

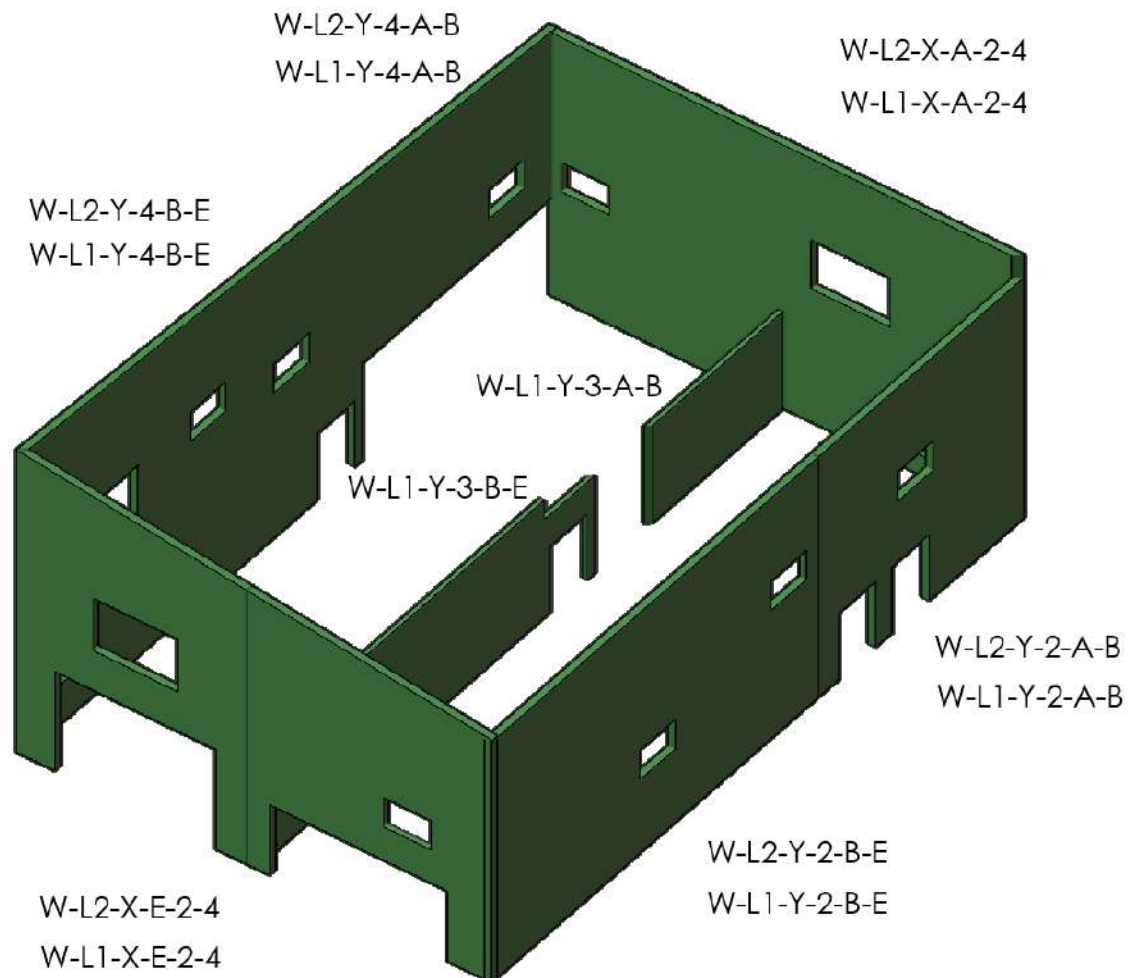
Wall Framing Design - Mezzanine

First Storey Walls:

- Wall Framing Design: W-L1-X-A-2-4
- Wall Framing Design: W-L1-X-E-2-4
- Wall Framing Design: W-L1-Y-2-A-B
- Wall Framing Design: W-L1-Y-2-B-E
- Wall Framing Design: W-L1-Y-3-A-B
- Wall Framing Design: W-L1-Y-3-B-E
- Wall Framing Design: W-L1-Y-4-A-B
- Wall Framing Design: W-L1-Y-4-B-E

Second Storey Walls:

- Wall Framing Design: W-L2-X-A-2-4
- Wall Framing Design: W-L2-X-E-2-4
- Wall Framing Design: W-L2-Y-2-A-B
- Wall Framing Design: W-L2-Y-2-B-E
- Wall Framing Design: W-L2-Y-4-A-B
- Wall Framing Design: W-L2-Y-4-B-E



Wall Framing Design: W-L1-X-A-2-4

Components

Wall - Dimensions (L x H): 30 ft x 10 ft

Window Opening - Dimensions (L x H_{top}): 3 ft x 5 ft

USE SPRUCE PINE FIR (SPF).
STUD GRADE FOR THIS
BUILDING SHOULD BE
ADEQUATE

Component	Section	Product / Species	Grade
Studs	2x6 @ 16 in O.C.	Southern Pine	Stud
Top plate	(2) 2x6	Southern Pine	No.2
Sill plate	2x6 Pressure Treated	Southern Pine	No.2
Window Opening - Posts	(1) 2x6	Southern Pine	Stud
Window Opening - Lintel	(3) 2x4	Southern Pine	No.2

Loads

I WOULD USE
20 PSF FOR
THIS AREA

I WOULD USE
80 PSF FOR
THIS AREA

Source	Dead	Live	Snow	Wind	Width
Self-weight and wind	10 psf	-	-	16.4 psf	-
Floor - Mezzanine	16.5 psf	50 psf	-	-	1.2 ft
Roof - Mezzanine	15 psf	-	23.4 psf	-	1.2 ft
Wall above	10 psf	-	-	-	16 ft

Anchor Design Results

IF YOU USE 80
PSF, THIS
LOAD CAN BE
DELETED

I WOULD SUGGEST USING A
ROOF SNOW LOAD OF 30 PSF
FOR DESIGN, THAT IS MY
PERSONAL PREFERENCE

Studs

I WOULD USE A MINIMUM OF 20 PSF,
BUT YOU MAY WANT TO USE 25 PSF
TO ACCOUNT FOR FUTURE
CONSIDERATION OF PHOTO VOTAIC
PANELS ADDED TO THE ROOF

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + L	Buckling	P: 0.41 kip , f_c : 49.7 psi	F_c : 560 psi , C_P : 0.7	0.09	✓
D + 0.75 L + 0.75 S	Buckling	P: 0.42 kip , f_c : 50.7 psi	F_c : 598 psi , C_P : 0.65	0.08	✓
D + 0.6 W	Buckling + Bending	P: 0.33 kip , f_c : 40 psi M: 0.16 kip-ft , f_b : 260.2 psi	F_c : 665.6 psi , C_P : 0.52 F_b : 1242 psi	0.22	✓
D + 0.75 L + 0.75 S + 0.45 W	Buckling + Bending	P: 0.42 kip , f_c : 50.7 psi M: 0.12 kip-ft , f_b : 195.2 psi	F_c : 665.6 psi , C_P : 0.52 F_b : 1242 psi	0.18	✓
D + 0.6 W	Shear	V: 0.066 kip , f_v : 11.9 psi	F_v : 280 psi	0.04	✓
D + 0.75 L + 0.75 S + 0.45 W	Shear	V: 0.049 kip , f_v : 8.95 psi	F_v : 280 psi	0.03	✓

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
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Combination	Check Type	Action	Limit	Ratio	Check
0.42 W	Deflection	d: 0.058 in	d_U : 0.33 in (L / 360)	0.18	✓

Top plate

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + L	Bending	M: 0.068 kip-ft , f_b : 199 psi	F_b : 1150 psi	0.17	✓
D + 0.75 L + 0.75 S	Bending	M: 0.07 kip-ft , f_b : 202.9 psi	F_b : 1322.5 psi	0.15	✓
D + L	Shear	V: 0.21 kip , f_v : 18.7 psi	F_v : 175 psi	0.11	✓
D + 0.75 L + 0.75 S	Shear	V: 0.21 kip , f_v : 19 psi	F_v : 201.2 psi	0.09	✓

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
L	Deflection	d: 0.001 in	d_U : 0.044 in (L / 360)	0.03	✓
0.75 L + 0.75 S	Deflection	d: 0.001 in	d_U : 0.044 in (L / 360)	0.03	✓
1.5 D + L	Deflection	d: 0.008 in	d_U : 0.067 in (L / 240)	0.12	✓
1.5 D + 0.75 L + 0.75 S	Deflection	d: 0.008 in	d_U : 0.067 in (L / 240)	0.12	✓

Window Opening - Posts

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + L	Buckling	P: 0.46 kip , f_c : 56 psi	F_c : 560 psi , C_p : 0.7	0.10	✓
D + 0.75 L + 0.75 S	Buckling	P: 0.47 kip , f_c : 57.1 psi	F_c : 598 psi , C_p : 0.65	0.10	✓
D + 0.6 W	Buckling + Bending	P: 0.37 kip , f_c : 45.1 psi M: 0.18 kip-ft , f_b : 292.8 psi	F_c : 665.6 psi , C_p : 0.52 F_b : 1242 psi	0.26	✓
D + 0.75 L + 0.75 S + 0.45 W	Buckling + Bending	P: 0.47 kip , f_c : 57.1 psi M: 0.14 kip-ft , f_b : 219.6 psi	F_c : 665.6 psi , C_p : 0.52 F_b : 1242 psi	0.20	✓
D + 0.6 W	Shear	V: 0.074 kip , f_v : 13.4 psi	F_v : 280 psi	0.05	✓
D + 0.75 L + 0.75 S + 0.45 W	Shear	V: 0.055 kip , f_v : 10.1 psi	F_v : 280 psi	0.04	✓

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
0.42 W	Deflection	d: 0.066 in	d_U : 0.33 in (L / 360)	0.20	✓

Window Opening - Lintel

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + L	Bending	M: 0.35 kip-ft , f_b : 452.3 psi	F_b : 1100 psi	0.41	✓
D + 0.75 L + 0.75 S	Bending	M: 0.35 kip-ft , f_b : 461.2 psi	F_b : 1265 psi	0.36	✓
D + L	Shear	V: 0.46 kip , f_v : 44 psi	F_v : 175 psi	0.25	✓
D + 0.75 L + 0.75 S	Shear	V: 0.47 kip , f_v : 44.8 psi	F_v : 201.2 psi	0.22	✓

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
L	Deflection	d: 0.006 in	d_U : 0.1 in (L / 360)	0.06	✓
0.75 L + 0.75 S	Deflection	d: 0.006 in	d_U : 0.1 in (L / 360)	0.06	✓
1.5 D + L	Deflection	d: 0.04 in	d_U : 0.15 in (L / 240)	0.27	✓
1.5 D + 0.75 L + 0.75 S	Deflection	d: 0.041 in	d_U : 0.15 in (L / 240)	0.27	✓

Wall Framing Design: W-L1-X-E-2-4

Components

Wall - Dimensions (L x H): 30 ft x 12 ft

Garage Door - Dimensions (L x H_{top}): 10.2 ft x 10.1 ft

USE SPRUCE PINE FIR (SPF).
STUD GRADE FOR THIS
BUILDING SHOULD BE
ADEQUATE

Component	Section	Product / Species	Grade
Studs	2x6 @ 16 in O.C.	Southern Pine	Stud
Top plate	(2) 2x6	Southern Pine	No.2
Sill plate	2x6 Pressure Treated	Southern Pine	No.2
Garage Door - Posts	(3) 2x6	Southern Pine	Stud
Garage Door - Lintel	(3) 2x12	Southern Pine	Select Structural

Loads

I WOULD USE
20 PSF FOR
THIS AREA

I WOULD USE
80 PSF FOR
THIS AREA

Source	Dead	Live	Snow	Wind	Width
Self-weight and wind	10 psf	-	-	16.4 psf	-
Floor - Mezzanine	16.5 psf	50 psf	-	-	1.2 ft
Roof - Mezzanine	15 psf	-	23.4 psf	-	1.2 ft
Wall above	10 psf	-	-	-	14 ft

A IF YOU USE 80
PSF, THIS
LOAD CAN BE
DELETED

and Design Result

I WOULD USE A MINIMUM OF 20 PSF,
BUT YOU MAY WANT TO USE 25 PSF
TO ACCOUNT FOR FUTURE
CONSIDERATION OF PHOTO VOTAIC
PANELS ADDED TO THE ROOF

I WOULD SUGGEST USING A
ROOF SNOW LOAD OF 30 PSF
FOR DESIGN, THAT IS MY
PERSONAL PREFERENCE

Studs

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + L	Buckling	P: 0.4 kip , f_c : 48.1 psi	F_c : 448 psi , C_p : 0.56	0.11	✓
D + 0.75 L + 0.75 S	Buckling	P: 0.41 kip , f_c : 49.1 psi	F_c : 469.2 psi , C_p : 0.51	0.10	✓
D + 0.6 W	Buckling + Bending	P: 0.32 kip , f_c : 38.4 psi M: 0.24 kip-ft , f_b : 374.7 psi	F_c : 499.2 psi , C_p : 0.39 F_b : 1242 psi	0.33	✓
D + 0.75 L + 0.75 S + 0.45 W	Buckling + Bending	P: 0.41 kip , f_c : 49.1 psi M: 0.18 kip-ft , f_b : 281.1 psi	F_c : 499.2 psi , C_p : 0.39 F_b : 1242 psi	0.26	✓
D + 0.6 W	Shear	V: 0.079 kip , f_v : 14.3 psi	F_v : 280 psi	0.05	✓
D + 0.75 L + 0.75 S + 0.45 W	Shear	V: 0.059 kip , f_v : 10.7 psi	F_v : 280 psi	0.04	✓

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
0.42 W	Deflection	d: 0.12 in	d_U : 0.4 in (L / 360)	0.30	✓

Top plate

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + L	Bending	M: 0.066 kip-ft , f_b : 192.5 psi	F_b : 1150 psi	0.17	✓
D + 0.75 L + 0.75 S	Bending	M: 0.068 kip-ft , f_b : 196.4 psi	F_b : 1322.5 psi	0.15	✓
D + L	Shear	V: 0.2 kip , f_v : 18 psi	F_v : 175 psi	0.10	✓
D + 0.75 L + 0.75 S	Shear	V: 0.2 kip , f_v : 18.4 psi	F_v : 201.2 psi	0.09	✓

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
L	Deflection	d: 0.001 in	d_U : 0.044 in (L / 360)	0.03	✓
0.75 L + 0.75 S	Deflection	d: 0.001 in	d_U : 0.044 in (L / 360)	0.03	✓
1.5 D + L	Deflection	d: 0.008 in	d_U : 0.067 in (L / 240)	0.12	✓
1.5 D + 0.75 L + 0.75 S	Deflection	d: 0.008 in	d_U : 0.067 in (L / 240)	0.12	✓

Garage Door - Posts

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
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Combination	Check Type	Action	Resistance	Ratio	Check
D + L	Buckling	P: 1.52 kip , f_c : 61.4 psi	F_c : 448 psi , C_p : 0.56	0.14	✓
D + 0.75 L + 0.75 S	Buckling	P: 1.55 kip , f_c : 62.6 psi	F_c : 469.2 psi , C_p : 0.51	0.13	✓
D + 0.6 W	Buckling + Bending	P: 1.21 kip , f_c : 49 psi M: 0.9 kip-ft , f_b : 477.8 psi	F_c : 499.2 psi , C_p : 0.39 F_b : 1242 psi	0.43	✓
D + 0.75 L + 0.75 S + 0.45 W	Buckling + Bending	P: 1.55 kip , f_c : 62.6 psi M: 0.68 kip-ft , f_b : 358.3 psi	F_c : 499.2 psi , C_p : 0.39 F_b : 1242 psi	0.34	✓
D + 0.6 W	Shear	V: 0.3 kip , f_v : 18.2 psi	F_v : 280 psi	0.07	✓
D + 0.75 L + 0.75 S + 0.45 W	Shear	V: 0.23 kip , f_v : 13.7 psi	F_v : 280 psi	0.05	✓

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
0.42 W	Deflection	d: 0.15 in	d_U : 0.4 in (L / 360)	0.38	✓

Garage Door - Lintel

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + L	Bending	M: 3.87 kip-ft , f_b : 489.6 psi	F_b : 1600 psi	0.31	✓
D + 0.75 L + 0.75 S	Bending	M: 3.95 kip-ft , f_b : 499.6 psi	F_b : 1840 psi	0.27	✓
D + L	Shear	V: 1.52 kip , f_v : 45 psi	F_v : 175 psi	0.26	✓
D + 0.75 L + 0.75 S	Shear	V: 1.55 kip , f_v : 45.9 psi	F_v : 201.2 psi	0.23	✓

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
L	Deflection	d: 0.017 in	d_U : 0.34 in (L / 360)	0.05	✓
0.75 L + 0.75 S	Deflection	d: 0.019 in	d_U : 0.34 in (L / 360)	0.06	✓
1.5 D + L	Deflection	d: 0.12 in	d_U : 0.51 in (L / 240)	0.23	✓
1.5 D + 0.75 L + 0.75 S	Deflection	d: 0.12 in	d_U : 0.51 in (L / 240)	0.24	✓

Wall Framing Design: W-L1-Y-2-A-B

Components

Wall - Dimensions (L x H): 16.9 ft x 10 ft

Internal Door - Dimensions (L x H_{top}): 3.2 ft x 6.7 ft

USE SPRUCE PINE FIR (SPF).
STUD GRADE FOR THIS
BUILDING SHOULD BE
ADEQUATE

Component	Section	Product / Species	
Studs	2x6 @ 16 in O.C.	Southern Pine	No.2
Top plate	(2) 2x6	Southern Pine	No.2
Sill plate	2x6 Pressure Treated	Southern Pine	No.2
Internal Door - Posts	(1) 2x6	Southern Pine	No.2
Internal Door - Lintel	(3) 2x6	Southern Pine	No.2

Loads

I WOULD USE
20 PSF FOR
THIS AREA

I WOULD USE
80 PSF FOR
THIS AREA

Source	Dead	Live	Snow	Wind	Width
Self-weight and wind	10 psf	-	-	-	-
Floor - Mezzanine	16.5 psf	50 psf	-	-	7.5 ft
Roof - Mezzanine	15 psf	-	23.4 psf	-	15 ft
Wall above	10 psf	-	-	-	16 ft

Analysis

IF YOU USE 80
PSF, THIS
LOAD CAN BE
DELETED

Design Results

I WOULD USE A MINIMUM OF 20 PSF,
BUT YOU MAY WANT TO USE 25 PSF
TO ACCOUNT FOR FUTURE
CONSIDERATION OF PHOTO VOTAIC
PANELS ADDED TO THE ROOF

I WOULD SUGGEST USING A
ROOF SNOW LOAD OF 30 PSF
FOR DESIGN, THAT IS MY
PERSONAL PREFERENCE

Studs

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + L	Buckling	P: 1.25 kip , f_c : 150.9 psi	F_c : 728 psi , C_p : 0.52	0.21	✓
D + 0.75 L + 0.75 S	Buckling	P: 1.47 kip , f_c : 178.3 psi	F_c : 756.7 psi , C_p : 0.47	0.24	✓

NB: No serviceability checks required

Top plate

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + L	Bending	M: 0.21 kip-ft , f_b : 603.6 psi	F_b : 1150 psi	0.52	✓
D + 0.75 L + 0.75 S	Bending	M: 0.25 kip-ft , f_b : 713.2 psi	F_b : 1322.5 psi	0.54	✓
D + L	Shear	V: 0.62 kip , f_v : 56.6 psi	F_v : 175 psi	0.32	✓
D + 0.75 L + 0.75 S	Shear	V: 0.74 kip , f_v : 66.9 psi	F_v : 201.2 psi	0.33	✓

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
L	Deflection	d: 0.007 in	d_u : 0.044 in (L / 360)	0.16	✓
0.75 L + 0.75 S	Deflection	d: 0.01 in	d_u : 0.044 in (L / 360)	0.23	✓

Combination	Check Type	Action	Limit	Ratio	Check
1.5 D + L	Deflection	d: 0.023 in	d_U : 0.067 in (L / 240)	0.34	✓
1.5 D + 0.75 L + 0.75 S	Deflection	d: 0.026 in	d_U : 0.067 in (L / 240)	0.39	✓

Internal Door - Posts

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + L	Buckling	P: 1.49 kip , f_C : 181.1 psi	F_C : 728 psi , C_P : 0.52	0.25	✓
D + 0.75 L + 0.75 S	Buckling	P: 1.77 kip , f_C : 214 psi	F_C : 756.7 psi , C_P : 0.47	0.28	✓

NB: No serviceability checks required

Internal Door - Lintel

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + L	Bending	M: 1.2 kip-ft , f_B : 632.2 psi	F_B : 1000 psi	0.63	✓
D + 0.75 L + 0.75 S	Bending	M: 1.41 kip-ft , f_B : 746.9 psi	F_B : 1150 psi	0.65	✓
D + L	Shear	V: 1.49 kip , f_V : 90.5 psi	F_V : 175 psi	0.52	✓
D + 0.75 L + 0.75 S	Shear	V: 1.77 kip , f_V : 107 psi	F_V : 201.2 psi	0.53	✓

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
L	Deflection	d: 0.013 in	d_U : 0.11 in (L / 360)	0.12	✓
0.75 L + 0.75 S	Deflection	d: 0.019 in	d_U : 0.11 in (L / 360)	0.18	✓
1.5 D + L	Deflection	d: 0.043 in	d_U : 0.16 in (L / 240)	0.27	✓
1.5 D + 0.75 L + 0.75 S	Deflection	d: 0.049 in	d_U : 0.16 in (L / 240)	0.31	✓

Wall Framing Design: W-L1-Y-2-B-E

Components

USE SPRUCE PINE FIR

Wall - Dimensions (L x H): 27.1 ft x 11 ft

Internal Window - Dimensions (L x H_{top}): 3 ft x 10.5 ft

Component	Section	Product / Species	Grade
Studs	2x6 @ 16 in O.C.	Southern Pine	No.2
Top plate	(2) 2x6	Southern Pine	No.2

USE SPRUCE PINE FIR (SPF).
STUD GRADE FOR THIS
BUILDING SHOULD BE
ADEQUATE

Component	Section	Product / Species	Grade
Sill plate	2x6 Pressure Treated	Southern Pine	No.2
Internal Window - Posts	(1) 2x6	Southern Pine	No.2
Internal Window - Lintel	(3) 2x6	Southern Pine	No.2

Loads

I WOULD USE
20 PSF FOR
THIS AREA

I WOULD USE
80 PSF FOR
THIS AREA

Source	Dead	Live	Snow	Wind	Width
Self-weight and wind	10 psf	-	-	16.4 psf	-
Floor - Mezzanine	16.5 psf	50 psf	-	-	3 ft
Roof - Mezzanine	15 psf	-	23.4 psf	-	15 ft
Wall above	10 psf	-	-	-	15 ft

Anc Studs

IF YOU USE 80
PSF, THIS
LOAD CAN BE
DELETED

Design Results

I WOULD USE A MINIMUM OF 20 PSF,
BUT YOU MAY WANT TO USE 25 PSF
TO ACCOUNT FOR FUTURE
CONSIDERATION OF PHOTO VOTAIC
PANELS ADDED TO THE ROOF

I WOULD SUGGEST USING A
ROOF SNOW LOAD OF 30 PSF
FOR DESIGN, THAT IS MY
PERSONAL PREFERENCE

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + L	Buckling	P: 0.84 kip , f_c : 101.7 psi	F_c : 630 psi , C_p : 0.45	0.16	✓
D + 0.75 L + 0.75 S	Buckling	P: 1.14 kip , f_c : 138.2 psi	F_c : 644 psi , C_p : 0.4	0.21	✓
D + 0.6 W	Buckling + Bending	P: 0.64 kip , f_c : 77.5 psi M: 0.2 kip-ft , f_b : 314.9 psi	F_c : 672 psi , C_p : 0.3 F_b : 2160 psi	0.18	✓
D + 0.75 L + 0.75 S + 0.45 W	Buckling + Bending	P: 1.14 kip , f_c : 138.2 psi M: 0.15 kip-ft , f_b : 236.2 psi	F_c : 672 psi , C_p : 0.3 F_b : 2160 psi	0.18	✓
D + 0.6 W	Shear	V: 0.072 kip , f_v : 13.1 psi	F_v : 280 psi	0.05	✓
D + 0.75 L + 0.75 S + 0.45 W	Shear	V: 0.054 kip , f_v : 9.84 psi	F_v : 280 psi	0.04	✓

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
0.42 W	Deflection	d: 0.079 in	d_u : 0.37 in (L / 360)	0.22	✓

Top plate

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + L	Bending	M: 0.14 kip-ft , f_b : 407 psi	F_b : 1150 psi	0.35	✓
D + 0.75 L + 0.75 S	Bending	M: 0.19 kip-ft , f_b : 552.9 psi	F_b : 1322.5 psi	0.42	✓

Combination	Check Type	Action	Resistance	Ratio	Check
D + L	Shear	V: 0.42 kip , f_v : 38.2 psi	F_v : 175 psi	0.22	✓
D + 0.75 L + 0.75 S	Shear	V: 0.57 kip , f_v : 51.8 psi	F_v : 201.2 psi	0.26	✓

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
L	Deflection	d: 0.003 in	d_U : 0.044 in (L / 360)	0.06	✓
0.75 L + 0.75 S	Deflection	d: 0.007 in	d_U : 0.044 in (L / 360)	0.16	✓
1.5 D + L	Deflection	d: 0.016 in	d_U : 0.067 in (L / 240)	0.24	✓
1.5 D + 0.75 L + 0.75 S	Deflection	d: 0.02 in	d_U : 0.067 in (L / 240)	0.31	✓

Internal Window - Posts

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + L	Buckling	P: 0.94 kip , f_c : 114.5 psi	F_c : 630 psi , C_p : 0.45	0.18	✓
D + 0.75 L + 0.75 S	Buckling	P: 1.28 kip , f_c : 155.5 psi	F_c : 644 psi , C_p : 0.4	0.24	✓
D + 0.6 W	Buckling + Bending	P: 0.72 kip , f_c : 87.2 psi M: 0.22 kip-ft , f_b : 354.2 psi	F_c : 672 psi , C_p : 0.3 F_b : 2160 psi	0.20	✓
D + 0.75 L + 0.75 S + 0.45 W	Buckling + Bending	P: 1.28 kip , f_c : 155.5 psi M: 0.17 kip-ft , f_b : 265.7 psi	F_c : 672 psi , C_p : 0.3 F_b : 2160 psi	0.21	✓
D + 0.6 W	Shear	V: 0.081 kip , f_v : 14.8 psi	F_v : 280 psi	0.05	✓
D + 0.75 L + 0.75 S + 0.45 W	Shear	V: 0.061 kip , f_v : 11.1 psi	F_v : 280 psi	0.04	✓

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
0.42 W	Deflection	d: 0.089 in	d_U : 0.37 in (L / 360)	0.24	✓

Internal Window - Lintel

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + L	Bending	M: 0.71 kip-ft , f_b : 374.6 psi	F_b : 1000 psi	0.37	✓
D + 0.75 L + 0.75 S	Bending	M: 0.96 kip-ft , f_b : 508.9 psi	F_b : 1150 psi	0.44	✓
D + L	Shear	V: 0.94 kip , f_v : 57.2 psi	F_v : 175 psi	0.33	✓
D + 0.75 L + 0.75 S	Shear	V: 1.28 kip , f_v : 77.8 psi	F_v : 201.2 psi	0.39	✓

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
L	Deflection	d: 0.004 in	$d_U: 0.1 \text{ in (L / 360)}$	0.04	✓
0.75 L + 0.75 S	Deflection	d: 0.011 in	$d_U: 0.1 \text{ in (L / 360)}$	0.11	✓
1.5 D + L	Deflection	d: 0.025 in	$d_U: 0.15 \text{ in (L / 240)}$	0.16	✓
1.5 D + 0.75 L + 0.75 S	Deflection	d: 0.031 in	$d_U: 0.15 \text{ in (L / 240)}$	0.21	✓

Wall Framing Design: W-L1-Y-3-A-B

Components

Wall - Dimensions (L x H): 24 ft x 10 ft

Internal Full-height Opening - Dimensions (L x H_{top}): 4.5 ft x 10 ft

USE SPRUCE PINE FIR (SPF).
STUD GRADE FOR THIS
BUILDING SHOULD BE
ADEQUATE

Component	Section	Product / Species	Grade
Studs	2x4 @ 16 in O.C.	Southern Pine	No.1
Top plate	(2) 2x4	Southern Pine	No.1
Sill plate	2x4 Pressure Treated	Southern Pine	No.1
Internal Full-height Opening - Posts	(2) 2x4	Southern Pine	No.1
Internal Full-height Opening - Lintel	(3) 2x12	Southern Pine	No.2

Loads

Source	Dead	Live	Snow	Wind	Width
Self-weight and wind	6 psf	-	-	-	-
Floor - Mezzanine	16.5 psf	50 psf	-	-	15 ft

I WOULD USE
80 PSF FOR
THIS AREA

Analysis and Design Results

I WOULD USE
20 PSF FOR
THIS AREA

Studs

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + L	Buckling	P: 1.37 kip , $f_c: 261 \text{ psi}$	$F_c: 379.5 \text{ psi}$, $C_p: 0.23$	0.69	✓

NB: No serviceability checks required

Top plate

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + L	Bending	M: 0.23 kip-ft , f_b : 1043.8 psi	F_b : 1650 psi	0.63	✓
D + L	Shear	V: 0.69 kip , f_v : 97.9 psi	F_v : 175 psi	0.56	✓

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
L	Deflection	d: 0.019 in	d_U : 0.044 in (L / 360)	0.43	✓
1.5 D + L	Deflection	d: 0.03 in	d_U : 0.067 in (L / 240)	0.45	✓

Internal Full-height Opening - Posts

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + L	Buckling	P: 2.31 kip , f_c : 220.2 psi	F_c : 379.5 psi , C_p : 0.23	0.58	✓

NB: No serviceability checks required

Internal Full-height Opening - Lintel

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + L	Bending	M: 2.6 kip-ft , f_b : 328.8 psi	F_b : 750 psi	0.44	✓
D + L	Shear	V: 2.31 kip , f_v : 68.5 psi	F_v : 175 psi	0.39	✓

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
L	Deflection	d: 0.015 in	d_U : 0.15 in (L / 360)	0.10	✓
1.5 D + L	Deflection	d: 0.024 in	d_U : 0.23 in (L / 240)	0.11	✓

Wall Framing Design: W-L1-Y-3-B-E

Components

USE SPRUCE PINE FIR

Wall - Dimensions (L x H): 20 ft x 12 ft

Internal Window - Dimensions (L x H_{top}): 3 ft x 5.6 ft

Component	Section	Product / Species	Grade
Studs	2x4 @ 16 in O.C.	Southern Pine	No.1
Top plate	(2) 2x4	Southern Pine	No.1

USE SPRUCE PINE FIR (SPF).
STUD GRADE FOR THIS
BUILDING SHOULD BE
ADEQUATE

Component	Section	Product / Species	Grade
Sill plate	2x4 Pressure Treated	Southern Pine	No.1
Internal Window - Posts	(1) 2x4	Southern Pine	No.1
Internal Window - Lintel	(3) 2x6	Southern Pine	No.2

Loads

Source	Dead	Live	Snow	Wind	Width
Self-weight and wind	6 psf	-	-	-	-
Floor - Mezzanine	16.5 psf	50 psf	-	-	7.5 ft

I WOULD USE
80 PSF FOR
THIS AREA

Analysis and Design Results

Studs

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + L	Buckling	P: 0.71 kip , f_c : 135.8 psi	F_c : 264 psi , C_p : 0.16	0.51	✓

I WOULD USE
20 PSF FOR
THIS AREA

NB: No serviceability checks required

Top plate

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + L	Bending	M: 0.12 kip-ft , f_b : 543.2 psi	F_b : 1650 psi	0.33	✓
D + L	Shear	V: 0.36 kip , f_v : 50.9 psi	F_v : 175 psi	0.29	✓

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
L	Deflection	d: 0.01 in	d_U : 0.044 in (L / 360)	0.22	✓
1.5 D + L	Deflection	d: 0.016 in	d_U : 0.067 in (L / 240)	0.24	✓

Internal Window - Posts

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + L	Buckling	P: 0.8 kip , f_c : 152.8 psi	F_c : 264 psi , C_p : 0.16	0.58	✓

NB: No serviceability checks required

Internal Window - Lintel

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + L	Bending	M: 0.6 kip-ft , f_b : 318.2 psi	F_b : 1000 psi	0.32	✓
D + L	Shear	V: 0.8 kip , f_v : 48.6 psi	F_v : 175 psi	0.28	✓

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
L	Deflection	d: 0.011 in	d_u : 0.1 in (L / 360)	0.11	✓
1.5 D + L	Deflection	d: 0.017 in	d_u : 0.15 in (L / 240)	0.12	✓

Wall Framing Design: W-L1-Y-4-A-B

Components

Wall - Dimensions (L x H): 24 ft x 10 ft

Internal Full-height Opening - Dimensions (L x H_{top}): 16 ft x 10 ft

USE SPRUCE PINE FIR (SPF).
STUD GRADE FOR THIS
BUILDING SHOULD BE
ADEQUATE

Component	Section	Product / Species	Grade
Studs	2x6 @ 16 in O.C.	Southern Pine	No.2
Top plate	(2) 2x6	Southern Pine	No.2
Sill plate	2x6 Pressure Treated	Southern Pine	No.2
Internal Full-height Opening - Posts	(3) 2x6	Southern Pine	No.2
Internal Full-height Opening - Lintel	(2) PSL-5x12	PSL	2.0E

I WOULD USE A MINIMUM OF 20 PSF,
BUT YOU MAY WANT TO USE 25 PSF
TO ACCOUNT FOR FUTURE
CONSIDERATION OF PHOTO VOTAIC
PANELS ADDED TO THE ROOF

Source	Dead	Live	Wind	Width
Self-weight and wind	10 psf	-	-	-
Floor - Mezzanine	16.5 psf	50 psf	-	7.5 ft
Roof - Mezzanine	15 psf	-	23.4 psf	15 ft
Wall above	10 psf	-	-	16 ft

I WOULD USE
80 PSF FOR
THIS AREA

Analysis and Design Results

Stud

IF YOU USE 80
PSF, THIS
LOAD CAN BE
DELETED

THIS SHOULD BE A MINIMUM OF 15
PSF, BUT YOU MAY WANT TO USE 20
PSF TO ACCOUNT FOR FUTURE
CONSIDERATION OF PHOTO VOTAIC
PANELS ADDED TO THE ROOF

I WOULD SUGGEST USING A
ROOF SNOW LOAD OF 30 PSF
FOR DESIGN, THAT IS MY
PERSONAL PREFERENCE

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
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Combination	Check Type	Action	Resistance	Ratio	Check
D + L	Buckling	P: 1.25 kip , f_c : 150.9 psi	F_c : 728 psi , C_p : 0.52	0.21	✓
D + 0.75 L + 0.75 S	Buckling	P: 1.47 kip , f_c : 178.3 psi	F_c : 756.7 psi , C_p : 0.47	0.24	✓

NB: No serviceability checks required

Top plate

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + L	Bending	M: 0.21 kip-ft , f_b : 603.6 psi	F_b : 1150 psi	0.52	✓
D + 0.75 L + 0.75 S	Bending	M: 0.25 kip-ft , f_b : 713.2 psi	F_b : 1322.5 psi	0.54	✓
D + L	Shear	V: 0.62 kip , f_v : 56.6 psi	F_v : 175 psi	0.32	✓
D + 0.75 L + 0.75 S	Shear	V: 0.74 kip , f_v : 66.9 psi	F_v : 201.2 psi	0.33	✓

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
L	Deflection	d: 0.007 in	d_u : 0.044 in (L / 360)	0.16	✓
0.75 L + 0.75 S	Deflection	d: 0.01 in	d_u : 0.044 in (L / 360)	0.23	✓
1.5 D + L	Deflection	d: 0.023 in	d_u : 0.067 in (L / 240)	0.34	✓
1.5 D + 0.75 L + 0.75 S	Deflection	d: 0.026 in	d_u : 0.067 in (L / 240)	0.39	✓

Internal Full-height Opening - Posts

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + L	Buckling	P: 7.47 kip , f_c : 301.8 psi	F_c : 728 psi , C_p : 0.52	0.41	✓
D + 0.75 L + 0.75 S	Buckling	P: 8.83 kip , f_c : 356.6 psi	F_c : 756.7 psi , C_p : 0.47	0.47	✓

NB: No serviceability checks required

Internal Full-height Opening - Lintel

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + L	Bending	M: 29.9 kip-ft , f_b : 1453 psi	M_u : 59.7 kip-ft	0.50	✓
D + 0.75 L + 0.75 S	Bending	M: 35.3 kip-ft , f_b : 1716.7 psi	M_u : 68.7 kip-ft	0.51	✓
D + L	Shear	V: 7.47 kip , f_v : 89.9 psi	V_u : 24.1 kip	0.31	✓
D + 0.75 L + 0.75 S	Shear	V: 8.83 kip , f_v : 106.2 psi	V_u : 27.7 kip	0.32	✓

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
L	Deflection	d: 0.2 in	d_U : 0.53 in (L / 360)	0.37	✓
0.75 L + 0.75 S	Deflection	d: 0.29 in	d_U : 0.53 in (L / 360)	0.54	✓
1.5 D + L	Deflection	d: 0.65 in	d_U : 0.8 in (L / 240)	0.81	✓
1.5 D + 0.75 L + 0.75 S	Deflection	d: 0.74 in	d_U : 0.8 in (L / 240)	0.92	✓

Wall Framing Design: W-L1-Y-4-B-E

Components

Wall - Dimensions (L x H): 20 ft x 12 ft

Window - Dimensions (L x H_{top}): 3 ft x 7 ft

USE SPRUCE PINE FIR (SPF).
STUD GRADE FOR THIS
BUILDING SHOULD BE
ADEQUATE

Component	Section	Product / Species	Grade
Studs	2x6 @ 16 in O.C.	Southern Pine	No.2
Top plate	(2) 2x6	Southern Pine	No.2
Sill plate	2x6 Pressure Treated	Southern Pine	No.2
Window - Posts	(1) 2x6	Southern Pine	No.2
Window - Lintel	(3) 2x6	Southern Pine	No.2

Loads

I WOULD USE
20 PSF FOR
THIS AREA

I WOULD USE
80 PSF FOR
THIS AREA

Source	Dead	Live	Snow	Wind	Width
Self-weight and wind	10 psf	-	-	16.4 psf	-
Floor - Mezzanine	18.5 psf	50 psf	-	-	3 ft
Roof - Mezzanine	15 psf	-	23.4 psf	-	15 ft
Wall above	10 psf	-	-	-	17 ft

IF YOU USE 80
PSF, THIS
LOAD CAN BE
DELETED

Design Results

I WOULD SUGGEST USING A
ROOF SNOW LOAD OF 30 PSF
FOR DESIGN, THAT IS MY
PERSONAL PREFERENCE

Studs

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + L	Buckling	P: 0.87 kip , f_c : 105.8 psi	F_c : 546 psi , C_p : 0.39	0.19	✓
D + 0.75 L + 0.75 S	Buckling	P: 1.17 kip , f_c : 142.3 psi	F_c : 547.4 psi , C_p : 0.34	0.26	✓
D + 0.6 W	Buckling + Bending	P: 0.67 kip , f_c : 81.5 psi M: 0.24 kip-ft , f_b : 374.7 psi	F_c : 582.4 psi , C_p : 0.26 F_b : 2160 psi	0.22	✓

Combination	Check Type	Action	Resistance	Ratio	Check
D + 0.75 L + 0.75 S + 0.45 W	Buckling + Bending	P: 1.17 kip , f_c : 142.3 psi M: 0.18 kip-ft , f_b : 281.1 psi	F_c : 582.4 psi , C_p : 0.26 F_b : 2160 psi	0.23	✓
D + 0.6 W	Shear	V: 0.079 kip , f_v : 14.3 psi	F_v : 280 psi	0.05	✓
D + 0.75 L + 0.75 S + 0.45 W	Shear	V: 0.059 kip , f_v : 10.7 psi	F_v : 280 psi	0.04	✓

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
0.42 W	Deflection	d: 0.11 in	d_U : 0.4 in (L / 360)	0.28	✓

Top plate

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + L	Bending	M: 0.15 kip-ft , f_b : 423.1 psi	F_b : 1150 psi	0.37	✓
D + 0.75 L + 0.75 S	Bending	M: 0.2 kip-ft , f_b : 569.1 psi	F_b : 1322.5 psi	0.43	✓
D + L	Shear	V: 0.44 kip , f_v : 39.7 psi	F_v : 175 psi	0.23	✓
D + 0.75 L + 0.75 S	Shear	V: 0.59 kip , f_v : 53.3 psi	F_v : 201.2 psi	0.27	✓

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
L	Deflection	d: 0.003 in	d_U : 0.044 in (L / 360)	0.06	✓
0.75 L + 0.75 S	Deflection	d: 0.007 in	d_U : 0.044 in (L / 360)	0.16	✓
1.5 D + L	Deflection	d: 0.017 in	d_U : 0.067 in (L / 240)	0.25	✓
1.5 D + 0.75 L + 0.75 S	Deflection	d: 0.021 in	d_U : 0.067 in (L / 240)	0.32	✓

Window - Posts

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + L	Buckling	P: 0.98 kip , f_c : 119 psi	F_c : 546 psi , C_p : 0.39	0.22	✓
D + 0.75 L + 0.75 S	Buckling	P: 1.32 kip , f_c : 160 psi	F_c : 547.4 psi , C_p : 0.34	0.29	✓
D + 0.6 W	Buckling + Bending	P: 0.76 kip , f_c : 91.7 psi M: 0.27 kip-ft , f_b : 421.6 psi	F_c : 582.4 psi , C_p : 0.26 F_b : 2160 psi	0.26	✓
D + 0.75 L + 0.75 S + 0.45 W	Buckling + Bending	P: 1.32 kip , f_c : 160 psi M: 0.2 kip-ft , f_b : 316.2 psi	F_c : 582.4 psi , C_p : 0.26 F_b : 2160 psi	0.28	✓
D + 0.6 W	Shear	V: 0.089 kip , f_v : 16.1 psi	F_v : 280 psi	0.06	✓

Combination	Check Type	Action	Resistance	Ratio	Check
D + 0.75 L + 0.75 S + 0.45 W	Shear	V: 0.066 kip , f_v : 12.1 psi	F_v : 280 psi	0.04	✓

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
0.42 W	Deflection	d: 0.13 in	d_U : 0.4 in (L / 360)	0.31	✓

Window - Lintel

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + L	Bending	M: 0.74 kip-ft , f_b : 389.5 psi	F_b : 1000 psi	0.39	✓
D + 0.75 L + 0.75 S	Bending	M: 0.99 kip-ft , f_b : 523.8 psi	F_b : 1150 psi	0.46	✓
D + L	Shear	V: 0.98 kip , f_v : 59.5 psi	F_v : 175 psi	0.34	✓
D + 0.75 L + 0.75 S	Shear	V: 1.32 kip , f_v : 80 psi	F_v : 201.2 psi	0.40	✓

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
L	Deflection	d: 0.004 in	d_U : 0.1 in (L / 360)	0.04	✓
0.75 L + 0.75 S	Deflection	d: 0.011 in	d_U : 0.1 in (L / 360)	0.11	✓
1.5 D + L	Deflection	d: 0.026 in	d_U : 0.15 in (L / 240)	0.17	✓
1.5 D + 0.75 L + 0.75 S	Deflection	d: 0.032 in	d_U : 0.15 in (L / 240)	0.21	✓

Wall Framing Design: W-L2-X-A-2-4

Components

Wall - Dimensions (L x H): 30 ft x 15 ft

Window Opening - Dimensions (L x H_{top}): 5 ft x 8 ft

Component	Section	Product / Species	Grade
Studs	2x6 @ 16 in O.C.	Southern Pine	Stud
Top plate	(2) 2x6	Southern Pine	No.2
Sill plate	2x6 Pressure Treated	Southern Pine	No.2
Window Opening - Posts	(2) 2x6	Southern Pine	Stud
Window Opening - Lintel	(3) 2x4	Southern Pine	No.2

USE SPRUCE
PINE FIR



Loads

Source	Dead	Live	Snow	Wind	Width
Self-weight and wind	10 psf	-	-	16.4 psf	-
Roof - Mezzanine	15 psf	-	23.4 psf	-	1.2 ft

Analysis and Design Results

Studs

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + S	Buckling	P: 0.16 kip , f_c : 19.6 psi	F_c : 322 psi , C_p : 0.35	0.06	✓
D + 0.6 W	Buckling + Bending	P: 0.12 kip , f_c : 15 psi M: 0.37 kip-ft , f_b : 585.5 psi	F_c : 332.8 psi , C_p : 0.26 F_b : 1242 psi	0.49	✓
D + 0.75 S + 0.45 W	Buckling + Bending	P: 0.15 kip , f_c : 18.4 psi M: 0.28 kip-ft , f_b : 439.1 psi	F_c : 332.8 psi , C_p : 0.26 F_b : 1242 psi	0.37	✓
D + 0.6 W	Shear	V: 0.098 kip , f_v : 17.9 psi	F_v : 280 psi	0.06	✓
D + 0.75 S + 0.45 W	Shear	V: 0.074 kip , f_v : 13.4 psi	F_v : 280 psi	0.05	✓

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
0.42 W	Deflection	d: 0.29 in	d_u : 0.5 in (L / 360)	0.58	✓

Top plate

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + S	Bending	M: 0.027 kip-ft , f_b : 78.3 psi	F_b : 1322.5 psi	0.06	✓
D + S	Shear	V: 0.081 kip , f_v : 7.34 psi	F_v : 201.2 psi	0.04	✓

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
S	Deflection	d: 5.23e-04 in	d_u : 0.044 in (L / 360)	0.01	✓
1.5 D + S	Deflection	d: 0.003 in	d_u : 0.067 in (L / 240)	0.05	✓

Window Opening - Posts

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + S	Buckling	P: 0.3 kip , f_c : 18.3 psi	F_c : 322 psi , C_p : 0.35	0.06	✓
D + 0.6 W	Buckling + Bending	P: 0.23 kip , f_c : 14.1 psi M: 0.69 kip-ft , f_b : 548.9 psi	F_c : 332.8 psi , C_p : 0.26 F_b : 1242 psi	0.46	✓
D + 0.75 S + 0.45 W	Buckling + Bending	P: 0.29 kip , f_c : 17.3 psi M: 0.52 kip-ft , f_b : 411.7 psi	F_c : 332.8 psi , C_p : 0.26 F_b : 1242 psi	0.35	✓
D + 0.6 W	Shear	V: 0.18 kip , f_v : 16.8 psi	F_v : 280 psi	0.06	✓
D + 0.75 S + 0.45 W	Shear	V: 0.14 kip , f_v : 12.6 psi	F_v : 280 psi	0.04	✓

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
0.42 W	Deflection	d: 0.27 in	d_u : 0.5 in (L / 360)	0.55	✓

Window Opening - Lintel

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + S	Bending	M: 0.38 kip-ft , f_b : 494.2 psi	F_b : 1265 psi	0.39	✓
D + S	Shear	V: 0.3 kip , f_v : 28.8 psi	F_v : 201.2 psi	0.14	✓

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
S	Deflection	d: 0.018 in	d_u : 0.17 in (L / 360)	0.11	✓
1.5 D + S	Deflection	d: 0.11 in	d_u : 0.25 in (L / 240)	0.44	✓

Wall Framing Design: W-L2-X-E-2-4

Components

Wall - Dimensions (L x H): 30 ft x 13 ft

Window Opening - Dimensions (L x H_{top}): 5 ft x 8 ft

USE SPRUCE PINE
FIR

Component	Section	Product / Species	Grade
Studs	2x6 @ 16 in O.C.	Southern Pine	Stud
Top plate	(2) 2x6	Southern Pine	No.2
Sill plate	2x6 Pressure Treated	Southern Pine	No.2
Window Opening - Posts	(2) 2x6	Southern Pine	Stud
Window Opening - Lintel	(3) 2x4	Southern Pine	No.2

Loads

Source	Dead	Live	Snow	Wind	Width
Self-weight and wind	10 psf	-	-	16.4 psf	-
Roof - Mezzanine	15 psf	-	23.4 psf	-	1.2 ft

Analysis and Design Results

Studs

Strength Checks (ASD)

I WOULD USE A MINIMUM OF 15 PSF, BUT YOU MAY WANT TO USE 20 PSF TO ACCOUNT FOR FUTURE CONSIDERATION OF PHOTO VOTAIC PANELS ADDED TO THE ROOF

I WOULD SUGGEST USING A ROOF SNOW LOAD OF 30 PSF FOR DESIGN, THAT IS MY PERSONAL PREFERENCE

Combination	Check Type	Action	Resistance	Ratio	Check
D + S	Buckling	P: 0.15 kip , f_c : 18 psi	F_c : 414 psi , C_p : 0.45	0.04	✓
D + 0.6 W	Buckling + Bending	P: 0.11 kip , f_c : 13.4 psi M: 0.28 kip-ft , f_b : 439.8 psi	F_c : 435.2 psi , C_p : 0.34 F_b : 1242 psi	0.36	✓
D + 0.75 S + 0.45 W	Buckling + Bending	P: 0.14 kip , f_c : 16.8 psi M: 0.21 kip-ft , f_b : 329.8 psi	F_c : 435.2 psi , C_p : 0.34 F_b : 1242 psi	0.28	✓
D + 0.6 W	Shear	V: 0.085 kip , f_v : 15.5 psi	F_v : 280 psi	0.06	✓
D + 0.75 S + 0.45 W	Shear	V: 0.064 kip , f_v : 11.6 psi	F_v : 280 psi	0.04	✓

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
0.42 W	Deflection	d: 0.16 in	d_u : 0.43 in (L / 360)	0.38	✓

Top plate

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + S	Bending	M: 0.025 kip-ft , f_b : 71.8 psi	F_b : 1322.5 psi	0.05	✓
D + S	Shear	V: 0.074 kip , f_v : 6.73 psi	F_v : 201.2 psi	0.03	✓

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
S	Deflection	d: 5.23e-04 in	d_u : 0.044 in (L / 360)	0.01	✓
1.5 D + S	Deflection	d: 0.003 in	d_u : 0.067 in (L / 240)	0.04	✓

Window Opening - Posts

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + S	Buckling	P: 0.28 kip , f_c : 16.8 psi	F_c : 414 psi , C_p : 0.45	0.04	✓
D + 0.6 W	Buckling + Bending	P: 0.21 kip , f_c : 12.6 psi M: 0.52 kip-ft , f_b : 412.3 psi	F_c : 435.2 psi , C_p : 0.34 F_b : 1242 psi	0.34	✓
D + 0.75 S + 0.45 W	Buckling + Bending	P: 0.26 kip , f_c : 15.8 psi M: 0.39 kip-ft , f_b : 309.2 psi	F_c : 435.2 psi , C_p : 0.34 F_b : 1242 psi	0.26	✓
D + 0.6 W	Shear	V: 0.16 kip , f_v : 14.5 psi	F_v : 280 psi	0.05	✓
D + 0.75 S + 0.45 W	Shear	V: 0.12 kip , f_v : 10.9 psi	F_v : 280 psi	0.04	✓

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
0.42 W	Deflection	d: 0.15 in	d_U : 0.43 in (L / 360)	0.36	✓

Window Opening - Lintel

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + S	Bending	M: 0.35 kip-ft , f_b : 453.4 psi	F_b : 1265 psi	0.36	✓
D + S	Shear	V: 0.28 kip , f_v : 26.4 psi	F_v : 201.2 psi	0.13	✓

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
S	Deflection	d: 0.018 in	d_U : 0.17 in (L / 360)	0.11	✓
1.5 D + S	Deflection	d: 0.1 in	d_U : 0.25 in (L / 240)	0.40	✓

Wall Framing Design: W-L2-Y-2-A-B

Components

Wall - Dimensions (L x H): 16.9 ft x 16 ft

Window Opening - Dimensions (L x H_{top}): 3 ft x 5 ft

USE SPRUCE PINE FIR

Component	Section	Product Species	Grade
Studs	2x6 @ 16 in O.C.	Southern Pine	No.2
Top plate	(2) 2x6	Southern Pine	No.2
Sill plate	2x6 Pressure Treated	Southern Pine	No.2
Window Opening - Posts	(1) 2x6	Southern Pine	No.2
Window Opening - Lintel	(3) 2x6	Southern Pine	No.2

Loads

Source	Dead	Live	Snow	Wind	Width
Self-weight and wind	10 psf	-	-	16.4 psf	-
Roof - Mezzanine	15 psf	-	23.4 psf	-	15 ft

Analysis and Design Results

Studs

Strength Checks (ASD)

I WOULD USE A MINIMUM OF 15 PSF, BUT YOU MAY WANT TO USE 20 PSF TO ACCOUNT FOR FUTURE CONSIDERATION OF PHOTO VOTAIC PANELS ADDED TO THE ROOF

I WOULD SUGGEST USING A ROOF SNOW LOAD OF 30 PSF FOR DESIGN, THAT IS MY PERSONAL PREFERENCE

Combination	Check Type	Action	Resistance	Ratio	Check
D + S	Buckling	P: 0.87 kip , f_c : 106 psi	F_c : 322 psi , C_p : 0.2	0.33	✓
D + 0.6 W	Buckling + Bending	P: 0.41 kip , f_c : 49.3 psi M: 0.42 kip-ft , f_b : 666.2 psi	F_c : 336 psi , C_p : 0.15 F_b : 2160 psi	0.38	✓
D + 0.75 S + 0.45 W	Buckling + Bending	P: 0.76 kip , f_c : 91.8 psi M: 0.31 kip-ft , f_b : 499.6 psi	F_c : 336 psi , C_p : 0.15 F_b : 2160 psi	0.39	✓
D + 0.6 W	Shear	V: 0.1 kip , f_v : 19.1 psi	F_v : 280 psi	0.07	✓
D + 0.75 S + 0.45 W	Shear	V: 0.079 kip , f_v : 14.3 psi	F_v : 280 psi	0.05	✓

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
0.42 W	Deflection	d: 0.35 in	d_U : 0.53 in (L / 360)	0.65	✓

Top plate

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + S	Bending	M: 0.15 kip-ft , f_b : 424.1 psi	F_b : 1322.5 psi	0.32	✓
D + S	Shear	V: 0.44 kip , f_v : 39.8 psi	F_v : 201.2 psi	0.20	✓

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
S	Deflection	d: 0.007 in	d_U : 0.044 in (L / 360)	0.15	✓
1.5 D + S	Deflection	d: 0.015 in	d_U : 0.067 in (L / 240)	0.23	✓

Window Opening - Posts

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + S	Buckling	P: 0.98 kip , f_c : 119.3 psi	F_c : 322 psi , C_p : 0.2	0.37	✓
D + 0.6 W	Buckling + Bending	P: 0.46 kip , f_c : 55.5 psi M: 0.47 kip-ft , f_b : 749.5 psi	F_c : 336 psi , C_p : 0.15 F_b : 2160 psi	0.45	✓
D + 0.75 S + 0.45 W	Buckling + Bending	P: 0.85 kip , f_c : 103.3 psi M: 0.35 kip-ft , f_b : 562.1 psi	F_c : 336 psi , C_p : 0.15 F_b : 2160 psi	0.47	✓
D + 0.6 W	Shear	V: 0.12 kip , f_v : 21.5 psi	F_v : 280 psi	0.08	✓
D + 0.75 S + 0.45 W	Shear	V: 0.089 kip , f_v : 16.1 psi	F_v : 280 psi	0.06	✓

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
0.42 W	Deflection	d: 0.39 in	d_U : 0.53 in (L / 360)	0.74	✓

Window Opening - Lintel

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + S	Bending	M: 0.74 kip-ft , f_b : 390.3 psi	F_b : 1150 psi	0.34	✓
D + S	Shear	V: 0.98 kip , f_v : 59.6 psi	F_v : 201.2 psi	0.30	✓

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
S	Deflection	d: 0.01 in	d_U : 0.1 in (L / 360)	0.10	✓
1.5 D + S	Deflection	d: 0.023 in	d_U : 0.15 in (L / 240)	0.15	✓

Wall Framing Design: W-L2-Y-2-B-E

Components

Wall - Dimensions (L x H): 27.1 ft x 16 ft

Window Opening - Dimensions (L x H_{top}): 3 ft x 5 ft

USE SPRUCE PINE
FIR

Component	Section	Product / Species	Grade
Studs	2x6 @ 16 in O.C.	Southern Pine	No.2
Top plate	(2) 2x6	Southern Pine	No.2
Sill plate	2x6 Pressure Treated	Southern Pine	No.2
Window Opening - Posts	(1) 2x6	Southern Pine	No.2
Window Opening - Lintel	(3) 2x6	Southern Pine	No.2

Loads

Source	Dead	Live	Snow	Wind	Width
Self-weight and wind	10 psf	-	-	16.4 psf	-
Roof - Mezzanine	15 psf	-	23.4 psf	-	15 ft

Analysis and Design Results

Studs

Strength Checks (ASD)

I WOULD USE A MINIMUM OF 20 PSF, BUT YOU MAY WANT TO USE 25 PSF TO ACCOUNT FOR FUTURE CONSIDERATION OF PHOTO VOTAIC PANELS ADDED TO THE ROOF

I WOULD SUGGEST USING A ROOF SNOW LOAD OF 30 PSF FOR DESIGN, THAT IS MY PERSONAL PREFERENCE

Combination	Check Type	Action	Resistance	Ratio	Check
D + S	Buckling	P: 0.87 kip , f_c : 106 psi	F_c : 322 psi , C_p : 0.2	0.33	✓
D + 0.6 W	Buckling + Bending	P: 0.41 kip , f_c : 49.3 psi M: 0.42 kip-ft , f_b : 666.2 psi	F_c : 336 psi , C_p : 0.15 F_b : 2160 psi	0.38	✓
D + 0.75 S + 0.45 W	Buckling + Bending	P: 0.76 kip , f_c : 91.8 psi M: 0.31 kip-ft , f_b : 499.6 psi	F_c : 336 psi , C_p : 0.15 F_b : 2160 psi	0.39	✓
D + 0.6 W	Shear	V: 0.1 kip , f_v : 19.1 psi	F_v : 280 psi	0.07	✓
D + 0.75 S + 0.45 W	Shear	V: 0.079 kip , f_v : 14.3 psi	F_v : 280 psi	0.05	✓

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
0.42 W	Deflection	d: 0.35 in	d_U : 0.53 in (L / 360)	0.65	✓

Top plate

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + S	Bending	M: 0.15 kip-ft , f_b : 424.1 psi	F_b : 1322.5 psi	0.32	✓
D + S	Shear	V: 0.44 kip , f_v : 39.8 psi	F_v : 201.2 psi	0.20	✓

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
S	Deflection	d: 0.007 in	d_U : 0.044 in (L / 360)	0.15	✓
1.5 D + S	Deflection	d: 0.015 in	d_U : 0.067 in (L / 240)	0.23	✓

Window Opening - Posts

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + S	Buckling	P: 0.98 kip , f_c : 119.3 psi	F_c : 322 psi , C_p : 0.2	0.37	✓
D + 0.6 W	Buckling + Bending	P: 0.46 kip , f_c : 55.5 psi M: 0.47 kip-ft , f_b : 749.5 psi	F_c : 336 psi , C_p : 0.15 F_b : 2160 psi	0.45	✓
D + 0.75 S + 0.45 W	Buckling + Bending	P: 0.85 kip , f_c : 103.3 psi M: 0.35 kip-ft , f_b : 562.1 psi	F_c : 336 psi , C_p : 0.15 F_b : 2160 psi	0.47	✓
D + 0.6 W	Shear	V: 0.12 kip , f_v : 21.5 psi	F_v : 280 psi	0.08	✓
D + 0.75 S + 0.45 W	Shear	V: 0.089 kip , f_v : 16.1 psi	F_v : 280 psi	0.06	✓

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
0.42 W	Deflection	d: 0.39 in	d_U : 0.53 in (L / 360)	0.74	✓

Window Opening - Lintel

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + S	Bending	M: 0.74 kip-ft , f_b : 390.3 psi	F_b : 1150 psi	0.34	✓
D + S	Shear	V: 0.98 kip , f_v : 59.6 psi	F_v : 201.2 psi	0.30	✓

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
S	Deflection	d: 0.01 in	d_U : 0.1 in (L / 360)	0.10	✓
1.5 D + S	Deflection	d: 0.023 in	d_U : 0.15 in (L / 240)	0.15	✓

Wall Framing Design: W-L2-Y-4-A-B

Components

Wall - Dimensions (L x H): 24 ft x 16 ft

Window Opening - Dimensions (L x H_{top}): 3 ft x 5 ft

Component	Section	Product / Species	Grade
Studs	2x6 @ 16 in O.C.	Southern Pine	No.2
Top plate	(2) 2x6	Southern Pine	No.2
Sill plate	2x6 Pressure Treated	Southern Pine	No.2
Window Opening - Posts	(1) 2x6	Southern Pine	No.2
Window Opening - Lintel	(3) 2x6	Southern Pine	No.2

USE SPRUCE PINE FIR



Loads

Source	Dead	Live	Snow	Wind	Width
Self-weight and wind	10 psf	-	-	16.4 psf	-
Roof - Mezzanine	15 psf	-	23.4 psf	-	15 ft

Analysis and Design Results

Studs

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + S	Buckling	P: 0.87 kip , f_c : 106 psi	F_c : 322 psi , C_p : 0.2	0.33	✓
D + 0.6 W	Buckling + Bending	P: 0.41 kip , f_c : 49.3 psi M: 0.42 kip-ft , f_b : 666.2 psi	F_c : 336 psi , C_p : 0.15 F_b : 2160 psi	0.38	✓
D + 0.75 S + 0.45 W	Buckling + Bending	P: 0.76 kip , f_c : 91.8 psi M: 0.31 kip-ft , f_b : 499.6 psi	F_c : 336 psi , C_p : 0.15 F_b : 2160 psi	0.39	✓
D + 0.6 W	Shear	V: 0.1 kip , f_v : 19.1 psi	F_v : 280 psi	0.07	✓
D + 0.75 S + 0.45 W	Shear	V: 0.079 kip , f_v : 14.3 psi	F_v : 280 psi	0.05	✓

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I WOULD SUGGEST USING A ROOF SNOW LOAD OF 30 PSF FOR DESIGN, THAT IS MY PERSONAL PREFERENCE

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
0.42 W	Deflection	d: 0.35 in	d_U : 0.53 in (L / 360)	0.65	✓

Top plate

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + S	Bending	M: 0.15 kip-ft , f_b : 424.1 psi	F_b : 1322.5 psi	0.32	✓
D + S	Shear	V: 0.44 kip , f_v : 39.8 psi	F_v : 201.2 psi	0.20	✓

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
S	Deflection	d: 0.007 in	d_U : 0.044 in (L / 360)	0.15	✓
1.5 D + S	Deflection	d: 0.015 in	d_U : 0.067 in (L / 240)	0.23	✓

Window Opening - Posts

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + S	Buckling	P: 0.98 kip , f_c : 119.3 psi	F_c : 322 psi , C_p : 0.2	0.37	✓
D + 0.6 W	Buckling + Bending	P: 0.46 kip , f_c : 55.5 psi M: 0.47 kip-ft , f_b : 749.5 psi	F_c : 336 psi , C_p : 0.15 F_b : 2160 psi	0.45	✓
D + 0.75 S + 0.45 W	Buckling + Bending	P: 0.85 kip , f_c : 103.3 psi M: 0.35 kip-ft , f_b : 562.1 psi	F_c : 336 psi , C_p : 0.15 F_b : 2160 psi	0.47	✓
D + 0.6 W	Shear	V: 0.12 kip , f_v : 21.5 psi	F_v : 280 psi	0.08	✓
D + 0.75 S + 0.45 W	Shear	V: 0.089 kip , f_v : 16.1 psi	F_v : 280 psi	0.06	✓

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
0.42 W	Deflection	d: 0.39 in	d_U : 0.53 in (L / 360)	0.74	✓

Window Opening - Lintel

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + S	Bending	M: 0.74 kip-ft , f_b : 390.3 psi	F_b : 1150 psi	0.34	✓
D + S	Shear	V: 0.98 kip , f_v : 59.6 psi	F_v : 201.2 psi	0.30	✓

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
S	Deflection	d: 0.01 in	d_U : 0.1 in (L / 360)	0.10	✓
1.5 D + S	Deflection	d: 0.023 in	d_U : 0.15 in (L / 240)	0.15	✓

Wall Framing Design: W-L2-Y-4-B-E

Components

Wall - Dimensions (L x H): 20 ft x 17 ft

Window Opening - Dimensions (L x H_{top}): 5.4 ft x 8 ft

USE SPRUCE PINE FIR

Component	Section	Product / Species	Grade
Studs	2x6 @ 16 in O.C.	Southern Pine	No.2
Top plate	(2) 2x6	Southern Pine	No.2
Sill plate	2x6 Pressure Treated	Southern Pine	No.2
Window Opening - Posts	(2) 2x6	Southern Pine	No.2
Window Opening - Lintel	(3) 2x6	Southern Pine	Select Structural

Loads

Source	Dead	Live	Snow	Wind	Width
Self-weight and wind	10 psf	-	-	16.4 psf	-
Roof - Mezzanine	15 psf	-	23.4 psf	-	15 ft

Analysis and Design Results

Studs

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + S	Buckling	P: 0.88 kip , f_c : 106.8 psi	F_c : 289.8 psi , C_p : 0.18	0.37	✓
D + 0.6 W	Buckling + Bending	P: 0.41 kip , f_c : 50.1 psi M: 0.47 kip-ft , f_b : 752.1 psi	F_c : 291.2 psi , C_p : 0.13 F_b : 2160 psi	0.45	✓
D + 0.75 S + 0.45 W	Buckling + Bending	P: 0.76 kip , f_c : 92.6 psi M: 0.36 kip-ft , f_b : 564.1 psi	F_c : 291.2 psi , C_p : 0.13 F_b : 2160 psi	0.48	✓
D + 0.6 W	Shear	V: 0.11 kip , f_v : 20.3 psi	F_v : 280 psi	0.07	✓
D + 0.75 S + 0.45 W	Shear	V: 0.084 kip , f_v : 15.2 psi	F_v : 280 psi	0.05	✓

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
0.42 W	Deflection	d: 0.44 in	d_U : 0.57 in (L / 360)	0.78	✓

Top plate

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + S	Bending	M: 0.15 kip-ft , f_b : 427.3 psi	F_b : 1322.5 psi	0.32	✓
D + S	Shear	V: 0.44 kip , f_v : 40.1 psi	F_v : 201.2 psi	0.20	✓

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
S	Deflection	d: 0.007 in	d_U : 0.044 in (L / 360)	0.15	✓
1.5 D + S	Deflection	d: 0.015 in	d_U : 0.067 in (L / 240)	0.23	✓

Window Opening - Posts

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + S	Buckling	P: 1.78 kip , f_c : 108.2 psi	F_c : 289.8 psi , C_p : 0.18	0.37	✓
D + 0.6 W	Buckling + Bending	P: 0.84 kip , f_c : 50.7 psi M: 0.96 kip-ft , f_b : 761.5 psi	F_c : 291.2 psi , C_p : 0.13 F_b : 2160 psi	0.45	✓
D + 0.75 S + 0.45 W	Buckling + Bending	P: 1.55 kip , f_c : 93.8 psi M: 0.72 kip-ft , f_b : 571.1 psi	F_c : 291.2 psi , C_p : 0.13 F_b : 2160 psi	0.48	✓
D + 0.6 W	Shear	V: 0.23 kip , f_v : 20.5 psi	F_v : 280 psi	0.07	✓
D + 0.75 S + 0.45 W	Shear	V: 0.17 kip , f_v : 15.4 psi	F_v : 280 psi	0.05	✓

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
0.42 W	Deflection	d: 0.45 in	d_u : 0.57 in (L / 360)	0.79	✓

Window Opening - Lintel

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + S	Bending	M: 2.41 kip-ft , f_b : 1274.4 psi	F_b : 2415 psi	0.53	✓
D + S	Shear	V: 1.78 kip , f_v : 108.2 psi	F_v : 201.2 psi	0.54	✓

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
S	Deflection	d: 0.066 in	d_u : 0.18 in (L / 360)	0.37	✓
1.5 D + S	Deflection	d: 0.15 in	d_u : 0.27 in (L / 240)	0.57	✓