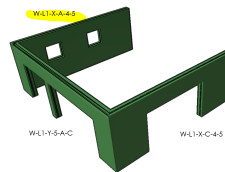
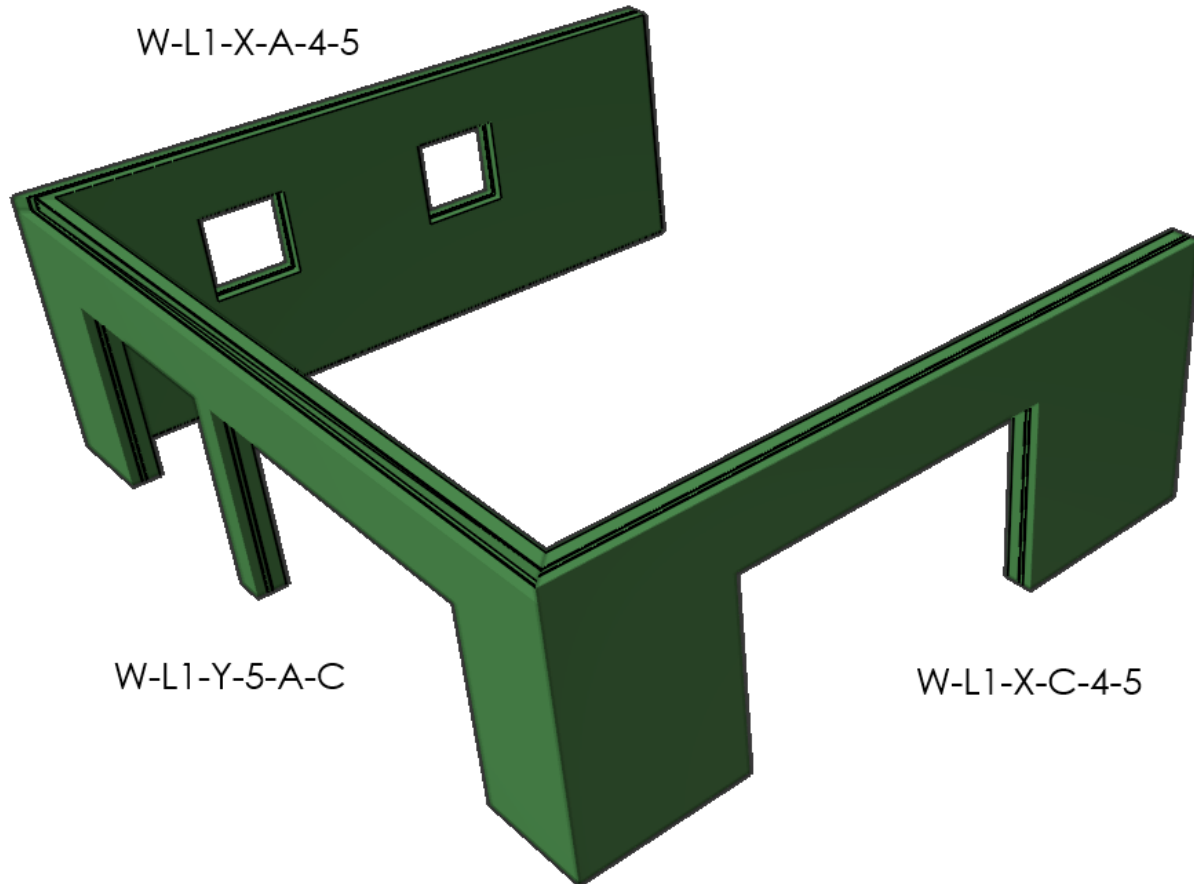


Wall Framing Design - Existing Area

First Storey Walls:

- Wall Framing Design: W-L1-X-A-4-5
- Wall Framing Design: W-L1-X-A-4-5 with snow drift
- Wall Framing Design: W-L1-X-C-4-5
- Wall Framing Design: W-L1-X-C-4-5 with snow drift
- Wall Framing Design: W-L1-Y-5-A-C



Wall Framing Design: W-L1-X-A-4-5

Components

Wall - Dimensions (L x H): 24.5 ft x 10 ft

Window Opening - Dimensions (L x H_{top}): 3.3 ft x 7.6 ft

Component	Section	Product / Species	Grade
Studs	2x6 @ 16 in O.C.	Spruce-Pine-Fir	Stud
Top plate	(2) 2x6	Spruce-Pine-Fir	Stud
Sill plate	2x6 Pressure Treated	Spruce-Pine-Fir	Stud
Window Opening - Posts	(1) 2x6	Spruce-Pine-Fir	Stud
Window Opening - Lintel	(3) 2x6	Spruce-Pine-Fir	Stud

Loads

Source	Dead	Live	Snow	Wind	Width
Self-weight and wind	10 psf	-	-	20 psf	-
Roof - Existing area	20 psf	-	30 psf	-	17.1 ft

Analysis and Design Results

Studs

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + S	Buckling	P: 1.21 kip , f_c : 146.3 psi	F_c : 550.3 psi , C_p : 0.66	0.27	✓
D + 0.6 W	Buckling + Bending	P: 0.52 kip , f_c : 63.4 psi M: 0.2 kip-ft , f_b : 317.4 psi	F_c : 614.8 psi , C_p : 0.53 F_b : 1458 psi	0.25	✓
D + 0.75 S + 0.45 W	Buckling + Bending	P: 1.04 kip , f_c : 125.5 psi M: 0.15 kip-ft , f_b : 238 psi	F_c : 614.8 psi , C_p : 0.53 F_b : 1458 psi	0.23	✓
D + 0.6 W	Shear	V: 0.08 kip , f_v : 14.5 psi	F_v : 216 psi	0.07	✓
D + 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 + S	Bending	M: 0.2 kip-ft , f_b : 585.1 psi	F_b : 892.7 psi	0.66	✓
D + S	Shear	V: 0.6 kip , f_v : 54.8 psi	F_v : 155.2 psi	0.35	✓

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
S	Deflection	d: 0.011 in	d_U : 0.044 in (L / 360)	0.25	✓
1.5 D + S	Deflection	d: 0.024 in	d_U : 0.067 in (L / 240)	0.36	✓

Window Opening - Posts

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + S	Buckling	P: 1.49 kip , f_c : 181 psi	F_c : 550.3 psi , C_p : 0.66	0.33	✓
D + 0.6 W	Buckling + Bending	P: 0.65 kip , f_c : 78.4 psi M: 0.25 kip-ft , f_b : 392.7 psi	F_c : 614.8 psi , C_p : 0.53 F_b : 1458 psi	0.32	✓
D + 0.75 S + 0.45 W	Buckling + Bending	P: 1.28 kip , f_c : 155.4 psi M: 0.19 kip-ft , f_b : 294.5 psi	F_c : 614.8 psi , C_p : 0.53 F_b : 1458 psi	0.31	✓
D + 0.6 W	Shear	V: 0.099 kip , f_v : 18 psi	F_v : 216 psi	0.08	✓
D + 0.75 S + 0.45 W	Shear	V: 0.074 kip , f_v : 13.5 psi	F_v : 216 psi	0.06	✓

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
0.42 W	Deflection	d: 0.096 in	d_U : 0.33 in (L / 360)	0.29	✓

Window Opening - Lintel

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + S	Bending	M: 1.23 kip-ft , f_b : 651.6 psi	F_b : 776.2 psi	0.84	✓
D + S	Shear	V: 1.49 kip , f_v : 90.5 psi	F_v : 155.2 psi	0.58	✓

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
S	Deflection	d: 0.024 in	d_U : 0.11 in (L / 360)	0.22	✓
1.5 D + S	Deflection	d: 0.051 in	d_U : 0.17 in (L / 240)	0.31	✓

Wall Framing Design: W-L1-X-A-4-5 with snow drift

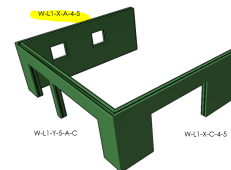
Components

Wall - Dimensions (L x H): 24.5 ft x 10 ft

Component	Section	Product / Species	Grade
Studs	2x6 @ 16 in O.C.	Spruce-Pine-Fir	Stud
Top plate	(2) 2x6	Spruce-Pine-Fir	Stud
Sill plate	2x6 Pressure Treated	Spruce-Pine-Fir	Stud

Loads

Source	Dead	Live	Snow (balanced + drift)	Wind	Width
Self-weight and wind	10 psf	-	-	20 psf	-
Roof - Existing area	20 psf	-	30 + 17.4 psf	-	17.1 ft



* Snow drift load value interpolated at a distance of 1.33 ft from edge; $p_d = 23.3$ psf and $w = 5.2$ ft

Analysis and Design Results

Studs

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + S	Buckling	P: 1.6 kip , f_c : 194.3 psi	F_c : 550.3 psi , C_p : 0.66	0.35	✓
D + 0.6 W	Buckling + Bending	P: 0.52 kip , f_c : 63.4 psi M: 0.2 kip-ft , f_b : 317.4 psi	F_c : 614.8 psi , C_p : 0.53 F_b : 1458 psi	0.25	✓
D + 0.75 S + 0.45 W	Buckling + Bending	P: 1.33 kip , f_c : 161.6 psi M: 0.15 kip-ft , f_b : 238 psi	F_c : 614.8 psi , C_p : 0.53 F_b : 1458 psi	0.27	✓
D + 0.6 W	Shear	V: 0.08 kip , f_v : 14.5 psi	F_v : 216 psi	0.07	✓
D + 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

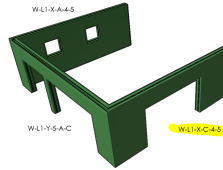
Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + S	Bending	M: 0.27 kip-ft , f_b : 777.4 psi	F_b : 892.7 psi	0.87	✓
D + S	Shear	V: 0.8 kip , f_v : 72.9 psi	F_v : 155.2 psi	0.47	✓

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
S	Deflection	d: 0.018 in	d_u : 0.044 in (L / 360)	0.40	✓
1.5 D + S	Deflection	d: 0.03 in	d_u : 0.067 in (L / 240)	0.46	✓

Wall Framing Design: W-L1-X-C-4-5



Components

Wall - Dimensions (L x H): 24.5 ft x 10 ft

Wide Door - Dimensions (L x H_{top}): 12 ft x 7.1 ft

Component	Section	Product / Species	Grade
Studs	2x6 @ 16 in O.C.	Spruce-Pine-Fir	Stud
Top plate	(2) 2x6	Spruce-Pine-Fir	Stud
Sill plate	2x6 Pressure Treated	Spruce-Pine-Fir	Stud
Wide Door - Posts	(2) 2x6	Spruce-Pine-Fir	Stud
Wide Door - Lintel	(3) LVL-2x11	LVL	2.0E

Loads

Source	Dead	Live	Snow	Wind	Width
Self-weight and wind	10 psf	-	-	20 psf	-
Roof - Existing area	20 psf	-	30 psf	-	17.1 ft

Analysis and Design Results

Studs

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + S	Buckling	P: 1.21 kip , f_c : 146.3 psi	F_c : 550.3 psi , C_p : 0.66	0.27	✓
D + 0.6 W	Buckling + Bending	P: 0.52 kip , f_c : 63.4 psi M: 0.2 kip-ft , f_b : 317.4 psi	F_c : 614.8 psi , C_p : 0.53 F_b : 1458 psi	0.25	✓
D + 0.75 S + 0.45 W	Buckling + Bending	P: 1.04 kip , f_c : 125.5 psi M: 0.15 kip-ft , f_b : 238 psi	F_c : 614.8 psi , C_p : 0.53 F_b : 1458 psi	0.23	✓
D + 0.6 W	Shear	V: 0.08 kip , f_v : 14.5 psi	F_v : 216 psi	0.07	✓
D + 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 + S	Bending	M: 0.2 kip-ft , f_b : 585.1 psi	F_b : 892.7 psi	0.66	✓
D + S	Shear	V: 0.6 kip , f_v : 54.8 psi	F_v : 155.2 psi	0.35	✓

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
S	Deflection	d: 0.011 in	d_u : 0.044 in (L / 360)	0.25	✓
1.5 D + S	Deflection	d: 0.024 in	d_u : 0.067 in (L / 240)	0.36	✓

Wide Door - Posts

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + S	Buckling	P: 5.43 kip , f_c : 329.1 psi	F_c : 550.3 psi , C_P : 0.66	0.60	✓
D + 0.6 W	Buckling + Bending	P: 2.35 kip , f_c : 142.5 psi M: 0.9 kip-ft , f_b : 714.1 psi	F_c : 614.8 psi , C_P : 0.53 F_b : 1458 psi	0.66	✓
D + 0.75 S + 0.45 W	Buckling + Bending	P: 4.66 kip , f_c : 282.5 psi M: 0.67 kip-ft , f_b : 535.5 psi	F_c : 614.8 psi , C_P : 0.53 F_b : 1458 psi	0.80	✓
D + 0.6 W	Shear	V: 0.36 kip , f_v : 32.7 psi	F_v : 216 psi	0.15	✓
D + 0.75 S + 0.45 W	Shear	V: 0.27 kip , f_v : 24.5 psi	F_v : 216 psi	0.11	✓

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
0.42 W	Deflection	d: 0.17 in	d_u : 0.33 in (L / 360)	0.52	✓

Wide Door - Lintel

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + S	Bending	M: 16.3 kip-ft , f_b : 1765.2 psi	M_u : 27.8 kip-ft	0.59	✓
D + S	Shear	V: 5.43 kip , f_v : 137.9 psi	V_u : 12.9 kip	0.42	✓

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
S	Deflection	d: 0.21 in	d_u : 0.4 in (L / 360)	0.53	✓
1.5 D + S	Deflection	d: 0.45 in	d_u : 0.6 in (L / 240)	0.75	✓

Wall Framing Design: W-L1-X-C-4-5 with snow drift

Same as Wall Framing Design: W-L1-X-A-4-5 with snow drift

Wall Framing Design: W-L1-Y-5-A-C

Components

Wall - Dimensions (L x H): 28.9 ft x 10 ft

Wide Door 1 - Dimensions (L x H_{top}): 8 ft x 7.1 ft

Wide Door 2 - Dimensions (L x H_{top}): 13.2 ft x 7.1 ft



Component	Section	Product / Species	Grade
Studs	2x6 @ 16 in O.C.	Spruce-Pine-Fir	Stud
Top plate	(2) 2x6	Spruce-Pine-Fir	Stud
Sill plate	2x6 Pressure Treated	Spruce-Pine-Fir	Stud
Wide Door 1 - Posts	(2) 2x6	Spruce-Pine-Fir	Stud
Wide Door 1 - Lintel	(3) 2x12	Spruce-Pine-Fir	Stud
Wide Door 2 - Posts	(2) 2x6	Spruce-Pine-Fir	Stud
Wide Door 2 - Lintel	(3) 2x12	Spruce-Pine-Fir	Stud

Loads

Source	Dead	Live	Snow	Wind	Width
Self-weight and wind	10 psf	-	-	20 psf	-
Roof - Existing area	20 psf	-	30 psf	-	2.3 ft

Analysis and Design Results

Studs

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + S	Buckling	P: 0.22 kip , f_c : 26.7 psi	F_c : 550.3 psi , C_p : 0.66	0.05	✓
D + 0.6 W	Buckling + Bending	P: 0.13 kip , f_c : 15.5 psi M: 0.2 kip-ft , f_b : 317.4 psi	F_c : 614.8 psi , C_p : 0.53 F_b : 1458 psi	0.23	✓
D + 0.75 S + 0.45 W	Buckling + Bending	P: 0.2 kip , f_c : 23.9 psi M: 0.15 kip-ft , f_b : 238 psi	F_c : 614.8 psi , C_p : 0.53 F_b : 1458 psi	0.17	✓
D + 0.6 W	Shear	V: 0.08 kip , f_v : 14.5 psi	F_v : 216 psi	0.07	✓
D + 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 + S	Bending	M: 0.037 kip-ft , f_b : 106.7 psi	F_b : 892.7 psi	0.12	✓
D + S	Shear	V: 0.11 kip , f_v : 10 psi	F_v : 155.2 psi	0.06	✓

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
S	Deflection	d: 0.001 in	d_u : 0.044 in (L / 360)	0.03	✓
1.5 D + S	Deflection	d: 0.005 in	d_u : 0.067 in (L / 240)	0.07	✓

Wide Door 1 - Posts

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + S	Buckling	P: 0.66 kip , f_c : 40 psi	F_c : 550.3 psi , C_p : 0.66	0.07	✓
D + 0.6 W	Buckling + Bending	P: 0.38 kip , f_c : 23.3 psi M: 0.6 kip-ft , f_b : 476 psi	F_c : 614.8 psi , C_p : 0.53 F_b : 1458 psi	0.34	✓
D + 0.75 S + 0.45 W	Buckling + Bending	P: 0.59 kip , f_c : 35.8 psi M: 0.45 kip-ft , f_b : 357 psi	F_c : 614.8 psi , C_p : 0.53 F_b : 1458 psi	0.26	✓
D + 0.6 W	Shear	V: 0.24 kip , f_v : 21.8 psi	F_v : 216 psi	0.10	✓
D + 0.75 S + 0.45 W	Shear	V: 0.18 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: 0.12 in	d_u : 0.33 in (L / 360)	0.35	✓

Wide Door 1 - Lintel

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + S	Bending	M: 1.32 kip-ft , f_b : 166.9 psi	F_b : 776.2 psi	0.21	✓
D + S	Shear	V: 0.66 kip , f_v : 19.6 psi	F_v : 155.2 psi	0.13	✓

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
S	Deflection	d: 0.012 in	d_u : 0.27 in (L / 360)	0.05	✓
1.5 D + S	Deflection	d: 0.037 in	d_u : 0.4 in (L / 240)	0.09	✓

Wide Door 2 - Posts

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + S	Buckling	P: 1.09 kip , f_c : 66.3 psi	F_c : 550.3 psi , C_p : 0.66	0.12	✓
D + 0.6 W	Buckling + Bending	P: 0.64 kip , f_c : 38.5 psi M: 0.99 kip-ft , f_b : 788.4 psi	F_c : 614.8 psi , C_p : 0.53 F_b : 1458 psi	0.57	✓
D + 0.75 S + 0.45 W	Buckling + Bending	P: 0.98 kip , f_c : 59.3 psi M: 0.75 kip-ft , f_b : 591.3 psi	F_c : 614.8 psi , C_p : 0.53 F_b : 1458 psi	0.45	✓
D + 0.6 W	Shear	V: 0.4 kip , f_v : 36.1 psi	F_v : 216 psi	0.17	✓
D + 0.75 S + 0.45 W	Shear	V: 0.3 kip , f_v : 27.1 psi	F_v : 216 psi	0.13	✓

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
0.42 W	Deflection	d: 0.19 in	d_u : 0.33 in (L / 360)	0.58	✓

Wide Door 2 - Lintel

Strength Checks (ASD)

Combination	Check Type	Action	Resistance	Ratio	Check
D + S	Bending	M: 3.62 kip-ft , f_b : 457.8 psi	F_b : 776.2 psi	0.59	✓
D + S	Shear	V: 1.09 kip , f_v : 32.4 psi	F_v : 155.2 psi	0.21	✓

Serviceability Checks

Combination	Check Type	Action	Limit	Ratio	Check
S	Deflection	d: 0.08 in	d_u : 0.44 in (L / 360)	0.18	✓
1.5 D + S	Deflection	d: 0.25 in	d_u : 0.66 in (L / 240)	0.37	✓