ODOT District 8

2024 Fracture Critical and In-Depth Element Level Inspection Report

October 2024

Bridge No. HAM-50-0376L

SFN: 3102521

Prepared for:

ODOT District 8
505 SR 741
Lebanon, Ohio 45036

PID No. 105475

Prepared by:

TRANSYSTEMS

1100 Superior Avenue,
Suite 1000
Cleveland, OH 44114

Project Number P402220026

2024 FRACTURE CRITICAL AND IN-DEPTH ELEMENT LEVEL PHYSICAL CONDITION REPORT

of

BRIDGE NO. HAM-50-0376L
SFN: 3102521

CLEVES, OHIO

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July 8-10, 2024

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OHIO DEPARTMENT OF TRANSPORTATION
DISTRICT 8

PID No. 105475

Report Submitted October 2024

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BRIDGE DESCRIPTION

The HAM-50-0376L Bridge carries two lanes of traffic for westbound U.S. Route 50 over the Great Miami River in the village of Cleves, Ohio. The eastbound lanes at this location are carried by a separate structure. The bridge was built in 1959 and in 1992 the bridge received a new deck and all of the structural steel was painted.

The bridge consists of four simply supported truss spans – two 191'-4", 8-panel spans at the ends (Spans 1 and 4) and two 250'-0", 10-panel spans in the center (Spans 2 and 3). The trusses are modified Camelback Pratt Trusses whose fracture critical members are highlighted in **RED** (see **Figure 2 and Figure 3**).

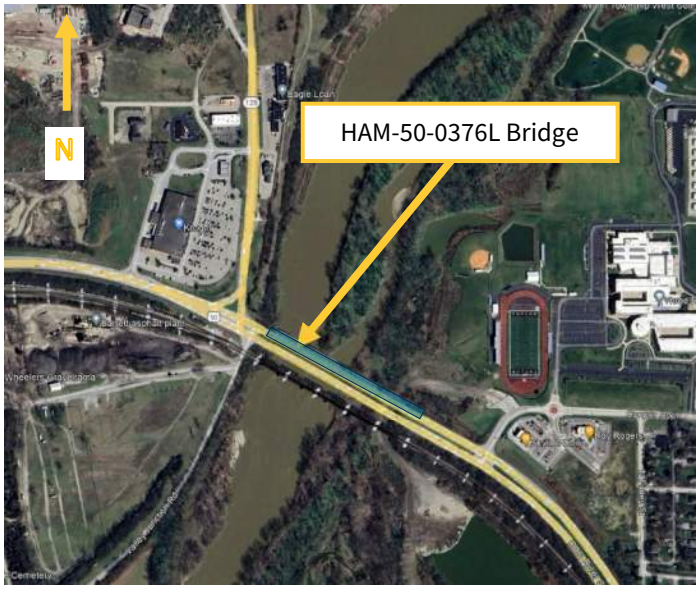


Figure 1 - Location Map

The lower chords of the trusses are constructed from open double web sections with intermediate diaphragms. The upper chords and end posts are built-up riveted box sections composed of a top cover plate, channels, and bottom lacing bars. The diagonals and verticals are rolled wide flange sections. The stringers are rolled wide flange members that frame into the floorbeam with tie plates over the floorbeam creating a continuous stringer. The floorbeams are rolled wide flange beams, also highlighted as fracture critical members and are connected to the lower gusset plates (see **Figure 2 and Figure 3**).

The substructure is comprised of reinforced concrete abutments and piers. The abutments are labeled as Abutment 1 (west) and Abutment 5 (east). The piers are labeled as Piers 2, 3, and 4.

The HAM-50-0376L Bridge is on a west by northwest alignment. The nomenclature of this bridge will follow previous inspection reports for consistency in accordance with current ODOT standards with trusses labeled north and south, floorbeams labeled 0 to 8 (Spans 1 and 4) and 0 to 10 (Spans 2 and 3) from the west to the east and the stringers were labeled 1 to 5 from the north to the south.

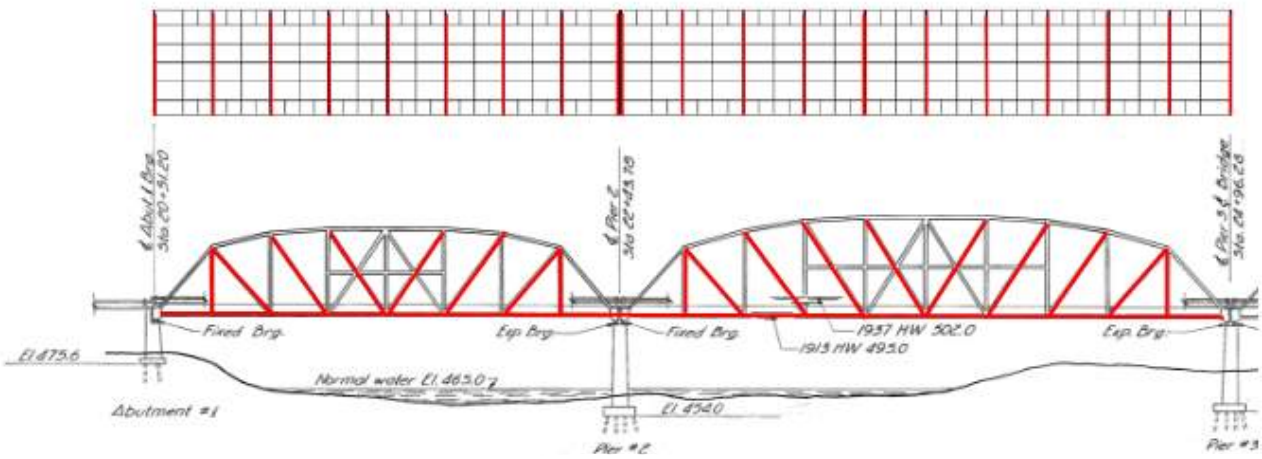


Figure 2 - Partial south elevation of bridge with Spans 1 and 2 shown (Note the non-redundant steel tension members highlighted in red)

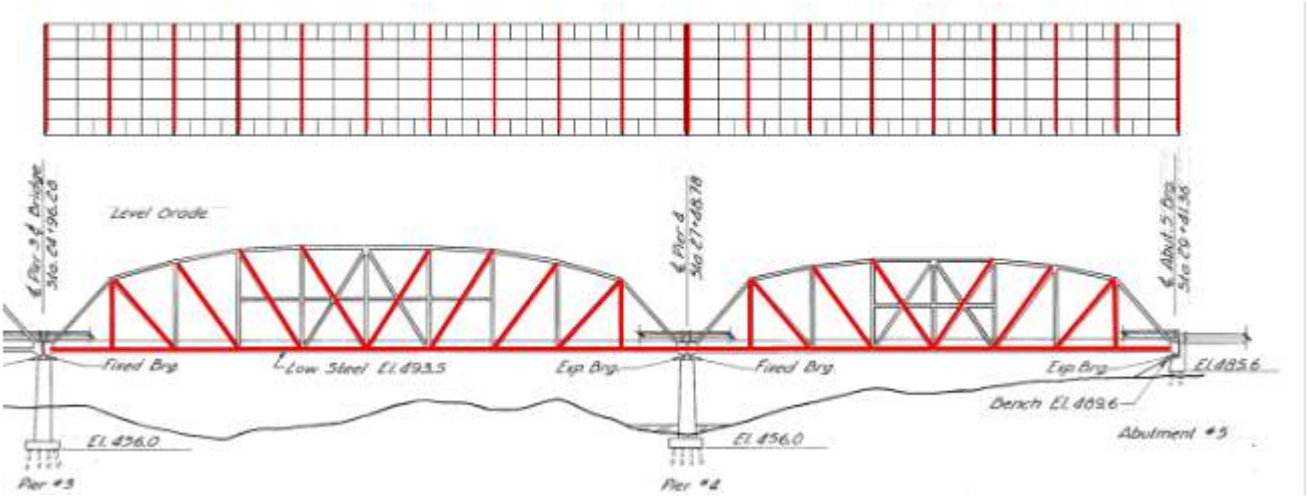


Figure 3 - Partial south elevation of bridge with Spans 3 and 4 shown (Note the non-redundant steel tension members highlighted in red)

RECENT MAINTENANCE HISTORY

1959 Construction

- Bridge opened to traffic.

1992 Rehabilitation

- Replaced reinforced concrete deck.
- Painted all structural steel.

2017-2018 Rehabilitation

- Patched deck wearing surface.
- Replaced approach guardrail.
- Removed debris and buildup at substructure units.
- Isolated painting of structural steel.
- Isolated replacement of existing riveted connections with high strength steel bolt connections.
- Performed weld repairs to stringer cross frame connections.
- Replaced lacing bars with advanced section loss.
- Removed stringer erection angles welded to floorbeam webs.

INSPECTION SCOPE AND PROCEDURE

Personnel from TranSystems Corporation and TRC Engineers, Inc. performed a Non-redundant Steel Tension Member (NSTM) and in-depth element level inspection of the bridge during the days of July 8 – 10, 2024. All NSTMs were inspected by team leaders who have completed the *National Highway Institute (NHI) Course No. 130078 - Fracture Critical Inspection Techniques for Steel Bridges*. Access to the structure was gained through the use of a 40-foot self-propelled boom lift, underbridge inspection unit (UBIU), 24-foot extension ladder, protected climbing, and on foot.

The truss bottom chords were inspected using a combination of the UBIU and protected climbing. The diagonals and verticals above deck and upper chord truss members were inspected using the boom lift. Span 4, which was entirely over land, was inspected using an extension ladder. The abutments and abutment bearings were inspected using an extension ladder. The piers and pier bearings were inspected from the UBIU. The bridge deck, wearing surface, and approaches were inspected on foot utilizing the lane closure. Underwater inspection was not part of the scope for this project and was not performed.

Traffic control was necessary to gain access to the bridge while using the UBIU and boom lift. A right lane daytime closure of U.S Route 50 westbound was required on July 8 and 10. A left lane daytime closure was required on July 9 to access the south side of the bridge. Traffic control was provided by A&A Safety, Inc. and all signs/devices were placed in accordance with the latest Ohio Manual for Uniform Traffic Control Devices.

The inspection findings were recorded on bridge specific field inspection forms. Field sketches were created to document specific conditions. Inspection equipment utilized during the inspection included but was not limited to: chipping hammers, wire brushes, measuring tapes, 6 foot carpenter rules, and flashlights. Color digital photographs were taken of areas of deterioration, condition changes, typical details, and any immediate maintenance needs, if necessary.

INSPECTION TEAM

The inspection team members are as follows:

- Josh Sadlock, PE, Team Leader – TranSystems
- Jacob Adamrovich, EI – TranSystems
- Ricardo Pobega – TranSystems
- Michael Schrepfer, – TRC Engineers, Inc.

CONDITION RATING

State and federal guidelines for evaluating the condition of bridges have been developed to promote uniformity in the inspections performed by different teams and at different times. Condition ratings are used to describe the existing, in-place bridge as compared to the as-built condition. The following table was used as a guide in evaluating the condition of the various members of the bridge.

SUMMARY ITEMS (SNBI)	CONDITION	DEFECTS
9	Excellent	Isolated inherent defects.
8	Very Good	Some inherent defects.
7	Good	Some minor defects.
6	Satisfactory	Widespread minor or isolated moderate defects.
5	Fair	Some moderate defects; strength and performance of the component are not affected.
4	Poor	Widespread moderate or isolated major defects; strength and/or performance of the component is affected.
3	Serious	Major defects; strength and/or performance of the component is seriously affected. Condition typically necessitates more frequent monitoring, load restrictions, and/or corrective actions.
2	Critical	Major defects; component is serverly compromised. Condition typically necessitates frequent monitoring, significant load restrictions, and/or corrective actions in order to keep the bridge open.
1	“Imminent” Failure	Bridge is closed to traffic due to component condition. Repair or rehabilitation may return the bridge to service
0	Failed	Bridge is closed due to component condition, and is beyond corrective action. Replacement is required to restore service.

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

1. Manual of Bridge Inspection, Ohio Department of Transportation (ODOT), 2014.
2. Manual for Bridge Element Inspection, 2nd Edition, AASHTO, 2019 (rev 2022).
3. Manual for Condition Evaluation of Bridges, 2nd Edition, AASHTO, 2011 (rev 2016).
4. Bridge Inspector's Reference Manual, U. S. Department of Transportation, 2022 (rev 2023).
5. Inspection of Fracture Critical Bridge Members, U.S. Department of Transportation, 1986.
6. National Bridge Inspection Standards, U.S. Department of Transportation, 2022.
7. Manual for Bridge Evaluation, AASHTO, 2018 (3rd edition with 2020 and 2022 Interim Revisions).
8. Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation’s Bridges, Federal Highway Administration, 1995 with Latest Revisions.
9. Ohio Manual of Uniform Traffic Control Devices (OMUTCD), ODOT, 2012 (rev 2011).

EXECUTIVE SUMMARY

The HAM-50-0376L Bridge is in FAIR CONDITION [5-SNBI] overall. Significant findings include:

- Small spalls and minor cracks in deck wearing surface
- Large spalls with exposed reinforcement in the substructure elements
- Active corrosion and section loss to gusset plate connections
- Active corrosion and pack rust along the bottom chord plates with deformations of diaphragm plates due to pack rust

The overall item ratings can be summarized in Table 1:

Bridge Condition Summary Ratings		
ITEM	**RATING**	**TYPICAL NOTES**
DECK	**6**	**Hairline cracks, isolated spalls with minimal exposed reinforcement, and minor impact damage to railing**
SUPERSTRUCTURE	**5**	**Paint failure throughout lower chord, surface and laminar corrosion, section loss up to 100%, active corrosion and section loss on gusset plates**
SUBSTRUCTURE	**5**	**Widespread delamination, some large spalls with exposed reinforcement with section loss, hairline cracking, and efflorescence**

Table 1 – Bridge Condition Summary Ratings

INSPECTION FINDINGS

ITEM 58 – DECK SUMMARY

The deck is in SATISFACTORY CONDITION [6-SNBI] overall. The underside of the deck has transverse hairline cracking throughout, with isolated areas of moderate width cracks. There are several areas of spalling in the wearing surface, leaving rebar exposed in isolated areas. The railings have some areas of minor impact damage. There is a buildup of debris along the edge of the deck.

ELEMENT 12 – REINFORCED CONCRETE DECK

The underside of the reinforced concrete deck is visible and is in satisfactory condition with isolated minor spalls and areas of 1/16" wide map cracking **(see Photo 1)** and transverse hairline cracks. The fascia stringer haunches typically exhibit up to 6" wide by 1" deep spall or delamination along the length of the stringer **(see Photo 2)**. The north end of the deck above Floorbeam 0 in Span 3 exhibits a 6" by 6" by 6" spall along the bottom edge **(see Photo 3)**.

Photo 1 - Typical map cracking in underside deck. Shown Span 4, Bay 3, near Floorbeam 8

Photo 2 - Typical haunch spall. Shown 15' long by 6" high by 0.5" deep in Span 4, top of Stringer 1, looking north

Photo 3 - 6" by 6"by 6" spall on edge of deck on north end, above FB0, in Span 3

ELEMENT 510 – WEARING SURFACE

The monolithic concrete deck wearing surface is in satisfactory condition with some isolated hairline longitudinal and transverse cracks throughout all spans. There is a 9’ long by 1/16" wide longitudinal crack in the south lane in Span 3. The wearing surface also exhibits moderate wear along the wheel paths in each span. There is isolated spalling throughout the spans, noted most pronounced at the following locations:

- Multiple spalls along both sides of Pier 2 joint, up to 6" long by 6" wide by 1/2" deep **(see Photo 4)**.
- Span 3, between Panel Points 2 and 3, left lane, 2 spalls. One 16" long by 17" wide by 2" deep with longitudinal rebar exposed and the other 10" long by 9" wide by 3/4" deep; there is no corrosion or section loss evident **(see Photo 5)**.
- Span 1, east end of span, spall 12" long by 6" wide by 1" deep **(see Photo 6)**.

Photo 4 - Spalling along Pier 2 joint

Photo 5 - Spalls in wearing surface on Span 3, left lane, between Panel Points 2 and 3

ELEMENT 300 – STRIP SEAL EXPANSION JOINT

The expansion joints are in satisfactory condition with moderate debris accumulation in all joints. Accumulation is heavier along the shoulders. The debris does not impact the joints' ability to function. The armored edges at Abutment 1 and Piers 2 and 4 exhibit up to 1/16" section loss with surface corrosion throughout **(see Photo 7)**. There is minor vegetation growth in the joint at Pier 2 in the shoulder. There are minor gouges in the edges of the armor.

Joint opening measurements were taken at each joint and are summarized below **(see Table 2)**.

Photo 6 - Spall in Span 1, east side of span

Joint Location	Measurement (temperature)		
	2020 (80° F)	2022 (90° F)	2024 (75° F)
Abutment 1	5/8"	5/8"	7/8"
Pier 2	1 3/16"	1 1/8"	1 1/4"
Pier 3	1 9/16"	1 1/4"	1 1/2"
Pier 4	2 1/4"	2 3/4"	2 1/2"
Abutment 5	1 1/4"	1 1/4"	1 1/2"

Table 2: Strip Seal Expansion Joint Measurement

Photo 7 - Typical expansion joint with debris and surface corrosion. Shown is Pier 2 joint, looking north

ELEMENT 330 – METAL BRIDGE RAILING

The metal bridge railing is in satisfactory condition. There is a 10’ long by 6" high by 1" deep spall in the left curb between Panel Points 5 and 6 **(see Photo 8)**. Impact damage is present along the metal railing in Span 3 at the following locations:

- Span 3, south railing between Panel Points 0 and 1, four linear feet in length **(see Photo 9)**.
- Span 3, south railing, between Panel Points 1 and 2, six linear feet in length **(see Photo 10)**.
- Span 3, north railing, between Panel Points 3 and 4.
- Span 3, north railing, at Panel Point 7.

Photo 8 - Spalling of left lane curb in Span 2, between Panel Points 5 and 6

Photo 9 - Impact damage to metal railing, showing Span 3, south railing, between Panel Points 0 and 1

Photo 10 - Impact damage to metal railing, showing Span 3, south railing, between Panel Points 1 and 2

ELEMENT 815 – DRAINAGE

The bridge deck drainage is in satisfactory condition. There is debris accumulation along the edges of the deck throughout all four spans **(see Photo 11)**. Some drains exhibit minor corrosion below deck at the outlets.

Photo 11 - Typical debris accumulation along edge of bridge deck, shown Span 4, south lane

ITEM 59 – SUPERSTRUCTURE SUMMARY

The superstructure is in FAIR CONDITION [5-SNBI] overall with active pack rust throughout the lower chord, especially along the top edges between the plates, along the edges of the gusset plates and between the diaphragm connection plates. There are corrosion holes in some of the stiffeners within the end panel points. The lower chord and gusset plates exhibit corrosion and section loss along the interfaces between the gusset plate and member plates. There are some improperly installed and broken rivets in the top chord connections. There are isolated minor deformations in members due to pack rust.

ELEMENT 113 – STEEL STRINGER

The steel stringers are in good condition. There is surface corrosion with no measurable section loss to the unpainted inside edges of the top flanges of Stringers 1 and 5 **(see Photo 12)**. There are isolated areas of poor welds on the stringer connections in all spans, with cracked welds in Span 1 at the Stringer 1 to Floorbeam 1 connection and Span 3 at the cross frame connection to Stringer 3 in Floorbeam Bay 10 **(see Photo 13)**.

Photo 12 - Typical haunch spalling along outside stringers with surface corrosion along top flange. Shown Span 2, Stringer 1, looking northeast

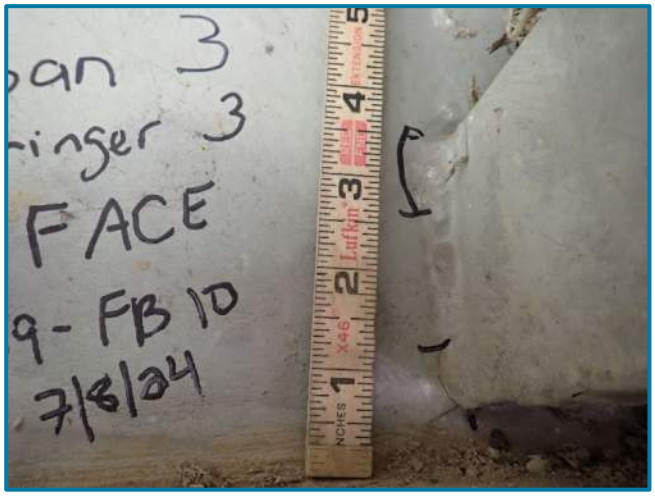


Photo 13 - Crack in weld for 2/3 of length on Stringer 3 connection to diaphragm between Floorbeam 9 and 10, looking north

There are welded top and bottom flange cover plates on the stringer ends at each floorbeam. The ends of these welds are Category E details. The top flange cover plates are not visible due to the presence of the deck haunch, but the bottom flange cover plates were inspected. There are indications of poor-quality welding throughout these details, but no cracks were observed.

ELEMENT 120 – STEEL TRUSS

The steel truss is in fair condition with active corrosion, pack rust and section loss in the splash zones above deck and throughout the lower chord.

LOWER CHORD

Pack rust, typically between 1/8" and 1/4" thick, is present between the lower chord plates throughout each span. Lower chord member L7L8 exhibits 1/2" thick pack rust in Span 2 of the North Truss **(see Photo 14)** and 3/4" pack rust on member L7L8 in Span 3 of the North Truss **(see Photo 15)**. Up to 3/4" pack rust is present between the lower chord and diaphragms in all spans **(see Photo 16)**. The pack rust has caused bowing of the lower chord plates and diaphragm angles in some locations **(see Photo 14 and Photo 17)**.

Photo 14 - 1/2" pack rust in lower chord plates in Span 2, North Truss, member L7L8, looking east

Photo 15 - 3/4" pack rust in lower chord plates in Span 3, North Truss, member L7L8, looking east

Photo 16 - 3/4" pack rust between lower chord and diaphragm, Span 2, South Truss, member L0L1

The lower chord also exhibits bowing due to inconsistent diaphragm dimensions between Panel Points 2 and 3 in the North Truss Span 1, Panel Points 0 and 1 in the South Truss Span 3 and Panel Points 0 and 1 in the South Truss Span 4 **(see Photo 18)**.

Tack welds between the lower chord and gusset plates and internal diaphragms are typical in all spans **(see Photo 19)**, with one broken tack weld in Span 4, North Truss, at Panel Point 1 **(see Photo 20)**.

The edges of the lower chord plates exhibit surface corrosion throughout with areas of active pitting up to 3/16" deep. In Span 1, on the North Truss, member L0L1 at L0, there is a 2" wide by 4" high by 3/16" deep area of painted over pitting on the south face of the north web plate, along the diaphragm with 3/4" pack rust **(see Photo 21)**. There is section loss present in isolated locations along the lower chord due to active corrosion, with the most significant at the following locations:

- Span 2, North Truss at L10, with 100% section loss on the lower chord stiffener.
- Span 4, North Truss, at L8, with up to 100% section loss on the lower chord stiffener **(see Photo 22)**.
- Span 1, North Truss, member L6L7 at L7, section loss on the web of the lower chord below the vertical connection **(see Photo 23)**.
- Span 2, North Truss, member L0L1 near L0, active laminar corrosion throughout the connection with 1/8" section loss **(see Photo 24)**.
- Span 4, South Truss, member L0L1 near L0, 12" long paper-thin section of stiffener.

Photo 17 - Bowing in lower chord northeast diaphragm angle due to pack rust, 1 1/2" over 4", Span 4, North Truss, member L0L1

Photo 18 – Inconsistent diaphragm dimensions; Member L0L1, South Truss, Span 4 shown

Photo 19 - Tack weld between lower chord plate and gusset plate, Span 1, South Truss, Panel Point 1, looking north

Photo 20 - Broken tack weld between lower chord and gusset plates, Span 4, North Truss, at Panel Point 1, looking south

Photo 21 - Area of 2" wide by 4" high x 3/16" deep pitting on the south face of north web plate in Span 1, North Truss, between Panel Point 0 and 1, looking west

Photo 22 - Up to 100% section loss on the lower chord stiffener, Span 4, North Truss, at L8, looking east

Photo 23 - 2" wide section loss on the web of the lower chord below the vertical connection, Span 1, North Truss, at Panel Point 7, looking south

Photo 24 - Active laminar corrosion throughout the connection, Span 2, North Truss, at Panel Point 0, looking west

UPPER CHORD

The upper chord exhibits minor spot rust and surface corrosion throughout due to paint failure **(see Photo 25)**. Reactivated corrosion is present between the channels and web plates **(see Photo 26)**. The areas of spot rust and surface corrosion are typically less than one square foot with no measurable section loss. Two areas of 6" long by 4" width on Span 4 North Truss, on members U5U6 **(see Photo 27)** and U6U7 **(see Photo 28)**.

Photo 25 - Typical paint spot failure on top of upper chord, with active corrosion. Shown Span 4, North Truss, east of U1, looking northwest

Photo 26 – Reactivated corrosion between the channel and web plate in Span 3, North Truss, member U7U8, looking northwest

Photo 27 - 6" long by 4" wide paint failure in Span 4, North Truss, member U5U6, looking northeast

Photo 28 - 6" long by 4" wide paint failure in Span 4, North Truss, member U6U7, looking north

There are missing rivet heads between the upper chord connections with the diaphragm interior clip angles and some with flattened rivet heads. There are also improperly installed rivets in some locations. The quantities and locations of the missing and improperly installed rivet heads are summarized below:

- North Truss, Span 3, Panel Point 3, (2) rivets without heads and (1) rivet with 1/2" exposed shank **(see Photo 29)**.
- North Truss, Span 3, Panel Point 4, 4 rivets without heads on south clip angle and 4 rivets improperly installed **(see Photo 30)**.
- North Truss, Span 3, Panel Point 6, 2 rivets without heads and 6 improperly installed **(see Photo 31)**.
- South Truss, Span 1, Panel Point 3, 8 rivets without heads on north clip angle, 4 on each side of the diaphragm.
- South Truss, Span 1, Panel Point 5, 3 rivets missing heads on north clip angle.
- South Truss, Span 2, Panel Point 4, 1 rivet missing a head on north clip angle.
- South Truss, Span 2, Panel Point 6, 1 rivet missing a head on west side of diaphragm.
- South Truss, Span 2, Panel Point 7, 1 rivet missing a head on north clip angle.
- South Truss, Span 3, Panel Point 4, 1 rivet missing a head.
- South Truss, Span 3, Panel Point 6, 8 rivets missing heads on north clip angle.
- South Truss, Span 3, Panel Point 7, 2 rivets missing heads on north clip angle.

Photo 29 – Typical improperly installed rivet heads in stiffener plate, Span 3, North Truss, at Panel Point 3

Photo 30 - Typical missing rivet heads on south diaphragm clip angle, Span 3, North Truss, at Panel Point 4, looking southeast

Photo 31 – Improperly installed rivets in stiffener plate, Span 3, North Truss, at Panel Point 6, looking north

On the south stiffener plate of the upper chord in Span 2, South Truss, at Panel Point 3, some connections have bolts and square nuts instead of rivets and others have flattened heads **(see Photo 32)**.

There are also tack welds between the upper chord and the gusset plate clip angles. There is a cracked tack weld between the sway bracing connection angle and upper chord at Panel Point 4 of the South Truss in Span 4 **(see Photo 33)**.

Photo 32 - Bolt with square nut and flattened rivet head on upper chord stiffener plate, Span 2, South Truss, at Panel Point 3, looking south

Photo 33 - Crack in tack weld between upper chord and sway bracing connection plate in Span 4, South Truss, at Panel Point 4, looking southeast

END POSTS

The end posts have active corrosion with advanced section loss, up to 100%, on the lacing bars on both trusses in all spans. There are lacing bars that have been replaced, but these posts still have remaining bars with advanced section loss **(see Photo 34)**. There are areas of paint failure along the top flange of the end posts in Spans 1 and 2 **(see Photo 35)**. Additionally, there are isolated areas of pack rust between the end post and portal bracing connection plate along the North Truss, up to 1/2" thick, in Span 2 member U9L10, Span 3 members L0U1 and U9L10, and Span 4 member U7L8 **(see Photo 36)**.

Photo 34 - Typical lacing bars with up to 100% section loss. Shown is the end post in Span 1, North Truss, between Panel Points 0 and 1, looking northwest

Photo 35 - Paint failure with surface corrosion on top face of end post in Span 1, North Truss, between Panel Points 7 and 8, looking west

Photo 36 - 1/2" pack rust between portal bracing connection plate and edge post in Span 4, North Truss, on U7L8, looking west

VERTICALS

The vertical members exhibit active corrosion with section loss up to 3/8" **(see Photo 37)**, painted over pitting up to 3/16" deep **(see Photo 38)** and laminar corrosion in the splash zone, along gusset plate edges and near former railing attachments.

Photo 37 - Pitting with active corrosion and section loss (2" high by 6" wide by 3/8" deep) on vertical just above lower chord connection in Span 3, North Truss, at Panel Point 9, looking west

Photo 38 - Painted over pitting up to 3/16" deep on vertical just above lower chord connection, Span 1, North Truss, at Panel Point 1, looking northwest

The locations of heaviest active corrosion on the verticals are as follows:

- North Truss, Span 2, L9U9 at L9, east face, 1/16" deep section loss.
- North Truss, Span 3, L9U9 at L9, east face, 18" high by 3" wide **(see Photo 39)**.
- South Truss, Span 2, L9U9 at L9, east web **(see Photo 40)**.
- North Truss, Span 2, U6L6 near lower chord connection, 1" diameter hole in web.

Photo 39 - Laminar corrosion on flange and web of vertical member in Span 3, North Truss, at Panel Point 9, looking west

Photo 40 - Active corrosion with section loss along flanges and web of vertical member in Span 2, South Truss, at Panel Point 9, looking west

The following vertical members exhibit deformations:

- North Truss, Span 1, on U7L7 at mid height, 1/2" over 5".
- North Truss, Span 3, on U6L6 above mid height, 1/2" over 6" to the south, north flange **(see Photo 41)**.
- South Truss, Span 1, on U4L4 below mid height.
- South Truss, Span 4, on U7L7 near L7, 1/2" over 8".

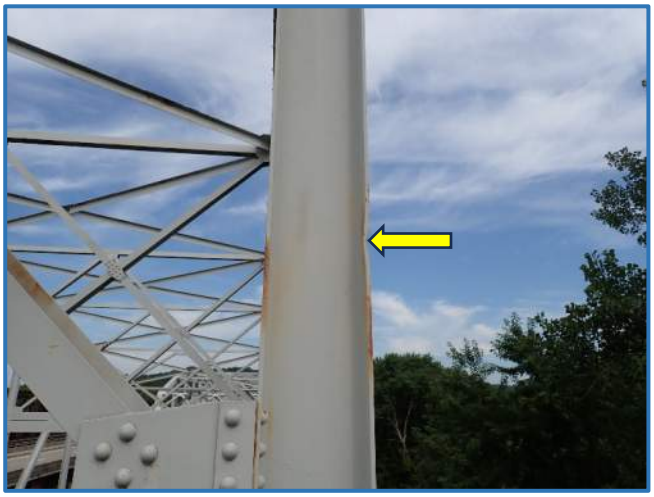


Photo 41 - Impact damage to north flange in Span 3, North Truss, at Panel Point 6, looking west

DIAGONALS

The diagonal members exhibit areas of isolated painted over pitting, pack rust, and active corrosion. Isolated diagonal members exhibit reactivated corrosion and 1/8" deep pitting due to paint failure **(See Photo 42 and 43)**.

There are instances of surface corrosion and paint failure to the diagonals in isolated locations throughout all spans **(see Photo 44)**.

Photo 42 - Pitting on underside of web in Span 2, North Truss, member L8U9, looking west

Photo 43 - Pitting on interior of flange in Span 1, South Truss, member L5U6, looking northwest

Photo 44 - Paint failure with active corrosion on web of diagonal in Span 3, South Truss, member U5L6, looking west

In Span 1, North Truss, member L5U6 vibrates significantly under the live loading of the bridge. There is also a 1/2" deformation in the flange of the diagonal in Span 4, North Truss, on member U1L2. In Span 2, North Truss, on member L8U9, there is 3/16" deep section loss to the south outside face of the diagonal along the lower gusset plate **(see Photo 45).** Pack rust is also present between the diagonal member and lower gusset plate in Span 3, North Truss, at Panel Point 2, and in Span 2, North Truss, at Panel Point 8.

There are also tack welds between the diagonal members and the middle gusset plate at the following locations:

- South Truss, Span 1, member L4U5.
- South Truss, Span 4, member L3U4.
- South Truss, Span 4, member L4U5.

The tack welds are typically of poor quality, but no cracks were observed.

Photo 45 - 3/16" deep section loss along lower gusset plate on south face of diagonal in Span 2, North Truss, at Panel Point 8, looking north

ELEMENT 152 – STEEL FLOORBEAM

The steel floorbeams are in satisfactory condition overall. Up to 1/16" deep pitting is present along the top of the bottom flange is widespread in Span 1 for up to 4' on the ends of the floorbeams **(see Photo 46)**. There is also up to 1/8" pitting along the bottom of the floorbeam web in the following isolated locations:

- Span 1, Floorbeam 7, north end, west face.
- Span 4, Floorbeam 5, south end, east face, 36" long by 5" wide **(see Photo 47)**.
- Span 4, Floorbeam 7, south end, west face, 10' long by 2" wide **(see Photo 48)**.

Photo 46 -Typical pitting on top face of bottom flange. Shown is 3.5' long by 1/16" deep pitting on Floorbeam 1, south end, Span 1, looking north

Photo 47 - Pitting along bottom of floorbeam web and top of bottom flange of Floorbeam 5 east face, Span 4, at Stringer 5, looking west

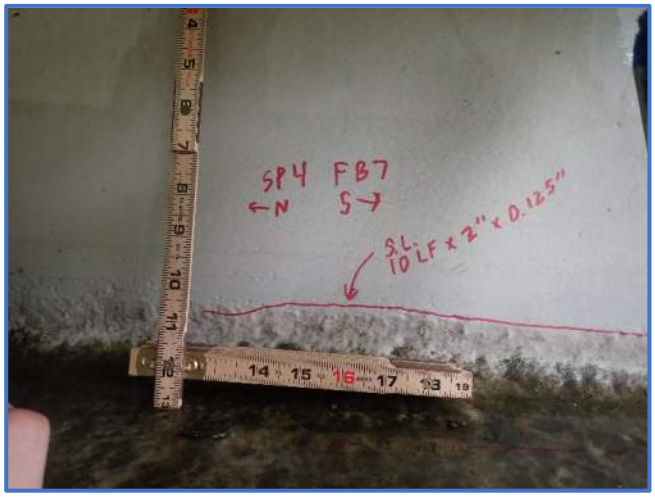


Photo 48 - Pitting along bottom edge of Floorbeam 7 web west face, Span 4, at Stringer 5, looking east

Along the top face of the top flange in Span 4, Floorbeam 3, south end, there is pitting with an area of section loss measuring 12" long by 5" wide by 1/4" deep **(see Photo 49)**. There are also typical areas of pitting along the bottom of the bottom flange of the floorbeams in Span 2 and at the following isolated locations:

- Span 3, Floorbeam 1, north end, east edge, 3' long by 2" wide by 1/16" deep **(see Photo 50)**.
- Span 3, Floorbeam 3, south end, 3/16" deep.

Photo 49 - Pitting with section loss along the top of top flange, at south end of Floorbeam 1, Span 4, looking west

There are isolated areas of corrosion throughout all spans at the bridge deck and floorbeam interface with rust staining on the floorbeam **(see Photo 51)**. There is also corrosion on the clip angle connections to the floorbeam web at the following locations:

- Span 3, Floorbeam 0, south end, east face.
- Span 1, Floorbeam 6, north end, west face, 6" long by 6" wide laminar corrosion, extends onto south gusset plate **(see Photo 52)**.
- Span 2, Floorbeam 9, north end, west face, 2" long by 1/4" deep.

Section loss is present in isolated areas on the floorbeams. There is a 2" long by 1" wide by 1/16" deep of area section loss in Span 4, Floorbeam 6, south end, on the west face web along the top flange. In Span 3, Floorbeam 10, south end on the web at the truss connection, there is a 3" by 3" area of section loss. Section loss is also present in Span 4, Floorbeam 2, north end, on the east face. Two rivets in the clip angle connection to the north gusset plate in Span 3, Floorbeam 4 south end exhibit up to 50% section loss **(see Photo 53)**.

There is a tack weld between the floorbeam and truss clip angle connection in Span 2, Floorbeam 9, north end, east face. No crack was observed in the weld **(see Photo 54)**.

Photo 50 - Pitting along underside of Floorbeam 1, Span 3, looking south

Photo 51 - Corrosion at deck and Floorbeam top flange interface. Shown Span 3, Floorbeam 8, north end, looking west

Photo 52 – Corrosion along top flange and clip angle in Span 1, Floorbeam 6 west face, north end, looking north

Photo 53 - Up to 50% section loss in rivet heads in Span 3, Floorbeam 4, gusset plate clip angle connection, south end, looking west

ELEMENT 162 – STEEL GUSSET PLATE

Photo 54 – Corrosion along top flange and clip angle in Span 2, Floorbeam 9 west face, north end, looking west. Note tack weld at clip angle to floorbeam web connection.

The steel gusset plates are in fair condition with widespread corrosion and section loss on the inner face of the lower chord gusset plates in all spans. Both the north and south gusset plates in both trusses exhibit section loss up to 1/8", primarily on the interior face along the top of the lower chord **(see Photo 55 and Photo 56)**. Active corrosion is also present between the diagonal member and center gusset plate in Span 4, South Truss, on member L4U5, but no section loss is present. There are isolated areas with deeper section loss at the following locations:

- North Truss, Span 1, lower gusset plate at Panel Point 1, 4" long by 3" wide by 3/16" deep section loss **(see Photo 57)**.
- North Truss, Span 2, lower gusset plate at Panel Point 10, 100% section loss in stiffener angle 6" from end and top cover plate **(see Photo 58)**.

There is pack rust between the gusset plates and lower chord in some locations in Spans 1 and 2 with section loss up to 1/8". The pack rust is typically between 1/16" and 3/16" thick. Two gusset plates exhibit pack rust up to 1/2" thick located in Span 2, South Truss, at Panel Points 3 and 7. Pack rust has also caused 1/8" bowing in the lower south gusset plate east corner in the North Truss, Span 1, at L4.

Tack welds previously mentioned are also present between the gusset plates and the lower chord, the upper chord, and the diagonals. Refer to previous sections for additional details.

Photo 55 - Laminar corrosion with section loss on interior lower gusset plate. Span 2, North Truss, Panel Point 6, 3" long by 3" wide by 1/8" deep, looking west

Photo 56 - Typical coated pitting on interior gusset plate. Shown Span 1, South Truss, at Panel Point 4, looking south

Photo 57 - Section loss on east edge of lower gusset plate at top of lower chord, Span 1, North Truss, at Panel Point 1, looking north

Photo 58 - Corrosion holes with 100% section loss on top cover plate in Span 2, North Truss, at Panel Point 10, looking west

ELEMENT 311/313 – MOVABLE/FIXED BEARINGS

The bearings are in satisfactory condition overall. The bridge has both fixed and movable bearings, with a fixed and expansion bearing at each pier. The rear abutment has fixed bearings, while the forward abutment has movable bearings. There is active corrosion with some section loss on all bearings. Similar corrosion and section loss is also present on the masonry plate at each bearing **(see Photo 59)**. On all movable bearings, there is a tilt between 5 and 9 degrees, with 9 degree tilt at the north Span 3 bearing at Pier 4 **(see Photo 60)** and the 5 degree tilt measured at the north Forward Abutment bearing **(see Photo 61)**. There is a backed off nut on the southeast anchor bolt on the south bearing of Span 2 at Pier 3 **(see Photo 62)**.

Photo 59 - Typical corrosion and section loss on bearings. Shown is Span 3, movable bearing on Pier 4, looking east

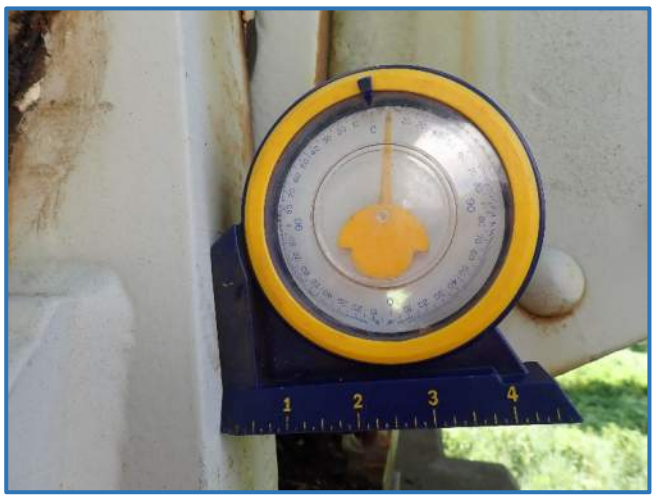


Photo 60 - 9-degree tilt of bearing in Span 3, north bearing on Pier 4, looking south

Photo 61 - 5-degree tilt of north bearing at forward abutments, looking north

Photo 62 - Backed off nut on southeast anchor bolt on south bearing in Span 2, at Pier 3, looking north

ELEMENT 515 – STEEL PROTECTIVE COATING

The structure was painted in 1992 with OZEU paint. Overall, the steel protective coating is in fair condition. The upper half of the trusses, above the splash zone, exhibits isolated areas of paint failure with surface corrosion **(see Photo 63)**. The verticals and diagonals have areas of paint failure. The lower chord gusset plates and bearings have widespread areas of missing paint with active corrosion **(see Photo 64)**. The paint on the floorbeams and stringers is in good condition **(see Photo 65)**, with minor isolated spots of paint failures and areas of rust staining at the floorbeam ends. The upper lateral bracing has isolated areas of peeling paint with surface corrosion **(see Photo 66)**.

Photo 63 - Upper lateral bracing paint failure with surface corrosion. Shown is worst case in Span 3, North Truss, between Panel Points 5 and 6, looking southeast

Photo 64 - Typical protective coating condition on lower chord. Shown is Span 3, South Truss, between Panel Points 6 and 7, looking east

Photo 65 - Typical protective coating condition of floorbeam and stringers. Shown in Span 4

Photo 66 - Typical paint failure of top of upper lateral bracing connection plate with surface corrosion. Shown in Span 4, between Panel Points 3 and 4, looking south

DIAPHRAGMS AND CROSS FRAMES

The diaphragms and cross frames are in good condition. There are isolated deformed cross frames in Spans 1, 2, and 4 **(see Photo 67)**.

LATERAL BRACING

The lateral bracing is in satisfactory condition overall. There are two members that show bowing deformations at the following locations:

- Span 3, between Panel Points 8 and 9, upper lateral bracing connection plate, bowed 1/2" upward due to pack rust **(see Photo 68)**.

Photo 67 - Deformed diaphragm in Span 1 at Floorbeam 2, looking north

Photo 68 - Bowing in upper lateral bracing connection plate in Span 3, between Panel Points 8 and 9, looking west

- Span 4, upper lateral brace going from Panel Point 6 South Truss to Panel Point 7 North Truss, impact damage of 1" over 5' **(see Photo 69)**.

There is also 1/4" pack rust at the upper lateral bracing connection plate in Span 1, between Panel Points 4 and 5. These connection plates also experience typical paint failure with surface corrosion, as previously mentioned **(see Photo 66)**. Isolated areas of paint failure and surface corrosion are also present along the lateral braces in Span 3, between Panel Points 5 and 6, on both braces **(see Photo 70)**.

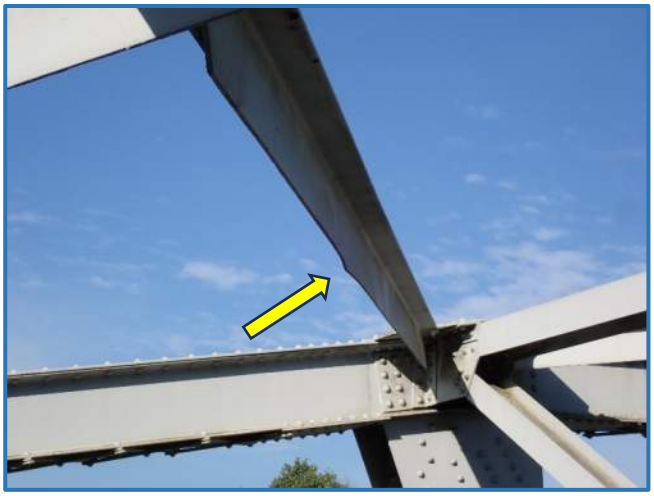


Photo 69 - Bowing in bottom leg of upper lateral bracing in Span 4, between Panel Points 6 and 7, looking south

Photo 70 - Paint failure with surface corrosion on upper later brace in Span 3, between Panel Points 5 and 6, looking northwest

SWAY BRACING

The sway bracing is in satisfactory condition. In Span 4, at Panel Point 6, at the upper sway bracing connection, there is a blind hole. There are also three misdrilled holes on the lower sway brace in the portal frame in Span 1 at Panel Point 1, at the South Truss connection **(see Photo 71)**. Surface corrosion is also present in Span 3, at Panel Point 3, on both diagonal sway braces **(see Photo 72)**. The sway bracing also exhibits isolated areas of bowing, deformations due to pack rust and impact damage at the following locations:

- Span 2, at Panel Point 6 lower sway bracing, bowed 1" over 12" on west face flange.

Photo 71 - Misdrilled holes on lower sway brace in portal frame in Span 1, at Panel Point 1, at South Truss connection, looking east

Photo 72 - Surface corrosion on diagonal sway braces in Span 3, at Panel Point 3, looking west

- Span 3, east portal frame at Panel Point 9, bowing at connection plate due to minor pack rust.
- Span 3, at Panel Point 4 lower sway bracing connection plate, bowing due to pack rust with a popped rivet head **(see Photo 73)**.
- Span 4, at Panel Point 3, impact damage on diagonal sway brace, 1/2" over 7".

ALIGNMENT

Alignment is in fair condition with isolated misalignment in the stringers and bowing and local deformation in truss lower chords, verticals, and diagonals.

Photo 73 - Bowing of lower sway bracing connection plate due to pack rust in Span 3 at Panel Point 4, looking north

FATIGUE

The superstructure fatigue prone details are in satisfactory condition. The Category E fatigue details include the termination of the stringer tie plates over the floorbeams, the longitudinal stringer bottom flange weld to the floorbeam webs, and tack welds. The stringer tie plates were encased in the deck and were not able to be inspected. The tack welds were typically noted between chord members and fill plates, lower chord web plates and gusset plates, lateral bracing connection angles and upper chord splice plates, clip angles for floorbeam connections and lateral brace connection plates to upper chord cover plates. These tack welds were typically noted as poor quality, but no cracks were noted in the base metal at the time of the inspection.

ITEM 60 – SUBSTRUCTURE SUMMARY

The substructure is in FAIR CONDITION [5-SNBI] overall. There are widespread areas of spalled and delaminated concrete on all substructure units. There are large spalls with exposed reinforcement on each face of each pier, with several debonded bars. There is typically minor section loss to the exposed rebar, with one exposed bar on Pier 3 exhibiting 25% loss.

ELEMENT 210 – REINFORCED CONCRETE PIER WALL

The reinforced concrete pier walls are in fair condition. All three exhibit widespread delaminations and large spalls predominantly in the upper half of the wall with exposed reinforcing bars on both faces. There are isolated locations with debonded reinforcing bars and a bar in Pier 3 with 25% section loss. Additionally, efflorescence and map cracking are typical for all pier faces. The west face of Pier 2 **(see Photo 74)** has two large spalls. The spall under Stringer 3 measures 4' high by 2' wide by 3" deep with exposed rebar, while the other spall, under Stringer 5, is 4' high by 3' wide by 3" deep with debonded rebar. exposed **(see Photo 75)**.

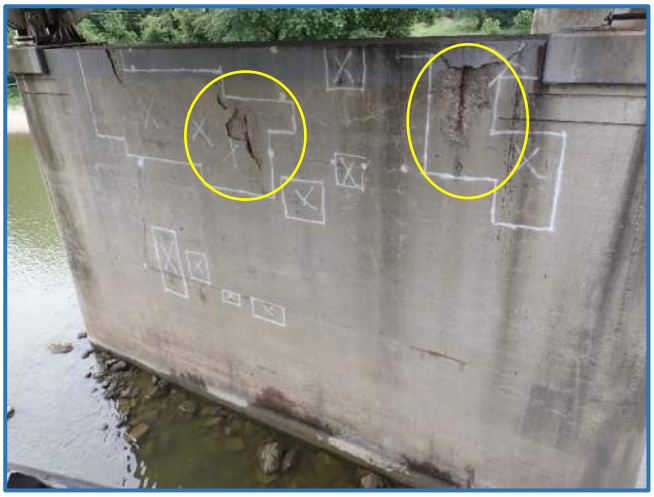


Photo 74 - Large spalls at top of west face of Pier 2

Photo 75 - Spall in west face of Pier 2 with exposed debonded rebar under Stringer 5

The east face of Pier 2 **(see Photo 76)** consists of two 4’ wide by 4’ high spalls located under Stringer 2 and between Stringers 4 and 5, both with exposed rebar.

On the west face of Pier 3 **(see Photo 77)**, there is one large spall under Stringer 2 that measures 8’ high by 3’ wide by 3" deep with an exposed, debonded rebar for 3’ length. The exposed rebar also exhibits 25% section loss **(see Photo 78)**.

The east face of Pier 3 **(see Photo 79)** has the typical pier defects. Additionally, along the north face of the pier, there is debris buildup along the base of the pier.

Photo 76 – Large spalls at top of east face of Pier 2

Photo 77 - Large delaminated area at the top of west face of Pier 3

Photo 78 - Spall in west face of Pier 3 under Stringer 2, with exposed rebar with section loss

The west face of Pier 4 **(see Photo 80)** has one large spall under Stringer 4 that is 10' in length. A debonded rebar with 25% section loss is exposed for most of the length **(see Photo 81)**.

Photo 80 – Large spall under Stringer 4 on West face of Pier 4

Photo 79 – Widespread delaminated areas and spalls on east face of Pier 3

Photo 81 - Spall in west face of Pier 4, under Stringer 4 with exposed, debonded rebar

On Pier 4 east face **(see Photo 82)**, a previously sealed vertical crack under Stringer 3 is cracked up to 1/8" wide by full height **(see Photo 83)**.

Photo 82 - East face of Pier 4

Photo 83 - Crack up to 1/8" wide by full width under Stringer 4 on west face of Pier 4, previously sealed

ELEMENT 234 – REINFORCED CONCRETE PIER CAP

The reinforced concrete pier caps are in fair condition overall. Spalls within the pier cap are present in every pier in the following locations:

- Pier 2, west face, previously identified spall extends into pier cap **(see Photo 74)**.
- Pier 3, west face, previously identified spall extends into pier cap **(see Photo 77)**.
- Pier 3, east face, large spall along pier cap between Stringers 2 and 4, measuring 12’ wide by 2’ high by 2" deep, with exposed rebar **(see Photo 84)**.
- Pier 4, west face, previously identified spall extends into pier cap.
- Pier 4, west face, large spall measuring 10’ long by 2’ high, between Stringers 1 and 3, with 4 exposed vertical rebars and 1 exposed transverse rebar; bars exhibit minor section loss **(see Photo 85)**.
- Pier 4, east face, 2’ wide by 2’ high spall in pier cap under Stringer 3.

Photo 84 - Spall in top of Pier 3 east face between Stringers 2 and 4, with exposed rebar

ELEMENT 234 – REINFORCED CONCRETE ABUTMENT

The reinforced concrete abutments are in FAIR CONDITION [SNBI-5] overall. On the rear abutment, there is a 24’ wide by full height delamination in the backwall of the abutment between Stringers 1 and 4. Additionally, the abutment has cracking up to 1/2" wide running horizontally between Stringers 2 and 4 **(see Photo 86)**. There are also widespread areas of delaminations between Stringers 1 and 4 on the face of the abutment that extend 1’ onto the bearing seat **(see Photo 87)**.

Photo 85 - Spall in Pier 4 west face pier cap, with vertical and transverse rebar exposed

Photo 86 - Rear abutment with cracking and delaminations

Photo 87 - Bearing seat of rear abutment with delaminations, looking south

The forward abutment has a 12’ wide by 2.5’ high delamination along the backwall, between Stringers 3 and 4 **(see Photo 88)**. There is also hairline cracking to the north of the delaminated area on the backwall at approximately 45-degree angles. Additionally, there is a 4’ wide by 2.5’ high delamination along the full width of the bearing seat, with large spalls up to 3" deep and exposed rebar **(see Photo 89)**.

Photo 88 - Delaminated area along backwall of forward abutment

APPROACH SUMMARY

ELEMENT 321 – REINFORCED CONCRETE APPROACH SLABS

The reinforced concrete approach slabs are in satisfactory condition. The west approach slab has multiple full-length by 1/16" wide cracks. There are also longitudinal cracks 12" long by 1/16" wide along the top of the header of the rear abutment **(see Photo 90)**. Two spalls are also present in the left lane of the west approach slab, measuring up to 3' long by 9" wide by 1" deep **(see Photo 91)**.

Photo 90 - Longitudinal crack in top of header of rear abutment, looking north

The east approach slab has four areas of spalling **(see Photo 92)** with the following dimensions:

- (1) spall measuring 24" long by 16" wide.
- (2) spalls measuring 3' long by 12" wide.
- (1) spall measuring 18" long by 12" wide by 1" deep.

Photo 89 - Delamination and spalling with exposed rebar along bearing seat of forward abutment, looking southeast

Photo 91 - Spalling in west approach slab, just west of rear abutment, looking north

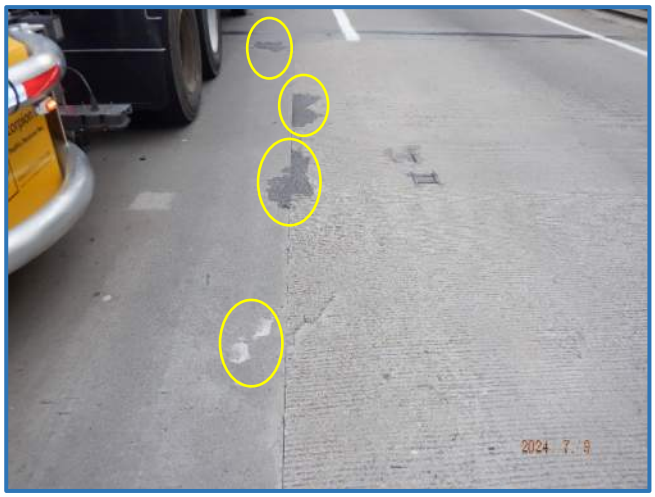


Photo 92 - Spalling in the east approach along center of road, looking west

APPROACH ROADWAY

The asphalt approach roadway is in satisfactory condition, with up to 1/8" wide longitudinal and transverse cracks throughout **(see Photo 93)**. Map cracking up to 1/8" wide is present at the west approach **(see Photo 94)**.

Photo 93 - Longitudinal cracks up to 1/8" wide in east approach pavement, looking north

Photo 94 - Map cracking in west approach pavement, looking northwest

APPROACH GUARDRAIL

The approach guardrail is in very good condition, with no defects identified. The guardrail in all four quadrants has been replaced since the previous inspection. The west approach consists of a W-beam with steel strong posts and composite spacer blocks. The south end has a nested thrie beam with steel strong posts and timber spacer blocks, with a radius. The east approach consists of W-beams with steel strong posts and composite spacer blocks. These guardrails are continuous.

EMBANKMENT

The embankments are in satisfactory condition and covered in heavy vegetation, hindering the verification of previously noted erosion at the northwest corner. There are two areas where vegetation has encroached onto/near the bridge. In Span 3, North Truss, on member U9L10, there is a tree reaching over the upper chord end post **(see Photo 95)**. In Span 4, South Truss, on member U7L8, there is vegetation growth along the length of the underside of the end post **(see Photo 96)**.

Photo 95 - Tree encroaching on end post in Span 3, North Truss, between Panel Points 9 and 10, looking northwest

Photo 96 - Vegetation growth along underside of end post in Span 4, South Truss, between Panel Points 7 and 8, looking northeast

CHANNEL SUMMARY

The channel is in SATISFACTORY CONDITION [SNBI-6], with indications of scour and a large debris pile around Pier 3.

SCOUR

The scour is in good condition. During the inspection, only Pier 2 was in the water. The last underwater inspection was performed in August of 2019 by Terracon. No significant scour was found at Pier 2 during the most recent underwater inspection. There were some indications of scour around Pier 3, with debris buildup.

CHANNEL ALIGNMENT

The channel alignment is in good condition.

CHANNEL PROTECTION

The channel protection is in good condition overall, with moderate vegetation along each embankment.

SIGNS AND SUPPORTS
The approach warning signs are in good condition. There are no sign support structures on the bridge.

HYDRAULIC OPENING
The hydraulic opening is in satisfactory condition overall, with debris buildup around Pier 3.

ITEM 41 – OPERATIONAL STATUS

The bridge remains OPEN WITH NO RESTRICTIONS [A-SNBI].

CONCLUSIONS AND RECOMMENDATIONS

Based upon the results of the 2024 fracture critical and in-depth element level inspection, the HAM-50-0376L Bridge (SFN 3105946) is in FAIR CONDITION [5-SNBI] overall. The concrete substructure units have widespread delaminations and large spalls with exposed rebar, leading to section loss in the rebar. The piers and abutments both experienced these defects. The truss elements showed isolated paint failures, leading to corrosion and section loss, especially at the lower chord gusset plate connections. The upper chord connections were found to have improperly installed rivets and rivets with missing heads. The floorbeams and stringers exhibited some areas of corrosion and section loss, especially along the clip angle connections of the floorbeams. The bearings have minor corrosion and section loss throughout. There was typical haunch spalling on the outside girders to the underside of the deck. The steel expansion joints have some debris buildup and some corrosion. There are small spalls and hairline cracking throughout the concrete wearing surface, and minor impact damage to the railings.

The four categories of recommendations for the HAM-50-0376L Bridge are as follows:

- Priority Work: (Within 1 Year Period) — Work which should be performed as soon as possible to address deficiencies which affect the capacity of the structure or public safety.
- Rehabilitation/Evaluation: (Within 5 Year Period) — Recommendations for large-scale deficiencies which are extensive in nature and require engineering analysis.
- Maintenance: (As Scheduled) — Recommendations that are minor in nature and can be easily repaired.
- Monitoring: (As Recommended) — Regular field observation of defects which are not currently in need of repair but will require corrective action if deterioration continues.

Priority Work: None.

Rehabilitation/Evaluation:

<u>Deck</u>

- Patch spalls in wearing surface and reinforced concrete deck.

<u>Superstructure</u>

- Clean and paint steel superstructure.
- Caulk areas of pack rust on the lower chord, gusset plates and diaphragms.
- Replace lacing bars with severe section loss.
- Replace poorly installed rivets and rivets with missing heads.

<u>Substructure</u>

- Patch spalls and delaminations in the abutments, piers and pier caps.

Maintenance:

Deck

- Remove debris from expansion joints.
- Remove debris from deck shoulders
- Overlay wearing surface.

Superstructure

- Tighten bearing anchor nuts.

Substructure

- Remove channel debris built up around the northern nose of Pier 3.

Monitoring:

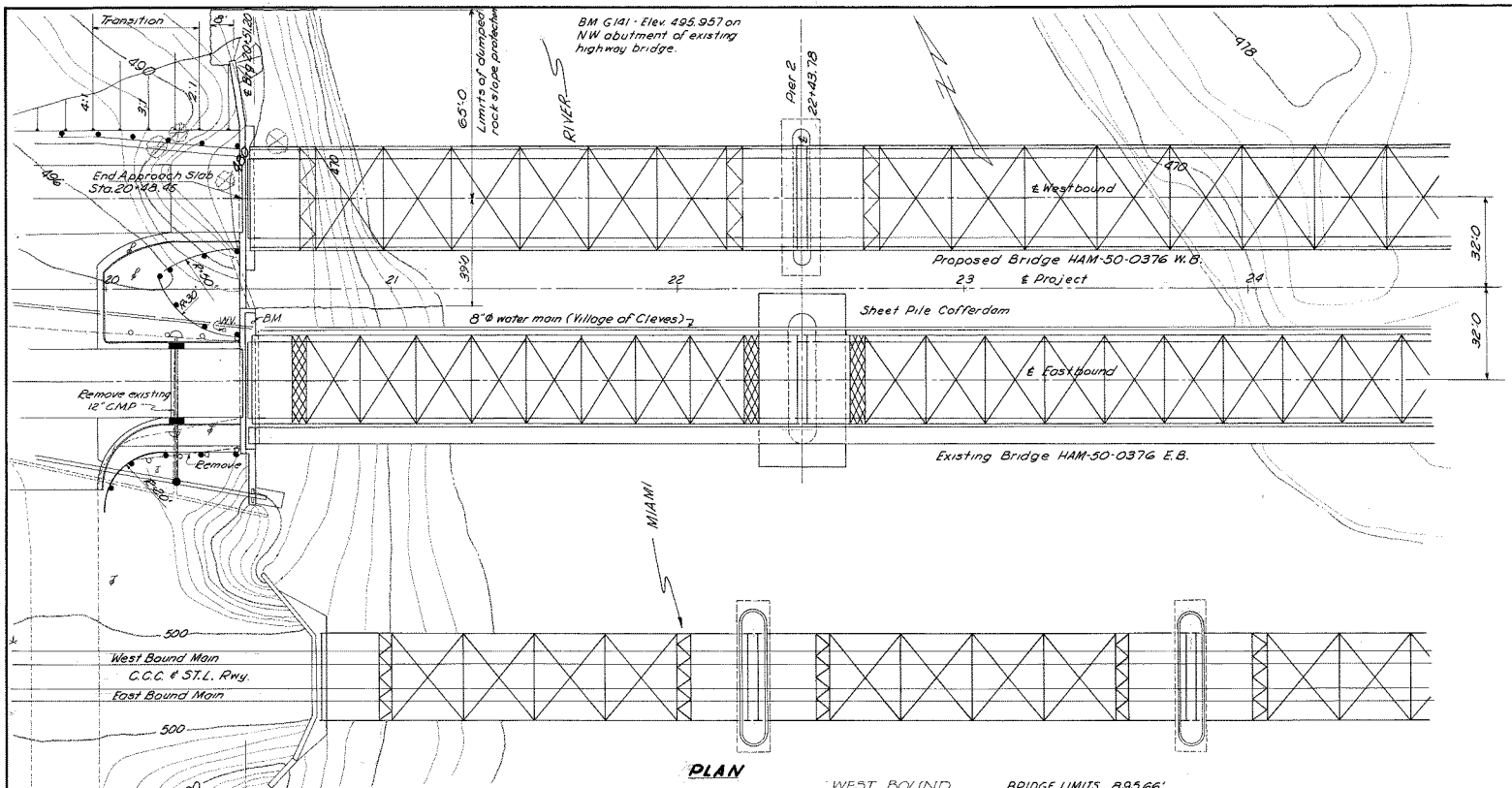
Superstructure

- Continue to monitor the fatigue prone details of the fracture critical members.
- Continue to monitor gusset plate deformations.

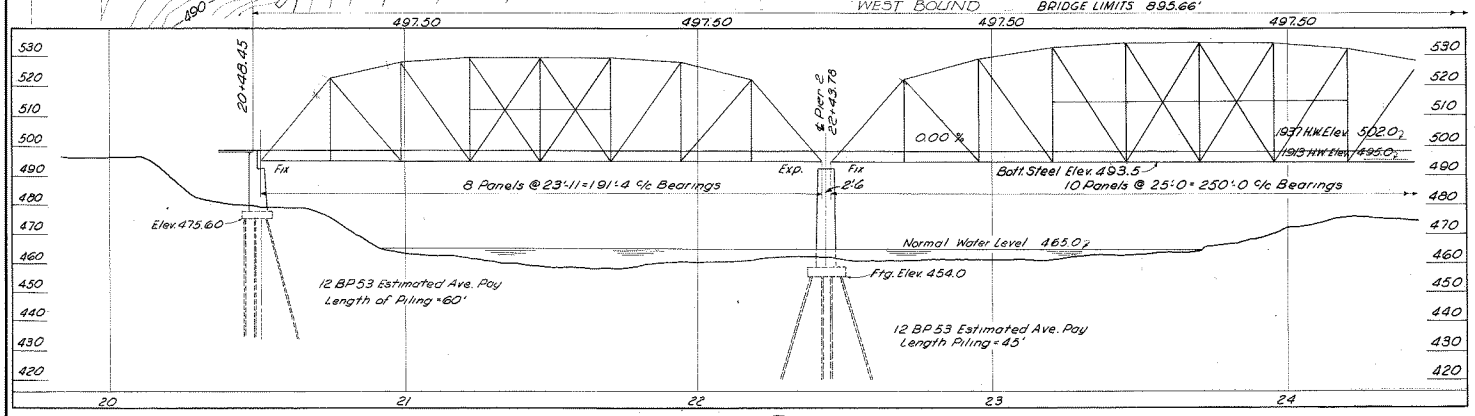
Appendix A

Select Plan Sheets

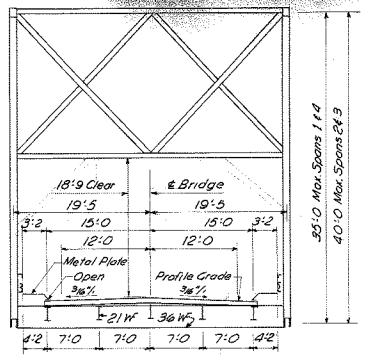
TRANSYSTEMS



PLAN



ELEVATION



TYPICAL SECTION

EXISTING BRIDGE DATA

GREAT MIAMI RIVER BRIDGE HAM-50-0376 E.B.
TYPE - High Truss - Conc. Deck & Substruct.
SPANS - 190'-10, 250'-0, 250'-0, 190'-10
ROADWAY - 26'-11 with 5'-9 sidewalk, 3 side
WEARING SURFACE - Mono. Concrete
LOADING - C - H-15
SKEW - None
DATE BUILT - 1914
CONDITION - See Sheets 268, 269, 270 & 271
CCC. & St. L. RAILWAY BRIDGE No. 132
TYPE - Thru Truss - Masonry Substruct.
SPANS - 6 @ 150'c/c Pins
ROADWAY - Double Track main line
WEARING SURFACE - 139# rail
LOADING -
SKEW - None
DATE BUILT - 1913
CONDITION - Good

DRAINAGE AREA = 3,950 Sq. Mi.

PROPOSED STRUCTURE

TYPE - High Truss, Concrete Deck & Substructure
SPANS - 191'-4, 250'-0, 250'-0, 191'-4
ROADWAY - 30'-0 Curb to Curb
SIDEWALKS - 3'-0 Safety Walk each Side
LIVE LOAD - CF 2000 (57), Adequate for AASHO alternate loading.
SKEW - None
ALIGNMENT - Tangent
APPROACH SLABS - 25' long, 24' Wide
WEARING SURFACE - 1" Monolithic

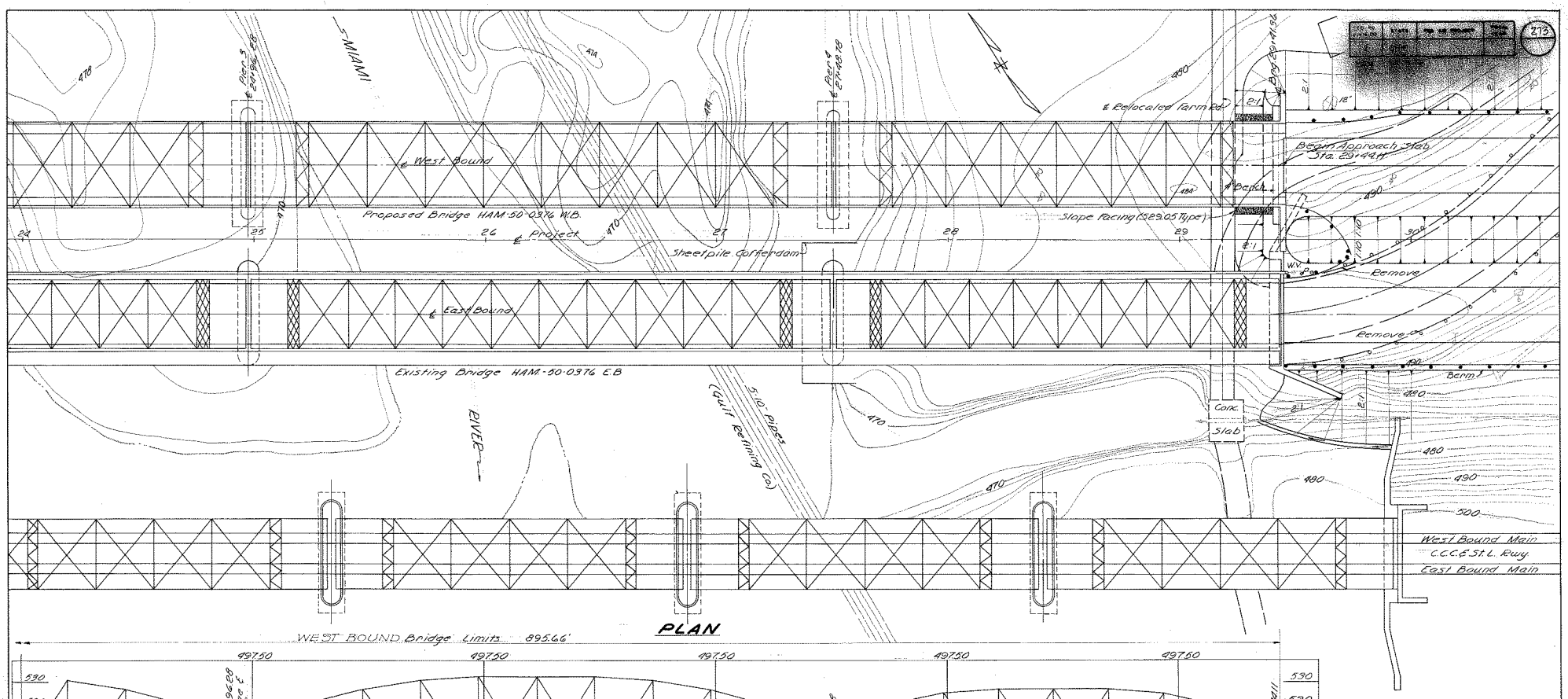
Foundation design and foundation quantities are based on a study of rod soundings and soil sampling soundings made at the site. This sounding information may be inspected in the office of the Bureau of Bridges in Columbus, or in an abridged form in the Division office, but the State assumes no responsibility for the accuracy thereof.

HARRY GALLE ENGINEERS
2350 KIPLING PARKWAY
CINCINNATI 6, O.

SITE PLAN

BRIDGE HAM-50-0376 E.B. & W.B.
EXISTING & PROPOSED U.S. ROUTE 50
OVER GREAT MIAMI RIVER
HAMILTON CO.
SEC. 2.72 STA. 24+196.78

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED	DATE	REVISED
R.A.K.	R.A.K.	D.S.	R.C.B.	A.C.A.	9/27/57	

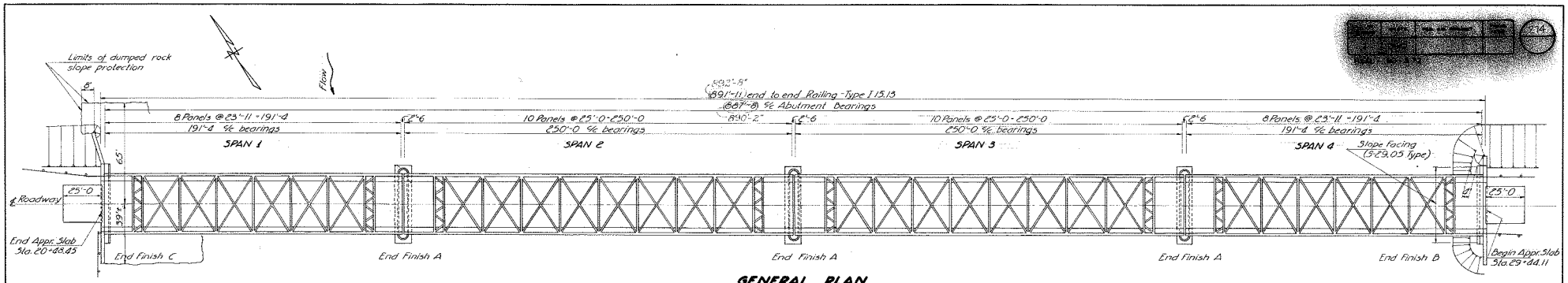


HARRY G. BALL ENGINEERS
2321 VICTORY PARKWAY
CINCINNATI 6, O.

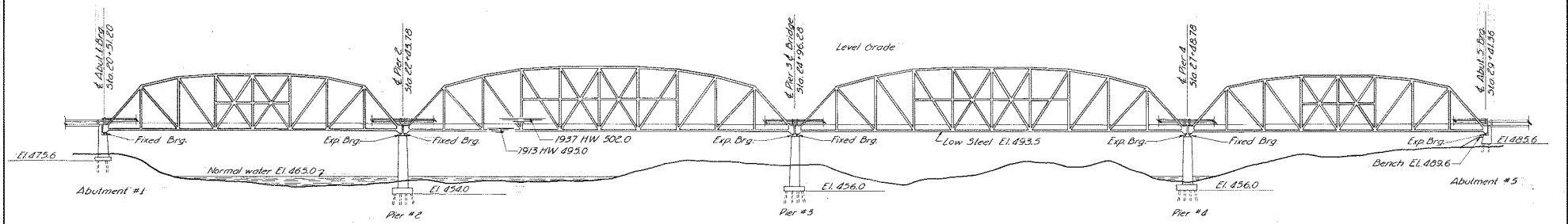
SITE PLAN

BRIDGE HAM-50-0376 EB&WB
EXISTING & PROPOSED U.S. ROUTE 50
OVER GREAT MIAMI RIVER
HAMILTON CO.

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED	DATE	SHEET
RAK	RAK	DG	RCB	ACA	8/27/59	



GENERAL PLAN



ELEVATION

ESTIMATED QUANTITIES

ITEM	TOTAL	UNIT	DESCRIPTION	Abut 1	Pier 2	Pier 3	Pier 4	Abut 5	Superstr.	General
E-2	lump sum	lump sum	Cofferdams, cribs & sheeting							lump sum
E-2	1,372	cu. yds.	Unclassified excavation	227	664	561	186	134		
S-1	744.2	cu. yds.	Class "C" concrete, superstructure						744.2	
S-1	321.1	cu. yds.	Class "C" concrete, abutments	222.5				98.6		
S-1	378.6	cu. yds.	Class "E" concrete, footings	83.4	98.4	98.4	98.4			
S-1	933.8	cu. yds.	Class "E" concrete, piers above footings		327.6	303.1	303.1			
S-2	125	sq. ft.	Patching concrete	93				32		
S-3	14	lin. ft.	Waterproofing, ½" premolded sealing strip (12" wide)	14						
S-4	265,971	lbs.	Reinforcing steel	18,764	7,476	7,422	7,422	7,893	223,394	
S-7	2226,806	lbs.	Structural steel						2226,806	
S-8	2226,806	lbs.	Field painting of structural steel						2226,806	
S-9	95	sq. ft.	1 in. Preformed expansion joint filler (Type M-10.02)	73				22		
S-14	1745.33	lin. ft.	Railing (Type T-15.13 steel, 4x3x⅜ handrail, 6W-20 Posts)						1745.33	
S-16	1,783.83	lin. ft.							1783.83	
S-16	lump sum	lump sum	First test pile							lump sum
S-18	11,185	lin. ft.	Steel piles (12 BP 53)	2160	2700	2700	2700	925		
S-22	lump sum	lump sum	Removal of portions of existing structure							lump sum
S-29	115	cu. yds.	Porous backfill	76				39		
S-29	34	cu. yds.	Slope facing (S-29.05 Type)					34		
I-10	414	cu. yds.	Dumped rock fill	414						

GENERAL NOTES

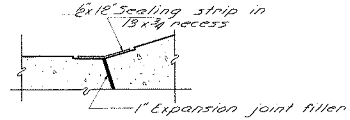
REFERENCE shall be made to Standard Drawing A3-1-54 dated December 1, 1954.
DESIGN SPECIFICATIONS: This structure conforms to the requirements of "Design Specifications for Highway Structures" of the State of Ohio, Department of Highways, dated Sept. 1, 1957.
PILING shall be driven to a minimum bearing capacity of 30 tons.
WELDING shall be class "A" unless otherwise shown. Any weld shown as a field weld may be made in the shop at the option of the contractor.
SLOPE FACING (S-29.05, TYPE) shall be provided under the structure at Abutment 5. The slope facing material shall be 12 inches thick and shall extend from the face of the abutment down to Elev. 484.0 and transversely to 3 ft. outside the edge of the superstructure.
DUMPED ROCK FILL 2 ft. thick shall be provided under the bridge at Abutment 1. The dumped rock fill shall be constructed above Elevation 463 and to the limits shown on the plans.
CONCRETE DECK PLACING: The slab may be placed in sections, between transverse construction joints which are normal to the centerline of the bridge and are located near the center of any span.
COFFERDAMS: Before construction is started on the Piers, three sets of prints showing details of the cofferdams at each pier shall be submitted to the Director for approval by the Department of Highways.

HARRY E. PYLE ENGINEERS
Columbus, Ohio
DESIGNED BY [illegible]

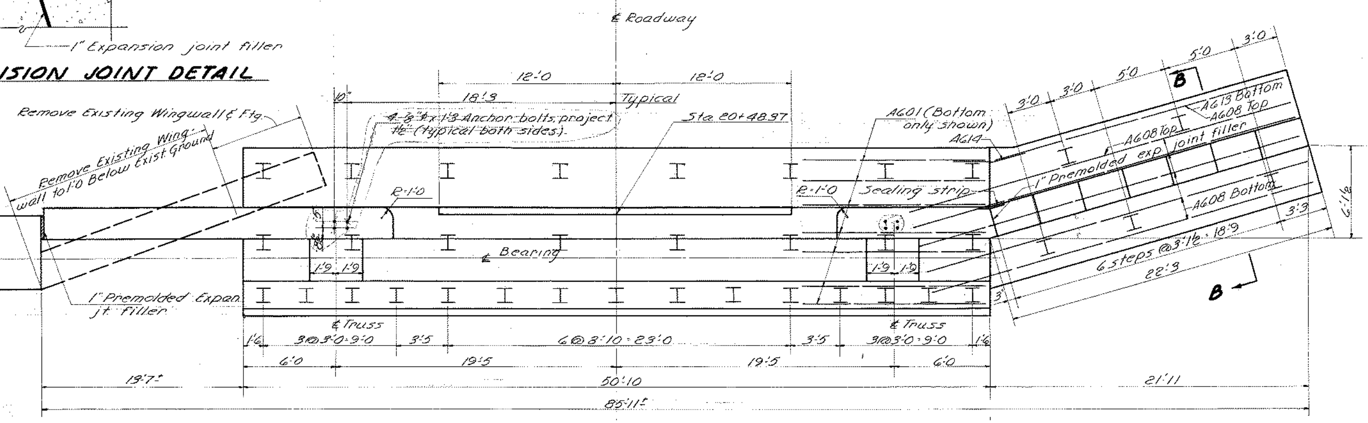
GENERAL PLAN & ELEVATION NOTES & ESTIMATED QUANTITIES

BRIDGE HAM-50-0376 WB
PROPOSED U.S. ROUTE 50
OVER GREAT MIAMI RIVER
HAMILTON COUNTY
SHEET [illegible] OF [illegible]

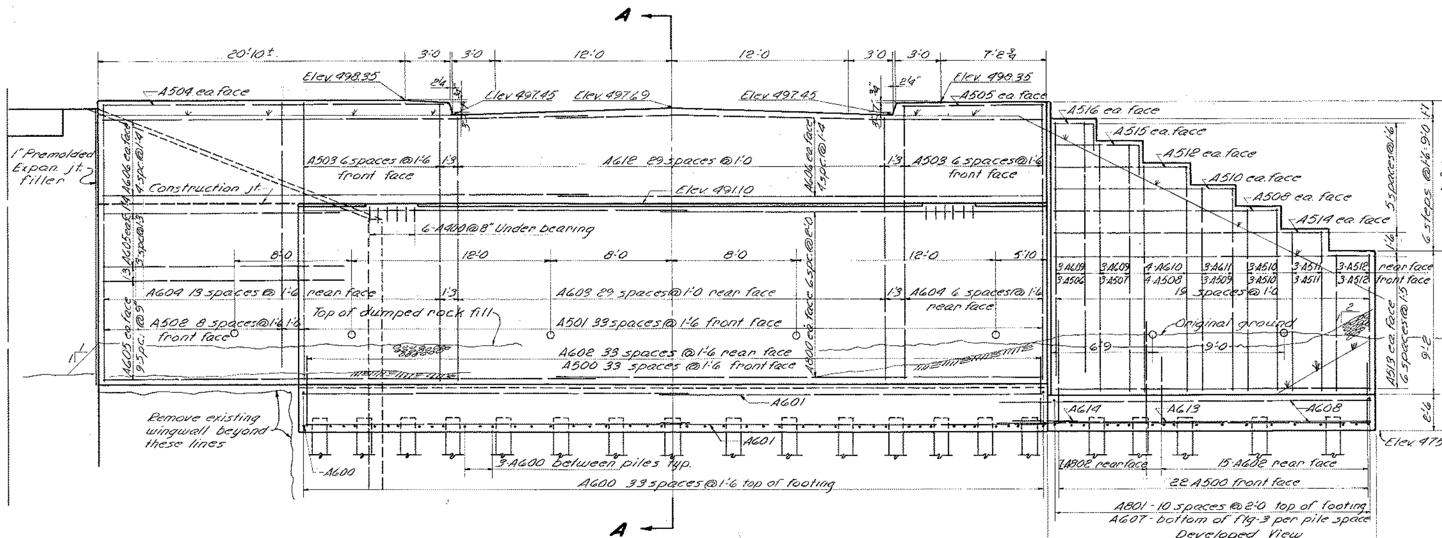
L.T.	L.P.	CHL.	F.C.C.	A.C.A. 8/27/58



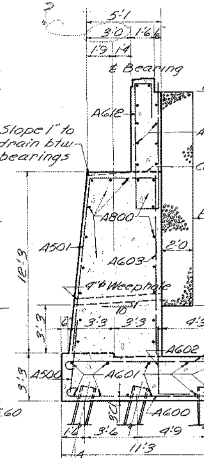
EXPANSION JOINT DETAIL



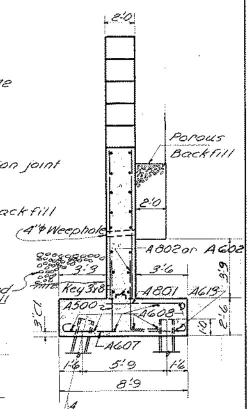
PLAN



ELEVATION



SECTION A-A



SECTION B-B

ABUTMENT NOTES

Before construction is started, the North wingwalls on Existing Bridge No. HAM-50-0376 E.B shall be removed to the limits shown on the plans. Waste masonry shall be used as bank protection in front of proposed Abutment 1. The exposed end of the existing breastwalls shall be thoroughly cleaned and all loose material removed. A dressing coat of concrete mortar shall be applied to the exposed breastwall ends in accordance with item 52 of the construction and materials specifications.

Excavation shall be made for abutment cap & wingwall footings, after which piling shall be driven.

Concrete for Abutments shall be Class "E."

Reinforcing bars in the bridge seat shall be placed to clear anchor bolts.

Concrete above bridge seat construction joint shall not be placed until steel work is erected. Steel end finish shall be used as a template for top of backwall.

Porous backfill, 2' thick shall extend upward to the approach slab and to the shoulders, and outward to the surface of embankment slope on the North and to end of wingwall on the South.

PILE DESIGN LOAD : 45 Tons per pile.

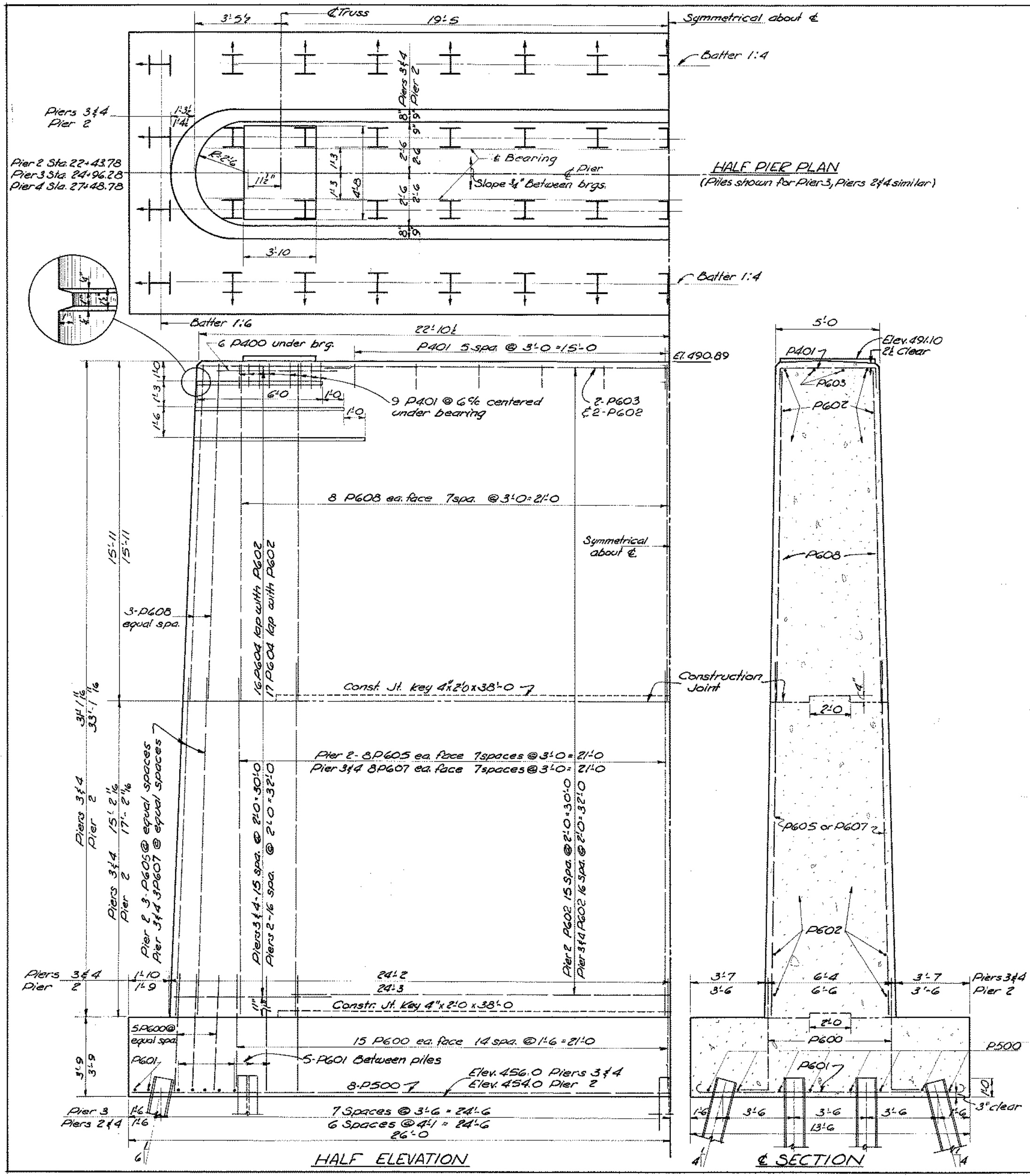
HARRY BALKE ENGINEERS

CINCINNATI, O.

ABUTMENT 1 DETAILS

BRIDGE HAM-50-0376 W.B.
PROPOSED US ROUTE 50
OVER GREAT MIAMI RIVER
HAMILTON CO.

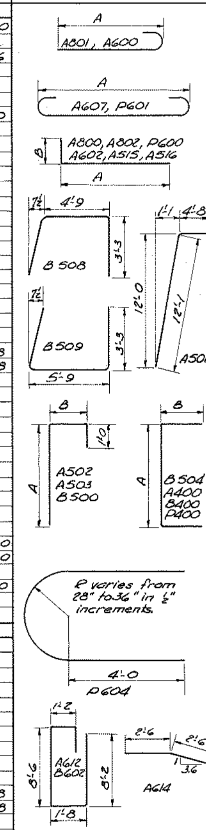
K.M. & L.A.	R.C. W.B. R.K.H.	D.G.	R.C.B.	A.C.A. 2/27/5[illegible]



REINFORCING STEEL LIST

Mark	No.	Length	Weight	Shape	A	B
ABUTMENT 1						
A800	34	30-9	2,791	B	26-9	4'-0
A801	11	7-6	220	B	6-5	
A802	7	8'-6	45	B	7-0	1-6
A600	78	11-5	1,338	B	10-9	
A601	22	26-6	876	S		
A602	49	6-0	442	B	5'-0	1-0
A603	30	12-0	541	S		
A604	23	19-3	665	S		
A605	28	18-0	757	S		
A606	20	33-0	991	S		
A607	18	9-7	259	B	8-3	
A608	7	27-0	284	S		
A609	6	16-6	149	S		
A610	4	15-0	90	S		
A611	3	13-6	61	S		
A612	30	22-0	991	B	–	–
A613	1	20-0	30	S		
A614	1	5-0	8	B		
A500	56	5-0	292	S		
A501	34	16-9	594	B		
A502	9	21-8	203	B	19-0	1-8
A503	14	11-4	165	B	8-8	1-8
A504	2	23-6	49	S		
A505	2	9-9	20	S		
A506	3	18-0	56	S		
A507	3	16-6	52	S		
A508	6	15-0	94	S		
A509	3	13-6	42	S		
A510	8	12-0	100	S		
A511	6	10-6	66	S		
A512	8	9-0	75	S		
A513	14	21-6	314	S		
A514	2	18-3	38	S		
A515	2	7-9	16	B	5-9	2-0
A516	2	4-9	10	B	2-9	2-0
A400	12	5-0	40	B	3-0	1-0
ABUTMENT 5						
B800	32	30-9	2627	S		
B801	4	26-9	286	S		
B600	18	18-0	216	S		
B601	4	33-0	198	S		
B602	30	22-0	991	B		
B603	16	36-0	865	S		
B604	14	9-9	205	S		
B500	14	11-4	165	B	8-8	1-8
B501	20	14-8	306	B	12-0	1-8
B502	2	23-6	49	S		
B503	2	9-9	20	S		
B504	32	9-0	300	B	3-8	1-8
B505	10	7-9	81	S		
B506	4	9-6	40	S		
B507	4	11-0	46	S		
B508	35	11-3	411	B		
B509	35	12-3	447	B		
A400	12	5-0	40	B	3-0	1-0

Bending Diagrams



Mark	No.	Length	Weight	Shape	A	B
PIER 2						
P600	68	7-3	740	B	6-0	1-3
P601	64	14-4	1378	B	13-0	
P602	36	36-6	1974	S		
P603	2	10-6	32	S		
P604	2ea =34	Varies 15-4 to 17-5	836	B		
P605	36	19-3	1041	S		
P608	36	15-9	852	S		
P500	16	26-9	446	S		
P400	12	6-0	48	S		
P401	29	6-8	129	B	4-8	1-0
PIER 3						
P600	68	7-3	740	B	6-0	1-3
P601	74	14-4	1593	B	13-0	
P602	34	36-6	1864	S		
P603	2	10-6	32	S		
P604	2ea =32	Varies 15'4 to 17'4	785	B		
P607	36	17-3	933	S		
P608	36	15-9	852	S		
P500	16	26-9	446	S		
P400	12	6-0	48	S		
P401	29	6-8	129	B	4-8	1-0
PIER 4						
P600	68	7-3	740	B	6-0	1-3
P601	74	14-4	1593	B	13-0	
P602	34	36-6	1864	S		
P603	2	10-6	32	S		
P604	2ea. =32	Varies 15-4 to 17-4	785	B		
P607	36	17-3	933	S		
P608	36	15-9	852	S		
P500	16	26-9	446	S		
P400	12	6-0	48	S		
P401	29	8-0	129	B	4-8	1-0
SUPERSTRUCTURE						
S700	1294	30-3	80,009	S		
S600	1294	30-3	58,794	S		
S601	372	33-9	18,858	S		
S602	434	37-6	24,445	S		
S500	960	11-6	11,515	S		
S501	372	33-6	12,998	S		
S502	434	37-6	16,975	S		
REPLACEMENT STEEL						
RE800	1	6-6	·	S		
RE700	5	6-3		S		
RE600	7	5-11		S		
RE500	3	5-7		S		
RE400	1	5-3		S		

REPLACEMENT BARS If reinforcing bars are fabricated from stock which has been previously tested and approved by the Ohio Highway Testing Laboratory, test samples as provided in Sec. S-4.02 need not be furnished and replacement bars will not be required.

REINFORCING under bearings shall be placed to clear anchor bolts.

CONCRETE for piers shall be Class "E."

PILE DESIGN LOAD: 50 tons per pile

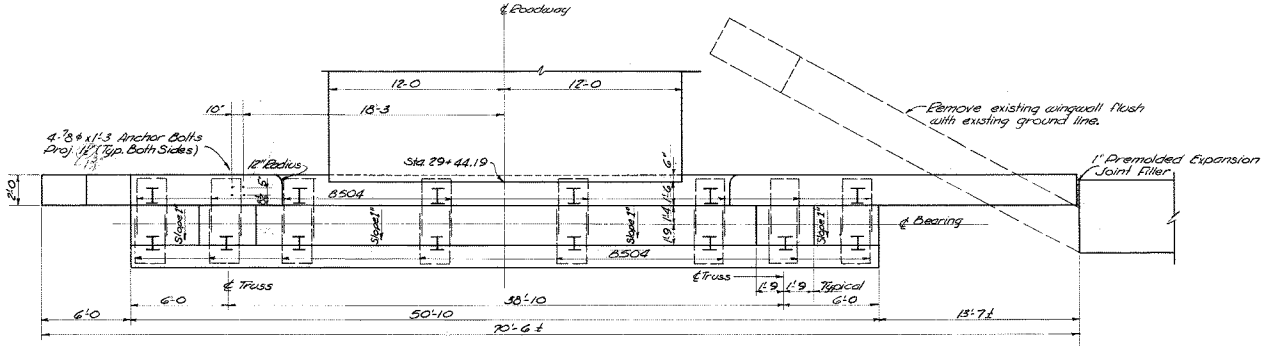
BAR SIZE is indicated in the bar mark. The first digit indicates the bar size number. For example A502 is a № 5 size bar and A803 is a № 8 size bar.

HARRY BALKE ENGINEERS
2390 VICTORY PARKWAY
CINCINNATI 6, O.

PIER DETAILS & REINFORCING BAR LIST

BRIDGE HAM-50-03.76 W.B.
PROPOSED U.S. ROUTE 50
OVER GREAT MIAMI RIVER
HAMILTON CO.
SEC. 3.72 STA. 24+96.28

H.J. W.H.	AL	RCB	ACA	2/27/56

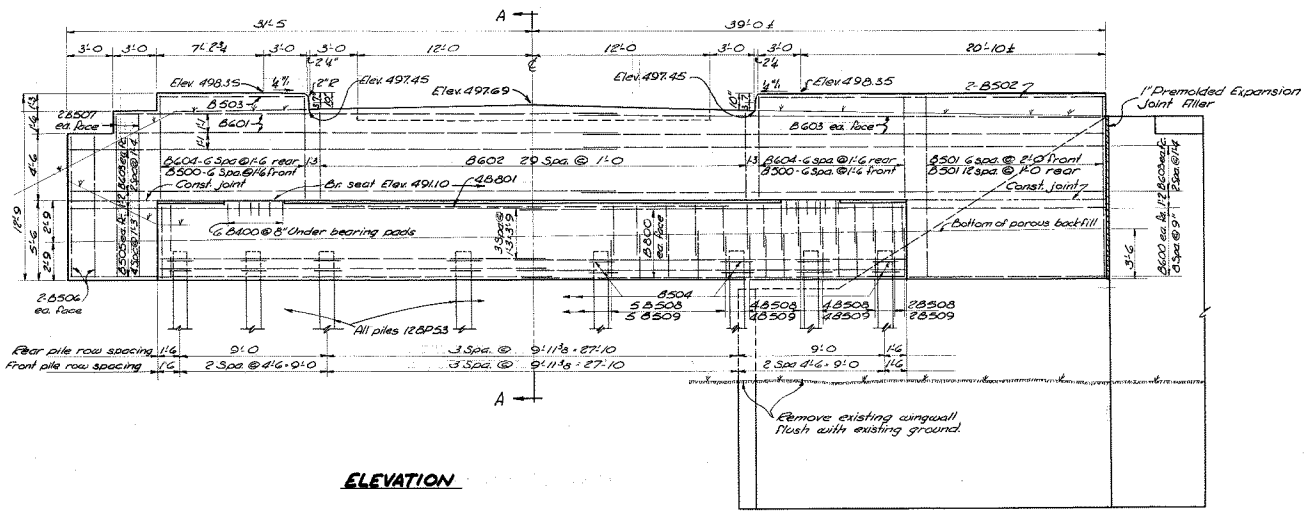


PLAN

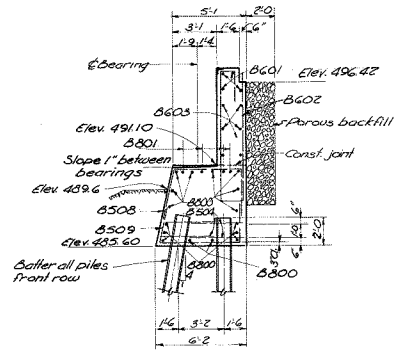
ABUTMENT NOTES

See sheet 275

PILE DESIGN LOAD: 45 tons per pile



ELEVATION



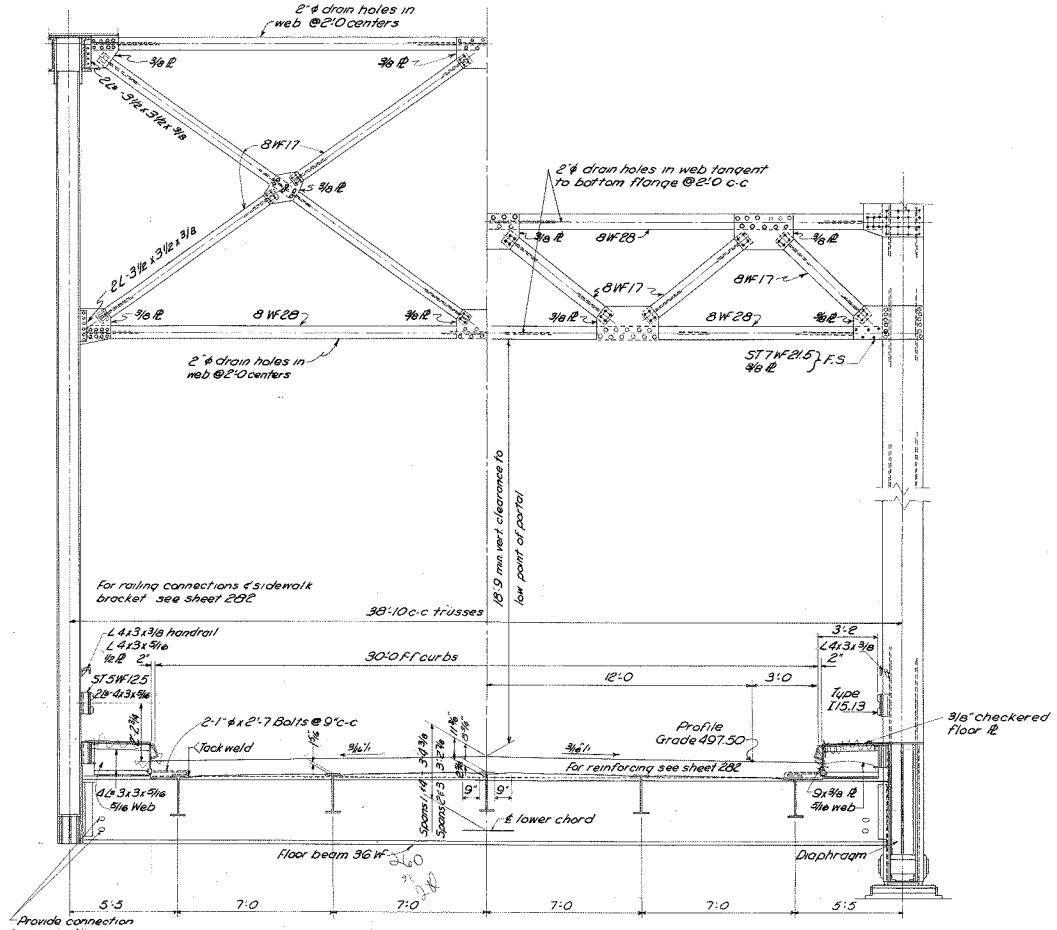
SECTION-A-A

HARRY BALKE ENGINEERS
CINCINNATI, OHIO

ABUTMENT 5 DETAILS

BRIDGE HAM-50-0376 WB
PROPOSED U.S. ROUTE 50
OVER GREAT MIAMI RIVER
HAMILTON CO.
SEC. 3.72 STA. 29+96.28

DESIGNED	DRAWN	TRACED	CHECKED	DATE
CA	WJ	AL	FWB	CA 2/27/80

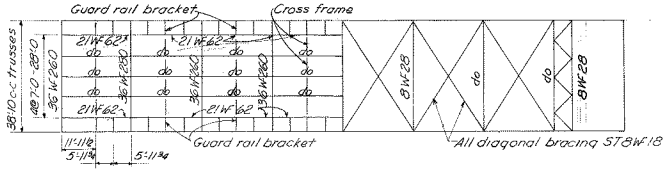


HALF CROSS SECTION

HALF END ELEVATION

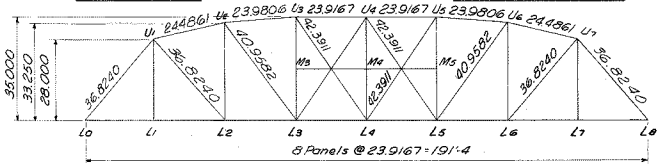
TYPICAL FOR ALL SPANS

SPANS 1 & 4

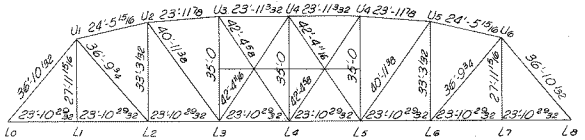


HALF FLOOR PLAN

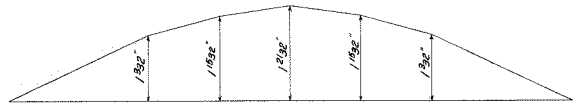
HALF TOP CHORD PLAN



ELEVATION



FABRICATED LENGTHS



CAMBER BLOCKING ORDINATES

TABLE OF MODIFIED STRESSES (SPANS 1 & 4)

Member	Modified Stresses in Kips DL	LL & I	Total	Section	
L_0U_1	-284	-200	-484	2-15 C 50	1-PL 21"x 9/16"
U_1U_2	-275	-179	-454	2-15 C 40	1-PL 21"x 1"
U_2U_3	-319	-210	-529	2-15 C 40	1-PL 21"x 11/16"
U_3U_4	-340	-224	-564	2-15 C 50	1-PL 21"x 9/16"
L_0L_2	+195	+121	+306	2 PL 15"x 3/8"	6 holes out
L_2L_3	+268	+177	+445	2-PL 15"x 11/16"	2 PL 15"x 3/8" do
L_3L_4	+319	+207	+526	2-PL 15"x 11/16"	2 PL 15"x 9/16" do
U_1L_2	+129	+109	+238	12 WF 58	4 holes out
U_2L_3	+88	+96	+184	12 WF 53	do
U_3L_4	+39	+79	+118	12 WF 36	do
U_1L_1	+59	+108	+167	12 WF 40	do
U_2L_2	-36	-62	-98	12 WF 65	do
U_3L_3	-9	-63	-72	12 WF 36	do
Substruts				12 WF 36	do
Floor beam reactions	56.6	86.4	143		

Note: Stresses modified according to sec. 76 of the 1957 Design Specification

All Rivets ⅞" unless noted

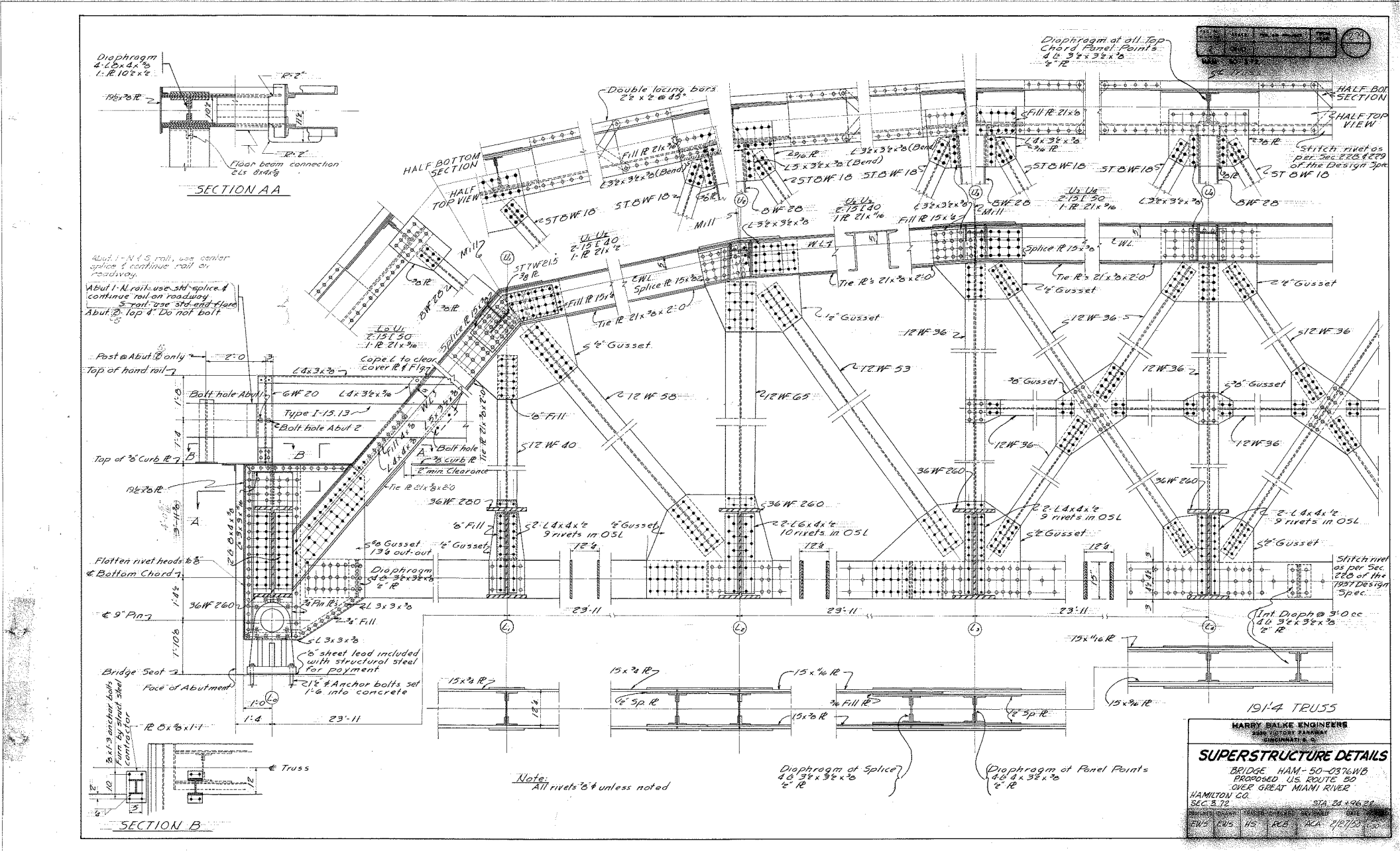
191'-4" TRUSS

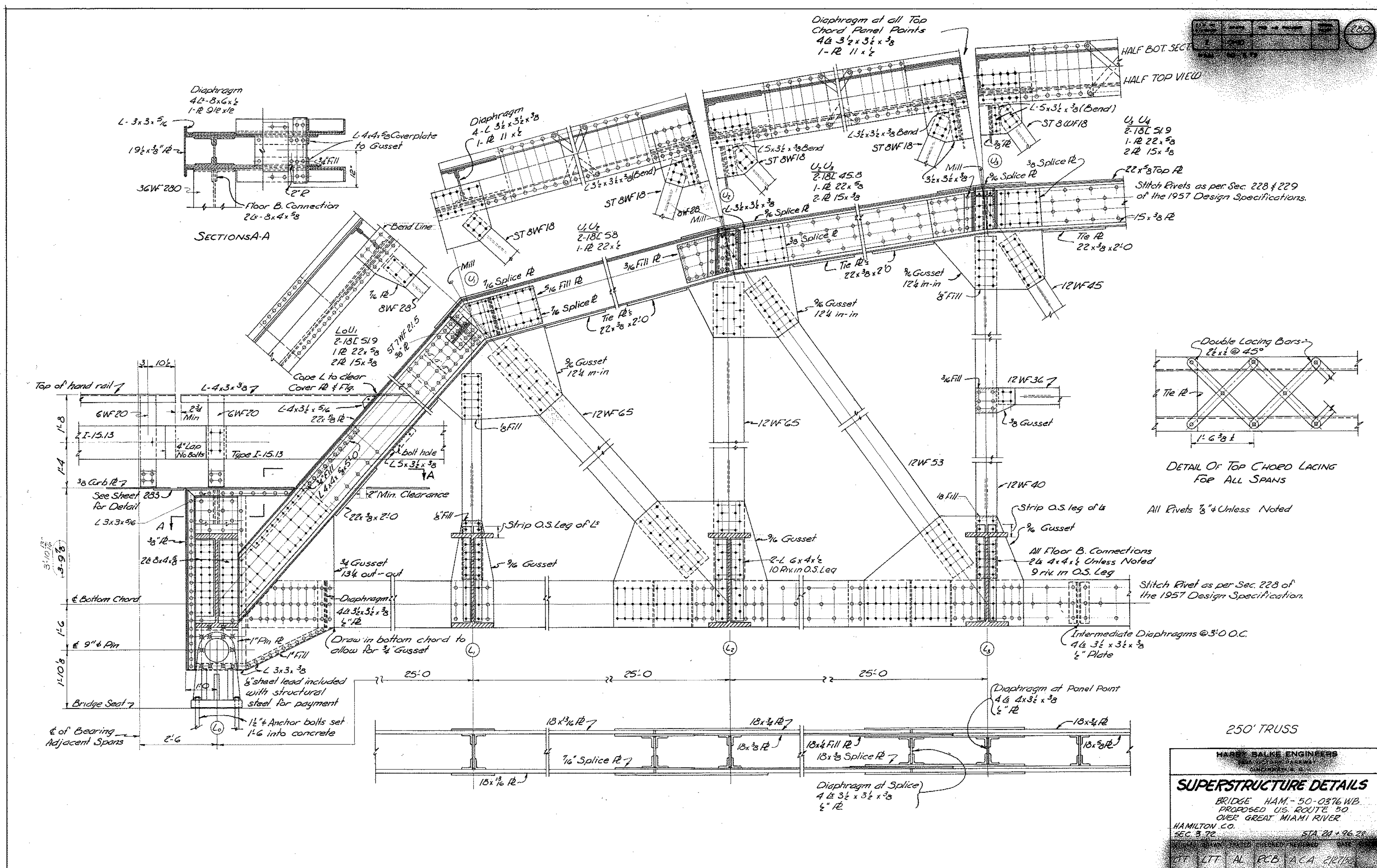
HARRY BALKE ENGINEERS
2828 VICTORY PARKWAY
CINCINNATI 6, O.

SUPERSTRUCTURE DETAILS

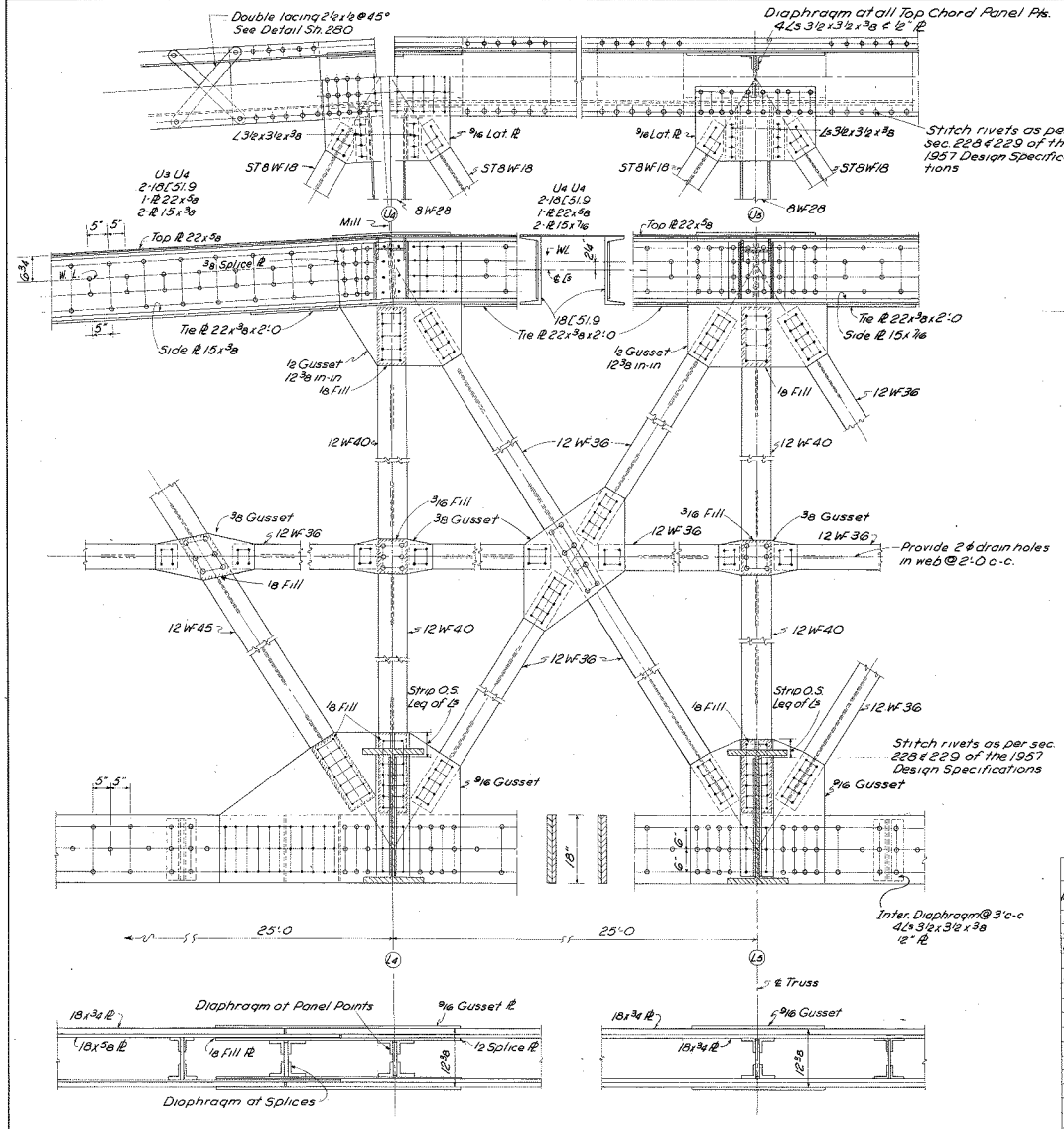
BRIDGE HAM-50-03.76 WB
PROPOSED U.S. ROUTE 50
OVER GREAT MIAMI RIVER
HAMILTON CO.
SEC. 3.76 STA. 24+36.27

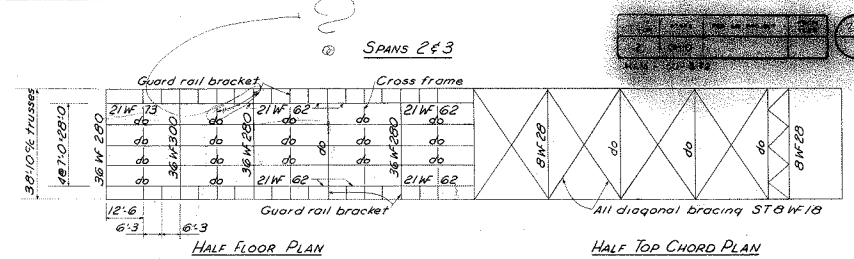
DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED	DATE
A.W.S. L.T.	P.W.	D.S.	R.G.B.	A.C.A.	2/27/63

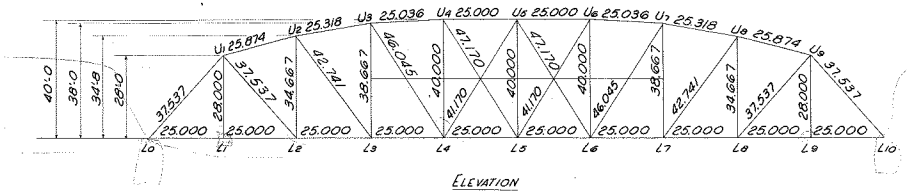

SECTION A A
SECTION B
191'-4 TRUSS
Note: All rivets 7/8" ϕ unless noted
HARRY BALKE ENGINEERS
SUPERSTRUCTURE DETAILS
BRIDGE HAM-50-0376WB
PROPOSED U.S. ROUTE 50
OVER GREAT MIAMI RIVER
HAMILTON CO.
SEC. 3.72
STA 24+96.28
DESIGNED FWS
DRAWN CWS
TRACED HS
CHECKED RKB
APPROVED RCA
DATE 2/27/74
SHEET 1 OF 2

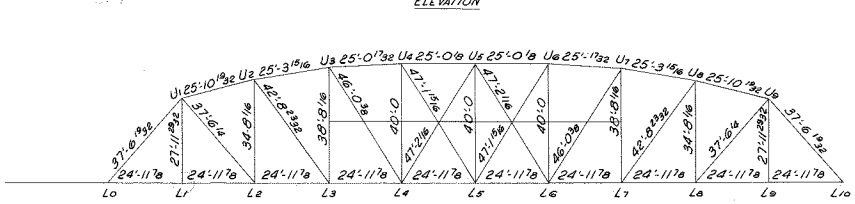


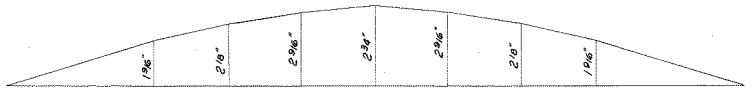
Diaphragm at all Top Chord Panel Points
4 Ls 3½ x 3½ x ⅜
1-PL 11 x ½
HALF BOT. SECT.
HALF TOP VIEW
Diaphragm
4Ls-8x6x½
1-PL 9½ x ½
L-3x3x5/16
19½ x ⅜" PL
L-4x4x⅝ Coverplate to Gusset
¾" Fill
36WF280
2" R
Floor B. Connection
2Ls-8x4x⅝
SECTIONS A-A
Diaphragm
4-L 3½ x 3½ x ⅜
1-PL 11 x ½
L 3½ x 3½ x ⅜ (Bend)
ST 8WF18
L 5x3½ x ⅜ Bend
L 3½ x 3½ x ⅜ Bend
L-5x3½ x ⅜ (Bend)
ST 8WF18
U3 U4
2-18[51.9
1-PL 22 x ⅝
2 PL 15 x ⅜
U2 U3
2-18[45.8
1-PL 22 x ⅝
2-PL 15 x ⅜
⅜ Splice PL
9/16 Splice PL
22 x ⅝ Top PL
Stitch Rivets as per Sec. 228 & 229 of the 1957 Design Specifications.
15 x ⅜ PL
Tie PL 22 x ⅜ x 2'-0
Bend Line
U1 U2
2-18[58
1-PL 22 x ½
3/16 Fill PL
Mill
7/16 Splice PL
5/16 Fill PL
7/16 Splice PL
Tie PL's 22 x ⅜ x 2'-0
9/16 Gusset 12¼ in-in
⅛" Fill
12WF45
8WF28
7/16 PL
L0U1
2-18[51.9
1 PL 22 x ⅝
2 PL 15 x ⅜
ST 7WF21.5
Cope L to clear Cover PL & Flg.
12WF65
12WF53
12WF36
12WF40
⅜ Gusset
Double Lacing Bars
2½ x ½ @ 45°
Tie PL
1'-6⅜
DETAIL OF TOP CHORD LACING FOR ALL SPANS
All Rivets ⅞"φ Unless Noted
Top of hand rail
6WF20
2¾ Min
L-4x3x⅜
I-15.13
4" Lap No Bolts
Type I-15.13
⅜ Curb PL
See Sheet 283 for Detail
L 3x3x5/16
⅜" PL
2Ls 8x4x⅝
L-4x3½ x 5/16
22 x ⅝ PL
bolt hole
L 5x3½ x ⅜
L 4x4x⅝x5'-0
2" Min. Clearance
22 x ⅜ x 2'-0
¾ Gusset 13¼ out-out
Diaphragm
4Ls 3½ x 3½ x ⅜
½" PL
Strip O.S. Leg of Ls
9/16 Gusset
2-L 6x4x½
10 Riv. in O.S. Leg
Strip O.S. leg of Ls
All Floor B. Connections
2Ls 4x4x½ Unless Noted
9 riv. in O.S. Leg
Stitch Rivet as per Sec. 228 of the 1957 Design Specification.
℄ Bottom Chord
℄ 9"φ Pin
1" Pin PL
1" Fill
L 3x3x⅜
Draw in bottom chord to allow for ¾" Gusset
Intermediate Diaphragms @ 3'-0 O.C.
4Ls 3½ x 3½ x ⅜
½" Plate
⅛" sheet lead included with structural steel for payment
Bridge Seat
1½"φ Anchor bolts set 1'-6 into concrete
℄ of Bearing Adjacent Spans
2'-6
25'-0
25'-0
25'-0
Diaphragm at Panel Point
4 Ls 4x3½ x ⅜
½" PL
18 x 13/16 PL
18 x ¾ PL
18 x ¾ PL
18 x ⅜ PL
18 x ⅝ PL
18 x ¼ Fill PL
18 x ⅜ Splice PL
7/16" Splice PL
18 x 13/16 PL
Diaphragm at Splice
4 Ls 3½ x 3½ x ⅜
½" PL
250' TRUSS
HARRY BALKE ENGINEERS
SUPERSTRUCTURE DETAILS
BRIDGE HAM.-50-0376 WB.
PROPOSED U.S. ROUTE 50
OVER GREAT MIAMI RIVER
HAMILTON CO.
SEC. 3.72
STA. 24+96.28
LTT AL RCB ACA











CAMBER BLOCKING ORDINATES

TABLE OF MODIFIED STRESSES FOR 250' SPANS

MEMBER	MODIFIED STRESSES IN KIPS			SECTION		
	DL	LL+I	TOTAL			
L0 U1	-398	-240	-638	2-18[51.9	1 PL 22x⅜	2 PLs 15x⅜
U1 U2	-394	-224	-618	2-18[58	1 PL 22x1⅛	—
U2 U3	-455	-260	-715	2-18[45.8	1 PL 22x⅝	2 PLs 15x⅜
U3 U4	-499	-281	-780	2-18[51.9	1 PL 22x⅝	2 PLs 15x⅜
U4 U5	-520	-293	-813	2-18[51.9	1 PL 22x⅝	2 PLs 15x⅜
L0 L2	+266	+151	+417	2 PLs 18x13/16		6 holes out
L2 L3	+381	+215	+596	2 PLs 18x¾	2 PLs 18x⅜	do
L3 L4	+451	+254	+705	2 PLs 18x¾	2 PLs 18x⅜	do
L4 L5	+498	+281	+779	4 PLs 18x¾		do
U1 L2	+175	+114	+289	12WF65		4 holes out
U2 L3	+118	+97	+215	12WF53		do
U3 L4	+89	+96	+185	12WF45		do
U4 L5	+40	+84	+124	12WF36		do
U1 L1	+63	+95	+158	12WF40		do
U2 L2	-65	-69	-134	12WF65		do
U3 L3	-29	-63	-92	12WF40		do
U4 L4	-8	-71	-79	12WF40		do
Substruts				12WF36		
Floor Beam Reactions	60	87.4	147.4			

Note: Stresses modified according to Sec. 76 of the 1957 Design Specifications

All rivets ⅞ ø unless noted

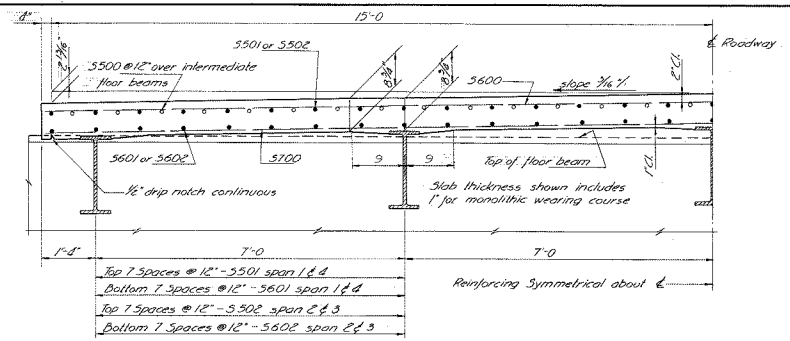
250' TRUSS

HARRY BALKE ENGINEERS
2200 VICTORY PARKWAY
CINCINNATI 6, O.

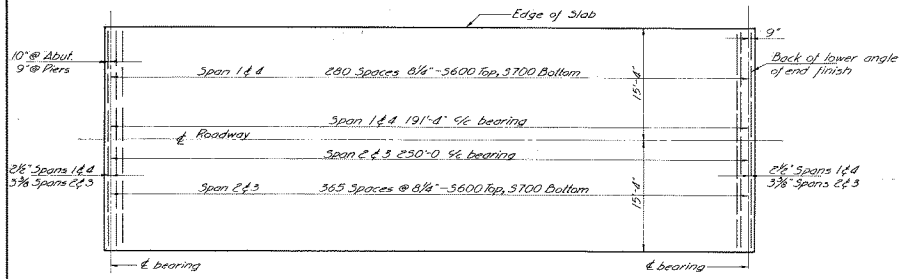
SUPERSTRUCTURE DETAILS

BRIDGE HAM-50-0376WB.
PROPOSED U.S. ROUTE 50.
OVER GREAT MIAMI RIVER.
HAMILTON CO.
SEC. 3.72 STA. 24+19.96

DESIGNED	TRACED	DETAILED	CHECKED	DATE
EJT	LLT	DS	RCB	ACA 2/27/59

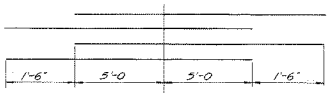


TYPICAL SECTION

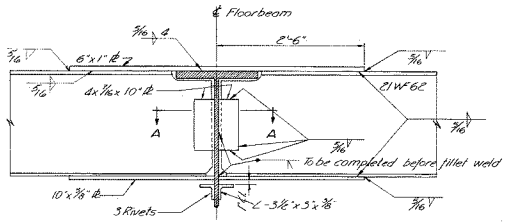


NOTE: One transverse, keyed construction joint may be used in each truss span, at the Contractor's option. If used, the joint shall be located not less than four feet from a transverse floor beam.

SLAB PLAN

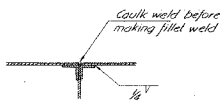


SPACING OF 3500 BARS OVER FLOOR BEAMS



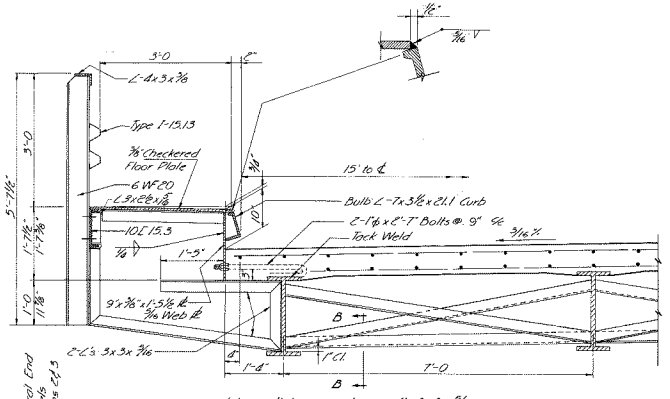
SPLICE DETAIL

NOTE: See sheet C76 for reinforcing steel schedule



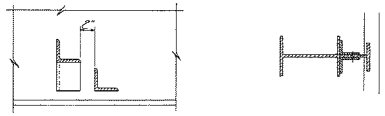
SECTION C

SECTION A-A



SECTION AT INTERMEDIATE CROSS FRAME

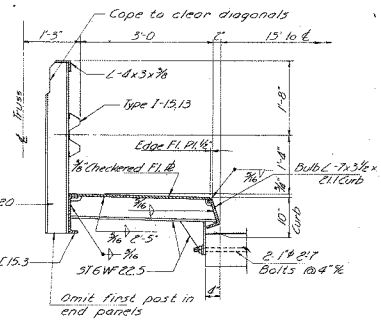
All slab concrete shall be class 'C'.
All welding shall be class A.
Rivets ⅞ ϕ unless noted.



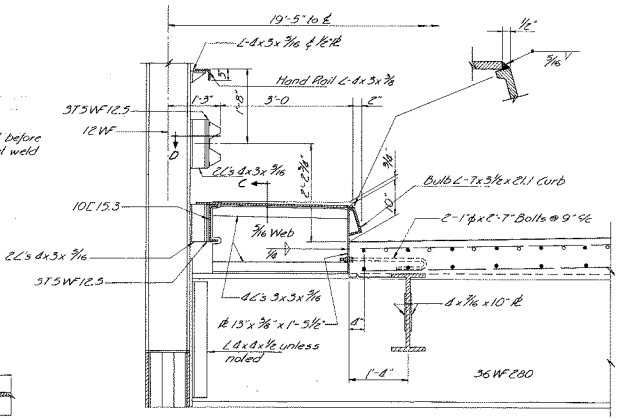
SECTION B-B

SECTION D

NOTE: S-1d, shall include the type I-13.13 railing, 4x3x7/16 top angle railing, railing post and railing connections to trusses for payment.



INTERMEDIATE RAILING AND CURB SUPPORT



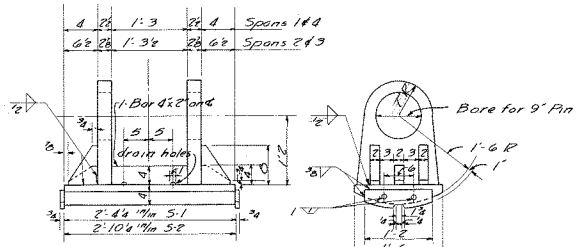
SECTION AT FLOOR BEAM

HARRY BALKE ENGINEERS
1550 MOUNT ROYAL PARKWAY
CINCINNATI 8, O.

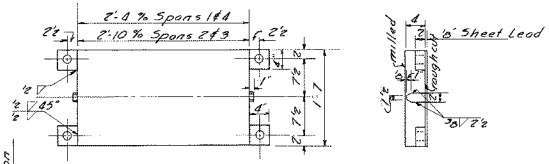
SUPERSTRUCTURE DETAILS

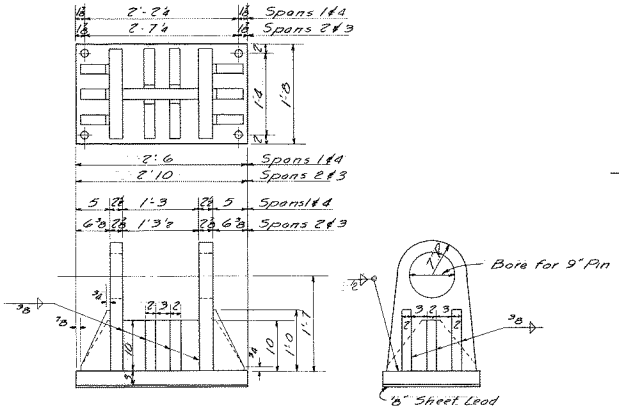
BRIDGE HAM-50-0876 WB
PROPOSED US ROUTE 50
OVER GREAT MIAMI RIVER
HAMILTON CO.
SEC. 3.72 STA 24+96.28

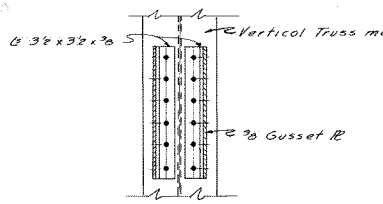
DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED	DATE	REVISED
C.L.T.	A.C.	C.L.	R.C.B.	A.C.A.	2/27/64	



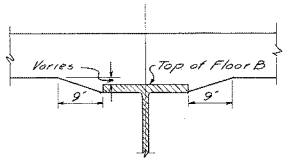
EXPANSION SHOE ROCKER



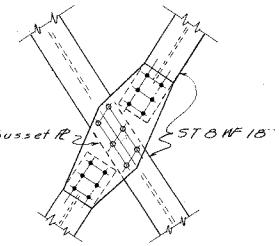




TYPICAL CONNECTION OF SWAY BRACING TO TRUSS VERTICAL



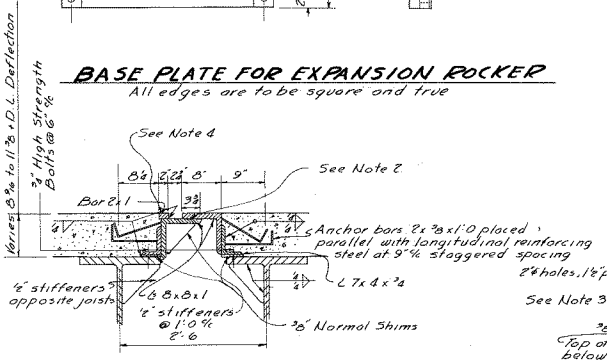
SECTION AT FLOOR BEAM



TYPICAL CONNECTION FOR TOP CHORD BRACING

BASE PLATE FOR EXPANSION ROCKER

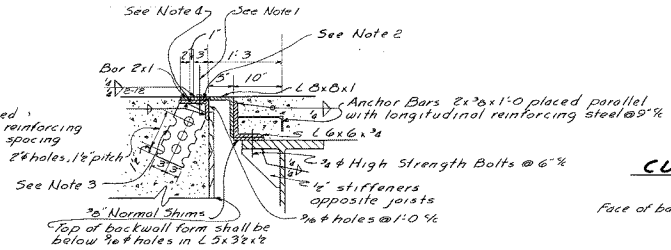
All edges are to be square and true



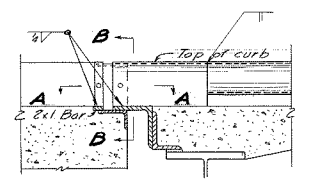
ROADWAY END FINISH "A"

FIXED SHOES

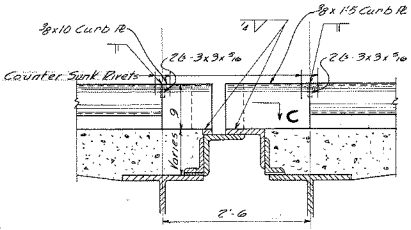
All edges are to be square and true



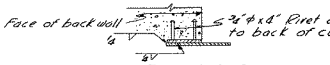
ROADWAY END FINISH "C"



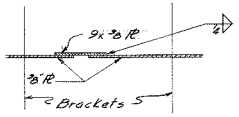
CURB PLATE AT ABUTMENT



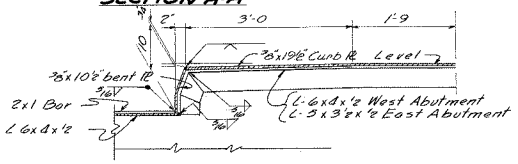
CURB PLATE AT PIERS



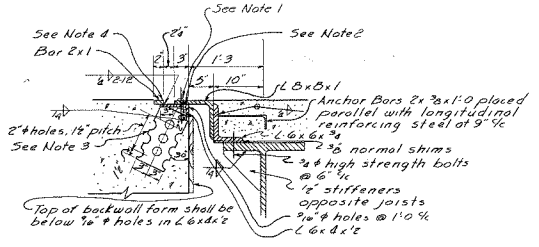
SECTION A-A



SECTION C-C



SECTION B-B



ROADWAY END FINISH "B"

NOTES:

1. ⅞ x 2 bolts of not more than 2'-0 c with nuts tack-welded to under side of lower angle. 1 1/16" ϕ holes in upper angle. Center ⅞" ϕ bolts in 1 1/16" ϕ holes. Apply flake graphite between washers and angles. Turn bolt tight and release one-half turn. Remove bolts as soon as concrete has reasonably set preferably within two hours, to avoid effect of temperature expansion or contraction of superstructure. Fill hole with bituminous material.
2. This contact surface shall not be painted and shall be lubricated with flake graphite prior to placing of backwall concrete.
3. 6 x ½ x 12" plates spaced at approximately 15" c except near joints in the angle, where the plates shall be placed within 6 in. of each side of the joint. The holes may be burned in the plate.
4. Provide a joint in the edge bar and in the angle on the center line of the roadway. Additional joints may be provided in them at a minimum spacing of 6'-0". (Joints shall not be welded.)

See Sheets 279 and 280 for railing details for bridge ends

HARRY BALKE ENGINEERS
2326 VICTORY PARKWAY
CINCINNATI 6, O.

SUPERSTRUCTURE DETAILS

BRIDGE HAM-50-0376 WB
PROPOSED U.S. ROUTE 50
OVER GREAT MIAMI RIVER
HAMILTON CO.
SEC. 3, 7.2 STA 24+196.28

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED	DATE	REVISED
L.L.T. E.W.S.	J.L.	J.S.	R.C.B.	A.C.A.	8/27/58	

Appendix B

Assetwise Report

TRANSYSTEMS

Inspector: Sadlock,Joshua **Structure Number:** 3102521

Inspection Date: 07/10/2024 **Facility Carried:** US50

Ohio Bridge Inspection Summary Report

HAM-00050-0376L_(3102521)

2: District District 08 — 84938 - WHITEWATER TWP (HAM county)

5A: Inventory Route 1 00050

21: Major Maint A/B 01 - State Highway Agency /

225 Routine Main A/B 01 - State Highway Agency /

221 Inspection A/B 01 - State Highway Agency /

220: Inv. Location DISTRICT 08

7: Facility On US50

6: Feature Ints GREAT MIAMI R;PRIVATE DR

9: Location JUST E OF SR128

Lat, Lon 39.1703976663762 ,-84.759054594733

Condition

58: Deck	**6 - Satisfactory Condition**
58.01 Wearing Surface	6 - Satisfactory (1-10% distress)
58.02 Joint	6- Satisfactory (isolated leaking)
59: Superstructure	**5 - Fair Condition**
59.01 Paint & PCS	5 - Fair (10-15% corr.)
60: Substructure	**5 - Fair Condition**
61: Channel	**6**
61.01 Scour	**7 - Good**
62: Culverts	**N - Not Applicable**
67.01 GA	**5**

Appraisal

Sufficiency Rating	78.7 SD/FO 0 - ND
36: Rail, Tr, Gd, Term Std	1 1 1 1
72: Approach Alignment	8 - Equal to present desirable criteria
113: Scour Critical	7 - Countermeasures installed to correct scour problem
71: Waterway Adequacy	9 - Bridge Above Flood Water Elevations

Geometric

48: Max Span Length (ft)	248.0
49: Structure Length (ft)	893.0
52: Deck Width, Out-To-Out (ft)	40.6
424: Deck Area (sf)	36255.8
32: Appr Roadway Width (ft)	24.0
51: Road Width, Curb-Curb (ft)	32.0
50A: Curb/SW Width: Left (ft)	0
50A: Curb/SW Width: Right (ft)	0
34: Skew (deg)	0
33: Bridge Median	0 - No median
54B: Min Vert Underclearance (ft)	12.08
336A: Min Vert Clrnce IR Cardinal (ft)	18.583
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 (%)	150
704: Analysis Date	02/28/2020
63: Analysis Method	6 - Load Factor (LF) rating reported by rating factor (RF) method using MS18 loading.

Structure Type

43: Bridge Type	3 - Steel 10 - Truss - Thru N- Not Applicable
45: Spans Main / Approach	4 / 0
107: Deck Type	1 - Concrete Cast-in-Place
408: Composite Deck	N - Non-composite Construction
414A Joint Type 1	2 - Sliding Metal Plate Angle
414B: Joint Type 2	N - None
108A: Wearing Surface	1 - Monolithic Concrete (concurrently placed with structural deck) N- Not Applicable
422: WS Date	01/01/1989
423: WS Thick (in)	1.2
482: Protective Coating	0 - Other Paint
483: PCS Date	01/01/1992
453: Bearing Type 1	2 - Rockers & Bolsters
455: Bearing Type 2	N - None
528: Foundn: Abut Fwd	1 - Steel H Piles (Other size)
533: Foundn: Abut Rear	1 - Steel H Piles (Other Size)
536: Foundn: Pier 1	1 - Steel H Piles (Other size)
539: Foundn: Pier 2	N - None (Such as most Culverts)

Age and Service

27: Year Built/ 106 Rehab	1959 / 0000
42A: Service On	1 - Highway
42B: Service Under	5 - Waterway
28A: Lanes on	02
28B: Lanes Under	00
19: Bypass Length	4
29: ADT	9907
109: % Trucks (%)	7

Inspections

		Months	
90: Routine Insp.		12	07/10/2024
92A: FCM Insp.	Y	12	07/10/2024
92B: Dive Insp.	Y	60	08/30/2019
92C: Special Insp.	N	0	
92D: UBIT Insp.	N	0	
92E: Drone Insp.	N	0	

Inspector Sadlock,Joshua

Inspector: Sadlock,Joshua
Inspection Date: 07/10/2024
Structure Number: 3102521
Facility Carried: US50

	Environment	Total Quantity	Units	Condition State 1	Condition State 2	Condition State 3	Condition State 4
12-Reinforced Concrete Deck	3 - Mod.	29867	sq. ft.	12727	17100	40	0
	CS3: -Spalling of the haunches is typical along the top flanges of the exterior stringers, up to 1-inch deep with no exposed reinforcement noted -A few isolated spalls are present near deck fascia cracks at the floor beams. This typically occurs at the piers. The spalls average 10 inches wide x 20 inches high and are up to 8 inches deep -There is a 2 SF spall with exposed rebar in Span 3 between Panel Points 2 and 3. CS2: -The bridge floor (underside) exhibits extensive transverse, random, and map cracking throughout and there are isolated locations of abrasion dust between the deck soffit and stringer top flange interfaces. No “pumping” was observed between the deck and the stringer top flange. -Moderate vertical, diagonal and random cracks are present to the deck fascia above the floor beams -All cracks are hairline to 1/16" wide.						
805-Wearing Surface - Monolithic Concrete		29867	sq. ft.	26527	3300	40	0
	CS3: -There is a 4 SF spall in the south lane of Span 3, Panel 3, one with exposed rebar -There is a 10SF spall at the downstream curb of Span 2 between PP5 and PP6 -There is a broken RPM with pointed metal protruding above the deck in Span 4 near PP2 CS2: -The wearing surface exhibits moderate wear throughout the length of the structure -Minor shallow spalls up to 6 inches in diameter exist adjacent to the Pier 2 expansion joint -Several patches exist on the concrete wearing surface. These patches are in good condition, but exhibit hairline cracks. -Hairline transverse shrinkage cracks are typical along the gutter line						
113-Steel Stringer	3 - Mod.	4413	ft.	3728	670	15	0
	CS2: -The edges of the exterior stringer top flanges exhibit active surface corrosion with no section loss due to the deck haunches being spalled off. No gaps were noted between the stringer top flanges and the deck floor. This indicates that pack rust has not formed between the stringer and the deck -There are isolated examples of interior stringers exhibiting minor fretting corrosion at the top flange near the deck interface -Isolated exterior stringers exhibit minor painted over pitting, usually less than 1/16-inch deep -Several locations of poor quality welds exist at stringer connections to floor beams and top and bottom flange cover/splice plate end welds. No cracks were observed; however, these are fatigue prone details and should continue to be monitored during future inspections						
515-Steel Protective Coating		19390	sq. ft.	19190	200	0	0
	Stringers have minor freckling						
120-Steel Truss	3 - Mod.	1786	ft.	0	1334	452	0

Inspector: Sadlock,Joshua
Inspection Date: 07/10/2024

Structure Number: 3102521
Facility Carried: US50

Environment	Total Quantity	Units	Condition State 1	Condition State 2	Condition State 3	Condition State 4
515-Steel Protective Coating		54837	sq. ft.	0	52606	1809	422

Verticals
CS3:
-The verticals exhibit active corrosion with section loss up to 1/8” deep as well as painted over pitting up to 3/16” deep in the splash zone, at the gusset plates, and near former railing attachments
-There is a 1” diameter active corrosion hole in the web of L6U6 near L6 of Span 2, North Truss
-There are undercut tack welds on the flange of L2U2 of Span 1, South Truss
-There is a 1’ long deformation in the flange of L7U7 of Span 4, North Truss
-Pack rust up to 1/8-inch thick is typical between truss verticals and gusset plates

Diagonals
CS3:
-The diagonals exhibit active corrosion with section loss up to 3/16” deep as well as painted over pitting up to 3/16” deep in the splash zone, at the gusset plates, and near former railing attachments
-The diagonals exhibit pack rust up to 1/4-inch thick between the member and the lower gusset plates
-The inboard flange of U1L2, Span 4, North Truss is deformed up to 1/2” out of plane
-Span 2, South Truss U4L5, 5 feet above M4.5, there is a 1/2-inch inward kink in the bottom inboard flange over an 8-inch length

Upper Chord
CS3:
-There is pack rust up to 1/8-inch thick between lateral bracing connection plates and upper chord cover plates
-Excessive rusting between lattice bracing and bottom flanges of upper chord. Severed lattice bracing.
CS2:
-The upper chord members exhibit minor spot rust and isolated surface corrosion throughout
-There is reactivating corrosion between the channels and web plates
-A ground/gouged area exists to U7U8 at U7 in Span 2, north truss. This appears to be a rolled defect

End Posts:
CS3:
-In the splash zones, there is laminating corrosion with section loss up to 3/16” on the channels and pack rust up to 1/8” thick under the cover plates
-The lacing bars exhibit typically exhibit advanced section loss and deformations due to pack rust
-Deterioration to lacing bars at endposts is present at L0U1 in Span 4 NT, U9L10 in Span 2 ST, and L0U1 in Span 3 ST
-Isolated locations of painted over pitting up to 1/8-inch deep were observed on the exterior of the channel webs
-The endposts typically exhibit pack rust up to 1/8-inch thick between the top cover plate and portal bracing connection plates

CS2:
-The end posts exhibit surface corrosion throughout

Lower Chord
CS3:
-Pack rust of 1/8” to 1/4” is typical between lower chord plates in all spans with isolated locations up to 3/4"
-Pack rust up to 1/4" exists between the lower chord and the gusset plates
-Pack rust up to 1" thick is present under the lower chord diaphragm angles
-The lower chords exhibit surface corrosion throughout with active pitting up to 3/16” deep on the plate edges and around the diaphragm angles, with laminar corrosion with section loss up to 1/8” deep at the gusset plates
-The most significant area of section loss is L0L1 near L0 in Span 2 of the North Truss with 1/8” section loss along the full width of the inboard plate (originally 13/16” thick), approximately 8% of the total cross-sectional area of the member
- Several lower chord members exhibit minor bowing and local deformations

CS2:
-Active surface corrosion is present on the lower chords throughout

Inspector: Sadlock,Joshua
Inspection Date: 07/10/2024
Structure Number: 3102521
Facility Carried: US50

	Environment	Total Quantity	Units	Condition State 1	Condition State 2	Condition State 3	Condition State 4
	CS4: -The protective coating system exhibits isolated areas of paint failure and active corrosion to the upper portions of the truss -Throughout the lower chords and splash zone of the trusses the paint system is failing, with active pack rust and corrosion CS3: -The paint on the upper half of the trusses is in good condition with isolated areas of peeling paint and surface corrosion. CS2, Fading and light rust.						
152-Steel Floor Beam	3 - Mod.	1500	ft.	780	390	330	0
	CS3: -Painted over section loss up to 3/16-inch deep exists on the bottom 4 inches of the webs for the end 4 feet of the floor beams -The floor beams typically exhibit painted over section loss up to 3/16-inch deep along the top faces of the top flange near the truss connection -There are isolated areas of laminating corrosion and pack rust at the gusset plate connection angles CS2: -Reactivating corrosion exists at the interface of the floor beam top flange and the deck fascia, and on the bottom flange near the truss connections -Isolated rivet heads at the connection angles exhibit up to 25% section loss. The section loss generally is less than 1/8-inch deep -Several locations of poor quality welds exist at stringer connections to floor beams. No cracks were observed; however, this detail is a fatigue prone detail and should continue to be monitored during future inspections						
515-Steel Protective Coating		8360	sq. ft.	8142	84	92	42
	The paint system for the floorbeams are in good condition with isolated areas of corrosion.						
162-Steel Gusset Plate	3 - Mod.	400	each	28	292	80	0
	CS3: -The gusset plates typically exhibit active pack rust up to 3/16” thick -There is active pack rust up to 3/8" thick under the lower chord splice plates at the gussets -The gusset plates exhibit active laminating and surface corrosion with section loss up to 3/16” deep, as well as painted over pitting up to 3/16” deep -There is laminating corrosion and corrosion holes in the gusset plate stiffening angles behind the bearings in several locations -There are corrosion holes in the top cover plate of L10 in Span 2 of the North Truss -There are corrosion holes in the top cover plate of L8 of Span 1 of both trusses -The gussets exhibit bowing up to 1/4” out of plane; no significant changes in the gusset bowing dimensions were observed compared to the 2020 inspection CS2: -There are improperly installed rivets at U6, Span 2, South Truss 2023 CS3, Span 3, south, L4 (end post L0), warped gusset from pack rust, at bottom forward, (bolted at rear).						
515-Steel Protective Coating		3120	sq. ft.	0	2989	94	37
	CS3/CS4 The protective coating system typically exhibits areas of paint failure and active corrosion at all lower chord gusset plates. CS2 - Fading and light rust.						
210-Reinforced Concrete Pier Wall	3 - Mod.	138	ft.	0	90	48	0

Inspector: Sadlock,Joshua
Inspection Date: 07/10/2024
Structure Number: 3102521
Facility Carried: US50

	Environment	Total Quantity	Units	Condition State 1	Condition State 2	Condition State 3	Condition State 4
	CS3: -Pier 2 has two 4'x4' spalls with exposed rebar on the east face and the west face. There is a debonded rebar in the west face. -There is widespread spalling with exposed rebar on the west face of Pier 4 and a spall with exposed rebar on the east face. There is a debonded bar on the east face. CS2: -The piers typically exhibit full height vertical cracks up to 1/16-inch wide, which typically wrap around the top face of the wall -Pier 2 has map cracking with efflorescence and widespread delamination on both faces -Pier 3 has widespread delaminations and map cracking throughout -Pier 4 has widespread delaminations and map cracking throughout -On all piers, the delaminations are concentrated in the upper half of the pier wall.						
215-Reinforced Concrete Abutment	3 - Mod.	101	ft.	36	25	40	0
	CS3: -The rear abutment has a 24' wide by 3" deep by full height delaminated area between Stringers 1 and 4; delaminations could not be removed with a hammer and extend 1' onto the beam seat. -There are multiple large spalls and cracks up to 1/2" wide between Stringers 2 and 4 of the rear abutment -The forward abutment has a 12'W x 2.5'H area of delamination and spalls up to 3" deep with exposed rebar between Stringers 3 and 4. The delaminated concrete extends the full width of the bearing seat. -The forward abutment has a 6"W x 1' H spall with exposed rebar under Stringer 2 CS2: -There are widespread areas of delamination on the rear abutment seat between Stringers 1 and 4 -There is a 4'W x 2.5'H area of delamination on the forward abutment under Stringers 4 and 5						
234-Reinforced Concrete Pier Cap	3 - Mod.	141	ft.	49	48	44	0
	CS3: -Pier Cap 2 has a 4W' x 3'H spall and a 1'W x 2'H spall on the west face -Pier Cap 3 has a 12'W x 2'H x 2"D spall with exposed rebar on the east face between Stringer 2 and 4 and a 5'W x 4'H spall with exposed rebar on the west face under Stringer 2 -Pier Cap 4 has a 15'W x 3'H area of spalls with exposed rebar with minor section loss on the west face between Stringers 1 and 3 and a 2' x 2' spall on the east face CS2: -The pier caps typically exhibit areas of delamination, minor spalls, and debris accumulation around the bearings						
300-Strip Seal Expansion Joint	3 - Mod.	167	ft.	0	76	91	0
	CS3: -There is moderate debris accumulation in all joints, heavier at the shoulders. -There is vegetation growth in the shoulder at Pier 2. -The armored edges at the rear abutment, Pier 2 and Pier 4 exhibit up to 1/16" section loss. CS2: -Small spalls exist on the concrete header in isolated locations along the length of the joints -There is surface corrosion on the armored edges See the 2024 in-depth and fracture critical report for joint measurements						
311-Movable Bearing	3 - Mod.	8	each	0	6	2	0

Inspector: Sadlock,Joshua
Inspection Date: 07/10/2024
Structure Number: 3102521
Facility Carried: US50

	Environment	Total Quantity	Units	Condition State 1	Condition State 2	Condition State 3	Condition State 4
	CS3: -Active laminar corrosion with isolated minor section loss is present on the castings, pins and/or masonry plates of two bearings (Pier 2, Span 2, North bearing and Pier 4, Span 3, North bearing) CS2: -Active surface corrosion is present on all bearings, pins, and masonry plates. -Loose anchor rod nuts are present on several bearings						
313-Fixed Bearing	3 - Mod.	8	each	0	1	7	0
	CS3: -Active laminar corrosion with isolated minor section loss is typical on the castings, pins and/or masonry plates CS2: -Active surface corrosion is present on all bearings, pins, and masonry plates -Loose anchor rod nuts are present on several bearings						
321-Reinforced Concrete Approach Slab	3 - Mod.	1716	sq. ft.	1479	225	12	0
	CS3: -There is 3 SF cracking and broken up concrete in the rear approach slab near the abutment joint -There are 4 spalls between 1 SF and 3 SF in the forward approach slab along the longitudinal joint and a 2'x2' spall near the abutment joint CS2: -Asphalt patches are present in the rear approach slab with hairline longitudinal cracks near the abutment. -There are 1/16" wide longitudinal cracks in the rear approach slab.						
330-Metal Bridge Railing	3 - Mod.	1792	ft.	1677	115	0	0
	CS2: -The North Railing has been damaged by vehicle impact for a total length of 60 ft and the South Railing has been damaged by vehicle impact for a total length of 45 ft -There is a 10 ft long curb spall on the south curb in Span 2						
815-Drainage	3 - Mod.	88	each	87	1	0	0
	Small amounts of debris are present at the edge of the roadway. Some scuppers exhibit minor corrosion at the outlets. Partially clogged deck drain in the downstream gutter line in Span 3						
830-Abutment Backwall	3 - Mod.	101	ft.	60	41	0	0
	CS2: -Hairline cracks are present in the backwalls -The West Abutment exhibits cracks and delaminations throughout						

Inspector:	Sadlock,Joshua	**Structure Number:**	3102521
Inspection Date:	07/10/2024	**Facility Carried:**	US50

HAM-00050-0376L_(3102521)

ODOT District:	District 08			Date Built:	07/01/1959
Major Maint:	01 - State Highway Agency	Facility Carried:	US50	Traffic On: 1 - Highway	Rehab Date:
Routine Maint:	01 - State Highway Agency	Feature Inters:	GREAT MIAMI R;PRIVATE DR	Traffic Under: 5 - Waterway	Insp. Resp A: 01 - State Highway Agency
FIPS Code:	84938 - WHITEWATER TWP (HAM county)	Location:	DISTRICT 08	JUST E OF SR128	Insp Resp B:

Inspector Sadlock,Joshua Inspection Date 07/10/2024 Reviewer Not Approved

Inspector Comments - Deck and Approach

Deck

The deck is in satisfactory condition. The deck underside exhibits transverse hairline cracks and isolated hairline map cracking. There is a spall with exposed rebar in the top of deck in Span 3.

Approach

The asphalt approach wearing surface is in good condition, with longitudinal and transverse hairline cracks throughout. The approach guardrail has been replaced since the previous inspection.

Inspector Comments - General Appraisal

Superstructure

The superstructure is in fair condition, with active corrosion, pack rust, and section loss throughout the truss members and floorbeams.

Substructure

The substructure is in fair condition, with widespread delaminations and spalls on the piers and abutments with exposed rebar with minor section loss.

Culvert

N/A

Inspector Comments - Waterway

Waterway Adequacy

The hydraulic opening is adequate.

Channel

The channel is in satisfactory condition, with minor indications of scour and a large debris pile around Pier 3.

The alignment is good with the waterway running under Spans 1 and 2. There is a slight skew with

gradual bends upstream and downstream.

The channel protection is natural with moderate vegetation along each embankment.

Scour Critical

N/A

Appendix C

Gusset Plate Bowing Tables

TRANSYSTEMS

North Truss Upper Chord Gusset Plates															
Span	Location	Plan Plate Thickness (in)	North Gusset Plate							South Gusset Plate						
			2010 Bowing(in)	2012 Bowing(in)	2014 Bowing(in)	2018 Bowing(in)	2020 Bowing(in)	2022 Bowing(in)	2024 Bowing(in)	2010 Bowing(in)	2012 Bowing(in)	2014 Bowing(in)	2018 Bowing(in)	2020 Bowing(in)	2022 Bowing(in)	2024 Bowing(in)
1	U1	1/2	- 1/16	- 1/16	- 1/16	- 1/16	- 1/16	- 1/16	- 1/16	- 1/16	- 1/16	- 1/16	- 1/16	- 1/16	- 1/16	- 1/16
	U2	1/2	- 1/8	- 1/8	- 1/16	- 1/16	- 1/16	- 1/16	- 1/16	Flat	Flat	Flat	Flat	Flat	Flat	Flat
	U3	1/2	Flat	Flat	- 1/16	- 1/16	- 1/16	- 1/16	- 1/16	- 1/16	- 1/16	- 1/16	- 1/16	- 1/16	- 1/16	- 1/16
	U4	1/2	1/16	1/16	Flat	Flat	Flat	Flat	Flat	1/16	1/16	- 1/16	- 1/16	- 1/16	- 1/16	- 1/16
	U5	1/2	1/16	- 1/16	- 1/16	- 1/16	- 1/16	1/8*	- 1/16	Flat	Flat	- 1/16	- 1/16	- 1/16	- 1/8	- 1/16
	U6	1/2	- 1/8	- 1/8	- 1/8	- 1/8	- 1/8	- 1/8	- 1/8	- 1/16	- 1/16	- 1/16	- 1/16	- 1/16	- 1/16	- 1/16
	U7	2-Jan	Flat	Flat	- 1/16	- 1/16	- 1/16	- 1/16	- 1/16	Flat	Flat	Flat	Flat	Flat	Flat	Flat
2	U1	9/16	Flat	Flat	Flat	Flat	Flat	Flat	Flat	- 1/16	- 1/16	Flat	- 1/16	- 1/16	- 1/16	- 1/16
	U2	9/16	- 1/16	- 1/16	- 1/16	- 1/16	- 1/16	- 1/16	- 1/16	1/16	1/16	1/16	1/16	1/16	1/16	1/16
	U3	9/16	1/16	1/16	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat
	U4	1/2	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat
	U5	1/2	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat
	U6	1/2	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat
	U7	9/16	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat
	U8	9/16	Flat	Flat	Flat	Flat	Flat	Flat	Flat	1/8	1/8	1/8	1/8	1/8	1/8	1/8
	U9	9/16	- 1/16	- 1/16	- 1/16	- 1/16	- 1/16	- 1/16	- 1/16	Flat	Flat	Flat	Flat	Flat	Flat	Flat
3	U1	9/16	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	1/16	1/16	1/16	1/16	1/16
	U2	9/16	- 1/16	- 1/16	- 1/16	- 1/16	- 1/16	1/16	1/16	- 1/8	- 1/8	- 1/8	- 1/8	- 1/8	- 1/8	- 1/8
	U3	9/16	1/16	1/16	1/16	1/16	1/16	1/16	1/16	Flat	Flat	Flat	Flat	Flat	Flat	Flat
	U4	1/2	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	- 1/16	- 1/16	- 1/16	- 1/16	- 1/16
	U5	1/2	- 1/16	- 1/16	- 1/16	- 1/16	- 1/16	- 1/16	- 1/16	Flat	Flat	Flat	Flat	Flat	Flat	Flat
	U6	1/2	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat
	U7	9/16	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat
	U8	9/16	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat
	U9	9/16	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat
4	U1	1/2	- 1/8	- 1/8	- 1/8	- 1/8	- 1/8	- 1/8	- 1/8	- 1/16	- 1/16	- 1/16	- 1/16	- 1/16	- 1/16	- 1/16
	U2	1/2	1/8	1/8	1/16	1/16	1/16	1/8	1/16	- 1/8	- 1/8	- 1/16	- 1/16	- 1/16	- 1/16	- 1/16
	U3	1/2	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat
	U4	1/2	Flat	Flat	Flat	Flat	Flat	Flat	Flat	1/16	1/16	1/16	1/16	1/16	1/16	1/16
	U5	1/2	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat
	U6	1/2	Flat	Flat	Flat	Flat	Flat	Flat	Flat	- 1/16	- 1/16	Flat	- 1/16	- 1/16	- 1/16	- 1/16
	U7	1/2	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat

Note:

Positive bow indicates the center of the gusset plate is bowing away from the centerline of the truss. Negative bow indicates the center of the gusset plate is bowing towards from the centerline of the truss.

+/- indicates both positive and negative bows measured at different locations on the plate.

Measurements shown from previous inspections were populated from previous inspection reports created by other consultants; these measurements were not verified by AECOM.

Yellow highlight indicates changes in bowing measurements.

*Gusset does not visually appear to have changed since the last inspection. Measurements between current and previous inspections appear to disagree. Verify during next inspection.

North Truss Lower Chord Gusset Plates																
Span	Location	Plan Plate Thickness (in)	North Gusset Plate							South Gusset Plate						
			2010 Bowing(in)	2012 Bowing(in)	2014 Bowing(in)	2018 Bowing(in)	2020 Bowing(in)	2022 Bowing(in)	2024 Bowing(in)	2010 Bowing(in)	2012 Bowing(in)	2014 Bowing(in)	2018 Bowing(in)	2020 Bowing(in)	2022 Bowing(in)	2024 Bowing(in)
1	L0	5/8	Flat	Flat	Flat	Flat	1/8	1/8	1/8	Flat	Flat	Flat	Flat	Flat	Flat	Flat
	L1	1/2	Flat	Flat	Flat	Flat	1/16	1/16	1/16	Flat	Flat	Flat	Flat	Flat	Flat	Flat
	L2	1/2	1/8	1/8	-1/16	-1/16	-1/16	-1/16	-1/16	-1/16	-1/16	-1/16	-1/16	-1/16	-1/16	-1/16
	L3	1/2	1/16	3/16	-1/16	-1/16	-1/16	-1/16	-1/16	-1/16	3/16	-1/16	-1/16	-1/16	-1/16	-1/16
	L4	1/2	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	1/4	1/4	1/4
	L5	1/2	1/8	3/16	-1/8	-1/8	-1/8	-1/8	-1/8	-1/8	-1/8	-1/16	-1/16	-1/16	-1/16	-1/16
	L6	1/2	1/8	1/8	-1/8	-1/8	-1/8	-1/8	-1/8	1/8	1/8	-1/8	-1/8	-1/8	-1/8	-1/8
	L7	1/2	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat
	L8	5/8	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	1/8	1/8	1/8
2	L0	3/4	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat
	L1	9/16	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	-1/16	-1/16	-1/16	-1/16	-1/16
	L2	9/16	Flat	Flat	-1/16	-1/16	-1/16	-1/16	-1/16	1/8	1/8	1/8	1/8	3/16	3/16	3/16
	L3	9/16	Flat	Flat	1/8	1/8	Flat	Flat	Flat	1/4	1/4	3/16	3/16	3/16	3/16	3/16
	L4	9/16	Flat	Flat	1/8	1/8	1/16	1/16	1/16	Flat	Flat	3/16	3/16	3/16	3/16	3/16
	L5	9/16	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat
	L6	9/16	1/8	3/16	3/16	3/16	3/16	3/16	3/16	Flat	Flat	1/16	1/16	1/16	1/16	1/16
	L7	9/16	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/8	1/8	1/8	1/8	1/8	1/8	1/8
	L8	9/16	1/8	1/8	-1/8	-1/8	-1/8	-1/8	-1/8	1/8	1/8	-1/8	-1/8	-1/8	-1/8	-1/8
	L9	9/16	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat
	L10	3/4	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat
3	L0	3/4	Flat	Flat	-1/16	-1/16	-1/16	-1/16	-1/16	Flat	Flat	Flat	Flat	Flat	Flat	Flat
	L1	9/16	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat
	L2	9/16	Flat	Flat	-1/16	-1/16	-1/16	-1/16	-1/16	Flat	Flat	-1/16	-1/16	1/8	1/8	1/8
	L3	9/16	Flat	Flat	Flat	Flat	Flat	Flat	Flat	1/4	1/4	-1/4	-1/4	1/8	1/8	1/8
	L4	9/16	1/8	1/8	-1/8	-1/8	-1/16	-1/16	-1/16	1/8	1/8	Flat	Flat	1/8	1/8	1/8
	L5	9/16	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat
	L6	9/16	1/8	1/8	1/8	1/8	1/16	1/16	1/16	1/8	1/8	Flat	Flat	1/16	1/16	1/16
	L7	9/16	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/8	1/8	1/8	1/8	1/16	1/16	1/16
	L8	9/16	1/4	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/16	1/16	1/16	1/16	1/16
	L9	9/16	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat
	L10	3/4	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat
4	L0	5/8	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat
	L1	1/2	Flat	Flat	1/16	1/16	1/16	1/16	1/16	Flat	Flat	Flat	Flat	Flat	Flat	Flat
	L2	1/2	1/8	1/8	-1/8	-1/8	-1/8	-1/8	-1/8	1/8	1/8	-1/8	-1/8	-1/8	-1/8	-1/8
	L3	1/2	Flat	Flat	-1/16	-1/16	-1/16	-1/16	-1/16	1/8	1/8	-1/8	-1/8	-1/8	-1/8	-1/8
	L4	1/2	Flat	Flat	-1/16	-1/16	-1/16	-1/16	-1/16	Flat	Flat	Flat	Flat	Flat	Flat	Flat
	L5	1/2	1/8	1/4	-1/4	-1/4	-1/4	-1/4	-1/4	1/8	1/8	-1/8	-1/8	-1/8	-1/8	-1/8
	L6	1/2	3/16	3/16	-1/8	-1/8	-1/8	-1/8	-1/8	1/8	1/8	-1/8	-1/8	-1/8	-1/8	-1/8
	L7	1/2	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat
	L8	5/8	Flat	Flat	-1/16	-1/16	-1/16	-1/16	-1/16	Flat	Flat	Flat	Flat	Flat	Flat	Flat

Note:
Positive bow indicates the center of the gusset plate is bowing away from the centerline of the truss. Negative bow indicates the center of the gusset plate is bowing towards from the centerline of the truss.
+/- indicates both positive and negative bows measured at different locations on the plate.
Measurements shown from previous inspections were populated from previous inspection reports created by other consultants; these measurements were not verified by AECOM.
Yellow highlight indicates changes in bowing measurements.

South Truss Upper Chord Gusset Plates																
Span	Location	Plan Plate Thickness (in)	North Gusset Plate							South Gusset Plate						
			2010 Bowing(in)	2012 Bowing(in)	2014 Bowing(in)	2018 Bowing(in)	2020 Bowing(in)	2022 Bowing(in)	2024 Bowing(in)	2010 Bowing(in)	2012 Bowing(in)	2014 Bowing(in)	2018 Bowing(in)	2020 Bowing(in)	2022 Bowing(in)	2024 Bowing(in)
1	U1	1/2	+/- 1/16	+/- 1/16	+/- 1/16	+/- 1/16	+/- 1/16	+/- 1/16	+/- 1/16	1/8	Flat	Flat	Flat	Flat	Flat	Flat
	U2	1/2	- 1/8	- 3/16	- 1/16	- 1/16	- 1/16	- 1/16	- 1/16	Flat	Flat	Flat	Flat	Flat	Flat	Flat
	U3	1/2	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat
	U4	1/2	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat
	U5	1/2	- 1/8	- 1/8	- 1/16	- 1/16	- 1/16	- 1/16	- 1/16	Flat	Flat	Flat	Flat	-1/16	-1/16	-1/16
	U6	1/2	- 1/8	- 1/8	- 1/8	- 1/8	- 1/8	- 1/8	- 1/8	-1/16	-1/16	-1/16	-1/16	-1/16	-1/16	-1/16
	U7	1/2	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	1/16	1/16	1/16	1/16	1/16
2	U1	9/16	Flat	Flat	-1/16	-1/16	-1/16	-1/16	-1/16	Flat	Flat	Flat	Flat	Flat	Flat	Flat
	U2	9/16	Flat	Flat	-1/8	-1/8	-1/8	-1/8	-1/8	Flat	Flat	Flat	Flat	Flat	Flat	Flat
	U3	9/16	-1/16	-1/16	Flat	-1/16	-1/16	-1/16	-1/16	Flat	Flat	Flat	Flat	Flat	Flat	Flat
	U4	1/2	1/16	1/16	Flat	1/16	1/16	1/16	1/16	Flat	Flat	Flat	Flat	Flat	Flat	Flat
	U5	1/2	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat
	U6	1/2	-1/16	-1/16	Flat	-1/16	-1/16	-1/16	-1/16	Flat	Flat	Flat	Flat	Flat	Flat	Flat
	U7	9/16	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	1/16	1/16	1/16
	U8	9/16	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat
	U9	9/16	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat
3	U1	9/16	Flat	Flat	Flat	Flat	Flat	Flat	Flat	-1/16	-1/16	Flat	Flat	Flat	Flat	Flat
	U2	9/16	-1/16	-1/16	-1/16	-1/16	-1/16	-1/16	-1/16	1/8	1/8	1/16	1/16	1/16	1/16	1/16
	U3	9/16	Flat	Flat	Flat	Flat	Flat	Flat	Flat	-1/16	-1/16	-1/16	-1/16	-1/16	-1/16	-1/16
	U4	1/2	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat
	U5	1/2	1/16	1/16	Flat	1/16	1/16	1/16	1/16	-1/16	-1/16	-1/16	-1/16	-1/16	-1/16	-1/16
	U6	1/2	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat
	U7	9/16	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat
	U8	9/16	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat
	U9	9/16	1/16	1/16	1/16	1/16	Flat	Flat	Flat	Flat	Flat	1/16	1/16	1/16	1/16	1/16
4	U1	1/2	Flat	Flat	Flat	Flat	Flat	Flat	Flat	-1/16	-1/16	-1/16	-1/16	-1/16	-1/16	-1/16
	U2	1/2	-1/16	-1/16	-1/16	-1/16	-1/16	-1/16	-1/16	-1/8	-1/8	-1/8	-1/8	-1/8	-1/8	-1/8
	U3	1/2	Flat	Flat	-1/16	-1/16	-1/16	-1/16	-1/16	Flat	Flat	Flat	Flat	Flat	Flat	Flat
	U4	1/2	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	1/16	1/16	1/16	1/16	1/16
	U5	1/2	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat
	U6	1/2	-1/16	-1/16	-1/16	-1/16	-1/16	-1/16	-1/16	Flat	Flat	-1/16	-1/16	-1/16	-1/16	-1/16
	U7	1/2	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat

Note:
Positive bow indicates the center of the gusset plate is bowing away from the centerline of the truss. Negative bow indicates the center of the gusset plate is bowing towards from the centerline of the truss.
+/- indicates both positive and negative bows measured at different locations on the plate.
Measurements shown from previous inspections were populated from previous inspection reports created by other consultants; these measurements were not verified by AECOM.
Yellow highlight indicates changes in bowing measurements.

South Truss Lower Chord Gusset Plates															
Span	Location	Plan Plate Thickness (in)	North Gusset Plate												
			2010 Bowing(in)	2012 Bowing(in)	2014 Bowing(in)	2018 Bowing(in)	2020 Bowing(in)	2022 Bowing(in)	2024 Bowing(in)	2010 Bowing(in)	2012 Bowing(in)	2014 Bowing(in)	2018 Bowing(in)	2020 Bowing(in)	2022 Bowing(in)	2024 Bowing(in)
1	L0	5/8	Flat	Flat	Flat	Flat	1/4	1/4	1/4		1/8	1/16	1/16	1/8	1/8	1/8
	L1	1/2	Flat	Flat	-1/16	-1/16	-1/16	-1/16	-1/16	Flat	Flat	-1/16	-1/16	-1/16	-1/16	-1/16
	L2	1/2	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/16	1/16	1/16	1/16	1/16	1/16	1/16
	L3	1/2	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/4	1/4	3/16	3/16	3/16	3/16	3/16
	L4	1/2	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat
	L5	1/2	1/8	1/8	1/8	1/8	1/16	1/16	1/16	Flat	Flat	1/16	1/16	1/16	1/16	1/16
	L6	1/2	1/4	1/4	3/16	3/16	1/8	1/8	1/8	Flat	Flat	1/16	1/16	1/16	1/16	1/16
	L7	1/2	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	-1/16	-1/16	-1/8	-1/8	-1/8
	L8	5/8	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	1/16	1/16	1/16
2	L0	3/4	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat
	L1	9/16	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	1/16	1/16	1/16
	L2	9/16	Flat	Flat	-1/8	-1/8	-1/8	-1/8	-1/8	3/16	3/16	1/16	1/16	1/16	1/16	1/16
	L3	9/16	Flat	Flat	1/16	1/16	1/16	1/16	1/16	3/16	3/16	3/16	3/16	3/16	3/16	3/16
	L4	9/16	1/8	1/8	3/16	3/16	1/8	1/8	1/8	1/4	1/4	1/4	1/4	1/8	1/8	1/8
	L5	9/16	Flat	Flat	1/8	1/8	1/8	1/8	1/8	Flat	Flat	-1/16	-1/16	-1/16	-1/16	-1/16
	L6	9/16	3/16	3/16	3/16	3/16	3/16	3/16	3/16	1/8	1/8	1/8	1/8	1/8	1/8	1/8
	L7	9/16	1/4	1/4	1/4	1/4	1/8	1/8	1/8	Flat	Flat	1/8	1/8	1/8	1/8	1/8
	L8	9/16	Flat	Flat	1/16	1/16	1/16	1/16	1/16	Flat	Flat	1/8	1/8	1/8	1/8	1/8
	L9	9/16	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	1/4	1/4	1/4
	L10	3/4	Flat	Flat	1/16	1/16	1/16	1/16	1/16	Flat	Flat	Flat	Flat	Flat	Flat	Flat
3	L0	3/4	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	1/16	1/16	1/16
	L1	9/16	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	1/8	1/8	1/8
	L2	9/16	1/4	1/4	- 3/16	- 3/16	- 1/16	- 1/16	- 1/16	-1/16	-1/16	-1/16	-1/16	-1/8	-1/8	-1/8
	L3	9/16	-1/16	-1/16	Flat	Flat	Flat	Flat	Flat	1/8	1/8	-1/8	-1/8	-1/8	-1/8	-1/8
	L4	9/16	+/-1/16	+/-1/16	+/- 1/16	+/- 1/16	+/- 3/16	+/- 3/16	+/- 3/16	3/16	3/16	-1/8	-1/8	-1/8	-1/8	-1/8
	L5	9/16	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	1/16	1/16	1/16	1/16	1/16
	L6	9/16	1/8	1/8	- 1/8	- 1/8	- 1/8	- 1/8	- 1/8	Flat	Flat	Flat	Flat	Flat	Flat	Flat
	L7	9/16	1/8	1/8	Flat	Flat	Flat	Flat	Flat	Flat	1/8	-1/16	-1/16	-1/16	-1/16	-1/16
	L8	9/16	Flat	Flat	Flat	Flat	1/16	1/16	1/16	Flat	Flat	Flat	Flat	1/16	1/16	1/16
	L9	9/16	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat
	L10	3/4	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	-1/16	-1/16	-1/16	-1/16	-1/16
4	L0	5/8	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat
	L1	1/2	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat
	L2	1/2	Flat	1/16	-1/8	-1/8	-1/8	-1/8	-1/8	1/16	1/16	1/16	1/16	1/16	1/16	1/16
	L3	1/2	Flat	Flat	1/8	1/8	1/8	1/8	1/8	Flat	Flat	Flat	Flat	Flat	Flat	Flat
	L4	1/2	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat
	L5	1/2	1/8	1/8	-1/8	-1/8	-1/8	-1/8	-1/8	1/8	1/8	-1/8	-1/8	-1/8	-1/8	-1/8
	L6	1/2	1/8	1/8	-1/8	-1/8	-1/8	-1/8	-1/8	1/8	1/8	-1/8	-1/8	-1/8	-1/8	-1/8
	L7	1/2	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat
	L8	5/8	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat

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