# 2022 PHYSICAL CONDITION INSPECTION REPORT

## ERI-6-2893

## SFN 2202344

**State Route 6 over the Vermilion River**

**Ohio Department of Transportation**

**District 3**

**September 7-12, 2022**

RICHLAND ENGINEERING LTD
A WALLACEPANCHER GROUP COMPANY

# 2022 PHYSICAL CONDITION INSPECTION REPORT
# OF
# ODOT BRIDGE NO. ERI-6-2893
# STATE ROUTE 6 OVER THE VERMILION RIVER

Prepared by

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Inspected between September 7-12, 2022

Inspected by:

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Prepared for

Ohio Department of Transportation
District 3

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# 2022 PHYSICAL CONDITION INSPECTION REPORT

## ERI-6-2893

## BRIDGE DESCRIPTION

**Bridge No. ERI-6-2893** carries three lanes of State Route 6 (one eastbound lane, two westbound lanes including one turn lane) and two sidewalks over the Vermilion River in Vermilion, Ohio. The superstructure is a single span steel through truss. The substructure consists of reinforced concrete abutments and wingwalls.

The truss span is 243'-0" center to center of bearings. The roadway vertical clearance is 15.9 feet per the bridge inventory. The bottoms of the floorbeams are about 12'-0" from the river. The bridge is 35'-0" wide face to face of guardrail and 38'-8" center to center of truss. (See Bridge Drawings in Appendix B).

The structure consists of a reinforced concrete deck and cantilevered sidewalks, carried by steel stringers and floorbeams, on steel through trusses. The deck has a 1" monolithic wearing surface. The rear expansion joint is a strip sealed type and the forward abutment has a compression seal both of which were replaced in 2021.

The roadway carries an average of 15,119 vehicles per day (2021). Approximately 3% of the traffic is heavy trucks.

## SUMMARY

The General Appraisal of this bridge is a **5**, meaning that it is in **fair** condition. This rating is governed by the bowing in the gusset plates and the leaning abutments. The gusset plate rating includes bowing due to pack rust and misalignment.

- Several lower chord gusset plates have bowing due to pack rust or member misalignment along the lower chords. Nine (9) lower chord gusset plates have bows of ½" or more. See the "Truss Gusset Plate" section for specifics.

- The rear abutment leans $^{3}/_{8}$" away from the river for every 4 feet vertical. The forward abutment leans $^{3}/_{8}$" towards the river for every 4 feet vertical.

- Due to an incident of deck edge falling on a boat in 2021 special care was taken during this inspection to inspect, assess, and carefully remove any delaminations on the deck edge to minimize future potential of falling concrete.

- The compression seal at the east end and expansion joint at the west end of the truss were replaced in 2021.

## CONSTRUCTION AND MAINTENANCE HISTORY

The ERI-6-2893 structure was originally designed by the Ohio Department of Transportation and was built in 1928.

The structure was rehabilitated in 1986. The roadway rehabilitation plans were prepared by the Ohio Department of Transportation and the structure plans were prepared by Adache-Ciuni-Lynn Associates. The 1986 rehabilitations plans included the following repairs:

The approach repairs included the following:

- replacing the approach slabs sidewalks at all corners of the bridge
- replacing the approach guardrail and portions of the pedestrian railing
- replacing the west approach drainage

The deck repairs included the following:

- replacing the deck and sidewalk
- making the floorbeams composite with the deck
- replacing the scuppers
- repairing the pedestrian railing
- replacing the guardrail with deep beam railing
- replacing the forward abutment compression seal and rear abutment joint with strip seal

The superstructure repairs included the following:

- modifying the truss to increase vertical clearance
- painting the steel
- rehabilitating the bearings and supplementing the rocker bearings with elastomeric bearing pads at the rear abutment
- replacing bearing anchor bolts
- replacing the lower lateral bracing
- replacing nine deck stringers and two sidewalk stringers
- replacing some of the connections below deck
- replacing some of the sidewalk cantilever tension bolts
- replacing the end floorbeams

The substructure repairs included the following:

- replacing the abutment backwalls
- repairing and raising the abutment seats
- patching the abutment breastwalls
- patching the abutment wingwalls

In 2009, Wilbur Smith Associates performed an in-depth inspection and load rating of the structure. The load rating included truss members and gusset plates. The load rating did not include analysis of the stringer and floorbeam connections. The bridge inspection report included maintenance recommendations that were incorporated into the 2012 rehabilitation project.

The 2012 rehabilitation plans were prepared by Wilbur Smith Associates. The 2012 rehabilitation plans included the following repairs and have been confirmed by field observations (2014):

The approach repairs included the following:

- replacing portions of the northeast, northwest and southeast approach sidewalks
- replacing the guardrail end terminal assemblies
- replacing pedestrian railing on the retaining wall at the southeast corner

The deck repairs included the following:

- installing new guardrail
- tightening loose post caps on the pedestrian railing
- replacing angles of the bottom pedestrian railing connection to the posts
- making curb repairs

The superstructure repairs included the following:

- painting the steel with system OZEU
- adding angles to gusset plate edges (see the following table for locations)

| Angles Added to Gusset Plate Edges | | | |
|---|---|---|---|
| **Truss** | **Panel Point** | **Gusset Plate** | **Side of Gusset** |
| North | U1 | Inside | East |
| North | U1 | Outside | East |
| North | U2 | Inside | West |
| North | U2 | Outside | West |
| North | U7 | Inside | East |
| North | U7 | Outside | East |
| North | U8 | Inside | West |
| North | U8 | Outside | West |
| South | L4 | Inside | East |
| South | L4 | Inside | West |
| South | L5 | Inside | East |
| South | L5 | Inside | West |
| South | L6 | Inside | East |
| South | L6 | Inside | West |
| South | U1 | Inside | East |
| South | U1 | Outside | East |
| South | U2 | Inside | West |
| South | U2 | Outside | West |
| South | U7 | Inside | East |
| South | U7 | Outside | East |
| South | U8 | Inside | West |
| South | U8 | Outside | West |

The substructure repairs included the following:

- sealing the abutment seats

The 2021 rehabilitation plans were prepared by Carpenter Marty Transportation. These rehabilitation plans included the following repairs and have been confirmed by field observations (2022):

The joint repairs included the following:

- replaced the west expansion joint and east deflection joint in the deck and sidewalk
- Patching the deck and approach slabs around the joints and at spalls and delaminations

## MAINTENANCE RECOMMENDATIONS

Immediate Action Recommendations:

- There are no Immediate recommendations at this time

Maintenance and repair recommendations.

- Continue to monitor the deck edge closely for potential spalls.
- Consider cleaning and clearing underside of bridge of pigeon debris and nests.

For future rehab projects consider:

- The addition of stiffening angles to the lower edge of U1 and U8.
- Blast and paint lower chord members and gusset plates to arrest active corrosion and pack rust.
- Reinforce sheet piling along river on west side and regrade back to abutment.

## GENERAL

The data for this Physical Condition Inspection Report was obtained September 7-12, 2022. The field inspection was performed by personnel from Wallace Pancher Group (WPG). The inspection team members are as follows:

| | |
|---|---|
| Robert W. Cunning, P.E. | WPG |
| Douglas H. Timmer, P.E. | WPG |
| Ryan Kilgore, Survey | WPG |
| Don Helman, Survey | WPG |
| Nick Crossman, Technician | WPG |

The inspection of this bridge was performed in accordance with the following documents:

1. *Manual of Bridge Inspection,* Ohio Department of Transportation (ODOT), Revised 2014 (version.8).
2. *Manual for Bridge Evaluation*, American Association of State Highway and Transportation Officials (AASHTO), 3nd Edition 2018.
3. *Bridge Inspector's Reference Manual,* U.S. Department of Transportation, 2012.
4. *Inspection of Fracture Critical Bridge Members,* U.S. Department of Transportation, 1986.
5. *National Bridge Inspection Standards,* U.S. Department of Transportation, 2004.
6. *Ohio Manual of Uniform Traffic Control Devices* (MUTCD).

The project scope involved an "in-depth" element level inspection of the entire structure. This included an "arm's length" inspection of all fracture critical components of the structure, an inspection of the gusset plates at the panel points, and a visual inspection of the remaining elements from the deck, ground, ladders, platform boat and manlift. Inspection team members used a combination of traditional access methods (hydraulic manlift, platform boat, ladders) to access the

superstructure. The bridge substructure received an inspection from the ground and with ladders. Areas of deterioration were sounded and documented.

The deck wearing surface was chain dragged while lanes of traffic were closed for the manlift access. The abutments were sounded with pick hammers. Inspection findings were documented with sketches, color photographs, and field notes. No destructive testing was performed as part of this project.

The hydraulic manlift for the inspection was provided by ALL Erection & Crane Rental Corp. on September 8th and 9th, 2022.

Traffic control was provided by WPG personnel on September 8 and 9, 2022. The lane closures were necessary to utilize the manlift for inspecting the truss members above the deck and for inspecting the upper chord gusset plates. When the manlift was not present on the deck, traffic maintenance operations were not performed. Both directions of traffic were maintained throughout the inspection's duration.
A platform boat was provided by the Vermilion Port Authority. Frame ladders were strapped to the boat for vertical access to the members below deck. The platform boat was used September 12, 2022, to access the lower chord, lower chord gusset plates, stringers, floorbeams, and underside of deck.

The scope of this inspection also involved a survey of the abutments. This included monumentation on and off the bridge. This was done to allow for recreating a traverse for the purpose of future monitoring. See Appendix F

## OVERALL APPRAISAL AND OPERATIONAL STATUS

The General Appraisal of the bridge is **5**, meaning that it is in **fair** condition. The General Appraisal is governed by the bowing in the gusset plates due to pack rust and rotation of the abutments. The operating status is **A**, meaning that the structure is open with no restrictions.

The ratings of the summary items are as follows:

| Item | Condition Rating |
|---|---|
| Deck Summary | 6 - Satisfactory Condition |
| Superstructure Summary | 5 - Fair Condition |
| Substructure Summary | 5 - Fair Condition |
| Channel Summary | 7 - Good Condition |

## DECK ITEMS

The deck is rated a **6 - satisfactory** condition. The bridge deck is 7½" thick reinforced concrete including 1" monolithic wearing surface. The deck was made composite with the floorbeams in 1986. The roadway is 35'-0" wide between faces of barrier. Deep beam railing posts are anchored into the 6" thick reinforced concrete sidewalk. Two 7'-10" sidewalks with steel post and panel pedestrian railing are cantilevered on the outside of the both trusses.

The individual deck items are as follows:

| Component | Condition |
|---|---|
| Floor/Slab | Fair |
| Edge of Floor/Slab | Poor |
| Wearing Surface | Satisfactory |
| Curb/Sidewalk/Walkway | Good |
| Railing | Good |
| Drainage | Fair |
| Expansion Joint | Excellent |

**Floor/Slab**

| 12-Reinforced Concrete Deck (SF) | Quantity | CS1 | CS2 | CS3 | CS4 |
|---|---|---|---|---|---|
| | 8931 | 0 | 8534 | 397 | 0 |

The floor is in **fair** condition. The floor has typical hairline map cracking (see Picture 1). There are cracks with efflorescence in Panels 1 and 5 through 9, and cracks with moisture in Panels 6 and 7 (see Appendix E for more information).

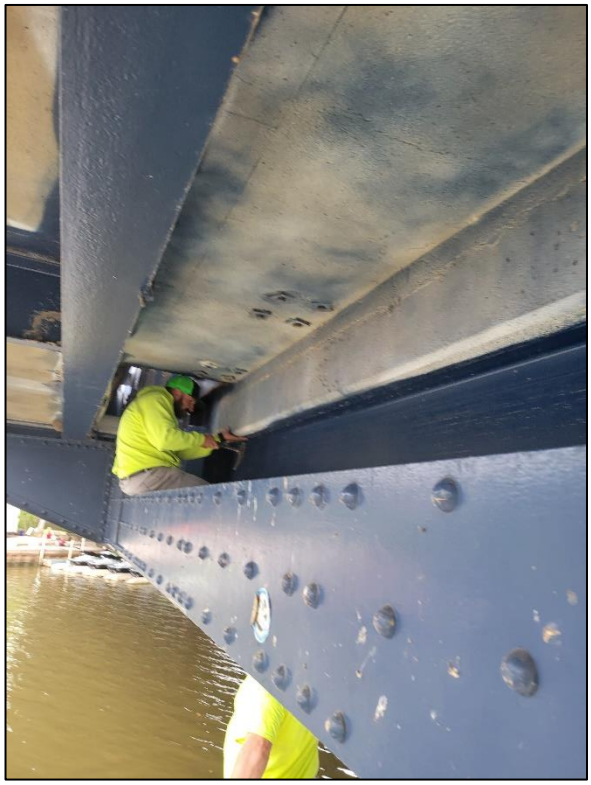
Picture 1: Typical hairline map cracking in deck.

## Edge of Floor/Slab

The edge of floor is in **poor** condition. There are spalls and delaminations for more than 200 feet of the 992 ft of deck edge (>20% spalled) (see Picture 2). For a more detailed layout of the deck edge deterioration see Appendix C. In 2021, a large spall fell from the deck edge and landed on a boat parked below. WPG closely inspected the entire length of the deck edges and found additional delaminations. The spalls and delaminations are due to the way the deck reinforcing was framed, no end rebar was used based on standard practice of the time. This has been known to cause spalling along the edges, especially in more aquatic applications. WPG took special care to look at the entire deck edge and safely remove any existing delaminations during this inspection to minimize future risk of falling concrete in the river or anyone using the recreational waterway beneath the structure (see Pictures 3 & 4).

Picture 2: Spalls on south edge of deck in Panel 1.

Picture 3: A portion of the spalls safely removed.



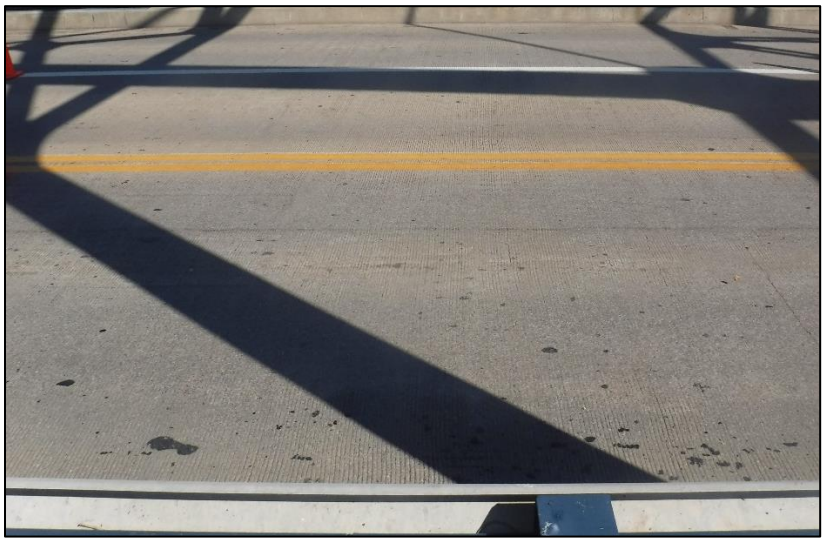
Picture 4: Safely removing delaminations on deck edge.

## Wearing Surface

| 805-Wearing Surface-Monolithic Concrete (SF) | Quantity | CS1 | CS2 | CS3 | CS4 |
|---|---|---|---|---|---|
| | 8683 | 0 | 8311 | 372 | 0 |

The monolithic wearing surface was inspected and found to be in **satisfactory** condition. The wearing surface was inspected visually and chain dragged for this inspection.

There are a few small spalls and pop-outs in the westbound and turn lanes near the east end of the bridge. There were no delaminated areas found by sounding the deck. There are typical transverse cracks all along the deck (see Picture 5). Transverse cracks that are over the floorbeams are up to 0.03" wide. There are two longitudinal hairline cracks down the westbound lane that may be located above stringers. The westbound lane has deformations in the wearing surface that may be due to original construction. Typically, the grooves in the wearing surface are worn smooth in the wheel lines.



Picture 5: Looking north (near mid panel) at hairline cracks in wearing surface.

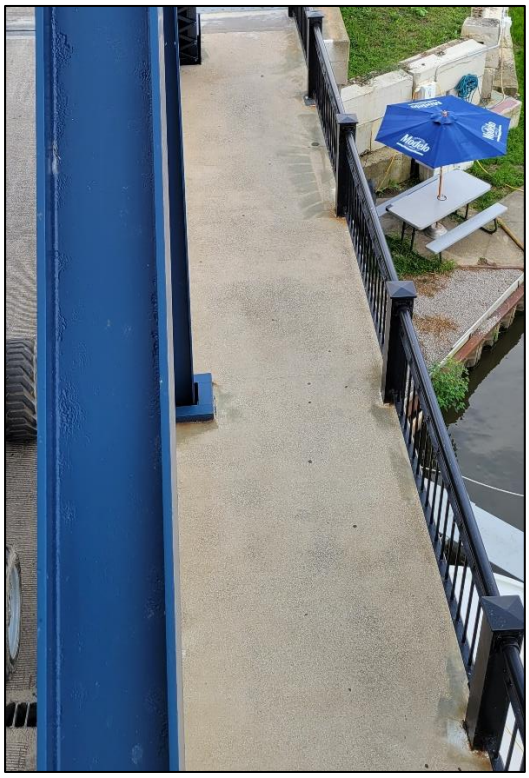
## Curb/Sidewalk/Walkway

The curbs and sidewalks were inspected and found to be in **good** condition. The sidewalks are reinforced concrete and are supported by two steel rolled stringers with steel diaphragms. The steel diaphragms are 12" channels spaced at approximately 9'-0", and are connected to the stringers with riveted angles. The sidewalk stringers are supported by built-up riveted steel cantilever brackets that are connected to the outside gusset plates with riveted angles and tension rods. The sidewalks support the steel panel and post pedestrian railing.

Curbs - The concrete curbs have minor cracks and spalls. There are typical cracks in the curbs next to the verticals, diagonals and guardrail posts (see Picture 6). There is a spall in the curb in Panel 6 of the north truss that has a hole 2" deep. The hole appears to be from original construction.

Picture 6: Looking northwest at north sidewalk near L4.

Sidewalk - The concrete sidewalks have minor spalls and typical minor hairline cracks originating from the pedestrian rail posts, guardrail posts and truss members (see Picture 7).



Picture 7: Looking west at north sidewalk near L1.

Sidewalk Stringers and Diaphragms - The sidewalk stringers are in good condition (see Picture 8) with minor section loss at the connections to the cantilever brackets. The fascia stringer of the north sidewalk at L6 has a small hole in the bottom flange. There are a few small localized areas with active rust at the ends of the fascia sidewalk stringers between the bearing and abutment backwall. There are holes in the end of the fascia sidewalk stringer web between the bearing and rear abutment backwall on south sidewalk. There is a hole in the end of the fascia sidewalk stringer web on south sidewalk in Panel 8 at L7. The diaphragms are in good condition.

Picture 8: Typical sidewalk stringer condition.

Sidewalk Cantilever Brackets - The sidewalk cantilever brackets are typically in good condition. There is some minor section loss in the webs at the connections to the trusses. The north cantilever bracket at L3 has a small hole in the web. The south cantilever bracket at L4 has three small holes in the web (see Picture 9). The south cantilever bracket at L5 has two small holes in the web. The south cantilever bracket at L6 has impact damage and a small hole in the web (see Picture 10). The sidewalk south cantilever at L9 has pack rust and minor active rust at the bottom of the connection angle at the bearing. Three of the sidewalk cantilever brackets have bent ends where boats have impacted the structure (see Picture 11).


Picture 9: Looking west at hole in web of south cantilever bracket at L4.

Picture 10: Looking east at pinholes in web of south cantilever bracket at L4.

Picture 11: Bent south cantilever bracket.

Truss Member Cover Plates - Steel cover plates at the sidewalk level protect the truss members at each lower chord panel point. The cover plates have minor active rust at the bottom next to the sidewalk. The cover plates at L3 of the north truss, L6 of the north truss and L3 of the south truss are loose. There is ponding next to the cover plate at L6 of the north truss. The cover plate at L0 of the north truss is ¼" higher than the adjacent sidewalk (see Picture 12).

Picture 12: Minor misalignment of plates at L0 on north truss.

**Railing**

| Railing (LF) | Quantity | CS1 | CS2 | CS3 | CS4 |
|---|---|---|---|---|---|
| | 496 | 357 | 137 | 2 | 0 |

Deep Beam Rail and Posts - The roadway railings consist of deep beam rail with steel posts and are in **good** condition. The steel posts are anchored into the concrete sidewalks. The guardrail has minor scratches and rub marks with paint transfer for a majority the north rail and the entirety of the south rail. There is impact damage with a hole in the railing at L4 on the north railing (see Picture 6) . The reflectors have broken off the steel tubes in Panel 1 of the north truss, Panel 3 of the south truss, and Panel 9 of the north truss. There is minor active rust at the steel tube connections and base plate anchor bolts. There are minor surface rust spots appearing on the top of the steel tube railing.

Steel Panel and Post Pedestrian Railing - The sidewalk pedestrian railing is original. The sidewalk pedestrian railing is generally in good condition with some deficiencies. A portion of the pedestrian railing was replaced at the southeast approach during the 2012 rehabilitation project. The 2012 rehabilitation also tightened loose post caps on the pedestrian railing, and replaced angles connecting the bottom pedestrian railing to the posts.

The bolt is missing from the connection at the top rail and post (see Picture 13) at 3 locations on the south pedestrian railing and 10 locations on the north pedestrian railing.

Picture 13: Missing bolt in connection plate.

The top rail connection plate to the post is cracked or broken at 8 locations on the south pedestrian railing and 3 locations on the north pedestrian railing. There are 15 bent vertical rails on the south pedestrian railing and 13 bent vertical rails on the north pedestrian railing (see Picture 14). Many of the vertical rails have section loss at the bottom connection (see Picture 14). The south pedestrian railing section loss is worse (up to 50% section loss).

There is a broken nut on the top rail connection to the post of the south pedestrian railing at Truss Panel 4. The top rail has missing bolts at the connection to the post on the south pedestrian railing at Truss Panels 2 and 5. There is section loss with holes in the steel post connection to the stringer at L8 of the south truss on the west side (see Picture 15). There is some pitting on the bottom of pedestrian railing posts at the connections to the fascia sidewalk stringers at other locations.

Picture 14: Bent vertical rails on pedestrian railing and section loss at bottom vertical rails.

Picture 15: South truss L8 pedestrian post connection to stringer on west side.

There are concrete posts on the approaches that connect to the pedestrian railing. The posts have access panels for the electric. The concrete posts have minor cracks. The access panel is dented at the southwest corner. Flower boxes decorate the pedestrian railing of both trusses. Sprinkler hoses are connected to the pedestrian railing to water the flowers. The sprinkler hose is loose on the south pedestrian railing and some flower boxes are missing from the south pedestrian railing.

**Drainage**

| 815-Drainage (EA) | Quantity | CS1 | CS2 | CS3 | CS4 |
|---|---|---|---|---|---|
| | 12 | 6 | 6 | 0 | 0 |

The drainage system is in **fair** condition. The roadway surface is crowned. Scuppers collect the water run-off and deposit it below deck through downspouts. There are 6 scuppers along each curb. Six of the 12 scuppers are partially plugged (approximate blockage for 30% of area). There is minor ponding and debris along the curbs (see Picture 16).

Picture 16: Evidence of ponding along south curb near L8 and partially blocked scupper.

**Expansion Joint**

| 300-Strip Seal | Quantity | CS1 | CS2 | CS3 | CS4 |
|---|---|---|---|---|---|
| Expansion Joint (LF) | 108 | 108 | 0 | 0 | 0 |

The expansion joints are rated in **excellent** condition. Both the expansion joint at the west end of the truss and the compression seal at the east end of the truss were replaced during the 2021 rehab project.

Expansion Joint - The roadway expansion joint is located at the rear abutment. The joint opening was measured to be: 1-3/8" between the steel plates at both curbs at 80 degrees (see Picture 17).

Picture 17: Expansion joint opening at rear abutment at north curb.

Compression Seals - A compression seal is located between the deck at forward abutment and the forward approach slab (see Picture 18).

Picture 18: Forward compression seal.

## SUPERSTRUCTURE ITEMS

The superstructure is rated a **6 - fair** condition.

The individual items are rated as follows:

| Component | Condition |
|---|---|
| Alignment | Good |
| Stringers | Good |
| Floorbeams | Fair |
| Truss | Fair |
| Truss Gusset Plate | Poor |
| Lateral Bracing | Good |
| Sway Bracing | Fair |
| Bearing Devices | Poor |
| Protective Coating System | Good |

### Alignment

The alignment was inspected by sighting down both truss lines from the ground and from the manlift from both ends of the structure. The alignment is **good**.

### Stringers

| 113-Steel Stringer (LF) | Quantity | CS1 | CS2 | CS3 | CS4 |
|---|---|---|---|---|---|
| | 2430 | 2366 | 61 | 3 | 0 |

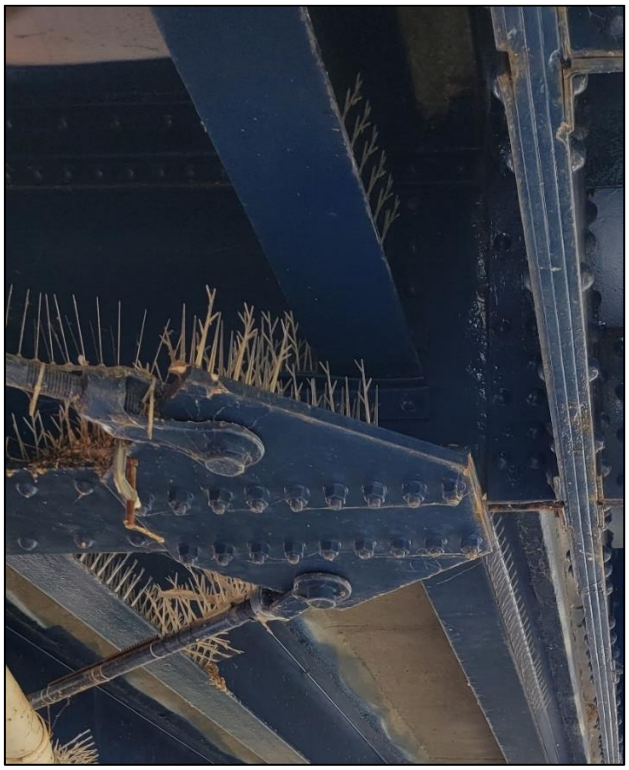
The stringers are in **good** condition with only minor corrosion. The stringers are simple span rolled sections connected to the floorbeam webs with riveted angles. There are a few small localized areas with active rust. The active rust is located at a few stringer bottom flanges at the floorbeams, and along the top flanges of Stringer 10 near the rear abutment and Stringer 1 near the forward abutment. There is pitting in stringer webs and the top of the bottom flanges with a maximum of 15% section loss. Approximately 5 stringer bottom flanges are bent at the floorbeam connections (see Picture 19). One stringer top flange is bent at the floorbeam connection. One stringer has dings in the bottom flange. These minor deficiencies are most likely from original construction. About 4 stringers have small holes in the bottom flange at the floorbeam connection and one stringer has small holes in the web at the floorbeam connection (see Picture 20).

Picture 19: Typical bent stringer connection and support angle.

Picture 20: Looking south at Stringer 1 on the east side of Floorbeam 6.

Approximately 23 stringers are not seated on the support angles. The stringer and floorbeam connections were rated in 2015, and found that the support angles are not needed to safely carry loads. The support angles were likely installed to temporarily support the stringers while the web connections were made. There are approximately 15 stringer support angles that are bent and have section loss (see Picture 21). There are pigeons and swallows nesting on the bridge. Pigeon spikes have been installed on the stringer bottom flanges (see Picture 22) over the boats docked at each side of the channel, but this has not fully deterred birds from nesting.

Picture 21: Floorbeam 5 truss connection plate; also, the stringer is not seated on the seat angle.



Picture 22: South lateral bracing connection angle of Floorbeam 7; note the pigeon spikes.

## Floorbeams

| 152-Steel Floorbeam (LF) | Quantity | CS1 | CS2 | CS3 | CS4 |
|---|---|---|---|---|---|
| | 374 | 326 | 42 | 6 | 0 |

The floorbeams and the floorbeam connections are in **fair** condition. The floorbeams span between the north and south truss verticals. The interior floorbeams (1-8) are built-up riveted steel members from original construction (see Picture 23). The end floorbeams (0 and 9) are built-up welded steel members installed in 1986. The floorbeam connections to the verticals are riveted angles. There is some minor active rust at the floorbeam connections. There is some pitting and section loss (up to 20%) in the floorbeams and the floorbeam connections near the verticals (see Picture 21). A few of the connection angles are bent due to pack rust. A few connection angles have small holes. Two floorbeams have holes in the bottom flange near the connection to the lower lateral bracing. There is one location with holes in the fill plate between the vertical and the gusset plate at the top two rivets of the floorbeam connection to the vertical. The top two rivets are not engaged. One location has a hole in the floorbeam web at the top two rivet connections to vertical. The condition of the floorbeam web between the connection angles could not be determined.

Picture 23: Typical floor system layout.

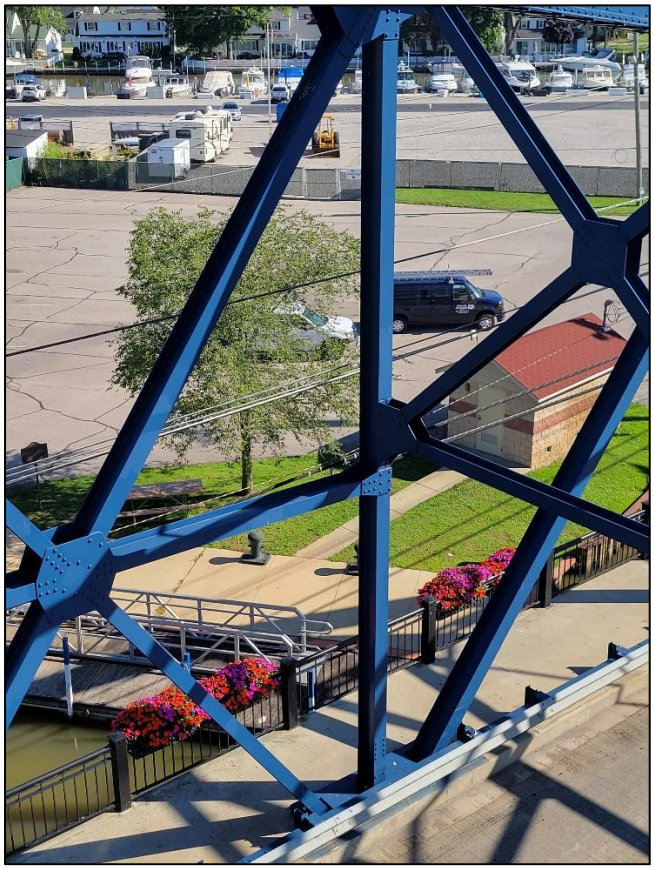
**Truss**

| 120-Steel Truss (LF) | Quantity | CS1 | CS2 | CS3 | CS4 |
|---|---|---|---|---|---|
| | 486 | 27 | 378 | 81 | 0 |

The overall truss is in **fair** condition. The truss is made up of an upper chord, a lower chord, verticals, and diagonals. The upper and lower chords comprise built up riveted members and the verticals and diagonals are rolled sections.

Truss Verticals

The verticals are rolled steel sections. The truss verticals are in **fair** condition having minor section loss (see Picture 24) and pitting in areas outside of the splash zone. There is pitting on the end verticals at the original end portal connection locations. The end portals were raised to increase vertical clearance in 1986. There is pitting at locations of the original pipe rail connections located above the deep beam guardrail. The truss verticals have pitting with section loss (approximately 10% of web area) in the splash zone (see Picture 25). Plates have been added to the bottom of the vertical webs at L2U2 of the south truss, L8U8 of the north truss, and L8U8 of the south truss. Vertical L6U6 on the north truss has a hole on the south side of the web in the splash zone The vertical connections to floorbeams have minor section loss and pack rust.



Picture 24: Looking northeast at L5U5 of north truss.

Picture 25: L8U8 of the north truss typical pitting in splash zone.

Truss Diagonals

Truss Diagonals - The truss diagonals are in **fair** condition. The diagonals are rolled steel sections (see Picture 26). The truss diagonals and their connections have minor section loss and pitting in areas outside of the splash zone. There is pitting at locations of the original pipe rail connections located above the deep beam guardrail. The truss diagonals have pitting with section loss (approximately 10% of web area) in the splash zone (see Picture 27). There are holes and deep pitting in the webs of L3U4 of the south truss, L4U5 of the south truss, and L6U5 of the north truss. L6U7 of the south truss and L7U8 of the south truss have section loss and holes in the web at the bottom of the diagonal. Plates have been added to the bottom of the diagonal webs at L3U2 of the south truss, L5U4 of the south truss, and L6U5 of the south truss. The fill plates between the diagonals and the lower chord gusset plates have section loss with minor active rust, some of the fill plates are bent, and rivets are not engaged at some locations. U4L5 of the north truss has minor misalignment of flanges (see Picture 28).

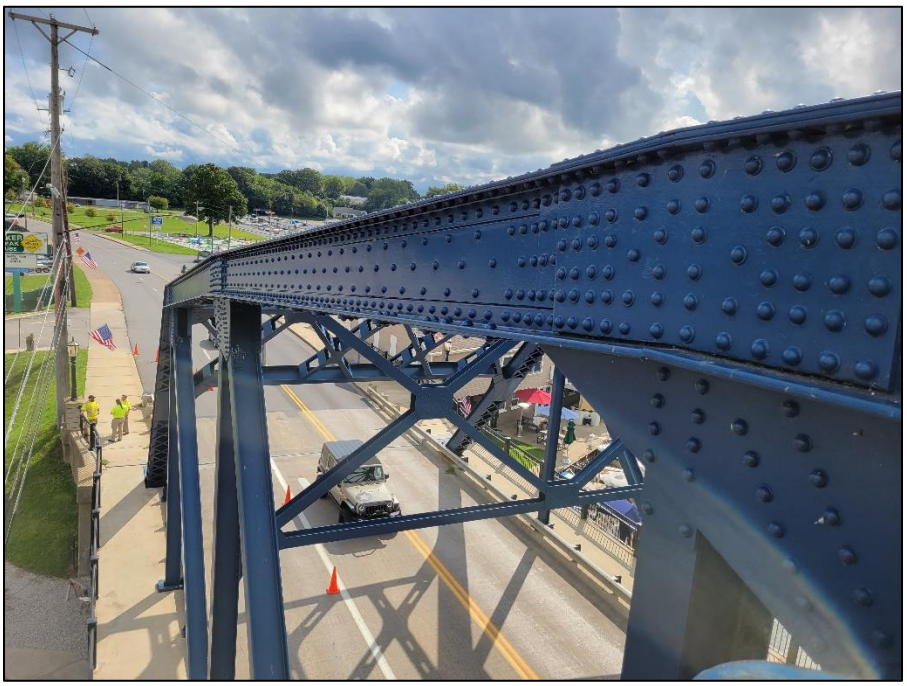
Picture 26: Typical X-diagonal (Panel 6 of north truss).

Picture 27: Reactivated pitting at the bottom of L7U8 of the south truss.

Picture 28: Minor waviness of north flange of U4L5 of the north truss.

Truss Upper Chord

The truss upper chords are in **fair** condition. The upper chords are built-up riveted members made of plates and angles (see Picture 29). The upper chord members have minor pitting in the webs. There is minor pitting and section loss at the connections to the portals and sway bracing. There are dents from original construction in the top flange of the upper chord at U1U2 of the north truss (see Picture 30), U3U4 of the south truss, U5U6 of the north truss, U6U7 of the south truss, U7U8 of the south truss, and U8U9 of the south truss. There is active rust at a small hole in the web of U6U7 of the south truss. The upper chord has several bent lacing bars. The bottom flanges of U2 of the south truss and U5 of the north truss have ¼" offset from original construction.

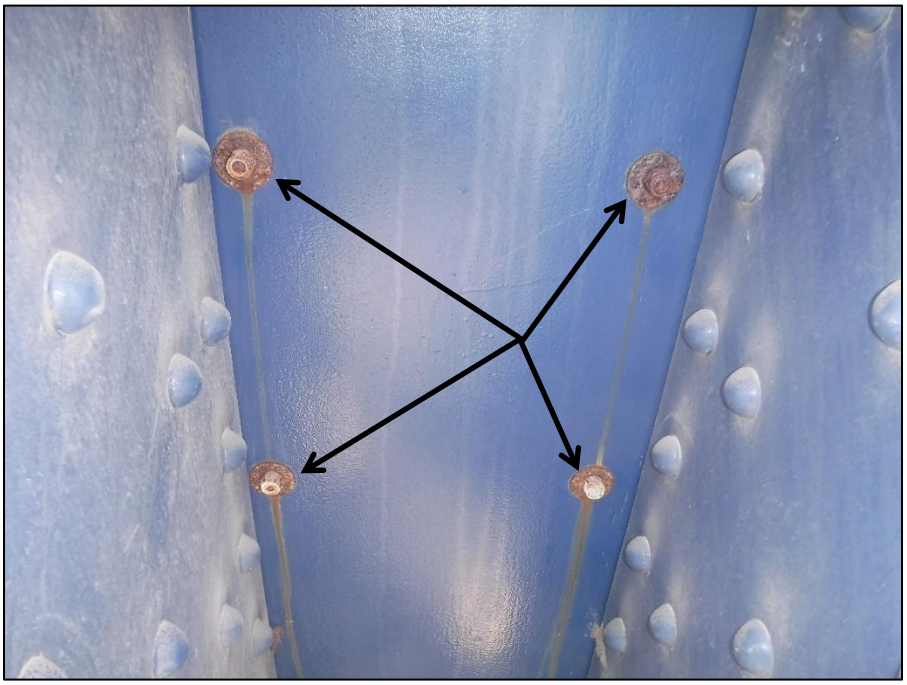


Picture 29: U6 of the north truss looking east.

Picture 30: Dent in the top flange of U1U2 of the north truss.

End Posts - The end posts are built-up riveted members made of plates and angles. The end posts have minor section loss, pitting and pack rust in the splash zone and a few other localized areas. There is pitting at locations of the original pipe rail connections located above the deep beam guardrail (see Picture 31). The end posts have minor active rust at the web to flange connections. The batten plates near the lower chord have section loss with holes at L0U1 of the north truss and L9U8 of the south truss. Several lacing bars at each end post are bent. Some of the angles at the bottom of the end posts are bent due to pack rust. There are sections of the upper flange where the sign connections bolts are rusting through the plate (see Picture 32).

Picture 31: Looking at L0U1 of the north truss.



Picture 32: Rusted sign connection bolts inside end post.

Truss Lower Chord

The truss lower chords are in **poor** condition. The lower chords are built-up riveted members made of plates on each side with diaphragms in between. The lower chords typically have minor pitting and section loss except at the gusset plate connections. There is minor active rust at some of the gusset plate connections.

Lower chord members L3L4 and L5L6 are made up of 4 plates on each side - three 15"x$^{3}/_{4}$" plates and one 15"x$^{5}/_{16}$" plate. Lower chord member L4L5 are made up of 4 plates on each side - three 15"x$^{3}/_{4}$" and one 15"x$^{1}/_{2}$" plate. The thinner plates are on the insides of the member. There are holes in the inner lower chord web plates on L2L3 of the north truss, L3L4 of the south truss, L4L5 of the north truss, L5L6 of the north truss, and L6L7 of the south truss. Similarly the exterior plates near the gusset plate connections are thinner and have reactivated pack rust (see Picture 33).

Picture 33: Holes in north inside plate of L5L6 at L6 of south truss.

The lower chord is wavy from pack rust at L2L3 of the north truss, L3L4 of the north truss, L3L4 of the south truss (see Picture 34), L4L5 of the north truss, L5L6 of the north truss, and L5L6 of the south truss due to the thin plates on the insides of the member. Several of the diaphragm angles have pack rust causing bulges in the angles and have minor active rust. There is a hole in the diaphragm at L7 of the north truss.

Picture 34: Pack rust in between plates of L3L4 of the south truss.

The lower chord stiffener angles behind the bearings have bends likely due to construction or rehabilitation. There is minor section loss in lower chord at the abutments where water and debris get through at the curb joints.

**Truss Gusset Plate**

| 162-Steel Gusset Plate | Quantity | CS1 | CS2 | CS3 | CS4 |
|---|---|---|---|---|---|
| (EA) | 84 | 43 | 19 | 19 | 3 |

The truss gusset plates are in **poor** condition. The gusset plates were rated in 2009 by Wilbur Smith Associates based on field measured gusset plate thicknesses. The rating included section loss measured in the field and determined that the gusset plates have sufficient capacity. The section loss in the gusset plates has not increased since 2009. Bowing due to pack rust at the lower chord gusset plates governed the rating of the gusset plates on this bridge.

Bowing due to member misalignment were found by placing a straight edge along the free edge from where the gusset plate and members meet and measuring the maximum offset of the gusset plate. The size of the pack rust bows were found by measuring the gap created by pack rust between the gusset plate and member (or the fill plate if between the member and gusset plate).

Picture 35: North face of gusset plate at U7.

The lower chord gusset plates have section loss, minor active rust and bows due to pack rust or misalignment. The lower chord gusset plate thicknesses are ½" except at L0 and L9 where the gusset plate thicknesses are ¾". There is a maximum bow of ½" due to pack rust. See the following table for locations with bows:

| Gusset Plate Bows | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Truss | Panel Point | Gusset Plate Inside/Outside | Plate th. (in) | Misalignment or Pack Rust | Bowing 2014 | Bowing 2016 | Bowing 2022 | Location |
| North | L1 | Outside | 1/2" | Misalignment | < 1/4" | 1/8" | 1/8" | West Edge |
| North | L2 | Outside | 1/2" | Pack Rust | < 1/4" | 1/4" | 1/4" | West Edge |
| North | L2 | Inside | 1/2" | Pack Rust | < 1/4" | 3/16" | 3/16" | West Edge |
| North | L4 | Outside | 1/2" | Pack Rust | 1/2" | 1/2" | 1/2" | East Edge |
| North | L4 | Inside | 1/2" | Pack Rust | 1/2" | 3/8" | 3/8" | Top Edge |
| North | L5 | Outside | 1/2" | Pack Rust | - | 1/4" | 1/4" | West Edge |
| North | L5 | Inside | 1/2" | Pack Rust | < 1/4" | 3/16" | 1/4" | West Edge |
| North | L7 | Outside | 1/2" | Pack Rust | 1/2" | 1/2" | 1/2" | East Edge |
| North | L7 | Outside | 1/2" | Pack Rust | < 1/4" | 1/8" | 1/8" | Top Edge |
| North | L7 | Inside | 1/2" | Pack Rust | 3/8" | 3/8" | 3/8" | East Edge |
| North | L7 | Inside | 1/2" | Pack Rust | < 1/4" | 3/16" | 3/16" | West Edge |
| North | L7 | Inside | 1/2" | Pack Rust | < 1/4" | 1/8" | 1/8" | Top Edge |
| North | L8 | Outside | 1/2" | Misalignment | - | 1/16" | 1/16" | West Edge |
| North | L8 | Outside | 1/2" | Misalignment | - | 1/16" | 1/16" | East Edge |
| South | L1 | Inside | 1/2" | Pack Rust | - | 1/4" | 1/4" | East Edge |
| South | L2 | Outside | 1/2" | Pack Rust | - | 3/16" | 3/16" | East Edge |
| South | L2 | Inside | 1/2" | Pack Rust | < 1/4" | 1/4" | 3/16" | East Edge |
| South | L4 | Outside | 1/2" | Pack Rust | < 1/4" | 1/4" | 3/8" | East Edge |
| South | L4 | Inside | 1/2" | Pack Rust | 1/2" | 7/16" | 7/16" | East Edge |
| South | L5 | Outside | 1/2" | Pack Rust | 3/8" | 3/8" | 3/8" | West Edge |
| South | L5 | Inside | 1/2" | Pack Rust | < 1/4" | 5/16" | 5/16" | West Edge |
| South | L6 | Inside | 1/2" | Pack Rust | 3/8" | 1/4" | 1/4" | East Edge |
| South | L7 | Outside | 1/2" | Pack Rust | < 1/4" | 3/16" | 3/16" | West Edge |
| South | L7 | Inside | 1/2" | Pack Rust | - | 5/16" | 5/16" | East Edge |
| South | U8 | Inside | 1/2" | Misalignment | - | - | 1/4" | Bottom Edge |
| South | U8 | Outside | 1/2" | Misalignment | - | - | 1/4" | Bottom Edge |

The outside gusset plates at L1 and L8 of the north truss, and both inside and outside gusset plates of U8 of the south truss, are the only gusset plates that have slight bows due to misalignment. The remaining gusset plates listed in the table above have bows due to pack rust.

There is an approximate $^{3}/_{8}$" bow on the top edge of the outside gusset plate at M4.5 of the north truss, which connects the center of diagonals L4U5 and L5U4.

Picture 36: Pack Rust Bowing at L4 South Truss Inside Gusset Plate

There is a hole on the inside gusset plates of L5 and L6 of the south truss on the east side of the floorbeam connection (see Picture 37). There are 2 holes on inside gusset plate of L4 of the south truss on the west side of the floorbeam connection.

Picture 37: Looking at a rust hole through the inside gusset plate of L6 of the south truss.

There is deep pitting of the inside gusset plates at L4 (see Picture 38), L5, and L6 of the south truss and up to 50% previous section loss over 30-50% of the plate area. The inside gusset plate at L2 of the south truss has pitting and about 20% section loss. All other gusset plates have minor pitting and less than 15% section loss.

Picture 38: Looking at outside gusset plate of L4 of the south truss.

Angles were added to the gusset plate edges during the 2012 repair project at the following locations: U1 of the north truss, U1 of the south truss, U2 of the north truss, U2 of the south truss, U7 of the north truss, U7 of the south truss, U8 of the north truss, U8 of the south truss, L4 of the south truss, L5 of the south truss, and L6 of the south truss. The angle locations correspond to the rehabilitation plan details and are listed in the table under section “Construction and Maintenance History”.

## Lateral Bracing

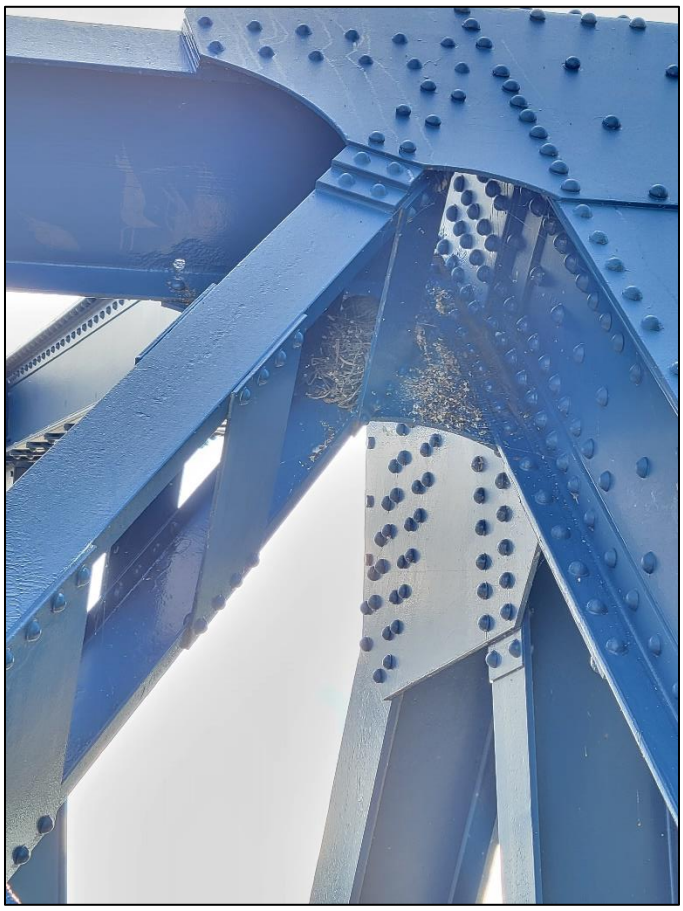
The lateral bracing is rated in **good** condition. The upper lateral bracing has minor deformation in the connection plates due to pack rust. The pack rust at the connection plates has been removed but not caulked in some areas. The members from U3 of the north truss to U4 of the south truss are bowed (see Picture 39).

Picture 39: Looking at upper lateral bracing from U3N to U4S.

The lower lateral bracing has one bent rod in Panel 7 at the southwest corner, one connection hanger broken in Panel 7 and one bent connection hanger in Panel 9.

## Sway Bracing

The sway bracing is in **fair** condition. The portals have minor pitting and minor section loss at connections. The sway bracing has minor pitting and section loss. Approximately 15 sway brace connection plates have minor deformation due to pack rust.



Picture 40: Pigeon presence on portal at U1 of the south truss.

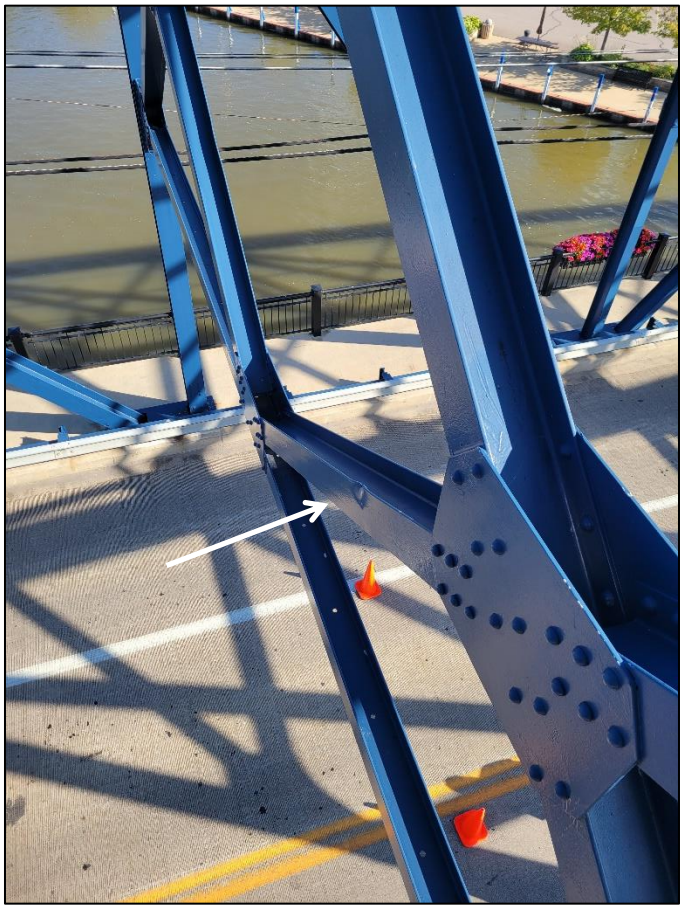
The sway braces and their connections to the upper chord have pitting and section loss (see Picture 41). See the following table for locations with holes:

| Holes in Sway Bracing | |
|---|---|
| **Panel Point** | **Location** |
| 3 | Web of Top Brace at U3 South |
| 5 | Angle Connection at U5 South |
| 6 | Angle Connection to U6 North |
| 6 | Angle Connection at U6 South |
| 8 | Web of Top Brace at U8 South |

Picture 41: Looking west at sway brace connection to U6 of the south truss.

Several sway bracing members and gussets are bent (see Picture 42). The damage appears to be from original construction. See the following table for locations of sway bracing members with bends:

| Sway Bracing Bends in Members | |
|---|---|
| **Panel Point** | **Location** |
| 2 | Flange at Middle of Lower Brace |
| 2 | Flange of Lower Diagonal Eastbound Lane |
| 2 | Web of Upper Diagonal Eastbound Lane |
| 5 | Flange of Lower Diagonal Westbound Lane |
| 5 | Middle Gusset Westbound Lane |
| 5 | Flange of Upper Diagonal Westbound Lane |
| 7 | Flange of Lower Brace Westbound Lane |
| 7 | Flange of Upper Diagonal Westbound Lane |



Picture 42: Dent in flange of lower diagonal sway bracing at PP5.

**Bearing Devices**

| 311-Movable Bearing (EA) | Quantity | CS1 | CS2 | CS3 | CS4 |
|---|---|---|---|---|---|
| | 2 | 0 | 0 | 2 | 0 |

| 313-Fixed Bearing (EA) | Quantity | CS1 | CS2 | CS3 | CS4 |
|---|---|---|---|---|---|
| | 2 | 0 | 2 | 0 | 0 |

The movable bearings at the rear end of the structure are in **poor** condition and the fixed bearings at the forward end are in **fair** condition. The rear abutment bearings are elastomeric pads and rocker type (see Pictures 43 and 44). The forward abutment bearings are bolster type (see Picture 45). The north rocker bearing at the rear abutment has a 19.50-degree tilt towards the backwall at 80 degrees Fahrenheit (see Picture 43). The south rocker bearing at the rear abutment has a 17.00-degree tilt towards the backwall at 80 degrees Fahrenheit. The rear abutment elastomeric bearings have a horizontal deformation toward the backwall (see table below & Picture 43). The horizontal deformation difference is found by measuring the distance from front face of the rear abutment to the top and bottom of each edge of the elastomers.

| L0 Elastomeric Bearings Top to Bottom Difference | | | | | |
|---|---|---|---|---|---|
| **Truss** | **Edge** | **2014** | **2016** | **2020** | **2022** |
| North | Outside | 1 1/4" | 1 5/8" | 1 3/16" | 1 3/8" |
| North | Inside | 1 1/8" | 1 3/8" | | 1 1/2" |
| South | Inside | 1 3/16" | 1 5/16" | 1 5/16" | 1 5/16" |
| South | Outside | 1 3/16" | 1 1/2" | | 1 5/16" |

Picture 43: North elastomeric bearing on rear abutment.

Picture 44: North side of north bearing at rear abutment.

Picture 45: South bearing (bolster) on forward abutment.

There is minor active rust at the north bearing pin on the south nut on the forward abutment. There is minor pitting on the bearings where water and debris get through the curbs. There is a nut missing at the forward abutment south bearing on the northeast corner. There are loose bearing anchor nuts at several locations. See the following table for locations of loose bearing nuts:

| Loose Bearing Nuts | | |
|---|---|---|
| **Truss** | **Abutment** | **Location** |
| South | Rear | Northwest |
| North | Forward | Southeast |
| South | Forward | Southeast |
| South | Forward | Southwest |

Measurements were taken from the back of the truss at the west (expansion) end to the backwall to help gauge if movement to the backwall is the measurements are as follows.

| Backwall Measurements of Expansion Bearing (Rear) | | | |
|---|---|---|---|
| **Truss** | **Side** | **Backwall to bearing plate** | **Backwall to back of gusset** |
| South | South | 1 1/2" | 2 1/2" |
| North | North | 2" | 2 3/4" |

**Protective Coating System**

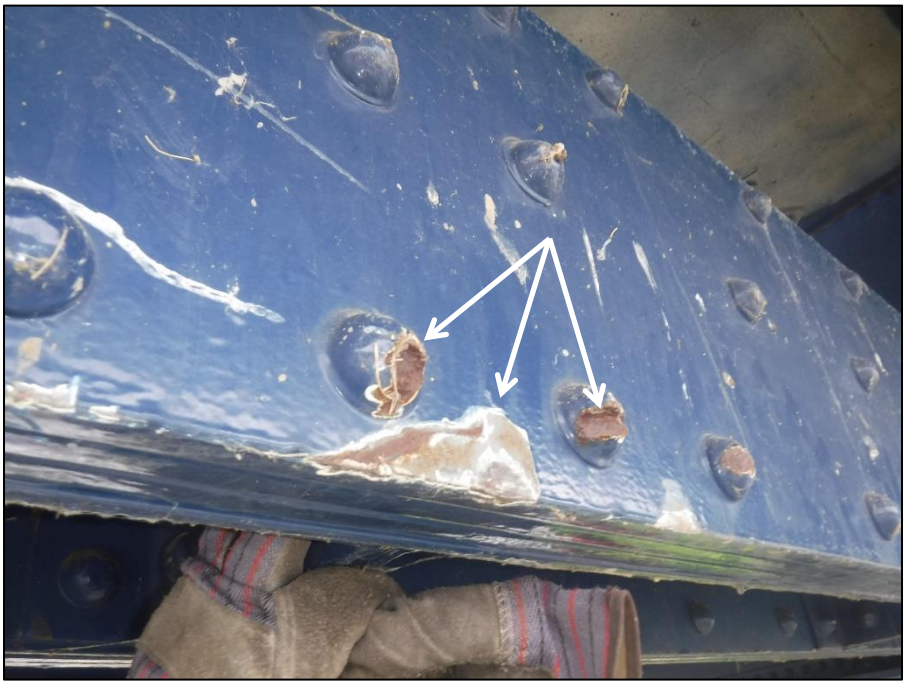
| | |
|---|---|
| 515-Steel Protective Coating (SF) | Item 515 is broken up by element<br>For specific element breakdowns see Appendix B (element section) |

The paint is in **good** condition. The entire structure was cleaned and painted according to OZEU paint specifications in 2012.

The paint system has good coverage with no major defects overall. Typical locations of minor corrosion include the guardrail post base plate anchor bolts, the tube of the deep beam railing, the stringer connections to the floorbeams, the floorbeam connections to the trusses (see Picture 46), the ends of the fascia sidewalk stringers at abutments, the end posts, the web plate U6U7 of the south truss with a small hole, the lower chord diaphragm connections, the lower chord gusset plate connections, the holes in the lower chord, and the bearing pin nuts.

There is chipped paint or minor scrapes in the paint is typical on both the diagonals and verticals from roadway and sidewalk impacts, and on the lower chord due to minor impacts from boats (see Picture 47). There are chips and dings in the paint at L0U1 of the north truss, L6U7 of the north truss, L9U8 of the north truss, deep beam railing bolt in Panel 4, the pedestrian railing, the sway brace at Panel Point 2 and the lower gusset plate connection to the north truss.

Picture 46: Floorbeam connection at L2 of the north truss.



Picture 47: Looking at south face of L5L6 of the south truss.

There are a few areas with localized excess paint or overspray. There is one location that appears to have been sand blasted, but not cleaned before painting; the length is about 6 feet along the west face of L8U8 of the south truss.

## SUBSTRUCTURE ITEMS

The substructure summary is a **5**, meaning that it is in **fair** condition.

The individual items are rated as follows:

| Component | Condition |
|---|---|
| Abutment Walls | Fair |
| Backwalls | Good |
| Wingwalls | Fair |
| Scour | Good |
| Slope Protection | Good |

### Abutment Walls

| 215 Reinforced Concrete Abutment (LF) | Quantity | CS1 | CS2 | CS3 | CS4 |
|---|---|---|---|---|---|
| | 189 | 0 | 174 | 15 | 0 |

The abutments walls are in **fair** condition. The abutments are reinforced concrete cantilever type with timber piles.

The rear abutment is leaning $^{3}/_{8}$" away from the river for every 4 feet vertical. The rear abutment breastwall has delaminations, minor spalls, cracks, and efflorescence (see Picture 48). The rear abutment breastwall has 15.0 square feet of spalls and delaminations.

Picture 48: Rear abutment.

The forward abutment is leaning $^{3}/_{8}$" towards the river for every 4 feet vertical. The forward abutment breastwall has cracks, efflorescence and spalls with exposed reinforcing steel (see Picture 49). The forward abutment breastwall has 30.5 square feet of delamination.

Picture 49: Forward abutment.

**Backwalls**

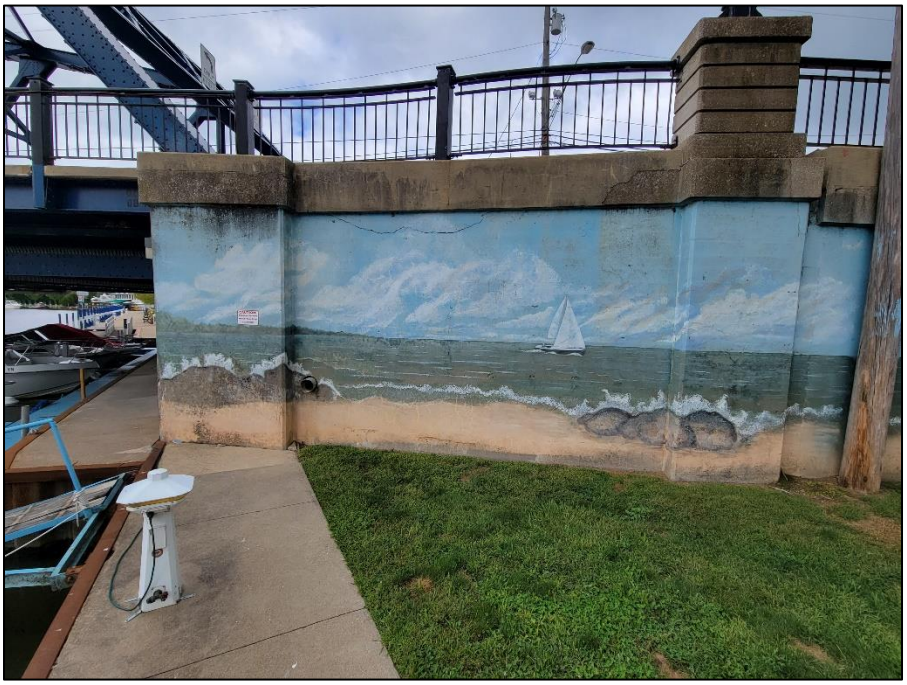
| Backwalls (LF) | Quantity | CS1 | CS2 | CS3 | CS4 |
|---|---|---|---|---|---|
| | 109 | 107 | 1 | 1 | 0 |

The backwalls are in **good** condition. The backwalls have minor vertical cracks and rust staining. There are a few locations of minor saturation to the cracks primarily near the bearings. The rear abutment backwall has a small delamination at the north end near the top. The forward abutment backwall has a small delamination at the south end near the top.

There are multiple locations along the length of each backwall with four dowel holes that have been filled in. There is no delamination at the dowel hole locations.

**Wingwalls**

The wingwalls are in **fair** condition. The approach sidewalks at all corners have settled. This may be caused by the loss of fill from behind the wingwalls. There are a few spalls with exposed reinforcing on the backs of the southwest wingwall next to the seat. The southwest wingwall has 1.75 square feet of delamination. The southeast wingwall has a mural (See Picture 50). The southeast wingwall has map cracking, a few small delaminations and one long crack at the top. The seal in the joint between the southeast wingwall and the retaining wall to the east has deteriorated and is mostly gone. The northeast and northwest wingwalls have minor cracks (see Picture 51).



Picture 50: Southeast wingwall.

Picture 51: Northeast wingwall.

**Scour**

Scour is rated **good** for this structure. The abutments have soil in front of them for ten to twenty feet. Sheet piling retains the soil in front of the abutments. There is no scour at the abutments. The sheet piling was not probed for scour due to the depth of water.

**Slope Protection**

Slope protection for this bridge is in **good** condition. The rear abutment slope has crushed aggregate slope protection and vegetation. Sheet piling retains the soil in front of the rear abutment. There are several deep ruts leading to the sheet piling. The forward abutment slope has crushed aggregate slope protection and concrete sidewalks. Sheet piling retains the soil in front of the forward abutment all of the slope protection measures on the forward end of the structure is in good condition.

Picture 52: Looking east at forward abutment slope protection.

## CHANNEL ITEMS

The channel summary is a **7**, meaning that it is in **good** condition. The existing channel of the Vermilion River is navigable for small boats and allows access to Lake Erie located north of the structure.

The individual items are rated as follows:

| Component | Condition |
|---|---|
| Alignment | Good |
| Protection | Fair |
| Hydraulic Opening | Good |

### Alignment

The alignment of the Vermilion River is **good**. No deficiencies are noted.

Picture 53: Looking downstream (north).

Picture 54: Looking upstream (south).

## Protection

The channel protection of the Vermilion River is **fair**. Steel sheet piling protects the channel banks at the structure, upstream of the structure, and downstream of the structure.

The rear abutment sheet piling is sloped 1.40 degrees towards the water. The ground behind the sheet piling is 6" below the top of the sheet piling. There is a hole and deterioration of the sheet piling at the centerline of the bridge and appears to be the cause of the rutting to the slope protection. There is 10-15% section loss in the rear sheet piling where the ruts in the slope meet the sheet piling. The ruts are discharging water onto the sheet piling and causing deterioration.

The forward abutment sheet piling is sloped 1.45 degrees toward the water. There is minor section loss in the steel sheet piling at the north end.

## Hydraulic Opening

The hydraulic opening of the Vermilion River is **good**. There is no restriction in flow through the channel under the structure.

## APPROACH ITEMS

The approach is in good condition.

The vertical alignment of the roadway consists of an approximate 3.5-percent downhill grade per the 1985 rehabilitation plans.

The horizontal alignment of the roadway is tangent with no skew.

The individual items are rated as follows:

| Component | Condition |
|---|---|
| Approach Wearing Surface | Good |
| Approach Slabs | Good |
| Embankment | Fair |
| Guardrail | Fair |

### Approach Wearing Surface

The approach pavement has a concrete base with a layer of brick and an asphalt overlay. The approach pavement is rated **good**. Both approach wearing surfaces were replaced in the last 2 years (see Picture 55).

Picture 55: Looking southwest at forward approach.

## Approach Slabs

| 321-Reinforced Concrete Approach Slabs (SF) | Quantity | CS1 | CS2 | CS3 | CS4 |
|---|---|---|---|---|---|
| | 1467 | 1454 | 12 | 0 | 0 |

The reinforced concrete approach slabs are in **good** condition. The approach slabs are 20'-0" long, 13" thick reinforced concrete (see Picture 56). The approach slabs have a few small potholes, a 12 square foot patch was added in 2021 to repair a delamination in the eastbound lane on the west approach slab. A portion of the approach slab along both deck joints were replaced during the 2021 joint rehab to fix many small spalls along the joints.

Picture 56: Looking north at rear approach slab.

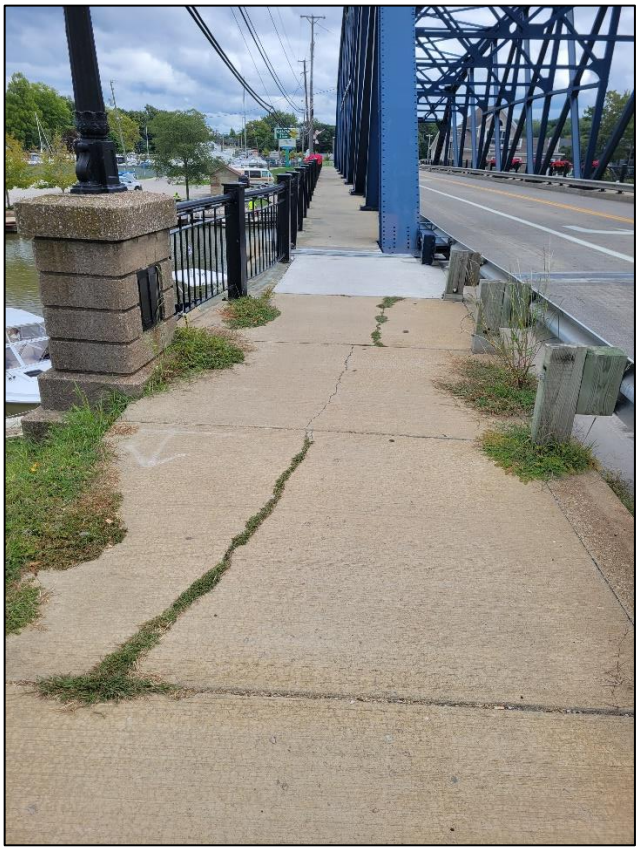
**Embankment**

The embankment for this bridge is rated **fair**. There is minor erosion at the northeast, northwest and southwest corners. The northeast embankment has a hole with a horizontal depth of 2'-5" beginning at the face of the wingwall with approximately 1'-0" undermining of sidewalk (see Picture 57).

Picture 57: Erosion at northeast embankment is beneath sidewalk.

The approach sidewalks are reinforced concrete. There are long cracks on the sidewalk at the northeast, northwest, and southwest corners (see Picture 58). The sidewalks have settlement at all corners. The settlement is up to 1" at the guardrail posts and curbs on the northeast, and northwest approaches The northeast, northwest and southeast approach curbs are cracked. Indicating minor settlement. The first section of approach sidewalk off the bridge on the northwest was replaced during the 2021 rehab to the joint (see Picture 59) along with the curbs at all four corners.

Picture 58: Approach sidewalk cracked at southwest corner.



Picture 59: Northwest approach sidewalk cracked.

## Approach Guardrail

The approach guardrail is rated **fair**. The northeast (see Picture 60) and southwest end terminal assemblies have impact damage. The post connection bolts are loose at the first post off the northwest and southwest corners of the bridge. The end terminal assemblies at the northwest and southwest approaches have loose bearing plates and cables. The first timber post off the northeast approach has a loose timber block. There is minor paint transfer on the guardrail.

Picture 60: End terminal assembly at northeast corner.

## SIGN/UTILITY ITEMS

The individual items are rated as follows:

| Component | Condition |
|---|---|
| Signs | Good |
| Sign Supports | Good |
| Utilities | Good |

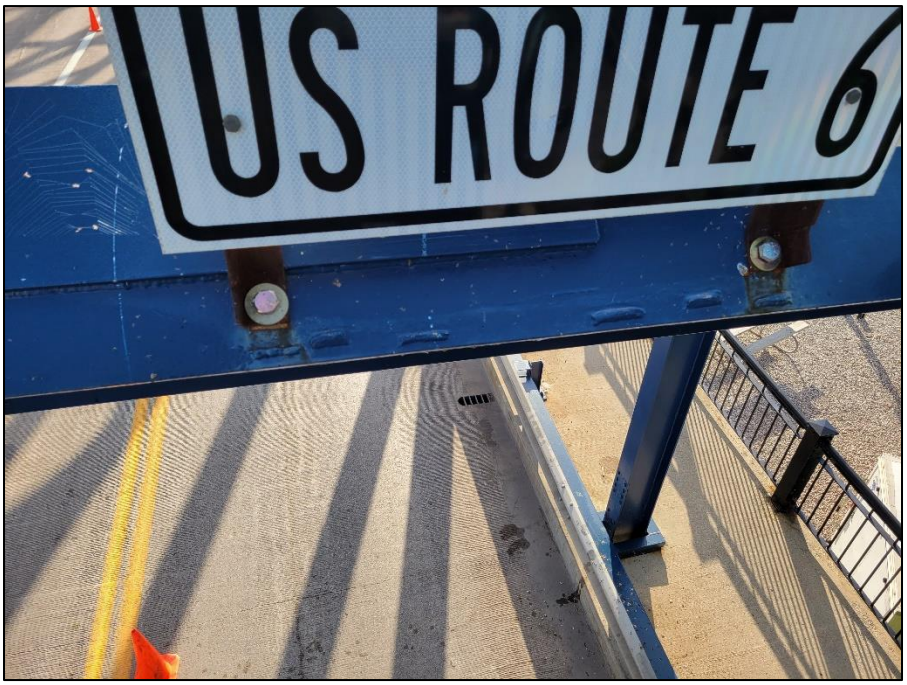
### Signs

The warning signs are rated **good**. There are two signs attached to the east portal over the westbound lane and the turn lane (see Picture 61). There is one sign attached to the west portal over the eastbound lane.


Picture 61: Lane signs on east portal.

## Sign Supports

The sign supports are rated **good**. The sign connections to the truss appear to be fairly new (see Picture 62) and were likely replaced with the 2012 rehabilitation project.

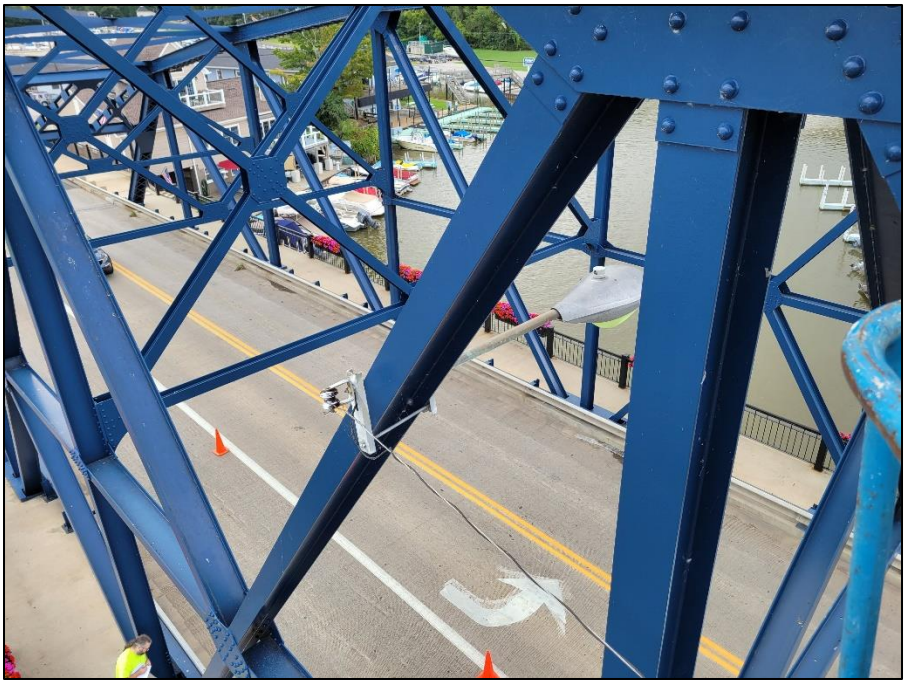



Picture 62: Lane sign support on west portal.

## Utilities

The utilities are rated **good**. The only utility on the bridge that has evidence of being used is the roadway light on the north truss. The other utilities seem to have been abandoned.

There is a light on the north truss over the westbound lane. An electric line runs from the northwest power pole to a connection at U1 of the north truss and then to the lamp attached to L5U4 of the north truss (see Picture 63). The connections to the truss are in good condition. The cover of the photoelectric sensor is located on top of the lamp and is cracked. The light was working during the 2022 field inspection.



Picture 63: Looking southeast at light at L5U4 of the north truss.

There is an electrical conduit supported by the south inside sidewalk stringer. There are clamps holding the conduit along the stringer. One of the clamps is disconnected. There are electric boxes at each corner of the abutments with conduit spanning between them along the backwalls. It appears that the electric was provided to power lighting under the structure at the abutments. There is only one light remaining at the southeast corner and the electric wiring has been disconnected. The utility box in the southwest corner has frayed wires and broken conduit.

There is a watering hose on both the north and south pedestrian railings. It originates at the northeast corner and is connected to the forward abutment to reach both pedestrian railings. It runs along the outside top of the railings to all of the attached flower boxes. There is a broken section of the watering hose along the north pedestrian railing at the east end of the bridge.

## SUBSTRUCTURE MONUMENTATION

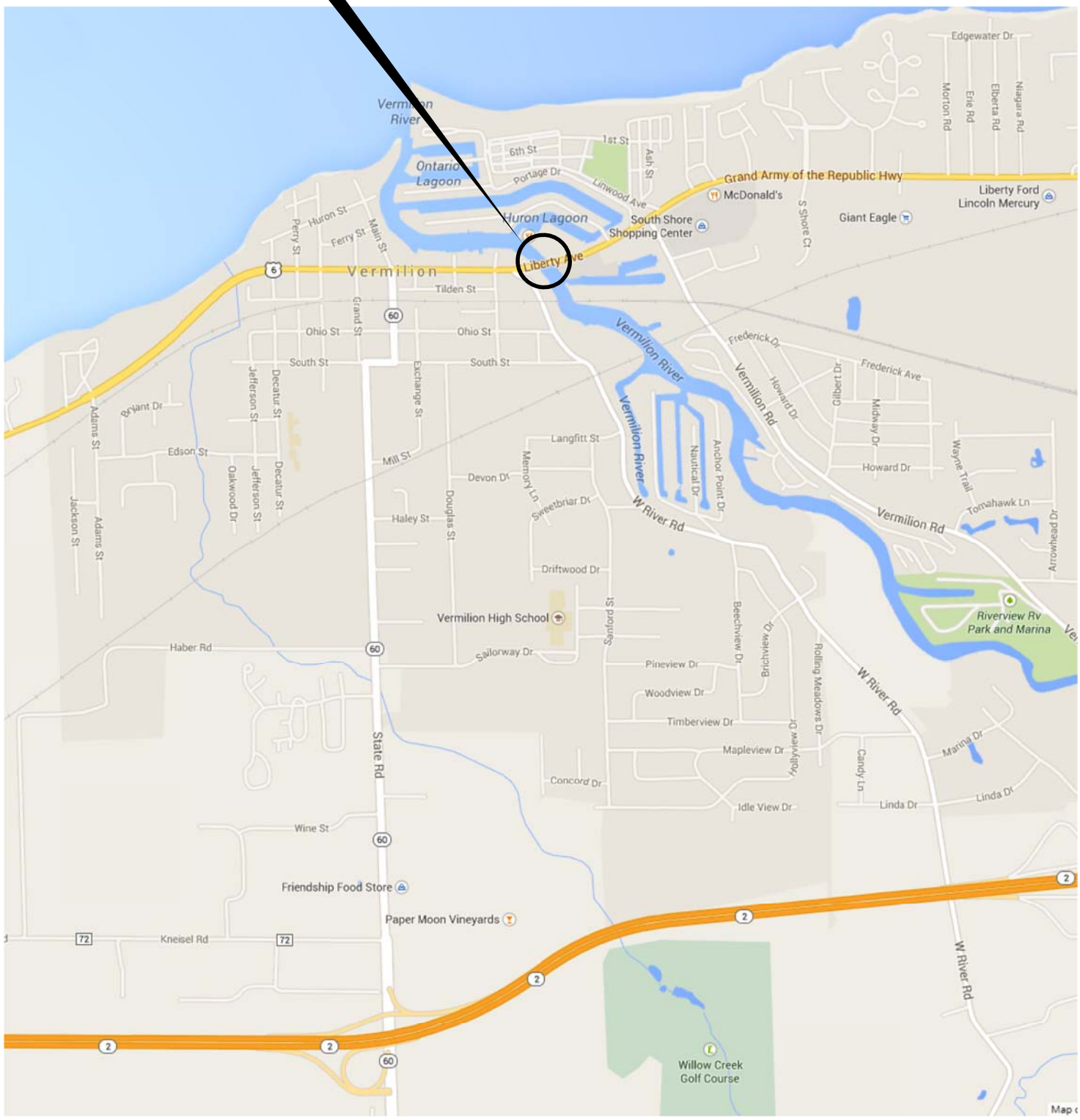
In 2020 both bridge joints were replaced due to the joints being closed and crushing the seals. To investigate the possibility that this joint closure is caused by the substructures moving inward (toward the river), an abutment monitoring program was initiated in 2022.

The monumentation and monitoring plan presented in Appendix F gives the location of control and monitoring points, the procedure to repeat the measurements, and the initial locations of the measurements taken with respect to the baseline off the structure.

On August 24th, 2022, WPG placed survey monuments and performed a baseline survey for the abutments. WPG returned on December 8th, 2022, to repeat the survey at a different ambient temperature.

# APPENDIX A

# Location Map




LOCATION MAP
PROJECT: ERI-6-28.84 PID 93094

RICHLAND ENGINEERING LIMITED

# APPENDIX B

# Bridge Inspection Field Report

| | | | |
|---|---|---|---|
| **Inspector:** | Cunning,Robert | **Structure Number:** | 2202344 |
| **Inspection Date:** | 09/12/2022 | **Facility Carried:** | USR 6 |

**Bridge Inspection Report**

# Ohio Bridge Inspection Summary Report

# ERI-00006-2893 (2202344)

| | | | |
|---|---|---|---|
| 2: District | District 03 79716 - VERMILION (ERI & LOR county) | 5A: Inventory Route | 1 00006 |
| 21: Major Maint A/B | 01 - State Highway Agency / | 7: Facility On | USR 6 |
| 225 Routine Main A/B | 04 - City or Municipal Highway Agency / | 6: Feature Ints | VERMILION RIVER |
| 221 Inspection A/B | 01 - State Highway Agency / | 9: Location | .60 MI W LOR. CO. LINE |
| 220: Inv. Location | DISTRICT 03 | Lat, Lon | 41.422192 ,-82.358766 |

## Condition

| | |
|---|---|
| **58: Deck** | **6 - Satisfactory Condition** |
| 58.01 Wearing Surface | 6 - Satisfactory (1-10% distress) |
| 58.02 Joint | 9- Excellent |
| **59: Superstructure** | **5 - Fair Condition** |
| 59.01 Paint & PCS | 7 - Good (1-5% corr.) |
| **60: Substructure** | **5 - Fair Condition** |
| **61: Channel** | **7** |
| **61.01 Scour** | **7 - Good** |
| **62: Culverts** | **N - Not Applicable** |
| **67.01 GA** | **5** |

## Appraisal

| | |
|---|---|
| Sufficiency Rating | 45.1 SD/FO 2 - FO |
| 36: Rail, Tr, Gd, Term Std | 1 1 1 1 |
| 72: Approach Alignment | 6 - Equal to present minimum criteria |
| 113: Scour Critical | 9 - Foundations above flood waters |
| 71: Waterway Adequacy | 8 - Bridge Above Approaches |

## Geometric

| | |
|---|---|
| 48: Max Span Length (ft) | 243.0 |
| 49: Structure Length (ft) | 248.1 |
| 52: Deck Width, Out-To-Out (ft) | 36.0 |
| 424: Deck Area (sf) | 8931.6 |
| 32: Appr Roadway Width (ft) | 40.0 |
| 51: Road Width, Curb-Curb (ft) | 35.0 |
| 50A: Curb/SW Width: Left (ft) | 6 |
| 50A: Curb/SW Width: Right (ft) | 6 |
| 34: Skew (deg) | 0 |
| 33: Bridge Median | 0 - No median |
| 54B: Min Vert Underclearance (ft) | 0 |
| 336A: Min Vert Clrnce IR Cardinal (ft) | 14.66 |
| 336B: Min V Clr IR Non-Cardinal (ft) | 0 |
| 578: Culvert Length (ft) | 0 |

## Load Posting

| | |
|---|---|
| 41: Op/Post/Closed | A - Open |
| 70: Posting | 5 - Equal to or above legal loads |
| 70.01: Date | |
| 70.02: Sign Type | |
| 734: Percent Legal (%) | 100 |
| 704: Analysis Date | 02/28/2022 |

## Structure Type

| | |
|---|---|
| 43: Bridge Type | 3 - Steel<br>10 - Truss - Thru<br>N- Not Applicable |
| 45: Spans Main / Approach | 1 / 0 |
| 107: Deck Type | 1 - Concrete Cast-in-Place |
| 408: Composite Deck | N - Non-composite Construction |
| 414A Joint Type 1 | 8 - Elastomeric Strip Seal |
| 414B: Joint Type 2 | 3 - Compression Seal |
| 108A: Wearing Surface | 1 - Monolithic Concrete (concurrently placed with structural deck)<br>N- Not Applicable |
| 422: WS Date | 01/01/1986 |
| 423: WS Thick (in) | 1.0 |
| 482: Protective Coating | 5 - Paint System OZEU |
| 483: PCS Date | 09/01/2012 |
| 453: Bearing Type 1 | 2 - Rockers & Bolsters |
| 455: Bearing Type 2 | N - None |
| 528: Foundn: Abut Fwd | 5 - Timber Piles |
| 533: Foundn: Abut Rear | 5 - Timber Piles |
| 536: Foundn: Pier 1 | N - None (Such as most Culverts) |
| 539: Foundn: Pier 2 | N - None (Such as most Culverts) |

## Age and Service

| | |
|---|---|
| 27: Year Built/ 106 Rehab | 1928 / 1986 |
| 42A: Service On | 5 - Highway-pedestrian |
| 42B: Service Under | 5 - Waterway |
| 28A: Lanes on | 03 |
| 28B: Lanes Under | 00 |
| 19: Bypass Length | 16 |
| 29: ADT | 15119 |
| 109: % Trucks (%) | 3 |

## Inspections

| | | *Months* | |
|---|---|---|---|
| 90: Routine Insp. | | 12 | 09/12/2022 |
| 92A: FCM Insp. | Y | 24 | 09/12/2022 |
| 92B: Dive Insp. | N | 0 | |
| 92C: Special Insp. | N | 0 | |
| 92D: UBIT Insp. | N | 0 | |
| 92E: Drone Insp. | N | 0 | |

Inspector Cunning,Robert

| | | | |
|---|---|---|---|
| **Inspector:** | Cunning,Robert | **Structure Number:** | 2202344 |
| **Inspection Date:** | 09/12/2022 | **Facility Carried:** | USR 6 |

**Bridge Inspection Report**

| | |
|---|---|
| 63: Analysis Method | 6 - Load Factor (LF) rating reported by rating factor (RF) method using MS18 loading. |

**Inspector:** Cunning,Robert **Structure Number:** 2202344

**Inspection Date:** 09/12/2022 **Facility Carried:** USR 6

## Bridge Inspection Report

| | Environment | Total Quantity | Units | Condition State 1 | Condition State 2 | Condition State 3 | Condition State 4 |
|---|---|---|---|---|---|---|---|
| **12-Reinforced Concrete Deck** | 3 - Mod. | 8931 | sq. ft. | 0 | 8534 | 397 | 0 |
| | Panels 1-4 and 7-9 have hairline map cracking. Panel 5 has hairline transverse cracks. Cracks with efflorescence were found in Panel 1 between Stringers 2 and 3, Panel 5 between stringers 8 and 9, Panel 6 between Stringers 1 and 4, Panel 7 between Stringers 1 and 2, Panel 7 between Stringers 3 and 5, Panel 7 between Stringers 6 and 8, panel 8 between stringers 2 and 3, and panel 9 between stringers 1 and 2. Cracks with moisture were found in panel 6 between Stringers 4 and 5, Panel 7 between stringers 6 and 8, and panel 7 between stringers 9 and 10.<br><br>There are various minor spalling and delaminations to stringer haunches. None have exposed reinforcing.. | | | | | | |
| 805-Wearing Surface - Monolithic Concrete | | 8683 | sq. ft. | 0 | 8311 | 372 | 0 |
| | There are a few small spalls (2-3" x 3" and a 3" x 6") at east end along lane line for westbound and turn lanes. No delaminations present. Longitudinal crack lines in westbound lane, 22 ft of turn lane between L8 and L9, and 81 ft of eastbound lane between L6 and L9. Typical transverse cracks over floorbeams up to 1/16" wide. Wesbound lane has deformations in the wearing surface. Grooves for monolithic wearing surface are worn throughout. | | | | | | |
| **113-Steel Stringer** | 3 - Mod. | 2430 | ft. | 2366 | 61 | 3 | 0 |
| | Stringer 1 - Pitting on bottom flange and web for 5 ft in Panel 5 near center towards L5. Pitting on bottom flange and web for 11 ft and two holes in the flange (1/2" x 1/8" and pin size) and two small reactivated holes in the web at L6 in Panel 7. Active rust of the top flange at 3 ft from forward abutment to 8 ft away and on inside edge of top flange in panel 9. Bent bottom flange in Panel 7 at L6. Stringer 6 - Bent bottom flange in Panel 6 at L5. Stringer 7 - Bent bottom flange in Panel 6 at L5. Stringer 9 - Bent bottom flange in panel 8 at L7. Stringer 10 - Active rust of the top flange from rear abutment to 6 ft away. Pitting on bottom flange and web for 6 ft in Panel 7 near L6. Bent top flange in Panel 8 at L7. Many stringers are not seated on support angles. Many of the stringer support angles are bent and some have section loss or holes. Stringer connections to floorbeams were analyzed, and it showed that the support angles are not necessary for load capacity (probably used for erection of stringers). | | | | | | |
| 515-Steel Protective Coating | | 19776 | sq. ft. | 19756 | 20 | 0 | 0 |
| | There is some areas of active corrosion along the top flanges near spalled haunches. | | | | | | |
| **120-Steel Truss** | 3 - Mod. | 486 | ft. | 27 | 378 | 81 | 0 |

**Inspector:** Cunning,Robert **Structure Number:** 2202344

**Inspection Date:** 09/12/2022 **Facility Carried:** USR 6

## Bridge Inspection Report

| Environment | Total Quantity | Units | Condition State 1 | Condition State 2 | Condition State 3 | Condition State 4 |
|---|---|---|---|---|---|---|
| Verticals - Verticals have pitting with section loss in splash zone. Plates have been welded to the vertical webs in the splash zone at L8U8 North, L8U8 South, and L2U2 South. U6L6 North has a hole on the south side in the splash zone. Minor pitting on sections outside of the splash zone.<br><br>Diagonals - Fill plates at diagonals and lower gusset plates have section loss and some fill plates are bent due to pack rust. There is deep pitting and holes in the web of diagonals in splash zone at L6U5 north truss, L4U5 South, and L3U4 South. L6U7 South and L7U8 South have section loss and holes in the web at the bottom of the diagonals. Plates have been added to diagonal webs in the splash zone at U2L3 South, U4L5 South and U5L6 South. There is pitting and section loss in web of diagonals in splash zone. Minor pitting and section loss in diagonals above splash zone. Minor pitting at connections.<br><br>Upper Chord - Minor pitting in webs. Pitting and section loss at connections to portals and sway bracing. Dents in top flange of upper chord at U1U2 N, U3U4 S, U5U6 N, U6U7 S and U8U9 S likely from construction. Active rust at small hole in web U6U7. Several bent lacing bars. Bottom flanges at U2 S and U5 N have 1/4" offset likely from construction. End Posts - Pitting along railing splash zone for L0U1 and U8L9 for both trusses. Several lacing bars are bent. Minor active rust at web to flange connections. Paint scraped in a few locations. Batten plates have section loss with holes at L0U1 N and U8L9 S. Minor pitting with section loss and some pack rust.<br><br>Lower Chord - Minor pitting and section loss except at connections. Minor active rust at some connections. Holes in lower chord diaphragm web plates at: L2L3 N, L3L4 S, L4L5 N, L5L6N, and L6L7S. Lower Chord has section loss from pack rust (up to 1 1/2") in Panels 4, 5 and 6. Several diaphragm connection angles have pack rust causing distortion in the angles and minor active rust. Hole in diaphragm at L7 N. Bends in angles behind bearings likely due to construction or rehab. Minor section loss in lower chord where water and debris get in. | | | | | | |
| 515-Steel Protective Coating | | 18235 | sq. ft. | 17871 | 300 | 0 | 64 |
| There is various paint failures mainly in the splash zones of the lower chord, verticals, and diagonals.<br>CS4- typical 1-3 foot paint failures between the deck and the bottom chord and active pack rust on lower chord in Panels 4, 5, and 6 on both trusses has caused paint failure. | | | | | | | |
| **152-Steel Floor Beam** | 3 - Mod. | 374 | ft. | 326 | 42 | 6 | 0 |
| Several floorbeam-to-vertical connection plates are bent at the top or bottom due to pack rust. Pitting and section loss at floorbeam ends and their connections to verticals - up to 20% loss. Some connection angles have holes at very top or bottom (do not seem to affect the connection capacity). Floorbeams 2 and 5 (both at north end) have holes in bottom flange at connection to lower lateral bracing plate. Minor active rust at various floorbeam connections. | | | | | | | |
| 515-Steel Protective Coating | | 3983 | sq. ft. | 3947 | 36 | 0 | 0 |
| There is some active corrosion at the ends of floorbeams. | | | | | | | |

**Inspector:** Cunning,Robert **Structure Number:** 2202344

**Inspection Date:** 09/12/2022 **Facility Carried:** USR 6

## Bridge Inspection Report

| | Environment | Total Quantity | Units | Condition State 1 | Condition State 2 | Condition State 3 | Condition State 4 |
|---|---|---|---|---|---|---|---|
| **162-Steel Gusset Plate** | 3 - Mod. | 84 | each | 43 | 19 | 19 | 3 |
| | Gusset Plates -<br>Upper gusset plates have no section loss U1 an U8 have outward bowing bottom free edge worst at U8S where both interior and exterior plate have 1/4" bow.<br>Lower gusset plates have bows in gusset plates at L1 N, L2 N, L2 S, L3 N, L4 N, L4 S, L5 N, L5 S, L6 N, L6 S, L7 N, L7 S, L8 N, and L8 S. All plates are 1/2" thick, and L7 N outside plate is the only one with bow greater than the thickness. All bows due to pack rust except L1N, L8 N, and L8 S which appears to be due to slight misalignment of members. Two holes (one near top and another in middle) in L4S inside gusset plate. 1/2" hole in L5S inside gusset plate. Hole in L6S inside gusset plate. Deep painted over pitting in plates at L4 S, L5 S and L6 S have deep pitting and up to 50% section loss over 30-50% of the plate area. L2 S has painted over pitting and 20% section loss. All other gusset plates have minor painted over pitting with less than 10% section loss. | | | | | | |
| 515-Steel Protective Coating | | 5040 | sq. ft. | 4960 | 80 | 0 | 0 |
| | There is some active corrosion mainly on the bottom gusset plates where water infiltration is happening from the deck. | | | | | | |
| **215-Reinforced Concrete Abutment** | 3 - Mod. | 189 | ft. | 0 | 174 | 15 | 0 |
| | Rear Abutment: Leans approximately 3/4" to north and 3/8" away from river for every 4 ft vertical. This may be an as-built condition. This appears unchanged since the previous inspection. Seat has minor delaminations at front edge along many portions of the rear abutment. There is one small spall with one exposed reinforcing bar.<br><br>Forward Abutment: Leans approximately 3/8" to towards river for every 4 ft vertical. This appears unchanged since previous inspection. Seat has minor cracks with large delaminated area in center section. Seat has minor delaminations at the front edge in the center (between and not close to the bearings) of forward abutment. There are several small spalls with one exposed reinforcing bar in each near the middle of the wall. | | | | | | |
| **300-Strip Seal Expansion Joint** | 3 - Mod. | 108 | ft. | 108 | 0 | 0 | 0 |
| | The new (2021) expansion joint is in excellent condition. | | | | | | |
| **311-Movable Bearing** | 3 - Mod. | 2 | each | 0 | 0 | 2 | 0 |
| | Minor active rust at pin nuts. Southeast anchor nut at north bearing forward abutment is loose. Northeast anchor nut is missing at south bearing forward abutment. Southeast and southwest anchor nuts at south bearing forward abutment are loose. Northwest anchor nut at south bearing rear abutment is loose. Minor pitting on bearings where debris and water gets through at curb.<br><br>Rear Abutment: North rocker bearing has a tilt toward backwall of 19.5 degrees at 80 degrees (15.85 degrees at 72 degrees in 2014). South rocker bearing at rear abutment has a tilt toward backwall of 17.0 degrees at 80 degrees (12.5 degrees at 72 degrees in 2014). Rear abutment elastomeric bearings have 1.375" deformation towards backwall (was 1.25" in 2014). | | | | | | |
| **313-Fixed Bearing** | 3 - Mod. | 2 | each | 0 | 2 | 0 | 0 |
| | Fixed bearings have some active corrosion around the pins and pin nuts. | | | | | | |
| **321-Reinforced Concrete Approach Slab** | 3 - Mod. | 1467 | sq. ft. | 1455 | 12 | 0 | 0 |
| | Rear Approach Slab (West) - Patch (3 ft x 5 ft) in eastbound lane along lane line and approximately 5 ft from compression seal. Cracks, spalls, and delaminations for 6 ft of north curb.<br>Forward Approach Slab (East) -minor Cracks, spalls, and delaminations along north curb and for 2.5 ft of south curb. | | | | | | |

| | | | |
|---|---|---|---|
| **Inspector:** | Cunning,Robert | **Structure Number:** | 2202344 |
| **Inspection Date:** | 09/12/2022 | **Facility Carried:** | USR 6 |

## Bridge Inspection Report

| | Environment | Total Quantity | Units | Condition State 1 | Condition State 2 | Condition State 3 | Condition State 4 |
|---|---|---|---|---|---|---|---|
| **330-Metal Bridge Railing** | 3 - Mod. | 497 | ft. | 357 | 137 | 3 | 0 |
| | CS2:<br>7' Rub mark at L1 North<br>13' Rub mark at L6 north<br>8' Rub Mark at L2 North<br>majority of the South Railing has minor rub marks<br>CS3:<br>Hole in Rail at L4 North due to impact<br>Impact damage at L7 on south | | | | | | |
| **815-Drainage** | 3 - Mod. | 12 | each | 6 | 6 | 0 | 0 |
| | There is minor debris in most scuppers and 6 are partially blocked .<br>there are 2 locations were minor water is ponding along the curb: near L1 S and L4S | | | | | | |
| **830-Abutment Backwall** | 3 - Mod. | 109 | ft. | 107 | 1 | 1 | 0 |
| | Minor cracks present with one CS3 crack at rear abutment. Small delaminations near top north side of rear abutment and top south end of forward abutment. | | | | | | |

| | | | |
|---|---|---|---|
| **Inspector:** | Cunning,Robert | **Structure Number:** | 2202344 |
| **Inspection Date:** | 09/12/2022 | **Facility Carried:** | USR 6 |

**Bridge Inspection Report**

## ERI-00006-2893 _(2202344)

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| ODOT District: | District 03 | | | | | Date Built: | 07/01/1928 |
| Major Maint: | 01 - State Highway Agency | Facility Carried: | USR 6 | Traffic On: | 5 - Highway-pedestrian | Rehab Date: | 01/01/1986 |
| Routine Maint: | 04 - City or Municipal Highway Agency | Feature Inters: | VERMILION RIVER | Traffic Under: | 5 - Waterway | Insp. Resp A: | 01 - State Highway Agency |
| FIPS Code: | 79716 - VERMILION (ERI & LOR county) | Location: | DISTRICT 03 | .60 MI W LOR. CO. LINE | | Insp Resp B: | |

Inspector Cunning,Robert Inspection Date 09/12/2022 Reviewer Rinehart,David

## Inspector Comments - Deck and Approach

### Deck

### Edge of Floor/Slab (LF)

2021: a ~6' spall fell from the north deck edge near PP 7. There is no reinforcing along the deck edge and this has allowed large delaminations to occur.

2022: WPI removed a large portion of these delaminations; there is a total of 71' of spalling on the south deck edge and 36' of spalling on the north deck edge along with an additional 7' of deeper delamination on the north edge. (This delamination should be monitored at least every FC inspection.)

### Bridge Wearing Surface (SF)

Mild map cracking throughout, moderate (less than 0.05) along each floorbeam. Visible wear of surface grooves along tire lines in lanes.

2019: W.S. looks to have been sealed w/ HMWM. 2021: new expansion joint rehab has fixed all minor spalling to along ends of deck addjcent to expansion and deflectoin joint

### Curbs/Sidewalk (LF)

Several spalls on curbs are present. Hole in north curb between L5 and L6. Typical hairline transverse cracks originate at pedestrian rail posts, guardrail posts and truss members on sidewalks. There is ponding on the north sidewalk next to the truss members at L6. Minor active rust at truss member cover plates and sidewalk. L3 north truss, L6 north truss and L3 south truss have loose cover plates. Fascia stringer at L6 on the north sidewalk has a small hole in bottom flange. L3 north truss sidewalk cantilever has a small hole in the web. L5 south truss sidewalk cantilever has two holes in the web. L6 south truss has impact damage to sidewalk cantilever. Approach sidewalks have long cracks and settlement at northeast and northwest corners. Southeast approach sidewalk has settlement.

### Bridge Railing (LF)

DBR Railing - Impact damage of north rail at L4 made a hole in the rail. Paint transfer along westbound lane and some in eastbound lane. Minor active rust at connections on posts and base plates. 3 reflectors are broken off of steel tube. Small section of north truss tube rail has small rust spots forming. A few areas with chipped paint.

Pedestrian Railing (Informational; not part of rating): Several bolts missing at top rail connection to posts. Typical section loss at bottom of vertical rails up to 50%. Several pipe rail collars at post connections are broken. Several vertical rails are bent. Concrete end posts have minor cracks. Sprinkler hose is loose on south railing and south railing has missing flower boxes. L8 south truss post connection to sidewalk cantilever has holes in west side. Chipped paint in a some areas. Loose post caps were tightened with the 2012 project, at least one (NW Approach SW) is loose now.

### Deck Drainage (EA)

Minor ponding and debris at curbs. All scuppers are open, with the majority partially filled from debris at grating. One scupper horizontal pipe connection is cracked.

**Expansion Joint (LF)**

2021: Proj. 164(21) PID 101445 replaced compression seal and installed complete new expansion joint at RA

measurements: taken between center line of bolt anchors for the bearing's armor. (second set off curb)

2022- North opening: 10-1/8" South opening 10"

## Approach

**Approach Wearing Surface (EA)**

2021 - New approach pavement. Proj. 164(21) - ERI-SR-0060-08.98 Two Lane Resurfacing; PID 101445

Minor longitudinal cracks in center of exterior lanes on the west.

**Approach Slab (SF)**

Rear Approach Slab (West) - very minor spalling along approach WS transition. During new expansion joint installation in 2021 spalling along the bridge end of the west approach slab was repaired. Patched Delamination (2.25 ft x 5 ft) in eastbound lane along lane line and approximately 5 ft from expansion joint. Cracks, spalls, and delaminations for 6 ft of north curb.

Forward Approach Slab (East) - Cracks, spalls, and delaminations along north curb and for 2.5 ft of south curb.

**Approach Embankment (EA)**

Minor erosion at northeast, northwest and southwest corners. Hole under sidewalk at northeast corner 30" horizontal depth starting at face of wingwall. The northeast and northwest approach sidewalks have long cracks with settlement up to 1" at the guardrail posts and cracked curbs. The southeast approach sidewalk has settlement at the curb but no cracks.

2022 - Property owner pointed out sinkhole at toe of NE slope adjacent gravel parking lot. (May be outside ODOT ROW) Filled once in 2020 and twice more in 2021. Roughly 24" wide and 24" deep chamber, with no visible washout - indicating possible settlement and material escaping into failed pipe below? No pipes shown in ODOT plans, possible City storm sewer draining to river along roadway. no further sinking to hole noted during 2022 inspection.

**Approach Guardrail (EA)**

All 4 terminal assemblies have some impact damage (all posts are intact).The post bolts are loose at the first post off of the northwest and southwest corners of the bridge. The end terminal assemblies at the northwest and southwest approaches have loose bearing plates. First timber post off northeast approach has a loose timber block. Paint transfer on guardrail.

# Inspector Comments - General Appraisal

## Superstructure

### Stringers (LF)

Stringer 1: rust along top flange first half of Panel 1 and majority of Panel 9, pitting on bottom flange and web most prominent between L4-L5 and east side of L6 (all inactive). Holes in web and flange near L6.

Stringer 9: bent bottom flange east end of L7

Stringer 10: 6 feet of active rust along the first half of bay 1. Pitting on bottom flange most prominent east side of L6 and middle of bay 8, bent flange near L7.

### Floorbeams (LF)

Active rust at ends of floorbeams (near truss connections). Hole on north end of L2, south end of L4, north and south end of L5, south end of L8.

### Truss Verticals (EA)

(Same comments as Element Truss comments) Verticals have pitting with section loss in splash zone. Plates have been welded to the vertical webs in the splash zone at L8U8 North, L8U8 South, and L2U2 South. U6L6 North has a hole on the south side in the splash zone. Minor pitting on sections outside of the splash zone.

### Truss Diagonals (EA)

(Same comments as Element Truss comments) Diagonals - Fill plates at diagonals and lower gusset plates have section loss and some fill plates are bent due to pack rust. There is deep pitting and holes in the web of diagonals in splash zone at L6U5 North, L4U5 South, and L3U4 South. L6U7 South and L7U8 South have section loss and holes in the web at the bottom of the diagonals. Plates have been added to diagonal webs in the splash zone at U2L3 South, U4L5 South and U5L6 South. There is pitting and section loss in web of diagonals in splash zone. Minor pitting and section loss in diagonals above splash zone. Minor pitting at connections.

### Truss Upper Chord (EA)

(Same comments as Element Truss comments) Minor pitting in webs. Pitting and section loss at connections to portals and sway bracing. Dents in top flange of upper chord at U1U2 N, U3U4 S, U5U6 N, U6U7 S and U8U9 S likely from construction. Active rust at small hole in web U6U7 S. Several bent lacing bars. Bottom flanges at U2 S and U5 N have 1/4" offset likely from construction.

End Posts - Pitting along railing splash zone for L0U1 and U8L9 for both trusses. Several lacing bars are bent. Minor active rust at web to flange connections. Paint scraped in a few locations. Batten plates have section loss with holes at L0U1 N and U8L9 S. Minor pitting with section loss and some pack rust.

### Truss Lower Chord (EA)

(Same comments as Element Truss comments) Minor pitting and section loss except at connections. Minor active rust at some connections. Holes in lower chord diaphragm web plates at: L2L3 N, L3L4 S, L4L5 N, L5L6 N, and L6L7 S. Lower chord has section loss from pack rust (up to 1 1/2") in Panels 4, 5

and 6. Several diaphragm connection angles have pack rust causing distortion in the angles and minor active rust. Hole in diaphragm at L7 N. Bends in angles behind bearings likely due to construction or rehab. Minor section loss in lower chord where water and debris get in at curbs.

## Truss Gusset Plate (EA)

all gusset plates are 1/2 in, Rehab in 2014 added angles to stiffing free edges of gussets: U1 N&S, U2 N&S, U7 N&S, U8 N&S, L4 S, L5 S, and L6 S

Upper gusset plates have no section loss. Gusset plates U1 N&S and U8 N have minor bowing to the bottom free edge. U8 S has +1/4" bow on both the inside and outside plate. This should be monitored during all fracture critical inspections.

Lower gusset plates generally have bows due to pack rust <1/2" except: L1N, L8 N, and L8 S have bows not due to pack rust which appears to be due to slight misalignment of members, L7 N - outside plate bows out,

all gusset plates have minor pitting with less than 10% section loss except: L4S - Two holes (one near top and another in middle) in inside gusset plate, L5S - 1/2" hole in inside gusset plate, L6S inside plate small hole, Deep pitting (30-50% loss of the plate area) in plates at L4 S, L5 S and L6 S, L2 S has pitting and 20% section loss

Connection plates at mid-height of Verticals U3L3, U4L4, U5L5 and U6L6 have been removed from the element level quantities since they connect secondary members to truss members. All pitting is typically painted over and not active.

## Lateral Bracing (EA)

Lower Lateral Bracing - One rod bent in Panel 7 near L6 South. One broken center connection hanger in Panel 7, and one bent center connection hanger in Panel 9. Upper Lateral Bracing - minor deformation in connection plates due to pack rust.

## Sway Bracing (EA)

Minor pitting and section loss. Connection plates have minor deformation due to pack rust. Connections to truss have pitting and section loss. Panel 2 has minor gouges in lower diagonal at north truss, a bent flange on lower brace, and a bent flange at the south center lower diagonal. Panel 3 has pack rust at lower center gusset. Panel 2 has minor gouges in lower diagonal at north truss. Panel 5 has a bent flange on north center lower diagonal and bent north diagonal gusset. Panel 7 has a bent flange on lower brace over westbound lane and a bent flange on the north upper diagonal. Panel Point 6 north has a hole in angle connection to upper chord. Sway brace connection to U8 south truss has hole in web of the top brace. Sway brace connection to U3 south truss has hole in web of the top brace. Sway brace connection angle has hole at U3 S and U5 S. Web section losses at lower connection to truss for all lower locations. End portals - Minor pitting and section loss.

## Bearing Devices (EA)

The bearings (bolsters on the east end and expansion rockers set on elastomeric on the west end) have some minor rust on around the pins. The expansion rockers are tilted all the way back and the elastomeric bearings are in expansion throughout the year.

2020: Rear rockers were at 16 deg. (north brg.) and 13 deg. (south brg.) expanded at 65 deg. F. The elastomeric bearing pads were deformed 1 3/16" (north) and 1 5/16" (south). There is a 2 3/8" gap between the backwall and the truss at the north bearing and 2 3/4" gap at south bearing.

2022 - 2 3/8" gap between the backwall and the truss at the north bearing and 2 3/4" gap at south bearing 73 deg.

## Protective Coating System (LF)

A few locations with chipped paint or paint scrapes on end posts, diagonals and railing posts. Local overspray or dripped paint present. Minor active rust at connections and bearing pin nuts. L8U8 south has a 6' area that appears to have been sandblasted and painted without cleaning all the sand off. PCS applied in 2012 (513-11).

## Utilities (LF)

Light on bridge is working. There is a cracked cover on the photo electric control. Electric conduit runs down south truss interior sidewalk stringer - one of the clamps is disconnected. There is a light at forward abutment that is no longer connected to the electric - conduit and wires are severed. Utility box south side of rear abutment has broken conduit and frayed wires. Watering hoses for flower boxes on bridge originate at northeast corner of bridge. One hose runs along forward abutment to south end. Both hoses go up the wingwalls to the pedestrian railing and run along pedestrian railing to all flower boxes on their respective side. 2019: water hoses hanging down over water, pulled up over sidewalk post so boats can access water.

# Substructure

## Abutment Walls (LF)

in 2022 WPG surveyed the abutment for vertical and horizontal location to check if movement is occurring to the substructure. A traverse was made to locate pins set adjacent to all 4 bearings. See traverse map and instructions for detailed survey procedure. This measurement should be performed every 2 years.

## Backwalls (LF)

Minor cracks present. Small delaminations near top north side of rear abutment and top south end of forward abutment.

## Wingwalls (EA)

Rear Abutment: Minor map cracking and delaminations with efflorescence. Spalls with exposed rebar on side of wall facing bearings. 2.75 SF delamination southwest wingwall. Forward Abutment: Southeast wingwall has mural. Southeast wingwall has map cracking and a few small delaminations. Northeast wingwall has minor cracks and 3 SF delamination. 2021 - added 80' of estimated wingwall length to abutment quantity.

## Slope Protection (EA)

Rear abutment - Several deep ruts leading to sheet piling, away from abutment. Forward abutment has a few small ruts at abutment face.

2021 - Jet-ski operator squatting below bridge concerned with erosion of slope and sheet pile deterioration. Water coming from SW parking lot and pipe outletting through southwest wingwall.

## Culvert

# Inspector Comments - Waterway

## Waterway Adequacy

## Channel

### Channel Protection (LF)

Rear - Sheet piling sloped 1:36 (1.40 degrees) toward water. 10-15% section loss where ruts in slope meet sheet piling. (NOTE: This may be an as-built condition.) There is a hole in the sheet piling at near the bridge centerline. There is 6" from top of sheet piling to ground behind sheet piling. Forward - Sheet piling at sloped 1:38 (1.45 degrees) toward water. (NOTE: This may be an as-built condition.) Minor section loss north end.

## Scour Critical

Inspector: Robert Cunning

Structure Number: 2202344

Inspection Date: 09/12/2022

Facility Carried: USR 6

Bridge Inspection Report

## Pictures

PHOTO 1

Description General east end

PHOTO 1

Description East Appr. Slab

Inspector: Robert Cunning

Structure Number: 2202344

Inspection Date: 09/12/2022

Facility Carried: USR 6

Bridge Inspection Report

## Pictures

PHOTO 1

Description FA

PHOTO 1

Description SE Bolster

## Pictures

PHOTO 2

Description SE Bolster rust around pin bolt

PHOTO 2

Description NW WW

Inspector: Robert Cunning

Structure Number: 2202344

Inspection Date: 09/12/2022

Facility Carried: USR 6

Bridge Inspection Report

## Pictures

PHOTO 2

Description deflection joint at east end

PHOTO 3

Description erosion at NE

Inspector: Robert Cunning

Structure Number: 2202344

Inspection Date: 09/12/2022

Facility Carried: USR 6

Bridge Inspection Report

## Pictures

PHOTO 3

Description U2 S (interior)

PHOTO 3

Description RA

## Pictures

PHOTO 4

Description NW WW and retaining wall

PHOTO 4

Description U1 S (exterior)

## Pictures

PHOTO 4

Description SE appr. Sidewalk


PHOTO 5

Description East Appr. WS

Inspector: Robert Cunning

Structure Number: 2202344

Inspection Date: 09/12/2022

Facility Carried: USR 6

Bridge Inspection Report

## Pictures

PHOTO 5

Description upper chord looking east


PHOTO 5

Description NE WW

## Pictures

PHOTO 6

Description SE WW

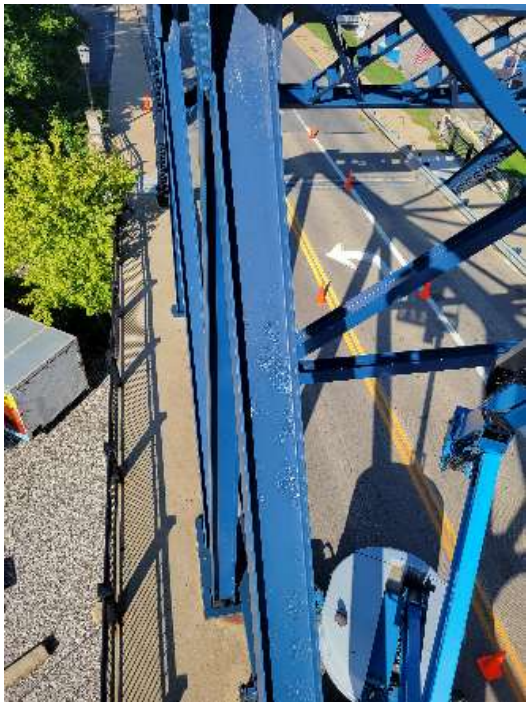


PHOTO 6

Description minor rust (non active typ)

## Pictures

PHOTO 6

Description New Expansion joint (West end)

PHOTO 7

Description Rear Approach WS

## Pictures

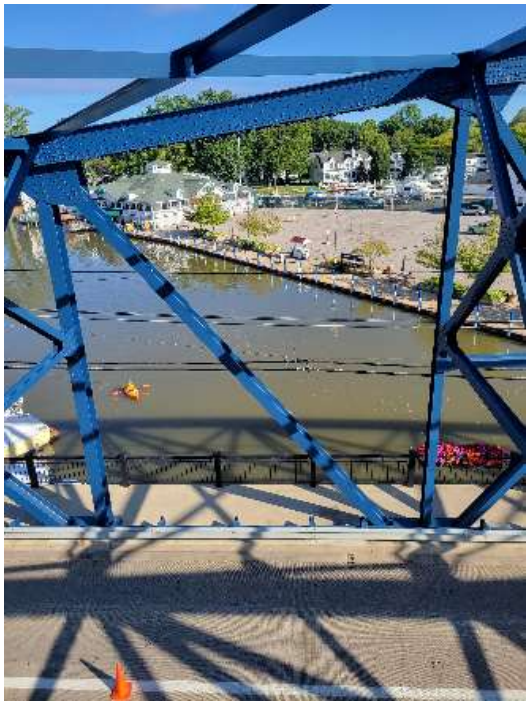


PHOTO 7

Description typ diagonal

PHOTO 8

Description SW Rocker

## Pictures

PHOTO 8

Description Rear Appr. Slab

PHOTO 9

Description Damage at NW Terminal assembly

## Pictures

PHOTO 9

Description NW rocker

PHOTO 10

Description L0U1S rust reactivated on interior

## Pictures

PHOTO 11

Description top of Sway brace U2 hole in webs

PHOTO 12

Description stringer 1 PP 7 holes in web and flange

## Pictures

PHOTO 13

Description typical pack rust at bottom of gusset plate and lower chord.

PHOTO 14

Description impact damage to sidewalk supports from boats fairly typical

## Pictures

PHOTO 15

Description typical interior deck and stringer condition.

PHOTO 16

Description typ. floorbeam stringer layout

## Pictures


PHOTO 17

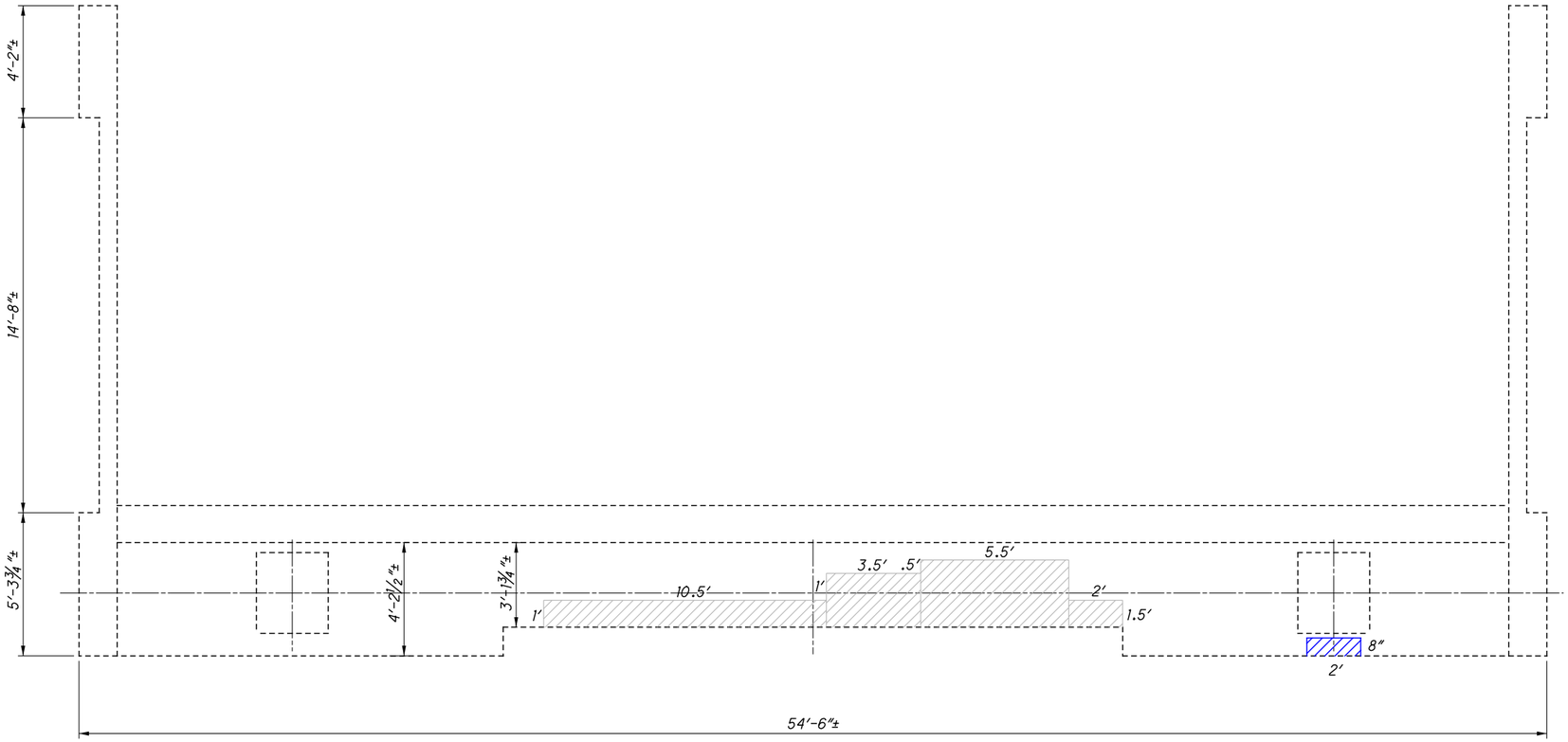
Description sidewalk support (FB4S

PHOTO 18

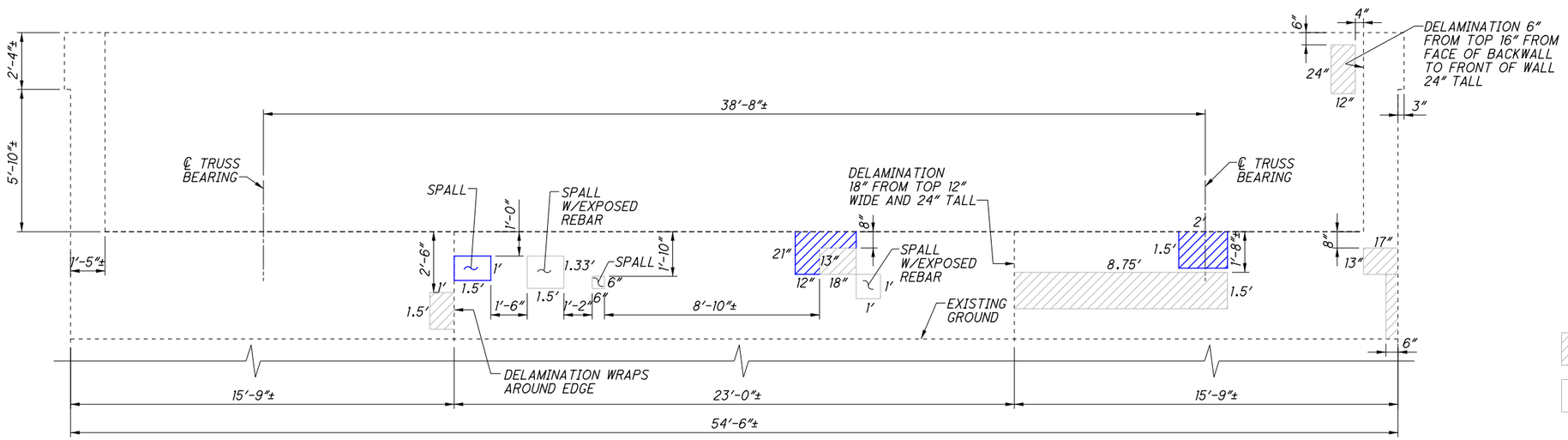
Description Swallow nests under structure

# APPENDIX C

# Bridge Inspection Drawings




PLAN




ELEVATION

## LEGEND

- DELAMINATION
- SPALL

EFFL. - EFFLORESCENCE

- INCIATES NEW AREA FROM 2022 INSPECTION

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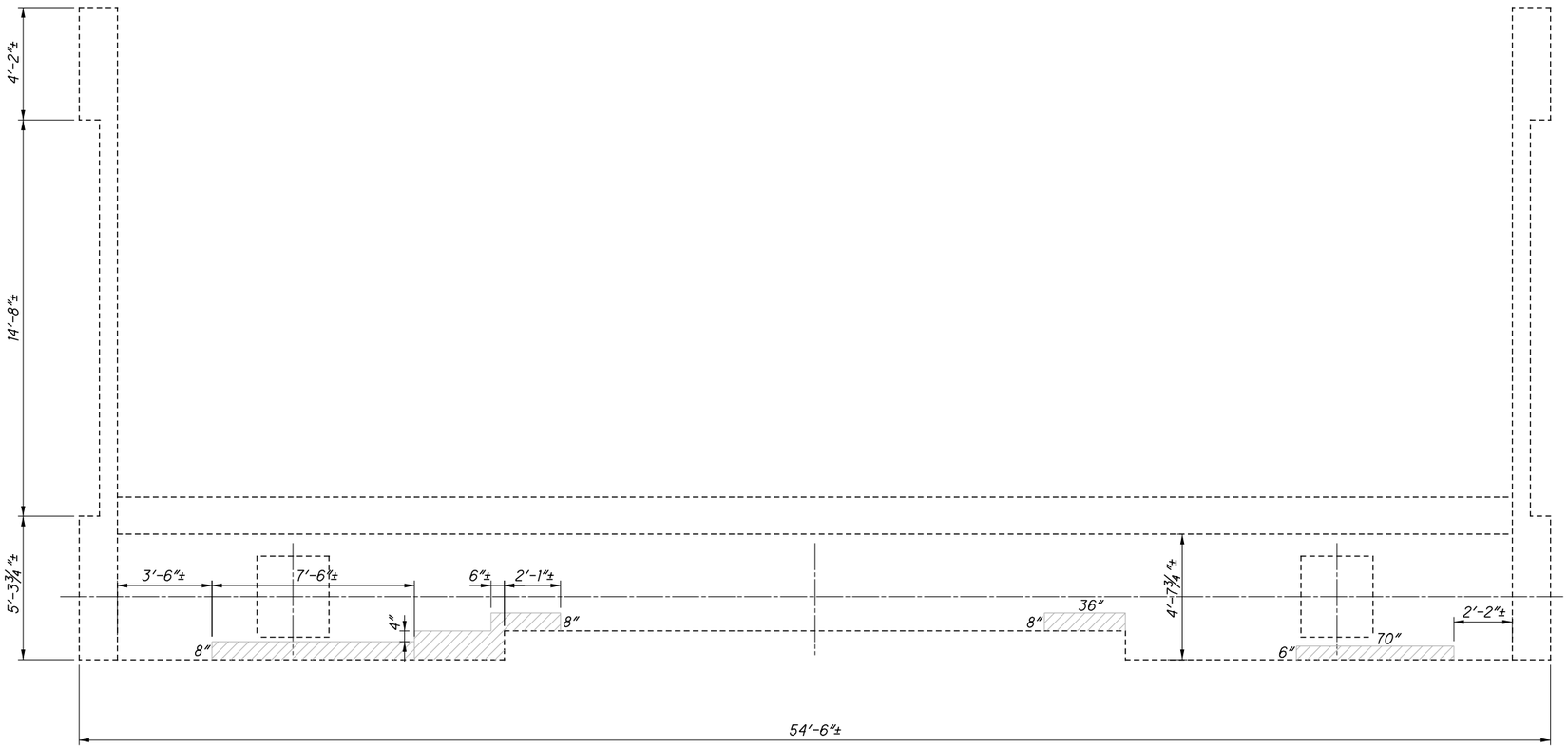
|---|---|---|---|
| CHECKED | REVISED | | |

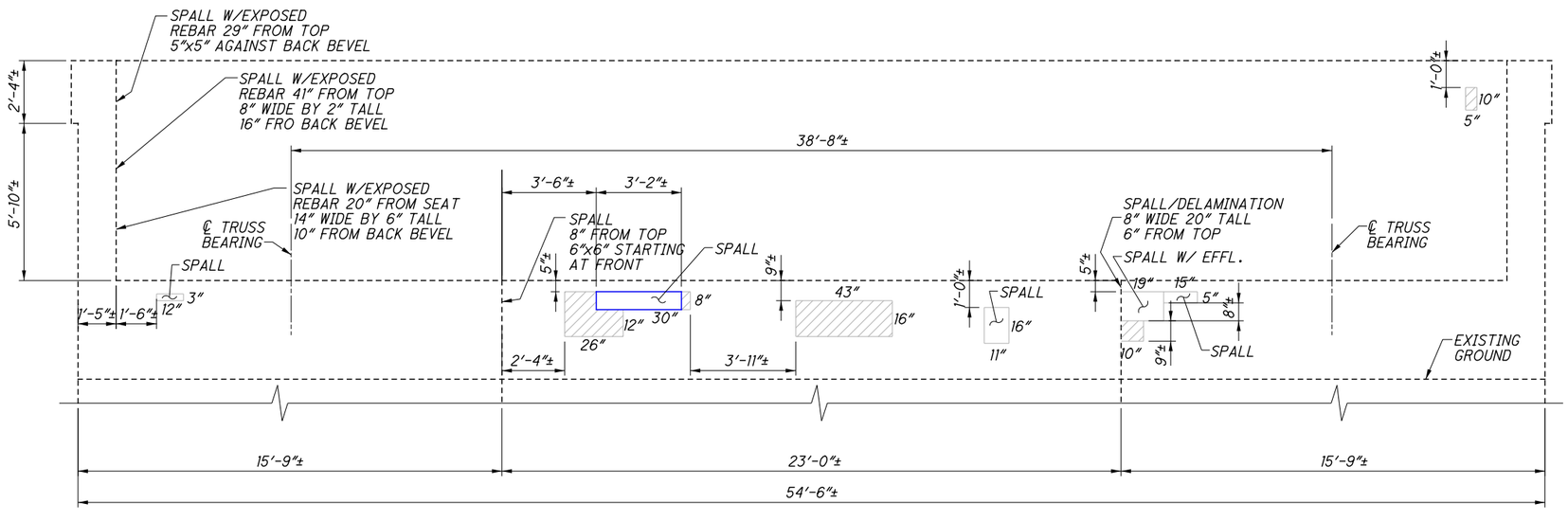
# FORWARD ABUTMENT PLAN AND ELEVATION

BRIDGE NO. ERI-6-28.84
OVER VERMILION RIVER

**ERI-6-28.84**
**PID No. 84081**




PLAN




ELEVATION

## LEGEND

- DELAMINATION
- SPALL

EFFL. - EFFLORESCENCE

- INDICATES NEW AREA FROM 2022 INSPECTION

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|---|---|---|---|
| CHECKED | REVISED | | |

# REAR ABUTMENT PLAN AND ELEVATION

BRIDGE NO. ERI-6-28.84
OVER VERMILION RIVER

**ERI-6-28.84**
**PID No. 84081**

1

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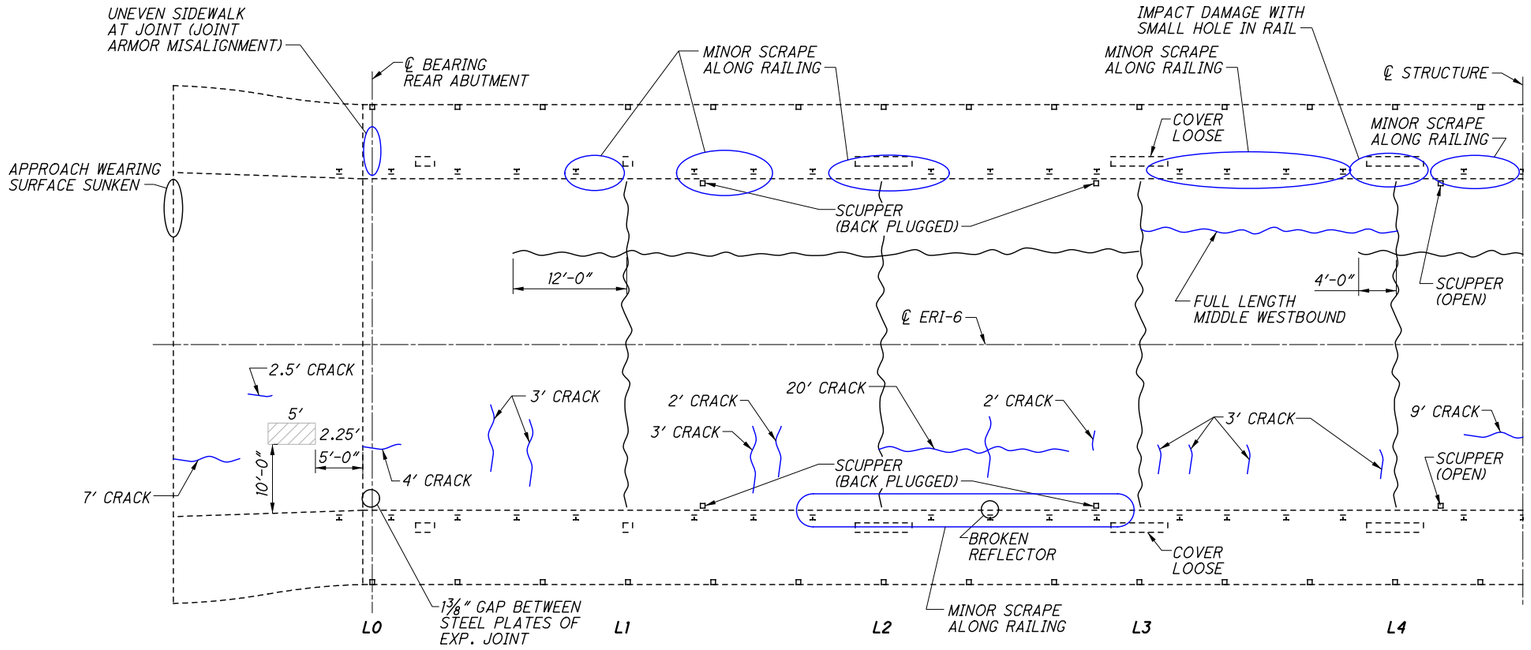


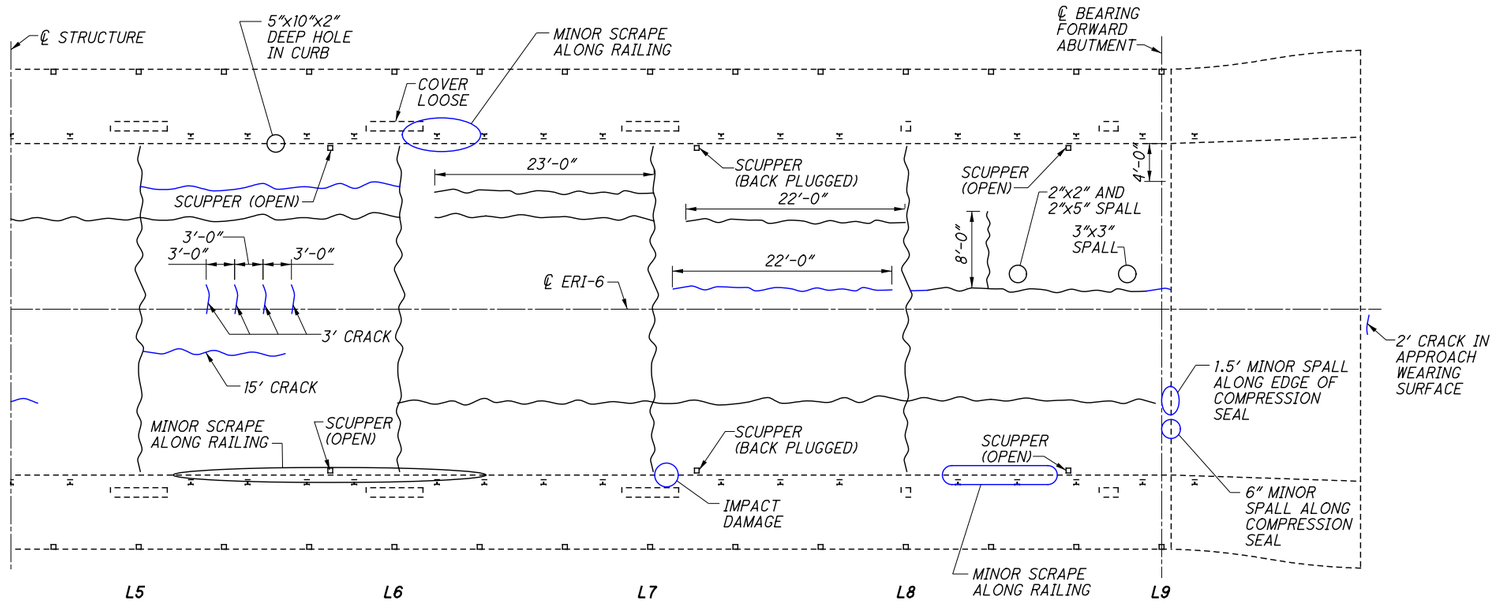


## LEGEND

- CONCRETE PATCH
- CRACK
- INDICATES NEW NOTE FROM 2022 INSPECTION

## NOTES:

TRANSVERSE CRACKS TYPICAL ON SIDEWALKS.

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| CHECKED | REVISED | | |

DECK PLAN
BRIDGE NO. ERI-6-28.84
OVER VERMILION RIVER

ERI-6-28.84
PID No. 84081

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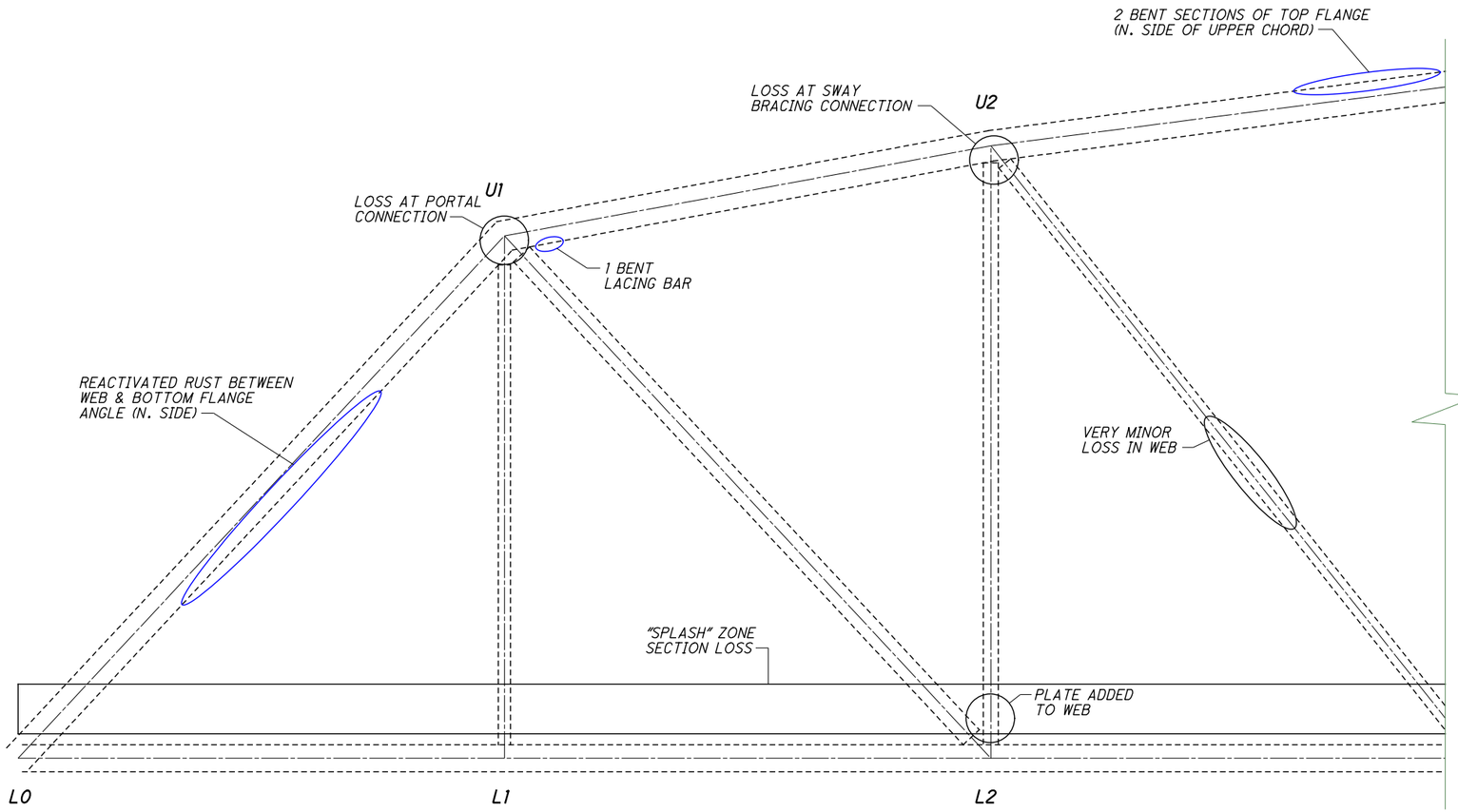


ELEVATION

## LEGEND

——— - INDICATES NEW NOTE FROM 2022 INSPECTION

## NOTES:

"SPLASH" ZONE HAS OLD SECTION LOSS AROUND GUARDRAIL FROM WATER SPLASHING FROM ROADWAY.

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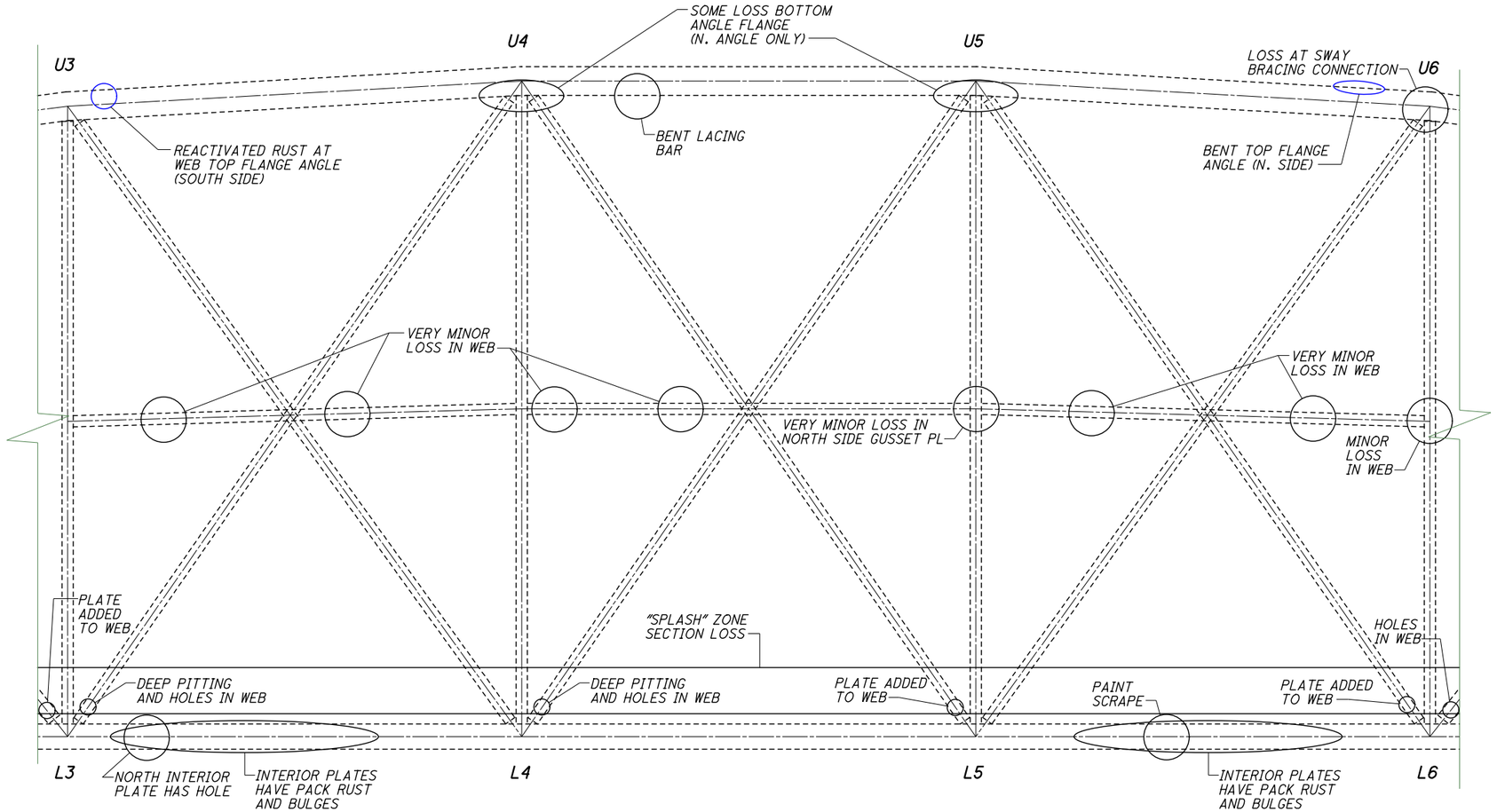
SOUTH TRUSS - LO TO L3
BRIDGE NO. ERI-6-28.84
OVER VERMILION RIVER

ERI-6-28.84
PID No. 84081




## ELEVATION

### LEGEND

——— - INDICATES NEW NOTE FROM 2022 INSPECTION

### NOTES:

"SPLASH" ZONE HAS OLD SECTION LOSS AROUND GUARDRAIL FROM WATER SPLASHING FROM ROADWAY.

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|---|---|
| DRAWN | REVISED |
| REVIEWED | DATE |

SOUTH TRUSS - L3 TO L6
BRIDGE NO. ERI-6-28.84
OVER VERMILION RIVER

ERI-6-28.84
PID No. 84081

7

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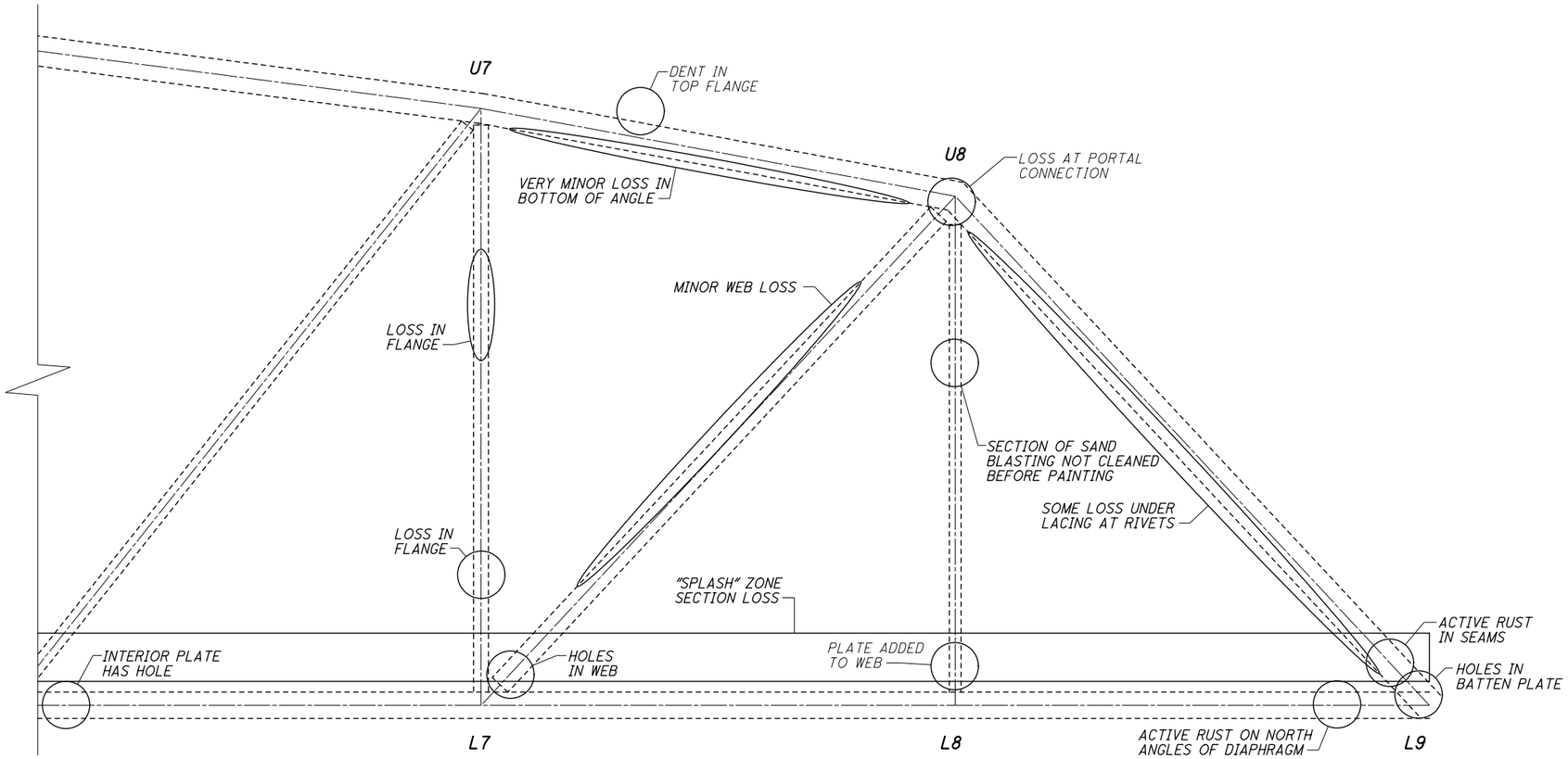


ELEVATION

**NOTES:**

"SPLASH" ZONE HAS OLD SECTION LOSS AROUND GUARDRAIL FROM WATER SPLASHING FROM ROADWAY.

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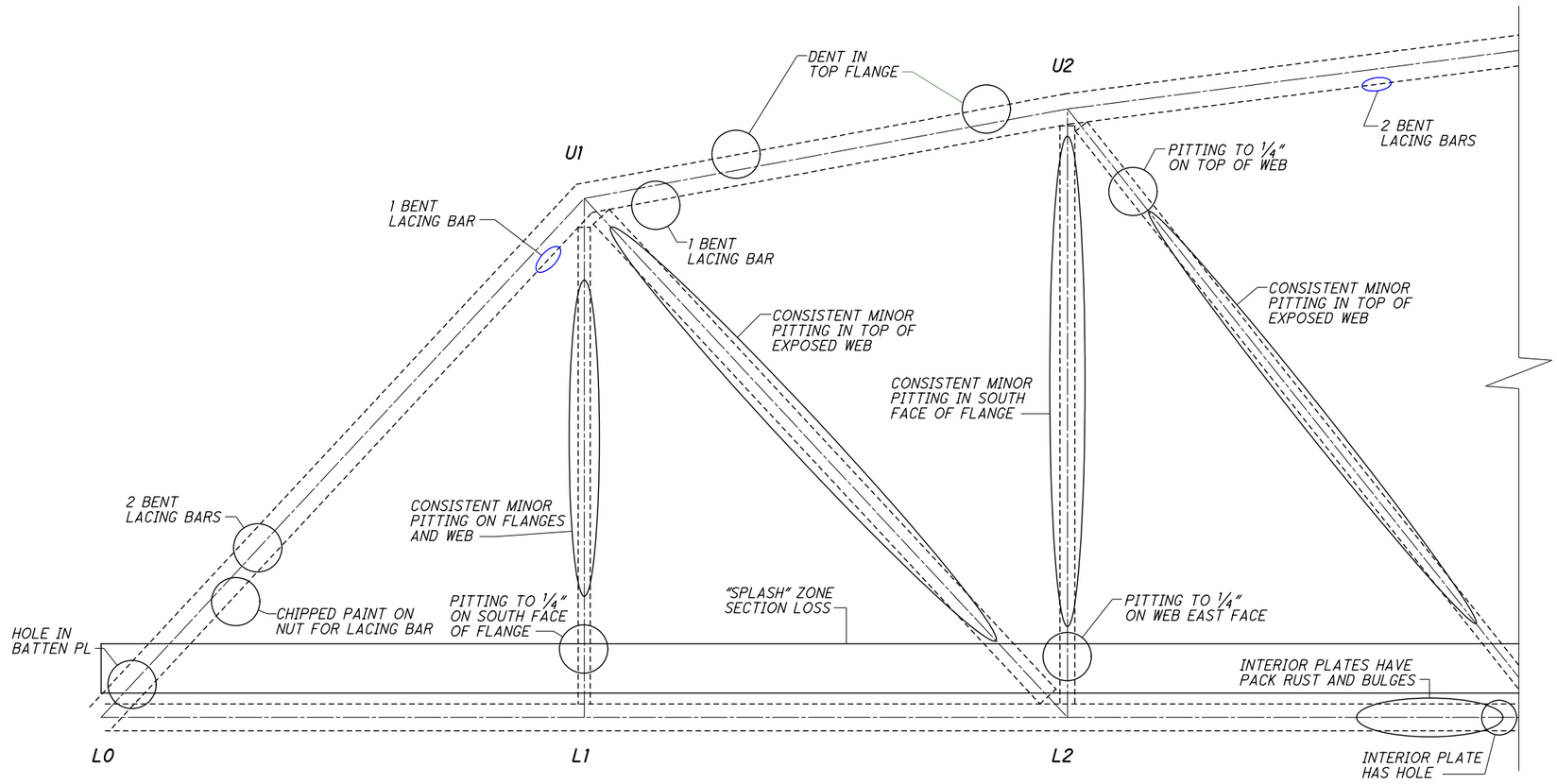
| CHECKED | REVISED | | |

SOUTH TRUSS - L6 TO L9
BRIDGE NO. ERI-6-28.84
OVER VERMILION RIVER

ERI-6-28.84
PID No. 84081

7




## ELEVATION

## LEGEND

——— - INDICATES NEW NOTE FROM 2022 INSPECTION

## NOTES:

"SPLASH" ZONE HAS OLD SECTION LOSS AROUND GUARDRAIL FROM WATER SPLASHING FROM ROADWAY.

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| CHECKED | REVISED | | |

NORTH TRUSS - LO TO L3
BRIDGE NO. ERI-6-28.84
OVER VERMILION RIVER

ERI-6-28.84
PID No. 84081

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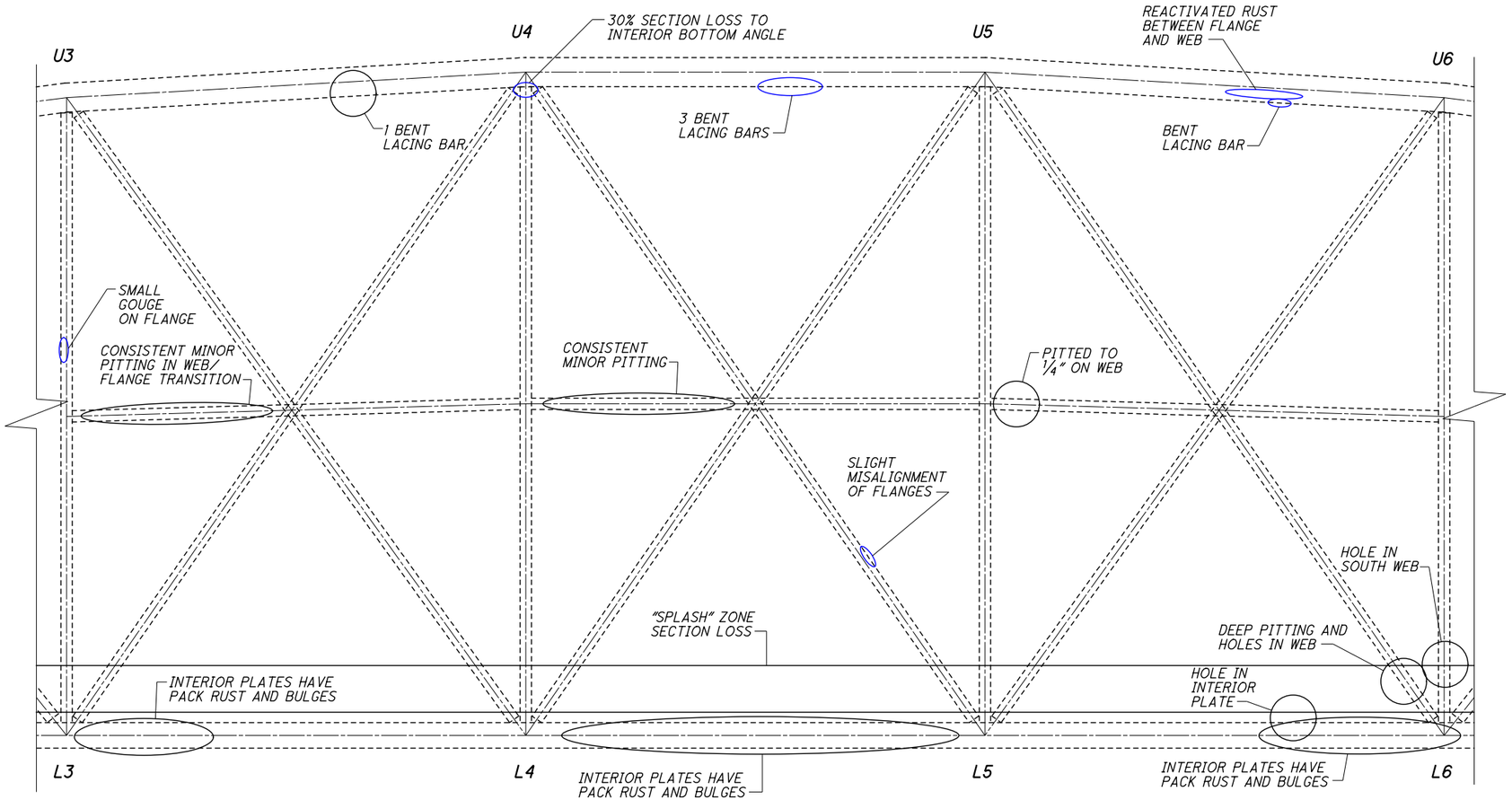


ELEVATION

## LEGEND

——— - INDICATES NEW NOTE FROM 2022 INSPECTION

## NOTES:

"SPLASH" ZONE HAS OLD SECTION LOSS AROUND GUARDRAIL FROM WATER SPLASHING FROM ROADWAY.

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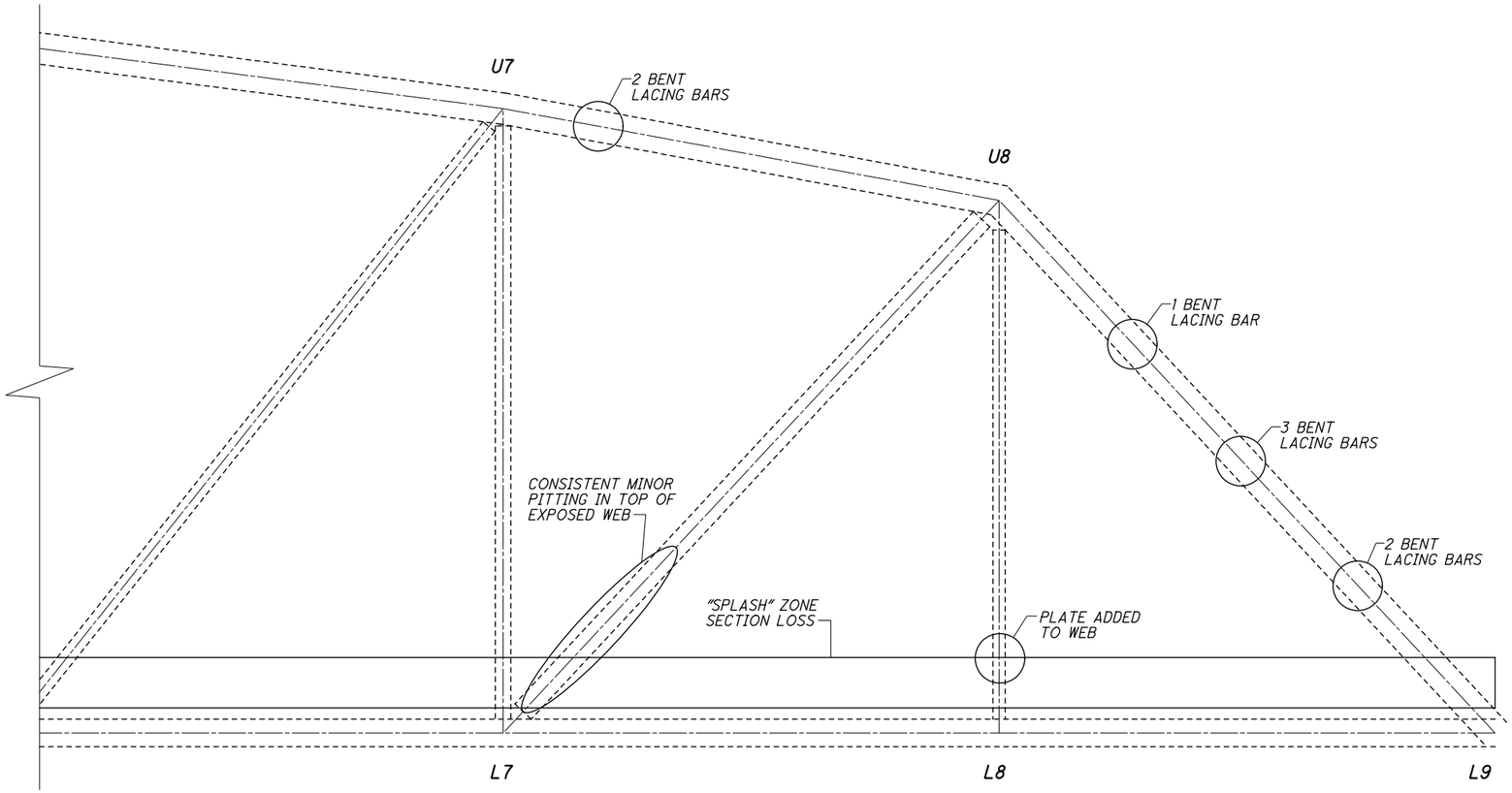
|---|---|---|---|
| CHECKED | REVISED | | |

NORTH TRUSS - L3 TO L6
BRIDGE NO. ERI-6-28.84
OVER VERMILION RIVER

ERI-6-28.84
PID No. 84081

7




ELEVATION

NOTES:

"SPLASH" ZONE HAS OLD SECTION LOSS AROUND GUARDRAIL FROM WATER SPLASHING FROM ROADWAY.

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NORTH TRUSS - L6 TO L9
BRIDGE NO. ERI-6-28.84
OVER VERMILION RIVER

ERI-6-28.84
PID No. 84081

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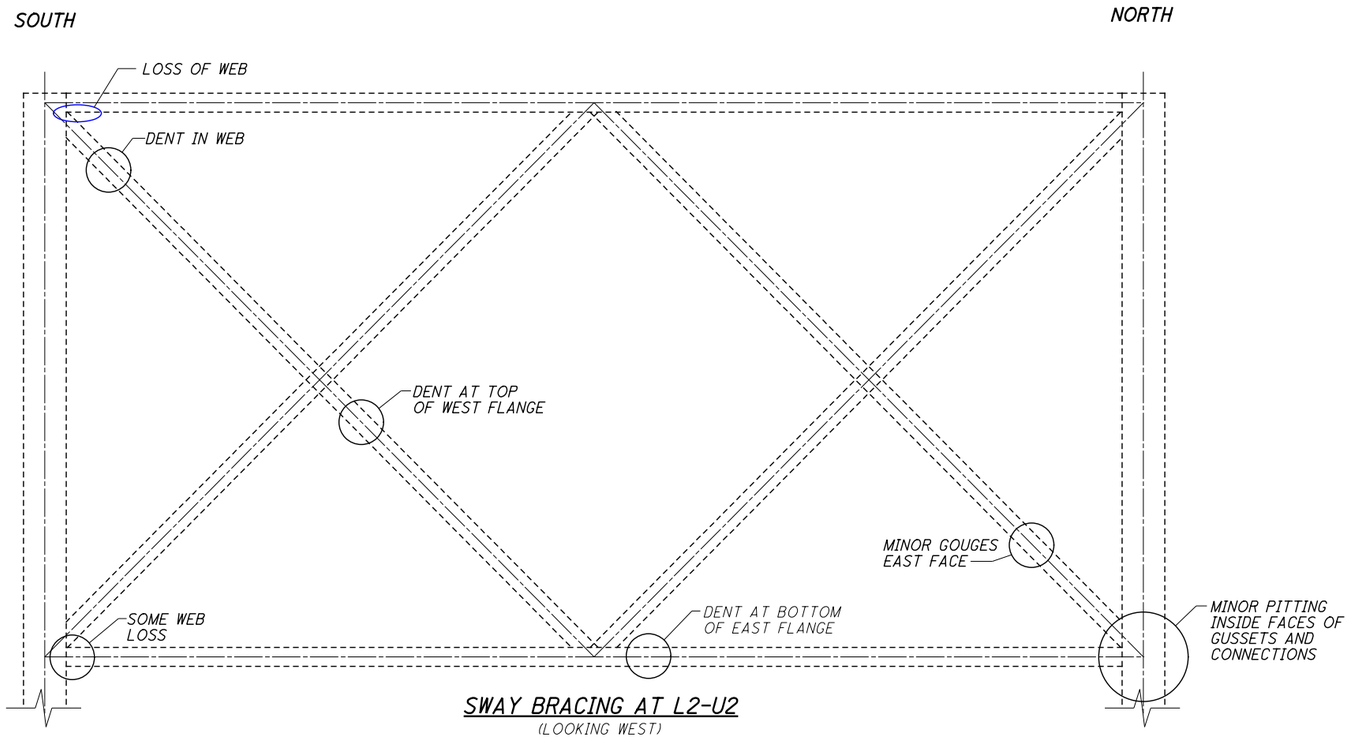
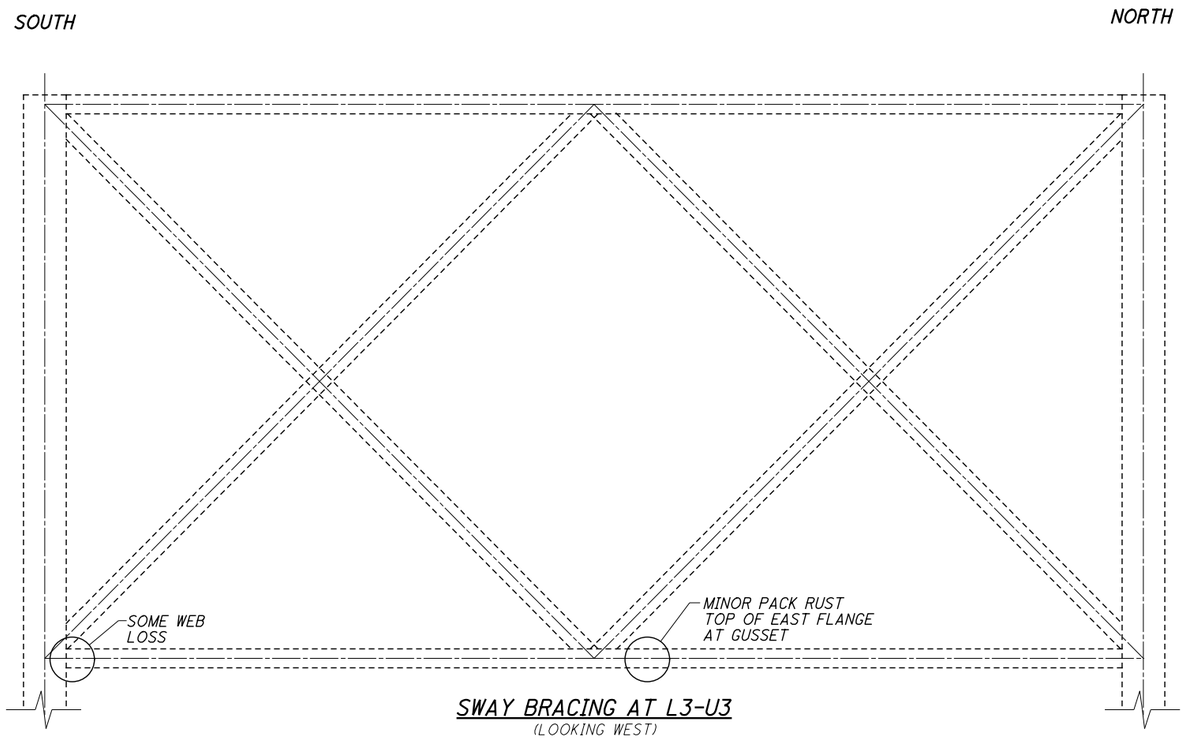



SWAY BRACING AT L2-U2

(LOOKING WEST)




SWAY BRACING AT L3-U3

(LOOKING WEST)

## LEGEND

——— - INDICATES NEW NOTE FROM 2022 INSPECTION

## NOTES:

MINOR PITTING AND SECTION LOSS ALONG WEB OF MEMBERS AND AT CONNECTIONS (TYPICAL)

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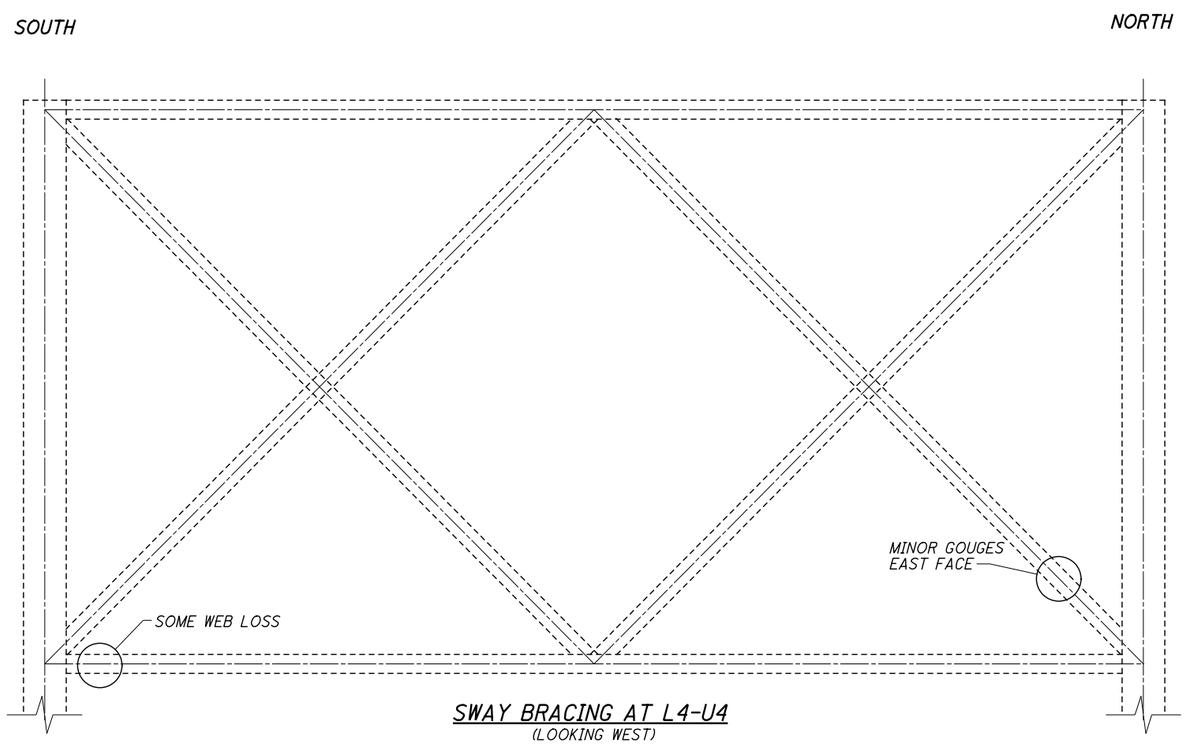
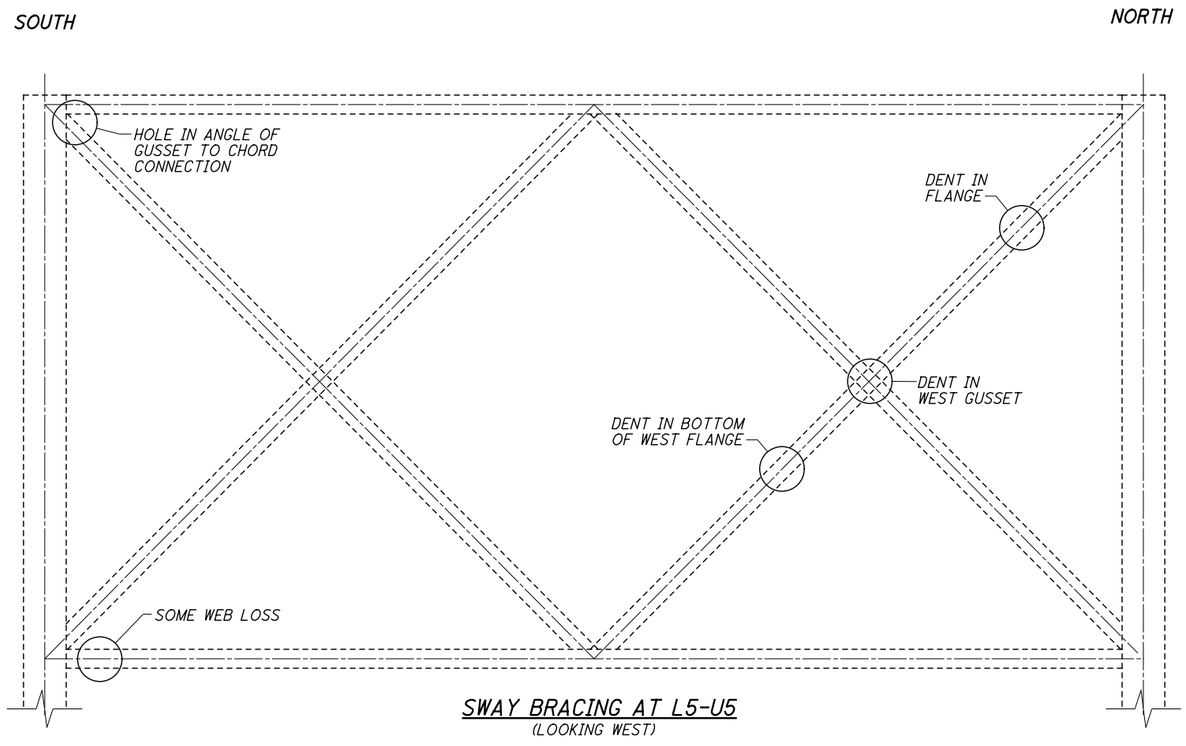
|---|---|---|---|
| CHECKED | REVISED | | |

SWAY BRACES 2 & 3
BRIDGE NO. ERI-6-28.84
OVER VERMILION RIVER

ERI-6-28.84
PID No. 84081




SWAY BRACING AT L4-U4
(LOOKING WEST)




SWAY BRACING AT L5-U5
(LOOKING WEST)

NOTES:

MINOR PITTING AND SECTION LOSS ALONG WEB OF MEMBERS AND AT CONNECTIONS (TYPICAL)

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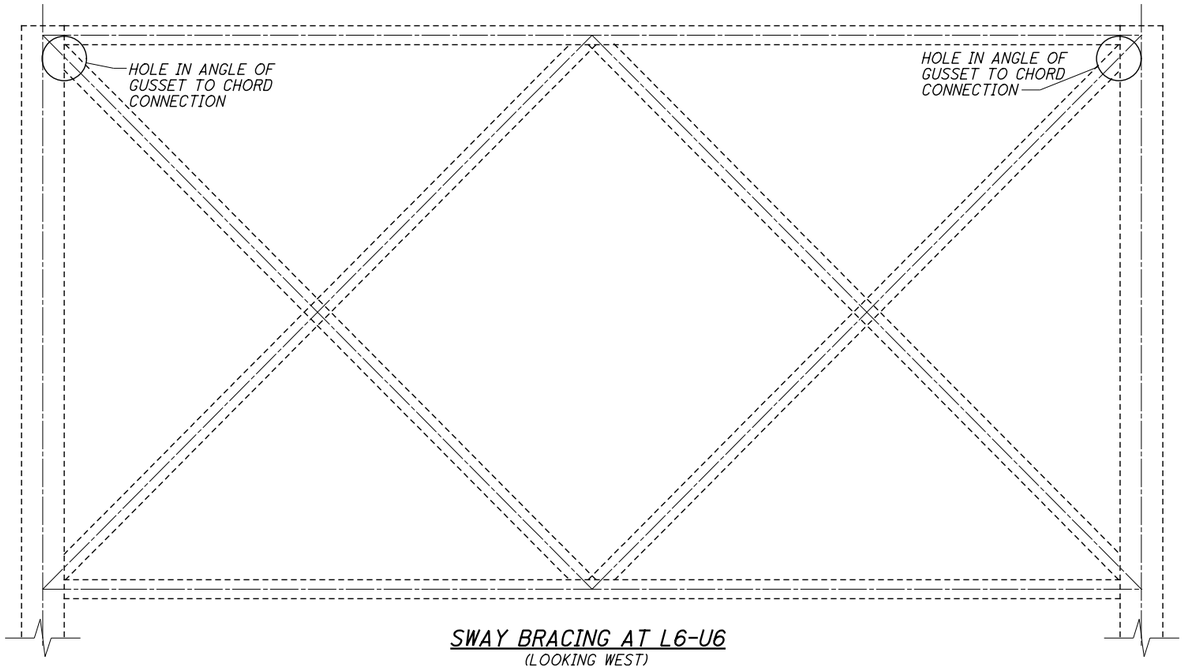
| DESIGNED | DRAWN | REVIEWED | DATE |
|---|---|---|---|
| CHECKED | REVISED | | |

SWAY BRACES 4 & 5
BRIDGE NO. ERI-6-28.84
OVER VERMILION RIVER

ERI-6-28.84
PID No. 84081

SOUTH

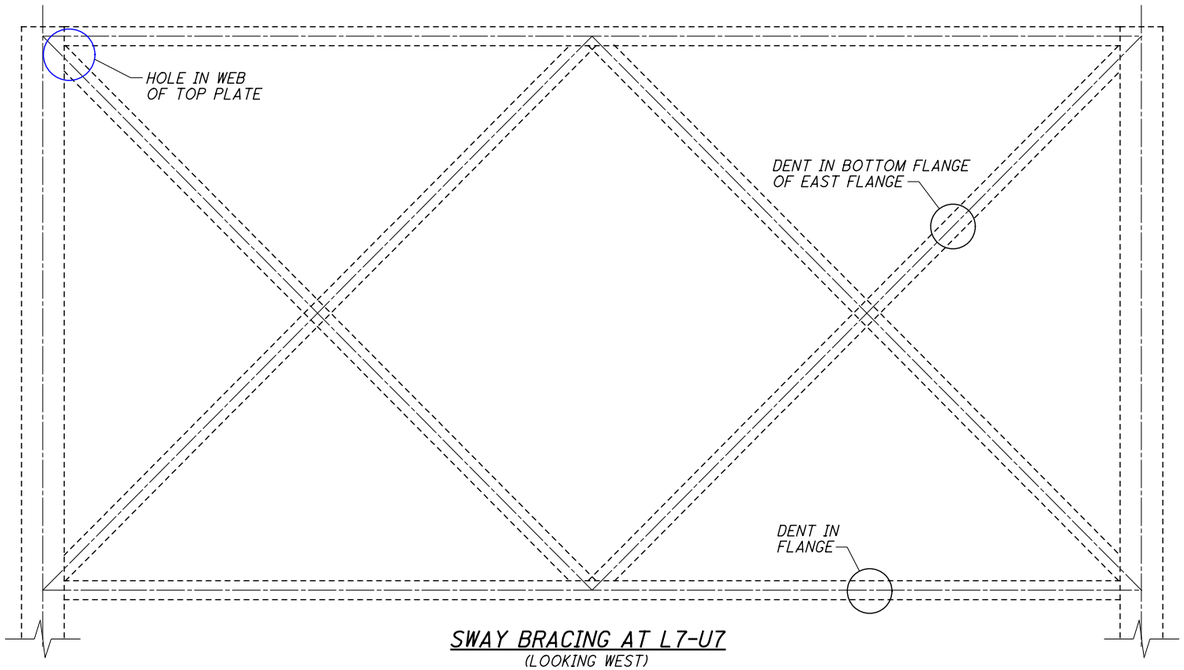
NORTH




SWAY BRACING AT L6-U6
(LOOKING WEST)

SOUTH

NORTH




SWAY BRACING AT L7-U7
(LOOKING WEST)

LEGEND

——— - INDICATES NEW NOTE FROM 2022 INSPECTION

NOTES:

MINOR PITTING AND SECTION LOSS ALONG WEB OF MEMBERS AND AT CONNECTIONS (TYPICAL)

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MANSFIELD, OHIO 44902

| DESIGNED | DRAWN | REVIEWED | DATE |
|---|---|---|---|
| CHECKED | REVISED | | |

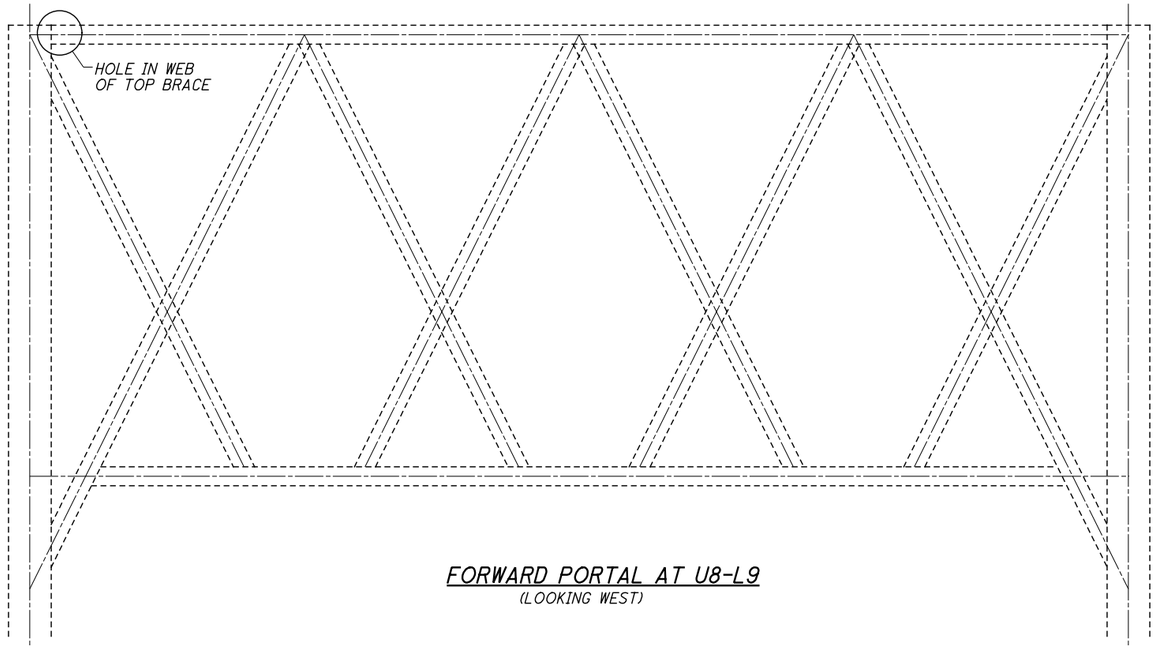
SWAY BRACES 6 & 7
BRIDGE NO. ERI-6-28.84
OVER VERMILION RIVER

ERI-6-28.84
PID No. 84081

2 / 7

SOUTH

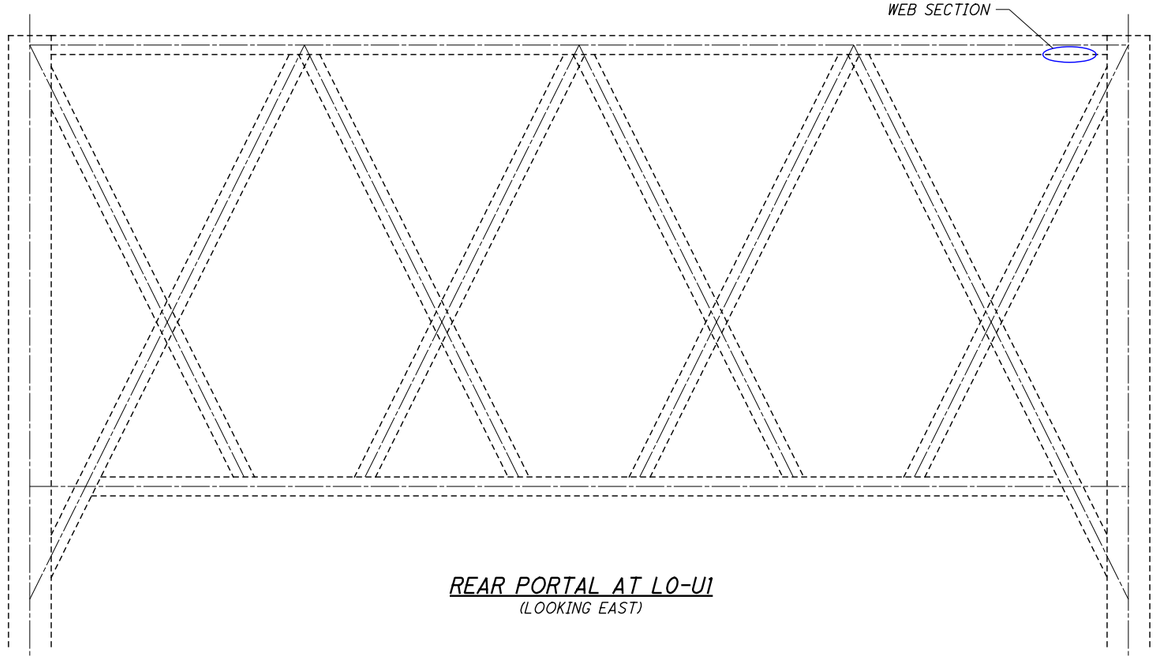
NORTH




FORWARD PORTAL AT U8-L9
(LOOKING WEST)

NORTH

SOUTH




REAR PORTAL AT L0-U1
(LOOKING EAST)

LEGEND

——— - INDICATES NEW NOTE FROM 2022 INSPECTION

NOTES:

MINOR PITTING AND SECTION LOSS ALONG WEB OF MEMBERS AND AT CONNECTIONS (TYPICAL)

RICHLAND ENGINEERING LIMITED
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MANSFIELD, OHIO 44902

| DESIGNED | DRAWN | REVIEWED | DATE |
|---|---|---|---|
| CHECKED | REVISED | | |

PORTALS
BRIDGE NO. ERI-6-28.84
OVER VERMILION RIVER

ERI-6-28.84
PID No. 84081

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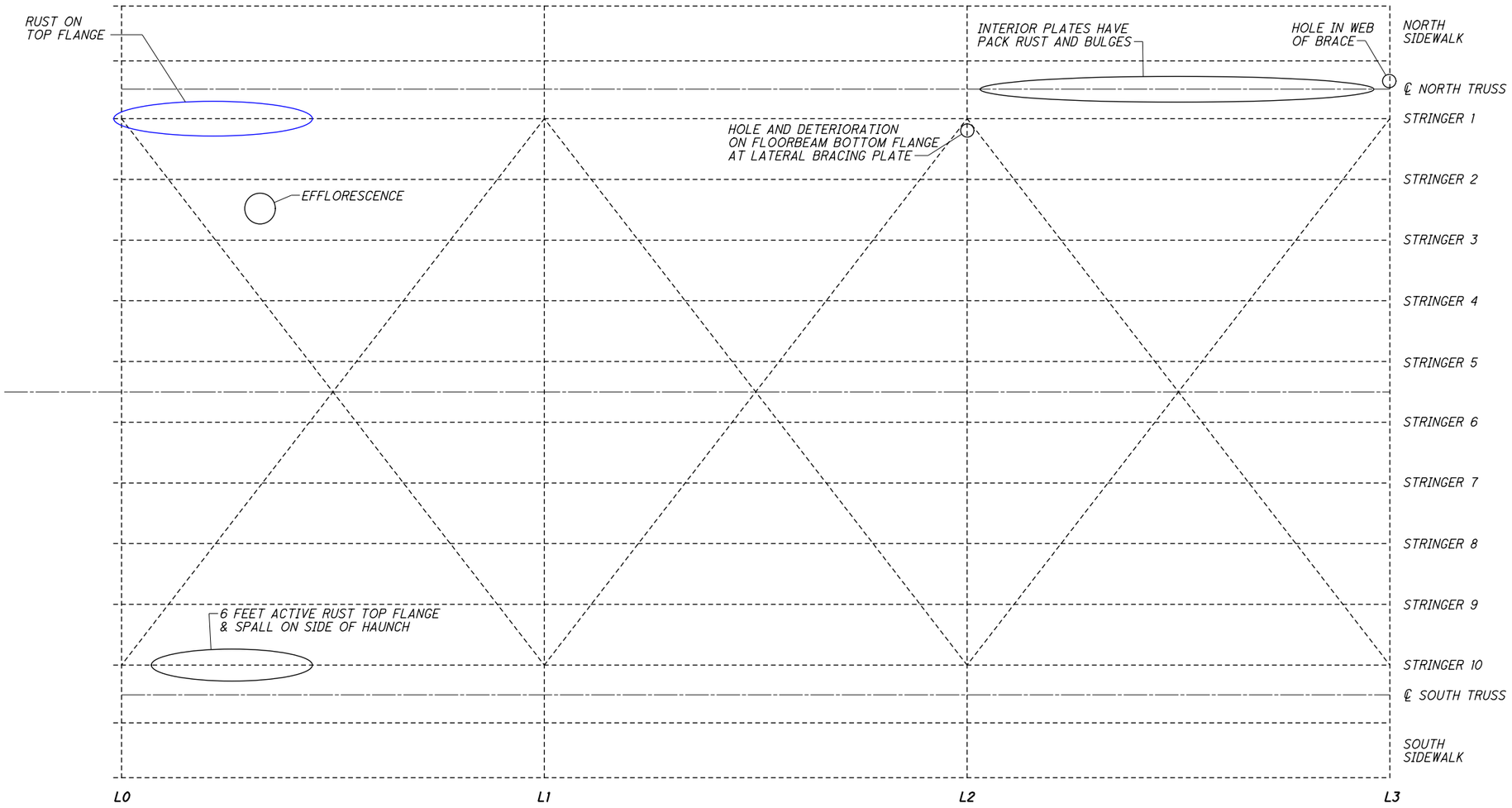


## LEGEND

——— - INDICATES NEW NOTE FROM 2022 INSPECTION

## NOTES:

- HAIRLINE MAP CRACKING IS TYPICAL THROUGHOUT DECK.
- FOR DECK EDGE SPALLS SEE DECK EDGE PLAN.

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| DESIGNED | DRAWN | REVIEWED | DATE |
|---|---|---|---|
| CHECKED | REVISED | | |

# FRAMING PLAN - L0 TO L3

BRIDGE NO. ERI-6-28.84
OVER VERMILION RIVER

**ERI-6-28.84**
**PID No. 84081**

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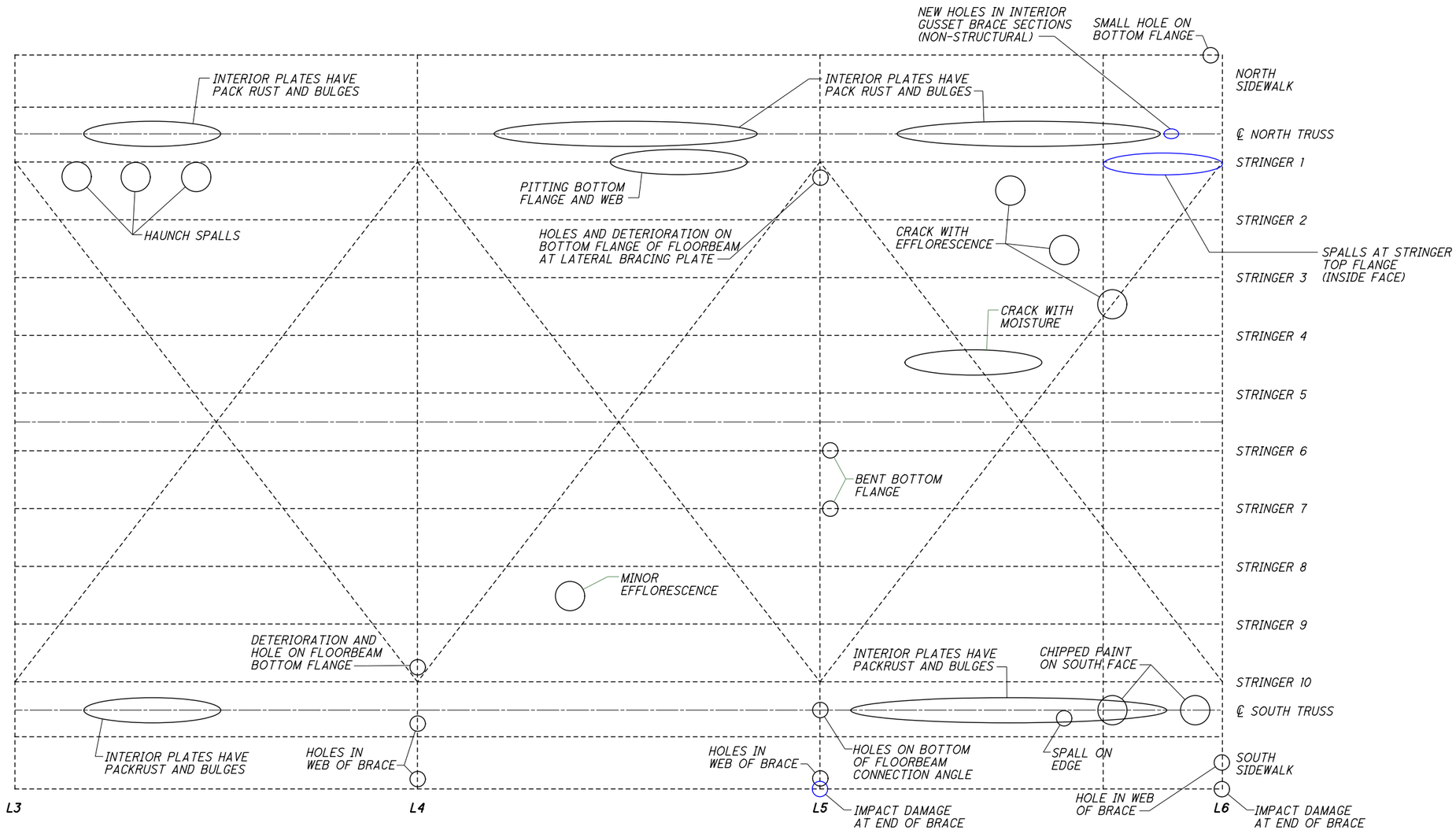



## LEGEND

——— - INDICATES NEW NOTE FROM 2022 INSPECTION

## NOTES:

- HAIRLINE MAP CRACKING IS TYPICAL THROUGHOUT DECK.
- FOR DECK EDGE SPALLS SEE DECK EDGE PLAN.

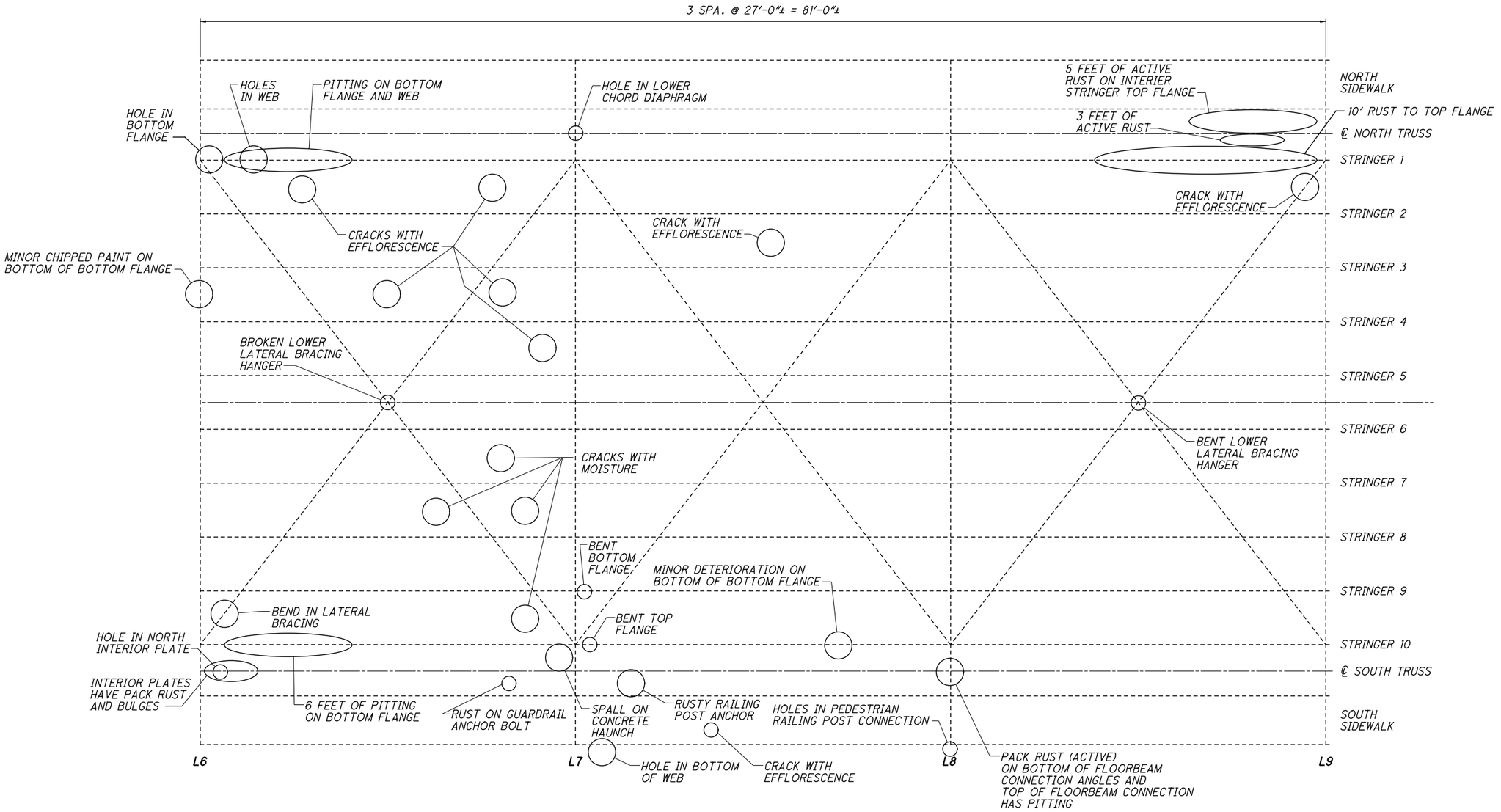
RICHLAND ENGINEERING LIMITED
29 NORTH PARK STREET
MANSFIELD, OHIO 44902

| DESIGNED | DRAWN | REVIEWED | DATE |
|---|---|---|---|
| CHECKED | REVISED | | |

# FRAMING PLAN - L3 TO L6

BRIDGE NO. ERI-6-28.84
OVER VERMILION RIVER

ERI-6-28.84
PID No. 84081




## NOTES:

HAIRLINE MAP CRACKING IS TYPICAL THROUGHOUT DECK.

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| DESIGNED | DRAWN | REVIEWED | DATE |
|---|---|---|---|
| CHECKED | REVISED | | |

# FRAMING PLAN - L6 TO L9

BRIDGE NO. ERI-6-28.84
OVER VERMILION RIVER

**ERI-6-28.84**
**PID No. 84081**

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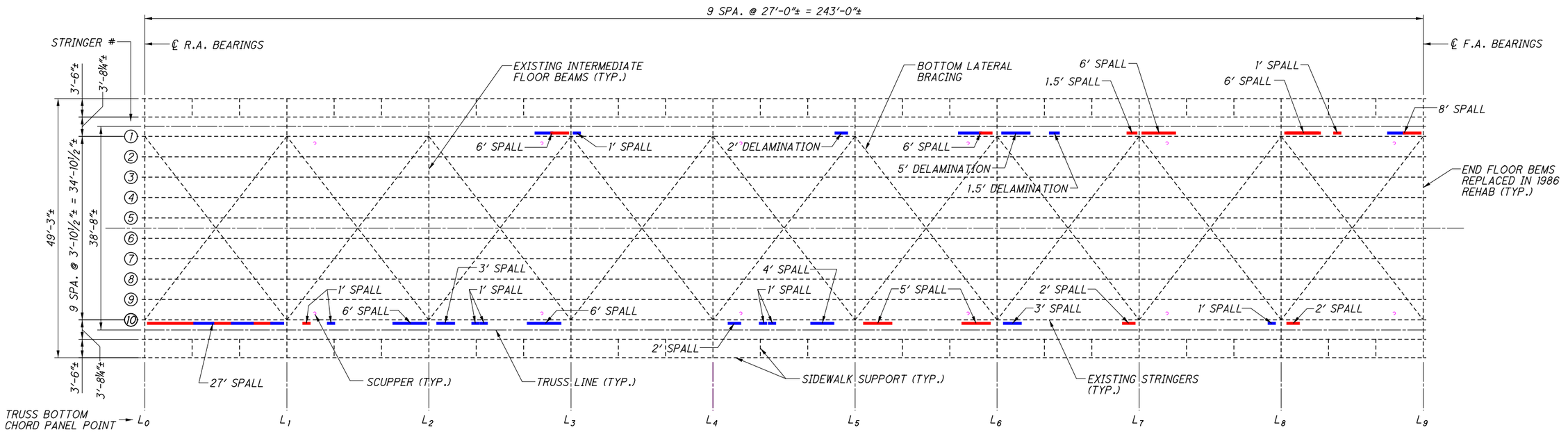
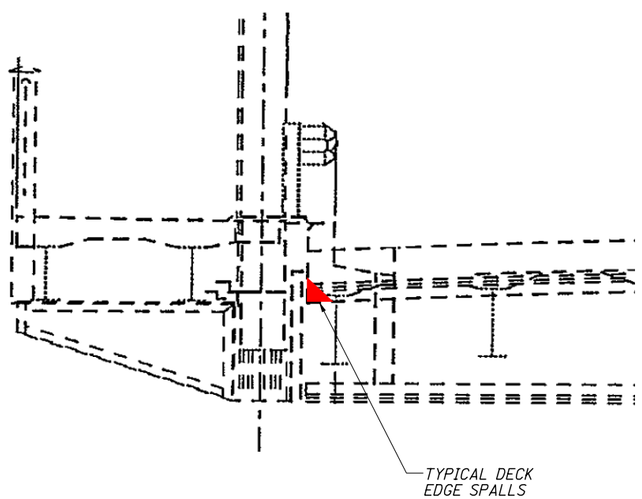



## DECK EDGE PLAN




## TYPICAL DECK SPALL LOCATION

## LEGEND

- NOTES PRIOR TO 2022 INSPECTION
- NEW NOTES FROM 2022 INSPECTION

RICHLAND ENGINEERING LIMITED
29 NORTH PARK STREET
MANSFIELD, OHIO 44902

| DESIGNED | DRAWN | REVIEWED | DATE |
|---|---|---|---|
| CHECKED | REVISED | STRUCTURE FILE NUMBER | |

DECK EDGE PLAN
BRIDGE NO. ERI-6-28.84
OVER VERMILION RIVER

ERI-6-28.84
PID No. 84081

# APPENDIX D

# Fracture Critical Member Drawing

**Fracture Critical Plan**

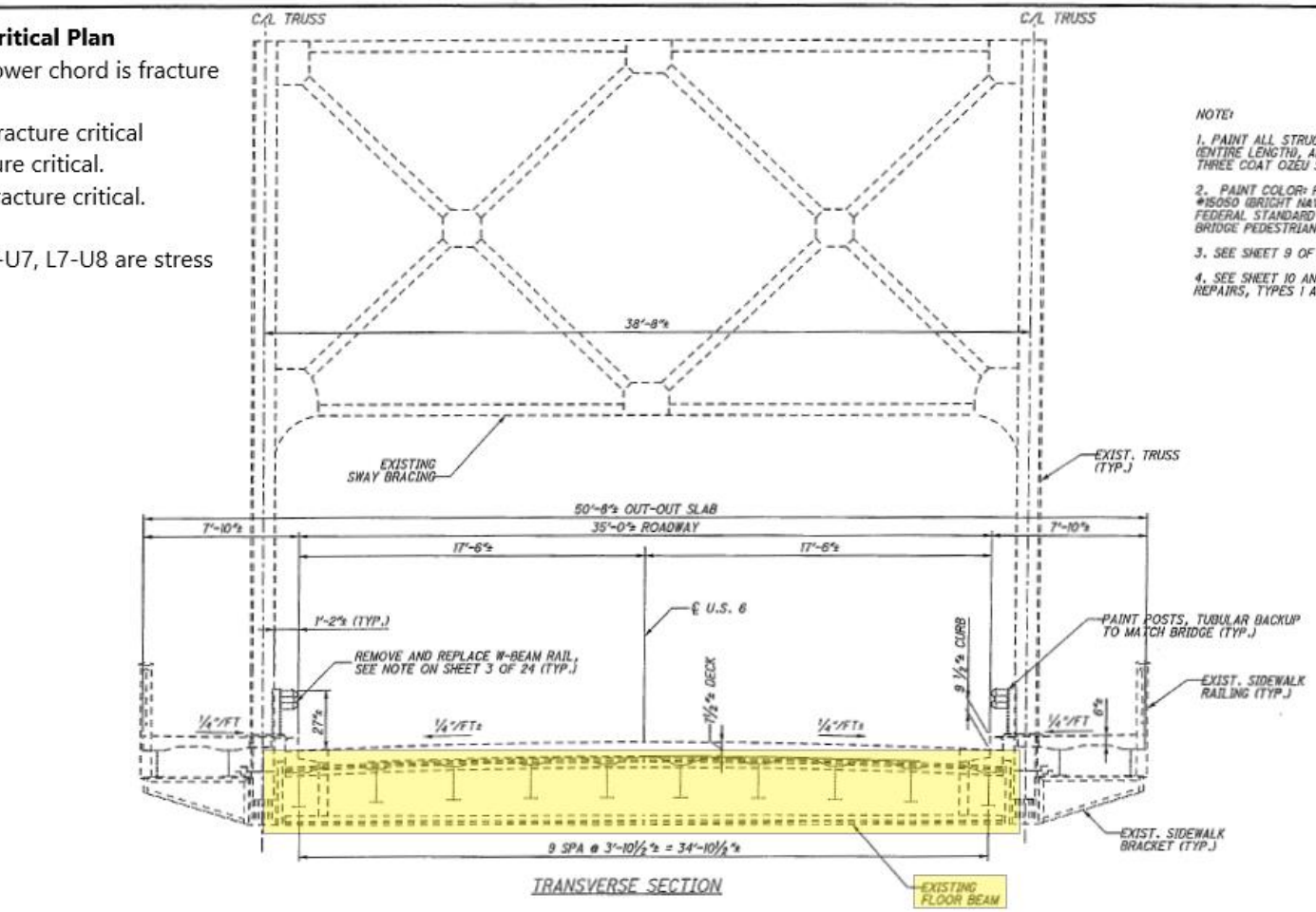
The full length of the lower chord is fracture critical

All 10 floorbeams are fracture critical

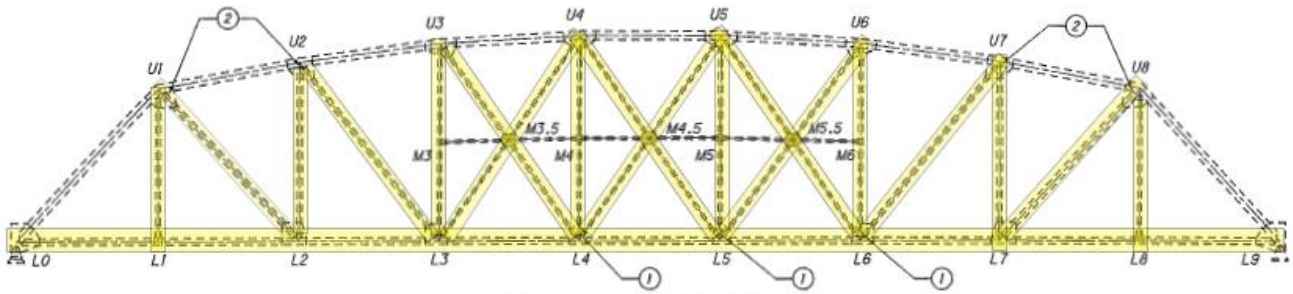
All 8 Verticals are fracture critical.

All 10 diagoonals are fracture critical.

Note: U1-L2, U2-L3, L6-U7, L7-U8 are stress reversal members




TRANSVERSE SECTION




TRUSS ELEVATION (LOOKING NORTH)

Scale: 1" = 10'

NOTE:

1. PAINT ALL STRUCTURAL STEEL, PEDESTRIAN RAILING (ENTIRE LENGTH), AND TRUSS BEARING USING THE ODOT THREE COAT OZEU SYSTEM.

2. PAINT COLOR: FEDERAL STANDARD 595B COLOR #15050 (BRIGHT NAVY BLUE) FOR BRIDGE STRUCTURE, FEDERAL STANDARD 595B COLOR #17038 (BLACK) FOR BRIDGE PEDESTRIAN RAILING AND LIGHT POSTS.

3. SEE SHEET 9 OF 11 FOR CURB AND RAILING REPAIR.

4. SEE SHEET 10 AND 11 OF 11 FOR GUSSET PLATE REPAIRS, TYPES 1 AND 2.

REPAIR LEGEND:

(1) TRUSS GUSSET REPAIR, TYPE 1. REPAIR INSIDE GUSSET, UPSTREAM (SOUTH) TRUSS ONLY. (SEE DRAWING 10 OF 11.)

(2) TRUSS GUSSET REPAIR, TYPE 2. STIFFEN FREE EDGES, BOTH GUSSETS, BOTH TRUSSES. (SEE DRAWING 11 OF 11.)


DESIGN AGENCY
WILBUR SMITH ASSOCIATES
55 PUBLIC SQUARE, SUITE 600
CLEVELAND, OH 44113-1901


| DESIGNED | DRAWN | CHECKED | DATE |
|---|---|---|---|
| TRY | SMS | MAR | 04-09-11 |
| REVISED | | | STRUCTURE FILE NUMBER |
| SDG | | | 2202344 |

TRANSVERSE SECTION AND TRUSS ELEVATION

BRIDGE NO. ERI-6-28.84
OVER VERMILION RIVER

ERI-6-28.84
PID No. 84081

8 / 11

21 / 24

# APPENDIX E

## Element Level Itemized Notes

**APPROACH ITEMS**

| | | Description of Problems |
|---|---|---|
| Approach Wearing Surface (EA) | Rear | Small longitudnal cracks in outer lanes |
| | Forward | south lane repaved in 2021 |

| | | Description of Problems |
|---|---|---|
| Approach Slabs (SF) | Rear | 11.3 SF of patched concrete. |
| | Forward | 1.0 SF of spalls/delaminations on concrete along joint armor. |

| | | Description of Problems |
|---|---|---|
| Embankment (EA) | Northwest | Sidewalk settled and cracked at guardrail post. Minor Erosion. |
| | Northeast | 2'-5" hole under sidewalk. Sidewalk settled and cracked at guardrail post. Minor Erosion. |
| | Southwest | Sidewalk settled and cracked at guardrail post. Minor Erosion. |
| | Southeast | Sidewalk settled, but no cracks. Retaining wall with some minor cracks. |

| | | Description of Problems |
|---|---|---|
| Guardrail (EA) | Northwest | Loose end terminal assembly. Post bolts loose on first post off bridge. |
| | Northeast | Timber block loose on first timber post off bridge. Impact damage at end terminal assembly (Rail bent and block at post split). |
| | Southwest | Impact on rail at terminal assembly. Loose end terminal assembly. Post bolts loose on first post off bridge. |
| | Southeast | Long rubmark. |

**DECK ITEMS**

| | | Description of Problems |
|---|---|---|
| Floor/Slab (SF) | Rear | General hairline map cracking. |
| | Panel 1 | General hairline map cracking. Efflorescence between stringers 2&3. |
| | Panel 2 | General hairline map cracking. |
| | Panel 3 | General hairline map cracking. |
| | Panel 4 | General hairline map cracking. |
| | Panel 5 | General hairline map cracking. Efflorescence between stringers 8&9. |
| | Panel 6 | General hairline map cracking. Efflorescence between stringers 1&4. Moisture between stringers 4&5. |
| | Panel 7 | General hairline map cracking. Efflorescence between stringers 1&2, 3&5 and 7&8. Moisture between stringers 6&8 and 9&10. |
| | Panel 8 | General hairline map cracking. Efflorescence between stringers 2&3. |
| | Panel 9 | General hairline map cracking. Efflorescence between stringers 1&2. |
| | Forward | General hairline map cracking. |

| | | Description of Problems |
|---|---|---|
| Edge of Floor/Slab (LF) | Rear | No notable issues (2022). |
| | Bay 1 | minor spall full length on south edge. Active rust (leak) at top flange of stringer 10 from L0 to 6 feet away. |
| | Bay 2 | 2 1' Spalls on south edge at near L1 one is deep. Deep 6' spall on gneear L2 |
| | Bay 3 | deep 6' spall on  north near L3. Minor spalling first half of bay on the south. Deep 6' spall on the south near L3 |
| | Bay 4 | small 1' spall on north near L3 |
| | Bay 5 | Deep Delamination (could not be removed on north), spalling throughout south edge |
| | Bay 6 | 2 existing 5' spalls on the south. Deep 6' spall on the north edge |
| | Bay 7 | delaminations on the noth could not be removed. Spalls on the south near PPs |
| | Bay 8 | deep 6' spall on the north (fell off on a boat in 2021). 1' spall |
| | Bay 9 | shallow 8' spall off the abutment on the north and 7 ' of additional spallling on the north |
| | Forward | No notable issues (2022). |

| | | Description of Problems |
|---|---|---|
| Wearing Surface (SF) | Rear | Worn. Full-length longitudinal crack at middle of eastbound lane. |
| | Panel 1 | Worn. Two tranverse cracks 5ft long in eastbound lane at midpanel. Longitudinal cracks: 12ft long near lane line for westbound and turn lanes at L1. |
| | Panel 2 | Worn. Tranverse cracks: 4ft long and 5ft long in eastbound lane near midpanel, and full-width at L1. Full-length longitudinal crack near lane line for westbound and turn lanes. |
| | Panel 3 | Worn. Tranverse cracks: 5ft at midpanel in eastbound lane, 2ft long near L3 in eastbound lane, and full-width at L2. Longitudinal cracks: 20ft long at at middle of eastbound lane and full-length near lane line for westbound and turn lanes. |
| | Panel 4 | Worn. Tranverse cracks: Four 3ft cracks in east bound lane and full-width at L3. Longitudinal cracks: 4ft near lane line for westbound and turn lanes and full-length at middle of westbound lane. |
| | Panel 5 | Worn. Tranverse crack at L4. Longitudinal cracks: 18ft crack near lane line for eastbound and turn lanes and full-length near lane line for westbound and turn lanes. |
| | Panel 6 | Worn. Tranverse cracks: Four 3ft cracks in turn lane and full-length at L4. Longitudinal cracks: 15ft crack near lane line for eastbound and turn lanes, full-length near lane line for westbound and turn lanes, and full-length in middle of westbound lane. |
| | Panel 7 | Worn. Tranverse cracks: 6ft and two 3ft near L7 and full-length at L6. Longitudinal cracks: 23ft near lane line for westbound and turn lanes, 23ft at middle of westbound lane and full-length at middle of eastbound lane. |
| | Panel 8 | Worn. Full-length tranverse crack at L7. Longitudinal cracks: 22ft near lane line for westbound and turn lanes, 22ft at middle of turn lane, and full-length at middle of eastbound lane. |
| | Panel 9 | Worn. 3"x3" and 3"x6" spalls along lane line for westbound and turn lanes. Tranverse cracks: 8ft near L8 across lane line between westbound and turn lanes, and full-length at L9. Longitudinal cracks: full-length at middle of turn lane and full-length at middle of eastbound lane. |
| | Forward | Worn. |

| | | Description of Problems |
|---|---|---|
| Curb/Sidewalk/Walkway (LF) | Rear | Misalignment of joint armor at north sidewalk create possible tripping hazard. |
| | Panel 1 | Minor cracks. |
| | Panel 2 | Minor cracks. |
| | Panel 3 | Minor cracks. |
| | Panel 4 | Small hole in web of cantilever near bottom of connection with L3 of north truss. Minor cracks. |
| | Panel 5 | 3 small holes in web of cantilever at L4 of south truss. Minor cracks. |
| | Panel 6 | 5"x10"x2" deep hole in north curb at midpanel. Small hole in bottom flange af north sidewalk fascia stringer at L6 of north truss. 2 small holes in web of cantilever at L5 of south truss. Minor cracks. |
| | Panel 7 | Impact damage to south end and a small hole in web of cantilever at L6 of south truss. Minor cracks. |
| | Panel 8 | Hole in bottom of web of south fascia stringer at L7. Crack with efflorescence at midpanel of south sidewalk. Minor cracks. |
| | Panel 9 | Minor cracks. |
| | Forward | No notable issues (2022). |

| | | Description of Problems |
|---|---|---|
| Railing (LF) | Rear | No notable issues (2022). |
| | Panel 1 | 7ft long rubmark on north rail near L1. |
| | Panel 2 | 13ft long rubmark on north rail at midpanel, 8ft long rubmark on north rail at L2, and 8ft long rubmark on south rail at L2. |
| | Panel 3 | 5ft long rubmark on north rail at L2 and full-length rubmark on south rail. |
| | Panel 4 | Full-length rubmark on north rail and 2ft impact damage with hole on north rail at L4. |
| | Panel 5 | No notable issues (2022). |
| | Panel 6 | Long rubmark and impact around L6 on south railing. |
| | Panel 7 | 6ft long rubmark on north rail at L6, and rubmark and impact around L6 on south railing. |
| | Panel 8 | Impact damage at L7 North. |
| | Panel 9 | 12ft rubmark on south rail near L8 |
| | Forward | No notable issues (2022). |

| | | Description of Problems |
|---|---|---|
| Drainage (EA) | Panel 2 | Partially clogged along north curb. Partially clogged along south curb. Some ponding along south curb in panel 1 (away from scupper). |
| | Panel 3 | Partially clogged along north curb. Partially clogged along south curb. No Ponding. |
| | Panel 5 | No Ponding. |
| | Panel 6 | Ponding at L6 of north truss |
| | Panel 8 | Partially clogged along north curb. Partially clogged along south curb. No Ponding. |
| | Panel 9 | No Ponding. |

| | | Description of Problems |
|---|---|---|
| Expansion Joint (LF) | Rear | New in 2021 |
| | Forward | New in 2021 |

| | | Description of Problems |
|---|---|---|
| Alignment (EA) | Span 1 | No misalignment of superstructure. |

| | | Description of Problems |
|---|---|---|
| Stringers (LF) | Panel 1 S1 | No notable issues (2022). |
| | Panel 1 S2 | No notable issues (2022). |
| | Panel 1 S3 | No notable issues (2022). |
| | Panel 1 S4 | No notable issues (2022). |
| | Panel 1 S5 | No notable issues (2022). |
| | Panel 1 S6 | No notable issues (2022). |
| | Panel 1 S7 | No notable issues (2022). |
| | Panel 1 S8 | No notable issues (2022). |
| | Panel 1 S9 | No notable issues (2022). |
| | Panel 1 S10 | Active rust at top flange from RA to 6ft away. |
| | Panel 2 S1 | No notable issues (2022). |
| | Panel 2 S2 | No notable issues (2022). |
| | Panel 2 S3 | No notable issues (2022). |
| | Panel 2 S4 | No notable issues (2022). |
| | Panel 2 S5 | No notable issues (2022). |
| | Panel 2 S6 | No notable issues (2022). |
| | Panel 2 S7 | No notable issues (2022). |

| | | |
|---|---|---|
| Stringers (LF) (Continued-1) | Panel 2 S8 | No notable issues (2022). |
| | Panel 2 S9 | No notable issues (2022). |
| | Panel 2 S10 | Active rust form PP L15 to 4' away form south edge |
| | Panel 3 S1 | No notable issues (2022). |
| | Panel 3 S2 | No notable issues (2022). |
| | Panel 3 S3 | No notable issues (2022). |
| | Panel 3 S4 | No notable issues (2022). |
| | Panel 3 S5 | No notable issues (2022). |
| | Panel 3 S6 | No notable issues (2022). |
| | Panel 3 S7 | No notable issues (2022). |
| | Panel 3 S8 | No notable issues (2022). |
| | Panel 3 S9 | No notable issues (2022). |
| | Panel 3 S10 | No notable issues (2022). |
| | Panel 4 S1 | No notable issues (2022). |
| | Panel 4 S2 | No notable issues (2022). |
| | Panel 4 S3 | No notable issues (2022). |
| | Panel 4 S4 | No notable issues (2022). |
| | Panel 4 S5 | No notable issues (2022). |
| | Panel 4 S6 | No notable issues (2022). |
| | Panel 4 S7 | No notable issues (2022). |
| | Panel 4 S8 | No notable issues (2022). |
| | Panel 4 S9 | No notable issues (2022). |
| | Panel 4 S10 | No notable issues (2022). |
| | Panel 5 S1 | Pitting on bottom flange and web for 5 feet near midpanel. |
| | Panel 5 S2 | No notable issues (2022). |
| | Panel 5 S3 | No notable issues (2022). |
| | Panel 5 S4 | No notable issues (2022). |
| | Panel 5 S5 | No notable issues (2022). |
| | Panel 5 S6 | No notable issues (2022). |
| | Panel 5 S7 | No notable issues (2022). |
| | Panel 5 S8 | No notable issues (2022). |
| | Panel 5 S9 | No notable issues (2022). |
| | Panel 5 S10 | No notable issues (2022). |
| | Panel 6 S1 | No notable issues (2022). |

| | | |
|---|---|---|
| Stringers (LF) (Continued-2 | Panel 6 S2 | No notable issues (2022). |
| | Panel 6 S3 | No notable issues (2022). |
| | Panel 6 S4 | No notable issues (2022). |
| | Panel 6 S5 | No notable issues (2022). |
| | Panel 6 S6 | Bent bottom flange at L5 |
| | Panel 6 S7 | Bent bottom flange at L5 |
| | Panel 6 S8 | No notable issues (2022). |
| | Panel 6 S9 | No notable issues (2022). |
| | Panel 6 S10 | No notable issues (2022). |
| | Panel 7 S1 | Pitting on bottom flange and web for 11 feet and 2 holes (1/2"x1/8" and pin size) at L6. Bent bottom flange at L6. |
| | Panel 7 S2 | No notable issues (2022). |
| | Panel 7 S3 | No notable issues (2022). |
| | Panel 7 S4 | No notable issues (2022). |
| | Panel 7 S5 | No notable issues (2022). |
| | Panel 7 S6 | No notable issues (2022). |
| | Panel 7 S7 | No notable issues (2022). |
| | Panel 7 S8 | No notable issues (2022). |
| | Panel 7 S9 | No notable issues (2022). |
| | Panel 7 S10 | Pitting on bottom flange and web for 6 feet near L6. |
| | Panel 8 S1 | No notable issues (2022). |
| | Panel 8 S2 | No notable issues (2022). |
| | Panel 8 S3 | No notable issues (2022). |
| | Panel 8 S4 | No notable issues (2022). |
| | Panel 8 S5 | No notable issues (2022). |
| | Panel 8 S6 | No notable issues (2022). |
| | Panel 8 S7 | No notable issues (2022). |
| | Panel 8 S8 | No notable issues (2022). |
| | Panel 8 S9 | Bent bottom flange at L7 |
| | Panel 8 S10 | Bent top flange at L7 |
| | Panel 9 S1 | Active rust at top flange at FA to 8ft away. |
| | Panel 9 S2 | No notable issues (2022). |
| | Panel 9 S3 | No notable issues (2022). |
| | Panel 9 S4 | No notable issues (2022). |
| | Panel 9 S5 | No notable issues (2022). |

| | | |
|---|---|---|
| Stringers (LF) (Continued-3) | Panel 9 S6 | No notable issues (2022). |
| | Panel 9 S7 | No notable issues (2022). |
| | Panel 9 S8 | No notable issues (2022). |
| | Panel 9 S9 | No notable issues (2022). |
| | Panel 9 S10 | active rust on TF starting at FA. 3.5 ft aactive rust on bottom flange (6.5'-10' from FA) |

| | | Description of Problems |
|---|---|---|
| Floorbeams (LF) | FB 0 | Active rust and section loss at end connections. |
| | FB 2 | Active rust and section loss at end connections. |
| | FB 3 | Active rust and section loss at end connections. |
| | FB 4 | Active rust and section loss at end connections. |
| | FB 5 | Active rust and section loss at end connections. |
| | FB 6 | Active rust and section loss at end connections. |
| | FB 7 | Active rust and section loss at end connections. |
| | FB 8 | Active rust and section loss at end connections. |
| | FB 9 | Active rust and section loss at end connections. |

| | | Description of Problems |
|---|---|---|
| Truss Verticals (EA) | L1U1 N | Pitting at splash zone. |
| | L2U2 N | Pitting at splash zone. |
| | L4U4 N | Pitting at splash zone. |
| | L5U5 N | Pitting at splash zone. |
| | L6U6 N | Pitting at splash zone. Hole on south at splash zone. |
| | L7U7 N | Pitting at splash zone. |
| | L8U8 N | Pitting at splash zone. Plate added to web at splash zone. |
| | L1U1 S | Pitting at splash zone. |
| | L2U2 S | Pitting at splash zone. Plate added to web at splash zone. |
| | L3U3 S | Pitting at splash zone. |
| | L4U4 S | Pitting at splash zone. |
| | L5U5 S | Pitting at splash zone. |
| | L6U6 S | Pitting at splash zone. |
| | L7U7 S | Pitting at splash zone. |
| | L8U8 S | Pitting at splash zone. Plate added to web at splash zone. |

| | | Description of Problems |
|---|---|---|
| Truss Diagonals (EA) | L2U1 N | Pitting at splash zone. |
| | L3U2 N | Pitting at splash zone. |
| | L3U4 N | Pitting at splash zone. |
| | L4U5 N | Pitting at splash zone. |
| | L5U4 N | Pitting at splash zone. |
| | L5U6 N | Pitting at splash zone. |
| | L6U5 N | Deep pitting and holes in web at splash zone. |
| | L6U7 N | Pitting at splash zone. |
| | L7U8 N | Pitting at splash zone. |
| | L2U1 S | Pitting at splash zone. |
| | L3U2 S | Pitting at splash zone. Plate added to web at splash zone. |
| | L3U4 S | Deep pitting and holes in web at splash zone. |
| | L4U3 S | Pitting at splash zone. |
| | L4U5 S | Deep pitting and holes in web at splash zone. |
| | L5U4 S | Pitting at splash zone. Plate added to web at splash zone. |
| | L5U6 S | Pitting at splash zone. |
| | L6U5 S | Pitting at splash zone. Plate added to web at splash zone. |
| Truss Diagonals (EA) (Continued) | L6U7 S | Pitting at splash zone. Holes in web at bottom. |
| | L7U8 S | Pitting at splash zone. Holes in web at bottom. |

| | | Description of Problems |
|---|---|---|
| Truss Upper Chord (EA) | L0U1 N | Pitting at splash zone. Holes in bottom batten plate. Bent lacing bars. |
| | U1U2 N | 2 dents in top flange (from construction?). Bent lacing bar. |
| | U2U3 N | 2 bent sections in top flange north side (from construction?) |
| | U3U4 N | Bent lacing bar. ~30% section loss to interior bottom angle aat U4 connection |
| | U5U6 N | Dent in top flange in north side (from construction?). Reactivated rust between flange and web angle |
| | U6U7 N | No notable issues (2022). |
| | U7U8 N | Bent lacing bars. |
| | L9U8 N | Pitting at splash zone. Bent lacing bars. |
| | L0U1 S | Pitting at splash zone. Reactivated rust between web and bottom flange on north side of member |
| | U1U2 S | No notable issues (2022). |
| | U2U3 S | No notable issues (2022). |
| | U3U4 S | Dent in top flange (from construction?). |
| | U4U5 S | No notable issues (2022). |
| | U5U6 S | No notable issues (2022). |
| | U6U7 S | Dent in top flange (from construction?). |
| | U7U8 S | Dent in top flange (from construction?). |
| | L9U8 S | Pitting at splash zone. Holes in bottom batten plate. |

| | | Description of Problems |
|---|---|---|
| Truss Lower Chord (EA) | L0L1 N | No notable issues (2022). |
| | L1L2 N | No notable issues (2022). |
| | L2L3 N | Hole in interior plate near L3. Interior plates bowing from pack rust. |
| | L3L4 N | Interior plates bowing from pack rust. |
| | L4L5 N | Hole in interior plate near L4. Interior plates bowing from pack rust. |
| | L6L7 N | Interior plates bowing from pack rust. |
| | L7L8 N | Hole in diaphragm at L7. |
| | L8L9 N | No notable issues (2022). |
| | L0L1 S | No notable issues (2022). |
| | L1L2 S | No notable issues (2022). |
| | L2L3 S | No notable issues (2022). |
| | L3L4 S | Hole in interior plate near L3. Interior plates bowing from pack rust. |
| | L4L5 S | No notable issues (2022). |
| | L5L6 S | Interior plates bowing from pack rust. |
| | L6L7 S | Hole in interior plate near L6 |
| | L7L8 S | No notable issues (2022). |
| | L8L9 S | Active rust on north angle of diaphragm near L9. |

| | | Description of Problems |
|---|---|---|
| Truss Gusset Plate (EA) | N Ext L0 | Minor pitting. |
| | N Ext L1 | Misalignment bow of 1/8" on west edge. |
| | N Ext L2 | Pack rust bow of 1/2" at L2U2. Measured by largest gap between the gusset and the fill plate (if there is a fill plate) or member. |
| | N Ext L3 | Pack rust bow of 3/8" at L2L3. Measured by largest gap between the gusset and the fill plate (if there is a fill plate) or member. |
| | N Ext L4 | Pack rust bow of 1/2" at L4U5. Measured by largest gap between the gusset and the fill plate (if there is a fill plate) or member. |
| | N Ext L5 | Pack rust bow of 1/4" at L5U4. Measured by largest gap between the gusset and the fill plate (if there is a fill plate) or member. |
| | N Ext L7 | Pack rust bow of 1/2" at L7U7. Measured by largest gap between the gusset and the fill plate (if there is a fill plate) or member. |
| | N Ext L8 | Pack rust bow of 1/2" at L8U8. Measured by largest gap between the gusset and the fill plate (if there is a fill plate) or member. |
| | N Ext L9 | Minor pitting. |
| | N Ext U1 | 2012 rehabilitation added stiffening angle to east edge. |
| | N Ext U2 | 2012 rehabilitation added stiffening angle to west edge. |
| | N Ext U3 | No notable issues (2022). |
| | N Ext U4 | No notable issues (2022). |
| | N Ext U5 | No notable issues (2022). |
| | N Ext U6 | No notable issues (2022). |
| | N Ext U7 | 2012 rehabilitation added stiffening angle to east edge. |
| | N Ext U8 | 2012 rehabilitation added stiffening angle to west edge. |
| | N Ext M3 | No notable issues (2022). |
| | N Ext M3.5 | No notable issues (2022). |
| | N Ext M4 | No notable issues (2022). |
| | N Ext M4.5 | Bow on top edge. |
| | N Ext M5 | No notable issues (2022). |
| | N Ext M5.5 | No notable issues (2022). |
| | N Ext M6 | No notable issues (2022). |

Truss Gusset Plate (EA) (Continued-1)

| | |
|---|---|
| N Int L0 | Minor pitting. |
| N Int L1 | Minor pitting. |
| N Int L2 | Pack rust bow of 1/2" at L2U2. Measured by largest gap between the gusset and the fill plate (if there is a fill plate) or member. |
| N Int L3 | Minor pitting. |
| N Int L4 | Pack rust bow of 3/8" at L4U5. Measured by largest gap between the gusset and the fill plate (if there is a fill plate) or member. |
| N Int L5 | Pack rust bow of 3/16" at L5U4. Measured by largest gap between the gusset and the fill plate (if there is a fill plate) or member. |
| N Int L6 | Pack rust bow of 7/16" at L6L7. Measured by largest gap between the gusset and the fill plate (if there is a fill plate) or member. |
| N Int L7 | Pack rust bow of 5/8" at L7U7. Measured by largest gap between the gusset and the fill plate (if there is a fill plate) or member. |
| N Int L8 | Pack rust bow of 3/8" at L8U8. Measured by largest gap between the gusset and the fill plate (if there is a fill plate) or member. |
| N Int L9 | Minor pitting. |
| N Int U1 | 2012 rehabilitation added stiffening angle to east edge. |
| N Int U2 | 2012 rehabilitation added stiffening angle to west edge. +1/8" bow verticaly |
| N Int U3 | No notable issues (2022). |
| N Int U4 | No notable issues (2022). |
| N Int U5 | No notable issues (2022). |
| N Int U6 | No notable issues (2022). |
| N Int U7 | 2012 rehabilitation added stiffening angle to east edge. |
| N Int U8 | 2012 rehabilitation added stiffening angle to west edge. +3/16" bow along bottom free edge |
| N Int M3 | No notable issues (2022). |
| N Int M3.5 | No notable issues (2022). |
| N Int M4 | No notable issues (2022). |
| N Int M4.5 | No notable issues (2022). |
| N Int M5 | No notable issues (2022). |
| N Int M5.5 | No notable issues (2022). |
| N Int M6 | No notable issues (2022). |

| | | |
|---|---|---|
| Truss Gusset Plate (EA) (Continued)-2 | S Ext L0 | Minor pitting. |
| | S Ext L1 | Minor pitting. |
| | S Ext L2 | Pack rust bow of 3/8" at L2U2. Measured by largest gap between the gusset and the fill plate (if there is a fill plate) or member. |
| | S Ext L3 | Minor pitting. |
| | S Ext L4 | Pack rust bow of 1/4" at L4U5. Measured by largest gap between the gusset and the fill plate (if there is a fill plate) or member. |
| | S Ext L5 | Pack rust bow of 3/8" at L5U4. Measured by largest gap between the gusset and the fill plate (if there is a fill plate) or member. |
| | S Ext L6 | Minor pitting. |
| | S Ext L7 | Pack rust bows of 5/16" at L7U7 & 1/2" at L7U8. Measured by largest gap between the gusset and the fill plate (if there is a fill plate) or member. |
| | S Ext L8 | Minor pitting. |
| | S Ext L9 | Minor pitting. |
| | S Ext U1 | 2012 rehabilitation added stiffening angle to east edge. |
| | S Ext U2 | 2012 rehabilitation added stiffening angle to west edge. |
| | S Ext U3 | No notable issues (2022). |
| | S Ext U4 | No notable issues (2022). |
| | S Ext U5 | No notable issues (2022). |
| | S Ext U6 | No notable issues (2022). |
| | S Ext U7 | 2012 rehabilitation added stiffening angle to east edge. |
| | S Ext U8 | 2012 rehabilitation added stiffening angle to west edge. +1/4" bow along bottom free edge |
| | S Ext M3 | No notable issues (2022). |
| | S Ext M3.5 | No notable issues (2022). |
| | S Ext M4 | No notable issues (2022). |
| | S Ext M4.5 | No notable issues (2022). |
| | S Ext M5 | No notable issues (2022). |
| | S Ext M5.5 | No notable issues (2022). |
| | S Ext M6 | No notable issues (2022). |

| | | |
|---|---|---|
| Truss Gusset Plate (EA) (Continued-3) | S Int L0 | Minor pitting. |
| | S Int L1 | Pack rust bow of 1/4" at L1U1. Measured by largest gap between the gusset and the fill plate (if there is a fill plate) or member. |
| | S Int L2 | Pack rust bow of 1/2" at L2U2. Measured by largest gap between the gusset and the fill plate (if there is a fill plate) or member. |
| | S Int L3 | Minor pitting. |
| | S Int L4 | Pack rust bow of 7/16" at L4U5. Measured by largest gap between the gusset and the fill plate (if there is a fill plate) or member. 2012 rehabilitation added stiffening angles to east and west edges. |
| | S Int L5 | Pack rust bow of 3/8" at L5U4. Measured by largest gap between the gusset and the fill plate (if there is a fill plate) or member. 2012 rehabilitation added stiffening angles to east and west edges. |
| | S Int L6 | Pack rust bow of 1/4" at L6L7. Measured by largest gap between the gusset and the fill plate (if there is a fill plate) or member. 2012 rehabilitation added stiffening angles to east and west edges. |
| | S Int L7 | Pack rust bow of 1/2" at L7U8. Measured by largest gap between the gusset and the fill plate (if there is a fill plate) or member. |
| | S Int L8 | Misalignment bow of 1/16" on west edge. |
| | S Int L9 | Minor pitting. |
| | S Int U1 | 2012 rehabilitation added stiffening angle to east edge. |
| | S Int U2 | 2012 rehabilitation added stiffening angle to west edge. |
| | S Int U3 | No notable issues (2022). |
| | S Int U4 | No notable issues (2022). |
| | S Int U5 | No notable issues (2022). |
| | S Int U6 | No notable issues (2022). |
| | S Int U7 | 2012 rehabilitation added stiffening angle to east edge. |
| | S Int U8 | 2012 rehabilitation added stiffening angle to west edge.+1/4" bow along bottom free edge |
| | S Int M3 | No notable issues (2022). |
| | S Int M3.5 | No notable issues (2022). |
| | S Int M4 | No notable issues (2022). |
| | S Int M4.5 | No notable issues (2022). |
| | S Int M5 | Minor section loss. |
| | S Int M5.5 | No notable issues (2022). |
| | S Int M6 | No notable issues (2022). |

| | | Description of Problems |
|---|---|---|
| Lateral Bracing (EA) | Lower Panel 1 | No notable issues (2022). |
| | Lower Panel 2 | No notable issues (2022). |
| | Lower Panel 3 | No notable issues (2022). |
| | Lower Panel 4 | No notable issues (2022). |
| | Lower Panel 5 | No notable issues (2022). |
| | Lower Panel 6 | No notable issues (2022). |
| | Lower Panel 7 | Rod bent near south truss L6. Center connection hanger broken. |
| | Lower Panel 8 | No notable issues (2022). |
| | Lower Panel 9 | Center connection hanger bent. |
| | Upper Panel 2 | No notable issues (2022). |
| | Upper Panel 3 | No notable issues (2022). |
| | Upper Panel 4 | Bow in bracing from north truss U3 to south truss U4. |
| | Upper Panel 5 | No notable issues (2022). |
| | Upper Panel 6 | No notable issues (2022). |
| | Upper Panel 7 | No notable issues (2022). |
| | Upper Panel 8 | No notable issues (2022). |

| | | Description of Problems |
|---|---|---|
| Sway Bracing (EA) | Rear Portal | Minor pitting and section loss along web of members. Open bolt holes at lower connection to L0U1. |
| | U2 | Minor pitting and section loss along web of members. A minor gouge on north lower diagonal. Bent flanges on lower brace and south center lower diagonal. |
| | U3 | Minor pitting and section loss along web of members. Pack rust at lower center gusset. Hole in angle connection to south upper chord. |
| | U4 | Minor pitting and section loss along web of members. Minor gouges on north lower diagonal. |
| | U5 | Minor pitting and section loss along web of members. Bent flanges on north center lower diagonal. Bent north diagonal gusset plate. Hole in angle connection to south upper chord. |
| | U6 | Minor pitting and section loss along web of members. Hole in angle connection to north upper chord. |
| | U7 | Minor pitting and section loss along web of members. Bent flanges on lower brace and north upper diagonal. |
| | Forward Portal | Minor pitting and section loss along web of members. Open bolt holes at lower connection to U8L9. |

| | | Description of Problems |
|---|---|---|
| Bearing Devices (EA) | RA North | Tilted towards backwall. Active rust at pin nuts. |
| | RA South | Tilted towards backwall. Northwest anchor nut loose. Active rust at pin nuts. |
| | FA North | Southeast anchor nut loose. Active rust at pin nuts. |
| | FA South | Northeast anchor nut missing. Southeast and southwest anchor nuts loose. Active rust at pin nuts. |

| | | Description of Problems |
|---|---|---|
| Arch (LF) | Rear | No Arch |
| | Forward | No Arch |
| Arch Total | | |

| | | Description of Problems |
|---|---|---|
| Arch Column/Hanger (EA) | Rear | No Arch |
| | Forward | No Arch |
| Arch Column/Hanger Total | | |

| | | Description of Problems |
|---|---|---|
| Arch Spandrel Walls (LF) | Rear | No Arch |
| | Forward | No Arch |
| Arch Spandrel Walls Total | | |

| | | Description of Problems |
|---|---|---|
| Protective Coating System (LF) | N Truss Panel 1 | Active rust at bearing pin nut. Chipped paint on L0U1. |
| | N Truss Panel 2 | No notable issues (2022). |
| | N Truss Panel 3 | Active rust on interior plates of L2L3. |
| | N Truss Panel 4 | Active rust on interior plates of L3L4. |
| | N Truss Panel 5 | Active rust on interior plates of L4L5. |
| | N Truss Panel 6 | Active rust on interior plates of L5L6. |
| | N Truss Panel 7 | scrape on L6L7 from vehical . |
| | N Truss Panel 8 | Active rust at top of L8 gusset plate. |
| | N Truss Panel 9 | Active rust at bearing pin nut. Chipped paint on east portal gusset at L9U8. |
| | S Truss Panel 1 | Active rust at bearing pin nut. |
| | S Truss Panel 2 | No notable issues (2022). |
| | S Truss Panel 3 | No notable issues (2022). |
| | S Truss Panel 4 | Active rust on interior plates of L3L4. |
| | S Truss Panel 5 | No notable issues (2022). |
| | S Truss Panel 6 | Paint scrape on L5L6. Active rust on interior plates of L5L6. |
| | S Truss Panel 7 | Active rust on interior plates of L6L7. |
| | S Truss Panel 8 | L8U8 has section where sandblasting not cleaned away before painting. |

| | | |
|---|---|---|
| Protective Coating System (LF) (Continued-1) | S Truss Panel 9 | Active rust at bearing pin nut. Active rust on diaphragm of L8L9 near L9. |
| | Panel 1 S1 | No notable issues (2022). |
| | Panel 1 S2 | No notable issues (2022). |
| | Panel 1 S3 | No notable issues (2022). |
| | Panel 1 S4 | No notable issues (2022). |
| | Panel 1 S5 | No notable issues (2022). |
| | Panel 1 S6 | No notable issues (2022). |
| | Panel 1 S7 | No notable issues (2022). |
| | Panel 1 S8 | No notable issues (2022). |
| | Panel 1 S9 | No notable issues (2022). |
| | Panel 1 S10 | Active rust from RA to 6 feet away. |
| | Panel 2 S1 | No notable issues (2022). |
| | Panel 2 S2 | No notable issues (2022). |
| | Panel 2 S3 | No notable issues (2022). |
| | Panel 2 S4 | No notable issues (2022). |
| | Panel 2 S5 | No notable issues (2022). |
| | Panel 2 S6 | No notable issues (2022). |
| | Panel 2 S7 | No notable issues (2022). |
| | Panel 2 S8 | No notable issues (2022). |
| | Panel 2 S9 | No notable issues (2022). |
| | Panel 2 S10 | No notable issues (2022). |
| | Panel 3 S1 | No notable issues (2022). |
| | Panel 3 S2 | No notable issues (2022). |
| | Panel 3 S3 | No notable issues (2022). |
| | Panel 3 S4 | No notable issues (2022). |
| | Panel 3 S5 | No notable issues (2022). |
| | Panel 3 S6 | No notable issues (2022). |
| | Panel 3 S7 | No notable issues (2022). |
| | Panel 3 S8 | No notable issues (2022). |
| | Panel 3 S9 | No notable issues (2022). |
| | Panel 3 S10 | No notable issues (2022). |
| | Panel 4 S1 | No notable issues (2022). |
| | Panel 4 S2 | No notable issues (2022). |
| | Panel 4 S3 | No notable issues (2022). |

| | | |
|---|---|---|
| Protective Coating System (LF) (Continued-2 | Panel 4 S4 | No notable issues (2022). |
| | Panel 4 S5 | No notable issues (2022). |
| | Panel 4 S6 | No notable issues (2022). |
| | Panel 4 S7 | No notable issues (2022). |
| | Panel 4 S8 | No notable issues (2022). |
| | Panel 4 S9 | No notable issues (2022). |
| | Panel 4 S10 | No notable issues (2022). |
| | Panel 5 S1 | No notable issues (2022). |
| | Panel 5 S2 | No notable issues (2022). |
| | Panel 5 S3 | No notable issues (2022). |
| | Panel 5 S4 | No notable issues (2022). |
| | Panel 5 S5 | No notable issues (2022). |
| | Panel 5 S6 | No notable issues (2022). |
| | Panel 5 S7 | No notable issues (2022). |
| | Panel 5 S8 | No notable issues (2022). |
| | Panel 5 S9 | No notable issues (2022). |
| | Panel 5 S10 | No notable issues (2022). |
| | Panel 6 S1 | No notable issues (2022). |
| | Panel 6 S2 | No notable issues (2022). |
| | Panel 6 S3 | No notable issues (2022). |
| | Panel 6 S4 | No notable issues (2022). |
| | Panel 6 S5 | No notable issues (2022). |
| | Panel 6 S6 | No notable issues (2022). |
| | Panel 6 S7 | No notable issues (2022). |
| | Panel 6 S8 | No notable issues (2022). |
| | Panel 6 S9 | No notable issues (2022). |
| | Panel 6 S10 | No notable issues (2022). |
| | Panel 7 S1 | No notable issues (2022). |
| | Panel 7 S2 | No notable issues (2022). |
| | Panel 7 S3 | No notable issues (2022). |
| | Panel 7 S4 | No notable issues (2022). |
| | Panel 7 S5 | No notable issues (2022). |
| | Panel 7 S6 | No notable issues (2022). |

| | | |
|---|---|---|
| Protective Coating System (LF) (Continued-3) | Panel 7 S7 | No notable issues (2022). |
| | Panel 7 S8 | No notable issues (2022). |
| | Panel 7 S9 | No notable issues (2022). |
| | Panel 7 S10 | No notable issues (2022). |
| | Panel 8 S1 | No notable issues (2022). |
| | Panel 8 S2 | No notable issues (2022). |
| | Panel 8 S3 | No notable issues (2022). |
| | Panel 8 S4 | No notable issues (2022). |
| | Panel 8 S5 | No notable issues (2022). |
| | Panel 8 S6 | No notable issues (2022). |
| | Panel 8 S7 | No notable issues (2022). |
| | Panel 8 S8 | No notable issues (2022). |
| | Panel 8 S9 | No notable issues (2022). |
| | Panel 8 S10 | No notable issues (2022). |
| | Panel 9 S1 | Active rust at 3 feet from FA to 8 feet away. |
| | Panel 9 S2 | No notable issues (2022). |
| | Panel 9 S3 | No notable issues (2022). |
| | Panel 9 S4 | No notable issues (2022). |
| | Panel 9 S5 | No notable issues (2022). |
| | Panel 9 S6 | No notable issues (2022). |
| | Panel 9 S7 | No notable issues (2022). |
| | Panel 9 S8 | No notable issues (2022). |
| | Panel 9 S9 | No notable issues (2022). |
| | Panel 9 S10 | No notable issues (2022). |
| | FB 0 | Active rust at beam ends. |
| | FB 1 | Active rust at beam ends. |
| | FB 2 | Active rust at beam ends. |
| | FB 3 | Active rust at beam ends. |
| | FB 4 | Active rust at beam ends. |
| | FB 5 | Active rust at beam ends. |
| | FB 6 | Chipped paint on bottom flange. Active rust at beam ends. |
| | FB 7 | Active rust at beam ends. |
| | FB 8 | Active rust at beam ends. |
| | FB 9 | Active rust at beam ends. |

**SUBSTRUCTURE ITEMS**

| | | Description of Problems |
|---|---|---|
| Abutment Walls (LF) | Rear | Leaning 3/4" to North and 3/8" away from river for every 4 feet vertical. 15.0 SF of spall/delaminations. Cracks & efflorescence. |
| | Forward | Leaning 3/8" towards river for every 4 feet vertical. 30.5 SF of spall/delaminations. 2 exposed rebars. |

| | | Description of Problems |
|---|---|---|
| Backwalls (LF) | Rear | 1.25 SF of spall/delaminations near top at north side. |
| | Forward | 2.0 SF of spall/delaminations near top at south side. |

| | | Description of Problems |
|---|---|---|
| Wingwalls (EA) | Northwest | Fill behind might be moving (settlement of approach sidewalk). |
| | Northeast | Fill behind might be moving (settlement of approach sidewalk). |
| | Southwest | Fill behind might be moving (settlement approach sidewalk). 1.75 SF of spall/delaminations. |
| | Southeast | Fill behind might be moving (settlement of approach sidewalk). 6.75 SF of spall/delaminations. Exposed rebar. |

| | | Description of Problems |
|---|---|---|
| Scour (EA) | Rear | No Scour |
| | Forward | No Scour |

| | | Description of Problems |
|---|---|---|
| Slope Protection (EA) | Rear | Deep ruts near sheet piling. |
| | Forward | Small ruts at abutment. |

**CHANNEL ITEMS**

| | | Description of Problems |
|---|---|---|
| Alignment (LF) | Upstream | Sheet piling walls keep water flow in middle of bridge. |
| | Downstream | Sheet piling walls keep water flow in middle of bridge. |

| | | Description of Problems |
|---|---|---|
| Protection (LF) | Upstream | Sheet piling wall leans towards water. Section loss. Hole in west sheet piling near bridge center. |
| | Downstream | Sheet piling wall leans towards water. Section loss. Hole in west sheet piling near bridge center. |
| | Protection Total | |

| | | Description of Problems |
|---|---|---|
| Hydraulic Opening (EA) | Upstream | No signs of water levels reaching bottom of Superstructure. |
| | Downstream | No signs of water levels reaching bottom of Superstructure. |

**SIGN/UTILITY ITEMS**

| | | Description of Problems |
|---|---|---|
| Signs (EA) | Rear Portal | Look clean and is legible. |
| | Forward Portal | Both look clean and are legible. |

| | | Description of Problems |
|---|---|---|
| Sign Supports (EA) | Rear Portal | connection appears stable |
| | Forward Porta | Both connections appears stable. |

| | | Description of Problems |
|---|---|---|
| Utilities (LF) | Lower Electric | Two disconnections at south end of RA. Disconnected c-clamp connector along south sidewalk fascia stringer. (Abandoned?) |
| | South FA Light | Conduit and wires disconnected and missing section at bottom. (Abandoned?) |
| | Light on N Truss | Light works. Cover on photo electric control is cracked. Power line from NW along North Truss. |
| | Watering Hose | Broken hose along north pedestrian railing at east end of bridge. Originates at NE. Connect to both pedestrian railings to water flower baskets. (Abandoned?) |

# APPENDIX F

## Substructure Monumentation

# ERI -6 – 2893
# Substructure Monumentation
# and
# Monitoring

## PROJECT DESCRIPTION

**Bridge No. ERI-6-2893** carries three lanes of State Route 6 (one eastbound lane, one westbound lane, and one turn lane) and two sidewalks over the Vermilion River in Vermilion, Ohio. The superstructure is a single span steel through truss. The substructure consists of reinforced concrete abutments and wingwalls. The substructure units of the bridge were monumented and measured with electronic distance measuring equipment. Control points were established off the bridge for measurement of the points on the substructure units.

**Purpose:**
Establish monumentation and baseline data for monitoring movement in the bridge substructure.

**Monumentation:**
Four threaded rods were set in the abutments, establishing two survey points on each abutment referenced to the centerline of the bearings.

Four secondary control monuments (two 5/8" rebar with cap, one survey marker spike, and one MAG nail) were established under the bridge to observe the threaded rods from two locations.

Three primary control monuments (two 40" X 3/4" rebar with cap and one survey marker spike) were established outside the area of possible movement. Local benchmarks were established.

**Procedure:**
After all monuments were established, the following procedures were followed.

1. GPS observations were recorded for each of the primary control monuments. GPS data was processed providing horizontal and vertical data for each monument.

2. Using a recently calibrated instrument a closed traverse was completed through the primary and secondary monuments based on the GPS data. Recorded data was processed providing horizontal and vertical data for the secondary monuments.

3. Each of the threaded rods was observed from each of two secondary monuments recording a minimum of one direct and one reverse reading for each rod. The data was processed providing horizontal and vertical data for the four threaded rods.

4. A level circuit by digital level was completed to establish the elevation of the threaded rods.

5. Field data was entered into a spreadsheet providing a basis for comparison with future observations. All coordinates and elevations are in English units of feet.

**Future observations:**

Procedure steps 2, 3, 4 and 5 will be repeated for future observations.

**Data:**

**Point Definitions**

**Primary Control**
PCM 1 – 3/4" rebar with cap stamped "PRIMARY" (SV1)
PCM 2 – Survey Marker Spike (SV2)
PCM 3 – 3/4" rebar with cap stamped "PRIMARY" (SV3)

**Secondary Control**
SCM 1 – Survey Marker Spike (SV4)
SCM 2 – MAG Nail (SV5)
SCM 3 – 5/8" rebar with cap stamped "TRAVERSE PT" (SV6)
SCM 4 – 5/8" rebar with cap stamped "TRAVERSE PT" (SV7)

**Control Rods**
SUR 1 – 5/8" threaded rod set in bridge seat (SV10)
SUR 2 – 5/8" threaded rod set in bridge seat (SV11)
SUR 3 – 5/8" threaded rod set in bridge seat (SV12)
SUR 4 – 5/8" threaded rod set in bridge seat (SV13)

**Field Data:**

**PRIMARY CONTROL**

| POINT | FIELD PT. | NORTHING | EASTING | ROD ELEV. | DESCRIPTION |
|---|---|---|---|---|---|
| **Date: 8/24/2022** | | | | | |
| PCM1 | SV1 | 639758.8183 | 2008009.3643 | 577.11 | 3/4" REBAR W/ PRIMARY CAP |
| PCM2 | SV2 | 639457.3550 | 2007520.4765 | 589.09 | SURVEY MARKER SPIKE |
| PCM3 | SV3 | 639725.9372 | 2007662.2343 | 585.65 | 3/4" REBAR W/ PRIMARY CAP |
| **Date: 12/8/2022** | | | | | |
| PCM1 | SV1 | 639758.8212 | 2008009.3624 | 577.11 | 3/4" REBAR W/ PRIMARY CAP |
| PCM2 | SV2 | 639457.3534 | 2007520.4858 | 589.15 | SURVEY MARKER SPIKE |
| PCM3 | SV3 | 639725.9338 | 2007662.2346 | 585.66 | 3/4" REBAR W/ PRIMARY CAP |

**SECONDARY CONTROL**

| POINT | FIELD PT. | NORTHING | EASTING | ROD ELEV. | DESCRIPTION |
|---|---|---|---|---|---|
| **Date: 8/24/2022** | | | | | |
| SCM1 | SV4 | 639717.6304 | 2007545.9996 | 574.31 | SURVEY MARKER SPIKE |
| SCM2 | SV5 | 639662.0759 | 2007603.2126 | 575.51 | MAG NAIL |
| SCM3 | SV6 | 639672.6815 | 2007368.5027 | 574.99 | 5/8" REBAR W/ TRAV CAP |
| SCM4 | SV7 | 639609.9153 | 2007428.8729 | 575.15 | 5/8" REBAR W/ TRAV CAP |
| **Date: 12/8/2022** | | | | | |
| SCM1 | SV4 | 639717.6379 | 2007545.9899 | 574.32 | SURVEY MARKER SPIKE |
| SCM2 | SV5 | 639662.0735 | 2007603.2140 | 575.52 | MAG NAIL |
| SCM3 | SV6 | 639672.6733 | 2007368.5001 | 574.99 | 5/8" REBAR W/ TRAV CAP |
| SCM4 | SV7 | 639609.9065 | 2007428.8694 | 575.14 | 5/8" REBAR W/ TRAV CAP |

**CONTROL RODS**

| POINT | FIELD. PT. | NORTHING | EASTING | ROD ELEV. | DESCRIPTION | SEAT ELEV. |
|---|---|---|---|---|---|---|
| **Date: 8/24/2022** | | | | | | |
| SUR1 | SV10 | 639620.8925 | 2007370.8790 | 579.73 | 5/8" THREADED ROD | 579.67 |
| SUR2 | SV11 | 639663.9301 | 2007363.1096 | 579.69 | 5/8" THREADED ROD | 579.65 |
| SUR3 | SV12 | 639707.4913 | 2007602.0445 | 579.33 | 5/8" THREADED ROD | 579.28 |
| SUR4 | SV13 | 639664.5632 | 2007609.9112 | 579.34 | 5/8" THREADED ROD | 579.28 |
| **Date: 12/8/2022** | | | | | | |
| SUR1 | SV10 | 639620.8792 | 2007370.8827 | 579.74 | 5/8" THREADED ROD | 579.68 |
| SUR2 | SV11 | 639663.9203 | 2007363.1109 | 579.70 | 5/8" THREADED ROD | 579.66 |
| SUR3 | SV12 | 639707.4796 | 2007602.0414 | 579.34 | 5/8" THREADED ROD | 579.29 |
| SUR4 | SV13 | 639664.5544 | 2007609.9095 | 579.35 | 5/8" THREADED ROD | 579.31 |

**SURVEY:**

The field survey was performed by Richland Engineering Limited, a Wallace Pancher Group company, on August 24th and December 8th, 2022.

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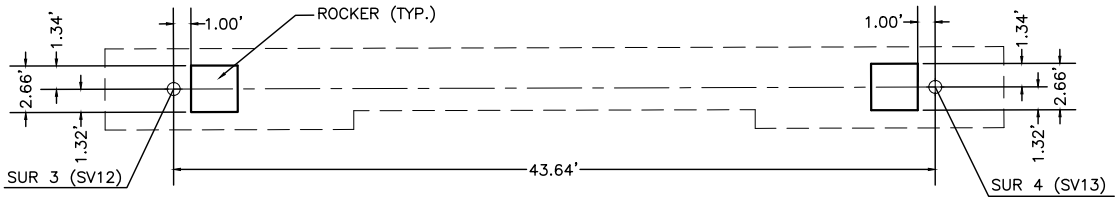
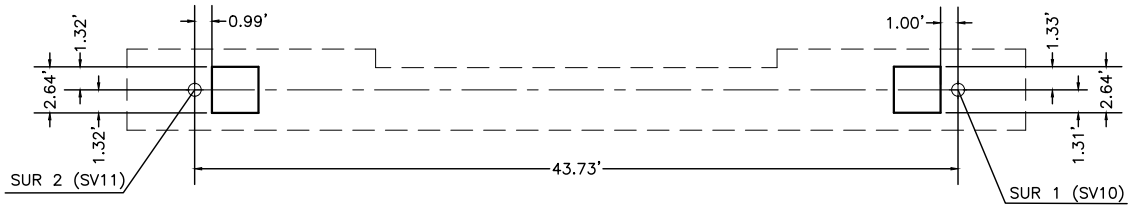
# ERI –6 – 2893
# SUBSTRUCTURE MONUMENTATION
# THREADED ROD LOCATIONS

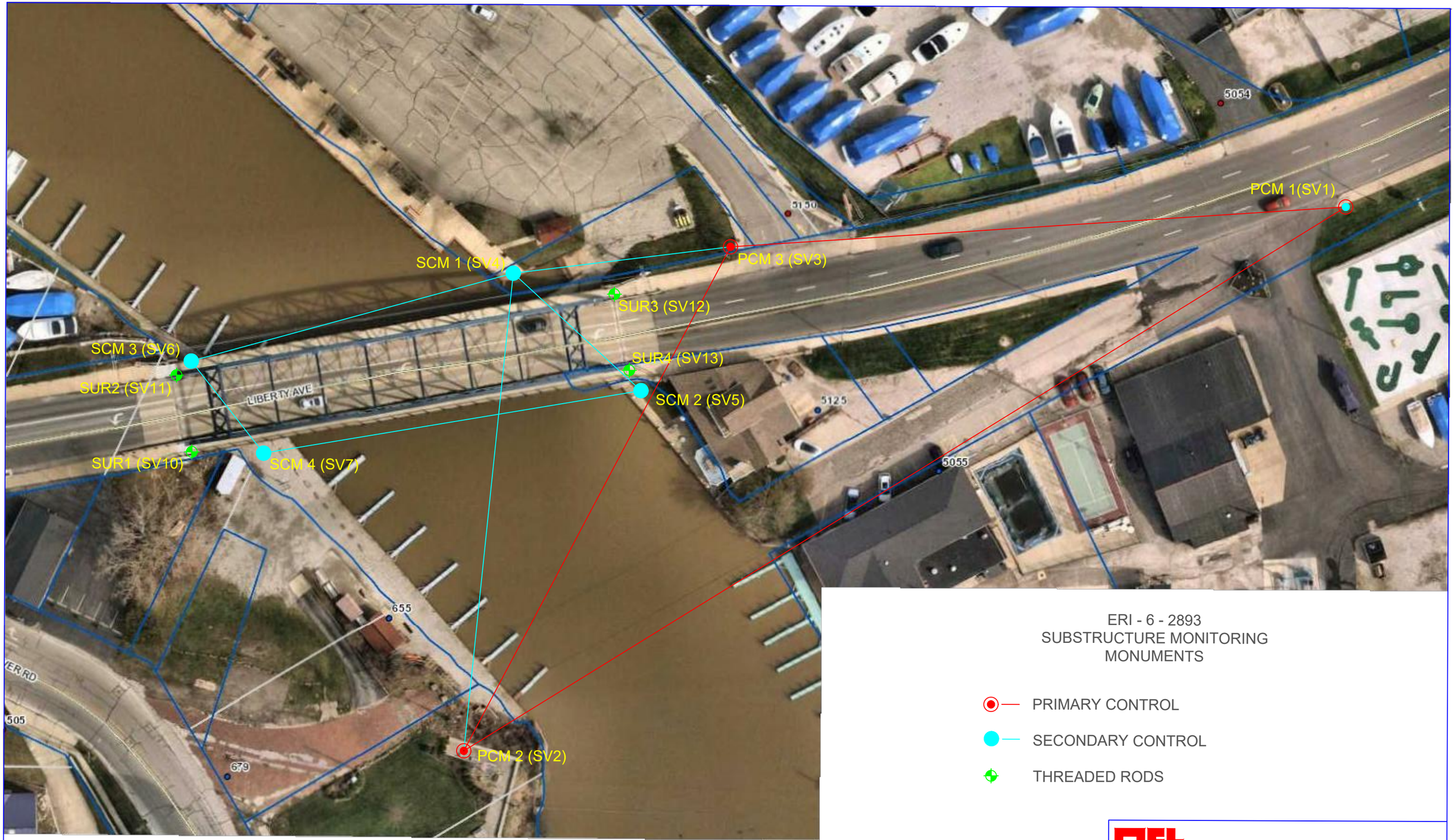
NORTH




FORWARD ABUTMENT




REAR ABUTMENT

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SUBSTRUCTURE MONITORING
MONUMENTS

PRIMARY CONTROL

SECONDARY CONTROL

THREADED RODS

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