MEMORANDUM

DATE: June 26, 2020

TO: Andrew Cannon

CC: Luis Diaz

FROM: JD Allen

RE: RGVMPO 2045 MTP – Bridge and Roadway Condition Analysis

RGVMPO Transportation System Conditions and Performance

The RGVMPO roadway network is critical to the movement of people and goods through various modes of transportation, within, from to, and through the RGVMAB. RGVMPO transportation network conditions and performance is even more critical due to its role in international travel and trade as it is located on the United States – Mexico border and Gulf of Mexico, therefore providing connectivity to Ports of Entry (POE) and deep water ports throughout Texas. The following analysis focuses on existing asset conditions for bridges and roadways found within the RGVMAB.

Transportation System Asset Conditions and Preservation

In addition to being federally required, it is important to create an inventory of the region's bridge and roadway conditions in order to promote the safe and efficient movement of people and goods throughout the RGVMPO. This 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. Having assets in poor condition has many potential negative impacts to network users (i.e. personal automobiles, transit vehicles, and freight). Poor conditions along roadways can cause wear-and-tear to vehicles; delays due to drivers having to maneuver around poor conditions or using unordinary routes due to conditions; and can also impact the attractiveness of local businesses as individuals and freight operators may have to avoid facilities with deficient accessibility. To create a robust inventory of existing network conditions, this analysis includes an evaluation of bridge and roadway pavement conditions.

Bridge Condition Analysis

The bridge conditions analysis was based on the most up-to-date version of the Federal Highway Administration's (FHWA) National Bridge Index (NBI). The NBI included location and condition information for 765 bridges within the RGVMAB as of April ,2020. 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. First, the data was sorted to only include overpassing bridges in the RGVMAB that were open to vehicle traffic with a length

greater than 20 feet (structures that meet or exceed this minimum length are designated as a bridge for National Bridge Inspection Standards/meets the criteria for a bridge as defined by AASHTO).

The methodology for determining bridge condition included the calculation of a minimum component condition rating and application of the following scale based on this rating:

- Poor: minimum condition rating between 0 and 4 (indicates a bridge is structurally deficient)
- Fair: minimum condition rating between 5 and 6
- Good: minimum condition rating between 7 and 9

Out of the 765 bridges considered for the analysis, only 9 were identified as being structurally deficient. **Table 1** 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.

Table 1: RGVMAB Bridge Conditions

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

Figure 2 displays structurally deficient bridges a the RGVMAB level, showing poor bridge infrastructure to largely occur in rural, local areas of the roadway network. **Figure 3** through **Figure 6** display bridge conditions at more detailed extents for better context. Bridges have been numbered to match with table references detailing location, roadway, and bridge crossing type (**Table 2** through **Table 5**). The RGVMAB's proximity to the Gulf Coast and Rio Grande River, along with a strong agricultural presence, produces many smaller bodies of water that are not immediately apparent. It must be noted that majority of the structurally deficient bridges within the RGVMAB are located on rural roads and are crossing small culverts and/or drainage lines (**Figure 1**).

Figure 1: S. Minnesota Ave. Bridge Crossing - Brownsville

Source: Google Earth Street View, 2020

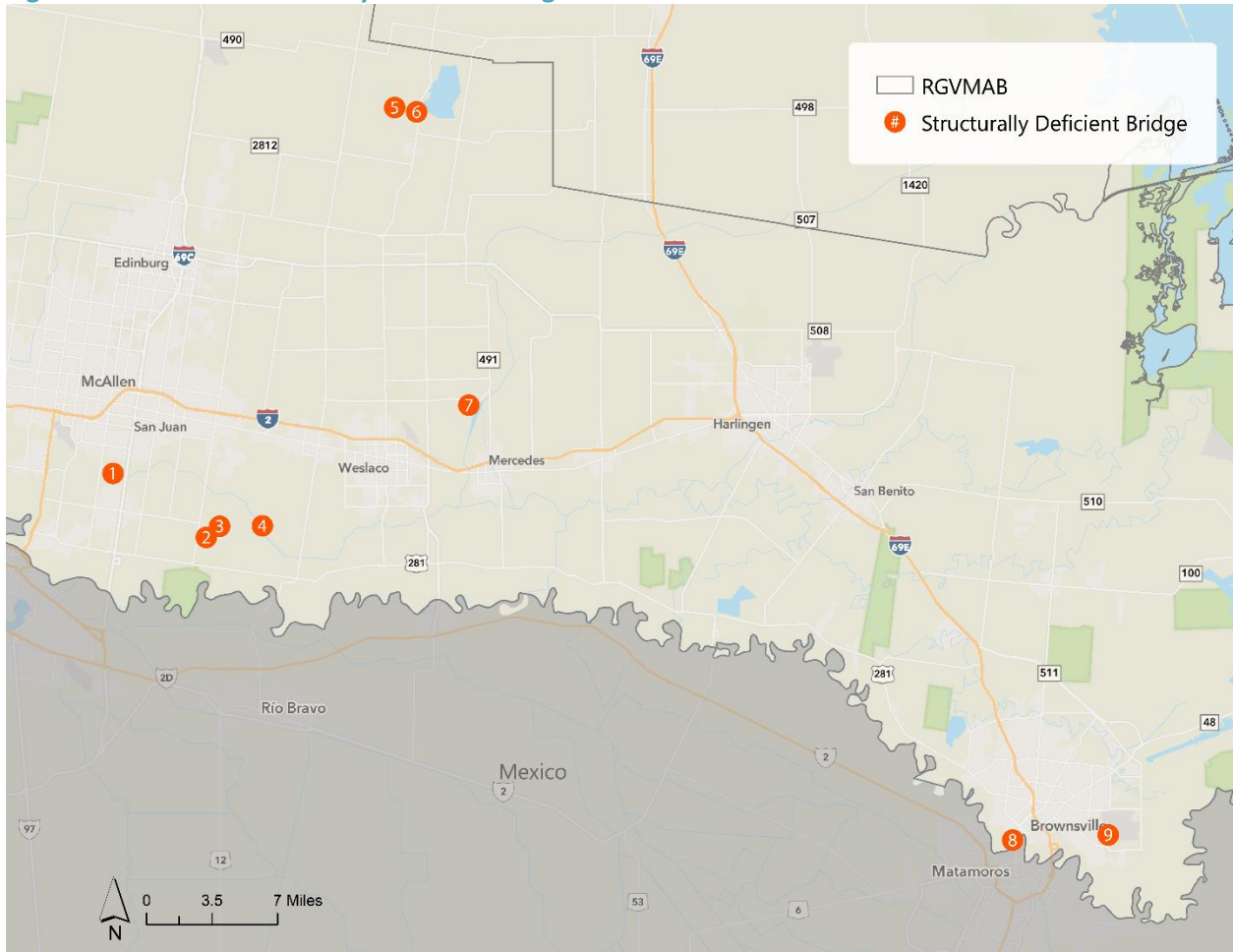## Figure 2: RGVMAB Structurally Deficient Bridges

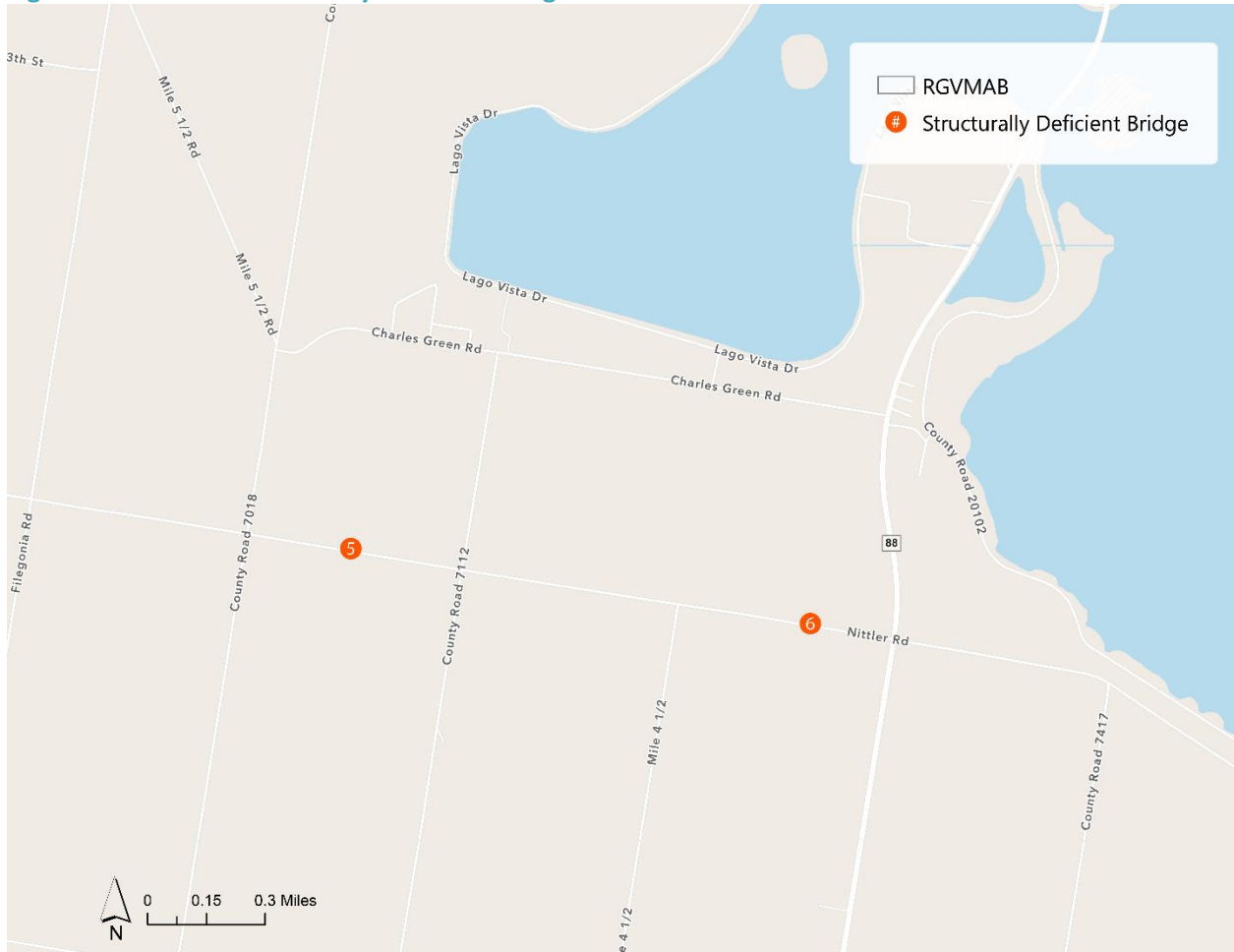**Figure 3: RGVMAB Structurally Deficient Bridges – Pharr Area**

Table 2: RGVMAB Structurally Deficient Bridges – Pharr Area

Bridge	Roadway	Facility Description
1*	N/A	Bridge crossing; culvert
2	Las Milpas Rd.	Bridge crossing; culvert
3	S. Tower Rd.	Bridge crossing; channel
4	N. Valley View Rd.	Bridge crossing; culvert

* This bridge facility is not accessible via satellite imagery

Figure 4: RGVMAB Structurally Deficient Bridges – Delta Lake Area

Table 3: RGVMAB Structurally Deficient Bridges – Delta Lake Area

Bridge	Roadway	Facility Description
5	Nittler Rd.	Bridge crossing; culvert
6	Nittler Rd.	Bridge crossing; culvert

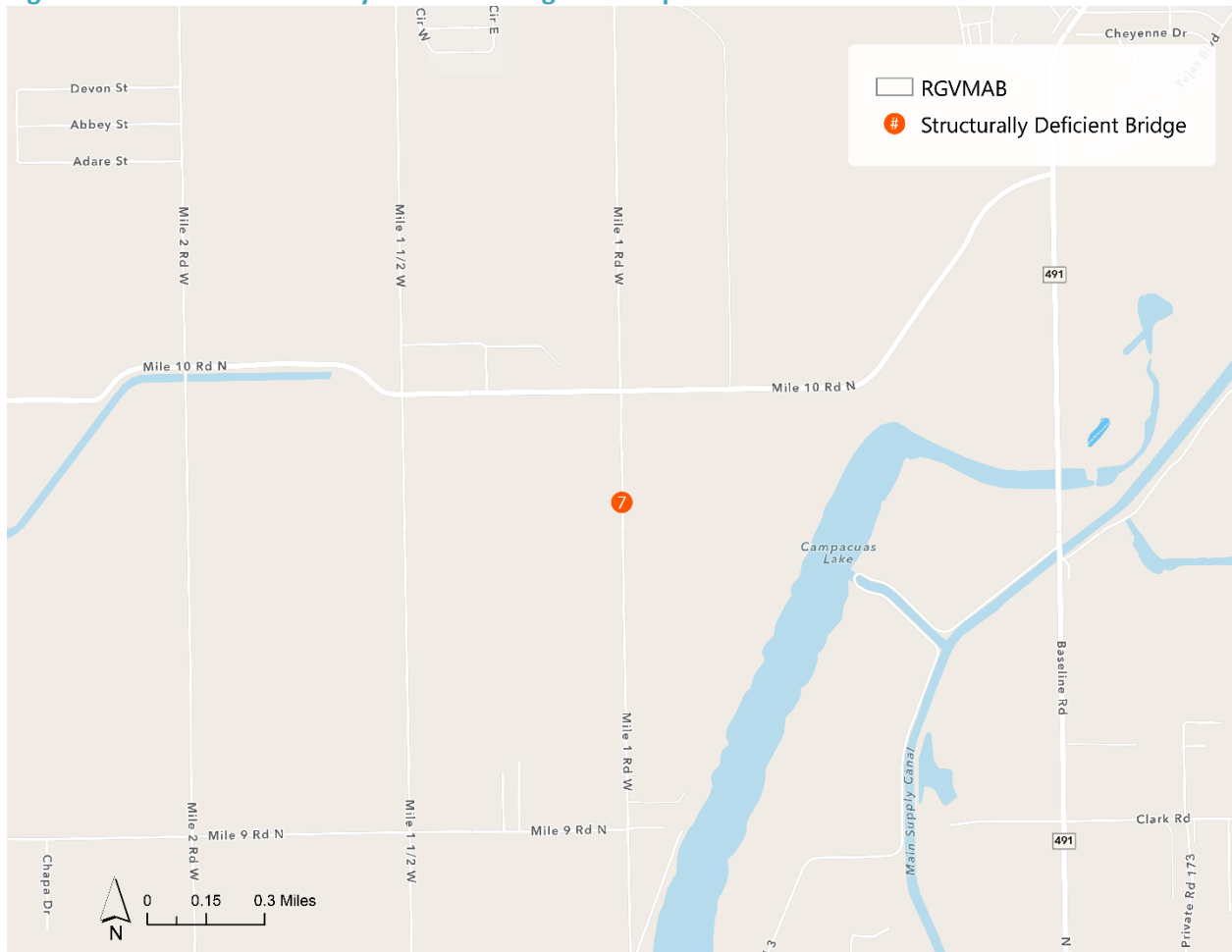**Figure 5: RGVMAB Structurally Deficient Bridges – Campacuas Lake Area**

Table 4: RGVMAB Structurally Deficient Bridges – Campacuas Lake Area

Bridge	Roadway	Facility Description
7	Mile 1 Rd. W.	Bridge crossing; channel

Figure 6: RGVMAB Structurally Deficient Bridges – Brownsville
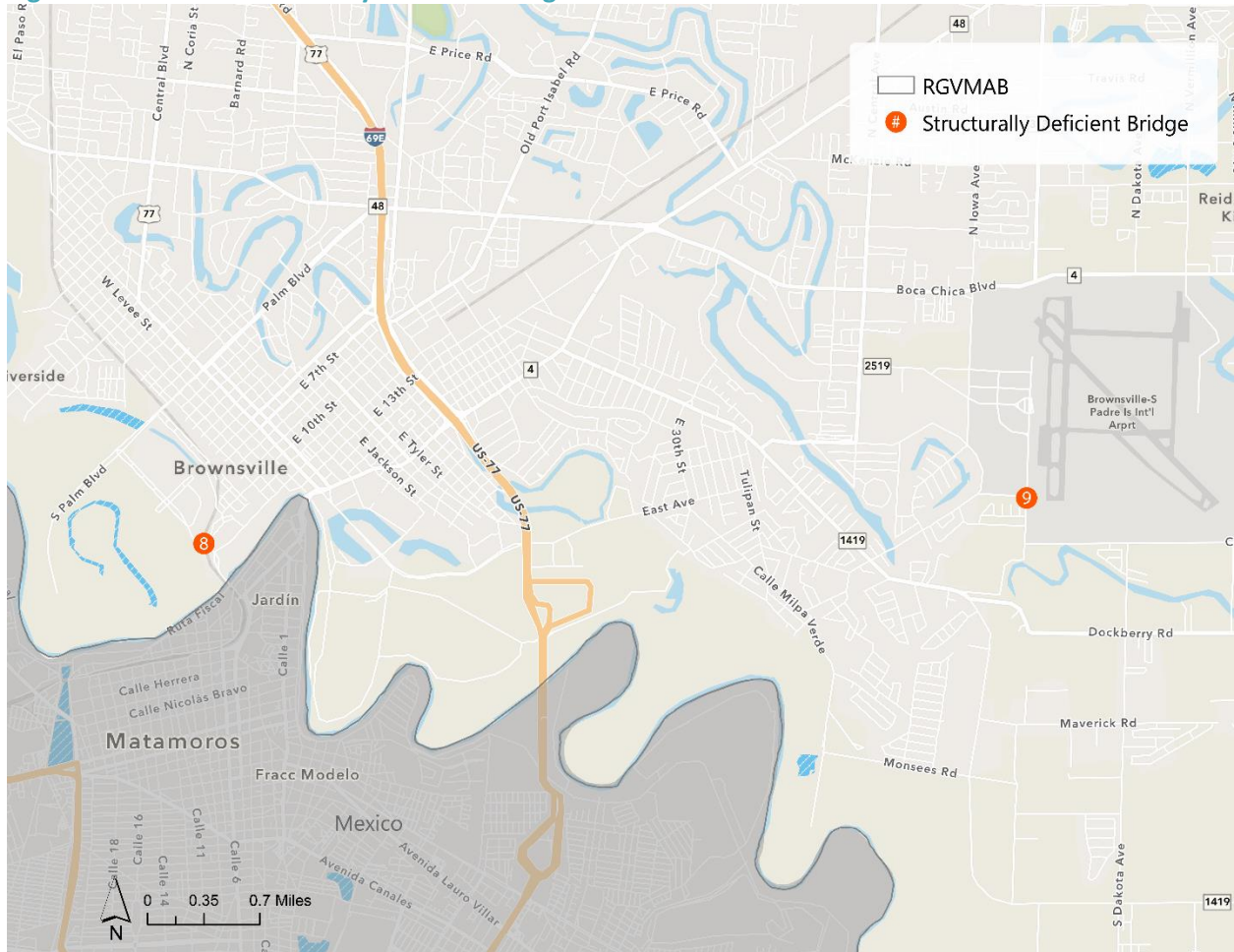
Table 5: RGVMAB Structurally Deficient Bridges – Brownsville

Bridge	Roadway	Facility Description
8	Union Pacific Rail Crossing	Grade-separated railroad crossing; NB/SB over Mexico Blvd.
9	S. Minnesota Ave.	Bridge crossing; culvert

Roadway Pavement Condition Analysis

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 various other roadways critical to the movement of people and goods in the region. Based on guidance from the Code of Federal Regulations (23 C.F.R. 490.313), each roadway segment was categorized by condition according to the following IRI rating scale:

- Poor Condition: IRI > 170
- Fair Condition: IRI >= 95 and <= 170
- Good Condition: IRI <95

It must be noted that some of the roadway segments provided by the FHWA HPMS dataset did not include an IRI rating and are not represented in the below tables/figures. Present Serviceability Rating (PSR) values, a secondary roadway condition metric, were not included in the 2018 dataset.

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 6** presents the pavement condition results which coincide with the national performance measures identified by the FHWA. It must be noted that these values were derived from, and representative of roadway segment containing IRI values.

Table 6: RGVMAB NHS Roadway Conditions

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

Out of the 552 total NHS lane miles with IRI data, 62% were found to be in good condition, while 30% were recorded as being in fair condition. This suggests that 92% of the NHS roadway pavement conditions are either in a state of good repair or adequate for utilization. Regarding interstate lane miles, 84% were rated as being in good condition, while 15% were in fair condition, totaling 99% either in a state of good repair or adequate serviceability. Non-Interstate NHS lane miles totaled 91% in a state of good repair or adequate serviceability.

Figure 7 displays roadway pavement conditions for the NHS (both Interstate and Non-Interstate) at the RGVMAB level, showing majority of major interstate and highway infrastructure to be in a state of good repair.

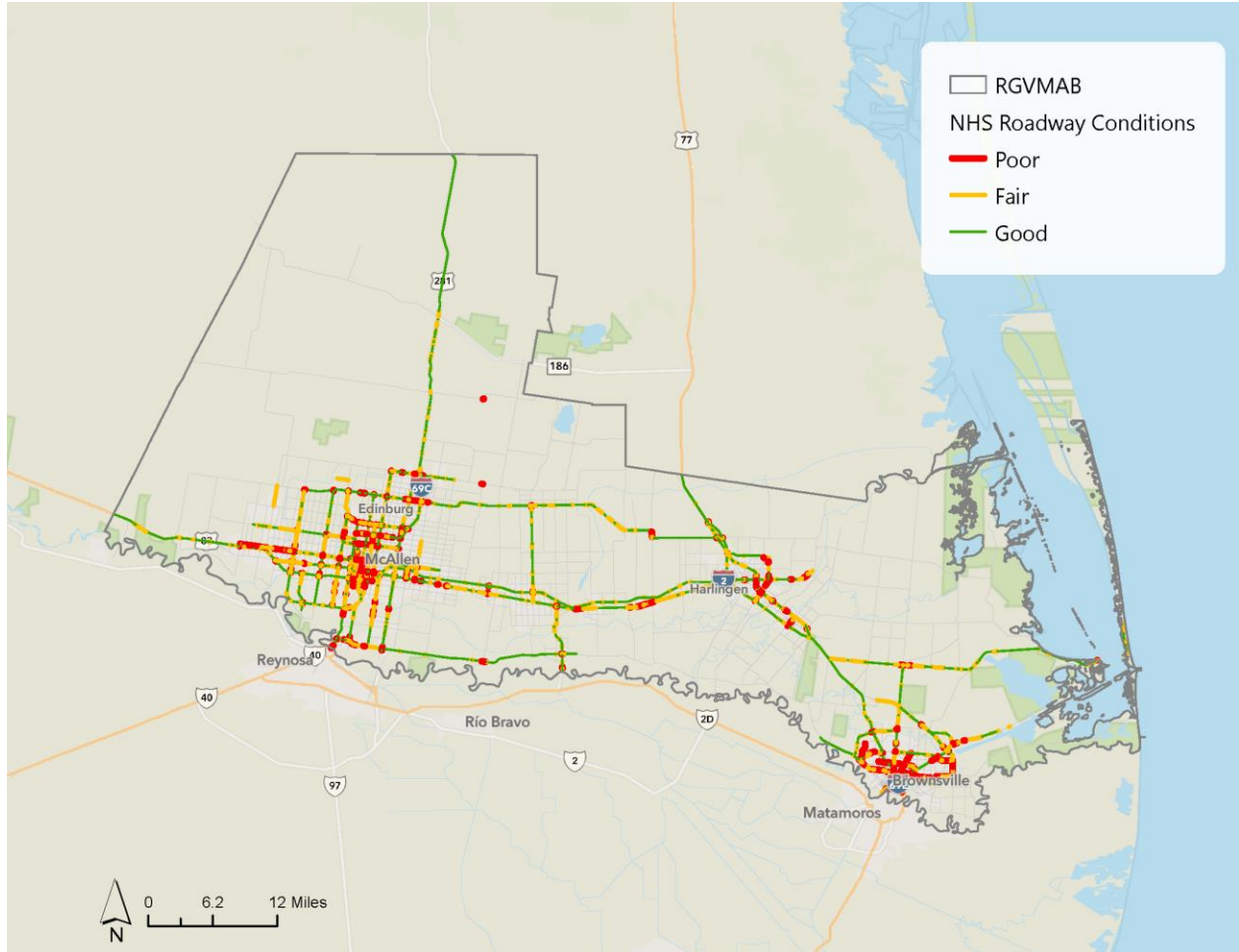**Figure 7: RGVMAB NHS Roadway Conditions**

Figure 8 through **Figure 12** display roadway pavement conditions for the NHS at more detailed extents to further highlight potential areas of concern.
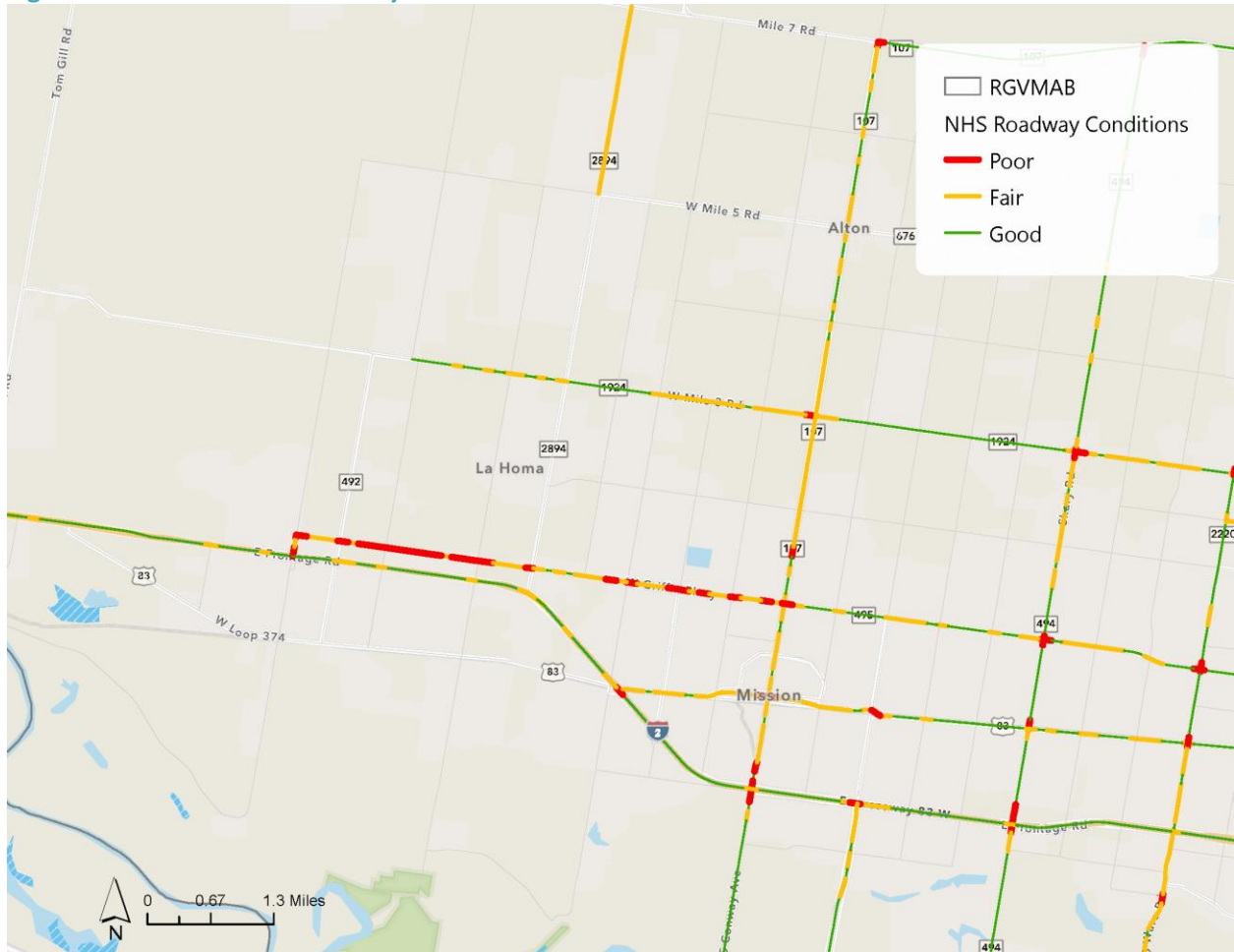
Figure 8: RGVMAB NHS Roadway Conditions – Mission Area

Figure 8 displays Mission area NHS roadway pavement conditions. One contiguous stretch of inadequate roadway pavement conditions exists along FM 495 parallel to I-2. Of note, several key intersections (e.g. FM 495 and FM 494) exist throughout the area containing poor roadway infrastructure.

Figure 9: RGVMAB NHS Roadway Conditions – McAllen/Pharr Area
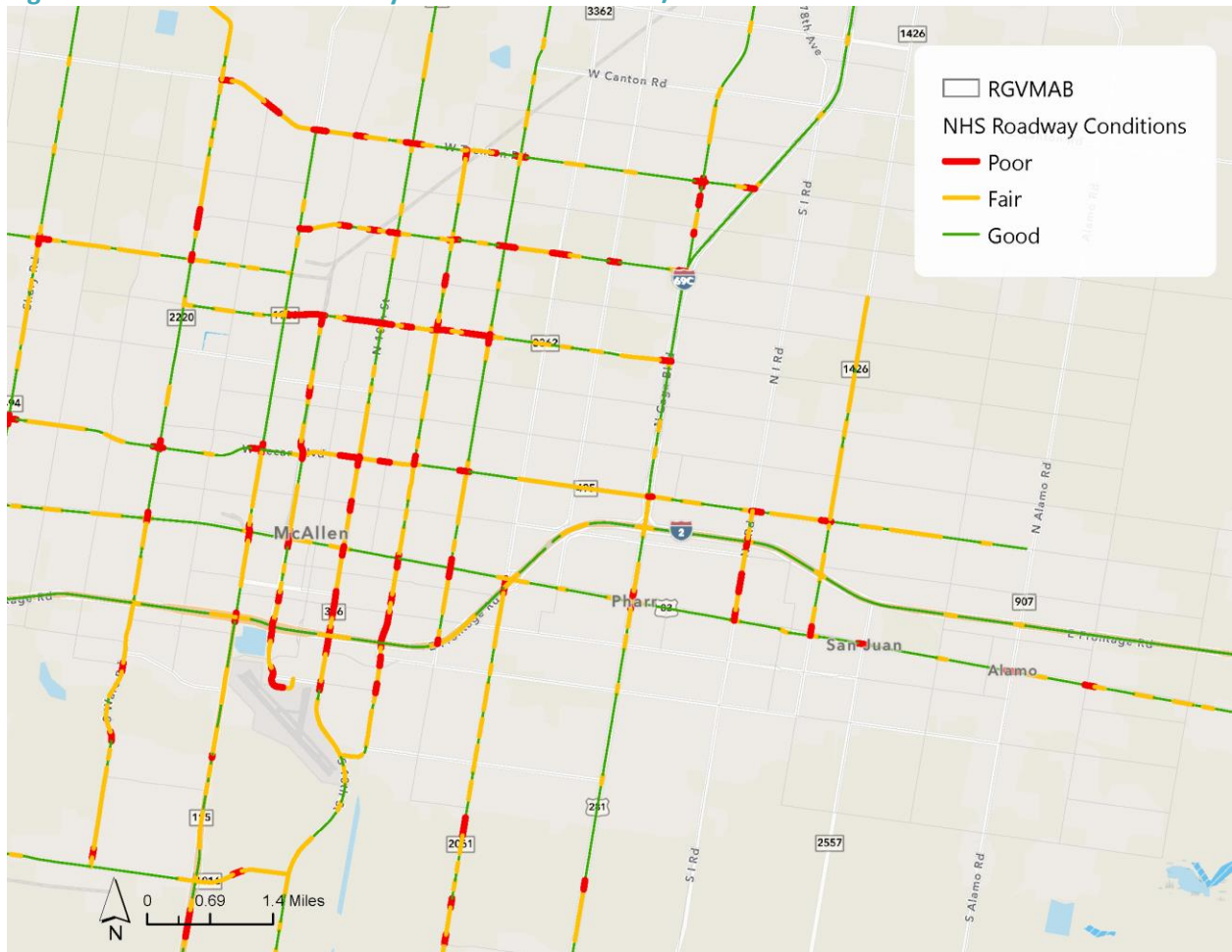
Figure 9 displays McAllen/Pharr area NHS roadway pavement conditions. Major arterials throughout the area contain intermittent roadway segments rated as having poor pavement conditions. This includes infrastructure such as W. Trenton Rd., Dove Ave., Nolana St., N. Bicentennial Blvd., S. 10th St., S. 2nd St., and N. I Rd.

Figure 10: RGVMAB NHS Roadway Conditions – Weslaco/Mercedes Area
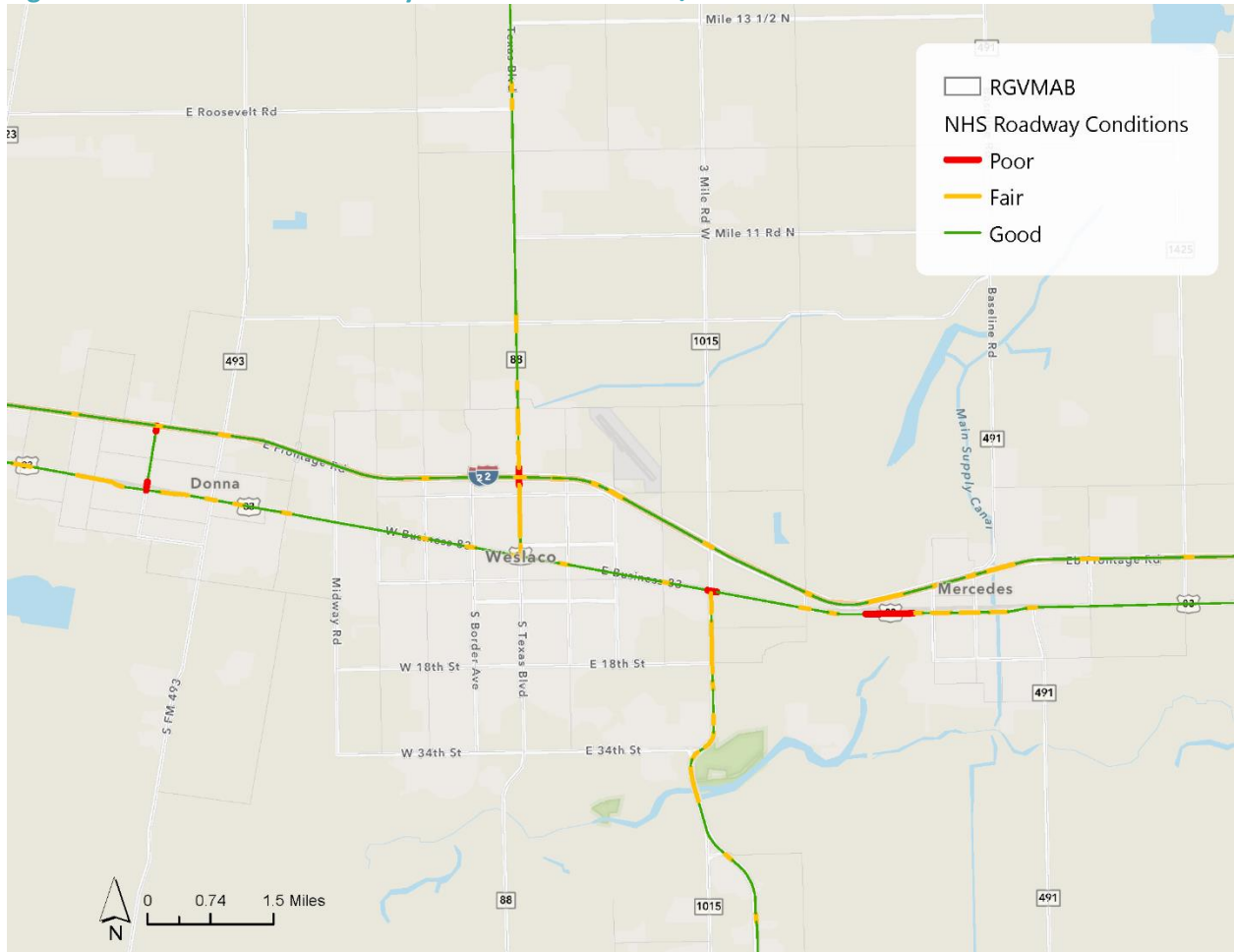
Figure 10 displays Weslaco/Mercedes area NHS roadway pavement conditions. While poor conditions in this area are limited, they do exist at critical intersections involving Business 83, US-83, and I-2.

Figure 11: RGVMAB NHS Roadway Conditions – Harlingen/San Benito Area
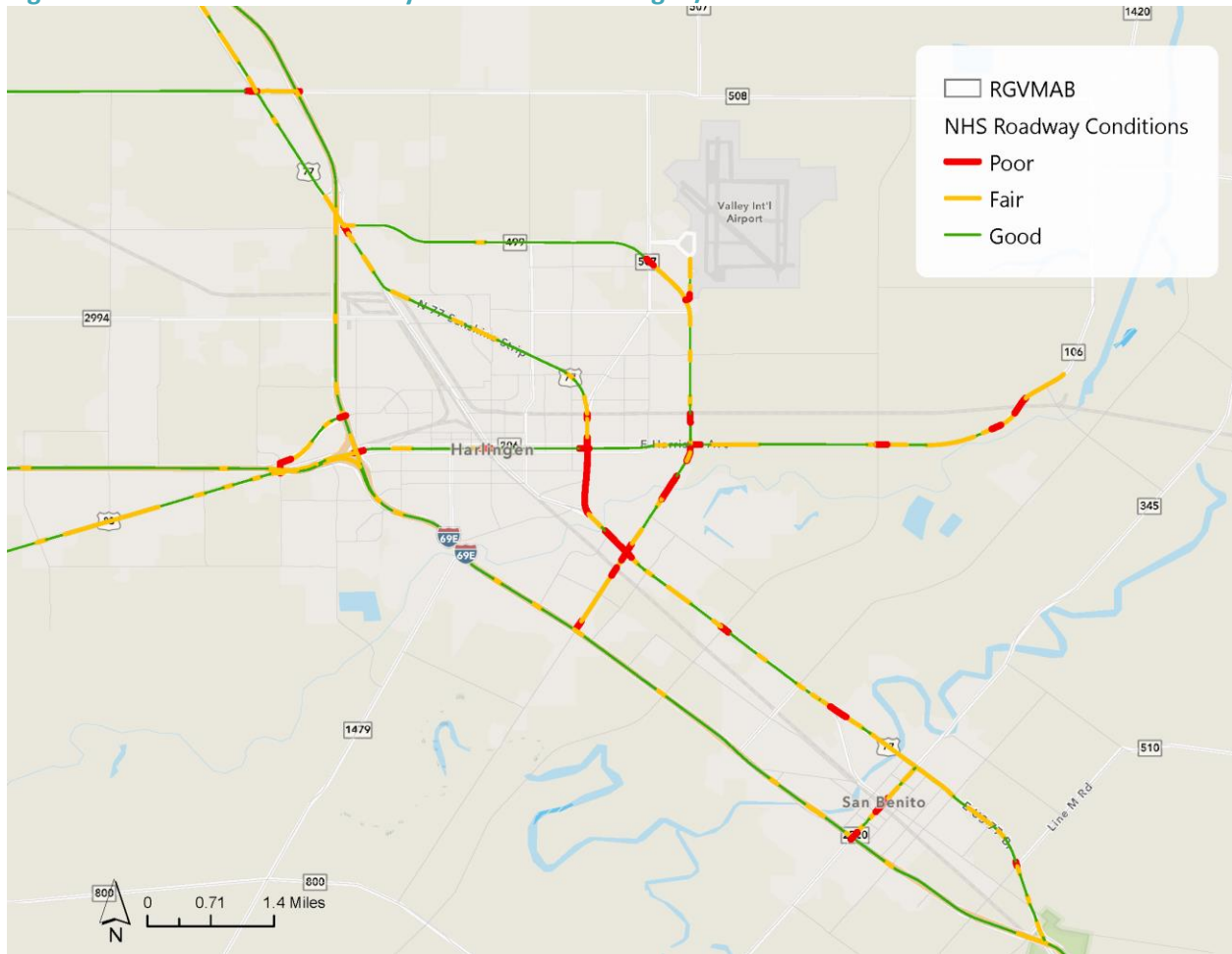
Figure 11 displays Harlingen/San Benito area NHS roadway pavement conditions. The most noteworthy area containing inadequate roadway infrastructure includes US-77 and FM 499 in south Harlingen.

**Figure 12: RGVMAB NHS Roadway Conditions – Brownsville Area**
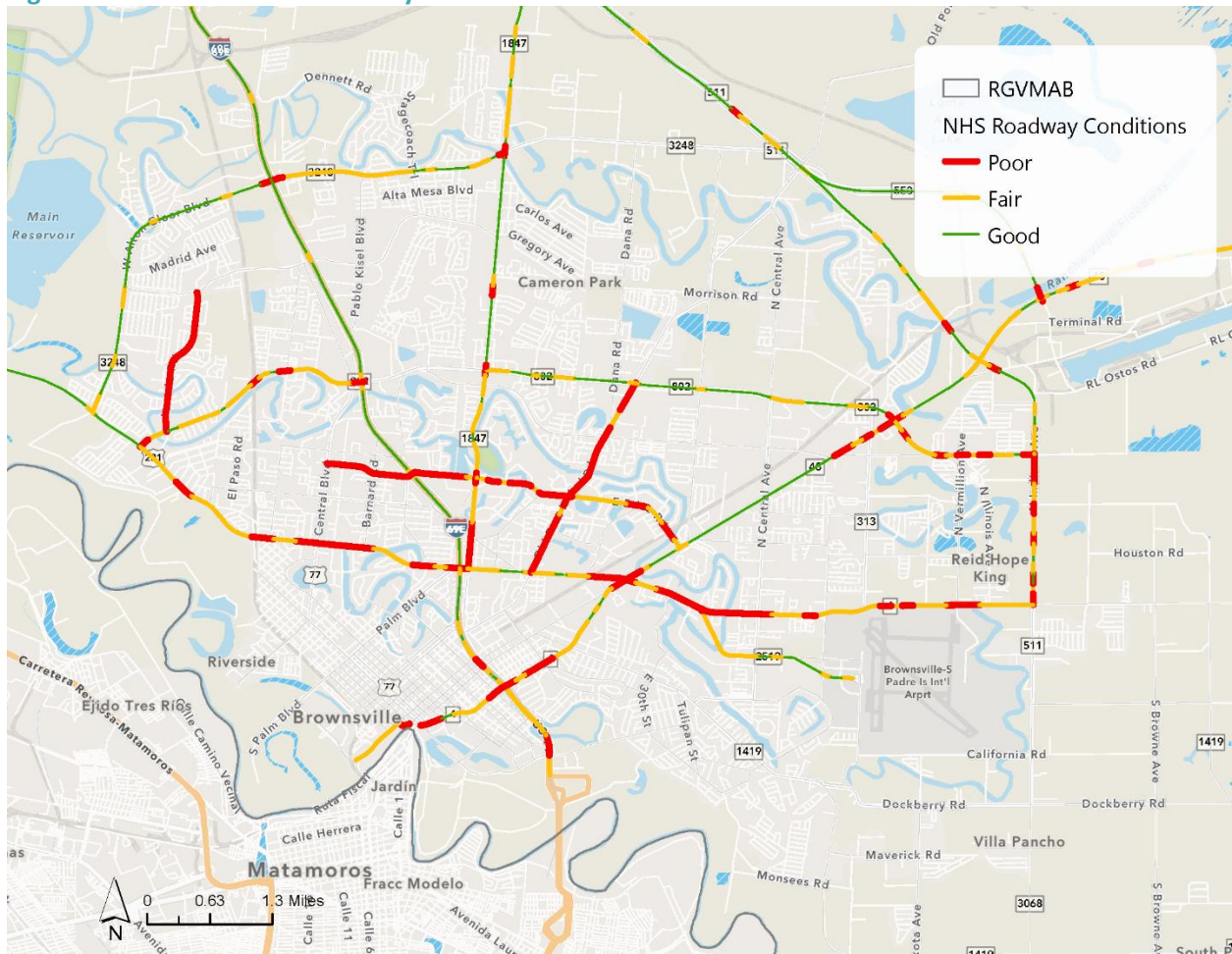
Figure 12 displays Brownsville area NHS roadway pavement conditions, which can be seen throughout the extent on major highway and arterial roadway infrastructure. Roadways of note include US-281, SH 48, SH 4, FM 511, Laredo Rd., E. Price Rd., Palm Blvd., E. 10th St., and Old Part Isabel Rd.

Figure 13: RGVMAB NHS-STRAHNET Roadway Conditions
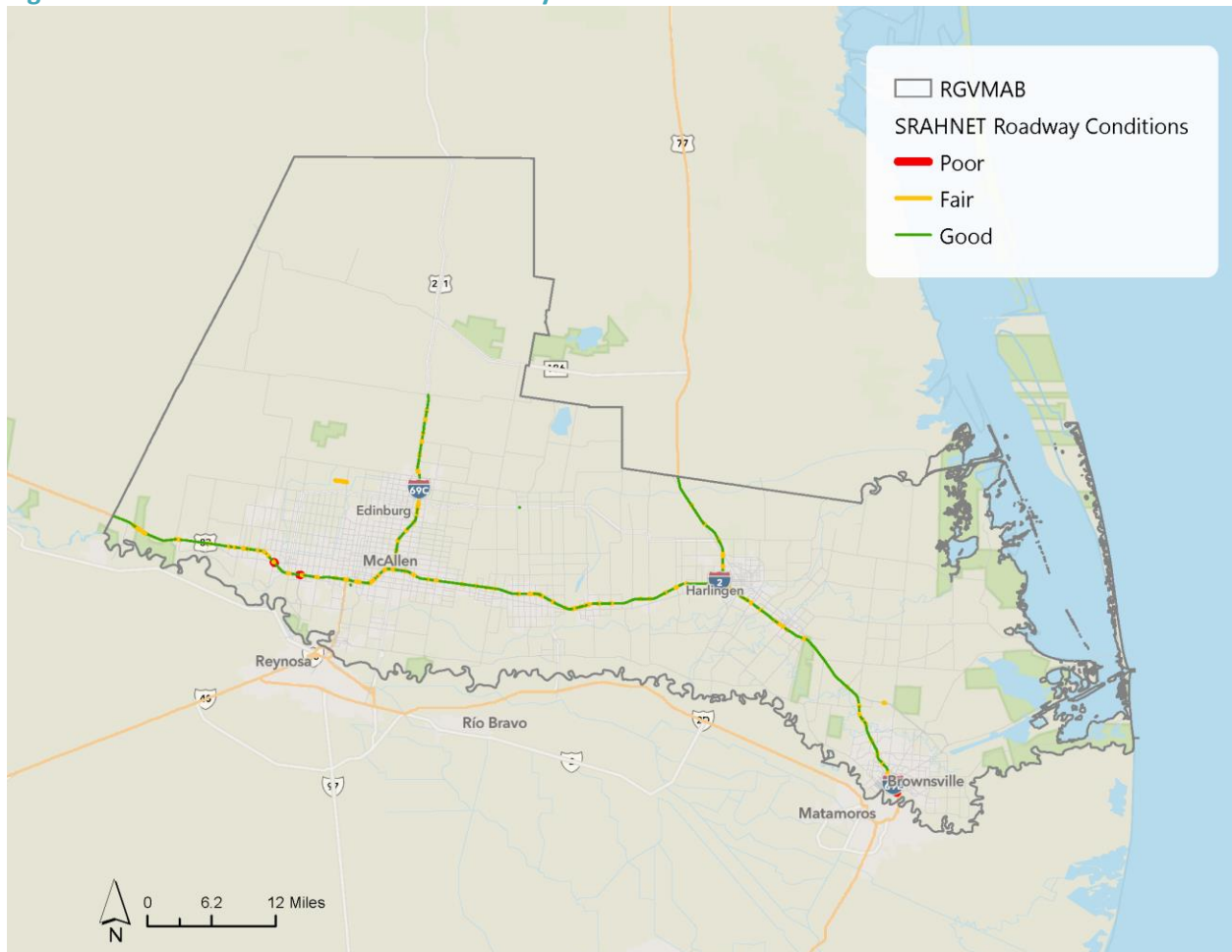
As a supplement to the graphical review of the NHS pavement conditions represented in **Figure 8** through **Figure 12,** the roadway pavement conditions for the Strategic Highway Network (STRAHNET) within the RGVMAB were also reviewed separately from the NHS maps. STRAHNET pavement conditions are shown at the regional level in **Figure 13.** The majority of the STRAHNET within the RGVMAB is recorded in good or fair condition with only 6 small segments rating in poor condition. These segments are shown in **Figure 14**, **Figure 15**, and **Figure 16.**

Figure 14: RGVMAB NHS STRAHNET Roadway Conditions – Mission Area

Figure 14 displays Mission area NHS STRAHNET roadway pavement conditions. Two small segments on IH 2 have a poor rating condition on the southside of the BUS 83 overpass and the west side of the FM 396 overpass.

Figure 15: RGVMAB NHS STRAHNET Roadway Conditions – Harlingen/San Benito Area
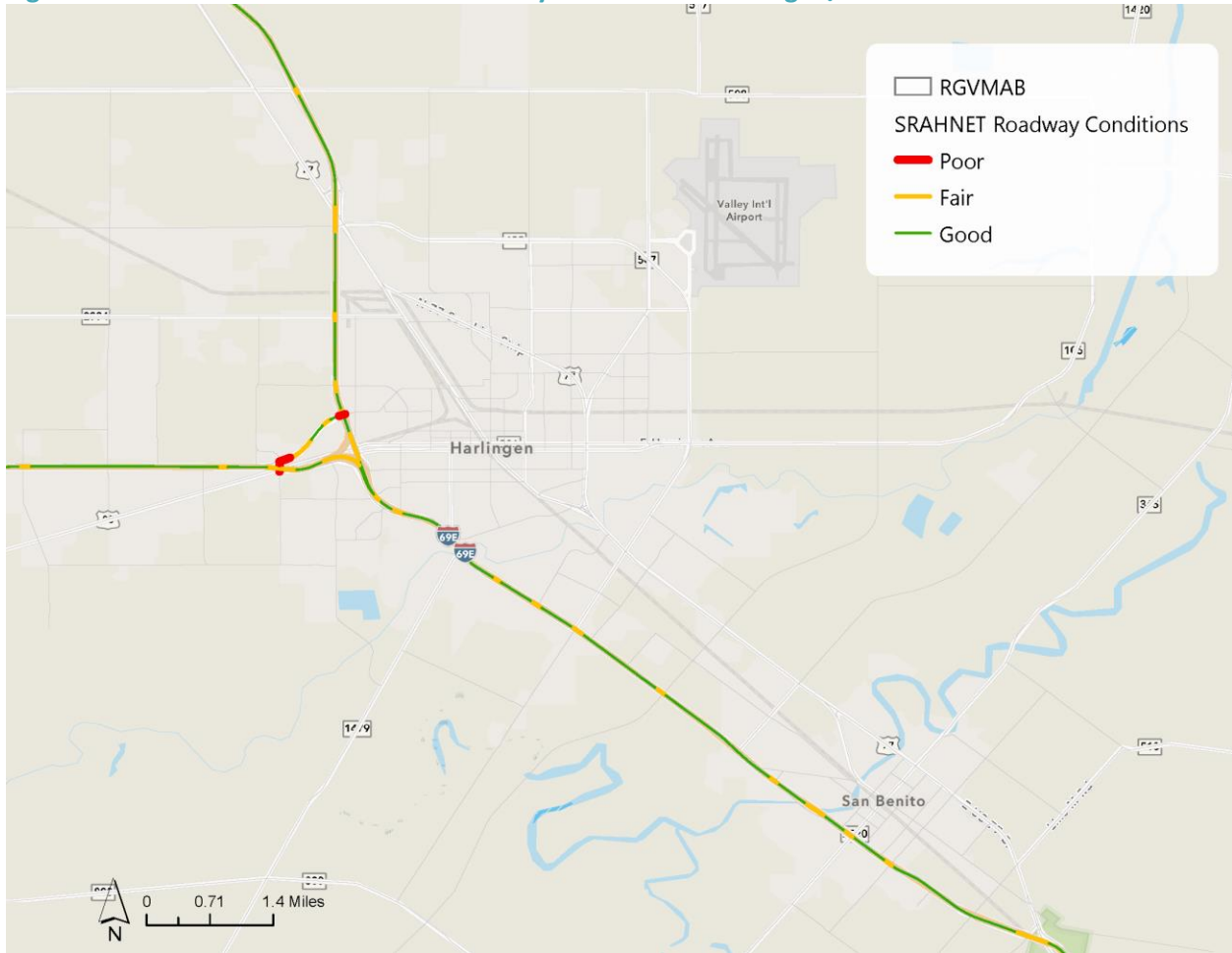

Figure 15 displays Harlingen and San Benito area NHS STRAHNET roadway pavement conditions. Two small segments on Jefferson Valley Fair (US 54) have a poor condition rating crossing under IH 2 and IH 69E.

Figure 16: RGVMAB NHS STRAHNET Roadway Conditions – Brownsville Area
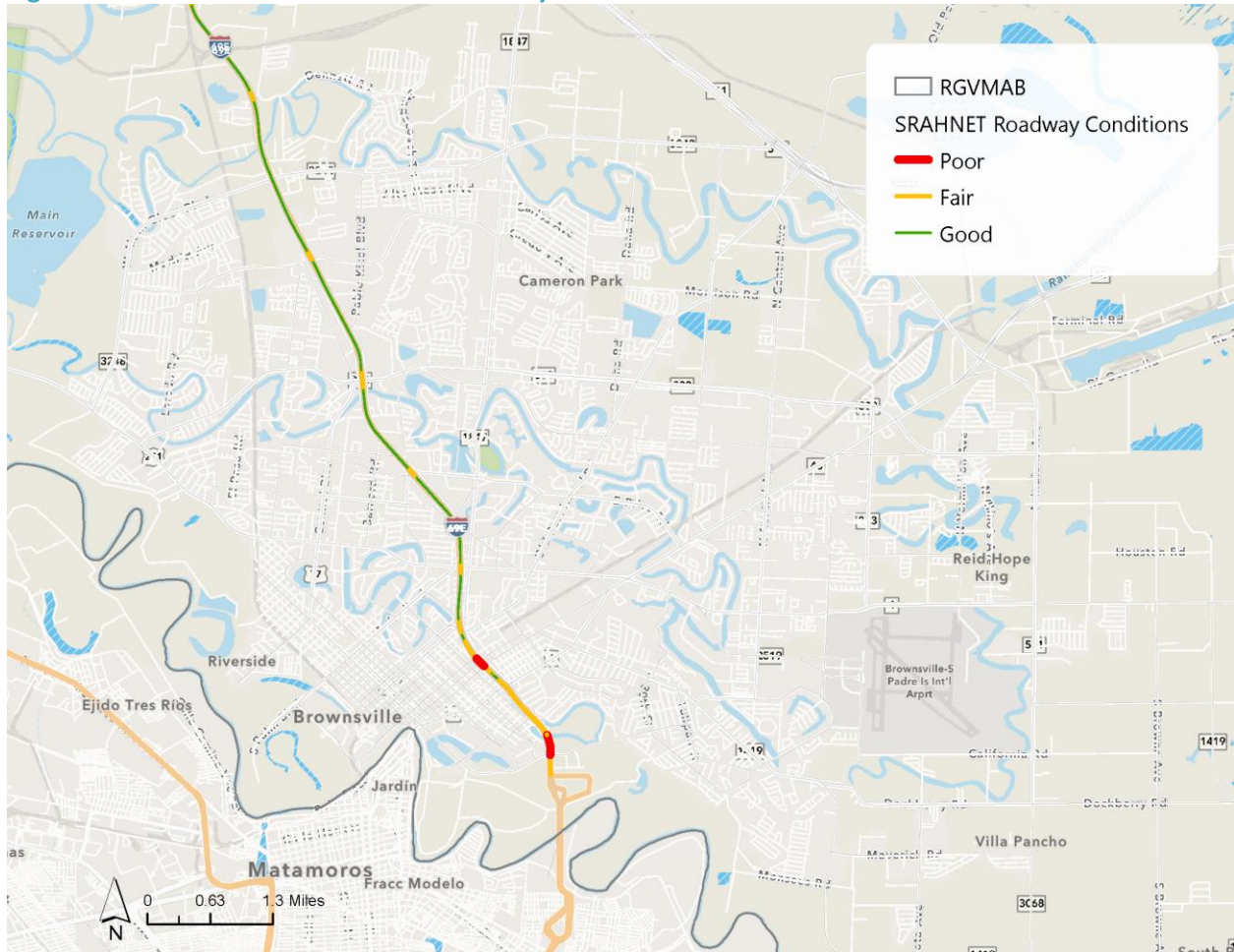

Figure 16 displays Brownsville area NHS STRAHNET roadway pavement conditions. Two segments are shown to have a poor condition rating on IH 69 E between 12th and 14th Streets and between East University Boulevard and just east of East 27th Street.

IRI data was available for a portion of the Non NHS system in the RGVMAB. In order to provide as much information as is available for better decision making representations of this Non-NHS data has also been included in this memo Error! Reference source not found. presents roadway conditions for Non-NHS roadways containing IRI data. The majority of this data represented pavement in either good or fair condition, with only 9% representing pavement in poor condition.

Table 7: RGVMAB Non-NHS Roadway Conditions

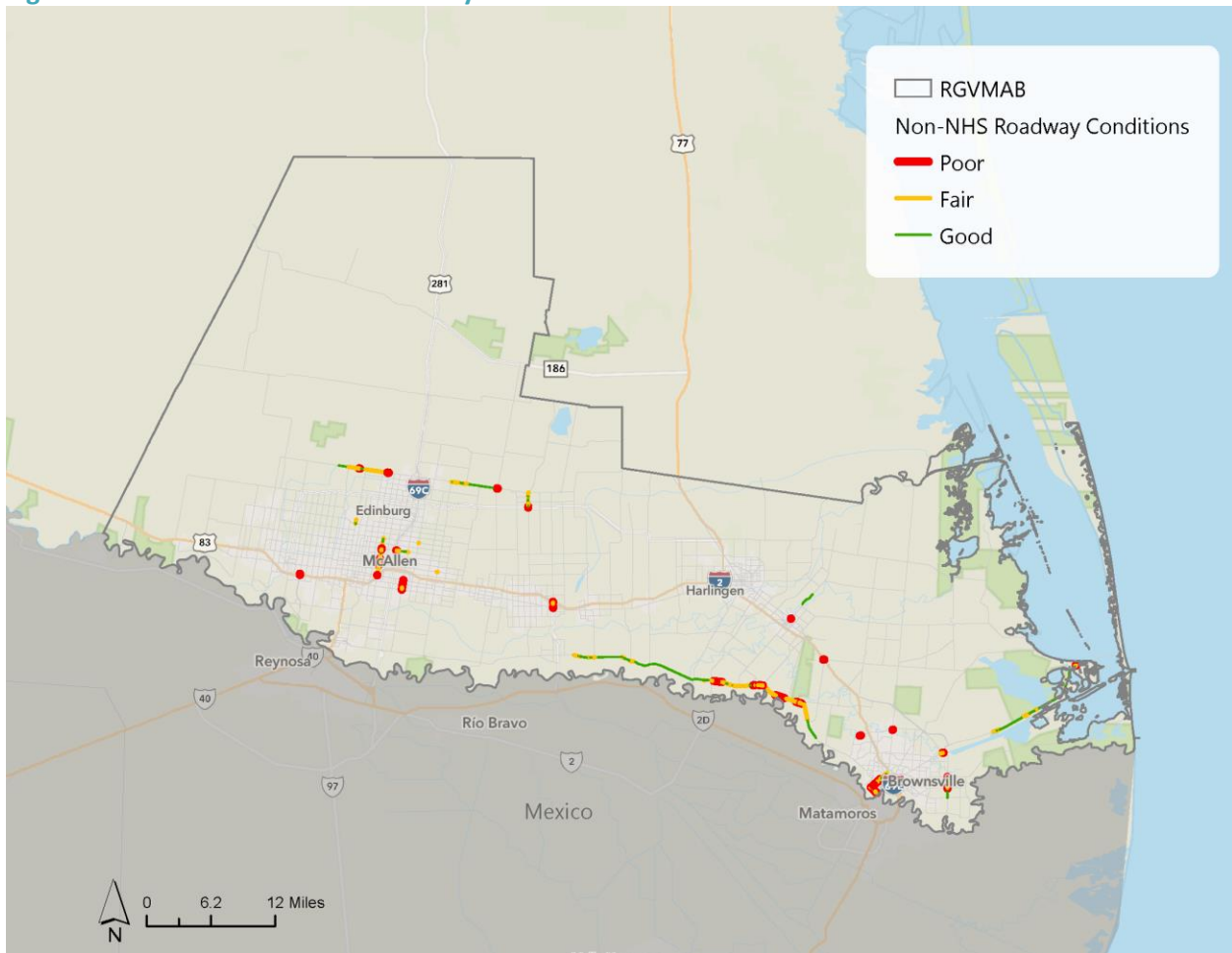|	Lane Miles	% of Total Lane Miles
Poor Condition	5	9%
Fair Condition	19	32%
Good Condition	34	59%
Total	58	100%

Figure 17: RGVMAB Non-NHS Roadway Conditions

Figure 17 displays roadway pavement conditions for the Non-NHS network with IRI data at the RGVMAB level, showing majority of the infrastructure to be in a state of good repair.

Figure 18 through **Figure 22** display available roadway pavement conditions for the Non-NHS at more detailed extents to further highlight potential areas of concern.

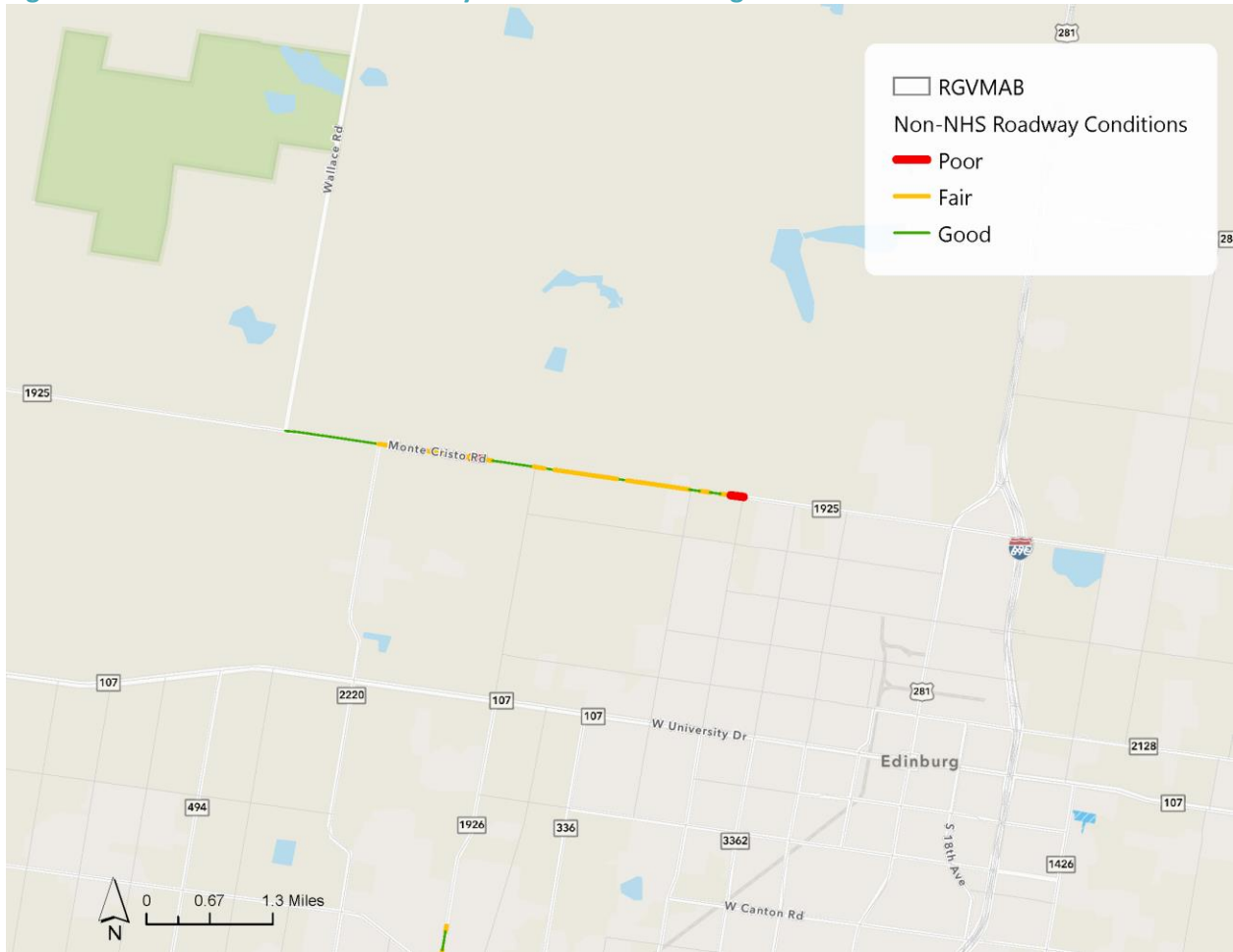**Figure 18: RGVMAB Non-NHS Roadway Conditions – Edinburg Area**

Figure 18 shows one portion of FM 1925 with a poor condition rating on just west of North McColl Rd just northwest of Edinburg.

Figure 19: RGVMAB Non-NHS Roadway Conditions – McAllen/Pharr Area
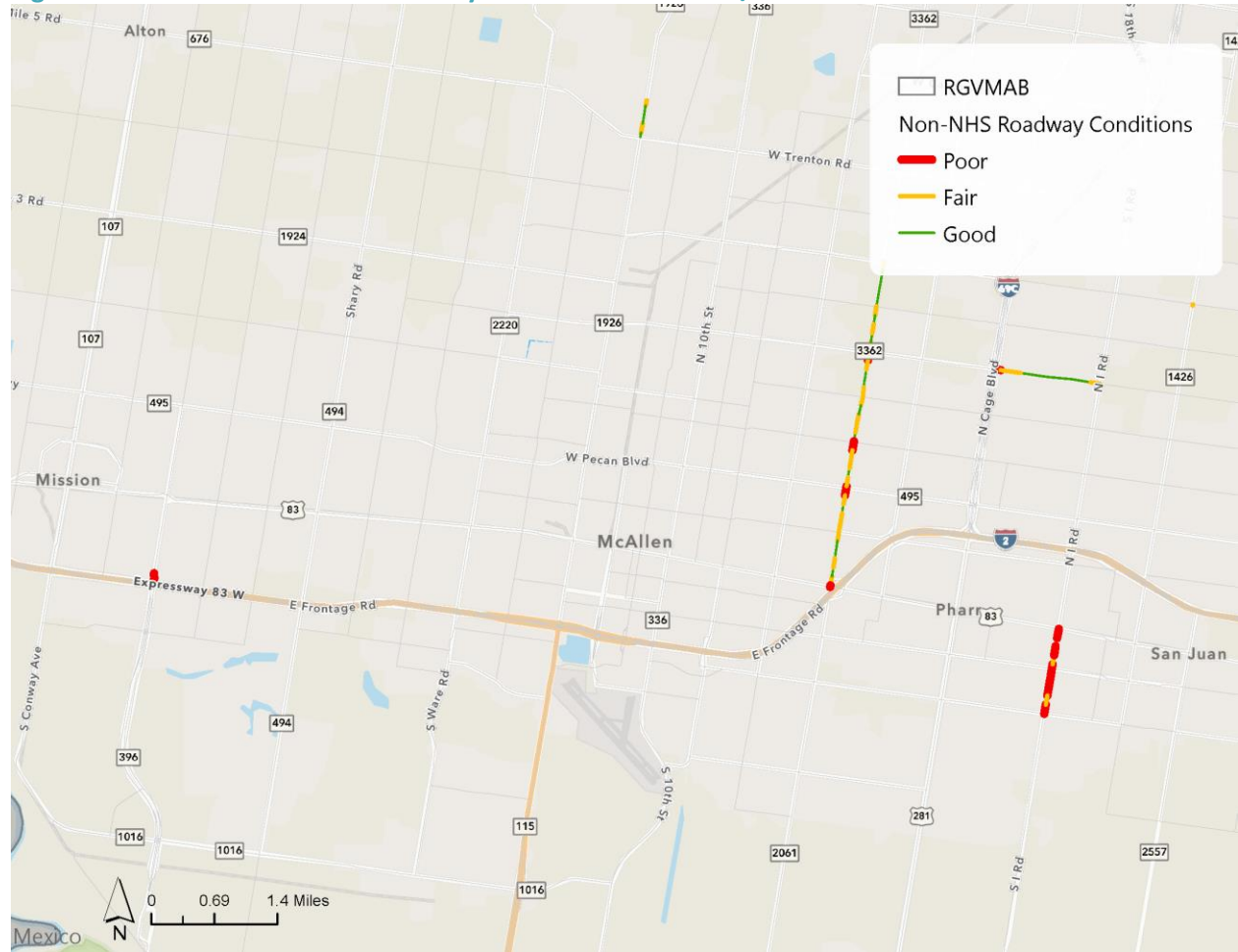

Figure 19 shows a number of Non-NHS segments in the McAllen/Pharr area with a poor condition rating. Of note is a stretch on S Veterans Blvd between W Ridge Rd and E Center Ave with mostly contiguous poor rating. Other segments of note are intermittent segments on N Jackson Rd at the intersection of E Business 83, the intersection of US 495, and at the intersection of W Sioux Rd. One other segment appears along Bryan Rd just north of IH 2.

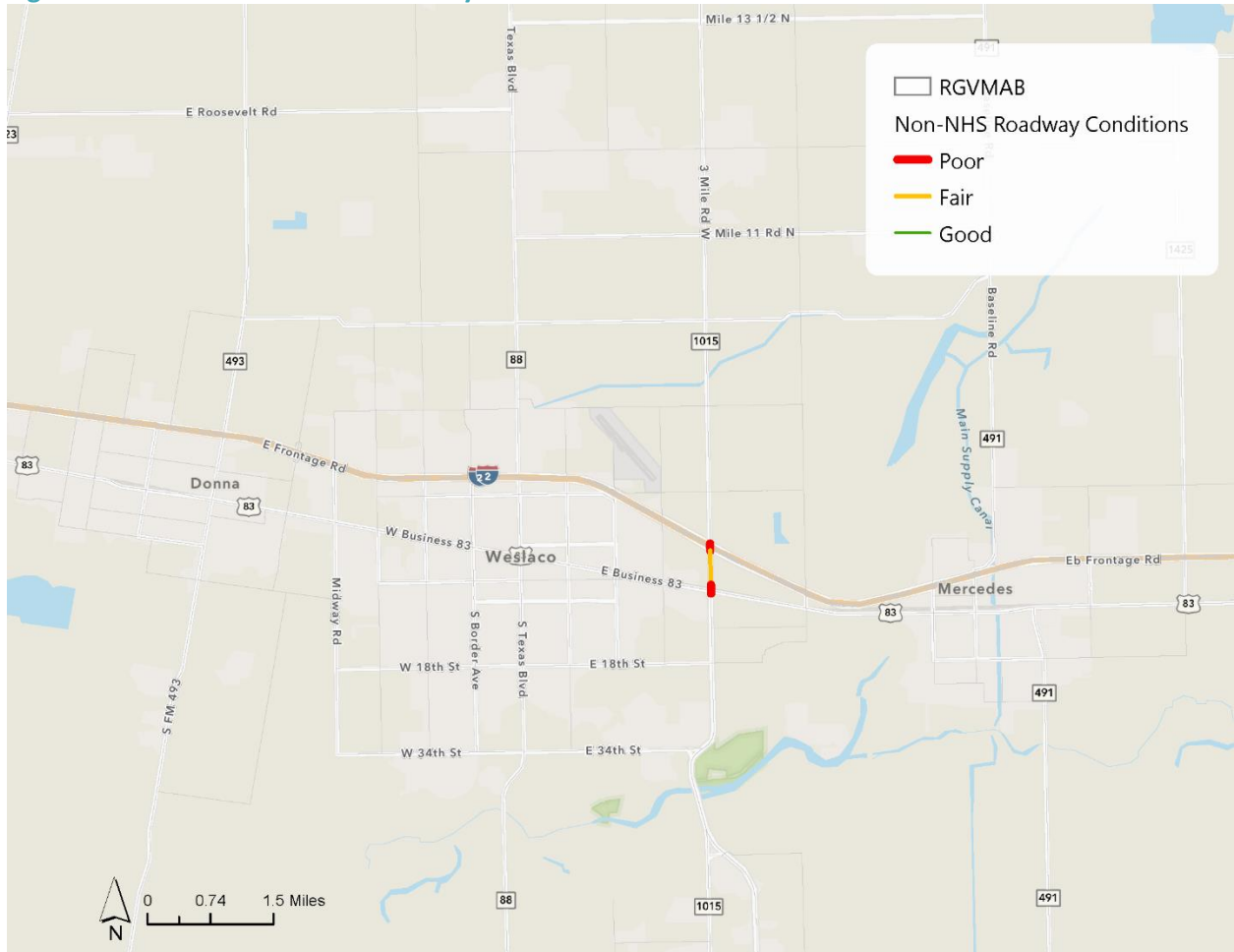**Figure 20: RGVMAB Non-NHS Roadway Conditions – Weslaco Area**

Figure 20 shows two Non-NHS segments in the Weslaco Area with a poor condition rating both along S International Blvd; just north of E 18th St and at the IH 2 overpass.

Figure 21: RGVMAB Non-NHS Roadway Conditions – Elsa, La Blanca, San Carlos Area
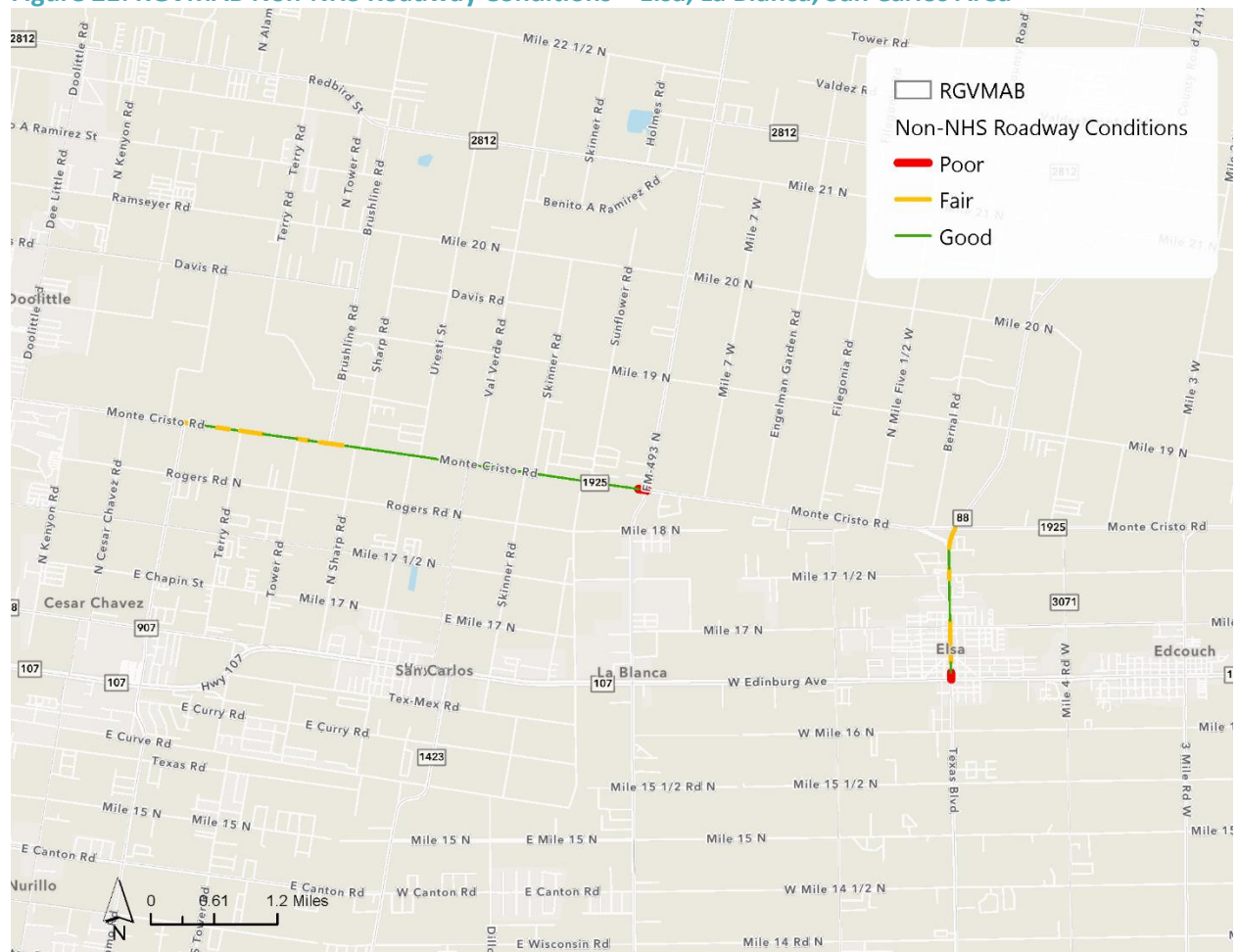

Figure 21 shows two brief segments of Non-NHS with poor condition rating in the Elsa, La Blanca, San Carlos Area; one along FM 1925, just west of La Blanca Rd and the other on Mile 5 Road W (Broadway St) just north of W Edinburg Ave.

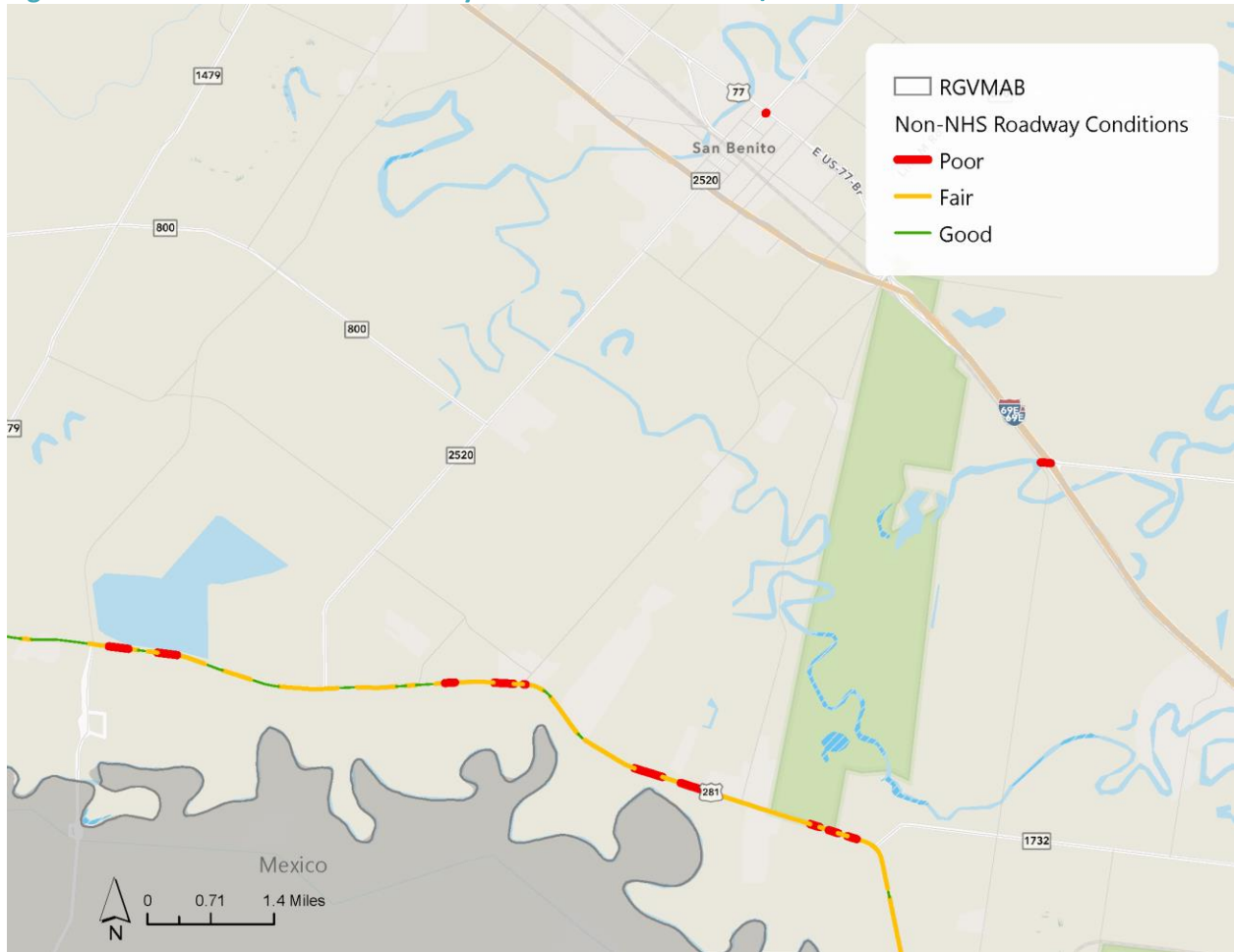**Figure 22: RGVMAB Non-NHS Roadway Conditions – La Paloma/San Benito Area**

Figure 22 shows a number Non-NHS of segments with poor rating in the La Paloma/San Benito area. The majority of these segments occur along SH 281 off and on between Santos Gomez Dr and just east of FM 509. The other two segments of Non-NHS with poor IRI rating shown in **Figure 22** are on Rice Track Rd passing under IH 69 East and on SH 345 just north of Business 77.

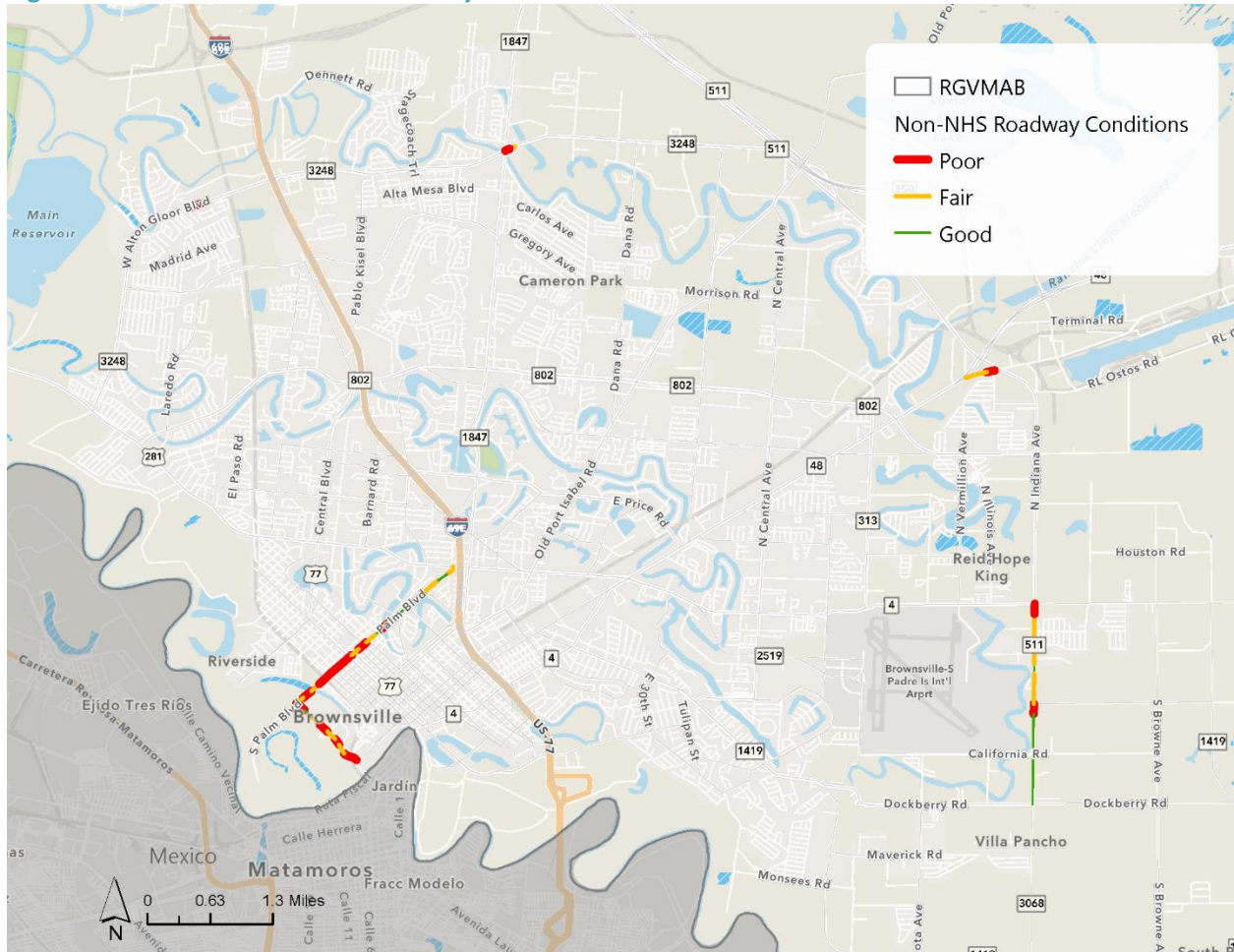**Figure 23: RGVMAB Non-NHS Roadway Conditions – Brownsville Area**

Figure 23 shows Non-NHS segments with poor rating in the Brownsville area. One adjoined stretch occurs along Mexico Blvd and Palm Blvd, between Sam Perl Blvd and W Jefferson St. Two small segments occur on S Indian Ave just west of the Brownsville South Padre Island International Airport. One segment occurs on Padre Island Hwy just west/southwest of N Indian Ave. One segment occurs on Dr. Hugh Emerson Rd. just west of Paredes Line Rd.

Conclusion

Analysis shows the RGVMPO transportation system to be in an overall state of good repair. Currently, nearly all bridge infrastructure within the RGVMAB rates at either fair or good condition based on NBI ratings (less than 1%, or 9 total, rate as structurally deficient). To prevent future operations and maintenance issues, it will be beneficial to focus on bridges rated as poor and to monitor bridge facilities rated as fair to ensure continued bridge infrastructure quality in the region. While majority of NHS and non-NHS roadway infrastructure falls within adequate condition ratings provided by IRI ratings, critical roadways in the RGVMAB contain contiguous segments of roadways in a poor state of repair. This suggests potential negative effects on the efficient and safe and resilient movement of people and goods throughout the region. Moving forward, RGVMPO will be able to leverage the methodology described in this memo to monitor bridge and roadway condition performance measures to help the continued enhancement of the RGVMPO transportation network and inform project prioritization.