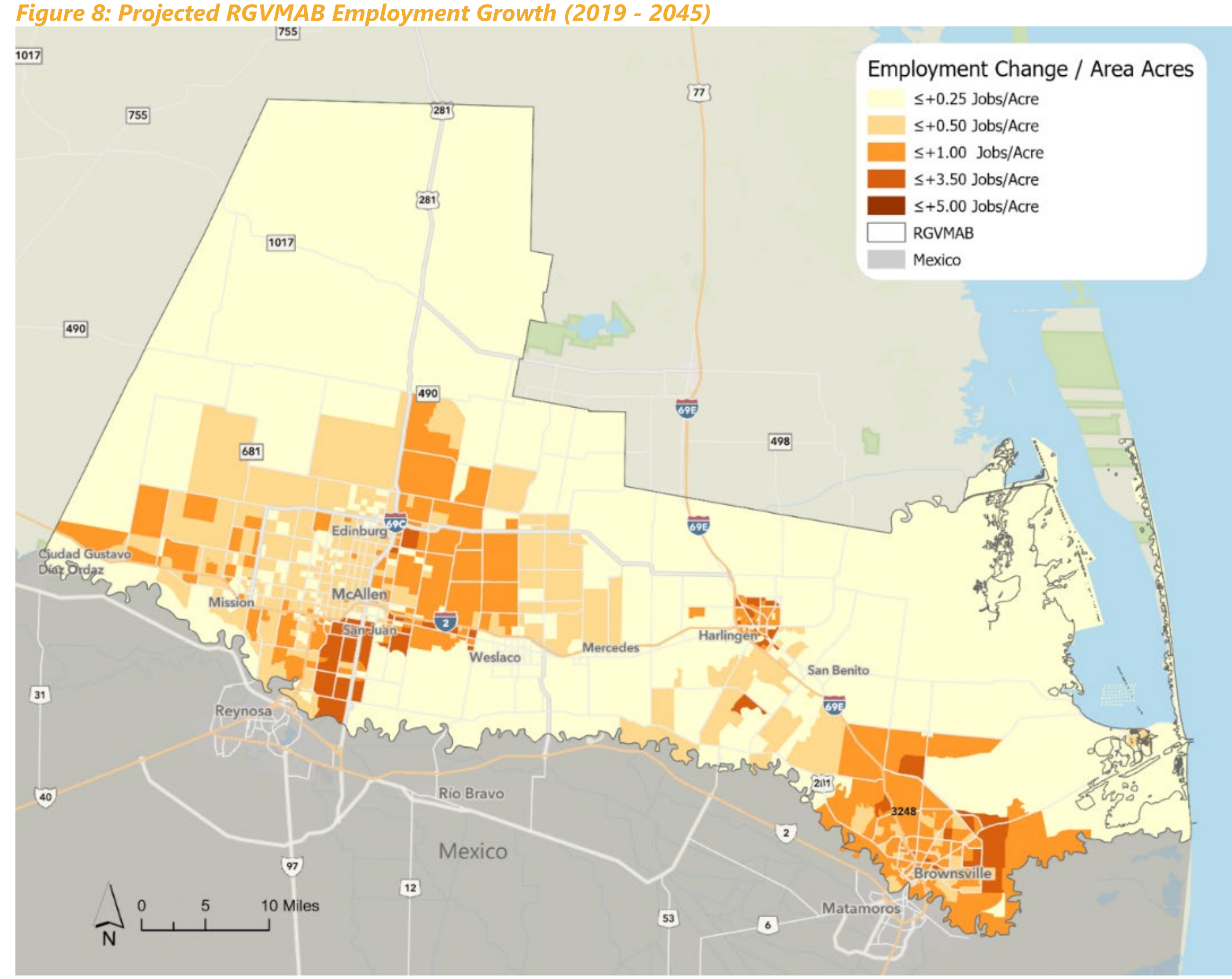


Figure 4-7 presents employment growth by density (per acre) at the block group level over the same forecast horizon. Areas projected to experience high employment growth cluster around the I-69C/US 281 corridor from the United States – Mexico border north beyond Edinburg, throughout the Harlingen municipality, and within and surrounding the Brownsville area.

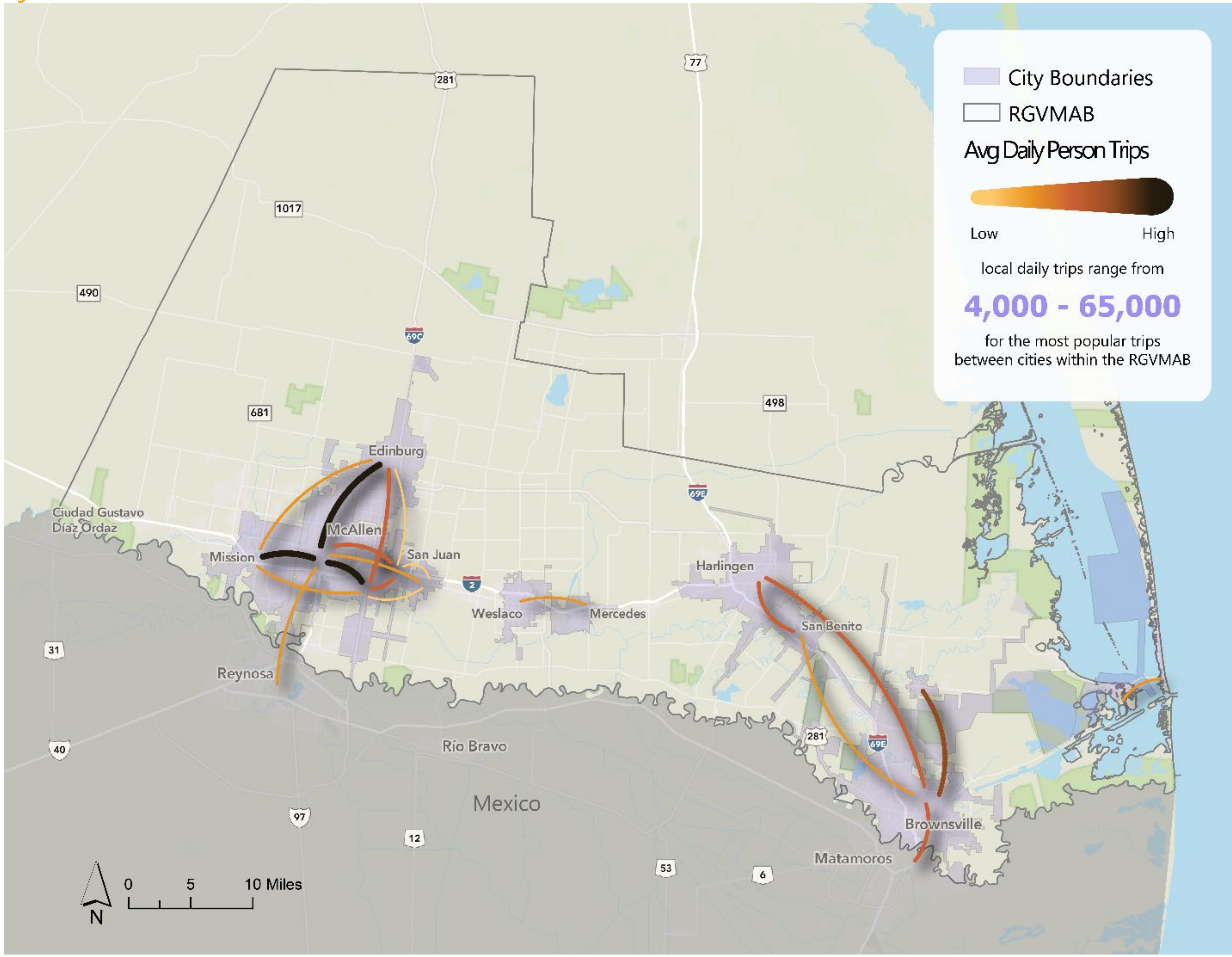
Figure 8: Projected RGVMAB Employment Growth (2019 - 2045)



Travel Patterns

The most common transportation mode in the RGVMAB is the automobile. Understanding where most of the population in the region is traveling reveals the most heavily used travel patterns or 'desire lines' in the region. RGVMPO TDM outputs were used to better understand the movement of people in the RGVMAB within municipal boundaries (Figure 4-8). Accordingly, results display the most traveled city pairs to be in Hidalgo County between Mission, McAllen, Pharr, and Edinburg (roughly 65,000 annual trips). This analysis works in tandem with population and employment growth projections in the previous sections to understand where transportation improvements are most needed within the RGVMAB.

Figure 9: RGVMAB Desire Lines



Roadway

The roadway analysis provides policy makers and the public with a better understanding of how the roadway network will be impacted by changes in the region over time if no improvements are made to the existing transportation system. The project team looked at three aspects of roadway performance for the analysis, listed below:

- Existing roadway performance using FHWA's NPMRDS
- Transportation system performance over time using the RGVMPO TDM to report anticipated trends in roadway performance over the MTP planning horizon
- Capacity deficiencies analysis using the RGVMPO TDM

This approach provided a holistic understanding of the state of the RGVMAB's roadway infrastructure, as well as where improvements should be focused as the RGVMPO moves forward with the MTP planning process. Key findings from the RGVMPO 2045 MTP roadway analysis include:

- The existing interstate network meets the system reliability target of 90%; the non-interstate NHS network does not meet the system reliability target
- The percentage of non-SOV travel on the NHS network suggests SOV to be the RGVMAB's mode of choice
- TDM outputs show large increases in all congestion measures at the regional and per capita level between 2019 and the 2045 No-Build scenario

The following sections detail findings from analyses based on FHWA's NPMRDS and the RGVMPO TDM to create a robust understanding of existing and future roadway conditions.

Congestion & Delay Analysis

LOTTR is a measure of "the consistency or dependability of travel times from day to day or across different times of day" for a given roadway. While congestion typically focuses on the average roadway conditions in terms of delay, travel time reliability indicates the level to which traffic or roadway conditions can be anticipated for travelers to plan around expected delays. Reliability of the roadway network is important because it allows travelers to reach their destinations at their planned time. LOTTR is a federally mandated performance measure. RGVMPO LOTTR measures can be found in Chapter 9.

Per the 2019 NPMRDS, the current system reports 93.7% percent of person-miles traveled on interstate segments that are reliable. The current system further reports 88.4% percent of person-miles traveled on non-interstate National Highway System (NHS) segments that are reliable. Figure 4-9 displays segments at the RGVMAB level for Interstate and non-interstate NHS facilities with an LOTTR greater than 1.5. This value represents the threshold for a roadway segment concerning its designation as 'reliably congested'. Those segments with values greater than 1.5 are considered unreliably congested and should be prioritized when considering transportation infrastructure improvements. Accordingly, contiguous segments with flagged LOTTR values exist on I-2, I-69C, and I-69E. Non-interstate NHS segments are dispersed throughout the region

To bolster the NPMRDS national performance measure information on existing conditions, separate congestion measures from the RGVMPO TDM outputs were analyzed for both 2019 and 2045 and compared to no-build outputs to highlight potential future issues in terms of congestion and delay. Outputs were calculated to represent performance trends at a system and per capita level. The following measures were used to gain this detailed understanding:

- Vehicle Miles Traveled (VMT) - The amount of roadway miles traveled by vehicles within a specified segment for AM and PM peak period travel times
- Vehicle Hours Traveled (VHT) - The number of hours traveled by vehicles
- Vehicle Hours of Delay - Additional hours spent in traffic due to congestion on the roadway network
- Travel Time Index (TTI) - The ratio of travel time during peak travel periods (congested time) required to make the same trip at free-flow speeds

Table 4-1 shows the existing and 2045 No-Build transportation systems to be inefficient based on TDM outputs.

Figure 10: RGVMAB Interstate & Non-Interstate NHS Segments - 2019 LOTTR > 1.5

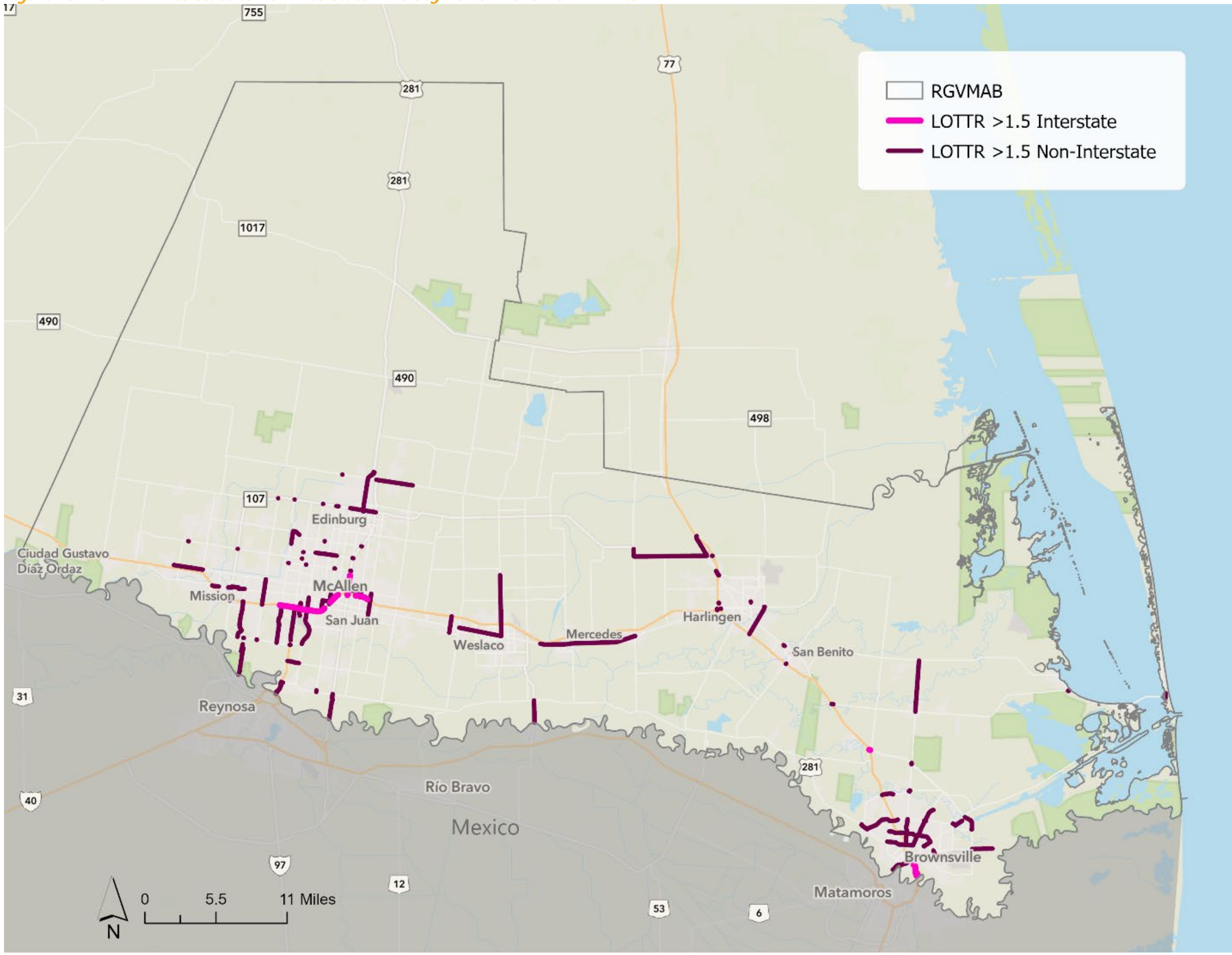


Table 4-1: RGVMAB Congestion Trends

Measure	2019 – Existing Conditions*			2045 – No-Build			% Change for Totals
	Interstate & Toll	Arterials	Total	Interstate & Toll	Arterials	Total	
Daily VMT**	1,253	3,659	4,912	2,030	6,501	8,531	74%
per person			3.44			3.69	7%
Daily VHT	28,422	124,215	152,637	70,253	763,769	834,022	446%
per person			0.11			0.36	237%
Annual Wkday Vehicle Hrs of Delay**	1,019	9,157	10,176	7,998	196,716	204,714	1912%
per person			7.13			88.53	1142%
Weighted Avg. TTI	1.17	1.61	1.39	1.84	6.79	4.32	211%

**2019 was used as stand in for current conditions because it is the most recent year for which complete data is available*

***VMT & Annual Weekday Vehicle Hours of Delay represent metrics/1,000 and rounded to nearest whole number*

The TDM also provides capacity attributes, which create the base for the RGVMAB roadway system deficiencies analysis of anticipated 2045 transportation system performance. Volume to Capacity (V/C) Ratio was used to generate Level of Service (LOS) values and is defined below.

- V/C Ratio – The ratio of traffic flow to capacity (maximum allowable traffic flow) on a roadway segment, where a ratio of 1 represents a segment at full capacity and higher values indicate more severe congestion

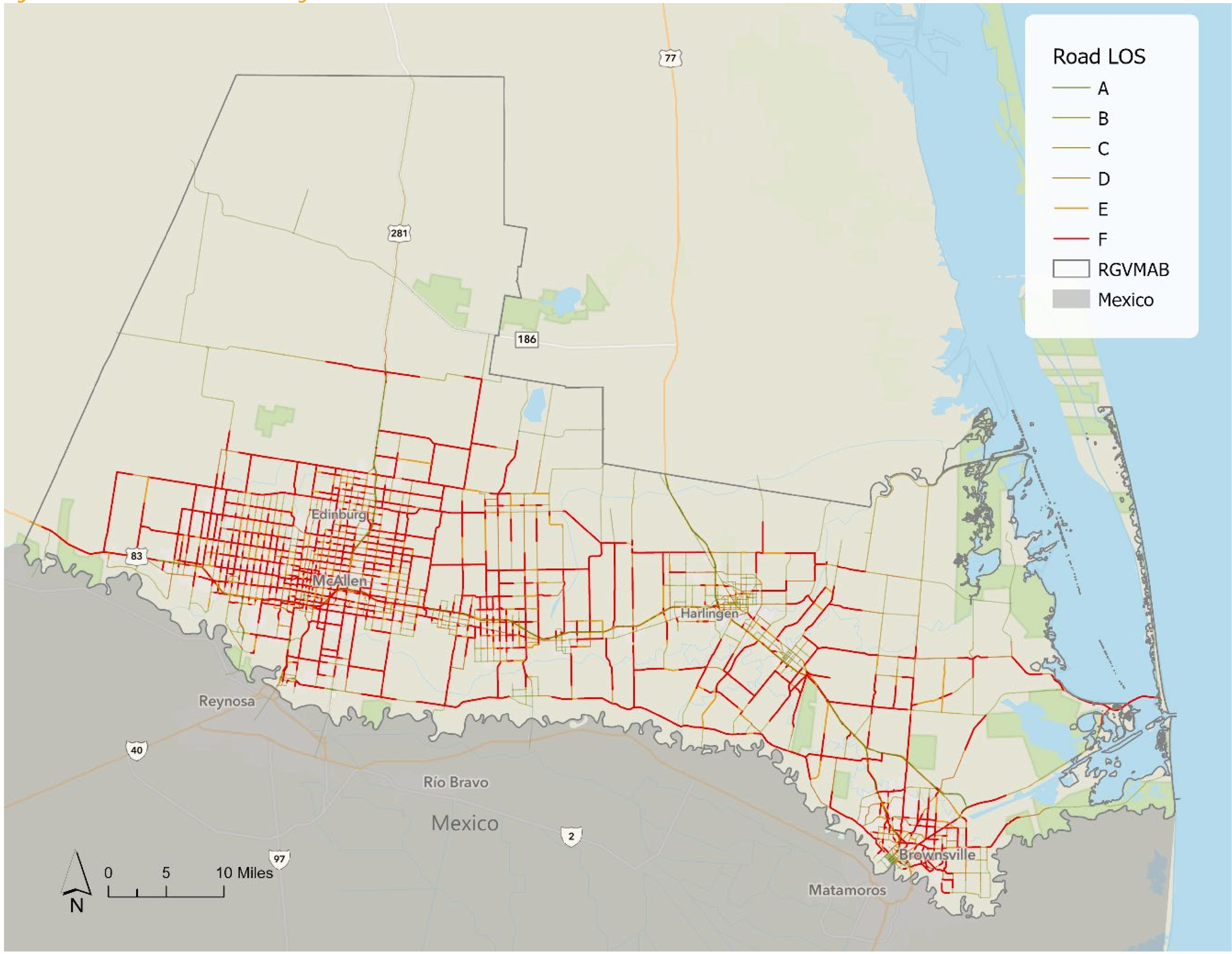
Table 4-2 displays RGVMAB capacity measures. The 2045 average V/C ratio suggests that the roadway network will be roughly 26% above capacity during peak travel periods, increasing by 63% from 2019. The 2045 No-Build average V/C ratio falls within LOS F, which indicates severe congestion as the status quo for the RGVMAB if no action is taken.

Table 4-2: RGVMAB Capacity Measures

Measure	2019 – Existing Conditions*			2045 – No Build			
	Interstate & Toll	Arterials	Total	Interstate & Toll	Arterials	Total	% Change for Totals
Avg. V/C Ratio	0.78	0.76	0.77	1.27	1.25	1.26	63%
% of Roadway Miles with Heavy Congestion	-	-	43%	-	-	80%	85%

Figure 4-10 displays RGVMAB roadway network LOS values for 2019 to further illustrate potential roadway system deficiencies within the RGVMAB. LOS is an indicator of congestion on a scale from A to F, with A representing a high-quality LOS under which the traveler experiences free-flow traffic conditions and F represents a failure in service delivery under which the traveler experiences severe congestion with major delays. TDM outputs forecast severe LOS conditions not only within major and minor municipalities, but similar conditions expanding throughout peripheral areas and rural highways.

Figure 11: RGVMAB LOS - 2019 Existing Conditions



Operations & Maintenance

In addition to being federally required, creating an inventory of the region's bridge and roadway conditions helps to promote the safe and efficient movement of people and goods throughout the RGVMAB. This inventory allows regional and local decision-makers to understand which facilities are in a state of good repair, which are in fair condition and require oversight, and which are in poor condition and must be prioritized for improvement.

BRIDGE CONDITIONS

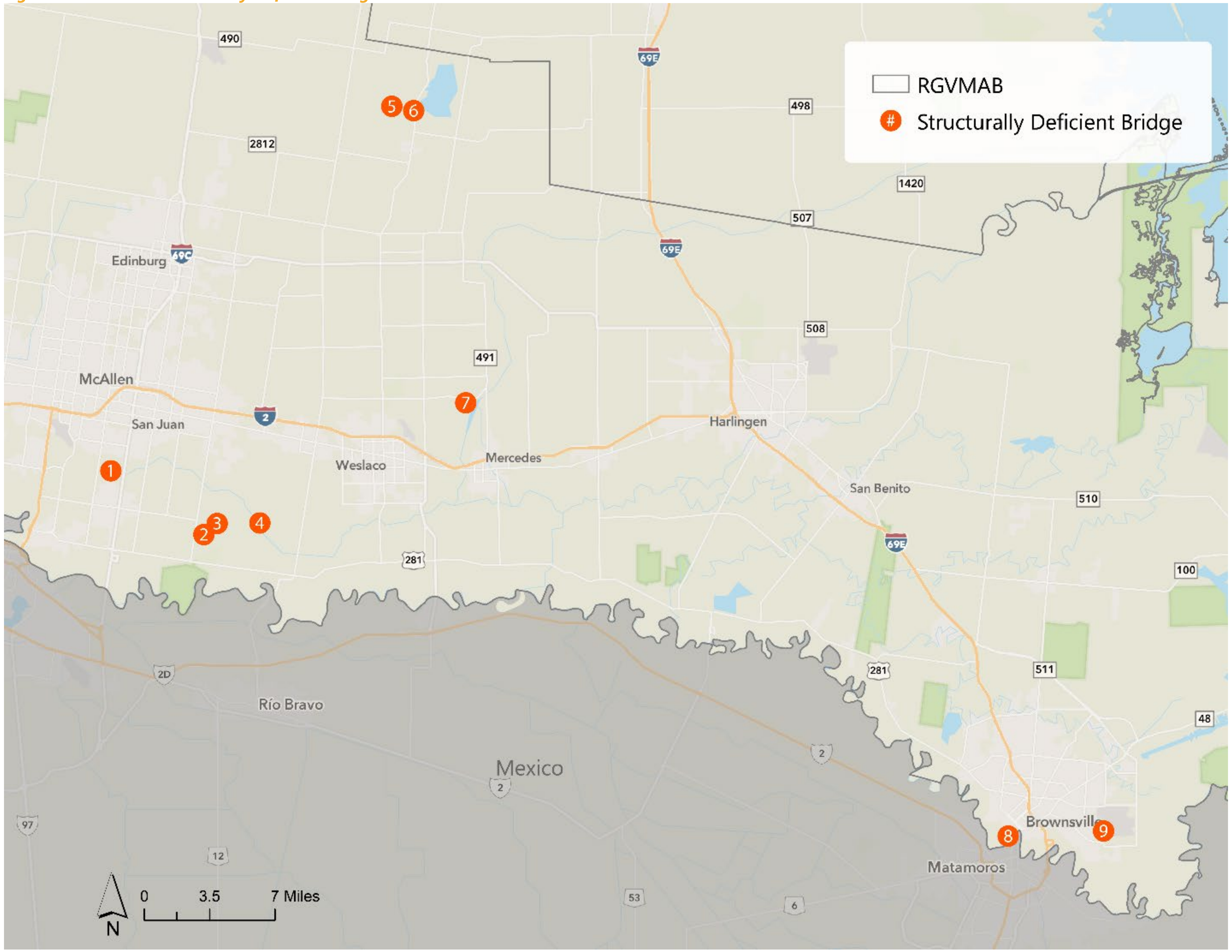
The bridge conditions analysis was based on the most up-to-date version of the FHWA's NBI. The NBI included location and condition information for 765 bridges within the RGVMAB as of April 2020. It must be noted that bridges identified were limited to the NBI dataset, and more deficient bridges likely exist that are off system and/or locally owned. The project team followed guidance provided in FHWA's Computation Procedure for the Bridge Condition Measures and the Code of Federal Regulations (23 C.F.R 490.409) to determine the condition of each bridge asset.

Out of the 765 bridges considered for the analysis, only 9 were identified as being structurally deficient. Table 4-3 shows the percentage of bridge deck area by condition for bridges in the RGVMAB, as well as those located on the NHS in the study area. Figure 4-11 displays structurally deficient bridges at the RGVMAB level, showing poor bridge infrastructure to largely occur in rural and/or local areas of the roadway network.

Table 4-3: RGVMAB Bridge Conditions

	Total	Interstate and Non/Interstate NHS
% in Good Condition	59%	51%
% in Poor Condition	0.13%	0%

Figure 12: RGVMAB Structurally Deficient Bridges



ROADWAY CONDITIONS

Roadway pavement condition analysis for the RGVMPO 2045 MTP was based on 2018 data from FHWA's Highway Performance Monitoring System (HPMS). HPMS data provided a condition rating based on the International Roughness Index (IRI) for roadways in the RGVMAB. This includes roadway segments found on the National Highway System (NHS), as well as other roadways critical to the movement of people and goods in the region.

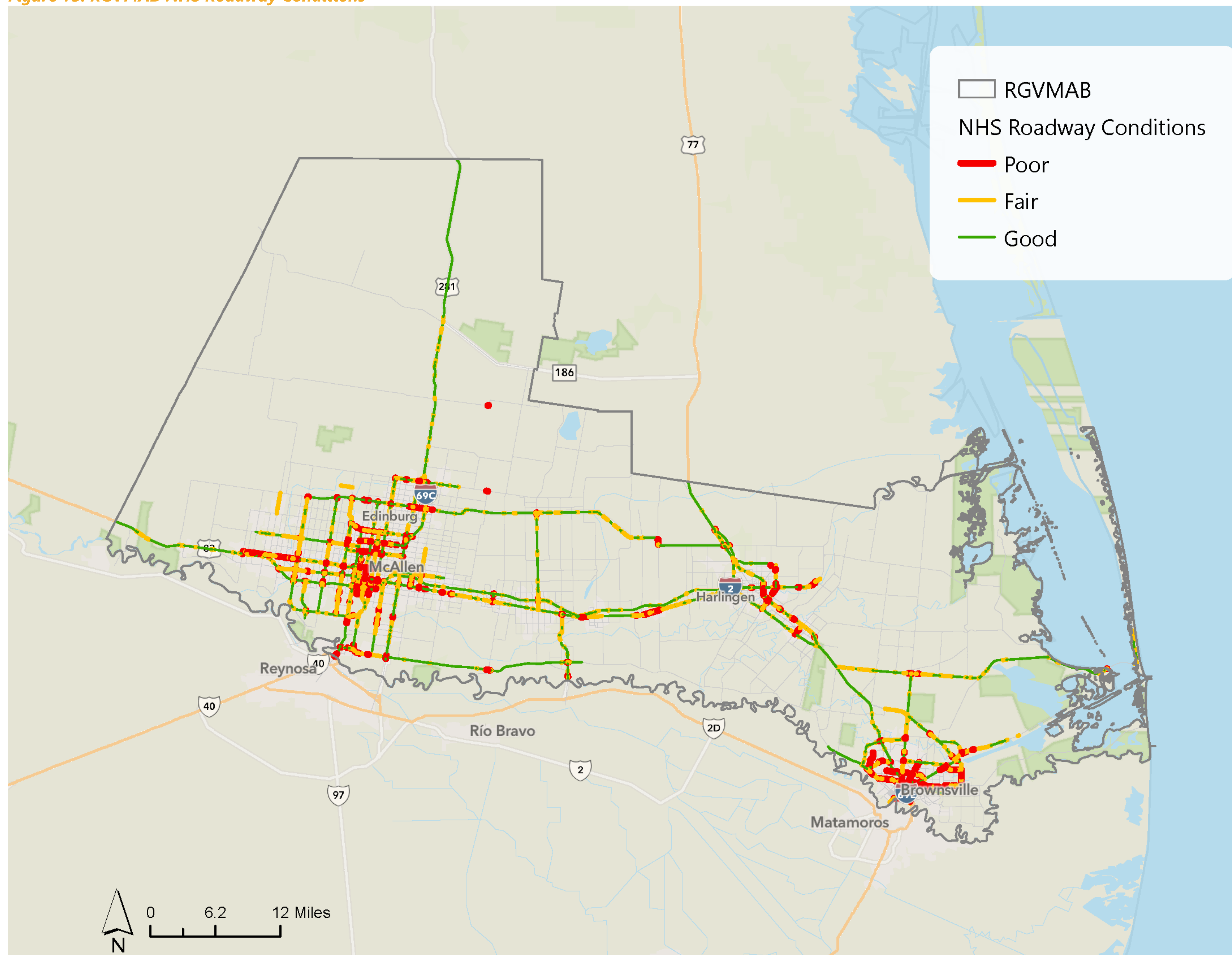
HPMS data was then totaled to represent the number of lane miles for each of the three pavement condition categories, allowing the project team to calculate the percentage of interstate (NHS) and non-interstate NHS lane miles and percentage of lane miles by condition. Table 4-4 presents the pavement condition results which coincide with the national performance measures identified by the FHWA using values derived from representative roadway segments reported in the HPMS.

Table 4-4: RGVMAB NHS Roadway Conditions

	Total Lane Miles			% of Total Lane Miles		
Cond-ition	Inter-state	Non-Interstate NHS (with condition scores)	Total NHS	Inter-state	Non-Interstate NHS (with condition scores)	Total NHS
Poor	1	42	43	1%	9%	8%
Fair	16	152	168	15%	34%	30%
Good	86	256	342	84%	57%	62%
Total	102	451	552	100%	100%	100%

Figure 4-12 displays roadway pavement conditions for the NHS (both Interstate and Non-Interstate) at the RGVMAB level, showing the majority of major interstate and highway infrastructure to be in a state of good repair.

Figure 13: RGVMAB NHS Roadway Conditions

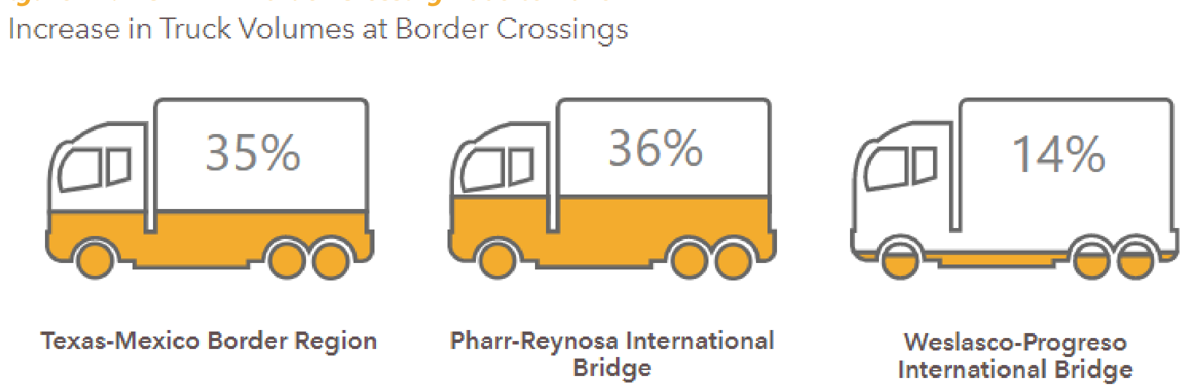


Freight

The RGVMAB is a multimodal freight and international trade hub due to its location on the United States – Mexico border and the Gulf of Mexico. This creates a unique need for freight connectivity in the region. The RGVMPO multimodal freight network serves critical connections throughout the RGVMAB, state of Texas, United States, and beyond through an intricate network of freight facilities. This includes major interstate and highway infrastructure, railroads, deep water and inland ports, and airports, all connected to efficiently move goods throughout the region and beyond. Key takeaways from the RGVMPO 2045 MTP freight analysis are listed as follows:

- NPMRDS TTTR analysis displays several areas are experiencing unreliable travel times, which may impact on-time delivery of freight and cause the deviation of freight traffic onto surrounding infrastructure
- The TDM forecasts suggest that a majority of the freight network is likely experience severe peak hour LOS conditions by 2045
- Due to the many intermodal facilities and geographical location of the RGVMAB, the region contains many important freight generators with transportation connectivity needs
- The RGVMAB contains several border crossing facilities, four of which allow commercial/freight truck traffic. These facilities have experienced increasing northbound crossings over the last decade

Figure 14: RGVMAB Border Crossing 2008 to 2018



Assets

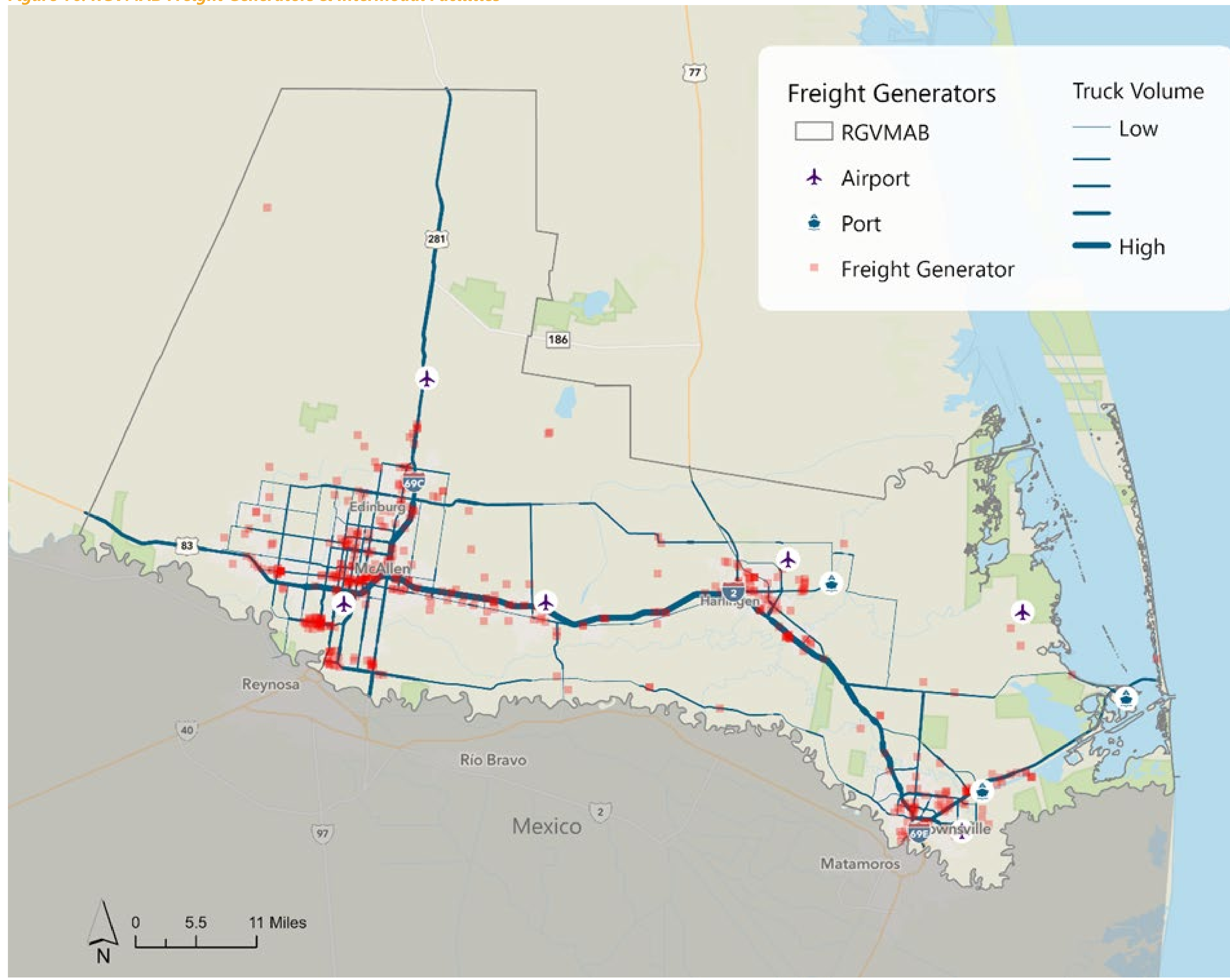
The Freight Roadway Network was defined based on a combination of sources that identify major roadways in the region that support freight truck traffic. Identified roadways include the Interstate Highway System, the NHS, the Texas Statewide Freight Network, and the Texas Trunk System, which defines rural/off-system roadways capable of handling freight. Due to the high volume of freight traveling within and through the RGVMAB, it must be noted that not all roads experiencing significant freight travel were included in the defined RGVMAB freight network. The freight network mainly includes roads more local and/or rural in nature that may currently serve as through routes or handle freight spillover from dedicated freight routes.

Figure 4-14 shows the designated freight network with associated 2019 truck volumes within the RGVMAB.

Figure 15: RGVMAB Freight Network & Truck Flow - 2019 Existing Conditions

Figure 4-15 identifies the locations of freight generators and intermodal facilities in the RGVMAB in relation to the freight network. Freight generators are represented by concentrations of employment in the following industries: natural resources extraction, utilities, constructions, manufacturing, wholesale trade, and transportation/warehousing jobs. Generators tend to cluster near intermodal facilities. Intermodal facilities represent break of bulk points where cargo changes freight mode (i.e. airports and ports). These generators contribute significantly to truck traffic; this includes the Port of Harlingen and Port of Brownsville which are considered nationally significant ports in reference to goods movement.

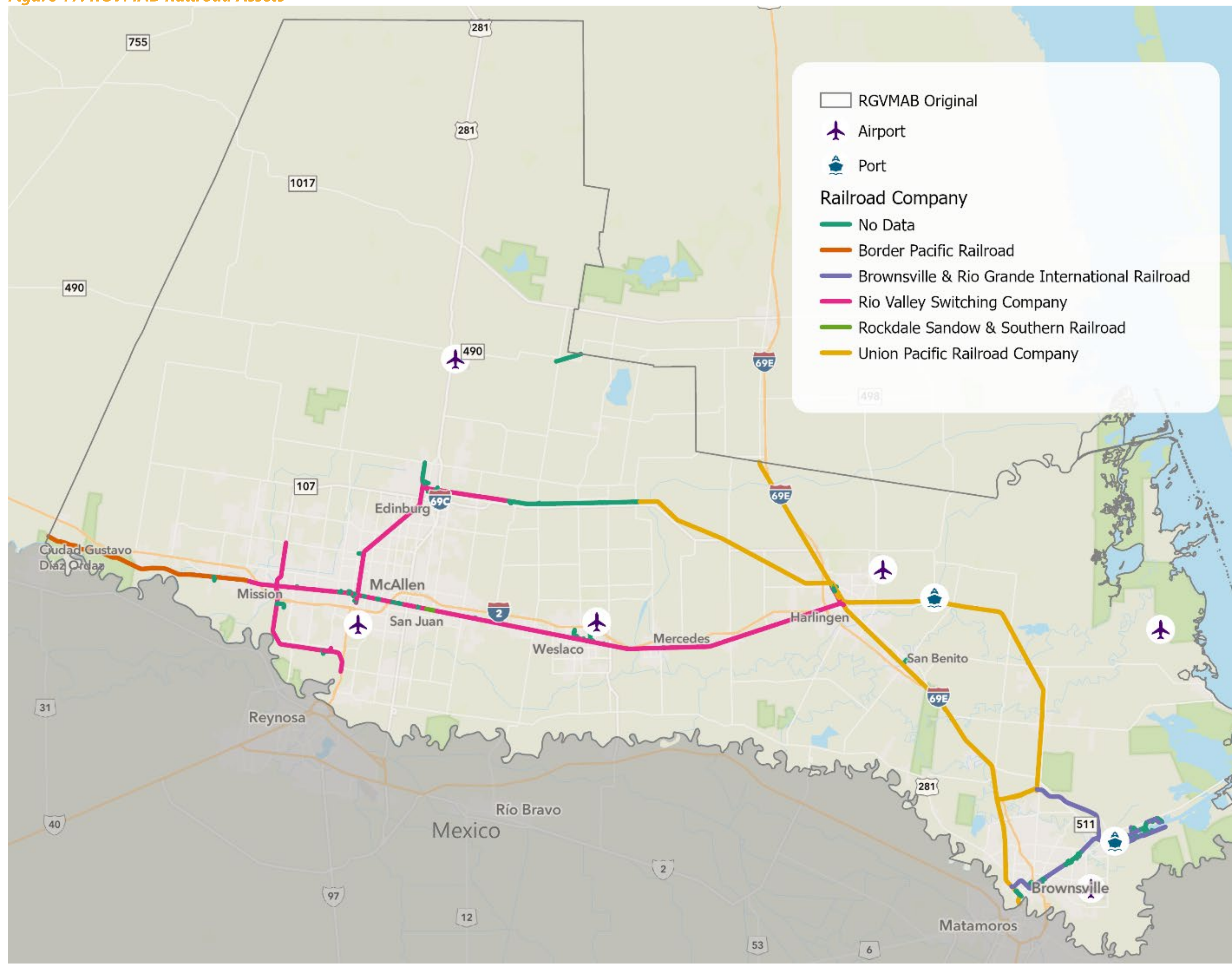
Figure 16: RGVMAB Freight Generators & Intermodal Facilities



The RGVMAB's inland and border location creates opportunity for the region, because the area has become a crossover station for both international and domestic rail freight traffic – specifically east-west traffic in the United States (Figure 4-16). The RGVMAB contains roughly 535 miles of railroad facility, 8 miles of rail bridges, and 6 railyards. Both the Union Pacific Railroad (UP) and BNSF Railway (BNSF) connect with the Ferrocarril Mexicano Railroad (FXE) in Ciudad Juarez and Chihuahua, Mexico, producing 11% of annual rail freight border crossings in Texas.

While the RGVMAB's rail facilities have a substantial impact on the generation of freight in the region, the existing infrastructure also creates externalities due to a series of at-grade crossings with freight network roadways. Such crossings create potential delays which may impact roadway congestion and safety.

Figure 17: RGVMAB Railroad Assets



Conditions & Performance

Trucks carry more freight tonnage than any other single mode (rail, water, and air) operating in the Texas multimodal freight transport system. The roadway network is critical to the movement of freight within, into, and out of the RGVMAB. It is critical that the RGVMPO's roadways provide safe, efficient, reliable routes for the movement of goods.

TTTRI is an indicator of unexpected delay or the predictability of congestion specific to freight. TTTRI is an important measure to consider for freight analysis as many businesses rely on predictable, just-in-time freight deliveries as part of their operations. FHWA provides data resources for reporting TTTRI values specifically for interstate segments. Figure 4-17 presents all interstate segments in the RGVMAB with TTTRI score that indicates that travel times on the segment are unreliable.

Figure 18: RGVMAB 2019 Interstate Segments; TTTRI greater than 1.5

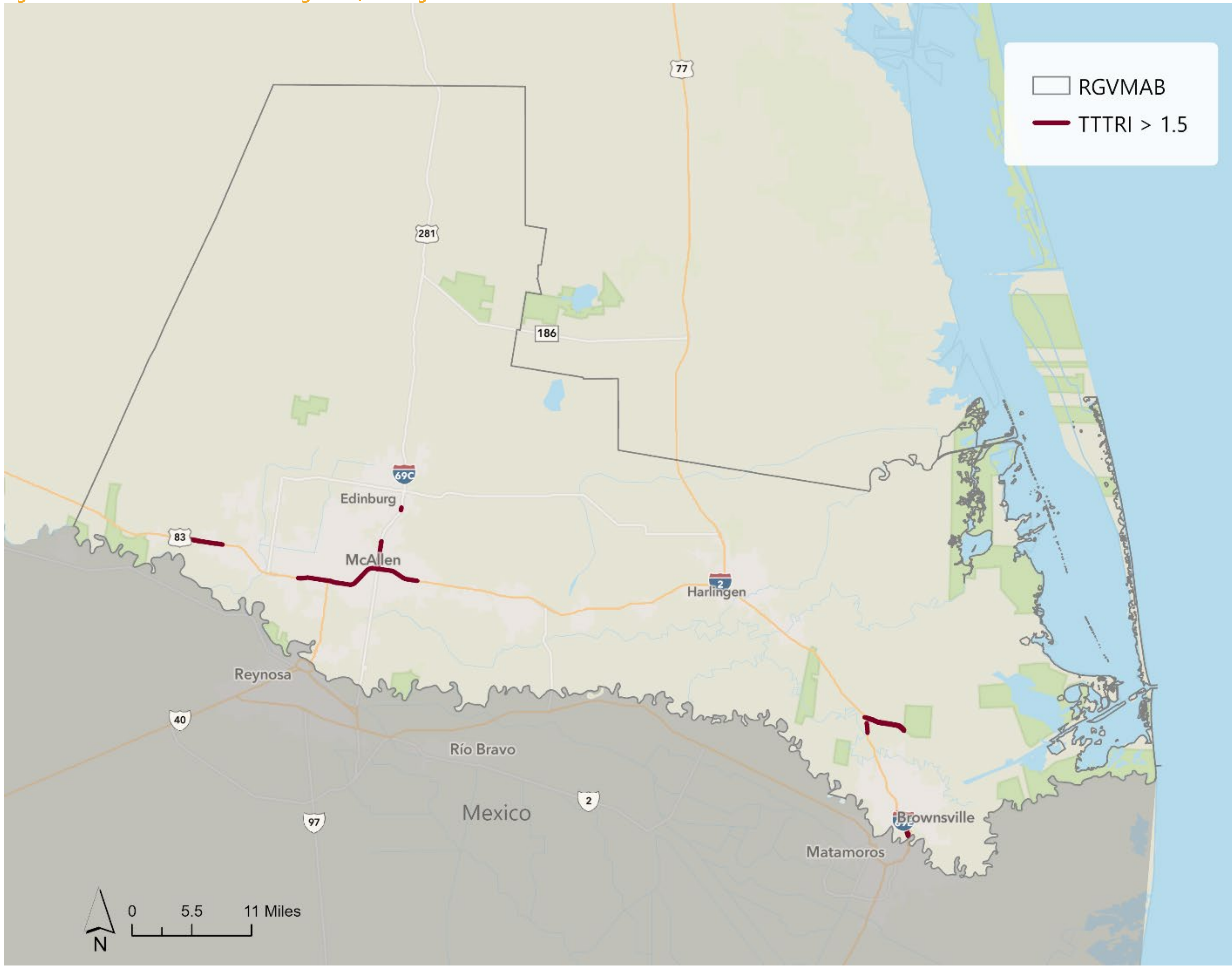
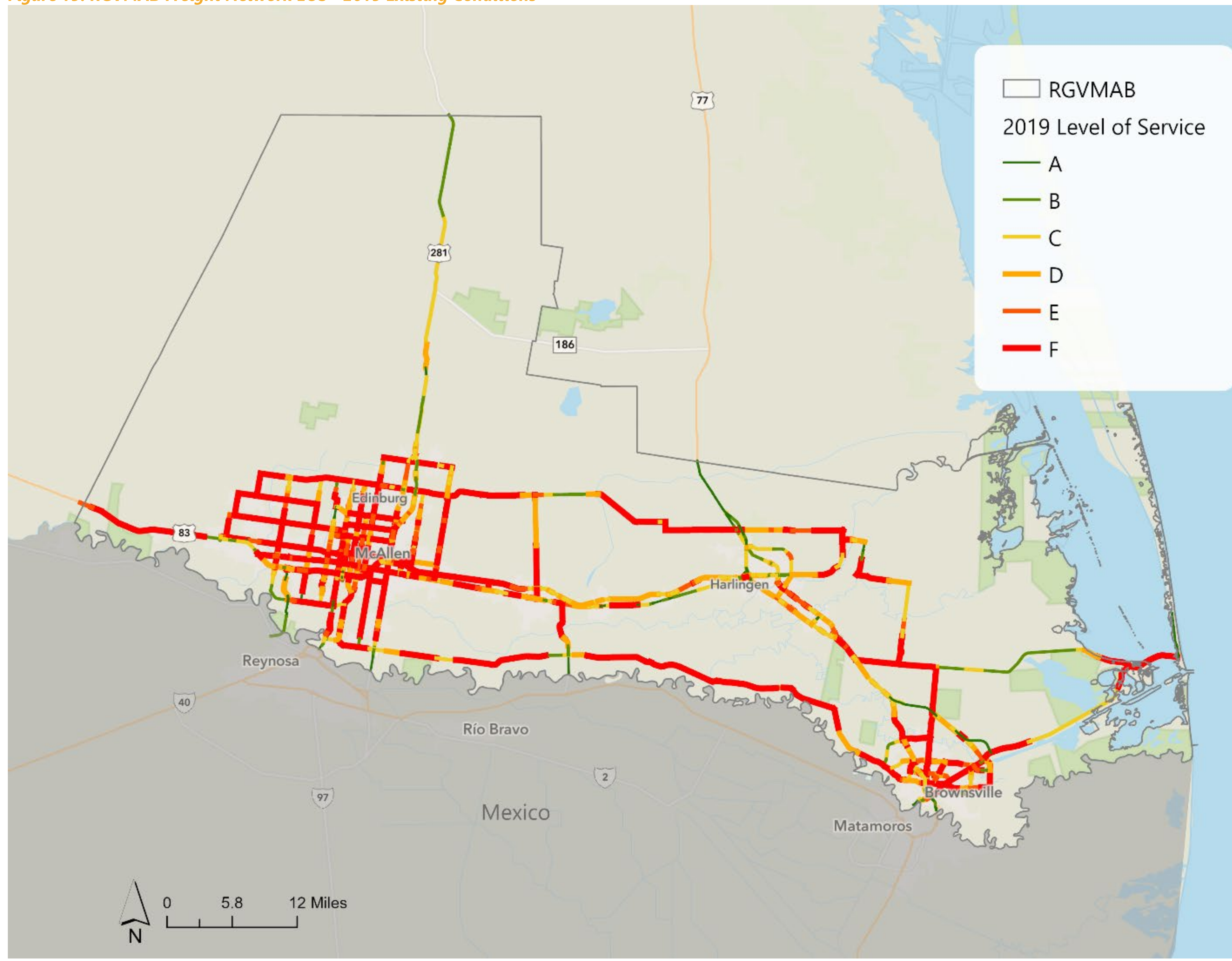


Figure 4-18 presents 2019 peak period LOS for the RGVMAB freight network and displays high levels of congestion along major freight corridors throughout the region. Like the roadway analysis, TDM outputs suggest severe existing congestion occurring along the RGVMAB freight network, with LOS projected to worsen by the 2045 no-build period. Not only is congestion inconvenient to freight traffic, but it also comes with a cost. With the e-commerce boom in full swing, the movement of goods is at a higher demand than ever, and when goods do not arrive on time there are inherent costs due to congestion.

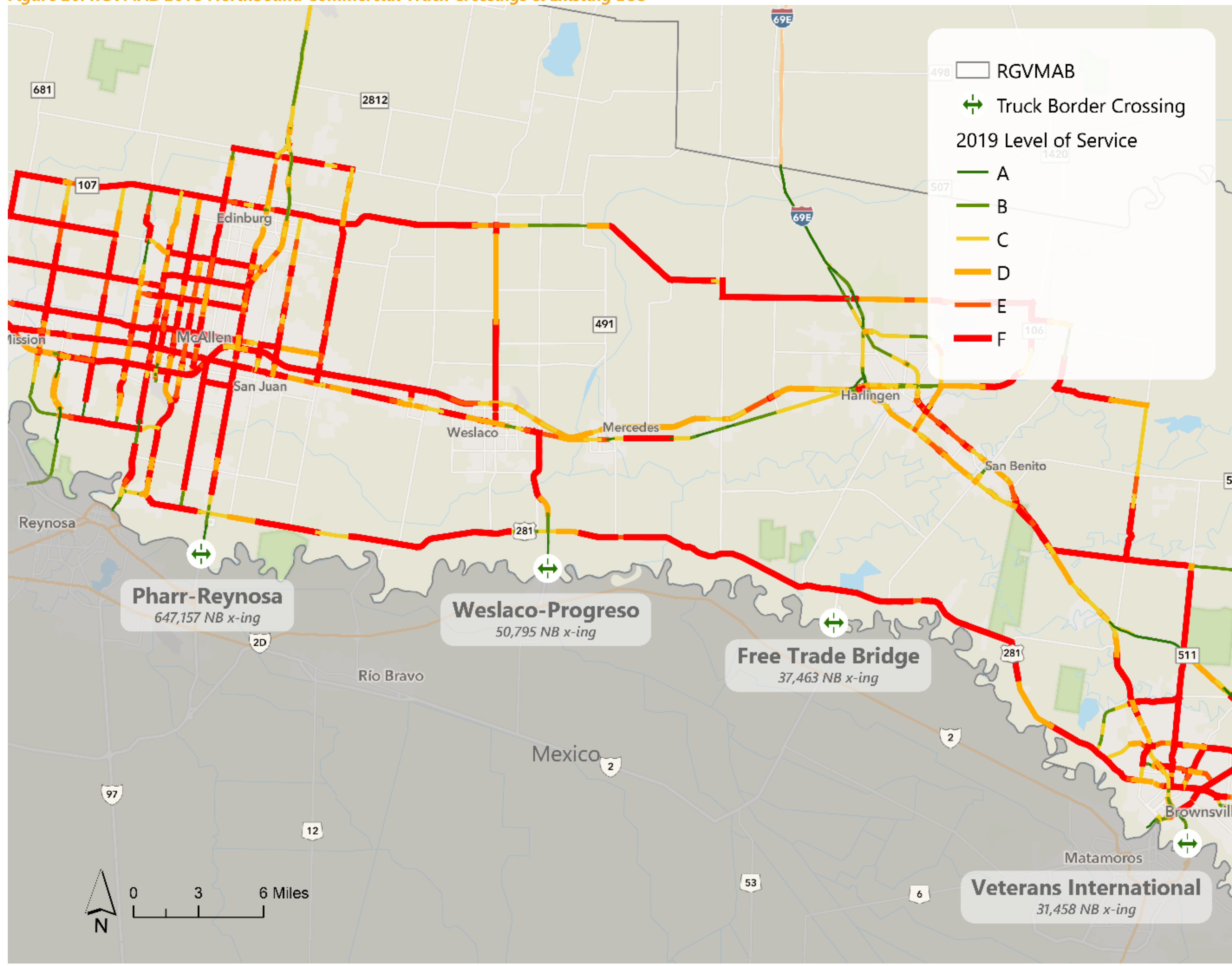
Figure 19: RGVMAB Freight Network LOS - 2019 Existing Conditions



The RGVMAB contains 11 border crossings (including roadway and railway infrastructure) that facilitate the movement of goods between the region and Mexico. Accordingly, it is important to understand current conditions of the RGVMAB's border crossing facilities as they heavily influence truck volumes in the region. Out of the 11 total RGVMAB border crossings, four allow commercial truck traffic: Pharr-Reynosa, Weslaco-Progreso, Free Trade Bridge, and Veterans International. All 4 facilities have seen an increase in truck volume since 2008, with Pharr-Reynosa (36%) outpacing the volume change seen throughout the Texas-Mexico border region, per the TxDOT-TPP Texas-Mexico International Bridges and Border Crossings Study.

Figure 4-19 presents the four border crossing facilities which contain commercial truck traffic, displaying each facility's 2018 northbound crossings and the RGVMAB freight network's existing LOS. While immediate border connections show relatively low congestion, surrounding roadway segments display high peak hour strain (LOS E and F).

Figure 20: RGVMAB 2018 Northbound Commercial Truck Crossings & Existing LOS



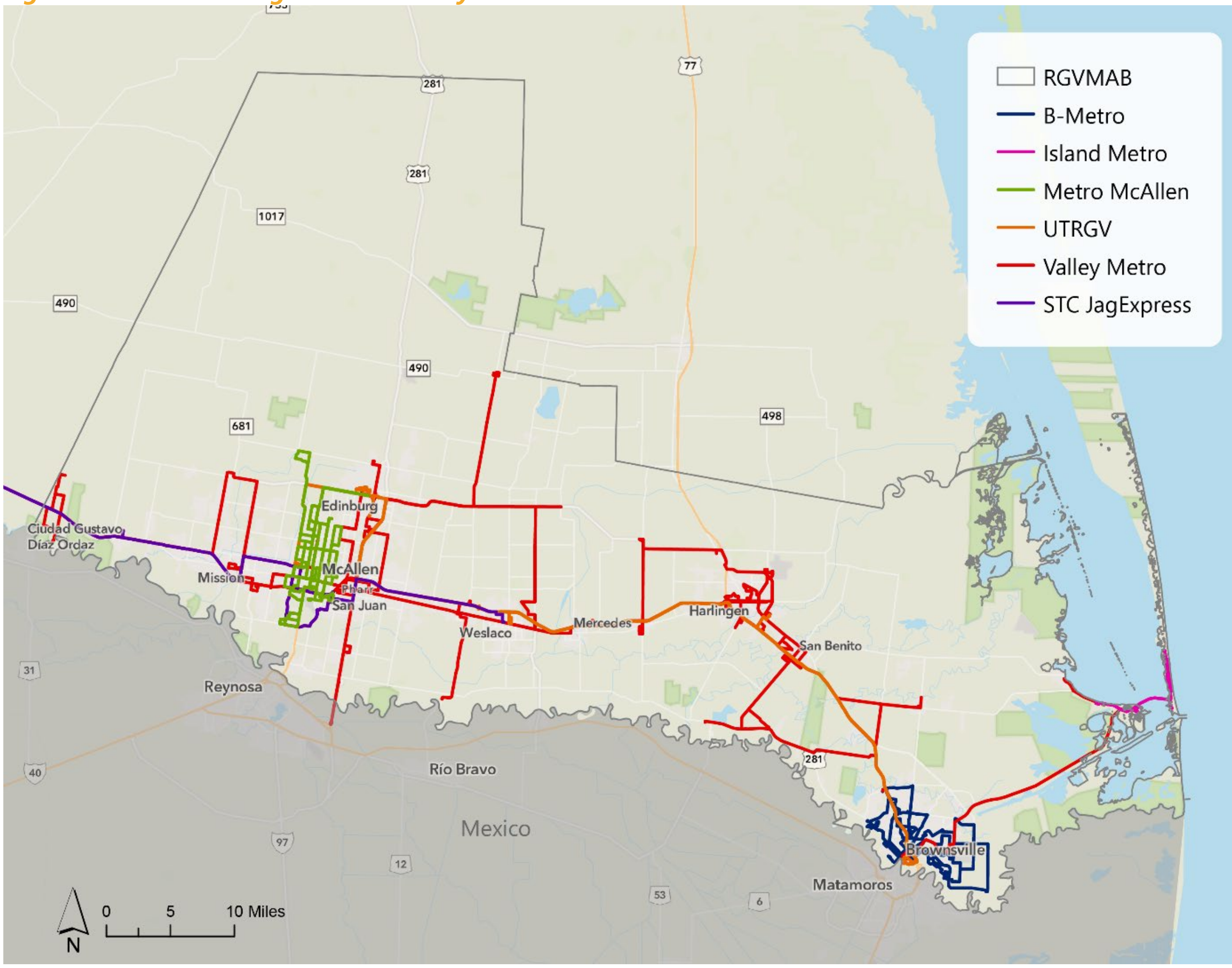
Transit

The RGVMAB contains an intricate and interrelated transit system comprised of several different service providers. To identify system strengths and weaknesses, it is critical to create an existing inventory of current transit provider's services in the region. This level of understanding helps inform the processes and methodologies used to create locally sensitive solutions which address existing gaps and duplications in service. Key takeaways from the RGVMPO 2045 MTP transit analysis include:

- 38% of the RGVMAB population are within a 0.25-mile walkshed to a regional transit route; roughly 60% of RGVMAB jobs are within the same walkshed
- Areas with higher transit propensity tend to include downtown districts, high density neighborhoods, medical centers, and shopping centers
- Transit need is spread throughout the region; however, the highest-ranking areas tend to be near regional transit coverage
- Transit connectivity to schools should be prioritized
- Transit gaps include northwest Edinburg, Hidalgo near the United States – Mexico border, Weslaco/Mercedes area, northwest of Harlingen near Primera, south of I-2 west of Harlingen, and northeast Brownsville near Cameron Park

The RGVMAB contains five major transit providers: B Metro, Island Metro, Metro McAllen, UTRGV Transit, and Valley Metro. Figure 4-20 displays current transit routes in the region.

Figure 21: RGVMAB Regional Transit System



Transit Potential, Need, Coverage, & Gaps in Service

TRANSIT POTENTIAL

The RGVMAB is a fast-growing region with expected sustained economic and population growth. Development and land use that has a mix of jobs, retail and housing indicate areas with high activity and potential for supporting transit use. One method for identifying transit potential is looking at locations that have the potential to support transit service. For the RGVMPO 2045 MTP, transit potential is measured through examining population and employment density, or transit propensity. Figure 4-21 displays the dispersion of transit propensity within the RGVMAB. Future growth areas regarding propensity can be identified in Figure 4-22. For both figures, TAZs with darker shading represent areas containing the highest potential for transit ridership.

Figure 22: Current RGVMAB Transit Propensity - 2019

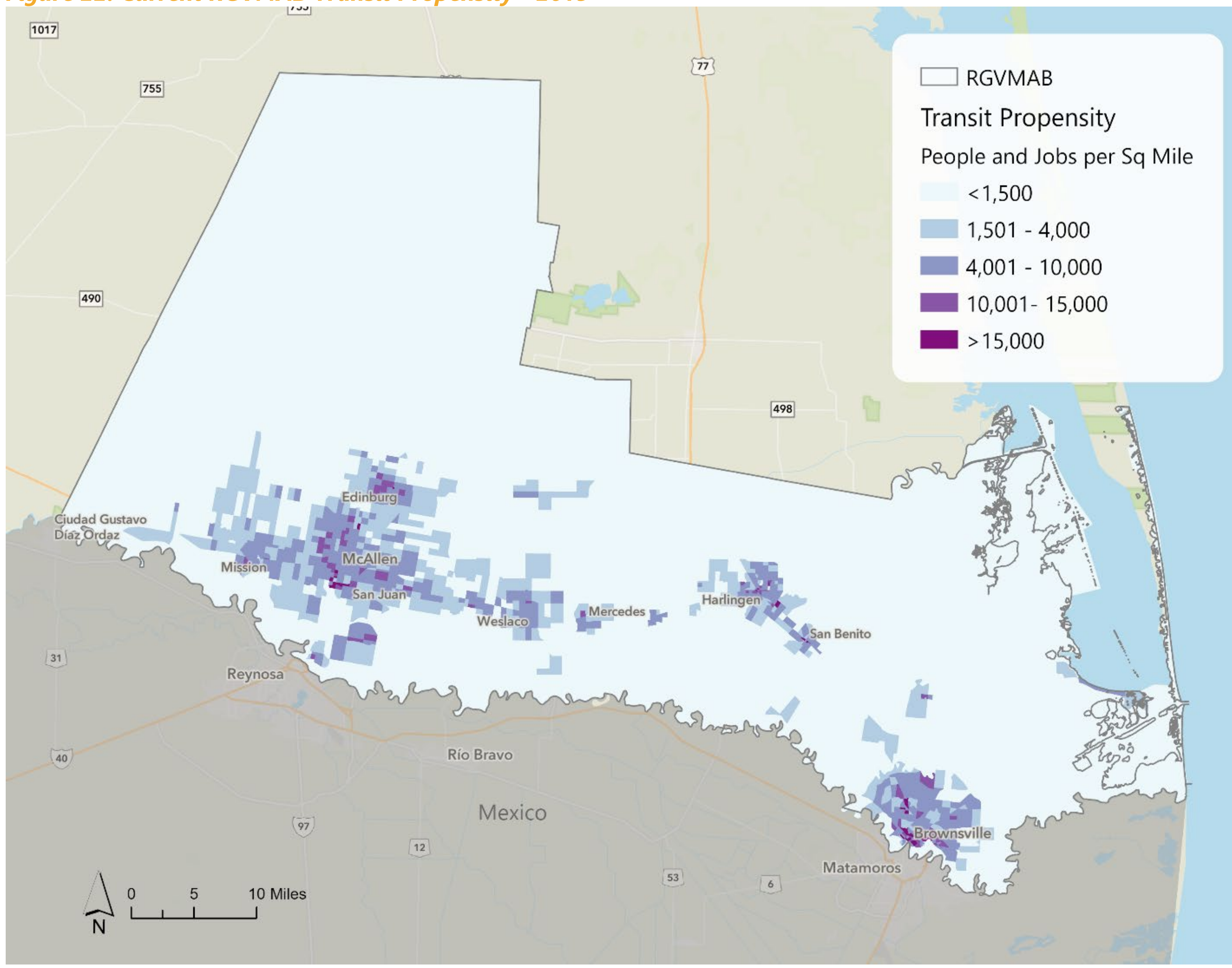
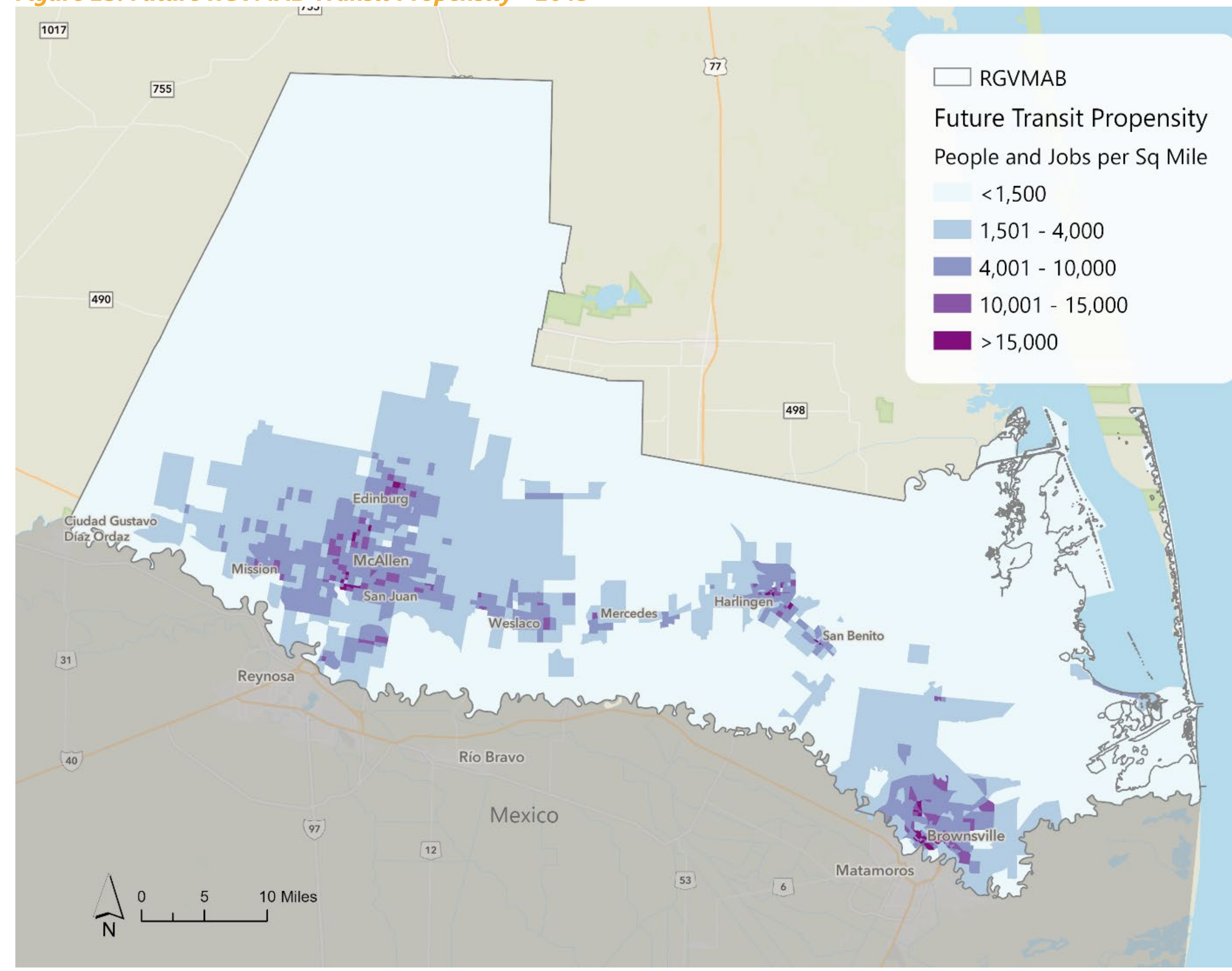


Figure 23: Future RGVMAB Transit Propensity - 2045



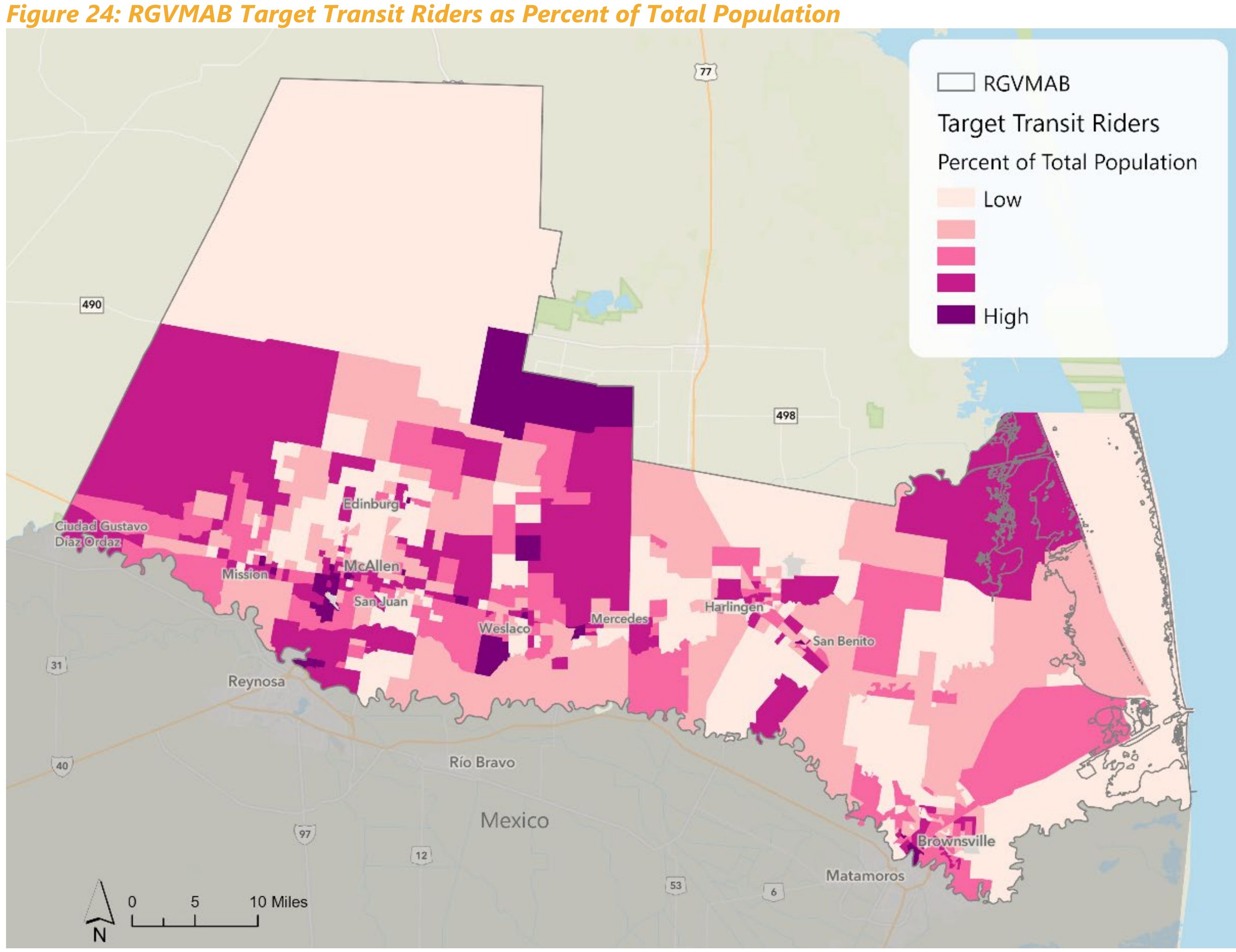
TRANSIT NEED

An analysis of target transit riders can help to identify the locations which have a higher need for transit service and help to prioritize transit adjustments to better support the community. A target transit rider (TTR) includes the following demographic subgroups:

- Non-driving population (Youth under 18, and Elderly over 65)
- Population with LEP
- Minority populations
- Population with disabilities
- Population living in poverty
- Population without access to a personal automobile

It is generally assumed that individuals in these demographic subgroups are more likely to rely on public transportation for their mobility needs. Locating the areas in which these subgroups are concentrated can help ensure that the people with the highest need for services have access to reliable and effective transit. These demographic subgroups are considered as categories of transit need for the analysis. A graphic representation of the analysis of TTR for the region can be found in Figure 4-23.

Figure 24: RGVMABB Target Transit Riders as Percent of Total Population

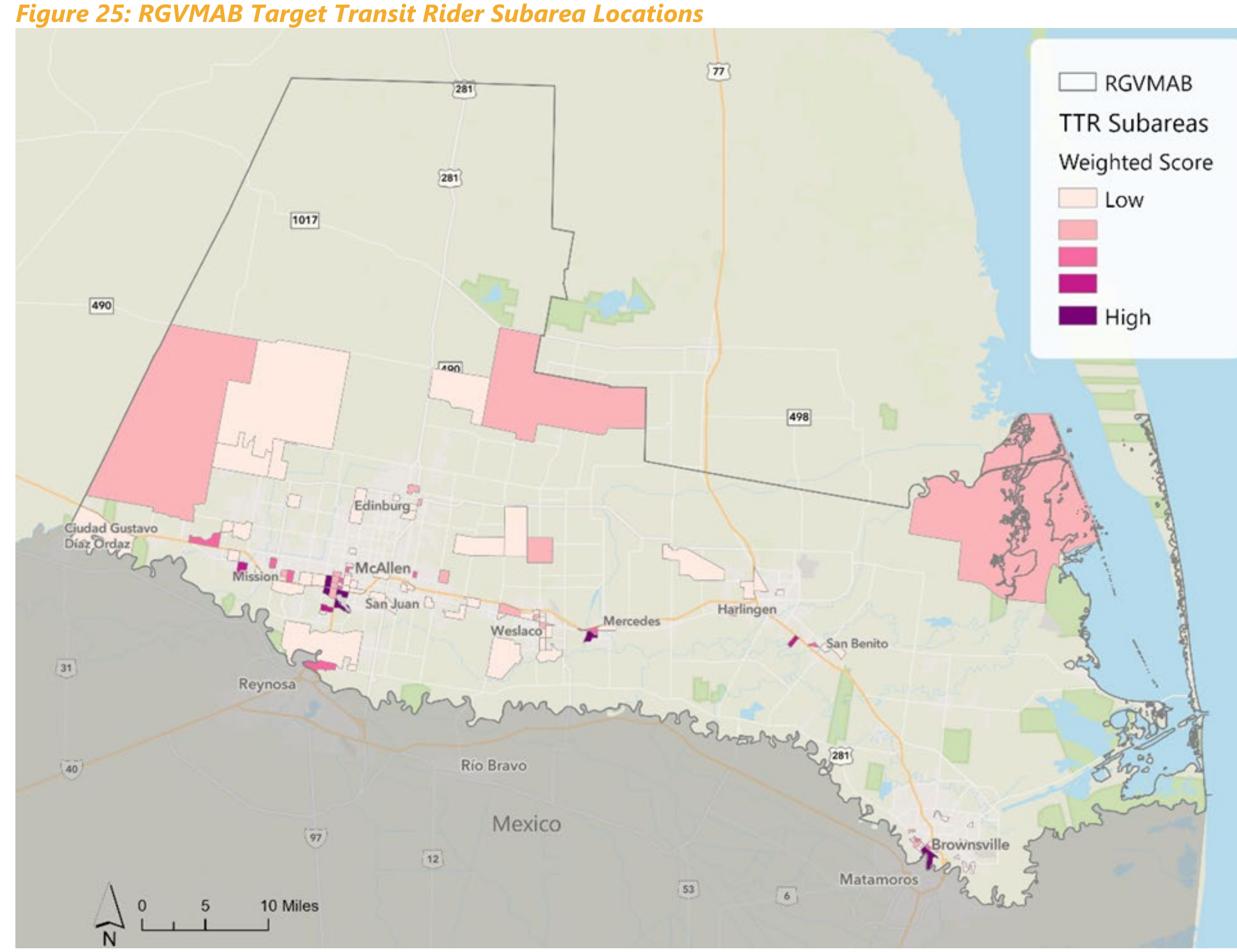


The TTR analysis compares the percent of target transit riders relative to the total population and provides insight into where these populations are concentrated. To further understand the areas with greatest transit need, TTR subareas were developed. These TTR subareas were selected from the locations determined to have higher concentrations of target transit riders from the TTR analysis and are based on U.S. Census block group delineations. The process for selecting and comparing the relative need of the TTR subareas followed four steps:

- Identify potential TTR subareas
- Develop weights by rank for each needs category
- Develop concurrent category weighting for TTR subareas
- Generate weighted score in TTR subarea

A total of 104 TTR Subareas exist in the RGVMAB, displayed in Figure 4-24. These subareas provide more detailed information in the TTR analysis and allowed the project team to better understand where transit need exists within the RGVMAB.

Figure 25: RGVMAB Target Transit Rider Subarea Locations



To further understand transit need in the RGVMAB, the existing conditions analysis considered the accessibility to destinations, especially key destinations, by transit within the RGVMAB. Destinations data was collected using an ArcGIS Business Facilities Search Tool. A total of 32,149 businesses were discovered in the RGVMAB. From this total, roughly 44% could be categorized for this analysis. Accessibility to many amenities can ensure that residents who rely on transit are able to access the basic goods and services for daily life. Although it is important for transit riders to have access to many goods and services throughout their communities, some services are essential for "daily" life. There are 895 key destinations identified in the RGVMAB (Figure 4-25), including:

- Government Facilities: Community and Recreation Centers, Post Offices, Libraries, and Social Service and Welfare
- Hospitals and Medical Centers
- Major Grocery Stores
- Public Schools and Colleges

Table 4-5 breaks down key destination by category and percent currently covered by transit service.

Figure 26: RGVMAB Key Destinations

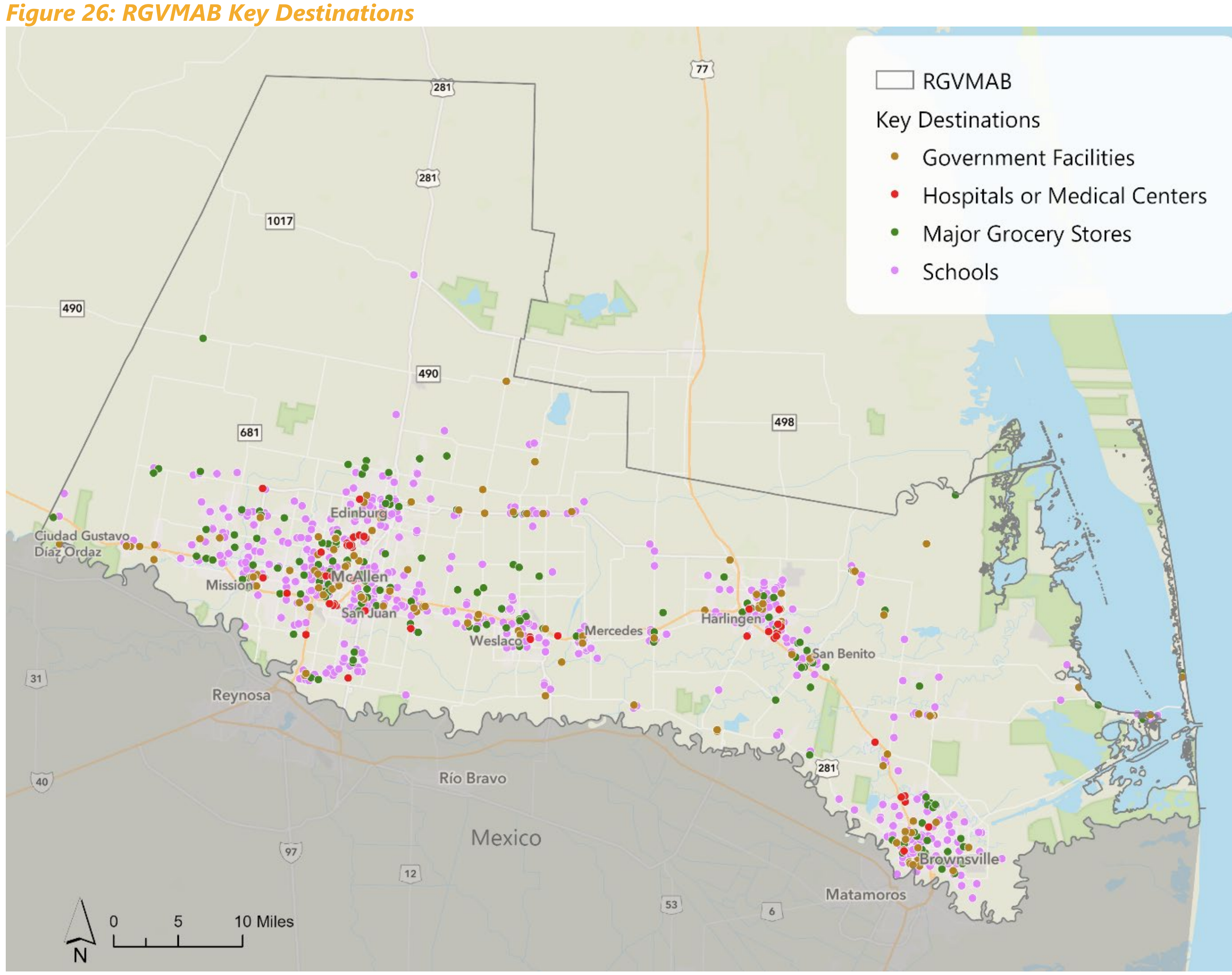


Table 4-5: Regional Transit Coverage of Key Destinations by Category

Key Destination Category	RGVMAB	Within Regional Transit Walkshed	% Covered by Transit
Government	122	97	80%
Hospitals/Medical	51	49	96%
Major Grocery Stores	169	130	77%
Schools	570	290	51%

SERVICE GAPS

Locations of people and jobs which have the potential to support transit, populations in need of transit, and desirable destinations to be served by transit all indicate and contribute to the demand for transit in the region. Identifying locations that have high potential demand and inadequate transit supply can assist in the prioritization of future transit investments. Criteria from the previous sections were selected, standardized, and scored to provide a cumulative look at transit demand in relation to the transit supply. This comparison identifies gaps where demand is not met with current transit supply.

To make it easier to draw 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 for all of the datasets, which each have their own geography (TAZ, Census BG, Point Data). One method is to use hexagon 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 0.25 square miles each.

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. Once each measure was scaled from 0 -100, the measures were aggregated to generate final combined scores (Figure 4-26). Final scores were also normalized on a scale from 0 -100. This final combined score is a transit demand score which indicates the demand for transit based on the cumulation of these measures (Figure 4-27).

Gaps in transit service exist where demand scores are high and transit supply does not exist. This condition indicates areas with some combination of high transit potential or need, as well as destinations and key destinations that do not fall within the transit walkshed. Conversely, gaps also exist where transit supply covers areas with low transit demand scores; this is representative of transit service covering areas that may not need or use transit. This type of gap can be helpful when creating alternative transit scenarios as it informs decision-makers where inefficient service exists and can possibly be reallocated somewhere containing higher transit demand.

Figure 27: Development of Transit Demand Score

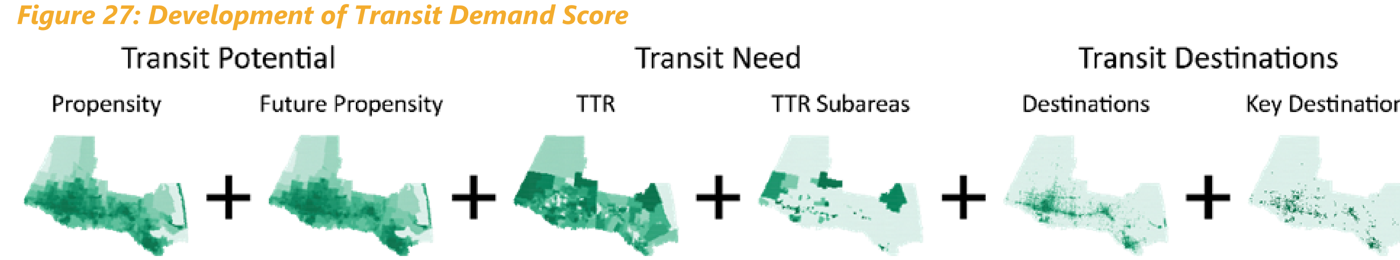
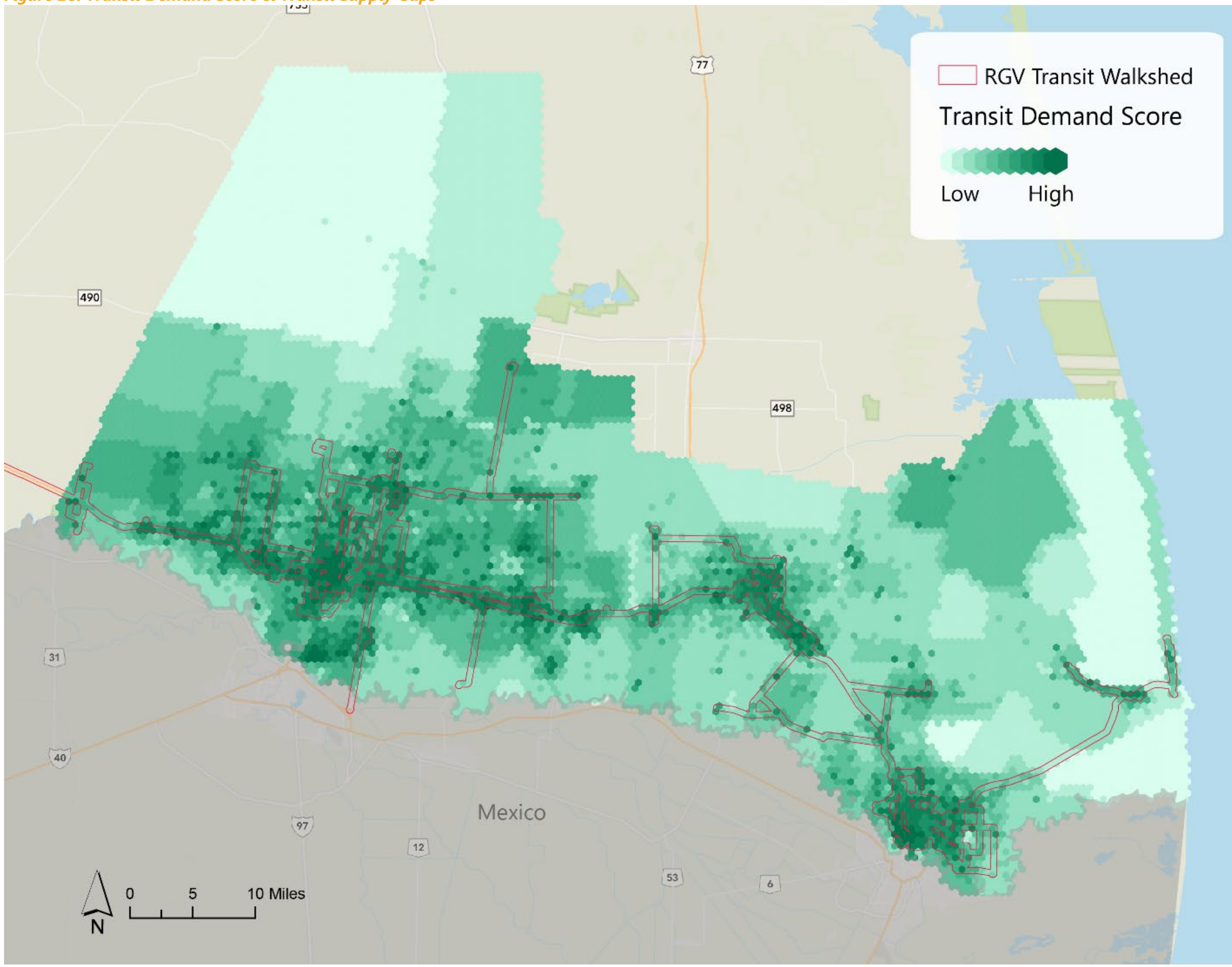


Figure 28: Transit Demand Score & Transit Supply Gaps



Active Transportation

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.

The analysis reviewed three primary aspects (existing conditions, safety, and network analysis) in gauging active transportation network performance. These three aspects were then aggregated to create a gaps analysis which serves to inform the RGVMPO during the project prioritization process. The primary takeaways from the RGVMPO 2045 MTP active transportation analysis include:

- Opportunities for additional policy and program elements can be found in all major cities within the RGVMAB
- Crashes involving bicyclists and/or pedestrians happen most often during PM peak travel times
- Safety findings suggests that active transportation users bear a disproportionate amount of risk of injury or fatality
- Many urban areas have an array of low stress roadways due to gridded roadway networks
- Low stress connections between urban areas are limited
- Active transportation gaps were most substantial in Alton, Donna, Edcouch, and Harlingen

Existing Conditions

The RGVMAB has a mixture of on-street and off-street active transportation facilities. As urban areas in the RGVMAB continue to densify and grow, walking and bicycling become an increasingly vital component of the transportation system.

EXISTING BICYCLE & PEDESTRIAN FACILTIES

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 (Figure 4-29). 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. 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.

EXISTING SIDEWALK FACILITIES

There are nearly 2,200 miles of sidewalk infrastructure and 114 miles of hike and bike trails within the RGVMAB (Figure 4-30). Sidewalk facilities in the RGVMAB are prevalent within urban areas. In addition to the quantity of pedestrian facilities, 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.

Figure 29: RGVMAB Active Transportation Facility Summary Statistics

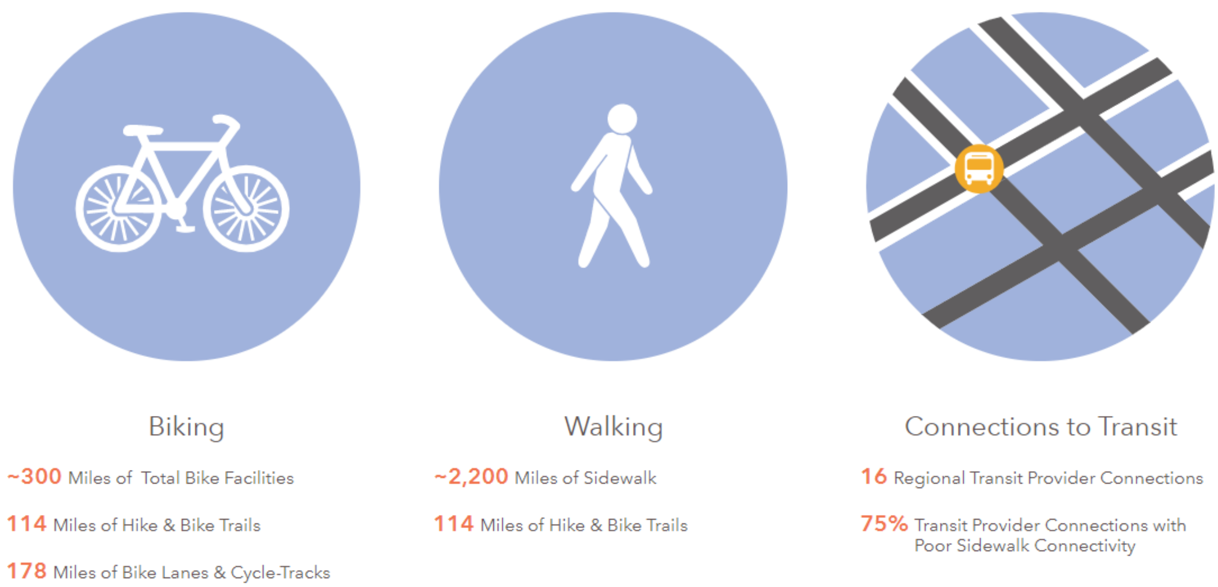


Figure 30: RGVMAB Existing Bicycle Facilities

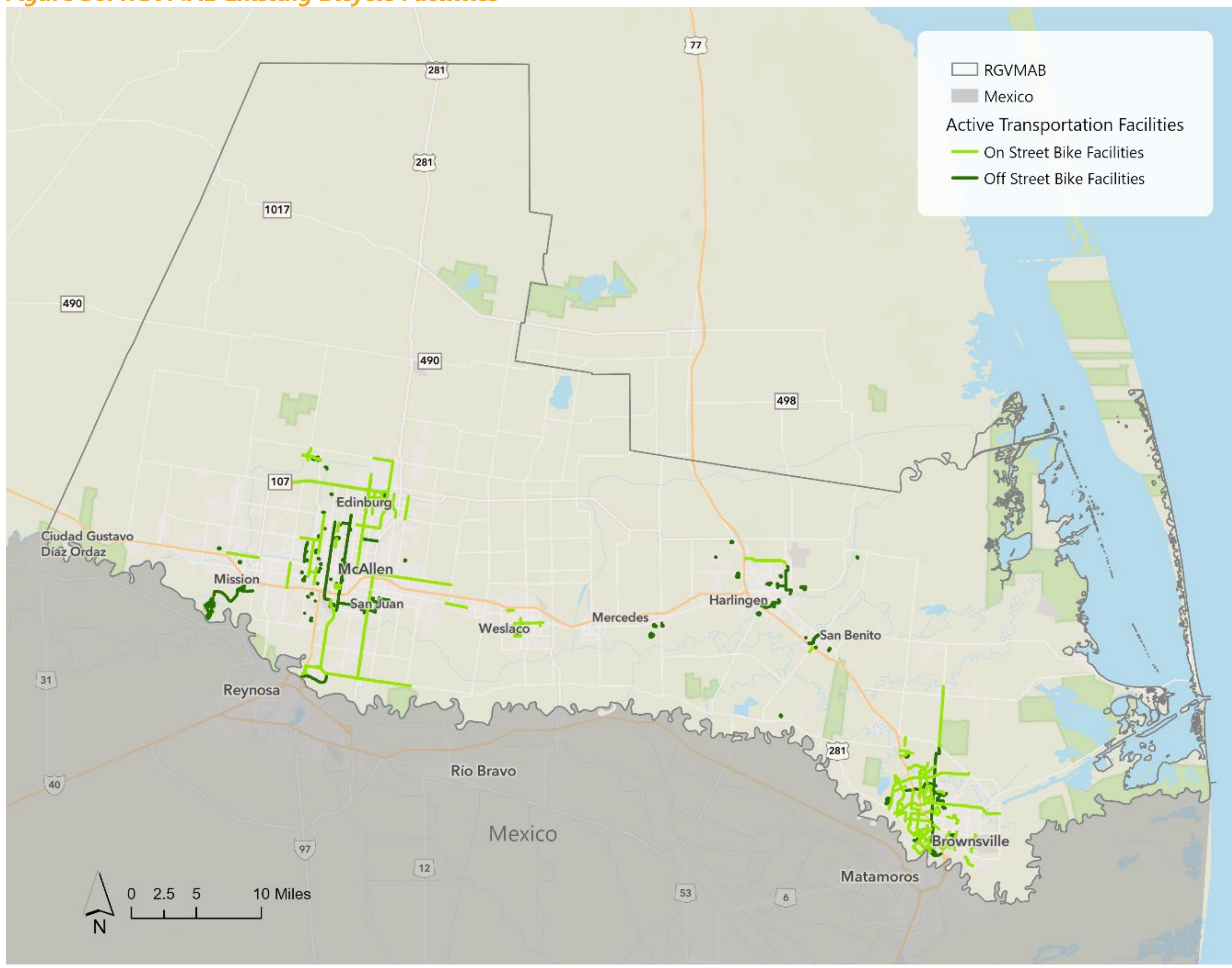
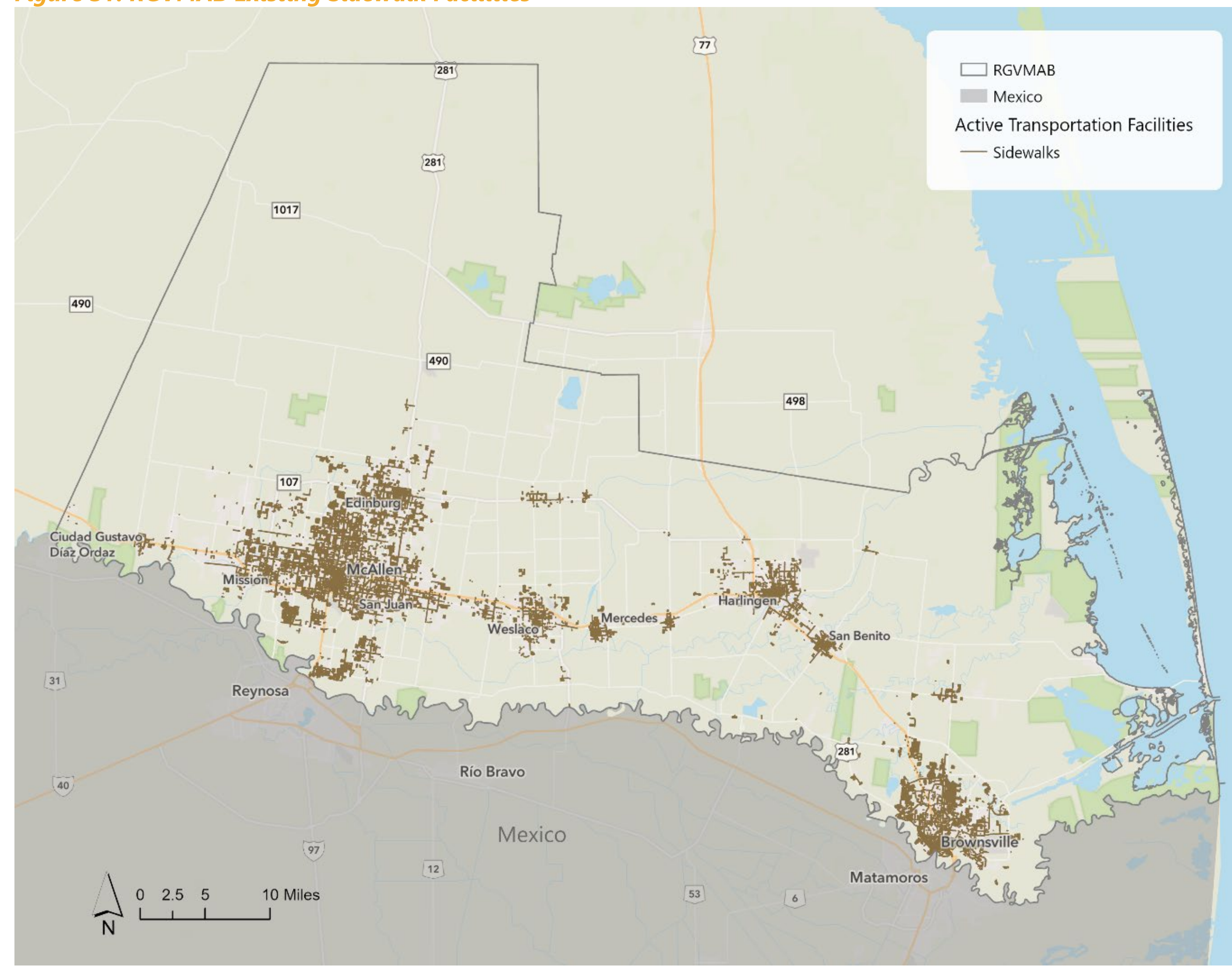


Figure 31: RGVMAB Existing Sidewalk Facilities



Needs Analysis

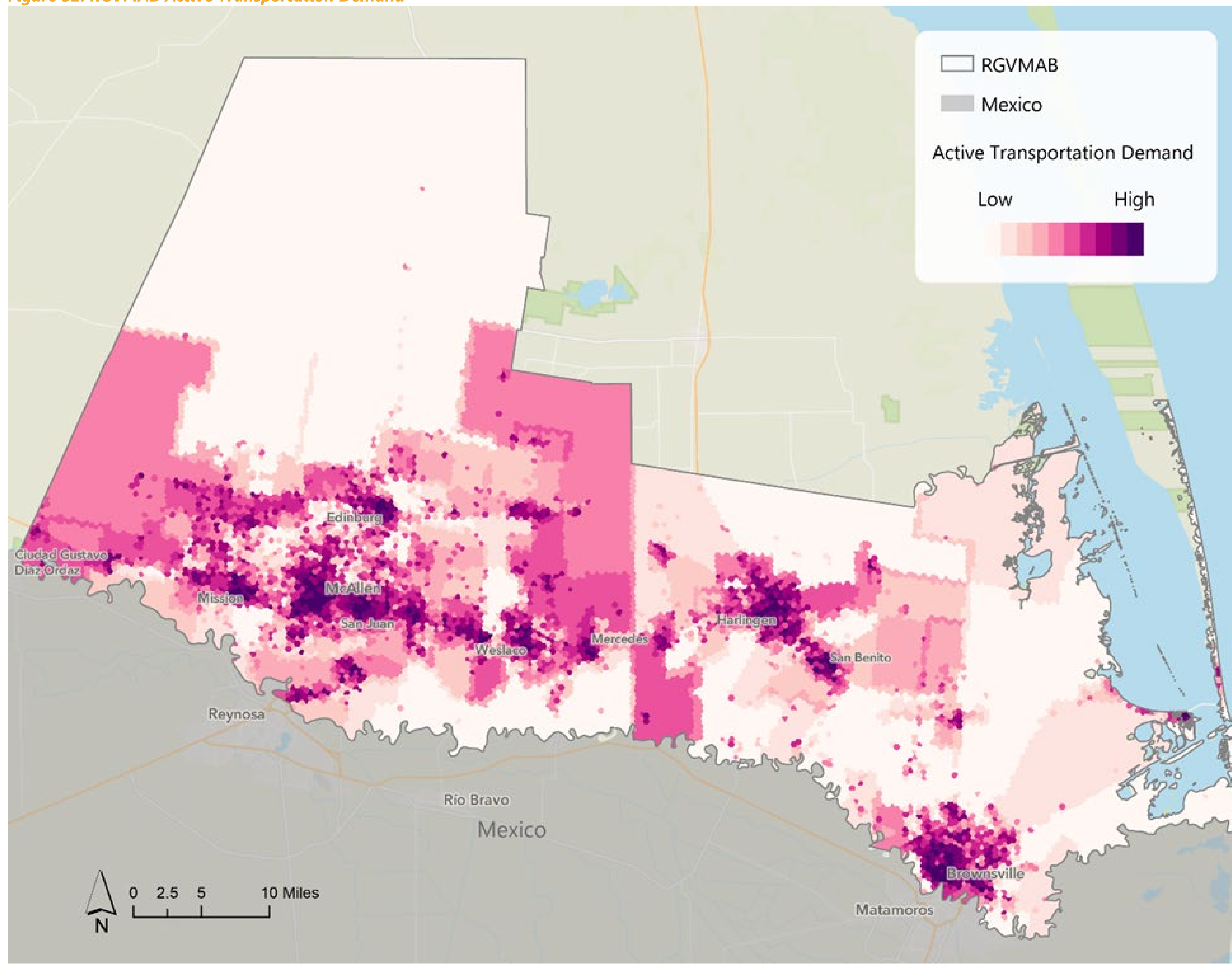
In addition to the review of the existing conditions for active transportation, a granular analysis was conducted to review the safety, level of stress, transit proximity, and expected travel patterns as part of the deficiencies, or needs analysis for non-motorized travel choices. These separate analyses informed the gaps analysis which allowed the project team to identify areas in need of active transportation infrastructure improvements. The following section details key findings.

ACTIVE TRANSPORTAITON GAPS ANALYSIS

To better understand where disparities within the RGVMAB occur between demand and supply for active transportation facilities, a gap analysis was conducted. 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.

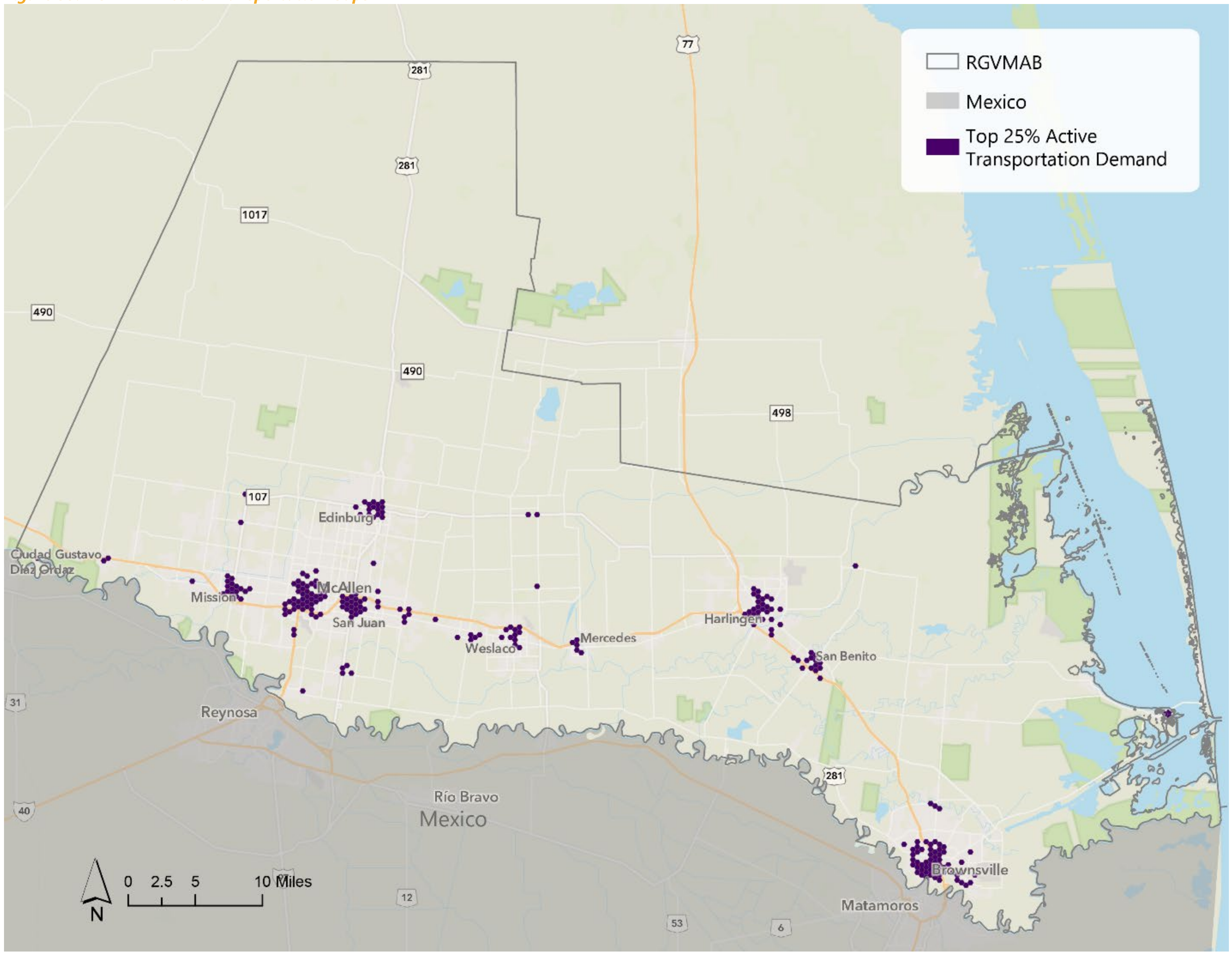
Current walking and biking facilities were overlaid with active transportation demand, based on several criteria covering populations more likely to use active transportation modes derived from the 2018 ACS. The criteria were standardized into hexagonal grids and then normalized to a 100-point scale to rank each hexagon, like the transit gap analysis. This final combined score indicates the relative demand for active transportation options occurring in each hexagon, based on the criteria. Figure 4-31 shows demand dispersed across the RGVMAB and will be used (along with the GIS data used to create the graphic) to inform decisions on active transportation improvements.

Figure 32: RGVMAB Active Transportation Demand



Current supply of active transportation facilities (sidewalks, bike lanes, and hike & bike trails) were overlaid on the top 25% of demand score hexagons to identify where areas of high demand have insufficient facilities. Figure 4-32 shows the areas with the top 25% of active transportation demand. The analysis showed many gaps occurring in rural or semi-rural areas, many of which contain gridded street networks, but lack adequate sidewalk facilities.

Figure 33: RGVMAB Active Transportation Gaps



System Safety

Transportation safety data analysis provides planners, policy makers, and the public with a better understanding of where critical safety issues are occurring in the transportation system and what factors may be contributing to regional crashes and crash rates. As such, safety data analysis is a critical component of regional transportation planning. The primary takeaways from the RGVMPO 2045 MTP safety analysis include:

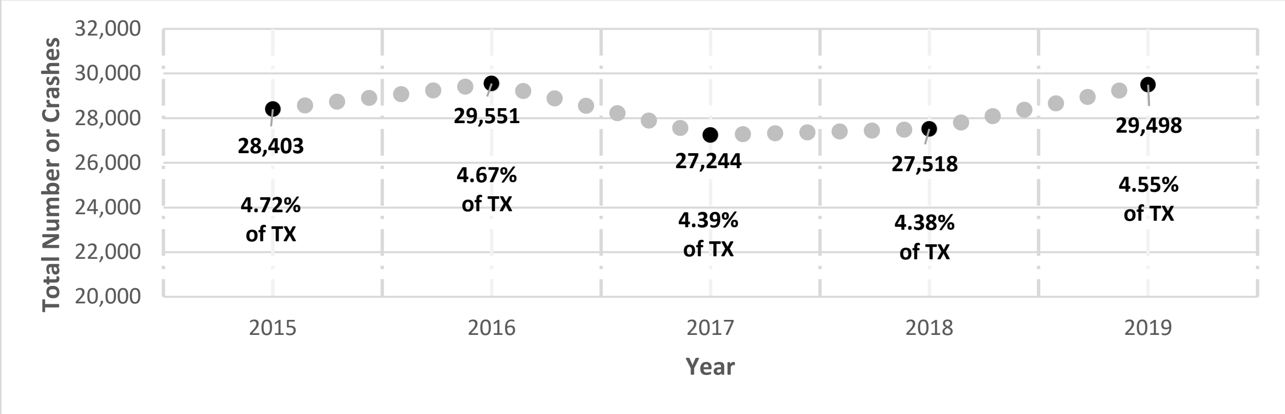
- Crash locations do not necessarily correlate directly with the amount of travel (i.e. VMT), as the crash rate did not consistently increase along with VMT over the five-year period
- The serious injury and fatality rates for the RGVMAB are all significantly lower in comparison to the Texas statewide average rates
- The total number of crashes involving pedestrians is around 2.41 times higher than the number of crashes involving cyclists
- The interstates and frontage roads within the region appear to have the highest crash rates and should be a priority when considering safety improvements

The following analysis on regional crash trends for the RGVMAB multimodal transportation network will help the RGVMPO prioritize projects by understanding where high priority intersections exist, and how to best implement safety enhancements. This information will also help the MPO understand and identify factors that contribute to crash totals and severity, which will in turn inform future planning efforts within the RGVMAB.

Regional Crash Trends

Between 2015 and 2019, a total of 142,216 crashes occurred within the RGVMAB. Over this five-year period, the total number of crashes per year has remained between the range of 27,000 to 30,000, with the largest single-year total (29,551) occurring in 2019. The region experienced an 8% decrease in the total number of crashes between 2016 and 2017 and a 7% increase between 2018 and 2019. Figure 4-33 summarizes the annual number of reported crashes in the region between 2015 and 2019.

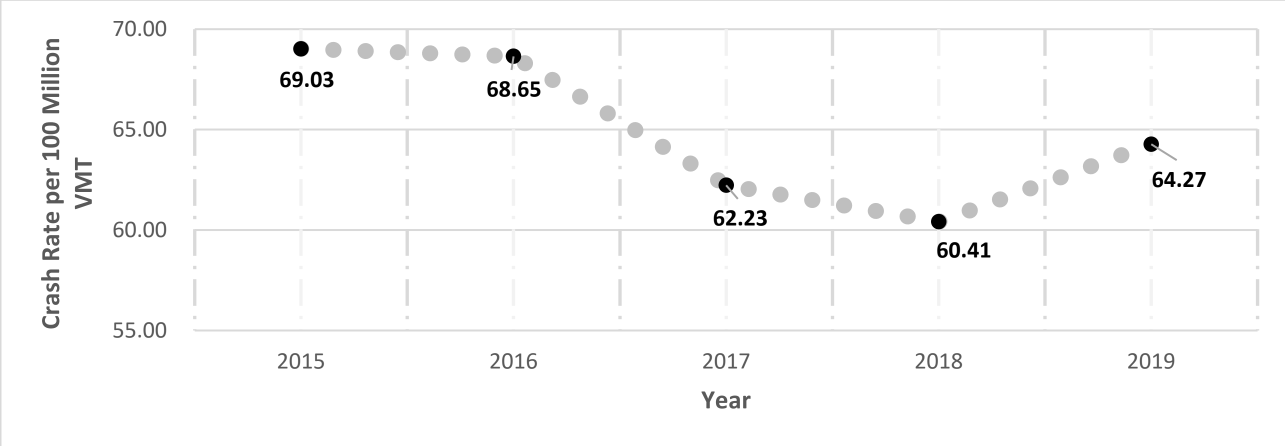
Figure 34: Regional Crash Totals by Year & as a % of Total Statewide Crashes, 2015 - 2019



Crash rate is a metric that illustrates the ratio of crashes that occurred per vehicle miles traveled (VMT) within the region. This provides a method to normalize the gross crash count by including a consideration of roadway usage (i.e. VMT). Crash rates over the five-year period remain consistent, with a gradual decrease from 2016 to 2018 and a gradual increase from 2018 to 2019.

Over this five-year period, VMT gradually increased from 22.5 million VMT to 25.2 million VMT. Figure 4-34 shows the crashes per 100 million vehicle miles traveled for the region between 2015 and 2019.

Figure 35: Regional Crashes per 100 Million VMT by Year, 2015 - 2019



Crash severity is a crucial aspect of each reported accident because crashes that result in fatalities or serious injuries represent a higher risk to life and safety, and understanding where there are concentrations of these types of crashes can illuminate opportunities for operational or design improvements. The RGVMPO 2045 MTP reviews crash data in three different ways – total crashes/crash rate, the total number/rate of crashes resulting in fatality, and the total number/rate of crashes resulting in serious injury – and compares the rolling averages of these values to those at the statewide level. The data represented in Table 4-6 demonstrates that, on average, only 1.38% of crashes in the region resulted in a serious injury, and just under 0.31% resulted in a fatality.

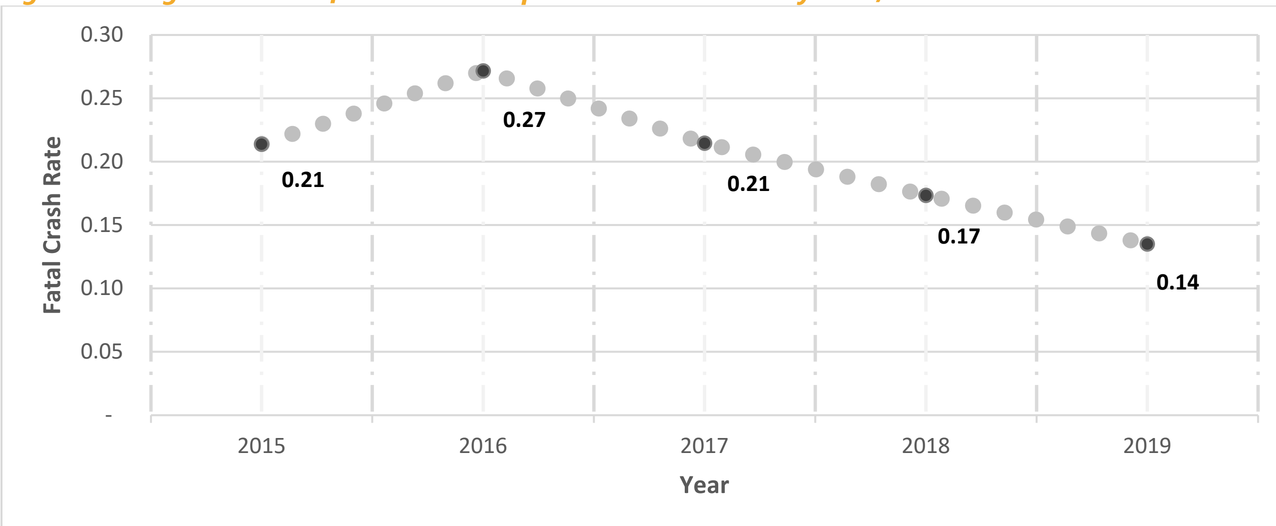
Table 4-6: RGVMAB Crash Totals & Rates by Year & 2019 5-Year Rolling Average

Measure	2015	2016	2017	2018	2019	2019 5 Yr. Rolling Average	% of Total
Number of Crashes	28,403	29,551	27,244	27,518	29,500	28,443.2	100%
Rate of Crashes per 100 million VMT	69.03	68.65	62.23	60.41	64.27	64.92	-
Number of Fatalities	88	117	94	79	62	88	0.309%
Rate of Fatalities per 100 million VMT	0.21	0.27	0.21	0.17	0.14	0.20	-
Number of Serious Injuries	384	421	398	338	427	393.6	1.384%
Rate of Serious Injuries per 100 million VMT	0.93	0.98	0.91	0.74	0.93	0.90	-

Though the region experienced its second highest total number of crashes in 2019 (29,551) compared to the other four years in the five-year period, 2019 also had the lowest number of crashes resulting in fatality (62). The five-year rolling average rate of fatal crashes per 100 million VMT in the RGVMAB over the reporting period was 0.20. A comparison to the Statewide five-year rolling average rate of fatal crashes (1.35) indicates that fewer crashes in the region have resulted in fatality compared to the rest of the State over the last five years.

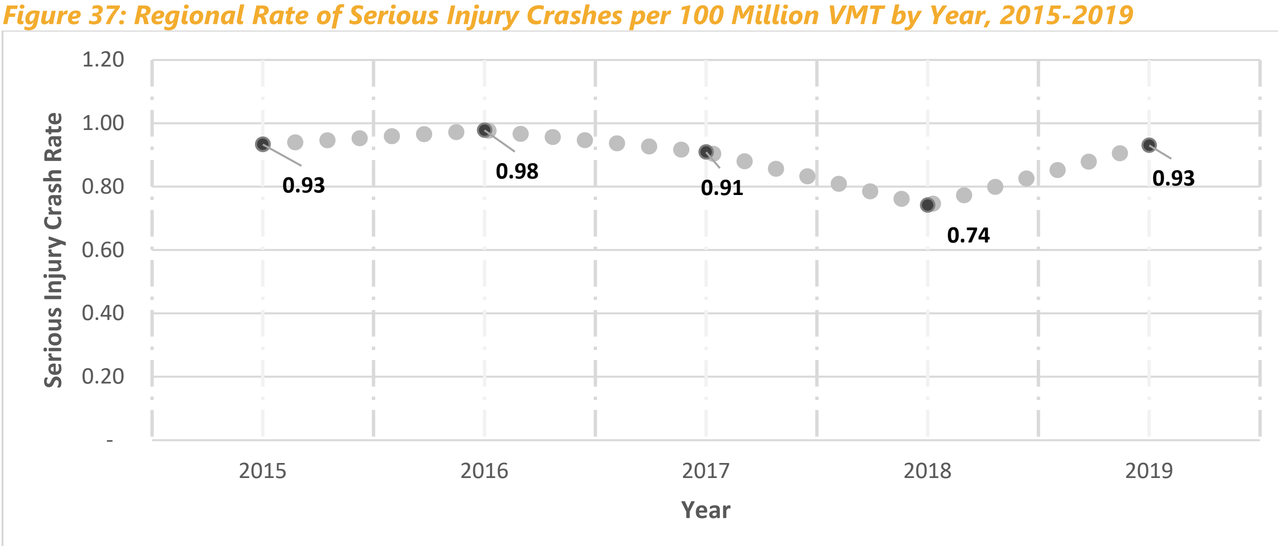
Figure 4-35 illustrates annual rates of fatal crashes and Figure 4-36 shows annual rates of serious injury crashes. It is worth noting that while the total crash rate over the five-year period has varied with an increase in 2019, the rate of fatalities has decreased over the same period.

Figure 36: Regional Rate of Fatal Crashes per 100 Million VMT by Year, 2015-2019



In contrast to the downward trend in fatality rates, the rate of serious injury crashes seems to follow a similar trend in variance over the five-year period as the total crash rate.

Figure 37: Regional Rate of Serious Injury Crashes per 100 Million VMT by Year, 2015-2019

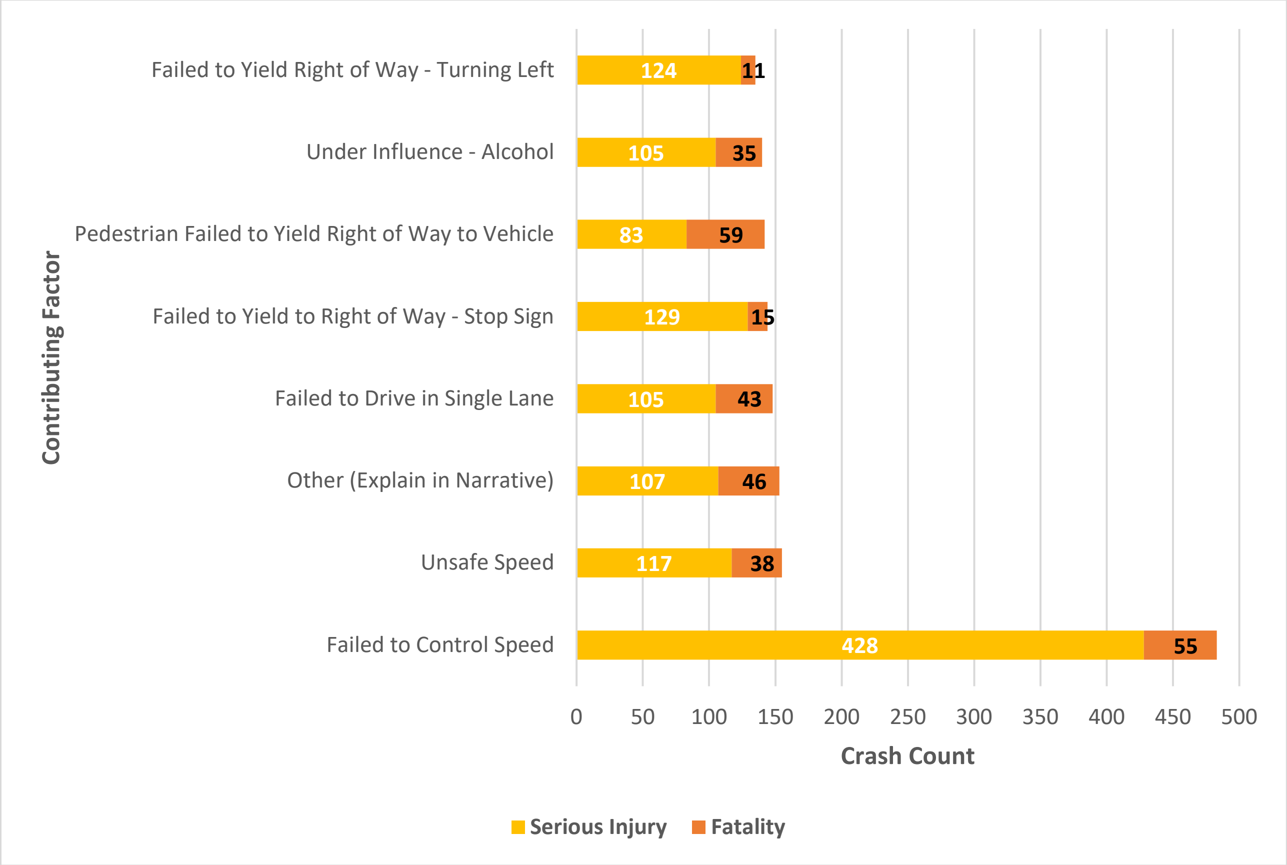


Top Contributing Factors

It is vital to understand common factors that contribute to crashes, especially those resulting in serious injuries or fatalities. The importance of understanding these factors applies both to assessing location specific improvements as well as setting a framework to address safety needs where location data is not available, e.g. new roadways. Identifying the top contributing factors allows the RGVMPO and its planning partners to incorporate proven safety countermeasures and crash modification factors into the design and prioritization of future roadway investments in order to address or mitigate these contributing factors.

Of the top eight contributing factors, the top two (in terms of total crashes) involved speeding, while three others involved failing to yield the right of way. The top eight contributing factors are represented in Figure 4-37 and categorized by crash severity.

Figure 38: Number of Fatal and Serious Injury Crashes by Contributing Factor, 2015-2019



FHWA has set out a variety of proven safety countermeasures, such as implementing a roundabout at an intersection with a high crash rate or installing walkways to increase safety for pedestrians on segments where pedestrian-related crashes were higher than others (Figure 4-36).

In some cases where the implementation of a proven safety countermeasure in response to a top contributing factor is not possible, a risk management approach can be used by applying crash modification factors. One example of this concept can be illustrated using the top contributing factor represented in Figure 4-37.

Failure to control speed might indicate that the improvement of a roadway should incorporate traffic calming techniques, however, in the case of interstates, traffic calming measures would be prohibited. Crash modification factors (CMF) become useful tools the goal to reduce the risk and/or severity of a crash where speeding was a factor. One such CMF would be to install cable rails in the clear zone for non-elevated portions of the interstate. A crash might still occur in this location, but the likely severity of the crash could be greatly reduced by the cable rail compared to the potential severity if no rail or concrete barriers were present.

Additionally, the consideration of safety countermeasures and CMFs is useful when scoring and comparing new roadways where no data is yet available. In these instances, the design and scope of the new roadway can be scored based on what safety countermeasures and CMFs it incorporates in comparison to the region's top contributing factors. A new commercial corridor that implements access management should ostensibly receive a better score than a roadway that allows any number of driveways, as the first example has a higher likelihood of improving regional safety performance because it directly addresses the top contributing factor of failure to yield.

Point scale and range for this scoring process is then a critical step to consider thoroughly and carefully to avoid creating a false sense of bias. Figure 4-38 shows the safety countermeasures promoted by FHWA, and further detail can be found on FHWA's safety page.[1] Additional information on CMFs can be found on the CMF Clearinghouse.[2]

Figure 39: FHWA Proven Safety Countermeasures[3]

[1] https://safety.fhwa.dot.gov/provencountermeasures/fhwasa18029/
[2] http://www.cmfclearinghouse.org/
[3] https://safety.fhwa.dot.gov/provencountermeasures/

Crash Hotspots

Crash hotspots were identified within the RGVMAB through spatial analysis of intersections and roadway segments that experienced the highest number of crashes over the five-year period. Total crashes, crashes involving pedestrians, crashes involving bicyclists, and crashes resulting in serious injury or fatality are all considered in this analysis. Figure 4-39 displays crash hotspots identified through geolocation of the collected crash data.

Using the TDM network, a GIS points layer was generated to identify all intersections in the roadway network for the region. Along with crash point data, these intersection points were used to conduct a proximity analysis that associated intersection crashes to the nearest intersection. Texas crash data was filtered using attributes provided in the dataset that flagged crashes occurring at intersections. Once the crash data was narrowed down, the number of crashes for each intersection was calculated by assigning each crash to its closest intersection. Table 4-7 shows the intersections that experienced the most crashes between 2015 and 2019.

Figure 40: RGVMAB Crash Hotspots, 2015 - 2019

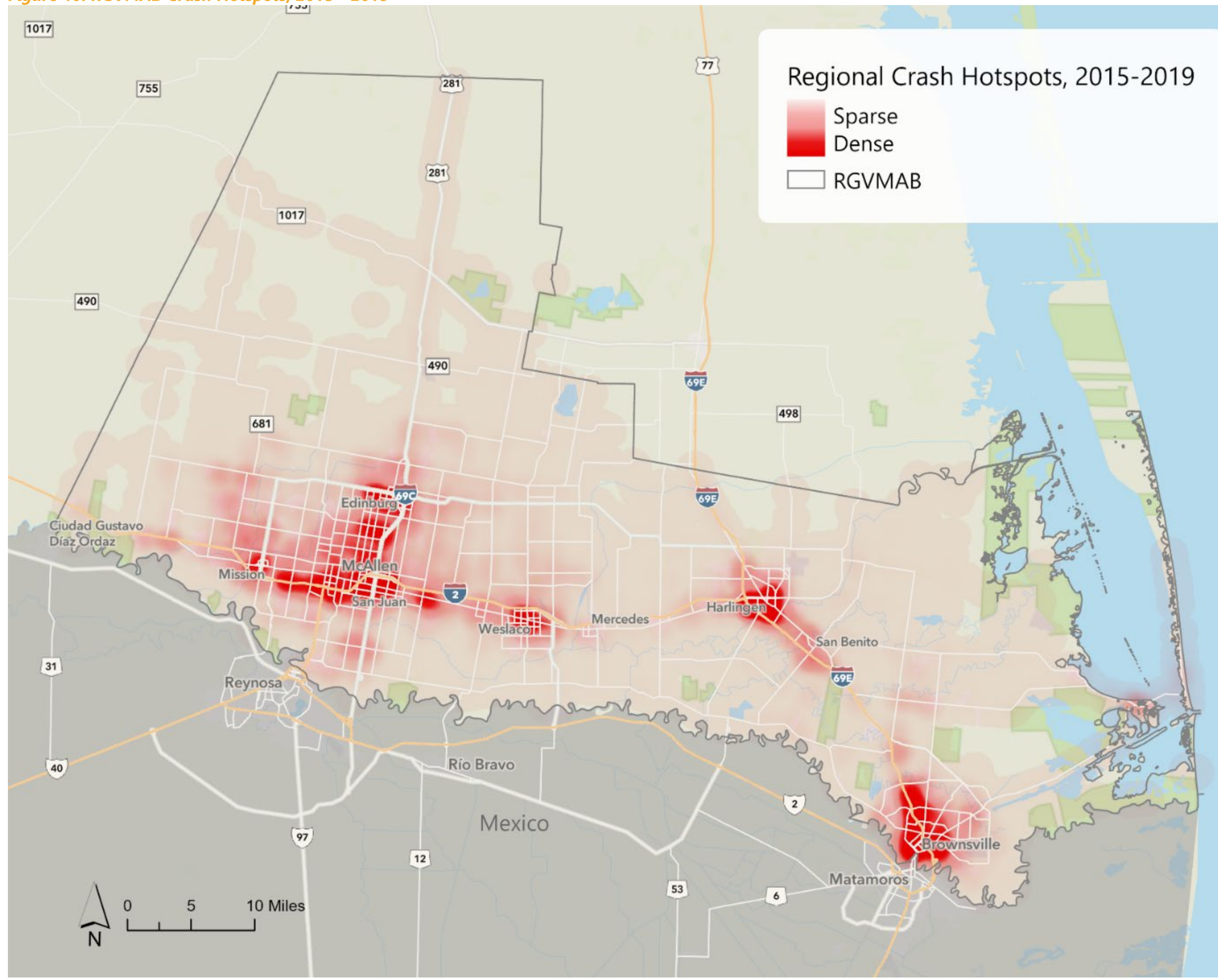


Table 4-7: RGVMAB Top 20 Crash Intersection, 2015 - 2019

Intersection	Crash Count	Bicyclist Crashes	Pedestrian Crashes	Serious Injury Crashes	Fatal Crashes
E. Ruben M. Torres Sr. Blvd. & Old Hwy 77	106	0	0	24	0
E./W. Frontage Rd. (US-83) & S. Ware Rd.	86	0	1	1	0
Spur 206 & I-69E	80	0	2	1	0
E./W. Frontage Rd. (US-83) & S. Shary Rd.	79	0	1	1	0
E./W. Frontage Rd. (US-83) & S. Bryan Rd.	67	0	0	1	0
E. Tyler Ave. (Spur 206) & S. 15th St.	67	1	3	0	0
E./W. Frontage Rd. (US-83) & N. Cage Blvd.	66	0	1	1	0
E. Earling St./E. Nolana Loop & N. Cage Blvd.	61	0	2	1	0
E. Rueben M. Torres Blvd. & N./S. Frontage Rd. (IH-69E)	56	0	0	1	0
W. Alton Gloor Blvd. & N./S. Frontage Rd. (I-69E)	54	0	0	0	0
W. Price Rd. & N./S. Frontage Rd. (I-69E)	54	0	0	0	0
Ed Cary Dr. & N./S. Frontage Rd. (I-69E)	53	0	0	0	0
W. Wisconsin Rd. & S. McColl St.	53	1	0	2	0
US-83 & Jackson Rd.	50	1	1	1	0
E./W. Frontage (US-83) & S. 10th St.	47	1	3	2	0
Wilson Rd. & I-69E	46	0	0	0	0
W. Ferguson Ave. & N. Cage Blvd.	46	0	0	0	0
TX-54-SPUR & I-69E	45	1	0	1	0
Primera Rd./TX-499-Loop & N. 77 Sunshine Strip	44	0	0	1	0
BUS-83 & Alamo Rd.	43	0	0	0	0

Active Transportation Safety Trends

Over the course of the five-year period, a total of 2,238 active transportation (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 4-8 shows a breakdown of total crashes involving pedestrians or bicyclists.

Table 4-8: RGVMAB Active Transportation Crashes & Crashes by Mode

Crash Types	Crash Count	Percent of All AT Crashes	As
Pedestrian Crashes	1,582	71%	
Bicyclist Crashes	656	29%	
Total	**2,238**	**100%**	

Figure 4-40 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.

Table 4-9 summarizes the five-year counts and percentage of active transportation crashes in comparison to regional totals for all crashes. While non-motorized crashes comprise only 1.57% of all crashes for this period, they comprise 26.14% of all fatal crashes

Table 4-9: Comparison of Five-Year Crash Totals; Active Transportation vs. All Users, 2015-2019

Measure	All Users	Active Transportation	Percent of Measure
Crash Count	142,216	2,238	1.57%
Fatalities	440	115	26.14%
Serious Injuries	1,968	248	12.60%

Like regional crashes, the project team identified specific intersections that experienced the most AT crashes over the five-year period to further fine-tune any potential solutions to its active transportation safety issues and distribute resources more efficiently. Table 4-10 displays the top AT crash intersections within the RGVMAB.

Figure 41: RGVMAB Active Transportation Crash Hotspots

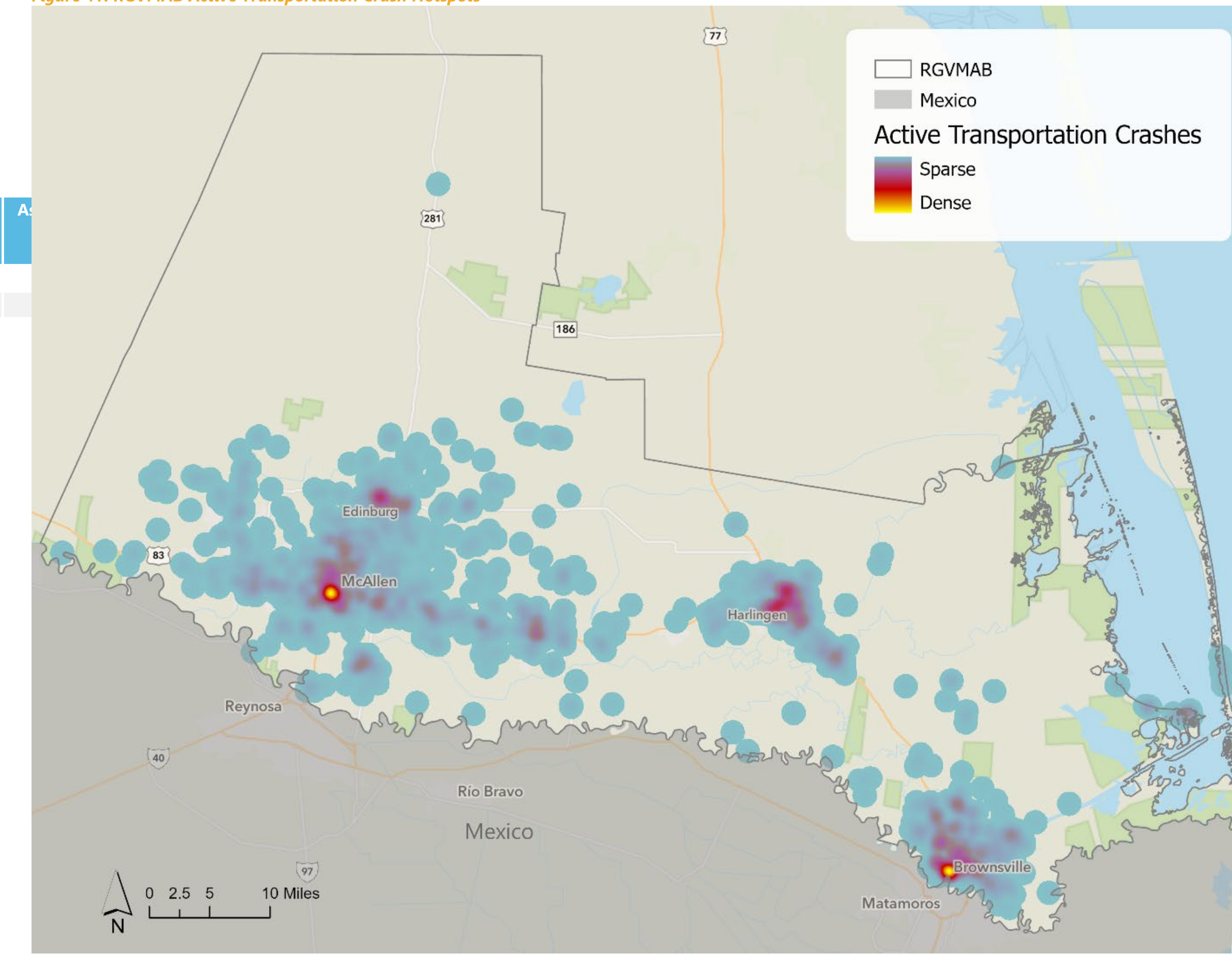


Table 4-10: RGVMAB Top Active Transportation Crash Intersections

Intersection	Location	Crash Count
International Blvd. (SH 4) @ Southmost Blvd. (FM 1419)	Brownsville	11
Spur 206 @ I-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
I-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

SUMMARY ON ANALYSIS OF MULTIMODAL NEEDS

The findings of the RGVMAB multimodal needs assessment reflect the current state of the region’s transportation system and show projections where possible for the future of its various components. Overall, the region is growing and will continue to do so over the next 25 years. This growth will impact each aspect of the regional transportation network, requiring the community to invest in transportation policy and projects that address the infrastructure, land use, and socioeconomic changes that will arise in the coming years. The analysis summarized here provides a holistic understanding of the regional transportation system encompassing the community's roadways, transit and active transportation systems, freight network, and socioeconomic landscape. This framework provides data-driven insight into the needs of the community and informs the review and consideration of investments and strategies that are laid out in subsequent chapters of the RGVMPO 2045 MTP, specifically Chapter 5, Strategies for Regional Mobility.