

## Beam Design Guide for Depths Greater than 18" for 1.9E Microllam® LVL and 2.2E Parallam® PSL

Microllam® LVL and Parallam® PSL beams manufactured by iLevel® 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. 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 iLevel® specifier's guide *iLevel® Trus Joist® Commercial Parallam® PSL (COM-4000)*.

### TJ-Beam® Software Settings

1.9E Microllam® and 2.2E Parallam® beams deeper than 18" can be designed using TJ-Beam® software or by contacting your iLevel® Representative. When designing deep depth Microllam® LVL in TJ-Beam®, it is necessary to use the "Custom Depth" function (See Figure 1). When designing 2.2E Parallam® PSL in TJ-Beam®, an "option" setting needs to be changed. Under, Settings\Options\Program Settings, set the "Supplier" to "Custom". See Figure 2. Then during the design process, deeper Parallam® beam depths can be chosen as shown in Figure 3.

### 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	
	1.9E LVL	2.2E PSL
Modulus of Elasticity, E	$1.9 \times 10^6$	$2.2 \times 10^6$
Flexural Stress <sup>(1)</sup> , $F_b$	2,600	2,900
Compression Parallel to Grain, $F_{c  }$	2,510	2,900
Compression Perpendicular to Grain <sup>(2)</sup> , $F_{c\perp}$	750	750
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)  $F_{c\perp}$  shall not be increased for duration of load.

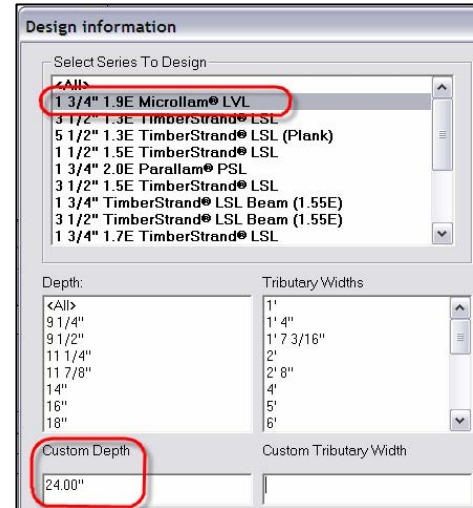


Figure 1: Sizing Microllam® LVL Using Custom Depth Feature in TJ-Beam

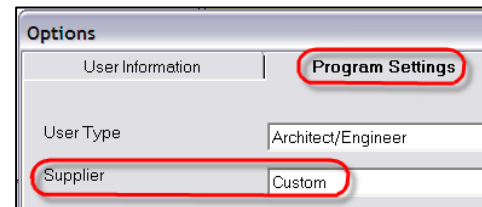


Figure 2: TJ-Beam® Settings for 2.2E Parallam® Beam Design

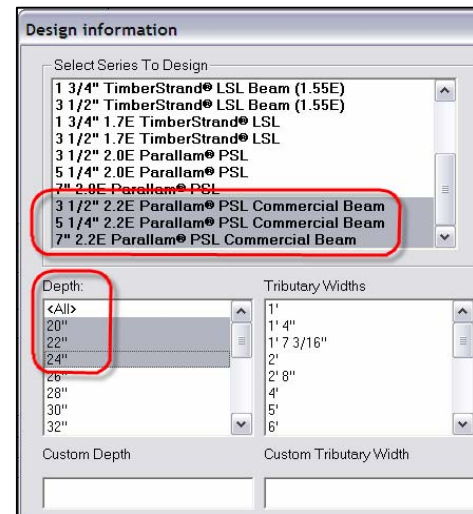
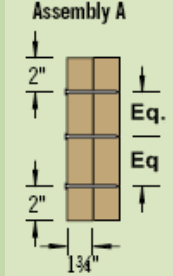
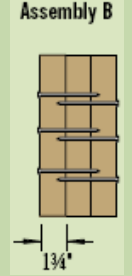
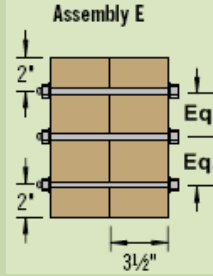
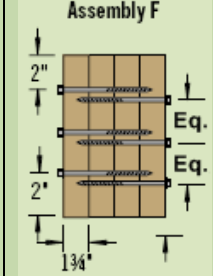


Figure 3: Sizing 2.2E Parallam® PSL in TJ-Beam®

## Maximum Uniform Load Applied to Either Outside Member (PLF)

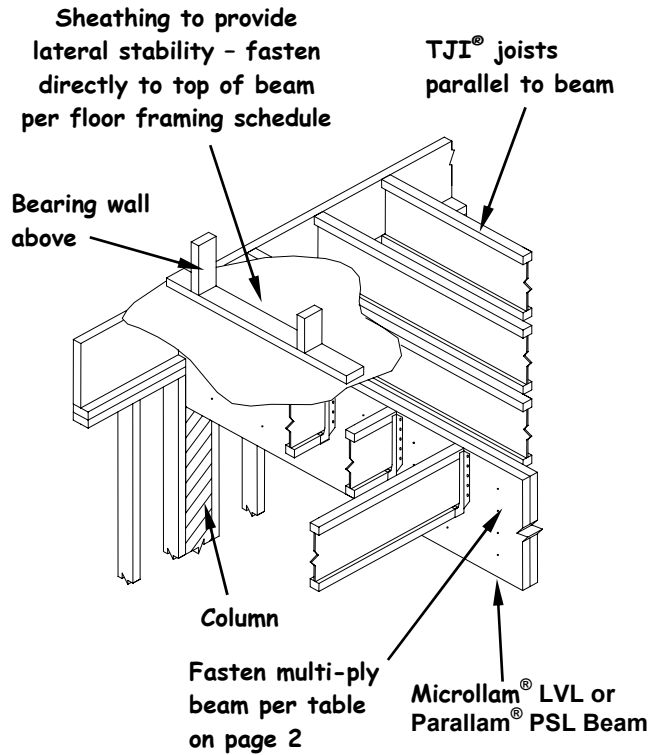
		Connector Pattern	Assembly A	Assembly B	Assembly E	Assembly F
Connector Type	Number of Rows		3½" 2-Ply	5¼" 3-Ply	7" 2-Ply	7" 4-Ply
						
		Connector On-Center Spacing				
10d (0.128" x 3") <sup>(1)</sup> nail	3	12"	555	<b>415</b>		
	4	12"	740	<b>555</b>		
½" A307 Through Bolt <sup>(2)</sup>	3	24"	760	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	<b>765</b>		
		12"	2,040	<b>1,530</b>		
	4	24"	1,360	<b>1,020</b>		
		12"	2,720	<b>2,040</b>		
SDS ¼" x 6"	3	24"			<b>695</b>	<b>680</b>
		12"			<b>1,395</b>	<b>1,360</b>
	4	24"			<b>930</b>	<b>905</b>
		12"			<b>1,860</b>	<b>1,815</b>
USP WS35	3	24"	715	<b>540</b>		
		12"	1,435	<b>1,075</b>		
	4	24"	955	<b>715</b>		
		12"	1,915	<b>1,435</b>		
USP WS6	3	24"			<b>790</b>	<b>525</b>
		12"			<b>1,580</b>	<b>1,055</b>
	4	24"			<b>1,055</b>	<b>705</b>
		12"			<b>2,110</b>	<b>1,405</b>
3¾" Trussloc	3	24"	955	<b>715</b>		
		12"	1,910	<b>1,430</b>		
	4	24"	1,270	<b>955</b>		
		12"	2,545	<b>1,910</b>		
5" Trussloc	3	24"		750	<b>725</b>	<b>665</b>
		12"		1,500	<b>1,445</b>	<b>1,330</b>
	4	24"		1,000	<b>965</b>	<b>890</b>
		12"		2,000	<b>1,925</b>	<b>1,775</b>
6¾" Trussloc	3	24"			925	665
		12"			1,855	1,330
	4	24"			1,235	890
		12"			2,470	1,775

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

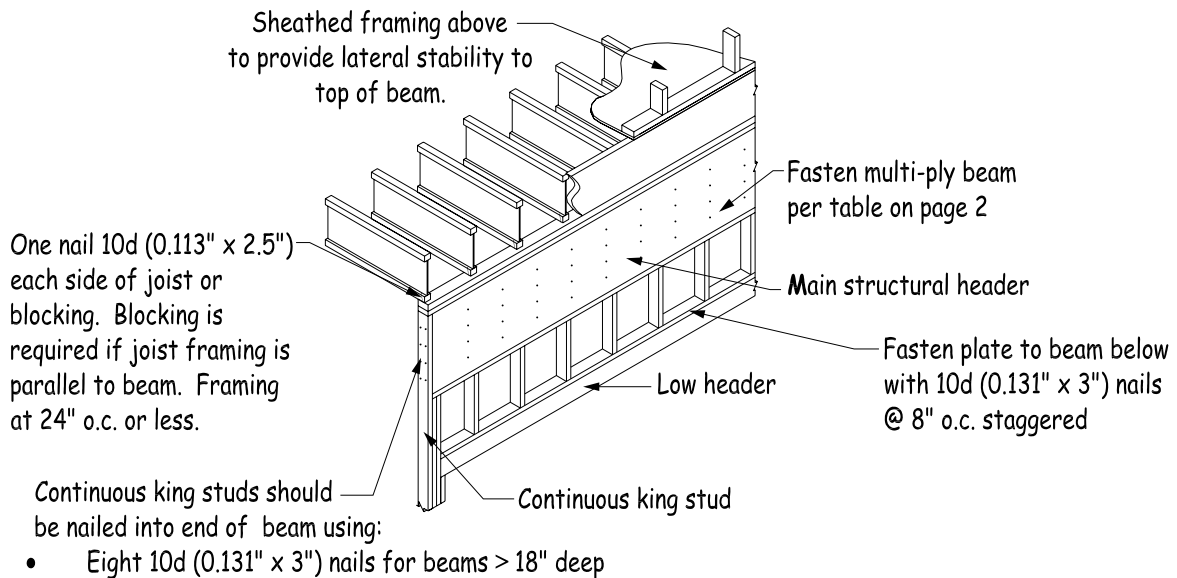
(2) Washers required. Bolt holes to be 9/16" maximum.

### General Notes

- Connections are based on NDS<sup>®</sup> 2005 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**

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