

Types of Roofs

Light roof is composition shingles or wood shingles.

Heavy roof is clay tile or cement tile.

One Story Building Weights

Wood siding, light roof, sheetrock walls 39 pounds per square foot of foundation footprint.

Wood siding, light roof, plaster walls: 49 pounds per square foot of foundation footprint.

Wood siding, heavy roof, plaster walls : 58 pounds per square foot of foundation footprint.

Stucco siding, light roof, plaster walls: 50 pounds per square foot of foundation footprint.

Stucco siding, heavy roof, plaster walls: 65 pounds per square foot of foundation footprint.

Two Story Building Weights

Wood siding, light roof, sheetrock walls: 66 pounds per square foot of foundation footprint.

Wood siding, light roof, plaster walls: 84 pounds per square foot of foundation footprint.

Wood siding, heavy roof, plaster walls: 92 pounds per square foot of foundation footprint.

Stucco siding, light roof, plaster walls: 72 pounds per square foot of foundation footprint.

Stucco siding, heavy roof, plaster walls: 98 pounds per square foot of foundation footprint.

Appendix A

Determination of house weights based on calculations found in Plan Set A's

SUBSTANTIATING DATA FOR CRIPPLE WALL and SILL BOLTING

SEISMIC RETROFIT of ONE & TWO FAMILY DWELLINGS

4/21/04

These weights are the engineering basis of Plan Set A. The building weights determined by Mr. Russell were for 4 cases of buildings. A fifth case, **Case D) Heavy roofing with wood sheathing or board finish**, has been added using Mr. Russell's calculations because this configuration is common in Berkeley. All page citations are from Mr. Russell's work mentioned above.

The cases are as follows:

Case A) Lightweight roofing (5 psf) of wood shake, wood shingle, or composition shingle, exterior wood sheathing and 1/2" gypsum wallboard interior finish. :

Case B) Lightweight roofing, (5 psf) of wood shake, wood shingle, or composition shingle, exterior wood sheathing, and gypsum lath and plaster interior finish.

Case C) Lightweight roofing (5 psf) of wood shake, wood shingle, or composition shingle, cement plaster (stucco) exterior finish, and gypsum lath and plaster interior finish.

Case D) Heavy roofing (11 psf) of concrete or clay tile, exterior wood sheathing or board finish, and gypsum lath and plaster interior finish.

Case E) Heavy roofing (11 psf) of concrete or clay tile, cement plaster (stucco) exterior finish, and gypsum lath and plaster interior finish.

Case A Weight for 30' x 40' One Story House (1,200 Sq. Ft.) **Page 10**

Dead loads (W) tributary to cripple wall level:

Roof/Ceiling: 11 psf (34' x 44') = 16.456 kips

First floor: 7 psf (30' x 40') = 8.4 kips

Exterior Walls:

1st Story wall: 8 psf (8') (30' x 2 + 40' x 2) = 8.96 kips

Gable end walls: 5 psf (5' x 30') 2 / 2 = 0.75 kips

Cripple walls 6 psf (2') (30' x 2 + 40' x 2) = 1.68 kips
11.39 kips

Interior walls: 8 psf (8') (30' x 3 + 40' x 2) = 10.88 kips

Sum W = 16.456 + 8.4 + 11.39 + 10.88 = 47.126 kips

47.126kips/1200sf=39.27psf for a 1200sf one story Case A house.

Weight per square foot=-39 pounds

Case A- Weight for 30 ft x 30 ft Two Story House (1,800 Sq. Ft.) **P 42,**

Dead loads (W) tributary to cripple wall level for 1,800 square feet:

Roof/Ceiling: 11 psf (34' x 34') = 12.716 kips

Second Floor: 9 psf (30' x 30') = 8.10 kips

First floor: 7 psf (30' x 30') = 6.30 kips

Exterior Walls:

1st & 2nd Story walls: 8 psf (16') (30' x 2 + 30' x 2) = 15.36 kips

Gable end walls: 5 psf (5' x 30') 2 / 2 = 0.75 kips

Cripple walls: 6 psf (2') (30' x 2 + 30' x 2) = 1.44 kips
17.55 kips

Interior wall: 8 psf (8') (29' x 5 + 29' x 3) = 14.848 kips

Sum W = 12.72 + 8.10 + 6.30 + 17.55 + 14.85 = 59.51 kips

59.51kips/1800sf=33.06psf for an 1800sf two story Case A house.

Weight per square foot=-33 pounds

Case B-Weight for 30' x 40' One Story House (1,200 Sq. Ft.) P19

Dead loads (W) tributary to cripple wall level:

Roof/Ceiling: 14 psf (34' x 44') = 20.944 kips

First floor: 7 psf (30' x 40') = 8.4 kips

Exterior Walls:

1 st Story wall:	10 psf (8') (30' x 2 + 40' x 2) =	11.20 kips
Gable end walls:	5 psf (5' x 30') 2 / 2 =	0.75 kips
Cripple walls	6 psf (2') (30' x 2 + 40' x 2) =	<u>1.68 kips</u>
		13.63 kips

Interior walls: 12 psf (8') (30' x 3 + 40' x 2) = 16.32 kips

Sum W = 20.944 + 8.4 + 13.63 + 16.32 = 59.294 kips

59.294kips/1200sf=49.41psf for a one story Case B house.

Weight per square foot=-49 pounds

Case B-Weight for 30 ft x 30 ft Two Story House (1,800 Sq. Ft.) P48,

Dead loads (W) tributary to cripple wall level for 1,800 square feet:

Roof/Ceiling: 14psf (34' x 34') = 16.184 kips

Second Floor: 11 psf (30' x 30') = 9.90 kips First floor: 7 psf (30' x 30') = 6.30 kips

Exterior Walls:

1 st & 2 nd Story walls:	10 psf (16') (30' x 2 + 30' x 2) =	19.20 kips
Gable end walls:	5 psf (5' x 30') 2 / 2 =	0.75 kips
Cripple walls:	6 psf (2') (30' x 2 + 30' x 2) =	<u>1.44 kips</u>
		21.39 kips

Interior wall: 12 psf (8') (29' x 5 + 29' x 3) = 22.272 kips

Sum W = 16.18 + 9.90 + 6.30 + 21.39 + 22.27 = 76.05 kips

76.05kips/1800=42.25psf for a Case B Two Story House

Weight per square foot=-42 pounds

Case C Weight for 30' x 40' One Story House (1,200 Sq. Ft.) P27

Dead loads (W) tributary to cripple wall level:

Roof/Ceiling: 14 psf (34' x 44') = 20.944 kips

First floor: 7 psf (30' x 40') = 8.4 kips

Exterior Walls:

1 st Story wall:	17 psf (8') (30' x 2 + 40' x 2) =	19.040 kips
Deduct for Windows:	-7 psf (130 sq. ft.)	<-0.91 kips>
Gable end walls:	12 psf (5' x 30') 2 / 2 =	1.80 kips
Cripple walls	13.5 psf (2') (30' x 2 + 40' x 2) =	<u>3.78 kips</u>
		23.71 kips

Interior walls: 12 psf (8') (30' x 3 + 40' x 2) = 16.32 kips

Sum W = 20.944 + 8.4 + 23.71 + 16.32 = 69.374 kips

69.374 kips / 1200 = 57.81 psf for a Case C One Story House

Weight per square foot = 58 pounds

Case C- Weight for 30 ft x 40 ft Two Story House (2,400 Sq. Ft.) P52

Assume SD soil with $C_a = 0.44$; $N_a = 1.3$; $I = 1.00$; and $R = 5.5$; Conversion to ASD force level:
 $1 / 1.4$ Seismic $V = 0.186 W$

Dead loads (W) tributary to cripple wall level for 30 x 40 two story = 2,400 square feet:

Roof/Ceiling: 14 psf (34' x 44') = 20.944 kips

Second Floor: 11 psf (30' x 40') = 13.20 kips First floor: 7 psf (30' x 40') = 8.40 kips

Exterior Walls:

1 st & 2 nd Story walls:	17 psf (16') (30' x 2 + 40' x 2) =	38.08 kips
Deduct for windows:	-7 psf (240 sq. ft.) =	<-1.68> kips
Gable end walls:	12 psf (5' x 30') 2 / 2 =	1.80 kips
Cripple walls:	13.5 psf (2') (30' x 2 + 40' x 2) =	<u>3.78 kips</u>
		41.98 kips

Interior wall: 12 psf (8') (29' x 5 + 39' x 3) = 25.152 kips

Sum W = 20.94 + 13.2 + 8.4 + 41.98 + 25.15 = 109.68 kips

109.68 kips / 2400 = 45.7 psf for a Case C Two Story House

Weight per square foot = 46 pounds

Case 3 Weight for 30' x 40' One Story House (1,200 Sq. Ft.)

Dead loads (W) tributary to cripple wall level:

Roof/Ceiling: 20 psf (34' x 44') = 29.92 kips

First floor: 7 psf (30' x 40') = 8.4 kips

Exterior Walls:

1 st Story wall:	8 psf (8') (30' x 2 + 40' x 2) =	8.96 kips
Gable end walls:	5 psf (5' x 30') 2 / 2 =	0.75 kips
Cripple walls	6 psf (2') (30' x 2 + 40' x 2) =	<u>1.68 kips</u>
		11.39 kips

Interior walls: 8 psf (8') (30' x 3 + 40' x 2) = 10.88 kips

Sum W = 16.456 + 8.4 + 11.39 + 10.88 = 60.59 kips

60.59kips/1200=50.49 psf for a CaseD One Story House

Weight per square foot=-50 pounds

Case 3 Weight for 30 ft x 40 ft Two Story House (2,400 Sq. Ft.)

Assume SD soil with $C_a = 0.44$; $N_a = 1.3$; $I = 1.00$; and $R = 5.5$; Conversion to ASD force level:
1 / 1.4 Seismic V = 0.186 W

Dead loads (W) tributary to cripple wall level for 30 x 40 two story = 2,400 square feet:

Roof/Ceiling: 20 psf (34' x 44') = 29.92 kips

Second Floor: 9 psf (30' x 40') = 10.80 kips First floor: 7 psf (30' x 40') = 8.40 kips

Exterior Walls:

1 st & 2 nd Story walls:	8 psf (16') (30' x 2 + 40' x 2) =	17.92 kips
Gable end walls:	5 psf (5' x 30') 2 / 2 =	0.75 kips
Cripple walls:	6 psf (2') (30' x 2 + 40' x 2) =	<u>1.68 kips</u>
		20.35 kips

Interior wall: 8 psf (8') (29' x 5 + 39' x 3) = 16.768 kips

Sum W = 16.46 + 10.8 + 8.4 + 20.35 + 16.77 = 86.234 kips

86.234kips/2400=35.93psf for a Case E Two Story House

Weight per square foot=-36 pounds

Case E Weight for 30' x 40' One Story House (1,200 Sq. Ft.) P 58

Dead loads (W) tributary to cripple wall level:

Roof/Ceiling: 20 psf (34' x 44') = 29.92 kips

First floor: 7 psf (30' x 40') = 8.4 kips

Exterior Walls:

1 st Story wall:	17 psf (8') (30' x 2 + 40' x 2) =	19.040 kips
Deduct for Windows:	-7 psf (130 sq. ft.)	<-0.91 kips>
Gable end walls:	12 psf (5' x 30') 2 / 2 =	1.80 kips
Cripple walls	13.5 psf (2') (30' x 2 + 40' x 2) =	<u>3.78 kips</u>
		23.71 kips

Interior walls: 12 psf (8') (30' x 3 + 40' x 2) = 16.32 kips

Sum W = 29.92 + 8.4 + 23.71 + 16.32 = 78.35 kips

78.35 kips/1200=65.29psf for a Case D One Story House

Weight per square foot=-65 pounds

Case E-Weight for Two Story House 30 ft x 40 ft (2,400 Sq. Ft.) **P61**

Assume SD soil with Ca = 0.44; Na = 1.3; I = 1.00; and R = 5.5; Conversion to ASD force level:
1 / 1.4 Seismic V = 0.186 W

Dead loads (W) tributary to cripple wall level for 30 x 40 two story = 2,400 square feet:

Roof/Ceiling: 20 psf (34' x 44') = 29.92 kips

Second Floor: 11 psf (30' x 40') = 13.20 kips First floor: 7 psf (30' x 40') = 8.40 kips

Exterior Walls:

1 st & 2 nd Story walls:	17 psf (16') (30' x 2 + 40' x 2) =	38.08 kips
Deduct for windows:	-7 psf (240 sq. ft.) =	<-1.68> kips
Gable end walls:	12 psf (5' x 30') 2 / 2 =	1.80 kips
Cripple walls:	13.5 psf (2') (30' x 2 + 40' x 2) =	<u>3.78 kips</u>
		41.98 kips

Interior wall: 12 psf (8') (29' x 5 + 39' x 3) = 25.152 kips

Sum W = 29.92 + 13.2 + 8.4 + 41.98 + 25.15 = 118.65 kips

118.65kips/2400=49.43psf for a Case D Two Story House

Weight per square foot=-49 pounds

