# Other Special 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:

**11/11/2014**

Report Prepared By:

**BURGESS & NIPLE, INC.**

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

BURGESS & NIPLE
Engineers ■ Surveyors ■ Planners

# *OKLAHOMA DEPARTMENT OF TRANSPORTATION -* Bridge Inspection Report

NBI No.: **04085** Structure No.: 0902 0000 X Local ID:-1 Suff. Rating: 34.9 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

## 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

## 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: 2012 109. Truck ADT %: 16
42A. Type of Service on: 1 Highway
42B. Type of Service under: 5 Waterway

## 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 | DO NOT U | DO NOT U |

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

## INSPECTION

| Type | Insp Req. | Insp Done | Freq: | Insp. Date: | Next Insp.: |
|---|---|---|---|---|---|
| NBI: | | N | 24 | 11/20/2013 | 11/20/2015 |
| FC Freq.: | Y | N | 24 | **11/20/2013** | **11/20/2015** |
| UW Freq.: | N | N | NA | **NA** | **NA** |
| OS Freq.: | Y | Y | 24 | **11/11/2014** | **11/20/2016** |

## 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: N 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

## 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:
[11/2014] FL to top of curb = 29.7' @ pier 9 east column
[2013] FL to top of curb = 30.1' measured @ pier 9 east column
[2011] FL to top of curb = 24.8' measured @ pier 9 east column

## LOAD RATING AND POSTING

31. Design Load: 2 M 13.5 (H 15) 41. Posting status: A Open, no restriction
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 ): | 24.4 | 36.3 | 65.4 |
| 66. Inventory Rating ( H / HS / 3-3 ) : | 14.5 | 21.8 | 37.7 |

65. Inv. Rating Method: 1 LF Load Factor-Ton Alt. Inv. Rating Meth.: 1 LF Load Factor-To
70. Posting: 5 At/Above Legal Loads Date Rated : 3/25/2014

## 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.: 2007 115. Year of Future ADT: 2032

## 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: 4 Tolerable
72. Approach Alignment: 6 Equal Min Criteria
113. Scour Critical: 7 Countermeasures

200c. Temperature: 30
200d. Weather: CLEAR
201. Structural Steel ASTM Desig.: -1 -1
202. Waterproof Membrane : -1
Date Installed : 1/1/1901
203. Type Exp. Dev. : Sliding Plate
-
204. Type of Handrail: Steel Post and Rail
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 -3.0
-3.0 -3.0 -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: NR
b. Posted Speed Limit : -1
c. Narrow/One Lane Bridge sign : -1
d. Vertical Clearance Sign: NO
Advanced Warning Sign : NO
Min. Measured Clearance : -1
Max. Measured Clearance : -1
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
224. Critical Feature Type: 1
225. Paint Type : Red Lead Ready
Overcoat : 0
226. Date Painted: -1
227. Paint Coloring: Silver
233. Deck Forming: -
236. Deck Cleaning : -1
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 Over
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
254. Thru Truss Type : Pony
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 N
264. Interstate Milepoint -1.00

| | | | |
|---|---|---|---|
| Inspection Date: | 11/11/2014 | Reported By: | DPOORMAN |
| Invoice No.: | -1 | Inspected With: | -1 |
| | | Agency : | |

Dale Poorman

Digitally signed by Dale Poorman
DN: cn=Dale Poorman, o=Burgess Niple, Inc., ou, email=dale.poorman@burgessniple.com, c=US
Date: 2014.12.22 14:22:46 -05'00'

**Structure / Inspection Notes**

(38) 100-foot pony trusses with (2) 36-foot beam approach spans.
O/S Inspection Items: 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; Sweep in end floor beams where stiff leg repairs have not been installed*; Misalignment of WU1U2 sp 37; Stringer 5 section loss at end floor beams. *=See attached spreadsheet with crack locations/lengths, broken rivets, and floor beam sweep where stiff leg repairs have not been installed.
Former Smart Flag 364 (Steel Out-of-Plane Compression Member) was placed in Condition State 3 with the following note:'FX- West truss U1U2 and L0U1 in span 37 is bowed globally to the west. Several above deck truss members have local bends due to impact damage.'
CX findings inlcude: cracks in the end gusset plates above the bearings: span 2, L0, east truss, 15 1/8"; span 29, L5, east truss, 10". Sweeps in the end floor beams: span 25, floor beam 5, 7/16"; span 38, floor beam 5, 5/8"; span 39, floor beam 0, 5/8". These findings were discussed with Wes Kellogg and a letter was sent on 11/12/2014.

CX - Cracks in the end GP's above the bearings: span 2, L0, east truss, 15 1/8"; span 29, L5, east truss, 10". Sweeps in the end floor beams: span span 25, floor beam 5, 7/16"; span 38, floor beam 5, 5/8"; span 39, floor beam 0, 5/8"
PX – Reinforce the damaged concrete bridge railing in spans 1 and 40; Seal cracks in the asphalt wearing surface; Reinstall missing elastomeric pads/shims under beams at supplemental pier beams over piers 1 and 39; Drill crack tips in stringers and floor beams that grow significantly; Repair cracks in stringer connection angles by adding seat brackets below stringer; Repair section loss in stringer and floor beam webs; Reposition rotated shim plate at pier 26 stiff leg; Strengthen the horizontal shear planes of the end lower chord gusset plates at east L0 in spans 2 and 20 and east L5 in span 29; Replace sheared rivets in the vertical connection, upper chord, and end post at west U1 in spans 31 and 37; Grind out notches and cuts in inboard flange and gusset plate at west U1L2, span 31; Removing pack rust and caulk/paint along edges of end gusset plates; Cleaning and painting steel below deck within 5 feet of the joints; Add rip rap around pier 9; Install pressure relief joints in both approaches.
FX – Monitor: Pack rust/section loss in truss members at railing conn's; Deck, joints, and end floor beams for further distress due to possible deck growth; Spalls/reinforcing in soffit for further deterioration; Cracks at floor beam copes for growth; Stitch welds for strengthening angle at floor beam 0, span 2 for cracking; Corr holes through the floor bracing gusset plates for cracks; Bowed members near west U1, span 37 for distress; Impact damage on UC and truss web members for additional misalignment and development of cracks; Bowed GP's near bearings for distress; Lower chord section loss at floor system bracing connections, splices, and adjacent to stay/batten plates; Bullet strike damage to east truss span 4 members/gussets.

Additional Elements

| NBI # | Structure # | County | Fac. Carried | Fac. Intersected | Insp. Date |
|---|---|---|---|---|---|
| 04085 | 0902 0000 X | Canadian | U.S. 281 | S. CANADIAN RIVER | 11/11/2014 |


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 | 11/11/2014 |

Photograph 2 - Elevation looking northwest

| NBI # | Structure # | County | Fac. Carried | Fac. Intersected | Insp. Date |
|---|---|---|---|---|---|
| 04085 | 0902 0000 X | Canadian | U.S. 281 | S. CANADIAN RIVER | 11/11/2014 |

Photograph 3 - Looking southwest at span 24, floor beam 0 connection to east truss. Note: Crack has grown 1/16-inch and is now 4 1/16 inches.

| NBI # | Structure # | County | Fac. Carried | Fac. Intersected | Insp. Date |
|---|---|---|---|---|---|
| 04085 | 0902 0000 X | Canadian | U.S. 281 | S. CANADIAN RIVER | 11/11/2014 |

Photograph 4 - Looking east at span 25 floor beam 5, above pier 25. Note: 7/16-inch sweep without stiff leg.

| NBI # | Structure # | County | Fac. Carried | Fac. Intersected | Insp. Date |
|---|---|---|---|---|---|
| 04085 | 0902 0000 X | Canadian | U.S. 281 | S. CANADIAN RIVER | 11/11/2014 |

Photograph 5 - Looking north at span 25, floor beam 5 connection to east truss. Note: The crack at the connection to the east truss has grown 1/2-inch and is now 6 3/4 inches long.

| NBI # | Structure # | County | Fac. Carried | Fac. Intersected | Insp. Date |
|---|---|---|---|---|---|
| 04085 | 0902 0000 X | Canadian | U.S. 281 | S. CANADIAN RIVER | 11/11/2014 |

Photograph 6 - Looking north at span 30, floor beam 1 connection to the west truss. Note: Crack has grown 1/8-inch and is now 1/2 inch long.

| NBI # | Structure # | County | Fac. Carried | Fac. Intersected | Insp. Date |
|---|---|---|---|---|---|
| 04085 | 0902 0000 X | Canadian | U.S. 281 | S. CANADIAN RIVER | 11/11/2014 |

Photograph 7 - Looking north at span 35, floor beam 5 connection to the east truss. Note: The crack has grown 1/16-inch and is now 2 13/16 inches long.

| NBI # | Structure # | County | Fac. Carried | Fac. Intersected | Insp. Date |
|---|---|---|---|---|---|
| 04085 | 0902 0000 X | Canadian | U.S. 281 | S. CANADIAN RIVER | 11/11/2014 |

Photograph 8 - Looking east at span 38, floor beam 5 over pier 38. Note: 5/8-inch sweep to the south.

| NBI # | Structure # | County | Fac. Carried | Fac. Intersected | Insp. Date |
|---|---|---|---|---|---|
| 04085 | 0902 0000 X | Canadian | U.S. 281 | S. CANADIAN RIVER | 11/11/2014 |

Photograph 9 - Looking east at span 39, floor beam 0 above pier 38. Note: 5/8-inch sweep to the north.

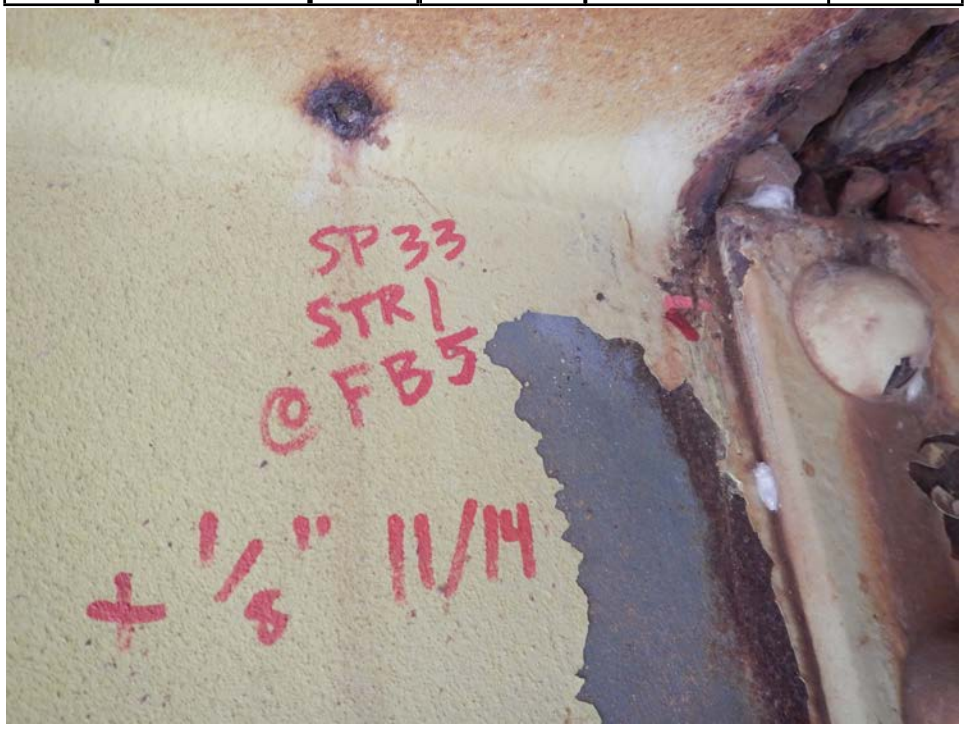
| NBI # | Structure # | County | Fac. Carried | Fac. Intersected | Insp. Date |
|---|---|---|---|---|---|
| 04085 | 0902 0000 X | Canadian | U.S. 281 | S. CANADIAN RIVER | 11/11/2014 |

Photograph 10 - Looking northeast at span 27, stringer 1 at the south face of floor beam 1. Note: Crack has grown 1/2-inch and is now 7/8 inch long.

| NBI # | Structure # | County | Fac. Carried | Fac. Intersected | Insp. Date |
|---|---|---|---|---|---|
| 04085 | 0902 0000 X | Canadian | U.S. 281 | S. CANADIAN RIVER | 11/11/2014 |

Photograph 11 - Looking east at span 32, stringer 5 at floor beam 0. Note: Stringer cope crack has grown 1/8-inch and is now 5/8 inch long.

| NBI # | Structure # | County | Fac. Carried | Fac. Intersected | Insp. Date |
|---|---|---|---|---|---|
| 04085 | 0902 0000 X | Canadian | U.S. 281 | S. CANADIAN RIVER | 11/11/2014 |




Photograph 12 - Looking northwest at span 33, stringer 1 connection to floor beam 5. Note: Stringer cope crack has grown 1/8-inch and is now 1 1/4 inch long.

| NBI # | Structure # | County | Fac. Carried | Fac. Intersected | Insp. Date |
|---|---|---|---|---|---|
| 04085 | 0902 0000 X | Canadian | U.S. 281 | S. CANADIAN RIVER | 11/11/2014 |


Photograph 13 - Looking southwest at span 36, stringer 4 connection to floor beam 0, east connection angle. Note: Stringer connection angle crack has grown 1/8-inch and is now 4 1/8 inches long.

| NBI # | Structure # | County | Fac. Carried | Fac. Intersected | Insp. Date |
|---|---|---|---|---|---|
| 04085 | 0902 0000 X | Canadian | U.S. 281 | S. CANADIAN RIVER | 11/11/2014 |


Photograph 14 - Looking northwest at span 2, L0, east truss, inboard gusset plate. Note: Crack has grown 5 7/8 inches since 2013 bringing the crack to 15 1/8 inches total length.

| NBI # | Structure # | County | Fac. Carried | Fac. Intersected | Insp. Date |
|---|---|---|---|---|---|
| 04085 | 0902 0000 X | Canadian | U.S. 281 | S. CANADIAN RIVER | 11/11/2014 |

Photograph 15 - Looking north at span 2, L0, east truss, inboard gusset plate. Note: Crack has grown 5 7/8 inches since 2013 bringing the crack to 15 1/8 inches total length.

| NBI # | Structure # | County | Fac. Carried | Fac. Intersected | Insp. Date |
|---|---|---|---|---|---|
| 04085 | 0902 0000 X | Canadian | U.S. 281 | S. CANADIAN RIVER | 11/11/2014 |


Photograph 16 - Looking west at span 8, east truss, L0 inboard gusset plate. Note: Crack has grown 1/2 inch and is now 7 1/4 inches long.

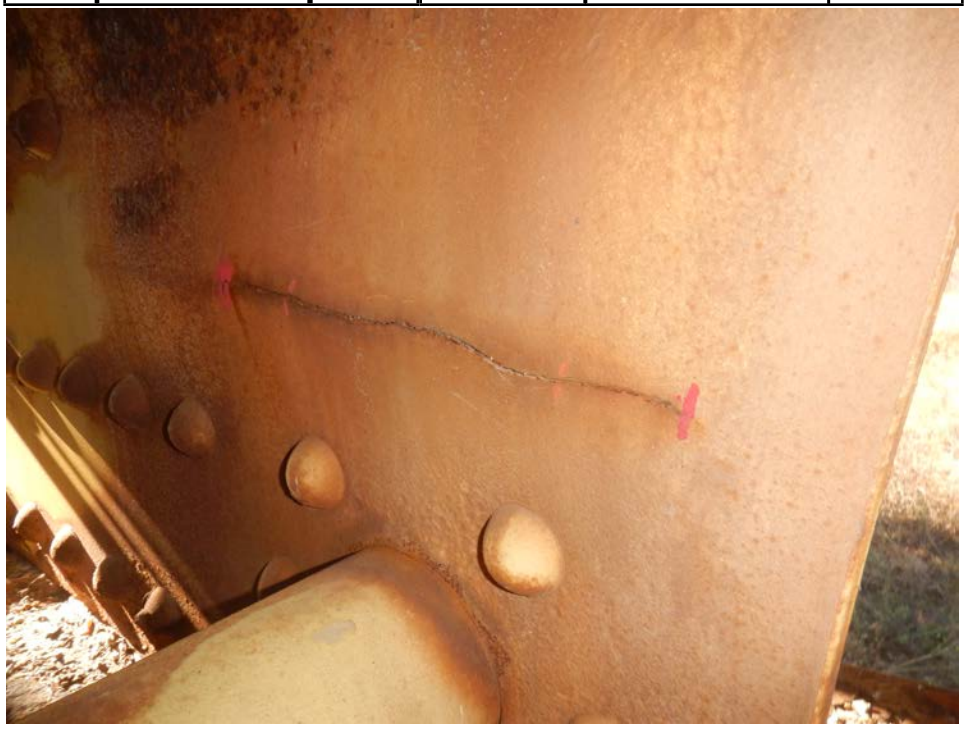
| NBI # | Structure # | County | Fac. Carried | Fac. Intersected | Insp. Date |
|---|---|---|---|---|---|
| 04085 | 0902 0000 X | Canadian | U.S. 281 | S. CANADIAN RIVER | 11/11/2014 |


Photograph 17 - Looking southwest at span 17, east truss, L5 inboard gusset plate. Note: Crack has grown 3/4 inch and is now 9 inches long.

| NBI # | Structure # | County | Fac. Carried | Fac. Intersected | Insp. Date |
|---|---|---|---|---|---|
| 04085 | 0902 0000 X | Canadian | U.S. 281 | S. CANADIAN RIVER | 11/11/2014 |

Photograph 18 - Looking northeast at span 20, east truss, L0 inboard gusset plate. Note: crack has grown 3 1/2 inches and is now 6 1/2 inches long.

| NBI # | Structure # | County | Fac. Carried | Fac. Intersected | Insp. Date |
|---|---|---|---|---|---|
| 04085 | 0902 0000 X | Canadian | U.S. 281 | S. CANADIAN RIVER | 11/11/2014 |



Photograph 19 - Looking southwest at span 29, east truss, L5 inboard gusset plate. Note: Crack has grown 3 3/4 inches to 10 inches.

| NBI # | Structure # | County | Fac. Carried | Fac. Intersected | Insp. Date |
|---|---|---|---|---|---|
| 04085 | 0902 0000 X | Canadian | U.S. 281 | S. CANADIAN RIVER | 11/11/2014 |

Photograph 20 - Looking northwest at span 30, east truss L0 inboard gusset plate. Note: New 4 3/4-inch long crack.

# Appendix A: Stringer Cope Cracks

| Span | Floor Beam | Floor Beam Face | Stringer | Length (in.) | Comment |
|---|---|---|---|---|---|
| 2 | 0 | North | 5 | 7/8 | |
| 2 | 2 | South | 1 | 3/8 | |
| 2 | 4 | South | 1 | 1/8 | |
| 2 | 5 | South | 1 | 3/8 | |
| 3 | 0 | North | 1 | 1 1/4 | |
| 3 | 0 | North | 5 | 1/2 | 1/8" growth (2013) |
| 3 | 5 | South | 1 | 3/8 | |
| 4 | 0 | North | 1 | 3/8 | |
| 4 | 2 | South | 5 | 1/4 | |
| 4 | 5 | South | 5 | 1 1/2 (drilled) | |
| 5 | 0 | North | 5 | 1/2 | |
| 6 | 2 | North | 1 | 1/8 | New crack (2013) |
| 6 | 3 | North | 1 | 1/4 | |
| 7 | 0 | North | 5 | 2 1/4 | |
| 7 | 5 | South | 1 | 1/2, 3/8 | Two diagonal cracks (2013) |
| 7 | 5 | South | 5 | 3/4 | |
| 8 | 5 | South | 1 | 1 1/8 | |
| 9 | 1 | North | 1 | 1/4 | |
| 9 | 3 | North | 1 | 1/8 | 3/8" no growth from previous paint mark (2013) |
| 9 | 3 | South | 1 | 3/8 | |
| **9** | **5** | **South** | **1** | **3/4** | **New crack (2014)** |
| 10 | 2 | North | 1 | 5/8 | |
| 10 | 5 | South | 5 | 7/8 | |
| 11 | 0 | North | 5 | 9/16 | |
| 12 | 5 | South | 1 | 1 1/2 | 1-1/2" long crack splits into multiple cracks (up to 1-1/2" additional length, others 3/16" long) (2013) |
| 13 | 5 | South | 5 | 5/8 | 1/8" growth (2013) |
| 14 | 0 | North | 5 | 1 3/8 | 1/8" growth and 1/4" corrosion hole (2013) |
| 14 | 5 | South | 1 | 1 1/4 | |
| 15 | 0 | North | 1 | 1/8, 1/8 | |
| 16 | 4 | North | 5 | 1/2 | |
| 16 | 5 | South | 5 | 1/4 | New crack (2013) |
| 17 | 0 | North | 5 | 1 | |
| 17 | 3 | North | 1 | 1/16 | |
| 18 | 0 | North | 1 | 1/2 | |
| 18 | 2 | South | 1 | 3/8 | |
| 18 | 5 | South | 1 | 3/4 | |
| 19 | 0 | North | 5 | 1/2 | |
| 19 | 5 | South | 3 | 3/4 | |
| 19 | 5 | South | 5 | 1-1/4 | 1/4" growth (2013) |
| 20 | 1 | North | 5 | 1/8 | |
| 20 | 2 | North | 1 | 1/2 | |

* Bolded and highlighted rows show new or changed comments.

# Appendix A: Stringer Cope Cracks

| Span | Floor Beam | Floor Beam Face | Stringer | Length (in.) | Comment |
|---|---|---|---|---|---|
| 20 | 2 | South | 1 | 3/4 | |
| 20 | 4 | North | 5 | 1/8 | |
| 20 | 5 | South | 1 | 1/8 | |
| 21 | 0 | North | 5 | 7/8 | 1/8" growth (2013) |
| 21 | 3 | North | 1 | 1/8 | New crack (2013) |
| 21 | 4 | South | 1 | 1/8 | |
| 23 | 1 | South | 5 | 3/16 | New crack (2013) |
| 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 | 3/8 | |
| **27** | **1** | **South** | **1** | **7/8** | **New crack (2013), 7/8", 1/2" growth (2014)** |
| 27 | 1 | South | 5 | 1/4 | 1/8" growth (2013) |
| 27 | 2 | South | 1 | 3/16 | |
| 28 | 1 | North | 1 | 3/16 | |
| 28 | 2 | North | 1 | 5/8 | |
| 28 | 2 | South | 1 | 1/4 | |
| 28 | 2 | North | 1 | 1/2 | New crack (2013) |
| 28 | 5 | South | 1 | 5/8 | |
| 30 | 1 | South | 5 | 1/2 | |
| 30 | 4 | North | 5 | 1/2 | On east face of stringer, crack measures 1/4" (2013) |
| 31 | 2 | North | 1 | 1/4 | |
| 32 | 2 | South | 1 | 1/4 | |
| 32 | 4 | South | 1 | 1/4 | |
| 32 | 5 | South | 1 | 1/4 | |
| **32** | **0** | **North** | **5** | **5/8** | **New crack (2013), 5/8", 1/8" growth (2014)** |
| 33 | 2 | South | 1 | 1/8 | New crack (2013) |
| **33** | **5** | **South** | **1** | **1 1/4** | **1 1/4", 1/8" growth (2014)** |
| 34 | 1 | South | 1 | 1/4 | |
| 34 | 2 | South | 1 | 1/4 | |
| 34 | 5 | South | 1 | 1/2 | |
| 35 | 0 | North | 1 | 1/2 | |
| 35 | 4 | South | 1 | 1/8 | |
| 36 | 2 | South | 1 | 3/4 | |
| 36 | 0 | North | 1 | 1/4 | New crack (2013) |
| 37 | 0 | North | 5 | 1/2 | |
| 37 | 3 | North | 1 | 1/4 | |
| 38 | 2 | North | 1 | 3/4 | |
| 38 | 2 | South | 1 | 5/8 | |
| 38 | 5 | South | 1 | 1/2 | |

* Bolded and highlighted rows show new or changed comments.

# Appendix A: Stringer Cope Cracks

| Span | Floor Beam | Floor Beam Face | Stringer | Length (in.) | Comment |
|---|---|---|---|---|---|
| 39 | 1 | North | 1 | 1/8 | New crack (2013) |
| 39 | 1 | South | 1 | 1/2 | |
| 39 | 3 | South | 1 | 3/8 | |

* Bolded and highlighted rows show new or changed comments.

# Appendix B: Stringer Connection Cracks

| Span | Floor Beam | Floor Beam Face | Stringer | Stringer Face | Length (in.) | Comment |
|---|---|---|---|---|---|---|
| 2 | 0 | North | 2 | West | 3 1/4 | |
| 3 | 5 | South | 4 | West | 2 1/2 | |
| 4 | 0 | North | 2 | West | 3 | |
| 5 | 5 | South | 3 | East | 3 1/4 | |
| 8 | 0 | North | 3 | West | 3 1/2 | |
| **9** | **5** | **South** | **3** | **East** | **1 1/4** | **New crack (2013)** |
| 9 | 5 | South | 3 | West | 3 1/2 | |
| 10 | 0 | North | 3 | West | 3 | |
| 12 | 0 | North | 2 | East | 3 | |
| 13 | 5 | South | 4 | East | 4 | |
| 15 | 5 | South | 4 | West | 3 5/8 | |
| 17 | 5 | South | 4 | East | 4 3/4 | |
| **18** | **0** | **North** | **3** | **East** | **2 3/4** | **1/4" growth (2013)** |
| 18 | 0 | North | 4 | East | 2 3/4 | |
| 22 | 0 | North | 1 | East | 3 3/4 | |
| 22 | 0 | North | 3 | East | 3 1/2 | |
| 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 1/2 | |
| 25 | 5 | South | 4 | West | 3 1/2 | |
| 25 | 5 | South | 5 | West | 6 | |
| 26 | 0 | North | 2 | East | 2 3/4 | |
| 26 | 0 | North | 2 | West | 3 1/4 | |
| 26 | 0 | North | 3 | East | 5 3/8 | |
| 26 | 0 | North | 3 | West | 2 3/8 | |
| **26** | **0** | **North** | **4** | **East** | **3 1/2** | **1/4" growth (2013)** |
| 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 | |
| 28 | 0 | North | 3 | East | 3 3/4 | |
| 29 | 5 | South | 3 | West | 4 | |
| 29 | 5 | South | 4 | East | 1 1/2 | |

* Bolded and highlighted rows show new or changed comments.

# Appendix B: Stringer Connection Cracks

| Span | Floor Beam | Floor Beam Face | Stringer | Stringer Face | Length (in.) | Comment |
|---|---|---|---|---|---|---|
| 30 | 0 | North | 2 | East | 5 5/8 | |
| 30 | 0 | North | 3 | East | 4 1/2 | |
| 30 | 0 | North | 4 | East | 3 1/2 | |
| **30** | **1** | **South** | **5** | **West** | **9/16** | **New crack (2013)** |
| 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 | 4 1/2 | |
| 35 | 5 | South | 3 | West | 4 1/4 | |
| 35 | 5 | South | 4 | West | 4 | |
| 36 | 0 | North | 2 | West | 2 7/8 | |
| 36 | 0 | North | 3 | West | 2 | |
| **36** | **0** | **North** | **4** | **East** | **4 1/8** | **1/8" growth (2014)** |
| 38 | 0 | North | 2 | West | 2 1/8 | |
| 38 | 0 | North | 3 | West | 2 1/2 | |
| **39** | **5** | **South** | **4** | **West** | **4 5/8** | **1/8" growth (2013)** |

* Bolded and highlighted rows show new or changed comments.

# Appendix C: Missing Stringer Rivets

| Span | Floor Beam | Floor Beam Face | Stringer | Number | Comment |
|---|---|---|---|---|---|
| 2 | 0 | North | 2 | 1 | All shanks still in shear plane unless noted otherwise. |
| 2 | 0 | North | 3 | 2 | |
| 4 | 0 | North | 2 | 1 | |
| 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 | 5 | South | 4 | 1 | |
| 6 | 0 | North | 2 | 2 | East rivet shank no longer in shear plane. |
| 6 | 0 | North | 3 | 1 | East rivet shank no longer 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 | |
| 7 | 5 | South | 4 | 2 | |
| 8 | 0 | North | 2 | 2 | |
| 8 | 0 | North | 3 | 1 | Rivet shank is welded to connection angle |
| 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 | |
| 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 | Both shanks not in shear plane. |
| 11 | 5 | South | 4 | 2 | |
| 12 | 0 | North | 3 | 2 | |
| 12 | 0 | North | 4 | 1 | |
| 13 | 2 | North | 2 | 2 | |
| 14 | 0 | North | 2 | 2 | Both shanks not in shear plane. |
| 15 | 5 | South | 3 | 2 | |
| 15 | 5 | South | 4 | 1 | |
| 16 | 0 | North | 2 | 2 | |

* Bolded and highlighted rows show new or changed comments.

# Appendix C: Missing Stringer Rivets

| Span | Floor Beam | Floor Beam Face | Stringer | Number | Comment |
|---|---|---|---|---|---|
| 16 | 0 | North | 3 | 1 | |
| 17 | 5 | South | 4 | 1 | |
| 18 | 0 | North | 2 | 2 | Both shanks not in shear plane. |
| 18 | 0 | North | 3 | 1 | |
| 18 | 4 | South | 3 | 1 | |
| 20 | 0 | North | 1 | 1 | |
| 20 | 0 | North | 2 | 1 | |
| 22 | 0 | North | 2 | 2 | Previously only 1 |
| 22 | 0 | North | 3 | 1 | |
| 23 | 2 | North | 2 | 1 | |
| 23 | 4 | North | 4 | 1 | |
| 24 | 0 | North | 2 | 2 | |
| 24 | 4 | South | 4 | 2 | |
| 25 | 2 | North | 2 | 1 | |
| 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 | |
| 30 | 0 | North | 3 | 1 | |
| 31 | 5 | South | 3 | 2 | |
| 32 | 0 | North | 2 | 2 | |
| 32 | 0 | North | 3 | 1 | |
| 33 | 1 | North | 2 | 1 | |
| 33 | 5 | South | 3 | 1 | |
| 34 | 0 | North | 3 | 1 | |
| 34 | 1 | North | 2 | 1 | |
| 34 | 1 | North | 3 | 1 | |
| 35 | 2 | North | 2 | 2 | |
| 35 | 4 | South | 4 | 1 | |
| 35 | 5 | South | 3 | 2 | |
| 35 | 5 | South | 4 | 1 | |
| 36 | 0 | North | 2 | 1 | |
| 36 | 0 | North | 3 | 1 | |
| 36 | 1 | North | 2 | 2 | |
| 36 | 1 | North | 3 | 2 | |
| 36 | 4 | South | 3 | 1 | |
| 37 | 1 | North | 2 | 1 | |
| 37 | 2 | North | 2 | 1 | |
| 37 | 5 | South | 3 | 2 | |
| 37 | 5 | South | 4 | 1 | |

* Bolded and highlighted rows show new or changed comments.

# Appendix C: Missing Stringer Rivets

| Span | Floor Beam | Floor Beam Face | Stringer | Number | Comment |
|---|---|---|---|---|---|
| 38 | 0 | North | 2 | 2 | Shank no longer in shear plane, east connection angle. |
| 38 | 0 | North | 3 | 2 | Shank no longer in shear plane, east connection angle. |
| 38 | 1 | North | 2 | 1 | |
| 39 | 5 | South | 3 | 1 | |

* Bolded and highlighted rows show new or changed comments.

# Appendix D: Stringer Loss

| Span | Floor Beam | Floor Beam Face | Stringer | Description |
|---|---|---|---|---|
| 2 | 0 | North | 1 | 3/4" diameter |
| 4 | 0 | North | 5 | 1 1/4" diameter with 1/4"crack |
| 5 | 5 | South | 5 | 1" diameter with horizontal crack, 1/2"L, and vertical crack, 3/8"L |
| 6 | 0 | North | 1 | 1-1/2 " diameter with vertical crack, 3/4" |
| 6 | 0 | South | 5 | 1 3/8" diameter, 1/4" vertical crack |
| 9 | 1 | South | 5 | 2 1/4" x 1" |
| 9 | 5 | South | 1 | 2 3/4"H x 1" with 3/8" vertical crack and 3/8" diagonal crack |
| 9 | 5 | South | 5 | 1" x 1 1/4" with 1/8" crack. |
| 10 | 0 | North | 5 | 1/2" diameter hole with 3"H x 3/16", 4"H x 1/8", and 3"H x 1/16" pitting extending below the hole |
| 11 | 5 | South | 5 | 5/8" diameter with 7/8" long crack |
| 12 | 0 | North | 1 | 1" diameter with 1/4" vertical crack. |
| 12 | 0 | North | 5 | 1-1/8"H x 5/8" |
| 12 | 1 | North | 5 | 1"H x 3/4"W |
| 13 | 5 | South | 1 | 1 1/2"x 5/8" with 1/8" loss over top half of web depth, outboard face (20% total web loss). |
| 15 | 5 | South | 5 | 7/8" diameter at cope & 1" diameter below connection angle |
| 16 | 0 | North | 5 | 4-1/4"H x 1-1/2" hole with two cracks (5/8" & 1/4") |
| 17 | 4 | North | 5 | 2 1/2" x 1" with 3/8" long crack |
| 17 | 5 | South | 1 | Two holes: 1 1/2"W x 1/2"H and 1/2"H hole with 5/8" crack |
| 17 | 5 | South | 5 | 2 1/4"H x 1" with 1/2" long crack |
| 18 | 0 | North | 5 | 2 1/2"H x 1"W hole with 3/16" pitting for 7"H |
| 19 | 5 | South | 1 | 1/2" hole with 3/4" crack |
| 19 | 5 | South | 5 | 7 1/2"W x 4"H |
| 20 | 0 | North | 5 | 1 1/4" diameter |
| 21 | 5 | South | 1 | 1 1/4" x 1/4" |
| 21 | 5 | South | 5 | 2 1/2"H x 1 1/2"W with 3-7/8" long crack |
| 22 | 0 | North | 1 | 2" x 1/2" |
| 23 | 5 | South | 5 | 2 3/4"H x 1/2"W |
| 24 | 0 | North | 1 | 1"H x 1/2" W with 3/16" max pitting over 6" below hole |
| 24 | 0 | North | 5 | 10 1/2"W x 2"H with 1/16-1/8" remaining full height at edge of connection angle |
| 24 | 5 | South | 5 | 1" diameter |
| 25 | 2 | North | 5 | 1/2" diameter |
| 25 | 5 | South | 1 | 2"H x 5/8"W with 5/8" crack |
| 25 | 5 | South | 5 | 1/8" section loss, full height. |
| 26 | 0 | North | 1 | 1/2" diameter |
| 26 | 0 | North | 5 | 2" x 1/2" |

* Bolded and highlighted rows show new or changed comments.

# Appendix D: Stringer Loss

| Span | Floor Beam | Floor Beam Face | Stringer | Description |
|---|---|---|---|---|
| 27 | 5 | South | 1 | 3"H X 1"W with 1" horizontal crack and 3/16" vertical crack |
| 29 | 4 | South | 5 | 5/8" dia corrosion hole in stringer cope |
| 29 | 5 | South | 5 | 1 1/2"H X 1"W with two cracks, 1" crack extends cope to hole & 1" crack below hole |
| 30 | 0 | North | 5 | 1 1/2" x 1 1/2" |
| 31 | 5 | South | 5 | 1 1/2" H x 1" W & 1 1/4" H x 1" W |
| 34 | 3 | South | 5 | 3" H x 3/4" W |
| 34 | 4 | South | 5 | 1" x 1 1/4" |
| 35 | 5 | South | 5 | 5" W X 1 3/4" H |
| 36 | 0 | North | 5 | 2-1/2" H x 1-1/4" W with 7/8" vertical crack. Also, 1/4" pitting for 3" H and 1/8" 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 hole is 3" W x 1-1/4"H in lower web of stringer. |
| 38 | 0 | North | 5 | 2"H x 3/4"H hole at cope with 1/8" average (3/16" max) section loss full height on outboard face |
| 38 | 5 | South | 5 | 1 1/2"H X 4 1/2"W below connection angle and 1/2" cope crack |
| 39 | 0 | North | 5 | 1/4" X 1/2" |
| 39 | 1 | South | 5 | 1/2"H x 1/4"W hole within 1-1/16" crack at cope, also 1/8" average full height section loss. |
| 39 | 5 | South | 1 | 1" diameter with 1/2" crack |

* Bolded and highlighted rows show new or changed comments.

# Appendix E: Floor Beam Sweep

| Span | Floor Beam | North / South | Sweep | Stiff Leg | Comment |
|---|---|---|---|---|---|
| 1 | pier 1 | | | N | Sister pier girder added due to severe sweep |
| 2 | 0 | | | N | |
| 2 | 5 | | | N | |
| 3 | 0 | North | 1/2 | Y | Stiff leg installed |
| 3 | 5 | South | 1/4 | Y | Stiff leg installed |
| 4 | 0 | North | 1/4 | Y | Stiff leg installed |
| 4 | 5 | South | 1/4 | Y | Stiff leg installed |
| 5 | 0 | North | 3/4 | Y | Stiff leg installed |
| 5 | 5 | | | N | |
| 6 | 0 | | | N | |
| 6 | 5 | South | 1/2 | Y | Stiff leg installed |
| 7 | 0 | North | 1/2 | Y | Stiff leg installed |
| 7 | 5 | | | N | |
| 8 | 0 | North | 1/4 | Y | Stiff leg installed |
| 8 | 5 | South | 1/2 | Y | Stiff leg installed |
| 9 | 0 | North | 3/8 | Y | Stiff leg installed |
| 9 | 5 | | | N | |
| 10 | 0 | | | N | |
| 10 | 5 | South | 1/2 | Y | Stiff leg installed |
| 11 | 0 | North | 5/8 | Y | Stiff leg installed |
| 11 | 5 | South | | N | |
| 12 | 0 | North | 1/4 | Y | Stiff leg installed |
| 12 | 5 | South | 5/8 | Y | Stiff leg installed |
| 13 | 0 | North | 1/2 | Y | Stiff leg installed |
| 13 | 5 | South | 3/16 | Y | Stiff leg installed |
| 14 | 0 | North | 5/8 | Y | Stiff leg installed |
| 14 | 5 | South | 1/2 | Y | Stiff leg installed |
| 15 | 0 | North | 5/8 | Y | Stiff leg installed |
| 15 | 5 | South | 3/16 | Y | Stiff leg installed |
| 16 | 0 | North | 3/16 | N | No change. No stiff leg at floor beam. |
| 16 | 5 | South | 3/4 | Y | Stiff leg installed |
| 17 | 0 | North | 1/2 | Y | Stiff leg installed |
| 17 | 5 | South | 1/4 | Y | Stiff leg installed |
| 18 | 0 | North | 5/16 | Y | Stiff leg installed |
| 18 | 5 | South | 3/4 | Y | Stiff leg installed |
| 19 | 0 | North | 5/8 | Y | Stiff leg installed |
| 19 | 5 | | | N | |
| 20 | 0 | | | N | |
| 20 | 5 | South | 7/8 | Y | Stiff leg installed |
| 21 | 0 | North | 5/8 | Y | Stiff leg installed |

* Bolded and highlighted rows show new or changed comments.

# Appendix E: Floor Beam Sweep

| Span | Floor Beam | North / South | Sweep | Stiff Leg | Comment |
|---|---|---|---|---|---|
| 21 | 5 | North | | N | |
| 22 | 0 | North | 1/4 | Y | Stiff leg installed |
| 22 | 5 | South | 1/8 | N | Stiff leg installed |
| 23 | 0 | North | 1/2 | Y | |
| 23 | 5 | | | Y | Stiff leg installed |
| 24 | 0 | North | 1/4 | Y | Stiff leg installed |
| 24 | 5 | South | 3/4 | Y | Stiff leg installed |
| 25 | 0 | North | 3/8 | Y | Stiff leg installed |
| **25** | **5** | **North** | **7/16"** | **N** | **CX - Add Stiff Leg, Sweep is 7/16", no stiff leg repair** |
| 26 | 0 | North | 3/8 | Y | Stiff leg installed |
| 26 | 5 | South | 1/2 | Y | Stiff leg installed |
| 27 | 0 | North | 3/4 | Y | Stiff leg installed |
| 27 | 5 | South | 5/8 | Y | Stiff leg installed |
| 28 | 0 | North | 1/2 | Y | Stiff leg installed |
| 28 | 5 | South | 3/4 | Y | Stiff leg installed |
| 29 | 0 | North | 3/4 | Y | Stiff leg installed |
| 29 | 5 | | | N | |
| 30 | 0 | | | N | |
| 30 | 5 | South | 7/8 | Y | Stiff leg installed |
| 31 | 0 | North | 1/2 | Y | Stiff leg installed |
| 31 | 5 | | | N | |
| 32 | 0 | | | N | |
| 32 | 5 | South | 3/4 | Y | Stiff leg installed |
| 33 | 0 | North | 3/8 | Y | Stiff leg installed |
| 33 | 5 | | | N | |
| 34 | 0 | | | N | |
| 34 | 5 | South | 3/4 | Y | Stiff leg installed |
| 35 | 0 | North | 1/2 | Y | Stiff leg installed |
| 35 | 5 | | | N | |
| 36 | 0 | | | N | |
| 36 | 5 | South | 5/8 | Y | Stiff leg installed |
| 37 | 0 | North | 1/2 | Y | Stiff leg installed |
| 37 | 5 | | | N | |
| 38 | 0 | | | N | |
| **38** | **5** | **South** | **3/8** | **N** | **CX - Add Stiff Leg (2013), Sweep now 5/8", no stiff leg repair** |
| **39** | **0** | **North** | **3/8** | **N** | **CX - Add Stiff Leg (2013), Sweep now 5/8", no stiff leg repair** |

* Bolded and highlighted rows show new or changed comments.

# Appendix E: Floor Beam Sweep

| Span | Floor Beam | North / South | Sweep | Stiff Leg | Comment |
|---|---|---|---|---|---|
| 39 | 5 | | | N | |
| 40 | pier 39 | | | | Sister pier girder added due to severe sweep |

* Bolded and highlighted rows show new or changed comments.

# Appendix F: Floor Beam Loss

| Span | Floor Beam | Location | Comment |
|---|---|---|---|
| 3 | 5 | Between stringers 3 and 4 | 1 1/2" diameter |
| 4 | 0 | At stringer 4 | 14" L x 1" H |
| 5 | 5 | Between stringers 3 and 4 | 2" H x 1" W |
| 5 | 5 | Between stringers 1 and 2 | 3/4" diameter and 1" H x 2" W |
| 6 | 0 | Between stringers 3 and 4 | 1" H x 14" W |
| 6 | 0 | Between stringers 1 and 2 | 6" W x 1-1/4" H |
| 7 | 2 | At E Truss | 1/2" U-shaped corrosion hole with crack. |
| 11 | 5 | Between stringers 4 and 5 | 5 through holes, 4"Hx1-1/2" and four 3/8" diameter |
| 11 | 5 | Near stringer 3 | 4 1/2" W x 1 1/2" H |
| 12 | 0 | Near stringer 4 | 1.5" W x 1" H, 3.5" W x 3/4" H, 2.5" W x 1" H |
| 12 | 3 | At E Truss | 1" H x 1/2" W |
| 15 | 3 | At E Truss | 9/16" diameter with 1/4" corrosion crack |
| 15 | 4 | At E Truss | 1/2"W x 1/4"H corrosion hole in floor beam cope. |
| 15 | 5 | Between stringers 1 and 2 | 6" W x 2" H |
| 16 | 4 | East truss | 3-1/2"H x 4-1/4"W |
| 18 | 2 | At E Truss | 1"H x 5/8"W, with 3/4" crack, with 1/4" diameter corrosion hole. |
| 22 | 5 | Near stringer 4 | 1-1/2" W x 3/4" H in lower web |
| 23 | 0 | At E truss | 1-1/8" H x 5/8" W in lower web |
| 24 | 0 | Between stringer 1 & west truss | 3/4" diameter in lower web |
| 25 | 2 | At E Truss | 2 5/8" H x 1 3/4" W corrosion hole in floor beam cope |
| 26 | 3 | At E Truss | 1/2" corrosion hole in floor beam cope |
| 27 | 0 | Between stringer 1-2 | 1-3/4"W x 1"H |
| 27 | 1 | At W Truss | 2" diam. |
| 27 | 2 | At E Truss | 1 1/4" H x 1" W |
| 28 | 3 | At stringer 5 | 4" H x 3/4" W |
| 29 | 5 | Between stringers 2-3 | 2-1/4" W x3/4" H |
| 37 | 5 | Between stringers 4 and 5 | 3/4" H X 2" W, multiple holes (3/4"H x 12"W) |
| 38 | 0 | At east truss connection | 1 1/4" H x 3/4" W |
| 38 | 0 | Between stringers 4 and 5 | 3 corrosion holes between: 1" H x 5" W, 1" H x 1" W, 1" H x 1 1/2" W |

* Bolded and highlighted rows show new or changed comments.

# Appendix G: Floor Beam Cracks

| Span | Truss | Floor Beam | Length (inch) |
|---|---|---|---|
| 2 | East | 0 | 2 1/4 |
| 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 |
| 5 | West | 3 | 1/4 |
| 5 | East | 5 | 3 |
| 5 | West | 5 | 1 |
| 6 | East | 0 | 8 |
| 6 | West | 0 | 1 1/4 |
| 7 | West | 0 | 7/8 |
| 7 | East | 5 | 3 |
| 7 | West | 5 | 1 5/8 |
| 8 | East | 0 | 6 1/8 |
| 8 | West | 0 | 3 7/8 |
| 9 | East | 5 | 3 |
| 9 | West | 5 | 2 1/2 |
| 10 | East | 0 | 6 5/8 |
| 10 | West | 0 | 3 |
| 11 | East | 5 | 3 |
| 11 | West | 5 | 2 1/2 |
| 12 | East | 0 | 1 7/8 |
| 12 | West | 0 | 1 11/16 |
| 13 | East | 5 | 2 1/2 |
| 13 | West | 5 | 1 1/4 |
| 14 | East | 0 | 5 7/16 |
| 14 | West | 0 | 2 9/16, 1 5/8 |
| 14 | East | 1 | 7/16 |
| 15 | East | 5 | 4 3/4 with 3/16 lateral offset |
| 15 | East | 3 | 1/4 |
| 16 | East | 0 | 3 3/4 |
| 16 | West | 0 | 3 5/8 |
| 16 | East | 1 | 1/2 |
| 16 | West | 1 | 1/2 |
| 17 | East | 4 | 3/8 |
| 17 | West | 4 | 1/2 |
| 17 | East | 5 | 3 |
| 17 | West | 5 | 3 1/8 |
| 18 | East | 0 | 5 1/8 |
| 18 | West | 0 | 3 3/8 |

* Bolded and highlighted rows show new or changed comments.

# Appendix G: Floor Beam Cracks

| Span | Truss | Floor Beam | Length (inch) |
|---|---|---|---|
| 18 | East | 2 | 3/4 |
| 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 | 1/8 |
| 21 | East | 5 | 1 1/4 |
| 21 | West | 5 | 1 5/8 |
| 22 | East | 0 | 3 3/4 with 5/16 lateral offset in web |
| 22 | West | 0 | 5 1/4 |
| 22 | West | 1 | 3/8 |
| 23 | East | 5 | 4 |
| 23 | West | 5 | 3/4 |
| **24** | **East** | **0** | **4 1/16, grew 1/16" (2014)** |
| 24 | West | 0 | 4 5/8 |
| 24 | East | 1 | 3/4 |
| 24 | East | 2 | 5/8 |
| **25** | **East** | **5** | **6 1/4 (2013), grew 1/2" to 6 3/4" (2014)** |
| 26 | East | 0 | 4 1/4 |
| 26 | West | 0 | 2 1/4 |
| 27 | East | 5 | 1 1/4 |
| 28 | East | 2 | 3/16 |
| 29 | East | 4 | 3/8 |
| 29 | East | 5 | Two cracks: 4 7/8 & unk (continues under connection angle) |
| 29 | West | 5 | 5/8 |
| 30 | East | 0 | 1 5/8 |
| 30 | West | 0 | 5/8 |
| **30** | **West** | **1** | **3/8" (2013), grew 1/8" to 1/2" (2014)** |
| 30 | East | 2 | 1 |
| 31 | East | 5 | 4 1/4 |
| 31 | West | 5 | 1 |
| 32 | East | 0 | 2 |
| 32 | West | 0 | 5/8 |
| 33 | East | 3 | 1/8 with 3/8 dia corrosion hole |
| 33 | East | 5 | 3 1/4 |

* Bolded and highlighted rows show new or changed comments.

# Appendix G: Floor Beam Cracks

| Span | Truss | Floor Beam | Length (inch) |
|---|---|---|---|
| 34 | East | 0 | 2 |
| 35 | East | 3 | 1/4 |
| **35** | **East** | **5** | **2 13/16, grew 1/16" (2014)** |
| 35 | West | 5 | 3 1/8 |
| 36 | East | 0 | 2 1/4 |
| 36 | West | 0 | 1 3/8 |
| 36 | West | 1 | 3/8 |
| 37 | East | 5 | 2 |
| 37 | West | 5 | 1 3/4 |
| **38** | **East** | **0** | **9" with 3/8" lateral offset (2013), grew 3/16" to 9 3/16" (2014)** |
| 38 | West | 0 | 3 1/2 |
| 38 | West | 1 | 3/8 |
| 38 | East | 2 | 9/16 vertical with 1/4 horizontal |
| 38 | West | 4 | 1/8 |
| 39 | West | 1 | 1/8 |
| 39 | East | 4 | 1/4 |
| 39 | West | 4 | 1/4 |
| 39 | East | 5 | 3 |
| 39 | West | 5 | 1 1/2 |

* Bolded and highlighted rows show new or changed comments.

# Appendix G: Floor Beam Cracks

| Span | Truss | Panel Point | Length of Crack (in.) | Comment |
|---|---|---|---|---|
| **2** | **East** | **L0** | **15 1/8** | **New (2013), 15 1/8", 5 7/8" growth (2014)** |
| **8** | **East** | **L0** | **7 1/4** | **1 1/4" growth. Welded angle repair (2013), 7 1/4", 1/2" growth (2014)** |
| 14 | West | L0 | 4 1/2 | 1/2" growth. Welded angle repair (2013), No Change (2014) |
| **17** | **East** | **L5** | **9 3/4** | **1/4" growth. Welded angle repair (2013), 9", 3/4" growth (2014)** |
| 19 | West | L5 | 8 1/8 | 2 3/4" growth. Welded angle repair (2013), No Change (2014) |
| **20** | **East** | **L0** | **6 1/2** | **New (2013), 6 1/2", 3 1/2" growth (2014)** |
| 24 | East | L0 | 8 | 2 3/4" growth. Welded angle repair (2013), No Change (2014) |
| **29** | **East** | **L5** | **10** | **New (2013), 10", 3 3/4" growth (2014)** |
| **30** | **East** | **L5** | **6 3/4** | **New (2014)** |
| 33 | East | L5 | 13 | 1 1/2" growth. Welded angle repair (2013), No Change (2014) |

* Bolded and highlighted rows show new or changed comments.

**BURGESS & NIPLE**

5085 Reed Road | Columbus, OH 43220 | 614.459.2050

Mr. Wes Kellogg, PE
Field Service Engineer
Oklahoma Department of Transportation
Bridge Division
200 NE 21st Street
Oklahoma City, OK 73105

Re: CX Repair Recommendation
NBI No.: 04085
S.H. 281 over S. Canadian River
Field Division 4

November 12, 2014

Wes:

As Ed Cinadr briefly discussed with you yesterday, we found the following CX issues on the above referenced bridge:

- Cracks in the truss gusset plate above the bearing:
  - Span 2, L0 east truss, inboard gusset **(photo 1)** – 15 1/8-inch long horizontal crack (crack has grown 5 7/8 inches since the 2013 inspection).
  - Span 29, L5 east truss, inboard gusset plate **(photo 2)** – 10-inch long horizontal crack (crack has grown 3 3/4 inches since the 2013 inspection).

  We are recommending that these gusset plates be repaired by welding an angle between the inboard face of the gusset plate and the top flange of the lower chord inboard channel (similar to other recent repairs). In addition to these cracks, similar cracks were also observed at:
  - Span 20, L0 east truss, inboard gusset plate **(photo 3)**. This 6 3/4-inch long horizontal crack has grown 3 3/4 inches since the 2013 inspection.
  - Span 30, L0 east truss, inboard gusset plate **(photo 4)**. This 4 3/4" long horizontal crack was not previously noted. The crack is adjacent to that noted above in Span 29, L5 east truss.

  Due to the rate of propagation, it is recommended that these cracks also be repaired.

- Sweeps in the floor beam bottom flange:
  - Span 25, floor beam 5 over pier 25 **(photo 5)** – 7/16-inch sweep to the north of the floor beam bottom flange.
  - Span 38, floor beam 5 over pier 38 **(photo 6)** – 5/8-inch sweep to the south of the bottom flange (this sweep was reported as 3/8 inch during the 2013 inspection.
  - Span 39, floor beam 0 over pier 38 **(photo 7)** – 5/8-inch sweep to the south of the bottom flange (this sweep was reported as 3/8 inch during the 2013 inspection.

We recommend that a stiff leg repair be installed at each of these floor beams.

The bridge runs southwest to northeast, but for the purposes of this letter and previous reports, is considered to run south-to-north. If the bridge is to reopen for an extended period of time, consideration should be given to strengthening all of the inboard L0 and L5 gusset plates and stiff legging all of the end floor beams which are not already retrofitted. Based on inspection findings over the past few cycles, it appears that these issues will continue to occur at similar locations with ongoing deterioration.

Feel free to contact me with any questions or comments you may have regarding this issue.

Sincerely,

BURGESS & NIPLE, INC.

Dale E. Poorman

Dale Poorman, PE
Team Leader

cc: Ed Cinadr, PE


**Photo 1** – Looking northwest at span 2, L0 east truss, inboard gusset plate.
Note: 15 1/8-inch long horizontal crack above bearing pin.

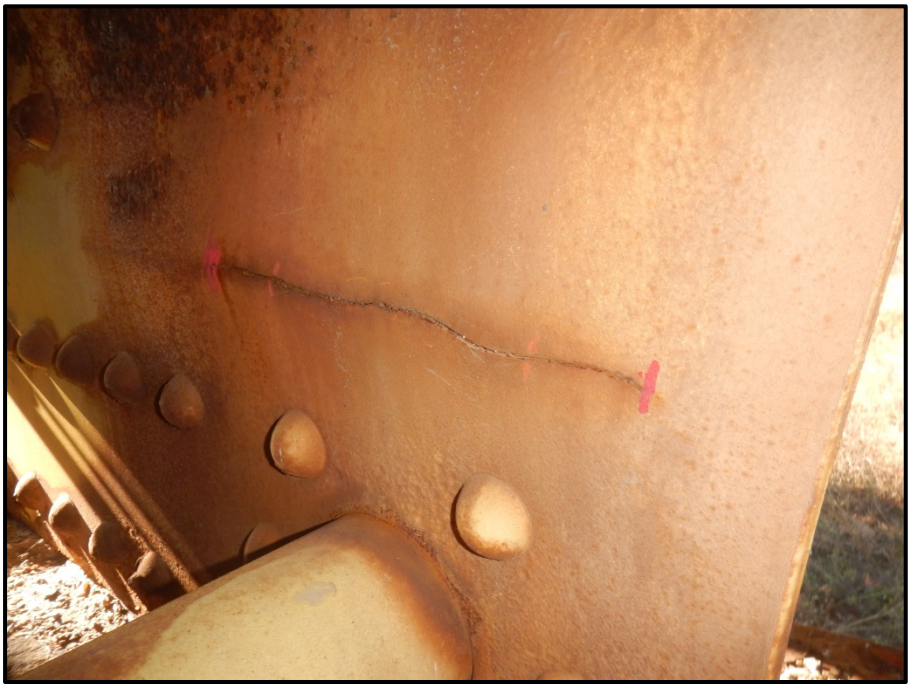


**Photo 2** – Looking southwest at span 29, L5 east truss, inboard gusset plate.
Note: 10-inch long horizontal crack above bearing pin.

**Photo 3** – Looking northwest at span 20, L0 east truss, inboard gusset plate.
Note: 6 3/4-inch long horizontal crack above bearing pin.

**Photo 4** – Looking northwest at span 30, L0 east truss, inboard gusset plate.
Note: 4 3/4-inch long horizontal crack above bearing pin.

Photo 5 – Looking east along floor beam 5, span 25 over pier 25. Note: 7/16-inch sweep of bottom flange to the north.

**Photo 6** – Looking east along floor beam 5, span 38 over pier 38. Note: 5/8-inch sweep of bottom flange to the south.

**Photo 7** – Looking east along floor beam 0, span 39 over pier 38. Note: 5/8-inch sweep of bottom flange to the north.