

## Beam Design Guide for 20", 22", and 24" Depth 2.0E Microllam® LVL

The following is a supplement to *Trus Joist® Beam, Header and Column Specifier's Guide* ([TJ-9000](#) / Pacific Coast & Northwest: [TJ-9020](#)) and includes critical information for 20", 22", and 24" depth 2.0E Microllam® LVL beams. For additional design and installation guidance, reference [TJ-9000](#) or [TJ-9020](#).

### ALLOWABLE DESIGN PROPERTIES<sup>[1]</sup> (100% LOAD DURATION)

Grade	Width	Design Property	Depth		
			20"	22"	24"
2.0E	1¾"	Moment (ft-lbs)	23,580	28,165	33,125
		Shear (lbs)	6,650	7,315	7,980
		Moment of Inertia (in. <sup>4</sup> )	1,167	1,553	2,016
		Weight (plf)	10.2	11.2	12.3

[1] For product in beam orientation.

### DESIGN STRESSES<sup>[1]</sup> (100% LOAD DURATION)

Grade	Orientation	E Modulus of Elasticity <sup>[2]</sup> (psi)	F <sub>b</sub> Flexural Stress <sup>[3]</sup> (psi)	F <sub>c⊥</sub> Compression Perpendicular to Grain <sup>[4]</sup> (psi)	F <sub>c//</sub> Compression Parallel to Grain (psi)	F <sub>v</sub> Horizontal Shear Parallel to Grain (psi)
2.0E	Beam	2.0 x 10 <sup>6</sup>	2,600	750	2,510	285

[1] Unless otherwise noted, adjustment to the design stresses for duration of load are permitted in accordance with the applicable code.

[2] To properly calculate deflections for the full range of typical SCL span and loading applications, bending and shear deflection must be considered. For additional information, reference [TJ-9000](#) or [TJ-9020](#).

[3] For 12" depth. For other depths, multiply F<sub>b</sub> by (12/d)<sup>0.136</sup>.

[4] F<sub>c⊥</sub> may not be increased for duration of load.

### ForteWEB®

To evaluate 20", 22", and 24" depth 2.0E Microllam® LVL beams using [ForteWEB®](#), enter the member design information (i.e., member type, spans, supports, loads, etc.), then click on the "Product Selection" tab and select Microllam® LVL under the "Product" list.

### Bracing Considerations

Deep depth 2.0E Microllam® LVL beams must be used as multiple plies and require special attention to installation details. Lateral bracing is essential to prevent buckling of the beam. The compression edge must be laterally braced at intervals of 24" on-center or less. See page 5 for lateral bracing examples that prevent buckling of the beam and develop full design capacity.

### Multiple-Member Connections for Side-Loaded Beams

#### General Notes for Side-Loaded Beam Tables

- Connections are based on NDS® or manufacturer's test or code reports.
- Use specific gravity of 0.5 for design of lateral connections.
- Values listed are for 100% stress level. Increase 15% for snow-loaded roof conditions or 25% for non-snow roof conditions, where code allows.
- Minimum end distance for bolts and screws is 6".
- 7" wide beams should be side-loaded only when loads are applied to both faces of the members (to minimize rotation).
- Beams wider than 7" require special consideration by the design professional of record.

## UNIFORM LOAD – MAXIMUM UNIFORM LOAD APPLIED TO EITHER OUTSIDE MEMBER (PLF)

Fastener Type	Placement	Number Of Rows	Fastener On-Center Spacing	Fastener Pattern		
				Assembly A 	Assembly B 	Assembly F 
10d (0.128" x 3") or (0.131" x 3") Nail <sup>[1]</sup>	As shown	3	12"	560	<b>420</b>	
		4	12"	745	<b>560</b>	
1/2" A307 Through Bolt <sup>[2][3]</sup>	-	3	24"	760	570	510
			19.2"	955	715	635
			16"	1,145	855	760
		4	24"	1,015	760	675
			19.2"	1,270	955	845
			16"	1,525	1,145	1,015
Screw Length →				3 1/2"	3 1/2"	6"
Simpson Strong-Tie® SDS <sup>[3]</sup>	As shown	3	24"	1,020	<b>765</b>	<b>835</b>
			19.2"	1,275	<b>955</b>	<b>1,045</b>
			16"	1,530	<b>1,150</b>	<b>1,250</b>
		4	24"	1,360	<b>1,020</b>	<b>1,110</b>
			19.2"	1,700	<b>1,275</b>	<b>1,390</b>
MiTek® WS <sup>[3]</sup>	As shown	3	24"	955	<b>720</b>	<b>715</b>
			19.2"	1,195	<b>895</b>	<b>895</b>
			16"	1,435	<b>1,075</b>	<b>1,075</b>
		4	24"	1,275	<b>955</b>	<b>955</b>
			19.2"	1,595	<b>1,195</b>	<b>1,195</b>
Screw Length →				3 3/8"	5"	6 3/4"
Simpson Strong-Tie® SDW22 <sup>[3][4]</sup>	One face	3	24"	1,200	675	600
			19.2"	1,500	845	750
			16"	1,800	1,015	900
		4	24"	1,600	900	800
			19.2"	2,000	1,125	1,000
Mitek® WSWH <sup>[3][5]</sup>	One face	3	24"	905	645	575
			19.2"	1,130	805	715
			16"	1,355	965	860
		4	24"	1,205	860	765
			19.2"	1,505	1,075	955
Screw Length →				1,805	1,290	1,145

[1] Nailed connection values may be doubled for 6" on-center or tripled for 4" on-center nail spacing.

[2] Washer required. Bolt holes to be 9/16" maximum.

[3] 24" on-center bolted or screwed connection values may be doubled for 12" on-center spacing.

[4] When loading the head side of a SDW22 screw, assemblies B and F can be increased by 30%.

[5] When loading the head side of a WSWH screw, assemblies B and F can be increased by 25%.

- **Bold italic** loads indicate assemblies that require fastener placement on both faces. Stagger fasteners on the second face so they fall halfway between fasteners on the first face.

**POINT LOAD – MAXIMUM POINT LOAD APPLIED TO EITHER OUTSIDE MEMBER (LBS)**

Fastener Type	Placement	Number of Fasteners per Face	Fastener Pattern		
			Assembly A  3 1/2" wide, 2-ply	Assembly B  5 1/4" wide, 3-ply	Assembly F  7" wide, 4-ply
10d (0.128" x 3") or (0.131" x 3") Nail	As shown	6	1,115	<b>835</b>	
		12	2,230	<b>1,675</b>	
		18	3,350	<b>2,510</b>	
		24	4,465	<b>3,350</b>	
		Screw Length →	3 1/2"	3 1/2"	6"
Simpson Strong-Tie® SDS	As shown	4	2,720	<b>2,040</b>	<b>2,225</b>
		6	4,080	<b>3,060</b>	<b>3,335</b>
		8	5,440	<b>4,080</b>	<b>4,450</b>
MiTek® WS	As shown	4	2,550	<b>1,915</b>	<b>1,910</b>
		6	3,830	<b>2,870</b>	<b>2,865</b>
		8	5,105	<b>3,830</b>	<b>3,820</b>
		Screw Length →	3 3/8"	5"	6 3/4"
Simpson Strong-Tie® SDW22 <sup>[1]</sup>	One face	4	3,200	1,800	1,600
		6	4,800	2,700	2,400
		8	6,400	3,600	3,200
Mitek® WSWH <sup>[2]</sup>	One face	4	2,410	1,720	1,525
		6	3,610	2,580	2,290
		8	4,815	3,435	3,055

[1] When loading the head side of a SDW22 screw, assemblies B and F can be increased by 30%.

[2] When loading the head side of a WSWH screw, assemblies B and F can be increased by 25%.

- **Bold italic** loads indicate assemblies that require fastener placement on both faces. For screws required on both faces, refer to screw manufacturer's guidelines for minimum spacing requirements.

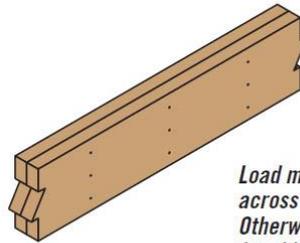
## Multiple-Member Connections for Top-Loaded Beams

### FASTENER INSTALLATION REQUIREMENTS

Piece Width	Number of Plies	Fastener				
		Type <sup>[1]</sup>	Min. Length	Placement	# Rows	O.C. Spacing
1 3/4"	2	10d nails	3"	One face	4	12"
		12d-16d nails <sup>[2]</sup>	3 1/4"		3	24"
		Screws	3 3/8" or 3 1/2"			
	3	10d nails	3"	Both faces	4	12"
			12d-16d nails <sup>[2]</sup>		3 1/4"	
		Screws	3 3/8" or 3 1/2"	Both faces	3	24"
			5"	One face		
	1/2" bolts <sup>[4]</sup>	6"	-	3	24"	
	4	10d nails <sup>[3]</sup>	3"	One face (per ply)	4	12"
			12d-16d nails <sup>[2][3]</sup>		3 1/4"	
		Screws	5" or 6"	Both face	3	24"
			6 3/4"	One face		
1/2" bolts <sup>[4]</sup>		8"	-	3	24"	

- [1] 10d nails are 0.128"-0.131" diameter; 12d-16d nails are 0.148"-0.162" diameter; screws are SDS, WS, SDW22, or WSWH.
- [2] Three (3) rows of 12d-16d nails are permitted with 20" depth.
- [3] When connecting 4-ply members, nail each ply to the other and offset nail rows by 2" from rows in the ply below.
- [4] Washer required. Bolt holes to be 9/16" maximum.

*When fasteners are required on both faces, stagger fasteners on the second face so they fall halfway between fasteners on the first face.*

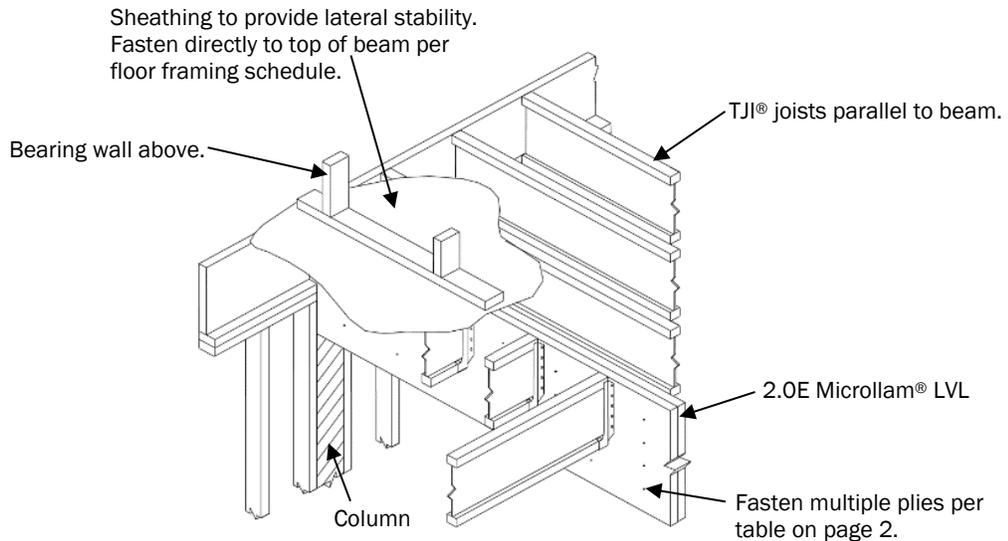


*Load must be applied evenly across entire beam width. Otherwise, use connections for side-loaded beams*

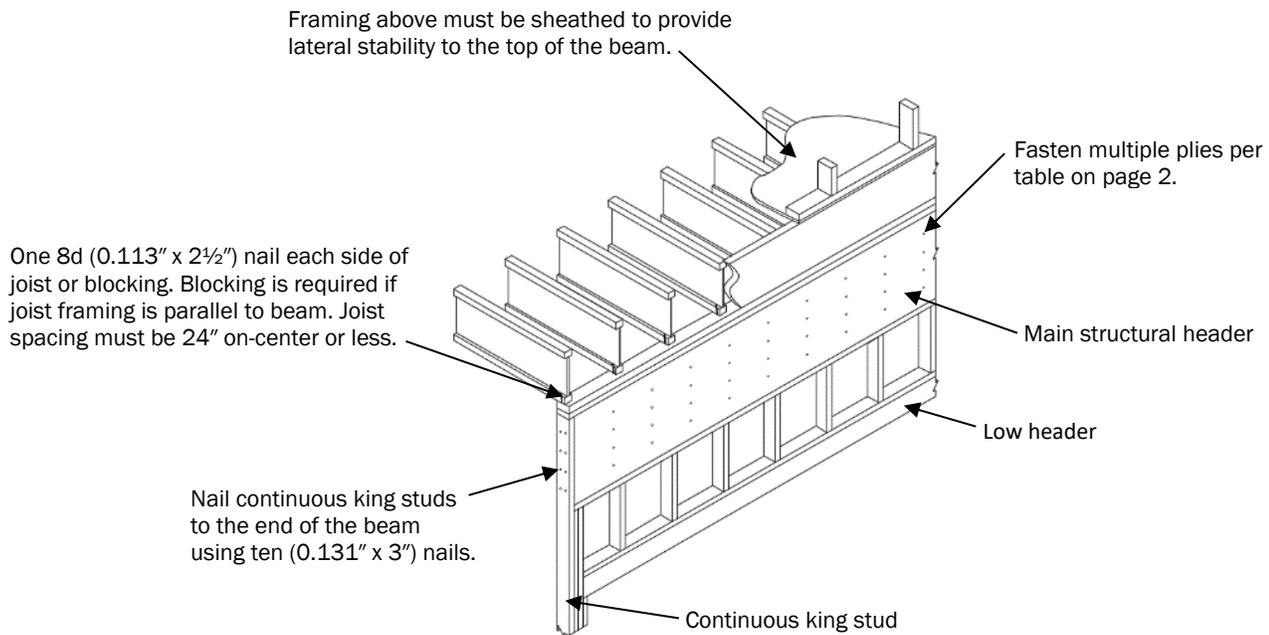


*Multiple pieces can be nailed or bolted together to form a header or beam of the required size, up to a maximum width of 7"*

**Lateral Bracing Examples**



**Detail 1: Fully Braced Flush Beam**



**Detail 2: Fully Braced Alternative for Dropped Header Applications**

***If you have any questions, please contact your Weyerhaeuser representative.***

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