

NSTM Member Inspection Report

Submitted to:



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

HAM-50-1903L

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

SFN: 3102807, PID: 109781



October 31, 2025

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October 31, 2025

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Submitted by:



October 2025

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INTRODUCTION

Bridge Description

The HAM-50-1903L Bridge is a 14-span, welded steel plate girder structure with a reinforced concrete deck that carries westbound US 50 traffic over Mill Creek, CSX Transportation and the Central Railroad of Indiana railroad tracks (See Figure 1). The overall length of the bridge is 1,049.0'.

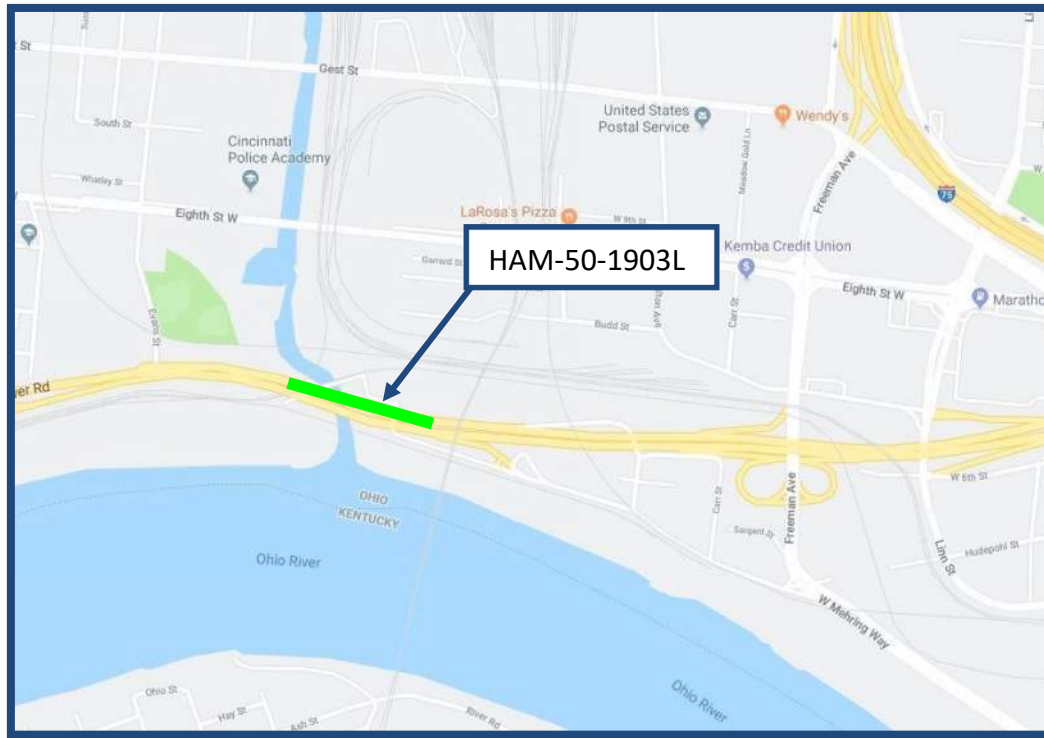


Figure 1: HAM-50-1903L Bridge Location Map

The structure has one NSTM pier cap located at Pier 5N. This cap spans over the Central Railroad of Indiana track (See Figure 2). Pier Cap 5N is a 67'-5" simply supported welded steel box beam. A 24" diameter water line passes through the cap at mid-span. The nomenclature and girder designations shown on the design plans were used in the NSTM member inspection of the pier cap. The bridge was rehabilitated in 2015 to widen US 50. Structural improvements, including fatigue retrofits, were performed on the pier cap in 1992 and 2013. The 1993 rehabilitation included 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.

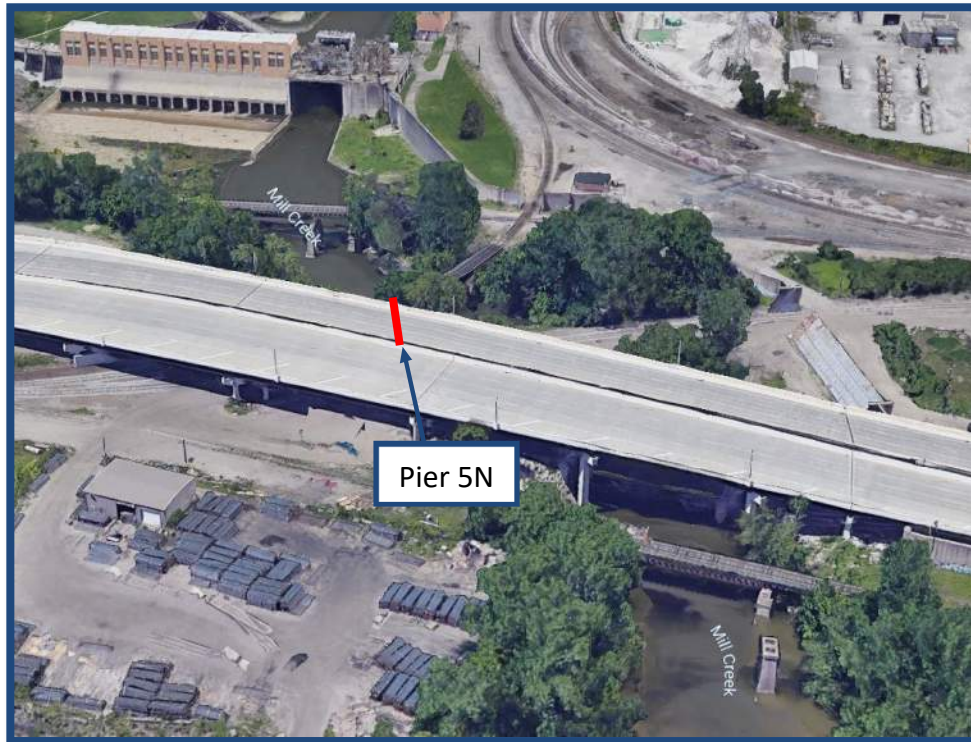


Figure 2: NSTM Pier Cap Location



Figure 3: Elevation of Pier Cap 5N

Inspection Access and Methods

Gannett Fleming, Inc. performed an NSTM inspection of Pier Cap 5N on September 26, 2025. A railroad flagger coordinated train traffic on the Central Railroad of Indiana tracks in the work zone to ensure safe operation around the rail lines. A 46' bucket truck was used to access the pier cap interior and perform the "arm's length" exterior inspection. The pier cap hatch cover was removed for the entry and replaced with an impact wrench and resealed with exterior grade silicone caulk after inspection.

OSHA confined space entry procedures were followed while inspectors were working inside the pier cap. 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 Kent, Jr., PE, CBI Team Leader
- Rob Parker, CBI Team Leader
- Brandon Brewster, EI 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, 2023.
3. Bridge Inspector's Reference Manual, U.S. Department of Transportation, 2022.
4. Inspection of Fracture Critical Bridge Members, U.S. Department of Transportation, 1986.
5. National Bridge Inspection Standards, U.S. Department of Transportation, 2022.

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 5N									
231		3	Steel Pier Cap	67	FT	55	8	4	
515		3	Steel Protective Coating	2,943	SQ FT	1,404	1,407	126	6
Substructure									
PIER 5N									
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 5N

The steel pier cap is in Satisfactory Condition [6]. There were no significant changes observed during the 2025 inspection. The pier cap is a built-up steel plate section 6'-6" in height and 4'-0" in width. The bridge girders are attached to the pier cap via bolted tie plates connected to the flanges of both members and bolted angles on the webs. The pier cap was retrofitted in 1992 and 2013 (Photo 1).

Pier Cap 5N Interior

Both access hatches appear to be well sealed. There is evidence of leakage through the bolted connection on the top flange of the pier cap at Girders 1 and 6 (Photo 2), suggesting that there may be cracking in the concrete deck above the pier cap. The paint system of the pier cap interior is in good condition with several areas of light surface corrosion (Photo 3).

During the rehabilitation project, a bolted sleeve was added to holes that were previously cut into the web plates to allow installation of a 24" water main through the pier cap. Some of the bolts that connect the conduit sleeves to the web plates were cut through the fillet welds of the longitudinal web stiffeners surrounding the conduit holes (Photo 4). The remains of the fillet welds around the bolt holes are thin and vulnerable to crack initiation. During the inspection no signs of distress were found in the welds.

The fillet welds of the transverse and longitudinal web stiffeners surrounding the water main porthole intersect in tension zones of the web plates (Photo 5).

The horizontal stiffeners below the Girder 6 diaphragm portal are both bent downward slightly (Photo 6). There are two tack welds measuring 1-1/2" and 2-1/2" on the top flange of the pier cap at the north side of Girder 1 (Photo 7). There are several locations of un-welded butt joints between the bottom flange backer bar sections (Photo 8).



Photo 1: Typical stiffener retrofit



Photo 2: Evidence of leakage through the top flange at Girder 6



Photo 3: Surface corrosion on the north end of the Pier Cap bottom flange



Photo 4: Thin welds at the water main bolted connection with the Pier Cap web



Photo 7: Two tack welds on the top flange north of Girder 1



Photo 5: Triaxial weld between the transverse and longitudinal stiffeners at the water main



Photo 8: Un-welded butt joint between backer bar sections on the east web between Girder 4 and Girder 5



Photo 6: Bends in both horizontal stiffeners at the Girder 6 diaphragm

Pier Cap 5N Exterior

The paint system of the pier cap exterior is in good condition with corrosion present at the south end of the cap and corrosion initiating at several isolated locations. Heavy bird debris at the girder intersections with the pier cap is a typical condition (Photo 9).

There is moderate surface corrosion on both the pier cap flange plates and web plates at the south end of the pier cap (Photo 10). There is also minor surface corrosion initiating at the edge of the bridge deck on the south end of the top flange of the pier cap (Photo 11). Pack rust was observed between the Girder 6 bottom flange tie plate and both the pier cap filler plate and girder bottom flange (Photo 12). There is also pack rust beginning to impact the bottom flange of the pier cap at the east web on the north side of Girder 1.

In the 2013 rehabilitation project, tack welds were removed from the bottom flange and girder bottom flange tie plates. Three tack welds measuring between 1-3/4" and 2-3/4" remain on the west side of the bottom flange between Girders 2 and 3 (Photo 13).

The bearings for the steel pier cap are in good condition. The bearing devices for Pier Cap 5N consist of curved plate bearings. Both the south and north pier cap bearings display minor surface corrosion, especially on the lower portion of the masonry plate (Photo 14) and pack rust around the anchor bolts (Photo 15).



Photo 9: Typical bird debris buildup at the Girder connections with the Pier Cap



Photo 10: Surface corrosion on the south end of the Pier Cap



Photo 11: Minor corrosion on the south end of top flange at the bridge deck edge



Photo 13: Tack welds on the west side of the bottom flange of the Pier Cap at Girder 2



Photo 12: Pack rust at the west web of the Pier Cap at the Girder 6 connection



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



Photo 15: Surface corrosion and pack rust on the anchor bolts of the south bearing

Pier Cap 5N Fatigue Prone Details

Fatigue Prone Detail 1

Fillet welds between transverse stiffeners and web plates. Category: C

Location: All transverse web stiffeners.

Fatigue Prone Detail 2

Full penetration groove weld of flange splice.

Category: B

Location: Two bottom flange splices.

Fatigue Prone Detail 3

Tack welds, less than 2", on flange plate.

Category: C

Location: Two tack welds on exterior of bottom flange at Girder 2.

Fatigue Prone Detail 4

Tack welds, greater than, or equal to, 2" and less than, or equal to, 4". Category: C

Location: One 2 1/2" tack weld on exterior of bottom flange at Girder 2.

Fatigue Prone Detail 8

Intersection of fillet welds.

Category: E

Location: Fillet welds of web plates and longitudinal stiffeners intersecting fillet welds of web plates and transverse stiffeners around the water main portholes between Girders 3 and 4.

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 joints between sections of bottom flange backer bars along both webs (5 total).

Fatigue Prone Detail 11

Fillet welds between longitudinal stiffeners and web plates. Category: B

Location: Longitudinal web stiffeners around the water main portholes between Girders 3 and 4.

Fatigue Prone Detail 13

Weld intersection removal holes in web plates.

Category: C

Location: Bottom of web plates at all transverse stiffeners.

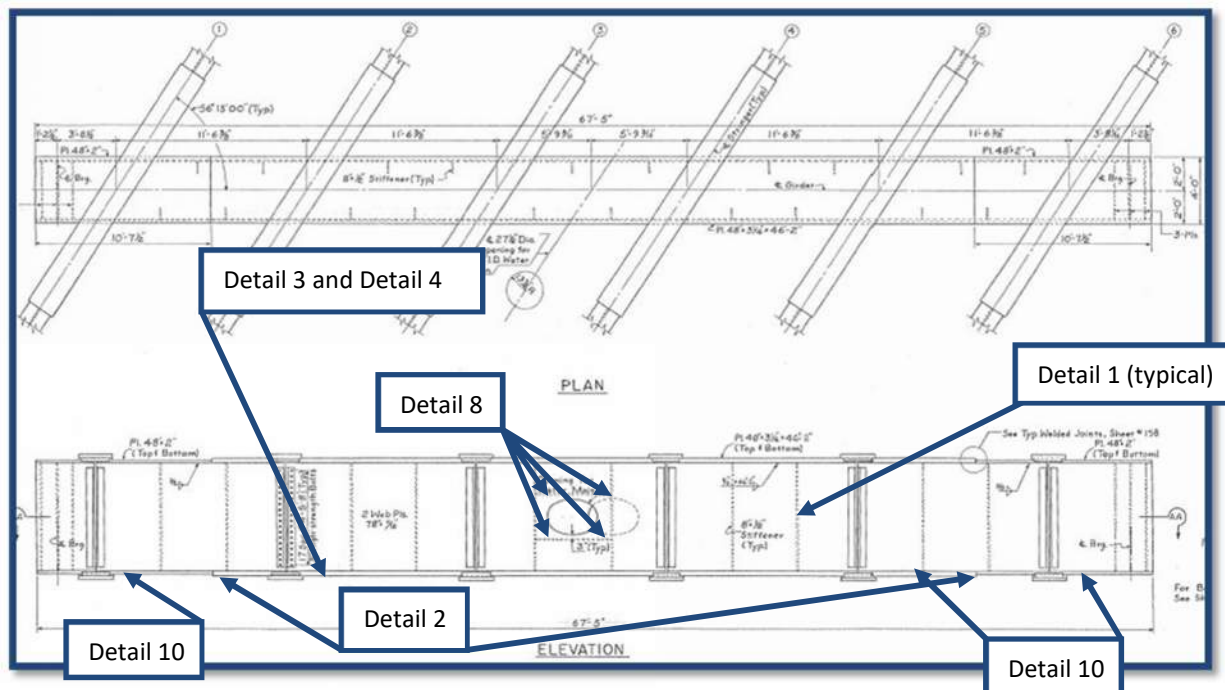


Figure 4: Plan and elevation of Pier Cap 5N

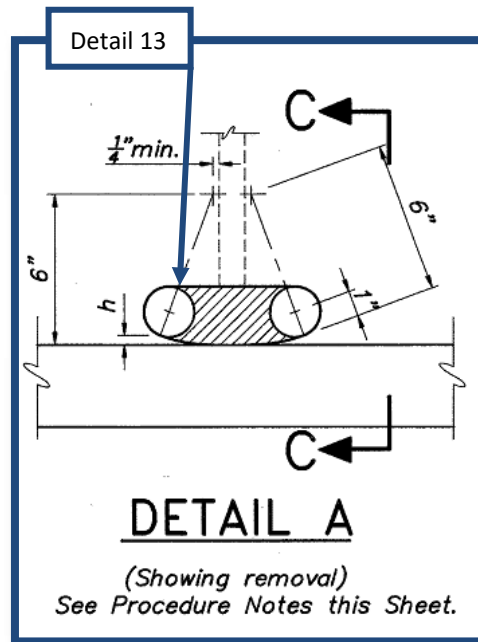


Figure 5: Weld intersection retrofit.

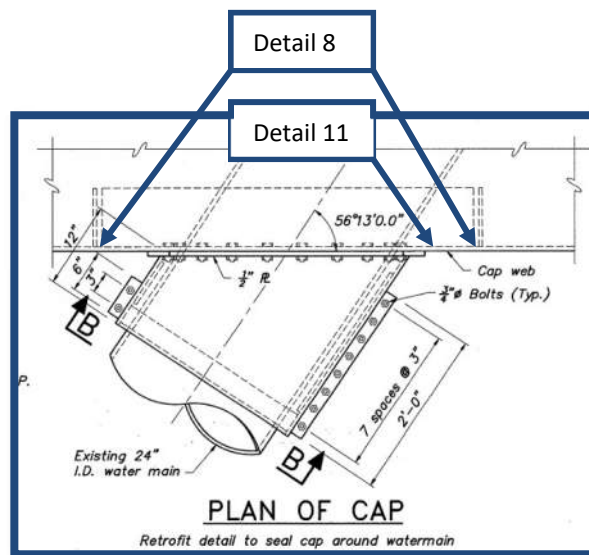


Figure 6: Water main portal detail.

CONCLUSIONS AND RECOMMENDATIONS

Based on the inspection, the NSTM pier cap of Bridge No. HAM-50-1903L 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)

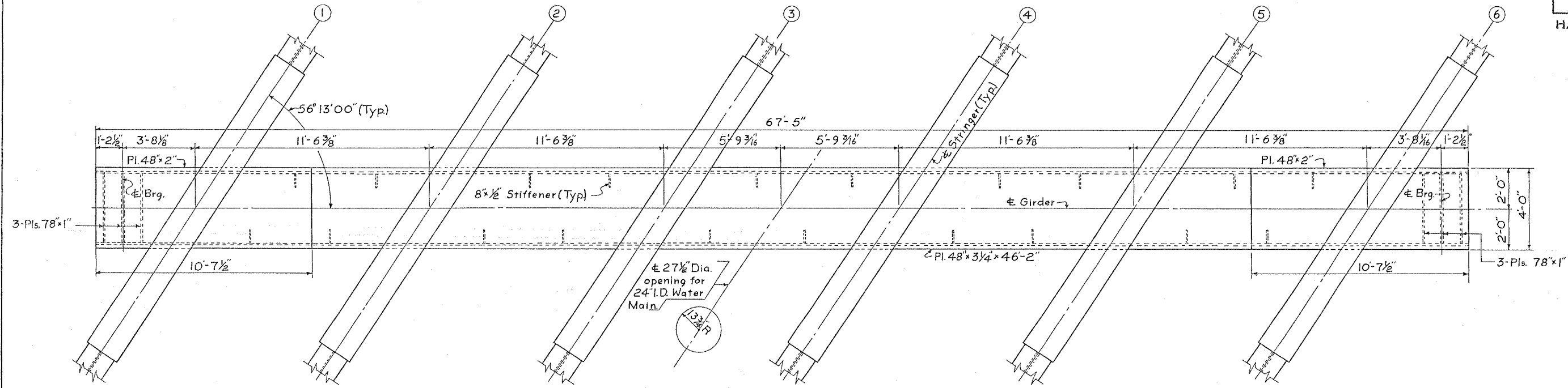
Regular field observations of deficiencies which are not currently in need of repair but will require corrective action if deterioration continues.

Pier Cap 5N – Recommendations:

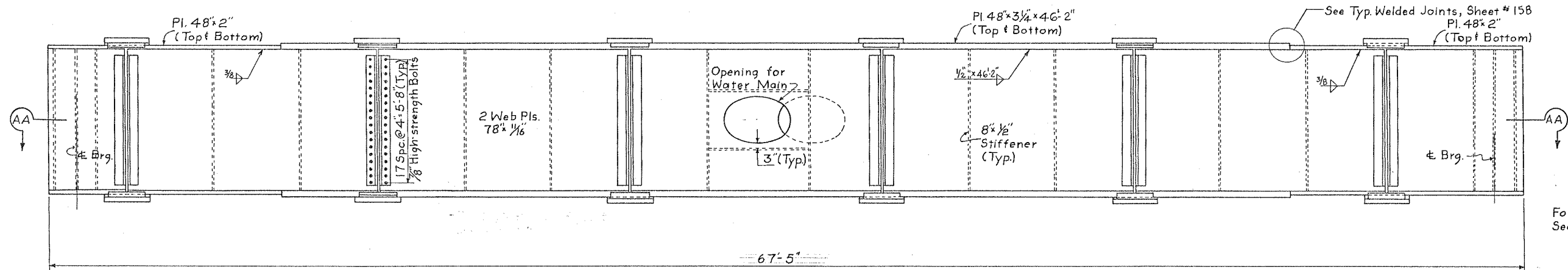
Priority Repairs:	None
Rehabilitation/Evaluation:	None
Maintenance:	Remove the tack welds on the exterior of the bottom flange at Girder 2.
Monitoring:	Continue to monitor fatigue prone details at a 24-month cycle.

APPENDIX A

EXISTING PIER PLANS



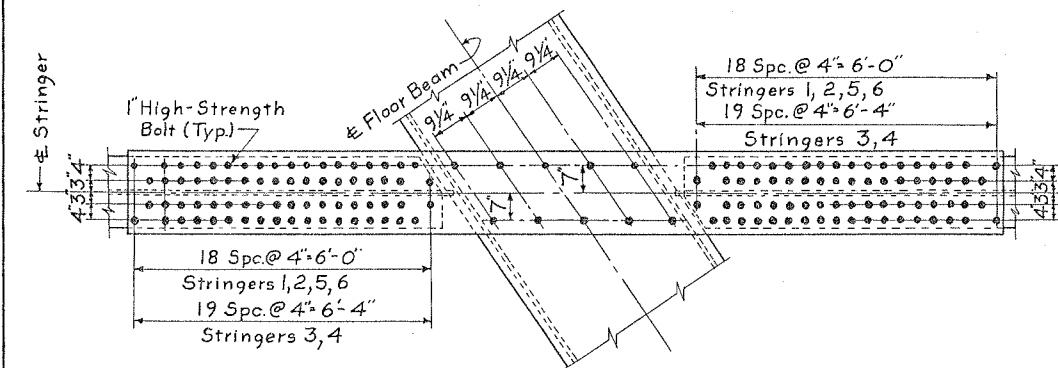
PLAN



ELEVATION

For Section AA-AA See Sh. #152

For Bearing Detail
See Sheet #160



PLAN OF TIE PLATE

(Showing Bolt Spacing - Typ. Top & Bot. Pls.)

Intermediate Stiffeners (8 x 1/2) Welding Sequence

- (1) Use a stiffener that does not fit too tightly (Say D-1/16)
- (2) Push tight against tension flange (No welding)
- (3) Weld to web. Use $\frac{1}{4}$
- (4) Weld to compression flange only. Use $\frac{5}{16}$

Work this sheet with Sh. #152

HAZELET & ERDAL
CONSULTING ENGINEERS
CINCINNATI, OHIO

STRUCTURAL STEEL DETAILS

UNIT 4

BRIDGE NO. HAM-50-1938 R.&L.

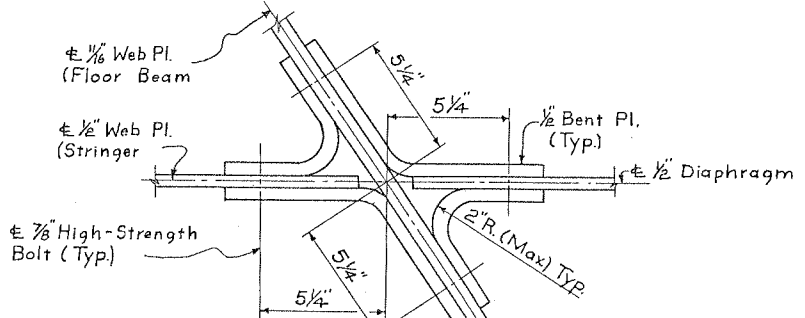
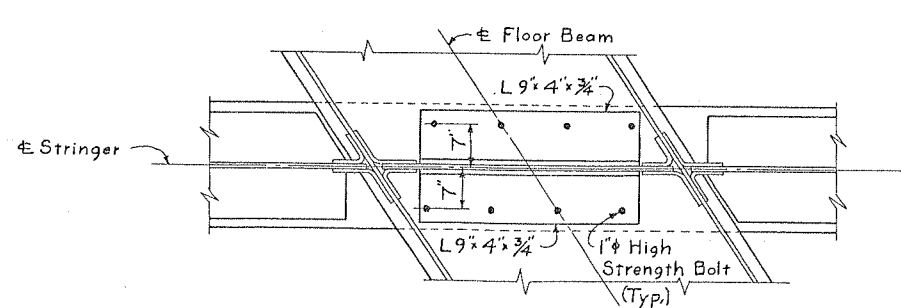
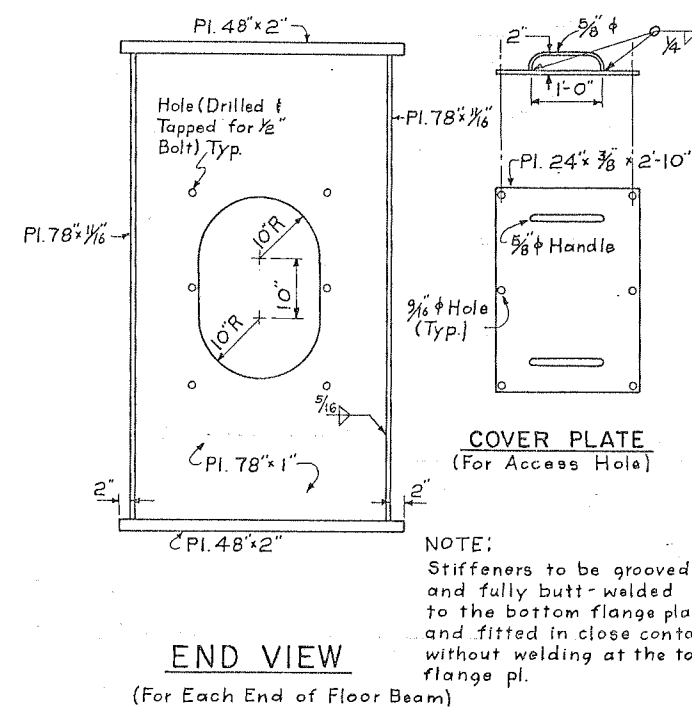
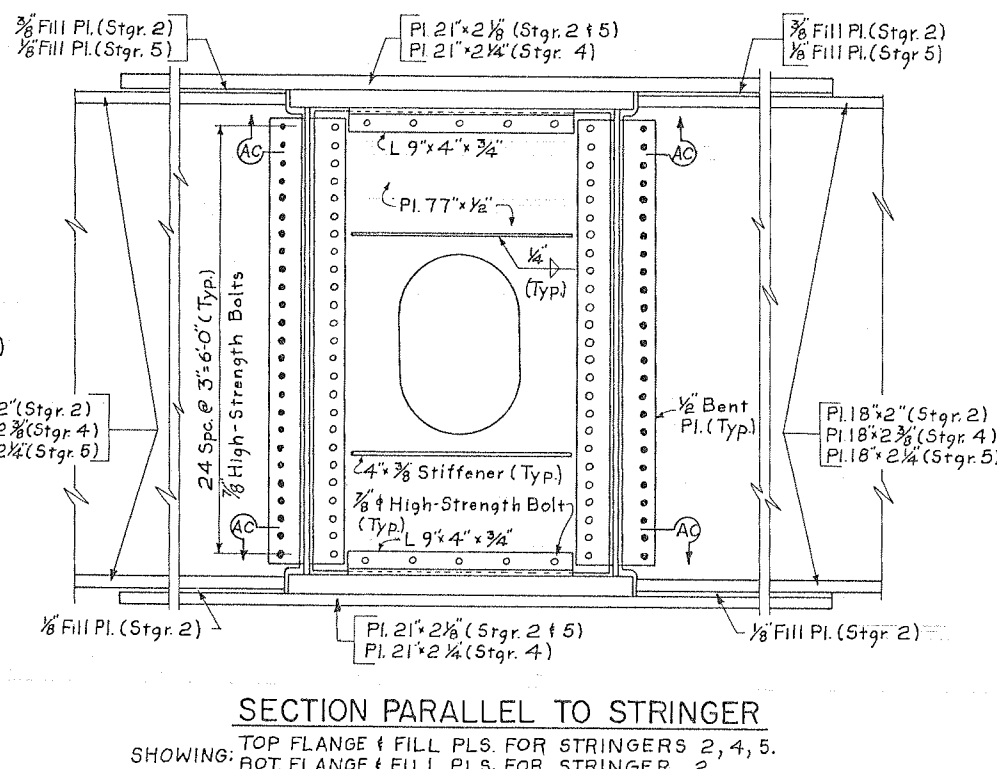
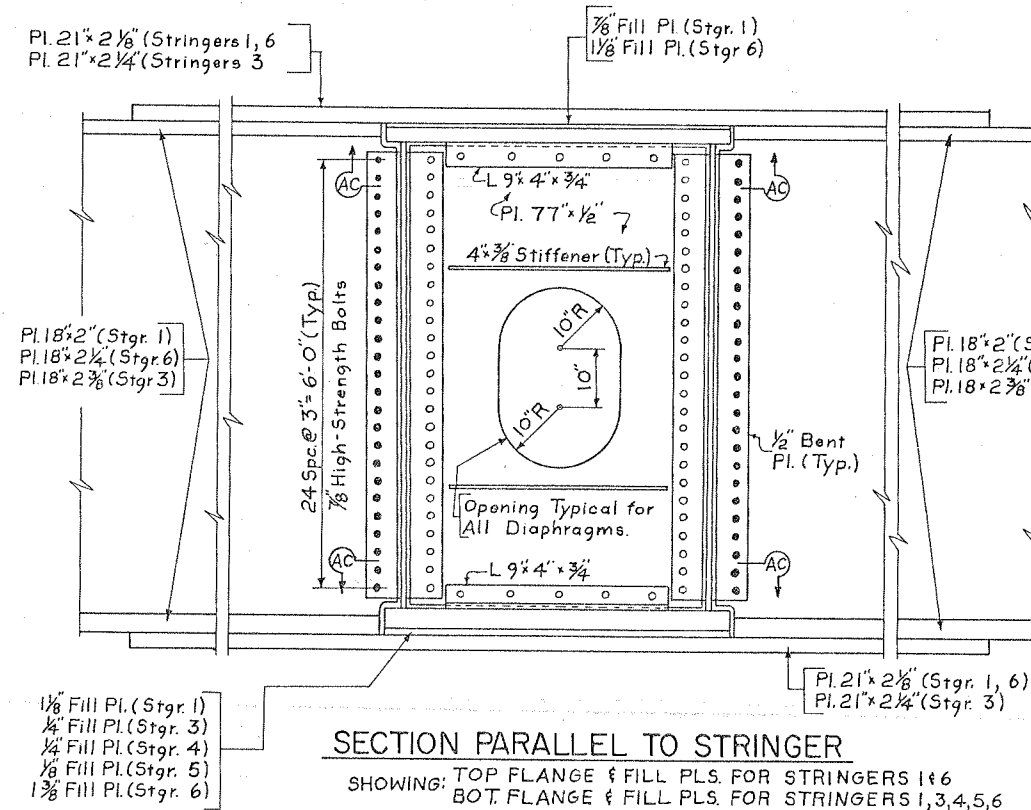
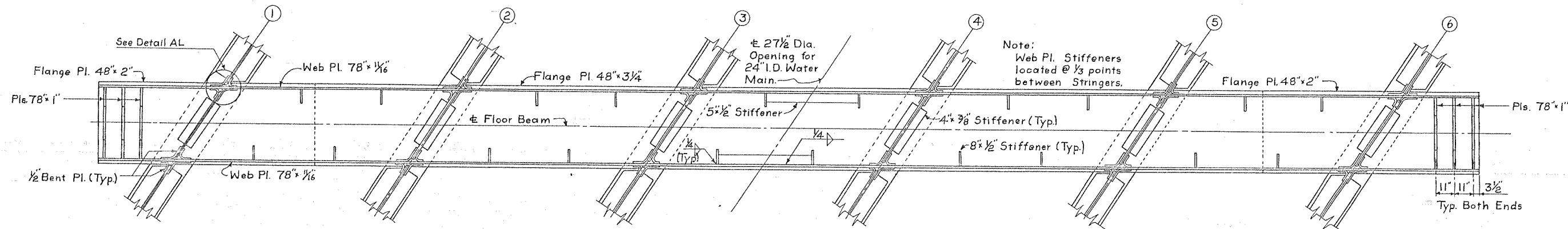
H.&E. BRIDGE NO. 1

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVIEWED

RECORDED

JAN 15 1965

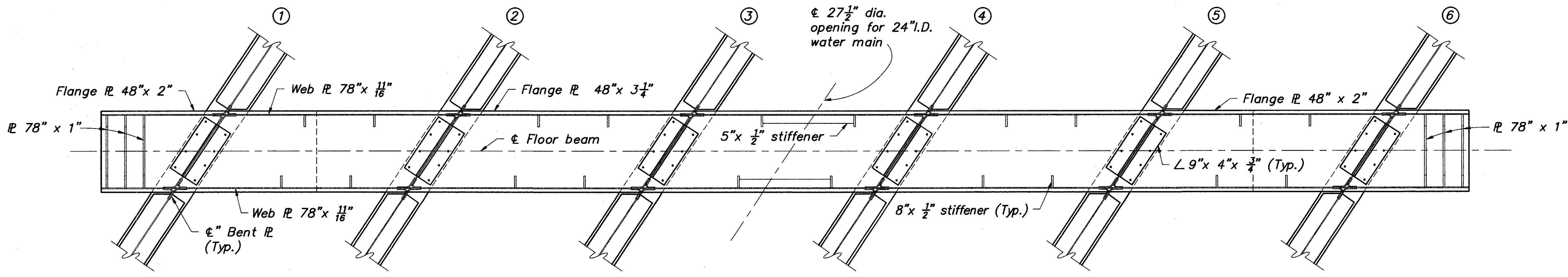
HAM-50-19.38



Work this sheet with sheet No. 151

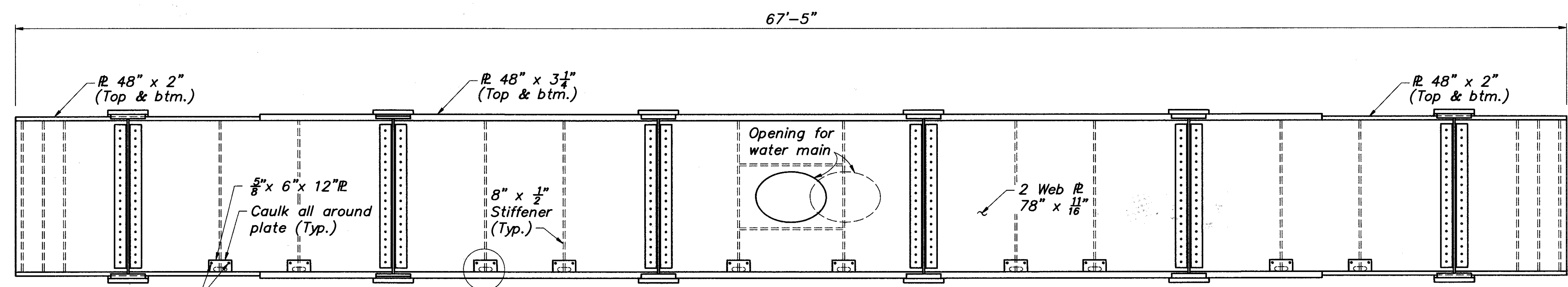
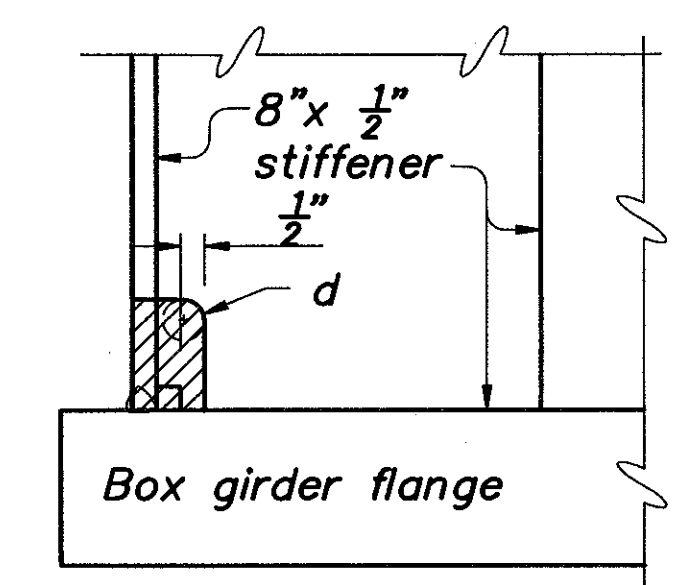
APPENDIX B

REHABILITATION PLANS



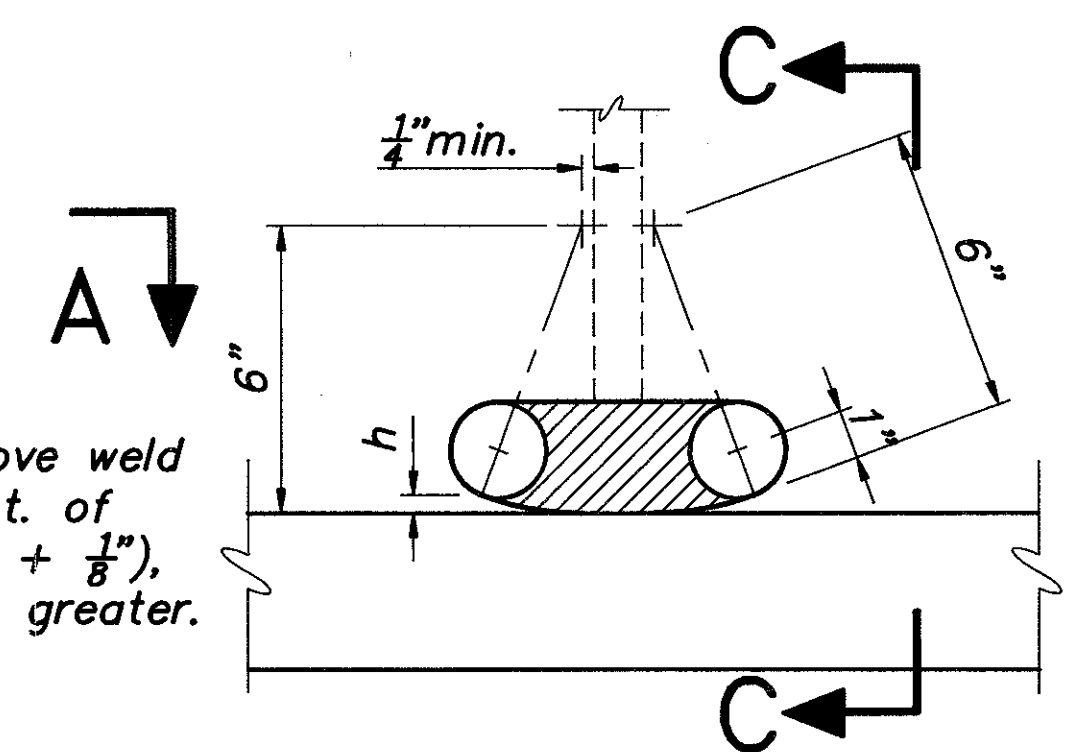
SECTION A-A

$d = \text{diameter of hole} = \frac{3}{8}'' + \text{width of backing bar.}$



ELEVATION

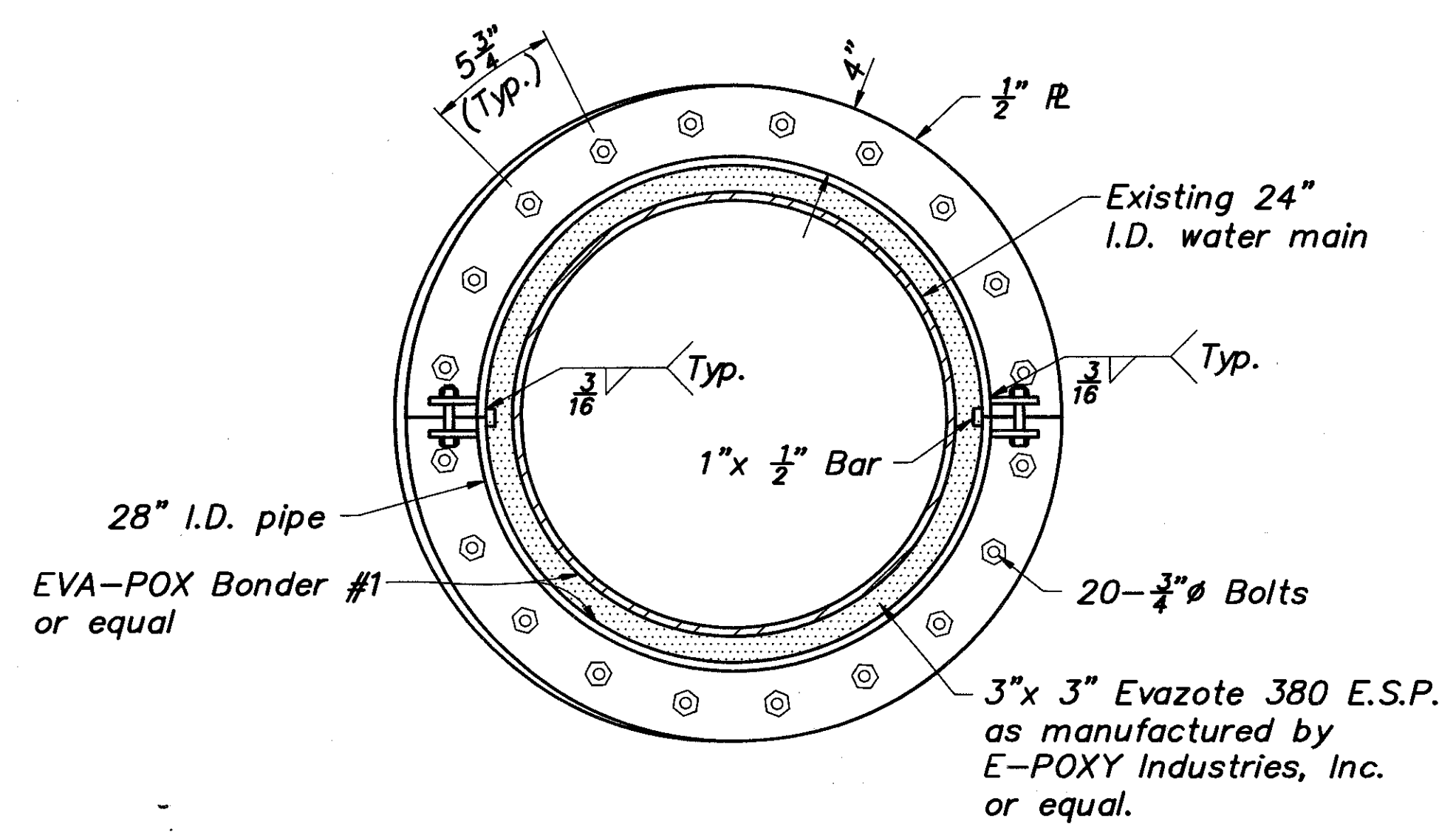
SECTION C-C



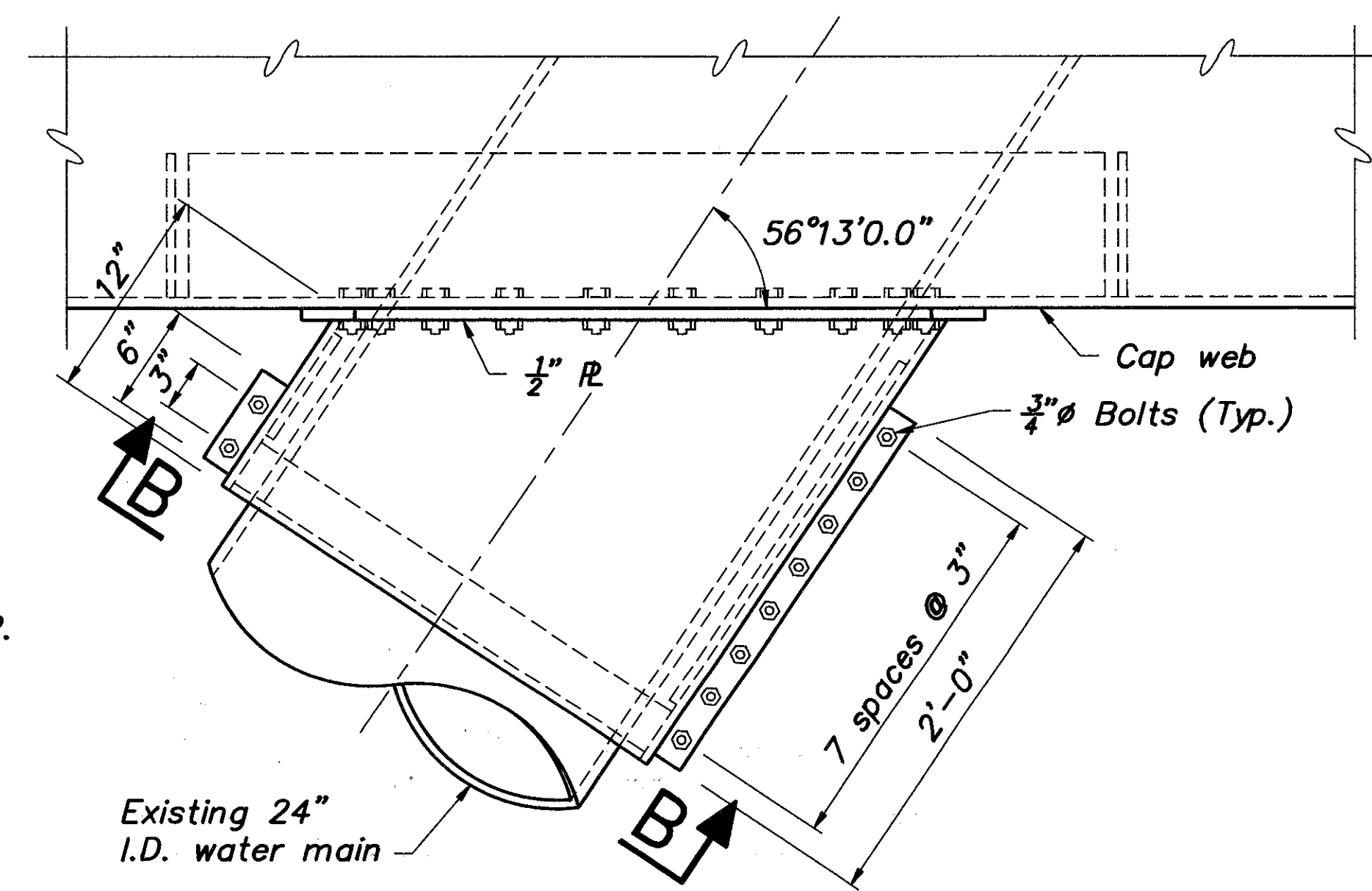
$h = (\text{ht. of groove weld} + \frac{1}{8}'')$ or $(\text{ht. of backing bar} + \frac{1}{8}'')$, whichever is greater.

DETAIL A

(Showing removal)
See Procedure Notes this Sheet.



SECTION B-B



PLAN OF CAP

Retrofit detail to seal cap around watermain

PROCEDURE

1. Drill hole in stiffener.
2. Drill twin 2" holes through web and backing bar.
3. Remove crosshatched areas by grinding. Preliminary removals may be by other methods as approved by the Engineer, provided NO DAMAGE is done to the metal which is to remain. Grinding shall be used to make all surfaces smooth and according to plan contours.
4. Perform magnetic particle and/or dye penetrant tests of the remaining metal in the presence of the Engineer.

NOTES:
1. See sheet 14/30 for description of required work.

BALKE ENGINEERS 13/30 1848 SUMMIT ROAD CINCINNATI, OHIO 45237					
PIER 5N DETAILS BRIDGE NO. HAM-50-1936 R & L SIXTH STREET EXPRESSWAY OVER RR AND MILL CREEK					
DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISION
MRS	ALH	~	DWI	CRS 4/92	

SCOPE OF WORK:

The following work is required at the box girder floorbeam at Pier 5N.

1. Remove bird droppings & nests from bottom flanges of girders.
2. Remove bird & wasp nests & trash from interior of box girder.
3. Retrofit backing bars at stiffeners inside box girder as noted on plans.
4. Excess weld material is present on underside of bottom flange near girder #5. Grind excess material flush with bottom flange.
5. Clean & prime corroded and repaired areas on the interior of the box girder. Apply final coat of paint to entire inside of box girder. Final coat to be silver or white in color. Cleaning & painting to be per System EEU.
6. Seal opening around water main. See Sheet 13/30 for details.
7. Provide 1/8" neoprene gasket for each access hatch cover. Gasket to be same dimensions as cover. Provide additional bolts as indicated.

All labor, material, & equipment necessary to execute items 1 thru 7 shall be included for payment in the unit price bid for Item 513, Structural steel, misc.: repair fracture critical box girder pier cap.

8. Replace the bottom splice plates connecting the longitudinal girders.

All labor, material, & equipment necessary to execute item 8 shall be included for payment in the unit price bid for Item 513, Structural steel, misc.: splice plate replacement.

9. Remove stitch welds along backing bars as noted with the following restrictions: Stitch welds 2" or less in length shall not be removed; stitch welds from 2" to 4" in length shall not be removed between girders 1 & 2 and 5 & 6. After stitch welds have been removed, the web-to-flange groove weld adjacent to removal areas shall be examined by the use of dye penetrant or magnetic particle testing to check for damage. The Engineer shall approve the welds to be removed.

All labor, material, & equipment necessary to execute item 9 shall be included for payment in the unit price bid for Item 513, Structural steel, misc.: removal of backing bar stitch weld including NDT.

NOTES:

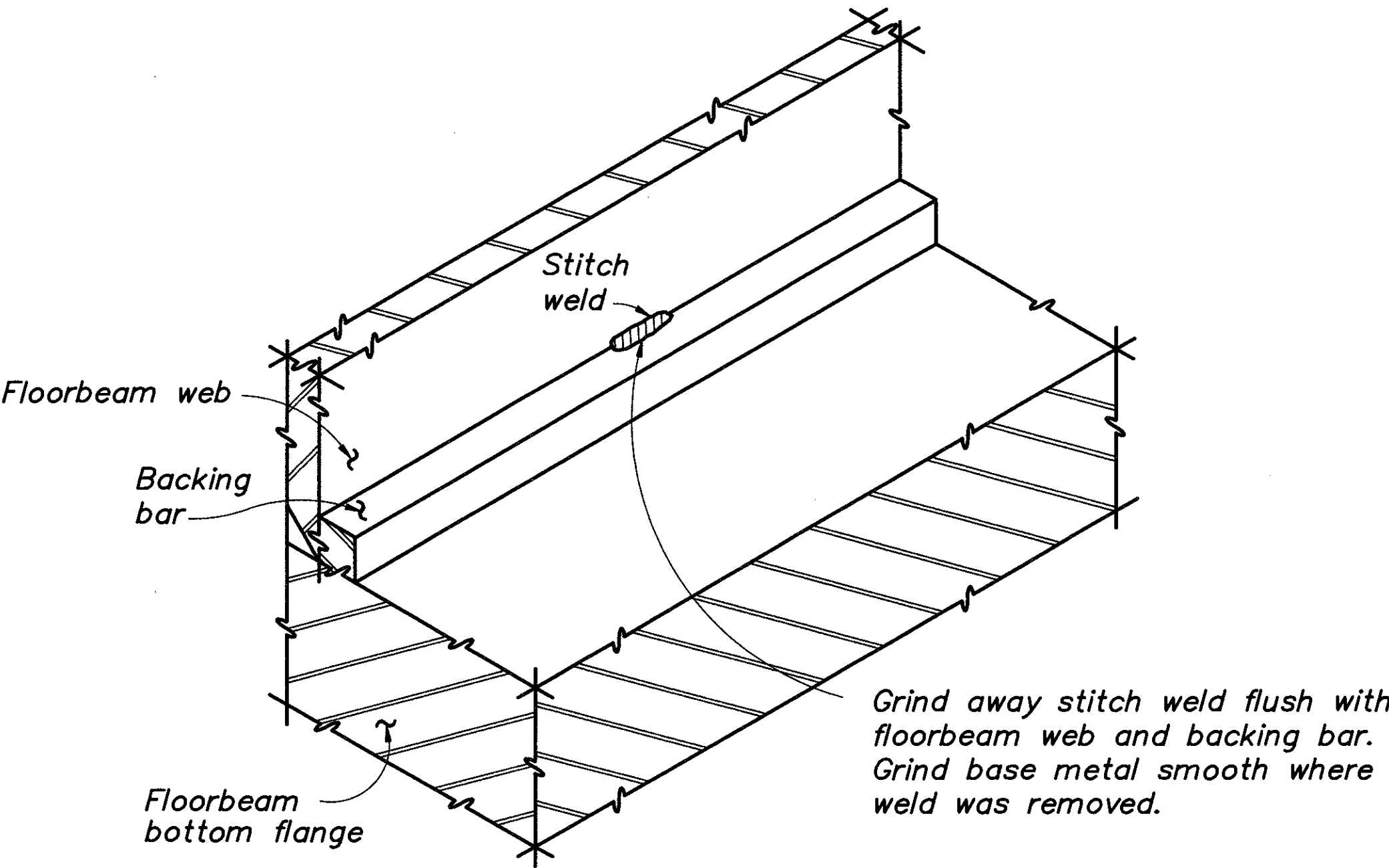
The box girder pier cap is a fracture critical member and as such, requires high quality work be performed in a careful manner which will not damage the member.

SPLICE PLATE REPLACEMENT:

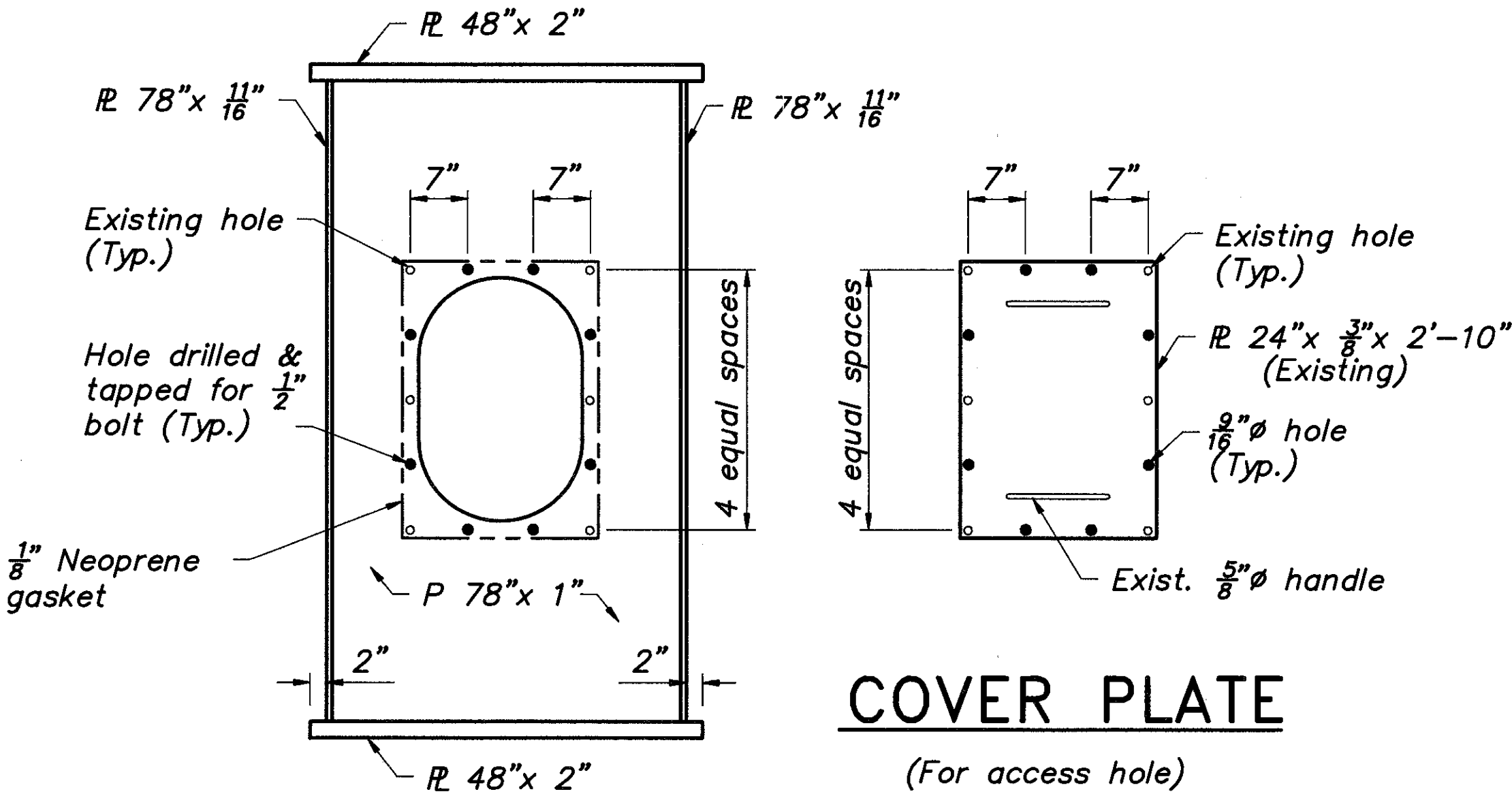
Suggested procedure is as follows:

- a. Shore girders on each side of the box girder pier cap to relieve dead load.
- b. Remove the bottom splice plate and, where present, the fill plate from the bottom flange of the box girder pier cap by removing the bolts and chipping through the welds. Care shall be taken not to gouge or remove any portion of the flange of the box girder.
- c. Remove the splice plate and fill plates from the bottom flange of the longitudinal girders.
- d. Grind flush remaining weld material on bottom flange of box girder.
- e. Reassemble new splice plates and fill plates to the girders and box girder with new 1" dia. ASTM A325 bolts and nuts.
- f. Clean and paint repaired areas per OZEU except that faying surfaces shall be coated with primer only.
- g. Tighten all existing bolts in web connection angles to proper torque.

The Contractor shall submit his shoring plan to the Engineer for approval. Alternate construction methods may be submitted by the Contractor for approval.

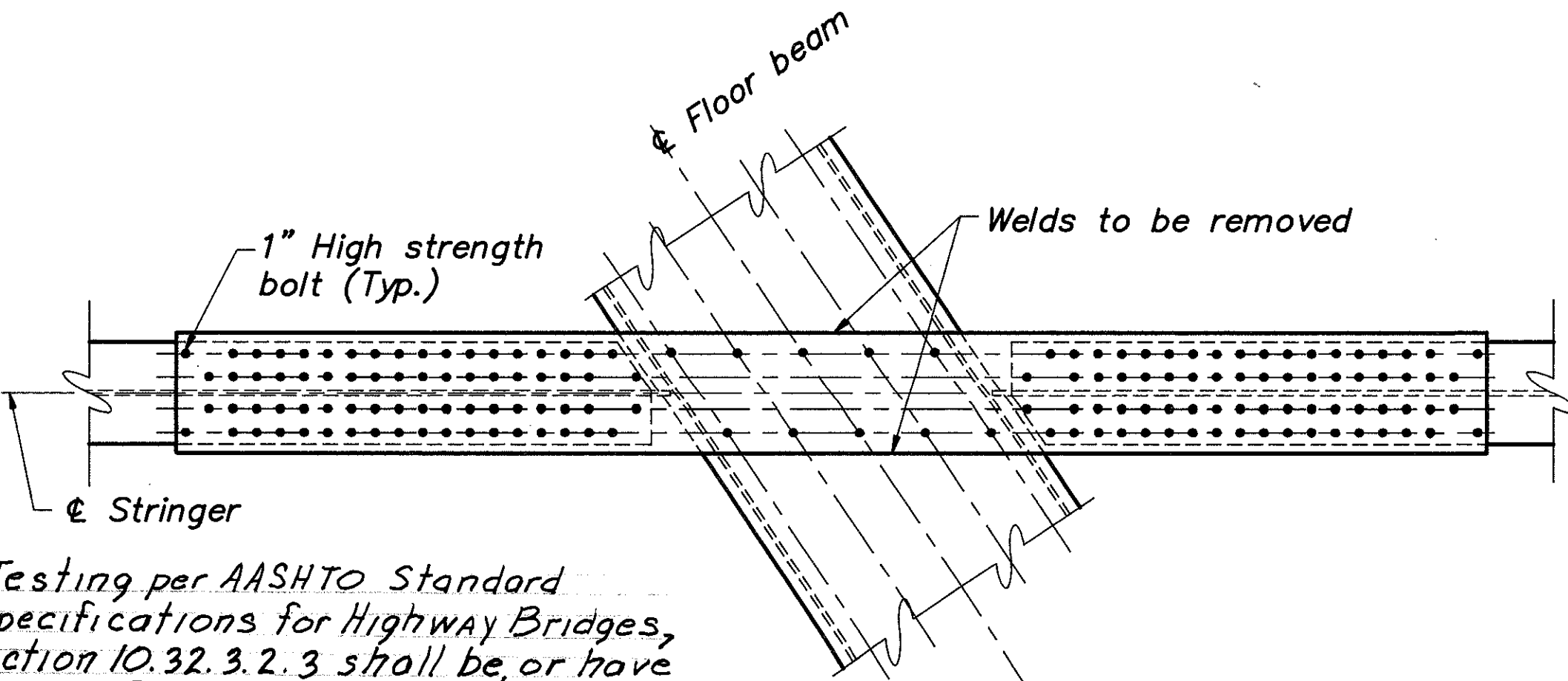


STITCH WELD REMOVAL
ON BACKING BAR



END VIEW
(For each end of floor beam)

ACCESS COVER DETAIL



Testing per AASHTO Standard Specifications for Highway Bridges, Section 10.32.3.2.3 shall be, or have been performed, to determine the slip coefficient. A min. coeff. of 0.33 is required. Certification showing the test results shall be furnished.

PLAN OF BOTTOM SPLICE PLATE

BALKE ENGINEERS 1848 SUMMIT ROAD CINCINNATI, OHIO 45237					
PIER 5N DETAILS BRIDGE NO. HAM-50-1936 R & L SIXTH STREET EXPRESSWAY OVER RR AND MILL CREEK					
DESIGNED MRS	DRAWN ALH	TRACED ~	CHECKED DWI	REVIEWED DATE CRS 4/92	REVISION 14/30



**GANNETT
FLEMING**

8890 Lyra Road, Suite 110
Columbus, OH 43240