

NSTM Member Inspection Report

Submitted to:



Ohio Department of Transportation, District 8
505 S. State Route 741
Lebanon, Ohio 45036

HAM-75-1192R 2025 NSTM Member Inspection Report (VAR-District 8 Bridge Inspections for Steel Caps) SFN: 3110656, PID: 109781

Submitted by:



October 2, 2025

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TABLE OF CONTENTS

I.	INTRODUCTION	1
	A. Description	1
	B. Inspection and Access Methods	3
	C. Inspection Team	3
	D. Condition Rating.....	4
II.	PIER CAP 5	6
	A. Pier Cap 5 Interior	6
	B. Pier Cap 5 Exterior.....	8
	C. Pier Cap 5 Fatigue Prone Details	10
III.	PIER CAP 16	12
	A. Pier Cap 16 Interior	12
	B. Pier Cap 16 Exterior.....	15
	C. Pier Cap 16 Fatigue Prone Details	17
IV.	PIER CAP 20	20
	A. Pier Cap 20 Interior	20
	B. Pier Cap 20 Exterior.....	23
	C. Pier Cap 20 Fatigue Prone Details	25
V.	CONCLUSIONS AND RECOMMENDATIONS	28
	A. Pier Cap 5 Recommendations	28
	B. Pier Cap 16 Recommendations	28
	C. Pier Cap 20 Recommendations	29
VI.	APPENDIX A – EXISTING PIER PLANS	

INTRODUCTION

Bridge Description

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, and 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.

The structure has three NSTM pier caps which are located at Pier 5 (Figure 2), Pier 16, and Pier 20 (Figure 3). 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'-3" center-to-center. The west bearing allows for expansion while the east bearing is fixed. The web plate height is 72" 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'-10" center-to-center. The west bearing is fixed while the east bearing allows for expansion. The web plate height is 120" 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'-1 ½" center-to-center. The west bearing allows for expansion while the east bearing is fixed. The web plate height is 96" 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. Several stitch welds that attached the 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.

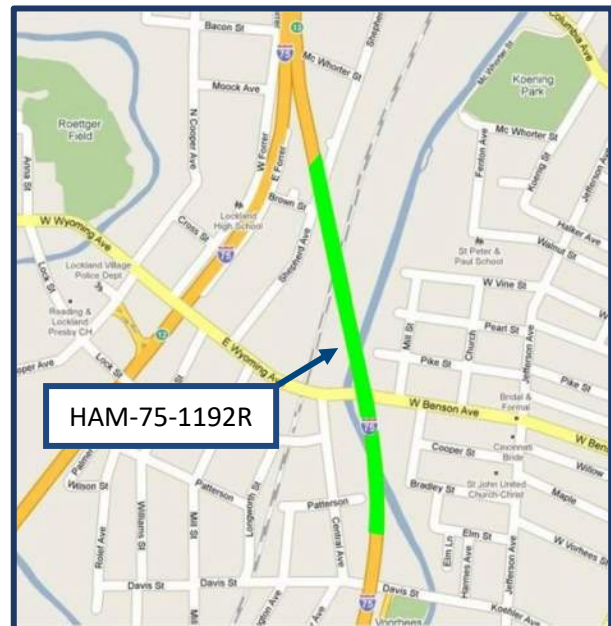


Figure 1: Bridge Location Map



Figure 2: NSTM Pier Cap Location – Pier 5



Figure 3: NSTM Pier Cap Location – Pier 16 & Pier 20

Inspection and Access Methods

Between July 14, 2025 and August 10, 2025, Gannett Fleming performed an in-depth inspection of the NSTM pier caps. The pier cap hatch covers were removed for the entry and replaced with an impact wrench and resealed with exterior grade silicone caulk after the inspections. Various socket sizes from ½" to 24mm 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. OSHA compliant safety harnesses and lanyards were worn by inspectors when working in the bucket truck, manlift, or aerial snooper, and when implementing bridge climbing techniques.

The inspection of Pier Cap 5 was performed on August 10, 2025. Traffic was maintained while ODOT's Aspen Aerial Snooper vehicle was used to perform the "arms-length" exterior inspection of the pier cap and to access the steel pier cap interior. A truck mounted attenuator was placed behind the snooper to protect the inspection crew.

Pier Cap 16 was inspected between July 21 and July 25, 2025. An 86' manlift was used to inspect the interior and exterior of the cap. The coordination for site access with RailPros and NS Railroad took over 3 months in 2025. During future inspections start the permit activity and coordination early with Norfolk Southern and RailPros.

Pier Cap 20 was inspected between July 14 and July 18, 2025. The interior and exterior of the pier cap were inspected using a 46' 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.

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.

Inspection Team

The following individuals were part of the inspection team:

- | | |
|--------------------------------|-------------|
| • Daniel E. Kent, Jr., PE, CBI | Team Leader |
| • Matthew McFadden, EI, CBI | Inspector |
| • Rob Parker, CBI | Inspector |
| • Tanner Hartley, EI, CBI | Inspector |

Condition Rating

State and Federal guidelines for evaluating the condition of bridges have been developed to promote uniformity in the inspections performed by different teams 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 caps.

Summary Items (NBIS)	Condition	Defects
9	Excellent	Excellent Condition.
8	Very Good	No problems noted.
7	Good	Some minor problems.
6	Satisfactory	Structural elements show some minor deterioration.
5	Fair	All primary structural elements are sound but may have minor section loss, cracking, spalling, or scour.
4	Poor	Advanced section loss, deterioration, spalling, or scour.
3	Serious	Loss of section, deterioration, spalling, or scour have seriously affected primary structural components. Local failures are possible. Fatigue cracks in steel or shear cracks in concrete may be present.
2	Critical	Advanced deterioration of primary structural elements. Fatigue cracks in steel or shear cracks in concrete may be present or scour may have removed substructure support. Unless closely monitored it may be necessary to close the bridge until corrective action is taken.
1	"Imminent" Failure	Major deterioration or section loss present in critical structural components or obvious vertical or horizontal movement affecting structure stability. Bridge is closed to traffic, but corrective action may put it back in light service.
0	Failed	Out of service-beyond corrective action

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

1. Manual of Bridge Inspection, Ohio Department of Transportation (ODOT), 2025.
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. National Bridge Inspection Standards, U.S. Department of Transportation, 2004.

AASHTO National Bridge Element Quantities:

NATIONAL BRIDGE ELEMENTS RECORDING SHEET ¹									
Element	Defect	Env	Element/Defect Description	Total Qty	Units	Condition State Quantity			
						CS1	CS2	CS3	CS4
Superstructure									
PIER 5									
231		3	Steel Pier Cap	53	FT	52	1		
PIER 16									
231		3	Steel Pier Cap	92	FT	92			
PIER 20									
231		3	Steel Pier Cap	68	FT	67	1		
515		3	Steel Protective Coating	24,921	SQ FT	24,561	360		
Substructure									
PIER 5									
205		3	Reinforced Concrete Column	2	EA	2			
PIER 16									
205		3	Reinforced Concrete Column	2	EA	2			
PIER 20									
205		3	Reinforced Concrete Column	2	EA	2			

¹Includes only the defects for the portions of the elements that were inspected during the NSTM inspection.

PIER CAP 5

Pier Cap 5 is in Good condition [7] (Photo 1). As part of the 1993 rehabilitation project, tack welds were removed along the webs and bottom flange and backer bars, though many still remain. Additionally, 1" Diameter holes were drilled through the webs of the pier cap on both sides of the girder webs in which bolts were installed.

Pier Cap 5 Interior

The interior of Pier Cap 5 was dry at the time of inspection. Both access hatches appear to be well sealed. No water staining or leakage was noted inside the pier cap. The paint system of the pier cap interior is in good condition with adequate coverage throughout. There are several locations of isolated light surface corrosion on the bottom flange, and the west end of the cap. One of these areas between Girders 3 and 4 is 24" x 12" (Photo 2). The areas that were affected by the past rehabilitation have been painted over.

Select portions of the bottom flange backer bars were removed throughout the length of the pier cap to eliminate fatigue prone details (Photo 3). Some of the backer bars that remain have intermittent tack welds along their lengths.

There are ten total tack welds that are less than 2" on the north web. There are three total tack welds that are less than 2" on the south web. Most of these tack welds appear to be at least partially removed (Photo 4). There are six total tack welds, ranging between 1.5" and 4" between the north web and west end cap (Photo 5). There are two tack welds along the bottom flange backer bar, one measuring 3" located east of Girder 3 (Photo 6), and another measuring 2-1/4" west of Girder 3 (Photo 7). Additional tack welds were identified between the north web plate and diaphragm stiffeners at Girders 4 and 5.

There are two previously noted plug welds on the pier cap web plates:

- 3" L x 1" H on the south web plate east of Girder 6 (Photo 8)
- 2" L x 1" W on the north web plate between Girder 5 and Girder 6 (Photo 9)



Photo 1: Elevation of Pier Cap 5



Photo 2: Surface corrosion on the bottom of the flange of Pier Cap 5 between Girders 3 and 4



Photo 3: Typical Bottom Flange backer bar retrofit of Pier Cap 5, east of Girder 2

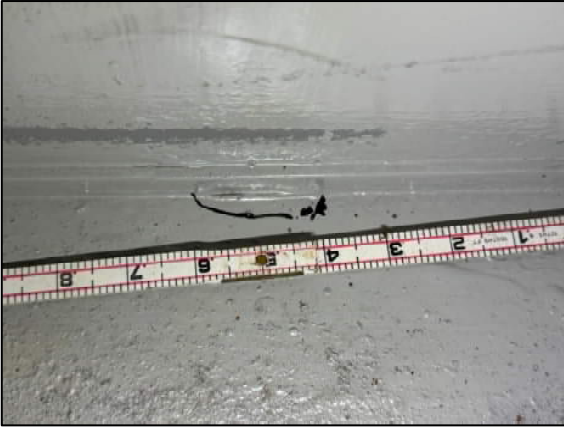


Photo 4: Typical incomplete removal of tack welds on Pier Cap 5, some material remaining



Photo 7: 2-1/4" tack weld between the bottom flange and north web of Pier Cap 5, west of Girder 3



Photo 5: Tack welds ranging from 1.5" to 4" at the west end of the north end of Pier Cap 5



Photo 8: 3" x 1" plug weld on the south web of Pier Cap 5, east of Girder 6



Photo 6: Typical 3" tack weld between the bottom flange and north web of Pier Cap 5, east of Girder 3



Photo 9: 2" x 1" plug weld on the north web of Pier Cap 5, between Girder 5 and Girder 6

Pier Cap 5 Exterior

The paint system of the pier cap exterior is in good condition with adequate coverage throughout the length of the pier cap.

The bottom flange of the pier cap typically exhibits uneven and overlapping weld beads (Photo 10). There are discontinuous fillet welds along the bottom flange groove welds below Girder 2 and Girder 3 (Photo 11).

A lifting plate was welded to the top flange of the pier cap west of the Girder 2 bearing. It is still in place (Photo 12).

There are numerous 1/32" gouges in the north face of bottom flange in scattered locations between Girder 2 and Girder 5 (Photo 13). These are most likely a result of the construction process.

The east pier cap bearing displays isolated peeling paint and surface corrosion at the bottom of the masonry plate (Photo 14). There is peeling paint with areas of surface and laminating corrosion on the west pier cap bearing (Photo 15).

The girder bearings are welded to the top flange of the pier cap and typically exhibit light surface corrosion (Photo 16).



Photo 11: Fillet welds at groove weld between north web and bottom flange of Pier Cap 5, between Girder 2 and 3



Photo 12: Lifting angle welded in place on top of Pier Cap 5 at Girder 2



Photo 10: Typical overlapping weld beads on bottom flange of Pier Cap 5, south web below Girder 4



Photo 13: Gouges from construction on the north face of the bottom flange of Pier Cap 5 at Girder 2



Photo 14: Typical Peeling Paint and surface corrosion at the east bearing of Pier Cap 5



Photo 15: Typical Peeling Paint and surface corrosion at the west bearing of Pier Cap 5



Photo 16: Surface Corrosion of the girder bearings at Pier Cap 5

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", 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" and less than or equal to 4", on the flange plate.

Category: D

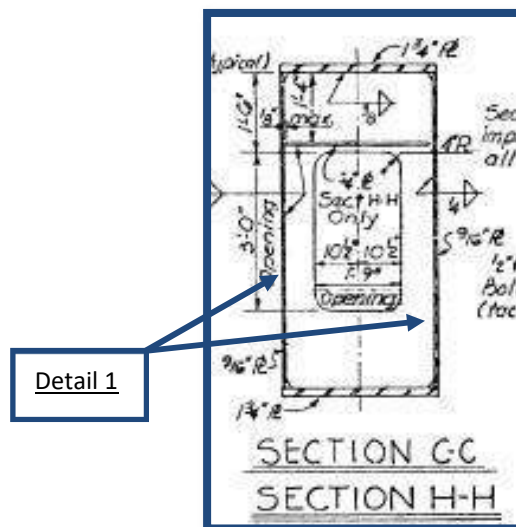
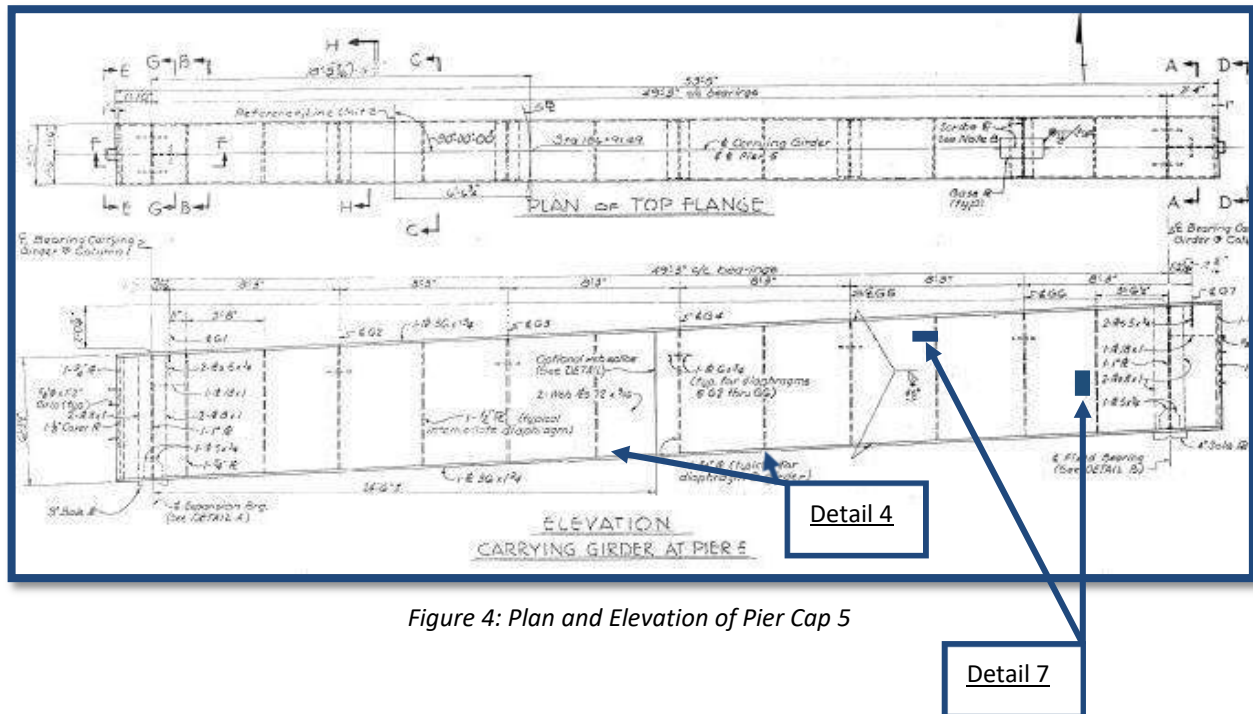
Location: Two tack welds between the bottom flange and north web backer bar: one 3" long between Girders 3 and 4, and one 2-1/4" long between Girders 2 and 3.

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).



PIER CAP 16

Pier Cap 16 is in Good condition [7] (Photo 17). As part of the 1993 rehabilitation project, tack welds were removed along the webs and bottom flange and backer bars, though many still remain. Additionally, 1" diameter holes were drilled through the webs of the pier cap on both sides of the girder webs in which bolts were installed.

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 (Photo 18).

The paint system of the pier cap interior is in fair condition. There are several locations of peeling paint and surface corrosion on the top flange, bottom flange, and web plates throughout (Photo 19). The floor was covered in accumulations of steel filings, paint flakes, and sand blasting medium (Photo 20).

During the 1993 rehabilitation project, tack welds along the bottom flange, webs 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 (Photo 21). Random tack welds were also observed throughout the pier cap. Select portions of bottom flange backer bar have been removed throughout the length of the pier cap to eliminate butt joints (Photo 22). A random spot weld was also noted on the north web between Girder 1 and the west diaphragm approximately 3' above the bottom flange (Photo 23).

The fillet welds between the pier cap diaphragms and the webs and girder bottom flange tie plates typically exhibit ripples, discontinuities, and overlapping beads (Photo 24). In some locations, the excess overlapping weld bead material is breaking off (Photo 25).

The fillet welds along the pier cap diaphragms, pier cap webs and the girder tie plates are not sufficiently coped resulting in triaxial welds (Photo 26). As part of the 1993 rehabilitation project, the 1" diameter drilled and bolted stress relief holes were installed in the pier cap webs adjacent to all girder diaphragms above the girder tie plates. At an earlier date, drilled, sawcut and bolted retrofits were added in the pier cap webs, at the tips of the girder bottom flanges.

During the inspection, feces was observed at the east end of the pier cap adjacent to the diaphragm above the east bearing (Photo 27). This condition was not noted in previous reports.



Photo 17: Elevation of Pier Cap 16



Photo 18: Missing nut for the west access hatch of Pier Cap 16



Photo 19: Corrosion on the bottom flange of Pier Cap 16



Photo 22: Typical bottom flange backer bar retrofit of Pier Cap 16



Photo 20: Typical corrosion and blasting media on the bottom of Pier Cap 16



Photo 23: Random spot weld on the north web of Pier Cap 16, west of Girder 1



Photo 21: Typical partially removed tack welds on the bottom flange backer bar of Pier Cap 16

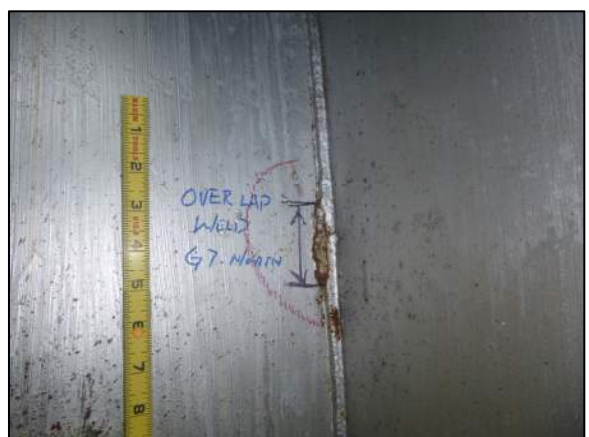


Photo 24: Overlapping weld with minor corrosion above girder tie plate on the north web of Pier Cap 16 at Girder 7.



Photo 25: Typical excess weld bead material breaking off at overlapping welds



Photo 26: Typical triaxial weld above girder tie plate



Photo 27: Feces encountered at east end above east bearing.

Pier Cap 16 Exterior

The paint system of the pier cap exterior is in good condition with scattered minor freckling corrosion, mostly on the top flange (Photo 28). The west side of Girder 1 exhibits bubbling paint and corrosion, which is starting to extend onto the south web of the pier cap (Photo 29). The bearing devices for Pier Cap 16 are steel rockers and bolsters. The west bearing exhibits surface corrosion (Photo 30).

Painted over pitting was also observed along the top face of the top flange between Girder 7 and the east end. There is bubbling paint and corrosion on the east side of Girder 7 on the north pier cap web.

The drilled and bolted retrofits noted above are also visible on the exterior of the pier caps. In addition to the pier cap web retrofits, 2" Diameter stress relief holes were drilled through all girder webs adjacent to the pier cap top flange and connected with sawcuts. On the north side of the pier at Girder 3, the sawcut extends 5/16" beyond the lower hole; no cracks were noted (Photo 31). 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, as well as slightly below the bottom hole (Photo 32). On the south web at Girders 2 and 4, there are minor gouges below the bottom hole due to sloppy sawcuts. No significant changes were observed during the 2025 inspection.

The intersecting welded connections of the lower lateral bracing gusset plates to the web plate of the pier cap and the webs of Girders 2 and 6 were retrofitted during the rehabilitation project. Circular copes were cut near the intersection of the welds but did not fully remove the fillet welds at the web plates (Photo 33).

Random tack welds were previously noted along the bottom flange and webs of the pier cap. A 4" long tack weld was identified between Girders 3

and 4 along the south edge of the bottom flange (Photo 34), as well as a 5" long tack weld below Girder 5 on the north edge of the bottom flange. A 1" long tack weld was noted on the south web between Girders 4 and 5. No changes were observed during the 2025 inspection.

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" to 18", and do not show signs of distress (Photo 35). An errant 3" weld along the top weld at the west side of Girder 6 and the north web of the pier cap and the 0.25" weld discontinuity noted previously at the north face of the pier cap between Girder 7 was noted previously. No changes were observed at these weld locations.



Photo 28: Typical freckling corrosion on the top flange at the west end of Pier Cap 16

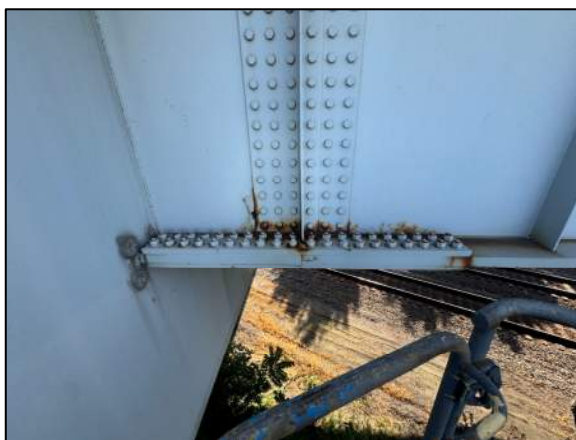


Photo 29: Bubbling paint and corrosion on the west face of Girder 1 extending onto the south web of Pier Cap 16



Photo 30: Surface corrosion on west bearing of Pier Cap 16



Photo 33: Typical lateral bracing cope detail at Pier Cap 16, fillet welds not completely removed



Photo 31: Sawcut retrofit extending 5/16" past the stress relief hole on Girder 3 at the north web of Pier Cap 16



Photo 34: 4" tack weld between Girders 3 and 4 on the south face of the Pier Cap 16 bottom flange



Photo 32: Stress relief holes in the web of Girder 4 at the north web of Pier Cap 16 not connected



Photo 35: 18" overlapping weld under Girder 5 between the south web and bottom flange of Pier Cap 16

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" on the web or flange plates.

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" and less than, or equal to 4" on the web or flange plates.

Category: D

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

Fatigue Prone Detail 5

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

Category: E

Location:

- 5" weld on the exterior of the bottom flange below Girder 5.
- 10" fillet weld between 3/8" 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.

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.

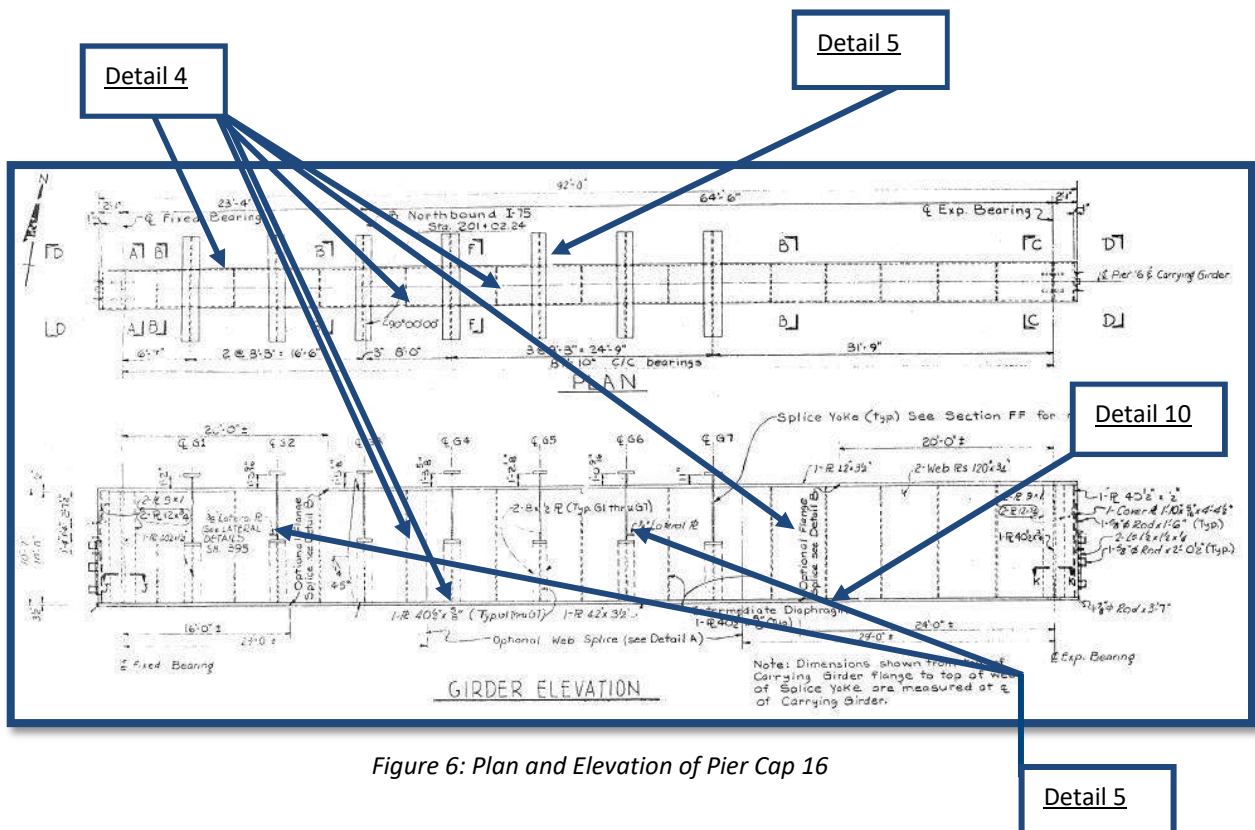


Figure 6: Plan and Elevation of Pier Cap 16

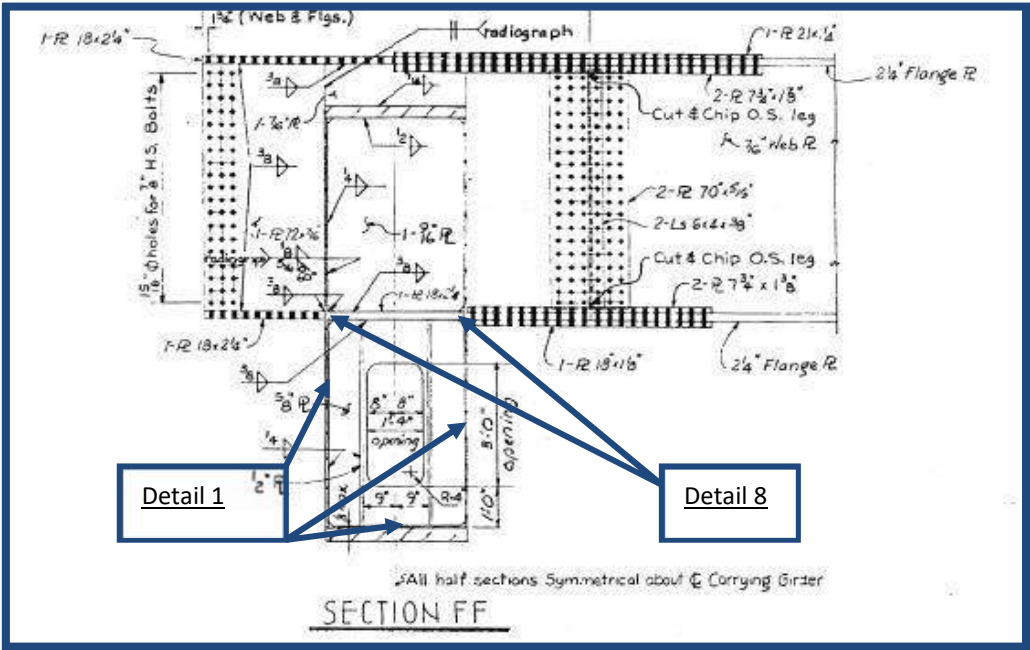


Figure 7: Section of Pier Cap 16

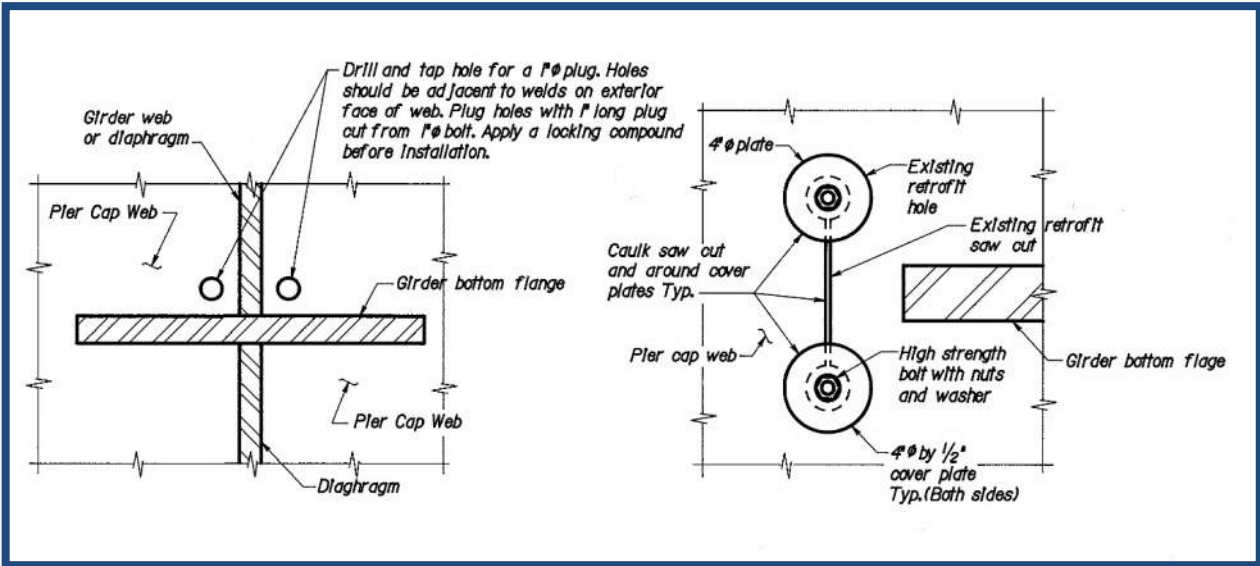


Figure 8: Drilled hole retrofit details from rehabilitation plan

PIER CAP 20

Pier Cap 20 is in Satisfactory condition [6] (Photo 36). As part of the 1993 rehabilitation project, tack welds were removed along the webs and bottom flange and backer bars, though many still remain. Additionally, 1" diameter holes were drilled through the webs of the pier cap on both sides of the girder webs in which bolts were installed.

Pier Cap 20 Interior

The interior of Pier Cap 20 was dry at the time of inspection. Both access hatches appeared to be properly sealed, however, the west hatch is 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 (Photo 37). The paint system of the pier cap interior is in fair condition. A few areas of light surface corrosion and accumulations of steel filings, paint flakes, and blasting medium exist throughout the bottom flange (Photo 38).

During the 1993 rehabilitation project, tack welds along the bottom flange, webs and backer bars were ground down, however; some were missed or only partially ground (Photo 39). Select portions of the backer bar were removed throughout the length of the pier cap to eliminate butt joints and bent sections. The fillet welds connecting the pier cap diaphragms to the webs and girder bottom flange tie plates typically exhibit ripples, discontinuities, and overlapping beads with no signs of distress noted.

The fillet welds along the pier cap diaphragms, pier cap webs and the girder tie plates are not sufficiently coped resulting in triaxial welds (Photo 40). As part of the 1993 rehabilitation project, the 1" diameter drilled and bolted stress relief holes were installed in the pier cap webs adjacent to all girder diaphragms above girder tie plates. 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 (Photo 41).

A total of six tack welds were also noted at random along the pier cap webs and flanges (Photos 42). The welds at the diaphragms are typically sloppy and poorly developed, displaying discontinuities, a lack of fusion, and overlapping (Photo 43).

The 2023 inspection reported a 1-5/8" crack along the vertical fillet weld at the triaxial weld connecting the south web plate to the diaphragm at Girder 1. The district investigated and determined the suspected crack was painted over slag. The district removed the slag and performed a dye-penetrant test and confirmed no crack existed in the weld material. No changes observed during the 2025 inspection (Photo 44-45).



Photo 36: Elevation of Pier Cap 20



Photo 37: Two of the four missing nuts at the east access hatch of Pier Cap 20



Photo 38: Typical light corrosion on the bottom flange of Pier Cap 20



Photo 41: Unfilled stress relief hole above girder bottom flange east of Girder 6 at the north web



Photo 39: Partially ground fillet welds from the bottom flange backer bar retrofit at Pier Cap 20



Photo 42: 4-1/2" of weld material on the south web of Pier Cap 20, east of the west bearing.



Photo 40: Typical triaxial welds at the girder bottom flanges and Pier Cap 20 diaphragms



Photo 43: Sloppy welds at the diaphragms of Pier Cap 20



Photo 44: General location view of removed slag on Girder 1



Photo 45: General location view of removed slag on Girder 1 (Closeup)

Pier Cap 20 Exterior

The paint system of the pier cap exterior is in good condition with a few locations of minor deterioration.

Bubbling and peeling paint with surface corrosion is a typical condition on the top flange and on the pier cap webs at some of the girder connections (Photo 46).

The steel cable supporting the utility lines under the pier cap is rubbing against the bottom flange and has worn through the paint between Girders 6 and 7. On the underside of the bottom flange between Girders 5 and 6, there is a 14" long paint scrape due to impact (Photo 47). Impact damage to bottom flange below Girder 5 on south side.

The drilled and bolted retrofits noted above are visible from the exterior of the pier cap. During the 1993 rehabilitation, 2" Diameter holes were drilled through the girder webs above and below the top flange of the pier cap. These holes are open and connected with a sawcut. At Girder 5 on the north web, an errant sawcut extends approximately 9/16" past the bottom stress relief hole (Photo 48). Smaller additional overcuts were also noted on the east face of Girder 2 on the south web of the pier cap (Photo 49), 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" Diameter circular copes were cut near the intersection of the welds but did not fully remove the fillet welds at the web plates (Photo 50).

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

- South web on the east side of Girder 3: 1-3/8" longitudinal weld and a 2" longitudinal weld (Photo 51).
- Bottom of south web between Girders 1 and 2: three discontinuous lengths of weld material, up to 1-1/2" L.
- South web between Girders 5 and 6: a 3" x 1" area of errant weld material.

Above the west bearing, there is a 12-1/2" long fillet weld with errant weld material around it on the south web at the bottom flange groove weld. The bearing devices for Pier Cap 20 display peeling paint and surface corrosion along the top of the sole plates. This condition is less extreme on the west bearing. Both bearings also exhibit laminating corrosion beneath the paint on the top face and bottom edges of the masonry plates (Photo 52).



Photo 46: Bubbling paint and corrosion on the east face of Girder 7 extending onto the north web



Photo 47: 14" Paint scrape due to impact on the bottom flange of Pier Cap 20 below Girders 5 and 6



Photo 50: Typical lateral bracing cope detail at Pier Cap 20, fillet welds not completely removed



Photo 48: Sawcut retrofit extending 9/16" past stress relief hole on Girder 5 at the north web



Photo 51: Tack welds on the south web of Pier Cap 20, east of Girder 3 above the girder flange



Photo 49: Numerous overcuts up to 1/8" on the Girder retrofits



Photo 52: East Bearing cap Pier Cap 20 displaying peeling paint

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.

Fatigue Prone Detail 3

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

Category: D

Location:

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

Fatigue-Prone Detail 5

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

Category: E

Location: 10" fillet weld between 3/8" 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.

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.

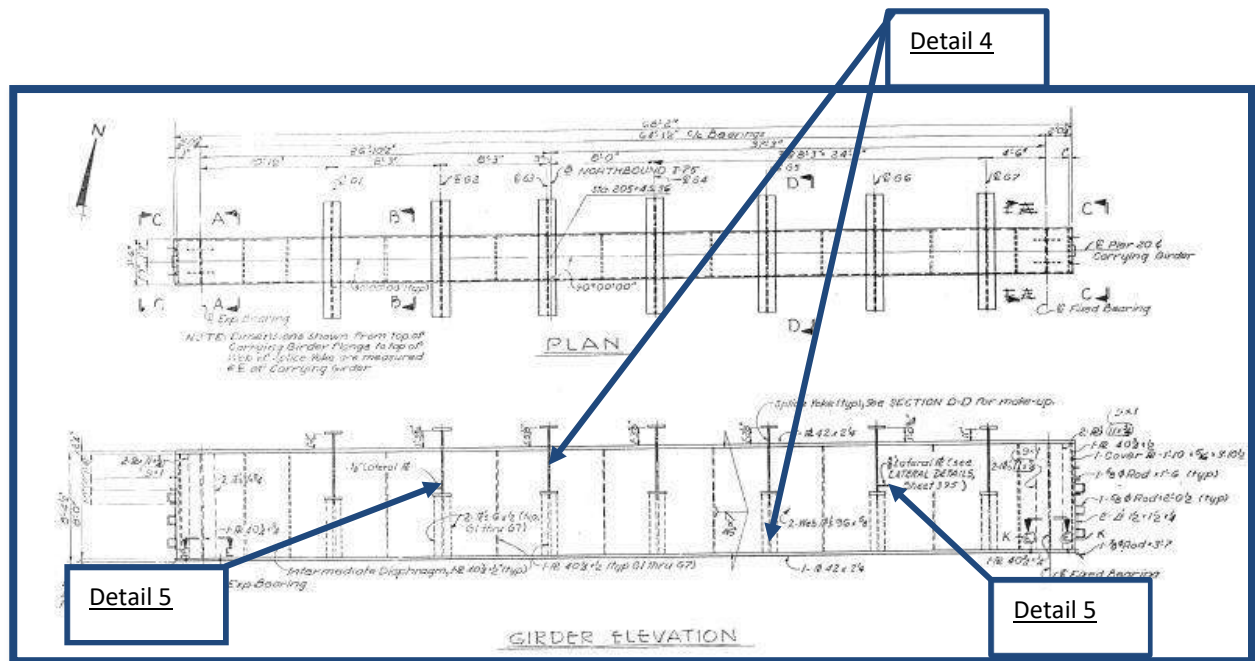


Figure 9: Plan and Elevation of Pier Cap 20

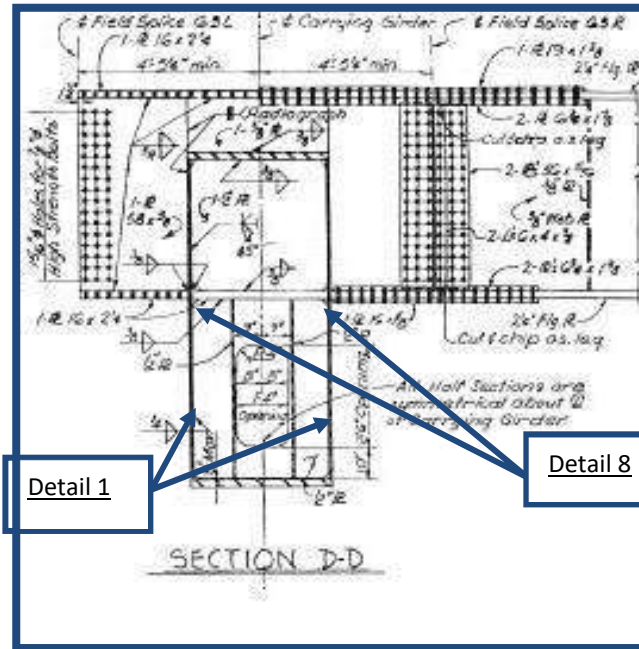


Figure 10: Section of Pier Cap 20

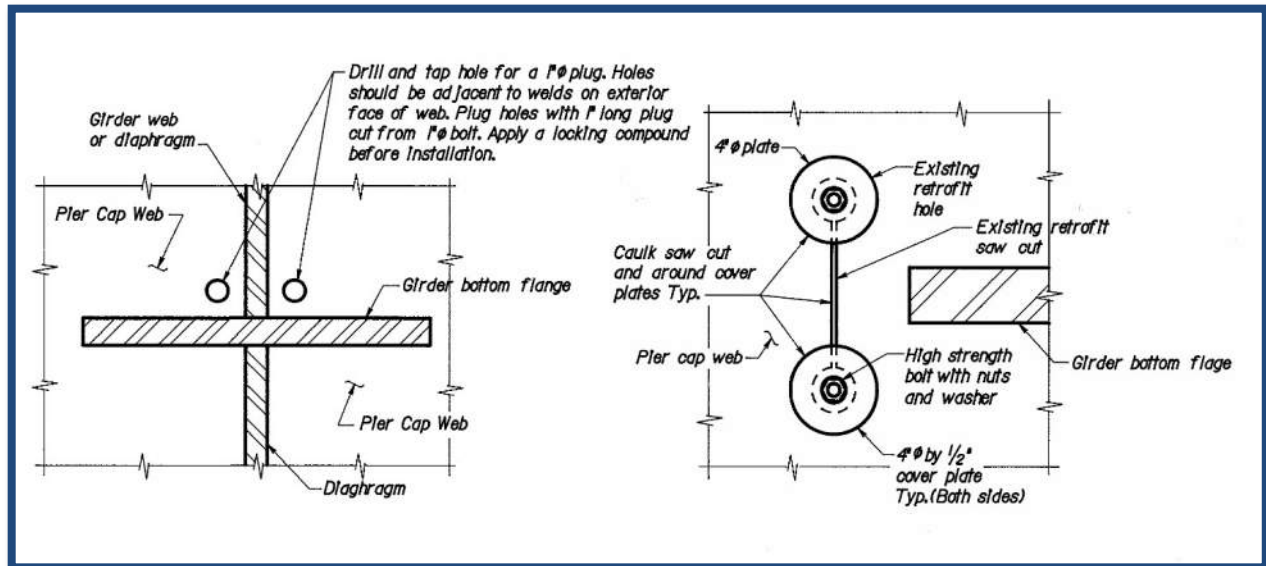


Figure 11: Drilled hole retrofit details from rehabilitation plans

CONCLUSIONS AND RECOMMENDATIONS

Based on the in-depth inspection, the NSTM pier caps of Bridge No. HAM-75-1192R, and its associated fatigue prone details, are in Satisfactory Condition [6] overall. The recommendations for maintenance of the pier caps are presented in the following four categories:

Priority Repairs (Within 1 Year Period)

Work which should be performed as soon as possible to address deficiencies which affect the capacity of the structure or public safety

Rehabilitation/Evaluation (Within 5 Year Period)

Recommendations for large-scale deficiencies which are extensive in nature and require engineering analysis.

Maintenance (Within 2-4 Month Period)

Recommendations that are minor in nature and can be performed by maintenance personnel or through small maintenance repair contracts.

Monitoring (As Recommended)

Regular field observations of deficiencies which are not currently in need of repair but will require corrective action if deterioration continues.

Pier Cap 5 Recommendations:

Priority Repairs:	None
Rehabilitation/Evaluation:	None
Maintenance:	None
Monitoring:	Continue to monitor fatigue prone details at a 24-month cycle.

Pier Cap 16 Recommendations:

Priority Repairs:	None
Rehabilitation/Evaluation:	Connect the stress relief holes in the web of Girder 4 with a sawcut on the north side of the pier cap. Drill an overlapping hole to remove the overextended sawcut in the stress relief holes at Girders 2, 3, and 4.
Maintenance:	Replace the detached anchor nut on the west hatch cover and remove feces at east end of Pier Cap.
Monitoring:	Continue to monitor fatigue prone details at a 24-month cycle.

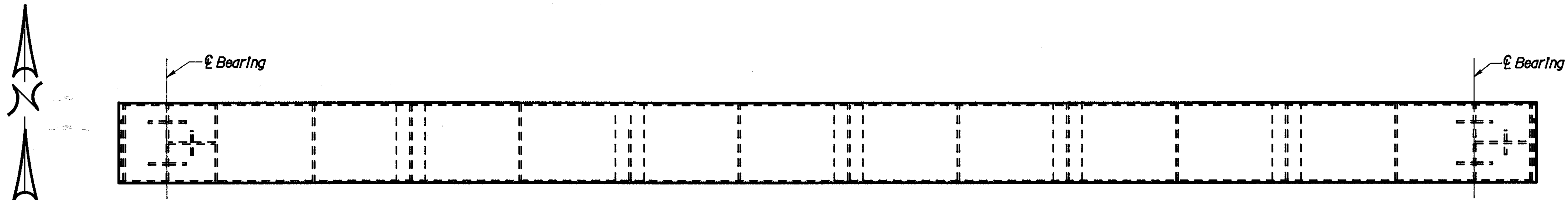
Pier Cap 20 Recommendations:

Priority Repairs:	None
Rehabilitation/Evaluation:	Drill overlapping holes to remove the overextended sawcuts in the stress relief holes of Girders 1, 2, 3, and 5.
Maintenance:	Replace the detached anchor nuts (6 total) at both the east and west access hatches and ensure that the hatch cover plates can be removed.
Monitoring:	Continue to monitor Girder 1 diaphragm weld discontinuity and the fatigue prone details at a 24-month cycle.

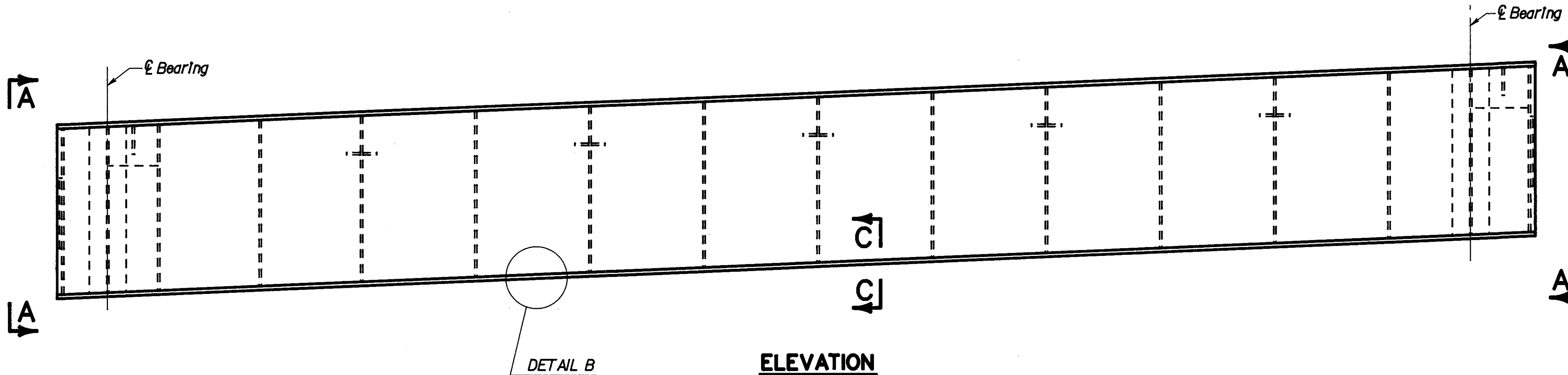
APPENDIX A

EXISTING PIER PLANS

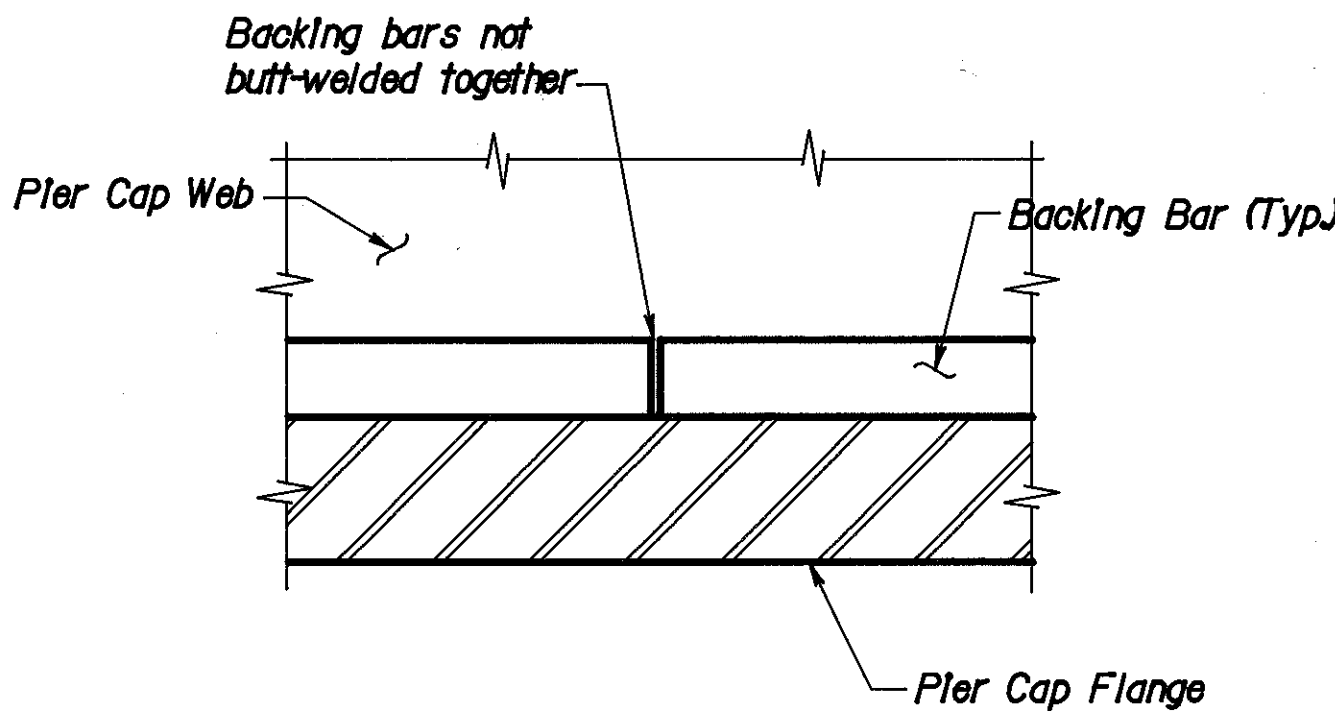
**HAMILTON COUNTY
HAM-75-9.75**



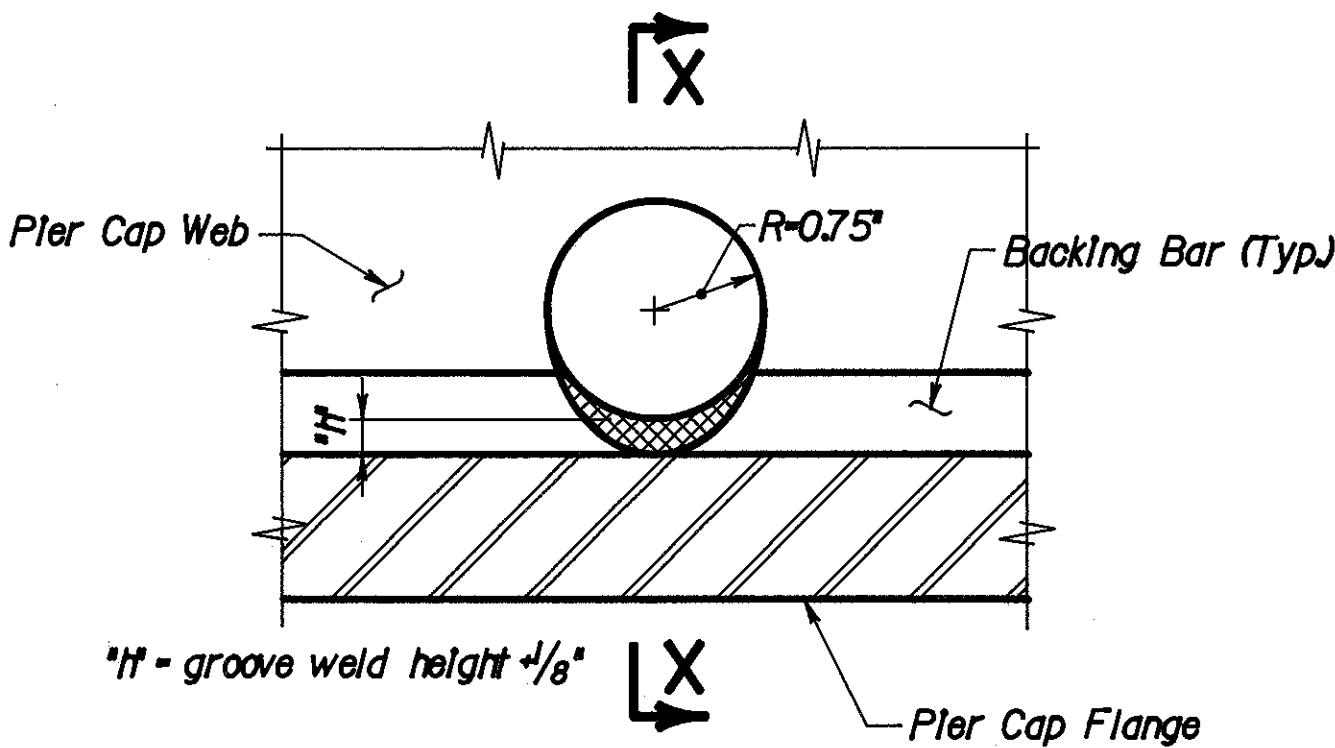
PLAN



**ELEVATION
PIER CAP**



EXISTING DETAIL

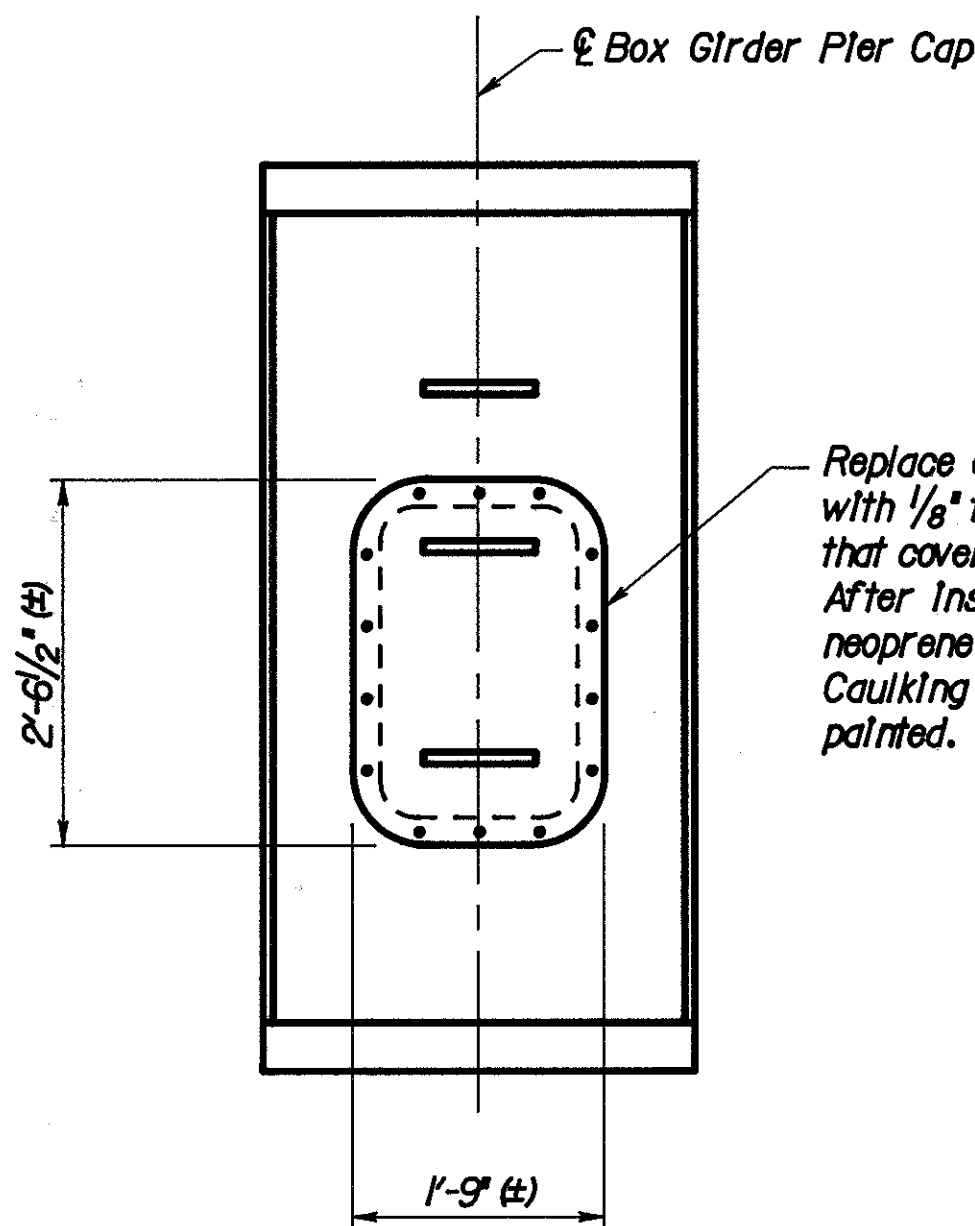


PROCEDURE

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.

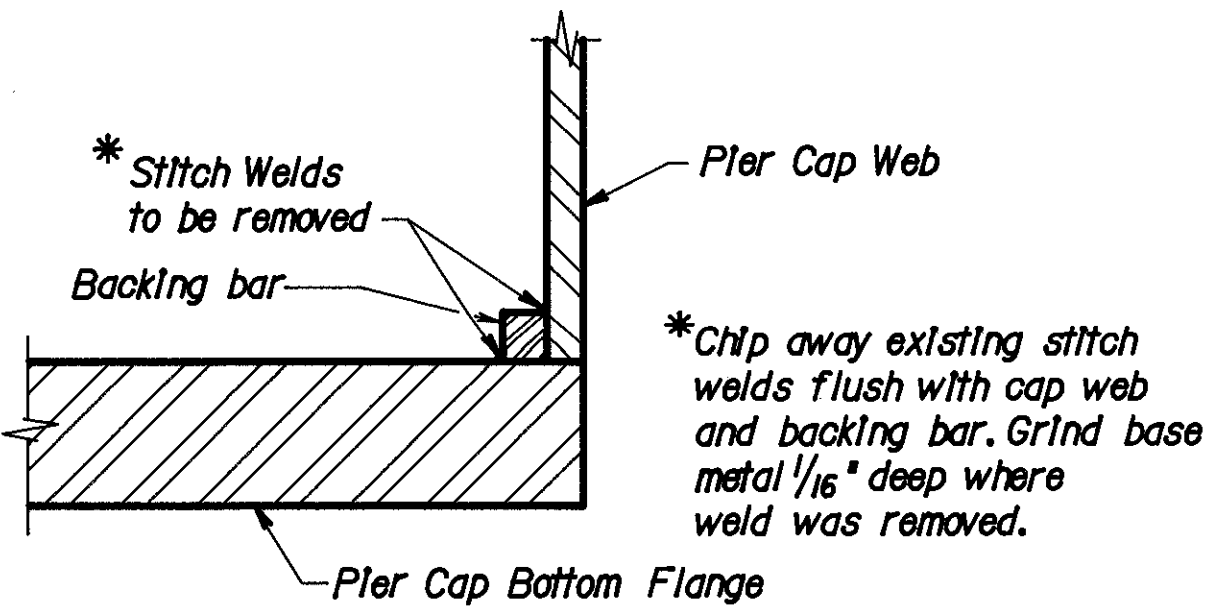
**RETROFIT DETAIL
DETAIL B**

BOTTOM FLANGE SHOWN.
TOP FLANGE SIMILAR.

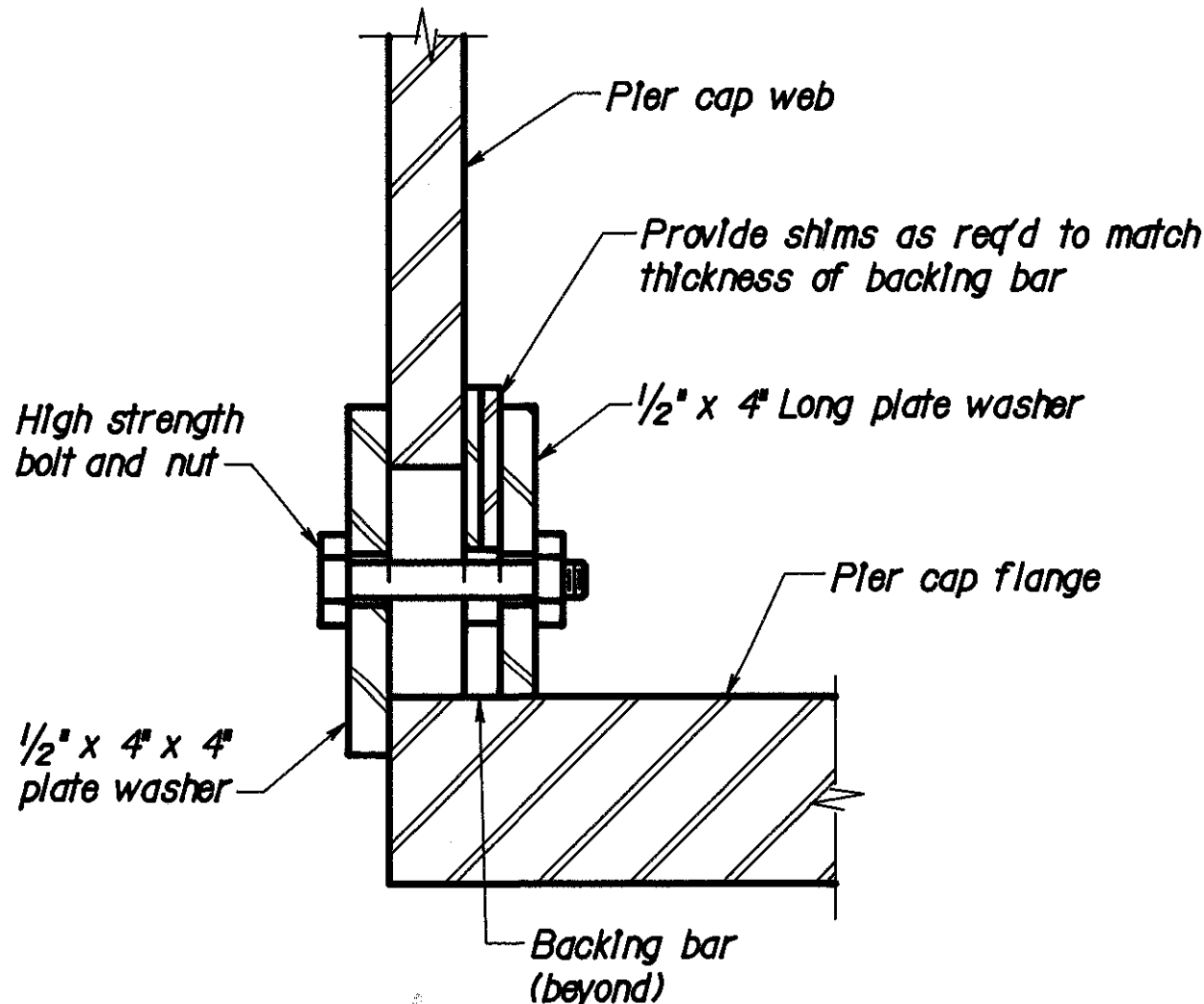


SECTION A-A

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

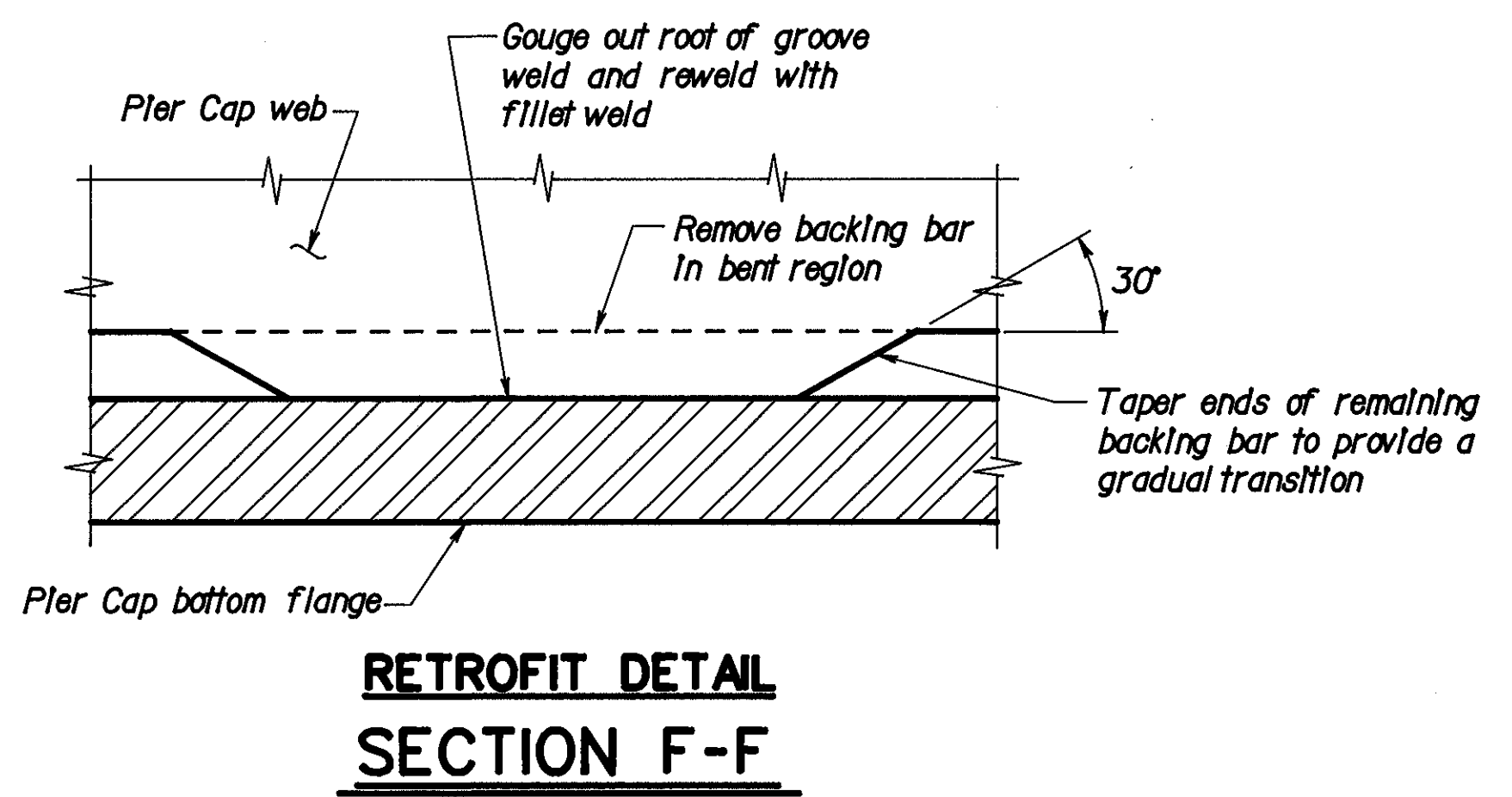
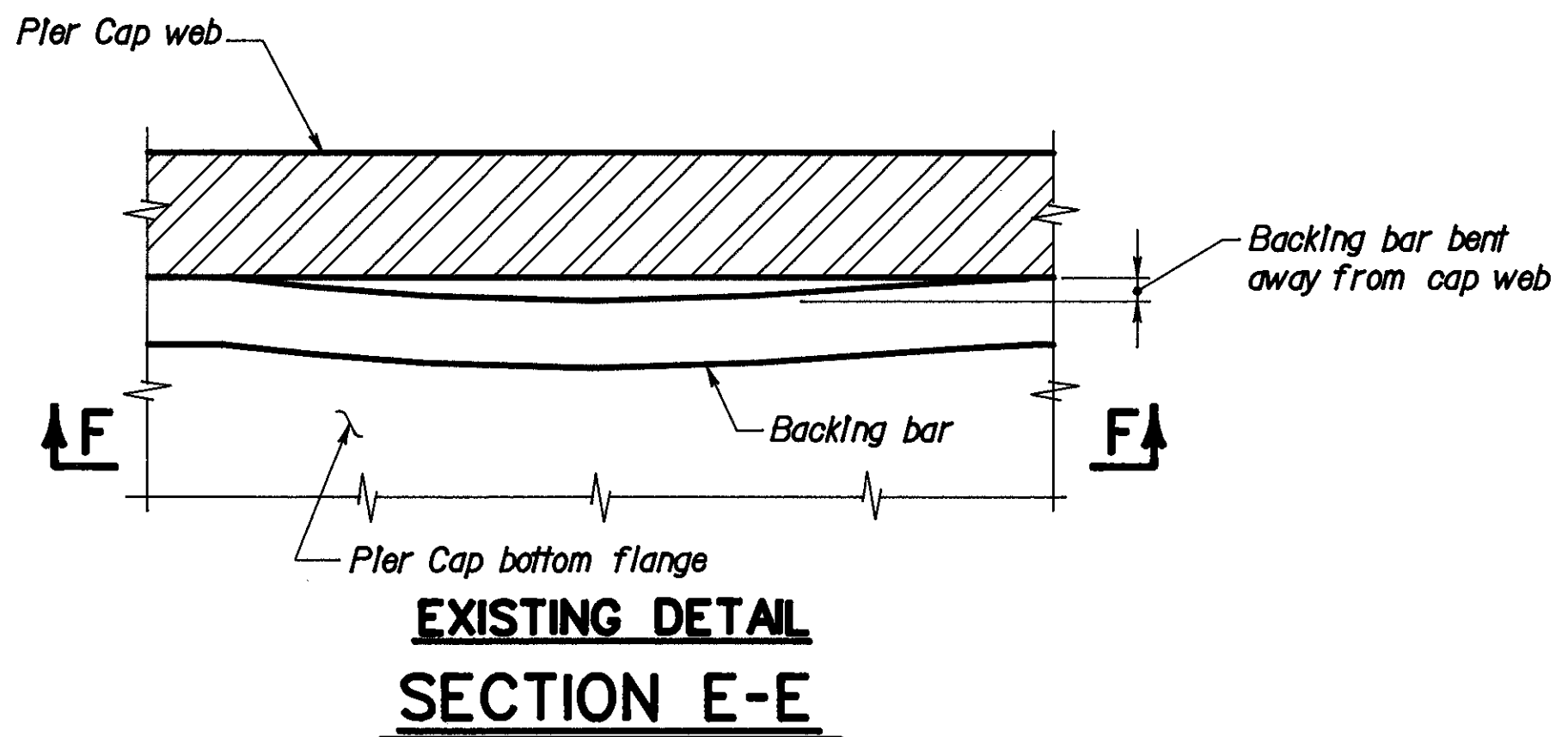
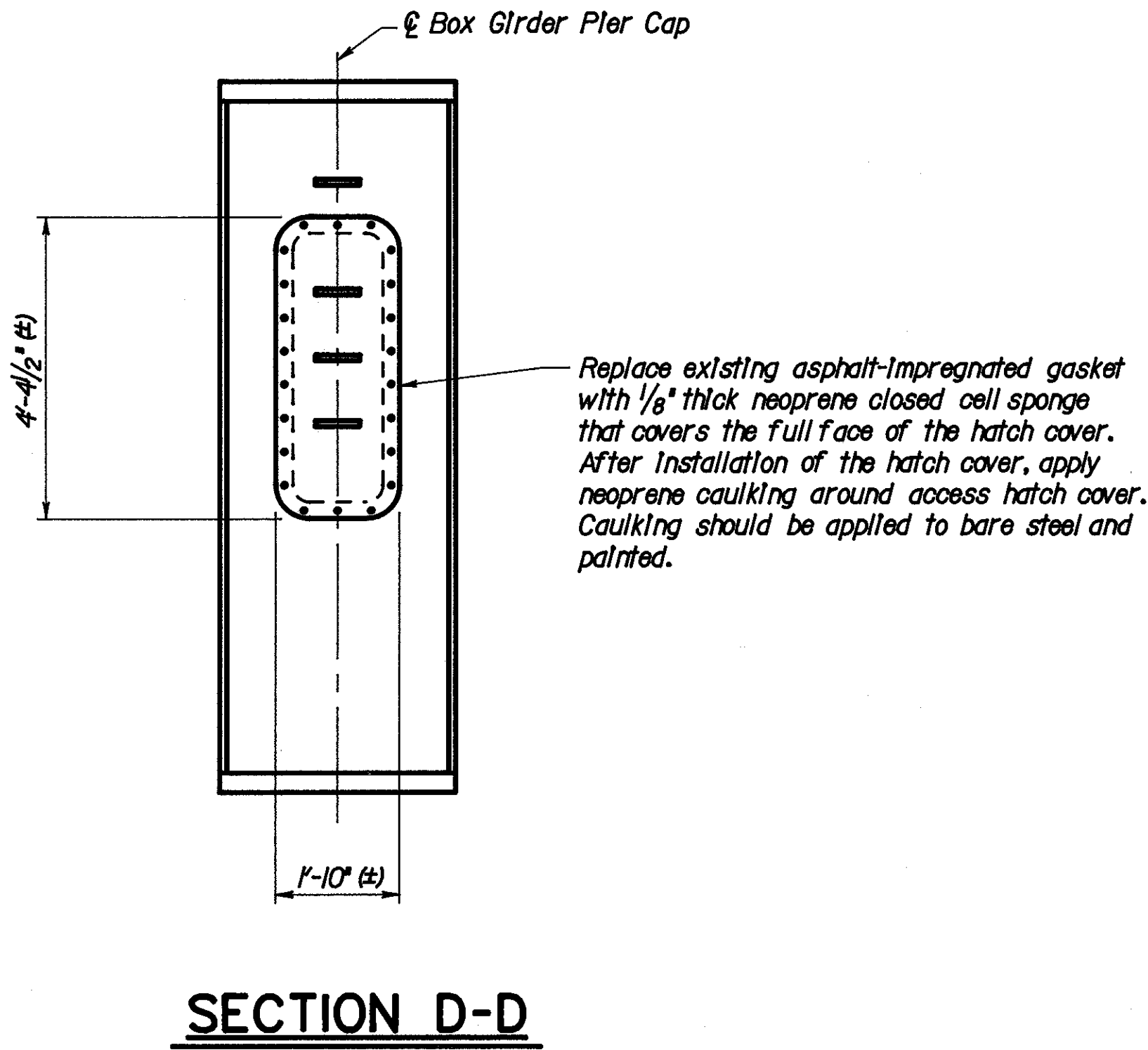
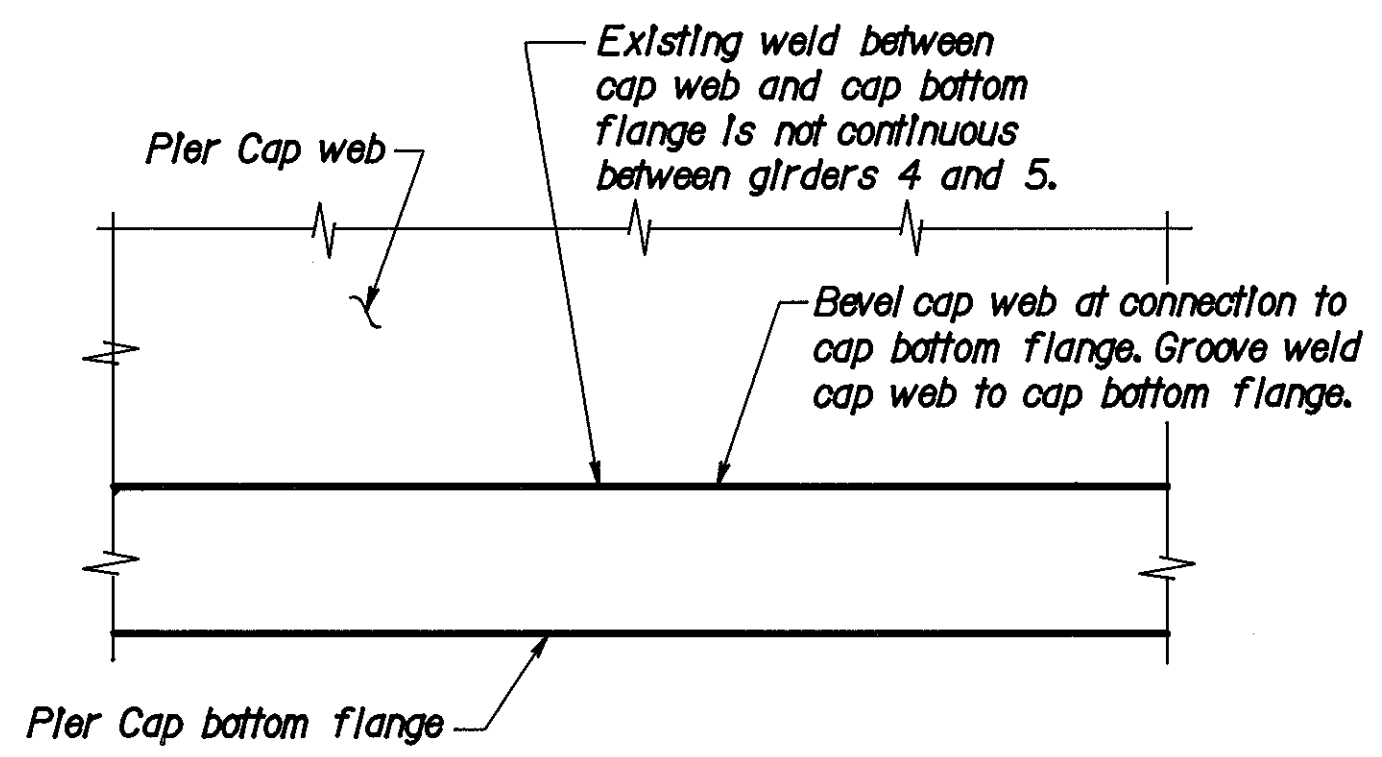
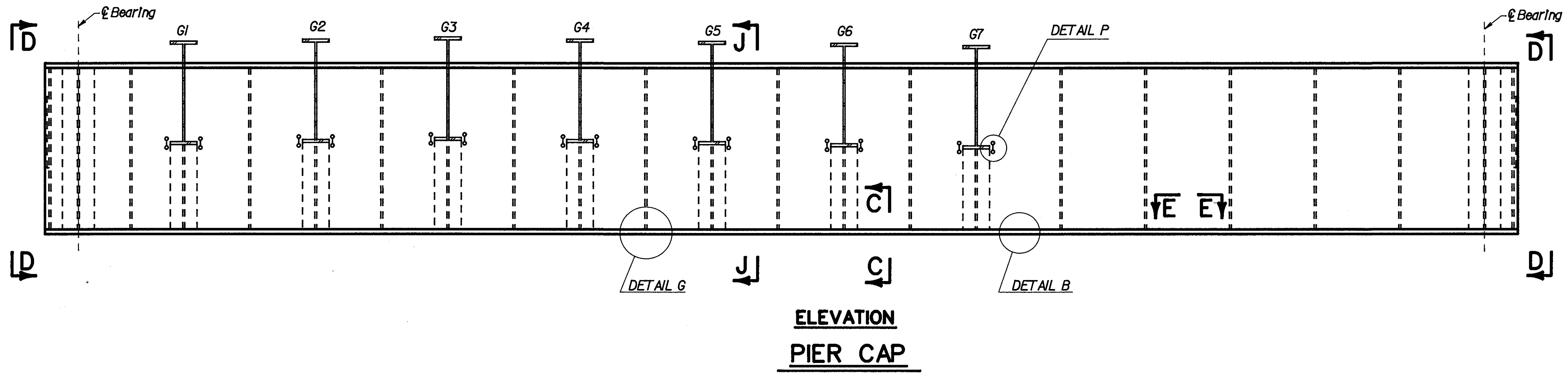
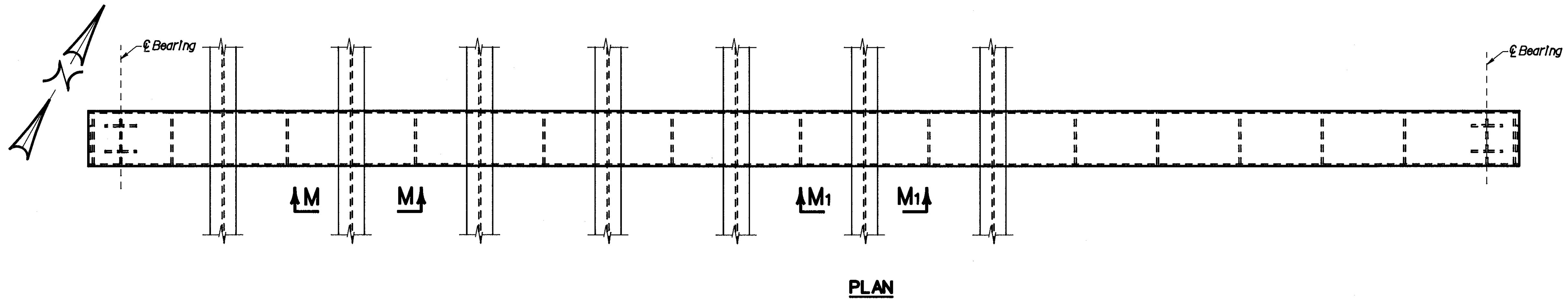
NOTES

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.

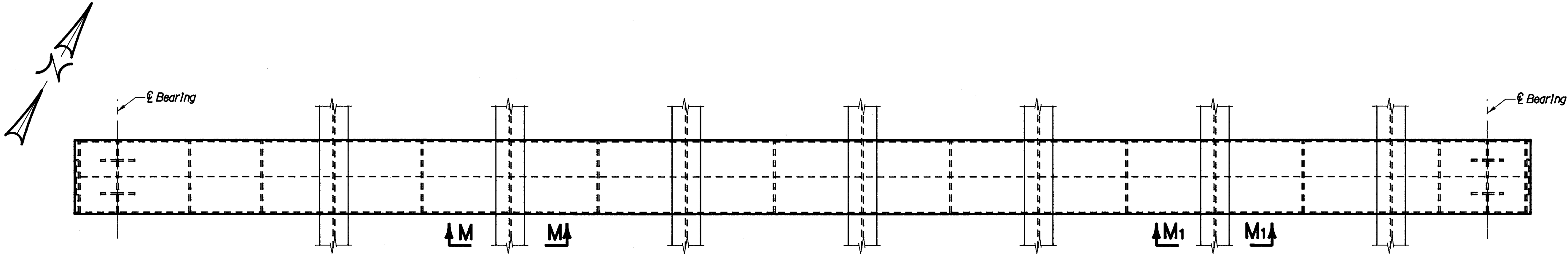
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STEEL PIER CAP REPAIR AT PIER 5					
BRIDGE NO. HAM-75-1192R NORTHBOUND I-75 OVER MILL CREEK, BENSON ST., N.Y.C.R.R. & SHEPHERD AVENUE.					
DESIGNED B&N	CHECKED B&N	DRAWN MJZ	CHECKED DFS	REVIEWED DATE HDJ 12/92	REVISED

NOTES

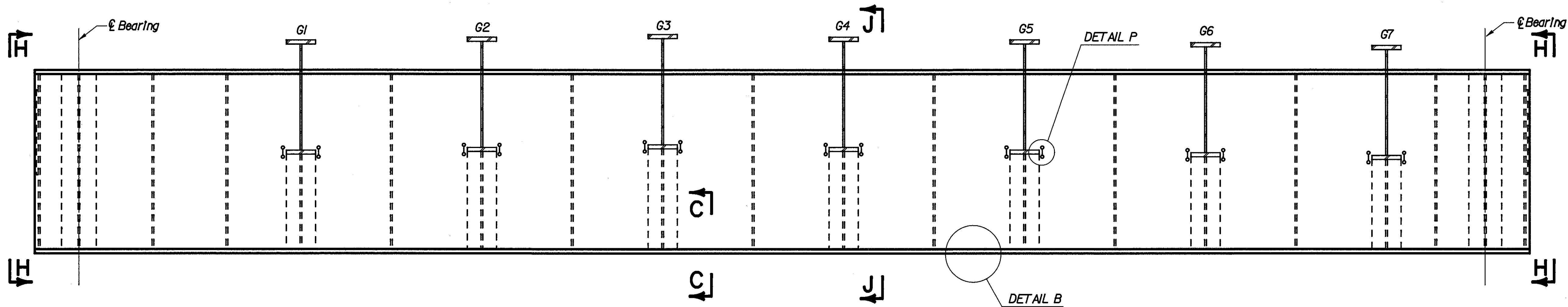
1. Clean and paint areas where paint has fallen on the inside of the pier cap. Include with item - Special - Field painting of existing steel system OZEU.
2. For Detail B and Section C-C, see Sheet 54/105
3. For Sections J-J, M-M and M₁-M₁, see Sheet 57/105
4. For Detail P, see Sheet 57/105



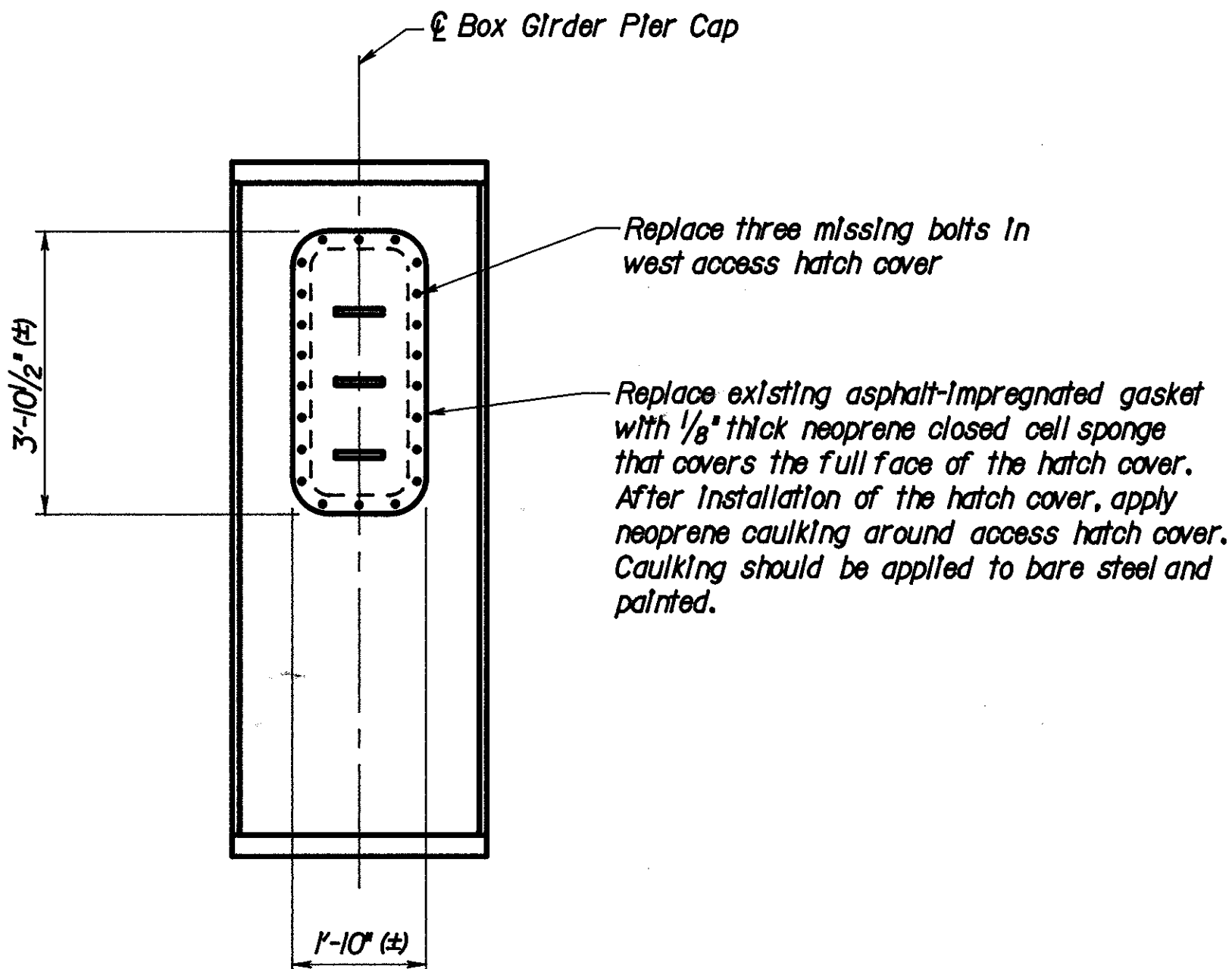
LOCKWOOD, JONES & BEALS CONSULTING ENGINEERS DAYTON, OHIO		55/105
STEEL PIER CAP REPAIR AT PIER 16		
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DESIGNED B&N	CHECKED B&N	REVIEWED DATE HDJ 12/92
DRAWN MJZ	CHECKED DFS	REVISED



PLAN



ELEVATION
PIER CAP

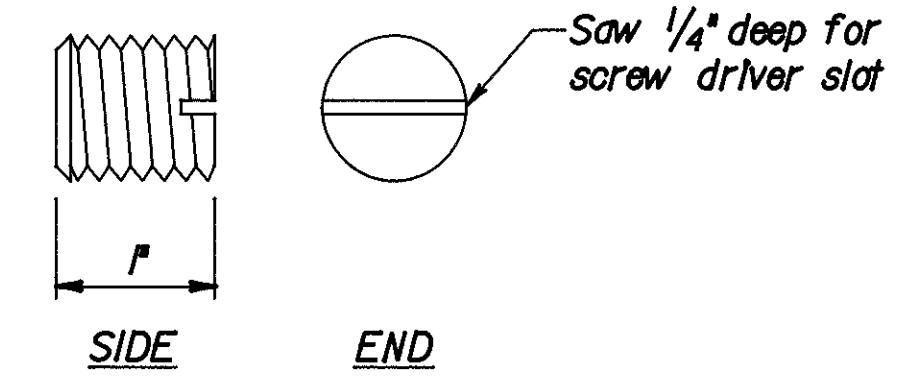
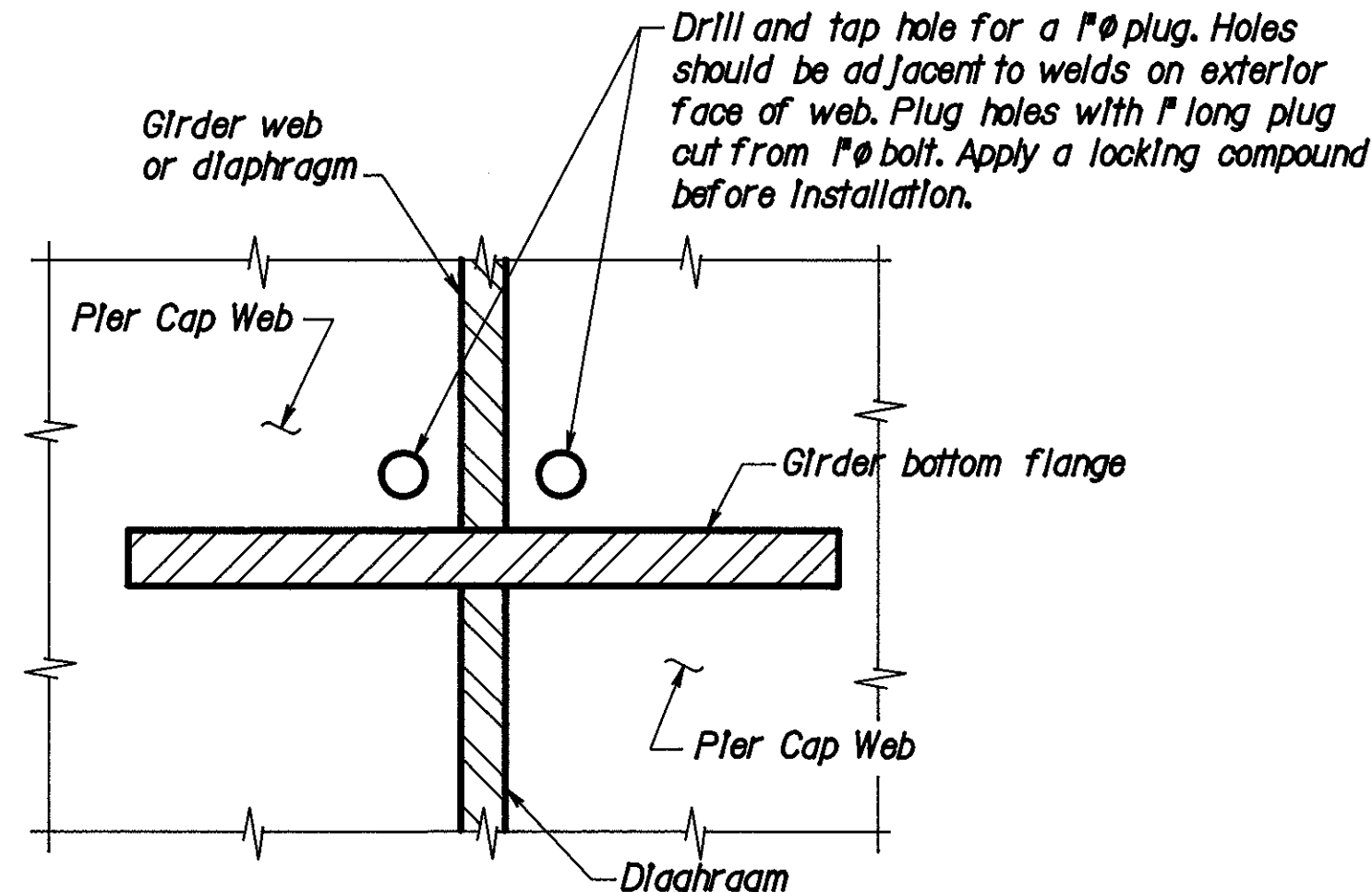
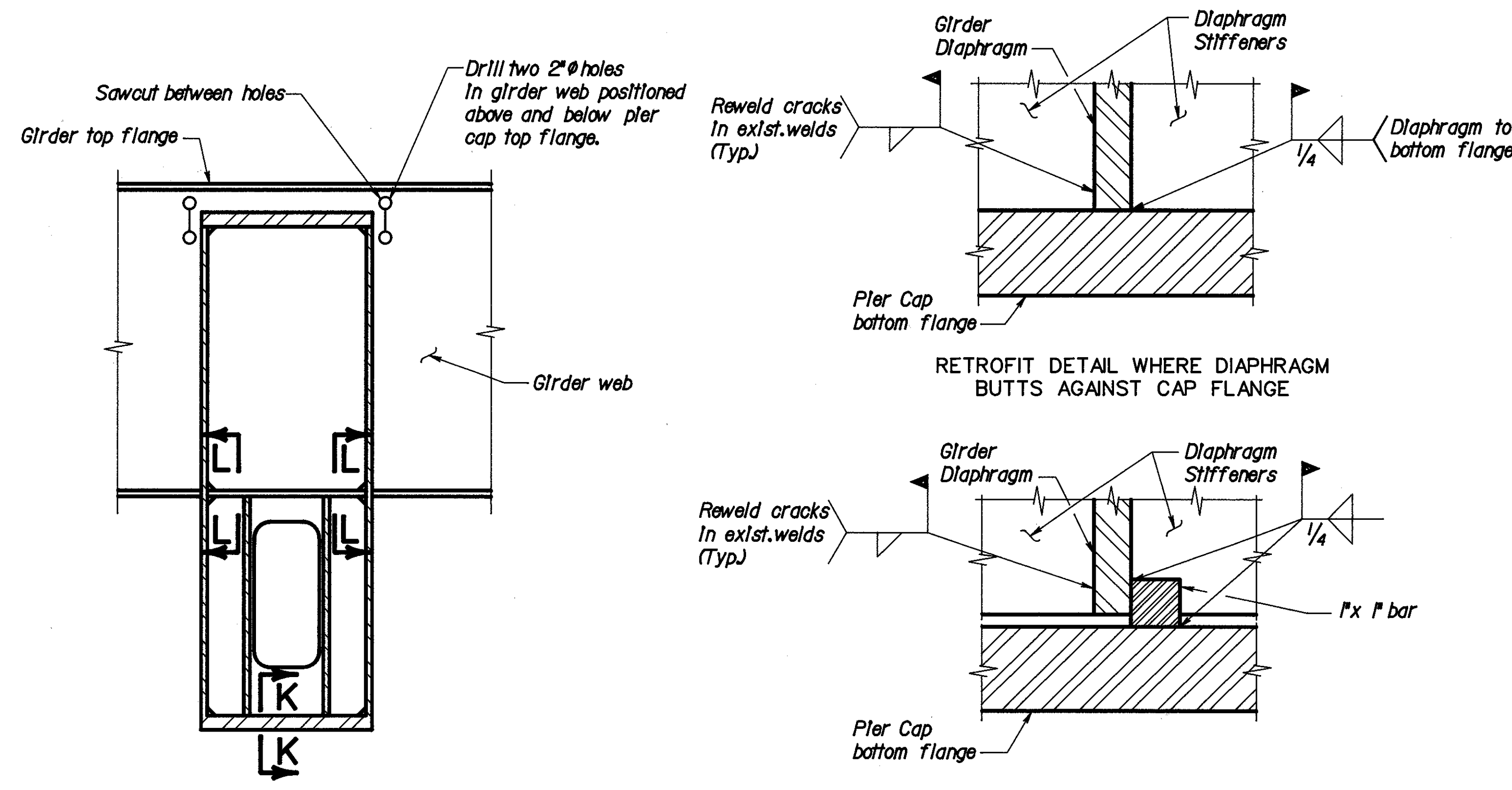


SECTION H-H

NOTES

1. Clean and paint areas where paint has failed 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

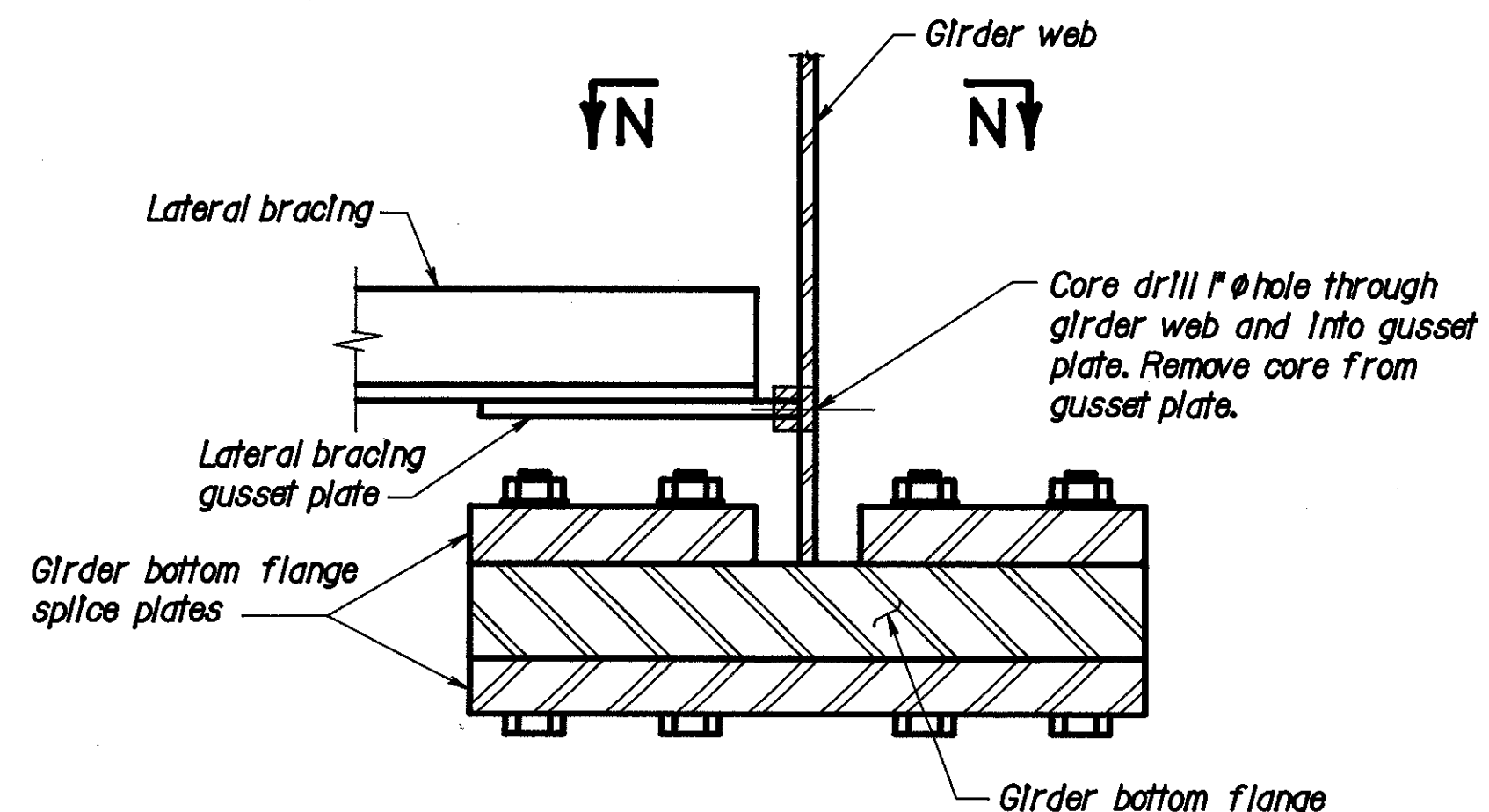
**HAMILTON COUNTY
HAM-75-9.75**



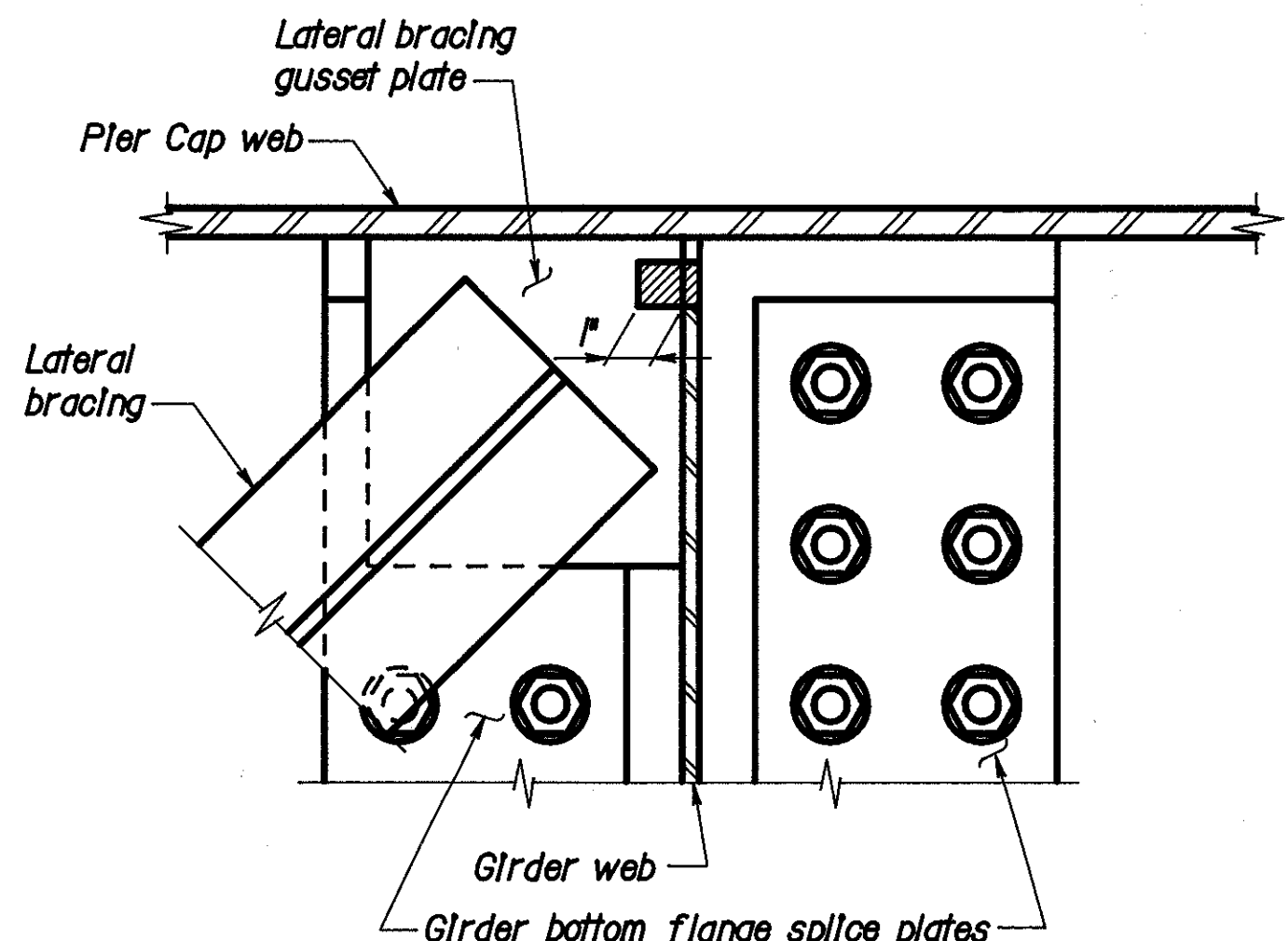
SECTION J-J

SECTION K-K

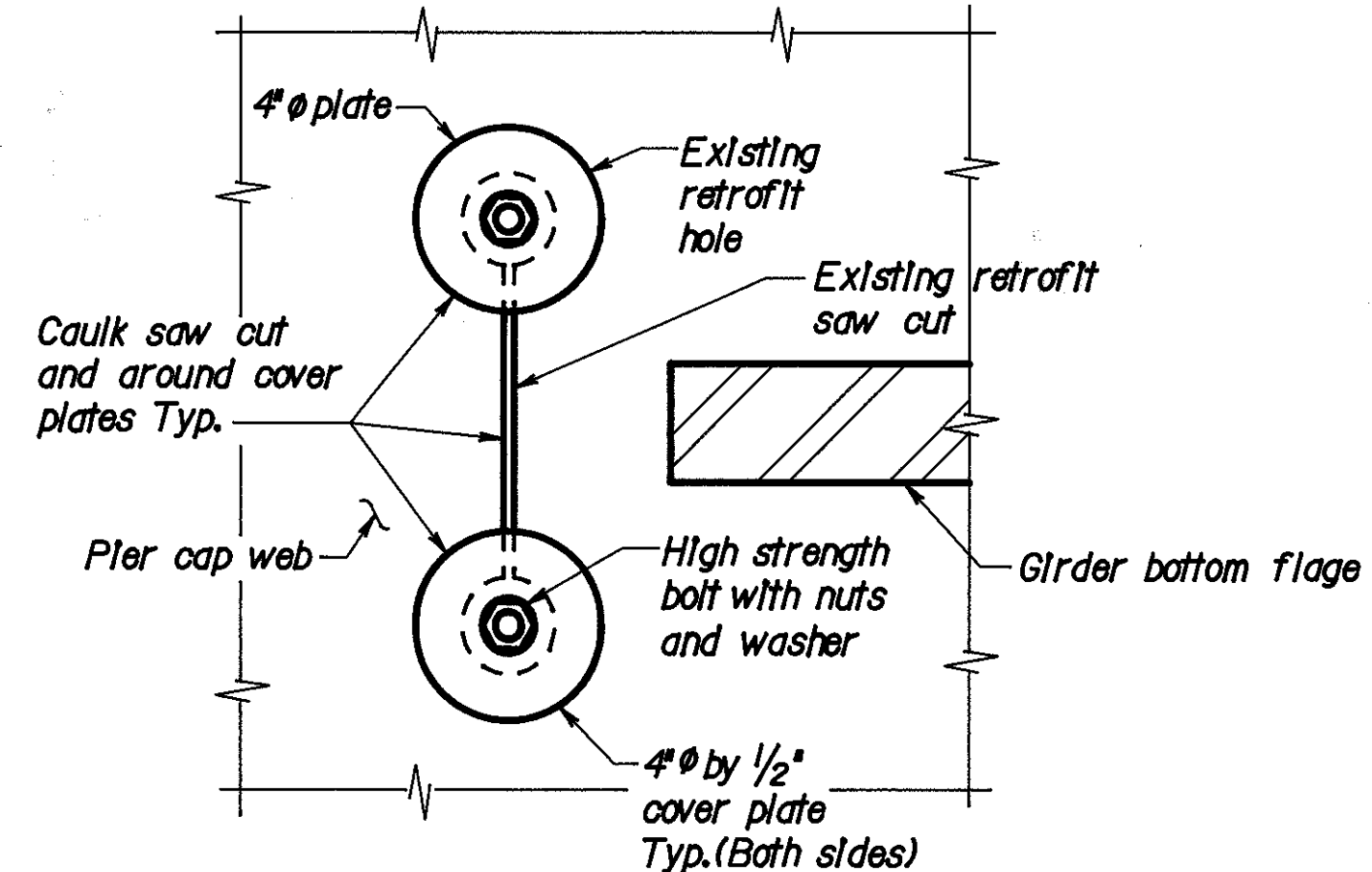
SECTION L-L



SECTION M-M
SECTION M-M OPP. HAND

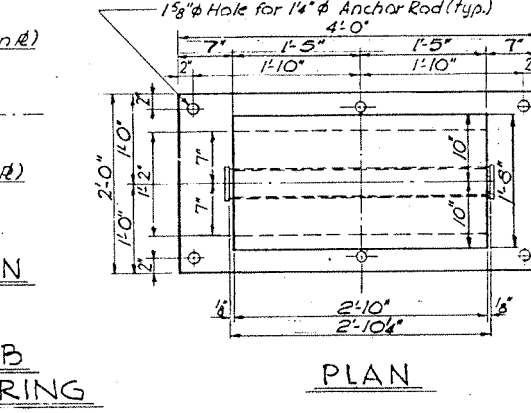
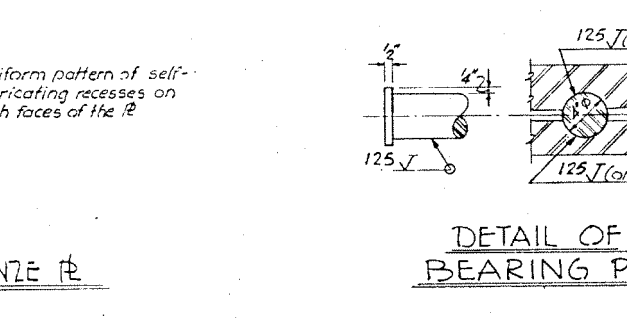
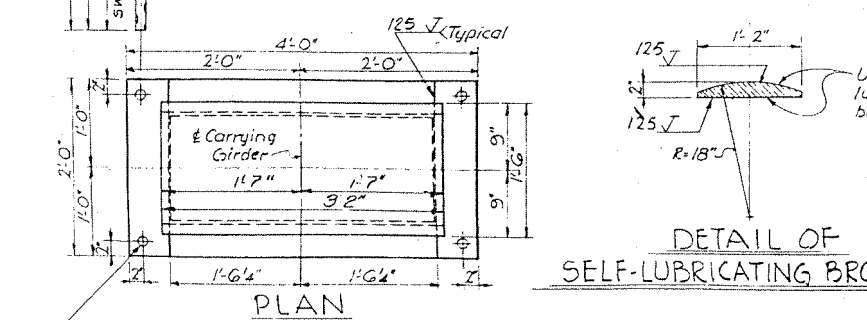
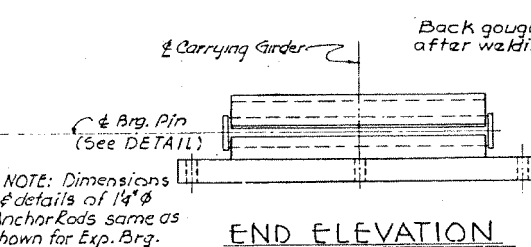
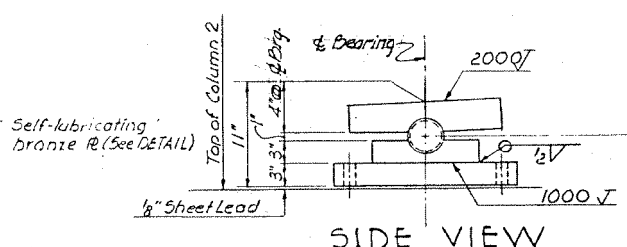
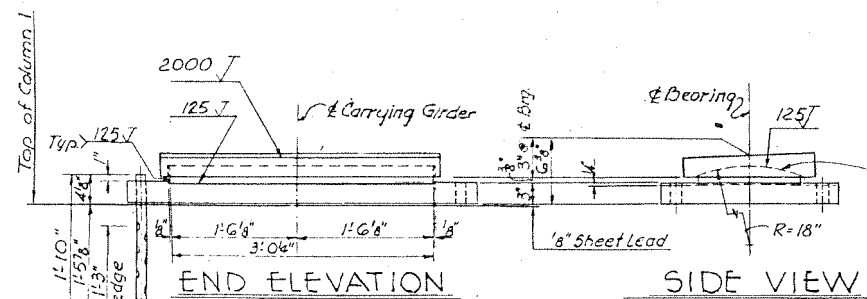
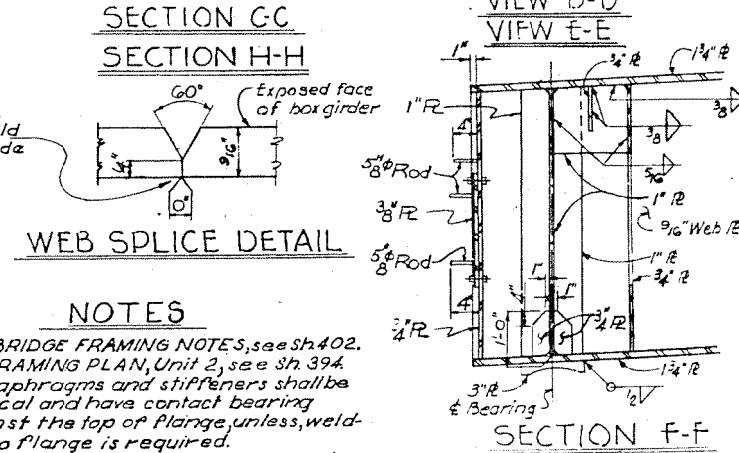
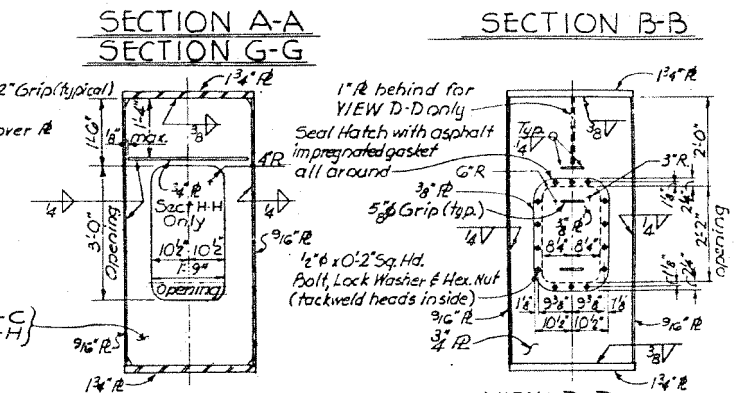
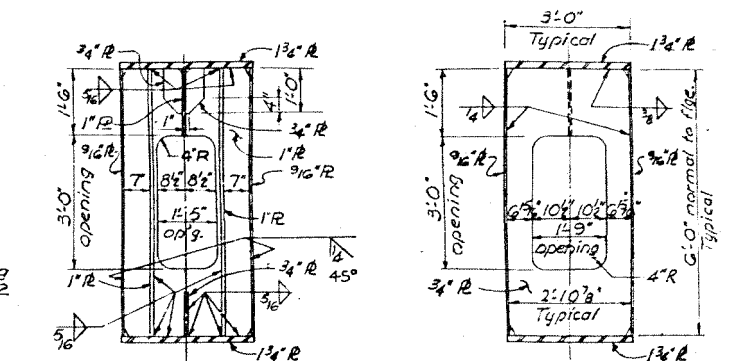
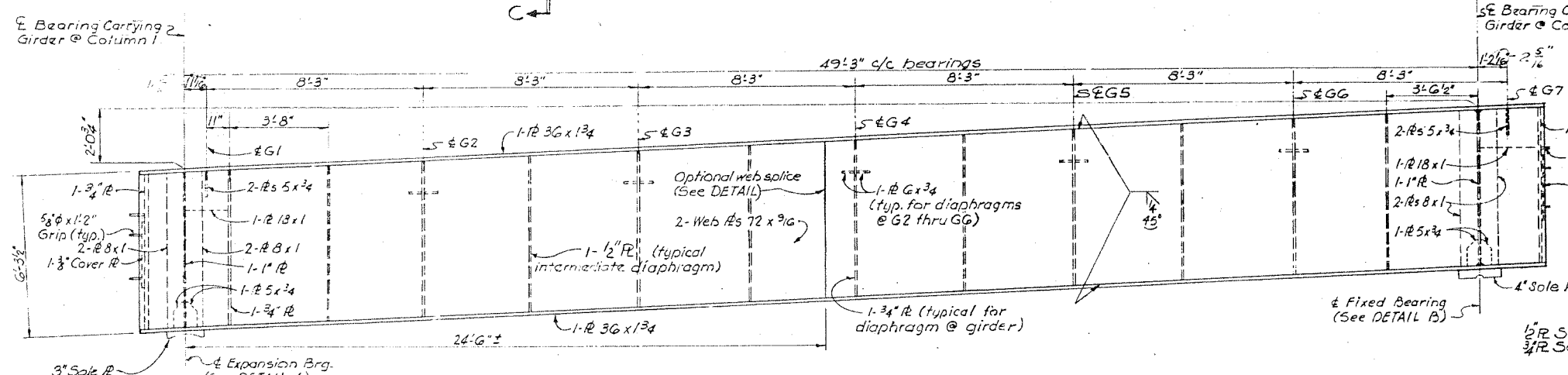
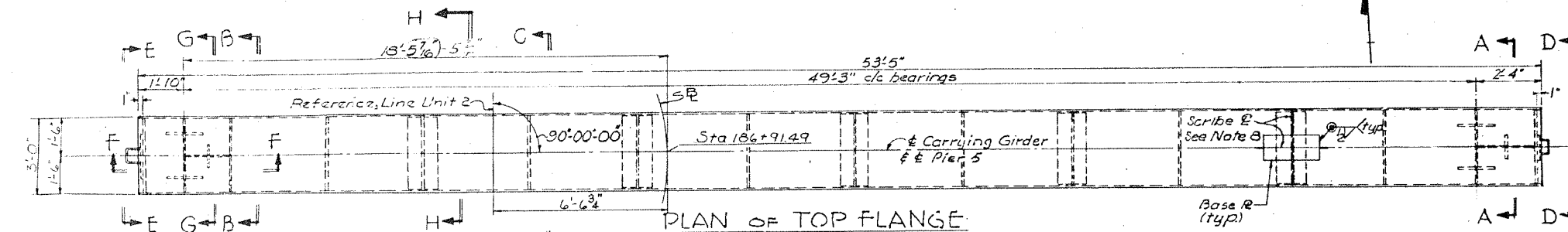


SECTION N-N



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 B&N	CHECKED B&N	DRAWN M.J.Z	CHECKED DFS	REVIEWED DATE HDJ 12/92	REVISOR	



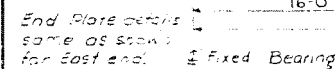
- NOTES**
1. For BRIDGE FRAMING NOTES, see Sh. 402.
 2. For FRAMING PLAN, Unit 2, see Sh. 394.
 3. All diaphragms and stiffeners shall be vertical and have contact bearing against the top of flange, unless welding to flange is required.
 4. Sole R's shipped on girder must be protected against damage 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

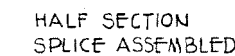
**CARRYING GIRDER AT PIER 5
UNIT 2**

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

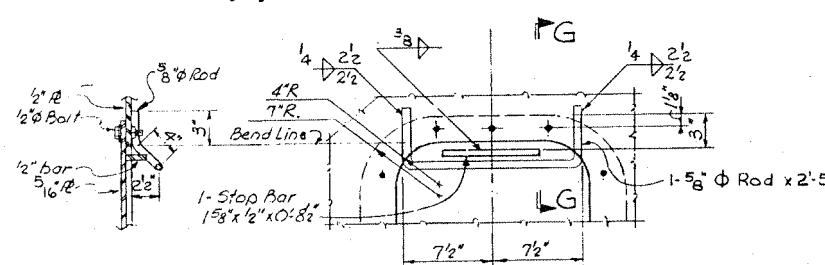
DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED	DATE
AY	TEC	~	LMY	JAD	7-8-64



Note: Dimensions shown from top of Carrying Girder flange to top of web of Splice Yoke are measured at $\frac{1}{2}$ of Carrying Girder.

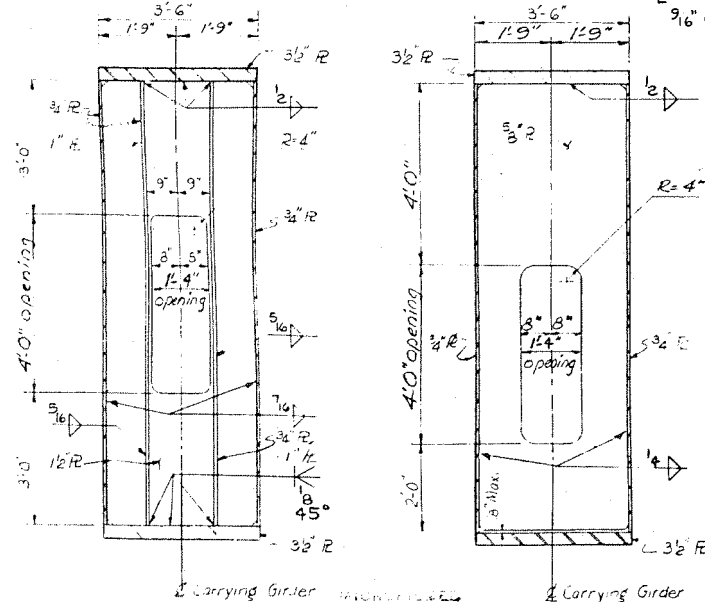


Note: Butt welds on girder flange plates shall be ground flush, the finish grinding being parallel to the direction of stress.



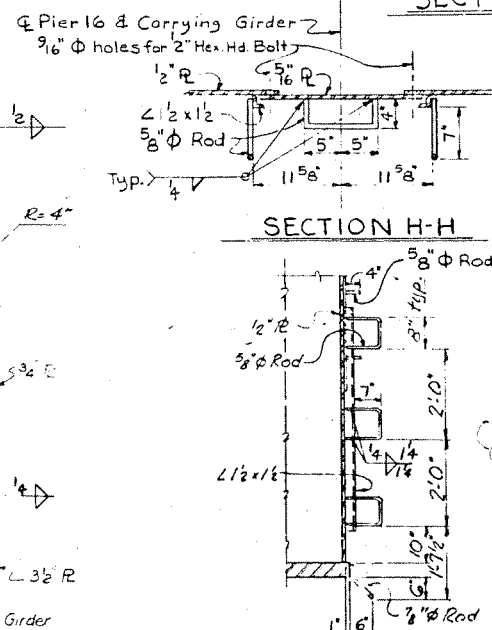
SECTION G-G

DETAIL C
INSIDE OF HATCH SHOWN



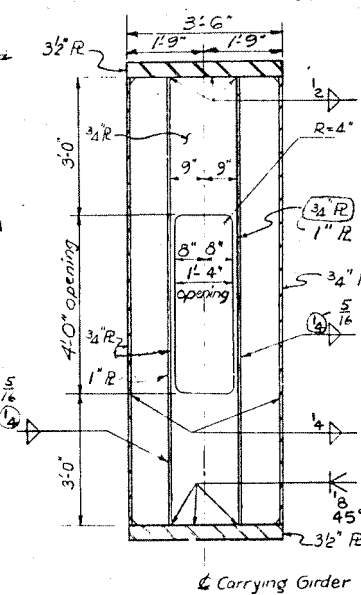
SECTION A-A

SECTION B-B.

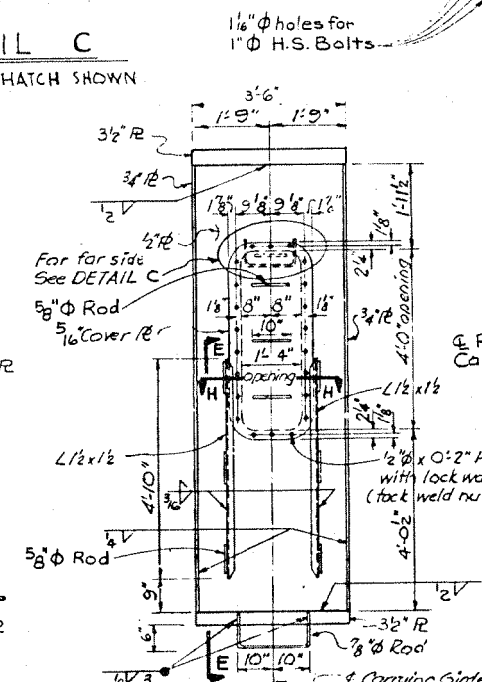


SECTION H-H

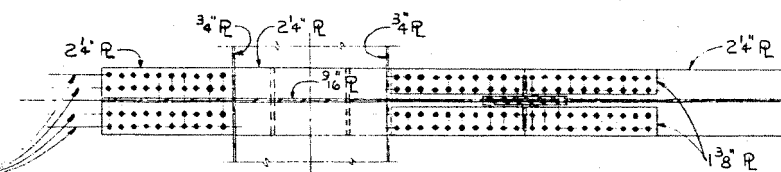
SECTION E-E



SECTION C-C



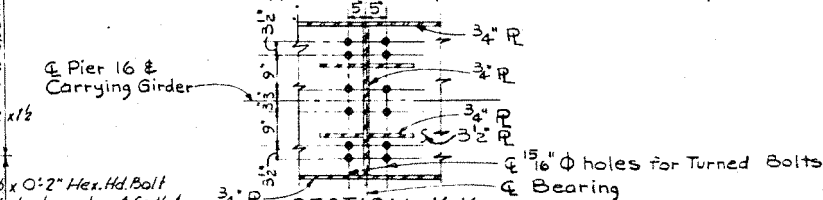
VIEW D-



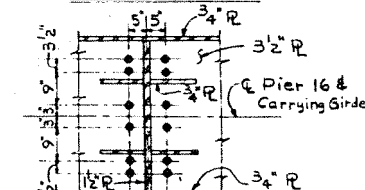
HALF SECTIONS AT BOTTOM FLANGE

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. S-307, dated 8-23-60.



SECTION H



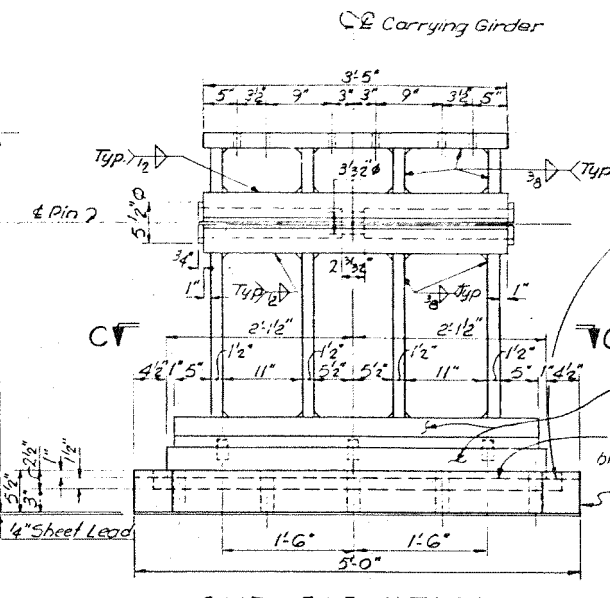
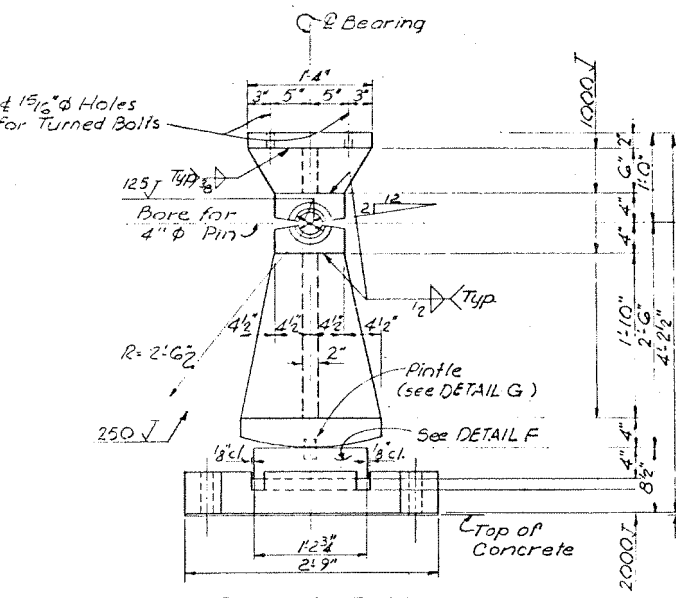
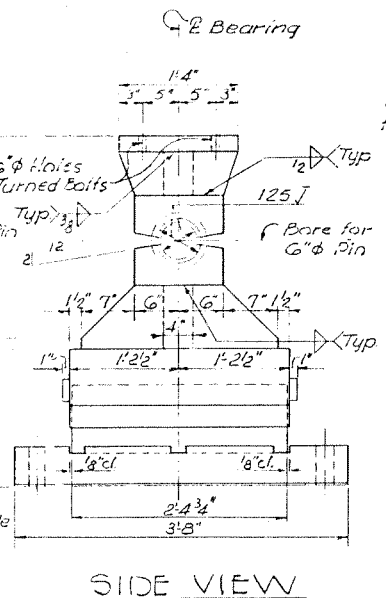
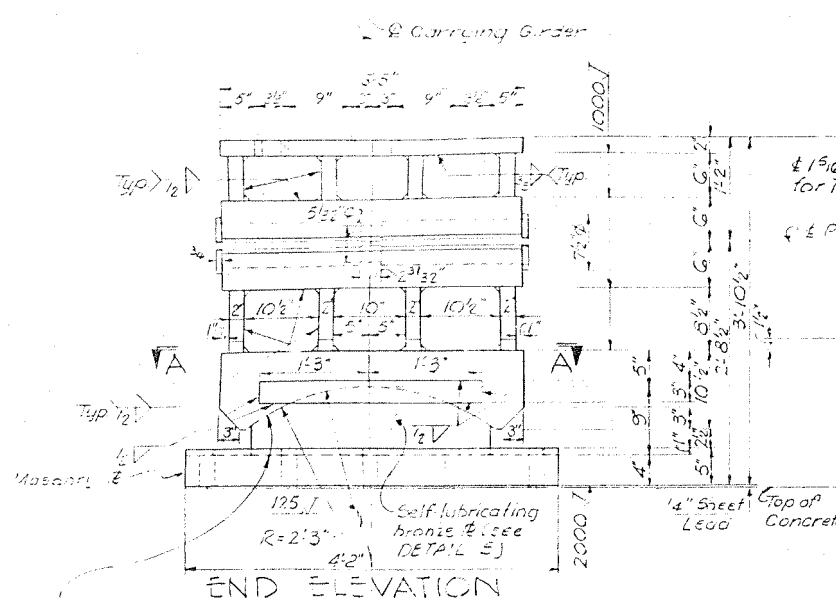
SECTION J

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 MILL CREEK
BENSON ST., N.Y.C.R.R. & SHEPHERD AVENUE
HAMILTON COUNTY STA. 182 + 97.99 TO
STA. 207 + 15.49

DESIGNED HDJ	DRAWN AKS	TRACED	CHECKED HDJ	REVIEWED JAD	DATE 7-8-64	REVISED 2-23-65
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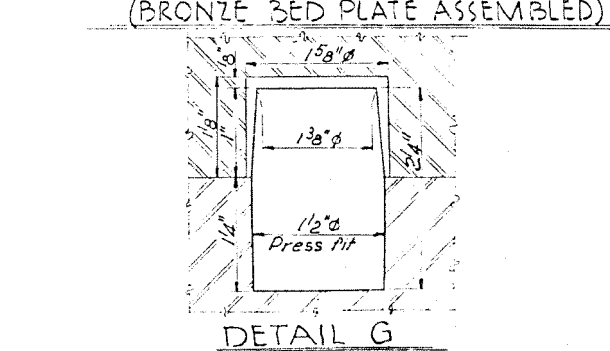
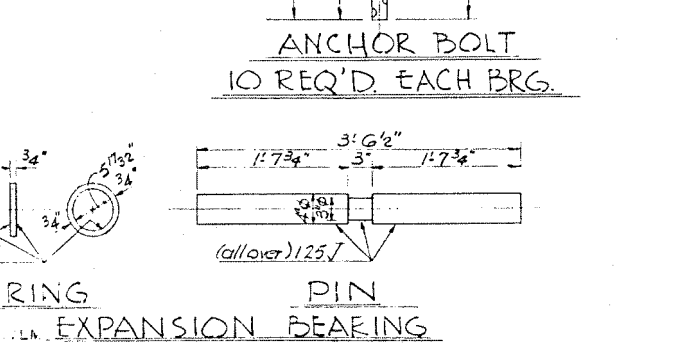
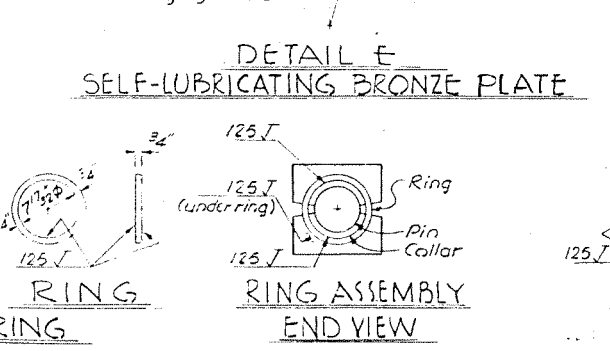
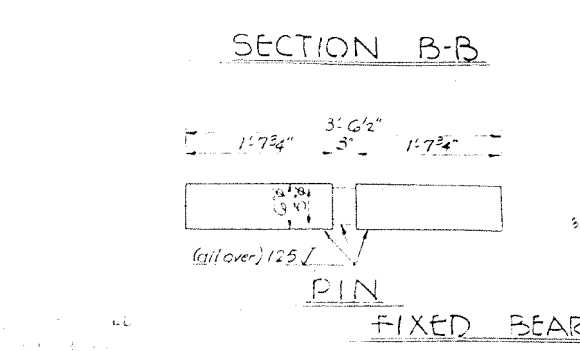
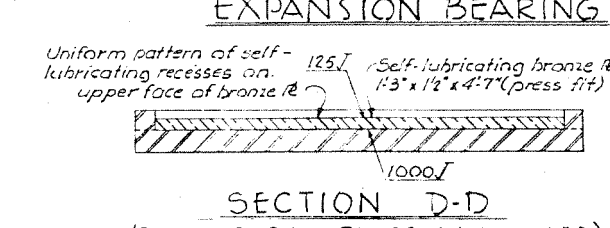
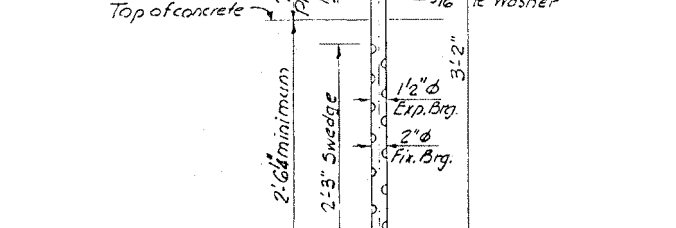
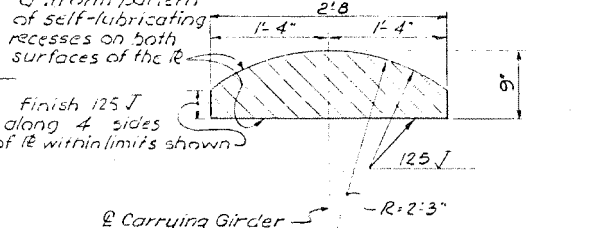
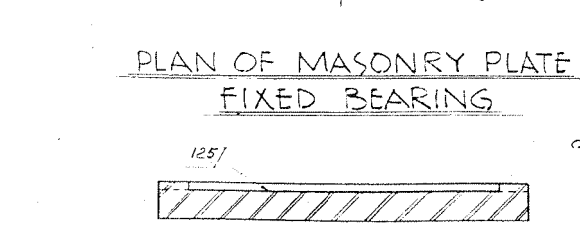
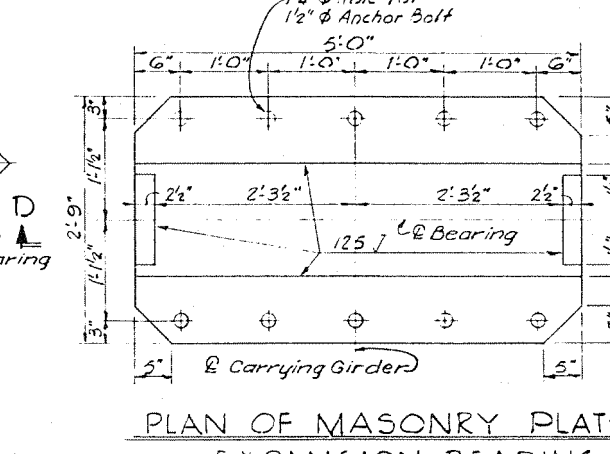
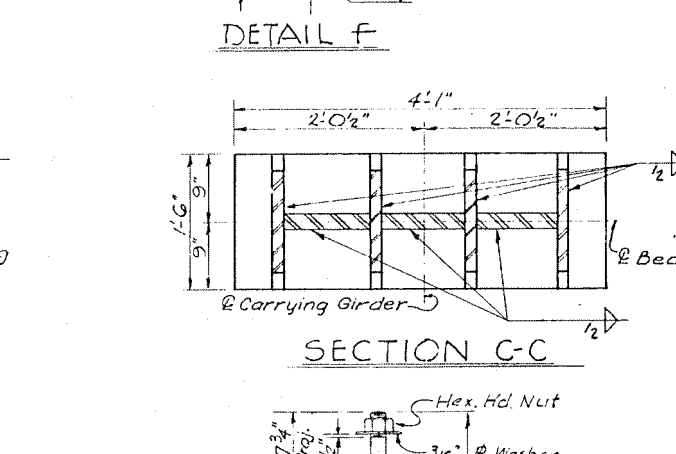
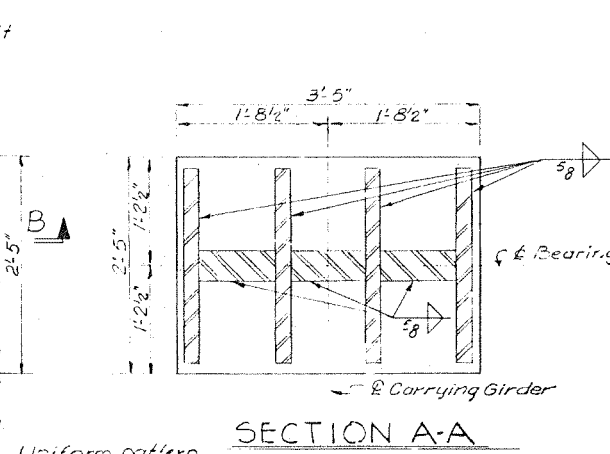
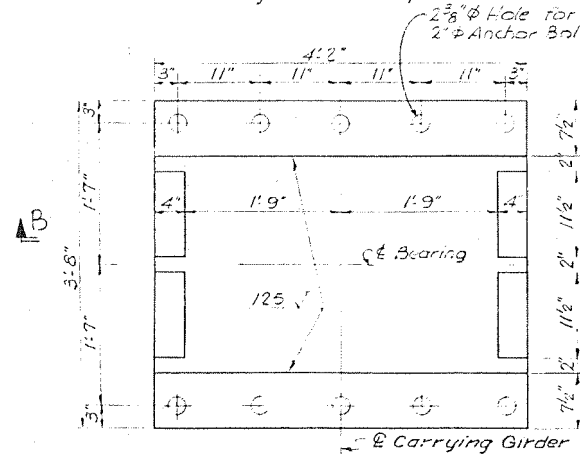
Before final assembly the upper surface of the bronze plate and the opposing steel plate shall be coated with a lubricant similar to that in the recesses. The three parts shall be banded together for shipment.

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

NOTES

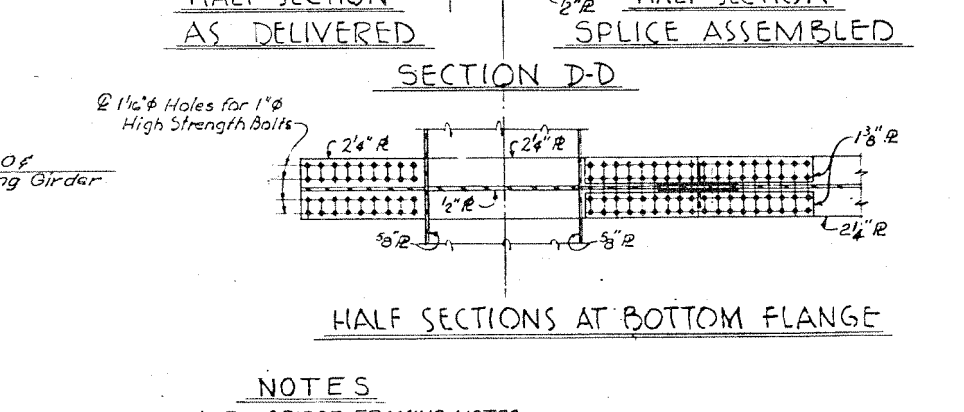
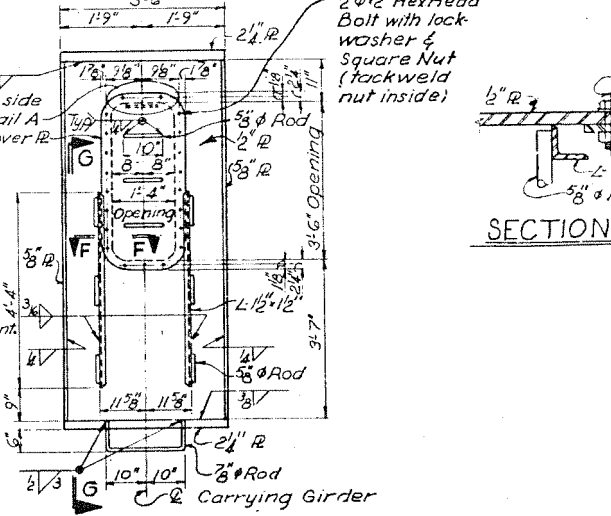
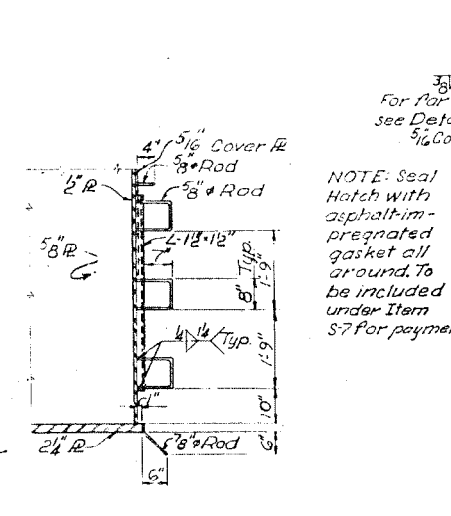
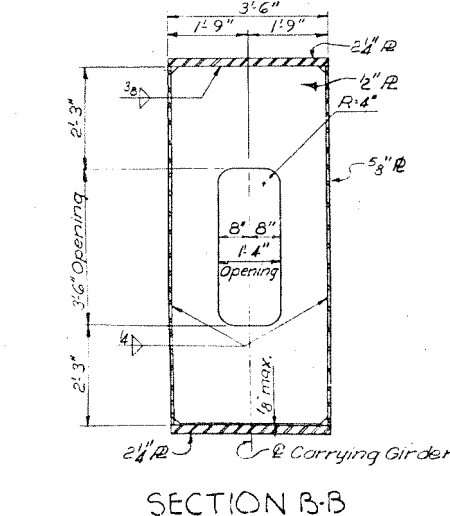
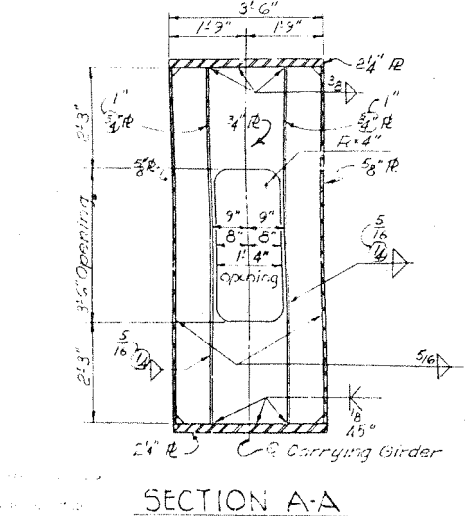
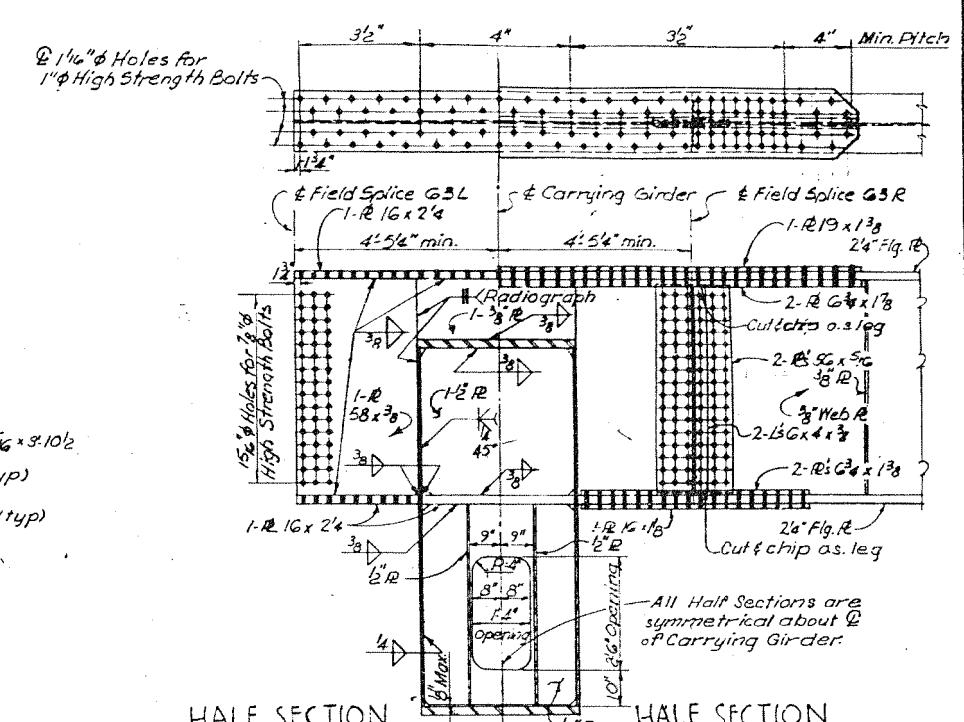
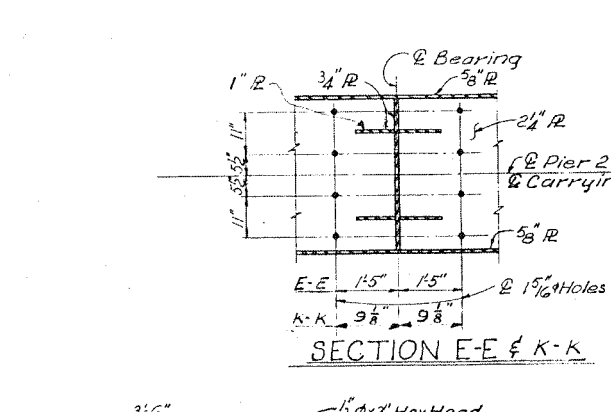
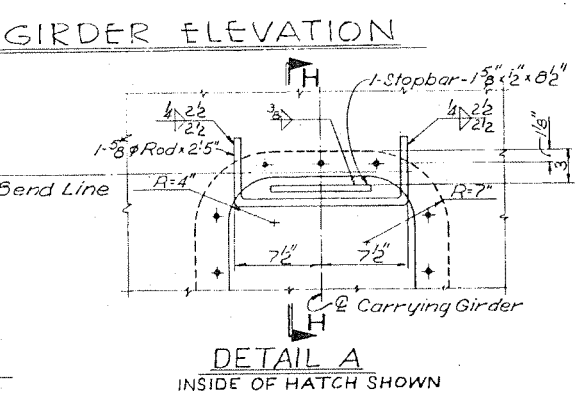
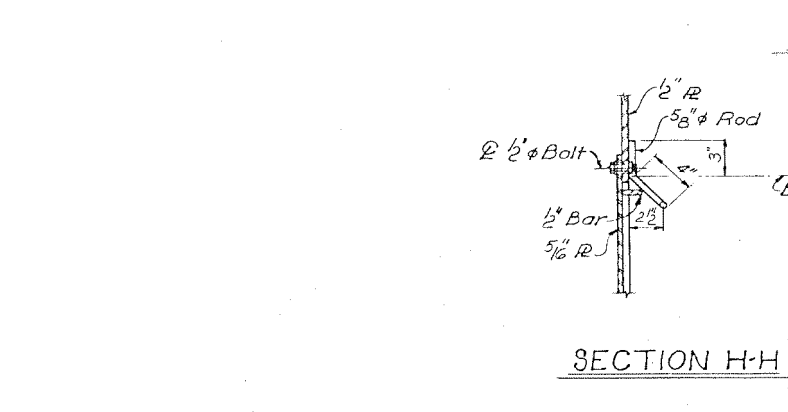
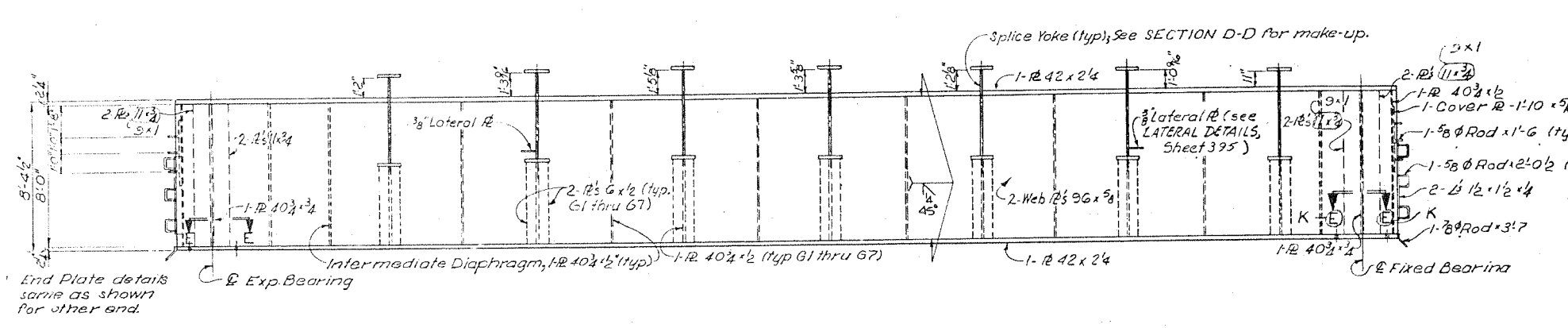
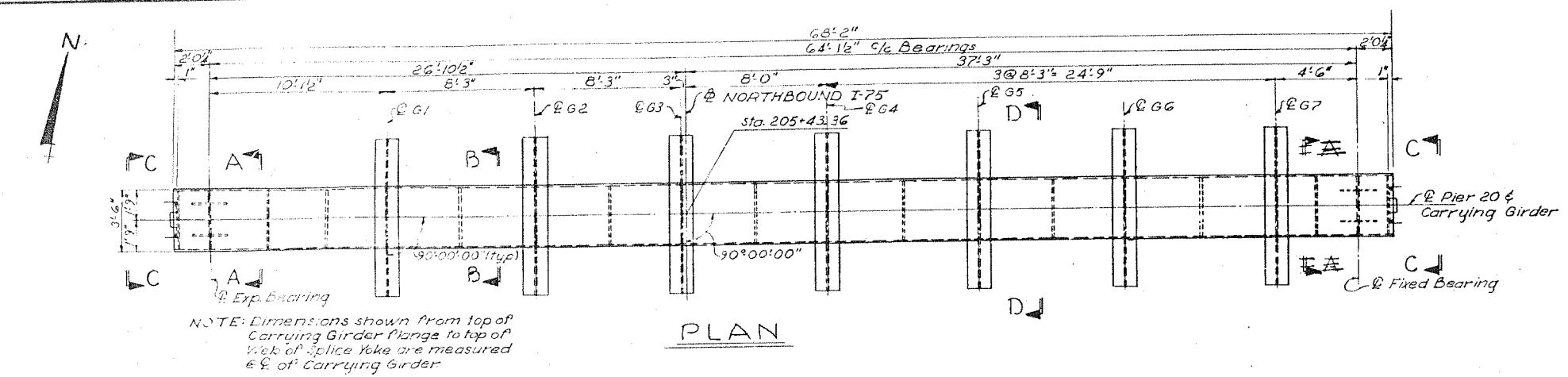
- For BRIDGE FRAMING NOTES see Sh. 402.
- For location of Bearings and for details of Carrying Girder see Sh. 404.
- Specifications for Self-Lubricating Bronze Bearing Plates, Std. Dwg. FS 8-1-62, Rev. 1-15-63 shall apply with the following revisions:
Change Paragraph (a) to read: Cast phosphor bronze shall conform to Sec. M-7.11 of the Construction Materials Specifications. ASTM Designation B22, Alloy B with an allowable unit stress of 2,500 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 plate 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 CINCINNATI		ARCHITECTS 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 JAD ERH	DRAWN TEC	TRACED ~	CHECKED HQU JAD 7-8-64

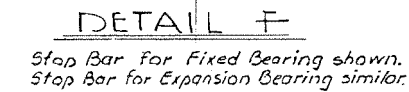
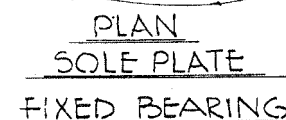
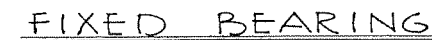
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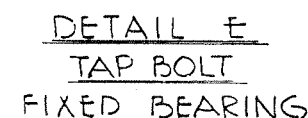
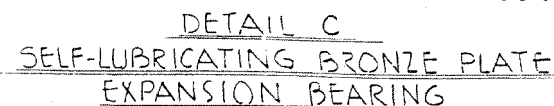
- NOTES**
1. For BRIDGE FRAMING NOTES see Sh. 402.
 2. For FRAMING PLAN, Unit G, see Sh. 401.
 3. For DEFLECTION & CAMBER see Sh. 402.
 4. For details of Bearings see Sh. 407.
 5. Butt welds shall be radiographically examined in accordance with Supplemental Specifications No. S-307, dated 8-23-60.

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 JAD	DATE 7-8-64	REVISED 2-25-65	

SFN 3110656



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. H-5-63, 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 B22, 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 of at least equal to the width of the ring or diameter of the hole.
4. Steel: All steelparts (including bolts) shall conform to ASTM Designation A36-C2 T.





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