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Basic Crane Design and Stress Analysis

Appendix: Figures

Course No: M03-055

Credit: 3 PDH

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The figures are essential to this course. It is recommended to view the figures document side by side with the course document.





ROTATION SLEW, WORM GEAR DRIVE



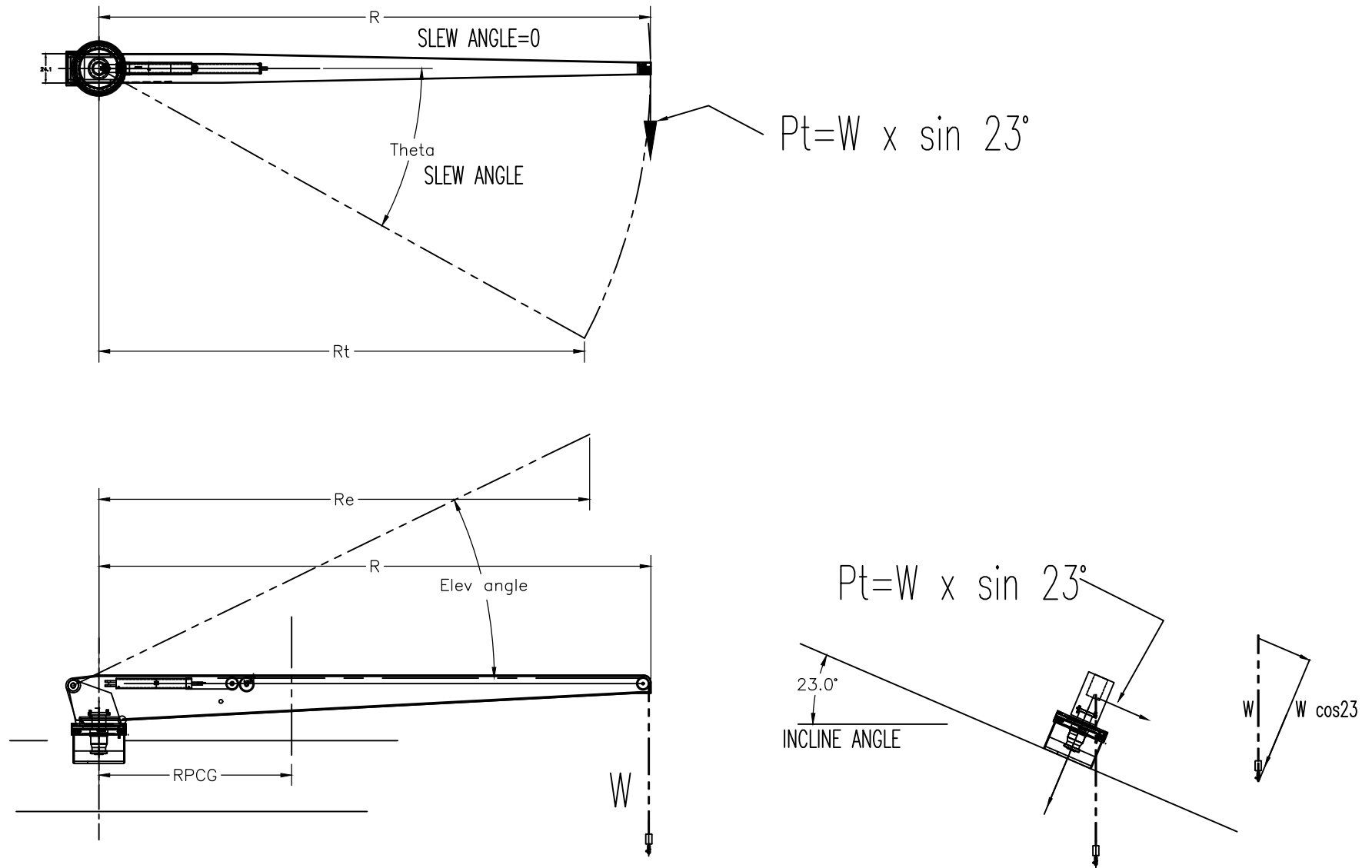


FIG M1.0-A CRANE ROTATIONAL TORQUE

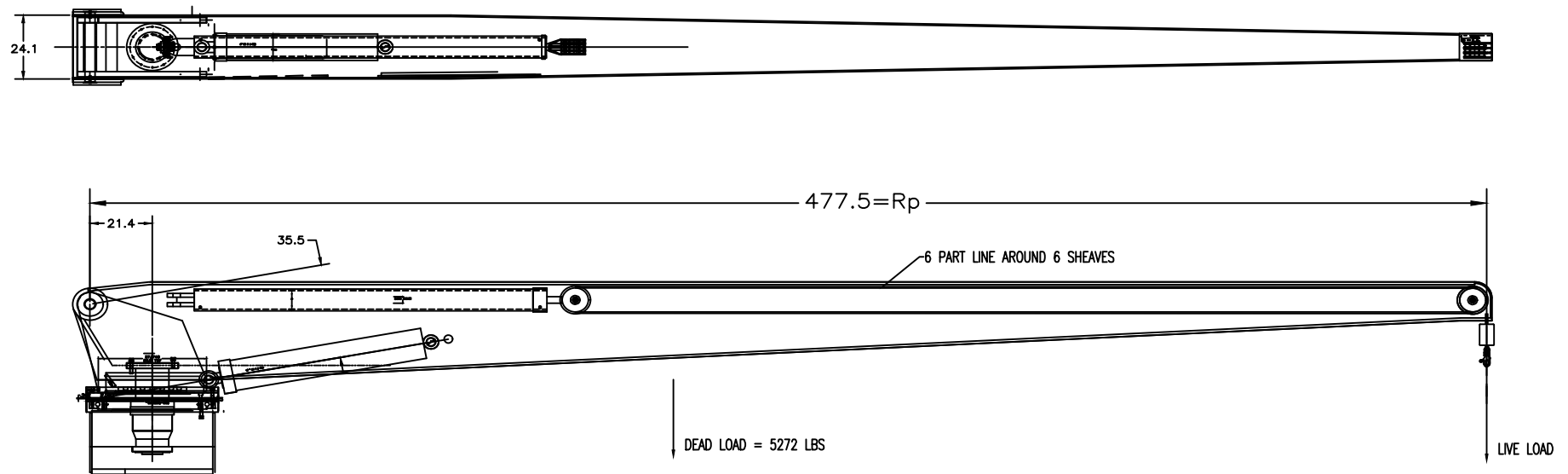


FIG M2.0—A BOOM and CABLE CYLINDER

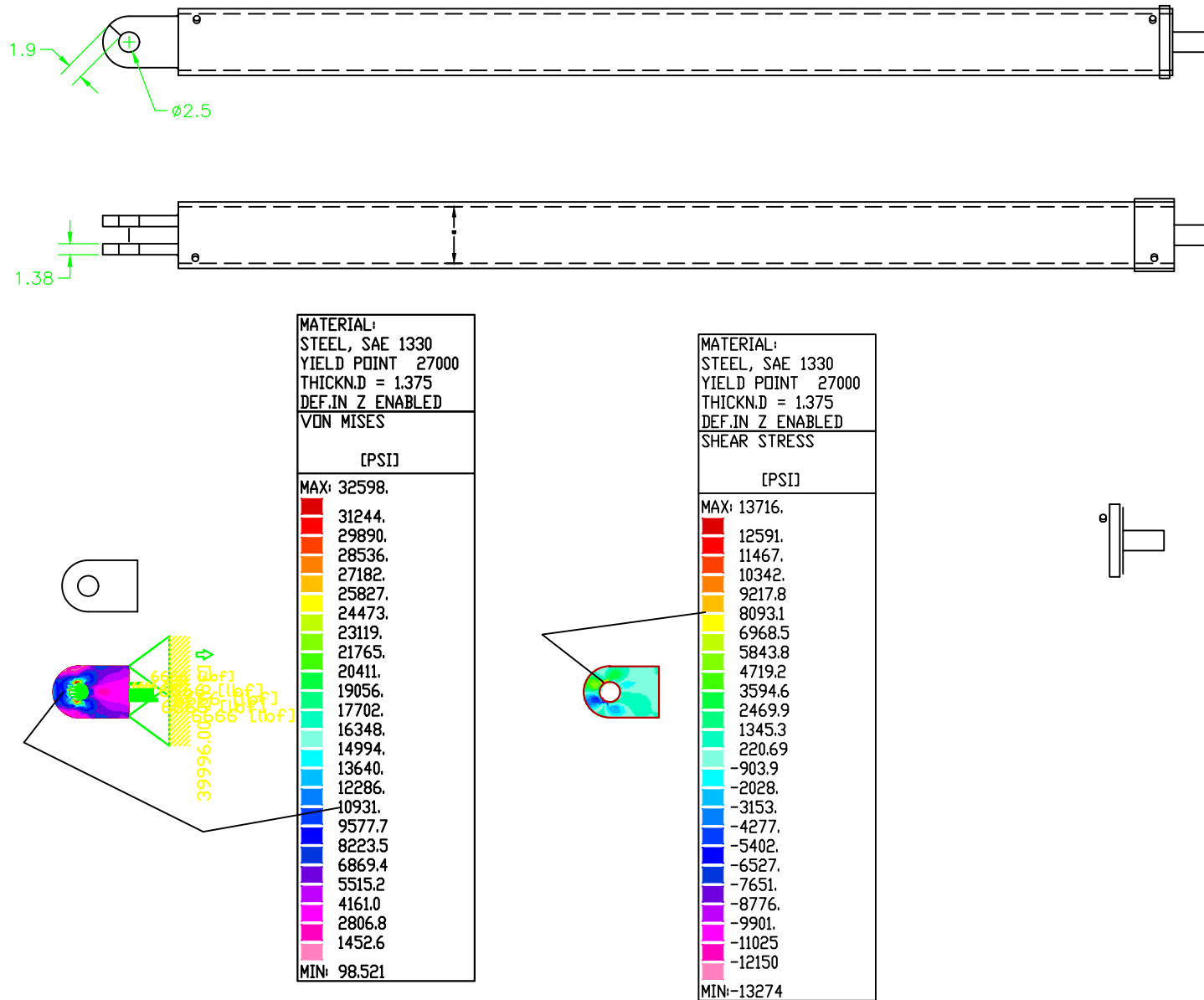


FIG M3.2-A CABLE CYLINDER

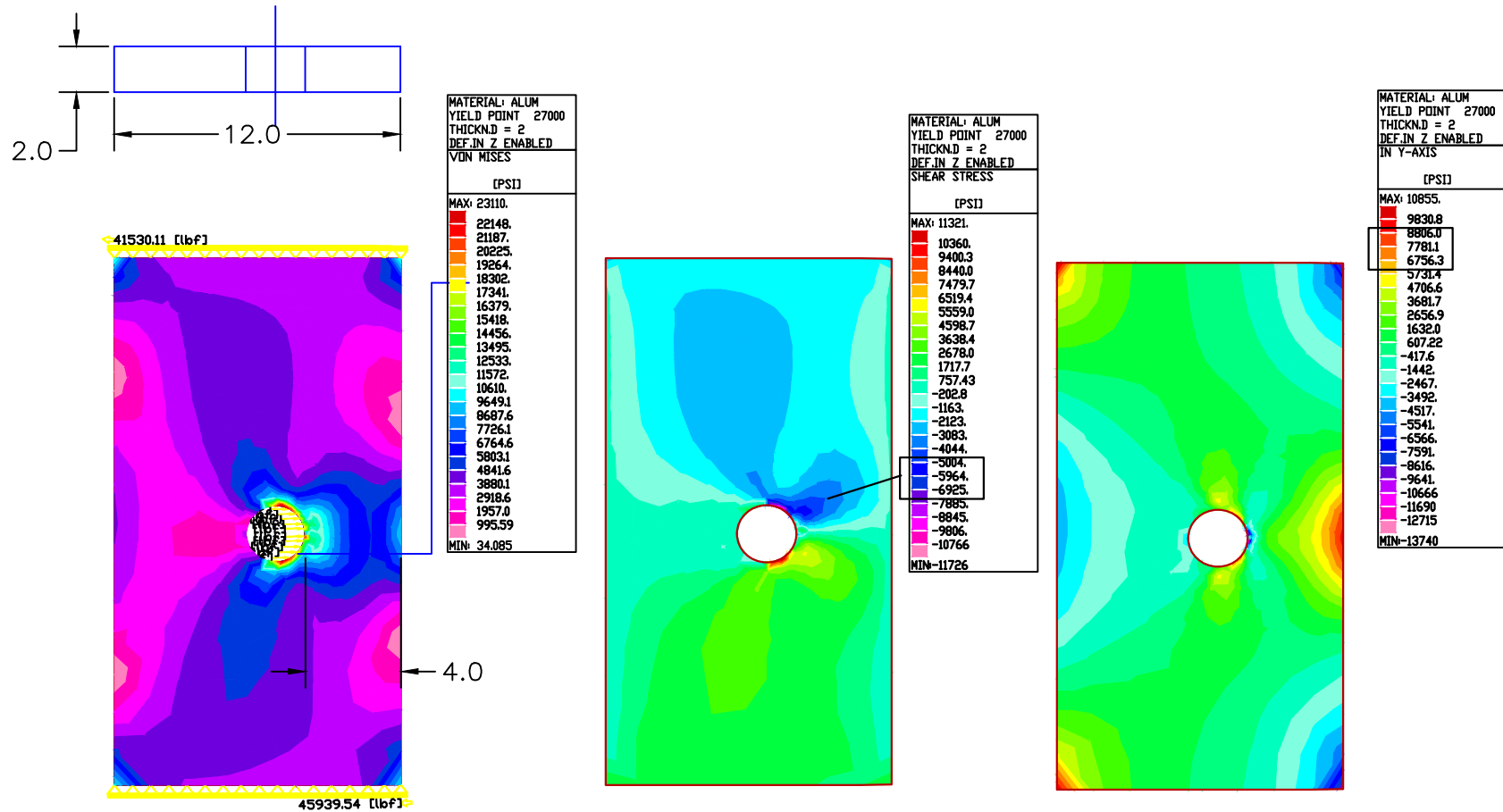
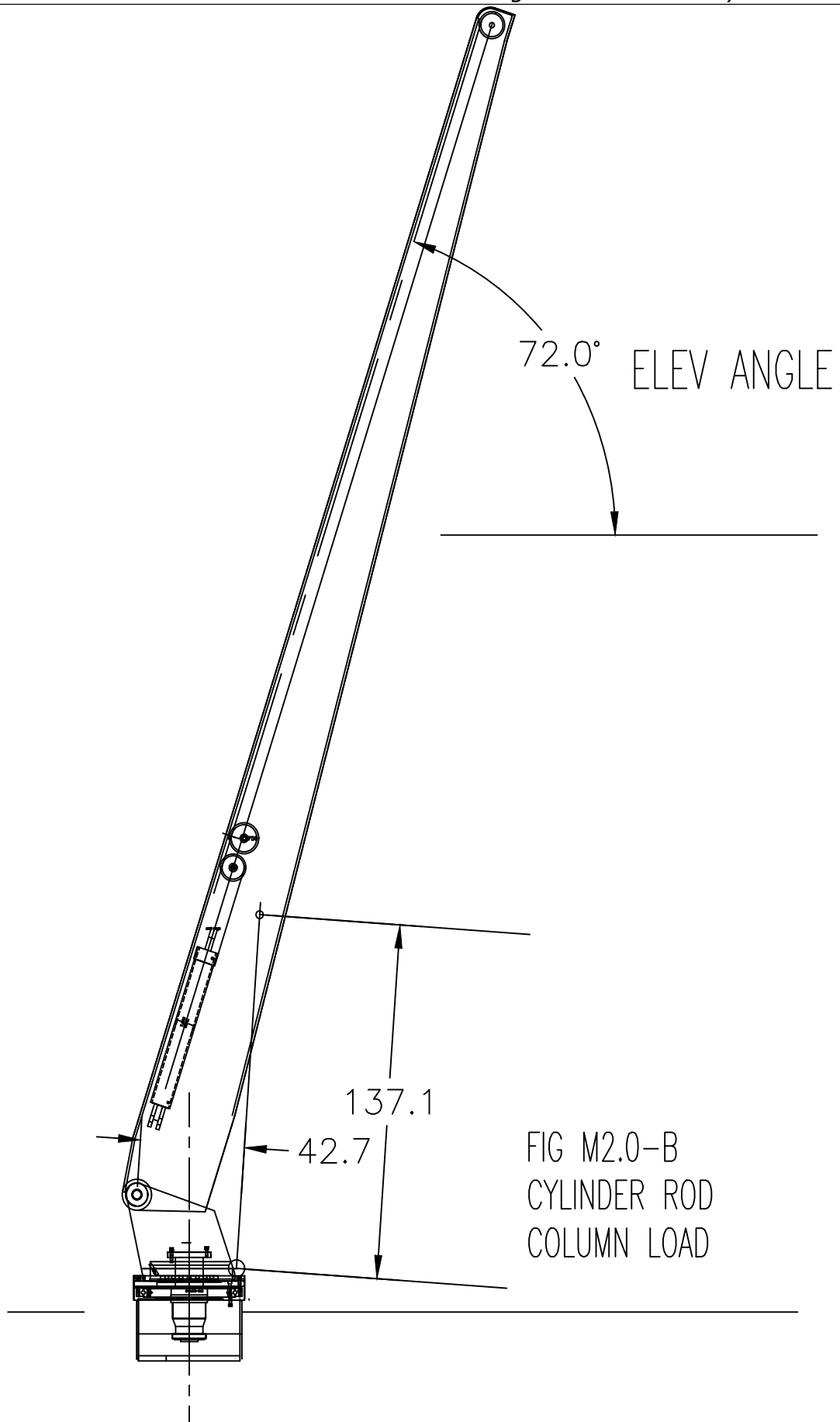
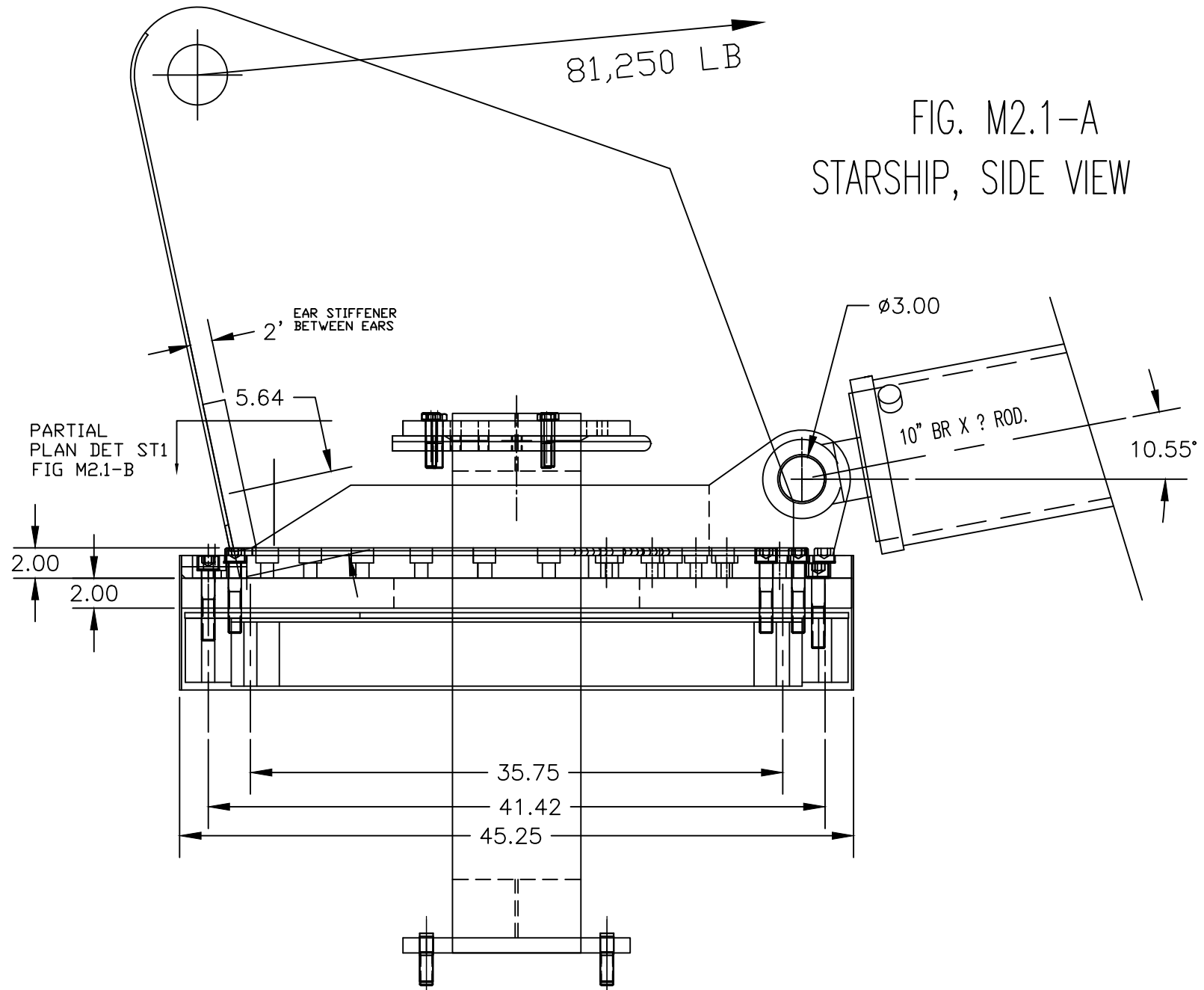


FIG M3.2-B
CABLE CYLINDER MOUNT





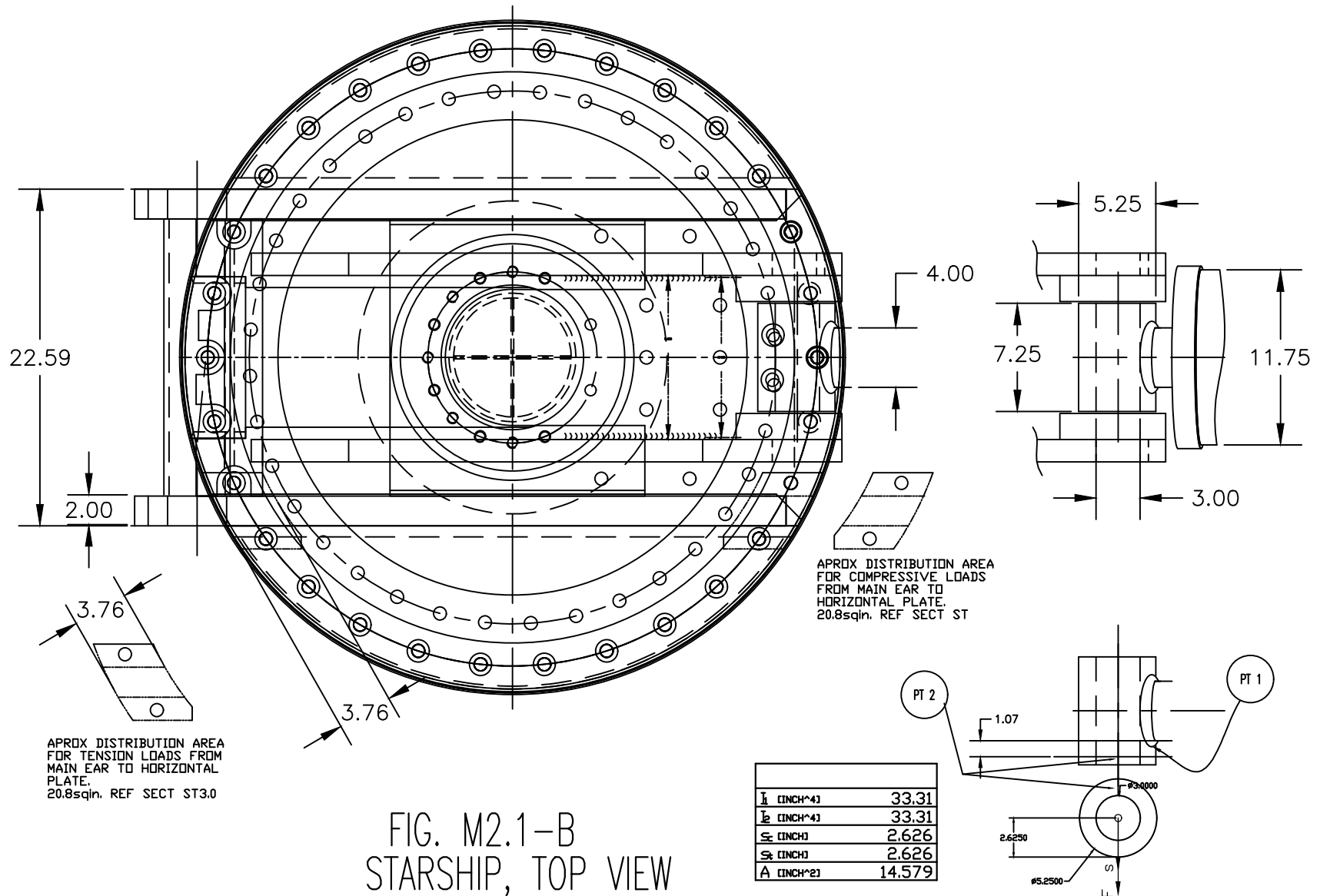


FIG M2.1-C
BOOM CYLD TUBE ROD END

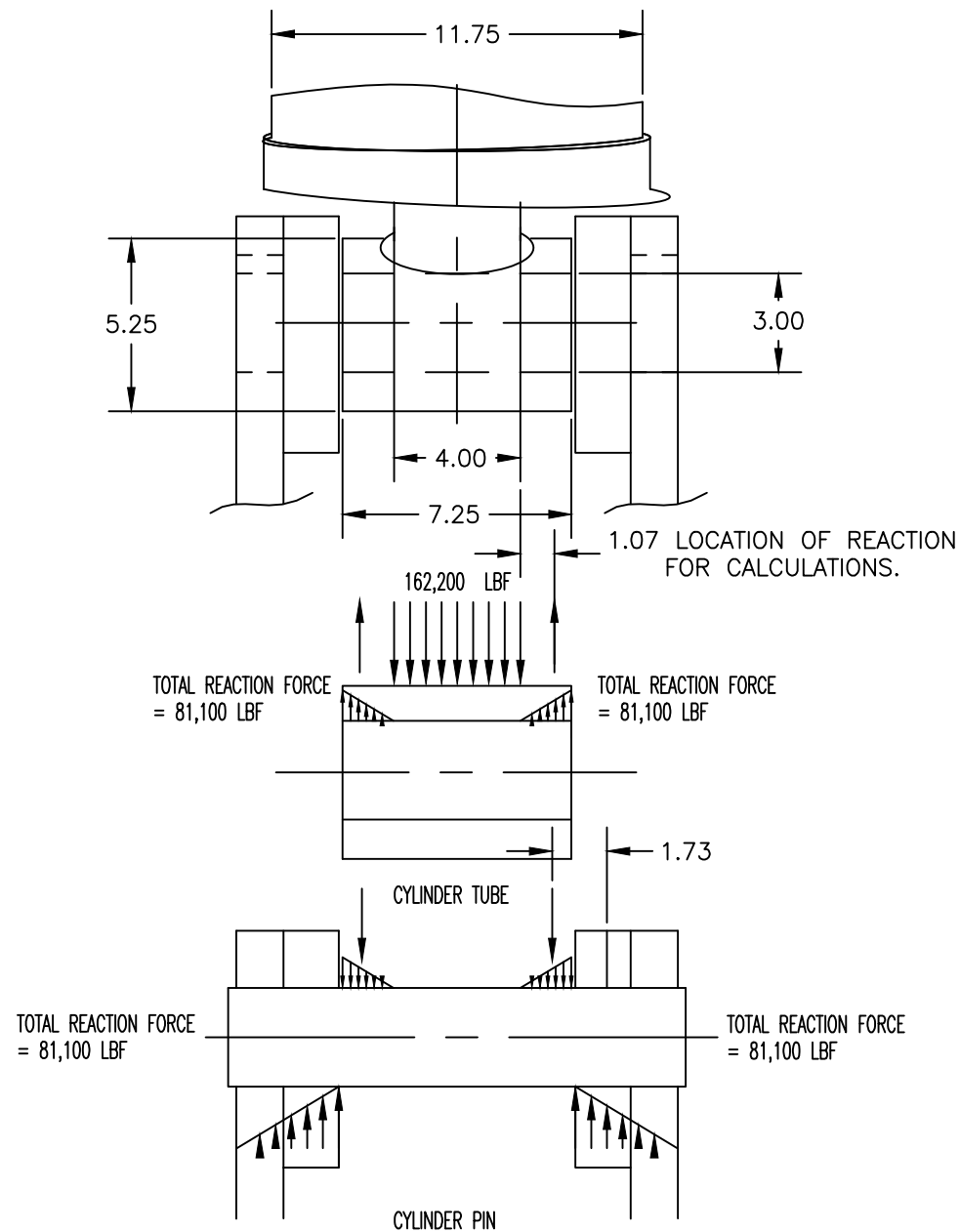


FIG M2.1—D
BOOM CYLD CAP END & PIN

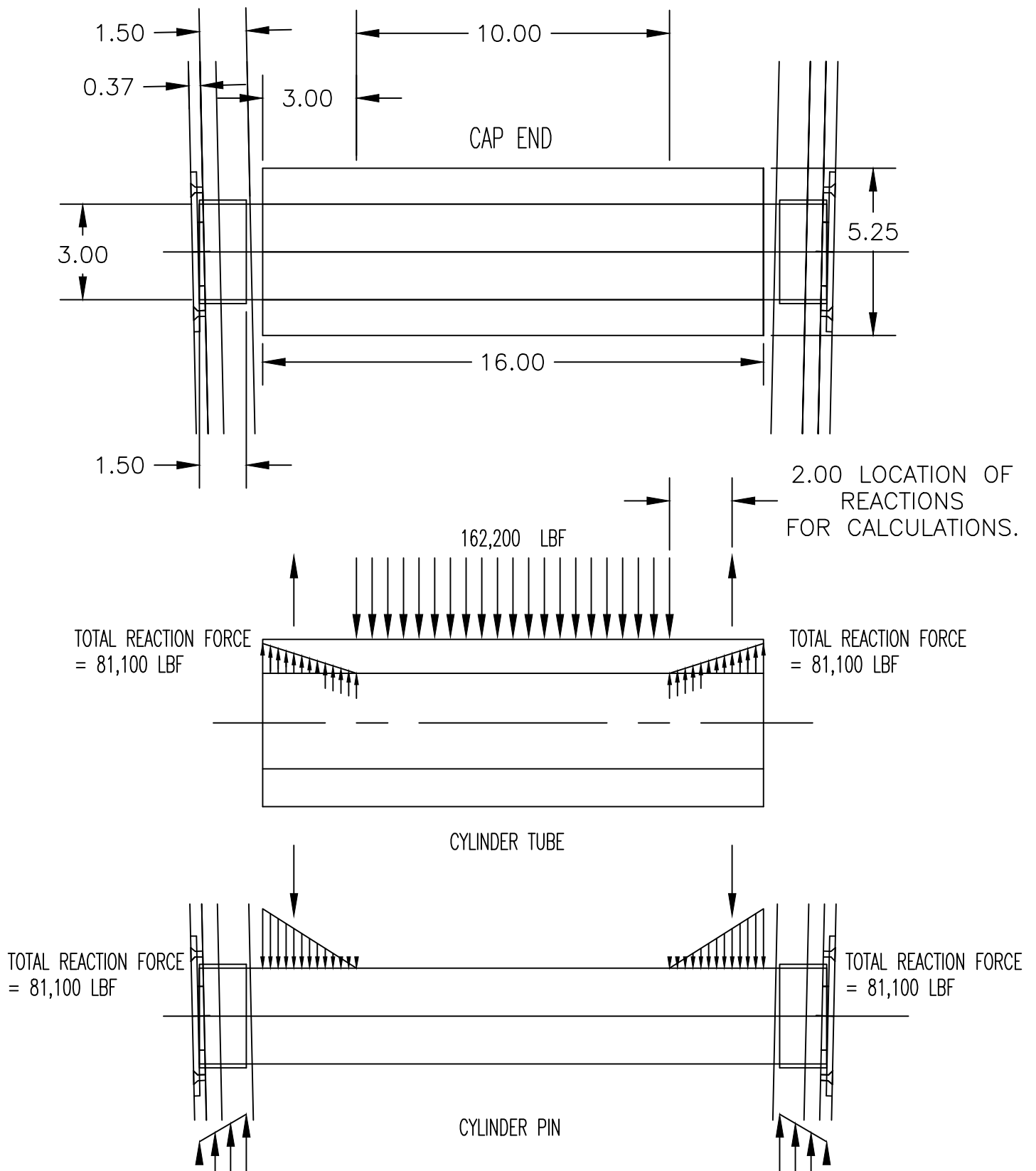
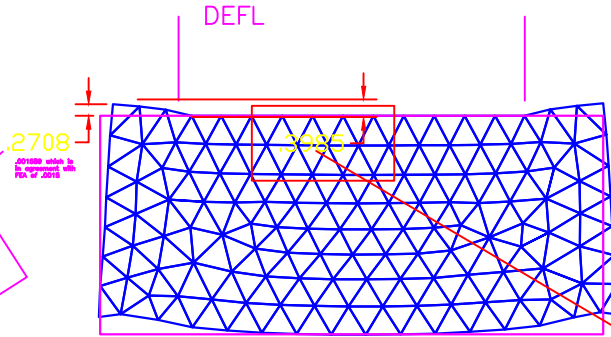


FIG M2.1–E
BOOM CAP END & PIN

BOOM CYLD CAP END
DEFL

MATERIAL:
STEEL, SAE 1330
THICKN.D = 2.55
DEF.IN Z ENABLED
DISPLACEMENT
[INCH]
MAXX: 2.2985 E-3
MAXY: 2.9614 E-3
CDEFF: 170.42



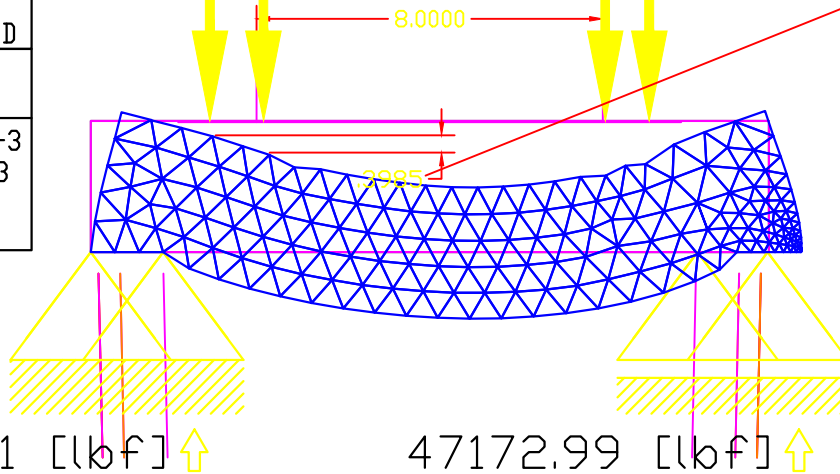
BOOM CYLD PIN CAP END
DEFL

SOME AGREEMENT

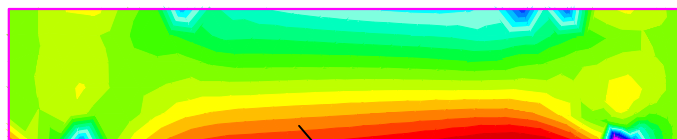
BOOM CYLD PIN CAP END
DEFL

MATERIAL:
STEEL, SAE 1330
THICKN.D = 1.76
DEF.IN Z ENABLED
DISPLACEMENT
[INCH]
MAXX: 5.4413 E-3
MAXY: -9.087 E-3
CDEFF: 170.00

30000 [lbf] 30000 [lbf]
20000 [lbf] 20000 [lbf]

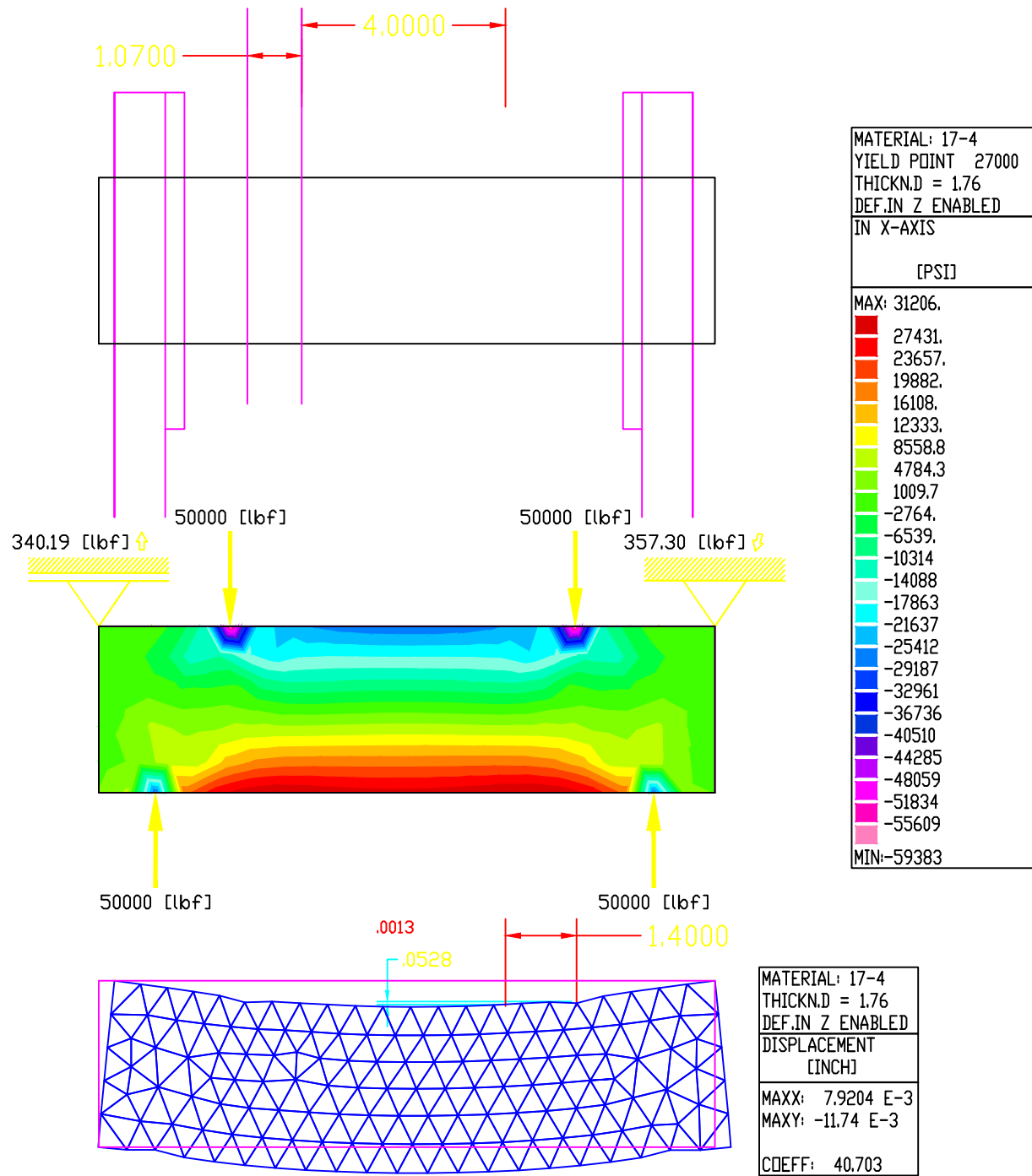


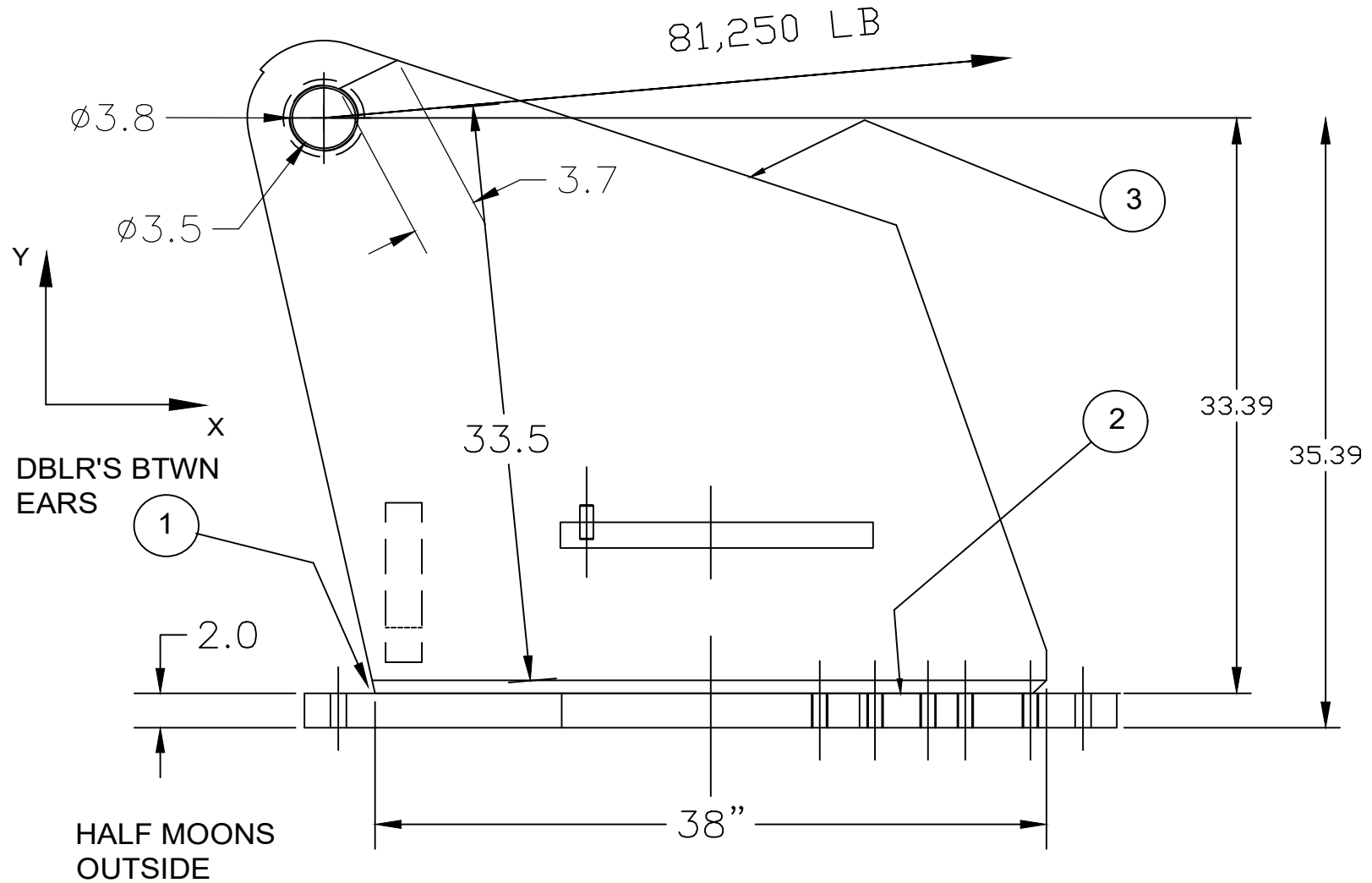
MATERIAL:
STEEL, SAE 1330
YIELD POINT 27000
THICKN.D = 1.76
DEF.IN Z ENABLED
IN X-AXIS
[PSI]
MAX: 21811.
18870.
15929.
(12987.)
10046.
7105.6
4164.5
1223.4
-1717.
-4658.
-7599.
-10541
-13482
-16423
-19364
-22305
-25246
-28187
-31129
-34070
-37011
-39952
-42893
-45834
MIN: -48775



BOOM CYLD PIN CAP END
STRESS

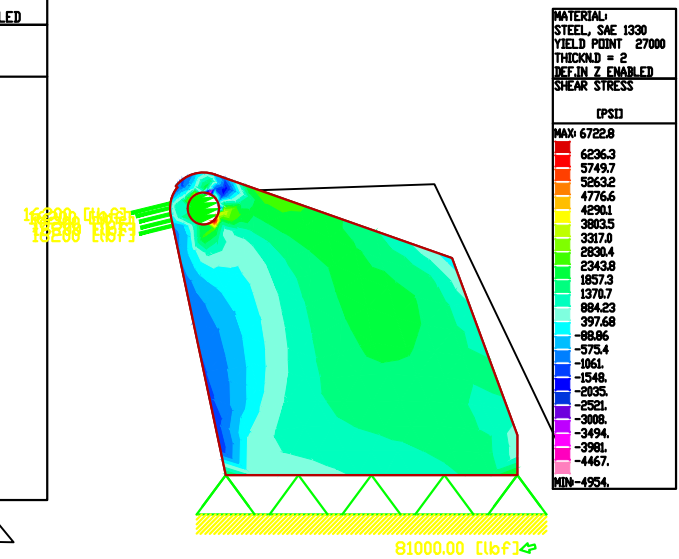
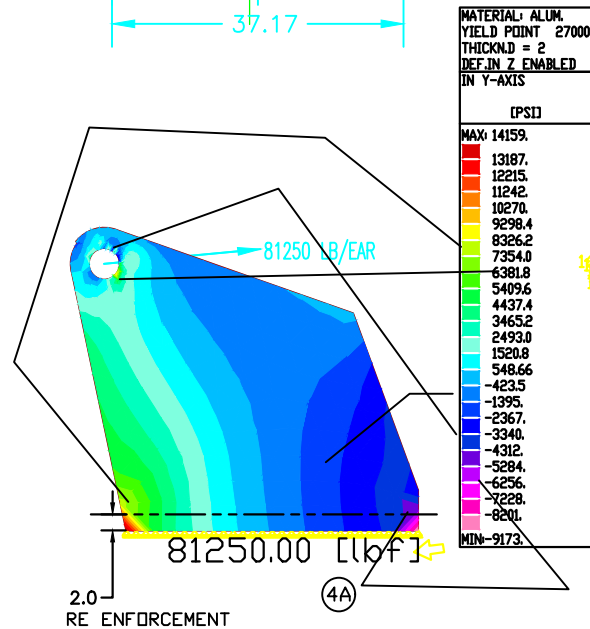
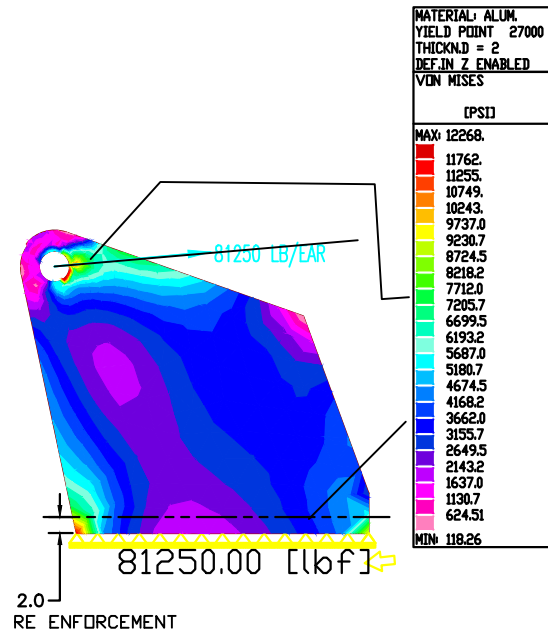
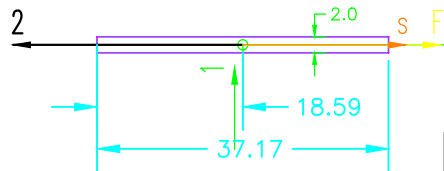
FIG M2.1—F
BOOM PIN, ROD END

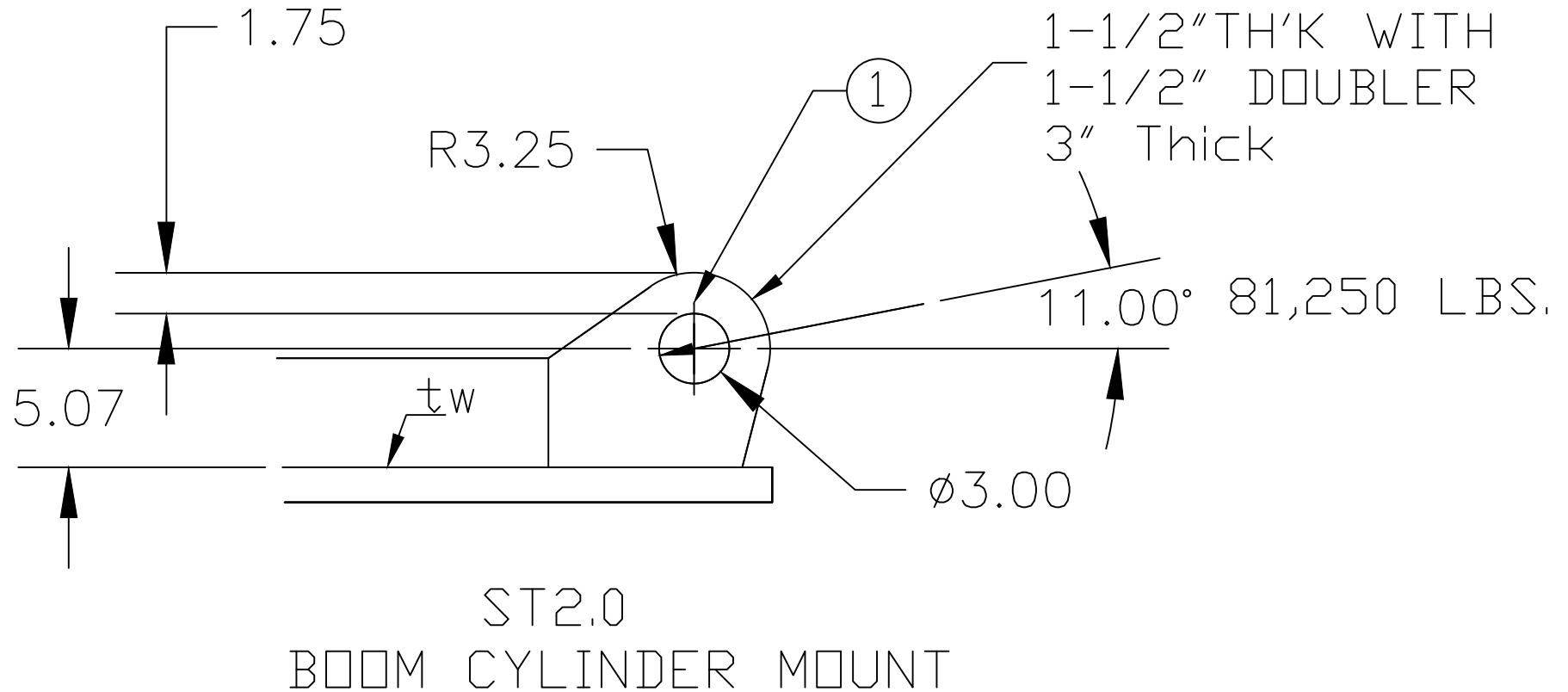




I_1 [INCH ⁴]	8562
I_2 [INCH ⁴]	24.78
S_x [INCH]	18.588
S_y [INCH]	18.588
A [INCH ²]	74.34

FIG ST1.0-A
STARSHIP MAIN EARS





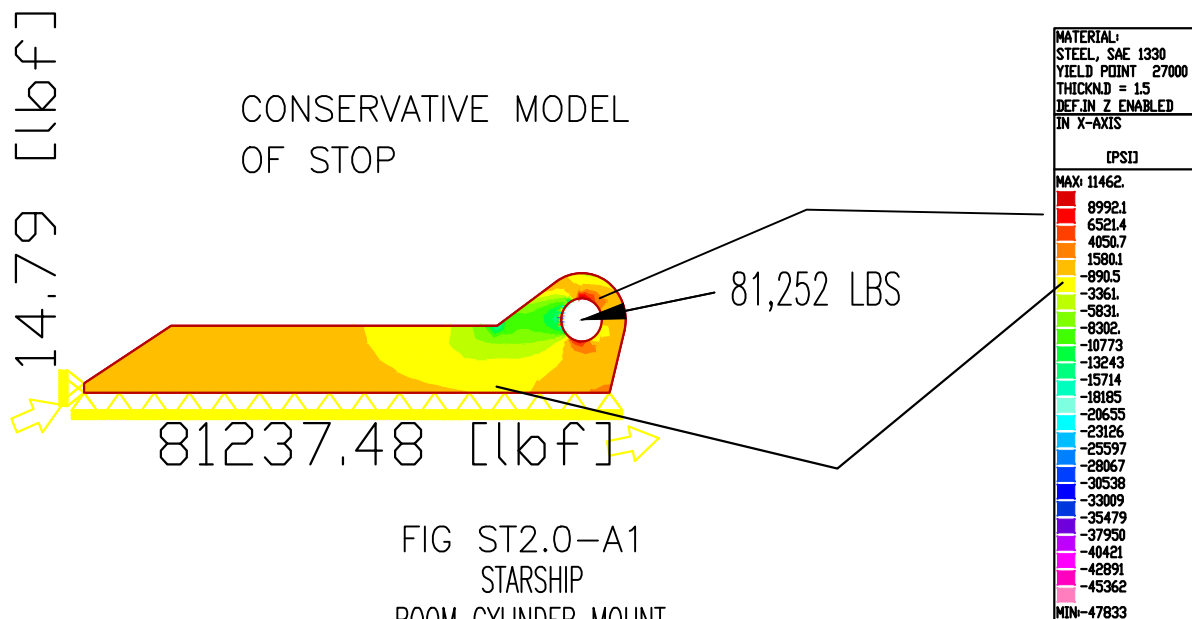
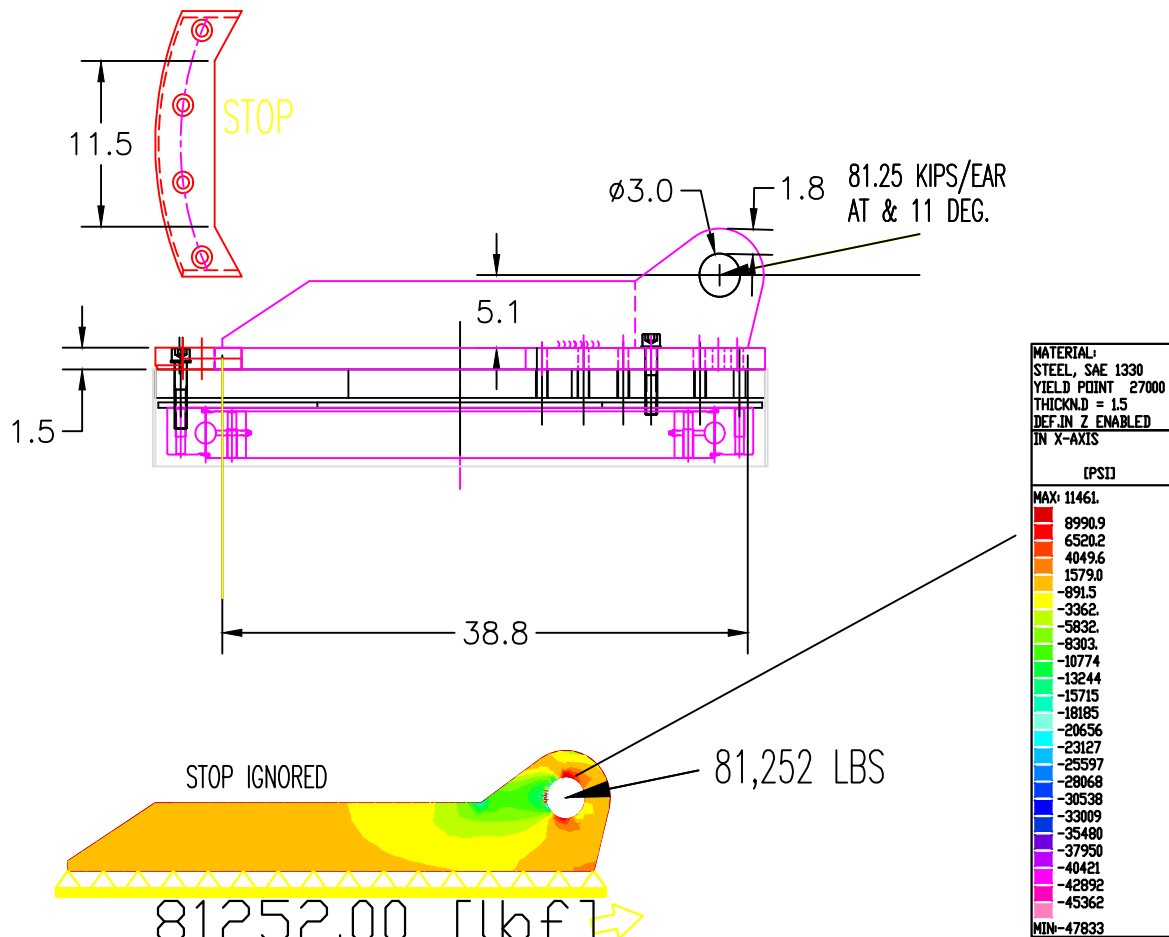
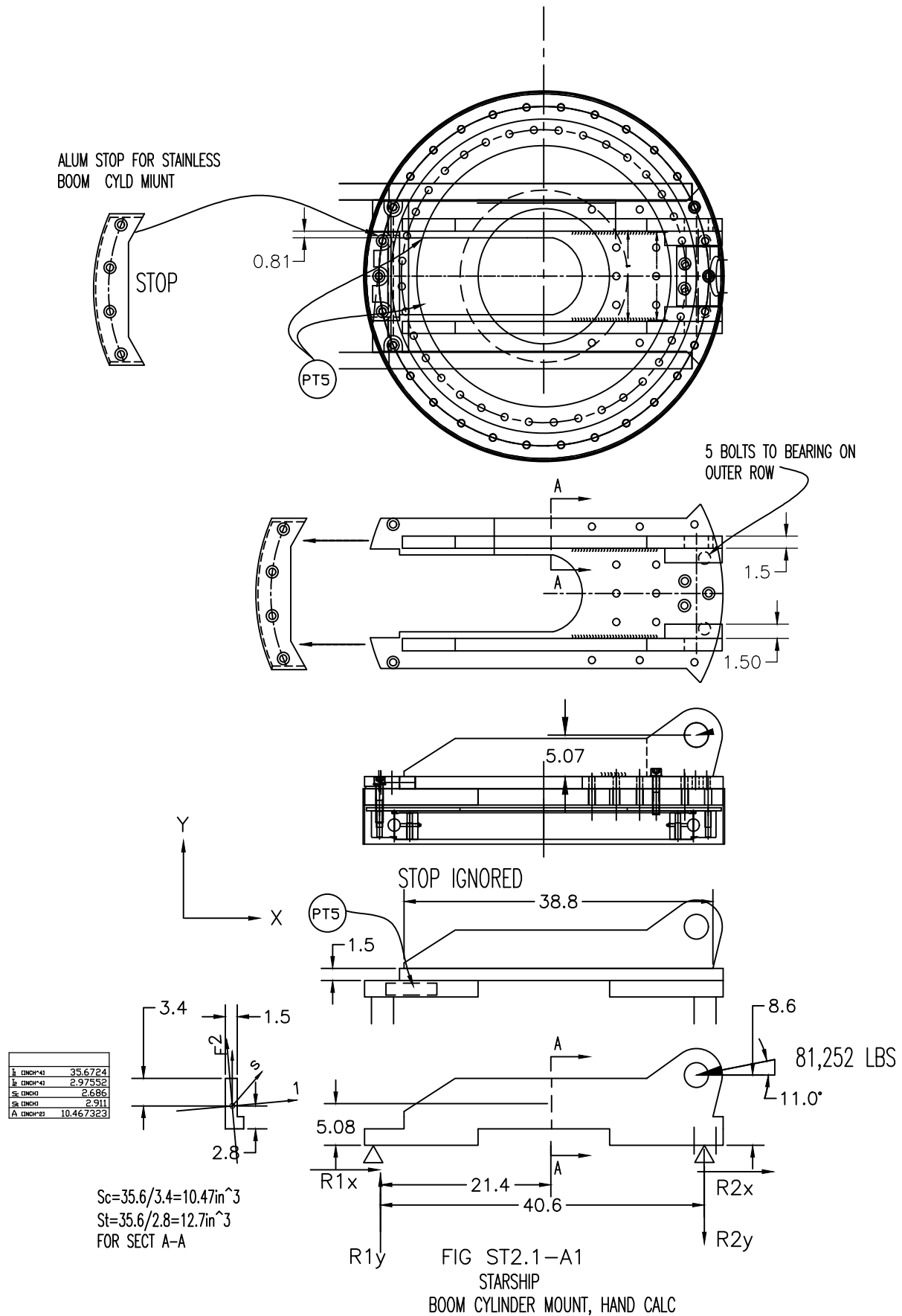
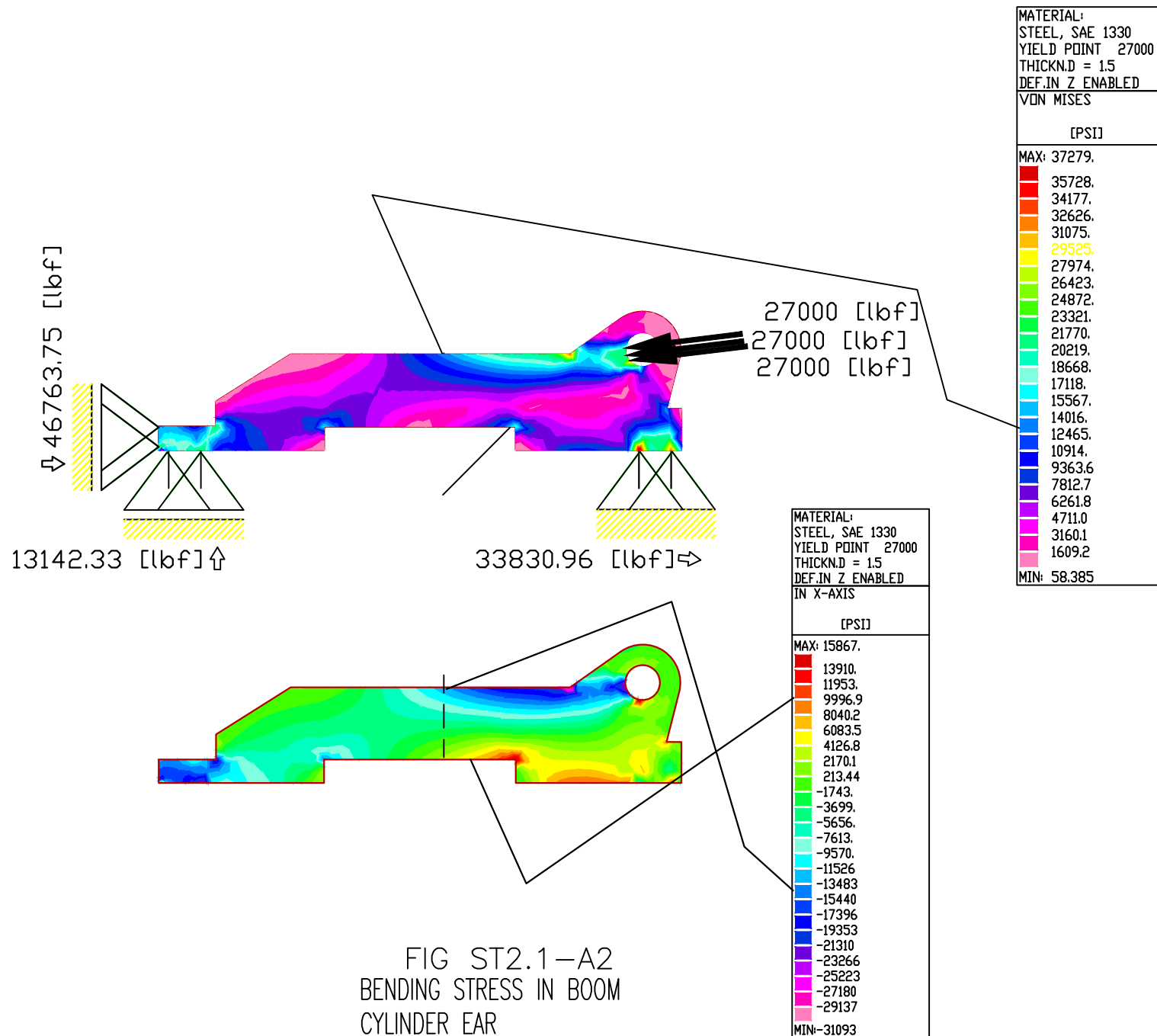
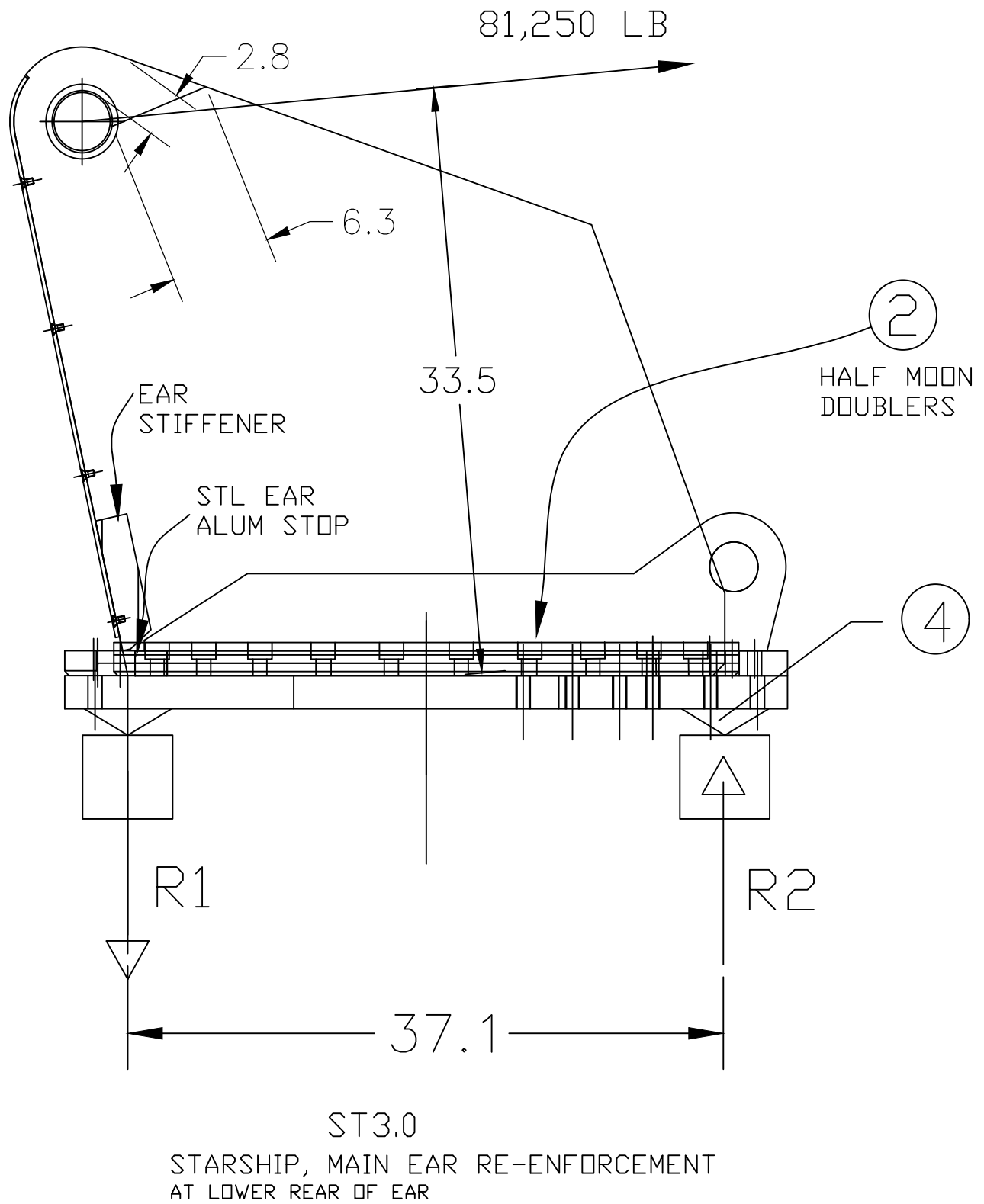


FIG ST2.0-A1
STARSHIP
BOOM CYLINDER MOUNT
(Near pin hole only)







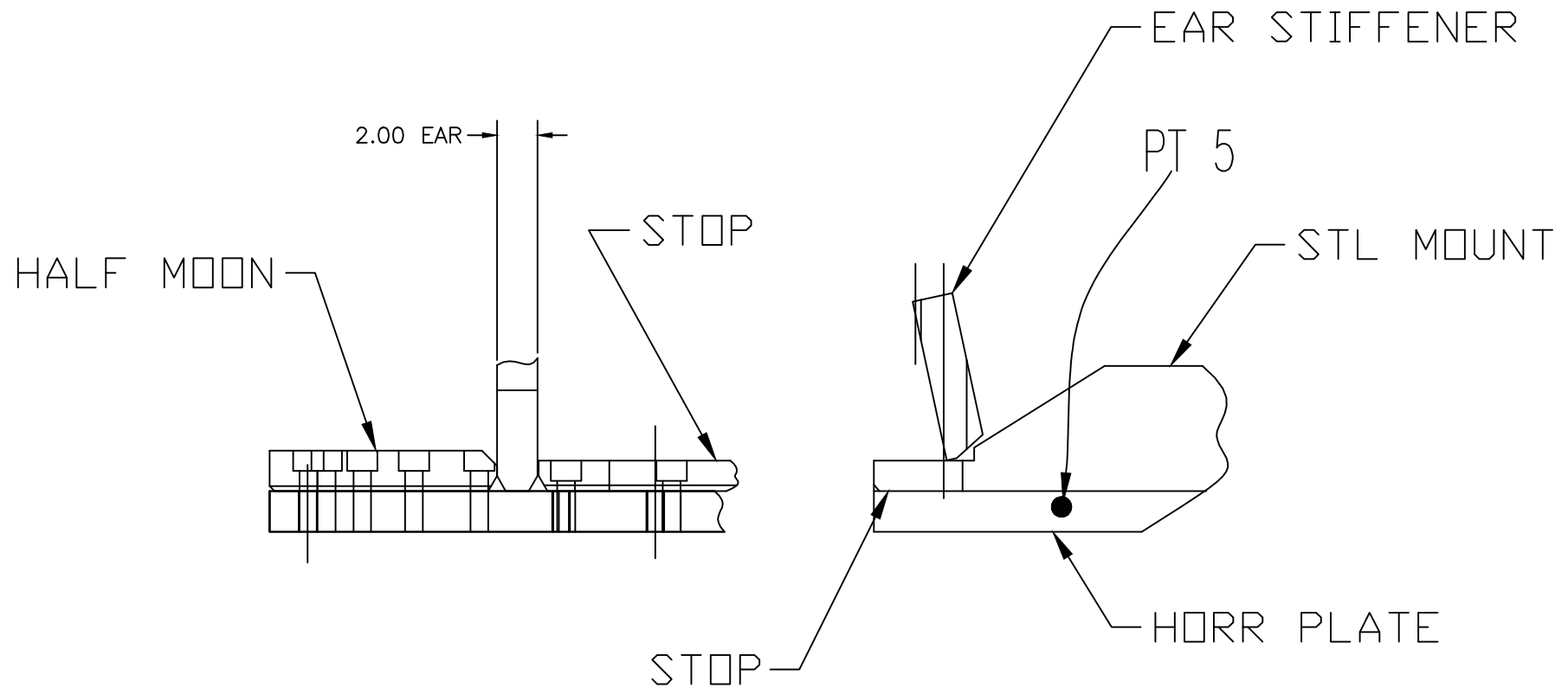
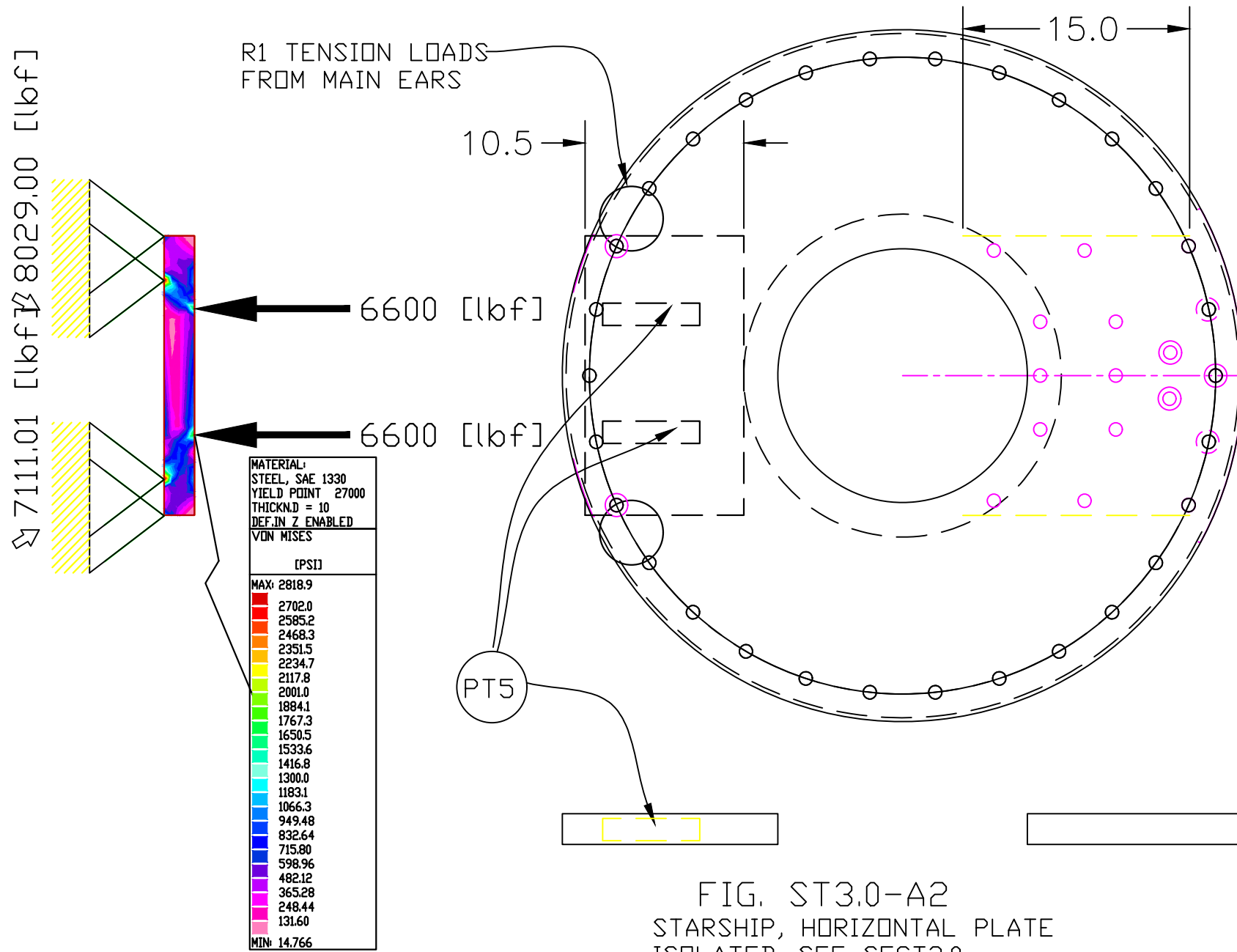


FIG. ST3.0-A1
STARSHIP MAIN HORIZONTAL PLATE &
STARSHIP REINFORCEMENT DOUBLERS



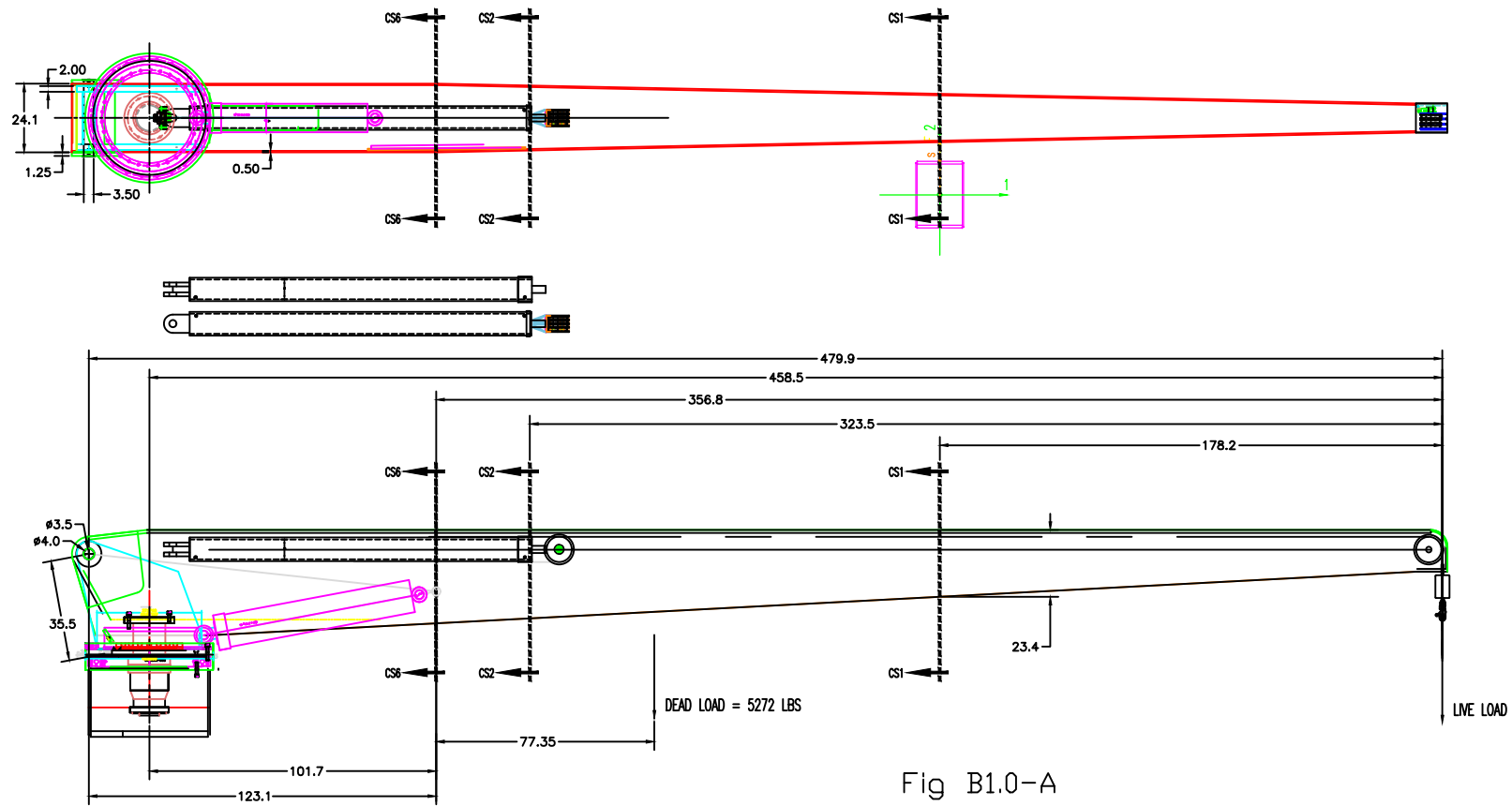


Fig B1.0-A
BOOM CROSS SECTION LOCATIONS

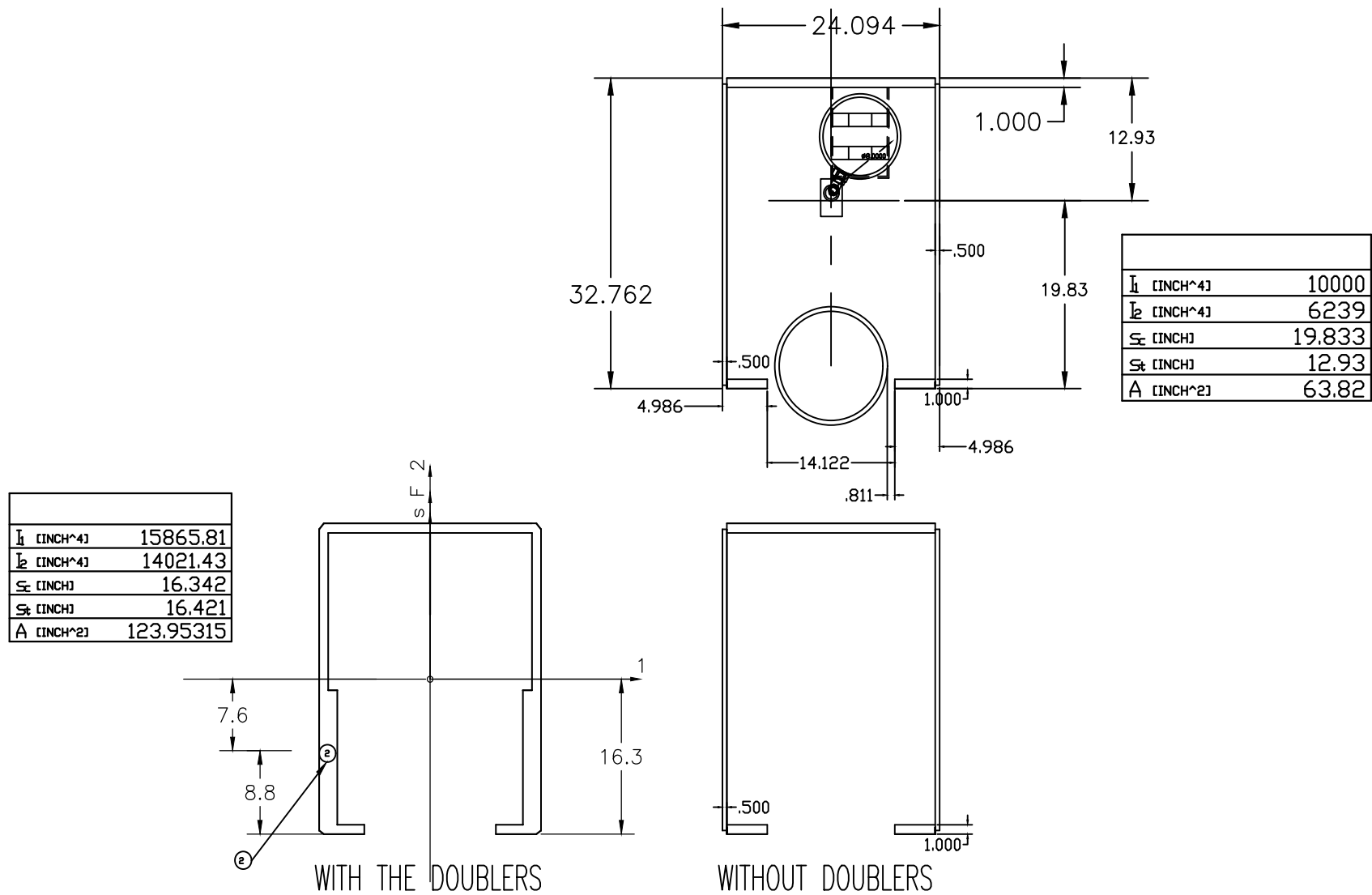
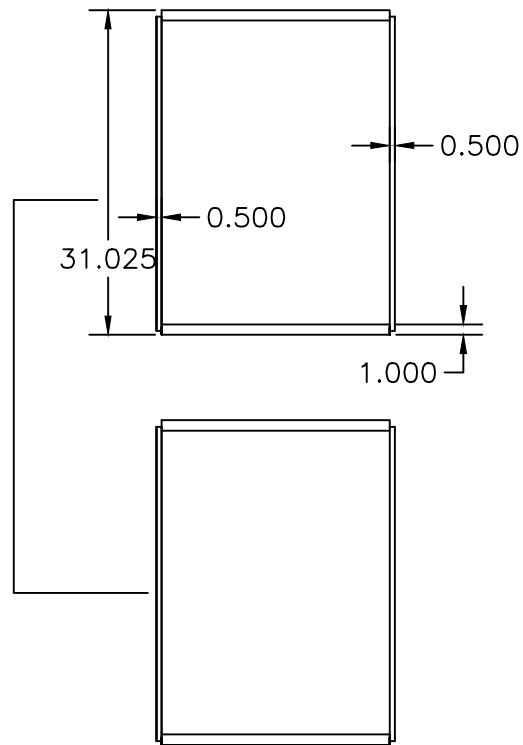


FIG B1.0-A1
SECT "CS6"



I_1 [INCH ⁴]	12084
I_2 [INCH ⁴]	5458
S_x [INCH]	15.462
S_y [INCH]	15.564
A [INCH ²]	73.61

$$M_{cap} = 7000 \times 12084 / (15.46 \times 12) = 456 \text{ ftk}$$

$$F_b = M/S = 15.46 \times 325 \times 10000 / 12084 = 4157 \text{ PSI}$$

CONCL; DBLRS DO NOT NEED TO EXTEND ANY
FURTHER, EXCEPT TO MAYBE REDUCE LOCAL PLATE BEND STRESSES
TO BE CHECKED BY JL FEA

FIG B1.0-A2
SECT "CS2"

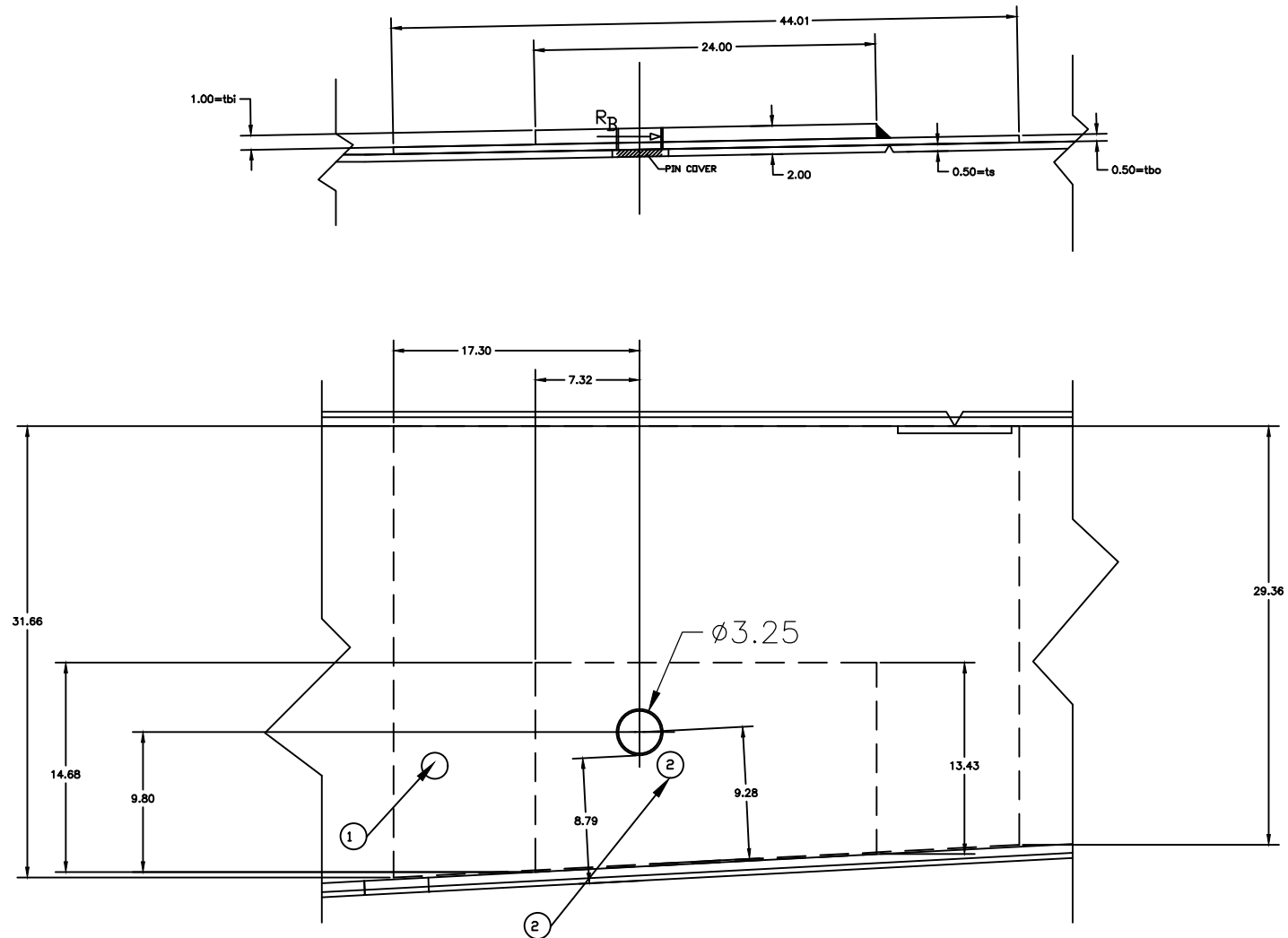
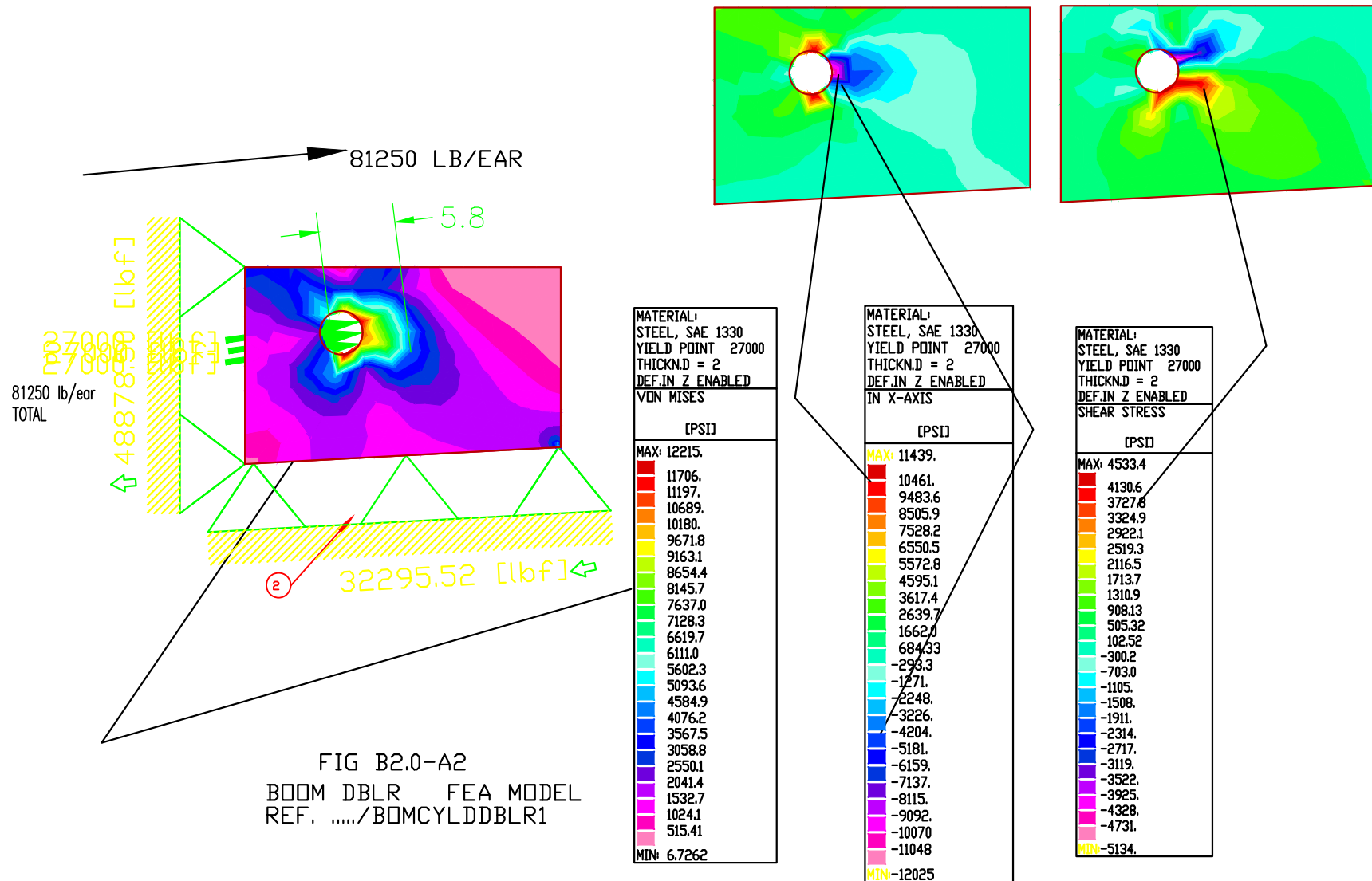


FIG B2.0-A1
BOOM DBLR FEA MODEL
REF./BDMCYLDDBLR1



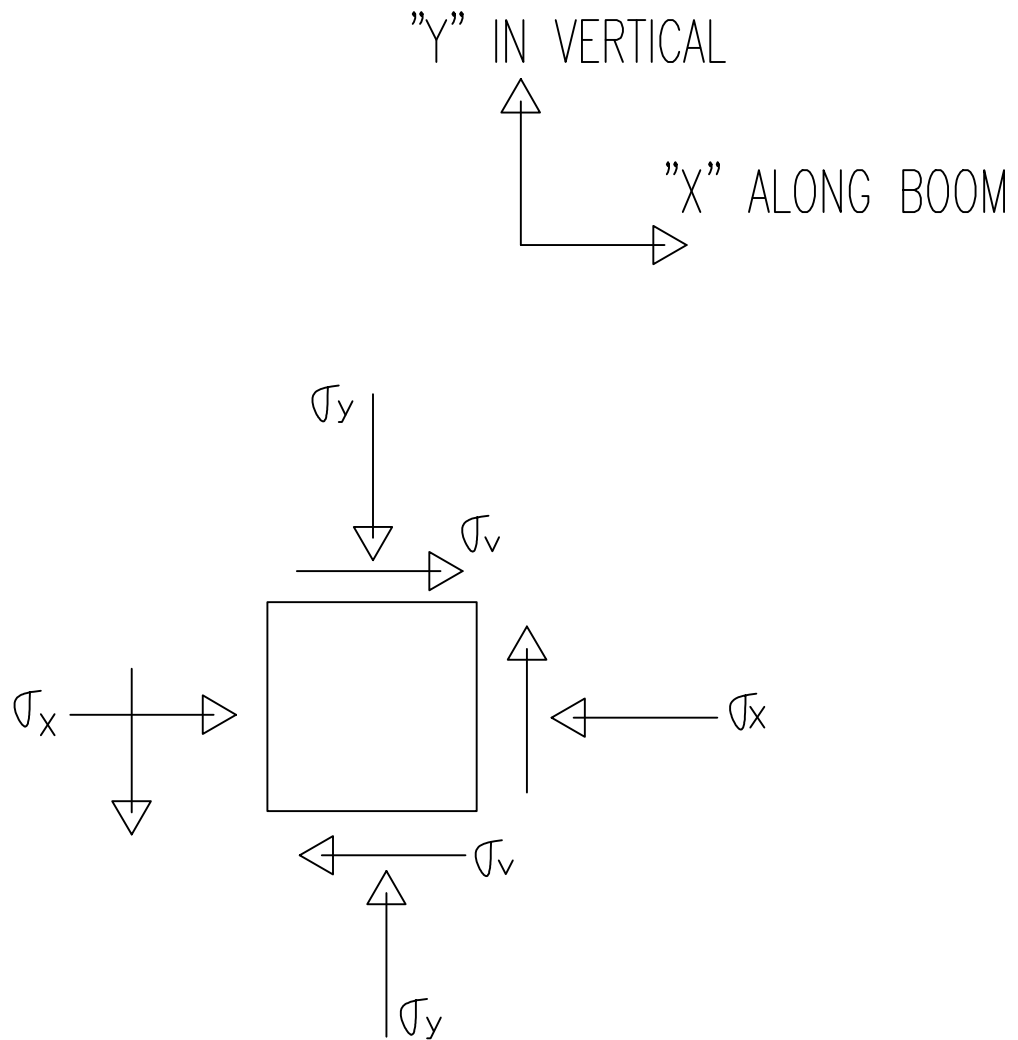


FIG. B4.0
BOOM MAIN PIN
DOUBLERS STRESSES

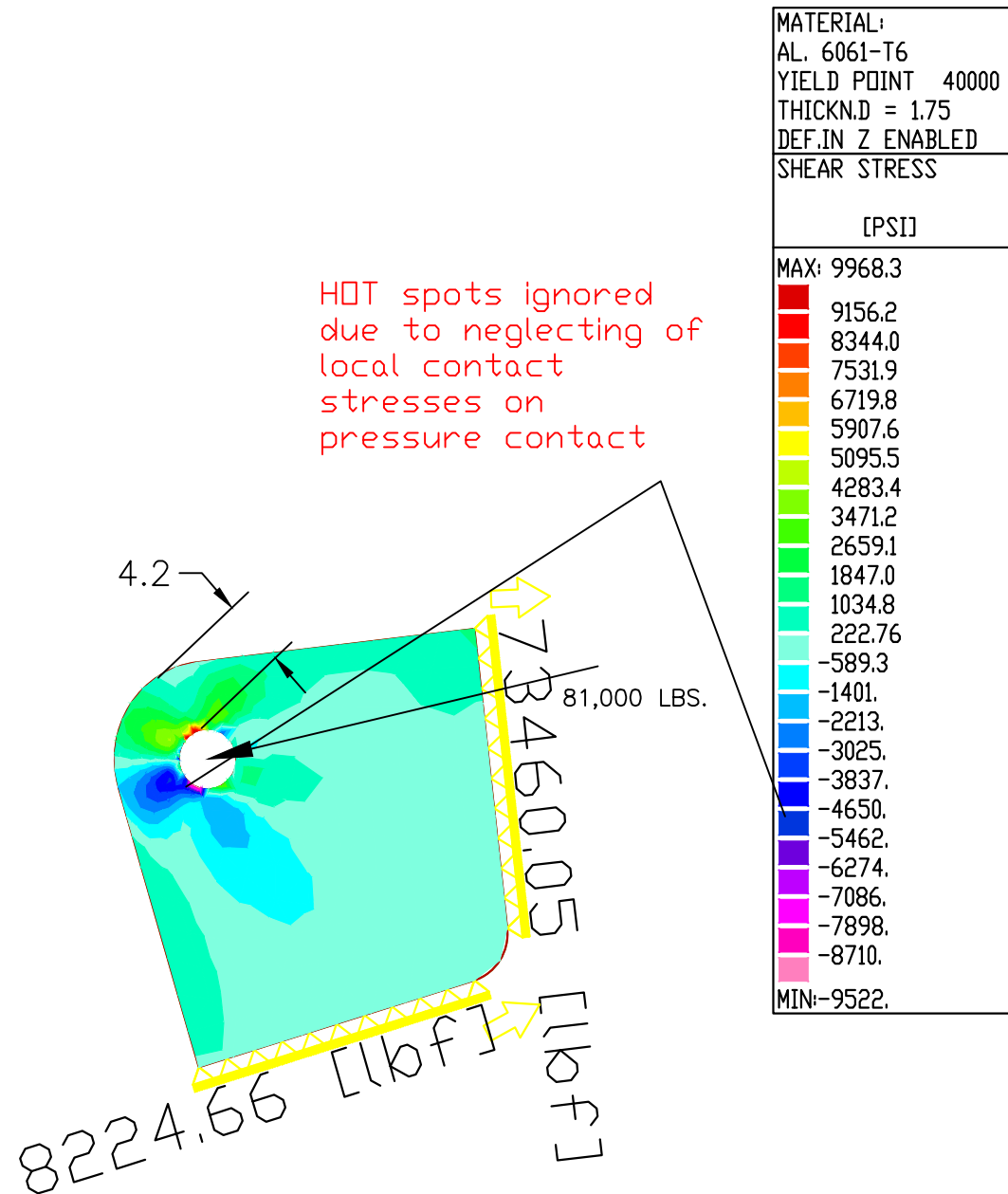


FIG B5.1-A
BOOM MAIN PIN DBLRS

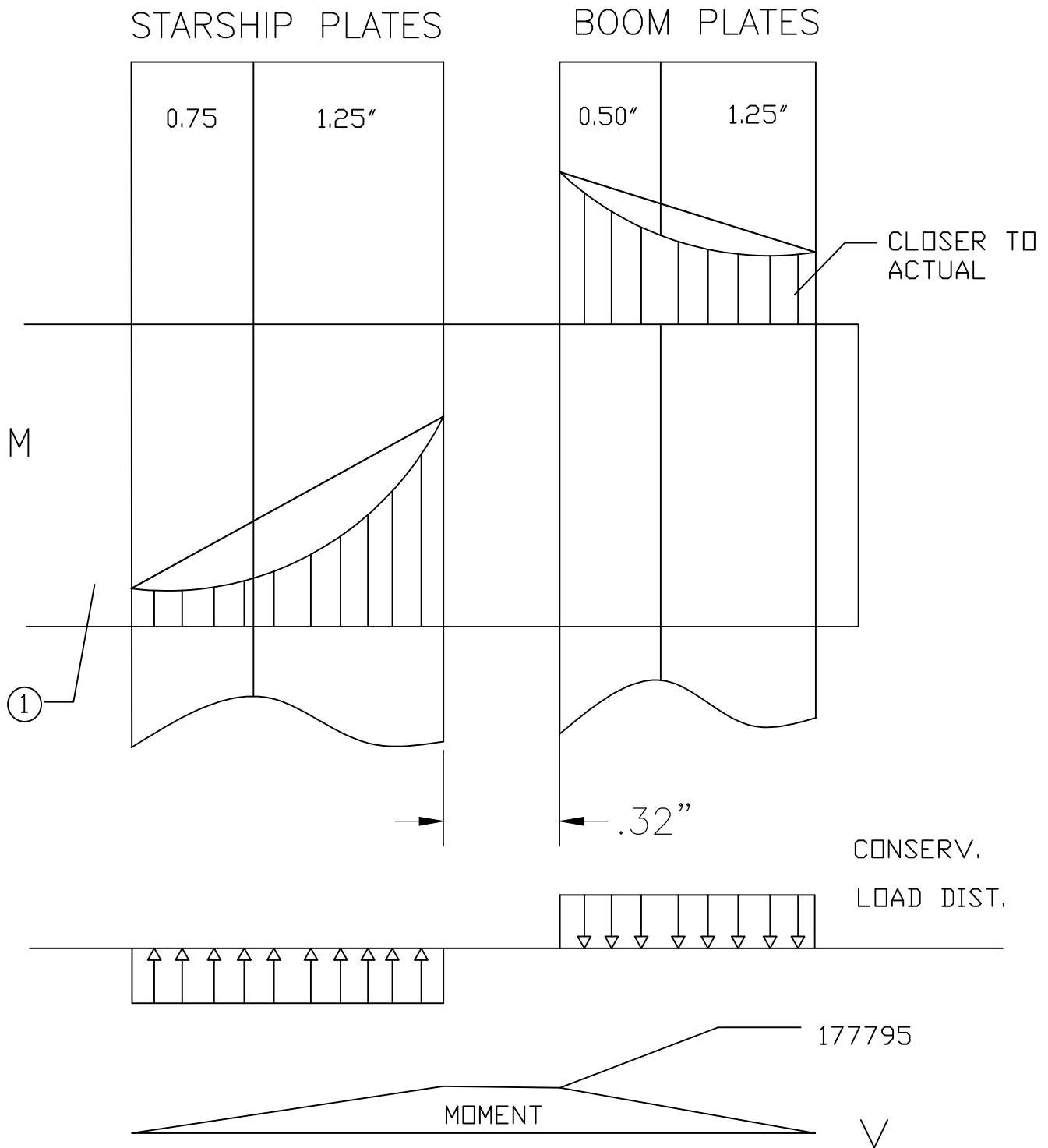


FIG P1.0

MAIN BOOM / STARSHIP PIN

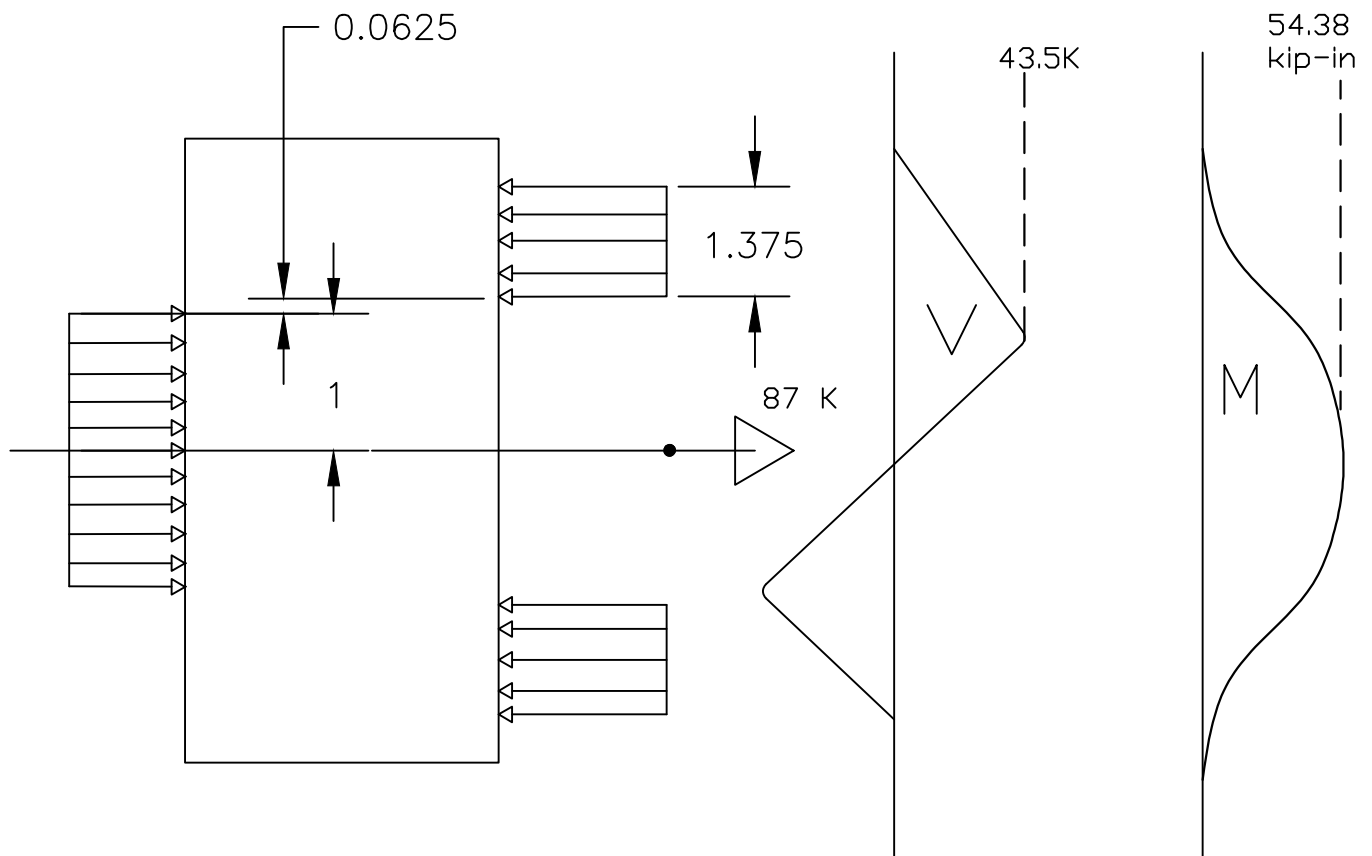


FIG P2.0
CABLE CYLINDER PIN

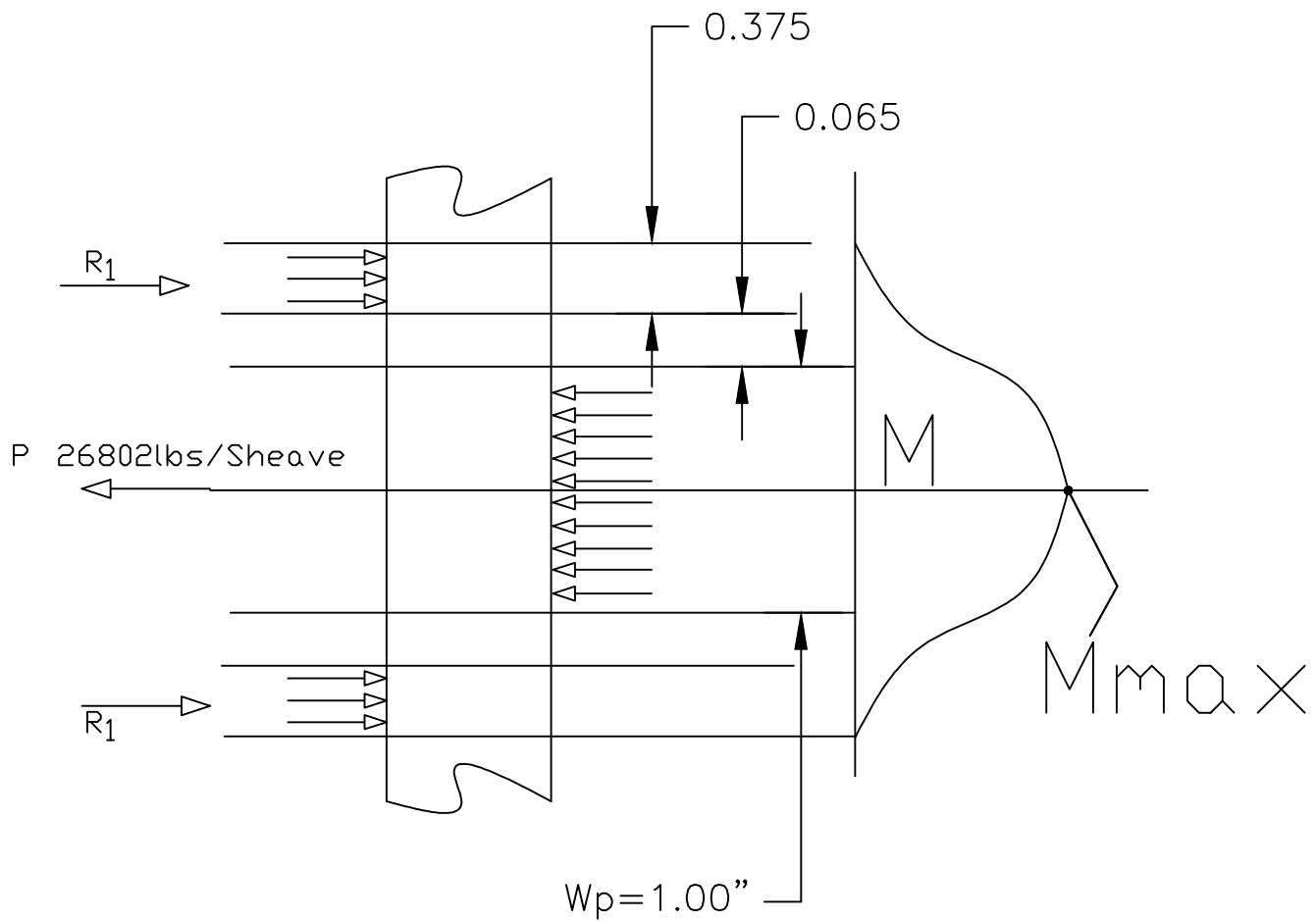


FIG P3.0
BOOM HEAD PULLEY PIN

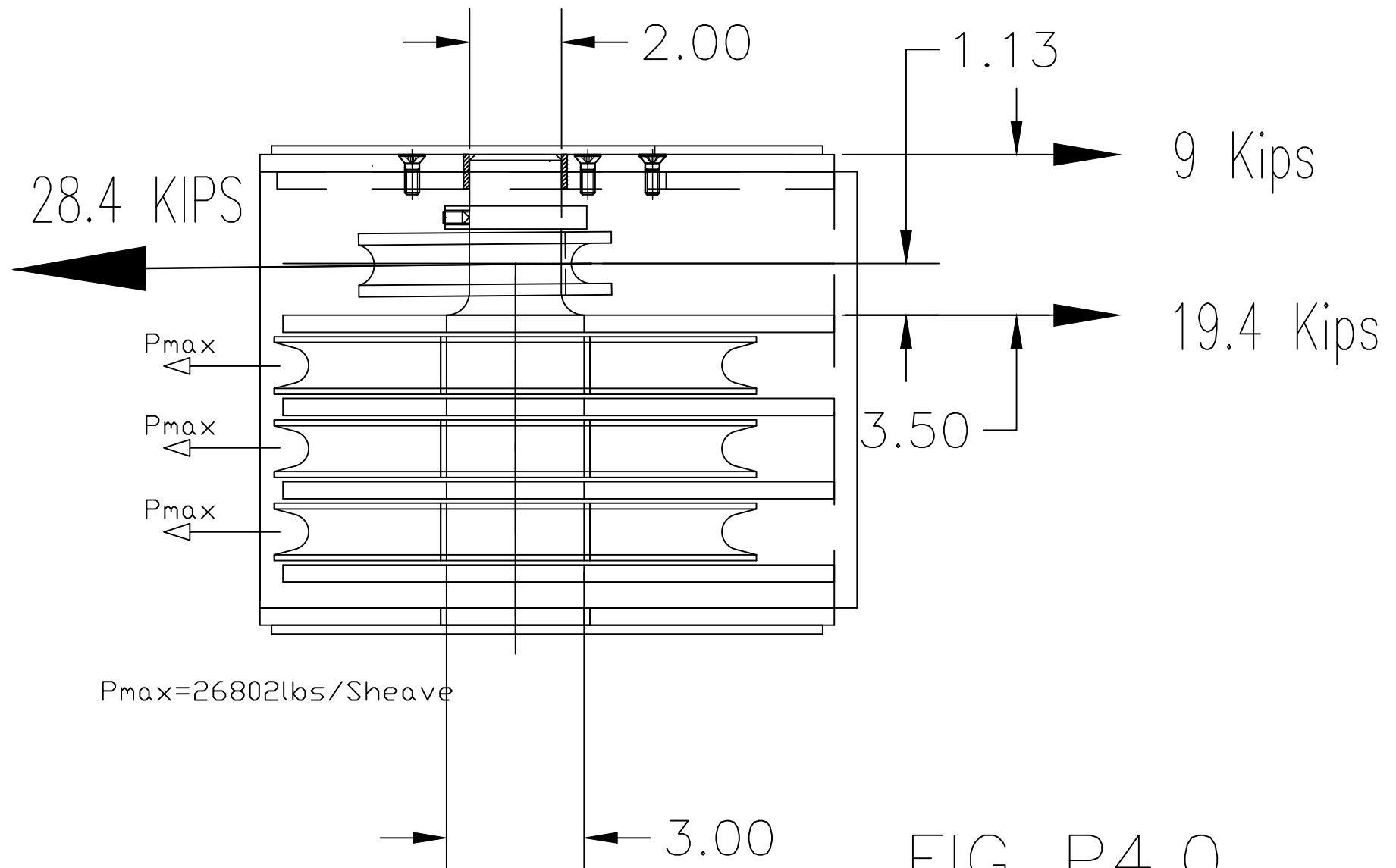


FIG P4.0
BITTER END PIN

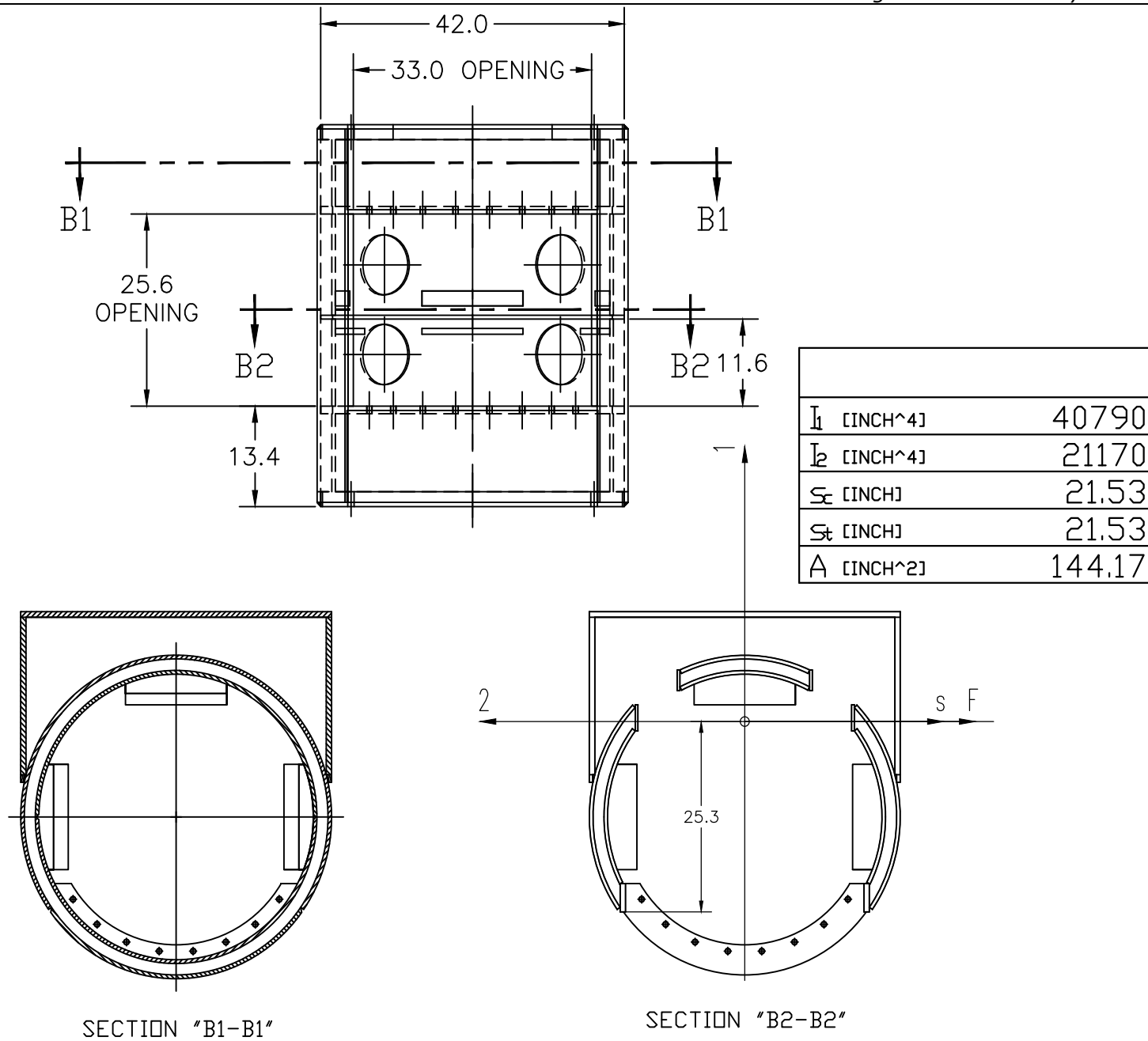


FIG BA1.0-A SECTION B2 PROPERTIES

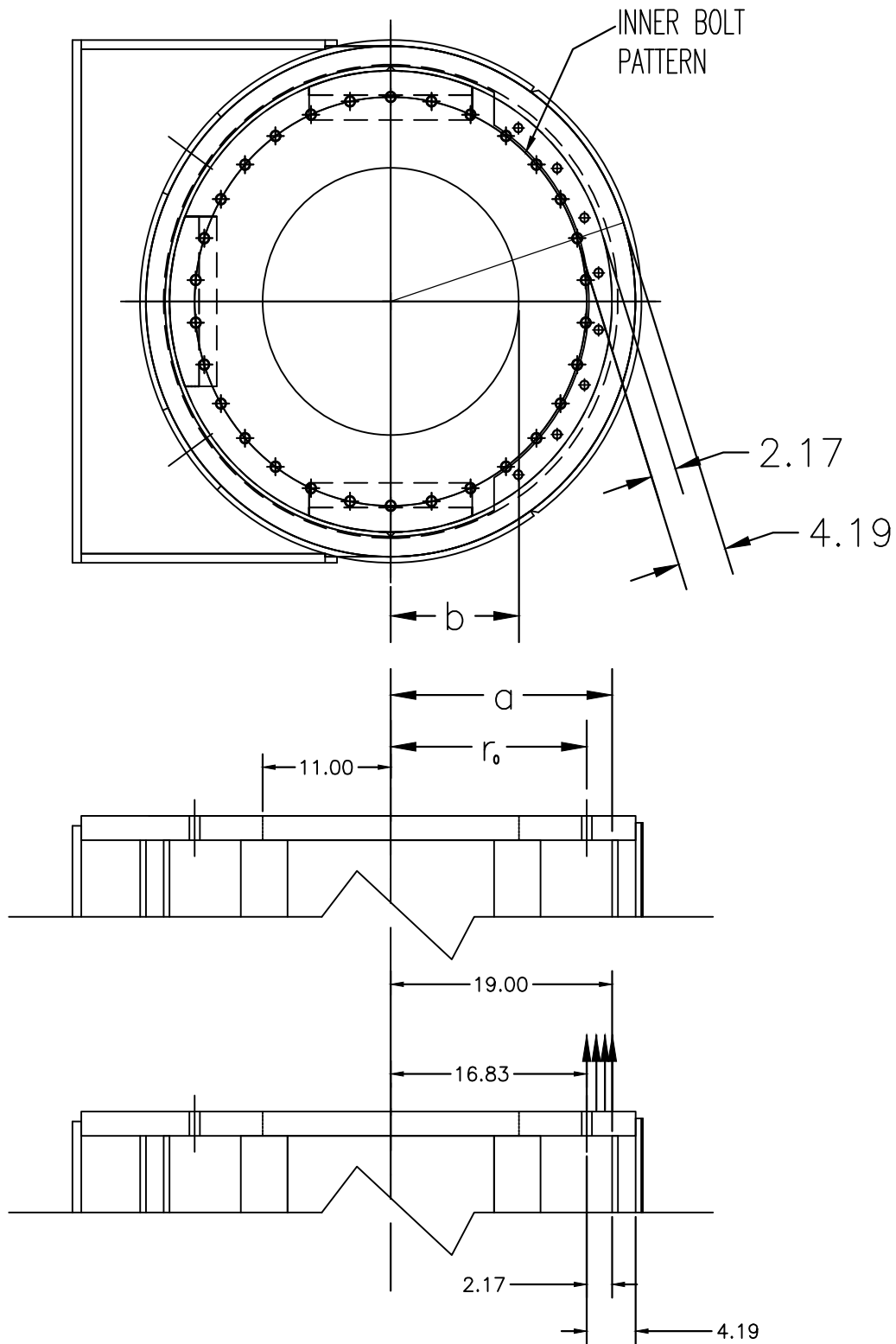
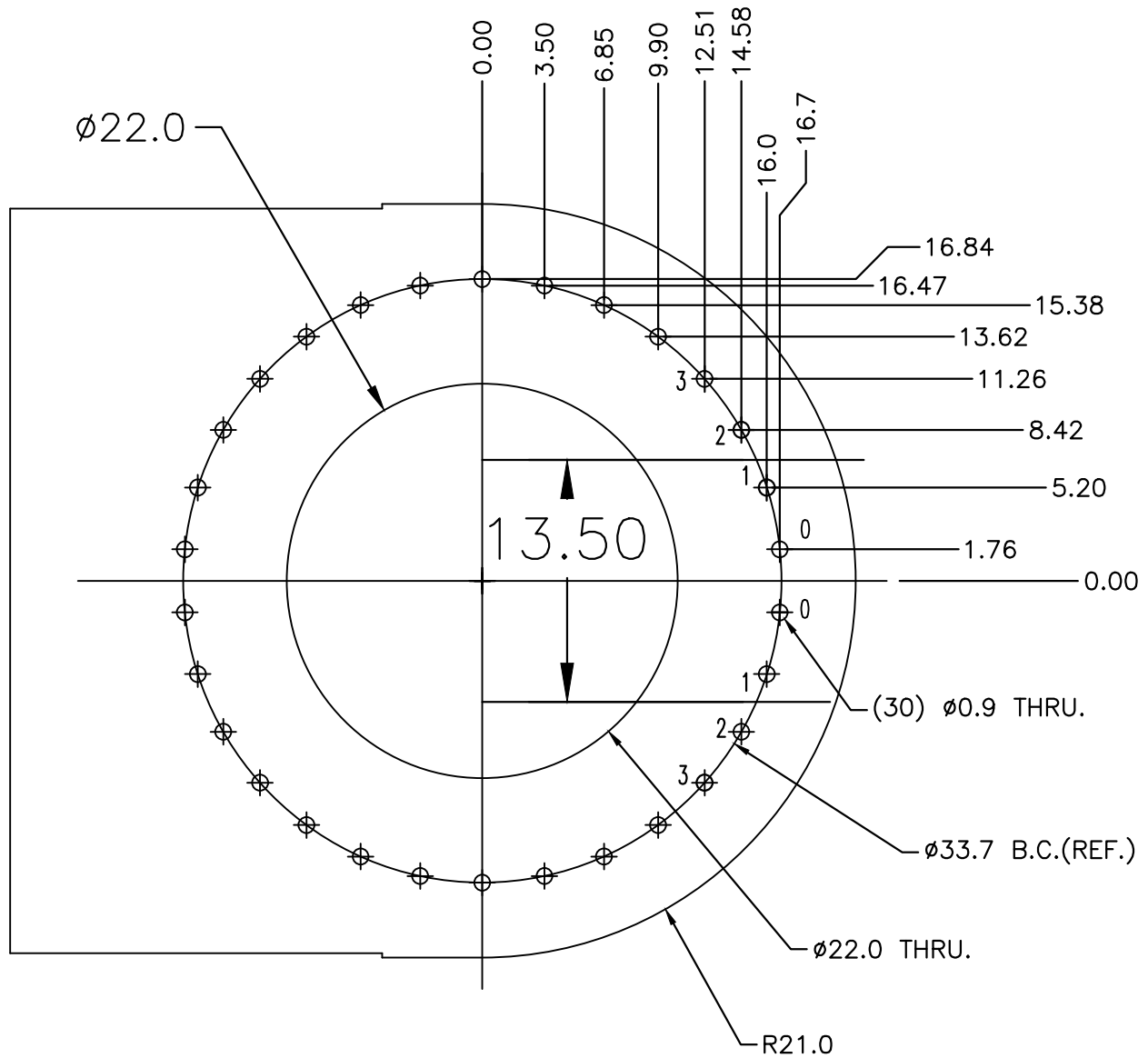


FIG BA2.0
TOP PLATE BOLT LOADS SECT BA2.0



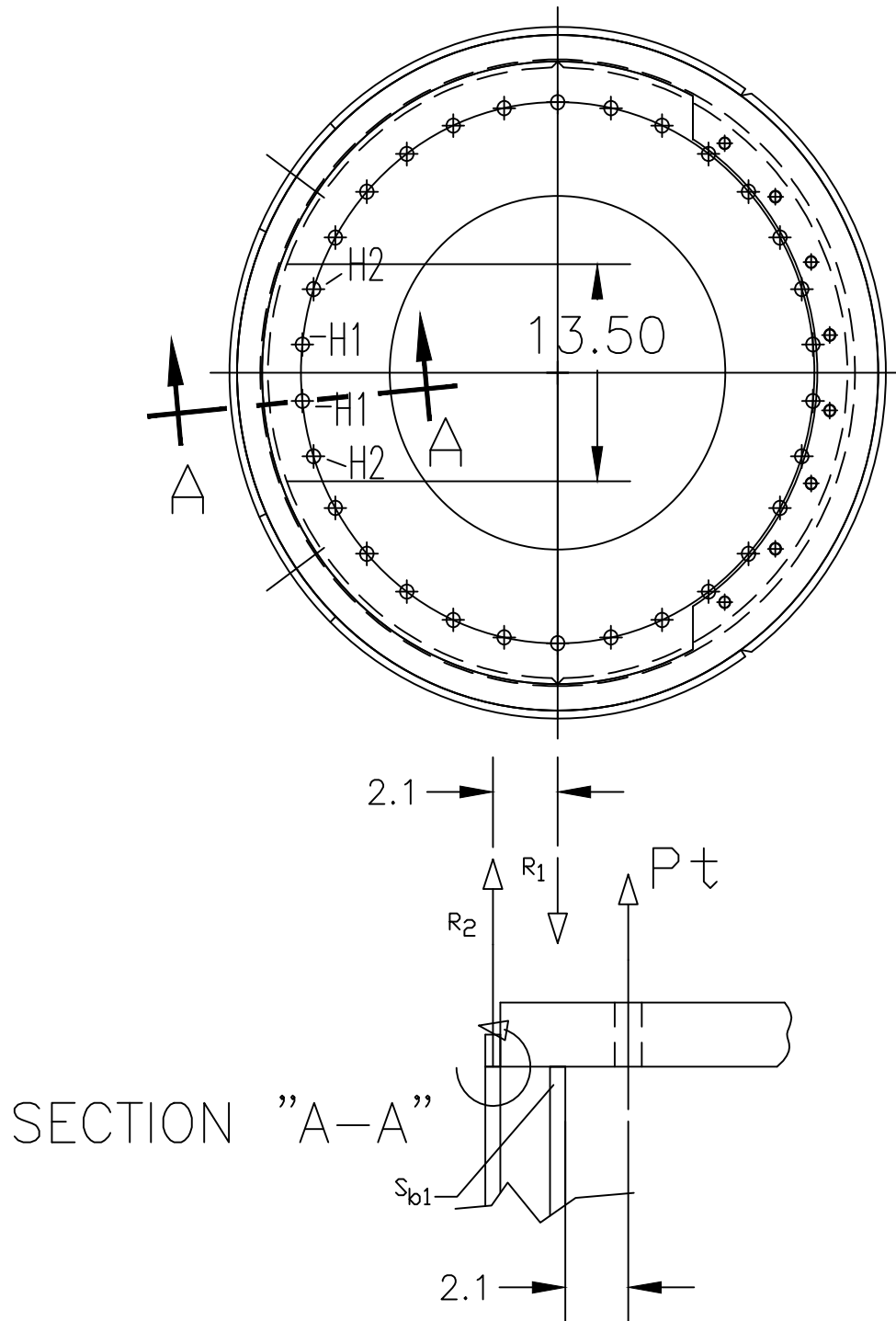


FIG BA3.1 GUSSET PLATE

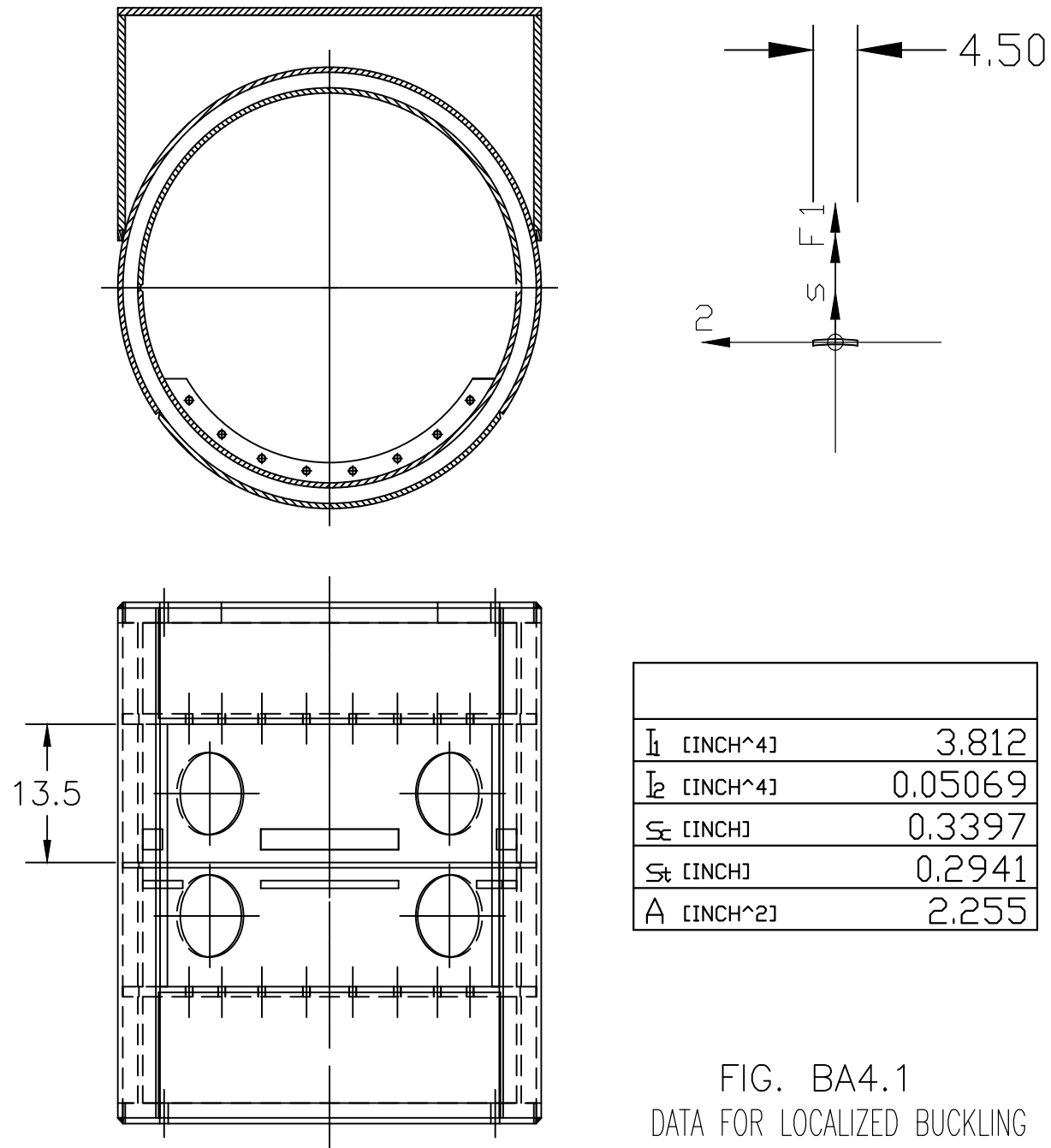


FIG. BA4.1
DATA FOR LOCALIZED BUCKLING

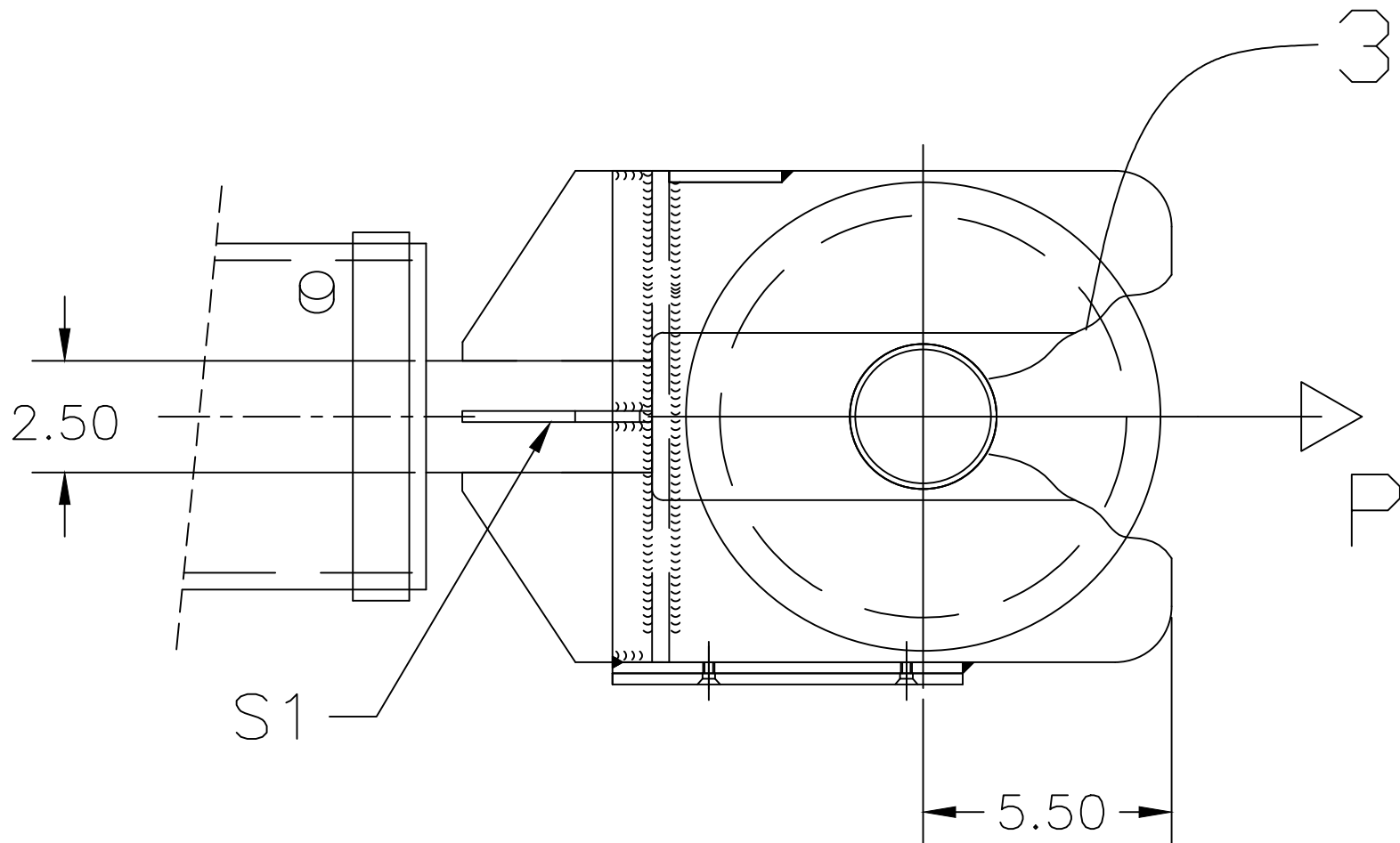
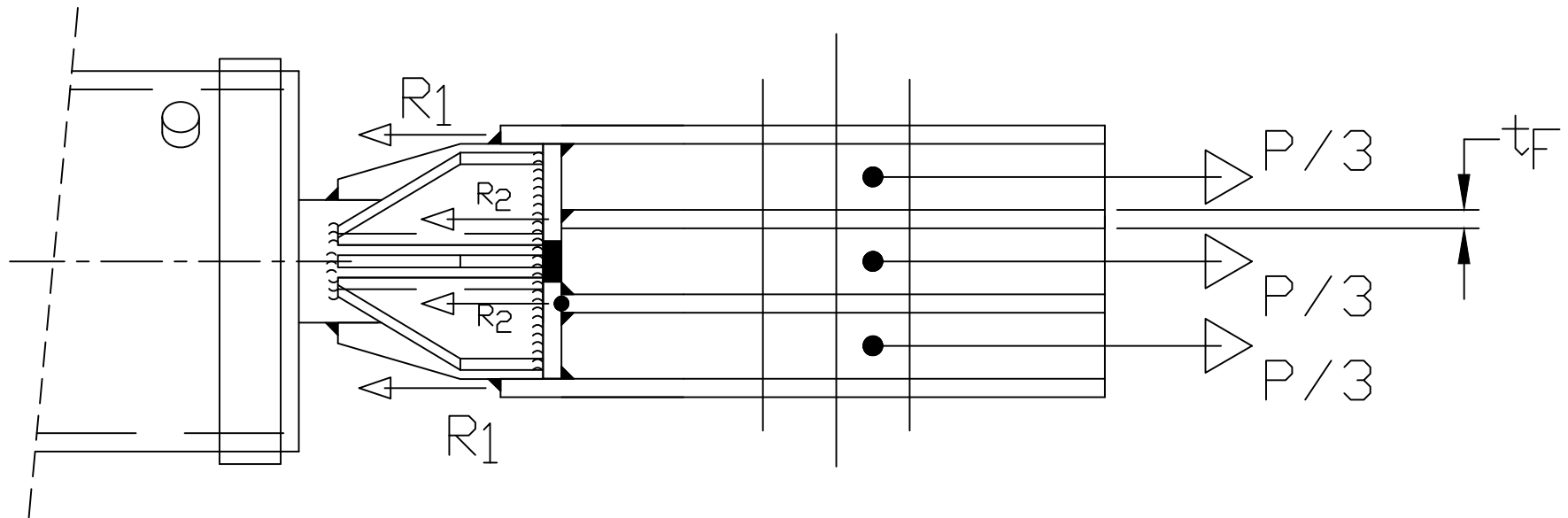


FIGURE H1.0
CABLE HEAD
SIDE VIEW



$$P/3 = 87000 / 3 = 29,000 \text{ LBS}$$

FIGURE H1.0-1
CABLE HEAD
TOP VIEW

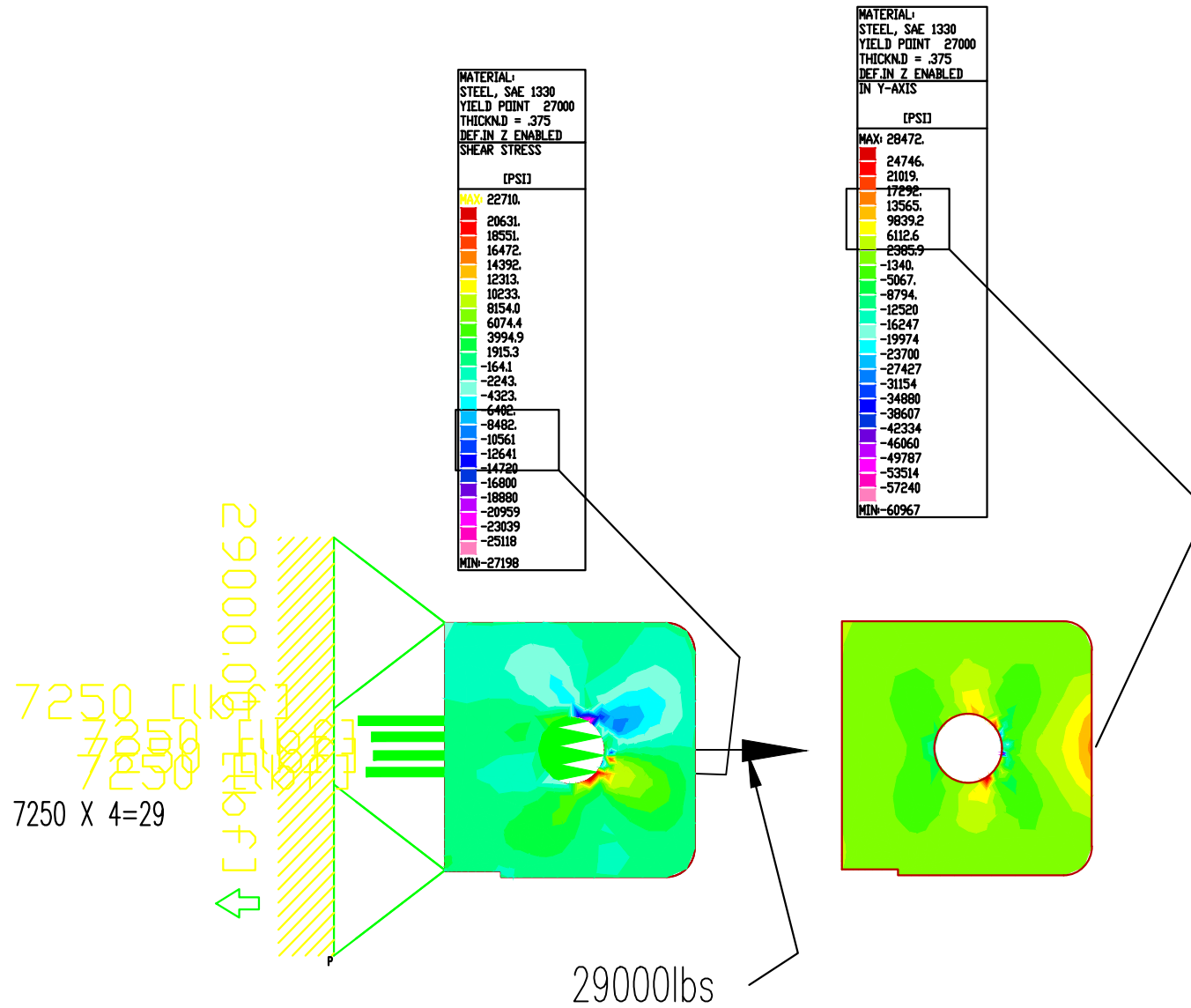


FIGURE H1.2
FEA IN STAINLESS $\frac{3}{8}$ PLATES

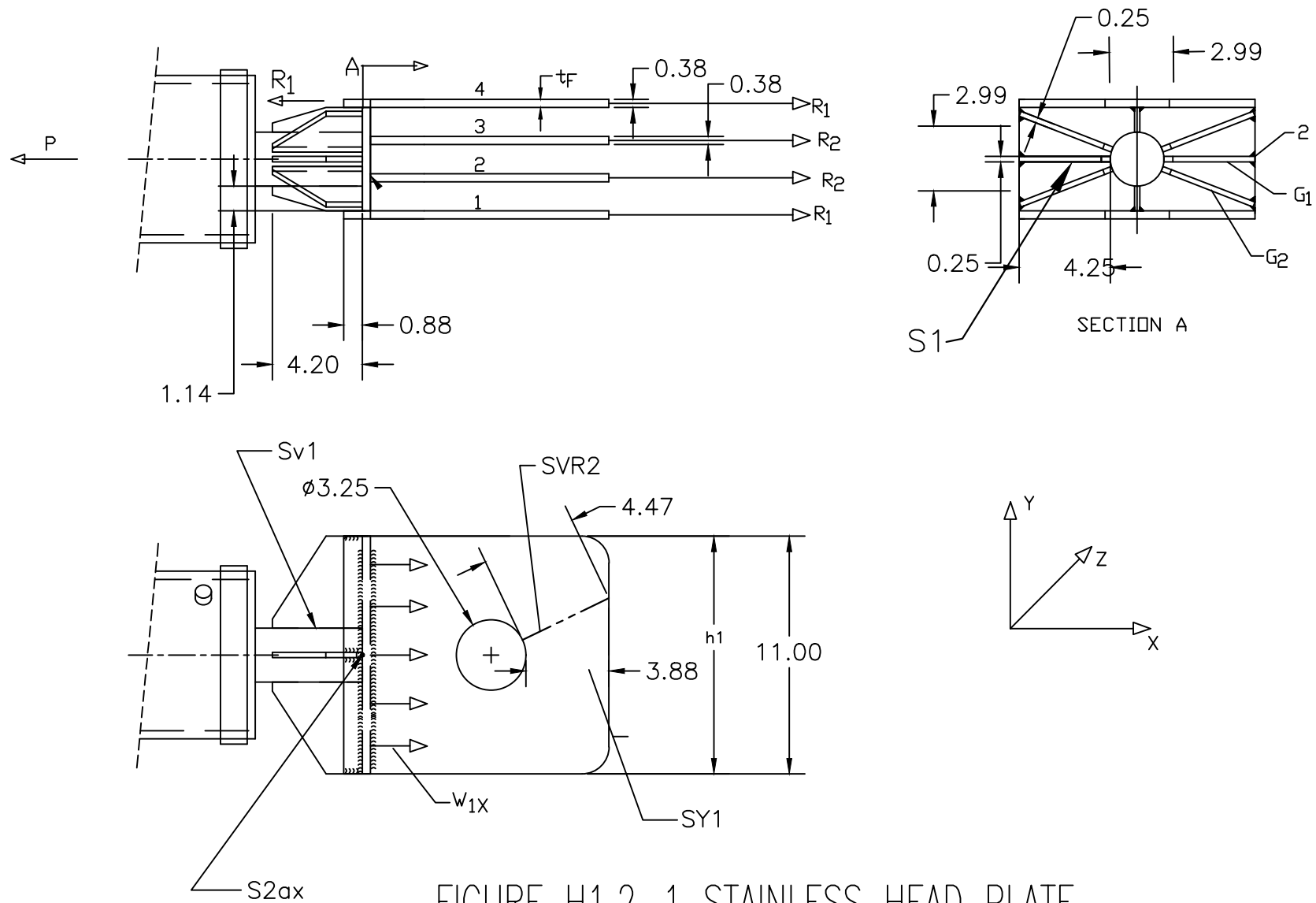


FIGURE H1.2-1 STAINLESS HEAD PLATE STRESSES