Fracture Critical Bridge Inspection Report

NBI Bridge No.: 04085

Route U.S. 281 over S. CANADIAN RIVER
Canadian County

Prepared for:

Oklahoma Department of Transportation

Field Division 04

Inspection Date:

10/5/2017

Report Prepared By:

BURGESS & NIPLE, INC.

5085 Reed Rd.
Columbus, Ohio 43220
614-459-2050

BURGESS & NIPLE
Engineers ■ Surveyors ■ Planners

BURGESS & NIPLE

5085 Reed Road | Columbus, OH 43220 | 614.459.2050

Mr. Wes Kellogg, P.E.
Field Service Engineer
Oklahoma Department of Transportation
200 Northeast 21st Street
Oklahoma City, OK 73102-3204

Re: Fracture Critical Bridge Inspection Report
Structure No.: 0902 0000 X
NBI No.: 04085
U.S. 281 over South Canadian River
Canadian County, ODOT Field Division 4

November 4, 2017

Dear Mr. Kellogg:

Burgess & Niple (B&N) performed a fracture critical and routine inspection of the above referenced bridge on October 2 through 5, 2017. Route 281 is not a National Highway System (NHS) route. The bridge is a 40-span structure **(photos 1 and 2)** with spans numbered south to north and consisting of:

Spans 1 and 40:	36-foot long steel multi-beam approach spans
Spans 2-39:	100-foot long riveted pony truss spans

The limits of the inspection were from the south abutment to the north abutment. Inspection team members included Dale E. Poorman, PE (Team Leader), Ed Cinadr, PE, Shaun Fillmore, EI, Michael Kronander, PE, Benjamin Barkan, EI, Will Strehler, EI, Ryan Brown, EI, and Kevin Hyland, EI.

The bridge is currently open with a 15-ton load restriction **(photo 3)**. As per the latest load rating report date March 25, 2014, the bridge does not require a load posting; however, due to the significant number of severe deficiencies the state has decided to post the structure.

This report includes appendices containing:

- Significant Findings
- FC/Truss Rating Form
- Condition Photographs
- Oklahoma DOT Bridge Inspection Form/PONTIS element report
- Appendix A – Stringer Cope Cracks
- Appendix B – Stringer Connection Cracks
- Appendix C – Missing Stringer Rivets
- Appendix D – Stringer Loss
- Appendix E – Floor Beam Sweep
- Appendix F – Floor Beam Loss
- Appendix G – Floor Beam Cracks
- Appendix H – Gusset Plate Cracks

The current and previous NBI ratings for the bridge are:

NBI Item	Previous Rating (2017)	Current Rating (2016)
NBI Item 58 (Deck)	5 = Fair	5 = Fair
NBI Item 59 (Superstructure)	4 = Poor	4 = Poor
NBI Item 60 (Substructure)	5 = Fair	5 = Fair
NBI Item 61 (Channel)	5 = Bank Eroded	5 = Bank Eroded
Sufficiency Rating	21.1 (SD)	21.1 (SD)

The bridge is structurally deficient.

RECOMMENDED ACTIONS, in order of decreasing priority, are as follows:

Priority Code **CX** – *Bridge condition is bad enough that there is a possibility of failure of a major structural component if repairs are not completed within the next few days.*

- There are no CX repair items required at this time.

Priority Code **PX** – *Bridge condition is such that immediate repair is not necessary, but should be completed within the next several weeks or months.*

- Strengthen the stringer webs as recommended in Spans 15, 16, 21, 24, 31, 36, and 38 as soon as possible.
- Reinforce/replace the damaged concrete bridge railing in spans 1 and 40. Consider installing approach railing with transitions and terminations compliant with current standards in both approach roadways.
- Seal cracks in the asphalt in both the bridge and approach wearing surfaces.
- Remove loose concrete and patch the joint headers as necessary to provide a smooth riding surface across the bridge.
- Reseal the poured seal expansion joints. Consider replacing the deteriorated joints and joint headers due to deteriorated concrete adjacent to the joint opening.
- Install elastomeric pads or steel shims at missing locations on the supplemental pier beams over piers 1 and 39.
- During future inspections, compare lengths of cracks in stringer and floor beam webs with Appendix table values. Drill crack tips that grow significantly.
- Repair cracks in stringer connection angles by adding seat brackets below stringer.
- Repair section loss in stringer and floor beam webs where corrosion holes and/or heavy section loss exists with welded plates and/or angles.
- Remove broken rivets and replace with bolts throughout.
- Replace sheared rivets in the vertical connection, upper chord, and end post with bolts at west U1 in spans 31 and 37.
- Remove pack rust and apply caulking and paint along vertical edges of end gusset plates to arrest/mitigate ongoing edge bowing.
- Clean and paint exposed reinforcing steel below deck within 5 feet of the joints.
- Replace missing elastomeric pads at pier beams 1 and 39.
- Add rip rap around piers 5 and 6 in the main channel to arrest/mitigate the ongoing scour. Consider adding rip rap at the base of the piers adjacent to the main channel, near spans 10 and 11 as well.

- Install full depth pressure relief joints on both approaches to mitigate ongoing effects of pavement pressure.

Priority Code **FX** – *Bridge condition is such that repair should not be necessary any time soon, monitor during future inspections.*

- Monitor the beam connections to the original pier beams at piers 1 and 39 for further cracking.
- Monitor notches and cuts in inboard flange and gusset plate at west U1L2, span 31 for cracks or signs of distress. Consider strengthening member if further distress is noted.
- Monitor pack rust and section loss in truss web members and end posts at railing connections.
- Monitor spalls and corroding reinforcing steel in soffit for further deterioration.
- Monitor the lower chord gusset plates over the bearings for the development of horizontal cracks.
- Monitor cracks at floor beam copes for growth and further deterioration.
- Monitor fatigue prone stitch welds of angle strengthening at floor beam 0, span 2 for cracking.
- Monitor corrosion holes through the floor bracing system gusset plates for the development of cracks.
- Monitor bowed members near locations of collision damage for further distress and development of cracks.
- Monitor bowed gusset plates near bearings for distress.
- Monitor inboard lower chord section loss at floor system bracing connections, splices, and adjacent to stay/batten plates.
- Monitor bullet strike damage to east truss span 4 members/gusset plates for crack development.
- Monitor the cracking/spall at the east column capital, pier 3 for conditions which would undermine the bearing.
- Monitor the expansion bearing pins for signs of additional wear or distress.

In addition to these recommendations, it is recommended that this structure remains on a 12-month Routine/Fracture Critical Inspection Frequency and a 12-month Other Special Inspection Frequency.

We thank you for the opportunity to provide our engineering services. Please contact me if you have any questions or comments.

Sincerely,

BURGESS & NIPLE, INC.

Michael Kronander, PE
Team Leader
Attachments

SIGNIFICANT FINDINGS are as follows:

NBI Item 36 – Traffic Safety (5 = Fair condition)

- **PX** – Collision damage exists to the concrete railing in spans 1 and 40. One section of the east bottom rail has been severed in span 1 **(photo 4)**. The concrete post at the north abutment for the east rail is spalled and is severed from the base **(photo 5)**. The adjacent post has spalling with exposed reinforcing steel. Four of the concrete posts for the west rail in span 40 are leaning outward and the deck is cracked on the outside edge of the posts.
- Pack rust is typical between the metal bridge railing and the truss end posts and web members. No significant section loss was noted to the railing.
- Small cracks exist in the railing where the flange and web have been coped around the end post. Collision damage has caused minor bends in the steel railing at numerous locations. These conditions have not significantly affected the strength of the railing.
- None of the traffic safety items meet current standards for a non-National Highway System roadway.

NBI Item 58 – Deck (5 = Fair condition)

Driving Surface – (5 = Fair condition)

- **PX** – The asphalt wearing surface has unsealed longitudinal and transverse cracks throughout the spans **(photo 6)**.
- The deck appears to be growing from the center of each truss span as evidenced by the distress in the floor system at the end floor beams (cracking and web rotation of the floor beams, cracks in the stringer connection angles, and broken rivet heads at the stringer connection angles). These conditions were observed in nearly all of the truss spans.
- Evidence of significant approach pavement growth was noted at the deck/abutment backwall interface**.** The deck at the abutment seats has pushed towards the channel up to 3 inches.
- Many portions of the curbs exhibit spalls and/or cracking with corroding reinforcing steel, especially over the ends of the intermediate floor beams **(photo 7)**. Spalls have been patched in isolated areas throughout the deck.

Soffit – (5 = Fair condition)

- **FX** – Spalls exposing corroded reinforcing steel are common in the underside of the deck at the expansion joints **(photo 8)**. The spalls appear to be the result of deck drainage leaking through cracks in the deck adjacent to the joint.
- The deck is lifting adjacent to the floor beams due to pack rust on the top flange of the stringers and floor beams **(photo 9)**. This condition is worse at the end floor beams and is the result of deck drainage leaking through the expansion and deck joints. A transverse crack is common in the underside of the deck between 4 and 6 feet from the expansion joints as a result of the lifting deck. This lifting of the deck is beginning to produce a ramping effect for traffic over each floor beam.
- The underside of the deck exhibits transverse cracks with light efflorescence. Spalls and deteriorated concrete exist in exterior stringer bays at isolated locations **(photo 10)**. Full

depth patches exist adjacent to many of the joints and along the east curb at isolated locations. At a few locations, the timber formwork remains in place.

- A deck repair utilizing timber boards occurs on the south face of floor beam 3 between stringers 4 and 5 in span 34.
- The deck overhangs have cracks and isolated spalls with rust staining and efflorescence commonly observed near scupper outlets.

Joints – (4 = Poor condition)

- **PX** – Joint headers consisting of elastomeric concrete were installed to maintain a joint opening with the asphalt wearing surface. These headers are only as deep as the asphalt wearing surface and exhibit past patching using asphalt, concrete and elastomeric concrete. Spalling of the headers was observed along the joints at piers 31, 33, 35, 37, and 39 **(photo 11).** These spalls have occurred since the 2016 inspection when the previously noted spalling was patched with asphalt concrete.
- **PX** – The poured seal joints typically are deteriorated and show evidence of leaking **(photo 12)**. The poured seal was never installed at many of the repaired header locations, leaving only the form board to fill the joint **(photo 13)**. Spalling of the underside of the deck at the expansion joints is common and a direct result of the leaking joints.
- The joints are typically closed near the ends of the bridge as a result of approach pavement growth. The joints above the expansion bearings further from the ends of the bridge are not closed, though many of the truss expansion bearings are at or near their limits of movement. Joints over the fixed bearings typically are closed.
- The void between floor beam 5, span 20, and floor beam 0, span 21, over pier 20 has been completely filled with asphalt from the top of the floor beam bottom flanges to the underside of the deck **(photo 14)**. The asphalt retains moisture which accelerates corrosion and section loss on the floor beams.
- Joint armor and supports at pier 1 are heavily twisted. This is caused by pavement pressure and pack rust.
- Several of the fixed joints have been paved over with a transverse crack observed over the joint.

NBI Item 59 – Superstructure (4 = Poor condition)

Fracture Critical Member Rating Summary	
Floor Beams	4 = Poor condition
Pier Beams	4 = Poor condition
Truss Lower Chord	5 = Fair condition
Truss Web Members	5 = Fair condition

Steel Beams – (5 = Fair condition)

- **FX** – The connection angles for the beams to pier beam 39 are deformed due to the apparent approach pavement growth and pier beam sweep. The beams are still supported by the original pier beams at piers 1 and 39; however, the added pier beam will support the beams should the connection angles fail **(photo 15)**.
- The elastomeric bearing pads have begun walking beneath beams 4 and 5 at pier 39 resulting in a loss of bearing area.
- Surface corrosion exists along the top flanges of exterior beams and on the end 1-3 feet of the beams.

Stringers – (4 = Poor condition)

- **PX** – Cracks were observed in the web of numerous stringers at the top flange cope **(photos 16, 17, and 18)**. There are a total of 98 locations (see **Appendix A**) and 36 locations where cracks extend from section loss (see **Appendix D**). 6 new cracks and 8 cracks with growth were noted during the 2017 inspection. The cracks range in length from 1/8 inch to 2 1/4 inches. The cracks are well distributed throughout the truss spans with only two spans (spans 22 and 24) having no cracks observed. Over half of the cracks exist at the end floor beams and all but one cracks exists in the exterior stringers. A definitive cause for the cracks could not be determined during the inspection; however, the force of an expanding deck and differential movements between the deck and floor beam during flexure of the floor beams are likely causes. The end floor beams no longer exhibit visible deflection during passage of truck loads due to the presence of the stiff leg repairs.
- **PX** – Cracks were observed in 60 stringer connection angles (see **Appendix B** for locations and lengths) **(photos 19 and 20)**. Only 1 new crack was found, and 4 cracks with growth were noted during the 2017 inspection. All connection angle cracks were at the end floor beams. Cracks range from 1 1/4 inch to 7 inches in length with an average length of 3 1/2 inches. The conditions were generally worse at the odd number floor beams where the expansion bearings/joints exist. More cracked connection angles were observed in the north half of the bridge and all but 3 cracked connection angles exist at the interior stringers (stringers 2, 3 and 4). The vertical cracks start at the top of the connection angle, propagating down through the angle leg adjacent to the floor beam web at the fillet. These cracks typically have a horizontal offset as if the floor beam web is being pushed away from the stringer.
- **PX** – 120 broken rivets were observed at 91 stringer connections (see **Appendix C** for locations and number of rivets) **(photo 21 and 22)**. Three locations are new for 2017. 32 connections were noted to have 2 rivet heads missing (A total of 8 rivets in single shear exist between the connection angles and floor beam web). The broken rivets are between the connection angle and the floor beam web and at the top rivet of the connection angle. The number of broken rivets are highest at the end floor beams and become less progressive for each floor beam further away from the end of each span (only one rivet broken at floor beam 3 for the entire bridge). Broken rivets were also

greatest at stringers 2, 3 and 4 with no rivets broken at stringer 5 and only one broken at stringer 1. These conditions appear to be the result of live load induced stringer end rotation causing the rivet shank to fatigue at the head.

- **PX** – Section loss, including corrosion holes, exists through the exterior stringer webs at the end floor beams at numerous locations (see **Appendix D** for locations and sizes) **(photo 23)**. Multiple corrosion holes exist through the web adjacent to the connection angle. Section loss is typically worst at stringers 1 and 5 at the end floor beams due to deck drainage passing through the joints. Numerous through holes also have cracks extending from the holes due to very thin remaining web thickness adjacent to the holes. Exceptionally severe section loss was observed in the following locations in which strengthening the stringer webs is recommended:
  - Web of stringer 5 at the south face of floor beam 5 in span 15 **(photo 24)**.
  - Web of stringer 5 at the north face of floor beam 0 in span 16 **(photo 25)**.
  - Web of stringer 5 at the south face of floor beam 5 in span 21.
  - Web of stringer 5 at the north face of floor beam 0 of span 24 **(photo 26)**.
  - Web of stringer 5 at the south face of floor beam 5 of span 31.
  - Web of stringer 5 at the north face of floor beam 0 in span 36.
  - Web of stringer 5 at the north face of floor beam 0 in span 38.

[FCM] Floor Beams – (4 = Poor condition)

- **PX** – Active section loss is common in the floor beams under the expansion joints. Corrosion holes were observed through the web of the floor beams at 28 locations (see **Appendix F** for locations and dimensions) **(photos 27 and 28)**. Corrosion holes were also noted through the web at the top flange cope of the interior floor beams at 27 locations (see **Appendix F** for locations and dimensions) **(photo 29)**. Several areas have cracks that extend from the corrosion holes in the copes due to very thin remaining section **(photo 30)**. Nearly half of the noted locations in Appendix F show a measurable increase in deterioration.
- **FX** – Cracks were observed in the web of the end floor beams between the top flange and the truss connection angle (see **Appendix G** for locations and lengths) **(photo 31)**. Horizontal cracks ranging from 5/8 inch to 9 3/16 inches in length were noted at 71 locations. Several of these cracks have a horizontal offset between the faces of the crack with the top flange being pushed towards the joint. The cracks exist in every span except span 28 and most commonly occur over the odd number piers where the expansion bearings exist. New growth in existing cracks was noted at four locations ranging from 1/16-inch to 1/8-inch growth. One new crack measuring 1 1/8-inch in length was found in floor beam 1, span 9 during this inspection. This new crack has self-arrested into a corrosion hole.
- **FX** – Cracks were observed in the web cope at the truss connection of the intermediate floor beams at 38 locations and range in size from 1/8-inch to 3/4-inch long (see **Appendix G** for locations and lengths) **(photo 32)**. New cracks were observed at one location and crack growth was noted at two locations (1/4-inch maximum growth observed). One new crack measuring 1 1/8-inch in length was found in floor beam 1, span 9 during this inspection. This new crack has self-arrested into a corrosion hole. The

cracks have slightly higher occurrence at floor beams 1 and 4 than floor beams 2 and 3. Section loss at the cope appears to contribute to the cracking.

- **FX** – Floor beam 0 of span 2 has been strengthened using an angle stitch welded to the web and bottom flange. This condition creates a category E fatigue prone detail at the termination of the welds at the end of the member. No signs of cracking or distress were observed at these locations.
- **Member Alignment** – The end floor beams for the truss spans exhibit a sweep of the bottom flange away from the joint at the majority of the piers (see **Appendix E** for locations and dimensions). Stiff leg repairs have been installed at all end floor beams to mitigate the sweep. The bottom flange sweep ranges from 1/4 inch to 7/8 inch. The floor beam top flange is bent towards the joint causing the bottom flange to have a sweep in the opposite direction. It could not be determined if the floor beam distortion is caused by the deck expanding against the top flanges of the floor beam or pack rust developing between the deck and the joint armor pushing down and eccentrically on the floor beam top flange.
- The stiff leg shim plate under floor beam 5, span 26 at pier 26 is rotating out from under the floor beam bottom flange. Floor beam 0, span 8 at pier 7 impacts the stiff leg under truck loads. The stiff leg repairs are intended to catch the floor beam should it fail and do not need to be in contact with the floor beam.

[FCM] Pier Beams – (4 = Poor condition)

- **PX** – **Member Alignment** – The pier beams at piers 1 and 39 have been retrofitted with a supplemental pier beam due to severe sweep and rotation as a result of approach pavement growth **(photo 15)**. Longitudinal forces act through the deck to distort the pier beam. The majority of the elastomeric pads between the supplemental pier beam and the beam bottom flange are missing, allowing the original pier beam to still carry the beam reactions **(photo 33)**. The supplemental pier beam currently acts as a catcher beam to support the beams should the original pier beam fail. No signs of distress from vehicular live loads were observed in either the original pier beam or the supplemental pier beam.
- The lower portion of the supplemental pier beam at pier 1 is rolled approximately 3 degrees to the south, and upper section is rolled approximately 1 degree south. Pier beam 39 is rolled approximately 1 degree over the lower portion of the web. This is likely an as-built condition and does not significantly affect the load carrying capacity of the supplemental pier beam.
- The bottom flange of the original pier beam at pier 1 is in contact with the stiff leg at pier 1. During higher temperatures they are in contact with each other, resulting in 1/16-inch wear on the north face of the original pier beam **(photo 34).**

Floor System Bracing– (5 = Fair condition)

- **FX** - Corrosion holes were observed at numerous lower lateral bracing gusset plates **(photo 35)**. The corrosion holes typically are less than 4 inches in diameter and occur adjacent to the interface with the floor beam bottom flange, though some of the holes

are up to 14 inches long adjacent to the inboard flange of the lower chord. The corrosion holes do not significantly affect the functionality of the bracing. Up to 1/2-inch thick pack rust with adjacent pitting is also common at the floor system bracing gusset plates **(photo 36)**.

- Many hanger rods which support the floor system bracing near their mid-lengths are broken due to repetitive loading/vibration. The missing rods allow the lower lateral bracing to oscillate under live loads.

Truss Upper Chord – (5 = Fair condition)

- **PX/FX** – **Member Alignment** – Vehicular collision damage was observed at numerous locations in the upper chord:
  - **PX** – Impact damage resulting in multiple sheared rivets for the bottom lacing bars exists at west U1U2, span 31 **(photo 37)**. No signs of local buckling were observed at this location.
  - **FX** – West U1U2 in span 37 is bowed globally to the east 1/4 inch. This damage does not significantly affect the load carrying capacity of the member and appears to be the result of vehicular collision. Multiple rivet heads are also sheared off at the inboard bottom flange of U1U2 at this location with detached lacing bars.
  - Five failed lacing bars exist on the underside of east U3U4, span 9 **(photo 38).**
  - Impact damage exists on the inboard flanges of the upper chord at several additional locations. The damage does not significantly affect the load carrying capacity of the members.
- Outboard gusset plate at east U3, span 13 is bowed locally approximately 1/8-inch between the upper chord and the diagonal**.**
- Minor pack rust and laminating corrosion is forming on isolated upper chord gusset plates at the seams **(photo 39)**. The pack rust is typically 1/16-inch thick, up to 3/16 inch maximum, and section loss is minimal, 1/16-inch deep maximum.

[FCM] Truss Lower Chord – (5 = Fair condition)

- **FX** – Horizontal cracks were observed in the inboard truss gusset plate between the bearing pin and the end floor beam (see **Appendix H** for locations and sizes of cracks). All ten locations noted during the previous Fracture Critical inspection have been strengthened with the addition of a welded steel angle on the inboard face; however, one of the previously noted cracks has grown up to approximately 1/8 inch since the 2017 OS inspection **(photo 40).** The distortion and cracks are a result of section loss and pack rust occurring between the gusset plate and the top edge of the lower chord channel. The crack is within the horizontal shear plane between the end post and the lower chord. Numerous locations exist where the gusset plate exhibits paint cracks indicating eminent development of cracks.
- **FX** – Lower chord gusset plates are typically bowed at L0 and L5 due to pack rust **(photo 41)**. The inboard gusset plate is bowed up to 1 inch between the end post and the lower chord with the outboard gusset plates typically bowed less than the inboard. The end of the end post is in contact or near contact with the top of the lower chord making the likelihood of a buckling failure remote. Section loss of the gusset plate is up to 50% of

the plate thickness (gusset plate is 3/8 inch thick) and occurs at multiple locations. This loss affects the horizontal shear capacity of the gusset plate.

- **FX** – Corrosion is common around the inboard splice plates at L2 and L3 and appears to be the result of deck drainage splashing over the edge of the deck **(photo 42)**. Pack rust is developing at the bottom flange splice, however, no significant distress was observed in the web splice plates. Pack rust and corrosion are significantly less on the west truss.
- **FX** – Corrosion of the lower chord is common at the floor beam/floor system bracing gusset plate connection. The corrosion has caused section loss of less than 1/4-inch to the inboard channel top flange. Corrosion also occurs around the inboard splice plates at L2 and L3 under the floor beams **(photo 43)**. The corrosion and resulting section loss is due to deck drainage passing through the deck joints above the interior floor beams and expansion joints. Several areas of the lower chord have corrosion holes through the inboard bottom flange of the channels **(photo 44).** Corrosion is typically heavier at the east truss.
- Section loss up to 3/8 inch deep is common on the channel webs at the bearings**.** The channels are developed into the truss gusset plates at the location of the loss and the loss does not significantly affect the load carrying capacity of the truss.
- Pack rust exists between the channels of the lower chord and the stay and batten plates. The corrosion has produced 1/8-inch deep section loss of the channel web for the lower chord beneath the stay and batten plates. The localized loss does not significantly affect the load carrying capacity of the member.
- Wear is evident in the truss pins and/or pin plates at panel points L0 and L5. Up to 3/16-inch gaps were noted between the bottom of the pin and the pin hole at many end panel points **(photo 45)**. This is normal wear due to the repeated rotations that the end bearings undergo due to live load deflection.

[FCM] Truss Web Members – (5 = Fair condition)

- **PX/FX – Member Alignment** – Vehicular collision damage was observed at numerous locations on the above deck truss members. The following are the most significant:
  - **PX** – Span 37, west U1L1 – U1L1 carries the floor beam reaction only. Two sheared rivet heads exist at the inboard gusset plate at U1 **(photo 46)**. The shank still exists through the rivet hole of the gusset plate and there is no sign of movement or distress from loading.
  - **FX** – Span 6, west U1L2 – Inboard flange bent inward 2 1/8 inch near U1 **(photo 47)**.
  - **FX** – Span 31, west U1L2 – Inboard flange has a tear near U1 resulting in an approximate 50% loss of the flange **(photo 37)**. The adjacent gusset plate has two gouges measuring 1 7/8 inches deep at the upper chord and 1-inch deep at connection to U1L2. The 1 7/8 inch deep gouge occurs in the shear plane between the diagonals and upper chord and will affect the shear strength of the gusset plate. The 1-inch deep gouge occurs near the corner of the gusset plate and does not significantly affect the capacity of the gusset plate. The gusset plate is also

bowed approximately 2 inches to the west due to the collision damage. This has not changed since the previous inspection.
    - **FX** – Span 37, west U1 gusset plate – A 5/16-inch long crack exists in the bottom edge of the inboard gusset plate between U1L1 and U1L2 near U1L2.
    - **FX** – Span 37, west U1L2 – Inboard bottom flange is bent 1-inch near U1.
- **FX** –Bullet strike damage exists at the outboard gusset plate between east U2L3 and L2U3 in span 4. This condition does not significantly affect the connection's capacity.
- Slight bows of 1/8-inch are typical in the horizontal edges of the U1, L2 and L3 gusset plates. This appears to be an as-built condition as the verticals are approximately 9 7/8 inches deep and the diagonals are 10 inches deep with no fill plates utilized at the panel point connections.
- Pack rust 1/4-inch thick is common between the diagonals and the mid gusset plates with minimal section loss. Isolated locations exhibited pack rust up to 1-inch thick with 1/8-inch deep section loss. Similar conditions exist at the bridge railing connections to the truss web members.

Truss End Posts – (5 = Fair condition)

- **PX** – Pack rust is common at the end post connection to the inboard gusset plate at the lower chord connection **(photo 48)**. Deck drainage which splashes over the curb travels down the end post promoting corrosion.
- **FX** – Pack rust is forming at many of the bridge railing to inboard end post channel connections. Up to 3/4-inch section loss was noted along the full height of the inboard channel webs.
- **FX** – Vehicular collision damage exists at numerous locations. The following are the most significant:
    - Span 7, west L0U1 – Bent inboard channel bottom flange and edge damage to top cover plate at U1**.**
    - Span 14, east L0U1 – Top inboard flange is bent down approximately 4 inches, and 5 rivet heads are sheared off **(photo 49)**.
    - Span 37, west L0U1 – Three lacing bars are detached on the bottom face and the member is also bowed globally 1/4-inch to the west. The inboard bottom flange is bowed west 5/8 inch and up 2 3/4 inch, and is torn 1 3/8 inches wide over 4 1/4 inches in length at top railing.
    - Span 39, east L0U1 – Inboard flange bent down approximately 2 inches near U1 **(photo 50)**.

  This damage does not significantly affect the load carrying capacity of the end posts.

Paint/Coating System – (4 = Poor condition)

- **PX** – Corrosion and significant section loss are occurring at many locations on the lower chord, floor beams and stringers due to deck drainage passing through joints. Widespread section loss and corrosion holes exist in the exterior stringers and end floor beams **(photo 51)**.

- Minor to moderate pack rust and minor section loss at the gusset plate seams are common on the above deck truss members with weathered and chalking paint throughout.

Load Deflection – (6 = Satisfactory condition)

- Slight deflections of the end floor beams were observed during passage of truck loads.
- The global live load response is adequate.

NBI Item 60 – Substructure (5 = Fair condition)

Abutments – (6 = Satisfactory condition)

- No significant deficiencies were noted in the abutments, except for moderate debris on the bearing seats of both abutments and map cracking exposing a few reinforcing bars at the ends of the south abutment.

Piers – (5 = Fair condition)

- **FX** – A 7/8-inch wide crack exists in the capital of the east column of pier 3 which is emanating from the span 2 bearing anchor bolt **(photo 51)**. The crack has led to a large portion of the column capital shifting to the south approximately 1 inch. The truss bearing appears to be adequately supported and brackets have been added to stabilize the capital. A definitive cause of the crack could not be determined during the inspection.
- Map cracking with efflorescence and delaminations are common throughout many of the piers. It could not be determined if the cracks in the pier columns are the result of Alkali-Silica Reactivity.
- Vertical and horizontal cracks which mirror the reinforcing steel exist in the web walls at several locations. Spalls exposing reinforcing steel exist in the face and corners of the web walls due to inadequate cover **(photo 52)**. The cracks and spalls are most prevalent on the south face of the piers and do not affect the load carrying capacity.
- Shallow spalls due to gunshot damage are typical on the columns and web walls of piers 1 through 8.
- The top one to five feet of the pier column foundation are exposed at many piers, generally in the floodplain north of the river and on some piers in the south floodplain. This may be indicative of general scour of the sandy soils and/or may be an as-built condition.

Bearings – (5 = Fair condition)

- **PX** – Elastomeric pads are missing at the supplemental pier beams under beams 1 through 4 at pier 1 and at beams 2 and 3 at pier 39 with heavy pack rust forming at beam 5, pier 1 **(photo 33)**. The bearings appear to be walking from beneath the beams at pier 39 under beams 4 and 5. This condition limits the supplemental pier beams to act only as a catcher beam, available to carry the beams should the original pier beam fail.

- **FX** – Wear causing grooving in the expansion bearing pins and enlarging of the pin hole in the connecting gusset plates are common throughout the spans. The wear is a result of bearing rotation under live loads. This condition is most severe at L0 span 38 over pier 37, which has 3/16-inch total wear to the pin and gusset plate **(photo 45)**.
- Heavy pack rust with minor associated pitting is widespread on and between the bearing components, more so at the expansion bearings. Much of this deterioration is caused by debris accumulating on and around the bearing seats.
- Expansion bearings are rotated up to 3/4-inch towards the joint with pack rust filling the gap between the masonry plate and sole plate **(photo 53)**. The expansion bearings are generally centered on the masonry plate with no signs of recent movement observed, though many are in or near full expansion. The bronze sliding plate has slid slightly towards the center of the truss span and is fractured into pieces at a few locations. One bronze sliding plate has slid to the north 3 inches under the west truss at pier 5 in span 6. It is speculated that the bearings became frozen, and then rotated in expansion during warm weather, allowing pack rust to incrementally fill the gap between the plates.
- Exterior beams at both abutments have sheared anchor bolts at the bearings (the interior beam anchor bolts do not extend into the abutment seat concrete) **(photo 54)**. This most likely is a result of pavement pressure from the approach roadway pushing the bridge deck; up to 2 inches of movement to the north was noted at the south abutment. The beam bearings at the north abutment are pushed to the south up to 4 inches also due to pavement pressure.
- Approximately 25-percent of the anchor bolts are broken or have corroded through within the slotted holes of the truss expansion bearing assemblies **(photo 55)**. This condition is more common at the expansion bearings. The remaining anchor bolts should be capable of resisting lateral forces on the truss spans. The anchor bolts are failing due to a combination of shear, pack rust-induced tension, and corrosion.

NBI Item 61 – Channel and Channel Protection (5 = Bank Eroded condition)

Flowline Stability – (5 = Fair condition)

- The flow line was 29.7 feet measured from the west truss at Panel Point L4 of span 10. The flow line of the stream has dropped 2.4 feet since the last inspection in October 2016 duet to stream degradation.

Channel Bank Damage – (5 = Fair condition)

- **PX** – Local scour exists around the columns at piers 5 and 6 **(photo 56)**. The top of the column foundation is exposed up to 4 feet 3 inches at these locations. Local scour was also observed at the columns in the flood plain north of the river**.**

Debris – (6 = Satisfactory condition)

- Heavy accumulations of drift exists under spans 5 through 10, with the heaviest of accumulation at piers 7 and 10 **(photo 57)**. This does not significantly affect the high water flow characteristics under the bridge.

Vegetation – (6 = Satisfactory condition)

- The banks are well vegetated north of pier 9 with large trees and vegetation in the floodplain. The floodplain south of pier 9 contains sparse vegetation.

NBI Item 72 – Approach (5 = Fair condition)

Approach Roadway Condition – (5 = Fair condition)

- **PX** – The concrete approach roadway is overlaid with asphalt which has unsealed joints and cracks **(photo 58)**. Obvious signs of pavement growth were observed at both abutments. This has caused longitudinal movement of the approach spans resulting in the severe sweep and rotation in the pier beams at piers 1 and 39.
- Cracks and patches exist in the south approach roadway resulting in a relatively level yet rough riding surface with minor rutting in the wheel lines. A few moderately sized potholes between 4 and 8 square feet exist both approach asphalt overlays.

Approach Roadway Settlement – (6 = Satisfactory condition)

- No significant settlement was observed.

NBI Item 113 – Scour Rating (7 = Countermeasures Installed) No change to scour rating is recommended.

- Local scour was observed around piers 5 through 9, and pier 23. Column footings were exposed up to 4 1/2 feet.
- Riprap has been installed around the north abutment and a drift fence consisting of tripods fabricated from railroad rails and cable exists northwest of pier 38.

Truss/FC Bridge Rating Form

Division 4 County Canadian

NBI # 04085 Structure # 092 0000 X

Route U.S. 281 Feature South Canadian River

NBI Item #	2017	2016
36 - Traffic Safety	5	5
58 - Deck	5	5
a. Driving Surface	5	5
b. Soffit	5	5
c. Joints	4	4
59 - Superstructure*	4	4
a. Beams	5	5
b. Stringers**	4	4
c. Floor Beams **(FCM)**	4	4
d. Pier Beams **(FCM)**	4	4
e. Floor Bracing System	5	5
f. Truss Upper Chord***	5	5
g. Truss Lower Chord*** **(FCM)**	5	5
h. Truss Web Members **(FCM)**	5	5
i. Truss End Posts	5	5
j. Truss Bracing	N/A	N/A
k. Paint/Coating	4	4
l. Load Deflection	6	6
60 - Substructure****	5	5
a. Abutments	6	6
b. Piers	5	5
c. Bearings	5	5
61 - Channel/Channel Protection	5	5
a. Flowline Stability (formerly Channel Sco	5	5
b. Channel Bank Damage (new element)	5	5
c. Debris	6	6
d. Vegetation	6	6
Approach Roadway	5	5
a. Approach Roadway Condition	5	5
b. Approach Roadway Settlement	6	6
113 - Scour	7	7

Rating	Description (For 36, 58, 59, 60, 72)
N	NOT APPLICABLE
9	EXCELLENT CONDITION
8	VERY GOOD CONDITION - no problems noted.
7	GOOD CONDITION - some minor problems.
6	SATISFACTORY CONDITION - structural elements show some minor deterioration
5 (FX,PX)	FAIR CONDITION - all primary structural elements are sound but may have minor section loss, cracking, spalling or scour.
4 (PX)	POOR CONDITION - advanced section loss, deterioration, spalling or scour.
3 (PX,CX)	SERIOUS CONDITION - loss of section, deterioration, spalling or scour have seriously affected primary structural components. Local failures are possible. Fatigue cracks in steel or shear cracks in concrete may be present.
2 (CX)	CRITICAL CONDITION - advanced deterioration of primary structural elements. Fatigue cracks in steel or shear cracks in concrete may be present or scour may have removed substructure support. Unless closely monitored it may be necessary to close the bridge until corrective action is taken.
1 (CX)	IMMINENT FAILURE CONDITION - major deterioration or section loss present in critical structural components or obvious vertical or horizontal movement affecting structure stability. Bridge is closed to traffic but corrective action may put back in light service.
0	FAILED CONDITION - out of service - beyond corrective action.

* - Members with fatigue cracks in compression zones (top flange stringer copes, clip angles, etc.) are to be coded as a 5 unless the crack turns toward a tension zone, then code 3.

* - Members with fatigue cracks in tension zones (cover plate ends, etc.) are to be coded as a 3.

** - Includes connection angles.

*** - Includes gusset plates. Missing rivets in connections are coded as a 3.

**** - Elements with superficial cracking are coded as 6, spalls with exposed rebar 5, spalls with exposed rebar with section loss 4.

Rating	Description (For 61)
N	NOT APPLICABLE
9	There are no noticeable or noteworthy deficiencies which affect thecondition of the channel.
8	Banks are protected or well vegetated. River control devices such as spur dikes and embankment protection are not required or are in a stable condition.
7	Bank protection is in need of minor repairs. River control devices and embankment protection have a little minor damage. Banks and/or channel have minor amounts of drift.
6	Bank is beginning to slump. River control devices and embankment protection have widespread minor damage. There is minor stream bed movement evident. Debris is restricting the channel slightly.
5	Bank protection is being eroded. River control devices and/or embankment have major damage. Trees and brush restrict the channel.
4	Bank and embankment protection is severely undermined. River control devices have severe damage. Large deposits of debris are in the channel.
3	Bank protection has failed. River control devices have been destroyed. Stream bed aggradation, degradation or lateral movement has changed the channel to now threaten the bridge and/or approach roadway.
2	The channel has changed to the extent the bridge is near a state ofcollapse.
1	Bridge closed because of channel failure. Corrective action may putback in light service.
0	Bridge closed because of channel failure. Replacement necessary.

Rating		Description (For 113)
N		Bridge not over waterway
U		Unknown foundation that has not been evaluated for scour.
9		Foundations (including piles) on dry land well above floor water elevations.
8		Foundations determined to be stable for assessed or calculated scour conditions; Calculated scour above top of footing.
7		Countermeasures installed to correct previous scour problems.
6		Scour calculations not made
5		Foundations determined to be stable for calculated scour conditions; Calculated scour within limits of footing/piles.
4		Foundations determined to be stable for calculated scour conditions; Field review notes action is required.
3	Scour Critical	Foundations determined to be unstable for calculated scour conditions; Scour within/below limits of footing/piles.
2	Scour Critical	Field review indiates scour has occurred at foundations; Immediate action is required.
1	Scour Critical	Field review indicates failure of foundations is imminent; Bridge closed to traffic.
0	Scour Critical	Bridge has failed and is closed to traffic.

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
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Photograph 1 - End view looking north.

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
04085	0902 0000 X	Canadian	U.S. 281	S. CANADIAN RIVER	10/5/2017

Photograph 2 - Elevation looking southwest.

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
04085	0902 0000 X	Canadian	U.S. 281	S. CANADIAN RIVER	10/5/2017

Photograph 3 - Looking north at the 15-ton load posting sign at south approach. North approach is similar.

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
04085	0902 0000 X	Canadian	U.S. 281	S. CANADIAN RIVER	10/5/2017

Photograph 4 - Looking southeast at east railing, span 1. Note: bottom concrete railing bar is severed from previous collision damage.

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
04085	0902 0000 X	Canadian	U.S. 281	S. CANADIAN RIVER	10/5/2017

Photograph 5 - Looking southeast at east concrete railing, span 40. Note: the concrete post at the north end of the east rail is spalled and has severed from the base.

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
04085	0902 0000 X	Canadian	U.S. 281	S. CANADIAN RIVER	10/5/2017

Photograph 6 - Looking northeast at the typical deck condition. Note: unsealed longitudinal and transverse cracks in asphalt wearing surface.

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
04085	0902 0000 X	Canadian	U.S. 281	S. CANADIAN RIVER	10/5/2017

Photograph 7 - Looking southwest at east truss, floor beam 3, span 37. Note: typical spalling of curb over floor beams.

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
04085	0902 0000 X	Canadian	U.S. 281	S. CANADIAN RIVER	10/5/2017

Photograph 8 - Looking east at deck soffit, between stringers 4 and 5, north of floor beam 2, span 30. Note: 4 foot long by 3 foot wide by 2 1/2 inch deep spall with 11 exposed reinforcement bars.

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
04085	0902 0000 X	Canadian	U.S. 281	S. CANADIAN RIVER	10/5/2017

Photograph 9 - Looking west at stringer 5, south face of floor beam 2, span 37. Note: typical pack rust between stringer top flange and deck soffit up to 1/2-inch thick.

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
04085	0902 0000 X	Canadian	U.S. 281	S. CANADIAN RIVER	10/5/2017

Photograph 10 - Looking northeast at west face of stringer 1, south of floor beam 1, span 3. Note: spall in soffit approximately 4 1/2 feet long by 1-foot wide by 2 inches deep with exposed reinforcing steel.

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
04085	0902 0000 X	Canadian	U.S. 281	S. CANADIAN RIVER	10/5/2017

Photograph 11 - Looking west at the joint over pier 31. Note: the elastomeric joint header material is spalling.

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
04085	0902 0000 X	Canadian	U.S. 281	S. CANADIAN RIVER	10/5/2017

Photograph 12 - Looking east along the underside of the expansion joint at pier 13. Note: joint material missing causing leaking through the joint.

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
04085	0902 0000 X	Canadian	U.S. 281	S. CANADIAN RIVER	10/5/2017

Photograph 13 - Looking west at the joint over pier 17. Note: no joint gland has been installed allowing leakage through the joint.

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
04085	0902 0000 X	Canadian	U.S. 281	S. CANADIAN RIVER	10/5/2017

Photograph 14 - Looking west at the underside of the floor beams at pier 20. Note: asphalt has completely filled the area between the floor beams at the fixed joint.

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
04085	0902 0000 X	Canadian	U.S. 281	S. CANADIAN RIVER	10/5/2017

Photograph 15 - Looking northeast at pier beam at pier 1. Note: supplemental pier beam added to support the approach beams if the connection angles fail.

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
04085	0902 0000 X	Canadian	U.S. 281	S. CANADIAN RIVER	10/5/2017

Photograph 16 - Looking east at stringer 5, north face of floor beam 0, span 2. Note: new 1-inch horizontal crack in addition to previously noted 1 1/2-inch crack in stringer cope.

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
04085	0902 0000 X	Canadian	U.S. 281	S. CANADIAN RIVER	10/5/2017

Photograph 17 - Looking west at stringer 5 at north face of floor beam 4, span 8. Note: 1 1/4 inch long and 7/8-inch long cracks at top stringer cope.

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
04085	0902 0000 X	Canadian	U.S. 281	S. CANADIAN RIVER	10/5/2017

Photograph 18 - Looking east at stringer 5, south face of floor beam 4, span 29. Note: new 1 1/4-inch crack in top web cope.

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
04085	0902 0000 X	Canadian	U.S. 281	S. CANADIAN RIVER	10/5/2017

Photograph 19 - Looking northeast at stringer 3 at floor beam 5, span 9. Note: 3 5/8-inch vertical crack in the west connection angle (crack grew 1/8-inch).

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
04085	0902 0000 X	Canadian	U.S. 281	S. CANADIAN RIVER	10/5/2017

Photograph 20 - Looking northeast at stringer 4 at floor beam 5, span 29. Note: new 2 1/8 inch long vertical crack in the west connection angle.

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
04085	0902 0000 X	Canadian	U.S. 281	S. CANADIAN RIVER	10/5/2017

Photograph 21 - Looking southwest at stringer 2 connection to floor beam 0, span 6. Note: broken rivet in the east connection angle with the shank no longer in the shear plane.

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
04085	0902 0000 X	Canadian	U.S. 281	S. CANADIAN RIVER	10/5/2017

Photograph 22 - Looking south at north face of stringer 2 at floor beam 1, span 14. Note: new missing rivet in stringer connection to floor beam. Shank is still in shear plane.

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
04085	0902 0000 X	Canadian	U.S. 281	S. CANADIAN RIVER	10/5/2017

Photograph 23 - Looking northeast at stringer 1, south face of floor beam 5, span 18. Note: 2 1/2-inch long by 5/8-inch wide corrosion hole in the stringer web at top cope with 25% section loss to the web below.

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
04085	0902 0000 X	Canadian	U.S. 281	S. CANADIAN RIVER	10/5/2017

Photograph 24 - Looking east at stringer 5 at floor beam 5, span 16. Note: 1 1/4-inch diameter corrosion hole with a 3/8-inch long vertical crack at the cope. Additional 2-inch high by 5-inch wide corrosion hole below the connection angle.

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
04085	0902 0000 X	Canadian	U.S. 281	S. CANADIAN RIVER	10/5/2017

Photograph 25 - Looking southwest at stringer 5 at floor beam 5, span 16. Note: 4 1/4-inch high by 1 1/2-inch wide corrosion hole with 1/4-inch and 5/8-inch long cracks at the cope and 5-inch wide by 1-inch high corrosion hole at the bottom flange.

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
04085	0902 0000 X	Canadian	U.S. 281	S. CANADIAN RIVER	10/5/2017

Photograph 26 - Looking southwest at stringer 5, north face of floor beam 0, span 24. Note: 10 1/2-inch wide x 2-inch high corrosion hole with 1/16 to 1/8-inch remaining section along connection angle.

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
04085	0902 0000 X	Canadian	U.S. 281	S. CANADIAN RIVER	10/5/2017

Photograph 27 - Looking south at floor beam 3 at east truss, span 19. Note: knife edging at floor beam cope with small crack forming.

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
04085	0902 0000 X	Canadian	U.S. 281	S. CANADIAN RIVER	10/5/2017

Photograph 28 - Looking southeast at floor beam 0 between stringers 4 and 5 in span 38. Note: 4 corrosion holes measuring measuring up to 1 1/2 inches in diameter in bottom of floor beam web.

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
04085	0902 0000 X	Canadian	U.S. 281	S. CANADIAN RIVER	10/5/2017

Photograph 29 - Looking southwest at floor beam 0 under stringer 4 in span 12. Note: multiple corrosion holes through the web in a 48 1/2 inches wide by 1 5/8 inches high area near the bottom flange.

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
04085	0902 0000 X	Canadian	U.S. 281	S. CANADIAN RIVER	10/5/2017

Photograph 30 - Looking northeast at floor beam 5, span 11 above the stiff leg repair. Note: 29-inch long horizontal crack in the web with both ends turning down towards the bottom flange extending from corrosion hole.

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
04085	0902 0000 X	Canadian	U.S. 281	S. CANADIAN RIVER	10/5/2017

Photograph 31 - Looking south at east truss floor beam 0, span 38. Note: 9 3/16-inch horizontal crack in floor beam cope over the connection angle.

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
04085	0902 0000 X	Canadian	U.S. 281	S. CANADIAN RIVER	10/5/2017

Photograph 32 - Looking south at floor beam 4, west truss, span 37. Note: 3/8-inch long crack in the floor beam cope (crack grew 1/4-inch).

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
04085	0902 0000 X	Canadian	U.S. 281	S. CANADIAN RIVER	10/5/2017

Photograph 33 - Looking northeast at bearing at beam 2 at pier 1. Note: elastomeric pad is missing between stringer and top of pier beam.

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
04085	0902 0000 X	Canadian	U.S. 281	S. CANADIAN RIVER	10/5/2017

Photograph 34 - Looking east at original pier beam for span 1 at stiff leg over pier 1. Note: pier beam bottom flange has 1/16-inch deep wear when contact with the stiff leg.

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
04085	0902 0000 X	Canadian	U.S. 281	S. CANADIAN RIVER	10/5/2017

Photograph 35 - Looking southeast at east truss, south face of floor beam 3, span 38. Note: 4-inch diameter corrosion hole in lower lateral bracing gusset plate.

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
04085	0902 0000 X	Canadian	U.S. 281	S. CANADIAN RIVER	10/5/2017

Photograph 36 - Looking west at west truss lower lateral bracing connection to floor beam 1, span 2. Note: typical corrosion, pack rust and section loss up to 1/8-inch deep on floor beam bottom flange and lower lateral bracing gusset plate.

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
04085	0902 0000 X	Canadian	U.S. 281	S. CANADIAN RIVER	10/5/2017

Photograph 37 - Looking west at U1L2, west truss, span 31. Note: collision damage to U1 gusset plate and lacing bars along U1U2. The tear in the inboard flange of U1L2 has resulted in approximately 50% section loss to flange. No change.

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
04085	0902 0000 X	Canadian	U.S. 281	S. CANADIAN RIVER	10/5/2017

Photograph 38 - Looking south at U3U4, east truss, span 9. Note: five failed lacing bars along bottom of upper chord. No change.

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
04085	0902 0000 X	Canadian	U.S. 281	S. CANADIAN RIVER	10/5/2017

Photograph 39 - Looking northeast at U4, east truss, span 22. Note: typical pack rust and corrosion/minor section loss to exterior of inboard gusset plate along upper chord.

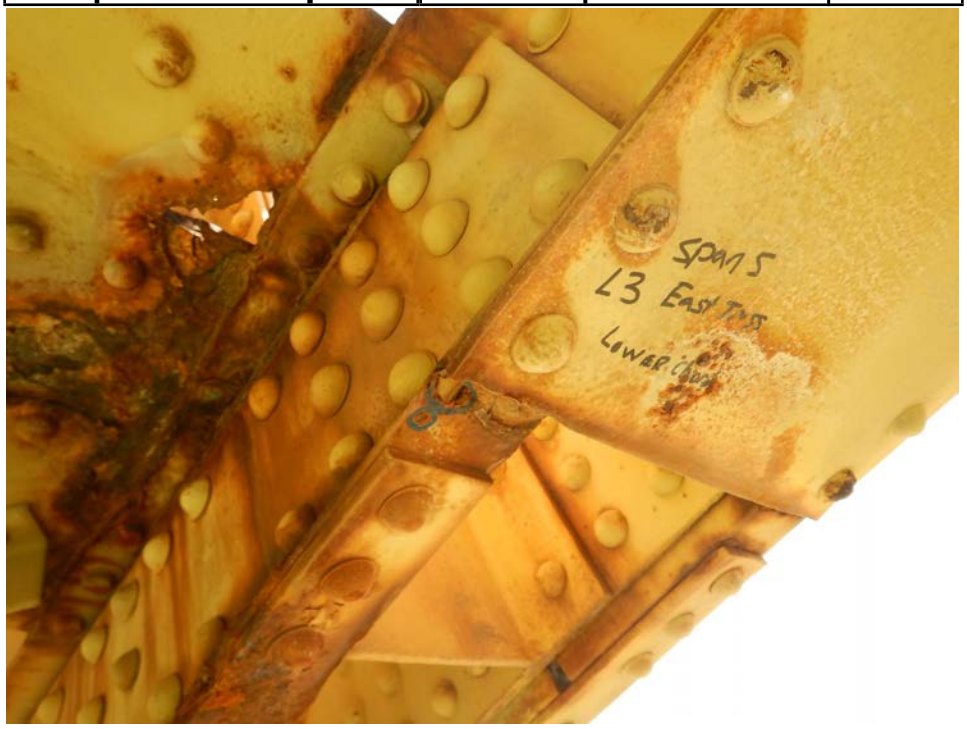
NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
04085	0902 0000 X	Canadian	U.S. 281	S. CANADIAN RIVER	10/5/2017

Photograph 40 - Looking northwest at east L0 inboard gusset plate, span 2. Note: previously noted 17 5/8-inch crack (crack grew 1/8-inch).

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
04085	0902 0000 X	Canadian	U.S. 281	S. CANADIAN RIVER	10/5/2017

Photograph 41 - Looking north at west L0, span 21. Note: 1/2-inch thick pack rust between gusset plate and inboard channel.

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
04085	0902 0000 X	Canadian	U.S. 281	S. CANADIAN RIVER	10/5/2017



Photograph 42 - Looking north at east L3, span 5. Note: 1-inch diameter corrosion hole with adjacent 1/4-inch corrosion hole to the bottom flange of the inboard channel near splice connection.

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
04085	0902 0000 X	Canadian	U.S. 281	S. CANADIAN RIVER	10/5/2017

Photograph 43 - Looking east at L2, east truss, span 19. Note: typical corrosion on splice plate for inboard channel web.

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
04085	0902 0000 X	Canadian	U.S. 281	S. CANADIAN RIVER	10/5/2017

Photograph 44 - Looking up at east L5 inboard channel, span 20. Note: 1 1/2-inch diameter corrosion hole in bottom flange of channel.

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
04085	0902 0000 X	Canadian	U.S. 281	S. CANADIAN RIVER	10/5/2017

Photograph 45 - Looking northwest at east truss bearing at pier 37, span 38. Note: inboard gusset plate and pin have up to 3/16-inch wear.

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
04085	0902 0000 X	Canadian	U.S. 281	S. CANADIAN RIVER	10/5/2017

Photograph 46 - Looking northwest at L0U1, west truss, span 37. Note: two missing rivets for vertical connection and 5/8-inch crack at U1 gusset plate at diagonal. Upper chord U1U2 bowed 1/4-inch. No change.

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
04085	0902 0000 X	Canadian	U.S. 281	S. CANADIAN RIVER	10/5/2017

Photograph 47 - Looking southwest at U1L2, west truss, span 6. Note: inboard flange is bent from previous collision damage. No change.

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
04085	0902 0000 X	Canadian	U.S. 281	S. CANADIAN RIVER	10/5/2017

Photograph 48 - Looking east at east L5, span 33. Note: laminating corrosion with 1/8-inch deep section loss in inboard gusset plate above the end post.

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
04085	0902 0000 X	Canadian	U.S. 281	S. CANADIAN RIVER	10/5/2017

Photograph 49 - Looking northeast at L0U1, east truss, span 14. Note: collision damage to end post. No change.

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
04085	0902 0000 X	Canadian	U.S. 281	S. CANADIAN RIVER	10/5/2017

Photograph 50 - Looking northeast at L0U1, east truss, span 39. Note: collision damage has bent top flange of end post.

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
04085	0902 0000 X	Canadian	U.S. 281	S. CANADIAN RIVER	10/5/2017

Photograph 51 - Looking east at the east column for pier 3. Note: 7/8-inch wide crack in the capital of the pier. Anchor bolt is missing on the expansion bearing for span 4. The paint is failing at piers typically where the joints continue to leak.

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04085	0902 0000 X	Canadian	U.S. 281	S. CANADIAN RIVER	10/5/2017

Photograph 52 - Looking northwest at top, west corner of pier 15 web wall. Note: approximate 12-foot long by up to 3-inch deep spall with exposed corroding reinforcing steel.

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04085	0902 0000 X	Canadian	U.S. 281	S. CANADIAN RIVER	10/5/2017

Photograph 53 - Looking west at at the west truss expansion bearings at pier 3. Note: bearings are at the limits of expansion and lifted 3/4-inch towards the joint.

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04085	0902 0000 X	Canadian	U.S. 281	S. CANADIAN RIVER	10/5/2017

Photograph 54 - Looking west at the inboard bolt on the expansion bearing of beam 1 at the south abutment. Note: bolt has been sheared off and is missing.

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Photograph 55 - Looking southwest at east truss at pier 33, span 33 bearing. Note: typical missing anchor bolt for moveable bearing.

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04085	0902 0000 X	Canadian	U.S. 281	S. CANADIAN RIVER	10/5/2017

Photograph 56 - Looking northeast at pier 5 west column. Note: local scour exposing 4 feet 3 inches of the foundation.

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
04085	0902 0000 X	Canadian	U.S. 281	S. CANADIAN RIVER	10/5/2017

Photograph 57 - Looking north at south face of pier 10. Note: heavy debris accumulation at pier 10.

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
04085	0902 0000 X	Canadian	U.S. 281	S. CANADIAN RIVER	10/5/2017

Photograph 58 - Looking west at the joint over the south abutment. Note: the asphalt concrete exhibits unsealed map cracking across the length of the joint.

OKLAHOMA DEPARTMENT OF TRANSPORTATION - Bridge Inspection Report

NBI No.: **04085** Structure No.: 0902 0000 X Local ID:-1 Suff. Rating: 21.1 SD Health Index : 53.8

IDENTIFICATION

Description:
38-100' PONY TRUSS & 2-36' I-BM. SPANS(BRIDGEPORT BR.)
1. State: Oklahoma 2. SHD District: Division 4
3. County Code: CANADIAN 4. Place Code: Unknown
Admin. Area: LT Snooper Truss
5. Inventory Route (Route On Structure) : 1 - 2 - 1 - 00281 - 0
6. Feature Intersected: S. CANADIAN RIVER
7. Facility Carried: U.S. 281 U.S. 281
9. Location: CADDO CANADIAN CL 11. Mile Post: 0.000 mi
13. LRS Inv. Route./ Subroute.: 0902 0000 01
16. Latitude: 35 32 25.00 17. Longitude: 098 19 22.00
98. Border Br. Code: Unknown (P) % Resp. : 0 99. Border Br. #: Unknown

INSPECTION

Type	Insp Req.	Insp Done	Freq:	Insp. Date:	Next Insp.:
NBI:		Y	12	10/5/2017	10/5/2018
FC Freq.:	Y	Y	12	**10/5/2017**	**10/5/2018**
UW Freq.:	N	N	NA	**NA**	**NA**
OS Freq.:	Y	N	12	**4/14/2017**	**4/5/2018**

CLASSIFICATION

12. Base Hwy Network : On Base Network
20. Toll Facility: 3 On free road
21. Custodian: 01 State Highway Agency
22. Owner: 01 State Highway Agency
26. Functional Class: 06 Rural Minor Arteri
37. Historical Sig.: 2 Br eligible for NRHP
100. Defense Highway: 0 Not a STRAHNET h
101. Parallel Structure: No || bridge exists
102. Dir. of Traffic: 2 2-way traffic
103. Temp. Structure: Not Applicable (P)
104. Highway System: 0 Not on NHS
105. Fed. Land Hwy 0 N/A (NBI)
110. National Truck Network: 0 Not part of na
112. NBIS Length: Long Enough

STRUCTURE TYPE AND MATERIALS

43. Main Span Material and Design Type
Steel Truss-Thru
44. Approach Span Material and Design Type
Steel Stringer/Girder
45. No. of Spans Main Unit: 38 46. No. of Approach Spans: 2
107. Deck Type: 1 Concrete-Cast-in-Place
108A. Wearing Surface: 6 Bituminous
108B. Membrane: 8 Unknown
108C. Deck Protection: 8 Unknown

CONDITION

58. Deck: 5 Fair
59. Super.: 4 Poor
60. Sub.: 5 Fair
62. Culvert: N N/A (NBI)
61. Channel/Channel Protection: 5 Bank Prot Eroded
Flowline Notes:

OCT-2017: 29.7' TOC at L4, west truss, span 10
OCT-2016: 27.3 'TOC at L3, west truss, span 6
[2016] FL to top of curb = 27.3' measured at E L5, span 6

AGE AND SERVICE

27. Year Built: 1933
106. Year Reconstructed: Unknown
28A. Lanes on: 2
28B. Lanes Under: 0
19. Detour Length: 11.8 mi
29. ADT: 1100
30. Year of ADT: 2015
109. Truck ADT %: 16
42A. Type of Service on: 1 Highway
42B. Type of Service under: 5 Waterway

LOAD RATING AND POSTING

31. Design Load: 2 M 13.5 (H 15)
41. Posting status: P Posted for load
63. Op. Rating Method: 1 LF Load Factor-Ton
Alt. Op. Rating Meth.: 1 LF Load Factor-To

64. Operating Rating (H / HS / 3-3):	16.5	16.5	16.5
66. Inventory Rating (H / HS / 3-3) :	15.0	15.1	37.7

65. Inv. Rating Method: 1 LF Load Factor-Ton
Alt. Inv. Rating Meth.: 1 LF Load Factor-To
70. Posting: 2 20.0-29.9%below
Date Rated : 3/25/2014

GEOMETRIC DATA

10. Inv. Rte. Min. Vert. Clr.: 328.1 ft
32. Approach Roadway Width (W/ Shoulders): 30.0 ft
Deck Area: 102,364.8 sq. ft
33. Median: 0 No median
34. Skew: 0
35. Structure Flared: 0 No flare
47. Inv. Rte. Total Horiz. Clr.: 24.0 ft
48. Length Maximum Span: 100.1 ft
49. Structure Length: 3,937.0 ft
50A. Curb/Sdwlk Wdth L: 1.0 ft
50B. Curb/Sidewalk Width R: 1.0 ft
51. Width Curb to Curb: 24.0 ft
52. Width Out to Out: 26.0 ft
53. Minimum Vertical Clearance Over Bridge: 328.1 ft
54A/54B. Min. Vert. Underclearance : N Feature not hwy or RR 0.0 ft

	N/E			S/W		
Meas.	-1	-1	-1	-1	-1	-1
Post.	DO NOT U	DO NOT U	DO NOT U	DO NOT U	B&N	-1

55A/55B. Minimum Lateral Undrclearance R: N Feature not hwy or RR 327.8 ft
56. Minimum Lateral Undrclearance L: 327.8 ft

PROPOSED IMPROVEMENTS

94. Bridge Cost: $6,781,689
75. Type of Work: 31 Repl-Load Capacity
95. Roadway Cost: $4,500,000
76. Lgth. of Improvment: 3,937.0 ft
96. Total Cost: $11,920,275
114. Future ADT: 1760
97. Year of Cost Est.: 2015
115. Year of Future ADT: 2035

NAVIGATION DATA

38. Navigation Control: Permit Not Required
39. Vertical Clearance: 0.0 ft
40. Horizontal Clearance: 0.0 ft
111. Pier Protection: 1 Not Required
116. Lift Bridge Vert. Clear.: 0.0 ft

APPRAISAL

36A. Bridge Rail: 0 Substandard
36C. Approach Rail: 0 Substandard
36B. Transition: 0 Substandard
36D. Approach Rail Ends: 0 Substandard
67. Str. Evaluation: 4 Minimum Tolerable
68. Deck Geometry: 4 Tolerable
69. Underclearance, Vertical and Horizontal: N Not applicable (NBI)
71. Waterway Adequacy: 5 Above Tolerable
72. Approach Alignment: 6 Equal Min Criteria
113. Scour Critical: 7 Countermeasures

200c. Temperature: 70
200d. Weather: CLOUDY
201. Structural Steel ASTM Desig.: -1 -1
202. Waterproof Membrane : -1
Date Installed : 1/1/1901
203. Type Exp. Dev. : Pourable
-
204. Type of Handrail: Metal Railing (other)
205. Material and Quantity : 10.0
208. Type of Abutment : Pedestal
Type of Foundation : Natural Foundation Matl.
209. Type of Pier / Found.: 2 Piers Yes
No Piling or Drilled Shaft
210. Foundation Elev. -1.0 -1.0
-1.0 -1.0 -1.0
211. Wear. Surf. Prot. System : None
Date Installed : 1/1/1901
213. Utilities Attached : -1
-1 -1 -1
-1 -1 -1

214a. Posted Weight Limit: 151515
b. Posted Speed Limit : -1
c. Narrow/One Lane Bridge sign : -1
d. Vertical Clearance Sign: NO
Advanced Warning Sign : NO
e. Navigation Lights : NO
Working/Not Working : NO
215. Overpass : C - US Highway
221. Substructure Cond. (U/W) : -
222. Fill over RCB: -1
223. Appr. Slab/Rdwy Cond.: Satisfactory
225. Paint Type : Red Lead Ready
Overcoat : Not Applicable
226. Date Painted: 3301
227. Paint Coloring: Silver
233. Deck Forming: -
238. School Bus Rte: Current and Desired Route
240. Appr. Roadway Type: Concrete

243. Girder Spacing/Number : -1.0 / -1
244. Span Lengths :
-1 -1 -1
-1 -1 -1
-1 -1
245. Girder Depth : 48.000
246. Type of Overlay : AC Overlay
246. Overlay Thickness : 3.0
246. Overlay Date : 12/4/2003
246. Overlay Depth Changed > 1"? _
247. Protective Systems : 1: _
2: _ 3: _
4: _ 5: _
248. No. of Field Splices w/ Corrosion : -1
249. Scour Crit. POA exists?: _
250. Culvert Headwall Dist.: -1.0
256. Chan. Profile Up/Down Stream?: _
257a. OkiePROS Auto. Truck Routing Yes
258. Plans w/ found. are in file at ODOT:
259. Scour Eval. is in file at ODOT:
263. Interchange at Intersection: No Interchange
264. Interstate Milepoint: -1.00

OKLAHOMA DEPARTMENT OF TRANSPORTATION - Bridge Inspection Report

Suff. Rating: 21.1 SD | Health Index : 53.8

NBI No.: **04085** Structure No.: 0902 0000 X Local ID:-1

Inspection Date: 10/5/2017 Reported By: MKRONANDER

Invoice No.: -1 Inspected With: -1

Agency :

Michael Kronander

Digitally signed by Michael Kronander
DN: cn=Michael Kronander, o=Burgess and Niple, Inc., ou, email=mike.kronader@burgessniple.com, c=US
Date: 2017.12.08 08:24:31 -05'00'

Structure / Inspection Notes

(38) 100-foot long riveted pony trusses with (2) 36-foot long steel beam approach spans.
OS Inspection Items: See tables in 2017-10-05 FC report appendix for list of the following: Inspect cracks in stringer web copes, stringer connection angles, floor beams web copes, lower chord gusset plates above bearings for growth, stringer connections at end floor beams for additional loss or broken rivets; pier beams and supplemental pier beams at piers 1 and 39 for distress; misalignment of WU1U2 sp 37; floor beam section loss; scour from stream in spans 10 and 11; areas of collision damage on deck to steel trusses; east bearing at pier 3 for any undermining.
Posted 15 tons due to extensive deterioration to bridge.

PX – Strengthn stringer webs in several spans; Reinforce/replace the damaged concrete bridge railing in spans 1 and 40; Seal cracks in wearing surface and approach pavement; Remove debris from along the curbs; Remove loose concrete and patch the joint headers; Reseal the expansion joints; Install elastomeric pads or steel shims at missing locations on the supplemental pier beams over piers 1 and 39; Monitor cracks in stringer and floor beam webs. Drill crack tips that grow significantly; Repair cracks in stringer connection angles; Repair section loss in stringer and floor beam webs where corrosion holes and/or heavy section loss exists; Replace sheared rivets in the vertical connection, upper chord, and end post with bolts near west U1 in spans 31 and 37; Remove pack rust and apply caulking and paint along vertical edges of end gusset plates to arrest/mitigate ongoing edge bowing; Clean and paint steel below deck within 5 feet of the joints; Add rip rap around the piers in spans 10 and 11 in the main channel to arrest/mitigate the ongoing scour; Install full depth pressure relief joints on both approaches to mitigate ongoing effects of pavement pressure.
FX – Monitor: the beam connections to the original pier beams at piers 1 and 39 for further cracking; notches and cuts in inboard flange; notches and cuts in inboard flange and gusset plate at west U1L2, span 31; packrust and section loss in truss members; spalls and corroding rebar in soffit; lower chord gusset plates over bearings for development of horizontal cracks; cracks at FB copes and stringer connections; fatigue prone strich welds of angle strengthening at FB 0, span 2; corrosion holes in floor bracing system; bowed members near locations of collision damage; bowed gusset plates near bearings; bullet strike damage to east truss, span 4; cracking/ spall at east column capiital, pier 3 for condition which would undermine bearing; expansion bearing pins for signs of additional wear or distress.

Elm.	Env.	Description	Un.	Qty.	Qty.St. 1	% 1	Qty.St. 2	% 2	Qty.St. 3	% 3	Qty.St. 4	% 4	Qty.St. 5	% 5
12	1	Reinforced Concrete Deck	(SF)	94,488	0	0 %	0	0 %	94,488	100 %	0	0 %	0	0 %
107	1	Steel Open Girder Beam	(LF)	259	174	67 %	85	33 %	0	0 %	0	0 %	0	0 %
113	1	Steel Stringer/Floorbeam	(LF)	9,501	0	0 %	6,176	65 %	3,325	35 %	0	0 %	0	0 %
120	1	Steel Truss (Pony)	(LF)	7,600	0	0 %	4,940	65 %	2,660	35 %	0	0 %	0	0 %
152	1	Steel Floor Beam	(LF)	6,155	0	0 %	3,816	62 %	2,339	38 %	0	0 %	0	0 %
162	1	Steel Gusset Plate	(EA)	1,672	0	0 %	760	45 %	912	55 %	0	0 %	0	0 %
205	1	Reinforced Conc Column or Pile Extension	(EA)	78	0	0 %	77	99 %	1	1 %	0	0 %	0	0 %
215	1	Reinforced Conc Abutment	(LF)	49	25	50 %	25	50 %	0	0 %	0	0 %	0	0 %
301	1	Pourable Joint Seal	(LF)	495	0	0 %	0	0 %	248	50 %	248	50 %	0	0 %
310	1	Elastomeric Bearing	(EA)	4	2	50 %	0	0 %	2	50 %	0	0 %	0	0 %
311	1	Moveable Bearing (roller, sliding, etc.)	(EA)	86	0	0 %	61	71 %	25	29 %	0	0 %	0	0 %
313	1	Fixed Bearing	(EA)	84	0	0 %	84	100 %	0	0 %	0	0 %	0	0 %
330	1	Metal Bridge Railing	(LF)	7,600	0	0 %	7,220	95 %	380	5 %	0	0 %	0	0 %
510	1	Wearing Surfaces	(SF)	94,488	75,488	80 %	9,500	10 %	9,500	10 %	0	0 %	0	0 %
515	1	Steel (Superstructure) Protective Coating	(SF)	406,533	0	0 %	0	0 %	406,533	100 %	0	0 %	0	0 %
859	1	Soffit of Concrete Decks and Slabs	(EA)	1	0	0 %	0	0 %	1	100 %	0	0 %	0	0 %
877	1	Steel Stringer End (5 Ft.)	(LF)	9,501	0	0 %	4,751	50 %	4,751	50 %	0	0 %	0	0 %
909	1	Pourable Fixed Joint Seal	(LF)	495	0	0 %	0	0 %	248	50 %	248	50 %	0	0 %
956	1	Steel Cracking/Fatigue	(EA)	1	0	0 %	0	0 %	1	100 %	0	0 %	0	0 %
957	1	Pack Rust	(EA)	1	0	0 %	0	0 %	1	100 %	0	0 %	0	0 %
961	1	Scour	(EA)	1	0	0 %	0	0 %	1	100 %	0	0 %	0	0 %
962	1	Superstructure Traffic Impact	(EA)	1	0	0 %	0	0 %	1	100 %	0	0 %	0	0 %
963	1	Steel Section Loss	(EA)	1	0	0 %	0	0 %	1	100 %	0	0 %	0	0 %
965	1	Debris	(EA)	1	0	0 %	1	100 %	0	0 %	0	0 %	0	0 %
969	1	Out-Of-Plane Distortion/Loading	(EA)	1	0	0 %	1	100 %	0	0 %	0	0 %	0	0 %
973	1	Horizontal Force	(EA)	1	0	0 %	0	0 %	1	100 %	0	0 %	0	0 %

Additional Elements

Elem.	Element Notes (Include Size and Location of Deterioration
12	Many portions of the curbs exhibit spalls and/or cracking with corroding reinforcing steel, especially over the ends of the intermediate floor beams. Some spalls have been patched in isolated areas throughout the deck.
107	FX – The connection angles for the beams to pier beam 39 are deformed due to the apparent approach pavement growth and pier beam sweep. The beams are still supported by the original pier beams at piers 1 and 39; however, the added pier beam will support the beams should the connection angles fail.
113	PX – Cracks were observed in the web of numerous stringers at the top flange cope and stringer connection angles. Numerous broken rivets wre observed at the connection angles. Section loss exists through the exterior stringers at the end floor beams at numerous locations.
120	PX – Impact damage at west U1U2, span 31 and west U1L1 span 37. FX– Span 37, west U1 gusset plate – A 5/16-inch long crack in the bottom edge of the inboard gusset plate; Impact damage exists to the truss web members at multiple locations; West U1U2 in span 37 is bowed globally to the east 1/4"; Impact damage exists on the inboard flanges of the upper chord. Pack rust is common at the end post connection to the inboard gusset plate at the lower chord connection; Horizontal cracks were observed in the inboard truss gusset plate between the bearing pin and the end floor beam. All eight locations noted during the previous Fracture Critical inspection have been strengthened with the addition of a welded steel angle on the inboard face. Vehicular collision damage exists at numerous locations of the truss end posts. See FC Report.
152	PX – Active section loss with corrosion holes is common on the floor beams under the expansion joints; FX – Cracks were observed in the web of the end floor beams and intermediate floor beams in many locations.
162	PX- Numerous horizontal cracks were observed in the inboard truss gusset plates above the bearings, see report for locations and crack lengths; FX-LC inboard gusset plates typically bowed at L0 and L5 due to pack rust.
205	FX – A 7/8-inch maximum wide crack exists in the capital of the east column of pier 3 which is emanating from the span 2 bearing anchor bolt.

Elem.	Element Notes (Include Size and Location of Deterioration
215	No significant deficiencies were noted in the abutments, except for moderate debris on the bearing seats of both abutments and map cracking exposing a few reinforcing bars at the ends of the south abutment.
301	PX – Spalling of the headers was observed along the joints at piers 7, 9, 15, 25, 27, and 31; The poured joint seals typically are deteriorated and show evidence of leaking. Many of the poured seals were never installed at many of the hrepaired header locations, leaving only the form board to fill the joint.
310	PX – Elastomeric pads are missing at the supplemental pier beams under beams 1 through 4 at pier 1 and at beams 2 and 3 at pier 39 with heavy pack rust forming at beam 5, pier 1. The pads appear to be walking at pier 39 under beams 4 and 5.
311	FX – Wear causing grooving in the expansion bearing pins and enlarging of the pin hole in the connecting gusset plates are common throughout the spans. The wear is a result of bearing rotation under live loads. This condition is most severe at L0 span 38 over pier 37, which has 3/16-inch total wear to the pin and gusset plate. Heavy pack rust with minor associated pitting is widespread on and between the bearing components.
313	Surface corrosion exists the the fixed bearings.
330	FX- Pack rust is typical between the metal bridge railing, truss end posts and web members. Small cracks were observed in the railing where the flange and web have been coped.
510	PX – The asphalt wearing surface has unsealed longitudinal and transverse cracks throughout the spans. The deck growing in each span causing rotation/sweep in floor beams.
515	PX – Corrosion and significant section loss are occurring at many locations on the lower chord, floor beams and stringers due to deck drainage passing through joints. Widespread section loss and corrosion holes exist in the exterior stringers and end floor beams.
859	FX- Spalls exposing corroded rebar are common in the underside of the deck at the expansion joints due to leakage thru joints. The underside of the deck exhibits transverse cracks with light efflorescence. Spalls and deteriorated concrete exist in exterior stringer bays at isolated locations.
877	PX- Cracks were observed in the web of numerous stringers at the top flange cope, see FC report for locations; Cracks in the stringer connection angles were observed at numerous locaations at the end floor beams, see FC report for locations; Severe section loss with corrosion holes exists through exterior stringer webs.
909	The poured seal joints typically are deteriorated and show evidence of leaking.
956	PX- Numerous cracks exist in the stringer copes, stringer connection angles, end floor beams, and interior floor beams. See FC report.
957	PX – Pack rust is common at the end post connection to the inboard gusset plate at the lower chord connection; FX – Pack rust is forming at many of the bridge railing to inboard end post channel connections.
961	PX –Local scour exists around the columns at piers 5 through 9 and pier 23. The top of the column foundation is exposed up to 4 1/2 feet at these locations. Local scour was also observed at the columns in the flood plain north of the river.
962	PX-Collision damage to end posts, upper chord, verticals and diagonals at numerous locations.
963	PX- Corrosion holes through stringer webs, floor beam webs at numerous locations; FX- Corrosion of the lower chord has caused section loss on inboard top flange.
965	Accumulations of drift exists under spans 5 through 10. Heaviest accumulations at piers 7 and 10.
969	PX – Pier beams 1 and 39 have severe sweep and have been sistered.
973	PX-Significant approach pavement pressure occurs at both abutments pushing inward from both ends as evidenced by the movement of the deck, sheared rivets on stringers and anchor bolts missing for bearings.

Appendix A: Stringer Cope Cracks

Span	Floor Beam	Floor Beam Face	Stringer	Length (in.)	2017 FC Comment
2	0	North	5	1 1/2 vertical, 1 horizontal	Horizontal crack added
2	2	South	1	3/8	
2	4	South	1	1/8	
2	5	South	1	1/2	Crack grew 1/8-inch
3	0	North	1	1 1/4	
3	0	North	5	1/2	
3	5	South	1	3/8	
4	0	North	1	5/8	
4	2	South	5	1/4	Overcut
4	5	South	5	1 1/4	Crack arrested by drilled hole, 2007
5	0	North	5	1/2	
6	2	North	1	1/8	
6	3	North	1	1/4	
6	3	North	1	1/8	
7	0	North	5	2 1/4	Crow's foot end
7	5	South	5	3/4	Adjacent 50% section loss to the web 3 inches high
8	4	North	5	1 1/4, 7/8 (exterior), 1 1/4, 1 1/4 (interior)	One crack grew 1/8-inch
8	5	South	1	1 3/8	
9	1	North	1	1/4	
9	3	North	1	3/8	
9	3	South	1	3/8	
9	4	North	1	3/8	
10	0	North	1	5/8	New crack (2017)
10	1	South	2	3/4	
10	2	North	1	5/8	
10	5	South	5	1	
11	0	North	5	9/16	
11	0	North	1	3/4	
12	5	South	1	1 1/2, 1 1/2	
13	5	South	5	5/8	
14	5	South	1	1 1/4	
15	0	North	1	3/8	
16	1	South	5	1 1/8	
16	4	North	5	3/8	

Appendix A: Stringer Cope Cracks

Span	Floor Beam	Floor Beam Face	Stringer	Length (in.)	2017 FC Comment
16	5	South	5	1, 1/4	Crack grew 1/4-inch
17	0	North	5	1 3/8	
18	0	North	1	7/8	Crack grew 3/8-inch
18	2	South	1	3/8	
18	2	North	1	1/4	New crack (2017)
19	0	North	5	1/2	
19	5	South	1	3/4	
19	5	South	5	1 1/4	
20	0	North	1	5/8	
20	1	North	5	1/8	
20	2	North	1	3/8	
20	2	South	1	3/4	
20	4	North	5	1/8	
20	4	North	1	3/16	
21	0	North	5	7/8	
21	3	North	1	1/8	
21	4	South	1	1/8	
23	0	North	5	1/4	
23	1	South	5	3/16	
25	0	North	5	3/4	
25	2	South	1	1/4	
26	3	North	1	3/16	
26	5	South	1	2 1/2	
27	1	North	1	1/2 & 1	
27	1	South	1	1	
27	1	South	5	1/4	
27	2	South	1	3/16	
27	4	North	5	1/2	
28	1	North	1	3/16	
28	2	North	1	5/8	
28	2	South	1	1/4	
28	3	North	5	3/8	
28	5	South	1	5/8	
29	4	South	5	1 1/4	New crack (2017)
30	1	South	5	1/2	
30	4	North	5	1/2	
31	1	North	1	1/4	
31	2	North	1	1/4	
32	2	South	1	1/4	

Appendix A: Stringer Cope Cracks

Span	Floor Beam	Floor Beam Face	Stringer	Length (in.)	2017 FC Comment
32	0	North	5	5/8	
32	3	South	1	1/4	
32	4	North	1	1/8	
32	5	South	1	1/4	
33	2	South	1	1/8	
33	3	South	1	1/4	New crack (2017)
33	5	South	1	2	Crack grew 1/2-inch
34	1	South	1	1/4	
34	2	South	1	5/16	
34	5	South	1	1/2, 1/2	Additional crack added
35	0	North	1	1/2	
35	4	South	1	1/8	
36	0	North	1	1/2	Crack grew 1/8-inch
36	1	North	1	3/8	
36	2	South	1	3/4	
36	4	North	1	1/8	
36	5	South	1	2 1/4	
37	3	North	1	1/4	
37	0	North	5	1/2	
38	2	North	1	3/4	
38	2	South	1	5/8	
38	5	South	1	1/2	
39	1	North	1	1/8	
39	1	South	1	1/2	
39	3	South	1	3/8	

Appendix B: Stringer Connection Cracks

Span	Floor Beam	Floor Beam Face	Stringer	Stringer Face	Length (in.)	2017 FC Comment
2	0	North	2	West	3 1/4	
3	5	South	4	West	2 1/2	
4	0	North	2	West	2 3/4	
5	5	South	3	East	3 1/4	
8	0	North	3	West	3 1/2	
9	5	South	3	East	1 3/8	
9	5	South	3	West	3 5/8	Crack grew 1/8-inch
10	0	North	3	West	3	
12	0	North	2	East	3	
13	5	South	4	West	4	
15	5	South	4	West	3 7/8	
17	5	South	4	East	4 1/2	
18	0	North	3	East	2 3/4	
18	0	North	4	East	2 3/4	
22	0	North	1	East	3 3/4	
22	0	North	3	East	3 7/8	
22	0	North	4	East	2 3/4	
23	5	South	4	West	3 1/2	
24	0	North	2	West	2 3/4	
24	0	North	3	East	4	
24	0	North	3	West	4	
24	0	North	4	East	3 1/4	
25	5	South	2	West	3 1/4	
25	5	South	3	West	4 3/4	Crack grew 1/4-inch
25	5	South	3	East	1 1/4	
25	5	South	4	West	3 5/8	
25	5	South	5	West	5 1/2	Updated dimension from 6-inch to 5 1/2-inch. No change
26	0	North	2	East	2 7/8	
26	0	North	2	West	3 1/4	
26	0	North	3	East	5 3/8	
26	0	North	3	West	2 5/8	Crack grew 1/4-inch
26	0	North	4	East	3 1/2	
27	5	South	3	East	2 1/2	
27	5	South	3	West	3 3/4	
27	5	South	4	West	4 1/4	
28	0	North	2	East	4 1/4	
28	0	North	3	East	3 7/8	
29	5	South	3	West	4	

Appendix B: Stringer Connection Cracks

Span	Floor Beam	Floor Beam Face	Stringer	Stringer Face	Length (in.)	2017 FC Comment
29	5	South	4	East	1 1/2	
29	5	South	4	West	2 1/8	New crack (2017)
30	0	North	2	East	5 5/8	
30	0	North	3	East	4 5/8	Crack grew 1/8-inch
30	0	North	4	East	3 3/4	
31	5	South	4	East	3 3/4	
31	5	South	4	West	6 1/8	
33	5	South	3	West	4	
33	5	South	4	West	7	
34	0	North	2	East	3 1/2	
34	0	North	2	West	2	
34	0	North	3	West	2 1/4	
34	5	South	5	West	3 1/2	Updated dimension from 4 1/2-inch to 3 1/2-inch. No change
35	5	South	2	West	1 1/4	
35	5	South	3	West	4 1/4	
35	5	South	4	West	4	
36	0	North	2	West	3	
36	0	North	3	West	2	
36	0	North	4	East	4 1/8	
38	0	North	2	West	2 1/8	
38	0	North	3	West	2 1/2	
39	5	South	4	West	4 5/8	

Appendix C: Missing Stringer Rivets

Span	Floor Beam	Floor Beam Face	Stringer	Number	Previous comments, and 2017 FC comments
2	0	North	2	1	
2	0	North	3	2	
4	0	North	2	1	Shanks not in shear plane.
4	1	South	2	1	
4	3	South	3	1	
5	1	North	2	1	
5	1	North	3	1	
5	2	North	2	1	
5	4	South	4	1	
5	5	South	4	1	
6	0	North	2	2	East shank not in shear plane
6	0	North	3	1	Shank not in shear plane.
6	1	North	2	1	
6	2	North	2	2	
7	1	North	2	1	
7	2	North	2	2	
7	2	North	3	1	
7	5	South	3	2	Shanks not in shear plane.
7	5	South	4	2	Shanks not in shear plane.
8	0	North	2	2	Shanks not in shear plane.
8	0	North	3	1	Rivet shank is welded to connection angle, weld has broken away from rivet. Rivet shank no longer in shear plane.
8	1	North	2	1	
9	1	North	2	2	
9	4	South	4	1	
9	5	South	4	2	
10	0	North	2	2	
10	0	North	3	1	Shank not in shear plane.
10	1	North	2	2	
10	1	North	3	2	
10	4	South	4	1	
11	1	North	2	1	
11	4	South	4	2	
11	5	South	3	2	Shanks not in shear plane.
11	5	South	4	2	
12	0	North	2	1	
12	0	North	3	2	Shanks not in shear plane.
12	0	North	4	1	
13	2	North	2	2	

Appendix C: Missing Stringer Rivets

14	0	North	2	2	Shanks not in shear plane.
14	1	North	2	1	New missing rivet (2017)
15	5	South	3	2	West shank not in shear plane.
15	5	South	4	1	Shank not in shear plane.
16	0	North	2	2	Shanks not in shear plane.
16	0	North	3	1	
17	5	South	4	1	
18	0	North	2	2	Shanks not in shear plane.
18	0	North	3	1	Shank not in shear plane.
18	4	South	3	1	
20	0	North	1	1	
20	0	North	2	1	
22	0	North	2	2	Shanks not in shear plane.
22	0	North	3	1	Shank not in shear plane.
23	2	North	2	1	
23	4	South	4	1	
24	0	North	2	2	East shank not in shear plane.
24	4	South	4	2	
25	2	North	2	1	New missing rivet (2017)
25	5	South	4	1	Shank not in shear plane.
26	0	North	2	1	
28	1	North	2	1	
29	1	North	2	2	
29	2	North	2	1	
30	0	North	3	1	
31	2	North	2	1	New missing rivet (2017)
31	5	South	3	2	
32	0	North	2	2	East rivet shank not in shear plane.
32	0	North	3	1	Shank not in shear plane.
33	1	North	2	1	
33	5	South	3	1	Shank not in shear plane
34	0	North	3	1	Shank not in shear plane
34	1	North	2	1	
34	1	North	3	1	
35	2	North	2	2	
35	4	South	4	1	
35	5	South	3	1	Shank not in shear plane.
35	5	South	4	1	Shank not in shear plane.
36	0	North	2	1	Shank not in shear plane.
36	0	North	3	1	Shank not in shear plane.
36	1	North	2	2	
36	1	North	3	2	

Appendix C: Missing Stringer Rivets

36	4	South	3	1	
36	4	North	3	1	
37	1	North	2	1	
37	2	North	2	1	Shank not in shear plane.
37	5	South	3	2	
37	5	South	4	1	
38	0	North	2	2	East shank not in shear plane.
38	0	North	3	1	Shank not in shear plane.
38	1	North	2	1	
39	5	South	3	1	
39	5	South	4	1	

Appendix D: Stringer Loss

Span	Floor Beam	Floor Beam Face	Stringer	Description
2	0	North	1	3/4-inch diameter corrosion hole with 1/4-inch crack and 3-inch high knife edging below the hole
4	0	North	5	1 1/4-inch diameter corrosion hole with with 1/2-inch and 5/8-inch long horizontal cracks and additional 3-inch high x 3/16-inch remaining section below the corrosion hole
5	5	South	5	1-inch diameter with horizontal crack, 1/2-inch long, and vertical crack, 3/8-inch long
6	0	North	1	1 1/2 -inch diameter corrosion hole with 1 1/8-inch vertical crack and 2-inch high knife edging below the corrosion hole
6	0	South	5	1 3/8-inch diameter corrosion hole with 1/2-inch vertical crack and 3-inch high knife edging below the corrosion hole
7	5	South	1	1/2-inch diameter corrosion hole with 1/4-inch long crack
9	1	South	5	2 3/8-inch x 1-inch corrosion hole
9	5	South	1	2 7/8-inch high x 1 1/4-inch wide corrosion hole with 1-inch long vertical crack and 2-inch high area of 50% section loss below the corrosion hole
9	5	South	5	1-inch W x 1 1/4-inch H with 1/8-inch crack.
10	0	North	5	1/2-inch diameter hole with 3-inch H x 3/16-inch, 4-inch H x 1/8-inch, and 3-inch H x 1/16-inch pitting extending below the hole, and two cracks above hole, 3/4-inch & 1/2-inch. One crack below hole, 1/2-inch
10	5	South	5	4-inch W x 1 1/8-inch H with 1/2-inch knife edging adjacent in lower web.
11	5	South	1	Up to 25% section loss x 3-inch high to the web at the cope. New (2017)
11	5	South	5	5/8-inch diameter corrosion hole with 7/8-inch long crack and 3-inch high knife edging below the corrosion hole
12	0	North	1	1-inch diameter corrosion hole with 5/16-inch vertical crack (crack grew 1/16-inch).
12	0	North	5	1-1/8-inch H x 5/8-inch W with 3/4-inch vertical crack
12	1	North	5	1-inch H x 3/4-inch W
13	5	South	1	1/4-inch crack extends below through hole, 1 5/8-inch H x 1/2-inch W
14	0	North	5	1/2-inch diameter hole with 1 1/4-inch vertical crack.
14	5	South	1	5/16-inch diameter corrosion hole with 3-inch high knife edging below the corrosion hole. New (2017)
15	1	South	5	1-inch high x 3/4-inch wide corrosion hole. New (2017)
15	5	South	5	1 1/4-inch diameter corrosion hole at top cope with a 3/8-inch long crack and 2-inch high x 5-inch wide corrosion hole below the connection angle. RECOMMEND STRENGTHENING
16	0	North	5	Web top at connection angle: 4 1/4-inch H x 1 1/2-inch hole with two cracks (5/8-inch & 1/4-inch). Web bottom just above bottom flange 5-inch W x 1-inch H Approx 33% web area remains. RECOMMEND STRENGTHENING
17	4	North	5	2 1/2-inch x 1-inch with 9/16-inch long crack
17	5	South	1	1 1/2-inch wide x 1/2-inch high corrosion hole and 1/2-inch high corrosion hole with a 3/16-inch crack
17	5	South	5	2 1/4-inch high x 1-inch wide corrosion hole with 5/8-inch long crack (crack grew 1/8-inch)
18	0	North	5	2 1/4-inch diameter hole with 3/16-inch pitting for 7-inch H
18	5	South	1	2 1/2-inch long x 5/8-inch wide corrosion hole with 25% section loss to the web below the corrosion hole. Hole has taken spot of where previous corrosion crack was.
19	5	South	1	5/8-inch diameter corrosion hole with 3/4-inch long crack

Appendix D: Stringer Loss

Span	Floor Beam	Floor Beam Face	Stringer	Description
19	5	South	5	7 1/2-inch wide x 4-inch high corrosion hole in lower web with 3/8-inch long crack initiating at the top of the hole. 2-inch high knife edging above the hole with approximately 50% section loss in the web
20	0	North	5	1 1/4-inch diameter
21	5	South	1	1 1/4-inch W x 1/4-inch H with 1/4-inch vertical crack
21	5	South	5	2 1/2-inch H x 1 1/2-inch W with 4 1/2-inch long crack. RECOMMEND STRENGTHENING
22	0	North	1	2 1/4-inch wide x 1/2-inch high corrosion hole
23	5	South	5	2 3/4-inch high x 5/8-inch wide corrosion hole
24	0	North	1	1 1/4-inch H x 3/4-inch W with 3/16-inch max loss over 6-inch below hole
24	0	North	5	10 1/2-inch W x 2-inch H with 1/16-1/8-inch remaining full height at edge of connection angle; 1-inch and 3/4-inch diameter corrosion holes in web adjacent to connection angle with multiple holes emanating from lower holes, 1/4-inch max L. RECOMMEND STRENGTHENING
24	5	South	5	1-inch diameter corrosion hole in the bottom flange 10-inches from the beam end
25	2	North	5	1/2-inch diameter. Adjacent knife edging to hole.
25	5	South	1	2-inch H x 5/8-inch W with 5/8-inch crack
25	5	South	5	1/8-inch section loss, full height
26	0	North	1	1/2-inch diameter corrosion hole with 3/8-inch long crack and knife edging below the corrosion hole
26	0	North	5	2-inch H x 5/8-inch W
27	5	South	1	3 3/4-inch high X 1-inch wide corrosion hole with a 1/4-inch vertical crack
29	4	South	5	5/8-inch dia corrosion hole in stringer cope with 1-inch vertical crack below hole
29	5	South	5	1 1/2-inch H X 1-inch W with two cracks, 1-inch crack extends cope to hole & 1-inch crack below hole. Two new through holes, 1/2-inch and 5/8-inch diameter in lower web
30	0	North	5	1 1/2-inch x 1 1/2-inch corrosion hole with a 1-inch vertical crack
31	5	South	5	1 1/2-inch high x 1-inch wide corrosion hole and 1 1/4-inch high x 1-inch wide corrosion hole with 5-inch long vertical crack. Total web section loss = approx 75%. New Crack. RECOMMEND STRENGTHENING
33	5	South	5	Severe section loss to east connection angle, top 2 rivet heads have near 100% head loss (west connection angle good)
34	3	South	5	2 3/4-inch H x 1/2-inch W with 1/2-inch crack at bottom of hole
34	4	South	5	1-inch high by 1 1/4-inch wide corrosion hole with 1/2-inch vertical crack at bottom of hole (Crack grew 1/8-inch). Additional two corrosion holes in lower web, 2-inch wide x 1-inch high and 3/4-inch diameter
35	5	South	5	6 1/4-inch wide x 1 3/4-inch high corrosion hole
36	0	North	5	2 1/2-inch high x 1 1/2-inch wide corrosion hole with a 1 3/4-inch long vertical crack. Also, 1/4-inch deep pitting for 3-inch high and 1/8-inch deep pitting for remaining height. Approx. 50% section loss to this location. Heavy rivet head loss on stringer connection rivets on outside face due to laminating corrosion. Additional corrosion holes in lower web, up to 8-inch wide x 1 1/4-inch high. RECOMMEND STRENGTHENING
38	0	North	5	3/4-inch H x 10-inch W hole at bottom of web with 1/8-inch average (3/16-inch max) section loss full height on outboard face. RECOMMEND STRENGTHENING
38	5	South	5	1 1/2-inch H X 4 1/2-inch W below connection angle and 1/2-inch cope crack
39	0	North	5	1 1/4-inch H X 1/2-inch W below connection angle

Appendix D: Stringer Loss

Span	Floor Beam	Floor Beam Face	Stringer	Description
39	1	South	5	1/2-inch high x 1/4-inch wide corrosion hole within 1/2-inch long crack extending below corrosion hole. Also 1/8-inch deep section loss over the full height of the beam
39	5	South	1	1-inch diameter below connection angle with 1/2-inch crack at cope

Appendix E: Floor Beam Sweep

Span	Floor Beam	Sweep (in.)	Sweep Direction	Stiff Leg Installed	Description
1	pier 1			Yes	Sister pier beam added due to severe sweep
2	0	-	-	Yes	
2	5	-	-	Yes	
3	0	1/2	North	Yes	
3	5	1/4	South	Yes	
4	0	1/4	North	Yes	
4	5	1/4	South	Yes	
5	0	3/4	North	Yes	
5	5	-	-	Yes	
6	0	-	-	Yes	
6	5	1/2	South	Yes	
7	0	1/2	North	Yes	
7	5	-	-	Yes	
8	0	1/4	North	Yes	
8	5	1/2	South	Yes	
9	0	3/8	North	Yes	
9	5	-	-	Yes	
10	0	-	-	Yes	
10	5	1/2	South	Yes	
11	0	5/8	North	Yes	
11	5	-	-	Yes	
12	0	1/4	North	Yes	
12	5	5/8	South	Yes	
13	0	1/2	North	Yes	
13	5	3/16	South	Yes	
14	0	5/8	North	Yes	
14	5	1/2	South	Yes	
15	0	5/8	North	Yes	
15	5	3/16	South	Yes	
16	0	3/16	North	Yes	
16	5	3/4	South	Yes	
17	0	1/2	North	Yes	

Appendix E: Floor Beam Sweep

Span	Floor Beam	Sweep (in.)	Sweep Direction	Stiff Leg Installed	Description
17	5	1/4	South	Yes	
18	0	5/16	North	Yes	
18	5	3/4	South	Yes	
19	0	5/8	North	Yes	
19	5	-	-	Yes	
20	0	-	-	Yes	
20	5	7/8	South	Yes	
21	0	5/8	North	Yes	
21	5	-	-	Yes	
22	0	1/4	North	Yes	
22	5	3/8	South	Yes	
23	0	1/2	North	Yes	
23	5	-	-	Yes	
24	0	1/4	North	Yes	
24	5	3/4	South	Yes	
25	0	3/8	North	Yes	
25	5	7/16	North	Yes	
26	0	3/8	North	Yes	
26	5	1/2	South	Yes	
27	0	3/4	North	Yes	
27	5	5/8	South	Yes	
28	0	1/2	North	Yes	
28	5	3/4	South	Yes	
29	0	3/4	North	Yes	
29	5	-	-	Yes	
30	0	-	-	Yes	
30	5	7/8	South	Yes	
31	0	1/2	North	Yes	
31	5	-	-	Yes	
32	0	-	-	Yes	
32	5	3/4	South	Yes	
33	0	3/8	North	Yes	
33	5	-	-	Yes	
34	0	-	-	Yes	
34	5	3/4	South	Yes	
35	0	1/2	North	Yes	

Appendix E: Floor Beam Sweep

Span	Floor Beam	Sweep (in.)	Sweep Direction	Stiff Leg Installed	Description
35	5	-	-	Yes	
36	0	-	-	Yes	
36	5	5/8	South	Yes	
37	0	1/2	North	Yes	
37	5	-	-	Yes	
38	0	-	-	Yes	
38	5	3/8	South	Yes	
39	0	3/8	North	Yes	
39	5	-	-	Yes	
40	pier 39				Sister pier beam added due to severe sweep

Appendix F: Floor Beam Loss

Span	Floor Beam	Location	Description
2	0	Between stringer 2 and 5	4-inch x 8-inch x 3/8-inch angle added to bottom of web and bottom flange with stitch welds.
3	5	Between stringers 3 and 4	1 1/2-inch diameter
4	0	Between stringer 4 and 5	14-inch long x 1-inch high
5	5	Between stringers 3 and 4	2-inch high x 1-inch wide
5	5	Between stringers 1 and 2	3/4-inch diameter and 1-inch H x 2-inch wide
6	0	Between stringers 3 and 4	1-inch H x 16 1/2-inch wide
6	0	Between stringers 1 and 2	6-inch wide x 1-1/4-inch H
7	2	At E Truss	3/4-inch X 3/4-inch corrosion hole with 1/2-inch horizontal crack
7	3	At east truss cope	5/8-inch X 5/8-inch with 1/4-inch vertical crack
8	3	At E Truss	3/4-inch vertical by 1/2-inch horizontal corrosion hole
9	0	Under stringer 3	3/4-inch and 3/8-inch corrosion holes just in lower web above stiff leg.
9	1	West Truss	3/4-inch corrosion hole with adjacent knife edging in cope.
9	1	At east truss	1 1/2-inch wide x 2-inch high corrosion hole with a 1 1/8-inch long crack that has self-arresting into the corrosion hole.
10	1	At east truss cope	5/8-inch vertical X 3/16-inch horizontal.
11	5	Between stringers 4 and 5	5 through holes, 4-inch high x 1-1/2-inch and four 3/8-inch diameter.
11	5	Near stringer 3	29-inch long crack with slight offset (Crack grew 1/2-inch) with 6-inch x 1 1/2-inch corrosion hole.
12	0	Near stringer 4	Multiple corrosion holes over a 48 1/2-inch long x 1 5/8-inch high area.
12	3	At E Truss	1 3/8-inch high x 1-inch wide.
13	5	Near stringer 2	1 3/8-inch wide x 1-inch high corrosion hole
15	3	At E Truss	9/16-inch diameter with 1/4-inch corrosion crack
15	4	At E Truss	1/2-inch wide x 1/4-inch high corrosion hole in floor beam cope. Corrosion crack starting to form
15	5	Between stringers 1 and 2	Multiple holes over 21-inch length, max size 6-inch wide x 2-inch high
16	4	East truss	3-1/2-inch high x 4-1/4-inch wide
18	2	At E Truss	1-inch high x 5/8-inch wide & 1/4-inch diameter corrosion holes with 1-inch crack extending between holes.
19	3	At east truss	Section loss up to knife edging in cope. Crack forming (NEW)
20	0	between stringers 1&2	2 holes, 3/4-inch diameter and 1 1/4-inch wide x 3/4-inch high.
20	0	Between stringer 3 & 4	14 1/2-inch long horizontal crack with multiple corrosion holes up to 1-inch high
20	3	At east truss connection	1 1/8-inch wide x 9/16-inch high through hole with adjacent knife edging.

Appendix F: Floor Beam Loss

Span	Floor Beam	Location	Description
22	5	Near stringer 4	1 1/2-inch wide x 3/4-inch high in lower web
22	5	Near W truss connection	1-inch wide x 3-inch high corrosion hole
23	0	At E truss	2 3/4-inch high x 5/8-inch wide in lower web.
24	0	Between stringer 1 & west truss	3/4-inch diameter in lower web
24	2	At east truss connection	3/4-inch high x 3/4-inch wide hole at cope with 1/4-inch diagonal crack.
25	2	At E Truss	3 1/2-inch high x 2-inch wide corrosion hole in floor beam cope, with adjacent knife ending.
26	3	At E Truss	1/2-inch corrosion hole in floor beam cope
26	5	Between stringer 1-2	1 3/4-inch wide x 1-inch high
27	1	At W Truss	2-inch high x 2 1/2-inch wide.
27	1	At E Truss	3/4-inch diameter corrosion hole and a 3/16-inch crack at cope.
27	2	At east truss connection	1 1/4-inch high x 1 1/4-inch wide corrosion hole with 1/2-inch vertical crack below hole. (Crack grew 3/16-inch)
27	5	Between stringer 1 & 2	1 1/2-inch corrosion hole.
28	0	Between stringers 4-5	Through hole, 1 1/4-inch wide x 5/8-inch high.
28	2	At E Truss	3/4-inch diameter & 1-inch wide x 1/4-inch high holes. 1/8-inch crack emanating from hole at cope.
28	3	At E truss	4 1/2-inch high x 1-inch wide corrosion hole
29	5	Between stringers 2-3	2 1/4-inch wide x3/4-inch high
30	1	At west truss	1/2-inch X 1/2-inch with knife edging for 2 1/2-inch vertical.
30	2	At E Truss	1-inch high x 1/4-inch wide corrosion hole with 5/8-inch vertical crack.
33	2	At east truss connection	1 1/2-inch high x 5/16-inch wide hole at cope.
33	5	Between stringers 4-5	Through hole, 5 1/4-inch wide x 1 1/8-inch high.
34	3	At east truss connection	Heavy web section loss over top 15-inch with 1 1/8-inch high x 1/2-inch wide and 1/2-inch diameter holes. Also, 1-inch crack emanating from top hole. (Crack grew 1/4-inch). Approx 33% total web loss. RECOMMEND STRENGTHENING.
37	5	Between stringers 4 and 5	3/4-inch high X 2-inch wide, multiple holes (3/4-inch high x 12-inch wide)
37	5	At stringer 3, over stiff leg	Corrosion hole measuring 3/8-inch high x 1-inch wide with 3/8-inch crack to east side and 1 1/4-inch long crack to west side above stiff leg. (Additional crack added, original crack grew 5/8-inch)
38	0	At east truss connection	1 1/4-inch high x 3/4-inch wide
38	0	Between stringers 4 and 5	4 corrosion holes between: 1-inch high x 5-inch wide, 1-inch high x 1-inch wide, 1-inch high x 1 1/2-inch wide, 1 1/2-inch diameter
39	1	At east truss connection	3/4-inch high x 1/2-inch wide through hole at cope.

Appendix F: Floor Beam Loss

Span	Floor Beam	Location	Description
39	3	At east truss connection	1/2-inch x 3/8-inch

Appendix G: Floor Beam Cracks

Span	Truss	Floor Beam	Length (inch)	2017 FC Inspection Comment
2	East	0	2 1/4	
2	West	0	1	
2	West	5	1 3/8	
3	East	5	3 1/8	
3	West	5	1 1/2	
4	East	0	5	
4	West	0	3	Updated dimension from 3-inch to 2 3/4-inch. No change
5	West	3	5/16	
5	East	5	3 1/8	Crack grew 1/8-inch
5	West	5	1	
6	East	0	8	
6	West	0	1 1/2	Crack grew 1/8-inch
7	West	0	1	
7	East	2	1/2	
7	East	3	1/4	
7	East	5	3 1/8	
7	West	5	1 5/8	
8	East	0	6 1/4	
8	West	0	4 1/4	
8	East	3	3/16	
9	East	1	1 1/8	Self arrested in corrosion hole. New crack (2017)
9	East	5	3 1/4	
9	West	5	2 1/2	
10	East	0	6 5/8	
10	West	0	3	
11	East	5	2 5/8	Updated dimension from 3-inch to 2 5/8-inch. No change.
11	West	5	2 1/2	
12	East	0	1 7/8	
12	West	0	1 7/8	
13	East	5	2 1/2	
13	West	5	1 1/4	
14	East	0	5 7/16	
14	West	0	3	
14	East	1	7/16	
15	East	3	1/4	
15	West	4	5/16	
15	East	5	4 7/8	
16	East	0	3 7/8	

Appendix G: Floor Beam Cracks

Span	Truss	Floor Beam	Length (inch)	2017 FC Inspection Comment
16	West	0	3 5/8	
16	East	1	3/8	
16	West	1	1/2	
16	West	3	1	Crack grew 1/8-inch
17	West	1	1/8	
17	East	4	3/8	
17	West	4	1/2	
17	East	5	3 1/8	
17	West	5	3 1/8	
18	East	0	5 1/8	
18	West	0	3 3/8	
18	West	1	5/16	
19	East	5	1 3/8	
19	West	5	2 1/8	
20	East	0	6 3/8	
20	West	0	1 3/4	
20	East	2	3/16	
21	West	4	3/4	
21	East	5	1 1/4	
21	West	5	1 3/4	
22	East	0	3 3/4	
22	West	0	5 3/4	
22	West	1	1/2	
23	East	3	1/2	
23	West	4	3/8	
23	East	5	4	
23	West	5	1 3/4	
24	East	0	4 1/8	Crack grew 1/16-inch
24	West	0	4 3/4	Crack grew 1/8-inch
24	East	1	3/4	Self arrested in corrosion hole.
25	East	5	6 3/4	
26	East	0	4 1/4	
26	West	0	3 1/2	
27	East	5	1 1/4	
29	East	4	3/8	
29	East	5	5	
29	West	5	5/8	
30	East	0	1 5/8	
30	West	0	5/8	
30	West	1	1/2	
31	East	5	4 1/4	
31	West	5	1	

Appendix G: Floor Beam Cracks

Span	Truss	Floor Beam	Length (inch)	2017 FC Inspection Comment
32	East	0	2	
32	West	0	5/8	
33	East	3	1/8" crack with 3/8" diameter corrosion hole.	
33	West	4	5/16	
33	East	5	3 1/4	
34	East	0	2 1/8	
34	East	1	1/4	
35	East	3	1/4	
35	East	5	2 13/16	
35	West	5	3 1/8	
36	East	0	2 3/8	
36	West	0	1 3/8	
36	East	1	1/8	
36	East	4	1/4	
36	West	1	3/8	
36	West	4	1/8	Updated dimension from 1/4-inch to 1/8-inch. No change.
37	West	4	3/8	Crack grew 1/4-inch
37	East	5	1 5/8	
37	West	5	3/4	
38	East	0	9 3/16	
38	West	0	3 1/2	
38	West	1	1/2	
38	East	2	7/16 crack with through hole 9/16 H x 3/8 W.	
38	West	3	7/16	
38	West	4	1/8	
39	East	4	1/4	
39	West	4	1/4	
39	East	5	3	
39	West	5	1 1/2	

Appendix H: Gusset Plate Cracks

Span	Truss	Panel Point	Length of Crack (in.)	Strengthened (Y/N)	2017 FC Comment
2	East	L0	17 5/8	Yes	Crack grew 1/8-inch
7	East	L0	Paint Crack	No	
8	East	L0	9 1/4	Yes	
13	East	L5	Paint crack	No	New Paint Crack
14	West	L0	4 3/4	Yes	Welded angle strengthening, inboard face
17	East	L5	9 3/4	Yes	Welded angle strengthening, inboard face
19	West	L5	9 1/2	Yes	
20	East	L0	7 1/2	Yes	
20	East	L5	Paint Crack	No	
22	East	L0	Paint Crack	No	
23	East	L0	Paint Crack	No	
23	West	L0	Paint Crack	No	
24	East	L0	8 1/2	Yes	
27	East	L5	Paint Crack	No	
27	West	L5	Paint Crack	No	
28	East	L0	Paint Crack	No	
29	East	L5	11 1/2	Yes	
30	East	L0	6 3/4	Yes	
33	East	L5	14	Yes	
38	East	L0	Paint Crack	No	