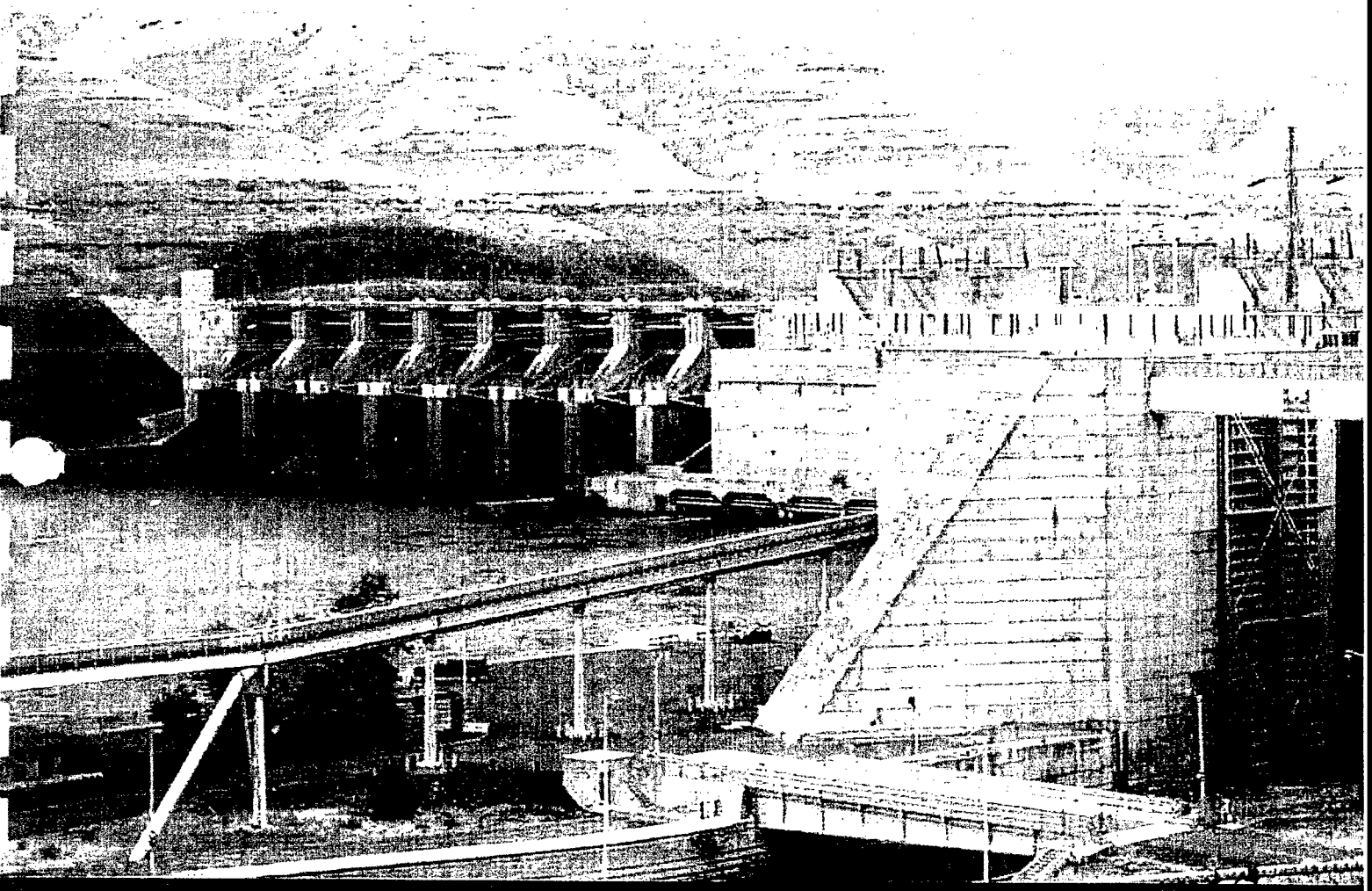
February 2001

Little Goose Dam

Radial Gate Inspection and Testing



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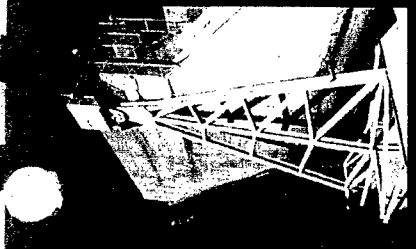

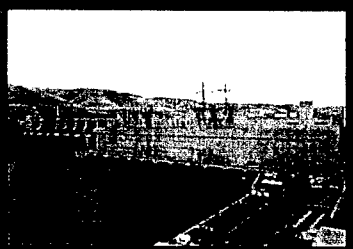

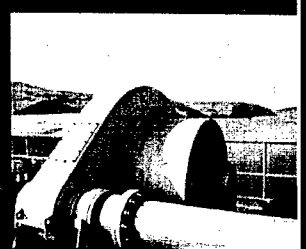

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This report is an evaluation of the overall condition of the spillway tainter gates at Little Goose Lock and Dam, Snake River Washington.

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Contents

LITTLE GOOSE DAM RADIAL GATE INSPECTION AND TESTING

INTRODUCTION

Purpose

The Corps of Engineers, Walla Walla District, requires a comprehensive evaluation of the radial gates at Little Goose Dam. The District retained HDR Engineering, Inc. to perform inspection and testing of the radial gates through Task Order No. 5 under Contract DACW68-00-D-0001. The task order scope of work includes review of project information, an initial meeting and inspection, comprehensive field inspection of the radial gates, testing of gate hoist machinery, recording trunnion movement, and preparation of a report.

Scope of Investigation

The scope of this investigation includes:

- Review of design, construction, maintenance and operations information provided by the District.
- Hands-on visual inspection of accessible upstream and downstream portions of eight radial gates.
- Visual inspection of the hoists and hoist equipment.
- Testing of gates and hoists while operating.
- Recording trunnion movements while raising gates in both loaded and unloaded condition.
- A report including documentation of the design and operation of the gates and hoists, inspection and testing results, conclusions, and recommendations.

Limitations

The services under this contract include the professional opinion and judgment on the data and information reviewed. The conclusions and recommendations presented in this report are based on the information provided by the District and the inspection of the radial gates and hoists. The inspection was visual only and only accessible portions of the components were inspected. No nondestructive tests or laboratory testing was conducted in the course of the inspection.

PROJECT BACKGROUND

Project Description

Little Goose Dam is located in southeastern Washington on the Snake River, 28.7 river miles upstream of Lower Monumental Dam, and 70.3 miles above its confluence with the Columbia River.

The main project structures include a powerhouse, concrete spillway, navigation lock, fish facilities, concrete non-overflow sections, and a rockfill embankment on the north shore. The dam is 2,655 feet long including the embankment. Construction of the project began in June 1963 and was completed in January 1970.

The spillway is 512-feet-long and is located about mid-river. The spillway consists of eight radial gate controlled bays separated by 14-feet-wide piers. The radial gates are each 50-feet wide by 60-feet high. The gates are numbered 1 to 8 from left to right looking downstream. The spillway structure has a maximum height of 204.4 feet with the deck at Elev. 651.0. The spillway crest is at Elev. 581.0 and the top of gates at Elev. 640.0. The reservoir stores 565,000 acre-feet at normal full pool (Elev. 638.0).

The Spillway Design Flood (SDF) is 850,000 cfs. The spillway has a design capacity of 850,000 cfs at reservoir level Elev. 646.5. The maximum spillway capacity at normal full pool (Elev. 638.0) is 676,000 cfs. At Little Goose Lock and Dam for the period from 1951 to 2000 the maximum flood of record was 306,700 cfs on June 18th, 1974. Peak flow outside the period of record is 409,000 cfs on June 5th 1894. This value was computed from flood marks by the U.S. Weather Bureau.

Gate Design and Construction

The Corps of Engineers designed the gates and project facilities. The gates were fabricated by Pacific Car and Foundry of Seattle, Washington.

The Walla Walla District provided copies of the engineering drawings and shop drawings for the gates. The gate and hoist specifications were also provided as well as design calculations for the gates. The following information was obtained from these documents.

The 3/8-inch to 1/2-inch thick skin plate is supported by vertical ST10WF31 purlins. The skin plate is 3/4-inch thick on each end of the gate to act as a wear surface for the lifting cables. The purlins are connected to three horizontal plate girders. Each horizontal girder is supported by 14WF gate arms. The gate arms are braced with 14 WF members and there are ST7WF15 braces between the downstream flanges of the horizontal girders. The gate end frames were assembled in

the field. The skin plate was installed in five vertical sections and joined by full penetration welds.

Cable attachment brackets are mounted on the skin plate at the bottom corners. The skin plate, purlins, horizontal girders and cable attachment brackets are A441 high strength / low alloy steel (Carbon - Magnesium – Vanadium, Heat Treated for Pressure Vessels). All other members are A-36 steel.

Each trunnion has a 24-inch diameter forged steel pin with a cast aluminum bronze bushing. The trunnion pin was designed to limit the bearing pressure to 4 ksi based on the reaction from the gate of 3,005 kips.

The trunnions rest on a concrete girder that is anchored to the spillway piers with two groups of 48 – 1-1/4 inch diameter prestressed bars. The trunnion girder and anchor bars were designed for two loading conditions: balanced and unbalanced. In the balanced condition with two adjacent gates closed, the total load on each group of anchor bars is 3,040 kips. When one gate is unloaded, the load on the anchor bars increases to 4,180 kips. The bars were designed for 0.6 of ultimate and a total prestress force of 5,122 kips.

The gates are raised and lowered by electric hoist units mounted on the deck above the gates. Eight, 1-inch diameter wire ropes on each side of the gate wind on separate drums mounted on a common shaft. The hoist operating speed is approximately 1.16 feet per minute.

The gates have rubber J-bulb side seals and rubber wedge bottom seals. The side seal plates and sill beams are heated to prevent ice formation. The heating system consists of piping embedded below the seal plates through which electrically heated oil is circulated. The seal heaters are manually started and thermostatically controlled when the air temperature drops to 32 degrees F. There are also air bubblers at three elevations on each pier for ice and debris clearing. They are manually operated from the service gallery.

A trunnion friction coefficient of 0.3 was used to design the yoke anchorage but there is no indication that trunnion friction was considered in the design of the gate arms.

Gate Operation

The gates may be operated by manual control from stations located near each hoist, but normally the gates are remotely controlled from the powerhouse. All of the hoists can be powered from a diesel generator set.

The spillway is operated to pass the desired discharge with the best hydraulic conditions in the stilling basin. The gates are opened in one-foot increments during the fish passage season from March 1 through December 31 according to the operating sequence in Table 1.

LITTLE GOOSE DAM

Gate Number / Gate Stops								Total	Spill
1	2	3	4	5	6	7	8	Stops	(kcfs)[1]
1	0	0	0	0	0	0	1	2	**4**
1	1	0	0	0	0	1	1	4	**8**
1	1	1	0	0	1	1	1	6	**11**
1	1	1	1	1	1	1	1	8	**15**
1	1	2	1	1	2	1	1	10	**19**
1	1	2	2	2	2	1	2	13	**25**
2	1	2	2	2	2	1	2	14	**27**
2	2	2	2	2	2	2	2	16	**31**
3	2	2	2	2	2	2	2	17	**33**
3	2	3	3	2	2	2	3	20	**39**
3	3	3	3	2	3	2	3	22	**43**
3	3	3	3	2	3	3	4	24	**47**
3	3	3	4	3	3	3	4	26	**52**
4	3	4	4	3	3	3	4	28	**56**
4	4	4	4	3	3	4	4	30	**60**
5	5	4	4	3	3	4	4	32	**64**
5	5	5	4	4	3	4	4	34	**68**
5	5	5	4	4	4	4	5	36	**72**
5	6	5	5	4	4	4	5	38	**76**
5	6	5	5	4	4	5	6	40	**80**
6	6	5	5	4	5	5	6	42	**84**
6	6	5	5	5	5	6	6	44	**88**
7	6	5	5	5	5	6	7	46	**92**
7	6	5	6	6	5	6	7	48	**96**
7	6	6	6	6	6	6	7	50	**100**
7	6	6	7	7	6	6	7	52	**104**
7	7	6	7	7	7	6	7	54	**108**
7	7	7	7	7	7	7	7	56	**112**
8	7	7	7	7	7	7	8	58	**116**
8	7	8	7	8	7	7	8	60	**120**
8	7	8	8	8	8	7	8	62	**124**
8	8	8	8	8	8	8	8	64	**128**
9	8	8	8	8	8	8	9	66	**132**
9	8	9	8	9	8	8	9	68	**136**
9	8	9	9	9	9	8	9	70	**140**

(1) Forebay El. 638

Table 1 - Gate Operating Sequence

Gate Maintenance

The District performs routinely inspects, tests, and lubricates the gates and hoists. Recent significant maintenance activities consist of:

- Gate1 – In August 1981, placed stoplogs and repaired hoist cable grooves in face plate with Belzona. Gate was sandblasted and painted. Also repaired hoist cable anchors by welding with stainless steel wire. Two 2-inch-diameter by 24-inch-long anodes were installed adjacent to each anchor block. These repairs were inspected in October 1987 and found to be in good condition.
- Gate 5 – Took gate out of service in June 1980 and inspected cables and anchors. Sandblasted damaged areas, repaired by welding, and painted with vinyl system. Inspected repairs in February 1988. South side of gate had severe corrosion under one wire rope with pits up to ¼ inch deep.
- Gate 8 – In September 1982 placed stops and repaired cable anchors by welding. Installed magnesium anodes adjacent to each block. Repaired corrosion under the cable with Devcon "A". Sandblasted and painted gate with standard vinyl system. Inspected in May 1992 and found that the repairs were in good condition. The anodes appeared to be preventing corrosion under the wire ropes. The south side shows more corrosion and the wear plates have small pinholes over the full length. The worst corrosion is occurring where the side seals connect to the gate face. The bolts are stainless steel. The center portion of the gate is showing pinhole corrosion.
- In 1983 all gates were reconditioned and repainted under contract DACW68-83-C-0111.

Inspection

General

Wayne Edwards and Mike Haynes of HDR Engineering performed an initial site visit and inspection on April 5, 2000. Based on information collected during the initial inspection, HDR prepared an inspection plan and inspection sheets that were submitted to the District for review prior to the detailed inspection.

The inspection and testing of the spillway radial gates was performed from October 2nd through 9th, by Sam Planck, P.E., Heather Yee and Tony Barela, of HDR Engineering, Inc. Steve Schmidlkofer and Jim Knowles of K&N Electric inspected the hoists, took amperage measurements, and recorded observations during testing. Gary Struthers Associates were responsible for operation of the gates during the loaded and unloaded testing and moved the stoplogs between gate testing. Emerald Services, Inc., as a sub-contractor to Gary Struthers, provided water blast cleaning of the skin plate during the upstream face inspection. The weather was clear with temperatures ranging from 50 to 75 degrees F for the inspection of Gates 2

through 8. The upstream inspection of Gate 1 was performed in rainy conditions and a temperature of 40 to 50 degrees. Due to the wet and unsafe conditions, the racking measurements, inspection of the bottom of the upstream face and the trunnion dial gage measurements were not performed. Sam Planck, P.E. Amy Akins and Marv Brammer, P.E. of HDR returned to the site on November 20th to complete the inspections for Gate 1. The reservoir was full during all of the inspections.

Procedures

Upstream Inspection & Testing

For the upstream inspections, stoplogs were placed in front of the gates prior to the inspection. The upstream face of Gates 1 through 8 were inspected from the spillway deck as each gate was raised to the full open position. The first part of the inspection was a rope access inspection of the bottom seal, bottom of the upstream surface of the skin plate and the hoist connections. At certain gates, the inspection under the bottom of the gate could not be made due to excessive leakage through the stoplogs, see Photo. 1. Racking measurements between the bottom seal and the spillway were also made at this time.

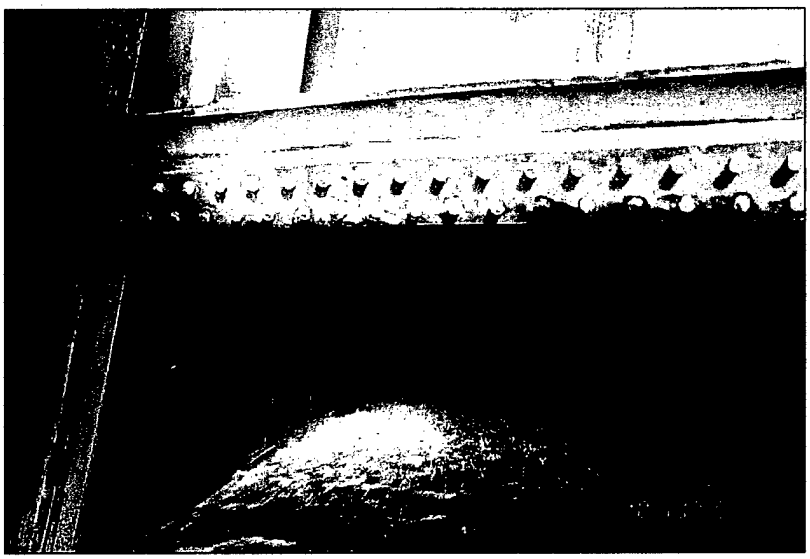

Photo. 1: Heavy leakage from stoplogs preventing inspection of bottom upstream face of Gate 3.

The second part of the upstream inspection consisted of the transverse, operational measurements at the trunnion, amperage readings while opening and closing the gate, and the inspection of the upstream surface of the skin plate. Measurements were made to determine transverse movement of the trunnion hub versus the trunnion yoke at the initial, full open, and final closed position. During the gate opening, visible corrosion, debris and surface inconsistencies were waterblasted from the gate face for better condition assessment, see Photo 2. Amperage readings for the hoist were recorded at initial opening, during opening and during closing.

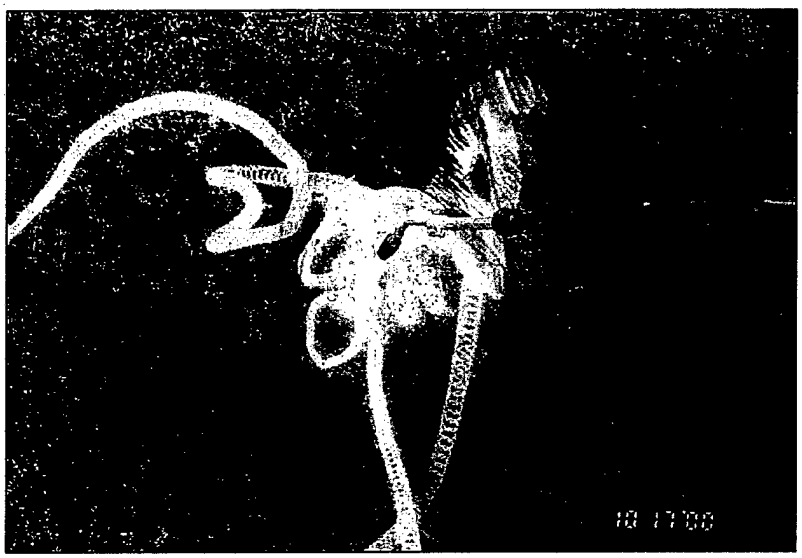

Photo. 2: Waterblasting of upstream surface of skin plate during full opening of gate.

Downstream Inspection

The downstream portions of all gates were inspected by climbing along the horizontal girders and radial struts, see Photo. 3. Inspection rigging for the downstream inspections was anchored to the gate hoist equipment and torque tubes. Visual observations were made for excessive sweep and camber of the main struts and were recorded only if an abnormal condition was observed.

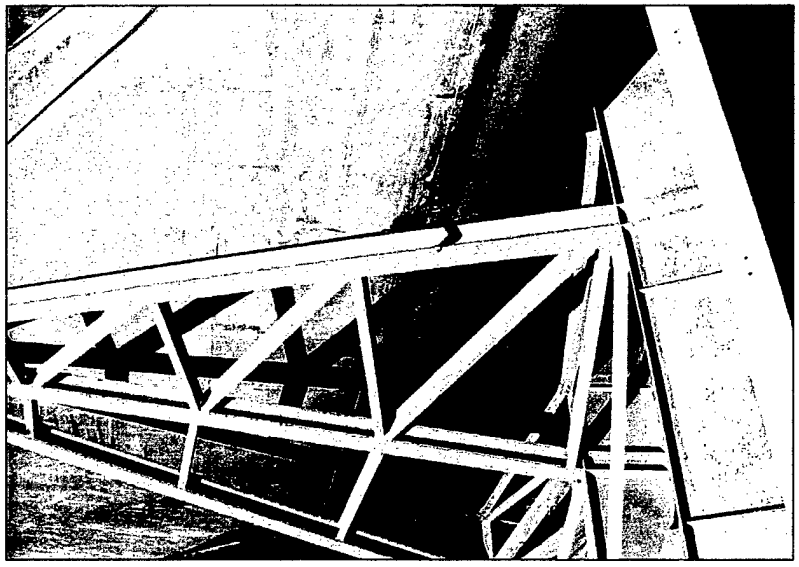

Photo. 3: Rope access downstream inspection.

Operational Testing – Unloaded vs. Loaded

At the completion of the upstream inspection, with the stoplogs in place and the gate unloaded, dial gages were set at the trunnion to measure the vertical and lateral movement of the trunnion hub versus the trunnion yoke. Steel rulers were used to measure the transverse movement of the trunnion hub versus the trunnion yoke. After initial readings were taken, the top stoplog was cracked open and the void was flooded, loading the gate. When the void between the stoplogs and the gate was completely full, final movement readings were taken. There was no gap present at the bearing between the trunnion yoke and the trunnion support beam, therefore, movement readings between the two surfaces were not made.

Operational Testing – Loaded

With the stoplogs removed and the gate fully loaded, the gates were opened to two feet. Amperage reading for the hoists were recorded at the initial opening, during the opening of the gate and during closing.

Ultrasonic Testing

Non-destructive, ultrasonic testing was not performed at Little Goose Dam. At Lower Granite Dam the locations of field weld splices were indicated on the plans and were ultrasonically tested during the inspection. There were no indications of field weld splices in primary members on the design or shop plans for Little Goose Dam and none were found in the field.

Nomenclature

The gates are identified as Gate 1 to 8, with 1 on the south end near the powerhouse looking downstream. Unless noted otherwise, all locations of observations, and notes pertaining to the radial gates are identified as right or left looking downstream.

In the inspection sheets and this report, corrosion is classified as light, moderate or heavy as follows:

- Light - Surface rust with no flaking or packing. Rust can not be scraped off by hand.
- Moderate - Some flaking, beginning to pack, but thickness of the pack is less than approximately 1/16". There is no observable loss of section.
- Heavy – Pack rust with measurable or observable section loss to the member.

Member Designations

For the radial gate inspection observations and the photographs, the member designations indicated in Figure 1 apply.

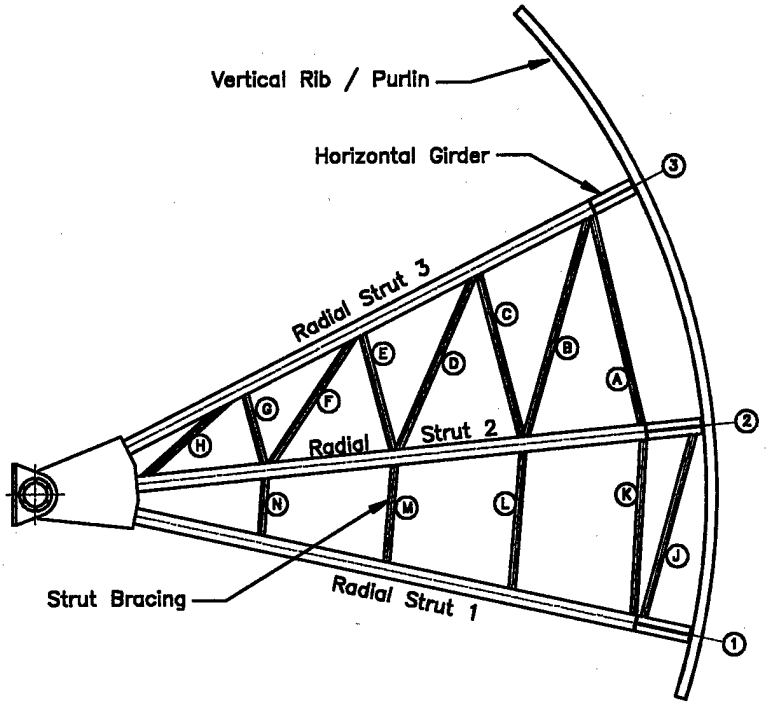

Figure 1: Radial gate member designations.

General Inspection Observations

The majority of condition observations found during the inspection are consistently found at all of the gates. The following section of the report pertains to those general observations or conditions which were found to apply to all of the gates. Specific observations or deficiencies for individual gates begin on page 25. No significant deviations from the as-built plans were observed for the radial gates. Field inspection sheets for the gates are included in Appendix A. Hoist operation and inspection sheets can be found in Appendix B.

Upstream Surface of Skin Plate

The condition of the upstream surface of the skin plate varies from generally good to extremely poor depending on the gate and the locations on the skin plate. On average, the pits are approximately one inch in diameter and 1/4-inch to 5/16-inch deep. Some appear to be greater than 1/4-inch deep in the 3/8-inch thick portion of the skin plate and greater than 3/8-inch deep in

the 1/2-inch thick portion. See Figure 2, and photos 4 and 5. There is moderate to heavy, scattered pitting on the 3/4-inch wear plates on most of the gates. There is pitting present in excess of 1/2-inch deep at some locations, see Photo. 6. At many locations the pitting on both the skin plate and wear plates appears to be associated with scratches or dings in the plates original protective coating, see Photo. 5 and Photo 7. Based on the hemispherical shape of the pitting, the corrosion appears to be microbially influenced. It is likely that increased acid levels due to microbial activity have created a concentration cell within the pits and accelerated the corrosion.

There is significant delamination of the vinyl coating on the wear plate at Gates 2 and 6 with smaller spots of delamination at other gates. See Photo. 8.

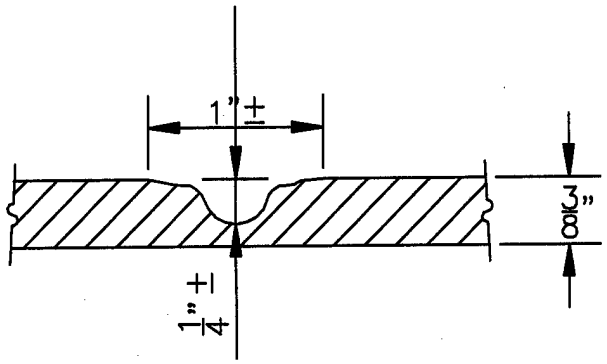

Figure 2: Typical pitting profile in 3/8 inch plate.

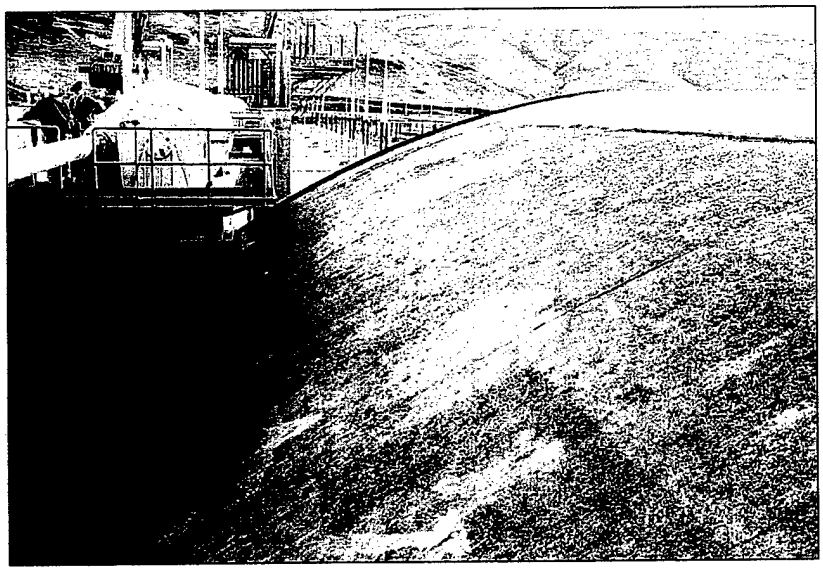

Photo. 4: Typical, generally good condition of skin plate.

Photo. 5: Skin plate pitting, typical.

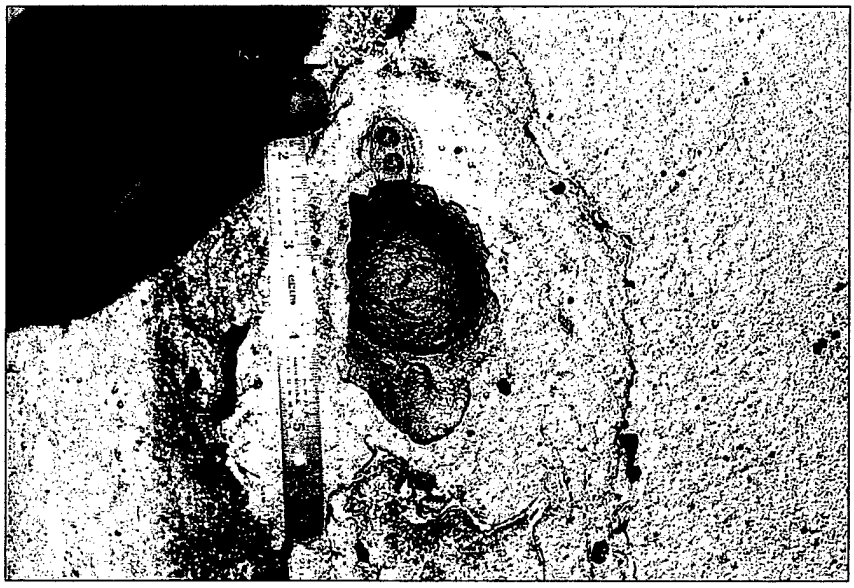

Photo. 6: Wear plate pitting - heavy, typical. Hemispherical shape is indication of microbially influenced corrosion.

Photo. 7: Pitting on wear plate. Pitting appears to be associated with scratches in coating, typical.

Photo. 8: Delamination of vinyl coating on wear plate, typical Gates 2 and 6.

Hoists Connections

The hoist connections are in generally good condition with light to moderate corrosion present on the lifting lug plates. The U-bolts, socket blocks and connection pin, which appear to be stainless steel, are in very good condition, see Photo. 9. The design or material type for the U-bolts, socket blocks and connection pin are not listed in the available plans. The sacrificial anodes appear to be in too good of a condition given their installation date of 1981 and 1982. It is likely that they were painted or in some way protected after their installation and ceased functioning as anodes.

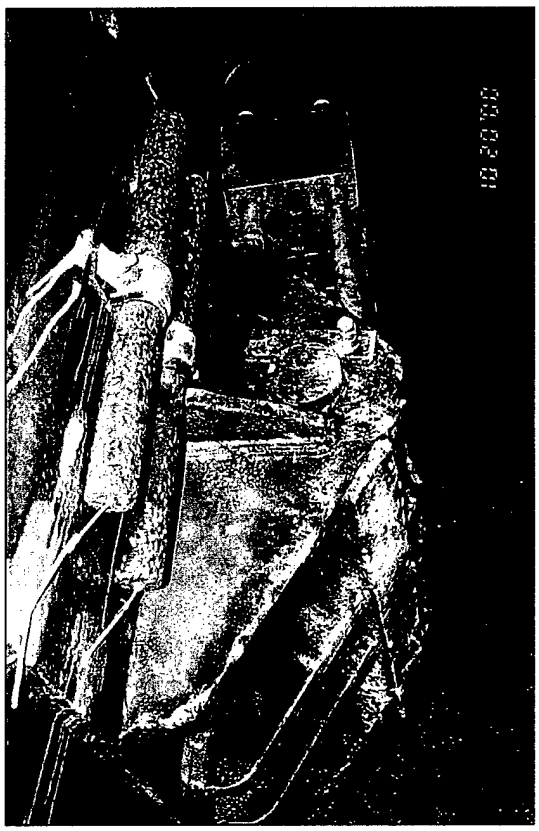

Photo. 9: Hoist connection, typical condition.

Downstream Surface of Skin Plate

The downstream surface of the skin plate is in generally good condition. Isolated spots of light to moderate surface corrosion and previous (painted over) pitting can be found at various locations. There is also evidence of previous weld and grind repairs made to some gates indicating earlier penetration of the skin plate by corrosion. The weld and grind repairs are in good condition and show no signs of further corrosion from the downstream side. See Individual Gate Inspection Observations on Page 25 for locations and photographs of weld repairs.

Vertical Purlins

The vertical purlins are in generally good condition. At the bottom of the gate there is standing water between the bottom seal closure plate, the web of the purlins and the downstream side of the skin plate. Light to moderate corrosion is forming on all surfaces. There is no drainage for this space and it is consistently full of water and debris at all gates, see Figure 3 and Photo. 10.

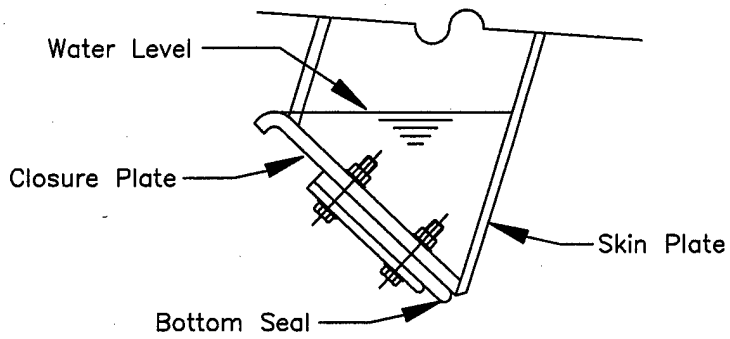

Figure 3: Standing water at bottom of gate between skin plate, purlin webs and bottom seal closure plate, typical.

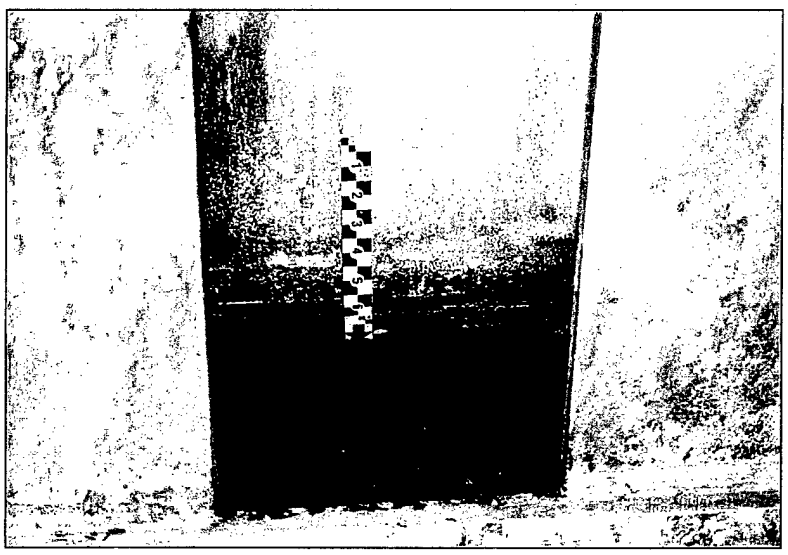

Photo. 10: Standing water at bottom of gate between skin plate, purlin webs and bottom seal closure plate, typical.

Horizontal Girders and Braces

The horizontal girders and bracing are in generally good condition. There are isolated spots of light to moderate corrosion, mostly at locations with poor drainage.

The top and middle horizontal girders are divided into twelve drainage areas due to the web stiffeners. The area at either end of the girders is free to drain off the end of the web. The remaining ten areas have only three drain holes and require water to flow horizontally through at least one notch in the stiffeners in order to reach a drain hole. There are debris lines and evidence of standing water on nearly all of the horizontal girder flanges and webs.

The worst corrosion occurs on the bottom horizontal girder, between the multiple stiffeners, at each end of the girder. There are six stiffeners in close proximity to one another with drainage only provided horizontally through a notch at the upstream (low) end of the stiffener. In order for the last space to drain, the water must travel horizontally under five stiffeners. These notches are typically clogged and the area between the stiffeners is consistently full of water and debris, see Photo. 11.

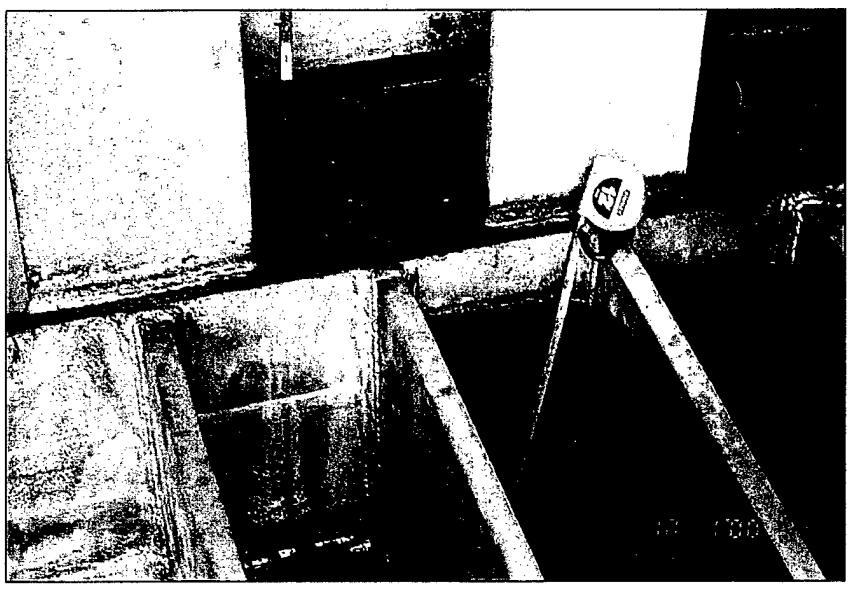

Photo. 11: Standing water between stiffeners at ends of bottom horizontal girder, typical.

Photo. 12: Standing water or debris lines between stiffeners at ends of bottom horizontal girder, typical.

Immediately upstream and slightly above the end of the bottom horizontal girders, there are stiffeners between the skin plate, purlins and upstream flange of the horizontal girders. There is no drainage from this location and the enclosed area is either full of water and/or debris on all gates. See Photo. 13.

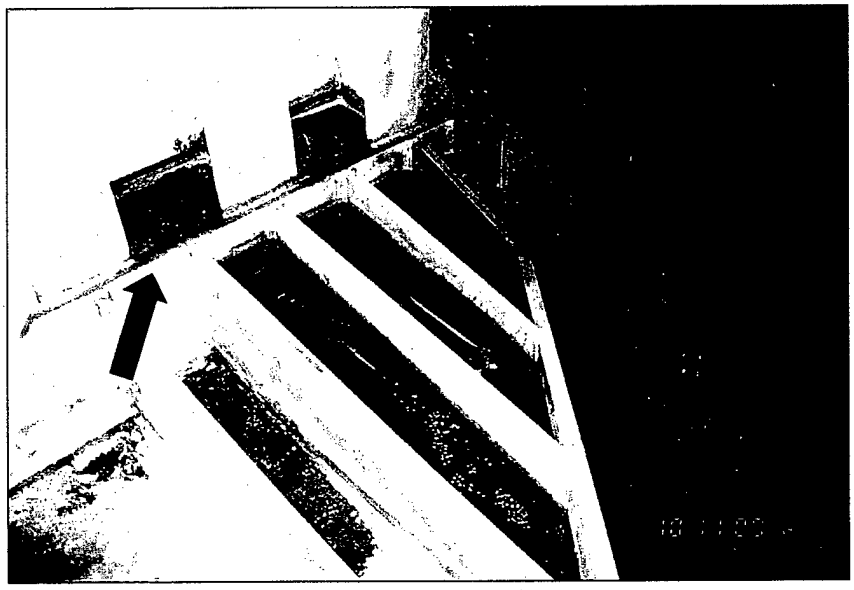

Photo. 13: Standing water and debris between purlins, skin plate and upstream horizontal girder flange, typical.

On the underside of the bottom horizontal girder, at the connection to the radial struts, there is delaminated paint and light to moderate corrosion around the drain hole in the girder web and near the adjacent stiffeners. See Photo. 14.

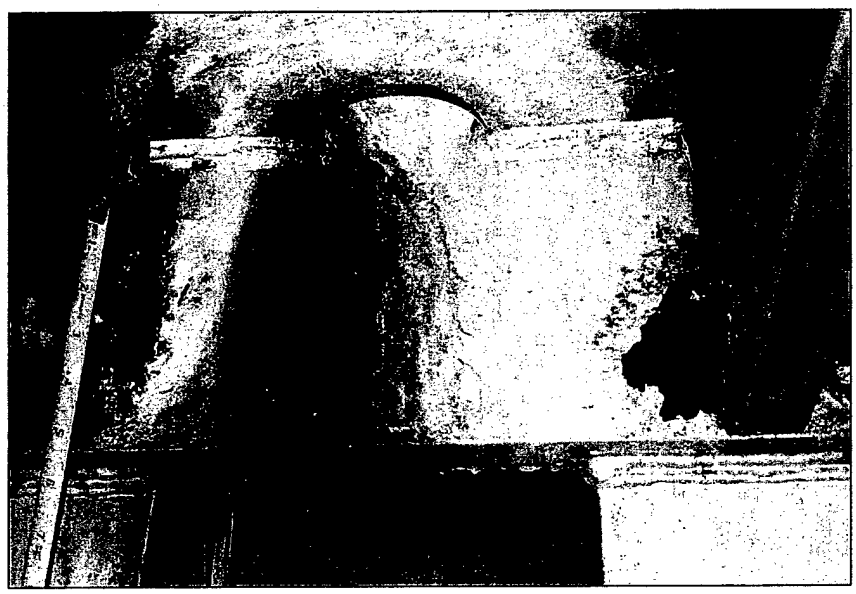

Photo. 14: Corrosion beneath bottom horizontal girder. Looking up at girder flange and drain hole. Stiffener at right, typical.

Radial Struts and Braces

The radial struts are in generally good condition with only light surface corrosion at isolated locations, see Photo 15.

There is very poor drainage from the upstream end of the bottom radial strut and ponding or debris lines (evidence of previous ponding) are found at every gate.

There is very poor drainage from the downstream end of the top radial strut at the trunnion. The three radial struts become an enclosed box section at the trunnion. Since there is no drainage vertically from between the flanges of the top strut, a small drain hole is provided horizontally through the strut flange. The drain hole is consistently clogged and standing water is present at most trunnions. See Photo. 16.

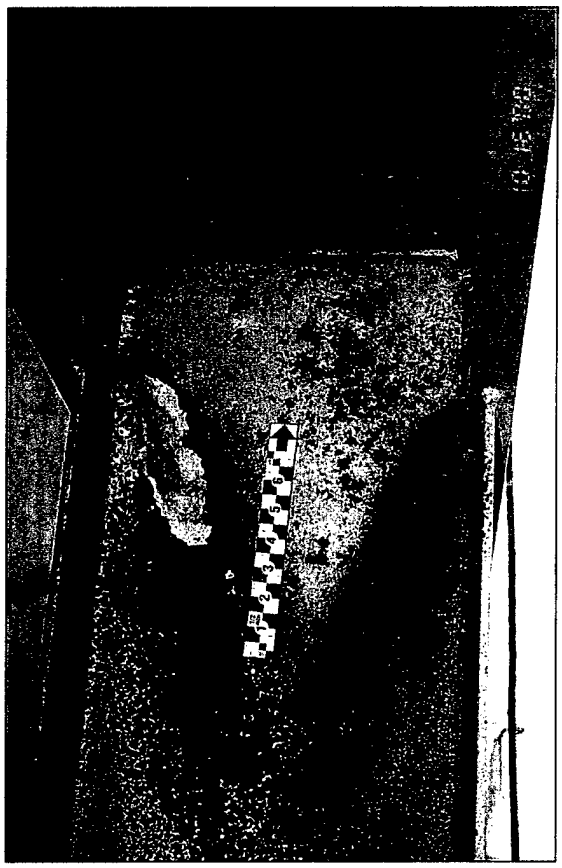

Photo. 15: Light surface corrosion on radial struts and braces, typical.

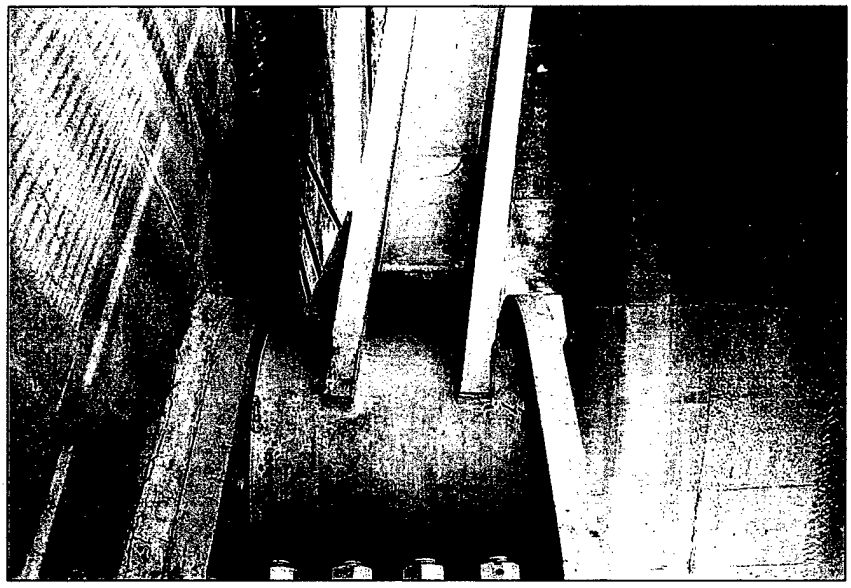

Photo. 16: Standing water at downstream end of top radial strut at trunnion hub, typical.

Trunnions

The trunnion hubs, yokes and bearing material are in generally very good condition and appear well lubricated. Lubricant was observed being expelled between the yoke and hub, around the circumference of all of the trunnions.

Side and Bottom Seals

The side and bottom seals are in generally good condition. Small side and bottom seal leaks are visible on many of the gates, although no major leaks were observed. There is a leak at the bottom seal, at the spillway monolith construction joint at nearly every gate, see Photo. 17. There is light to moderate corrosion on the downstream side of the skin plate at the side seals and side seal bolts, see Photo 19.

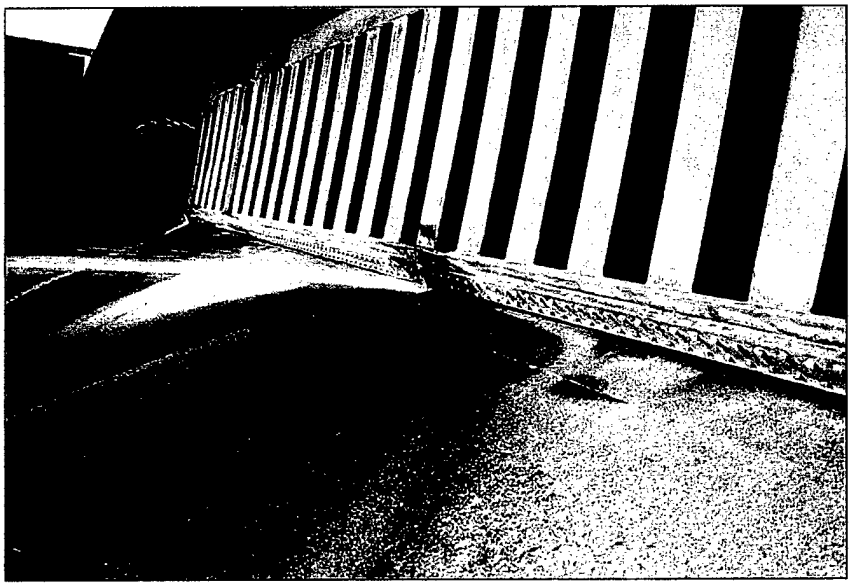

Photo. 17: Leak at spillway monolith construction joint, typical.

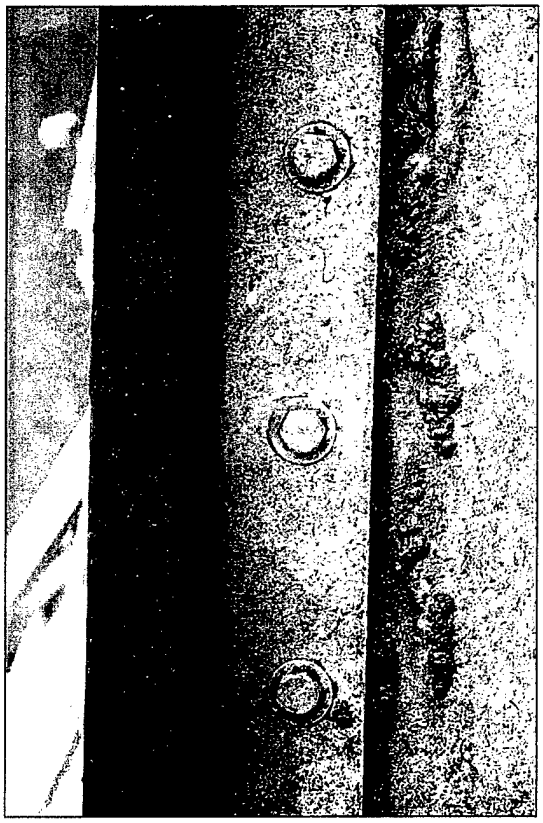

Photo. 19: Side seal from upstream side with no signs of cracking or deterioration, typical condition.

Photo. 18: Side seal from downstream side, light to moderate corrosion on skin plate, seal angles, nuts and bolts, typical condition.

There is moderate corrosion on the skin plate on the upstream side of the bottom seal. The downstream side of the bottom seal is in good condition with little occurrence of corrosion. See Photo. 20 and Photo. 21. The rubber seals are in good condition with only hairline cracking visible.

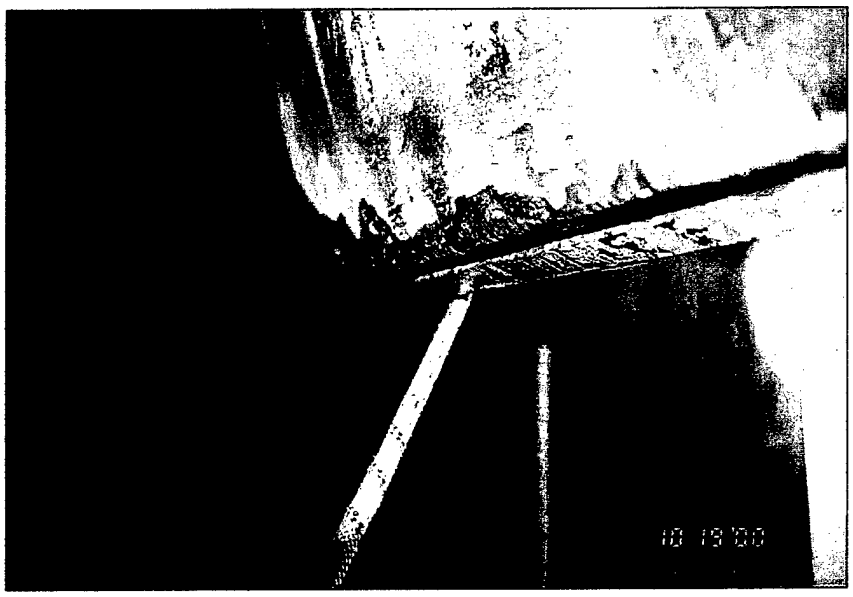

Photo. 20: Upstream side of bottom seal with light to moderate corrosion on skin plate, typical.

Photo. 21: Downstream side of bottom seal, typical

Radial Gate – Operation, Testing and Measurements

Member Section Dimensions

Section dimensions of main structural members were measured to verify conformance with the design drawings. These members included radial struts, radial strut bracing, horizontal girders, horizontal girder bracing and purlins. Measured dimensions were recorded on field data sheets found in Appendix A. The data sheets also contain nominal section dimensions from the American Institute of Steel Construction (AISC) *Steel Construction Manual, Seventh Edition, 1970.* Section measurements typically include the depth, d (measured at the edges of the flanges), the flange width, b_f, and the flange thickness, t_f. Web thickness, t_w, was only measured if there was an exposed portion of the web or drain holes large enough for calipers.

Differences between the design drawings and the actual field conditions of $1/16^{th}$ inch or less were deemed to be insignificant. Nearly all members in the field were found to be greater or equal in dimension than what was required in the design drawings. The larger dimensions were probably due to inaccuracies of the field measurements resulting from difficult access or with the thickness of the paint on the members. Those that were smaller were all within the fabrication tolerances. Of those measurements that were out of fabrication tolerance range, none were consistently out of range to conclude that a member other than what was specified in the design drawings was used.

Racking Measurements

Racking measurements for the gates were made at the beginning of the upstream inspection of the gates. Measurements were recorded for the distance between the bottom of the gate at the bottom corner of the bottom seal plate, and the embedded spillway sill plate. Measurements were made as far as possible to the left and right side of the gate depending on stoplog leakage and flow on the spillway. The gates were typically between two and four feet open when the measurements were made. The measurements for racking are as follows:

	Left (inches)	Right (inches)
Gate 1	39 – 1/2	39 – 1/2
Gate 2	39 – 1/2	39 – 1/2
Gate 3	42	42
Gate 4	Too much stoplog leakage to measure	
Gate 5	39 – 1/4	39
Gate 6	41	41
Gate 7	38 – 1/2	39
Gate 8	45	45

Table 1: Gate racking measurements.

The gates were also observed at the moment of first opening to look for signs of water release beginning from one side of the gate or the other. In most cases, water release would begin at both sides of the gate simultaneously and move towards the middle of the gate at equal rates. Based on the recorded measurements and observations, there is no apparent racking of the gates.

Trunnion Hub Movement: Closed - Full Open - Closed

With the stoplogs in place, measurements were made of the transverse gap between the trunnion hub and the trunnion yoke, at both sides of the trunnion, at both trunnions. The measurements were made with the gate at the initial opening, full open, and again when closed. The maximum transverse movement recorded between any two positions is as follows:

	Left Trunnion		Right Trunnion	
	Inside (inches)	**Pier Side (inches)**	**Inside (inches)**	**Pier Side (inches)**
Gate 1	1/32	1/32	0	0
Gate 2	0	1/32	0	1/32
Gate 3	0	0	0	0
Gate 4	0	1/32	0	1/32
Gate 5	1/32	1/32	0	0
Gate 6	0	0	1/32	1/32
Gate 7	1/32	2/32	1/32	1/32
Gate 8	1/32	2/32	1/32	0

Table 2: Transverse trunnion hub movement through full opening and closing

Based on the surface irregularities of the trunnion hub and the casting tolerances, the transverse measurements between the hub and the yoke can only be considered accurate to ±1/16-inch. The recorded measurements indicate there is no appreciable lateral movement of the trunnion hubs with respect to the trunnion yoke during either opening or closing of the gate.

Trunnion Hub Movement: Unloaded vs. Loaded

Dial gages were installed at both trunnion to record the vertical, transverse and upstream / downstream movement of the trunnion hub with respect to the trunnion yoke. The initial measurement was made with the stoplogs in place and no load on the gate. The final reading was made after the top stoplog was removed and the gate was fully loaded. The maximum movements recorded at the trunnion hubs are as follows:

	Vertical (1 / 1000 inch)	Upstream / Downstream (1 / 1000 inch)	Transverse (1 / 1000 inch)
Gate 1	7	34	0
Gate 2	4	22	0
Gate 3	12	31	31
Gate 4	8	32	0
Gate 5	10	31	31
Gate 6	0	45	0
Gate 7	11	37	31
Gate 8	1	30	0

Table 3: Loaded versus unloaded trunnion movements

For the vertical movements shown in Table 4, the hub moved upward with respect to the yoke during loading. The upstream / downstream movement of the hub was in the downstream direction and the transverse movement was outward, toward the piers.

The design tolerance for the 24-inch diameter trunnion pin is listed in the plans as +0.000 inches and –0.005 inches. The tolerances for the 24-inch diameter trunnion bushing is listed as +0.012 inches and –0.000 inches. The shop plans for the pin indicate the pin should be 23.98 inches in diameter with tolerances of +0.000 inches and –0.008 inches.

Based on the recorded movements and the tolerances, there is no significant displacements of the trunnion hub with respect to the trunnion yoke occurring during the loading process.

Individual Gate Inspection Observations

The observations in the following section pertain only to the gates indicated and were not typically found on all of the gates.

Gate 1

- There is an apparent weld and grind repair on the downstream side on the skin plate at approximately 5 feet above the middle horizontal girder near the left side of the gate.

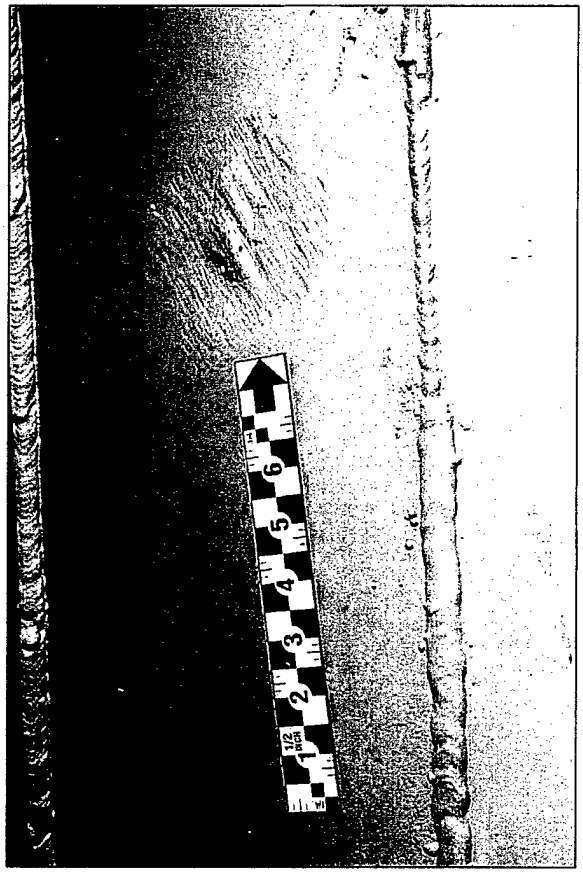

Photo. 22: Apparent previous weld and grind repair as seen from downstream side of skin plate on Gate 1.

Gate 2

- On the downstream side of the skin plate, along the wear plate, there is delamination of the vinyl coating on the plate. Large sheets of vinyl are peeling off of the wear plate and hanging loosely on the gate face.

Photo. 23: Delaminated vinyl coating on wear plate, right side of Gate 2.

Gate 3

- See General Inspection Observations

Gate 4

- There is a large deformation in the web of the top horizontal girder at the left end.

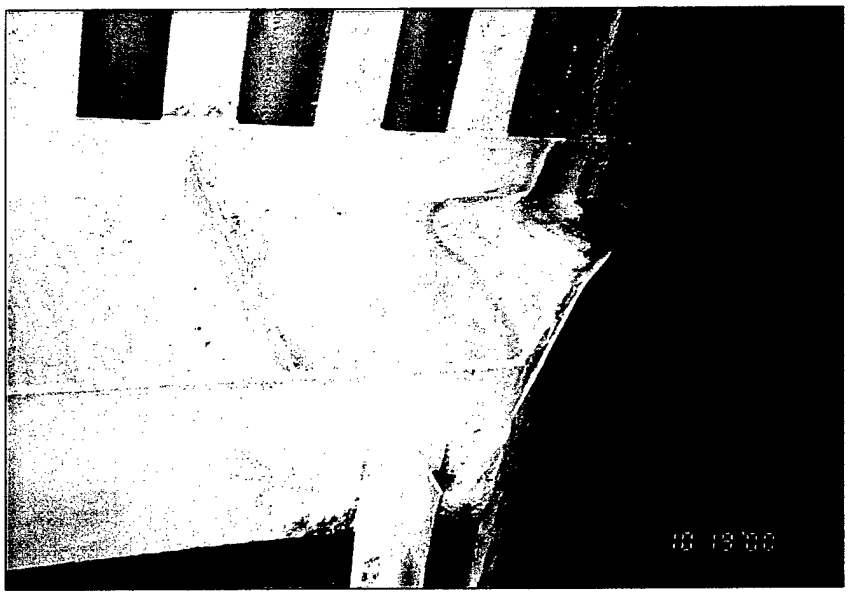

Photo. 24: Deformation in web of top horizontal girder.

Gate 5

- There is a line of light to moderate corrosion on the downstream side of the skin plate just above the top horizontal girder approximately 10 feet from the left side of the gate.

Photo. 25: Moderate corrosion on downstream surface of skin plate.

Photo. 26: Moderate surface corrosion on downstream surface of skin plate.

Gate 6

- On the downstream side of the skin plate at approximately half way between the middle and top horizontal girder, twelve feet from the left side, there is an apparent weld and grind repair from a previous leak. The plug weld is approximately ½-inch in diameter.

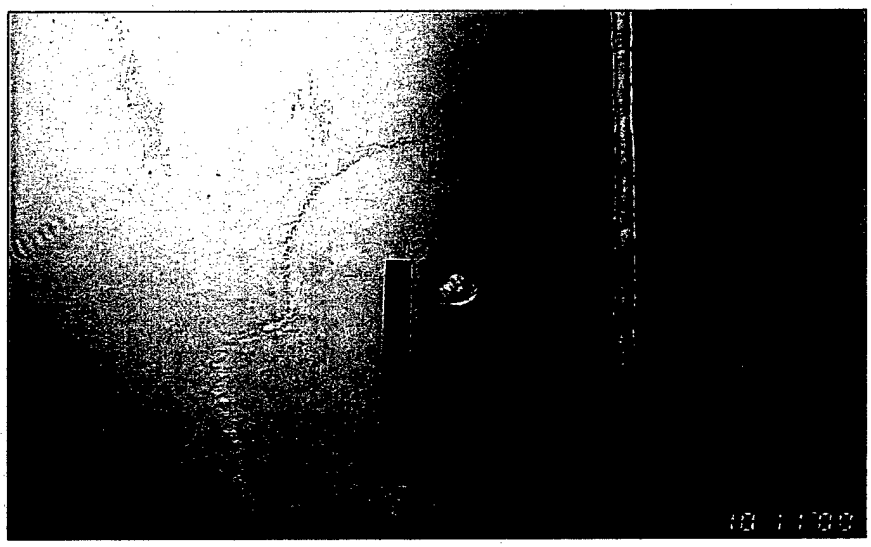

Photo. 27: Apparent, previous weld and grind repair on downstream surface of skin plate.

- On the downstream side of the skin plate, along the wear plate, there is delamination of the vinyl coating on the plate. Large sheets of vinyl are peeling off of the wear plate and hanging loosely on the gate face.

Photo. 28: Delaminated vinyl coating on wear plate, left side of Gate 6.

Gate 7

- See General Inspection Observations

Gate 8

- See General Inspection Observations

Hoists – Operation, Testing and Measurements

Hoist Operation Inspection

External portions of the hoist equipment, support platforms and gate connections were visually inspected for signs of excessive corrosion, wear or damage. The hoist and hoist machinery are in generally good condition, however, excessive motor and bearing noises were observed at many of the hoists. See Photos 30, 31 and 32.

Photo. 29: Recording hoist amperage readings.

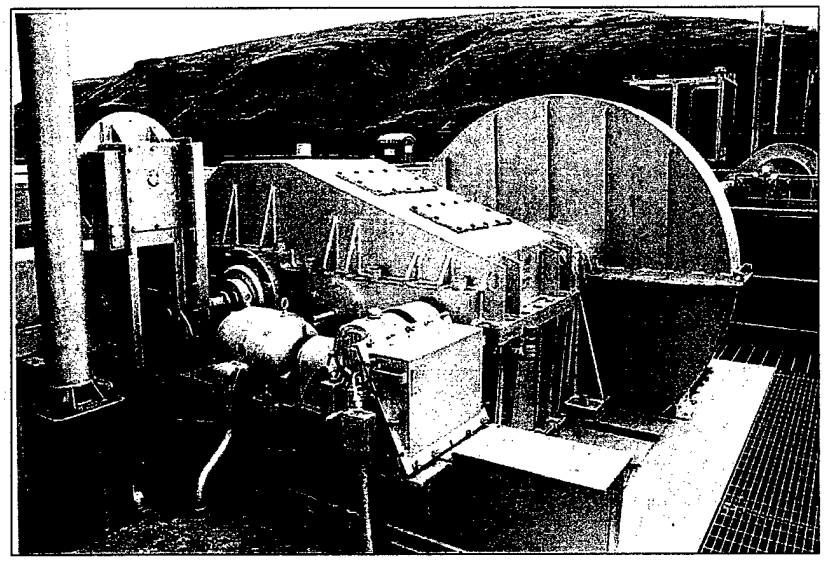

Photo. 30: Gate hoist, typical.

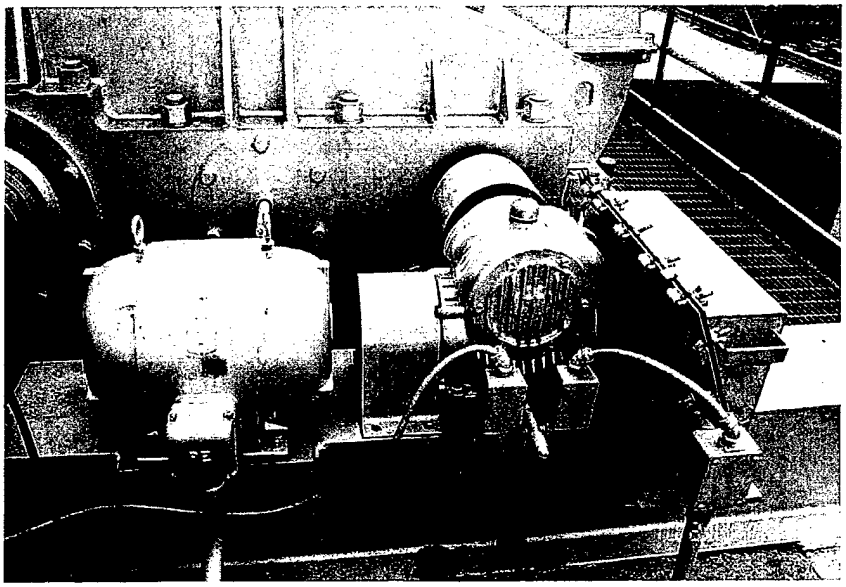

Photo. 31: Hoist motors, typical. Note fluid leaking from beneath motor.

Photo. 32: Hoist manufacture's plate.

The following observations were made at individual gate hoists:

	Hoist and Motor Observations
Gate 1	None
Gate 2	The motor bearings are noisy.
Gate 3	The motor lead wires and heater wires are frayed.
Gate 4	The motor bearings are noisy and sound dry.
Gate 5	None
Gate 6	The hoist brake seized during operation and was adjusted.
Gate 7	The motor bearings are in need of replacement.
Gate 8	None

Table 4: Hoist operation observations.

Hoist Amperage Measurements:

Hoist amperage readings were recorded during opening and closing of the gates in both the loaded and unloaded condition. The readings include the start up and running amperage. Running amperages were recorded for Phase A, B and C. Table 5 lists the opening and closing start up amperage and the average of the three phases for the running amperage for the gates in the unloaded condition. Table 6 lists the same information for the loaded condition.

	Start up Opening	Start up Closing	Running Opening	Running Closing
Gate 1	87.6	72.0	10.8	6.5
Gate 2	92.8	81.6	10.8	6.6
Gate 3	96.0	85.6	10.9	6.2
Gate 4	94.4	84.0	11.3	5.5
Gate 5	84.8	78.0	11.6	6.2
Gate 6	99.2	80.0	13.4	6.5
Gate 7	102.0	80.0	11.7	6.1
Gate 8	84.0	74.0	12.1	6.3

Table 5: Unloaded Gate - Hoist Amperage Readings

	Start up Opening	Start up Closing	Running Opening	Running Closing
Gate 1	112.0	110.0	16.0	9.6
Gate 2	103.0	93.6	12.0	6.8
Gate 3	101.0	94.0	11.6	6.4
Gate 4	96.0	75.0	11.7	5.8
Gate 5	93.0	88.0	12.4	6.1
Gate 6	104.0	99.2	13.6	7.5
Gate 7	101.5	86.0	10.9	6.4
Gate 8	102.0	80.0	11.5	6.1

Table 6: Loaded Gate - Hoist Amperage Readings

Based on the consistency of the readings the hoists are in generally good condition. The amperage data indicates that the tainter gate hoist motors are operating well within their design operating limits that normally allow the starting amperage to be in the range of 5 to 8 times the nameplate value. The current draw for all motors were in acceptable range and the gates appeared to be free with no apparent binding. The motors on the hoists are all noisier than would be expected for these units. The motors all have sealed bearings with no lube ports. During the opening of Gate 6 the hoist motor break seized and adjustments to the break were made in order to continue operation, see Photo. 33. The field inspection sheets for the hoist measurements can be found in Appendix B.

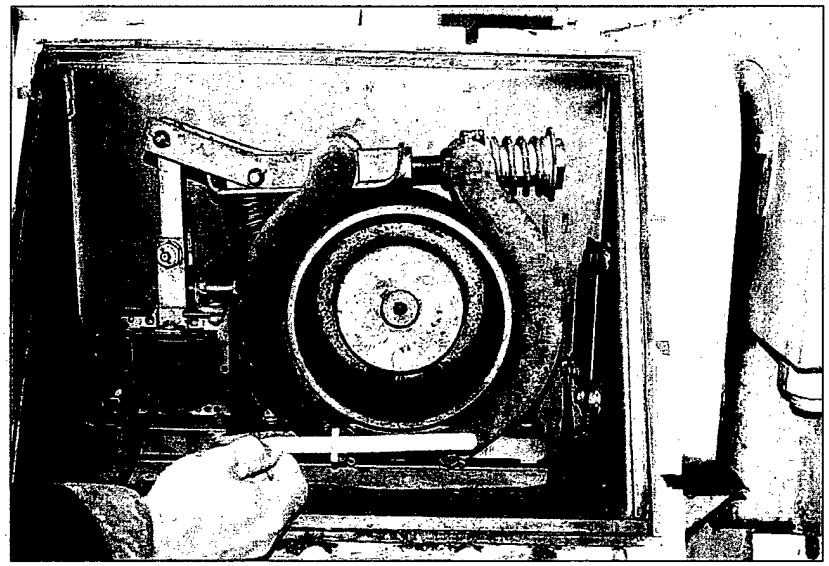

Photo. 33: Seized brake on Gate 6 hoist.

RECOMMENDATIONS

Recommended in the next year or as necessary:

- Repair pitting on skin plate and repaint (or recoat) upstream surface of gate face.
- Install new sacrificial anodes on upstream side of gate. A corrosion expert should be consulted to determine the number and location of anodes required. Existing anodes may remain in place.

  These repairs can be undertaken sequentially on all of the gates at once or the repairs could be made on an as-needed basis as the pitting penetrates the skin plate and leaks develop at individual gates.

Recommended in the next 2 years:

- Analyze the hoist gearboxes per the manufactures recommendation and remanufacture or replace as required.
- Replace the main gearbox seals on the hoist motors.

Recommended in the next 5 years:

- Install drain hole between the multiple stiffeners at ends of the bottom horizontal girders. The recommended size for these drain holes is 1-inch in diameter.
- Install drain holes in the purlin stiffeners near the ends of the bottom horizontal girders (Plate perpendicular to skin plate, above multiple stiffeners on bottom horizontal girder). The recommended size for these drain holes is 1-inch in diameter.
- Install drain holes in the downstream portion of the bottom seal plate between every purlin. Note: the rubber bottom seal is located between the bottom seal plate and the bottom seal keeper plate. The hole should not be flame cut with the rubber bottom seal in place. The recommended size for these drain holes is 1-inch in diameter.
- Enlarge the drain holes at upstream end of lower radial struts. The recommended size for these drain holes is 1 1/2 - inch in diameter.
- For all new and enlarged drain holes, the holes should be drilled, not flame cut, to reduce jagged edges which snag debris. If drilling holes is not feasible, then the edges of the flame cut holes should be reamed smooth.

REFERENCES

1. Water Control Manual, Little Goose Lock and Dam, U.S. Army Corps of Engineers, Walla Walla District, February 1988.

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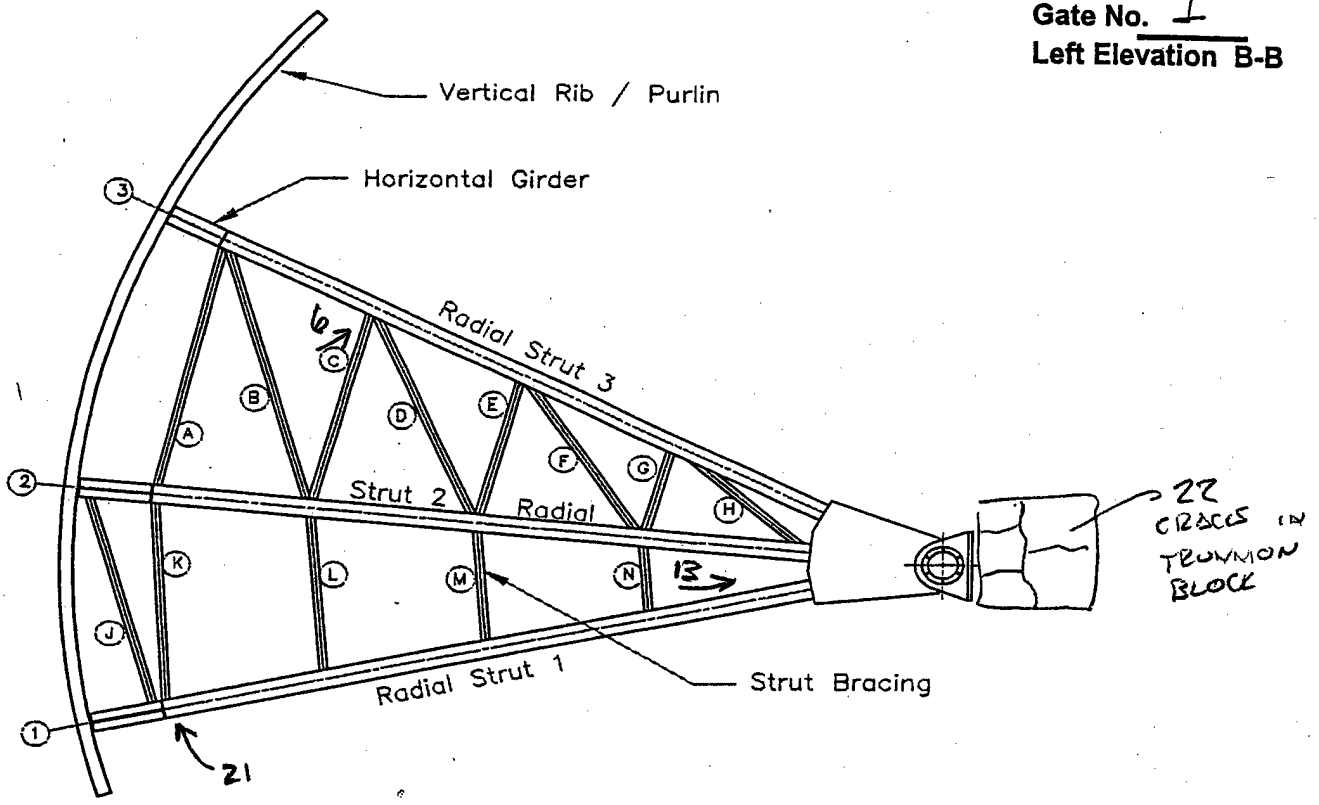
Little Goose Dam

Inspection Team (SMP) TDB HAY
Weather

Date 10/16/00
Sheet 1

Gate No. 1
Left Elevation B-B



Member	Type	Depth d		Web t_w		Flange(s)			
						b_f		t_f	
		Plan (in)	Measured (in)	Plan (in)	Measured (in)	Plan (in)	Measured (in)	Plan (in)	Measured (in)
Strut 3	14 WF 202	15 5/8	15 3/4	15/16	—	15 3/4	15 3/4	1 1/2	1 1/2
Strut 2	14 WF 342	17 1/2	17 1/2	1 9/16	—	16 3/8	16 3/8	2 7/16	2 1/2
Strut 1	14 WF 398	18 1/4	18 1/4	1 13/16	—	16 5/8	16 5/8	2 13/16	2 3/4
Brace A	14 WF 30	13 7/8	13 7/8	5/16		6 3/4		3/8	
Brace B	14 WF 30	13 7/8	13 7/8	5/16	5/16	6 3/4	6 3/4	3/8	3/8
Brace C	14 WF 30	13 7/8	14	5/16	5/16	6 3/4	6 3/4	3/8	3/8
Brace D	14 WF 30	13 7/8	13 7/8	5/16	5/16	6 3/4	6 3/4	3/8	3/8
Brace E	14 WF 30	13 7/8	13 15/16	5/16	5/16	6 3/4	6 3/4	3/8	3/8
Brace F	14 WF 30	13 7/8	13 7/8	5/16	5/16	6 3/4	6 3/4	3/8	3/8
Brace G	14 WF 30	13 7/8	13 7/8	5/16	5/16	6 3/4	6 3/4	3/8	3/8
Brace H	14 WF 30	13 7/8	14	5/16	5/16	6 3/4	6 3/4	3/8	3/8
Brace J	14 WF 30	13 7/8	13 7/8	5/16	5/16	6 3/4	6 3/4	3/8	3/8
Brace K	14 WF 30	13 7/8	13 7/8	5/16	5/16	6 3/4	6 3/4	3/8	3/8
Brace L	14 WF 30	13 7/8	14	5/16	5/16	6 3/4	6 3/4	3/8	3/8
Brace M	14 WF 30	13 7/8	13 7/8	5/16	5/16	6 3/4	6 3/4	3/8	3/8
Brace N	14 WF 30	13 7/8	13 7/8	5/16	5/16	6 3/4	6 3/4	3/8	3/8

21) MOD COR.

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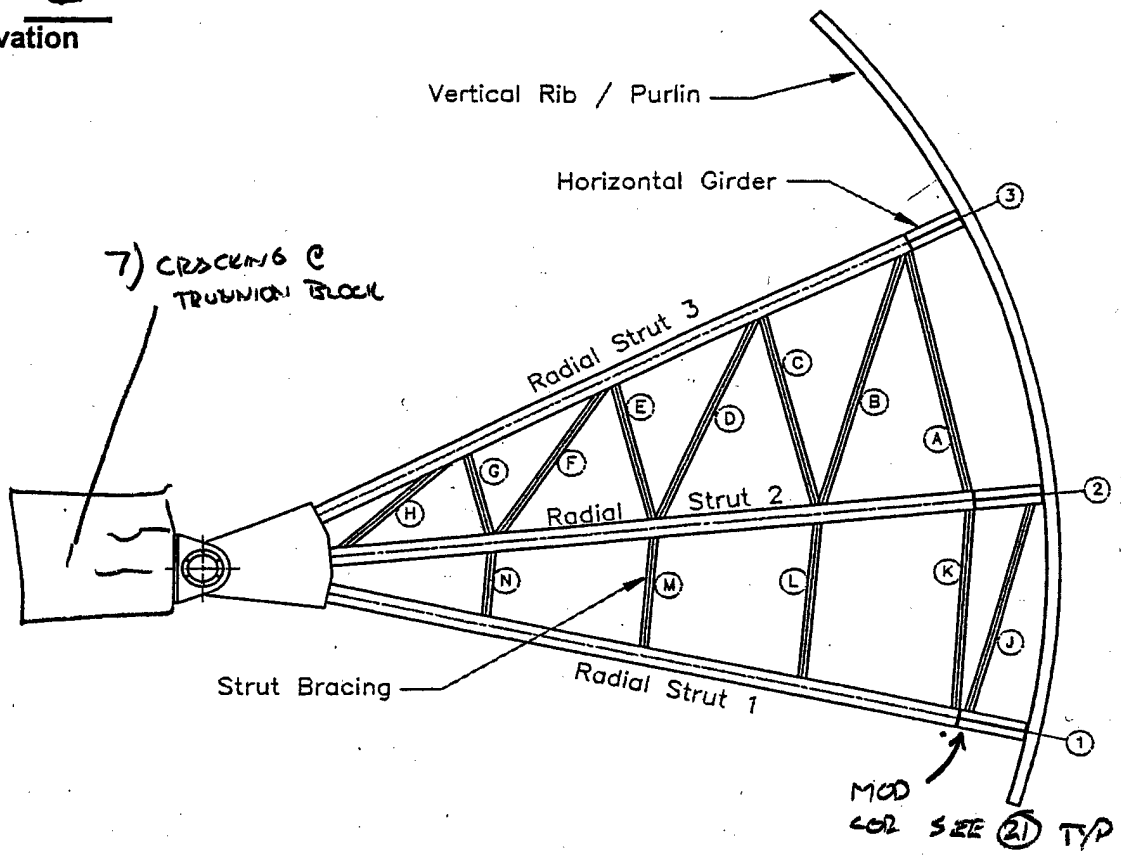
Little Goose Dam

Inspection Team (SMP) TDB HAY
Weather _____

Date 10/16
Sheet 2

Gate No. 1
Right Elevation
A-A



Member	Type	Depth d		Web t_w		Flange(s) b_f		t_f	
		Plan (in)	Measured (in)	Plan (in)	Measured (in)	Plan (in)	Measured (in)	Plan (in)	Measured (in)
Strut 3	14 WF 202	15 5/8	15 5/8	15/16	—	15 3/4	5 3/4	1 1/2	1 1/2
Strut 2	14 WF 342	17 1/2	17 1/2	1 9/16	—	16 3/8	16 3/8	2 7/16	2 1/2
Strut 1	14 WF 398	18 1/4	18 1/4	1 13/16	1 13/16	16 5/8	16 3/8	2 13/16	2 13/16
Brace A	14 WF 30	13 7/8	13 7/8	5/16	5/16	6 3/4	6 3/4	3/8	3/8
Brace B	14 WF 30	13 7/8	13 7/8	5/16	5/16	6 3/4	6 3/4	3/8	3/8
Brace C	14 WF 30	13 7/8	13 7/8	5/16	5/16	6 3/4	6 3/4	3/8	3/8
Brace D	14 WF 30	13 7/8	14	5/16	5/16	6 3/4	6 3/4	3/8	3/8
Brace E	14 WF 30	13 7/8	13 7/8	5/16	5/16	6 3/4	6 3/4	3/8	3/8
Brace F	14 WF 30	13 7/8	13 15/16	5/16	5/16	6 3/4	6 3/4	3/8	3/8
Brace G	14 WF 30	13 7/8	13 7/8	5/16	5/16	6 3/4	6 3/4	3/8	3/8
Brace H	14 WF 30	13 7/8	14	5/16	5/16	6 3/4	6 3/4	3/8	3/8
Brace J	14 WF 30	13 7/8	14	5/16	5/16	6 3/4	6 3/4	3/8	3/8
Brace K	14 WF 30	13 7/8	14	5/16	5/16	6 3/4	6 3/4	3/8	3/8
Brace L	14 WF 30	13 7/8	13 7/8	5/16	5/16	6 3/4	6 3/4	3/8	3/8
Brace M	14 WF 30	13 7/8	13 7/8	5/16	5/16	6 3/4	6 3/4	3/8	3/8
Brace N	14 WF 30	13 7/8	13 7/8	5/16	5/16	6 3/4	6 3/4	3/8	3/8

LEFT FRAME MORE COR THAN RIGHT

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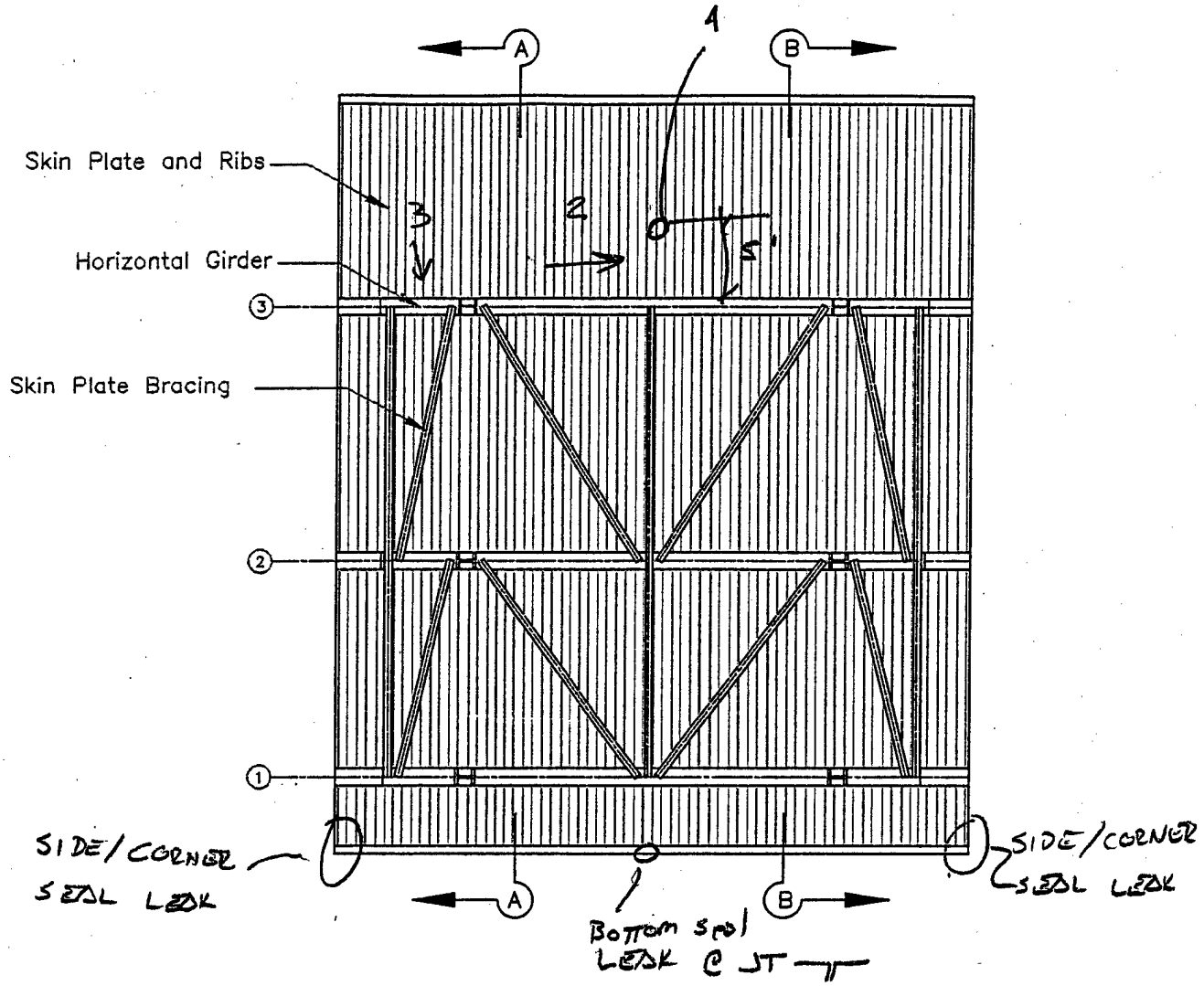
Little Goose Dam

Inspection Team (SMP) TDB HAY
Weather

Date 10/16
Sheet 3

Gate No. 1 **Downstream Elevation**



Member	Type	Depth d		Web t_w		Flange - End b_f		t_f	
		Plan (in)	Measured (in)	Plan (in)	Measured (in)	Plan (in)	Measured (in)	Plan (in)	Measured (in)
Horiz. Girder 3	PL Girder	49 3/4	49 7/8	7/16	7/16	16	16	7/8	7/8
Horiz. Girder 2	PL Girder	60 1/2	60 1/2	3/4	13/16	16 1/2	16 1/2	1 1/4	1 5/16
Horiz. Girder 1	PL Girder	60 1/2	60 1/2	1		16 1/2	16 1/2	1 1/4	1 5/16
Purlins	ST 10 WF 31	10 1/2	10 1/2	13/32	—	8 1/4	8 1/4	5/8	5/8
Skin Plate Bracing	ST 7 WF 15	7	7 1/8	1/4	1/4	6 3/4	6 3/4	3/8	3/8

LIGHT SURFACE COR - EVIDENCE STANDING WATER

2) TYP TOP GIRDER

3) TYP LIGHT COR

4) POSSIBLE PREV. WELD & GRIND PATCH

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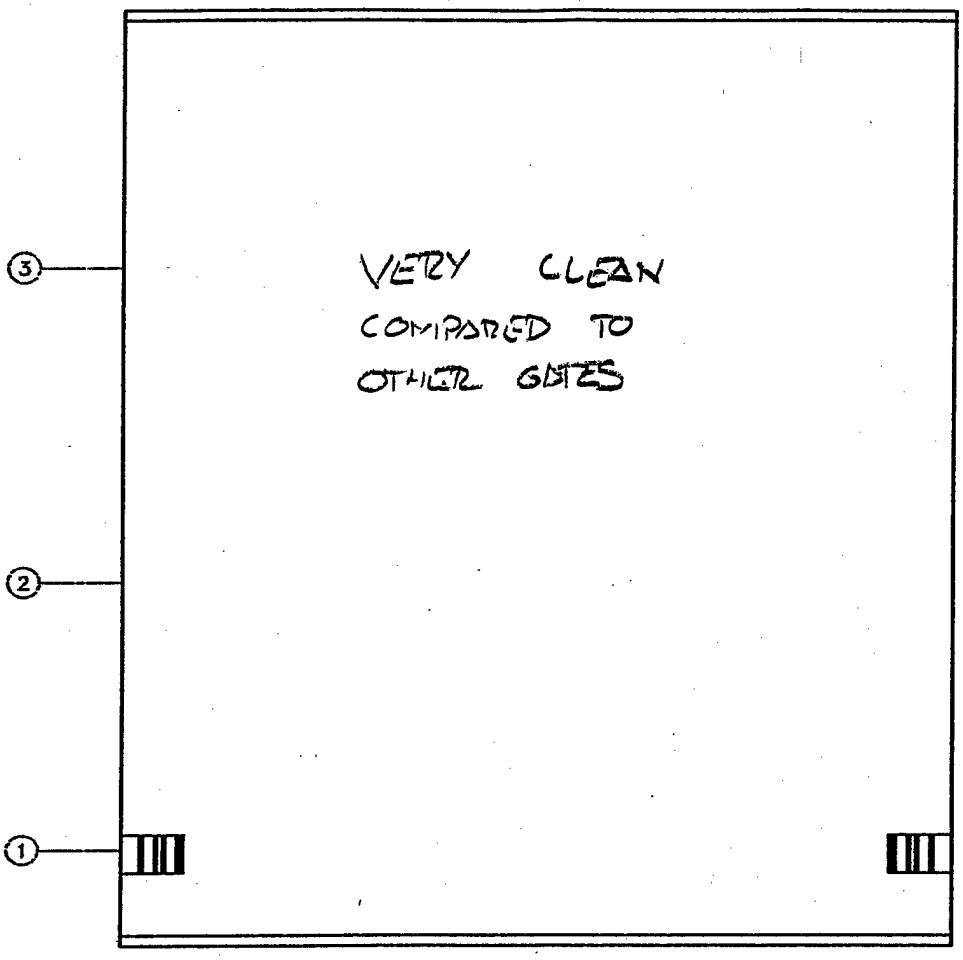
Little Goose Dam

Inspection Team (SMP) TDB HAY
Weather

Date
Sheet 4

Gate No. 1 **Upstream Elevation**



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Little Goose Dam

Inspection Team SMP TDB HAY AMA
Weather CLDY 23°

Date 10/21
Sheet 5

Gate No. 1 **Operation and Trunnion Measurements**

Racking Measurements: Bottom of Gate and Spillway

LEFT	RIGHT
39 1/4	39 1/4

Transverse Trunnion Hub Movement, No Load on Gate: Closed-Open-Closed

	LEFT		RIGHT	
	Inside	Outside (pier)	Inside	Outside (pier)
Initial Gate Closed	20/32	14/32	20/32	15/32
Gate Full Open	19/32	15/32	20/32	15/32
Final Gate Closed	20/32	14/32	20/32	15/32

3-D Trunnion Hub Movements - Unloaded vs. Loaded

	LEFT				RIGHT			
	No Load Void Dry		Full Load Void Full		No Load Void Dry		Full Load Void Full	
Vertical	0.0000		-0.0065		0.0000		0.0000	
US / DS	0.0000		+0.0335		+0.0065		+0.0365	
Transverse	29/32	15/32	29/32	15/32	29/32	14/32	21/32	14/32
	Inside	Outside	Inside	Outside	Inside	Outside	Inside	Outside

HDR Engineering, Inc.
Corp of Engineers - Walla Walla
Little Goose Dam

Inspection Team SMP TDB HAY (AMA)
Weather SUNNY 65

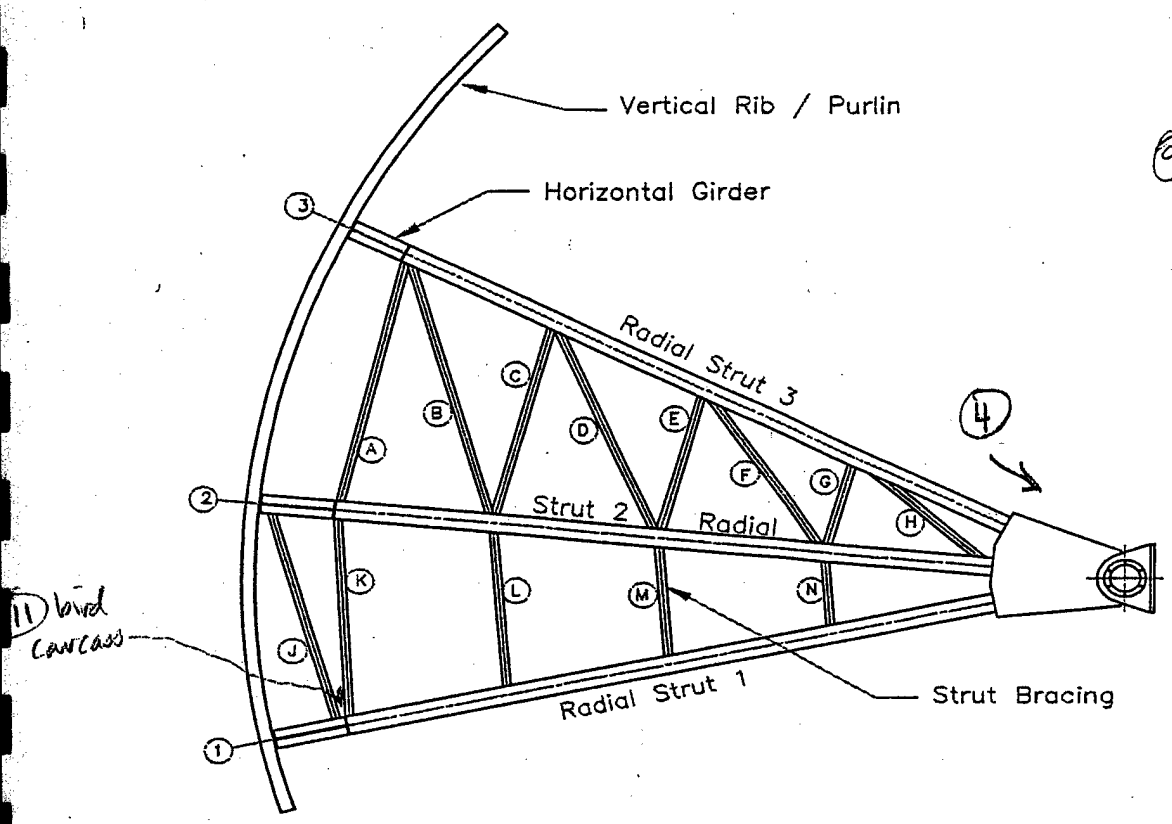
Date 10/17/00
Sheet 1

Gate No. 2
Left Elevation B-B

(9) US side of brace N typical light surface rust

(14) entire frame from bottom brace

(11) bird carcass

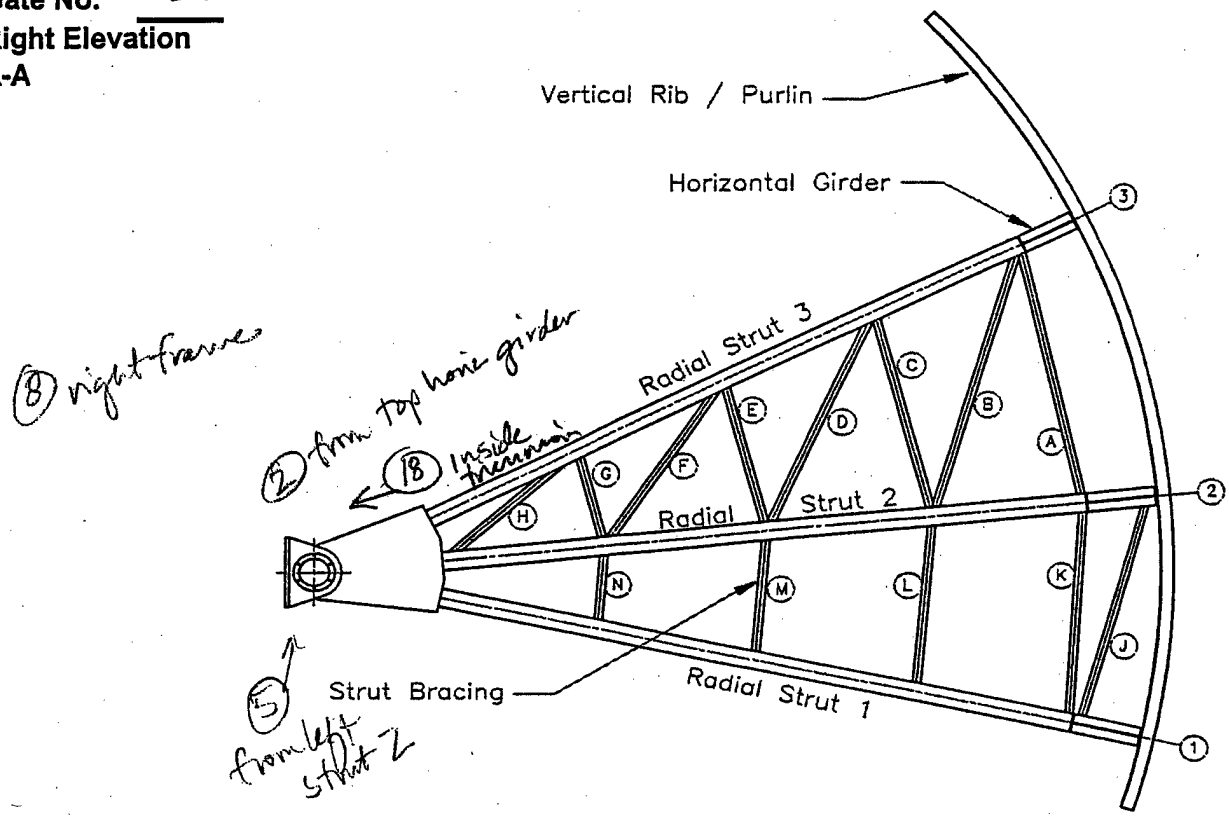


Member	Type	Depth d		Web t_w		Flange(s) b_f		t_f	
		Plan (in)	Measured (in)	Plan (in)	Measured (in)	Plan (in)	Measured (in)	Plan (in)	Measured (in)
Strut 3	14 WF 202	15 5/8	15 5/8	15/16		15 3/4	15 3/4	1 1/2	1 1/2
Strut 2	14 WF 342	17 1/2	17 3/4	1 9/16		16 3/8	16 3/8	2 7/16	2 7/16
Strut 1	14 WF 398	18 1/4	18 5/16	1 13/16	1 3/4	16 5/8	16 1/2	2 13/16	2 3/4
Brace A	14 WF 30	13 7/8	14	5/16		6 3/4	6 7/8	3/8	3/8
Brace B	14 WF 30	13 7/8	14	5/16		6 3/4	6 3/4	3/8	3/8
Brace C	14 WF 30	13 7/8	14	5/16		6 3/4	6 3/4	3/8	3/8
Brace D	14 WF 30	13 7/8	13 7/8	5/16		6 3/4	6 7/8	3/8	3/8
Brace E	14 WF 30	13 7/8	14	5/16		6 3/4	6 3/4	3/8	3/8
Brace F	14 WF 30	13 7/8	14	5/16		6 3/4	6 7/8	3/8	3/8
Brace G	14 WF 30	13 7/8	14	5/16		6 3/4	6 3/4	3/8	3/8
Brace H	14 WF 30	13 7/8	14	5/16		6 3/4	6 3/4	3/8	3/8
Brace J	14 WF 30	13 7/8	14	5/16		6 3/4	6 7/8	3/8	3/8
Brace K	14 WF 30	13 7/8	14	5/16		6 3/4	6 7/8	3/8	3/8
Brace L	14 WF 30	13 7/8	14	5/16		6 3/4	6 3/4	3/8	3/8
Brace M	14 WF 30	13 7/8	14	5/16		6 3/4	6 3/4	3/8	3/8
Brace N	14 WF 30	13 7/8	14	5/16		6 3/4	6 3/4	3/8	3/8

HDR Engineering, Inc.
Corp of Engineers - Walla Walla
Little Goose Dam

Inspection Team SMP TDB HAY (AMA) Date 10/17
Weather _____ Sheet 2

Gate No. 2
Right Elevation
A-A



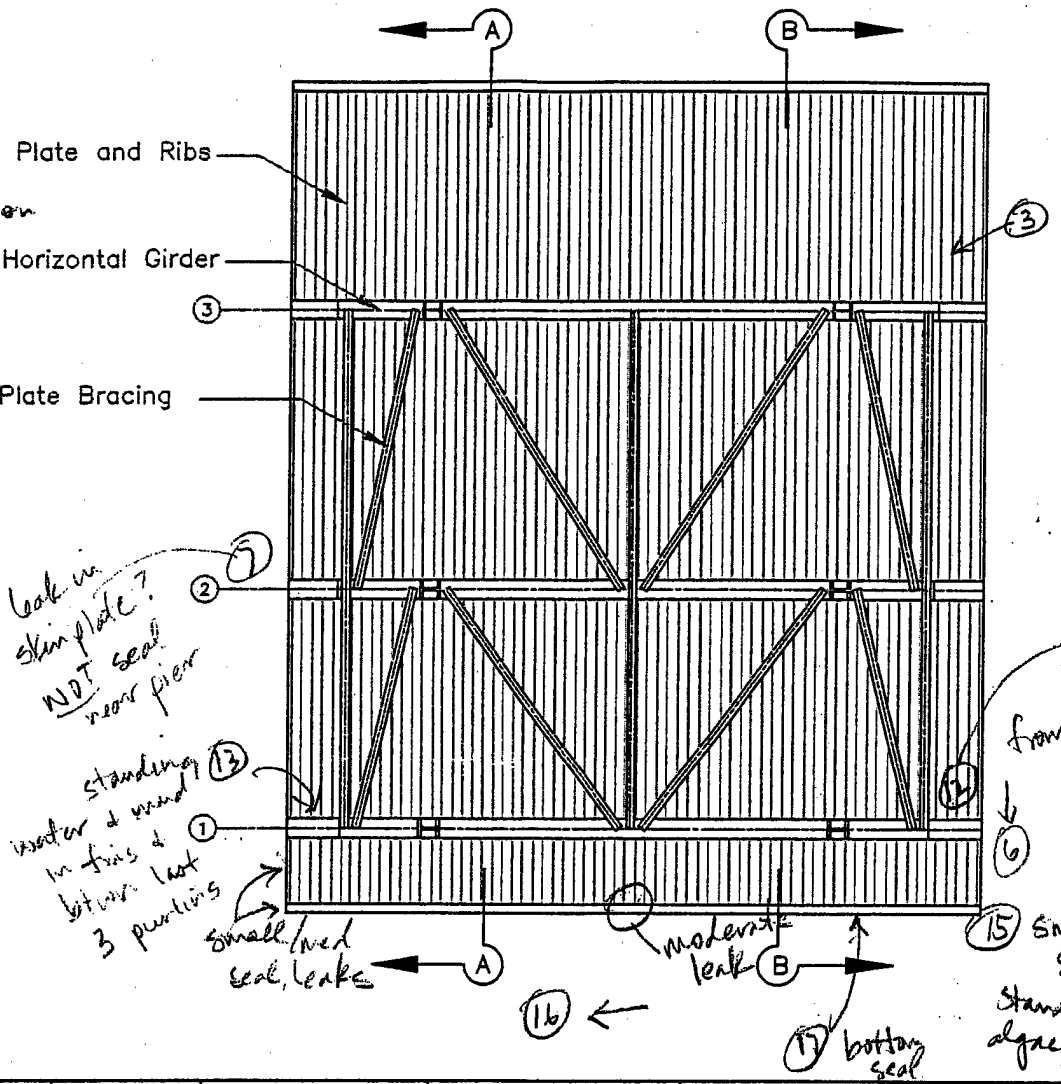
Member	Type	Depth d		Web t_w		Flange(s) b_f		t_f	
		Plan (in)	Measured (in)	Plan (in)	Measured (in)	Plan (in)	Measured (in)	Plan (in)	Measured (in)
Strut 3	14 WF 202	15 5/8		15/16		15 3/4		1 1/2	
Strut 2	14 WF 342	17 1/2	17 1/2	1 9/16		16 3/8	16 3/8	2 7/16	2 7/16
Strut 1	14 WF 398	18 1/4	18 3/8	1 13/16	1 3/4	16 5/8	16 1/2	2 13/16	2 13/16
Brace A	14 WF 30	13 7/8	14	5/16		6 3/4	6 3/4	3/8	3/8
Brace B	14 WF 30	13 7/8		5/16		6 3/4		3/8	
Brace C	14 WF 30	13 7/8		5/16		6 3/4		3/8	
Brace D	14 WF 30	13 7/8		5/16		6 3/4		3/8	
Brace E	14 WF 30	13 7/8		5/16		6 3/4		3/8	
Brace F	14 WF 30	13 7/8		5/16		6 3/4		3/8	
Brace G	14 WF 30	13 7/8		5/16		6 3/4		3/8	
Brace H	14 WF 30	13 7/8		5/16		6 3/4		3/8	
Brace J	14 WF 30	13 7/8	13 7/8	5/16		6 3/4	6 3/4	3/8	3/8
Brace K	14 WF 30	13 7/8	14	5/16		6 3/4	6 3/4	3/8	3/8
Brace L	14 WF 30	13 7/8	14	5/16		6 3/4	6 3/4	3/8	3/8
Brace M	14 WF 30	13 7/8	14	5/16		6 3/4	6 3/4	3/8	3/8
Brace N	14 WF 30	13 7/8	14	5/16		6 3/4	6 3/4	3/8	3/8

HDR Engineering, Inc.
Corp of Engineers - Walla Walla
Little Goose Dam

Inspection Team SMP TDB HAY AMA
Weather

Date 10/17
Sheet 3

Gate No. 2 **Downstream Elevation**



light surface rust on stem of purlins most near flange

pics noted looking upstream

leak in skinplate? NDT seal near pier

standing water & mud in this & between last 3 purlins

fine w/mud clogs (also from grid 2 btwn last 3 purlins

small/med seal leaks

moderate leak

small side seal leak - standing water w/ algae/mud btwn

bottom seal

all purlins & bottom lip

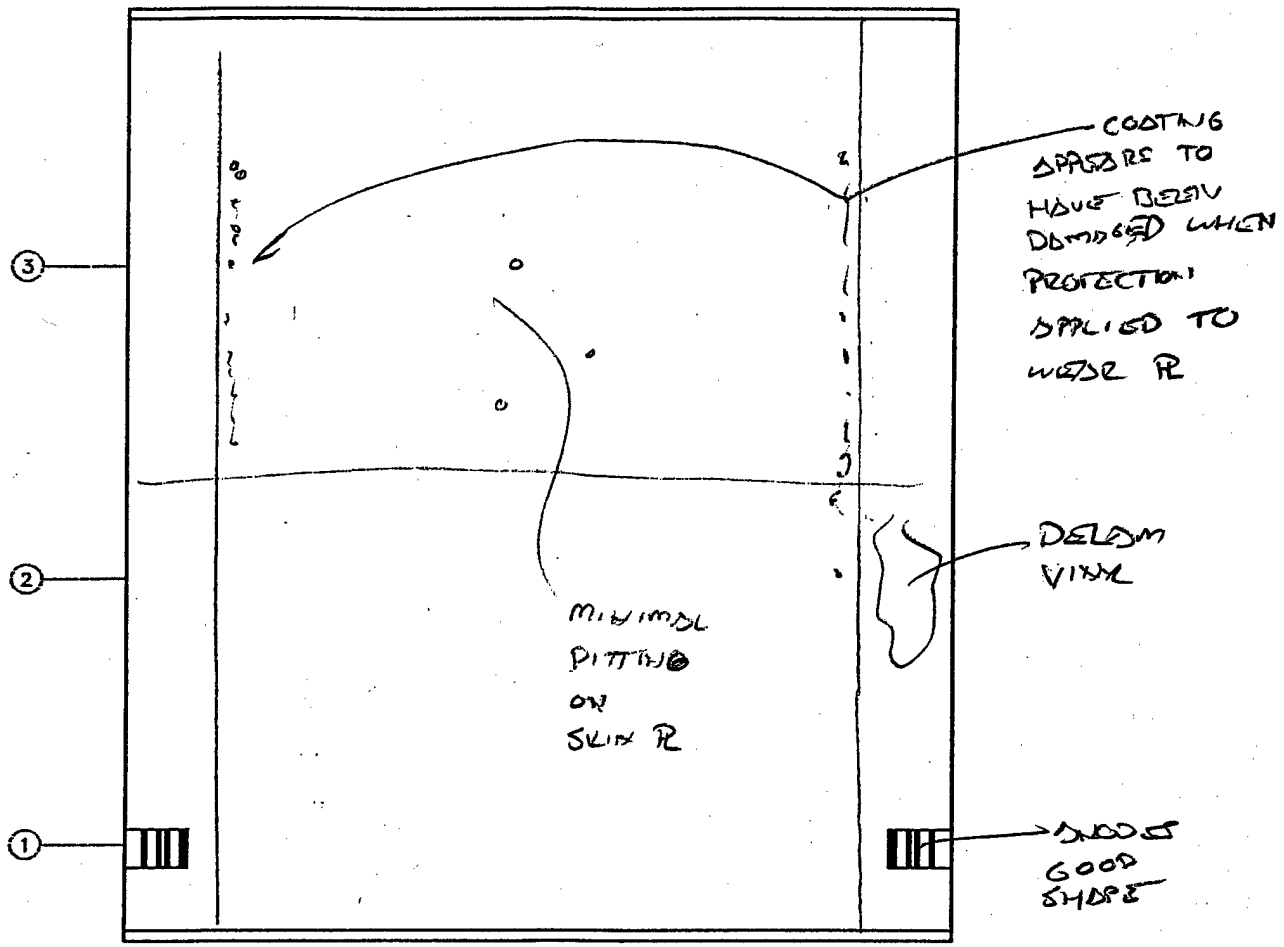
Member	Type	Depth d		Web t_w		Flange - End b_f		t_f	
		Plan (in)	Measured (in)	Plan (in)	Measured (in)	Plan (in)	Measured (in)	Plan (in)	Measured (in)
Horiz. Girder 3	PL Girder	49 3/4	50	7/16	7/16	16	16	7/8	30/32
Horiz. Girder 2	PL Girder	60 1/2	60 1/2	3/4	3/4	16 1/2	16 1/2	1 1/4	1 1/4
Horiz. Girder 1	PL Girder	60 1/2	60 1/2	1	1	16 1/2	16 1/2	1 1/4	1 1/4
Purlins	ST 10 WF 31	10 1/2	10 1/2	13/32		8 1/4	8 1/4	5/8	9/16
Skin Plate Bracing	ST 7 WF 15	7	7	1/4	5/16	6 3/4	6 7/8	3/8	3/8

HDR Engineering, Inc.
Corp of Engineers - Walla Walla
Little Goose Dam

Inspection Team (SMP) TDB HAY DMD
Weather CLDY 45

Date 10/20
Sheet 4

Gate No. 2 **Upstream Elevation**



HDR Engineering, Inc.
Corp of Engineers - Walla Walla
Little Goose Dam

Inspection Team SMP TDB HAY AMA
Weather CLDY 50

Date 10/20/00
Sheet 5

Gate No. 2 **Operation and Trunnion Measurements**

Racking Measurements: Bottom of Gate and Spillway

LEFT	RIGHT
39 1/2	39 1/2

Transverse Trunnion Hub Movement, No Load on Gate: Closed-Open-Closed

	LEFT		RIGHT	
	Inside	Outside (pier)	Inside	Outside (pier)
Initial Gate Closed	22/32	9/32	17/32	21/32
Gate Full Open	22/32	10/32	17/32	21/32
Final Gate Closed	22/32	10/32	17/32	22/32

3-D Trunnion Hub Movements - Unloaded vs. Loaded

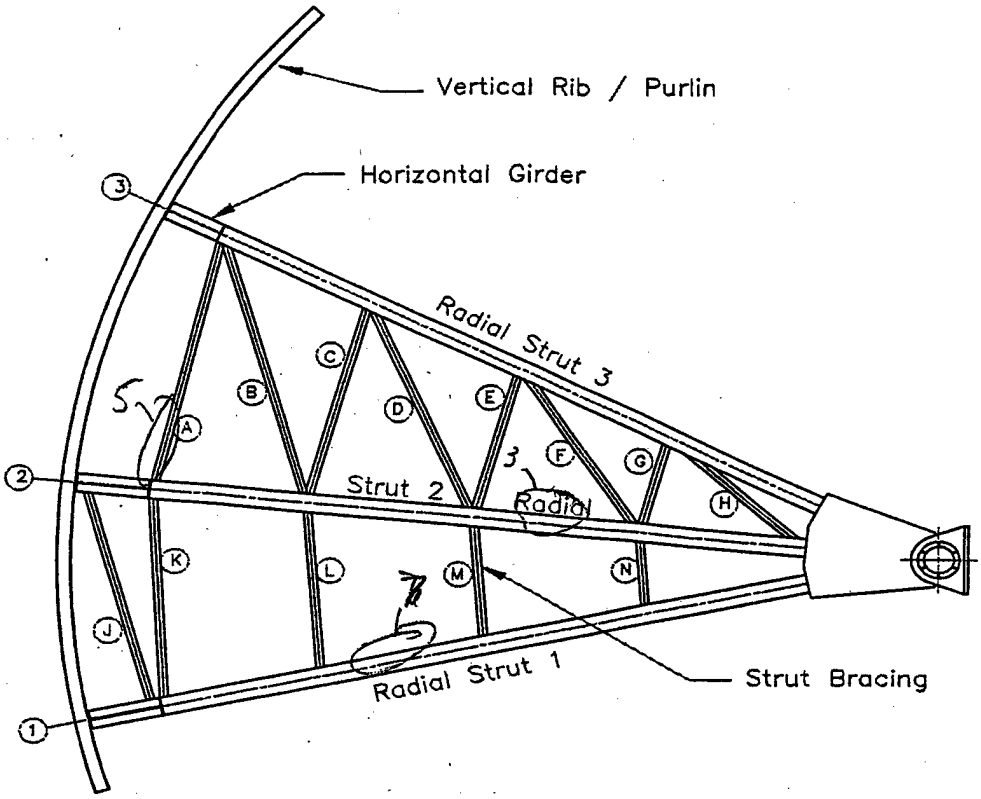
	LEFT				RIGHT			
	No Load Void Dry		Full Load Void Full		No Load Void Dry		Full Load Void Full	
Vertical	0.0000		+0.0020		-0.0005		-0.0045	
US / DS	0.0000		+0.0219		+0.0005		+0.0225	
Transverse	22/32	10/32	22/32	10/32	17/32	22/32	18/32	22/32
	Inside	Outside	Inside	Outside	Inside	Outside	Inside	Outside

HDR Engineering, Inc.
Corp of Engineers - Walla Walla
Little Goose Dam

Inspection Team SMP TDB HAY
Weather OVERCAST, 64°

Date 10/12/2000
Sheet 1

Gate No. 3
Left Elevation B-B



Member	Type	Depth d		Web t_w		Flange(s) b_f		t_f	
		Plan (in)	Measured (in)	Plan (in)	Measured (in)	Plan (in)	Measured (in)	Plan (in)	Measured (in)
Strut 3	14 WF 202	15 5/8	15 3/4	15/16		15 3/4	15 3/4	1 1/2	1 1/2
Strut 2	14 WF 342	17 1/2	17 7/16	1 9/16		16 3/8	16 3/8	2 7/16	2 7/16
Strut 1	14 WF 398	18 1/4	18 1/4	1 13/16		16 5/8	16 1/2	2 13/16	2 13/16
Brace A	14 WF 30	13 7/8	13 7/8	5/16		6 3/4	6 13/16	3/8	3/8
Brace B	14 WF 30	13 7/8	14	5/16		6 3/4	6 3/4	3/8	3/8
Brace C	14 WF 30	13 7/8	13 15/16	5/16		6 3/4	6 3/4	3/8	3/8
Brace D	14 WF 30	13 7/8	13 15/16	5/16		6 3/4	6 3/4	3/8	3/8
Brace E	14 WF 30	13 7/8	13 15/16	5/16		6 3/4	6 13/16	3/8	3/8
Brace F	14 WF 30	13 7/8	13 7/8	5/16		6 3/4	6 7/8	3/8	3/8
Brace G	14 WF 30	13 7/8	13 15/16	5/16		6 3/4	6 3/4	3/8	3/8
Brace H	14 WF 30	13 7/8	14 3/16	5/16		6 3/4	6 3/4	3/8	3/8
Brace J	14 WF 30	13 7/8	13 15/16	5/16		6 3/4	6 3/4	3/8	3/8
Brace K	14 WF 30	13 7/8	13 15/16	5/16		6 3/4	6 3/4	3/8	3/8
Brace L	14 WF 30	13 7/8	13 15/16	5/16		6 3/4	6 3/4	3/8	3/8
Brace M	14 WF 30	13 7/8	13 15/16	5/16		6 3/4	6 3/4	3/8	3/8
Brace N	14 WF 30	13 7/8	13 15/16	5/16		6 3/4	6 3/4	3/8	3/8

3. Splattered Concrete on Second Strut.

4. OVERALL Shot of LFT Frame NOTE. Concrete Splatter and Light Rust

5. Vert Brace Light Rust Typ. All braces

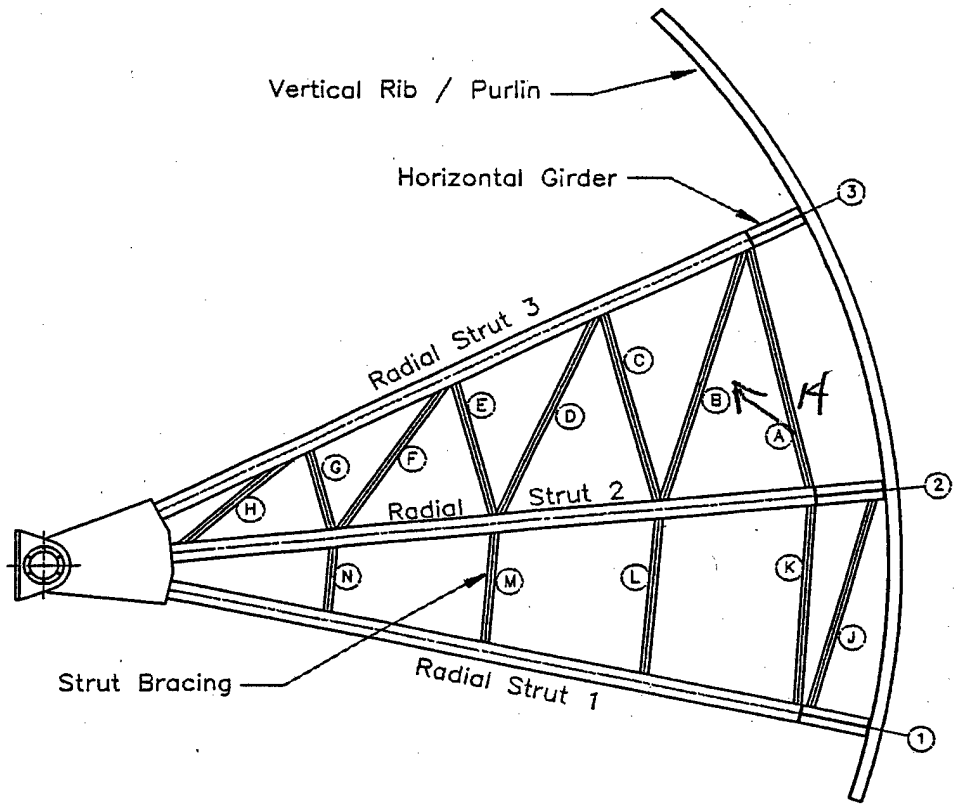
2. Concrete Splatter on Bot. Strut

HDR Engineering, Inc.
Corp of Engineers - Walla Walla
Little Goose Dam

Inspection Team SMP TDB HAY
Weather

Date 10/12
Sheet 2

Gate No. 3
Right Elevation
A-A



Member	Type	Depth d		Web t_w		Flange(s) b_f		t_f	
		Plan (in)	Measured (in)	Plan (in)	Measured (in)	Plan (in)	Measured (in)	Plan (in)	Measured (in)
Strut 3	14 WF 202	15 5/8	15 13/16	15/16		15 3/4	15 3/4	1 1/2	1 1/2
Strut 2	14 WF 342	17 1/2	17 1/2	1 9/16		16 3/8	16 1/4	2 7/16	2 7/2
Strut 1	14 WF 398	18 1/4	18 3/16	1 13/16		16 5/8	16 7/16	2 13/16	2 11/16
Brace A	14 WF 30	13 7/8	13	5/16		6 3/4	6 3/4	3/8	3/8
Brace B	14 WF 30	13 7/8	13 7/8	5/16		6 3/4	6 3/4	3/8	3/8
Brace C	14 WF 30	13 7/8	13 13/16	5/16		6 3/4	6 13/16	3/8	3/8
Brace D	14 WF 30	13 7/8	13 15/16	5/16		6 3/4	6 15/16	3/8	3/8
Brace E	14 WF 30	13 7/8	13 3/4	5/16		6 3/4	6 15/16	3/8	3/8
Brace F	14 WF 30	13 7/8	13 7/8	5/16		6 3/4	6 13/16	3/8	3/8
Brace G	14 WF 30	13 7/8	13 15/16	5/16		6 3/4	6 3/4	3/8	3/8
Brace H	14 WF 30	13 7/8	13 15/16	5/16		6 3/4	6 3/4	3/8	3/8
Brace J	14 WF 30	13 7/8	14	5/16		6 3/4	6 3/4	3/8	3/8
Brace K	14 WF 30	13 7/8	14	5/16		6 3/4	6 13/16	3/8	3/8
Brace L	14 WF 30	13 7/8	13 15/16	5/16		6 3/4	6 3/4	3/8	3/8
Brace M	14 WF 30	13 7/8	13 15/16	5/16		6 3/4	6 3/4	3/8	3/8
Brace N	14 WF 30	13 7/8	13 7/8	5/16		6 3/4	6 3/4	3/8	3/8

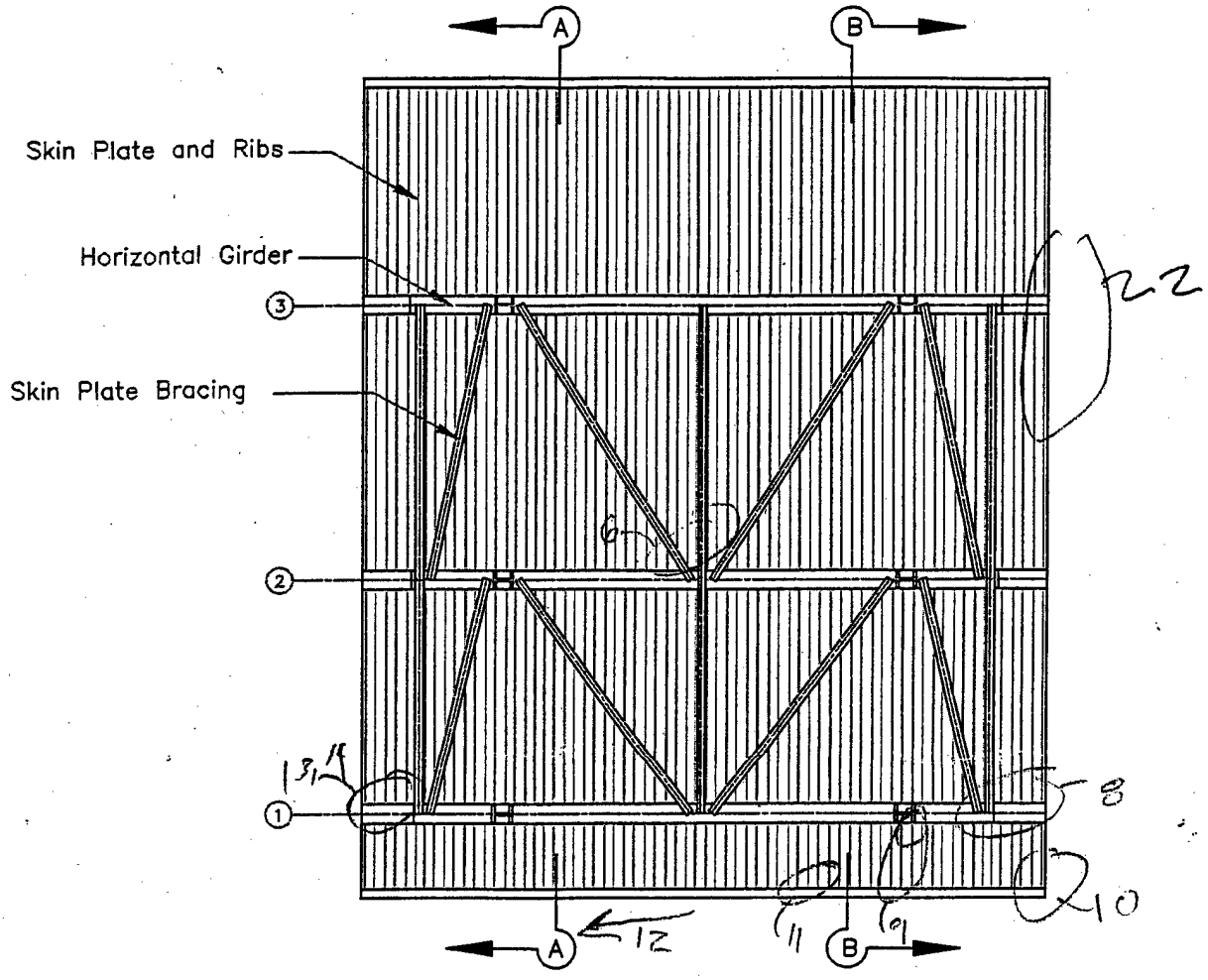
14. Shot of FRM. NOTE Light Rust on most Members

HDR Engineering, Inc.
Corp of Engineers - Walla Walla
Little Goose Dam

Inspection Team SMP TDB HAY
Weather

Date 10/12
Sheet 3

Gate No. 3 **Downstream Elevation**



Member	Type	Depth d		Web t_w		Flange - End b_f		t_f	
		Plan (in)	Measured (in)	Plan (in)	Measured (in)	Plan (in)	Measured (in)	Plan (in)	Measured (in)
Horiz. Girder 3	PL Girder	49 3/4	50	7/16	7/16	16	16	7/8	7/8
Horiz. Girder 2	PL Girder	60 1/2	60 7/16	3/4	3/4	16 1/2	16 9/16	1 1/4	1 1/4
Horiz. Girder 1	PL Girder	60 1/2	60 1/2	1	1 1/16	16 1/2	16 1/2	1 1/4	1 1/4
Purlins	ST 10 WF 31	10 1/2	10 1/2	13/32	9/16	8 1/4	8 5/16	5/8	
Skin Plate Bracing	ST 7 WF 15	7	7	1/4	5/16	6 3/4	6 3/4	3/8	3/8

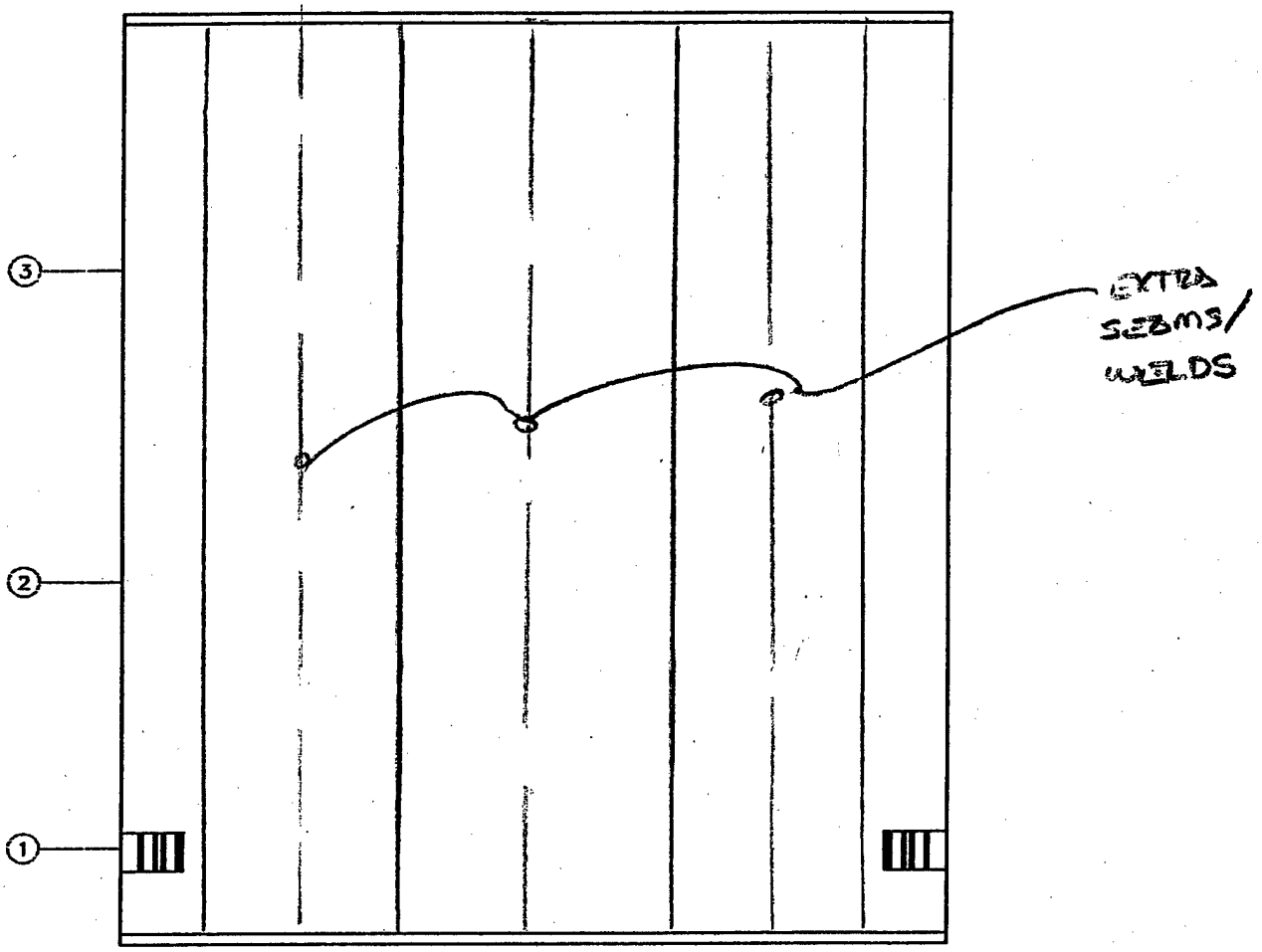
2. LEFT Purlin Light Rust W/ Min Deposits
6. Light Rust ON Bracing Typ.
8. Standing H_2O on Bot. Girder NOTE Light Rust
9. Drain hole W/ Continuous Flow from above
10. SIDE Seal leak. (LEFT)
11. Standing H_2O and Muck @ Bot. Pt.
12 looking RT. Along bottom Seal
13, 14 Moderate to heavy Rust @ Bot Girder @ Brace Mts

HDR Engineering, Inc.
Corp of Engineers - Walla Walla
Little Goose Dam

Inspection Team (SMP) TDB HAY AMD
Weather

Date 10/19
Sheet 4

Gate No. 3 **Upstream Elevation**



- VERY LITTLE COR.
- NOT PITS TOP 20'

HDR Engineering, Inc.
Corp of Engineers - Walla Walla
Little Goose Dam

Inspection Team SMP TDB HAY AMA
Weather SUNNY 70

Date 10/19/00
Sheet 5

Gate No. 3 **Operation and Trunnion Measurements**

Racking Measurements: Bottom of Gate and Spillway

LEFT	RIGHT
42	42

Transverse Trunnion Hub Movement, No Load on Gate: Closed-Open-Closed

	LEFT		RIGHT	
	Inside	Outside (pier)	Inside	Outside (pier)
Initial Gate Closed	28/32	18/32	18/32	14/32
Gate Full Open	28/32	18/32	18/32	14/32
Final Gate Closed	28/32	18/32	18/32	14/32

3-D Trunnion Hub Movements - Unloaded vs. Loaded

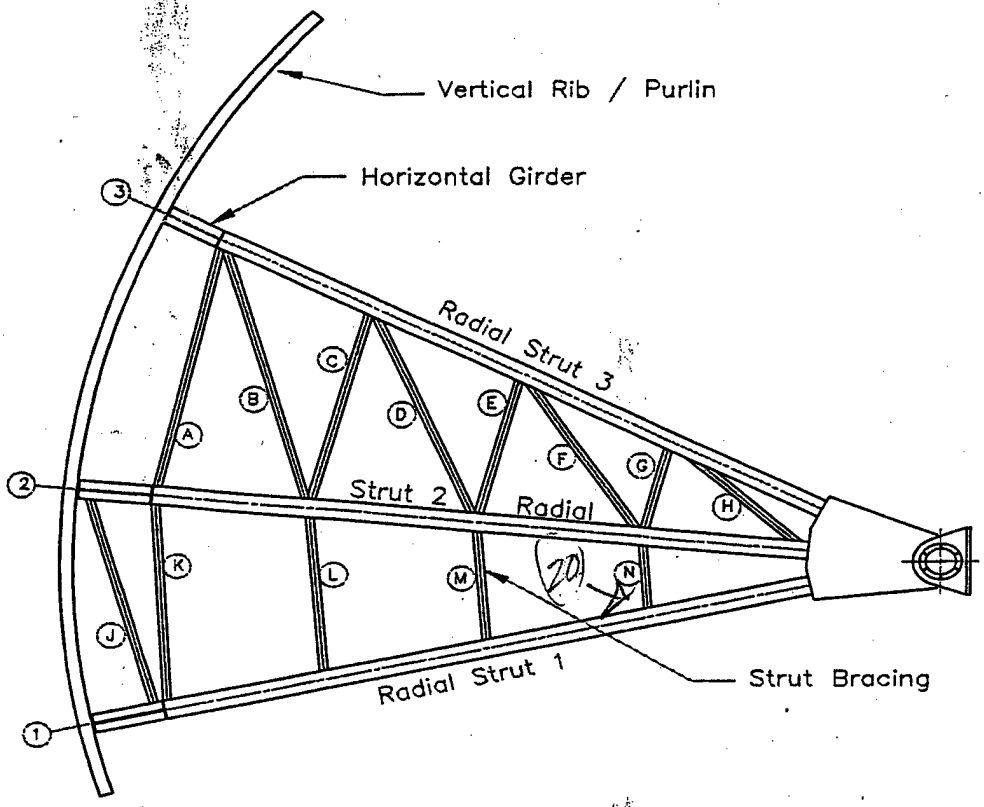
	LEFT				RIGHT			
	No Load Void Dry		Full Load Void Full		No Load Void Dry		Full Load Void Full	
Vertical	+0.0005		+0.0070		-0.0010		-0.0130	
US / DS	0.0000		+0.0308		-0.0025		+0.0250	
Transverse	28/32	18/32	28/32	18/32	18/32	14/32	19/32	13/32
	Inside	Outside	Inside	Outside	Inside	Outside	Inside	Outside

HDR Engineering, Inc.
Corp of Engineers - Walla Walla
Little Goose Dam

Inspection Team SMP TDB HAY
Weather OVERCAST 62°

Date 10/12/00
Sheet 1

Gate No. 4
Left Elevation B-B



Member	Type	Depth d		Web t_w		Flange(s)			
						b_f		t_f	
		Plan (in)	Measured (in)	Plan (in)	Measured (in)	Plan (in)	Measured (in)	Plan (in)	Measured (in)
Strut 3	14 WF 202	15 5/8	15 1/16	15/16	—	15 3/4	✓	1 1/2	✓
Strut 2	14 WF 342	17 1/2		1 9/16	—	16 3/8	✓	2 7/16	✓
Strut 1	14 WF 398	18 1/4	✓	1 13/16	—	16 5/8	16 1/2	2 13/16	✓
Brace A	14 WF 30	13 7/8	14	5/16	—	6 3/4	✓	3/8	5/16
Brace B	14 WF 30	13 7/8	13 15/16	5/16	—	6 3/4	✓	3/8	5/16
Brace C	14 WF 30	13 7/8	13 15/16	5/16	—	6 3/4	✓	3/8	5/16
Brace D	14 WF 30	13 7/8	13 15/16	5/16	—	6 3/4	✓	3/8	5/16
Brace E	14 WF 30	13 7/8	14	5/16	—	6 3/4	13 15/16	3/8	✓
Brace F	14 WF 30	13 7/8	✓	5/16	—	6 3/4	✓	3/8	5/16
Brace G	14 WF 30	13 7/8	✓	5/16	—	6 3/4	16 3/4	3/8	✓
Brace H	14 WF 30	13 7/8	✓	5/16	—	6 3/4	✓ 13/16	3/8	5/16
Brace J	14 WF 30	13 7/8	14	5/16	—	6 3/4	✓	3/8	1/4
Brace K	14 WF 30	13 7/8	14	5/16	—	6 3/4	✓	3/8	✓
Brace L	14 WF 30	13 7/8	13 3/4	5/16	—	6 3/4	16 7/16	3/8	✓
Brace M	14 WF 30	13 7/8	14	5/16	—	6 3/4	✓	3/8	✓
Brace N	14 WF 30	13 7/8	14	5/16	—	6 3/4	✓	3/8	✓

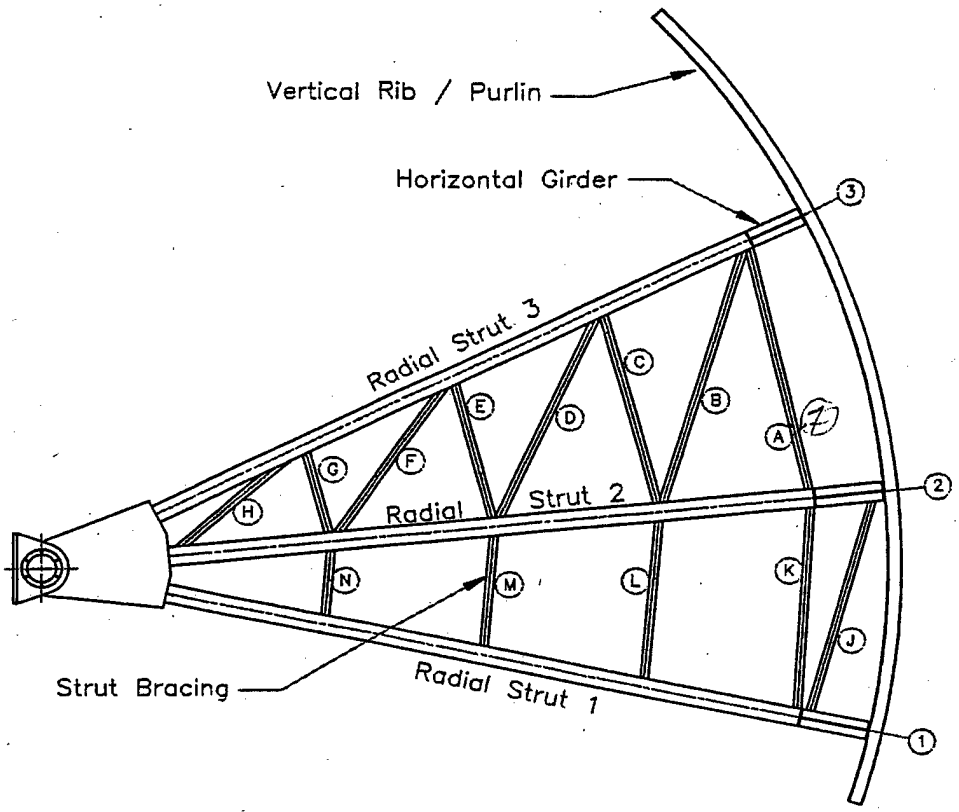
(20) 1/2 Fine layer of mud flaking off, typ.
(21) Bottom Seal, left.
(22) Spraying water, left.
(23) Gate face - minor pitting
(24) Side Seals, left.

HDR Engineering, Inc.
Corp of Engineers - Walla Walla
Little Goose Dam

Inspection Team SMP TDB HAY
Weather

Date
Sheet 2

Gate No. 4
Right Elevation
A-A



Member	Type	Depth d		Web t_w		Flange(s) b_f		Flange(s) t_f	
		Plan (in)	Measured (in)	Plan (in)	Measured (in)	Plan (in)	Measured (in)	Plan (in)	Measured (in)
Strut 3	14 WF 202	15 5/8		15/16		15 3/4		1 1/2	
Strut 2	14 WF 342	17 1/2		1 9/16		16 3/8		2 7/16	
Strut 1	14 WF 398	18 1/4		1 13/16		16 5/8		2 13/16	
Brace A	14 WF 30	13 7/8		5/16		6 3/4		3/8	
Brace B	14 WF 30	13 7/8		5/16		6 3/4		3/8	
Brace C	14 WF 30	13 7/8		5/16		6 3/4		3/8	
Brace D	14 WF 30	13 7/8		5/16		6 3/4		3/8	
Brace E	14 WF 30	13 7/8		5/16		6 3/4		3/8	
Brace F	14 WF 30	13 7/8		5/16		6 3/4		3/8	5/16
Brace G	14 WF 30	13 7/8		5/16		6 3/4		3/8	5/16
Brace H	14 WF 30	13 7/8		5/16		6 3/4		3/8	5/16
Brace J	14 WF 30	13 7/8		5/16		6 3/4		3/8	
Brace K	14 WF 30	13 7/8		5/16		6 3/4		3/8	
Brace L	14 WF 30	13 7/8		5/16		6 3/4		3/8	
Brace M	14 WF 30	13 7/8		5/16		6 3/4		3/8	5/16
Brace N	14 WF 30	13 7/8		5/16		6 3/4		3/8	

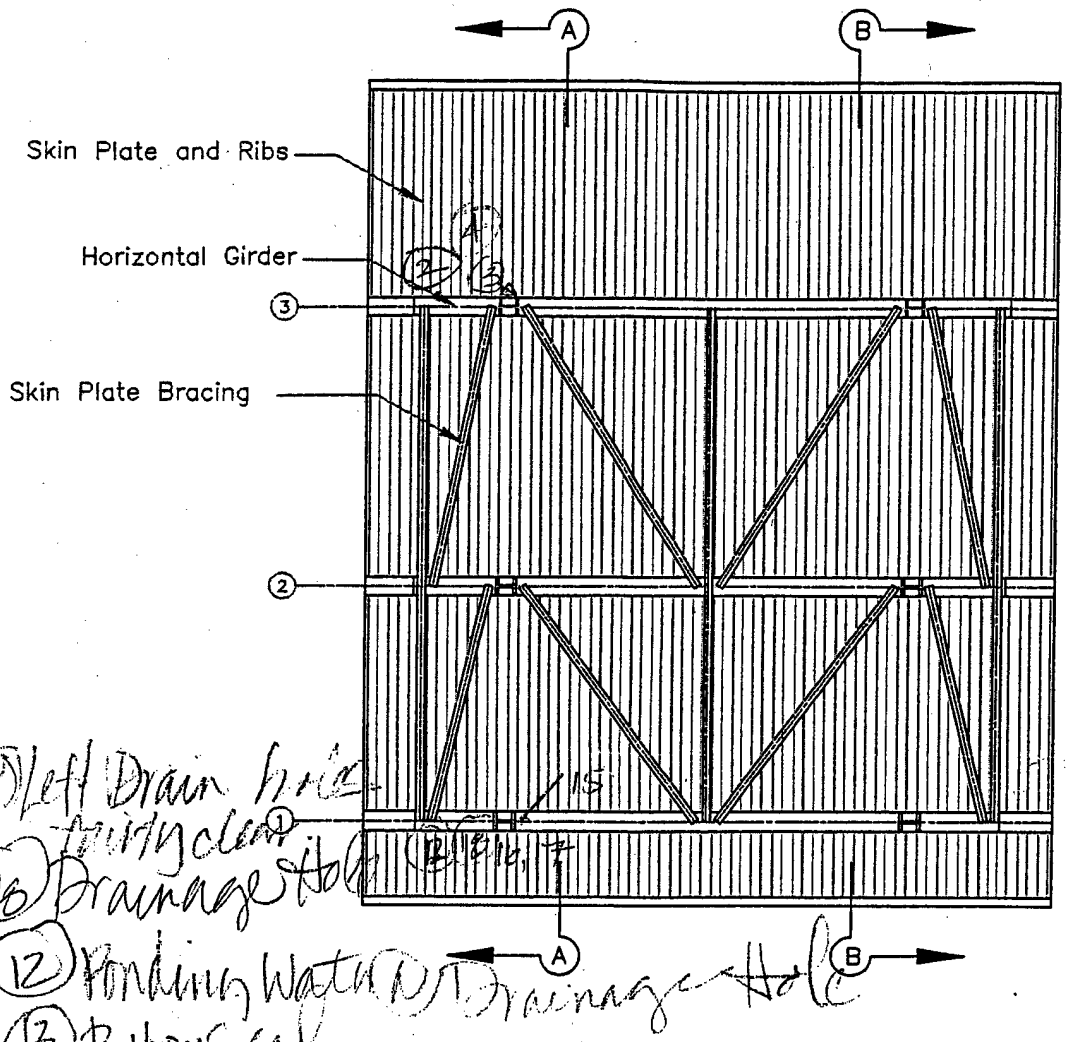
(7) Strange raised marks, like sanding buttons on skin plate also.
(8) BO
(9) Corrosion both sides, heavy at ends

HDR Engineering, Inc.
Corp of Engineers - Walla Walla
Little Goose Dam

Inspection Team SMP TDB HAY
Weather

Date
Sheet 3

Gate No. 4 **Downstream Elevation**



(15) Left Drain hole
(16) Drainage Hole
(12) Ponding Water @ Drainage Hole
(13) Bottom Seal

Member	Type	Depth d		Web t_w		Flange - End b_f		t_f	
		Plan (in)	Measured (in)	Plan (in)	Measured (in)	Plan (in)	Measured (in)	Plan (in)	Measured (in)
Horiz. Girder 3	PL Girder	49 3/4	✓	7/16	✓	16	✓	7/8	✓
Horiz. Girder 2	PL Girder	60 1/2	60 3/8	3/4	✓	16 1/2	✓	1 1/4	5/16
Horiz. Girder 1	PL Girder	60 1/2	✓	1	✓	16 1/2	✓	1 1/4	15/16
Purlins	ST 10 WF 31	10 1/2	✓	13/32	✓	8 1/4	✓	5/8	✓
Skin Plate Bracing	ST 7 WF 15	7	6 15/16	1/4	5/16	6 3/4	✓	3/8	✓

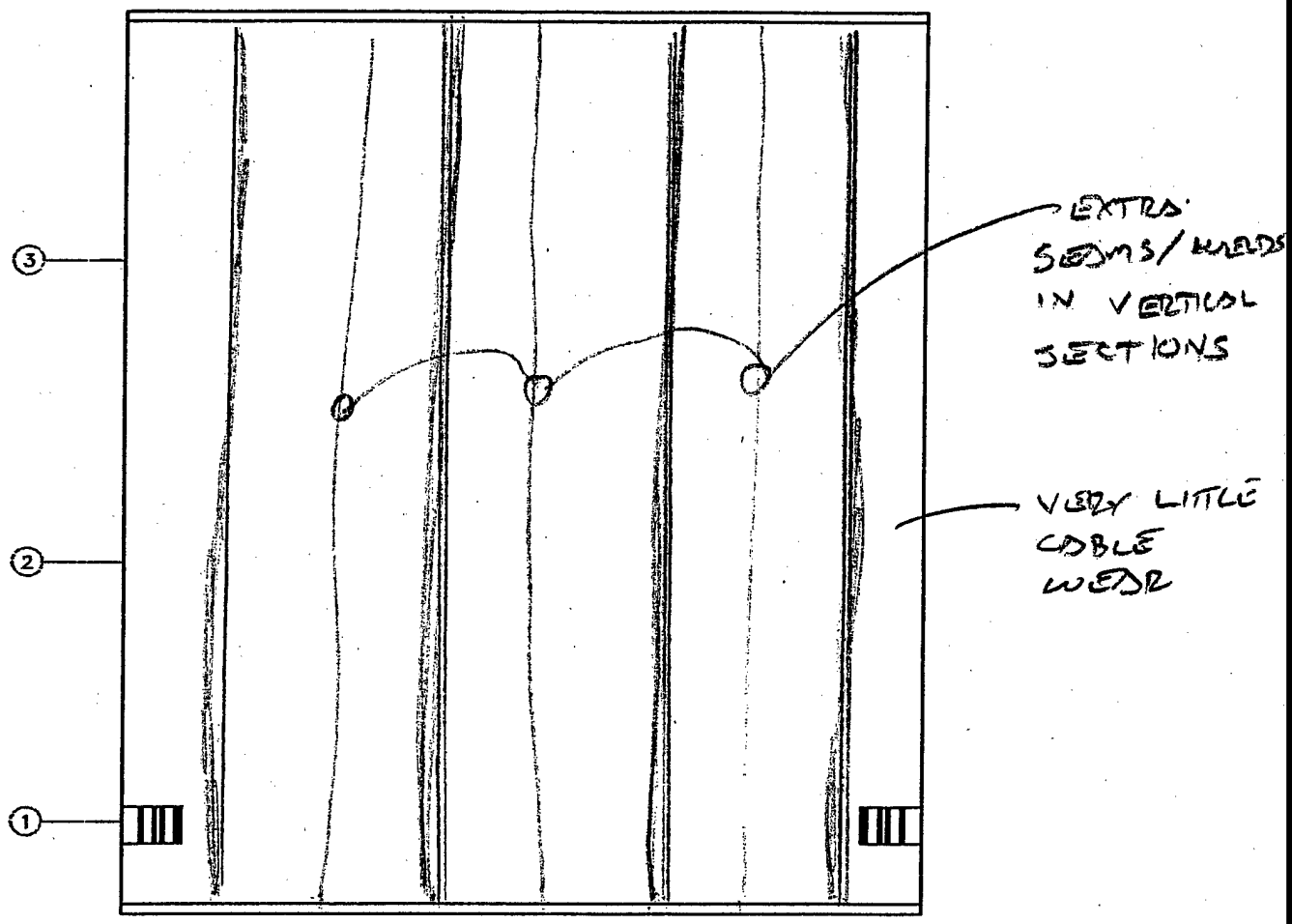
(1) Gate ID
(2) Light Rust on purlins, typ.
(3) Stiffeners not welded to plate face, typ. Corroding on ends.
(5) Right, Bottom Seal.
(4) Staining/Divits and minimal corrosion on main plate
(9) Light rust on Vertical Braces
(10) Ponding Plate bottom Girder
(16) Before, Corrosion Spots (15).
(17) After
(14) Collecting water, Bot seal, center

HDR Engineering, Inc.
Corp of Engineers - Walla Walla
Little Goose Dam

Inspection Team SMP TDB HAY AMA
Weather SUNNY 60

Date 10/19
Sheet 4

Gate No. 4 **Upstream Elevation**



- TYPICAL PITTING, LIGHTER THAN USUAL

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Little Goose Dam

Inspection Team SMP TDB HAY AMA
Weather SUNNY 60

Date 10/19/00
Sheet 5

Gate No. 4 **Operation and Trunnion Measurements**

Racking Measurements: Bottom of Gate and Spillway

LEFT	RIGHT

TOO MUCH LEAKAGE AND FLOW FROM STOPLOGS TO MEASURE

Transverse Trunnion Hub Movement, No Load on Gate: Closed-Open-Closed

	LEFT		RIGHT	
	Inside	Outside (pier)	Inside	Outside (pier)
Initial Gate Closed	15/32	13/32	14/32	27/32
Gate Full Open	15/32	12/32	14/32	27/32
Final Gate Closed	15/32	12/32	14/32	28/32

3-D Trunnion Hub Movements - Unloaded vs. Loaded

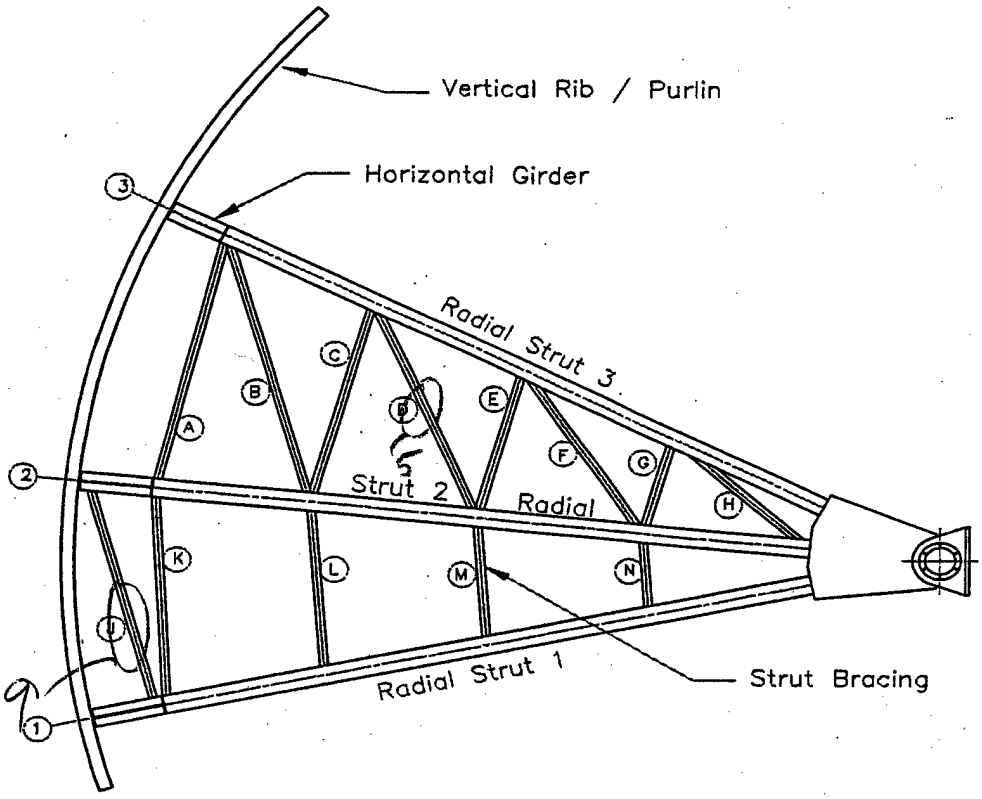
	LEFT				RIGHT			
	No Load Void Dry		Full Load Void Full		No Load Void Dry		Full Load Void Full	
Vertical	0.0000		+0.0030		-0.0010		-0.0085	
US / DS	0.0000		+0.0320		-0.0020		+0.0250	
Transverse	15/32	12/32	15/32	12/32	14/32	28/32	14/32	27/32
	Inside	Outside	Inside	Outside	Inside	Outside	Inside	Outside

HDR Engineering, Inc.
Corp of Engineers - Walla Walla
Little Goose Dam

Inspection Team SMR TDB HAY
Weather

Date 10/11/2000
Sheet 1

Gate No. 5
Left Elevation B-B



Member	Type	Depth d		Web t_w		Flange(s) b_f		t_f	
		Plan (in)	Measured (in)	Plan (in)	Measured (in)	Plan (in)	Measured (in)	Plan (in)	Measured (in)
Strut 3	14 WF 202	15 5/8	13 13/16	15/16		15 3/4	15 3/8	1 1/2	1 1/2
Strut 2	14 WF 342	17 1/2	17 1/2	1 9/16		16 3/8	16 3/16	2 7/16	2 7/16
Strut 1	14 WF 398	18 1/4	18 1/4	1 13/16		16 5/8	16 1/2	2 13/16	2 3/4
Brace A	14 WF 30	13 7/8	13 7/8	5/16		6 3/4	6 7/8	3/8	3/8
Brace B	14 WF 30	13 7/8	13 7/8	5/16		6 3/4	6 3/4	3/8	3/8
Brace C	14 WF 30	13 7/8	13 15/16	5/16		6 3/4	6 7/8	3/8	3/8
Brace D	14 WF 30	13 7/8	13 13/16	5/16		6 3/4	6 7/8	3/8	3/8
Brace E	14 WF 30	13 7/8	13 15/16	5/16		6 3/4	6 3/4	3/8	3/8
Brace F	14 WF 30	13 7/8	13 15/16	5/16		6 3/4	6 7/8	3/8	3/8
Brace G	14 WF 30	13 7/8	13 15/16	5/16		6 3/4	6 7/8	3/8	3/8
Brace H	14 WF 30	13 7/8	14	5/16		6 3/4	6 13/16	3/8	3/8
Brace J	14 WF 30	13 7/8	13 7/8	5/16		6 3/4	6 13/16	3/8	3/8
Brace K	14 WF 30	13 7/8	13 7/8	5/16		6 3/4	6 13/16	3/8	3/8
Brace L	14 WF 30	13 7/8	13 15/16	5/16		6 3/4	6 3/4	3/8	3/8
Brace M	14 WF 30	13 7/8	13 15/16	5/16		6 3/4	6 13/16	3/8	3/8
Brace N	14 WF 30	13 7/8	13 7/8	5/16		6 3/4	6 7/8	3/8	3/8

5. Paint Failure w/ Light Rust (Typ All Braces)

9. Light Rust on Dia. Braces (Typ.)

13. Overall Shot of Left Frame Note Bad Paint

HDR Engineering, Inc.
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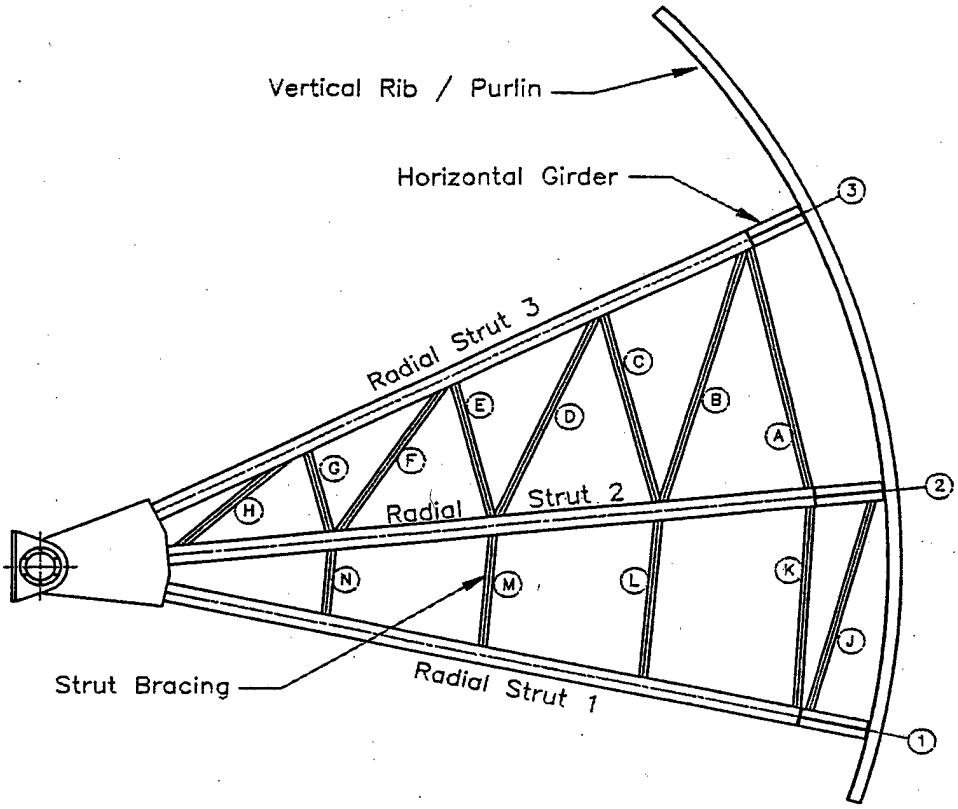
Little Goose Dam

Inspection Team SMP (TDB) HAY
Weather

Date 10/11
Sheet 2

Gate No. 5
Right Elevation
A-A



Member	Type	Depth d		Web t_w		Flange(s) b_f		t_f	
		Plan (in)	Measured (in)	Plan (in)	Measured (in)	Plan (in)	Measured (in)	Plan (in)	Measured (in)
Strut 3	14 WF 202	15 5/8	15 1/8	15/16		15 3/4	15 1/4	1 1/2	1 1/2
Strut 2	14 WF 342	17 1/2	17 1/2	1 9/16		16 3/8	16 3/16	2 7/16	2 7/16
Strut 1	14 WF 398	18 1/4	18 3/8	1 13/16		16 5/8	16 1/2	2 13/16	2 7/8
Brace A	14 WF 30	13 7/8	13 15/16	5/16		6 3/4	6 15/16	3/8	3/8
Brace B	14 WF 30	13 7/8	13 7/8	5/16		6 3/4	6 15/16	3/8	3/8
Brace C	14 WF 30	13 7/8	13 15/16	5/16		6 3/4	6 7/8	3/8	3/8
Brace D	14 WF 30	13 7/8	13 15/16	5/16		6 3/4	6 7/8	3/8	3/8
Brace E	14 WF 30	13 7/8	13 15/16	5/16		6 3/4	6 15/16	3/8	
Brace F	14 WF 30	13 7/8	14	5/16		6 3/4	6 3/4	3/8	3/8
Brace G	14 WF 30	13 7/8	13 15/16	5/16		6 3/4	6 3/4	3/8	3/8
Brace H	14 WF 30	13 7/8	13 15/16	5/16		6 3/4	6 3/4	3/8	3/8
Brace J	14 WF 30	13 7/8	13 15/16	5/16		6 3/4	6 13/16	3/8	3/8
Brace K	14 WF 30	13 7/8	13 15/16	5/16		6 3/4	6 3/4	3/8	3/8
Brace L	14 WF 30	13 7/8	13 15/16	5/16		6 3/4	6 3/4	3/8	3/8
Brace M	14 WF 30	13 7/8	13 15/16	5/16		6 3/4	6 3/4	3/8	3/8
Brace N	14 WF 30	13 7/8	13 15/16	5/16		6 3/4	6 3/4	3/8	3/8

14. OVERALL Pic of Gate

15. LEFT TRUNNION

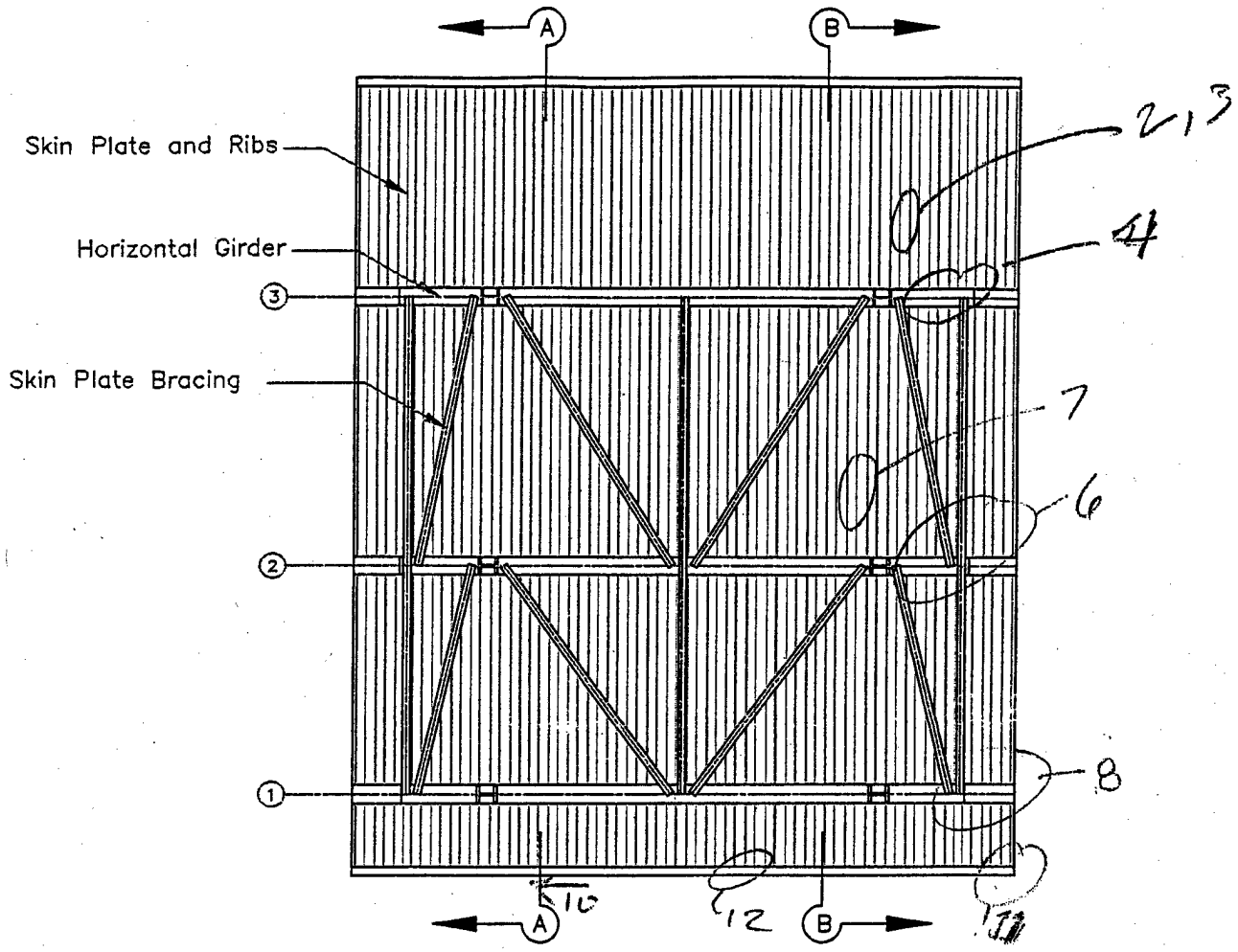
16. RT. TRUNNION W/Clogged Drain hole

HDR Engineering, Inc.
Corp of Engineers - Walla Walla
Little Goose Dam

Inspection Team SMP (TDB) HAY
Weather

Date 10/11
Sheet 3

Gate No. 5 **Downstream Elevation**



Member	Type	Depth d		Web t_w		Flange - End b_f		Flange - End t_f	
		Plan (in)	Measured (in)	Plan (in)	Measured (in)	Plan (in)	Measured (in)	Plan (in)	Measured (in)
Horiz. Girder 3	PL Girder	49 3/4	49 7/8	7/16	7/16	16	16	7/8	7/8
Horiz. Girder 2	PL Girder	60 1/2	60 1/2	3/4		16 1/2	16 1/2	1 1/4	1 1/4
Horiz. Girder 1	PL Girder	60 1/2	60 3/4	1	1 1/16	16 1/2	16 1/2	1 1/4	1 1/4
Purlins	ST 10 WF 31	10 1/2	10 1/2	13/32		8 1/4	8 1/4	5/8	5/8
Skin Plate Bracing	ST 7 WF 15	7	7	1/4	5/16	6 3/4	6 3/4	3/8	3/8

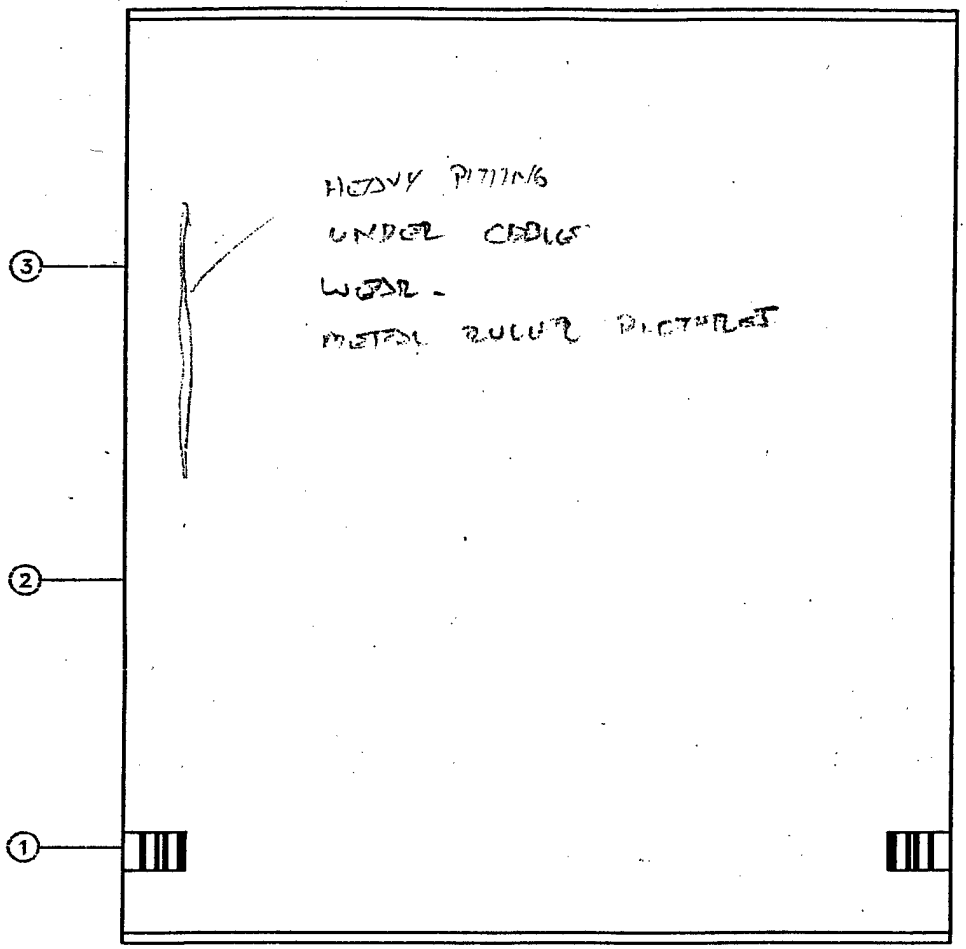
2,3. Delaminated Pnt and light Rust ON GATE FACE
4. Light Rust TOP GIRDER
6. Light Rust ON GIRDERS AND BRACES NOTE Delam ON GATE FACE
7. Delam. ON gate FACE W/ light Rust. These Delam spots ARE TYP ACROSS ENTIRE GATE FACE.
8. SIDE SEAL LEAK @ Bot GIRDER NOTE Light Rust & MINERAL Dep.
10. Bottom Seal looking Right
11. LEFT CORNER leak
12. Bottom Plate W/STANDING H2O

HDR Engineering, Inc.
Corp of Engineers - Walla Walla
Little Goose Dam

Inspection Team (SMF) TDB HAY
Weather

Date 10/18
Sheet 4

Gate No. 5 **Upstream Elevation**



- BEST CONDITION OF ANY GATES SEEN
- MINIMAL PITTING
- EXCESSIVE STOP LOG LEAK, COULD NOT GO UNDER SILL DO TO FALLING WATER -

HDR Engineering, Inc.
Corp of Engineers - Walla Walla
Little Goose Dam

Inspection Team SMP TDB HAY AMA
Weather CLDY 55°

Date 10/18
Sheet 5

Gate No. 5 **Operation and Trunnion Measurements**

Racking Measurements: Bottom of Gate and Spillway

LEFT	RIGHT
39 1/4	39

Transverse Trunnion Hub Movement, No Load on Gate: Closed-Open-Closed

	LEFT		RIGHT	
	Inside	Outside (pier)	Inside	Outside (pier)
Initial Gate Closed	22/32	16/32	20/32	18/32
Gate Full Open	21/32	15/32	20/32	18/32
Final Gate Closed	21/32	16/32	20/32	18/32

3-D Trunnion Hub Movements - Unloaded vs. Loaded

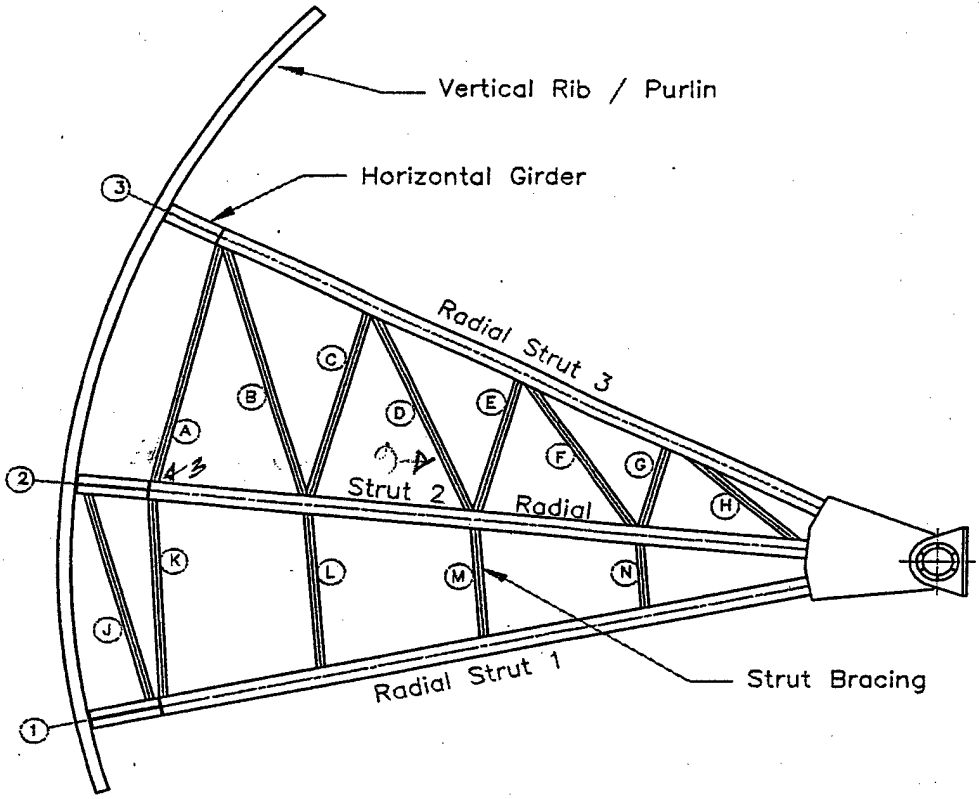
	LEFT				RIGHT			
	No Load Void Dry		Full Load Void Full		No Load Void Dry		Full Load Void Full	
Vertical	+0.0010		-0.0085		0.0005		-0.0020	
US / DS	0.0000		+0.0230		0.0000		+0.0380	
Transverse	21/32	16/32	22/32	16/32	20/32	18/32	20/32	18/32
	Inside	Outside	Inside	Outside	Inside	Outside	Inside	Outside

HDR Engineering, Inc.
Corp of Engineers - Walla Walla
Little Goose Dam

Inspection Team SMP TDB HAY
Weather OVERCAST 69°

Date 10/11/00
Sheet 1

Gate No. 6
Left Elevation B-B



Member	Type	Depth d		Web t_w		Flange(s) b_f		t_f	
		Plan (in)	Measured (in)	Plan (in)	Measured (in)	Plan (in)	Measured (in)	Plan (in)	Measured (in)
Strut 3	14 WF 202	15 5/8	✓	15/16	—	15 3/4	✓	1 1/2	✓
Strut 2	14 WF 342	17 1/2	✓	1 9/16	—	16 3/8	16 1/4	2 7/16	✓
Strut 1	14 WF 398	18 1/4	18 1/8	1 13/16	—	16 5/8	16 1/2	2 13/16	✓
Brace A	14 WF 30	13 7/8	✓	5/16	—	6 3/4	✓	3/8	✓
Brace B	14 WF 30	13 7/8	✓	5/16	—	6 3/4	✓	3/8	✓
Brace C	14 WF 30	13 7/8	✓	5/16	—	6 3/4	✓	3/8	5/16
Brace D	14 WF 30	13 7/8	✓	5/16	—	6 3/4	✓	3/8	✓
Brace E	14 WF 30	13 7/8	✓	5/16	—	6 3/4	✓	3/8	✓
Brace F	14 WF 30	13 7/8	13 15/16	5/16	—	6 3/4	✓	3/8	5/16
Brace G	14 WF 30	13 7/8	13 15/16	5/16	—	6 3/4	✓	3/8	5/16
Brace H	14 WF 30	13 7/8	14	5/16	—	6 3/4	✓	3/8	✓
Brace J	14 WF 30	13 7/8	✓	5/16		6 3/4	16 1/4	3/8	5/16
Brace K	14 WF 30	13 7/8	14	5/16	—	6 3/4	?	3/8	✓
Brace L	14 WF 30	13 7/8	✓	5/13	—	6 3/4	✓	3/8	✓
Brace M	14 WF 30	13 7/8	✓	5/16	—	6 3/4	✓	3/8	✓
Brace N	14 WF 30	13 7/8	13 3/4	5/16	—	6 3/4	✓	3/8	✓

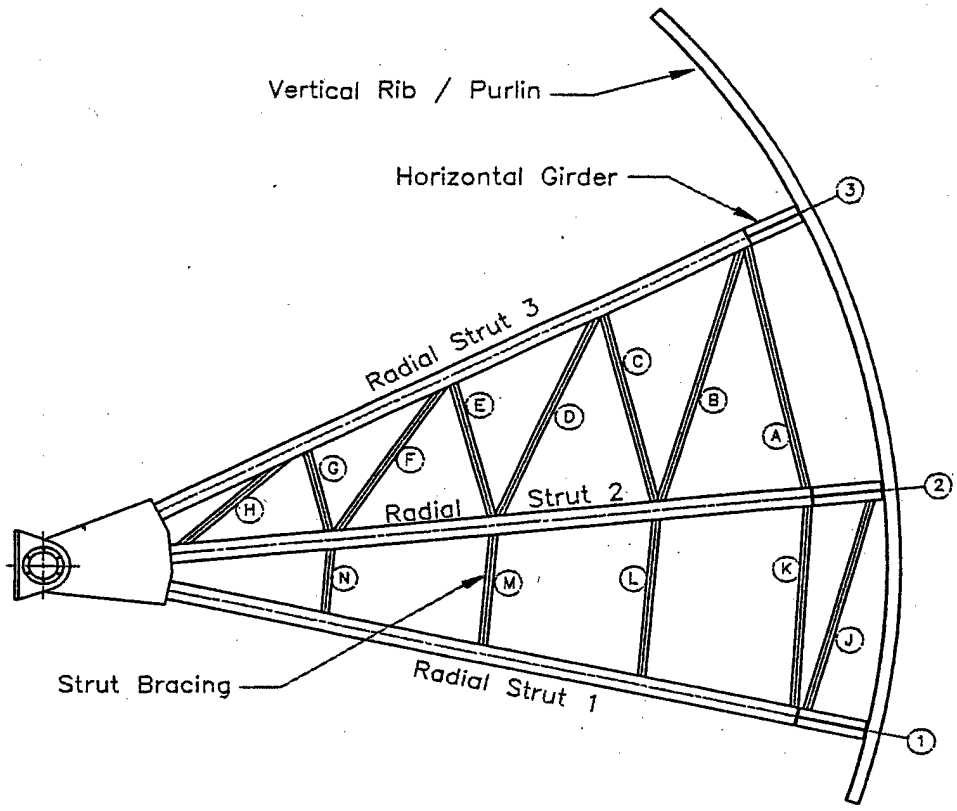
(1) Gate Tie
(2) Purlin B, typ on gate.
(3) Light Rust on A
(4) Weld 2 in inside of 4th purlin
(5) Flaking paint / fine deposits
(6) Paint line from previous.
(7) Pitting coat. Rust strut.
(8) Rust from gate motion stops.

HDR Engineering, Inc.
Corp of Engineers - Walla Walla
Little Goose Dam

Inspection Team SMP TDB HAY
Weather

Date 10/11
Sheet 2

Gate No. 10
Right Elevation
A-A



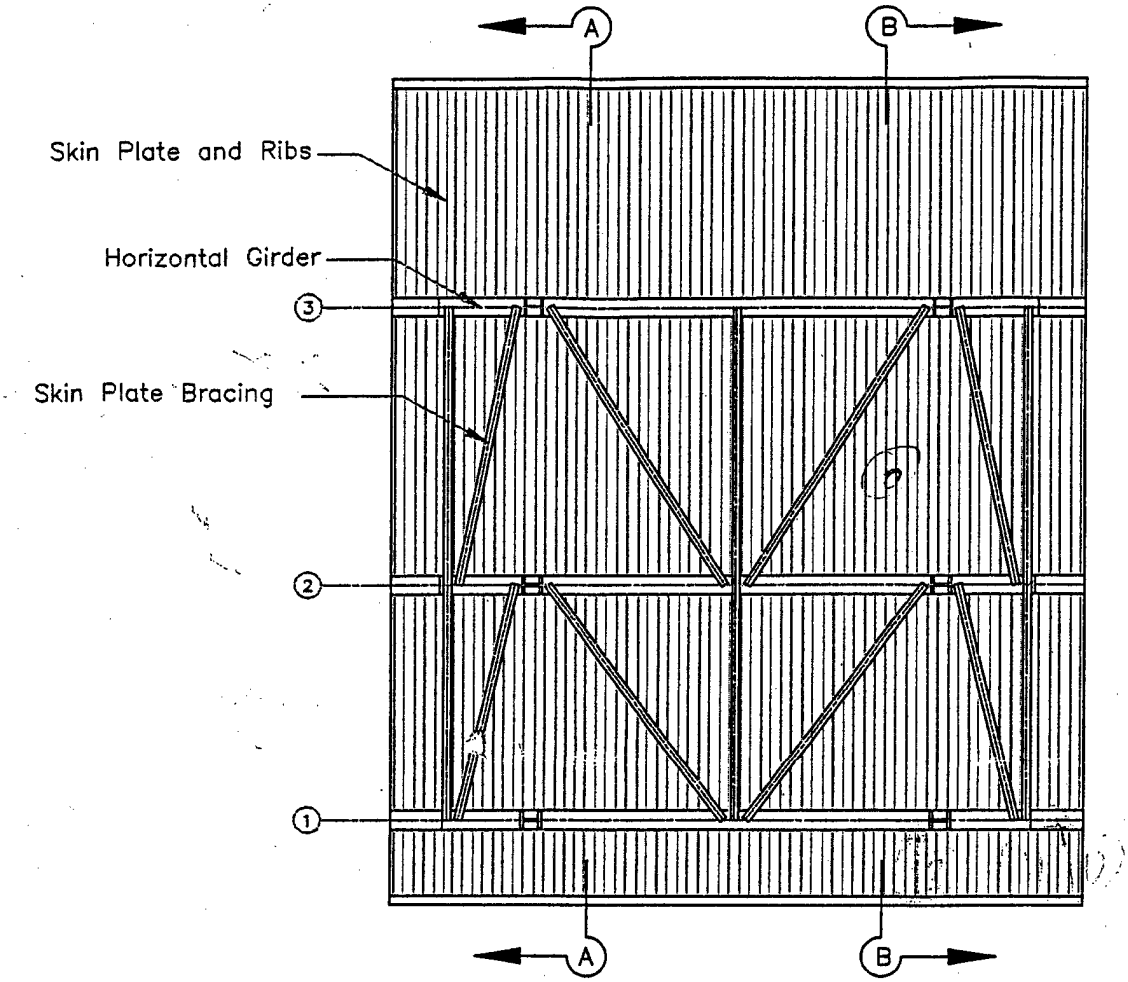
Member	Type	Depth d		Web t_w		Flange(s) b_f		t_f	
		Plan (in)	Measured (in)	Plan (in)	Measured (in)	Plan (in)	Measured (in)	Plan (in)	Measured (in)
Strut 3	14 WF 202	15 5/8	15 15/16	15/16	—	15 3/4	15 5/8	1 1/2	✓
Strut 2	14 WF 342	17 1/2	✓	1 9/16	—	16 3/8	16 1/4	2 7/16	✓
Strut 1	14 WF 398	18 1/4	✓	1 13/16	—	16 5/8	16 1/2	2 13/16	✓
Brace A	14 WF 30	13 7/8	✓	5/16	—	6 3/4	6 11/16	3/8	5/16
Brace B	14 WF 30	13 7/8	✓	5/16	—	6 3/4	✓	3/8	✓
Brace C	14 WF 30	13 7/8	13 15/16	5/16	—	6 3/4	✓	3/8	✓
Brace D	14 WF 30	13 7/8	13 15/16	5/16	—	6 3/4	✓	3/8	5/16
Brace E	14 WF 30	13 7/8	14	5/16	—	6 3/4	✓	3/8	✓
Brace F	14 WF 30	13 7/8	14	5/16	—	6 3/4	6 5/8	3/8	5/16
Brace G	14 WF 30	13 7/8	✓	5/16	—	6 3/4	✓	3/8	5/16
Brace H	14 WF 30	13 7/8	13 15/16	5/16	—	6 3/4	6 3/4	3/8	5/16
Brace J	14 WF 30	13 7/8	✓	5/16	—	6 3/4	6 5/8	3/8	5/16
Brace K	14 WF 30	13 7/8	✓	5/16	—	6 3/4	✓	3/8	5/16
Brace L	14 WF 30	13 7/8	✓	5/16	—	6 3/4	6 7/8	3/8	5/16
Brace M	14 WF 30	13 7/8	✓	5/16	—	6 3/4	✓	3/8	5/16
Brace N	14 WF 30	13 7/8	14	5/16	—	6 3/4	6 5/8	3/8	5/16

HDR Engineering, Inc.
Corp of Engineers - Walla Walla
Little Goose Dam

Inspection Team SMP TDB HAY
Weather

Date 10/11
Sheet 3

Gate No. 9 **Downstream Elevation**



(10) (20) Leak in middle, water coming through hole.

Member	Type	Depth d		Web t_w		Flange - End b_f		t_f	
		Plan (in)	Measured (in)	Plan (in)	Measured (in)	Plan (in)	Measured (in)	Plan (in)	Measured (in)
Horiz. Girder 3	PL Girder	49 3/4	✓	7/16	✓	16	✓	7/8	15/16
Horiz. Girder 2	PL Girder	60 1/2	60 3/4	3/4	✓	16 1/2	✓	1 1/4	✓
Horiz. Girder 1	PL Girder	60 1/2	60 3/4	1	—	16 1/2	✓	1 1/4	✓
Purlins	ST 10 WF 31	10 1/2	✓	13/32	—	8 1/4	✓	5/8	✓
Skin Plate Bracing	ST 7 WF 15	7	6 3/4	1/4	✓	6 3/4	✓	3/8	✓

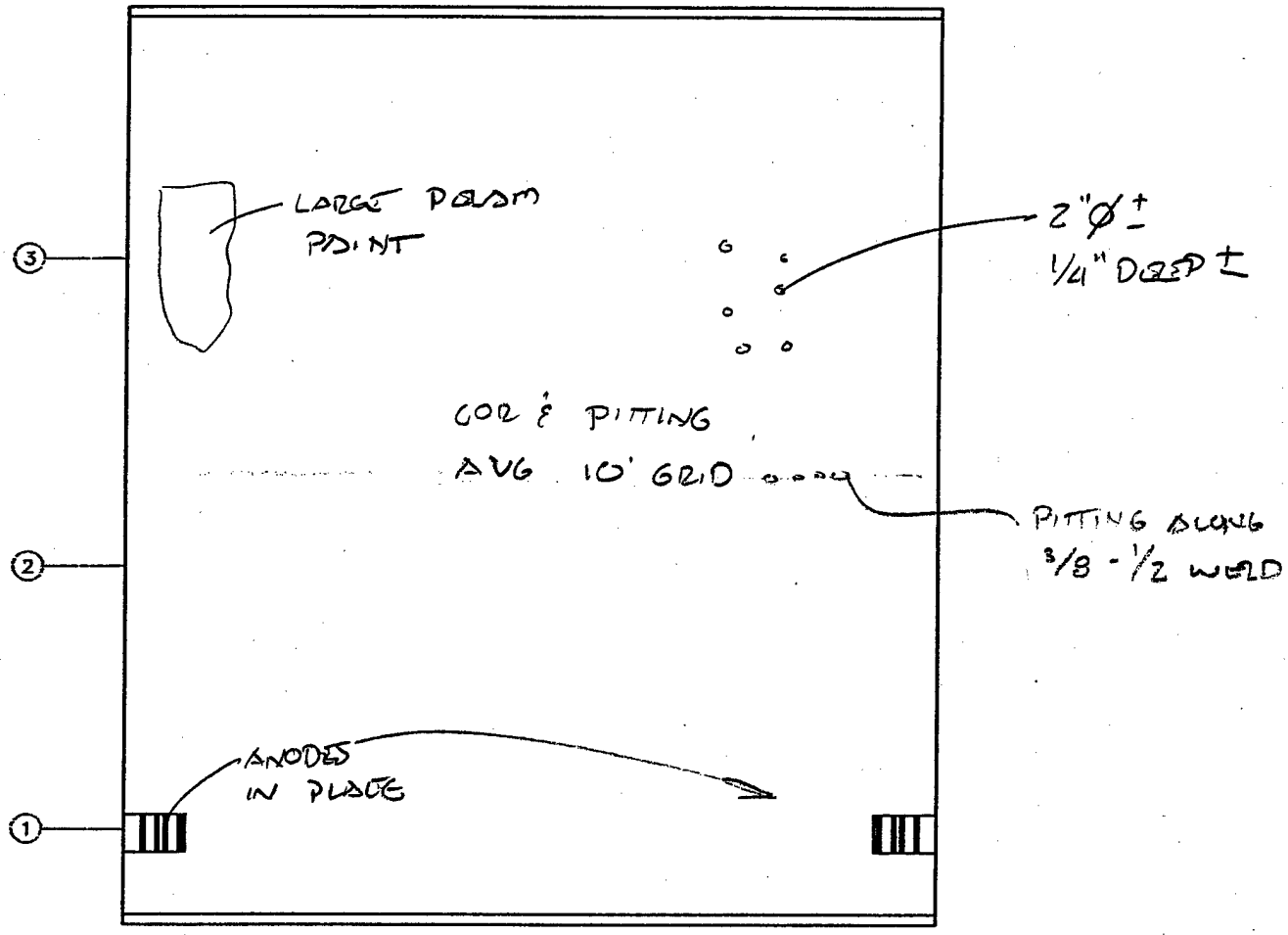
(8) Strange divits in skin plate
(11) Bottom member thin
(101) Debris [illegible]
(12) Bottom girder damage
(16) Packed drainage in bottom seal
(15) & bottom seal
(17) (18) Drainage hole from bottom girder
21) Drainage Hole Right
2223 Side seal, right

HDR Engineering, Inc.
Corp of Engineers - Walla Walla
Little Goose Dam

Inspection Team (SMP) TDB HAY AMA
Weather CLDY 45

Date 10/18
Sheet 4

Gate No. 6 **Upstream Elevation**



BRAKE MOTOR LOCKED & BURNING @ 25' OPEN 45 min delay

HDR Engineering, Inc.
Corp of Engineers - Walla Walla
Little Goose Dam

Inspection Team SMP TDB HAY AMA
Weather CLDY 55

Date 10/18/00
Sheet 5

Gate No. 6 **Operation and Trunnion Measurements**

Racking Measurements: Bottom of Gate and Spillway

LEFT	RIGHT
41	41

Transverse Trunnion Hub Movement, No Load on Gate: Closed-Open-Closed

	LEFT		RIGHT	
	Inside	Outside (pier)	Inside	Outside (pier)
Initial Gate Closed	21/32	17/32	16/32	21/32
Gate Full Open	21/32	17/32	15/32	22/32
Final Gate Closed	21/32	17/32	16/32	21/32

3-D Trunnion Hub Movements - Unloaded vs. Loaded

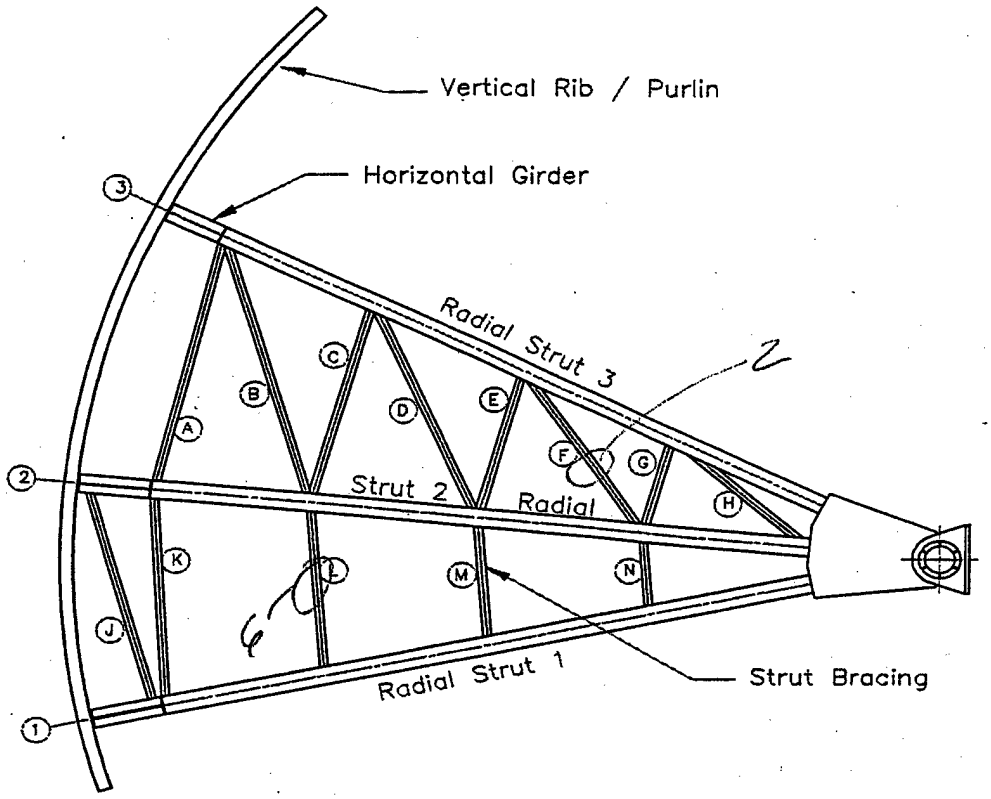
	LEFT				RIGHT			
	No Load Void Dry		Full Load Void Full		No Load Void Dry		Full Load Void Full	
Vertical	0.0000		0.0000		0.0000		0.0001	
US / DS	-0.0015		+0.0340		0.0000		+0.0450	
Transverse	21/32	17/32	21/32	17/32	16/32	21/32	16/32	21/32
	Inside	Outside	Inside	Outside	Inside	Outside	Inside	Outside

HDR Engineering, Inc.
Corp of Engineers - Walla Walla
Little Goose Dam

Inspection Team SMP (TDB) HAY
Weather Clear

WED. MORN.
Date 10/11/2000
Sheet 1

Gate No. 7
~~Left~~ Elevation B-B
Right



Member	Type	Depth d		Web t_w		Flange(s)			
						b_f		t_f	
		Plan (in)	Measured (in)	Plan (in)	Measured (in)	Plan (in)	Measured (in)	Plan (in)	Measured (in)
Strut 3	14 WF 202	15 5/8	15 5/8	15/16		15 3/4	15 3/4	1 1/2	1 1/2
Strut 2	14 WF 342	17 1/2	17 1/2	1 9/16		16 3/8	16 1/2	2 7/16	2 7/16
Strut 1	14 WF 398	18 1/4	18 3/16	1 13/16		16 5/8	16 1/2	2 13/16	2 3/4
Brace A	14 WF 30	13 7/8	13 7/8	5/16		6 3/4	6 3/4	3/8	3/8
Brace B	14 WF 30	13 7/8	13 7/8	5/16		6 3/4	6 3/4	3/8	3/8
Brace C	14 WF 30	13 7/8	13 15/16	5/16		6 3/4	6 3/4	3/8	3/8
Brace D	14 WF 30	13 7/8	13 15/16	5/16		6 3/4	6 13/16	3/8	3/8
Brace E	14 WF 30	13 7/8	13 13/16	5/16		6 3/4	6 13/16	3/8	3/8
Brace F	14 WF 30	13 7/8	13 7/8	5/16		6 3/4	6 3/4	3/8	3/8
Brace G	14 WF 30	13 7/8	13 7/8	5/16		6 3/4	6 13/16	3/8	3/8
Brace H	14 WF 30	13 7/8	13 7/8	5/16		6 3/4	6 3/4	3/8	3/8
Brace J	14 WF 30	13 7/8	13 7/8	5/16		6 3/4	6 3/4	3/8	3/8
Brace K	14 WF 30	13 7/8	13 15/16	5/16		6 3/4	6 3/4	3/8	3/8
Brace L	14 WF 30	13 7/8	13 7/8	5/16		6 3/4	6 7/16	3/8	3/8
Brace M	14 WF 30	13 7/8	13 7/8	5/16		6 3/4	6 3/4	3/8	3/8
Brace N	14 WF 30	13 7/8	13 15/16	5/16		6 3/4	6 3/4	3/8	3/8

2. FREEZE RUST @ DIA F

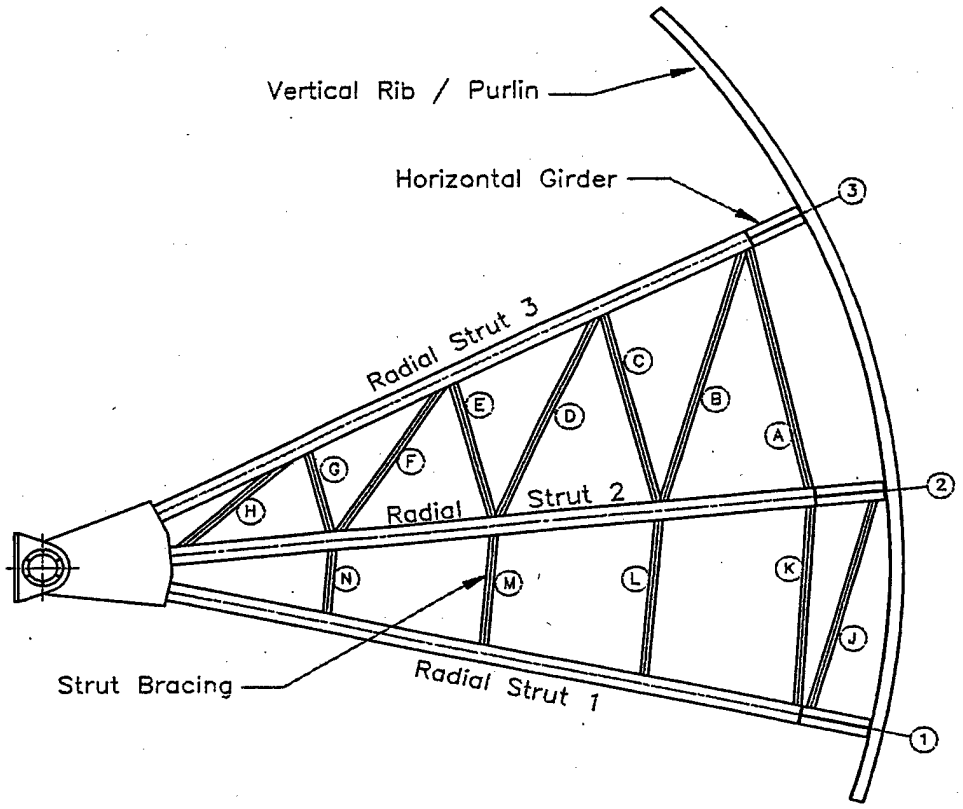
6, Deflection in Flange Vert. "L". ± 1/4" Deflection

HDR Engineering, Inc.
Corp of Engineers - Walla Walla
Little Goose Dam

Inspection Team SMP (TDB) HAY
Weather

Date 10/11
Sheet 2

Gate No. 7
Right Elevation
A-A



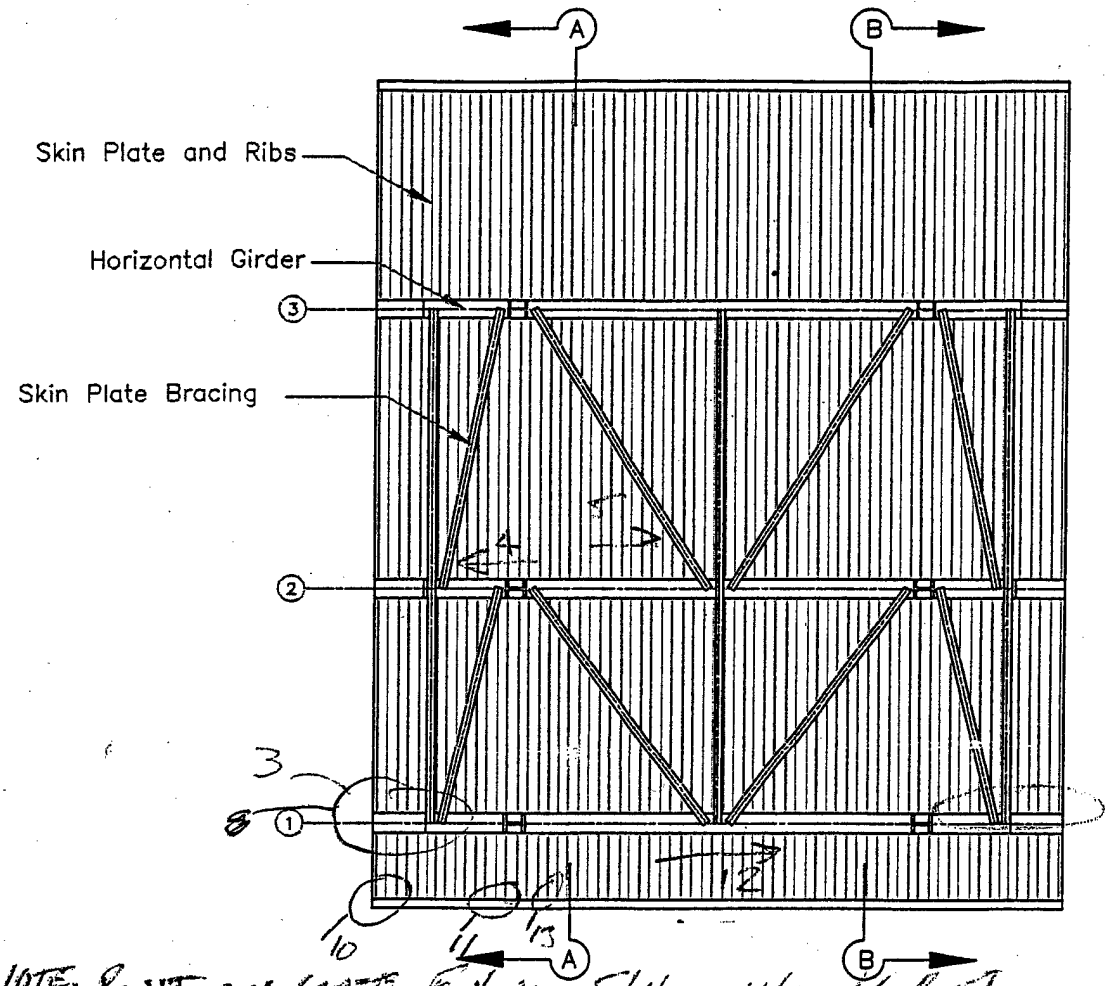
Member	Type	Depth d		Web t_w		Flange(s) b_f		t_f	
		Plan (in)	Measured (in)	Plan (in)	Measured (in)	Plan (in)	Measured (in)	Plan (in)	Measured (in)
Strut 3	14 WF 202	15 5/8	15 5/8	15/16		15 3/4	15 3/4	1 1/2	1 1/2
Strut 2	14 WF 342	17 1/2	17 1/2	1 9/16		16 3/8	16 3/16	2 7/16	2 7/16
Strut 1	14 WF 398	18 1/4	18 1/4	1 13/16		16 5/8	16 1/2	2 13/16	2 13/16
Brace A	14 WF 30	13 7/8	13 15/16	5/16		6 3/4	6 3/4	3/8	3/8
Brace B	14 WF 30	13 7/8	13 15/16	5/16		6 3/4	6 13/16	3/8	3/8
Brace C	14 WF 30	13 7/8	13 15/16	5/16		6 3/4	6 7/8	3/8	3/8
Brace D	14 WF 30	13 7/8	14	5/16		6 3/4	6 3/4	3/8	3/8
Brace E	14 WF 30	13 7/8	13 15/16	5/16		6 3/4	6 11/8	3/8	3/8
Brace F	14 WF 30	13 7/8	13 7/8	5/16		6 3/4	6 3/4	3/8	3/8
Brace G	14 WF 30	13 7/8	13 15/16	5/16		6 3/4	6 3/4	3/8	3/8
Brace H	14 WF 30	13 7/8	13 13/16	5/16		6 3/4	6 3/4	3/8	3/8
Brace J	14 WF 30	13 7/8	13 15/16	5/16		6 3/4	6 15/16	3/8	3/8
Brace K	14 WF 30	13 7/8	13 7/8	5/16		6 3/4	6 15/16	3/8	3/8
Brace L	14 WF 30	13 7/8	13 15/16	5/16		6 3/4	6 3/4	3/8	3/8
Brace M	14 WF 30	13 7/8	13 15/16	5/16		6 3/4	6 3/4	3/8	3/8
Brace N	14 WF 30	13 7/8	13 7/8	5/16		6 3/4	6 3/4	3/8	3/8

HDR Engineering, Inc.
Corp of Engineers - Walla Walla
Little Goose Dam

Inspection Team SMP TDB HAY
Weather

Date 10/11/2000
Sheet 3

Gate No. 7 **Downstream Elevation**



NOTE. PAINT ON GATE FAILING. FLAKEY W/LIGHT RUST

Member	Type	Depth d		Web t_w		Flange - End b_f		t_f	
		Plan (in)	Measured (in)	Plan (in)	Measured (in)	Plan (in)	Measured (in)	Plan (in)	Measured (in)
Horiz. Girder 3	PL Girder	49 3/4	49 3/4	7/16	7/16	16	16	7/8	7/8
Horiz. Girder 2	PL Girder	60 1/2	60 1/2	3/4	3/4	16 1/2	16 1/2	1 1/4	1 5/16
Horiz. Girder 1	PL Girder	60 1/2	60 3/8	1	1 1/16	16 1/2	16 1/2	1 1/4	1 5/16
Purlins	ST 10 WF 31	10 1/2	10 3/8	13/32		8 1/4	8 3/16	5/8	5/8
Skin Plate Bracing	ST 7 WF 15	7	7	1/4	1/4	6 3/4	6 3/16	3/8	3/8

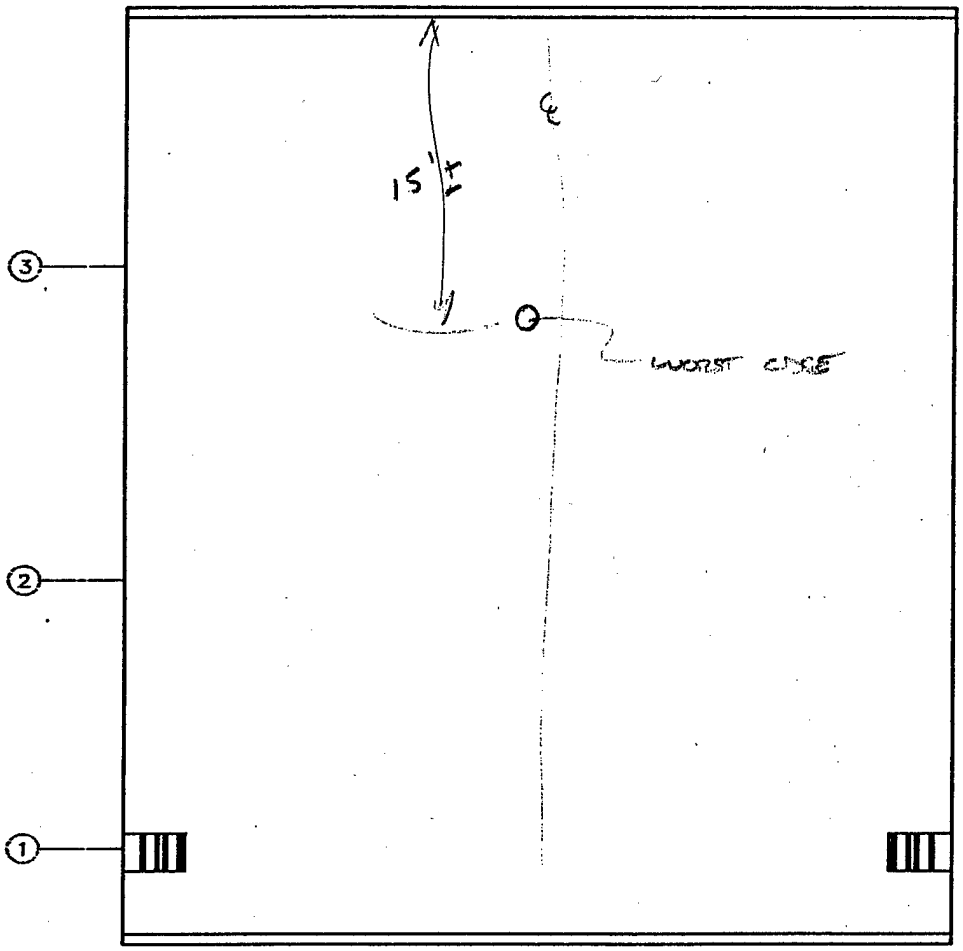
3. LEAK IN SIDE SEAL W/STANDING H_2O IN BOT. GIRDER
4. RT. FRAME LIGHT RUST
5. LOOKING LEFT NOTE LIGHT RUST ON ALL MEMBERS
8. STANDING H_2O ON BOT. GIRDER
9. GATE FACE PAINT FAILURE
10. SIDE SEAL LEAK W/ LIGHT RUST AND MIN. DEPOSIT
11. BOTTOM PLT. FULL OF H_2O W/ MUCK
12. ALONG BOT GIRDER LIGHT RUST ON ALL MEMBERS
13. MODERATE RUST ON PURLIN WEB DUE TO STANDING H_2O
14. MODERATE RUST ON BRACE PLTS.

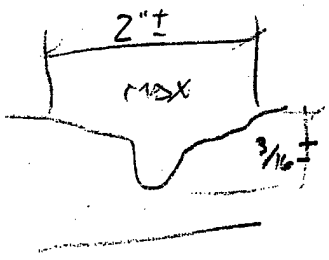
HDR Engineering, Inc.
Corp of Engineers - Walla Walla
Little Goose Dam

Inspection Team SMP TDB HAY
Weather

Date 10/11/2022
Sheet 4

Gate No. 7 **Upstream Elevation**





MUCH BETTER CONDITION THAN GRANITE

EVIDENCE OF PAST WELD & GRIND

HDR Engineering, Inc.
Corp of Engineers - Walla Walla
Little Goose Dam

Inspection Team SMP TDB HAY AMA
Weather

Date 10/17/00
Sheet 5

Gate No. 7 **Operation and Trunnion Measurements**

Racking Measurements: Bottom of Gate and Spillway

LEFT	RIGHT
38 1/2	39

Transverse Trunnion Hub Movement, No Load on Gate: Closed-Open-Closed

	LEFT		RIGHT	
	Inside	Outside (pier)	Inside	Outside (pier)
Initial Gate Closed	23/32	21/32	15/32	23/32
Gate Full Open	24/32	23/32	14/32	24/32
Final Gate Closed	23/32	21/32	15/32	23/32

3-D Trunnion Hub Movements - Unloaded vs. Loaded

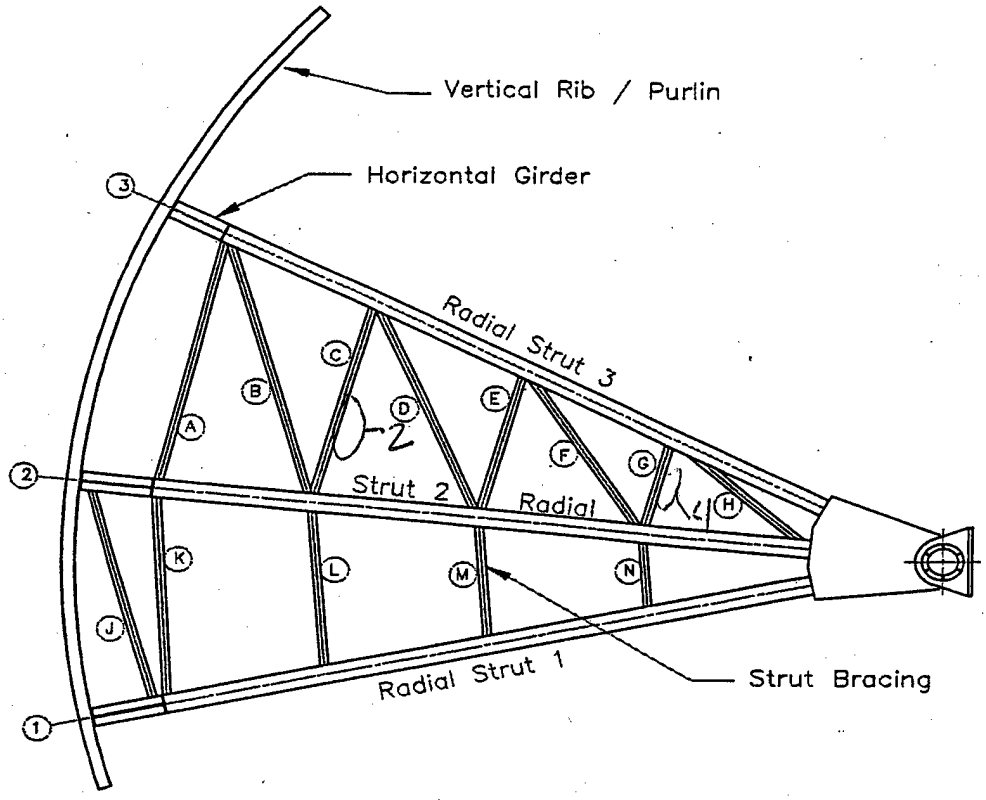
	LEFT				RIGHT			
	No Load Void Dry		Full Load Void Full		No Load Void Dry		Full Load Void Full	
Vertical	+0.002		-0.0025		-0.001		-0.012	
US / DS	+0.0005		+0.037		0.0000		+0.0300	
Transverse	23/32	20/32	23/32	21/32	15/32	23/32	16/32	22/32
	Inside	Outside	Inside	Outside	Inside	Outside	Inside	Outside

HDR Engineering, Inc.
Corp of Engineers - Walla Walla
Little Goose Dam

Inspection Team SMP TDB HAY
Weather SUNNY 65

Date 10/10
Sheet 1

Gate No. 8
Left Elevation B-B



Member	Type	Depth d		Web t_w		Flange(s) b_f		t_f	
		Plan (in)	Measured (in)	Plan (in)	Measured (in)	Plan (in)	Measured (in)	Plan (in)	Measured (in)
Strut 3	14 WF 202	15 5/8	15 7/8	15/16		15 3/4	15 3/4	1 1/2	1 7/16
Strut 2	14 WF 342	17 1/2	17 1/2	1 9/16		16 3/8	16 3/8	2 7/16	2 1/2
Strut 1	14 WF 398	18 1/4	18 1/8	1 13/16		16 5/8	16 3/8	2 13/16	2 13/16
Brace A	14 WF 30	13 7/8	13 15/16	5/16		6 3/4	6 13/16	3/8	3/8
Brace B	14 WF 30	13 7/8	13 15/16	5/16		6 3/4	6 3/4	3/8	3/8
Brace C	14 WF 30	13 7/8	13 7/8	5/16		6 3/4	6 13/16	3/8	3/8
Brace D	14 WF 30	13 7/8	13 7/8	5/16		6 3/4	6 13/16	3/8	3/8
Brace E	14 WF 30	13 7/8	13 13/16	5/16		6 3/4	6 13/16	3/8	3/8
Brace F	14 WF 30	13 7/8	13 7/8	5/16		6 3/4	6 3/4	3/8	3/8
Brace G	14 WF 30	13 7/8	13 15/16	5/16		6 3/4	6 13/16	3/8	3/8
Brace H	14 WF 30	13 7/8	13 7/8	5/16		6 3/4	6 3/4	3/8	3/8
Brace J	14 WF 30	13 7/8	13 7/8	5/16		6 3/4	6 3/4	3/8	3/8
Brace K	14 WF 30	13 7/8	13 15/16	5/16		6 3/4	6 13/16	3/8	3/8
Brace L	14 WF 30	13 7/8	13 3/4	5/16		6 3/4	6 7/8	3/8	3/8
Brace M	14 WF 30	13 7/8	13 15/16	5/16		6 3/4	6 3/4	3/8	3/8
Brace N	14 WF 30	13 7/8	13 15/16	5/16		6 3/4	6 3/4	3/8	3/8

2. Light Rust on Vert Rec. "C"

3. Light Flaky Rust on Diagonal "D"

4. Light Rust Coating Flaking Away

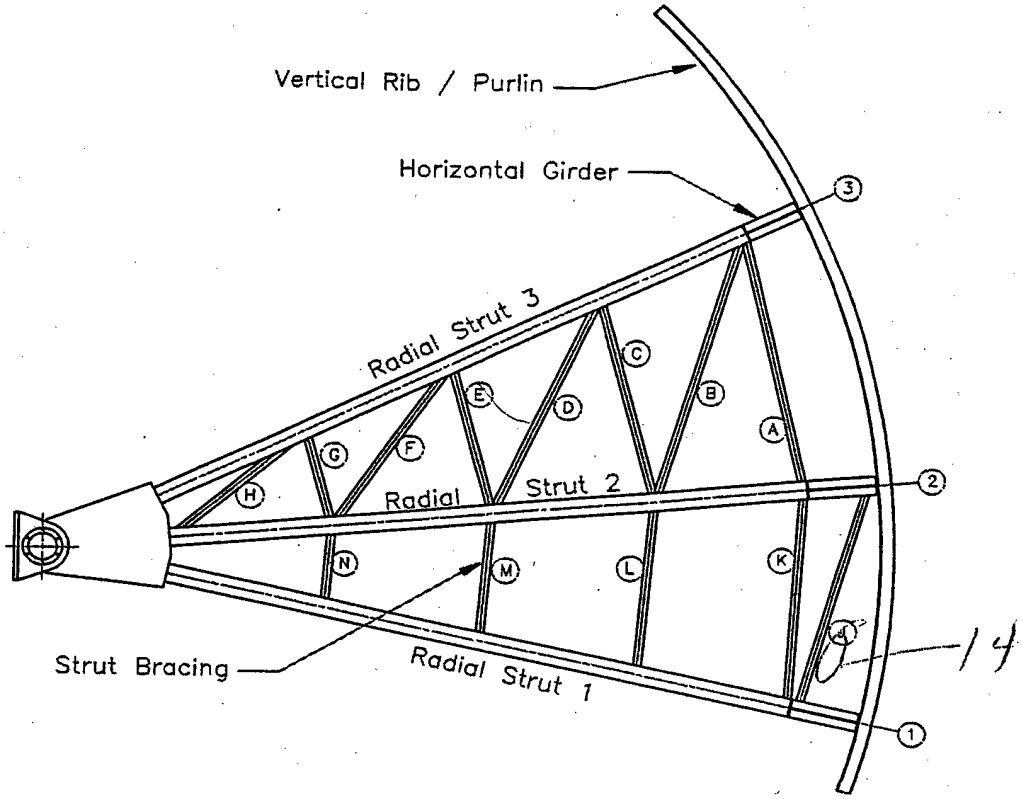
5. Overall Pic of LEFT Struts Light Rust & Delam Coating

HDR Engineering, Inc.
Corp of Engineers - Walla Walla
Little Goose Dam

Inspection Team SMP (TDB) HAY
Weather

Date 10/10
Sheet 2

Gate No. 8
Right Elevation
A-A



Member	Type	Depth d		Web t_w		Flange(s)			
						b_f		t_f	
		Plan (in)	Measured (in)	Plan (in)	Measured (in)	Plan (in)	Measured (in)	Plan (in)	Measured (in)
Strut 3	14 WF 202	15 5/8	15 7/8	15/16		15 3/4	15 3/4	1 1/2	1 7/16
Strut 2	14 WF 342	17 1/2	17 1/2	1 9/16		16 3/8	16 3/16	2 7/16	2 7/16
Strut 1	14 WF 398	18 1/4	18 1/4	1 13/16		16 5/8	16 1/2	2 13/16	2 7/8
Brace A	14 WF 30	13 7/8	13 15/16	5/16		6 3/4	6 3/4	3/8	3/8
Brace B	14 WF 30	13 7/8	13 15/16	5/16		6 3/4	6 13/16	3/8	3/8
Brace C	14 WF 30	13 7/8	13 15/16	5/16		6 3/4	6 13/16	3/8	3/8
Brace D	14 WF 30	13 7/8	13 15/16	5/16		6 3/4	6 3/4	3/8	3/8
Brace E	14 WF 30	13 7/8	13 15/16	5/16		6 3/4	6 3/4	3/8	3/8
Brace F	14 WF 30	13 7/8	13 15/16	5/16		6 3/4	6 3/4	3/8	3/8
Brace G	14 WF 30	13 7/8	13 15/16	5/16		6 3/4	6 3/4	3/8	3/8
Brace H	14 WF 30	13 7/8	13 7/8	5/16		6 3/4	6 3/4	3/8	3/8
Brace J	14 WF 30	13 7/8	13 7/8	5/16		6 3/4	6 3/4	3/8	3/8
Brace K	14 WF 30	13 7/8	13 7/8	5/16		6 3/4	6 3/4	3/8	3/8
Brace L	14 WF 30	13 7/8	13 15/16	5/16		6 3/4	6 3/4	3/8	3/8
Brace M	14 WF 30	13 7/8	13 15/16	5/16		6 3/4	6 3/4	3/8	3/8
Brace N	14 WF 30	13 7/8	13 15/16	5/16		6 3/4	6 3/4	3/8	3/8

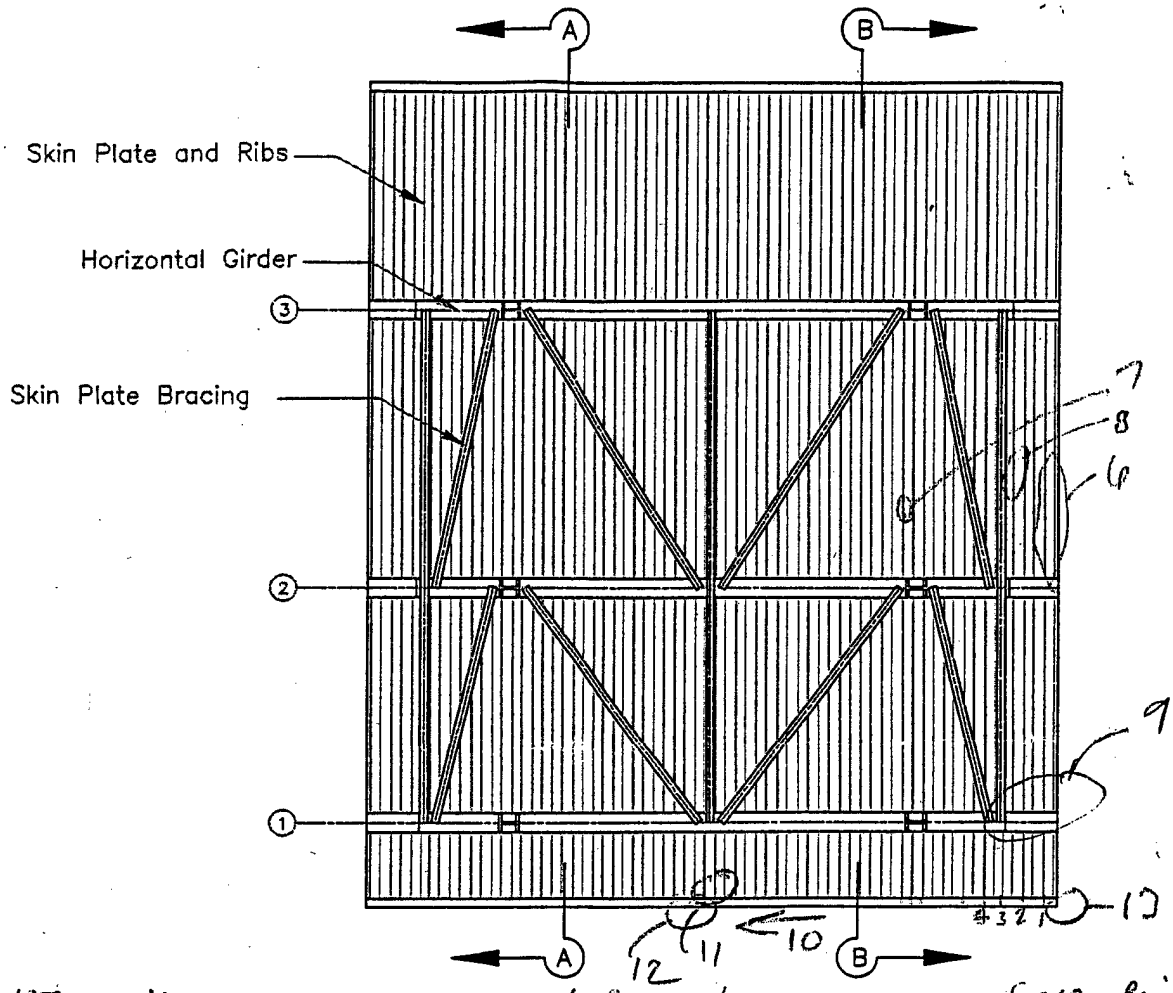
14. Typ Orlan and gate
15, 16 Water on 2nd Sheet from Drawing Above

HDR Engineering, Inc.
Corp of Engineers - Walla Walla
Little Goose Dam

Inspection Team SMP (TDB) HAY
Weather

Date 10/10
Sheet 3

Gate No. 8 **Downstream Elevation**



NOTE. ENTIRE GATE is Peeling w/ light Rust. there is evidence of NEW PAINT ON GATE ~~EEL~~ FACE PLT.

Member	Type	Depth d		Web t_w		Flange - End b_f		t_f	
		Plan (in)	Measured (in)	Plan (in)	Measured (in)	Plan (in)	Measured (in)	Plan (in)	Measured (in)
Horiz. Girder 3	PL Girder	49 3/4	49 3/4	7/16	7/16	16	16	7/8	7/8
Horiz. Girder 2	PL Girder	60 1/2	60 1/2	3/4	3/4	16 1/2	16 1/2	1 1/4	1 1/4
Horiz. Girder 1	PL Girder	60 1/2	60 3/8	1	1 1/16	16 1/2	16 7/16	1 1/4	1 1/4
Purlins	ST 10 WF 31	10 1/2	10 1/2	13/32		8 1/4	8 1/4	5/8	9/16
Skin Plate Bracing	ST 7 WF 15	7	7	1/4	1/4	6 3/4	6 3/4	3/8	3/4

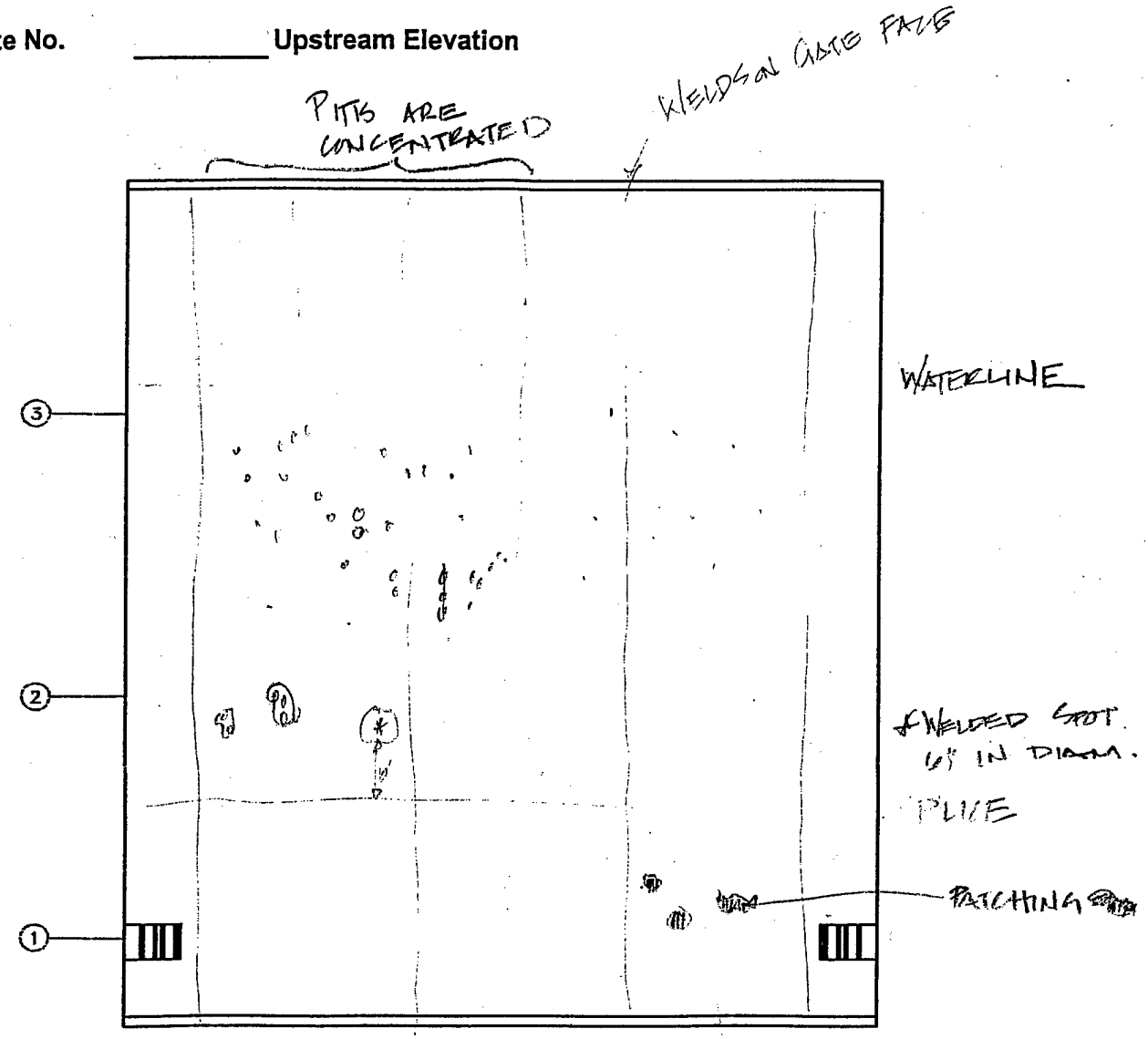
6. FAR LEFT PURLIN MINERAL Deposits & Light Rust.
7. PURLIN Web Bent.
8. GRINDING MARKS AROUND welds (TYP.)
9. Brace Plts w/Debris and evidence of STANDING H2O
10. Along Bot SEAL
11. Muck @ Bot. Plt.
12. leak @ Center of gate
13. leak @ LEFT CORNER

HDR Engineering, Inc.
Corp of Engineers - Walla Walla
Little Goose Dam

Inspection Team SMP TDB HAY
Weather OVERCAST

Date 10/15/2007
Sheet 4

Gate No. _____ **Upstream Elevation**



- SOME PITS HAVE BEEN FILLED W/ WELD MATERIAL.
- FEATURES SHOULD BE REFERENCED.
- OTHER PITS ARE EXISTING.
- SMALL PITS.
- WEAR PLATES LOOK CLEAN.

HDR Engineering, Inc.
Corp of Engineers - Walla Walla
Little Goose Dam

Inspection Team SMP TDB HAY AMA
Weather OVERCAST 50

Date 10/10/00
Sheet 5

Gate No. 2 **Operation and Trunnion Measurements**

Racking Measurements: Bottom of Gate and Spillway

LEFT	RIGHT
45"	45"

Transverse Trunnion Hub Movement, No Load on Gate: Closed-Open-Closed

	LEFT		RIGHT	
	Inside	Outside (pier)	Inside	Outside (pier)
Initial Gate Closed	24/32	14/32	16/32	19/32
Gate Full Open	23/32	16/32	15/32	19/32
Final Gate Closed	23/32	15/32	16/32	19/32

3-D Trunnion Hub Movements - Unloaded vs. Loaded

	LEFT				RIGHT			
	No Load Void Dry		Full Load Void Full		No Load Void Dry		Full Load Void Full	
Vertical	+0.0008		+0.0009		0.0000		-0.0010	
US / DS	+0.0020		+0.0315		+0.0010		+0.0250	
Transverse	23/32	15/32	23/32	14/32	16/32	19/32	16/32	19/32
	Inside	Outside	Inside	Outside	Inside	Outside	Inside	Outside

HDR Engineering, Inc.
Corp of Engineers - Walla Walla
Little Goose Dam

Inspection Team K & N
Weather RAIN

Date 10/10/00
Sheet 1 OF 1

Gate No. 1

Hoist Amperage Readings

Name Plate Data	REULAND
Horsepower	15
Voltage	440/3 PHASE/60 HZ DESIGN C
Current	19.00 1760 RPM
Type	A000
Frame	284U

Amperage		Loaded		Unloaded	
		Opening	Closing	Opening	Closing
	Starting	89.6	84.0	87.6	72.0
Running	Phase A	11.8	6.7	10.9	6.6
	Phase B	12.1	6.4	10.8	6.4
	Phase C	11.8	6.7	10.7	6.6

HDR Engineering, Inc.
Corp of Engineers - Walla Walla
Little Goose Dam

Inspection Team K&N
Weather RAIN

Date 10/10/00
Sheet 1 OF 1

Gate No. 2 **Hoist Amperage Readings**

Name Plate Data	REULAND	
Horsepower	15	
Voltage	440/3 PHASE/60 HZ	DESIGN C
Current	19.00	1760 RPM
Type	A000	
Frame	284U	

Amperage		Loaded		Unloaded	
		Opening	Closing	Opening	Closing
	Starting	103.0	93.6	92.8	81.6
Running	Phase A	12.1	6.8	10.9	6.7
	Phase B	12.0	6.7	10.8	6.4
	Phase C	12.0	6.8	10.8	6.8

BEARING NOISE IN MOTOR

HDR Engineering, Inc.
Corp of Engineers - Walla Walla
Little Goose Dam

Inspection Team K & N
Weather RAIN

Date 10/10/00
Sheet 1 OF 1

Gate No. 3 **Hoist Amperage Readings**

Name Plate Data	REULAND	
Horsepower	15	
Voltage	440/3 PHASE/60 HZ	DESIGN C
Current	19.00	1760 RPM
Type	A000	
Frame	284U	

Amperage		Loaded		Unloaded	
		Opening	Closing	Opening	Closing
	Starting	101.0	94.0	96.0	85.6
Running	Phase A	10.8	6.3	10.9	6.4
Running	Phase B	12.0	6.4	11.1	5.9
Running	Phase C	12.0	6.4	10.7	6.3

BAD TAPE ON MOTOR LEAD WIRES
HEATER WIRES FRAYED

HDR Engineering, Inc.
Corp of Engineers - Walla Walla
Little Goose Dam

Inspection Team K & N
Weather RAIN

Date 10/10/00
Sheet 1 OF 1

Gate No. 5 **Hoist Amperage Readings**

Name Plate Data	REULAND	
Horsepower	15	
Voltage	440/3 PHASE/60 HZ	DESIGN C
Current	19.00	1760 RPM
Type	A000	
Frame	284U	

Amperage		Loaded		Unloaded	
		Opening	Closing	Opening	Closing
	Starting	93.0	88.0	84.8	78.0
Running	Phase A	12.3	6.0	11.6	6.2
	Phase B	12.4	6.2	11.6	6.3
	Phase C	12.5	6.2	11.6	6.2

HDR Engineering, Inc.
Corp of Engineers - Walla Walla
Little Goose Dam

Inspection Team K & N
Weather CLOUDY/DAMP

Date 10/10/00
Sheet 1 OF 1

Gate No. 6 **Hoist Amperage Readings**

Name Plate Data	GE	
Horsepower	15	
Voltage	460/3 PHASE/60 HZ	DESIGN B
Current	19.20	1760 RPM
Type	5KW254SE205C	
Frame	254T	

Amperage		Loaded		Unloaded	
		Opening	Closing	Opening	Closing
	Starting	104.0	99.2	99.2	80.0
Running	Phase A	13.7	7.6	13.3	6.6
	Phase B	13.6	7.4	13.6	6.4
	Phase C	13.4	7.4	13.4	6.5

ADJUSTED BARKE UNIT

HDR Engineering, Inc.
Corp of Engineers - Walla Walla
Little Goose Dam

Inspection Team K & N
Weather 60' WARM DAY

Date 10/17/00
Sheet 1 OF 1

Gate No. 7

Hoist Amperage Readings

Name Plate Data	REULAND	
Horsepower	15	
Voltage	440/3 PHASE/60 HZ	DESIGN C
Current	19.00	1760 RPM
Type	A000	
Frame	284U	

Amperage		Loaded		Unloaded	
		Opening	Closing	Opening	Closing
	Starting	11.5	86.0	102.0	80.0
Running	Phase A	11.8	6.7	12.2	6.1
Running	Phase B	11.6	6.1	11.4	6.2
Running	Phase C	9.2	6.3	11.5	6.1

MOTOR BEARINGS GONE

HDR Engineering, Inc.
Corp of Engineers - Walla Walla
Little Goose Dam

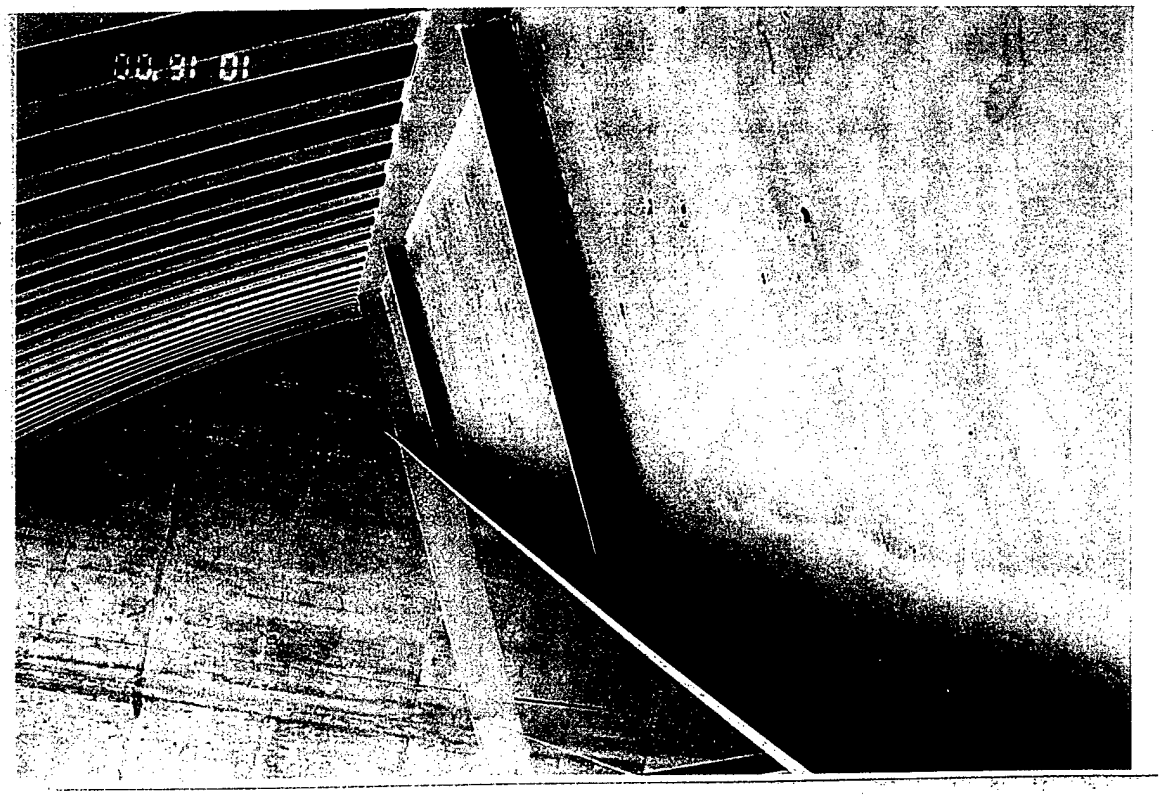
Inspection Team K & N
Weather DAMP

Date 10/10/00
Sheet 1 OF 1

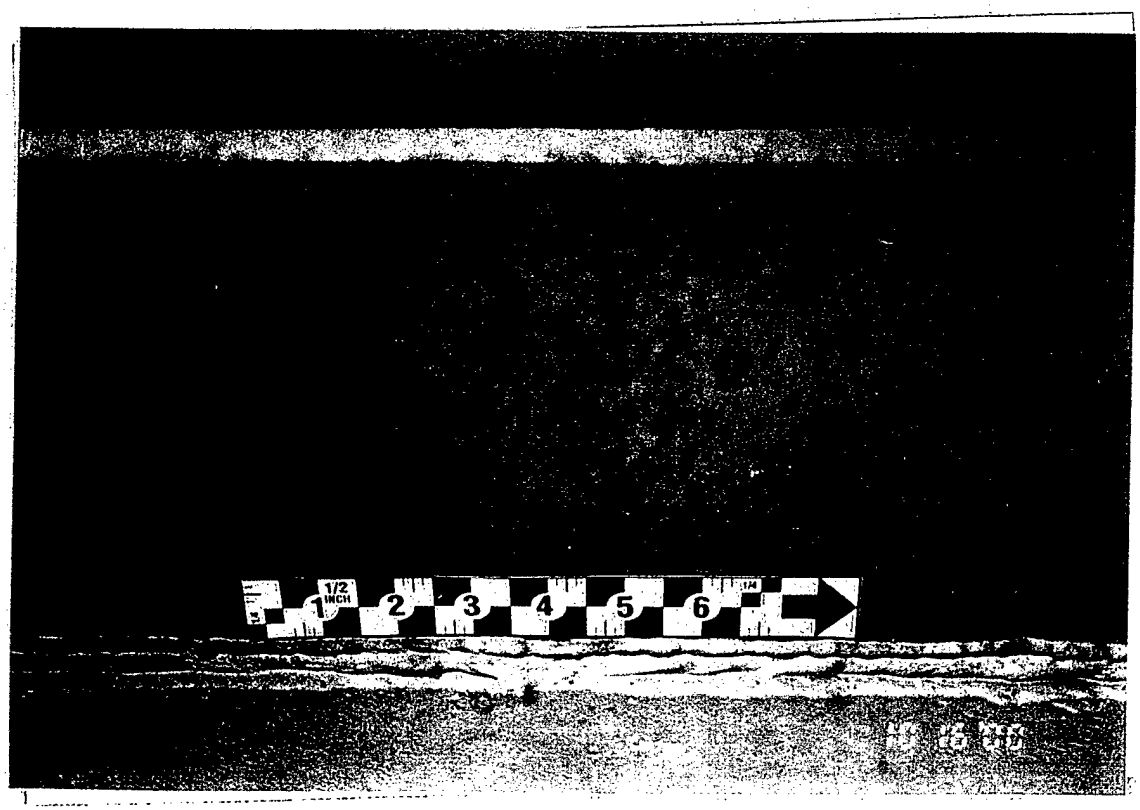
Gate No. 8 **Hoist Amperage Readings**

Name Plate Data	REULAND	
Horsepower	15	
Voltage	440/3 PHASE/60 HZ	DESIGN C
Current	19.00	1760 RPM
Type	A000	
Frame	284U	

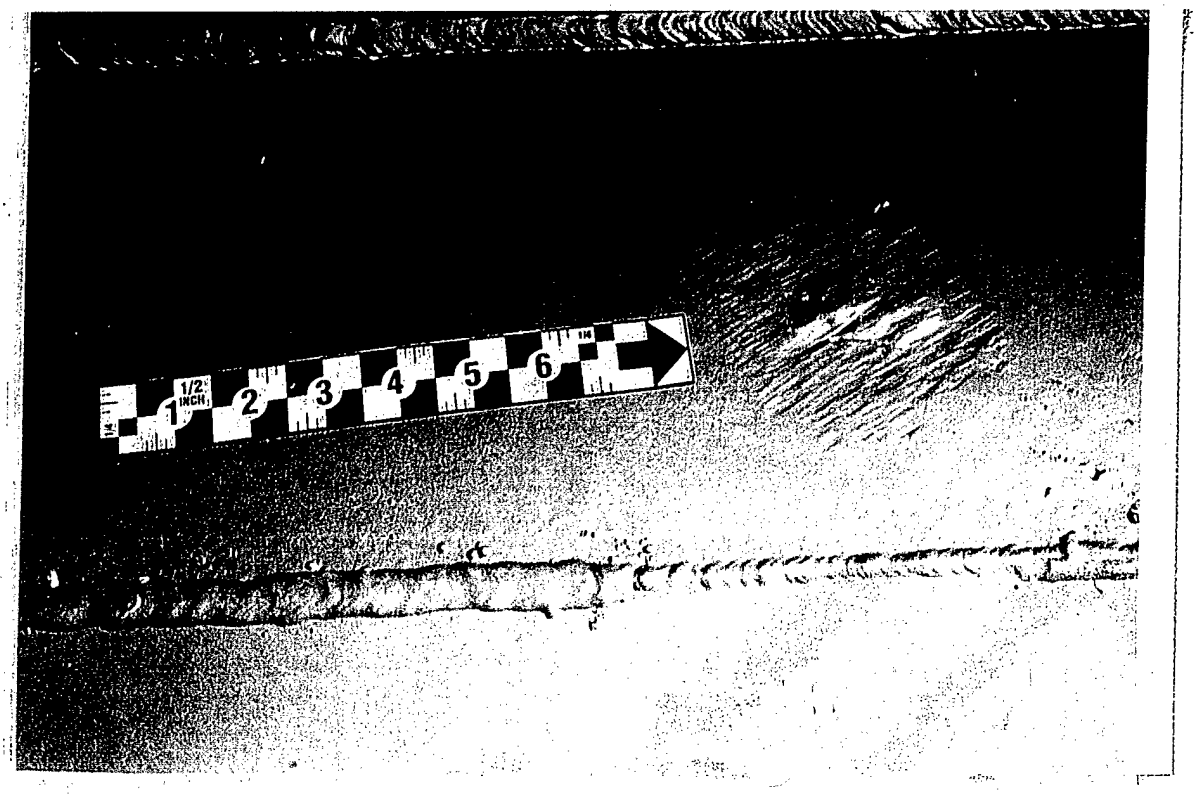
Amperage		Loaded		Unloaded	
		Opening	Closing	Opening	Closing
	Starting	95.2	84.0	84.0	74.0
Running	Phase A	11.8	5.8	12.2	6.4
	Phase B	10.8	5.5	12.0	6.3
	Phase C	11.0	5.7	11.8	6.3



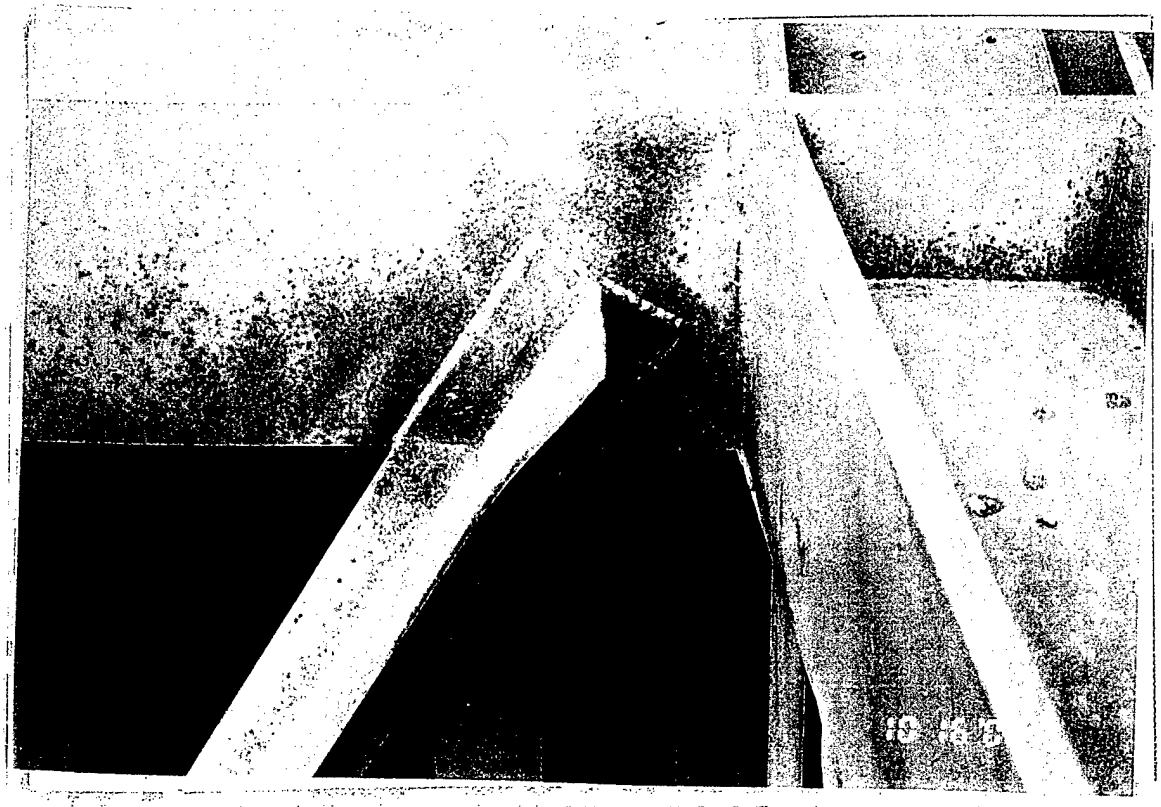
Little Goose Dam 10/16/00 1-1	**Gate 1** Top horizontal girder looking toward right frame, typical.



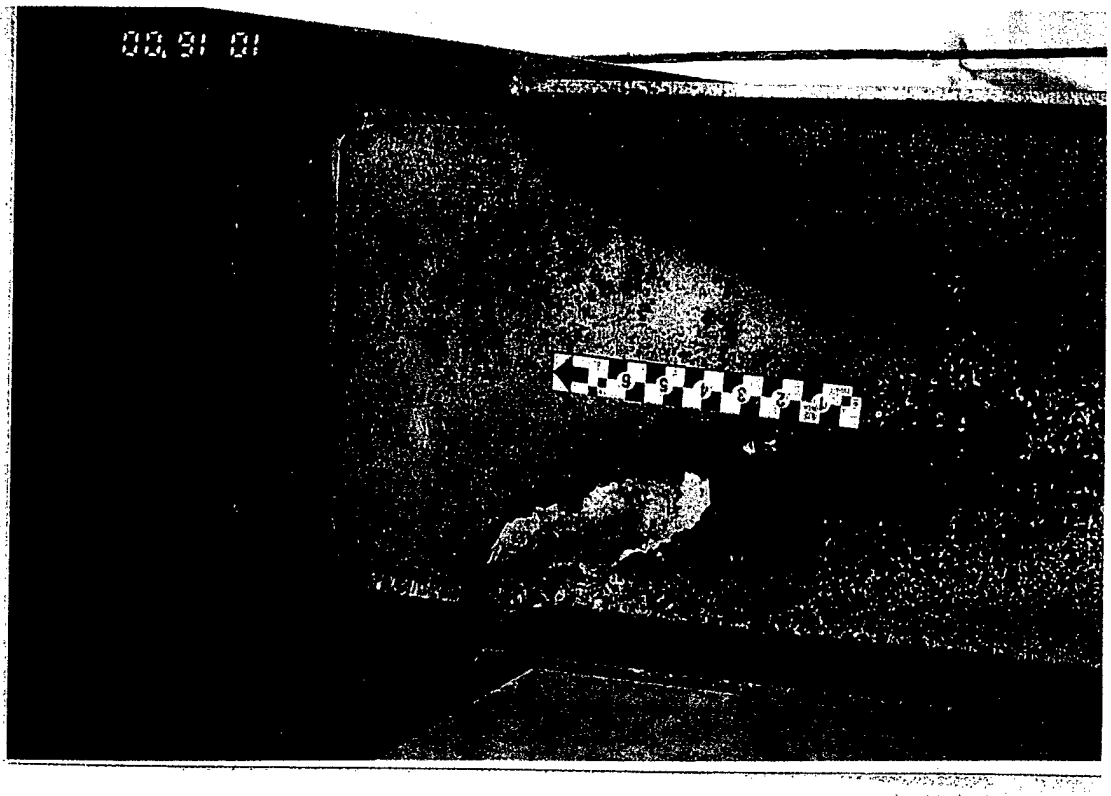
Little Goose Dam 10/16/00 1-2	**Gate 1** Downstream surface of skin plate. Light corrosion, typical.



Little Goose Dam 10/16/00 1-3	**Gate 1** Skin plate at center of gate, 5' above top horizontal girder. Apparent previous weld and grind repair.

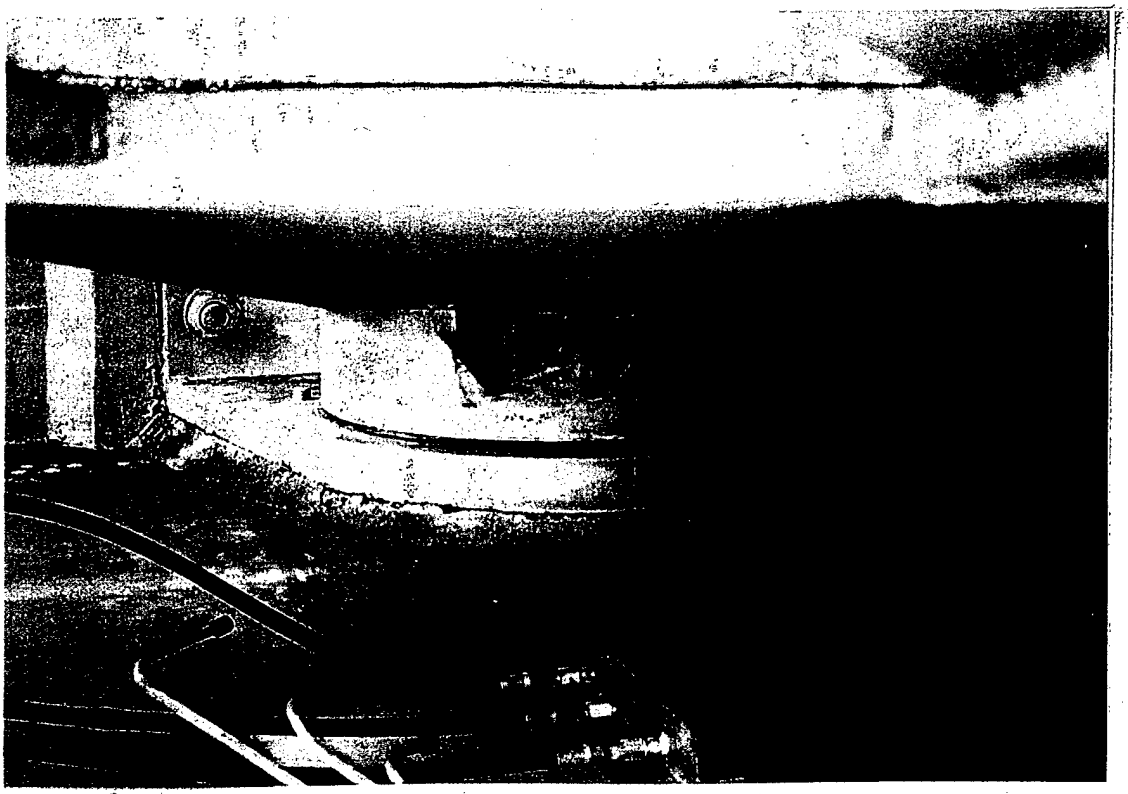


Little Goose Dam 10/16/00 1-4	**Gate 1** Top horizontal girder, downstream flange at connection to left top radial strut. Light corrosion.

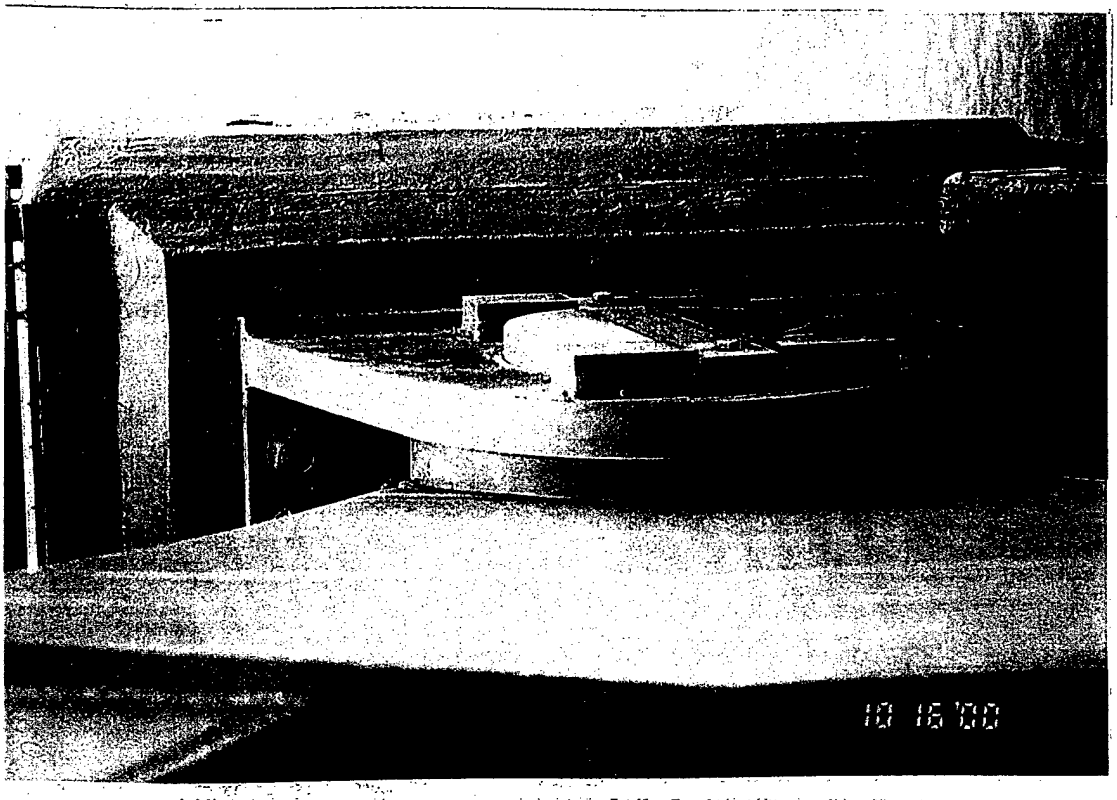


Little Goose Dam 10/16/00 1-5	**Gate 1** Left frame, brace C. Light corrosion beneath connection to top radial strut

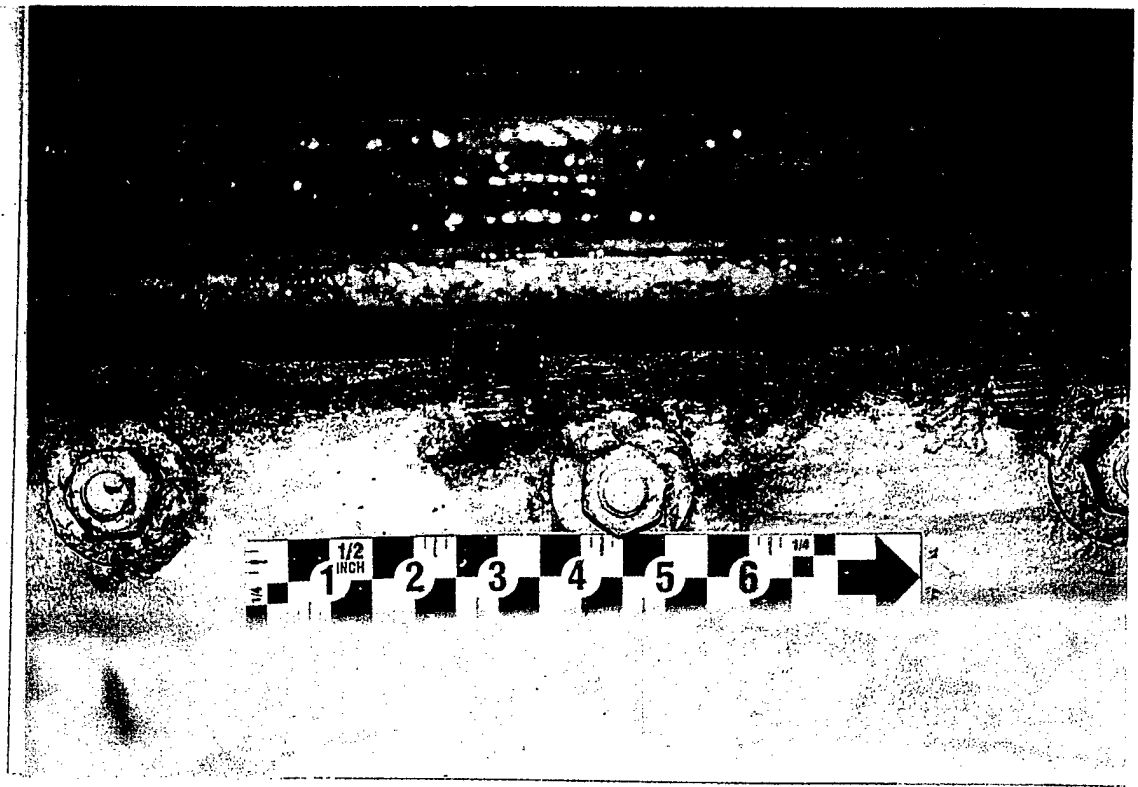
Little Goose Dam 10/16/00 1-6	**Gate 1** Right trunnion block. Light cracking in concrete.



Little Goose Dam 10/16/00 1-7	**Gate 1** Outside of left trunnion and trunnion yoke, typical.

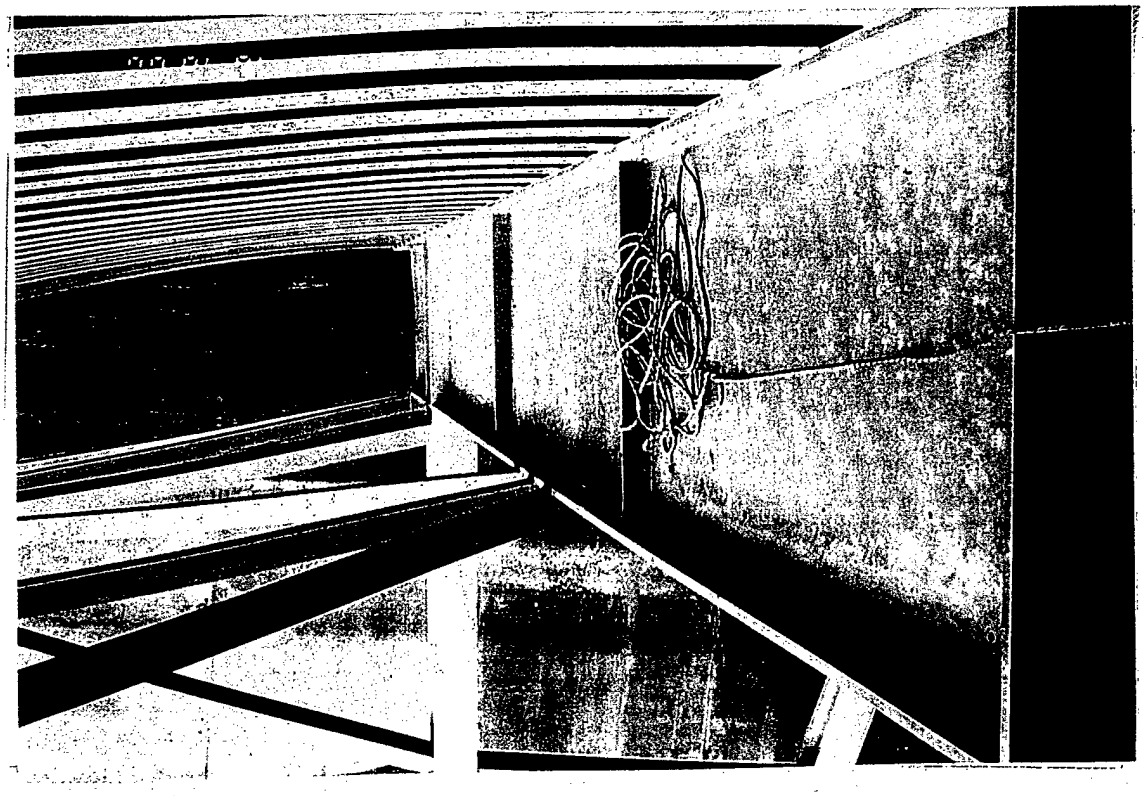


Little Goose Dam 10/16/00 1-8	**Gate 1** Inside of left trunnion and yoke, typical.

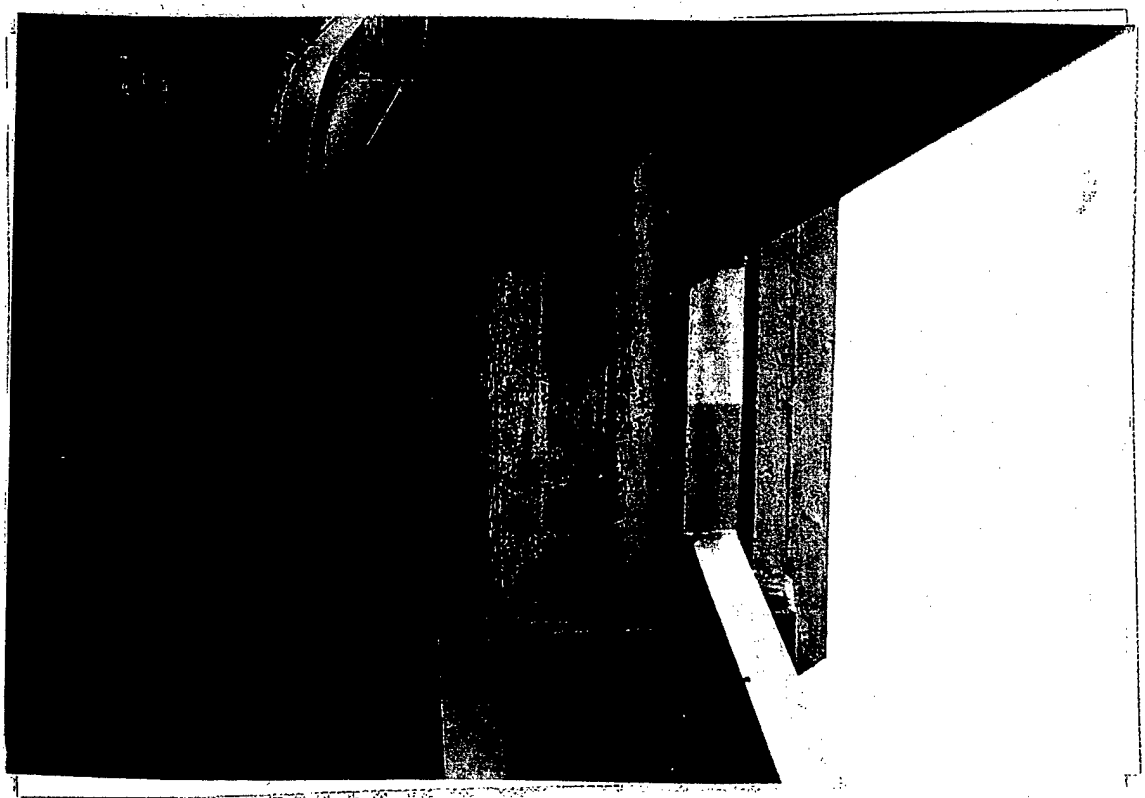


Little Goose Dam 10/16/00 1-9	**Gate 1** Side seal, typical. Light to moderate corrosion on skin plate, side seal angle, nuts and bolts.

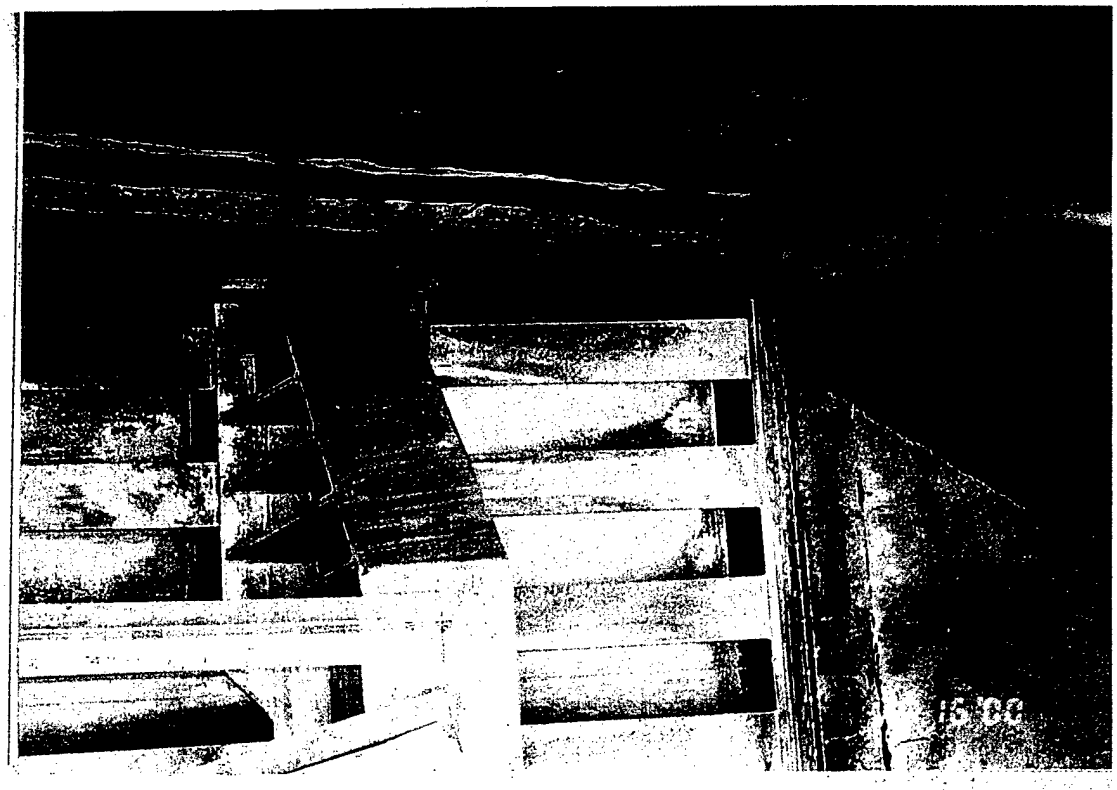
Little Goose Dam 10/16/00 1-10	**Gate 1** Side seal, typical. Light to moderate corrosion on skin plate, side seal angle, nuts and bolts.



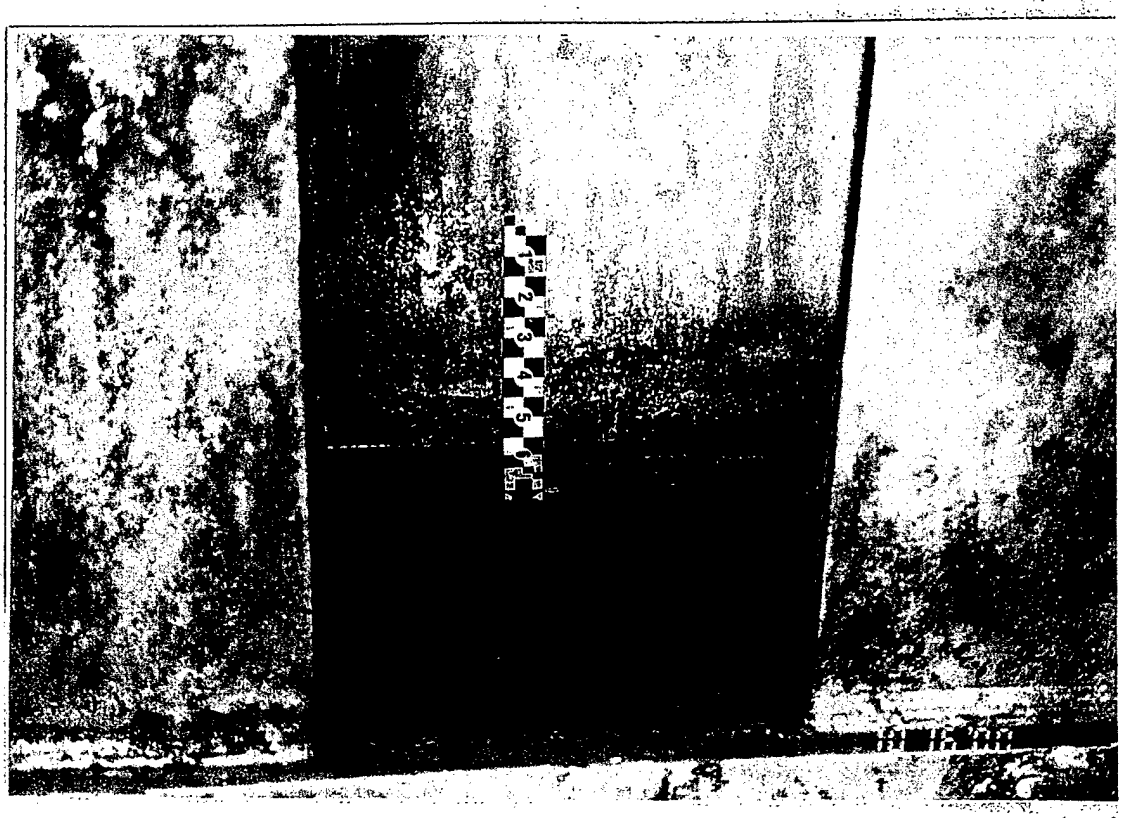
Little Goose Dam 10/16/00 1-11	**Gate 1** Middle horizontal girder looking toward right frame, typical.



Little Goose Dam 10/16/00 1-12	**Gate 1** Closure plate inside left trunnion. Light corrosion.

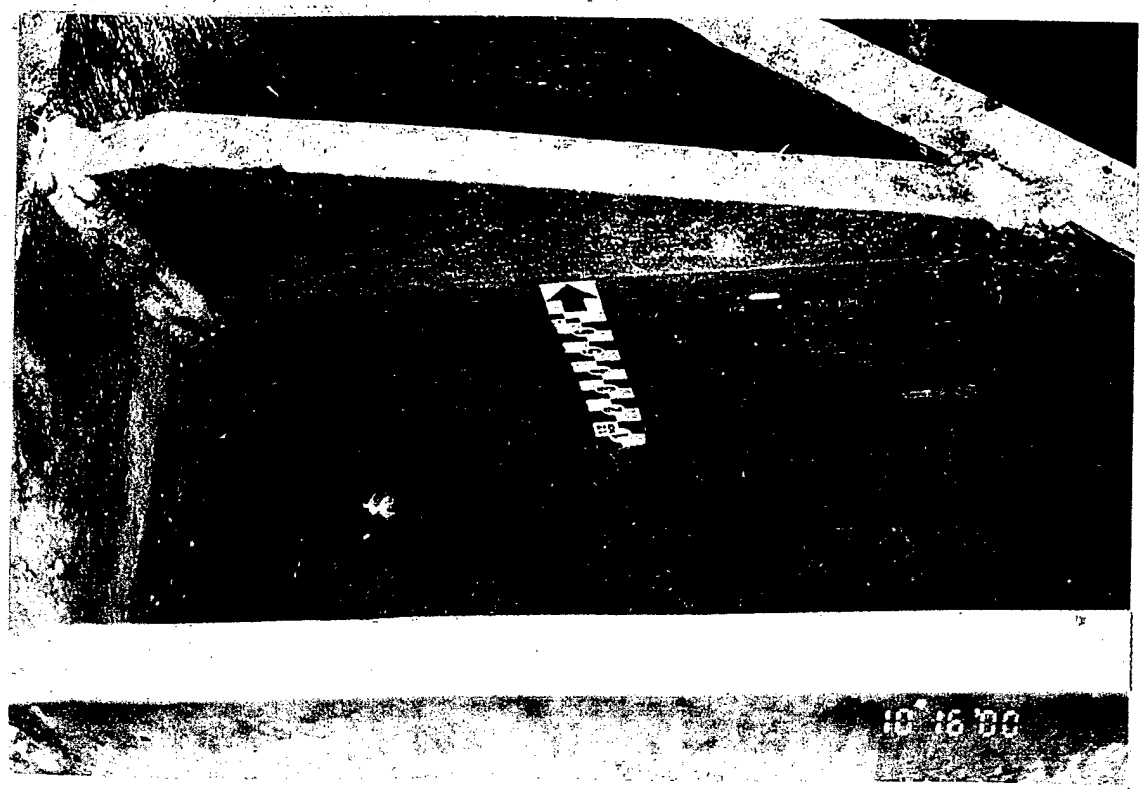


Little Goose Dam 10/16/00 1-13	**Gate 1** Corner leak at bottom left side of gate.

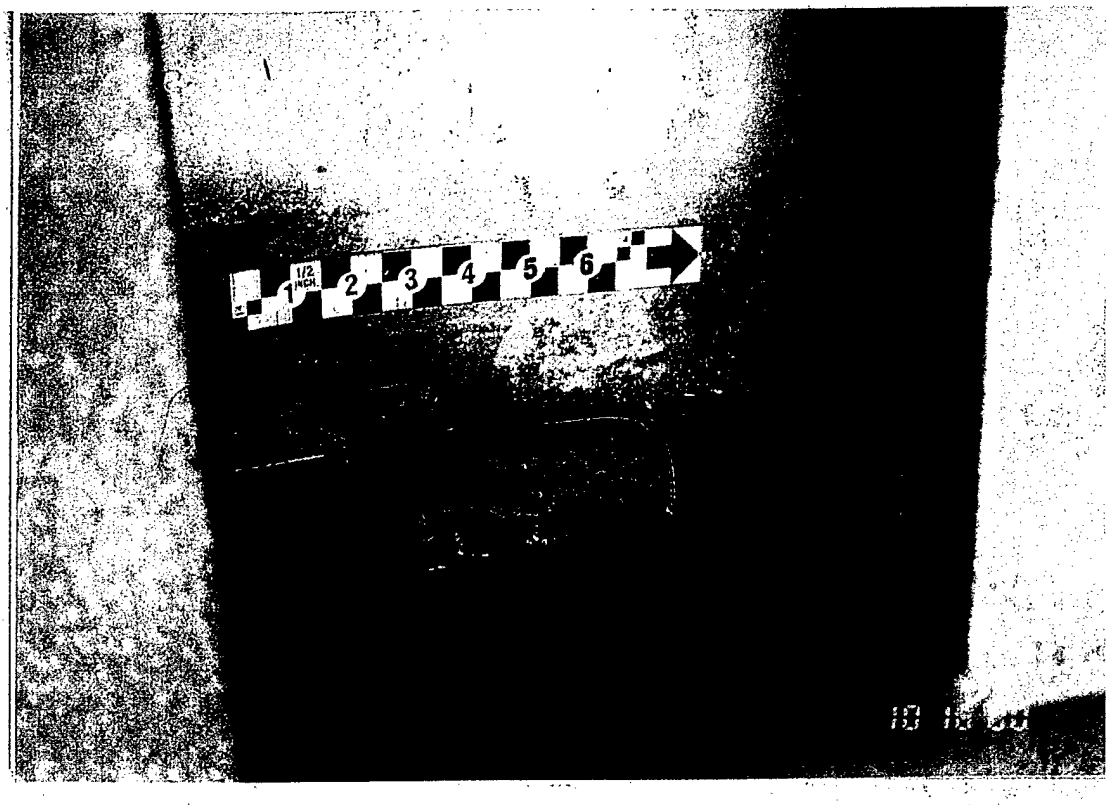


Little Goose Dam 10/16/00 1-14	**Gate 1** Bottom seal closure plate looking upstream. Standing water between closure plate, purlin webs and skinplate. Typical.

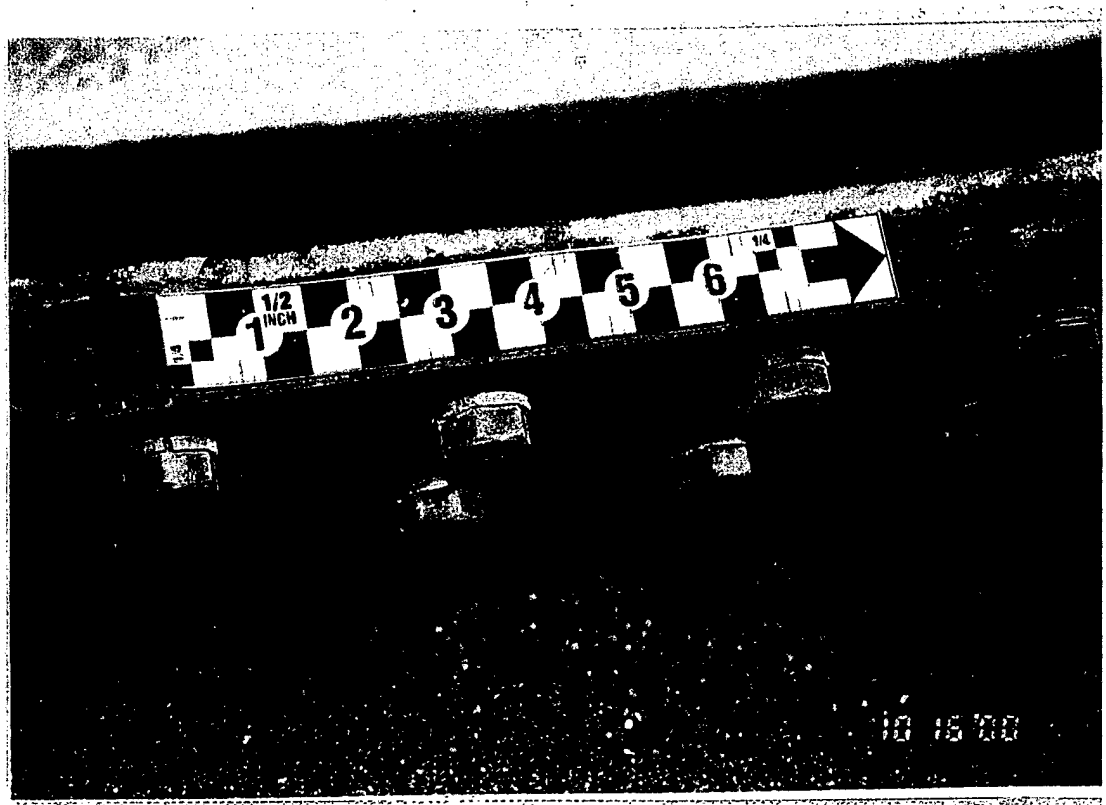
Little Goose Dam 10/16/00 1-15	**Gate 1** Bottom horiz. girder. Standing water, no drainage between multiple stiffeners, typical.



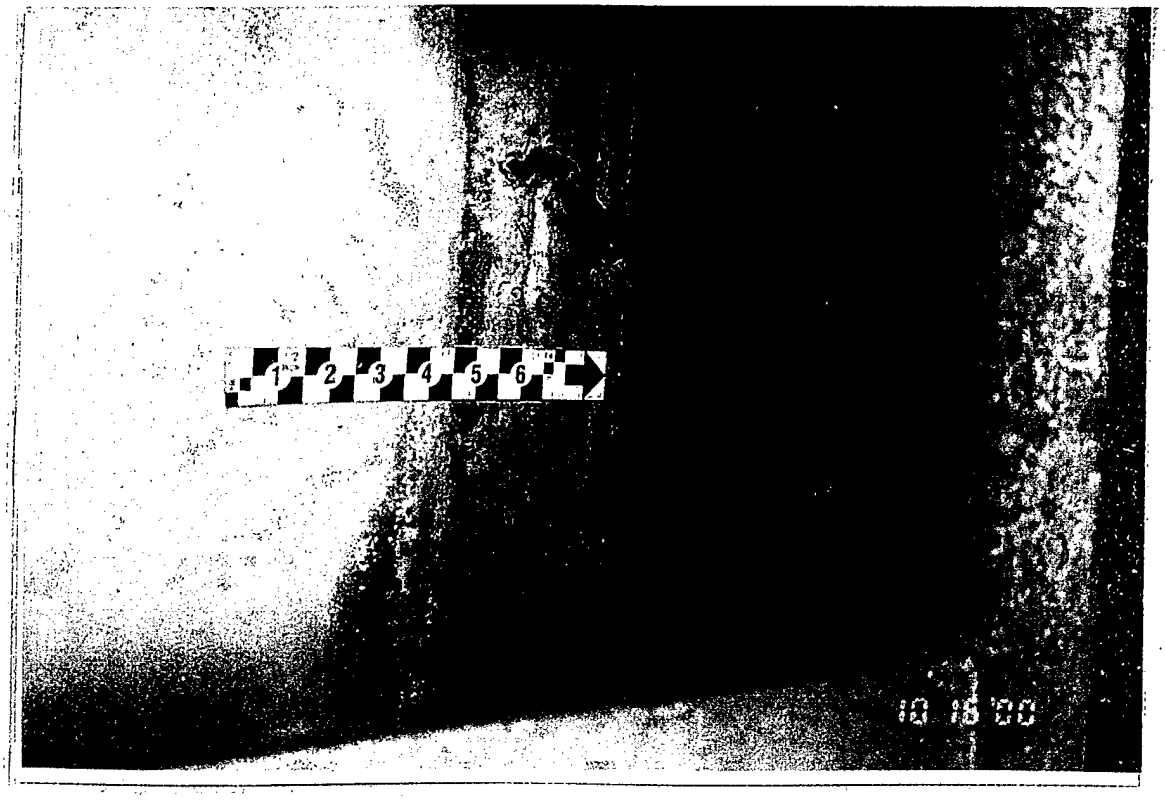
Little Goose Dam 10/16/00 1-16	**Gate 1** Bottom horiz. girder. Standing water, no drainage between multiple stiffeners, typical.



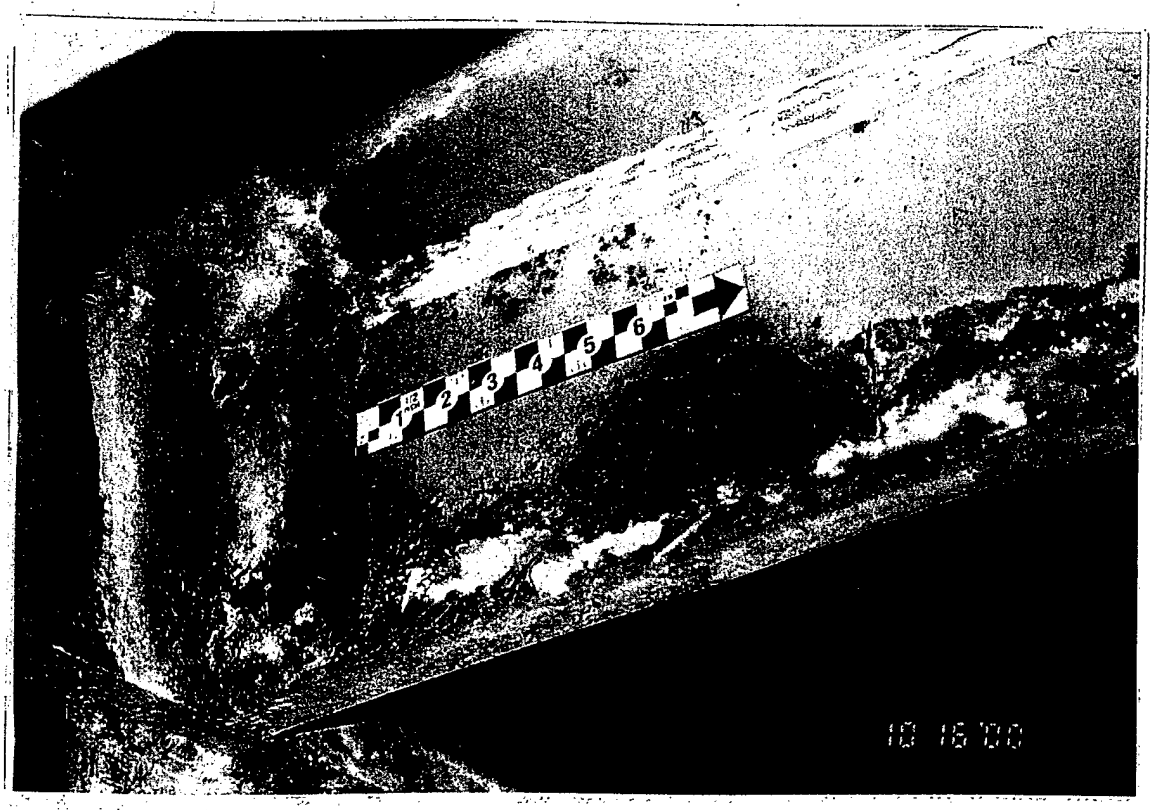
Little Goose Dam 10/16/00 1-17	**Gate 1** Bottom seal closure plate looking upstream. Standing water between closure plate, purlin webs and skinplate. Typical.



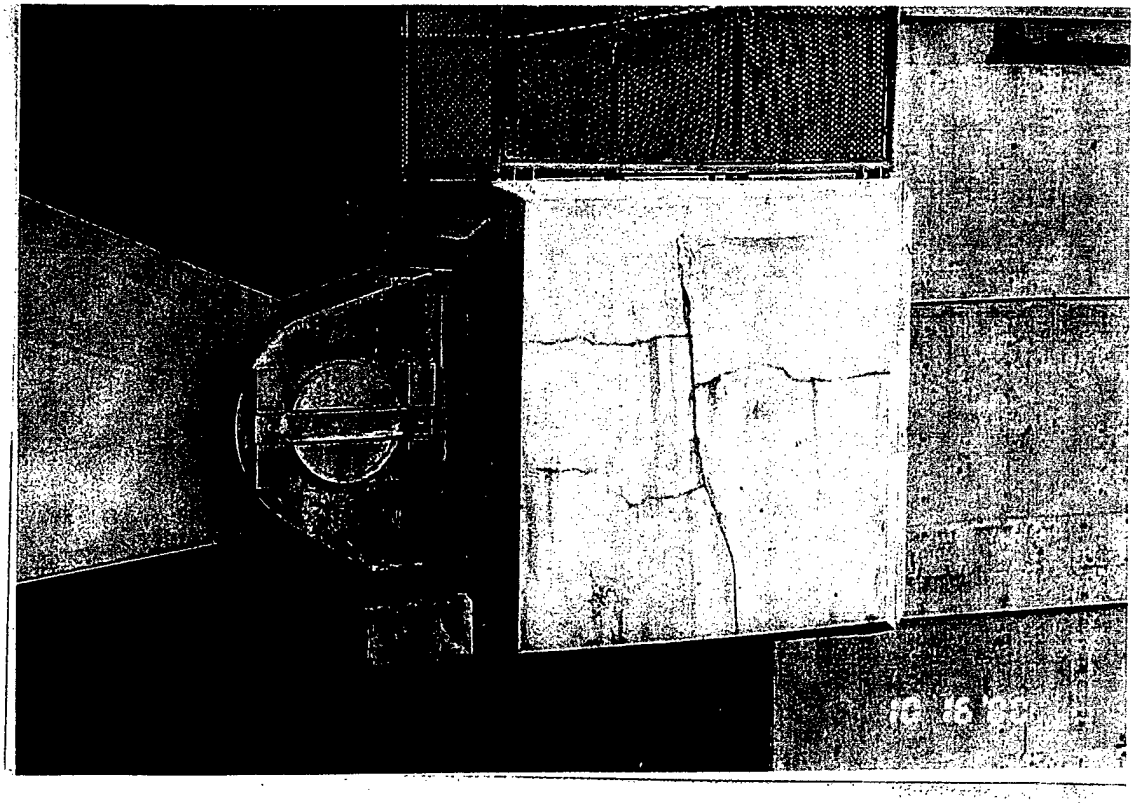
Little Goose Dam 10/16/00 1-18	**Gate 1** Bottom seal keeper plate and embedded bottom seal plate, typical.



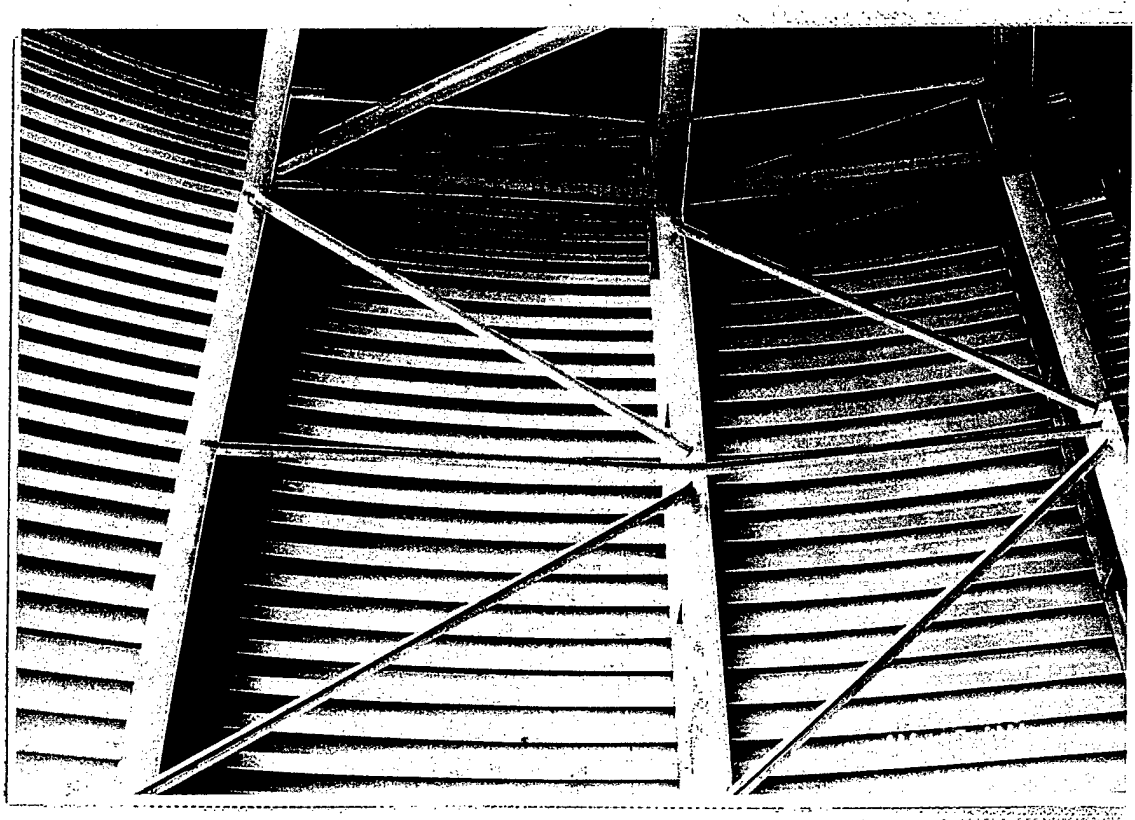
Little Goose Dam 10/16/00 1-19	**Gate 1** Bottom seal closure plate looking upstream. Standing water between closure plate, purlin webs and skinplate. Typical.



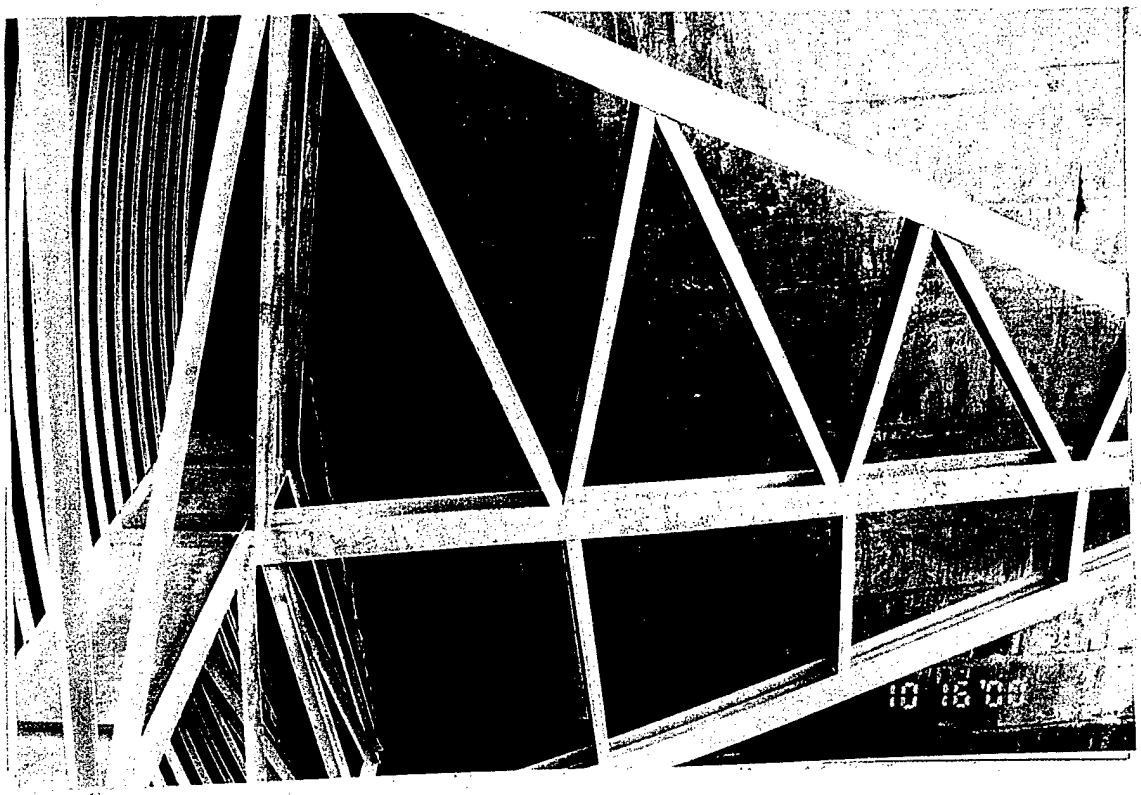
Little Goose Dam 10/16/00 1-20	**Gate 1** Bottom of bottom horizontal girder at stiffeners for bottom left radial strut. Light to moderate corrosion due to horiz. girder drain hole above.



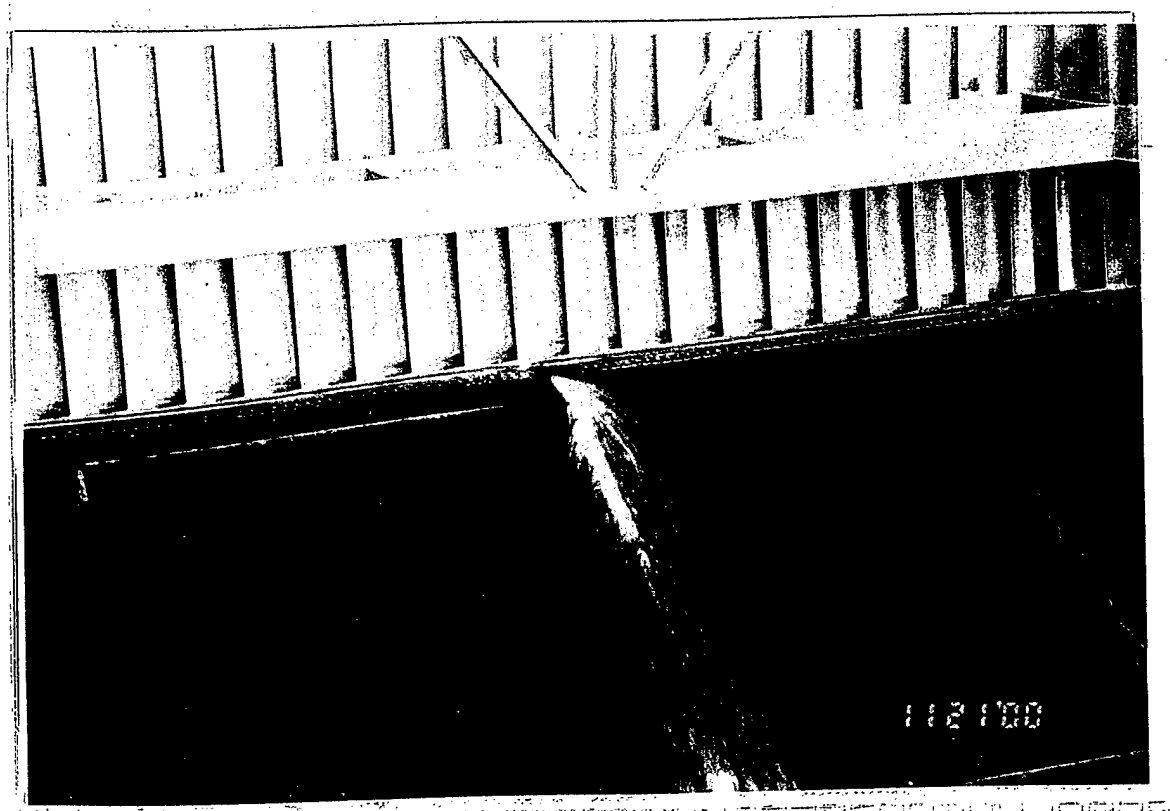
Little Goose Dam 10/16/00 1-21	**Gate 1** Left trunnion block. Light cracking in concrete.



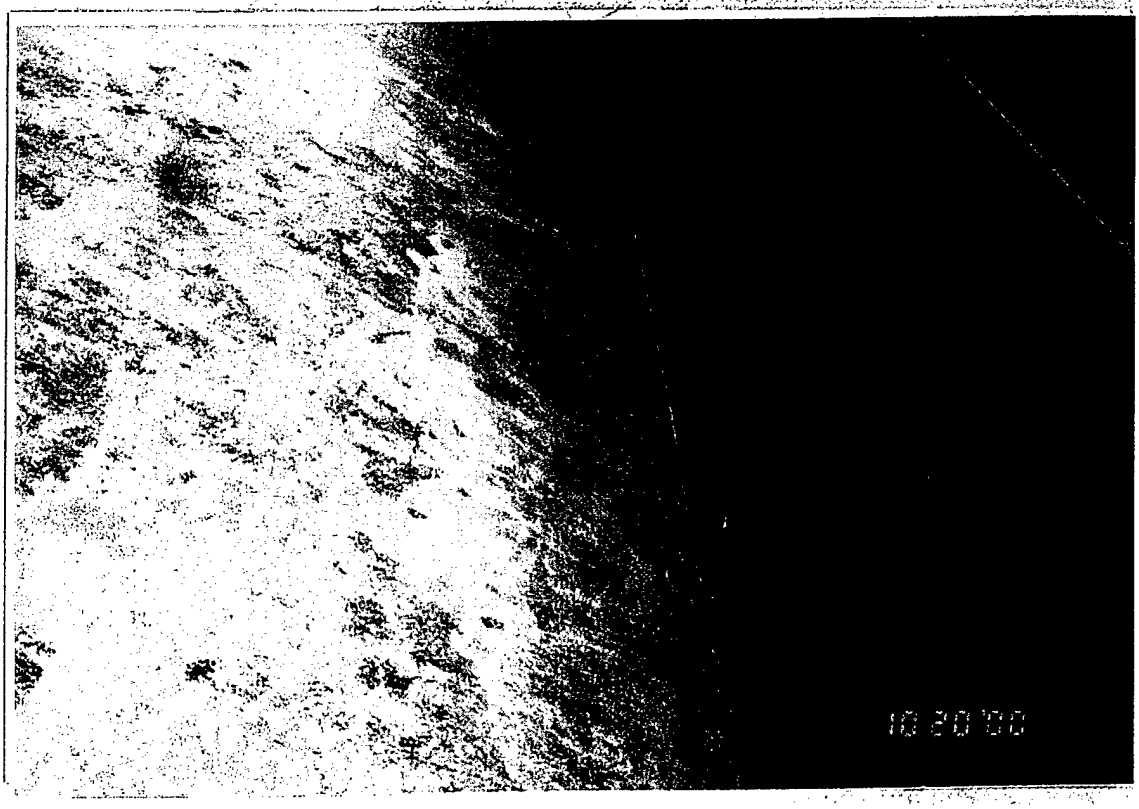
Little Goose Dam 10/16/00 1-22	**Gate 1** Gate face, typical.



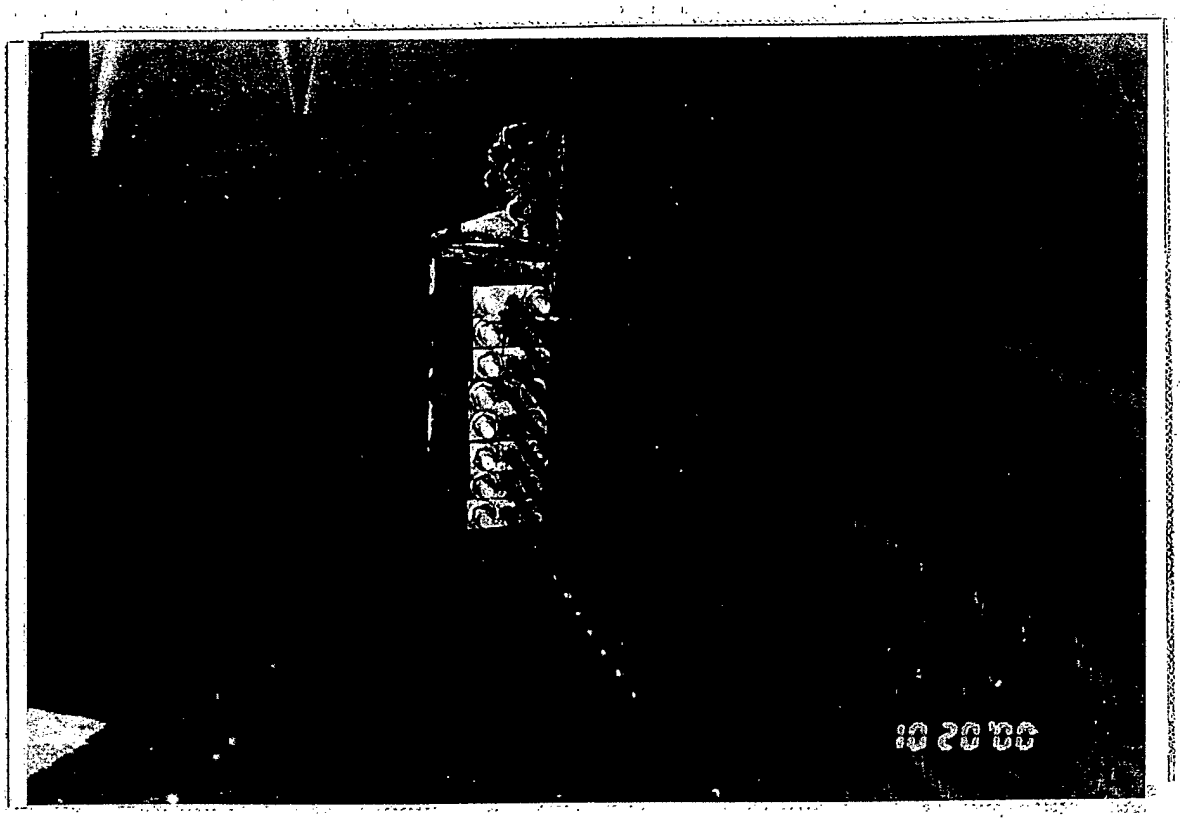
Little Goose Dam 10/16/00 1-23	**Gate 1** Left frame, typical.



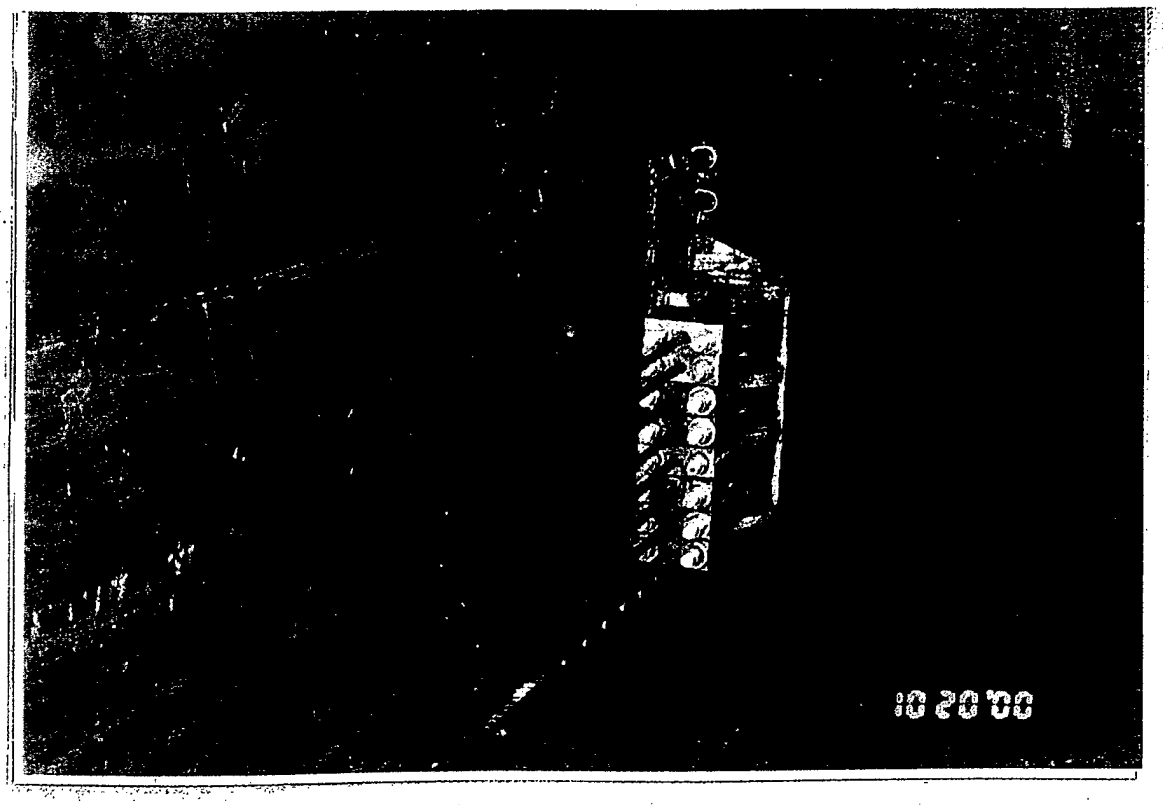
Little Goose Dam 11/21/00 1-24	**Gate 1** Leak at center construction joint in spillway monolith.



Little Goose Dam 10/20/00 1-25	**Gate 1** Typical condition of skin plate. Scattered pitting.

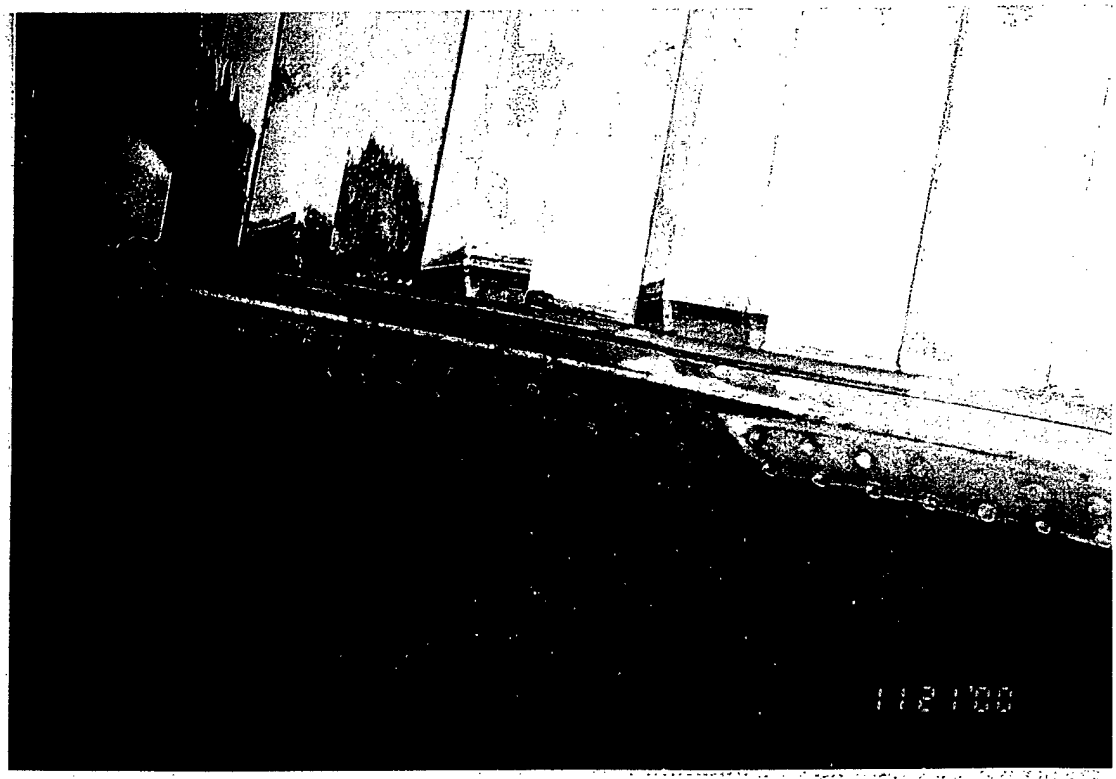


Little Goose Dam 10/20/00	**Gate 1** Top of hoist connection. Note: Good condition of stainless steel U-bolts and socket blocks.

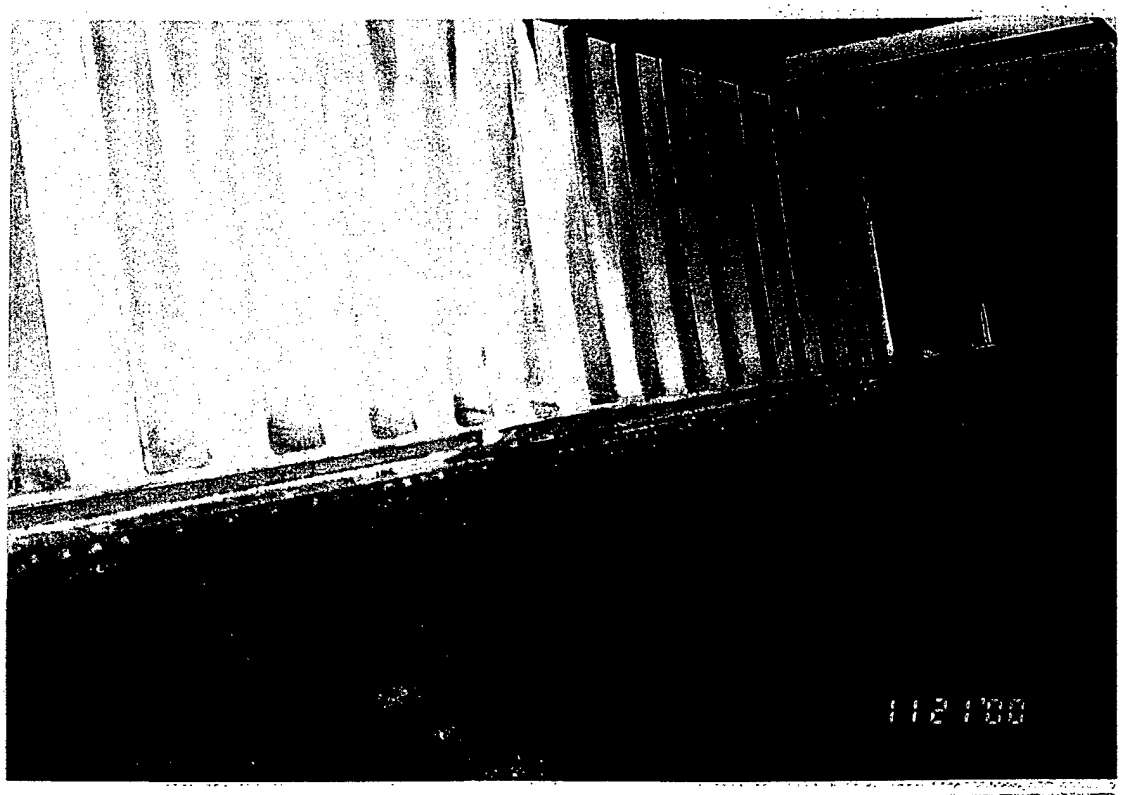


Little Goose Dam 10/20/00 1-27	**Gate 1** Top of hoist connection. Note: Good condition of stainless steel U-bolts and socket blocks.

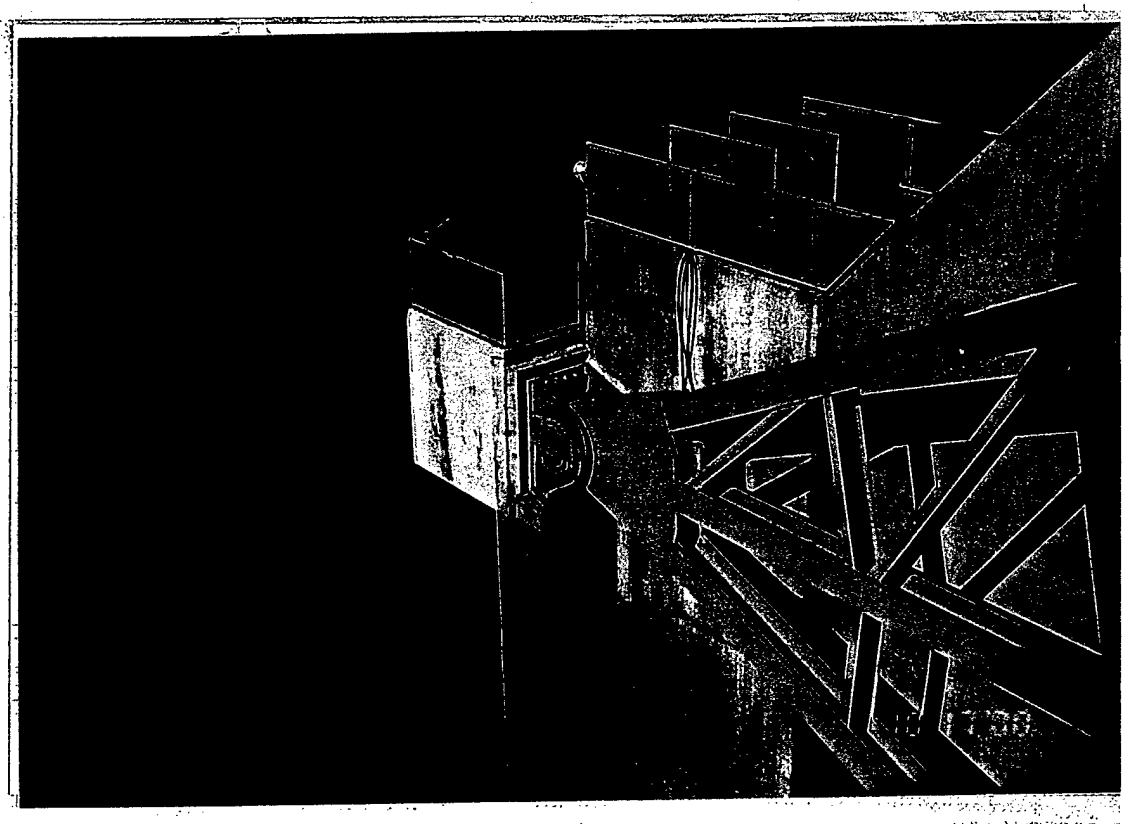
Little Goose Dam 10/20/00 1-28	**Gate 1** Skin plate pitting, typical.



Little Goose Dam 10/20/00 1-29	**Gate 1** Bottom of right side of gate at 3' open. Note: Heavy falling water due to stop log leakage precludes inspection of hoist connections.



Little Goose Dam 10/20/00 1-30	**Gate 1** Bottom of left side of gate at 3' open. Note: Heavy falling water due to stop log leakage precludes inspection of hoist connections.



Little Goose Dam

10/17/00

2-1

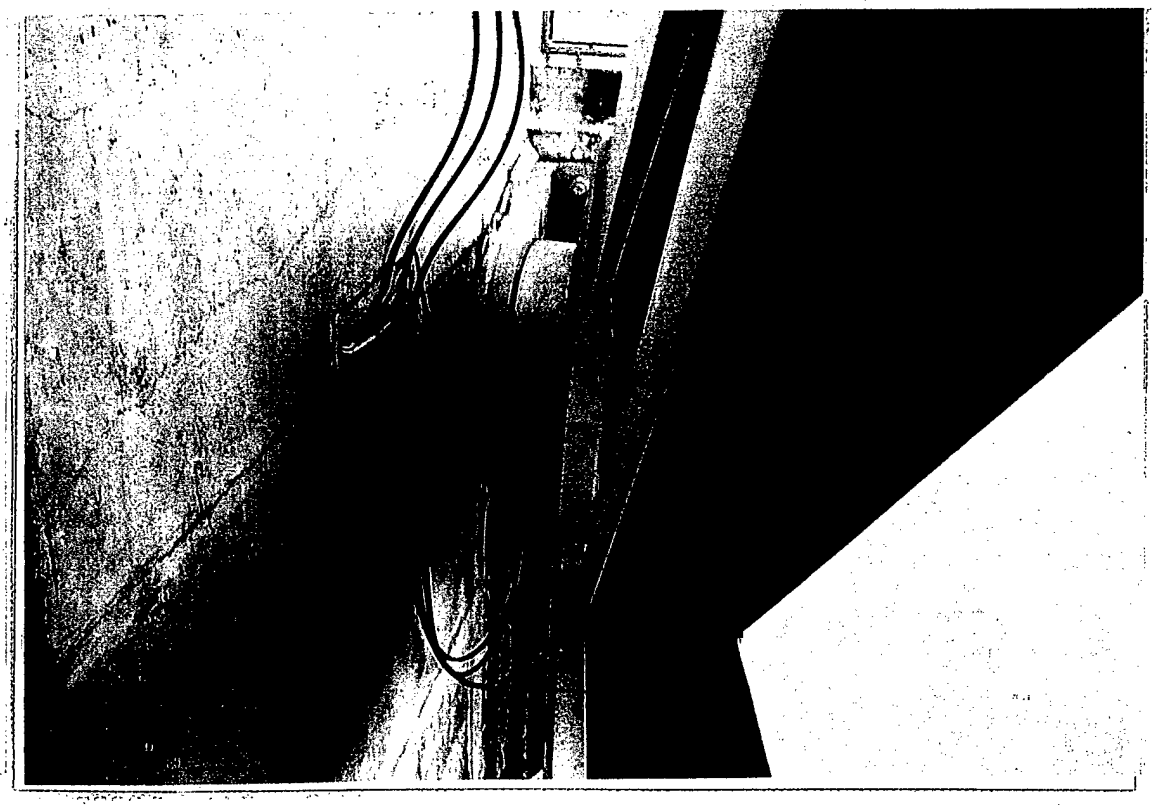
Gate 2
Right frame, typical.

Little Goose Dam

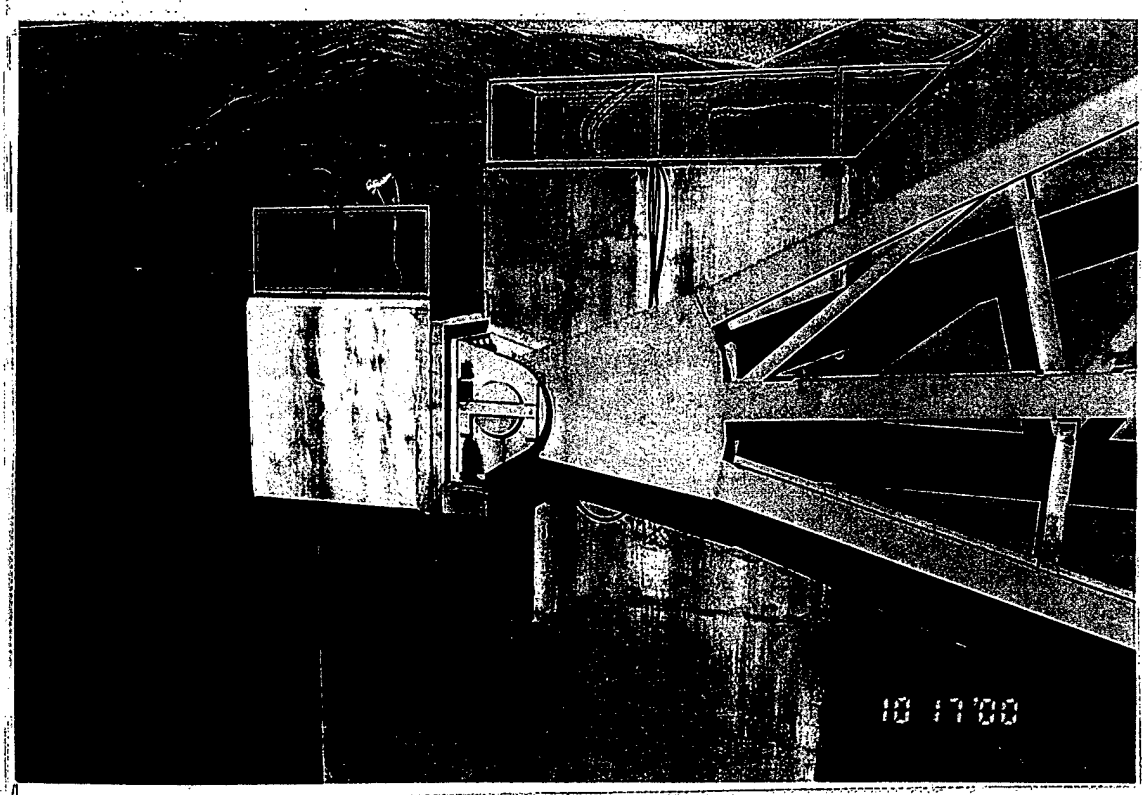
10/17/00

2-2

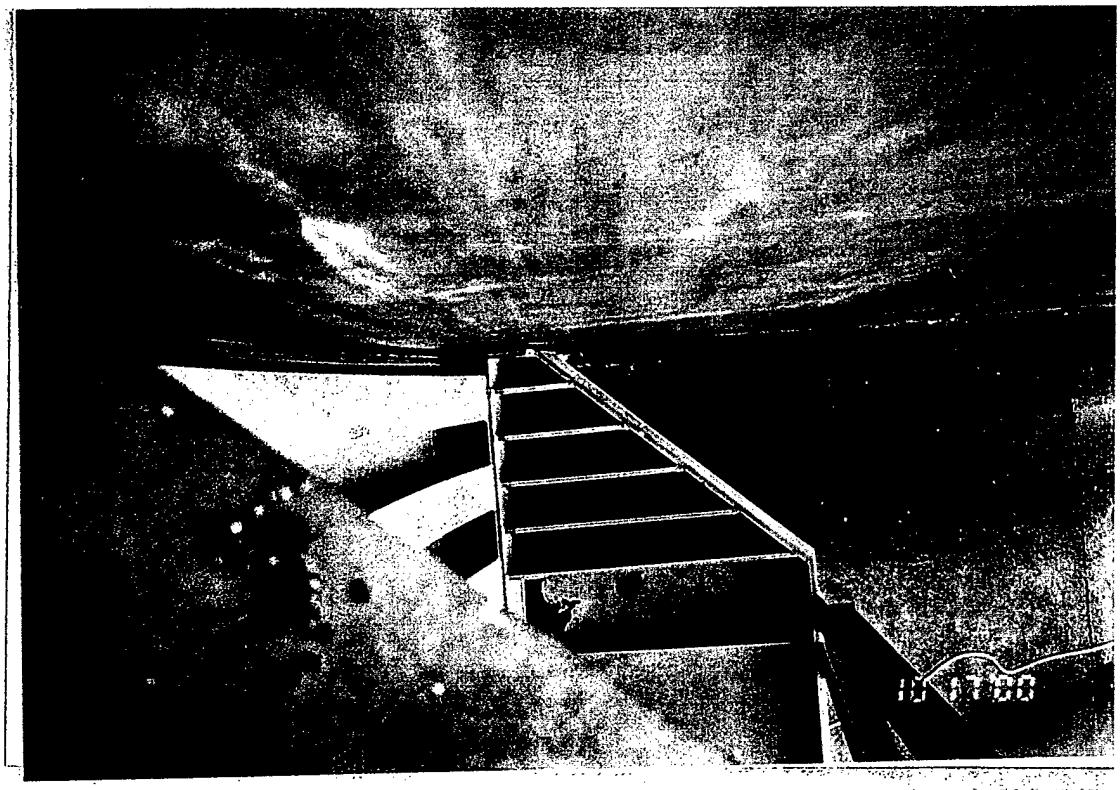
Gate 2
Top of top horizontal girder looking towards right frame, typical.



Little Goose Dam 10/17/00 2-3	**Gate 2** Outside of left trunnion and yoke, typical.

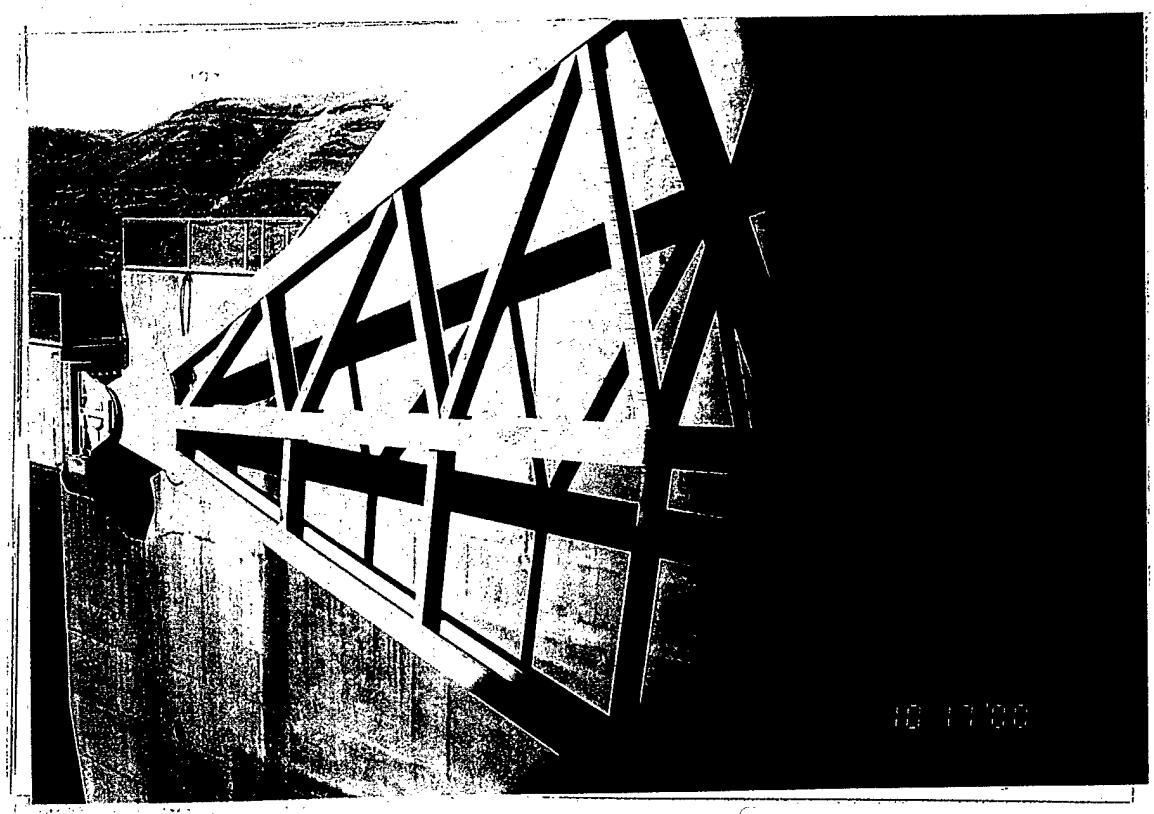


Little Goose Dam 10/17/00 2-4	**Gate 2** Right trunnion and trunnion block, typical.

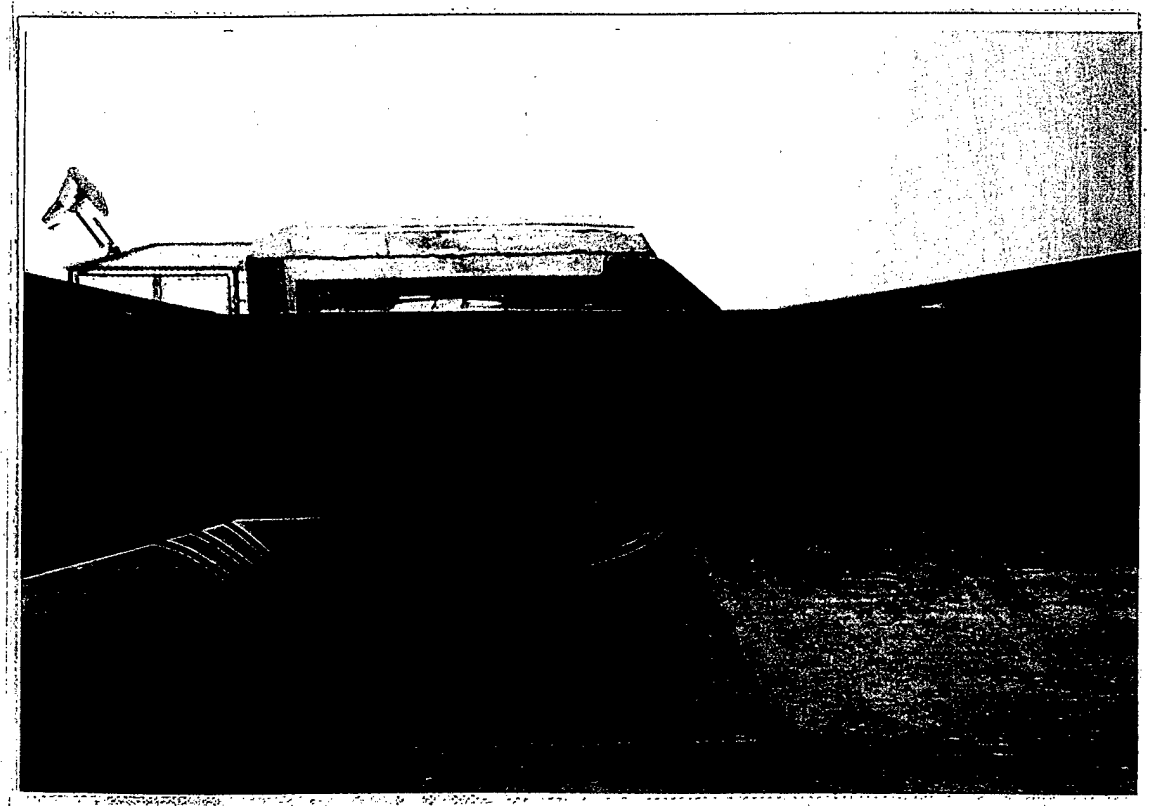


Little Goose Dam 10/17/00 2-5	**Gate 2** Bottom horizontal girder, left end. Standing water, no drainage between multiple stiffeners, typical.

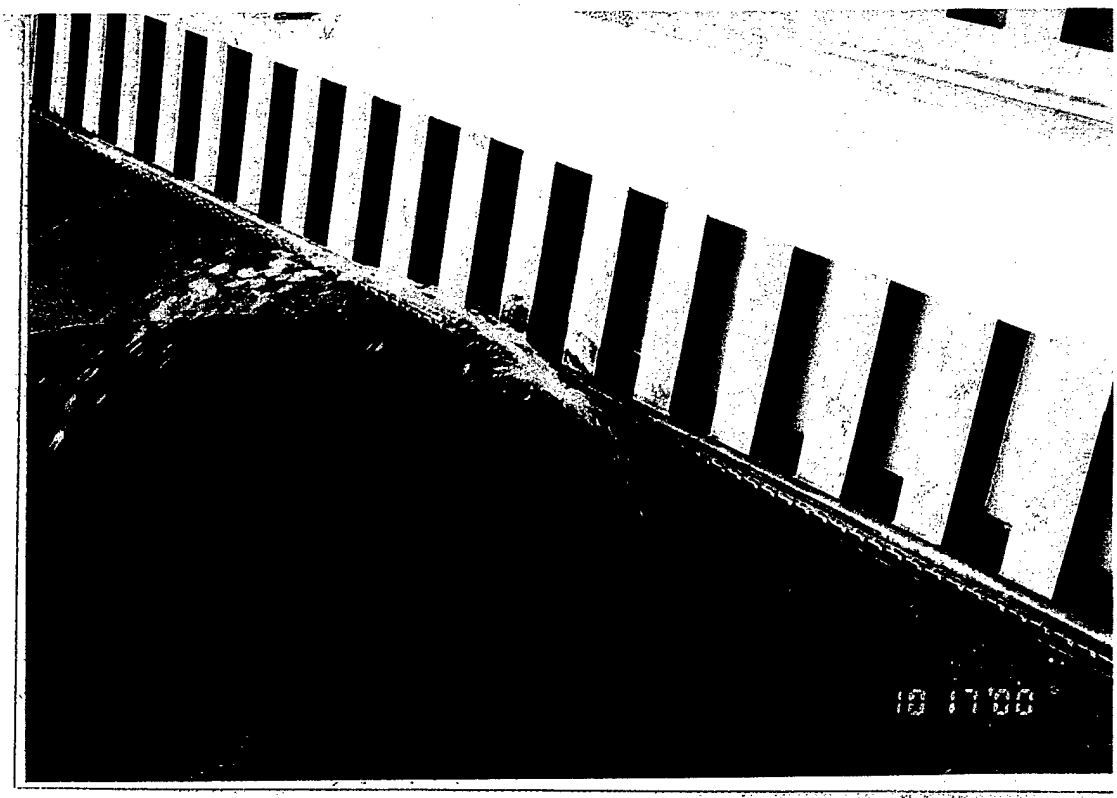
Little Goose Dam 10/17/00 2-6	**Gate 2** Side seal leak, right end of bottom horizontal girder.



Little Goose Dam 10/17/00 2-7	**Gate 2** Right frame, typical.



Little Goose Dam 10/17/00 2-8	**Gate 2** Brace H, left frame. Light corrosion on web.

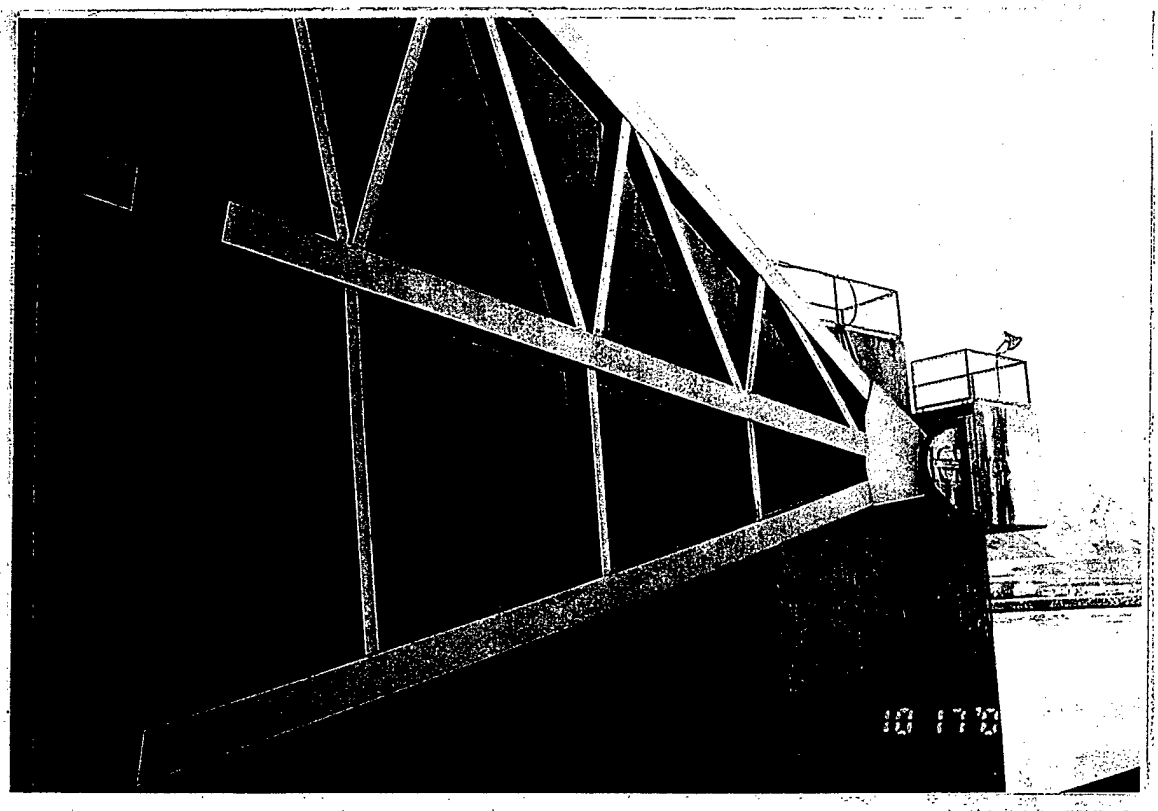


Little Goose Dam 10/17/00 2-9	**Gate 2** Leak at center construction joint in spillway monolith.

Little Goose Dam 10/17/00 2-10	**Gate 2** Left frame between brace J and K. Debris at upstream end of bottom radial strut.

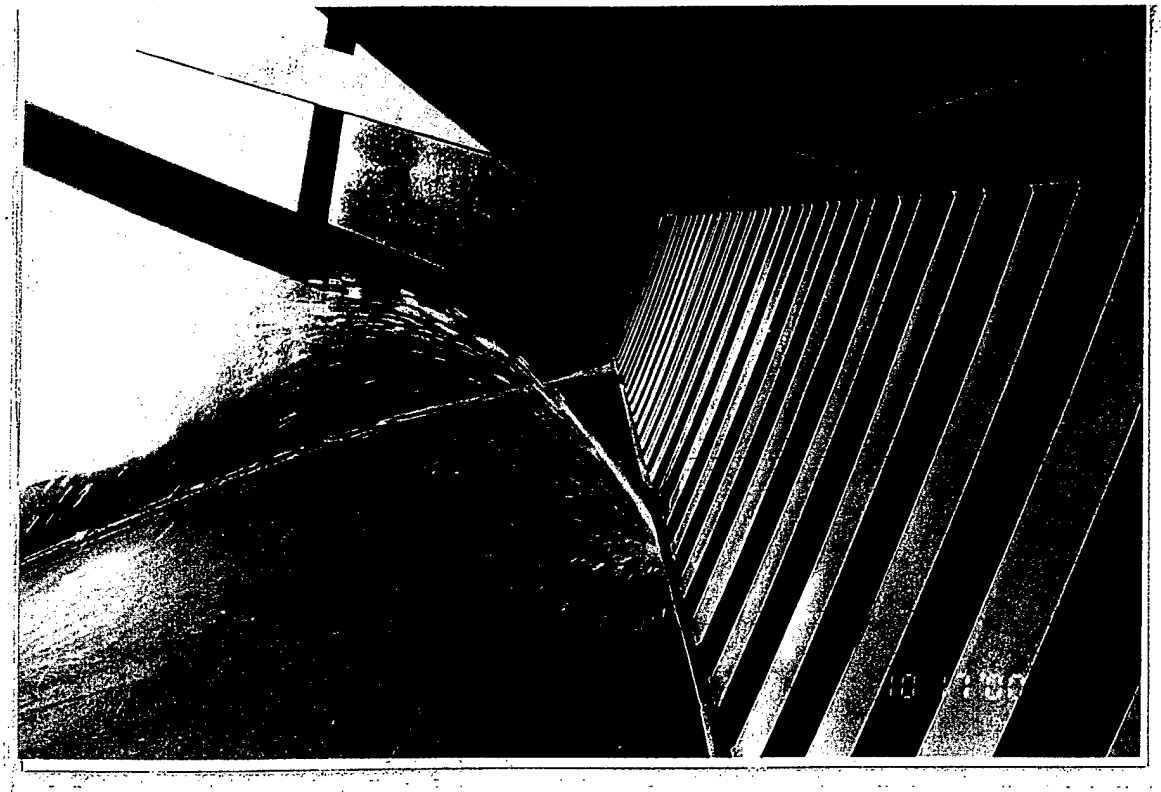
Little Goose Dam 10/17/00 2-11	**Gate 2** Bottom horizontal girder, left end. Standing water, no drainage between multiple stiffeners, typical.

Little Goose Dam 10/17/00 2-12	**Gate 2** Bottom horizontal girder, Right end. Standing water, no drainage between multiple stiffeners, typical.

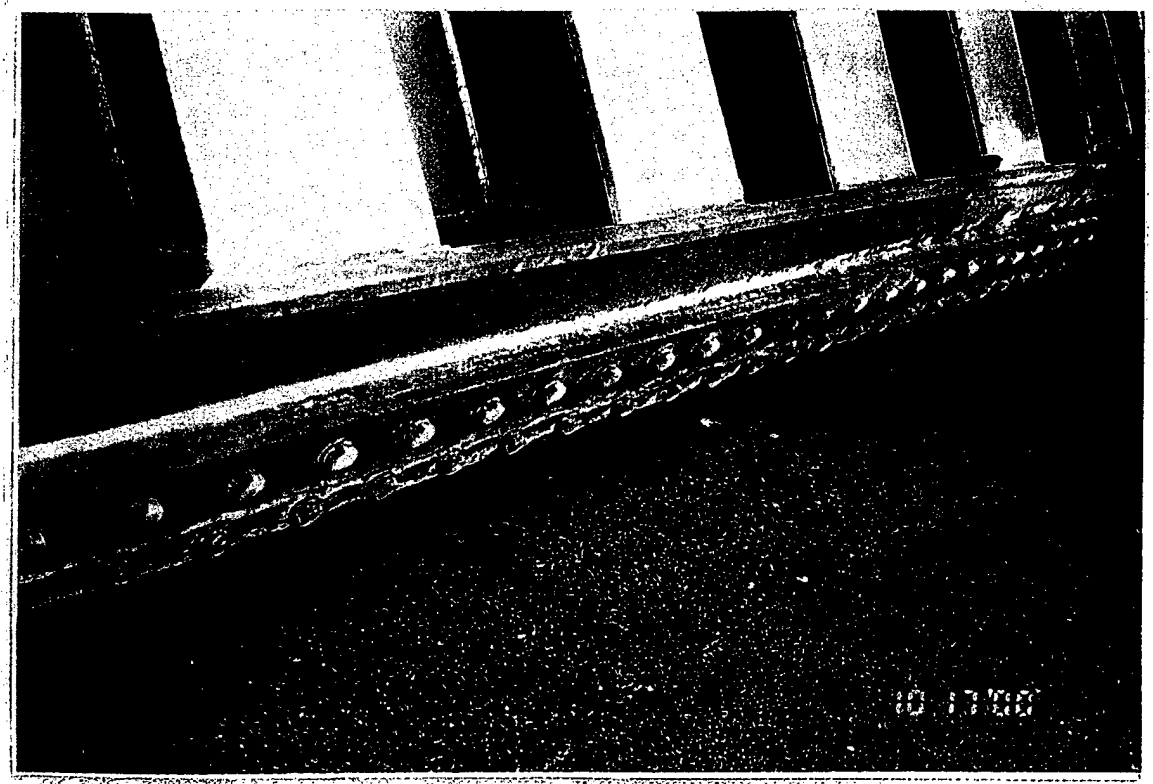


Little Goose Dam 10/17/00 2-13	**Gate 2** Left frame, typical.

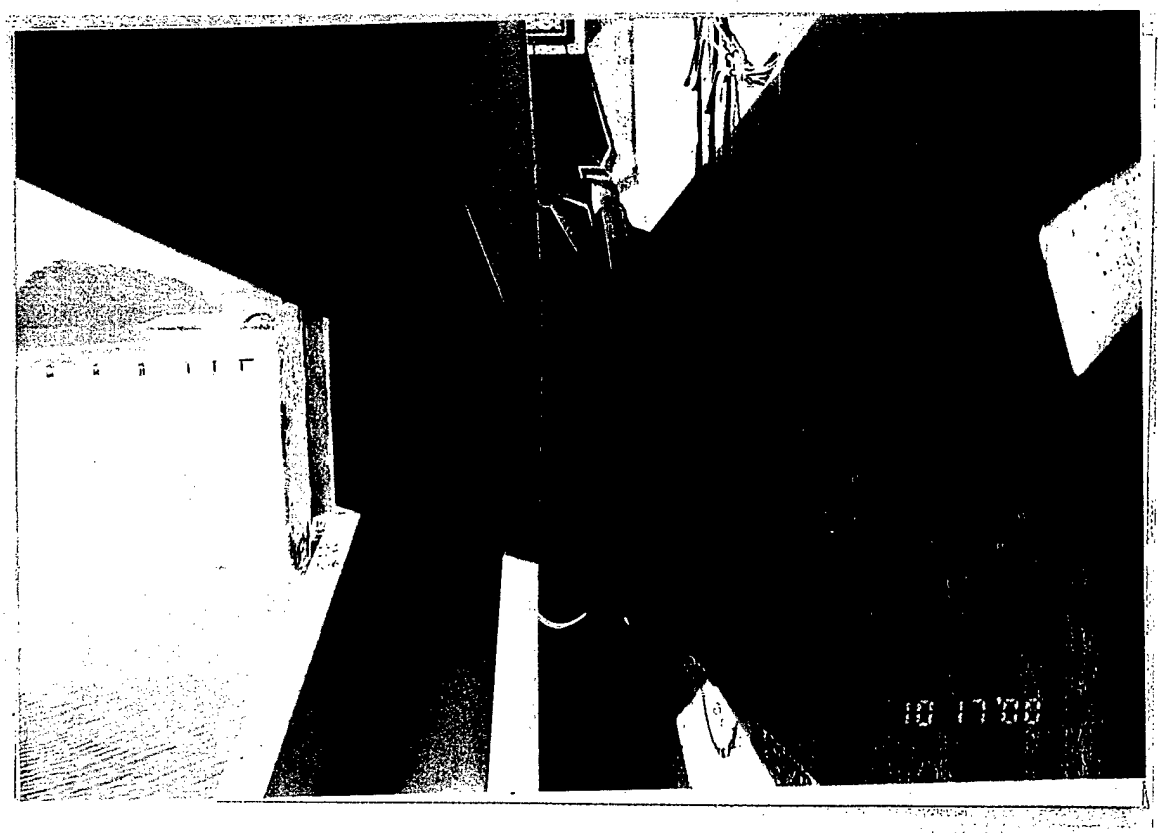
Little Goose Dam 10/17/00 2-14	**Gate 2** Leak, bottom left corner of gate. Bottom seal closure plate. Standing water between closure plate, purlin webs and skinplate. Typical.



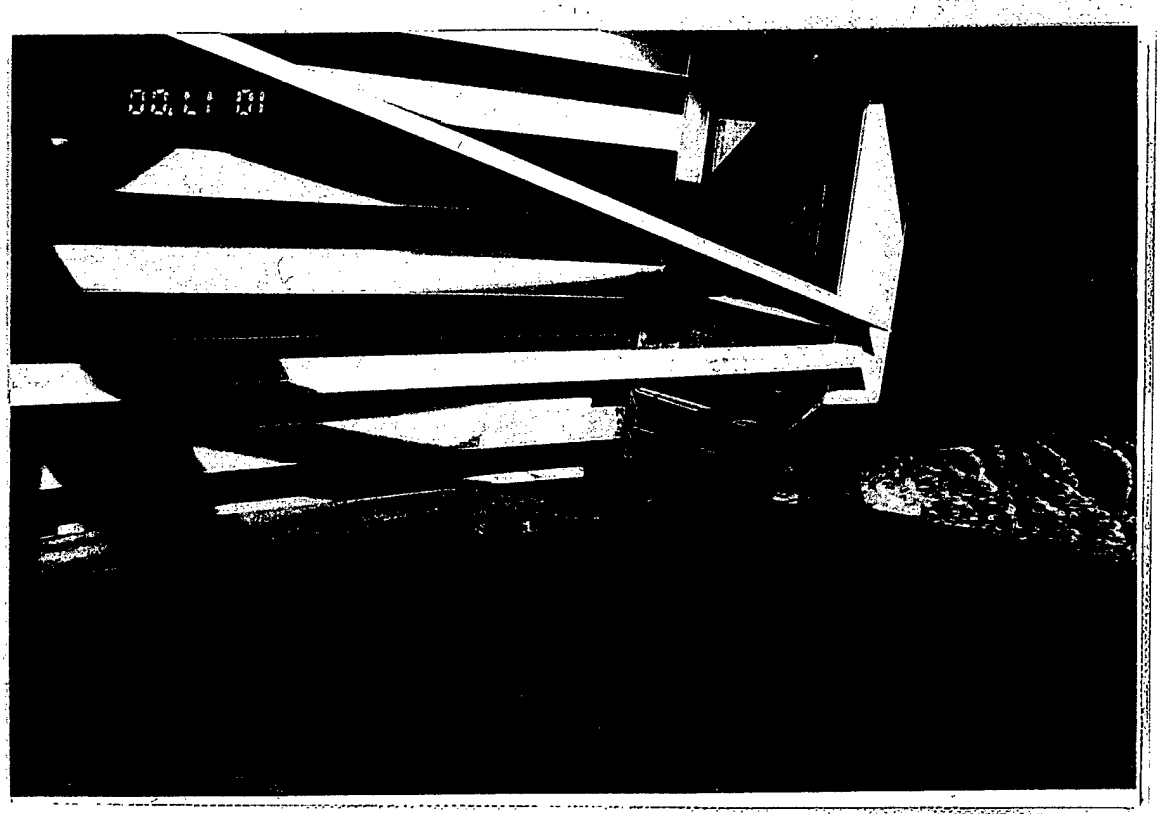
Little Goose Dam 10/17/00 2-15	**Gate 2** Leak at center construction joint in spillway monolith.



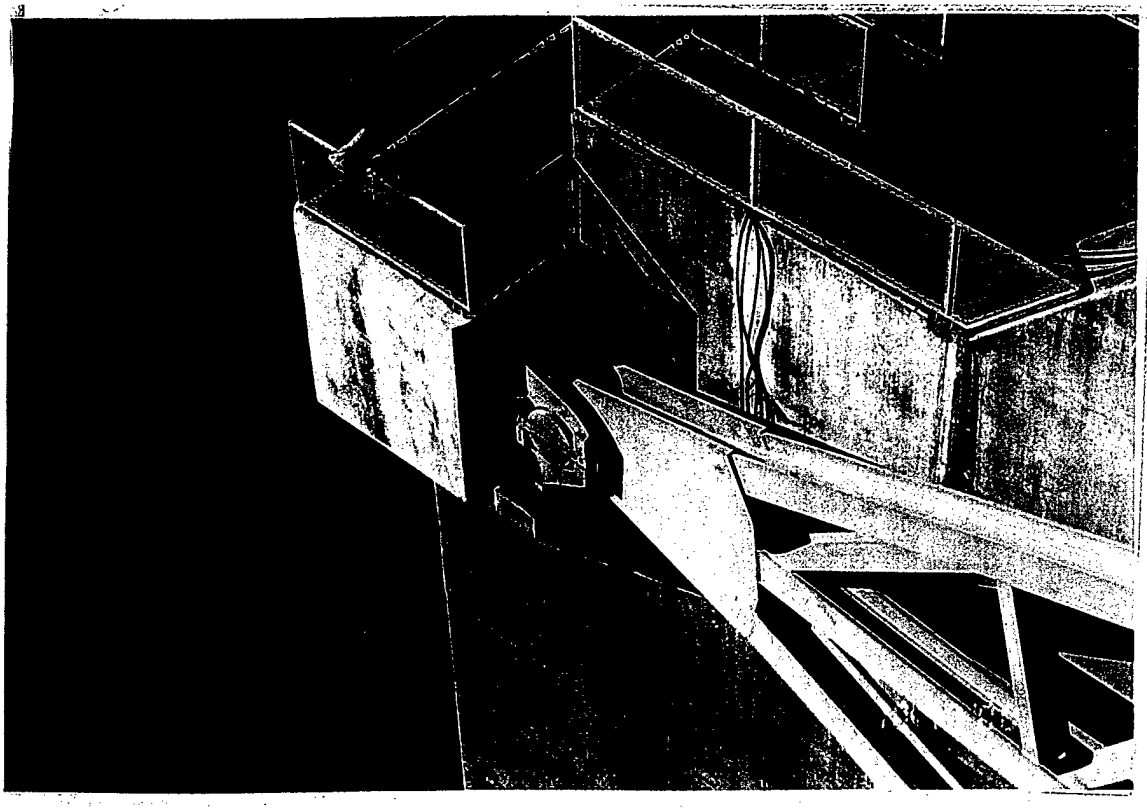
Little Goose Dam 10/17/00 2-16	**Gate 2** Bottom seal keeper plate, light corrosion. Embedded bottom seal plate, typical.



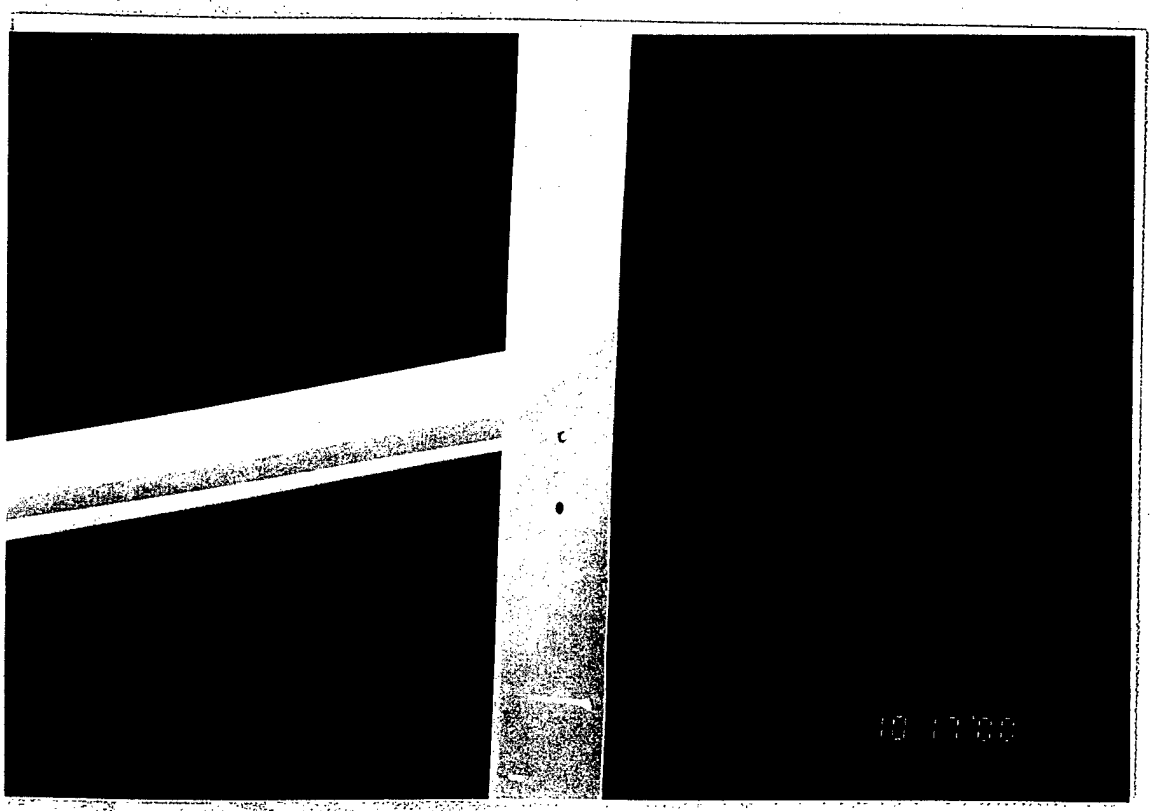
Little Goose Dam 10/17/00 2-17	**Gate 2** Inside closure plate at right trunnion. Light corrosion and staining from drain hole above.



Little Goose Dam 10/17/00 2-18	**Gate 2** Side seal leak, right side of gate.



Little Goose Dam 10/17/00 2-19	**Gate 2** Right trunnion block, typical.



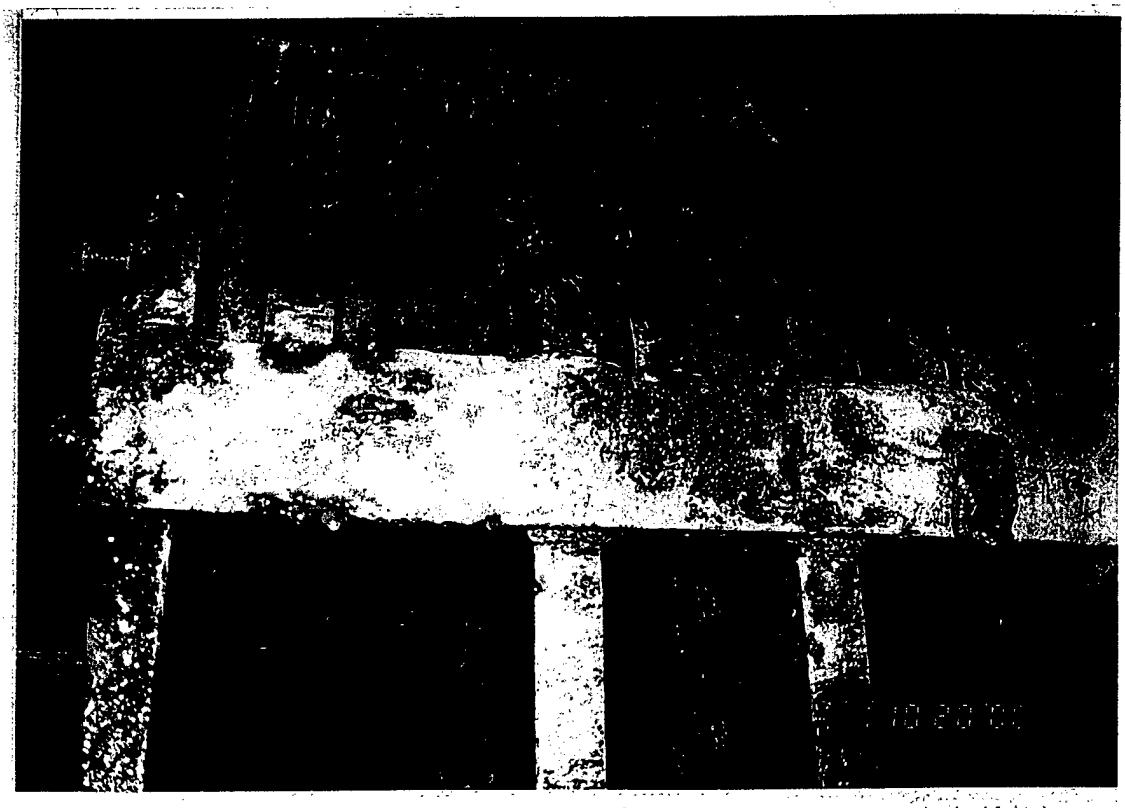
Little Goose Dam 10/17/00 2-20	**Gate 2** Extraneous holes, top plate at purlins.

Little Goose Dam 10/20/00 2-21	**Gate 2** Bottom seal keeper plate, typical.

Little Goose Dam 10/20/00 2-22	**Gate 2** Bottom seal, typical.

Little Goose Dam 10/20/00 2-23	**Gate 2** Right hoist connection and zinc anodes. Light corrosion on lifting lugs.

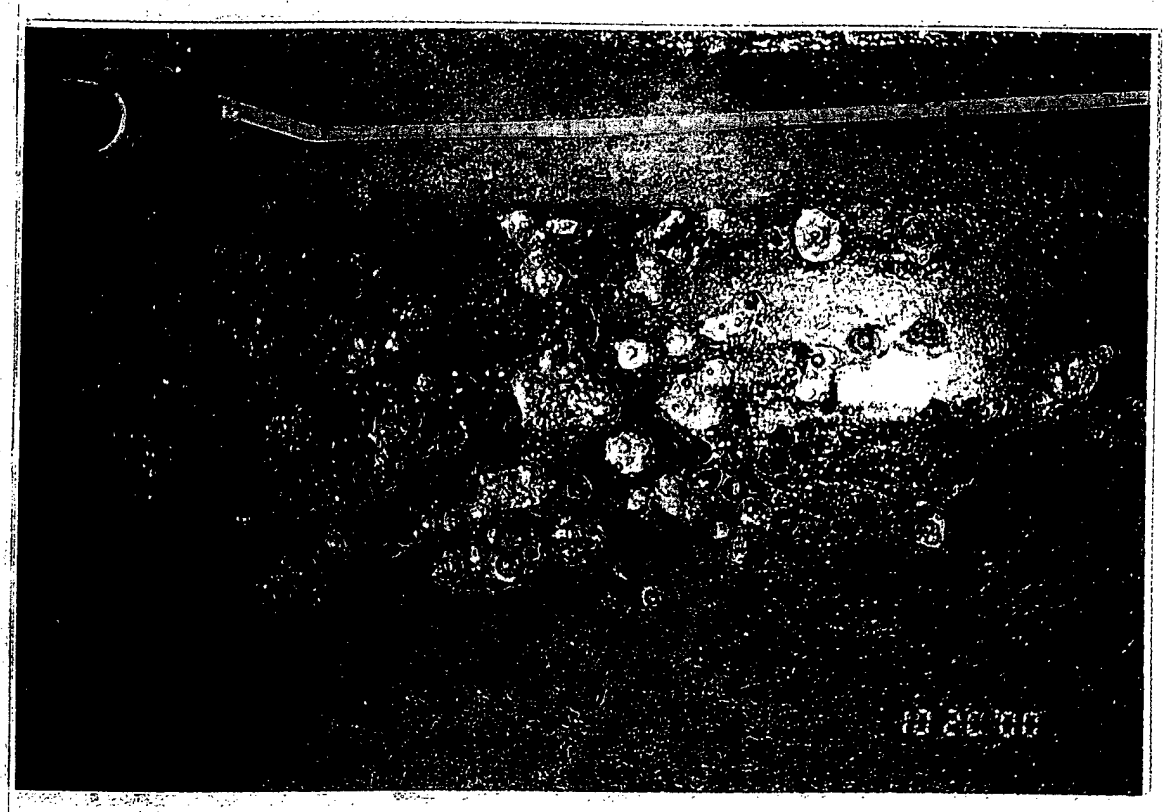
Little Goose Dam 10/20/00 2-24	**Gate 2** Zinc anodes, good condition.



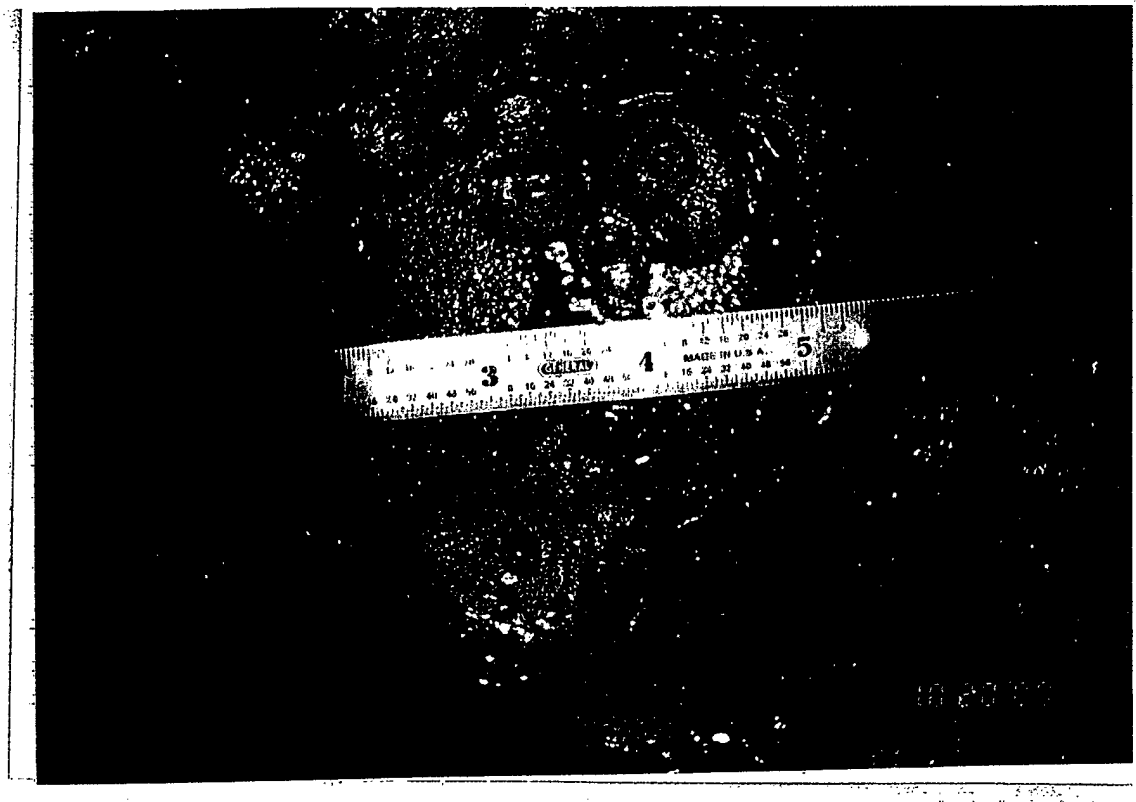
Little Goose Dam 10/20/00 2-25	**Gate 2** Bottom of hoist connection. Light corrosion on plates.

Little Goose Dam 10/20/00 2-26	**Gate 2** Unidentified metal clamp near hoist connection.

Little Goose Dam 10/20/00 2-27	**Gate 2** Bottom seal closure plate looking upstream. Standing water between closure plate, purlin webs and skinplate. Typical.

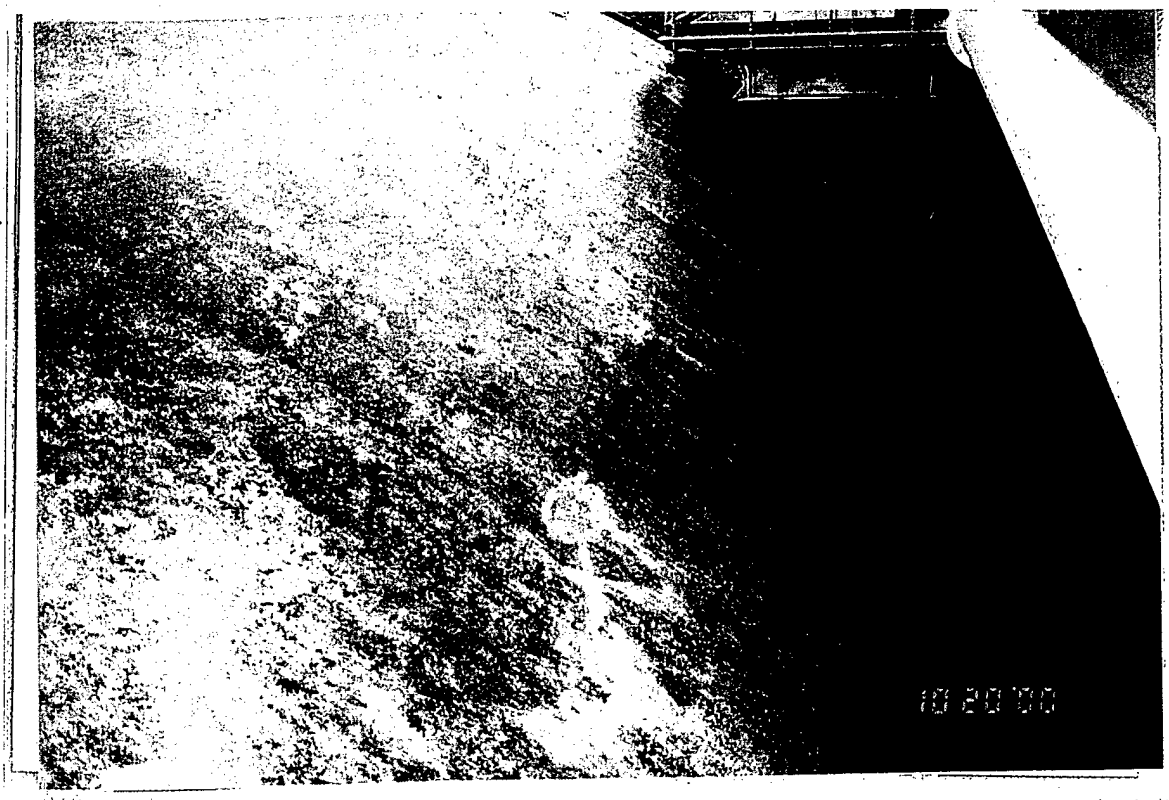


Little Goose Dam 10/20/00 2-28	**Gate 2** Skin plate pitting, typical.



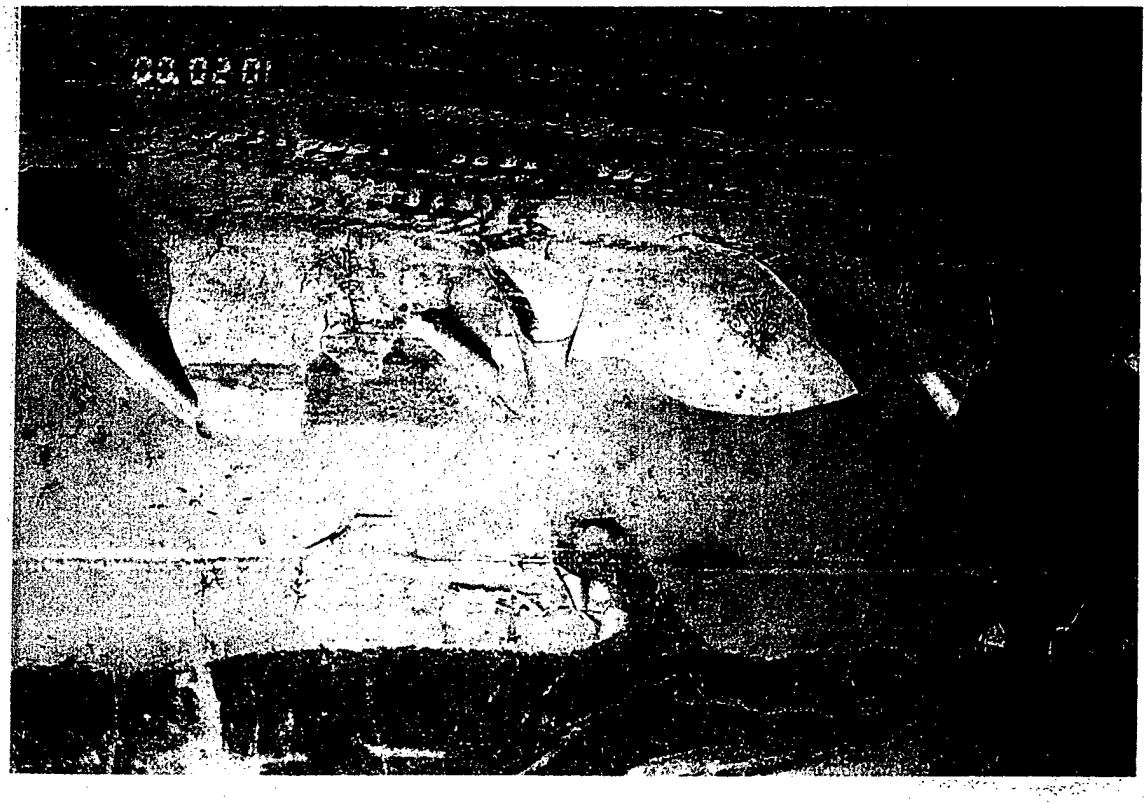
Little Goose Dam 10/20/00 2-29	**Gate 2** Skin plate pitting, typical.

Little Goose Dam 10/20/00 2-30	**Gate 2** Skin plate pitting, typical.

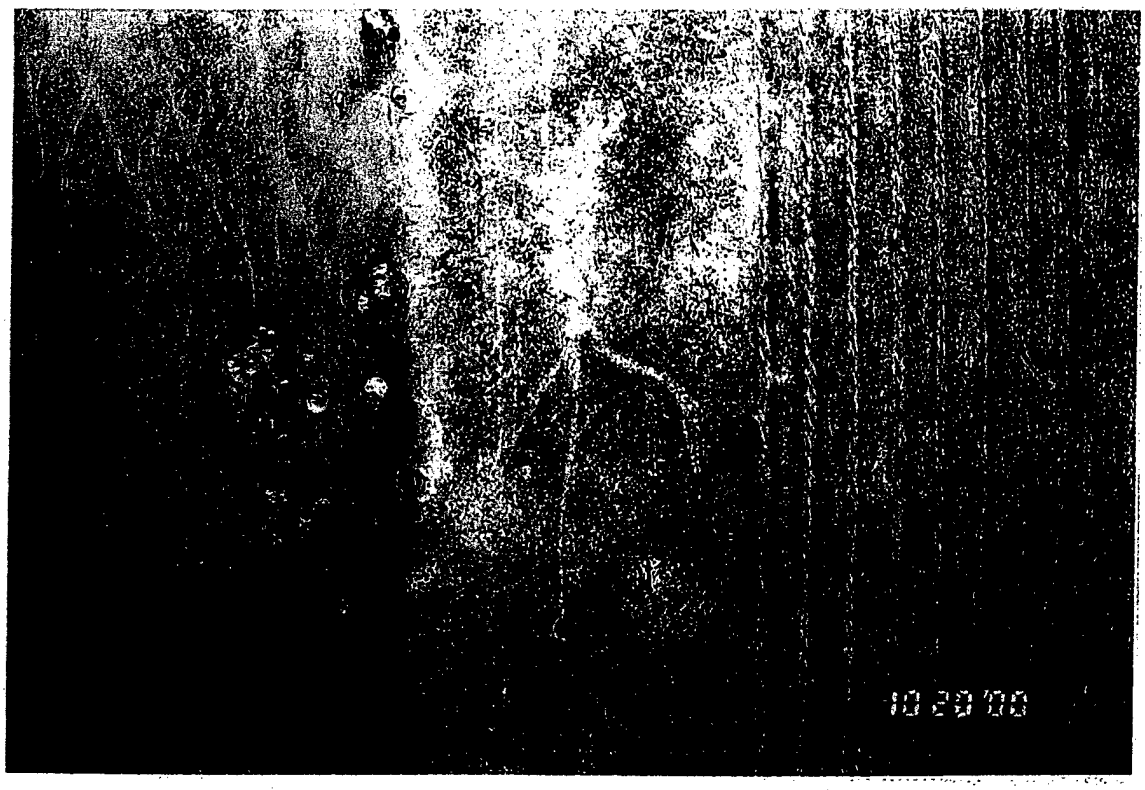


Little Goose Dam 10/20/00 2-31	**Gate 2** Skin plate condition, typical.

Little Goose Dam 10/20/00 2-32	**Gate 2** Top of hoist connection.

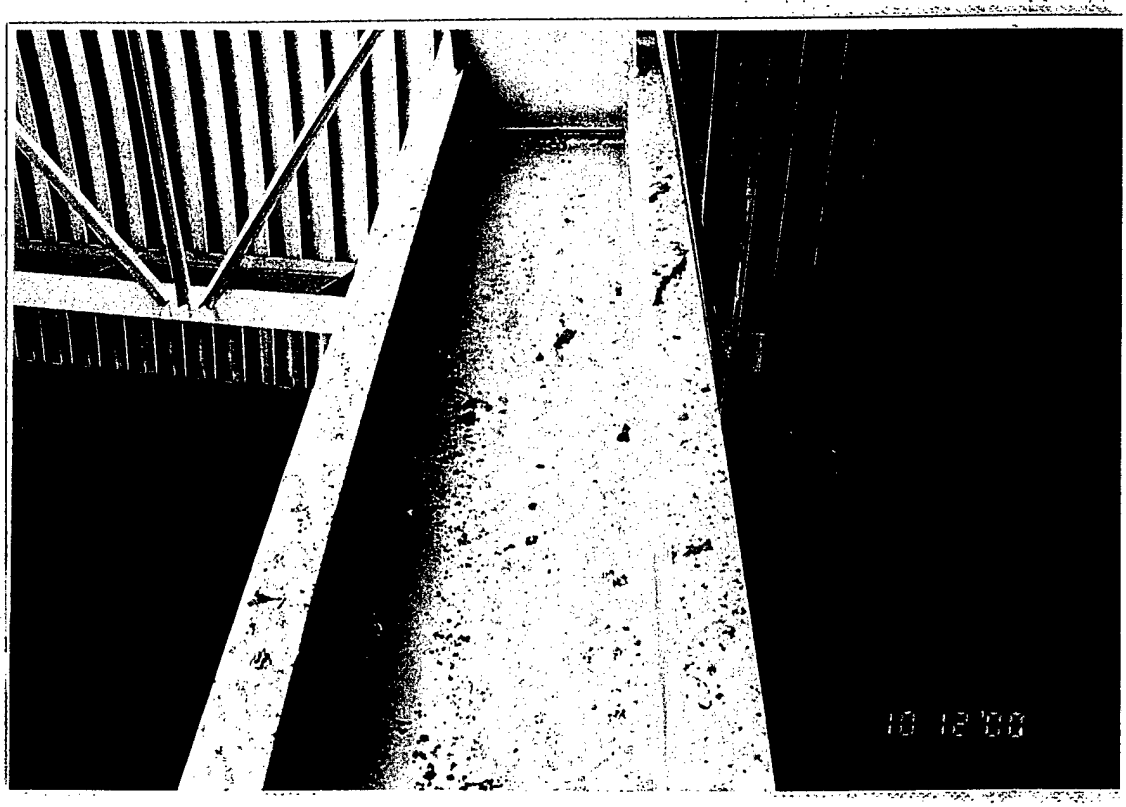


Little Goose Dam 10/20/00 2-33	**Gate 2** Delaminates vinyl, right side of wear plate, just below skin plate transition from 3/8" to 1/2".

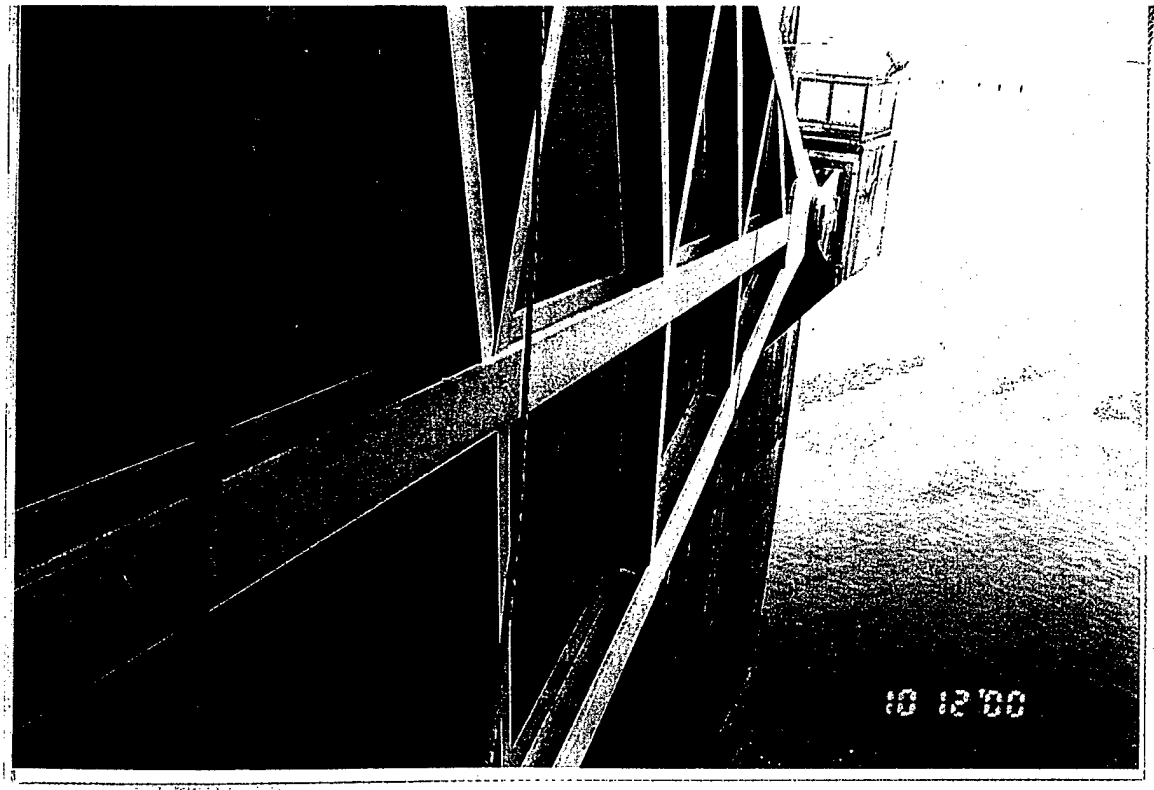


Little Goose Dam 10/20/00 2-34	**Gate 2** Skin plate pitting adjacent to wear plate, typical.

Little Goose Dam 10/12/00 3-1	**Gate 3** Left side of gate. Light corrosion on members.

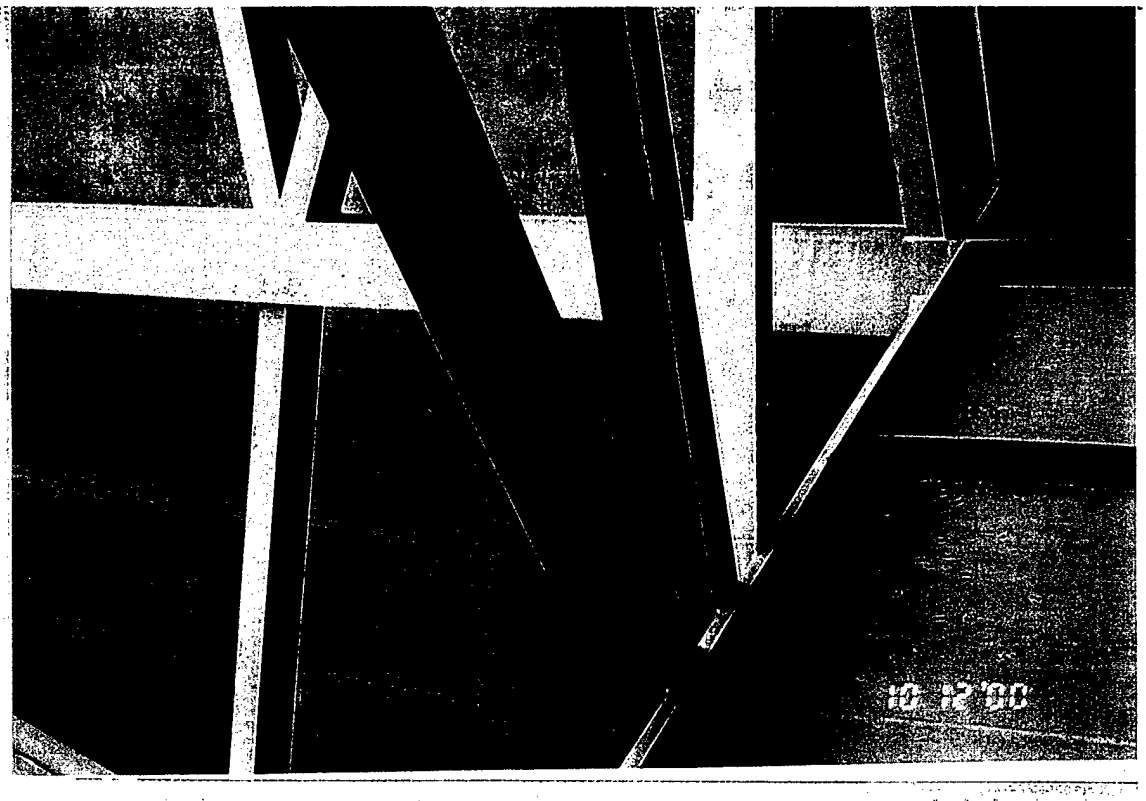


Little Goose Dam 10/12/00 3-2	**Gate 3** Left frame, middle radial strut, typical.

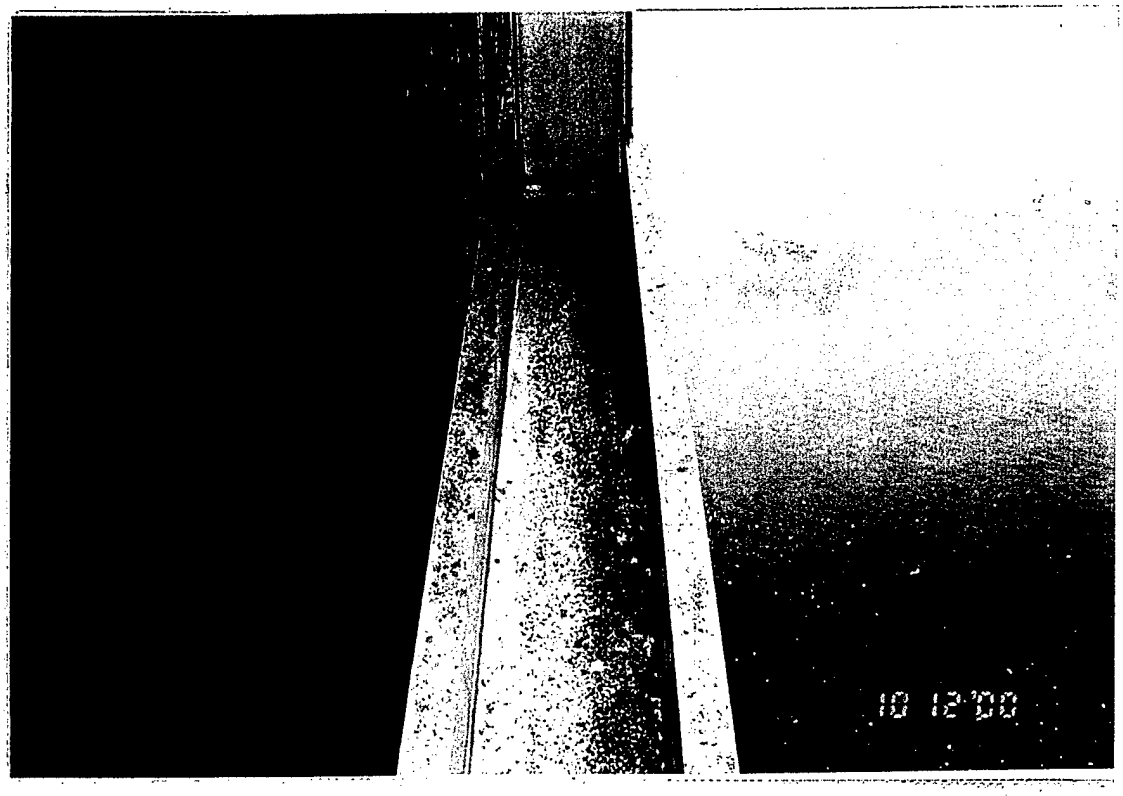


Little Goose Dam 10/12/00 3-3	**Gate 3** Left frame, typical.

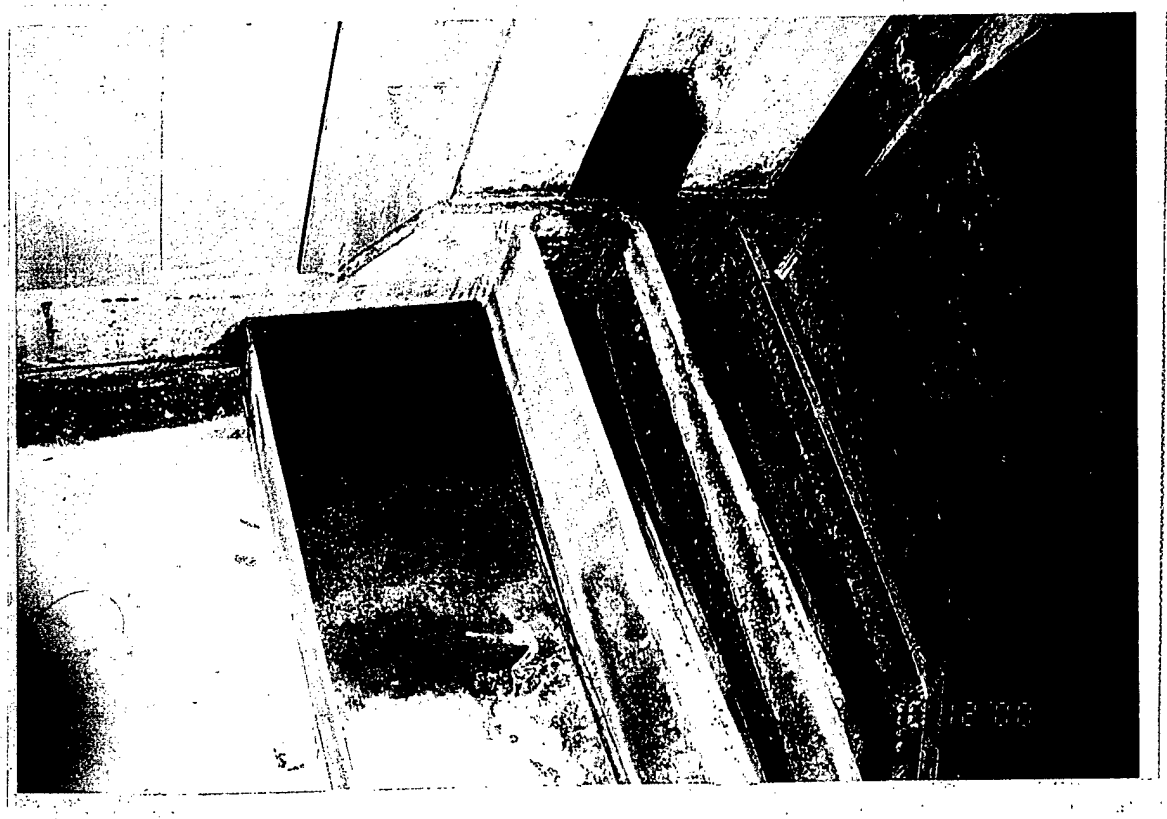
Little Goose Dam 10/12/00 3-4	**Gate 3** Left frame, Brace A. Light corrosion on upstream side.



Little Goose Dam 10/12/00 3-5	**Gate 3** Middle horizontal girder bracing. Light corrosion on braces.



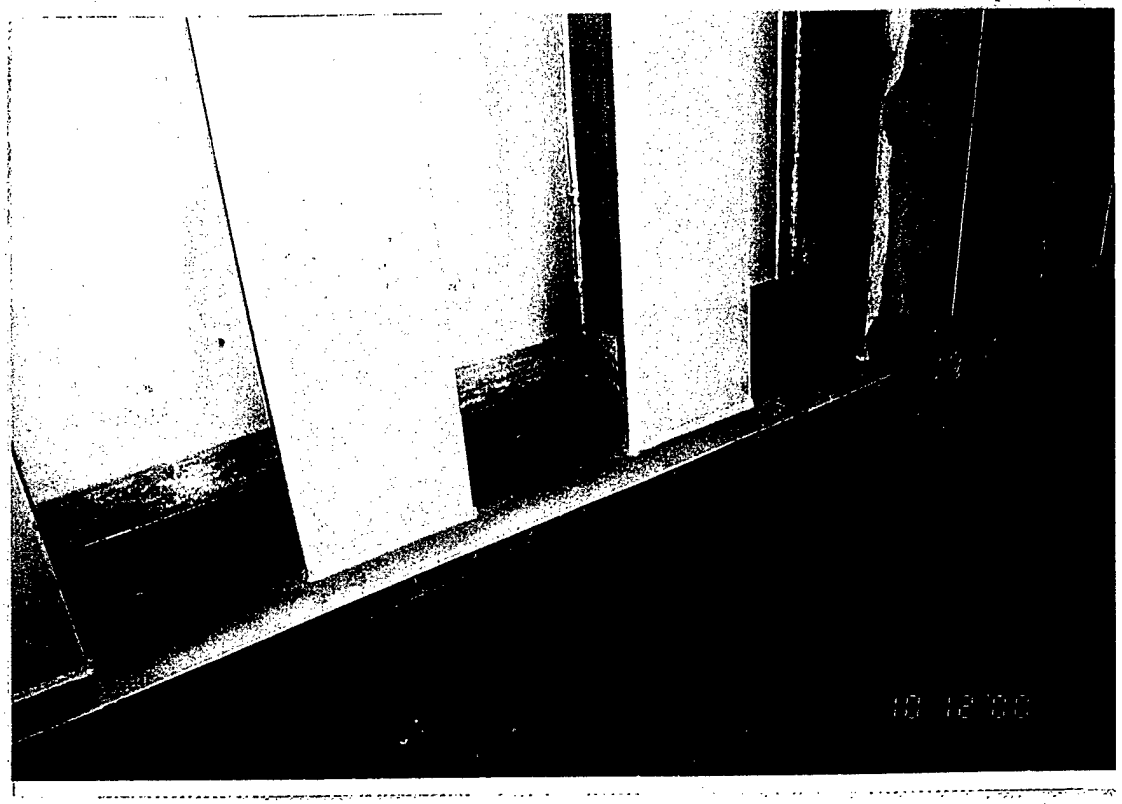
Little Goose Dam 10/12/00 3-6	**Gate 3** Middle radial strut, left frame. Light corrosion on strut.



Little Goose Dam 10/12/00 3-7	**Gate 3** Bottom horiz. girder, left end. Standing water, no drainage between multiple stiffeners, typical.

Little Goose Dam 10/12/00 3-8	**Gate 3** Standing water between closure plate, purlin webs and skinplate, typical. Light corrosion around drain hole at upstream side of bottom radial strut.

Little Goose Dam 10/12/00 3-9	**Gate 3** Side seal leak, bottom left corner of gate. Standing water between closure plate, purlin webs and skinplate, typical.

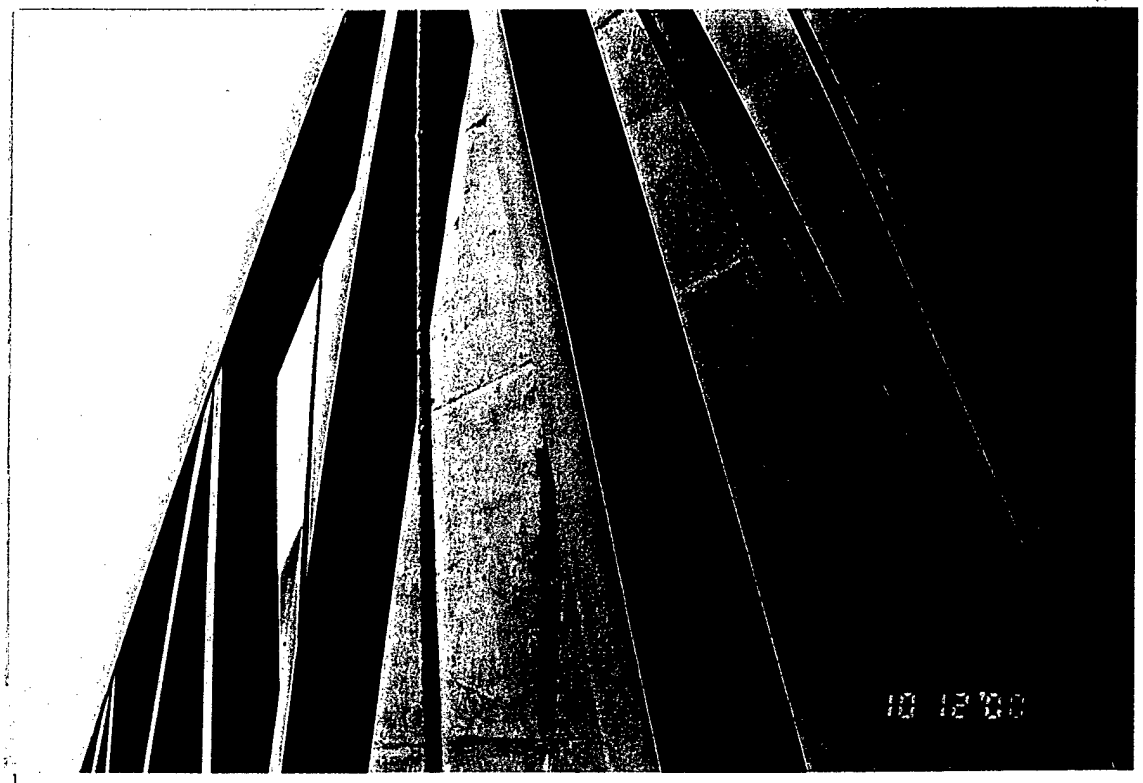


Little Goose Dam 10/12/00 3-10	**Gate 3** Standing water between closure plate, purlin webs and skinplate, typical.

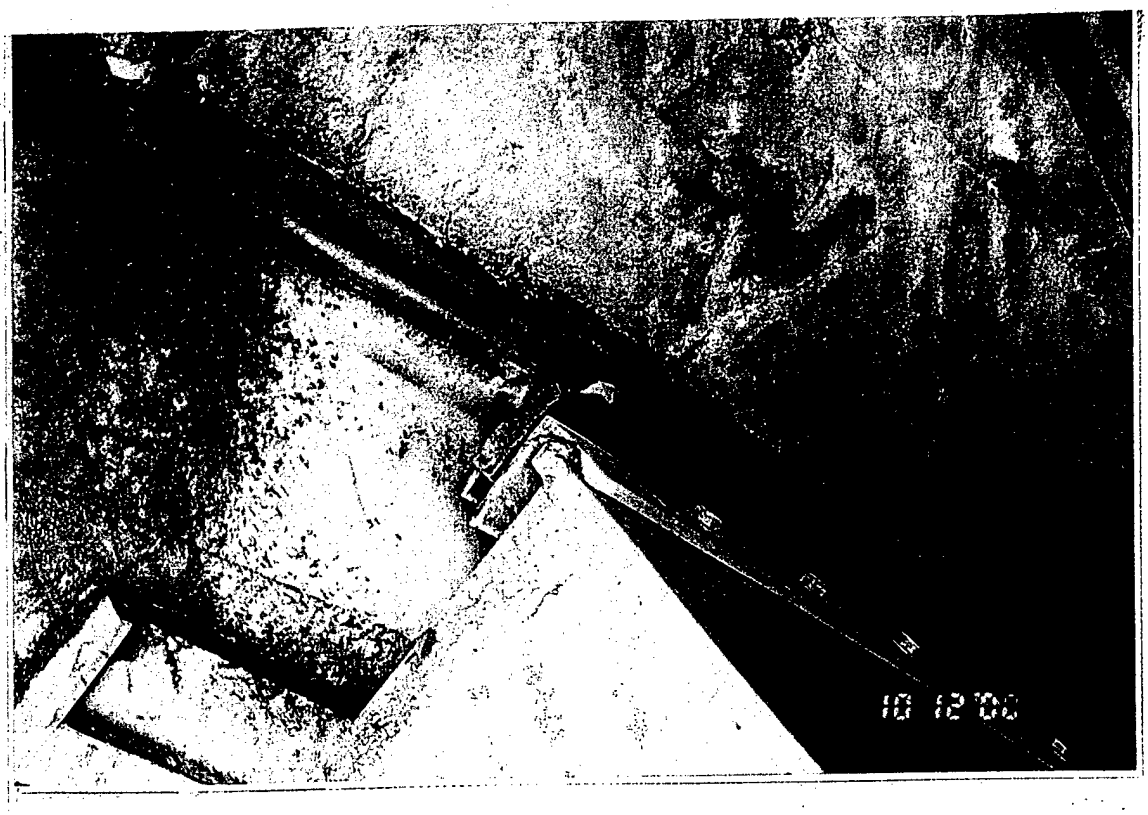
Little Goose Dam 10/12/00 3-11	**Gate 3** Leak at center construction joint in spillway monolith.

Little Goose Dam 10/12/00 3-12	**Gate 3** Bottom horizontal girder, right end. Standing water, no drainage between multiple stiffeners, typical.

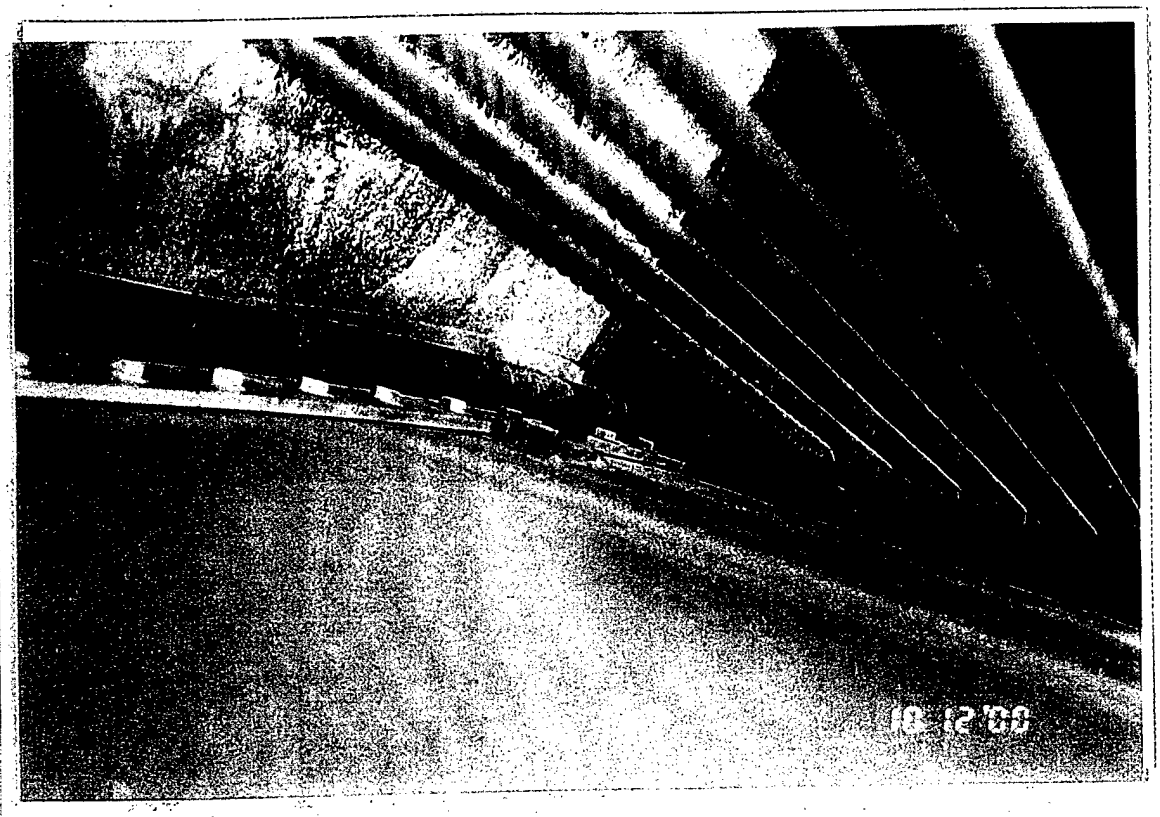
Little Goose Dam 10/12/00 3-13	**Gate 3** Close-up, bottom horizontal girder. Standing water, no drainage between multiple stiffeners, typical.



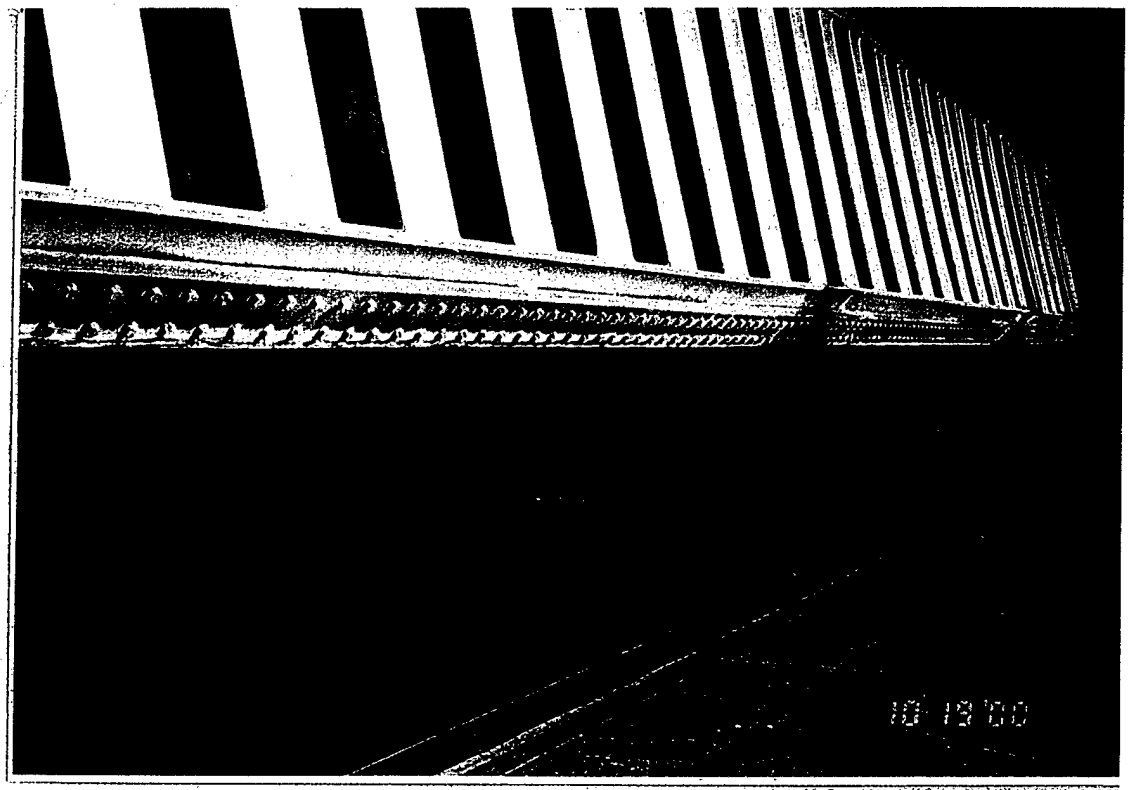
Little Goose Dam 10/12/00 3-14	**Gate 3** Bottom side of right frame, typical.



Little Goose Dam 10/12/00 3-15	**Gate 3** Top of side seal, typical.

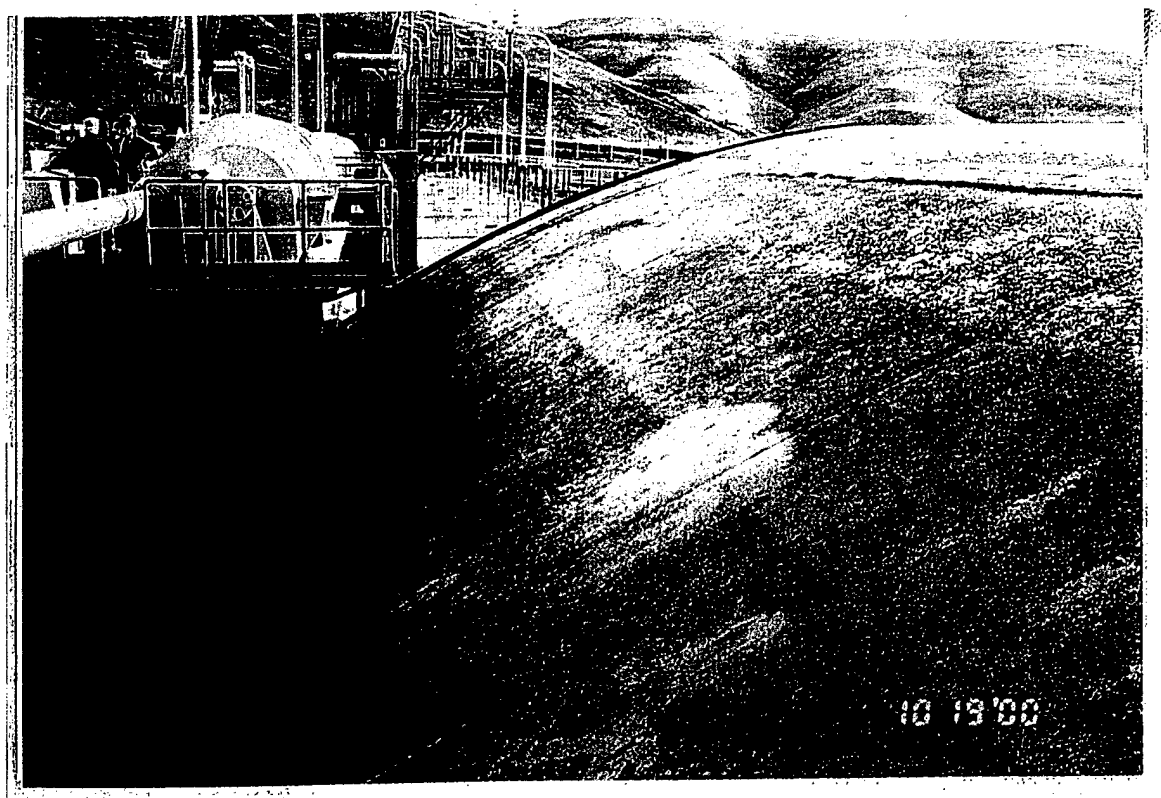


Little Goose Dam 10/12/00 3-16	**Gate 3** Top upstream skinplate at hoist cables. Moderate corrosion on unidentified metal.

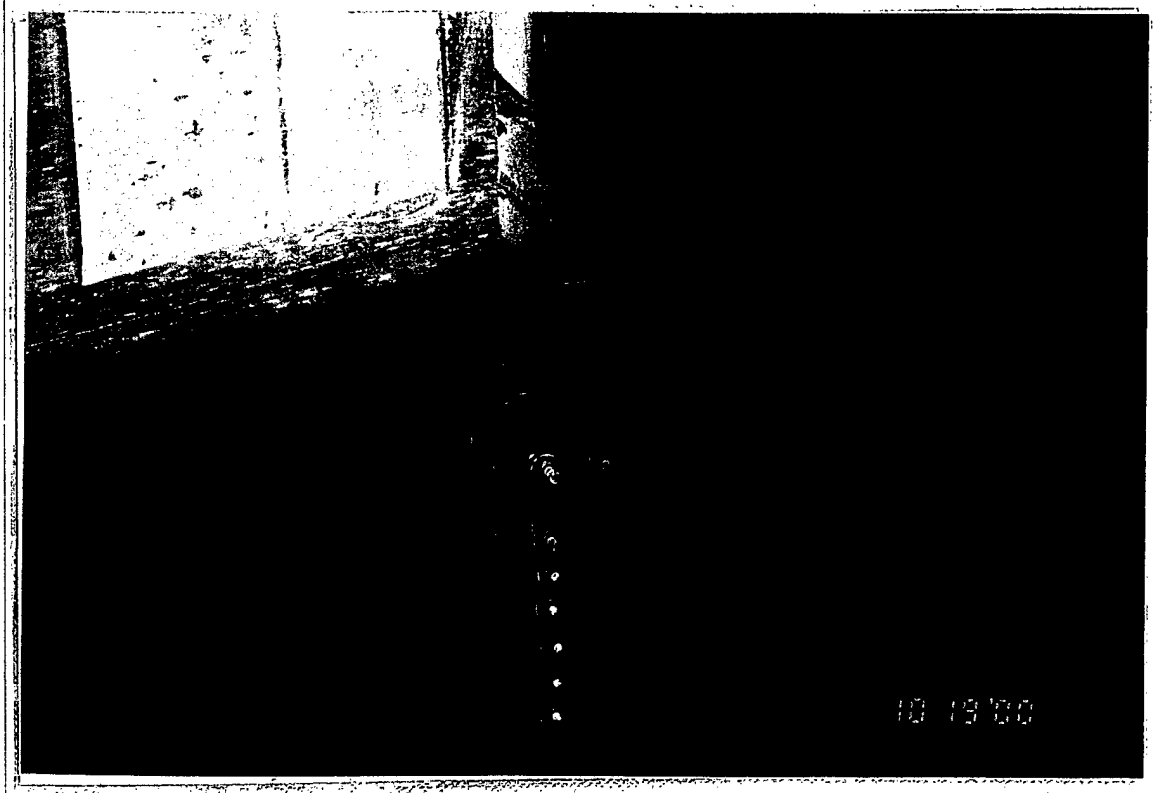


Little Goose Dam 10/19/00 3-17	**Gate 3** Bottom of left side of gate at 3' open. Note: Heavy falling water due to stop log leakage precludes inspection of hoist connections.

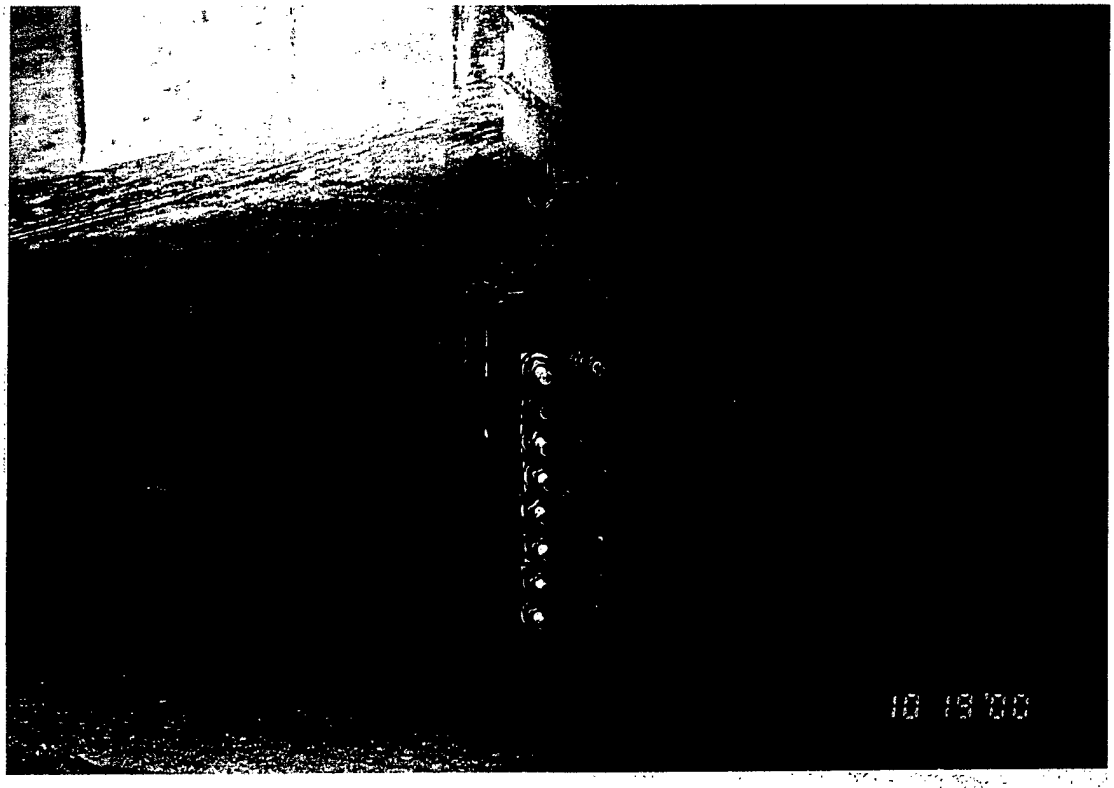
Little Goose Dam 10/19/00 3-18	**Gate 3** Bottom of right side of gate at 3' open. Note: Heavy falling water due to stop log leakage precludes inspection of hoist connections.



Little Goose Dam 10/19/00 3-19	**Gate 3** Skin plate condition, typical. Minimal pitting.



Little Goose Dam 10/19/00 3-20	**Gate 3** Hoist connection, right side of gate.

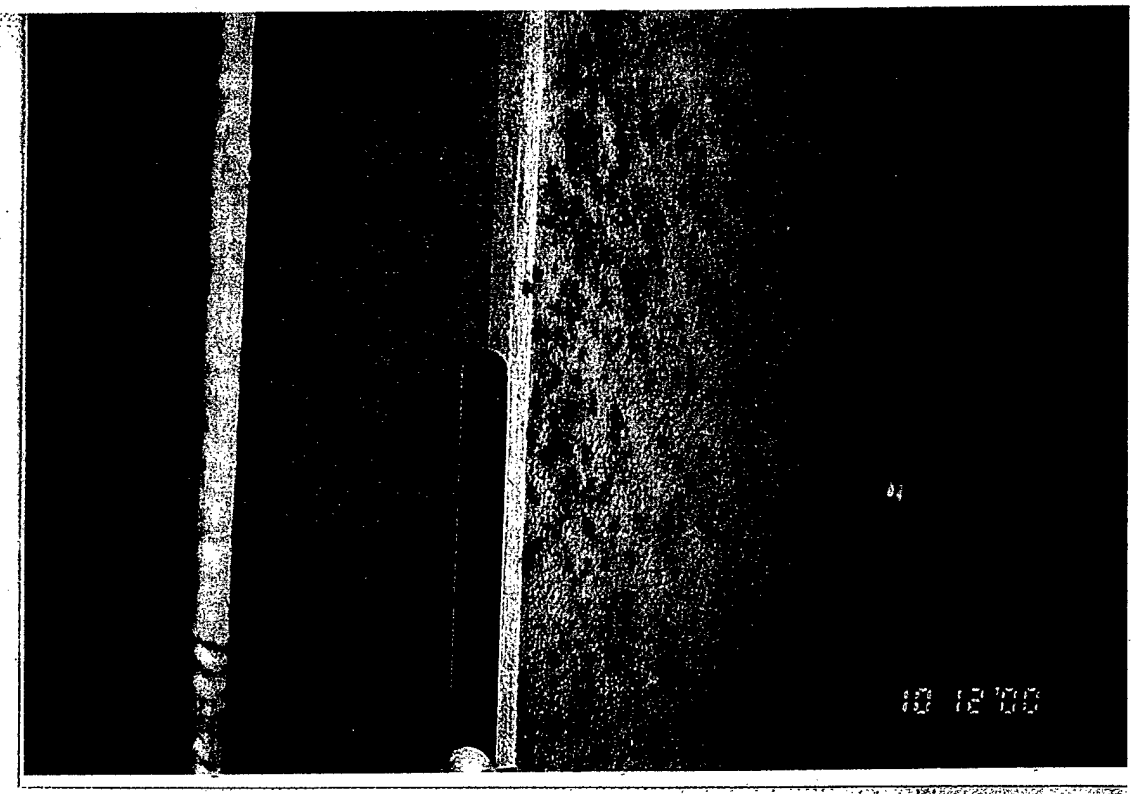


Little Goose Dam

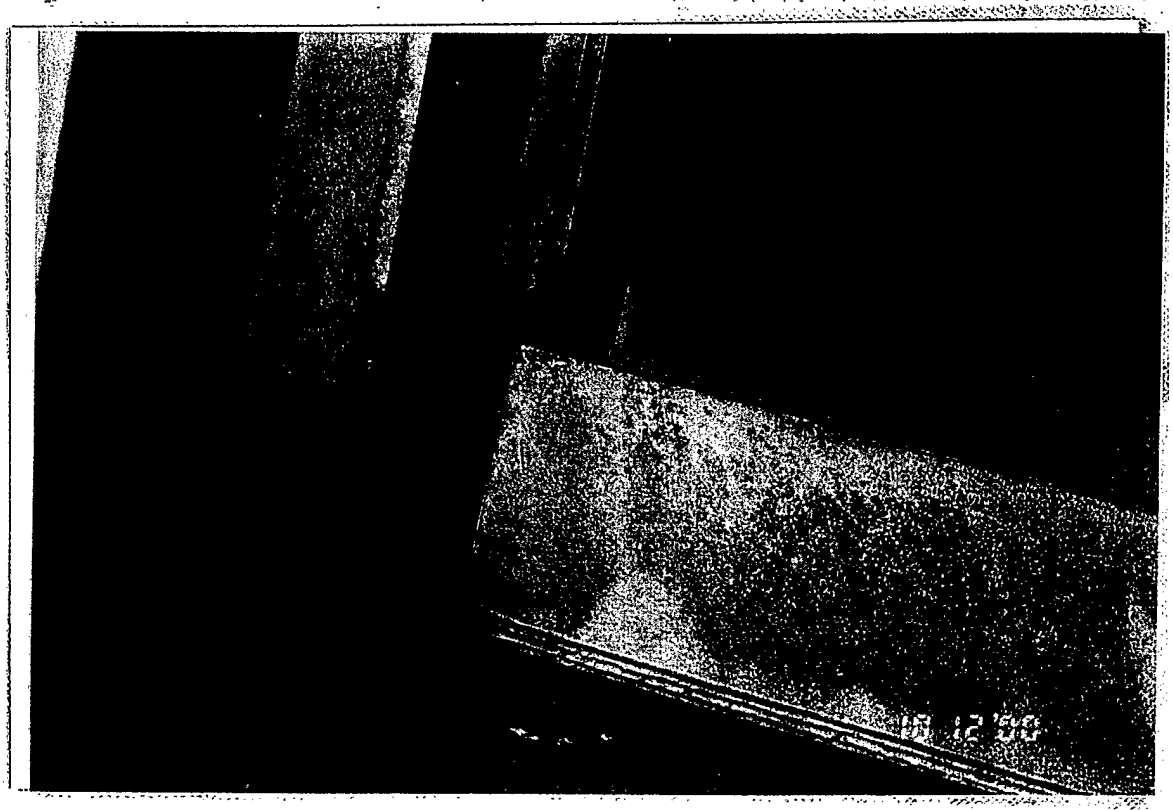
10/19/00

3-21

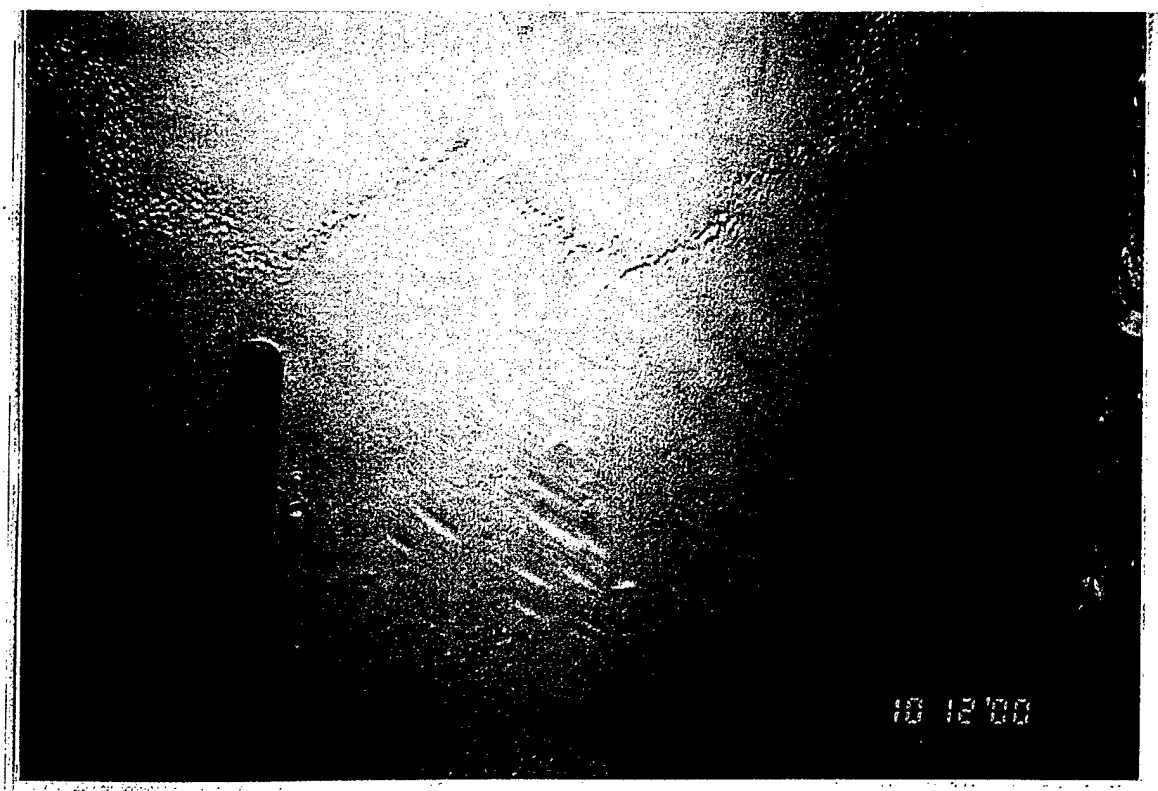
Gate 3
Hoist connection, left side of gate.



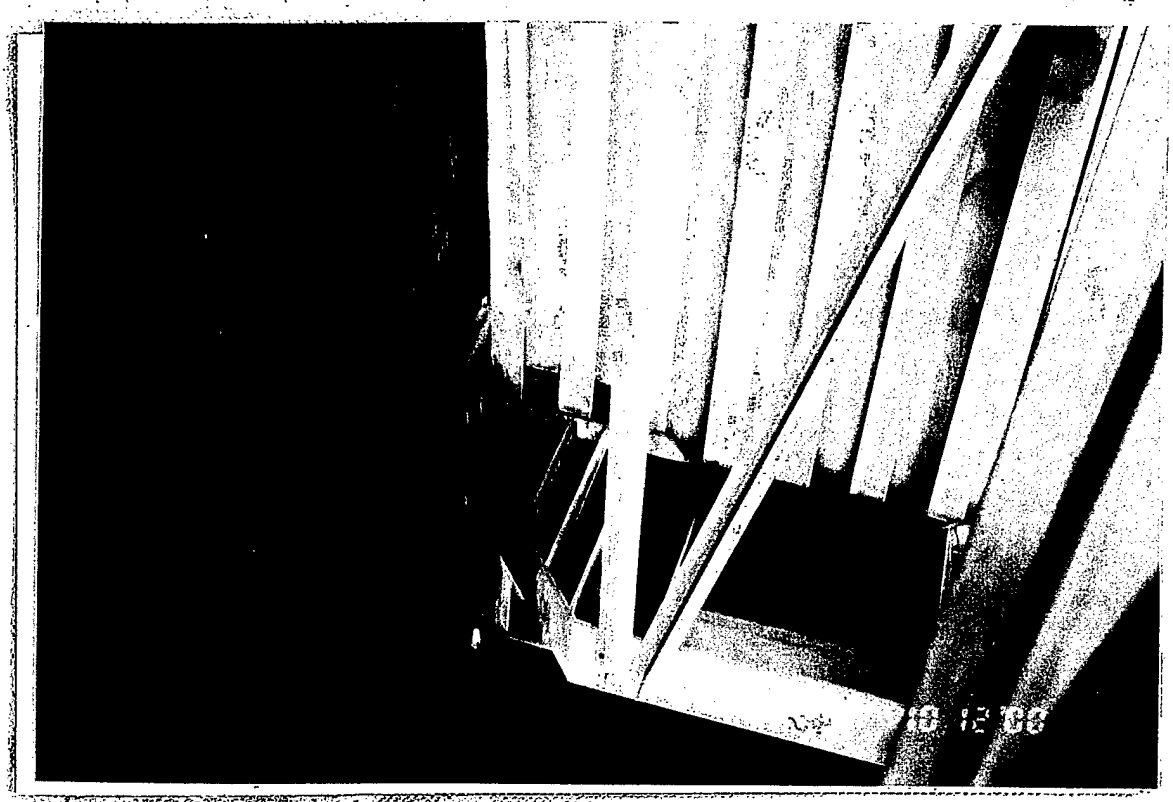
Little Goose Dam 10/12/00 4-1	**Gate 4** Skin plate purlin, right side of gate above top horizontal girder. Light corrosion on purlin flange.



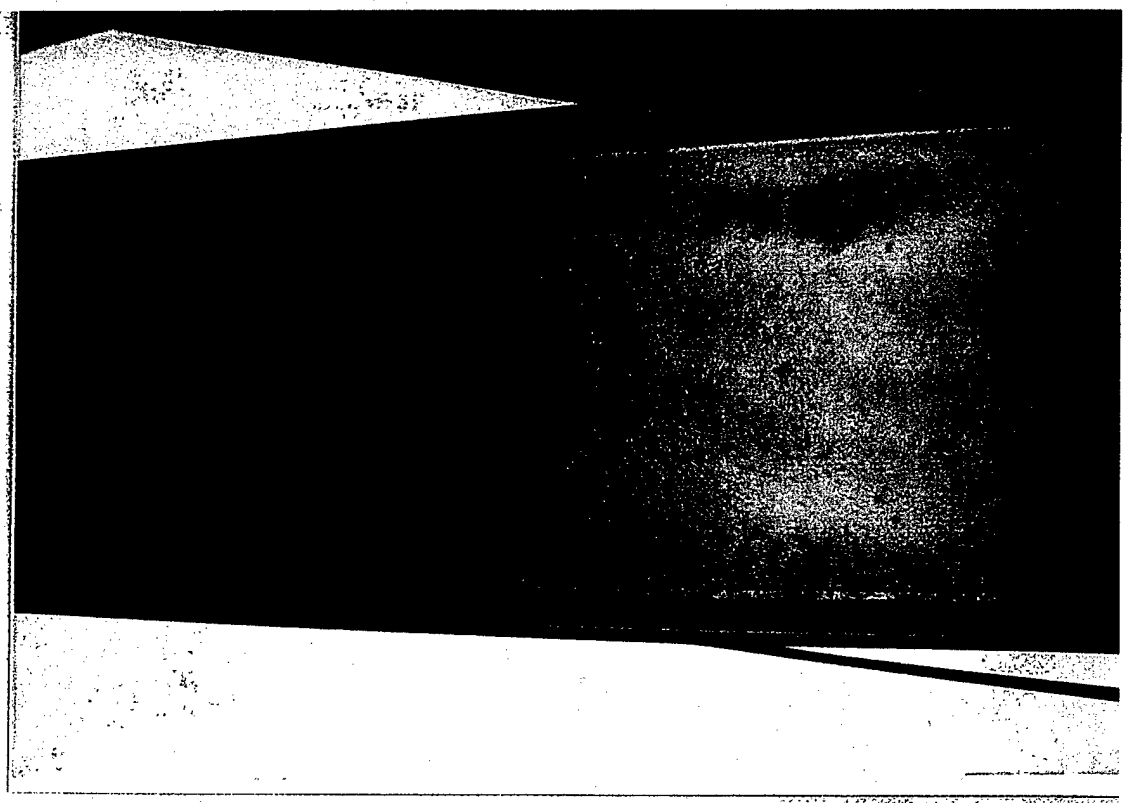
Little Goose Dam 10/12/00 4-2	**Gate 4** Top horizontal girder. Light corrosion, typical.



Little Goose Dam 10/12/00 4-3	**Gate 4** Downstream side of skin plate, right side of gate above top horizontal girder. Possible previous skin plate repair.

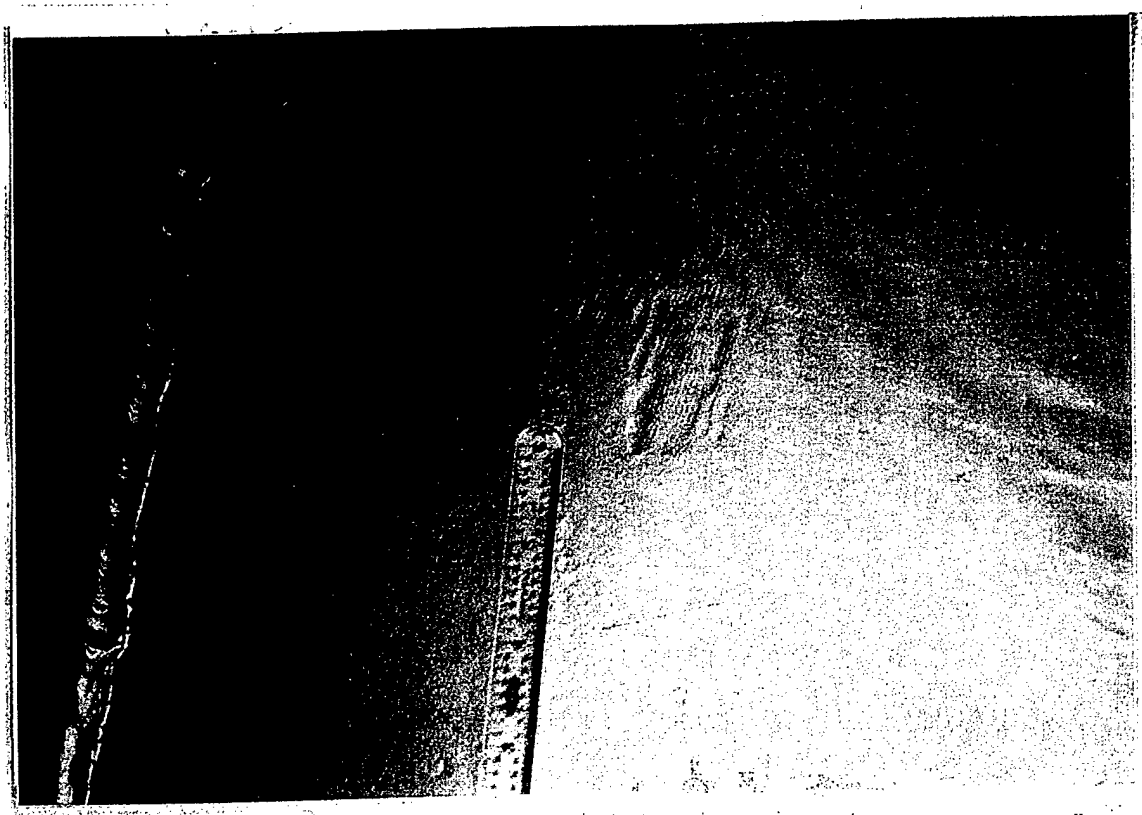


Little Goose Dam 10/12/00 4-4	**Gate 4** Bottom horizontal girder, left side. Standing water, no drainage between multiple stiffeners, typical. Side seal leak.



Little Goose Dam 10/12/00 4-5	**Gate 4** Right frame, brace K. Light corrosion on brace.

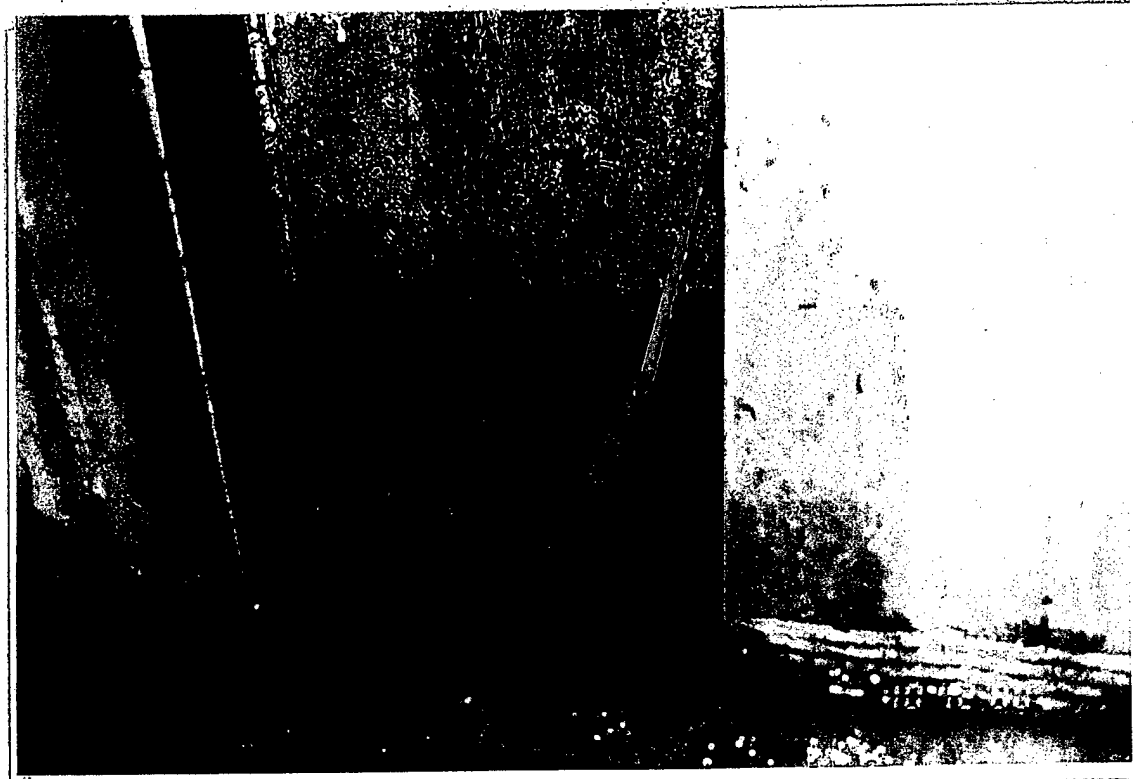
Little Goose Dam 10/12/00 4-6	**Gate 4** Downstream side of skin plate, above middle horizontal girder, right side of gate. Small circular protrusion in vertical line on skin plate.



Little Goose Dam 10/12/00 4-7	**Gate 4** Downstream side of skin plate, right side of gate above bottom horizontal girder. Possible previous skin plate repair.

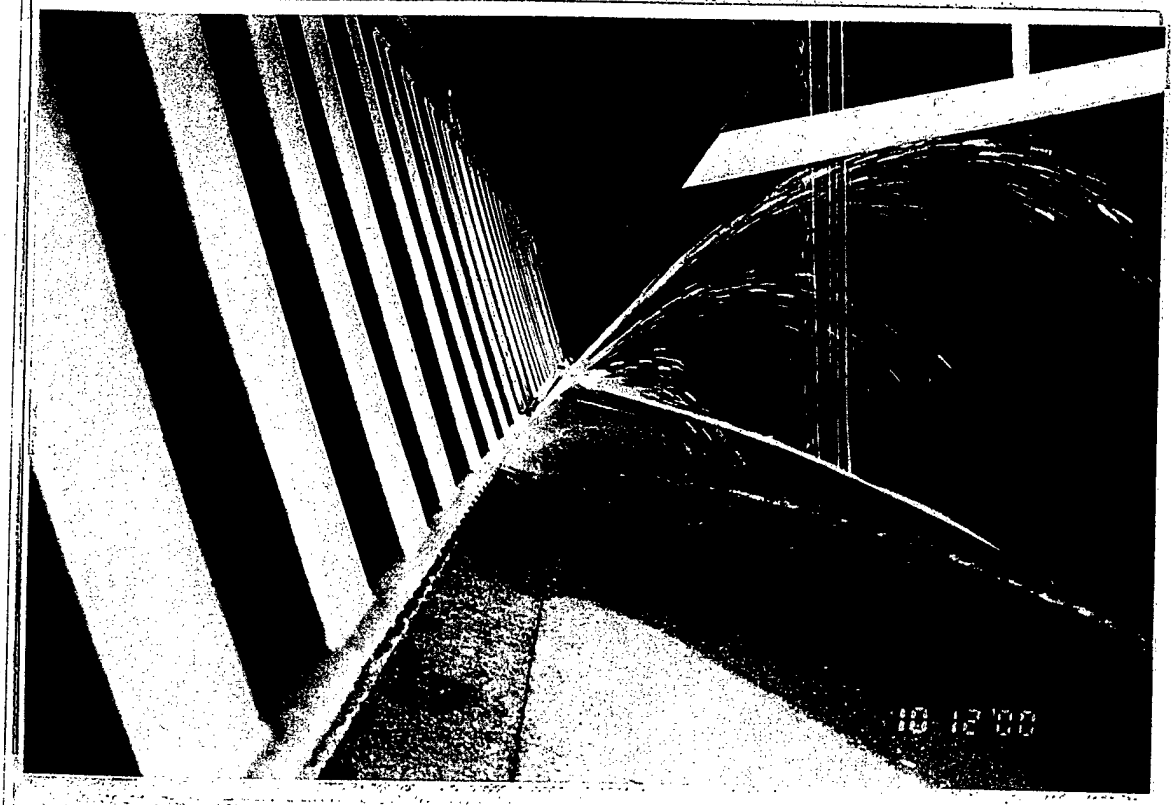
Little Goose Dam 10/12/00 4-8	**Gate 4** Brace J, left frame. Small scratches on web.

Little Goose Dam 10/12/00 4-9	**Gate 4** Bottom horizontal girder, right side. Standing water, no drainage between multiple stiffeners, typical. Side seal leak.

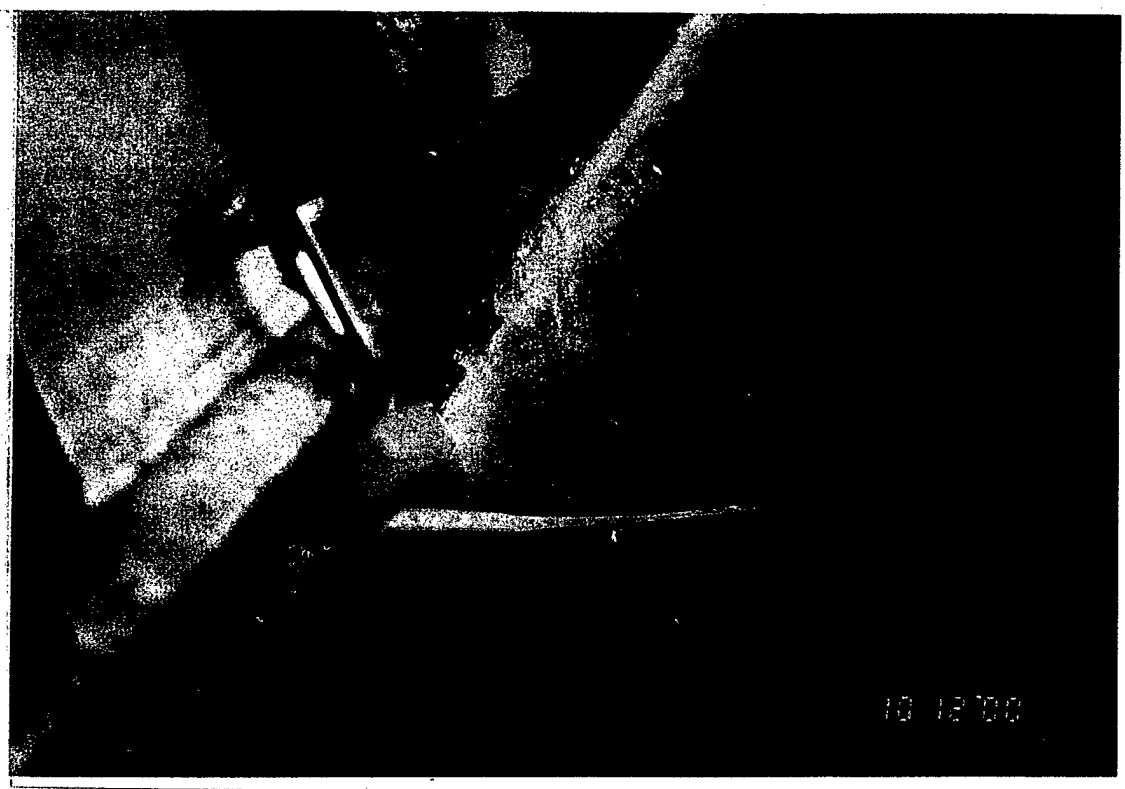


Little Goose Dam 10/12/00 4-10	**Gate 4** Bottom seal closure plate looking upstream. Standing water between closure plate, purlin webs and skinplate. Typical.

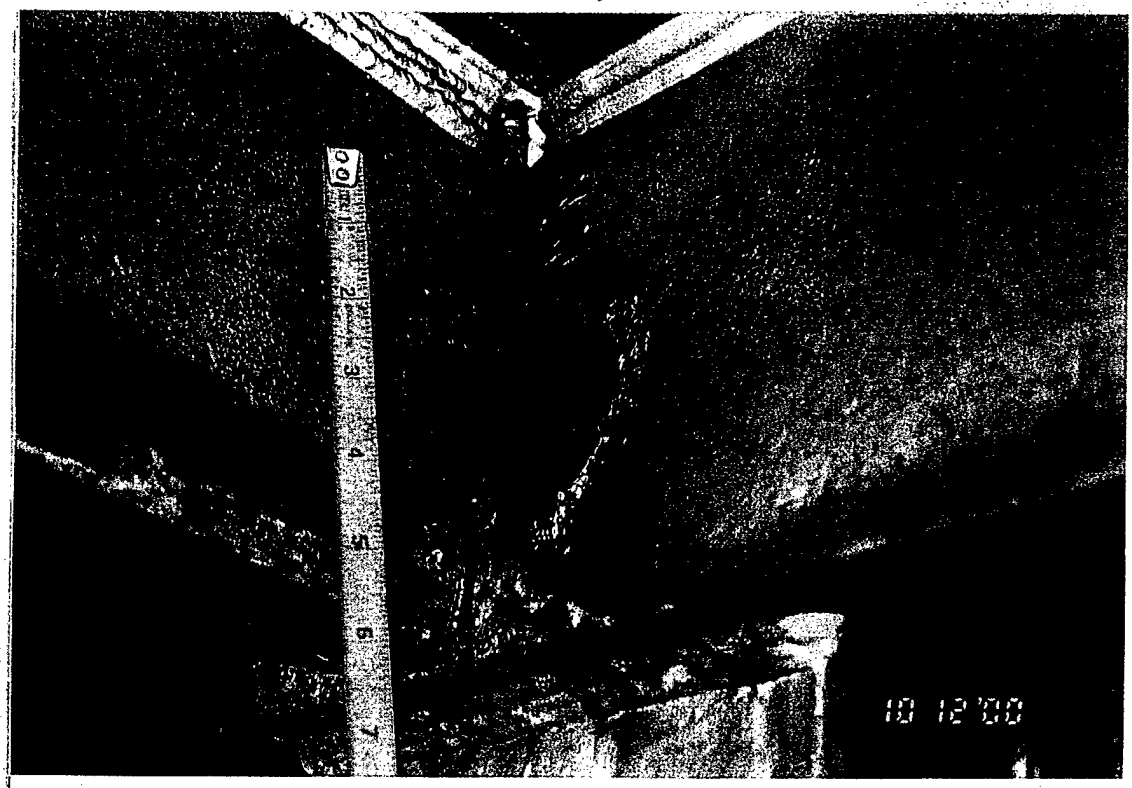
Little Goose Dam 10/12/00 4-11	**Gate 4** Standing water between closure plate, purlin webs and skinplate, typical. Bottom right corner seal leak.



Little Goose Dam 10/12/00 4-12	**Gate 4** Leak at center construction joint in spillway monolith.



Little Goose Dam 10/12/00 4-13	**Gate 4** Leak at center construction joint in spillway monolith.



Little Goose Dam 10/12/00 4-14	**Gate 4** Bottom of bottom horizontal girder, upstream flange and stiffener. Moderate corrosion due to horizontal girder drain hole above.

Little Goose Dam 10/12/00 4-15	**Gate 4** Bottom of bottom horizontal girder. Drain hole for upstream side of bottom horizontal girder. Light to moderate corrosion on surrounding members.

Little Goose Dam 10/12/00 4-16	**Gate 4** Bottom of bottom horizontal girder. Drain hole for upstream side of bottom horizontal girder. Light to moderate corrosion on surrounding members.

Little Goose Dam 10/12/00 4-17	**Gate 4** Bottom of bottom horizontal girder, light corrosion on girder, stiffeners and purlins.

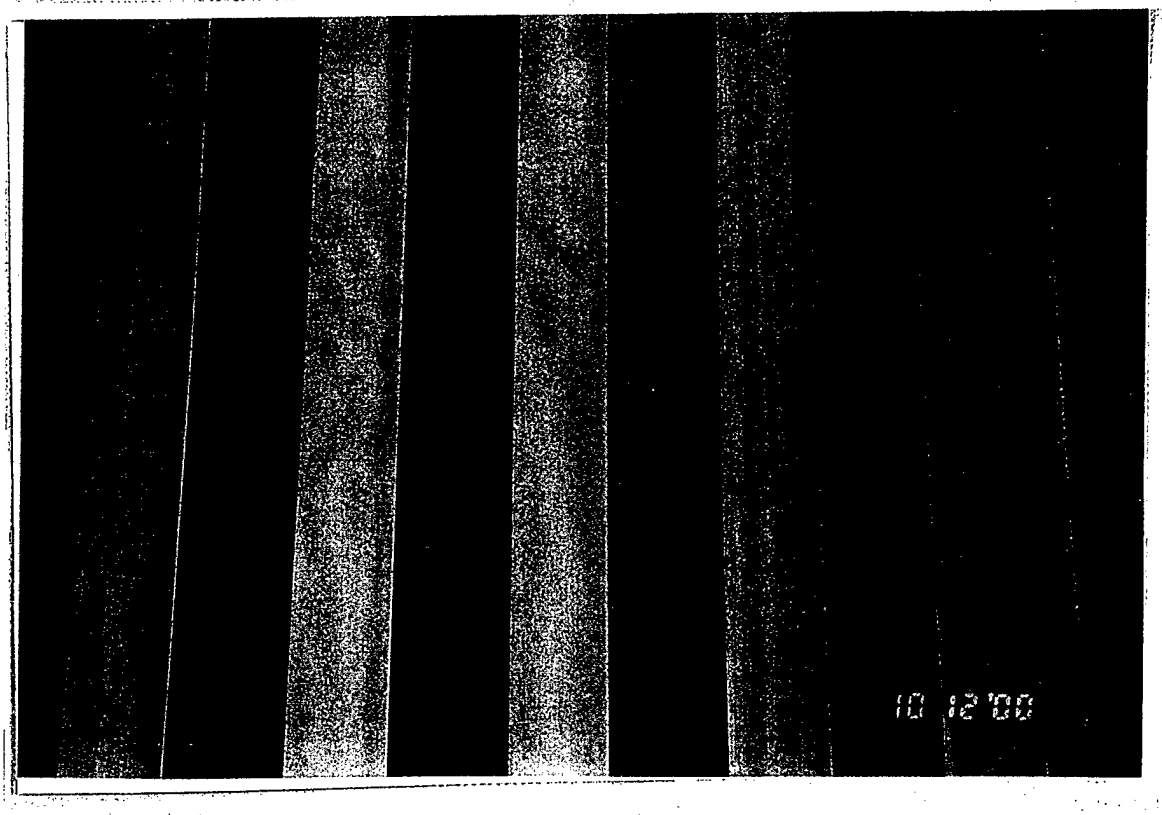
Little Goose Dam 10/12/00 4-18	**Gate 4** Bottom horizontal girder, left side. Standing water, no drainage between multiple stiffeners, typical. Side seal leak.

Little Goose Dam 10/12/00 4-19	**Gate 4** Brace N, left frame. Light corrosion on brace web and flanges.

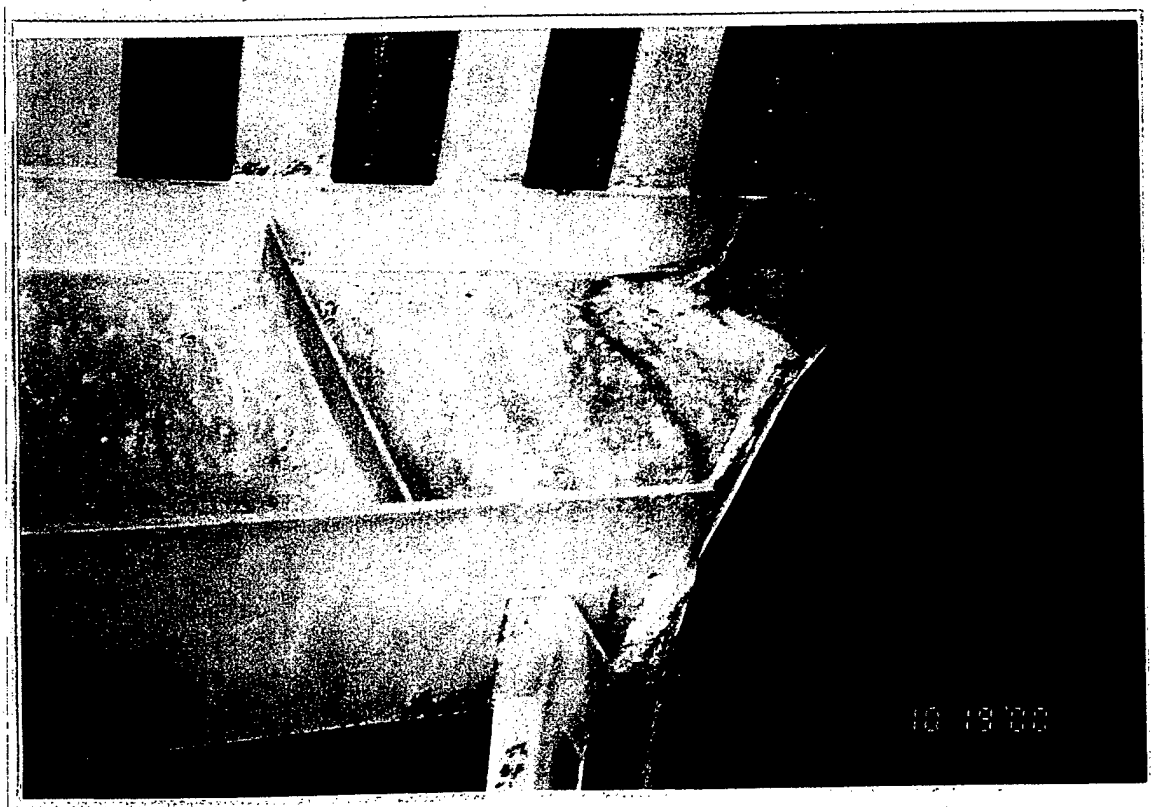
Little Goose Dam 10/12/00 4-20	**Gate 4** Bottom horizontal girder, left side. Standing water, no drainage between multiple stiffeners, typical. Side seal leak.

Little Goose Dam 10/12/00 4-21	**Gate 4** Side seal leak, left side of gate.

Little Goose Dam 10/12/00 4-22	**Gate 4** Side seal plates, nuts and bolts, typical.



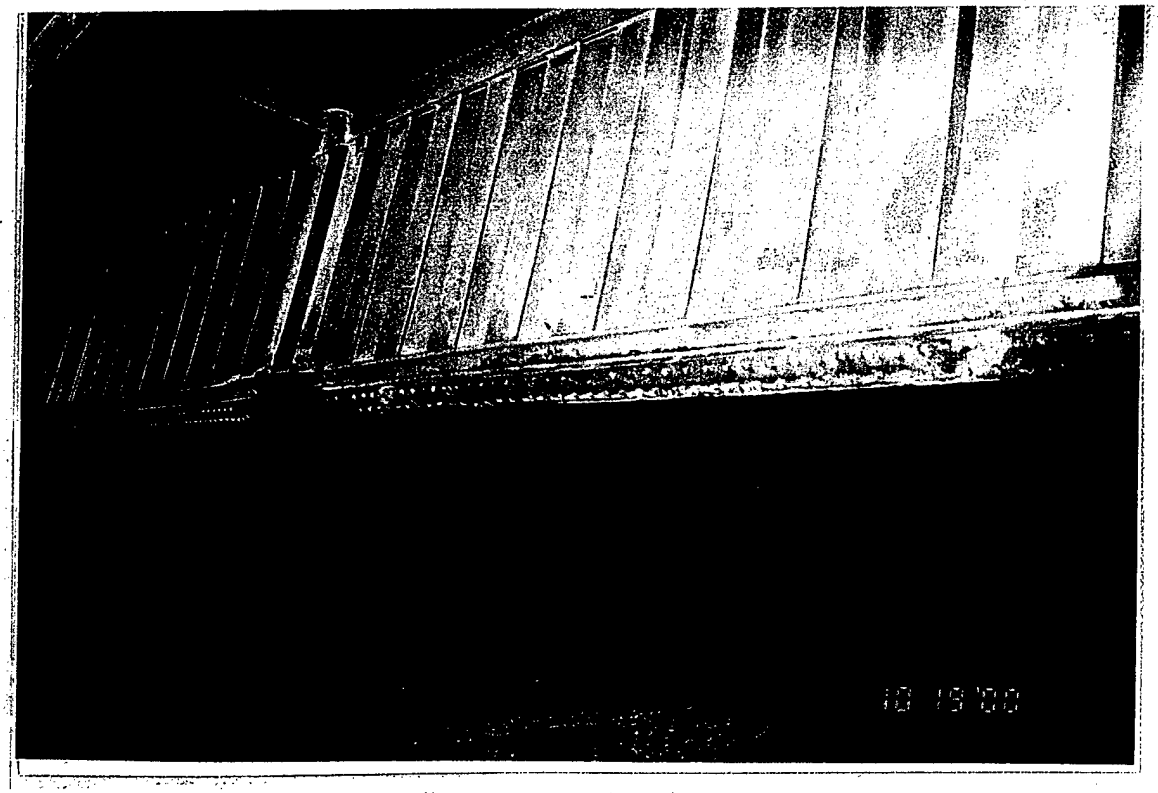
Little Goose Dam 10/12/00 4-23	**Gate 4** Downstream side of skin plate. Evidence of previous repairs.



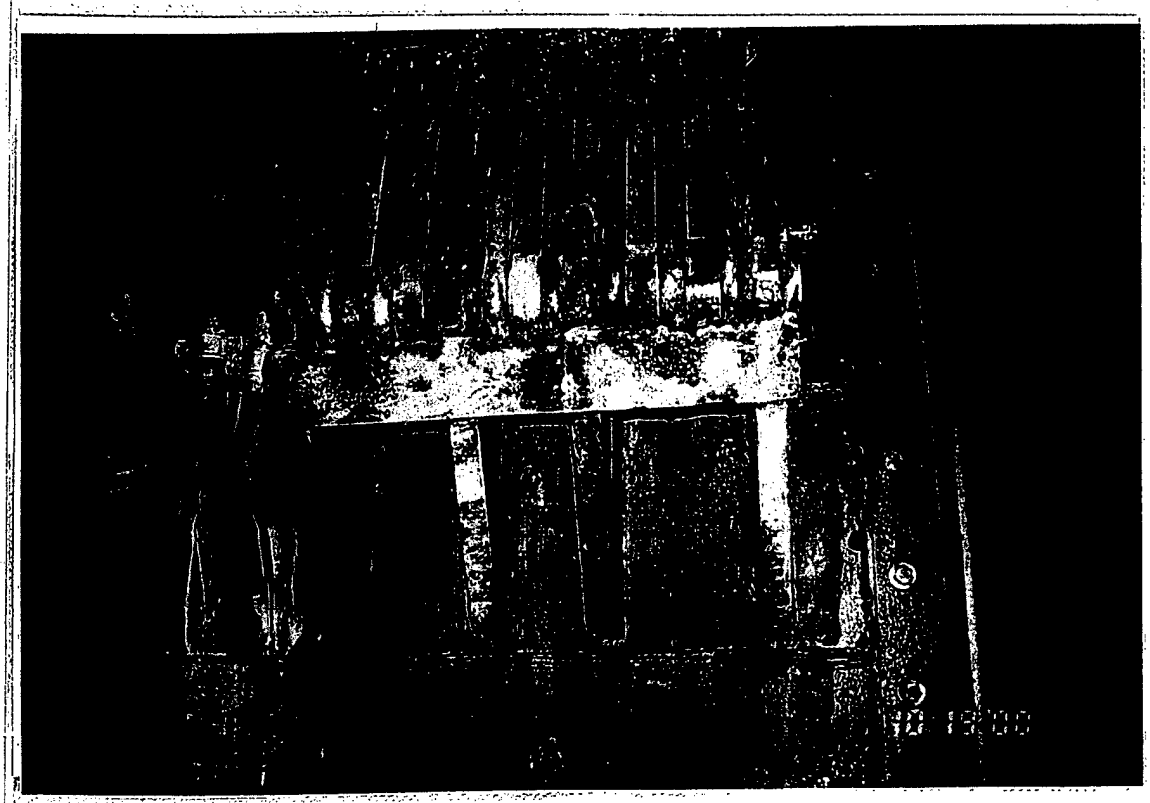
Little Goose Dam 10/19/00 4-24	**Gate 4** Top horizontal girder, left side. 2" to 3" deformation upward in girder web.

Little Goose Dam 10/19/00 4-25	**Gate 4** Waterblasting and skin plate condition, minimal pitting, typical.

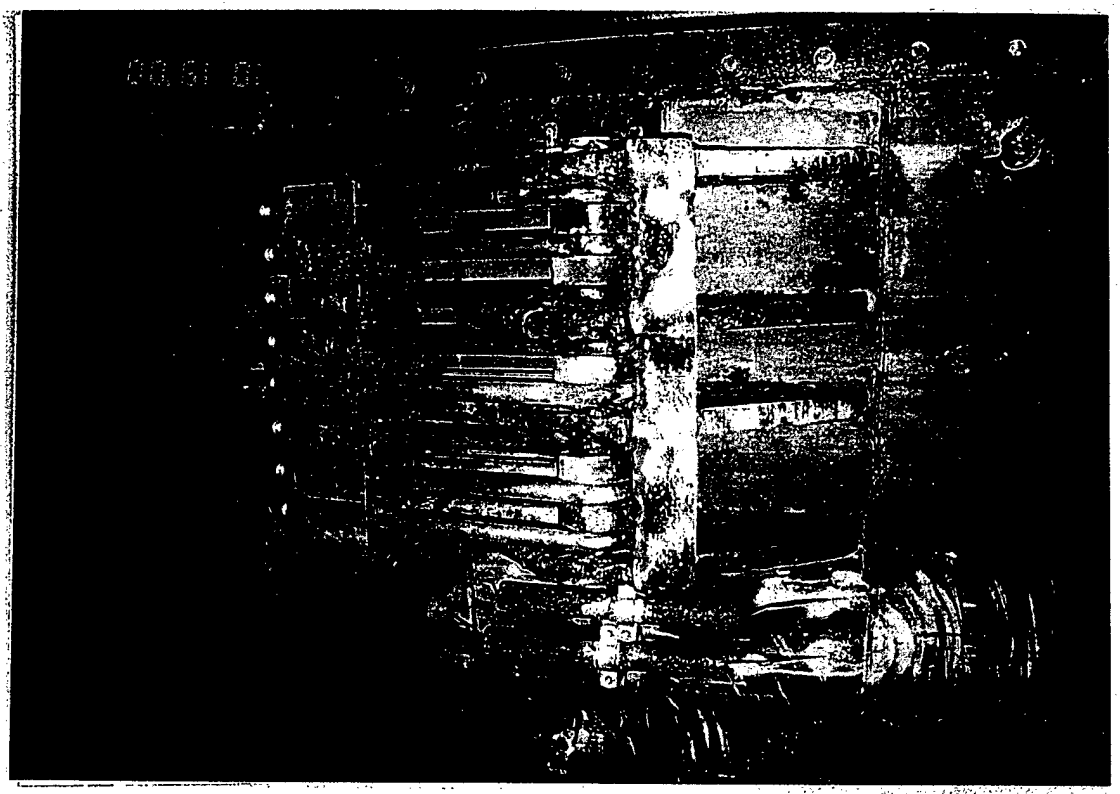
Little Goose Dam 10/19/00 4-26	**Gate 4** Bottom left corner of gate, typical.



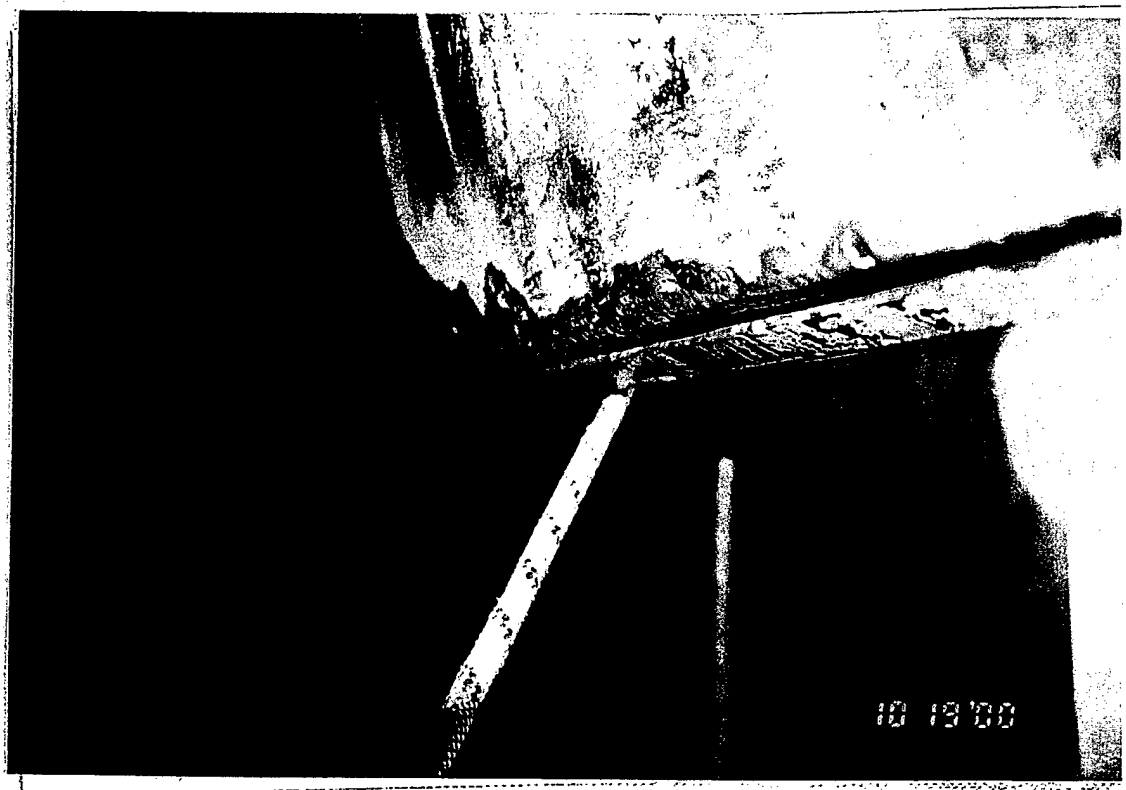
Little Goose Dam 10/19/00 4-27	**Gate 4** Bottom seal keeper plate, typical.



Little Goose Dam 10/19/00 4-28	**Gate 4** Right hoist connection. Moderate corrosion on lifting lugs, and plates.



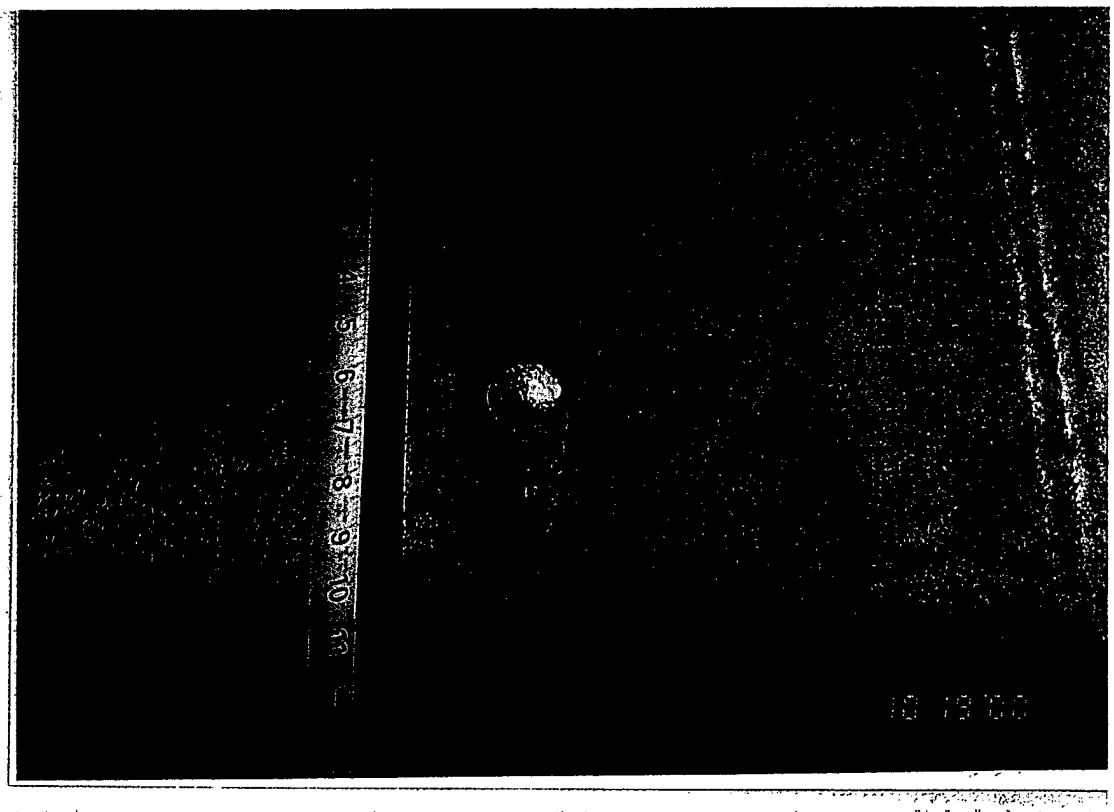
Little Goose Dam 10/19/00 4-29	**Gate 4** Right hoist connection. Moderate corrosion on lifting lugs, and plates.



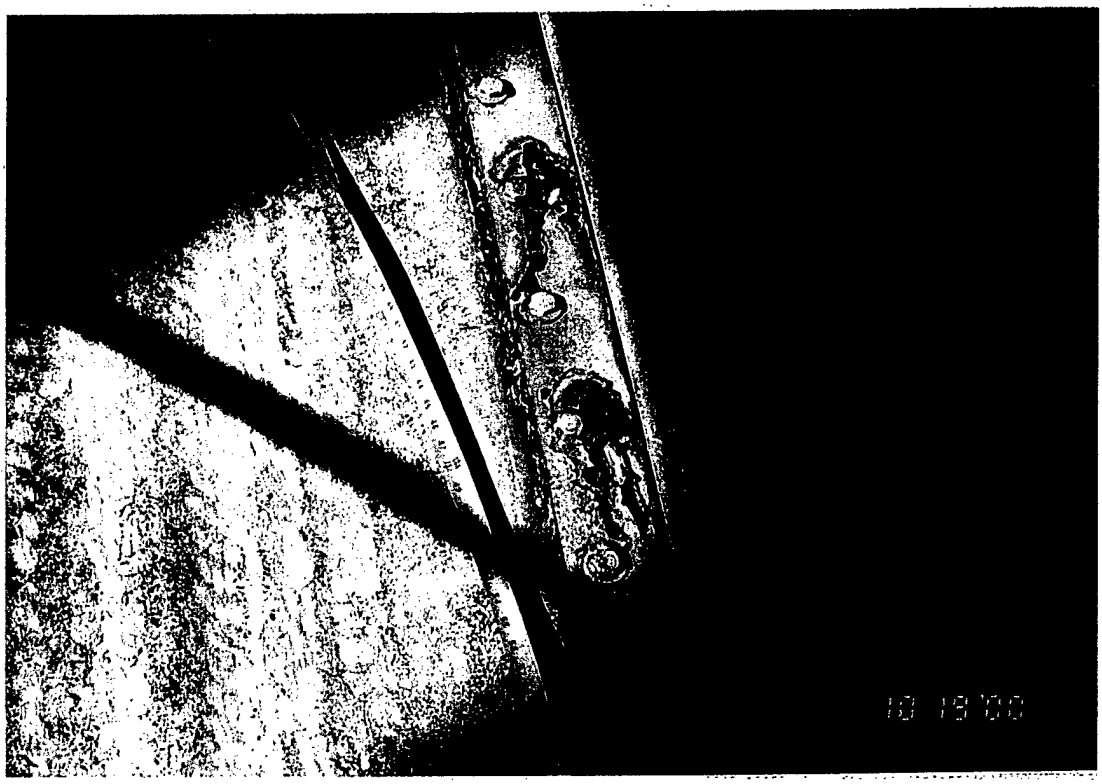
Little Goose Dam 10/19/00 4-30	**Gate 4** Bottom seal and bottom upstream side of skin plate. Moderate corrosion at bottom edge of skin plate.

Little Goose Dam 10/19/00 4-31	**Gate 4** Bottom seal, typical.

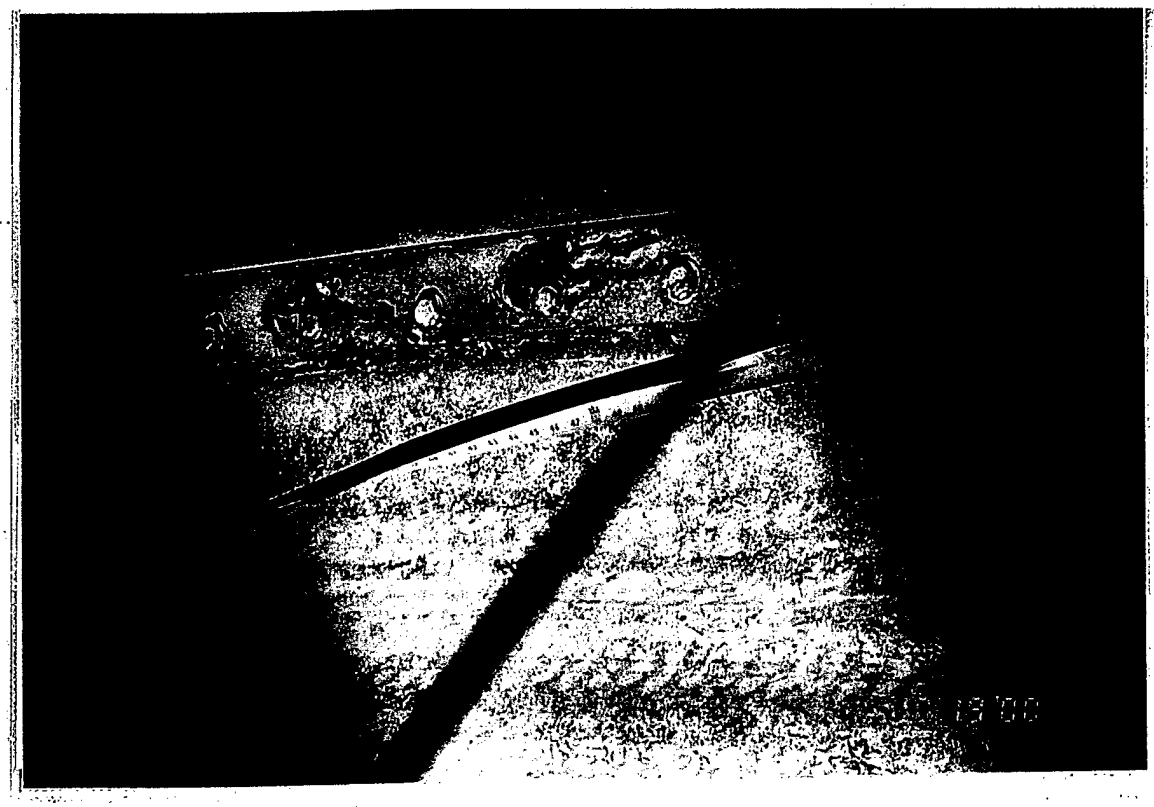
Little Goose Dam 10/19/00 4-32	**Gate 4** Skin plate condition, minimal pitting, typical.



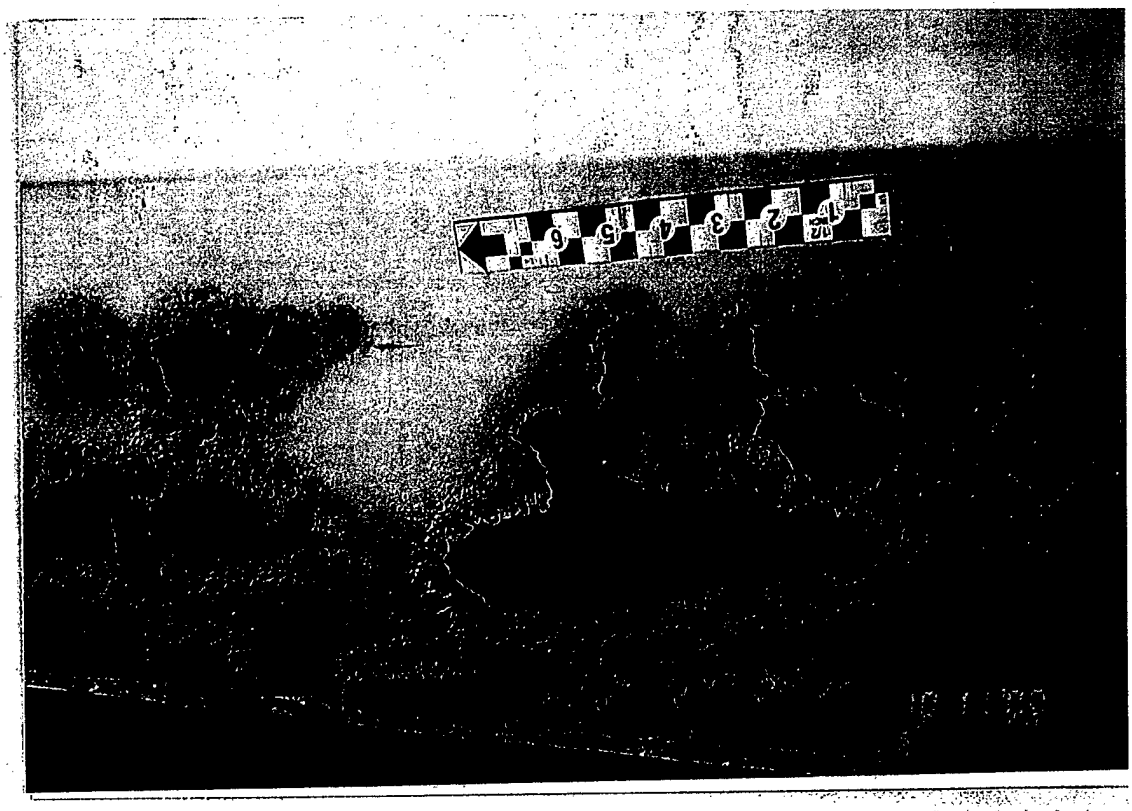
Little Goose Dam 10/19/00 4-33	**Gate 4** Skin plate pitting, where present, typical.



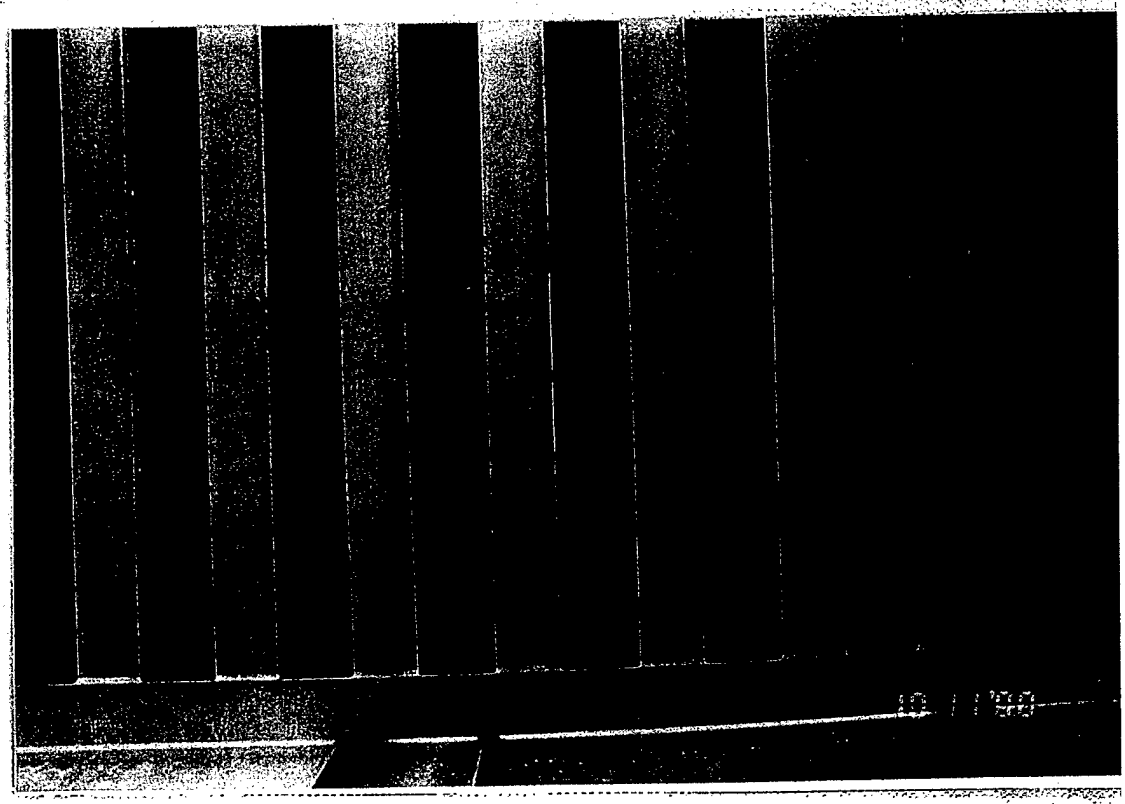
Little Goose Dam 10/19/00 4-34	**Gate 4** Side seal angles, wear plate and side seal, typical.



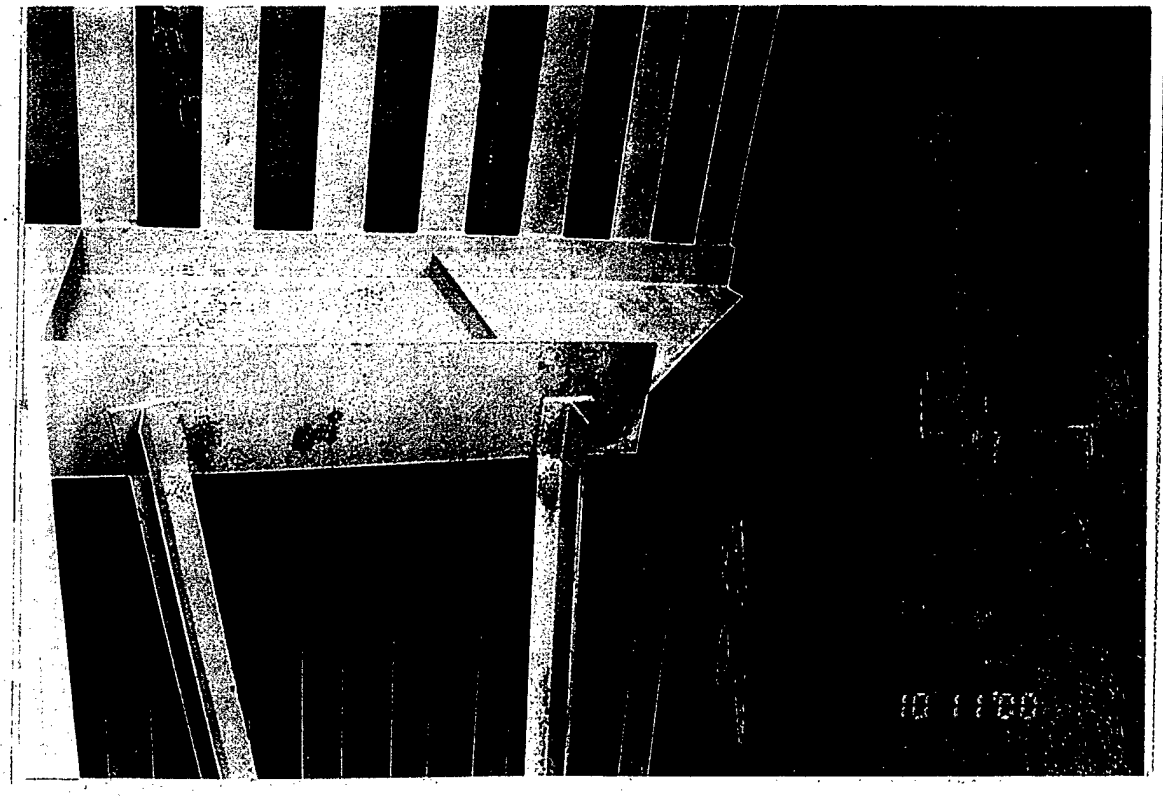
Little Goose Dam 10/19/00 4-35	**Gate 4** Side seal angles, side seal, and side seal, typical



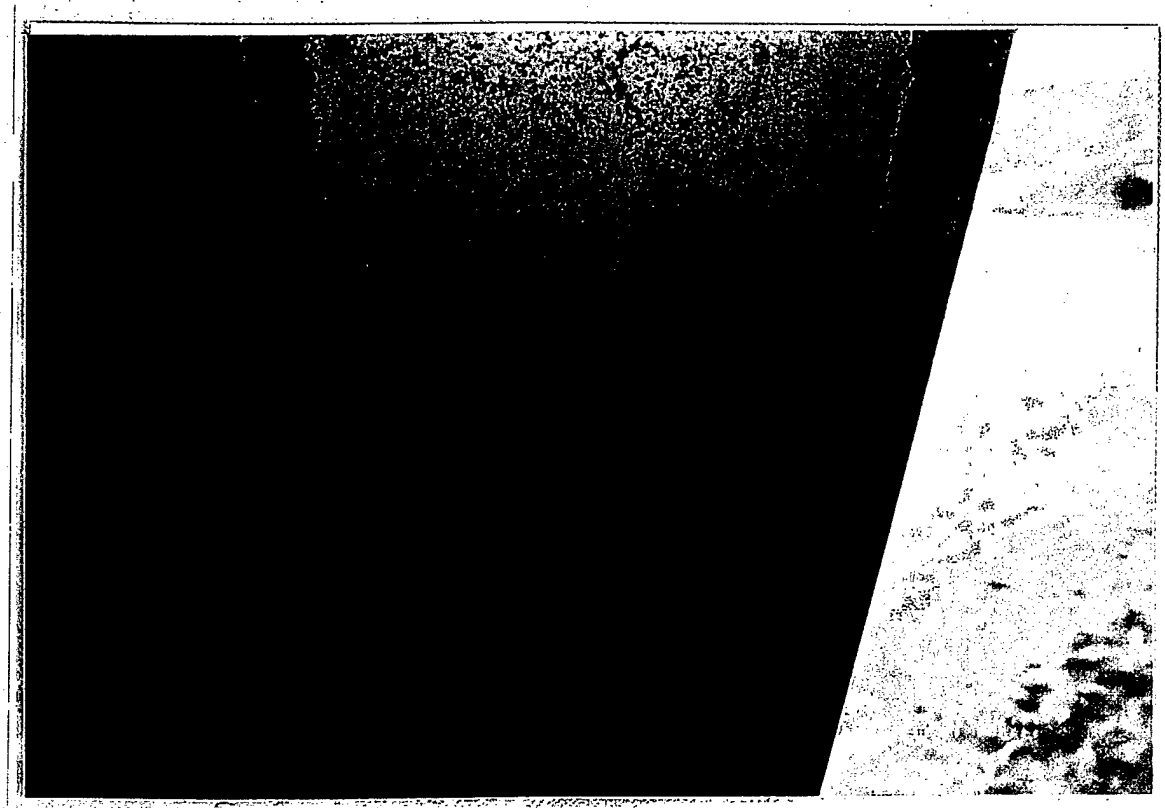
Little Goose Dam 10/11/00 5-1	**Gate 5** Downstream side of skin plate, left side of gate, above top horiz. girder. Peeling pain, light corrosion. Appears to be possible paint blister due to upstream skin plate welding.



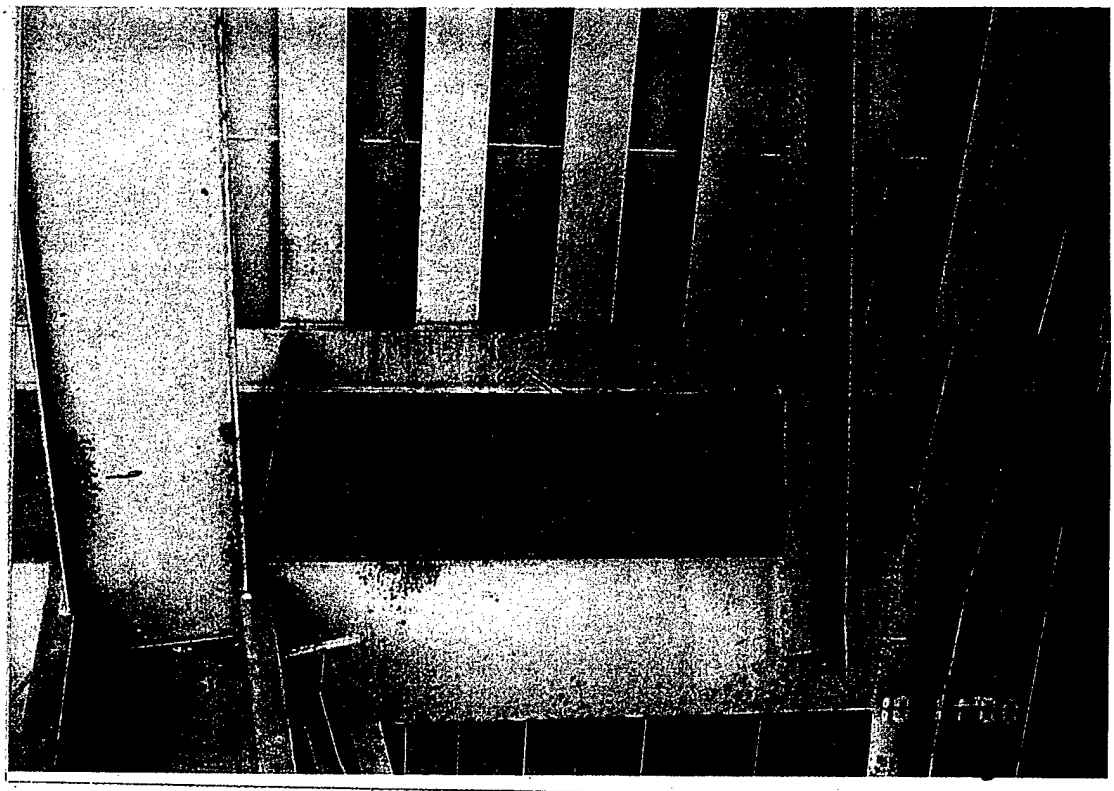
Little Goose Dam 10/11/00 5-2	**Gate 5** Downstream side of skin plate, left side of gate, above top horiz. girder. Peeling pain, light corrosion. Appears to be possible paint blister due to upstream skin plate welding.



Little Goose Dam 10/11/00 5-3	**Gate 5** Top horizontal girder, left side of gate. Light corrosion on girder web, purlins, braces.



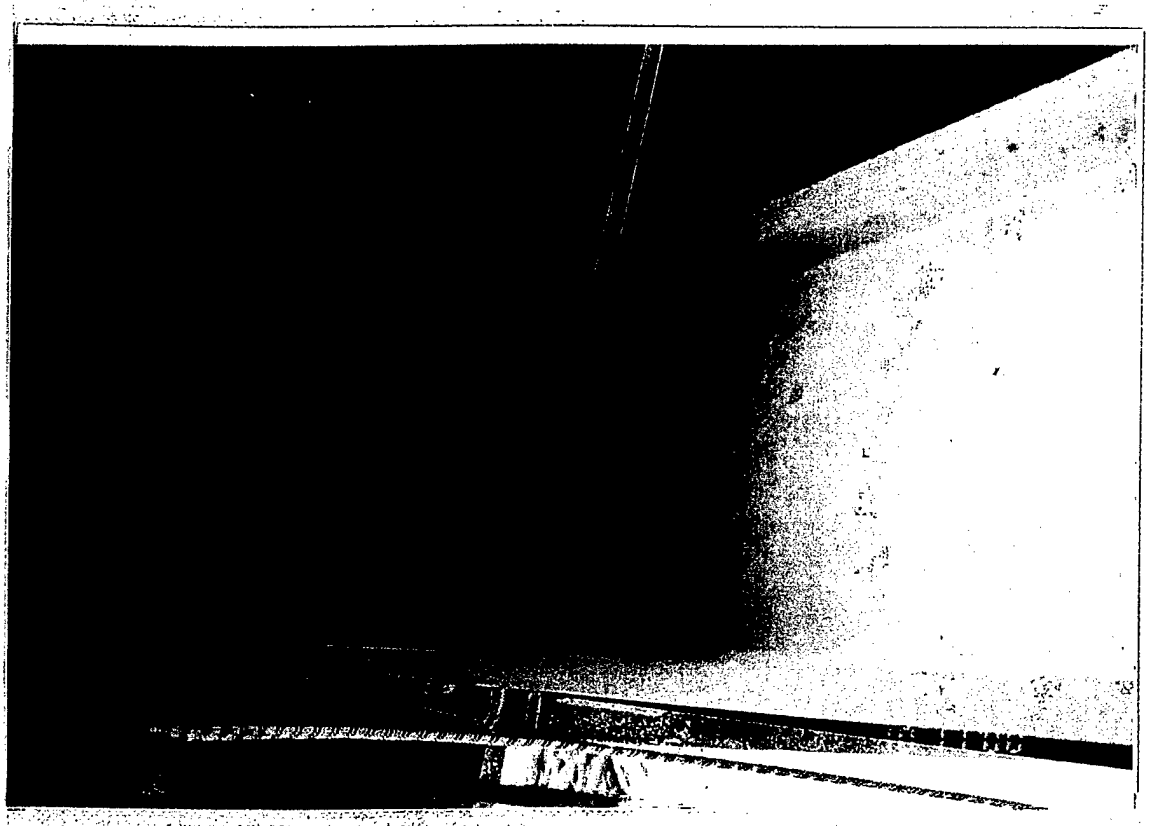
Little Goose Dam 10/11/00 5-4	**Gate 5** Left frame, Brace D. light corrosion and brace.



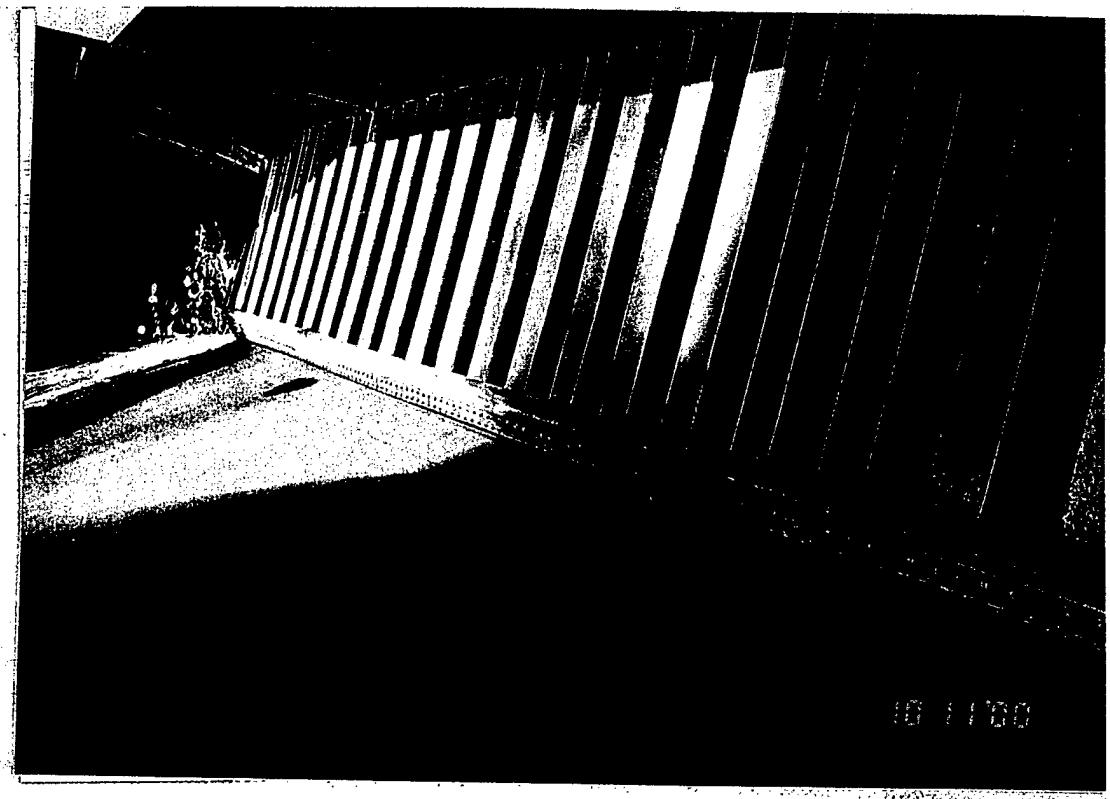
Little Goose Dam 10/11/00 5-5	**Gate 5** Middle horizontal girder, left end. Light corrosion on girder, braces and skin plate.

Little Goose Dam 10/11/00 5-6	**Gate 5** Downstream side of skin plate, left side of gate, above middle horiz. girder. Peeling pain, light corrosion. Appears to be possible paint blister due to upstream skin plate welding.

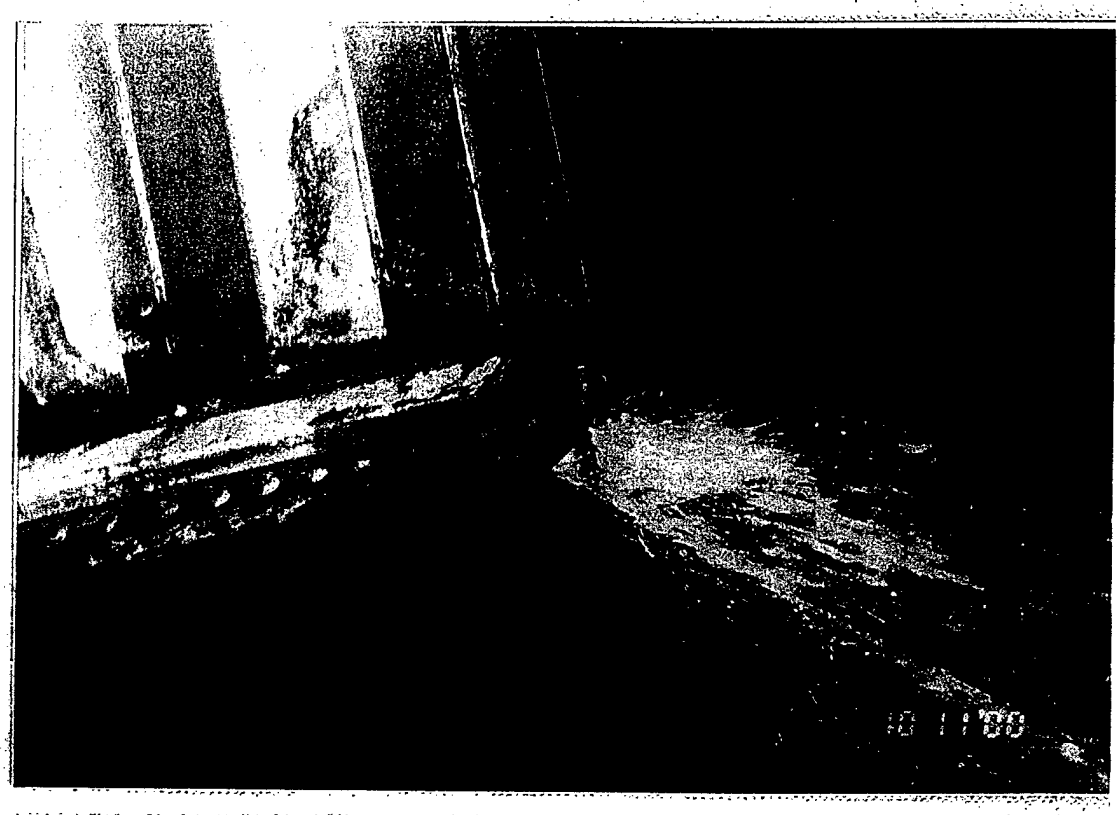
Little Goose Dam 10/11/00 5-7	**Gate 5** Bottom horizontal girder, left end. Standing water, no drainage between multiple stiffeners, typical.



Little Goose Dam 10/11/00 5-8	**Gate 5** Let frame, Brace J. Light corrosion on bottom radial strut and brace.

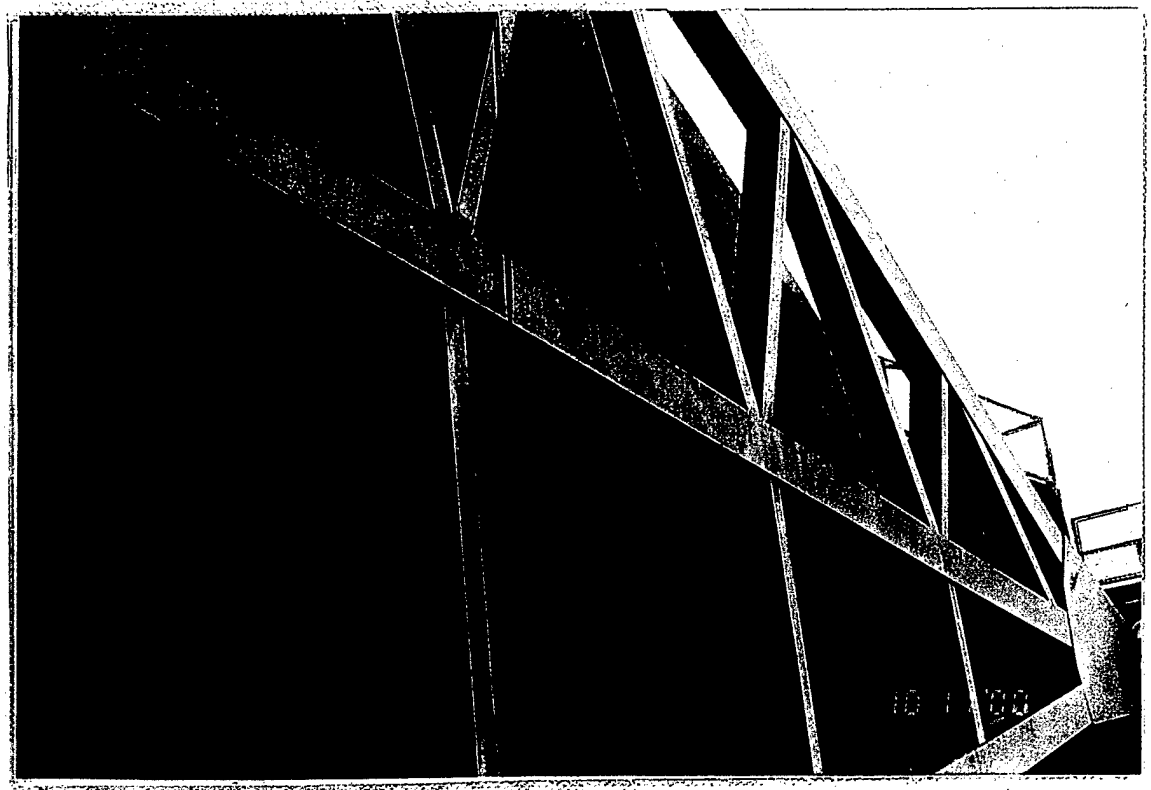


Little Goose Dam 10/11/00 5-9	**Gate 5** Leak at center construction joint in spillway monolith.

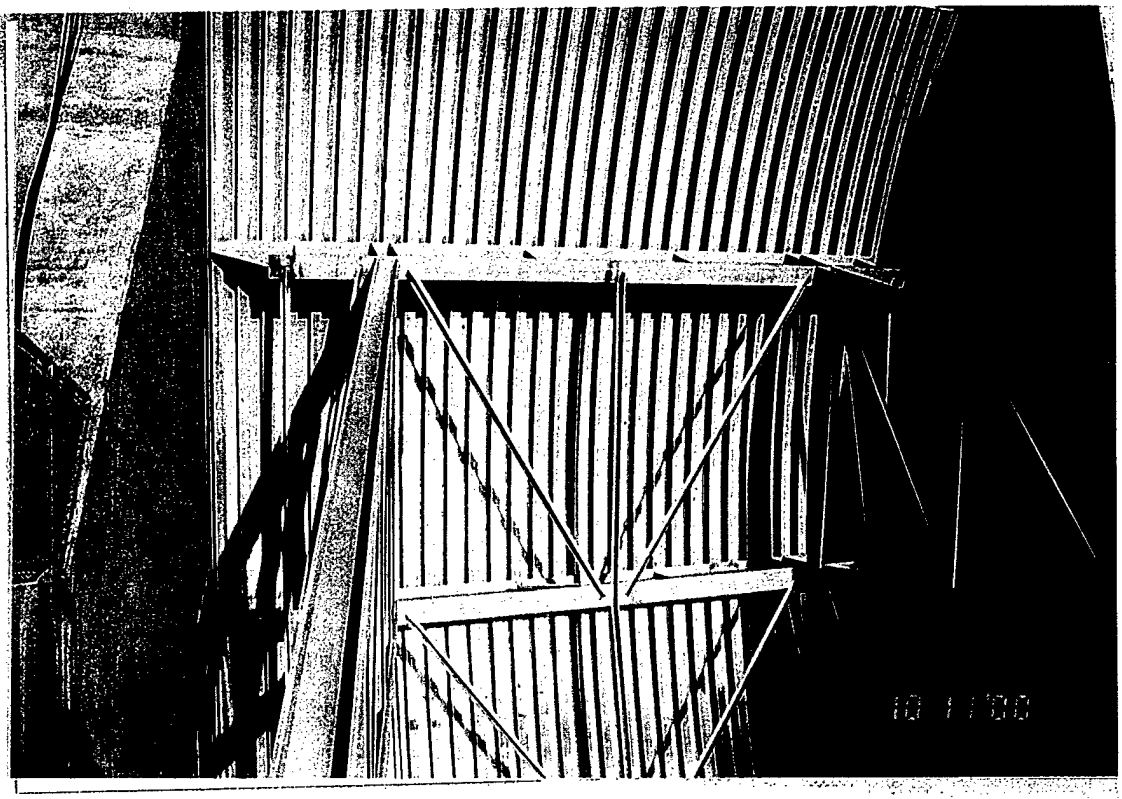


Little Goose Dam 10/11/00 5-10	**Gate 5** Bottom left corner of gate, bottom seal leak. Bottom seal closure plate. Standing water between closure plate, purlin webs and skinplate, typical.

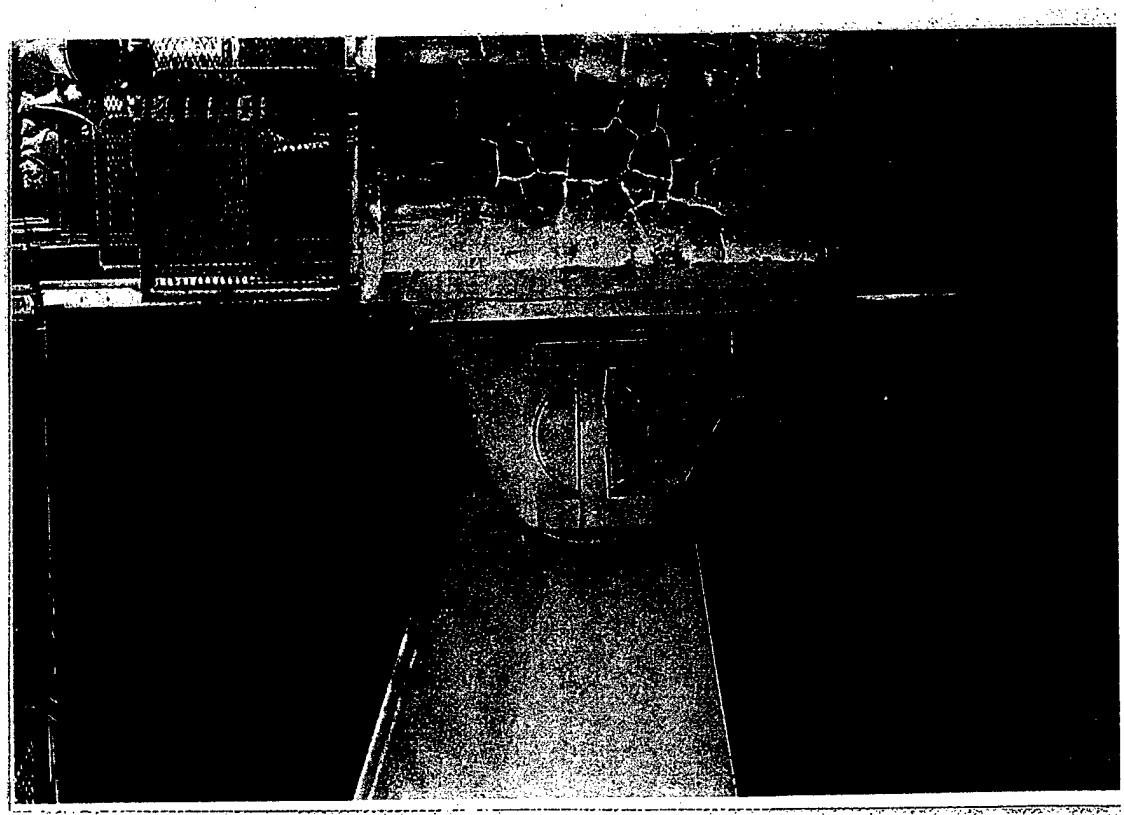
Little Goose Dam 10/11/00 5-11	**Gate 5** Bottom seal closure plate. Standing water between closure plate, purlin webs and skinplate, typical.



Little Goose Dam 10/11/00 5-12	**Gate 5** Left frame, typical.



Little Goose Dam 10/11/00 5-13	**Gate 5** Gate face, typical.

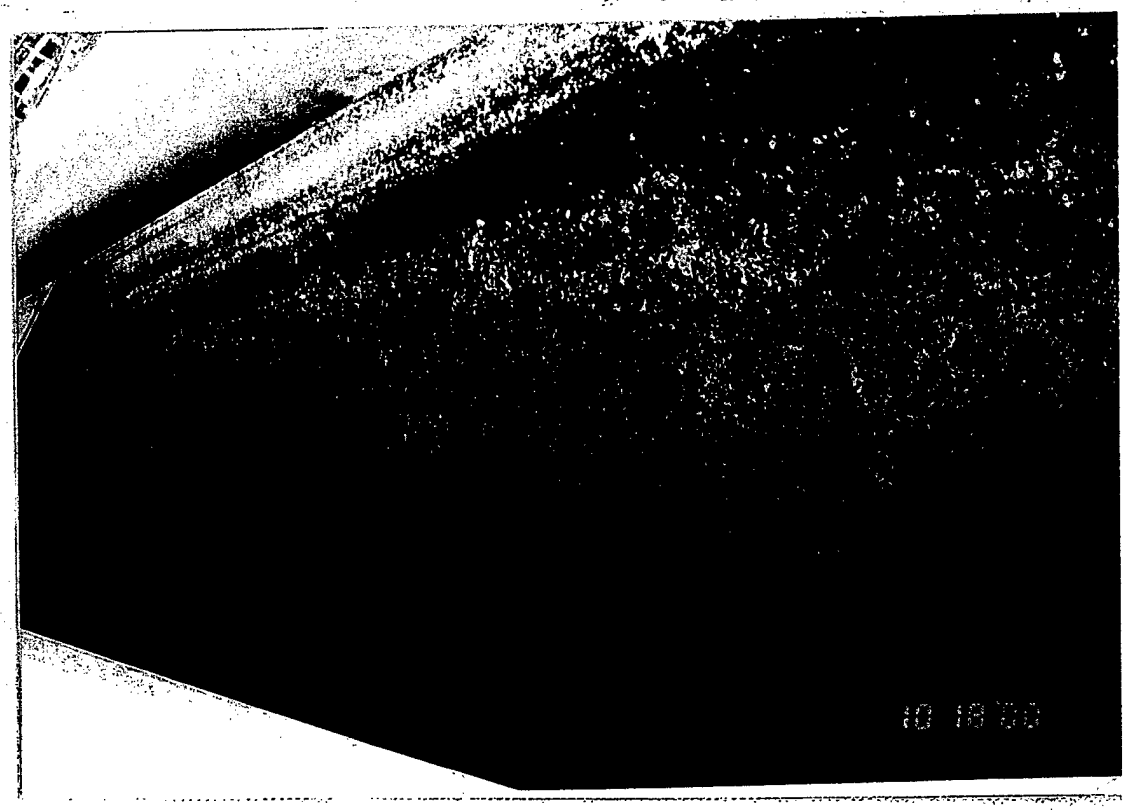


Little Goose Dam 10/11/00 5-14	**Gate 5** Left trunnion block. Light cracking in concrete.

Little Goose Dam 10/11/00 5-15	**Gate 5** Top of right trunnion. Standing water due to inadequate drainage in top radial strut web.

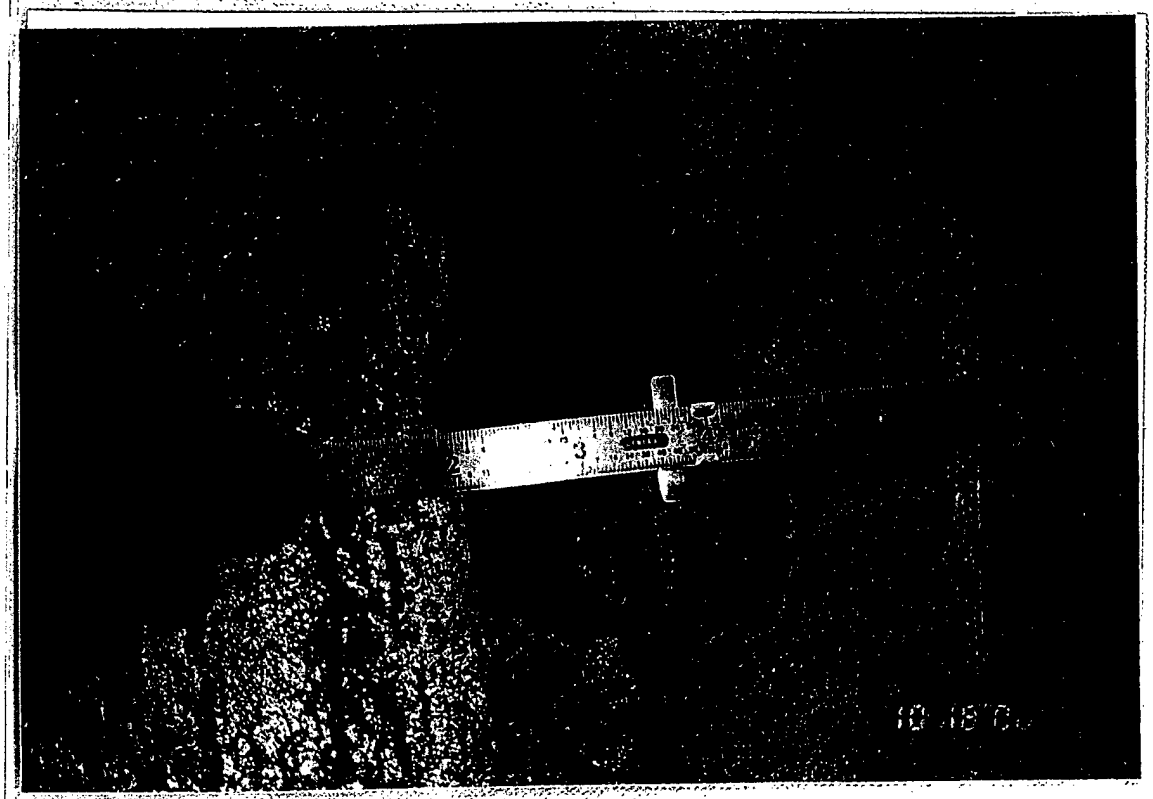
Little Goose Dam 10/18/00 5-16	**Gate 5** Top of right hoist connection. Light corrosion on lifting lugs and plates.

Little Goose Dam 10/11/00 5-17	Gate 5

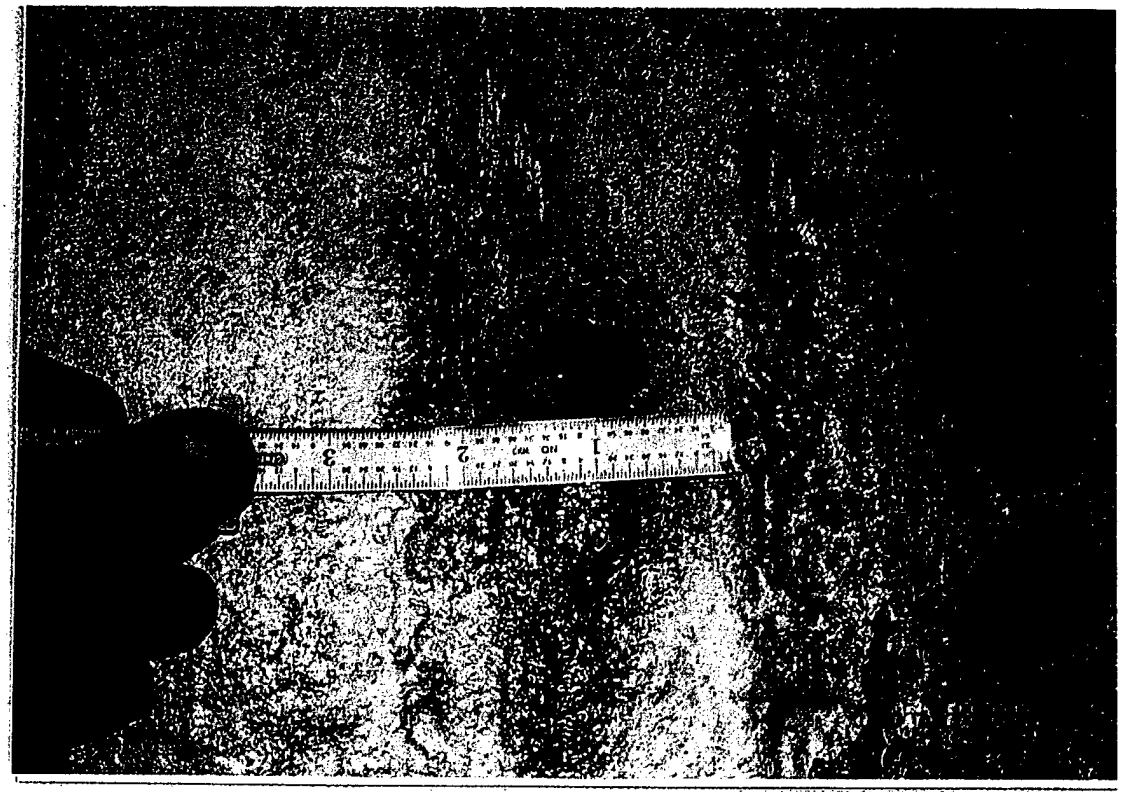


Little Goose Dam 10/11/00 5-18	Gate 5

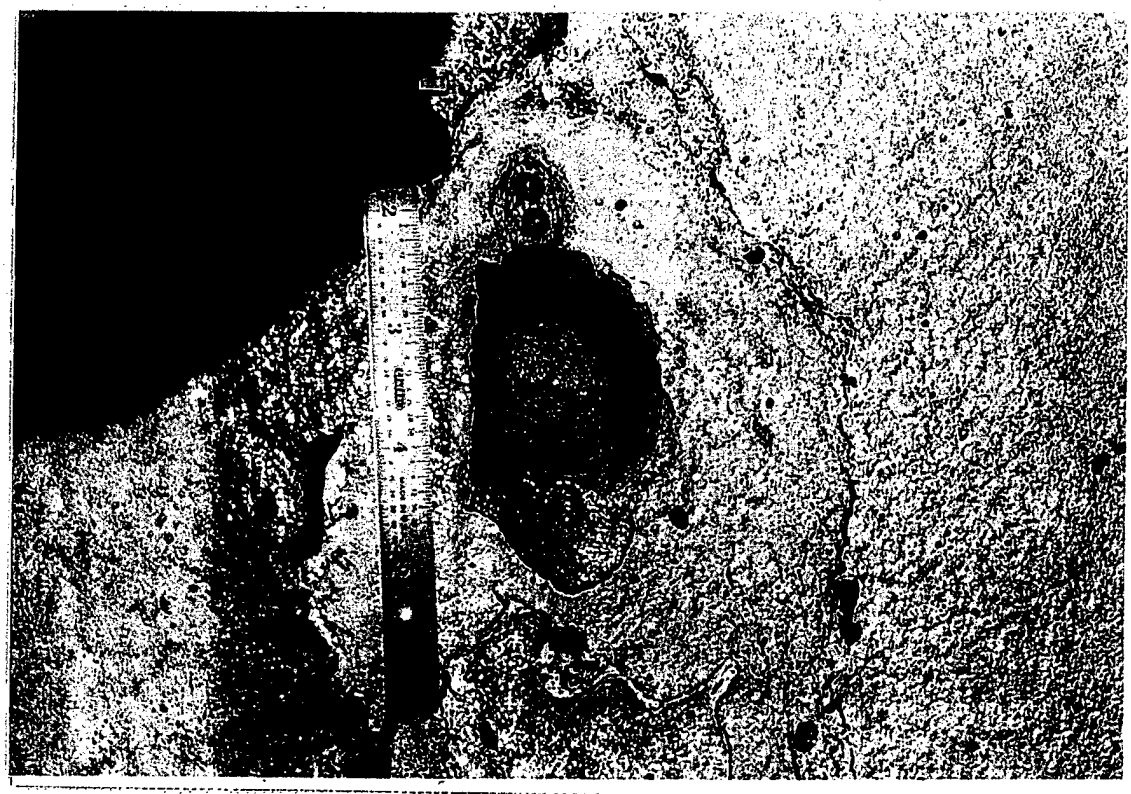
Little Goose Dam 10/11/00 5-19	**Gate 5**



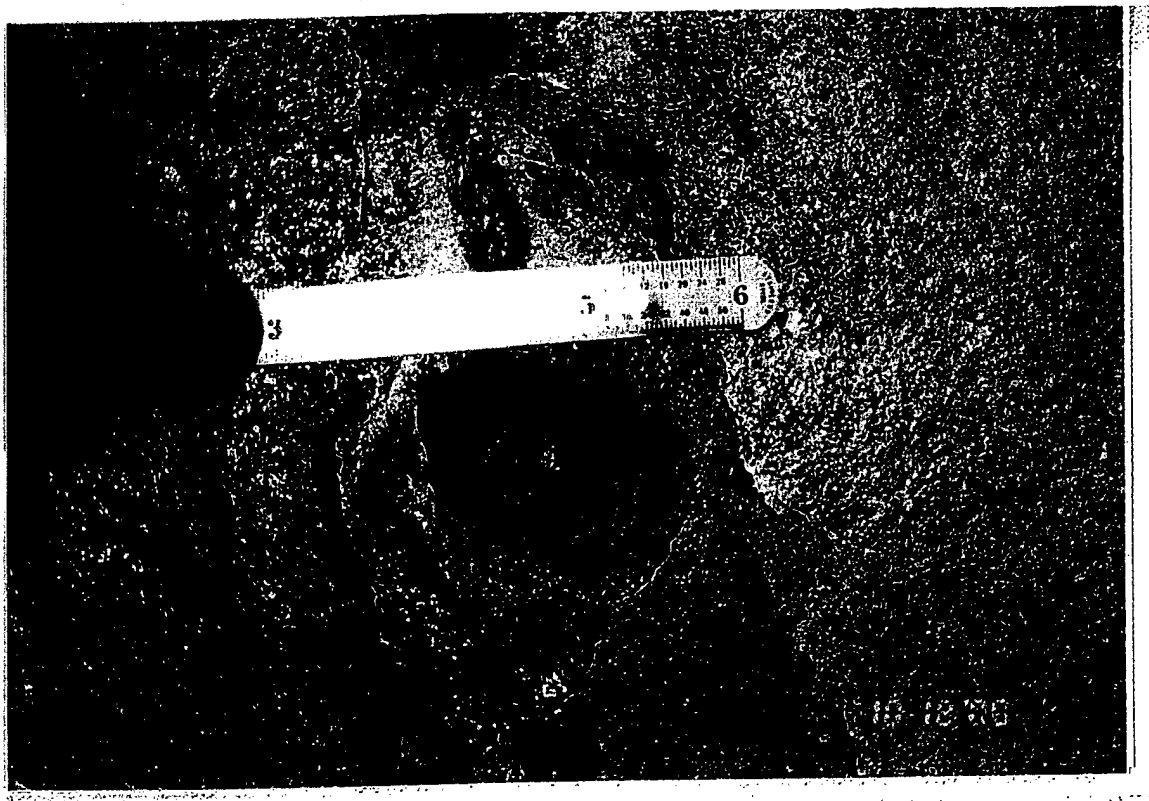
Little Goose Dam 10/11/00 5-20	**Gate 5**



Little Goose Dam 10/18/00 5-21	**Gate 5** Bottom seal keeper plate, typical.

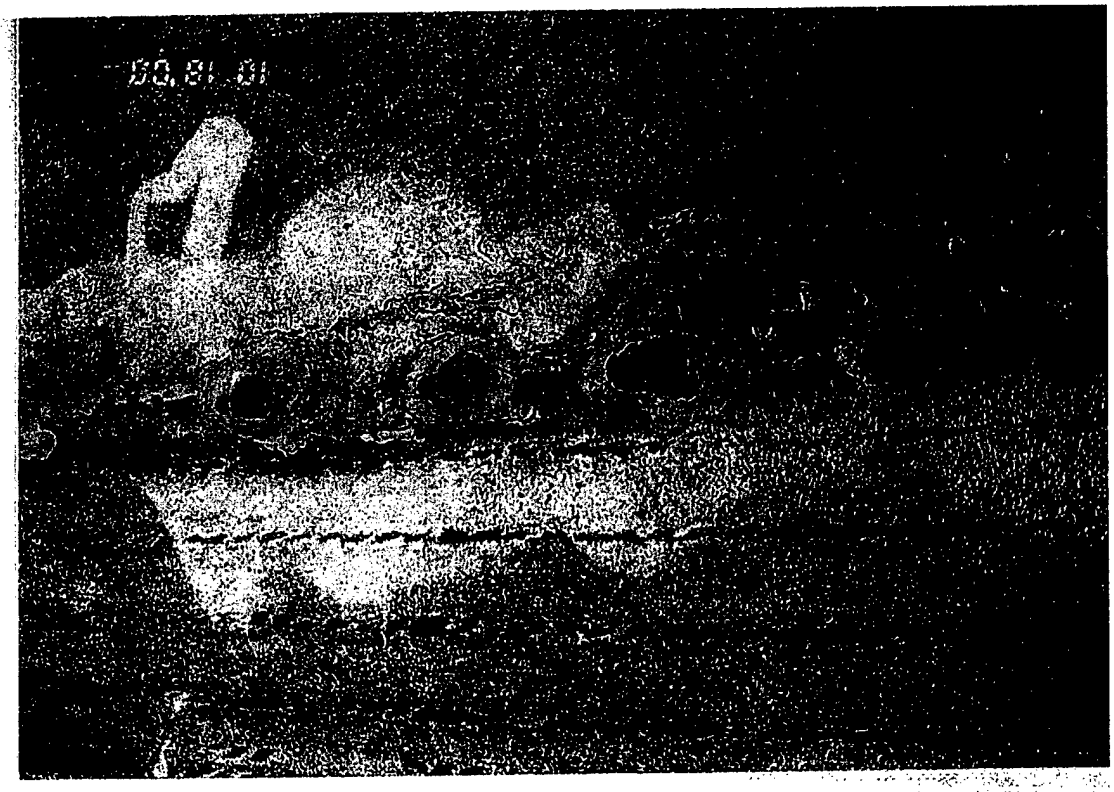


Little Goose Dam 10/18/00 5-22	**Gate 5** Waterblasting and typical skin plate condition. Minimal pitting on skin plate (except for wear plates).

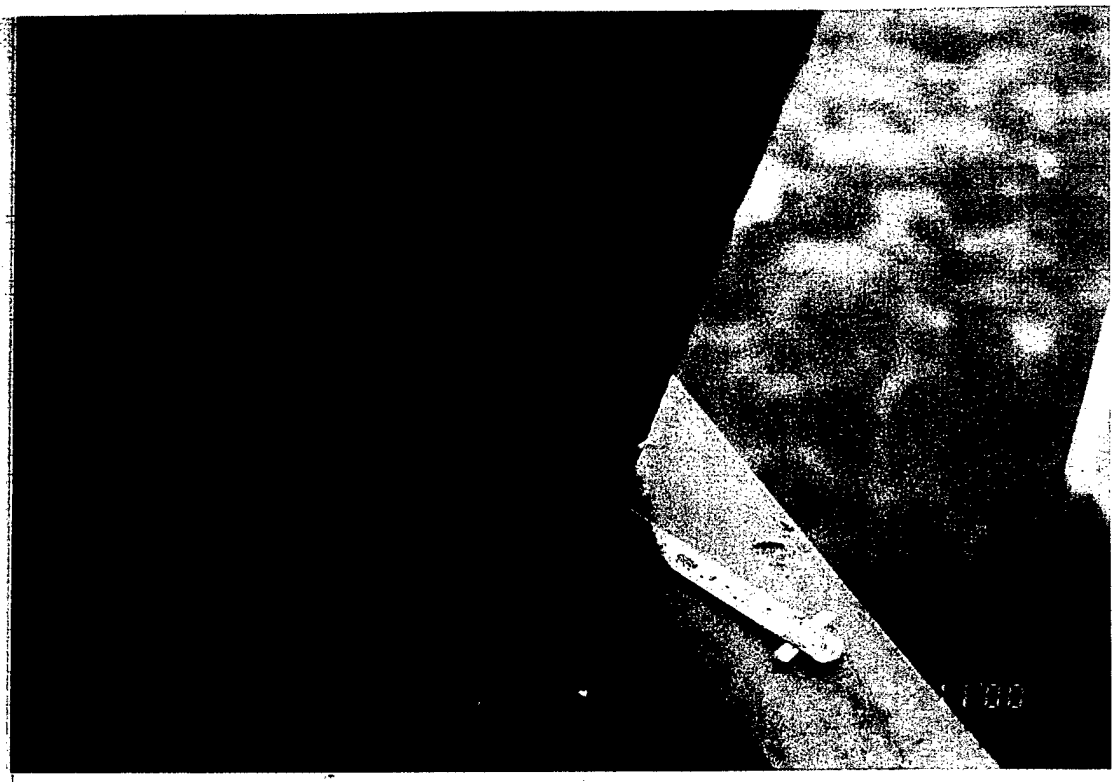


Little Goose Dam 10/18/00 5-23	**Gate 5** Heavy pitting on wear plate, typical.

Little Goose Dam 10/18/00 5-24	**Gate 5** Heavy pitting on wear plate, typical.

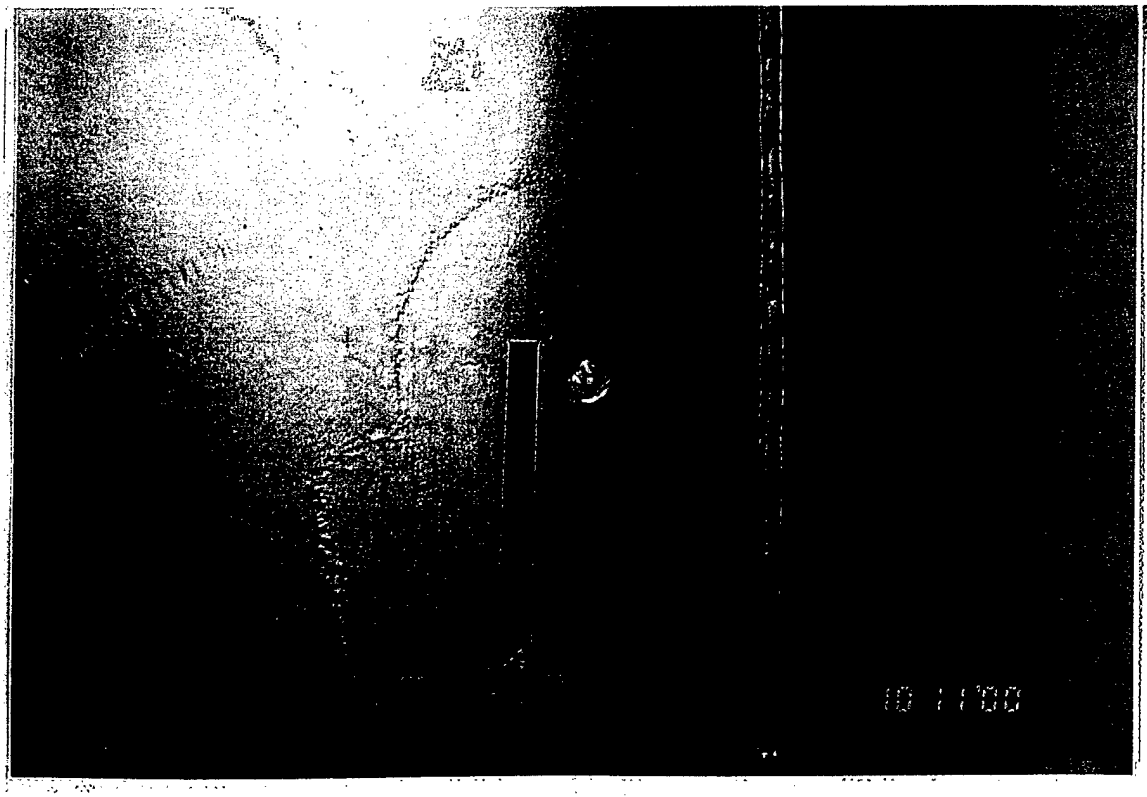


Little Goose Dam 10/18/00 5-25	**Gate 5** Heavy pitting on wear plate, typical.

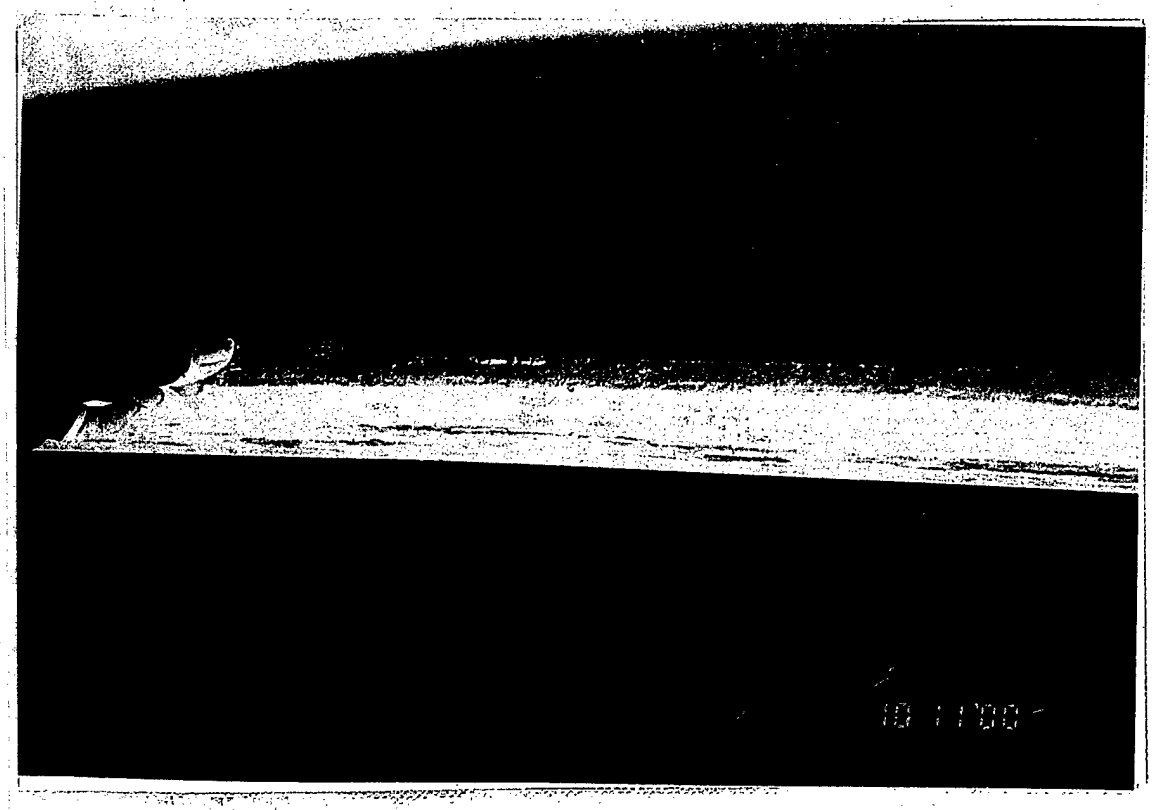


Little Goose Dam 10/11/00 6-1	**Gate 6** Left frame, Brace B. Light corrosion on brace (see photo 6-2).

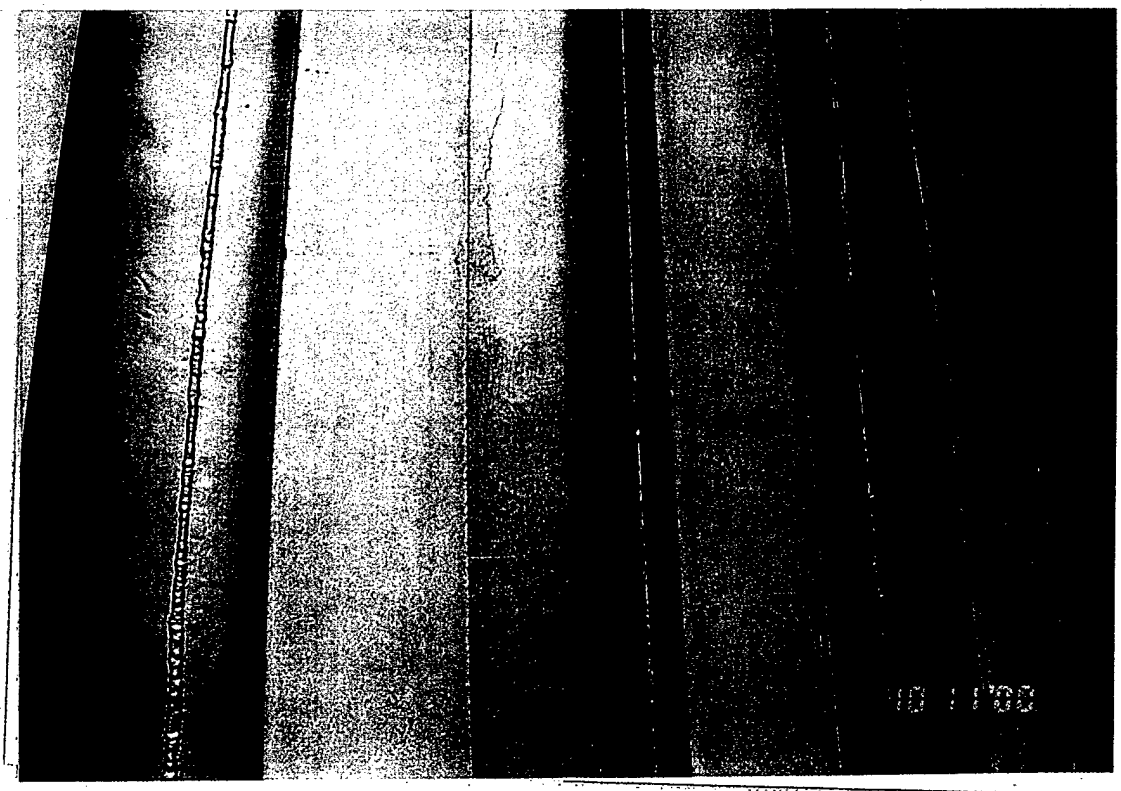
Little Goose Dam 10/11/00 6-2	**Gate 6** Left frame, Brace B. Light corrosion on brace.



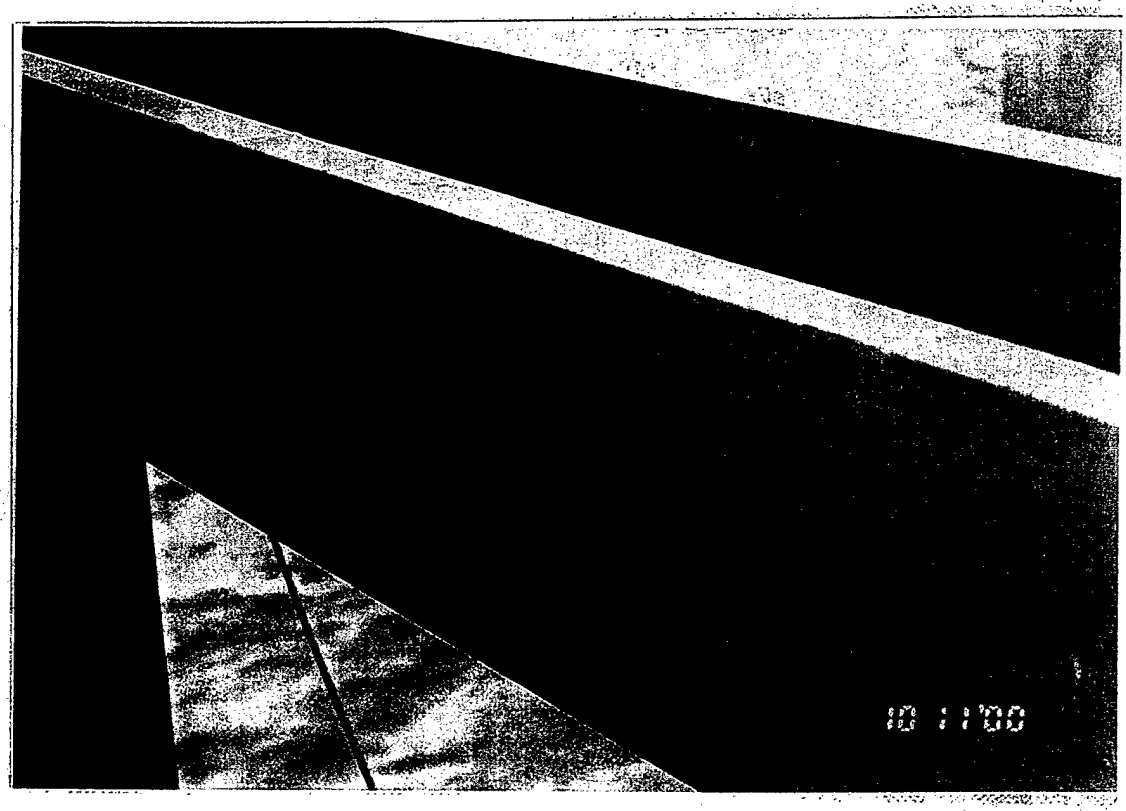
Little Goose Dam 10/11/00 6-3	**Gate 6** Downstream side of skin plate, left side of gate, above middle horizontal girder. Apparent skin plate repair.



Little Goose Dam 10/11/00 6-4	**Gate 6** Left frame, brace D. Light corrosion.

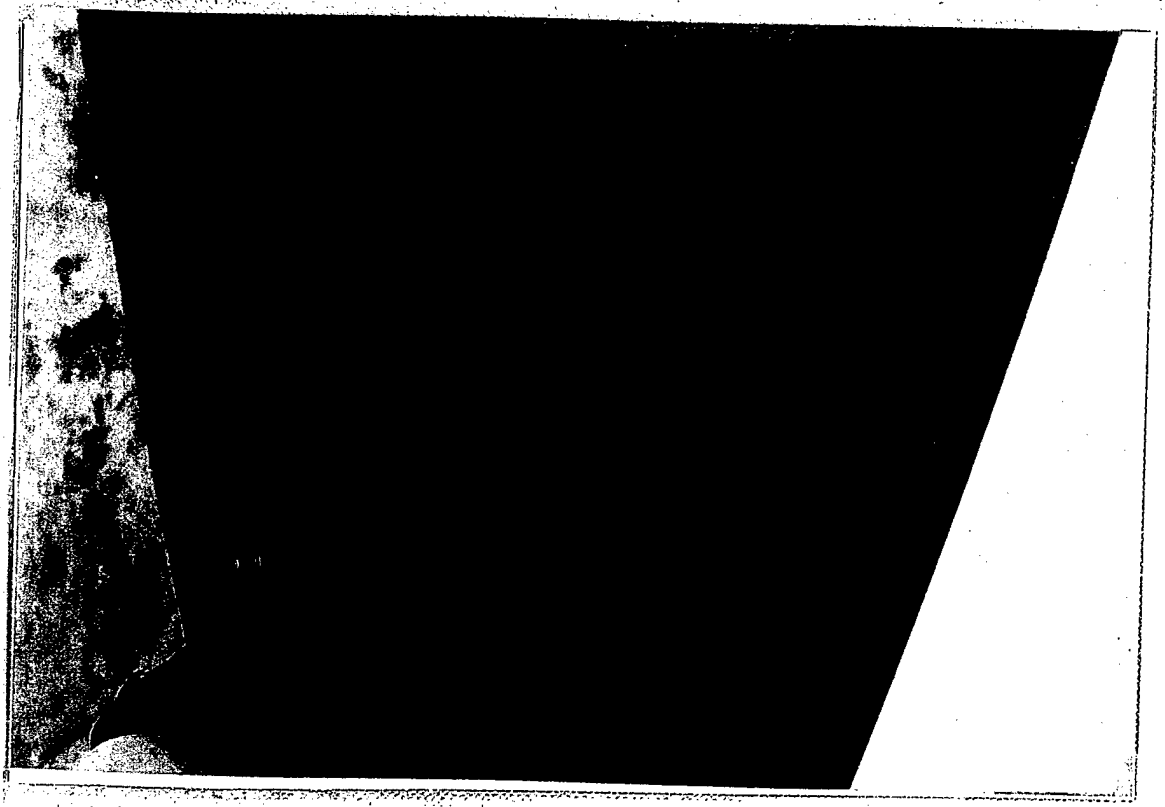


Little Goose Dam 10/11/00 6-5	**Gate 6** Downstream side of skin plate, left side of gate, above middle horizontal girder. Discolorization due to apparent repainting and possible skin plate repair.

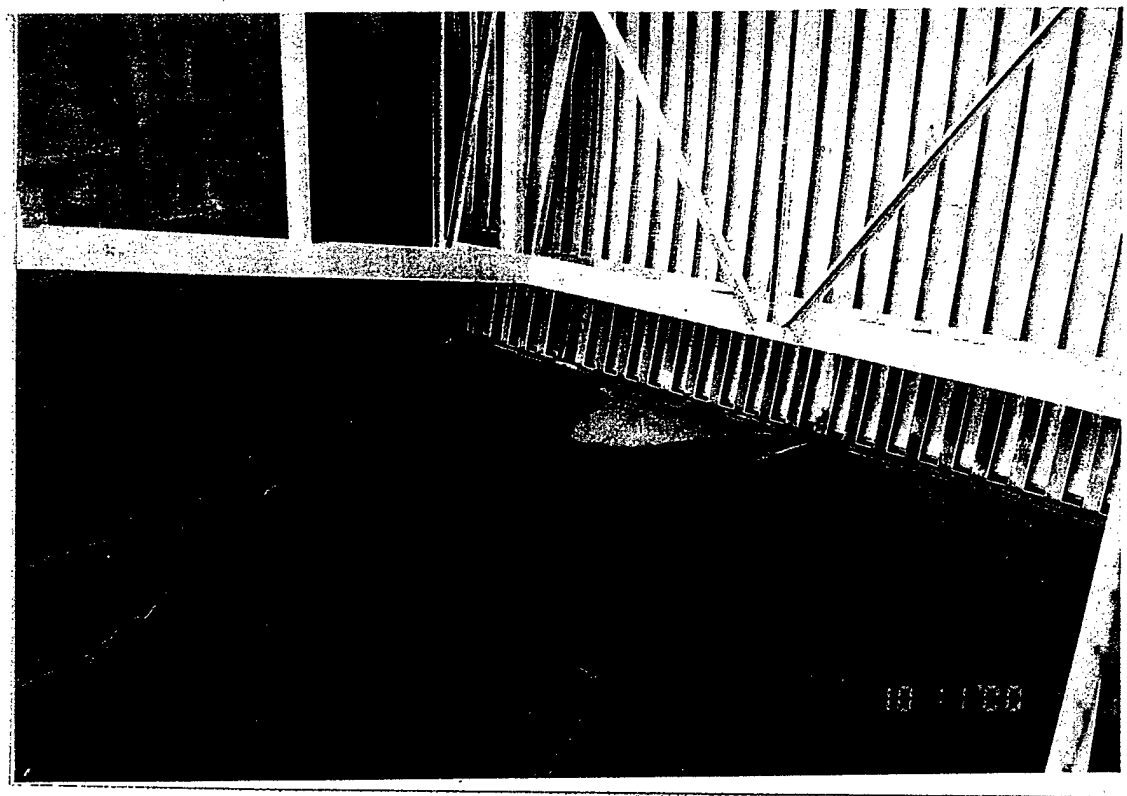


Little Goose Dam 10/11/00 6-6	**Gate 6** Left frame, middle radial strut. Light pitting on outside flange.

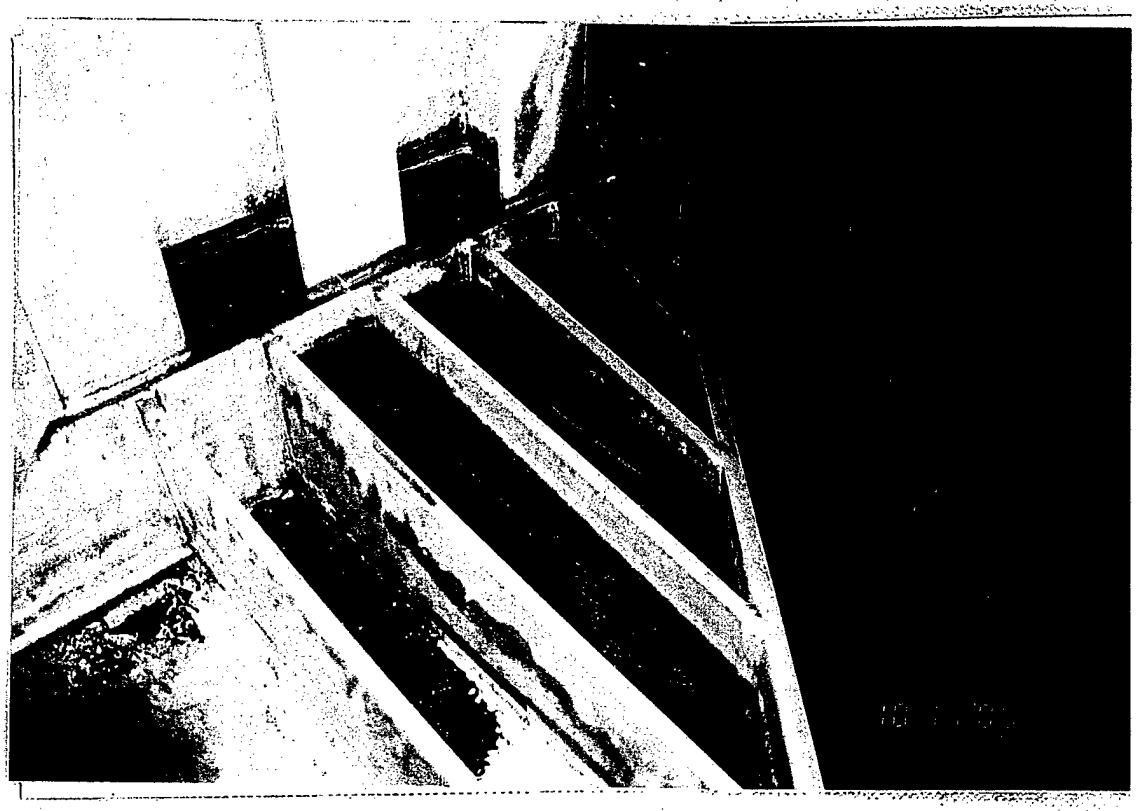
Little Goose Dam 10/11/00 6-7	**Gate 6** Downstream side of skin plate, apparent skin plate repair grinding.



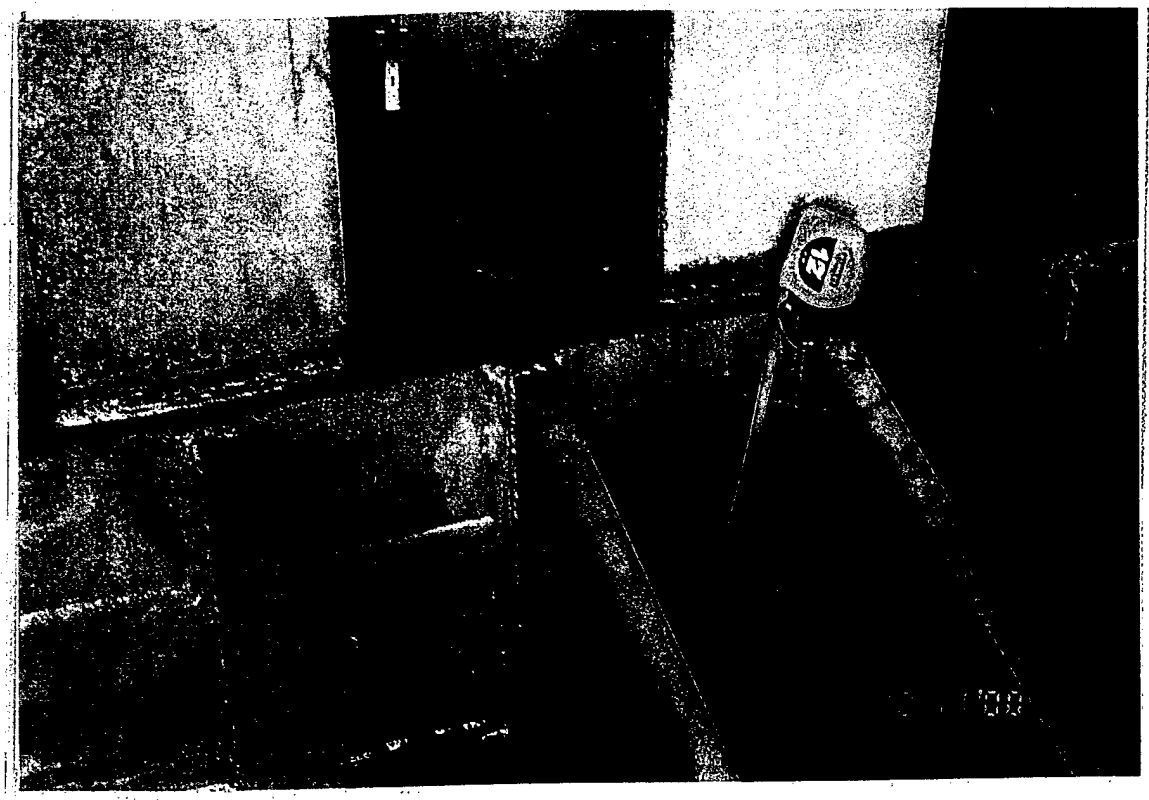
Little Goose Dam 10/11/00 6-8	**Gate 6** Light corrosion and debris coating on braces, typical.



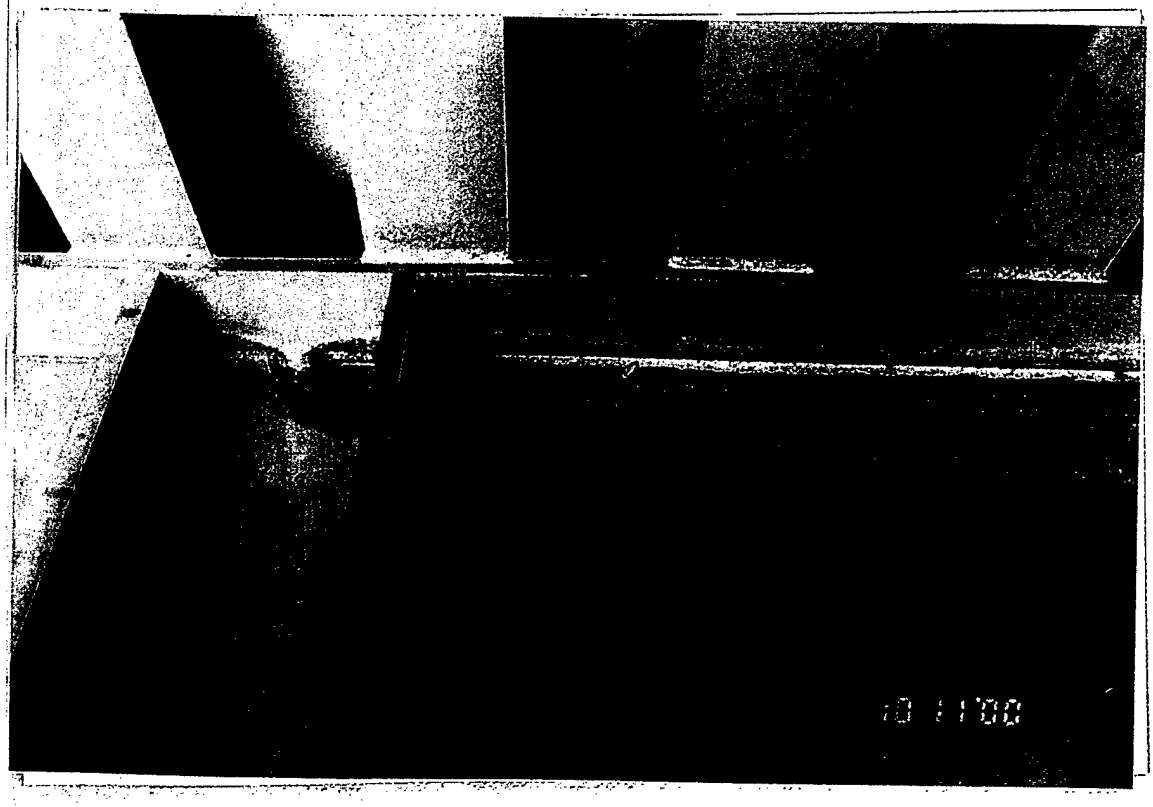
Little Goose Dam 10/11/00 6-9	**Gate 6** Gate face and spillway, typical. Leak at center construction joint in spillway monolith.



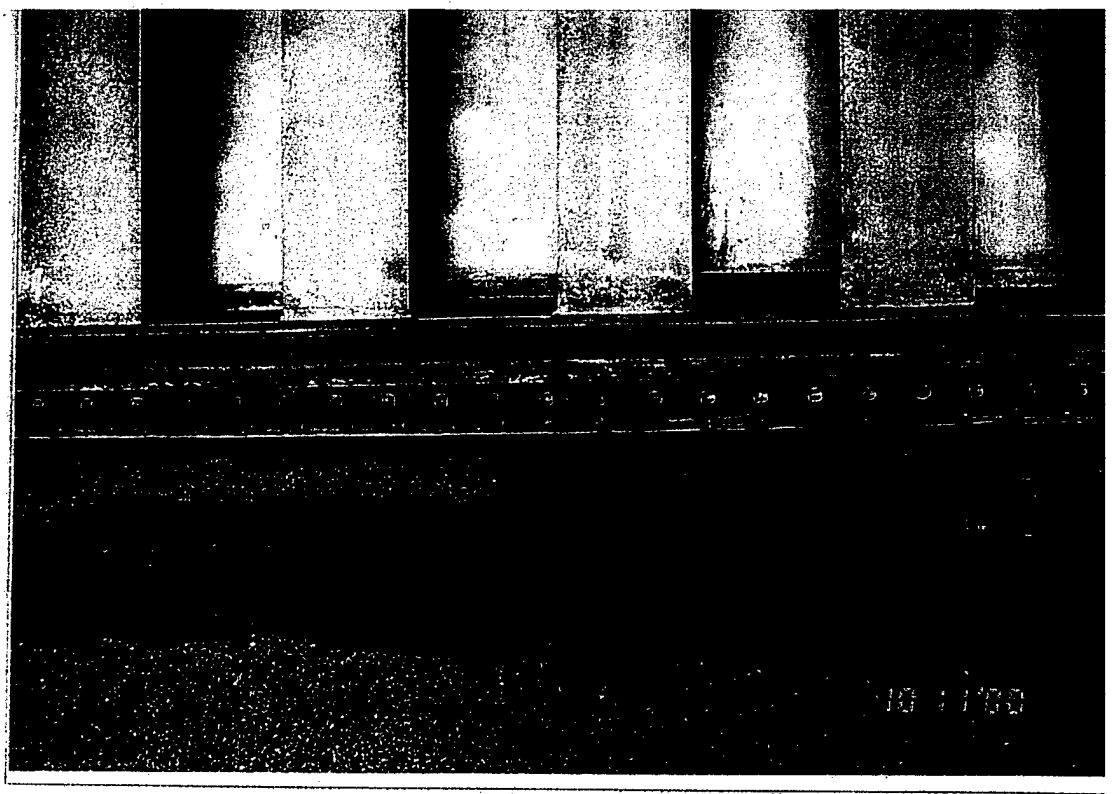
Little Goose Dam 10/11/00 6-10	**Gate 6** Bottom horizontal girder. Standing water, no drainage between multiple stiffeners, typical. Horizontal girder to skin plate stiffeners, standing water, debris and no drainage.



Little Goose Dam 10/11/00 6-11	**Gate 6** Bottom horizontal girder. Standing water, no drainage between multiple stiffeners, typical. Horizontal girder to skin plate stiffeners, standing water, debris and no drainage.



Little Goose Dam 10/11/00 6-12	**Gate 6** Bottom horizontal girder. Evidence of standing water on girder web and flange.

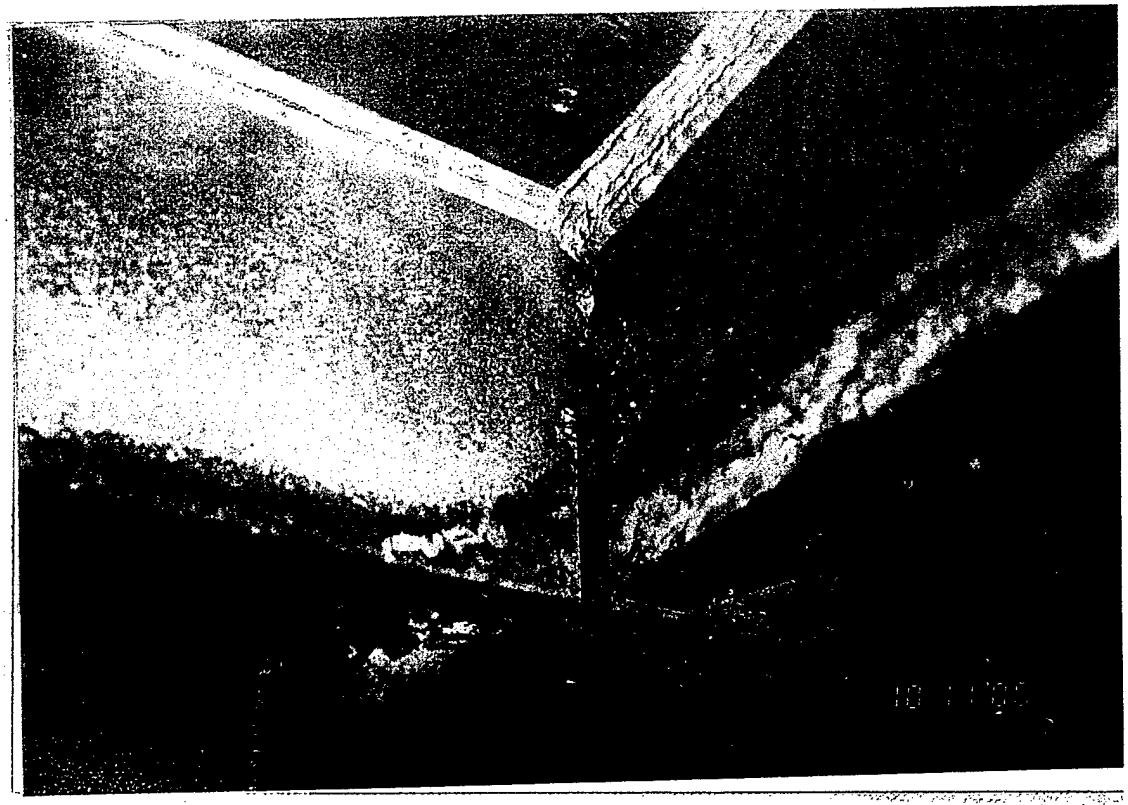


Little Goose Dam 10/11/00 6-13	**Gate 6** Bottom seal keeper plate, typical. Bottom seal closure plate, standing water between closure plate, purlin webs and skinplate, typical.

Little Goose Dam 10/11/00 6-14	**Gate 6** Leak at center construction joint in spillway monolith.

Little Goose Dam 10/11/00 6-15	**Gate 6** Bottom seal closure plate, standing water between closure plate, purlin webs and skinplate, typical.

Little Goose Dam 10/11/00 6-16	**Gate 6** Bottom of bottom horizontal girder at radial strut connection and girder drain hole. Light corrosion on girder web and stiffeners.

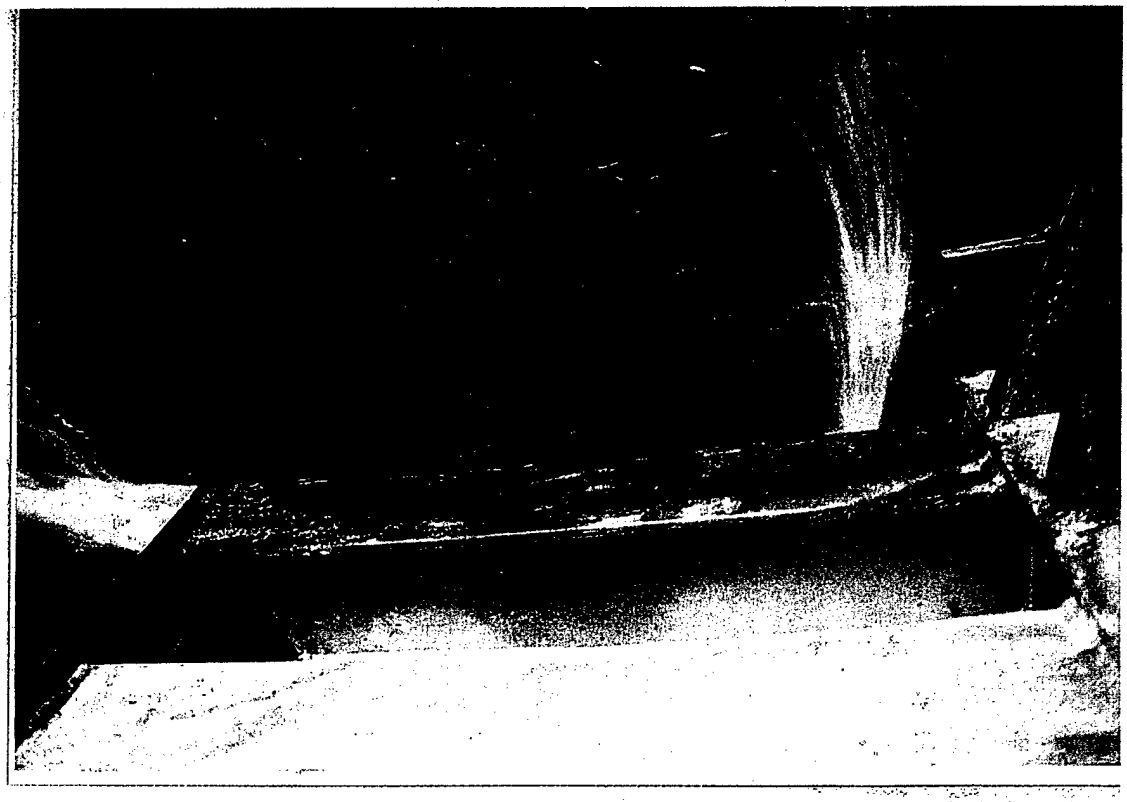


Little Goose Dam 10/11/00 6-17	**Gate 6** Bottom of bottom horizontal girder at radial strut connection and girder drain hole. Light corrosion on girder web and stiffeners.

Little Goose Dam 10/11/00 6-18	**Gate 6** Leak at center construction joint in spillway monolith. Light corrosion on bottom seal keeper plate.

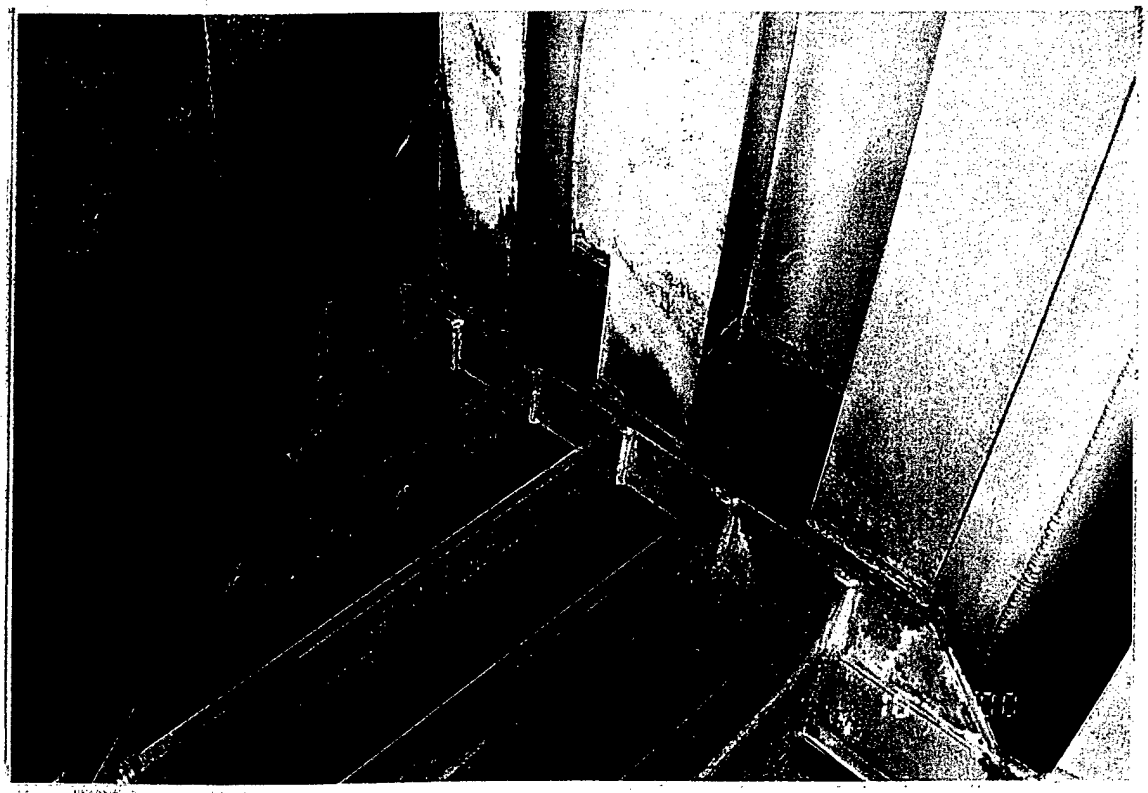
Little Goose Dam 10/11/00 6-19	**Gate 6** Bottom of bottom horizontal girder at radial strut connection and girder drain hole. Light corrosion on girder web and stiffeners.

Little Goose Dam 10/11/00 6-20	**Gate 6** Bottom seal closure plate, standing water between closure plate, purlin webs and skinplate, typical.



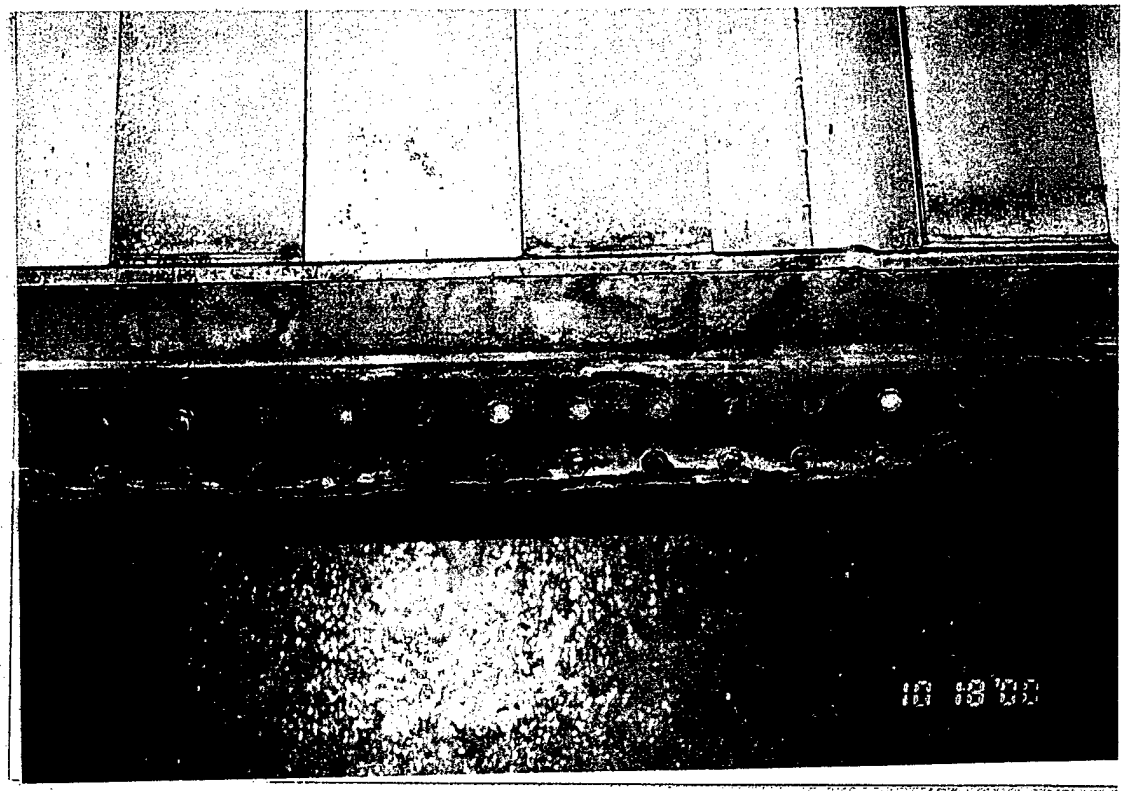
Little Goose Dam 10/11/00 6-21	**Gate 6** Side seal leak, bottom left side of gate. Light corrosion on purlin, horizontal girder and girder stiffeners.

Little Goose Dam 10/11/00 6-22	**Gate 6** Side seal leak, bottom right side of gate. Light corrosion on purlin, horizontal girder and girder stiffeners.



Little Goose Dam 10/11/00 6-23	**Gate 6** Bottom horizontal girder. Standing water, no drainage between multiple stiffeners, typical. Horizontal girder to skin plate stiffeners, standing water, debris and no drainage.

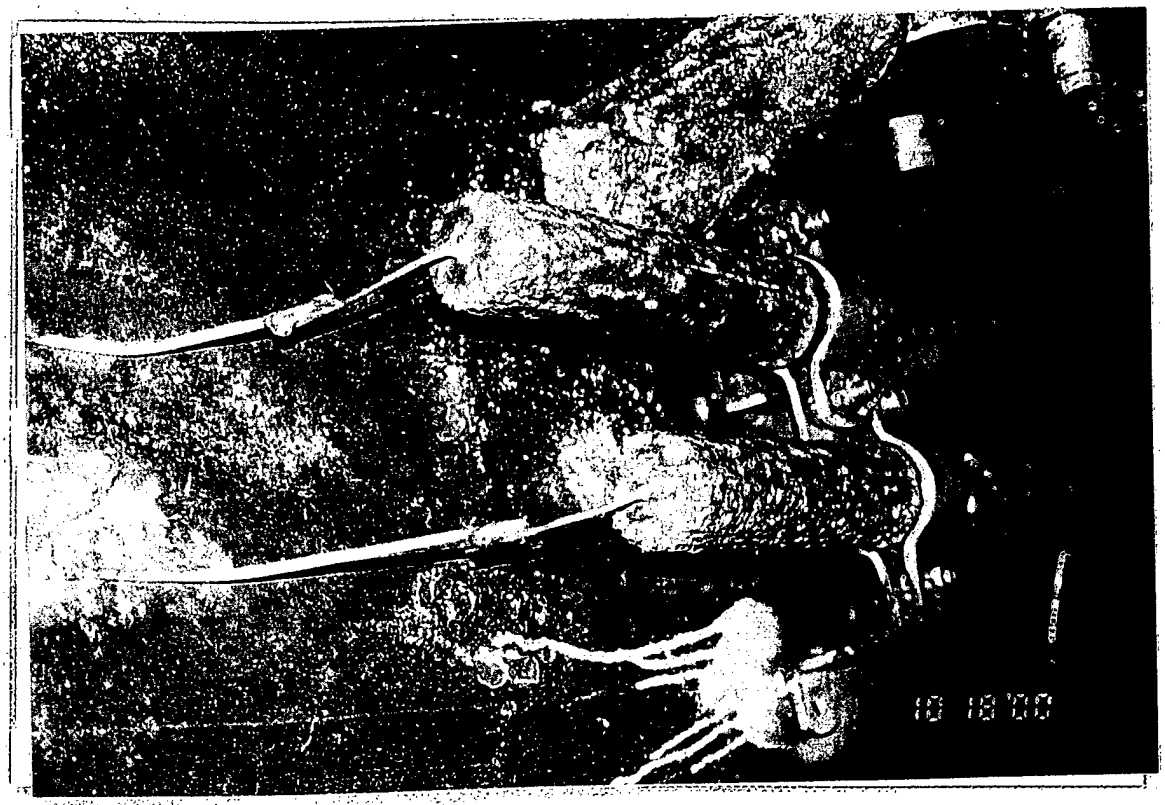
Little Goose Dam 10/11/00 6-24	**Gate 6** Bottom horizontal girder. Standing water, no drainage between multiple stiffeners, typical. Horizontal girder to skin plate stiffeners, standing water, debris and no drainage.



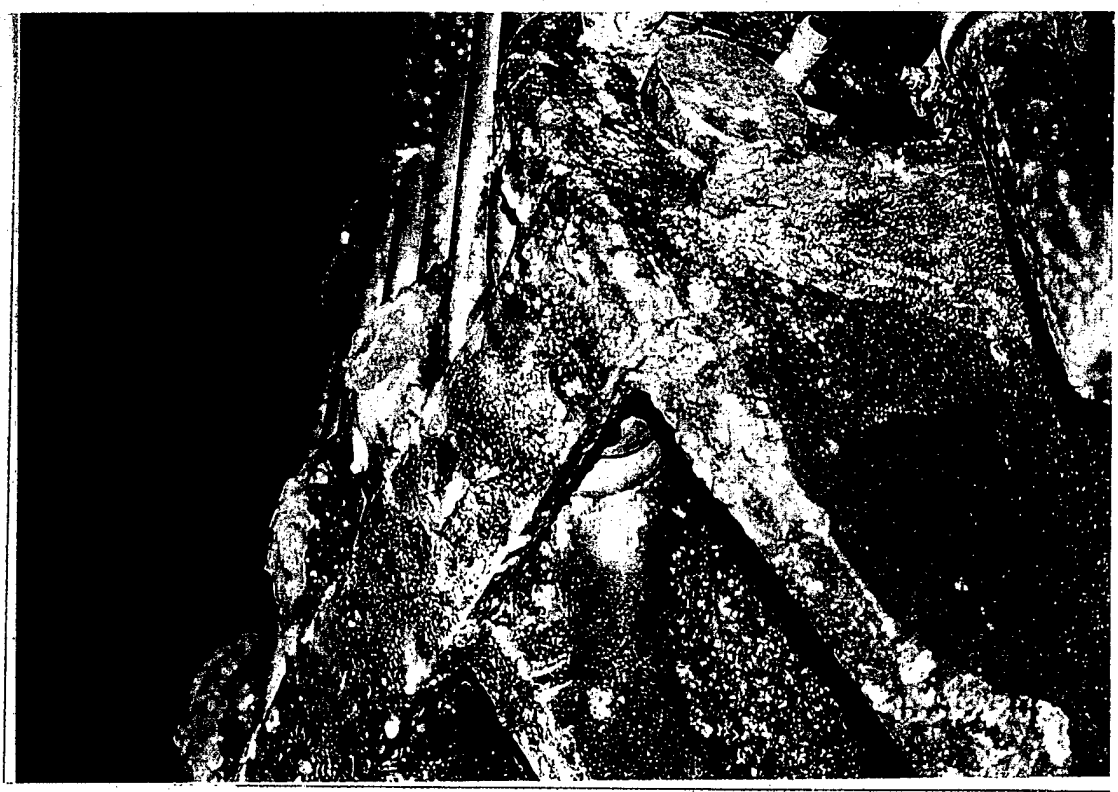
Little Goose Dam 10/18/00 6-25	**Gate 6** Bottom seal keeper plate, typical.

Little Goose Dam 10/18/00 6-26	**Gate 6** Bottom seal keeper plate, typical.

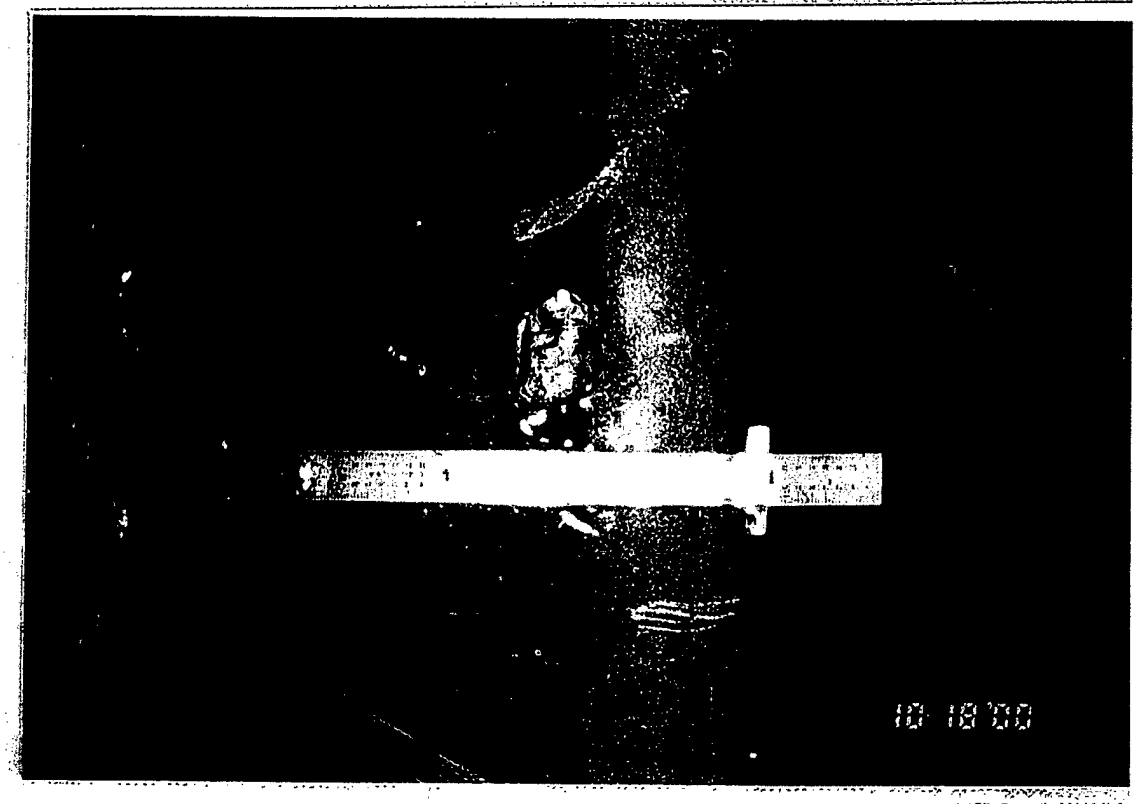
Little Goose Dam 10/18/00 6-27	**Gate 6** Left hoist connection and anodes. Light to moderate corrosion on lifting lugs and plates. Note: Extra anode under hoist connection not found on other gates.



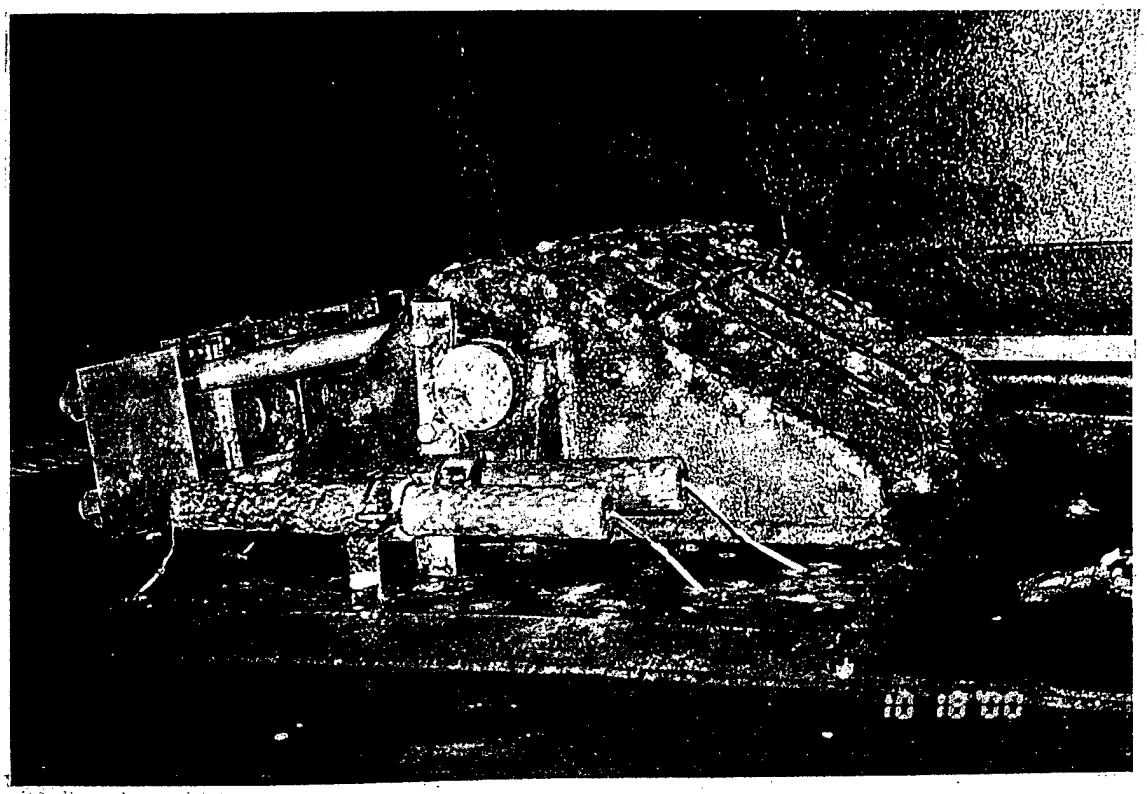
Little Goose Dam 10/18/00 6-28	**Gate 6** Hoist connection anodes, typical.



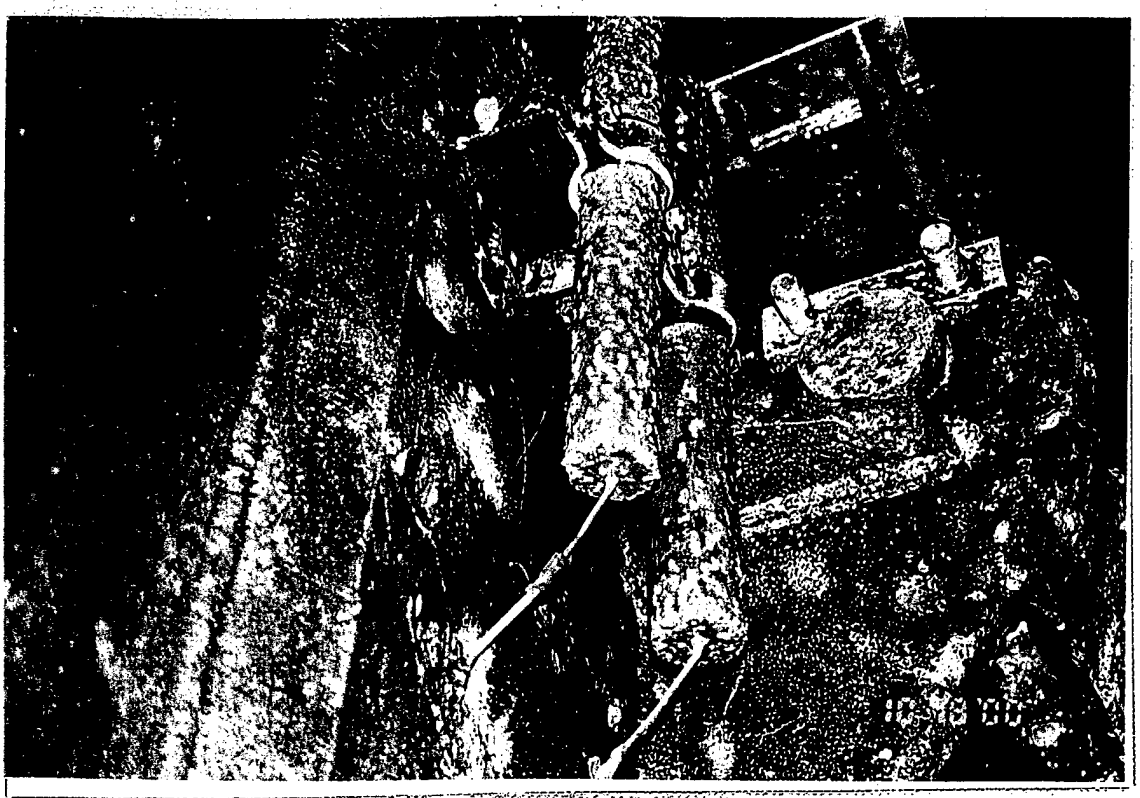
Little Goose Dam 10/18/00 6-29	**Gate 6** Close-up hoist connection. Light to moderate corrosion on lifting lugs and plates.



Little Goose Dam 10/18/00 6-30	**Gate 6** Close-up, embedded bottom seal in spillway.

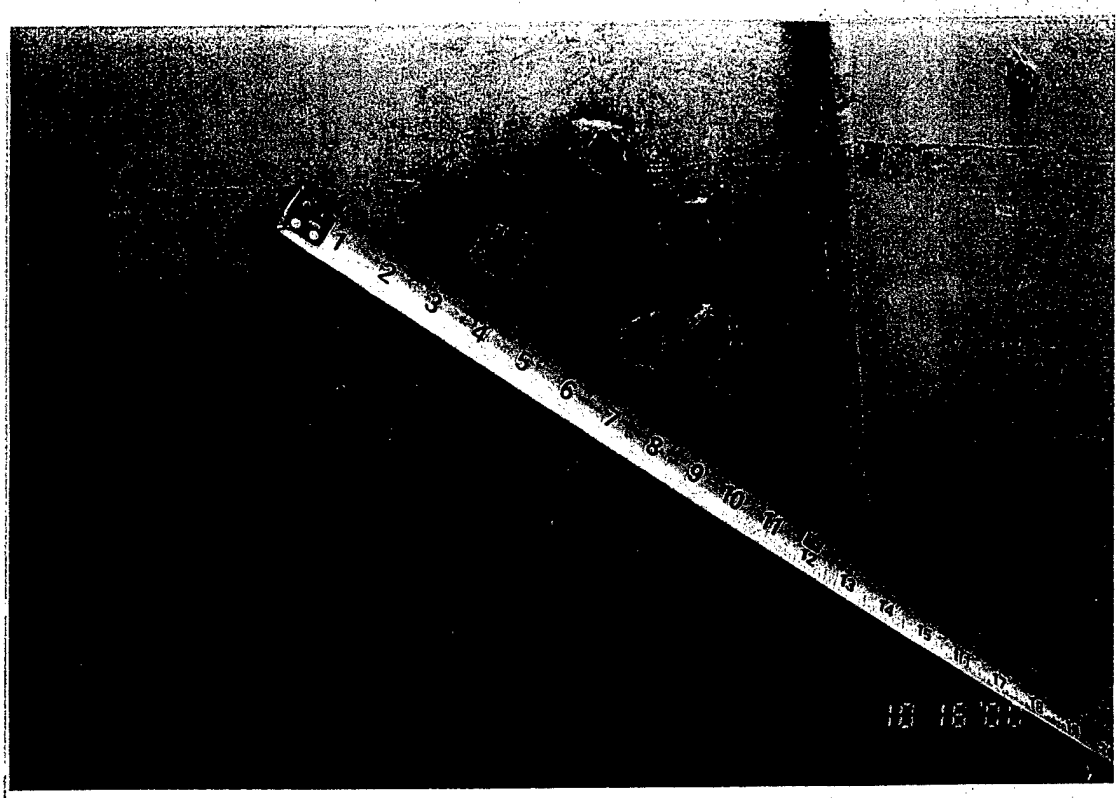


Little Goose Dam 10/18/00 6-31	**Gate 6** Right hoist connection. Light to moderate corrosion on lifting lugs and plates.

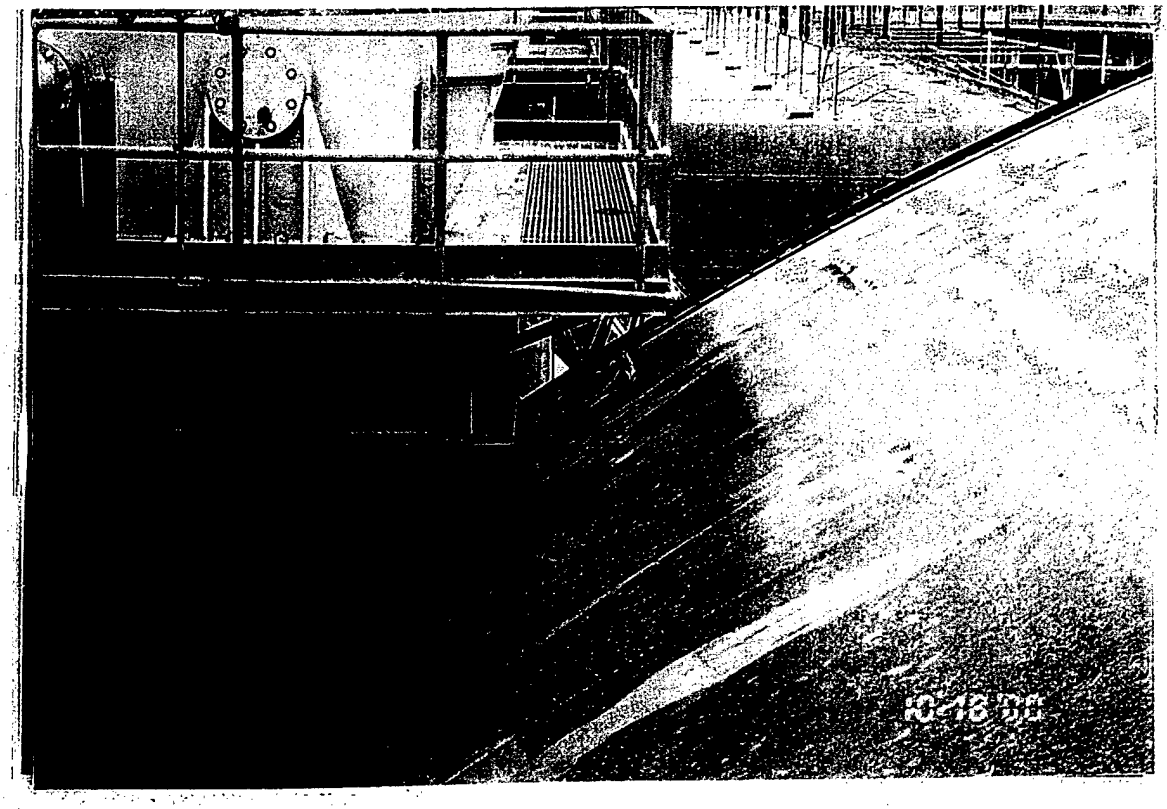


Little Goose Dam 10/18/00 6-32	**Gate 6** Right hoist connection. Light to moderate corrosion on lifting lugs and plates. Note: Generally good condition of anodes.

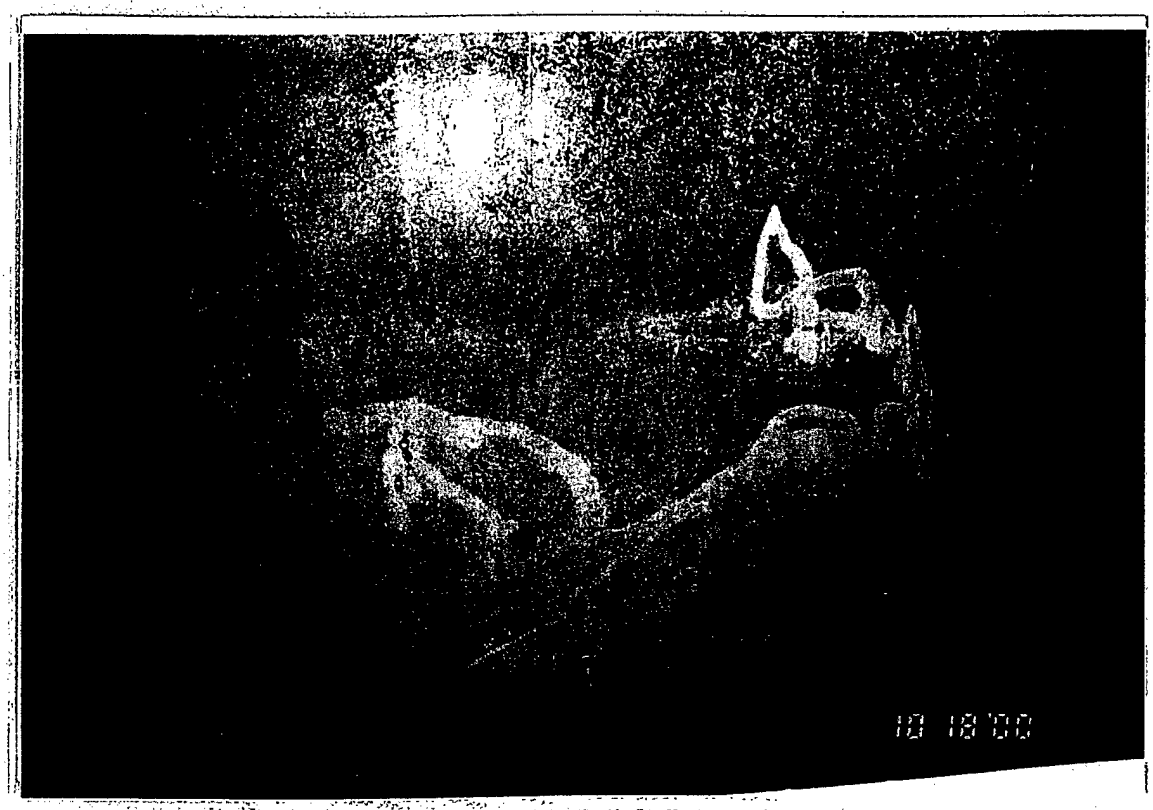
Little Goose Dam 10/18/00 6-33	**Gate 6** Apparent previous anode bracket.



Little Goose Dam 10/18/00 6-34	**Gate 6** .Skin plate pitting, typical.



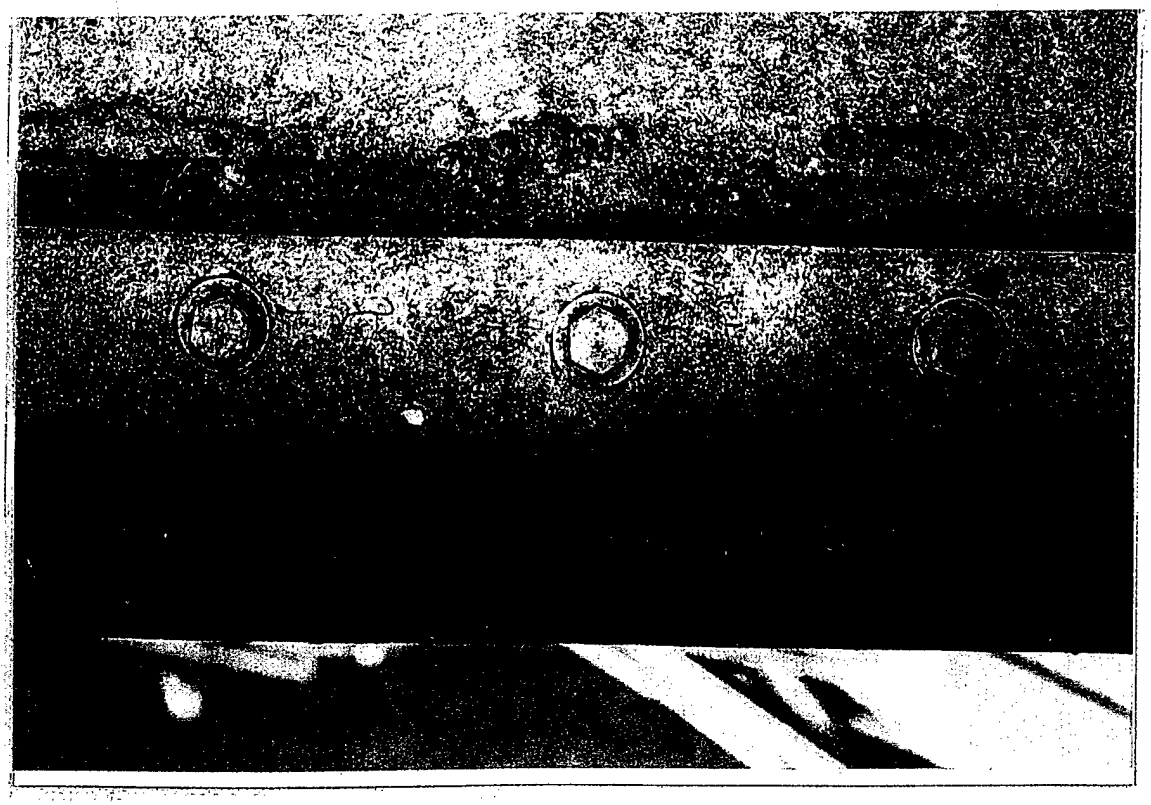
Little Goose Dam 10/18/00 6-35	**Gate 6** Skin plate condition, typical. Minimal skin plate pitting.



Little Goose Dam 10/18/00 6-36	**Gate 6** Skin plate condition, typical. Minimal skin plate pitting.

Little Goose Dam 10/18/00 6-37	**Gate 6** Left wear plate. Delaminated vinyl coating.

Little Goose Dam 10/18/00 6-38	**Gate 6** Left wear plate. Delaminated vinyl coating.

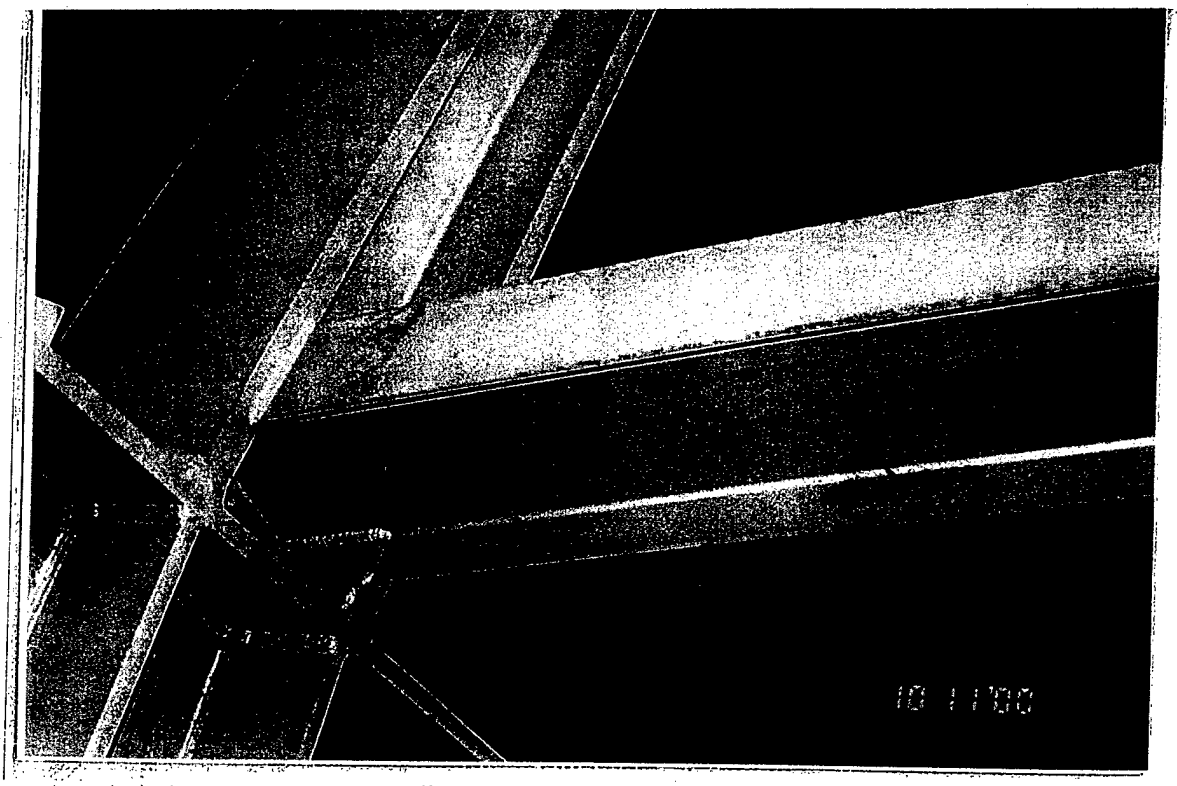


Little Goose Dam 10/18/00 6-39	**Gate 6** Upstream side of side seal, typical.

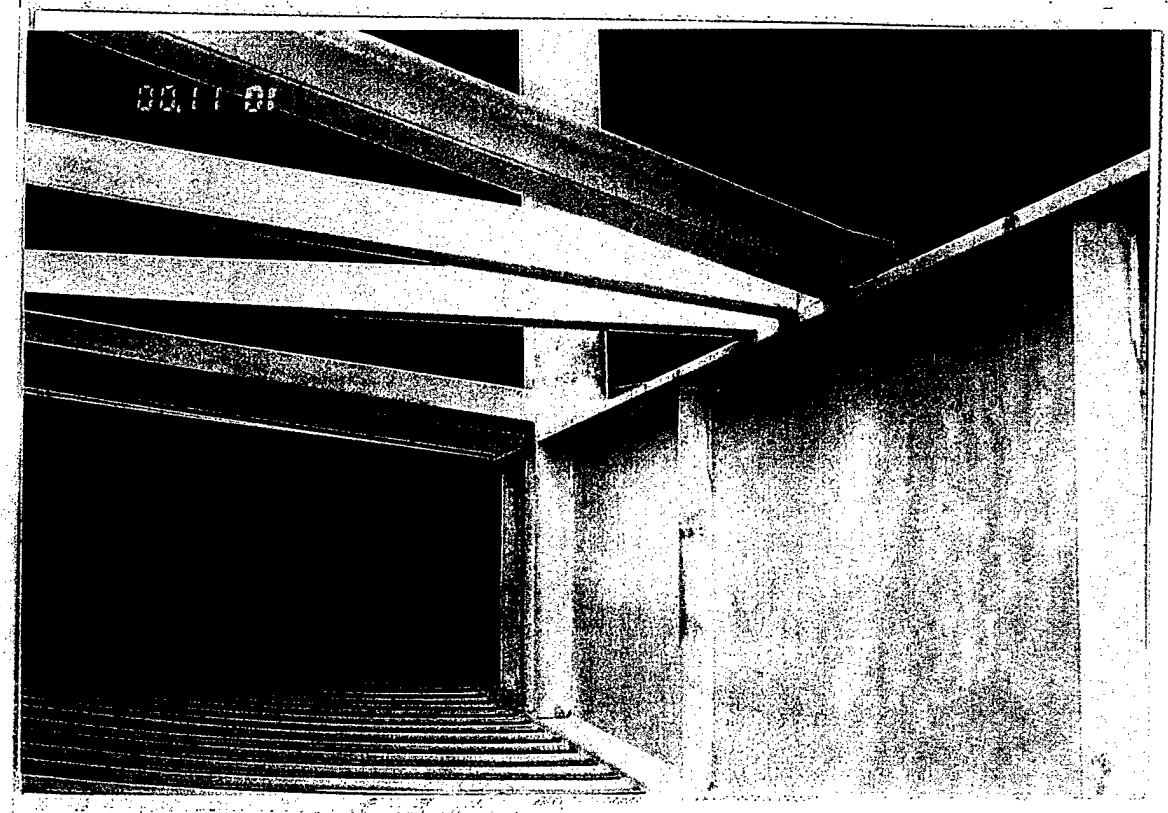
Little Goose Dam 10/18/00 6-40	**Gate 6** Light pitting along skin plate weld, typical.

Little Goose Dam 10/11/00 7-1	**Gate 7** Right frame, brace F. Loose moderate corrosion on brace.

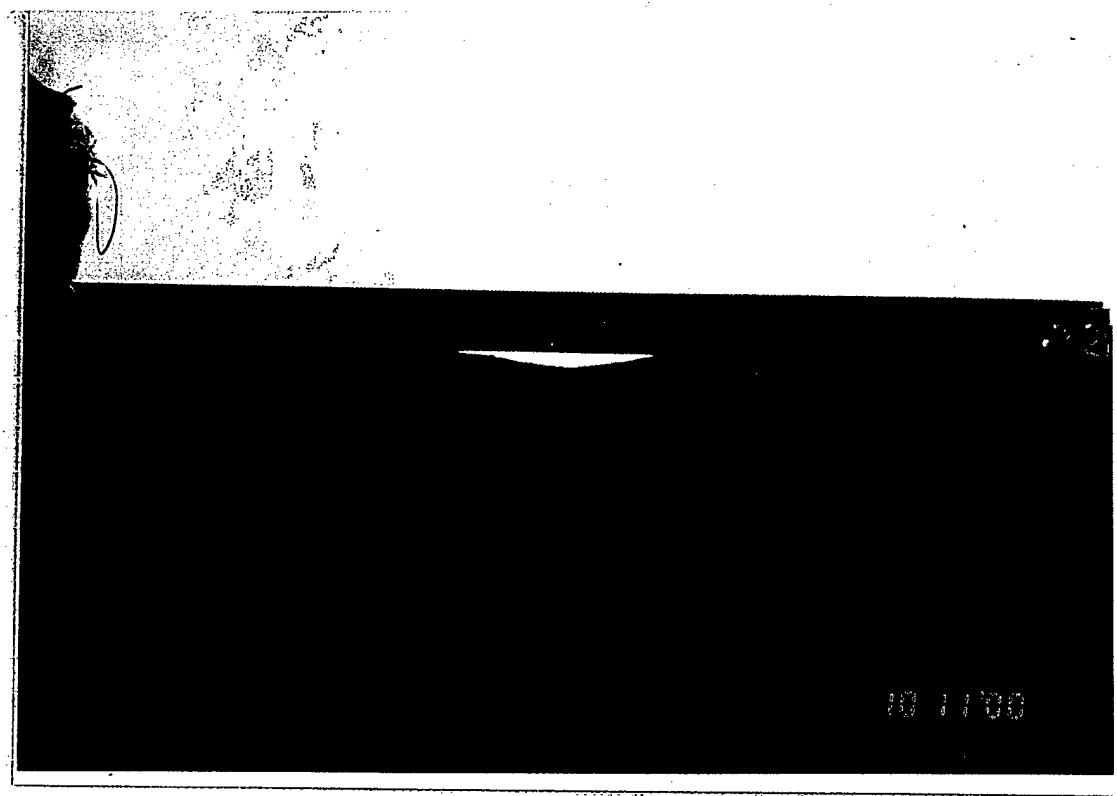
Little Goose Dam 10/11/00 7-2	**Gate 7** Bottom horizontal girder, right end. Standing water, no drainage between multiple stiffeners, typical.



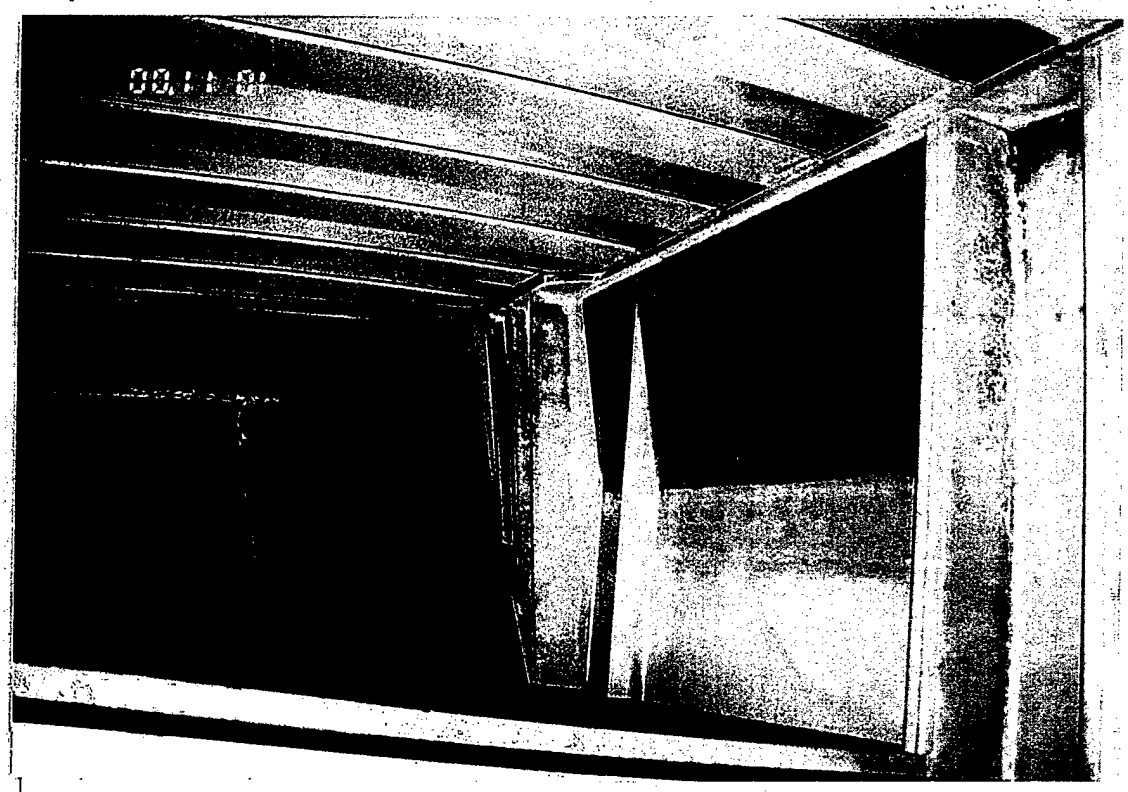
Little Goose Dam 10/11/00 7-3	**Gate 7** Left frame, Brace A. Light corrosion on brace, radial strut and horizontal girder.



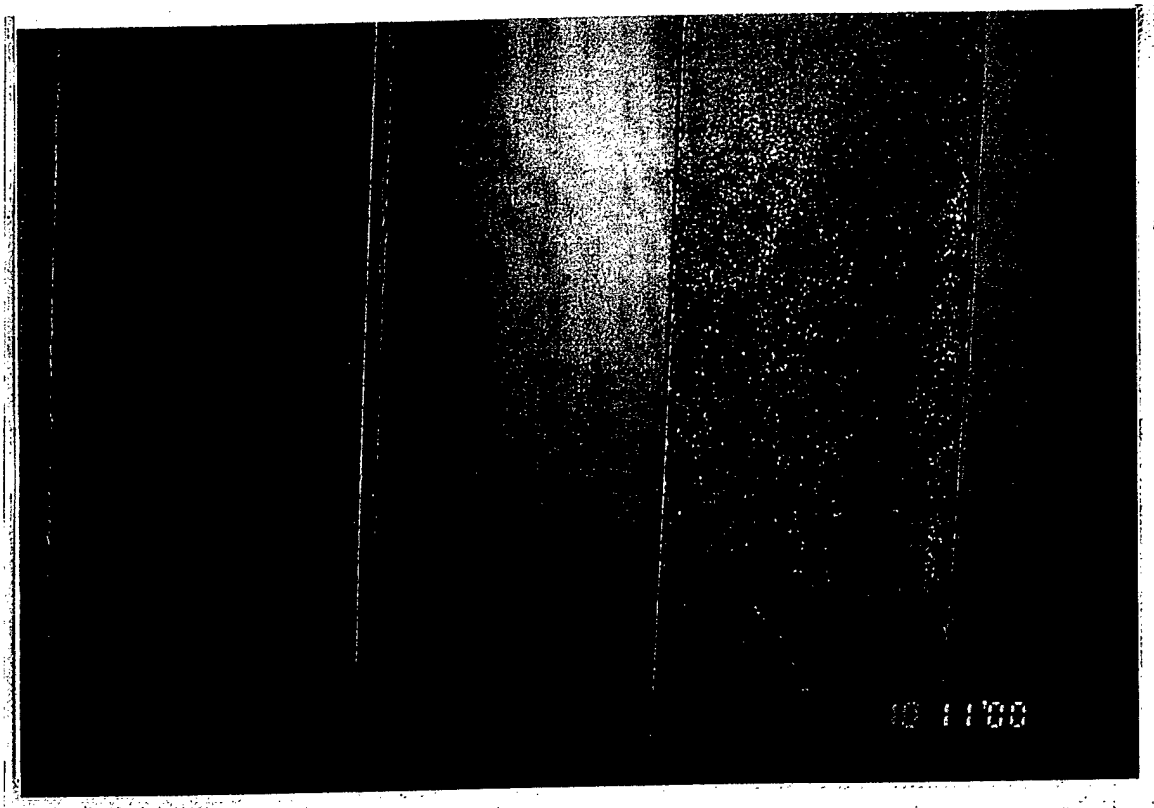
Little Goose Dam 10/11/00 7-4	**Gate 7** Middle horizontal girder, typical.



Little Goose Dam 10/11/00 7-5	**Gate 7** Right frame, Brace L. Small deformation in brace flange.



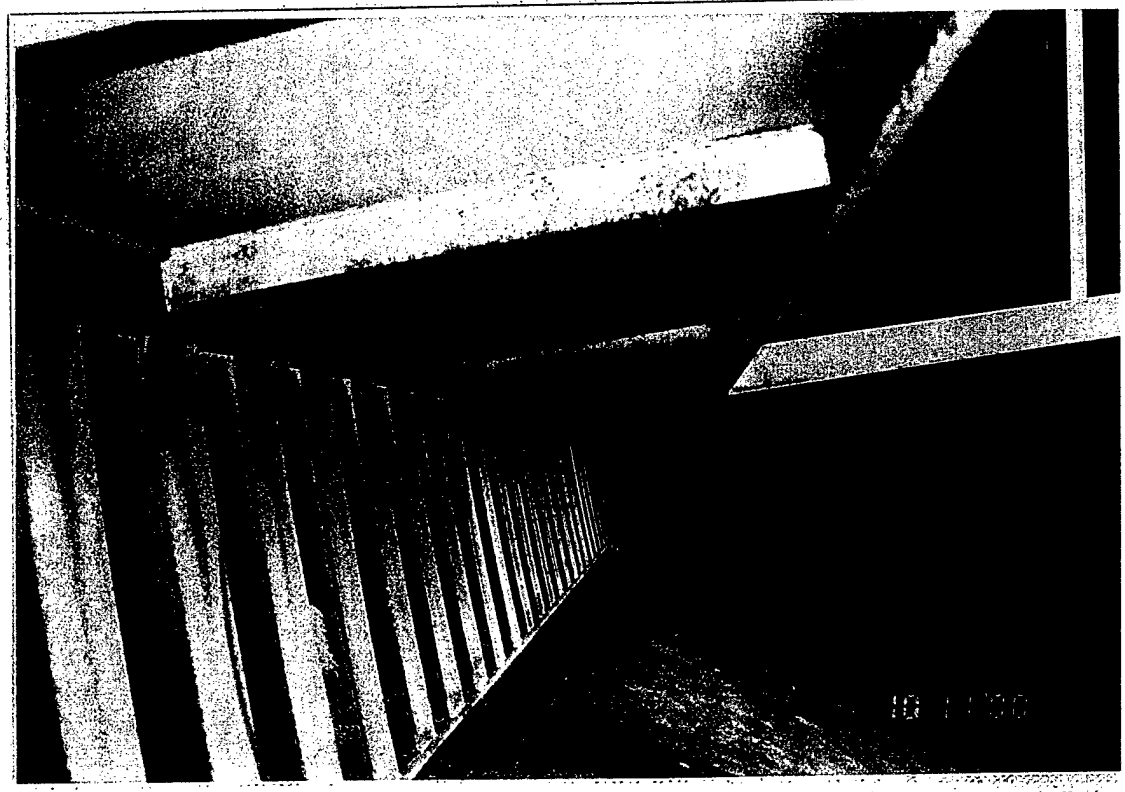
Little Goose Dam 10/11/00 7-6	**Gate 7** Bottom horizontal girder, right end. Standing water on girder web due to inadequate drainage and side seal leak.



Little Goose Dam 10/11/00 7-7	**Gate 7** Skin plate purlins, typical.

Little Goose Dam 10/11/00 7-8	**Gate 7** Bottom right corner of gate, side seal leak.

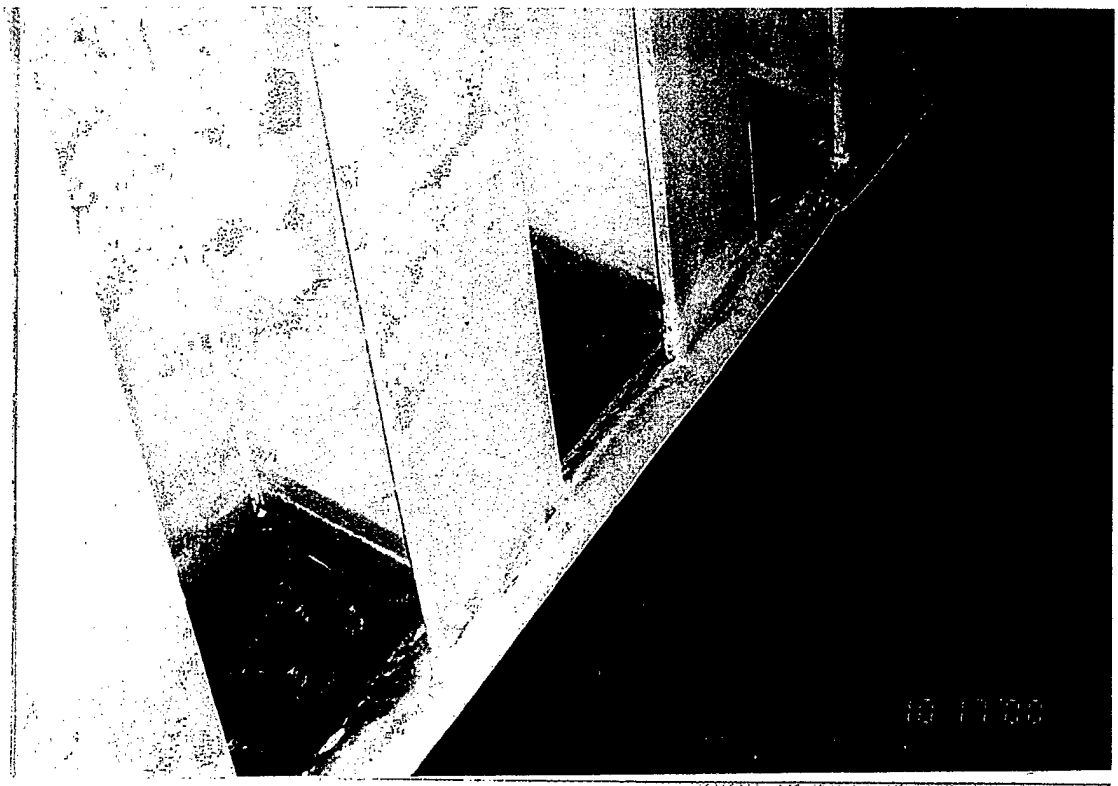
Little Goose Dam 10/11/00 7-9	**Gate 7** Bottom seal closure plate looking upstream. Standing water between closure plate, purlin webs and skinplate. Typical.



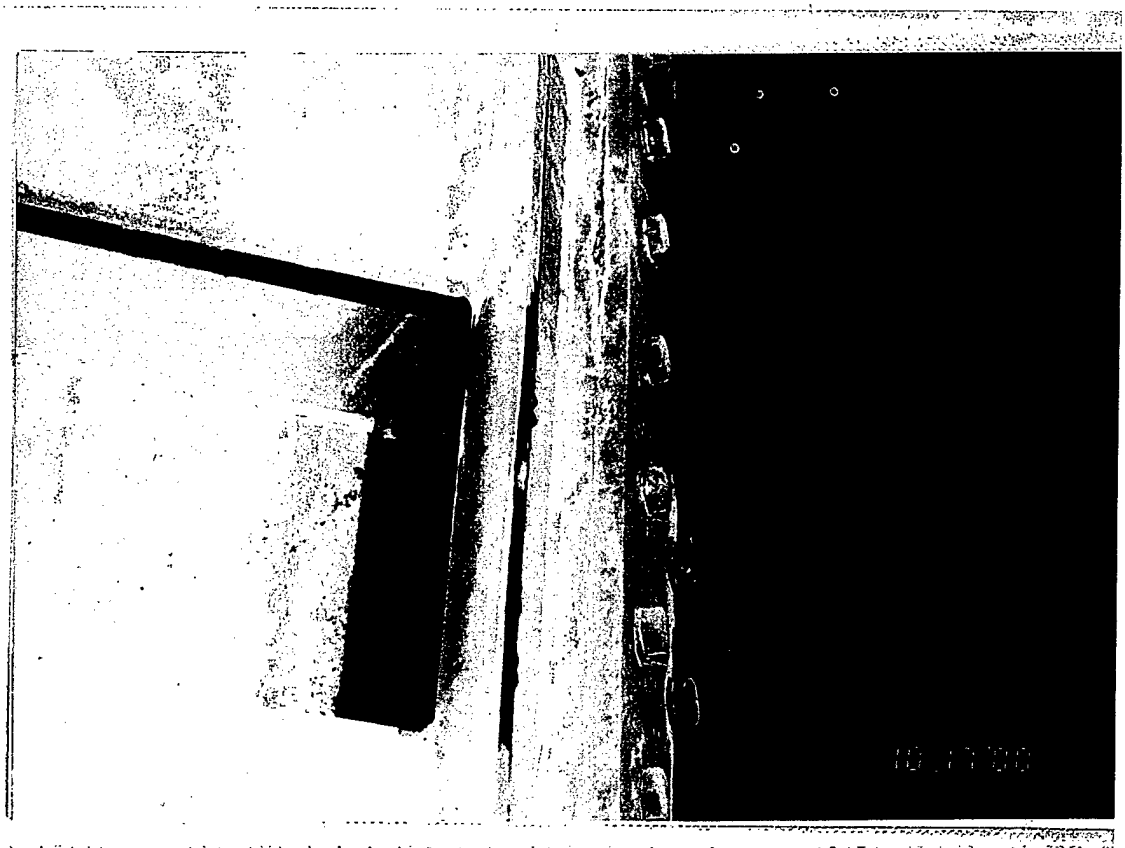
Little Goose Dam 10/11/00 7-10	**Gate 7** Bottom of bottom horizontal girder, typical.

Little Goose Dam 10/11/00 7-11	**Gate 7** Bottom seal closure plate looking upstream. Standing water between closure plate, purlin webs and skinplate, typical.

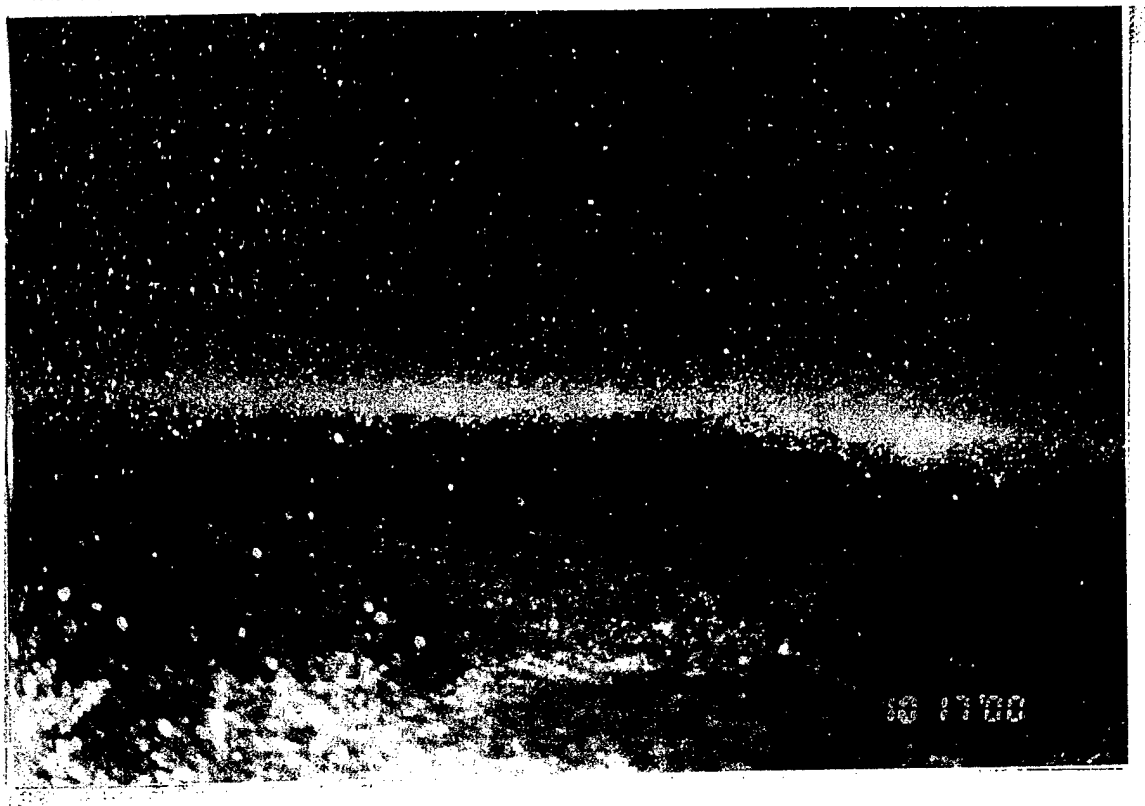
Little Goose Dam 10/11/00 7-12	**Gate 7** Bottom horizontal girder, left end. Standing water, no drainage between multiple stiffeners, typical.



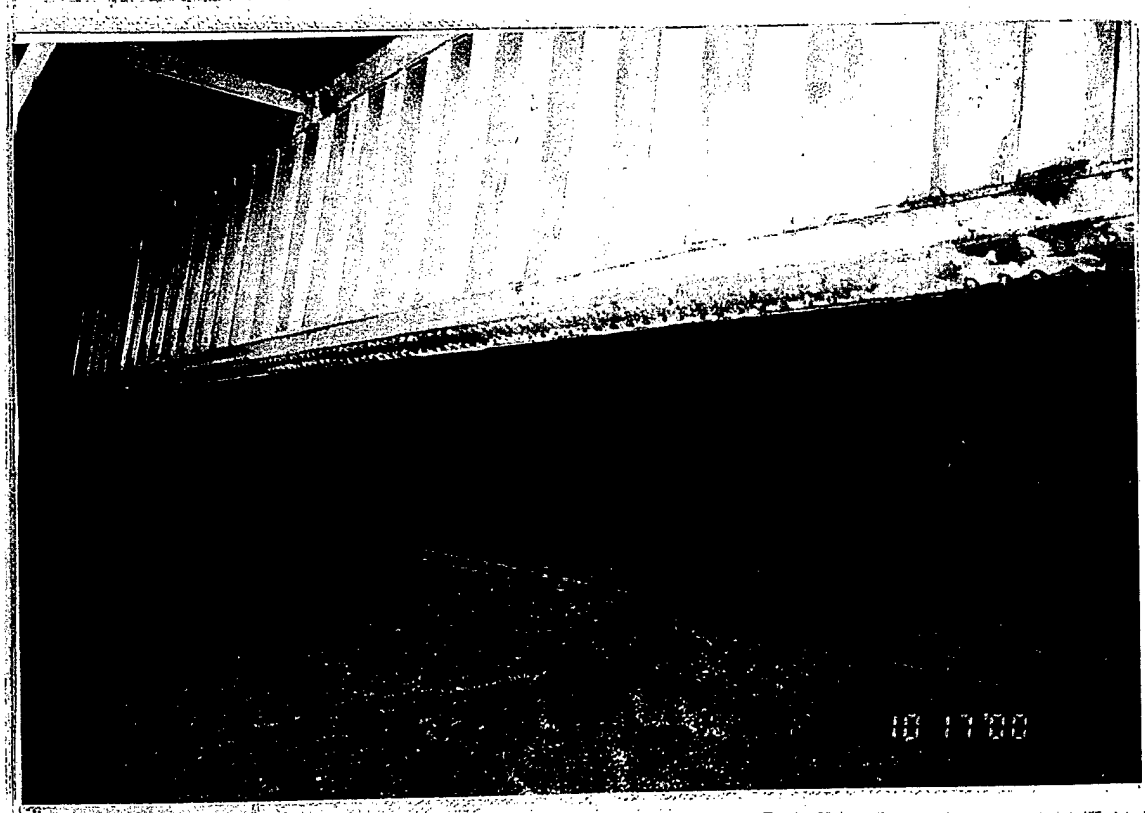
Little Goose Dam 10/17/00 7-13	**Gate 7** Bottom seal closure plate. Standing water between closure plate, purlin webs and skinplate, typical.



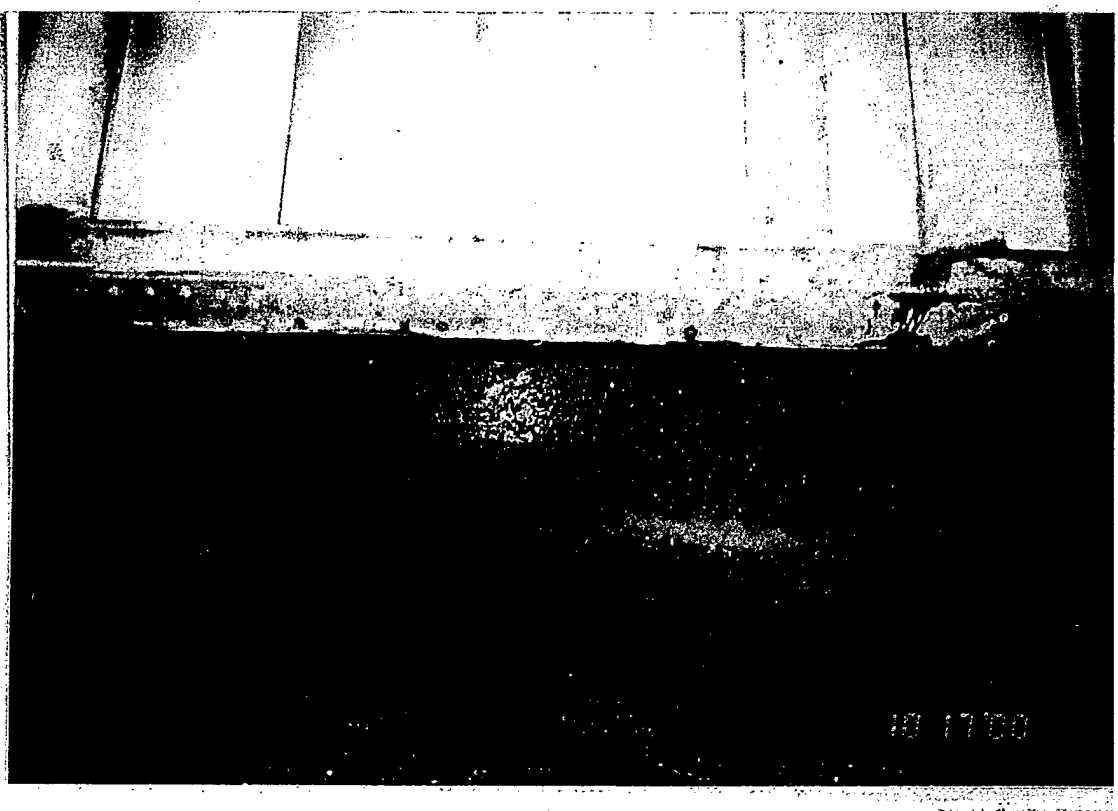
Little Goose Dam 10/17/00 7-14	**Gate 7** Bottom seal closure plate. Standing water between closure plate, purlin webs and skinplate, typical.



Little Goose Dam 10/17/00 7-15	**Gate 7** Stop log leakage precluding inspection of hoist connections from bottom.

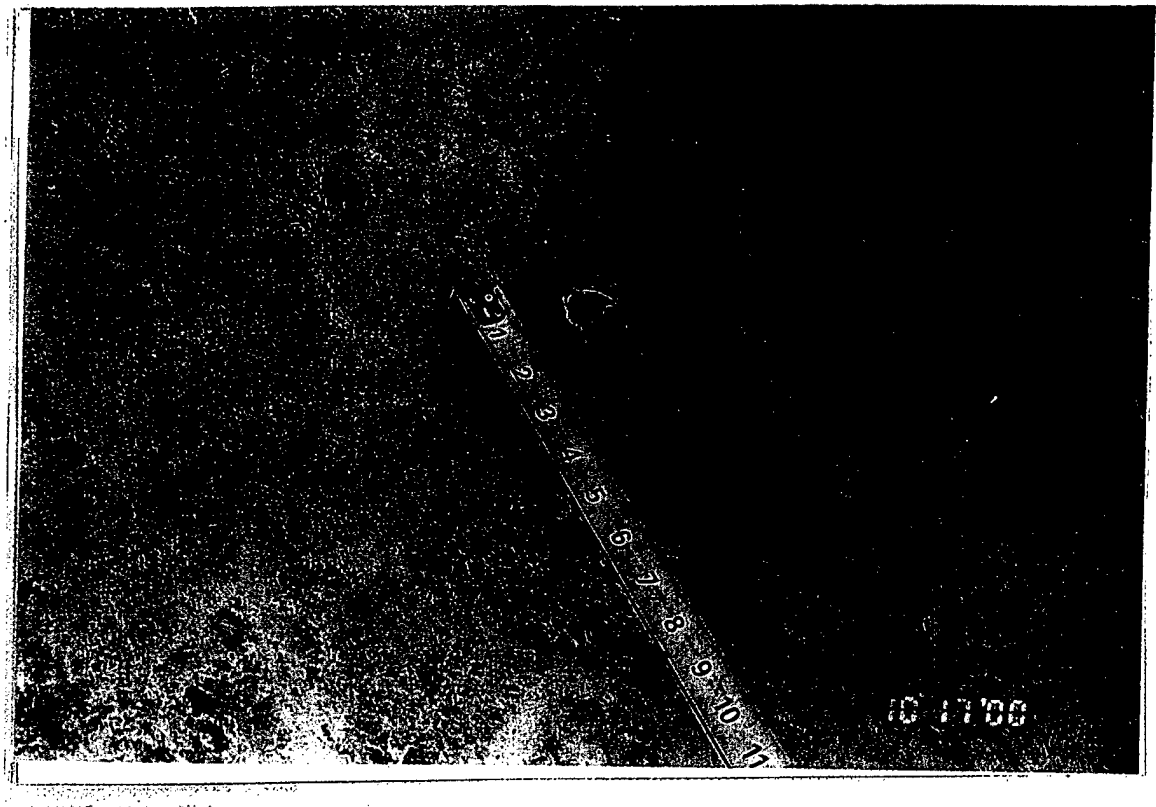


Little Goose Dam 10/17/00 7-16	**Gate 7** Bottom of gate and bottom seal keeper plate, typical. Stop log leakage precluding inspection of hoist connections from bottom.



Little Goose Dam 10/17/00 7-17	**Gate 7** Bottom seal keeper plate, typical. Stop log leakage precluding inspection of hoist connections from bottom.

Little Goose Dam 10/17/00 7-18	**Gate 7** Skin plate condition, typical.

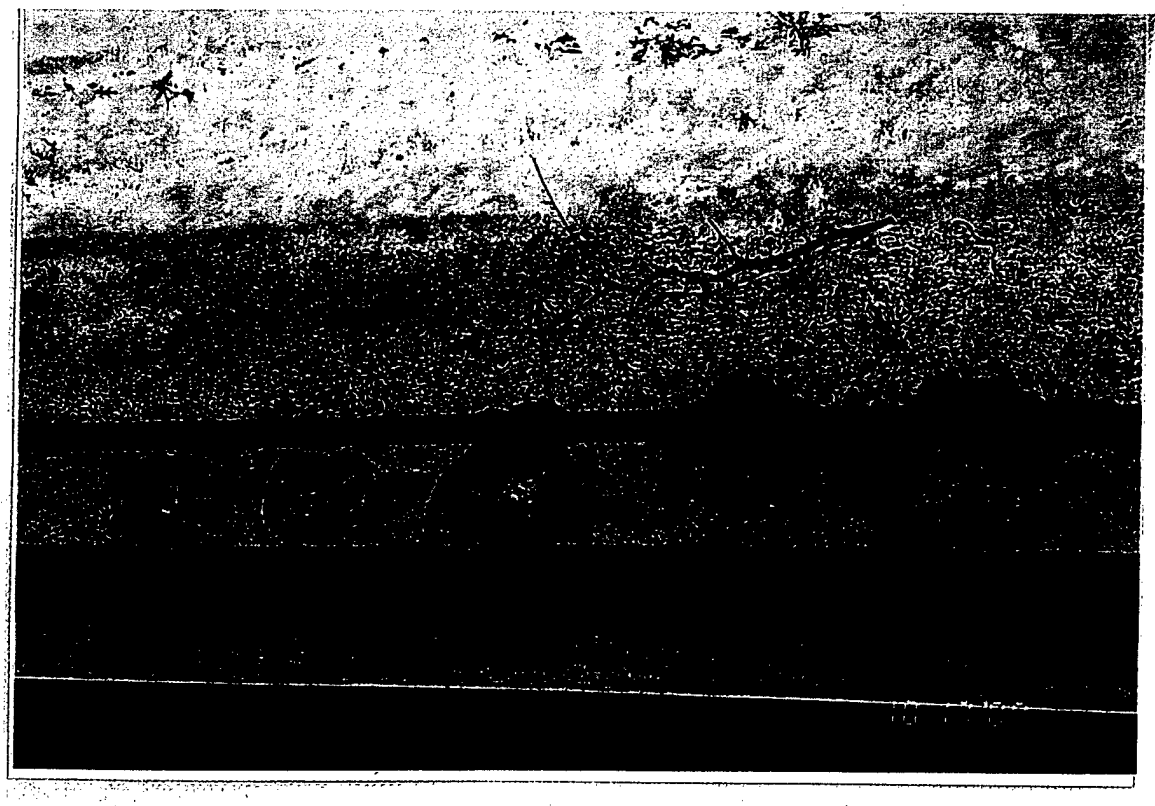


Little Goose Dam 10/17/00 7-19	**Gate 7** Skin plate pitting, typical.

Little Goose Dam 10/17/00 7-20	**Gate 7** Skin plate pitting, typical.

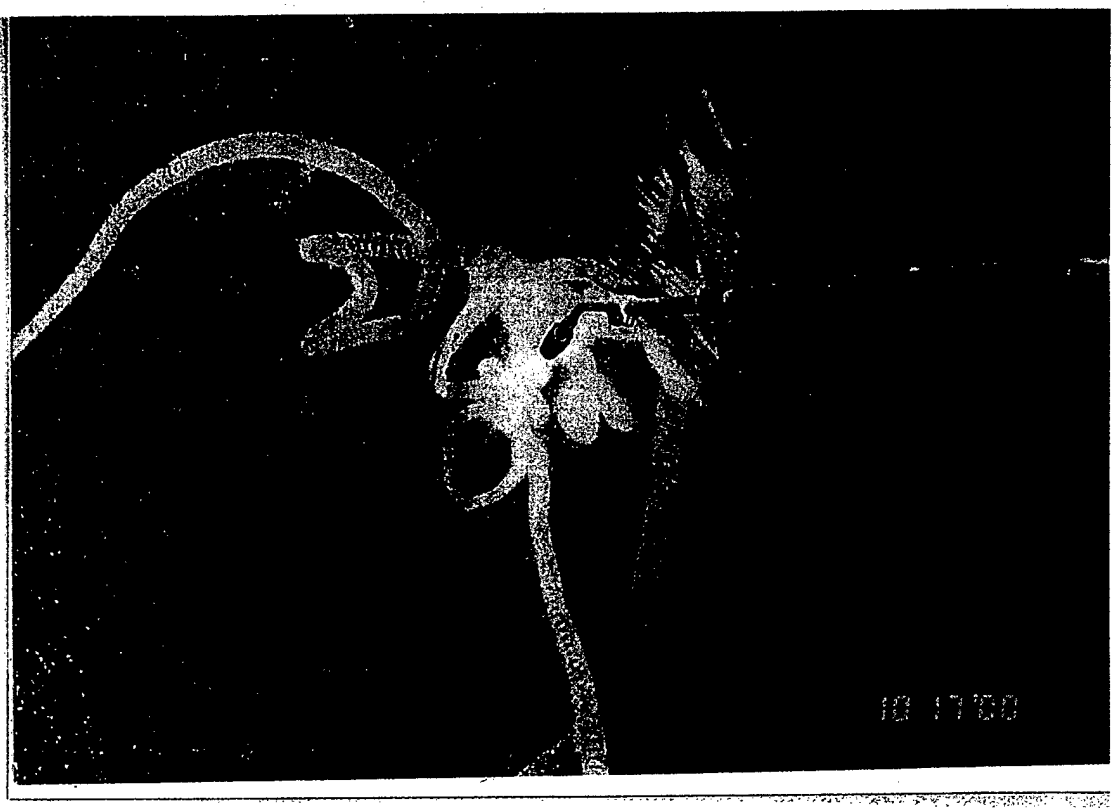
Little Goose Dam 10/17/00 7-21	**Gate 7** Skin plate pitting, typical.

Little Goose Dam 10/17/00 7-22	**Gate 7** Skin plate pitting, typical.



Little Goose Dam 10/17/00 7-23	**Gate 7** Upstream side of side seal, typical.

Little Goose Dam 10/17/00 7-24	**Gate 7** Wear plate condition, typical.

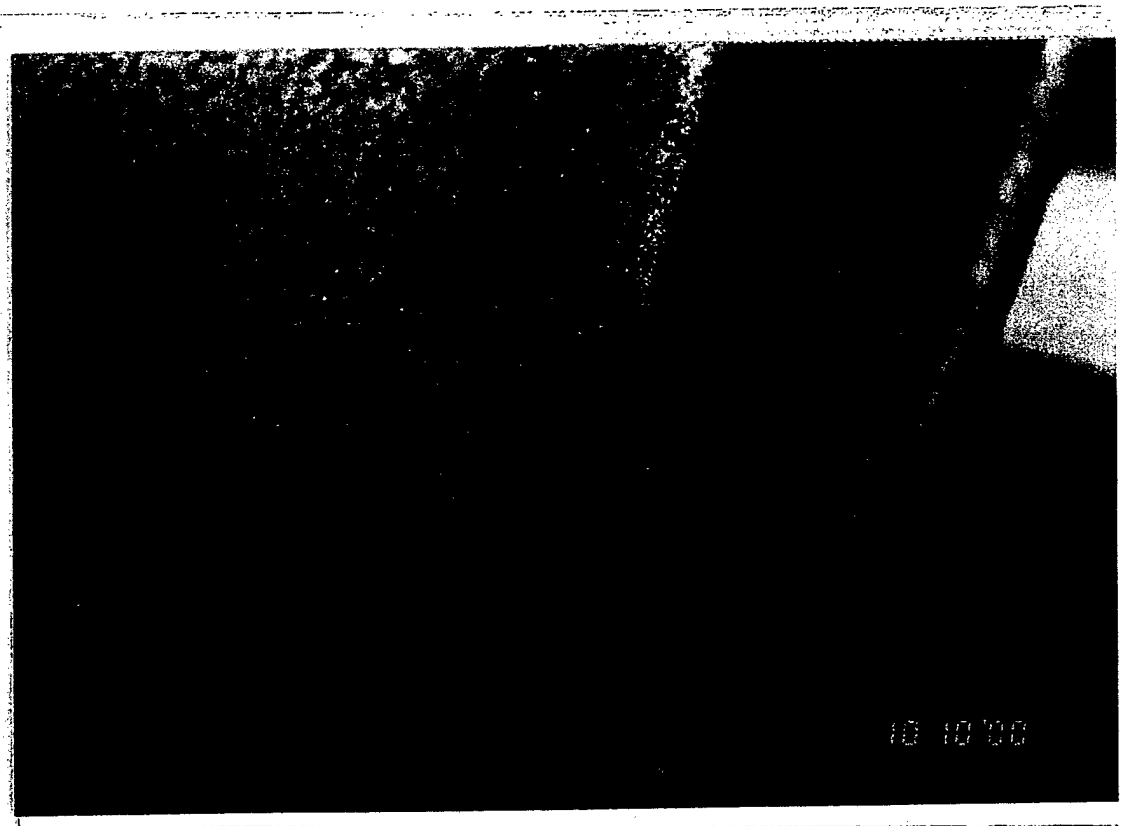


Little Goose Dam 10/17/00 7-25	**Gate 7** Waterblasting skin plate.

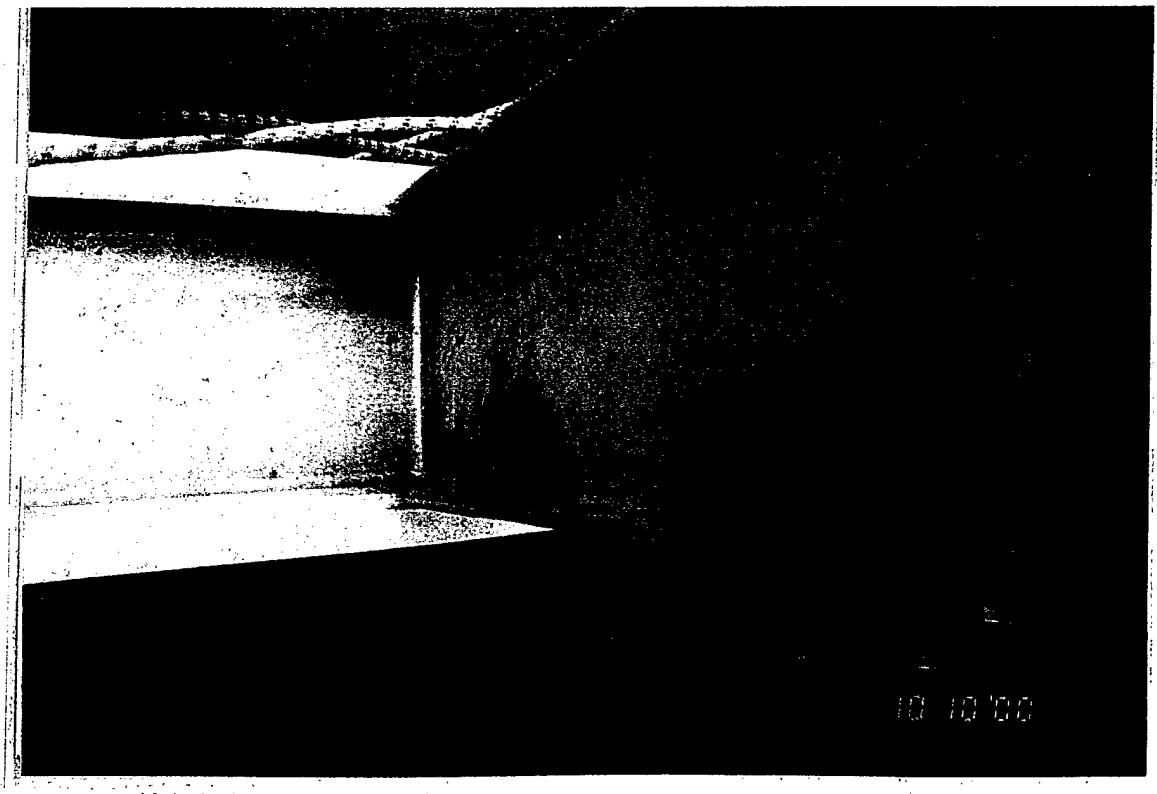
Little Goose Dam 10/17/00 7-26	**Gate 7** Hoist connection, from above.

Little Goose Dam 10/17/00 7-27	**Gate 7** Hoist connection from above. Light to moderate corrosion on lifting lugs and plates. Stainless steel U-bolts and socket blocks in good condition.

Little Goose Dam 10/10/00 8-1	**Gate 8** Left frame Brace C. Light corrosion on brace, typical.

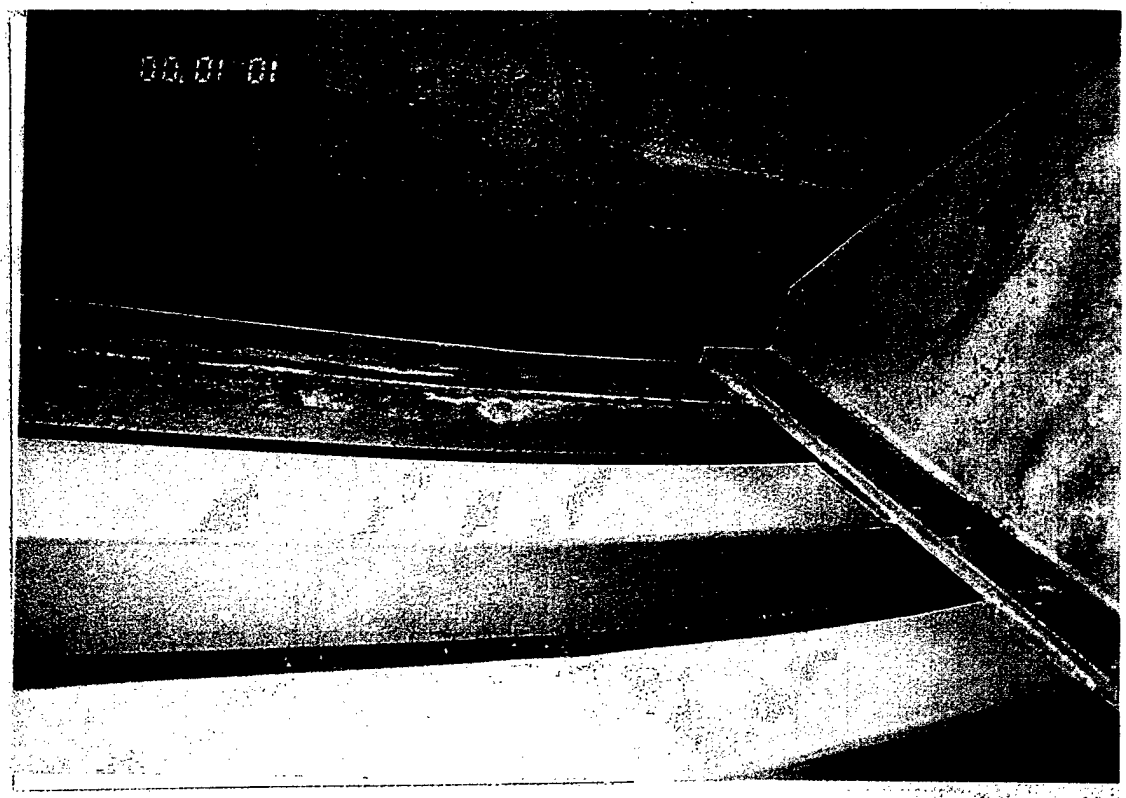


Little Goose Dam 10/10/00 8-2	**Gate 8** Close-up, left frame Brace D. Light corrosion on brace, typical.

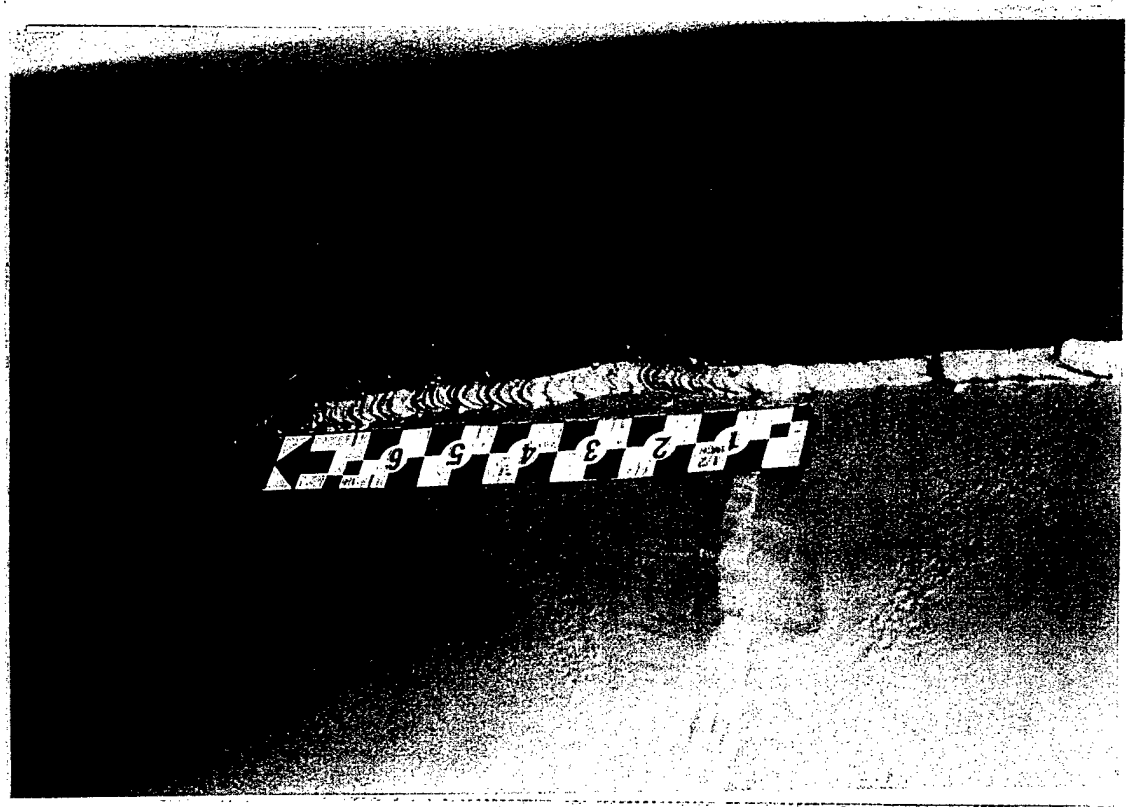


Little Goose Dam 10/10/00 8-3	**Gate 8** Left frame Brace G. Light corrosion on brace, typical.

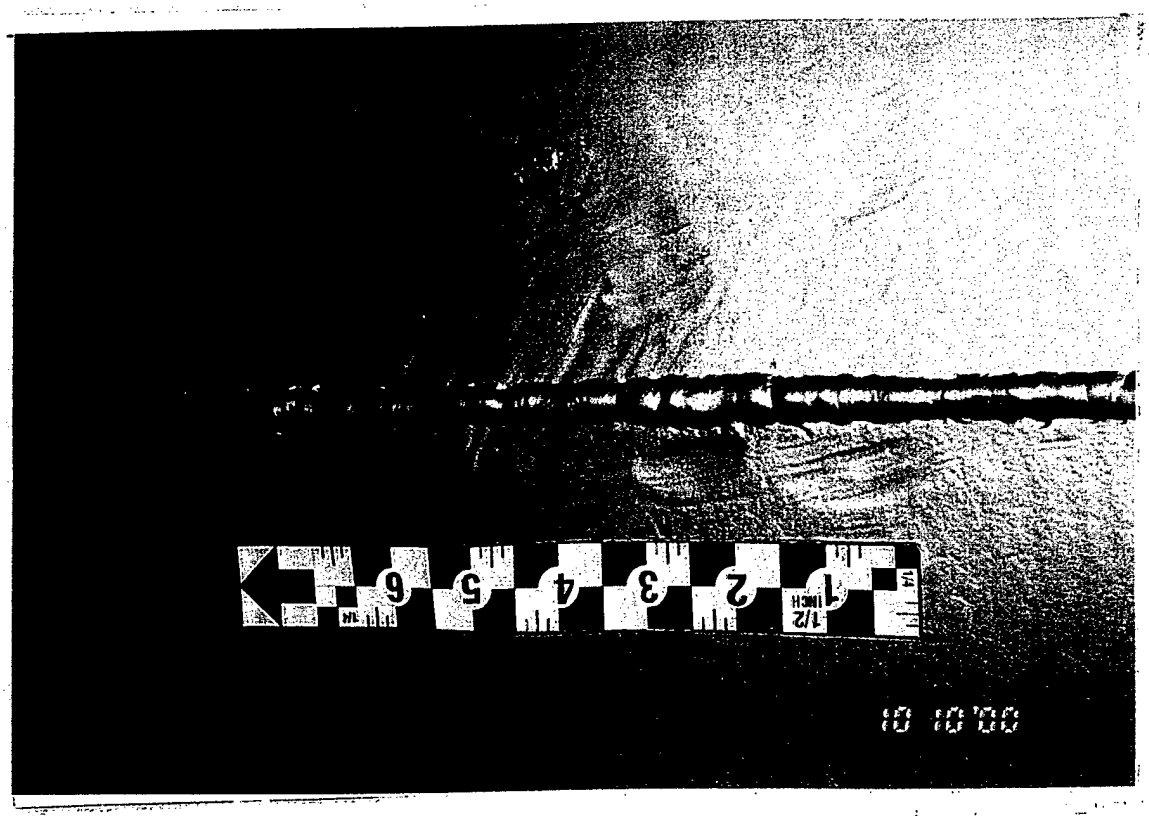
Little Goose Dam 10/10/00 8-4	**Gate 8** Outside of left frame, typical.



Little Goose Dam 10/10/00 8-5	**Gate 8** Left end, middle horizontal girder. Light corrosion on girder, purlins.

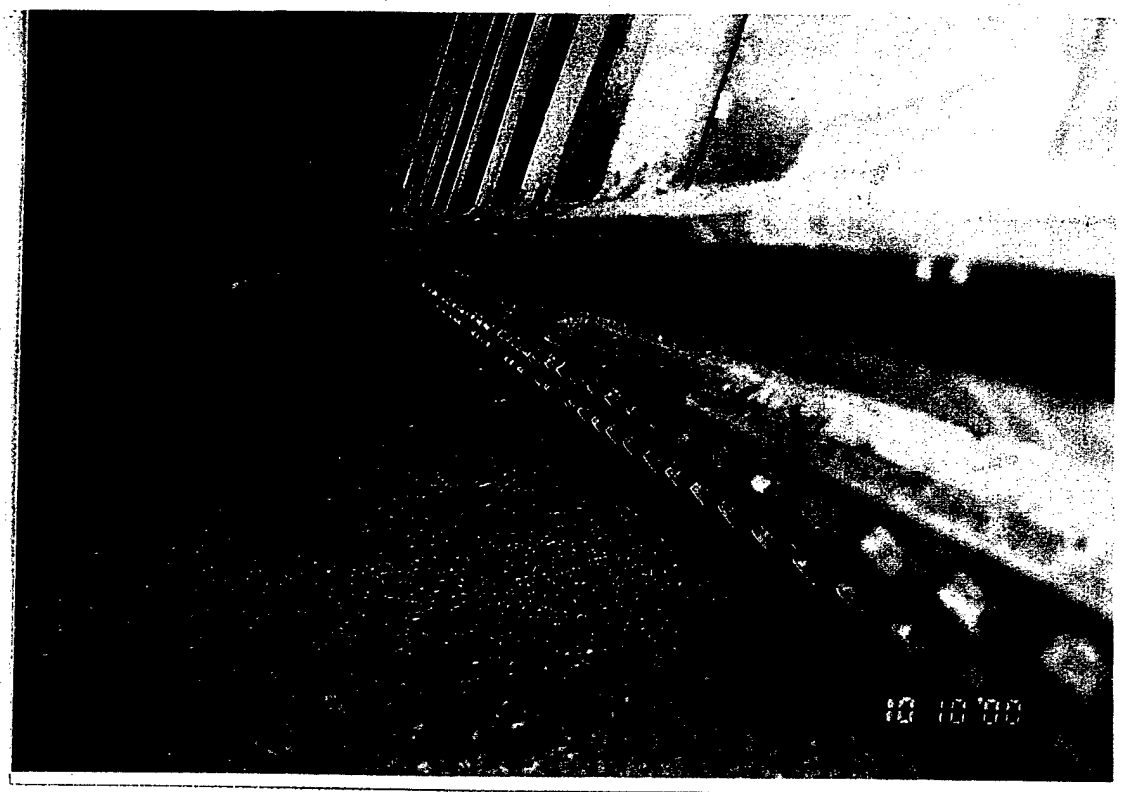


Little Goose Dam 10/10/00 8-6	**Gate 8** Downstream surface of skin plate, left side of gate above middle horizontal girder. Apparent grind marks from weld repair.



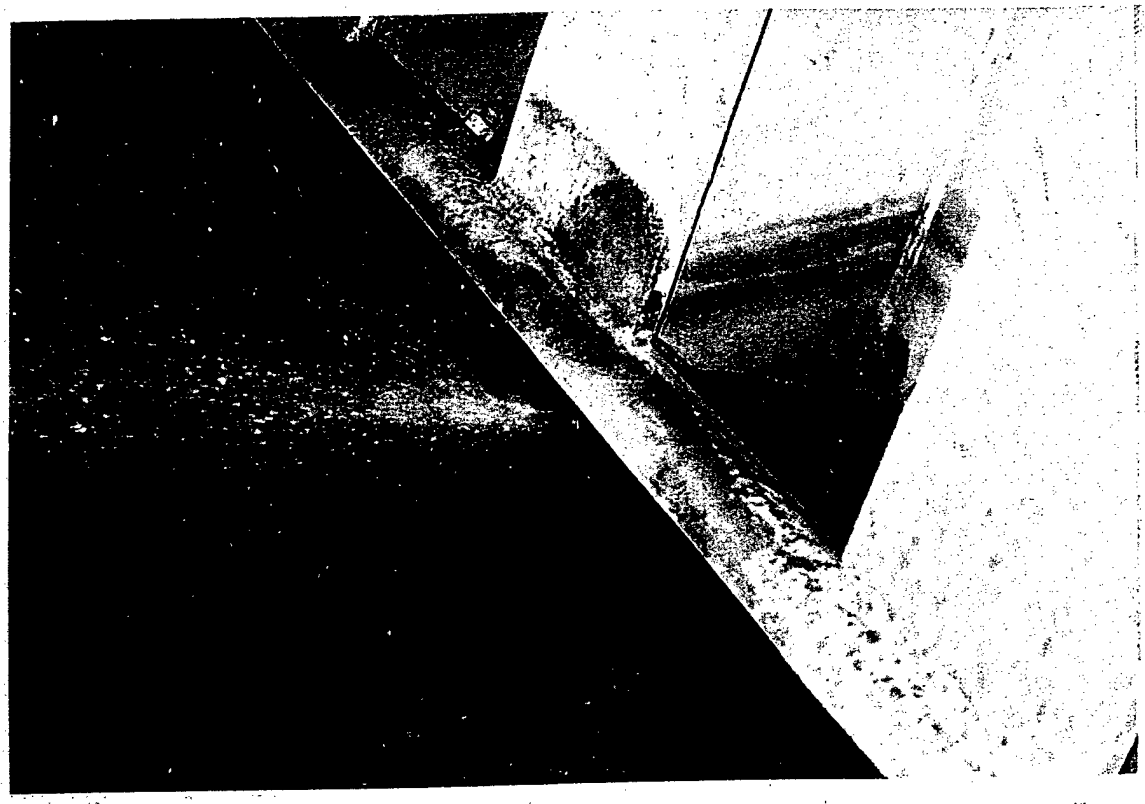
Little Goose Dam 10/10/00 8-7	**Gate 8** Downstream surface of skin plate, left side of gate above middle horizontal girder. Apparent grind marks from weld repair.

Little Goose Dam 10/10/00 8-8	**Gate 8** Bottom horizontal girder. Standing water, no drainage between multiple stiffeners, typical. Girder flange to skin plate stiffeners, standing water, no drainage.

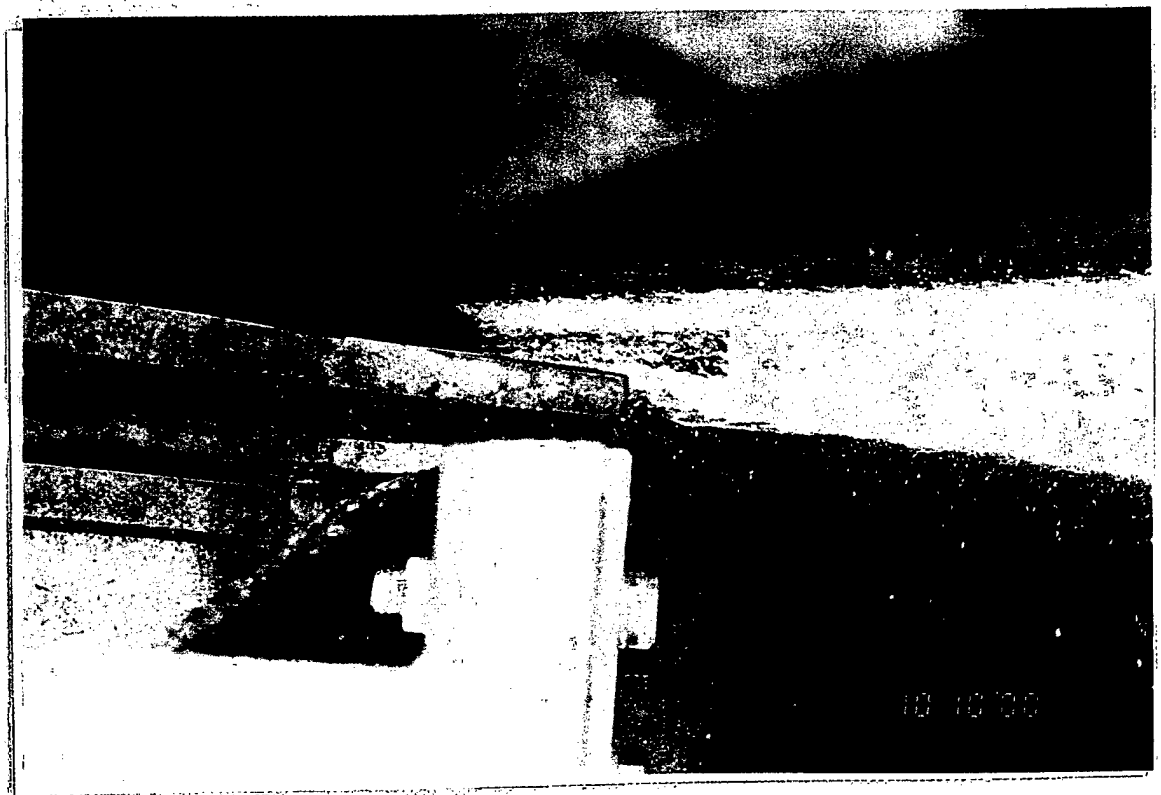


Little Goose Dam 10/10/00 8-9	**Gate 8** Bottom seal keeper plate, light corrosion, typical. Leak at center construction joint in spillway monolith.

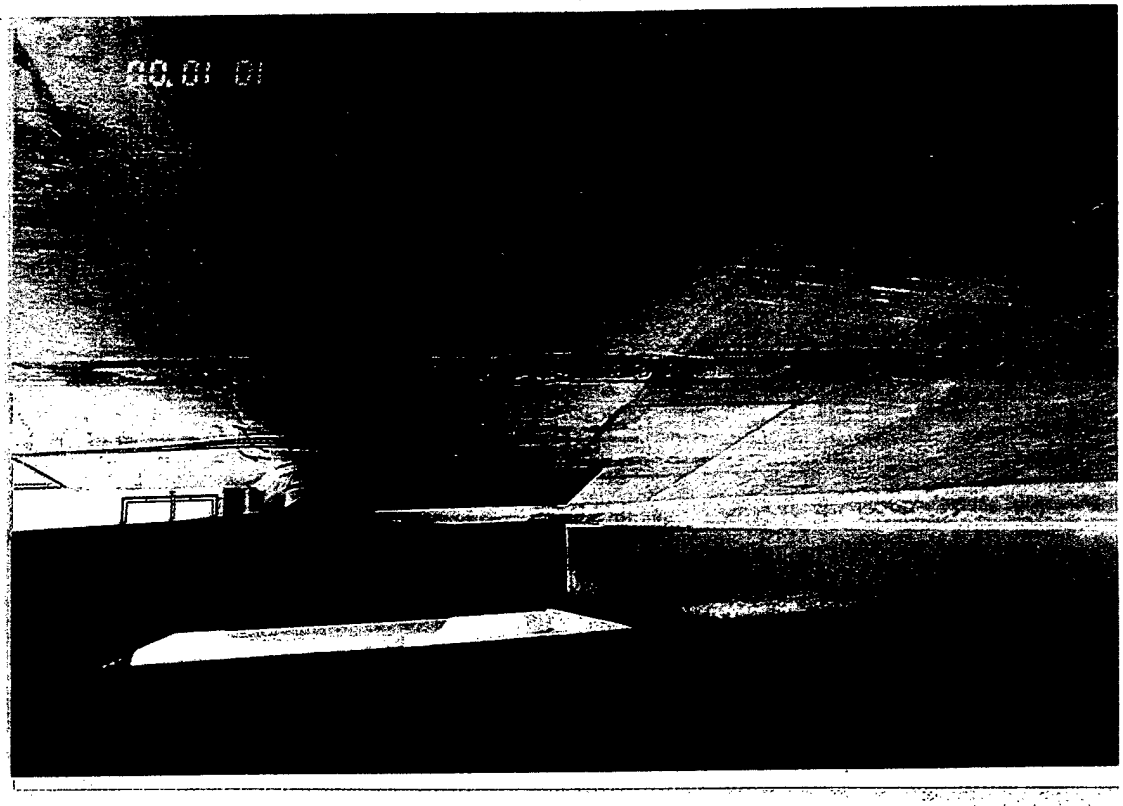
Little Goose Dam 10/10/00 8-10	**Gate 8** Bottom seal closure plate looking upstream. Standing water between closure plate, purlin webs and skinplate, typical.



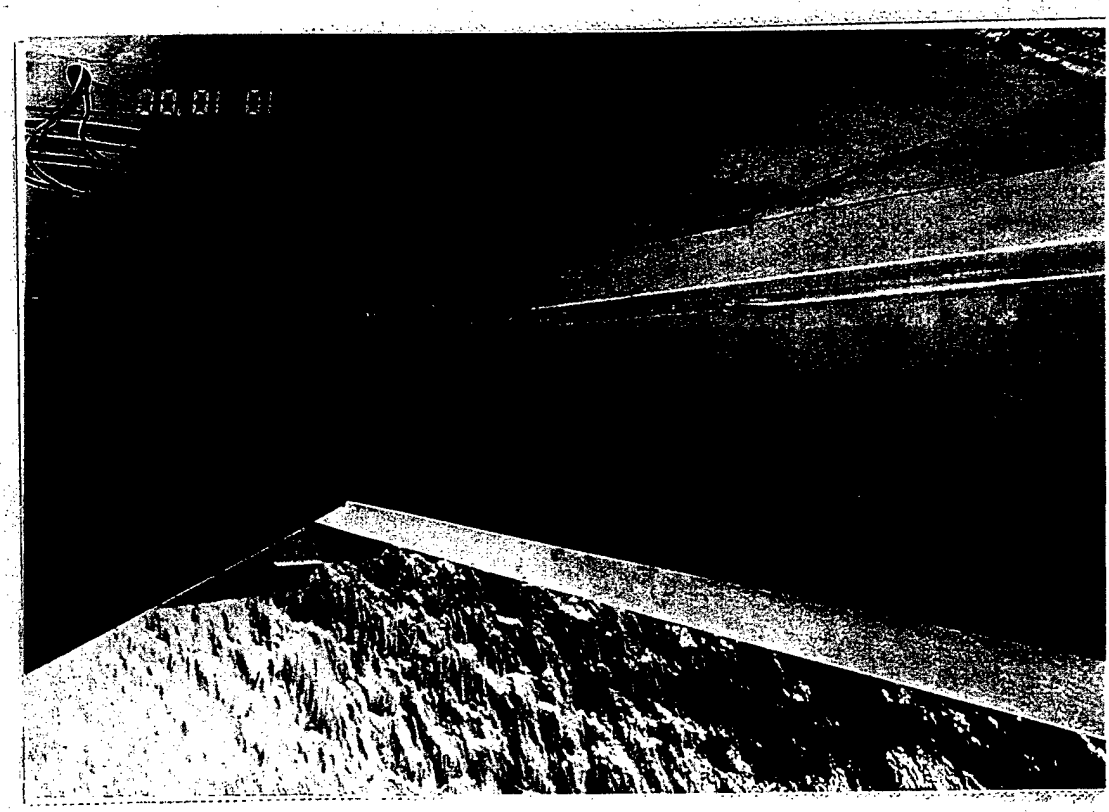
Little Goose Dam 10/10/00 8-11	**Gate 8** Bottom seal closure plate, standing water between closure plate, purlin webs and skinplate, typical. Leak at center construction joint in spillway monolith.



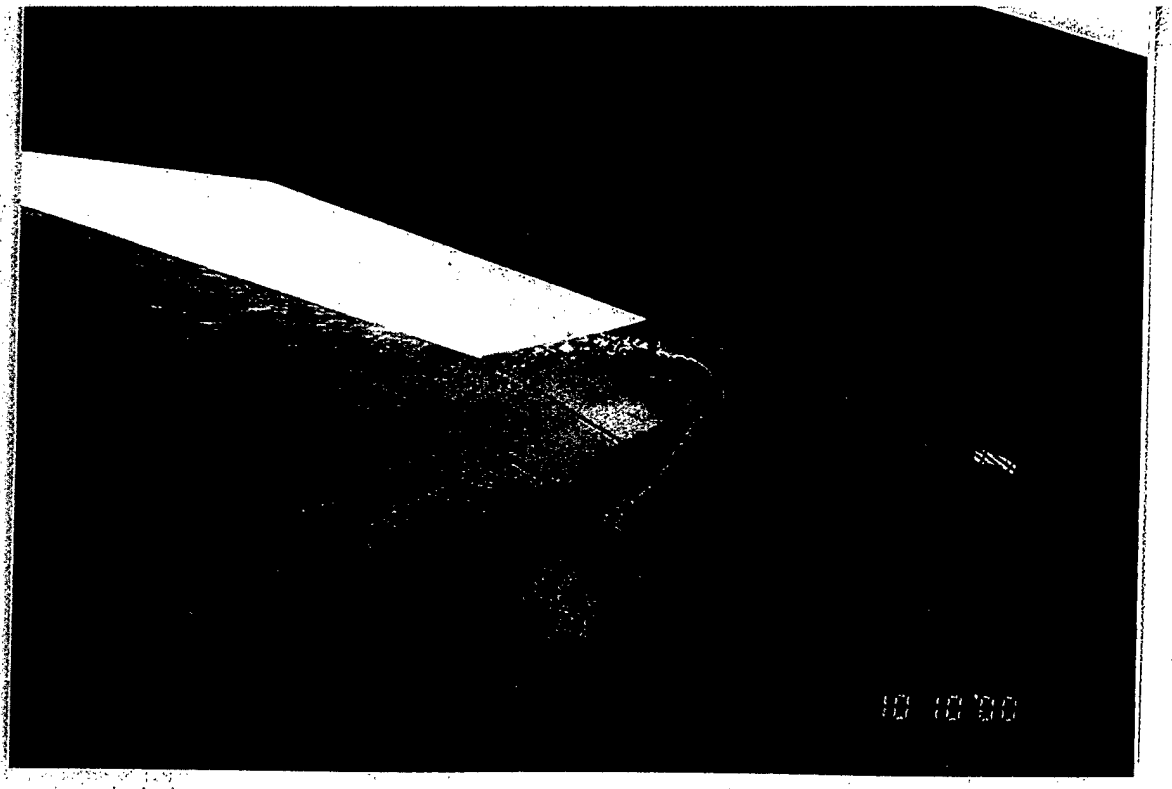
Little Goose Dam 10/10/00 8-12	**Gate 8** Side seal leak, bottom left side of gate.



Little Goose Dam 10/10/00 8-13	**Gate 8** Outside of right frame, typical.

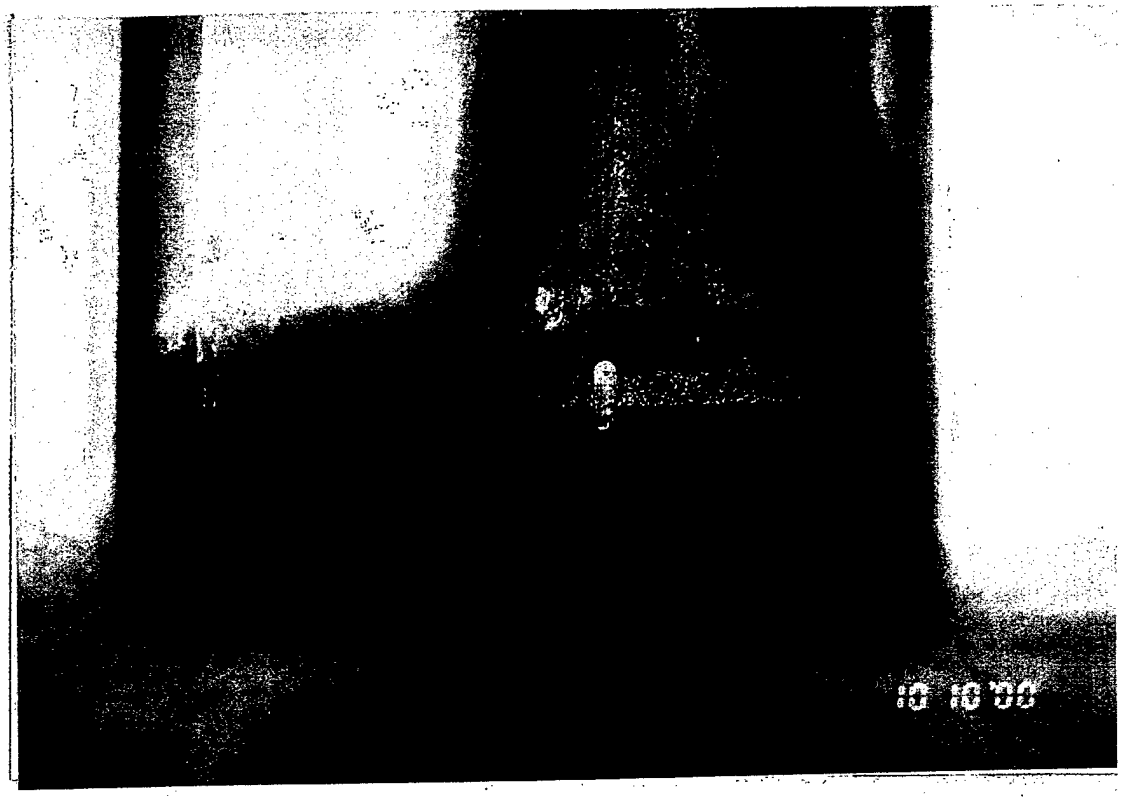


Little Goose Dam 10/10/00 8-14	**Gate 8** Right frame, middle radial strut, standing water between girder flanges due to drain above (see photo 8-15).



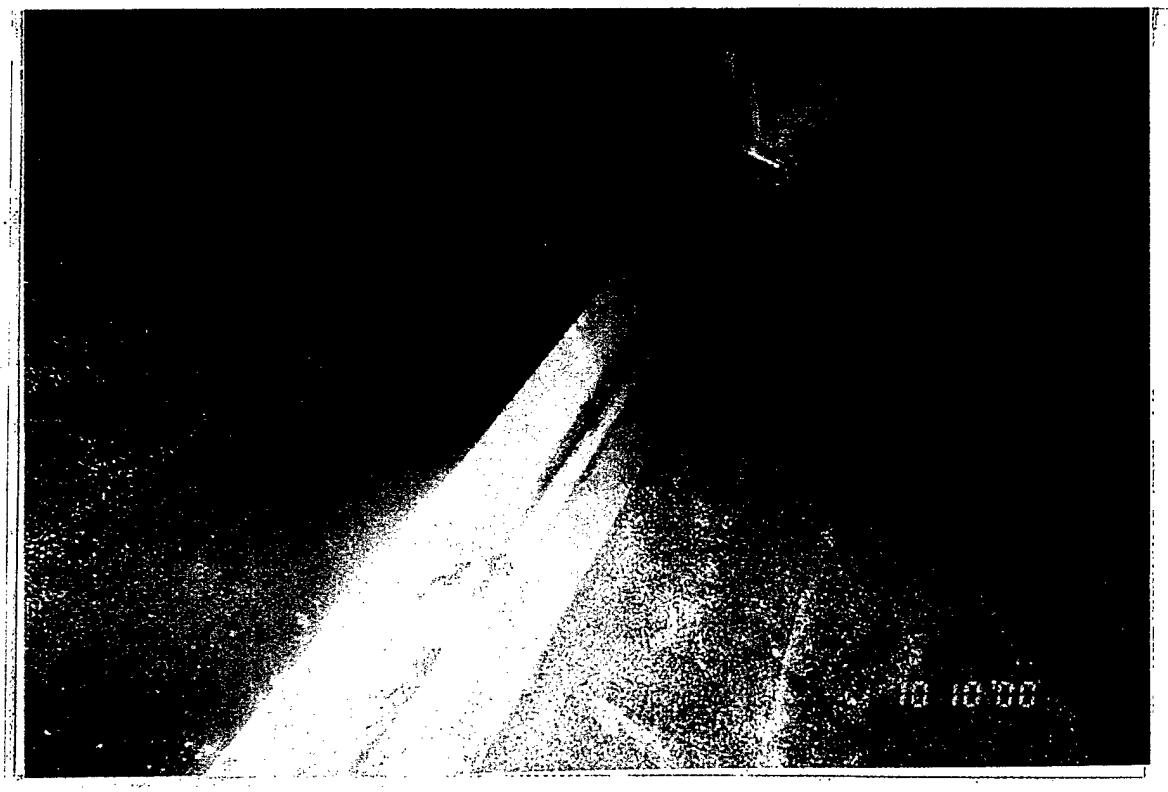
Little Goose Dam 10/10/00 8-15	**Gate 8** Drain in right pier wall, draining on gate members.

Little Goose Dam 10/10/00 8-16	**Gate 8** Typical upstream skin plate condition, heavy concentration of pitting.



Little Goose Dam 10/10/00 8-17	**Gate 8** Bottom seal closure plate looking upstream. Standing water between closure plate, purlin webs and skinplate, typical.

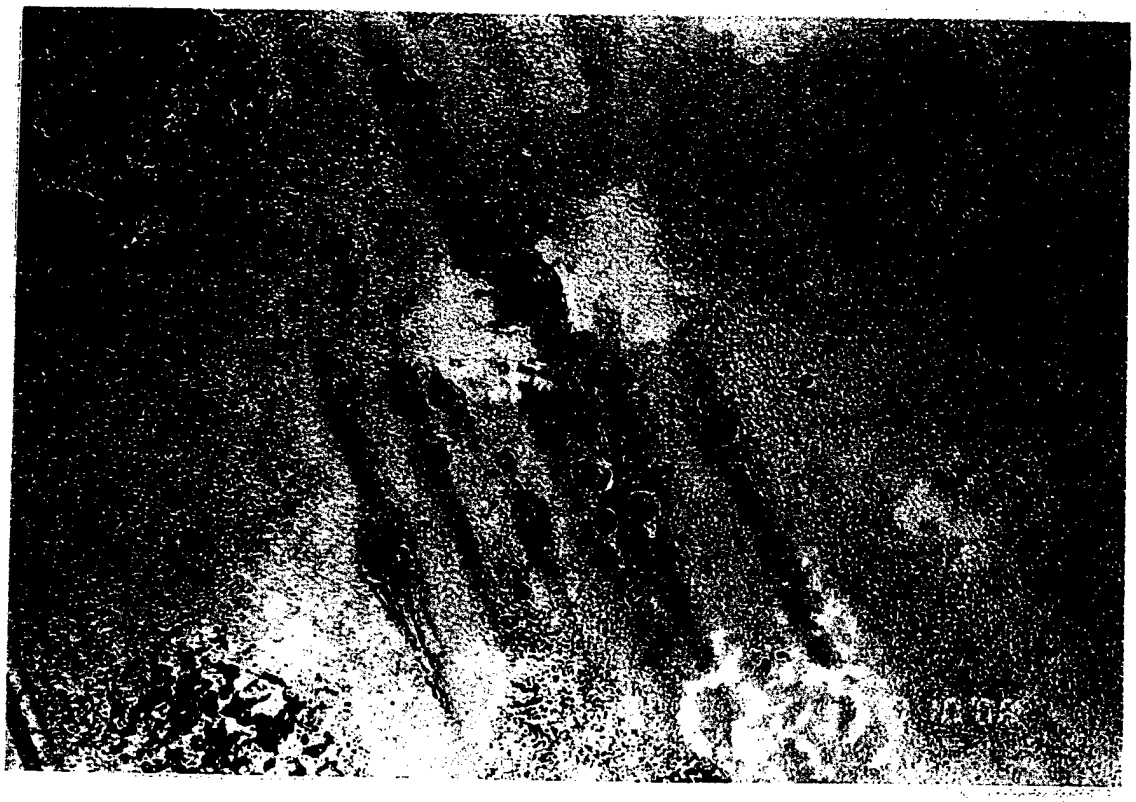
Little Goose Dam 10/10/00 8-18	**Gate 8** Bottom seal keeper plate, typical.



Little Goose Dam 10/10/00 8-19	**Gate 8** Embedded bottom seal plate. Note: heavy flow due to stop log leakage.

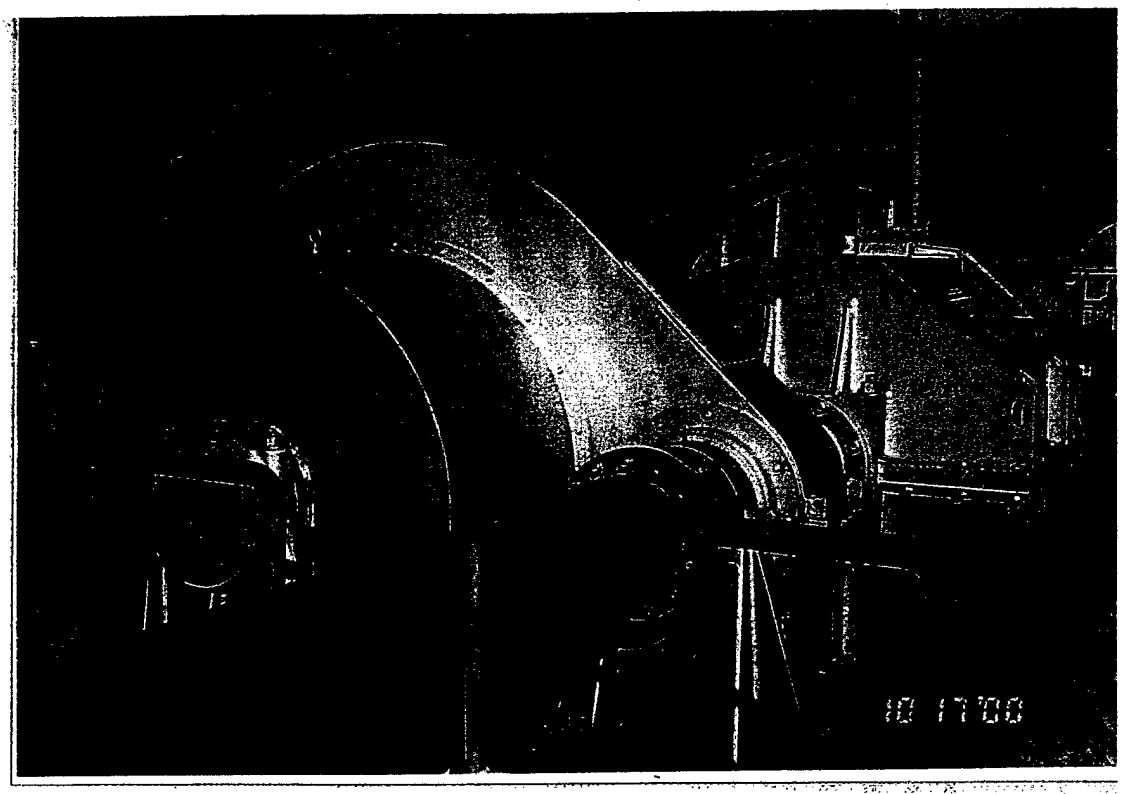
Little Goose Dam 10/10/00 8-20	**Gate 8** Bottom left corner of gate. Bottom seal closure plate looking upstream. Standing water between closure plate, purlin webs and skinplate, typical.

Little Goose Dam 10/10/00 8-21	**Gate 8** Skin plate pitting, typical.



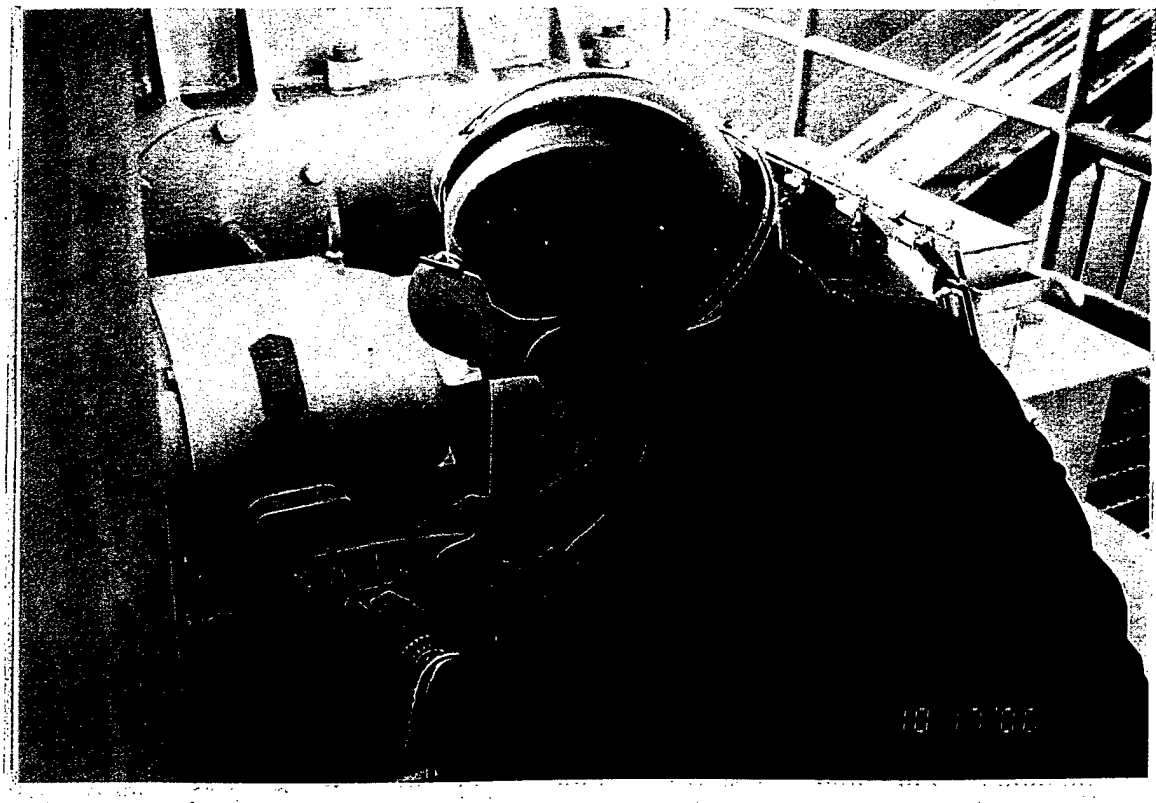
Little Goose Dam 10/10/00 8-22	**Gate 8** Skin plate, typical.

Little Goose Dam 10/10/00 8-23	**Gate 8** Cable wear plate, typical condition. Light to moderate corrosion, minimal cable wear.

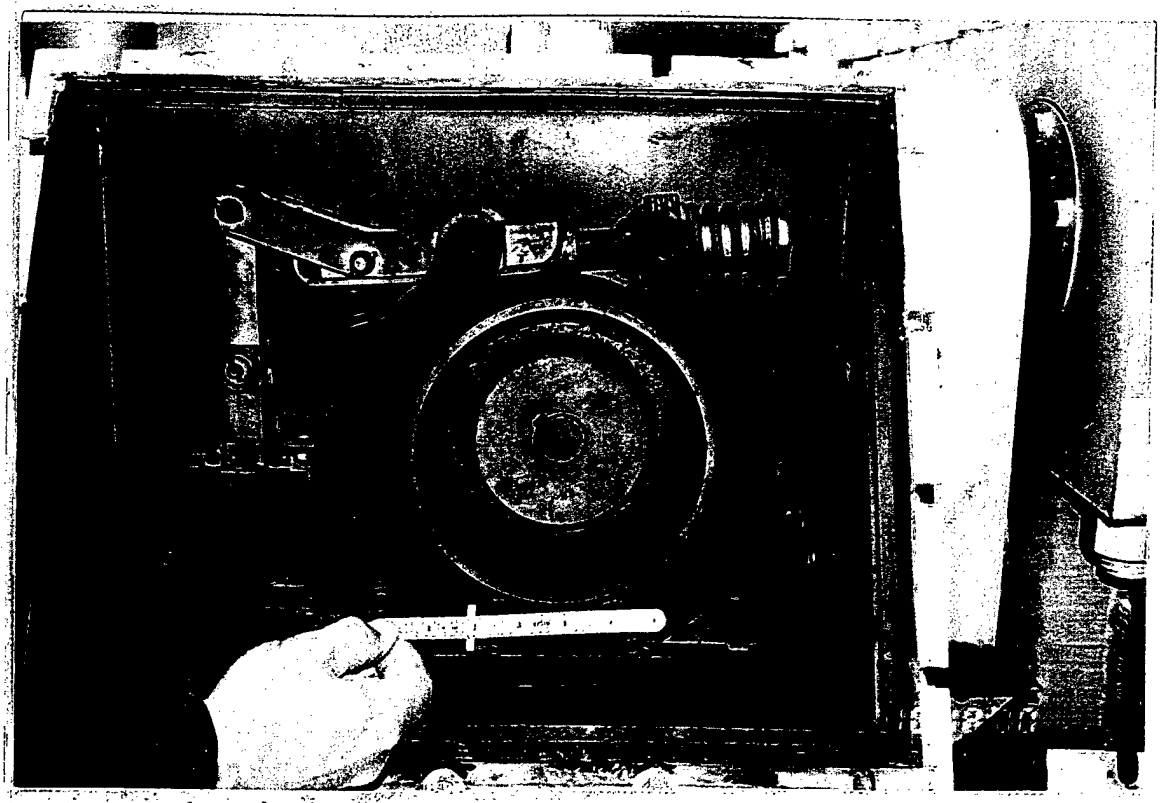


Little Goose Dam	**Hoist and Mechanical** Hoist, typical.
M-1	

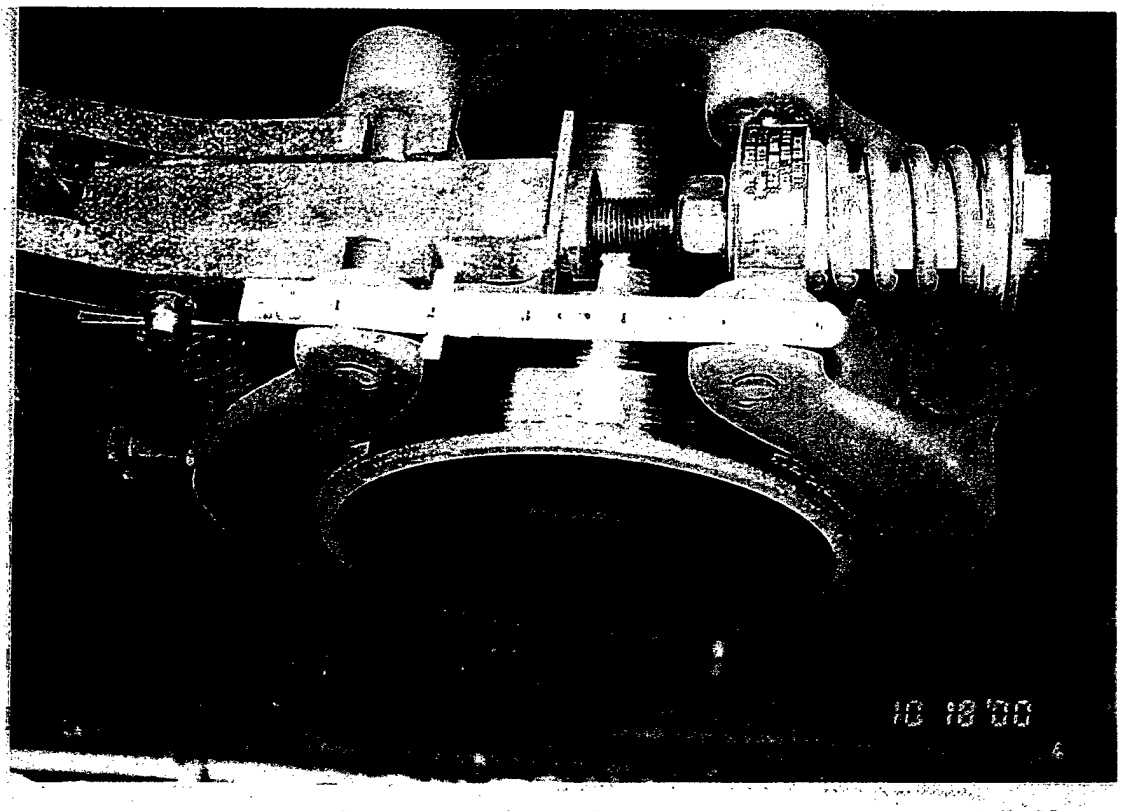
Little Goose Dam	**Hoist and Mechanical** Amperage readings during operational testing, typical.
M-2	



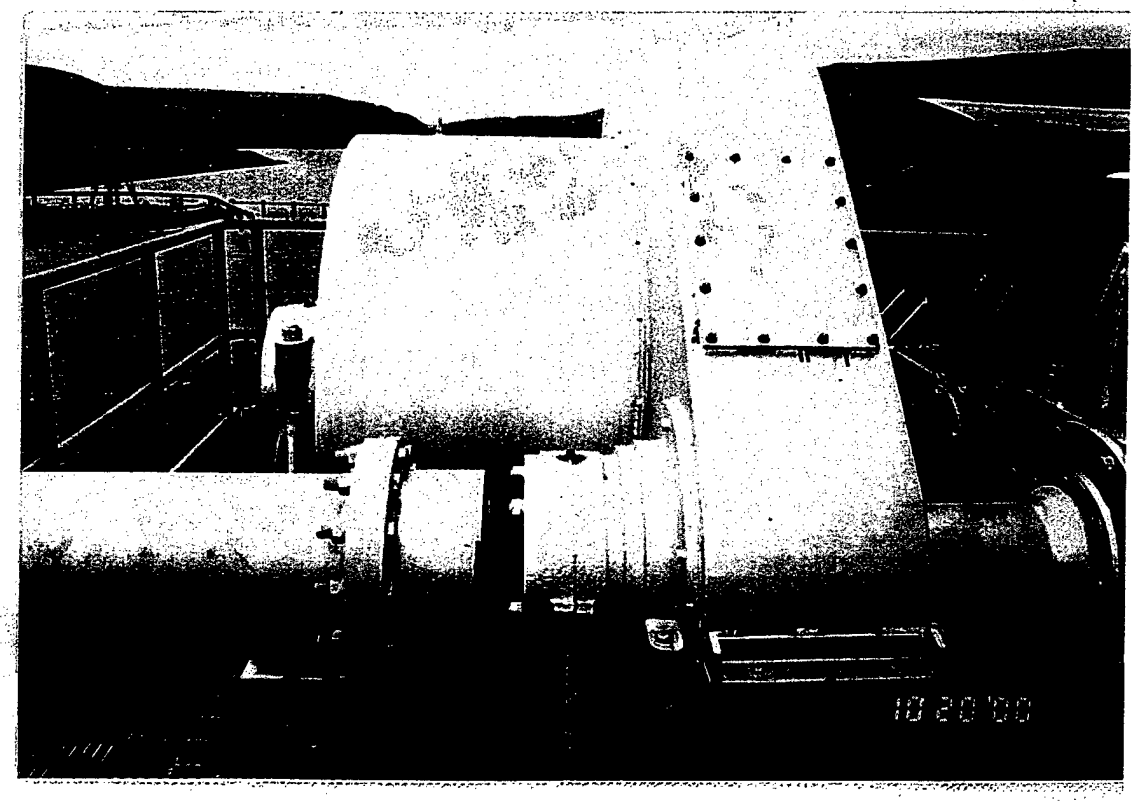
Little Goose Dam	**Hoist and Mechanical** Amperage readings during operational testing, typical.
M-3	



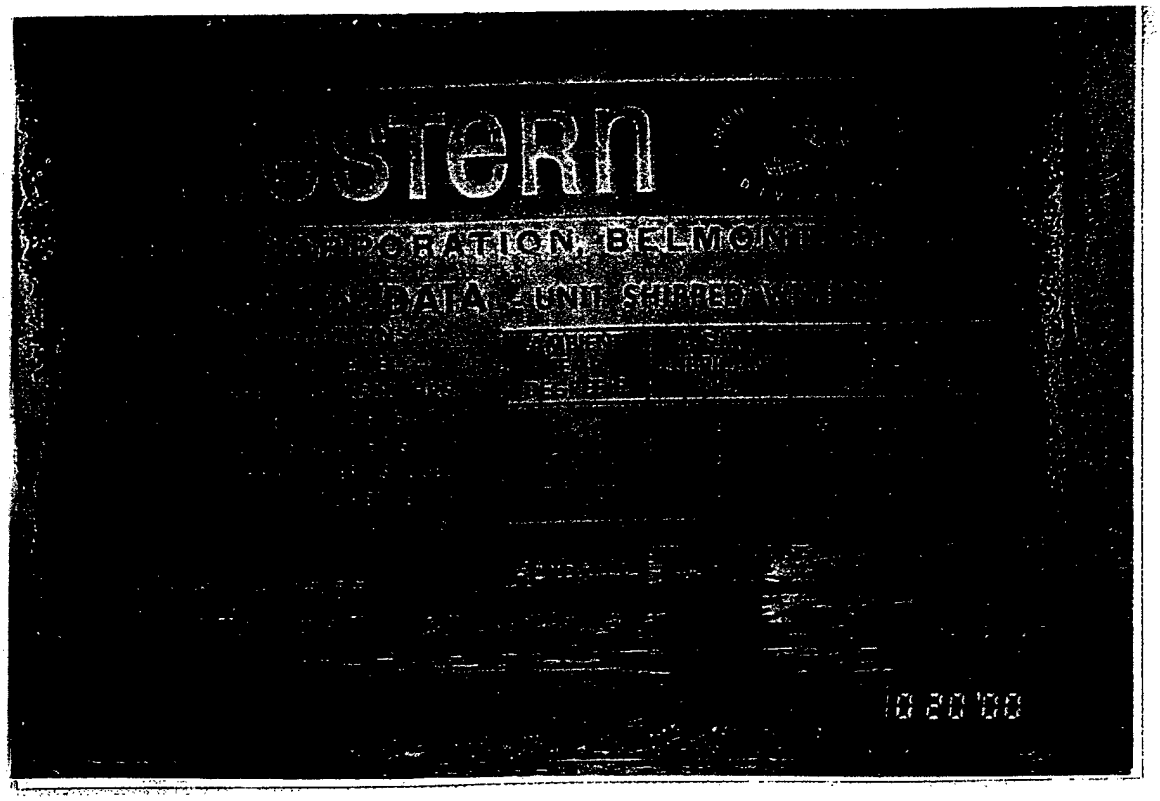
Little Goose Dam	**Hoist and Mechanical** Seized motor brake on Gate 6 during operational testing.
M-4	



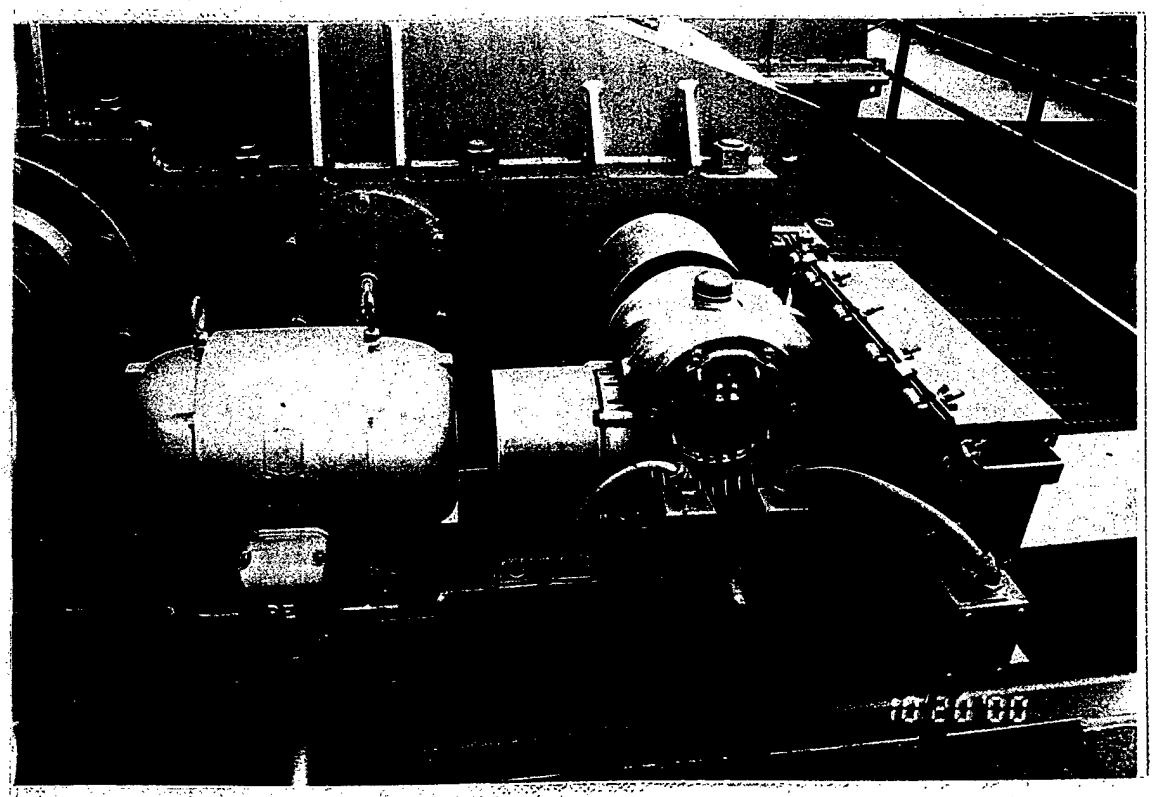
Little Goose Dam	**Hoist and Mechanical** Seized motor brake on Gate 6 during operational testing.
M-5	



Little Goose Dam	**Hoist and Mechanical** Hoist, typical.
M-6	

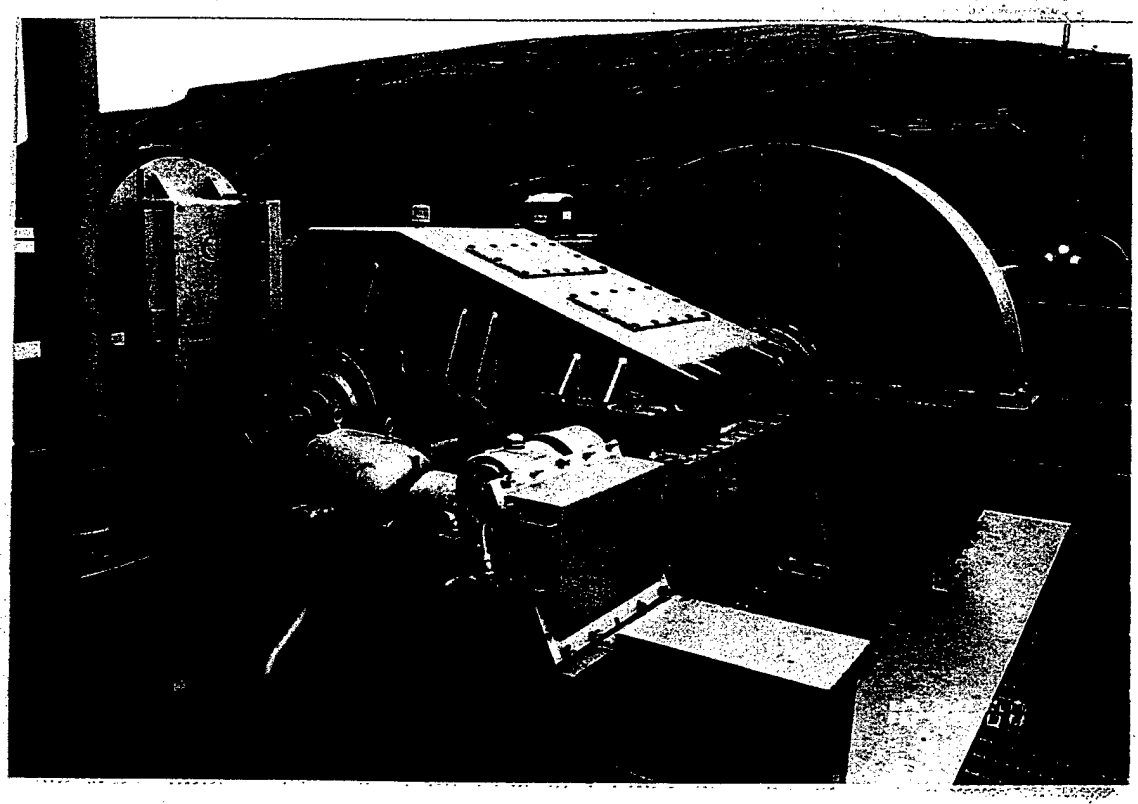


Little Goose Dam	**Hoist and Mechanical** Hoist, name plate, typical.
M-7	

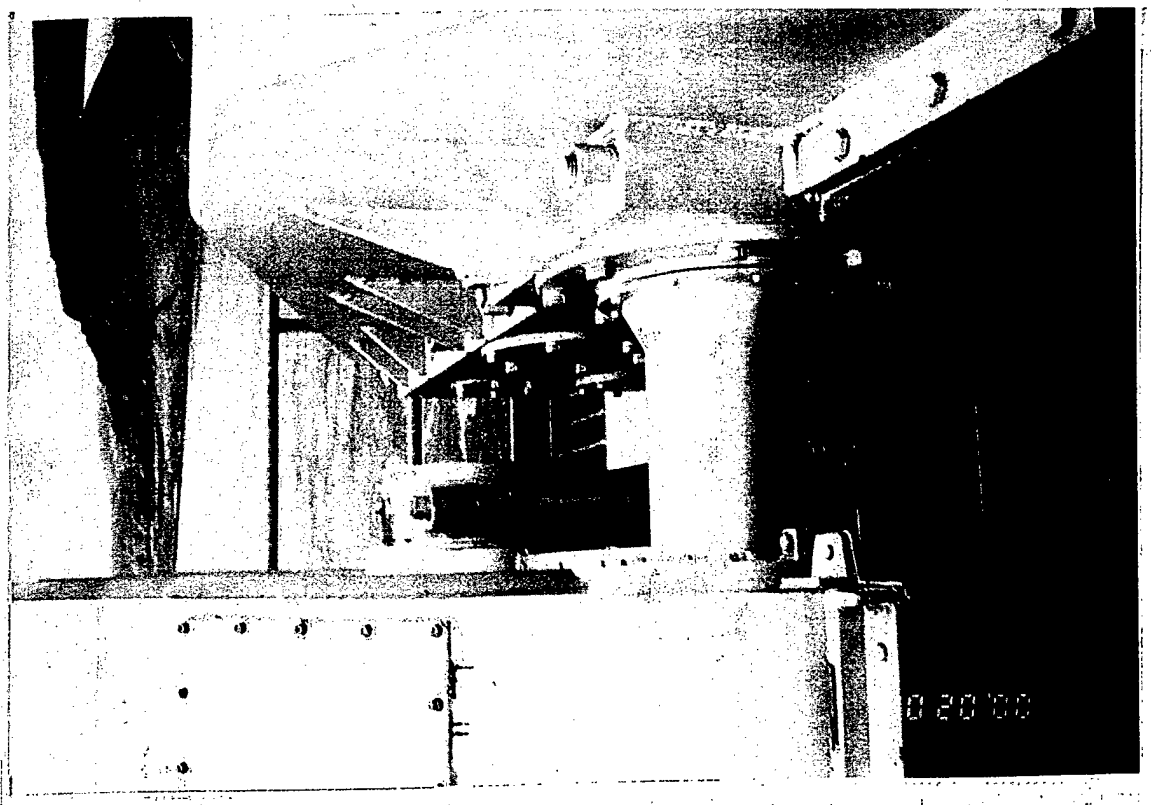


Little Goose Dam	**Hoist and Mechanical** Hoist, typical.
M-8	

Little Goose Dam M-9	**Hoist and Mechanical** Hoist, name plate, typical.



Little Goose Dam M-10	**Hoist and Mechanical** Hoist, typical.



Little Goose Dam	**Hoist and Mechanical** Hoist, typical.
M-11	

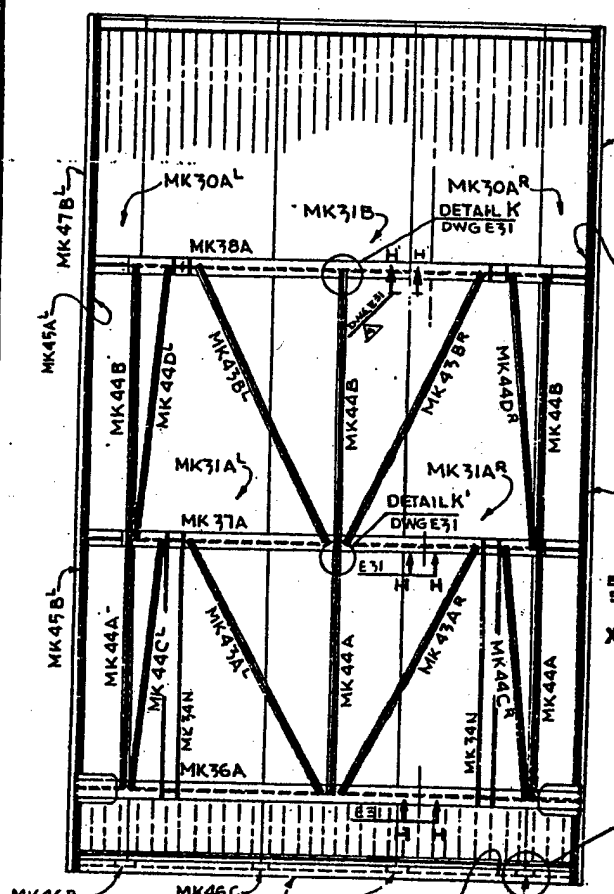
REVISIONS

1 REVISED TO SUIT APPL 10-3-66 CAHILL DW

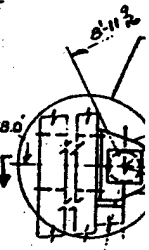
2 ADDED WORK POINT DIM.'S FOR STRUT BRACING TO ELEVATION VIEW. 4-19-67. H Bos. CAHILL

3 ADDED SECT X-X & GENERAL DIMENSIONS AT ELEV 5-18-67 JEB CAHILL

4 ADDED SECT MARK "O" SUIT E31 7/27/67 CAHILL H Bos.

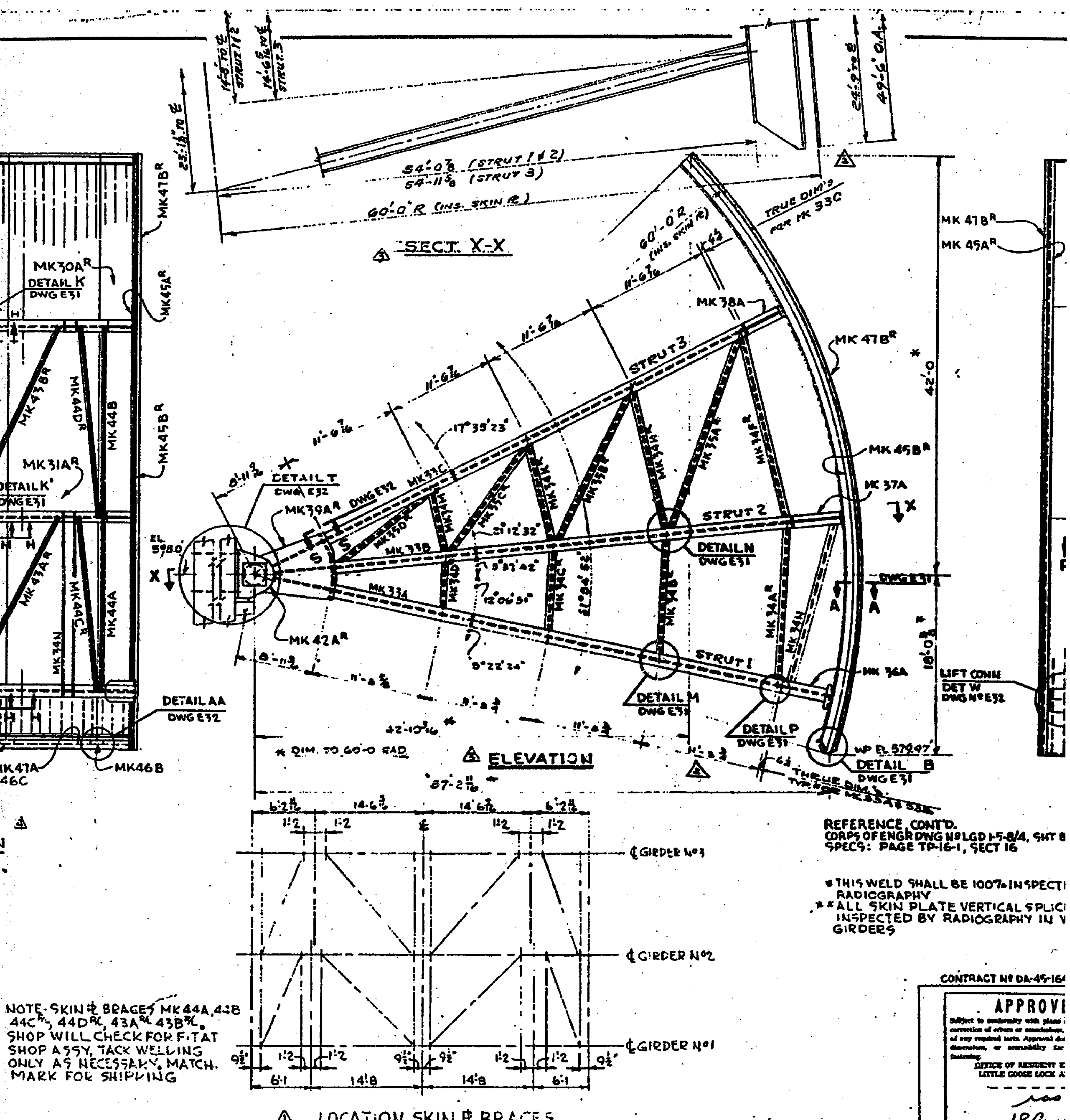


D/S ELEVATION



NOTE: SKIN & BRACES MK44A, 44B 44C R, 44D R, 43A R 43B R. SHOP WILL CHECK FOR F.I.T AT SHOP ASSY, TACK WELDING ONLY AS NECESSARY. MATCH MARK FOR SHIPPING

(1)



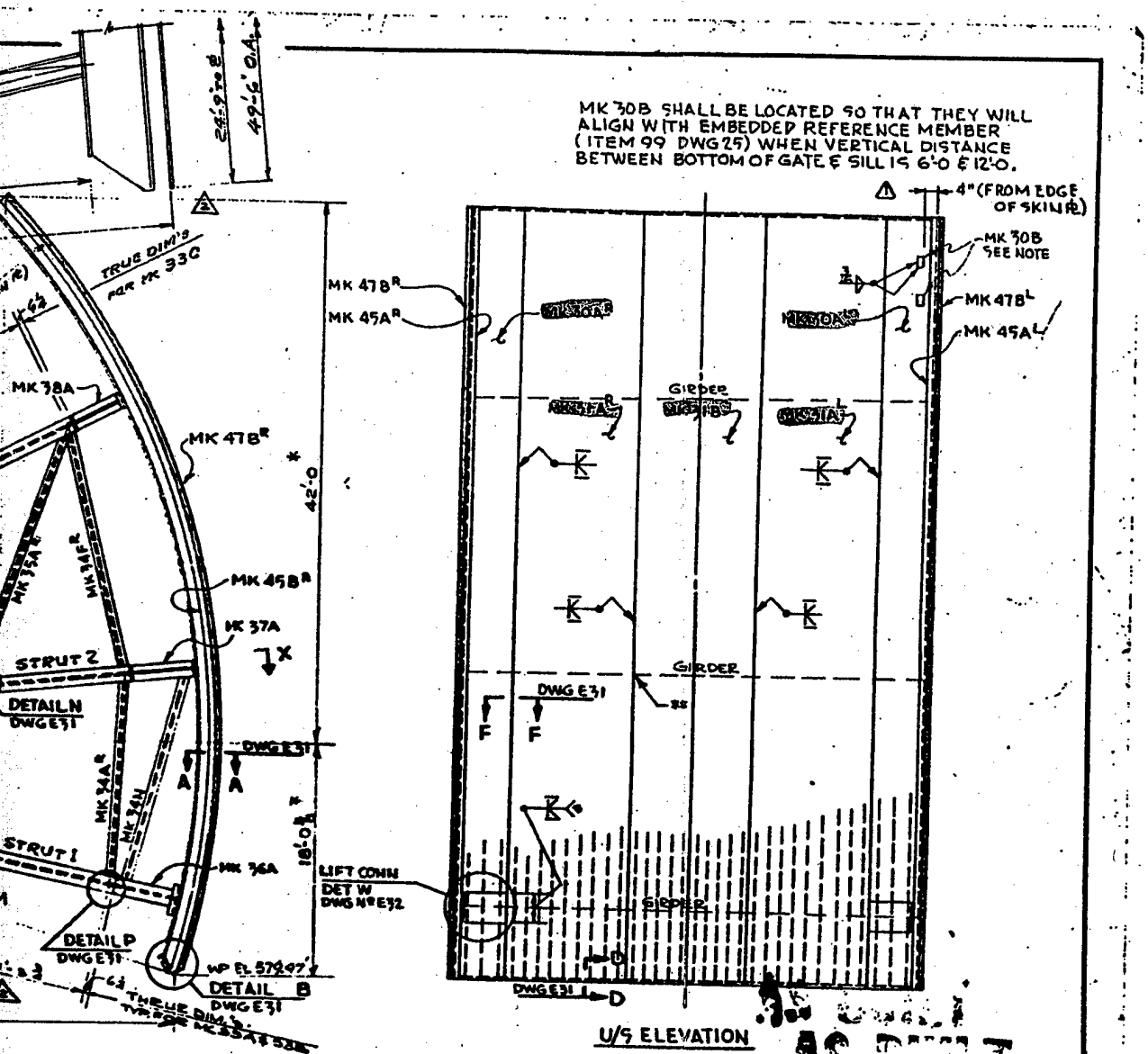
NOTE: SKIN PL BRACES MK 44A, 43B, 44C R, 44D R, 43A R, 43B R, SHOP WILL CHECK FOR FIT AT SHOP ASSY, TACK WELDING ONLY AS NECESSARY, MATCH-MARK FOR SHIPPING

REFERENCE CONT'D.
CORPS OF ENGR DWG NO LGD 1-5-8/4, SHT 8
SPECS: PAGE TP-16-1, SECT 16

* THIS WELD SHALL BE 100% INSPECTI RADIOGRAPHY
** ALL SKIN PLATE VERTICAL SPLICI INSPECTED BY RADIOGRAPHY IN V GIRDERS

CONTRACT NO DA-45-164

APPROVI
Subject to conformity with plans, correction of errors or omissions, of any required tests. Approval do dimensions, or accessibility for fastening.
OFFICE OF RESIDENT E
LITTLE GOOSE LOCK A
Date: 18 Aug



REFERENCE CONT'D.
CORPS OF ENGR DWG Nº LGD 1-5-8/4, SHT 89 VOL 1 REV A
SPECS: PAGE TP-16-1, SECT 16

REFERENCE
CORPS OF ENGR DWG Nº LGD 1-5-8/1 SHT 85 VOL 1 REV B
LGD 1-5-8/2 86 REV B
LGD 1-5-8/3 87 REV B
LGD 1-5-8/4 88 REV B

* THIS WELD SHALL BE 100% INSPECTED BY RADIOGRAPHY
** ALL SKIN PLATE VERTICAL SPLICES SHALL BE INSPECTED BY RADIOGRAPHY IN WAY OF GIRDERS

NOTE: ERECT PIECES WITH MARKS ON STEEL AT SAME END AS SHOWN ON PLAN.
FIELD CONNECTIONS:

CONTRACT Nº DA-45-164 CIVENG-65-560

APPROVED
Subject to conformity with plans and specifications, correction of errors or omissions, and to fulfillment of any required tests. Approval does not cover detail dimensions, or accessibility for assembling and fastening.
OFFICE OF RESIDENT ENGINEER
LITTLE GOOSE LOCK AND DAM
Date: 18 Aug 67

PACIFIC CAR AND FOUNDRY COMPANY
80 S. HUDSON ST. PA. 3-0888
SEATTLE, WASHINGTON 98134
LITTLE GOOSE LOCK & DAM
ITEM 101 - SPILLWAY GATE
FOR WINNELL, MANNIX, FULLER DILLINGHAM
DR. HILL DATE 4/9/68 CHK. AW DATE 5-14-46
ERECTION
C670-10101
E30 4

382 LTG-65-560-101-D01

3

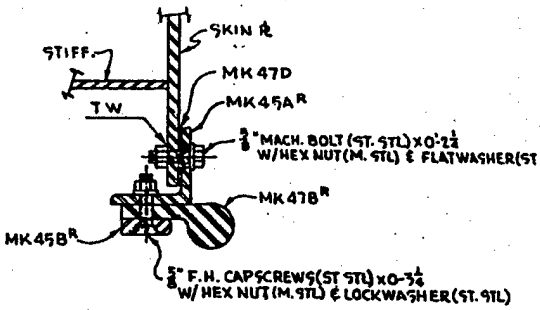
MAR 19 1980

REVISIONS

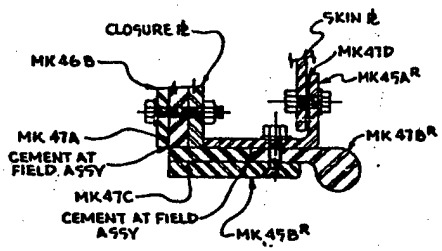
1 REVISED TO SUIT APP'L 10-3-66 CAHILL

2 REVISED DETAIL M-N & SHOP REQ. 4-19-67. H Boos CAHILL

3 REVISED ERECT. DETAIL 7/27/67 CAH H Boos

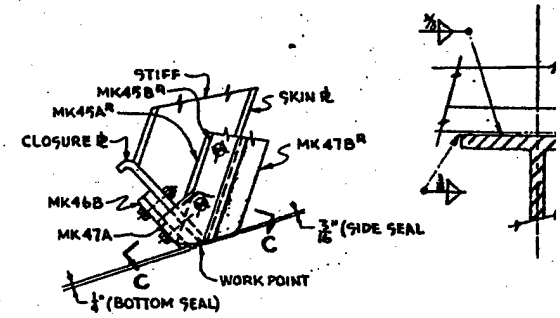


SECT. A-A



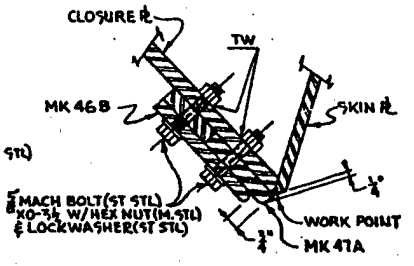
SECT C-C

TYP.

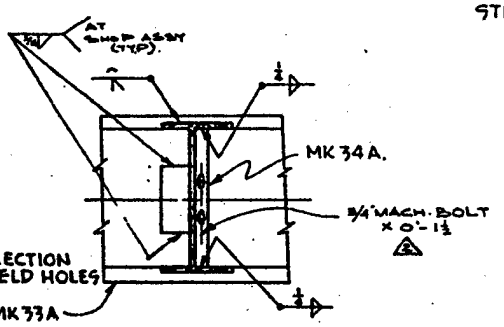


DETAIL B

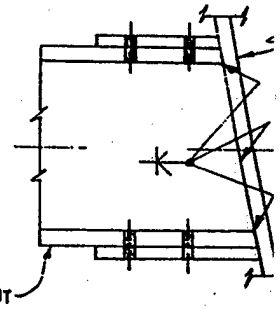
(1)



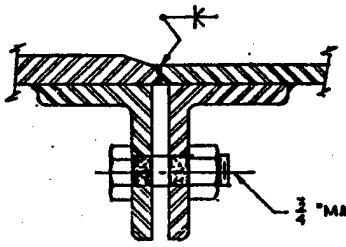
SECT D-D



NOTE: REMOVE ERECTION CLIPS & PLUG WELD HOLES ⚠

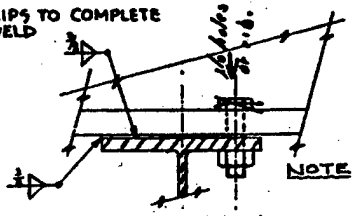


DETAIL P
TYPICAL FOR U/S END OF A SPLICE TO GIRDERS AS NO

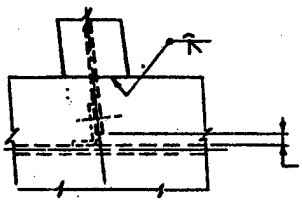


REMOVE CLIPS TO COMPLETE FIELD WELD

SECT F-F
TYP. FOR SKIN ℄ SPLICE

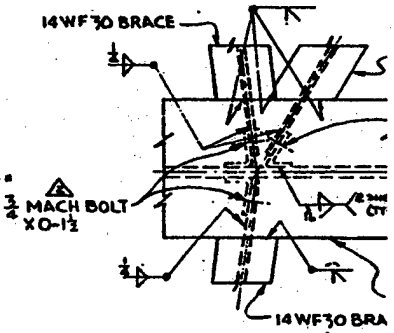


SECT H'-H' (SHT E.30) ⚠
TYPE SPLICES OF SKIN ℄ SECTIONS

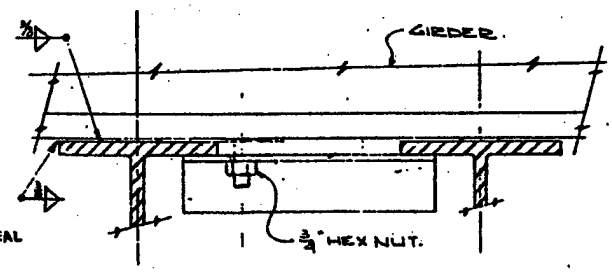


DETAIL M ⚠
TYP FOR LOWER STRUT

NOTE: REMOVE ~~BOLT~~ STUD & CLIP ~~& WELD HOLES~~

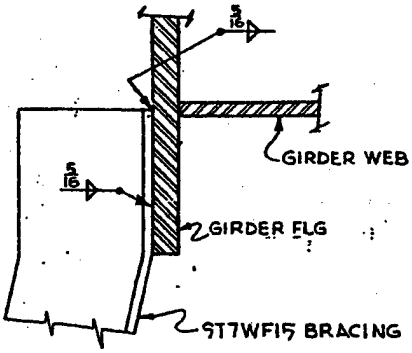


DETAIL N ⚠
TYP FOR CENTER STRUT UPPER STRUT SIM. EXCEP AS NOTED



SECT H-H ⚠
SHT. E.30

NOTE: REMOVE STUD & CLIP. TO COMPLETE FIELD WELD.



DETAIL K ⚠

CONTRACT NO DA-45-164-CIVENG-65-560

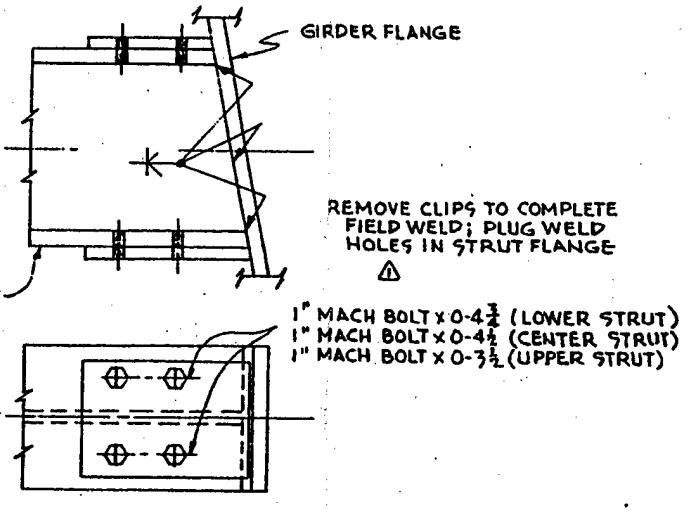
APPROVED
AS CORRECTED

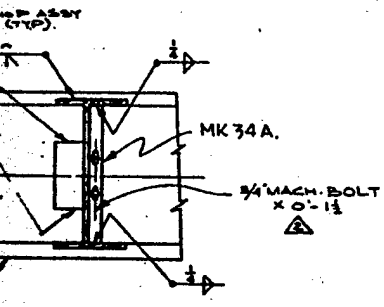
Subject to conformity with plans and specifications, correction of errors or omissions, and to fulfillment of any required tests. Approval does not relieve contractor of responsibility for correctness of dimensions, or responsibility for proper fitting and assembling.

OFFICE OF RESIDENT ENGINEER
LITTLE GOOSE LOCK AND DAM

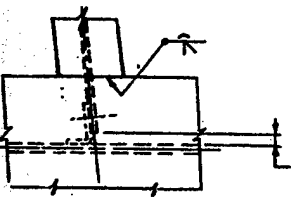
Date: 18 Aug 67

8



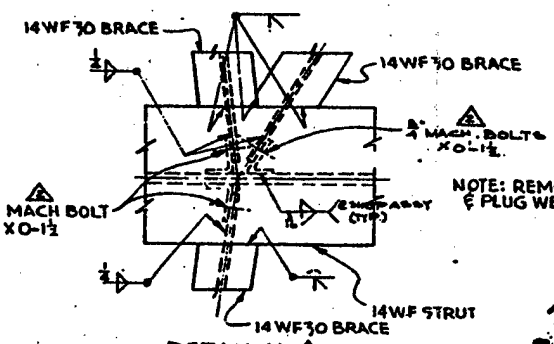


DETAIL P
TYPICAL FOR U/S END OF ALL STRUT SPLICE TO GIRDERS AS NOTED



DETAIL M
TYP FOR LOWER STRUT

STUD & CLIP
REMOVE BOLT



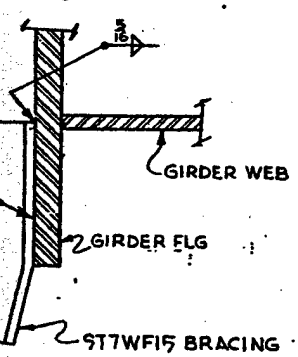
DETAIL N
TYP FOR CENTER STRUT UPPER STRUT. SIM. EXCEPT AS NOTED

AS BUILT

REFERENCE

CORPS OF ENGR DWG	LGD	SHT	VOL I	REV
	I-5-8/1	85		B
	I-5-8/2	86		B
	I-5-8/3	87		B
	I-5-8/4	88		B
	I-5-8/5	89		A

SPECS: PAGE TP-16-1, SECT. 16



K

Not Anch. Bolts
MA
MA

NOTE: ERECT PIECES WITH MARKS ON STEEL AT SAME END AS SHOWN ON PLAN.

FIELD CONNECTIONS:

CONTRACT NO DA-45-164-CIVENG-65-560

APPROVED
AS CORRECTED
8

Subject to conformity with plans and specifications, correction of errors or omissions, and to full discovery of any required tests. Approval does not cover detail dimensions, or accessibility for assembling and fastening.

OFFICE OF RESIDENT ENGINEER
LITTLE GOOSE LOCK AND DAM

Date: 18 Aug 67

PACIFIC CAR AND FOUNDRY COMPANY
80 S. HUDSON ST. PA. 3-6388
SEATTLE, WASHINGTON 98134

LITTLE GOOSE LOCK & DAM
ITEM 101, SPILLWAY GATE
FOR VINNELL, MANNIX, FULLER, DILLINGHAM

DR. HILL DATE 7/66 CHK. DW DATE 5-14-66

ISSUED ERECTION ORDER NO. C610-10101

Field Sketch - SEMI 12
Prints 48 APPROVED DWG. NO.
Prints Pencil - MYLAR P.O. Knudsen E31
Prints 560

LTG 65-560-1-1-002 383

3

MAR 19 1980

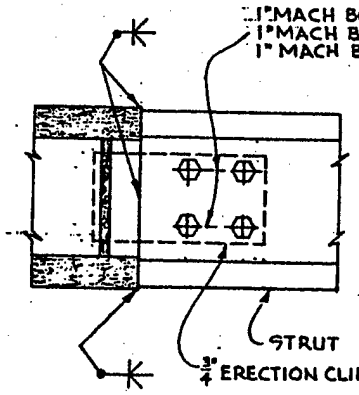
REVISIONS

⚠ REVISED PER CO No 44 10-3-66 CAHill ow

⚠ ADDED FIELD WELD DETAILS CAHill 8/23/67

TRUNNION (MK39A^R)

1" MACH BOLT x 0-4" (LOWER STRUT)
1" MACH BOLT x 0-3¾ (CENTER STRUT)
1" MACH BOLT x 0-3¼ (UPPER STRUT)



REMOVE CLIP TO COMPLETE FIELD WELD- PLUG WELD HOLES IN WEB

SECT 5-5

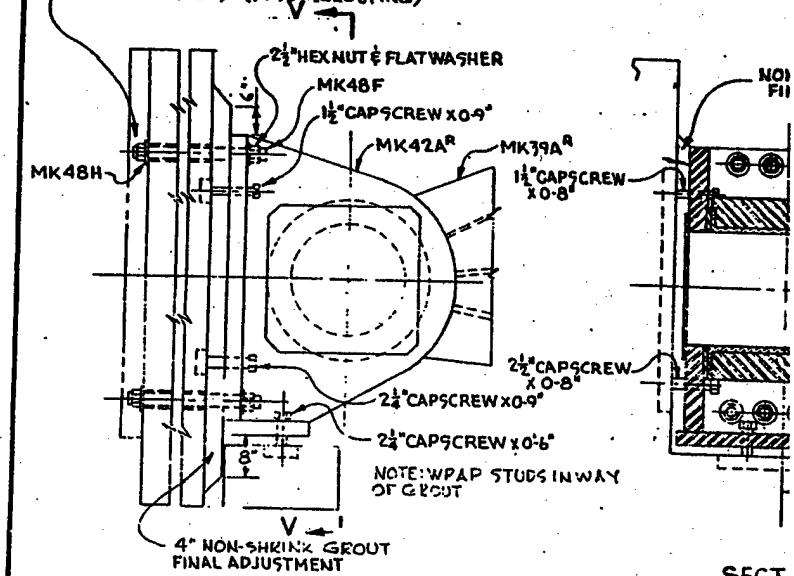
℄ LIFT ROPI (NOT BY P.

MK41 C

½" MACH BOLT x 0-1½ (NON

SPACERS (N BY P.C & F C

TENSION STUDS TO A 80 KIP LOAD, CUT OFF EXCESS STUD AFTER TENSIONING & COVER WITH 1" MIN CONCRETE OVER ENDS OF STUDS. (AFTER GROUTING)

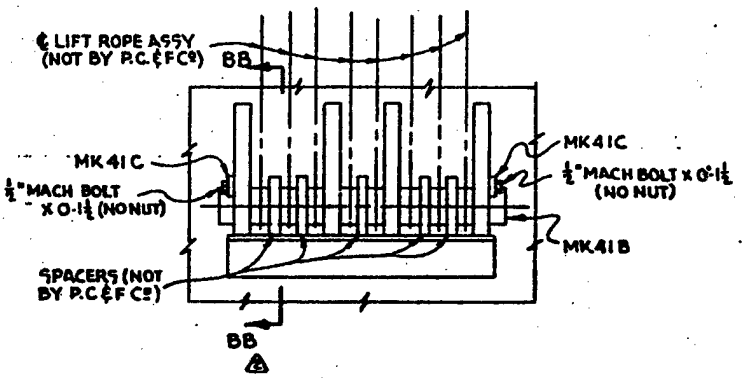


⚠ DETAIL T

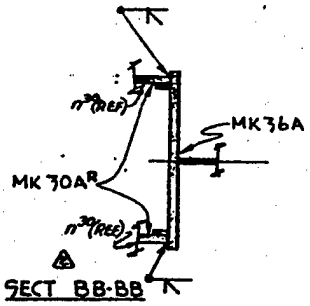
SECT.

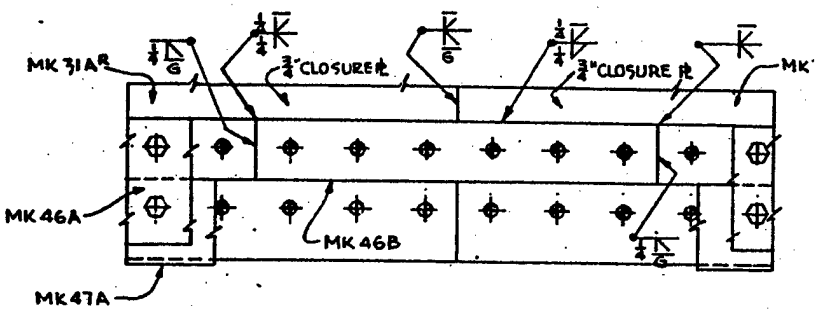
(1)

x 0-4" (LOWER STRUT)
x 0-3¾ (CENTER STRUT)
x 0-3¼ (UPPER STRUT)

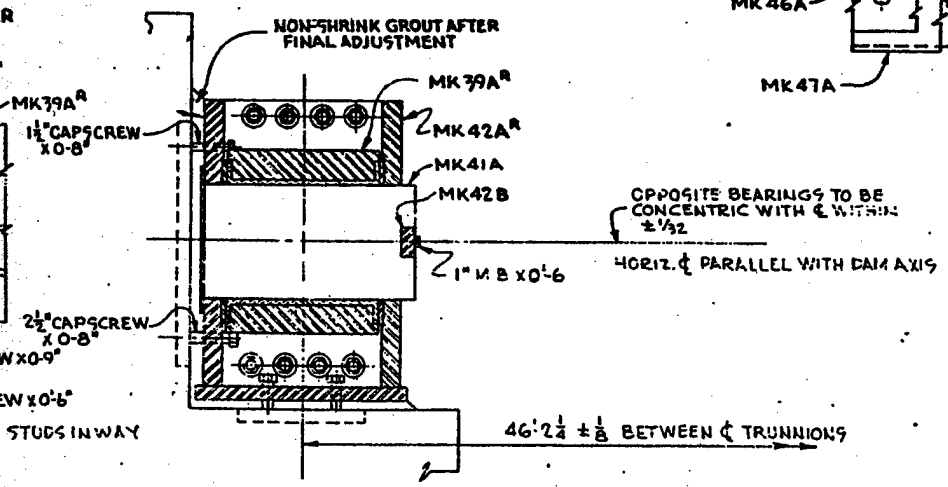


DETAIL W





DETAIL A-A
TYPICAL FOR ALL SPLICES



SECT. V-V

CONTRACT NO. DA45-164 CIVENG 65-

APPROVED

Subject to compliance with plans and specifications, correction of errors or omissions, and to fulfillment of any required [illegible]

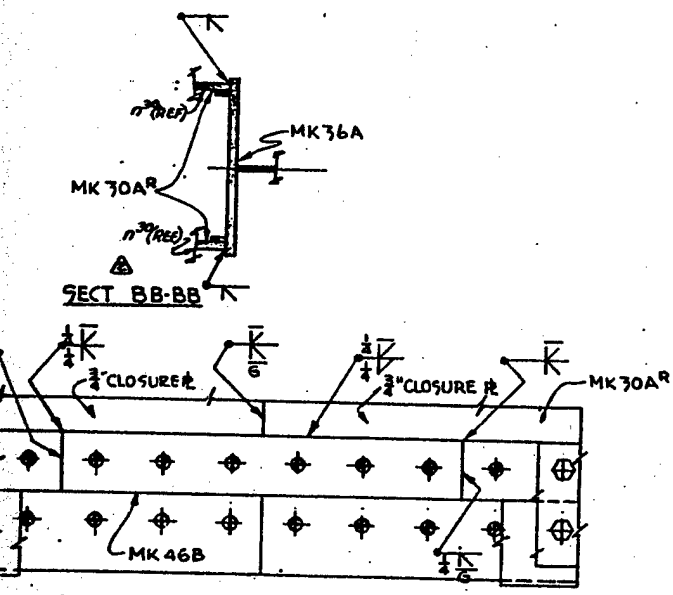
OFFICE [illegible]
LITTLE [illegible]

Yes

Date: 21 Sep 67

LTG

(2)



DETAIL A-A
TYPICAL FOR ALL SPLICES

REFERENCE: AS BUILT
CORPS OF ENGR DWG LGD I-5-8/1, SHT 85, VOL I, REV B
I-5-8/2 B
I-5-8/3 B
I-5-8/4 B
I-5-8/5 A
SPECS; PAGE TP-101, SECT 16

NOTE: ERECT PIECES WITH MARKS ON STEEL AT SAME END AS SHOWN ON PLAN.
FIELD CONNECTIONS:

CONTRACT NO DA45-164 CIVENG 65-560

APPROVED
Subject to conformity with plans and specifications, correction of errors or omissions, and to fulfillment of any required test. Approval does not relieve detailer of responsibility for dimensions and fastening.
OFFICE OF DISTRICT ENGINEER
LITTLE GOOSE LOCK AND DAM
Date: 21 Sep 67

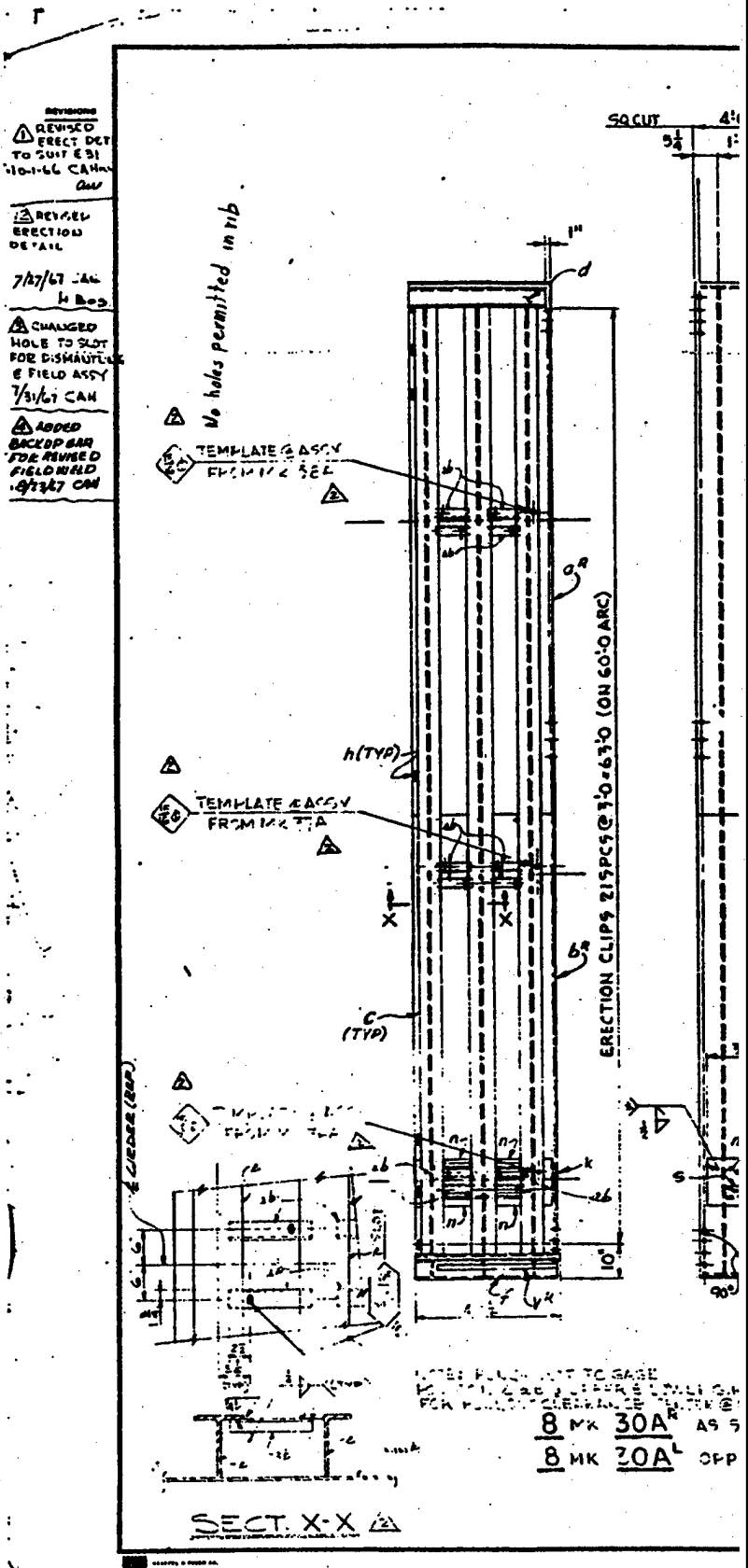
PACIFIC CAR AND FOUNDRY COMPANY
80 S. HUDSON ST. PA. 2-8988
SEATTLE, WASHINGTON 98134
LITTLE GOOSE LOCK & DAM
ITEM 101, SPILLWAY GATE
FOR VINNELL, MANNIX, FULLER, DILLINGHAM
DR. HILL DATE 8/1/67 CHK. LWH DATE 5-18-66
ISSUED
5 SEPT ERECTION ORDER NO. C670-10101
4 MYLAR
3 SEP
2 FINAL
2 MYLAR
1 FINAL
APPROVED P.O. Knudson DWG. NO. E32 2

LTG

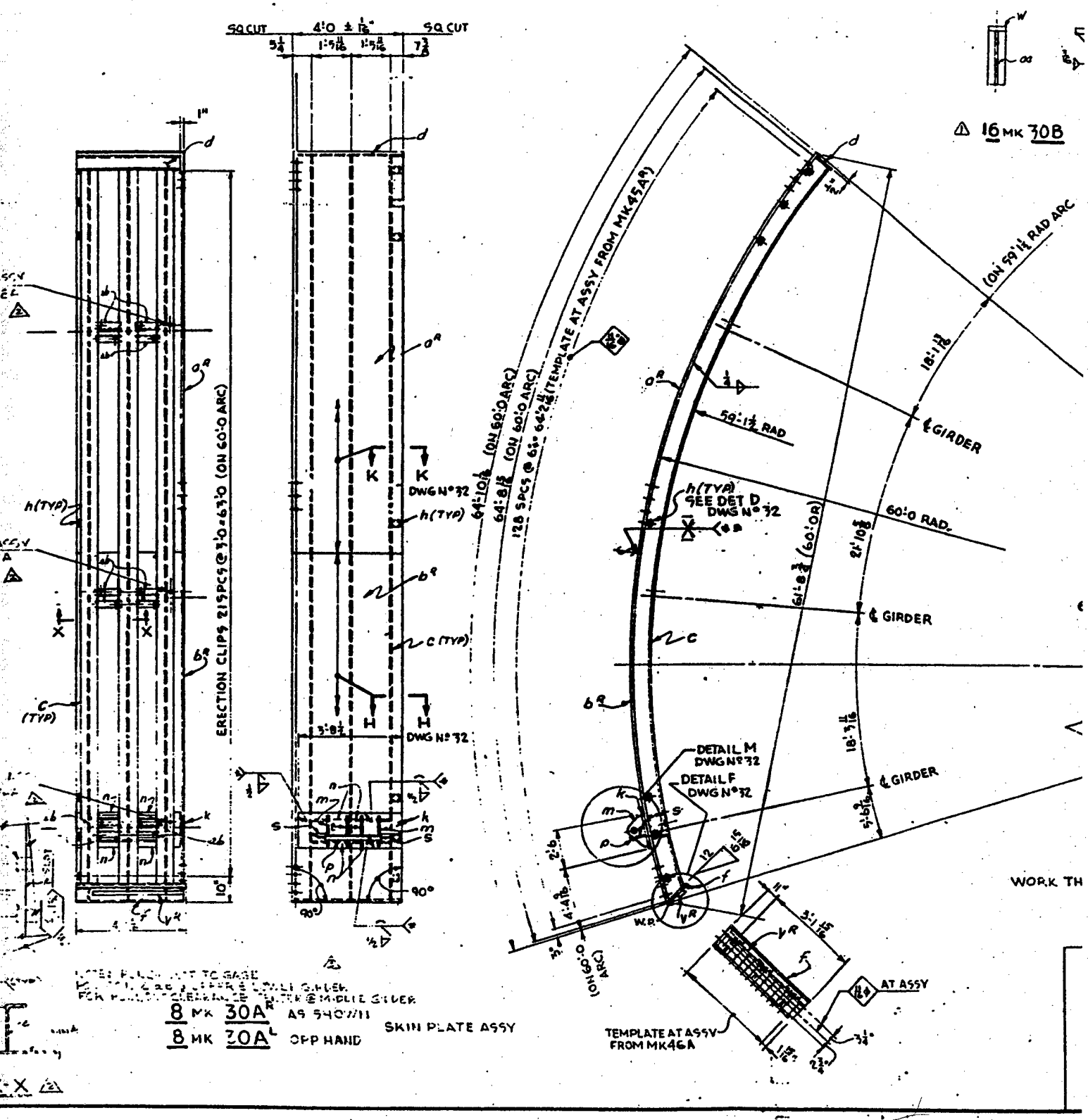
LTG-65-560-101-003 384

MAR 19 1980

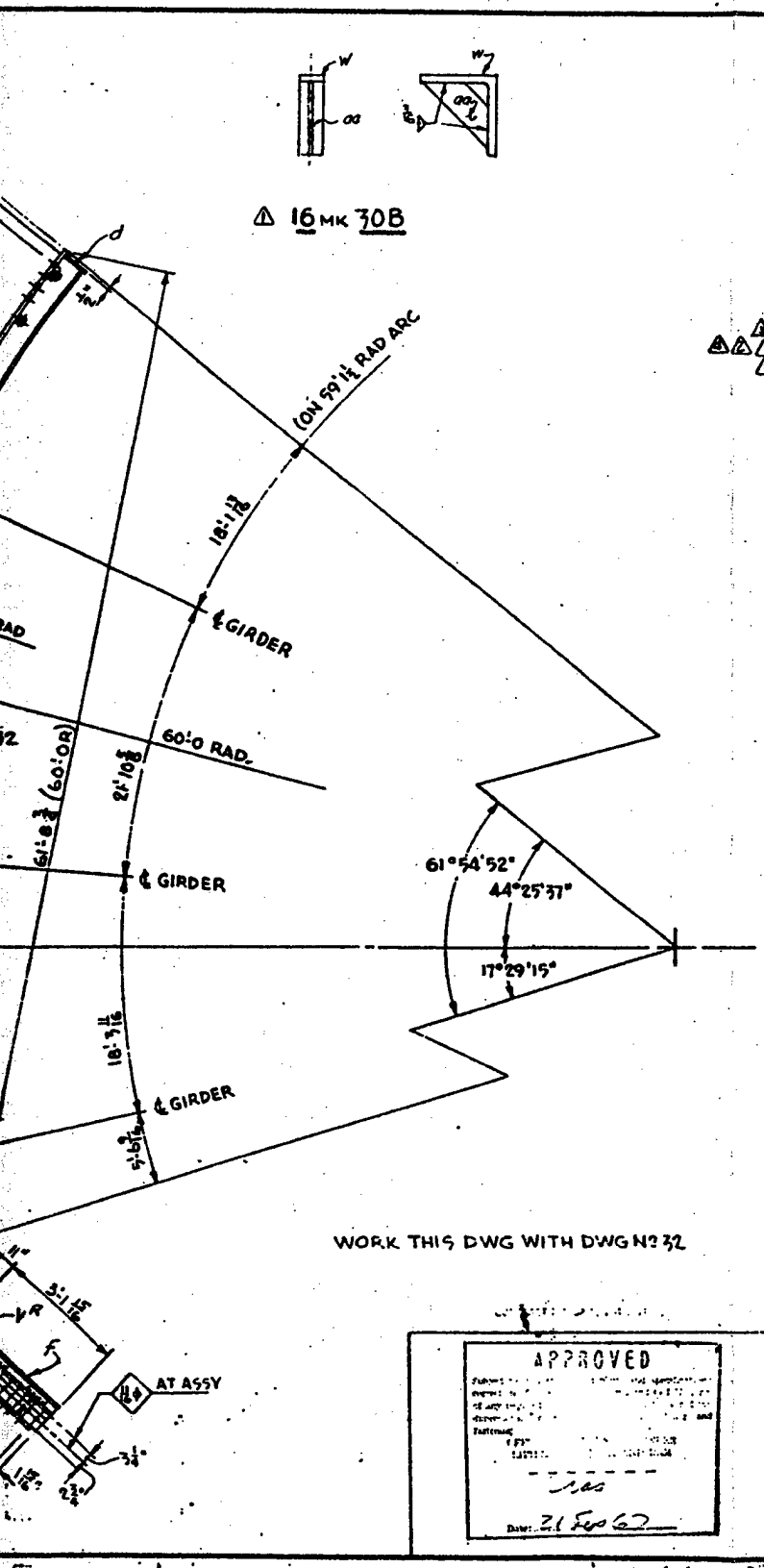
3


REVISIONS
REVISED ERECT DET TO SUIT E 31
10-1-66 CAH
REVISED ERECTION DETAIL
7/27/67 JAL
CHANGED HOLE TO SLOT FOR DISMANTLE & FIELD ASSY
7/31/67 CAH
ADDED BACKUP BAR FOR REVISED FIELD WELD
8/23/67 CAH
SQ CUT
No holes permitted in rib
TEMPLATE & ASSY
h (TYP)
TEMPLATE & ASSY
C (TYP)
ERECTION CLIPS 2 I SPCS @ 3'0 + 6 3'0 (ON 60'0 ARC)
8 MK 30A R
8 MK 30A L
SECT. X-X

(1)


SQ CUT
4'-0 ± 1/16"
SQ CUT
ERECTION CLIPS 215 PCS @ 3'-0 = 643'-0 (ON 60'-0 ARC)
h (TYP)
K
DWG N° 32
H
DWG N° 32
C (TYP)
90°
64'-10 1/8" (ON 60'-0 ARC)
64'-8 1/8" (ON 60'-0 ARC)
128 SPCS @ 6 1/2° = 64'-2 11/16" (TEMPLATE AT ASSY FROM MK45A)
(ON 59'-1 1/2 RAD ARC
59'-1 1/2 RAD
℄ GIRDER
60'-0 RAD.
61'-8 3/8" (60'-0 R)
h (TYP)
SEE DET D
DWG N° 32
DETAIL M
DWG N° 32
DETAIL F
DWG N° 32
W.P.
(ON 60'-0 ARC)
TEMPLATE AT ASSY
FROM MK46A
AT ASSY
WORK TH
8 MK 30A R AS SHOWN
8 MK 30A L OPP HAND
SKIN PLATE ASSY
16 MK 30B

2



BILL OF MATERIAL

8	30A	8	8	0 7/8	R 48 x 1 1/8 LOW ALLOY	38	1 1/4	R.S.S. ROLL	77.799
8	30A	8	8	6 1/2	R 48 x 3/4 LOW ALLOY	26	6 1/2	R.S.S. ROLL	54.777
		48	c		ST 10 WF 21 LOW ALLOY	64	0 1/2	ROLL	15.212
		16	d		R 11 x 3/8	3	11	2ES	STOCK .914
		16	f		R 14 x 1/4 ①	4	0 1/2	BENDERS	.2394
		176	h		L 4 x 3 x 3/8	0	3		.374
		16	k		R 30 x 1/2 LOW ALLOY	3	8 1/2	ROLL	.1223
		32	m		5/8 R 11 1/4 x 1 1/8 LOW ALLOY	2	4	①	.1561
		64	n		5/8 R 10 1/2 x 1 LOW ALLOY	1	5 3/16	①	.3375
		16	p		BAR 4 x 3/4	2	3		STOCK .317
		15/32	s		5/8 BAR AVI	1	3 1/2	FCUTS ①	STOCK .291
		32	t		5/8 R 11 3/4 x 1 1/8 LOW ALLOY	2	4	①	.4561
		16	v		BAR 3 x 3/4 LOW ALLOY	3	11 1/2		.4875
		192	aa		L 3 x 2 1/2 x 5/16 LOW ALLOY	1	2 1/2		.1402
		64	ac		BAR 1 1/2 x 1/4	0	8 1/2		.54
16	308	16	ag		BAR 2 1/2 x 1/4	0	8 1/2	①	.23
		16	w		L 6 x 6 x 3/8	0	2		.41
					SHOP WELD				.64
								TOTAL	263.941

⚠ ⚠ ⚠ ⚠

MATERIAL SPEC:
PLATE & SHAPES; ASTM-A36 EXCEPT AS NOTED
PLATE & SHAPES; LOW ALLOY STL.- SEE PG TP-9-36 PARA. 9-09 OF GEN. SPEC.
ST. STL - ASTM A276-TYPE 410 HOT ROLLED. PICKLED ANNEALED & PASSIVATED

NOTE
* THESE WELDS TO BE 100% INSPECTED BY RADIOGRAPHY EXCEPT WHERE WELD GEOMETRY PROHIBITS, ULTRASONIC TESTING MAY BE USED.
** 100% SHOP WELD; GRIND NEARSIDE SMOOTH GRIND FARSIDE FLUSH ONLY IN WAY OF RIBS.

REFERENCE:

CORPS OF ENGR DWG Nº	LGD	I-S-B/I	SHT	VOL	REV
		I-S-B½	86		B
		I-S-B⅔	87		B
		I-S-B¾	88		B

SPECS PAGE TP16-1 TP9-38 SECT 16 PARA 9-09

AS BUILT

WORK THIS DWG WITH DWG Nº 32

APPROVED
Date: 21 Feb 62

CONT. WELDING: REQ'D INSPECTION: CORPS OF ENGR
NO SHOP PAINT

PACIFIC CAR AND FOUNDRY COMPANY
80 S. HUDSON ST. PA. 2-0300
SEATTLE, WASHINGTON 98134

LITTLE GOOSE LOCK & DAM
ITEM 101 - SPILLWAY GATE
VINNELL, MANN, FULLER, BELLINGHAM
CAHILL DATE 2/62 CHK. DATE 5-15-62

SKIN PLATE ASSY
C610-10101
30 4

LTC 64 335 LGD 65-56 101-00 4 385

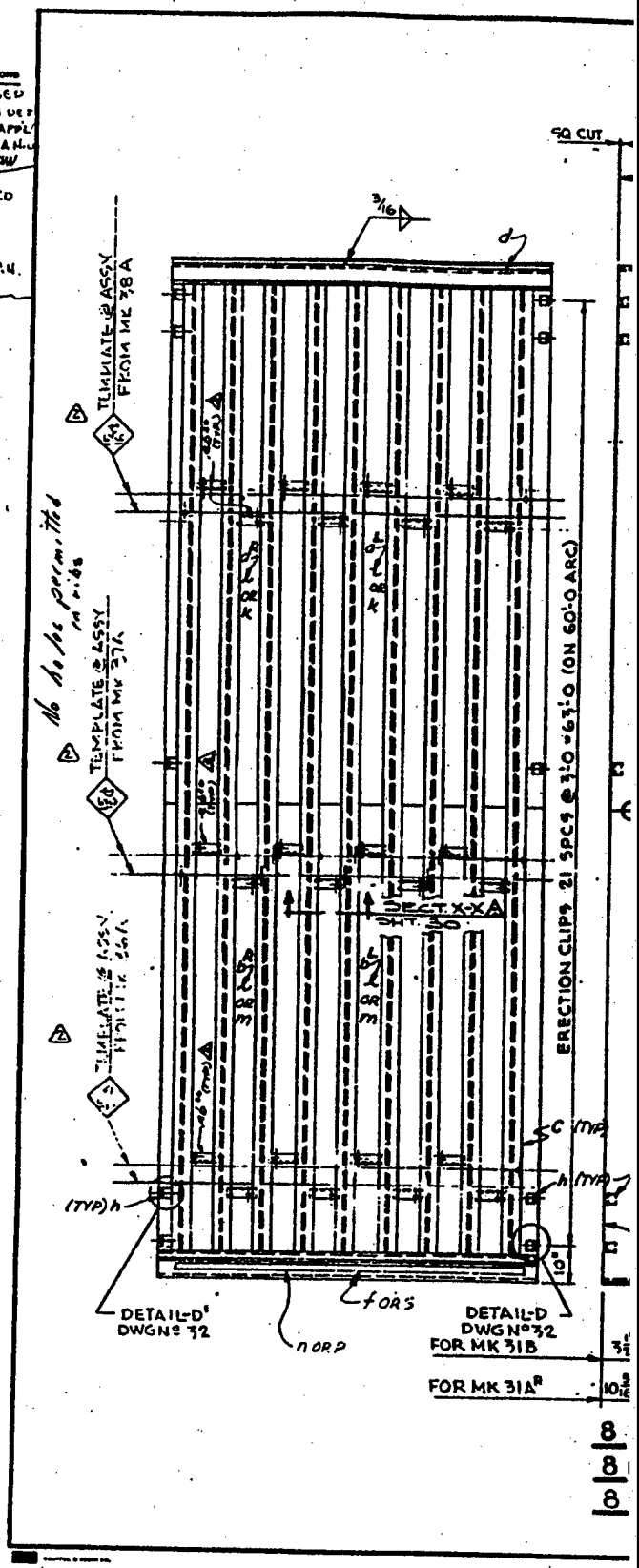
3

MAR 19 1980

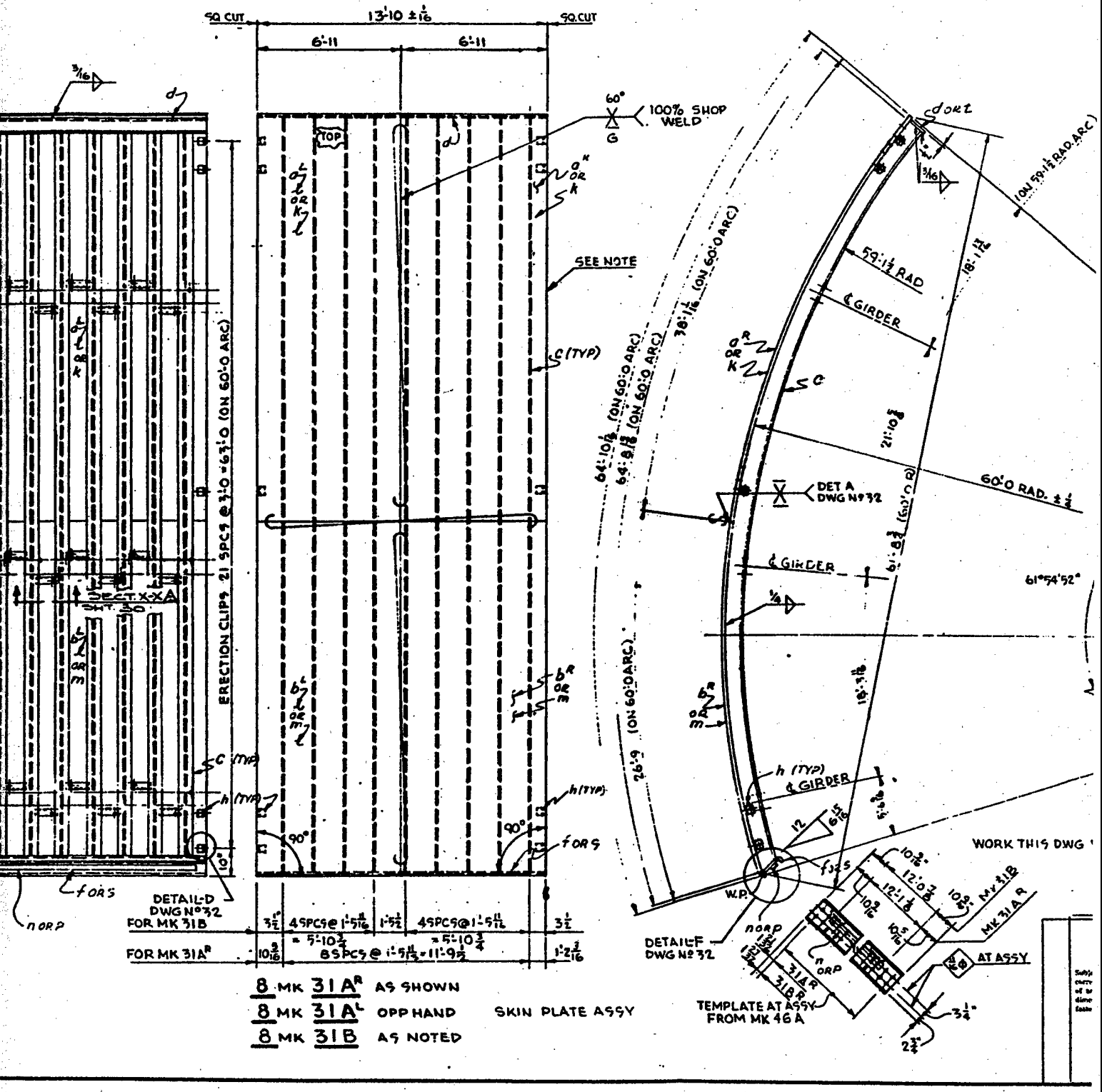
REVISIONS

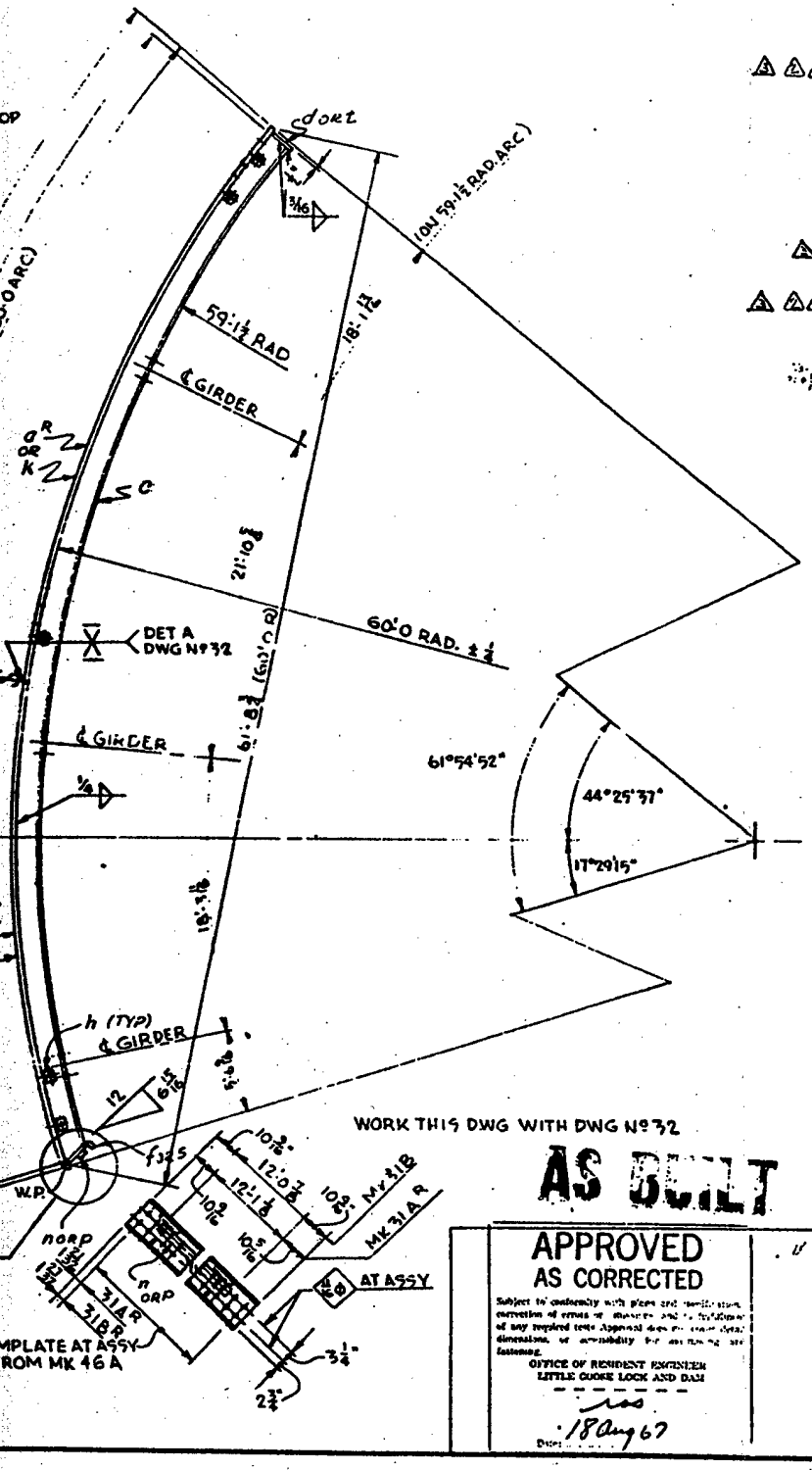
1 REVISED ERECTION DET. TO SUIT APPL. 10-1-66 C.A.N. CW

2 REVISED ERECTION DETAIL 7h7-67 C.A.N.



(1)


SQ CUT
13'-10 ± 1/16
SQ CUT
6'-11
6'-11
3/16
TOP
60°
100% SHOP WELD
SEE NOTE
℄ (TYP)
SECT X-XA
ERECTION CLIPS 21 SPCS @ 3'-0 = 63'-0 (ON 60'-0 ARC)
h (TYP)
90°
10°
f ORS
n ORP
DETAIL-D DWG Nº 32
FOR MK 31B
FOR MK 31A^R
4 SPCS @ 1'-5 11/16
= 5'-10 3/4
8 SPCS @ 1'-5 11/16 = 11'-9 1/2
3 1/2
1'-2 3/16
8 MK 31A^R AS SHOWN
8 MK 31A^L OPP HAND
8 MK 31B AS NOTED
SKIN PLATE ASSY
59'-1 1/2 RAD
℄ GIRDER
64'-10 1/8 (ON 60'-0 ARC)
64'-9 1/8 (ON 60'-0 ARC)
38'-1/16 (ON 60'-0 ARC)
26'-9 (ON 60'-0 ARC)
60'-0 RAD. ± 1/2
DET A DWG Nº 32
61°54'52"
W.P.
DETAIL-F DWG Nº 32
TEMPLATE AT ASSY FROM MK 46 A
AT ASSY
WORK THIS DWG



BILL OF MATERIAL

8	31A	16	a	PL ⅝ x 83 x ⅝ LOW ALLOY	38	1 3/16			
8	31A	16	b	PL ½ x 83 x ½ LOW ALLOY	24	9 3/16			
		144	c	ST 10 WF 31 LOW ALLOY	64	0 1/16	ROLL		
		16	d	PL 11 x ⅜	13	10			
		16	f	PL 14 x ¾ T	13	10	BEND		
		104	h	L 4 x 3 x ⅜	0	3			
		294	b	L 3 x 3 x 5/16	1	2 1/16			
		16	n	BAR 3 x 15/16 ST 3/8	12	1 1/8			
				SHOP WELD ST STL					
				SHOP WELD					
8	31B	16	k	PL ⅝ x 83 x ⅝ LOW ALLOY	38	1 3/16			
		16	m	PL 83 x ½ LOW ALLOY	26	9 3/16	ROLL		
		80	c	ST 10 WF 31 LOW ALLOY	64	0 1/16	ROLL T		
		8	f	PL 11 x ⅜	13	10			
		8	s	PL 14 x ¼ T	13	10	BEND		
		352	h	L 4 x 3 x ⅜	0	3			
		216	b	L 3 x 3 x 5/16	1	2 1/16			
		8	p	BAR 3 x 15/16 ST 3/8	12	0 1/8			
				SHOP WELD ST STL					
				SHOP WELD					
118				SHIP ¾" M.B	0	2			

Total 68,586

MATERIAL SPEC:
PLATE & SHAPES - ASTM-A36 EXCEPT AS NOTED
PLATE & SHAPES - LOWALLOY STL - SEE PG TP-9-38 IP 9-09 OF GENERAL SPEC.
M.B ASTM-A307 GRA
ST. STL ASTM-A276 TYPE 410 HOT ROLLED, ANNEALED, PICKLED & PASSIVATED

NOTE
BOTH VERTICAL EDGES OF M31B SHALL BE PREPARED FOR FIELD WELD BY CUTTING A DOUBLE CHAMFER: 45°x ⅜ IN WAY OF ⅜ PL AND 45°x ¼ IN WAY OF ½" PL. NO EDGE PREPARATION FOR WELD REQD FOR MK 31A PL. LIKE WISE BOTH EDGES OF PL "L" SHALL BE DOUBLE CHAMFERED 45°x 3/16" AND PL "S" SHALL BE DOUBLE CHAMFERED 45°x ⅜ IN WAY OF FIELD SPLICES

REFERENCE:
CORPS OF ENGR DWG Nº LGD 1-5-8/1, SHT 85, VOL I REV B
1-5-8/2, SHT 86, B
1-58/3, SHT 87 B
1-5-8/4, SHT 88 B
SPECS PAGE TP16-1, SECT 16
PAGE TP9-38, PARA 9-09

AS BUILT

APPROVED
AS CORRECTED
Subject to conformity with plans and specifications, correction of errors or omissions and acceptance of any required tests. Approval does not cover detail dimensions, nor assumability for assembling and fastening.
OFFICE OF RESIDENT ENGINEER
LITTLE GOOSE LOCK AND DAM
18 Aug 67
Date:

CENT. WELDING REQ'D ... INSPECTION CORPS OF ENGR.
RIVETS
BOLTS ..... OPEN HOLES ..... EXCEPT AS NOTED
END AND EDGE DISTANCE ..... EXCEPT AS NOTED
SPACING NOT ENOUGH .....
PAINT NO SHOP PAINT.

PACIFIC CAR AND FOUNDRY COMPANY
80 S. HUDSON ST. PA. 2-0388
SEATTLE, WASHINGTON 98134

LITTLE GOOSE LOCK & DAM
ITEM 101 - SPILL WAY GATE
FOR VINNELL, MAINIX, FULLER, BILLINGHAM
DR. CAHILL DATE 12/66 CHK. DLW DATE 5-16-67
ISSUED SKIN PLATE ASSY ORDER NO. C670-10101
APPROVED
SHOP DWG. NO. 31 2

BM #30 FOR SHOP CONVENIENCE

LIG 6[illegible] 560-101-005 ; 386

MAR 19 1980

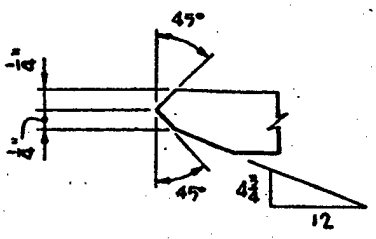
3

REVISIONS

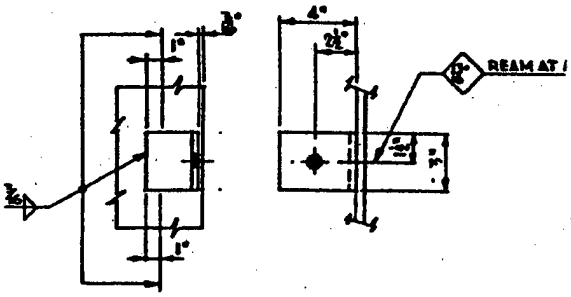
1 ADDED ERECTION CLIP DETAIL 10-1-66 CAH

2 DELETED ERECTION DETAIL 7/27/67 CAH

3 REVISED EDGE DETAIL PC 90-509. FIELD WELD 8/23/67 CAH

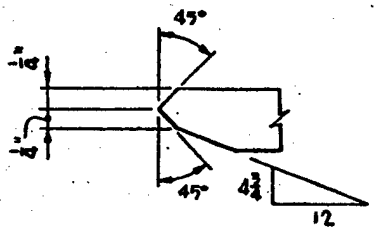


SECT K-K DWG Nº 30

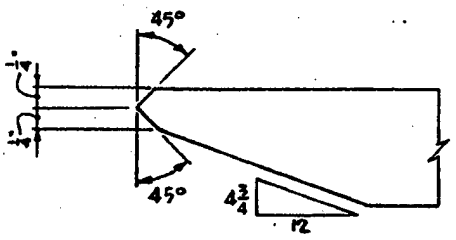


DETAIL D AS SHOWN
DETAIL D' OPP HAND
DWGS Nº 30 & 31

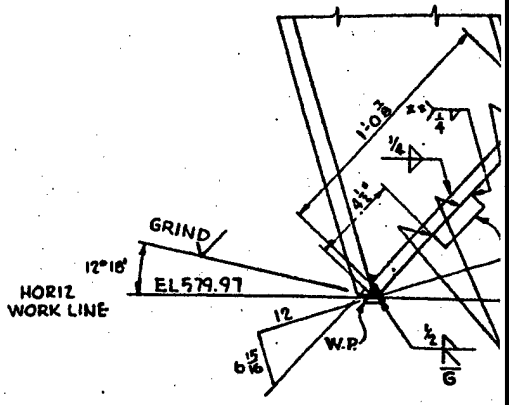
D



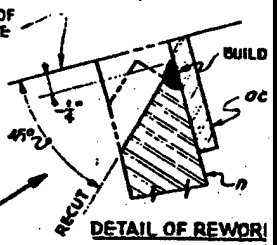
SECT K-K DWG Nº 30



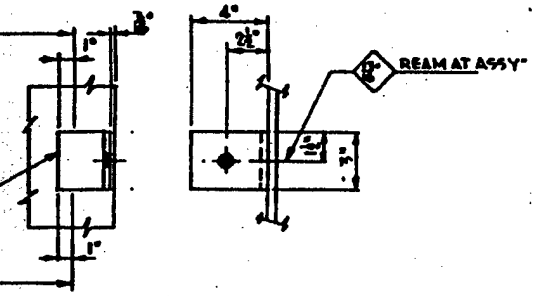
SECT H-H DWG Nº 30



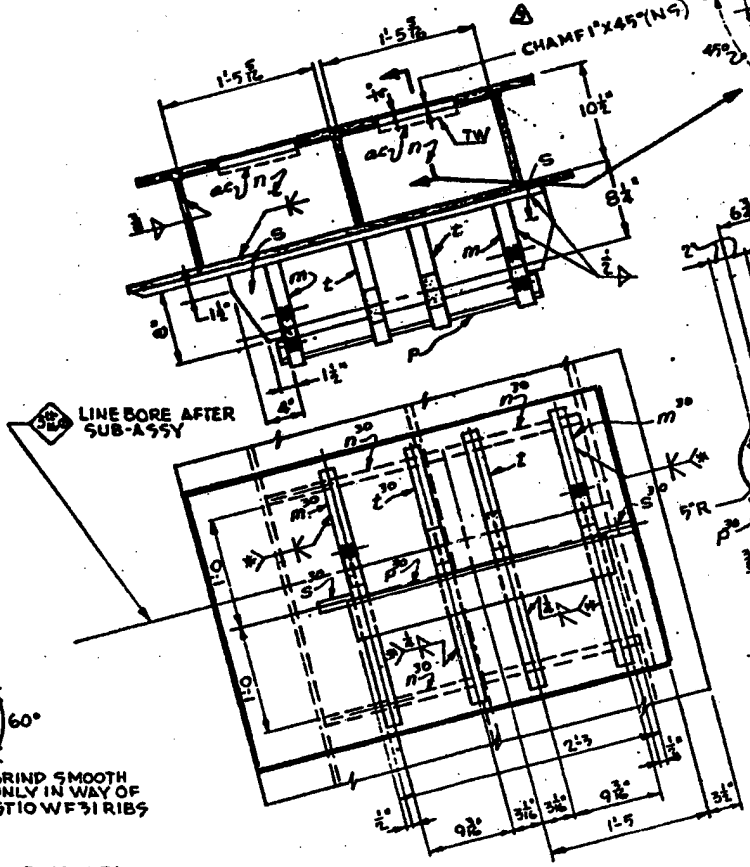
DETAIL F TYPICAL

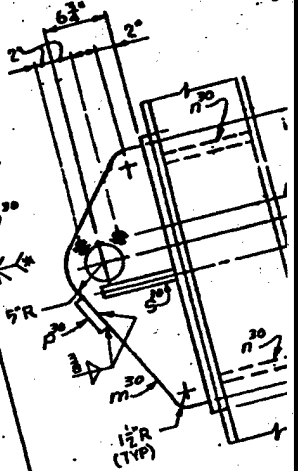


DETAIL OF REWOR

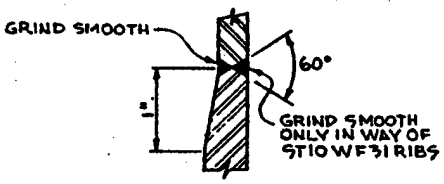


DETAIL D AS SHOWN
DETAIL D' OPP HAND
DWGS Nº 30 & 31





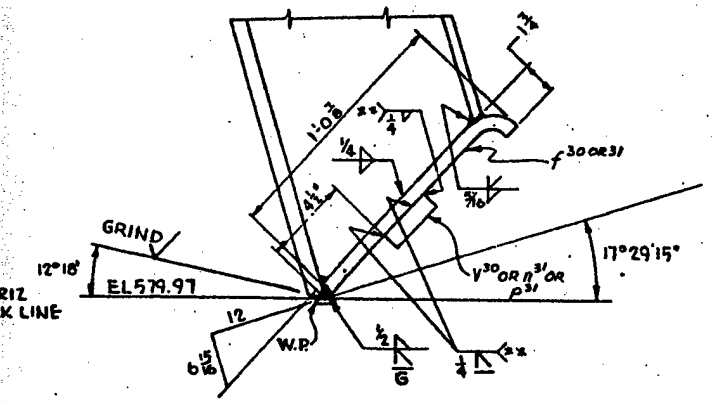
WORK



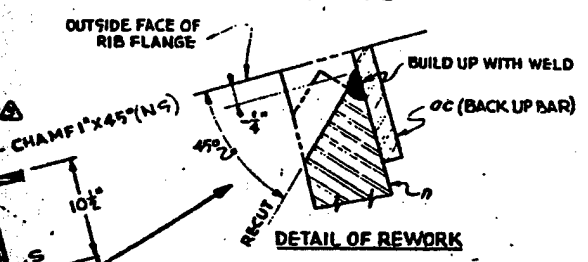
DETAIL A DWG Nº 31

DETAIL M DWG Nº 30

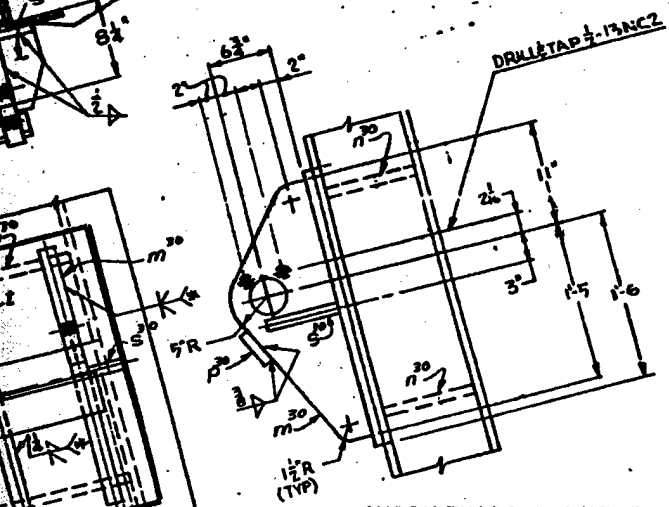
(2)



DETAIL F TYPICAL DWG Nº 30 & 31



DETAIL OF REWORK



DETAIL M DWG Nº 30

WORK THIS DWG WITH DWGS Nº 30 & 31

BILL OF MATERIAL

NOTE:
* THESE WELDS TO BE 100% INSPECTED BY RADIOGRAPHY EXCEPT WHERE WELD GEOMETRY PROHIBITS ULTRASONIC TESTING MAY BE USED
** ST. STL ELECTRODE

REFERENCE:
CORPS OF ENGR DWG Nº LGD 1-5-8/1 SHT 85 VOL I REV B
1-5-8/2 86 B
1-5-8/3 87 B
1-5-8/4 88 B
SPECS PAGE TP-16-1 SECT 16
TP-9-38 PARA 9.09

APPROVED.
Subject to ... correction of ... of any required ... dimension, or ... fastening.
OFFICE OF E.
LITTLE ...
Date 21 Sep 67

CONST. WELDING REQD ... INSPECTION CORPS OF ENGR
... OPEN HOLES ... EXCEPT AS NOTED
... EXCEPT AS NOTED
PAINT NO SHOP PAINT

PACIFIC CAR AND FOUNDRY COMPANY
80 S. HUDSON ST. P.O. Box 3566
SEATTLE, WASHINGTON 98124

LITTLE GOOSE LOCK & DAM
ITEM 101- SPILLWAY GATE
VINNELL MANNY, FULLER, OLLINGHAM
CA Hill DATE 7/65 CHK. DATE 5-16-66
SKIN PLATE
MISC DETAIL C610-10101
APPROVED R.O. Knudson 32 3

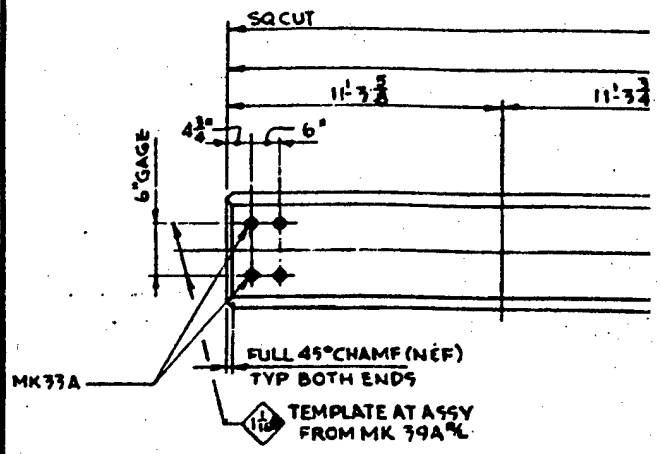
DACW 67-66-C-0101-0006

MAR 19 1980

3

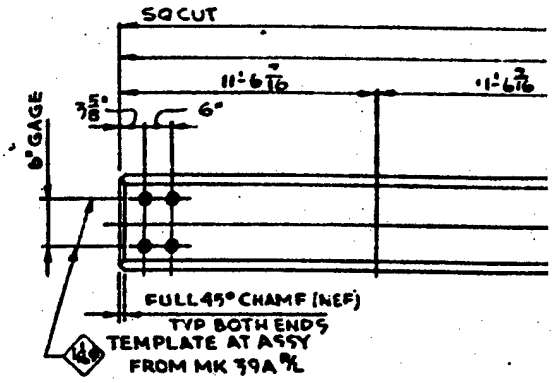
REVISIONS

Δ DELETED ALL Ø 7/16 HOLES FROM WEBS OF MK 33A, 33B & 33C. 4-13-67 M.B.



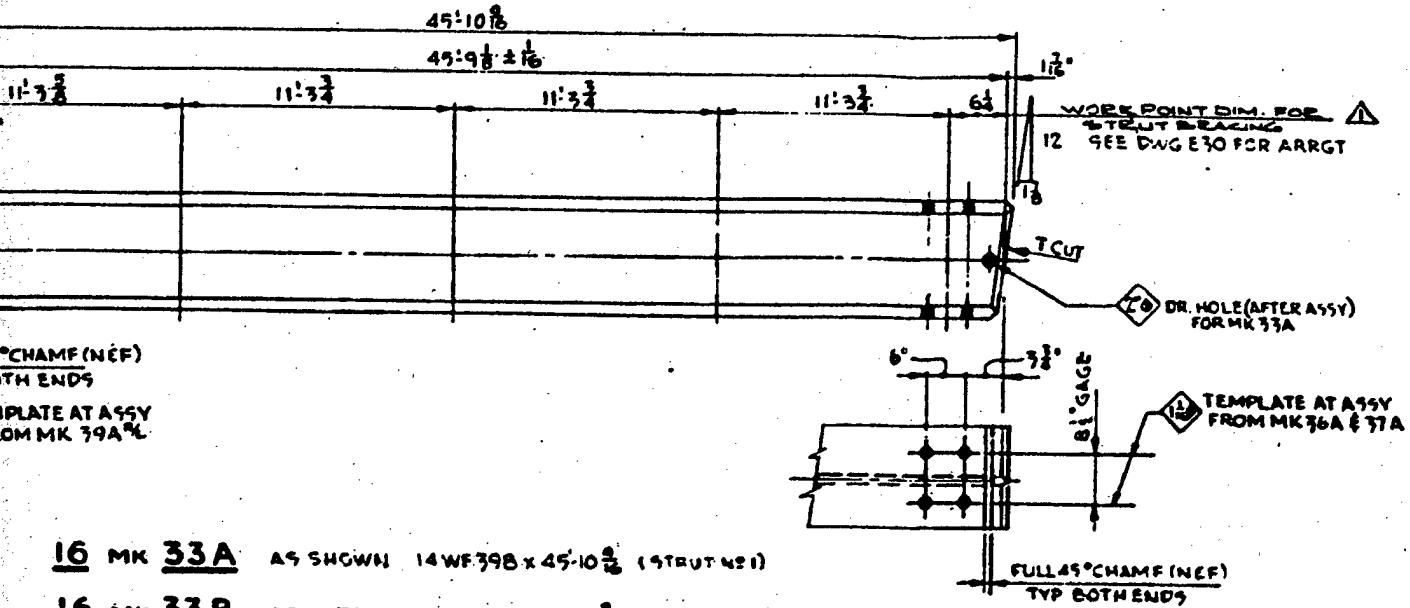
16 MK 33A AS SH

16 MK 33B AS NO



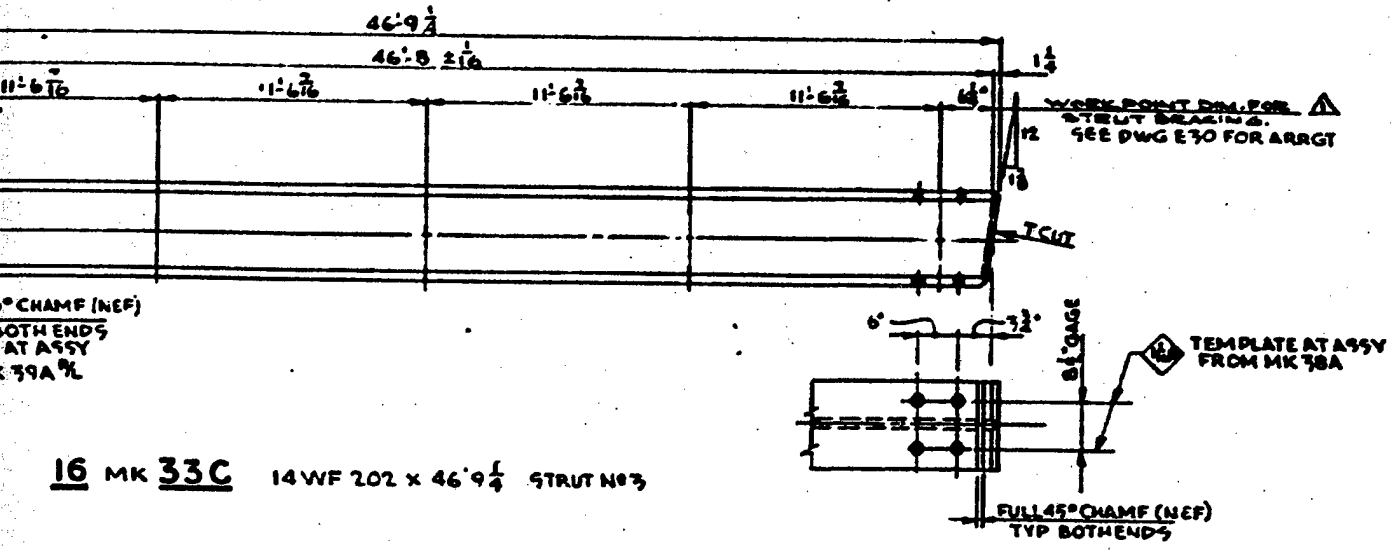
16 MK 33C 14 WI

(1)



16 MK **33A** AS SHOWN 14 WF 398 x 45'-10 9/16 (STRUT Nº 1)

16 MK **33B** AS NOTED 14 WF 342 x 45'-10 9/16 (STRUT Nº 2)



16 MK **33C** 14 WF 202 x 46'-9 1/4 STRUT Nº 3

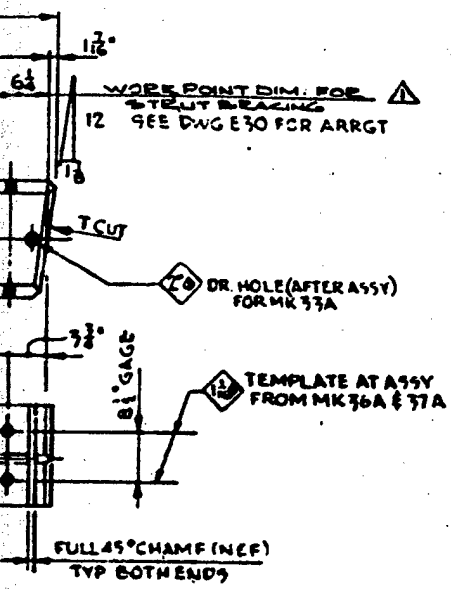
CONTRACT Nº

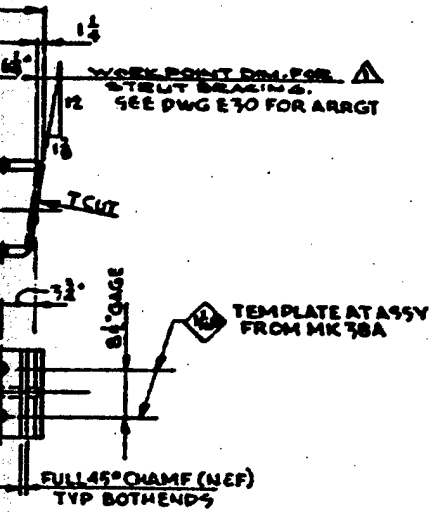
APPR

Subject to conformity wi
correction of errors or om
of any required work. Ap
dimensions, or omissio
Believing

OFFICE OF RES
LITTLE ROCK

Date 6-5-





BILL OF MATERIAL

16	33A			14 WF 398	45°		
16	33B			14 WF 342	45°		
16	33C			14 WF 202	45°		

MATERIAL SPEC:
SHAPES ASTM-A36

REFERENCE:
CORPS OF ENGR DWG N° LGD-1-5-8/1 SHT 85 VOL 1 REV B
SPECS: PG TP-161, SECT 16

AS BUILT
CONTRACT NR DA 45-164-CIVENG 65-560

APPROVED
Subject to conformity with plans and specifications, correction of errors or omissions, and to fulfillment of any required tests. Approval does not cover detail dimensions or necessarily the assembling and forming.
OFFICE OF RESIDENT ENGINEER
LITTLE GOOSE LOCK AND DAM
Date: 6-5-67

REQD ... SPECIFICATIONS CORPS OF ENGR
NO SHOP PAINT

PACIFIC CAR AND FOUNDRY COMPANY
99 S. HUDSON ST. RENTON, WASHINGTON 98055

LITTLE GOOSE LOCK & DAM
ITEM 101 - SPILLWAY GATE
WINNELL, MANNIX, FULLER, BILLINGHAM
CAHILL ... DATE 5-10-66

STRUTS
DETAILS
C610-1101

33.1

DACW 65-560-101-007

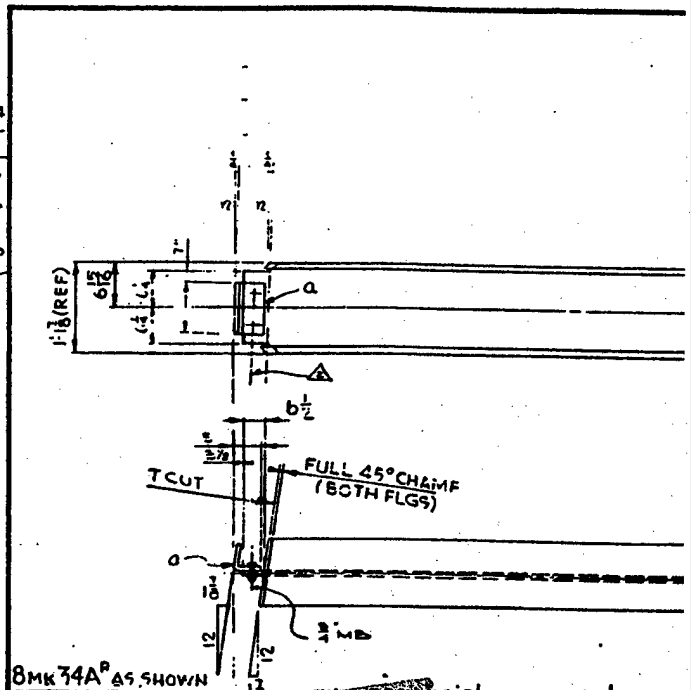
MAR 19 1980

(3)

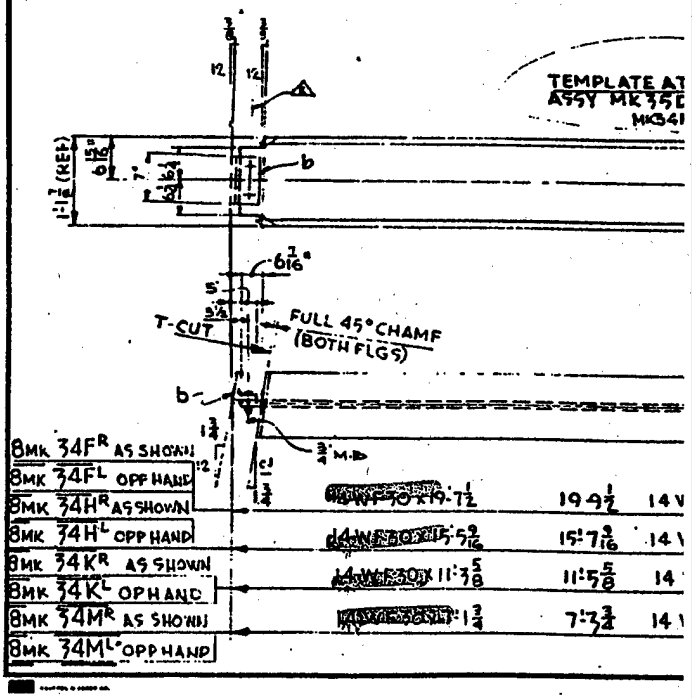
REVISIONS

⚠ REVISED
TO SUIT CO^no 46
10-3-66 CAN.

⚠ REVISED
EDGE CLIPS
FROM WELDED
TO BOLTED
& SHOP REC.
1-18-67 M.DD
CAN.



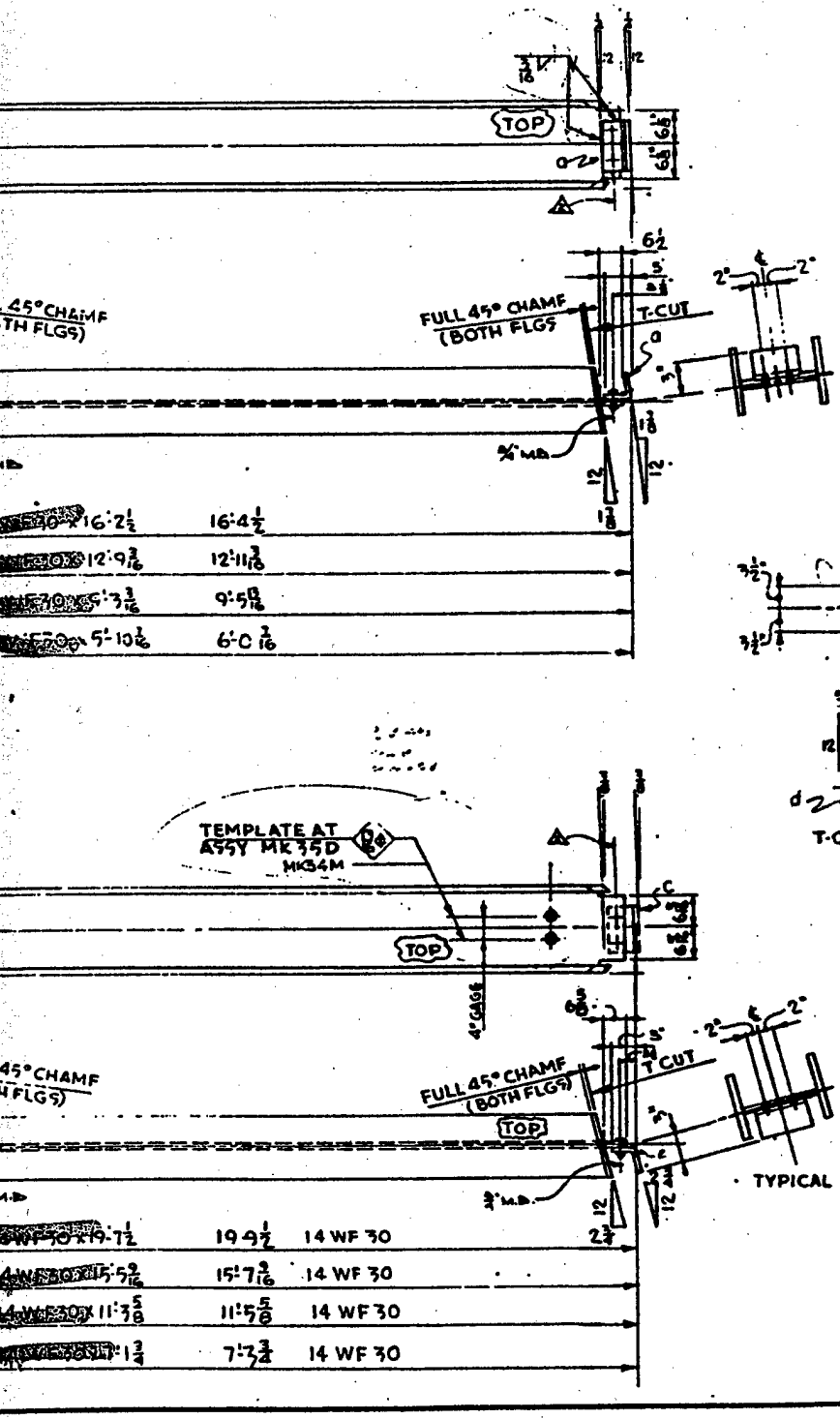
8 MK 34A^R AS SHOWN		
8 MK 34A^L OPP HAND	14 WF 30 × 16'-2½	16'-4½
8 MK 34B^R AS SHOWN		
8 MK 34B^L OPP HAND	14 WF 30 × 12'-9 3/16	12'-11 3/16
8 MK 34C^R AS SHOWN		
8 MK 34C^L OPP HAND	14 WF 30 × 9'-3 3/16	9'-5 5/16
8 MK 34D^R AS SHOWN		
8 MK 34D^L OPP HAND	14 WF 30 × 5'-10 3/16	6'-0 3/16

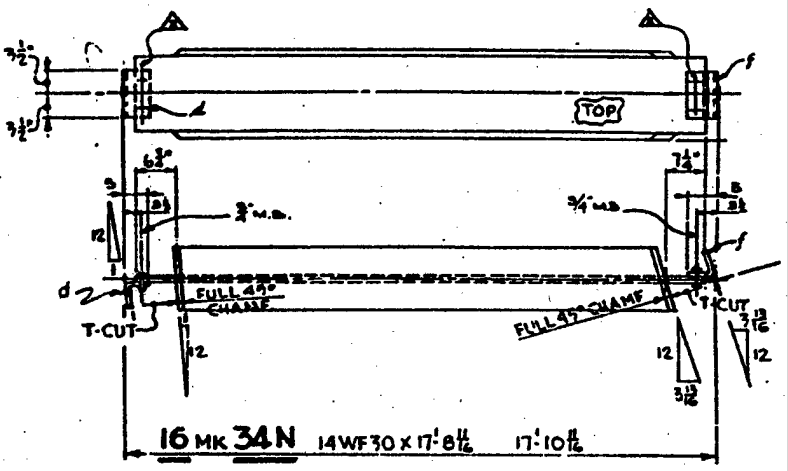


8 MK 34F^R AS SHOWN		
8 MK 34F^L OPP HAND	14 WF 30 × 19'-7½	19'-9½
8 MK 34H^R AS SHOWN		
8 MK 34H^L OPP HAND	14 WF 30 × 15'-5 9/16	15'-7 9/16
8 MK 34K^R AS SHOWN		
8 MK 34K^L OPP HAND	14 WF 30 × 11'-3 5/8	11'-5 5/8
8 MK 34M^R AS SHOWN		
8 MK 34M^L OPP HAND	14 WF 30 × 1¾	7'-7¾

TEMPLATE AT
ASSY MK 35
MK34

(1)





16'-2 1/2	16'-4 1/2	
12'-9 3/16	12'-11 3/16	
9'-3 3/16	9'-5 9/16	
5'-10 1/2	6'-0 3/16	
19'-7 1/2	19'-9 1/2	14 WF 30
15'-5 9/16	15'-7 3/16	14 WF 30
11'-3 5/8	11'-5 5/8	14 WF 30
7'-1 3/4	7'-3 3/4	14 WF 30

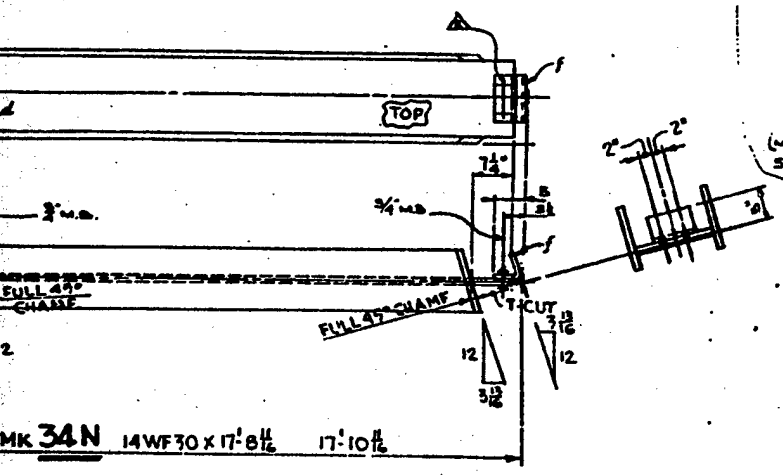
AS

CONTRU
APPR
AS COR

(2)

BILL OF MATERIAL

	8	34A	R	16		14WF30	16	2½	T	548721	.1791
A	8	34A	L	32	a	R 7 x ¼	0	7½	BEND		.125
											.1966
	8	34B	R	16		14WF30	12	9¾	T	548721	.6130
A	8	34B	L	32	a	R 7 x ¼	0	7½	BEND		.125
											.4256
	8	34C	R	16		14WF30	9	3¾	T	548721	.4450
A	8	34C	L	32	a	R 7 x ¼	0	7½	BEND		.125
											.4575
	8	34D	R	16		14WF30	5	10¾	T	548721	.2918
A	8	34D	L	32	a	R 7 x ¼	0	7½	BEND		.125
											.2043
	8	34E	R	16		14WF30	19	7½	T	548721	.7422
A	8	34E	L	16	b	R 7 x ¼	0	7½	BEND		.062
A				16	c	R 7 x ¼	0	7½	BEND		.062
											.9546
	8	34H	R	16		14WF30	15	5¾	T	548721	.7421
A	8	34H	L	16	b	R 7 x ¼	0	7½	BEND		.062
A				16	c	R 7 x ¼	0	7½	BEND		.062
											.7545
	8	34K	R	16		14WF30	11	1¾	T	548721	.5429
A	8	34K	L	16	b	R 7 x ¼	0	7½	BEND		.062
A				16	c	R 7 x ¼	0	7½	BEND		.062
											.5548
	8	34M	R	16		14WF30	7	11¾	T	548721	.3432
A	8	34M	L	16	b	R 7 x ¼	0	7½	BEND		.062
A				16	c	R 7 x ¼	0	7½	BEND		.062
											.3556
	16	34N				14WF30	17	8¾	T	548721	.5510
A				16	d	R 7 x ¼	0	7½	BEND		.062
A				16	f	R 7 x ¼	0	7½	BEND		.062
											.8634
(WT.)										TOTAL	
576	389					¾" M.Bs.	0	1½			56509



MK 34N 14WF30 X 17'-8½" 17'-10½"

MATERIAL SPEC:
R & SHAPES ASTM-A36

REFERENCE
CORPS OF ENGR DWG Nº LGD 1-5-8/1 SHT 85 VOL 1 REV 8
SPECS: PAGE TP-16-1, SECT 16

AS BUILT

CONTRACT NO. DA-45-168 CIVENG 65-560

APPROVED
AS CORRECTED

Subject to conformity with plans and specifications, correction of errors or omissions, and to fulfillment of any required tests. Approval does not cover data, dimensions, or accountability for accordance of statement.

OFFICE OF DISTRICT ENGINEER
LITTLE GOOSE DAM AREA OFFICE

Date 6-5-67

CONST. WELDING REQD INSPECTION CORPS OF ENGR
SPACING NOT SHOWN PAINT NO SHOP PAINT

PACIFIC CAR AND FOUNDRY COMPANY
99 S. HUDSON ST. PH. 2-9300
SEATTLE, WASHINGTON 98134

LITTLE GOOSE LOCK & DAM
ITEM 101 - SPILLWAY GATE
VINNELL, MANNIX, FULLER, DILLINGHAM
CAHILL DATE 5-12-66 CONT. (24) DATE 5-12-66

STRUT BRACING DETAILS

ORDER NO. C670 11101

DRWG. NO. 34-2

DWG 30 SHT 126

DACW 65-560-101-008 389

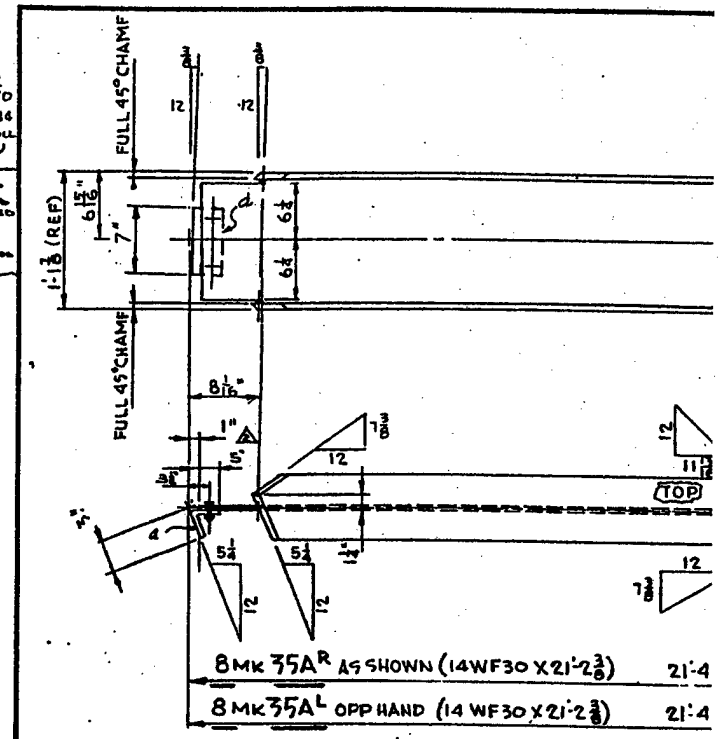
MAR 19 1980

3

REVISIONS

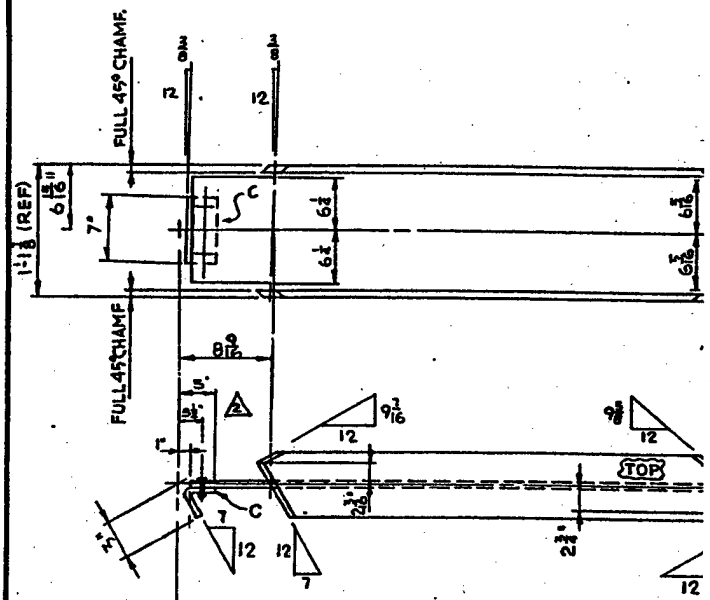
1 REVISED TO SUIT C.O. No 46 10-3-66 CAHILL DW

2 REVISED ERECT. CLIPS FROM WELDED TO BOLTED @ SHOP REQ. 4-19-67. W Box CAHILL



8 MK 35A^{R} AS SHOWN (14WF30 X 21'-2 3/8") 21'-4

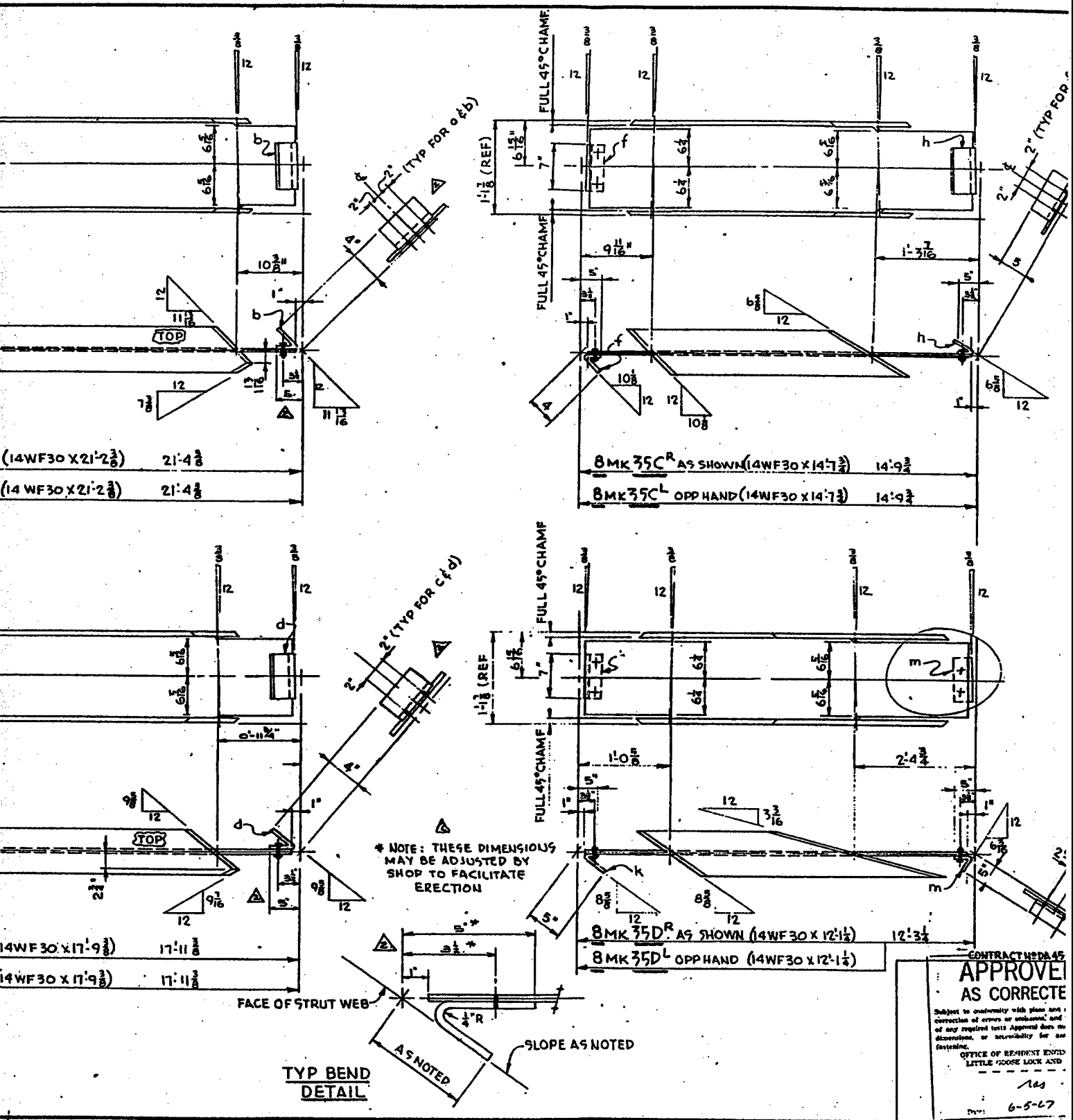
8 MK 35A^{L} OPP HAND (14 WF30 X 21'-2 3/8") 21'-4



8 MK 35B^{R} AS SHOWN (14WF30 X 17'-9 3/8") 17'-11

8 MK 35B^{L} OPP HAND (14WF30 X 17'-9 3/8") 17'-11

(1)



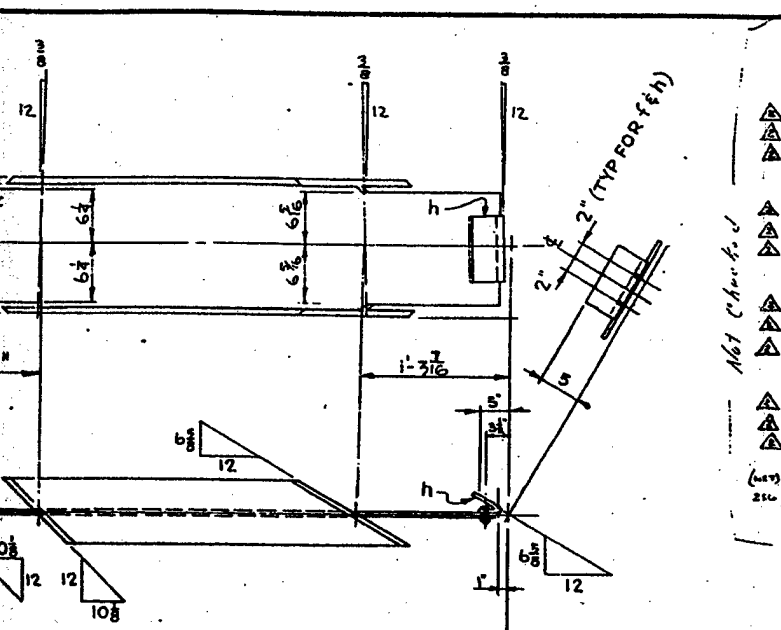
CONTRACT NO. DA 45

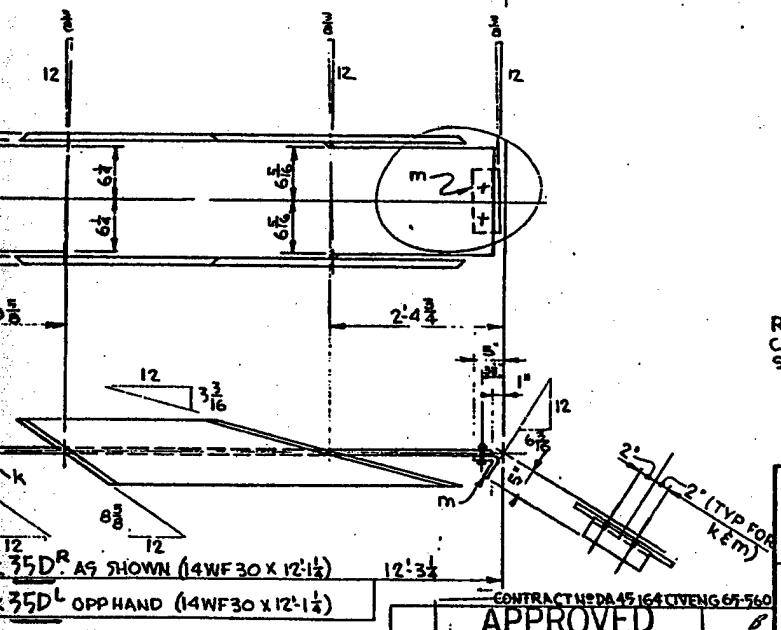
APPROVED
AS CORRECTED

Subject to conformity with plans and specifications, and correction of errors or omissions, and of any required tests. Approval does not relieve contractor of responsibility for accuracy of dimensions, or accessibility for and fastening.

OFFICE OF RESIDENT ENGINEER
LITTLE GOOSE LOCK AND DAM

6-5-67





35C^{R} AS SHOWN (14WF30 X 14'-7 3/4") 14'-9 3/4"

35C^{L} OPP HAND (14WF30 X 14'-7 3/4") 14'-9 3/4"

35D^{R} AS SHOWN (14WF30 X 12'-1 1/4") 12'-3 3/4"

35D^{L} OPP HAND (14WF30 X 12'-1 1/4")

BILL OF MATERIAL

NO. OF PIECES	MARK	TOTAL NO. OF PIECES	SIZE	LENGTH FT.	LENGTH IN.	REMARKS	WEIGHT
8	35A^{R} 16		W14WF30	21	2 3/8	S48T21	10176
8	35A^{L} 16 a		PL 7 x 1/4	0	7		57
	16 b		PL 7 x 1/4	0	7		57
							10290
8	35B^{R} 16		W14WF30	17	5 3/16	S48T21	8330
8	35B^{L} 16 c		PL 4 13/16 x 1/4	0	7		52
	16 d		PL 4 13/16 x 1/4	0	7		56
							8642
8	35C^{R} 16		W14WF30	14	7 3/4	S48T21	7022
8	35C^{L} 16 f		PL 7 x 1/4	0	7 3/4		61
	16 h		PL 7 x 1/4	0	8		66
							7159
8	35D^{R} 16		W14WF30	12	1/4	S48T21	5909
8	35D^{L} 16 k		PL 7 x 1/4	0	8		66
	16 m		PL 7 x 1/4	0	8		66
							5940
(WT) 256	2661		SHIP 3/4 M.B.	6	1/4	TOTAL	32,031

MATERIAL SPEC
PLATE & SHAPE ASTM-A36

REFERENCE
CORPS OF ENGR DWG Nº LGD1-5-8/1 SHT 85 VOL I REV B
SPECS PAGE TP-16-1, SECT 16

AS BUILT

CONTRACT Nº DA 45 164 CIVENG 65-560

APPROVED
AS CORRECTED
Subject to conformity with plans and specifications, correction of errors or omissions, and to fulfillment of any required tests. Approval does not cover detail dimensions, or accessibility for assembling and fastening.
OFFICE OF RESIDENT ENGINEER
LITTLE GOOSE LOCK AND DAM
ras
6-5-67

CERT. WELDING BY READ INSPECTION CORPS OF ENGR
RIVETS BOLTS 13/16" OPEN HOLES ...EXCEPT AS NOTED
END AND EDGE DISTANCE ...EXCEPT AS NOTED
SPACING NOT SHOWN
PAINT NO SHOP PAINT

PACIFIC CAR AND FOUNDRY COMPANY
60 S. HUDSON ST. PA. 2-5288
SEATTLE, WASHINGTON 98134

LITTLE GOOSE LOCK & DAM
ITEM 101 - SPILLWAY GATE
FOR VINNELL, MANNIX, FULLER, DILLINGHAM
DR. CAHILL DATE 7/65 CHK. GW DATE 5-16-66
ISSUED STRUT BRACING DETAILS ORDER NO. C670-11101
4 Prints; 2 Mylar
5 Prints; 2 Mylar
APPROVED R.O. Hudson
DWG. NO. 35 2/2
SCALE 30 DATE 7/9/65
DESIGNED BY
DRAWN BY
TRACED BY
CHECKED BY

DACW 65-560-101-009 390

3

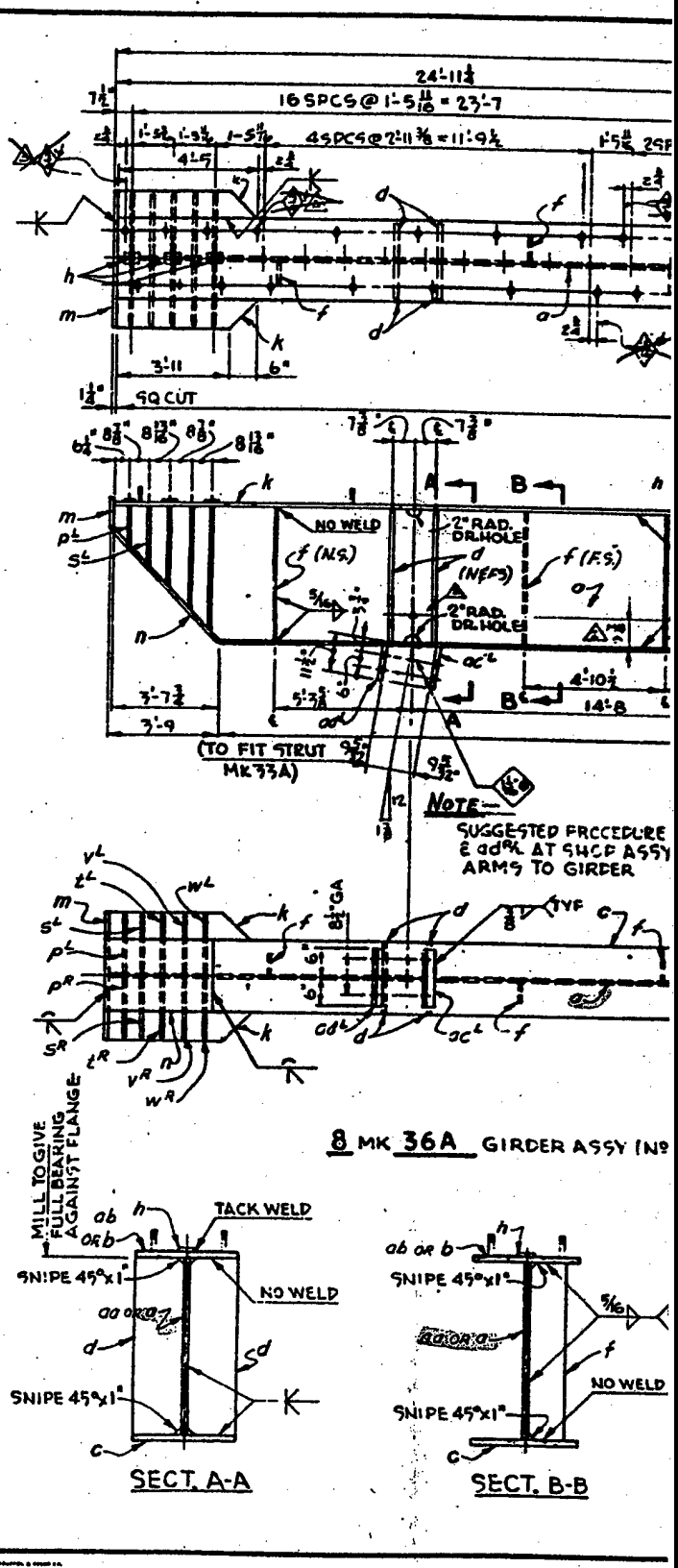
MAR 19 1980

DEVISIONS

1 REVISED ERECTION DET TO SUIT 10-3-66 CAMILL AW

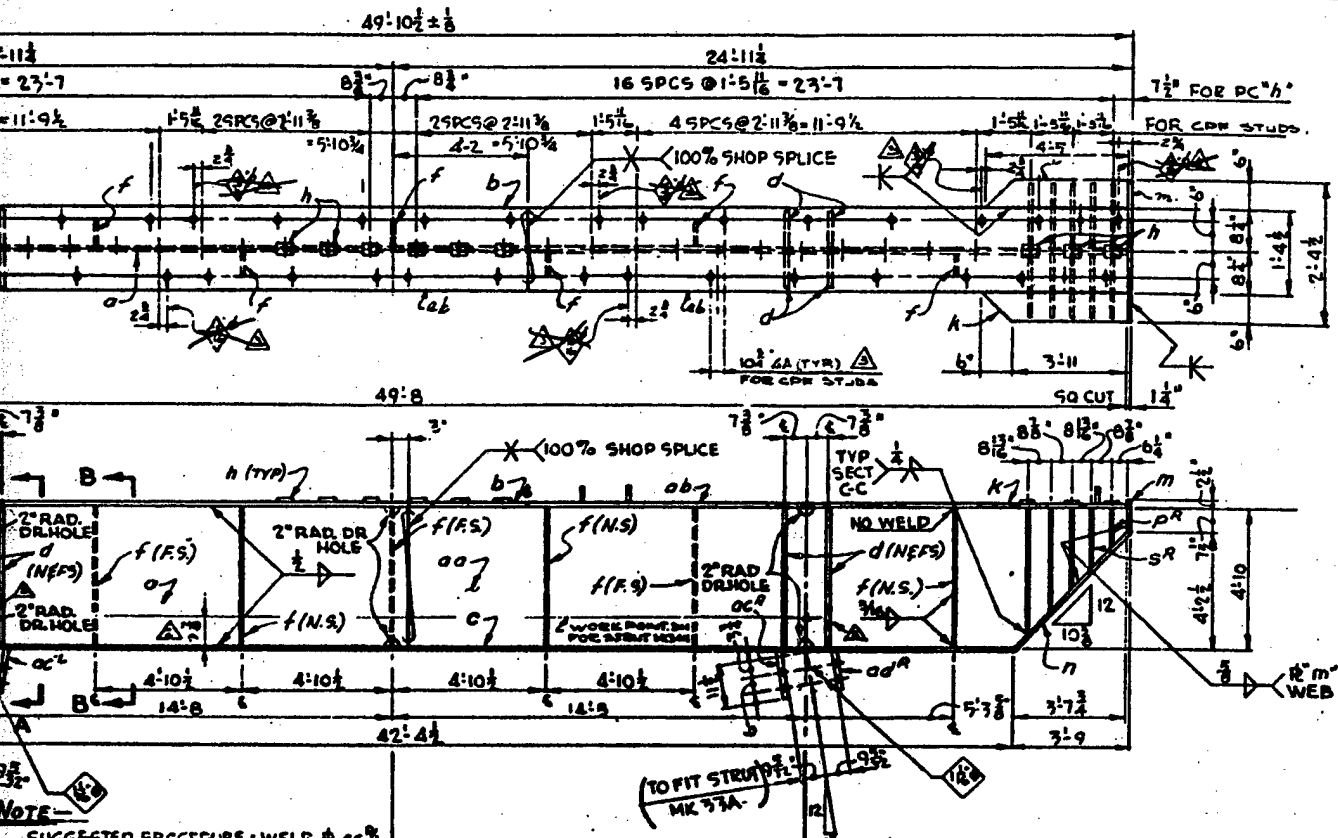
2 DELETED 13/16" DIA. HOLES FROM WEB OF GIRDER. & SHOP REQ. 4-19-67 J. Bock CAMILL

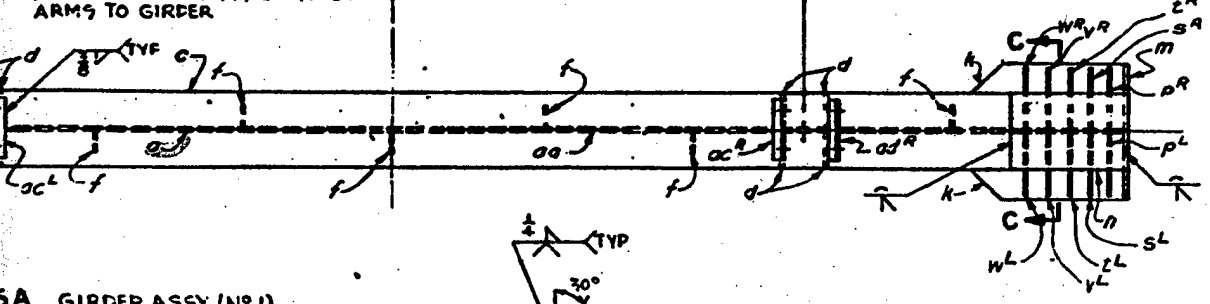
3 DELETED 8-CPF STUDS & ADDED 8-7/8" DIA. HOLES TO SUIT Weigh Bock CAMILL

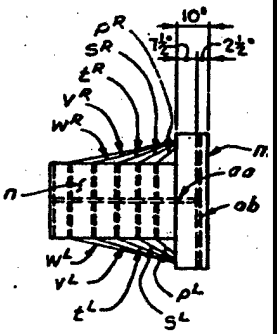


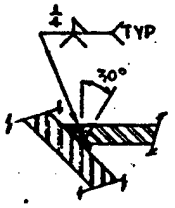
8 MK 36A GIRDER ASSY (No

(1)

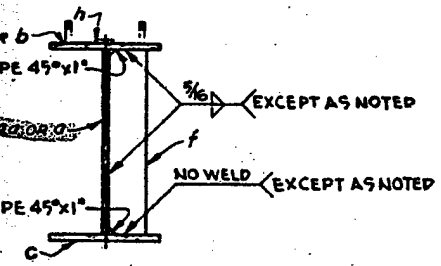




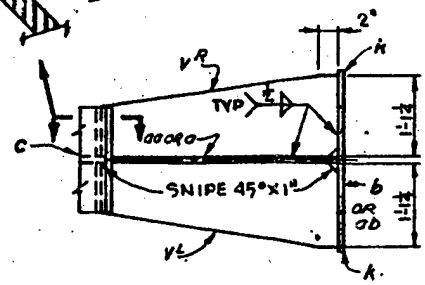




6A GIRDER ASSY (Nº 1)



SECT. B-B



SECT C-C
TYPICAL

CONTRACT NO DA45-144 CIVENG 66-590

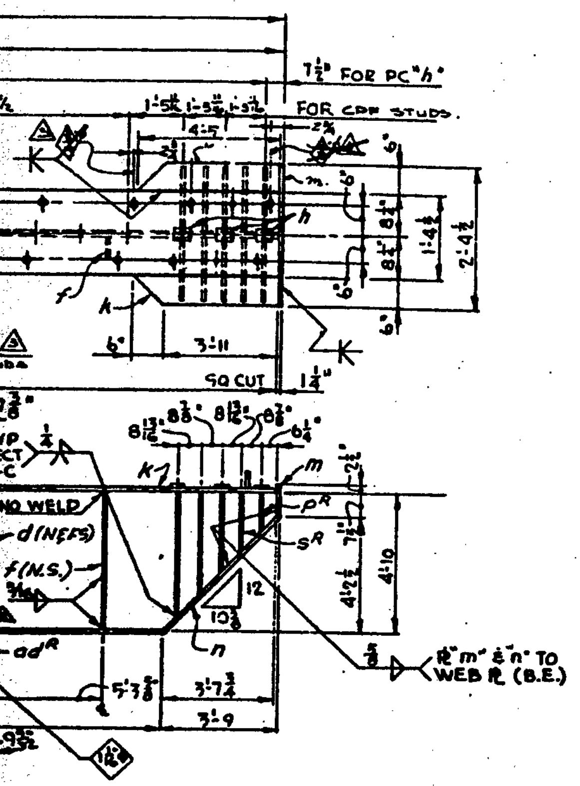
APPROVED
AS CORRECTED

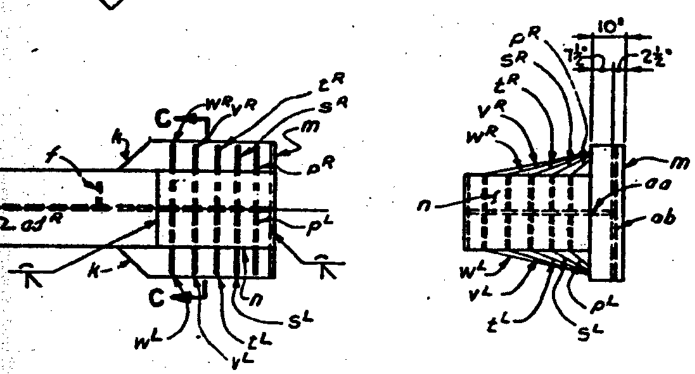
Subject to conformity with plans and specifications, correction of errors or omissions, and to fulfillment of any required tests. Approval does not relieve contractor of responsibility for furnishing and fabricating.

OFFICE OF DISTRICT ENGINEER
LITTLE GOOSE LOCK AND DAM

Date: 18 Aug 67

(2)





BILL OF MATERIAL

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Ft.	In.	[illegible]		[illegible]
8	36A	8	a	R 58X1 LOW ALLOY	25	1	① IES	548717	40,324
		8	b	R 16½X1½	29	10		548717	14,655
		8	c	R 16½x1¼	42	4½		548717	24,33?
		64	d	R 7¼x1½	4	10	MIE-SHIPE	548856	2,542
		56	f	BAR 5x⅝	4	10	SHIPE		1733
		272	h	BAR 2x⅛	0	8½		548099	164
		96/192	k	BAR 6X1¼	8	4	1CUTS2①	548099	3?4?
		16	m	R 10X1¼	2	4½		STOCK	1649
		16	n	R 16½x1¼	5	6¾		548092	6396
		16/96	p%	R 13¾X1	1	2¼	① SHIPE	548092	1729
		16/96	s%	R 13¾X1	2	0⅝	①		2773
		16/16	t%	R 13¾x1	2	10⅞	①		4233
		16/16	v%	R 13¾x1	3	8½	①		5463
		16/16	w%	R 13¾ x1	4	7	①		6709
		8	aa	R 58 x 1 LOW ALLOY	24	7	① IES	548717	38,520
		8	ab	R 16¼x1½	20	8		548717	11,871
		8/8	ac%	R 12x¾	1	1			539
		8/8	ad%	R 10⅛x¾	1	0			419
				SHOPWELD					3600
		236		¾" WEL STUD	0	2½			158
				SHIP					
64				⅞" M.B	0	3			-
133				1" M.B	0	4¾			-
294				⅞" HEX NUT.					
							TOTAL		184 398

MATERIAL SPEC:
PLATE & BAR ASTM-A36 EXCEPT AS NOTED
PLATE LOW ALLOY STL - SEE PAGE TP-9-38, PARA 9-09 OF GEN. SPEC.
MACH BOLTS ASTM A307 GR A
WELD STUDS - MFRS STD

REFERENCE:
CORPS OF ENGR DWG Nº LGD1-5-8/2 SHT 86 VOL I REV B
1-5-8/3 87 B
SPEC. PAGE TP-16-1, SECT 16
TP-9-38, PARA 9-09

AS BUILT

CONTRACT NO DA-45-164 CIVENG 65 560

APPROVED
AS CORRECTED

OFFICE OF RESIDENT ENGINEER
LITTLE GOOSE LOCK AND DAM

18 Aug 67

OPEN HOLES 1³⁄16" EXCEPT AS NOTED
PAINT NO SHOP PAINT

PACIFIC CAR AND FOUNDRY COMPANY
SEATTLE, WASHINGTON

LITTLE GOOSE LOCK & DAM
ITEM 101 - SPILLWAY GATE
FOR VINNELL, MANNIX, FULLER, DILLINGHAM
BY CAHILL

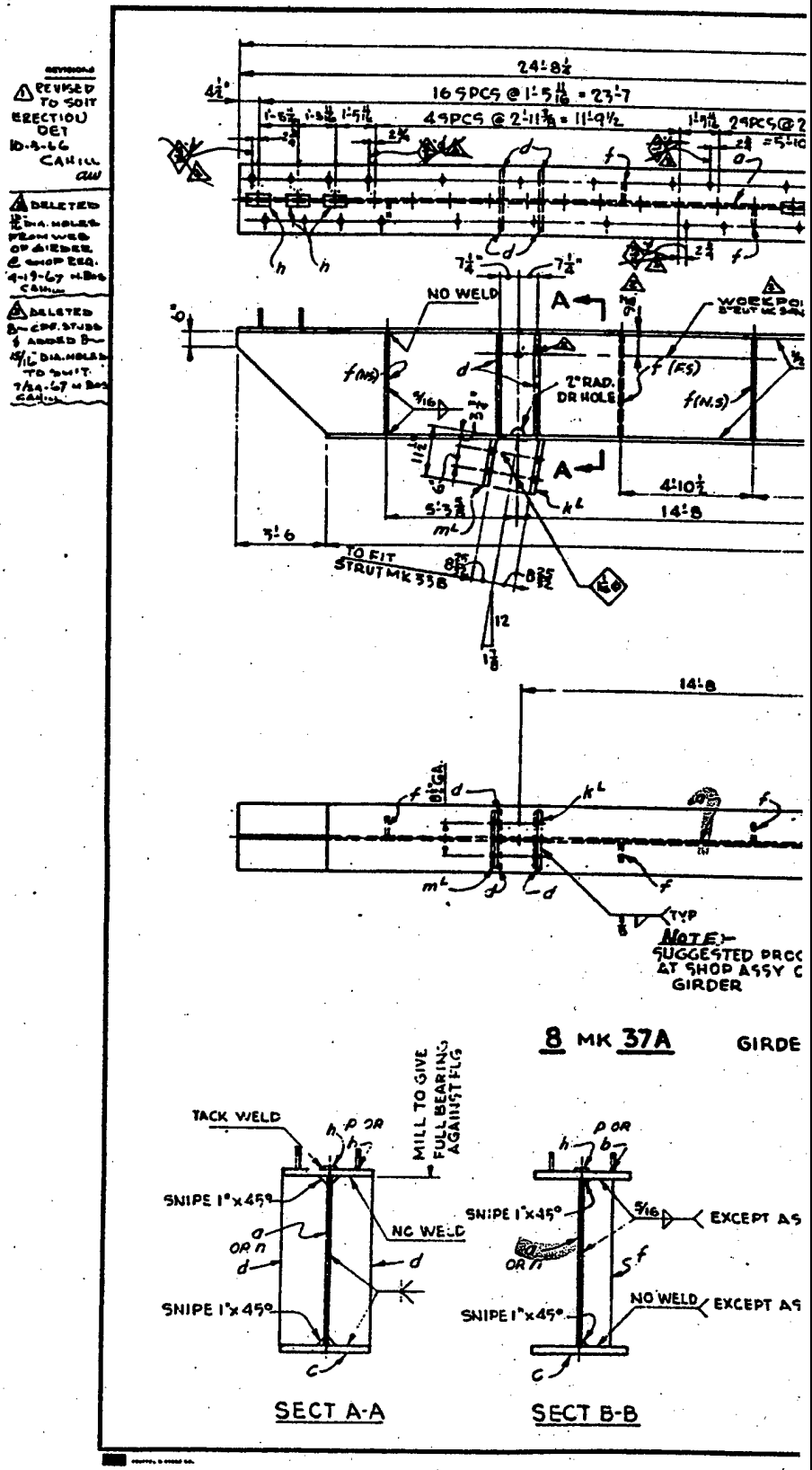
GIRDER Nº1 DETAIL
ORDER No C670-12101
DWG No 36-3

BM#30 FOR SHOP CONVEN: ELEC

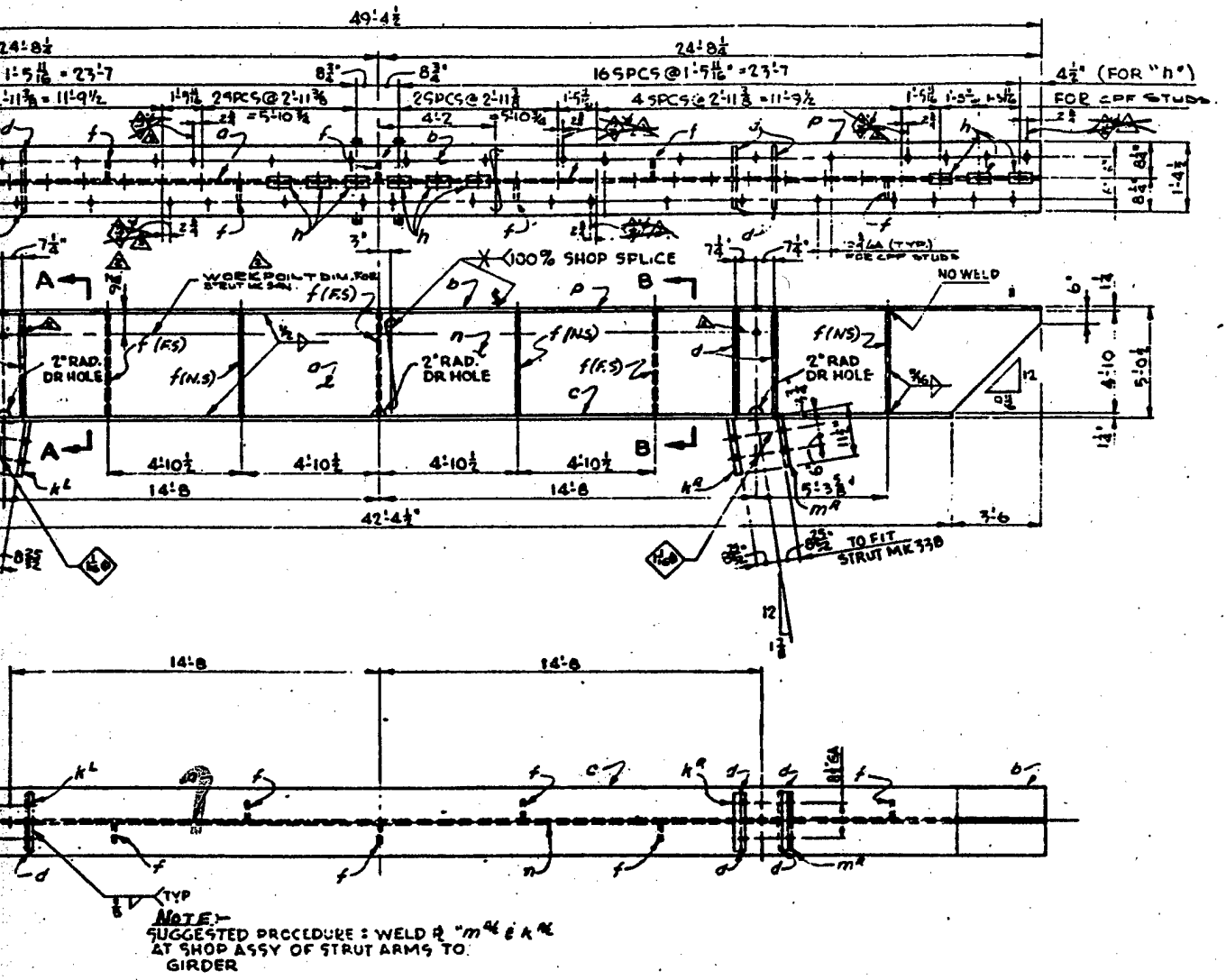
DG 65-560-101-010 391

(3)

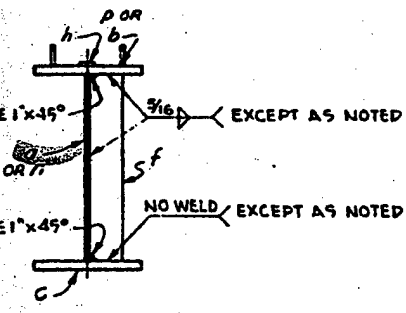
MAR 19 1980


REVISED TO SUIT ERECTION DET 10-8-66 CAHILL
DELETED 1" DIA. HOLES FROM WEB OF GIRDER & SHOP REQ. 4-19-67 M Bos CAHILL
DELETED 8 — CPF. STUDS & ADDED 8 — 15/16" DIA. HOLES TO SUIT 7/24-67 M Bos CAHILL
24'-8½
16 SPCS @ 1'-5 11/16 = 23'-7
49PCS @ 2'-11 3/8 = 11'-9½
NO WELD
2" RAD. DR HOLE
TO FIT STRUT MK 35B
14'-8
TYP
NOTE:-
SUGGESTED PROC
AT SHOP ASSY C
GIRDER
8 MK 37A
GIRDE
TACK WELD
MILL TO GIVE FULL BEARING AGAINST FLG
SNIPE 1"x45°
NO WELD
SNIPE 1"x45°
SECT A-A
SNIPE 1"x45°
5/16
EXCEPT AS
NO WELD
EXCEPT AS
SECT B-B

(1)



8 MK 37A GIRDER ASSY (Nº2)



SECT B-B

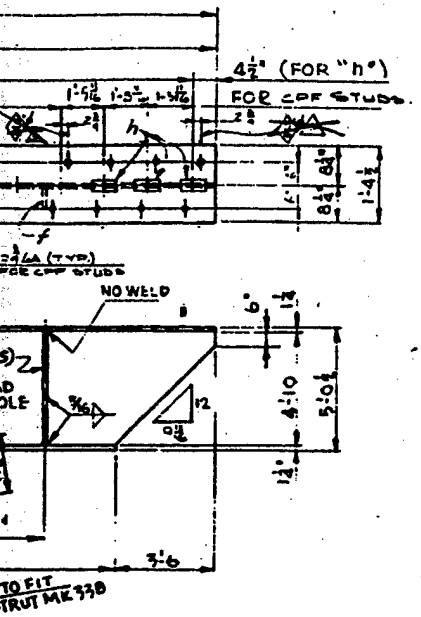
CONTRACT Nº DA45-164 CIVENG

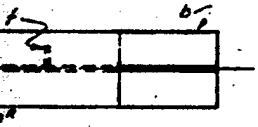
APPROVED
AS CORRECTED

Subject to conformity with plans and specifications of errors or omissions and to full of any required revis Approval does not relieve dimensions, or responsibility for accuracy Fabricator.

OFFICE OF RESIDENT ENGINEER
LITTLE GOOSE LOCK AND DAM

Date 18 Aug 67





BILL OF MATERIAL

				SIZE	LENGTH FT	LENGTH IN	REMARKS	WEIGHT
6	37A	8	a	PL 58 x ¾ LOW ALLOY	24	11¼	548117	33.07
		8	b	PL 16½ x 1¼	28	10¼		16,558
		8	c	PL 16½ x 1¼	42	4½		24,333
		64	d	PL 7⅛ x 1⅛	4	10	MK SNIPE 548850	10,613
		56	f	BAR 5 x ⅜	4	10	SNIPE	1735
		272	h	BAR 2 x ⅛	0	8½	548940	164
				SHOP WELD				516
		8	k	PL 12 x ¾	1	1		537
		8	m	PL 10 x ¾	1	0		414
		8	n	PL 58 x ¾ LOW ALLOY	24	5¼	548117	23,473
		3	P	PL 16½ x 1¼	20	6¼		11,795
		2.25	S	¾ HEL STUDS	0	2½ CPF		198
				SHIP				
⚠ (c)		66		⅞ M.B.	0	3		
		133		1" M.B.	0	4½		
⚠ (a)		264		¾ HX NUT				
							TOTAL	126,762

MATERIAL SPEC:
PLATE & BAR — ASTM-A36 EXCEPT AS NOTED
PLATE — LOW ALLOY - SEE PG TP-9-38, IP9-09 OF GENERAL SPECS.
MACH. BOLTS — ASTM A307, GR A
STUDS — MFRS STD

REFERENCE:
CORPS OF ENGR DWG NO LGD 1-5-8/2 SHT 86 VOLT REV B
1-5-8/3 ↑ 87 ↑ ↑ B
SPECS PAGE TP-16-1, SECT 16
PAGE TP-9-38, PARA. 9-09

AS BUILT

CONTRACT NO DA 45-164 CIVENG 65-560

APPROVED
AS CORRECTED
Subject to conformity with plans and specifications, correction of errors or omissions and to fulfillment of any required tests. Approval does not relieve the detail dimensions, or responsibility for errors and omissions.
OFFICE OF RESIDENT ENGINEER
LITTLE GOOSE LOCK AND DAM
Date 18 Aug 67

B

Fit #30 for SHOP CONVENIENCE

CONT. WELDING REQD. INSPECTION CORPS OF ENGR
RIVETS/BOLTS — OPEN HOLES — EXCEPT AS NOTED
END AND EDGE DISTANCE — EXCEPT AS NOTED
SPACING NOT SHOWN —
PAINT NO SHOP PAINT

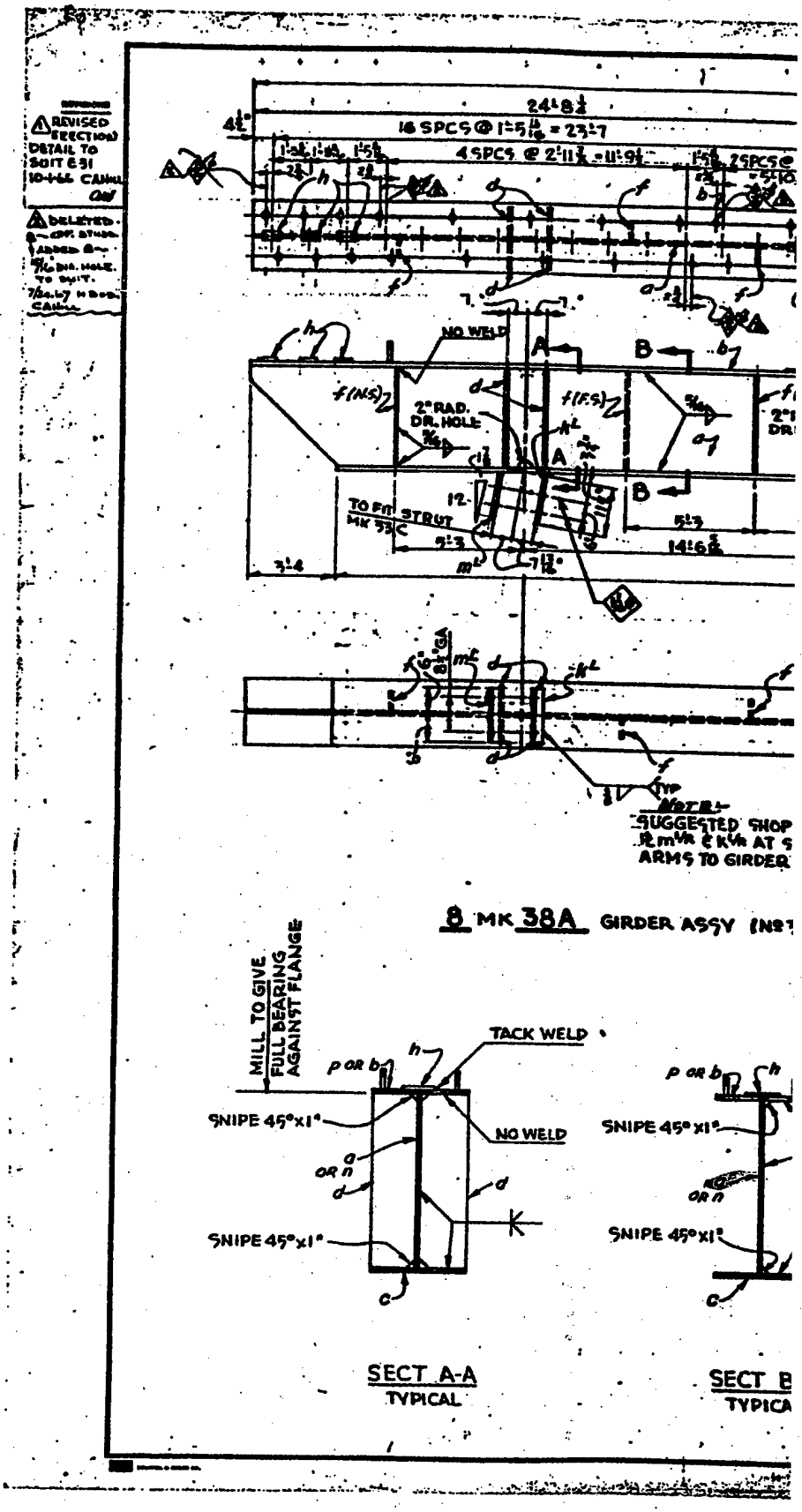
PACIFIC CAR AND FOUNDRY COMPANY
80 S. HUDSON ST. PA. 2-2300
SEATTLE, WASHINGTON 98134

LITTLE GOOSE LOCK & DAM
ITEM 101 - SPILLWAY GATE
FOR VINNELL, MANNIX, FULLER, ILLINGHAM
BY CAHILL DATE 12-20-65 CHK DATE 5-16-66
ISSUED
GIRDER #2 DETAIL
ORDER NO. C670-12101
APPROVED
DWG. NO. 37 3

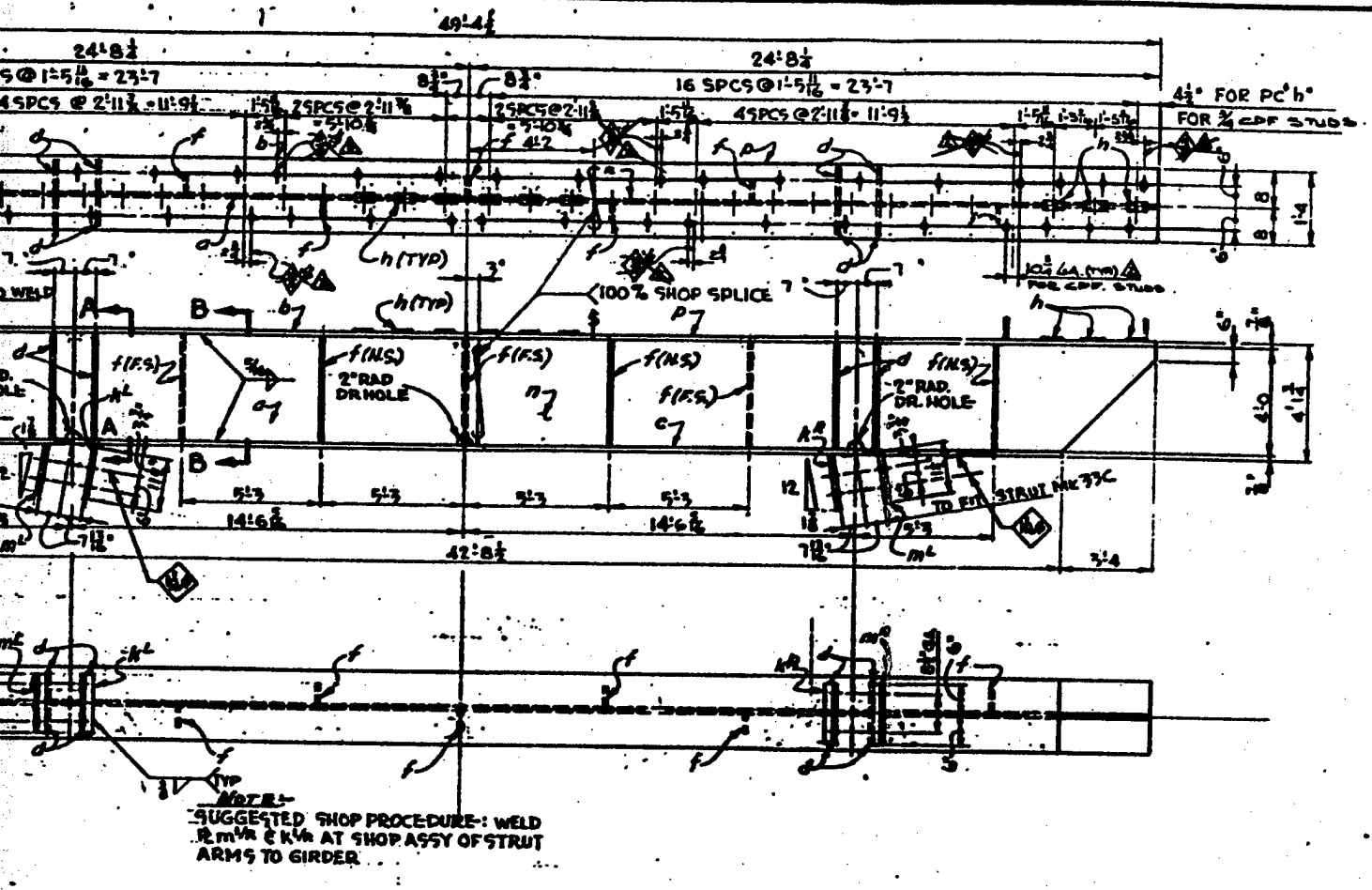
LIG. 65-560-101-011 392

3

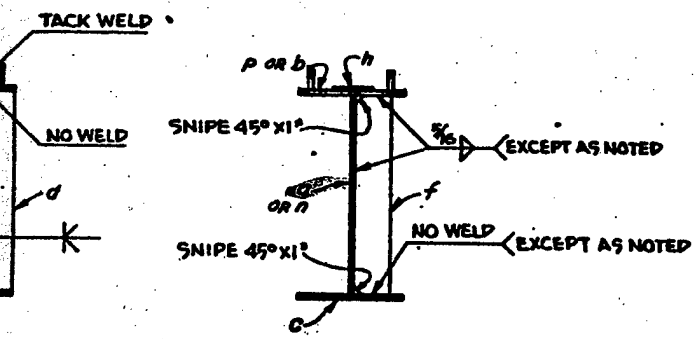
MAR 19 1980


REVISED ERECTION DETAIL TO SUIT E31
DELETED
24'-8 1/2"
16 SPCS @ 1'-5 11/16" = 23'-7"
4 SPCS @ 2'-11 3/4" = 11'-9"
NO WELD
2" RAD. DR. HOLE
TO Pnl MK 33C STRUT
14'-6 3/8"
SUGGESTED SHOP
ARMS TO GIRDER
8 MK 38A GIRDER ASSY
MILL TO GIVE FULL BEARING AGAINST FLANGE
TACK WELD
SNIPE 45°x1"
NO WELD
SECT A-A
TYPICAL
SECT B
TYPICA

1



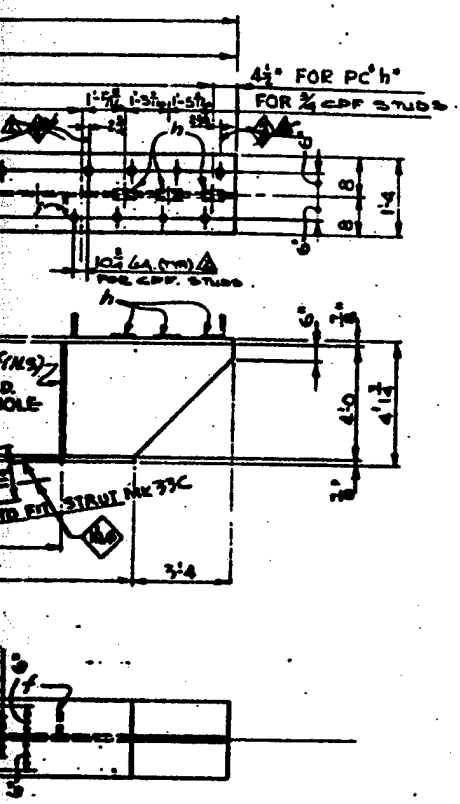
MK 38A GIRDER ASSY (N23)



SECT B-B
TYPICAL

APPROVED
AS CORRECTED

(2)



BILL OF MATERIAL

8	38A	8	a	PL 48"x 1" LOW ALLOY	24	11¼		S4811	14511
		8	b	PL 16"x ⅞"	28	10⅝			11176
		8	c	PL 16"x 1"	42	8½			16546
		64	d	PL 7½"x ⅝"	4	0	WITH SHIPS	S4811	5034
		56	f	BAR 2"x ⅞"	4	0			1438
		272	h	BAR 2"x ⅛"	0	8½		S4811	164
		8	k	PL 12"x ⅝"	1	0⅛			534
		8	m	PL 10½"x ⅝"	1	0			424
		8	n	PL 48"x 1" LOW ALLOY	24	5⅛		S4811	14382
		8	p	PL 16"x ⅞"	20	6⅜			7949
				SHOP WELD					1600
		288		¾ NELSTUDS	0	2½	CPF		1584
				SHIP					
	32			¾ M.B	0	2½			
	133			1" M.B	0	3½			
	66			⅞ M.B	0	2½			
	294			¾ ANCHORS			total		78,082

MATERIAL SPEC:
PLATE & BAR ASTM-A36 EXCEPT AS NOTED.
PLATE LOW ALLOY STL. SEE PG TP-9-38, PARA 9-09 OF GEN. SPEC.
WELD STUDS MFR'S. STD.

REFERENCE:
CORPS OF ENGR DWG Nº LGD 1-58/2 SHT 86 VOL I REV B
1-58/3 87
SPEC: PG TP-16-1, SECT. 16
PG TP- P-

AS BUILT

CONTRACT NO. DA-45-144-CIVENG-68-560

APPROVED
AS CORRECTED
Subject to conformity with plans and specifications, correction of errors or omissions, and to fabricator of any required tests. Approval does not cover detail dimensions, or responsibility for checking and stamping.
OFFICE OF RESIDENT ENGINEER
LITTLE GOOSE LOCK AND DAM
Date: 18 Aug 67

B

SM#30 FOR SHOP CONVENIENCE

REQD ____ INSPECTION CORPS OF ENGR
WELDING ____ OPEN HOLES ____ EXCEPT AS NOTED
END AND EDGE PREPARATION ____ EXCEPT AS NOTED
SPACING NOT CHECKED ____
FINISH NO SHOP PAINT

PACIFIC CAR AND FOUNDRY COMPANY
69 E. HUDSON ST. PH. 3-0500
SEATTLE, WASHINGTON 98102

LITTLE GOOSE LOCK & DAM
ITEM 101- SPILLWAY GATE
FOR HINNELL, MARNEY, FULLER, DILLINGHAM
DES. O.A.Hill CHKD. [illegible] APPD. [illegible] DATE 5-19-66

2 SHOP PRINTS	GIRDER #3 DETAILS	CONTRACT NO.	E670-12101
2 MYLAR		DWG. NO.	38 L
1 SEPIA			

R.O. Foundries

LGS-560-101-012 393

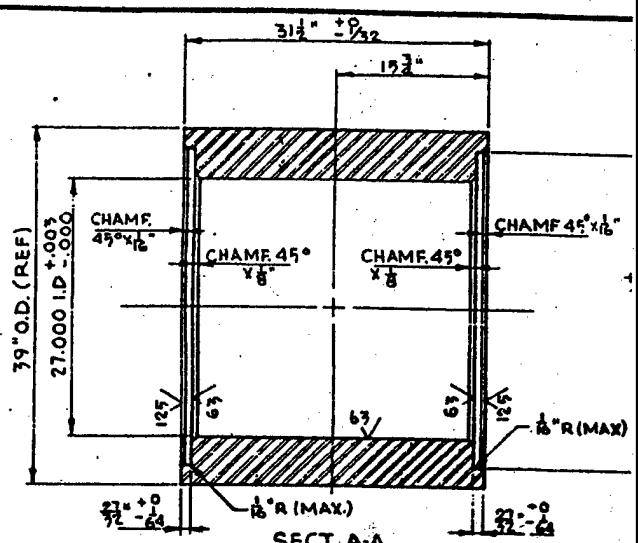
3

MAR 19 1980

REVISIONS

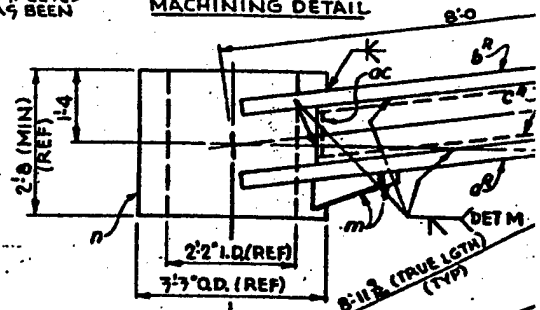
1 REVISED TO SUIT C.O 44°° 10-3-66 CAHILL AW

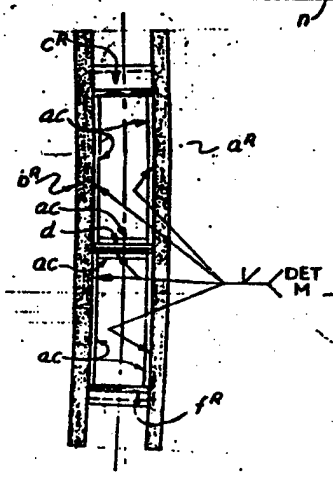
2 REVISED WELD DET. M TO SUIT COF DESIGN DWG J.S. 10/4/67 CAH



NOTE:
MACHINING TO BE COMPLETED AFTER WELDMENT HAS BEEN STRESS RELIEVED

SECT A-A
MACHINING DETAIL



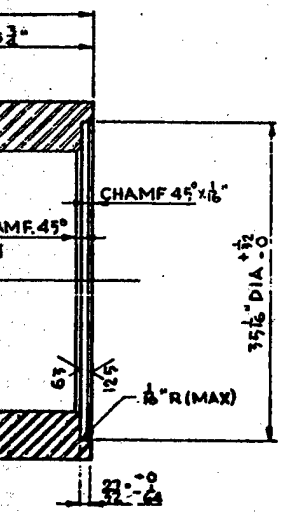


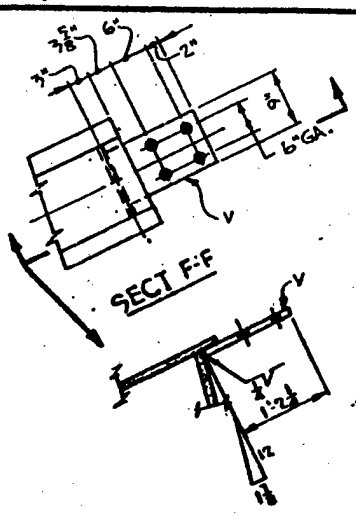
SECT D-D

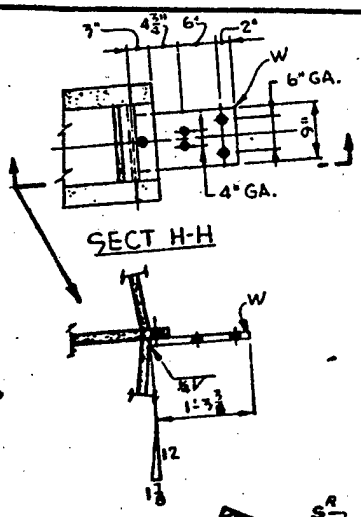
DETAIL B
WELDMENT ASSY
STRESS RELIEVE AFTER ALL WELDING HAS BEEN COMPLETED

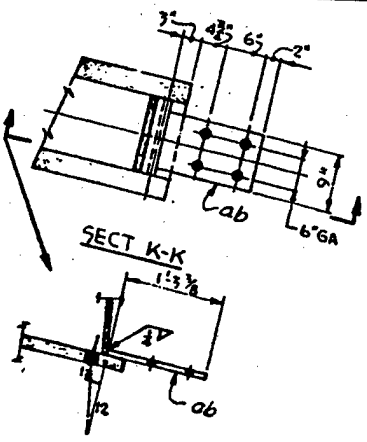
8 AS SHOWN
8 OPP HAND

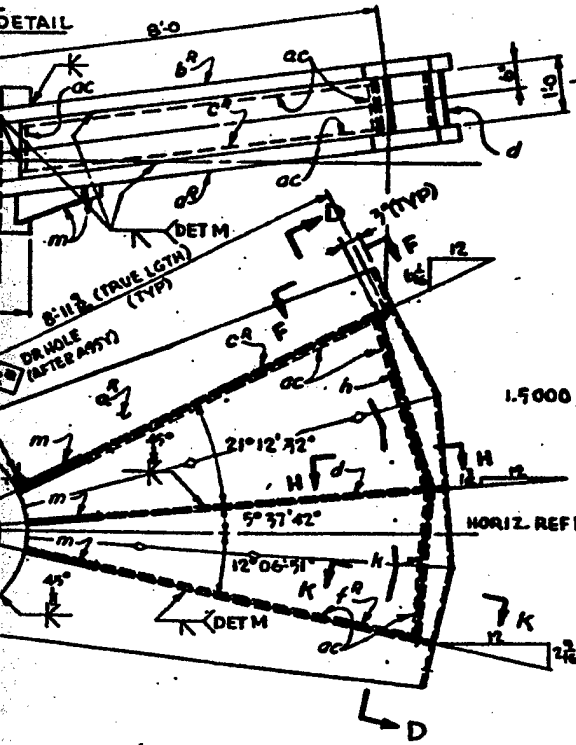
(1)

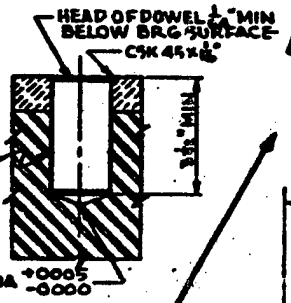


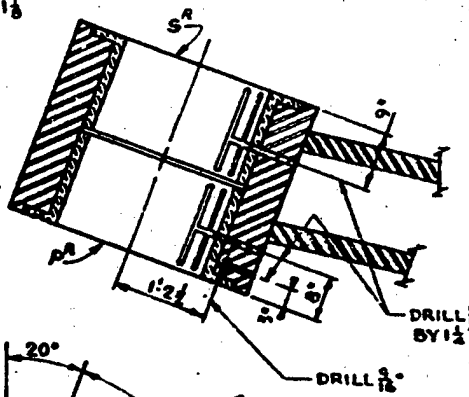


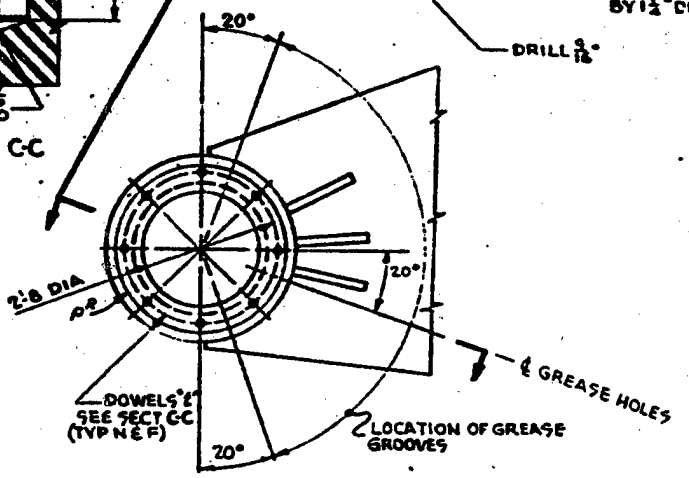


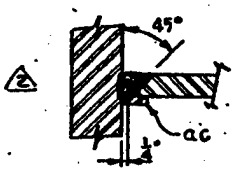












DETAIL M

ETAIL B

ELDMENT ASSY

ELIEVE AFTER ALL AS BEEN COMPLETED

AS SHOWN
OPP HAND

⚠ NOTE: ERECTION CLIPS NOT SHOWN; SEE SECT F-F, H-H, & K-K. CLIPS TO BE REMOVED TO COMPLETE REQUIRED FIELD WELD

.8 MK 39A^R AS SHOWN TRUNNION
.8 MK 39A^L OPP HAND HUB ASSY
SEE DET "B" FOR WELDMENT ASSY

WORK THIS SHEET WITH Nº40

CONTRACT NO. DA45-164 CIVENG 65-560

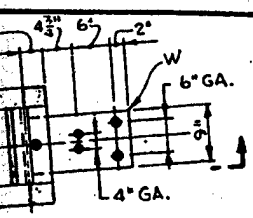
APPROVED

Subject to conformity with plans and specifications, correction of errors or omissions, and to fulfillment of any required tests. Approval does not cover details, dimensions, or responsibility for assembling and fastening.

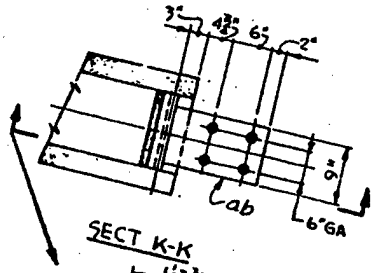
OFFICE OF RESIDENT ENGINEER
LITTLE GOOSE LOCK AND DAM

Date 31 Oct 67

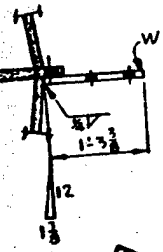
(2)

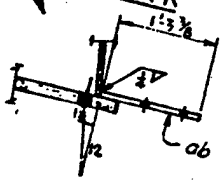


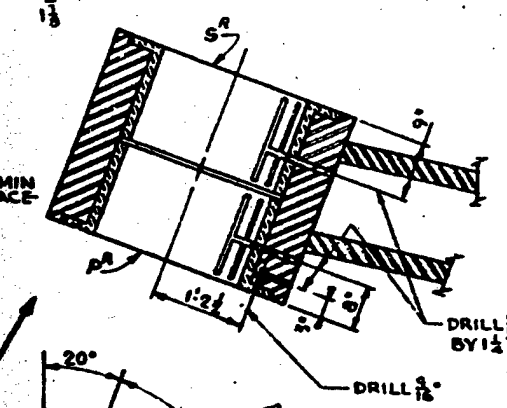
ECT H-H

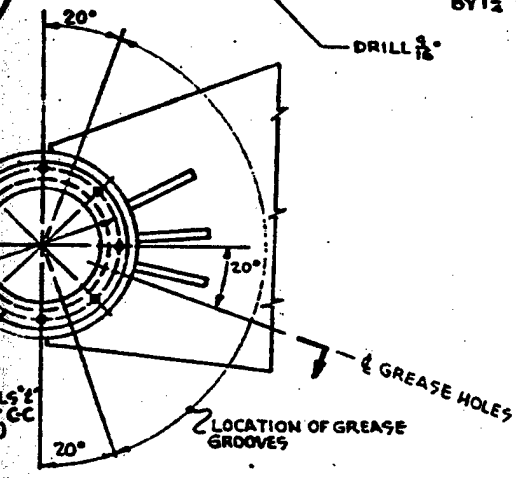


SECT K-K









BILL OF MATERIAL

DET DWG NO					NAME	QUANTITY PER		REMARKS	WEIGHT
40A	8	39A^{R}	16	a	PL 8 3/4 x 3/4	9	0 3/8		145 78L
40A	8	39A^{L}	16	b	PL 8 3/4 x 3/4	8	10 3/8		138 50L
40			16	c	PL 11 1/2 x 1	7	8 3/4		4723
40			16	d	PL 11 3/4 x 1 3/8	7	4 1/2		7848
40			16	f	PL 11 3/4 x 1 3/8	7	4 3/4		8857
40			16	h	PL 12 3/8 x 1	5	0 3/8		2197
40			16	k	PL 12 3/8 x 1	2	9 3/4		1701
40			48	m	PL 8 3/8 x 1 1/2	1	3		2422
—			16	n	HUB FORGING 31.30 OD x 21.2 ID	2	8		8872
40			16	p	BUSHING, BRZ				1200
40			16	s	BUSHING BRZ				1200
40			256	t	1 1/8 DOWEL	0	3	STRAIGHT TYPE	451
—			16	v	PL 9 x 3/4	1	2 3/4		446
—			16	w	PL 9 x 3/4	1	3 1/4		479
—			16	ab	PL 9 x 3/4	1	3 1/4		479
			—	ac	BAR 1 x 1/4	72.0		CUT TO SUIT ON JOB	61
					Shop WELD				1 1/2
					SHIP				
(44)	66				1" M.B	0	3 1/4		
(44)	66				1" MB	0	4 1/8		
(44)	66				1" MB	0	3 1/4		
								TOTAL	435 812

MATERIAL SPECS:

PLATE & BAR	ASTM-A36
HUB FORGING	ASTM-A235, CL. C1 (1025-1030)
BUSHINGS	ALUMINUM BRZ. ASTM B148 CL. 9-C HT.
DOWEL	COM'L COLD FIN STL (C1018)
MACH BOLTS	ASTM A307, Gr. A

REFERENCE:
CORPS OF ENGR DWG Nº LGD-1-5-8/5, SHT 89, VOL I, REV 6
SPECS: PG TP-16-1, SECT 16

AS BUILT

WORK THIS SHEET WITH Nº40

HOWN TRUNNION
HAND HUB ASSY
FOR WELDMENT
SSY

CONTRACT Nº DA45-164 CIVENG 65-560

APPROVED
Subject to conformity with plans and specifications, correction of errors or omissions, and to addition of any required tests. Approval does not cover details, dimensions, or responsibility for assembling and fitting.
OFFICE OF RESIDENT ENGINEER
LITTLE GOOSE LOCK AND DAM
Date 31 Oct 67

BM#30 FOR SHOP CONVENIENCE

MacPhail Date
- -
- -
- -
- -
Mark Date

CONST. WELDING REQD INSPECTION CORPS OF ENGRS
SPACING NOT SHOWN
PAINT NO SHOP PAINT

PACIFIC CAR AND FOUNDRY COMPANY
80 S. HUDSON ST. PH. 3-0080
SEATTLE, WASHINGTON 98134

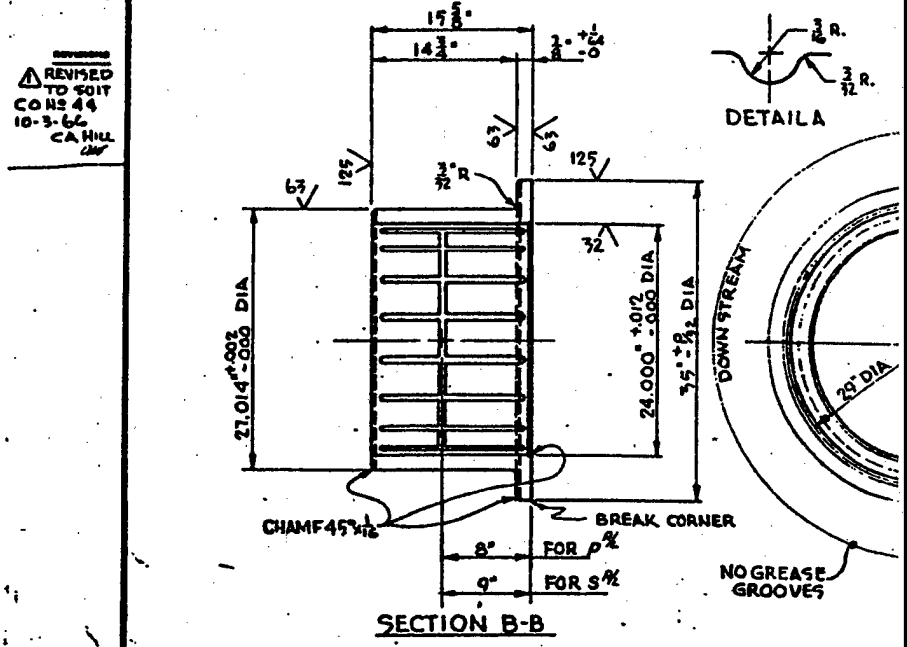
LITTLE GOOSE LOCK & DAM
ITEM 101 SPILL WAY GATE
FOR WINNELL MANNIX FULLER, DILLINGHAM
CAHILL

ENGR SHEET	TRUNNION HUB ASSY	C610-19101
2 MYLAR		
1 Mylar		
3 BD	R.D. Knudson	392
5 Final		

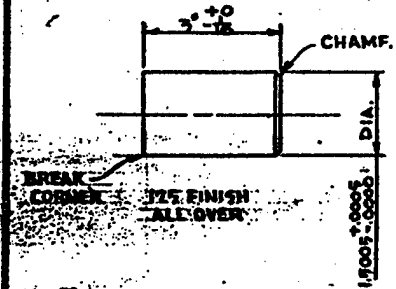
LIG-65-560-101-013

(3) MAR 19 1980

REVISIONS
⚠ REVISED TO SUIT CO № 44 10-3-66 CA HILL CHIEF



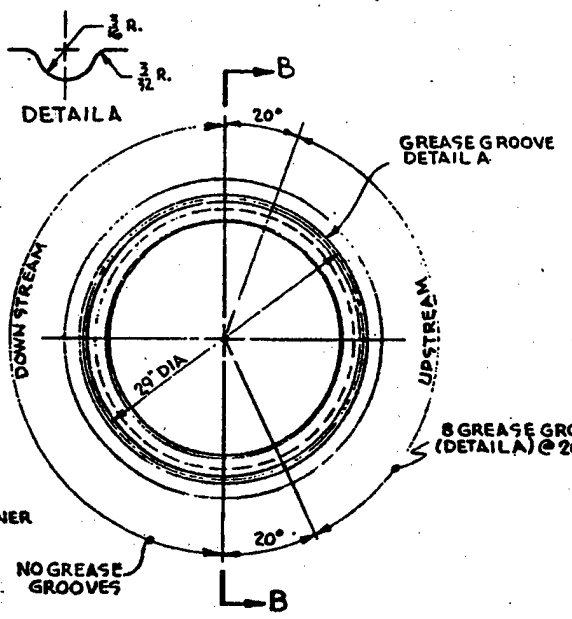
S39R AS SHOWN	MAKE 8	TRUNI MACHI MATC
S39L OPP HAND	MAKE 8	
P39R AS NOTED	MAKE 8	
P39L AS NOTED & OPP HAND	MAKE 8	

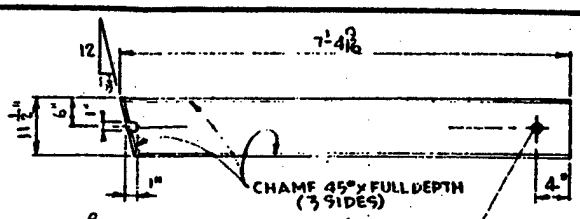


2 39 DOWEL PIN 1⅝ DIA x 0'-3 MAKE 256

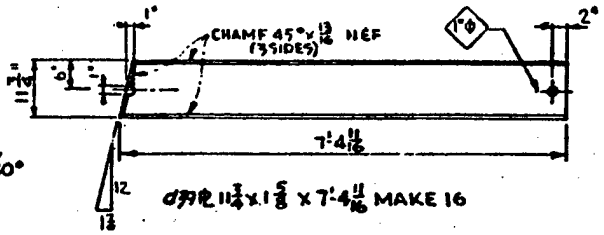
m39 R 8

1





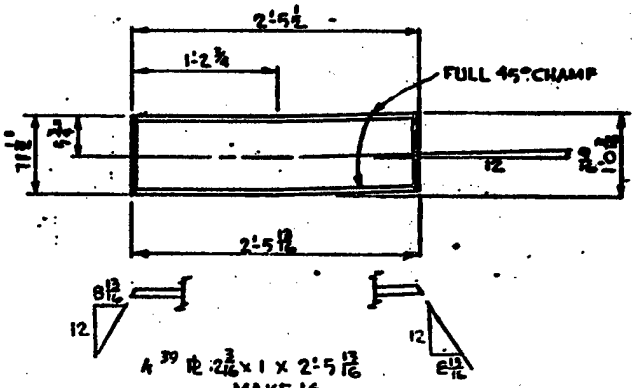
f39^R AS SHOWN PL 11½ x 1⅜ x 7'-4 9/16 MAKE 8
f39^L OPP HAND PL 11½ x 1⅜ x 7'-4 9/16 MAKE 8



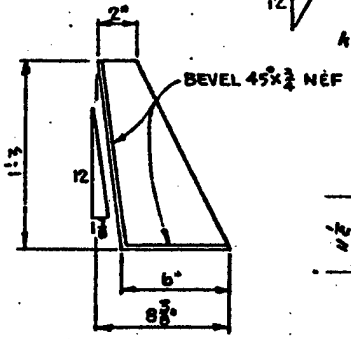
d39 PL 11¾ x 1⅝ x 7'-4 11/16 MAKE 16

c39^R AS SHOWN PL 11½ x 1 x 7'-4 9/16 MAKE 8
c39^L OPP HAND PL 11½ x 1 x 7'-4 9/16 MAKE 8

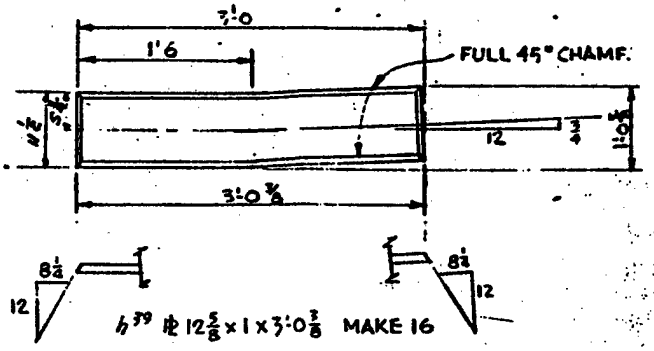
MAKE 8
MAKE 8
MAKE 8
MAKE 8
} TRUNNION BUSHING MACHINE IN PAIRS (S^R & P^R)(S^L & P^L) MATCH MARK N°1 THRU 8



h39 PL 2 3/16 x 1 x 2'-5 13/16 MAKE 16



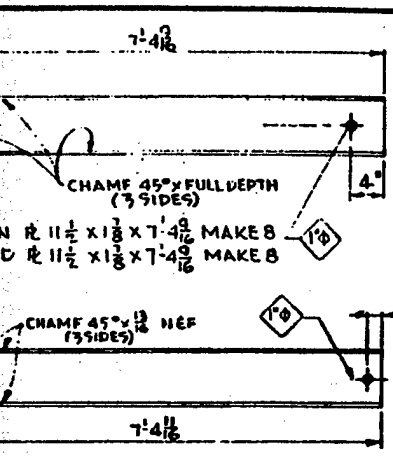
m39 PL 8 3/8 x 1½ x 1'-3 MAKE 48



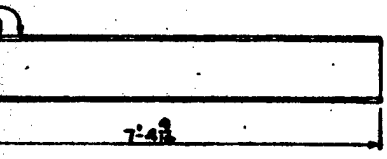
h39 PL 12 5/8 x 1 x 3'-0 3/8 MAKE 16

CONTRACT NO DA45-164 CIVENG 65-560

APPROVED
Subject to conformity with plans and specifications, correction of errors or omissions, and to fulfillment of any required tests. Approval does not cover detail dimensions, or responsibility for assembling and fabricating.
OFFICE OF RESIDENT ENGINEER
LITTLE GOOSE LOCK AND DAM
Date: 2 OCT 66

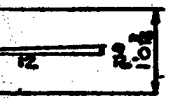


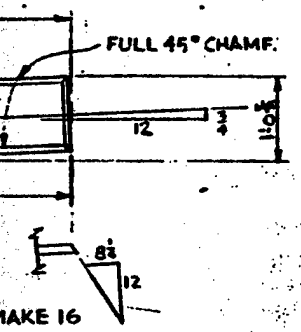
PL 11 3/4 x 1 5/8 x 7'-4 11/16 MAKE 16



AS SHOWN PL 11 1/2 x 1 x 7'-4 9/16 MAKE 8
OPP HAND PL 11 1/2 x 1 x 7'-4 9/16 MAKE 8

LL 45° CHAMF





BILL OF MATERIAL

MARK	SIZE	TOTAL REQD	PIECE MARK	SHAPE	LENGTH FT. IN.	REMARKS	WEIGHT

REFERENCE:
CORPS OF ENGR DWG LGD 1-5-8/5, SHT 89, VOL 1 REV'D
SPECS: PG TP-16-1, SECT 16

RECEIVED
OCT 7 1965
V, W, P, D

WORK THIS SHEET WITH Nº 39 & 40A F.D

AS BUILT

CONTRACT Nº DA 45-164 CIVENG 65-560

APPROVED
Subject to conformity with plans and specifications, correction of errors or omissions, and to fulfillment of any required tests. Approval does not cover detail dimensions, or responsibility for assembling and fabricating.
OFFICE OF RESIDENT ENGINEER
LITTLE GOOSE LOCK AND DAM
Date: 2 Oct 65

REQ'D CORPS OF ENGR
NO SHOP PAINT

PACIFIC CAR AND FOUNDRY COMPANY
RENTON, WASHINGTON

LITTLE GOOSE LOCK & DAM
ITEM 101 SPILLWAY GATE
WINNELL, MANNY, FULLER, DILLINGHAM
CAH 4-1-65 Filed (JH) 5-14-65

1 SHEET 2 MYLAR	TRUNNION HUB DETAILS	C670-13101
1 SHEET 2 MYLAR	R.O. Knudson	40

ENG 65-560-101-01

TR-962

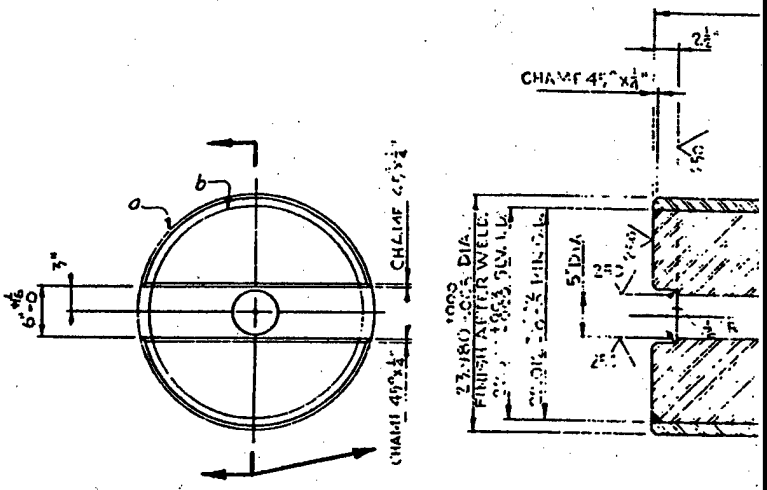
(3)

MAR 19 1980

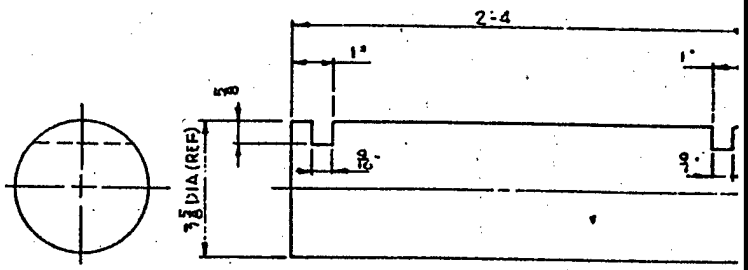
REVISIONS

1 REVISED MAT'L SPEC ... CANAL ...

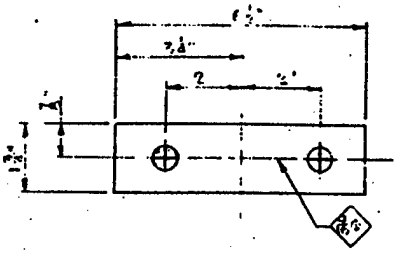
2 CORRECTED MAT'L SPEC FOR ST. STL. SLEEVE PC MK "A" CANAL 11/8/66



16 MK 41A TRUNNION

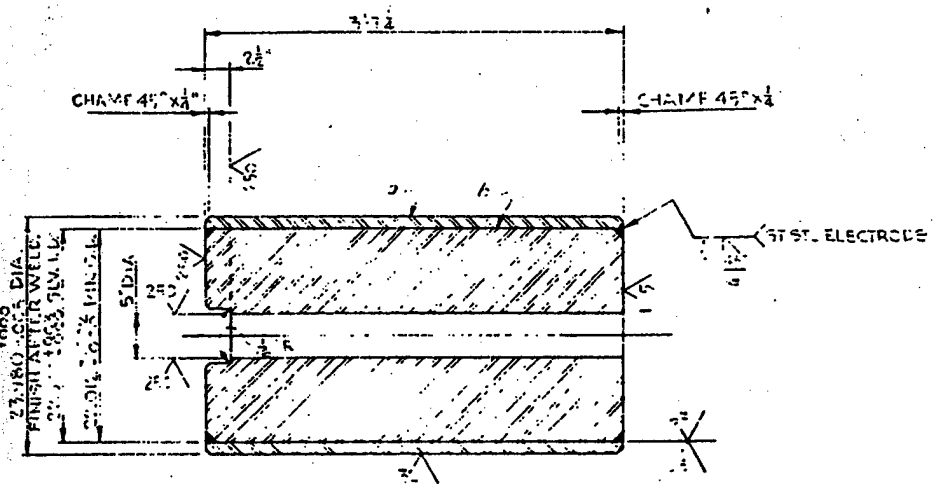


16 MK 41B LIFTING PIN BAR 3 5/8 ϕ

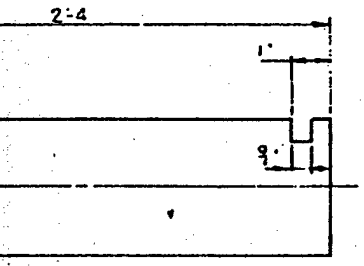


32 MK 41C KEEPER BAR BAR 1 3/4 x 1/2 x

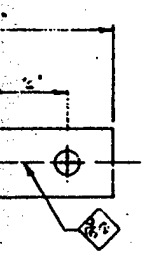
(1)



16 MK 41A TRUNNION PIN



B LIFTING PIN BAR 7/8 x 2'-4"



C KEEPER BAR BAR 1¾ x ½ x 0'-6½"

AS BUILT
CONTRACT No DA-45-164-CIVENG-65-5

APPROVED
AS CORRECTED
Subject to compliance with plans and specifications, exception of [illegible] to be submitted of any [illegible] of shop detail drawings of the [illegible] for reinforcing steel fasteners.
OFFICE OF RESIDENT ENGINEER
LITTLE GOOSE LOCK AND DAM
RS
Date: 19 Dec 66

(2)

BILL OF MATERIAL

NO. PC'S REQ'D	SHEET STOCK NUMBER	TOTAL NO. PC'S REQ'D	PIECE MARK	SIZE	LENGTH FT.	LENGTH IN.	REMARKS	WEIGHT
16	41A	16	a	24"O.D X 22" I.D ST.STL	3	7¼	MACH	1½ 4½
		16	b	22¼"O.D X 5" I.D FORGING	3	7½	MACH.	7 [illegible]
				SHOP WELD ST. STL				140
16	41B			BAR 3½ Ø ST.STL	2	4	MACH	1 [illegible]
32	41C			BAR 1⅝ x ½ ST. STL	0	6½		51
				SHIP				
66		¾"		HX HD CAPSCREW	0	1½	ST.STL	
68		¾"		LOCKWASHER			ST.STL	

Item No. 30,154

MATERIAL SPECS:

FORGING ASTM A237 CL.C
ST STL (LIFT PIN) ASTM A276 TYPE 410 COND T
ST STL (KEEPER BAR) ASTM A276 TYPE 303 COND A

△2 △1

ST STL CAP SCREW ASTM A276 TYPE 410
ST STL LOCKWASHER COM'L STD

△2 ST STL SLEEVE (PcMK"A") CENTRIFUGAL CAST STAINLESS STEEL MANUFACTURED IN ACCORDANCE WITH ASTM A351 GRADE CF8 ANNEALED WITH THE FOLLOWING EXCEPTIONS:

1. TENSILE STRENGTH SHALL NOT BE LESS THAN 75000 P.S.I.
2. YIELD STRENGTH SHALL NOT BE LESS THAN 30,000 P.S.I.
3. BRINELL STATIC TEST IS NOT REQUIRED
4. Sleeves shall be free from precipitated carbides which result in intergranular corrosion. Paragraphs 3.7 and 4.5.4. of Fed Spec QQ-S-765c.

REFERENCE:

CORPS OF ENGR DWG NR LGD I-5-8/2 SHT 86 VOL 1 REV B
I-5-8/3 87 B
I-5-8/5 89 A

SPECS PG TP-16-1, SECT 16

AS-BUILT

CONTRACT NO DA-05-164-CIVENG-65-560

APPROVED
AS CORRECTED

Subject to compliance with plans and specifications, corrections of [illegible] and subject to fulfillment of any [illegible] and minor detail dimensions of [illegible] for assembling and fastening.

OFFICE OF RESIDENT ENGINEER
LITTLE GOOSE LOCK AND DAM

RS

Date: 19 Dec 66

Not Field Data

MA. [illegible]
[illegible]
MA. [illegible]
[illegible]
Mark No.

BM 32 FOR SHOP CONVENIENCE

CONT. WELDING REQD INSPECTION CORPS OF ENGR
DRILLED [illegible] OPEN HOLES EXCEPT AS NOTED
END AND EDGE DISTANCE [illegible] EXCEPT AS NOTED
SPACING NOT SHOWN
PAINT NO SHOP PAINT

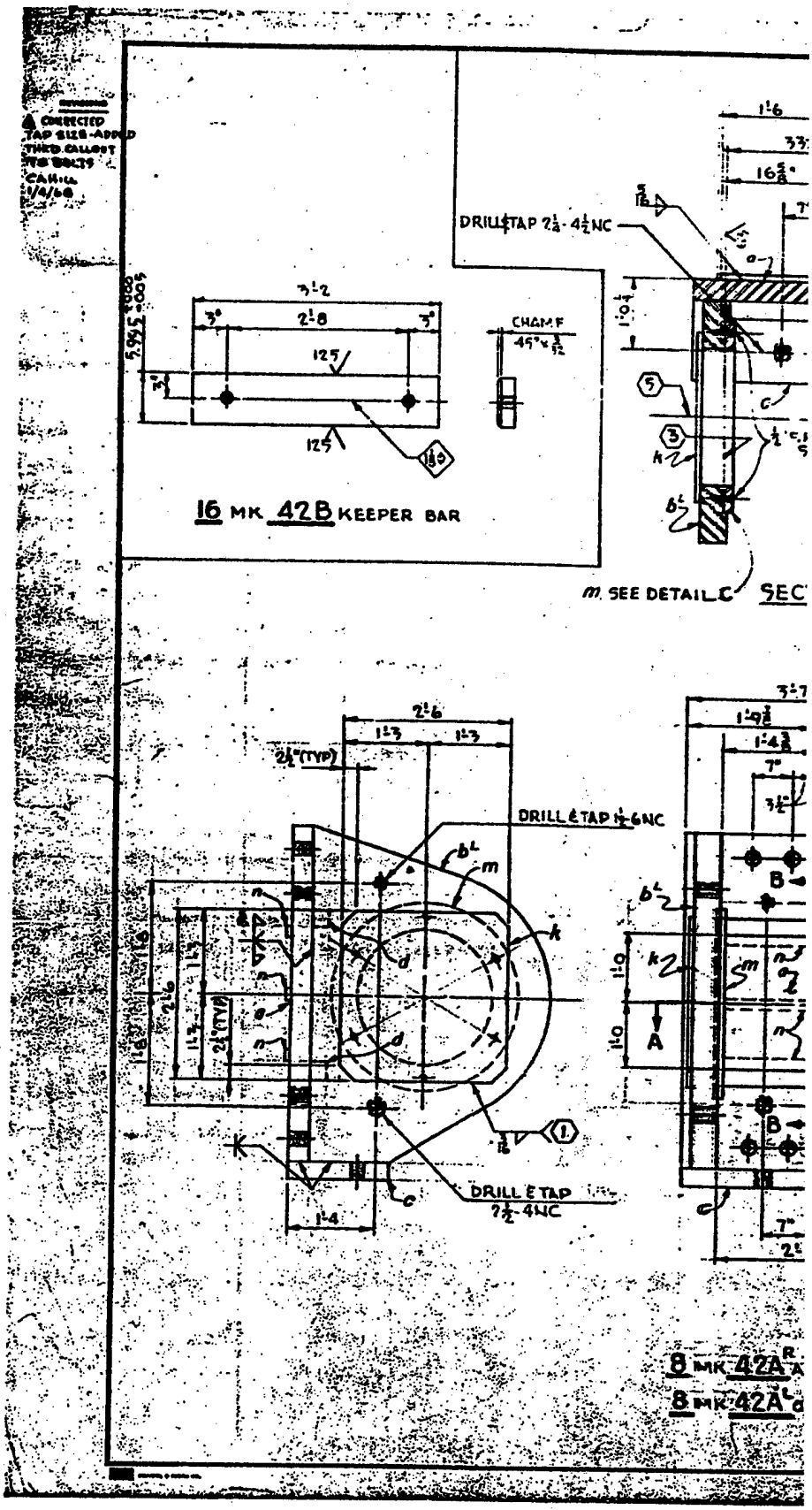
PACIFIC CAR AND FOUNDRY COMPANY
SEATTLE, WASHINGTON

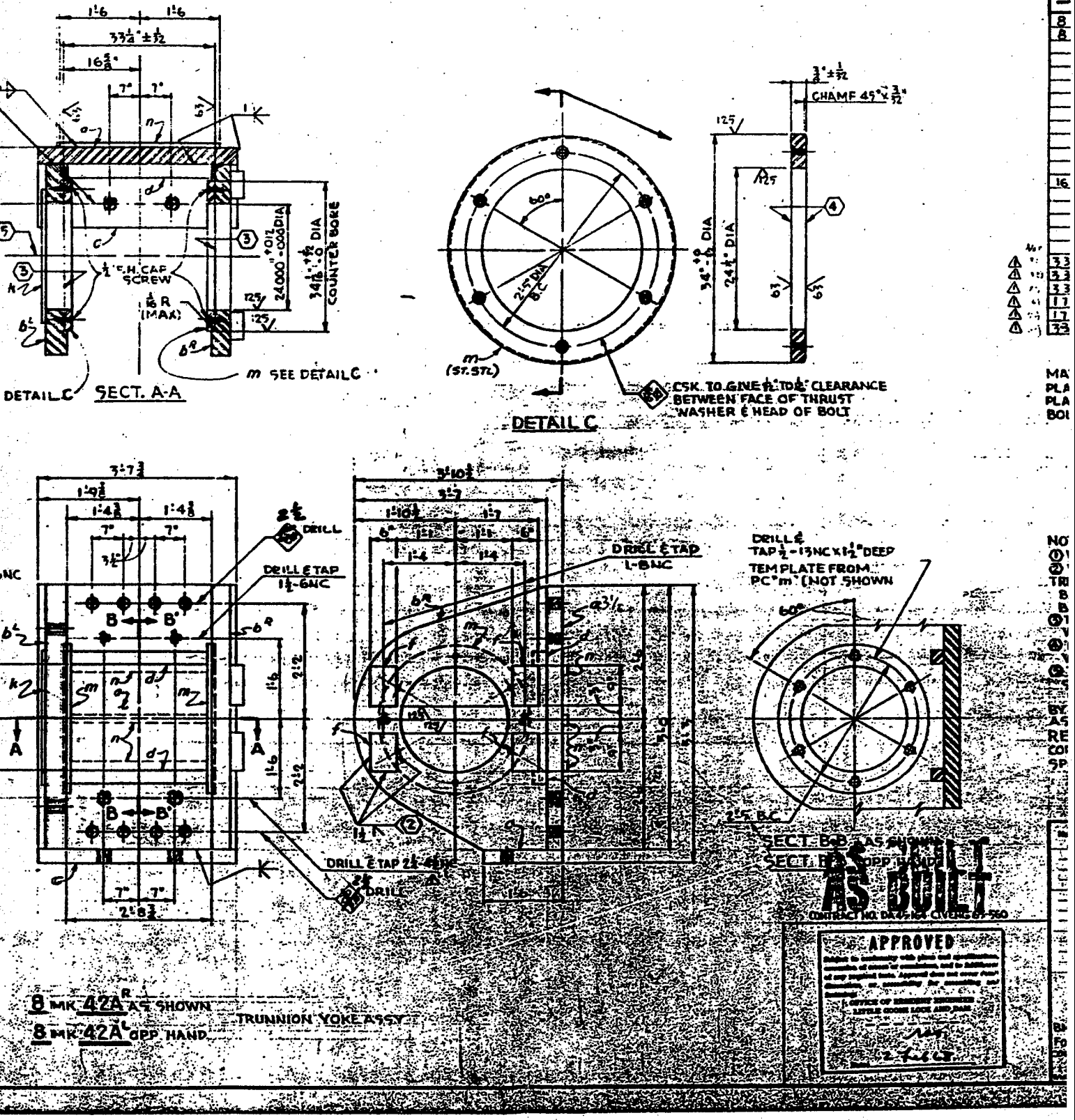
LITTLE GOOSE LOCK & DAM
ITEM 101 - SPILLWAY GATE
FOR VINNELL, MANNIX, FULLER, DILLINGHAM
DR. C.A. HILL DATE 5/16/66 CHK. AW DATE 5-16-66
ISSUED TRUNNION & LIFT PINS - DETAIL ORDER NO. C670-14101
APPROVED W. Lindson DWG. NO. 412

LTG-65-560-101-015 396.

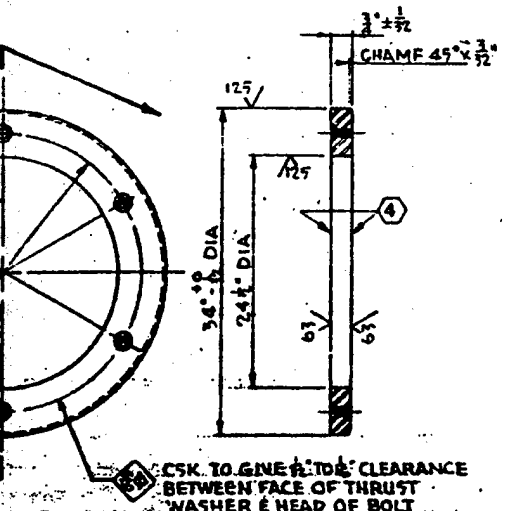
3.

MAR 19 1980


DRILL & TAP 2½ - 4½ NC
CHAMF
45° x 3/32
125
16 MK 42B KEEPER BAR
SEE DETAIL C
DRILL & TAP 1½ - 6 NC
DRILL & TAP
2½ - 4 NC
8 MK 42A R
8 MK 42A L


DETAIL C
SECT. A-A
m SEE DETAIL C
DETAIL C
CSK. TO GIVE 1/32" TO 1/16" CLEARANCE BETWEEN FACE OF THRUST WASHER & HEAD OF BOLT
CHAMF 45° x 3/32"
DRILL & TAP 1-8NC
DRILL & TAP 1 1/2-6NC
DRILL & TAP 2 1/2-4NC
DRILL & TAP 1/2-13NC x 1 1/2" DEEP
TEMPLATE FROM PC "m" (NOT SHOWN)
SECT. B-B AS SHOWN
SECT. B-B OPP HAND
AS BUILT
APPROVED
8 MK 42A R AS SHOWN
8 MK 42A L OPP HAND
TRUNNION YOKE ASSY

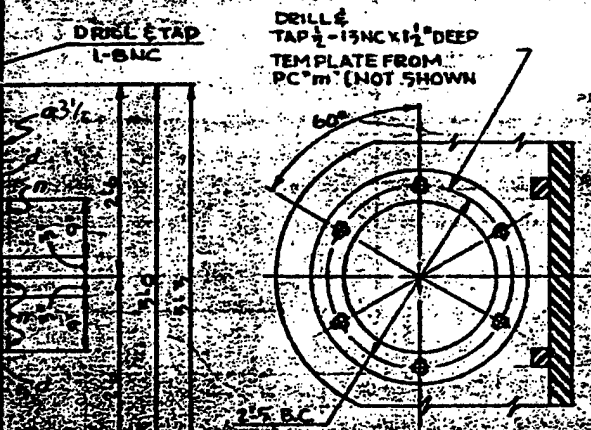
(2)



BILL OF MATERIAL

8	47A[8]	16	a	PL 43½ x 7½	5	0			42 341
8	49A[8]	5/16	b	PL 43½ x 4	5	0	①		33 484
		16	c	R 18 x 3	3	7½			10 715
		32	d	BAR 3 x 3	2	8½			2673
		64	f	BAR 6 x 3	0	9			2935
		16	K	R 30 x 2	2	6			1554
		32	m	PL 34 x 3 5/16	2	10	① MACH		4549
		48	n	BAR 2 x 1	3	0			979
				SHOP WELD					7305
		192		¾ F.H. CAP SCREW	0	2	U.S.S. STL	12 BOLTS	23
16	47B			BAR 6 x 24	3	2			2587
				SHIP					
⚠4	33			1" M.B. 4" THD	0	6	U.S. STL Bar Stock	8 NC	
⚠4	33			1¼" M.B. 5" THD	0	9		8 NC	
⚠4	33			2¼ M.B.	0	9		4½ NC	
⚠4	17			2¼ M.B.	0	8		4 NC	
⚠4	17			1¼ M.B.	0	8		6 NC	
⚠4	33			2¾ M.B.	0	6		4½ NC	
								total	175 340

MATERIAL SPEC:
PLATE & BAR ASTM-A36 EXCEPT AS NOTED
PLATE, SS STL QQ-S-766B TYPE 304 COND A
BOLTS, HIGH STRENGTH STL ASTM-A354, GR BB



NOTES
① WELD AFTER MACHING HAS BEEN COMPLETED
② WELD AT FINAL SHOP ASSEMBLY WITH TRUNNION PIN & KEEPER BAR IN PLACE. SHEAR BARS ARE TO BEAR FIRMLY AGAINST KEEPER BAR
③ THESE SURFACES TO BE FLAT AND PARALLEL WITHIN ½" AND NORMAL TO ℄ OF BORE
④ THESE SURFACES TO BE FLAT AND PARALLEL WITHIN ½"
⑤ THESE HOLES TO BE LINE BORED AFTER STRESS RELIEF
WELDMENT SHALL BE STRESS RELIEVED BY HEAT TREATMENT AFTER ALL WELDING EXCEPT AS INDICATED BY NOTE ① & ② HAS BEEN DONE

REFERENCE
CORPS OF ENGR DWG NO LGD-1-F-9/6 SHT 90 VOL 1 REV 1
SPECS: PG TP 16-1 SECTION

AS BUILT
CONTRACT NO DA-45-104-CIVENG-67-560

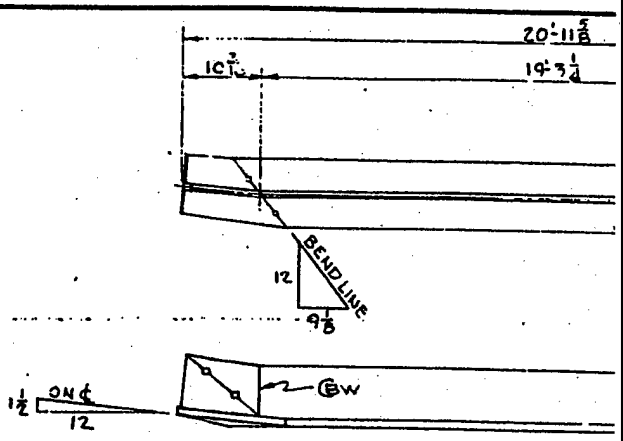
APPROVED
OFFICE OF RESIDENT ENGINEER
LITTLE GOOSE LOCK AND DAM
Mar 12 1969

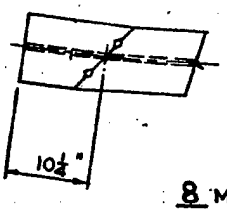
REQD CORPS OF ENGR
NO SHOP PAINT
PACIFIC CAR AND FOUNDRY COMPANY
RENTON, WASHINGTON
LITTLE GOOSE LOCK & DAM
ITEM 101 - SPILLWAY GATE
VINNELL MANN & FULLER & DURHAM
TRUNNION YOKE
ASSY & DETAILS CE 10-1510
BM 33
FOR SHOP CONVENIENCE
Lt Col CE
Asst Engr
Sampler
Inspr
R.O. Anderson
4-23-69
16.65-560-101-016

(5)

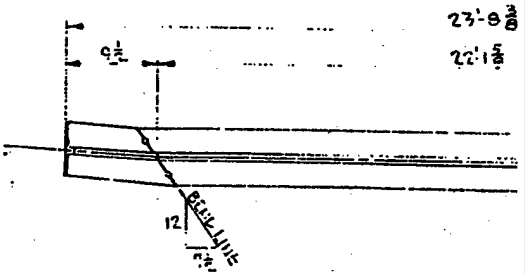
MAR 19 1980

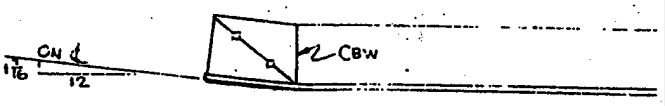
REVISIONS
⚠ DELETED HOLES PER DWG E81 10-1-66 CANCEL
AW

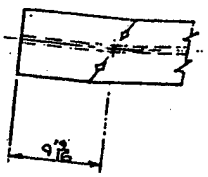




8 MK 43A^{R} AS SHOWN
8 MK 43A^{L} OPP HAND

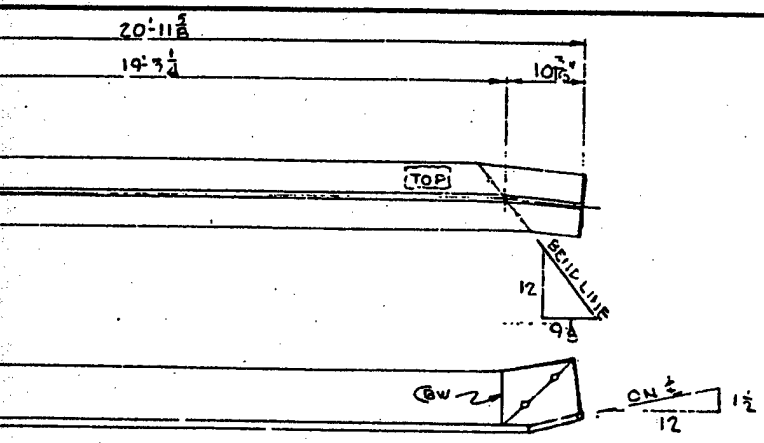


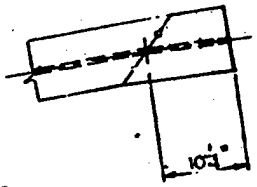




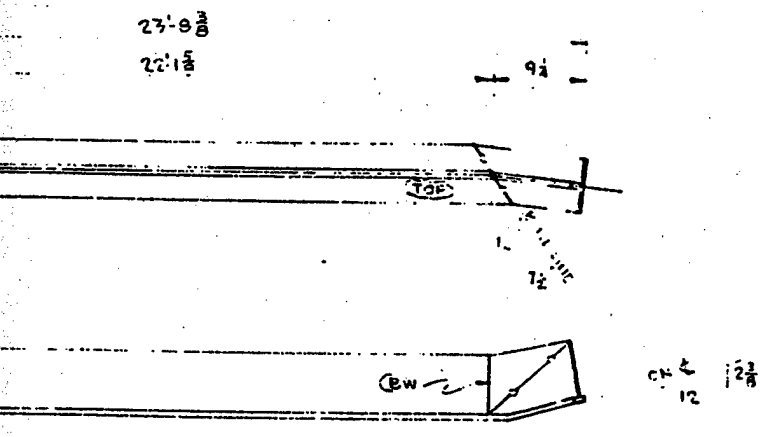
8 MK 43B^{R} AS SHOWN
8 MK 43B^{L} OPP HAND

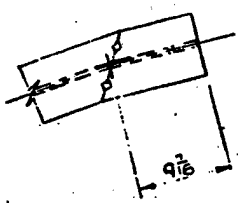
(1)





3A^{R} AS SHOWN
3A^{L} OPP HAND ST7WF15 x 20'-11¾





43B^{R} AS SHOWN
43B^{L} OPP HAND ST7WF15 x 23'-8⅝

AS BUILT

CONTRACT NO DA 45-164 CIVENG 65-560

APPROVED
Subject to conformity with plans and specifications, correction of errors or omissions, and to fulfillment of any required tests. Approval does not cover detail dimensions or assembly for assembling and fastening.
OFFICE OF RESIDENT ENGINEER
LITTLE GOOSE LOCK AND DAM
Date 28 Oct 66

(2)

BILL OF MATERIAL

NO. OF PIECES	MARK	TOTAL NO. REQ'D	PIECE MARK	SIZE	LENGTH FT.	LENGTH IN.	REMARKS	WEIGHT
8	43A[R]	1		ST7WF15	20	11 3/4	BEND	5035
8	43A[L]							
				SHOPWELD				
8	43B[R]	16		ST7WF15	23	8 3/4	BEND	5693
8	43B[L]							
				SHOPWELD				
							TOTAL	10,728

MATERIAL SPEC:
SHAPES ASTM-A36

REFERENCE:
CORPS OF ENGR DWG Nº LGDI-5-8/3 SHT 87 VOL I REV B
SPECS: PAGE TP16-1, SECT 16

T.R. -962

AS BUILT

CONTRACT NO DA 45-164 CIVENG 65-560

APPROVED
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OFFICE OF RESIDENT ENGINEER
LITTLE GOOSE LOCK AND DAM
Date 18 Oct 66

CONST. WELDING: REQD INSPECTION: CORPS OF ENGRS
PAINT: NO SHOP PAINT

PACIFIC CAR AND FOUNDRY COMPANY
80 S. HUDSON ST. RENTON, WASH.
SEATTLE, WASHINGTON 98134

LITTLE GOOSE LOCK & DAM
ITEM 101 - SPILLWAY GATE
FOR VINNELL, MANNY, FULLER, DILLINGHAM
BY CAHILL DRAWN [illegible] DATE 5-19-66

BRACING DETAIL

C610-16101

APPROVED K.O. Knudson

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LTG 2 - 760-101-017 398

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MAR 19 1980