Trus Joist™
Weyerhaeuser

U.S. WALL GUIDE

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

- Engineered to meet code requirements for walls up to 30' tall
- Easy-to-use tables adaptable to a variety of wind conditions, surface finishes, and wall layouts
- 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 ICC ES ESR-1387

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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

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

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

1.3E TimberStrand® LSL

Studs: 1½" x 3½" (2x4) • 1½" x 5½" (2x6)

Columns: 3½" x 5½" • 3½" x 7¼"

Headers: 3½" x 5½" • 3½" x 7¼" • 3½" x 8⅝"

1.5E TimberStrand® LSL

Studs and Columns: 1½" x 7¼" (2x8)

1.55E TimberStrand® LSL

Studs and Columns: 1¾" x 5½" • 1¾" x 7¼"

Headers: 3½" x 9½" • 3½" x 11⅞"

1.8E Parallam® PSL

Columns: 3½" x 3½" • 3½" x 5¼"
3½" x 7" • 5¼" x 5¼"
5¼" x 7" • 7" x 7"

Headers: 5¼" x 5¼"

2.0E Parallam® PSL

Columns: 3½" x 9¼" • 5¼" x 9¼"
7" x 9¼"

Headers: 5¼" x 9¼"

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.

DEFLECTION REQUIREMENTS

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, finish-material provider, and/or building code authority. Typical deflection requirements are shown in table below.

Code Minimum Deflection Criteria

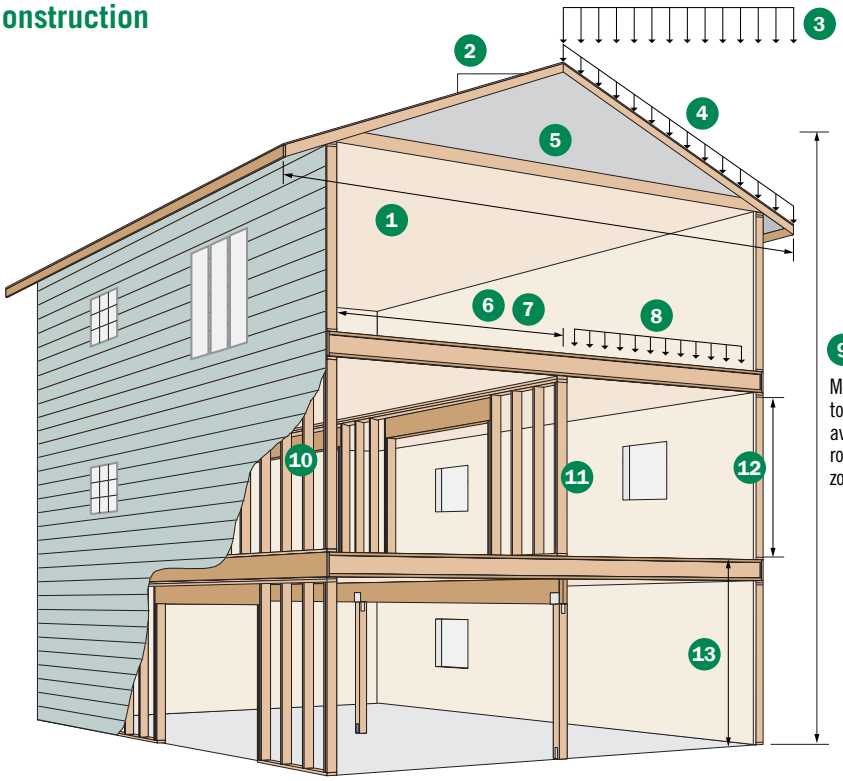
Type of Wall	Maximum Deflection
Exterior walls with plaster or stucco finish(1)	L/360(5)
Exterior walls with brittle finishes(1)(2)	L/240
Exterior walls with flexible finishes(1)(2)	L/120
Exterior walls with interior gypsum board finish(3)	L/180
Members supporting windows (mullions)(4)	L/175

(1) 2009 International Residential Code (IRC), Table R301.7
(2) 2009 International Building Code (IBC), Table 1604.3
(3) 2009 IRC, Table R301.7, noted
(4) 2009 IRC, Section R612.11.2; 2009 IBC, Section 2403.3
(5) For finishes that require a deflection stricter than L/360, contact your Weyerhaeuser representative.

CONVENTIONAL CONSTRUCTION APPLICATIONS

Limitations of Conventional Construction

For walls up to 10' in height, 2x4 and 2x6 1.3E TimberStrand® LSL studs may be conventionally specified per the limitations described on this page. Engineered design for more demanding applications is outlined on the pages that follow.



Wind Limitations
Basic wind speed:
< 100 mph in hurricane-prone regions;
< 110 mph elsewhere per IRC Section R301.2.1.1

Seismic Design Categories
A, B, C, D_0, D_1, and D_2. Excludes irregular portions of structures as defined by IRC R301.2.2.2.2

9 Mean roof height limited to 33' measured from average grade to average roof elevation, or per local zoning ordinance

Limitation Descriptions and IRC References

Description	2009 IRC Reference
1 Maximum roof span, including overhangs, limited to 40'. Maximum tabulated rafter span (horizontal projection) and ceiling joist span of 26'.	R802.10.2.1; footnote to IRC Tables R802.4(1), R802.4(2), R802.5.1(1)-R802.5.1(8)
2 Roof pitch: 3:12 minimum, 12:12 maximum	
3 Maximum ground snow load: 70 psf	IRC Section R301.2.3
4 Maximum tabulated roof/ceiling dead load: 20 psf	IRC Tables R802.5.1(1)-R802.5.1(8)
5 Maximum tabulated rafter and ceiling joist spacing: 24" on-center	IRC Tables R802.4(1), R802.4(2), R802.5.1(1)-R802.5.1(8)
6 Maximum tabulated joist span: 26'	IRC Tables R502.3.1(1), R502.3.1(2)
7 Maximum tabulated floor joist spacing: 24" on-center	IRC Tables R502.3.1(1), R502.3.1(2)
8 Maximum uniform floor loads: 40 psf live load, 20 psf dead load	IRC Tables R502.3.1(1), R502.3.1(2)
9 Maximum of 3 stories	IRC Section R101.2
10 Maximum stud spacing: 24" on-center	IRC Table R602.3(5)
11 With TJI® joist floor systems, load-bearing walls must stack directly over bearing walls or beams below. With rectangular joists, walls may be offset a distance equal to the joist depth.	IRC Section R502.4
12 Maximum load-bearing stud length: 10' between points of lateral support	IRC Table R602.3(5)
13 Maximum story height: 10' stud height plus 16" floor framing = 11'-4"	IRC Section R301.3

Stud Specifications for Conventional Applications per IRC Table R602.3(5)

Stud Size	Bearing Walls					Nonbearing Walls	
	Laterally unsupported stud height(1)	Maximum spacing when supporting roof and ceiling only	Maximum spacing when supporting one floor, roof, and ceiling	Maximum spacing when supporting two floors, roof, and ceiling	Maximum spacing when supporting one floor only	Laterally unsupported stud height(1)	Maximum spacing
2x4	10'	24"	16"	–	24"	14'	24"
2x6	10'	24"	24"	16"	24"	20'	24"

(1) Listed heights are distances between points of lateral support placed perpendicular to the plane of the wall.

When used in conventional construction applications, both 2x4 and 2x6 TimberStrand® LSL studs may be drilled or notched in accordance with IRC section R602.6.

DEFINITIONS

Buckling Length—Distance along the length of a member between braced points. This length is used to calculate the buckling stability of the member.

Conventional Construction—Generally, home design based on traditional construction methods and materials that have a history of adequate structural performance for specific building types and sizes. Both conventionally specified and pre-calculated members and connections are prescriptively specified in building codes such as the IRC and IBC, and may be combined to form a structure or structural assemblage.

Design Wind Pressure—The equivalent static wind pressure applied to structures to determine wind loads for buildings.

Effective Wind Area—The area used to determine external wind coefficients. These coefficients are used in the determination of the design wind pressures for components and cladding elements. Generally, the effective wind area is the length of a member's span times the tributary width **or** $L^2/3$, whichever is greater.

Lateral Loads—Loads applied to a structure in the horizontal direction. This includes loads from wind and seismic events.

Main Force Resisting System—Structural elements designated to provide support and stability for the overall structure. The system generally receives wind loading from more than one surface.

Tributary Area—A calculated area of influence surrounding a structural member. Loads within this area are added together to determine the amount of load a member is required to resist. For example, the tributary area for a wall stud is the sum of ½ the distance to the adjacent wall stud on each side of the stud in question. Likewise, the tributary area for a floor joist would be the sum of ½ the distance to the adjacent joist on each side of the joist in question.

ENGINEERED DESIGN ASSUMPTIONS

Design applications are limited to vertical loads, and to lateral wind loads that are perpendicular to the wall framing. Table information is based on the strength calculations and deflection limits of wall framing members, and was generated with the following assumptions:

- Member design and lateral support requirements for bending are based on National Design Specification® (NDS®).
- Stud and column tables assume structural sheathing on one side of the wall, or a combination of gypsum wallboard and non-structural sheathing or siding applied to each side of the wall, or equivalent.
- Blocking/bracing at 8' on-center maximum. See page 12.
- Beams and columns must remain straight to within $^{5L^2}/_{4608}$ (in.) of true alignment. L is the unrestrained length of the member in feet.
- If stud spacing is 19.2" or 24" on-center, trusses or rafters must be installed within 3" of the stud locations. This does not apply if studs are spaced at 16" on-center or less.
- The Components & Cladding (C&C) pressures shown in the **Wall Design Wind Pressure** table below are used only for strength calculations.
- Deflection limits are based on Main Wind Force Resisting System pressures, which were estimated by multiplying the C&C pressure by 0.70 (2009 IRC, Table R301.7; 2009 IBC, Table 1604.3).
- $\Delta = \frac{270\ wL^4}{Ebd^3} + \frac{28.8\ wL^2}{Ebd}$

  Δ = deflection
  w = uniform load (plf)
  L = span (ft)
  b = member width (in.)
  d = member depth (in.)
  E = modulus of elasticity (psi)

WIND TABLES

Wall Design Wind Pressure (PSF)(1)(2)

Exposure Category(3)	Effective Wind Area(4) (ft^2)	Basic Wind Speed (mph)																
		2009 IRC/IBC or Older (ASCE 7-05: W)								2012 IRC/IBC (ASCE 7-10: 0.6W)								
		85	90	100	110	120	130	140	150	110	115	120	130	140	150	160	170	180
B	≤ 10	14.5	16.2	20.1	24.3	28.9	33.9	39.3	45.1	14.6	15.9	17.3	20.3	23.6	27.1	30.8	34.8	39.0
	50	13.1	14.7	18.1	21.9	26.1	30.6	35.5	40.8	13.2	14.4	15.7	18.4	21.3	24.5	27.8	31.4	35.2
	≥ 100	12.5	14.0	17.3	20.9	24.9	29.2	33.9	38.9	12.5	13.7	14.9	17.5	20.3	23.3	26.6	30.0	33.6
C	≤ 10	20.1	22.6	27.9	33.7	40.1	47.1	54.6	62.7	20.3	22.1	24.1	28.3	32.8	37.7	42.9	48.4	54.3
	50	18.2	20.4	25.2	30.5	36.2	42.5	49.3	56.6	18.3	20.0	21.8	25.6	29.7	34.0	38.7	43.7	49.0
	≥ 100	17.3	19.4	24.0	29.1	34.6	40.6	47.1	54.0	17.5	19.1	20.8	24.4	28.3	32.5	37.0	41.7	46.8
D	≤ 10	23.7	26.6	32.9	39.8	47.3	55.5	64.4	73.9	23.9	26.1	28.4	33.4	38.7	44.4	50.6	57.1	64.0
	50	21.5	24.1	29.7	35.9	42.8	50.2	58.2	66.8	21.6	23.6	25.7	30.2	35.0	40.1	45.7	51.6	57.8
	≥ 100	20.5	22.9	28.3	34.3	40.8	47.9	55.5	63.7	20.6	22.5	24.5	28.8	33.4	38.3	43.6	49.2	55.2

(1) Tabulated pressures are based on the Analytical Procedure defined in ASCE 7. Values assume a Components and Cladding (C&C) member in the interior zone of an enclosed structure, with the following factors:
– Risk/occupancy category II
– Topographical factor of 1.0
– Mean roof height of 33'

(2) When designing in accordance with 2012 IRC/IBC, the load combinations include a 0.6 factor for wind. Tabulated wind pressures in the 2012 IRC/IBC portion of this table are reduced by 0.6 for direct use with the 2009 IRC-based load tables in this guide.

(3) Exposure categories are generally defined as follows (see ASCE 7):
B = Urban and suburban areas, wooded areas
C = Open terrain with scattered obstructions generally less than 30' in height
D = Flat, unobstructed areas

(4) **Effective Wind Area** is the span times the tributary width **or** $L^2/3$, whichever is greater. For values of effective wind areas not listed, interpolation between 10 ft^2 and 100 ft^2 is allowed.

- Check local codes for any special wind pressures.

The contents of this guide, including design examples, are based on the 2009 or older IRC. When designing in accordance with the 2012 IRC/IBC, use the load tables in this guide in conjunction with the 2012 IRC/IBC wind pressures above, which have been reduced by 0.6.

Effective Wind Area

Wall Height	Stud/Column Effective Wind Area (ft^2)
≥ 18'	100
16'	85
14'	65
12'	48
10'	33

- Values are based on $L^2/3$ with a maximum of 100 ft^2.
- The effective wind area should not be confused with the tributary area, which is used to determine the amount of load applied to an individual member.

DESIGN EXAMPLE

Given

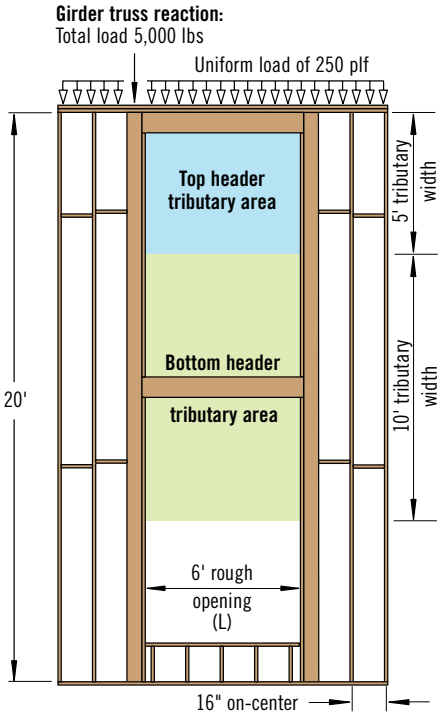
- Wall height = 20'
- Rough opening = 6'
- Exposure Category "B"
- 110 mph basic wind speed
- Flexible exterior finish with interior gypsum board finish; walls support window mullions
- Maximum column vertical load = 5,000 lbs
- Maximum header vertical load = 250 plf

When designing with C&C pressures, the effective wind area ($L^2/3$) helps determine the wall design wind pressure. A smaller effective wind area results in a higher wind pressure. The effective wind area should not be confused with the tributary area, which is used to determine the amount of load applied to an individual member.

1. **Determine effective wind areas (ft^2):**
   - For the studs and columns, refer to the **Effective Wind Area** table on page 4. A 20' stud or column will have an effective wind area of 100 ft^2.
   - For each header, consult the drawing at right and use the maximum value of the rough opening (L) times the tributary width **or** $L^2/3$, whichever is greater.
     – For the top header in our example wall, use the maximum of either (6' x 5' = 30 ft^2) or ($6^2/3$ = 12 ft^2).
     – For the bottom header in our example wall, use the maximum of either (6' x 10' = 60 ft^2) or ($6^2/3$ = 12 ft^2).

   The effective wind areas calculate to 30 ft^2 for the top header and 60 ft^2 for the bottom header, so interpolation would be required to find exact pressures. For simplicity, we will use an effective wind area of 10 ft^2 for each header. This allows us to skip the interpolation exercise, and provides a more conservative wind pressure.
2. **Determine design wind pressure:** Consult the **Wall Design Wind Pressure** table on page 4, using the example wall's criteria of Exposure B, a 110 mph basic wind speed, and an effective wind area as calculated above:
   - For studs/columns with an effective area of 100 ft^2, the wall design lateral wind pressure is 20.9 psf.
   - For headers with an effective area of 10 ft^2, the wall design wind pressure is 24.3 psf.
3. **Determine appropriate deflection criteria:** Consult the **Code Minimum Deflection Criteria** on page 2. Our example wall contains both windows (minimum L/175) and a flexible finish with interior gypsum board (minimum L/180). Because the L/180 deflection is more restrictive, the wall should be designed using the L/180 deflection values in this guide.

Refer to stud, column, and header tables on pages 6–10 to design the components for this example wall.



A complete wall specification should include permanent bracing, safety bracing, blocking, connections, details, etc. See pages 11–14.

ONE-HOUR WALL ASSEMBLY WITH TIMBERSTRAND® LSL STUDS

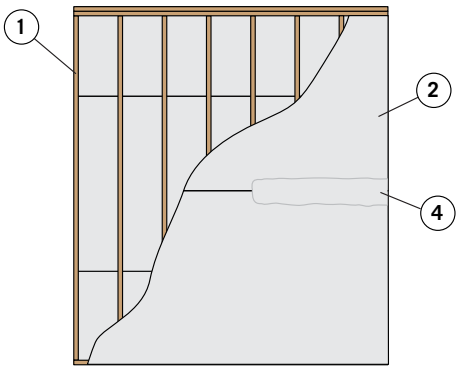
2x6 Wall Application: 2x6 wall made with TimberStrand® LSL studs and gypsum wallboard applied horizontally. *2x6 or larger TimberStrand® LSL is permitted as a substitute in fire-rated assemblies when used in the same or larger dimensions as sawn lumber.*

TimberStrand LSL Wall Assembly

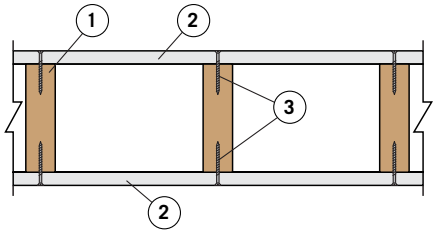
1. 2x6 TimberStrand® LSL studs, spaced 16" on-center, with double top plates and single bottom plate
2. ⅝" Type X gypsum wallboard, 4' wide, applied horizontally. Horizontal joints are unblocked. Horizontal application of wallboard represents the direction of least fire resistance as opposed to vertical application.
3. 2¼" #6 Type S drywall screws, spaced along stud at 7" on-center and covered with joint compound
4. Wallboard joints covered with paper tape and joint compound

- The design axial compressive stress within the TimberStrand® LSL studs must not exceed **the least** of the following:
  – 435 psi
  – F_c x 0.30, where F_c is the compression design value parallel-to-grain for the TimberStrand® LSL, adjusted by all applicable adjustment factors (in accordance with the NDS®), including the column stability factor C_p
  – F_c x 0.30, where F_c is caclulated in accordance with the NDS®, assuming a slenderness ratio L_e/d of 21

This assembly has been tested to ASTM E119/NFPA 251 and CAN/ULC-S101 Standards.



Top View (plates not shown)



STUD LOAD TABLE AND EXAMPLE

Studs—Maximum Allowable Lateral (Wind) and Vertical Load

Wall Ht.	Load and Deflection	1.3E TimberStrand® LSL										1.5E TimberStrand® LSL					
		1½" x 3½"				1½" x 5½"						1½" x 7¼"					
		Lateral Load (plf)				Lateral Load (plf)						Lateral Load (plf)					
		15	20	26[1]	30	15	20	26[1]	30	40	50	15	20	26[1]	30	40	50
8'	Vertical (lbs)	2,745	2,590	2,405	2,280	4,485	4,485	4,485	4,485	4,485	4,485	5,915	5,915	5,915	5,915	5,915	5,915
	Defl. Ratio	L/677	L/508	L/390	L/338	L/2,553	L/1,915	L/1,473	L/1,276	L/957	L/766	L/6,517	L/4,888	L/3,760	L/3,258	L/2,444	L/1,955
9'	Vertical (lbs)	2,175	2,010	1,820	1,690	4,485	4,485	4,485	4,485	4,485	4,485	5,915	5,915	5,915	5,915	5,915	5,915
	Defl. Ratio	L/477	L/358	L/275	L/238	L/1,811	L/1,358	L/1,045	L/905	L/679	L/543	L/4,656	L/3,492	L/2,686	L/2,328	L/1,746	L/1,396
10'	Vertical (lbs)	1,730	1,560	1,360	1,230	4,485	4,485	4,485	4,485	4,485	4,485	5,915	5,915	5,915	5,915	5,915	5,915
	Defl. Ratio	L/349	L/261	L/201	L/174	L/1,330	L/997	L/767	L/665	L/498	L/399	L/3,436	L/2,577	L/1,982	L/1,718	L/1,288	L/1,030
11'	Vertical (lbs)	1,380	1,205	1,005	870	4,485	4,485	4,485	4,485	4,230	3,775	5,915	5,915	5,915	5,915	5,915	5,915
	Defl. Ratio	L/263	L/197	L/151	L/131	L/1,004	L/753	L/579	L/502	L/376	L/301	L/2,606	L/1,954	L/1,503	L/1,303	L/977	L/781
12'	Vertical (lbs)	1,100	925			4,485	4,375	4,085	3,890	3,415	2,940	5,915	5,915	5,915	5,915	5,915	5,915
	Defl. Ratio	L/202	L/152			L/777	L/582	L/448	L/388	L/291	L/233	L/2,021	L/1,516	L/1,166	L/1,010	L/758	L/606
13'	Vertical (lbs)	875				3,980	3,725	3,420	3,220	2,725	2,230	5,915	5,915	5,915	5,915	5,915	5,915
	Defl. Ratio	L/159				L/613	L/460	L/353	L/306	L/230	L/184	L/1,598	L/1,199	L/922	L/799	L/599	L/479
14'	Vertical (lbs)	690				3,435	3,165	2,855	2,650	2,140	1,620	5,915	5,915	5,915	5,915	5,915	5,915
	Defl. Ratio	L/128				L/492	L/369	L/284	L/246	L/184	L/147	L/1,285	L/964	L/741	L/642	L/482	L/385
15'	Vertical (lbs)					2,965	2,690	2,370	2,160	1,635	1,095	5,915	5,915	5,915	5,915	5,915	5,915
	Defl. Ratio					L/401	L/300	L/231	L/200	L/150	L/120	L/1,049	L/786	L/605	L/524	L/393	L/314
16'	Vertical (lbs)					2,560	2,285	1,960	1,745	1,205		5,915	5,915	5,915	5,915	5,830	5,250
	Defl. Ratio					L/331	L/248	L/191	L/165	L/124		L/867	L/650	L/500	L/433	L/325	L/260
17'	Vertical (lbs)					2,215	1,930	1,605	1,385			5,915	5,915	5,875	5,630	5,025	4,430
	Defl. Ratio					L/276	L/207	L/159	L/138			L/724	L/543	L/418	L/362	L/271	L/217
18'	Vertical (lbs)					1,910	1,630	1,295				5,895	5,570	5,185	4,935	4,320	3,710
	Defl. Ratio					L/233	L/174	L/134				L/611	L/458	L/352	L/305	L/229	L/183
19'	Vertical (lbs)					1,650	1,365					5,300	4,965	4,575	4,320	3,695	3,075
	Defl. Ratio					L/198	L/148					L/521	L/390	L/300	L/260	L/195	L/156
20'	Vertical (lbs)					1,420	1,135					4,770	4,430	4,035	3,775	3,140	2,510
	Defl. Ratio					L/170	L/127					L/447	L/335	L/258	L/223	L/167	L/134
21'	Vertical (lbs)					1,220						4,300	3,955	3,555	3,295	2,650	
	Defl. Ratio					L/147						L/386	L/290	L/223	L/193	L/145	
22'	Vertical (lbs)					1,040						3,875	3,530	3,130	2,865	2,215	
	Defl. Ratio					L/128						L/336	L/252	L/194	L/168	L/126	
23'	Vertical (lbs)											3,500	3,150	2,745	2,480		
	Defl. Ratio											L/295	L/221	L/170	L/147		
24'	Vertical (lbs)											3,160	2,810	2,405	2,140		
	Defl. Ratio											L/260	L/195	L/150	L/130		
25'	Vertical (lbs)											2,855	2,505	2,100			
	Defl. Ratio											L/230	L/172	L/132			
26'	Vertical (lbs)											2,580	2,230				
	Defl. Ratio											L/204	L/153				
27'	Vertical (lbs)											2,335	1,980				
	Defl. Ratio											L/182	L/137				
28'	Vertical (lbs)											2,110	1,755				
	Defl. Ratio											L/164	L/123				
29'	Vertical (lbs)											1,905					
	Defl. Ratio											L/147					
30'	Vertical (lbs)											1,720					
	Defl. Ratio											L/133					

(1) Load based on a wind pressure of 19.4 psf and studs spaced at 16" on-center.

General Notes

- Table is based on:
  - A load duration factor of 1.60.
  - Full-width blocking at a maximum vertical spacing of 8' on-center.
  - A buckling length coefficient of $K_e = 0.85$. For deflection, use $K_e = 1.0$.
  - Axial loads applied eccentrically, at a distance of ⅙ of the **wall thickness** dimension of the stud, measured from the stud centerline.
  - A compression perpendicular-to-grain stress of 435 psi, adjusted per NDS®, 3.10.4.
  - A code-allowed repetitive-member increase of 4%.

Stud Example

For the **Design Example** on page 5, design 20' studs for lateral wind pressure of 20.9 psf and a maximum vertical load of 250 plf:

- **Determine the maximum stud length:**
  The maximum stud length in this example wall is 20'.
- **Calculate the lateral load in plf:**
  This example uses 16" on-center studs, so calculate the lateral load in plf and the vertical load in lbs as follows:
  20.9 psf x 16/12 = 28 plf; 250 plf x 16/12 = 333 lbs.
- **Select the appropriate studs:**
  In the **Stud Load Table**, scan across the 20' row until you find a cell in the

Stud Example continued on page 7

STUD LOAD TABLE AND EXAMPLE

Studs—Maximum Allowable Lateral (Wind) and Vertical Load *continued*

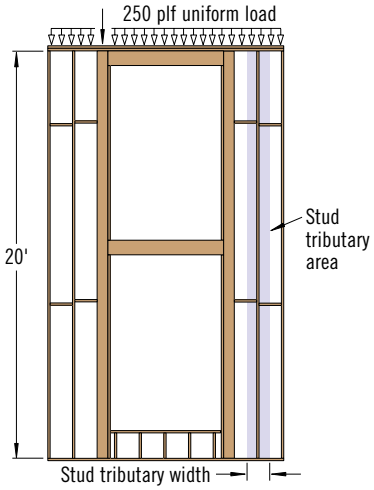
Wall Ht.	Load and Deflection	1.55E TimberStrand® LSL											
		1¾" x 5½"						1¾" x 7¼"					
		Lateral Load (plf)						Lateral Load (plf)					
		15	20	26[1]	30	40	50	15	20	26[1]	30	40	50
8'	Vertical (lbs)	5,085	5,085	5,085	5,085	5,085	5,085	6,700	6,700	6,700	6,700	6,700	6,700
	Defl. Ratio	L/3,551	L/2,663	L/2,049	L/1,775	L/1,331	L/1,065	L/7,857	L/5,892	L/4,533	L/3,928	L/2,946	L/2,357
9'	Vertical (lbs)	5,085	5,085	5,085	5,085	5,085	5,085	6,700	6,700	6,700	6,700	6,700	6,700
	Defl. Ratio	L/2,519	L/1,889	L/1,453	L/1,259	L/944	L/755	L/5,613	L/4,209	L/3,238	L/2,806	L/2,104	L/1,683
10'	Vertical (lbs)	5,085	5,085	5,085	5,085	5,085	5,085	6,700	6,700	6,700	6,700	6,700	6,700
	Defl. Ratio	L/1,850	L/1,387	L/1,067	L/925	L/693	L/555	L/4,143	L/3,107	L/2,390	L/2,071	L/1,553	L/1,242
11'	Vertical (lbs)	5,085	5,085	5,085	5,085	5,085	5,085	6,700	6,700	6,700	6,700	6,700	6,700
	Defl. Ratio	L/1,397	L/1,048	L/806	L/698	L/524	L/419	L/3,141	L/2,356	L/1,812	L/1,570	L/1,178	L/942
12'	Vertical (lbs)	5,085	5,085	5,085	5,085	5,085	5,085	6,700	6,700	6,700	6,700	6,700	6,700
	Defl. Ratio	L/1,081	L/810	L/623	L/540	L/405	L/324	L/2,437	L/1,827	L/1,406	L/1,218	L/913	L/731
13'	Vertical (lbs)	5,085	5,085	5,085	5,085	4,950	4,500	6,700	6,700	6,700	6,700	6,700	6,700
	Defl. Ratio	L/853	L/639	L/492	L/426	L/319	L/255	L/1,927	L/1,445	L/1,112	L/963	L/722	L/578
14'	Vertical (lbs)	5,085	5,085	4,795	4,600	4,130	3,670	6,700	6,700	6,700	6,700	6,700	6,700
	Defl. Ratio	L/684	L/513	L/395	L/342	L/256	L/205	L/1,550	L/1,162	L/894	L/775	L/581	L/465
15'	Vertical (lbs)	4,670	4,410	4,110	3,915	3,440	2,970	6,700	6,700	6,700	6,700	6,700	6,700
	Defl. Ratio	L/557	L/418	L/321	L/278	L/209	L/167	L/1,264	L/948	L/729	L/632	L/474	L/379
16'	Vertical (lbs)	4,095	3,835	3,530	3,330	2,845	2,370	6,700	6,700	6,700	6,700	6,700	6,700
	Defl. Ratio	L/460	L/345	L/265	L/230	L/172	L/138	L/1,045	L/783	L/603	L/522	L/391	L/313
17'	Vertical (lbs)	3,600	3,335	3,025	2,825	2,340		6,700	6,700	6,700	6,700	6,555	5,955
	Defl. Ratio	L/384	L/288	L/221	L/192	L/144		L/873	L/655	L/504	L/436	L/327	L/262
18'	Vertical (lbs)	3,170	2,905	2,595	2,395	1,900		6,700	6,700	6,590	6,335	5,710	5,095
	Defl. Ratio	L/324	L/243	L/187	L/162	L/121		L/737	L/553	L/425	L/368	L/276	L/221
19'	Vertical (lbs)	2,800	2,530	2,220	2,020			6,600	6,260	5,865	5,605	4,965	4,340
	Defl. Ratio	L/276	L/207	L/159	L/138			L/628	L/471	L/362	L/314	L/235	L/188
20'	Vertical (lbs)	2,475	2,205	1,895				5,965	5,620	5,215	4,955	4,310	3,675
	Defl. Ratio	L/236	L/177	L/136				L/539	L/404	L/311	L/269	L/202	L/161
21'	Vertical (lbs)	2,185	1,920					5,400	5,050	4,640	4,375	3,725	3,080
	Defl. Ratio	L/204	L/153					L/466	L/349	L/269	L/233	L/174	L/139
22'	Vertical (lbs)	1,935	1,670					4,895	4,540	4,130	3,860	3,205	2,555
	Defl. Ratio	L/178	L/133					L/406	L/304	L/234	L/203	L/152	L/121
23'	Vertical (lbs)	1,715						4,440	4,085	3,670	3,400	2,740	
	Defl. Ratio	L/156						L/355	L/266	L/205	L/177	L/133	
24'	Vertical (lbs)	1,515						4,035	3,675	3,260	2,990		
	Defl. Ratio	L/137						L/313	L/235	L/180	L/156		
25'	Vertical (lbs)	1,340						3,665	3,305	2,890	2,620		
	Defl. Ratio	L/121						L/277	L/208	L/160	L/138		
26'	Vertical (lbs)							3,335	2,975	2,560	2,285		
	Defl. Ratio							L/246	L/185	L/142	L/123		
27'	Vertical (lbs)							3,035	2,675	2,260			
	Defl. Ratio							L/220	L/165	L/127			
28'	Vertical (lbs)							2,765	2,405				
	Defl. Ratio							L/197	L/148				
29'	Vertical (lbs)							2,520	2,160				
	Defl. Ratio							L/178	L/133				
30'	Vertical (lbs)							2,295	1,935				
	Defl. Ratio							L/161	L/120				

(1) Load based on a wind pressure of 19.4 psf and studs spaced at 16" on-center.

Stud Example continued from page 6

30 plf **Lateral Load** column that meets the L/180 deflection and the 333 lbs vertical load criteria. According to the table, a 1.3E TimberStrand® LSL 2x6 stud is not an option. If the stud spacing is changed to 12" on-center (for a plf of 20.9), it still would not meet the L/180 requirement. However, a 1.5E TimberStrand® LSL 2x8 stud (at 3,775 lbs and L/223) spaced at 16" on-center meets the requirements, making it the best option for this wall.

- **Design stud connections:**
  Convert 28 plf into a reaction (uniform load x length/2): 28 (20'/2) = 280 lbs. Use the **Lateral Connections** tables on page 13 to select a nail or angle clip connection that meets or exceeds 280 lbs. For this example a nailed connection can be calculated as 280/104 = 2.69, so three 16d (0.131" x 3¼") nails (nailed through the plate into the end grain) would work. For an angle clip connection, one Simpson Strong-Tie® A34 angle clip at the top and bottom plate is sufficient.



COLUMN LOAD TABLES

Columns—Maximum Allowable Lateral (Wind) Load (PLF)/Vertical Load (lbs)

Defl. Ratio	Wall Ht.	Max. Defl.	3½" Wall Thickness						5½" Wall Thickness						
			TimberStrand® LSL			Parallam® PSL			TimberStrand® LSL			Parallam® PSL			
			1.3E			1.8E			1.3E		1.55E	1.8E			2.0E
			Double 2x4(1)	5½" x 3½" (Plank)	7¼" x 3½" (Plank)	3½" x 3½"	5¼" x 3½" (Plank)	7" x 3½" (Plank)	Dbl 2x6(1)	3½" x 5½"	Double 1¾" x 5½"(1)	3½" x 5¼"	5¼" x 5¼"	7" x 5¼" (Plank)	9¼" x 5¼" (Plank)
L/360	30'	1.00"													
	28'	0.93"													
	26'	0.87"													
	24'	0.80"												23/8,155	33/11,785
	22'	0.73"											22/7,040	30/9,385	44/13,445
	20'	0.67"											29/8,175	39/10,905	58/15,400
	18'	0.60"								22/5,105	27/6,415	27/6,495	40/9,600	54/12,800	80/17,615
	16'	0.53"						23/5,505	27/3,635	32/6,025	38/7,630	38/7,725	58/11,395	77/15,190	113/19,940
	14'	0.47"			25/5,040		25/5,125	34/6,830	41/3,675	47/6,915	57/6,680	57/7,995	86/11,990	115/15,985	169/21,125
	12'	0.40"		31/4,840	40/6,385	27/4,335	40/6,505	54/8,675	64/3,650	75/7,355	90/6,780	91/7,995	136/11,990	182/15,985	267/21,125
	10'	0.33"	29/2,355	53/6,290	70/8,290	47/5,330	70/7,995	94/10,660	110/3,550	129/7,530	154/6,720	156/7,995	234/11,990	300/15,985	300/21,125
	8'	0.27"	56/2,370	103/8,360	136/11,020	91/5,330	136/7,995	182/10,660	212/3,335	248/7,315	295/6,455	300/7,995	300/11,990	300/15,985	300/21,125
L/240	30'	1.50"													
	28'	1.40"													
	26'	1.30"													
	24'	1.20"											26/5,535	34/7,380	50/10,720
	22'	1.10"									22/4,240	22/4,280	33/6,315	45/8,420	66/12,145
	20'	1.00"							21/3,290	24/3,840	29/4,885	29/4,935	44/7,265	59/9,685	87/13,790
	18'	0.90"							29/3,785	34/4,415	40/5,670	40/5,730	61/8,415	81/11,220	120/15,610
	16'	0.80"			25/3,680		26/3,750	34/5,000	41/3,160	48/5,105	57/6,630	58/6,700	87/9,810	116/13,085	170/17,450
	14'	0.70"		29/3,415	38/4,500	25/3,065	38/4,600	51/6,130	61/3,145	71/5,700	85/5,800	86/7,840	129/11,485	173/15,310	254/18,995
	12'	0.60"	25/2,320	46/4,245	61/5,595	40/3,825	61/5,740	81/7,655	97/3,045	113/5,865	135/5,785	136/7,995	205/11,990	273/15,985	300/21,125
	10'	0.50"	43/2,055	80/5,355	105/7,060	70/4,855	105/7,285	141/9,710	166/2,820	194/5,670	231/5,545	234/7,995	300/11,990	300/15,985	300/21,125
	8'	0.40"	84/2,015	155/6,750	204/8,900	136/5,330	205/7,995	273/10,660	300/2,560	300/6,345	300/6,415	300/7,995	300/11,990	300/15,985	300/21,125
L/180	30'	2.00"													
	28'	1.87"													
	26'	1.73"													
	24'	1.60"									22/3,365	23/3,395	34/4,990	46/6,655	67/9,730
	22'	1.47"							21/2,535	24/2,960	29/3,810	30/3,840	45/5,640	60/7,520	88/10,925
	20'	1.33"							28/2,855	33/3,330	39/4,335	39/4,375	59/6,400	79/8,530	117/12,265
	18'	1.20"							38/3,220	45/3,755	54/4,955	54/4,995	81/7,285	109/9,710	160/13,690
	16'	1.07"		26/2,520	34/3,320	23/2,265	34/3,400	46/4,535	55/2,675	64/4,210	76/5,670	77/5,715	116/8,285	155/11,045	227/15,025
	14'	0.93"	21/1,655	39/3,030	51/3,990	34/2,735	51/4,105	68/5,475	82/2,585	95/4,495	114/4,915	115/6,460	173/9,330	230/12,440	300/17,355
	12'	0.80"	33/2,005	62/3,675	81/4,845	54/3,340	81/5,010	109/6,680	129/2,375	151/4,325	180/4,735	182/6,510	273/10,190	300/15,985	300/21,125
	10'	0.67"	58/1,755	106/4,445	140/5,860	94/4,080	141/6,120	188/8,165	221/1,945	258/3,605	300/4,390	300/6,365	300/11,990	300/15,985	300/21,125
	8'	0.53"	112/1,635	206/5,140	272/6,775	182/4,365	273/7,235	282/10,660	300/2,560	300/6,345	300/6,415	300/7,995	300/11,990	300/15,985	300/21,125

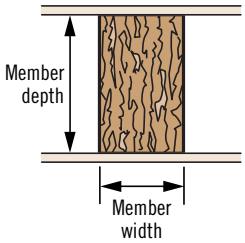
(1) For 3-ply and 4-ply built-up columns, multiply table values by 1.5 and 2.0, respectively. See page 11 for connection requirements.

- Green numbers refer to lateral (wind) load (PLF). Black numbers refer to vertical load (lbs).

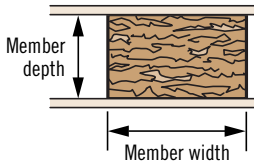
General Notes

- Tables are based on:
  - A load duration factor of 1.60.
  - Full-width blocking at a maximum vertical spacing of 8' on-center.
  - A buckling length coefficient of $K_e = 0.85$. For deflection use $K_e = 1.0$.
  - Axial loads applied eccentrically, at a distance of ⅙ of the **wall thickness** dimension of the column, measured from the column centerline.
  - A compression perpendicular-to-grain stress of 435 psi.
- Solid sections required where specified. Built-up columns require reductions. Contact your Weyerhaeuser representative for assistance.

Beam Orientation



Plank Orientation



Some columns are listed in both beam and plank orientation. The first dimension is for member width, and the second dimension is for member depth (wall thickness).

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

Not all products are available in all markets. Contact your Weyerhaeuser representative for information.

COLUMN LOAD TABLES AND EXAMPLE

Columns—Maximum Allowable Lateral (Wind) Load (PLF)/Vertical Load (lbs)

Defl. Ratio	Wall Ht.	Max. Defl.	7¼" Wall Thickness							9¼" Wall Thickness	
			TimberStrand® LSL			Parallam® PSL				Parallam® PSL	
			1.5E	1.3E	1.55E	1.8E			2.0E	2.0E	
			Dbl 2x8[1]	3½" x 7¼"	Double 1¾" x 7¼"[1]	3½" x 7"	5¼" x 7"	7" x 7"	9¼" x 7" (Plank)	3½" x 9¼"	5¼" x 9¼"
L/360	30'	1.00"					21/9,080	28/11,955	41/17,185	35/12,375	53/18,565
	28'	0.93"					25/10,130	34/13,330	50/18,995	43/13,235	65/19,855
	26'	0.87"			20/7,295	21/7,580	32/11,370	43/14,950	63/21,025	54/14,045	82/21,070
	24'	0.80"	21/6,835	21/6,550	26/8,240	27/8,560	40/12,840	54/16,855	80/23,230	69/14,085	104/21,125
	22'	0.73"	28/5,695	28/7,405	33/9,365	35/9,730	53/14,590	70/19,125	103/25,520	90/14,085	135/21,125
	20'	0.67"	37/5,780	37/8,420	44/10,715	47/10,660	70/15,985	94/21,315	138/27,715	119/14,085	179/21,125
	18'	0.60"	50/5,810	51/9,105	61/8,760	64/10,660	96/15,985	128/21,315	188/28,165	162/14,085	244/21,125
	16'	0.53"	72/5,795	73/9,520	87/8,845	91/10,660	136/15,985	182/21,315	267/28,165	230/14,085	282/21,125
	14'	0.47"	107/5,715	108/9,740	129/8,810	135/10,660	202/15,985	270/21,315	300/28,165	300/14,085	300/21,125
	12'	0.40"	168/5,560	170/9,695	203/8,635	212/10,660	300/15,985	300/21,315	300/28,165	300/14,085	300/21,125
	10'	0.33"	286/5,300	289/9,290	300/8,780	300/10,660	300/15,985	300/21,315	300/28,165	300/14,085	300/21,125
	8'	0.27"	300/6,115	300/11,040	300/10,060	300/10,660	300/15,985	300/21,315	300/28,165	300/14,085	300/21,125
L/240	30'	1.50"			20/5,255	21/5,450	31/8,170	42/10,715	61/15,500	53/10,860	80/16,290
	28'	1.40"	20/4,835	20/4,595	24/5,830	25/6,040	38/9,060	51/11,860	75/17,030	65/11,520	98/17,280
	26'	1.30"	25/5,385	25/5,090	30/6,490	32/6,720	48/10,085	64/13,180	94/18,710	82/12,115	123/18,175
	24'	1.20"	32/6,025	32/5,655	39/7,265	40/7,515	61/11,270	81/14,705	120/20,495	104/12,470	156/18,900
	22'	1.10"	42/5,055	42/6,295	50/8,160	53/8,430	79/12,650	106/16,460	155/22,295	135/12,525	202/19,390
	20'	1.00"	55/5,095	56/7,015	67/9,195	70/9,490	105/14,235	141/18,465	207/23,935	179/12,420	226/21,125
	18'	0.90"	76/5,080	77/7,415	92/7,550	96/10,390	144/15,985	192/20,705	251/26,710	244/12,115	251/21,125
	16'	0.80"	108/4,985	109/7,540	130/7,510	136/10,660	205/15,985	273/21,315	282/28,165	282/13,315	282/21,125
	14'	0.70"	160/4,805	162/7,405	193/7,310	202/10,660	300/15,985	300/21,315	300/28,165	300/14,085	300/21,125
	12'	0.60"	252/4,495	255/6,865	300/6,970	300/10,660	300/15,985	300/21,315	300/28,165	300/14,085	300/21,125
	10'	0.50"	300/5,185	300/9,055	300/8,780	300/10,660	300/15,985	300/21,315	300/28,165	300/14,085	300/21,125
	8'	0.40"	300/6,115	300/11,040	300/10,060	300/10,660	300/15,985	300/21,315	300/28,165	300/14,085	300/21,125
L/180	30'	2.00"	22/3,920	22/3,675	26/4,725	28/4,880	42/7,325	56/9,550	82/13,925	71/9,395	107/14,090
	28'	1.87"	27/4,315	27/4,010	32/5,200	34/5,365	51/8,045	68/10,470	101/15,175	87/9,845	131/14,770
	26'	1.73"	34/4,755	34/4,385	41/5,735	43/5,905	64/8,860	86/11,505	126/16,510	109/10,205	164/15,310
	24'	1.60"	43/5,255	43/4,790	52/6,335	54/6,515	81/9,770	109/12,645	160/17,875	139/10,325	188/16,920
	22'	1.47"	56/4,420	56/5,215	67/7,000	70/7,185	106/10,775	141/13,885	205/19,315	180/10,150	205/19,240
	20'	1.33"	74/4,405	75/5,630	89/7,720	94/7,895	141/11,845	188/15,175	226/22,915	226/10,345	226/21,125
	18'	1.20"	101/4,310	103/5,725	122/6,315	128/8,385	192/12,905	251/16,805	251/26,710	251/11,880	251/21,125
	16'	1.07"	144/4,120	146/5,495	174/6,105	182/8,330	273/13,760	282/21,315	282/28,165	282/13,315	282/21,125
	14'	0.93"	214/3,785	216/4,860	258/5,660	270/7,830	300/15,985	300/21,315	300/28,165	300/14,085	300/21,125
	12'	0.80"	300/3,815	300/5,210	300/6,970	300/10,660	300/15,985	300/21,315	300/28,165	300/14,085	300/21,125
	10'	0.67"	300/5,185	300/9,055	300/8,780	300/10,660	300/15,985	300/21,315	300/28,165	300/14,085	300/21,125
	8'	0.53"	300/6,115	300/11,040	300/10,060	300/10,660	300/15,985	300/21,315	300/28,165	300/14,085	300/21,125

(1) For 3-ply and 4-ply built-up columns, multiply table values by 1.5 and 2.0, respectively. See page 11 for connection requirements.

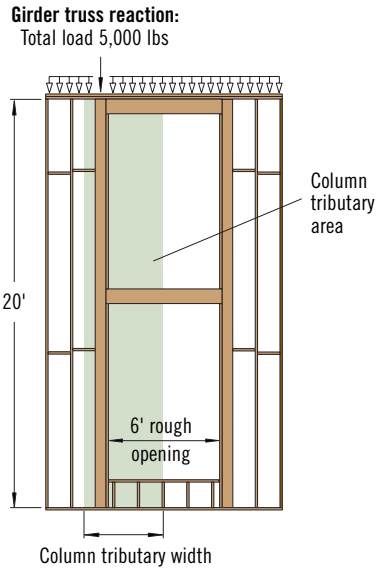
- Green numbers refer to lateral (wind) load (PLF). Black numbers refer to vertical load (lbs).

Column Example

For the **Design Example** wall on page 5, design 20' columns for lateral wind pressure of 20.9 psf and vertical loading of 5,000 lbs:

Note: Vertical load is the load applied to the top of the column, excluding the header reaction. The header reaction is assumed to transfer directly to the trimmers.

- **Calculate the lateral load in plf:**
  The calculated wind pressure in the example is 20.9 psf, so 20.9 x 3.67' tributary width = 77 plf.
- **Select an appropriate column:**
  Scan the L/180 section of the **Column Load Tables** to find a 20' column that meets or exceeds the 77 plf lateral load and the 5,000 lbs vertical load. For this example, a 7" x 5¼" 1.8E Parallam® PSL column (at 79/8,530), used in plank orientation, will work for a 2x6 wall. Alternatively, a double 1¾" x 7¼" 1.55E TimberStrand® LSL column (at 89/7,720) would work for a 2x8 wall.
- **Design the column to wall plate connections:**
  Convert 77 plf into a reaction (uniform load x length/2): 77 (20'/2) = 770 lbs. Use the **Lateral Connections** tables on page 13 to select a connection that meets or exceeds 770 lbs. For this example 770/515 = 1.50; so according to the **Angle Clips** table, two Simpson Strong-Tie® A34 connectors would be required—one on each side of the column, at both the top and bottom plates.



HEADER LOAD TABLE

Headers—Maximum Allowable Lateral (Wind) Load (PLF)/Vertical Load (PLF)

Lateral Defl. Ratio	Rough Opening	Max. Defl.	3½" Wall Thickness					5½" Wall Thickness			7¼" Wall Thickness
			TimberStrand® LSL					TimberStrand® LSL	Parallam® PSL		TimberStrand® LSL
			1.3E			1.55E		1.3E	1.8E	2.0E	1.3E
			3½" x 5½"	3½" x 7¼"	3½" x 8⅝"	3½" x 9½"	3½" x 11⅞"	5½" x 3½" (Plank)	5¼" x 5¼"	5¼" x 9¼"	7¼" x 3½" (Plank)
L/360	12'	0.41"	29/32	38/78	45/133	60/214	***75/399***		128/60	251/387	
	10'	0.34"	49/71	65/165	77/275	102/436	***127/641***	120/26	217/130	***426/786***	269/34
	9'	0.31"	67/109	88/249	105/413	***138/650***	***173/835***	162/42	294/200	***488/1,172***	362/55
	8'	0.28"	94/174	124/392	***148/644***	***194/886***	***243/1,094***	227/69	411/318	***500/1,645***	500/91
	7'	0.24"	138/293	***182/648***	***217/939***	***285/1,189***	***356/1,247***	330/119	500/533	***500/1,874***	500/157
	6'	0.21"	214/524	***282/904***	***336/1,245***	***441/1,451***	***500/1,448***	500/219	500/956	***500/2,177***	500/289
	5'	0.18"	356/691	***470/1,161***	***500/1,731***	***500/1,729***	***500/1,727***	500/368	***500/1,525***	***500/2,594***	500/486
	4'	0.14"	***500/1,128***	***500/1,991***	***500/2,140***	***500/2,139***	***500/2,136***	500/684	***500/2,060***	***500/3,208***	500/901
	3'	0.11"	***500/2,019***	***500/2,803***	***500/2,801***	***500/2,800***	***500/2,797***	500/1,340	***500/2,931***	***500/4,200***	500/1,767
L/240	12'	0.61"	43/32	57/78	68/133	90/214	112/357		193/60	368/387	
	10'	0.51"	74/71	98/165	116/275	153/436	***191/561***	180/26	326/130	***440/786***	404/34
	9'	0.46"	100/109	133/249	158/413	***207/576***	***259/719***	243/42	441/200	***488/1,172***	488/55
	8'	0.41"	141/174	186/392	***222/631***	***291/741***	***364/935***	340/69	500/318	***500/1,645***	500/91
	7'	0.36"	207/293	273/545	***325/748***	***427/962***	***500/1,247***	495/93	500/533	***500/1,874***	500/157
	6'	0.31"	321/380	423/638	***500/888***	***500/1,451***	***500/1,448***	500/219	500/956	***500/2,177***	500/289
	5'	0.26"	500/478	***500/1,104***	***500/1,731***	***500/1,729***	***500/1,727***	500/368	***500/1,525***	***500/2,594***	500/486
	4'	0.21"	***500/1,128***	***500/1,991***	***500/2,140***	***500/2,139***	***500/2,136***	500/684	***500/2,060***	***500/3,208***	500/901
	3'	0.16"	***500/2,019***	***500/2,803***	***500/2,801***	***500/2,800***	***500/2,797***	500/1,340	***500/2,931***	***500/4,200***	500/1,767
L/180	12'	0.82"	58/32	76/78	91/133	120/214	150/318		257/60	368/387	
	10'	0.68"	99/71	130/165	155/275	204/391	***255/486***	240/26	435/130	***440/786***	440/34
	9'	0.62"	134/109	177/249	211/413	277/486	***346/609***	325/40	488/200	***488/1,172***	488/55
	8'	0.55"	188/174	249/346	296/474	***389/605***	***486/768***	454/22	500/318	***500/1,645***	500/91
	7'	0.48"	276/224	364/376	434/518	***500/853***	***500/1,247***	500/90	500/533	***500/1,874***	500/157
	6'	0.42"	428/222	500/496	***500/888***	***500/1,451***	***500/1,448***	500/219	500/956	***500/2,177***	500/289
	5'	0.35"	500/478	***500/1,104***	***500/1,731***	***500/1,729***	***500/1,727***	500/368	***500/1,525***	***500/2,594***	500/486
	4'	0.28"	***500/1,128***	***500/1,991***	***500/2,140***	***500/2,139***	***500/2,136***	500/684	***500/2,060***	***500/3,208***	500/901
	3'	0.22"	***500/2,019***	***500/2,803***	***500/2,801***	***500/2,800***	***500/2,797***	500/1,340	***500/2,931***	***500/4,200***	500/1,767

- ***Bold italic*** values require two trimmers (3" bearing) at ends. Single trimmers may work for lightly loaded ***bold italic*** sections; see table below.
- Green numbers refer to lateral (wind) load (PLF). Black numbers refer to vertical load (PLF).

General Notes

- Table is based on:
  - A load duration factor of 1.60 for combined lateral and vertical load.
  - A load duration factor of 1.00 for vertical load only.
  - Uniform lateral (wind) and vertical loads (beam weight considered).
  - Vertical deflection, the more restrictive of L/240 or 5/16".
  - A maximum lateral (wind) load of 500 plf.

Bearing Requirements

- Trimmers must support the full width of the header.
- Minimum header support to be one trimmer (1½") at ends.

Maximum Allowable Vertical Load (PLF) with One Trimmer

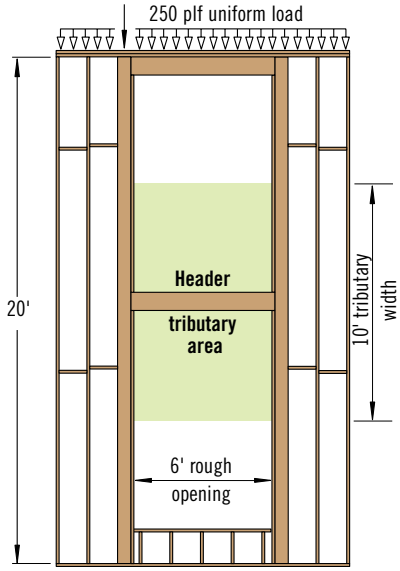
Rough Opening	Wall Thickness	
	3½"	5½"
12'	364	–
10'	439	661
9'	488	736
8'	550	828
7'	628	946
6'	733	1,103
5'	879	1,322
4'	1,095	1,646
3'	1,449	2,177

HEADER EXAMPLE

Header Example

The **Design Example** on page 5 assumes that both headers will be the same size, and considers worst-case loading. Design the headers for lateral wind pressure of 24.3 psf based on the lower header's 6' rough opening and 10' tributary width, and a vertical load based on the upper header's maximum 250 plf.

- **Calculate the lateral load in plf:**
  The calculated wind pressure in the example is 24.3 psf, so 24.3 x 10' tributary width = 243 plf.
- **Select the appropriate header:**
  Scan the L/180 section of the **Header Load Table** to find a header that meets your requirements (243 plf lateral and 250 plf vertical). For this example, a 6' header of 5¼" x 5¼" 1.8E Parallam® PSL (at 500/956) will work for a 2x6 wall. Alternatively, a 7¼" x 3½" 1.3E TimberStrand® LSL header (at 500/289), used in plank orientation, will work for a 2x8 wall. Since the table numbers for these selections are not bold, only one trimmer stud is required for bearing. Headers that do not match the wall thickness must be directly attached to a plate that matches the wall thickness to provide lateral bracing. See detail L13 on page 12.
- **Design header to column connections:**
  Convert 243 plf into a reaction (uniform load x length/2): 243 (6'/2) = 729 lbs. Use the **Lateral Connections** tables on page 13 to select a connection that meets or exceeds 729 lbs. For this example 729/515 = 1.42; so according to the **Angle Clips** connections table on page 13, two Simpson Strong-Tie® A34 connectors are sufficient—one on top and bottom at each end of both headers.



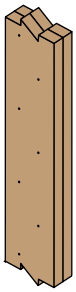
MULTIPLE-MEMBER CONNECTIONS

2-Ply Nailing Recommendations

- **For 2x4, 1¾" x 5½", 2x6, 1¾" x 7¼", and 2x8:** Minimum of **two rows** of 16d (0.131" x 3¼") pneumatic nails at 10" on-center, 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-center, staggered.
- **For 1¾" x 5½", 2x6, 1¾" x 7¼", and 2x8:** Minimum of **three rows** of 16d (0.131" x 3¼") pneumatic nails at 5" on-center, 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-center. When connecting each ply, offset nail rows by 2" from the ply below.
- **For 1¾" x 5½", 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-center. 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-center.

PRODUCT STORAGE

Protect product from sun and water

CAUTION:
Wrap is slippery when wet or icy

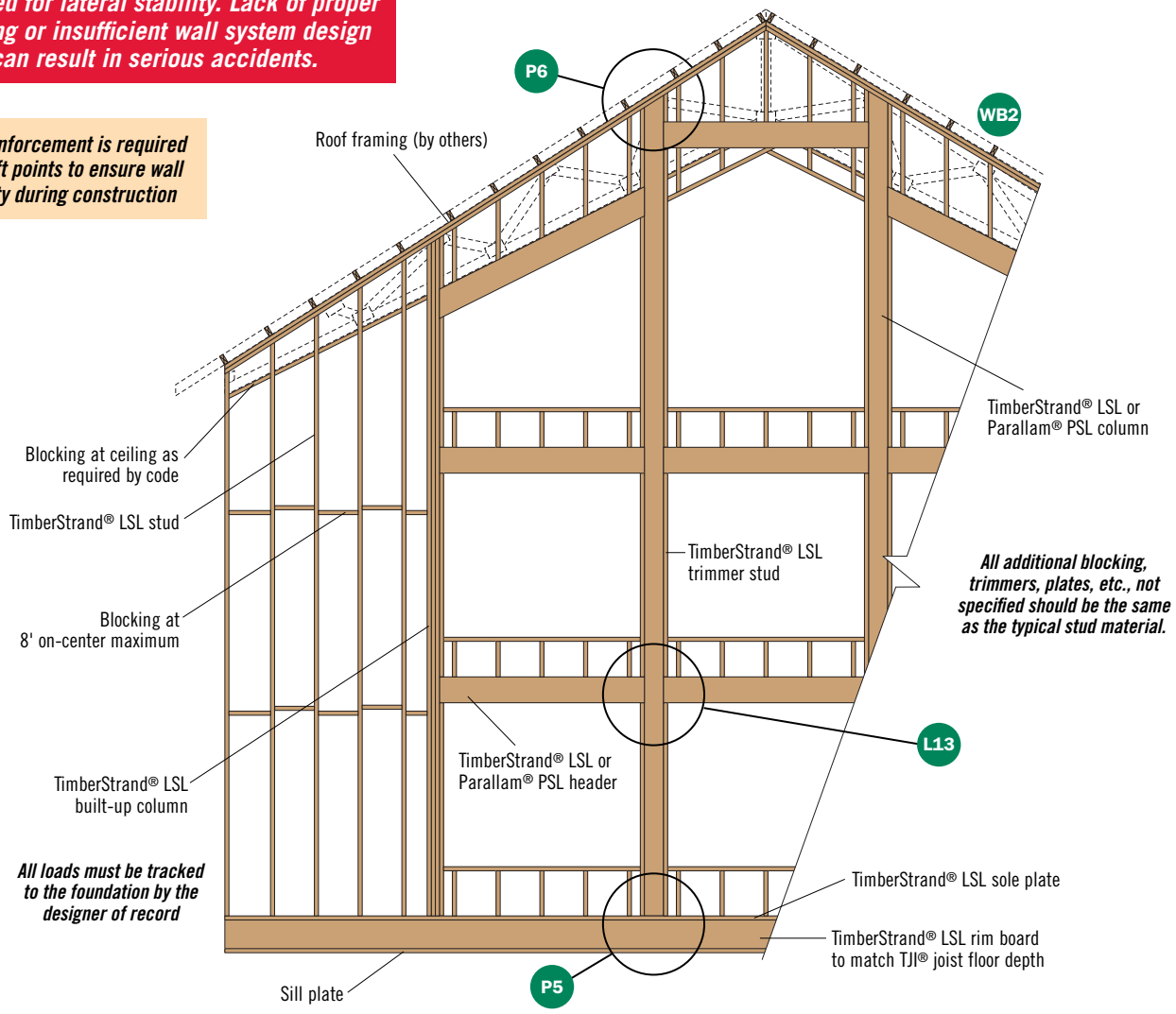
Align stickers (2x3 or larger) directly over support blocks

Use support blocks (6x6 or larger) at 10' on-center to keep bundles out of mud and water

TYPICAL TALL WALL FRAMING

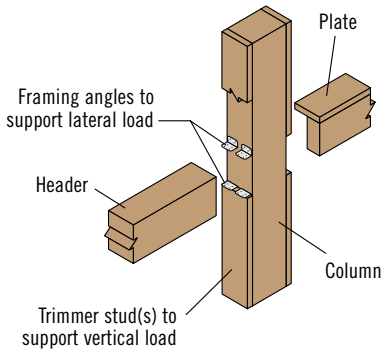
WARNING
Safety bracing during construction is required for lateral stability. Lack of proper bracing or insufficient wall system design can result in serious accidents.

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



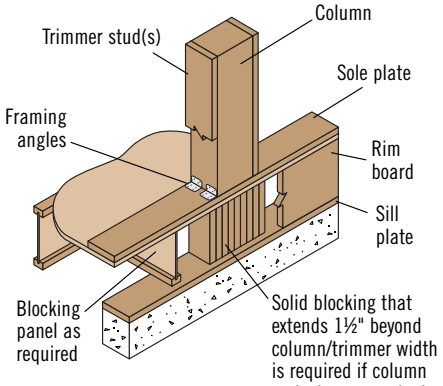
WALL DETAILS

Header to Column



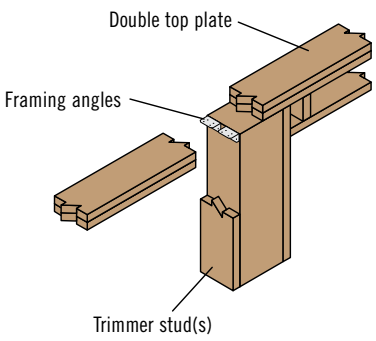
L13 ***Plate width must equal the wall thickness to provide lateral bracing. (Plate not required if header width equals the wall thickness.)***

Column or Stud to Bottom Plate



P5

Column or Stud to Top Plate

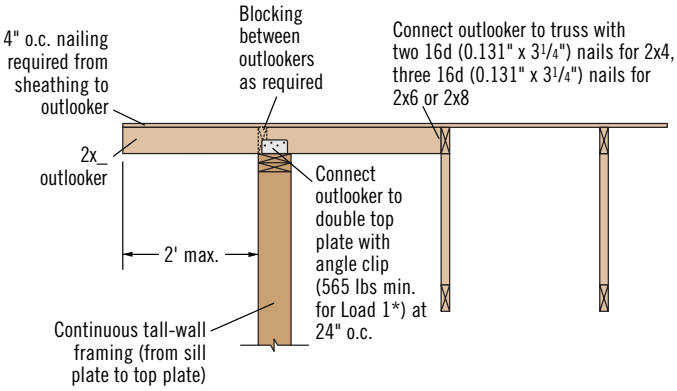


P6

WALL DETAILS

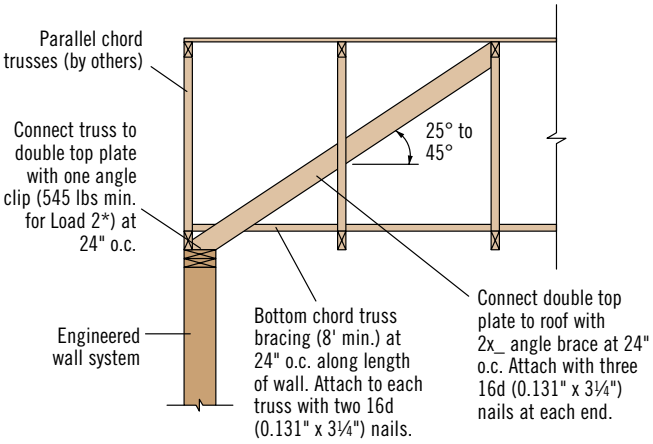
Wind Brace

Details shown are applicable for 90 mph basic wind speeds and the exposure categories and maximum wall heights shown in the table below. For other conditions, contact your Weyerhaeuser representative.



WB2

**** Load 1 value from* Lateral Connections—Angle Clips *table below.***



WB3

**** Load 2 value from* Lateral Connections—Angle Clips *table below.***

Wind Brace Detail Applicability

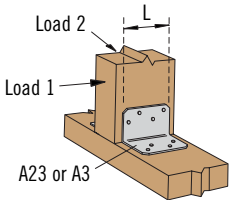
Detail	Exposure	Max. Wall Height
WB2	D	25'
	B, C	29'
WB3	B, C	20'(1)

(1) Maximum wall height shown includes depth of truss.

FRAMING CONNECTORS

Lateral Connections—Nails

Nail Size	End Grain	Toe Nail
8d (0.113" x 2½")	77 lbs	96 lbs
10d (0.128" x 3")	99 lbs	123 lbs
12d (0.128" x 3¼")	99 lbs	123 lbs
16d (0.135" x 3½")	110 lbs	137 lbs
16d (0.131" x 3¼")	104 lbs	129 lbs

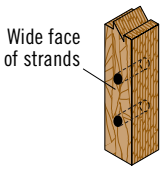


General Notes

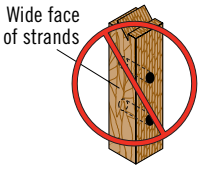
- Tables are based on a load duration factor of 1.60.
- Connection values based on a specific gravity of 0.50.
- For end-grain connections, a 0.67 factor was used (based on NDS®).
- For toenail connections, a 0.83 factor was used (based on NDS®).

Lateral Connections—Angle Clips

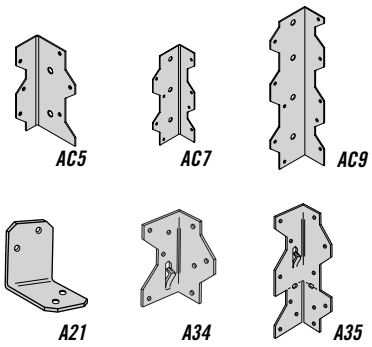
Type	Nails	Length of Connector (L)	Load 1: Allowable Load (lbs)	Load 2: Allowable Load (lbs)
Simpson Strong-Tie®				
A21	Four 10d (0.148" x 1½")	1⅜"	175	245
A34	Eight 8d (0.131" x 1½")	2½"	515	455
A35	Twelve 8d (0.131" x 1½")	4½"	695	670
A23	Eight 10d (0.148" x 1½")	2¾"	565	585
USP Structural Connectors®				
AC5	Six 10d (0.148" x 1½")	4⅞"	540	540
A3	Eight 10d (0.148" x 1½")	2¾"	590	600
AC7	Eight 10d (0.148" x 1½")	6$^{15}/_{16}$"	725	725
AC9	Ten 10d (0.148" x 1½")	8⅞"	905	905



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 at left.

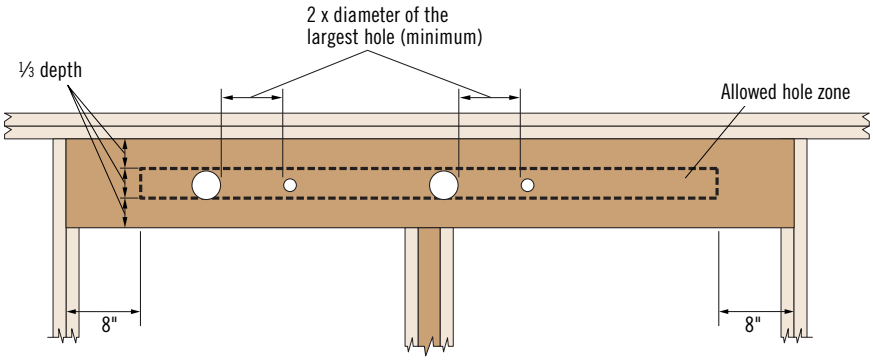


DO NOT install bolts or screws into the narrow face of strands



ALLOWABLE HOLES

1.55E TimberStrand® LSL Headers and Beams



General Notes

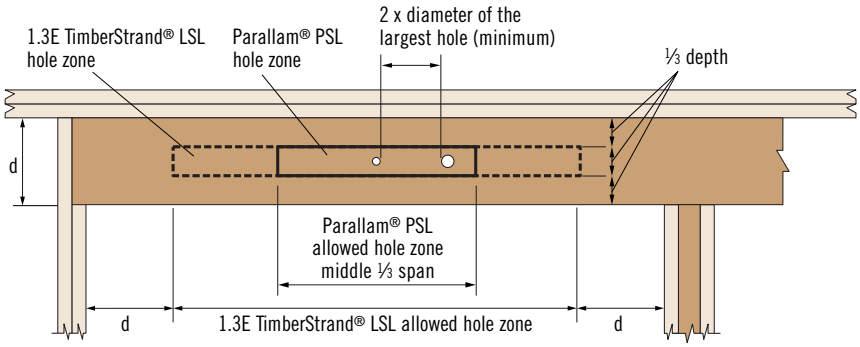
- Allowed hole zone suitable for headers and beams with **uniform and/or concentrated loads** anywhere along the member.
- Round holes only.
- No holes in headers or beams in plank orientation.

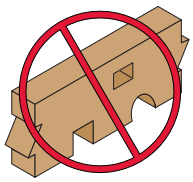
1.55E TimberStrand® LSL

Header or Beam Depth	Maximum Round Hole Size
9¼"–9½"	3"
11¼"–11⅞"	3⅝"
14"–16"	4⅝"

- See illustration for allowed hole zone.

Other Trus Joist® Headers and Beams





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

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.

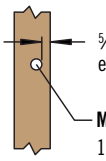
Other Trus Joist® Beams

Header or Beam Depth	Maximum Round Hole Size
4⅜"	1"
5½"	1¾"
7¼"–20"	2"

- See illustration for allowed hole zone.

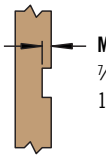
Allowable Holes and Notches* for TimberStrand® LSL Studs

Per ICC ES ESR-1387, holes may be drilled anywhere along the length of the stud or column but must be at least ⅝" from the edge



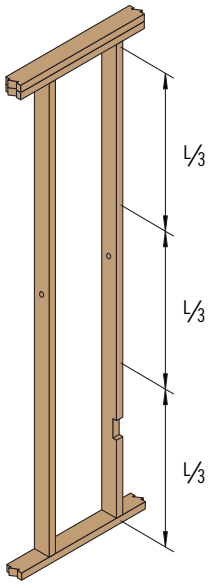
⅝" minimum edge distance

Maximum diameter:
1⅜" for 3½" thick walls
2³⁄₁₆" for 5½"–11⅞" thick walls

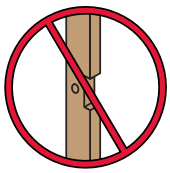


Maximum notch:
⅞" for 3½" thick walls
1⅜" for 5½"–11⅞" thick walls

* Applies to stud applications other than 2x4 and 2x6 studs in conventional construction as shown on page 3.



One notch may be cut anywhere except the middle ⅓ of the length of the stud or column



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

DESIGN PROPERTIES

Allowable Design Stresses (100% Load Duration)

Grade MOE (x10⁶) (psi)	E_{min}[1] (psi)	Axial		Joist/Beam			Plank			Equivalent Specific Gravity for Connections		
		$F_{c\perp}$ (psi)	F_t[2] (psi)	F_b[3] (psi)	F_v (psi)	$F_{c\perp}$[4] (psi)	F_b (psi)	F_v (psi)	$F_{c\perp}$[4] (psi)	Shear Walls[5]	Lateral	Withdrawal
TimberStrand® LSL												
1.3	660,750	1,835	1,075	1,700[6]	425	710	1,900	150	635[11][12]	0.42[7]	0.50	0.42
1.5	762,400	2,105	1,500	2,250[6]	505	860	2,525	150	750[12]	0.42		
1.55	787,815	2,170	1,070[8]	2,325[6]	310[8]	900	2,615	150	775[12]	0.42		
Parallam® PSL												
1.8	914,880	2,500	1,755	2,500[9]	230	600	2,400[9]	190	425	N.A.	0.50	0.50
2.0	1,016,535	2,900[10]	2,025	2,900[9]	290	750	2,800[9]	210	475			

(1) Reference modulus of elasticity for beam and column stability calculations per NDS®.

(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 the applicable building code, a 4% increase is permitted for F_b in addition to the increases permitted in Footnotes 6 and 9.

(4) $F_{c\perp}$ may not be increased for duration of load.

(5) Design shear wall applications per 2009 IBC Table 2306.3. When using StrandGuard® TimberStrand® LSL sill plate, see the *Trus Joist® Treated Sill Plates, Columns, and Studs Technical Brief*, TJ-8100.

(6) For 12" depth. For depths < 3½", use the 3½" factor; for other depths, multiply by $\left[\frac{12}{d}\right]^{0.092}$.

(7) Do not use 2009 IBC Table 2306.3 with nail spacings less than 6" on-center. (Studs at boundary locations, where two panels abut, are allowed two rows at 6" on-center.)

(8) Value accounts for large hole capabilities. See **Allowable Holes** on page 14.

(9) For 12" depth. For depths < 3½", use the 3½" factor; for other depths, multiply by $\left[\frac{12}{d}\right]^{0.111}$.

(10) For column and stud applications, use $F_{c\perp}$ of 500 psi. Alternatively, refer to ESR-1387, Table 1, footnote 15.

(11) For 1½" thick members, use $F_{c\perp}$ of 670 psi in plank orientation.

(12) NDS bearing area factor, $C_b = 1.0$.

Allowable Design Properties (100% Load Duration)

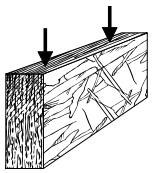
1½" TimberStrand® LSL Studs

Design Property	Beam Orientation		
	1.3E		1.5E
	3½"	5½"	7¼"
Moment (ft-lbs)	485	1,150	2,580
Shear (lbs)	1,490	2,340	3,660
Moment of Inertia (in.⁴)	5	21	48
Weight (plf)	1.5	2.4	3.3

1¾" TimberStrand® LSL Studs

Design Property	Beam Orientation	
	1.55E	
	5½"	7¼"
Moment (ft-lbs)	1,835	3,110
Shear (lbs)	1,990	2,620
Moment of Inertia (in.⁴)	24	56
Weight (plf)	3	4.0

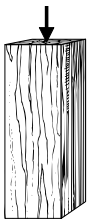
Beam Orientation



3½" TimberStrand® LSL Columns and Headers

Design Property	1.3E					1.55E			
	Beam Orientation			Plank Orientation		Beam Orientation			
	5½"	7¼"	8⅝"	5½"	7¼"	5½"	7¼"	9½"	11⅞"
Moment (ft-lbs)	2,685	4,550	6,335	1,780	2,350	3,675	6,225	10,420	15,955
Shear (lbs)	5,455	7,190	8,555	1,925	2,540	3,980	5,245	6,870	8,590
Moment of Inertia (in.⁴)	49	111	187	20	26	49	111	250	488
Weight (plf)	5.6	7.4	8.8	5.6	7.4	6	7.9	10.4	13.0

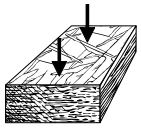
Column Orientation



3½" Parallam® PSL Columns

Design Property	1.8E					2.0E
	Beam Orientation			Plank Orientation		Beam Orientation
	3½"	5¼"	7"	5¼"	7"	9¼"
Moment (ft-lbs)	1,640	3,670	6,320	2,460	3,275	12,415
Shear (lbs)	1,550	2,820	3,755	2,330	3,105	6,260
Moment of Inertia (in.⁴)	13	42	100	19	25	231
Weight (plf)	3.8	5.7	7.7	5.7	7.7	10.1

Plank Orientation



5¼" Parallam® PSL Columns and Headers

Design Property	1.8E			2.0E	
	Beam Orientation		Plank Orientation	Beam Orientation	Plank Orientation
	5¼"	7"	7"	9¼"	9¼"
Moment (ft-lbs)	5,285	9,485	7,050	18,625	10,870
Shear (lbs)	3,490	5,635	4,655	9,390	6,800
Moment of Inertia (in.⁴)	63	150	84	346	112
Weight (plf)	8.6	11.5	11.5	15.2	15.2

7" Parallam® PSL Columns

Design Property	1.8E	2.0E
	Beam Orientation	Plank Orientation
	7"	9¼"
Moment (ft-lbs)	12,140	18,715
Shear (lbs)	6,205	9,065
Moment of Inertia (in.⁴)	200	264
Weight (plf)	15.3	20.2

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