



FRACTURE CRITICAL PIER CAP INSPECTION REPORT

**SFN3110656 (HAM-75-1192R)
I-75 NB OVER MILL CREEK, BENSON
AVE/SHEPHERD AVE, NS RR
HAMILTON COUNTY, OH
DISTRICT 8**

October 2023

Prepared for:



Prepared by:

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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 of bridges for the Ohio Department of Transportation, District 8.
- Inspection Team:** Team Leader – Michael Seal, P.E. – Collins Engineers, Inc.
Team Member – Matthew McFadden, E.I.T. –Gannett Fleming, Inc.
- Inspection Date(s):** July 14, 30, and October 14, 2023

Summary of Findings:

- **Pier Cap 5:**
 - A retrofit was performed previously to the interior consisting of backer bars removed along portions of the bottom corners, likely at butt weld locations. This retrofit is functioning as intended with no changes.
 - Tack welds and stitch welds are present at other, isolated locations. These are all previously noted and have not changed for this inspection. One plug weld was located at east of the Girder 6 diaphragm on the south cap web plate. No cracks were noted at the plug weld.
 - Active corrosion is present on the cap exterior. Little to no section loss was present at these locations.
 - Discontinuous, overlapping, and uneven weld throat are present for the welds connecting the exterior bottom flange plate and the cap web plates. These all were previously documented and have not changed for this inspection.
- **Pier Cap 16:**
 - As part of the 1993 rehabilitation project, many (but not all) tack welds were removed from the interior along the cap webs, the bottom flange plate, and backer bars. Isolated portions of backer bar along the cap bottom flange plate were removed along the length of the pier cap to eliminate butt joints. Additionally, 1 in. diameter holes were drilled through the webs of the pier cap on both sides of the girder webs, in which bolts were installed. There are multiple locations of poorly performed or incomplete sawcuts, and are detailed below in Section 2.1.2.2. These locations overall have not changed since the prior inspection.
 - Discontinuous and/or overlapping welds are present for the welds connecting the exterior bottom flange plate and the cap web plates. These all were previously documented and have not changed for this inspection.
 - Active corrosion is present on the cap exterior. Little to no section loss was present at these locations. Overall there are no changes from the prior inspection.
- **Pier 20:**
 - A new weld crack has developed on the interior of the cap at a location of intersecting/triaxial welds at the Girder 1 diaphragm. This crack is located on the west face of the diaphragm, at the south web plate. The crack is oriented vertical, on the diaphragm side of the vertical fillet

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weld (on the top part of the tie plate). The crack measures 1-5.8 in and was not present during the 2021 inspection.

- As part of the 1993 rehabilitation project, many (but not all) tack welds were removed from the interior along the cap webs, the bottom flange plate, and backer bars. Isolated portions of backer bar along the cap bottom flange plate were removed along the length of the pier cap to eliminate butt joints. Additionally, 1 in. diameter holes were drilled through the webs of the pier cap on both sides of the girder webs, in which bolts were installed. There are multiple locations of poorly performed or incomplete sawcuts, and are detailed below in Section 2.1.3 and 2.1.3.2. These locations overall have not changed since the prior inspection.
- Discontinuous and/or overlapping are present for the welds connecting the exterior bottom flange plate and the cap web plates. These all were previously documented and have not changed for this inspection.

Summary of Recommendations:

- The weld crack observed on the interior of Pier 20 should be monitored for changes or propagation during future inspections. Consideration should be given to putting this cap on a more frequent monitoring cycle than NSTM inspections. It should be noted that this cap is accessible with a 46 ft bucket truck and the interior accessed without needing traffic control.
- Future inspections should scrutinize locations of intersecting and triaxial welds on the cap interiors to ensure there are no weld cracks.
- Future inspections should continue to monitor the retrofits performed for any changes in condition or cracks developing on welded connections. For this inspection there were no observable changes from the prior conditions.
- Future inspections should scrutinize locations of continuous and overlapping welds on the exterior connecting the bottom flange plates and the cap web plates. Currently there are no cracks present.
- Future inspections should monitor locations of active corrosion on the cap bearings and on the exterior portions of the cap. Currently there is no section loss to these locations.

NBI Ratings:

Item ID	Description	Condition Rating	Summary
B.C.14	NSTM	5-Fair	New weld crack at triaxial weld. Fatigue retrofits present, overlapping welds present. Minor surface corrosion.

AASHTO National Bridge Element (NBE) Ratings:

Element #	Description	Units	Total	Condition State			
				1	2	3	4
152	Steel Floor Beam	LF	213	194	18	1	0

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

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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-75 NB Bridge over Mill Creek, Benson Ave/Shepherd Ave, NS RR in Hamilton County, OH. Collins Engineers, Inc. (Collins) conducted the fracture critical pier cap investigation for the Ohio Department of Transportation (ODOT), District 8 on July 24, 30, and October 14, 2023.

1.2 General Description of the Structure

The HAM-75-1192R Bridge is a 22-span welded steel plate girder structure with a reinforced concrete deck that carries three lanes of northbound Interstate I-75 traffic over Mill Creek, Benson Avenue, Shepherd Avenue (Figure 1). Mill Creek passes beneath the structure twice due to a bend in the channel. Two parallel Norfolk Southern railroad tracks also pass beneath the structure. The overall length of the bridge is 2,417.5 feet.

This bridge is oriented roadway south to north, and superstructure units are labeled from left to right looking roadway north. Substructure units are labeled as Rear and Forward Abutments (Abutments 1 and 2) and Piers 1 through 21. Refer to Photographs 1 and 2 below for overall views of the bridge superstructure.

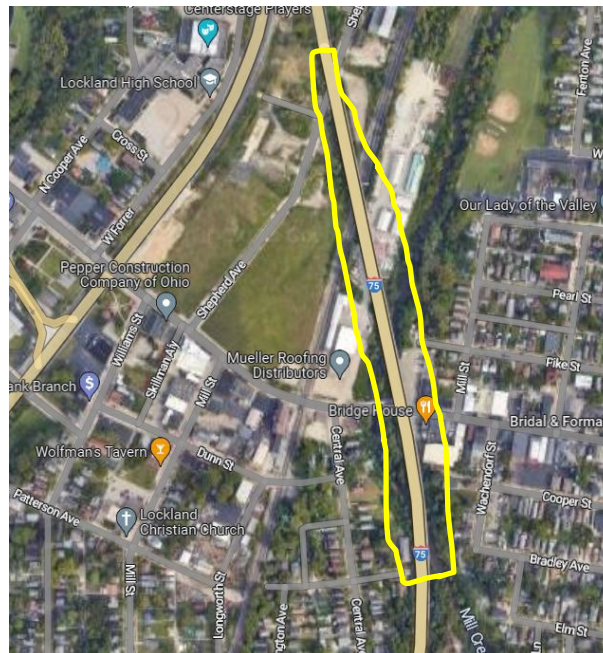


Figure 1: Bridge Location Map

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Photograph 1 – Elevation View of Pier 16. Looking Northeast.



Photograph 2 – Elevation View of Pier 5. Looking South.

The structure has three fracture critical pier caps which are located at Pier 5, Pier 16, and Pier 20. All three pier caps are welded steel plate box girders that are simply supported on two circular reinforced concrete columns.

Pier Cap 5 straddles Mill Creek and is simply supported between two circular reinforced concrete columns spaced 49 ft - 3 in. center-to-center. The west bearing allows for expansion while the east bearing is fixed. The web plate height is 72 in. across the length of the pier cap. Seven continuous welded steel I- girders sit on the top flange of the pier cap.

Pier Cap 16 straddles two parallel Norfolk Southern railroad tracks and is simply supported between two circular reinforced concrete columns spaced 87 ft -10 in. center-to-center. The west bearing is fixed while the east bearing allows for expansion. The web plate height is 120 in. across the length of the pier cap. Seven welded steel I-girders frame into the pier cap and are made continuous by bottom flange splice plates that pass through the web plates of the pier cap and by top flange splice plates that pass above the top flange of the pier cap. The girder webs are connected to the pier cap web plates by transverse fillet welds.

Pier Cap 20 straddles Shepherd Avenue and is simply supported between two circular reinforced concrete columns spaced 64 ft -1 1/2 in. center-to-center. The west bearing allows for expansion while the east bearing is fixed. The web plate height is 96 in. across the length of the pier cap. Seven welded steel I- girders frame into the pier cap and are made continuous by bottom flange splice plates that pass through the web plates of the pier cap and by top flange splice plates that pass above the top flange of the pier cap. The girder webs are connected to the pier cap web plates by transverse fillet welds.

The nomenclature and girder designation shown on the design plans were used in the inspection of the pier cap. The bridge was rehabilitated in 1993 to address some fatigue-prone details. Some tack welds/stitch

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welds that attach backer bars to the pier cap webs and bottom flange plates were removed throughout the pier caps. Sections of damaged backer bar have been removed at select locations throughout the lengths of the pier caps. The original asphalt-impregnated gaskets on the interiors of the access hatches were removed and replaced with neoprene closed cell sponges.

1.3 Method of Investigation

Between July 14, 2023, and October 14, 2023, Collins Engineering, Inc. performed an in-depth inspection of the fracture critical pier caps. A two-person team consisting of a professional engineer and NBI team leader (Michael Seal, P.E.) and team member Matthew McFadden, E.I.T. (Gannett Fleming) performed field work at these pier caps. These piers were accessed with a myriad of methods (detailed below). Pier 5 was accessed with the ODOT snooper. Pier 16 was accessed with an 86 ft. self-propelled manlift and railroad flagger. Pier 20 was accessed with a 46-ft. bucket truck. OSHA compliant safety harnesses and lanyards were worn by inspectors when working in the lift bucket. The pier cap hatch cover bolts were removed for the entry and replaced with an impact wrench, and the hatch resealed with exterior grade silicone caulk after the inspections. Various socket sizes from 1/2 in. to 15/16 in. were required to remove the hatch bolts.

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.

The inspection of Pier Cap 5 was performed on July 30, 2023. MoT consisting of a right lane closure was performed by ODOT resources as part of the routine NBI inspection of this bridge. Access to the cap was gained by use of the ODOT underbridge vehicle, deployed on the east side of the bridge and entering from the east hatch. A truck mounted attenuator was placed behind the snooper to protect the inspection crew.

Pier Cap 16 was inspected on October 14, 2023. An 86 ft manlift was used to inspect the cap. Site railroad flagging was performed by RailPros. It should be noted, as with the 2021 inspection, that it took multiple months (>5) to appropriately get right of entry and other permitting issues resolved, plus time for finding an available flagger and track time to access structure. Future inspections should continue to plan for additional time and coordination with Norfolk Southern and RailPros.

Pier Cap 20 was inspected on July 14, 2023. The cap was accessed using a 46 ft bucket truck. Traffic control was provided by A&A Safety, which consisted of a single lane closure on Shephard Avenue between the hours of 8:00 AM and 4:00 PM.

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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. Magnetic particle testing was performed at crack locations to verify crack propagation if necessary. 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 cap.

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.

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

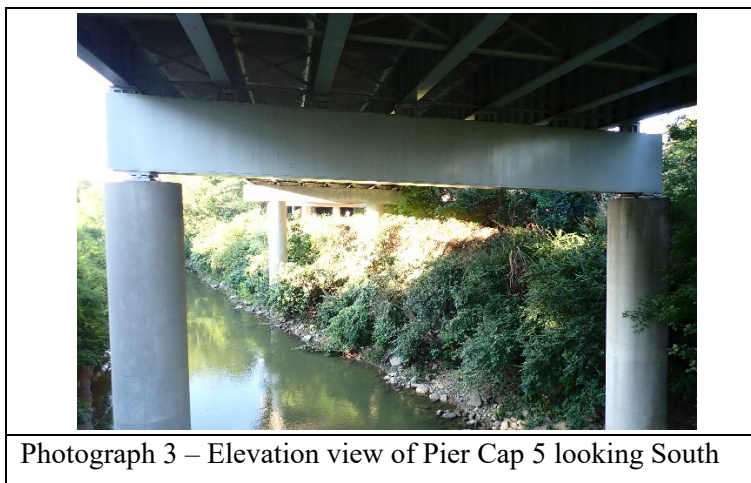
1. Manual of Bridge Inspection, Ohio Department of Transportation (ODOT), 2014.
2. Manual for Bridge Element Inspection, AASHTO, 2019.
3. Bridge Inspector's Reference Manual, U.S. Department of Transportation, 2002 (rev 2012).
4. Inspection of Fracture Critical Bridge Members, U.S. Department of Transportation,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

Pier Cap 5 is in Good condition [7] (Photograph 3). As part of the 1993 rehabilitation project, tack welds on the cap interior were removed along the cap web and bottom flange plates and on the backer bars in some areas. However, not all were removed and many tack welds are still present. Additionally, 1 in. diameter holes were drilled through the webs of the pier cap on both sides of the girder webs near the tie plates. Bolts were installed and vertical sawcuts were made between the drilled retrofit holes.



Photograph 3 – Elevation view of Pier Cap 5 looking South

2.1.1.1 *Pier Cap 5 Interior*

The interior of Pier Cap 5 was dry at the time of inspection. Both access hatches were well sealed. As with the prior inspection, no water staining or leakage was noted inside the pier cap. The interior paint system is in good condition and functions as intended. There are a few locations of isolated light surface corrosion on

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the bottom flange, and at the west end of the cap. The largest of these areas is between Girders 3 and 4 and measures 24 in. x 12 in. (Photograph 4). No section loss is present. Areas surrounding prior rehabilitation efforts have been painted over. This has not changed since the prior inspection.

The bottom flange backer bars were removed at some areas to eliminate fatigue prone details. This occurs at both the north and south web plates along the bottom, just west of the Girder 5 diaphragm, and at both north and south web plates along the bottom east of the Girder 2 diaphragm (Photograph 5). The remaining backer bars have intermittent tack welds along their lengths. Backer bars along the top corners have tack welds of varying length and spacing. Vertical backer bars at both bearing stiffeners exhibit tack welds, and the west end plate exhibits tack welds (see following paragraph for details). No weld cracks or noticeable changes were noted for this inspection.

There are ten total tack welds that are less than 2 in. on the north web plate. There are three total tack welds that are less than 2 in. on the south web plate. Most of these tack welds are at least partially removed (no change). There are six total tack welds, ranging between 1.5 in. and 4 in. in length between the north cap web and west end plate (Photograph 6). There are two tack welds along the bottom flange backer bar; one measures 3 in. and is located east of Girder 3, and the other measures 2-1/4 in. and is located west of Girder 3. Tack welds are present on the underside of the horizontal stiffeners at the diaphragms for Girders 4 and 5 at the north web plate. These are all previously noted items that have not changed for this inspection.

There are a few locations of weld remnants present on the cap web plates; these have previously noted as plug welds. One measures 3 in. L x 1 in. H and located on the south cap web plate east of Girder 6. A weld remnant measuring 2 in. L x 1 in. W is located on the north cap web plate between Girder 5 and Girder 6 both east and west of the diaphragm. A true plug weld is present east of the Girder 6 diaphragm on the south cap web plate; no cracks were observed around the plug weld (Photograph 7). These are all items that were previously noted and no changes have occurred since the prior inspection.

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Photograph 4 – View of Typical Surface Corrosion on the Bottom Flange Plate, Between Girders 3 and 4 Shown.



Photograph 5 – View of the Typical Backer Bar Removal, East of Girder 2 Shown.



Photograph 6 – View of the Tack Welds Between the North Web Plate and West End Cap.



Photograph 7 – Example of a Typical Weld Remnant, East Face of South Web Plate of Girder 6 Shown.

2.1.1.2 Pier Cap 5 Exterior

The paint is in Good Condition with adequate coverage throughout the length of the pier cap. The east pier cap bearing exhibits isolated peeling paint and surface corrosion at the bottom of the masonry plate. There is peeling paint with areas of surface and laminating corrosion on the west pier cap bearing (no section loss present). The girder bearings are welded to the bottom flange plate of the pier cap and typically exhibit light surface corrosion near these areas (Photograph 11). Overall, there were no significant changes from the prior inspection in regard to the paint condition or the presence and severity of corrosion. A lifting plate was welded to the top flange of the pier cap west of the Girder 2 bearing. This can be used in conjunction with ropes and other rigging equipment for removing and installing the cap hatch.

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The bottom flange of the pier cap typically exhibits uneven and overlapping weld beads between the bottom flange plate and the cap web plates (Photograph 9). There are discontinuous fillet welds along the cap bottom flange plate groove welds below Girders 2 and Girder 3 (Photograph 8). There are numerous 1/32 in. deep gouges on the north side of the cap bottom flange plate in scattered locations between Girders 2 and Girder 5 (Photograph 10). These are likely damage from original construction and are not structurally significant. Overall, these items have been previously recorded and have not changed since the prior inspection.



Photograph 8 – View of the Fillet Welds at Groove Weld Between the North Web and the Bottom Flange Weld Between Girder 2 and 3.



Photograph 9 – View of Typical Overlapping Weld Beads on the Bottom Flange Plate, South Web Below Girder 4 Shown.



Photograph 10 – View of the Gouges from Construction on the North Face of the Bottom Flange at Girder 2.



Photograph 11 – View of Bearing at Pier Cap 5.

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2.1.1.3 Pier Cap 5 Fatigue Prone Details

Fatigue Prone Detail 1

Fillet welds between girder webs or diaphragms and web plates.

Category: C'

Location: All girder diaphragms and web stiffeners.

Fatigue Prone Detail 3

Tack welds, less than 2 in., on web and flange.

Category: C

Location:

- Tack welds between bottom flange and north web backer between Girders 1 and 2, Girders 2 and 3, and Girders 3 and 4 (3 total).
- Tack welds between bottom flange and south web backer bar between Girders 2 and 3, and Girders 5 and 6 (2 total).
- Tack welds between the north web plate and diaphragm stiffeners at Girders 4 and 5 (2 total).
- Two tack welds in the interior of the north web plate at each bearing; one tack weld on the interior of the north web plate at Girder 5 and between Girders 5 and 6; one tack weld on the interior of the south web plate at Girder 6 (7 total).

Fatigue Prone Detail 4

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

Category: D

Location: Two tack welds between the bottom flange and north web backer bar: one 3 in. long between Girders 3 and 4, and one 2-1/4 in. long between Girders 2 and 3.

Fatigue Prone Detail 7

Plug welds in web plates.

Category: E

Location: One plug weld in the north web plate between Girders 5 and 6; one plug weld in the south web plate at Girder 6 (2 total).

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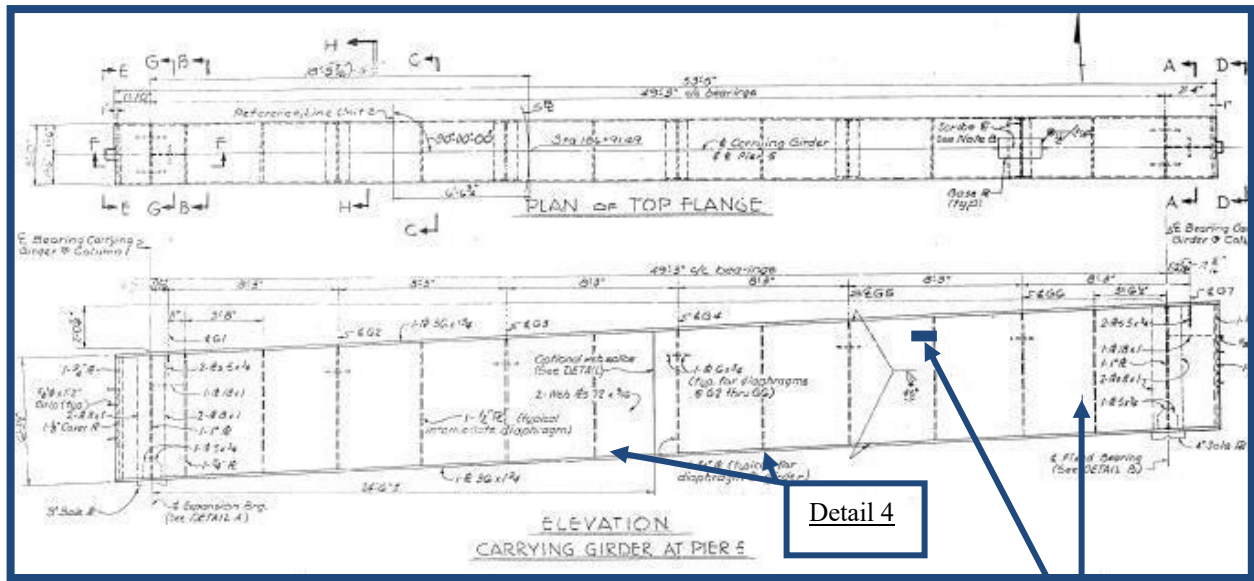


Figure 4: Plan and Elevation of Pier Cap

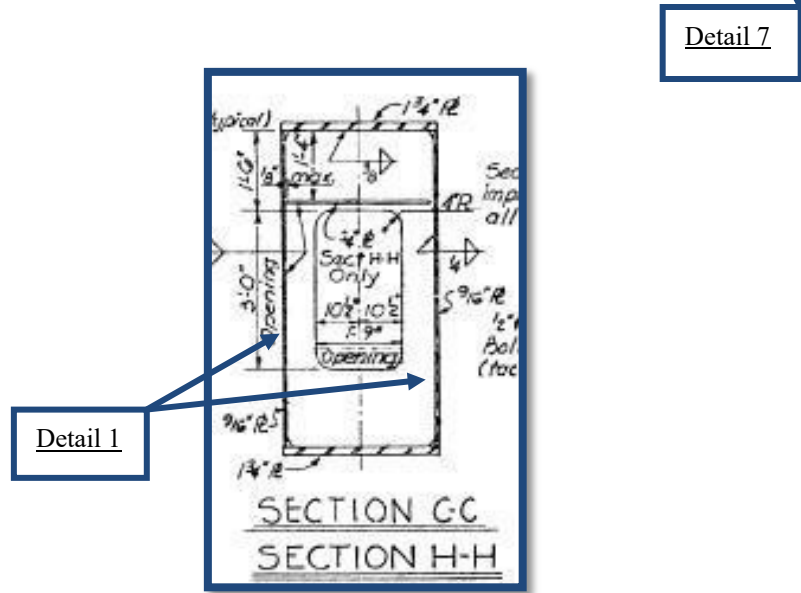
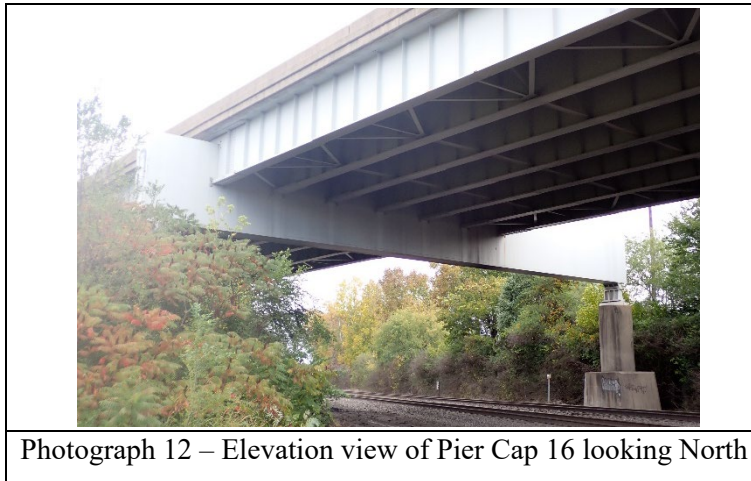


Figure 5: Section of Pier Cap 5



2.1.2 Pier Cap 16

Pier Cap 16 is in Good Condition [7] (Photograph 12). As part of the 1993 rehabilitation project, tack welds were removed along the cap webs, the bottom flange plate, and backer bars. Many tack welds still remain. Additionally, 1 in. diameter holes were drilled through the webs of the pier cap on both sides of the girder webs in which bolts were installed.



Photograph 12 – Elevation view of Pier Cap 16 looking North

2.1.2.1 Pier Cap 16 Interior

The interior of Pier Cap 16 was dry at the time of inspection. Both access hatches appeared to be properly sealed, however, both hatches are missing a nut (1 per hatch) that secures the hatch covers (Photograph 13). This has not changed since the prior inspection.

The paint system on the pier cap interior had several locations of peeling paint and surface corrosion with no section loss (Photograph 14). The floor was covered in accumulations of steel filings, paint flakes, and sand blasting medium without excessive moisture accumulation (Photograph 15). This did not appear to have changed since the prior inspection.

During the 1993 rehabilitation project, tack welds along interior bottom flange plates, web plates, and backer bars were ground down. A total of 40 partially removed welds were noted between the north web and the backer bars. A total of 36 partially removed welds were noted between the bottom flange and the backer bars (Photograph 16). No tack welds that remain are cracked. Random tack welds were observed elsewhere along the pier cap interior with no broken or cracked welds. Isolated portions of backer bar along the cap bottom flange plate were removed along the length of the pier cap to eliminate butt joints (Photograph 17). A random tack weld was noted on the north web between Girder 1 and the west diaphragm approximately 3 ft above the bottom flange (Photograph 18). These items were all previously noted and have not changed since the prior inspection.

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The fillet welds between the pier cap diaphragms, the cap web plates, and girder bottom flange tie plates typically exhibit discontinuities and overlapping beads. Excess overlapping weld material was observed to be breaking off in one location at the west side of Diaphragm B (Photograph 19).

The fillet welds intersecting along the pier cap diaphragms, pier cap webs and the girder tie plates are not sufficiently coped resulting in triaxial welds (Photograph 20).

As part of the 1993 rehabilitation project, the 1 in. diameter drilled and bolted stress relief holes were installed in the pier cap webs adjacent to all girder diaphragms above the girder tie plates (Photograph 21). At an earlier date, drilled, sawcut and bolted retrofits were added in the pier cap webs, at the tips of the girder bottom flanges.



Photograph 13 – View of Missing Hatch Bolt, West Hatch Shown.



Photograph 14 – View of the Typical Missing Paint and Surface Corrosion, Inside Cap Between Girders 1 and 2 Shown.



Photograph 15 – View of Accumulation of Steel Filings, Paint Flakes, and Sand Blasting Medium on the Floor.



Photo 16 – General Example of the Partially Removed Welds Between the Backer Bar and the Bottom Flange.

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Photograph 17 – View of the Isolated Portions of Backer Bar Removed Along the Length of the Pier Cap to eliminate Butt Joints.



Photograph 18 – View of a Random Tack Weld on the North Web between Girder 1 and the west diaphragm.



Photograph 19 – View of Excessive Weld Material Breaking off of Cap Web Stiffener, West Side of Diaphragm B Shown.



Photograph 20 – General Example of Triaxial (Intersecting) Welds at Cap Web Plates, Tie Plates, and Girder Diaphragms. East Face of Girder 7 at South Web Plate Shown.



Photograph 21 – View of the Drilled and Bolted Stress Relief Holes Installed in the Pier Cap Web Plates Adjacent to Girder Diaphragms near the Girder Tie Plates.



2.1.2.2 Pier Cap 16 Exterior

The paint system of the pier cap exterior exhibited scattered minor freckling corrosion, mostly on the top flange at the east side at the portion extending past the rail. The west side of Girder 1 exhibits bubbling paint and corrosion, which is extending onto the south web plate. Painted over pitting, measuring up to 1/16 in. deep, was observed along the top face of the top flange plate between Girder 7 and the east end. There is bubbling paint and corrosion on the east side of Girder 7 on the north web plate. The bearing devices for Pier Cap 16 are steel rockers and bolsters. The west bearing exhibits surface corrosion (Photograph 20).

The drilled and bolted retrofits noted in the interior portion above are also visible on the exterior. Besides these retrofits, 2 in. diameter stress relief holes were drilled through all girder webs adjacent to the pier cap top flange and connected with sawcuts. There are multiple locations of poor or incomplete sawcuts for this retrofit. On the north side of the pier at Girder 3, the sawcut extends 5/16 in. beyond the lower hole; this is an old comment and no changes were noted. Also on the north face, the stress relief holes in web of Girder 4 exhibit partial sawcuts that do not connect the drilled holes. The west side of this web exhibits shallow and partial sawcuts between the holes, and slightly below the bottom hole (Photograph 23). On the south web at Girders 2 and 4 there are minor gouges below the bottom hole due to sloppy sawcuts. These were all previously noted and have not changed.

The lower lateral bracing gusset plates are welded to the web plates at Girders 2 and 6. During rehabilitation, the gusset plates were retrofitted with circular copes from the corner of the plate adjacent to the girder connections to the pier cap webs. The 2 in. diameter circular copes were cut near the intersection of the welds but did not fully remove the fillet welds at the web plates (Photograph 24).

Random tack welds were noted along the bottom flange plate and web plates. A 4 in. long tack weld is present between Girders 3 and 4 along the south edge of the bottom flange plate. A 5 in. long tack weld is present below Girder 5 on the north edge of the bottom flange. A 1 in. long tack weld is present on the south web between Girders 4 and 5. These were all previously noted and do not appear to have changed.

Several discontinuous overlapping weld beads within the full penetration welds between the pier cap webs and flanges were noted. These range in size from less than 1 in. to 18 in., and do not show signs of distress (Photograph 23). An errant 3 in. weld along the top weld at the west side of Girder 6 and the north web of the pier cap was noted previously and has not changed. The 0.25 in. weld discontinuity noted previously at the north face of the pier cap between Girder 7 and the east bearing was unable to be accessed due to the railroad track restrictions.

FRACTURE CRITICAL INSPECTION

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Photograph 22 – View of the Surface Corrosion at the West Bearing.



Photograph 23 – View of Typical Drilled Stress Relief Hole with Saw Cuts, North Face of West Side of Girder 4 Shown.



Photograph 24 – General Example of Cut Out Portion of Lateral Bracing Retrofit at the Girder.



Photograph 25 – General Example of Overlapping Weld Beads within the Full Penetration Welds between the Cap Web Plates and Bottom Flange Plate.

2.1.2.3 Pier Cap 16 Fatigue Prone Details

Fatigue Prone Detail 1

Fillet welds between diaphragms and web or flange plates.

Category: C'

Location: All girder diaphragms and intermediate diaphragms.

Fatigue Prone Detail 3

Tack welds less than 2 in. on the web or flange plates.

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Category: C

Location:

- Tack welds between the north web backer bar and bottom flange- two between Girders 1 and 2; two between Girders 2 and 3; two between Girders 5 and 6; two between Girders 6 and 7 (8 total).
- Tack welds between bottom flange backer bar and north web – three between Girders 1 and 2; two between Girders 2 and 3; four between Girders 4 and 5; two between Girders 5 and 6; two between Girders 6 and 7; four between Girders 7 and the east bearing (17 total, previously ground but not completely removed).
- Tack weld on the exterior of the south web between Girders 4 and 5.

Fatigue Prone Detail 4

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

Category: D

Location: 2-1/2 in. tack weld on the interior of the bottom flange between Girders 4 and 5; 2 in. tack weld on the interior of the north web between Girders 3 and 4; 2-1/2 in. tack weld on the interior of the north web between the first and second diaphragms on the east side of Girder 7; 4 in. tack weld on the exterior of the bottom flange between Girders 3 and 4; 3 in. tack weld on the exterior of the north web blow girder 4 (5 total).

Fatigue Prone Detail 5

Fillet weld greater than 4 in. or 12 times the connection thickness with a connection thickness less than 1.0 in. on the web or flange plates.

Category: E

Location:

- 5 in. weld on the exterior of the bottom flange below Girder 5.
- 10 in. fillet weld between 3/8 in. gusset plate and both web plates at Girders 2 and 6 (4 total).

Fatigue Prone Detail 8

Intersection of fillet welds.

Category: E

Location: Fillet welds of the web plates and the girder bottom flange tie plates, intersecting the fillet welds between the girder diaphragms and the tie plates and web plates.

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Fatigue Prone Detail 9

Drilled hole and sawcut stress relief retrofit in web plates.

Category: B

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

Fatigue Prone Detail 10

Unwelded butt joint between sections of backer bar.

Category: No fatigue category is defined, but a significant potential exists for crack initiation in the web and flange plates adjacent to the butt joint.

Location: Butt joint between sections of bottom flange backer bar along the south web at the second diaphragm on the east side of Girder 7.

Fatigue Prone Detail 12

Drilled hole stress relief retrofit in web plates.

Category: D

Location: Both web plates above the bottom flange tie plates and on each side of all girder connections.

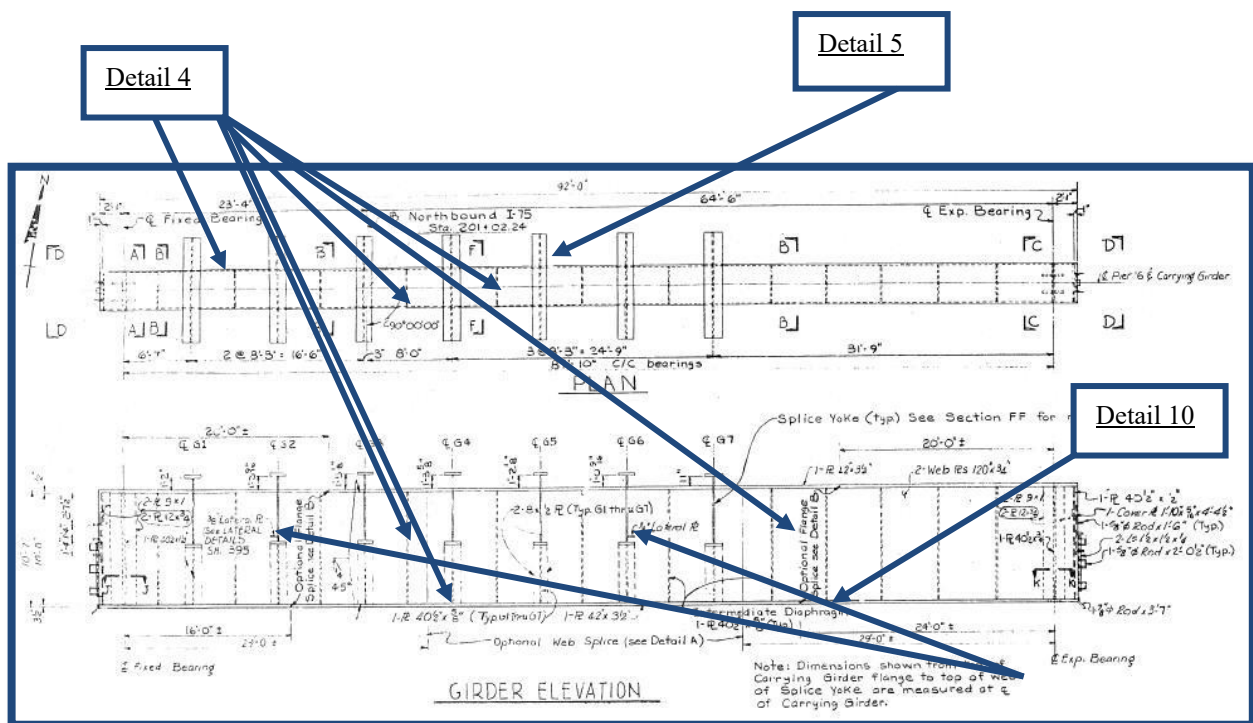


Figure 6: Plan and Elevation of Pier Cap

FRACTURE CRITICAL INSPECTION

I-75 NB over Mill Creek, Benson Ave/Shepherd Ave, NS RR • SFN3110656 (HAM-75-1192R)
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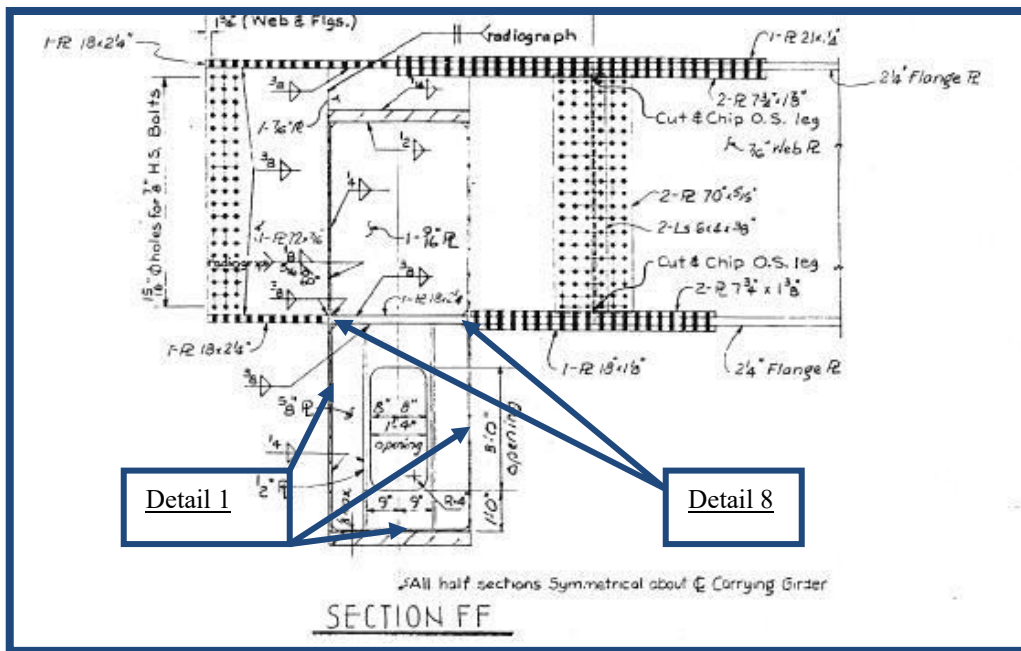


Figure 7: Section of Pier Cap 16

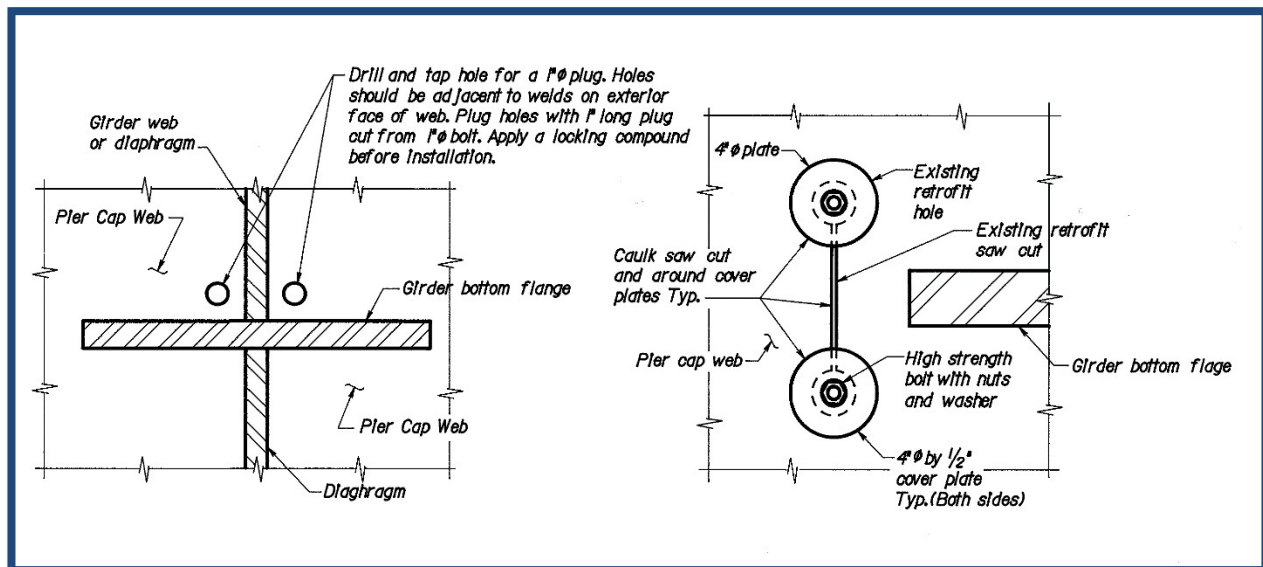


Figure 8: Drilled hole retrofit details from rehabilitation plan

2.1.3 Pier Cap 20

Pier Cap 20 is in Fair Condition [5], down from Good Condition in 2021. This is due to a new crack observed at intersecting welds (see details below on the interior section). As part of the 1993 rehabilitation project, tack welds were removed along the cap webs, the bottom flange plate, and backer bars. Many tack welds still remain. A total of six tack welds are present along the pier cap interior (Photograph 32). Additionally, 1 in. diameter holes were drilled through the webs of the pier cap on both sides of the girder webs in which bolts were installed.



2.1.3.1 Pier Cap 20 Interior

Fillet welds connecting the pier cap diaphragms to the cap web plates and girder bottom flange tie plates typically exhibit discontinuities and overlapping beads; this has not changed since the prior inspection. The intersecting fillet welds at pier cap diaphragms, cap web plates, and the girder tie plates are not sufficiently coped, which results in triaxial welds (Photograph 30). These welds along the diaphragms are typically of inferior quality, displaying discontinuities, a lack of fusion, and overlapping (Photograph 33). On the west face of the Girder 1 diaphragm, at the triaxial weld connecting the south web plate to the diaphragm, there is a 1-5/8 in. crack along the vertical fillet weld between the diaphragm and the web plate (Photographs 34 through 36). This crack runs vertical along the diaphragm plate side of the fillet weld, on the top part of the tie plate. This crack was not observed during the 2021 inspection. Due to the connection geometry, it was difficult to magnetic particle test for confirmation, but the crack was apparent in the weld material.

During the 1993 rehabilitation project, tack welds along the bottom flange plate, the web plates, and backer bars were ground down. However, some were missed or only partially ground (Photograph 29). Select portions of the backer bars were removed throughout the length of the pier cap to eliminate butt joints and bent sections. Additionally, during the 1993 rehabilitation project, there were 1 in. diameter drilled and bolted stress

FRACTURE CRITICAL INSPECTION

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relief holes installed in the pier cap webs adjacent to all girder diaphragms at the edges of the girder tie plates. They were installed approximately 6 to 8 in. from the edge of the tie plate. At an earlier date, drilled, sawcut and bolted retrofits were added in the pier cap webs, at the tips of the girder bottom flanges. On the north web, an additional hole was drilled on the east side of Girder 6 and does not have a bolt installed (Photograph 31). These were all previously noted and have not changed.

The interior of Pier Cap 20 was dry at the time of inspection and both access hatches appeared to be properly sealed. The west hatch is still missing the top middle nut and the top south nut and the east hatch is missing two nuts in the top row and one in each side row (Photograph 27). The paint system exhibits light corrosion with no section loss. There was an accumulation of steel filings, paint flakes, and blasting medium along the bottom flange (Photograph 28).



Photograph 27 – Typical Example of Missing Nuts at the East Access Hatch of Pier Cap 20.



Photograph 28 – View of the Typical Bottom Flange of Pier Cap 20. Note No Major Defects.



Photograph 29 – General Example of Partially Ground Fillet Welds on Bottom Flange Backer Bar Retrofit.



Photograph 30 – General Example of Triaxial Welds at the Intersections of Cap Web Plates, Girder Diaphragms, and Bottom Flange Tie Plates.

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Photograph 31 – View of the Unfilled Stress Relief Hole above the Girder Bottom Flange East of Girder 6 at the North Web.



Photograph 32 – General Example of an Unground Tack Weld.



Photograph 33 – General Example of Poor Quality Fillet Welds Between Cap Web Plates and Girder Diaphragms.



Photograph 34 – View of the 1-5.8 in. Triaxial Weld Crack at the West Face of the Girder 1 Diaphragm at the South Web Plate. Close up view.



Photograph 35 – View of the 1-5.8 in. Triaxial Weld Crack at the West Face of the Girder 1 Diaphragm at the South Web Plate. Perspective view.



Photograph 36 – View of the 1-5.8 in. Triaxial Weld Crack at the West Face of the Girder 1 Diaphragm at the South Web Plate. Close up view.

2.1.3.2 Pier Cap 20 Exterior

Bubbling and peeling paint with surface corrosion is a typical on the top flange and on the pier cap webs at girder connections (Photograph 37). This is an old comment and has not changed since the prior inspection.

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The steel cable supporting the utility lines under the cap is rubbing against the bottom flange plate and has worn through the paint between Girders 6 and 7 (Photograph 38). This defect was previously noted and has not changed. A paint scrape due to impact was observed on the north face of Bay 4 (Photograph 39). A localized impact scrape is present at the north face of Bay 4 (Photograph 40). These currently are not a significant concern.

The drilled and bolted retrofits noted in the interior portion above are also visible on the exterior. Besides these retrofits, 2 in. diameter stress relief holes were drilled through the girder webs adjacent to the pier cap top flange and connected with sawcuts. These holes are open and connected with a sawcut. There are multiple locations of poor or incomplete sawcuts for this retrofit. At Girder 5 on the north web, an errant sawcut extends approximately 9/16 in. past the bottom stress relief hole (Photograph 41). Smaller additional overcuts were also noted on the east face of Girder 2 on the south web of the pier cap (Photograph 42), on the west face of Girder 3 on the south web of the pier cap, and on the west face of Girder 1 on the south web of the pier cap. No cracks were noted beyond the overcuts.

The lower lateral bracing gusset plates are welded to the web plates at Girders 2 and 6. During rehabilitation, the gusset plates were retrofitted with circular copes from the corner of the plate adjacent to the girder connections to the pier cap webs. The 2 in. diameter circular copes were cut near the intersection of the welds but did not fully remove the fillet welds at the web plates (Photograph 43). This is an old comment and has not changed since the prior inspection.

Seven random welds were found on the exterior surface of the south web plate:

- On the south web on the east side of Girder 3: 1-3/8 in. longitudinal weld and a 2 in. longitudinal weld (Photograph 44). This condition was noted previously and has not changed. This is an old comment and has not changed since the prior inspection.
- On the bottom of the south web between Girders 1 and 2: three discontinuous lengths of weld material, up to 1-1/2 in. L. This condition was noted previously and has not changed.
- On the south web between Girders 5 and 6: a 3 in. x 1 in. area of errant weld material. This condition was noted previously and has not changed.

Minor deterioration continues on the bearings, with no major changes from the prior inspection. Above the west bearing, there is a 12-1/2 in. long fillet weld with errant weld material around it on the south web at the bottom flange groove weld (Photograph 45). The bearing devices exhibit peeling paint and surface corrosion along the top of the sole plates (Photograph 46). Both bearings exhibit laminating corrosion beneath the paint on the top face and bottom edges of the masonry plates (Photograph 47). These conditions were noted previously and no changes were observed.

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<p>Photograph 37 – General Example of Bubbling and Peeling Paint at Cap/Girder Connections.</p>	<p>Photograph 38 – View of the Steel Cable Rubbing against the Bottom Flange between Girders 6 and 7.</p>
<p>Photograph 39 – View of the Typical Paint Scrape Due to Impact, Between Girders 3 and 4 Looking South Shown.</p>	<p>Photograph 40 – View of Impact Damage to Bottom Flange Plate Corner below Girder 5 on South Side.</p>
<p>Photograph 41 – View of the Typical Stress Relief Holes with Connecting Sawcuts, Girder 5 Shown on the North Web. Note Errant Sawcut Extends Approximately 9/16 in. Past the Bottom Stress Relief Hole.</p>	<p>Photograph 42 – View of Additional Overcuts Between Retrofit Holes on the East Face of Girder 2 on the South Web of the Pier Cap.</p>

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Photograph 43 – Overall View of Lateral Bracing Retrofit at Girder Connections.	Photograph 44 – View of the Random Welds Found on the Exterior Surface of the South Web Plate.
	
Photograph 45 – View of the Errant Weld Material Above the West Bearing.	Photograph 46 – View of the Bearing Devices for Pier Cap 20 Displaying Peeling Paint and Surface Corrosion Along the Top of the Sole Plates.
	Photograph 47 – View of the Laminating Corrosion Beneath the Paint on the Top Face and Bottom Edges of the Masonry Plates at Both Bearings.

2.1.3.3 Pier Cap 20 Fatigue Prone Details

Fatigue Prone Detail 1

Fillet welds between diaphragms and web or flange plates.

Category: C'

Location: All girder diaphragms and intermediate diaphragms.

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Fatigue Prone Detail 3

Tack welds less than 2 in. on the web or flange plates.

Category: C

Location:

- One tack weld along the bottom flange backer bar and north web between Girder 7 and the east adjacent diaphragm.
- Three discontinuous tack welds on the exterior of the south web between Girders 1 and 2.
- One tack weld on the interior of the bottom flange between Girder 1 and the east adjacent diaphragm.
- One tack weld on the interior of the north web between Girder 4 and the east adjacent diaphragm.
- Two tack welds and other weld spots on the interior of the north web between Girder 7 and the east bearing.
- Weld spots on the interior of the north web between Girder 5 and the east adjacent diaphragm.
- Weld spots on the interior of the south web between the west bearing and the adjacent diaphragm.

Fatigue Prone Detail 4

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

Category: D

Location:

- Five 3 in. tack welds and one 2 in. tack weld along the north web backer bar and the bottom flange between Girder 7 and the west adjacent diaphragm (6 total).
- One 3 in. tack weld along the bottom flange backer bar and the north web between Girder 7 and the west adjacent diaphragm.
- One 2 in. tack weld on the exterior of the south web between Girders 3 and 4.

Fatigue Prone Detail 5

Fillet weld greater than 4 in. or 12 times the connection thickness with a connection thickness less than 1.0 in. on the web plates.

Category: E

Location: 10 in. fillet weld between 3/8 in. gusset plate and both web plates at Girders 2 and 6 (4 total).

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Fatigue Prone Detail 8

Intersection of fillet welds.

Category: E

Location: Fillet welds of the web plates and the girder bottom flange tie plates, intersecting the fillet welds between the girder diaphragms and the tie plates and web plates.

Fatigue Prone Detail 9

Drilled hole and sawcut stress relief retrofit in web plates.

Category: B

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

Fatigue Prone Detail 12

Drilled hole and stress relief retrofit in web plates.

Category: D

Location: Both web plates above the bottom flange tie plates and on each side of all girder connections.

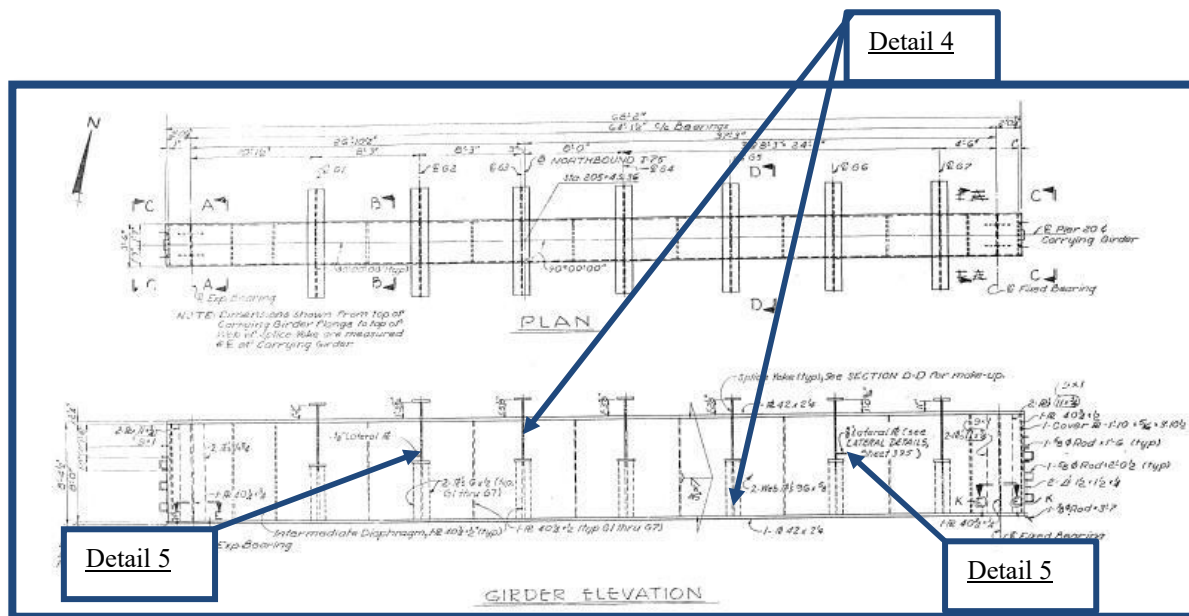


Figure 9: Plan and Elevation of Pier Cap 20

FRACTURE CRITICAL INSPECTION

I-75 NB over Mill Creek, Benson Ave/Shepherd Ave, NS RR • SFN3110656 (HAM-75-1192R)
Hamilton County, OH • July 2023

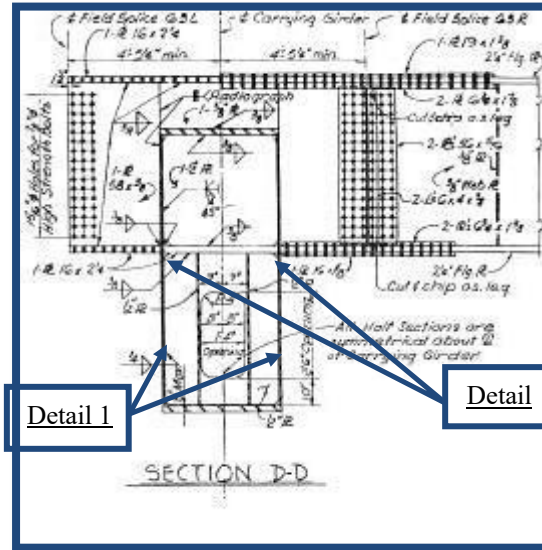


Figure 10: Section of Pier Cap 20

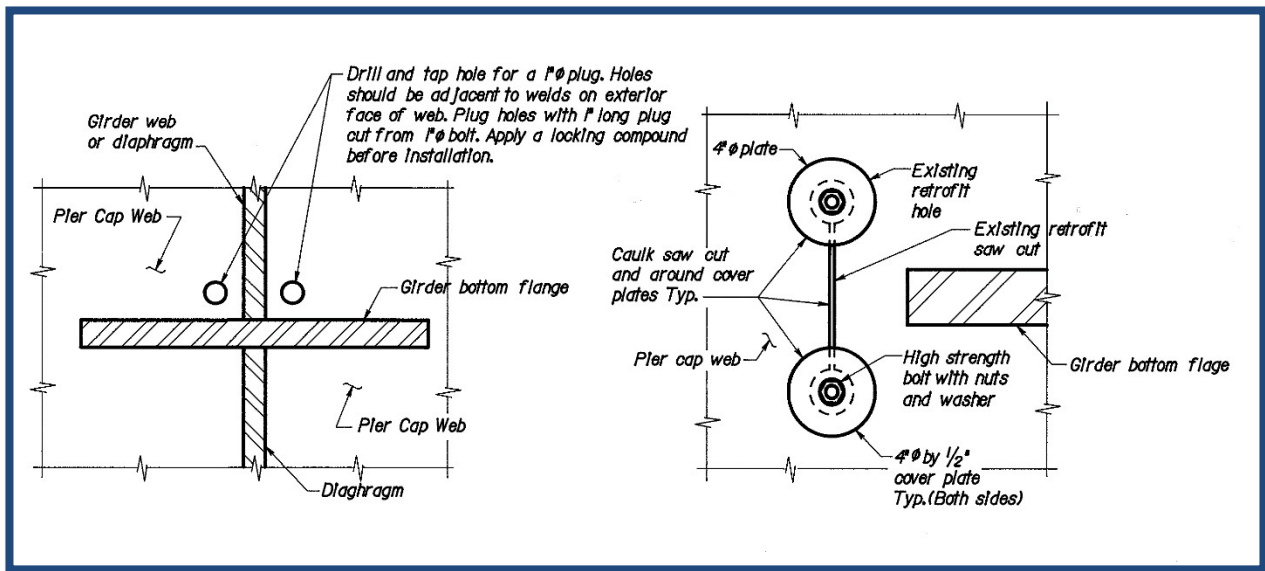


Figure 11: Drilled hole retrofit details from rehabilitation plans

FRACTURE CRITICAL INSPECTION

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3.0 EVALUATION AND RECOMMENDATIONS

Based on the fracture critical inspection, the pier caps of Bridge No. HAM-75-1192R, and its associated fatigue prone details, are in Fair Condition [5] overall. This has been lowered from the prior inspection due to weld crack observed at Pier 20.

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.

A handwritten signature in blue ink that reads "Michael Seal".

Michael Seal, P.E.
Project Manager

A handwritten signature in black ink that reads "Kevin Mitchell".

Kevin Mitchell, E.I.T.
Assistant Project Manager

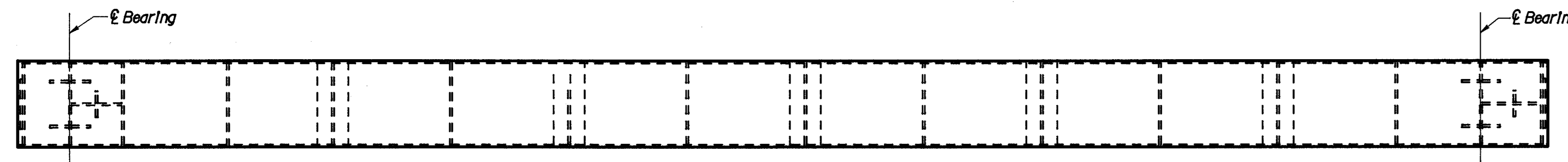
FRACTURE CRITICAL INSPECTION

I-75 NB over Mill Creek, Benson Ave/Shepherd Ave, NS RR • SFN3110656 (HAM-75-1192R)
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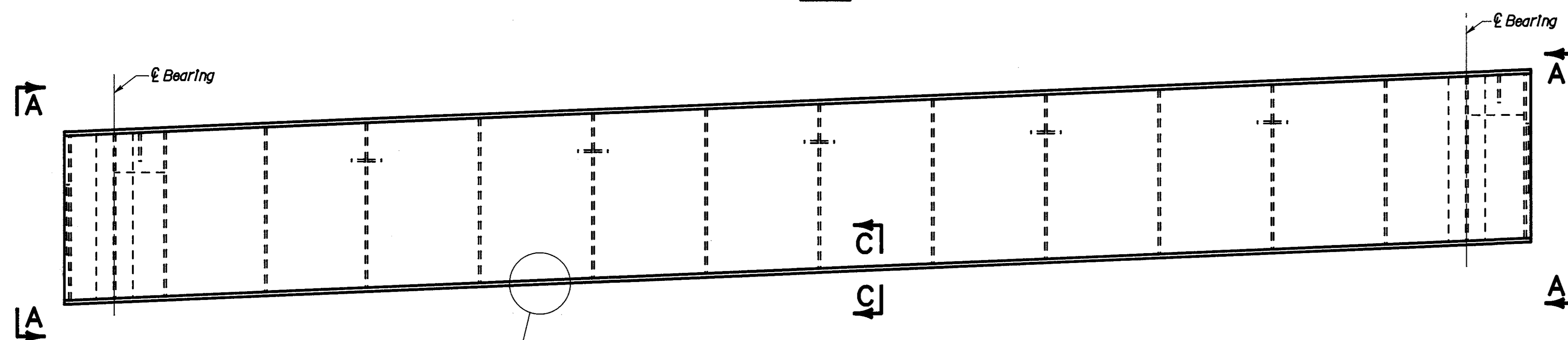


EXHIBIT 1 – EXISTING PIER PLANS

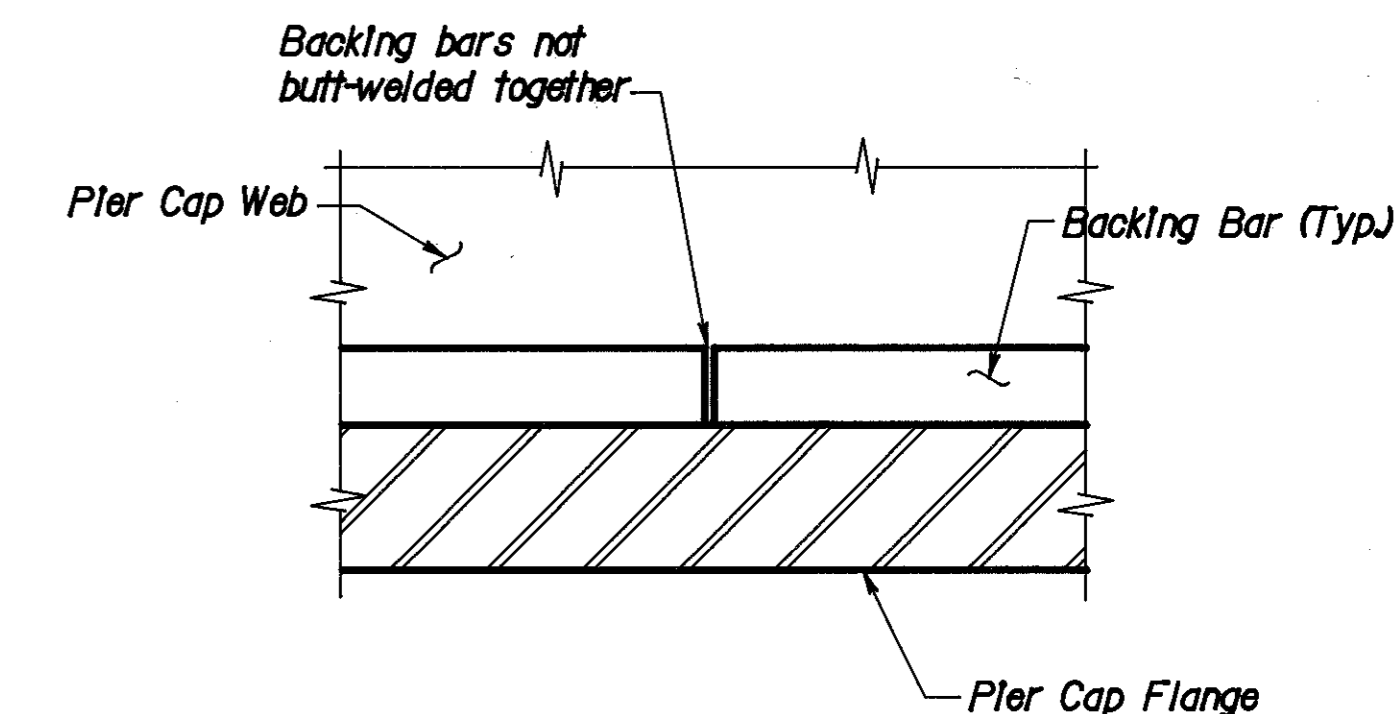
**HAMILTON COUNTY
HAM-75-9.75**



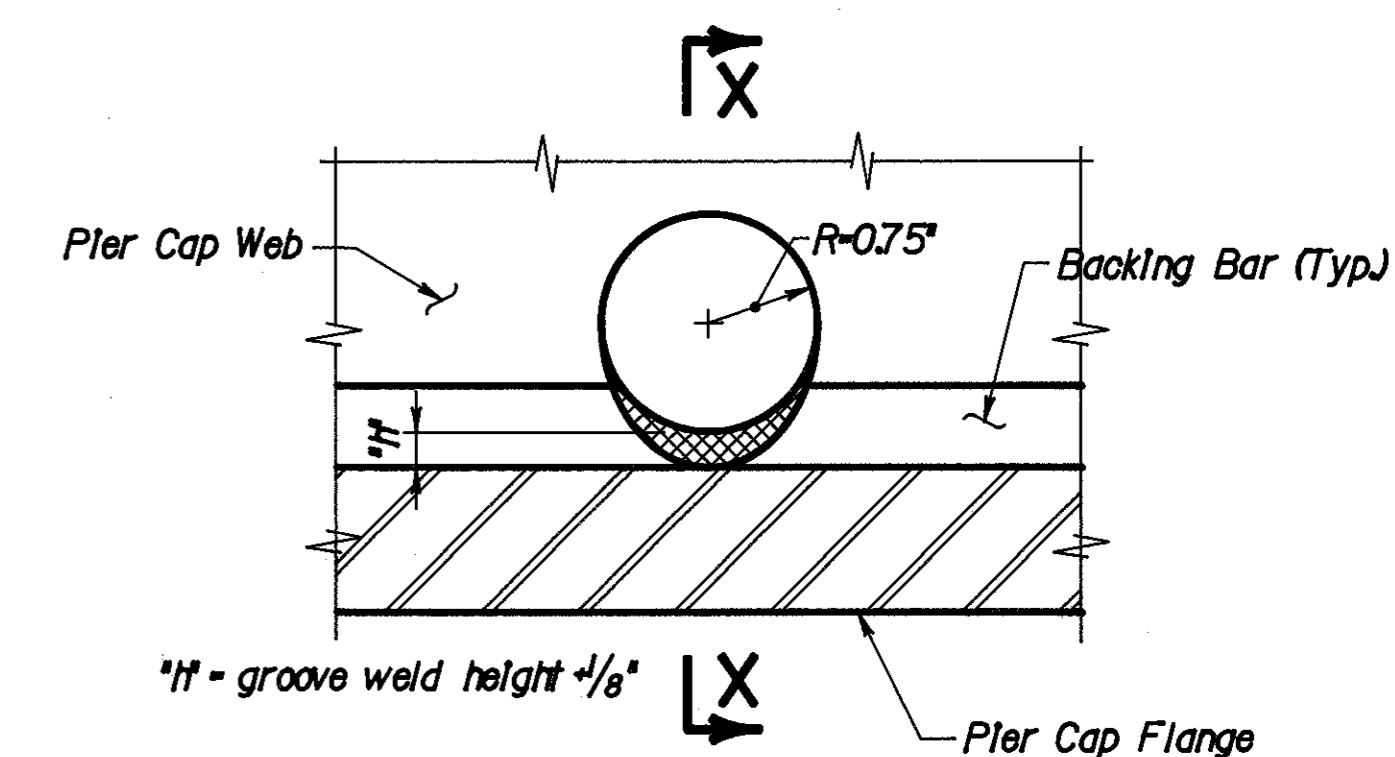
PLAN



**ELEVATION
PIER CAP**



EXISTING DETAIL

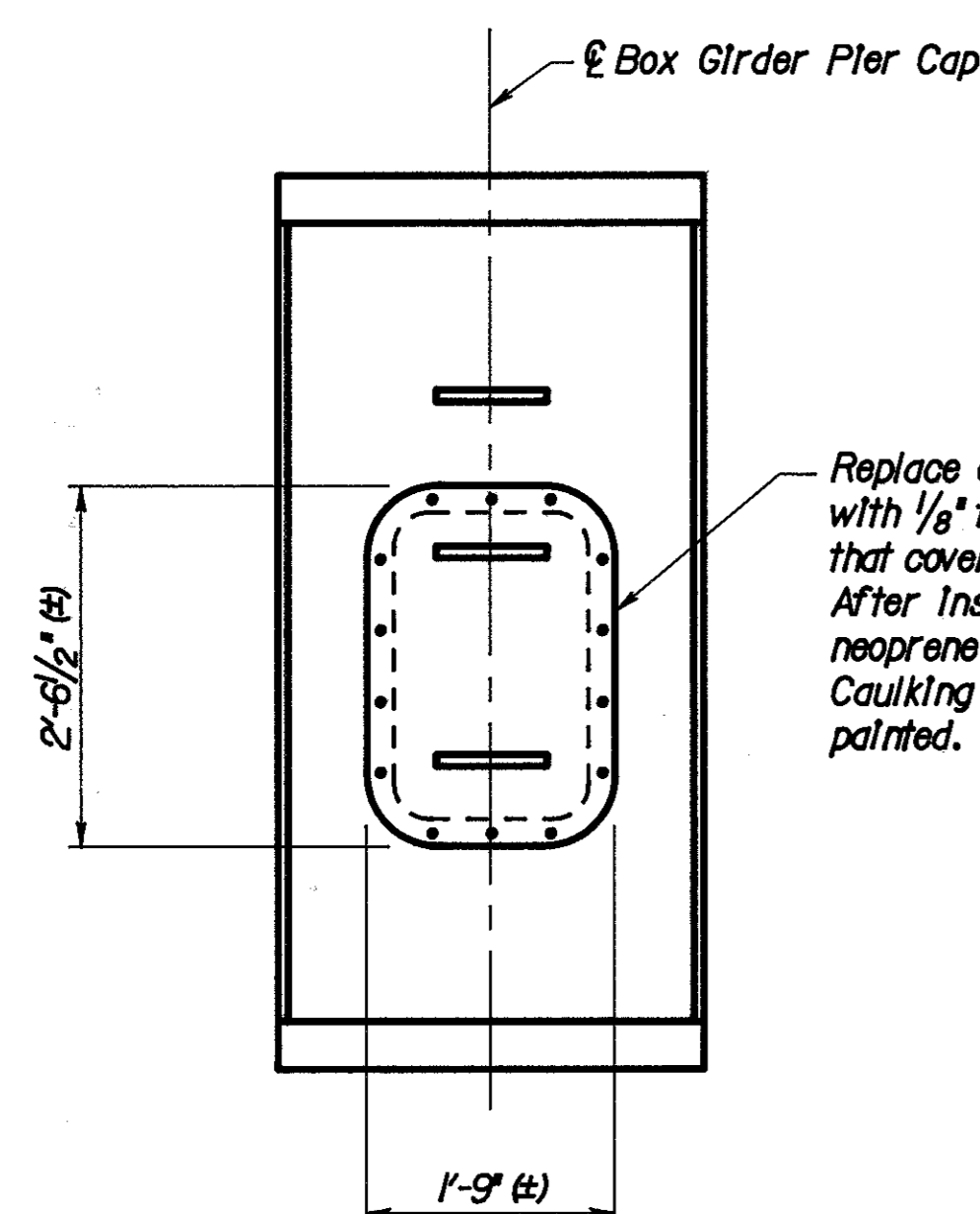


PROCEDURE

1. Drill 1/2" hole through web and backing bar.
2. Remove crosshatched area by grinding. Final surfaces shall be smooth.
3. Perform magnetic particle and/or dye penetrant tests of the remaining metal in the presence of the Engineer.

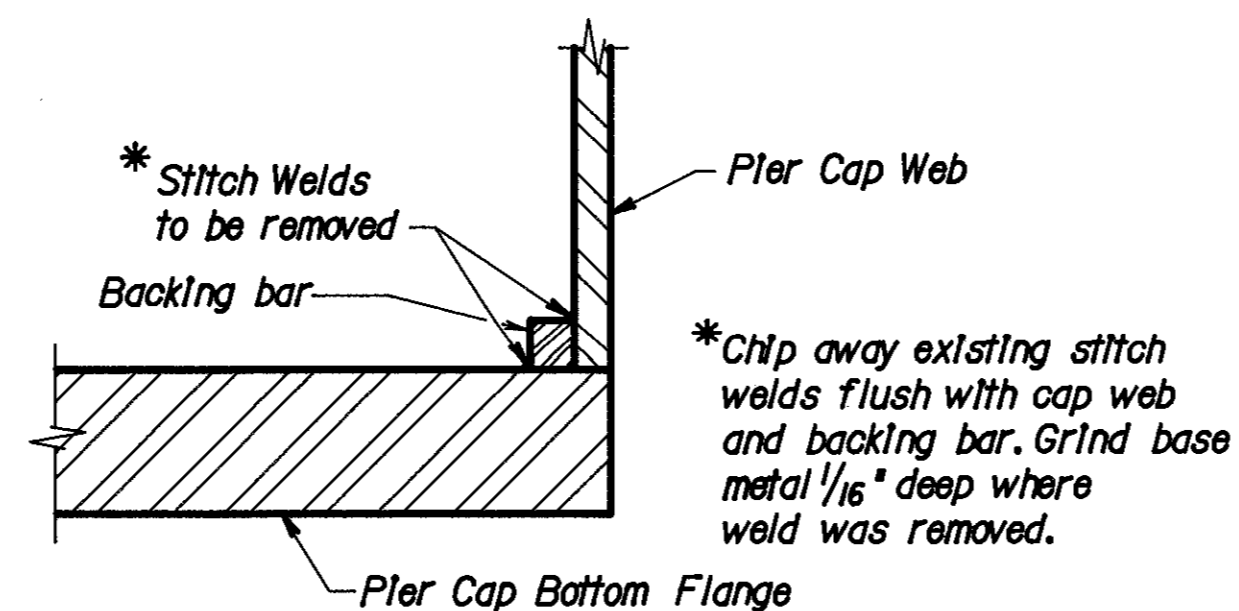
**RETROFIT DETAIL
DETAIL B**

BOTTOM FLANGE SHOWN.
TOP FLANGE SIMILAR.

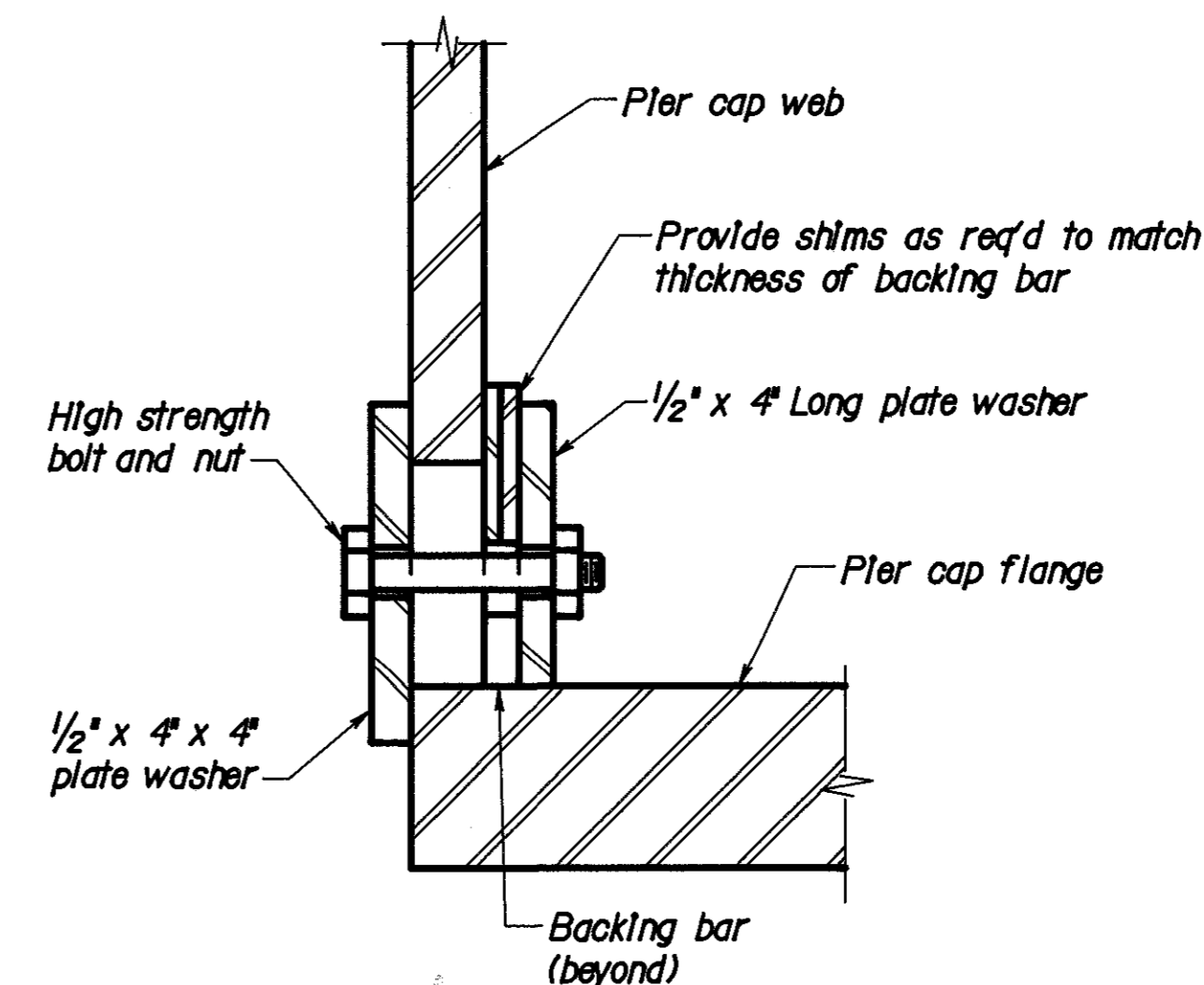


SECTION A-A

Replace existing asphalt-impregnated gasket with 1/8" thick neoprene closed cell sponge that covers the full face of the hatch cover. After installation of the hatch cover, apply neoprene caulking around access hatch cover. Caulking should be applied to bare steel and painted.



SECTION C-C



SECTION X-X

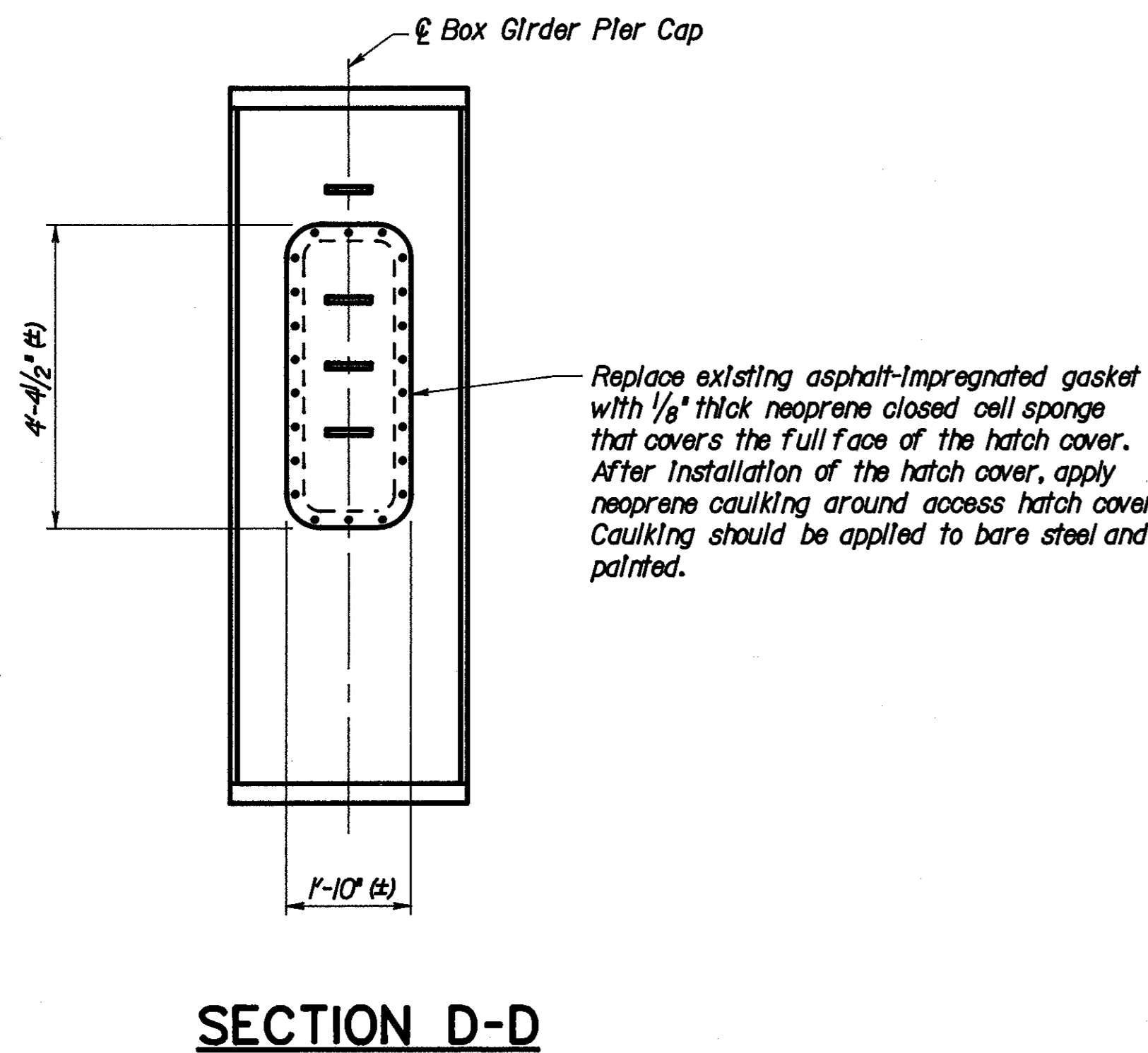
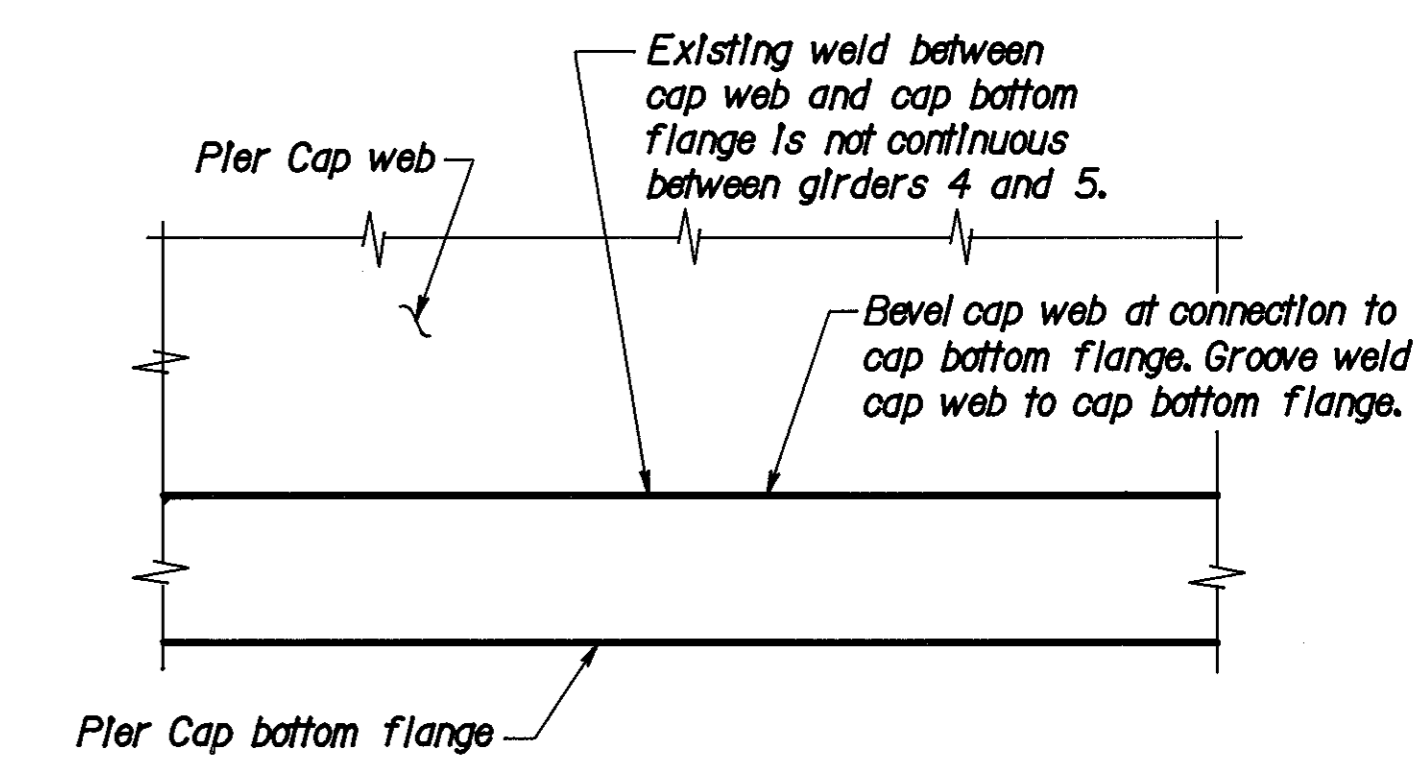
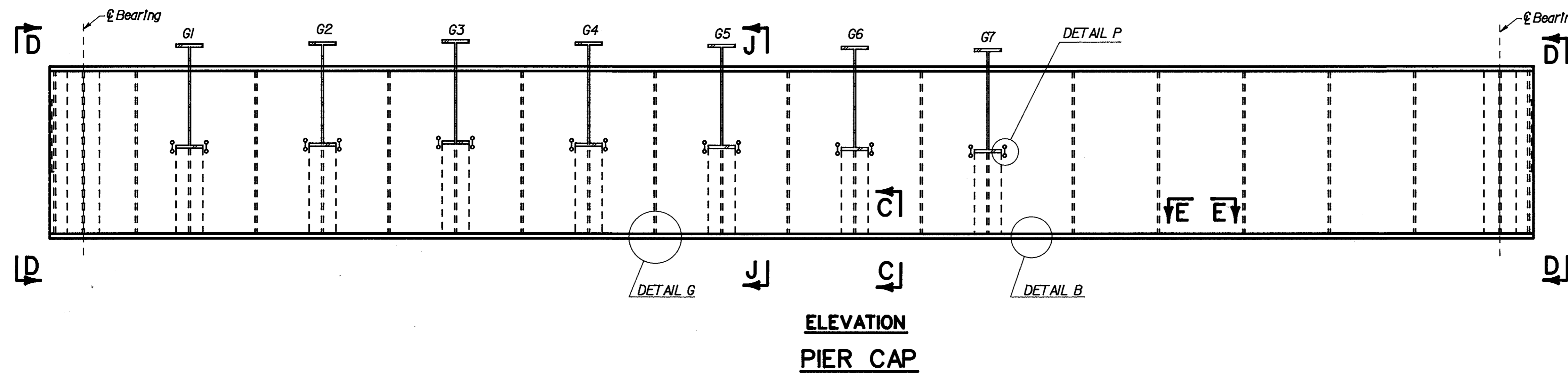
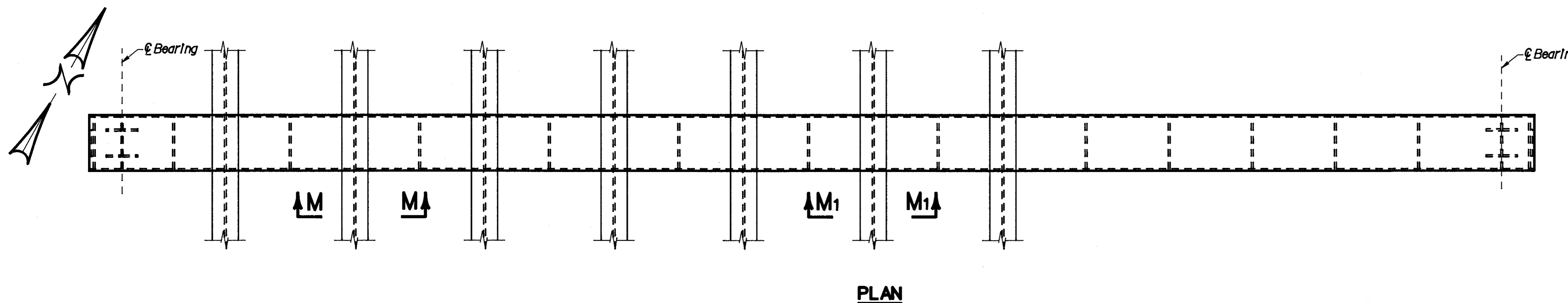
NOTES

1. Clean and paint areas where paint has fallen on the inside of the pier cap. Include with Item Special - Field painting of existing steel system OZEU.

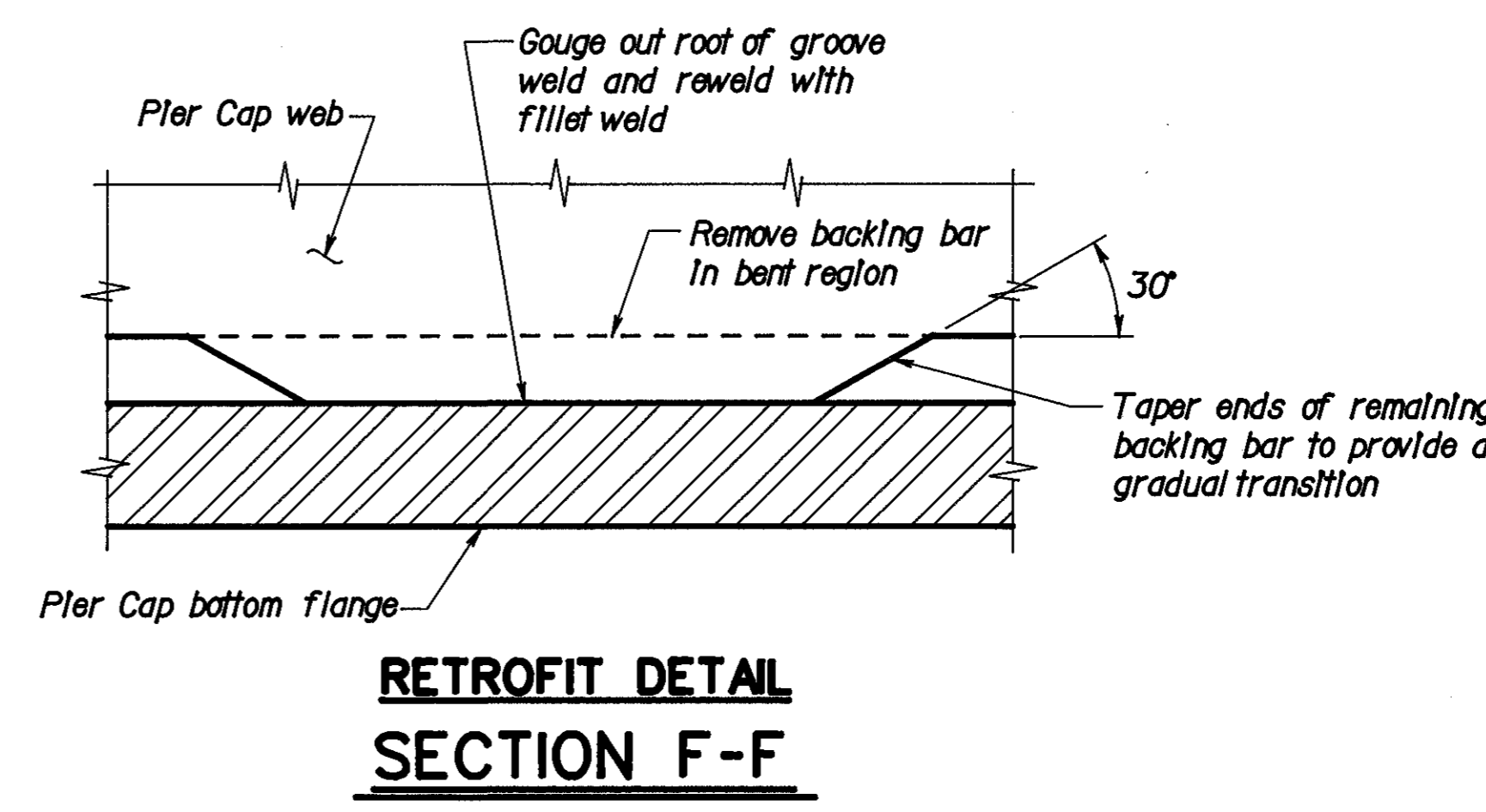
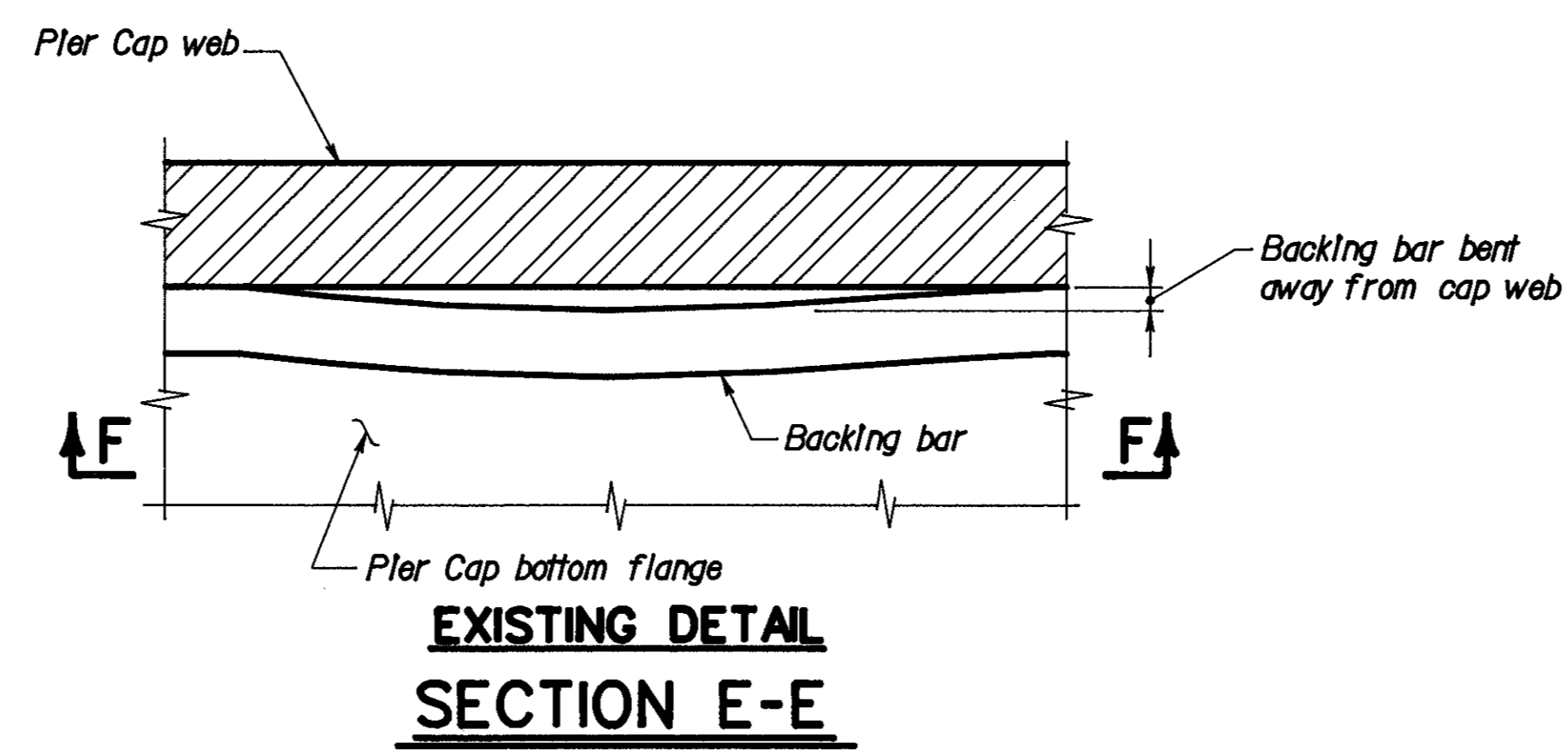
LOCKWOOD, JONES & BEALS CONSULTING ENGINEERS DAYTON, OHIO		54/105
STEEL PIER CAP REPAIR AT PIER 5		
BRIDGE NO. HAM-75-1192R NORTHBOUND I-75 OVER MILL CREEK, BENSON ST., N.Y.C.R.R. & SHEPHERD AVENUE.		
DESIGNED	CHECKED	REVIEWED DATE
B&N	B&N	HDJ 12/92
DRAWN	CHECKED	REVIEWED DATE
MJZ	DFS	
REVISED		

NOTES

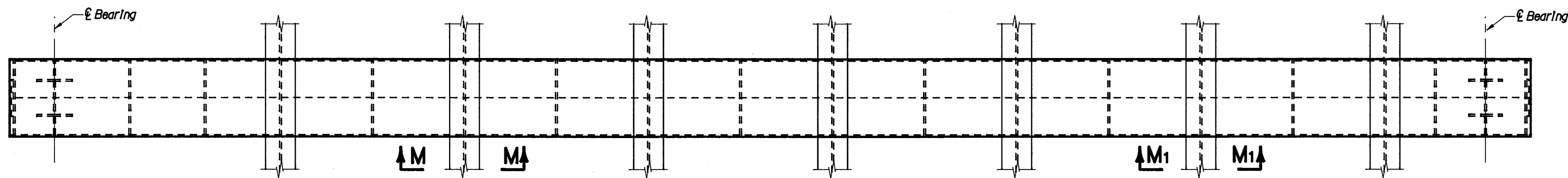
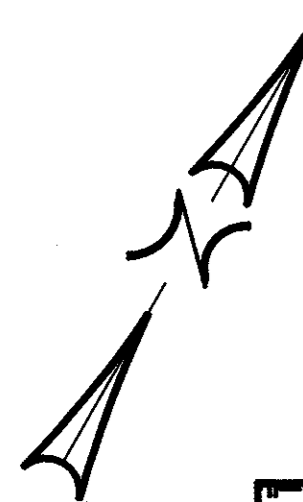
1. Clean and paint areas where paint has fallen on the inside of the pier cap. Include with item - Special - Field painting of existing steel, system OZEU.
2. For Detail B and Section C-C, see Sheet 54/105
3. For Sections J-J, M-M and M₁-M₁, see Sheet 57/105
4. For Detail P, see Sheet 57/105



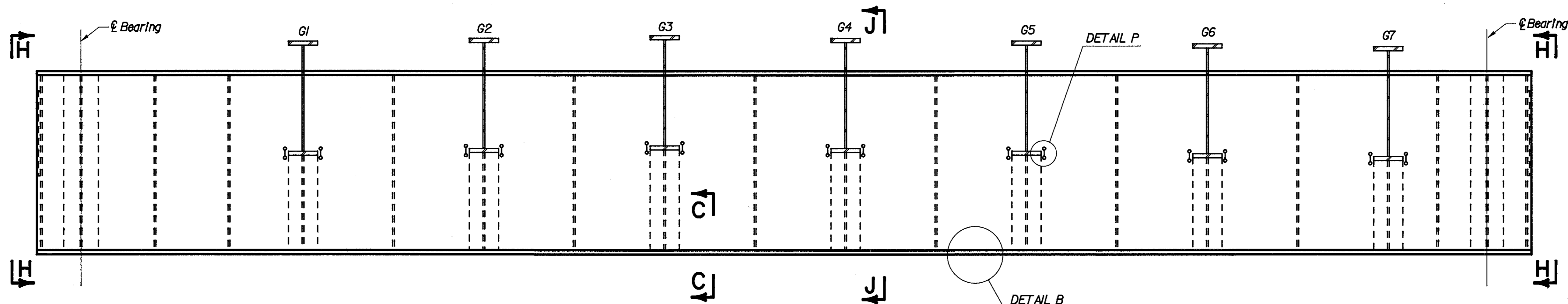
Replace existing asphalt-impregnated gasket with 1/8" thick neoprene closed cell sponge that covers the full face of the hatch cover. After installation of the hatch cover, apply neoprene caulking around access hatch cover. Caulking should be applied to bare steel and painted.



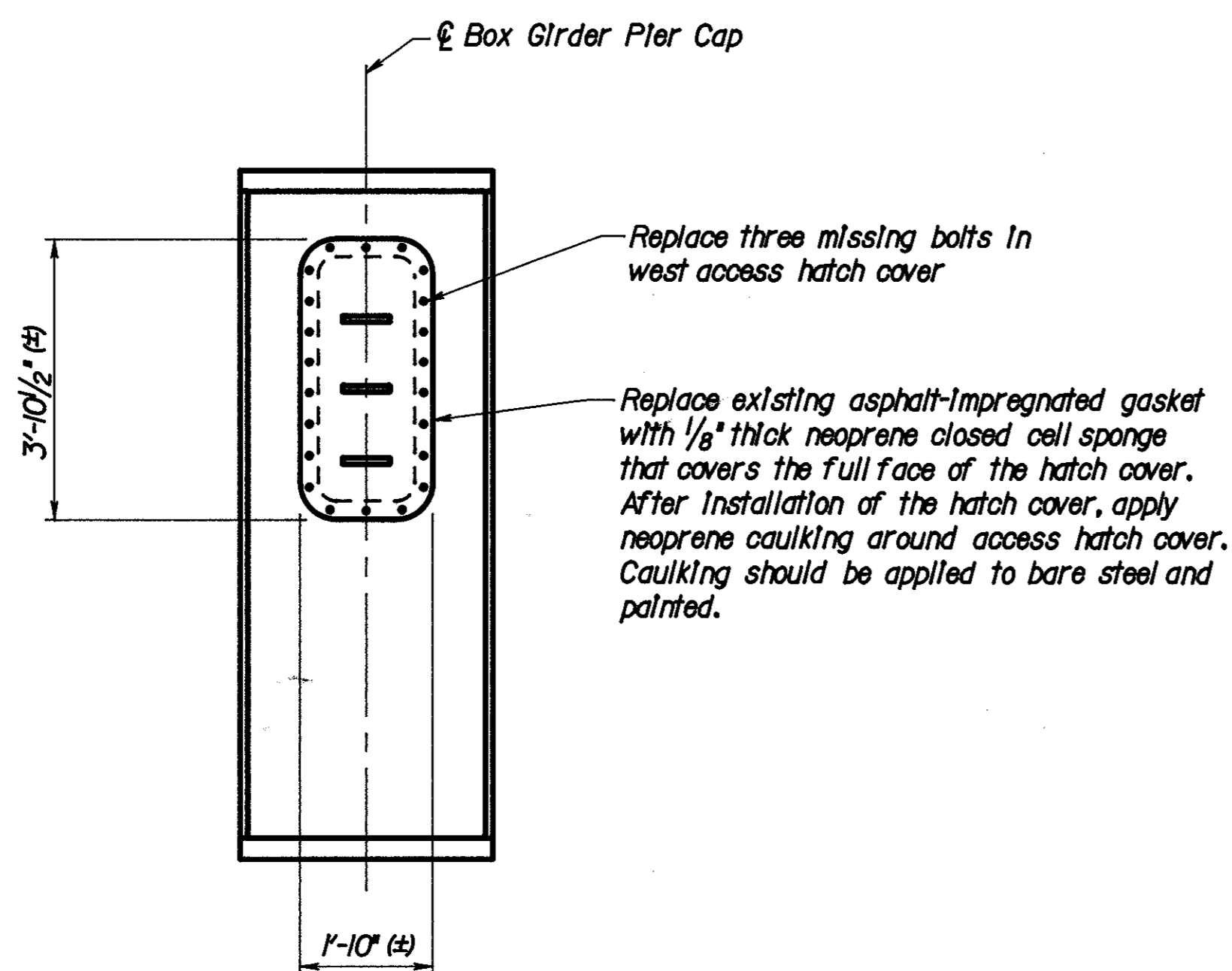
LOCKWOOD, JONES & BEALS CONSULTING ENGINEERS DAYTON, OHIO		55/105
STEEL PIER CAP REPAIR AT PIER 16		
BRIDGE NO. HAM-75-1192R NORTHBOUND I-75 OVER MILL CREEK, BENSON ST., N.Y.C.R.R. & SHEPHERD AVENUE.		
DESIGNED B&N	CHECKED B&N	DRAWN MJZ
CHECKED DFS	REVIEWED DATE HDJ 12/92	REVISED



PLAN



**ELEVATION
PIER CAP**

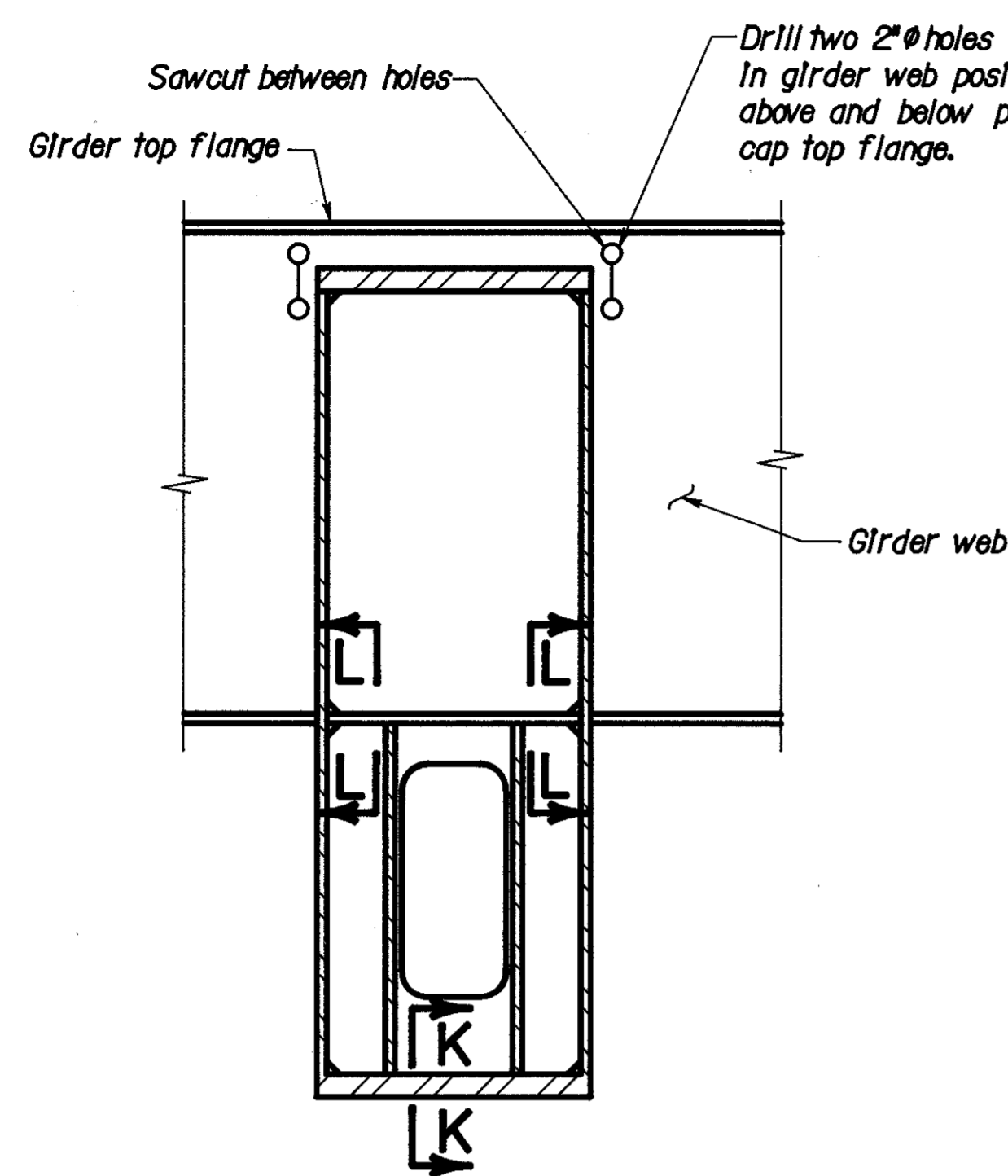


SECTION H-H

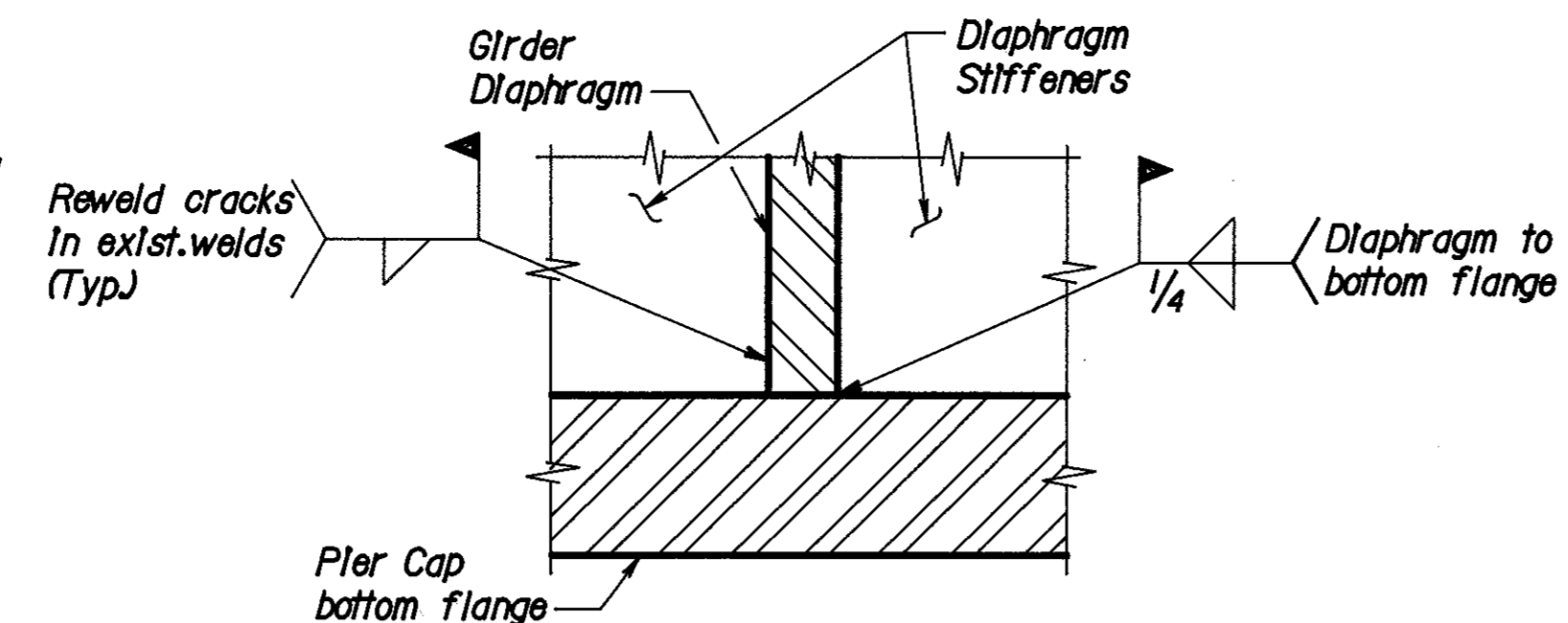
NOTES

1. Clean and paint areas where paint has fallen on the inside of the pier cap. Include with Item - Special - Field painting of existing steel system OZEU.
2. Grind flush any nicks or gouges in the cap bottom flange resulting from minor collision damage.
3. Grind weld material flush with pier cap web on the inside of the north web plate just west of girder G4.
4. Remove broken glass from inside pier cap.
5. For Detail B and Section C-C, see Sheet 54/105
6. For Sections J-J, M-M and M₁-M₁, see Sheet 57/105
7. For Detail P, see Sheet 57/105

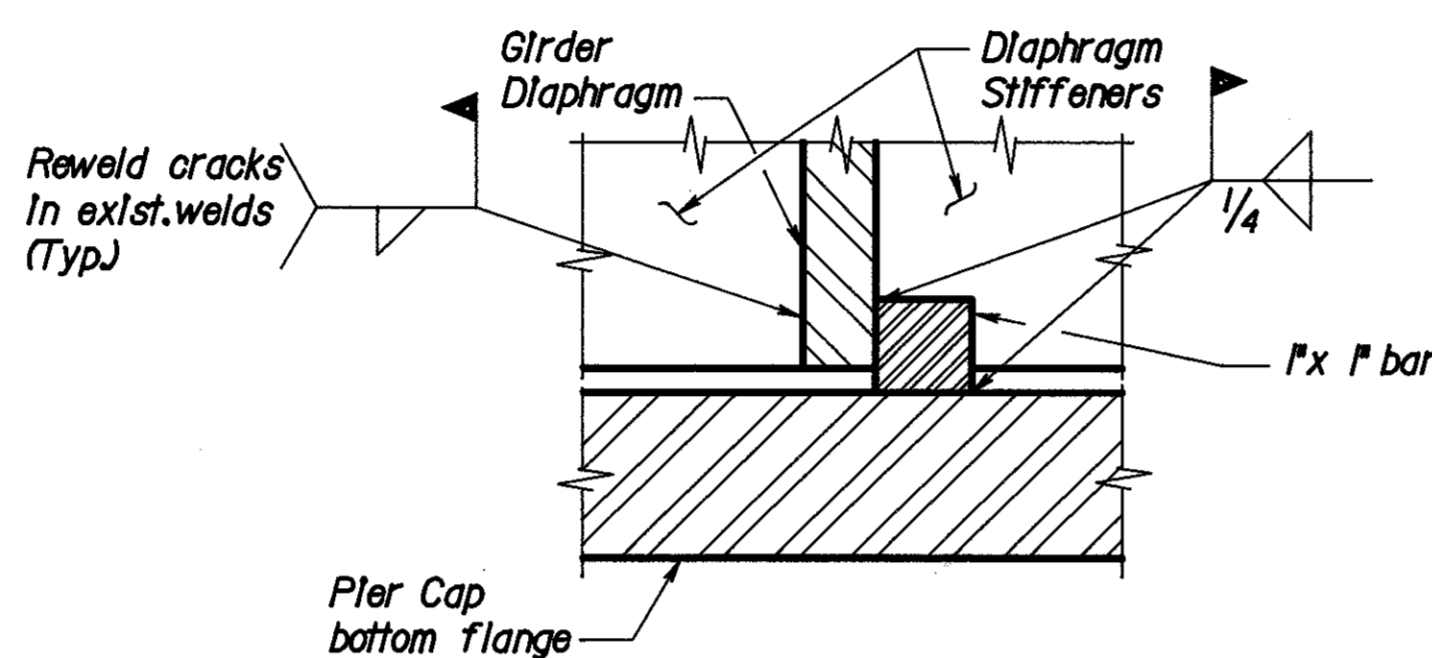
**HAMILTON COUNTY
HAM-75-9.75**



SECTION J-J

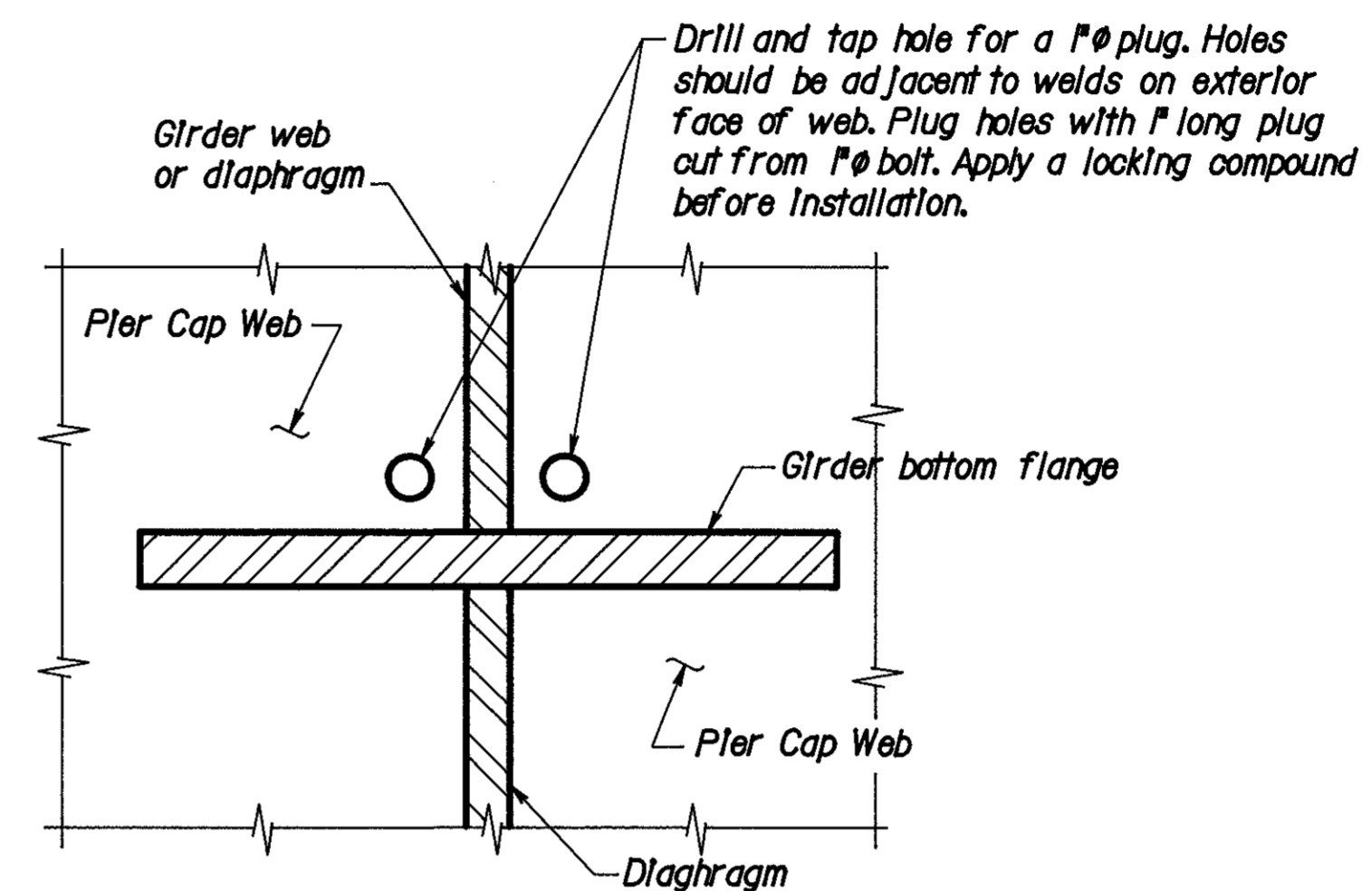


RETOFIT DETAIL WHERE DIAPHRAGM BUTTS AGAINST CAP FLANGE

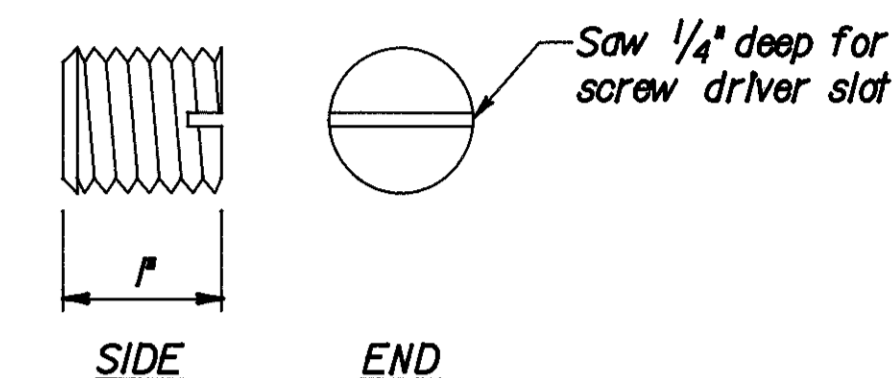


RETOFIT DETAIL WHERE DIAPHRAGM IS NOT BUTTED AGAINST CAP FLANGE

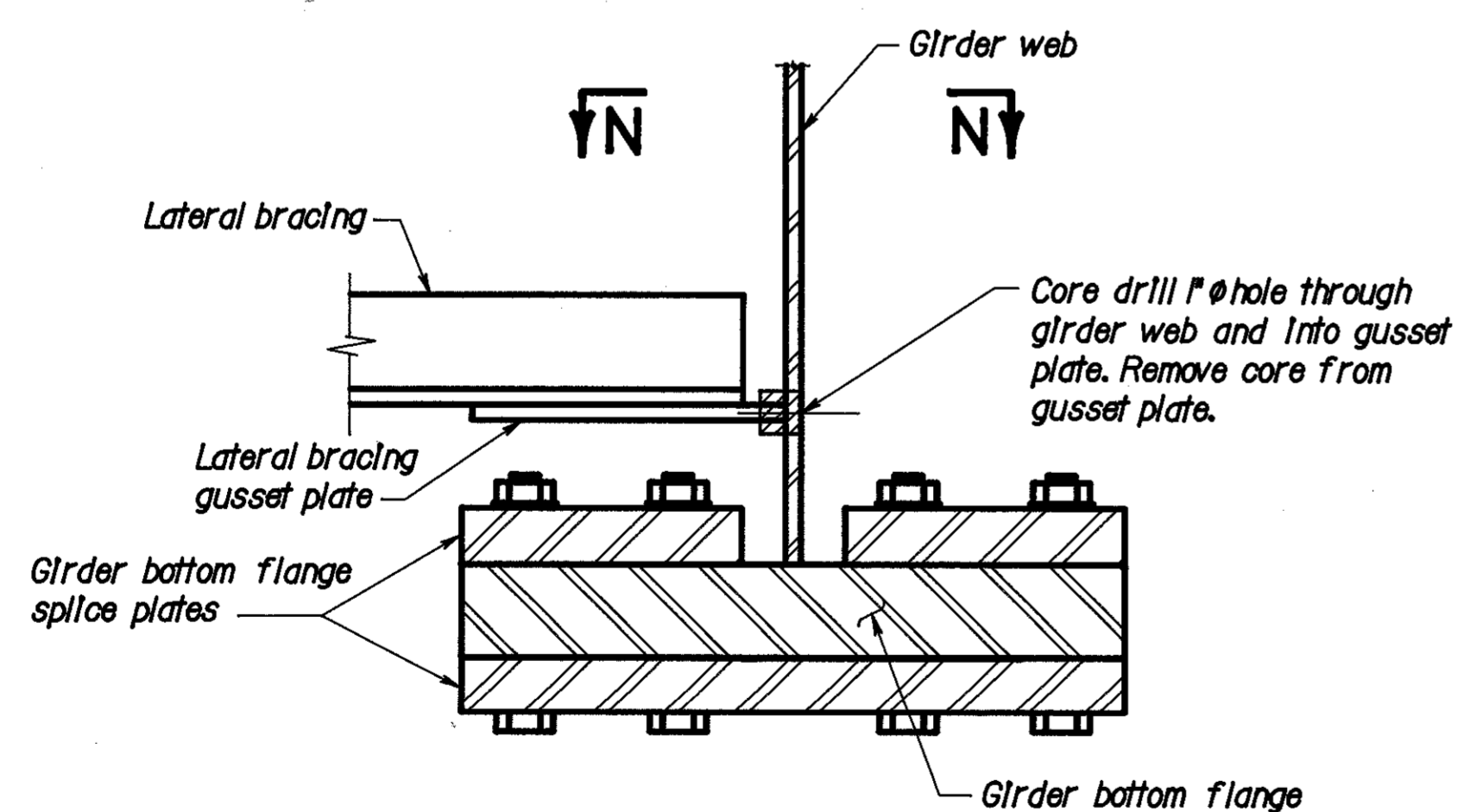
SECTION K-K



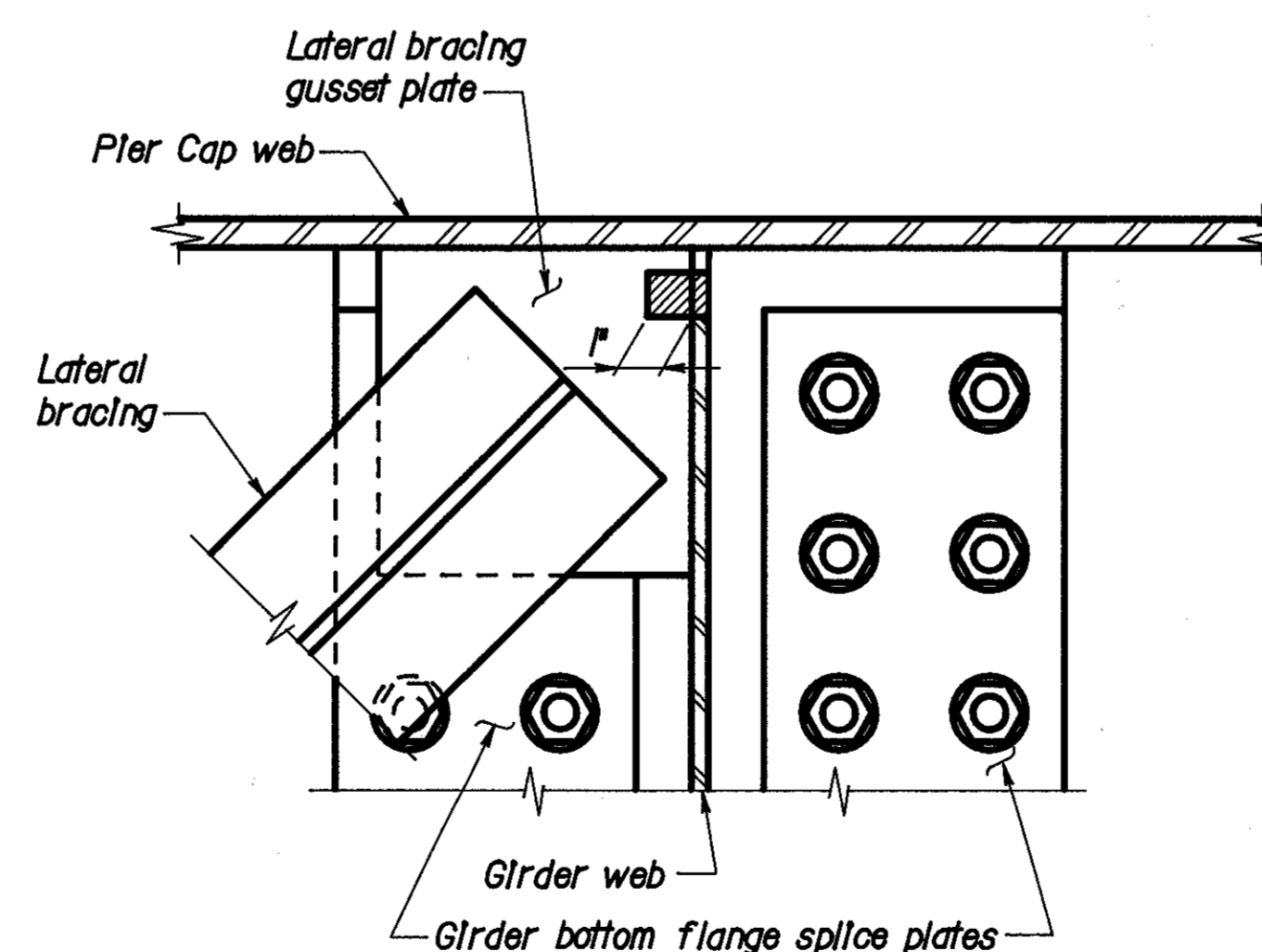
SECTION L-L



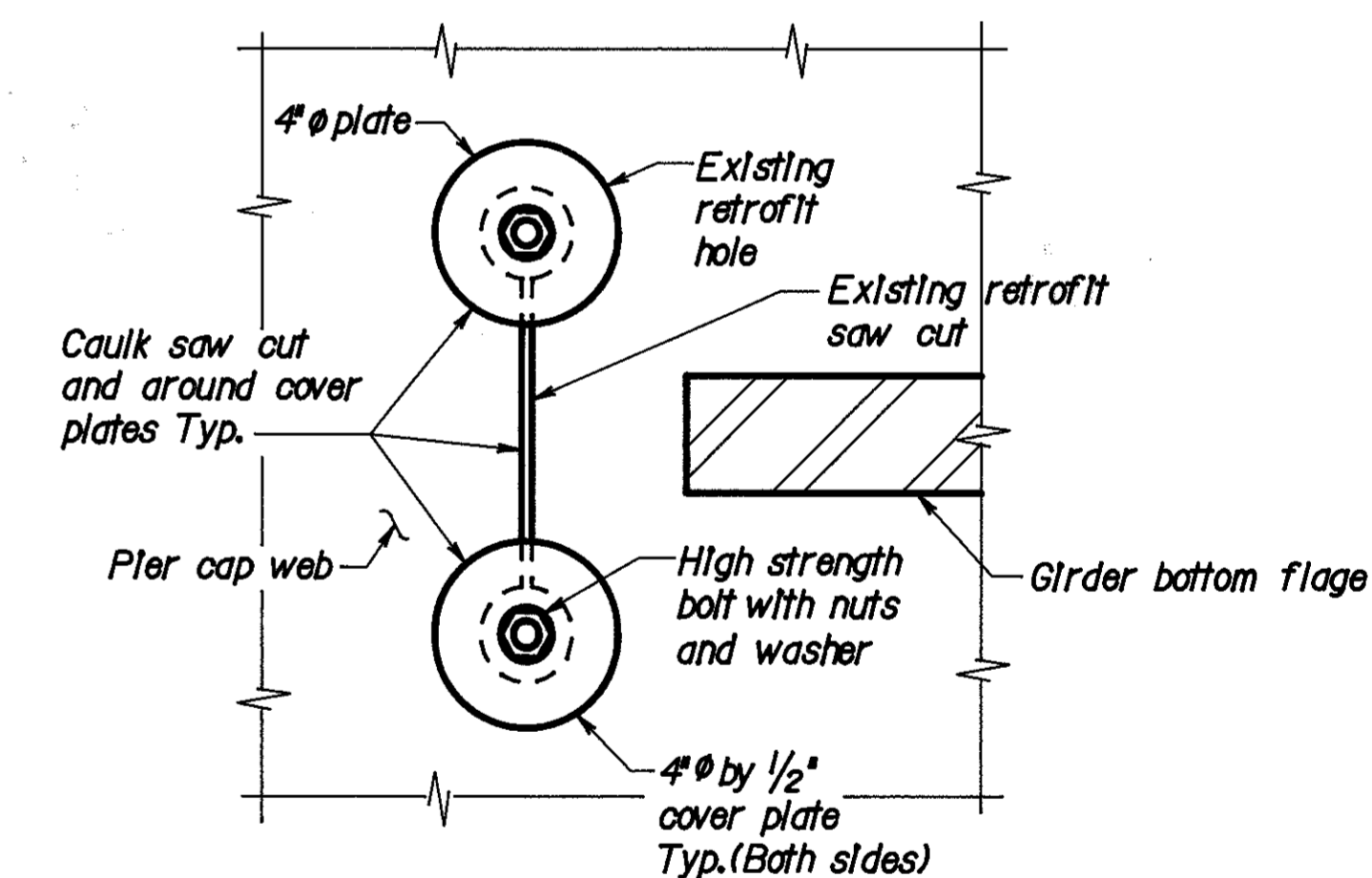
PLUGS FOR HOLES



SECTION M-M
SECTION M-M, OPP. HAND



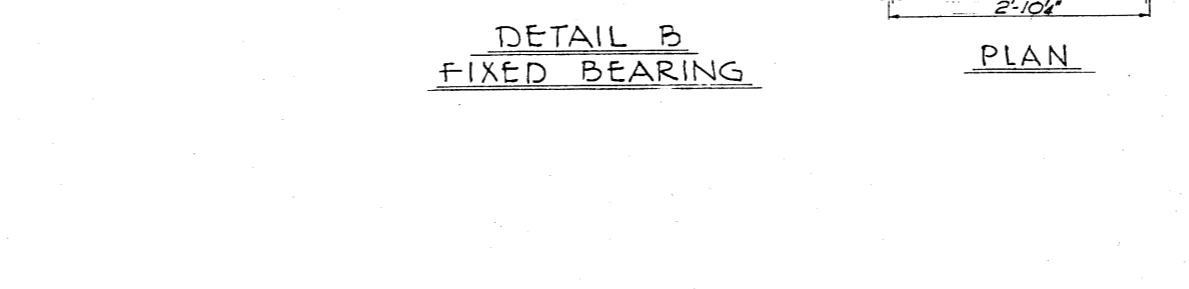
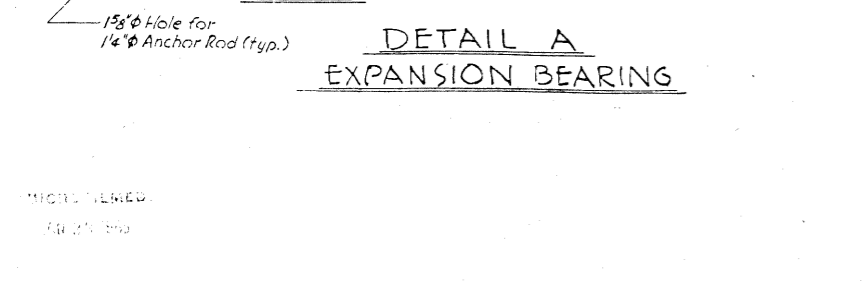
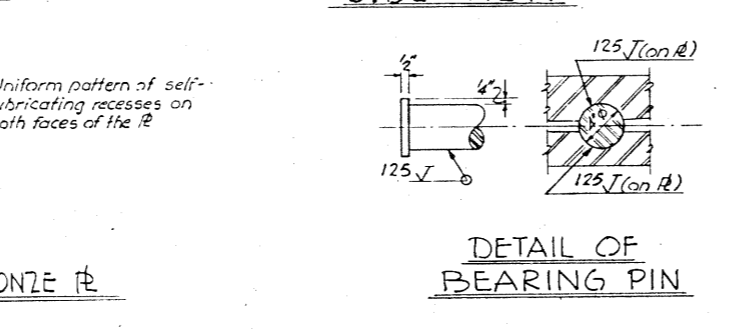
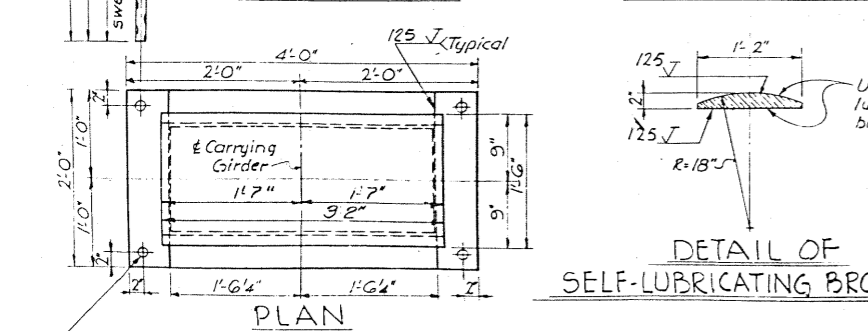
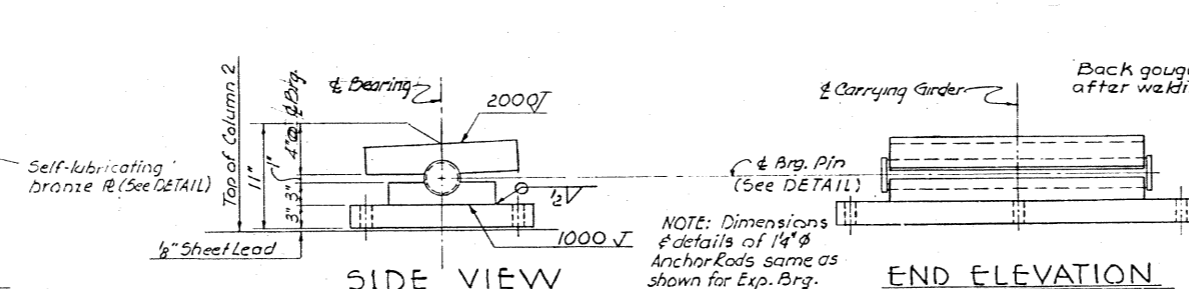
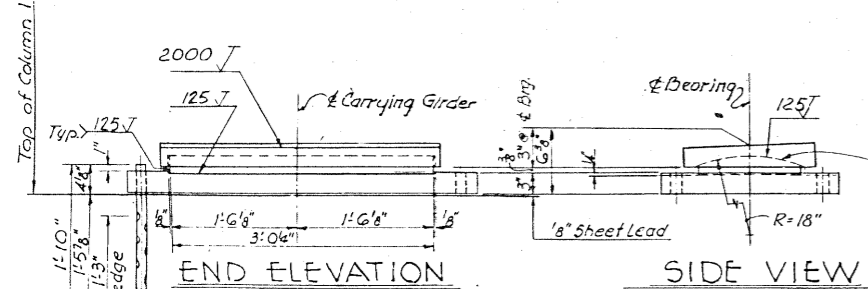
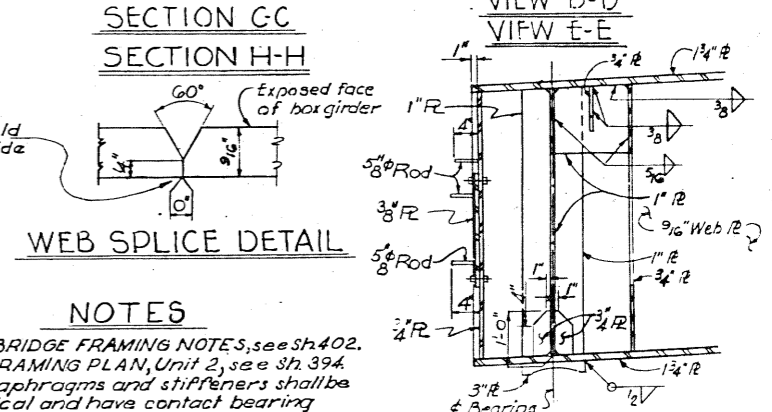
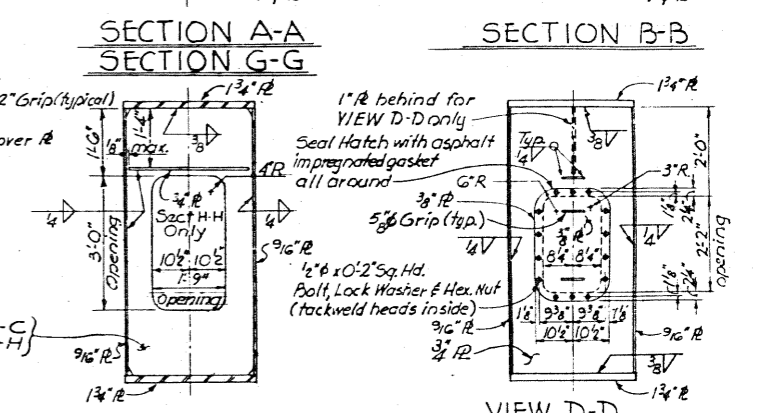
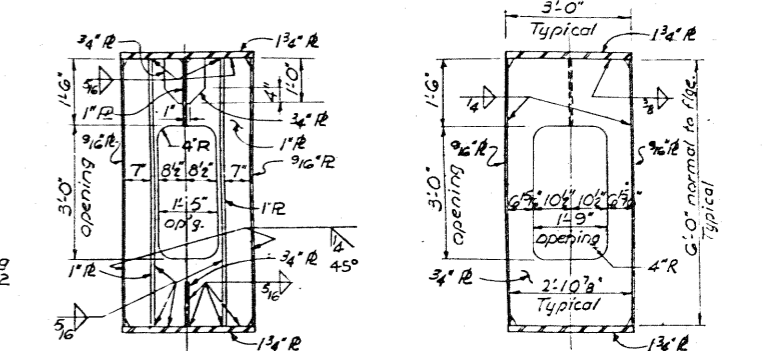
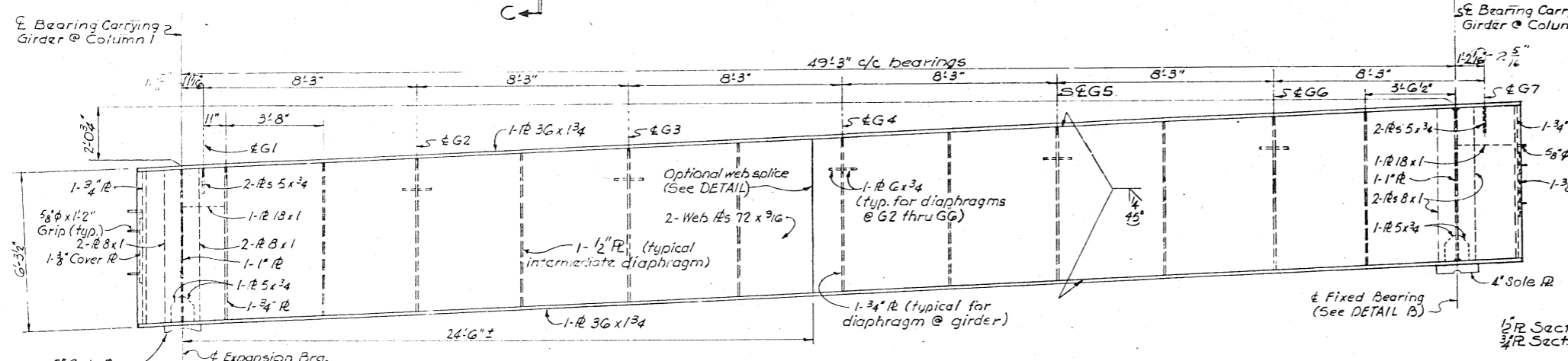
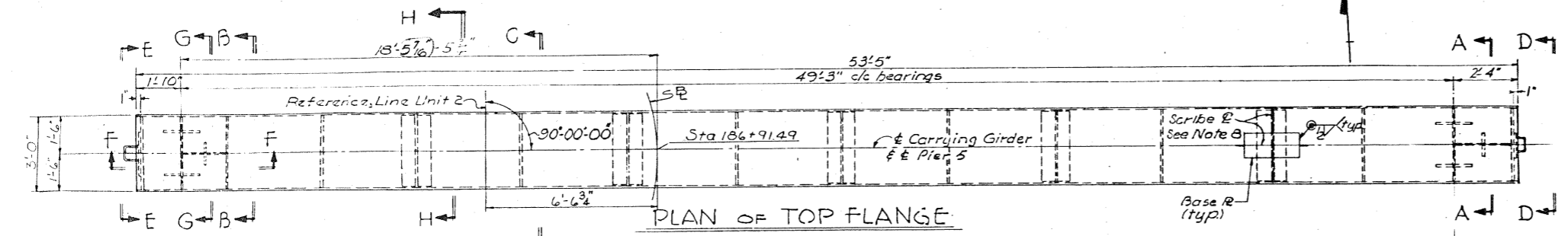
SECTION N-N



DETAIL P

LOCKWOOD, JONES & BEALS CONSULTING ENGINEERS DAYTON, OHIO					57 / 105
STEEL PIER CAP REPAIR DETAILS					
BRIDGE NO. HAM-75-1192R NORTHBOUND I-75 OVER MILL CREEK, BENSON ST., N.Y.C.R.R. & SHEPHERD AVENUE.					
DESIGNED	CHECKED	DRAWN	CHECKED	REVIEWED DATE	REVISED
B&N	B&N	MJZ	DFS	HDJ 12/92	

HAM-75-9.30



- WEB SPLICE DETAIL
- NOTES
1. For BRIDGE FRAMING NOTES, see Sh. 402.
 2. For FRAMING PLAN, Unit 2, see Sh. 394.
 3. All diaphragms and stiffeners shall be vertical and have contact bearing against the top of flange, unless welding to flange is required.
 4. Sole IRs shipped on girder must be protected against damage in transit.
 5. For Deflection and Camber, see Sh. 395.
 6. Butt welds on girder flange plates shall be ground flush, the finish grinding being parallel to the direction of stress.
 7. Butt welds shall be radiographically examined in accordance with Supplemental Specifications No. S-307, dated 8-23-60.
 8. Scribe center lines of carrying girder and longitudinal girders to extend beyond edges of shoes for control of setting shoes in the field. See Sh. 395.

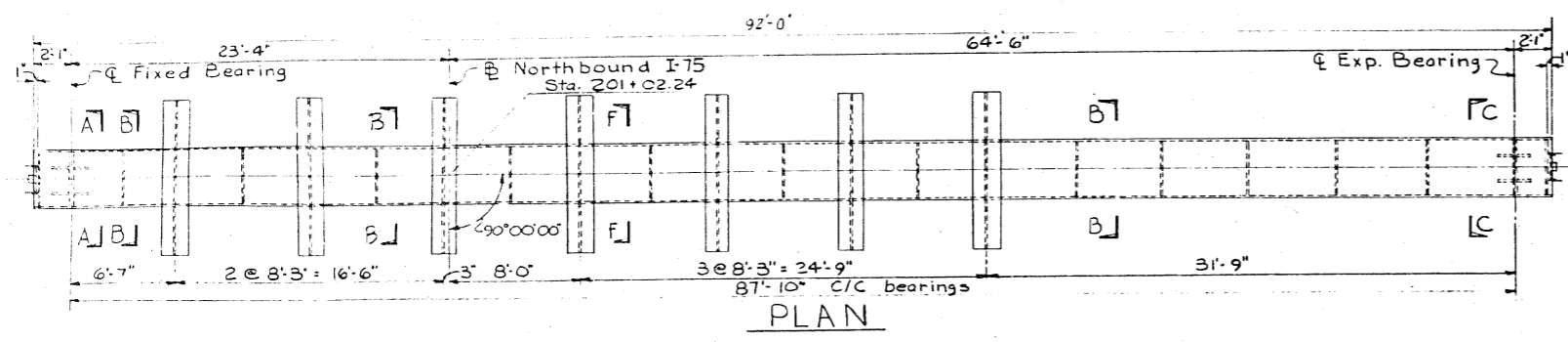
VOGT, IVERS, & ASSOCIATES
ENGINEERS ARCHITECTS
CINCINNATI CHICAGO

CARRYING GIRDER AT PIER 5
UNIT 2

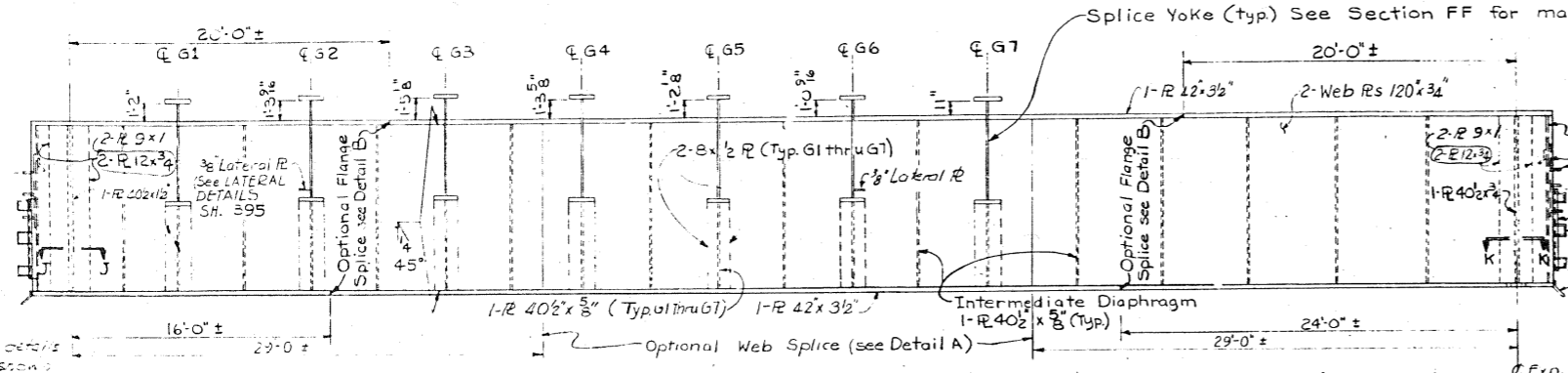
BRIDGE NO. HAM-75-1147
NORTHBOUND I-75 OVER MILL CREEK,
BENSON ST., NYC. RR. & SHEPHERD AVENUE
HAMILTON COUNTY STA. 182-91.99 TO
STA. 207-15.49

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
AY	TEC	~	IMY	JAD. 7-8-64	

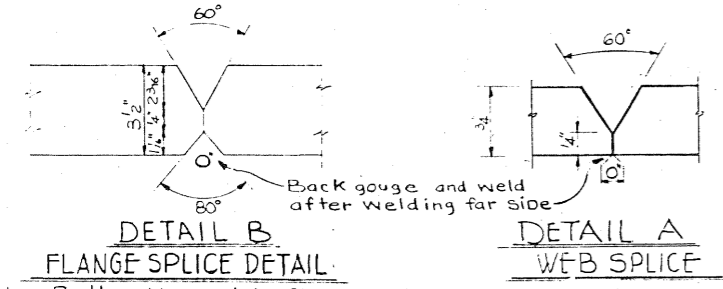
SFN 3110656



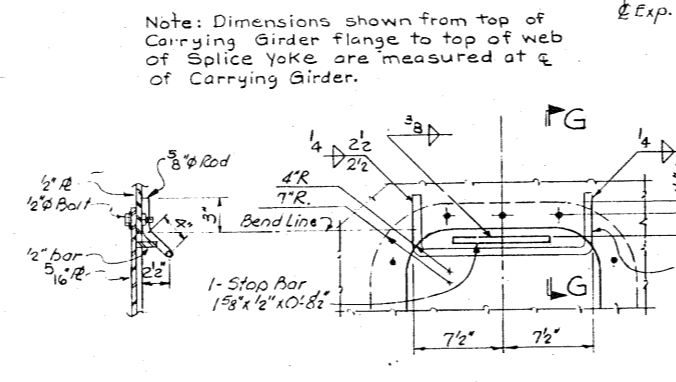
PLAN



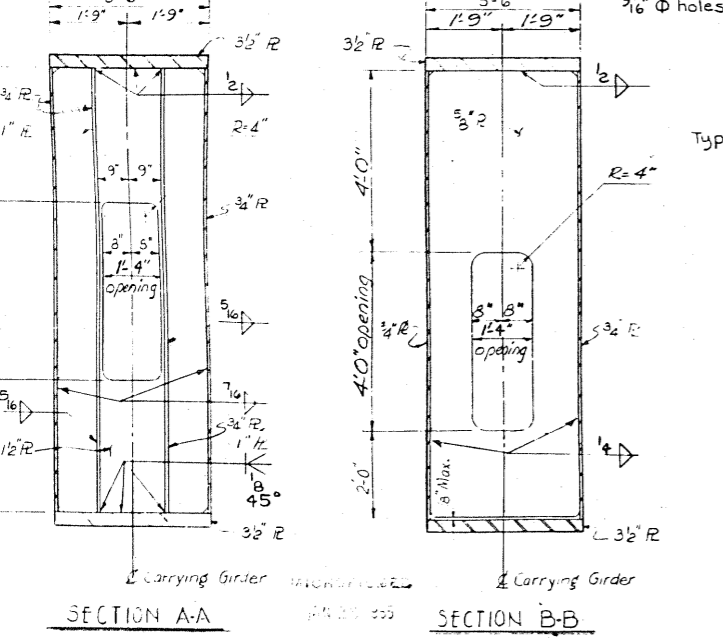
GIRDER ELEVATION



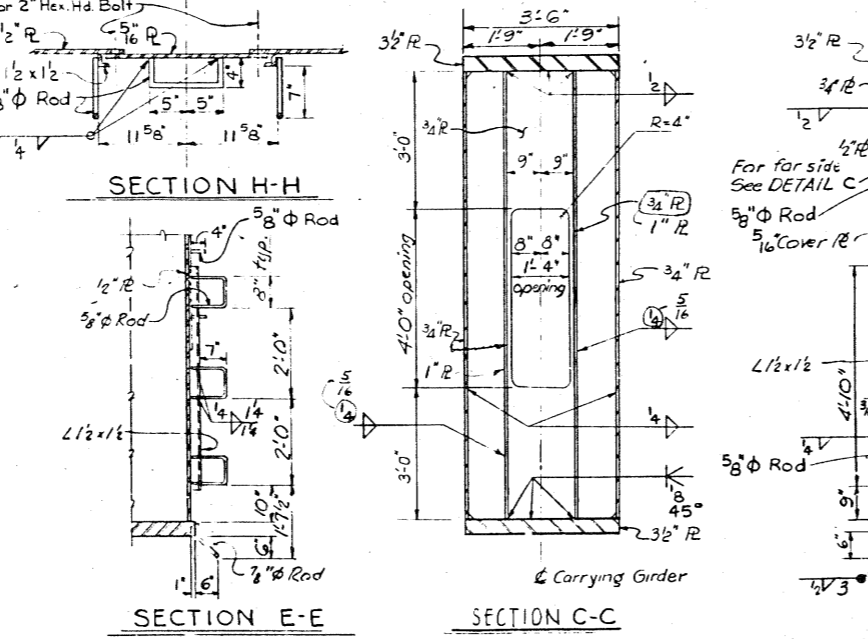
Note: Butt welds on girder flange plates shall be ground flush, the finish grinding being parallel to the direction of stress.



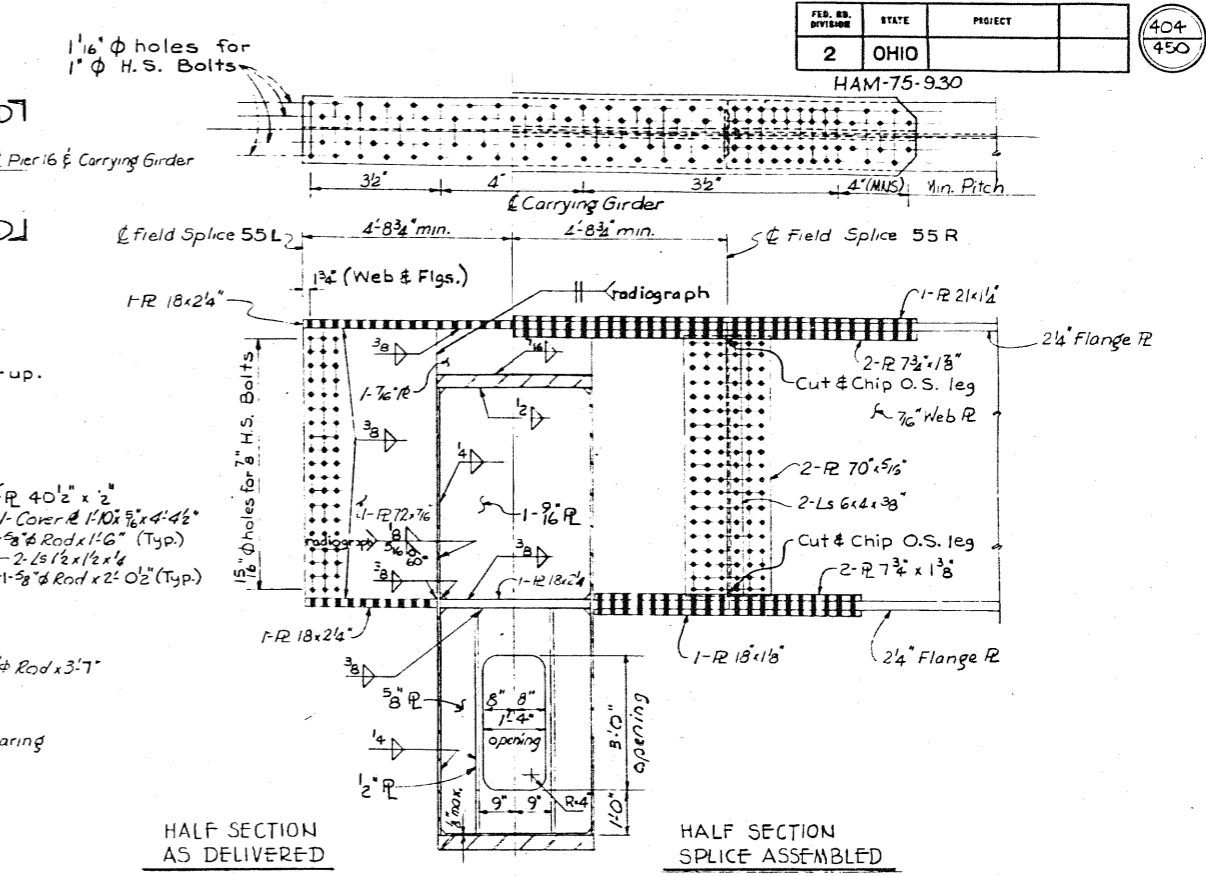
SECTION G-G DETAIL C INSIDE OF HATCH SHOWN



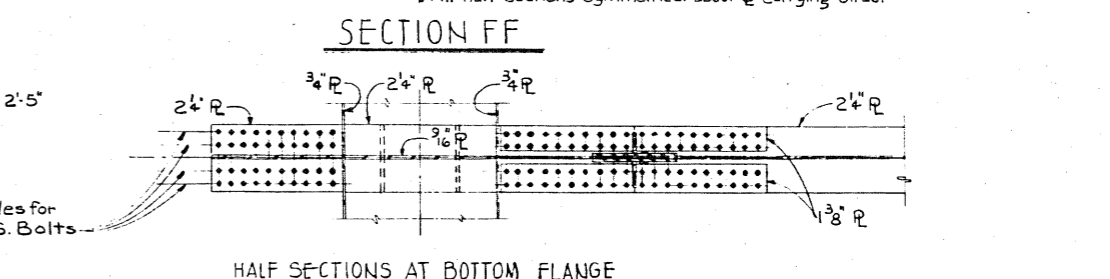
SECTION A-A SECTION B-B



SECTION E-E SECTION C-C

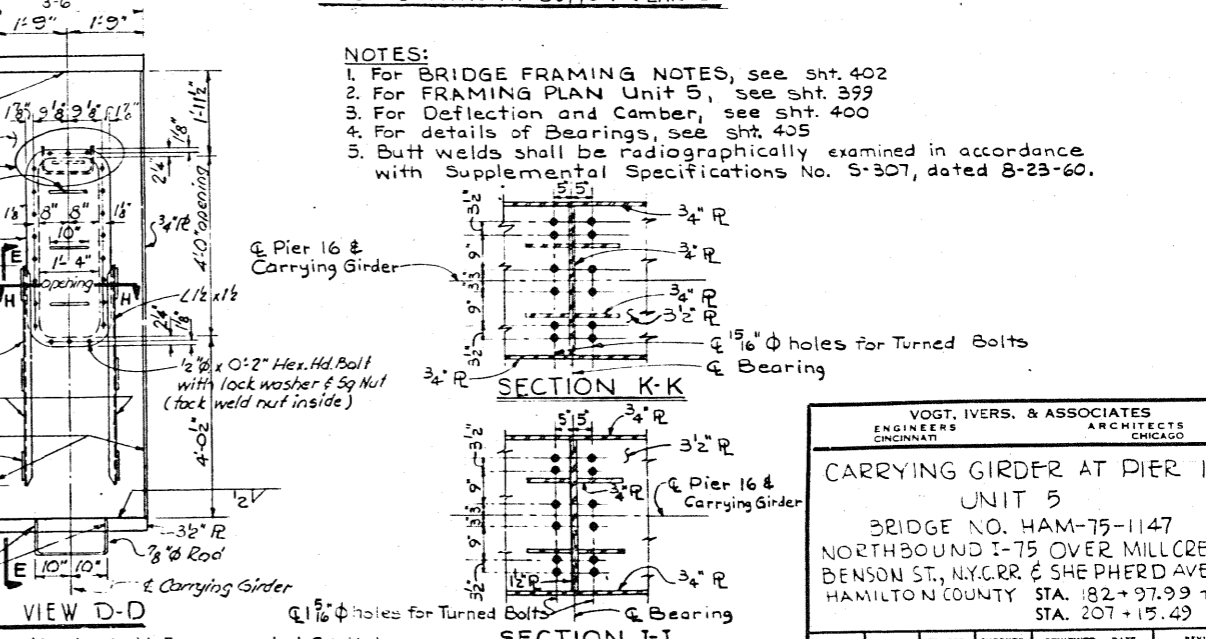


HALF SECTION AS DELIVERED HALF SECTION SPICE ASSEMBLED



SECTION FF HALF SECTIONS AT BOTTOM FLANGE

- NOTES:
1. For BRIDGE FRAMING NOTES, see sht. 402
 2. For FRAMING PLAN Unit 5, see sht. 399
 3. For Deflection and Camber, see sht. 400
 4. For details of Bearings, see sht. 405
 5. Butt welds shall be radiographically examined in accordance with Supplemental Specifications No. 5-307, dated 8-23-60.



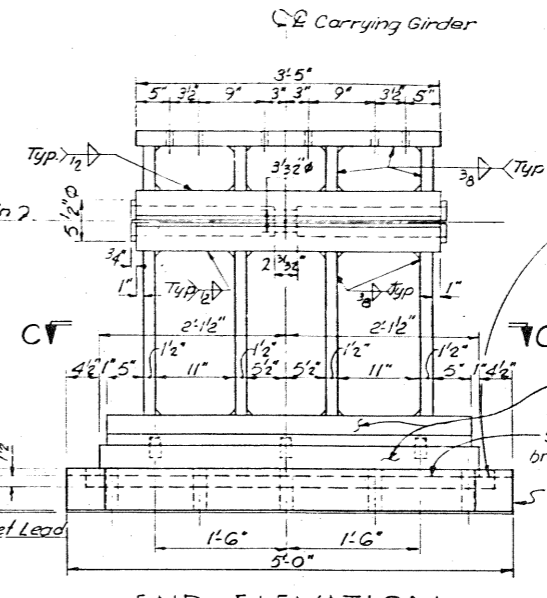
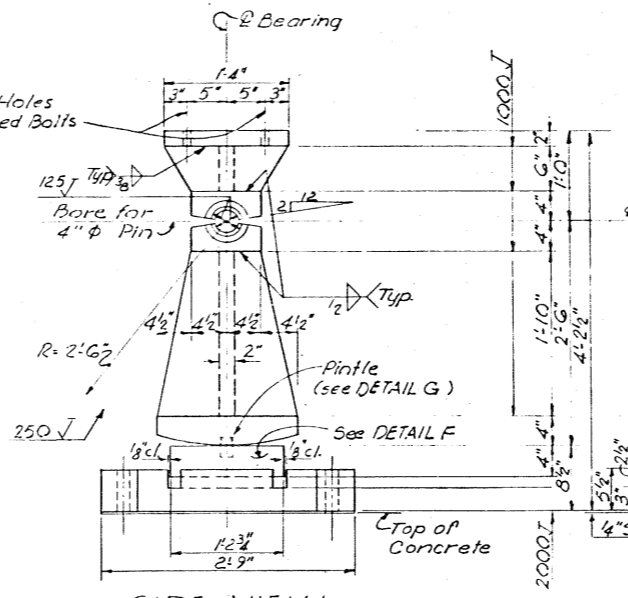
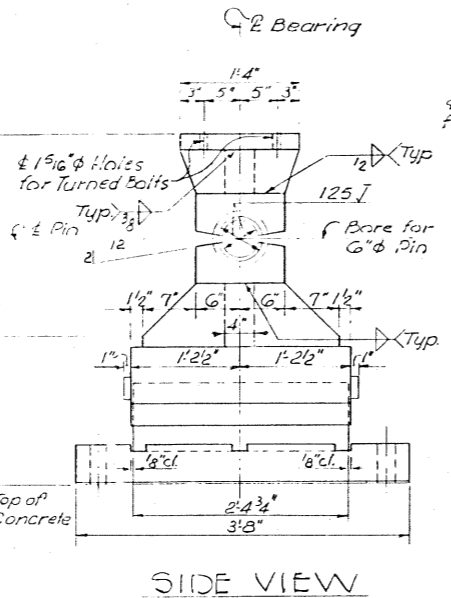
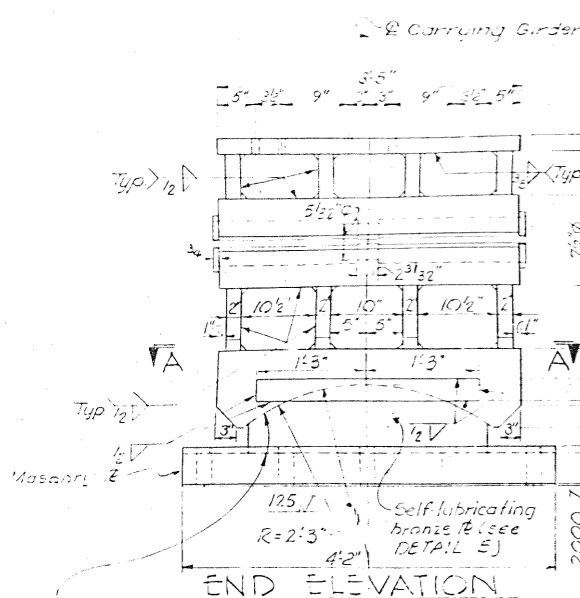
VIEW D-D SECTION J-J

Note: Seal hatch with Asphalt Impregnated Gasket all around. To be included under Item S-7 for payment.

VOGT, IVERS, & ASSOCIATES ENGINEERS ARCHITECTS CINCINNATI CHICAGO	
CARRYING GIRDER AT PIER 16 UNIT 5	
BRIDGE NO. HAM-75-1147 NORTHBOUND I-75 OVER MILLCREEK BENSON ST., N.Y.C.R.R. & SHEPHERD AVENUE HAMILTON COUNTY STA. 182+97.99 TO STA. 207+15.49	
DESIGNED HDJ	TRACED ARK/DHW
CHECKED HDJ	REVIEWED JAD
DATE 7-8-64	DATE 7-8-64

SFN 3110656

HAM-75-9.30



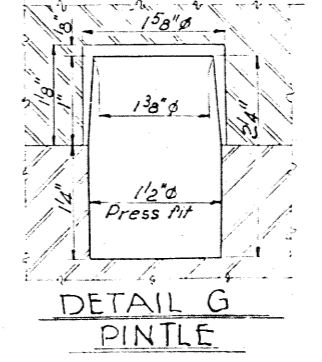
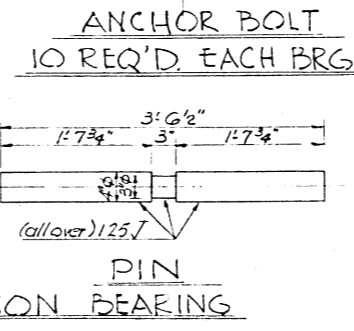
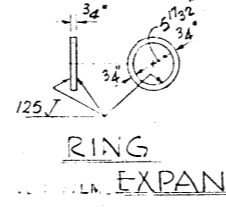
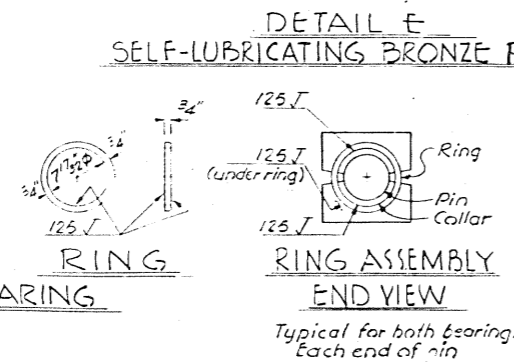
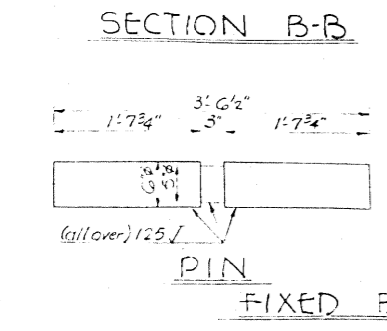
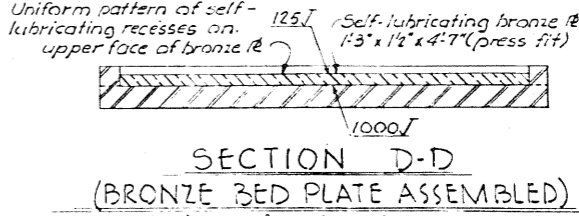
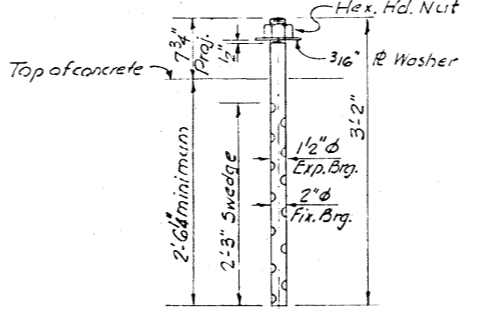
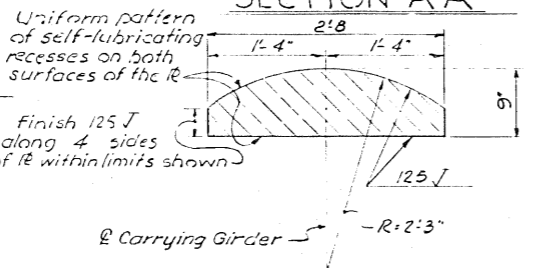
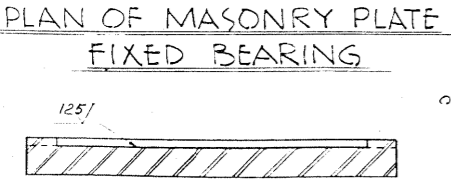
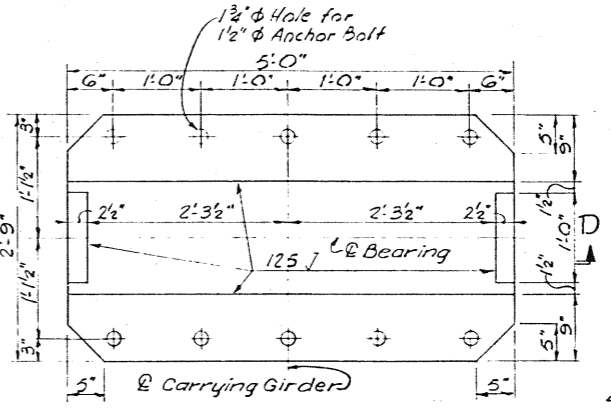
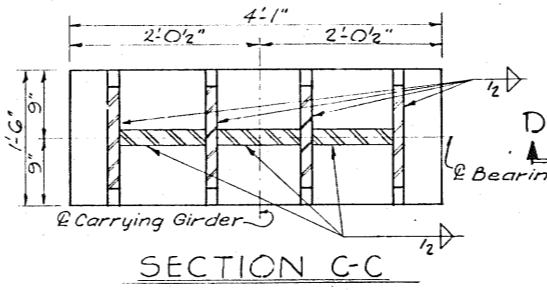
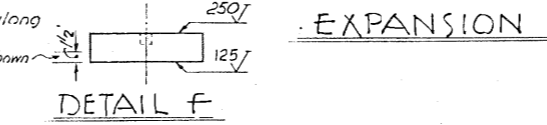
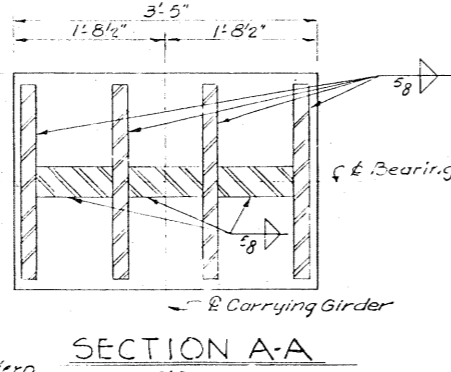
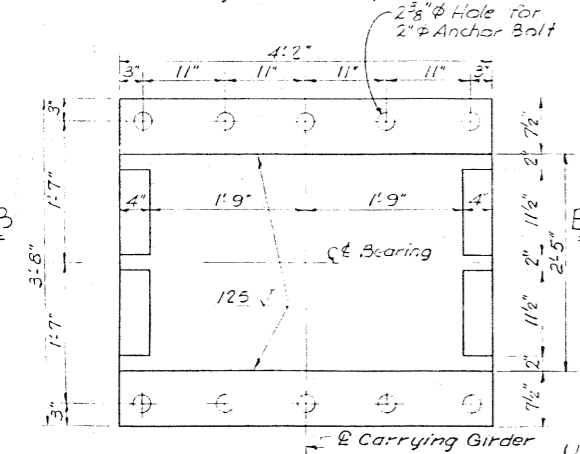
Before final assembly the upper surface of the bronze plate and the opposing steel plate shall be coated with a lubricant similar to that in the recesses. The three parts shall be banded together for shipment.

ASTM A441 High Strength Structural Steel
Self-lubricating bronze B (See SECTION D-D)
Masonry

NOTES

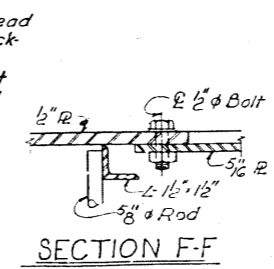
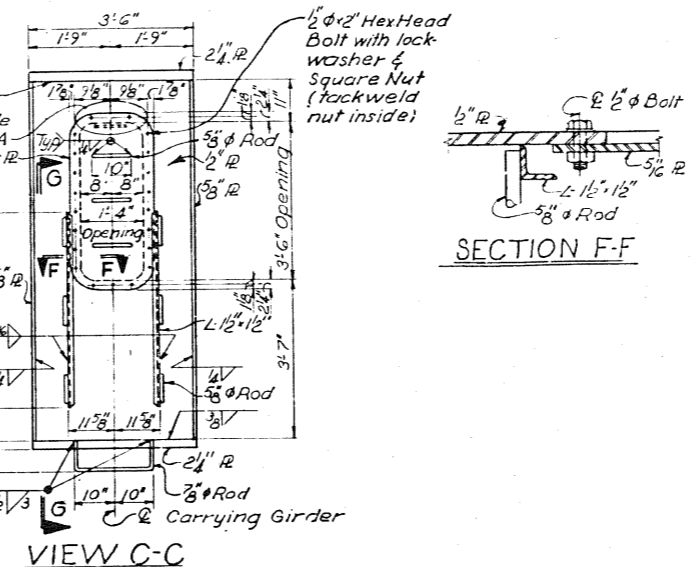
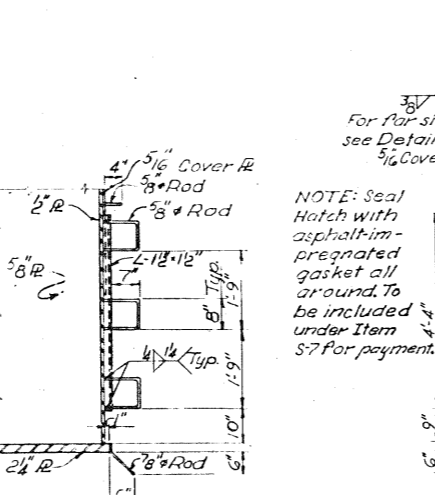
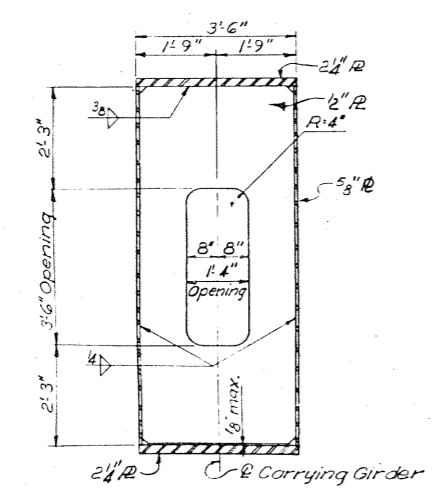
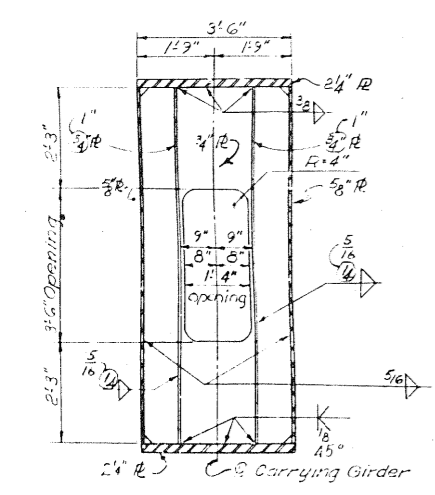
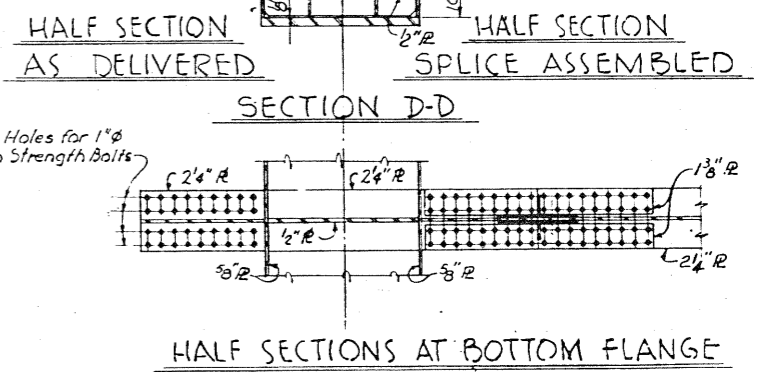
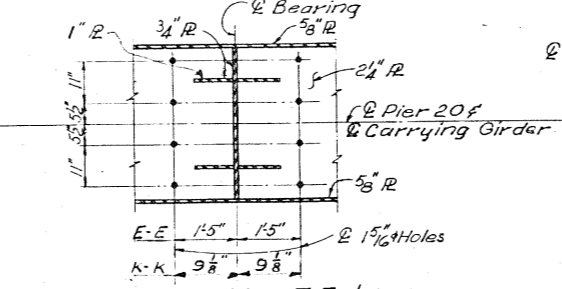
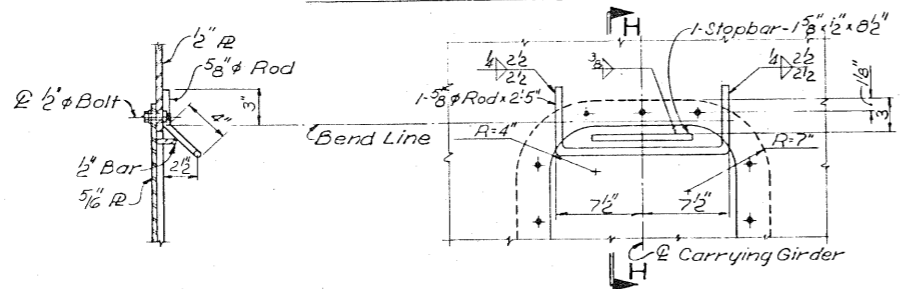
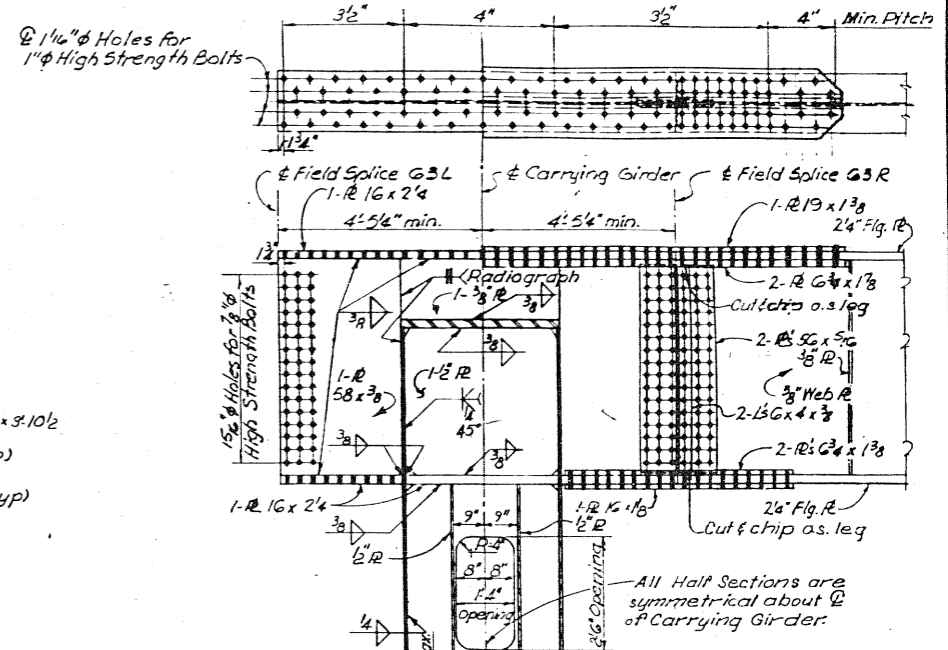
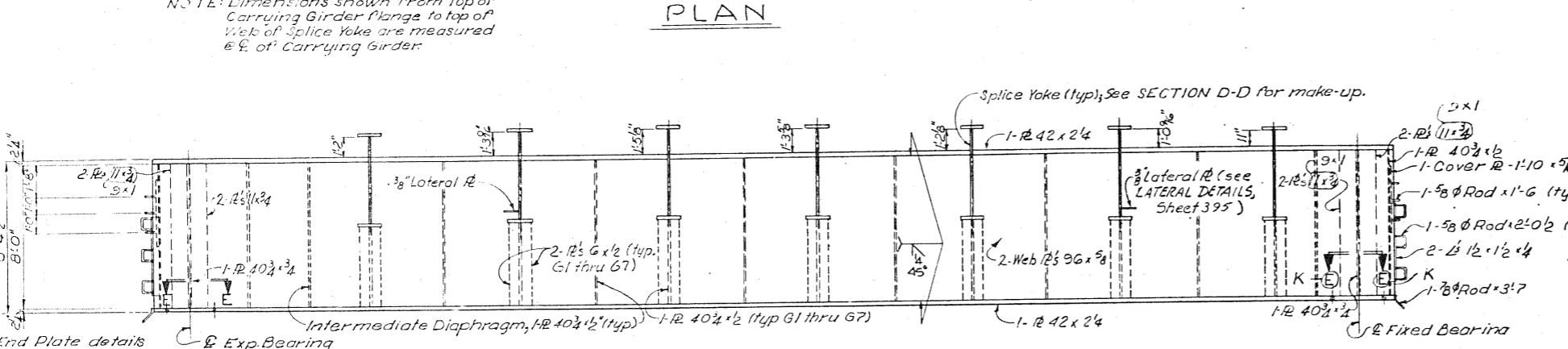
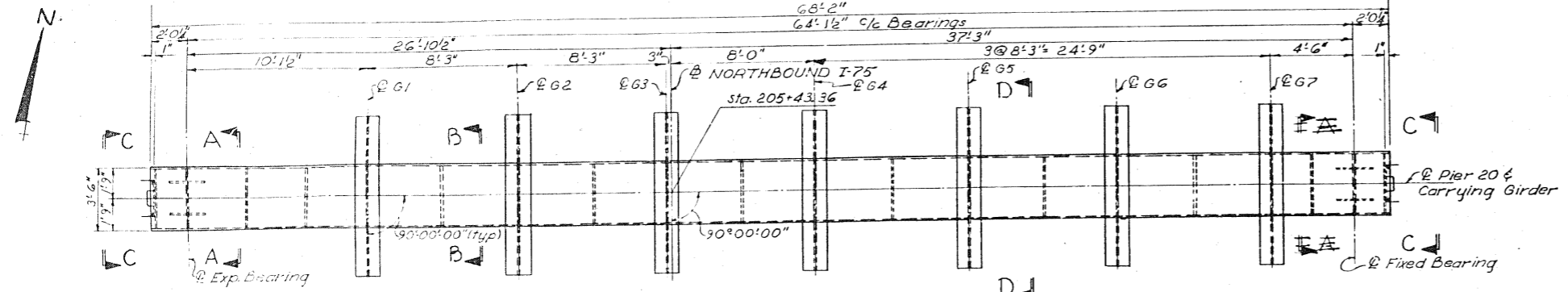
- For BRIDGE FRAMING NOTES see Sh. 402.
- For location of Bearings and for details of Carrying Girder see Sh. 404.
- Specifications for Self-Lubricating Bronze Bearing Plates, Std. Dwg. FS B-1-G2, Rev. 1-15-63 shall apply with the following revisions:
Change Paragraph (a) to read: Cast phosphor bronze shall conform to Sec. M-7.11 of the Construction Materials Specifications. ASTM Designation B22, Alloy B with an allowable unit stress of 3,500 p.s.i. in compression shall be used for Expansion Bearing. ASTM Designation B22, Alloy E with an allowable unit stress of 3,500 p.s.i. in compression shall be used for Fixed Bearing.
Change Paragraph (c) to read: "The recesses for the lubricant shall consist of annular rings with or without a central circular recess, with a depth at least equal to the width of the ring or diameter of hole."
- Steel Plates and bolts shall conform to ASTM Designation A36-G2T, except as shown, and pins to ASTM A-108.

Before final assembly the surface of the bronze plate and the opposing steel plates shall be coated with a lubricant similar to that in the recesses. The three parts shall be banded together for shipment.



VOGT, IVERS, & ASSOCIATES		ENGINEERS ARCHITECTS	
CINCINNATI		CHICAGO	
BEARINGS FOR CARRYING GIRDER AT PIER 16 UNIT 5			
BRIDGE NO. HAM-75-1147			
NORTHBOUND I-75 OVER MILLCREEK, BENSON ST., NYC. RR. & SHEPHERD AVENUE HAMILTON COUNTY STA. 182+97.99 TO STA. 207+15.49			
DESIGNED	DRAWN	TRACED	CHECKED
JAD	TEC	~	HJU
ERH			
REVIEWED	DATE		
JAD	7-8-64		

SFN 3110656

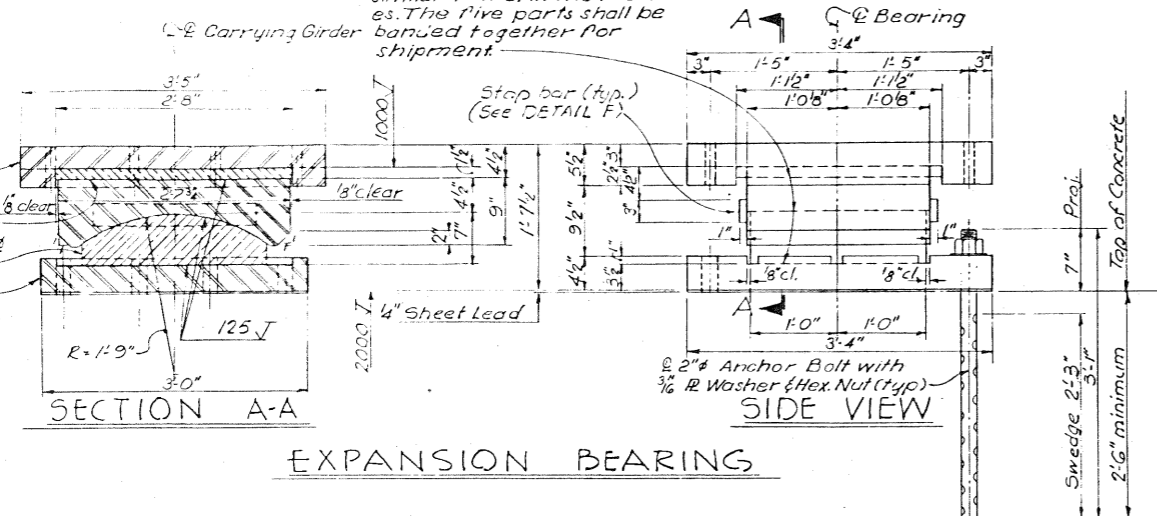


- NOTES
- For BRIDGE FRAMING NOTES see Sh. 402.
 - For FRAMING PLAN, Unit G, see Sh. 401.
 - For DEFLECTION & CAMBER see Sh. 402.
 - For details of Bearings see Sh. 407.
 - Butt welds shall be radiographically examined in accordance with Supplemental Specifications No. S-307, dated 8-23-60.

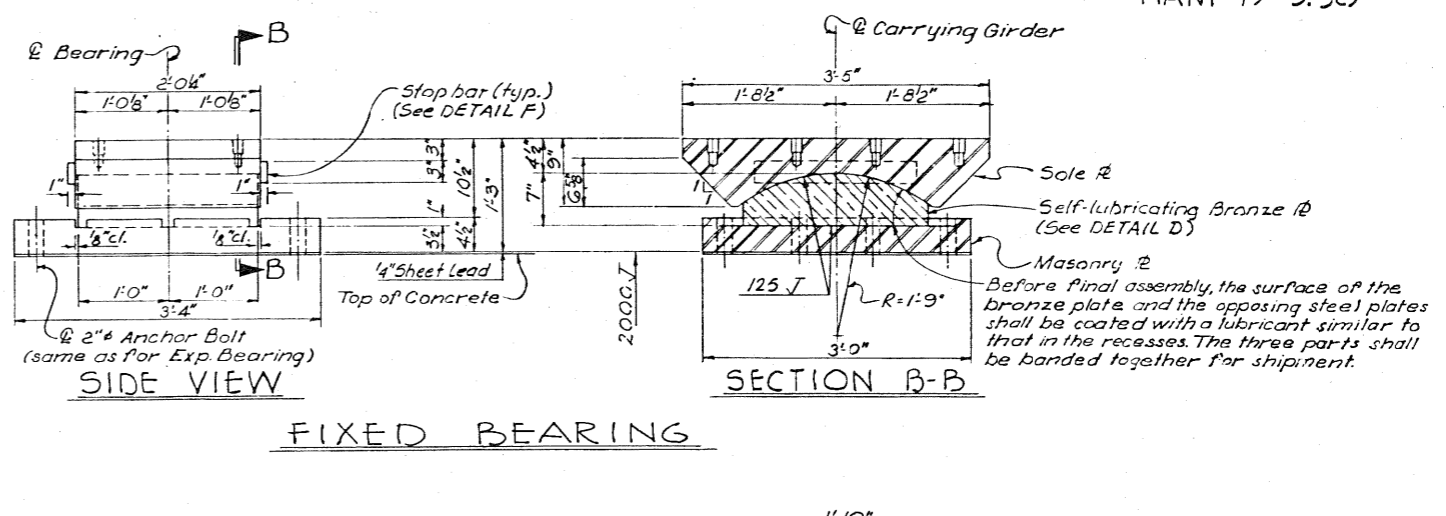
VOGT, IVERS, & ASSOCIATES ENGINEERS CINCINNATI		ARCHITECTS CHICAGO	
CARRYING GIRDER AT PIER 20 UNIT G			
BRIDGE NO. HAM-75-1147 NORTHBOUND I-75 OVER MILLCREEK, BENSON ST., N.Y.C.R.R. & SHEPHERD AVENUE HAMILTON COUNTY STA. 182+97.99 TO STA. 207+15.49			
DESIGNED EPA	DRAWN TEC	TRACED ~	CHECKED RKS.
REVIEWED DATE 7-8-64	DATE 2-25-65		

SFN 3110656

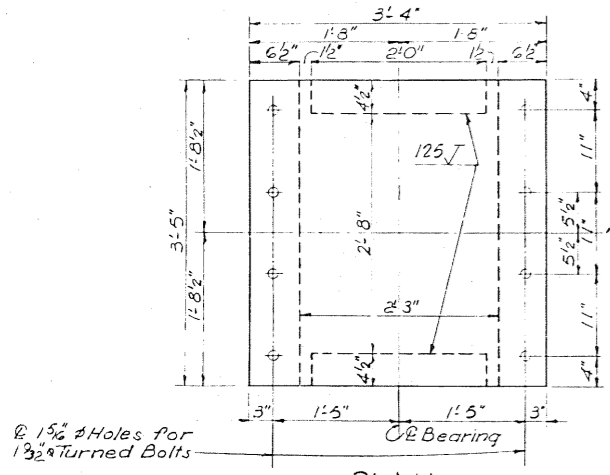
Before final assembly, the surfaces of the bronze plates indicated below and the opposing steel plates shall be coated with a lubricant similar to that in the recesses. The five parts shall be banded together for shipment.



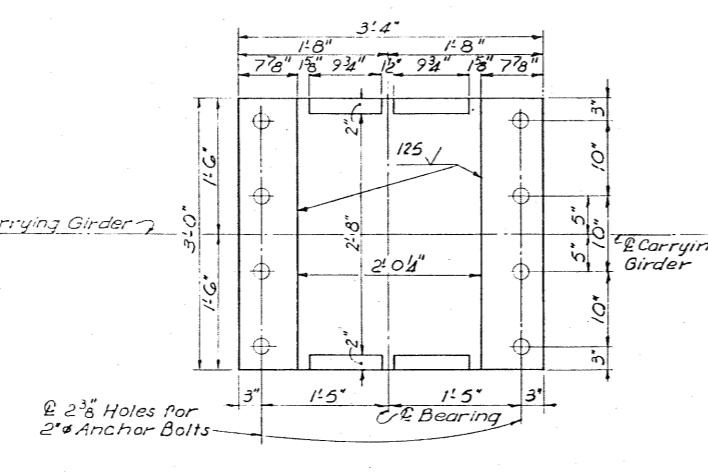
EXPANSION BEARING



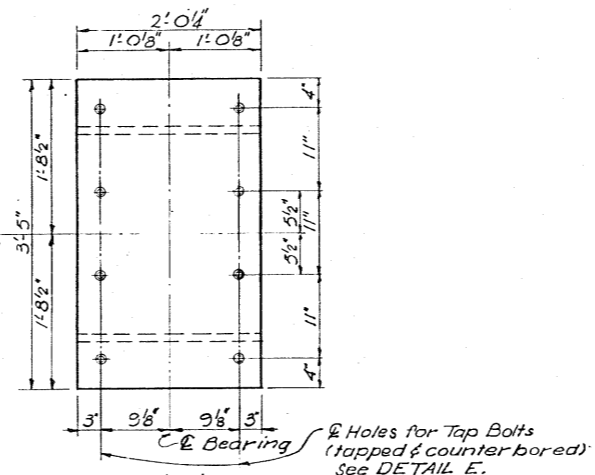
FIXED BEARING



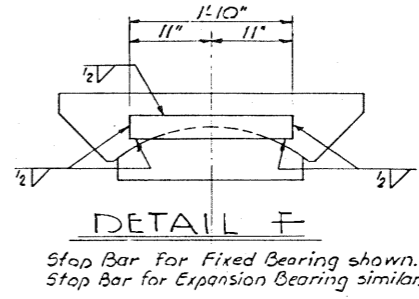
PLAN SOLE PLATE EXPANSION BEARING



PLAN MASONRY PLATE EXPANSION BEARING



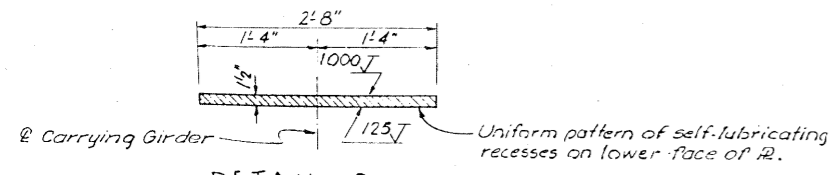
PLAN SOLE PLATE FIXED BEARING



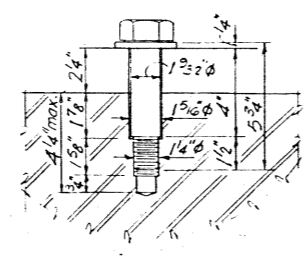
DETAIL F

NOTES

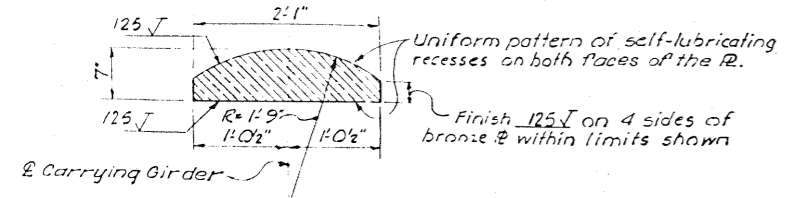
1. For BRIDGE FRAMING NOTES see Sh. 402.
2. For location of bearings and for details of Carrying Girder see Sh. 406.
3. "Specifications for Self-Lubricating Bronze Bearing Plates," Std. Dwg. F.S.B-1-63, Rev. 1-15-63, shall apply, with the following revisions:
Change Paragraph a) to read:
"Cast Phosphor Bronze shall conform to Section M-7-11 of the Construction and Material Specifications, ASTM Designation B 22, Alloy E, and shall have an allowable unit stress of 3500 P.S.I. in compression."
Change Paragraph c) to read:
The recesses for the lubricant shall consist of annular rings with or without a central circular recess, with a depth at least equal to the width of the ring or diameter of the hole.
4. Steel: All steel parts (including bolts) shall conform to ASTM Designation A36-G2 T.



DETAIL C SELF-LUBRICATING BRONZE PLATE EXPANSION BEARING



DETAIL E TAP BOLT FIXED BEARING



DETAIL D SELF-LUBRICATING BRONZE PLATE

VOGT, IVERS, & ASSOCIATES ENGINEERS ARCHITECTS CINCINNATI CHICAGO					
BEARINGS FOR CARRYING GIRDER AT PIER 20 UNIT G BRIDGE NO. HAM-75-1147 NORTHBOUND I-75 OVER MILL CREEK, PENSON ST., N.Y.C. RR & SHEPHERD AVENUE HAMILTON COUNTY STA. 182+97.99 to STA. 207+15.49					
DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED	DATE
ERH	TEC	~	R.K.S.	JAD	7-8-64
REVISED					