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W.O.# 381694
W.O.# 407285

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MAR 8 '65

3427-1

NS 3466 (27113) SIGMA 3
SCDR-46-59

CHARACTERISTICS
AND
DEVELOPMENT REPORT
FOR

H-638

INVENTORIED

MAR 1 1966

3428-3

~~INVENTORIED~~

AUG 1 1963

~~3427-1~~

INVENTORIED

~~3428-3~~

F. T. Stixrud - 1284-2

April 14, 1959

Emelda Selph ^U 10-0396
R.T. duff 10/29/96

96SN525
97SN013
9-30-96

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SEPT 8 1960

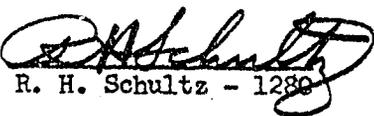
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1. Introduction:

The purpose of this document is to provide a current authoritative record of the design intent, product characteristics and development history for the H-638. The product definition drawings and specifications which are the basis of production contracts are listed on NX-321292.

2. Description:

The H-638 (Fig. 1, Appendix A) is a short strongback with a wire rope "belly band" at each end. It is used to adapt the TX-41 to overhead hoists. The strongback is fabricated from two 5" channels back to back. A lifting eye is welded to the center of the span. A wire cable sling is suspended from each end. Each cable sling is eight parts of 3/16" diameter cable terminated by flexible braided loops and measuring 157" in length. Each cable is covered by a canvas boot in order to protect the surface of the TX-41 from abrasion. In use the strongback is placed longitudinally on the top of the TX-41. It is intended to be centered over the TX-41 CG by guide marks on the TX-41. The cables are placed under the TX-41 and hung on lugs on the ends of the strongback.

The H-638 weighs about 150 pounds. The strongback alone is approximately 32" long by 12" x 12", and weighs approximately 125 pounds.

3. Design Intent:

The H-638 is intended to adapt the TX-41 to overhead hoists. It is to be compatible with 10 ton hoists and be capable of lifting the TX-41 clear of the H-641 with a 10 feet maximum hook height. It is to be attached at available strong areas and not conflict with the H-641 bolster support areas. Provision must be made to prevent marring the additive finish of the TX-41. No other equipment is to be attached within 16-1/2" of the CG of the TX-41 during the use of the H-638.

4. Product Characteristics:

The H-638 has all of the characteristics specified under Design Intent. It can be shipped in one 3' x 1' x 1' box and one 3' x 3' x 6" box. It can be used by one man. It may be used under any environmental conditions. It may be stored at any temperature but should be protected from sand and/or excessive moisture. Periodic inspection and maintenance should be given to the wire rope components.

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5. Test and Quality Requirements:

Representative parts have been proof tested during development. Destructive strength tests will be made at a later date. A proof test of 40,000 pounds on the assembled H-638 is required by the product drawing. Parts bought separately have proportionate proof test requirements specified on their product drawings.

6. Development History:

The need for this equipment was established in the second quarter of 1957. The design requirements were obtained from Division 1218. The H-638 was developed as TRM and W.R. equipment. Two units supplied to 1218 for TRM used a strongback similar to that of the released version. The "belly bands," however, were 3/16" x 4" steel bands.

Experience with the first units showed that a device which could be attached more quickly would be desirable. It was found that a wire fabric sling about 8 inches wide and 15 feet long attached in a basket hitch at the CG was functionally adequate. This was demonstrated as the intended W.R. version of the H-638 at the 1284/1218 functional demonstration on September 30, 1958 and accepted with the stipulation that a canvas cover be added for abrasion protection. During further evaluation, destructive proof tests showed that the wire fabric sling did not have the ultimate strength advertised. This fault could not be resolved with a satisfactory degree of reliability, so the present design was developed. The final design differs from the original mainly in that the "belly bands" are light, flexible, quickly attached, and require no pretensioning.

Stress calculations are summarized in Appendix A.

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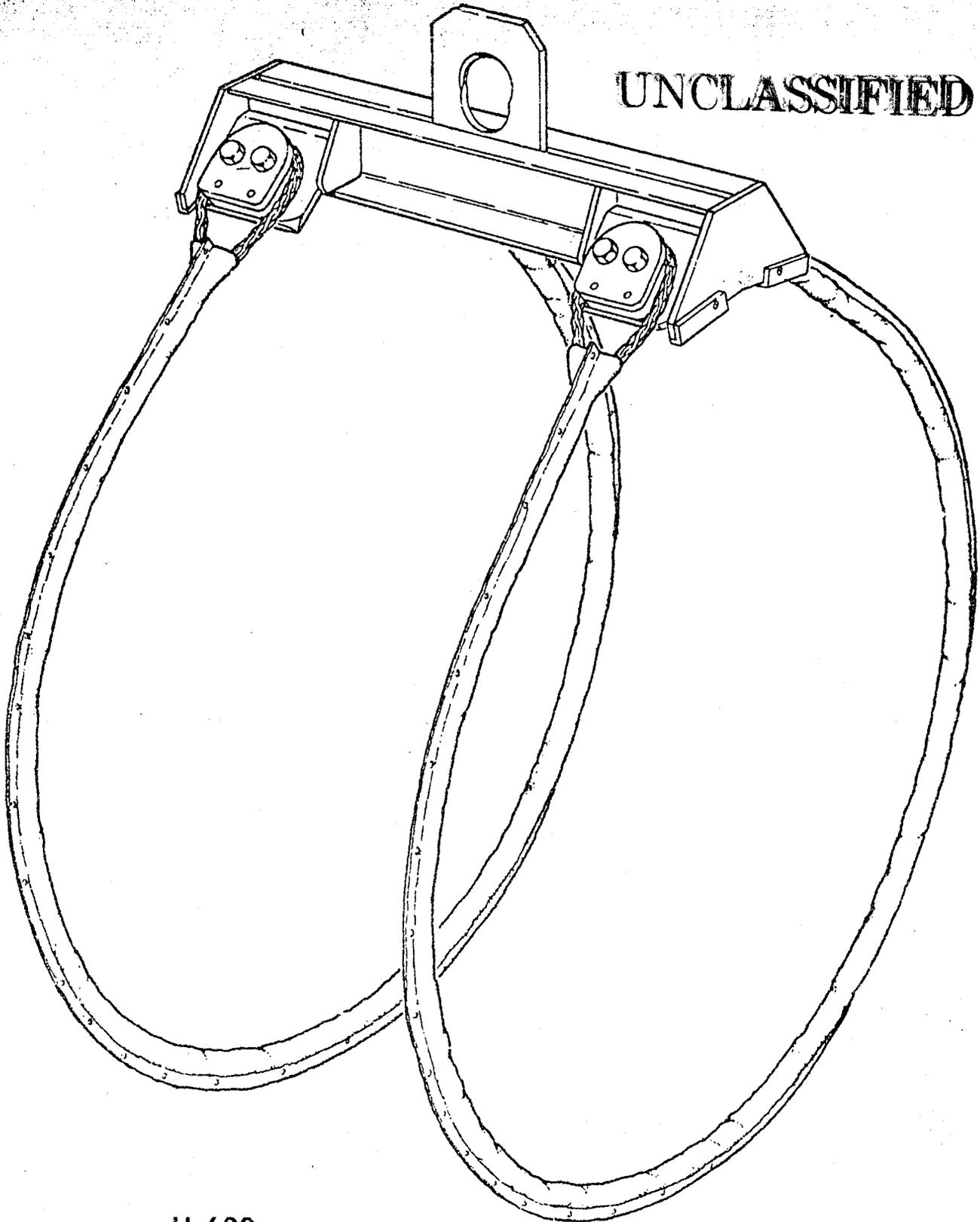
APPENDIX A

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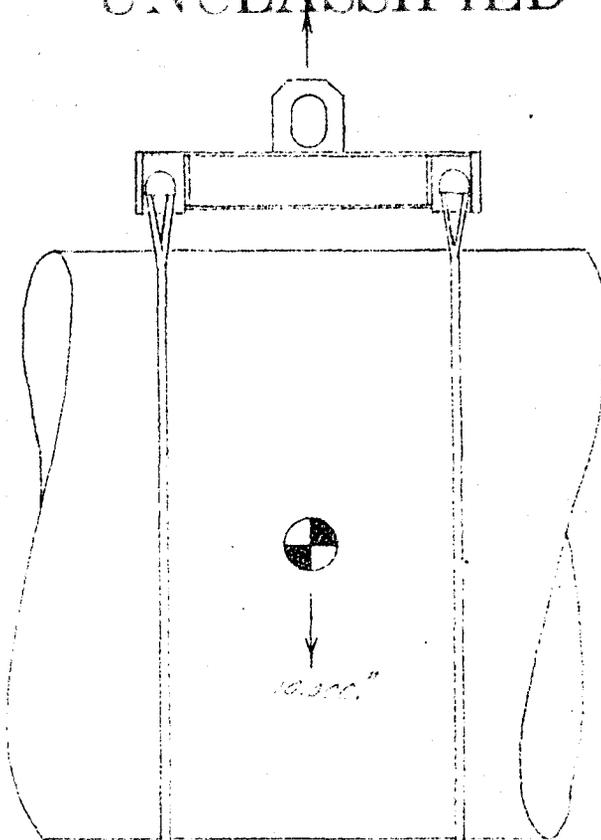
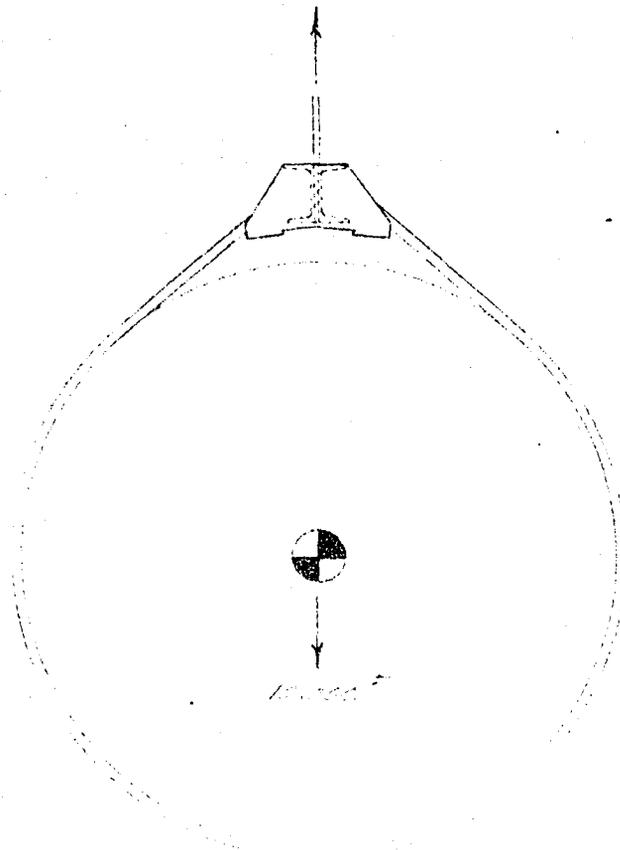
H-638

Fig. 1

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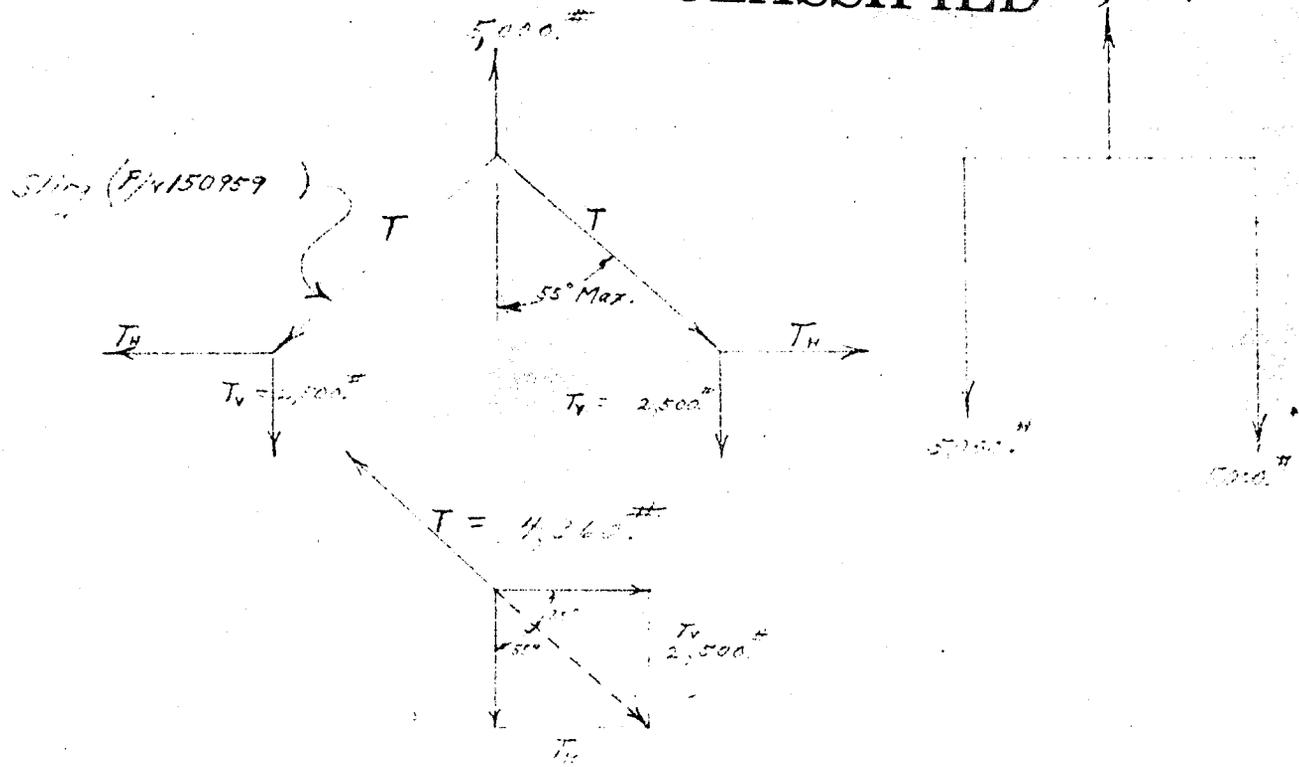
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BY _____ DATE _____
CHKD. BY _____ DATE _____

SUBJECT *H-638*
F/N 150959

000584
SHEET NO. 9 OF 12
JOB NO. SCDR-46-59

UNCLASSIFIED 19100. #



Sling : F/N 150959

- Load 4,300 #*
- Limit Load 7,940 #*
- Yield Load 20100 #*
- ULT Load 26100 #*

Fail. Strength = 26,100 # ULT.

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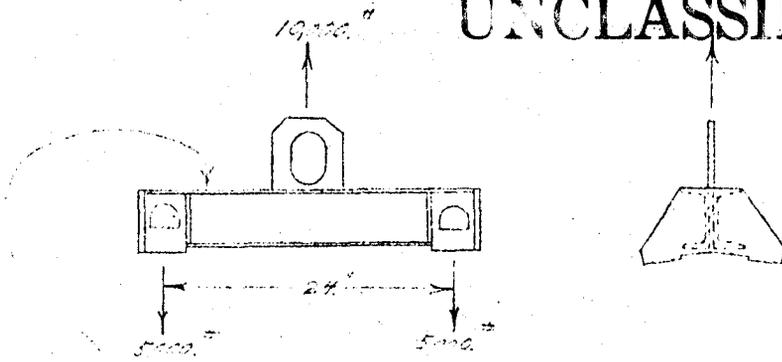
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SUBJECT *H-638*
P/N 150.131

000585

SHEET NO. 10 OF 12
JOB NO. SCDR-46-59

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(2) - 5" @ 6.7" = L $I_c = 3.0$ (inch)
Mil-C-7809
 $F_u = 70,000$ psi
 $F_y = 59,000$ psi

Bending Moment Load 60,000. In lb
Limit Load 240,000. In lb
Hold Load 276,000. In lb
Ult Load 360,000. In lb

Stress: $S_u = \frac{360,000}{3.015} = 60,000$ psi

$S_1 = \frac{276,000}{2.95} = 46,000$ psi

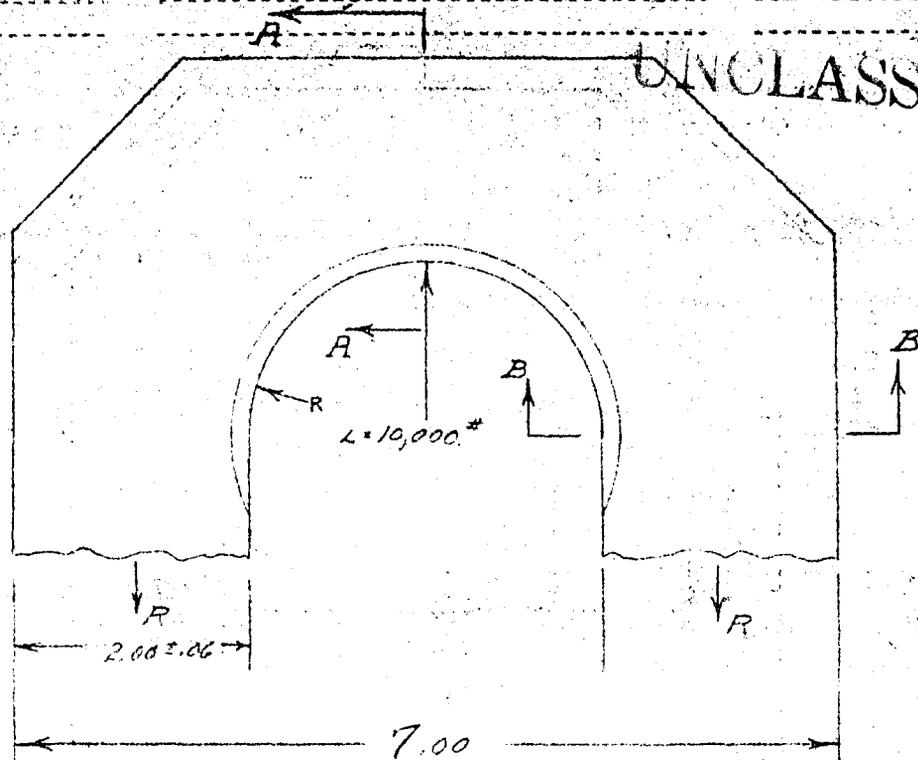
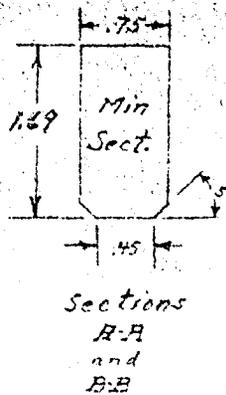
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BY _____ DATE _____
 CHKD. BY _____ DATE _____

SUBJECT H-438
P/N 156131

000586

SHEET NO. 11 OF 12
 JOB NO. SCDR-66-49



Material - Steel, Plate (4130) per MIL-S-18729 Card, N
 Min. Properties: $F_u = 90,000.$
 $F_y = 70,000.$

Load = 10,000.#
 Limit Load = 40,000.#
 Yield Load = 46,000.#
 U.T. Load = 60,000.#

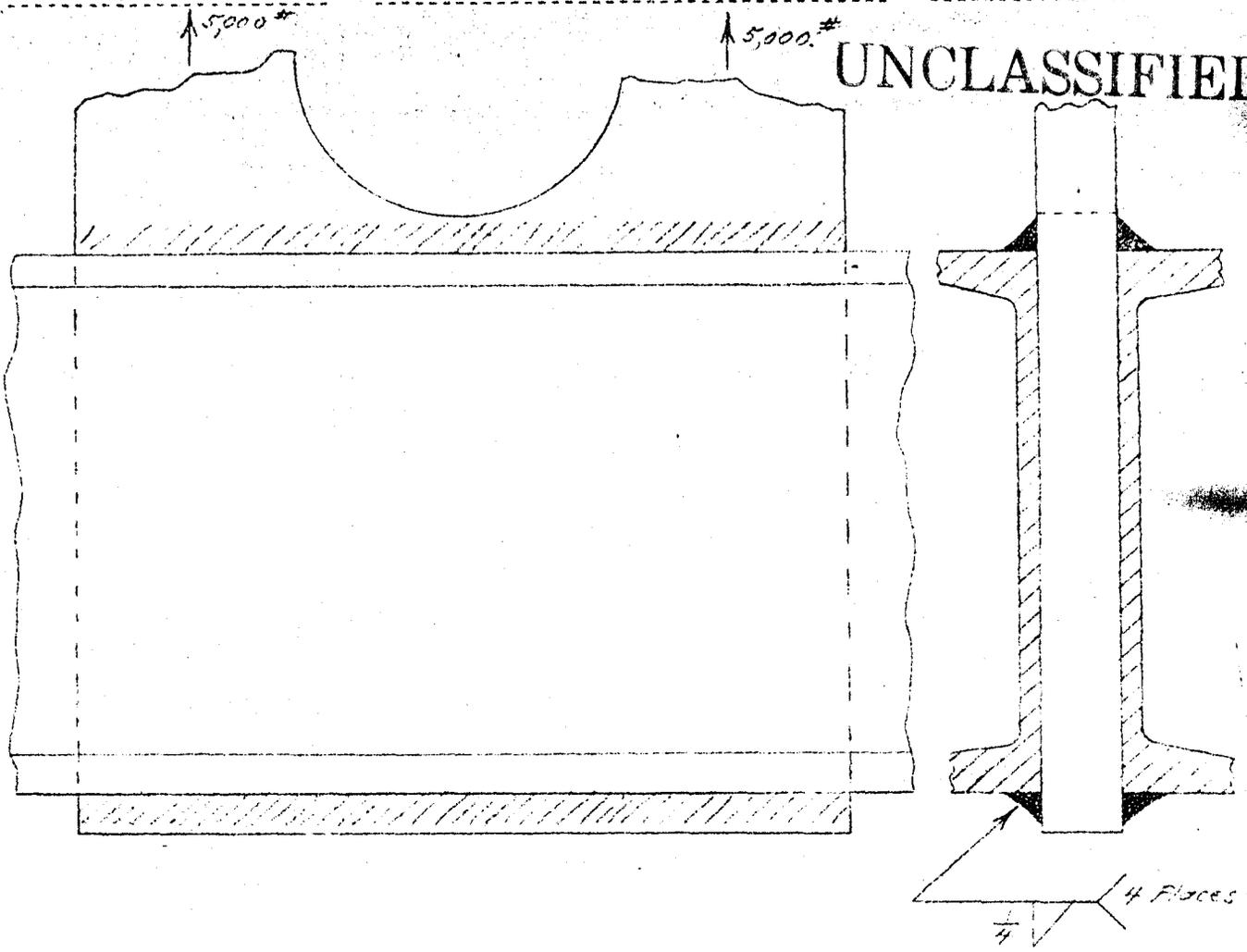
BM at sect. A-A = $\frac{WL}{6.7}$ (based upon analysis not documented here)
 Section Mod. (I/c) = .36

Stress at Sect A-A
 $S_f = \frac{WL}{I/c} = \frac{46,000 (3.)}{.36 (6.7)} = 55,000. \text{ psi}$
 $S_u = \frac{60,000 (3.)}{.36 (6.7)} = 71,700. \text{ psi}$

Stress in Section B-B (Tension)

$S_f = \frac{20,000}{[1.69 (.75) - (.15)^2]} = 18,500. \text{ psi}$
 $S_u = \frac{30,000}{[1.69 (.75) - (.15)^2]} = 24,200. \text{ psi}$

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Weld Strength $F_u = 72,000.$
 $F_{xy} = \text{---}$
 $F_{su} = 25,000.$ } Assume 80% of these values due to weld quality.

Load $15,000.$
 Limit Load $40,000.$
 Yield Load $44,000.$
 Ult. Load $60,000.$

Top Weld Effective area = $14. \times .25 \times .707 = 2.48 \text{ in}^2$
 Effective strength = $F_{su} \times 80\% \times A = 79,000. \text{ Ult.}$

Bottom Weld Effective area = $14. \times .25 \times .707 = 2.47$
 Effective strength = $F_{su} \times 80\% \times A \times 1.114 = 69,800. \text{ Ult.}$