

Mudsill Analysis and Design

Analysis to determine the adequacy of a plywood mudsill supporting a shore post base over compacted soil. The mudsill consists of stacked plywood panels distributing the post load to the ground.

Geometry and Loads

$P = 3000 \text{ lbf}$	Post axial load on mudsill
$B_p = 6 \text{ in}$	Post base width
$H_p = 6 \text{ in}$	Post base length
$B = 18 \text{ in}$	Mudsill panel width
$H = 18 \text{ in}$	Mudsill panel length
$t = 0.75 \text{ in}$	Plywood thickness
$N = 3$	Number of plywood panels

Plywood Bearing Under Post Base

$A_p = B_p H_p = 36 \text{ in}^2$	Post base contact area
$f_{\text{brg}} = \frac{P}{A_p} = 83.333 \text{ psi}$	Bearing stress in plywood
$F_{\text{abrg}} = 360 \text{ psi}$	Allowable plywood bearing (D510 ch 4.4.7)

Plywood bearing under post base

OK

$f_{\text{brg}}: 83.33 \text{ psi}$ $F_{\text{abrg}}: 360 \text{ psi}$

D/C: 0.23

Soil Bearing

$A_{\text{brg}} = \frac{BH}{144} = 2.25 \text{ ft}^2$	Mudsill bearing area on soil
$f_{\text{brg}} = \frac{P}{A_{\text{brg}}} = 1333.333 \text{ psf}$	Soil bearing pressure
$F_{\text{brg}} = 2000 \text{ psf}$	Allowable soil bearing pressure

Soil bearing pressure

OK

$f_{\text{brg}}: 1333.33 \text{ psf}$ $F_{\text{brg}}: 2000 \text{ psf}$

D/C: 0.67

Plywood Bending

The soil pressure acting on the panel produces a lineal load on the plywood spanning between the post base edge and the panel edge. A 0.6 reduction factor is applied to the soil pressure to account for partial loading at the cantilever.

$w = 0.6 f_{\text{brg}} B = 1200 \text{ plf}$	Lineal load on plywood
$a = \frac{H - H_p}{2} = 6 \text{ in}$	Cantilever length
$M = w \frac{a^2}{2} = 150 \text{ lbf} \cdot \text{ft}$	Maximum bending moment

$$S_p = NB \frac{t^2}{6} = 5.063 \text{ in}^3$$

Section modulus of plywood

$$f_b = \frac{M}{S_p} = 355.556 \text{ psi}$$

Bending stress in plywood

$$F_b = \frac{F_{bs}}{S} = 360 \text{ psi}$$

Allowable bending stress

Plywood bending stress

OK

f_b : 355.56 psi F_b : 360 psi

D/C: 0.99

Plywood Shear

$$V = wa = 600 \text{ lbf}$$

Maximum shear force

$$A_v = NBt = 40.5 \text{ in}^2$$

Shear area of plywood

$$f_v = 1.5 \frac{V}{A_v} = 22.222 \text{ psi}$$

Shear stress in plywood

$$F_v = 90 \text{ psi}$$

Allowable shear stress

Plywood shear stress

OK

f_v : 22.22 psi F_v : 90 psi

D/C: 0.25