

NSTM Member Inspection Report

Submitted to:



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

HAM-75-1102R 2025 NSTM Member Inspection Report (VAR-District 8 Bridge Inspections for Steel Pier Caps)

SFN: 3110443, PID: 109781



September 09, 2025

Submitted by:



September 2025

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INTRODUCTION

Bridge Description

The HAM-75-1102R Bridge is a six-span welded steel plate girder structure with a reinforced concrete deck that carries four lanes of interstate I-75 northbound traffic over the West Fork of Mill Creek and Galbraith Road (See Figure 1). The West Fork of Mill Creek passes beneath span 2 of the structure, and Galbraith Road passes beneath spans 3-5, as it is skewed 60 degrees from northbound Interstate I-75. The overall length of the bridge is 507.3'.

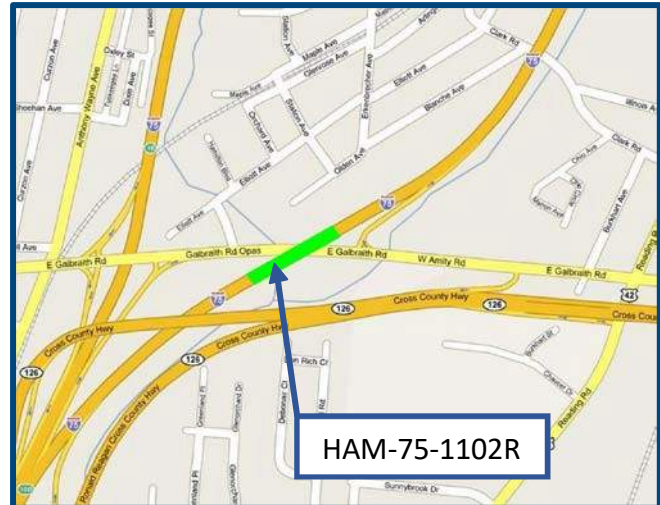


Figure 1: Bridge Location Map

The structure has two NSTM integral pier caps which are located at Piers 3 and 4 (See Figure 2). The identical pier caps are welded steel plate box girders that are simply supported on two circular reinforced concrete columns space 46'-10 1/2" center to center. The pier caps are both 52'-0" in length. The web plate heights vary from 3'-5 1/4" to 3'-10 5/8" across the length of the pier caps. The superstructure consists of seven welded steel I-girders that are haunched and continuous through the pier caps. Their top flanges pass above the pier caps and their bottom flanges pass below the pier caps. Their webs are connected to the web plates of the pier caps by fillet welds.

The nomenclature and girder designation shown on the design plans were used in the inspection of the pier caps. The bridge was rehabilitated in 1993 to improve several fatigue-prone weld details. Two 2" diameter stress-relief holes were drilled through the longitudinal girder webs at their connection to the top flange of the pier cap (both north and south face) and then connected with a vertical sawcut. Tack welds between the longitudinal girder bottom flanges and the bottom flanges of the pier caps were ground out. Tack welds that attached the backer bars to the pier cap webs and bottom flange plates were ground out. Sections of backer bar that had bent away from the web plates of the pier caps were removed.



Figure 2: NSTM Pier Cap Locations

Inspection and Access Methods

Gannett Fleming, Inc. performed an NSTM member inspection of Pier Cap 3 and Pier Cap 4 from July 10-11, 2025. A&A Safety was used to close one lane of traffic on E. Galbraith Road at a time while traffic was maintained to enable use of a 46' bucket truck to access the pier cap interiors and perform the "arm's length" exterior inspection of the pier caps. One cover plate was removed from each pier cap and replaced using an impact wrench. The cover was resealed with exterior grade silicone caulk.

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

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

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 3									
231		3	Steel Pier Cap	52	FT	42	7	3	
PIER 4									
231		3	Steel Pier Cap	52	FT	49	3		
515		3	Steel Protective Coating	20,672	SQ FT	9,303	10,336	1,033	
Substructure									
PIER 3									
205		3	Reinforced Concrete Column	2	EA	1	1		
PIER 4									
205		3	Reinforced Concrete Column	2	EA	2			

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

PIER CAP 3

Based on the 2021 inspection, Pier Cap 3 is in Satisfactory condition [6] (Photo 1). The pier cap is a built-up steel plate sections of varying thicknesses and heights. As part of the 1993 rehabilitation project, tack welds were removed along the webs and bottom flange and backer bars. Additionally, 2" Diameter stress-relief holes were drilled and connected with a sawcut through the webs of the longitudinal girders on both sides of the pier caps.

Pier Cap 3 Interior

The interior of Pier Cap 3 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 is minor surface corrosion on the bottom flange adjacent to the west access hatch (Photo 2).

Select portions of the bottom flange backer bars were removed throughout the length of the pier cap where the backer bars were bowing away from the web plate or where two backer bars met without a butt-weld. Some of the remaining backer bars show gaps between them and the web plates (Photo 3). There are two remaining 1-1/2" tack welds between both north and south backer bars and the bottom flange between Girder 3 and the east adjacent diaphragm (Photo 4). The top flange backer bars are connected to the webs and flange with intermittent tack welds, some of which have cracked. There are two cracked welds between the top flange backer bars and both web plates between the east bearing and Girder 7 (Photo 5). There is also a completely cracked tack weld between the top flange backer bar and the south web plate at Girder 7 (Photo 6).

There are seven miscellaneous tack welds on the bottom flange throughout the pier cap: three 1/2" welds between Girder 4 and the east adjacent diaphragm, and three 1/2" and one 1" welds between Girder 5 and the east adjacent diaphragm (Photos 7-8). There are also tack

welds between diaphragm east of the west bearing and the bottom flange (Photo 9).



Photo 1: Pier Cap 3 Elevation



Photo 2: Surface corrosion on the bottom flange of Pier Cap 3 adjacent to west access hatch.



Photo 3: Gap between the backer bar and south web plate west of Girder 6 at Pier Cap 3.

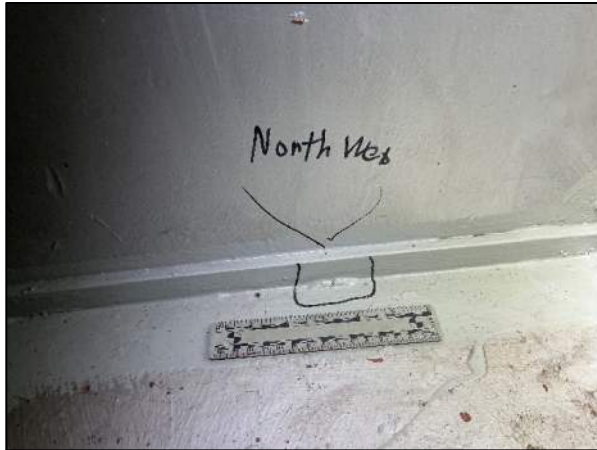


Photo 4: 1-1/2" tack weld on bottom flange at the north web of Pier Cap 3 east of Girder 3.



Photo 7: Four tack welds ranging from 1/2" to 1" on the bottom flange of Pier Cap 3 east of Girder 5.



Photo 5: Cracked tack weld between the top flange and north web between the east bearing and Girder 7 at Pier Cap 3.



Photo 8: Additional 1/2" tack welds on the bottom flange east of Girder 4.



Photo 6: Cracked tack weld between the top flange and south web at Girder 7 at Pier Cap 3.



Photo 9: 1" tack weld on the Pier Cap 3 bottom flange at the diaphragm east of the west bearing.

Pier Cap 3 Exterior

The east pier cap bearing displays minor surface corrosion with some layered corrosion around the anchor bolts (Photo 10). The west bearing exhibits minor surface corrosion on the masonry plate and anchor bolts (Photo 11).

The paint system of the pier cap exterior is in satisfactory condition with widespread areas of chalking. There are several small areas of minor freckling corrosion and peeling paint on the bottom flange near the bearings (Photo 12) and the top flange between the girders. There is moderate surface corrosion on the west end of the pier cap resulting in 5/16" of pack rust between the bottom flange and the pier cap (Photo 13). On the south side of the bottom flange west of Girder 3, there is a 4" long area of impact damage (Photo 14).

As per the 1993 rehabilitation project, 2" Diameter stress relief holes were drilled through all girder webs adjacent to the pier cap top flange and connected with sawcuts. Some of the retrofits display gouges in the stress relief holes due to mis-drilled holes at Girders 1, 2, 3, and 6 (Photo 15). On the south side of the west face of Girder 2, there are errant sawcuts between two of the stress relief holes (Photo 16).

The full penetration groove welds between the flange plates and web plates are overlapped with multiple discontinuous fillet welds that were not ground smooth, but the welds show no signs of distress (Photo 17). Tack welds or fillet welds were typically found between the bottom flange and the bottom flanges of the girders. The welds running transverse to the pier cap flange were removed during the rehabilitation. This caused gouging of the bottom flange (Photo 18), and some gouging of the welds running longitudinally along the pier cap flange (Photo 19). At several locations, this removal has resulted in cracks of the welds longitudinally along the pier cap flange. Locations of this condition include:

- On the northeast corner of the Girder 5 bottom flange, there is a 1-1/2" sawcut with a 9/16" crack (Photo 20).
- On the northeast corner of the bottom flange of Girder 4, there is a 3/4" sawcut with a 1" crack (Photo 21).
- On the southeast corner of the bottom flange of Girder 6, there 1-1/2" crack (Photo 22).

These cracks show no signs of growth since the previous inspection.



Photo 10: Typical Peeling Paint and surface corrosion at the east bearing of Pier Cap 3



Photo 11: Minor surface corrosion on the masonry plate and anchor bolts at the Pier Cap 3 west bearings.



Photo 12: Minor freckling corrosion, peeling paint and vehicle scrapes on bottom flange.



Photo 15: Typical gouges in the Girder sawcut retrofit.



Photo 13: Up to 5/16" pack rust between the Girder 1 bottom flange and the pier cap at the west end of Pier Cap 3.



Photo 16: Typical view of errant sawcuts on the Girders.



Photo 14: 4" long area of impact damage on Pier Cap 3 bottom flange west of Girder 3.



Photo 17: Typical overlapping welds on the Pier Cap 3 web plates.



Photo 18: Gouges of the bottom flange of Pier Cap 3 at the west side of Girder 4 from stitch weld removal.



Photo 21: 3/4" sawcut and 1" crack on the northwest corner of Girder 4 at Pier Cap 3.



Photo 19: 1-1/2" sawcut in the weld on the northwest corner of Girder 6 at the north face of Pier Cap (could not access due to pigeon nest).



Photo 22: 1-1/2" combination sawcut and crack in the weld on the southeast corner of Girder 6 at the south face of Pier Cap 3.



Photo 20: No change to the 1-1/2" combination sawcut and crack on the northeast corner of Girder 5 at the north face of Pier Cap 3.

PIER CAP 4

Based on the 2021 inspection, Pier Cap 4 is in Good condition [7] (Photo 23). It was dry at the time of the inspection and no moisture was found inside the cap. The paint system on the interior of the pier cap is in good condition while the exterior paint system is in satisfactory condition. The most noticeable deterioration is the result of impact damage to the pier cap and Girder 5 from westbound vehicular traffic on Galbraith Road. Tack welds were noted between both edges of the bottom flange and the bottom flanges of the girders. A few miscellaneous tack welds were identified on the interior and exterior of the bottom flange.

Pier Cap 4 Interior

The interior of Pier Cap 4 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.

Select portions of the bottom flange backer bars were removed throughout the length of the pier cap where the backer bars were bowing away from the web plate or where two backer bars met without a butt-weld (Photo 24). Some of the remaining backer bars are still bowing away from the web plates (Photo 25). There are discontinuous stitch welds of varying lengths and unwelded butt joints on the top flange backer bars (Photo 26).

Typically, there are numerous poor-quality welds at the pier cap diaphragms that display overlapping and porosity (Photo 27).

There are various stray welds on the flanges:

- At the bottom flange east of the Girder 6 diaphragm, there is a 7" long tack weld (Photo 28).
- At the bottom flange west of Girder 5, there is a 1-1/2" partially ground tack weld (Photo 29).
- At the bottom flange east of Girder 2, there is a 2" long tack weld.

- At the top flange there are tack welds in scattered locations.



Photo 23: Pier Cap 4 Elevation



Photo 24: Typical bottom flange backer bar removal from a previous rehabilitation of Pier Cap 4.



Photo 25: Backer bar pulling 1/2" away from the Pier Cap 4 web plate west of Girder 3.

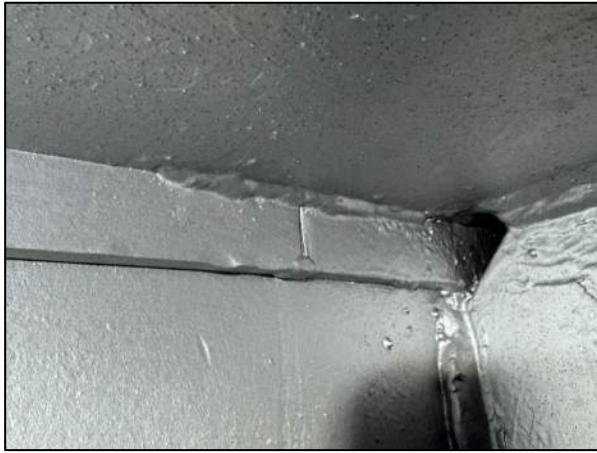


Photo 26: Discontinuous backer bar and varying length stitch welds east of Girder 3 on the top flange of Pier Cap 4.



Photo 29: Partially ground tack weld west of Girder 5 on the bottom flange of Pier Cap 4.



Photo 27: Poor quality welds displaying overlapping and porosity on the diaphragms of Pier Cap 4.



Photo 28: 7" transverse weld east of the Girder 6 diaphragm on the bottom flange of Pier Cap 4.

Pier Cap 4 Exterior

Both bearing devices for Pier Cap 4 exhibit minor corrosion on the masonry plate and anchor bolts (Photo 30).

The paint system of the pier cap exterior is in satisfactory condition with widespread areas of chalking. There are isolated areas of peeling paint and surface corrosion with active rust on cap bottom flange (Photo 31). At north face of the pier cap at Girder 5, there are several areas of impact damage with peeling paint and surface corrosion on the bottom flange (Photo 32).

As per the 1993 rehabilitation project, 2" Diameter stress relief holes were drilled through all girder webs adjacent to the pier cap top flange and connected with sawcuts. Some of the retrofits display gouges in the stress relief holes due to mis-drilled holes at Girders 2, 4, and 5 (Photo 33).

At the northwest corner of Girder 2, there is a 2" tack weld along the bottom flange. Pier Cap doors have minor surface corrosion with active rust (Photo 34). Groove welds typically exhibit multiple passes and overlaps (Photo 35). The removal of tack welds between the pier cap bottom flange and girder bottom flange plates typically produced minor gouges in the pier cap bottom flange (Photo 36).



Photo 30: Minor surface corrosion on the masonry plate and anchor bolts at the Pier Cap 4 east bearing.



Photo 31: Typical minor surface corrosion on Pier Cap 4



Photo 32: Impact damage with peeling paint and surface corrosion on the bottom flange at the north face of Pier Cap 4 and Girder 5.



Photo 33: Typical gouges in the Girder sawcut retrofit.



Photo 34: Typical condition of Pier Cap Door and Seal, east side.



Photo 35: Typical multiple passes and overlap in the bottom flange groove weld of Pier Cap 4.



Photo 36: Typical gouges on the Pier Cap bottom flange from tack weld removal.

Pier Cap 3/Pier Cap 4 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 top flange backer bars and pier cap 3 flange and web plates between fascia girders and bearings.
- One tack weld between pier cap 3 bottom flange and each backer bar between Girder 3 and the adjacent east diaphragm (2 total).
- Three tack welds on interior of pier cap 3 bottom flange between Girder 4 and the adjacent east diaphragm; Four tack welds on interior of pier cap 3 bottom flange between girder 5 and the adjacent east diaphragm (7 total).
- One tack weld on interior of pier cap 4 bottom flange between Girder 5 and the adjacent west diaphragm.

Fatigue Prone Detail 4

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

Category: D

Location: 2" tack weld on interior of pier cap 4 bottom flange between Girder 2 and the adjacent east diaphragm; 2" tack weld on exterior of pier cap 4 bottom flange on west side of Girder 2.

- 2½"-3½" tack welds between the edges of both pier cap bottom flange plates and the bottom flanges of Girders 2 through 6.
- 2"-3½" tack welds along the top flange backer bars and both pier cap flange and web plates between the fascia girders and bearings.

Fatigue Prone Detail 5

Fillet weld greater than 4" or 12 times the connection thickness with a connection thickness less than 1".

Category: E

Location:

- Fillet weld between bottom flange of Girder 6 and south edge of pier cap 3 bottom flange.
- 7" weld on the interior of the pier cap 4 bottom flange between Girder 6 and the east bearing.
- 4¼" welds along the top flange backer bars and the flange plates of both pier caps between the east bearings and Girder 7.

Fatigue Prone Detail 9

Drilled hole stress relief retrofit in girder web plates.

Category: B

Location: All girder web plates on each side of the pier cap top flange.

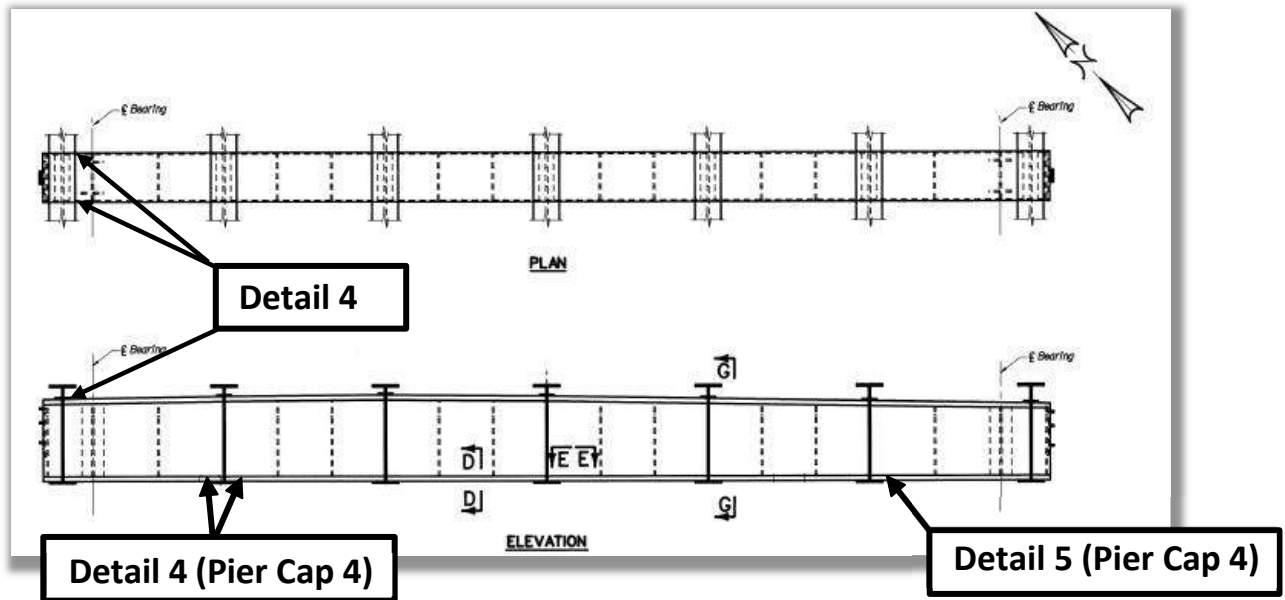


Figure 3: Plan and elevation of Pier Caps 3 & 4 with Fatigue Prone Details

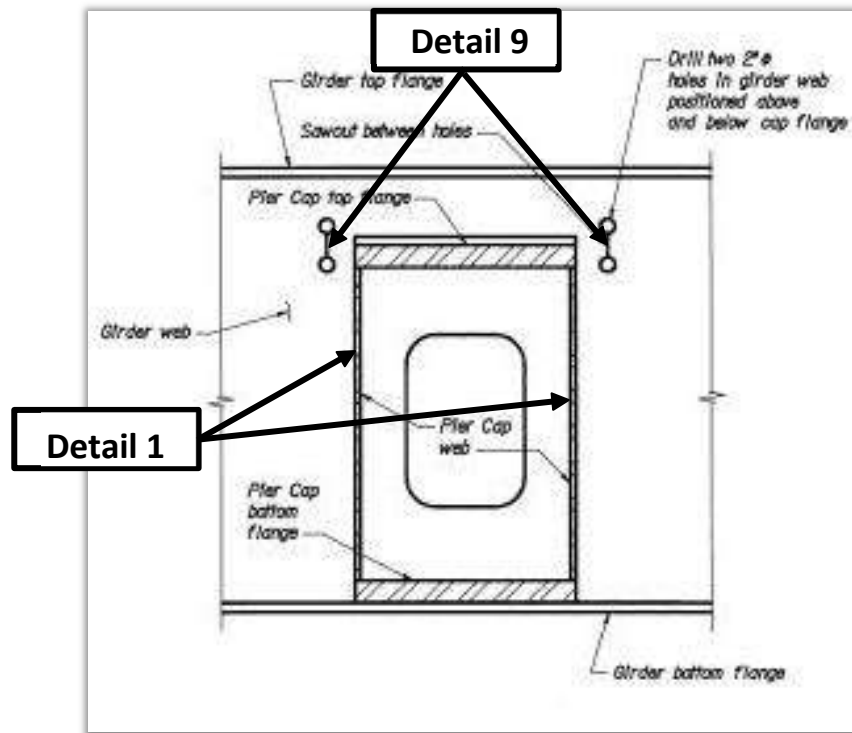


Figure 4: Typical section of Pier Caps 3 & 4.

CONCLUSIONS AND RECOMMENDATIONS

Based on the inspection, the NSTM pier caps of Bridge No. HAM-75-1102R and its associated fatigue prone details are in SATISFACTORY condition [6] overall. The recommendations for maintenance of the pier cap 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 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 3 – Recommendations:

Priority Repairs: None

Rehabilitation/Evaluation: None

Maintenance:

1. Remove the welds between the edges of the bottom flange and the bottom flange of the girders.
2. Clean and paint the exterior surfaces of the pier cap and girder connections.

Monitoring: Continue to monitor fatigue prone details at a 24-month cycle.

Pier Cap 4 – Recommendations:

Priority Repairs: None

Rehabilitation/Evaluation: None

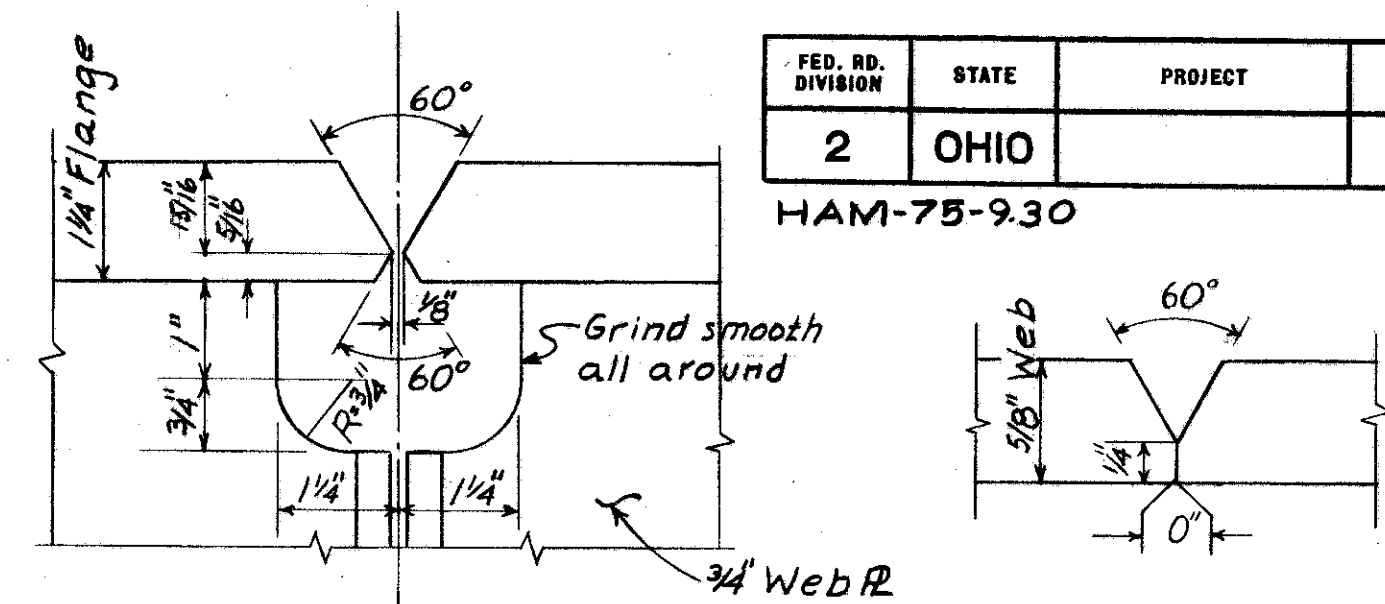
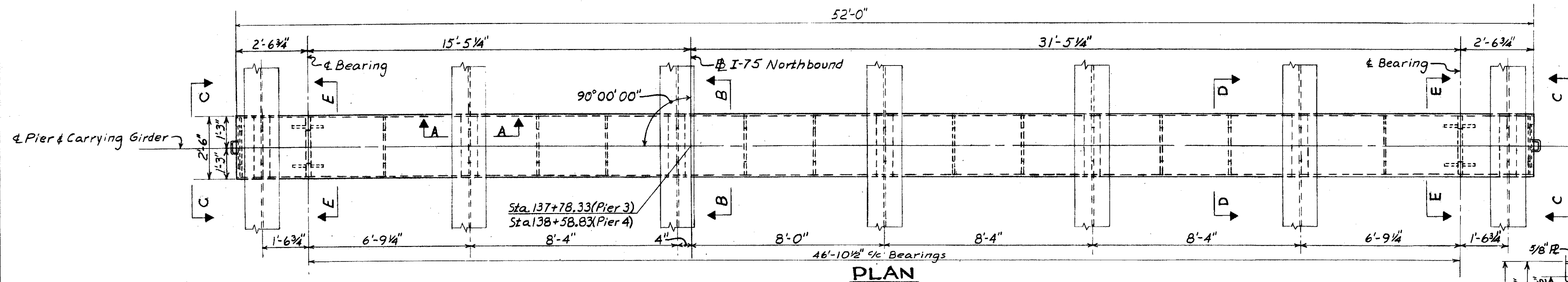
Maintenance:

1. Remove the welds between the edges of the bottom flange and the bottom flange of the girders.
2. Clean and paint the exterior surfaces of the pier cap and girder connections.

Monitoring: Continue to monitor fatigue prone details at a 24-month cycle.

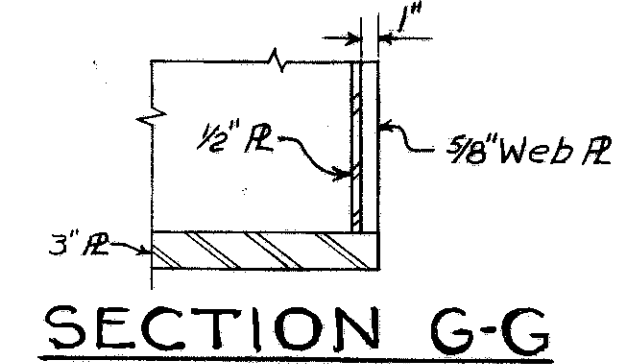
APPENDIX A

EXISTING PIER PLANS

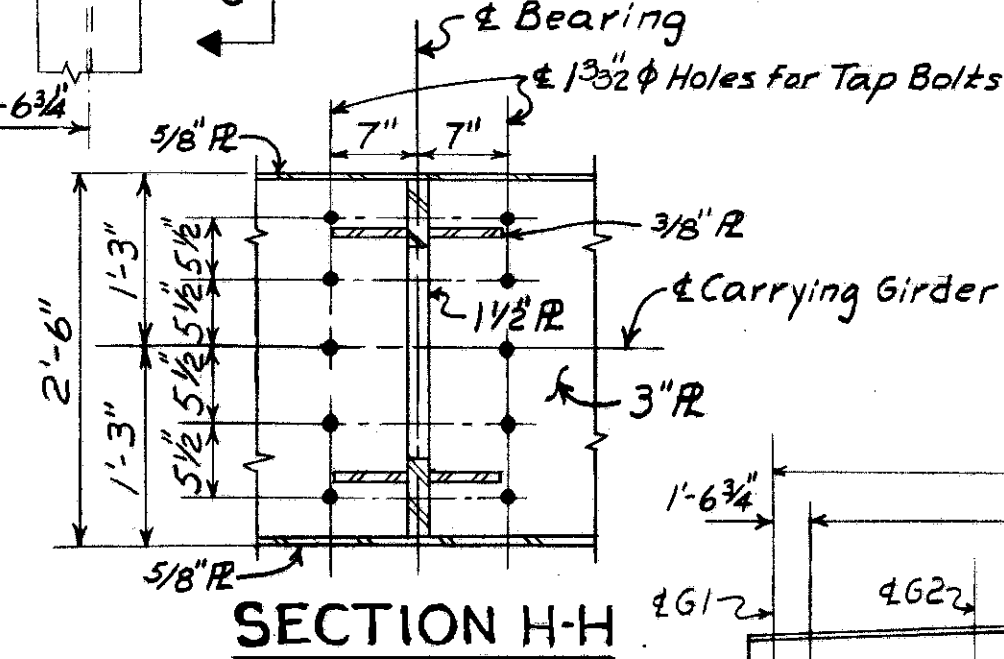


DETAIL A

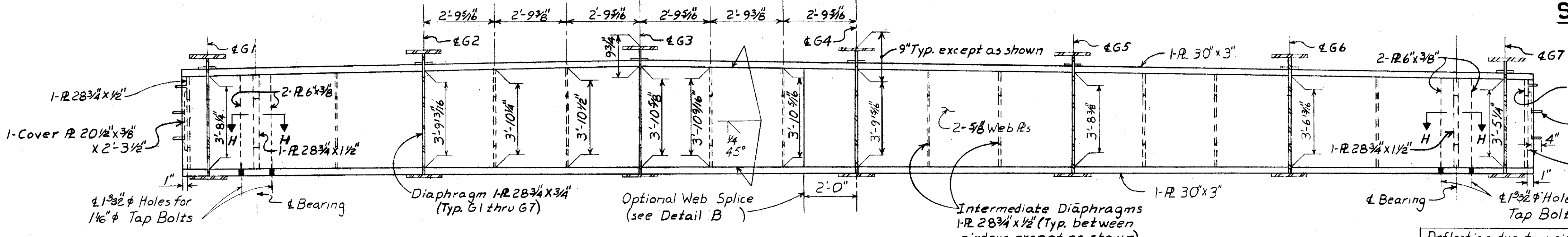
DETAIL B



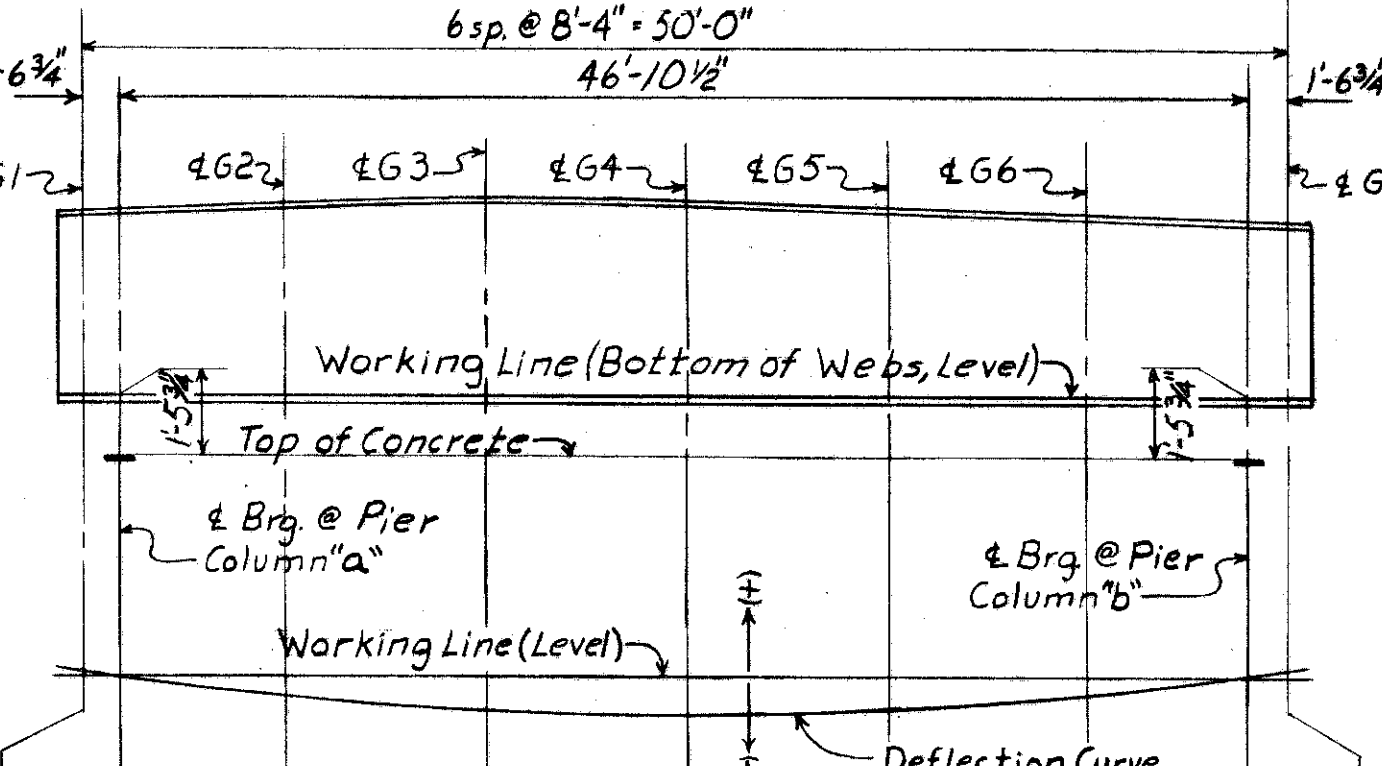
SECTION G-G



SECTION H-H



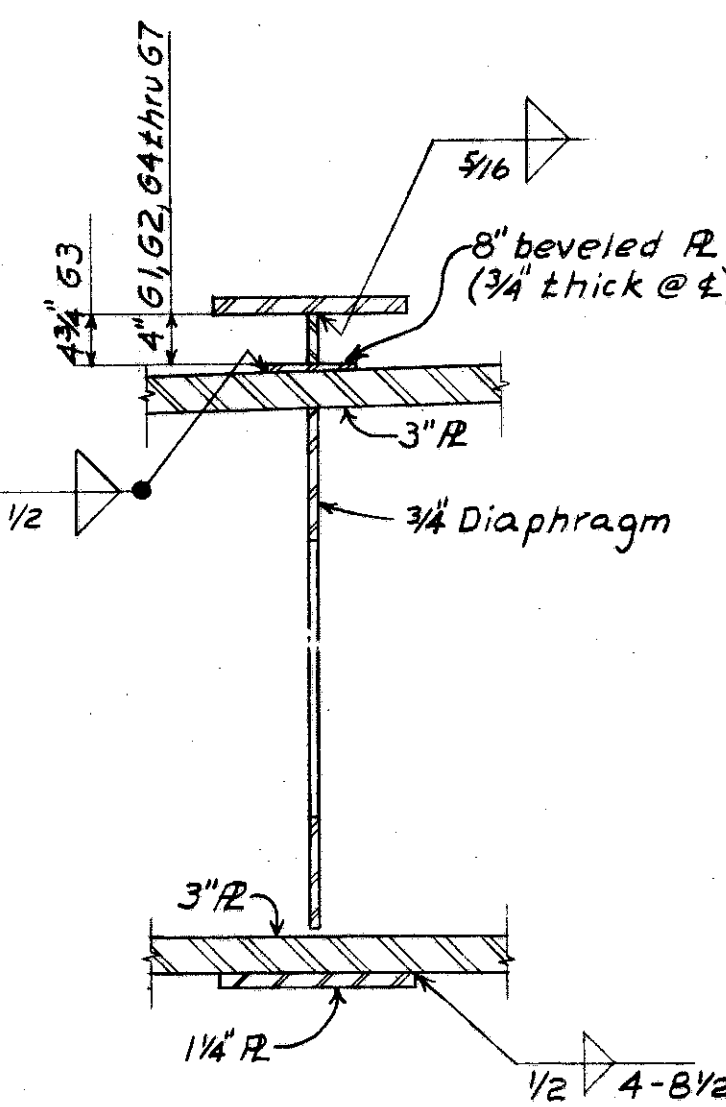
GIRDER ELEVATION



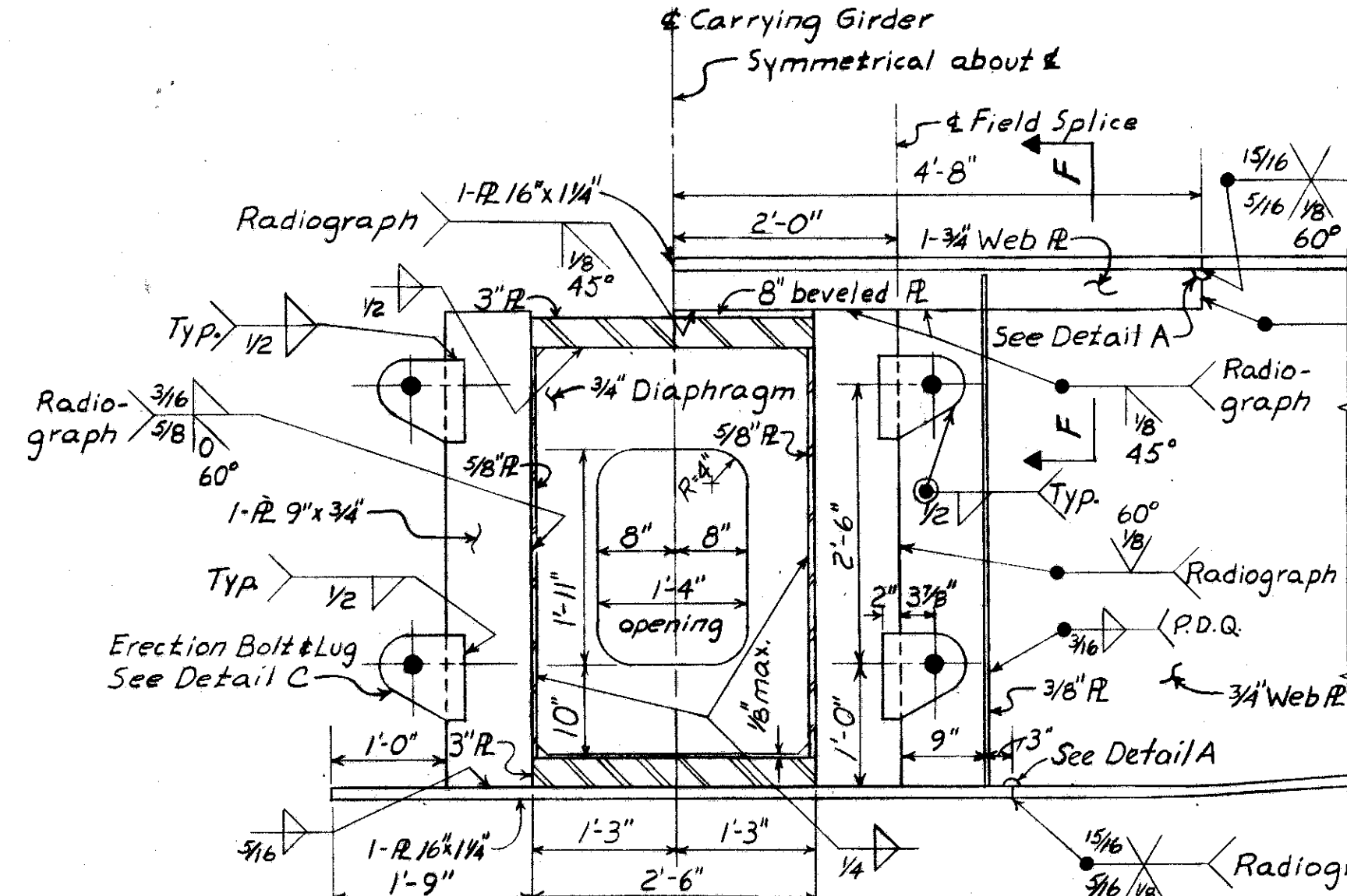
Deflection due to weight of steel	0	0	-1/16	-1/16	-1/8	-1/16	-1/16	0	0
Deflection due to remaining dead load	0	0	-1/8	-1/8	-5/16	-1/4	-1/8	0	0
Total dead load deflection	0	0	-3/16	-3/16	-7/16	-3/8	-3/16	0	0
Camber required	0	0	+3/16	+3/16	+7/16	+3/8	+3/16	0	0

Weight of steel includes longitudinal girders, crossframes, etc., as well as the carrying girders.

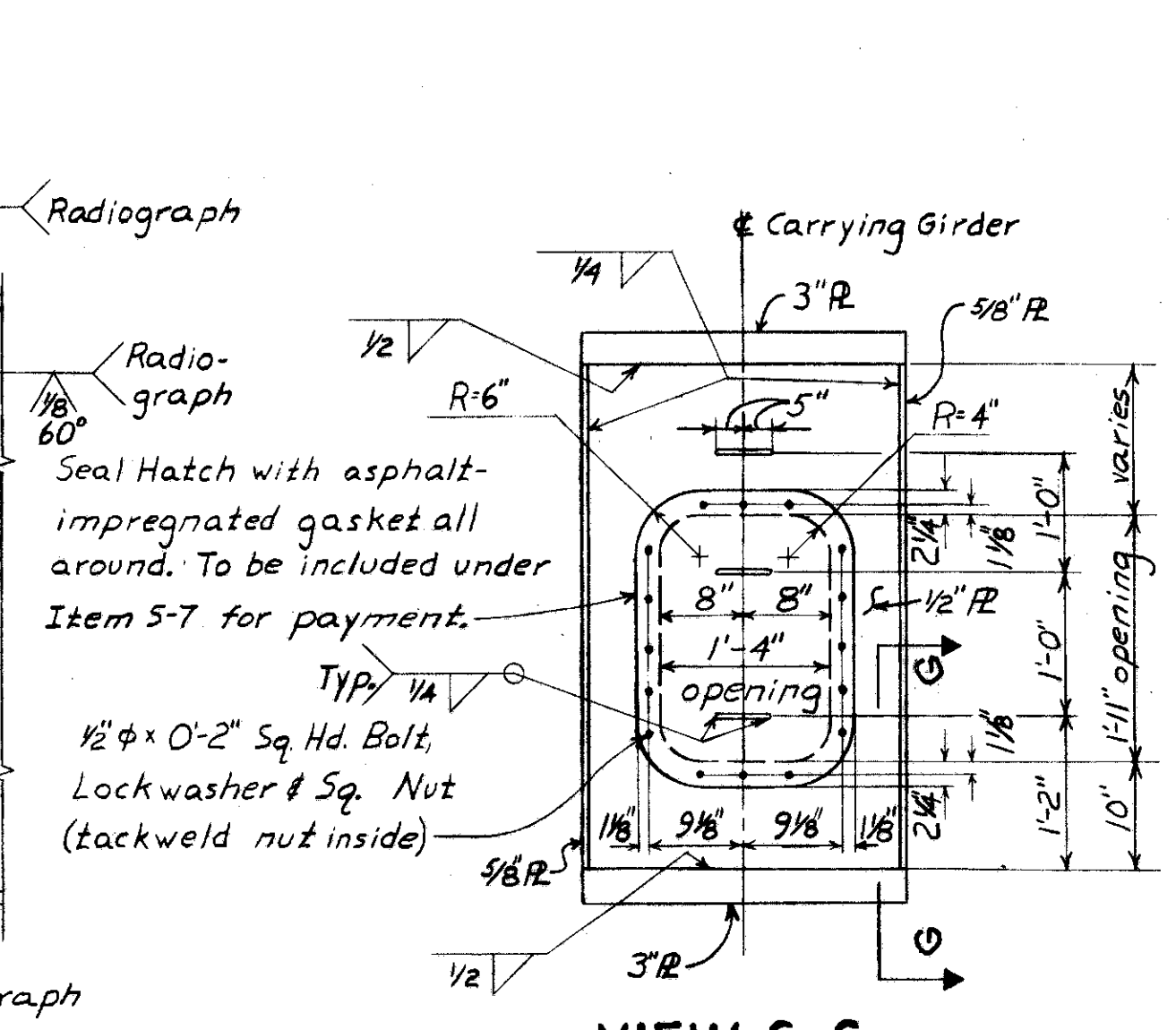
ELEVATION LAYOUT, DEFLECTION & CAMBER



SECTION A-A



HALF SECTION AS DELIVERED



HALF SECTION SPLICE ASSEMBLED

SECTION B-B

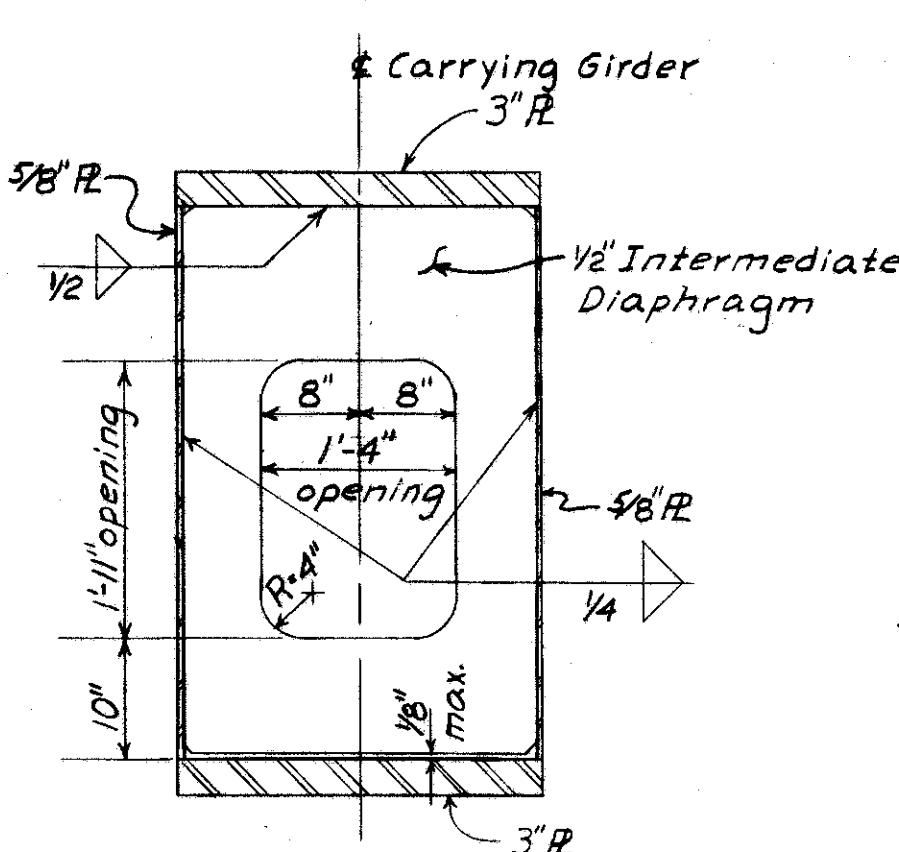
Applies to Field Splice Nos. 2 & 3

MICROFILMED

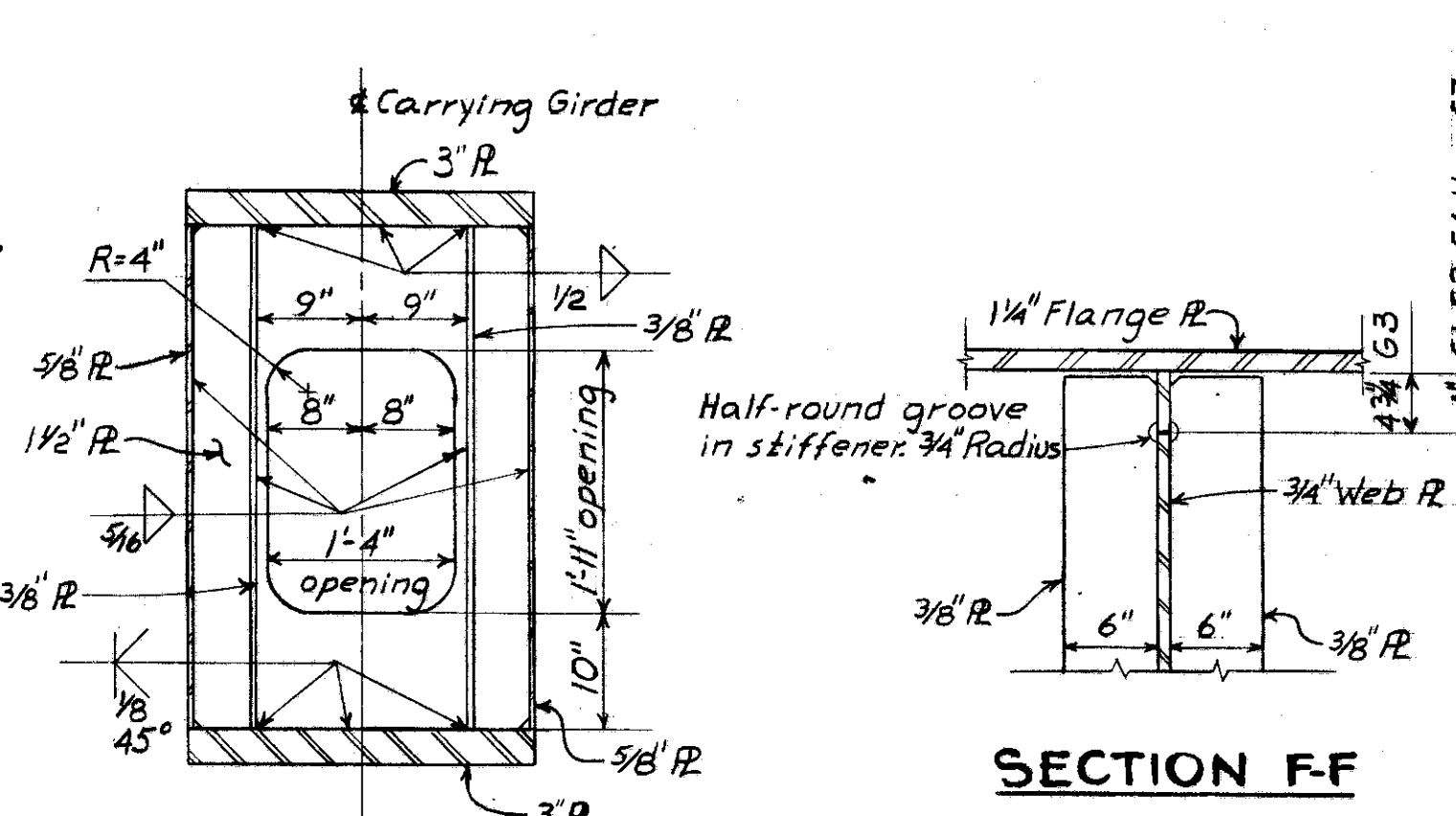
JAN 28 1965

NOTES

- All diaphragms shall be vertical, and have contact bearing against the top flange.
- For details of bearings, see Sheet 306.
- Butt welds shall be radiographically examined in accordance with Supplemental Specification No. S-307, dated 8-23-60.
- All of the full penetration welds shall be back-gouged and welded after welding far side.



SECTION D-D



SECTION E-E

SECTION F-F

VOGT, IVERS, & ASSOCIATES
ENGINEERS ARCHITECTS
CINCINNATI CHICAGO

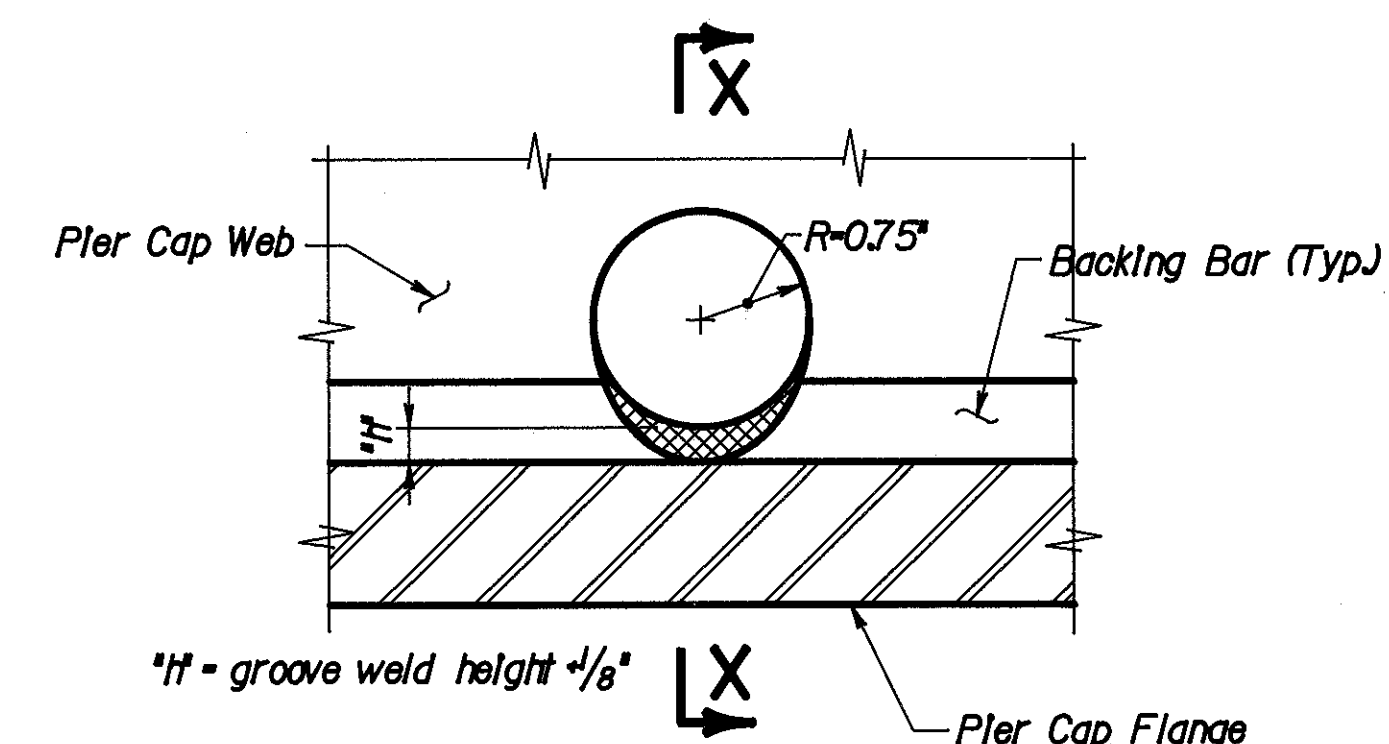
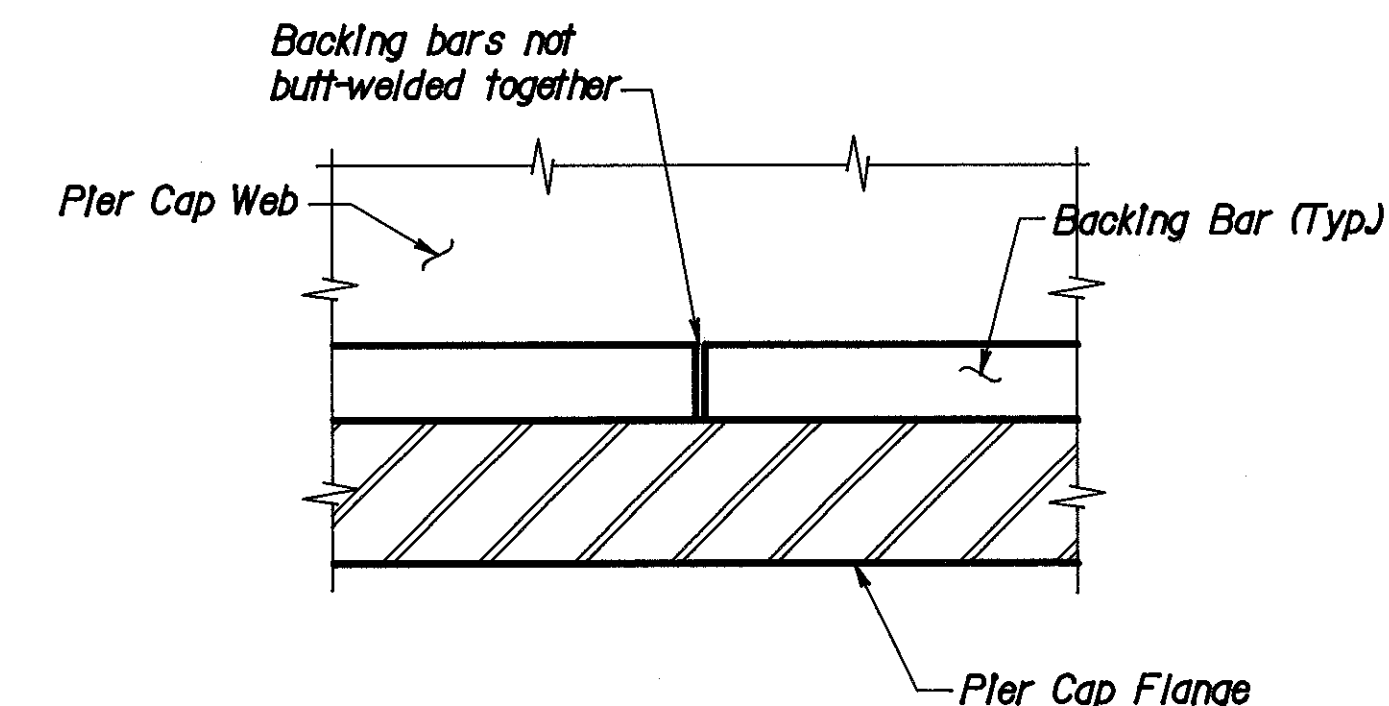
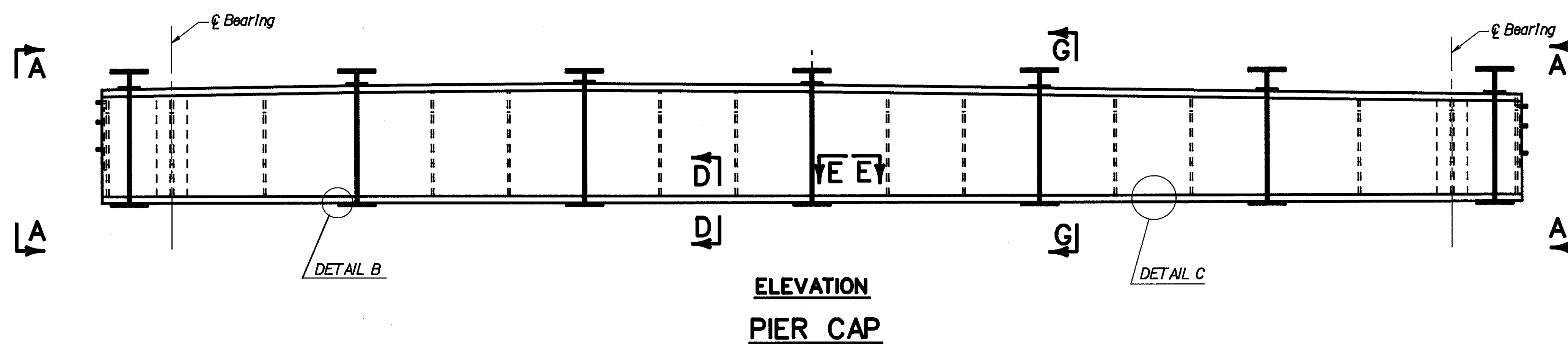
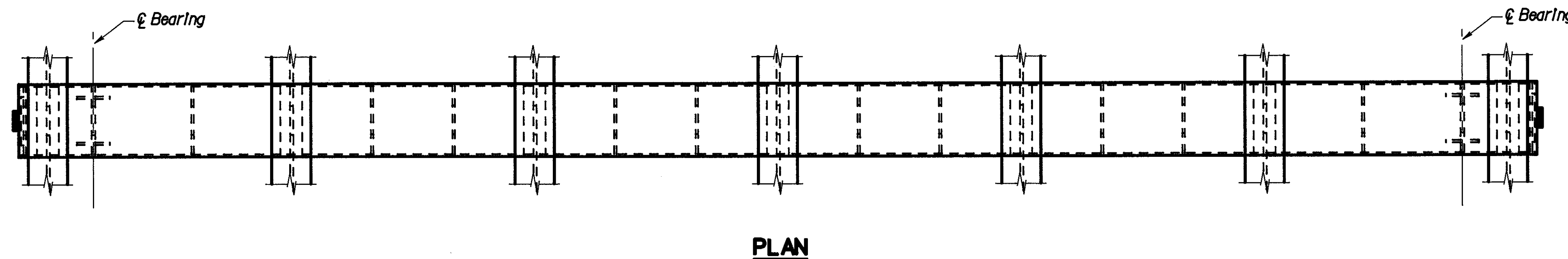
CARRYING GIRDERS
AT PIERS 3 & 4
BRIDGE NO. HAM-75-1056
NORTHBOUND I-75 OVER WEST FORK
OF MILL CREEK AND GALBRAITH ROAD
HAMILTON COUNTY STA. 135+07.08 to
STA. 140+14.08

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED	DATE	REVISED
RKS	GRH		RLS	JAD	7-23-64	

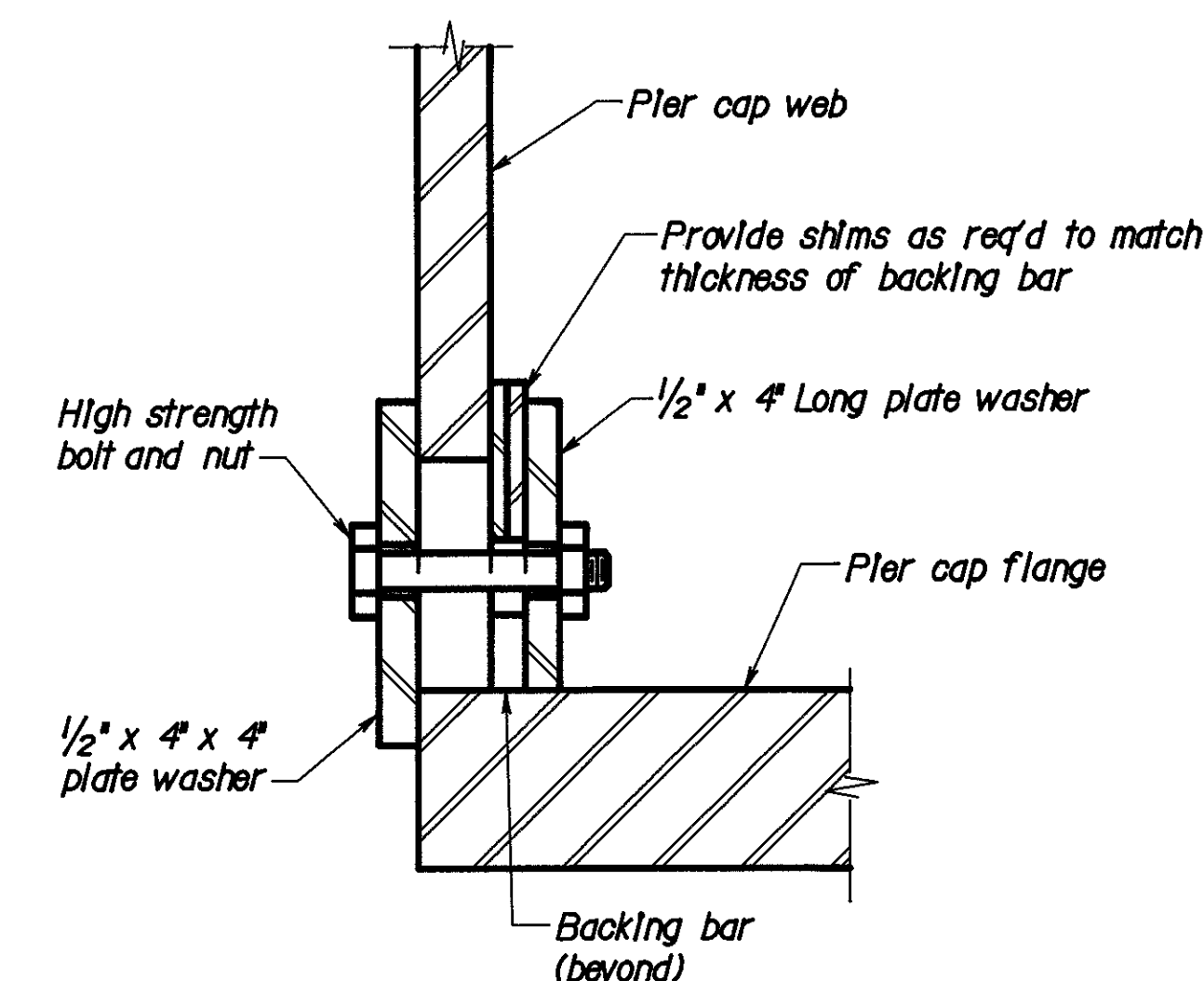
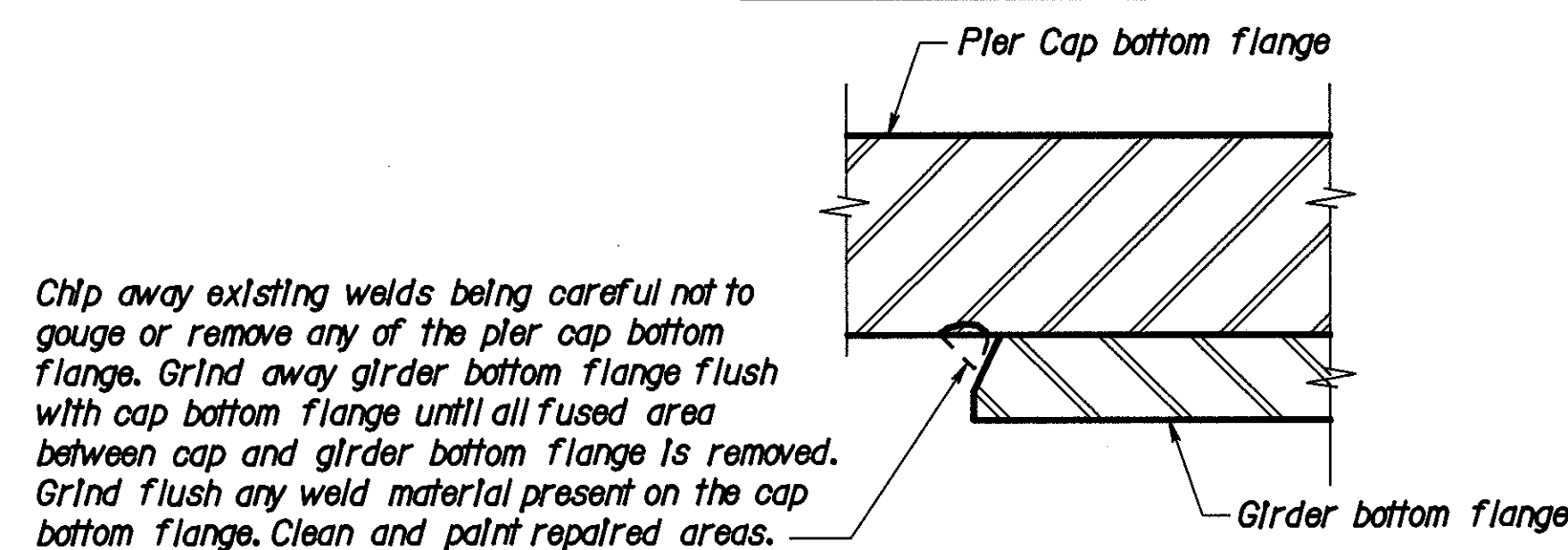
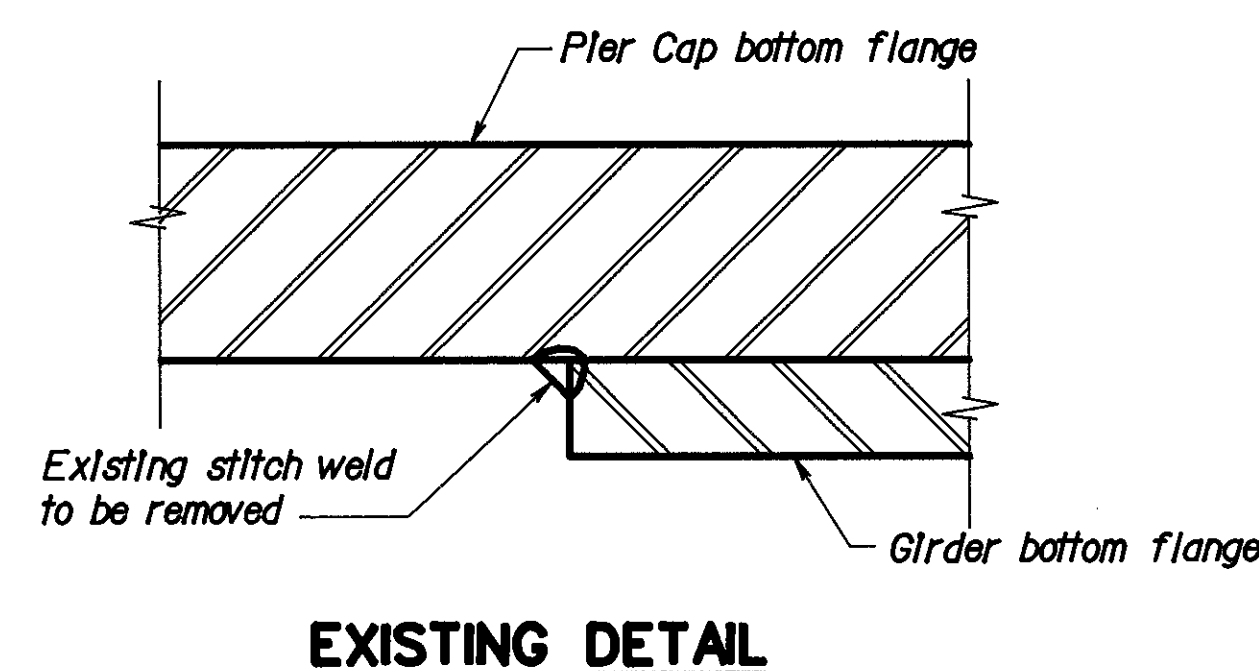
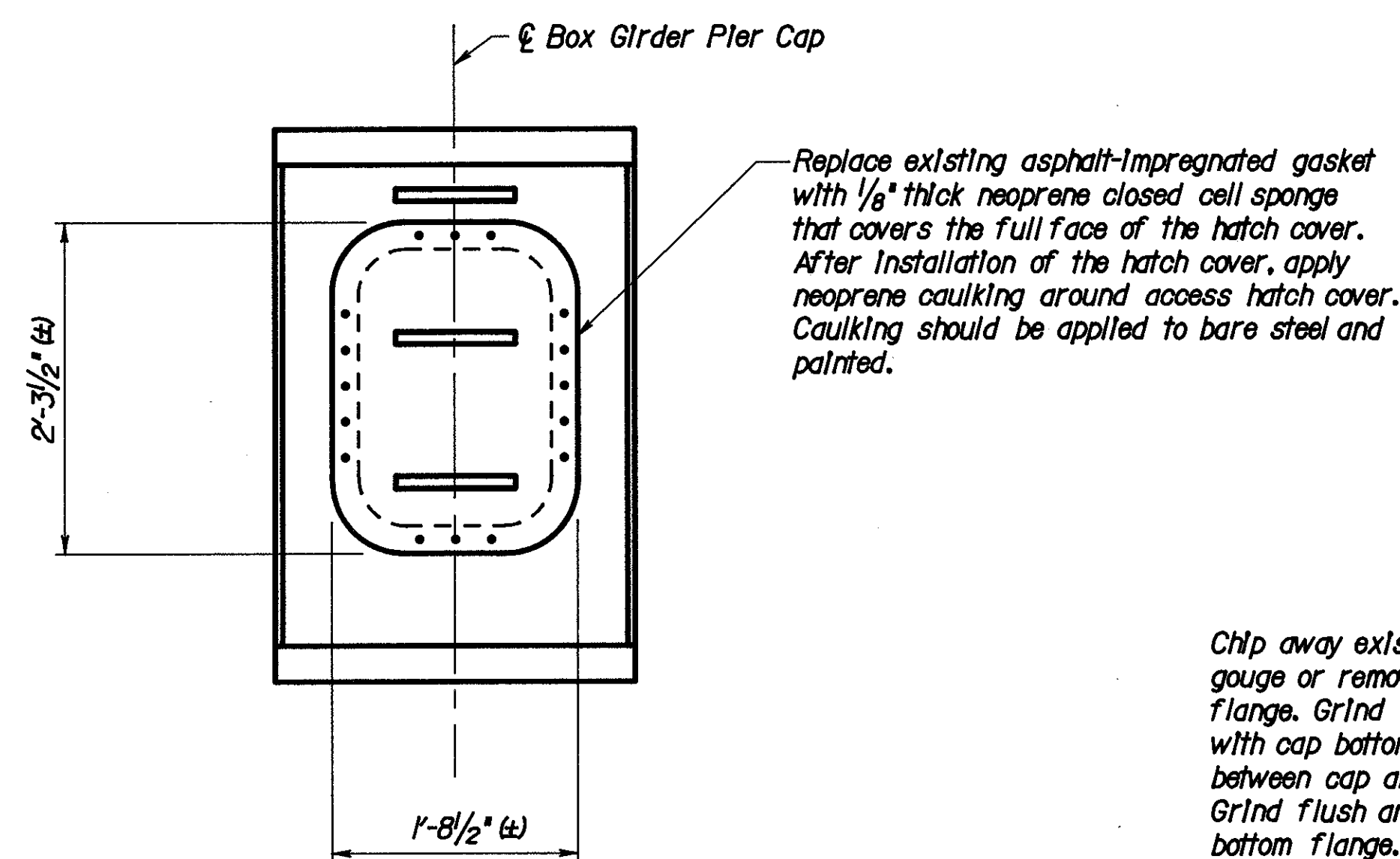
APPENDIX B

REHABILITATION PLANS

**HAMILTON COUNTY
HAM-75-9.75**



- PROCEDURE**
1. Drill $1\frac{1}{2}$ " 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.



NOTES

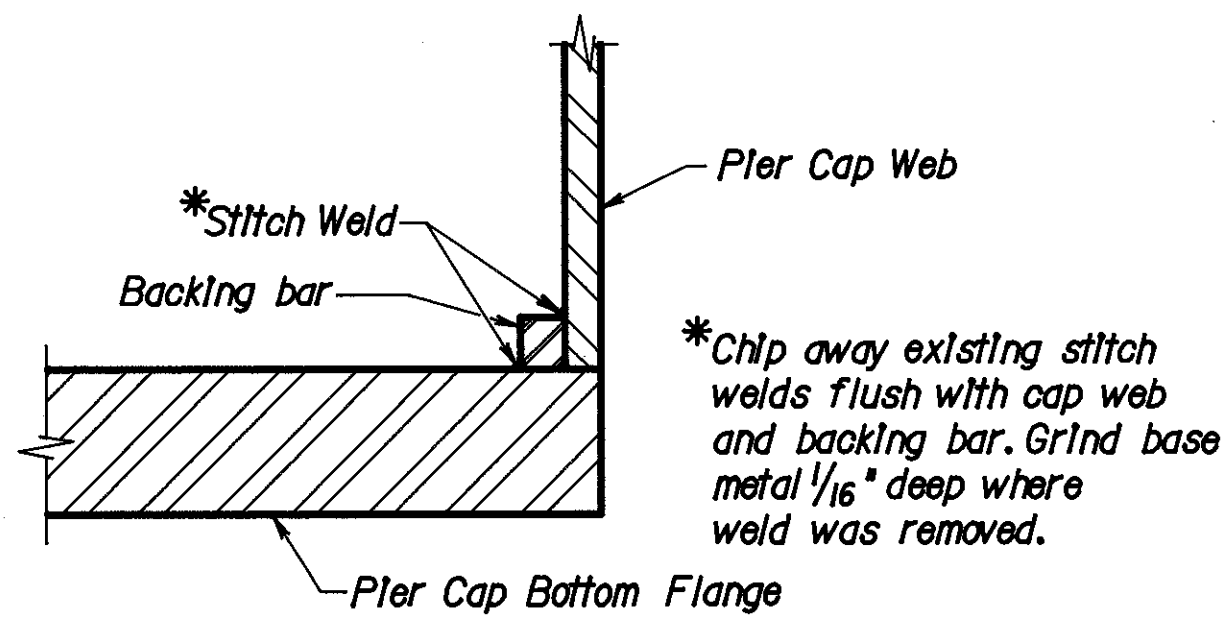
1. Remove all debris, bird droppings, and nesting material from top of pier caps and bottom flange of girders.
2. Grind scratches from collision damage on bottom flange of girders in vicinity of pier caps.
3. Remove soil and debris from inside of cap at pier No. 4. Open hatches to allow moisture to evaporate.
4. For Sections D-D, E-E and G-G, see sheet 28/105

LOCKWOOD, JONES & BEALS CONSULTING ENGINEERS DAYTON, OHIO				27/105
STEEL PIER CAP REPAIR DETAILS AT PIERS 3 & 4				
BRIDGE NO. HAM-75-1102R NORTHBOUND I-75 OVER WEST FORK OF MILL CREEK & GALBRAITH RD.				
DESIGNED B&N	CHECKED B&N	DRAWN M.J.Z.	CHECKED DFS	REVIEWED DATE HDJ 12/92
				REVISED

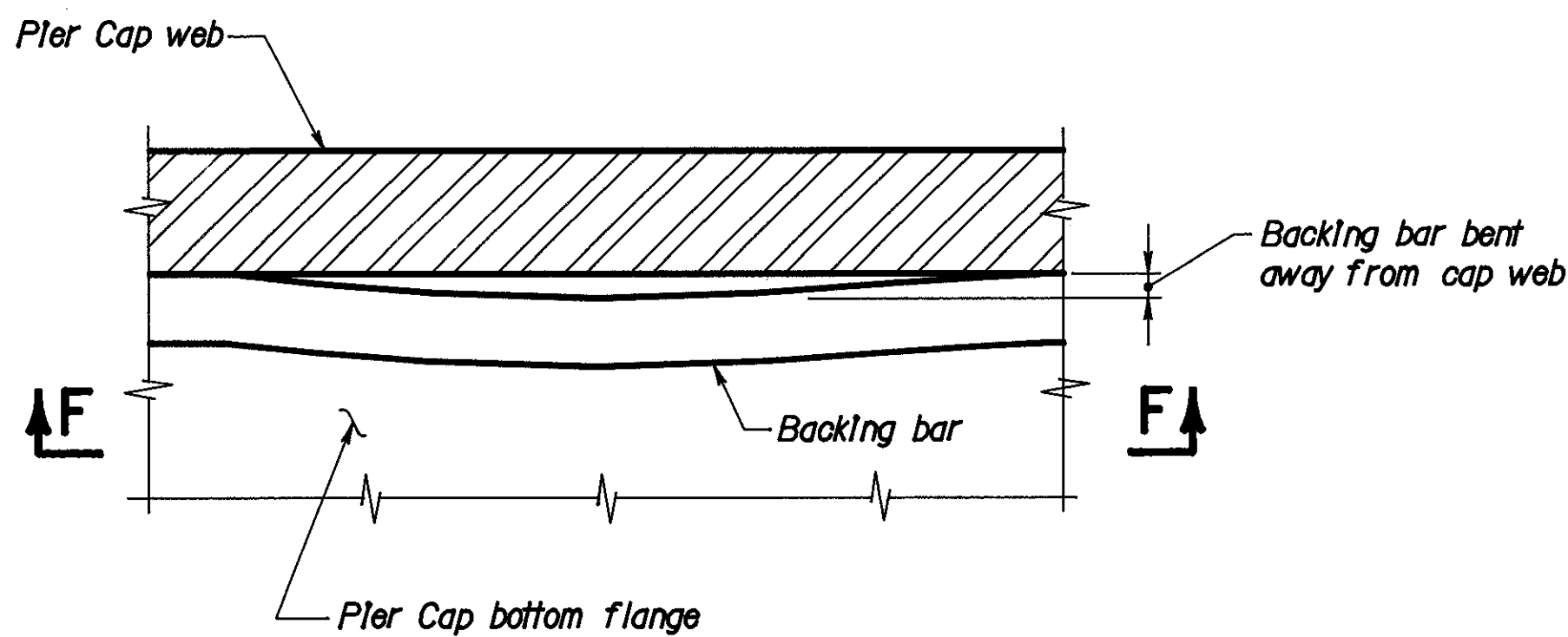
F.H.W.A. REGION	STATE	PROJECT	
5	OHIO		

261
338

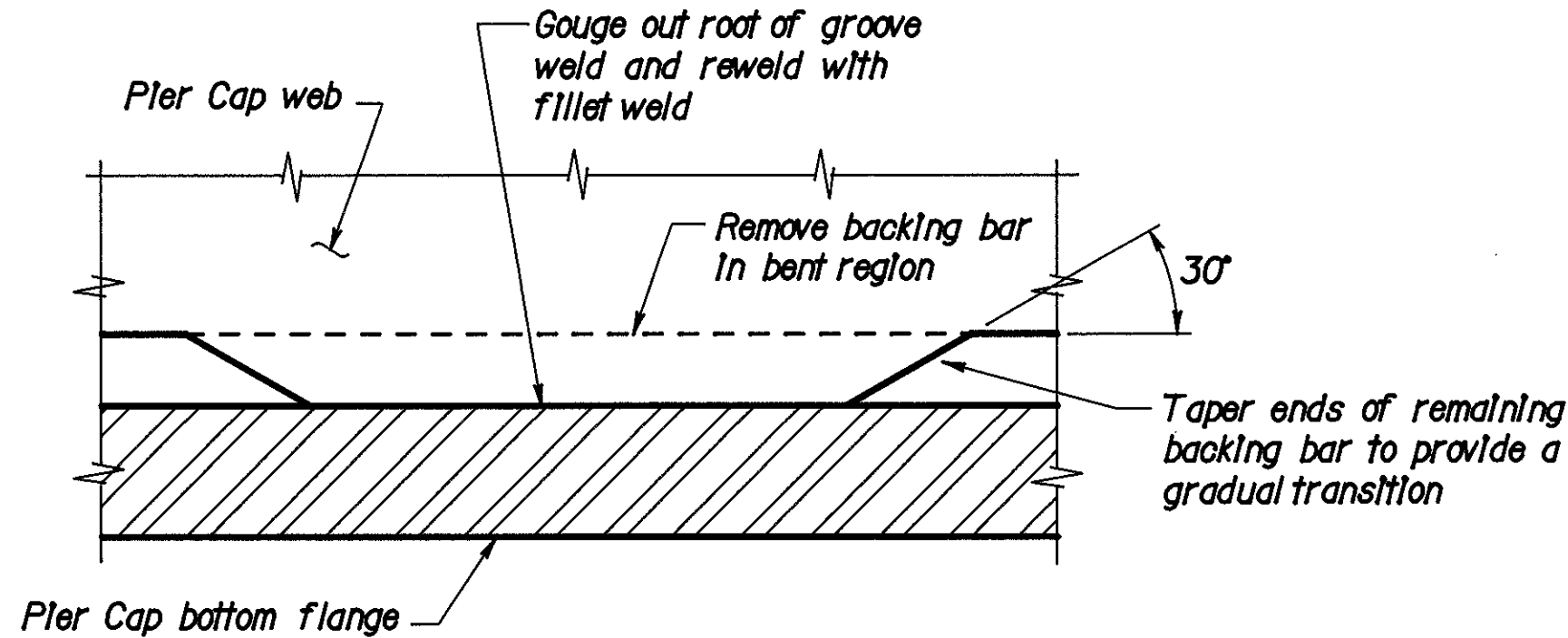
HAMILTON COUNTY
HAM-75-9.75



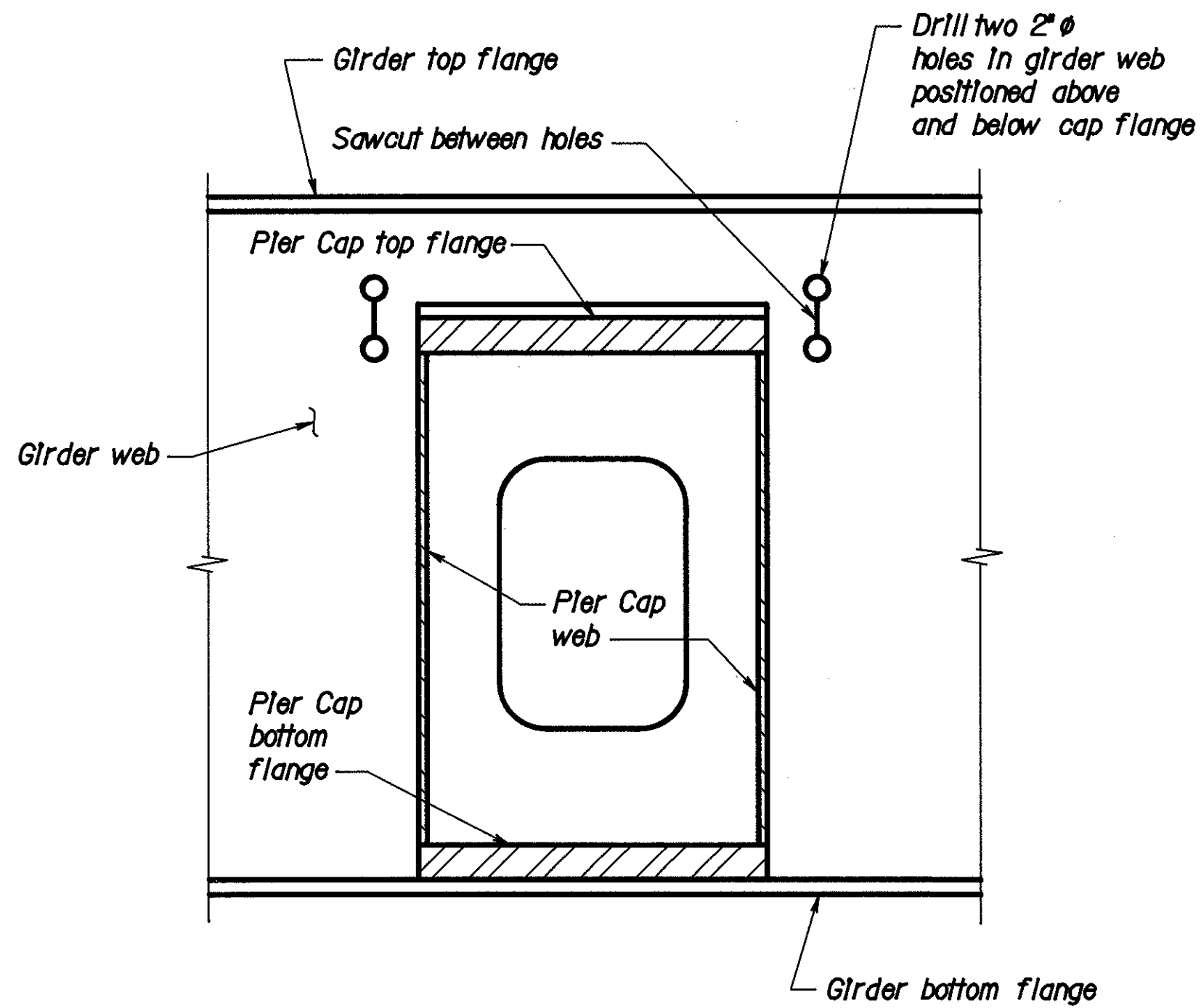
SECTION D-D



**EXISTING DETAIL
SECTION E-E**



**RETROFIT DETAIL
SECTION F-F**



SECTION G-G

TYPICAL AT ALL GIRDER TO
PIER CAP CONNECTIONS

LOCKWOOD, JONES & BEALS CONSULTING ENGINEERS DAYTON, OHIO					28/105
STEEL PIER CAP REPAIR DETAILS AT PIERS 3 & 4					
BRIDGE NO. HAM-75-1102R NORTHBOUND I-75 OVER WEST FORK OF MILL CREEK & GALBRAITH RD.					
DESIGNED B&N	CHECKED B&N	DRAWN MJZ	CHECKED DFS	REVIEWED DATE HDJ 12/92	REVISED



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