

STUD WALL CALCULATIONS

Stud Width (dy)	1.50 in
Stud Depth (dx)	5.50 in
Stud Length (L)	15.00 ft
Stud Spacing	16.00 in

Design Values

Fb	900 psi
Fc	1350 psi
Fc _⊥	625 psi
E	1600000 psi
E _{min}	580000 psi
CF _b	1.30
CF _c	1.10
A	8.25 in ²
S _x	7.56 in ³
I _x	20.80 in ⁴
C _t	1.00
CM	1.00
C _i	1.00

Load Case 1: Gravity Loads Only

CD	1.15
(le/d) _y	0.00 sheathing
(le/d) _x	32.73
E' _{min}	580000 psi
FcE	445.12 psi
Fc*	1707.75 psi
c	0.80 sawn lumber
FcE/Fc*	0.261
1 + FcE/Fc*/2c	0.788
C _p	0.245
Fc'	418.03 psi
f _c	57.05 psi
CSI (axial)	0.14 OK

Bearing on Stud Wall Plates

l _b	1.50 in
C _b	1.00 (conservative)
Fc _⊥ '	625.00 psi
f _{c⊥}	57.05
CSI (bearing)	0.09 OK

Vertical Loads

Wall LL (wLL)	184 plf
Wall DL (wDL)	169 plf
Wall DL (wTL)	353 plf
Trib. Length	1.33 ft
P _c	470.67 lbs

Lateral Loads (Wind MWFRS)

Wind Load (windward wall)	38.20 psf
MWFRS Wind Load ASD	22.92 psf
Wind Atrib	20.00 ft ²
W	458.40 lbs
w	30.56 plf

Lateral Loads (Wind C&C)

Wind Load (Zone 5)	55.90 psf
CC Wind Load ASD	33.54 psf
W	670.80 lbs
w	44.72 plf

Load Case 2: Lateral Loads Only (Wind C&C)

M _{max}	1257.75 ft-lbs
	15093.00 in-lbs
f _{bx}	1995.77 psi
CSI (bending C&C)	0.93 OK

Load Case 3: Gravity Loads and Lateral Loads

CD	1.60 (Wind)
M _{max}	859.50 ft-lbs
	10314.00 in-lbs
CL	1.00 (lat. braced)
C _r	1.15 @ 16 O/C
F _b '	2152.80 psi
f _{bx}	1363.83 psi
CSI (bending MWFRS)	0.63 OK

Combined Stress*(re-evaluate compression values with CD = 1.6)*

FcE	445.12 psi
Fc*	2376.00 psi
c	0.80 sawn lumber
FcE/Fc*	0.187
1 + FcE/Fc*/2c	0.742
C _p	0.179
Fc'	426.47 psi

$$\left(\frac{f_c}{F_c'}\right)^2 + \left(\frac{1}{1 - \frac{f_c}{F_{cE}}}\right)\left(\frac{f_b}{F_b'}\right) = \mathbf{0.74 OK}$$

Location: WALL D (Garage)

Specification: Use 2 x 6 DF No. 2 Grade @ 16" o/c