Trus Joist™
Weyerhaeuser

CANADA WALL GUIDE

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

- Engineered to meet code requirements for walls up to 30' tall

- Available in ForteWEB® software for quick, easy sizing of studs, columns, headers, and connections
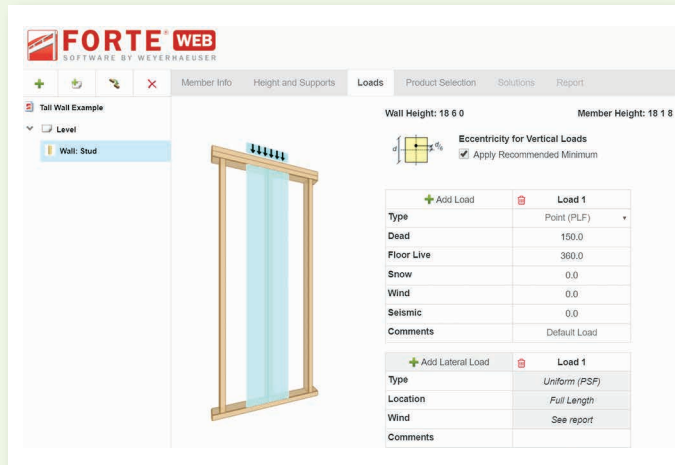
- Limited product warranty

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

ForteWEB® software is a single-member sizing solution created by Weyerhaeuser to help estimators, architects, and engineers design walls quickly and efficiently. ForteWEB® software 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 ForteWEB® software today.

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.

This guide is for use with NBCC 2010, NBCC 2015, CSA O86-09 and CSA O86-14.

SUSTAINABLE FORESTRY INITIATIVE

Certified Sourcing

www.sfiprogram.org

SFI-00008

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: 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", and 18"

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.*

TIMBERSTRAND® LSL WALL SYSTEMS IN MID-RISE CONSTRUCTION

With 5- and 6-storey wood frame construction now approved in several Canadian jurisdictions, builders and specifiers are looking to TimberStrand® LSL as a solution for applications where higher loads are applied to wall framing. Conventional studs used in lower levels of mid-rise buildings often require tight on-center spacing, posing a challenge for trades when installing wiring, fixtures, plumbing and other services in the walls. But high-strength TimberStrand® LSL studs allow wider on-center spacing, which not only helps speed up construction but also improves the energy performance associated with thermal-bridging at exterior walls. In addition, TimberStrand® LSL gives builders quality walls that are stiff, strong and straight.

TimberStrand® LSL wall systems also address the challenges of dimensional stability, plate crushing and shear wall performance that designers and builders commonly face with multi-storey construction projects:

- Because TimberStrand® LSL studs are manufactured dry, walls built with them are straighter than those built with traditional materials and movement due to plate shrinkage is significantly reduced as well.

- Used in flat orientation, TimberStrand® LSL studs in wall applications can support the demanding loads of mid-rise structures.

DEFLECTION REQUIREMENTS

How stiff does a wall need to be?

Annex A-4.5.2.2 of CSA O86 suggests that for brittle finishes such as brick, typical stud wall systems should be designed for an out-of-plane deflection criteria of L/360. However, this section of the code is non-mandatory and included for informative purposes. As an alternative, organizations such as the Brick Industry Association suggest L/240 criteria for brick veneer with wood stud walls, which is consistent with model codes in the United States.

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 right.

Code Minimum Deflection Criteria[1]

Type of Wall	Maximum Deflection
Exterior walls with brittle finish (brick/stucco/plaster)	L/360[2]
Exterior walls with brick veneer	L/240[3]
Exterior walls with flexible finish	L/180[4]

(1) Local authority may require higher deflection criteria. Contact your Weyerhaeuser representative for more information.

(2) CSA O86 Annex A (Informative) section A.4.5.2.2.

(3) The Brick Industry Association Technical Note, *Brick Veneer/Wood Stud Walls*.

(4) *Commentary D–User's Guide–NBCC Structural Commentaries* (Part 4 of Division B).

DESIGN PROPERTIES

Specified Strengths[1] and Moduli of Elasticity (Standard Term)

			TimberStrand® LSL			Parallam® PSL		
Modulus of elasticity	E	=	**1.3 x 10⁶**	**1.5 x 10⁶**	**1.55 x 10⁶**	**1.8 x 10⁶**	**2.0 x 10⁶**	**2.2 x 10⁶**
	Shear modulus of elasticity	G	=	81,250 psi	93,750 psi	96,875 psi	112,500 psi	125,000 psi	137,500 psi
Axial	Compression parallel to grain	f_{cll}	=	2,930psi	3,355 psi	3,465 psi	3,990 psi	4,630[10] psi	4,630[10] psi
	Tension stress	f_t[2]	=	1,985 psi	2,770 psi	1,975[9] psi	3,245 psi	3,750 psi	3,750 psi
Joist or Beam Orientation	Flexural stress	f_b[3]	=	3,140[6] psi	4,160[6] psi	4,295[6] psi	4,620[6] psi	5,360[6] psi	5,360[6] psi
	Horizontal shear parallel to grain	f_v	=	780 psi	935 psi	575[9] psi	425 psi	540 psi	540 psi
	Compression perpendicular to grain	$f_{c\perp}$[4]	=	1,295 psi	1,570 psi	1,635 psi	990 psi	1,135 psi	1,135 psi
Plank Orientation	Flexural stress	f_b	=	3,510 psi	4,660 psi	4,830 psi	4,435[6] psi	4,895[6] psi	4,895[6] psi
	Horizontal shear parallel to grain	f_v	=	280 psi	280 psi	280 psi	355 psi	390 psi	390 psi
	Compression perpendicular to grain	$f_{c\perp}$[4]	=	1,215 psi	1,355 psi	1,405 psi	990 psi	1,155 psi	1,155 psi
Equivalent Specific Gravity for Connections	Shear Walls[5]	SG	=	0.42[7]	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
	Minimum Shear Wall[8] nail spacing	oc	=	6"	3"	3"	N.A.	N.A.	N.A.

(1) To obtain factored resistances, apply the appropriate formulae from CSA O86 to the specified strengths shown.

(2) f_t 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) Refer to CCMC 12627-R and CSA O86 for additional nail placement requirements.

(9) Value accounts for large hole capabilities. See **Allowable Holes** on page 7.

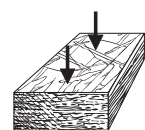(10) For column applications, use F_{cll} of 800 psi. Alternatively, refer to CCMC 11161-R, Table 4.1.1, footnote 9.

Beam Orientation
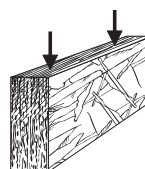
Column Orientation

Plank Orientation

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

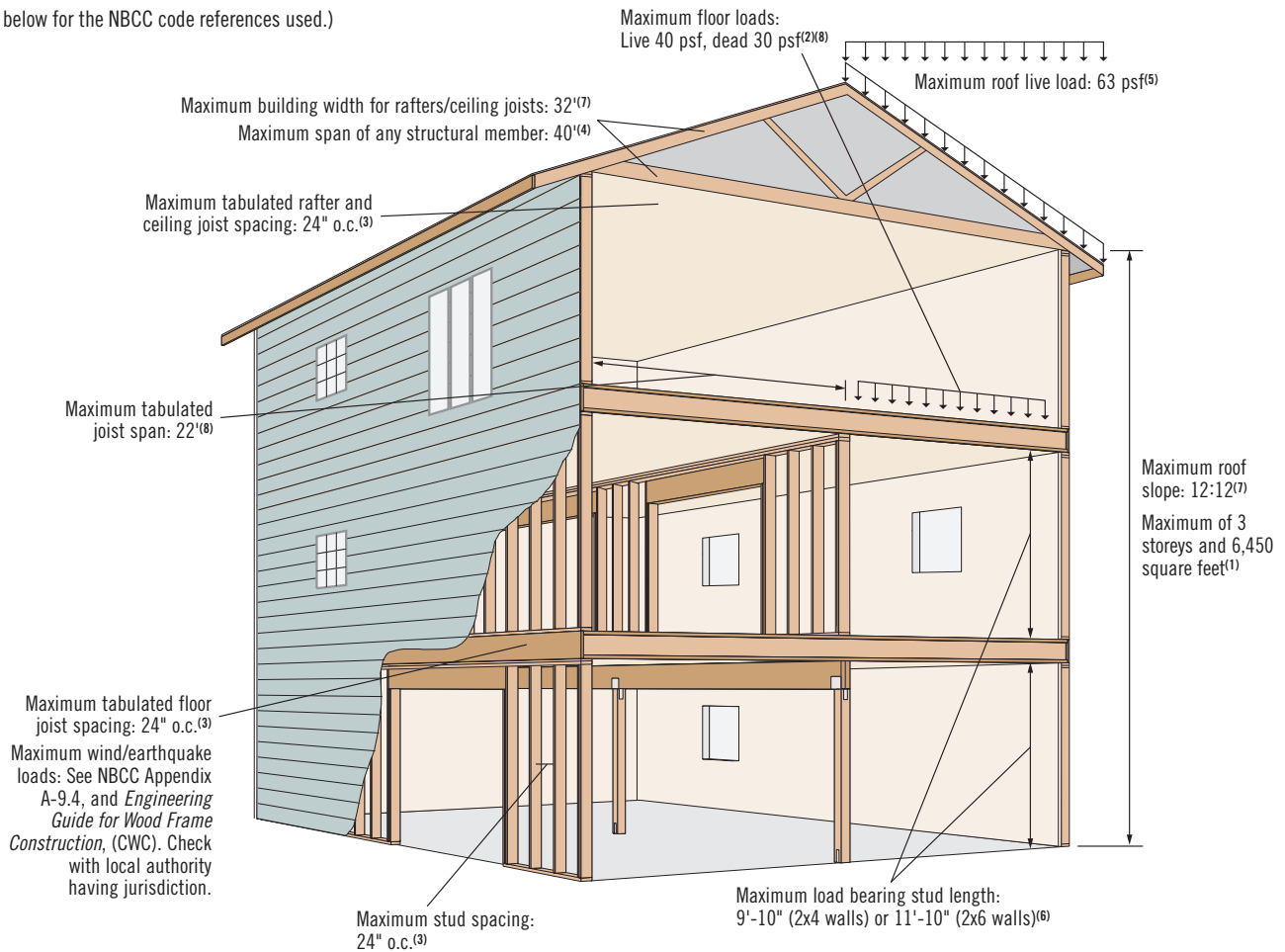## Stud Specifications for Conventional Construction
(from NBCC Table 9.23.10.1.)*

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"
	Attic accessible by a stairway plus 3 floors	2x6	12"	13'-9"
	Roof load plus 3 floors	2x6	12"	13'-9"
Exterior	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"

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

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.

Limitations of Conventional Construction
(See legend below for the NBCC code references used.)

Maximum floor loads: Live 40 psf, dead 30 psf[2][8]

Maximum roof live load: 63 psf[5]

Maximum building width for rafters/ceiling joists: 32'[7]

Maximum span of any structural member: 40'[4]

Maximum tabulated rafter and ceiling joist spacing: 24" o.c.[3]

Maximum tabulated joist span: 22'[8]

Maximum roof slope: 12:12[7]

Maximum of 3 storeys and 6,450 square feet[1]

Maximum tabulated floor joist spacing: 24" o.c.[3]

Maximum wind/earthquake loads: See NBCC Appendix A-9.4, and *Engineering Guide for Wood Frame Construction*, (CWC). Check with local authority having jurisdiction.

Maximum stud spacing: 24" o.c.[3]

Maximum load bearing stud length: 9'-10" (2x4 walls) or 11'-10" (2x6 walls)[6]

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.
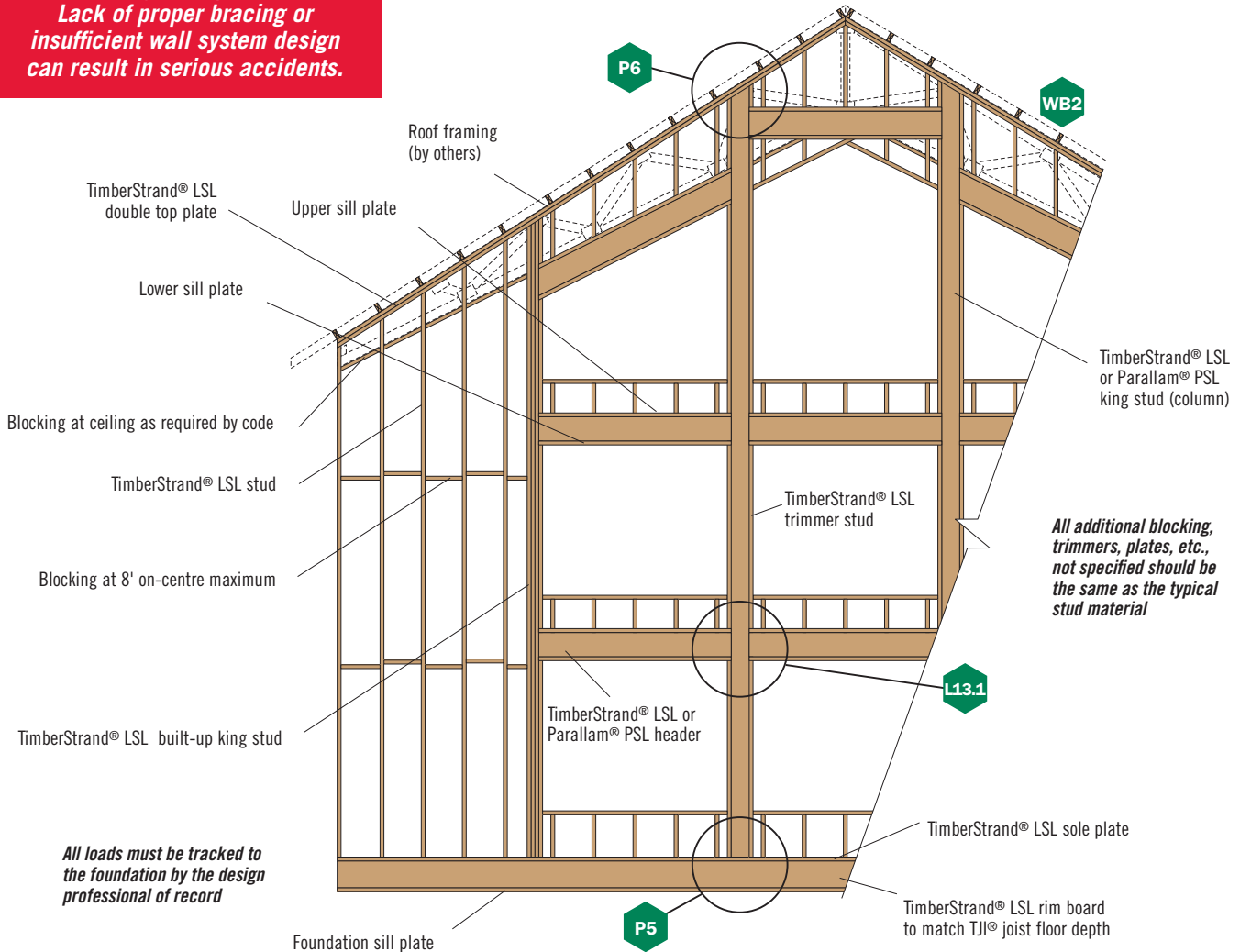(7) NBCC Table 9.23.14.8
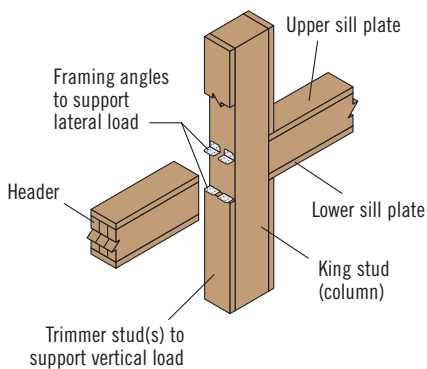(8) NBCC Part 9 Table A-2

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
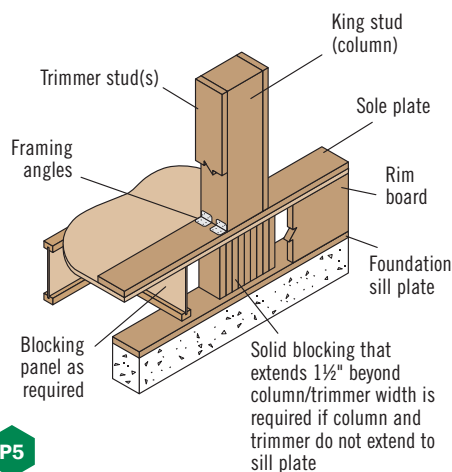
Roof framing (by others)

TimberStrand® LSL double top plate

Upper sill plate

Lower sill plate

Blocking at ceiling as required by code

TimberStrand® LSL stud

Blocking at 8' on-centre maximum

TimberStrand® LSL built-up king stud

P6

WB2

TimberStrand® LSL or Parallam® PSL king stud (column)

TimberStrand® LSL trimmer stud

All additional blocking, trimmers, plates, etc., not specified should be the same as the typical stud material

L13.1

TimberStrand® LSL or Parallam® PSL header

TimberStrand® LSL sole plate

All loads must be tracked to the foundation by the design professional of record

Foundation sill plate

P5

TimberStrand® LSL rim board to match TJI® joist floor depth

WALL DETAILS

Header to King Stud (Column)

Upper sill plate

Framing angles to support lateral load

Header

Lower sill plate

King stud (column)

Trimmer stud(s) to support vertical load

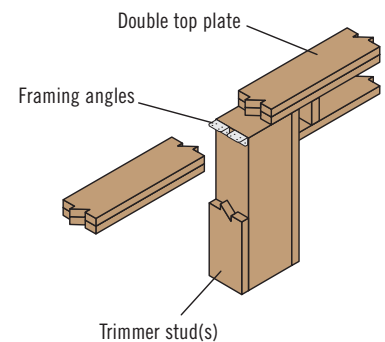**L13.1** *Plate width must equal the wall thickness to provide lateral bracing.*

King Stud (Column) to Bottom Plate

King stud (column)

Trimmer stud(s)

Sole plate

Framing angles

Rim board

Foundation sill plate

Blocking panel as required

Solid blocking that extends 1½" beyond column/trimmer width is required if column and trimmer do not extend to sill plate

P5

King Stud (Column) to Top Plate

Double top plate

Framing angles

Trimmer stud(s)

P6

Wind Brace

4" o.c. nailing required from sheathing to outlooker

Blocking between outlookers as required

Connect outlooker to truss with two 16d (0.131" x 3¼") nails for 2x4, three 16d (0.131" x 3¼") nails for 2x6 or 2x8

2x_ outlooker; spacing equivalent to wall stud spacing

2' max.

Connect outlooker to double top plate with connection equivalent to stud end connection

Continuous tall-wall framing (from foundation sill plate to top plate)

Roof diaphragm

High wind force

Excessive bow in gable end frame

Connection failure between top of wall and bottom of gable end frame

Ceiling and finish cracking and related serviceability issues (i.e. construction defects)

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

*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.*

FRAMING CONNECTORS

Lateral Connections

On Flat Plate				On Sloped Plate			
Lateral Connection at Each End	Nailing	Capacity[1] (lbs)	Connector Length (L)	Lateral Connection at Each End	Nailing	Capacity[1] (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[2]	Twelve 8d (0.131" x 1½")	675	4½"	One LS50[2][4][5]	Eight 10d (0.148" x 3")	720	4⅞"
Two A34	Eight 8d (0.131" x 1½")	950	2½"	Two LS30[3][5]	Six 10d (0.148" x 3")	830	3⅜"
Two A35[2]	Twelve 8d (0.131" x 1½")	1,350	4½"	Two LS50[3][5]	Eight 10d (0.148" x 3")	1,440	4⅞"
Four A34[3]	Eight 8d (0.131" x 1½")	1,900	2½"	Two LS70[5][6]	Ten 10d (0.148" x 3")	1,610	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)

Load

L

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).

Wide face of strands

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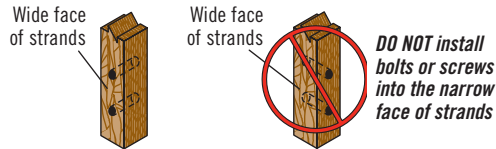
DO NOT install bolts or screws into the narrow face of strands

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

LS

A35

A34
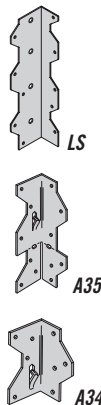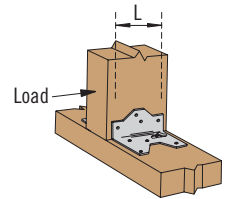
MULTIPLE-MEMBER CONNECTIONS

2-Ply Nailing Recommendations

- **For 2x4, 2x6, 1¾" 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, 1¾" 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, 1¾" 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.
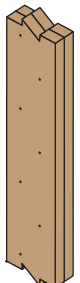
ALLOWABLE HOLES

1.55E TimberStrand® LSL Headers and Beams

2 x diameter of the largest hole (minimum)
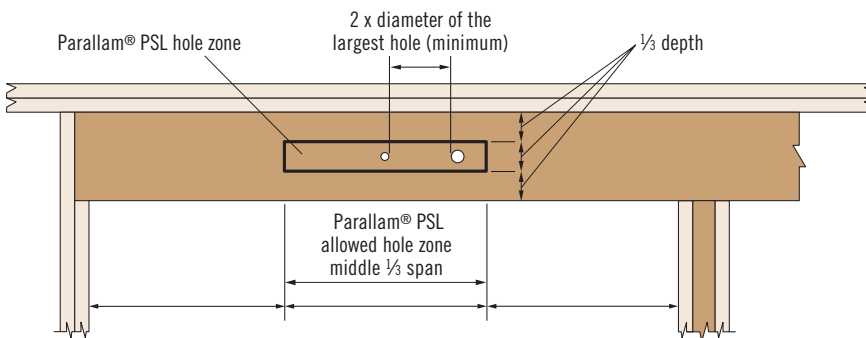
⅓ depth

Allowed hole zone

8"

8"
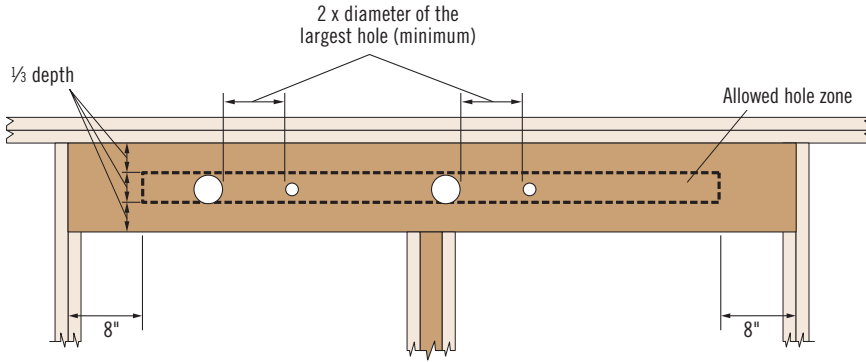
General Notes

- 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

Parallam® PSL hole zone

2 x diameter of the largest hole (minimum)

⅓ depth
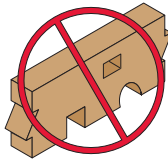
Parallam® PSL allowed hole zone middle ⅓ span

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

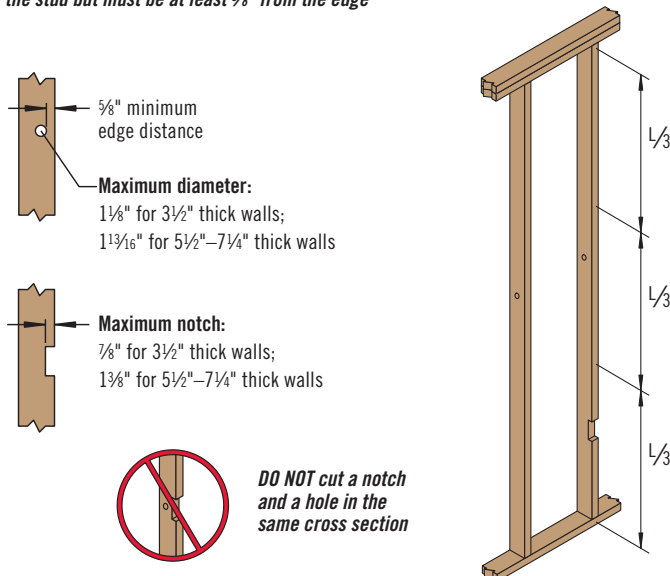| Header or Beam Depth	Maximum Round Hole Size
5½"	1¾"
7¼"–20"	2"

- 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
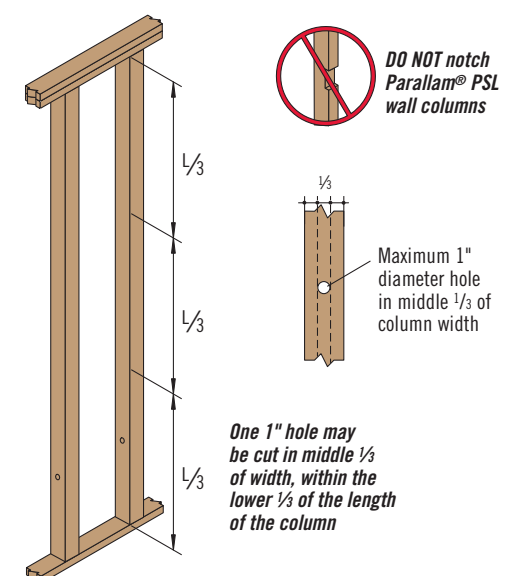

Allowable Holes and Notches for TimberStrand® LSL Studs

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

⅝" minimum edge distance

Maximum diameter:
1⅛" for 3½" thick walls;
1¹³⁄₁₆" for 5½"–7¼" thick walls

Maximum notch:
⅞" for 3½" thick walls;
1⅜" for 5½"–7¼" thick walls

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

L/3

L/3

L/3

One notch may be cut anywhere <u>except</u> the middle ⅓ of the length of the stud

Allowable Holes for Parallam® PSL Wall Columns

(For columns in tall wall applications primarily supporting out-of-plane wind loads.)

DO NOT notch Parallam® PSL wall columns

L/3

L/3

L/3

⅓

Maximum 1" diameter hole in middle ⅓ of column width

One 1" hole may be cut in middle ⅓ of width, within the lower ⅓ of the length of the column

WE CAN HELP YOU BUILD SMARTER

Trus Joist ™
▲ Weyerhaeuser

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.

LIMITED LIFETIME
PRODUCT WARRANTY

Weyerhaeuser provides a limited warranty for the expected life of the structure for all Trus Joist® branded products. Product information, installation instructions, and the full text of each product's limited warranty (including limitations and exclusions) are available on the Weyerhaeuser website, from your Weyerhaeuser representative, or by calling toll free: 888-453-8358.

Additionally, Weyerhaeuser offers limited warranties on a broad variety of its other products. To see complete details of all Weyerhaeuser product warranties, visit weyerhaeuser.com/wood products/warranty.

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