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JOB

SHEET NO. 1 OF

CALCULATED BY DATE 3-7-07

CHECKED BY DATE

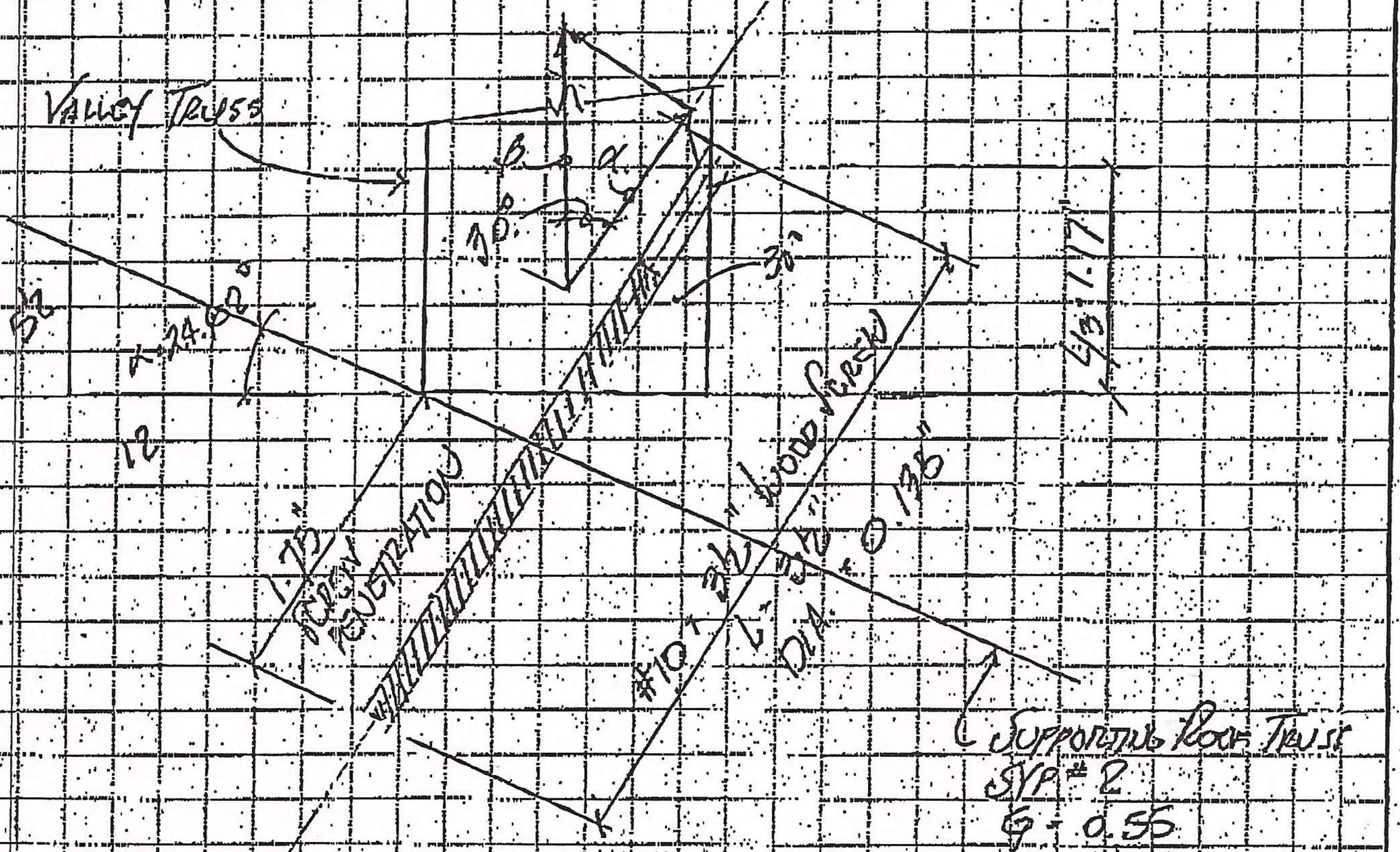
SCALE

USING A #10 x 3½" WOOD SCREW
DIA = 0.136"

SOUTHERN YELLOW PINE
(SYP) SPECIFIC GRAVITY = 0.55

WITHDRAWL VALUE = 163 #/INCH OF THREAD PENETRATION

VALLEY TRUSS



SUPPORTING ROOF TRUSS
SYP #2
G = 0.55

X = SCREW PULLOUT COMPONENT
= 1.75" (163 #/in) (1.6) = 4564 #/SCREW

1.75 = SCREW PENETRATION
163 = SCREW PULLOUT STRENGTH, POUND/INCH OF PENETRATION
1.6 = WIND LOAD COEFFICIENT

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REFERRING TO FIG. 1, THE MAXIMUM UPLIFT THAT MAY BE APPLIED TO A SINGLE SCREW CONNECTION FOR A WIND LOAD CONDITION IS B, THE VERTICAL COMPONENT OF THE SCREW FASTENED AT 30° FROM THE VERTICAL.

THUS, $B = \frac{L}{\cos 30°}$

$L = \frac{456}{0.866} = 527.0\ \#$

THE SIMULTANEOUS LATERAL SCREW LOAD = $527(\sin 30°) = 263.5\ \#$

WHICH EXCEED THE MAXIMUM ALLOWABLE LATERAL SCREW LOAD OF 129.96 #

THEREFORE LOOKING "BACKWARDS", THE MAXIMUM VERTICAL UPLIFT LOAD IS $129.96 / \sin 30 = 259.92\ \#$

WHICH CAUSES A SCREW PULL-OUT LOAD OF $259.92 \cos 30° = 225\ \# < 456.4$ (ALLOWABLE).

CONCLUSION:
MAXIMUM ALLOWABLE UPLIFT LOAD PER SINGLE SCREW CONNECTION IS 225 #

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COMBINED LATERAL AND WITHDRAWL LOADS

$$Z' = \frac{W p}{Z_k = W p \cos^2\alpha + Z' \sin^2\alpha}$$

α = ANGLE B'TWN. WOOD SURFACE AND DIRECTION OF APPLIED LOAD

p = LENGTH OF THREAD PENETRATION

W = SCREW WITHDRAWL VALUE (163 #/in.)

Z' = LATERAL ALLOWABLE LOAD

$$= \frac{D t_s F_{es}}{K_D}$$

SEE ALSO PG 4

D = 0.130"

t_s = 1.17

F_{es} = 5,550 (DOWEL BEARING STRENGTH)

K_D = 2.2

$$= \frac{0.130(1.17)(5\,550)}{2.2}$$

= 407.3# → USE 110# SEE PG 4

THEREFORE:

$$Z_k = \frac{163(1.75)(110)}{163(1.75)\cos^2(90°) + 110(\sin^2(90°))}$$

Z_k = 129.96#

THUS, THE MAXIMUM ALLOWABLE LATERAL LOAD ON A SCREW WITH A WITHDRAWL LOAD OF 1.75(163) = 285#, IS 129.96#

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(CALCULATIONS OF ALLOWABLE LATERAL SCREW LOAD)

$$Z = \frac{KD^2 F_{em}}{K_D(C+R_e)}$$

$$K = -1 + \sqrt{\frac{2(1+R_e)}{R_e} + \frac{F_{yb}(C+R_e)D^2}{2F_{em}L_s^2}}$$

$$R_e = \frac{F_{em}}{F_{es}} = 1$$

$F_{yb} = 100{,}000$ psi

$F_{es} = 5{,}500$ psi

$$K = -1 + \sqrt{\frac{2(1+1)}{1} + \frac{100{,}000(2\cdot1)(0.136)^2}{2(5{,}550)(1.5)^2}}$$

$$K = -1 + \sqrt{4 + 0.229}$$

$K = 3.22$

$$\therefore Z = \frac{3.22(0.136)(1.30)(5550)}{2.2(2+1)} = 560\ \text{lbs}$$

$$\text{Also } Z = \frac{D^2}{K_D}\left[\frac{1.75 F_{em} F_{yb}}{3(1+R_e)}\right]^{\frac{1}{2}}$$

$$= \frac{0.130^2}{2.2}\left[\frac{1.75(5550)(100{,}000)}{3(1+1)}\right]^{\frac{1}{2}}$$

$= 110$ lbs

Governs