

# RESIDENTIAL WALL GUIDE FOR CANADA

Featuring Trus Joist® TimberStrand® LSL  
and Parallam® PSL Wall Framing

- Engineered to meet code requirements for walls up to 30' tall
- Tall Wall Calculator software includes:
  - quick and easy sizing of studs, columns, and connections
  - out-of-plane wind and vertical load information for designing walls that are stiff, strong, and straight
- Limited product warranty





The products in this guide are readily available through our nationwide network of distributors and dealers. For more information on other applications or other Trus Joist® products, contact your Weyerhaeuser representative.

**Code Evaluations:**  
See CCMC 12627-R, CCMC 11161-R

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## Choose Trus Joist® wall framing for straight, flush walls that:

- are critical for tile applications.
- allow easy countertop and cabinet installation in kitchens and bathrooms.
- give visual appeal to tall walls in great rooms and entryways.
- have the strength and stiffness to accommodate “window” walls.

Many of today’s homes have design requirements—such as walls over 10 feet tall—that exceed the code provisions for conventional construction. Trus Joist® TimberStrand® laminated strand lumber (LSL) and Parallam® parallel strand lumber (PSL) can help you meet the requirements of these challenging designs. Weyerhaeuser also offers product and design support that includes technical information, design software, and design advice from our team of skilled engineers and sales representatives.

### Tall wall software solutions

The Weyerhaeuser Tall Wall Calculator is single-member sizing software created by Weyerhaeuser to help estimators, architects, and engineers design walls quickly and efficiently. The Tall Wall Calculator provides the most economical solutions for studs, columns, and headers, and helps you design connections for each member. Professional calculations can be printed out for engineer sign-off or to give to building officials. Ask your Weyerhaeuser representative how you can get the Tall Wall Calculator today.

Contact your Weyerhaeuser representative for more information about our design software for walls.

## This guide features the following Trus Joist® wall framing products:

### Western Canada:

#### 1.5E TimberStrand® LSL studs:

1½" x 5½" (2x6)  
1½" x 7¼" (2x8)

#### 1.55E TimberStrand® LSL studs:

1¾" x 7¼"

#### 1.55E TimberStrand® LSL headers and beams:

Widths: 1¾" and 3½"  
Depths: 9½", 11⅞", 14", and 16"

#### 2.2E Parallam® PSL headers and beams:

Widths: 1¾", 3½", 5¼", and 7"  
Depths: 9¼", 9½", 11¼", 11⅞", 14", 16", and 19"

#### 1.8E Parallam® PSL columns and posts:

3½" x 3½" 3½" x 5¼" 3½" x 7"  
5¼" x 5¼" 5¼" x 7" 7" x 7"

### Eastern Canada:

#### 1.3E TimberStrand® LSL studs\*:

1½" x 3½" (2x4) in lengths up to 14'

#### 1.5E TimberStrand® LSL studs:

1½" x 5½" (2x6)  
1½" x 7¼" (2x8)

#### 1.55E TimberStrand® LSL headers and beams:

Widths: 1¾" and 3½"  
Depths: 9½", 11⅞", 14", and 16"

#### 2.0E Parallam® PSL headers and beams:

Widths: 3½", 5¼", and 7"  
Depths: 9½", 11⅞", 14", 16", 18", and 19"

#### 1.8E Parallam® PSL columns and posts:

3½" x 3½" 3½" x 5¼" 3½" x 7"  
5¼" x 5¼" 5¼" x 7" 7" x 7"

*Other sizes may be available in Weyerhaeuser software; however, not all products are available in all markets. Contact your Weyerhaeuser representative for the sizes available in your area.*

\* For 1.3E TimberStrand® LSL headers, columns, and posts, refer to the Trus Joist® Beam, Header, and Column Specifier's Guide for Eastern Canada, TJ-9500.

# DEFLECTION REQUIREMENTS

## Code Minimum Deflection Criteria<sup>(1)</sup>

Type of Wall	Maximum Deflection
Exterior walls with brick or stone finish	L/360 <sup>(2)</sup>
All other exterior walls	L/180 <sup>(3)</sup>

- (1) Local authority may require higher deflection criteria. Contact your Weyerhaeuser representative for more information.  
 (2) *Engineering Guide for Wood Frame Construction*, Canadian Wood Council 2009 (for brick).  
 (3) *Commentary D—User's Guide—NBCC Structural Commentaries* (Part 4 of Division B).

## How stiff does a wall need to be?

While model building codes provide required deflection limits based on the type of finish supported by the wall framing, acceptable deflection limits are usually established by the design professional of record, finish-material provider, and/or building code authority. Typical deflection requirements are shown in table at left.

## ENGINEERED DESIGN ASSUMPTIONS

**Design applications are limited to vertical loads, and to lateral wind loads that are perpendicular to the wall framing.** Seismic load and in-plane lateral load are beyond the scope of this guide. The design professional of record should base in-plane analysis (shear wall analysis) on spruce-pine-fir (SPF) values.

### Tall Wall Calculator member design is based on the following:

- Residential construction conforming to Part 9 of the National Building Code of Canada (NBCC).
- Member design and lateral support requirements for bending are based on Limit States Design per CSA O86.
- Studs, columns, and king studs are braced laterally to prevent buckling in the narrow dimension.
- Blocking/bracing at 8' on-centre, maximum. See page 5.
- Studs are considered pinned at both ends.
- For ultimate limit states (ULS), eccentric axial loading of 1/6 of the stud depth and  $P_{\Delta}$  effects are considered.
- For serviceability limit states (SLS), eccentricity and  $P_{\Delta}$  effects are considered for lengths over 18'-3".
- Beams and columns must remain straight to within  $5L/4608$  (in.) of true alignment. L is the unrestrained length of the member in feet.

### Wall design wind pressure is based on the following:

- Pressure =  $I_w[qC_eC_gC_p \pm qC_{ei}C_{pi}]$  from NBCC. q is referenced from NBCC, volume 2, Division B, Appendix C.
- $C_{ei} = 2.0$
- For ULS:  $I_w = 1.0$ ;  $C_eC_gC_p = -2.0$  to 1.75;  $C_{pi} = -0.45$  to 0.3
- For SLS:  $I_w = 0.75$ ;  $C_eC_gC_p = -1.75$  to 1.75;  $C_{pi} = -0.3$  to 0.3
- For load conditions outside the scope of this literature, contact your local Weyerhaeuser representative.

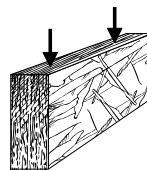
## DESIGN PROPERTIES

### Specified Strengths<sup>(1)</sup> and Moduli of Elasticity (Standard Term)

	Modulus of elasticity	E	TimberStrand® LSL			Parallam® PSL		
			1.3 x 10 <sup>6</sup>	1.5 x 10 <sup>6</sup>	1.55 x 10 <sup>6</sup>	1.8 x 10 <sup>6</sup>	2.0 x 10 <sup>6</sup>	2.2 x 10 <sup>6</sup>
Axial	Shear modulus of elasticity	G	= 81,250 psi	93,750 psi	96,875 psi	112,500 psi	125,000 psi	137,500 psi
	Compression parallel to grain	$f_{c  }$	= 2,235 psi	3,110 psi	3,270 psi	3,990 psi	4,630 <sup>(9)</sup> psi	4,630 <sup>(9)</sup> psi
	Tension stress	$f_t^{(2)}$	= 1,985 psi	2,770 psi	1,975 <sup>(8)</sup> psi	3,245 psi	3,750 psi	3,750 psi
Joist or Beam Orientation	Flexural stress	$f_b^{(3)}$	= 3,140 <sup>(6)</sup> psi	4,160 <sup>(6)</sup> psi	4,295 <sup>(6)</sup> psi	4,620 <sup>(6)</sup> psi	5,360 <sup>(6)</sup> psi	5,360 <sup>(6)</sup> psi
	Horizontal shear parallel to grain	$f_v$	= 745 psi	745 psi	575 <sup>(8)</sup> psi	425 psi	540 psi	540 psi
	Compression perpendicular to grain	$f_{c\perp}^{(4)}$	= 1,240 psi	1,405 psi	1,455 psi	1,080 psi	1,365 psi	1,365 psi
Plank Orientation	Flexural stress	$f_b$	= 3,510 psi	4,660 psi	4,815 psi	4,435 <sup>(6)</sup> psi	5,175 <sup>(6)</sup> psi	5,175 <sup>(6)</sup> psi
	Horizontal shear parallel to grain	$f_v$	= 280 psi	280 psi	280 psi	355 psi	390 psi	390 psi
Equivalent Specific Gravity for Connections	Shear Walls <sup>(5)</sup>	SG	= 0.42 <sup>(7)</sup>	0.42	0.42	N.A.	N.A.	N.A.
	Lateral	SG	= 0.50	0.50	0.50	0.50	0.50	0.50
	Withdrawal	SG	= 0.42	0.42	0.42	0.50	0.50	0.50

- (1) To obtain factored resistances, apply the appropriate formulae from CSA O86 to the specified strengths shown.  
 (2)  $f_b$  has been adjusted to reflect the volume effects for most standard applications.  
 (3) When structural members qualify as repetitive members in accordance with CSA O86, a 4% increase is permitted for  $f_b$  in addition to the increases permitted in Footnote 6.  
 (4)  $f_{c\perp}$  shall not be increased for duration of load.  
 (5) Design shear wall applications per CSA O86 Table 9.5.1A.  
 (6) For 12" depth. For other depths, multiply  $f_b$  by the appropriate factor as follows:  
 – For TimberStrand® LSL multiply by  $\left[\frac{12}{d}\right]^{0.092}$  – For Parallam® PSL multiply by  $\left[\frac{12}{d}\right]^{0.111}$   
 (7) Do not use CSA O86 Table 9.5.1A with nail spacings less than 6" on-centre. (Studs at boundary locations, where two panels abut, are allowed two rows at 6" on-centre.)  
 (8) Value accounts for large hole capabilities. See **Allowable Holes** on page 7.  
 (9) For column and stud applications, use  $F_{c||}$  of 800 psi.

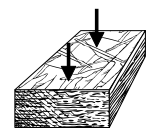
**Beam Orientation**



**Column Orientation**



**Plank Orientation**



TimberStrand® LSL and untreated Parallam® PSL are intended for dry-use applications

# CONVENTIONAL CONSTRUCTION APPLICATIONS

## Stud Specifications for Conventional Construction (from NBCC Table 9.23.10.1.)\*

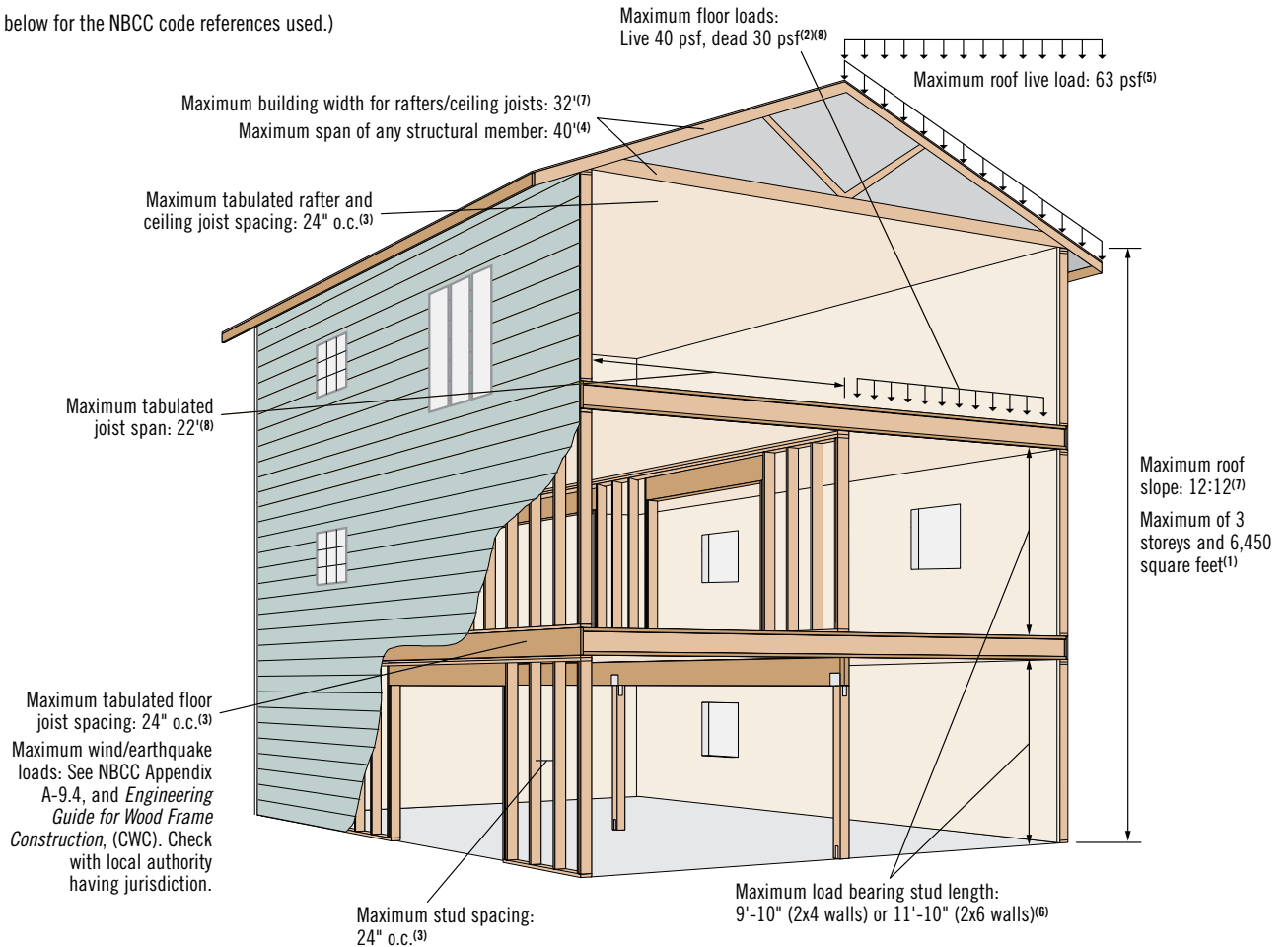
Type of Wall	Supported Loads (including dead loads)	Minimum Stud Size, Nominal	Maximum Stud Spacing	Maximum Unsupported Height
Interior	Attic not accessible by a stairway	2x4	24"	11'-10"
	Attic accessible by a stairway plus 1 floor	2x4	16"	11'-10"
	Roof load plus 1 floor	2x4	16"	11'-10"
	Attic not accessible by stairway plus 2 floors	2x4	16"	11'-10"
	Attic accessible by a stairway	2x4	24"	11'-10"
	Attic not accessible by a stairway plus 1 floor	2x4	24"	11'-10"
	Attic accessible by a stairway plus 2 floors	2x4	12"	11'-10"
	Roof load plus 2 floors	3x4	16"	11'-10"
		2x6	16"	13'-9"
		2x6	12"	13'-9"
Exterior	Roof load plus 3 floors	2x6	12"	13'-9"
	Roof with or without attic	2x4	24"	9'-10"
	Roof with or without attic storage plus 1 floor	2x4	16"	9'-10"
		2x6	24"	9'-10"
	Roof with or without attic storage plus 2 floors	2x4	12"	9'-10"
		3x4	16"	9'-10"
		2x6	16"	11'-10"
	Roof with or without attic storage plus 3 floors	2x6	12"	5'-11"

The illustration below provides the key limitations to the prescribed information in Part 9 of the NBCC. If these requirements and the nailing requirements of NBCC Table 9.23.3.4. are met, TimberStrand® LSL wall studs can be used in Part 9 buildings as a direct substitution for the lumber studs listed in Table 9.23.10.1. of the NBCC. A section of this table is provided to the left for your convenience.

\*Printed with written permission from the National Research Council of Canada.

## Limitations of Conventional Construction

(See legend below for the NBCC code references used.)



NBCC Code References:

(1) NBCC 1.3.3.3 (1)

(2) NBCC Table 4.1.5.3.

(3) NBCC 9.4.2.1. (1) b

(4) NBCC 9.4.2.1. (1) c

(5) NBCC 9.23.4.2. (1)

(6) NBCC Table 9.23.10.1.

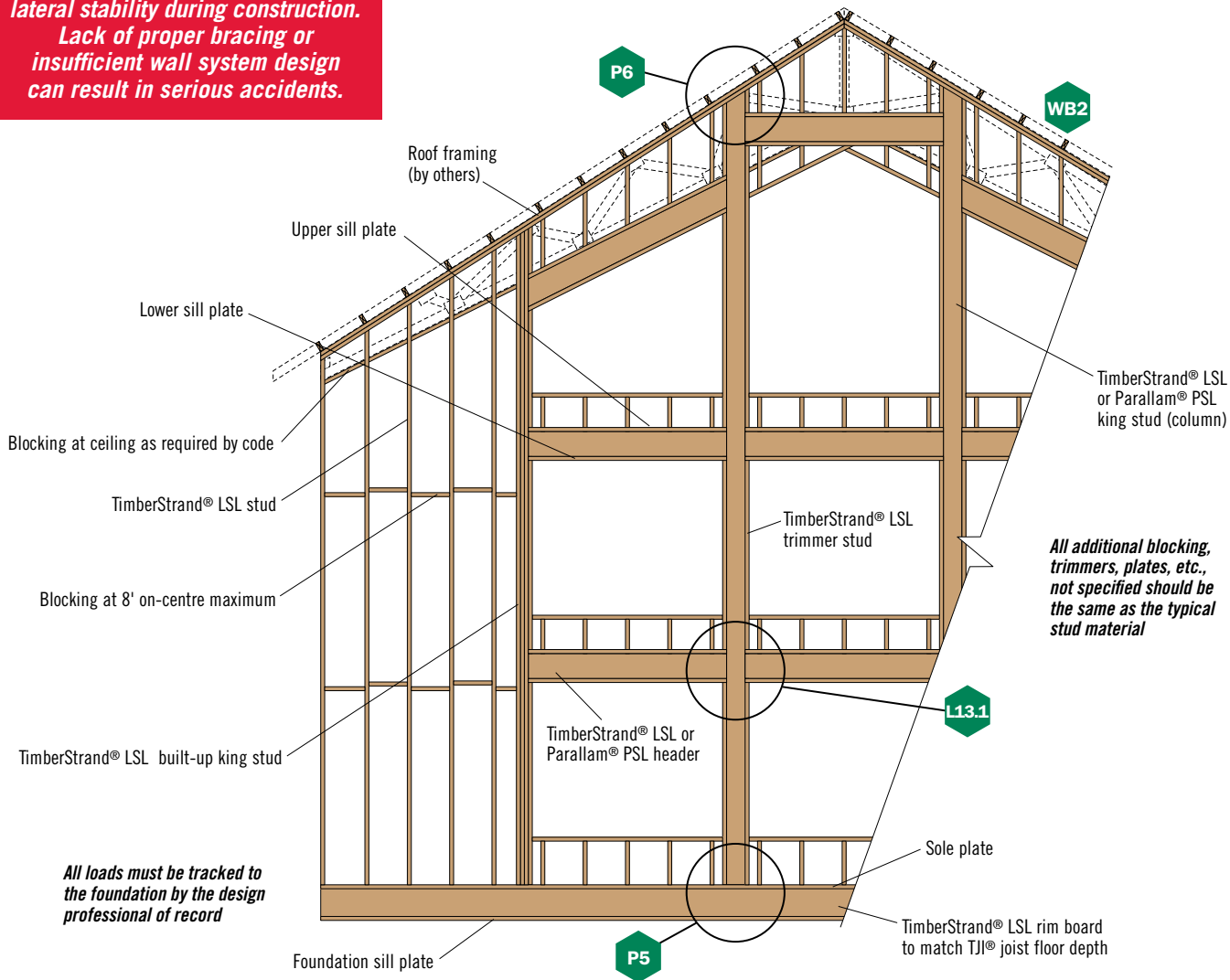
(7) NBCC Table 9.23.14.8

(8) NBCC Part 9 Table A-2

# TYPICAL TALL WALL FRAMING

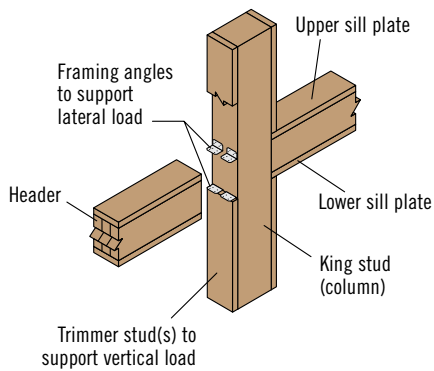
**WARNING**  
 Safety bracing is required for lateral stability during construction. Lack of proper bracing or insufficient wall system design can result in serious accidents.

Wall reinforcement is required at all lift points to ensure wall stability during construction



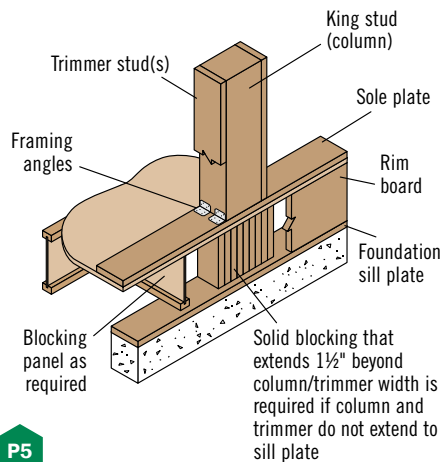
## WALL DETAILS

### Header to King Stud (Column)



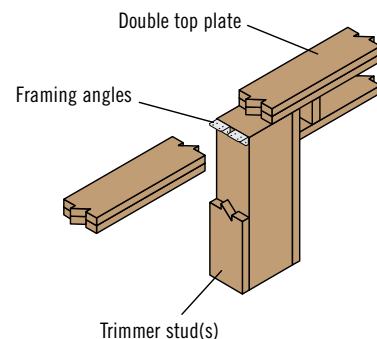
**L13.1** Plate width must equal the wall thickness to provide lateral bracing.

### King Stud (Column) to Bottom Plate



**P5**

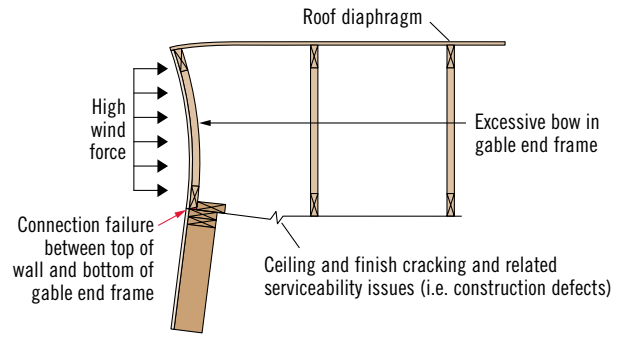
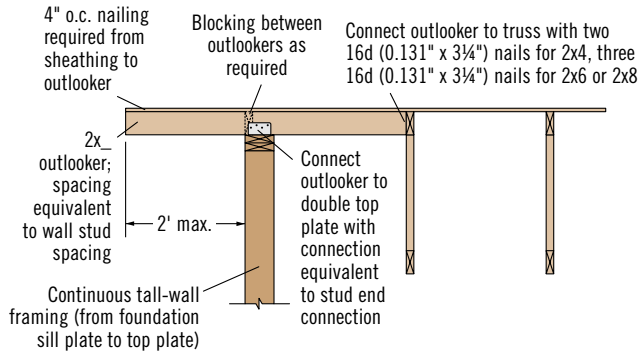
### King Stud (Column) to Top Plate



**P6**

# WALL DETAILS

## Wind Brace



The top of the wall framing must be supported by either the outlooker framing or by perpendicular trusses attached to the roof diaphragm. Depending on the application, gypsum ceilings can lack adequate strength to transfer lateral loads. Bracing for gable trusses that are stacked on walls is outside the scope of this document. Contact your building engineer for specific design information in these cases.

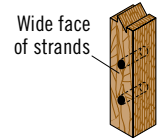
**WB2** Outlooker spacing must be the same as the stud spacing. For alternate spacing, contact your Weyerhaeuser representative.

## FRAMING CONNECTORS

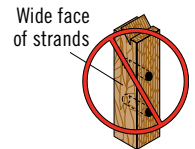
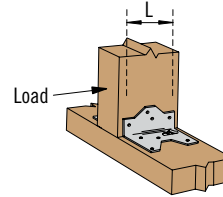
### Lateral Connections

On Flat Plate				On Sloped Plate			
Lateral Connection at Each End	Nailing	Capacity <sup>(1)</sup> (lbs)	Connector Length (L)	Lateral Connection at Each End	Nailing	Capacity <sup>(1)</sup> (lbs)	Connector Length (L)
Two end or toe nails	12d (0.120" x 3¼")	175	N.A.	Two end or toe nails	12d (0.120" x 3¼")	175	N.A.
Three end or toe nails	12d (0.120" x 3¼")	260	N.A.	Three end or toe nails	12d (0.120" x 3¼")	260	N.A.
Four toe nails	12d (0.120" x 3¼")	435	N.A.	Four toe nails	12d (0.120" x 3¼")	435	N.A.
One A35 <sup>(2)</sup>	Twelve 8d (0.131" x 1½")	675	4½"	One LS50 <sup>(2)(4)(5)</sup>	Eight 10d (0.148" x 3")	670	4⅞"
Two A34	Eight 8d (0.131" x 1½")	950	2½"	Two LS30 <sup>(3)(5)</sup>	Six 10d (0.148" x 3")	790	3⅜"
Two A35 <sup>(2)</sup>	Twelve 8d (0.131" x 1½")	1,350	4½"	Two LS50 <sup>(3)(5)</sup>	Eight 10d (0.148" x 3")	1,340	4⅞"
Four A34 <sup>(3)</sup>	Eight 8d (0.131" x 1½")	1,900	2½"	Two LS70 <sup>(5)(6)</sup>	Ten 10d (0.148" x 3")	1,550	6⅜"

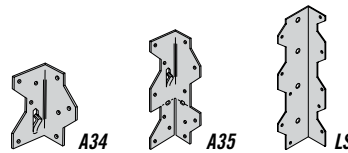
- (1) Factored value
- (2) Minimum 5¼" deep column or stud
- (3) Minimum 3½" wide x 5¼" deep column or stud (i.e., 2x6 wall)
- (4) Clinched when possible
- (5) 2-ply top plate required
- (6) Minimum 3½" wide x 7" deep column or stud (i.e., 2x8 wall)



In order to use the manufacturer's published capacities when designing column caps, bases, or holdowns for uplift, the bolts or screws must be installed perpendicular to the wide face of strands, as shown above



DO NOT install bolts or screws into the narrow face of strands



### General Notes

- Table is based on:
  - Short-term load duration.
  - Lateral connection values based on a specific gravity of spruce-pine-fir.
- For end-grain nailed connections, a 0.67 factor was used (based on CSA O86).
- For toenail connections, a 0.83 factor was used (based on CSA O86).

## MULTIPLE-MEMBER CONNECTIONS

### 2-Ply Nailing Recommendations

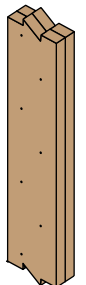
- For 2x4, 2x6, 1¼" x 7¼", and 2x8: Minimum of two rows of 16d (0.131" x 3¼") pneumatic nails at 10" on-centre, staggered.
- Nail from one side.

### 3-Ply Nailing Recommendations

- For 2x4: Minimum of two rows of 16d (0.131" x 3¼") pneumatic nails at 8" on-centre, staggered.
- For 2x6, 1¼" x 7¼", and 2x8: Minimum of three rows of 16d (0.131" x 3¼") pneumatic nails at 5" on-centre, staggered.
- Nail from both sides.

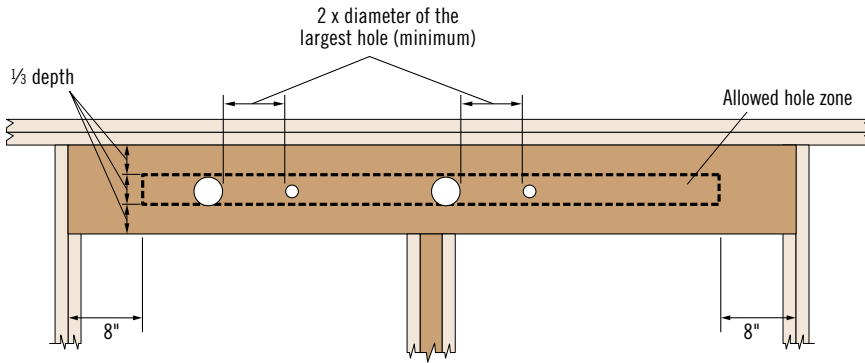
### 4-Ply Fastening Recommendations

- For 2x4: Nail each ply to the other with a minimum of two rows of 16d (0.131" x 3¼") pneumatic nails at 5" on-centre. When connecting each ply, offset nail rows by 2" from the ply below.
- For 2x6, 1¼" x 7¼", and 2x8:
  - Nail each ply to the other with a minimum of three rows of 16d (0.131" x 3¼") pneumatic nails at 5" on-centre. When connecting each ply, offset nail rows by 2" from the ply below.
  - or,
  - Minimum of two rows of ½" diameter bolts spaced at 8" on-centre.



# ALLOWABLE HOLES

## 1.55E TimberStrand® LSL Headers and Beams



### General Notes

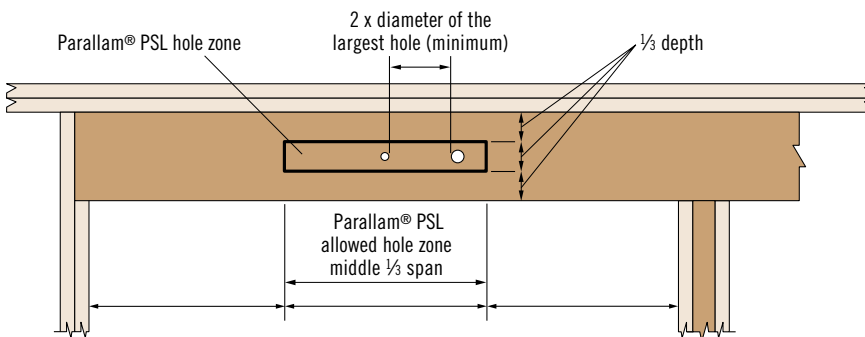
- Allowed hole zone suitable for headers and beams with **uniform and/or concentrated loads** anywhere along the member.
- Round holes only.
- No holes in headers or beams in plank orientation.

### 1.55E TimberStrand® LSL

Header or Beam Depth	Maximum Round Hole Size
9½"	3"
11⅞"	3⅝"
14"–16"	4⅝"

- See illustration for allowed hole zone.

## Parallam® PSL Headers and Beams



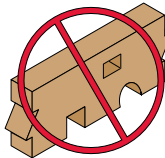
### General Notes

- Allowed hole zone suitable for headers and beams with **uniform loads only**.
- Round holes only.
- No holes in cantilevers.
- No holes in headers or beams in plank orientation.

### Parallam® PSL

Header or Beam Depth	Maximum Round Hole Size
5½"	1¾"
7¼"–20"	2"

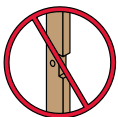
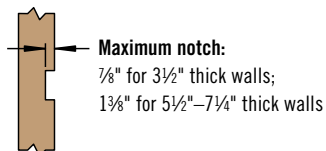
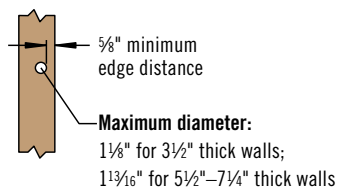
- See illustration for allowed hole zone.



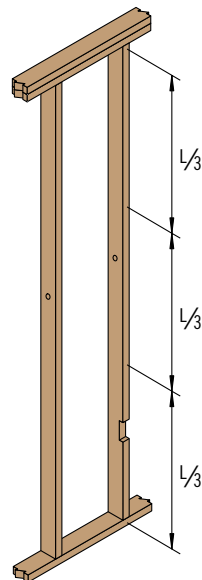
**DO NOT cut, notch, or drill holes in headers or beams except as indicated in the illustrations and tables above**

## Allowable Holes and Notches for TimberStrand® LSL Studs

One hole may be drilled anywhere along the length of the stud or column but must be at least ⅝" from the edge

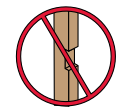
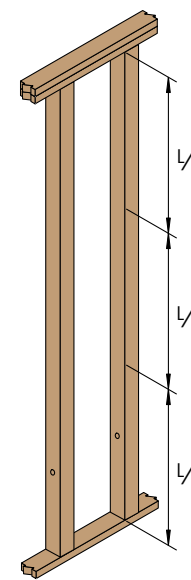


**DO NOT cut a notch and a hole in the same cross section**

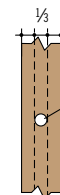


One notch may be cut anywhere **except the middle 1/3 of the length of the stud or column**

## Allowable Holes for Parallam® PSL Wall Columns



**DO NOT notch Parallam® PSL wall columns**



One 1" hole may be cut in middle 1/3 of width, within the lower 1/3 of the length of the column

## WE CAN HELP YOU BUILD SMARTER

You want to build solid and durable structures—we want to help. Weyerhaeuser provides high-quality building products and unparalleled technical and field assistance to support you and your project from start to finish.

**Floors and Roofs:** Start with the best framing components in the industry: our Trus Joist® TJI® joists; TimberStrand® LSL rim board; and TimberStrand® LSL, Microllam® LVL, and Parallam® PSL headers and beams. Pull them all together with our self-gapping and self-draining Weyerhaeuser Edge Gold™ floor panels and durable Weyerhaeuser roof sheathing.

**Walls:** Get the best value out of your framing package—use TimberStrand® LSL studs for tall walls, kitchens, and bathrooms, and our traditional, solid-sawn lumber everywhere else. Cut down installation time by using TimberStrand® LSL headers for doors and windows, and Weyerhaeuser wall sheathing with its handy two-way nail lines.

**Software Solutions:** Whether you are a design professional or lumber dealer, Weyerhaeuser offers an array of software packages to help you specify individual framing members, create cut lists, manage inventories—even help you design a complete structural frame. Contact your Weyerhaeuser representative to find out how to get the software you need.

**Technical Support:** Need technical help? Weyerhaeuser has one of the largest networks of engineers and sales representatives in the business. Call us for help, and a skilled member from our team of experts will answer your questions and work with you to develop solutions that meet all your structural framing needs.



Visit [woodbywy.com/warranty](http://woodbywy.com/warranty) for copies of this and other Trus Joist® Engineered Wood Product warranties.


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