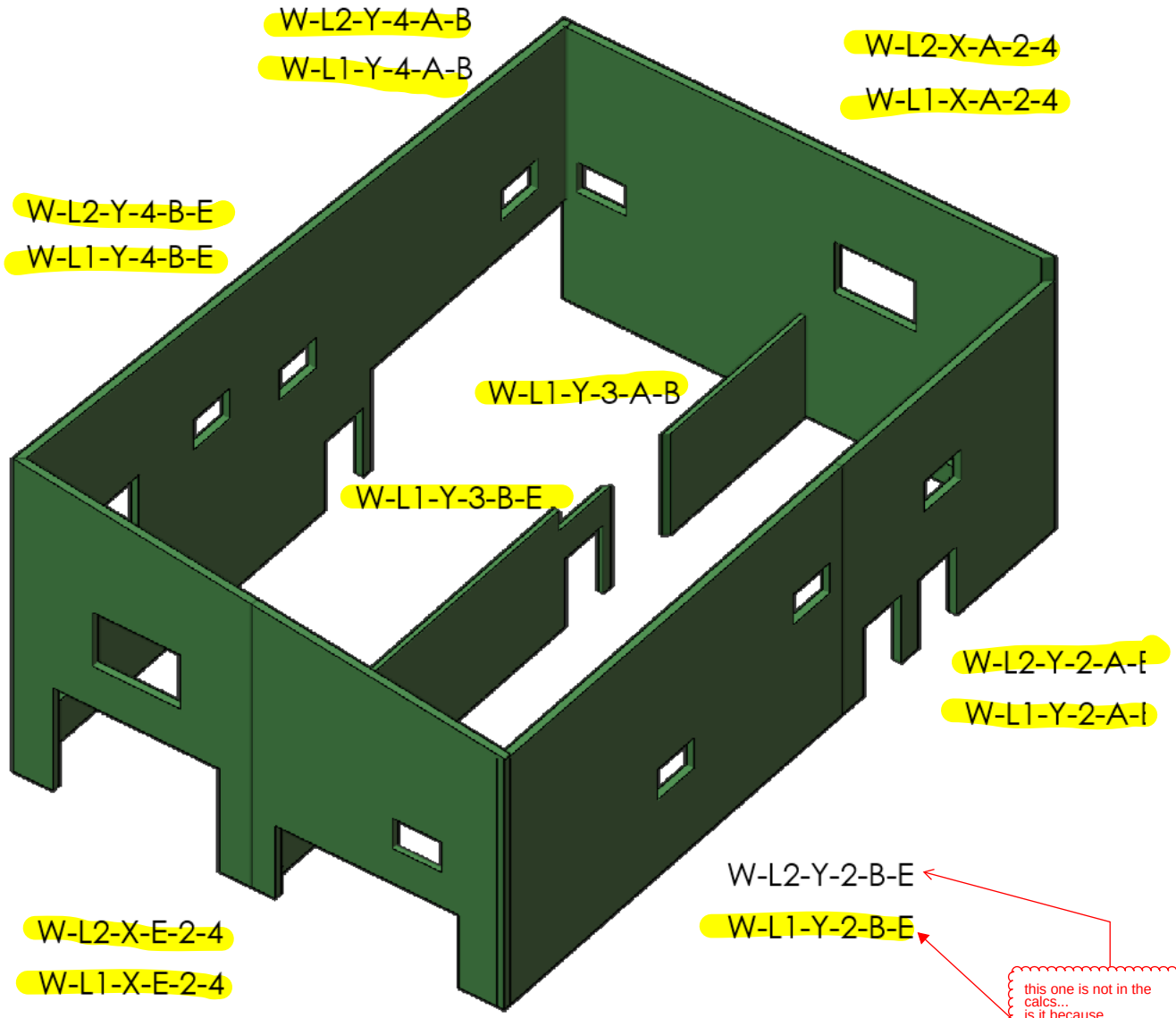
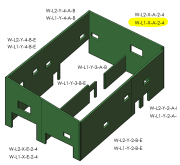
Wall Framing Design - Mezzanine

First Storey Walls:

Second Storey Walls:



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

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

Loads

Source	Dead	Live	Snow	Wind	Width
Self-weight and wind	10 psf	-	-	20 psf	-
Floor - Mezzanine	20 psf	80 psf	-	-	1 ft
Roof - Mezzanine	25 psf	-	30 psf	-	1 ft
External second-storey wall (Width denotes Height)	10 psf	-	-	-	16 ft

Analysis and Design Results

Studs

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + L	Buckling	P: 0.45 kip , f_c: 54.1 psi	F_c: 514.8 psi , C_P: 0.71	0.11	✔
D + S	Buckling	P: 0.38 kip , f_c: 46.1 psi	F_c: 550.3 psi , C_P: 0.66	0.08	✔
D + 0.75 L + 0.75 S	Buckling	P: 0.45 kip , f_c: 54.5 psi	F_c: 550.3 psi , C_P: 0.66	0.10	✔
D + 0.6 W	Buckling + Bending	P: 0.34 kip , f_c: 41.2 psi M: 0.2 kip-ft , f_b: 317.4 psi	F_c: 614.8 psi , C_P: 0.53 F_b: 1458 psi	0.24	✔
D + 0.75 L + 0.75 S + 0.45 W	Buckling + Bending	P: 0.45 kip , f_c: 54.5 psi M: 0.15 kip-ft , f_b: 238 psi	F_c: 614.8 psi , C_P: 0.53 F_b: 1458 psi	0.18	✔
D + 0.6 W	Shear	V: 0.08 kip , f_v: 14.5 psi	F_v: 216 psi	0.07	✔
D + 0.75 L + 0.75 S + 0.45 W	Shear	V: 0.06 kip , f_v: 10.9 psi	F_v: 216 psi	0.05	✔

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
0.42 W	Deflection	d: 0.077 in	d_U: 0.33 in (L / 360)	0.23	✔

Top plate

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + L	Bending	M: 0.074 kip-ft , f_b: 216.6 psi	F_b: 1305.2 psi	0.17	✔
D + S	Bending	M: 0.063 kip-ft , f_b: 184.2 psi	F_b: 1501 psi	0.12	✔
D + 0.75 L + 0.75 S	Bending	M: 0.075 kip-ft , f_b: 218.2 psi	F_b: 1501 psi	0.15	✔
D + L	Shear	V: 0.22 kip , f_v: 20.3 psi	F_v: 135 psi	0.15	✔
D + S	Shear	V: 0.19 kip , f_v: 17.3 psi	F_v: 155.2 psi	0.11	✔
D + 0.75 L + 0.75 S	Shear	V: 0.23 kip , f_v: 20.5 psi	F_v: 155.2 psi	0.13	✔

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
L	Deflection	d: 0.001 in	d_U: 0.044 in (L / 360)	0.03	✔
S	Deflection	d: 5.59e-04 in	d_U: 0.044 in (L / 360)	0.01	✔
0.75 L + 0.75 S	Deflection	d: 0.002 in	d_U: 0.044 in (L / 360)	0.03	✔
1.5 D + L	Deflection	d: 0.009 in	d_U: 0.067 in (L / 240)	0.13	✔
1.5 D + S	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: 0.009 in	d_U: 0.067 in (L / 240)	0.13	✔

Window Opening - Posts

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + L	Buckling	P: 0.5 kip , f_c: 60.9 psi	F_c: 514.8 psi , C_P: 0.71	0.12	✔
D + S	Buckling	P: 0.43 kip , f_c: 51.8 psi	F_c: 550.3 psi , C_P: 0.66	0.09	✔
D + 0.75 L + 0.75 S	Buckling	P: 0.51 kip , f_c: 61.4 psi	F_c: 550.3 psi , C_P: 0.66	0.11	✔
D + 0.6 W	Buckling + Bending	P: 0.38 kip , f_c: 46.4 psi M: 0.22 kip-ft , f_b: 357 psi	F_c: 614.8 psi , C_P: 0.53 F_b: 1458 psi	0.26	✔
D + 0.75 L + 0.75 S + 0.45 W	Buckling + Bending	P: 0.51 kip , f_c: 61.4 psi M: 0.17 kip-ft , f_b: 267.8 psi	F_c: 614.8 psi , C_P: 0.53 F_b: 1458 psi	0.21	✔
D + 0.6 W	Shear	V: 0.09 kip , f_v: 16.4 psi	F_v: 216 psi	0.08	✔
D + 0.75 L + 0.75 S + 0.45 W	Shear	V: 0.068 kip , f_v: 12.3 psi	F_v: 216 psi	0.06	✔

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
0.42 W	Deflection	d: 0.087 in	d_U: 0.33 in (L / 360)	0.26	✔

Window Opening - Lintel

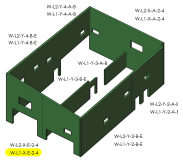
Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + L	Bending	M: 0.38 kip-ft , f_b: 492.2 psi	F_b: 1310 psi	0.38	✔
D + S	Bending	M: 0.32 kip-ft , f_b: 418.8 psi	F_b: 1506.5 psi	0.28	✔
D + 0.75 L + 0.75 S	Bending	M: 0.38 kip-ft , f_b: 495.9 psi	F_b: 1506.5 psi	0.33	✔
D + L	Shear	V: 0.5 kip , f_v: 47.9 psi	F_v: 135 psi	0.35	✔
D + S	Shear	V: 0.43 kip , f_v: 40.7 psi	F_v: 155.2 psi	0.26	✔
D + 0.75 L + 0.75 S	Shear	V: 0.51 kip , f_v: 48.2 psi	F_v: 155.2 psi	0.31	✔

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
L	Deflection	d: 0.007 in	d_U: 0.1 in (L / 360)	0.07	✔
S	Deflection	d: 0.003 in	d_U: 0.1 in (L / 360)	0.03	✔
0.75 L + 0.75 S	Deflection	d: 0.008 in	d_U: 0.1 in (L / 360)	0.08	✔
1.5 D + L	Deflection	d: 0.043 in	d_U: 0.15 in (L / 240)	0.29	✔
1.5 D + S	Deflection	d: 0.038 in	d_U: 0.15 in (L / 240)	0.25	✔
1.5 D + 0.75 L + 0.75 S	Deflection	d: 0.043 in	d_U: 0.15 in (L / 240)	0.29	✔

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

Component	Section	Product / Species	Grade
Studs	2x6 @ 16 in O.C.	Spruce-Pine-Fir	Stud
Top plate	(2) 2x6	Spruce-Pine-Fir	No.1/No.2
Sill plate	2x6 Pressure Treated	Spruce-Pine-Fir	No.1/No.2
Garage Door - Posts	(3) 2x6	Spruce-Pine-Fir	Stud
Garage Door - Lintel	(3) 2x12	Spruce-Pine-Fir	No.1/No.2

would it be possible to call out the number of jack studs and the number of king studs, throughout all the docs?

Loads

Source	Dead	Live	Snow	Wind	Width
Self-weight and wind	10 psf	-	-	20 psf	-
Floor - Mezzanine	20 psf	80 psf	-	-	1 ft
Roof - Mezzanine	25 psf	-	30 psf	-	1 ft
External second-storey wall (Width denotes Height)	10 psf	-	-	-	14 ft

Analysis and Design Results

Studs

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + L	Buckling	P: 0.43 kip , f_c: 52.5 psi	F_c: 413.2 psi , C_P: 0.57	0.13	✔
D + S	Buckling	P: 0.37 kip , f_c: 44.4 psi	F_c: 433.6 psi , C_P: 0.52	0.10	✔
D + 0.75 L + 0.75 S	Buckling	P: 0.44 kip , f_c: 52.9 psi	F_c: 433.6 psi , C_P: 0.52	0.12	✔
D + 0.6 W	Buckling + Bending	P: 0.33 kip , f_c: 39.6 psi M: 0.29 kip-ft , f_b: 457 psi	F_c: 464 psi , C_P: 0.4 F_b: 1458 psi	0.34	✔
D + 0.75 L + 0.75 S + 0.45 W	Buckling + Bending	P: 0.44 kip , f_c: 52.9 psi M: 0.22 kip-ft , f_b: 342.7 psi	F_c: 464 psi , C_P: 0.4 F_b: 1458 psi	0.28	✔
D + 0.6 W	Shear	V: 0.096 kip , f_v: 17.5 psi	F_v: 216 psi	0.08	✔
D + 0.75 L + 0.75 S + 0.45 W	Shear	V: 0.072 kip , f_v: 13.1 psi	F_v: 216 psi	0.06	✔

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
0.42 W	Deflection	d: 0.16 in	d_U: 0.4 in (L / 360)	0.40	✔

Top plate

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + L	Bending	M: 0.072 kip-ft , f_b: 210.1 psi	F_b: 1305.2 psi	0.16	✔
D + S	Bending	M: 0.061 kip-ft , f_b: 177.8 psi	F_b: 1501 psi	0.12	✔
D + 0.75 L + 0.75 S	Bending	M: 0.073 kip-ft , f_b: 211.7 psi	F_b: 1501 psi	0.14	✔
D + L	Shear	V: 0.22 kip , f_v: 19.7 psi	F_v: 135 psi	0.15	✔
D + S	Shear	V: 0.18 kip , f_v: 16.7 psi	F_v: 155.2 psi	0.11	✔
D + 0.75 L + 0.75 S	Shear	V: 0.22 kip , f_v: 19.8 psi	F_v: 155.2 psi	0.13	✔

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
L	Deflection	d: 0.001 in	d_U: 0.044 in (L / 360)	0.03	✔
S	Deflection	d: 5.59e-04 in	d_U: 0.044 in (L / 360)	0.01	✔
0.75 L + 0.75 S	Deflection	d: 0.002 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)	0.13	✔
1.5 D + S	Deflection	d: 0.007 in	d_U: 0.067 in (L / 240)	0.11	✔
1.5 D + 0.75 L + 0.75 S	Deflection	d: 0.008 in	d_U: 0.067 in (L / 240)	0.13	✔

Garage Door - Posts

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + L	Buckling	P: 1.66 kip , f_c: 67 psi	F_c: 413.2 psi , C_P: 0.57	0.16	✔
D + S	Buckling	P: 1.4 kip , f_c: 56.7 psi	F_c: 433.6 psi , C_P: 0.52	0.13	✔
D + 0.75 L + 0.75 S	Buckling	P: 1.67 kip , f_c: 67.5 psi	F_c: 433.6 psi , C_P: 0.52	0.16	✔
D + 0.6 W	Buckling + Bending	P: 1.25 kip , f_c: 50.5 psi M: 1.1 kip-ft , f_b: 582.7 psi	F_c: 464 psi , C_P: 0.4 F_b: 1458 psi	0.45	✔
D + 0.75 L + 0.75 S + 0.45 W	Buckling + Bending	P: 1.67 kip , f_c: 67.5 psi M: 0.83 kip-ft , f_b: 437 psi	F_c: 464 psi , C_P: 0.4 F_b: 1458 psi	0.37	✔
D + 0.6 W	Shear	V: 0.37 kip , f_v: 22.3 psi	F_v: 216 psi	0.10	✔
D + 0.75 L + 0.75 S + 0.45 W	Shear	V: 0.28 kip , f_v: 16.7 psi	F_v: 216 psi	0.08	✔

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
0.42 W	Deflection	d: 0.2 in	d_U: 0.4 in (L / 360)	0.51	✔

Garage Door - Lintel

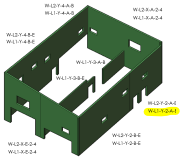
Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + L	Bending	M: 4.23 kip-ft , f_b: 534.3 psi	F_b: 875 psi	0.61	✔
D + S	Bending	M: 3.58 kip-ft , f_b: 452.1 psi	F_b: 1006.2 psi	0.45	✔
D + 0.75 L + 0.75 S	Bending	M: 4.26 kip-ft , f_b: 538.4 psi	F_b: 1006.2 psi	0.54	✔
D + L	Shear	V: 1.66 kip , f_v: 49.1 psi	F_v: 135 psi	0.36	✔
D + S	Shear	V: 1.4 kip , f_v: 41.6 psi	F_v: 155.2 psi	0.27	✔
D + 0.75 L + 0.75 S	Shear	V: 1.67 kip , f_v: 49.5 psi	F_v: 155.2 psi	0.32	✔

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
L	Deflection	d: 0.029 in	d_U: 0.34 in (L / 360)	0.09	✔
S	Deflection	d: 0.011 in	d_U: 0.34 in (L / 360)	0.03	✔
0.75 L + 0.75 S	Deflection	d: 0.03 in	d_U: 0.34 in (L / 360)	0.09	✔
1.5 D + L	Deflection	d: 0.16 in	d_U: 0.51 in (L / 240)	0.32	✔
1.5 D + S	Deflection	d: 0.15 in	d_U: 0.51 in (L / 240)	0.29	✔
1.5 D + 0.75 L + 0.75 S	Deflection	d: 0.17 in	d_U: 0.51 in (L / 240)	0.32	✔

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

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

Loads

Source	Dead	Live	Snow	Wind	Width
Self-weight and wind	10 psf	-	-	-	-
Floor - Mezzanine	20 psf	80 psf	-	-	7.5 ft
Roof - Mezzanine	25 psf	-	30 psf	-	15 ft
Roof - Mezzanine - snow drift	-	-	4.4 plf	-	-
External second-storey wall (Width denotes Height)	10 psf	-	-	-	13.5 ft

Analysis and Design Results

Studs

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check

Combination	Check Type	Action	Resistance	Ratio	Check
D + L	Buckling	P: 1.75 kip , f_c: 211.7 psi	F_c: 708.4 psi , C_P: 0.56	0.30	✔
D + S	Buckling	P: 1.55 kip , f_c: 188.2 psi	F_c: 727.4 psi , C_P: 0.5	0.26	✔
D + 0.75 L + 0.75 S	Buckling	P: 2 kip , f_c: 242.6 psi	F_c: 727.4 psi , C_P: 0.5	0.33	✔

NB: No serviceability checks required

Top plate

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + L	Bending	M: 0.29 kip-ft , f_b: 846.9 psi	F_b: 1305.2 psi	0.65	✔
D + S	Bending	M: 0.26 kip-ft , f_b: 752.8 psi	F_b: 1501 psi	0.50	✔
D + 0.75 L + 0.75 S	Bending	M: 0.33 kip-ft , f_b: 970.2 psi	F_b: 1501 psi	0.65	✔
D + L	Shear	V: 0.87 kip , f_v: 79.4 psi	F_v: 135 psi	0.59	✔
D + S	Shear	V: 0.78 kip , f_v: 70.6 psi	F_v: 155.2 psi	0.45	✔
D + 0.75 L + 0.75 S	Shear	V: 1 kip , f_v: 91 psi	F_v: 155.2 psi	0.59	✔

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
L	Deflection	d: 0.011 in	d_U: 0.044 in (L / 360)	0.25	✔
S	Deflection	d: 0.008 in	d_U: 0.044 in (L / 360)	0.19	✔
0.75 L + 0.75 S	Deflection	d: 0.015 in	d_U: 0.044 in (L / 360)	0.33	✔
1.5 D + L	Deflection	d: 0.031 in	d_U: 0.067 in (L / 240)	0.47	✔
1.5 D + S	Deflection	d: 0.028 in	d_U: 0.067 in (L / 240)	0.42	✔
1.5 D + 0.75 L + 0.75 S	Deflection	d: 0.035 in	d_U: 0.067 in (L / 240)	0.52	✔

Internal Door - Posts

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + L	Buckling	P: 2.1 kip , f_c: 254.1 psi	F_c: 708.4 psi , C_P: 0.56	0.36	✔
D + S	Buckling	P: 1.86 kip , f_c: 225.8 psi	F_c: 727.4 psi , C_P: 0.5	0.31	✔
D + 0.75 L + 0.75 S	Buckling	P: 2.4 kip , f_c: 291.1 psi	F_c: 727.4 psi , C_P: 0.5	0.40	✔

NB: No serviceability checks required

Internal Door - Lintel

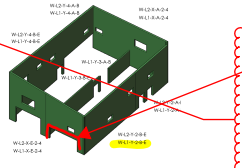
Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + L	Bending	M: 1.68 kip-ft , f_b: 886.9 psi	F_b: 1135 psi	0.78	✔
D + S	Bending	M: 1.49 kip-ft , f_b: 788.3 psi	F_b: 1305.2 psi	0.60	✔
D + 0.75 L + 0.75 S	Bending	M: 1.92 kip-ft , f_b: 1016.1 psi	F_b: 1305.2 psi	0.78	✔
D + L	Shear	V: 2.1 kip , f_v: 127 psi	F_v: 135 psi	0.94	✔
D + S	Shear	V: 1.86 kip , f_v: 112.9 psi	F_v: 155.2 psi	0.73	✔
D + 0.75 L + 0.75 S	Shear	V: 2.4 kip , f_v: 145.5 psi	F_v: 155.2 psi	0.94	✔

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
L	Deflection	d: 0.021 in	d_U: 0.11 in (L / 360)	0.20	✔
S	Deflection	d: 0.016 in	d_U: 0.11 in (L / 360)	0.15	✔
0.75 L + 0.75 S	Deflection	d: 0.028 in	d_U: 0.11 in (L / 360)	0.26	✔
1.5 D + L	Deflection	d: 0.059 in	d_U: 0.16 in (L / 240)	0.37	✔
1.5 D + S	Deflection	d: 0.054 in	d_U: 0.16 in (L / 240)	0.34	✔
1.5 D + 0.75 L + 0.75 S	Deflection	d: 0.066 in	d_U: 0.16 in (L / 240)	0.41	✔

Wall Framing Design: W-L1-Y-2-B-E (LSL 2x8)



i don't think Kurt knew about the moment frame here, when he suggested this LSL2x8.
Are these still necessary with the moment frame?

Regardless, LSL and LVL sizes are called out by their exact size.

so is this a (LSL 1.5"x7.25")?

Components

Wall - Dimensions (L x H): 27.1 ft x 24.5 ft

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

Component	Section	Product / Species	Grade
Studs	2x8 @ 16 in O.C.	LSL	1.5E
Top plate	(2) 2x8	LSL	1.5E
Sill plate	2x8 Pressure Treated	LSL	1.5E
Internal Window - Posts	(1) 2x8	LSL	1.5E
Internal Window - Lintel	(3) 2x6	Spruce-Pine-Fir	No.1/No.2

Loads

Source	Dead	Live	Snow	Wind	Width
Self-weight and wind	10 psf	-	-	20 psf	-
Floor - Mezzanine	20 psf	80 psf	-	-	3 ft

Source	Dead	Live	Snow	Wind	Width
Roof - Mezzanine	25 psf	-	30 psf	-	15 ft
Roof - Mezzanine - snow drift	-	-	4.4 plf	-	-

Analysis and Design Results

Studs

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + L	Buckling	P: 1.06 kip , f_c: 97.8 psi	F_c: 378.9 psi , C_P: 0.18	0.26	✔
D + S	Buckling	P: 1.35 kip , f_c: 124.1 psi	F_c: 363.1 psi , C_P: 0.15	0.34	✔
D + 0.75 L + 0.75 S	Buckling	P: 1.44 kip , f_c: 132.2 psi	F_c: 363.1 psi , C_P: 0.15	0.36	✔
D + 0.6 W	Buckling + Bending	P: 0.74 kip , f_c: 68.4 psi M: 1.2 kip-ft , f_b: 1096.3 psi	F_c: 370.5 psi , C_P: 0.11 F_b: 4670 psi	0.31	✔
D + 0.75 L + 0.75 S + 0.45 W	Buckling + Bending	P: 1.44 kip , f_c: 132.2 psi M: 0.9 kip-ft , f_b: 822.2 psi	F_c: 370.5 psi , C_P: 0.11 F_b: 4670 psi	0.41	✔
D + 0.6 W	Shear	V: 0.2 kip , f_v: 27 psi	F_v: 808 psi	0.03	✔
D + 0.75 L + 0.75 S + 0.45 W	Shear	V: 0.15 kip , f_v: 20.3 psi	F_v: 808 psi	0.03	✔

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
0.42 W	Deflection	d: 1.03 in	d_u: 1.23 in (L / 240)	0.84	✔

Top plate

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + L	Bending	M: 0.18 kip-ft , f_b: 391.1 psi	F_b: 2525 psi	0.15	✔
D + S	Bending	M: 0.22 kip-ft , f_b: 496.3 psi	F_b: 2903.8 psi	0.17	✔
D + 0.75 L + 0.75 S	Bending	M: 0.24 kip-ft , f_b: 528.8 psi	F_b: 2903.8 psi	0.18	✔
D + L	Shear	V: 0.53 kip , f_v: 36.7 psi	F_v: 150 psi	0.24	✔
D + S	Shear	V: 0.67 kip , f_v: 46.5 psi	F_v: 172.5 psi	0.27	✔
D + 0.75 L + 0.75 S	Shear	V: 0.72 kip , f_v: 49.6 psi	F_v: 172.5 psi	0.29	✔

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
L	Deflection	d: 0.003 in	d_u: 0.044 in (L / 360)	0.07	✔
S	Deflection	d: 0.006 in	d_u: 0.044 in (L / 360)	0.13	✔
0.75 L + 0.75 S	Deflection	d: 0.007 in	d_u: 0.044 in (L / 360)	0.15	✔
1.5 D + L	Deflection	d: 0.014 in	d_u: 0.067 in (L / 240)	0.21	✔
1.5 D + S	Deflection	d: 0.017 in	d_u: 0.067 in (L / 240)	0.26	✔
1.5 D + 0.75 L + 0.75 S	Deflection	d: 0.018 in	d_u: 0.067 in (L / 240)	0.27	✔

Internal Window - Posts

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + L	Buckling	P: 1.2 kip , f_c: 110 psi	F_c: 378.9 psi , C_P: 0.18	0.29	✔
D + S	Buckling	P: 1.52 kip , f_c: 139.6 psi	F_c: 363.1 psi , C_P: 0.15	0.38	✔
D + 0.75 L + 0.75 S	Buckling	P: 1.62 kip , f_c: 148.7 psi	F_c: 363.1 psi , C_P: 0.15	0.41	✔
D + 0.6 W	Buckling + Bending	P: 0.84 kip , f_c: 76.9 psi M: 1.35 kip-ft , f_b: 1233.3 psi	F_c: 370.5 psi , C_P: 0.11 F_b: 4670 psi	0.37	✔
D + 0.75 L + 0.75 S + 0.45 W	Buckling + Bending	P: 1.62 kip , f_c: 148.7 psi M: 1.01 kip-ft , f_b: 925 psi	F_c: 370.5 psi , C_P: 0.11 F_b: 4670 psi	0.49	✔
D + 0.6 W	Shear	V: 0.22 kip , f_v: 30.4 psi	F_v: 808 psi	0.04	✔
D + 0.75 L + 0.75 S + 0.45 W	Shear	V: 0.17 kip , f_v: 22.8 psi	F_v: 808 psi	0.03	✔

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
0.42 W	Deflection	d: 1.15 in	d_u: 1.23 in (L / 240)	0.94	✔

Internal Window - Lintel

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + L	Bending	M: 0.9 kip-ft , f_b: 474.5 psi	F_b: 1135 psi	0.42	✔
D + S	Bending	M: 1.14 kip-ft , f_b: 602.1 psi	F_b: 1305.2 psi	0.46	✔
D + 0.75 L + 0.75 S	Bending	M: 1.21 kip-ft , f_b: 641.6 psi	F_b: 1305.2 psi	0.49	✔
D + L	Shear	V: 1.2 kip , f_v: 72.5 psi	F_v: 135 psi	0.54	✔
D + S	Shear	V: 1.52 kip , f_v: 92 psi	F_v: 155.2 psi	0.59	✔
D + 0.75 L + 0.75 S	Shear	V: 1.62 kip , f_v: 98 psi	F_v: 155.2 psi	0.63	✔

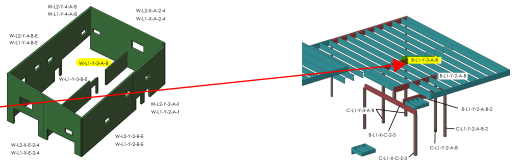
Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
L	Deflection	d: 0.007 in	d_U: 0.1 in (L / 360)	0.07	✔
S	Deflection	d: 0.013 in	d_U: 0.1 in (L / 360)	0.13	✔
0.75 L + 0.75 S	Deflection	d: 0.015 in	d_U: 0.1 in (L / 360)	0.15	✔
1.5 D + L	Deflection	d: 0.031 in	d_U: 0.15 in (L / 240)	0.20	✔
1.5 D + S	Deflection	d: 0.037 in	d_U: 0.15 in (L / 240)	0.24	✔
1.5 D + 0.75 L + 0.75 S	Deflection	d: 0.038 in	d_U: 0.15 in (L / 240)	0.26	✔

Wall Framing Design: W-L1-Y-3-A-B (SPF 2x6)

Components

not sure where this opening is coming from...
if it's the hall, isn't that beam already called out, in the 'Beams' doc?



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

Component	Section	Product / Species	Grade
Studs	2x6 @ 16 in O.C.	Spruce-Pine-Fir	No.1/No.2
Top plate	(2) 2x6	Spruce-Pine-Fir	No.1/No.2
Sill plate	2x6 Pressure Treated	Spruce-Pine-Fir	No.1/No.2
Internal Full-height Opening - Posts	(2) 2x6	Spruce-Pine-Fir	No.1/No.2
Internal Full-height Opening - Lintel	(3) 2x12	Spruce-Pine-Fir	No.1/No.2

Loads

Source	Dead	Live	Snow	Wind	Width
Self-weight and wind	6 psf	-	-	-	-
Floor - Mezzanine	20 psf	80 psf	-	-	15 ft

Analysis and Design Results

Studs

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + L	Buckling	P: 2.04 kip , f_c: 247.3 psi	F_c: 708.4 psi , C_P: 0.56	0.35	✔

NB: No serviceability checks required

Top plate

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + L	Bending	M: 0.34 kip-ft , f_b: 989.1 psi	F_b: 1305.2 psi	0.76	✔
D + L	Shear	V: 1.02 kip , f_v: 92.7 psi	F_v: 135 psi	0.69	✔

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
L	Deflection	d: 0.022 in	d_U: 0.044 in (L / 360)	0.50	✔
1.5 D + L	Deflection	d: 0.032 in	d_U: 0.067 in (L / 240)	0.47	✔

Internal Full-height Opening - Posts

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + L	Buckling	P: 3.44 kip , f_c: 208.6 psi	F_c: 708.4 psi , C_P: 0.56	0.29	✔

NB: No serviceability checks required

Internal Full-height Opening - 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: 875 psi	0.56	✔
D + L	Shear	V: 3.44 kip , f_v: 102 psi	F_v: 135 psi	0.76	✔

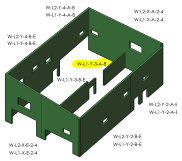
Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
L	Deflection	d: 0.025 in	d_U: 0.15 in (L / 360)	0.16	✔
1.5 D + L	Deflection	d: 0.035 in	d_U: 0.23 in (L / 240)	0.15	✔

Wall Framing Design: W-L1-Y-3-A-B (LSL 2x4)

Components

is this just an alternate option, in addition to the 2x6 wall called out above?



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

Component	Section	Product / Species	Grade
Studs	2x4 @ 16 in O.C.	LSL	1.3E
Top plate	(2) 2x4	LSL	1.3E
Sill plate	2x4 Pressure Treated	LSL	1.3E
Internal Full-height Opening - Posts	(2) 2x4	LSL	1.3E
Internal Full-height Opening - Lintel	(3) 2x12	Spruce-Pine-Fir	No.1/No.2

Loads

Source	Dead	Live	Snow	Wind	Width
Self-weight and wind	6 psf	-	-	-	-
Floor - Mezzanine	20 psf	80 psf	-	-	15 ft

Analysis and Design Results

Studs

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + L	Buckling	P: 2.04 kip , f_c: 388.6 psi	F_c: 440.4 psi , C_P: 0.24	0.88	✔

NB: No serviceability checks required

Top plate

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + L	Bending	M: 0.34 kip-ft , f_b: 1554.3 psi	F_b: 1900 psi	0.82	✔
D + L	Shear	V: 1.02 kip , f_v: 145.7 psi	F_v: 150 psi	0.97	✔

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
L	Deflection	d: 0.038 in	d_U: 0.044 in (L / 360)	0.85	✔
1.5 D + L	Deflection	d: 0.053 in	d_U: 0.067 in (L / 240)	0.80	✔

Internal Full-height Opening - Posts

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + L	Buckling	P: 3.44 kip , f_c: 327.9 psi	F_c: 440.4 psi , C_P: 0.24	0.74	✔

NB: No serviceability checks required

Internal Full-height Opening - Lintel

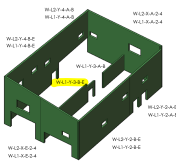
Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + L	Bending	M: 3.87 kip-ft , f_b: 489.6 psi	F_b: 875 psi	0.56	✔
D + L	Shear	V: 3.44 kip , f_v: 102 psi	F_v: 135 psi	0.76	✔

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
L	Deflection	d: 0.025 in	d_U: 0.15 in (L / 360)	0.16	✔
1.5 D + L	Deflection	d: 0.035 in	d_U: 0.23 in (L / 240)	0.15	✔

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



Components

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.	Spruce-Pine-Fir	No.1/No.2
Top plate	(2) 2x4	Spruce-Pine-Fir	No.1/No.2
Sill plate	2x4 Pressure Treated	Spruce-Pine-Fir	No.1/No.2
Internal Window - Posts	(1) 2x4	Spruce-Pine-Fir	No.1/No.2
Internal Window - Lintel	(3) 2x6	Spruce-Pine-Fir	No.1/No.2

Loads

Source	Dead	Live	Snow	Wind	Width

Source	Dead	Live	Snow	Wind	Width
Self-weight and wind	6 psf	-	-	-	-
Floor - Mezzanine	20 psf	80 psf	-	-	7.5 ft

Analysis and Design Results

Studs

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + L	Buckling	P: 1.05 kip , f_c: 199.6 psi	F_c: 237.6 psi , C_P: 0.18	0.84	✔

NB: No serviceability checks required

Top plate

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + L	Bending	M: 0.17 kip-ft , f_b: 798.5 psi	F_b: 1441 psi	0.55	✔
D + L	Shear	V: 0.52 kip , f_v: 74.9 psi	F_v: 135 psi	0.55	✔

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
L	Deflection	d: 0.018 in	d_u: 0.044 in (L / 360)	0.40	✔
1.5 D + L	Deflection	d: 0.026 in	d_u: 0.067 in (L / 240)	0.39	✔

Internal Window - Posts

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + L	Buckling	P: 1.18 kip , f_c: 224.6 psi	F_c: 237.6 psi , C_P: 0.18	0.95	✔

NB: No serviceability checks required

Internal Window - Lintel

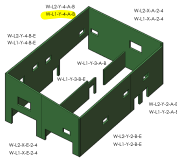
Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + L	Bending	M: 0.88 kip-ft , f_b: 467.7 psi	F_b: 1135 psi	0.41	✔
D + L	Shear	V: 1.18 kip , f_v: 71.5 psi	F_v: 135 psi	0.53	✔

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
L	Deflection	d: 0.017 in	d_u: 0.1 in (L / 360)	0.17	✔
1.5 D + L	Deflection	d: 0.025 in	d_u: 0.15 in (L / 240)	0.17	✔

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



Components

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

Component	Section	Product / Species	Grade
Studs	2x6 @ 16 in O.C.	Spruce-Pine-Fir	No.1/No.2
Top plate	(2) 2x6	Spruce-Pine-Fir	No.1/No.2
Sill plate	2x6 Pressure Treated	Spruce-Pine-Fir	No.1/No.2

Loads

Source	Dead	Live	Snow	Wind	Width
Self-weight and wind	10 psf	-	-	-	-
Floor - Mezzanine	20 psf	80 psf	-	-	7.5 ft
Roof - Mezzanine	25 psf	-	30 psf	-	15 ft
Roof - Mezzanine - snow drift	-	-	65.9 plf	-	-
External second-storey wall (Width denotes Height)	10 psf	-	-	-	16 ft

Analysis and Design Results

Studs

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + L	Buckling	P: 1.78 kip , f_c: 215.8 psi	F_c: 708.4 psi , C_P: 0.56	0.30	✔
D + S	Buckling	P: 1.67 kip , f_c: 202.2 psi	F_c: 727.4 psi , C_P: 0.5	0.28	✔
D + 0.75 L + 0.75 S	Buckling	P: 2.1 kip , f_c: 254 psi	F_c: 727.4 psi , C_P: 0.5	0.35	✔

NB: No serviceability checks required

Top plate

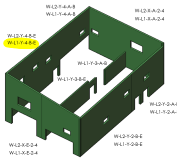
Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + L	Bending	M: 0.3 kip-ft , f_b: 863 psi	F_b: 1305.2 psi	0.66	✔
D + S	Bending	M: 0.28 kip-ft , f_b: 808.7 psi	F_b: 1501 psi	0.54	✔
D + 0.75 L + 0.75 S	Bending	M: 0.35 kip-ft , f_b: 1016.2 psi	F_b: 1501 psi	0.68	✔
D + L	Shear	V: 0.89 kip , f_v: 80.9 psi	F_v: 135 psi	0.60	✔
D + S	Shear	V: 0.83 kip , f_v: 75.8 psi	F_v: 155.2 psi	0.49	✔
D + 0.75 L + 0.75 S	Shear	V: 1.05 kip , f_v: 95.3 psi	F_v: 155.2 psi	0.61	✔

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
L	Deflection	d: 0.011 in	d_u: 0.044 in (L / 360)	0.25	✔
S	Deflection	d: 0.01 in	d_u: 0.044 in (L / 360)	0.22	✔
0.75 L + 0.75 S	Deflection	d: 0.016 in	d_u: 0.044 in (L / 360)	0.35	✔
1.5 D + L	Deflection	d: 0.032 in	d_u: 0.067 in (L / 240)	0.48	✔
1.5 D + S	Deflection	d: 0.03 in	d_u: 0.067 in (L / 240)	0.45	✔
1.5 D + 0.75 L + 0.75 S	Deflection	d: 0.036 in	d_u: 0.067 in (L / 240)	0.54	✔

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

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

Loads

Source	Dead	Live	Snow	Wind	Width
Self-weight and wind	10 psf	-	-	20 psf	-
Floor - Mezzanine	20 psf	80 psf	-	-	7.5 ft
Roof - Mezzanine	25 psf	-	30 psf	-	15 ft
Roof - Mezzanine - snow drift	-	-	65.9 plf	-	-
External second-storey wall (Width denotes Height)	10 psf	-	-	-	17 ft

Analysis and Design Results

Studs

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + L	Buckling	P: 1.81 kip , f_c: 219 psi	F_c: 531.3 psi , C_P: 0.42	0.41	✔
D + S	Buckling	P: 1.69 kip , f_c: 205.4 psi	F_c: 552.8 psi , C_P: 0.38	0.37	✔
D + 0.75 L + 0.75 S	Buckling	P: 2.12 kip , f_c: 257.3 psi	F_c: 552.8 psi , C_P: 0.38	0.47	✔
D + 0.6 W	Buckling + Bending	P: 1.01 kip , f_c: 122 psi M: 0.29 kip-ft , f_b: 457 psi	F_c: 566.7 psi , C_P: 0.28 F_b: 2451.6 psi	0.29	✔
D + 0.75 L + 0.75 S + 0.45 W	Buckling + Bending	P: 2.12 kip , f_c: 257.3 psi M: 0.22 kip-ft , f_b: 342.7 psi	F_c: 566.7 psi , C_P: 0.28 F_b: 2451.6 psi	0.44	✔
D + 0.6 W	Shear	V: 0.096 kip , f_v: 17.5 psi	F_v: 216 psi	0.08	✔
D + 0.75 L + 0.75 S + 0.45 W	Shear	V: 0.072 kip , f_v: 13.1 psi	F_v: 216 psi	0.06	✔

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
0.42 W	Deflection	d: 0.14 in	d_u: 0.4 in (L / 360)	0.34	✔

Top plate

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + L	Bending	M: 0.3 kip-ft , f_b: 876 psi	F_b: 1305.2 psi	0.67	✔
D + S	Bending	M: 0.28 kip-ft , f_b: 821.6 psi	F_b: 1501 psi	0.55	✔
D + 0.75 L + 0.75 S	Bending	M: 0.35 kip-ft , f_b: 1029.1 psi	F_b: 1501 psi	0.69	✔
D + L	Shear	V: 0.9 kip , f_v: 82.1 psi	F_v: 135 psi	0.61	✔
D + S	Shear	V: 0.85 kip , f_v: 77 psi	F_v: 155.2 psi	0.50	✔
D + 0.75 L + 0.75 S	Shear	V: 1.06 kip , f_v: 96.5 psi	F_v: 155.2 psi	0.62	✔

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
L	Deflection	d: 0.011 in	d_U: 0.044 in (L / 360)	0.25	✔
S	Deflection	d: 0.01 in	d_U: 0.044 in (L / 360)	0.22	✔
0.75 L + 0.75 S	Deflection	d: 0.016 in	d_U: 0.044 in (L / 360)	0.35	✔
1.5 D + L	Deflection	d: 0.032 in	d_U: 0.067 in (L / 240)	0.48	✔
1.5 D + S	Deflection	d: 0.031 in	d_U: 0.067 in (L / 240)	0.46	✔
1.5 D + 0.75 L + 0.75 S	Deflection	d: 0.037 in	d_U: 0.067 in (L / 240)	0.55	✔

Window - Posts

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + L	Buckling	P: 2.03 kip , f_c: 246.4 psi	F_c: 531.3 psi , C_P: 0.42	0.46	✔
D + S	Buckling	P: 1.91 kip , f_c: 231.1 psi	F_c: 552.8 psi , C_P: 0.38	0.42	✔
D + 0.75 L + 0.75 S	Buckling	P: 2.39 kip , f_c: 289.4 psi	F_c: 552.8 psi , C_P: 0.38	0.52	✔
D + 0.6 W	Buckling + Bending	P: 1.13 kip , f_c: 137.3 psi M: 0.32 kip-ft , f_b: 514.1 psi	F_c: 566.7 psi , C_P: 0.28 F_b: 2451.6 psi	0.33	✔
D + 0.75 L + 0.75 S + 0.45 W	Buckling + Bending	P: 2.39 kip , f_c: 289.4 psi M: 0.24 kip-ft , f_b: 385.6 psi	F_c: 566.7 psi , C_P: 0.28 F_b: 2451.6 psi	0.56	✔
D + 0.6 W	Shear	V: 0.11 kip , f_v: 19.6 psi	F_v: 216 psi	0.09	✔
D + 0.75 L + 0.75 S + 0.45 W	Shear	V: 0.081 kip , f_v: 14.7 psi	F_v: 216 psi	0.07	✔

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	✔

Window - Lintel

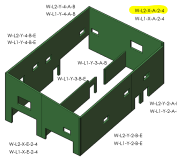
Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + L	Bending	M: 1.52 kip-ft , f_b: 806.3 psi	F_b: 1135 psi	0.71	✔
D + S	Bending	M: 1.43 kip-ft , f_b: 756.2 psi	F_b: 1305.2 psi	0.58	✔
D + 0.75 L + 0.75 S	Bending	M: 1.79 kip-ft , f_b: 947.3 psi	F_b: 1305.2 psi	0.73	✔
D + L	Shear	V: 2.03 kip , f_v: 123.2 psi	F_v: 135 psi	0.91	✔
D + S	Shear	V: 1.91 kip , f_v: 115.5 psi	F_v: 155.2 psi	0.74	✔
D + 0.75 L + 0.75 S	Shear	V: 2.39 kip , f_v: 144.7 psi	F_v: 155.2 psi	0.93	✔

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
L	Deflection	d: 0.017 in	d_U: 0.1 in (L / 360)	0.17	✔
S	Deflection	d: 0.015 in	d_U: 0.1 in (L / 360)	0.15	✔
0.75 L + 0.75 S	Deflection	d: 0.024 in	d_U: 0.1 in (L / 360)	0.24	✔
1.5 D + L	Deflection	d: 0.049 in	d_U: 0.15 in (L / 240)	0.33	✔
1.5 D + S	Deflection	d: 0.047 in	d_U: 0.15 in (L / 240)	0.31	✔
1.5 D + 0.75 L + 0.75 S	Deflection	d: 0.056 in	d_U: 0.15 in (L / 240)	0.37	✔

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.	Spruce-Pine-Fir	Stud
Top plate	(2) 2x6	Spruce-Pine-Fir	No.1/No.2
Sill plate	2x6 Pressure Treated	Spruce-Pine-Fir	No.1/No.2
Window Opening - Posts	(2) 2x6	Spruce-Pine-Fir	Stud
Window Opening - Lintel	(3) 2x4	Spruce-Pine-Fir	No.1/No.2

Loads

Source	Dead	Live	Snow	Wind	Width
Self-weight and wind	10 psf	-	-	20 psf	-
Roof - Mezzanine	25 psf	-	30 psf	-	1 ft

Analysis and Design Results

Studs

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + S	Buckling	P: 0.17 kip , f_c: 21 psi	F_c: 300.1 psi , C_P: 0.36	0.07	✔

Combination	Check Type	Action	Resistance	Ratio	Check
D + 0.6 W	Buckling + Bending	P: 0.13 kip , f_c: 16.2 psi M: 0.45 kip-ft , f_b: 714.1 psi	F_c: 313.2 psi , C_P: 0.27 F_b: 1458 psi	0.52	✔
D + 0.75 S + 0.45 W	Buckling + Bending	P: 0.16 kip , f_c: 19.8 psi M: 0.34 kip-ft , f_b: 535.5 psi	F_c: 313.2 psi , C_P: 0.27 F_b: 1458 psi	0.40	✔
D + 0.6 W	Shear	V: 0.12 kip , f_v: 21.8 psi	F_v: 216 psi	0.10	✔
D + 0.75 S + 0.45 W	Shear	V: 0.09 kip , f_v: 16.4 psi	F_v: 216 psi	0.08	✔

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
0.42 W	Deflection	d: 0.38 in	d_u: 0.5 in (L / 360)	0.77	✔

Top plate

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + S	Bending	M: 0.029 kip-ft , f_b: 84 psi	F_b: 1501 psi	0.06	✔
D + S	Shear	V: 0.087 kip , f_v: 7.88 psi	F_v: 155.2 psi	0.05	✔

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
S	Deflection	d: 5.59e-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: 0.33 kip , f_c: 19.7 psi	F_c: 300.1 psi , C_P: 0.36	0.07	✔
D + 0.6 W	Buckling + Bending	P: 0.25 kip , f_c: 15.2 psi M: 0.84 kip-ft , f_b: 669.4 psi	F_c: 313.2 psi , C_P: 0.27 F_b: 1458 psi	0.48	✔
D + 0.75 S + 0.45 W	Buckling + Bending	P: 0.31 kip , f_c: 18.6 psi M: 0.63 kip-ft , f_b: 502.1 psi	F_c: 313.2 psi , C_P: 0.27 F_b: 1458 psi	0.36	✔
D + 0.6 W	Shear	V: 0.23 kip , f_v: 20.5 psi	F_v: 216 psi	0.09	✔
D + 0.75 S + 0.45 W	Shear	V: 0.17 kip , f_v: 15.3 psi	F_v: 216 psi	0.07	✔

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
0.42 W	Deflection	d: 0.36 in	d_u: 0.5 in (L / 360)	0.72	✔

Window Opening - Lintel

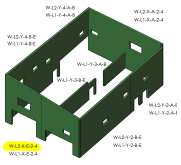
Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + S	Bending	M: 0.41 kip-ft , f_b: 530.6 psi	F_b: 1506.5 psi	0.35	✔
D + S	Shear	V: 0.33 kip , f_v: 31 psi	F_v: 155.2 psi	0.20	✔

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
S	Deflection	d: 0.02 in	d_u: 0.17 in (L / 360)	0.12	✔
1.5 D + S	Deflection	d: 0.12 in	d_u: 0.25 in (L / 240)	0.47	✔

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

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

Loads

Source	Dead	Live	Snow	Wind	Width
Self-weight and wind	10 psf	-	-	20 psf	-
Roof - Mezzanine	25 psf	-	30 psf	-	1 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: 19.4 psi	F_c: 383.5 psi , C_p: 0.46	0.05	✔
D + 0.6 W	Buckling + Bending	P: 0.12 kip , f_c: 14.5 psi M: 0.34 kip-ft , f_b: 536.3 psi	F_c: 406 psi , C_p: 0.35 F_b: 1458 psi	0.38	✔
D + 0.75 S + 0.45 W	Buckling + Bending	P: 0.15 kip , f_c: 18.2 psi M: 0.25 kip-ft , f_b: 402.2 psi	F_c: 406 psi , C_p: 0.35 F_b: 1458 psi	0.29	✔
D + 0.6 W	Shear	V: 0.1 kip , f_v: 18.9 psi	F_v: 216 psi	0.09	✔
D + 0.75 S + 0.45 W	Shear	V: 0.078 kip , f_v: 14.2 psi	F_v: 216 psi	0.07	✔

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
0.42 W	Deflection	d: 0.22 in	d_u: 0.43 in (L / 360)	0.50	✔

Top plate

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + S	Bending	M: 0.027 kip-ft , f_b: 77.6 psi	F_b: 1501 psi	0.05	✔
D + S	Shear	V: 0.08 kip , f_v: 7.27 psi	F_v: 155.2 psi	0.05	✔

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
S	Deflection	d: 5.59e-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: 18.2 psi	F_c: 383.5 psi , C_p: 0.46	0.05	✔
D + 0.6 W	Buckling + Bending	P: 0.23 kip , f_c: 13.6 psi M: 0.63 kip-ft , f_b: 502.8 psi	F_c: 406 psi , C_p: 0.35 F_b: 1458 psi	0.35	✔
D + 0.75 S + 0.45 W	Buckling + Bending	P: 0.28 kip , f_c: 17 psi M: 0.48 kip-ft , f_b: 377.1 psi	F_c: 406 psi , C_p: 0.35 F_b: 1458 psi	0.27	✔
D + 0.6 W	Shear	V: 0.2 kip , f_v: 17.7 psi	F_v: 216 psi	0.08	✔
D + 0.75 S + 0.45 W	Shear	V: 0.15 kip , f_v: 13.3 psi	F_v: 216 psi	0.06	✔

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
0.42 W	Deflection	d: 0.2 in	d_u: 0.43 in (L / 360)	0.47	✔

Window Opening - Lintel

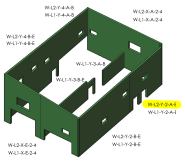
Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + S	Bending	M: 0.37 kip-ft , f_b: 489.8 psi	F_b: 1506.5 psi	0.33	✔
D + S	Shear	V: 0.3 kip , f_v: 28.6 psi	F_v: 155.2 psi	0.18	✔

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
S	Deflection	d: 0.02 in	d_u: 0.17 in (L / 360)	0.12	✔
1.5 D + S	Deflection	d: 0.11 in	d_u: 0.25 in (L / 240)	0.43	✔

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



Components

Wall - Dimensions (L x H): 16.9 ft x 13.5 ft

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

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

Loads

Source	Dead	Live	Snow	Wind	Width
Self-weight and wind	10 psf	-	-	20 psf	-

Source	Dead	Live	Snow	Wind	Width
Roof - Mezzanine	25 psf	-	30 psf	-	15 ft
Roof - Mezzanine - snow drift	-	-	4.4 plf	-	-

Analysis and Design Results

Studs

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + S	Buckling	P: 1.2 kip , f_c: 145 psi	F_c: 451 psi , C_P: 0.31	0.32	✔
D + 0.6 W	Buckling + Bending	P: 0.59 kip , f_c: 71.5 psi M: 0.36 kip-ft , f_b: 578.4 psi	F_c: 465.5 psi , C_P: 0.23 F_b: 2451.6 psi	0.30	✔
D + 0.75 S + 0.45 W	Buckling + Bending	P: 1.04 kip , f_c: 126.6 psi M: 0.27 kip-ft , f_b: 433.8 psi	F_c: 465.5 psi , C_P: 0.23 F_b: 2451.6 psi	0.32	✔
D + 0.6 W	Shear	V: 0.11 kip , f_v: 19.6 psi	F_v: 216 psi	0.09	✔
D + 0.75 S + 0.45 W	Shear	V: 0.081 kip , f_v: 14.7 psi	F_v: 216 psi	0.07	✔

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
0.42 W	Deflection	d: 0.22 in	d_U: 0.45 in (L / 360)	0.48	✔

Top plate

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + S	Bending	M: 0.2 kip-ft , f_b: 579.8 psi	F_b: 1501 psi	0.39	✔
D + S	Shear	V: 0.6 kip , f_v: 54.4 psi	F_v: 155.2 psi	0.35	✔

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
S	Deflection	d: 0.008 in	d_U: 0.044 in (L / 360)	0.19	✔
1.5 D + S	Deflection	d: 0.021 in	d_U: 0.067 in (L / 240)	0.31	✔

Window Opening - Posts

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + S	Buckling	P: 1.35 kip , f_c: 163.1 psi	F_c: 451 psi , C_P: 0.31	0.36	✔
D + 0.6 W	Buckling + Bending	P: 0.66 kip , f_c: 80.5 psi M: 0.41 kip-ft , f_b: 650.7 psi	F_c: 465.5 psi , C_P: 0.23 F_b: 2451.6 psi	0.35	✔
D + 0.75 S + 0.45 W	Buckling + Bending	P: 1.17 kip , f_c: 142.4 psi M: 0.31 kip-ft , f_b: 488 psi	F_c: 465.5 psi , C_P: 0.23 F_b: 2451.6 psi	0.38	✔
D + 0.6 W	Shear	V: 0.12 kip , f_v: 22.1 psi	F_v: 216 psi	0.10	✔
D + 0.75 S + 0.45 W	Shear	V: 0.091 kip , f_v: 16.6 psi	F_v: 216 psi	0.08	✔

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
0.42 W	Deflection	d: 0.24 in	d_U: 0.45 in (L / 360)	0.54	✔

Window Opening - Lintel

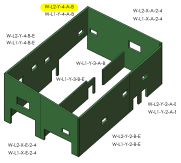
Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + S	Bending	M: 1.01 kip-ft , f_b: 533.7 psi	F_b: 1305.2 psi	0.41	✔
D + S	Shear	V: 1.35 kip , f_v: 81.5 psi	F_v: 155.2 psi	0.53	✔

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
S	Deflection	d: 0.013 in	d_U: 0.1 in (L / 360)	0.13	✔
1.5 D + S	Deflection	d: 0.032 in	d_U: 0.15 in (L / 240)	0.21	✔

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.	Spruce-Pine-Fir	No.1/No.2
Top plate	(2) 2x6	Spruce-Pine-Fir	No.1/No.2
Sill plate	2x6 Pressure Treated	Spruce-Pine-Fir	No.1/No.2
Window Opening - Posts	(1) 2x6	Spruce-Pine-Fir	No.1/No.2

Component	Section	Product / Species	Grade
Window Opening - Lintel	(3) 2x6	Spruce-Pine-Fir	No.1/No.2

Loads

Source	Dead	Live	Snow	Wind	Width
Self-weight and wind	10 psf	-	-	20 psf	-
Roof - Mezzanine	25 psf	-	30 psf	-	15 ft
Roof - Mezzanine - snow drift	-	-	65.9 plf	-	-

Analysis and Design Results

Studs

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + S	Buckling	P: 1.29 kip , f_c: 156.9 psi	F_c: 320 psi , C_P: 0.22	0.49	✔
D + 0.6 W	Buckling + Bending	P: 0.61 kip , f_c: 73.5 psi M: 0.51 kip-ft , f_b: 812.4 psi	F_c: 323.8 psi , C_P: 0.16 F_b: 2451.6 psi	0.47	✔
D + 0.75 S + 0.45 W	Buckling + Bending	P: 1.12 kip , f_c: 136.1 psi M: 0.38 kip-ft , f_b: 609.3 psi	F_c: 323.8 psi , C_P: 0.16 F_b: 2451.6 psi	0.59	✔
D + 0.6 W	Shear	V: 0.13 kip , f_v: 23.3 psi	F_v: 216 psi	0.11	✔
D + 0.75 S + 0.45 W	Shear	V: 0.096 kip , f_v: 17.5 psi	F_v: 216 psi	0.08	✔

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
0.42 W	Deflection	d: 0.43 in	d_U: 0.53 in (L / 360)	0.80	✔

Top plate

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + S	Bending	M: 0.22 kip-ft , f_b: 627.7 psi	F_b: 1501 psi	0.42	✔
D + S	Shear	V: 0.65 kip , f_v: 58.8 psi	F_v: 155.2 psi	0.38	✔

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
S	Deflection	d: 0.01 in	d_U: 0.044 in (L / 360)	0.22	✔
1.5 D + S	Deflection	d: 0.022 in	d_U: 0.067 in (L / 240)	0.33	✔

Window Opening - Posts

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + S	Buckling	P: 1.46 kip , f_c: 176.5 psi	F_c: 320 psi , C_P: 0.22	0.55	✔
D + 0.6 W	Buckling + Bending	P: 0.68 kip , f_c: 82.7 psi M: 0.58 kip-ft , f_b: 914 psi	F_c: 323.8 psi , C_P: 0.16 F_b: 2451.6 psi	0.55	✔
D + 0.75 S + 0.45 W	Buckling + Bending	P: 1.26 kip , f_c: 153.1 psi M: 0.43 kip-ft , f_b: 685.5 psi	F_c: 323.8 psi , C_P: 0.16 F_b: 2451.6 psi	0.73	✔
D + 0.6 W	Shear	V: 0.14 kip , f_v: 26.2 psi	F_v: 216 psi	0.12	✔
D + 0.75 S + 0.45 W	Shear	V: 0.11 kip , f_v: 19.6 psi	F_v: 216 psi	0.09	✔

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
0.42 W	Deflection	d: 0.48 in	d_U: 0.53 in (L / 360)	0.90	✔

Window Opening - Lintel

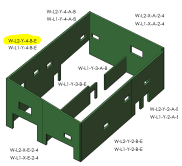
Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + S	Bending	M: 1.09 kip-ft , f_b: 577.7 psi	F_b: 1305.2 psi	0.44	✔
D + S	Shear	V: 1.46 kip , f_v: 88.3 psi	F_v: 155.2 psi	0.57	✔

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
S	Deflection	d: 0.015 in	d_U: 0.1 in (L / 360)	0.15	✔
1.5 D + S	Deflection	d: 0.034 in	d_U: 0.15 in (L / 240)	0.23	✔

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

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

intuitively this seems undersized.

curious why you went with 'select structural' here? and not No.1/No.2?

Loads

Source	Dead	Live	Snow	Wind	Width
Self-weight and wind	10 psf	-	-	20 psf	-
Roof - Mezzanine	20 psf	-	30 psf	-	15 ft
Roof - Mezzanine - snow drift	-	-	65.9 plf	-	-

Analysis and Design Results

Studs

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + S	Buckling	P: 1.2 kip , f_c: 145.6 psi	F_c: 290.9 psi , C_P: 0.2	0.50	✔
D + 0.6 W	Buckling + Bending	P: 0.51 kip , f_c: 62.2 psi M: 0.58 kip-ft , f_b: 917.2 psi	F_c: 303.6 psi , C_P: 0.15 F_b: 2451.6 psi	0.50	✔
D + 0.75 S + 0.45 W	Buckling + Bending	P: 1.03 kip , f_c: 124.8 psi M: 0.43 kip-ft , f_b: 687.9 psi	F_c: 303.6 psi , C_P: 0.15 F_b: 2451.6 psi	0.64	✔
D + 0.6 W	Shear	V: 0.14 kip , f_v: 24.7 psi	F_v: 216 psi	0.11	✔
D + 0.75 S + 0.45 W	Shear	V: 0.1 kip , f_v: 18.5 psi	F_v: 216 psi	0.09	✔

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
0.42 W	Deflection	d: 0.54 in	d_u: 0.57 in (L / 360)	0.96	✔

Top plate

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + S	Bending	M: 0.2 kip-ft , f_b: 582.4 psi	F_b: 1501 psi	0.39	✔
D + S	Shear	V: 0.6 kip , f_v: 54.6 psi	F_v: 155.2 psi	0.35	✔

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
S	Deflection	d: 0.01 in	d_u: 0.044 in (L / 360)	0.22	✔
1.5 D + S	Deflection	d: 0.02 in	d_u: 0.067 in (L / 240)	0.31	✔

Window Opening - Posts

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + S	Buckling	P: 2.43 kip , f_c: 147.4 psi	F_c: 290.9 psi , C_P: 0.2	0.51	✔
D + 0.6 W	Buckling + Bending	P: 1.04 kip , f_c: 63 psi M: 1.17 kip-ft , f_b: 928.6 psi	F_c: 303.6 psi , C_P: 0.15 F_b: 2451.6 psi	0.52	✔
D + 0.75 S + 0.45 W	Buckling + Bending	P: 2.08 kip , f_c: 126.3 psi M: 0.88 kip-ft , f_b: 696.5 psi	F_c: 303.6 psi , C_P: 0.15 F_b: 2451.6 psi	0.65	✔
D + 0.6 W	Shear	V: 0.28 kip , f_v: 25 psi	F_v: 216 psi	0.12	✔
D + 0.75 S + 0.45 W	Shear	V: 0.21 kip , f_v: 18.8 psi	F_v: 216 psi	0.09	✔

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
0.42 W	Deflection	d: 0.55 in	d_u: 0.57 in (L / 360)	0.97	✔

Window Opening - Lintel

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + S	Bending	M: 3.28 kip-ft , f_b: 1736.9 psi	F_b: 1868.8 psi	0.93	✔
D + S	Shear	V: 2.43 kip , f_v: 147.4 psi	F_v: 155.2 psi	0.95	✔

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
S	Deflection	d: 0.12 in	d_u: 0.18 in (L / 360)	0.65	✔
1.5 D + S	Deflection	d: 0.25 in	d_u: 0.27 in (L / 240)	0.92	✔