



# Texas Pacifico Transportation South Orient Rail-line Infrastructure Assessment

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## Executive Summary

The Texas Pacifico Transportation Ltd. (TXPF) operates and maintains the Texas Department of Transportation (TxDOT)-owned South Orient Rail-line right of way between San Angelo Junction (near Coleman, Texas) to Presidio, Texas. There are approximately 371 mainline track miles between San Angelo Junction and Presidio. TxDOT contracted with HNTB Corporation for an infrastructure needs assessment and order-of-magnitude cost analysis to complete the rehabilitation of the line. The project was divided into two segments for the needs assessment report: Segment 1 – San Angelo Junction to Fort Stockton (milepost 0.00 to milepost 69.6 and milepost 714.5 to milepost 881.7) and Segment 2 – Fort Stockton to Presidio (milepost 881.7 to milepost 1029). The San Angelo Junction-to-Fort Stockton section is currently in service, while the Fort Stockton-to-Presidio section has been out of service for approximately six years.

Most of the rail between San Angelo Junction MP 0.00 and the west side of the city of San Angelo (MP 722.00) is in need of rehabilitation or replacement due to flattened head, severely worn rail, and worn out and damaged joints. TxDOT and TXPF have changed out some rail in this segment of track in order to initiate and maintain 25 mph track speeds. In order to maintain the South Orient Rail-line at a Class 2 (25 mph) designation, it is recommended that any rail section with a rail weight of less than 115# per yard be replaced with rail of 115# or higher. Areas below a weight of 110 # occur between milepost 1.00 and milepost 69.60, between milepost 714.50 and milepost 716.00 and between mileposts 870.00 and 880.00. It is recommended that the rail change-out program between MP 0 and MP 880 be completed within three years. The rail in the Segment 2 section from Fort Stockton to Presidio is 90# or lighter (70# between MP 880 and MP 943) and should all be replaced. Numerous switches were identified for repair or replacement in both the Segment 1 and Segment 2 segments. Switches must be replaced anywhere that rail size is changed for the switch to match the rail and function.

Many ties were observed to be in fair to poor condition and should be also be replaced. In order to meet and maintain a solid Class 2 designation, it is recommended that 127,370 ties be replaced per year over the next three (3) years in the Segment 1 study area to satisfy these criteria. This equates to replacing 4% of the overall ties per year for the next three years, followed by an effective maintenance program that will continue the annual replacement of ties as needed for Class 2. It is recommended that the Segment 2 section be completely rebuilt in order to meet Class 2 designation.

Most bridges on the line are timber structures. Many repairs have been completed in the Segment 1 section as part of the on-going effort to achieve and maintain Class 2 track conditions. It is recommended that bridge improvements continue in the Segment 1 section with an estimated budget of \$179,000 for 3 years. A bridge maintenance and repair program should also be instituted in the Segment 2 section with a budget of \$986,125 per year for 2 years.

The table below summarizes the estimated costs for improvements. The Segment 2 items can be deferred if necessary since no traffic currently moves over that section of the line and have been given an alphabetical year designation so it doesn't appear that those investments must be made during the same timeframe as the Segment 1 investments.

<b>Segment 1</b>	<b>Year 1</b>	<b>Year 2</b>	<b>Year 3</b>
Ties	\$9,481,680	\$9,170,640	\$9,170,640
Rail	\$9,798,858	\$9,399,998	\$9,399,998
Switches	\$1,750,000	\$750,000	\$750,000
Switch Timber	\$15,577	\$0	\$0
Bridges/Drainage	\$986,125	\$986,125	\$986,125
<b>Subtotal Segment 1</b>	<b>\$22,032,240</b>	<b>\$20,306,763</b>	<b>\$20,306,763</b>
<b>Segment 2</b>			
Ties	\$14,460,048	\$7,230,024	\$7,230,024
Rail	\$18,879,250	\$9,439,625	\$9,439,625
Switches	\$3,996,184	\$0	\$0
Switch Timber	\$31,154	\$31,154	\$31,154
Bridges/Drainage	\$10,998,600	\$3,351,100	\$0
<b>Subtotal Segment 2</b>	<b>\$48,365,236</b>	<b>\$20,051,903</b>	<b>\$16,700,803</b>
<b>Total Segments 1 and 2</b>	<b>\$70,397,476</b>	<b>\$40,358,666</b>	<b>\$37,007,566</b>
Estimated Cost Summary for Improvements - Segments 1 and 2			

## **1. Project Description and Purpose**

### **1.1 Purpose of Project**

The Texas Pacific Transportation Ltd. (TXPF) operates and maintains the TxDOT-owned South Orient Rail-line right of way between San Angelo Junction (near Coleman, Texas) to Presidio, Texas. There are approximately 371 mainline track miles between San Angelo Junction and Presidio. The railroad line was constructed at two different times – San Angelo Junction to San Angelo in the 1800's and San Angelo to Presidio in the late 1920's to 1930's as part of the Santa Fe Railway.

TxDOT acquired the railroad right-of-way in 1994 and completed the acquisition of the infrastructure in 2001. Interchanges with other railroads are present at San Angelo Junction with the BNSF Railway (BNSF) and the Fort Worth and Western Railroad (FWWR), at Alpine Junction with the Union Pacific Railroad (UPRR), and at Presidio/Ojinaga with Ferrocarril Mexicano (Ferromex). With recent oil and gas exploration throughout the area, TXPF has incurred a large increase in freight car shipments on the aging infrastructure. The line is maintained by TXPF as a Class 2 railroad<sup>1</sup>. Based on actual and anticipated car counts for the line provided by TXFP (as summarized in Table 1), sand, crude oil, grain, and other shipments totalled 3,968 carloads in 2011, while counts through October 2014 were up to 21,142 carloads with an estimated end-of-year count of 25,803 carloads and a 2015 estimate of 39,996 carloads. This trend of estimated annual increases in carloads continues through 2019. This recent heavy increase in freight car shipments is accelerating the degradation of the aging rail infrastructure of the South Orient Rail-line.

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<sup>1</sup> The Federal Railroad Administration (FRA) per section 213.9 of the Code of Federal Regulations (CFR) defines the speed for Class 2 track as 25 miles per hour for freight trains and 30 miles per hour for passenger trains over track that meets all of the requirements prescribed in the CFR.

ITEM	2011	2012	2013	YTD OCT 2014	Estimated 2014 (10+2)	Budget 2015	Estimated 2016	Estimated 2017	Estimated 2018	Estimated 2019
Sand	2329	6,846	16,018	19,055	23,215	33,664	38,714	44,443	51,021	58,572
Crude	0	2,202	6,054	1,228	1,472	4,704	5,410	6,210	7,129	8,184
Grain	354	894	927	196	196	740	851	977	1,122	1,288
Other	1,285	707	533	663	920	888	1,021	1,172	1,346	1,545
<b>Total</b>	<b>3,968</b>	<b>10,649</b>	<b>23,532</b>	<b>21,142</b>	<b>25,803</b>	<b>39,996</b>	<b>45,996</b>	<b>52,802</b>	<b>60,618</b>	<b>69,589</b>
Carload information received from TXPF on 11/17/14										

Table 1: TXPF Carload Data (through October 2014)

The South Orient Rail-line Infrastructure Assessment project provides a needs assessment for the determination and identification of selected track, switch, crossing, siding, bridge, drainage structure, or facility defects to be replaced, rehabilitated, or reconstructed and for the rehabilitation of the South Orient Rail-line between San Angelo Junction and Presidio, Texas.

Order-of-magnitude construction cost estimates for maintenance and capital projects, based on the results of the field observations, for near-term and cyclical programs may help TXPF and TxDOT secure additional funding to support the additional capital projects to maintain the railroad in a state of good repair for continuing and increasing freight rail service.

## 1.2 Project Description

The project was divided into two phases for the assessment needs report: the first phase was designated as Segment 1 – San Angelo Junction to Fort Stockton (milepost 0.00 to milepost 69.6 and milepost 714.5 to milepost 881.7). The second phase was designated as Segment 2 – Fort Stockton to Presidio (milepost 881.7 to milepost 1029). The San Angelo Junction-to-Fort Stockton section is currently in service, while TXPF advises the Fort Stockton-to-Presidio section has been out of service for approximately six years.

Major tasks performed as part of this infrastructure assessment are listed below and documented in this report:

- Random observations were performed on tangent and curved track, switches, bridges, drainage structure, and facilities.

- Observations were compared to most recent TXPF inspection records for track, switches, and bridges. TXPF did not provide inspection records for drainage structures or facilities.
- Data was collected for track and switch observations, including:
  - Locations of defective ties,
  - Locations of ties that should be programmed for replacement,
  - Observation of ballast, sub-ballast and/or track surface conditions (profile/cross-level),
  - Vertical and horizontal rail wear,
  - Track gauge,
  - Rail size and year of manufacture, and
  - Digital photographs and GPS coordinates for respective asset observed.
- Data was collected for bridges, drainage structures, and facilities, including:
  - Comparison of most recent bridge inspection records to field observation,
  - Observation of facilities (in-service buildings),
  - Observation of drainage structures, and
  - Digital photographs and GPS coordinates for respective asset observed.
  - Recommended improvements and estimated order-of-magnitude construction costs for those recommended improvements were prepared for the Segment 1 and 2 sections of the South Orient Rail-line for near-term (first year) and cyclical programs to maintain Class 2 status.

## **2. Field Observations**

A four-person HNTB team performed the field observations for both the Segment 1 and Segment 2 sections of the railroad. The majority of the railroad for Segment 1 – San Angelo Junction to Fort Stockton was hi-railed by the team with a TXPF employee in charge. A random asset observation list was prepared upon review of inspections records provided by TXPF. Random observations were documented based, in part, on what comments were listed on the respective reports. The track inspections may have shown gauge or tie conditions and this location would have been included for a random observation. The same rationale existed for the random bridge observations. Additional random observations were taken based upon what was seen in the field. Upon arrival to the

respective asset observation, the team walked the area, recorded appropriate information, and took photographs.

Segment 1 included the following observations:

- 101 tangent track observations
- 73 curved track observations
- 21 switch observations
- 47 bridge observations
- 5 drainage structure observations
- 5 facility observations

Segment 2 included the following observations:

- 51 tangent track observations
- 45 curved track locations
- 14 switch locations
- 33 bridge observations
- 14 drainage structure
- 2 facility observations (there are currently no in-service facilities)
- 1 private crossing
- 1 rockslide area

## **2.1 Track Observations (tangent, curves and switches)**

Track (including tangent track, curved track, ties and switches) field observation data for Segments 1 and 2 is documented in Appendix A1 and A3, and recommended improvements and estimated construction costs are documented in Appendix B1 and B3. Photos for track items for Segments 1 and 2 are contained in Appendix C1 and C3. Observations and recommended track improvements are summarized in the following sections.

### **2.1.1 San Angelo Junction to Fort Stockton (Segment 1)**

#### Rail

One hundred and one (101) field observations were performed. The condition of the rail inspected during Segment 1 is in good condition between milepost 722.00 and milepost 880.00, showing only normal wear, degradation requiring only minimal work, and may be re-used when performing tie replacement. The rail between milepost 0.00 and 69.6 and milepost 714.5 to 722.00 is in need of rehabilitation or replacement due to flattened head, severely worn rail, and worn out and damaged joints. TXPF has changed out some rail and replaced joint bars to maintain an interim Class 2 of track.

In order to maintain the South Orient Rail-line at a Class 2 designation, it is recommended that the rail be replaced for any rail section with a rail weight of less than 115#. Areas below a weight of 110 # occur between milepost 1.00 and milepost 69.60, between milepost 714.50 and milepost 716.00 and between mileposts 870.00 and 880.00. It is recommended that the rail change-out program be completed in three years.

There is immediate maintenance work needed on the rail between milepost 0.00 and milepost 69.60 and between milepost 714.50 and milepost 722.00 and minor work between milepost 722.00 and milepost 880.00, involving rail grinding and small sections of rail replacement.

#### Ties

Throughout the 101 field observations performed it was observed that the ties are in poor condition, and tie replacement may be the area that needs the most attention along the Segment 1 section. The ties were rated in percentages of the amount of anticipated usable life left in the ties. Ties are recommended to be deemed ready for replacement when life expectancy falls below 30% of their remaining usable life per accepted practices for rail inspection set forth by AREMA. The most deteriorated area for tie condition was observed between milepost 737.00 and milepost 880.00.

The Federal Railroad Administration (FRA) dictates that in order to maintain a Class 2 designation, each 39-foot segment of track shall have a minimum of eight (8) effective ties throughout its 39-foot length with no more than two successive defective ties in a row in that 39-foot segment.

In order to meet a solid Class 2 designation, it is recommended that TXPF initiates a program to install 127,370 ties per year over the next three (3) years in the Segment 1 study area to satisfy these criteria. This equates to replacing 4% of the overall ties per year for the next three years and to initiate a plan to continue to install 4%, or 127370 ties, per year until all of the ties have been replaced.

Immediate attention is needed from milepost 752 to 759 and milepost 790 to 791 where 4320 ties should be installed within the next six months. These locations have tie conditions observed to be below 20% of remaining tie life. These areas listed below (below 20% remaining tie life) should be scheduled for tie replacement in the next three (3) months.

- Milepost 752 to 753 – 15% remaining life
- Milepost 753 to 754 (curve) – 5% remaining life
- Milepost 753 to 754 (switch) – 2% remaining life
- Milepost 758 to 759 – 15% remaining life
- Milepost 790 to 791 (from the tangent into switch 8014E, 8015E and 8014W) 5%-15% remaining life

### Curves

Field observations were performed for 73 curves. The curves were observed to be in good overall condition showing a normal amount of wear and degradation throughout for the age of the railroad. There are several areas of greater than normal rail head wear between MP 3.5 and MP 69.9. The most severe rail head wear was observed on curves #21 and #33 (as defined from TXPF track chart information). It is recommended that this rail be replaced within the next year. Curve #180 also needs immediate attention due to it not holding gauge with weathered and severely worn and damaged ties; this was brought to the attention of TXPF at the time of observation. Rail and tie replacement needs noted in previous sections are also applicable for curve locations.

### Switches

Field observations were performed for 21 switches. There are nine switches observed that need attention. Three of the switches needing attention should be scheduled for replacement within the next year as listed below:

- Switch #9007 between milepost 20-21
- Switch at milepost 21.6 (unknown number)
- Switch #7101 at milepost 70.2

The remaining six switches, as observed, need repairs as follows:

- Milepost 1.4 (unknown switch number) – frog points showing excessive wear and need to be replaced

- Milepost 37.5 switch #9012 – replace stock rail and north switch points
- Milepost 45.8 switch #9023 – replace frog
- Milepost 64.3 switch #9027 – replace frog
- Milepost 715.5 switch # 7701 – add ballast and tamp
- Milepost 753.6 switch # 8006E – needs timber replacement

### **2.1.2 Fort Stockton to Presidio (Segment 2)**

#### Rail

Fifty-one (51) tangent track field observations were performed. The condition of the rail inspected in Segment 2 is in extremely poor condition. The rail line from milepost 883 to milepost 1027.11 has not been in service for some time, adding to its deteriorated state.

In order for the South Orient Rail-line to be rated at a Class 2 designation in the Segment 2 area, it is recommended that the rail be replaced for any rail section with a rail weight of less than 115# To meet Class 2 designation with 115#, all of the rail from Fort Stockton to Presidio should be replaced.

#### Ties

Throughout the 110 field observations performed, only eleven (11) observations showed ties that were sufficient for operations due to ties being replaced in 2004 to hold gauge. The hardware holding the rail to the ties is showing signs of severe wear and needs to be replaced. There were 35 locations where the ties are in such bad condition they are forcing the rail to be out of AREMA guidelines with thirty-five (35) geometry issues, ranging from waves in the rail to sinking rails to alignment issues.

The ballast throughout Segment 2 is in need of attention due to being fouled. This entire section needs regulating and tamping throughout with several locations in need of additional ballast. There are also many areas that do not have a sufficient ballast shoulder. In a majority of the observations, weeds grew in the gauge of the track and in several areas rock and mud slides fouled the track.

In order to meet a Class 2 designation, it is recommended that TXPF initiates a program to completely rebuild the region covered in Segment 2. This rebuild will include ties, rail and ballast.

## Curves

Field observations were performed for 45 curves. Other than the general condition issues mentioned above relating to ties and ballast, the curves were observed to be in good condition and showed a normal amount of rail wear and degradation throughout for the age of the railroad. Rail and tie replacement noted for in previous sections are applicable for curve locations.

## Switches

Field observations were performed for 14 switches. There are eight (8) switches observed that need replacement. Before this line segment is returned to service, all of the eight switches identified below should be replaced:

- Switch #8601
- Switch #8605
- Switch #8810
- Switch #8615
- Switch #8622
- Switch #8629
- Switch @ MP 969.10
- Switch @ MP 969.40

All of the ties at Segment 2 observed switches need to be replaced.

## **2.2 Bridge, Drainage and Facility Observations**

Bridge, drainage structure, and facility field observation data for Segments 1 and 2 are documented in Appendix A2 and A4, and recommended improvements and estimated construction costs are documented in Appendix B2 and B4. Photos for Segments 1 and 2 are contained in Appendix C2 and C4. Observations and recommended improvements for bridges, drainage structures, and facilities are summarized in the following sections.

## 2.2.1 San Angelo Junction to Fort Stockton (Segment 1)

### Bridges

A total of 47 bridge observations were performed and compared with most current bridge inspection records provided. Fourteen (14) of the observations did not match or partially matched the text provided in the bridge inspection record. None of the 14 observations were critical issues and are summarized below:

- TXPF record: “visual open inspection” written on bridge 826.10 inspection record with no clarification of reference.
- TXPF record: Replace cap on bridge 815.80 record.
  - Observation: Cap was inspected and sounded with hammer. Disagree with comment on report.
- TXPF record: Replace bridge ties on bridge 804.30 record.
  - Observation: Inspected and resulted in partial tie replacement recommendation.
- TXPF record: Replace stringers on bridge 770.20 record.
  - Observation: Outside stringers were added (inspection record may have been prepared prior to stringer replacement).
- TXPF record: Reference to measure section loss on bridge 755.20 inspection record.
  - Observation: This was a reference to a timber stringer structure. Section loss usually refers to steel spans.

(Refer to Appendix A2)

Additionally, TXPF provided a copy of its Bridge Management Plan as required by the FRA. More specifically, a portion of this Code of Federal Regulations requires bridge ratings be performed to maintain safe load capacities. TXPF had advised that approximately 60% of their carloads were 286,000 pound (286 kip) loads. Its Bridge Management Plan referenced these bridge ratings. It was suggested that TXPF discuss the bridge rating capacities with its Bridge Engineer of Record and prepare any component replacement/additional member or upgrades program as may be reflected in the capacity ratings.

Many of the bridge ties observed in Segment 1 still had ‘date nails’ reflecting the age of the bridge tie. Several structures had tie replacements or the installation of gauge holding ‘safety ties’. Based on the age and condition of the bridges observed, a formal bridge tie replacement is recommended.

TXPF's bridge inventory lists 64 open deck bridges from San Angelo Junction to Fort Stockton for a total length of approximately 5,031 feet. With an anticipated bridge tie spacing of 16 inches, this equates to an approximate total of 3,773 open deck bridge ties. Not counting any safety ties added to maintain the current Class 2 status, a three-year tie replacement program is suggested. Similar to the track tie replacement, the FRA dictates that in order to maintain a Class 2 designation, each 39-foot segment of track shall have a minimum of eight (8) effective ties throughout its 39-foot length. This would equate to a bridge tie replacement of a little more than 1,257 bridge ties per year.

It is estimated this tie replacement program will cost approximately \$628,500 per year for each of the three-year open deck tie replacement program (total of \$1,885,500). This does not include new rail or tie plates.

Based on the observations performed and bridge inspection records, it appears timber component replacement is an on-going effort. Additional stringers and cap/post replacements were seen on several structures. With the additional increase in traffic and the 286 kip car loadings and as mentioned above, it is further suggested a formal 'heavy' bridge component replacement program be put in place. Several of the bridge inspection records had a comment to provide additional bridge inspection (monitoring of conditions until component replacement is completed) and this should also be implemented if not already completed.

It is estimated that a 'heavy' timber component replacement program be initiated with an annual budget based on bridge inspection record recommendations and estimated at \$179,000 per year for three years.

### Drainage Structures

A total of 5 drainage structure observations were performed. TXPF did not provide inspections records for drainage structures. These observations were made as the team hi-railed the study area. A collapsed culvert was observed at milepost 764.10 resulting in an approximate 16-inch deep opening in the gauge of the track with no ballast supporting the ties as shown in Photo 1. This collapsed culvert warranted corrective action of which TXPF was notified.



Photo 1: Collapsed Culvert at Milepost 764.10

Other drainage components observed included the following:

- Ditch-line scour at northeast and southeast quadrants of private road crossing at milepost 63.95
- Bank sloughing south side of railroad at milepost 794.60
- No ballast shoulder on south side at milepost 852.40
- Erosion at north side of culvert at milepost 875.10

## Facilities

A total of 5 facility observations were performed. TXPF does not have many facilities throughout the railroad nor do they have inspection records for their facilities. Facilities observed included the following:

- Telephone/communication concrete structure in San Angelo Junction
- Metal ‘crew reporting’ building in San Angelo Junction
- Train inspection facility in San Angelo Yard
- Mechanical services building, including inspection pit in San Angelo Yard
- Yard office building in San Angelo Yard

No condition exceptions were taken at the facility locations.

### **2.2.2 Fort Stockton to Presidio (Segment 2)**

## Bridges

A total of 33 bridge observations were performed and compared with most current bridge inspection records provided. Three (3) of the observations did not match or partially matched the text provided in the bridge inspection record. None of the three observations were critical issues and are summarized below:

- TXPF record: “Add longitudinals” on bridge 889.70 inspection record. Stringers were observed as being tight to back wall.
- TXPF record: “Multiple ballast leaks in bridge deck” on bridge 929.00 record. Did not observe any loss of ballast (problem may have been potentially corrected).
- TXPF record: Frame bent #20 and post pile bents 6 and 13 on bridge 967.20 record. Did not observe potential to post pile.

As mentioned in Segment 1 of this report on bridges, TXPF provided a copy of its Bridge Management Plan as required by the FRA. With this Segment 2 section of the railroad out of service, it is suggested that TXPF verify bridge capacity ratings before returning the line to service.

Many of the bridge ties observed in Segment 2 still had ‘date nails’ reflecting the age of the bridge tie. Based on the age and condition of the bridges observed, a formal bridge tie replacement is recommended. TXPF’s bridge inventory lists forty-four (44) open deck bridges from Fort Stockton to Presidio (not counting Bridge 1029 in Presidio) for a total length of approximately 3,531 feet. With

an anticipated bridge tie spacing of 16 inches, this equates to an approximate total of 2,655 open deck bridge ties. A safety bridge tie program should be initiated immediately once it is determined the segment will be placed back into service. This safety tie program would be part of a suggested two-year tie replacement program. Similar to the track tie replacement, the FRA dictates that in order to maintain a Class 2 designation, each 39-foot segment of track shall have a minimum of eight (8) effective ties throughout its 39-foot length. This two-year program would equate to a bridge tie replacement of 1,328 bridge ties per year.

It is estimated this tie replacement program will cost approximately \$664,000 per year for each of the two-year open deck tie replacement program (total of \$1,328,000). This does not include new rail or tie plates.

Based on the observations performed and bridge inspection records, it appears timber component replacement is critical and will be an on-going effort for this line segment. With the potential to place this portion of track back into service with the possibility of operating 286 kip car loadings, it is suggested a formal 'heavy' bridge component replacement program be put in place. The drainage area also presents unique problems with accelerated deterioration of bridge components as a result of erosion in and around substructure components. Unsupported timber sills, exposed timber piling and undermining of timber back-walls were observed in many areas. This heavy bridge component replacement does not include entire bridge replacements. Photo 2 was taken at milepost 1006.50 where subgrade was washed away and rail is now 'hanging'. This may be a location for a new bridge. Photo 3 was taken at Bridge 985.90 where the streambed under the bridge is being eroded away exposing more of the driven timber piles.



Photo 2. Milepost 1006.50 Subgrade washed away



Photo 3. Bridge 985.90 (piling exposed)

It is recommended that a 'heavy' timber component replacement and streambed protection program be initiated with an annual budget based on bridge inspection record recommendations and estimated at \$750,000 per year for two years for a total of \$1,500,000

Total bridge replacements costs, as in the case of Presidio Bridge 1029.00 and the potential for a new bridge at milepost 1006.50, are estimated as a single-track structure for \$7,000 per track foot, not including H&H analysis, geotechnical exploration, or environmental permitting. This approximate 950 feet of new substructure and superstructure is estimated at \$6,650,000.

### Drainage Structures

A total of 14 drainage structure observations were performed. TXPF did not provide inspection records for drainage items. These observations were made as the team hi-railed the study area. Major subgrade and subballast erosion is present throughout the area. Several areas indicate drainage occurs through the track ties, washing away the ballast between the ties and leaving the track ties unsupported. There are also areas where it appears runoff in drainages overtopped the existing structures. Embankment areas parallel to the track structure continues to erode. This is not a recent situation and has likely taken months/years to occur. Photo 4 at milepost 906.9 shows subgrade erosion, while Photo 5 at Bridge 985.90 shows upstream bank erosion. Photo 6 at Bridge 1000.20 shows limited streambed clearance to underside of structure, and Photo 7 shows surface flow through track ties, resulting in unsupported ties.



Photo 4. Milepost 906.9 and subgrade erosion



Photo 5. Bridge 985.90 and upstream bank erosion towards track structure



Photo 6. Bridge 1000.20 and restricted flow under structure



Photo 7. Drainage through tie structure

Mobilization costs to address erosion/drainage issues in the Segment 2 area will likely be more than similar projects due to accessibility. There are multiple areas to address prior to placing the railroad back in service and there is minimal roadway access to these locations, resulting in mobilization, in most cases, to be by rail only.

A hydraulic/hydrology analysis of the area would assist in the prioritization of the repair locations. It is estimated these drainage/erosion areas could be addressed over a two-year period with an annual expenditure of \$1,500,000 per year, totalling \$3,000,000.

### Facilities

A total of 2 facility observations were performed. TXPF does not have any occupied facilities throughout the Segment 2 area nor do they have inspection records for the existing facilities. Facilities observed included the following:

- Tinaja Station at milepost 969.1
- Presidio Yard Facility at milepost 1026.7

It is noted the Presidio Yard Facility would again be active if the railroad is placed back into service and rail cars again be shipped or received from Mexico. Those facilities would include the Department of Homeland Security Rail Car Inspection, lighting and Office structures.

No estimated improvements are required at this time.

## **3. Recommended Improvements**

Improvements (and estimates) were based on field observations and overall condition and age of the infrastructure to maintain levels of service for freight car movements. Attention was also placed on TXPF's current and anticipated car-loadings and their information on shipping 286 KIP loads. Programmed work scheduled over a three-year period was estimated for the assessment needs.

### **3.1 Track (tangent, curve and switch) Segment 1**

Track improvements and estimated cost summary are shown in Appendix B1.

### **3.2 Bridge, Drainage and Facilities Segment 1**

Bridge/ Drainage/Facility improvements and estimated cost summary are shown in Appendix B2.

### **3.3 Track (tangent, curve and switch) Segment 2**

Track improvements and estimated cost summary are shown in Appendix B3.

### **3.4 Bridge, Drainage and Facilities Segment 2**

Bridge/ Drainage/Facility improvements and estimated cost summary are shown in Appendix B4.

## **4. Estimated Costs for Segment 1**

Track estimates for the assessment needs was based on historical data from other rail, ties, surfacing and switch replacement projects and use of the RS Means On-Line Version 5.1 estimating guidelines for specific regions in the country.

Bridge, drainage and facility estimates for this assessment needs were based on historical data from similar projects.

Summary of estimated costs include \$59,687,391 for track and \$2,958,375 for bridge, drainage, and facilities from appendices B1 and B3.

## **5. Estimated Costs for Segment 2**

Track estimates for the assessment needs was based on historical data from other rail, ties, surfacing and switch replacement projects and use of the RS Means On-Line Version 5.1 estimating guidelines for specific regions in the country.

Bridge, drainage and facility estimates for this assessment needs were based on historical data from similar projects.

Summary of estimated costs include \$70,768,242 for track and \$14,349,700 for bridge, drainage, and facilities from appendices B2 and B4.

# Appendix A: Field Observation Documentation

# Appendix A1: Field Observation Documentation Track Segment 1

# Appendix A2: Field Observation Documentation Segment 1 Bridge, Drainage and Facilities

# Appendix A3: Field Observation Documentation Segment 2 Track

# Appendix A4: Field Observation Documentation Segment 2 Bridge, Drainage and Facilities

# Appendix B: Recommended Improvements and Costs

# Appendix B1: Recommended Improvements and Cost Segment 1 Track

# Appendix B2: Recommended Improvements and Cost Segment 1 Track Bridge, Drainage and Facilities

# Appendix B3: Recommended Improvements and Cost Segment 2 Track

## Appendix B4: Recommended Improvements and Cost Segment 2 Bridge, Drainage and Facilities

# Appendix C: Field Observation Photographs

# Appendix C1: Field Observation Photographs Segment 1 Track

# Appendix C2: Field Observation Photographs Segment 1 Bridge, Drainage and Facilities

# Appendix C3: Field Observation Photographs Segment 2 Track

# Appendix C4: Field Observation Photographs Segment 2 Bridge, Drainage and Facilities