RELIANCE ENGINEERING, INC.

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Engineering Calculations

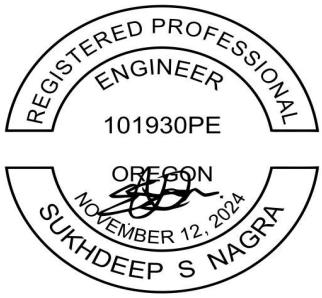
PACIFIC POLE BUILDINGS
RICHARD ATWOOD

Site Information
800 S SPRINGBROOK DR.
NEWBERG, OR 97132

SCOPE

Structural Analysis of post framed barn of risk category I

PROJECT TO COMPLY WITH THE OSSC 2018; 2018 IBC; ASCE7-16; ACI318-14; NDS 2018; SDPWS-2015 & WFCM-2018



EXPIRES: 12-31-2026

12/15/25

Reliance Engineering

DESIGN CRITERIA

PROJECT INFORMATION

Structural Analysis of post framed barn of risk category I

Construction Type: V-B

Codes : OSSC 2018; 2018 IBC ; ASCE 7-16; ACI 318-14; NDS 2018
SDPWS-2015 & WFCM-2018

SOILS DESIGN CRITERIA

Bearing Capacity : 1,500 PSF W/ 2,000 MAX USING WIND/SEISMIC

Lateral Bearing : 100 PSF/FT (INCREASE 1/3 FOR WIND OR SEISMIC LOADS)

Friction Coefficient : N//A

Sliding Resistance : 130 PSF

Soil Investigation Report : NONE

Site Soil Class: D

SEISMIC DESIGN CRITERIA

Force Resisting System(s) : Light Framed Walls with shear panels of all other materials

Analysis Procedure : EQUIVALENT LATERAL FORCE ANALYSIS

Spectral Response Coefficient, Ss = 0.850 g
Spectral Response Acceleration, S1 = 0.410 g

Spectral Response Coefficient, Sds = 0.680
Spectral Response Acceleration, Sd1 = 0.519

Design Category : D

Seismic Design Base Shear, V = 0.453 W

Response Modification Factor, R = 1.5

WIND DESIGN CRITERIA

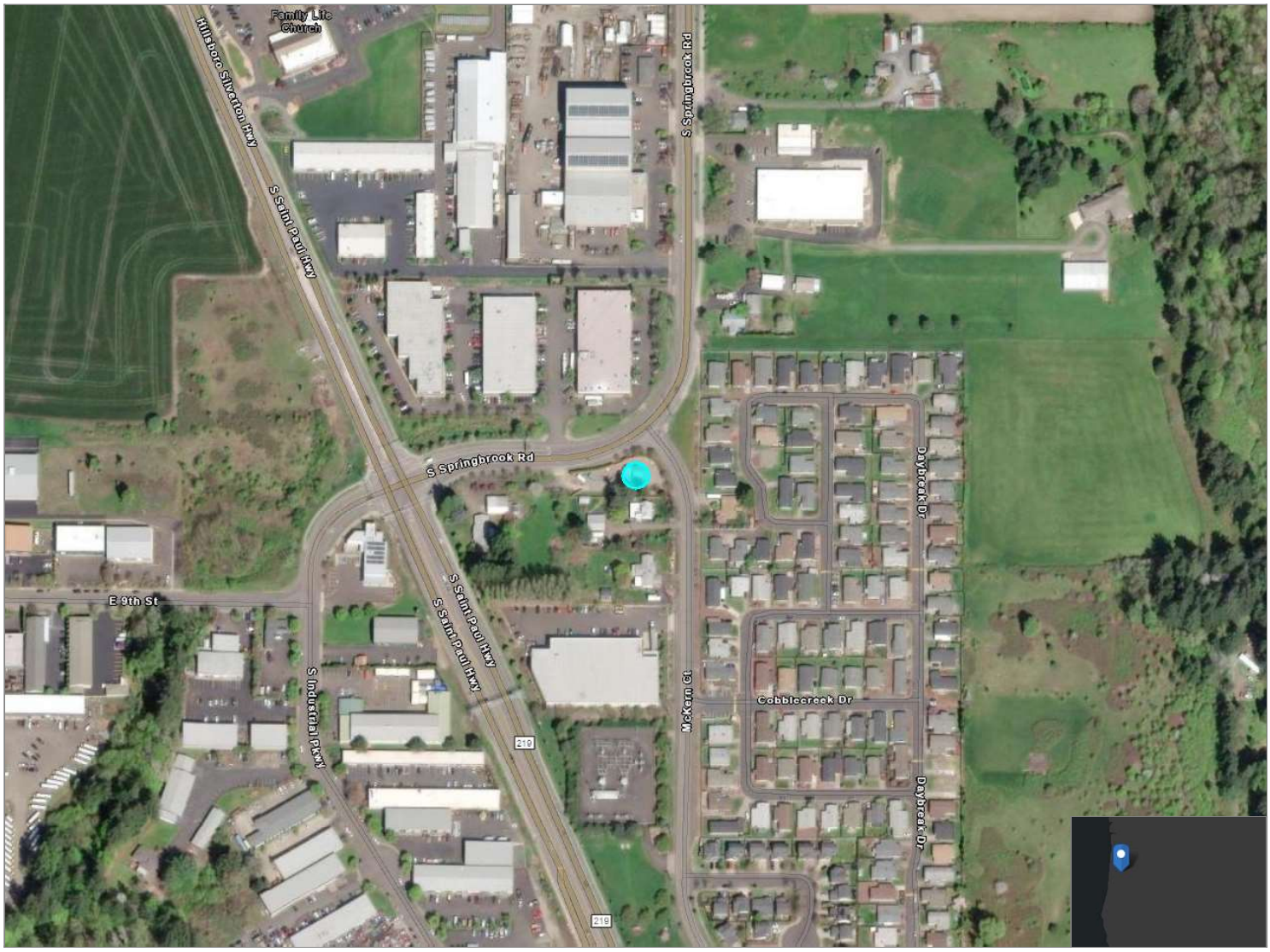
Wind Exposure : C

Basic Wind Speed (3 sec. gust) : 100 mph

Design Criteria Hub Report OSSC 2022

800 S Springbrook Rd, Newberg, Oregon, 97132
Latitude / Longitude: 45.2936 -122.9475

Area of Interest



Site-Specific Climatic and Geographic Design Criteria

Risk Category	II
Site Soil Class	D - Default
County	Yamhill County
Adjusted Ground Snow Load	8 psf
Basic Wind Speed	97 mph
Seismic Design Category	SEE NOTE (Seismic Section)

See Section 1613.2 of the 2022 Oregon Structural Specialty Code for more information.

Design Criteria Hub Report OSSC 2022

Seismic

800 S Springbrook Rd, Newberg, Oregon, 97132
Latitude: 45.29361, Longitude: -122.94747

Seismic Design Category SEE NOTE

NOTE: Spectrum data is not available. A site-specific ground motion analysis may be required. See ASCE 7-16 Supplement 3 Section 11.4.8. User is responsible for seismic design category determination in accordance with ASCE 7-16 Section 11.6.

Type	Value	Description
S_S	0.85	Mapped spectral accelerations for short periods (0.2 s) (Risk-Targeted Maximum Considered Earthquake (MCE_R) spectral response acceleration)
S_1	0.41	Mapped spectral accelerations for a 1-second period (Risk-Targeted Maximum Considered Earthquake (MCE_R) spectral response acceleration)
F_a	1.2	Site amplification factor (0.2 s)
F_v	N/A	Site amplification factor (1.0 s)
S_{MS}	1.02	Maximum considered earthquake spectral response acceleration for short periods (0.2 s)
S_{M1}	N/A	Maximum considered earthquake spectral response acceleration for 1-second period
S_{DS}	0.68	Five-percent damped design spectral response acceleration at short periods (0.2 s)
S_{D1}	N/A	Five-percent damped design spectral response acceleration at a 1-second period
T_L	16	Transition period to constant displacement region in horizontal elastic design spectrum
PGA	0.391	MCE_G peak ground acceleration
I_e	1.00	Seismic importance factor

Query Date	Sunday, November 23, 2025 at 8:40 PM
Design Code Reference Document	ASCE 7-16
Risk Category	II
Site Class	D - Default

See Section 1613.2 of the 2022 Oregon Structural Specialty Code for more information.

Snow

800 S Springbrook Rd, Newberg, Oregon, 97132
Latitude: 45.29361, Longitude: -122.94747

Adjusted Ground Snow Load: 8 psf

The reported ground snow load has been fully adjusted in accordance with Section 1608.2.2 of the 2022 OSSC utilizing Level 3 and 4 Ecoregion maps of Oregon.

Ground Snow Load Adjustment

Ground Snow Load Adjustment Region	Willamette Valley
Ground Snow Adjustment Load (psf per foot of elevation gain)	0.04
Ground Snow Load (psf)	7
PRISM Modeled Elevation (ft)	154
Site Elevation (USGS 3DEP Elevation Service)	172.5 ft

See Section 1608.2.2 of the 2022 Oregon Structural Specialty Code for more information.

Wind

800 S Springbrook Rd, Newberg, Oregon, 97132
Latitude: 45.29361, Longitude: -122.94747

Basic Design Wind Speed: 97 mph

Layer	Within
County	Yamhill County
Basic Design Wind Speed Risk Category II	97
Within Special Wind Region	No

See Section 1609.3 of the 2022 Oregon Structural Specialty Code for more information.

DESIGN DEAD AND LIVE LOADS

NOTE: SOME LOADS MAY NOT BE APPLICABLE

ROOF LOADS:

Galvanized Roofing	=	3.5	PSF
ROOF FRAMING	=	4.1	PSF
SHEATHING	=	0.0	PSF
GYPSUM BOAD	=	0.0	PSF
SOLAR	=	0.0	PSF
	=		PSF
SUB-TOTAL	=	7.6	PSF
SLOPE CORRECTION "X:12" 4.0		1.05	PSF
MISCELLANEOUS	=	0.0	PSF
ROOF DEAD LOAD	=	8.0	PSF
MIN. ROOF LIVE LOAD	=	20.0	PSF
ROOF SNOW LOAD	=	10.0	PSF
TOTAL ROOF LOAD	=	**28.0**	PSF

TYPICAL FLOOR LOADS:

FLOOR COVERING	=	8.0	PSF
SHEATHING	=	2.3	PSF
FRAMING	=	3.2	PSF
INSULATION	=	1.5	PSF
CEILING	=	3.1	PSF
MISCELLANEOUS	=	1.9	PSF
FLOOR DEAD LOAD	**=**	20.0	PSF
FLOOR LIVE LOAD	**=**	40.0	PSF
TOTAL FLOOR LOAD	=	**60.0**	PSF

SNOW LOAD SUMMARY: SEE WORKSHEET FOR DETAILS

GROUND SNOW LOAD	=	10	PSF
ROOF SNOW LOAD	=	10	PSF
ADDITIONAL SNOW LOAD ADDED TO SEISMIC	=	0	PSF

EXTERIOR WALL LOADS:

Wood Panel Siding	=	1.3	PSF
2X STUDS AT 16" OC	=	0.9	PSF
SHEATHING	=	1.5	PSF
INSULATION	=	1.0	PSF
GYPSUM BD.	=	2.2	PSF
MISCELLANEOUS	=	0.9	PSF
TOTAL EXTERIOR WALL	**=**	**7.8**	PSF

INTERIOR WALL LOADS:

GYPSUM BD. (BOTH SIDES)	=	4.4	PSF
2x STUDS AT 16" O.C.	=	1.5	PSF
MISCELLANEOUS	=	2.1	PSF
OTHER	=	0.0	PSF
TOTAL INTERIOR WALL	**=**	**8.0**	PSF

DECK OR BALCONY LOADS:

DECK/BALCONY DEAD LOAD	**=**	10.0	PSF
DECK/BALCONY LIVE LOAD	**=**	60.0	PSF
DECK/BALCONY SNOW LOAD	**=**	10	
TOTAL DECK/BALCONY LOAD	=	**70.0**	PSF

ASD LOAD COMBINATIONS CBC 1604

BASIC COMBOS PER 1605.3.1

D+L	D=DEAD
D+(Lr OR S OR R)	L=LIVE
D+(0.75L+0.75(Lr OR s OR R)	Lr=ROOF LIVE
D+(0.6W OR 0.7E)	S=SNOW
D+0.75(.6W)+.075L+0.75(LR or S OR S)	W=WIND
D+.75(0.7E)+0.75L+0.75S	E=EARTHQUAKE
0.6D+0.6W	NOTE: FLOOD AND EARTH LOADS
0.6D+0.7E	CONSIDERED WHEN APPLIC

LIVE LOAD REDUCTIONS AND SNOW LOADS

1607.13.2.1 MINIMUM ROOF LIVE LOAD

Tributary area A_t = 600.0 SQ.FT

R_1 = 0.60 Eq. 16-29

= 0.60

Rise per feet, F = 4 :12

R_2 = 1.00 Eq. 16-31

= 1.00

$L_r = 20R_1R_2$ Eq. 16-24

= 20(0.6)(1)

Min Design Roof Load L_r = 12.00 psf

1607.110 REDUCTION OF LIVE LOAD

1607.11.1 General

$L = L_o[0.25+15/(K_{LL}A_T)]^{1/2}$ (16-23)

L_o = 40 psf T-1607.1

K_{LL} = 2 Interior beams T-1607.10.1

A_T = 500.0 SQ.FT

L = 29.0 psf = 0.72 L_o

L shall not be less than 0.50 L_o for members supporting one floor and L shall not be less than 0.40 L_o for

1607.10 Alternate Live Load reduction for Horizontal member

L_o = 40 psf

R = r(A-150) (16-24)

A = 500.0 SQ.FT

r = 0.08 for floor

R = 28 40% Max for horizontal member

L = 28.8 psf M

And R = 23.1(1+D/L_o) (16-25)

Dead load D = 20.0 psf

R = 34.7 40% Max for horizontal member

L = 26.1 psf

Min Design Live Load L = 28.8 psf

ASCE 7.3 FLAT ROOF SNOW LOAD (slope ≤ 5°)

Flat-roof snow load, $p_f = 0.7C_eC_tI_sp_g$ (7-1)

Ground snow load, p_g = 10 psf Figure 7.2-1

Terrain Category = B (see Section 6.5.6)

Exposure of Roof = Partially Exposed

Thermal Condition = All structures except as indicated below

Snow load importance factor, I_s = 1 Table 7-4

Snow exposure factor, C_e = 1.0 Table 7.3-1

Thermal factor, C_t = 1.0 Table 7.3-2

Flat-roof snow load, p_f = 7 psf

Min p_f = 10 psf 7.3

Design p_f = 10.00 psf

N/A

7.4 SLOPE ROOF SNOW LOAD (slope > 5°)

$p_s = C_sp_f$ (7.4-1)

Design p_f = 10.00 psf

Slope Θ = 18.43 ° All Other Surfaces

C_t = 1.0

Slope factor C_s = 1.00 7.4.1, 7.4.2, 7.4.3 Figure 7.2a,b and c

p_s = 10.00 psf

Balanced and Unbalanced Snow Load for Hip and Gable Roof

Snow Density γ = .13p_g + 14 ≤ 30 pcf (7.7-1)

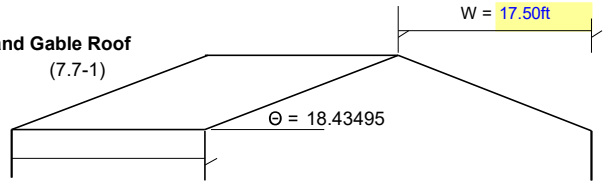
= 15.30 pcf

S =1/tanΘ = 3.00

Height of Snow Drift h_d = 1 ft

$h_d\gamma/S^{½}$ = 8.83 psf

$^{8}/_{3}h_dS^{½}$ = 4.62 ft



See Figure 7.4-2 for Curved Roof **BALANCED**

See Figure 7.5.1 for Cont Beam

See Figure 7.6-3 for Sawtooth Roof

See Figure 7.6-2 For Hips and Gables **UNBALANCED W ≤ 20**

See Figure 7.13-1 Open-Frame Structures

UNBALANCED OTHER

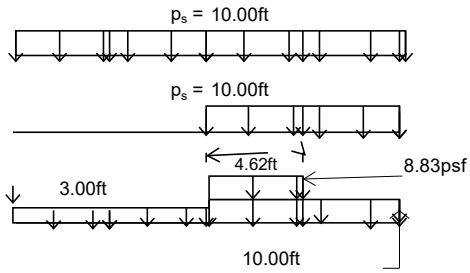


Figure 7-5

SEISMIC DESIGN CRITERIA

Response Spectral Acc. (0.2 sec) Ss =	85.00%g	= 0.850g	CBC 1613.2.3
Response Spectral Acc.(1.0 sec) S_1 =	41.00%g	= 0.410g	CBC 1613.2.4
Soil Site Class	D	CBC 1613.2.2	
Site Coefficient F_a =	1.2		Table 1613.2.3(1)
Site Coefficient F_v =	1.9		Table 1613.2.3(2)
Max Considered Earthquake Acc. S_{MS} =	$F_a.S_s$	= 1.020	EQ 16-36
Max Considered Earthquake Acc. S_{M1} =	$F_v.S_1$	= 0.779	EQ 16-37
@ 5% Damped Design S_{DS} =	$2/3(S_{MS})$	= 0.680	EQ 16-38
S_{D1} =	$2/3(S_{M1})$	= 0.519	EQ 16-39
Building Occupancy Categories	II, Standard		Table 1604.5
Design Category Consideration:	Flexible Diaphragm		with dist. between seismic resisting system >40ft
Seismic Design Category for 0.2sec	D		Table 1613.2.5(1)
Seismic Design Category for 1.0sec	D		Table 1613.2.5(2)
S1 < .75g	NA		Section 11.6
Since Ta < .8Ts (see below), SDC =	D	Control (exception of Section 11.6 does not apply)	

Comply with Seismic Design Category D

12.8 Equivalent lateral force procedure

G. CANTILEVERED COLUMN SYSTEMS DETAILED TO CONFORM TO THE REQUIREMENTS FOR:

Seismic Force Resisting Systems — 7. Timber frames

C_t =	0.02	x = 0.75		T-12.8-2	
Building ht. H_n =	29.5	ft	Limited Building Height (ft) =	35	
C_u =	1.400	for S_{D1} of 0.519g	Table 12.8-1		
Approx Fundamental period, T_a =	$C_t(h_n)^x$	= 0.253	12.8-7	T_L =	16.0 Sec
Calculated T shall not exceed ≤	Cu.Ta	= 0.354		Use T =	0.354 sec.
0.8Ts =	$0.8(S_{D1}/S_{DS})$	= 0.632	Control (exception of Section 11.6 does not apply)		
Is structure Regular & ≤ 5 stories ?	Yes		12.8.1.3		
Response Spectral Acc.(0.2 sec) S_s =	0.850g		*Max Ss ≤ 1.5g*		
F_a =	1.16				
@ 5% Damped Design S_{DS} =	$\frac{2}{3}(F_a.S_s)$	= 0.657g	(11.4-3)		
Response Modification Coef. R =	1.5		Table-12.2-1		
Over Strength Factor Ω_o =	2		foot note g		
Importance factor I =	1		Table 11.5-1		
Seismic Base Shear V =	$C_s W$				
C_s =	$\frac{S_{DS}}{R/I}$	=0.453			(12.8-2)
or need not to exceed, C_s =	$\frac{S_{D1}}{(R/I).T}$	= 0.977	For T≤ T_L		(12.8-3)
or C_s =	$\frac{S_{D1}T_L}{T^2(R/I)}$	N/A	For T > T_L		(12.8-4)
C_s shall not be less than =	0.01				(12.8-5)
Min C_s =	$0.5S_1I/R$	N/A	For S_1 ≥ 0.6g		(12.8-6)
Use C_s =	0.453				
Design base shear V =	**0.453 W**	**Control**			

SEISMIC FORCE DISTRIBUTION

Block Description	STRUCTURAL AREA NUMBER BLOCK 1 OF 1

Stories = 1

Story Dead Load Calculator

	Plate Height Ft.	Area 1 s.f.		Load Type	Area 2 s.f.		Load Type		W lb.	A_{Total} s.f.
$H_{roof - h (ft)}$	16	Ft. 2700	Sq. Ft.	Roof Load		Sq. Ft.	None	=	62,130	2700
		0		None	0		None		0	0
		0		None			None		0	0

Note: Dead loads assume the weight of partitions (exterior and interior) of 5-psf at top level and 10-psf at floor level

	Vertical Distribution of Forces							Diaphragm Force Distribution			
	W_x Lb.	h_x Ft.	w_xh_x (Ft-Lb.)	$\%w_xh_x$	F_x (N/S) Lb.	F_x (E/W) Lb.		F_p (N/S) Lb.	f_p (N/S) psf	F_p (E/W) Lb.	f_p (E/W) psf
Hroof - h (ft)	62,130	16	994,079.67	100%	28,166	28,166	Lb.	28166	10.4	28166	10.4
	0	0	0.00	0%	0	0	Lb.	0	0.0	0	0.0
	0	0	0.00	0%	0	0	Lb.	0	0.0	0	0.0
SUM	62,130		9.94E+05		28,166	28166	Lb.				

STRUCTURAL AREA NUMBER BLOCK 1 OF 1

Basic wind speed (3 sec gust) = 100 MPH Risk Category= 1

Exposure C

Roof Pitch = 4.00 :12

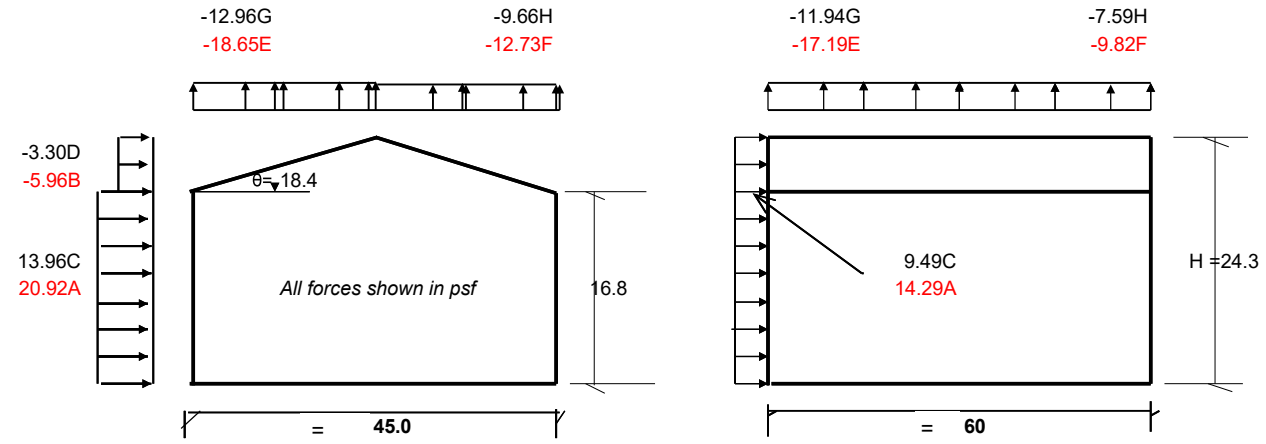
Mean Roof Height h = 20.5 ft

Wind Importance Factor I_w= 1.00 T-1.5-2

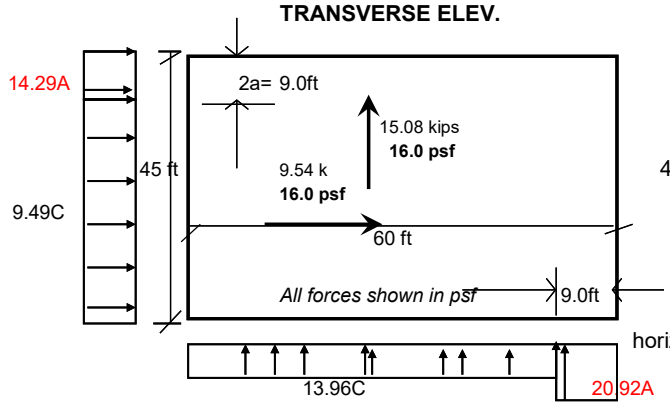
Buildings and other structures that represent low risk to human life in the event of failure

ASCE 7-16 CHAPTER 28 LOW RISE SIMPLE DIAPHRAGM

Height Adjustment factor λ = 0.90 Fig 28.6-1



TRANSVERSE ELEV. **LONGITUDINAL ELEV.**



PLAN VIEW

10 % of least dimension=	4.5 ft
40 % of the eave height =	6.7 ft
4 % of least dimension or 3 ft=	3.0 ft
therefore a =	4.5 ft
Example: $p_s = \lambda K_{zt} I p_{s30}$	
K_{zt} =	1.09
horizontal load at end zone p_{s30} =	15.8
Height Adjustment factor λ =	0.90 X
	14.29psf

Main Wind Force System

MWFRS

Load Direction	Roof Angle	Horizontal Loads				Vertical Loads					
		End Zone		Interior zone		End Zone		Interior zone		Overhang	
		Wall (A)	Roof (B)	Wall (C)	Roof (D)	WW (E)	LW (F)	WW (G)	LW (H)	E_{OH}	G_{OH}
Transverse	18.4	20.9	-6.0	14.0	-3.3	-18.7	-12.7	-13.0	-9.7	-26.2	-20.5
Longitudinal	All	14.3	-7.5	9.5	-4.5	-17.2	-9.8	-11.9	-7.6	-24.1	-18.9

* If roof pressure under horizontal loads is less than zero, use zero

Plus and minus signs signify pressures acting toward and away from projected surfaces, respectively.

For the design of the longitudinal MWFRS use Θ = 0°, and locate the zone E/F, G/H boundary at the mid-length of the building

FIGURE 6-3, COMPONENT AND CLADDING

Roof effective area = 15 sq. ft, θ= 18.4

Interior Zone 1 = 12.40 -16.47 psf

End Zone 2 = 12.40 -24.08 psf

Conner Zone 3 = 12.40 -31.63 psf

Roof Overhang effective area = 6 sq. ft

Interior Zone 2 = -31.65 psf

End Zone 3 = -44.46 psf

Effective Area for wall element = 20 Sq. ft

Wall, Interior Zone 4 = 16.84 -18.29 psf

End Zone 5 = 16.84 -22.05 psf

ROOF LEVEL DIAPHRAGM LOADS NORTH-SOUTH
STRUCTURAL AREA NUMBER BLOCK 1 OF 1

Mean Roof Height = 20.5 ft

Longitudinal Direction	1 to 2	2 to 3	3 to 4	4 to 5	5 to 6	6 to 7	7 to 8			
Shearwall Spacing (ft)	45.0									Total Length 45.0
Building Geometry										
Full Diaphragm Depth (ft)	60.0									
Net Diaphragm Depth (ft)	60.0									
Story Height (plate to plate) (ft)	16.0									
Diaphragm Shear f_p (psf) (SEIS)	10.43									Total Area 2700.0
Diaphragm Area **A** (sf)	2700.0									
Distance to Center of Uniform Load from origin (ft)	23									
Diaphragm Aspect Ratio	0.75									
Seismic Lateral Load - v_{rf} (plf)	235									
Wind Data										
Height from top plate to roof peak (ft)	9									
Height from Fndt to roof plate (ft)	16									
Wind / Seismic Comparison										
Wind Unit Shear (plf) (ASD)	102									
Seismic Unit Shear (plf) (ASD)	164									
Governing Force (plf) (ASD)	164									
Governing Force	Seismic									

ROOF LEVEL DIAPHRAGM LOADS EAST-WEST STRUCTURAL AREA NUMBER BLOCK 1 OF 1										
Transverse Direction	**A to B**	**B to C**	**C to D**	**D to E**	**E to F**	**F to G**				
										Total Length
Shearwall Spacing (ft)	**10.00**	**10.00**	**10.00**	**10.00**	**10.00**	**10.00**				**60.0**
Building Geometry										
Full Diaphragm Depth (ft)	**45.0**	**45.0**	**45.0**	**45.0**	**45.0**	**45.0**				
Net Diaphragm Depth (ft)	**45.0**	**45.0**	**45.0**	**45.0**	**45.0**	**45.0**				
Story Height (plate to plate) (ft)	**16.0**	**16.0**	**16.0**	**16.0**	**16.0**	**12.0**				
Diaphragm Shear f_p (psf)	**10.4**	**10.4**	**10.4**	**10.4**	**10.4**	**10.4**				**Total Area**
Diaphragm Area **A** (sf)	**450.0**	**450.0**	**450.0**	**450.0**	**450.0**	**450.0**				**2700.0**
Distance to Center of Uniform Load from origin (ft)	**5**	**10**	**25**	**35**	**45**	**55**				
Diaphragm Aspect Ratio	**0.22**	**0.22**	**0.22**	**0.22**	**0.22**	**0.22**				
Uniform Lateral Load - v_{rf} (plf)	**52**	**52**	**52**	**52**	**52**	**52**				
Wind Data										
Height from top plate to roof peak (ft)	**9**	**9**	**9**	**9**	**9**	**8**				
Height from Fndt to roof plate (ft)	**16**	**16**	**16**	**16**	**16**	**16**				
Wind / Seismic Comparison										
Wind Pressure (plf) (ASD)	**30**	**30**	**30**	**18**	**18**	**15**				
Seismic Force (plf) (ASD)	**37**	**37**	**37**	**37**	**37**	**37**				
Governing Force (plf)	**37**	**37**	**37**	**37**	**37**	**37**				
Governing Force	**Seismic**	**Seismic**	**Seismic**	**Seismic**	**Seismic**	**Seismic**				

SUMMARY

- LATERAL LOAD APPLIED PER POST (LINES 1, 2) - FOOTING A:
164 * 10 = 1640 LBS

- LATERAL LOAD APPLIED PER POST (LINES 1, 2) - FOOTING D:
164 * 5 = 820 LBS

SEE PIER CALCS

RELIANCE ENGINEERING
530-415-6468

SUPPLEMENTAL STRUCTURAL CALCULATIONS

PURLIN CALCS

RELIANCE ENGINEERING
530-415-6468

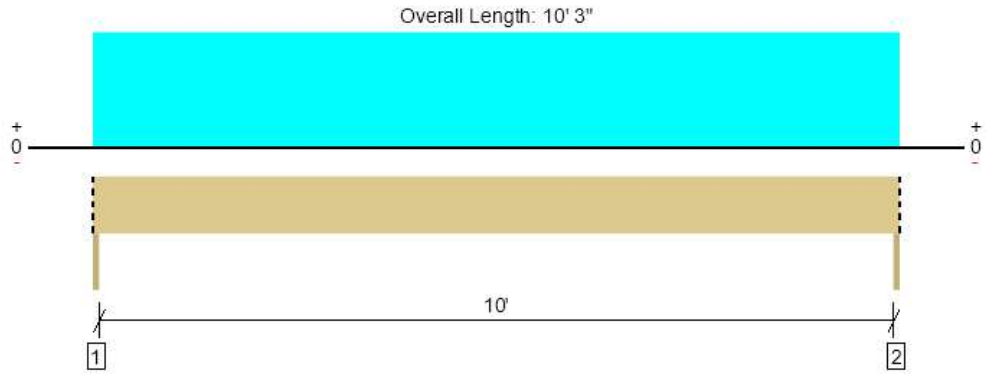
FORTEWEB

MEMBER REPORT

PASSED

Level, PURLINS - 10'

1 piece(s) 2 x 6 DF No.2 @ 24" OC



Drawing is Conceptual. All locations are measured from the outside face of left support (or left cantilever end). All dimensions are horizontal (typ.).

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	308 @ 1/2"	1406 (1.50")	Passed (22%)	--	1.0 D + 1.0 Lr (All Spans)
Shear (lbs)	273 @ 7"	1238	Passed (22%)	1.25	1.0 D + 1.0 Lr (All Spans)
Moment (Ft-lbs)	775 @ 5' 1 1/2"	1060	Passed (73%)	1.25	1.0 D + 1.0 Lr (All Spans)
Live Load Defl. (in)	0.289 @ 5' 1 1/2"	0.508	Passed (L/422)	--	1.0 D + 1.0 Lr (All Spans)
Total Load Defl. (in)	0.433 @ 5' 1 1/2"	0.678	Passed (L/281)	--	1.0 D + 1.0 Lr (All Spans)

Member Length : 10' 3"
System : Roof
Member Type : Joist
Building Use : Residential
Building Code : IBC 2021
Design Methodology : ASD
Member Pitch : 0/12

- Deflection criteria: LL (L/240) and TL (L/180).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- A 15% increase in the moment capacity has been added to account for repetitive member usage.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Roof Live	Snow	Factored	
1 - Beam - DF	1.50"	1.50"	1.50"	103	205	103	308	Blocking
2 - Beam - DF	1.50"	1.50"	1.50"	103	205	103	308	Blocking

• Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	9' 3" o/c	
Bottom Edge (Lu)	10' 3" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Load	Location (Side)	Spacing	Dead (0.90)	Roof Live (1.25)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 10' 3"	24"	10.0	20.0	10.0	Default Load

Weyerhaeuser Notes

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The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
SUKH NAGRA SUKH NAGRA (530) 415-6468 sukhsn@yahoo.com	

Weyerhaeuser

12/15/2025 5:20:06 PM UTC
ForteWEB v3.9, Engine: V8.4.3.94, Data: V8.1.7.3
File Name: 800 S SPRINGBROOK RD

RELIANCE ENGINEERING
530-415-6468

SUPPLEMENTAL STRUCTURAL CALCULATIONS

COLUMN CALCS

RELIANCE ENGINEERING
530-415-6468

WoodWorks® SOFTWARE FOR WOOD DESIGN	COMPANY	PROJECT
	Dec. 15, 2025 09:59	Column1

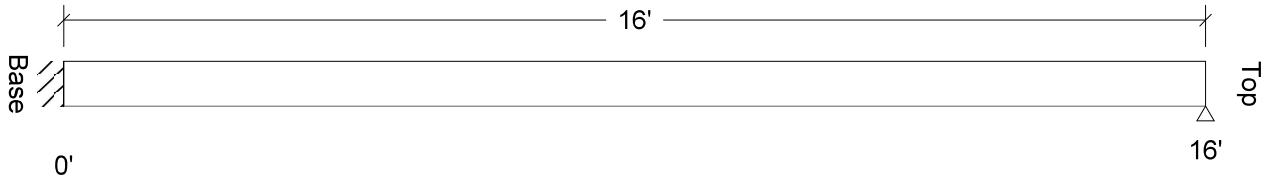
Design Check Calculation Sheet

WoodWorks Sizer 13.2.1

Loads:

Load	Type	Distribution	Location [ft] Start	End	Magnitude Start	End	Unit
Load1	Roof live	Axial	(Ecc. = 1.25")		4800		lbs
Load2	Dead	Axial	(Ecc. = 1.25")		2400		lbs
Load3	Earthquake	Point	16.00		1640		lbs
Self-weight	Dead	Axial			136		lbs

Reactions (lbs):



Unfactored:			
Lateral:			
Dead	23		-23
Roof Live	47		-47
Earthquake			1640
Axial:			
Dead	2536		2536
Roof Live	4800		4800
Factored:			
R->L			-70
Load comb			#2
L->R	70		1134
Load comb	#2		#4

Timber-soft, Hem-Fir, No.2, 6x8 (5-1/2"x7-1/2")

Support: Non-wood

Total length: 16.0'; Volume = 4.6 cu.ft.; Post or timber

Fixed base; Load face = width(b); Ke x Lb: 0.8 x 16.0 = 12.8 ft; Ke x Ld: 0.8 x 16.0 = 12.8 ft;

This section PASSES the design code check.

Analysis vs. Allowable Stress and Deflection using NDS 2024 :

Criterion	Analysis Value	Design Value	Unit	Analysis/Design
Shear	fv = 3	Fv' = 140	psi	fv/Fv' = 0.02
Bending(+)	fb = 175	Fb' = 575	psi	fb/Fb' = 0.30
Bending(-)	fb = 87	Fb' = 575	psi	fb/Fb' = 0.15
Axial	fc = 178	Fc' = 331	psi	fc/Fc' = 0.54
Combined	(axial + eccentric moment)			Eq.15.4-3 = 0.70
Axial Bearing	fc = 178	Fc* = 575	psi	fc/Fc* = 0.31
Live Defl'n	0.04 = < L/999	1.60 = L/120	in	0.02
Total Defl'n	0.07 = < L/999	1.60 = L/120	in	0.04

Additional Data:

FACTORS:	F/E(psi)	CD	CM	Ct	CL/CP	CF	Cfu	Cr	Cfrt	Ci	LC#
Fv'	140	1.00	1.00	1.00	-	-	-	-	1.00	1.00	2
Fb'+	575	1.00	1.00	1.00	1.000	1.000	-	1.00	1.00	1.00	2
Fb'-	575	1.00	1.00	1.00	1.000	1.000	-	1.00	1.00	1.00	2
Fc'	575	1.00	1.00	1.00	0.576	1.000	-	-	1.00	1.00	2
E'	1.1 million	1.00	1.00	-	-	-	-	-	1.00	1.00	2
Emin'	0.40 million	1.00	1.00	-	-	-	-	-	1.00	1.00	2
Eminy'	0.40 million	1.00	1.00	-	-	-	-	-	1.00	1.00	2
Fc*	575	1.00	1.00	1.00	-	1.000	-	-	1.00	1.00	2

CRITICAL LOAD COMBINATIONS:

```
Shear     : LC #2  = D + Lr
Bending(+): LC #2  = D + Lr
Bending(-): LC #2  = D + Lr
Deflection: LC #2  = D + Lr  (live)
            LC #2  = D + Lr  (total)
Axial     : LC #2  = D + Lr
Combined  : LC #2  = D + Lr
Load Types: D=dead Lr=roof live E=earthquake
Load combinations: ASD Basic from ASCE 7-22 2.4; all LC's listed in the Analysis report
```

CALCULATIONS:

```
V = 70 lbs
M(+) = 750 lbs-ft; M(-) = 375 lbs-ft; P = 7336 lbs
EI = 212.69e06 lb-in^2
Combined: Fb' = 575 psi; fb = 0 psi; fbe = (P x e)/S = fc(6e/d) = 175 psi;
FcE = 784 psi
"Live" deflection is due to all non-dead loads (live, wind, snow…)
Total deflection = 1.50 permanent + "live"
Axial b used, le/b = 27.9, le/d = 20.5
```

Design Notes:

1. Analysis and design are in accordance with the ICC International Building Code (IBC 2024) and the National Design Specification (NDS 2024), using Allowable Stress Design (ASD). Design values are from the NDS Supplement.
2. Please verify that the default deflection limits are appropriate for your application.
3. Axial load eccentricity applied in direction of load face only. It is the designers responsibility to check for effect of eccentricity in the other direction.

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SUPPLEMENTAL STRUCTURAL CALCULATIONS

FOOTING/PIER CALCS

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Tekla Tedds	Project				Job Ref.	
	Section				Sheet no./rev. 1	
	Calc. by S	Date 12/15/2025	Chk'd by	Date	App'd by	Date

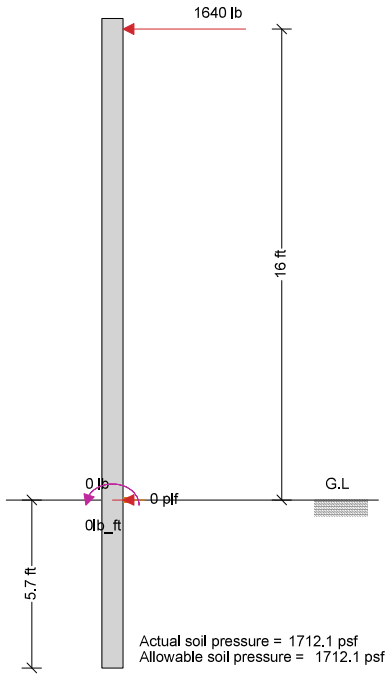
FOOTING A

In accordance with IBC 2018

Tedds calculation version 1.2.04

Design summary

Embedment depth required is 5.71 ft



Soil capacity data

Allowable passive pressure	L_{sbc} = **150** pcf
Maximum allowable passive pressure	P_{max} = **1820** psf
Load factor 1 (1806.1)	LDF_1 = **1.00**
Load factor 2 (1806.3.4)	LDF_2 = **2.0**

Pole geometry

Shape of the pole	**Round**
Diameter of the pole	Dia = **24** in
Laterally restrained	**Yes**

Load data

First point load	P_1 = **1640** lbs
Distance of P_1 from ground surface	H_1 = **16** ft
Second point load	P_2 = **0** lbs
Distance of P_2 from ground surface	H_2 = **0** ft
Uniformly distributed load	W = **0** plf
Start distance of W from ground surface	a = **0** ft
End distance of W from ground surface	a_1 = **0** ft
Applied moment	M_1 = **0** lb_ft
Distance of M_1 from ground surface	H_3 = **0** ft

Shear force and bending moment

Total shear force	$F = P_1 + P_2 + W \times (a_1 - a) =$ **1640** lbs
Total bending moment at grade	$M_g = P_1 \times H_1 + P_2 \times H_2 + W \times (a_1 - a) \times (a + a_1) / 2 + M_1 =$ **26240** lb_ft
Distance of resultant lateral force	$h = abs(M_g / F) =$ **16** ft

Embedment depth (1807.3.2.2)

Embedment depth provided	$D =$ **5.71** ft
Allowable lateral passive pressure	$S_3 = min(P_{max}, L_{sbc} \times min(D, 12\ ft)) \times LDF_1 \times LDF_2 =$ **1712.1** psf
Embedment depth required	$D_1 = ((4.25 \times abs(F) \times h) / (S_3 \times Dia))^{0.5} =$ **5.71** ft
Actual lateral passive pressure	$S_4 = (4.25 \times abs(F) \times h) / (D^2 \times Dia) =$ **1712.1** psf

Tekla Tedds	Project				Job Ref.	
	Section				Sheet no./rev. 1	
	Calc. by S	Date 12/15/2025	Chk'd by	Date	App'd by	Date

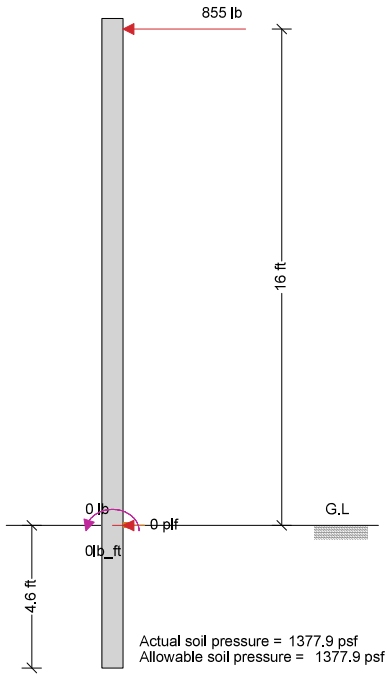
FOOTING D

In accordance with IBC 2018

Tedds calculation version 1.2.04

Design summary

Embedment depth required is 4.59 ft



Soil capacity data

Allowable passive pressure	L_{sbc} = **150** pcf
Maximum allowable passive pressure	P_{max} = **1820** psf
Load factor 1 (1806.1)	LDF_1 = **1.00**
Load factor 2 (1806.3.4)	LDF_2 = **2.0**

Pole geometry

Shape of the pole	**Round**
Diameter of the pole	Dia = **24** in
Laterally restrained	**Yes**

Load data

First point load	P_1 = **855** lbs
Distance of P_1 from ground surface	H_1 = **16** ft
Second point load	P_2 = **0** lbs
Distance of P_2 from ground surface	H_2 = **0** ft
Uniformly distributed load	W = **0** plf
Start distance of W from ground surface	a = **0** ft
End distance of W from ground surface	a_1 = **0** ft
Applied moment	M_1 = **0** lb_ft
Distance of M_1 from ground surface	H_3 = **0** ft

Shear force and bending moment

Total shear force	$F = P_1 + P_2 + W \times (a_1 - a) =$ **855** lbs
Total bending moment at grade	$M_g = P_1 \times H_1 + P_2 \times H_2 + W \times (a_1 - a) \times (a + a_1) / 2 + M_1 =$ **13680** lb_ft
Distance of resultant lateral force	$h = abs(M_g / F) =$ **16** ft

Embedment depth (1807.3.2.2)

Embedment depth provided	$D =$ **4.59** ft
Allowable lateral passive pressure	$S_3 = min(P_{max}, L_{sbc} \times min(D, 12\ ft)) \times LDF_1 \times LDF_2 =$ **1377.9** psf
Embedment depth required	$D_1 = ((4.25 \times abs(F) \times h) / (S_3 \times Dia))^{0.5} =$ **4.59** ft
Actual lateral passive pressure	$S_4 = (4.25 \times abs(F) \times h) / (D^2 \times Dia) =$ **1377.9** psf

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SUPPLEMENTAL STRUCTURAL CALCULATIONS

CONNECTION CALCS

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CONNECTION CALCS

TOTAL LOAD PER POST:

DEAD LOAD: 8PSF

LIVE LOAD: 20 PSF

ROOF SNOW LOAD: 8 PSF

TRIBUTARY AREA: 10’ X 23.5’ = 235 SQ FT.

TOTAL LOAD: (8+20) * 235 = ***6580 LBS***

SEE CONNECTION CALC.

USE (4) 3/4" BOLTS

CAPACITY OF CONNECTION: 2400 * 4 = ***9600 LBS***

ConnectionCalc Results

Analysis Type:

Design Method:	Allowable Stress
Connection Loading:	Lateral
Fastener Type:	Bolt
Loading Scenario:	Double Shear

Main Member Parameters:

Main Member material category:	Solid Lumber/Timber
Type:	Douglas Fir-Larch
Main Member Thickness:	5-1/2 in
Load to Grain Angle:	0 deg

Side Member Parameters:

Side Member material category:	Solid Lumber/Timber
Type:	Douglas Fir-Larch
Side Member Thickness:	1-1/2 in
Load to Grain Angle:	0 deg

Bolt Parameters:

Bolt Diameter:	ø 3/4"
Bolt Length:	10 in

Washer Thickness:	USS ³/4" (⌀0.148)

Analysis Factors:

Load Duration (CD):	1
Wet Service (CM):	1
Temperature Factor (Ct):	1

Results

Adjusted ASD Capacity:	2400 lb.

Yield Modes:

Z' Im:	5780 lb.
Z' Is:	3150 lb.
Z' IIIs:	2400 lb.
Z' IV:	3220 lb.

Notes

Douglas Fir- Larch Main Member Dowel Bearing Strength (psi):	5,600 psi
Douglas Fir- Larch Side Member Dowel Bearing Strength (psi):	5,600 psi
Fastener Bending Yield Strength:	45,000 psi
Screw Dowel Bending Strength rounding:	nearest 50 psi
Lateral Results Rounding:	nearest 10 lb
End, edge and spacing distance:	2024 NDS, chapter 12

UPLIFT CALCS

UPLIFT PER POST: 2.2 KIPS

DEAD LOAD: 0.9 KIPS

UPLIFT LOAD APPLIED: 2.2 – 0.9 = 1.3 KIPS

TOTAL TEN (10) 30d NAILS. CAPACITY: 1.6 KIPS

CAPACITY > UPLIFT.

ConnectionCalc Results

Analysis Type:

Design Method:	Allowable Stress
Connection Loading:	Lateral
Fastener Type:	Nail/Spike

Main Member Parameters:

Main Member material category:	Solid Lumber/Timber
Type:	Hem-Fir
Main Member Thickness:	5-1/2 in
Load to Grain Angle:	0 deg

Side Member Parameters:

Side Member material category:	Solid Lumber/Timber
Type:	Hem-Fir
Side Member Thickness:	1-1/2 in
Load to Grain Angle:	0 deg

Nail/Spike Parameters:

Type:	Common Wire
Size:	_30d
Nail/Spike Material	Carbon Steel

Analysis Factors:

Load Duration (CD):	1
Wet Service (CM):	1
End Grain (Ceg):	1
Temperature Factor (Ct):	1

Results

Adjusted ASD Capacity:	160 lb.

Yield Modes:

Z' Im:	790 lb.
Z' Is:	420 lb.
Z' II:	270 lb.
Z' IIIm:	280 lb.
Z' IIIs:	170 lb.
Z' IV:	160 lb.

Notes

Hem- Fir Main Member Dowel Bearing Strength (psi):	3,500 psi
Hem- Fir Side Member Dowel Bearing Strength (psi):	3,500 psi
Fastener Bending Yield Strength:	80,000 psi
Over-driven nails:	results do not apply
Tip length:	2x diameter
Screw Dowel Bending Strength rounding:	nearest 50 psi
Lateral Results Rounding:	nearest 10 lb
Toe-nails in wood members:	results do not apply

Disclaimer:

While every effort has been made to insure the accuracy of the information presented, and special effort has been made to assure that the information reflects the state-of-the-art, neither the American Wood Council nor its members assume any responsibility for any particular design prepared from this Connection Calculator. Those using this Connection Calculator assume all liability from its use.

Analysis Parameters