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Basic Crane Design and Stress Analysis

Appendix: Figures

Course No: M03-055

Credit: 3 PDH

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ROTATION SLEW, WORM GEAR DRIVE



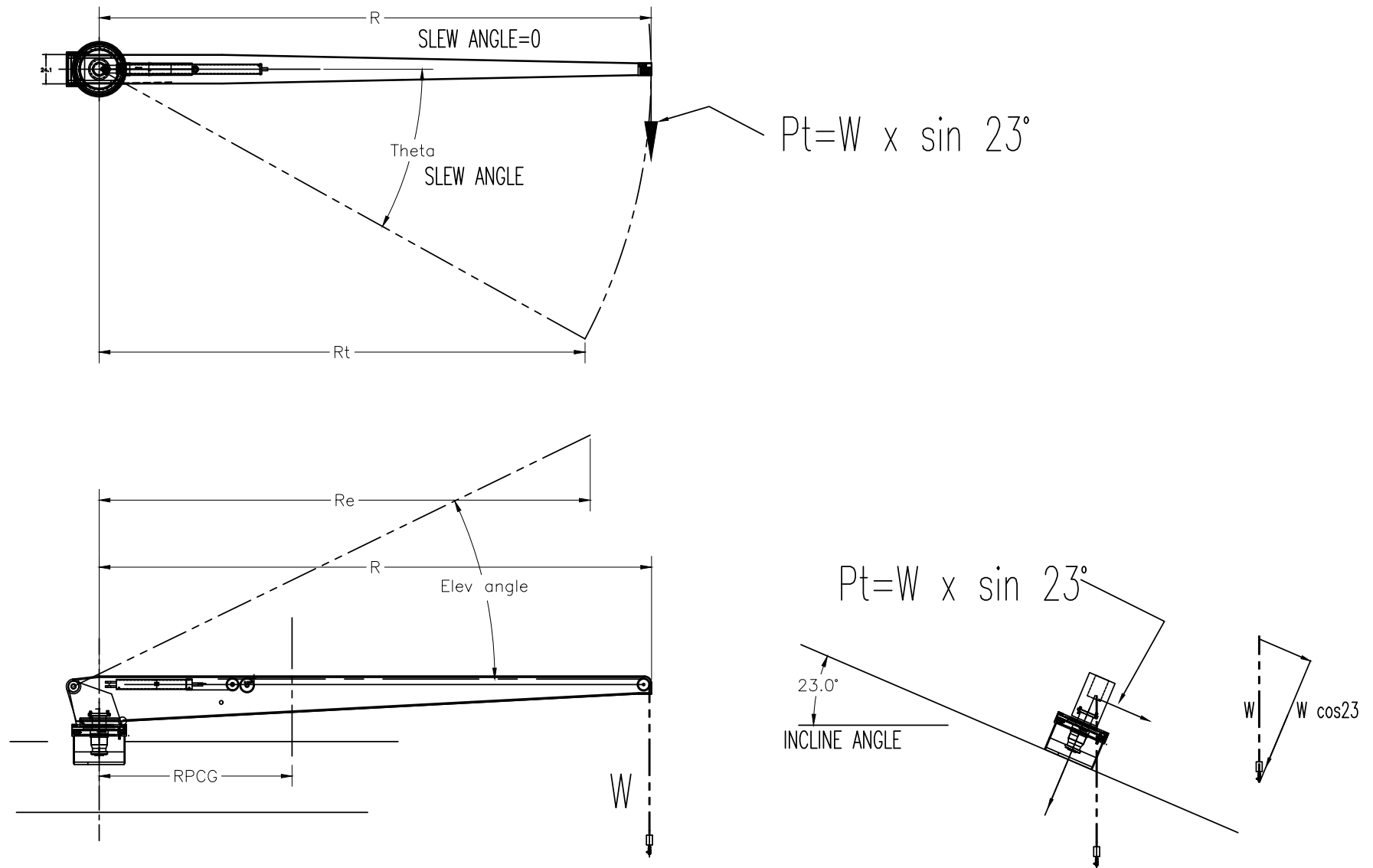


FIG M1.0—A CRANE ROTATIONAL TORQUE

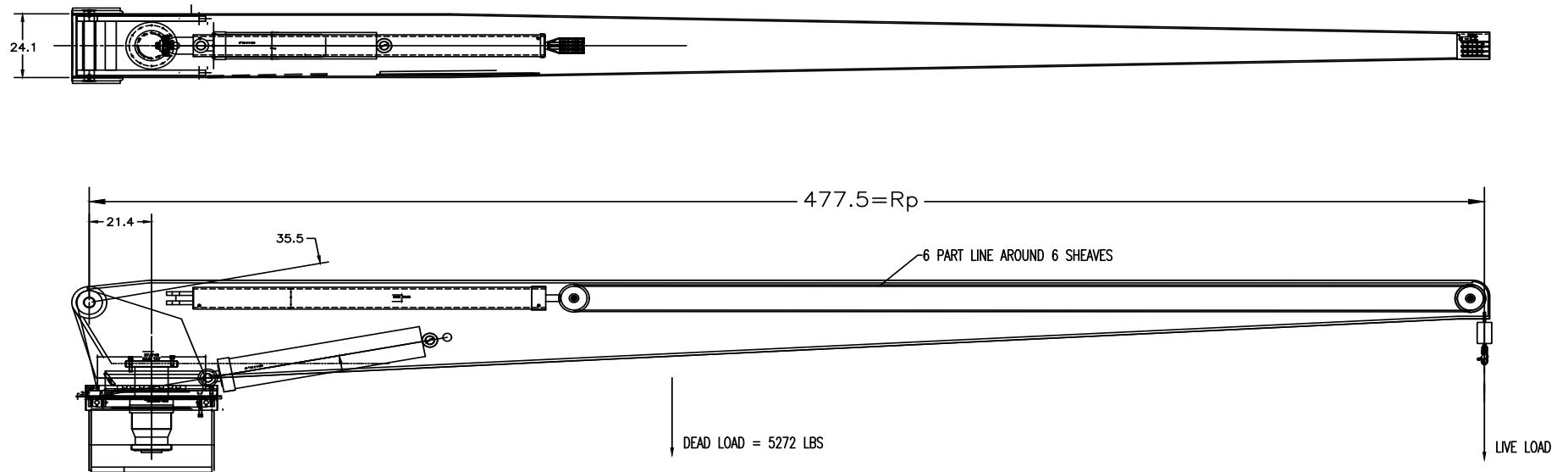
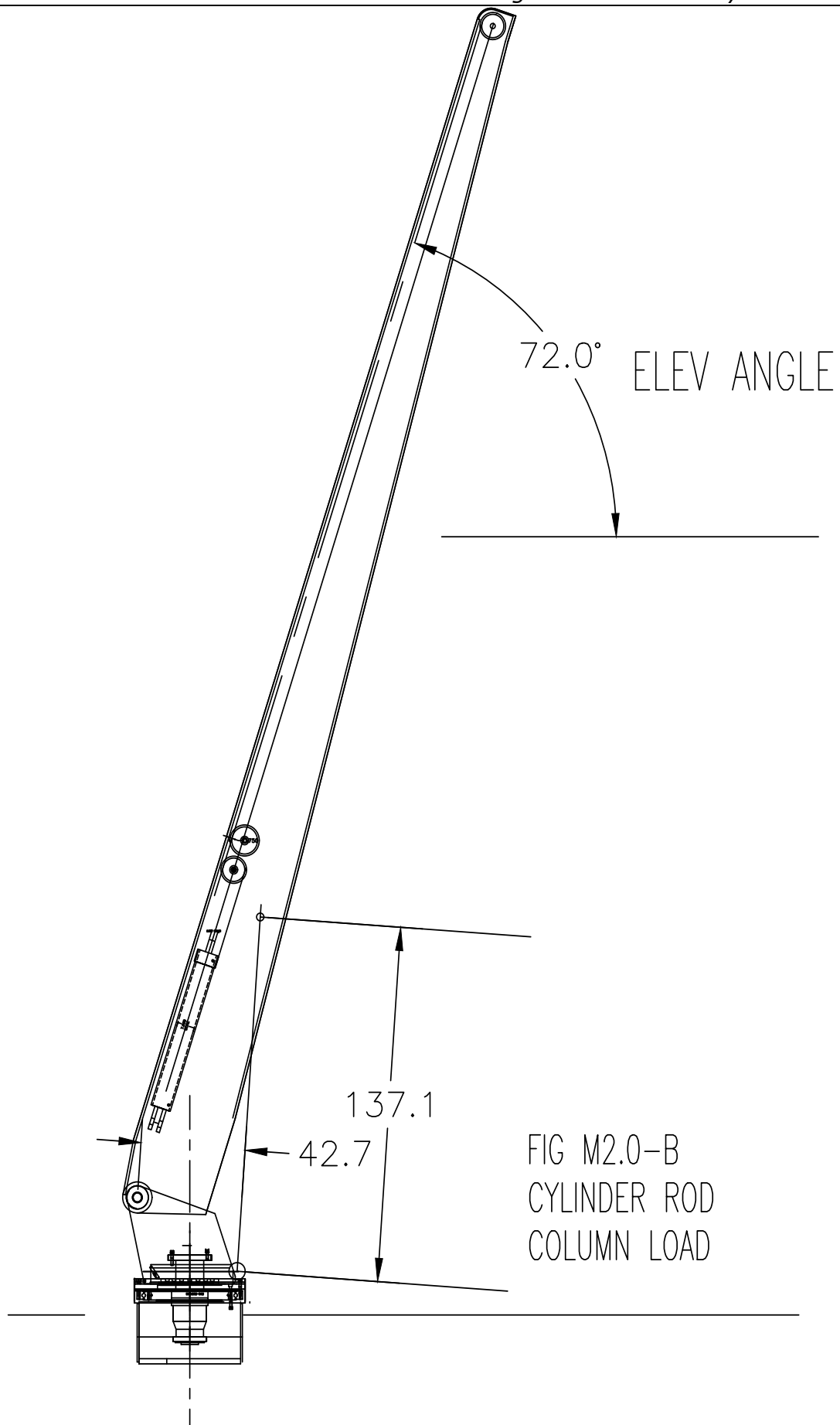
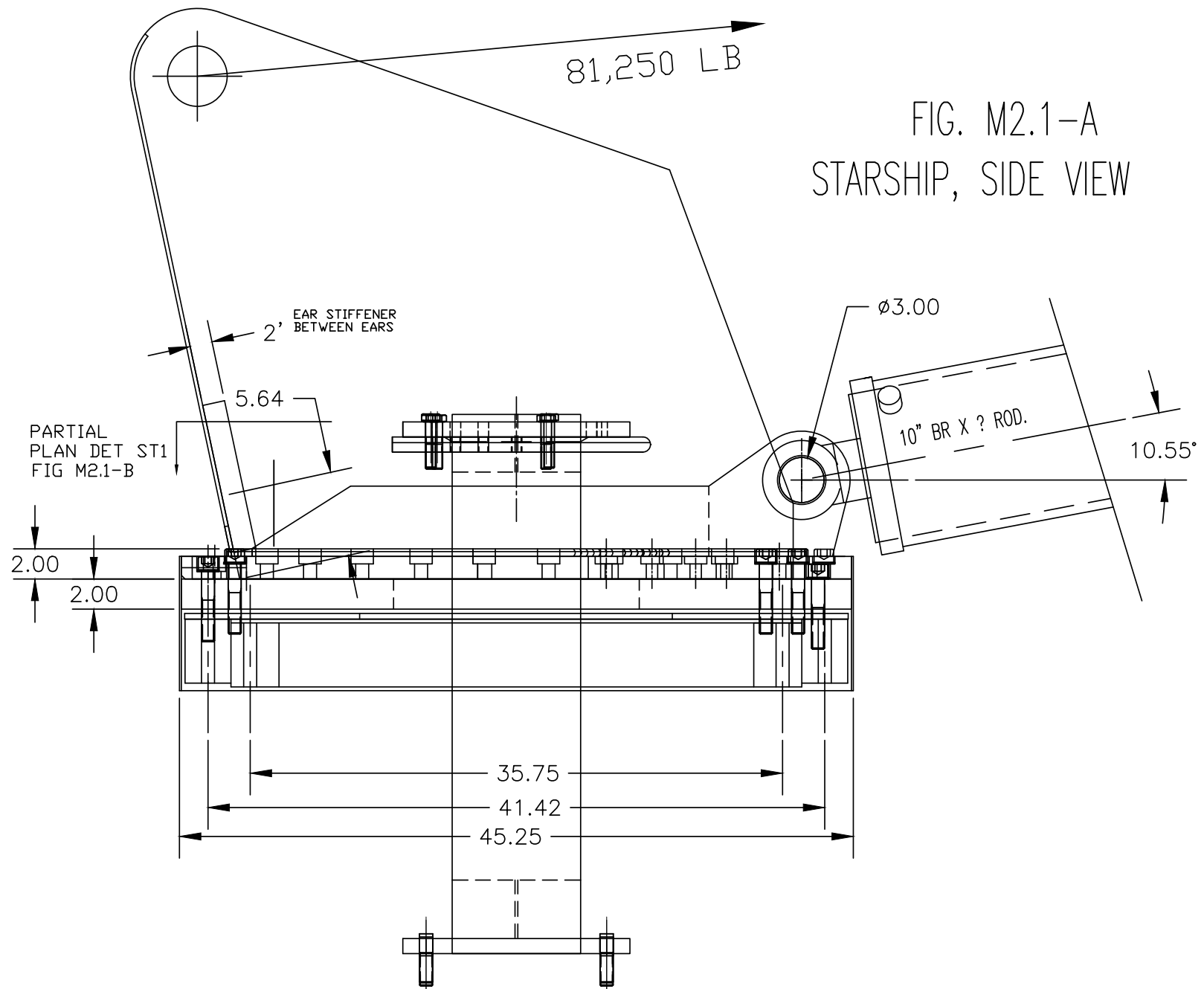


FIG M2.0—A BOOM and CABLE CYLINDER





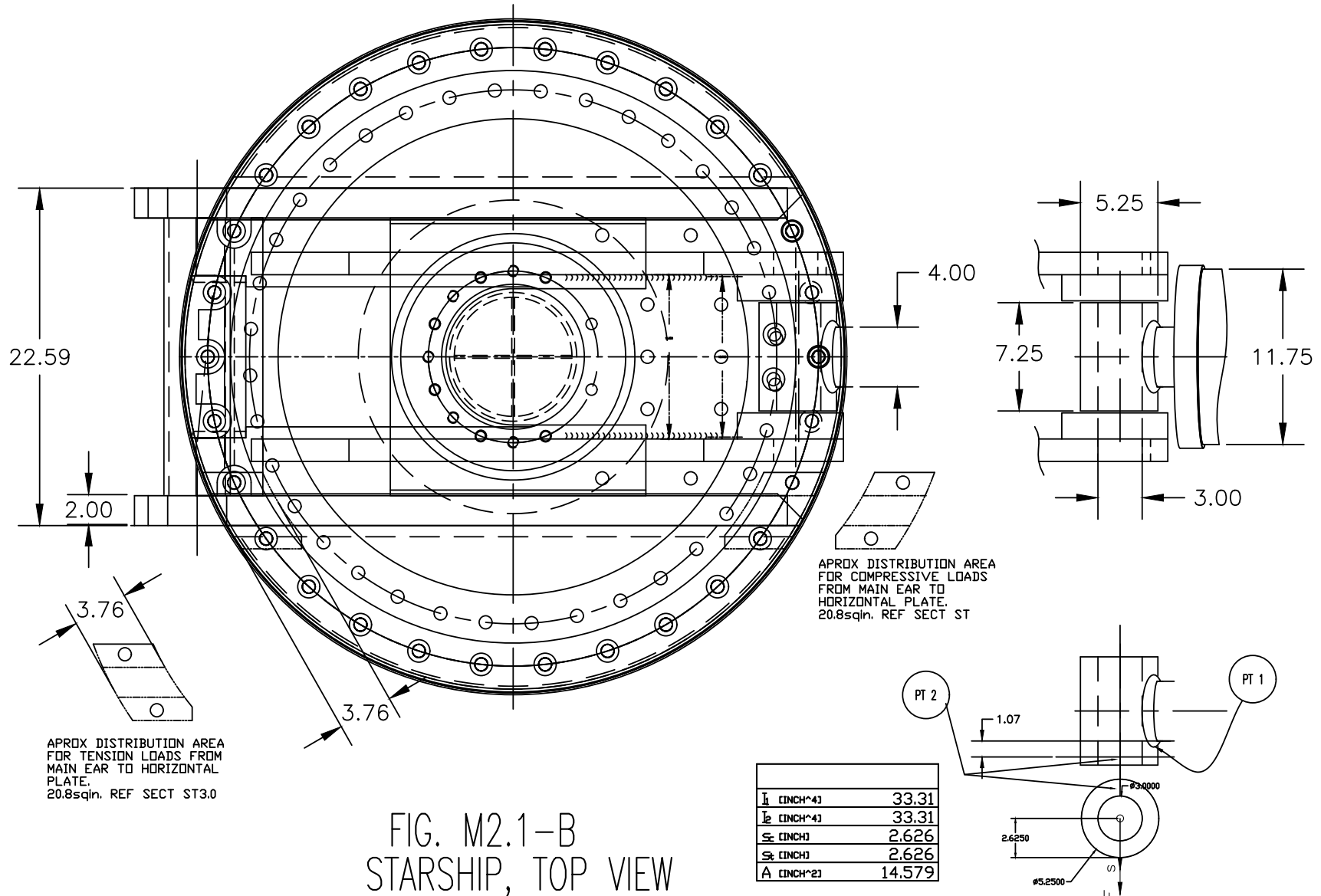


FIG M2.1—C
BOOM CYLD TUBE ROD END

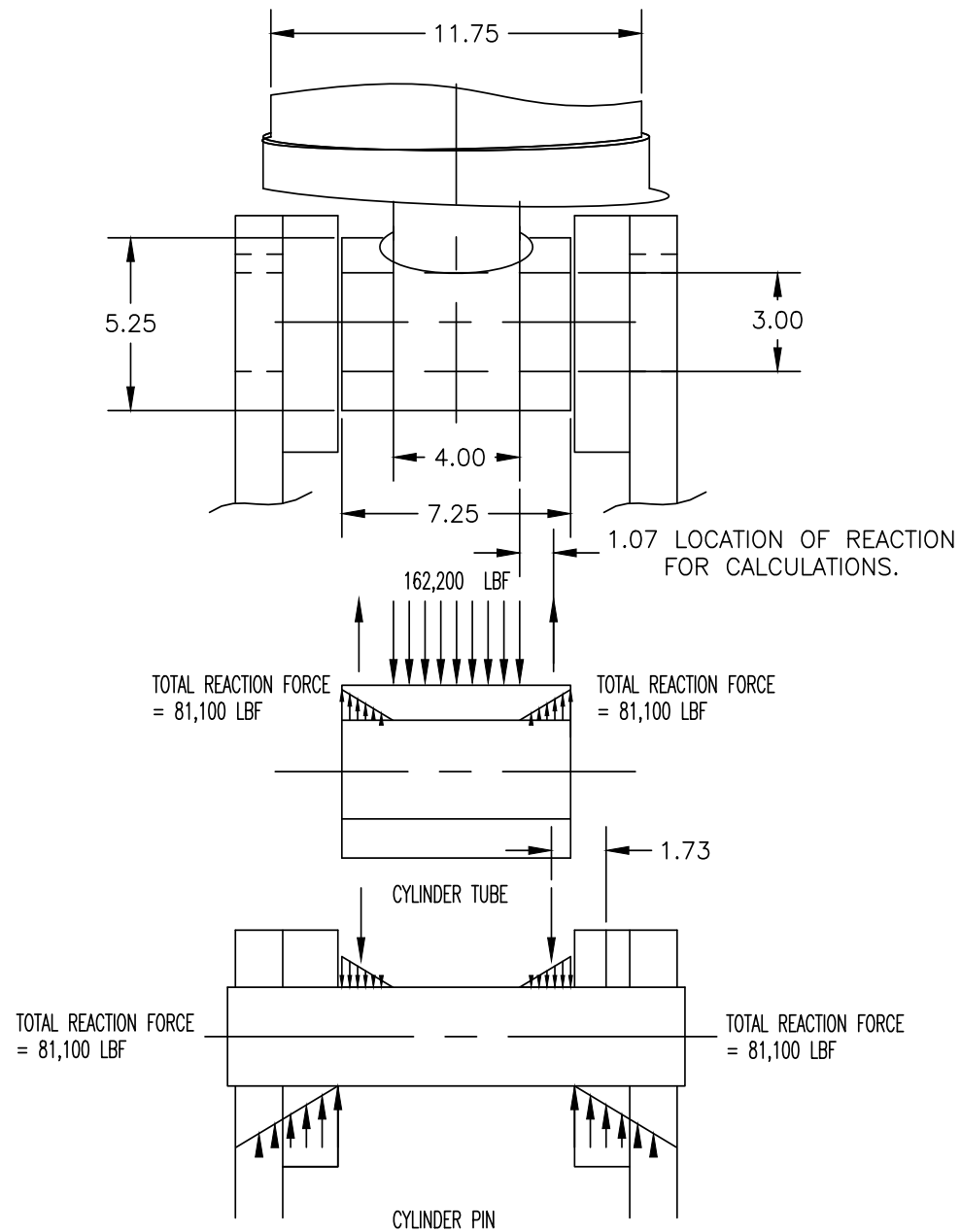


FIG M2.1—D
BOOM CYLD CAP END & PIN

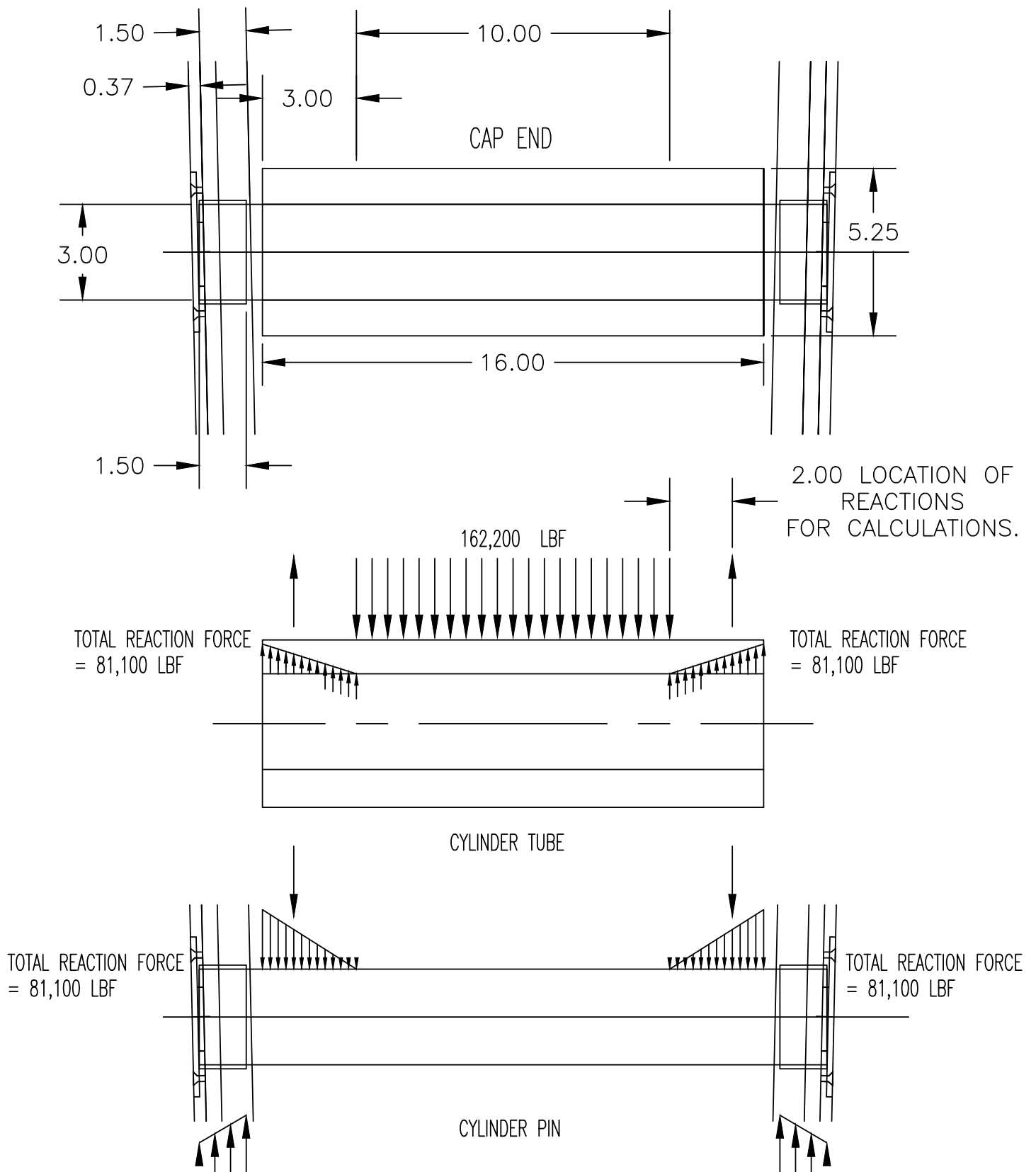
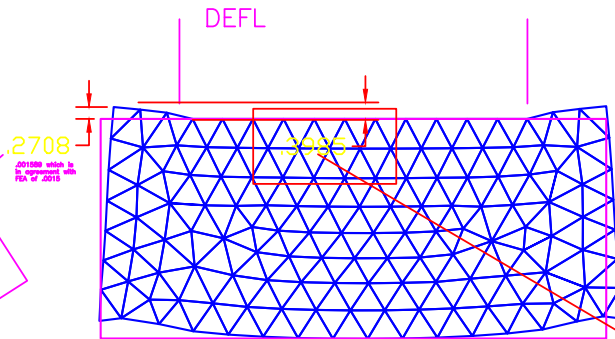


FIG M2.1—E
BOOM CAP END & PIN

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



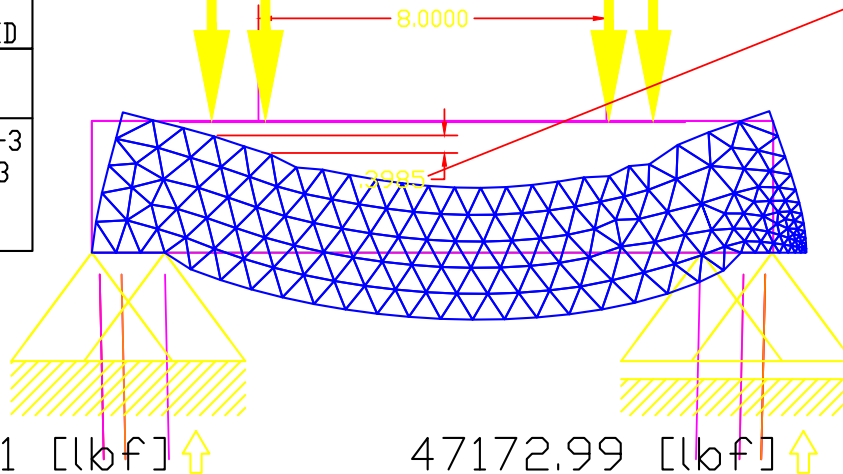
BOOM CYLD PIN CAP END
DEFL

SOME AGREEMENT

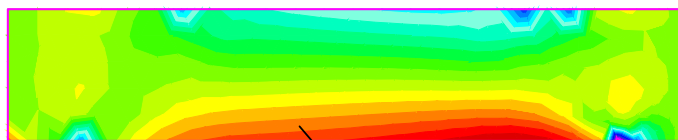
BOOM CYLD PIN CAP END
DEFL

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]

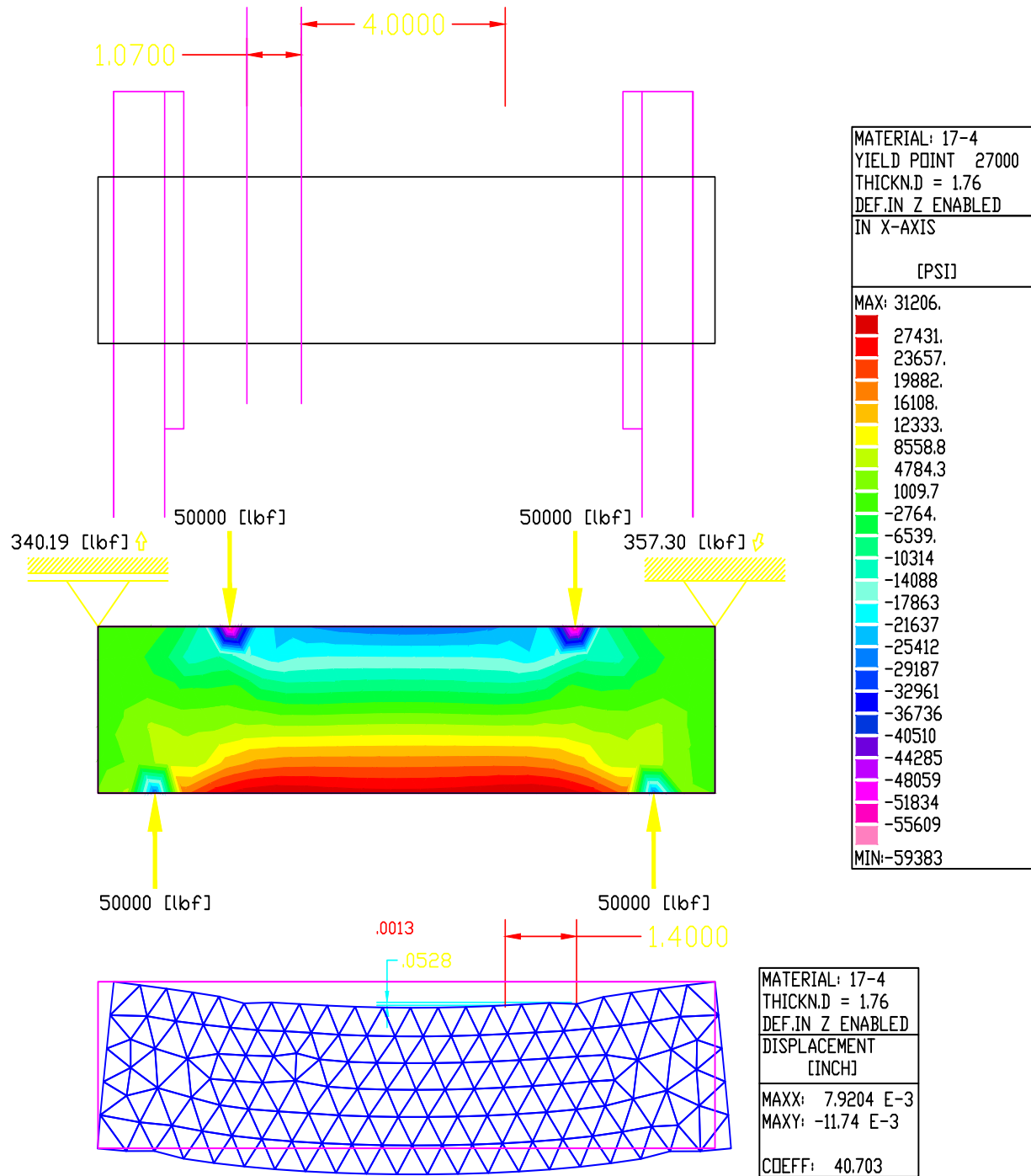


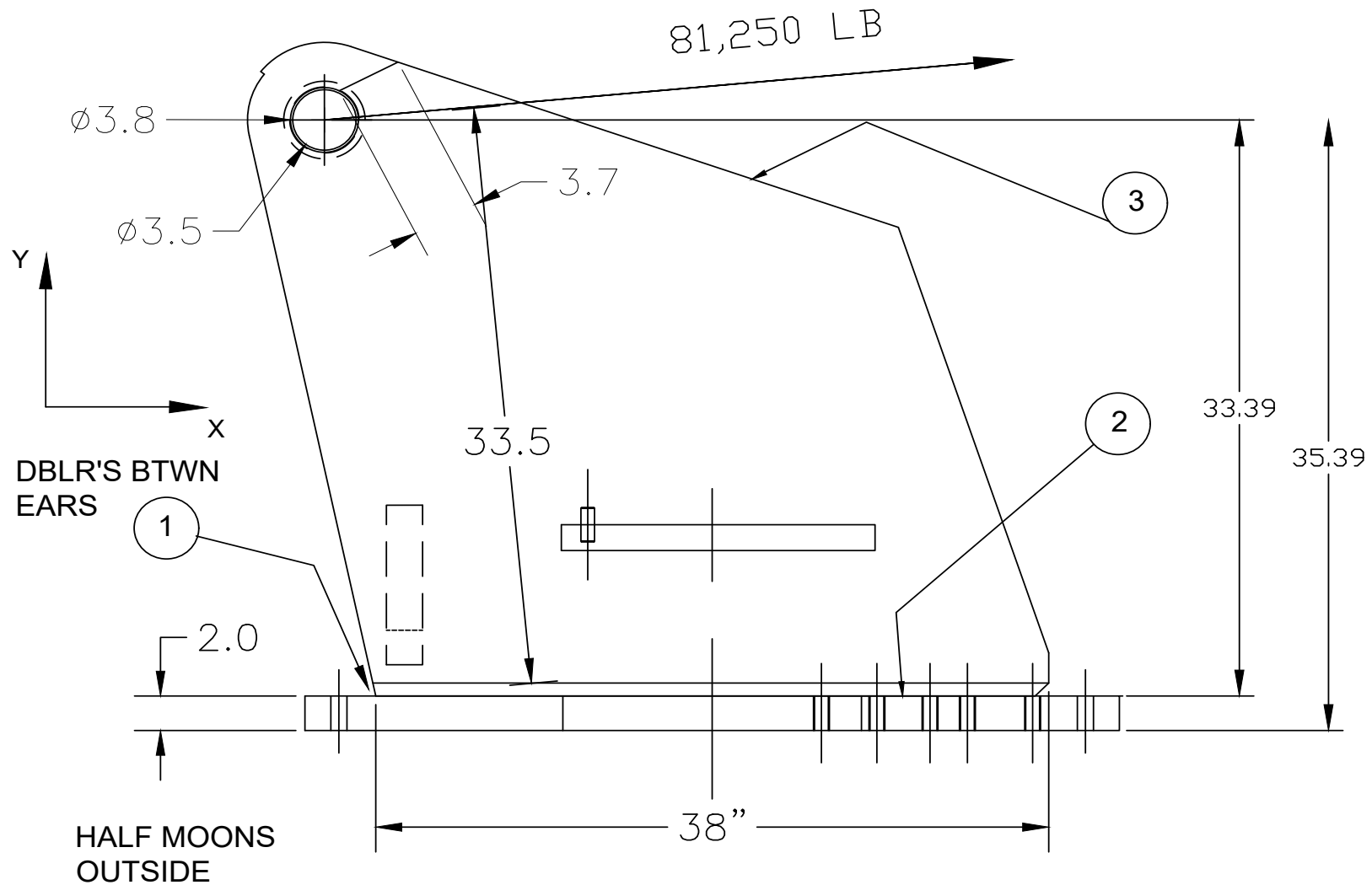
MATERIAL:
STEEL, SAE 1330
YIELD POINT 27000
THICKN.D = 1.76
DEF.IN Z ENABLED
IN X-AXIS
[PSI]
MAX: 21811.
18870.
15929.
12987.
10046.
7105.6
4164.5
1223.4
-1717.
-4658.
-7599.
-10541
-13482
-16423
-19364
-22305
-25246
-28187
-31129
-34070
-37011
-39952
-42893
-45834
MIN:-48775



BOOM CYLD PIN CAP END
STRESS

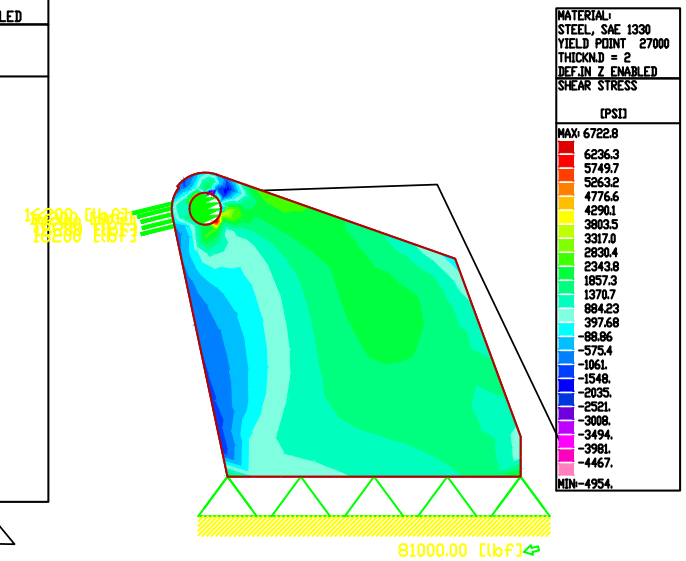
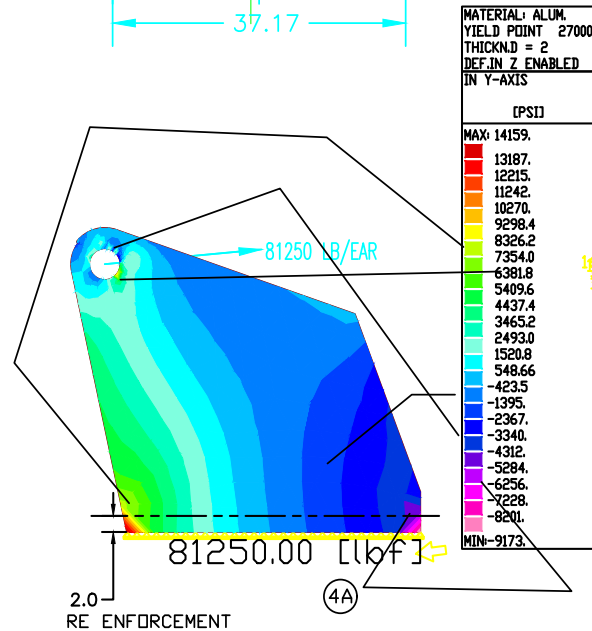
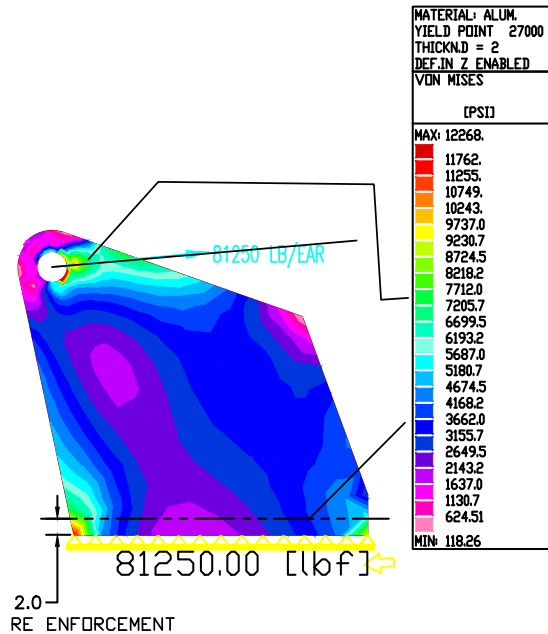
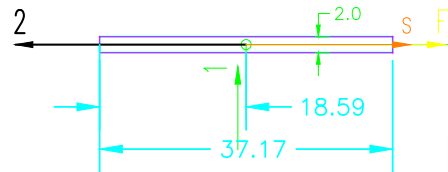
FIG M2.1—F
BOOM PIN, ROD END

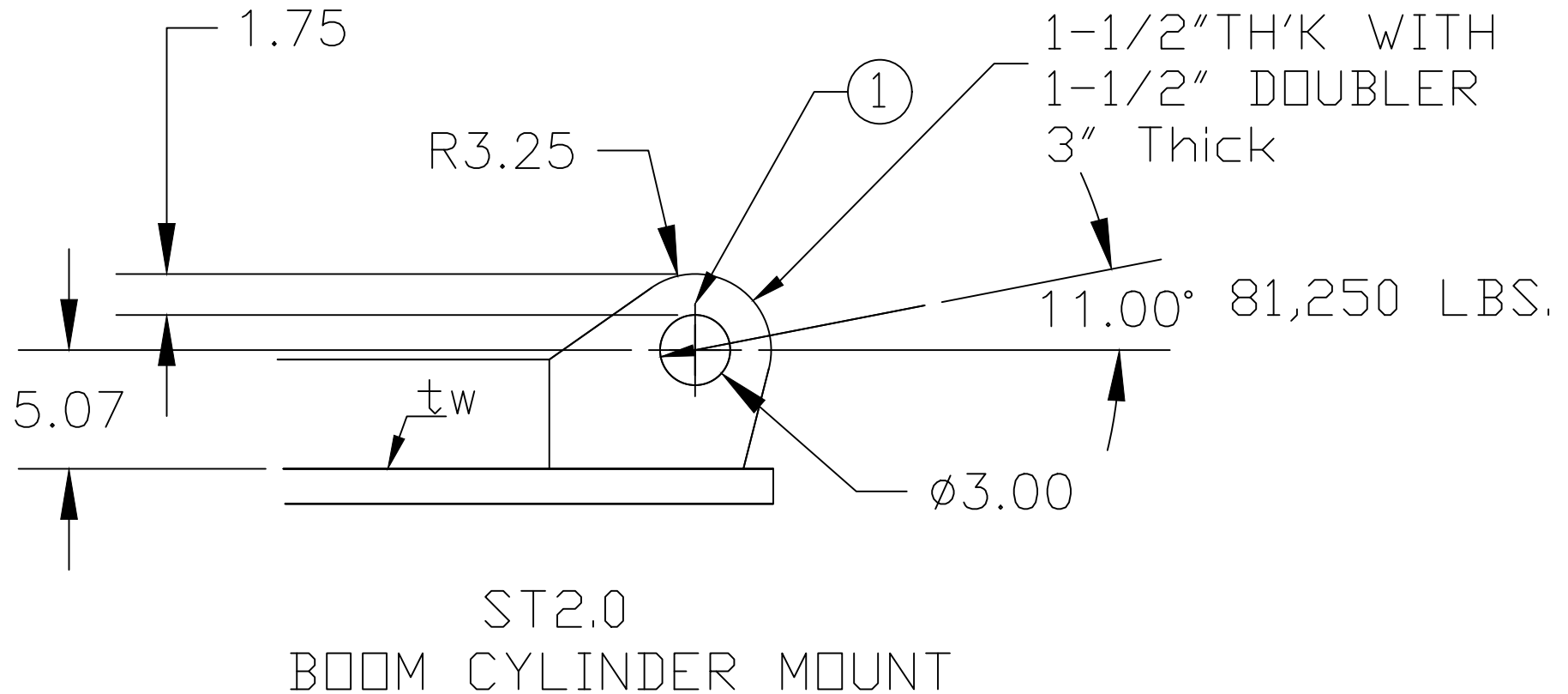




I_1 [INCH ⁴]	8562
I_2 [INCH ⁴]	24.78
S_x [INCH]	18.588
S_t [INCH]	18.588
A [INCH ²]	74.34

FIG ST1.0-A
STARSHIP MAIN EARS





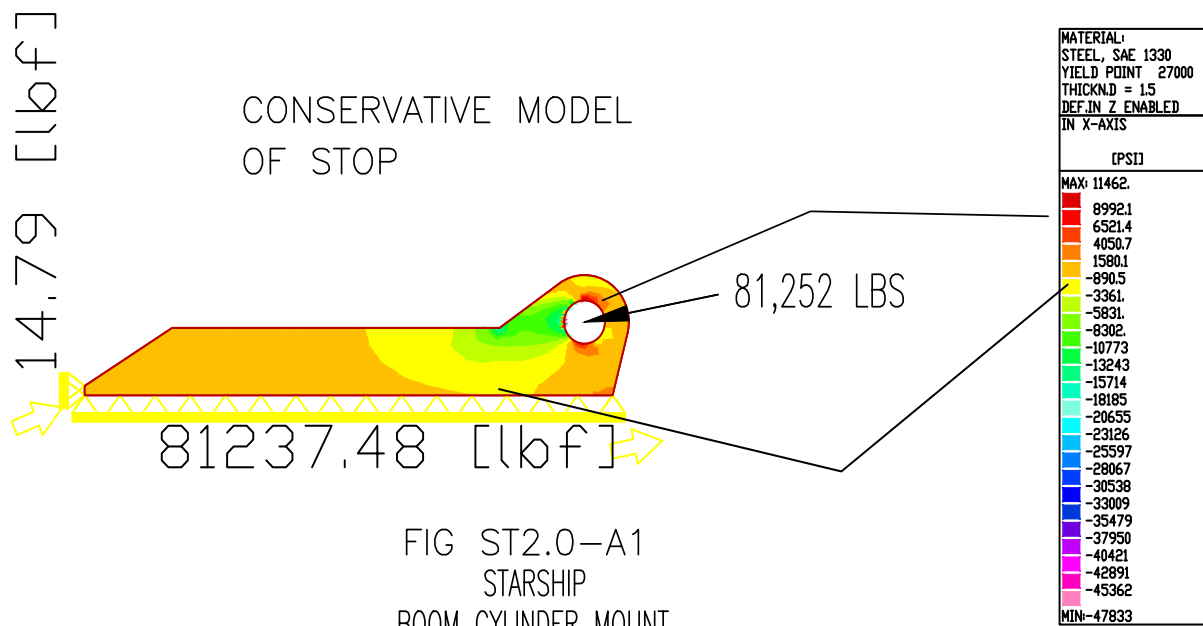
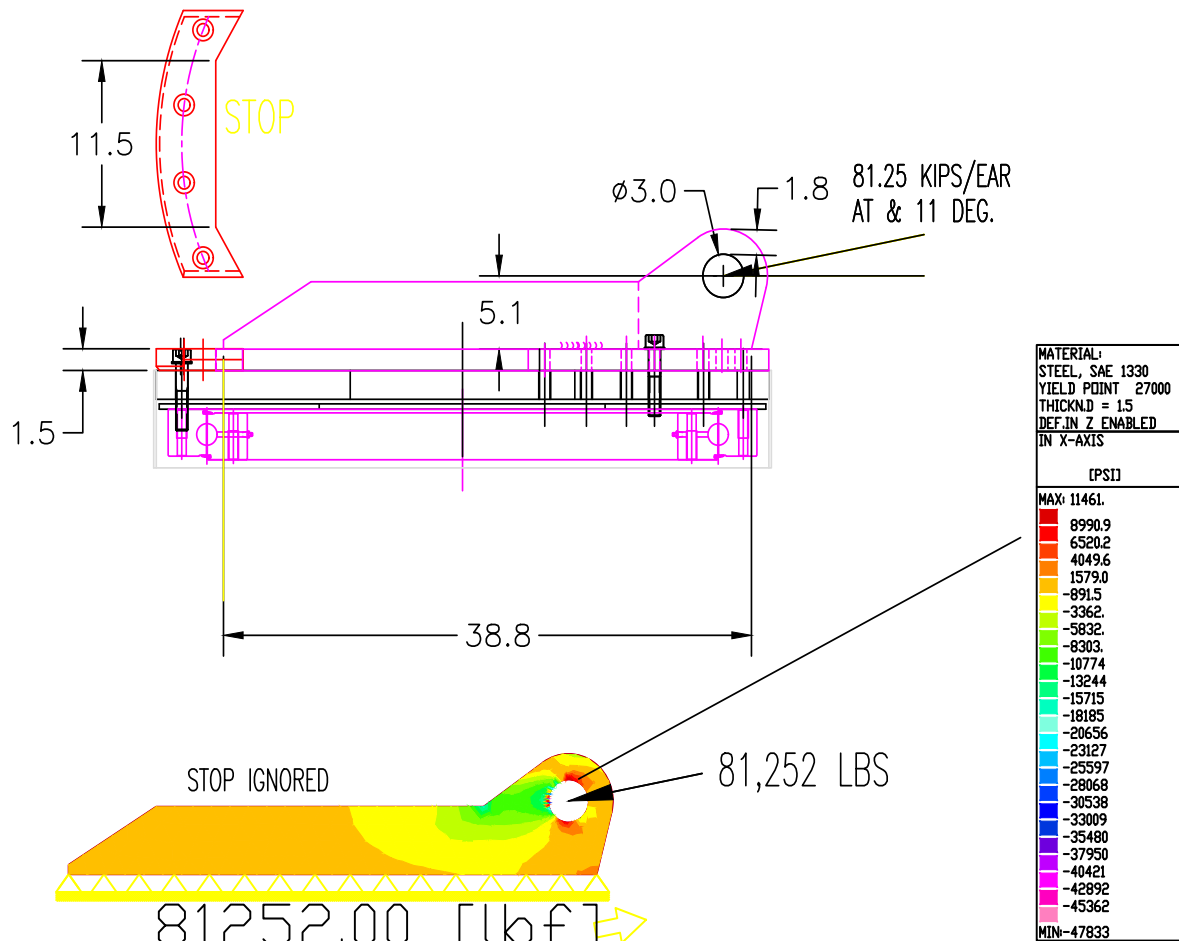
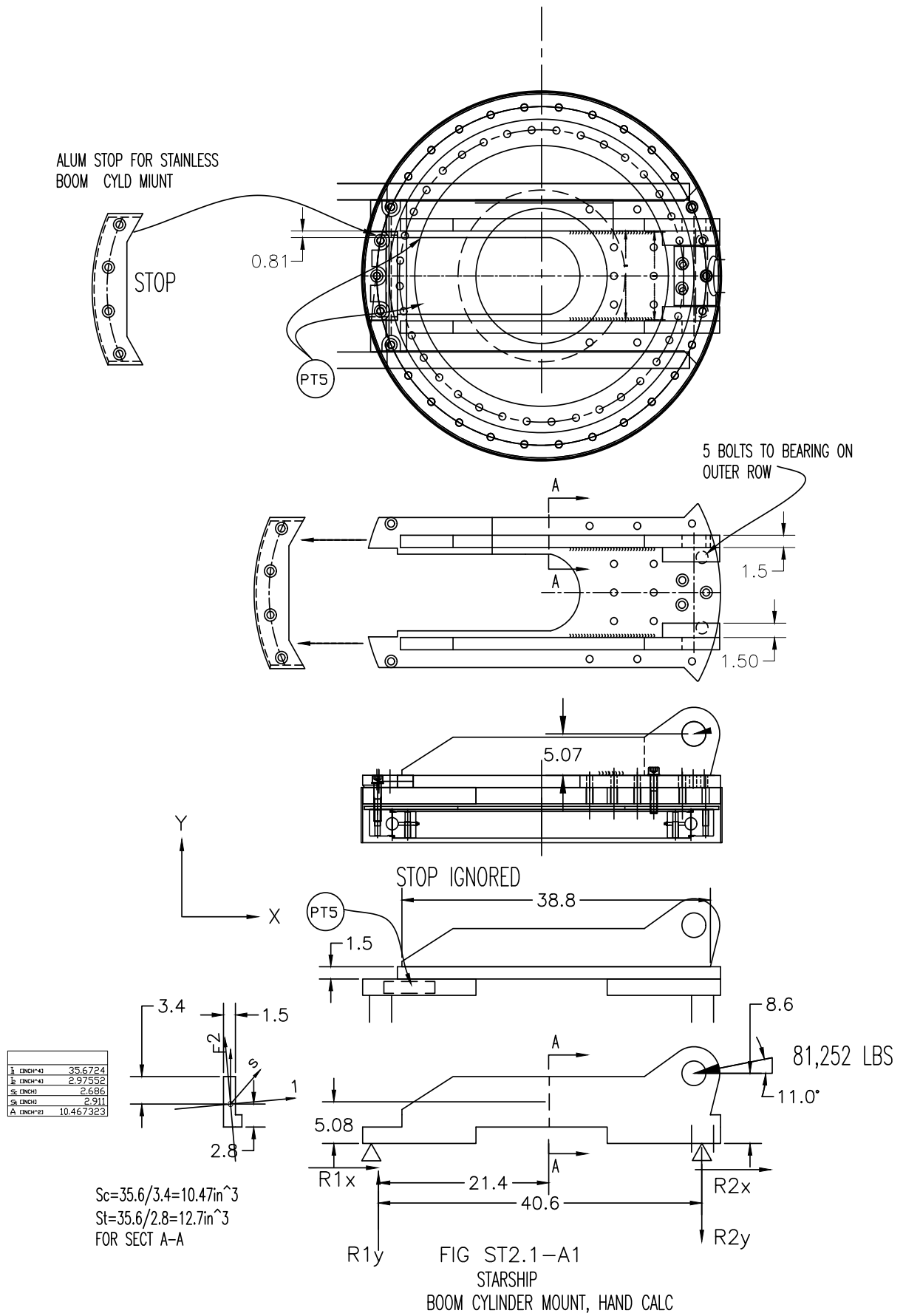


FIG ST2.0-A1
STARSHIP
BOOM CYLINDER MOUNT
(Near pin hole only)



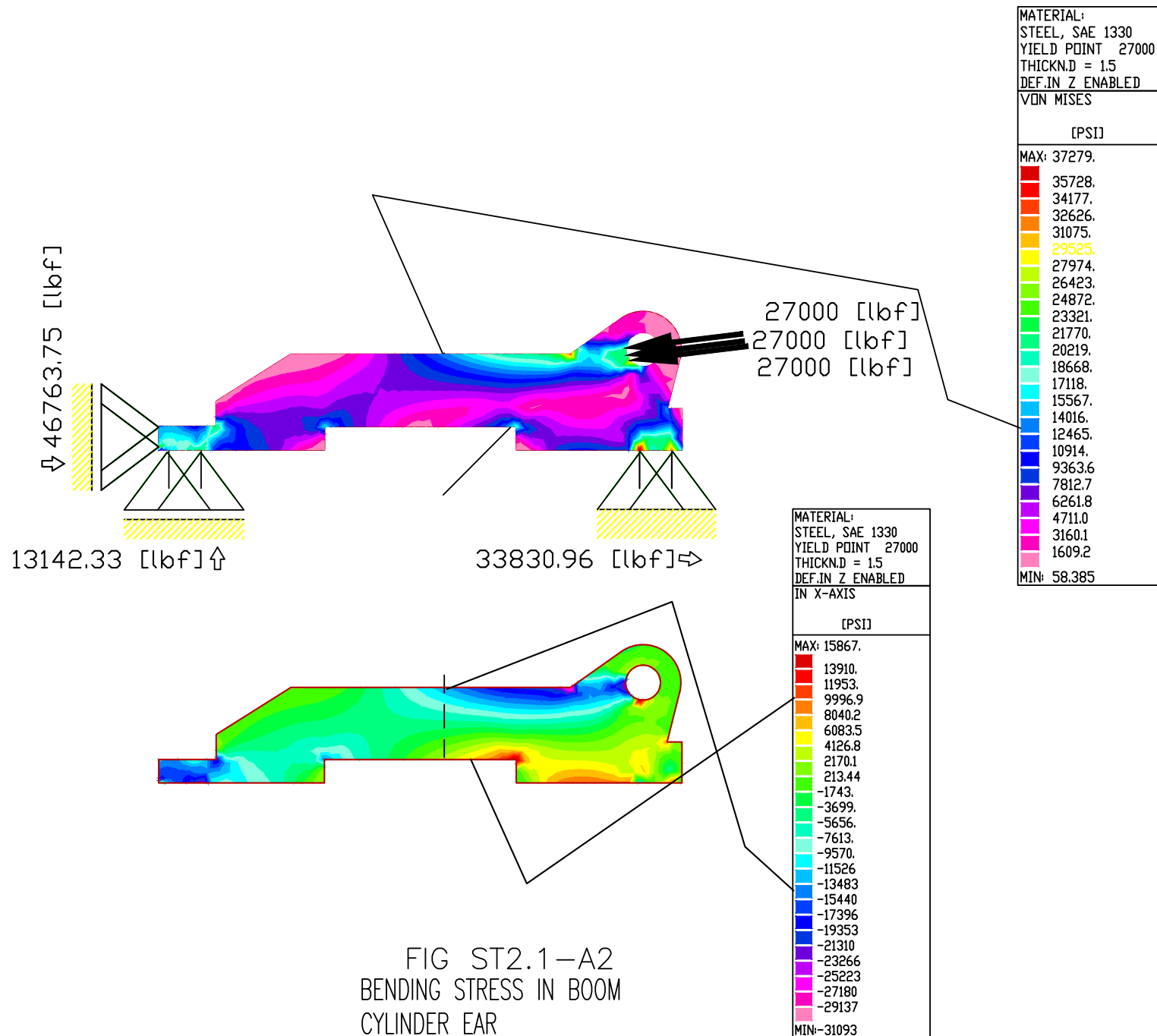


FIG ST2.1-A2
BENDING STRESS IN BOOM
CYLINDER EAR

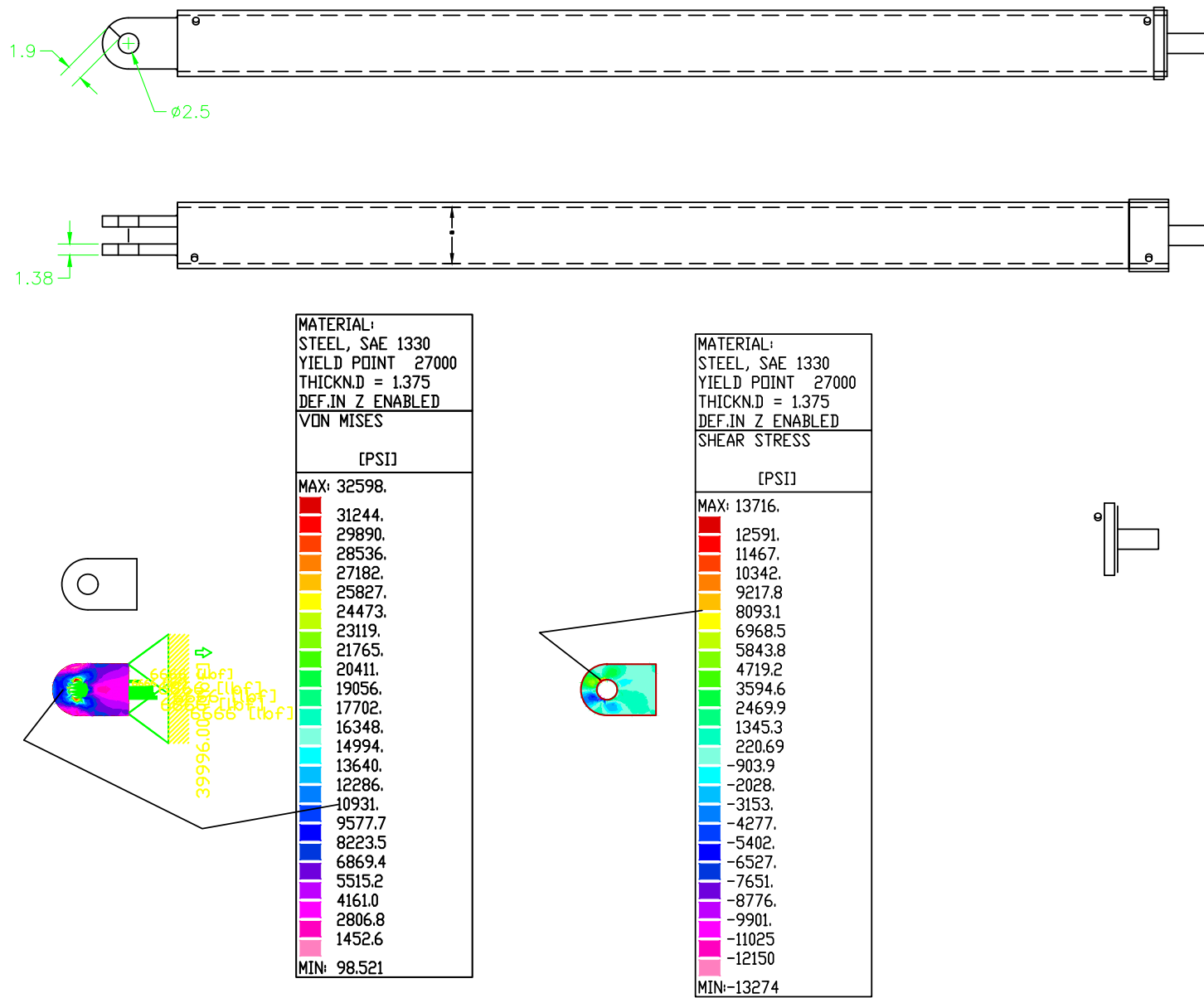


FIG M3.2–A CABLE CYLINDER

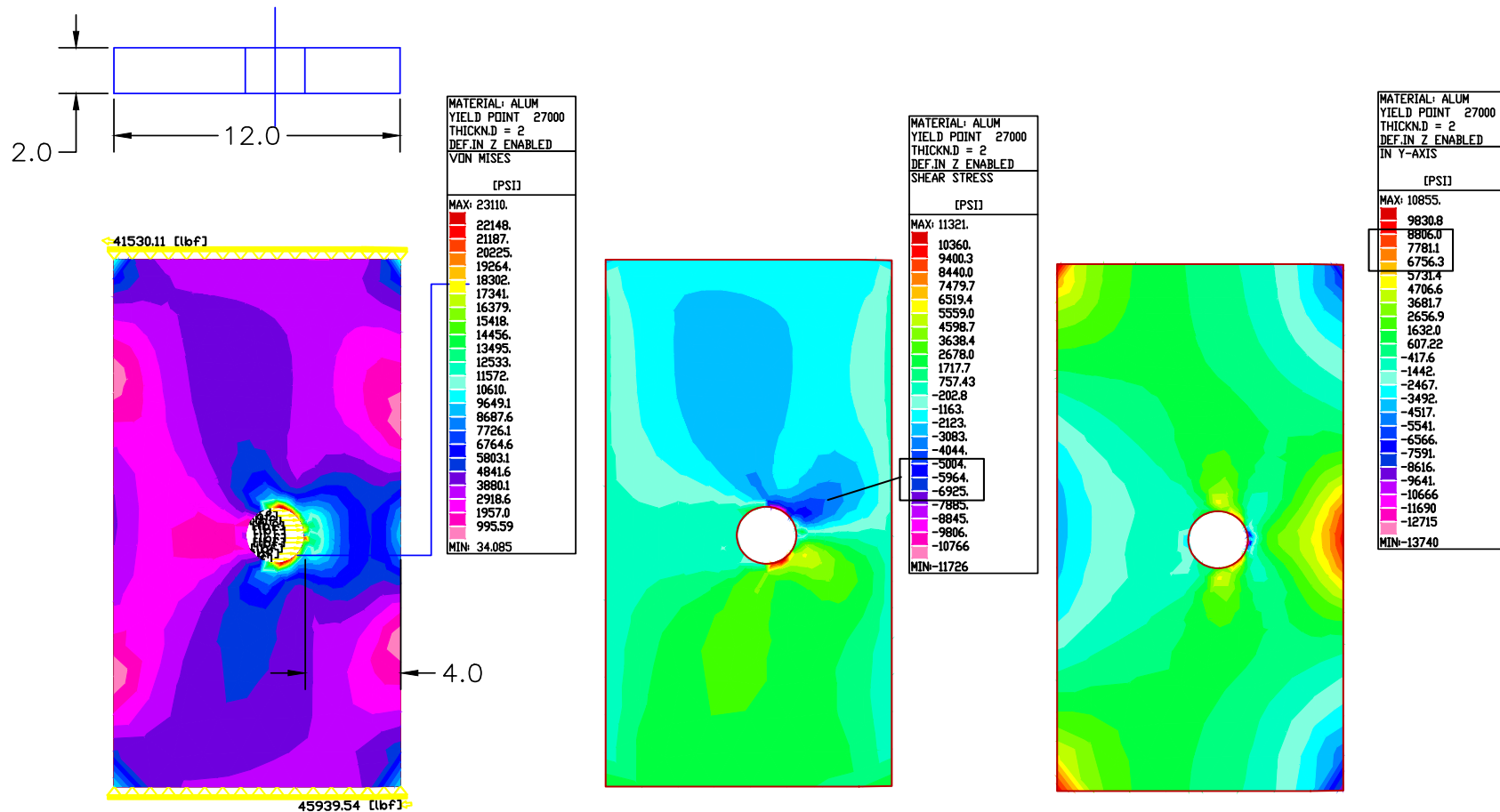
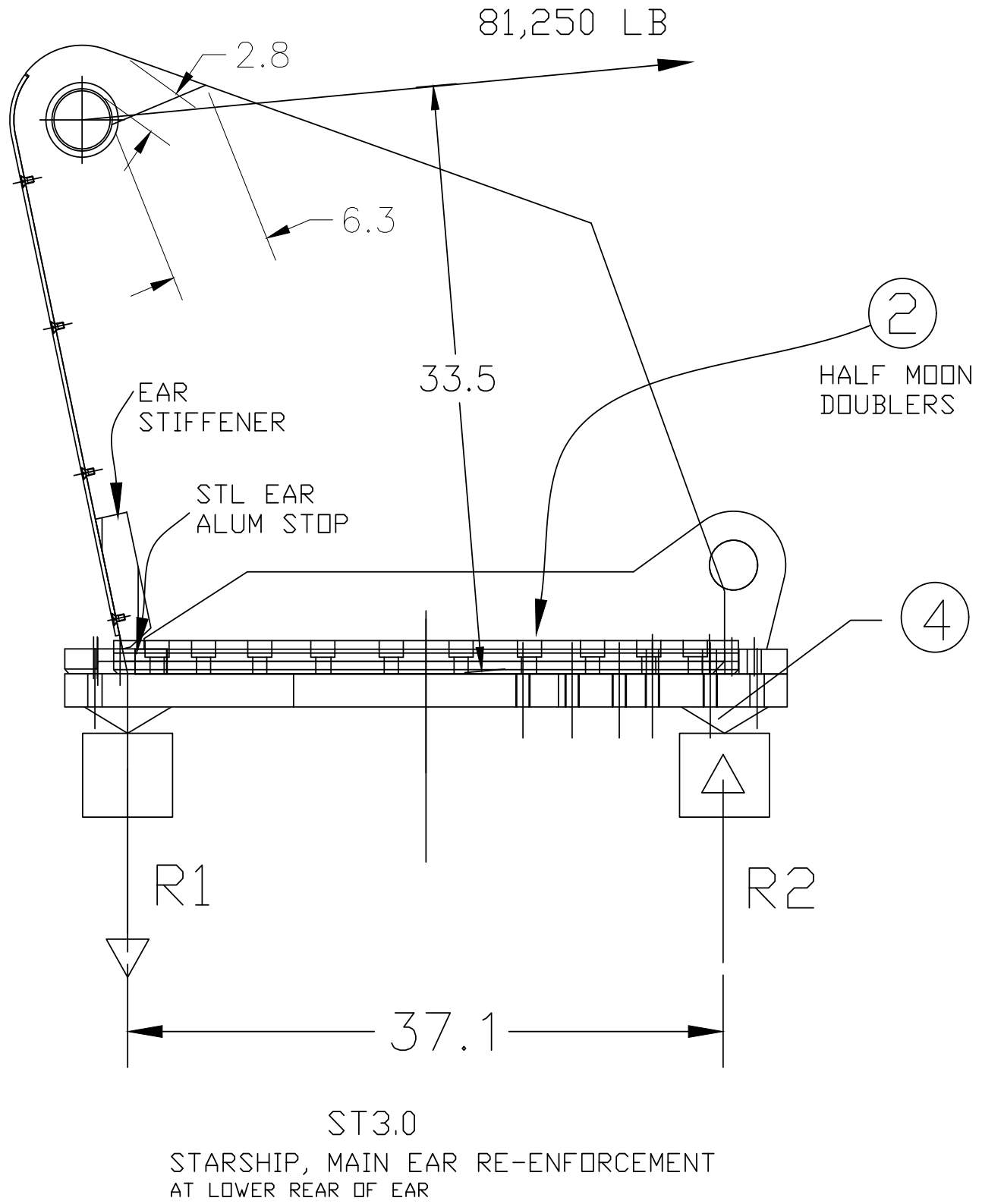


FIG M3.2-B
CABLE CYLINDER MOUNT



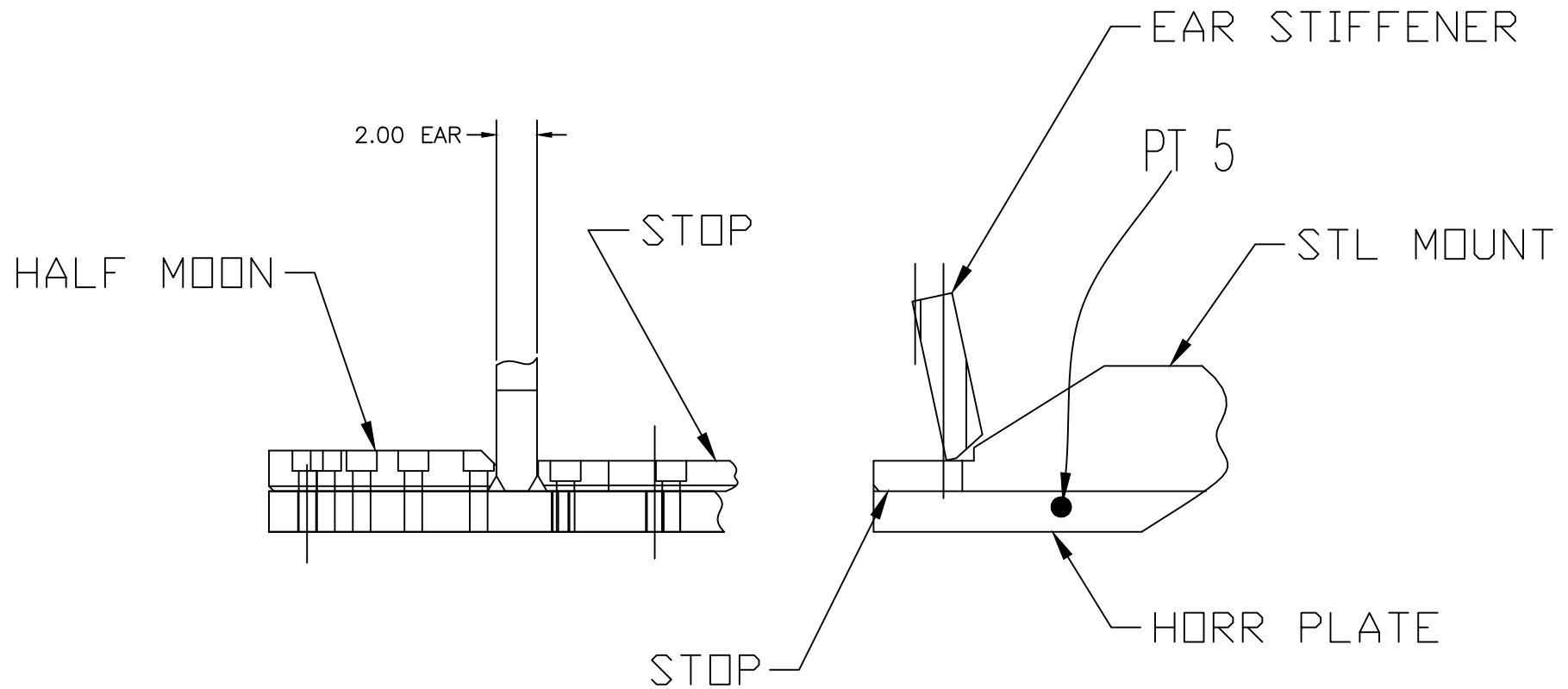
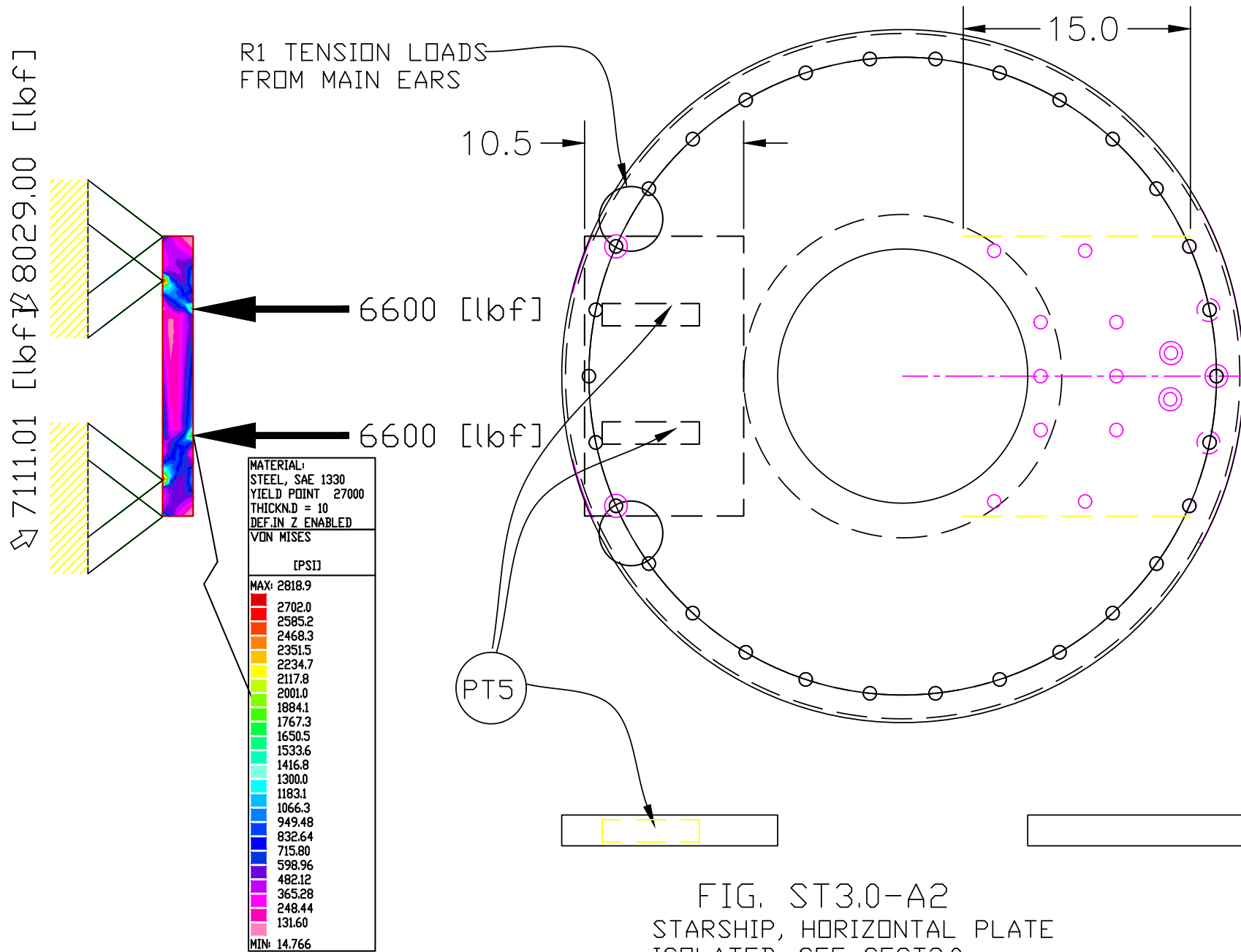


FIG. ST3.0-A1
STARSHIP MAIN HORIZONTAL PLATE &
STARSHIP REINFORCEMENT DOUBLERS



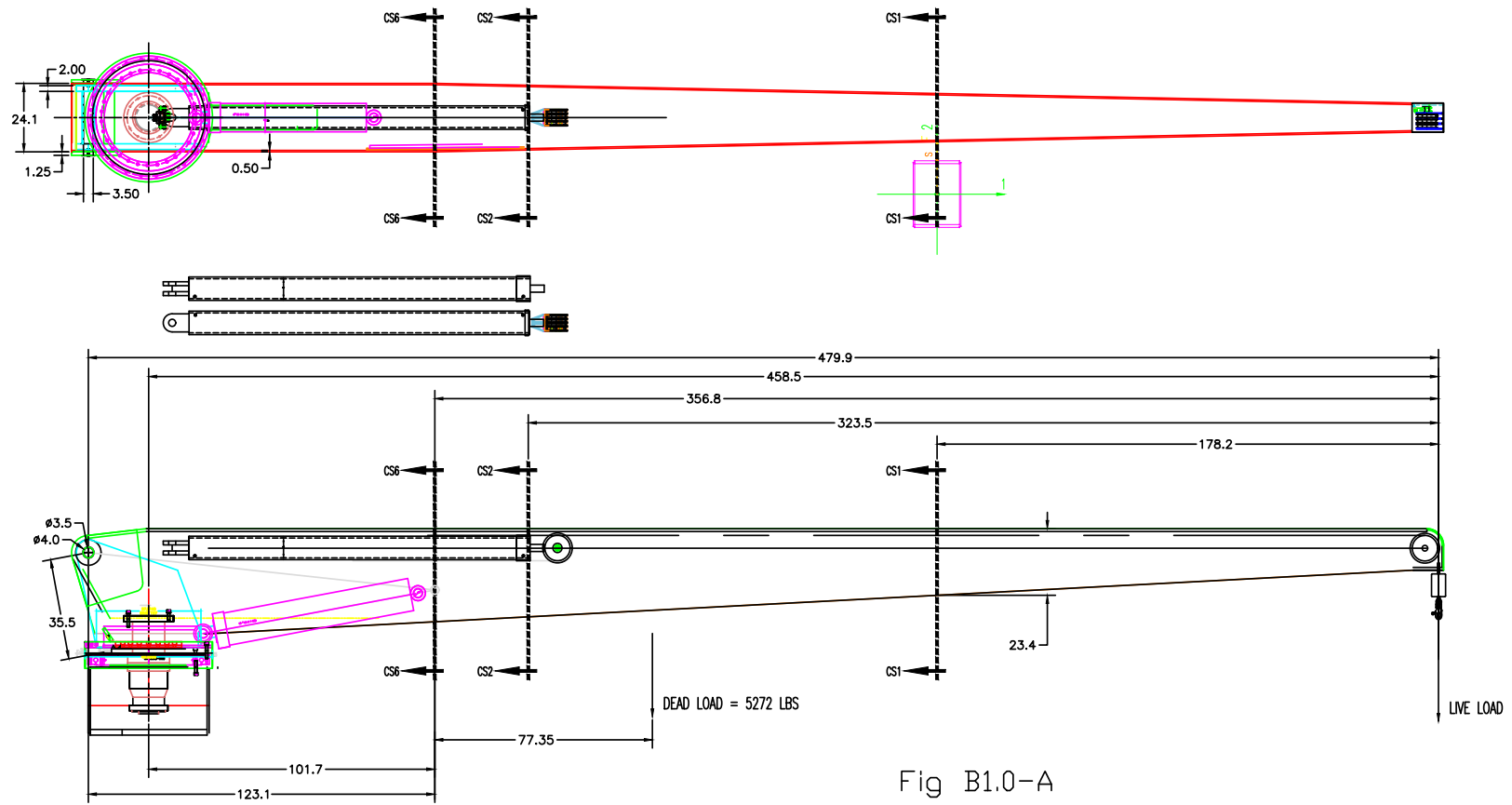


Fig B1.0-A
BOOM CROSS SECTION LOCATIONS

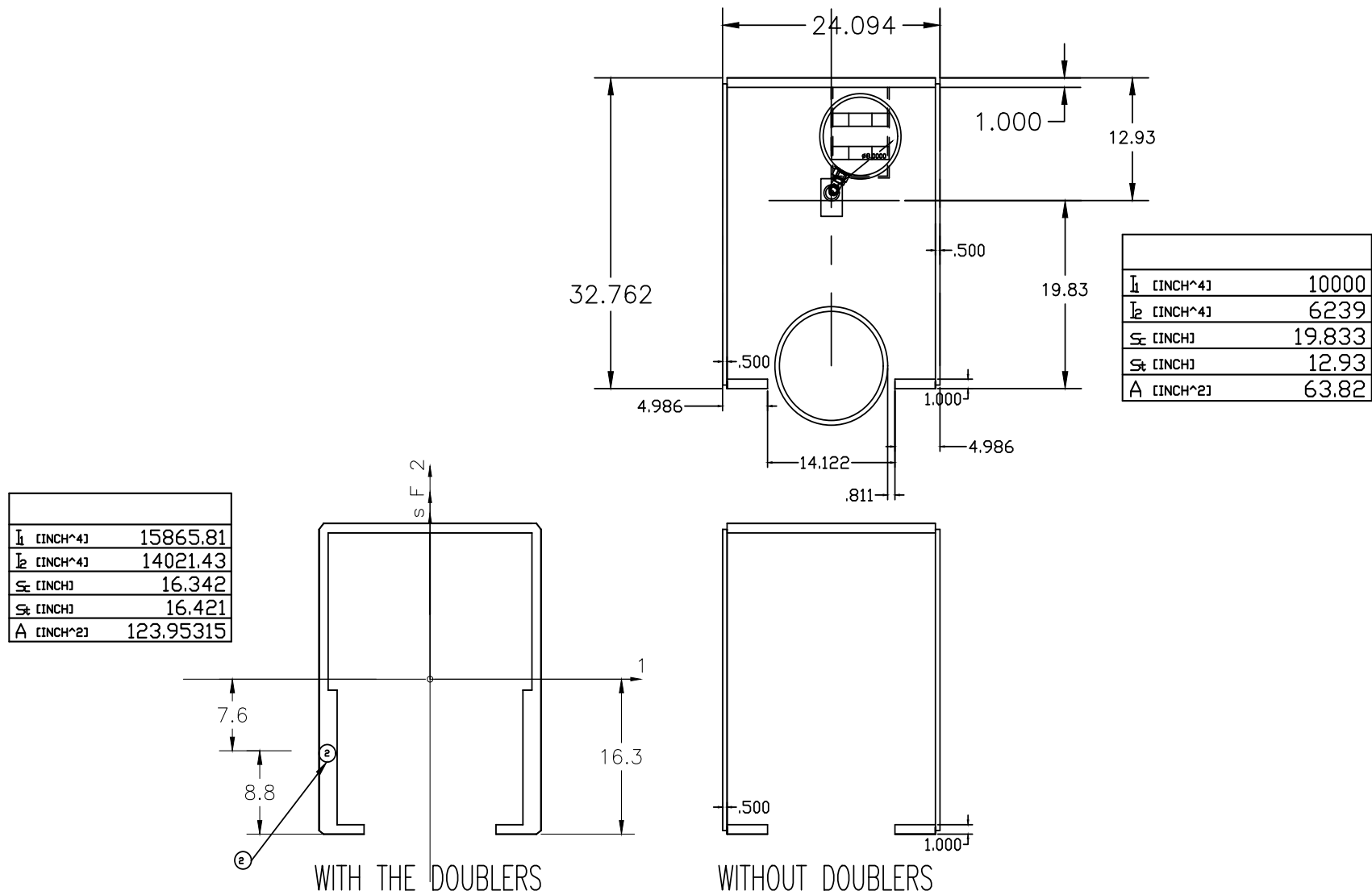
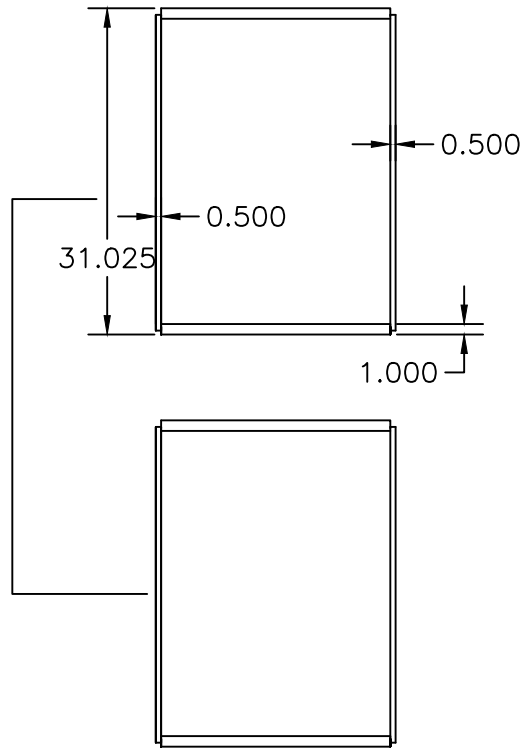


FIG B1.0-A1
SECT "CS6"



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"

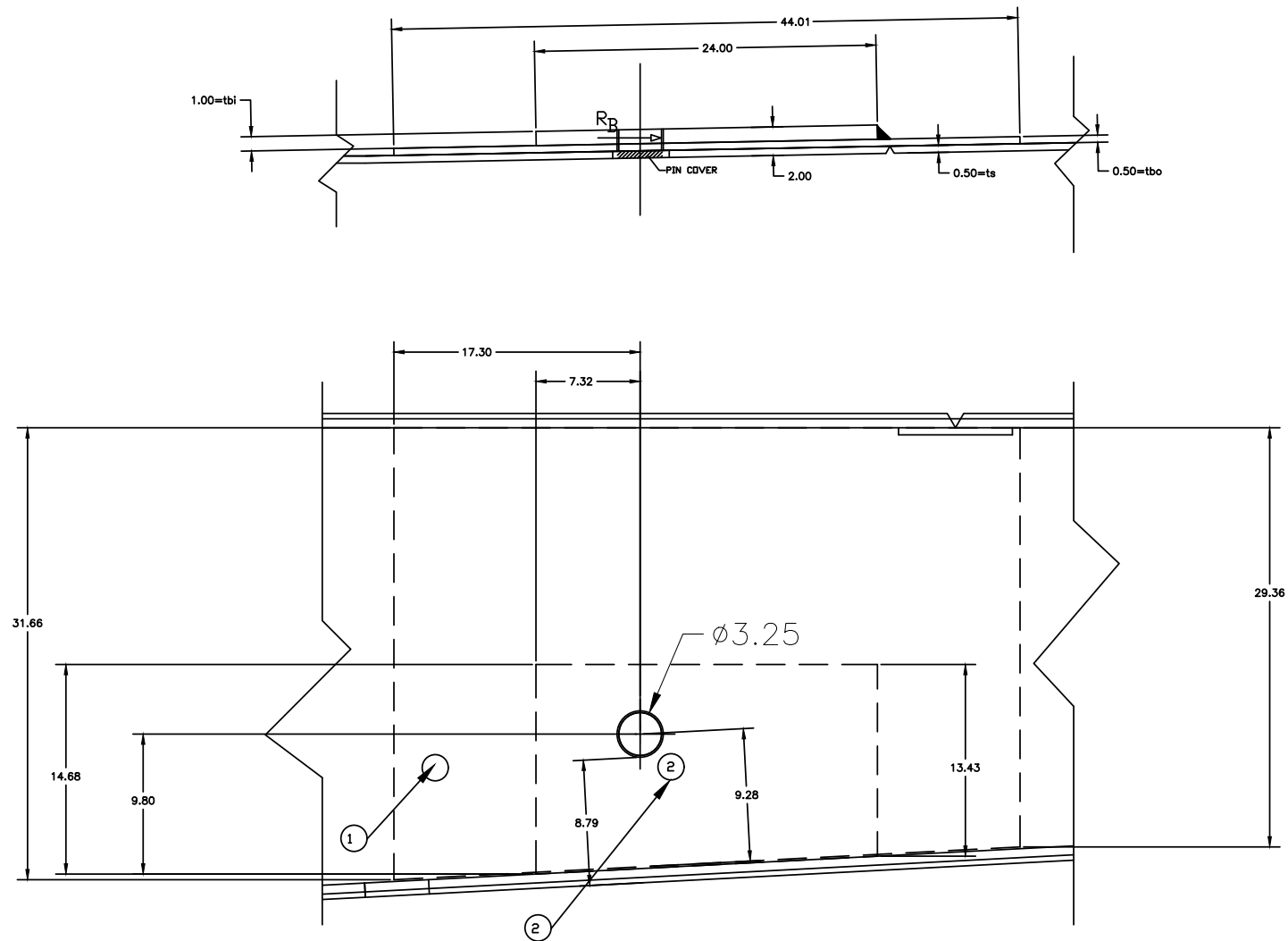
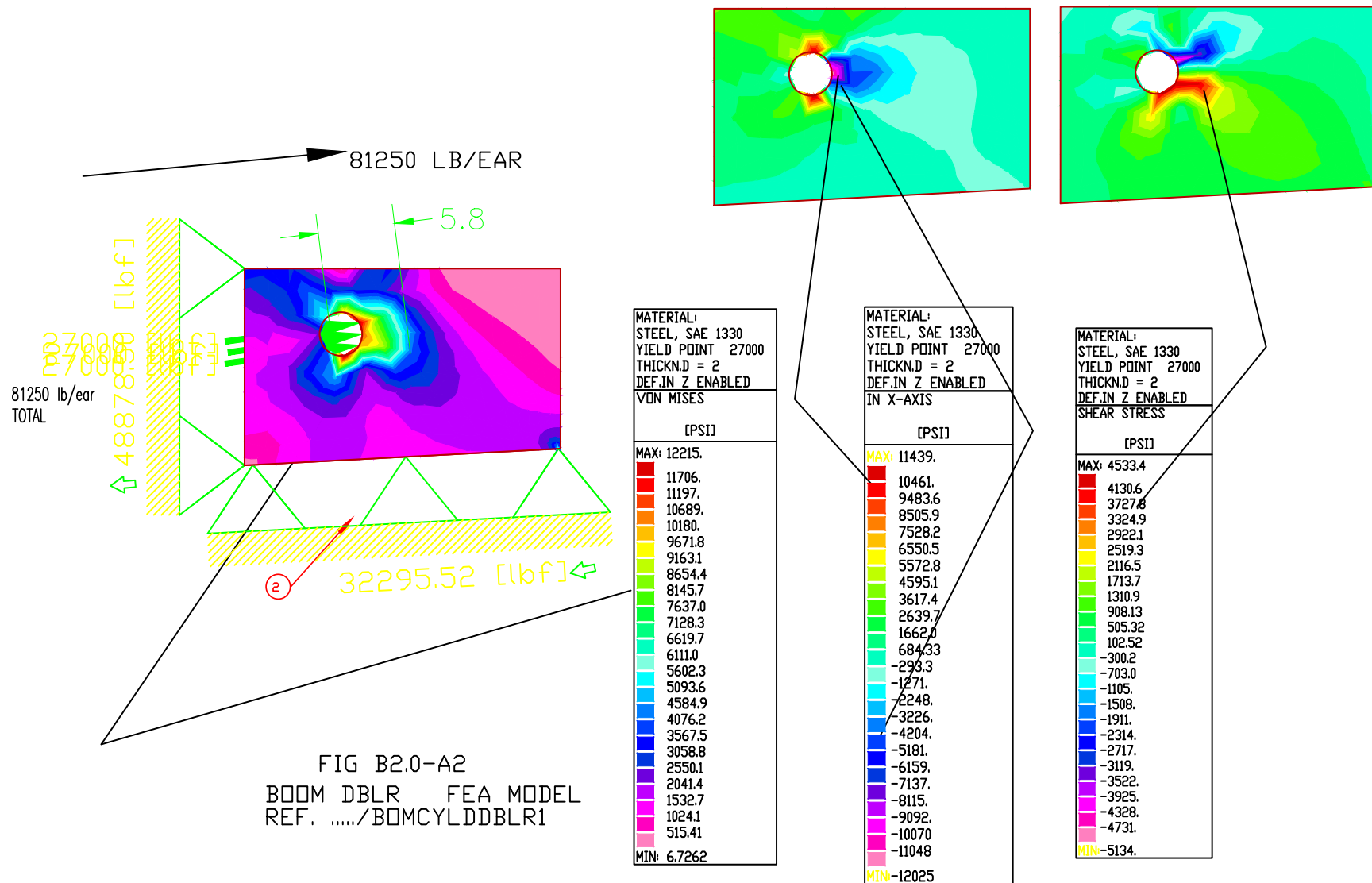


FIG B2.0-A1
BOOM DBLR FEA MODEL
REF./BOMCYLDDBLR1



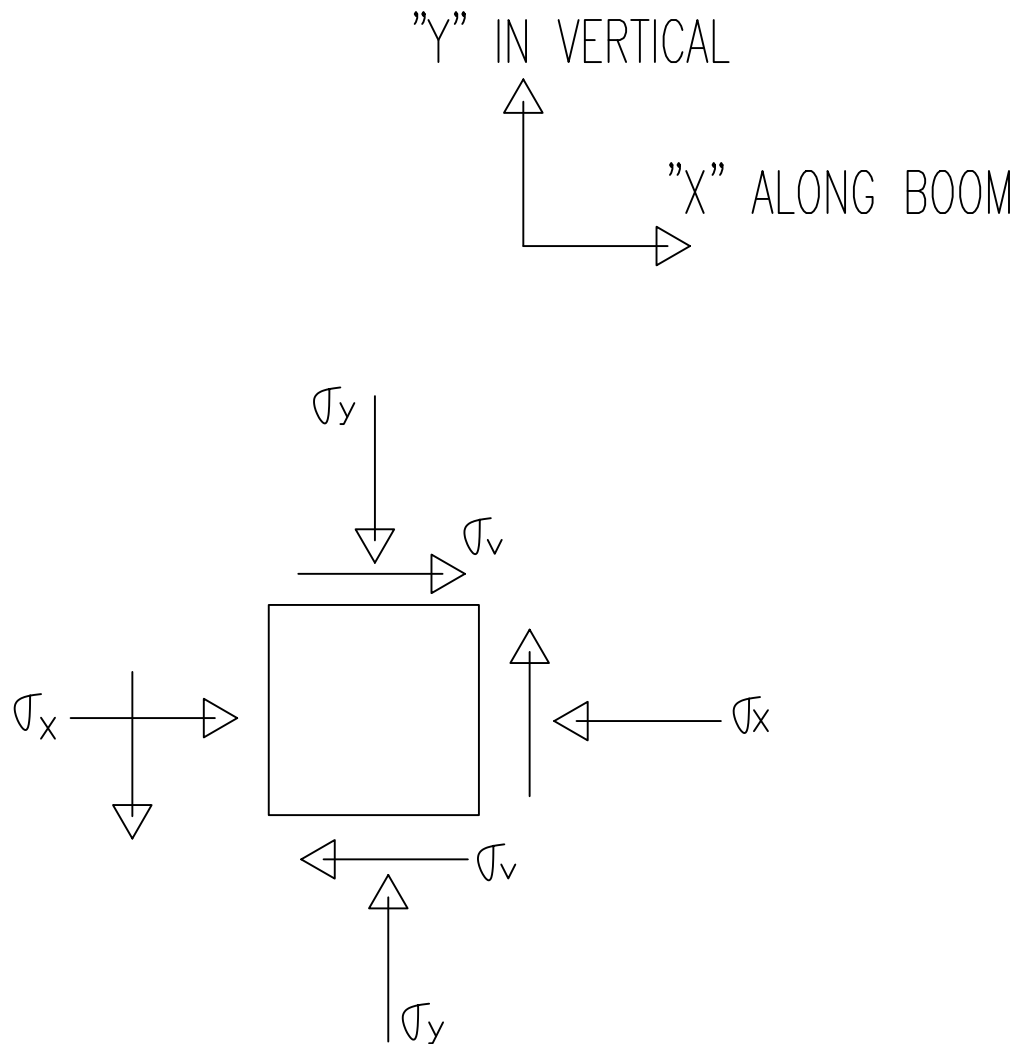


FIG. B4.0
BOOM MAIN PIN
DOUBLERS STRESSES

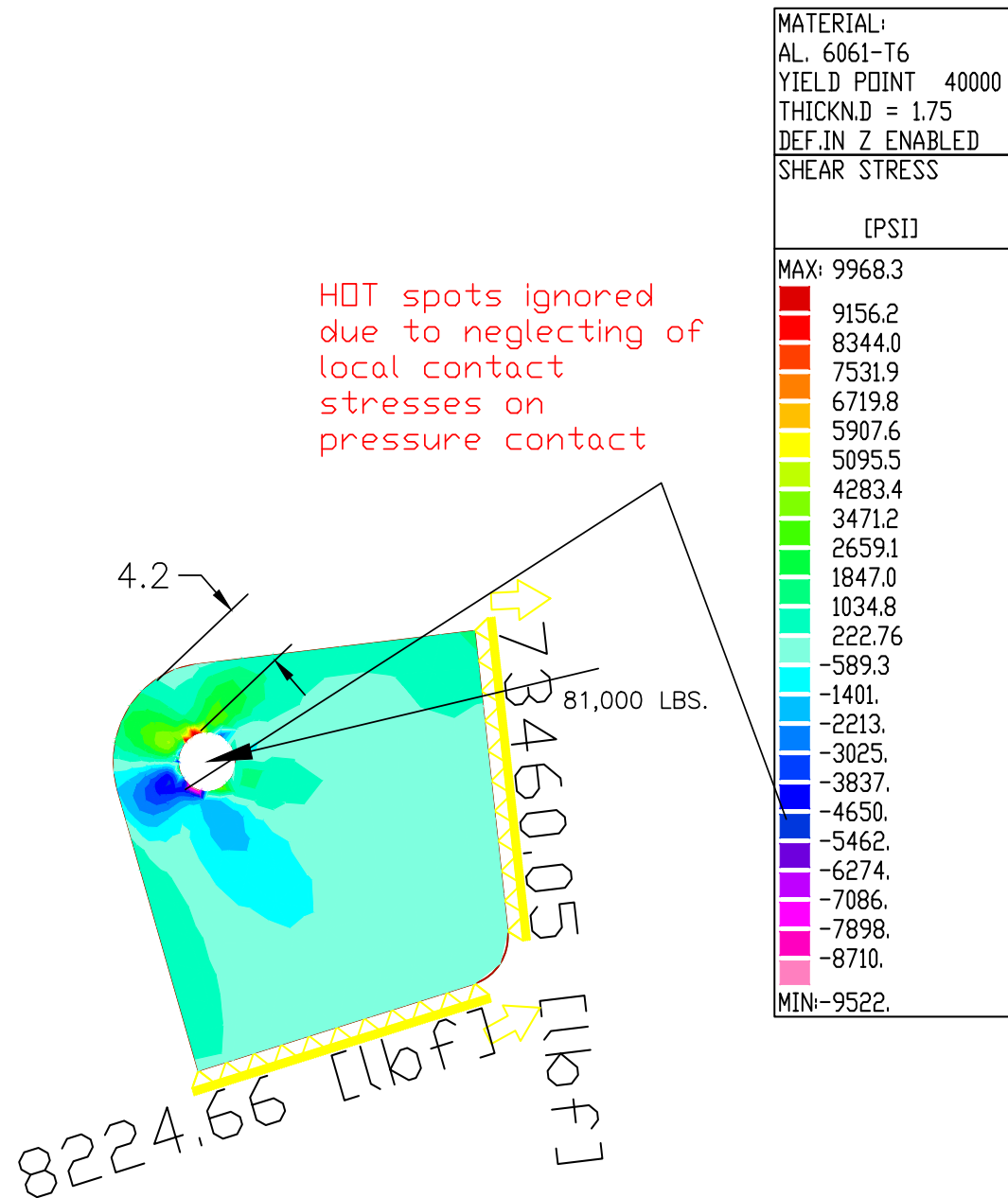


FIG B5.1-A
BOOM MAIN PIN DBLRS

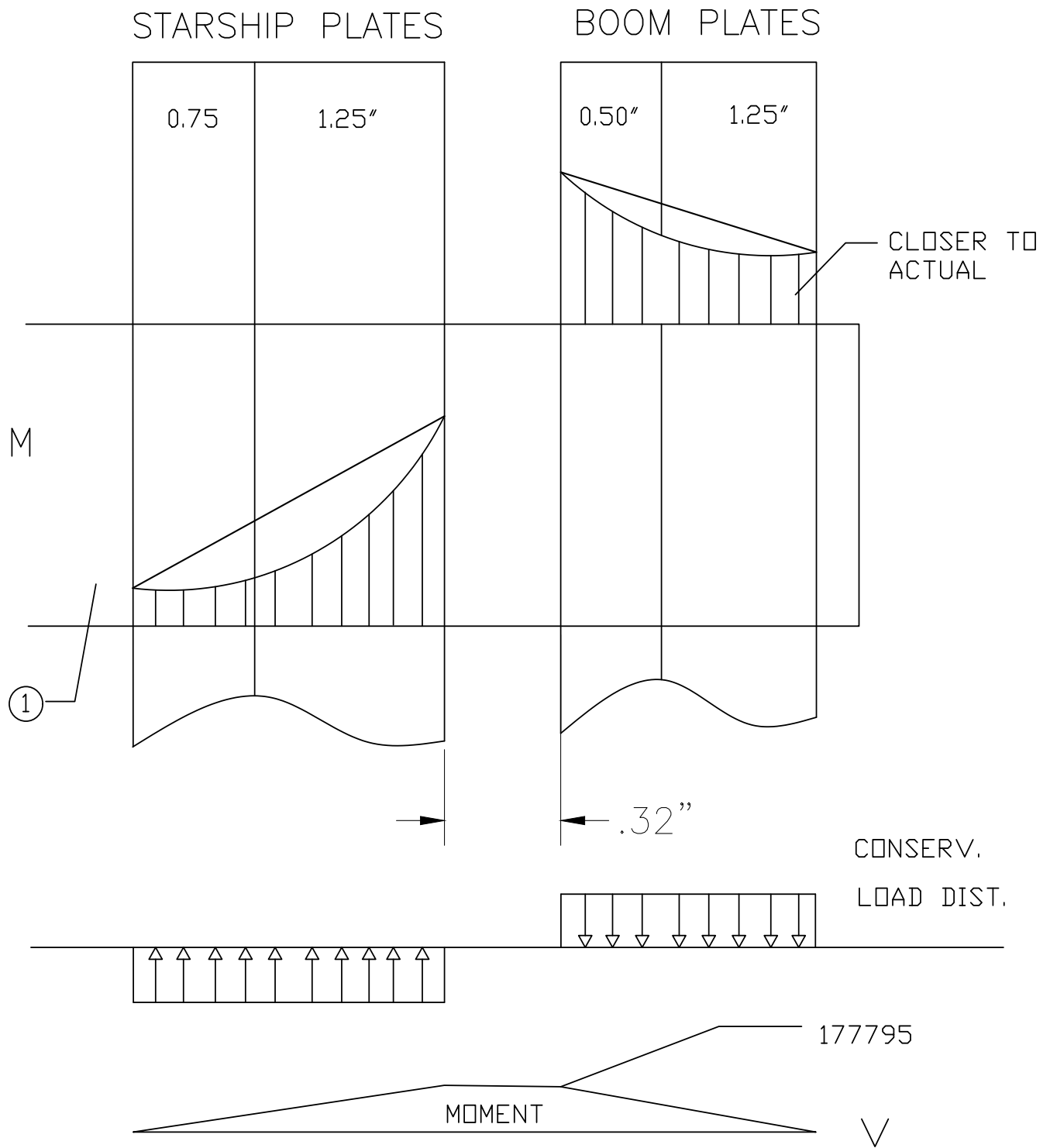


FIG P1.0
MAIN BOOM / STARSHIP PIN

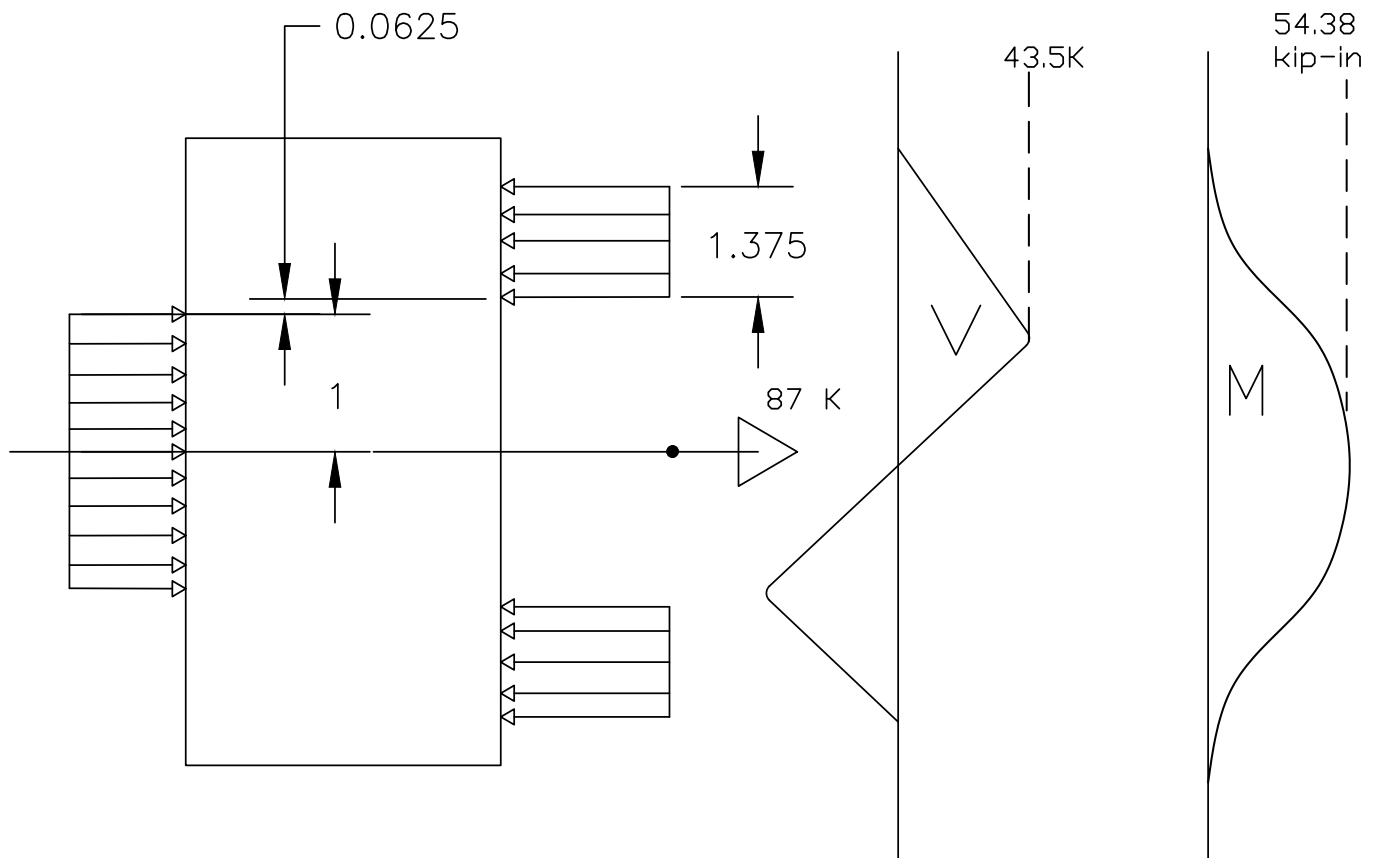


FIG P2.0
CABLE CYLINDER PIN

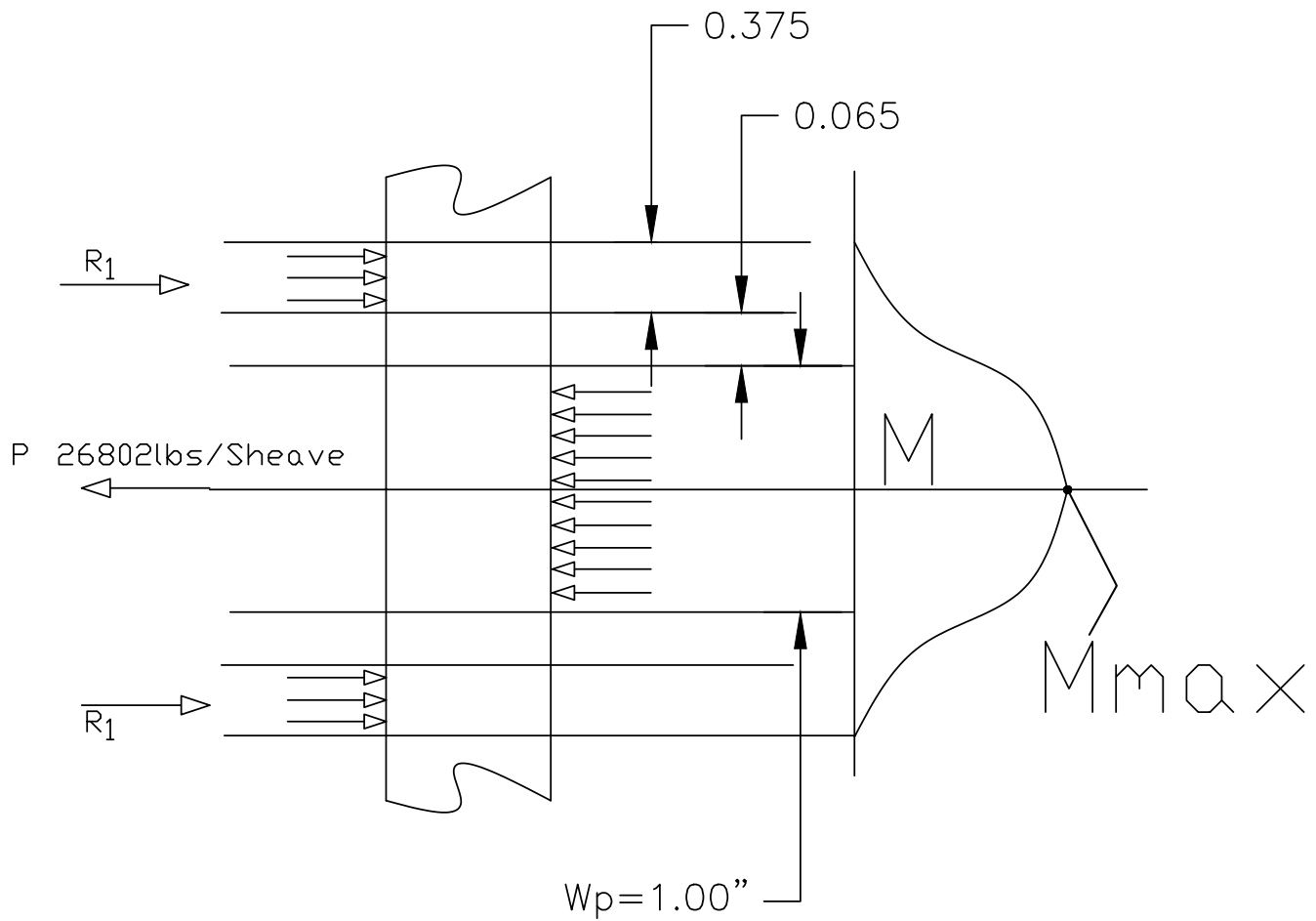


FIG P3.0
BOOM HEAD PULLEY PIN

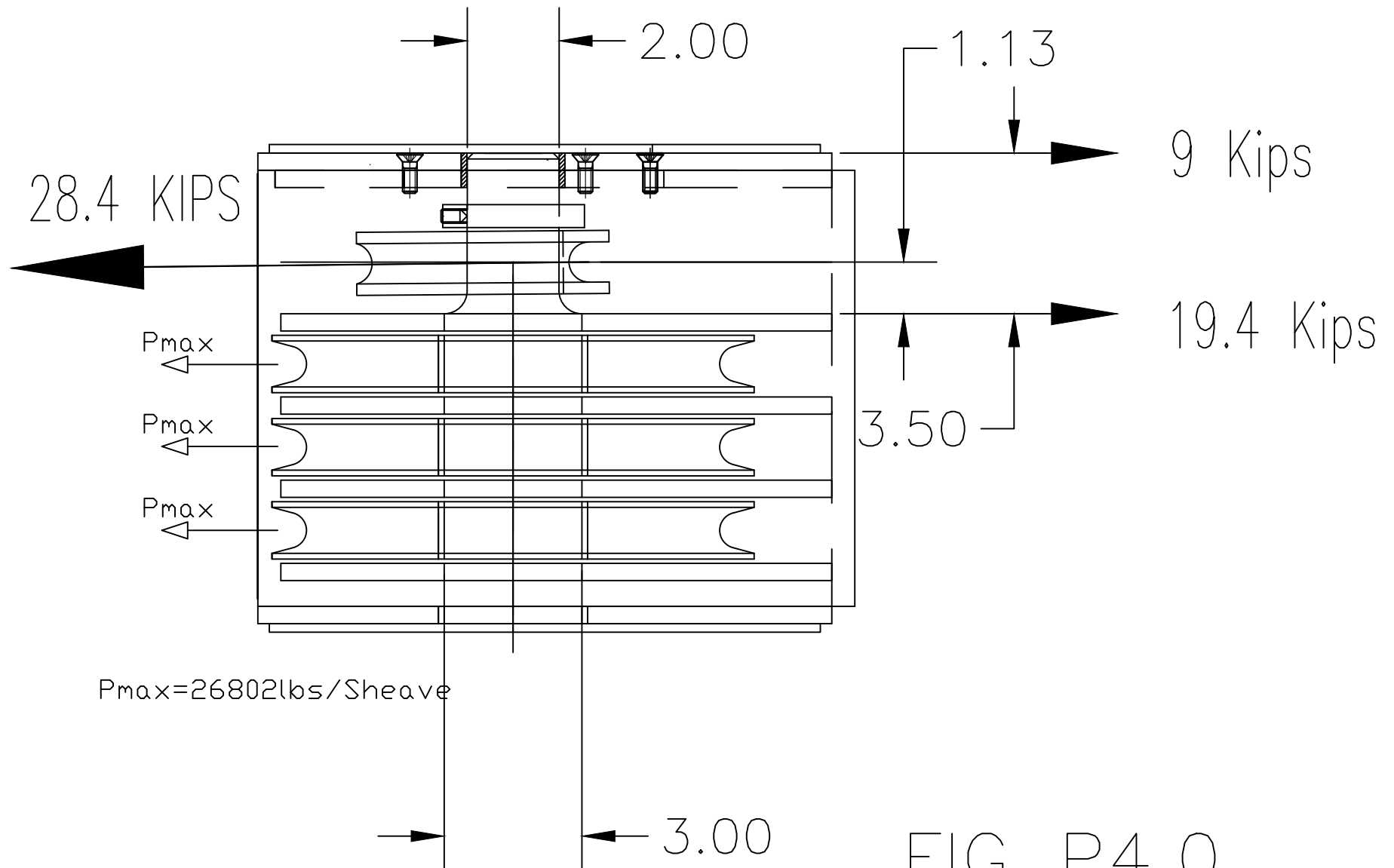


FIG P4.0
BITTER END PIN

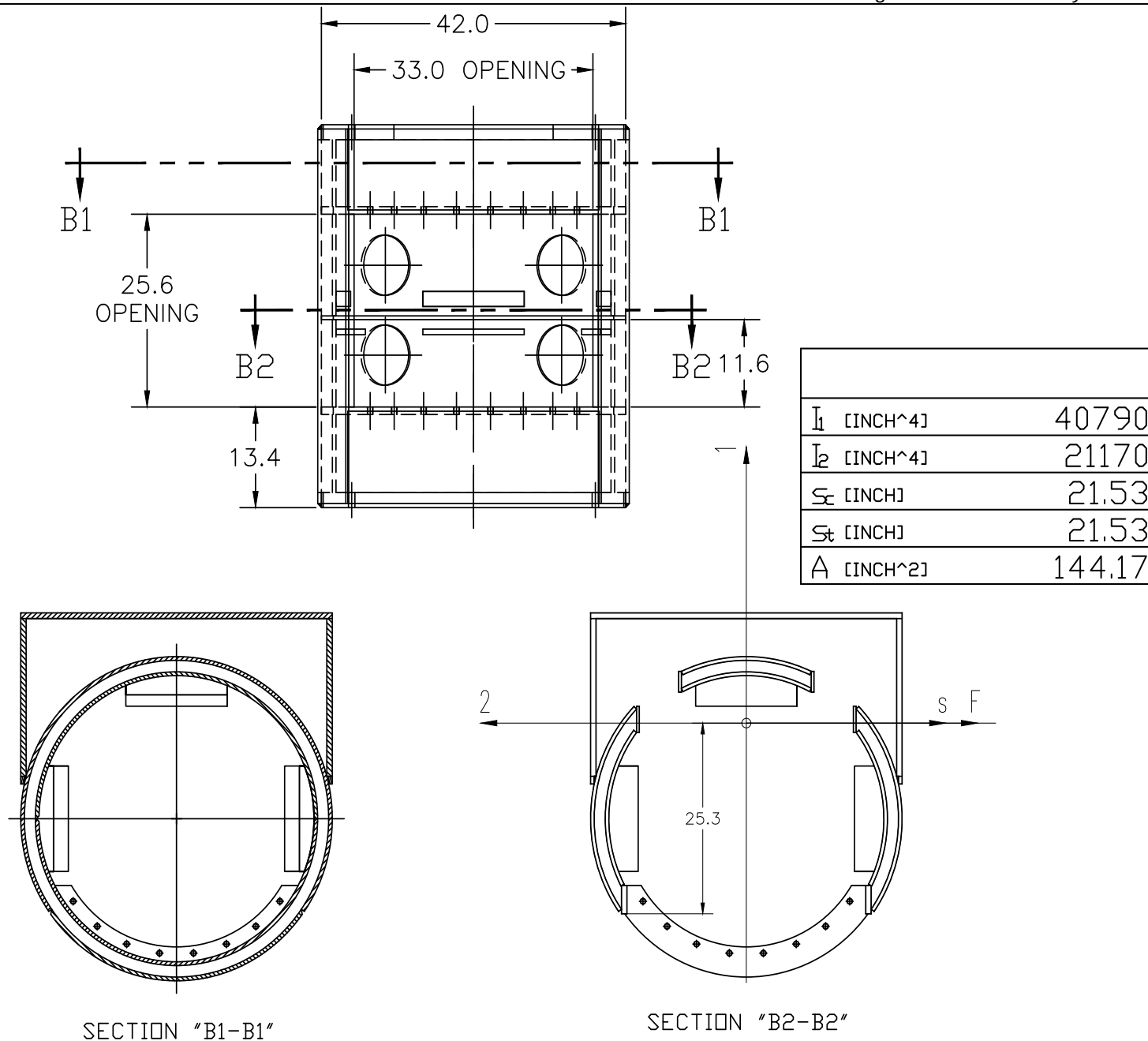


FIG BA1.0-A SECTION B2 PROPERTIES

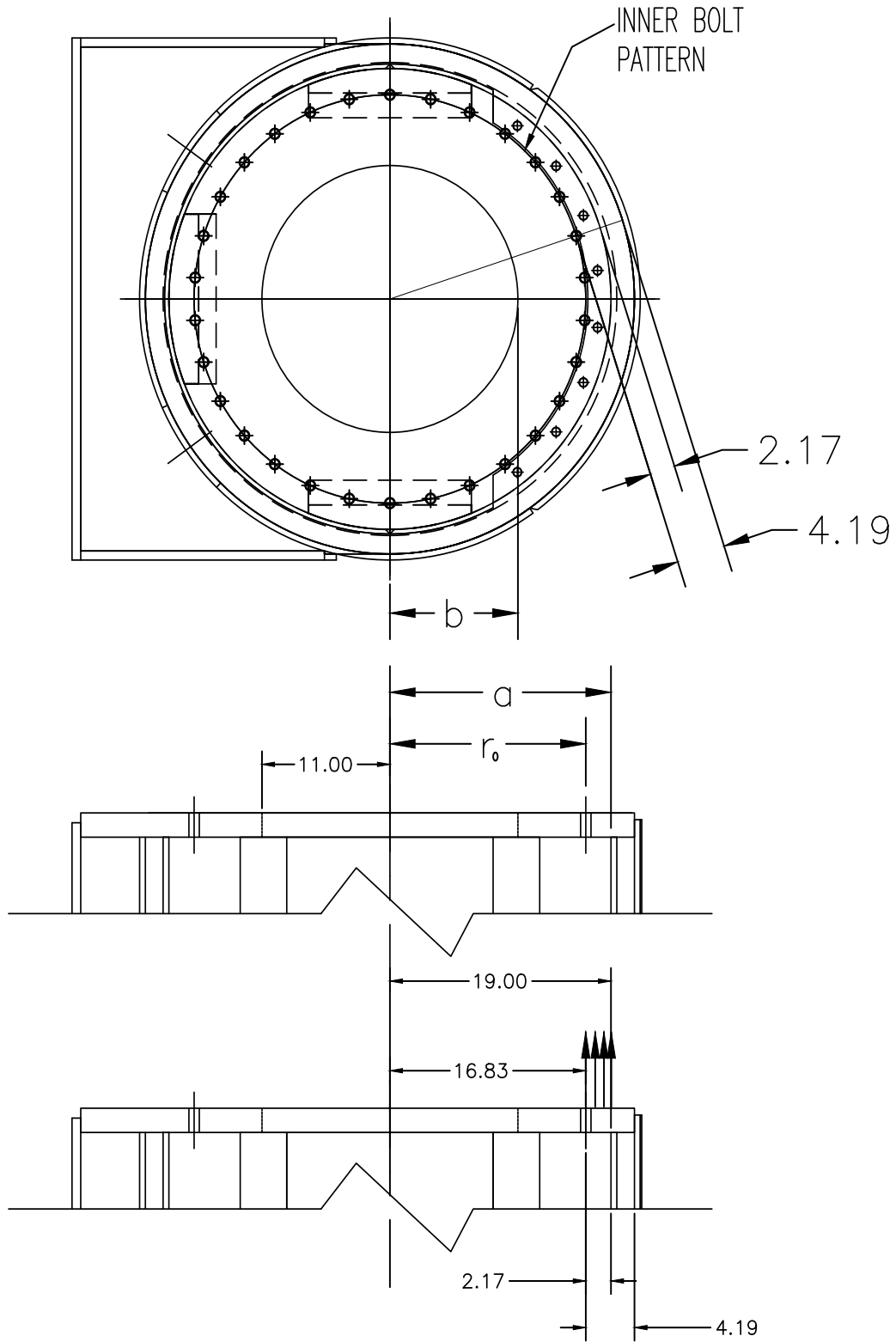


FIG BA2.0
TOP PLATE BOLT LOADS SECT BA2.0

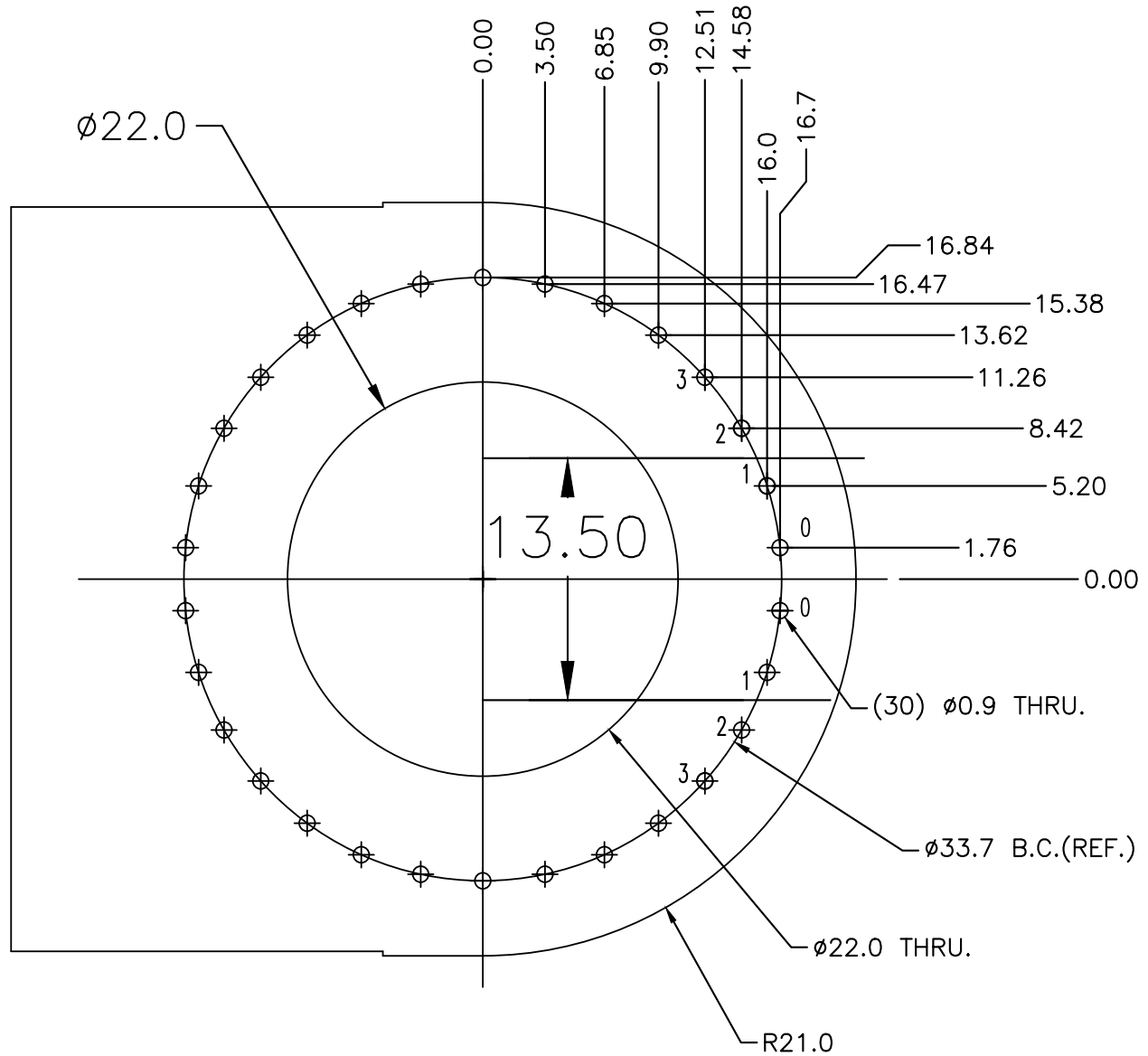


FIG BA2.1 TOP PLATE

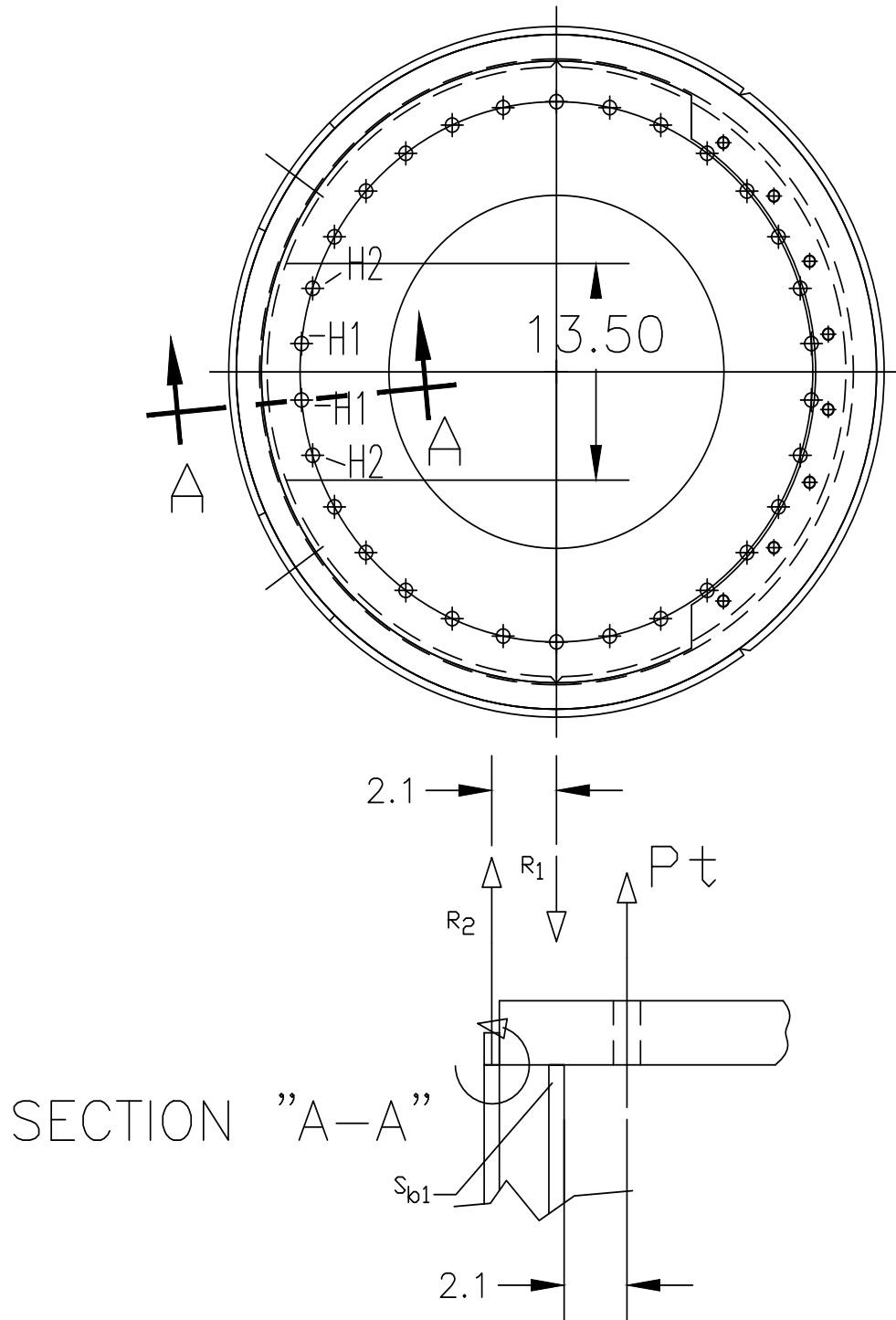


FIG BA3.1 GUSSET PLATE

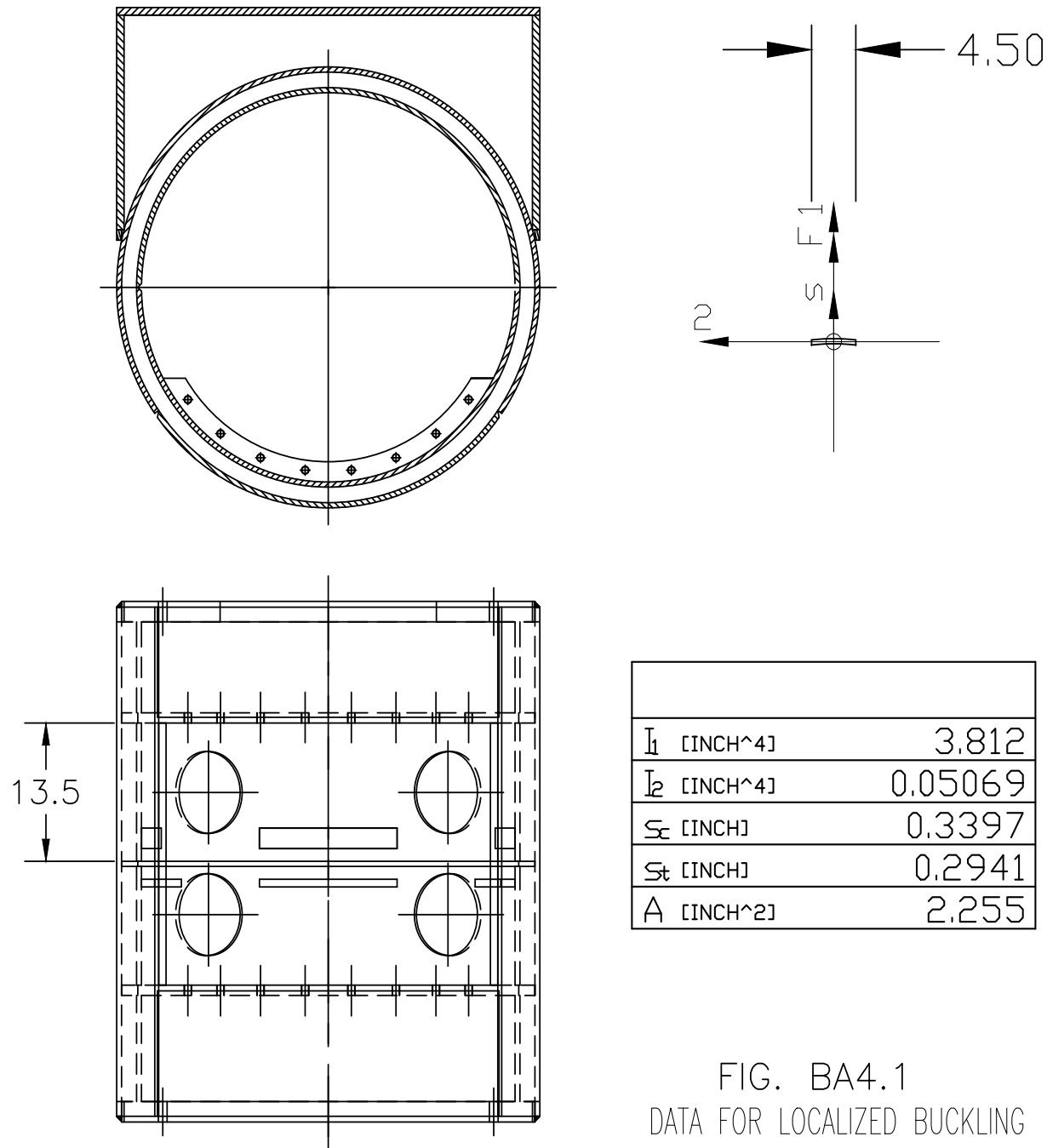


FIG. BA4.1
DATA FOR LOCALIZED BUCKLING

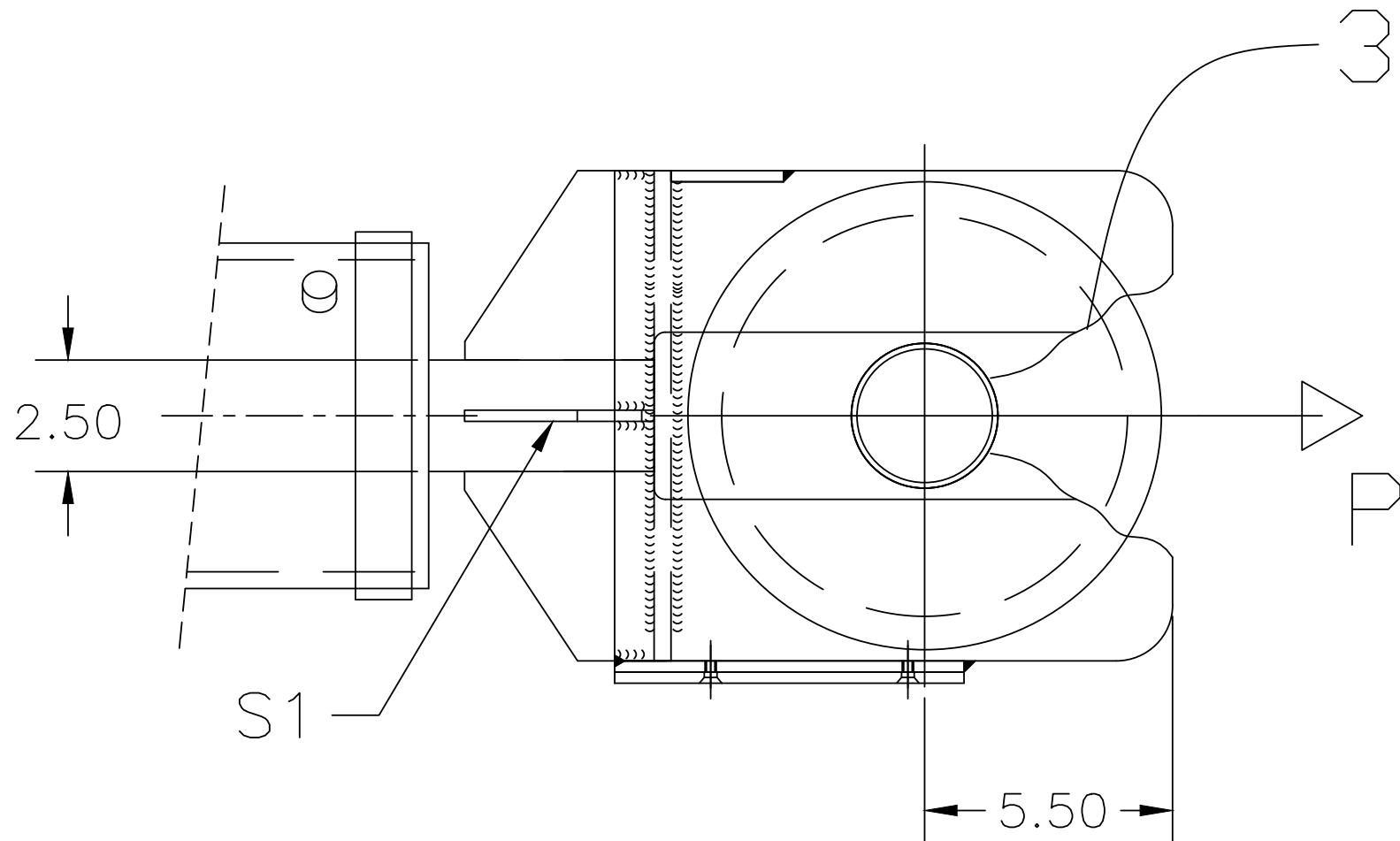
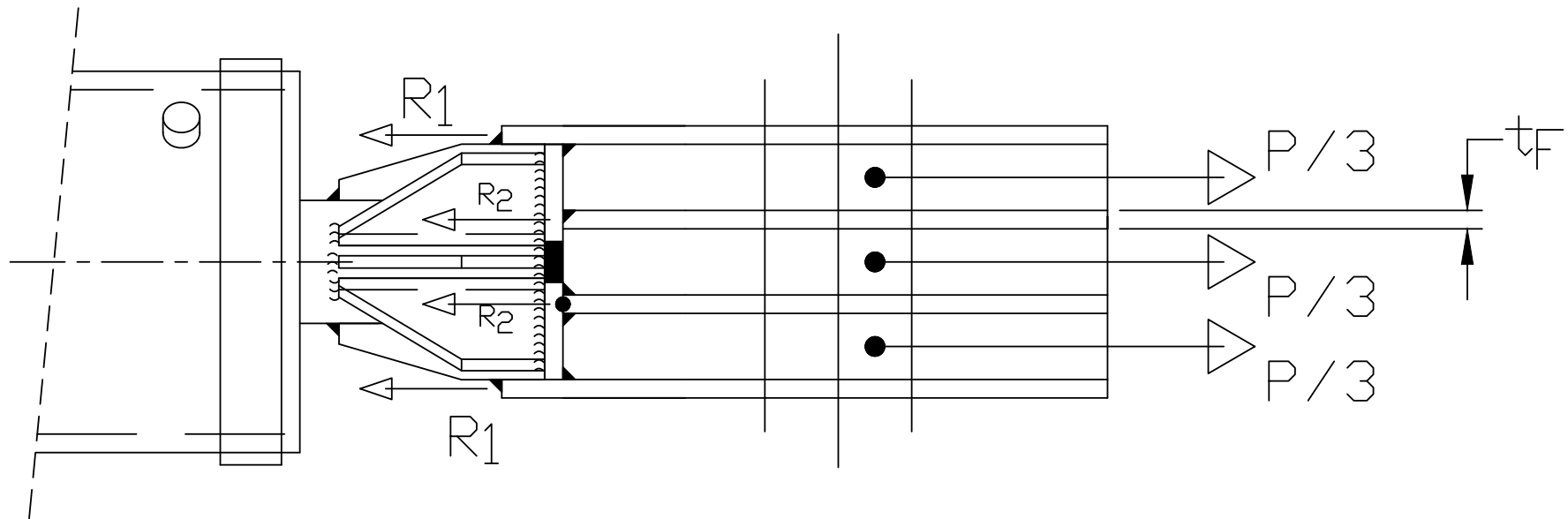


FIGURE H1.0
CABLE HEAD
SIDE VIEW



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

FIGURE H1.0-1
CABLE HEAD
TOP VIEW

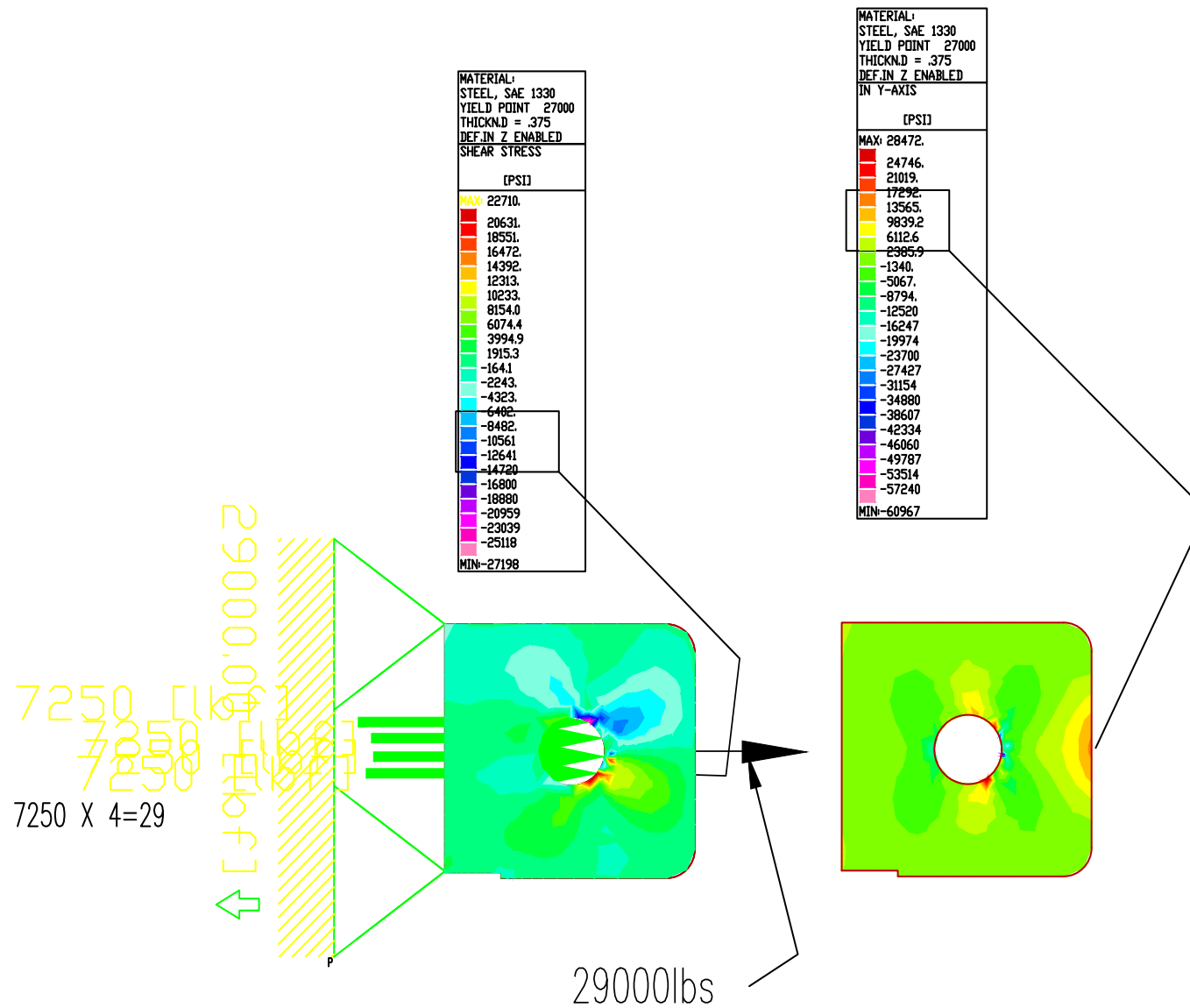


FIGURE H1.2
FEA IN STAINLESS $\frac{3}{8}$ PLATES

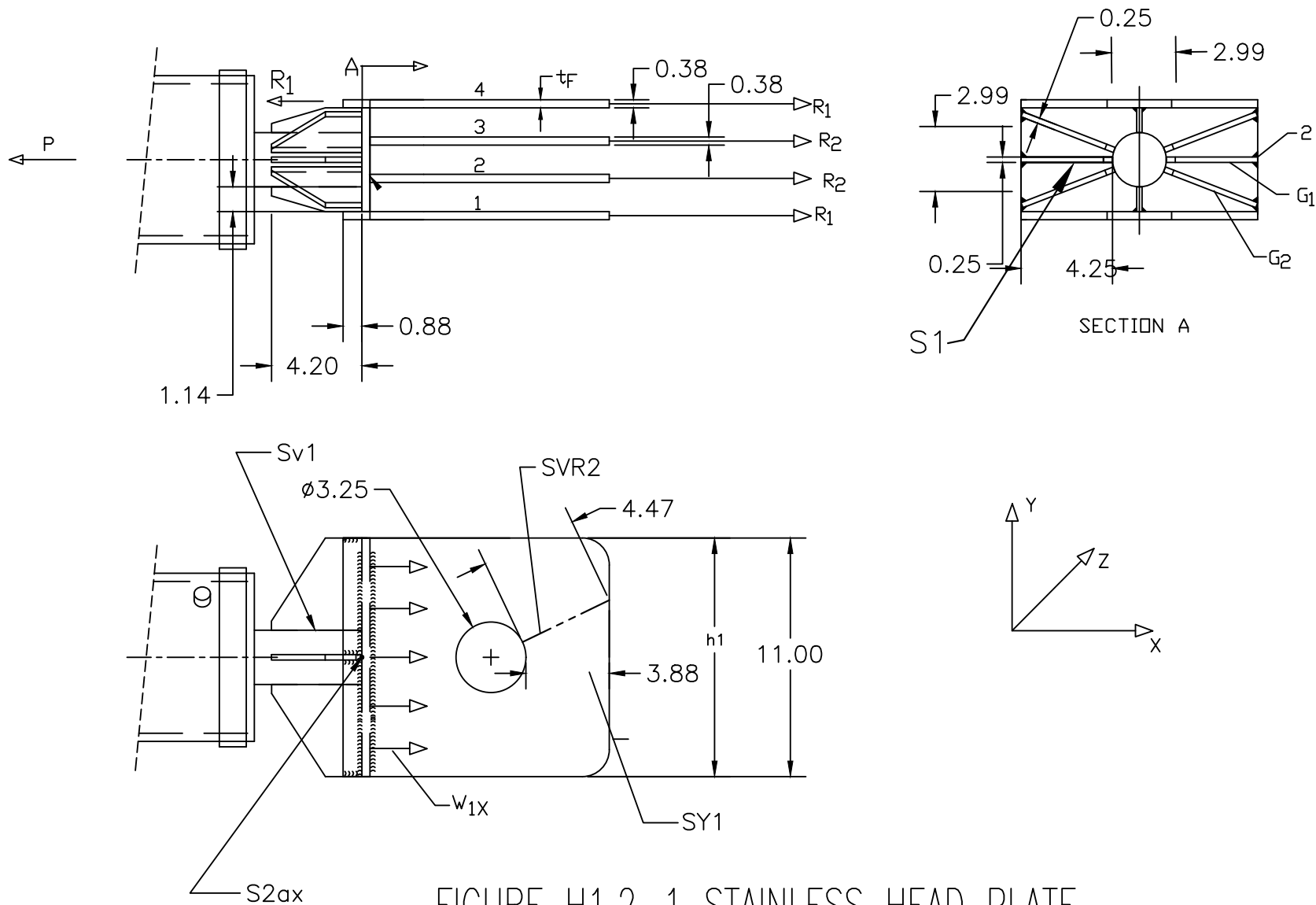


FIGURE H1.2-1 STAINLESS HEAD PLATE STRESSES