Fracture Critical Bridge Inspection Report

NBI Bridge No.: 16167

Route U.S. 81 over UP R.R. UNDER
Kingfisher County

Prepared for:

Oklahoma Department of Transportation

Field District 04

Inspection Date:

7/24/2024

Report Prepared By:

BURGESS & NIPLE, INC.

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BURGESS & NIPLE
Engineers ■ Surveyors ■ Planners

BURGESS & NIPLE

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

Re: Nonredundant Steel Tension Member Bridge Inspection Report
Structure No.: 3704 0543WX
NBI No.: 16167
Local ID: 024A
US 81 Southbound over Union Pacific Railroad
Kingfisher County, Field Division 4

August 22, 2024

Dear Mr. Kellogg:

Burgess & Niple (B&N) performed a nonredundant steel tension member and routine inspection of the above referenced bridge on July 24, 2024. The bridge is a six-span structure **(photos 1 and 2)** with a steel pier beam at pier 3. Spans are numbered south to north and consist of:

Span 1:	32-foot long steel multi beam simple span
Span 2:	49-foot long steel multi beam simple span
Spans 3 and 4:	57-foot long steel multi beam continuous spans over pier 3
Span 5:	49-foot long steel multi beam simple span
Span 6:	39-foot long steel multi beam simple span

The bridge is on a horizontal curve with the beams being straight between piers.

The limits of the inspection were from the south abutment to the north abutment. A nonredundant steel tension member pier beam exists at pier 3, straddling the single track of the Union Pacific Railroad. The bridge crosses the Union Pacific Railroad at railroad milepost 373.72 with crossing ID: 595413M. Inspection team members included Drew Appler, P.E., Jarrett Shafer, E.I., Jacob Olsen E.I., and Chance Miller

As per the latest load rating report the bridge does not require a load posting. Vertical clearance between the top of rail to bottom of the pier beam is 23 feet 3 inches and minimum lateral clearance from center of track to column 2 of pier 3 is 18.95 feet and controls the adjacent structure (NBI 16159).

This report includes appendices containing:

- Significant Findings
- Truss/NSTM Bridge Rating Form
- Condition Photographs
- Oklahoma DOT Bridge Inspection Form/BrM element report

The current and previous NBI ratings for the bridge are:

NBI Item	Current Rating (2024)	Previous Rating (2022)
NBI Item 58 (Deck)	5 = Fair	5 = Fair
NBI Item 59 (Superstructure)	6 = Satisfactory	6 = Satisfactory
NBI Item 60 (Substructure)	5 = Fair	5 = Fair
Sufficiency Rating	68.4 (ND)	68.4 (ND)

The bridge is neither structurally deficient nor functionally obsolete.

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.*

- No CX repair items are required.

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

- Upgrade the bridge and approach rail, transitions, and terminations to meet current standards.
- Repair damaged areas and abrasively clean and paint steel bridge rail. *(disregard if bridge railing is upgraded)*
- Patch spalls in the curb and soffit where the bridge railing posts are exposed.
- Patch the wearing surface on the bridge as necessary to provide a smooth riding surface.
- Repair the spall in the soffit between beams 1 and 2 above pier 1 with a full depth patch.
- Reseal the fixed and expansion joints.
- Place crushed aggregate slope protection in eroded areas around the southwest wingwall.
- Remove deteriorated concrete in the abutments and piers, patch, and install RFP over patches at pier caps and columns.
- Install CIM 1000 on bearing seats at abutments and piers.
- Install shim plates where beams are lifted from the canister bearing at:
  - Beam 3, span 4 at pier 4
  - Beam 2, span 5 at pier 4
  - Beam 4, span 6 at pier 5.
- Remove lead plugs and portion of anchor studs extending above the masonry plate of the canister bearings to allow expansion of the bearings.
- Seal the cracks in the approach roadway.

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

- Monitor the spalling in the curb and soffit at the joints for conditions which would compromise the strength of the bridge railing connection.
- Monitor the paint cracks in the beam connection angles to the pier beam at pier 3 at:
  - Beam 4, span 3 – 5 3/4 inches in southwest connection angle.
  - Beam 5, span 3 – 4 1/8 inches in southwest connection angle.

  - Beam 3, span 4 – Fine cracks in northwest connection angle.
  - Beam 5, span 4 – 2 1/2 inches in northwest connection angle.
- Monitor the corrosion and section loss to the top flange of the pier beam at pier 3.

It is recommended that this structure remain on a 24-month Routine/Nonredundant Steel Tension Member inspection frequency.

Observed fatigue prone details are as follows:

- Category E – Welded partial-length cover plates exist on the bottom flange of beam 5 in span 1, beams 1 and 2 in span 6 and each beam in spans 3 and 4.

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.

Drew Appler, PE
Team Leader

Attachments

8/22/2024

SIGNIFICANT FINDINGS are as follows:

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

- **PX** – The traffic safety features for the bridge railing, transitions, approach guardrail and guardrail terminations do not meet current standards for a National Highway System roadway.
  - Bridge railing – the metal bridge railing consisting of a steel channel supported by steel posts with safety curb is obsolete **(photo 3)**.
  - Approach railing – the w-beam rail is too low and blockouts are not installed between the posts and rail **(photo 4)**. The average height of the approach railing above the roadway is 21 inches. The top of the approach railing is currently required to be 27 inches above the roadway surface.
  - Transitions - the approach railing at all four transitions is not attached to the bridge railing leaving the end of the bridge railing inadequately protected **(photo 5)**. The approach railing also has insufficient post spacing, blockouts are not installed, and the railing is not strengthened with either nested rails or thrie-beam at the transitions
  - Terminations – the buffered ends for the w-beam railing terminations do not meet current standards. Flared ends at the end of the approach railing at the transition **(photo 5)**.
- **PX** – The bridge railing is corroded with section loss and missing bolts at isolated locations **(photo 6)**. This loss has not significantly affected the strength of the rail.
- **PX** – Spall exposing the embedded U-bolt anchorage for the railing posts exist at several locations in the curb top surface and soffit affecting the strength of the bridge railing **(photos 7 and 8)**.
- Bridge railing is in contact over the expansion joints at piers 2 and 4, inhibiting the free movement of the joint.
- The west bridge railing has impact damage near pier 3 and the north abutment. The end 17 feet of the west railing including the end railing post have been replaced in the past at the north abutment prior to the current collision damage. The damage has caused minor bends in the rail and posts.
- Cracks with corrosion stains are present throughout the face of the curb **(photo 3)**. Shallow spalls with exposed reinforcing steel exist in the face of the east curb in spans 4, 5 and 6. The spalls are due to shallow cover over the reinforcing steel.
- The approach railing exhibits several locations of impact damage.

NBI Item 58 – Deck (5 = Fair condition)

Driving Surface – (5 = Fair condition)

- **PX** – Asphalt patches exist in the asphalt wearing surface. These patches are most prominent in spans 2 and 3 near the roadway centerline and along the fixed and deck control joints **(photos 9 and 10)**. Multiple applications of patch material exist at most patches. Full-depth concrete patches exist at piers 1 and 3. Less than 2% of the overlay/deck surface has been patched.

- The asphalt wearing surface is weathered and exhibits longitudinal and map cracks in the west lane and along the roadway centerline, most prominent in spans 3 and 5 **(photo 9)**. Minor rutting is present in the wheel lines.
- No deck drains exist on the bridge.

Soffit – (5 = Fair condition)

- **PX** – Spalling and cracking is typical in the soffit along the end diaphragms at the expansion and fixed joints **(photos 11 and 12)**. The spall between beams 1 and 2, span 2 above pier 1 extends above the bottom reinforcing steel and an asphalt patch exists in the deck surface above the spall. A full depth patch exists between beams 2 and 3 above pier 1, adjacent to the spall **(photo 13)**. The spalls appear to be a combination of corrosion of the reinforcing steel and pack rust between the deck and the end diaphragms resulting in more load being applied to the diaphragm.
- **FX** – Spalls with exposed corroding reinforcing steel exist in both overhangs over most of the piers and abutments **(photos 8 and 14)**. Spalls, averaging 1 square foot in size, are exposing the railing connection anchorage which have active corrosion and minor section loss.
- A 3-foot long spall with exposed corroding reinforcing steel occurs in the soffit at the east end over the south abutment. The spall was caused by shallow cover over the reinforcing steel.
- Generally, the soffit exhibits a medium density of shrinkage cracks throughout.

Joints – (5 = Fair condition)

- **PX** – The poured seal expansion joints at piers 2 and 4 originally were finger joints with a trough that have been retrofitted to be poured seal expansion joints.
    - Pier 2 – The seal is missing in the west lane and exhibits adhesion failure at isolated areas along the length of the joint **(photo 15)**. The ends of the west bridge railing are in contact over the joint.
    - Pier 4 – The seal is missing in both lanes and exhibits adhesion failure at isolated areas along the length of the joint **(photo 16)**. The ends of the west bridge railing are in contact over the joint.
    - An elastomeric concrete header exists on the original finger joint steel with rust stains occurring in the travel lanes **(photos 15 and 16)**.
- **PX** – The poured seal fixed joints exist at both abutments and piers 1, 3, and 5 and have been paved over with asphalt and asphalt patches. Both abutments are skewed 60 degrees while the piers are normal to the roadway centerline. Piers 1 and 5 are linked to allow longitudinal movement of the superstructure with no opening of the joint. The beams at pier 3 frame into the pier beam with no evidence of a strap plate over the pier beam.
    - South abutment – Minor spalls exist in the asphalt wearing surface adjacent to the joint **(photo 17)**. The deck overshoots the backwall with evidence of past leakage onto the abutment seat. No obvious signs of seal damage were observed.

  - Pier 1 – A full-depth concrete patch exists between beams 2 and 3 with an unsealed crack in line with the joint **(photo 13)**. A deep spall exists in the underside of the deck adjacent to the joint between beams 1 and 2 with spalls forming between the remaining beams **(photos 11 and 12)**. Asphalt patches with adjacent cracks exist over the joint within the travel lanes.
  - Pier 3 (over pier beam) – A full-depth concrete patch exists in span 3 between beams 2 and 3 adjacent to the joint **(photo 18)**. Multiple asphalt patches with adjacent cracks exists in span 3 adjacent to the joint within the travel lanes. The patches are beginning to fail. Corrosion and debris on the pier beam confirm that the joint is leaking.
  - Pier 5 – Multiple asphalt patches and adjacent cracks exist over the joint in the west lane **(photo 19)**. The joint seal has debonded and is depressed within the joint in the travel lanes allowing free flow of deck drainage onto the bridge components below.
  - North abutment – A few asphalt patches exist in the asphalt wearing surface adjacent to the joint **(photo 20)**.
- Deck control joints with poured seals exist at midspan in spans 3 and 4. These spans are continuous with the pier beam at pier 3.
  - Span 3 deck control joint – Numerous asphalt patches exist over and adjacent to the joint in the travel lanes **(photo 10)**.
  - Span 4 deck control joint – Numerous asphalt patches exist over the joint **(photo 21)**.

  The soffit exhibits incipient spalls adjacent to the midspan diaphragms and evidence of leakage through control joints.

NBI Item 59 – **Superstructure** (6 = Satisfactory condition)

Nonredundant Steel Tension Member Rating Summary	
Pier Beams	6 = Satisfactory condition

Steel Beams – (6 = Satisfactory condition) *Conditions noted below are considered minor deterioration.*

- **FX** – Vertical paint cracks were noted in the bottom of the beam connection angles to the pier beam web at pier 3 at the following locations:

Pier Beam Face	Beam No.	Connection Angle	Comment	Photo
South	4	West	5 3/4-inch-long vertical paint crack at the bottom of the connection angle. No change from 2023.	**22**
South	5	West	4 1/8-inch-long vertical paint crack at the bottom of the connection angle. No change from 2023.	**23**
North	3	West	Fine paint cracks were observed in the bottom 1 1/2 inches of the connection angle. New for 2024	**24**
North	5	West	2 1/2-inch-long vertical paint crack. New for 2024.	**25**

Magnetic particle testing performed during the 2022 inspection on the connection angles to the south face of the pier showed no indications of cracks in the steel.

- Pack rust induced cracks are typical in the horizontal welds for the end diaphragm connection angles at pier 4 **(photo 26)** . The crack lengths have grown since the 2020 inspection; however, the connection angle is still adequately attached by welds along the vertical edge of the angle leg and along the top weld. Two bolts used during erection to aid in aligning the original finger joint also exist between the connection angle and the beam web.
- The end diaphragms and beam ends exhibit laminating corrosion of the top flange and pack rust up to 1/2 inch (1/4 inch typical) thick between the diaphragm top flange and deck. Minor distortion of the top flange and web due to the pack rust exists over piers 4 and 5.
- Section loss up to 1/8 inch deep exists with active corrosion exists in the top flange of the beam ends near the joints **(photo 27)**. The loss and up to 4 feet in length.
- Rust staining and minor painted over pitting typically occurs along the bottoms of beam webs and bottom flanges.
- Welded partial-length cover plates exist on the bottom flange of beams 4 and 5 in span 1, all beams in spans 2 through 5 and beams 1 and 2 in span 6 in the positive moment region **(photo 28)**. The shop-welded cover plates terminate near the quarter points of the spans with tapered ends. Similar cover plates likely exist on the top of the top flange. The cover plate terminations are a category E fatigue prone detail. No cracks or signs of distress were observed at the terminations.

[NSTM] Pier Beam – (6 = Satisfactory condition)

- **FX** – Laminating corrosion exists on the pier beam top flange with up to 1/8-inch-deep section loss at the edge of the deck **(photo 27)**.

- Pack rust up to 1/2 inch thick exists between the top flange of the pier beam and the deck soffit **(photo 27)**. Laminating corrosion is typical along the top flange especially at beam end connections to the pier beam.
- Debris exists on the bottom flange of the pier beam due to leaking fixed joint and bird nests.

Paint/Coating System – (6 = Satisfactory condition)

- The superstructure was painted in April 2004. Protective coating on the top flange of the beams, diaphragms and pier beam under the joints are failing with active surface corrosion and pack rust occurring **(photos 12 and 27)**.

Load Deflection – (6 = Satisfactory condition)

- No significant deflections were observed in the beams under live load.

NBI Item 60 – Substructure (5 = Fair condition)

Abutments – (5 = Fair condition)

- **PX** – Erosion has exposed the back face and the top of the pile cap of the southwest wingwall **(photo 29)**. This area is well vegetated, and the depth of erosion has not significantly changed since first recorded in 2018. The erosion is caused by deck drainage running off the end of the bridge. No deck drains exist on the bridge.
- **PX** – The breastwall of both abutments exhibits horizontal cracking along the top and bottom reinforcing steel with areas of delamination with deterioration more prominent in the south abutment **(photo 30)**. Spalls with exposed reinforcing steel exist along the bottom of the south abutment breastwall. Several of the cracks in both breastwalls have been sealed with epoxy; however, cracks have reappeared through the sealer at a few locations **(photo 31)**. Cracking and spalling are due to corrosion of the reinforcing steel promoted by deck drainage passing through the joint.
- A 1 1/2-inch deep spall with exposed reinforcing steel exists in the southwest corner of the beam 2 bearing pedestal at the north abutment **(photo 32)**. The spall is encroaching on the masonry plate. The spall likely started as a crack caused by longitudinal force acting on the fixed bearing as evidenced by the extruding lead bearing pad. The crack allowed deck drainage to corrode the reinforcing steel and produce the spall. Cracks and scaling also exist in the beams 3 and 4 bearing pedestals at the south abutment. These conditions have not significantly changed since the 2016 inspection and do not affect the bearing capacity of the fixed bearings.
- The embankment and slope wall at the south embankment has settled exposing the underside of the south abutment breastwall. The settlement at the west end has exposed one concrete pile for approximately 7 inches deep with 6 feet of penetration noted under the breastwall **(photo 33)**. The settlement at the east end is 14 inches deep with 21 inches of penetration under the breastwall, undermining the slope paving.

- A shallow spall exists in the south face of the beam 5 pedestal at the north abutment due to insufficient cover.
- The pedestal for beam 4 at the south abutment has 1/32 inch wide cracking.
- Isolated areas of hairline map cracking with minor efflorescence exist throughout the surface of the northwest wingwall.
- The retaining wall between the bridges is leaning away from the embankment.
    - South retaining wall is leaning 3 1/2 inches north **(photo 34)**.
    - North retaining wall is leaning 1 1/4 inches south.

  It is likely that the retaining wall is supported on a spread footing, isolated from the pile supported abutments.
- The slope wall near pier 1 has cracks up to 1/8 inch wide. Trees and vegetation are growing throughout the north and south slope wall construction joints. **(photo 35)**.

Piers – (5 = Fair condition)

- **PX** – Horizontal and vertical cracks with rust stains exists along the reinforcing steel in the vertical face and underside of the caps **(photos 37 through 43)**. Discolored concrete exists in the cap and is most prevalent near the west end. Piers 2 and 4 exhibit the most severe deterioration due to expansion joints above the piers. The deterioration generally exists between column 2 and the west end of the pier, becoming more severe towards the west due to the superelevation directing drainage towards the west curb. Several cracks in pier 5 have been sealed with epoxy. Leaking deck joints and overflowing drainage troughs under the finger joints likely contributed to the deterioration of the concrete.
- **PX** – Cracks typically occur in most bearing pedestals. Significant spalls and scaling in the pedestals were noted at:
    - Beam 1 at pier 2 – spall encroaching on the masonry plate **(photo 44)**.
    - Beam 4 at pier 4 – spall in the west face **(photo 45)**.
    - Beam 4 at pier 5 – scaling concrete in the bearing seat exists adjacent to the masonry plates of the bearings for spans 5 and 6 **(photo 46)**.
    - Beam 5 at pier 5 – scaling concrete along west edge has undermined the southwest corner of the span 5 masonry plate 1 inch **(photo 47)**. This condition does not significantly affect the bearing capacity.

  The spalls are due to shallow cover and deck drainage leaking through the joints above.
- **PX** – Cracks with adjacent delaminations, shallow spalls and rust stains exist along the vertical and hoop steel in column 1 of piers 2, 4 and 5 **(photos 36, 37 and 40)**.
- Hairline to narrow vertical cracks exist in the pier 3 columns with map cracking near the ground level.

Bearings – (5 = Fair condition)

- **PX** – Lifting of the beam from the canister bearing was noted at:
    - Beam 3, span 4 at pier 4
    - Beam 2, span 5 at pier 4, beam is floating, bearing vibrates under load.

- Beam 4, span 6 at pier 5, beam is floating. **(photo 46)**.

A definitive cause for the lifted beams could not be determined during the inspection; however, pack rust between bearing components of adjacent beams is suspected. The sole plate does not have tabs attached to keep the canister aligned when the beam lifts.

- **PX** – The lead plugs around the anchor studs are raised above the surface of the masonry plate, inhibiting the expansion of the bearings **(photo 48)**. At a few locations the plugs could be removed revealing some studs with corrosion and others with the stud above the top surface of the masonry plate. It could not be determined if the studs were installed to an incorrect height, or they have worked up over time.
- **PX** – The bearing seat for the beam 1 pedestal at pier 5 is scaled with exposed reinforcing steel and the corner of the masonry plate undermined **(photo 47)**. The undermining does not significantly affect the load capacity of the bearing.
- Pack rust up to 3/4 inch thick between the masonry plate and the pier seat is common at the canister bearings **(photo 48)**.
- The canister expansion bearings at piers 1, 2, 4 and 5 exhibit longitudinal offsets of 1/2 inch on average measured between the bearing stiffener and the point of contact for the canister **(photo 49)**. The canisters are rotated 9 degrees or less at 94^{o} F. These rotations and offsets have not changed significantly since the 2018 inspection. The maximum amount of rotation was noted at 9 degrees expansion for beam 3, span 4 at pier 4. The beam may have lifted off the bearing resulting in the canister rolling out of position. None of the rotations or offsets are of concern at the time of the inspection.
- Expansion bearings typically exhibit wear of the canister at the points of contact with the masonry and sole plates **(photo 49)**. At a few locations the sole plate was also noted to be worn. This condition does not significantly affect the capacity of the bearing; however, it does inhibit the bearing rotation.
- Cracked or broken tapered washers were noted under the anchor nuts at bearings for beams 1, 2 and 4 at the south abutment and at bearings 2, 3 and 4 at the north abutment fixed bearings.
- Lead bearing pads typically are extruding from underneath the fixed bearings at the abutments **(photo 32)**. This likely is due to the approach pavement shoving the deck towards the span. The abutments are heavily skewed while piers 1 and 5 are normal to the bridge, producing a rocking effect to the fixed bearings.

NBI Item 72 – **Approach** (5 = Fair condition)

Approach Roadway Condition – (5 = Fair condition)

- **PX** – The asphalt approach pavement has unsealed longitudinal and transverse cracking **(photo 50)**. The longitudinal cracking in the wheel path is load-related deterioration due to the higher concentration of truck traffic and occurs primarily in the right lane.
- The south approach slab has asphalt patches in the right lane wheel line and spalling of the wearing surface along the west curb.
- The north approach slab asphalt wearing surface exhibits wear at the edge lines.

Approach Roadway Settlement – (6 = Satisfactory condition) *Conditions noted below are considered minor deterioration.*

- **PX** – The paved flume at the northwest corner of the north approach slab is undermined with 1 foot of penetration **(photo 51)**.
- No significant settlement was noted in the approach roadways.

Truss/NSTM Bridge Rating Form

NBI	16167
Structure	3704 0543WX
County	Kingfisher
Division	4

Facility Carried
US 81 Southbound
Feature Intersected
UPRR

NBI Item #	2024	2022
36 - Traffic Safety	5, PX	5, PX
58 - Deck	5, PX	5, PX
a. Driving Surface	5, PX	5, PX
b. Soffit	5, PX	5, PX
c. Joints	5, PX	5, PX
59 - Superstructure*	6, FX	6, PX
a. Beams	6, FX	6, FX
b. Stringers**	N/A	N/A
c. Floor Beams	N/A	N/A
d. Pier Beams	6, FX	6, FX
e. Floor Bracing System	N/A	N/A
f. Truss Upper Chord***	N/A	N/A
g. Truss Lower Chord***	N/A	N/A
h. Truss Web Members	N/A	N/A
i. Truss End Posts	N/A	N/A
j. Truss Bracing	N/A	N/A
k. Paint/Coating	6	6
l. Load Deflection	6	6, PX
60 - Substructure****	5, PX	5, PX
a. Abutments	5, PX	5, PX
b. Piers	5, PX	5, PX
c. Bearings	5, PX	5, PX
61 - Channel & Channel Protection	N/A	N/A
a. Flowline Stability	N/A	N/A
b. Channel Bank Damage	N/A	N/A
c. Debris	N/A	N/A
d. Vegetation	N/A	N/A
Approach Roadway	5, PX	5, PX
a. Approach Roadway Condition	5, PX	5, PX
b. Approach Roadway Settlement	6, PX	6, PX
113 - Scour	N/A	N/A
Flowline/Notes	N/A	N/A

Rating	Description (For 36, 58, 59, 60, 72)
N/A	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/A	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.

Not over Waterway

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
16167	3704 0543WX	Kingfisher	U.S. 81	UP R.R. UNDER	7/24/2024

Photograph 1 - Looking south at the bridge elevation

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
16167	3704 0543WX	Kingfisher	U.S. 81	UP R.R. UNDER	7/24/2024

Photograph 2 - Looking south at the bridge end view.

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
16167	3704 0543WX	Kingfisher	U.S. 81	UP R.R. UNDER	7/24/2024

Photograph 3 - Looking west at the west bridge railing in span 4. Note: the railing is obsolete. Cracks with corrosion stains exists in the face of the curb and impact damage exists to the rail.

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Photograph 4 - Looking north along the northwest approach railing. Note: approach railing is low and blockouts were not used.

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16167	3704 0543WX	Kingfisher	U.S. 81	UP R.R. UNDER	7/24/2024

Photograph 5 - Looking northeast at the northeast approach railing and east bridge railing in spans 5 and 6. Note: approach railing transition is insufficient with flared end approach rail termination at the bridge. Curb is spalled with exposed reinforcing steel due to insufficient cover.

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
16167	3704 0543WX	Kingfisher	U.S. 81	UP R.R. UNDER	7/24/2024

Photograph 6 - Looking east at the east bridge railing at the 5th post in span 3. Note: typical surface corrosion to the rail and post, and missing connection bolts

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
16167	3704 0543WX	Kingfisher	U.S. 81	UP R.R. UNDER	7/24/2024

Photograph 7 - Looking east at the east curb in span 1 at pier 1. Note: spall in the top face of the curb exposing the U-bolt anchorage for the bridge railing post.

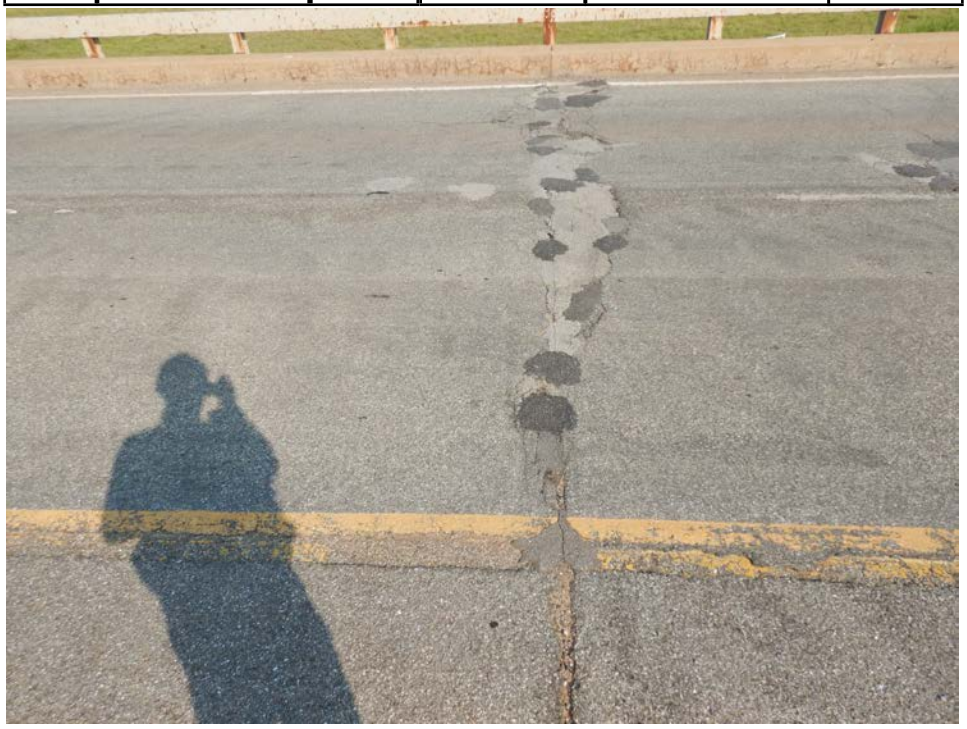
NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
16167	3704 0543WX	Kingfisher	U.S. 81	UP R.R. UNDER	7/24/2024

Photograph 8 - Looking northeast at the west overhang at pier 2. Note: spall in soffit exposing the U-bolt anchorage for the bridge railing post.

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
16167	3704 0543WX	Kingfisher	U.S. 81	UP R.R. UNDER	7/24/2024

Photograph 9 - Looking northwest at the driving surface in span 3. Note: 3-foot-diameter asphalt patch at the roadway centerline. Cracks exist in the asphalt along the roadway centerline and the west lane.

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
16167	3704 0543WX	Kingfisher	U.S. 81	UP R.R. UNDER	7/24/2024



Photograph 10 - Looking west along the north deck control joint in span 3. Note: asphalt patches along the control joint.

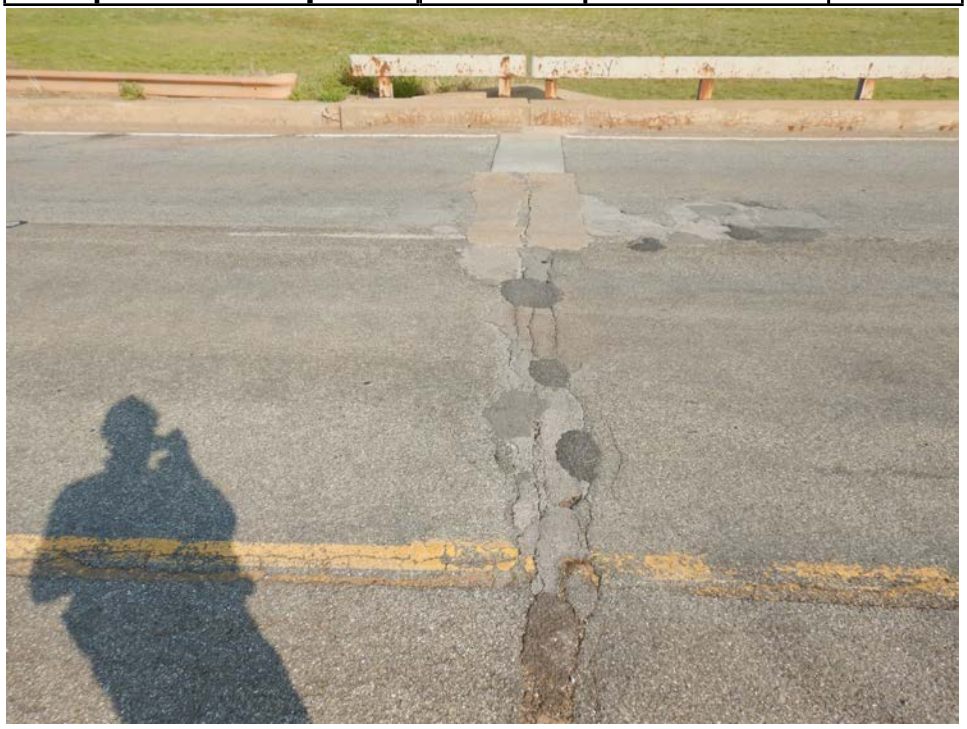
NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
16167	3704 0543WX	Kingfisher	U.S. 81	UP R.R. UNDER	7/24/2024

Photograph 11 - Looking south at the underside of span 2 at pier 1 between beams 1 and 4. Note: spalling with exposed reinforcing steel along the end diaphragm. Full-depth patch exists between beams 3 and 4.

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
16167	3704 0543WX	Kingfisher	U.S. 81	UP R.R. UNDER	7/24/2024

Photograph 12 - Looking south at the underside of span 2 at pier 1 between beams 1 and 2. Note: spall extending above the bottom reinforcing steel.

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
16167	3704 0543WX	Kingfisher	U.S. 81	UP R.R. UNDER	7/24/2024

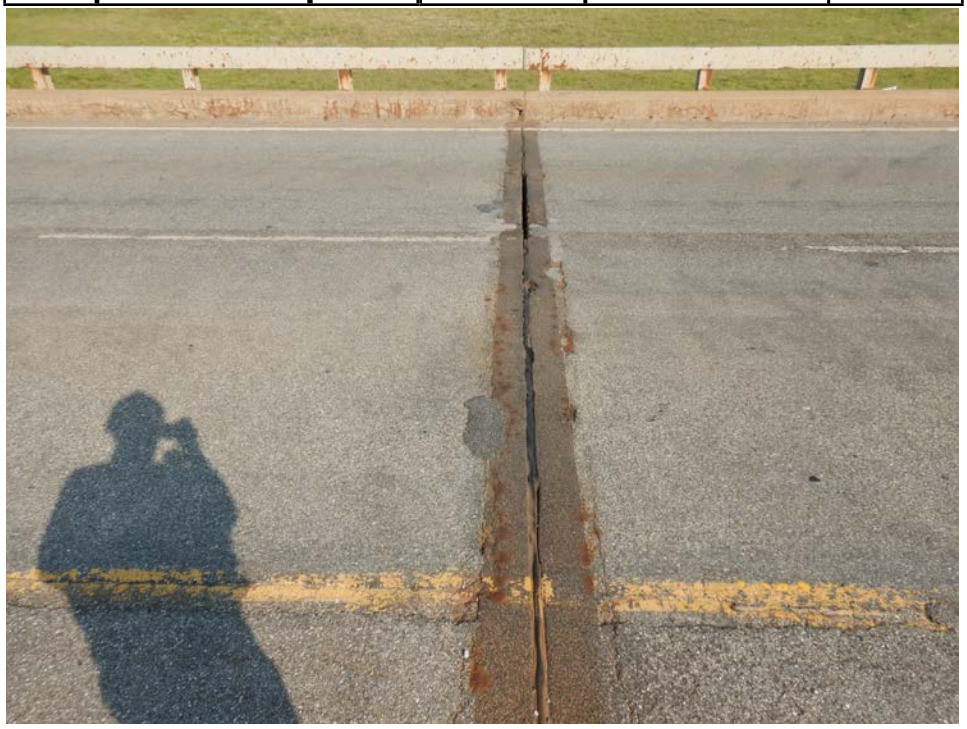


Photograph 13 - Looking north along the expansion joint over pier 1. Note: asphalt and concrete patches exist along the joint.

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
16167	3704 0543WX	Kingfisher	U.S. 81	UP R.R. UNDER	7/24/2024

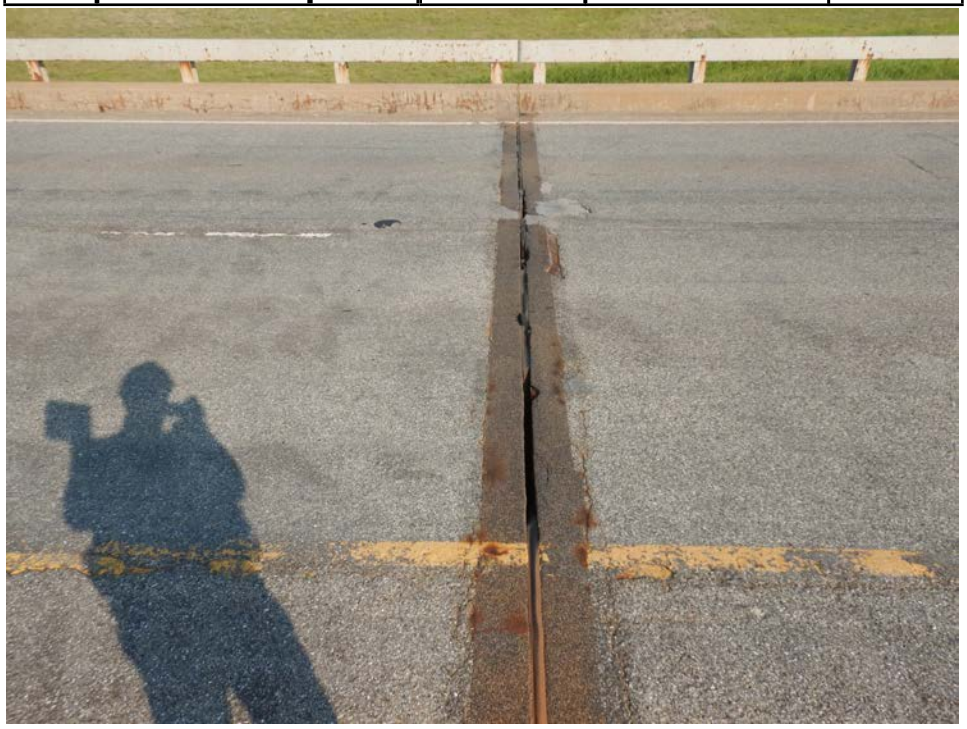
Photograph 14 - Looking east at Underside of deck overhang at Pier 4. Note: spalling and cracking at u bolts for bridge railing.

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
16167	3704 0543WX	Kingfisher	U.S. 81	UP R.R. UNDER	7/24/2024



Photograph 15 - Looking west along the poured seal expansion joint over pier 2. Note: seal is missing in the west lane. Joint is closed at the west bridge railing. Rust stains exist along the edges of the elastomeric concrete header.

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
16167	3704 0543WX	Kingfisher	U.S. 81	UP R.R. UNDER	7/24/2024

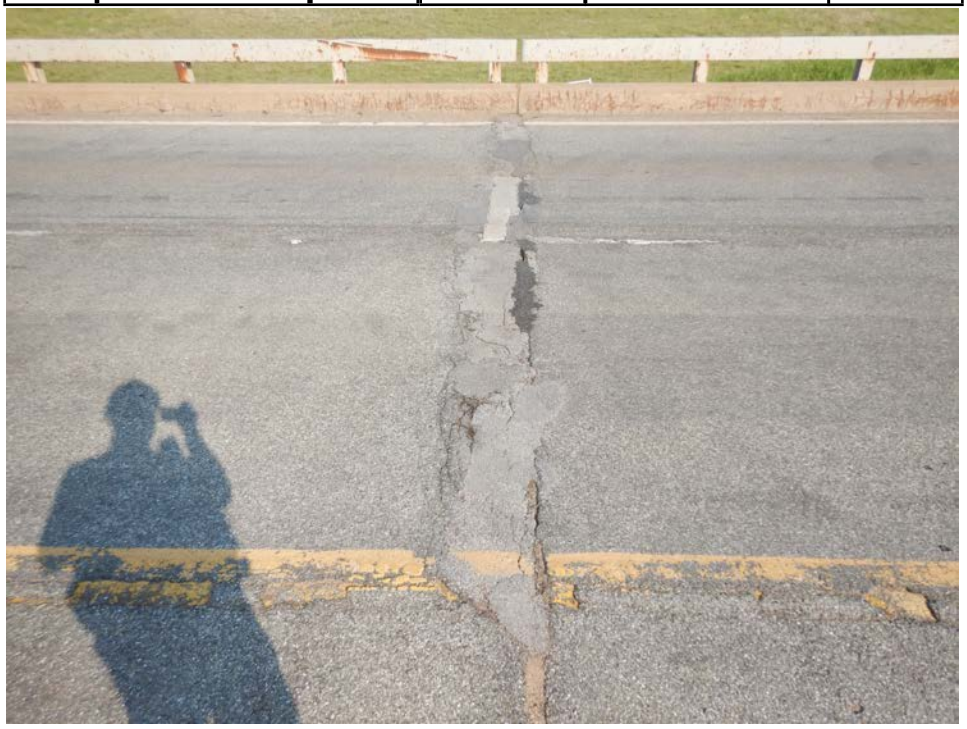


Photograph 16 - Looking west along the poured seal expansion joint over pier 4. Note: seal is missing in both lanes. Joint is closed at the west bridge railing. Rust stains exist along the edges of the elastomeric concrete header.

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
16167	3704 0543WX	Kingfisher	U.S. 81	UP R.R. UNDER	7/24/2024

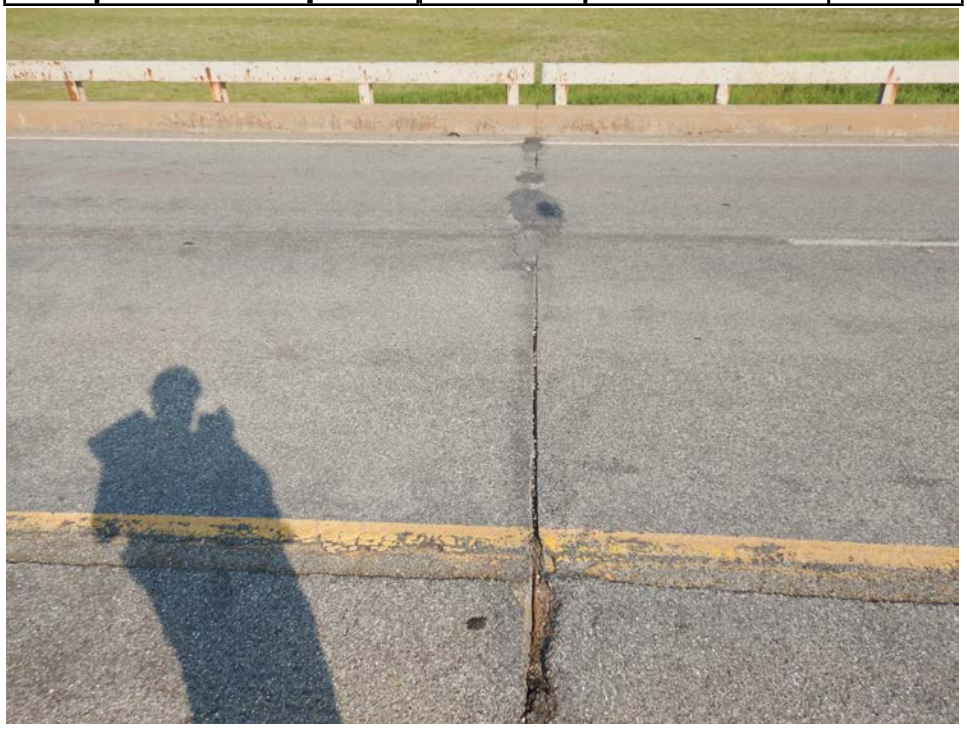
Photograph 17 - Looking northwest along the poured seal fixed joint over the south abutment. Note: minor spalling and patching of the asphalt exists along the joint.

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
16167	3704 0543WX	Kingfisher	U.S. 81	UP R.R. UNDER	7/24/2024



Photograph 18 - Looking west along the poured seal fixed joint over pier 3. Note: asphalt and concrete patches exist along the joint.

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
16167	3704 0543WX	Kingfisher	U.S. 81	UP R.R. UNDER	7/24/2024

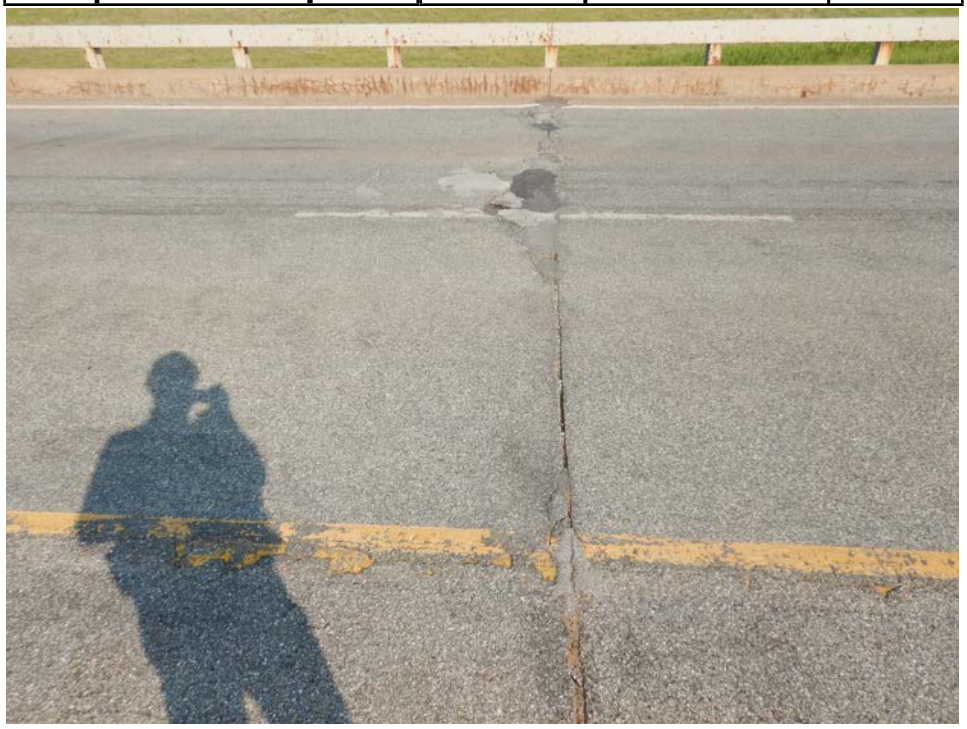


Photograph 19 - Looking west along the poured seal fixed joint over pier 5. Note: asphalt patches exist along the joint in the west lane.

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
16167	3704 0543WX	Kingfisher	U.S. 81	UP R.R. UNDER	7/24/2024

Photograph 20 - Looking northwest along the poured seal fixed joint over the south abutment. Note: few asphalt patches along the joint.

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
16167	3704 0543WX	Kingfisher	U.S. 81	UP R.R. UNDER	7/24/2024

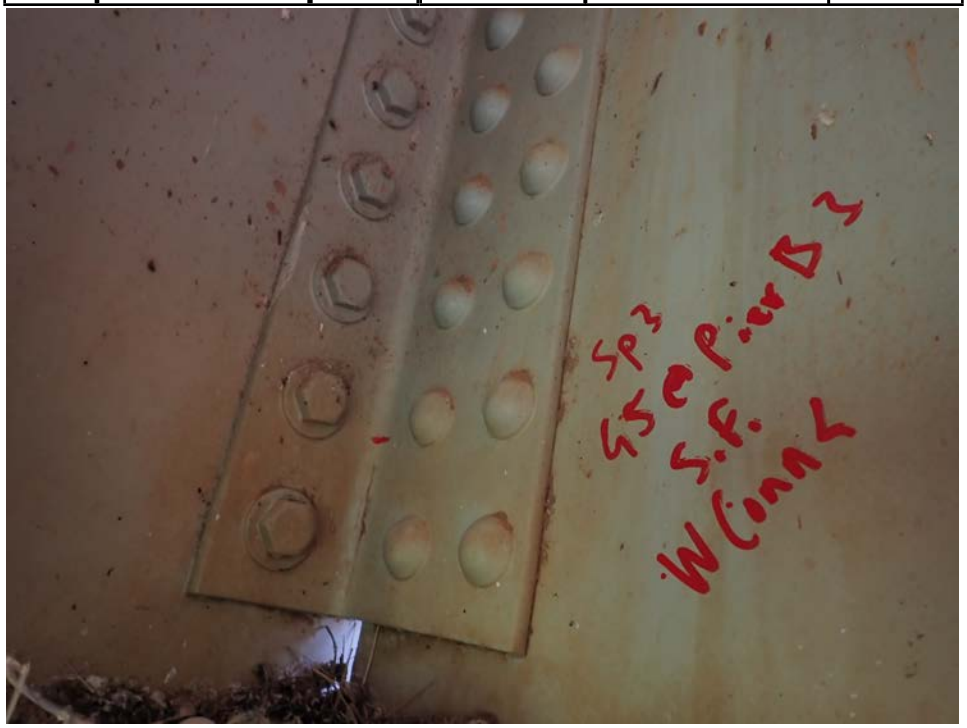


Photograph 21 - Looking west along the north deck control joint in span 4. Note: asphalt patches along the control joint.

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
16167	3704 0543WX	Kingfisher	U.S. 81	UP R.R. UNDER	7/24/2024

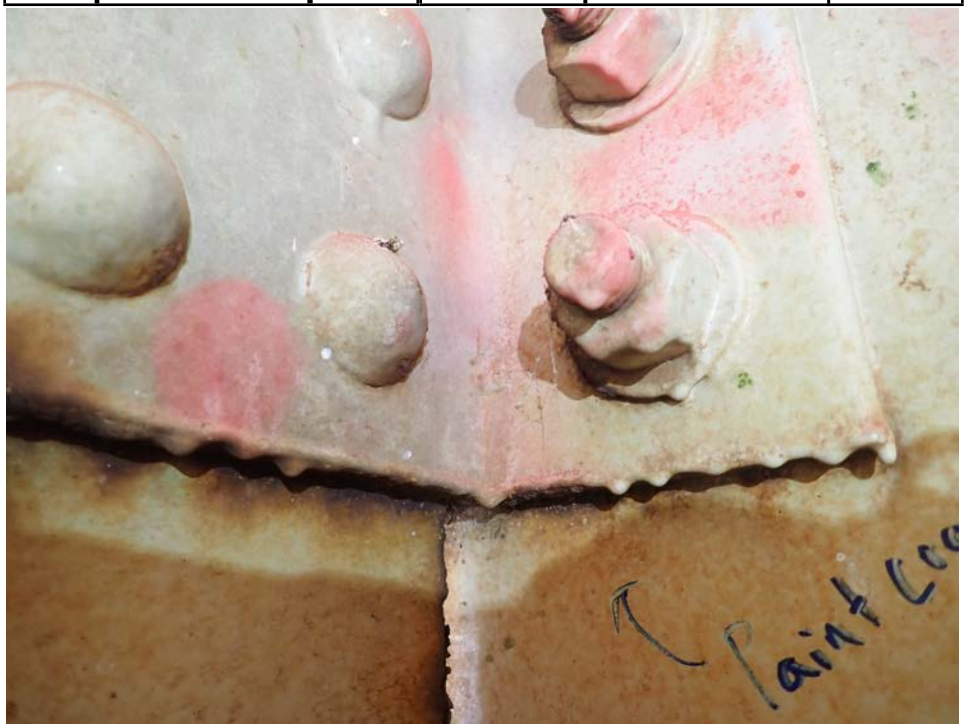
Photograph 22 - Looking northeast at the beam 4, span 3 southwest connection angle to the pier beam at pier 3. Note: 5 3/4-inch-long vertical paint crack at the bottom of the connection angle.

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
16167	3704 0543WX	Kingfisher	U.S. 81	UP R.R. UNDER	7/24/2024



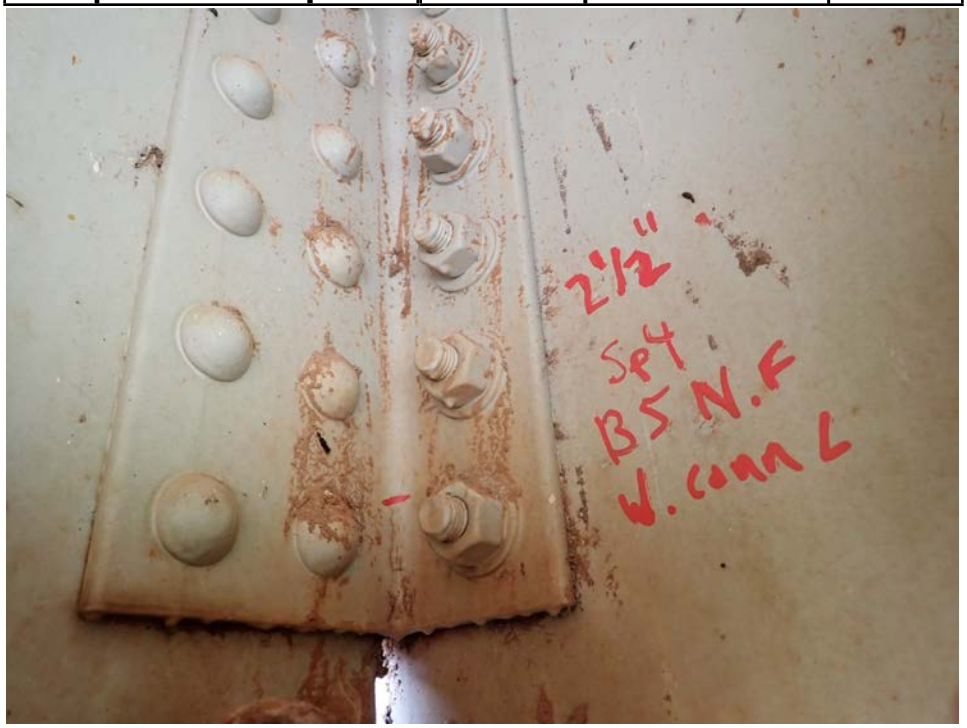
Photograph 23 - Looking northeast at the beam 5, span 3 southwest connection angle to the pier beam at pier 3. Note: 4 1/8-inch-long vertical paint crack at the bottom of the connection angle.

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
16167	3704 0543WX	Kingfisher	U.S. 81	UP R.R. UNDER	7/24/2024



Photograph 24 - Looking southeast at the beam 3, span 4 northwest connection angle to the pier beam at pier 3. Note: fine paint cracks in the bottomtypical paint cracks at the bottom of the connection angle.

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
16167	3704 0543WX	Kingfisher	U.S. 81	UP R.R. UNDER	7/24/2024



Photograph 25 - Looking southeast at the beam 5, span 4 northwest connection angle to the pier beam at pier 3. Note: 2 1/2-inch-long vertical paint crack in the bottom of the connection angle.

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
16167	3704 0543WX	Kingfisher	U.S. 81	UP R.R. UNDER	7/24/2024

Photograph 26 - Looking northwest beam 2, span 4 at pier 4. Note: 5-inch-long horizontal crack in the bottom weld between the end diaphragm connection angle and the beam web.

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
16167	3704 0543WX	Kingfisher	U.S. 81	UP R.R. UNDER	7/24/2024

Photograph 27 - Looking southeast at the beam 1, span 4 top flange at the pier beam at pier 3. Note: laminating corrosion and 1/8-inch-deep section loss in the top flange of the beam. 16-inch-deep section loss to the top flange of the pier beam. Deck is lifted off the pier beam top flange.

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
16167	3704 0543WX	Kingfisher	U.S. 81	UP R.R. UNDER	7/24/2024

Photograph 28 - Looking northwest at the underside of span 2. Note: partial-length welded cover plates exist on the bottom flange of the beams.

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
16167	3704 0543WX	Kingfisher	U.S. 81	UP R.R. UNDER	7/24/2024

Photograph 29 - Looking northeast at the southwest wingwall. Note: back face of wingwall exposed due to erosion.

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
16167	3704 0543WX	Kingfisher	U.S. 81	UP R.R. UNDER	7/24/2024

Photograph 30 - Looking south at the south abutment. Note: horizontal cracks in the breastwall with areas of delaminations and spalls forming.

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
16167	3704 0543WX	Kingfisher	U.S. 81	UP R.R. UNDER	7/24/2024

Photograph 31 - Looking southwest at east end of the south abutment. Note: cracks in the breastwall have been seal. Breastwall and slope wall undermined due to settlement of the embankment.

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
16167	3704 0543WX	Kingfisher	U.S. 81	UP R.R. UNDER	7/24/2024

Photograph 32 - Looking east at the beam 2, span 6 bearing pedestal at the north abutment. Note: spall encroaching on the bearing. Lead bearing pad extruded along the south and west edges.

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
16167	3704 0543WX	Kingfisher	U.S. 81	UP R.R. UNDER	7/24/2024

Photograph 33 - Looking south beneath the south abutment breastwall near the west end. Note: settlement of the embankment has exposed one concrete pile.

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
16167	3704 0543WX	Kingfisher	U.S. 81	UP R.R. UNDER	7/24/2024

Photograph 34 - Looking southeast along the south retaining wall in the median. Note: wall is leaning 3 1/2 inches away from the embankment relative to the wingwall.

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
16167	3704 0543WX	Kingfisher	U.S. 81	UP R.R. UNDER	7/24/2024

Photograph 35 - Looking southeast at the south slope wall. Note: vegetation growing in joints.

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
16167	3704 0543WX	Kingfisher	U.S. 81	UP R.R. UNDER	7/24/2024

Photograph 36 - Looking south at pier 2. Note: cracking and spalling in column 1 and pier cap.

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
16167	3704 0543WX	Kingfisher	U.S. 81	UP R.R. UNDER	7/24/2024

Photograph 37 - Looking north at pier 4, column 1. Note: cracks and spalls with exposed reinforcing steel.

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
16167	3704 0543WX	Kingfisher	U.S. 81	UP R.R. UNDER	7/24/2024

Photograph 38 - Looking up at the west end of the pier 4 cap. Note: cracking and spalling.

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
16167	3704 0543WX	Kingfisher	U.S. 81	UP R.R. UNDER	7/24/2024

Photograph 39 - Looking south at pier 4. Note: cracking and spalling with exposed reinforcing steel in the beam 2 pedestal.

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
16167	3704 0543WX	Kingfisher	U.S. 81	UP R.R. UNDER	7/24/2024

Photograph 40 - Looking south at the west end of the pier 5 cap. Note: vertical cracking up to 1/8 inch wide in column 1 in the west and north faces of the column.

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
16167	3704 0543WX	Kingfisher	U.S. 81	UP R.R. UNDER	7/24/2024

Photograph 41 - Looking up at the west end of the pier 5 cap. Note: spall in the west end of the cap adjacent to the beam 1 bearing.

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
16167	3704 0543WX	Kingfisher	U.S. 81	UP R.R. UNDER	7/24/2024

Photograph 42 - Looking northeast at pier 5 . Note: horizontal crack along bottom steel of cap with adjacent 2-foot by 5-foot delamination near column 1.

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
16167	3704 0543WX	Kingfisher	U.S. 81	UP R.R. UNDER	7/24/2024

Photograph 43 - Looking south at the west end of the pier 4 cap. Note: cracks with corrosion stains and delaminations exist in the vertical face and underside of the cap.

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
16167	3704 0543WX	Kingfisher	U.S. 81	UP R.R. UNDER	7/24/2024

Photograph 44 - Looking northwest at the beam 1 bearing pedestal on pier 2. Note: spall encroaching on the masonry plate with exposed reinforcing steel. Discolored concrete exists in the cap.

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
16167	3704 0543WX	Kingfisher	U.S. 81	UP R.R. UNDER	7/24/2024

Photograph 45 - Looking south at the west face of the beam 4 bearing pedestal on pier 4. Note: spall with exposed reinforcing steel.

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
16167	3704 0543WX	Kingfisher	U.S. 81	UP R.R. UNDER	7/24/2024

Photograph 46 - Looking west at the beam 4 canister bearings at pier 5. Note: scaling concrete in the bearing seat adjacent to the masonry plates. Beam 4, span 6 bearing is lifted from the canister.

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
16167	3704 0543WX	Kingfisher	U.S. 81	UP R.R. UNDER	7/24/2024

Photograph 47 - Looking north at the west end of pier 5. Note: scaling concrete has undermined the southwest corner of the beam 5, span 5 masonry plate 1 inch.

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
16167	3704 0543WX	Kingfisher	U.S. 81	UP R.R. UNDER	7/24/2024

Photograph 48 - Looking east at the beam 5 canister bearing at pier 5. Note: lead plugs are extruded and inhibit expansion of the canisters. Pack rust exists between the masonry plate and the bearing seat.

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
16167	3704 0543WX	Kingfisher	U.S. 81	UP R.R. UNDER	7/24/2024

Photograph 49 - Looking west at the beam 3, canister bearings at pier 4. Note: the span 4 bearing is offset from the bearing stiffener and rotated in expansion. The span 5 bearing is aligned with the vertical stiffener and rotated in contraction. Canister thickness is worn at the point of contact with the masonry and sole plates.

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
16167	3704 0543WX	Kingfisher	U.S. 81	UP R.R. UNDER	7/24/2024

Photograph 50 - Looking northeast at north approach asphalt roadway. Note: longitudinal cracking in the wheel paths.

NBI #	Structure #	County	Fac. Carried	Fac. Intersected	Insp. Date
16167	3704 0543WX	Kingfisher	U.S. 81	UP R.R. UNDER	7/24/2024

Photograph 51 - Looking south at the northwest corner of the north approach slab. Note: paved drainage flume undermined with approximately 1 foot of penetration.

Oklahoma Dept. of Transportation - Bridge Inspection Report

NBI No.:	Structure No.:	Local ID:	Suff. Rating:	
16167	3704 0543WX	024A	68.40	ND

IDENTIFICATION

Bridge Description:

32ft.,49ft.,2-57ft.,49ft.,39ft. I-BM. SPANS WITH 2-1.5ft. SAFETY CURBS
SKEW VARIES

1. State: Oklahoma
2. Division: Division 4
3. County: KINGFISHER
4. City: Unknown
Admin Area: Unknown
5a. On/Under: Route On Structure
5b. Kind of Hwy: U.S. Hwy
5c. Lvl of Srvc: Mainline
5d. Route No.: 00081
5e. Dir. Sufx: N/A (NBI)
7. Facility Carried U.S. 81
6. Feat. UP R.R. UNDER
9. 5.3 MI N JCT SH 33
11. Mile Post: 5.140 mi
13. LRS / Sub Rte: 3700004HV / 03
16. Latitude: 35° 55' 54.00"
17. Longitude: 097° 54' 59.00"
98. Border Unknown (P)
% Responsible: 0.00
99. Border Brdg #: Unknown

INSPECTION

Type	Insp. Req.	Insp. Done	Freq.	Insp. Date	Next Insp.
NBI:		1	24 months	7/24/2024	07/24/2026
FC:	Y	1	24 months	7/24/2024	7/24/2026
UW:	N	0		NA	NA
OS:	N	0		NA	NA

CLASSIFICATION

12.Base Hwy Net.: On Base Network
20. Toll Facility: On free road
21. Custodian: State
22. Owner: State
26. Function Class: 02 Rural Other Princ
37. Historical Sig.: Not eligible for NRHP
100. Def. Hwy: On STRAHNET
101. Parallel Str.: Left of || bridge
102. Traffic Dir.: 1-way traffic
103. Temp. Str.: Not Applicable (P)
104. Hwy System: On the NHS
105. Fed Land Hwy: N/A (NBI)
110. Defense Hwy: On STRAHNET
112. NBIS Length: Long Enough

STRUCTURE TYPE AND MATERIALS

43a/b. Main Span: Steel / Stringer/Girder
44a/b. Appr. Span: Unknown / Unknown (P)
45. # of Main Spans: 6
46. # of Appr. Spans: 0
107. Deck Type: Concrete-Cast-in-Place
108a. Wearing Surface: Bituminous
108b. Membrane: Unknown
108c. Deck protection: Unknown

CONDITION

58.Deck: 5 Fair
59.Sup.: 6 Satisfactory
60.Sub: 5 Fair
62.Culvert: N/A (NBI)
61.Chan./Chan. Prot.: N/A (NBI)

Flowline Notes:

N/A

AGE AND SERVICE

19. Detour Length: 0.1 mi
27. Year Built: 1964
28a/b. Lanes on/und: 2 / 0
29. ADT: 2,500
30. Year of ADT: 2022
42a/b. Type of Svc on/und: Highway / Railroad
106. Year Reconst,: 0
109. Truck ADT: 25%

LOAD RATING AND POSTING

31. Design Load MS 18 (HS 20)
41. Post. Status: A Open, no restriction
70. Posting: 5 At/Above Legal Loads
Date Rated 08/12/2020
63.Op / 65.Inv. Rating Meth.: 1 LF Load Factor / 1 LF Load Factor

	H	HS	3-3	EV3	SHV
64. Operating Rating (tons):	40.00	50.00	86.00	45.00	50.00
66. Inventory Rating (tons):	24.00	30.00	51.00	27.00	

GEOMETRIC DATA

10. Vert. Clearance: 99.99 ft
32. Appr Rwy Width: 38.00 ft
33. Median: No median
34. Skew: 60.00°
35. Struct. Flared: No flare
47Horizontal Clr: 30.00 ft
48. Length Max Span: 57.09 ft
49. Struct. Length: 284.12 ft
50a. Curb/Sdwlk Width L: 1.50 ft
50b. Curb/Sdwlk Width R: 1.50 ft
51. Width Curb to Curb: 30.00 ft
52. Width Out to Out: 33.00 ft
Deck Area: 9,375.37 sq. ft
53. Min.Vert.Cl.Ovr Brg: 99.99 ft
54a.Min.Vt.Undclr.Ref. R Railroad beneath
54b. Min. Vert. Undclr.: 23.25 ft
55a. Min.Lat.Undclr.Ref: R Railroad beneath
55. Min.Lat.Underclr. R: 18.91 ft
56. Min.Lat.Underclr. L: 0.00 ft

APPRAISAL

36a. Brdg Rail: 0 Substandard
36b. Transition: 0 Substandard
36c. Appr. Rail: 0 Substandard
36d. Appr.Rail Ends: 0 Substandard
67. Str Evaluation: 5 Above Min Tolera
68. Deck Geom.: 4 Tolerable
69. Vert./Horiz. Undclr: 7 Above Minimum
71. Waterway Adeq: N Not applicable
72. Appr. Alignment: 8 Equal Desirable Crit
113. Scour Critical: N Not Over Waterway

PROPOSED IMPROVEMENT

94. Bridge Cost: $868,618
95. Roadway Cost: $1,433,220
96. Total Cost: $2,432,131
97. Yr.of Cost Est.: 2015
75. Type of Work: 31 Repl-Load Capacity
76. Lngth of Improvement: 360.9 ft
114. Future ADT: 4,000
115. Yr.of Future ADT: 2042

NAVIGATION DATA

38. Nav. Control: NA-no waterway
39. Vert. Clearance: 0.0 ft
40. Horiz. Clearance: 0.0 ft
111. Pier Protect.: Not Applicable (P)
116. Lift Bridge Vert. Clr.: 0.0 ft

OKLAHOMA ITEMS

200c. Temperature: 94
200d. Weather: Clear
201. Struc.Stl. ASTM Desig.: A36 / 20
202. Waterprf.Membrane: -1
Date Installed: 01/01/1901
203. Type Exp. Device: Pourable
204. Type of Railing: Metal Railing (other)
205. Material Quantity: 1,123.00
208a. Type of Abutment: Skeleton
b. Type of Found.: Concrete Piling
209. Type of Pier/Found.: 2 / No
Spread Footing
210. Foundation Elev.: -1.00 -1.00 -1.00 -1.00 -1.00
211. Wear.Surf.Prot.Sys: None
Date Installed: 11/08/2011
211c. Silane Reapplied
211d. Date :
213. Utilities Attached:

214a. Posted Weight Limit: NR
b. Posted Speed Limit: N
c. Narrow/1way Brdg Sign: No
d. Vertical Clr. Sign: No
Adv. Warning Sign: No
e. Navigation Lights?: No
Working/Not Working: No
215. Overpass: U.S. HIGHWAY
218. Functionally Obsolete : -
220. Bridge Redecked
221. Substr.Cond.(U/W):
222. Fill Over RCB:
223. Appr.Slab/Rwy Cond.: 3
225. Paint Type/Ovrct: Inorganic Zinc 3Coat Sys
N/A
226. Date Painted: 2004
227. Paint Color: Gray
233. Deck Forming: Conventional Forming
238. School Bus Rte.: Current & Desired route
240. Appr. Rwy Type.: Asphalt/Bituminous
243. Grdr Spacing/No.: / 5

244. Span Lengths: 32 49 57 57 49 39
245. Girder Depth: 2.75
246a. Type of Ovelay: AC Overlay
b. Overlay Thickness: 4.00
c. Overlay Date: 03/04/2008
d. Ovly Depth Changed >1":
247. Protective Systems:
248. # Field Splices w/ Corrosion:
249. Scour Crit. POA Exists?:
250. Headwall:
258. Plans w/Found.in ODOT File
259. Scour Eval. in ODOT File:
263. Interchange at Intersection: No
264. Interstate Milepoint: -1.00

Oklahoma Dept. of Transportation - Bridge Inspection Report

NBI No.:	Structure No.:	Local ID:	Suff. Rating:	
16167	3704 0543WX	024A	68.40	ND

Inspection Date: 7/24/24 Drew Appler

Invoice No.: Inspected With:

James A Appler Digitally signed by James A Appler Date: 2024.10.03 08:33:24 -04'00'

BRIDGE NOTES:

The bridge is a 6-span structure numbered from south-to-north:
Span 1 - 32 ft steel multi beam
span 2 - 49 ft steel mutli beam
spans 3 & 4 - 57 ft steel multi beam
span 5 - 49 ft steel multi beam
span 6 - 39 ft steel multi beam
The bridge crosses the Union Pacific Railroad at railroad milepost 373.72 with crossing ID: 595413M.

INSPECTION NOTES: **7/24/24**

PX
- Upgrade bridge and approach rail, transitions, and terminations to meet current standards.
- Repair damaged areas and abrasively clean and paint steel bridge rail. (disregard if bridge railing is upgraded)
- Patch spalls in curb and soffit where bridge railing posts are exposed .
- Patch wearing surface on bridge as necessary to provide a smooth riding surface.
- Repair spall in soffit between beams 1 and 2 above pier 1 with a full depth patch.
- Reseal fixed and expansion joints.
- Place crushed aggregate slope protection in eroded areas around SW wingwall.
- Remove deteriorated concrete in abutments and piers, patch, and install RFP over patches at pier caps and columns .
- Install CIM 1000 on bearing seats at abutments and piers.
- Install shim plates where beams are lifted from canister bearing at:
  - Beam 3, span 4 at pier 4
  - Beam 2, span 5 at pier 4
  - Beam 4, span 6 at pier 5.
- Remove lead plugs and portion of anchor studs extending above masonry plate of canister bearings to allow expansion of bearings.
- Seal cracks in approach roadway.

FX
- Monitor spalling in curb and soffit at joints for conditions which would compromise strength of bridge railing connection .
- Monitor paint cracks in beam connection angles to pier beam at pier 3 at:
  - Beam 4, span 3 – 5 3/4 inches in SW connection angle.
  - Beam 5, span 3 – 4 1/8 inches in SW connection angle.
  - Beam 3, span 4 – Fine cracks in NW connection angle.
  - Beam 5, span 4 – 2 1/2 inches in NW connection angle.
- Monitor corrosion and section loss to top flange of pier beam at pier 3.

ELEMENT CONDITION STATE DATA

Elem. / Env	Description	Unit	Total Qty	% 1	Qty. 1	% 2	Qty. 2	% 3	Qty. 3	% 4	Qty. 4
12 / 4	Re Concrete Deck	sq.ft	8,523.00	0%	0.00	0%	0.00	100%	8,523.00	0%	0.00
	PX – Asphalt patches exist in spans 2 and 3 near roadway centerline and along fixed and deck control joints. Multiple patches suggest deterioration is ongoing and may be due to deterioration of concrete deck. Full depth concrete patches exist at piers 1 and 3. Less than 2% of the overlay/deck surface has been patched. - No deck drains exist on the bridge.										
510 / 4	Wearing Surfaces	sq.ft	8,523.00	0%	0.00	89%	7,573.00	11%	950.00	0%	0.00
	- Asphalt overlay has 1/16 inch wide cracks most prominent in spans 3 and 5. - Minor rutting in wheel lines and weathering of asphalt overlay exist throughout bridge.										
107 / 4	Steel Opn Girder/Beam	ft	1,120.00	75%	840.00	25%	280.00	0%	0.00	0%	0.00
	- Rust staining and minor painted over pitting typically occurs along the bottoms of beam webs and bottom flanges. - Shop-welded partial-length cover plates on beams 4 and 5 in span 1, all beams in spans 2 through 5 and beams 1 and 2 in span 6 in the positive moment region.										
515 / 4	Steel Protective Coating	sq.ft	137,778.00	0%	0.00	100%	137,778.00	0%	0.00	0%	0.00
	The superstructure was painted in April 2004 using an IZEU system. Protective coating on the beams top flange near the joints are failing with active surface corrosion and pack rust present.										
205 / 4	Re Conc Column	each	8.00	0%	0.00	75%	6.00	25%	2.00	0%	0.00
	At piers 2 and 4 PX – Poured seal expansion joints are retrofitted finger joints, now poured seal expansion joints. • Pier 2 – Seal missing in W lane with adhesion failure along length of joint (railing closed over joint). • Pier 4 – Seal missing in both lanes with isolated adhesion failure along length of joint (railing closed over joint). - Elastomeric concrete header at piers 2 and 4 shows rust stains.										
215 / 4	Re Conc Abutment	ft	150.00	27%	40.00	53%	80.00	20%	30.00	0%	0.00

NBI No.:	Structure No.:	Local ID:	Suff. Rating:	ND
16167	3704 0543WX	024A	68.40	

PX – Breastwall of both abutments exhibits horizontal cracking along the top and bottom reinforcing steel with areas of delamination with deterioration more prominent in S abutment. Spalls exposing reinforcing steel along bottom of S abutment breastwall. Several cracks in both breastwalls sealed with epoxy with cracks showing through at a few locations.
- 1 1/2-inch deep spall with exposed reinforcing steel exists in SW corner of beam 2 bearing pedestal at N abutment, encroaching on masonry plate.
- Cracks and scaling in beams 3 and 4 bearing pedestals at S abutment.
- Embankment and slope wall at S embankment has settled exposing the underside of the S abutment breastwall exposing one concrete pile for 7 inches. Settlement at E end is 14 inches deep with 21 inches of penetration under the breastwall, undermining slope paving.
- Spall in beam 5 pedestal at N abutment due to insufficient cover.
- Beam 4 pedestal at S abutment has 1/32 inch wide cracking.
- Slope wall near pier 1 has 1/8-inch-wide cracks with vegetation growing.

234 / 4	Re Conc Pier Cap	ft	131.00	0%	0.00	60%	79.00	40%	52.00	0%	0.00

PX – Horizontal and vertical cracks with rust stains along reinforcing steel in vertical face and underside of caps. Discolored concrete exists most prevalent near W end, most prevalent in piers 2 and 4 between column 2 and W end.
PX – Cracks in most bearing pedestals. Significant deterioration at beam 1 at pier 2, beam 4 at pier 4, beam 4 at pier 5, and beam 5 at pier 5.

301 / 4	Pourable Joint Seal	ft	60.00	0%	0.00	0%	0.00	0%	0.00	100%	60.00

At piers 2 and 4
PX – Poured seal expansion joints are retrofitted finger joints, now poured seal expansion joints.
- Pier 2 – Seal missing in W lane with adhesion failure along length of joint (railing closed over joint).
- Pier 4 – Seal missing in both lanes with isolated adhesion failure along length of joint (railing closed over joint).

- Elastomeric concrete header at piers 2 and 4 shows rust stains.

311 / 4	Moveable Bearing	each	40.00	0%	0.00	20%	8.00	80%	32.00	0%	0.00

At piers 1, 2, 4 and 5
PX – Beams lifting off canister at:
- Beam 3, span 4 at pier 4
- Beam 2, span 5 at pier 4, beam is floating, bearing vibrates under load.
- Beam 4, span 6 at pier 5, beam is floating. (photo 46).

PX – Lead plugs at anchor studs raised, inhibit expansion.
PX – Bearing seat scaled at beam 1 pedestal, pier 5 undermining corner 1 inch and exposing reinforcing steel.
- Pack rust (3/4 inch) under masonry plate is common.
- Canister expansion bearings exhibit longitudinal offsets of 1/2 inch average and rotated up to 9 degrees at 94° F (no significant change).
- Wear of canisters at points of contact with the masonry and sole plates is common.

313 / 4	Fixed Bearing	each	12.00	0%	0.00	75%	9.00	25%	3.00	0%	0.00

At abutments and under pier beam
- Cracked or broken tapered washers at bearings for beams 1, 2 and 4 at S abutment and at bearings for beams 2, 3 and 4 at N abutment.
- Lead bearing pads typically are extruding at abutments.

321 / 4	Re Conc Approach Slab	sq.ft	2.00	0%	0.00	100%	2.00	0%	0.00	0%	0.00

PX – Asphalt approach pavement has unsealed longitudinal and transverse cracking.
PX – Undermining of the paved flume was NW corner of N approach slab.
PX – The slope protection behind the northwest wingwall is undermined including 3 feet of penetration.
- S approach slab has asphalt patches in the right lane wheel line and spalling of the wearing surface along W curb.
- N approach slab asphalt wearing surface exhibits wear at edge lines.

330 / 4	Metal Bridge Railing	ft	568.00	0%	0.00	89%	508.00	11%	60.00	0%	0.00

PX – Traffic safety features do not meet standards for NHS roadway
PX – Railing has missing bolts at isolated locations.
PX – Spall exposing the embedded U-bolt anchorage railing posts in top of curb and soffit
- Bridge railing is in contact over the expansion joints at piers 2 and 4, inhibiting the free movement of joint.
- W bridge railing has minor impact damage near pier 3 and n abutment causing minor bends in the rail and posts.
- Approach railing exhibits several locations of impact damage.

919 / 4	St.(Rail) Prot. Coat	sq.ft	17,222.00	0%	0.00	0%	0.00	100%	17,222.00	0%	0.00

PX – Bridge railing is corroded with section loss forming at isolated locations.

859 / 4	Soffit	each	1.00	0%	0.00	0%	0.00	100%	1.00	0%	0.00

PX – Spalling and cracking typical along end diaphragms. Spall between beams 1 and 2, span 2 at pier 1 extends above bottom reinforcing steel with asphalt patch driving surface above.
FX – Spalls with exposed corroding reinforcing steel exist in both overhangs over piers and abutments exposing the railing connection anchorage.
- 3-foot long spall with exposed corroding reinforcing steel in the deck at E end over S abutment.
- Medium density of shrinkage cracks throughout.

Spalling and cracking is typical in the deck soffit above the diaphragms at the piers.
A 3-foot long spall with exposed corroding reinforcing steel occurs in the deck at the east end over the south abutment.
Generally; the underside of the deck exhibits a medium density of shrinkage cracks throughout.

863 / 4	Steel Pier Beam	ft	49.00	27%	13.00	0%	0.00	73%	36.00	0%	0.00

FX – Laminating corrosion top flange with 1/8-inch-deep section loss at the edges of the deck.
- Pack rust (1/2 inch) between pier beam and deck with laminating corrosion along top flange especially at beams.
- Debris on bottom flange from birds.

865 / 4	St.Open Gird End(5Ft	ft	300.00	0%	0.00	67%	200.00	33%	100.00	0%	0.00

NBI No.:	Structure No.:	Local ID:	Suff. Rating:	ND
16167	3704 0543WX	024A	68.40	

FX – Paint cracks in of beam connection angles at pier beam:
- Beam 4, span 3, SW angle – 5 3/4 inches.
- Beam 5, span 3, SW angle – 4 1/8 inches.
- Beam 3, span 4, NW angle – fine cracks.
- Beam 5, span 4, NW angle – 2 1/2 inches.

- Cracks in horizontal welds for end diaphragm connection angles at pier 4 due to pack rust.
- Beam ends have minor section loss with active corrosion in top flange at joints and painted over pitting in bottom flange and adjacent web.
- End diaphragms and beam ends have laminating corrosion of top flange.

870 / 4	Concrete Wingwall	each	4.00	100%	4.00	0%	0.00	0%	0.00	0%	0.00

PX – Erosion has exposed back face and top of pile cap of SW wingwall.
- Isolated areas of hairline map cracking with minor efflorescence in NW wingwall .
- Retaining wall in median leaning away from embankment (S - 3 1/2 inches, N - 1 1/4 inches).

909 / 4	Pourable Fix Jt.Seal	ft	270.00	0%	0.00	0%	0.00	0%	0.00	100%	270.00

At both abutments (skewed 60 degrees) and piers 1, 3 (pier beam), and 5.
PX – Poured seal fixed joints paved over with asphalt and asphalt patches
- S abutment – Spalls in asphalt. No obvious signs of seal damage.
- Pier 1 – Full-depth concrete patch between beams 2 and 3. A deep spall in underside adjacent to joint between beams 1 and 2, spalls forming between remaining beams. Asphalt patches with adjacent cracks exist over joint.
- Pier 3 (over pier beam) – Full-depth concrete patch between beams 2 and 3 with multiple failing asphalt patches.
- Pier 5 – Multiple asphalt patches and adjacent cracks exist over the joint in W lane. Seal debonded and depressed within joint.
- N abutment – Few asphalt patches over joint.

- Deck control joints (spans 3 and 4) have numerous asphalt patches over and adjacent to the joint.

957 / 4	Pack Rust Smart Flag	each	1.00	0%	0.00	100%	1.00	0%	0.00	0%	0.00

- Cracks in horizontal welds for end diaphragm connection angles at pier 4 due to pack rust.
- Pack rust (1/2 inch) between pier beam and deck with laminating corrosion along top flange especially at beams.

963 / 4	Steel Section Loss SF	each	1.00	0%	0.00	100%	1.00	0%	0.00	0%	0.00

FX – Laminating corrosion pier beam top flange with 1/8-inch-deep section loss at the edges of the deck.
- Beam ends have minor section loss with active corrosion in top flange at joints and painted over pitting in bottom flange and adjacent web.

968 / 4	Erosion SF	each	1.00	100%	1.00	0%	0.00	0%	0.00	0%	0.00

PX – Erosion has exposed back face and top of pile cap of SW wingwall.
- Embankment and slope wall at S embankment has settled exposing the underside of the S abutment breastwall exposing one concrete pile for 7 inches. Settlement at E end is 14 inches deep with 21 inches of penetration under the breastwall, undermining slope paving.

972 / 4	Loss of Bearing SF	each	1.00	0%	0.00	100%	1.00	0%	0.00	0%	0.00

PX – Bearing seat scaled at beam 1 pedestal, pier 5 undermining corner 1 inch and exposing reinforcing steel.

974 / 4	Straight Gird.Diaphr	each	1.00	0%	0.00	0%	0.00	100%	1.00	0%	0.00

- Cracks in horizontal welds for end diaphragm connection angles at pier 4 due to pack rust.
- End diaphragms have laminating corrosion of top flange and pack rust (1/2 inch) between top flange and deck with minor distortion of top flange and web over piers 4 and 5.