

20", 22" and 24" Deep Depth Beam Design Guide for 2.0E Microllam® LVL and 2.2E Parallam® PSL

Microllam® LVL and Parallam® PSL beams manufactured by Weyerhaeuser® are a cost-effective solution for supporting the loads and spans common in residential structures. Today's homes present demanding structural requirements including supporting longer spans, heavier loads, and the more stringent deflection criteria required for brick veneer applications. Often, deep beam depths are required. 20", 22" and 24" deep Microllam® LVL and Parallam® PSL beams provide the exceptional strength and stiffness that meet these demands. 2.2E Parallam® PSL can be sized using the *Weyerhaeuser® 2.2E Parallam® PSL Deep Beam Specifier's Guide (TJ-7001)*.

Forte™ Software Design Settings

Sizing 20", 22" and 24" deep beams in Forte™ couldn't be easier. Once you've entered span, support and load information, simply click on the "Products" tab; choose 2.0E Microllam® LVL or 2.2E Parallam® PSL under "Product" list. The available depths for these two products include 20", 22" and 24".

Bracing Considerations

Deep beams require special installation attention. In particular, lateral stability must be provided to ensure full design capacity. Lateral bracing is essential to prevent buckling of a beam. Buckling is the tendency for a beam to rotate out-of-plane as it is loaded. Bracing must adequately support the compression edge of the beam to prevent this rotation. See page 3.

Allowable Design Stresses (100% Load Duration)

Design Stress (psi)	Grade	
	2.0E LVL	2.2E PSL
Modulus of Elasticity, E	2.0 x 10 ⁶	2.2 x 10 ⁶
Flexural Stress ⁽¹⁾ , F _b	2,600	2,900
Compression Parallel to Grain, F _c	2,510	2,900
Compression Perpendicular to Grain ⁽²⁾ , F _{c⊥}	750	625
Horizontal Shear, F _v	285	290

(1) For 12" depth. For other depths, multiply F_b by the appropriate factor as follows:

- For Microllam® LVL, multiply by [12/d]^{0.136}
- For Parallam® PSL, multiply by [12/d]^{0.111}

(2) F_{c⊥} shall not be increased for duration of load.

Maximum Uniform Load Applied to Either Outside Member (PLF)

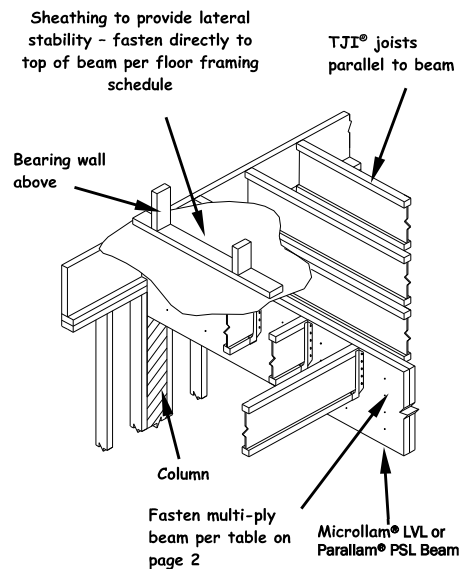
		Connector Pattern	Assembly A	Assembly B	Assembly E	Assembly F
Connector Type	Number of Rows		3½" 2-Ply	5¼" 3-Ply	7" 2-Ply	7" 4-Ply
		Connector On-Center Spacing	3½" 2-Ply	5¼" 3-Ply	7" 2-Ply	7" 4-Ply
10d (0.128" x 3") ⁽¹⁾ nail	3	12"	555	<i>415</i>		
	4	12"	740	<i>555</i>		
½" A307 Through Bolt ⁽²⁾	3	24"	760	570	1,290	505
		12"	1,520	1,140	2,580	1,015
	4	24"	1,015	760	1,720	675
		12"	2,030	1,520	3,435	1,355
SDS ¼" x 3½"	3	24"	1,020	<i>765</i>		
		12"	2,040	<i>1,530</i>		
	4	24"	1,360	<i>1,020</i>		
		12"	2,720	<i>2,040</i>		
SDS ¼" x 6"	3	24"			<i>2,040</i>	<i>832</i>
		12"			<i>4,080</i>	<i>1,670</i>
	4	24"			<i>2,720</i>	<i>1,110</i>
		12"			<i>5,480</i>	<i>2,225</i>
USP WS35	3	24"	730	<i>545</i>		
		12"	1,460	<i>1,095</i>		
	4	24"	970	<i>730</i>		
		12"	1,945	<i>1,460</i>		
USP WS6	3	24"			<i>1,460</i>	<i>485</i>
		12"			<i>2,915</i>	<i>970</i>
	4	24"			<i>1,945</i>	<i>650</i>
		12"			<i>3,890</i>	<i>1,295</i>
3⅝" TrussLOK	3	24"	870			
		12"	1,740			
	4	24"	1,160			
		12"	2,320			
5" TrussLOK	3	24"		675		
		12"		1,350		
	4	24"		900		
		12"		1,800		
6¾" TrussLOK	3	24"			930	620
		12"			1,860	1,240
	4	24"			1,240	825
		12"			2,480	1,655

(1) Nailed connection values may be doubled for 6" on-center or tripled for 4" on-center spacing.

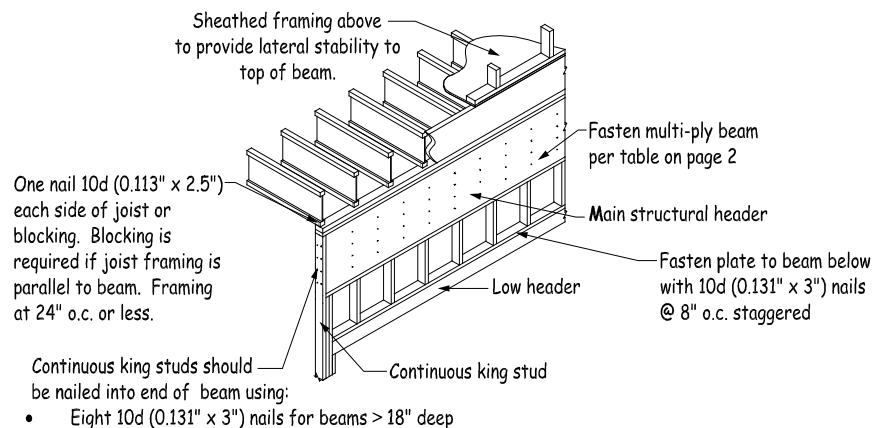
(2) Washers required. Bolt holes to be 9/16" maximum.

General Notes

- Connections are based on NDS® or manufacturers' code report.
- Use specific gravity of 0.5 when designing 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".
- ***Bold Italic*** cells indicate **Connector Pattern** must be installed on both sides. Stagger fasteners on opposite side of beam by ½ the required **Connector Spacing**.
- 7" wide beams should be side-loaded only when loads are applied to both sides of the members (to minimize rotation).
- Beams wider than 7" require special consideration by the design professional.



Detail 1: Fully Braced Flush Beam



Detail 2: Fully Braced Alternative to Dropped Header Applications