FRACTURE CRITICAL PIER CAP INSPECTION REPORT

SFN3101223 (HAM-42-0264R)
I-71 OVER I-71 SB RAMP/US-42/EDEN PARK
HAMILTON COUNTY, OH
DISTRICT 8

June 2023

Prepared for:

STATE OF OHIO DEPARTMENT OF TRANSPORTATION

STATE OF OHIO
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10/2/2023
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EXECUTIVE SUMMARY

Project: VAR-District 8 Bridge Inspections No. 2023-4. (PID No. 105476)

Purpose of Project: To perform a fracture critical inspection of steel pier caps and an NBI routine inspection for the Ohio Department of Transportation, District 8.

Inspection Team: Team Leader – Michael Seal, P.E. – Collins Engineers, Inc.
Team Member – Trent Graham – Collins Engineers, Inc.
Team Member – Rob Parker – Gannett Fleming, Inc.
Team Member – Matthew McFadden E.I.T. – Gannet Fleming, Inc.

Inspection Date(s): June 24, 2023 (Routine completed 8/3/2023)

Summary of Findings:

- **Pier 2:**
  - The drilled hole and sawcut retrofits were performed at all locations except Girder A. These overall are performing as designed and have not changed since the prior inspection.
  - Tack welds that were not ground down are present inside the cap. This is an old condition that has not changed.
  - A few triaxial weld connections were present on the interior at the intersections of diaphragms, tie plates, and cap web plates.
  - There was no change noted to the 1/4 in. long vertical crack present at the bottom of the fillet weld between the pier cap south web and the east knee brace below Girder G on the west stiffener of the seat connection.
  - There were no changes noted to the 3/16 in. long vertical crack on the bottom of the fillet weld between the pier cap north web and the east knee brace below Girder C nor to the 1/8 in. long vertical crack on the bottom of the fillet weld between the pier cap north web and the west knee brace below Girder C.
  - A few isolated areas of corrosion have reactivated. This is not currently problematic.
- **Pier 3:**
  - The section loss and corrosion holes at the east exterior end of the structure appear to have grown since the prior inspection.
  - There was no change to the 3/16 in. long vertical crack on the bottom of the fillet weld between the pier cap south web and the east knee brace below Girder B for the cap exterior.
  - Triaxial weld connections were present on the interior at the intersections of diaphragms, tie plates, and cap web plates. This has not changed from the prior inspection.
  - The drilled stress relief holes and sawcut retrofits were present at all girders except Girders A and B.
  - Gouges, tack welds, and undercuts are present at isolated areas on the interior. These are old comments that have not changed.

- **Pier 4:**
  - Minor active corrosion with no section loss, weld inclusions, and other weld discontinuities are present inside the cap. These are all previously noted and have not changed for this inspection.
  - During a previous rehabilitation, the web plates were retrofit with stress relief drilled holes connected by vertical saw cuts adjacent to the welded connections of the girder bottom flange tie plates, except at Girder A.

Summary of Recommendations:

- The drilled hole and sawcut retrofits can be monitored in future inspections for proper function. Currently these function as designed.
- The section loss and corrosion holes at the east end of Pier 3 can be monitored for additional deterioration. Locations of corrosion holes can be plated over to restore lost capacity.
- Locations of triaxial welds can be monitored for cracks or deterioration due to excessive restraint. Currently there were no issues noted at these locations.
- The cracks in the fillet welds for the knee braces at Piers 2 and 3 exteriors can be monitored for additional growth or propagation into the base metal. Currently these cracks had not changed from the prior inspection.

NBI Ratings:

Item ID	Description	Condition Rating	Summary
B.C.01	Deck Condition Rating	7-Good	A few cracks visible on overlay, no major defects.
B.C.02	Super. Condition Rating	5-Fair	A couple localized bends, no major defects.
B.C.03	Sub. Condition Rating	6-Satisfactory	A few small spalls, some minor cracks.
B.C.05	Railing Condition Rating	7-Good	Minor cracks, no major defects.
B.C.06	Rail Trans. Condition Rating	7-Good	Good, rail extends past bridge.
B.C.07	Bearings Condition Rating	6-Satisfactory	Laminating corrosion, some excessive tilt.
B.C.08	Joints Condition Rating	6-Satisfactory	Debris, evidence of leaking.
B.C.14	NSTM	5-Fair	Corrosion reactivating, weld cracks present but have not changed.

AASHTO National Bridge Element (NBE) Ratings:

Element #	Description	Units	Total	Condition State			
				1	2	3	4
231	Steel Pier Cap	LF	180	125	55	0	0

Note: Ratings were developed using the FHWA Specifications for the National Bridge Inventory and AASHTO Manual for Bridge Element Inspection, 2nd Edition.

1.0 INTRODUCTION

1.1 Purpose and Scope

This report consists of the results of a detailed inspection of non-redundant steel tension members (fracture critical) performed at the I-71 Bridge over I-71 SB RAMP/US-42/EDEN PARK in Hamilton County, OH. Collins Engineers, Inc. (Collins) conducted the fracture critical and NBI routine inspection for the Ohio Department of Transportation (ODOT), District 8 on June 24, 2023.

1.2 General Description of the Structure

Bridge HAM-42-0264R is a 6-span bridge built in 1969. On Span 2 through Span 5 the superstructure is comprised of welded steel plate girders that frame directly into steel pier caps. Spans 1 and 6 are continuous welded steel plate girders that individually bear on the substructure units. The overall bridge length is 525.88 ft. Pier Cap 2 spans over the IR 71 southbound ramp. Pier Cap 3 spans over US 42 Northbound (Reading Road). Pier Cap 4 is cantilevered over the east two lanes of US 42 Northbound (Reading Road).

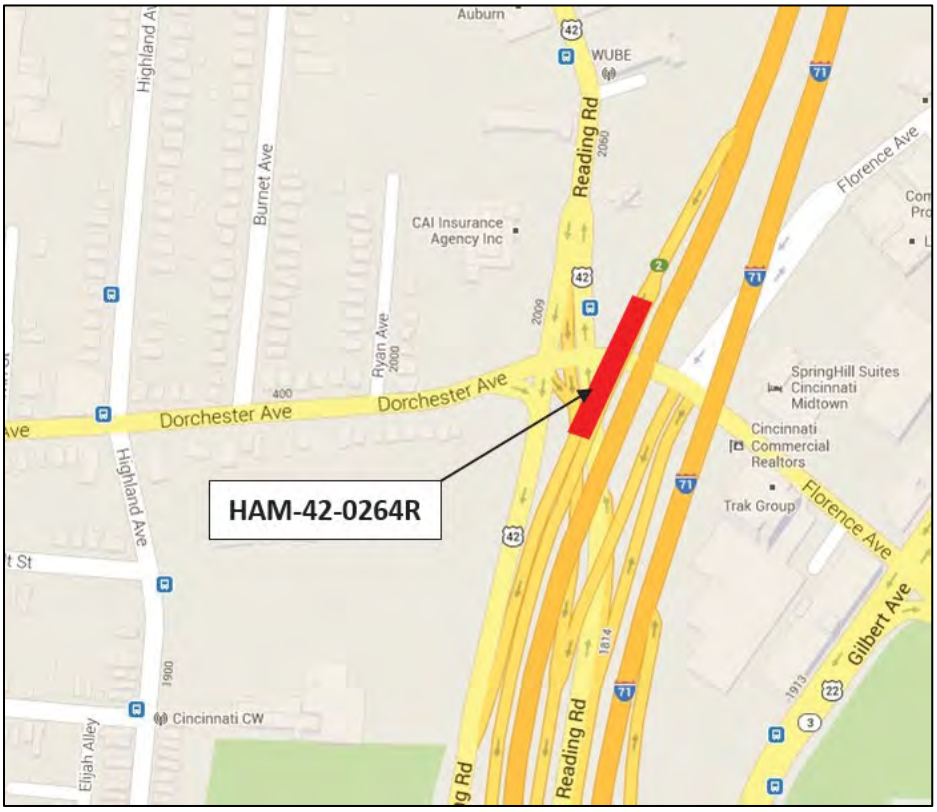


Figure 1: General Bridge Location

Three fracture critical pier caps are supported by concrete columns at Piers 2, 3 and 4. The caps are simply supported welded steel box members with one end cantilevered past an end column. Seven welded plate girders frame into the steel caps at Piers 2 and 3; six girders frame into the steel cap at Pier 4. Refer to Exhibit 1 for existing pier cap plans and Exhibit B plans for the past rehabilitation project.

A 2011 rehabilitation project performed the following repairs on this structure:

- Cleaned and painted portions of the interiors of the pier caps
- Installed bolted retrofit for welded drainage bracket connections to the pier cap webs
- Grinded miscellaneous tack welds on the pier cap
- Grinded intersecting fillet welds on the web stiffeners and the cap flanges
- Completed ultrasonic impact treatment and NDT around interior tie plates

A 2017 rehabilitation project performed the following repairs on this structure:

- Repaired fatigue cracks in Pier 2, 3, and 4 Steel Pier Caps
- Repaired 4 concrete truss support pilasters and anchor bolts, reusing existing steel support brackets below pilasters
- Note, the 2 in. Stress Relief Hole Retrofit detail, as specified in the PID 82975 plan set, was not installed in Piers 2-4 per RFI 5. Welds do not intersect.

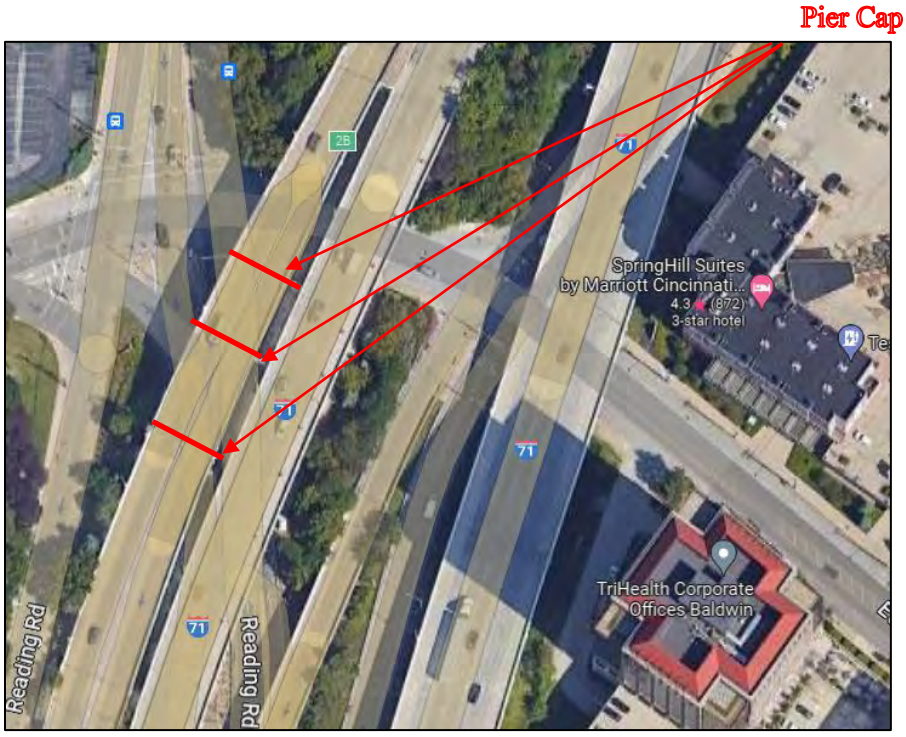


Figure 2: Fracture Critical Pier Cap Location

This bridge is inventoried in a south to north direction, and superstructure units are labeled from left to right looking north. Substructure units are labeled as Rear and Forward Abutments and Piers 2 through 5. Refer to Photographs 1 and 2 below for overall views of the bridge superstructure.

Photograph 1: Bridge Elevation, Looking Southeast.

Photograph 2: Bridge Endview, Looking North.

1.3 Method of Investigation

On June 22 to 24, and August 2 and 3, 2023, a two- to three-person team consisting of a professional engineer and NBI team leader (Michael A. Seal, P.E.) and technicians Trent Graham (Collins) and Rob Parker (Gannett Fleming), or Matthew McFadden (Gannett Fleming) performed an NBI routine and fracture critical inspection of Bridge HAM-42-0264R. A 46 ft. bucket truck was used to access the fracture critical pier cap interiors (Pier 2, Pier 3, Pier 4), perform the "arms-length" inspection of the exteriors, and to complete routine inspections for the remaining structural elements. Traffic control provided by A&A Safety was used to gain access to the box cap exteriors and consisted of single lane closures as follows:

- US 42 SB Ramp to IR 71S – Shoulders of this single lane ramp were closed between the hours of 8:00 AM to 3:30 PM to inspect Pier Caps 2 and 3.
- US 42 NB Exit Ramp from IR 71N – Single lane closures between the hours of 8:00 AM to 3:30 PM were necessary on the ramp to inspect Piers Caps 3 and 4.

OSHA confined space entry procedures were followed while inspectors were working inside the pier caps. Entry was performed in accordance with complete permit-required confined space entry procedures per GF SOP #10 and 29 CFR 1910.146. This included the use of an entry permit system, pre-entry air monitoring, continuous air monitoring, the designation of qualified entrants, attendants, and supervisor(s), and available emergency response. OSHA compliant safety harnesses and lanyards were worn by inspectors when working

in the lift bucket and when implementing bridge climbing techniques. The bolts securing the pier cap hatches were removed and reinstalled with an impact wrench and the hatches were sealed with exterior-grade caulking once the interior inspection was complete. Various socket sizes from 1/2 in. to 15/16 in. were required to remove the hatch bolts.

Field measurements were taken using tape measures, calipers, and an ultrasonic thickness gauge to verify structural component dimensions. Observed deficiencies were recorded on member-specific field inspection forms. Digital photographs were taken of the fatigue prone details and other areas of interest or concern to further document the physical condition of the pier caps.

1.4 Condition Ratings

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

CODE	CONDITION	DESCRIPTION
N	NOT APPLICABLE	Component does not exist.
9	EXCELLENT	Isolated inherent defects.
8	VERY GOOD	Some inherent defects.
7	GOOD	Some minor defects.
6	SATISFACTORY	Widespread minor or isolated moderate defects.
5	FAIR	Some moderate defects; strength and performance of the component are not affected.
4	POOR	Widespread moderate or isolated major defects; strength and/or performance of the component is affected.
3	SERIOUS	Major defects; strength and/or performance of the component is seriously affected. Condition typically necessitates more frequent monitoring, load restrictions, and/or corrective actions.
2	CRITICAL	Major defects; component is severely compromised. Condition typically necessitates frequent monitoring, significant load restrictions, and/or corrective actions in order to keep the bridge open.
1	IMMINENT FAILURE	Bridge is closed to traffic due to component condition. Repair or rehabilitation may return the bridge to service.
0	FAILED	Bridge is closed due to component condition, and is beyond corrective action. Replacement is required to restore service.

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

1. Manual of Bridge Inspection, Ohio Department of Transportation (ODOT), 2014.
2. Manual for Bridge Element Inspection, AASHTO, 2019.
3. Bridge Inspector's Reference Manual, U.S. Department of Transportation, 2002 (rev 2012).
4. Inspection of Fracture Critical Bridge Members, U.S. Department of Transportation, 1986.
5. Specifications for the National Bridge Inventory, U.S. Department of Transportation, 2022.

2.0 EXISTING CONDITIONS

2.1 Pier Cap Conditions

2.1.1 Pier Cap 2 Overall

The pier cap was in overall SATISFACTORY condition [6]. As stated above, the cap web plates have been retrofit with drilled stress relief holes connected by vertical sawcuts adjacent to the welded connections of the girder bottom flange tie plates at all girders except Girder A. Round cover plates were utilized to seal the drilled stress relief holes and are held in place by a bolt and nut.

Photograph 3: General Elevation of Pier Cap 2, Looking South.

2.1.1.1 Pier Cap 2 Interior

The interior paint and pier cap was in SATISFACTORY condition [6]. Specific items on the interior to note include:

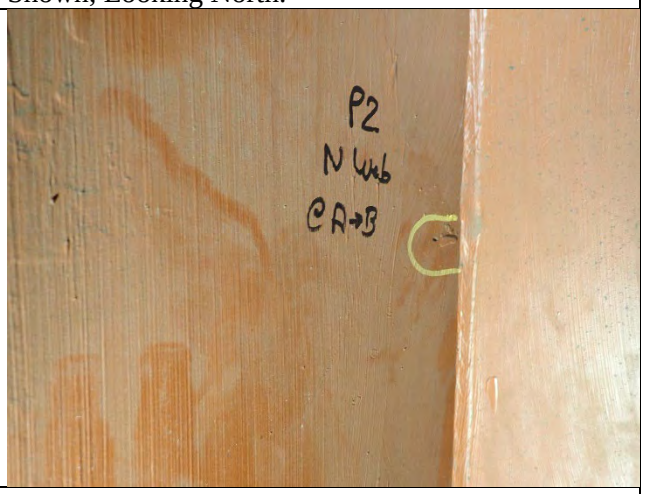
- The drilled holes and sawcut retrofits were present at all girders except Girder A (Photograph 4).

- During a previous rehabilitation, tack welds were ground down on the web and flange plates. Areas of removed tack welds that still had exposed bare steel have been previously noted at the following locations (no changes for this inspection):
    - Between Girders B and C on north cap web west of the stiffener
    - Between the Girders C and D diaphragms, on the north plate at the western stiffener
    - West of the stiffener between the Girder D and E diaphragms on the north web plate
    - West of the stiffener between the Girder E and F diaphragms on the north web plate (Photograph 5)
    - Two areas at the east side of the stiffener between the Girder F and G diaphragms (Photograph 6)
    - Bottoms of stiffeners between the Girder C and D diaphragms on the north plate
- Tack welds that were not removed along the interior were previously noted at the following locations (no changes for this inspection):
    - Two tack welds west of the stiffener between Girders A and B (Photograph 7)
    - One tack weld east of the stiffener between Girders B and C
    - Two tack welds west of the stiffener between Girders B and C
    - One tack weld east of the stiffener between Girders D and E on the north cap plate (Photograph 8)
- There were a few locations of triaxial welds located at the intersections of diaphragms, tie plates, and cap web plates. No discernable pattern was observed; overall there were approximately 6 locations observed.
- There was a 1 in. long x 1/2 in. high flaw in the cap web plate at the bottom of the south cap web plate and cap bottom flange between the two stiffeners between the Girder C and D diaphragms (Photograph 9). This has not changed from the prior inspection.
- Isolated active surface corrosion was observed throughout the interior. Over the west bearings, isolated areas of painted over pitting up to 1/16 in. deep were observed along the bottom of both cap web plates (Photograph 10).
- There were localized areas of porosity in the fillet welds between both cap web plates and the cap top flange (Photograph 11). This is an old comment and has not changed from the prior inspection.
- The cap bottom flange at the east bearing exhibited active corrosion. The lower corners had areas of active surface corrosion with no section loss at the east end of the cap.

Photograph 4: View of Typical Retrofit At Internal Diaphragm. West Side of Diaphragm B Shown, Looking South.

Photograph 5: General Example of Tack Weld Ground Down With Exposed Steel, North Cap Plate West of Stiffener Between Diaphragms E and F Shown, Looking North.

Photograph 6: General Example of Tack Weld Ground Down With Exposed Steel, North Cap Plate East of First Stiffener West of Diaphragm G Shown, Looking North.



Photograph 7: General Example of Tack Weld Not Removed, North Plate Between Diaphragm Aand B Shown, Looking Northeast.

Photograph 8: General Example of Tack Weld Ground Down With Exposed Steel, North Plate East of Stiffener Between Diaphragms D and E Shown, Looking Northwest.

Photograph 9: View of Weld Flaw At Bottom of South Web Between Diaphragms C and D. No Change, Looking South.

Photograph 10: View of Active Corrosion and Pitting over the West Bearing, Looking West.

Photograph 11: Porosity Examples For Web Plates, North Cap Plate Top Weld Between Diaphragms E and F Shown, Looking North.

2.1.1.2 Pier Cap 2 Exterior

The exterior of the pier cap and the exterior paint were in GOOD condition [7]. The bearings appeared to function properly and exhibited no significant defects. In a previous rehabilitation project, the exterior surfaces of the superstructure were cleaned and painted. Additionally, the cap web plates have been retrofit with drilled stress relief holes connected by vertical sawcuts adjacent to the welded connections of the girder bottom flange tie plates at all girders except Girder A (Photograph 12). Round cover plates were utilized to seal the drilled stress relief holes and are held in place by a bolt and nut. One bolt was missing on the east access hatch. Other specific items on the exterior to note include:

- A 1/4 in. long vertical crack was present at the bottom of the fillet weld between the pier cap south web and the east knee brace below Girder G on the west stiffener of the seat connection (Photograph 13). This was previously noted and has not changed.
- A 3/16 in. long vertical crack was present at the bottom of the fillet weld between the pier cap north web and the east knee brace below Girder C on the north cap web plate (Photograph 14). A 1/8 in. long vertical crack was present at the bottom of the fillet weld between the pier cap north web and the west knee brace below Girder C. (Photograph 15). These were previously noted and have not changed.
- There were three areas of reactivating corrosion and painted over pitting on the pier cap plates. Overall there were no significant changes since the prior inspection. These locations include:
    - There was a 7 in. long x 5 in. wide area of moderate reactivating painted over pitting to 1/16 in. deep on top of the bottom flange tie plate of Girder A, on the west side (Photograph 16).
    - There were areas of painted over pitting up to 1/16 in. deep on the north cap web plate east of Girder A.
    - There was a 7 in. x 3 in. area of isolated pitting to 1/16 in. deep present on the south cap web plate above the bottom flange tie plate of Girder G.
    - There was active rust with minor 1/16 in. section loss at the east face of Girder G at the cap flange plate. This is a high shear area and the flange plates do not carry significant load.
    - Along the pier cap web above the bottom flange tie plates at the fascia girders. The worst cases noted was at Girder A north side, with a 10 in. long x 2 in. high area.
- The welded connection of a drainpipe support bracket on the north cap web plate was replaced with a bolted connection (Photograph 17). This is an old comment and has not changed.
- Isolated locations of extra weld passes were noted on the fillet weld between the north cap web and the cap bottom flange plate along the full length. This is an old comment and has not changed.

Photograph 12: View of Typical Relief Hole Retrofit and Sawcut. North Face at Girder G Shown, Looking South.

Photograph 13: View of 1/4 in. Crack at East Knee Brace Below Girder G, South Cap Web Plate, Looking Northeast.

Photograph 14: View of a 3/16 in. Crack at East Knee Brace Below Girder C, North Cap Web Plate, Looking South.

Photograph 15: View of a 1/8 in. Crack at West Knee Brace Below Girder C, North Cap Web Plate, Looking South.

Photograph 16: View of 1/16 in. Deep Painted over Pitting On Tie Plate At West Side of Girder A, South Side of Pier, Looking East.

Photograph 17: View of Bolted Drainpipe Support Connection. No Change, Looking South.

2.1.1.3 Pier Cap 2 Fatigue Prone Details

Fatigue Prone Detail 1

Fillet welds between diaphragms or stiffeners and web plates.

Category: C'

Location: All girder diaphragms and web stiffeners.

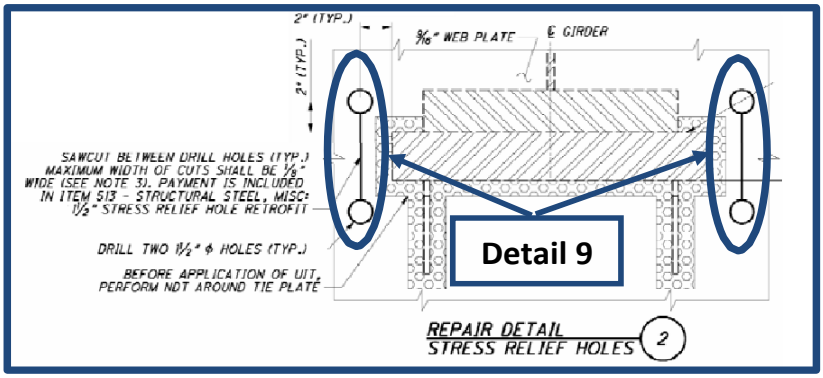


Figure 3: Web Plate Retrofit of Pier Cap 2

Fatigue Prone Detail 3

Tack welds, less than 2", on web and flange

Category: C

Location: Two tack welds on the interior of the north web plate between Girders A and B, and between Girders B and C, and one tack weld on the interior of the north web plate between Girders D and E (5 total, previously ground but not completely removed).

Fatigue Prone Detail 8

Intersection of fillet welds. Category: E

Location: Fillet weld of the web plates and the bottom flange tie plates of Girders D, E, F and G intersecting the fillet welds of the web plates and stiffeners. Although 2017 repair contract specified repairs to cracks on the north web of pier cap at Girder G, new cracks exist at the fatigue prone detail location.

Fatigue Prone Detail 9

Drilled hole stress relief retrofit in web plates. Category: B

Location: Both web plates on each side of all girder connections, except girder A.

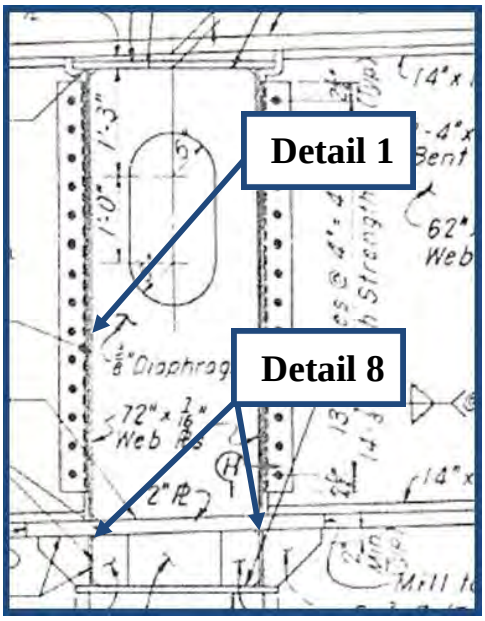


Figure 4: Section of Pier Cap 2

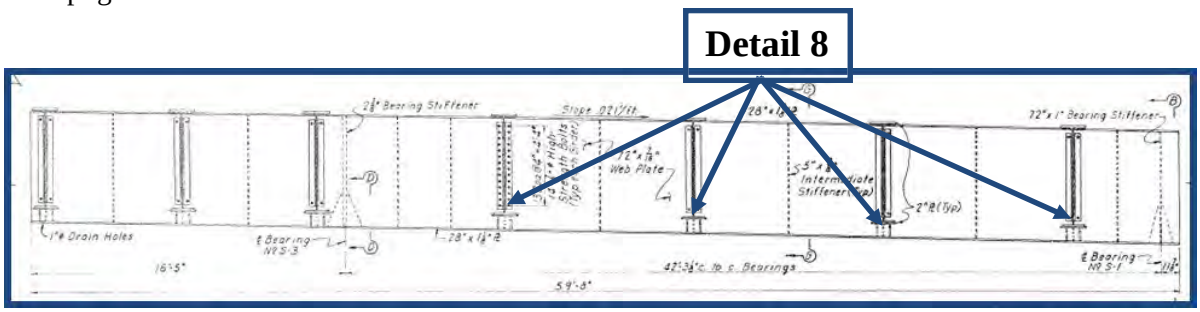


Figure 5: Elevation of Pier Cap 2

2.1.2 Pier Cap 3 Overall

Pier Cap 3 was in FAIR condition [5] (Photograph 18). At the time of the inspection the pier cap interior was dry.

Photograph 18: General Elevation of Pier Cap 3, Looking South.

2.1.2.1 Pier Cap 3 Interior

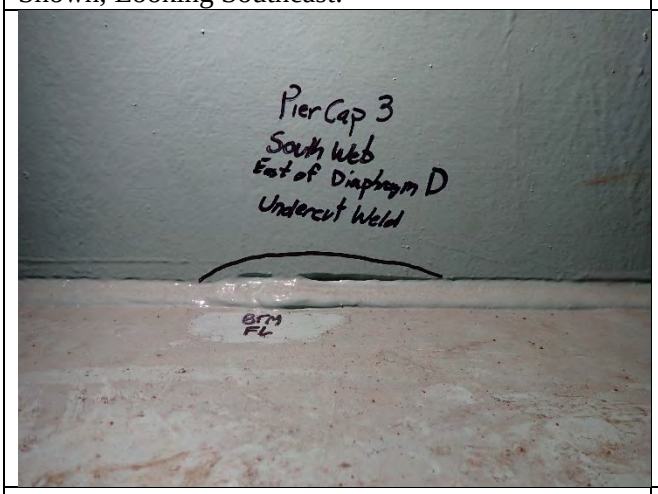
The interior was in GOOD condition [7]. Specific items on the interior to note include:

- At multiple locations the fillet welds connecting the top of the tie plates, diaphragms, and cap web plates intersect to form triaxial welds at the top of the tie plate. At the underside of the tie plate, the cap web plate stiffening switches to a plate stiffener section; these stiffeners are coped at the fillet welds for the cap web and bottom flange plates (Photographs 19 and 20).
- In the last rehabilitation project, areas of active corrosion were cleaned and painted. There are currently a couple small and isolated locations at the ends where the corrosion is reactivating. Painted over pitting up to 1/8 in. deep is present on the cap bottom flange adjacent to the east access hatch at the east end. This has not changed since the prior inspection.
- The drilled stress relief holes and sawcut retrofits were present at all girders except Girders A and B (Photograph 21).
- Various undercuts, tack welds, weld remnants, gouges, etc. are present inside the pier cap. These have previously been noted and have not changed. Specific include:
    - A 1-1/4 in. long tack weld was observed on the north cap web, west of the Girder D diaphragm at the stiffener (Photograph 22). This has not changed since the prior inspection.

- There were two 3 in. long undercuts along the fillet weld between the south cap web and the cap bottom flange, both located east of Girder D between the diaphragm and the stiffener (Photograph 23). This has not changed since the prior inspection.
- A 2 in. long painted over gouge, likely caused by tack weld removal, was found in the north cap web between the Girder E and F diaphragm.
- A 3 in. long undercut was observed between the Girder G diaphragm and the south cap web. This is an old comment that has not changed.
- There was a 3/4 in. length backer bar remnant in the fillet weld between the cap top flange and south cap web west of the Girder G diaphragm (Photograph 24). This is an old comment that has not changed.

Photograph 19: View of Typical Triaxial Weld on Top of Tie Plate, South Cap Web at West Side of Diaphragm F Shown, Looking Southeast.

Photograph 20: View of East Face of Diaphragm G at Underside of Girder Tie Plates. Note Coped Corners of Lower Stiffener, Looking West.

	
Photograph 21: View of Typical Stress Relief Retrofit. Diaphragm D North Cap Web West Face Shown, Looking Southeast.	Photograph 22: View of Tack Weld Present on North Cap Web Plate, West of Diaphragm D. No Change, Looking Northwest.
	
Photograph 23: View of Undercut Along South Cap Web Plate Bottom Weld, West of Diaphragm E, Looking South.	Photograph 24: View Backer Bar Remnant at South Cap Plate Top Weld, Between Diaphragm G and First Stiffener to the West, Looking South.

2.1.2.2 Pier Cap 3 Exterior

The exterior of the pier cap and the exterior paint were in fair condition [5]. This was due to the increase in the corrosion hole sizes at the east end of the cap. The bearings were in GOOD condition [7] and appeared to function properly. Specific items on the exterior to note include:

- A 3/16 in. long vertical crack was present at the bottom of the fillet weld between the pier cap south web and the east knee brace below Girder B. The crack has not propagated into the base metal and has not changed since the prior inspection (Photographs 25 and 26).
- During a previous rehabilitation, the cap web plates have been retrofit with drilled stress relief holes connected by vertical sawcuts adjacent to the welded connections of the girder bottom

flange tie plates at all girders except Girders A and B (Photograph 27). Additionally, knee braces were coped to remove intersecting fillet welds at the connections between the pier cap webs and the girder bottom flange tie plates. This has not changed since the prior inspection.

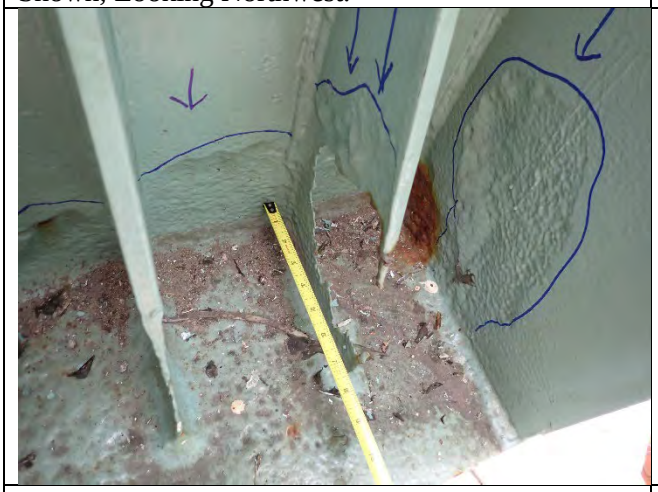
- Painted over pitting and corrosion holes were present at a few locations on this structure. These include:
  - The east end of the cap exhibits painted over section loss of 1/8 in. deep on the top of the bottom flange, at the base of the cap web plates at the east end, and around corrosion holes present at the base of the knee braces at the east end of the caps (Photograph 28). This appears to have slightly increased since the prior inspection.
  - Corrosion holes are present at the base of the knee braces at the east end of the cap. The northern knee brace corrosion hole measures 5 in. x 5 in and the center brace measures 3 in. high x up to 4-1/2 in. wide (Photographs 29 and 30). This has increased since the prior inspection.
  - A 7 in. long x 2 in. high area of painted over pitting up to 1/16 in. deep was present on the north cap web above the bottom flange tie plate of Girder A. This has not changed since the prior inspection.
  - A 7 in. long x 2 in. high area of up to 3/16 in. deep painted over pitting was present on the south cap web above the bottom flange tie plate of Girder G. This has not changed since the prior inspection.
- Active corrosion was present on the fillet weld between the knee brace and north web below Girder G. This has not changed since the prior inspection.
- Porosity was present in the toe of weld at the cap bottom flange plate, between Girder C and the north web plate. This is an old comment and is not significant.
- One bolt was missing from the east access hatch. The middle south and lower north bolts were missing from the west access hatch. Missing bolt holes were sealed with caulk to achieve a proper seal. The bearing seat at the east column holds water around the masonry plate; this is not currently significant.
- The welded connection of a drainpipe support bracket on the north web was replaced with a bolted connection. This is an old comment that has not changed.

Photograph 25: Perspective View of 3/16 in. Long Crack in Vertical Weld For Knee Brace, Girder B at South Web Plate, Looking Northeast.

Photograph 26: Close Up View of 3/16 in. Long Crack in Vertical Weld For Knee Brace, Girder B at South Web Plate, Looking Northeast.

Photograph 27: View of Typical Stress Relief Retrofit. Diaphragm F South Cap Web East Face Shown, Looking Northwest.

Photograph 28: Overall View of Painted over Pitting and Corrosion Holes at East End of Pier Cap.



Photograph 29: View of Corrosion Hole at Base of North Knee Brace at East End of Cap, Looking West.

Photograph 30: View of Corrosion Hole at Base of Center Knee Brace at East End of Cap, Looking West.

2.1.2.3 Pier Cap 3 Fatigue Prone Details

Fatigue Prone Detail 1

Fillet welds between diaphragms or stiffeners and web or flange plates.

Category: C'

Location: All girder diaphragms and web stiffeners.

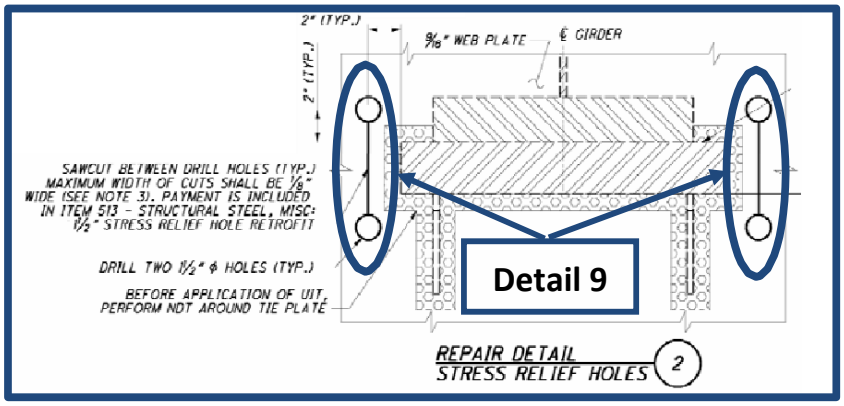


Figure 6: Web Plate Retrofit of Pier Cap 3

Fatigue Prone Detail 2

Full penetration groove weld of flange splice. Category: B

Location: Two bottom flange splices.

Fatigue Prone Detail 8

Intersection of fillet welds.

Category: E

Location: Fillet weld of the north web and the bottom flange tie plate of girder F intersecting the fillet weld of the north web and stiffener.

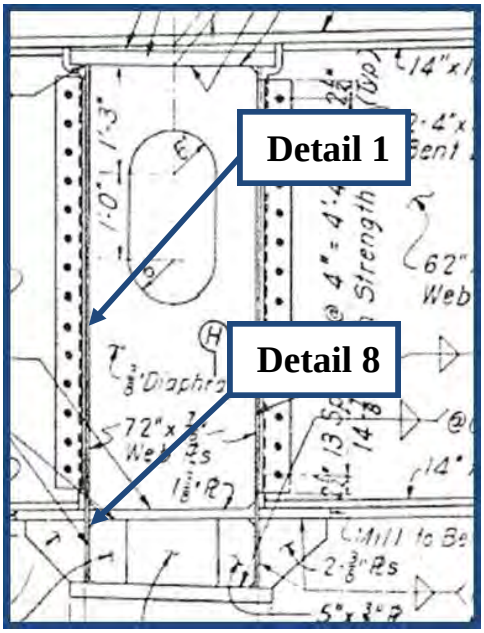


Figure 7: Section of Pier Cap 3

Fatigue Prone Detail 9

Drilled hole stress relief retrofit in web plates. Category: B

Location: Both web plates on each side of all girder connections, except Girder A and B.

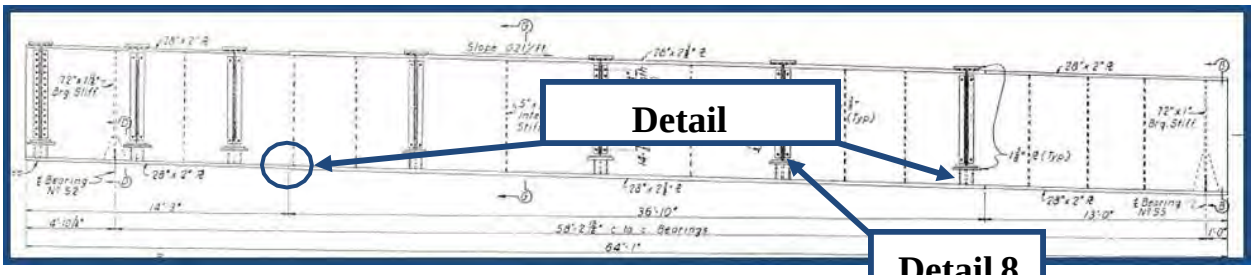


Figure 8: Elevation of Pier Cap 3

2.1.3 Pier Cap 4 Overall

Pier Cap 4 was in GOOD condition [7] overall (Photograph 31). There were no major changes noted overall. At the time of the inspection the pier cap interior was dry with a few welds of poor quality and scattered areas of light surface corrosion.

Photograph 31: General Elevation View of Pier Cap 4, Looking South.

2.1.3.1 Pier Cap 4 Interior

The interior paint was in GOOD condition [7]. Specific items on the interior to note include:

- The cap top flange typically exhibited paint adhesion failure with visible base metal. No corrosion was noted and no changes from the prior inspection.
- Moisture has penetrated the cope holes of the Girder A diaphragm and flowed along the bottom flange to the pier cap vertical web stiffeners above the west bearing. This is not currently problematic.
- There was a 3 ft. long x full width area of laminating corrosion on the cap bottom flange on both sides of the diaphragm above the west bearing (Photograph 32). This has not changed for this inspection. There is 3 ft. long x 27 in. wide L-shaped area of laminating corrosion on the cap bottom flange west of the Girder D diaphragm. No section loss or ponded water was present at these locations.
- Two discontinuities were present in the fillet welds in the north cap web. These are located:
    - Between the cap web and cap bottom flange between the Girder A and C diaphragms (Photograph 33).
    - Between the cap web and cap vertical web stiffener between the Girder E and F diaphragms.

- Isolated locations of intersecting fillet welds had been ground down and left unpainted. These locations are starting to corrode at the weld material (Photograph 34). This is an old comment with no change.
- A divergent fillet weld was noted between the bottom of the south cap web and cap vertical web stiffener between the Girder D diaphragm and the vertical stiffener for the west bearing (Photograph 35). This is an old comment with no change.
- Two 4 in. long areas of porosity were noted along the fillet weld between the south cap web and the cap vertical web stiffener between the Girder E and F diaphragms (Photograph 36). This is an old comment with no change.
- There are 1 in. long undercut welds along the fillet weld between south cap web and the cap bottom flange west of the cap web stiffener between the Girder F and G diaphragms. This is an old comment with no change.

Photograph 32: View of Laminating Corrosion Present Just West of West Bearing on Bottom Plate, Looking West.

Photograph 33: View of Discontinuity For Fillet Weld Between North Cap Web and Cap Bottom Flange Between the Girders A and C Diaphragm, Looking North.

Photograph 34: General Example of Ground Down Fillet Weld Unpainted With Corrosion Activating. Between West Bearing and Diaphragm D Shown, Looking Northeast

Photograph 35: View of Divergent Weld Located on the South Web Plate, First Stiffener West of West Bearing. Looking Southeast, No Change.

Photograph 36 (left) : View of Weld Porosity With No Change On The South Web Plate At The Web Stiffener Between the Girder E and F Diaphragms, Looking Southwest.

2.1.3.2 Pier Cap 4 Exterior

The exterior of the pier cap and the exterior paint were in GOOD condition [7]. The bearings were in GOOD condition [7] and appeared to function properly. Overall, there were no major changes since the prior inspection. Specific items on the exterior to note include:

- During a previous rehabilitation, the cap web plates have been retrofit with drilled stress relief holes connected by vertical sawcuts adjacent to the welded connections of the girder bottom flange tie plates at all girders except Girders A (Photograph 37).
- Painted over pitting was present at a few isolated locations around the pier cap. These locations have not changed since the prior inspection. Specifics of these include:

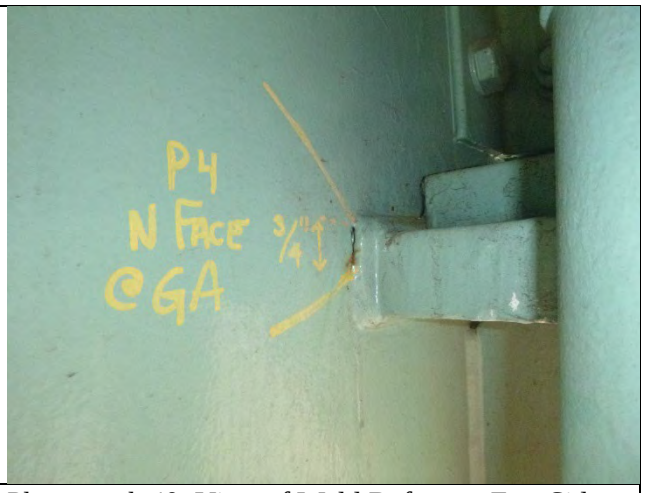
- There was painted over pitting up to 1/16 in. deep located on the cap bottom flange underneath the west hatch (Photograph 38).
- There was an area of painted over pitting up to 1/16 in. deep measuring 1 in. long x 4 in. wide observed on the top of the bottom flange tie plate at Girder A.
- There was an area of painted over pitting up to 3/16 in. deep measuring 2 in. high x 9 in. long observed in the north cap web above the bottom flange of Girder G, east side (Photograph 39).
- Painted over pitting up to 1/16 in. deep was noted on the base of the east end plate and the knee braces at the east end of the pier cap.

- There was no change observed to the multiple shallow gouges previously noted along the north edge of the bottom flange of the pier cap at the cantilevered section. These appear to be related to fabrication or construction and are not the result of impacts.
- There was no change in the 3/4 in. high x 1/8 in. deep inclusion in the fillet weld located on the east side of the Girder A bottom flange, between the north cap web and the Girder A tie plate (Photograph 40).
- There was no change observed to the 2 in. long tack weld present on top of the cap bottom flange below the Girder G connection to the south cap web.
- The welded connection of a drainpipe support bracket on the south web was replaced with a bolted connection. This is an old condition that has not changed.

Photograph 37: View of Typical Stress Relief Retrofit. South Web Plate West Face of Girder D Shown, Looking Northeast.

Photograph 38: View of Painted over Pitting To 1/16 in. Deep on Cap Bottom Flange Plate at the West End, Looking East.

Photograph 39: View of Painted Over Pitting to 3/16 in. Deep On North Cap Web Behind Girder G Bottom Flange, Looking Southwest.



Photograph 40: View of Weld Defect on East Side of Girder A at the North Cap Web Plate. No Change, Looking Southwest.

2.1.3.3 Pier Cap 4 Fatigue Prone Details

Fatigue Prone Detail 1

Fillet welds between diaphragms or stiffeners and web or flange plates.

Category: C'

Location: All girder diaphragms and web stiffeners.

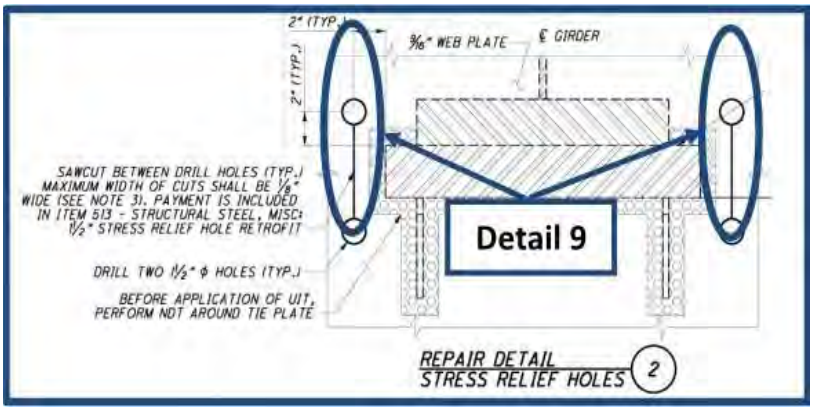


Figure 9: Drilled and Sawcut Stress Relief Retrofits

Fatigue Prone Detail 2

Full Penetration groove weld of flange splice.

Category: B

Location: One top flange splice and one bottom flange splice.

Fatigue Prone Detail 4

Tack welds, greater than, or equal to, 2" and less than, or equal to 4", on the flange plates.

Category: D

Location: 2" tack weld on top side of bottom flange below girder G connection to south web.

Fatigue Prone Detail 8

Intersection of fillet welds.

Category: E

Location: Fillet weld of the north web plate and top flange intersects the web stiffener fillet welds between girders A and C, and between girders C and D.

Fatigue Prone Detail 9

Drilled hole stress relief retrofit in web plates.

Category: B

Location: Both web plates on each side of all girder connections, except girders A.

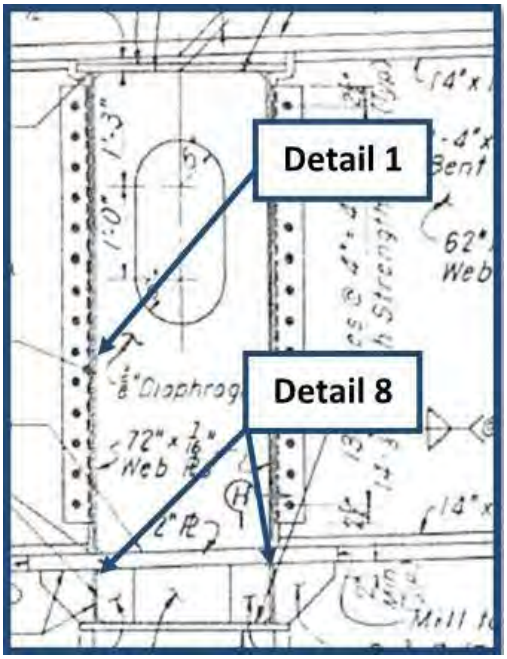


Figure 10: Typical End View of Pier Cap

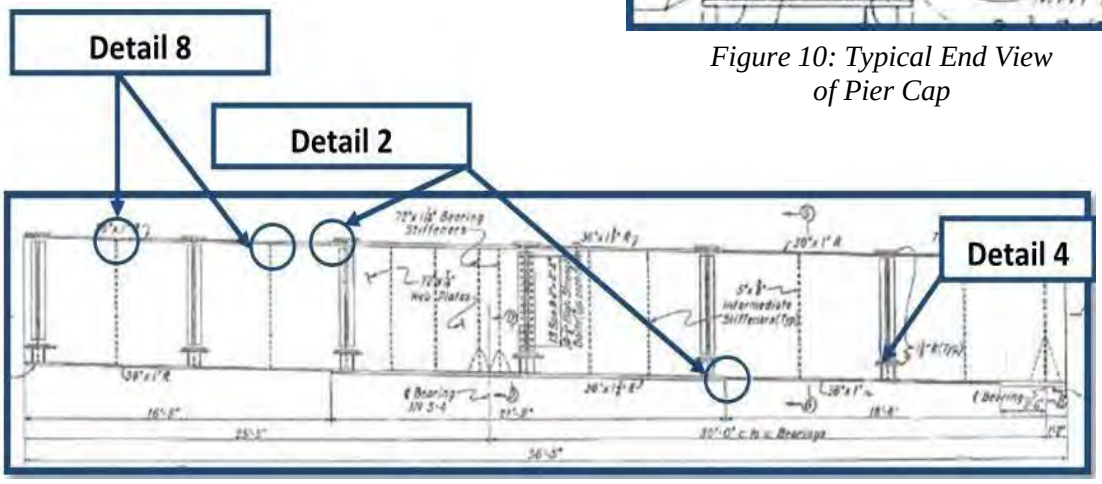


Figure 11: Pier Cap Elevation

3.0 EVAULATION AND RECOMMENDATIONS

Based on this inspection, the pier caps for Piers 2 to 4 are rated, respectively, in Satisfactory (Pier 2), Fair (Pier 3), and Good (Pier 4) condition. The overall rating for the NSTM (B.C.14) has not changed from Fair (5). The steel pitting and corrosion holes at the east end of Pier 3 exterior appear to have increased slightly since the prior inspection. Weld cracks to the vertical fillet welds at the knee braces under girders at the pier cap exterior have not changed, and no new cracks were noted; there currently are a total of three present at Pier 2 and one at Pier 3. Corrosion is reactivating on the interiors, mostly on the bottom plates toward the ends of the cap. Previously noted locations of tack welds, weld remnants, gouges, undercuts, and similar items were still present (mostly in the interior, some present on the exterior); these have not changed since the prior inspection. Locations of painted over section loss overall has not changed since the prior inspection. Drilled hole and sawcut retrofits are still present and these locations function as designed. Triaxial welds are present at locations on the cap interiors where diaphragms, cap web plates, and girder tie plate welds intersect; no cracks or issues resulting from excessive restraint were observed.

Collins appreciates the opportunity to work with the Ohio Department of Transportation on this project and looks forward to working together in the future. We would be happy to discuss any aspect of the report with you in person or via phone or email.

Respectfully Submitted,
COLLINS ENGINEERS, INC.

Michael Seal, P.E.
Project Manager

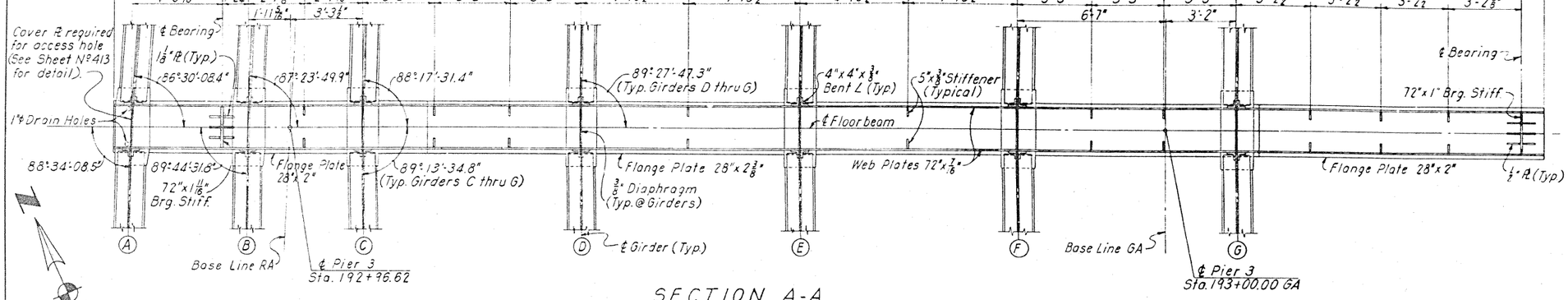
Originated by:
Kevin Mitchell, E.I.T.

EXHIBIT 1 – EXISTING PIER CAP PLANS

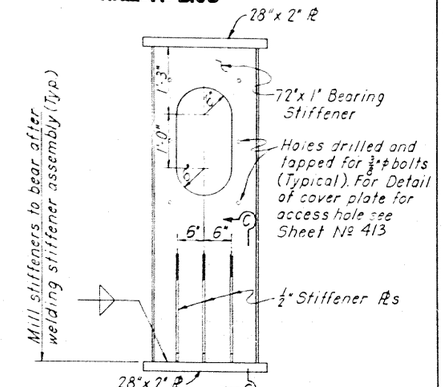
FED. RD. DIV.	STATE	PROJECT	FISCAL YEAR
2	OHIO		

414
460

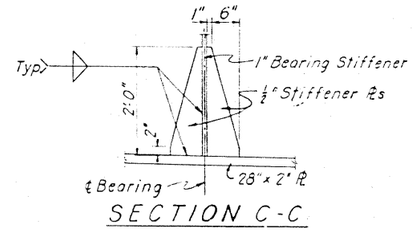
HAMILTON COUNTY
HAM-71- 2.08



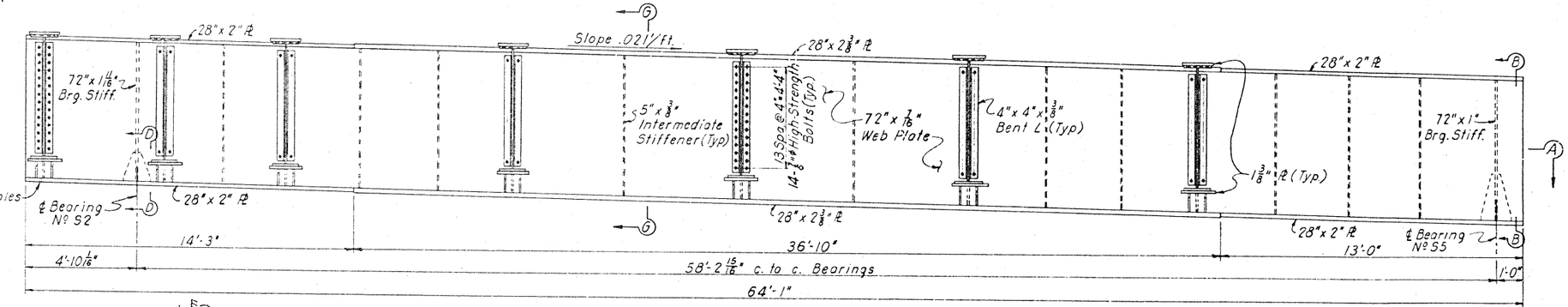
SECTION A-A



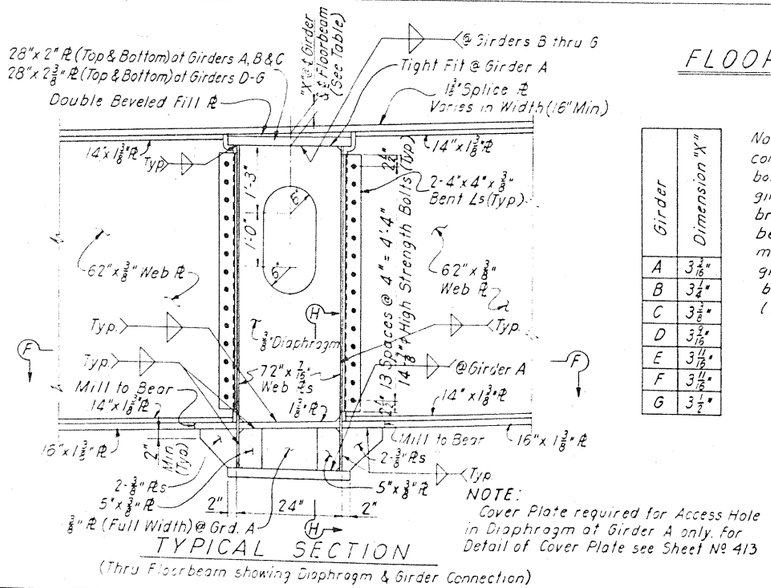
SECTION B-B



SECTION C-C



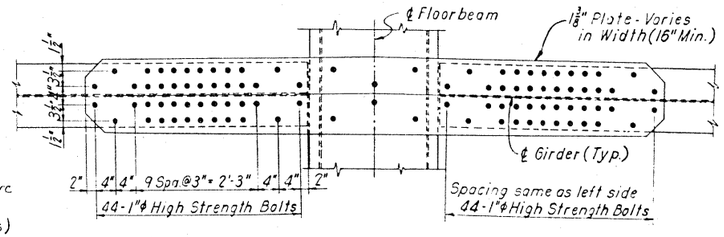
ELEVATION
FLOORBEAM AT PIER 3



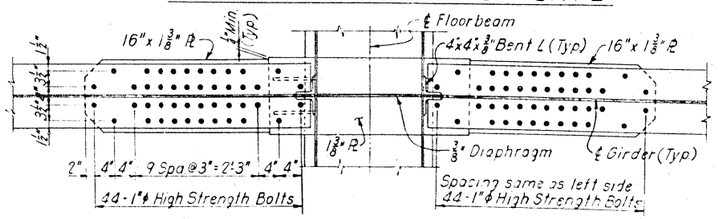
TYPICAL SECTION
(Thru Floorbeam showing Diaphragm & Girder Connection)

Girder	Dimension "X"
A	3 3/16"
B	3¼"
C	3⅜"
D	3 7/16"
E	3 11/16"
F	3 13/16"
G	3½"

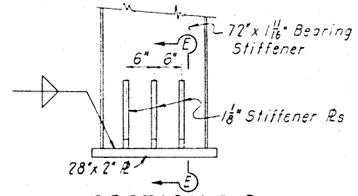
Note: Milled ends of compression splice on bottom flanges of girders shall be brought to full bearing against milled ends of pier girder brackets before bolts are tightened (Typ at all floorbeams)



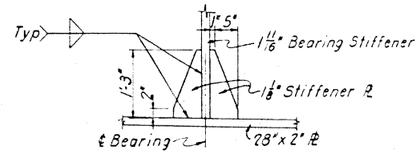
PLAN OF TOP SPLICE PLATE



SECTION F-F



SECTION D-D



SECTION E-E

NOTES:
For fillet weld sizes see "TABLE OF FILLET WELD SIZES" on Typical Drawing Nº 427
For Bearing Details see Sheet Nº 416
For Section G-G & Section H-H see Sheet Nº 413

Work this Sheet with Sheets Nº 411 thru 413 & 415 thru 417

HAZELET & ERDAL
CONSULTING ENGINEERS
CINCINNATI, OHIO

STRUCTURAL STEEL DETAILS
BRIDGE No. HAM-71-0231

H&E BRIDGE No. 18

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
OAF	SLR 1-13-65		OAF 4-19-65	JHO 8/1/65	

SFN 310223

FED. RD. DIV.	STATE	PROJECT	FISCAL YEAR
2	OHIO		

400
460

HAMILTON COUNTY
HAM-71-2.08

GENERAL NOTES

● Symbol denotes drill hole.
For test boring data see sheets 16 & 17 of 23
For Bench Marks, see sheet 39
Span lengths are measured along Ramp GA ℄.

PLAN

PROFILE

CURVE DATA

RAMP GA			RAMP RA	
Curve No. 3E	Curve No 3F	Curve No 3G	Curve No. 1RA	Curve No. 2RA
P.I. Sta.=186+72.54 GA	P.I. Sta.=190+21.35 GA	P.I. Sta.=193+57.35 GA	P.I. Sta.=189+32.68 RA	P.I. Sta.=192+54.02 RA
Δ=12°20'22"	Δ=0°34'49"	Δ=9°41'47"	Δ=5°55'38"	Δ=8°19'34"
D=1°56'45"	D=1°00'00"	D=1°34'48"	D=1°54'58"	D=2°30'00"
R=2,944.12'	R=5,729.58'	R=3,626.32'	R=2,990.12'	R=2,291.83'
L=634.06'	L=58.03'	L=613.70'	L=309.33'	L=333.05'
T=318.26'	T=29.01'	T=307.58'	T=154.80'	T=166.82'

PROPOSED STRUCTURE

Type: Continuous Steel Plate Girders with reinforced Concrete Deck and Substructure.
Spans: 90'-6", 94'-0", 98'-0", 68'-0", 105'-6", 69'-10½" bearings
Roadway: Varies (see Plan) With 1'-0" Curbs.
Skew: ℄ Pier No. 3 is radial; the ℄ of other Piers and Abutments ℄ Brg. are parallel to ℄ Pier No. 3.
Loading Frequency: C.F. = 2000 (57) Adequate for AASHO alternate loading.
Wearing Surface: 1" Monolithic Concrete.
Approach Slabs: AS-1-54 (25'-0" Long).
Alignment: Varies; see Plan.
Superelevation: Varies; see Plan.

Traffic Count 1985 A.D.T. = 22,300
D.H.V. = 2,680

SFN 310223

HAZELET & ERDAL
CONSULTING ENGINEERS
CINCINNATI, OHIO

SITE PLAN

BRIDGE No. HAM-71-0231
RAMPS GA and RA OVER RAMP RF NORTH-BOUND READING RD. and EDEN PARK ENT.
H&E BRIDGE No. 18

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE
	WDK			

FED. RD. DIV.	STATE	PROJECT	FISCAL YEAR
2	OHIO		

413
460

HAMILTON COUNTY
HAM-71- 2.08

59'-8"

9⅝" 7'-2⅜" 7'-0" 9'-9" 9'-9" 9'-9" 7'-9" 4'-8⅛" 1'-1⅞"

3'-7½" 3'-7⅜" 3'-6" 3'-6" 1'-5" 2'-9½" 2'-9½" 2'-9½" 4'-10½" 4'-10½" 4'-10½" 4'-10½" 4'-10½" 4'-10½" 2'-4" 2'-4⅛"

7'-2" 3⅛" 6'-7" 3'-2"

Cover ℄ req'd for access hole (See Cover Plate detail on this sheet)

℄ Bearing

Web Plates 72"x 7/16"

70°-46'-25.2" (Typ. Girders C thru G)

4"x4"x⅜" Bent L (Typ)

5"x⅜" Stiffener (Typical)

℄ Floorbeam

℄ 28"x 1⅛" Flange Plate

⅜" Diaphragm (Typ @ Girders)

1" Bearing Stiffener

1"ϕ Drain Holes

88°-34'-08.5"

89°-44'-31.8"

90°-15'-00.5"

90°-57'-53.4"

1" Rs (Typ)
2⅜" Bearing Stiffener

88°-11'-02.2" (Typ. Girders C thru G)

⅝" Rs (Typ)

Base Line GA

℄ Girder (Typ)

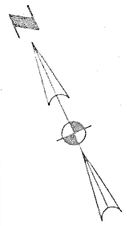
Base Line RA

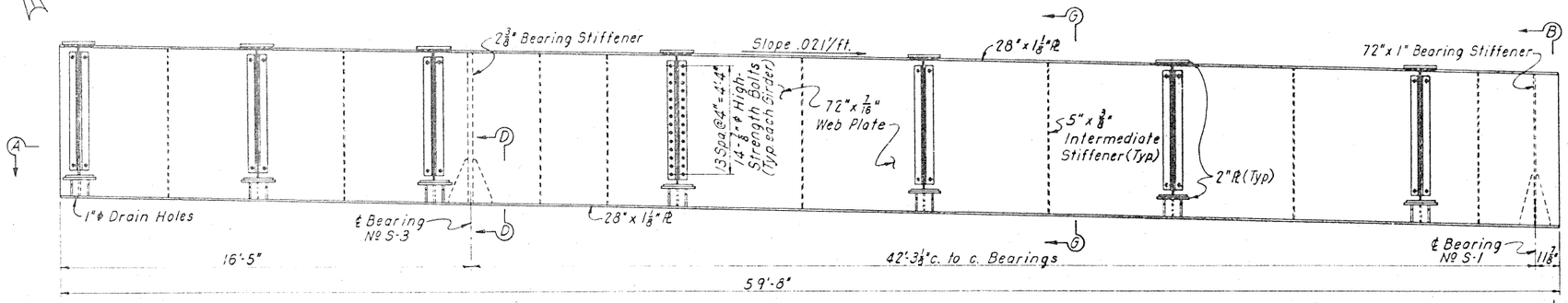
℄ Pier 2
Sta. 191+98.59 RA

℄ Pier 2
Sta. 192+02.00 GA

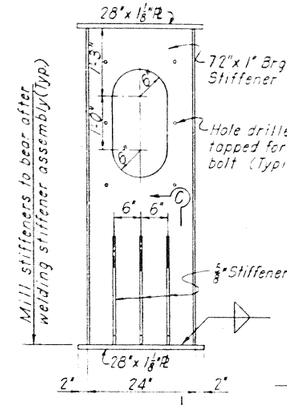
A B C D E F G

SECTION A-A

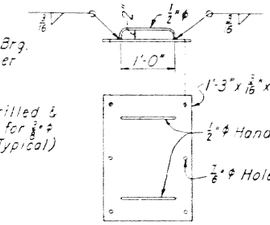




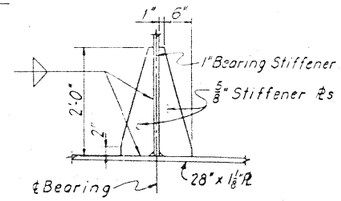
ELEVATION
FLOORBEAM AT PIER 2



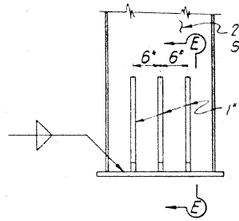
SECTION B-B



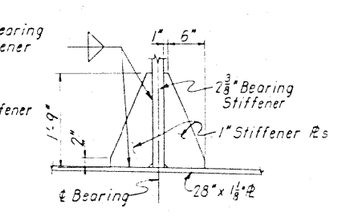
COVER PLATE
(For Access Hole)



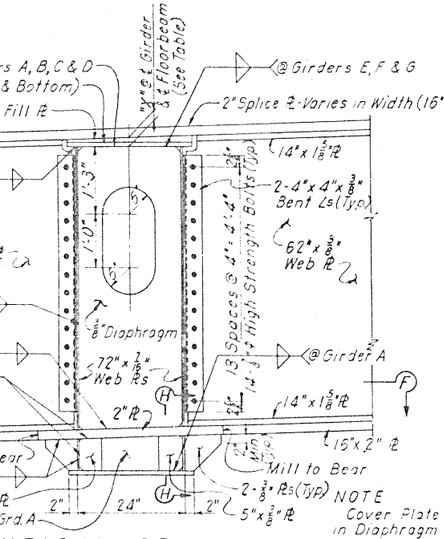
SECTION C-C



SECTION D-D



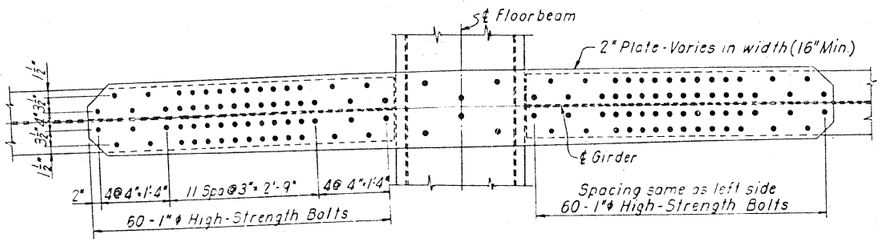
SECTION E-E



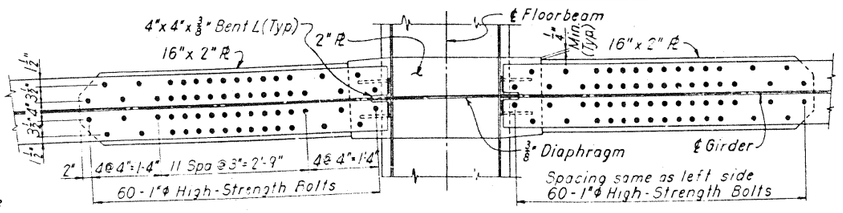
TYPICAL SECTION
(Thru Floorbeam showing Diaphragm & Girder Connection)

Girder	Dimension "X"
A	2 3/8"
B	2 1/16"
C	2"
D	2 1/16"
E	2 1/8"
F	2 1/4"
G	2 5/16"

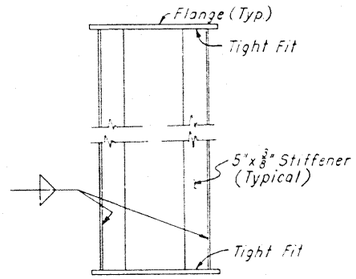
NOTE
Cover Plate required for Access Hole in Diaphragm at Girder A only See Cover Plate Detail on this sheet.



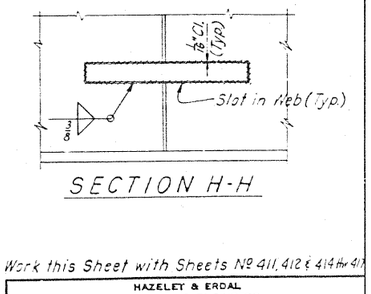
PLAN OF TOP SPLICE PLATE



SECTION F-F



SECTION G-G
(at Intermediate Stiffeners)



SECTION H-H

NOTES:
For fillet weld sizes see "TABLE OF FILLET WELD SIZES" on Typical Dwg. No. 427
For Bearing Details see Sheet Nº 416

Work this Sheet with Sheets Nº 411, 412 & 414 thru 417

HAZELET & ERDAL
CONSULTING ENGINEERS
CINCINNATI, OHIO

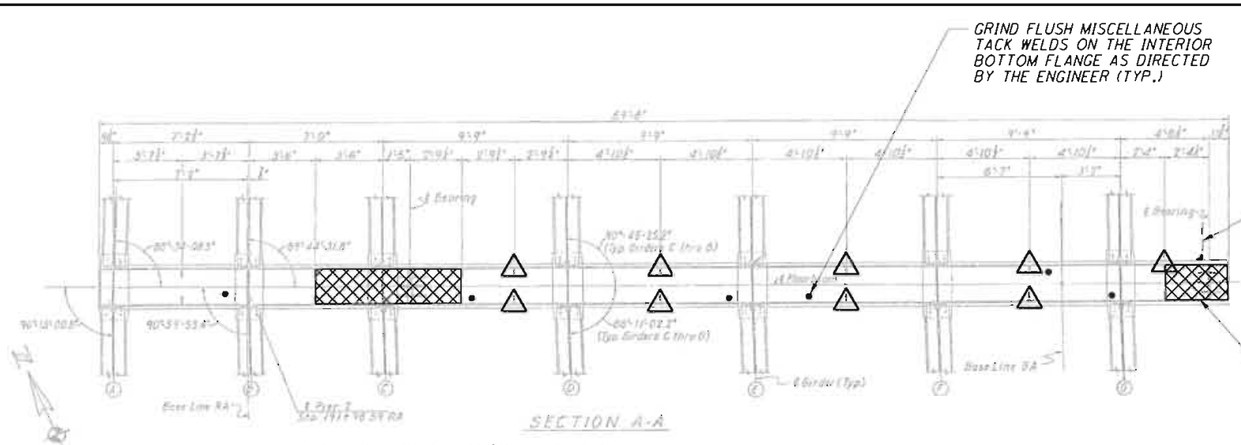
STRUCTURAL STEEL DETAILS
BRIDGE No. HAM-71-0231

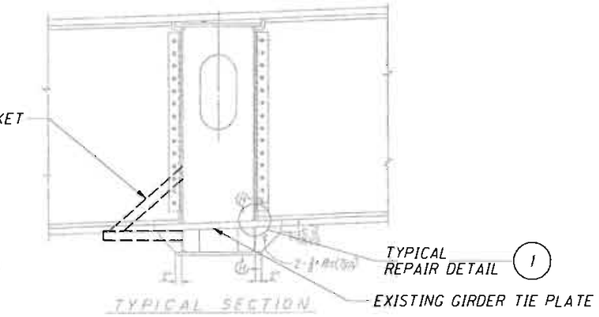
H&E BRIDGE No. 18

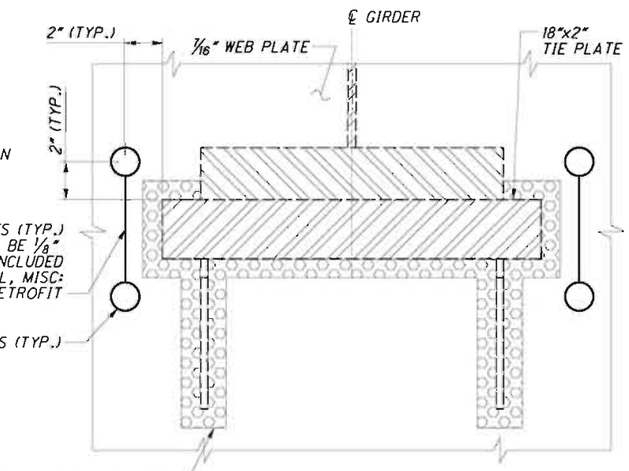
DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
OAF	R.L.R. 1-21-65		OAF 3-19-65	JHO 8/11/65	

SFN 3101223

EXHIBIT 2 – REHABILITATION PLANS

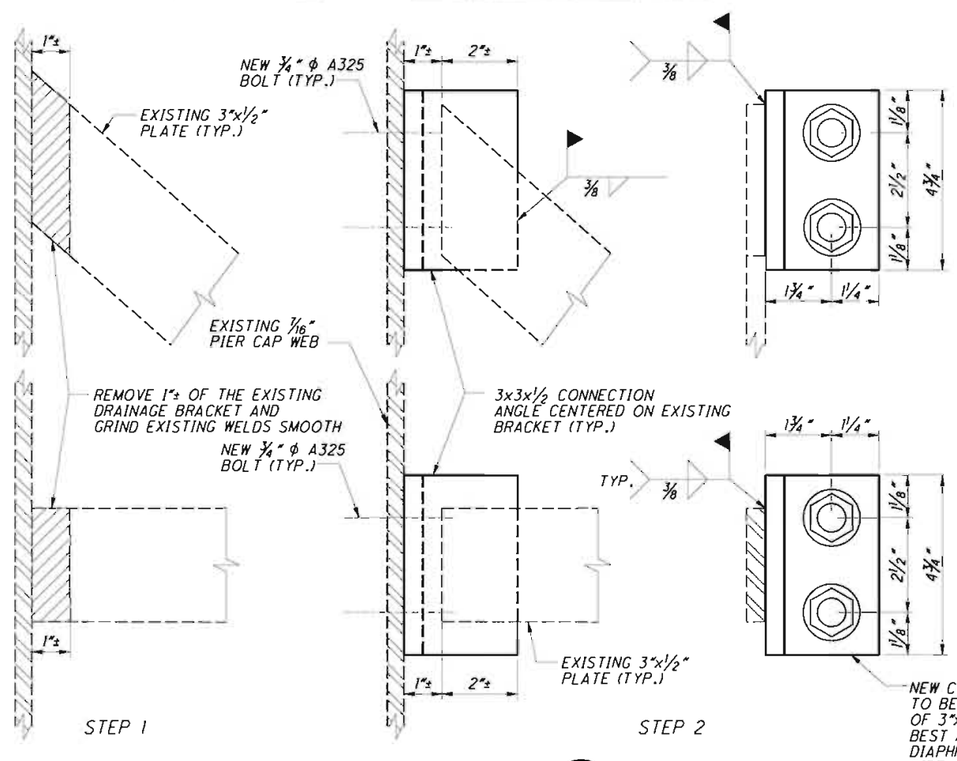




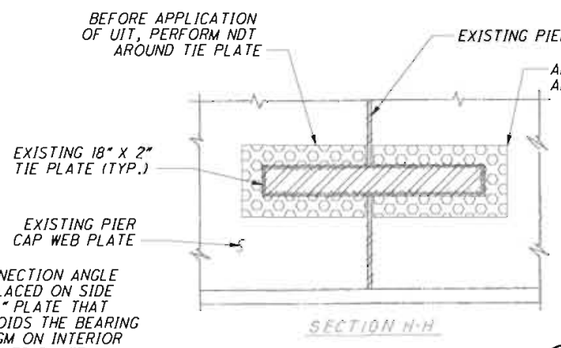


REPAIR DETAIL
STRESS RELIEF HOLES (2)

(FOR GIRDERS B, C, D, E, F AND G AT BOTH SIDES OF PIER CAP)



REPAIR DETAIL
DRAIN BRACKET RETROFIT (3)



REPAIR DETAIL
INTERIOR TIE PLATE TREATMENT (1)

NOTES:

1. PIER PLAN, SECTIONS A-A AND H-H, AND TYPICAL SECTION ARE TAKEN FROM THE ORIGINAL PLANS.
2. CLEAN AND PAINT REPAIR AREAS ON INTERIOR OF PIER CAP.
3. CARE SHALL BE TAKEN NOT TO OVERCUT SAWCUT BEYOND DRILLED HOLES. FLAME CUTTING IS NOT PERMITTED.

- LIMITS OF 1/2" WIDE ULTRASONIC IMPACT TREATMENT (UIT)
- LIMITS OF PAINTING INTERIOR OF PIER CAP
△ - LOCATION OF INTERSECTING WELD BETWEEN PIER CAP WEB STIFFENER WELD AND PIER CAP FLANGE WELD TO BE REMOVED BY GRINDING

TranSystems
55 PUBLIC SQUARE, SUITE 1900
CLEVELAND, OHIO 44113

DATE	12-05-07
REVISIONS	WRW
DRAWN	NBR
DESIGNED	NBR
CHECKED	BKC
STRUCTURE FILE NUMBER	3101223

PIER 2 CAP RETROFIT DETAILS
BRIDGE NO. HAM-42-0264R
RAMP TO US 42 OVER NORTHBOUND US 42, RAMP TO SB I-71 AND EDEN PARK DRIVE

HAM-BH-VAR
PID No. 25374

34
38

4/17/2008
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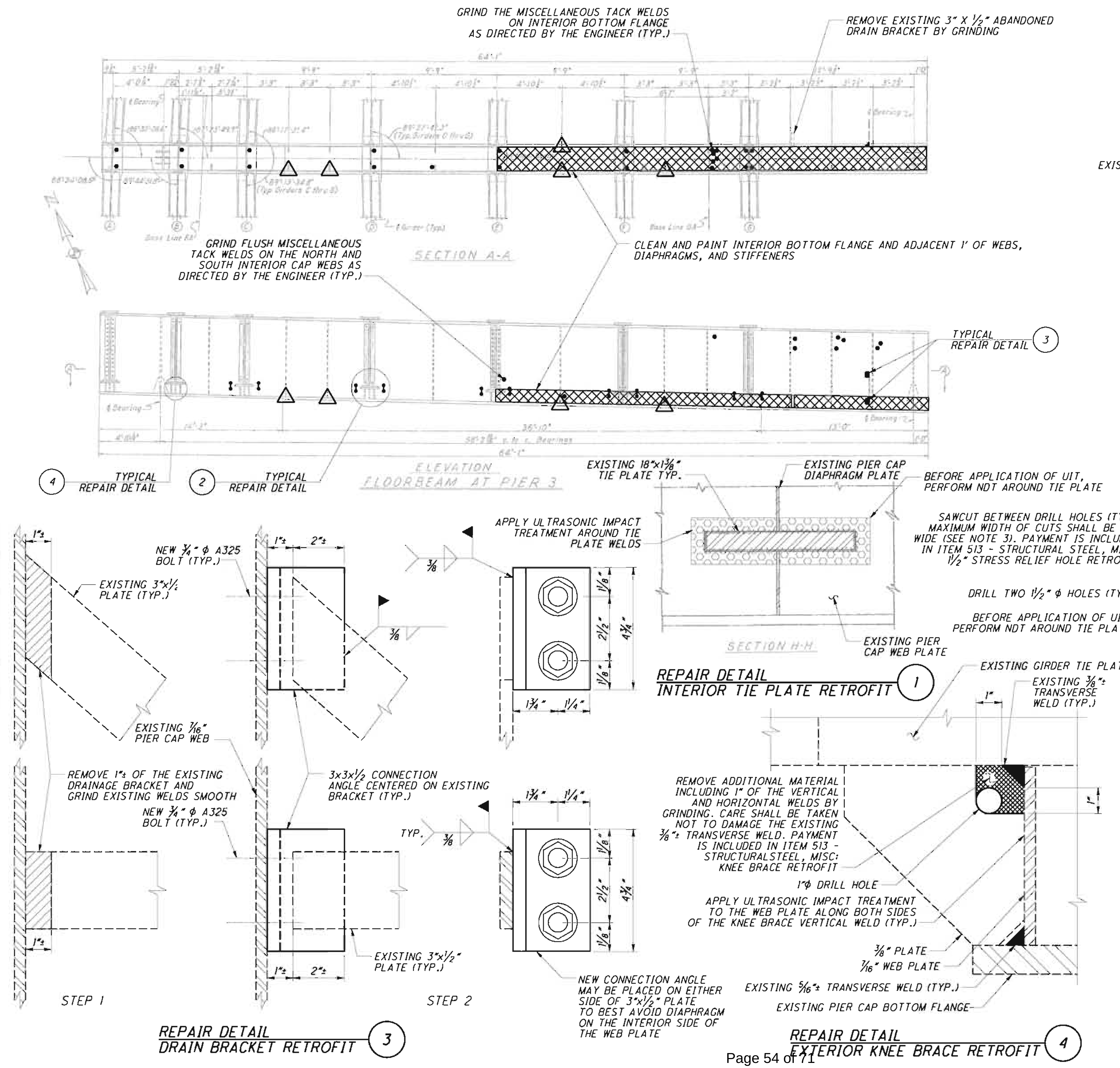

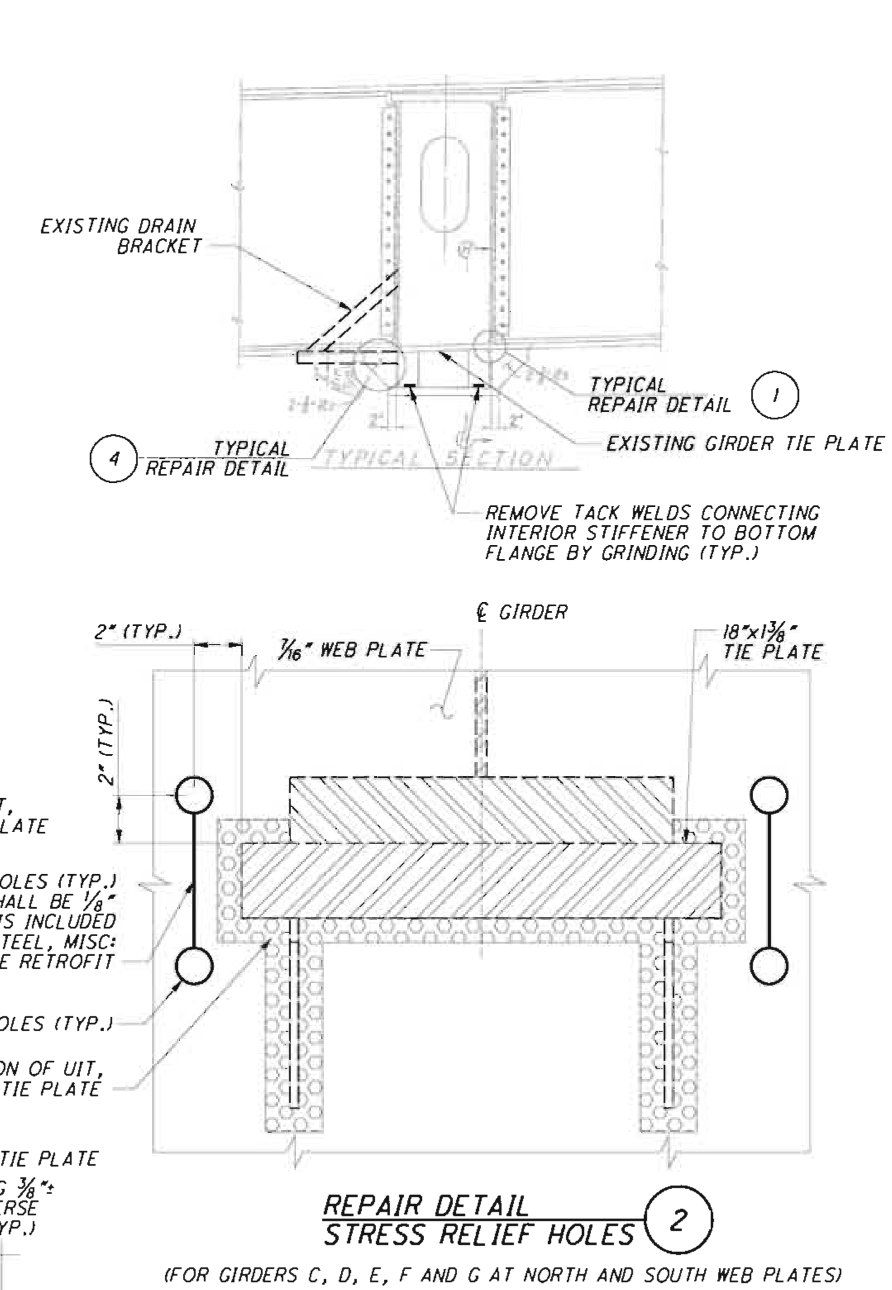

(FOR GIRDERS C, D, E, F AND G AT NORTH AND SOUTH WEB PLATES)

NOTES:

1. PIER ELEVATION, SECTIONS A-A AND H-H AND TYPICAL SECTION ARE TAKEN FROM THE ORIGINAL PLANS.
2. CLEAN AND PAINT REPAIR AREAS ON INTERIOR OF PIER CAP.
3. CARE SHALL BE TAKEN NOT TO OVERCUT SAWCUT BEYOND DRILLED HOLES. FLAME CUTTING IS NOT PERMITTED.

- LIMITS OF ½" WIDE ULTRASONIC IMPACT TREATMENT (UIT)
- LIMITS OF PAINTING ON PIER CAP INTERIOR
- LIMITS OF STEEL REMOVAL ON EXTERNAL KNEE BRACES BY GRINDING
- △ LOCATION OF INTERSECTING WELD BETWEEN PIER CAP WEB STIFFENER WELD AND PIER CAP FLANGE WELD TO BE REMOVED BY GRINDING

PIER 3 CAP RETROFIT DETAILS

BRIDGE NO. HAM-42-0264R

RAMP TO US 42 OVER NORTHBOUND US 42, RAMP TO SB I-71 AND EDEN PARK DRIVE

TranSystems, 55 PUBLIC SQUARE, SUITE 1900, CLEVELAND, OHIO 44113

DESIGNED	DRAWN	REVIEWED	DATE
NBR	NBR	WRW	12-05-07
CHECKED BKC	REVISED	STRUCTURE FILE NUMBER	3101223

HAM-BH-VAR

PID No. 25374

35/38

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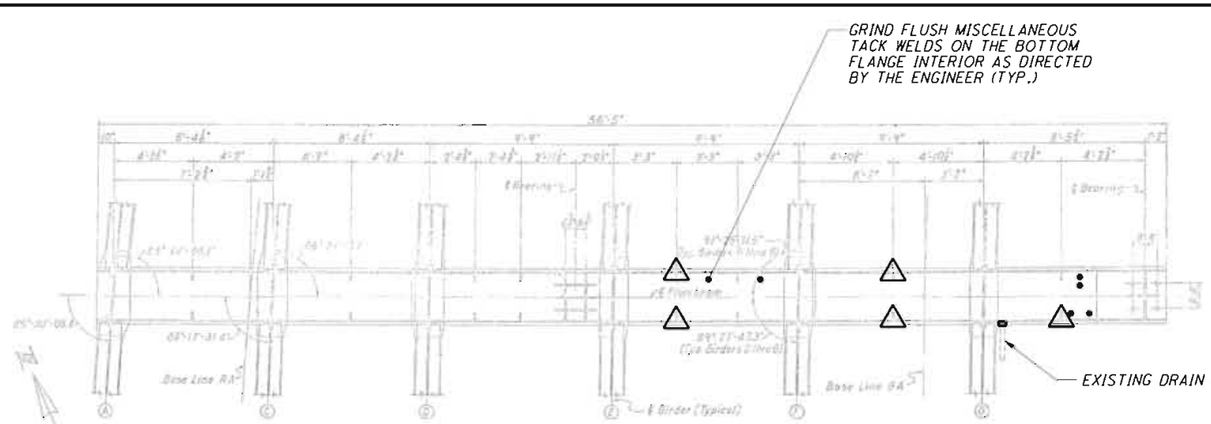

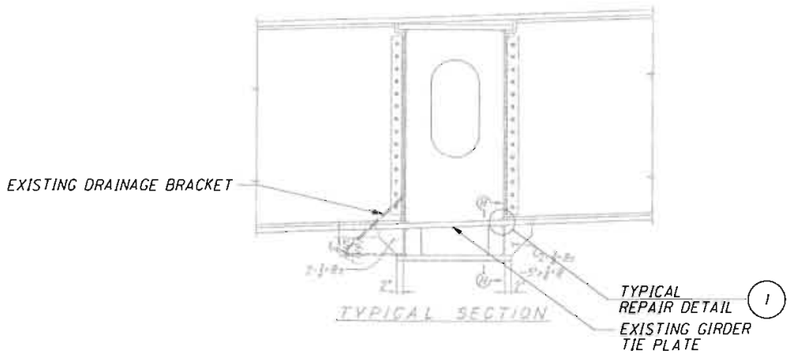

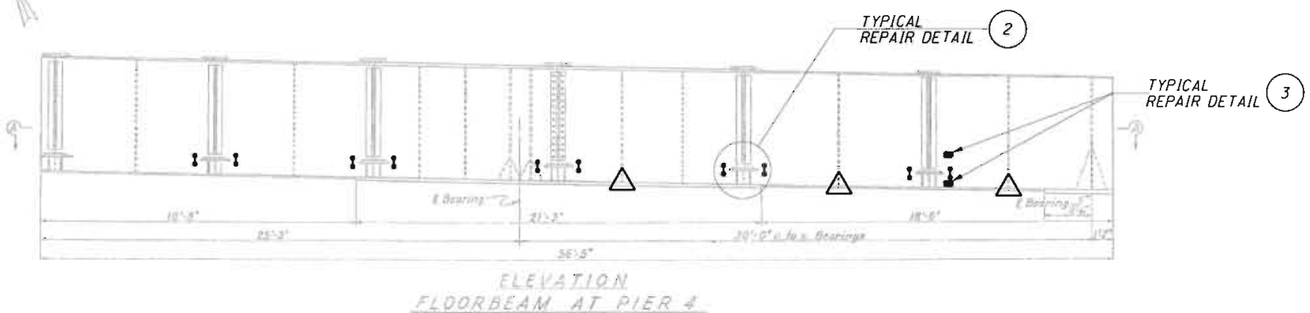

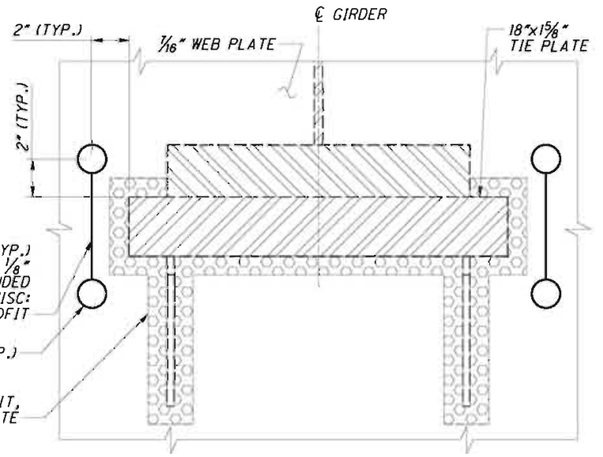

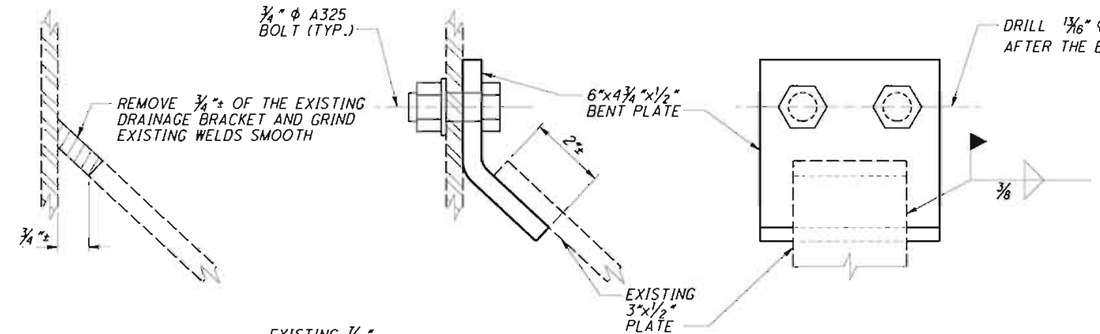

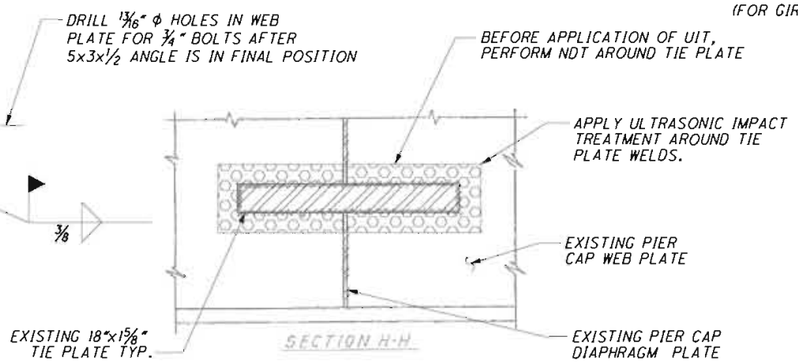

NOTES:

1. PIER ELEVATION, SECTIONS A-A AND H-H, AND TYPICAL SECTION ARE TAKEN FROM THE ORIGINAL PLANS.
2. CLEAN AND PAINT REPAIR AREAS ON INTERIOR OF PIER CAP.
3. CARE SHALL BE TAKEN NOT TO OVERCUT SAWCUT BEYOND DRILLED HOLES. FLAME CUTTING IS NOT PERMITTED.

- LIMITS OF ULTRASONIC IMPACT TREATMENT

△ - LOCATION OF INTERSECTING WELD BETWEEN PIER CAP WEB STIFFENER WELD AND PIER CAP FLANGE WELD TO BE REMOVED BY GRINDING

TranSystems
55 PUBLIC SQUARE, SUITE 1900
CLEVELAND, OHIO 44113

DESIGNED NBR
DETAILED NBR
CHECKED BKC
REVISED WRW
DATE 12-20-07
STRUCT. SEQ. SHEET NUMBER 3101223
DRAWN NBR
PROJECT NUMBER

PIER 4 CAP RETROFIT DETAILS
BRIDGE NO. HAM-42-0264R
RAMP TO US 42 OVER NORTHBOUND US 42, RAMP TO SB I-71 AND EDEN PARK DRIVE

HAM-BH-VAR
PID No. 25374

36
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4/17/2008
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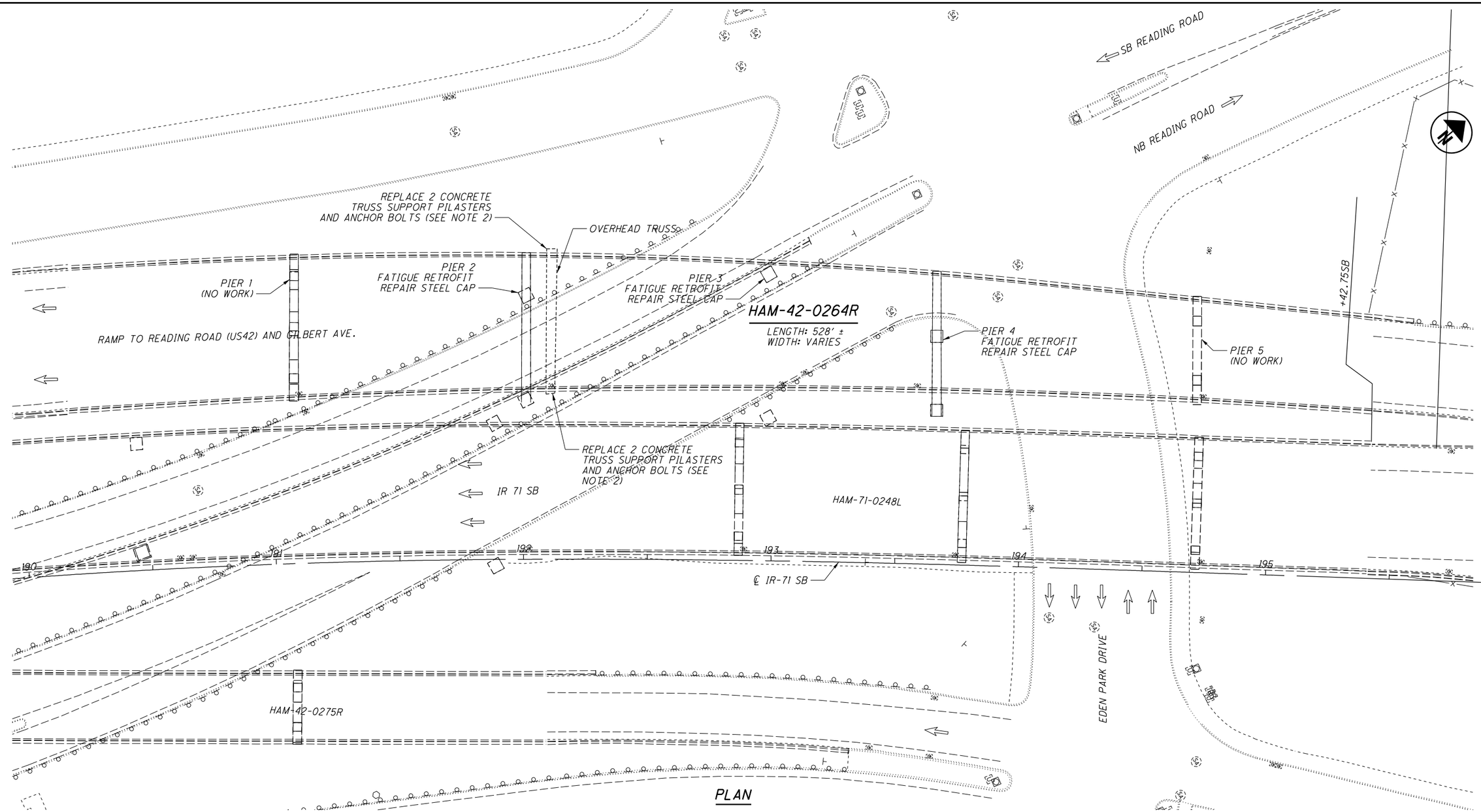

PLAN

EXISTING STRUCTURE

TYPE: CONTINUOUS WELDED PLATE GIRDER WITH REINFORCED CONCRETE DECK AND SUBSTRUCTURE

SPANS: 90'-6"±, 94'-0"±, 98'-0"±, 68'-0"±, 105'-6"±, 69'-10½"±

ROADWAY: VARIES

LOADING: C.F. = 2000 (57)

SKEW: VARIES

APPROACH SLABS: AS-1-54 (25'-0" LONG)

ALIGNMENT: VARIES

SUPERELEVATION: VARIES

STRUCTURAL FILE NUMBER: 3101223

DATE BUILT: 1969

PROPOSED STRUCTURE

TYPE: CONTINUOUS WELDED PLATE GIRDER WITH REINFORCED CONCRETE DECK AND SUBSTRUCTURE

SPANS: 90'-6"±, 94'-0"±, 98'-0"±, 68'-0"±, 105'-6"±, 69'-10½"±

ROADWAY: VARIES

LOADING: C.F. = 2000 (57)

SKEW: VARIES

APPROACH SLABS: AS-1-54 (25'-0" LONG)

ALIGNMENT: VARIES

SUPERELEVATION: VARIES

COORDINATES: LATITUDE 39°7'2" N
LONGITUDE 84°30'2" W

PROPOSED WORK:

1. REPAIR FATIGUE CRACKS IN PIER 2, 3 & 4 STEEL CAPS.
2. REPLACE 4 CONCRETE TRUSS SUPPORT PILASTERS AND ANCHOR BOLTS. SEAL CONCRETE SURFACES OF NEW PILASTERS. THE 4 EXISTING STEEL SUPPORT BRACKETS BELOW PILASTERS ARE TO BE RE-USED.

DESIGN AGENCY
BURGESS & NIPLE
312 PLUM ST. CINCINNATI OH

DESIGNED	DRAWN	REVIEWED	DATE
SJA	SJA	JSB	8/31/2016
CHECKED	REVISED	STRUCTURE FILE NUMBER	
XAC	XXX	3101223	

GENERAL PLAN
HAM-42-0264R
RAMP FROM I-71 SB TO SB US42/US22 OVER US 42 NB

HAM-71-1.97
PID No. 82975

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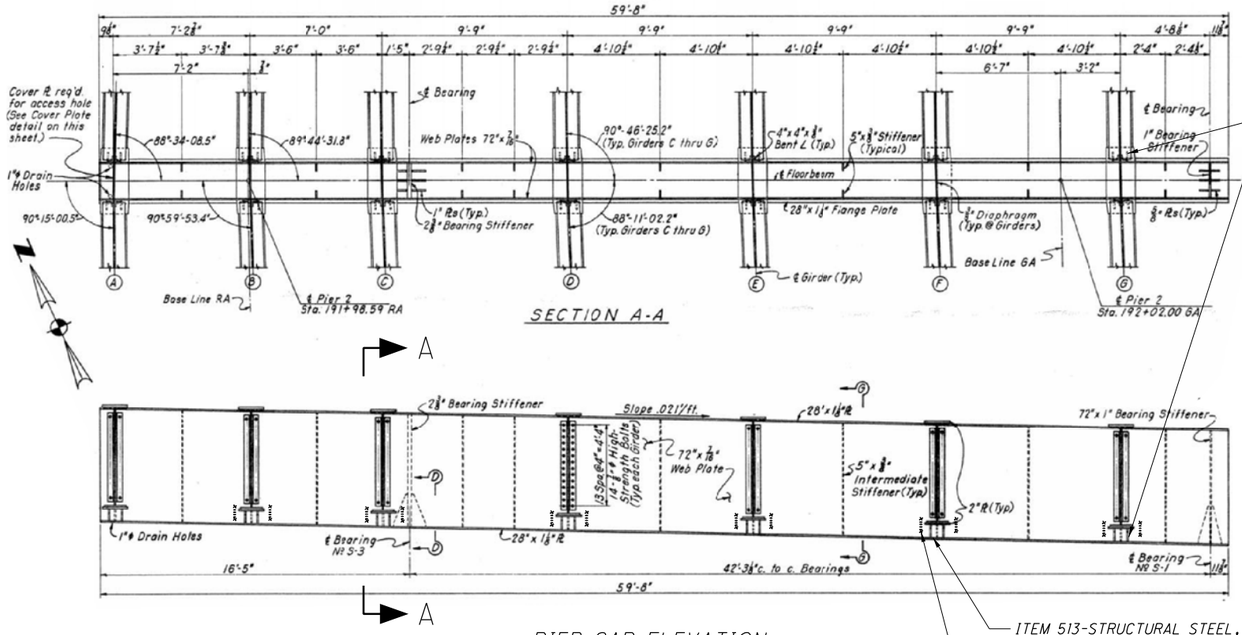


PIER CAP ELEVATION

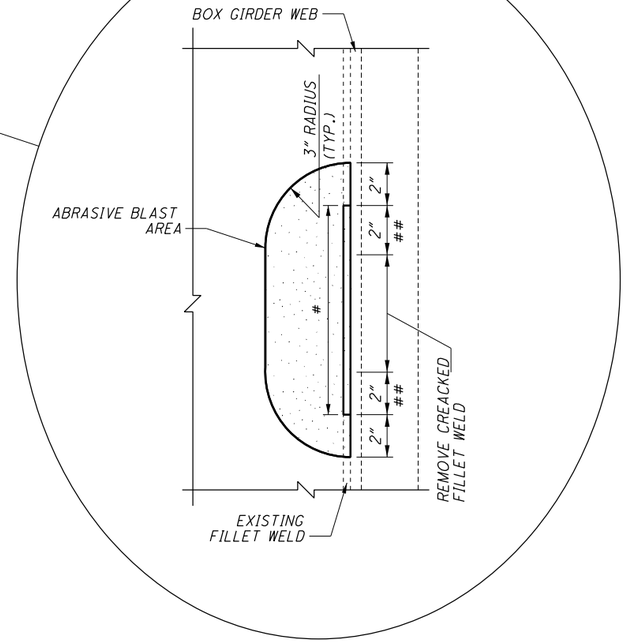
PIER 2 SHOWN

PIERS 3 AND 4 SIMILAR

REMOVE AND REPLACE ONE CRACK IN FILLET WELD BETWEEN EAST GIRDER G KNEE BRACE AND NORTH WEB OF PIER CAP 2 PAYMENT SHALL BE INCLUDED WITH ITEM 513-STRUCTURAL STEEL, MISC.: FILLET WELD CRACK RETROFIT. SEE GENERAL NOTES FOR REPAIR PROCEDURE.

ITEM 513-STRUCTURAL STEEL, MISC.: 2" STRESS RELIEF HOLE RETROFIT TYPICAL AT ALL EXISTING STRESS RELIEF RETROFIT LOCATIONS (DOG-BONE REPAIRS) DONE PREVIOUSLY.

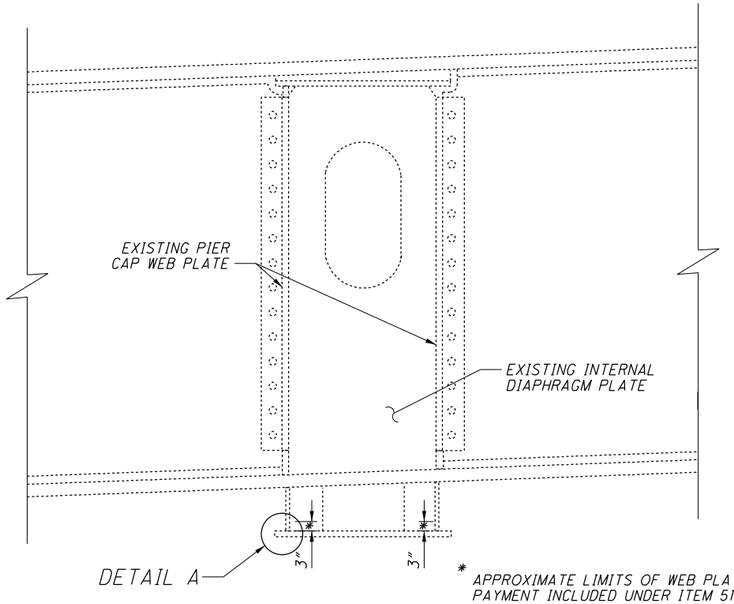
EXISTING STRESS RELIEF RETROFIT LOCATIONS (DOG-BONE REPAIRS) DONE PREVIOUSLY.



FILLET WELD CRACK RETROFIT DETAILS

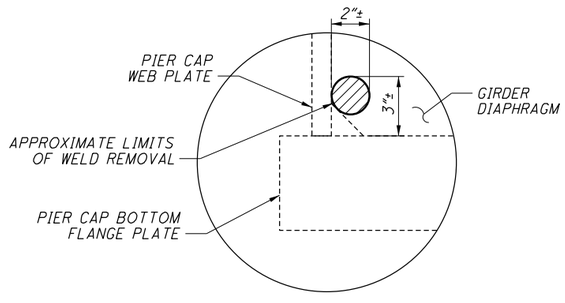
(INSIDE ELEVATION)

\# = PROVIDE NEW FILLET WELD
\## = REMELT EXISTING FILLET WELD AND INCORPORATE IN THE NEW WELD



* APPROXIMATE LIMITS OF WEB PLATE WELD REMOVAL. PAYMENT INCLUDED UNDER ITEM 513-STRUCTURAL STEEL, MISC.: 2" STRESS RELIEF HOLE RETROFIT.

SECTION A-A



DETAIL A

ITEM 513-STRUCTURAL STEEL, MISC.: 2" STRESS RELIEF HOLE RETROFIT

PERFORM THE REPAIRS DESCRIBED BELOW AT PIERS 2, 3 & 4.

PIER 2 - 12 LOCATIONS
PIER 3 - 10 LOCATIONS
PIER 4 - 10 LOCATIONS

SEE GENERAL NOTES FOR REPAIR PROCEDURE.

DESIGN AGENCY
BURGESS & NIPLE
312 PLUM ST. CINCINNATI OH

DESIGNED	DRAWN	REVIEWED	DATE
SJA	SJA	JSB	8/31/2016
CHECKED	REVISED	STRUCTURE FILE NUMBER	
XAC	XXX	3101223	

PIER CAP RETROFIT DETAILS

HAM-42-0264R

RAMP FROM I-71 SB TO SB US42/US22 OVER US 42 NB

HAM-71-1.97

PID No. 82975

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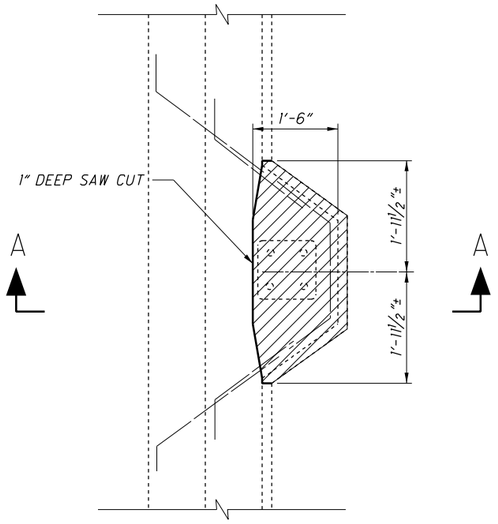
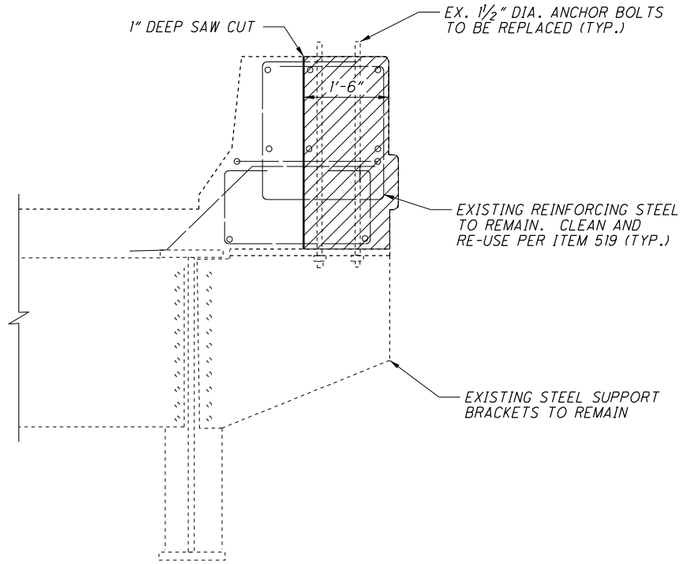


REMOVAL PLAN

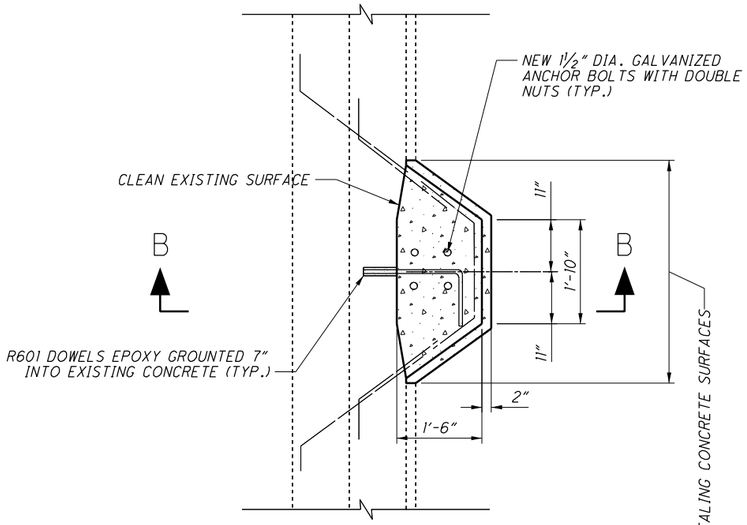


SECTION A-A

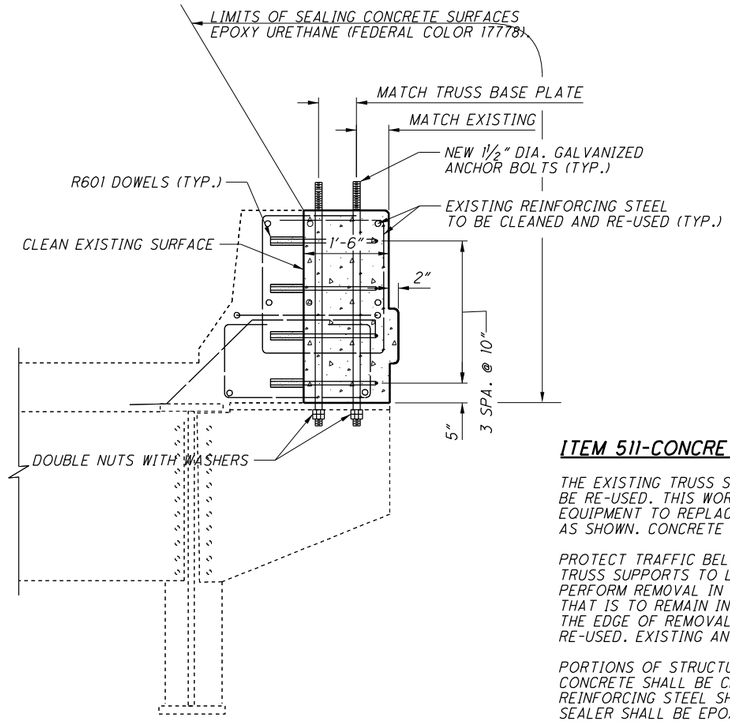
LEGEND:

= LIMITS OF EXISTING CONCRETE REMOVAL

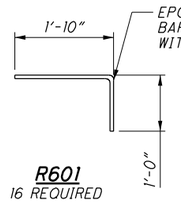
= LIMITS OF NEW CONCRETE



REPAIR PLAN



SECTION B-B



R601
16 REQUIRED

ITEM 511-CONCRETE, MISC.: REPLACE CONCRETE PILASTERS

THE EXISTING TRUSS SUPPORT ANCHOR BOLTS ARE RUSTED TO A POINT THEY CANNOT BE RE-USED. THIS WORK CONSISTS OF FURNISHING ALL NECESSARY LABOR, MATERIALS AND EQUIPMENT TO REPLACE THE EXISTING 16 ANCHOR BOLTS AND 4 CONCRETE PILASTERS AS SHOWN. CONCRETE PILASTER DIMENSIONS TO MATCH THE EXISTING STRUCTURE.

PROTECT TRAFFIC BELOW STRUCTURE BEFORE REMOVALS. REMOVE EXISTING CONCRETE TRUSS SUPPORTS TO LIMITS SHOWN AFTER SAW-CUTTING PERIMETER 1" DEEP. PERFORM REMOVAL IN SUCH A MANNER AS NOT TO DAMAGE OR SHATTER THE CONCRETE THAT IS TO REMAIN IN PLACE. MAKE SQUARE OR SLIGHTLY UNDER CUT SHOULDERS AT THE EDGE OF REMOVAL AREAS. EXISTING REINFORCING STEEL IS TO BE CLEANED AND RE-USED. EXISTING ANCHOR BOLTS SHALL BE REPLACED.

PORTIONS OF STRUCTURE REMOVED SHALL BE PER ITEM 202
CONCRETE SHALL BE CLASS QC2, BRIDGE DECK (PARAPET) PER ITEM 511.
REINFORCING STEEL SHALL BE EPOXY COATED GRADE 60 PER ITEM 509.
SEALER SHALL BE EPOXY URETHANE PER ITEM 512.
DOWEL HOLES SHALL BE PER ITEM 510.
GALVANIZED ANCHOR BOLTS, WASHERS AND NUTS SHALL BE PER ITEM 630.

THE COST OF ALL LABOR, MATERIALS AND EQUIPMENT NECESSARY TO PERFORM WORK SHOWN ON THIS SHEET SHALL BE INCLUDED IN THE LUMP SUM PAYMENT FOR ITEM 511 - CONCRETE, MISC.: REPLACE CONCRETE PILASTERS

DESIGN AGENCY
BURGESS & NIPLE
312 PLUM ST. CINCINNATI OH

DESIGNED	DRAWN	REVIEWED	DATE
SJA	SJA	JSB	8/31/2016
CHECKED	REVISED	STRUCTURE FILE NUMBER	
XAC	XXX	3101223	

LIGHT PILASTER REPLACEMENT DETAILS
HAM-42-0264R
RAMP FROM I-71 SB TO SB US42/US22 OVER US 42 NB

HAM-71-1.97
PID No. 82975

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EXHIBIT 3 – ODOT ASSETWISE FIELD REPORT

Inspector: Seal,Michael
Inspection Date: 08/05/2024
Structure Number: 3101223
Facility Carried: RMP I71 TO US22/42

Ohio Bridge Inspection Summary Report

HAM-00042-0264R (3101223)

2: District	District 08	15000 - CINCINNATI (HAM county)	
5A: Inventory Route	1	00071	
21: Major Maint A/B	01 - State Highway Agency	/	
225 Routine Main A/B	01 - State Highway Agency	/	
221 Inspection A/B	01 - State Highway Agency	/	
220: Inv. Location	DISTRICT 08		
7: Facility On	RMP I71 TO US22/42		
6: Feature Ints	I71S RMP/US42/EDEN PARK		
9: Location	W OF EDEN PARK		
Lat, Lon	39.118490492	,-84.499742039	

Condition

58: Deck	**7 - Good Condition**
58.01 Wearing Surface	7 - Good (1% distress)
58.02 Joint	6- Satisfactory (isolated 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	76.2 SD/FO 2 - FO
36: Rail, Tr, Gd, Term Std	1 1 1 1
72: Approach Alignment	9 - Superior to present desirable criteria
113: Scour Critical	N - Not over waterway
71: Waterway Adequacy	N - Not Applicable

Geometric

48: Max Span Length (ft)	106.0
49: Structure Length (ft)	528.0
52: Deck Width, Out-To-Out (ft)	40.3
424: Deck Area (sf)	21278.4
32: Appr Roadway Width (ft)	43.0
51: Road Width, Curb-Curb (ft)	38.0
50A: Curb/SW Width: Left (ft)	0
50A: Curb/SW Width: Right (ft)	0
34: Skew (deg)	3
33: Bridge Median	0 - No median
54B: Min Vert Underclearance (ft)	31.5
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 (%)	150
704: Analysis Date	07/01/1983
63: Analysis Method	7 - Allowable Stress (AS) rating reported by rating factor (RF) method using MS18 loading.

Structure Type

43: Bridge Type	4 - Steel continuous 02 - Stringer/Multi-beam or Girder N- Not Applicable
45: Spans Main / Approach	6 / 0
107: Deck Type	1 - Concrete Cast-in-Place
408: Composite Deck	U - Unknown
414A Joint Type 1	8 - Elastomeric Strip Seal
414B: Joint Type 2	N - None
108A: Wearing Surface	3 - Latex Concrete or similar additive N- Not Applicable
422: WS Date	08/30/1996
423: WS Thick (in)	1.7
482: Protective Coating	5 - Paint System OZEU
483: PCS Date	07/01/2010
453: Bearing Type 1	2 - Rockers & Bolsters
455: Bearing Type 2	N - None
528: Foundn: Abut Fwd	1 - Steel H Piles (Other size)
533: Foundn: Abut Rear	1 - Steel H Piles (Other Size)
536: Foundn: Pier 1	1 - Steel H Piles (Other size)
539: Foundn: Pier 2	4 - Spread Footing (on Soil)

Age and Service

27: Year Built/ 106 Rehab	1969 / 0000
42A: Service On	6 - Overpass structure at an interchange or second level of a multilevel interchange
42B: Service Under	1 - Highway, with or w/out pedestrian
28A: Lanes on	02
28B: Lanes Under	09
19: Bypass Length	2
29: ADT	9785
109: % Trucks (%)	5

Inspections

		Months	
90: Routine Insp.		12	08/03/2023
92A: FCM Insp.	Y	24	06/25/2023
92B: Dive Insp.	N	0	
92C: Special Insp.	N	0	
92D: UBIT Insp.	N	0	11/05/2014
92E: Drone Insp.	N	0	

Inspector Seal,Michael

Inspector:	Seal,Michael	**Structure Number:**	3101223
Inspection Date:	08/05/2024	**Facility Carried:**	RMP I71 TO US22/42

Inspector:	Seal,Michael	**Structure Number:**	3101223
Inspection Date:	08/05/2024	**Facility Carried:**	RMP I71 TO US22/42

	Environment	Total Quantity	Units	Condition State 1	Condition State 2	Condition State 3	Condition State 4
12-Reinforced Concrete Deck	3 - Mod.	21252	sq. ft.	18779	2470	3	0
	-The top of deck was walked along the right shoulder for the 2023 inspection. -The deck is in good condition overall. There are minor haunch spalls with exposed rebar chairs. -CS2: The soffit exhibited map and transverse cracks at crossframe locations, and transverse cracks with efflorescence randomly throughout the structure(2470 SF). No major changes overall from the 2022 inspection. -CS3: An isolated location of honeycombing/spall (3SF) with exposed steel reinforcing was noted in Bay 2 near Abutment 2.						
510-Wearing Surfaces		20064	sq. ft.	17481	2583	0	0
	The wearing surface is in good condition, with minor random cracks and small isolated delaminations at random locations. CS2: Hairline transverse and longitudinal cracks throughout, and minor delamination in the right lane over Span 5. (2583 SF)						
107-Steel Open Girder/Beam	3 - Mod.	3454	ft.	3435	19	0	0
	CS2: Section loss of up to 1/8in. was observed on the Girder G lower flange and web stiffener behind the rocker bearing at Abutment 2. This is past the bearing and the load has been transferred to the substructure at this location (2LF). CS2: Localized corrosion and water staining is present on the bottom flange splices in Span 2 and the outside beams ends at the forward part of the bridge. This has not changed. (8LF) CS2: The 13th web stiffener in Span 3 (from Pier 4) on Girder G is bent (just north of the sign supports). No change (1LF). CS2: Localized minor distortion (likely construction damage) was noted on the bottom flange of Girder G just north of the south bottom flange transition in Span 4. The east edge of the flange is bent downward, and the west half of the flange is bent upward (8LF). - Sign support brackets are connected to the fascia girder webs north of Pier Cap 3 in Span 4 to support the overhead sign supports for the overhead signs above the roadway. No changes or cracks noted. General: Girders B and C terminate prior to Abutment 2. The superstructure alignment is good with no major defects to note. Isolated locations of tack welds exist between the connection angles and the girder webs at girder connections to the pier caps. Most of the tack welds have been removed (ground down) at these locations. No change. The cross frames are welded and bolted to the vertical stiffeners of the girders.						
515-Steel Protective Coating		59566	sq. ft.	59546	14	6	0
	CS2: Very minor areas of active corrosion throughout (20SF). CS3: Localized corrosion and water staining is present on the bottom flange splices in Span 2 and the outside beams ends at the forward part of the bridge. Section loss of up to 1/8in. was observed on the Girder G lower flange and web stiffener behind the rocker bearing at Abutment 2. This is past the bearing and the load has been transferred to the substructure at this location.						
205-Reinforced Concrete Column	3 - Mod.	11	each	7	4	0	0
	The west column for Pier Cap 3 has an overhead light and junction box mounted to the north face. CS2: There are isolated spalls and delaminations on the columns, generally at the corners. No exposed rebar was present. The largest is on the west column of Pier 4. (4)						
215-Reinforced Concrete Abutment	3 - Mod.	108	ft.	87	21	0	0

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	Environment	Total Quantity	Units	Condition State 1	Condition State 2	Condition State 3	Condition State 4
	CS2: Abutment 1: The east end of the bearing seat between Girders 6 and 7 has a deck drainpipe that runs through the stem. It appears that the drainpipe is clogged inside the stem due to water staining and small sediment present on the abutment seat, the breastwall, and down along the slope protection. This is an old comment that does not appear to have changed since the prior inspection. Some minor crack (7LF) are present on the abutment around this area. CS2: Abutment 2: At the corner where the backwall meets the abutment seat, the concrete has poor finish work behind Girders C and D (old comment); there is one errant rebar that sticks up (stem reinforcing is exposed) and minor cracks are present. There is water and rust staining on the backwall and abutment seat due to the leaking joint above. The abutment has previously been sealed and painted (14LF).						
231-Steel Pier Cap	3 - Mod.	180	ft.	125	55	0	0
	The web plates have been retrofit with stress relief drilled holes connected by vertical saw-cuts adjacent to the welded connections of the girder bottom flange tie plates at all girders, 2017. The retrofit for the intersecting welds of the girder interior diaphragm stiffeners to the bottom flange were non-performed due to the welds not intersecting. See inspection report for RFI 5 details. No change to this. CS2: Pier 3, corrosion holes are present at the base of the knee braces at the east end of the cap. The northern knee brace corrosion hole measures 5 in. x 5 in and the center brace measures 3 in. high x up to 4-1/2 in. wide (Photographs 29 and 30). This has increased since the prior inspection. Painted over pitting is present in isolated areas on the exterior of the cap and on the interior near the ends. On the interior some of this has reactivated. CS2: several minor cracks to the knee braces supporting girders framing into pier caps, see below: Pier 2 -A 1/4 in. long vertical crack was present at the bottom of the fillet weld between the pier cap south web and the east knee brace below Girder G on the west stiffener of the seat connection -A 3/16 in. long vertical crack was present at the bottom of the fillet weld between the pier cap north web and the east knee brace below Girder C on the north cap web plate -A 1/8 in. long vertical crack was present at the bottom of the fillet weld between the pier cap north web and the west knee brace below Girder C Pier 3 -A 3/16 in. long vertical crack was present at the bottom of the fillet weld between the pier cap south web and the east knee brace below Girder B. The crack has not propagated into the base metal and has not changed since the prior inspection -There are minor areas of active corrosion or pitting and various weld defects. Several previous repair areas were not repainted and the bare steel is exposed on cap interiors. (50ft). -There are various gouges, tack welds, weld remnants, undercuts, porosity, backing bars, etc. present on the cap interiors. These are all old comments and have not changed for this inspection. -Triaxial welds are present but no cracks have currently resulted from excessive restraint.						
300-Strip Seal Expansion Joint	3 - Mod.	81	ft.	57	24	0	0
	CS2: The deck joint over Abutment 1 is leaking in Bay 4 (no change). The deck joint over Abutment 2 is leaking in Bays 3 and 4 (no change). 24LF total						

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	Environment	Total Quantity	Units	Condition State 1	Condition State 2	Condition State 3	Condition State 4
311-Movable Bearing	3 - Mod.	25	each	13	12	0	0
	CS2: Active laminating surface corrosion is present throughout the bearings, usually on the masonry plate (9). Painted over pitting up to 1/16in. deep is present on the masonry plate at Girder D, Abutment 1. Fascia girder bearings exhibit active corrosion with minor soil and debris present. Steel cap pot bearings are in good condition. The bearings overall function as designed. CS2: The bearings at Abutment 2 have active corrosion and rust staining and debris on the bearing and the masonry plate. The bearings appear to function as intended. -The rocker bearings at Abutment 1 were not uniformly in expansion at the time of the inspection. Girders A and G were expanded less than the others. This appears similar to prior inspections. - The rocker bearings at Abutment 2 are in expansion between 8 and 11 degrees at 70F. - The rocker bearing anchor bolt under Girder B at Pier Cap 5 is not fully seated.						
321-Reinforced Concrete Approach Slab	3 - Mod.	2150	sq. ft.	2062	88	0	0
	CS2: The forward approach slab and the forward approach roadway have a minor vertical misalignment, which is causing minor impact damage to the end of the approach slab. Both approach slabs have a few small spalls/popouts along the edges. Light is present scaling in the forward slab and has not changed. (88 SF)						
331-Reinforced Concrete Bridge Railing	3 - Mod.	1060	ft.	625	435	0	0
	CS2: The parapet was sealed in the past; however, the parapet exhibits minor vertical cracks at intervals spaced 3ft to 5ft throughout. Minor impact scrapes are present. Delaminations are present on the top corner of the left rear parapet, with some minor areas of collision damage (435ft). No major changes overall.						
815-Drainage	3 - Mod.	4	each	2	0	2	0
	-The previously welded brackets to the pier cap webs have been removed as part of past rehabilitation efforts and are now secured via bolted connections. -CS3: The drainage at Abutment 1 is clogged and exhibits rust staining down the abutment wall and section loss/small rust holes at ends of downspout; this is an old comment that has not changed. -CS2: The drainpipes through the slope protection at Abutment 2 have corrosion and section loss up to 1/8in. at the outlets of the pipes. -CS2: Drains and scuppers exhibit signs of being clogged due to debris.						
830-Abutment Backwall	3 - Mod.	108	ft.	100	8	0	0
	CS2: Minor vertical cracks in both abutment backwalls, along with rust staining in abutment 1 backwall in bay 4. (8')						

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HAM-00042-0264R_(3101223)

ODOT District:	District 08					Date Built:	07/01/1969
Major Maint:	01 - State Highway Agency	Facility Carried:	RMP I71 TO US22/42	Traffic On:	6 - Overpass structure at an interchange or second level of a	Rehab Date:	
Routine Maint:	01 - State Highway Agency	Feature Inters:	I71S RMP/US42/EDEN PARK	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	W OF EDEN PARK		Insp Resp B:	
Inspector	Seal,Michael	Inspection Date	08/05/2024	Reviewer	Not Approved		

Inspector Comments - Deck and Approach

Deck

- The top of deck was walked along the right shoulder for the 2023 inspection.
- The deck is in good condition overall. There are minor haunch spalls with exposed rebar chairs.
- The soffit exhibited map and transverse cracks over the crossframes, with efflorescence present randomly along the structure. No major changes overall from the 2022 inspection.
- An isolated location of honeycombing (2SF) with exposed steel reinforcing was noted in Bay 2 near Abutment 2.
- The wearing surface is in good condition, with minor random cracks and small isolated delaminations at random locations.
- The parapet was sealed in the past; however, the parapet exhibits minor vertical cracks at intervals spaced 3ft to 5ft throughout. Minor impact scrapes are present. No major changes overall.
- See the individual element comments for specifics.

Approach

- The right shoulder of the approach was walked in 2022.
- The south approach has a few broken up sections, mostly towards the center, with potholes and cold patch repairs present. A few random cracks are present in the asphalt.
- The approach roadway is ravelly but overall has a smooth transition from the approach slab.
- Approach guardrail is in good condition, no defects noted.
- Approach slab visible and has minor cracking and small spalls throughout.
- Trees are present on the roadway shoulder at the west end of Span 1 and the west (right) shoulder in the south approach. These can be cut back.

Inspector Comments - General Appraisal

Superstructure

- Superstructure have minor corrosion and pitting to girders and steel pier caps.
- Bearings have minor surface corrosion/pitting to bearings throughout.
- Steel pier caps have areas of corrosion and pitting as well as non-active small cracks in steel knee braces supporting girders. Retrofits were performed in 2017 to address fatigue prone details throughout the three caps. The web plates have been retrofit with stress relief drilled holes connected by vertical saw-cuts adjacent to the welded connections of the girder bottom flange tie plates at all girders, 2017. The retrofit for the intersecting welds of the girder interior diaphragm stiffeners to the bottom flange were non-performed due to the welds not intersecting. See inspection report for RFI 5 details.
- Pier 2 knee brace below Girder G, north web, 1/4" crack in weld, Pier 2 knee brace below Girder C, north web, 3/16" crack, Pier 2 knee brace below Girder C, south web, 1/8" crack in weld, Pier 3 knee brace below Girder B, south web, 3/16" crack in weld. No crack propagation observed during 2021 inspection.
- See the individual element comments for specifics.

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Substructure

- Substructures have minor vertical cracking throughout pier columns and abutments and some minor spalls in wingwalls.
- Abutments have minor vertical cracking and rust staining in stems and backwalls.
- Wingwalls have minor cracking and some spalls throughout, one with exposed rebar.
- Piers have only minor cracking and very small spalls some pier columns.
- See the individual element comments for specifics.

Non-element substructure comments include:

Slope Protection

-Under Pier 1 at Column 3, the slope protection has settled up to 4 inches.

-The slope protection around Abutment 1 and the east side of the slope protection at Abutment 2 has light vegetation growth along the joints throughout. Vegetation is starting in the western joint at Abutment 2.

-There is a full length 2in. wide x 1in. deep settlement along one joint of the slope protection under Bay 1.

Wingwalls

-The southwest wingwall has sealed cracks with efflorescence at the west corner of Abutment 1; no change.

-Spalls are present on the wingwalls. These are at: 1.5ft high x 6in. long x up to 2ft deep spall at the southeast wingwall joint with a 4ft long section of missing joint filler; 5ft high x 5in. long x 10in. deep spall at a joint in the southeast wingwall joint approximately 100' south of the abutment; has slightly grown.

-The northeast wingwall could be considered a continuation of Abutment 2 due to proximity to the adjacent bridge abutment.

-Minor spalls/popouts are typical along the wingwalls due to formwork attachments during construction.

-The embankments are in good conditin with no major defects.

Culvert

Inspector Comments - Waterway

Waterway Adequacy

Channel

Scour Critical

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Bridge Inspection Report

Pictures

PHOTO 1

Description Bridge endview looking north

PHOTO 2

Description Bridge endview looking south

Pictures

PHOTO 3

Description General bridge underview, looking south from the north end.

PHOTO 4

Description General bridge underview, looking north from the south end.

Pictures

PHOTO 5

Description View of the south approach slab. Note approach pavement has settled and potholes are present.

PHOTO 6

Description View of the north approach slab.

Pictures

PHOTO 7

Description View of south deck joint, looking east. Note debris impaction.

PHOTO 8

Description View of north deck joint, looking east. Note debris impaction.

Pictures

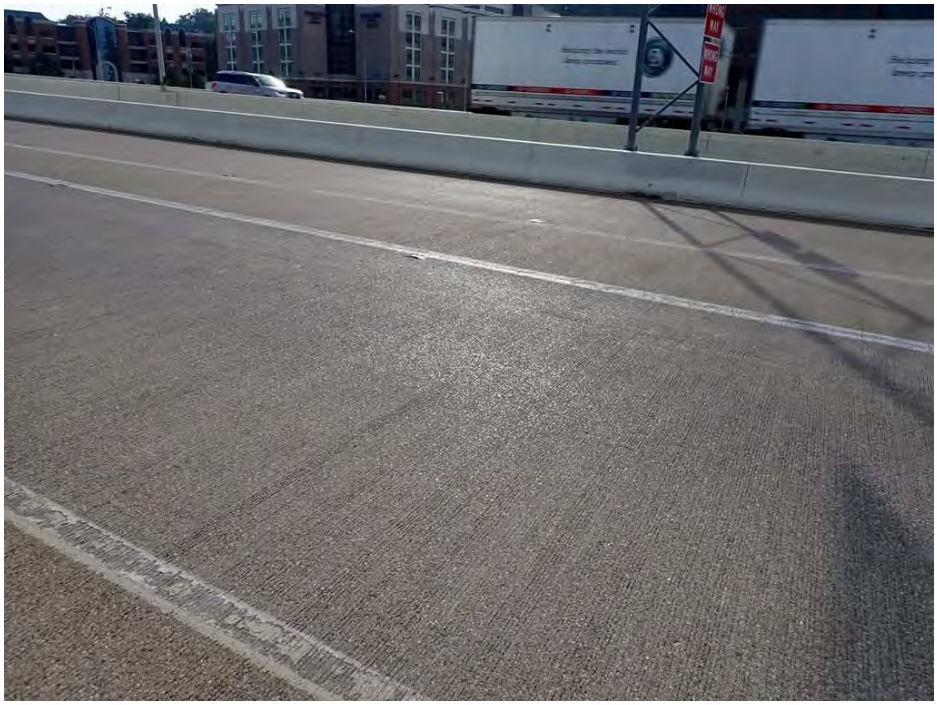

PHOTO 9

Description Typical deck condition, span 2 shown.

PHOTO 10

Description Typical rail condition, west rail shown. Note vertical cracks present on the rail.

Pictures

PHOTO 11

Description View of tree encroaching on roadway on the south approach, west side. Looking north.

PHOTO 12

Description View of the tree in Span 1, west end, encroaching on the roadway. Looking north.

Pictures

PHOTO 13

Description Typical girder/superstructure condition. Note no major defects. Span 4 shown looking south.

PHOTO 14

Description Typical girder/superstructure condition. Note no major defects. Spans 2 and 3 shown looking south.

Pictures

PHOTO 15

Description View of the bent web stiffener in Span 3, Girder G, just north of the sign supports (13th from Pier 4). No change. Looking west.

PHOTO 16

Description Example of heavy laminating corrosion on rocker bearing. Girder A at Abutment 1 shown looking south.

Pictures

PHOTO 17

Description Example of heavy corrosion on Abutment 2 bearings, also note bearing rocked far in expansion. Typical at this abutment.

PHOTO 18

Description Laminating corrosion on the bearing for Girder A, Abutment 2, looking north. Bearing is still able to move.

Pictures

PHOTO 19

Description Spalls on the northwest corner of the west column at Pier 4. Appear new since last inspection.

PHOTO 20

Description Rust staining in Bay D (4) on the Abutment 1 backwall. Looking south.

Pictures

PHOTO 21

Description General example of rust staining on the Abutment 2 backwall, looking north.

PHOTO 22

Description General example of vertical crack on the abutment backwalls. Abutment 2 shown looking north.

Pictures

PHOTO 23

Description View of clogged downspout at the east end of Abutment 1, no change. Looking southeast.

PHOTO 24

Description Close up view of clogged downspout at the east end of Abutment 1, looking southeast.

Pictures

PHOTO 25

Description Typical example of corrosion holes in corrugate metal drain pipes on the north slope.

PHOTO 26

Description General examples of vegetation growing through the slope protection, slope under Spans 1 and 2 shown looking south.