2022 In-Depth Element Level and Fracture-Critical Inspection Report

BRIDGE NO: HAM-50-2180N

SFN: 3103390

PID No.: 100838

City of Cincinnati

Submitted to ODOT District 8
December 2, 2022

Prepared by

AECOM

OHIO DEPARTMENT OF TRANSPORTATION

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1. INTRODUCTION

1.1. Bridge Description

The Columbia Parkway Viaduct (HAM-50-2180N) connects East 5th Street to U.S. Route 50 in Downtown Cincinnati carrying eastbound and westbound vehicular traffic and a pedestrian sidewalk over Butler Street, Culvert Street, local parking lots, Eggleston Avenue, Monastery St., Interstate 471, and ramps to U.S. Route 50. The location of the structure can be seen in **Figure 1**. The overall bridge length is 1,660'-9" and the structure was opened to traffic in 1938 with rehabilitations in 1997-1998 and 2017-2018. The rear approach spans (Spans 1-4) and the forward approach spans (Spans 12-17) consist of three lines of simple span, built-up steel girders. The main spans (Spans 5-11) consist of three lines of Pratt deck trusses. Spans 5-6 and 10-11 are continuous over two spans, while Spans 7-9 are continuous over three spans. In the truss spans, the diagonals and verticals consist of rolled members and the upper and lower chords consist of built-up box sections. The floor beams consist of rolled members and the cantilevered floor beam extensions consist of welded plates. In the truss spans, sway bracing, and lower lateral bracing are riveted to gusset plates at even-numbered panel points. In girder spans, cross-frame and lower lateral bracing spacing varies due to the curved geometry. A reinforced concrete deck, with a roadway width of 56'-4", carries four lanes of traffic across the structure. A 10' -8" wide sidewalk carries pedestrian traffic on the south side of the structure. The Rear Abutment (Abutment 1) and the Forward Abutment (Abutment 18) are concrete wall type substructures. All piers (Piers 2-17) are concrete cap and column substructures.

The bridge follows a west to east stationing. Girders and truss lines are labeled north, center, and south. Floor beams are numbered from west to east and re-cycle at the beginning of each continuous span. **Appendix A** contains select plan sheets.

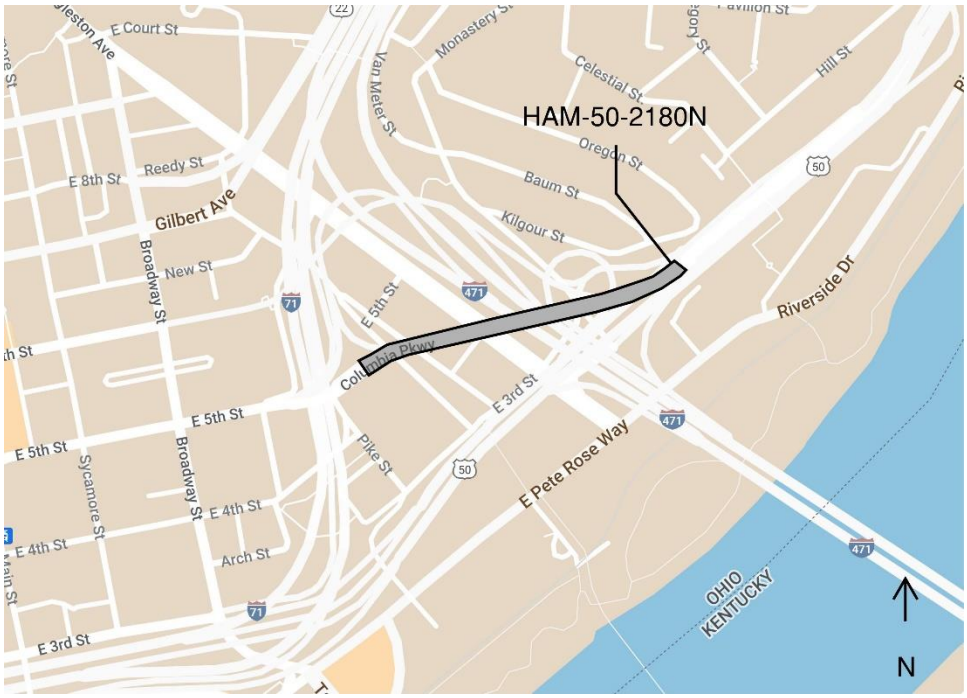


Figure 1: Location Map

1.2. Fracture Critical Member Locations

Bridge HAM-50-2080N contains fractural critical girders in the approach spans (Spans 1-4 and Spans 12-17), and fracture critical truss tension members in Spans 5-11. Per ODOT's direction, the floor beams are not considered fracture critical. The locations of the fracture-critical members can be seen in **Appendix B**.

1.3. Fatigue Details

There are tack welds present in both truss and girder spans on several gusset plates, truss member flanges, bearing plates, girder member plates, and fill plates. These tack welds are located on fracture critical members and are considered fatigue prone details since they can create stress risers and cracks in the weld metal could propagate into adjacent members. Some of the welds are of poor quality, are under cut, or cracked. None of the cracks were observed to have propagated into the base metal of any adjacent members or plates. The defects related to the tack welds are presented in the respective element sections of the report.

1.4. Construction and Recent Maintenance History

1938 Initial Construction

- The bridge was opened to traffic.

1997-1998 Rehabilitation

- The reinforced concrete deck was replaced.
- The floor beam cantilever brackets were replaced.
- The structural steel was repaired, cleaned, and painted.
- The expansion bearings and drainage structures were replaced.
- The piers and abutments were patched.

2017-2018 Rehabilitation

- The expansion joints were repaired.
- Miscellaneous superstructure and substructure repairs were performed.
- Isolated areas with active corrosion were spot painted.
- The drainage system was repaired and cleaned out.

1.5. Inspection Methods

The AECOM Team performed the in-depth element level and fracture-critical inspection over two periods on June 26, 2022 through July 1, 2022 and September 6, 2022 through September 8, 2022. The inspection was performed in accordance with the Consultant Bridge Inspection Scope of Services, dated January 6, 2021. The inspection team organization is shown below.

Inspection team members

Team Member	Role	Organization
Travis Baker, P.E.	Project Manager	AECOM
Kyle Compton, P.E.	Team Leader	AECOM
Charlie Tamayo, E.I.	Team Member	AECOM
Prateek Nepal, E.I.	Team Member	AECOM
David E. Rust, P.E.	Team Leader	Palmer
Jon P. Murrin, E.I.	Team Member	Palmer

The superstructure; including all truss members, gusset plates, girders, bearings, and bracing; the deck underside, and the upper portion of the substructure were accessed primarily using a manlift, the catwalk adjacent to the Center Truss, and ladders were also used to supplement. The remaining structural elements including the wearing surface, joints, drainage, railings, approaches, embankments, and the lower portion of the substructure were accessed from the ground or deck surface. **Table 1** below describes the condition ratings assigned to each item during the inspection. A copy of the AssetWise Bridge Inspection Report is included in **Appendix C**. Note that "inactive" as used in this report refers to areas where rusting/corrosion (pack rust, pitting, etc.) was once actively occurring but is currently arrested with paint.

Table 1: Guide for summary ratings (adapted from Table 34 from the ODOT Manual of Bridge Inspection 2014 Revision)

Condition	NBIS Condition Rating	Description
Excellent	9	No problems are noted: no section loss or general deterioration.
Very Good	8	
Good	7	Some minor problems are noted.
Satisfactory	6	Structural elements show some minor deterioration.
Fair	5	Structural elements show deterioration but are sound.
Poor	4	Advanced widespread deficiencies are noted, or there is a likely reduction in capacity. Usually, the load path appears to be affected for primary members, or there are obvious, advanced structural changes since the as-built condition.
Serious	3	The Poor Condition and local failures are possible.
Critical	2	The Serious Condition and unless closely monitored it may be necessary to close the bridge (or lanes) until corrective action is taken.
Imminent Failure	1	The Critical Condition and major deterioration is affecting stability. The bridge (or lanes) *shall be closed* to traffic until corrective action is taken.
Failed	0	The Imminent Failure Condition and the bridge is out of service and is beyond corrective action.

2. BRIDGE CONDITION

2.1. Item 58 – Deck

The deck is in ***Satisfactory*** condition and is controlled by the condition of the underside which exhibits transverse cracking with efflorescence, isolated map cracking, and isolated haunch spalls. The wearing surface has isolated transverse and longitudinal hairline cracks throughout. Cracks, some with rust staining, are present throughout the bridge railing, most prominently at the railing posts.

2.1.1. Element 12 – Reinforced Concrete Deck

There are hairline transverse cracks throughout the deck underside, primarily between the cantilever overhang brackets and between the floor beams (**Photo 1**). Some of the transverse cracks have light to moderate efflorescence. Areas of map cracking are present between floor beams and near the haunches. There are hairline longitudinal cracks along the length of the bridge between the three truss/girder lines, some with light efflorescence. Isolated spalls up to 1’ diameter were observed in the floor beam haunches (**Photo 2**).

The end haunches on the north overhang brackets were sounded along the length of the truss. Delaminated concrete was removed from five locations (three of which were over SB I-471) (**Photos 3-4**), while the remaining haunches were observed to be sound. The delaminations were caused by rust building up behind the haunch on the overhang brackets, and hairline vertical cracks indicated that the haunches may have been delaminated. Rust staining and or vertical cracks were observed at the following locations: Span 5 - Bracket 8; Span 6 - Brackets 10, 11, 15, 17, and 19; Span 7 - Brackets 3, 5, 6, 10, 11, and 15; and Span 8 - Bracket 21. While the concrete was sound at these locations, they should be revisited during future inspections.

Photo 1: Typical transverse and map cracking between cantilever overhang brackets (South overhang, Span 8, between U29 and U30 shown)

Photo 2: Example of an isolated haunch spall (South Truss, Span 8, North Face of U27 shown)

Photo 3: Example of haunch before the delaminated concrete was removed (Bracket 9 at Pier 6 shown)

Photo 4: Example of haunch after the delaminated concrete was removed (Bracket 9 at Pier 6 shown)

2.1.2. Element 805 – Wearing Surface (Item 58.01)

The monolithic concrete wearing surface is in ***Good*** condition. There are isolated transverse and longitudinal hairline cracks throughout the wearing surface (**Photo 5**). There are also minor cracks radiating from the drainage grates (**Photo 6**), and the tining is beginning to wear in the wheel paths. No patches were observed on the wearing surface. Finally, very minor isolated popouts are present in the wearing surface, and small spalls are present adjacent to the expansion joints. No major deficiencies were observed on the sidewalk wearing surface.

Photo 5: Wearing surface with typical cracks

Photo 6: Typical radial cracks at drainage grate

2.1.3. Element 300 – Strip Seal Expansion Joint (Item 58.02)

The strip seal expansion joints are in ***Satisfactory*** condition and were changed from Good condition due to torn joint seals in isolated areas. Strip seal expansion joints are located at every support (all substructure units except Piers 6, 8, 9, and 11). The joint armor exhibits minor surface corrosion, which is most prominent at Piers 2, 13, 14, 15, and 16 (**Photo 7**). The joints are typically full of debris along the entire length. Spalls are present in the concrete wearing surface adjacent to the joint armor. The seal material is torn in isolated locations as well (**Photo 8)**.

The joint opening measurements taken during the inspection are shown in **Table 2**. There are several joints with opening measurements that have changed more than 1/2" from the previous inspection, with the opening at Pier 4 increasing by 7/8" (back to the measurement recorded 2018). The changes in the joint measurements between the previous three inspections appear inconsistent overall and the changes are potentially due to inspectors measuring the openings in different locations on the joint cross-section, joint deterioration/debris impeding measurements, differing structure temperature, or a combination thereof. For the current inspection, joint measurements were taken on the insides of the joint seal anchors **(Photo 9).** While no issues related to excessive expansion/contractions were observed, future inspections should continue to measure the joints at consistent locations and temperatures.

Photo 7: Typical expansion joint surface corrosion and debris fill (Pier 13 shown)

Photo 8: Tear in expansion joint seal material (Pier 7 shown)

Photo 9: Typical expansion joint measurement location

Table 2: Expansion joint measurements (measured perpendicular to joint in inches)

Location	2018 (80˚F)		2020 (84˚F)		2022 (75˚F)	
	North Curb	South Curb	North Curb	South Curb	North Curb	South Curb
West Abut.	1 1/2	7/8	1 1/2	7/8	1 1/8	7/8
Pier 2	1 5/16	7/8	1 1/4	3/4	1 1/4	13/16
Pier 3	1 3/16	1 7/8	1 3/4	1 3/4	1 7/8	1 3/16
Pier 4	1 7/8	1 5/8	1	1 1/2	1 7/8	1 5/8
Pier 5	1 1/2	1 3/8	1 1/2	1 1/4	1 3/8	1 1/2
Pier 7	3 1/16	2 5/8	2 3/4	2 3/8	2 5/8	2 3/4
Pier 10	2 7/16	1 3/8	1 3/4	1 3/8	2 3/8	1 3/8
Pier 12	1	1 1/16	1 1/2	1	7/8	7/8
Pier 13	1 11/16	1 3/8	1 3/8	1 3/8	1 5/8	1 1/4
Pier 14	1 3/4	1 5/16	1 1/2	1 3/8	1 5/8	1 3/8
Pier 15	1 3/4	1 7/8	1 1/2	1 3/4	1 1/2	1 3/4
Pier 16	1 5/16	1 7/16	1 1/4	1 3/8	1 1/4	1 3/8
Pier 17	1	1 1/4	7/8	1 1/8	1/2	1 1/4
East Abut.	2	1 7/16	1 7/8	1 3/8	1 3/4	1 1/2

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

2.1.4. Element 331 – Reinforced Concrete Bridge Railing

The protective coating on the railings is chipped and peeling throughout the bridge. Cracks, some with rust staining, are present throughout the bridge railing, most prominently at the railing posts (**Photos 10-11**). There are also isolated minor impact scrapes on the interior face of the railing. The two impact attenuators still have unrepaired impact damage as stated in the previous inspection report (**Photo 12**). Based on the pictures included in the previous report, the impact attenuators have sustained further damaged since the last inspection.

Photo 10: Cracking and rust staining on exterior face of bridge railing (South Railing, Span 9 shown)

Photo 11: Cracking and rust staining on interior face of bridge railing (South Railing Span 7 shown)

Photo 12: Example of impact attenuator damage (East Attenuator shown)

2.1.5. Element 815 – Drainage

The downspouts are clear, but trash is beginning to clog the drainage grates at the ground terminations (**Photo 13**). The ground terminations are misaligned and/or broken at Piers 12 through 15, causing erosion and undermining beneath the approach slab and slope protection of the adjacent bridge (HAM-50-2173L) near Pier 13 (**Photos 14-15**). The drainage support channel beam for the downspout on the south side of Pier 9 is cracked along approximately half its depth (**Photo 16**); the channel beam is not structural and it appears secure, but it should be monitored during future inspections to check for it becoming loose and creating an overhead hazard. Furthermore, while the channel beam crack is not currently posing a structural threat, it could potentially reach the floor beam bracket through the connection angle welds and as such it should be monitored during future inspections. Isolated downspouts have rust staining including the downspouts at the North end of Pier 9, and both ends of Pier 2. Manhole covers near Column 3 of Piers 14 and 15 are missing and are covered with plywood, which can be easily removed and can be a safety hazard **(Photo 17**).

Photo 13: Example of debris in drainage grate at ground termination (Column 3 of Pier 3 shown)

Photo 14: Example of broken ground termination and undermining of the slope protection (Column 1 at Pier 12 shown)

Photo 15: Broken ground termination and undermining of approach slab of adjacent structure (HAM-50-2173L) at Column 3 of Pier 13

Photo 16: Cracked drainage support channel at the south end of Pier 9

Photo 17: Open manhole covered with plywood, East of Column 3 at Pier 15

2.2. Item 59 – Superstructure

The superstructure is in ***Fair*** condition and was changed from Satisfactory due to the condition of the gusset plates which exhibit pack rust, localized deformations, free edge bowing, laminating corrosion, and painted over section loss. Pack rust, laminating corrosion, and section loss is also present throughout the girders, truss members, and floor beams.

2.2.1. Element 107 – Steel Open Girder

Spans 1-4 and 12-17 consist of three lines of built-up riveted girders. Typical defects observed in isolated locations include the following: There are gouges and scrapes in the bottom flanges (**Photo 18**), as well as weld/flame cuts in the bottom flanges of Spans 13-15 (**Photo 19**). Painted over pitting up to 1/4" deep is present in the webs, flanges, and connection plates primarily behind the bearings (**Photo 20**). Active and inactive pack rust up to 1/2" thick has built up between flange plates causing the bottom flange plate to bend out of plane (**Photo 21**). Finally, mis-drilled holes are present at random locations throughout the girders, particularly at the ends of the girders (**Photo 22**). Tack welds are present at some of the floor beam connection angles, but no cracks were observed (**Photo 23**). Finally, surface corrosion is present on the edges of the top flange of the girders in isolated locations throughout the bridge.

Unique defects observed include the following: At the South Girder in Span 12, the bottom flange is bent out of plane 1/2" over a 1' long portion near midspan (**Photo 24**). There is a corrosion hole in the bottom of the web of the South Girder of Span 13 behind the bearing at Pier 14 (**Photo 25**).

Photo 18: Example of girder scrape (Center Girder, Span 14 shown)

Photo 19: Flame cut gouge on bottom flange of girder (North Girder, Span 15 near Pier 15 shown)

Photo 20: Example of painted-over pitting (North Girder, Span 14 at Pier 15 shown)

Photo 21: Example of active pack rust between flange plates (North Girder, Span 14 near midspan shown)

Photo 22: Example of mis-drilled holes (South Girder, Span 13 at Pier 14 shown)

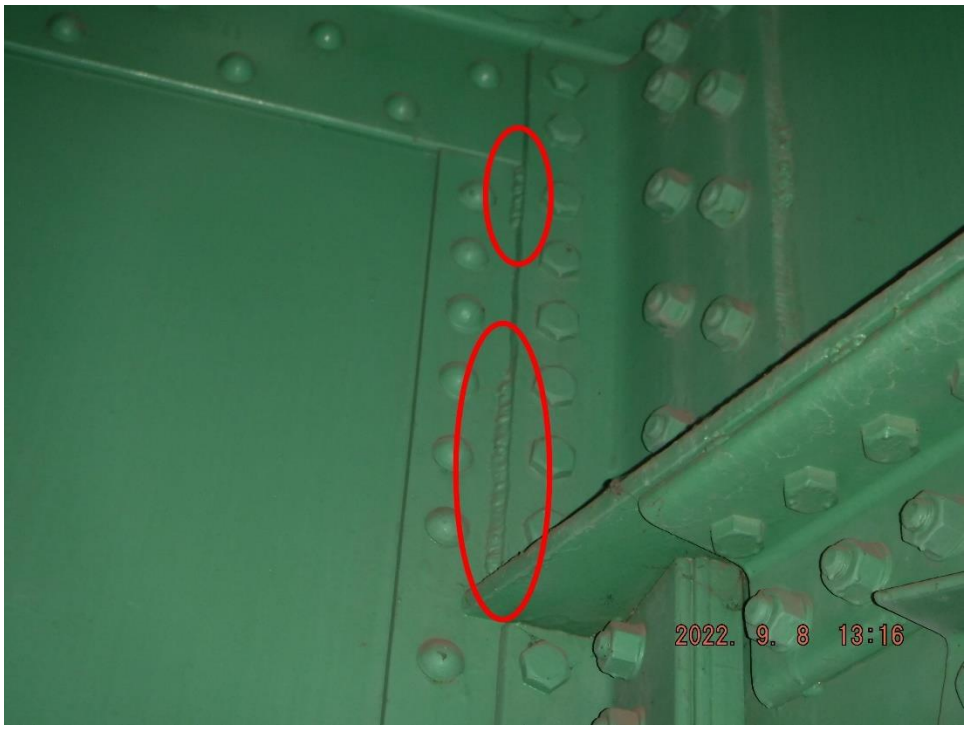


Photo 23: Example of tack welds on girder (North Girder, Span 2 at Pier 3 shown)

Photo 24: 1/2" out of plane bending of bottom flange on the South Girder in Span 12 near midspan

Photo 25: Corrosion hole in the web on South Girder, Span 13 at Pier 14

2.2.2. Element 120 – Steel Truss

The truss spans consist of Spans 5-11.

Lower Chord

The lower chord exhibits deteriorations throughout all three truss lines. The most common defect is pack rust up to 1" thick between built up web plates. Most of the pack rust is inactive, having been caulked and painted over during past rehabilitation work; however, some locations have reactivated. The pack rust has pushed the web plates outward causing them to bow (**Photos 26-27**). There is surface corrosion at various locations including at tie plates and lacing bars (**Photo 28**). There are tie plates and batten plates that have corrosion holes (**Photo 29**); these plates are not primary structural members and the corrosion holes do not affect the structural capacity of the chord. There are isolated gouges in the flanges and webs of the lower chord members up to 3/8" deep (**Photo 30**). There are isolated locations that have mis-drilled holes and or missing rivets/bolts (**Photo 29**). There is a lacing bar on L31-L32 in Span 9 of the South Truss that has bent out of plane up to 1" (**Photo 31**).

Photo 26: Example of widespread pack rust and out of plane plate bending (North Truss, Span 8, L28-L29 Web shown)

Photo 27: Example of splice plate separation due to pack rust (North face of North Truss, Span 10, at L16 shown)

Photo 28: Example of surface corrosion on lacing bar and tie plate (North Truss, Span 9 at L43 shown)

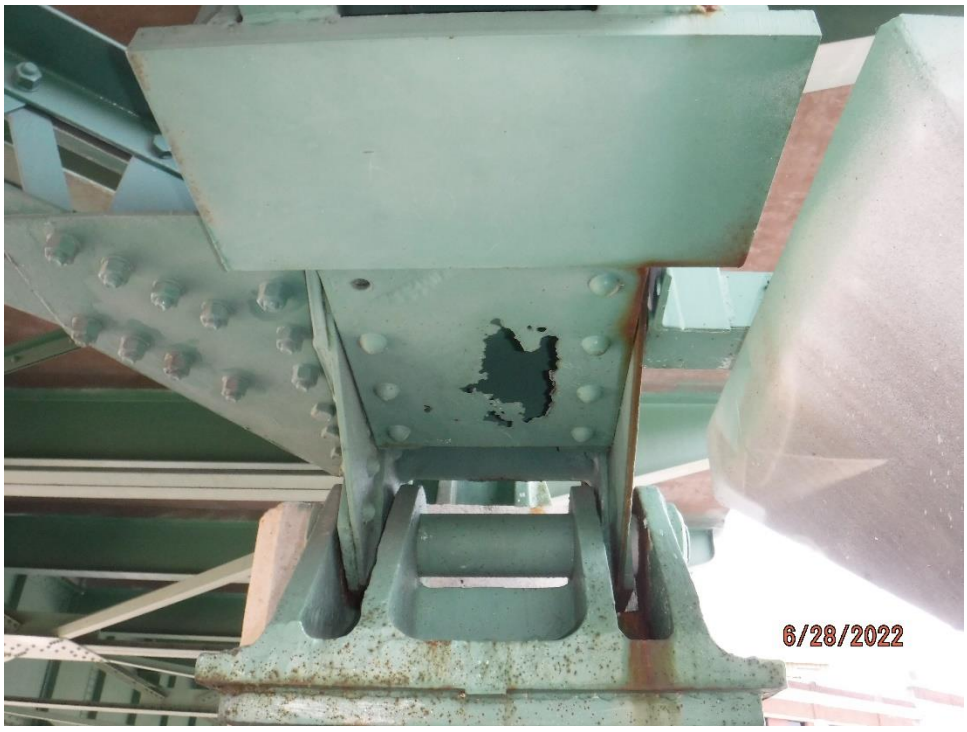


Photo 29: Example of corrosion hole and mis-drilled holes on batten plate (North Truss, Span 5, L0-L1 shown)

Photo 30: Example of gouge in member web (Center Truss, Span 9, L42-L44 shown)

Photo 31: Bent lacing bar on L31-L32 in Span 9 of the South Truss

Upper Chord

The upper chord deteriorations are isolated in nature, and do not exist throughout the entire upper chord. There are corrosion holes present in the bottom flanges at gusset plate connections in isolated locations (**Photo 32)**; these holes are generally inactive, but some are beginning to reactivate. The corrosion holes in the flanges are near the supports so they are not expected to significantly affect the structural capacity of the bridge. Laminating corrosion with minor section loss is present in isolated locations on lacing bars and on the bottom flanges (**Photo 33)**. There is isolated painted-over pitting up to 1/8" deep and painted-over pack rust up to 1/4" thick at a few splice plates and cover plates (**Photo 34**). Fabrication defects include isolated missing rivets and or mis-drilled holes and bent splice plates due to missing fill plates (**Photo 35**).

Photo 32: Example of reactivating corrosion hole on member top flange (South Truss, Span 10, U20 shown)

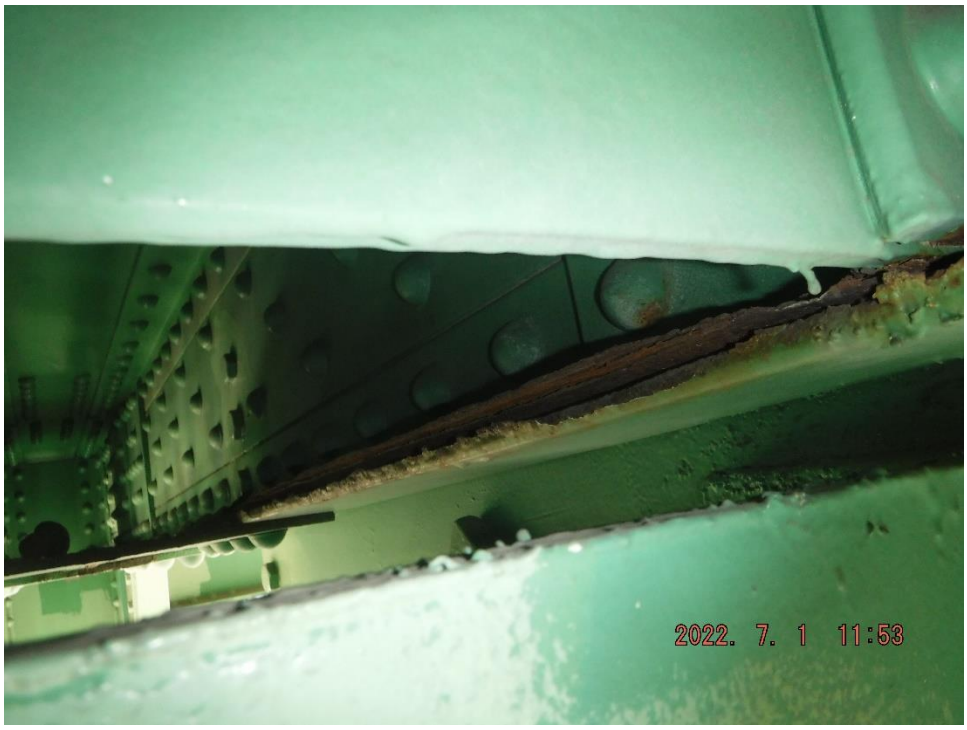


Photo 33: Example of laminating corrosion on member bottom flange (Center Truss, Span 9, U43-U44 at U43 shown)

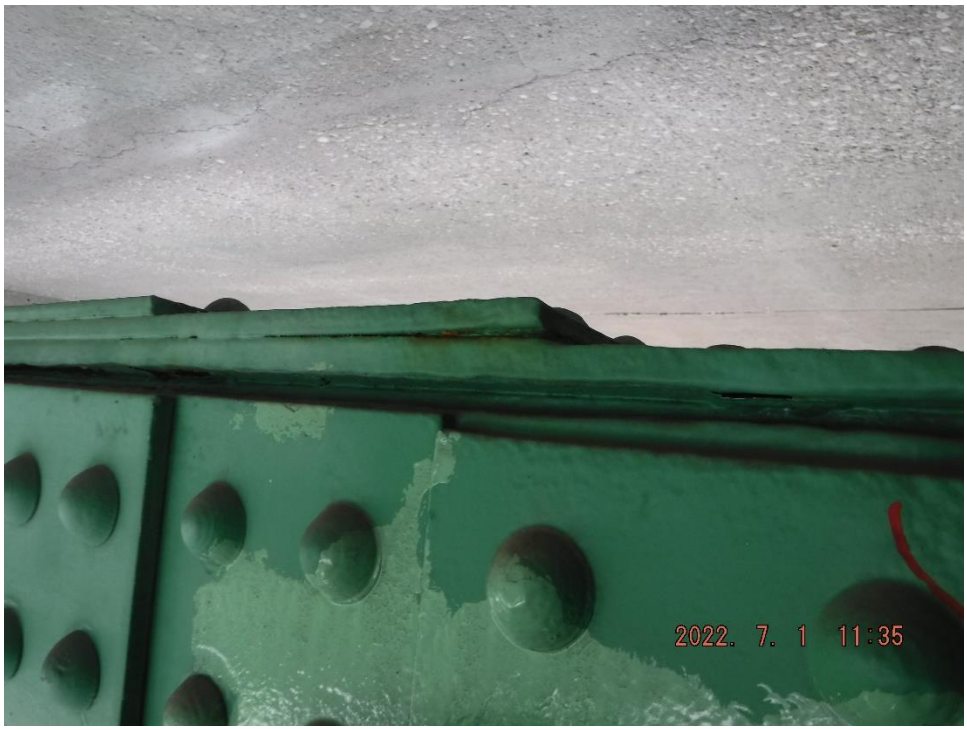


Photo 34: Example of pack rust and splice plate deformation (Center Truss, Span 9, U35-U36 at U36 shown)

Photo 35: Example of mis-drilled holes and bent cover plate due to missing fill plate (South Truss, Span 10, U10-U11 shown)

Verticals

Several flanges of the verticals have painted-over pitting up to 1/8" thick on the outside faces (**Photo 36**). There are isolated locations of pack rust up to 1/2" thick behind the fill plates. At some of these locations the pack rust has cracked the fill plate, but there is no propagation of the cracks into the base metal of the member (**Photo 37**). In some locations the fill plate is tack welded to the vertical member flange. Several of the tack welds are cracked, but no propagation into the base metal of the flange was observed (**Photos 38-39**). There are gouges in the webs and flanges at isolated locations including where attachments have been welded to the members (**Photo 40**). Finally, at U37 on member U37-L37 in Span 9 of the North Truss, the web stiffener weld is cracked (**Photo 41**).

Photo 36: Painted-over pitting on the outside face of the member flange (South Truss, Span 10, L18-U18 shown)

Photo 37: Fill plate cracked and deformed due painted-over pack rust between fill plate and member (South Truss, Span 7, L13-U13 shown)

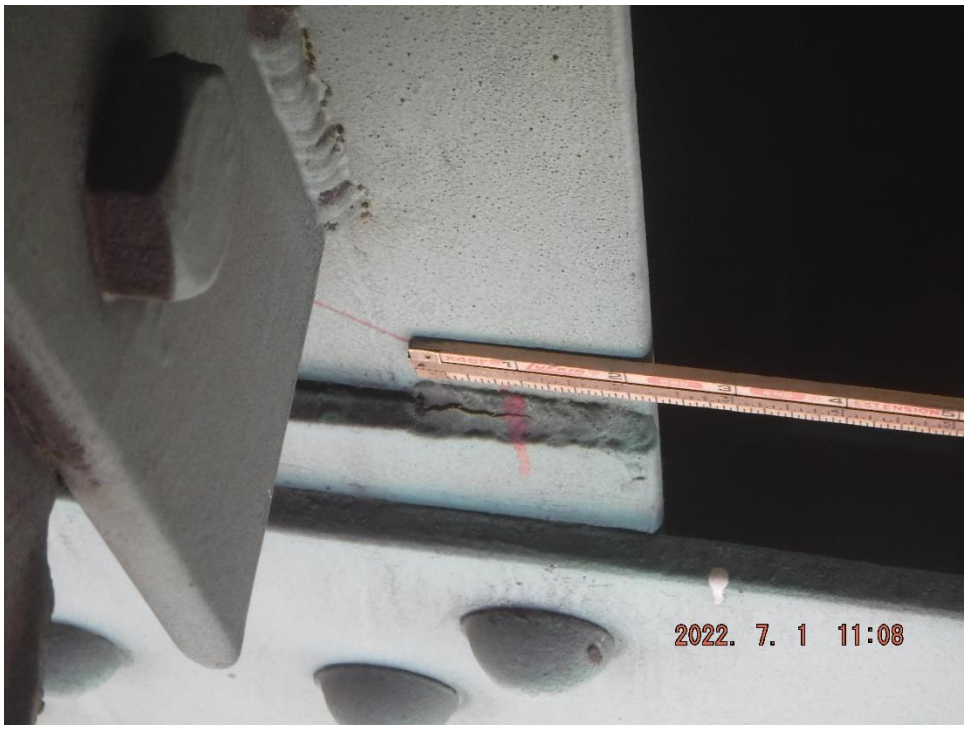


Photo 38: Cracked tack weld on fill plate (Center Truss, Span 8, L25-U25 shown)

Photo 39: Active pack rust behind cracked tack weld and fill plate (North Truss, Span 10, L18-U18 shown)

Photo 40: Welded attachment remains and gouge in member flange (South Truss, Span 8, L30-U30 shown)

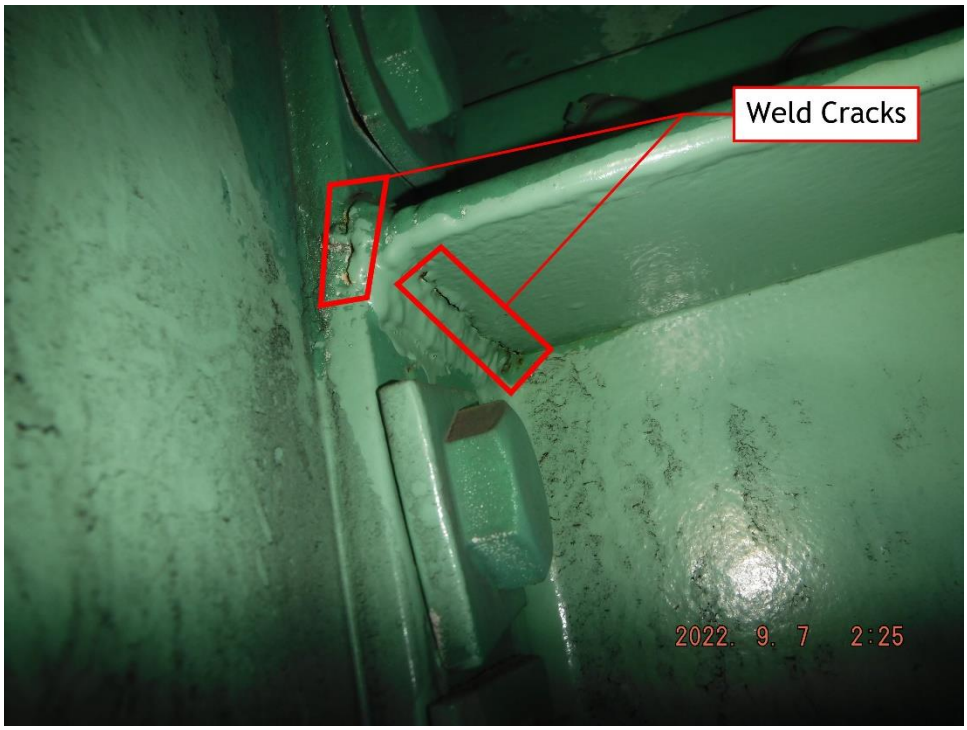


Photo 41: Cracked weld on web stiffener at U37 on member U37-L37

Diagonals

There are several locations where fill plates have been tack welded to the outer face of the flange of the diagonal. Some of the tack welds are undercut (**Photo 42**). There are also tack welds between the gusset plate and the diagonal flange. In isolated locations the outside flange face has painted-over pitting up to 1/32" deep (**Photo 43**). Active surface corrosion is present on the flange on U20-L21 in the North Truss (**Photo 44**). Finally, there are two mis-drilled holes, one at U2 on U2-L3 in the South Truss, and one that has been filled with a plug weld at U3 on U3-L4 (**Photo 45**).

Photo 42: Undercut tack weld on fill plate (South Truss, Span 8, L29-U30 at U30 shown)

Photo 43: Painted-over pitting on the member flange (Center Truss, Span 10, L15-U16 shown)

Photo 44: Active surface corrosion on the flange of U20-L21 in Span 8 of the North Truss

Photo 45: Mis-drilled holes in the member flange filled with plug welds at U3 on U3-L4 in Span 5 of the North Truss

2.2.3. Element 152 – Steel Floor Beam

Painted-over section loss up to 3/16" deep is present on the floor beams in several locations including the bottom of the webs and top face of the bottom flanges below the expansion joints and in isolated connection brackets and fill plates (**Photos 46-47).** There is active surface corrosion in isolated locations on the bottom flange. Laminar corrosion between the floor beam and the concrete haunch is present in several locations (**Photo 48**). The brackets for the cantilever floor beams have been field cut to avoid existing rivets and the cuts extend into the remaining portion of the brackets (**Photo 49**). Finally, mis-drilled holes are present at isolated locations around floor beam connections (**Photo 50**).

Photo 46: Painted-over section loss in connection plate and top flange (Center Truss, Span 10, South Bay at U20 shown)

Photo 47: Painted-over section loss in floor beam web and bottom flange (Center Truss, Span 6 South bay, at U20 shown)

Photo 48: Example of laminar corrosion between the floor beam and concrete haunch (Span 1 shown)

Photo 49: Field cut cantilever bracket connection angle (Span 8, South Truss at U27 shown)

Photo 50: Mis-drilled hole in built-up girder beam top flange at floor beam connection (Span 4, North Girder, Floor Beam 5 shown)

2.2.4. Element 162 – Steel Gusset Plate

A table of all gusset plates in Condition States 2, 3, or 4 is shown in **Appendix D**. Pack rust up to 7/8" thick has built up between the gusset plates, fill plates, bracing connections, and truss members. The pack rust is generally inactive but is active or reactivating in several locations **(Photo 51-Photo 52)**. Active pack rust is also present between the gusset plate and splice plate in some locations **(Photo 53)**. Pack rust at the free edges of gusset plates is discussed in more detail below. Many gusset plates exhibit painted-over section loss up to 5/16" thick; this condition is most severe at the piers with expansion joints (Piers 5, 7, 10, and 12) **(Photo 54-Photo 55)**. There is also minor laminating corrosion in some locations, primarily on the inside face of the gusset plates along the flange of the connecting member **(Photo 56)**. Tack welds are present between the gusset and fill plates. Some of the tack welds and adjacent fill plates are cracked and exhibit active corrosion, but there are no indications of the cracks propagating into the gusset plate base metal **(Photo 57)**. In isolated locations the gusset plates have gouges where previous attachments had been welded to the plates **(Photo 58)**. Catwalk supports have been welded to the gusset plates on the Center Truss, but no defects associated with this detail were observed. There are several mis-drilled holes, some of which have been filled with plug welds **(Photo 59)**. There is a 10" long laminar tear in the North Gusset Plate at L13 in Span 7 of the South Truss **(Photo 60)**; the tear is painted over and has not grown since the previous inspection.

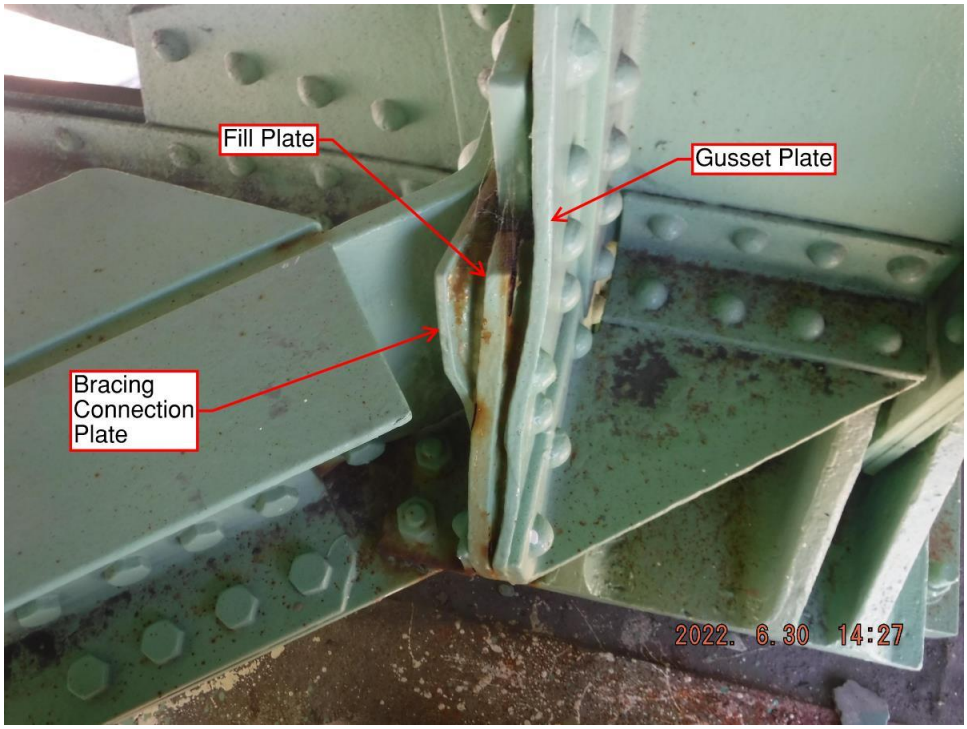


Photo 51: Reactivating pack rust between gusset, fill plate, and bracing connection plate (Span 11, North Truss, L0, South Gusset behind bearing shown)

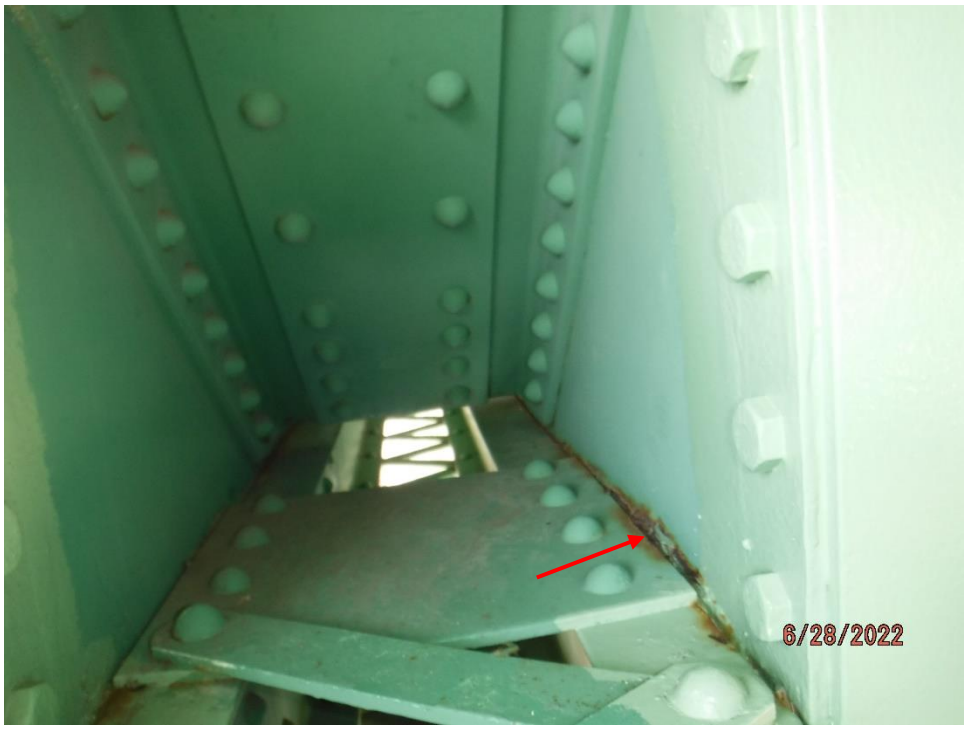


Photo 52: Reactivating pack rust between gusset and lower chord (Span 5, North Truss, L1, South Gusset shown)

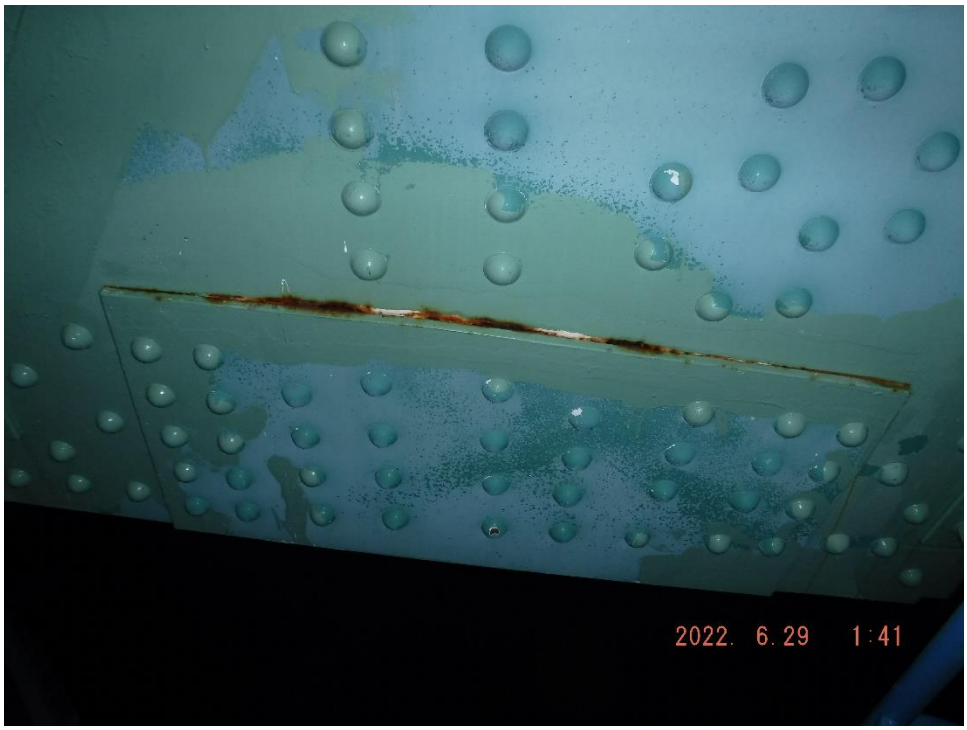


Photo 53: Pack rust between gusset plate and splice plate (Span 8, North Truss, L20, North Gusset shown)

Photo 54: Painted-over pitting on gusset plate at floor beam connection (Span 9, Center Truss, U36, South Gusset shown)

Photo 55: Painted-over pitting on inside face of gusset plate (Span 5, North Truss, L0, North Gusset shown)

Photo 56: Laminar corrosion along member flange on inside face of gusset plate (Span 8, North Truss, L19, South Gusset shown)

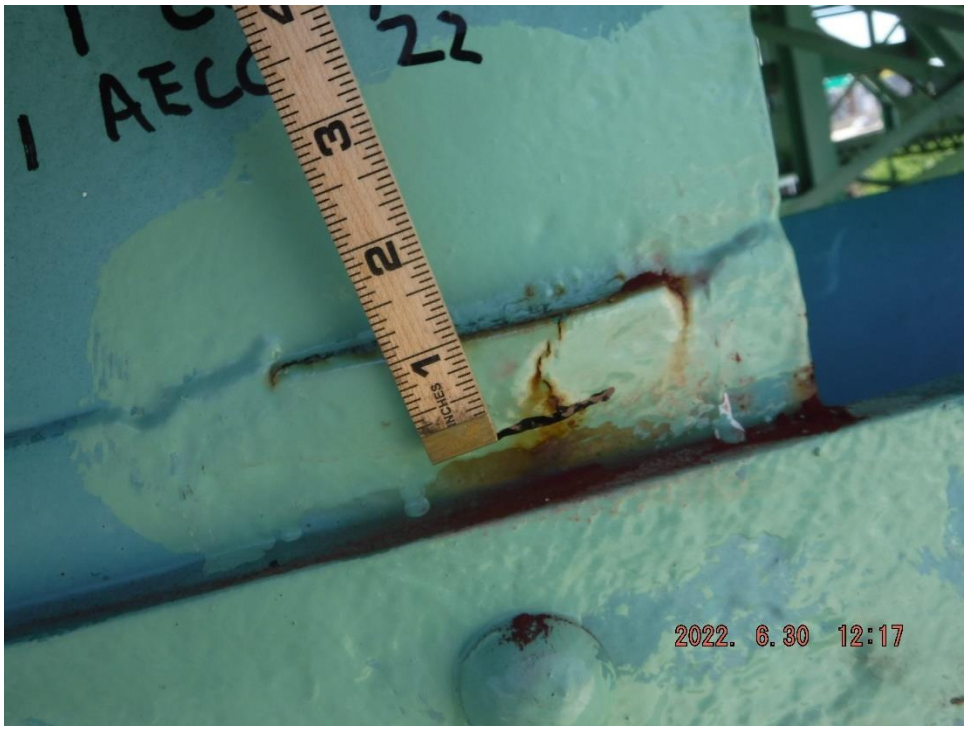


Photo 57: Cracked tack weld and fill plate with pack rust (Span 10, North Truss, L18, North Gusset shown)

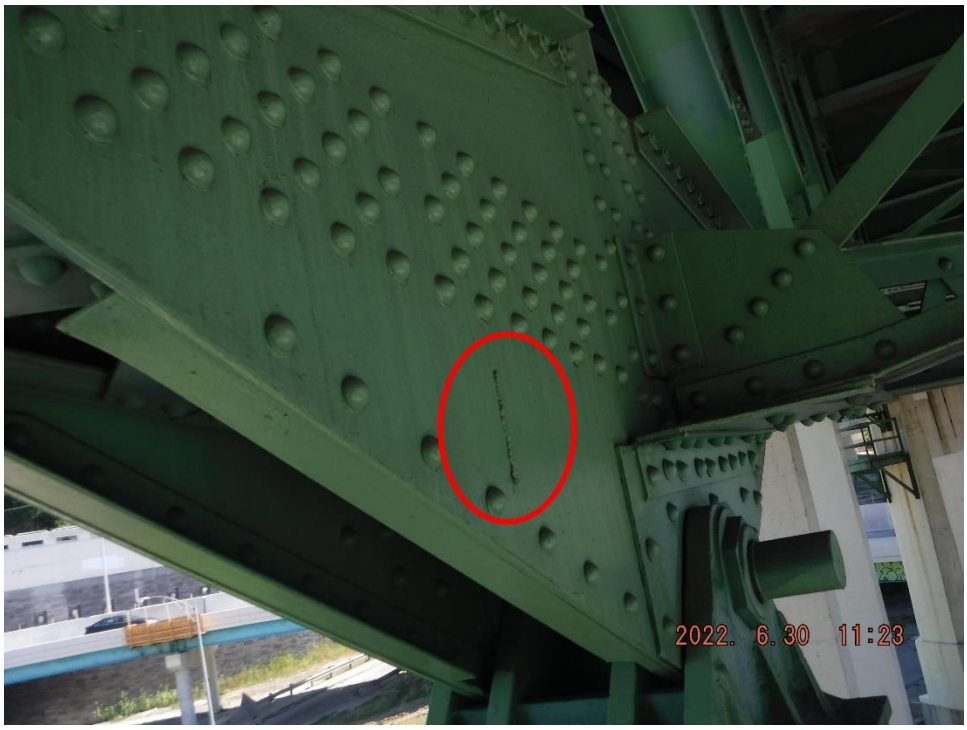


Photo 58: Gouge in gusset plate where attachment was previously welded (Span 10, North Truss, L8, South Gusset shown)

Photo 59: Mis-drilled holes that have been filled with plug welds (Span 10, North Truss, U12, North Gusset shown)

Photo 60: Laminar tear in the North Gusset Plate at L13 in Span 7 of the South Truss

Extensive section loss is present at the bottom of the L0 gusset plates in Span 7 of the North Truss. The remaining section thickness is only 1/4” in the North Gusset Plate, and 3/8” in the South Gusset Plate out of the 1/2" original section thickness **(Photo 61)**; this section loss is painted-over and inactive. There is a 3” diameter inactive corrosion hole present in the South Gusset Plate at L0 in Span 7 of the Center Truss **(Photo 62)**. Based on AECOM's cursory review of the 2009 load rating, the current section loss appears to be more than what was accounted for in the load rating; however, updates to the load rating are not likely needed considering 1) the lower chord at this location does not carry a substantial load (zero load according to the original design and a small load according to the more refined 2009 load rating), 2) the vertical is connected directly into the bearing and the load rating appears to conservatively ignore this connection, and 3) the gusset ratings potentially impacted by this section loss are relatively high.

Photo 61: Section loss on gusset plate and bowing due to pack rust at bearing connection (Span 7, North Truss, L0, South Gusset shown)

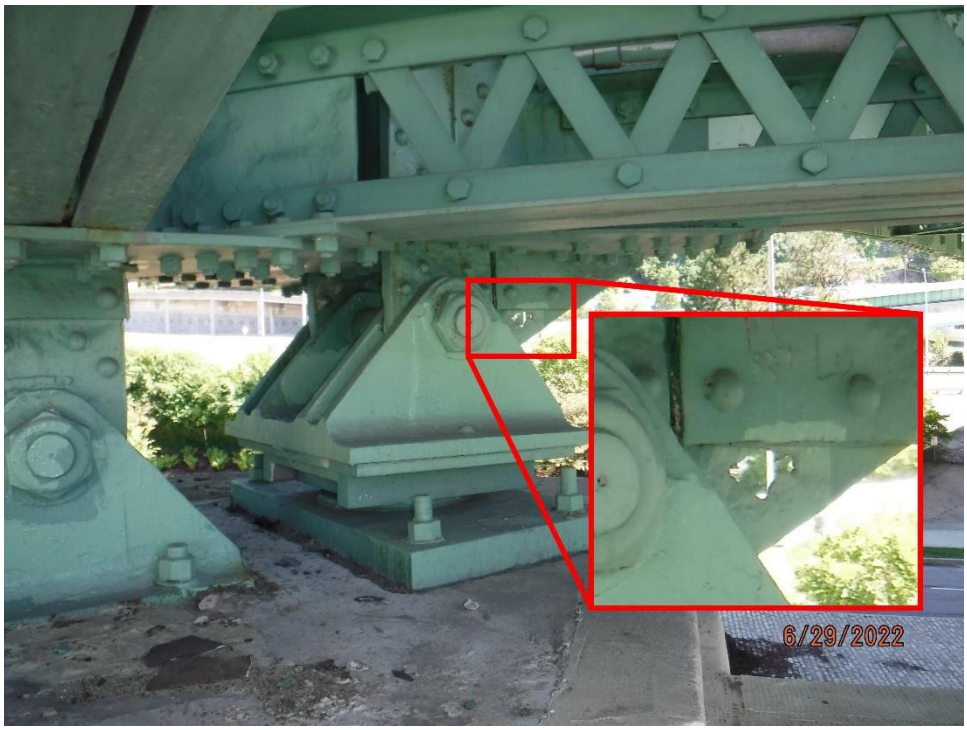


Photo 62: 3-in diameter corrosion hole in the South Gusset Plate of L0 in Span 7 of the Center Truss

Gusset plate bowing has been a previous concern for this bridge, as inspections dating back to at least 2008 noted bowing along the free edges of many gussets, with bowing dimensions changing over time. The configuration of the truss, with its short stocky members and relatively large gusset plates, may cause the truss connections to act more as fixed connections rather than the pinned connections trusses are typically designed for and this could subject the gussets to forces they were not designed to resist and result in bowing. Additionally, pack rust between the gussets and truss members appears to be causing some of the bowing. In 2017, many gussets were retrofitted with stiffening angles to correct the free edge bowing issues. Current gusset plate bowing and/or other deformations are described below. Note that according to the 2022 inspection scope, measurements were not required on gusset plates that do not appear to be warped more than 1/4" or are not actively corroding; as such, some of the measurements (denoted by: *) reported below are taken from the 2020 inspection report and the measurements should not be considered an exhaustive list of all gusset bowing less than 1/4" on the bridge.

Free edge localized deformation with pack rust at unrepaired gusset edges

Most gusset plate deformations found during the 2022 inspection were localized deformations (i.e., limited to the end of a free edge at a connection and not along an entire free edge) likely due to pack rust. This type of deformation is likely not an indication of overloading or out-of-plane forces being applied to the gusset plate; however, these deformations may cause a stress concentration or provide an initial eccentricity that could lead to additional bowing in the future. The likelihood of gusset plate bowing due to primary forces is low at the truss unit end bearing locations (L0, L20, and L44), where the lower chord does not carry substantial load and the vertical is connected directly to the bearing. While all gussets should be monitored during future inspections, close attention should be given to the unrepaired gusset edges away from the truss unit end bearing locations. Gussets with free edge localized deformation and pack rust at unrepaired edges include:

- Span 6, North Truss, L20: 1/4" (North Gusset) and 5/16" (South Gusset) deformation along L19-L20, pack rust is reactivating
- Span 7, North Truss, L0, North Gusset: 3/8" deformation along L0-L1, pack rust is reactivating
- Span 7, Center Truss, L0, North Gusset: 1/4" deformation along L0-L1, pack rust is reactivating
- Span 7, South Truss, L7, South Gusset: 1/8" deformation along L6-L7, pack rust is reactivating
- Span 8, North Truss, L25, North Gusset: 3/16" deformation along L24-L25, pack rust is reactivating **(Photo 63)**
- Span 10, Center Truss, L20, South Gusset: 3/8" deformation along top and bottom of L19-L20, pack rust is inactive
- Span 10, South Truss, L20, South Gusset: 5/8" deformation along L19-L20, pack rust is inactive **(Photo 64)**

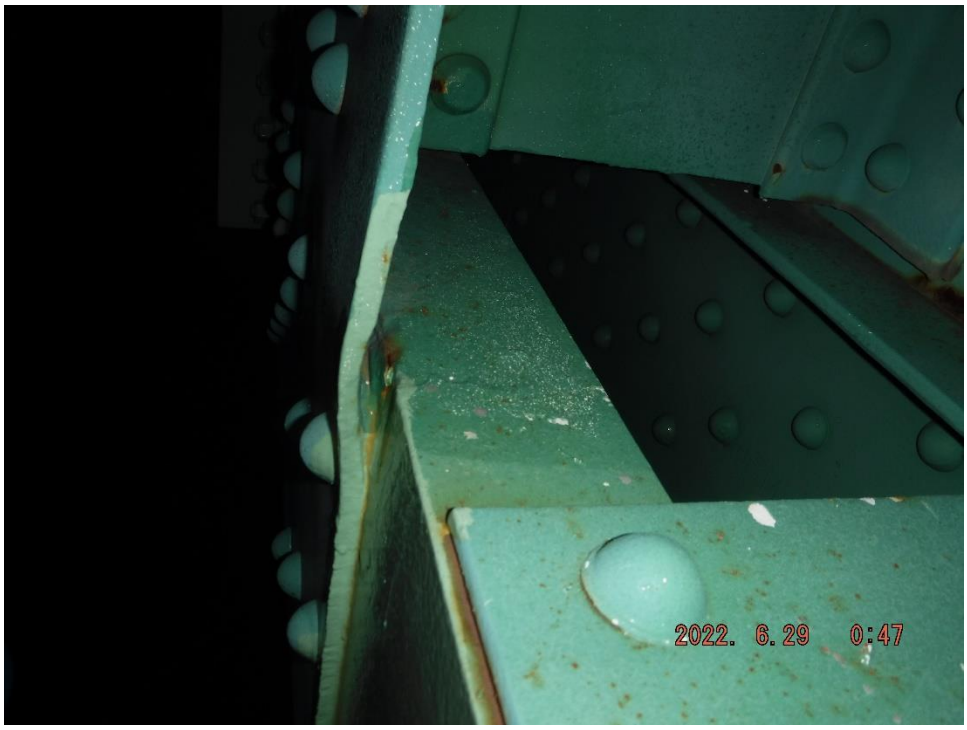


Photo 63: Free edge localized deformation with pack rust at unrepaired gusset edge (Span 8, North Truss, L25, North Gusset shown)

Photo 64: Free edge localized deformation with pack rust at unrepaired gusset edge (Span 10, South Truss, L20, South Gusset shown)

Free edge bowing with pack rust at unrepaired gusset edges

There are gussets with bowing along the entirety of at least one of the unrepaired free edges, which appears to be caused primarily by pack rust. These gussets are all located at bearing locations at the end of a truss unit, where the lower chord does not carry substantial load and the vertical is connected directly to the bearing; thus, the likelihood of gusset plate bowing due to primary forces is low and monitoring during future inspections is recommended. Gussets with free edge bowing and pack rust at unrepaired edges include:

- Span 5, North Truss, L0: 1/16” (North Gusset) and 1/8” (South Gusset) bow along the free edges between L0-L1 and L0-U0, inactive pack rust
- Span 5, South Truss, L0, South Gusset: 1/8” bow along the free edge between L0-L1 and L0-U0, active pack rust **(Photo 65)**
- Span 7, North Truss, L0, South Gusset: 5/8” bow along the bottom of the lateral bracing connection plate, inactive pack rust **(Photo 61)**
- Span 11, North Truss, L0: 1/8” (North Gusset) and 1/16” (South Gusset) bow along the free edges between L0-L1 and L0-U0, inactive pack rust

Photo 65: Free edge bowing with pack rust at unrepaired gusset edge (Span 5, South Truss, L0, South Gusset shown)

Free edge bowing without pack rust at unrepaired gusset edges

There are gussets with bowing along an unrepaired free edge and no apparent pack rust causing the bowing. The bowing measurements at these locations have not changed since at least the 2018 inspection. The truss members framing into these gussets are in tension and/or compression, thus the bowing could be a result of an as-built condition, out-of-plane forces, overloading, or another phenomenon. Given that nearly all of the bowing occurs in Span 6 and similar bowing has not been noted in the symmetric connections in Span 10, in addition to the location of the bridge and low percentage of truck traffic, overloading is unlikely. Future inspections should monitor unrepaired free edge bowing for any changes to the bowing measurements, as well as any patterns in the bowing such as bowing in similar connections and/or locations. Gussets with free edge bowing without pack rust at unrepaired edges include:

- Span 5, South Truss, L3, South Gusset: 1/8” bow along the free edge between L2-L3 and U2-L3 **(Photo 66)**
- Span 6, South Truss, U10, South Gusset: 1/8” bow along the free edge between U10-L10 and U10-L11
- Span 6, South Truss, L12, Both Gussets: 1/8” bow along the free edges between L12-U12 and L12-U11
- Span 6, South Truss, U12, South Gusset: 1/8”* bow along the free edge between L12-U12 and U12-L13
- Span 6, South Truss, U13, North Gusset: 1/8”* bow along the free edge between L13-U13 and U13-L14
- Span 6, South Truss, U15, South Gusset: 1/8”* bow along the free edge between L15-U15 and L14-U15
- Span 6, South Truss, L15, Both Gussets: 3/16”* bow along the free edges between L15-L16 and L15-U16
- Span 6, South Truss, L17, North Gusset: 1/16”* bow along the free edge between L17-U17 and L17-U18
- Span 9, Center Truss, L37, Both Gussets: 1/8”* bow along the free edges between L37-U38 and L37-L38

Photo 66: Minor free edge bowing without pack rust at unrepaired gusset edge (Span 5, South Truss, L3, South Gusset shown)

Free edge bowing at repaired gusset edges

Most gussets which previously had free edge bowing were repaired with stiffening angles, which greatly reduced or eliminated the bowing; however, there are repaired gussets which still have a slight bow along a free edge. Gussets with free edge bowing at repaired edges include:

- Span 9, North Truss, L37, North Gusset: 1/8” bow along the free edge between L36-L37 and U36-L37. No pack rust is present. This gusset was bowed 3/8” in 2016 before the repair and was bowed 1/8” in 2018 and 2020 after the repair **(Photo 67)**. Given the gusset has been repaired and the bowing has been reduced and appears to not be changing, monitoring during future inspections is recommended.
- Span 9, North Truss, L42, North Gusset: 1/16” bow along the free edge between L41-L42 and U42-L42. No pack rust is present. This gusset was bowed 1/2" in 2016 before the repair and was bowed 1/16” in 2018 and 2020 after the repair. Given the gusset has been repaired and the bowing has been reduced and appears to not be changing, monitoring during future inspections is recommended.

Photo 67: Free edge bowing at repaired gusset edge (Span 9, North Truss, L37, North Gusset shown)

2.2.5. Elements 310 – Elastomeric Bearing, 313 – Fixed Bearing, and 314 – Pot Bearing

The most common bearing defects are surface corrosion and painted-over pitting on the assembly components (**Photos 68-69**). The pin support plate of the fixed bearing at Pier 10 on the Center Truss is slightly bent (**Photo 70**), the pin nut on the Span 12, Pier 12 Center Truss Bearing has a gouge in it (**Photo 71**). There are undercut tack welds on isolated pin plates at the truss bearings (**Photo 72**). There is approximately 50% section loss on the anchor nut for the Span 13, North Girder Pier 14 Bearing (**Photo 73**). Finally, there is a manufacturing defect on the top of the south nut of the North Bearing at the West Abutment (**Photo 74**).

Photo 68: Painted-over pitting and surface corrosion on bearings (North Truss at Pier 7 shown)

Photo 69: Painted-over pitting on bearing (North Girder, Span 13, at Pier 13 shown)

Photo 70: Bent pin support plate at Pier 10, Center Truss, Span 10 Bearing

Photo 71: Gouge in pin nut at Pier 12, Center Girder, Span 12 Bearing

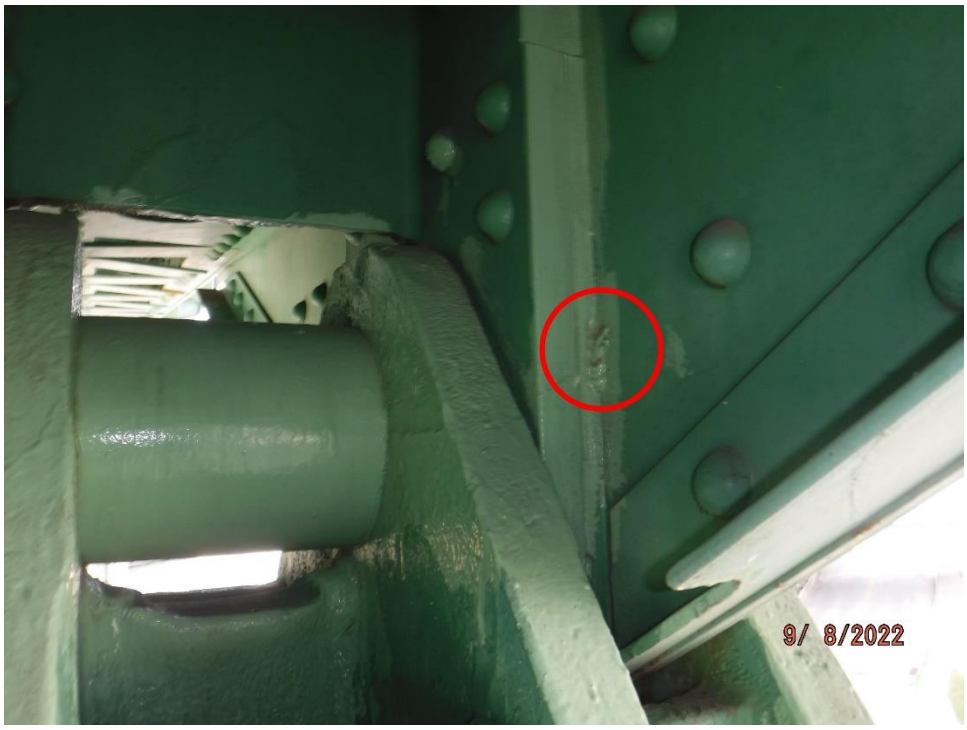


Photo 72: Undercut tack weld between gusset plate and pin plate (Span 11, Center Truss, L8 at Pier 11 shown)

Photo 73: Section loss on anchor nut at Pier 14, Center Girder, Span 13

Photo 74: Manufacturing defect on the North Bearing at the West Abutment

2.2.6. Element 515 – Steel Protective Coating (Item 59.01)

The steel protective coating system is OZEU paint applied in 1999 and is in ***Good*** condition (**Photos 75-76**). There are isolated areas of active corrosion throughout the structure. These areas are most prevalent between laminated plates such as in built up members, at splice plates, and at gusset plates. There are isolated locations where the paint has peeled or chipped away exposing either the prime coat or the bare steel (**Photos 77-78).**

Photo 75: Typical paint condition on girder spans (Span 4 shown)

Photo 76: Typical paint condition on truss (North Truss, Span 10 shown)

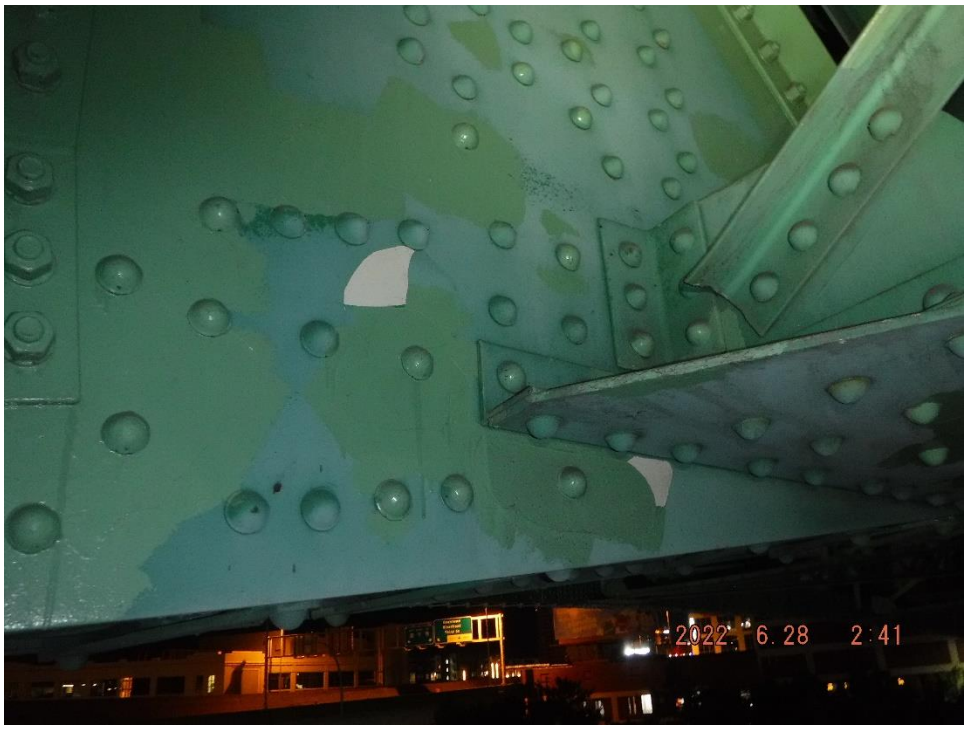


Photo 77: Chipped paint on gusset plate (Center Truss, Span 9, L42 shown)

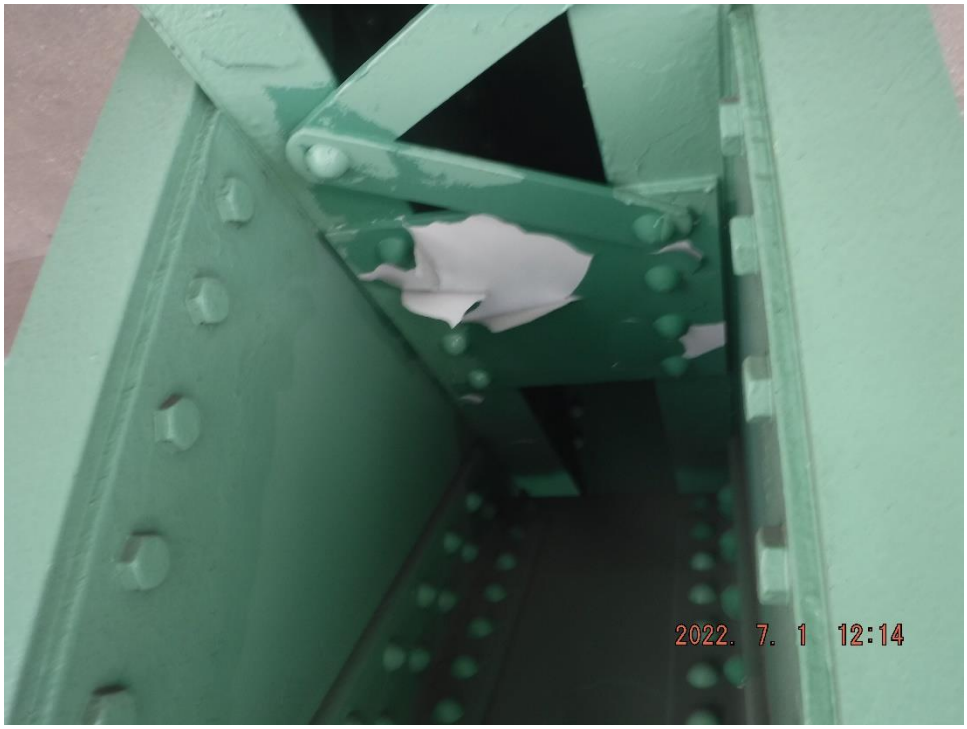


Photo 78: Example of peeling paint (upper chord tie plate shown)

2.2.7. Non-Inventoried Superstructure Items

Alignment

No deficiencies in the horizontal or vertical member alignment were observed during the inspection.

Cross Frames

No deficiencies were observed in the cross frames during the inspection.

Bracing

There are isolated areas of painted-over pitting in the bracing members, and the connection plates (**Photo 79**). In Span 10, there is a kink in the member connecting L20 on the South Truss to L18 on the Center Truss which was previously noted and has not changed (**Photo 80**). In Span 9 on the South Truss at L32 the gusset plate for the lower lateral bracing is bent out of plane (**Photo 81**). In Span 17 at the South Truss, the bracing member has corrosion holes. Finally, the lower sway bracing member connecting U32 of the North Truss to L30 on the Center Truss is bowed.

Photo 79: Painted-over pitting on connection plate (Center Truss, Span 7, U0 shown)

Photo 80: Bent cross brace member in Span 10 between L18 on the Center Truss and L20 on the North Truss

Photo 81: Bent bracing member gusset at L32 on Span 9 of the South Truss

2.3. Item 60 – Substructure

The substructure is in ***Satisfactory*** condition and is controlled by the condition of the reinforced concrete columns, abutment, pier caps, and backwall, which exhibit isolated vertical and transverse cracking, spalls with exposed reinforcement, and isolated delaminations.

2.3.1. Element 205 – Reinforced Concrete Column

The reinforced concrete columns exhibit vertical and map cracks some of which have rust staining. The cracks vary in width from hairline up to 1/16" wide. There are several locations, primarily at the bearing pedestals that have spalls with exposed reinforcement. Delaminations are present at several of the columns as well. **Table 3** below shows notable deficiencies observed in the concrete columns.

Table 3: Concrete column defects

Pier	Column	Location	Defect	Size	Photo
1 (abut.)	Center	North Face	Delaminated area	1' dia.	
1 (abut.)	South	South Face	Delaminated area	2' H x 6" W	
3	North	South Face	Hairline map cracking		
3	South	East Face	Spall with exposed reinforcement	3' H x 1' W x 2" D	
8	South	North face	Spall with exposed reinforcement	6" H x 2' W x 2" D	
9	Center	South Face	Spall with exposed reinforcement	6" H x 1' W x 1" D	
10	North	Southwest corner	Spall with exposed reinforcement	3' H x 1.5' W x 3" D	
10	South	Southeast corner	Vertical crack		**Photo 82**
11	South	North corner	Spall with exposed reinforcement	1.5' dia. x 1" D	
12	North	North face	Spall with rust staining	1' H x 6" W x 2" D	**Photo 83**
13	Center	North face	Spall with exposed reinforcement	1' H x 2.5' W x 2" D	**Photo 84**
13	Center	Southeast corner	Spall with exposed reinforcement	2' dia. x 2" D	**Photo 85**
14	North	North face	Vegetation growing on column		**Photo 86**

Photo 82: Vertical crack in the South Column of Pier 10

Photo 83: Spall with rust staining on the North Column of Pier 12

Photo 84: Spall with exposed reinforcement on the Center Column of Pier 13

Photo 85: Spall with exposed reinforcement on the Center Column of Pier 13

Photo 86: Vegetation growing on the North Column of Pier 14

2.3.2. Element 215 – Reinforced Concrete Abutment

The abutment walls exhibit minor horizontal, vertical, and map cracks throughout (**Photo 87**). Some of the cracks have rust staining. There are isolated spalls with exposed reinforcement (**Photo 88**). There is a large horizontal crack in the forward abutment between the Center and South Bearings that has previously been sealed (**Photo 89**).

Photo 87: Hairline map cracking with rust staining on the Rear Abutment

Photo 88: 2 SF spall with exposed reinforcement adjacent to the North Girder on the Forward Abutment

Photo 89: Sealed horizontal crack and map cracking on the Forward Abutment

2.3.3. Element 234 – Reinforced Concrete Pier Cap

There are spalls with exposed reinforcement at several locations on the pier caps. Spalls are beginning to undermine the South Span 3 Bearing at Pier 4, the South Span 4 Bearing at Pier 5, the South Span 9 Bearing at Pier 10, and the South Span 14 Bearing at Pier 15; there is currently no loss of bearing area. Horizontal cracks are present on the pier caps. Some of the cracks exhibit rust staining. There are isolated delaminations on the pier caps. **Table 4** below shows notable deficiencies observed in the concrete pier caps.

Table 4: Pier cap defects

Pier	Location	Defect	Size	**Photo**
2	South Bay, Bottom Face	Shallow spall	6” dia.	
2	South Bay, East Face	Spall	1.5’ H x 6” W x 1” D	
3	North Pedestal, Top Face	Cracks	up to 0.025 in	
3	Center Pedestal, South Face	Spall w/ exposed reinforcement & delaminated area	1.5’ W x 1” D 2’ x 2’ delam.	
4	South Pedestal, East Face	Spall and delamination	1’ H x 2’ W x 2in D	
5	Center Pedestal, North Face	Spall and delamination	1’ H x 4’ W	

5	South Pedestal, South Face	Spall under bearing	6” H x 1’ W x 2” D	**Photo 90**
8	South Pedestal, North Face	Spall w/ exposed reinforcement	6” H x 2’ W x 2” D	
8	South Bay, East Face	Spall w/ exposed reinforcement	1’ H x 1’ W x 1” D	
8	South Bay, Top Face	Spall w/ exposed reinforcement	2’ W x 1’ L x 2” D	**Photo 91**
9	South Bay, West Face	Spall w/ exposed reinforcement	6” dia. x 1” D	
10	South Pedestal, Top Face	Spall under bearing	1.5’ dia. x 2” D	**Photo 92**
10	North Bay, West Face	Horizontal cracks		
10	North Bay, East Face	Horizontal cracks w/ rust staining		
10	South Bay, Top Face	Map cracks		**Photo 93**
11	North Pedestal, West corner	Spall w/ exposed reinforcement	6” H x 2’ W x 2” D	
11	Center Pedestal, West Face	Spall w/ exposed reinforcement	6” H x 1.5’ W x 2” D	
12	South Pedestal, South Face	Spall w/ rust staining and map cracking	6” H x 4’ W x 2” D	
12	North Bay, West Face	Cracking w/ rust staining		
13	North Bay, East Face	Spall w/ exposed reinforcement	1.5’ H x 1’ W x 1” D	
13	North Bay, East Face	Spall w/ exposed reinforcement	3’ H x 1’ W x 1” D	**Photo 94**
13	North Bay, East Face	Delamination	4’ L	**Photo 95**
13	North Bay, Top Face	Spall	2’ dia. x 2 in D	
15	South Pedestal, Top Face	Spall	6” H x 1.5’ W x 2” D	
16	North Pedestal, North Face	Spall w/ exposed reinforcement	1’ dia. x 1” D	

Photo 90: 1’ x 6” spall beginning to undermine the Span 4 Bearing of the South Truss at Pier 5

Photo 91: 2’ x 1’ spall with exposed reinforcement on the top face of Pier 8 Cap between the Center and South Columns

Photo 92: Spall beginning to undermine the Span 9 Bearing at the South Truss at Pier 10

Photo 93: Map cracking on the top face of the Pier 10 Cap between the Center and South Columns

Photo 94: 3’ x 1’ spall with exposed reinforcement on the east face of the Pier 13 Cap between the North and Center Columns

Photo 95: 4’ long delamination on the east face of the Pier 13 Cap between the North and Center Columns

2.3.4. Element 830 – Abutment Backwall

There are isolated horizontal and vertical cracks, some of which have efflorescence and rust staining, on the abutment backwalls (**Photo 96**).

Photo 96: Cracks with efflorescence and rust staining on the rear abutment backwall

2.3.5. Non-Inventoried Substructure Items

Wingwalls

There is minor horizontal cracking on the northwest wingwall.

2.4. Approaches

2.4.1. Element 321 – Reinforced Concrete Approach Slab

There are hairline longitudinal cracks in the East Approach Slab. Some cracks propagate from drainage structures protruding into the slab (**Photo 97**). There are minor spalls in the approach slabs at the expansion joints (**Photo 98**).

Photo 97: East Approach Slab with cracks propagating from drainage structure

Photo 98: Spalls in the West Approach Slab at the expansion joint

2.4.2. Non-Inventoried Approach Items

Approach Pavement

The west approach pavement was recently repaved (**Photo 99**). The east approach pavement has had some sealed cracks, but there are many unsealed cracks in the travel lanes and near the edges of the pavement (**Photo 100**). There is a noticeable vertical transition between the east approach pavement and the approach slab.

Photo 99: West approach pavement and transition

Photo 100: East approach pavement with unsealed cracks in the travel lanes and near the south edge

Approach Concrete Barrier

No deficiencies in the approach concrete barrier were observed during the inspection.

Embankment

No deficiencies in the approach embankments were observed during the inspection.

Warning Signs and Sign Supports

No deficiencies in the approach signs were observed during the inspection.

2.5. General Appraisal

Based on the 2022 In-Depth Element Level and Fracture-Critical Inspection findings, the HAM-50-2180N bridge is in ***Fair*** condition. This rating is controlled by the condition of the Superstructure and was changed from Satisfactory due to the condition of the gusset plates. The AssetWise Bridge Inspection Report containing the element level condition ratings can be found in **Appendix C**.

3. RECOMMENDATIONS

A prioritized list of recommended corrective and preventative actions has been developed and is shown in Table 6. An explanation of the priority levels for the repairs is given in Table 5.

Table 5: Explanation of recommendation priority levels

Priority Level	Description	Time Frame
Critical	Immediate action is required. The integrity of the structure and or public safety is in jeopardy.	Within 7 days
High Priority	Complete the work as soon as possible. A serious structural deficiency exists in a primary bridge element. If not corrected, the deficiency could jeopardize the integrity of the structure or public safety.	Within 6 months
Priority	Review the work plan and re-prioritize the schedule. An advanced structural deficiency exists in a primary member or appurtenance. If not corrected, the deficiency may lead to further deterioration and or compromise public safety.	Within 1-2 years
Schedule	Add to scheduled work. A minor, but noteworthy deficiency exists in a primary member or appurtenance. If not addressed, the deficiency may become more serious in the future.	Add to schedule
Program	Add to programmed work. A minor deficiency exists in a primary or secondary member or appurtenance. If not addressed, the deficiency may become noteworthy in the future.	Upon availability of funds
Routine	Address the deficiency per the existing maintenance schedule. The condition is non-structural, does not affect public safety, and occurs over time with normal use of the structure.	Within next maintenance cycle

Table 6: Recommended actions

Priority Level	Recommendations
Critical	None
High Priority	**Drainage** • Correct ground termination issues at Piers 12-15 and arrest erosion and undermining, most notably at Pier 13. • Install covers on open manholes at Piers 14 and 15
Priority	**Reinforced Concrete Bridge Railing** • Replace impact attenuators at Pier 3 and Pier 11.
Schedule	**Deck** • Repair torn expansion joint seals. • Monitor deteriorated concrete in floor beam haunches over publicly occupied areas. **Drainage** • Monitor cracked channel beam. **Superstructure** • Monitor free edge bowing and section loss in gusset plates. **Substructure** • Repair spalls and delaminations in substructure concrete.
Program	None
Routine	**Deck** • Clear vegetation and debris along parapets. • Remove debris from expansion joints. **Substructure** • Remove vegetation growing on Pier 14.

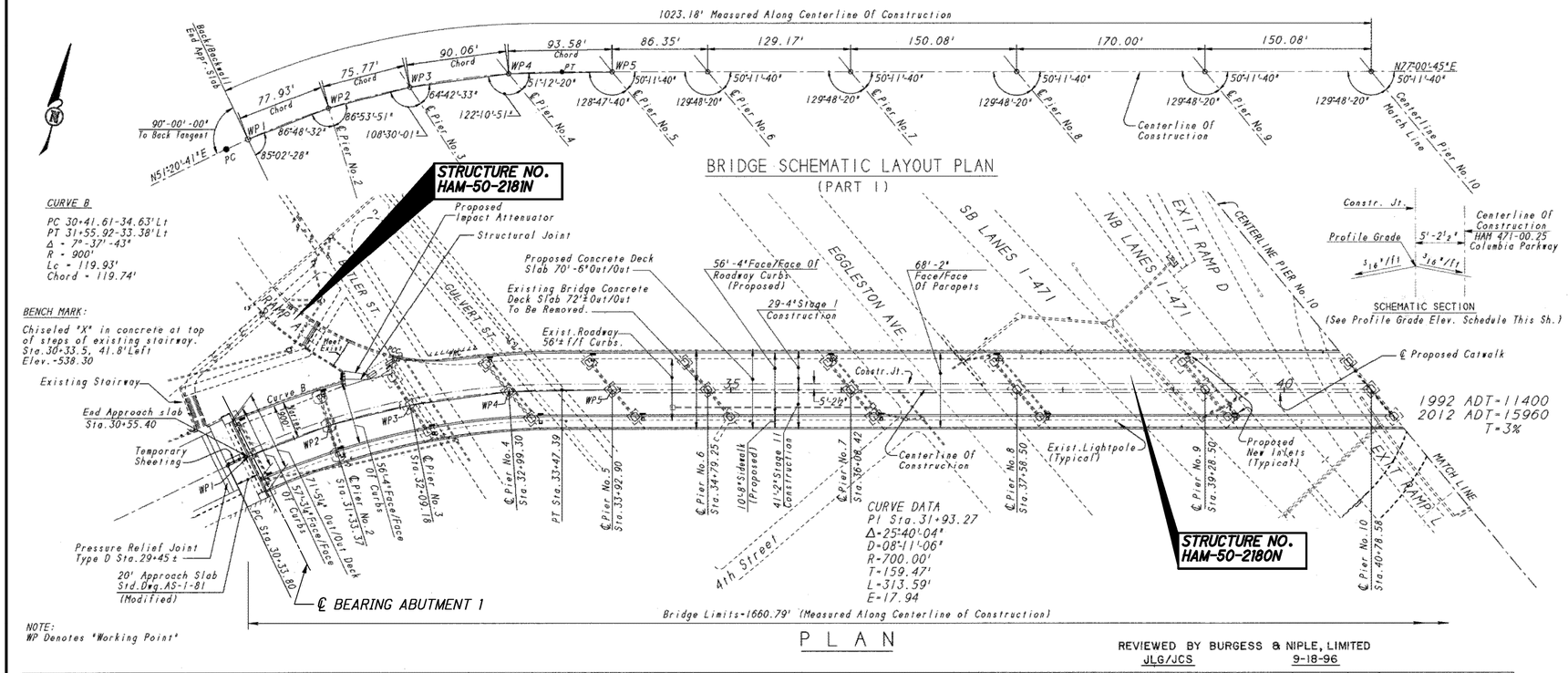
APPENDIX A:
Select Plan Sheets

F.H.W.A. REGION	STATE	PROJECT	
5	OHIO		

HAM-471-00.25

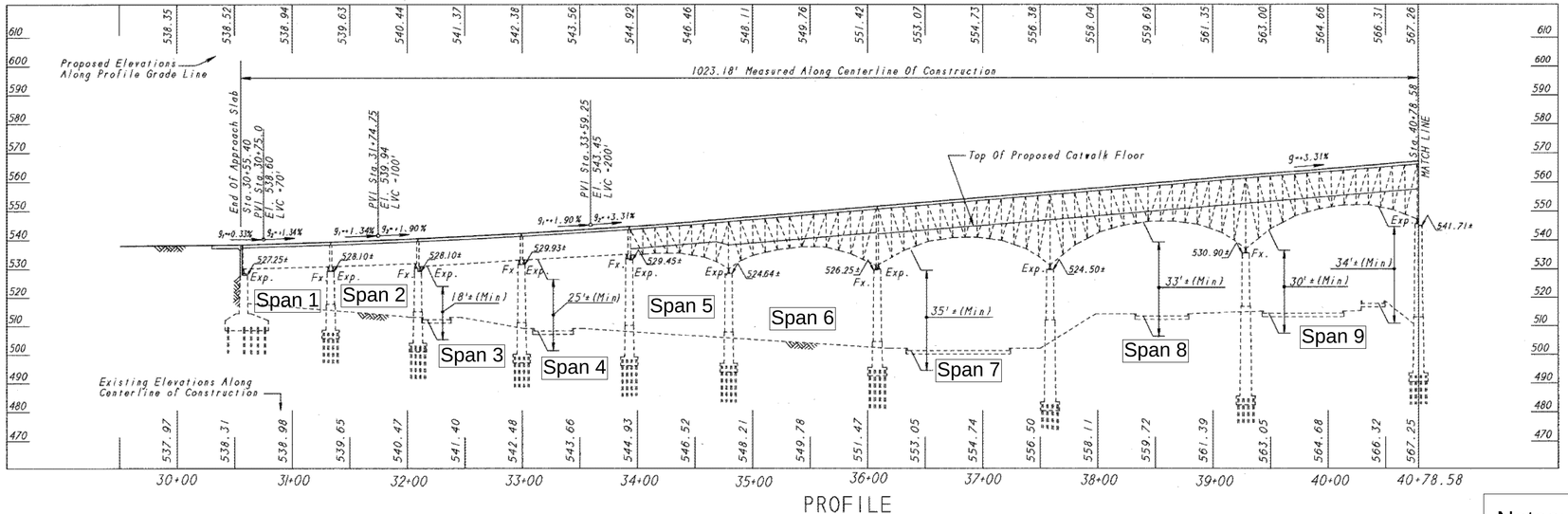
PROFILE GRADE ELEVATIONS SCHEDULE

LOCATION	STATION, OFFSET	ELEVATION
BEGIN BRIDGE	30+55.24, 5.21' LT	538.55
PIER NO. 2	31+33.37, 5.21' LT	539.39
PIER NO. 3	32+07.13, 5.21' LT	540.57
PIER NO. 4	32+95.57, 5.21' LT	542.29
PIER NO. 5	33+88.56, 5.21' LT	544.60
PIER NO. 6	34+74.91, 5.21' LT	547.28
PIER NO. 7	36+04.08, 5.21' LT	551.55
PIER NO. 8	37+54.16, 5.21' LT	556.52
PIER NO. 9	39+24.16, 5.21' LT	562.15
PIER NO. 10	40+74.24, 5.21' LT	567.12
PIER NO. 11	42+03.41, 5.21' LT	571.39
PIER NO. 12	42+89.91, 5.21' LT	574.25
PIER NO. 13	43+54.30, 5.21' LT	576.38
PIER NO. 14	44+36.95, 5.21' LT	579.12
PIER NO. 15	45+19.60, 5.21' LT	581.86
PIER NO. 16	45+84.60, 5.21' LT	584.01
PIER NO. 17	46+49.60, 5.21' LT	586.16
END BRIDGE	47+16.19, 5.21' LT	588.34



PLAN

REVIEWED BY BURGESS & NIPLE, LIMITED
JLG/JCS 9-18-96



PROFILE

EXISTING STRUCTURE

TYPE: STEEL GIRDERS AND DECK TRUSSES WITH REINFORCED CONCRETE DECK SUPERSTRUCTURE ON REINFORCED CONCRETE SUBSTRUCTURE

SPANS: AS NOTED ON BRIDGE SCHEMATIC LAYOUT PLAN

ROADWAY: 56'-4"± CURB TO CURB WITH 10'-8"± SIDEWALK ON RIGHT SIDE

LOADING: HS20-44 CASE II AND THE ALTERNATE MILITARY LOADING

SKEW: VARIES

ALIGNMENT: CURVE RIGHT 700'R, THEN TANGENT, THEN CURVE LEFT 850'R, THEN TANGENT

STRUCTURE FILE NUMBER: 3103390

DATE BUILT: 1938 ORIGINAL CONSTRUCTION, 1997 REHABILITATION

DISPOSITION: BRIDGE REHABILITATION

Notes:

1. Image is taken from the 2016 Rehabilitation Drawings, Sheet 1 of 156, Site Plan (1 of 2) Bridge No. Ham-50-2180N (Columbia Parkway Viaduct Over I-471). Some information from the original sheet has been removed and or updated.

HAMILTON COUNTY
STA. 30+55.40
STA. 47+16.19

SITE PLAN (1 OF 2)
BRIDGE No. HAM-50-2180N
COLUMBIA PARKWAY VIADUCT OVER I-471

HAM-50-2180N

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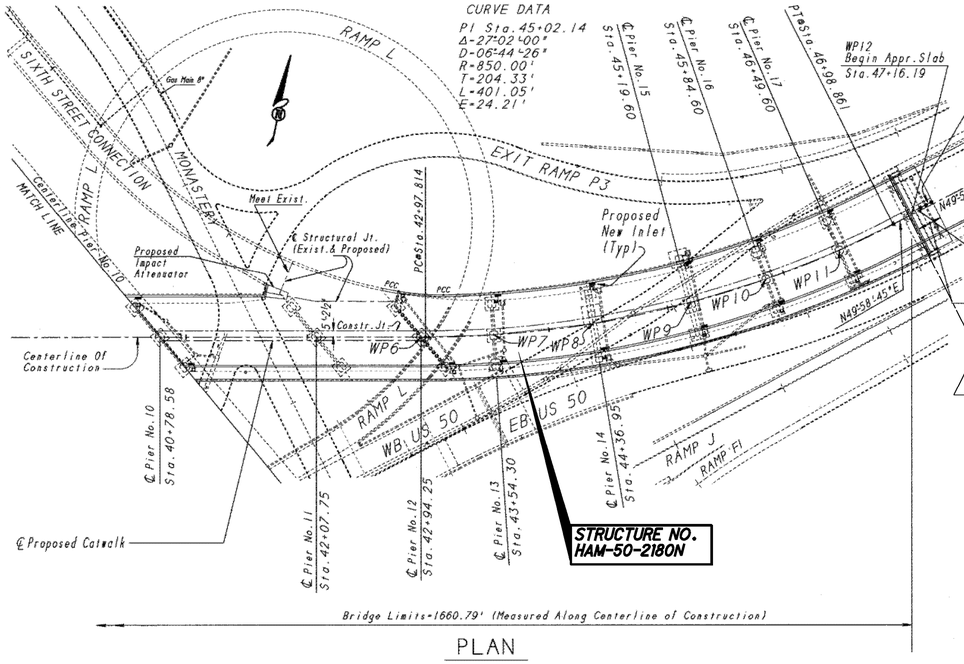
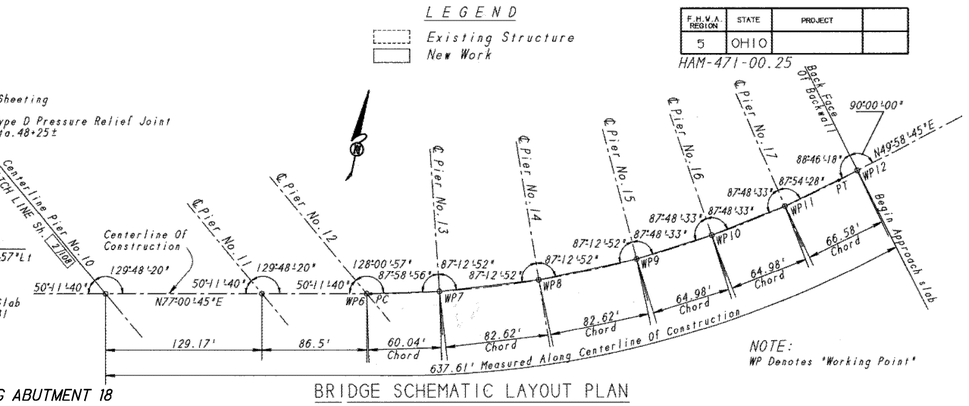
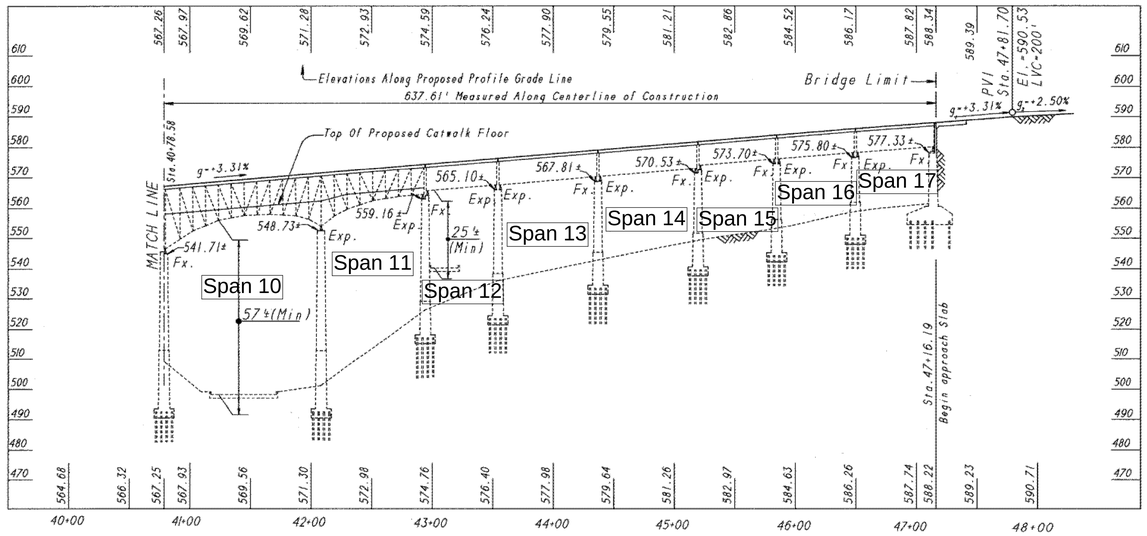


PLAN



BRIDGE SCHEMATIC LAYOUT PLAN
(PART 11)



PROFILE

Notes:

1. Image is taken from the 2016 Rehabilitation Drawings, Sheet 2 of 156, Site Plan (2 of 2) Bridge No. Ham-50-2180N (Columbia Parkway Viaduct Over I-471). Some information from the original sheet has been removed and or updated.

HAMILTON COUNTY
STA. 30+55.40
STA. 47+16.19

SITE PLAN (2 OF 2)
BRIDGE No. HAM-50-2180N
COLUMBIA PARKWAY VIADUCT OVER I-471

HAM-50-2180N

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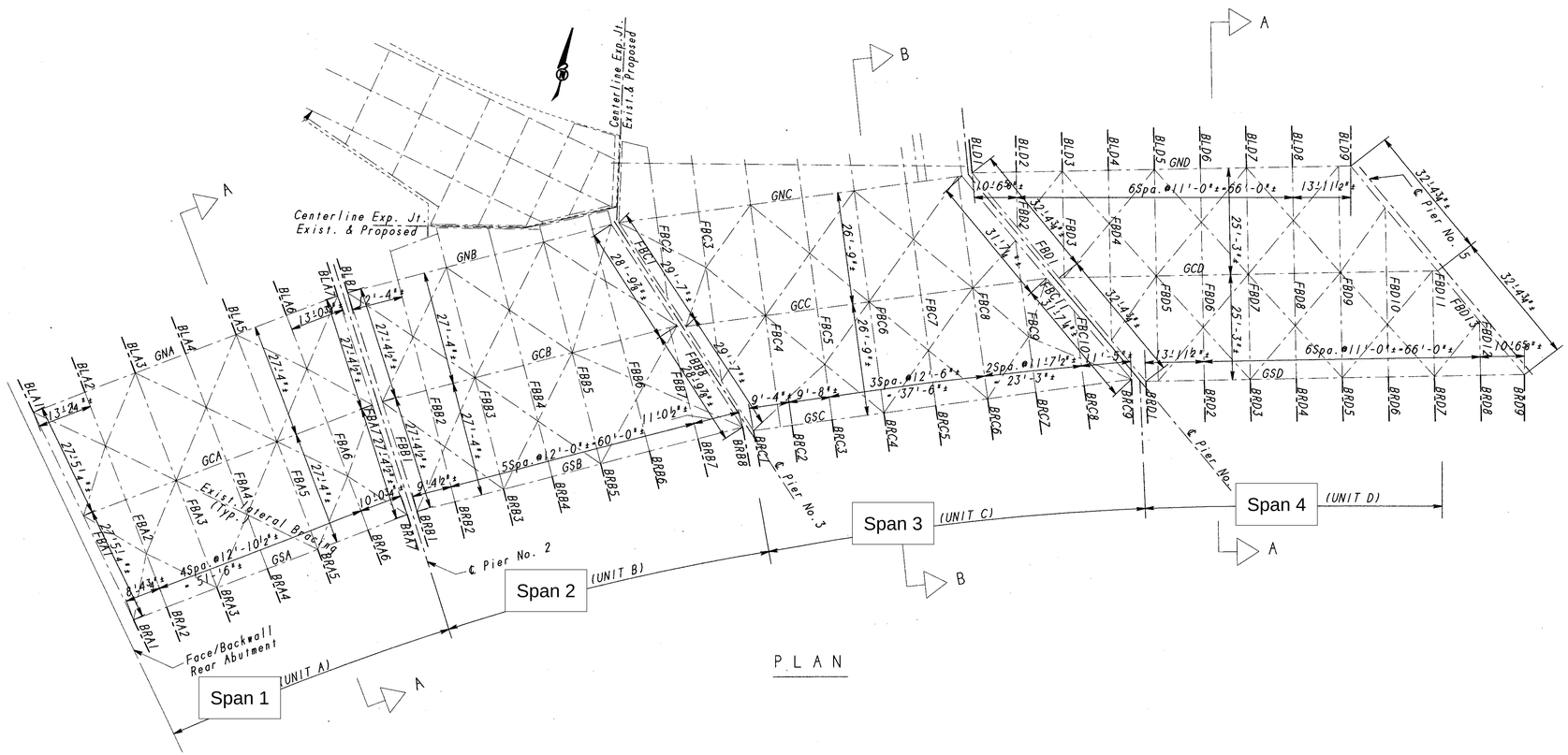
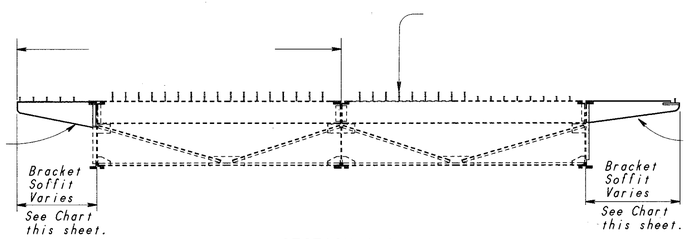
F.H.W.A. REGION	STATE	PROJECT	
5	OH10		

HAM-471-00.25

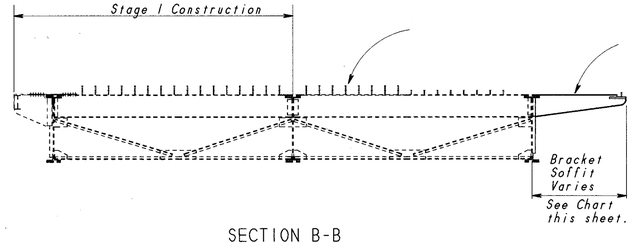
115
182



PLAN



SECTION A-A



SECTION B-B

LEGEND

BLA1 - Bracket Left Unit A Number 1
FBA1 - Floor Beam Unit A Number 1
GNA - Girder North Unit A
GCA - Girder Center Unit A
GSA - Girder South Unit A
BRA1 - Bracket Right Unit A Number 1

Existing Structure

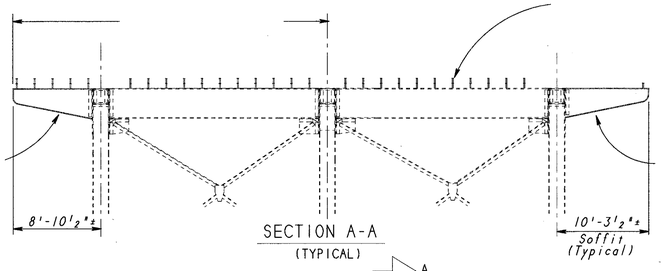
Notes:

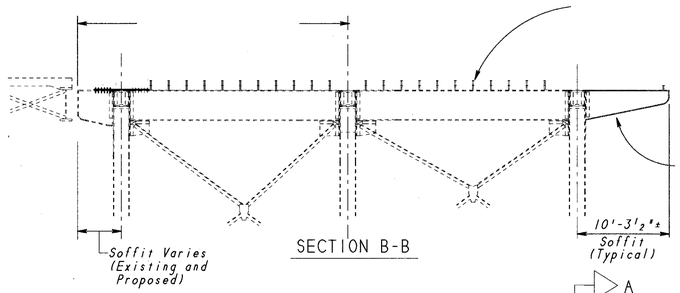
1. Image is taken from the 1997 Rehabilitation Drawings, Sheet 115 of 182, Structural Steel Details New Brackets Spans 1-2 Thru 4-5 (Slab Units A B C & D) Bridge No. HAM-471-0025 (Columbia Parkway Viaduct Over I-471). Some information from the original sheet has been removed and or updated.

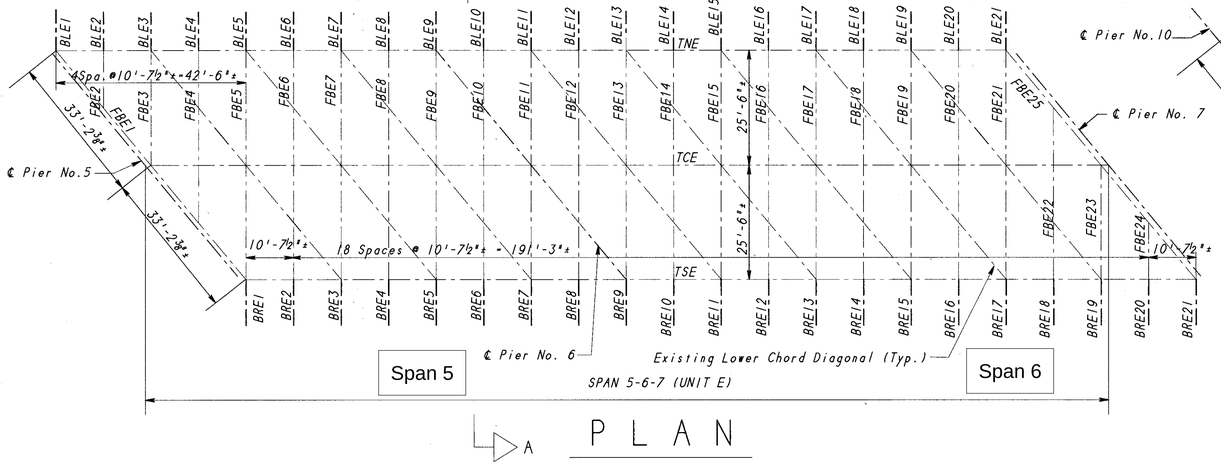
STRUCTURAL STEEL DETAILS
NEW BRACKETS
SPANS 1-2 THRU 4-5
(SLAB UNITS A B C & D)
BRIDGE No. HAM-471-0025
(COLUMBIA PARKWAY VIADUCT OVER I-471)

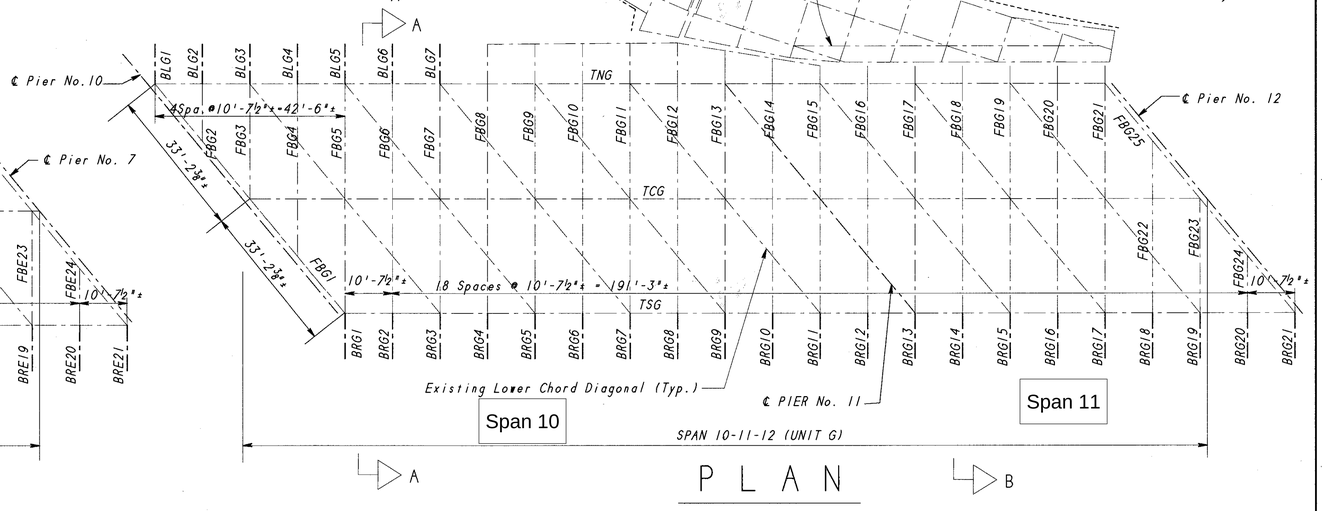
HAMILTON COUNTY

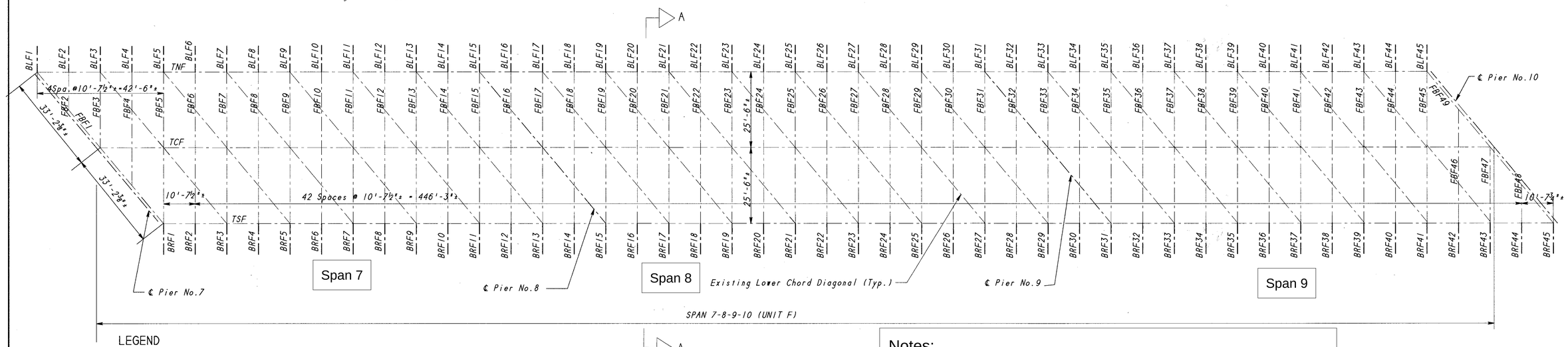
STLABCD Scale 1/6











LEGEND

BLF1 - Bracket Left Unit F Number 1
FBF1 - Floor Beam Unit F Number 1
TNF - Truss North Unit F
TCF - Truss Center Unit F
TSF - Truss South Unit F
BRF1 - Bracket Right Unit F Number 1

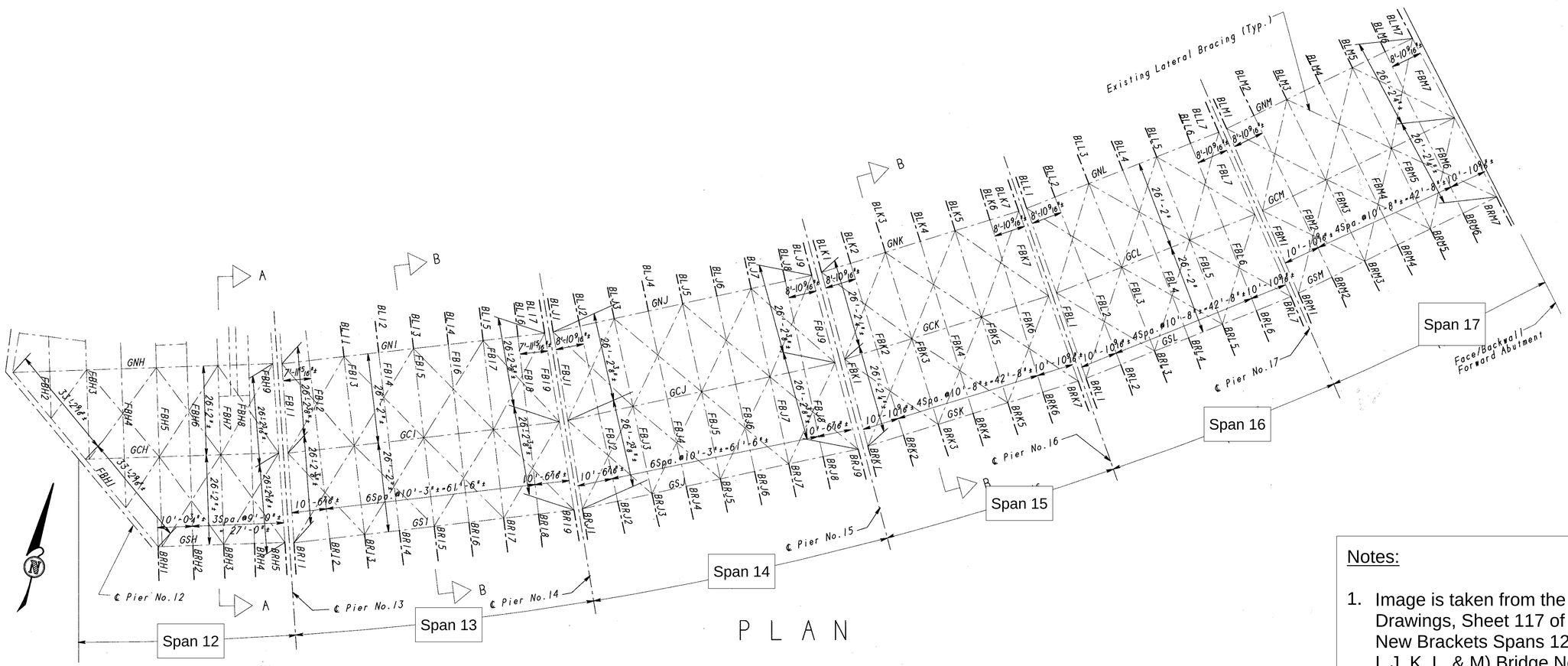
Existing Structure

Notes:

1. Image is taken from the 1997 Rehabilitation Drawings, Sheet 116 of 182, Structural Steel Details New Brackets Truss Spans 5-6-7, 7-8-9-10, & 10-11-12 (Slab Units E F & G) Bridge No. HAM-471-0025 (Columbia Parkway Viaduct Over I-471). Some information from the original sheet has been removed and or updated.

STRUCTURAL STEEL DETAILS
NEW BRACKETS
TRUSS SPANS 5-6-7, 7-8-9-10, & 10-11-12
(SLAB UNITS E F & G)
BRIDGE No. HAM-471-0025
(COLUMBIA PARKWAY VIADUCT OVER I-471)
HAMILTON COUNTY

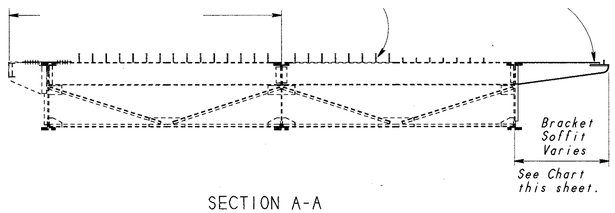
STLEFG Scale 16



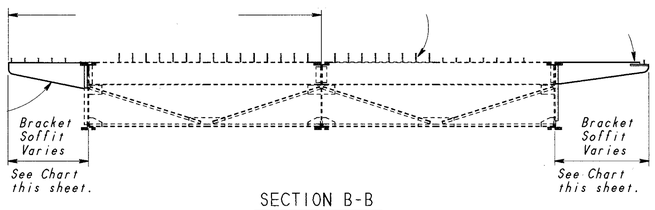
LEGEND

BLJI - Bracket Left Unit J Number I
FBHI - Floor Beam Unit H Number I
GNH - Girder North Unit H
GCH - Girder Center Unit H
GSH - Girder South Unit H
BRHI - Bracket Right Unit H Number I

Existing Structure



SECTION A-A



SECTION B-B
(TYPICAL)

Notes:

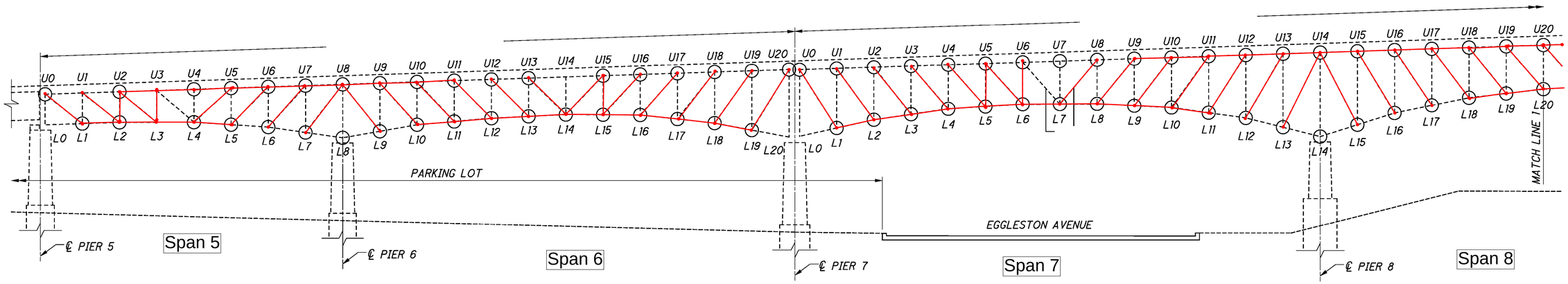
1. Image is taken from the 1997 Rehabilitation Drawings, Sheet 117 of 182, Structural Steel Details New Brackets Spans 12-13 Thru 17-18 (Slab Units H, I, J, K, L, & M) Bridge No. HAM-471-0025 (Columbia Parkway Viaduct Over I-471). Some information from the original sheet has been removed and or updated.

STRUCTURAL STEEL DETAILS
NEW BRACKETS
SPANS 12-13 THRU 17-18
(SLAB UNITS H,I,J,K,L,& M)
BRIDGE No. HAM-471-0025
(COLUMBIA PARKWAY VIADUCT OVER I-471)
HAMILTON COUNTY

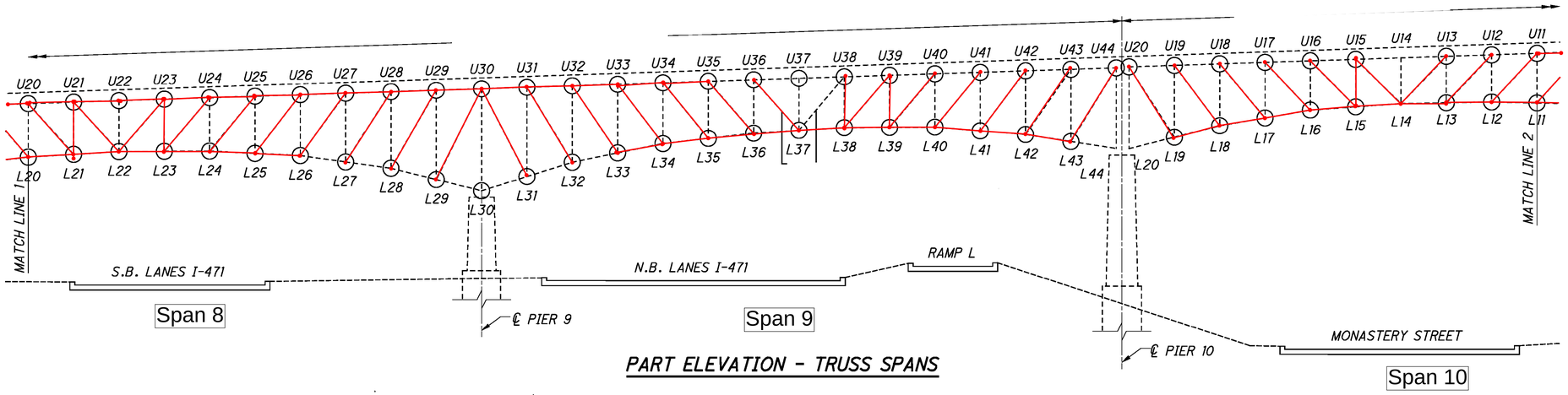
STLH-M Scale 16

APPENDIX B:

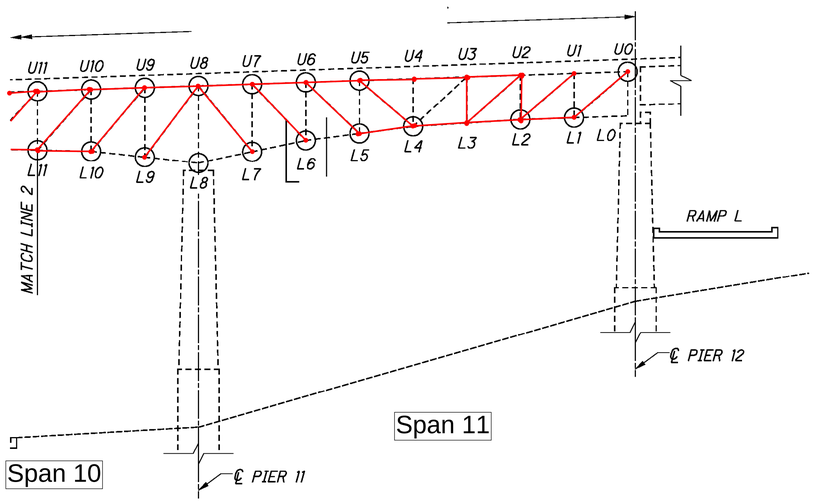
Fracture Critical Member Plan



PART ELEVATION - TRUSS SPANS



PART ELEVATION - TRUSS SPANS



PART ELEVATION - TRUSS SPANS

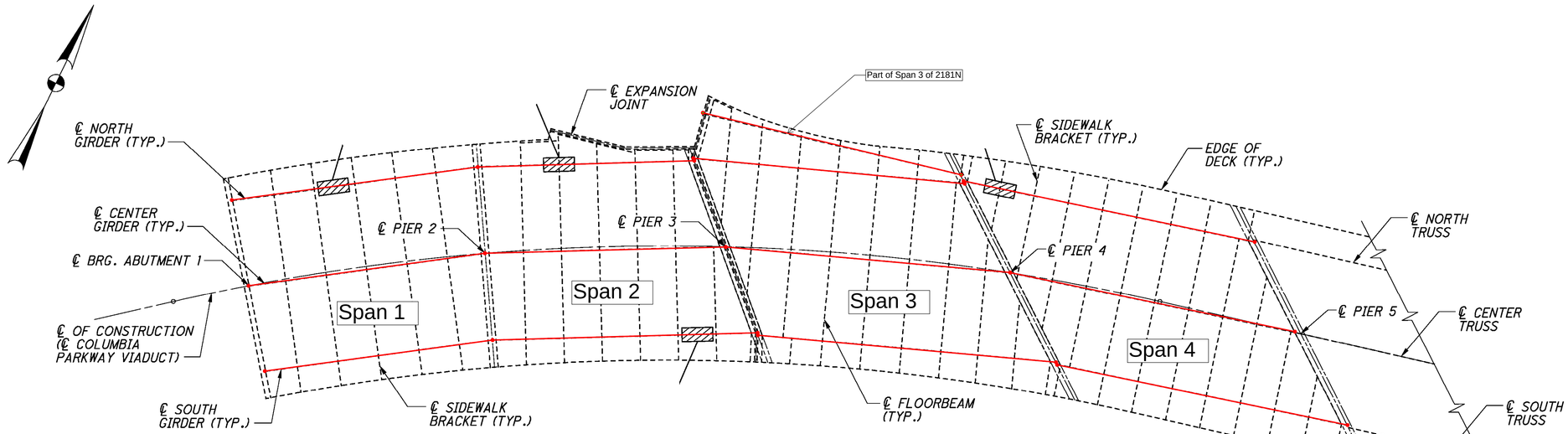
Notes:

1. Image is taken from the 2016 Rehabilitation Drawings, Sheet 19 of 156, Truss Spans Elevations - Repair Locations Bridge No. Ham-50-2180N (Columbia Parkway Viaduct Over I-471). Some information from the original sheet has been removed and or updated.

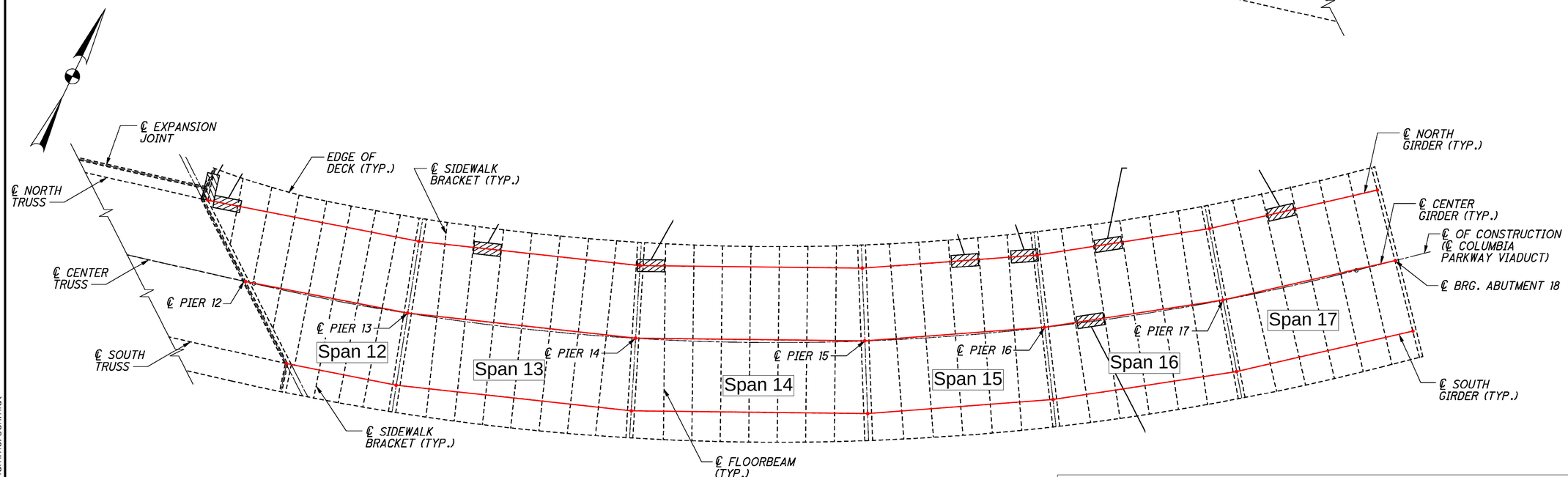
2. Red lines indicate fracture critical members (tension or stress reversal) based on the original construction drawings.

TRUSS SPANS ELEVATION
BRIDGE No. HAM-50-2180N
COLUMBIA PARKWAY VIADUCT OVER I-471

HAM-50-2180N



PART FRAMING PLAN - SPANS 1 THRU 4



PART FRAMING PLAN - SPANS 12 THRU 17

Notes:

1. Image is taken from the 2016 Rehabilitation Drawings, Sheet 150 of 156,Girder Spans Framing - Painting Locations Bridge No. Ham-50-2180N (Columbia Parkway Viaduct Over I-471). Some information from the original sheet has been removed and or updated.

2. Red lines indicate fracture critical members.

GIRDER SPANS FRAMING
BRIDGE No. HAM-50-2180N
COLUMBIA PARKWAY VIADUCT OVER I-471

HAM-50-2180N

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APPENDIX C:

AssetWise Bridge Inspection Report

Inspector:	Compton-Troesch,Kyle	**Structure Number:**	3103390
Inspection Date:	09/08/2022	**Facility Carried:**	COLUMBIA PARKWAY

Bridge Inspection Report

Ohio Bridge Inspection Summary Report

HAM-00050-2180N (3103390)

2: District	District 08 15000 - CINCINNATI (HAM county)	5A: Inventory Route	1 00050
21: Major Maint A/B	01 - State Highway Agency /	7: Facility On	COLUMBIA PARKWAY
225 Routine Main A/B	04 - City or Municipal Highway Agency /	6: Feature Ints	IR471,RAMP,EGG,CUL
221 Inspection A/B	01 - State Highway Agency /	9: Location	N OF I471 & US50 INT
220: Inv. Location	DISTRICT 08	Lat, Lon	39.103178 ,-84.502472

Condition

58: Deck	**6 - Satisfactory Condition**
58.01 Wearing Surface	7 - Good (1% distress)
58.02 Joint	7- Good (no leaking)
59: Superstructure	**5 - Fair Condition**
59.01 Paint & PCS	7 - Good (1-5% corr.)
60: Substructure	**6 - Satisfactory Condition**
61: Channel	**N**
61.01 Scour	**N - Not Applicable**
62: Culverts	**N - Not Applicable**
67.01 GA	**5**

Appraisal

Sufficiency Rating	59.1 SD/FO 2 - FO
36: Rail, Tr, Gd, Term Std	1 1 1 1
72: Approach Alignment	8 - Equal to present desirable criteria
113: Scour Critical	N - Not over waterway
71: Waterway Adequacy	N - Not Applicable

Geometric

48: Max Span Length (ft)	170.0
49: Structure Length (ft)	1659.0
52: Deck Width, Out-To-Out (ft)	72.0
424: Deck Area (sf)	119448
32: Appr Roadway Width (ft)	56.0
51: Road Width, Curb-Curb (ft)	56.0
50A: Curb/SW Width: Left (ft)	0
50A: Curb/SW Width: Right (ft)	10.7
34: Skew (deg)	0
33: Bridge Median	0 - No median
54B: Min Vert Underclearance (ft)	26.08
336A: Min Vert Clrnce IR Cardinal (ft)	99
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 (%)	145

Structure Type

43: Bridge Type	3 - Steel 09 - Truss - Deck N- Not Applicable
45: Spans Main / Approach	7 / 10
107: Deck Type	1 - Concrete Cast-in-Place
408: Composite Deck	Y - Composite Construction
414A Joint Type 1	8 - Elastomeric Strip Seal
414B: Joint Type 2	N - None
108A: Wearing Surface	1 - Monolithic Concrete (concurrently placed with structural deck) N- Not Applicable
422: WS Date	07/01/1997
423: WS Thick (in)	1.0
482: Protective Coating	5 - Paint System OZEU
483: PCS Date	10/01/1999
453: Bearing Type 1	4 - Elastomeric (Plain)
455: Bearing Type 2	5 - Pot
528: Foundn: Abut Fwd	4 - Spread Footing (on soil)
533: Foundn: Abut Rear	7 - Steel H Piles (HP 10 x 42)
536: Foundn: Pier 1	2 - Cast-in-Place Reinforced Concrete Piles (Other diameter)
539: Foundn: Pier 2	7 - Steel H Piles (HP 10 x 42)

Age and Service

27: Year Built/ 106 Rehab	1938 / 1997
42A: Service On	1 - Highway
42B: Service Under	1 - Highway, with or w/out pedestrian
28A: Lanes on	04
28B: Lanes Under	19
19: Bypass Length	5
29: ADT	56580
109: % Trucks (%)	3

Inspections

		Months	
90: Routine Insp.		12	09/08/2022
92A: FCM Insp.	Y	12	09/08/2022
92B: Dive Insp.	N	0	
92C: Special Insp.	N	0	
92D: UBIT Insp.	Y	24	09/08/2022
92E: Drone Insp.	N	0	

Inspector:	Compton-Troesch,Kyle	**Structure Number:**	3103390
Inspection Date:	09/08/2022	**Facility Carried:**	COLUMBIA PARKWAY

Bridge Inspection Report

704: Analysis Date	07/01/2009	Inspector	Compton-Troesch,Kyle
63: Analysis Method	6 - Load Factor (LF) rating reported by rating factor (RF) method using MS18 loading.		

Inspector: Compton-Troesch,Kyle **Structure Number:** 3103390

Inspection Date: 09/08/2022 **Facility Carried:** COLUMBIA PARKWAY

Bridge Inspection Report

	Environment	Total Quantity	Units	Condition State 1	Condition State 2	Condition State 3	Condition State 4
12-Reinforced Concrete Deck	3 - Mod.	119448	sq. ft.	91926	27511	11	0
	CS2: -There is hairline to 0.025" multi-directional cracking in all spans throughout. -The cantilevered overhangs exhibit minor transverse cracks with efflorescence on both sides. -There are hairline vertical cracks on haunches at the ends of isolated cantilever brackets on the north side of the deck. -Minor spalls were observed on the deck soffit. CS3: -There are spalls in the deck haunches at isolated floor beam ends, and isolated cantilever bracket ends on the north side of the deck.						
805-Wearing Surface - Monolithic Concrete		93170	sq. ft.	82921	10249	0	0
	CS2: -Isolated hairline to 0.030-inch wide longitudinal and transverse cracks were observed randomly throughout the deck. These are typically spaced around 5 to 10 feet. -Diagonal cracks were observed emanating from the deck drains. -Small shallow spalls are present along joint armor.						
107-Steel Open Girder/Beam	3 - Mod.	2262	ft.	2064	177	21	0
	CS2: -Mis-drilled holes are present at random locations primarily at beam ends. -Surface corrosion is present on the top flange in isolated areas and on rivet heads throughout. -The bottom flange of the South Girder in Span 12 is bent 12" out of plane. CS3 -The ends of the girder web and bottom flange below the joints exhibit locations of section loss up to 1/4" deep, and knife edging. Typically this section loss occurs past the bearing area, where the load has generally been transferred to the substructure unit. -Active and inactive pack rust is present causing distortion up to 1/2 in. thick between flange plates. -There is a corrosion hole in the bottom of the web of the South Girder of Span 13 at Pier 14 past the bearing area. -There are gouges caused by welds/flame cuts in the bottom flanges of Spans 13-15.						
515-Steel Protective Coating		50614	sq. ft.	49875	506	233	0
	CS2: -Paint on the outside has faded and chalked in isolated areas. -There are isolated areas of peeling or chipped paint. CS3: -There are isolated areas of active corrosion.						

Inspector: Compton-Troesch,Kyle **Structure Number:** 3103390

Inspection Date: 09/08/2022 **Facility Carried:** COLUMBIA PARKWAY

Bridge Inspection Report

	Environment	Total Quantity	Units	Condition State 1	Condition State 2	Condition State 3	Condition State 4
120-Steel Truss	3 - Mod.	2705	ft.	1899	136	670	0
	CS2: -Surface corrosion is present at various locations throughout the truss. -Mis-drilled holes are present in tie and cover plates. -Random lacing bars are deformed throughout the lower chord. -Cracked and or undercut tack welds are present on the verticals and diagonals but the cracks do not propagate into the base metal. CS3: -Pack rust up to 1 in. thick between web plates and cover/splice plates are present throughout the truss. The pack rust is mostly inactive, but some areas are reactivating. -There are isolated gouges up to 3/8 in. deep in the lower chord and verticals. -Mis-drilled holes are present in primary members. -Isolated painted over pitting up to 1/8 in. deep are present throughout the truss. -There are isolated corrosion holes in tie plates and batten plates in the lower chord. -There are isolated active and inactive corrosion holes in the upper chord flanges, primarily at supports. -The web stiffener weld at U37 on U37-L37 in Span 9 of the North Truss is cracked.						
515-Steel Protective Coating		95362	sq. ft.	93422	1435	505	0
	CS2: -There are isolated areas where the paint is peeling or chipped. -There are isolated areas with light surface corrosion. -In some areas the paint is beginning to exhibit surface dulling. CS3: -There are isolated areas of active corrosion, pack rust, and laminating corrosion.						
152-Steel Floor Beam	3 - Mod.	9256	ft.	9116	50	90	0
	CS2: -There is a 5/8-inch long gouge on the west face of Floor Beam 4 in Span 12 at the south girder. This has not changed over the past few inspection cycles. -Active surface corrosion is present at isolated locations throughout the bridge. -Painted over pitting up to 1/16 in. is present at isolated locations. CS3: -Painted over pack rust of up to 1/4-inch thick with painted over pitting to 1/8-inch thick exists at some floor beam connections. These locations have not reactivated since the prior rehabilitation. The heaviest location of this situation was observed in Span 9 at Floor Beam 36, where pack rust of 1/2-inch and pitting to 1/4-inch deep was observed. -Random misdrilled holes exist around the cantilevered portion of the floor beam connection on both the north and south ends (both truss and girder spans). -Painted over pitting is present in the flanges, webs, and connection angles at isolated locations, typically at expansion joints. -Laminar corrosion between the top flange and the haunch is present at isolated locations. -Random mis-drilled holes are present in isolated locations.						
515-Steel Protective Coating		96487	sq. ft.	95662	800	25	0
	CS2: -There are isolated areas where the paint is peeling or chipped. -There are isolated areas with light surface corrosion. -In some areas the paint is beginning to exhibit surface dulling. CS3: -There are isolated areas of active corrosion, pack rust, and laminating corrosion.						
162-Steel Gusset Plate	3 - Mod.	522	each	443	27	52	0

Inspector: Compton-Troesch,Kyle **Structure Number:** 3103390

Inspection Date: 09/08/2022 **Facility Carried:** COLUMBIA PARKWAY

Bridge Inspection Report

Environment	Total Quantity	Units	Condition State 1	Condition State 2	Condition State 3	Condition State 4
CS2: -Tack welds are present between gusset and fill plates at isolated locations. Some tack welds and fill plates are cracked but none of the cracks propagate into the base metal of the gussets. -There is bowing along gusset plate free edges due to pack rust in several locations; this bowing is typically 1/8" but isolated locations are bowed up to 5/8". -There are a few gusset free edges stiffened with retrofit angles which still have bows up to 1/8". CS3: -There are mis-drilled holes and missing rivets or bolts at isolated locations. -There are localized gusset plate deformations due to pack rust in many locations. - Active and inactive pack rust up to 7/8” thick has built up between the gusset plates, fill plates, bracing connections, and truss members in many locations. -There is free edge bowing up to 3/16" in several unrepaired gusset plates with no pack rust. The bowing has not changed significantly in the past several inspection cycles. -Laminating corrosion on the inside face of the gusset plates is present at isolated locations primarily under expansion joints. -Painted over section loss up to 5/16" is present at several gusset plates. -There is a 10" laminar tear in the North Gusset Plate at L13 in Span 7 of the South Truss. The tear is painted over and has not grown since previous inspection. -There is painted over section loss on the South Gusset Plate at L0 in Span 7 of the North Truss, with 1/4" remaining out of 1/2" original. -There is a 3" dia. inactive corrosion hole in the South Gusset Plate at L0 in Span 7 of the Center Truss.						
515-Steel Protective Coating		33408	sq. ft.	33083	75	250	0
CS2: -There are isolated areas where the paint is peeling or chipped. -There are isolated areas with light surface corrosion. -In some areas the paint is beginning to exhibit surface dulling. CS3: -There are isolated areas of active corrosion, pack rust, and laminating corrosion.							
205-Reinforced Concrete Column	3 - Mod.	48	each	14	14	20	0
CS2: -The pier columns generally exhibited vertical cracks, usually hairline in width but up to 0.013-inches wide. -2'x6" delaminated area was observed on the south face of south column and 1' diameter delaminated area was observed on the north face of center column at Pier 1 -There is hairline map cracking on the south face of north column at Pier 3. -There is a vertical crack on the southeast corner of the south column at Pier 10. -There is a 1' long spall with rust staining at the north face of north column at Pier 12. CS3: -A 1’x3’ spall with exposed reinforcing steel exists on the east side of the south column at Pier 3. -There is a spall with exposed reinforcement on the north face of the south column at Pier 8. -A 1'x6" spall with exposed reinforcement was observed at the south face of center column at Pier 9. -A 3'x1.5'x3" spall with exposed reinforcement was observed at the south face of north Column at Pier 10. -A 1.5' diameter spall is present at the north corner of the south column at Pier 11. -A 2.5' x 1'x 2" deep spall with exposed reinforcing steel exists on north face of the center column at Pier 13. -A 2' diameter spall with exposed reinforcing steel was observed at the southeast corner of the center column at Pier 13.							

Inspector: Compton-Troesch,Kyle **Structure Number:** 3103390

Inspection Date: 09/08/2022 **Facility Carried:** COLUMBIA PARKWAY

Bridge Inspection Report

	Environment	Total Quantity	Units	Condition State 1	Condition State 2	Condition State 3	Condition State 4
215-Reinforced Concrete Abutment	3 - Mod.	144	ft.	99	37	8	0
	CS2: -Horizontal, vertical, and map cracks, some with light efflorescence are present on both abutments. CS3: -Isolated areas of cracking with rust staining are present on both abutments. -A spall with exposed reinforcement is present on the forward abutment.						
234-Reinforced Concrete Pier Cap	3 - Mod.	1137	ft.	879	233	25	0
	CS2: -There is a 6 in. dia. shallow spall on the bottom face of the south bay of Pier 2. -There are cracks up to 0.025 in. wide on the top face of the north pedestal of Pier 3. -There is a 2 ft x 2 ft delamination on the south face of the center pedestal of Pier 3. -There are horizontal cracks on the west face of the north bay of Pier 10. -There are map cracks on the top face of the south bay of Pier 10. -There is a 4 ft wide delamination on the east face of the north bay of Pier 13. CS3: -There is a 1.5 ft x 6 in. x 1 in. spall on the east face of the south bay of Pier 2. -There is a 2 ft x 1 ft spall and delamination on the east face of the south pedestal of Pier 4. -There is a 4 ft x 1 ft spall and delamination on the north face of the center pedestal of Pier 5. -There is a 1 ft x 6 in. spall under the south bearing of Pier 5. -There is a 1.5 ft wide spall with exposed reinforcement on the south face of the center pedestal of Pier 3. -There is a 2 ft x 6 in. x 2 in. spall with exposed reinforcement on the north face of the south pedestal of Pier 8. -There is a 1 ft x 1 ft x 1 in.spall with exposed reinforcement on the east face of the south bay of Pier 8. -There is a 2 ft x 1 ft spall with exposed reinforcement on the top face of the south bay of Pier 8. -There is a 6 in. dia. spall with exposed reinforcement on the west face of the south bay of Pier 9. -There is a 1.5 ft dia. x 2 in. spall under the south bearing of Pier 10. -There are horizontal cracks with rust staining on the east face of the north bay of Pier 10. -There is a 2 ft x 6 in. spall with exposed reinforcement on the north pedestal of Pier 11. -There is a 1.5 ft x 6 in. spall with exposed reinforcement on the west face of the center pedestal of Pier 11. -There is a 4 ft x 6 ft area of spalling and map cracking with rust staining on the south pedestal of Pier 12. -There are cracks with rust staining on the west face of the north bay of Pier 12. -There is a 1 ft x 1.5 ft x 2 in. spall with exposed reinforcement on east face of the north bay of Pier 13. -There is a 3 ft x 1 ft x 1 in. spall with exposed reinforcement on the east face of the north bay of Pier 13. -There is a 2 ft dia. x 2 in. spall on the top face of the north bay of Pier 13. -There is a 2 SF spall with exposed reinforcement on the west face of the south bay of Pier 15. -There is a 1 ft dia. spall with exposed reinforcement on the north pedestal of Pier 16.						
300-Strip Seal Expansion Joint	3 - Mod.	973	ft.	339	630	4	0
	CS2: -The expansion joints are filled with debris. -There is typically corrosion on the joint armor, primarily at Piers 2, 13, 14, 15, and 16. CS3: -Joint seal is torn in isolated areas.						
310-Elastomeric Bearing	3 - Mod.	30	each	14	10	6	0

Inspector: Compton-Troesch,Kyle **Structure Number:** 3103390

Inspection Date: 09/08/2022 **Facility Carried:** COLUMBIA PARKWAY

Bridge Inspection Report

	Environment	Total Quantity	Units	Condition State 1	Condition State 2	Condition State 3	Condition State 4
	CS2: -There is surface corrosion on the bearing plates in isolated locations. -The rear abutment north bearing has a manufacturing defect on the pin nut. CS3: -The elastomeric bearings have painted over pitting at the following locations: Pier 3, Span 3 North bearing; Pier 4, Span 4, all bearings; Pier 13, Span 12, North bearing; Pier 13, Span 13, North bearing.						
515-Steel Protective Coating		30	sq. ft.	20	0	10	0
	CS3: -There is surface corrosion on the bearing plates in isolated locations.						
313-Fixed Bearing	3 - Mod.	39	each	13	11	15	0
	CS2: -There is surface corrosion on the bearings in isolated locations. CS3: -The fixed bearings have painted over pitting at the following locations: Pier 2, Span 1, north and center bearing; Pier 3, Span 2, north and center bearing; Pier 4, Span 3, all bearings; Pier 5, Span 4, all bearings; Pier 7, Span 6, all bearings -The Pier 3, Span 2 center fixed bearing has laminar corrosion. -The Pier 12, Span 12, center bearing has a gouge in the pin nut. -The Pier 14, Span 13, center bearing has section loss on one of the anchor nuts.						
515-Steel Protective Coating		39	sq. ft.	28	0	11	0
	CS3: -There is surface corrosion on the bearings in isolated locations.						
314-Pot Bearing	3 - Mod.	21	each	9	6	6	0
	CS2: -There is surface corrosion on the bearings in isolated locations. CS3: -The pot bearings have painted-over pitting at the following locations: Pier 5, Span 5, all bearings; Pier 7, Span 7, all bearings.						
515-Steel Protective Coating		21	sq. ft.	15	0	6	0
	CS3: There is surface corrosion on the bearings in isolated locations.						
321-Reinforced Concrete Approach Slab	3 - Mod.	2310	sq. ft.	1153	1155	2	0
	CS2: -The west approach slab exhibits hairline longitudinal cracks spaced at approximately 3 ft. -The east approach slab exhibits radiating cracks surrounding a manhole on the south lane. CS3: -Multiple spalls, up to 1ft long by 5 in. wide, were observed adjacent to the approach slab.						
331-Reinforced Concrete Bridge Railing	3 - Mod.	4980	ft.	3643	1245	92	0
	CS2: -The railings typically exhibit vertical, horizontal and map cracking throughout the entire length of the bridge. Some of the cracks have light efflorescence. -The protective coating is peeling and chipped throughout the railing, and scaling is present in some locations. CS3: -At isolated locations, primarily at the fence posts on the south side of the bridge, the railing exhibits heavy map cracking with areas of delaminated concrete, and rust staining. This condition is present on both the interior and exterior faces of the bridge railing.						
815-Drainage	3 - Mod.	32	each	23	5	4	0

Inspector: Compton-Troesch,Kyle **Structure Number:** 3103390

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Bridge Inspection Report

	Environment	Total Quantity	Units	Condition State 1	Condition State 2	Condition State 3	Condition State 4
	CS2: -There is light debris build up in a few of the drainage grates at the end of the downspouts, but drainage flow is not yet inhibited. -A few of the downspouts exhibit surface corrosion. -The support channel for the south downspout at Pier 9 is cracked. CS3: -The downspout terminations are misaligned or broken at Piers 12-15.						
830-Abutment Backwall	3 - Mod.	144	ft.	115	29	0	0
	CS2: -The West Abutment backwall exhibited vertical and horizontal cracks with efflorescence. -The East Abutment backwall exhibits vertical cracks with rust staining and efflorescence. -Map cracking and shallow surface spalls up to 1/2in. deep exist on the front faces of the bearing seats.						

Inspector:	Compton-Troesch,Kyle	**Structure Number:**	3103390
Inspection Date:	09/08/2022	**Facility Carried:**	COLUMBIA PARKWAY

Bridge Inspection Report

HAM-00050-2180N_(3103390)

ODOT District:	District 08					Date Built:	07/01/1938
Major Maint:	01 - State Highway Agency	Facility Carried:	COLUMBIA PARKWAY	Traffic On:	1 - Highway	Rehab Date:	07/01/1997
Routine Maint:	04 - City or Municipal Highway Agency	Feature Inters:	IR471,RAMP,EGG,CUL	Traffic Under:	1 - Highway, with or w/out pedestrian	Insp. Resp A:	01 - State Highway Agency
FIPS Code:	15000 - CINCINNATI (HAM county)	Location:	DISTRICT 08		N OF I471 & US50 INT	Insp Resp B:	

Inspector Compton-Troesch,Kyle Inspection Date 09/08/2022 Reviewer Collett,Brandon

Inspector Comments - Deck and Approach

Deck

Curbs/Sidewalk

-Isolated hairline longitudinal and transverse cracks were observed randomly throughout the sidewalk and along the curbs.

Item 300 - Strip Seal Expansion Joint

-The strip seals were installed during the 1997 rehabilitation. Expansion joint repairs took place during the 2017-2018 rehabilitation and primarily consisted of joint seal replacements.

Item 331 - Reinforced Concrete Bridge Railing

-The two impact attenuators have impact damage.

Item 815 - Drainage

-The slope protection is undermined at Pier 13 due to broken drainage.

Approach

Approach Wearing Surface

-The west approach pavement was recently repaved. The east approach pavement has had some cracks sealed, but there are many unsealed cracks in the travel lanes and near the edges of the pavement. There is a noticeable transition between the east approach pavement and the approach slab.

Approach Embankment

-The embankment for the east approach has no significant deficiencies to note.

Approach Guardrail

-The approach rail has no significant deficiencies to note.

Signs

-No significant deficiencies were noted on the signs.

Sign Supports

-The sign supports are in overall good condition with no significant deficiencies.

Inspector Comments - General Appraisal

Superstructure

Note that "inactive" as used in this report refers to areas where rusting/corrosion (pack rust, pitting, etc.) was once actively occurring, but is currently arrested with paint.

Superstructure Alignment

-No issues were noted at the time of inspection.

Item 107 - Steel Open Girder/Beam

-Surface corrosion is developing along the edges of the top flange. No section loss was observed at these locations.

Item 515 - Steel Protective Coating

-The bridge received spot painting on actively corroding areas during the 2017-2018 rehabilitation.

Diaphragm/X-Frames

-There were no significant deficiencies noted on the cross frames.

Lateral Bracing

-Bracing near piers under joints typically exhibit painted over pitting up to 1/4-inch. Locations of active corrosion have mostly been cleaned and spot painted.

-Vertical legs of the bracing angles exhibit isolated locations of knife edging and section loss. This typically occurs near truss connections.

-Span 3, between Floor Beams 1 and 2, between the south and center girder, the bracing is kinked.

-Span 5, lower sway bracing strut between center and north truss at center truss, L0, there is painted over pitting with a 1/2-inch diameter through hole.

-Span 8, at L18, between the south and center truss, the lateral bracing exhibits minor construction damage 6 feet to the south of the center connection and is bent slightly to the west.

-Span 17, south girder at Floor Beam 0, there are through holes in the vertical leg of the lateral bracing for the south girder at Floor Beam 0.

Sway Bracing

-Painted over section loss exists on connection plates and angles. This is typically 1/8-inch with locations up to 1/4-inch present.

-Pier 7, the vertical connection plate for L0 at the center truss exhibits a 1/2-inch diameter corrosion hole with surrounding section loss.

Fatigue

-Category E details present include tack welds on gusset plates, fill plates, and splice plates. Some of these are broken or cracked but none have propagated into the base metal. Many of the cracked locations are due to pack rust occurring between the plates.

Utilities

-There are broken light fixtures at several piers.

Substructure

Wingwalls

-The northwest wing wall exhibits horizontal cracks near the top of the column.

Slope Protection

-The downspout at the base of the north column of Pier 12 is not connected to the drain pipe and the slope protection is still damaged.

-Slope protection around columns mostly consists of paved parking lots, sidewalks, or concrete slope protection. This has not changed since the prior inspection. Vegetation is growing through the cracks on the slope protection near the east end of Piers 13 and 14.

Culvert

N/A

Inspector Comments - Waterway

Waterway Adequacy

N/A

Channel

N/A

Scour Critical

N/A

APPENDIX D:

Gusset Plate Condition State Table

Gusset Plate Condition State Table			
Span 5			
Truss	Panel	Condition State	Comment
N	L0	3	Inactive Section Loss, Inactive Pack Rust with Free Edge Bowing (Both Gussets)
N	L1	3	Inactive Section Loss, Active Pack Rust
N	L2	2	Cracked Fill Plate
S	L0	3	Active Pack Rust with Free Edge Bowing (South Gusset)
S	L3	2	Free Edge Bowing without Pack Rust (South Gusset)*
Span 6			
Truss	Panel	Condition State	Comment
N	L10	3	Active Pack Rust
N	L19	3	Active Section Loss
N	L20	3	Localized Free Edge Deformation due to Active Pack Rust (Both Gussets)
N	U20	3	Missing Bolt/Rivet
C	L20	3	Inactive Section Loss
S	L12	2	Free Edge Bowing without Pack Rust (Both Gussets)*
S	L15	2	Free Edge Bowing without Pack Rust (Both Gussets)*
S	L17	2	Free Edge Bowing without Pack Rust (North Gusset)*
S	L20	3	Inactive Pack Rust
S	U10	2	Free Edge Bowing without Pack Rust (South Gusset)*
S	U12	2	Free Edge Bowing without Pack Rust (South Gusset)*
S	U13	2	Free Edge Bowing without Pack Rust (North Gusset)*
S	U15	2	Free Edge Bowing without Pack Rust (South Gusset)*
Span 7			
Truss	Panel	Condition State	Comment
N	L0	3	Inactive Section Loss, Localized Free Edge Deformation due to Active Pack Rust (North Gusset), Inactive Pack Rust with Free Edge Bowing (South Gusset)
N	L8	2	Active Surface Corrosion
N	L14	3	Missing Rivets, Cracked Fill Plate
N	U0	3	Missing Bolt/Rivet
C	L0	3	Inactive Section Loss, Localized Free Edge Deformation due to Active Pack Rust (North Gusset), Missing Rivet
C	U0	3	Inactive Section Loss
C	U8	3	Inactive Section Loss
S	L0	3	3" Diameter Inactive Corrosion Hole
S	L7	3	Localized Free Edge Deformation due to Active Pack Rust (South Gusset)
S	L11	3	Inactive Pack Rust
S	L13	3	Laminar Tear In South Gusset Plate

*Defect 1900 (Distortion) governs condition state.

Span 8			
Truss	Panel	Condition State	Comment
N	L19	3	Active Section Loss
N	L20	2	Active Pack Rust Behind Splice Plate
N	L22	2	Active Pack Rust Behind Splice Plate
N	L25	3	Active Section Loss, Localized Free Edge Deformation due to Active Pack Rust (North Gusset)
N	L28	3	Inactive Section Loss
N	L30	3	Active Section Loss
C	L17	2	Cracked Fill Plate Tack Weld
C	U29	2	Active Surface Corrosion
C	U30	2	Active Surface Corrosion
S	L16	2	Active Surface Corrosion
S	L24	2	Active Pack Rust Behind Splice Plate
S	L28	3	Active Pack Rust

Span 9			
Truss	Panel	Condition State	Comment
N	L33	3	Active Pack Rust
N	L37	2	Free Edge Bowing at a Repaired Edge (North Gusset)*
N	L42	2	Free Edge Bowing at a Repaired Edge (North Gusset)*
C	L37	2	Free Edge Bowing without Pack Rust (Both Gussets)*
C	L44	3	Active Pack Rust, Inactive Section Loss
C	U35	3	Inactive Section Loss
C	U36	3	Inactive Section Loss
C	U44	3	Inactive Section Loss
S	L31	2	Inactive Pitting <1/16" Deep
S	L36	2	Inactive Pitting <1/16" Deep
S	L41	2	Active Surface Corrosion
S	L44	3	Inactive Section Loss
S	U44	3	Misdrilled Hole

*Defect 1900 (Distortion) governs condition state.

Span 10			
Truss	Panel	Condition State	Comment
N	L8	2	Weld From Previous Attachment on South Gusset
N	L10	3	Misdrilled Hole
N	L11	3	Inactive Pack Rust
N	L15	3	Misdrilled Hole, Sheared-Off Rivet Head
N	L18	2	Cracked Fill Plate Tack Weld
N	L20	3	Inactive Section Loss
N	U12	2	Misdrilled Holes Filled with Plug Welds
N	U20	3	Inactive Section Loss
C	L10	3	Inactive Pack Rust
C	L15	3	Misdrilled Hole
C	L18	3	Misdrilled Hole
C	L20	3	Inactive Section Loss, Localized Free Edge Deformation due to Inactive Pack Rust (South Gusset)
C	U9	3	Inactive Section Loss
C	U11	3	Inactive Section Loss
S	L8	3	Inactive Pack Rust, Undercut Tack Weld
S	L10	3	Misdrilled Holes
S	L12	3	Misdrilled Holes
S	L15	3	Misdrilled Hole
S	L20	3	Localized Free Edge Deformation due to Inactive Pack Rust (South Gusset)

Span 11			
Truss	Panel	Condition State	Comment
N	L0	3	Inactive Pack Rust With Free Edge Bowing (Both Gussets)
C	L6	2	Active Pack Rust Behind Fill Plate
C	U0	3	Inactive Section Loss
S	L0	3	Active Pack Rust
S	L1	3	Active Pack Rust
S	L6	3	Inactive Pack Rust

*Defect 1900 (Distortion) governs condition state.