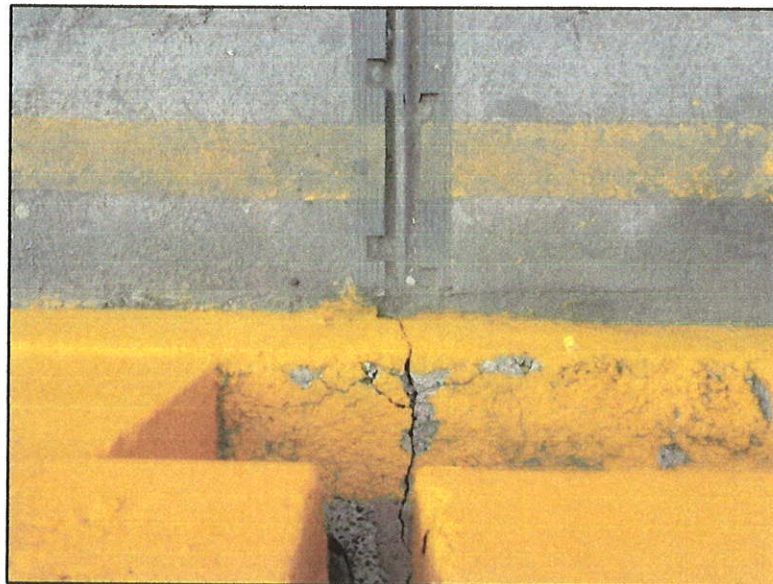


Figure 4.1.4–E (U.S.)



Figure 4.1.4–F (Mexico)



4.1.5 Traffic and Pedestrian Rails

The traffic rail that runs along the west edge of the roadway has minimal damage and a major constructability issue. A part of the bottom of the rail is detached from the vertical support (See Figure 4.1.5–A). There are no issues with the rail alignment that warrant discussion. There are many locations where the anchor bolt nuts are not properly tightened to the top of the rail connection

plate or are missing altogether. Figure 4.1.5-B shows an example of this. There is minimal spalling present on top of the curb where rail is bolted in (See Figure 4.1.5-C). This traffic rail requires immediate action with the proper placement of anchor bolts and nuts to the connection plates. Overall it appears to be in fair to satisfactory condition.

The pedestrian combination rail (PCR) that runs along the east edge of the roadway has minor honeycombing and transverse cracking throughout. The alignment of PCR is good and no major damage was noted. All post connections at the top of the rail are satisfactory along with the paint of both the concrete and steel. Figure 4.1.5-D shows a broad view of the PCR at the border. The U.S. side of the rail is to the left while the Mexico side is to the right. The PCR transitions to a combination rail without openings at span 5 (See Figure 4.1.5-E) and then transitions again into a tall concrete wall. There is some spalling noted at the top of this wall (See Figure 4.1.5-F). Overall the PCR and concrete wall appear to be in satisfactory condition.

Figure 4.1.5-A (Mexico)



Figure 4.1.5–B (Mexico)



Figure 4.1.5–C (Mexico)



Figure 4.1.5-D (Mexico & U.S.)

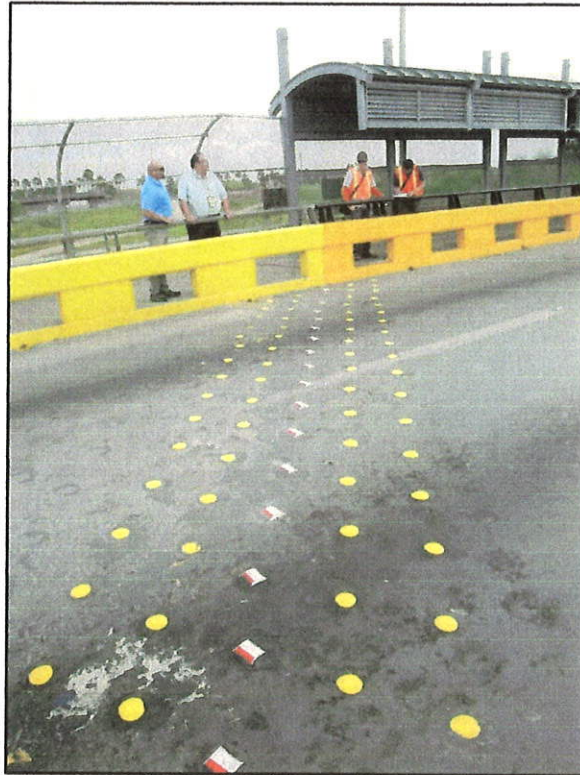


Figure 4.1.5-E (U.S.)



Figure 4.1.5–F (U.S.)



4.1.6 Canopy and Fence

The canopy (Mexico side) and high fence (U.S. side) both appear to be structurally adequate. Amongst the damage noted include damaged fencing, damaged bottom panels, and minor concrete spalling around the bolted connections to the sidewalk. There are also areas where the fencing panels are loose or not re-attached properly. The traffic rail behind the canopy and high fence appears to be in great condition since it has minimal exposure to pedestrians and traffic. There is not any notable damage to high fence on the U.S. side of the bridge. Figure 4.1.6–A shows the canopy on the right and the high fence on the left. This marks the border line for the U.S. and Mexico. Figure 4.1.6–B illustrates the typical damage to the bottom panels of the canopy. Figure 4.1.6–C shows a piece of the canopy fencing that needs to be re-attached properly while Figure 4.1.6–D shows a piece of canopy fencing that warrants replacement. Overall the canopy and high fence appear to be in good condition.

Figure 4.1.6–A (Mexico & U.S.)



Figure 4.1.6–B (Mexico)



Figure 4.1.6–C (Mexico)



Figure 4.1.6–D (Mexico)



4.2 Superstructure

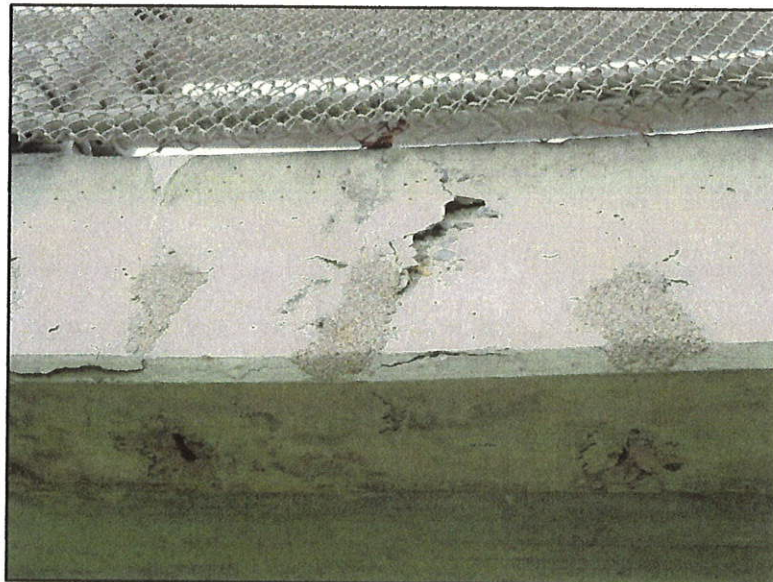
4.2.1 Concrete Slab and Diaphragms

The overhang on the downstream side of span 5 near abutment 6 has exposed rebar and spalling concrete on the bottom of the overhang as shown in Figure 4.2.1-A. This is an extreme case of this general condition that exists at many locations along the overhang. The overhang edge also has spots where the concrete is delaminated as shown in Figure 4.2.1-B.

Figure 4.2.1-A (U.S.)



Figure 4.2.1-B (U.S.)

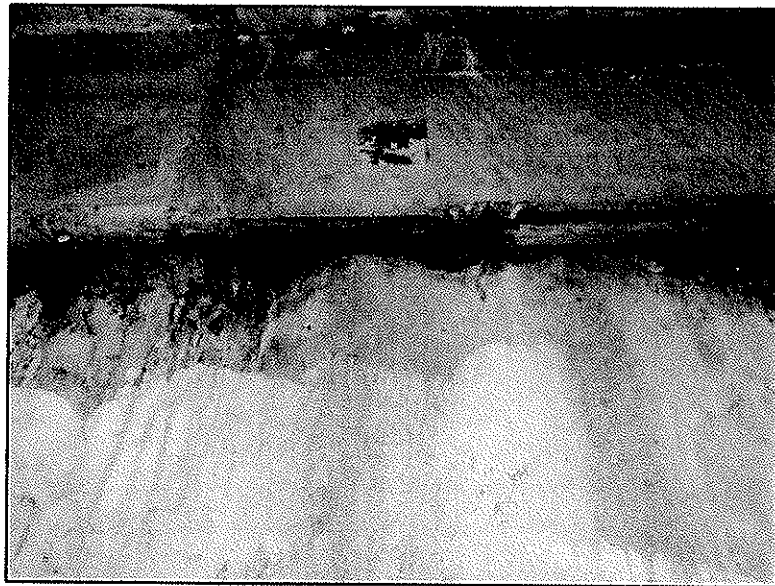


The deterioration on the overhangs is primarily in the narrow cast-in-place sections that run along the edges of the overhangs outside of the adjacent exterior T-beams for the entire length of the bridge.

The condition of spalled and delaminated concrete and exposed rebar, although it appears extensive in that it occurs in many areas throughout the bridge, is considered minor deterioration at this time because it occurs primarily, though not exclusively, in the overhangs. The overhangs are generally in fair to poor condition, and should be repaired soon, but they do not significantly affect the structural capacity of the bridge at this time.

Some of the interior diaphragms have exposed rebar on the bottoms of the diaphragms. Many of the diaphragms on the Mexican side of the bridge have small patches where it appears minor repairs were made. At abutment 1 the bottom of the end diaphragm has exposed and rusty rebar as shown in Figure 4.2.1-C. Overall, the diaphragms are in satisfactory condition.

Figure 4.2.1-C (Mexico)



The bridge drains and canopy base plates protruding through the overhangs are generally in good condition. Some of the piping is broken on bridge drains on the Mexican side of the bridge. The concrete in the areas of the drains and base plates appeared in good condition.

At the joint between the span 5 slab unit and bent cap 5 the edge of the slab overhang and bent cap overhang are offset. It is our understanding that this offset is due to movement of bent cap 5 that lead to the major repair of this bent cap. Figure 4.2.1-D above shows a close up of this condition where the edge of bent cap 5 is not in line with the edge of the overhang on the span 5 slab unit.

This condition does not significantly affect the structural capacity of the bridge at this time but warrants close monitoring.

Figure 4.2.1-D (U.S.)



Overall, the concrete slab and diaphragms are in fair to satisfactory structural condition.

4.2.2 Beams

The bridge spans consist of T-beam spans from span 1 through span 4 and a slab span with exterior beams in span 5. On the Mexican side of the bridge the bottoms of the beams have many small patches where it appears that exposed rebar or other deterioration may have been patched and repaired. At span 3 the bottom of a beam has exposed rebar. An exterior beam on the Mexican side of the bridge has exposed rebar and honeycombing at the bottom of the beam near a bent cap as shown in Figure 4.2.2-A. Pieces of wood formwork are attached to the end of one of the beams on the Mexican side of the bridge. At span 5 one of the exterior beams on the upstream side of the bridge has some exposed rebar and spalling at the bottom of the beam as shown in Figure 4.2.2-B. The exposed rebar is minor deterioration and does not significantly affect the structural capacity of the bridge. Observation of the bearing pads and bearing seat areas was limited to the abutments where observation was still limited due to the confined space. However, observation of the bearing areas did not reveal any problems with the beams. Overall the beams are in good structural condition.

Figure 4.2.2-A (Mexico)

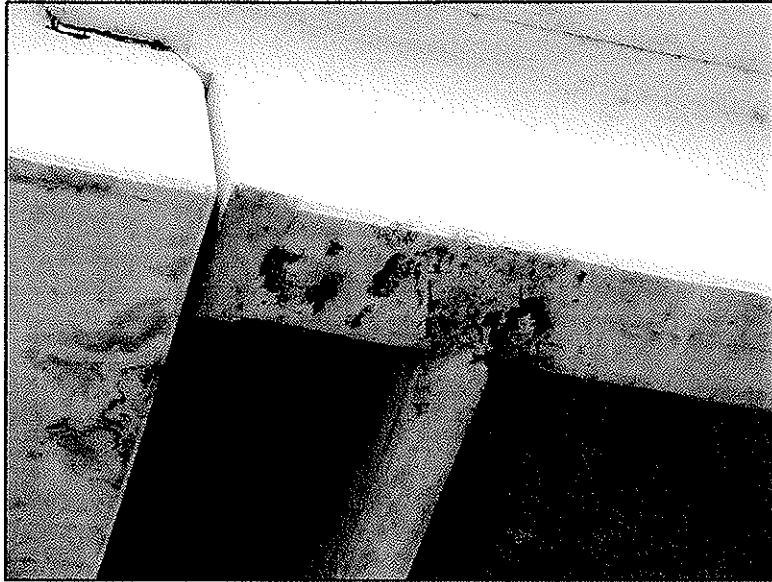
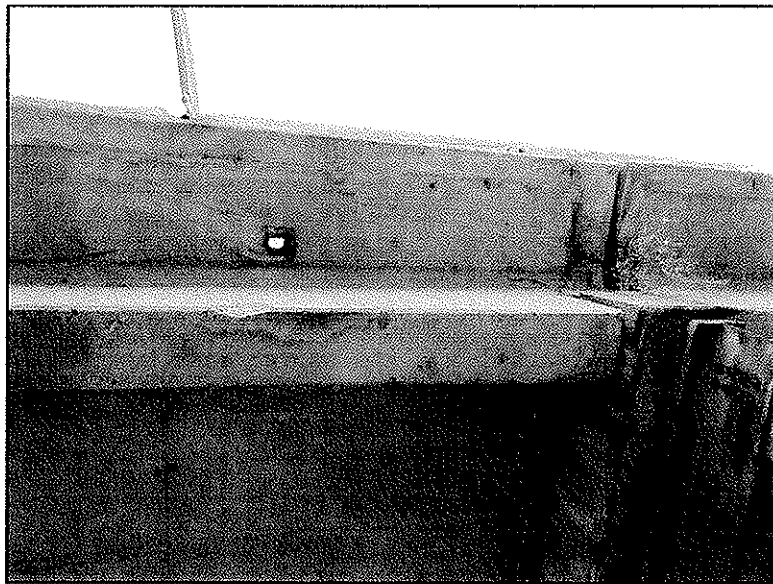


Figure 4.2.2-B (U.S.)

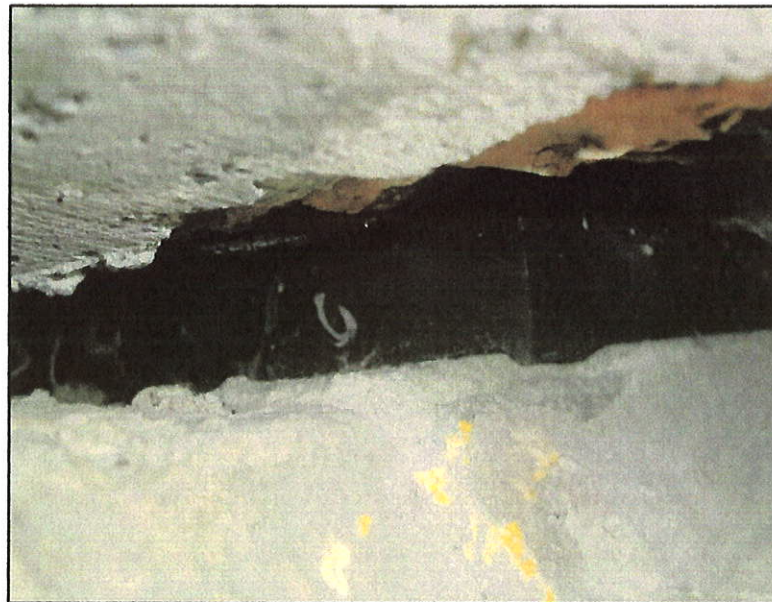


4.3 Substructure

4.3.1 Bearing Seats and Bearing Pads

Observation of the bearing seats and bearing pads was constrained to the abutments since no overhead equipment was provided. The confined spaces made bearing seat and pad observations difficult at the abutments. Figure 4.3.1-A shows one of the bearing pads at abutment 1 that appears to be in good condition. Overall, observation of the bearing areas did not reveal any problems with the bearing seats and bearing pads which appear to be in satisfactory structural condition.

Figure 4.3.1-A (Mexico)



4.3.2 Bent Caps

The bottom of the exterior cast-in-place overhang strip on the upstream side of bent cap 4 appears to have very little or no concrete cover. The bottom of bent cap 2 at the downstream side corner adjacent to span 1 is cracked and shows evidence of delamination as shown in Figure 4.3.2-A. On the Mexican side of the bridge, some of the bent caps have small patches on the bottom where it appears repairs were made. Also on the Mexican side, bent cap 2 has hardware embedded and left in place at the bottom of the cap from what appears to be epoxy injection repairs. Figure 4.3.2-B shows three locations of exposed rebar at the bottom of one of the bent caps on the Mexican side of the bridge.

Figure 4.3.2-A (Mexico)

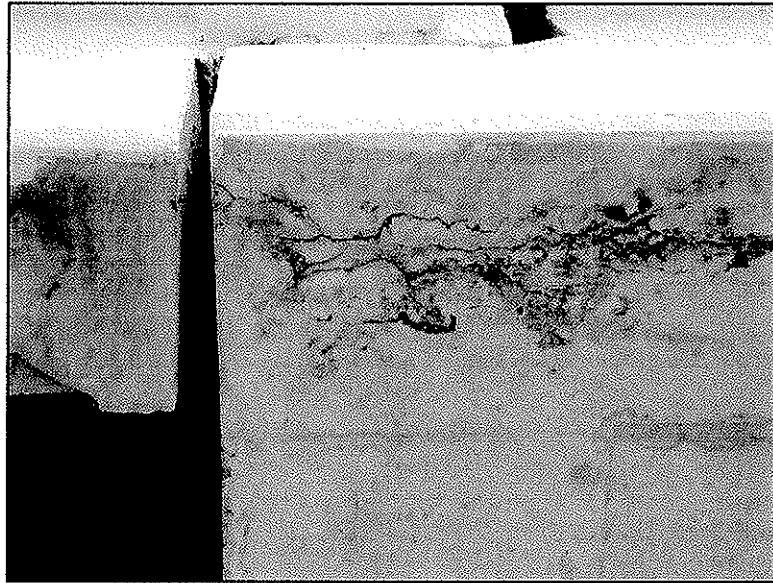
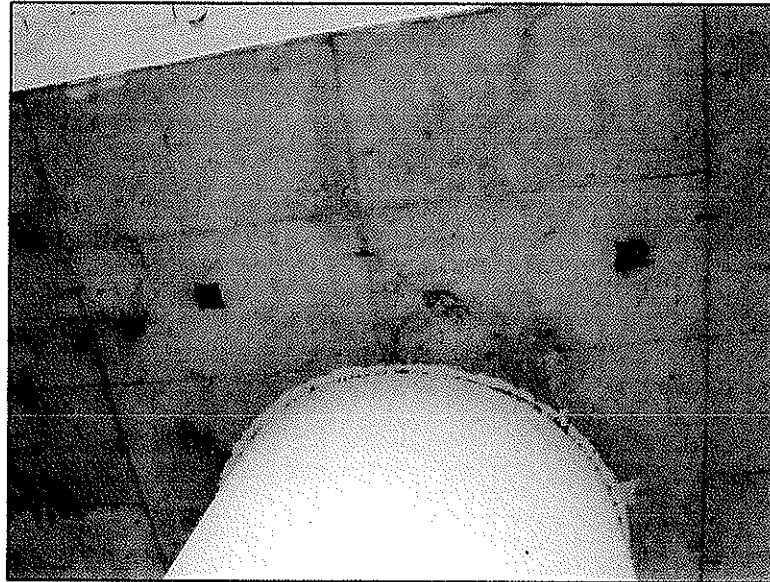


Figure 4.3.2-B (Mexico)



On the U.S. side of the bridge bent cap 5 is supported by a retrofitted steel frame and columns structure. The steel repair structure will be discussed in the Concrete Columns section below. Bent cap 5 has cracks at the upstream and downstream sides near the bearings. The bent cap overhangs have exposed rebar and cracks on the downstream side and cracks on the upstream side. The bottom of the overhang on the downstream side has significant areas of exposed rebar, cracks, spalls, and delaminated concrete. The bottom of the overhang on the upstream side has some spalling and exposed rebar at the joint with span 4 and a small area of exposed rebar closer to span 5.

Despite the deterioration mentioned above, the structural capacity of the bent caps as a whole does not appear to be significantly affected at this time and the bent caps appear to be in fair to satisfactory structural condition.

4.3.3 Concrete Columns

The column at bent 4 is telescoped with an upper section diameter that is slightly narrower than the section below it. The columns on the Mexican side of the bridge appeared to be in good condition.

As mentioned in the previous section, bent cap 5 on the U.S. side is supported by a retrofitted steel frame and steel columns encased in concrete. Figure 4.3.3-A shows the bent 5 column and the steel repair structure. The steel frame is connected to the column and is supported by steel columns encased in concrete under the north and south ends of the bent cap. The repair steel structure

appears to be adequately supporting bent cap 5. The paint system on the steel frame and columns is failing and all the steel needs to be sanded and repainted. The north concrete encasement wall has exposed rebar on the downstream side. Soundings on the encasement walls indicate signs of delamination in several areas of the walls. The bent 5 column has a crack on the downstream side.

Figure 4.3.3-A (U.S.)



The concrete columns did not appear to have any signs that would indicate significant loss of structural capacity. In general, the concrete columns appear to be in satisfactory structural condition.

4.3.4 Abutments

The downstream side of abutment 1 does not have a wingwall and shows signs of soil erosion. Abutment 1 has a steel framed structure in front of it that has steel rods going back to the abutment cap through the riprap in front of the abutment. The abutment 6 cap is stained. There was no evidence of any problems with the abutment backwalls. The abutments generally appear to be in satisfactory structural condition.

4.3.5 Foundations / Settlement

The concrete columns are supported on deep circular footings. The existing ground at the bases of the columns did not show signs of scour or erosion significant enough to affect the structural capacity of the foundations. No appreciable settlement was observed from below the bridge. The major repair at bent 5 was due to movement that occurred and this bent should be regularly monitored for any additional movements. The foundations appear to be in satisfactory to good structural condition.

5 Summary and Conclusions

The overall condition rating for the bridges utilizes the following TxDOT rating scale:

TxDOT's Condition Rating Scale:

- 0 = Failed condition – bridge closed and beyond repair
- 1 = Failing condition – bridge closed but repairable
- 2 = Critical condition – bridge should be closed until repaired
- 3 = Serious condition – deterioration seriously affects structural capacity
- 4 = Poor condition – deterioration significantly affects structural capacity
- 5 = Fair condition – minor deterioration of structural elements (extensive)
- 6 = Satisfactory condition – minor deterioration of structural elements (limited)
- 7 = Good condition – some minor problems
- 8 = Very good condition – no problems noted
- 9 = Excellent condition
- N = Not applicable

Condition Rating Table: Southbound Bridge

Bridge Component Description	Rating	
	U.S.	Mexico
Bridge Deck	7	7
Bridge Joints	6	7
Bridge Drains	6	6
Curbs and Sidewalks	6	6
Traffic and Pedestrian Rails	6	6
Canopy and Fence	7	7
Concrete Slab and Diaphragms	6	6
Beams	7	7
Bearing Seats and Bearing Pads	6	6
Bent Caps	6	6
Columns	7	7
Abutments	6	6
Foundations/Settlement	7	7
Overall Rating of Bridge	6	6

The ratings are based on the observations noted on the previous pages.

The overall condition rating for the U.S. side of the Southbound Gateway International Bridge is "6", which is defined as "Satisfactory condition – minor deterioration of structural elements (limited)" per TxDOT's condition rating scale.

The overall condition rating for the Mexican side of the Southbound Gateway International Bridge is "6", which is defined as "Satisfactory condition – minor deterioration of structural elements (limited)" per TxDOT's condition rating scale.

Condition Rating Table: Northbound Bridge

Description	Rating	
	U.S.	Mexico
Bridge Deck	6	6
Bridge Joints	6	7
Bridge Drains	6	6
Curbs and Sidewalks	5	6
Traffic and Pedestrian Rails	6	5
Canopy and Fence	7	7
Concrete Slab and Diaphragms	6	6
Beams	7	7
Bearing Seats and Bearing Pads	6	6
Bent Caps	5	6
Columns	5	7
Abutments	6	6
Foundations/Settlement	6	7
Overall Rating of Bridge	5	6

The ratings are based on the observations noted on the previous pages.

The overall condition rating for the U.S. side of the Northbound Gateway International Bridge is "5", which is defined as "Fair condition – minor deterioration of structural elements (extensive)" per TxDOT's condition rating scale.

The overall condition rating for the Mexican side of the Northbound Gateway International Bridge is "6", which is defined as "Satisfactory condition – minor deterioration of structural elements (limited)" per TxDOT's condition rating scale.

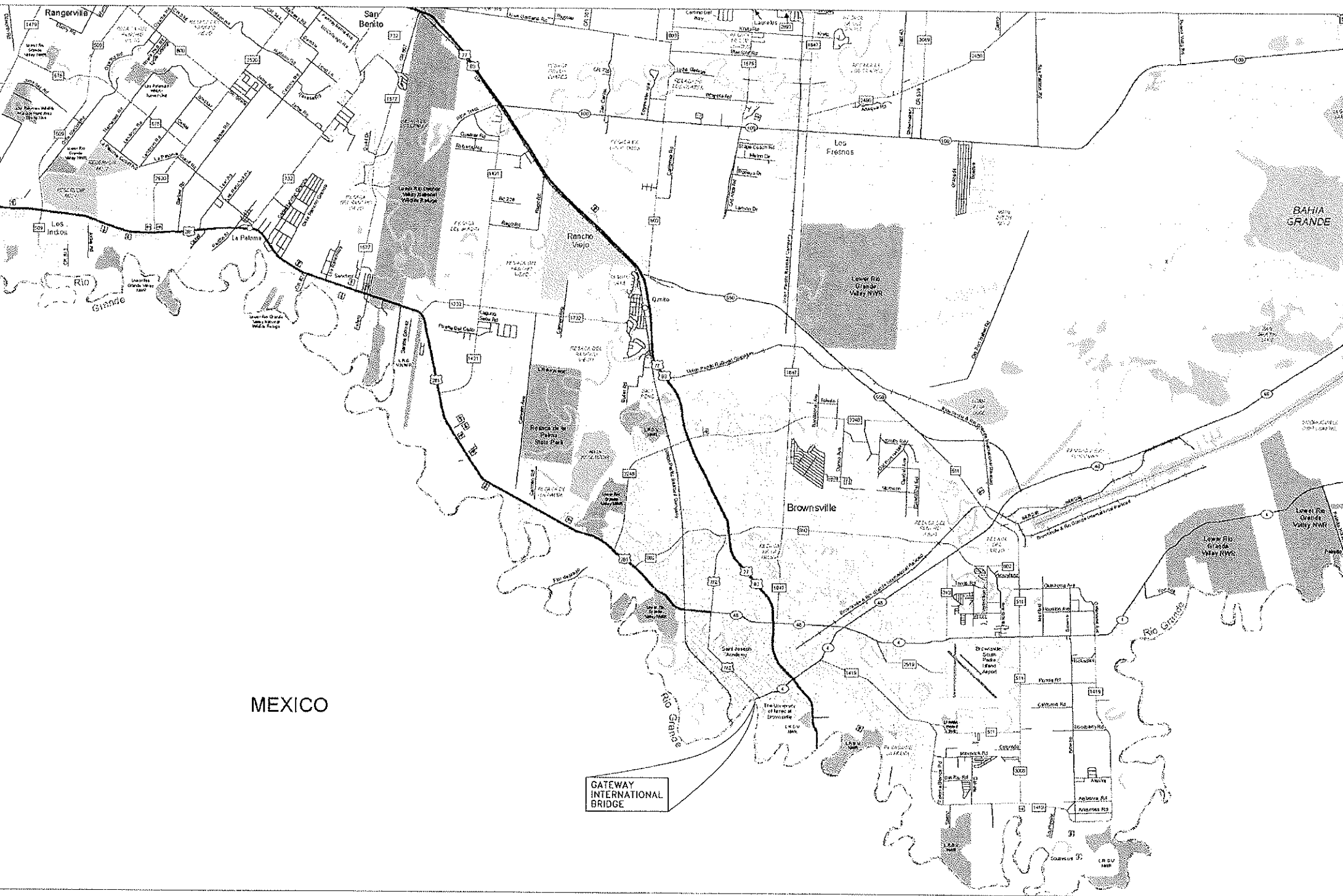
SUMMARY

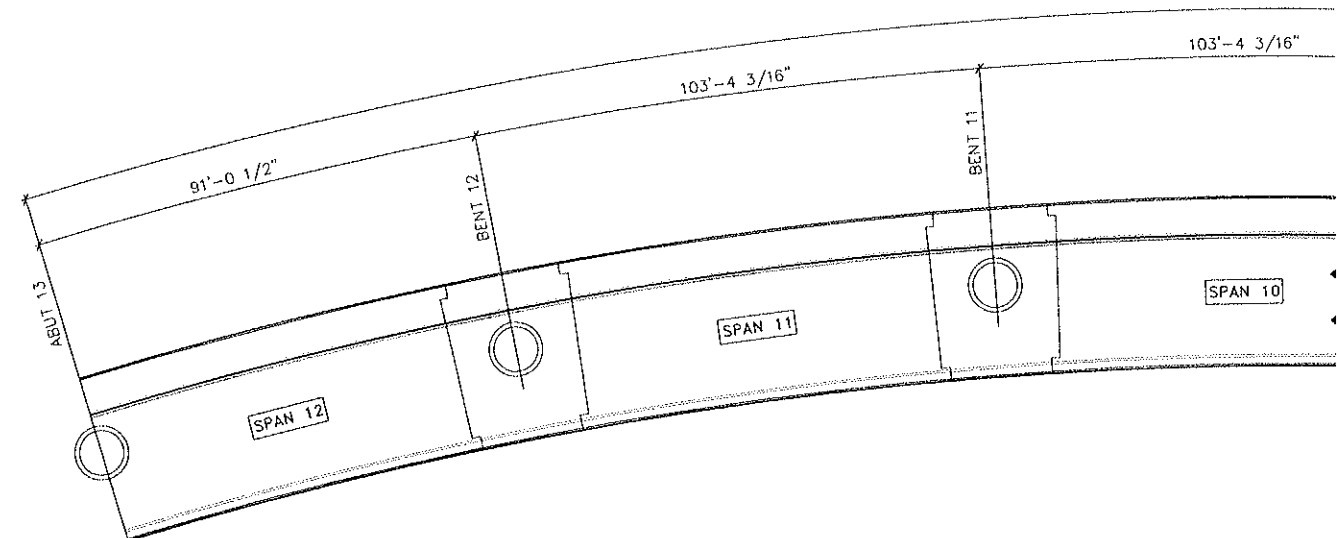
The Gateway International Bridges are approximately 33 years old and with proper maintenance could remain functional for many years to come, especially considering that commercial trucks are now directed to the Veterans International Bridge a few miles away. The U.S. portion of each bridge consists of one abutment, one bent and 1 1/2 spans. On the day of our visit the bridges were highly utilized by both pedestrian and vehicular traffic.

Overall, both the U.S. and Mexican sides of the southbound bridge is in satisfactory condition

Overall, the Mexican portion of the northbound bridge appears to be in satisfactory condition. The only exceptions to the satisfactory rating, on the Mexican portion, are the numerous missing nuts on the traffic rail. The U.S. portion received a less than satisfactory rating due to structural deficiencies at the bent cap and column.

6 Bridge Plans





BRIDGE

