LIFTING DEVICE

DEVICE NAME: EGGS SPREADER BAR

ENGINEERING NOTE NUMBER: 47

APPLICABLE STANDARD: ANSI/ASME B30.20-1985 & ANSI

RATED LOAD: 30 TONS

TEST LOAD: 37.5 TONS

TEST LOAD PERCENT: 125

LAST LOAD TEST DATE: JUNE 28 1988

COLOR: YELLOW

STRESS CALCULATIONS:
Done by: [signature]
Date: 7-13-88
Reviewed by: [signature]
Date: 6/24/92

REMARKS:

IDENTIFICATION:

Engineering Note Number & Rated Load Must be Clearly Marked On a Conspicuous Surface.

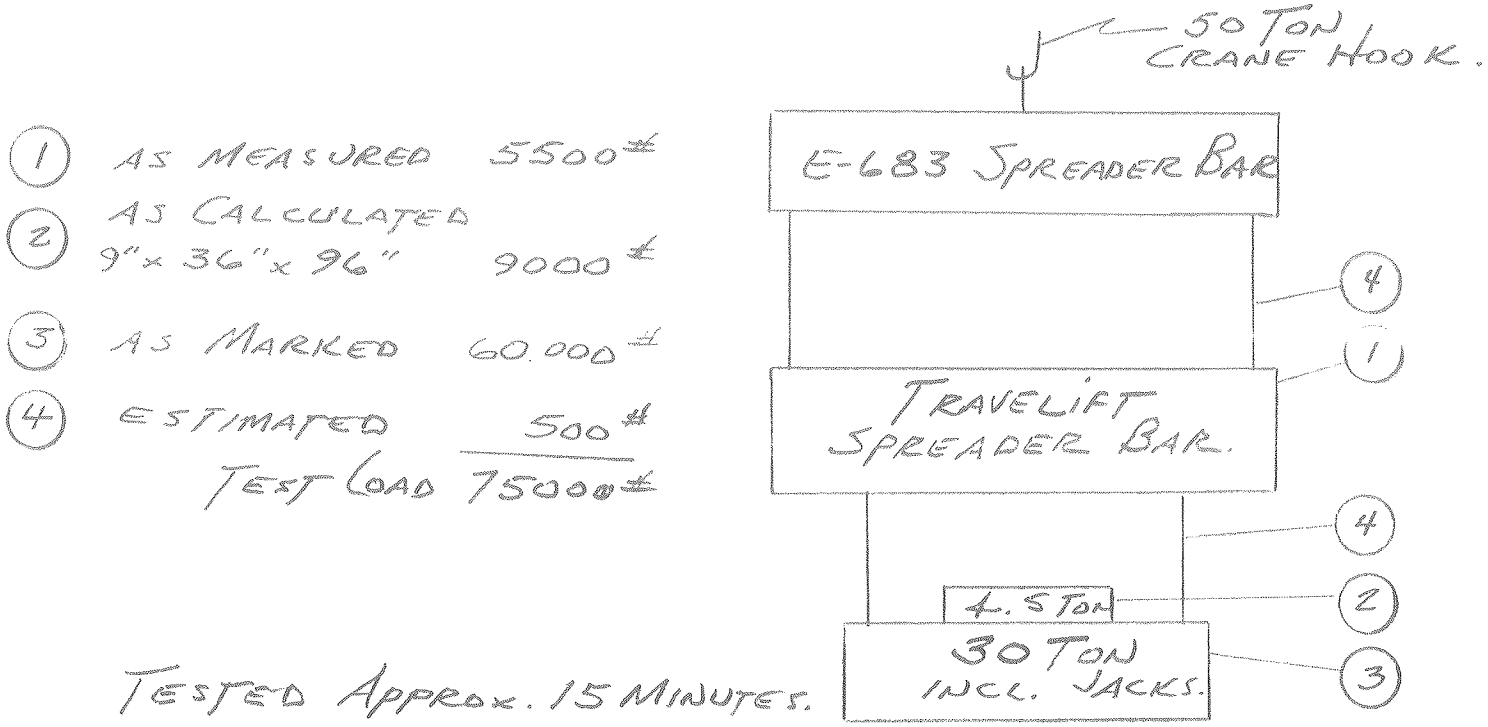
July 13, 1988

TO: R. Scherr

FROM: R. C. Currier

SUBJECT: E683 Spreader Bar

The 30-ton E683 Spreader Bar was successfully load tested on June 28, 1988 at the South hardstand at the Rail Siding. The 37.5 ton load used was one of the actual 30-ton pieces of steel required to build the SCM-105 Magnet plus other pieces as shown below.



SPREADER BAR

I.D. Nº 47 COLOR OF BAR : YELLOW

LOAD CAPACITY PAINTED ON BAR 30 TONS.

DATE CAP. & I.D. Nº PAINTED ON BAR 6-19-92

DATE OF LAST LOAD TEST. JUNE 28. 85

TEST LOAD WEIGHT 37.5 TONS

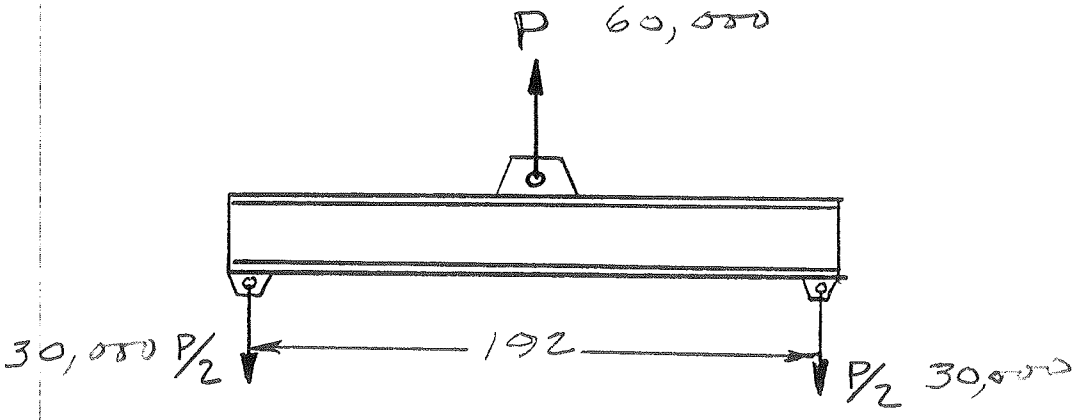
TEST LOAD % 125%

STRESS CALCULATIONS:
DONE BY R. CARRIER

DATE 2-15-38

REMARKS :
DESIGNED TO BE USED @ W.B.L.
WITH (2) 15 TON CRANES

SPREADER BAR Nº 47 PAINT COLOR YELLOW



BEAM SIZE 24"I

$d = 24$ $\quad A_w = d \cdot t_w = 19.488$

$L = 192$

$d/A_f = 2.706$ $\quad M = \frac{PL}{4} = 48P$

$S_x = 250.9$ $\quad V = \frac{P}{2}$

$t_w = .812$

BENDING STRESS:

$F_{b\ ALLOW} = 12{,}000$ psi

OR $F_{b\ ALLOW} = \frac{12 \times 10^6}{L \cdot d/A_f} = \frac{12 \times 10^6}{192 \cdot 2.706} =$ [illegible] } USE THE LEAST

$\therefore f_{b\ MAX} = \frac{M}{S_x} = 12000 = \frac{48P}{250.9}$ $\quad P = 62725\ \#$ $= 31.36$ TONS

SHEAR STRESS:

$F_{V\ ALLOW} = \frac{.4\ F_y}{3} = 4800$ psi

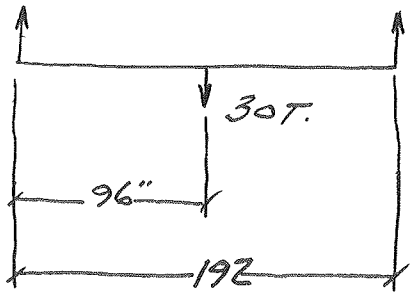
$\therefore f_{V\ MAX} = \frac{V}{A_w} = 4800 = \frac{P}{2} \times 19.488 \quad \therefore P = 187\text{K}\#$

SUMMARY: $\therefore P =$ 93.5 TONS OK.

(1)

E-683 SPREADER BAR.

W = TOTAL LOAD = 60,000 #
l = DISTANCE (2 HOOKS) = 192" OR 16'-0"



BEAM IN BENDING

MAX STRESS — $S = \frac{Wl}{4Z}$ USING ASTM-A36 I

YIELD = 36000 PSI
MIN. TENSILE = 58000 PSI

SAFETY FACTOR - TENSILE 5/1 58K/5 = 11,600 PSI
YIELD 3/1 36K/3 = 12,000 PSI

USE 11,600 PSI = S

$$Z = \frac{Wl}{4S} = \frac{60{,}000\# \times 192"}{4 \times 11{,}600 PSI} = \frac{11{,}520{,}000}{46{,}400} = 248 in^3$$

USE 24" I @ 120 #/FT $Z = 250 in^3 > 248 in^3$
$I = 3010 in^4$

MAX. DEFLECTION $\delta = \frac{Wl^3}{48EI} = \frac{60{,}000\# \times 192"^3}{48 \times 30 \times 10^6 \times 3010 in^4}$

$$\delta = \frac{60{,}000 \times 7.07 \times 10^6}{4{,}334{,}400 \times 10^6}$$

$$\delta = .098$$

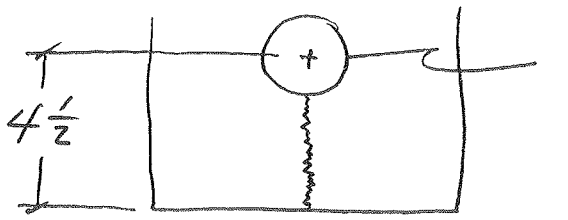
$$\frac{l}{\delta} = \frac{192}{.098} = \frac{1959}{1} > \frac{1600}{1}$$

OK, USE 24" I - 120 #/ft.

(2)

E-683 Spreader Bar.

Center Hole Tear out. (2 plates)



$4\frac{1}{2} - 1\frac{3}{16} = 3\frac{5}{16}$

$A = 3.312 \times 1 \times 2$

$S = \frac{W}{A}$ FOR TEAR OUT

USING CRS YIELD = 45000 psi

TENSILE = 70,000 psi

SAFETY FACTOR YIELD 3/1 $45K/3 = 15$ KSI

TENSILE 5/1 $70K/5 = 14$ KSI

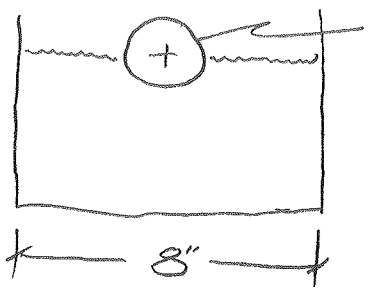
USE MAX. 12 KSI < 14 KSI

$S = \frac{W}{A} = \frac{60,000\#}{6.624 in^2} = 9058$ psi < 12000 psi

OK

Center Hole (Tension)

Do not consider Gussets (4)



$A = (8 - 2\frac{3}{8}) \times 2$

$A = 11.25$

$S = \frac{W}{A} = \frac{60,000\#}{11.25"} = 5333$ psi < 12000 psi.

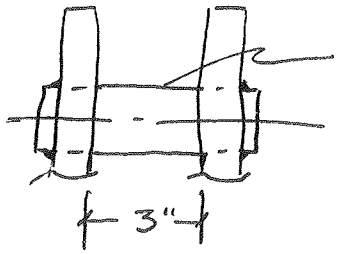
OK.

End Holes Tear out & Tension OK By Inspection

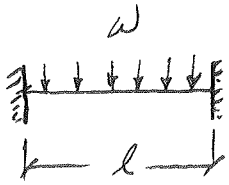
(3)

E-683 SPREADER BAR.

2" CRS BAR (5) END HOLES IN BENDING
HOOK WILL NOT FIT IN 3" OPENING, USING SLINGS = UNIFORM LOAD.

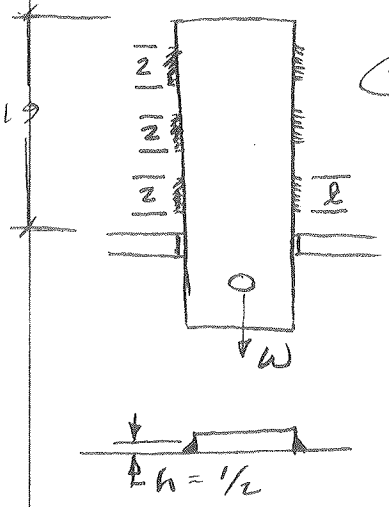


S = 12000 psi
W = 30,000



$$MA \times S = \frac{Wl}{12} = \frac{30{,}000^{\#} \times 3''}{12 \times .785 in^3} = \frac{90{,}000}{9.42} = 9{,}554 \text{ psi}$$

$S = 9{,}554 \text{ psi} < 12{,}000 \text{ psi}$ OK.



WELDING FILLET $h = 1/2$
$W = 60K^{\#}$
$l = 12''$

CENTER PLATES. (2)

1/2 WELD 12"/PLATE × 2 = 24" = $l/2$

$$^{*}S = \frac{.707\,W}{h\,l} = \frac{.707 \times 60{,}000^{\#}}{.5'' \cdot 12''}$$

$S = 7070 \text{ psi} < 12000 \text{ psi}$ OK.

3/8 WELD ON END OF (1) PLATE + GUSSET TO FLANGE WELD PROVIDES ADDED SAFETY FACTOR.

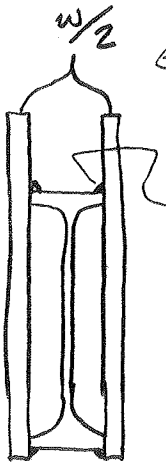
RULE OF THUMB FOR FILLET WELDS

1" of 1/2 WELD SAFE LOAD = $4800^{\#} \times 24'' = 115{,}200^{\#}$

* FROM BETTIS PLANT STANDARD CIRCA 1957 AEC, FACILITY

RONC
2-15-88

(4)



E-683 SPREADER BAR.

END PLATE WELDING

(4) 1/2" WELDS EACH 8" LONG TOTAL 32" = L/2

L = 16
W/2 = 30,000
h = 1/2

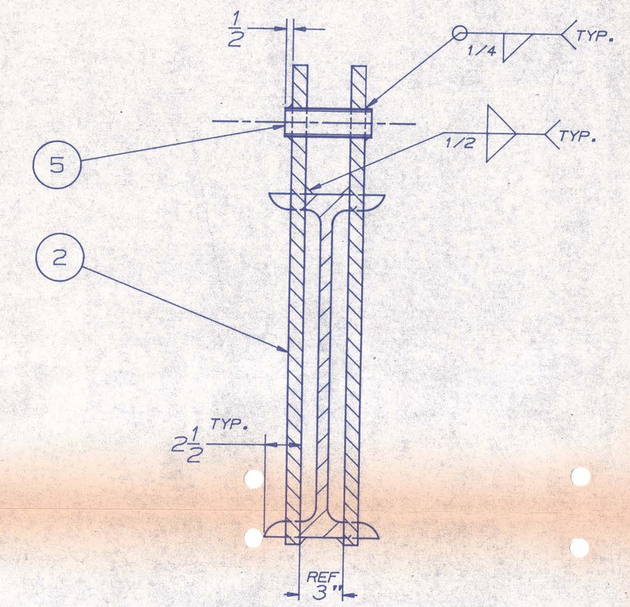
$$S = \frac{.707 \frac{W}{2}}{h L} = \frac{.707 \times 30{,}000\ \#}{.5" \times 16"}$$

S = 2651 psi < 12000 psi

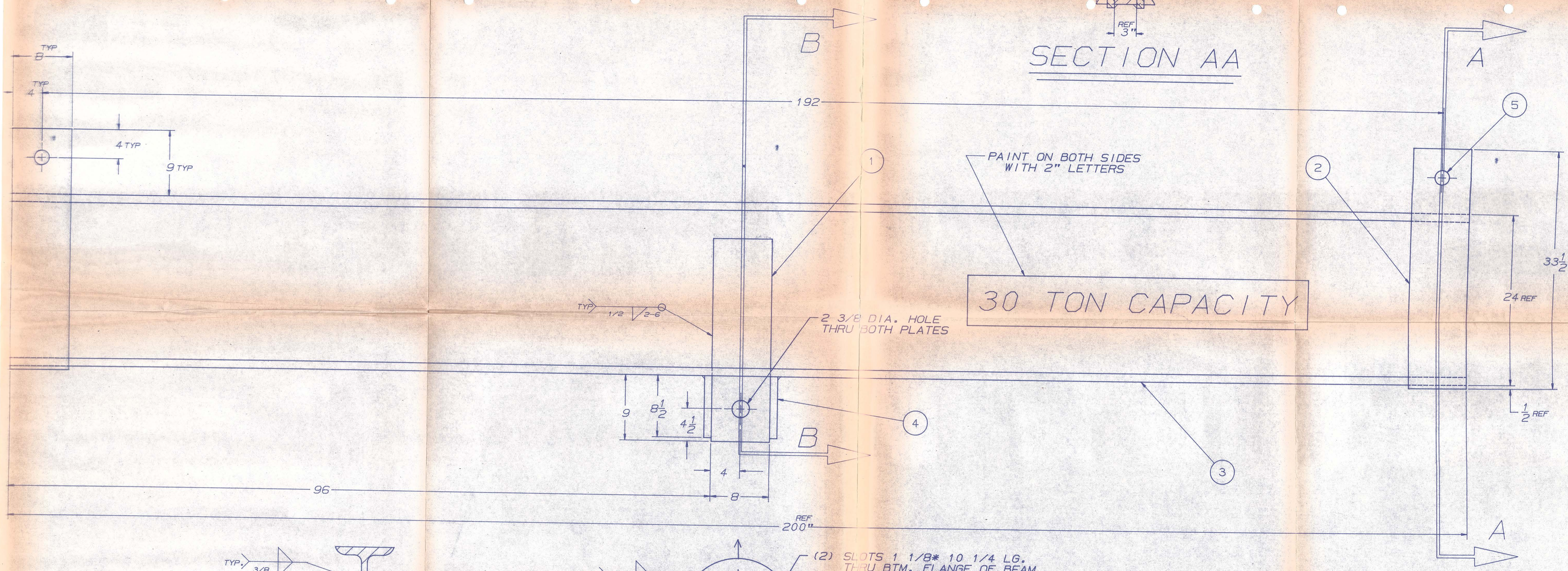
OK

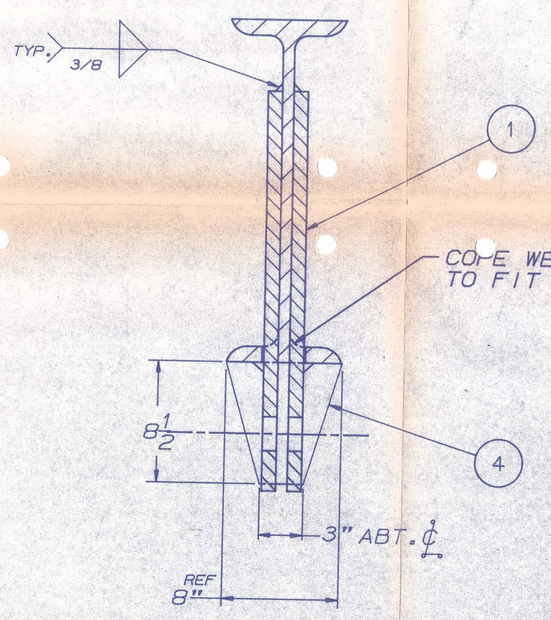
RULE of THUMB FROM PAGE 3

32" x 4800 # = 153,600 # > 30,000 #

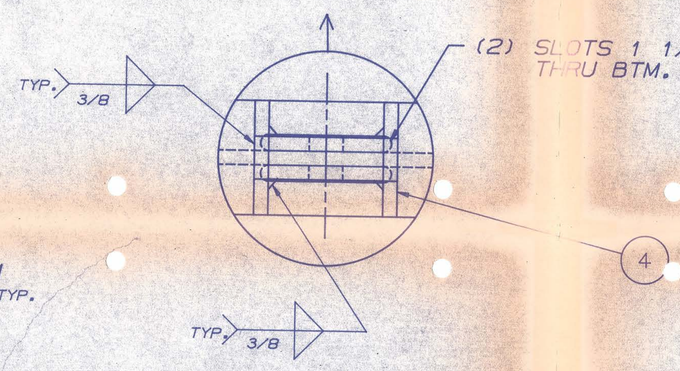


SECTION AA





SECTION BB



E 683 SPREADER BAR

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NOTE 1: PRIME ALL OVER & PAINT YELLOW

NOTE 2: TOTAL WT. OF SPREADER BAR 2500#

NOTE 3: 1 BEAM & 1*8 CRS ORDERED

NO	DESCRIPTION	REQ'D
5	2" DIA.* 6" LG. CRS BAR	1
4	1"* 8"* 8 1/2 LG. CRS BAR	2
3	S24*120* 200"LG. STL. 1 BM.	1
2	1"* 8"* 33 1/2"LG. CRS BAR	4
1	1"* 8"* 28" LG. CRS BAR	2

SCALE 3/16 = 1

RON CURRIER (1)REQ'D BY 4-1-88
BUDGET CODE E1M

90597