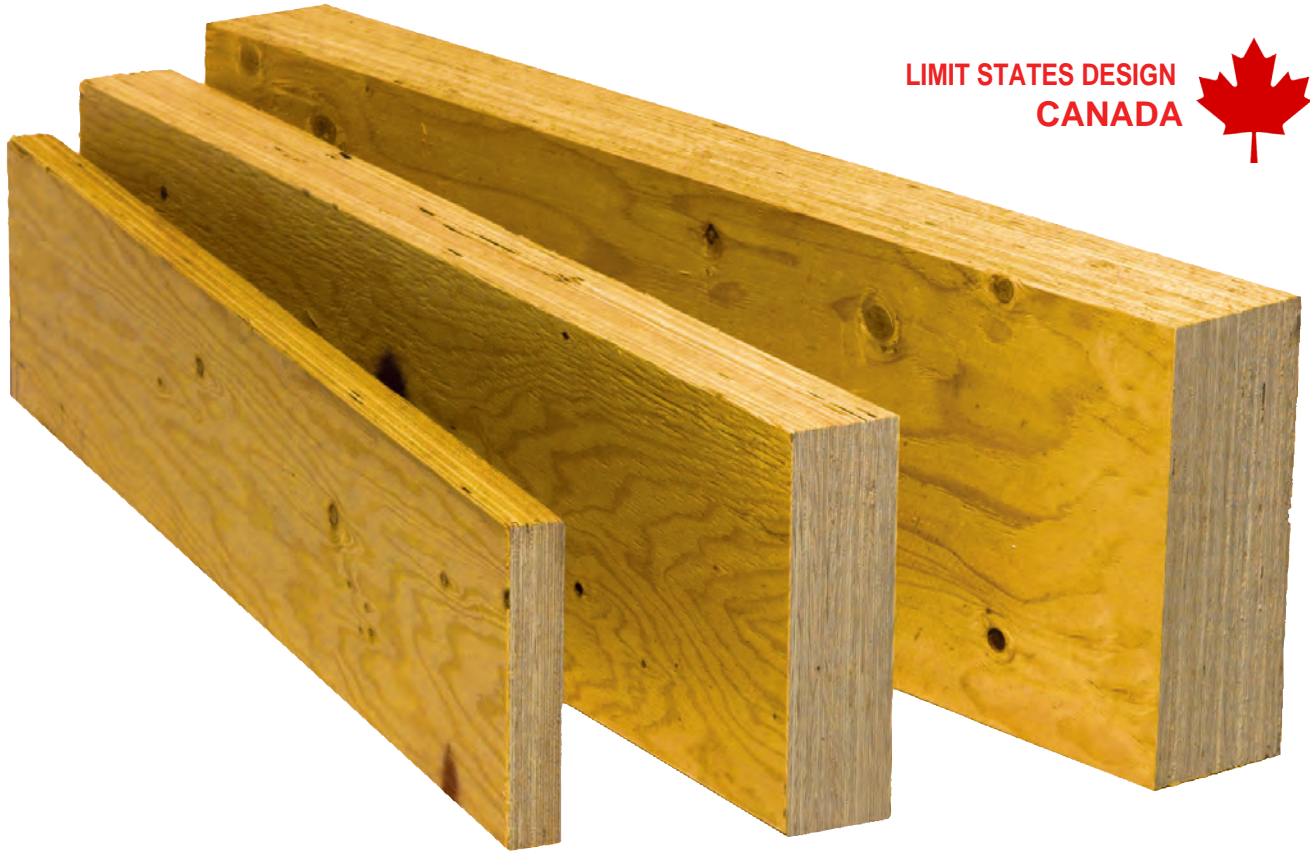




Boise Cascade®

**LIMIT STATES DESIGN
CANADA**



VERSA-STUD®

TALL WALL SPECIFIER GUIDE

STUD & COLUMN DESIGN

CCMC Report Number 12472-R VERSA-LAM® LVL

VERSA-STUD TALL WALL SPEC CA EN 05/06/2020

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High Performance Floor & Roof Systems



Makes Designing Homes Easier

Architects, engineers, and designers trust Boise Cascade's Engineered Wood Products to provide a better system for framing floors, roofs and walls.

It's the SIMPLE FRAMING SYSTEM®, featuring beams, joists, studs, columns and rim boards that work together as a system, so you spend less time cutting and fitting. In fact, the SIMPLE FRAMING SYSTEM® uses fewer pieces and longer lengths than conventional framing, so you'll complete jobs in less time.

You'll Build Better Homes with the SIMPLE FRAMING SYSTEM®

Now it's easier than ever to design and build better floor systems. When you specify the SIMPLE FRAMING SYSTEM®, your clients will have fewer problems with squeaky floors and ceiling gypsum board cracks. The SIMPLE FRAMING SYSTEM® also means overall better floor, roof and wall framing than dimension lumber allows.

Better Framing Doesn't Have to Cost More

Boise Cascade EWP SIMPLE FRAMING SYSTEM® often costs less than conventional framing methods when the resulting reduced labor and materials waste are considered. There's less sorting and cost associated with disposing of waste because you order

only what you need. Although our longer lengths help your clients get the job done faster, they cost no more.

Environmentally Sound

As an added bonus, floor, roof and wall systems built with Boise Cascade Joists require about half the number of trees as those built with dimension lumber. This helps you design a home both you and future generations will be proud to own.

What Makes the SIMPLE FRAMING SYSTEM® So Simple?

- **Floor and Roof Framing with Boise Cascade Joists**

Light in weight, but heavy-duty, Boise Cascade Joists have a better strength/ weight ratio than dimension lumber. Knockouts can be removed for cross-ventilation and wiring.

- **Ceilings Framed with Boise Cascade Joists**

The consistent size of Boise Cascade Joists helps keep gypsum board flat and free of unsightly nail pops and ugly shadows, while keeping finish work to a minimum.

- **Versa-Lam® LVL Beams for Floor and Roof Framing**

These highly-stable beams are free of the large-scale defects that plague dimension beams. The result is quieter, flatter floors (no camber) and no shrinkage-related call-backs.

- **Versa-Stud® and Versa-Lam® LVL Columns for Wall Framing**

Versa-Stud® laminated veneer lumber wall framing is engineered for the high quality builder who wants . . .

- Stronger walls to resist wind loads.
- Stiffer walls for a solid feel.
- Straight walls for a high quality finish.

- **Boise Cascade Rimboard**

Boise Cascade EWP offer several engineered rimboard products regionally, including BC RIM BOARD® OSB, VERSA-RIM®, VERSA-STRAND™ 0.8 (check supplier or Boise Cascade EWP representative for availability). These products work with Alljoist® and BCI® Joists to provide a solid connection at the critical floor/wall intersection.

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Information and Lifetime Guarantee Back cover

Versa-Stud®
1.8E 2400 / 1.8E 2650

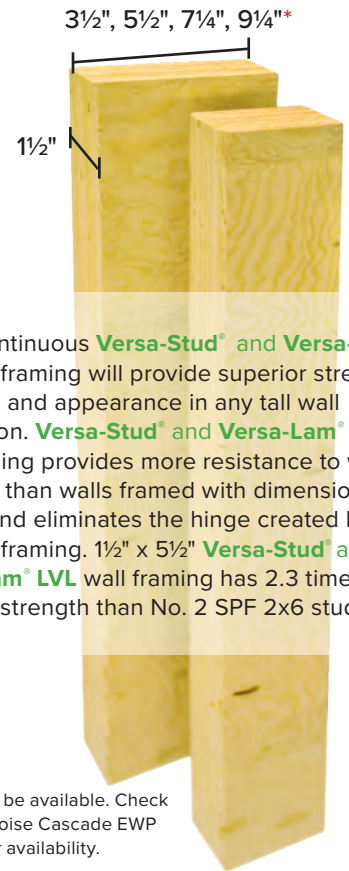
Engineered Studs for Tall Walls

Laminated veneer lumber wall framing is engineered for the high quality builder who wants . . .

- Stronger walls to resist wind loads
- Stiffer walls for a solid feel
- Straight walls for a high quality finish



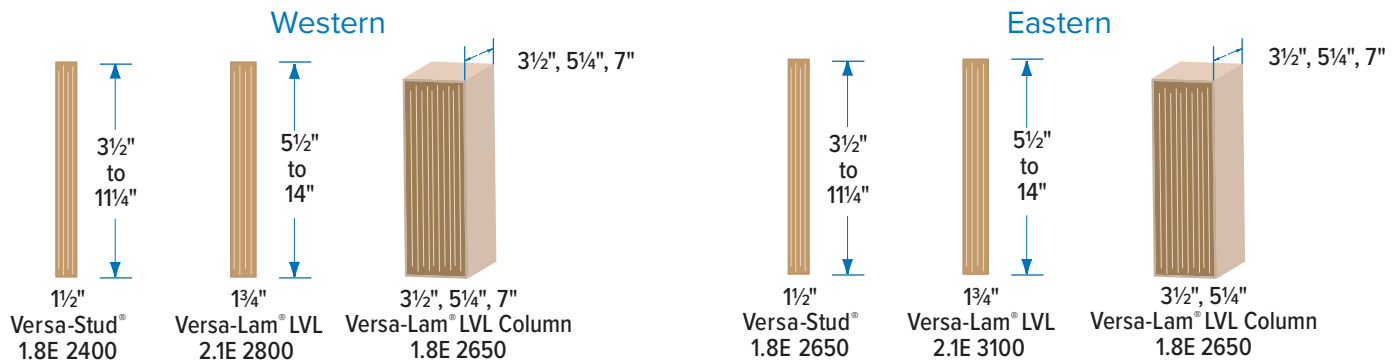
Building Code Approved for Both Prescriptive and Engineered Wall Stud Design



Long, continuous **Versa-Stud®** and **Versa-Lam® LVL** wall framing will provide superior strength, stiffness, and appearance in any tall wall application. **Versa-Stud®** and **Versa-Lam® LVL** wall framing provides more resistance to wind pressure than walls framed with dimension lumber and eliminates the hinge created by platform framing. 1 1/2" x 5 1/2" **Versa-Stud®** and **Versa-Lam® LVL** wall framing has 2.3 times more bending strength than No. 2 SPF 2x6 studs.

* 1 1/4" depths may be available. Check with supplier or Boise Cascade EWP representative for availability.

Versa-Lam®, Versa-Stud® & Versa-Lam® Column Product Profiles



Boise Cascade Chain-Of-Custody Certifications

Boise Cascade has a proven track record of providing quality wood products and a nationwide building materials distribution network for our customers, helping them to enhance their own businesses.

Boise Cascade Engineered Wood Products build better homes with stronger, stiffer floors using only wood purchased in compliance with a number of green building programs. Take a moment to view our sustainability certification site at <http://www.bc.com/sustainability/certification-audits/> or view our green brochure at www.bc.com, search **Green Brochure**.

Boise Cascade Engineered Wood Products throughout North America can now be ordered FSC® Chain-of-Custody (COC) certified, enabling homebuilders to achieve LEED® points under U.S. Green Building Council® residential and commercial green building programs including LEED for Homes and LEED for New Construction. Boise Cascade Engineered Wood Products are available as PEFC® Chain-of-Custody certified, SFI® Chain-of-Custody certified and SFI Fiber-Sourcing certified, as well as NAHB Research Center Green Approved, enabling homebuilders to also obtain green building points through the National Green Building Standard.

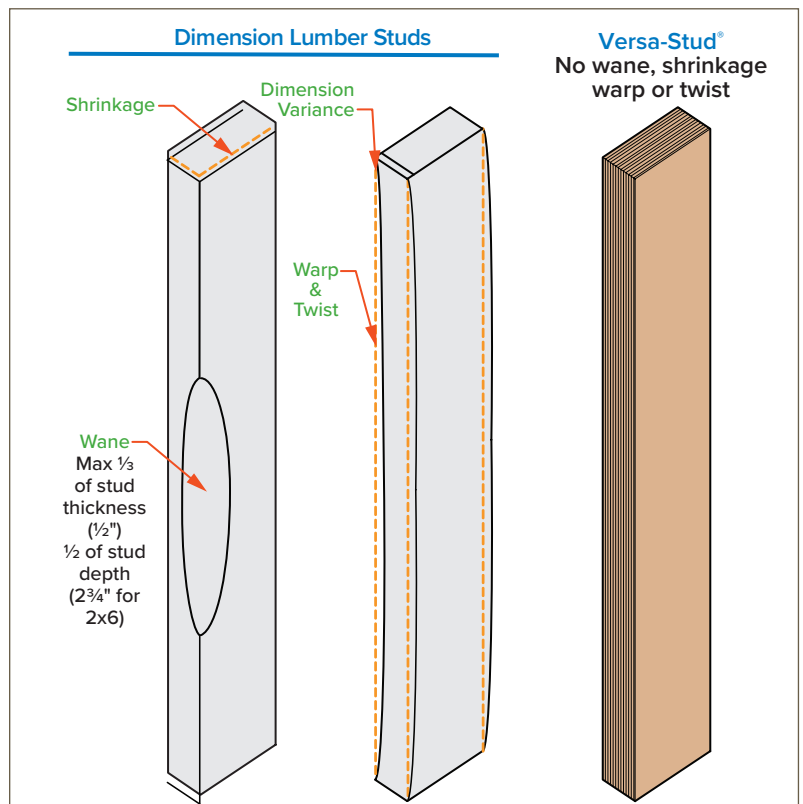
Versa-Stud® and Versa-Lam® LVL may be used as wall studs in accordance with the prescriptive requirements in section 9.23.10 of NBCC 2015. For conventional construction, the size and spacing of studs should conform to the table shown below.

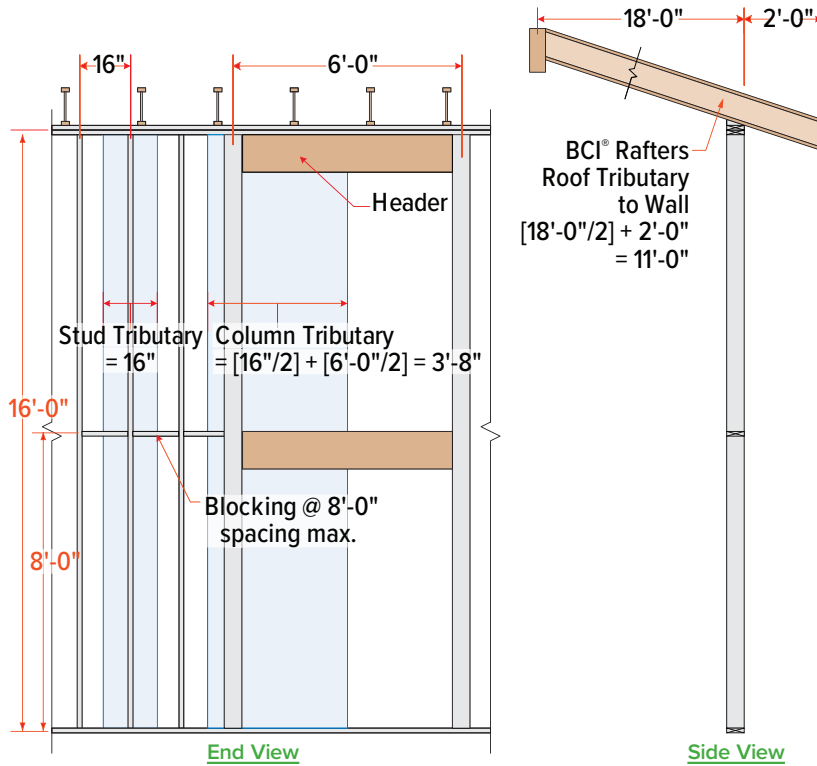
Size and Spacing of Studs: NBCC 2015, Part 9, section 9.23.10

| Wall Type | Supported Loads (including dead loads) | Min. Width (in) | Min. Depth (in) | Max. Stud Spacing (in) | Max. Unsupported Height (in) | Max. Unsupported Height (ft-in) |
|--|---|-----------------|-----------------|------------------------|------------------------------|---------------------------------|
| Interior | Attic not accessible by a stairway | 1½ | 2½ | 24 | 118 | 9'-10" |
| | | 1½ | 3½ | 24 | 142 | 11'-10" |
| | Attic accessible by a stairway plus on floor Roof loads plus one floor Attic not accessible by stairway plus 2 floors | 1½ | 3½ | 16 | 142 | 11'-10" |
| | | 1½ | 2½ | 16 | 94 | 7'-10" |
| | 3½ | | 24 | 142 | 11'-10" | |
| | Attic accessible by a stairway plus 2 floors Roof loads plus 2 floors | 1½ | 3½ | 12 | 142 | 11'-10" |
| | | 2½ | | 16 | 142 | 11'-10" |
| 3½ | | 16 | | 165 | 13'-9" | |
| Attic accessible by a stairway plus 3 floors Roof loads plus 3 floors | 1½ | 5½ | 12 | 165 | 13'-9" | |
| | | | | | | |
| Exterior | Roof with or without attic storage | 1½ | 2½ | 16 | 94 | 7'-10" |
| | | | 3½ | 24 | 118 | 9'-10" |
| | Roof with or without attic storage plus 1 floor | 1½ | 3½ | 16 | 118 | 9'-10" |
| | | | 5½ | 24 | 118 | 9'-10" |
| | Roof with or without attic storage plus 2 floors | 1½ | 3½ | 12 | 118 | 9'-10" |
| | | 2½ | 3½ | 16 | 118 | 9'-10" |
| | | 1½ | 5½ | 16 | 142 | 11'-10" |
| | Roof with or without attic storage plus 3 floors | 1½ | 5½ | 12 | 71 | 5'-11" |

Using Versa-Stud® for Cabinet and Tile Walls

Dimension lumber can exceed 30% moisture content. Wood dries to a moisture content of 10-12% once the building is finished. Shrinkage and warping of 2x studs is a problem in walls where cabinets are hung or tile is installed. Though 2x studs cost less, added labor from shimming cabinets, straightening walls and drywall repairs can quickly add up. Versa-Stud® eliminate these issues, providing a straight and true wall every time.





- The factored wind uplift loads minus the factored dead load were also calculated using a principal load factor of 0.9.
- Studs/Columns are considered fixed at both ends ($K_e = 1.0$).
- Single stud members shall not be used between openings.
- If the walls are located in high/extreme seismic regions and are constructed of heavy materials, the out-of-plane lateral seismic load from the heavy wall may need to be considered in the design of the studs.

| Category | Wind | Seismic | Requirement to resist lateral loads due to wind and earthquake |
|----------|--|--|--|
| | 1 in 50 yr hourly wind pressure q_{50} kPa | Spectral response acceleration at 0.2 sec $S_a(0.2)$ | |
| LOW | $q_{50} < 0.8$ | $S_a(0.2) \leq 0.7$ | 9.23.13 NBCC 2015 |
| HIGH | $0.8 \leq q_{50} < 1.2$ | $0.7 \leq S_a(0.2) \leq 1.1$ | 9.23.13 NBCC 2015 |
| EXTREME | $q_{50} \geq 1.2$ | $S_a(0.2) > 1.1$ | Part 4 of NBCC 2015 or accepted practices |

- Roof slope = 12/12
- Wall tributary width (from the roof) ≤ 18 ft. (including the 2 ft. overhang)
- Roof standard dead load = 10 psf
- Roof standard live load = 10 psf
- Roof snow load ≤ 50 psf
- Wind load is acting on the face of the wall
- Load table values are based upon axial loads applied at the top of the stud and lateral wind loads perpendicular to the wall (out of plane loading). Lateral loads parallel to the wall (in-plane loading), caused by seismic and wind, shall be designed by the project's design professional of record.
- Wind and axial loads are based upon the design provisions of Part 9 of 2015 National Building Code of Canada and CSA O86-14.
- Studs and King-Studs are braced laterally in the narrow dimension.
- Blocking between studs is required at a maximum spacing as shown below:

| Stud total width (in) | Blocking: max. spacing (ft) |
|-----------------------|-----------------------------|
| 1½", 1¾" | 6' |
| 3" to 7" | 8' |

- Maximum opening height for Built-up or Solid Columns should be 75% of the stud/column height or 10 feet, whichever is lower.
- Eccentric axial loading of 1/4 of the stud/column depth considered.
- P-Δ was also considered (combined action of factored axial loads and factored wind loads on the face of the stud including the effect of the axial load acting on the deflected shape due to the wind loads).
- Load table values are based upon assumption that stud walls have structural sheathing applied to one side or a combination of non-structural sheathing on the exterior side and gypsum wallboard on the interior side.

Load Combinations

The effect of the factored principal plus companion loads combinations for ultimate limit state (ULS), and the principal plus companion loads for the serviceability limit states (SLS) was determined as per NBCC 2015 and CSA O86-14 load combinations. Specifically for wall applications the following loading cases were considered:

Ultimate Limit States:

- 1.25D + 1.5L + 1.0S
- 1.25D/0.9D* + 1.5L + 0.4W
- 1.25D + 1.5S + 1.0L
- 1.25D/0.9D* + 1.5S + 0.4W
- 1.25D/0.9D* + 0.5L + 1.4W
- 1.25D/0.9D* + 0.5S + 1.4W

* for uplift calculations

Serviceability Limit States:

- D + L + 0.5S
- D + L + 0.4W
- D + S + 0.5L
- D + S + 0.4W
- D + 0.5L + W
- D + 0.5S + W

Wall studs shall be continuous for the full storey height except at openings and shall not be spliced.

Since the lintel spanning the opening is not more than 10 feet, an additional ply should be added to the King-Stud/Column on each side of the opening so that:

1. The inner ply on each side extend from the bottom of the support lintel to the top of the bottom wall plate.
2. The (outer) stud/column on each side extends from the bottom of the top wall plate to the bottom wall plate.

Wall Deflection

The maximum deflection^{(1), (2)} resulting from the specified wind and axial loads should not exceed the followings:

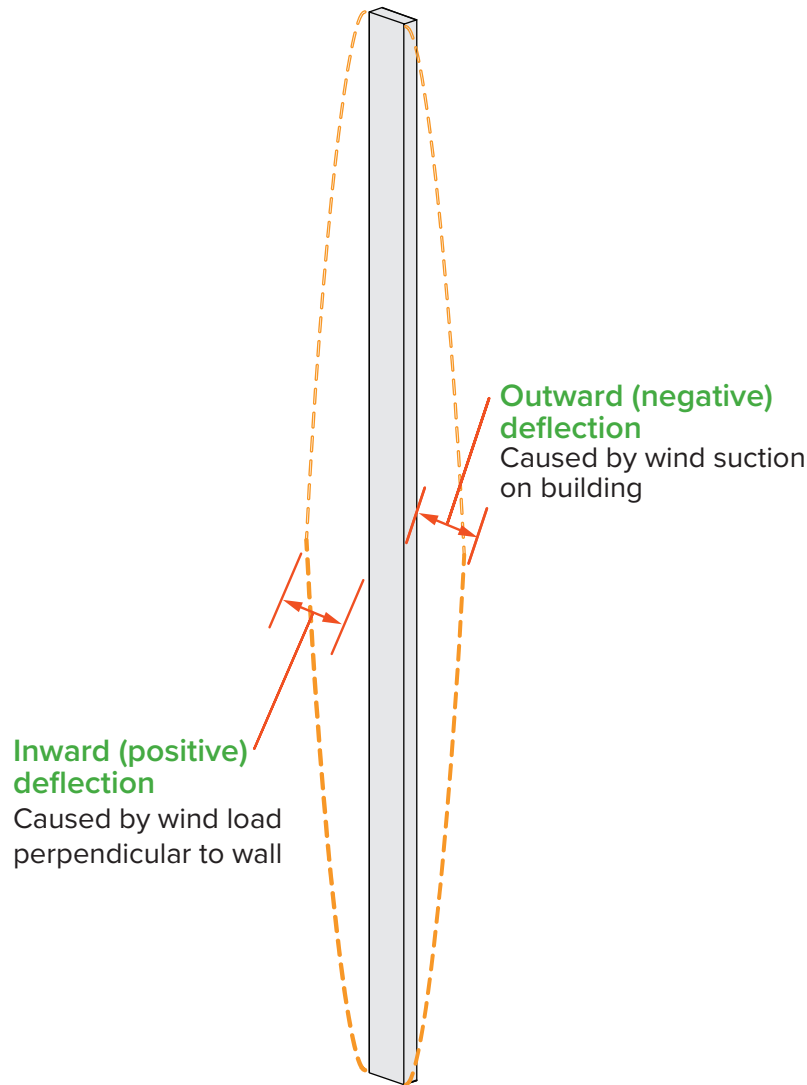
- L/360 for exterior walls with brittle finishes and members supporting windows
- L/180 for all other exterior walls

Wall stud deflection may occur both into the structure (positive pressure) or out from the structure (negative pressure). Thus, the total amount of possible movement is actually almost twice the deflection value shown in the design tables (see detail below). The maximum height tables shown on pages 11-19 provide the maximum stud/column heights for total deflections of L/360 and L/180. As is the case with floors, the deflection of tall walls should be considered in the design phase of the project.

Deflection criteria is used to limit serviceability issues such as doors and windows binding, cracking of exterior and interior surface materials, perceived sounds due to wall movement,

glass breaking, wall vibration and movement when pushed on. Wind produces pressure and suction loads on a wall producing deflection inward and outward. Vibration of walls can occur with high span/depth ratios much like a floor joist where depth equals the wall thickness. For further information on wall vibration, please contact Boise Cascade EWP Engineering.

In regards to brick veneer, though a deflection limit of L/360, is required, the Brick Industry Association (BIA) recommends designing studs to a deflection limit of L/600 to limit cracking of the veneer caused by excessive deflection.



(1) *Engineering Guide for Wood Frame Construction, 2009 Edition*

(2) *User's Guide – NBCC 2015 Structural Commentaries (Part 4 of Division B)*

Wind and Snow loads tables for each province are available on Boise Cascade's web site at :

www.BC.com/EWP Canada

Open terrain is level terrain with only scattered buildings, trees or other obstructions, and near open water or shorelines.

Rough terrain is suburban, urban or wooded terrain extending upwind from the building uninterrupted for at least 1 km or 20 times the building height (in meters), whichever is greater. For the wind conditions outside the scope of this literature, contact your local Boise Cascade EWP representative. Importance factor for wind was equal to 1 for ULS and 0.75 for SLS.

Determining Snow Load

Snow loads were calculated using the procedures for "Snow Loads" in Subsection 9.4.2.2 of the 2015 National Building Code ($C_b = 0.55$).

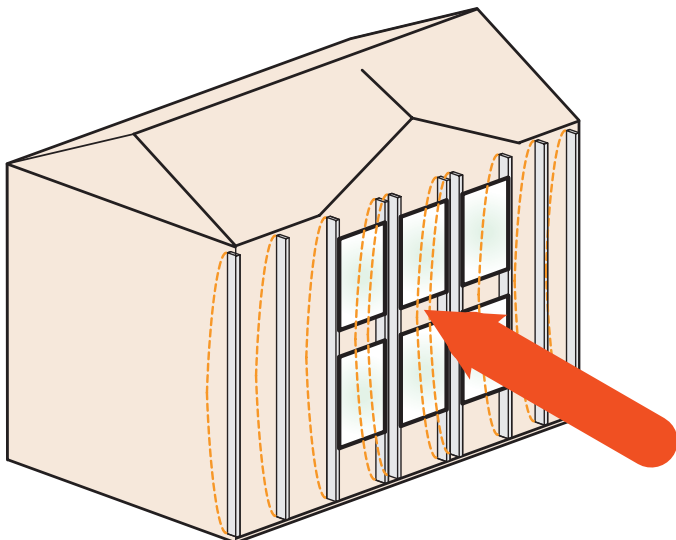
In-Plane Loading: Lateral loads applied along the length of the wall are referred to as in-plane loading (see detail below). Wind loading applied parallel to the wall length must be determined by the design professional of record. Bracing, braced wall panels and tie-down anchors at corners shall be determined by design professional of record and be in accordance with applicable building code.

Out-of-Plane Loading: Wind loading perpendicular to the wall length (see detail below). Tables shown in this guide are based on out-of-plane loading only.

Wind loads were calculated using the procedures for "Wind Loads" in Part 9 and Subsection 4.1.7 of the 2015 National Building Code of Canada, using the following factors:

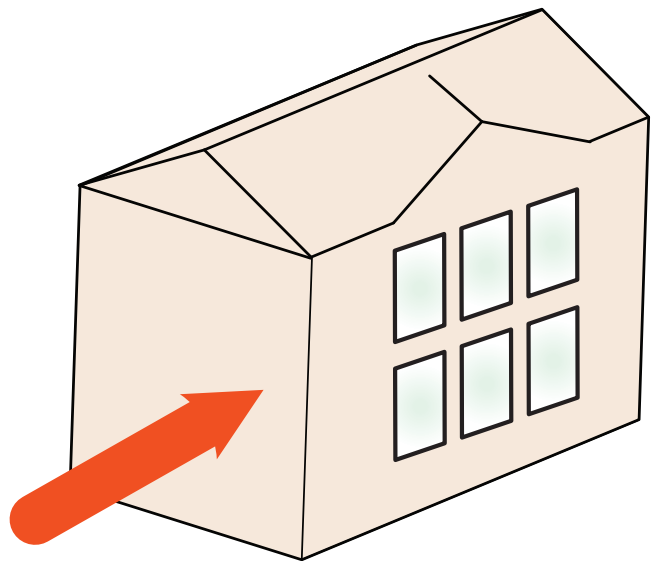
| Open Terrain | |
|-----------------------|-----|
| C_e exposure factor | 1.0 |
| Rough Terrain | |
| C_e exposure factor | 0.7 |

| | |
|--|-------|
| $+C_p C_g$, external pressure coefficient and gust factor | 2.0 |
| $-C_p C_g$, external pressure coefficient and gust factor | -2.1 |
| C_{gi} , internal gust factor | 2.0 |
| $+C_{pi}$, internal pressure coefficient | 0.3 |
| $-C_{pi}$, internal pressure coefficient | -0.45 |
| $+C_{pi} C_{gi}$, internal pressure coefficient and gust factor | 0.60 |
| $-C_{pi} C_{gi}$, internal pressure coefficient and gust factor | -0.90 |



Out-of-Plane Loading

Wind Load on wall surface. Stress and deflection of studs caused by perpendicular loading.



In-Plane Loading

Racking of wall caused by wind and/or seismic loading on opposite wall, applying parallel force on window wall.

Design Properties

| Width | Depth | Size Factor | Weight | Factored Shear Resistance Edge, V_r | Factored Bending Resistance Edge, M_r | Moment of Inertia | Modulus of Elasticity, E_{true} | Modulus of Elasticity, $E_{apparent}$ | Specified Bending Strength Edge, f_b | Specified Shear Strength Edge, f_v | Specified Compression Parallel to Grain, f_c | Specified Compression Perpendicular to Grain, f_{cp} |
|---|-------|-------------|---------|---------------------------------------|---|--------------------|-----------------------------------|---------------------------------------|--|--------------------------------------|--|--|
| (in) | (in) | | (lb/ft) | (lb) | (lb-ft) | (in ⁴) | (x10 ⁶ lb.in) | (x10 ⁶ psi) | (psi) | (psi) | (psi) | (psi) |
| Versa-Stud® 1.8E 2400 Design Properties | | | | | | | | | | | | |
| 1½ | 3½ | 1.15 | 1.3 | 1,670 | 1,170 | 5.4 | 1.8 | 1.7 | 4,435 | 530 | 4,790 | 1,365 |
| | 5½ | 1.09 | 2.1 | 2,625 | 2,745 | 20.8 | | | | | | |
| | 7¼ | 1.06 | 2.8 | 3,460 | 4,625 | 47.6 | | | | | | |
| | 9¼ | 1.03 | 3.6 | 4,410 | 7,325 | 98.9 | | | | | | |
| | 11¼ | 1.01 | 4.3 | 5,365 | 10,600 | 178.0 | | | | | | |
| Versa-Stud® 1.8E 2650 Design Properties | | | | | | | | | | | | |
| 1½ | 3½ | 1.15 | 1.5 | 1,670 | 1,290 | 5.4 | 1.8 | 1.7 | 4,900 | 530 | 4,790 | 1,365 |
| | 5½ | 1.09 | 2.4 | 2,625 | 3,030 | 20.8 | | | | | | |
| | 7¼ | 1.06 | 3.1 | 3,460 | 5,105 | 47.6 | | | | | | |
| | 9¼ | 1.03 | 4.0 | 4,410 | 8,090 | 98.9 | | | | | | |
| | 11¼ | 1.01 | 4.9 | 5,365 | 11,710 | 178.0 | | | | | | |
| Versa-Lam® LVL Column 1.8 2650 Design Properties | | | | | | | | | | | | |
| 3½ | 3½ | 1.15 | 3.5 | 3,895 | 3,010 | 12.5 | 1.8 | 1.7 | 4,900 | 530 | 4,790 | 1,365 |
| | 5¼ | 1.10 | 5.3 | 5,845 | 6,475 | 42.2 | | | | | | |
| | 7 | 1.06 | 7.1 | 7,790 | 11,155 | 100.0 | | | | | | |
| 5¼ | 5¼ | 1.10 | 7.9 | 8,765 | 9,715 | 63.3 | | | | | | |
| | 7 | 1.06 | 10.6 | 11,685 | 16,730 | 150.1 | | | | | | |
| | 7 | 1.06 | 12.6 | 15,580 | 22,305 | 200.1 | | | | | | |
| Versa-Lam® LVL 2.1E 2800 Design Properties | | | | | | | | | | | | |
| 1¾ | 5½ | 1.09 | 2.5 | 3,060 | 3,735 | 24.3 | 2.1 | 2.0 | 5,175 | 530 | 4,790 | 1,365 |
| | 7¼ | 1.06 | 3.3 | 4,035 | 6,295 | 55.6 | | | | | | |
| | 9¼ | 1.03 | 4.2 | 5,150 | 9,970 | 115.4 | | | | | | |
| | 9½ | 1.03 | 4.3 | 5,285 | 10,485 | 125.0 | | | | | | |
| | 11¼ | 1.01 | 5.1 | 6,260 | 14,430 | 207.6 | | | | | | |
| | 11⅞ | 1.00 | 5.3 | 6,610 | 15,980 | 244.2 | | | | | | |
| | 14 | 0.98 | 6.3 | 7,790 | 21,810 | 400.2 | | | | | | |
| Versa-Lam® LVL 2.1E 3100 Design Properties | | | | | | | | | | | | |
| 1¾ | 5½ | 1.09 | 2.8 | 3,060 | 4,135 | 24.3 | 2.1 | 2.0 | 5,730 | 530 | 4,790 | 1,365 |
| | 7¼ | 1.06 | 3.7 | 4,035 | 6,970 | 55.6 | | | | | | |
| | 9¼ | 1.03 | 4.7 | 5,150 | 11,040 | 115.4 | | | | | | |
| | 9½ | 1.03 | 4.8 | 5,285 | 11,610 | 125.0 | | | | | | |
| | 11¼ | 1.01 | 5.7 | 6,260 | 15,980 | 207.6 | | | | | | |
| | 11⅞ | 1.00 | 6.0 | 6,610 | 17,695 | 244.2 | | | | | | |
| | 14 | 0.98 | 7.1 | 7,790 | 24,150 | 400.2 | | | | | | |

NOTES:

- Design values as per CCMC 12472-R
- Repetitive member factor has not been applied to the Factored Bending Resistance
- Size factors have been applied to the Factored Bending Resistance
- Specified compression perpendicular to grain on plank orientation (plate) is 819 psi

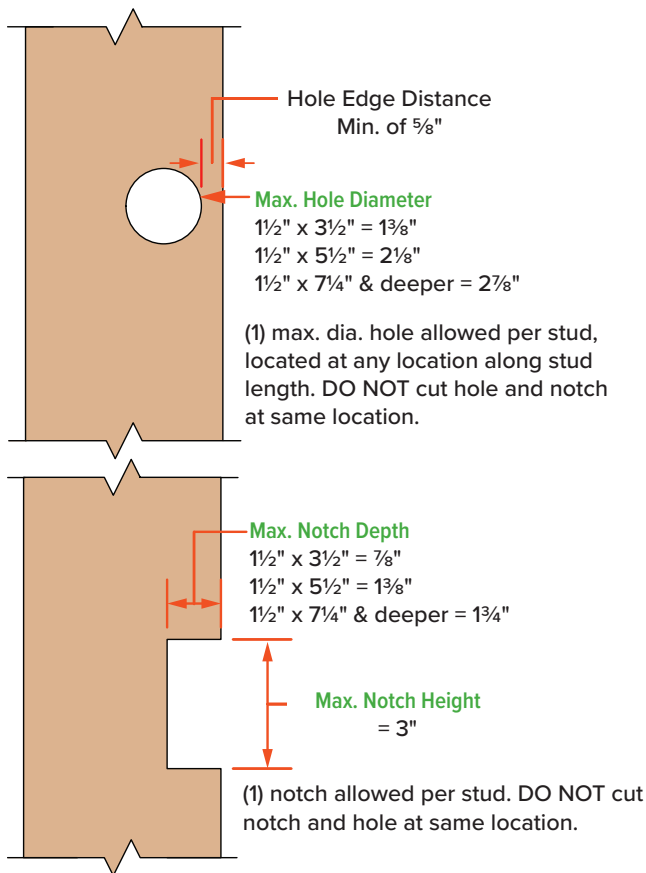
| Specified Strengths and Modulus of Elasticity Comparison | | | | | |
|--|--|---|---|--|--|
| Product | Modulus of Elasticity E_{apparent} | Specified Bending Strength Joist f_b | Specified Shear Strength Joist f_v | Specified Compression Parallel to Grain f_c | Specified Compression Perpendicular to Grain f_{cp} |
| | (x10 ⁶ psi) | (psi) | (psi) | (psi) | (psi) |
| Versa-Stud® 1.8E 2400 | 1.7 | 4,435 | 530 | 4,790 | 1,365 |
| Versa-Stud® 1.8E 2650 | 1.7 | 4,900 | 530 | 4,790 | 1,365 |
| Versa-Lam® LVL Column 1.8E 2650 | 1.7 | 4,900 | 530 | 4,790 | 1,365 |
| Versa-Lam® LVL 2.1E 2800 | 2.0 | 5,175 | 530 | 4,790 | 1,365 |
| Versa-Lam® LVL 2.1E 3100 | 2.0 | 5,730 | 530 | 4,790 | 1,365 |
| S-P-F No. 1/No. 2 | 1.4 | 1,710 | 218 | 1,670 | 769 |
| S-P-F SS | 1.5 | 2,390 | 218 | 2,100 | 769 |
| Hem-Fir No. 1/No. 2 | 1.6 | 1,600 | 232 | 2,150 | 667 |
| Hem-Fir SS | 1.7 | 2,320 | 232 | 2,550 | 667 |
| D Fir-L No. 1/No. 2 | 1.6 | 1,450 | 276 | 2,030 | 1,015 |
| D Fir-L SS | 1.7 | 2,390 | 276 | 2,760 | 1,015 |

NOTE:

- Specified strengths and modulus of elasticity for sawn lumber as per CSA O86-14 (Table 6.3.1A)

Versa-Stud® Allowable Holes and Notches

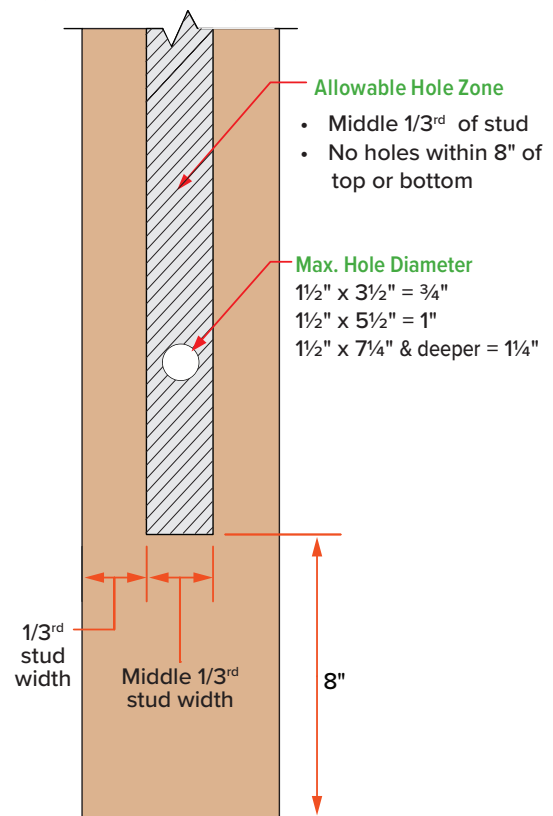
Prescriptive Provisions



Notes:

- Provisions valid only for studs within prescriptive design (see page 3).
- Shield plates or nail stops to prevent nailing into wiring or piping shall be installed per the governing building code.

Engineered Design Provisions



Notes:

- DO NOT drill more than 3 holes in any 4-foot-long section of stud.
- The vertical distance between adjacent holes must be at least 2 times the size of the larger hole
- Holes no greater than 3/4" dia may be cut in the hole zone shown in Versa-Lam® columns.
- For notches and larger holes, contact Boise Cascade EWP Engineering.

STUD Design

Given:

Wall Height 16'-0"
 Preliminary Stud Spacing 16" o.c.
 Wall Tributary Width (from roof) ≤18 ft. (including 2 ft. overhang)
 Maximum Roof Slope 2/12
 Roof Standard Live Load 10 psf
 Roof Standard Dead Load 10 psf
 Roof Standard Snow Load ≤50 psf
 = 40 psf (as an example)

Wind Load = 20 psf (as an example)
 Deflection Limit: L/360 (assuming brittle finishes)

Solution:

1½" x 7¼" , Versa-Stud® 1.8E 2400 / 1.8E 2650

| Versa-Stud® 1.8E 2400 / 1.8E 2650 | | | | | | |
|--|--------------|-----------------|---------|---------|---------|---------|
| Maximum Stud Height (ft-in): Max. deflection = L/360 | | | | | | |
| Snow load: ≤50 psf | | | | | | |
| Stud Size | Spacing (in) | Wind Load (psf) | | | | |
| | | 20 | 25 | 30 | 35 | 40 |
| 1½" x 3½" | 12 | 8'-11" | 8'-4" | | | |
| | 16 | 14'-5" | 13'-5" | | | |
| 1½" x 5½" | 12 | 12'-11" | 12'-1" | 12'-8" | 12'-1" | 11'-6" |
| | 16 | 11'-1" | 10'-4" | 11'-5" | 10'-10" | 10'-5" |
| | 24 | 11'-1" | 10'-4" | 9'-9" | 9'-4" | 8'-11" |
| 1½" x 7¼" | 12 | 19'-3" | 17'-11" | 16'-11" | 16'-1" | 15'-5" |
| | 16 | 17'-4" | 16'-2" | 15'-3" | 14'-6" | 13'-10" |
| | 24 | 14'-11" | 13'-11" | 13'-1" | 12'-6" | 12'-0" |
| 1½" x 9¼" | 12 | 24'-8" | 23'-0" | 21'-8" | 20'-8" | 19'-9" |
| | 16 | 22'-4" | 20'-10" | 19'-7" | 18'-8" | 17'-10" |
| | 24 | 19'-3" | 18'-00" | 17'-00" | 16'-2" | 15'-5" |

KING STUD Design (openings on one side only)

Given:

Wall Height: 16'-0"
 King Stud Tributary Width = [6'-0"/2] + [16"/2] = 3'-8" = 4'-0" (rounded up)
 Wall Tributary Width (from roof) ≤18 ft. (including 2 ft. overhang)
 Maximum Roof Slope 12/12
 Roof Standard Live Load 10 psf
 Roof Standard Dead Load 10 psf
 Roof Standard Snow Load 50 psf
 = 40 psf (as an example)

Wind Load = 20 psf (as an example)
 Deflection Limit: L/360 (assuming brittle finishes)

Solution:

1½" x 9¼" - 2 ply, Versa-Stud® 1.8E 2400 / 1.8E 2650

| Versa-Stud® 1.8E 2400 / 1.8E 2650 | | | | | | |
|---|----------------------|-----------------|---------|---------|---------|---------|
| Maximum King Stud Height (ft-in): Max. deflection = L/360 | | | | | | |
| Snow load: ≤ 50 psf | | | | | | |
| King Stud Size | Tributary width (ft) | Wind load (psf) | | | | |
| | | 20 | 25 | 30 | 35 | 40 |
| 1½" x 5½" - 2 ply | 3' | 11'-8" | 11'-0" | 10'-5" | 10'-0" | 9'-7" |
| | 4' | 10'-4" | 9'-9" | 9'-3" | 8'-10" | 8'-6" |
| | 5' | 9'-5" | 8'-10" | 8'-5" | 8'-1" | |
| | 6' | 8'-7" | 8'-2" | | | |
| 1½" x 7¼" - 2 ply | 3' | 16'-0" | 14'-11" | 14'-1" | 13'-6" | 12'-11" |
| | 4' | 14'-2" | 13'-4" | 12'-7" | 11'-12" | 11'-7" |
| | 5' | 12'-11" | 12'-2" | 11'-6" | 11'-0" | 10'-7" |
| | 6' | 12'-0" | 11'-3" | 10'-8" | 10'-3" | 9'-10" |
| 1½" x 9¼" - 2 ply | 8' | 10'-6" | 9'-11" | 9'-5" | 9'-1" | 8'-9" |
| | 3' | 20'-9" | 19'-5" | 18'-4" | 17'-6" | 16'-9" |
| | 4' | 18'-7" | 17'-5" | 16'-6" | 15'-8" | 15'-1" |
| | 5' | 17'-0" | 15'-11" | 15'-1" | 14'-5" | 13'-10" |
| | 6' | 15'-10" | 14'-9" | 14'-0" | 13'-5" | 12'-11" |
| | 8' | 14'-0" | 13'-2" | 12'-6" | 11'-11" | 11'-6" |
| 10' | 12'-8" | 12'-0" | 11'-5" | 10'-11" | 10'-6" | |

King Studs that could also be used as Built-up columns (with openings on both sides)

COLUMN DESIGN (openings on both sides)

Given:

Wall Height 16'-0"
 Column Tributary Width = 4'-0"
Wall Tributary Width (from roof) ≤18 ft. (including 2 ft. overhang)
Maximum Roof Slope 12/12
Roof Standard Live Load 10 psf
Roof Standard Dead Load 10 psf
Roof Standard Snow Load ≤50 psf
 = 40 psf (as an example)

Wind Load =20 psf (as an example)
 Deflection Limit: L/360 (assuming brittle finishes)

Solution:
5¼" x 7" (solid section), Versa-Lam® LVL 1.8E 2650

| Versa-Lam® LVL Column 1.8E 2650 | | | | | | |
|--|----------------------|-----------------|---------|---------|---------|--------|
| Maximum Column Height (ft-in): Max. deflection = L/360 | | | | | | |
| Snow load: ≤ 50 psf | | | | | | |
| Column Size | Tributary width (ft) | Wind load (psf) | | | | |
| | | 20 | 25 | 30 | 35 | 40 |
| 3½" x 5¼" | 3' | 12'-6" | 11'-7" | 11'-0" | 10'-6" | 10'-0" |
| | 4' | 11'-2" | 10'-5" | 9'-11" | 9'-5" | 9'-0" |
| | 5' | 10'-3" | 9'-7" | 9'-1" | 8'-8" | 8'-4" |
| | 6' | 9'-6" | 8'-11" | 8'-5" | 8'-0" | |
| 3½" x 7" | 3' | 16'-11" | 15'-9" | 14'-11" | 14'-2" | 13'-7" |
| | 4' | 15'-2" | 14'-2" | 13'-5" | 12'-9" | 12'-3" |
| | 5' | 14'-0" | 13'-1" | 12'-4" | 11'-9" | 11'-3" |
| | 6' | 13'-0" | 12'-2" | 11'-6" | 11'-0" | 10'-6" |
| | 8' | 11'-8" | 10'-11" | 10'-4" | 9'-10" | 9'-5" |
| 10' | 10'-8" | 10'-0" | 9'-5" | 9'-0" | 8'-8" | |
| 5¼" x 5¼" | 3' | 14'-6" | 13'-6" | 12'-9" | 12'-2" | 11'-8" |
| | 4' | 13'-1" | 12'-2" | 11'-6" | 10'-11" | 10'-6" |
| | 5' | 12'-0" | 11'-2" | 10'-7" | 10'-1" | 9'-8" |
| | 6' | 11'-2" | 10'-5" | 9'-11" | 9'-5" | 9'-0" |
| | 8' | 10'-0" | 9'-4" | 8'-10" | 8'-5" | 8'-1" |
| 10' | 9'-1" | 8'-6" | 8'-1" | | | |
| 5¼" x 7" | 3' | 19'-7" | 18'-3" | 17'-3" | 16'-4" | 15'-8" |
| | 4' | 17'-8" | 16'-6" | 15'-7" | 14'-9" | 14'-2" |
| | 5' | 16'-4" | 15'-2" | 14'-4" | 13'-8" | 13'-1" |
| | 6' | 15'-2" | 14'-2" | 13'-5" | 12'-9" | 12'-3" |
| | 8' | 13'-8" | 12'-9" | 12'-0" | 11'-6" | 11'-0" |
| | 10' | 12'-6" | 11'-8" | 11'-1" | 10'-7" | 10'-2" |
| 7" x 7" | 3' | 21'-8" | 20'-2" | 19'-0" | 18'-1" | 17'-4" |
| | 4' | 19'-7" | 18'-3" | 17'-3" | 16'-4" | 15'-8" |
| | 5' | 18'-1" | 16'-10" | 15'-11" | 15'-2" | 14'-6" |
| | 6' | 16'-11" | 15'-9" | 14'-11" | 14'-2" | 13'-7" |
| | 8' | 15'-2" | 14'-2" | 13'-5" | 12'-9" | 12'-3" |
| | 10' | 14'-0" | 13'-1" | 12'-4" | 11'-9" | 11'-3" |

Stud Load Tables - 1 & 2 Ply

| Versa-Stud® 1.8E 2400 / 1.8E 2650 | | | | | | | | | | | |
|-----------------------------------|--------------|---|---------|---------|---------|--------|---|---------|---------|---------|---------|
| Snow load: ≤ 50 psf | | | | | | | | | | | |
| Stud Size | Spacing (in) | Wind Load (psf) | | | | | | | | | |
| | | Maximum Stud Height (ft-in): Max. deflection = L/180 | | | | | Maximum Stud Height (ft-in): Max. deflection = L/360 | | | | |
| | | 20 | 25 | 30 | 35 | 40 | 20 | 25 | 30 | 35 | 40 |
| 1½" x 3½" | 12" | 11'-6" | 10'-9" | 10'-2" | 9'-8" | 9'-3" | 8'-11" | 8'-4" | | | |
| | 16" | 10'-6" | 9'-8" | 9'-1" | 8'-8" | 8'-4" | | | | | |
| 1½" x 5½" | 12" | 18'-6" | 17'-3" | 16'-2" | 15'-5" | 14'-9" | 14'-5" | 13'-5" | 12'-8" | 12'-1" | 11'-6" |
| | 16" | 16'-8" | 15'-6" | 14'-7" | 13'-11" | 13'-4" | 12'-11" | 12'-1" | 11'-5" | 10'-10" | 10'-5" |
| | 24" | 14'-4" | 13'-5" | 12'-7" | 12'-0" | 11'-6" | 11'-1" | 10'-4" | 9'-9" | 9'-4" | 8'-11" |
| 1½" x 7¼" | 12" | 24'-6" | 22'-10" | 21'-7" | 20'-6" | 19'-7" | 19'-3" | 17'-11" | 16'-11" | 16'-1" | 15'-5" |
| | 16" | 22'-2" | 20'-8" | 19'-5" | 18'-6" | 17'-9" | 17'-4" | 16'-2" | 15'-3" | 14'-6" | 13'-10" |
| | 24" | 19'-2" | 17'-10" | 16'-10" | 16'-0" | 15'-5" | 14'-11" | 13'-11" | 13'-1" | 12'-6" | 12'-0" |
| 1½" x 9¼" | 12" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 25'-1" | 24'-8" | 23'-0" | 21'-8" | 20'-8" | 19'-9" |
| | 16" | 26'-0" | 26'-0" | 25'-0" | 23'-9" | 22'-9" | 22'-4" | 20'-10" | 19'-7" | 18'-8" | 17'-10" |
| | 24" | 24'-9" | 23'-0" | 21'-9" | 20'-8" | 19'-9" | 19'-3" | 18'-0" | 17'-0" | 16'-2" | 15'-5" |

| Versa-Stud® 1.8E 2400 / 1.8E 2650 | | | | | | | | | | | |
|-----------------------------------|--------------|---|---------|---------|---------|---------|---|---------|---------|---------|--------|
| Snow load: ≤ 50 psf | | | | | | | | | | | |
| Stud Size | Spacing (in) | Wind Load (psf) | | | | | | | | | |
| | | Maximum Stud Height (ft-in): Max. deflection = L/180 | | | | | Maximum Stud Height (ft-in): Max. deflection = L/360 | | | | |
| | | 20 | 25 | 30 | 35 | 40 | 20 | 25 | 30 | 35 | 40 |
| 1½" x 3½" - 2 ply | 12" | 14'-4" | 13'-5" | 12'-9" | 12'-2" | 11'-8" | 11'-1" | 10'-5" | 9'-10" | 9'-5" | 9'-0" |
| | 16" | 12'-11" | 12'-1" | 11'-5" | 10'-10" | 10'-5" | 9'-10" | 9'-3" | 8'-9" | 8'-4" | 8'-0" |
| | 24" | 10'-11" | 10'-3" | 9'-9" | 9'-4" | 8'-11" | 8'-4" | | | | |
| 1½" x 5½" - 2 ply | 12" | 22'-11" | 21'-7" | 20'-4" | 19'-4" | 18'-7" | 18'-0" | 16'-9" | 15'-10" | 15'-1" | 14'-6" |
| | 16" | 20'-10" | 19'-5" | 18'-4" | 17'-6" | 16'-9" | 16'-2" | 15'-1" | 14'-4" | 13'-8" | 13'-1" |
| | 24" | 18'-0" | 16'-9" | 15'-10" | 15'-1" | 14'-6" | 13'-10" | 12'-11" | 12'-3" | 11'-8" | 11'-3" |
| 1½" x 7¼" - 2 ply | 12" | 26'-0" | 26'-0" | 26'-0" | 25'-8" | 24'-7" | 23'-12" | 22'-4" | 21'-1" | 20'-2" | 19'-3" |
| | 16" | 26'-0" | 25'-11" | 24'-5" | 23'-3" | 22'-3" | 21'-8" | 20'-2" | 19'-1" | 18'-2" | 17'-5" |
| | 24" | 24'-0" | 22'-5" | 21'-2" | 20'-2" | 19'-3" | 18'-8" | 17'-5" | 16'-6" | 15'-8" | 15'-0" |
| 1½" x 9¼" - 2 ply | 12" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 25'-11" | 24'-9" |
| | 16" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 24'-6" | 23'-4" | 22'-5" |
| | 24" | 26'-0" | 26'-0" | 26'-0" | 25'-11" | 24'-10" | 24'-1" | 22'-6" | 21'-3" | 20'-3" | 19'-5" |

| Versa-Stud® 1.8E 2400 / 1.8E 2650 | | | | | | | | | | | |
|-----------------------------------|--------------|---|---------|---------|--------|--------|---|--------|--------|--------|--------|
| Snow load: ≤ 50 psf | | | | | | | | | | | |
| Stud Size | Spacing (in) | Wind Load (psf) | | | | | | | | | |
| | | Maximum Stud Height (ft-in): Max. deflection = L/180 | | | | | Maximum Stud Height (ft-in): Max. deflection = L/360 | | | | |
| | | 20 | 25 | 30 | 35 | 40 | 20 | 25 | 30 | 35 | 40 |
| 1½" x 5½" - 3 ply | 12" | 22'-11" | 22'-11" | 22'-11" | 22'-4" | 21'-4" | 20'-10" | 19'-5" | 18'-4" | 17'-6" | 16'-9" |
| | 16" | 22'-11" | 22'-6" | 21'-2" | 20'-2" | 19'-4" | 18'-9" | 17'-6" | 16'-7" | 15'-9" | 15'-1" |
| | 24" | 20'-10" | 19'-5" | 18'-4" | 17'-6" | 16'-9" | 16'-2" | 15'-1" | 14'-4" | 13'-8" | 13'-1" |
| 1½" x 7¼" - 3 ply | 12" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 25'-9" | 24'-4" | 23'-2" | 22'-2" |
| | 16" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 25'-7" | 25'-0" | 23'-4" | 22'-0" | 21'-0" | 20'-1" |
| | 24" | 26'-0" | 25'-11" | 24'-5" | 23'-3" | 22'-3" | 21'-8" | 20'-2" | 19'-1" | 18'-2" | 17'-5" |
| 1½" x 9¼" - 3 ply | 12" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" |
| | 16" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 25'-9" |
| | 24" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 24'-6" | 23'-4" | 22'-5" |

| Versa-Stud® 1.8E 2400 / 1.8E 2650 | | | | | | | | | | | |
|-----------------------------------|--------------|---|--------|--------|--------|--------|---|--------|--------|---------|--------|
| Snow load: ≤ 50 psf | | | | | | | | | | | |
| Stud Size | Spacing (in) | Wind Load (psf) | | | | | | | | | |
| | | Maximum Stud Height (ft-in): Max. deflection = L/180 | | | | | Maximum Stud Height (ft-in): Max. deflection = L/360 | | | | |
| | | 20 | 25 | 30 | 35 | 40 | 20 | 25 | 30 | 35 | 40 |
| 1½" x 7¼" - 4 ply | 12" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 25'-7" | 24'-6" |
| | 16" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 25'-9" | 24'-4" | 23'-2" | 22'-2" |
| | 24" | 26'-0" | 26'-0" | 26'-0" | 25'-8" | 24'-7" | 24'-0" | 22'-4" | 21'-1" | 20'-2" | 19'-3" |
| 1½" x 9¼" - 4 ply | 12" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" |
| | 16" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" |
| | 24" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 25'-10" | 24'-9" |

NOTES:

- Wall stud design as per NBCC 2015 and CSA O86-14.
- Structural sheathing or structural siding installed on one side of wall.
- Maximum blocking spacing for the 1½" single ply studs should be 6'-0" and 8'-0" for all the other studs.
- Table assumes the followings:
 - factored compression strength perpendicular to grain for plate of 769 psi
 - wall tributary width (from roof) ≤ 18'-0" (including a 2'-0" overhang)
 - roof slope = 12/12
 - roof standard dead load = 10 psf
 - roof standard live load = 10 psf
 - roof snow load ≤ 50 psf
 - wind load is acting on the face of the wall
- Maximum factored vertical loads are shown on page 21.

King Stud Load Tables - 2 & 3 Ply

| Versa-Stud® 1.8E 2400 / 1.8E 2650 | | | | | | | | | | | |
|-----------------------------------|----------------------|--|---------|--------|--------|---------|--|---------|--------|---------|---------|
| Snow load: ≤ 50 psf | | | | | | | | | | | |
| King Stud Size | Tributary width (ft) | Wind Load (psf) | | | | | | | | | |
| | | Maximum King Stud Height (ft-in): Max. deflection = L/180 | | | | | Maximum King Stud Height (ft-in): Max. deflection = L/360 | | | | |
| | | 20 | 25 | 30 | 35 | 40 | 20 | 25 | 30 | 35 | 40 |
| 1½" x 5½" - 2 ply | 3' | 15'-4" | 14'-4" | 13'-7" | 13'-0" | 12'-6" | 11'-8" | 11'-0" | 10'-5" | 10'-0" | 9'-7" |
| | 4' | 13'-8" | 13'-0" | 12'-2" | 11'-8" | 11'-2" | 10'-4" | 9'-9" | 9'-3" | 8'-10" | 8'-6" |
| | 5' | 12'-6" | 11'-9" | 11'-2" | 10'-8" | 10'-3" | 9'-5" | 8'-10" | 8'-5" | 8'-1" | |
| | 6' | 11'-7" | 10'-11" | 10'-4" | 9'-11" | 9'-6" | 8'-7" | 8'-2" | | | |
| 1½" x 7¼" - 2 ply | 3' | 20'-9" | 19'-4" | 18'-3" | 17'-5" | 16'-8" | 16'-0" | 14'-11" | 14'-1" | 13'-6" | 12'-11" |
| | 4' | 18'-7" | 17'-4" | 16'-5" | 15'-8" | 15'-0" | 14'-2" | 13'-4" | 12'-7" | 11'-12" | 11'-7" |
| | 5' | 17'-0" | 15'-11" | 15'-1" | 14'-5" | 13'-10" | 12'-11" | 12'-2" | 11'-6" | 11'-0" | 10'-7" |
| | 6' | 15'-10" | 14'-10" | 14'-1" | 13'-5" | 12'-11" | 12'-0" | 11'-3" | 10'-8" | 10'-3" | 9'-10" |
| | 8' | 14'-1" | 13'-3" | 12'-6" | 12'-0" | 11'-6" | 10'-6" | 9'-11" | 9'-5" | 9'-1" | 8'-9" |
| 1½" x 9¼" - 2 ply | 3' | 26'-0" | 25'-0" | 23'-7" | 22'-6" | 21'-6" | 20'-9" | 19'-5" | 18'-4" | 17'-6" | 16'-9" |
| | 4' | 24'-1" | 22'-6" | 21'-3" | 20'-3" | 19'-5" | 18'-7" | 17'-5" | 16'-6" | 15'-8" | 15'-1" |
| | 5' | 22'-2" | 20'-8" | 19'-7" | 18'-8" | 17'-10" | 17'-0" | 15'-11" | 15'-1" | 14'-5" | 13'-10" |
| | 6' | 20'-8" | 19'-4" | 18'-3" | 17'-5" | 16'-9" | 15'-10" | 14'-9" | 14'-0" | 13'-5" | 12'-11" |
| | 8' | 18'-6" | 17'-4" | 16'-5" | 15'-8" | 15'-0" | 14'-0" | 13'-2" | 12'-6" | 11'-11" | 11'-6" |
| | 10' | 16'-11" | 15'-10" | 15'-0" | 14'-4" | 13'-9" | 12'-8" | 12'-0" | 11'-5" | 10'-11" | 10'-6" |

Studs that could also be used as Built-up columns (with openings on both sides)

| Versa-Stud® 1.8E 2400 / 1.8E 2650 | | | | | | | | | | | |
|-----------------------------------|----------------------|--|---------|---------|---------|---------|--|---------|---------|---------|--------|
| Snow load: ≤ 50 psf | | | | | | | | | | | |
| King Stud Size | Tributary width (ft) | Wind Load (psf) | | | | | | | | | |
| | | Maximum King Stud Height (ft-in): Max. deflection = L/180 | | | | | Maximum King Stud Height (ft-in): Max. deflection = L/360 | | | | |
| | | 20 | 25 | 30 | 35 | 40 | 20 | 25 | 30 | 35 | 40 |
| 1½" x 5½" - 3 ply | 3' | 18'-0" | 16'-9" | 15'-10" | 15'-1" | 14'-6" | 13'-10" | 12'-11" | 12'-3" | 11'-8" | 11'-3" |
| | 4' | 16'-1" | 15'-1" | 14'-3" | 13'-7" | 13'-0" | 12'-4" | 11'-6" | 10'-11" | 10'-5" | 10'-0" |
| | 5' | 14'-9" | 13'-10" | 13'-1" | 12'-6" | 12'-0" | 11'-3" | 10'-6" | 10'-0" | 9'-6" | 9'-2" |
| | 6' | 13'-8" | 13'-0" | 12'-2" | 11'-8" | 11'-2" | 10'-4" | 9'-9" | 9'-3" | 8'-10" | 8'-6" |
| | 8' | 12'-2" | 11'-5" | 10'-10" | 10'-5" | 10'-0" | 9'-1" | 8'-7" | 8'-2" | 7'-10" | 7'-7" |
| 1½" x 7¼" - 3 ply | 3' | 24'-0" | 22'-5" | 21'-2" | 20'-2" | 19'-3" | 18'-8" | 17'-5" | 16'-6" | 15'-8" | 15'-0" |
| | 4' | 21'-8" | 20'-2" | 19'-1" | 18'-2" | 17'-5" | 16'-8" | 15'-8" | 14'-9" | 14'-1" | 13'-6" |
| | 5' | 19'-10" | 18'-7" | 17'-7" | 16'-9" | 16'-1" | 15'-3" | 14'-4" | 13'-7" | 12'-11" | 12'-5" |
| | 6' | 18'-7" | 17'-4" | 16'-5" | 15'-8" | 15'-0" | 14'-2" | 13'-4" | 12'-7" | 12'-0" | 11'-7" |
| | 8' | 16'-7" | 15'-7" | 14'-9" | 14'-0" | 13'-6" | 12'-7" | 11'-10" | 11'-3" | 10'-9" | 10'-4" |
| | 10' | 15'-2" | 14'-3" | 13'-6" | 12'-11" | 12'-5" | 11'-5" | 10'-9" | 10'-3" | 9'-10" | 9'-5" |
| 1½" x 9¼" - 3 ply | 3' | 26'-0" | 26'-0" | 26'-0" | 25'-11" | 24'-10" | 24'-1" | 22'-6" | 21'-3" | 20'-3" | 19'-5" |
| | 4' | 26'-0" | 26'-0" | 24'-7" | 23'-5" | 22'-5" | 21'-8" | 20'-3" | 19'-2" | 18'-3" | 17'-6" |
| | 5' | 25'-9" | 24'-0" | 22'-8" | 21'-8" | 20'-8" | 19'-11" | 18'-8" | 17'-8" | 16'-10" | 16'-1" |
| | 6' | 24'-1" | 22'-6" | 21'-3" | 20'-3" | 19'-5" | 18'-7" | 17'-5" | 16'-6" | 15'-8" | 15'-1" |
| | 8' | 21'-8" | 20'-2" | 19'-1" | 18'-2" | 17'-6" | 16'-7" | 15'-6" | 14'-8" | 14'-0" | 13'-6" |
| | 10' | 19'-10" | 18'-7" | 17'-7" | 16'-9" | 16'-1" | 15'-1" | 14'-2" | 13'-5" | 12'-10" | 12'-4" |

Studs that could also be used as Built-up columns (with openings on both sides)

King Stud Load Table - 4 Ply

| Versa-Stud® 1.8E 2400 / 1.8E 2650 | | | | | | | | | | | |
|-----------------------------------|----------------------|--|---------|--------|---------|---------|--|---------|--------|--------|---------|
| Snow load: ≤ 50 psf | | | | | | | | | | | |
| King Stud Size | Tributary width (ft) | Wind Load (psf) | | | | | | | | | |
| | | Maximum King Stud Height (ft-in): Max. deflection = L/180 | | | | | Maximum King Stud Height (ft-in): Max. deflection = L/360 | | | | |
| | | 20 | 25 | 30 | 35 | 40 | 20 | 25 | 30 | 35 | 40 |
| 1½" x 7¼" - 4 ply | 3' | 26'-0" | 24'-10" | 23'-5" | 22'-4" | 21'-5" | 20'-9" | 19'-4" | 18'-4" | 17'-5" | 16'-9" |
| | 4' | 24'-0" | 22'-5" | 21'-2" | 20'-2" | 19'-3" | 18'-8" | 17'-5" | 16'-6" | 16'-1" | 15'-0" |
| | 5' | 22'-2" | 20'-8" | 19'-6" | 18'-7" | 17'-10" | 17'-1" | 16'-0" | 15'-1" | 14'-5" | 13'-10" |
| | 6' | 20'-9" | 19'-4" | 18'-3" | 17'-5" | 16'-8" | 16'-0" | 14'-11" | 14'-1" | 13'-6" | 12'-11" |
| | 8' | 18'-7" | 17'-4" | 16'-5" | 15'-8" | 15'-0" | 14'-2" | 13'-4" | 12'-7" | 12'-0" | 11'-7" |
| | 10' | 17'-0" | 15'-11" | 15'-1" | 14'-5" | 13'-10" | 12'-11" | 12'-2" | 11'-6" | 11'-0" | 10'-7" |
| 1½" x 9¼" - 4 ply | 3' | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 24'-11" | 23'-7" | 22'-5" | 21'-6" |
| | 4' | 26'-0" | 26'-0" | 26'-0" | 25'-11" | 24'-10" | 24'-1" | 22'-6" | 21'-3" | 20'-3" | 19'-5" |
| | 5' | 26'-0" | 26'-0" | 25'-2" | 23'-11" | 22'-11" | 22'-2" | 20'-9" | 19'-7" | 18'-8" | 17'-11" |
| | 6' | 26'-0" | 25'-0" | 23'-7" | 22'-6" | 21'-6" | 20'-9" | 19'-5" | 18'-4" | 17'-6" | 16'-9" |
| | 8' | 24'-1" | 22'-6" | 21'-3" | 20'-3" | 19'-5" | 18'-7" | 17'-5" | 16'-6" | 15'-8" | 15'-1" |
| | 10' | 22'-2" | 20'-8" | 19'-7" | 18'-8" | 17'-10" | 17'-0" | 15'-11" | 15'-1" | 14'-5" | 13'-10" |

Studs that could also be used as Built-up columns (with openings on both sides)

NOTES:

- Wall King stud design as per NBCC 2015 and CSA O86-14.
- Structural sheathing or structural siding installed on one side of wall/stud.
- Maximum blocking spacing for the 1½" single ply studs should be 6'-0" and 8'-0" for all other studs.
- Table assumes the followings:
 - specified compression strength perpendicular to grain for plate of 769 psi.
 - wall tributary width (from roof) ≤ 18'-0" (including a 2'-0" overhang). - roof slope = 12/12
 - roof standard dead load = 10 psf
 - roof standard live load = 10 psf
 - roof snow load ≤ 50 psf
 - wind load is acting on the face of the wall.
- Maximum factored vertical loads are shown on page 21.

Built-Up Column Load Table - 2 Ply

| Built-Up Column - Versa-Lam® LVL Column 2.1E 2800 / 2.1E 3100 | | | | | | | | | | | |
|---|----------------------|--|---------|---------|---------|---------|--|---------|---------|---------|---------|
| Snow load: ≤ 50 psf | | | | | | | | | | | |
| Built-Up Column Size | Tributary width (ft) | Wind load (psf) | | | | | | | | | |
| | | Maximum Built-Up Column Height (ft-in): Max. deflection = L/180 | | | | | Maximum Built-Up Column Height (ft-in): Max. deflection = L/360 | | | | |
| | | 20 | 25 | 30 | 35 | 40 | 20 | 25 | 30 | 35 | 40 |
| 1¾" x 5½" - 2 ply | 3' | 17'-4" | 16'-2" | 15'-4" | 14'-7" | 14'-0" | 13'-4" | 12'-6" | 11'-10" | 11'-3" | 10'-10" |
| | 4' | 15'-7" | 14'-6" | 13'-9" | 13'-2" | 12'-7" | 11'-10" | 11'-1" | 10'-7" | 10'-1" | 9'-8" |
| | 5' | 14'-3" | 13'-4" | 12'-7" | 12'-1" | 11'-7" | 10'-9" | 10'-2" | 9'-8" | 9'-3" | 8'-11" |
| | 6' | 13'-1" | 12'-5" | 11'-9" | 11'-3" | 10'-9" | 10'-0" | 9'-5" | 8'-11" | 8'-7" | 8'-3" |
| | 8' | 11'-4" | 11'-0" | 10'-5" | 10'-0" | 9'-8" | 8'-9" | 8'-3" | | | |
| 1¾" x 7¼" - 2 ply | 3' | 23'-3" | 21'-9" | 20'-6" | 19'-6" | 18'-8" | 18'-0" | 16'-10" | 15'-11" | 15'-2" | 14'-7" |
| | 4' | 20'-11" | 19'-7" | 18'-6" | 17'-7" | 16'-10" | 16'-2" | 15'-1" | 14'-3" | 13'-7" | 13'-1" |
| | 5' | 19'-3" | 18'-0" | 17'-0" | 16'-2" | 15'-7" | 14'-9" | 13'-10" | 13'-1" | 12'-6" | 12'-0" |
| | 6' | 17'-11" | 16'-9" | 15'-10" | 15'-2" | 14'-6" | 13'-8" | 12'-10" | 12'-2" | 11'-8" | 11'-2" |
| | 8' | 13'-0" | 13'-0" | 13'-0" | 13'-0" | 13'-0" | 12'-2" | 11'-5" | 10'-10" | 10'-4" | 10'-0" |
| | 10' | 11'-8" | 11'-8" | 11'-8" | 11'-8" | 11'-8" | 11'-0" | 10'-4" | 9'-10" | 9'-5" | 9'-1" |
| 1¾" x 9¼" - 2 ply | 3' | 26'-0" | 26'-0" | 26'-0" | 25'-1" | 24'-1" | 23'-4" | 21'-10" | 20'-7" | 19'-7" | 18'-10" |
| | 4' | 26'-0" | 25'-3" | 23'-10" | 22'-8" | 21'-9" | 21'-0" | 19'-7" | 18'-6" | 17'-8" | 16'-11" |
| | 5' | 25'-0" | 23'-3" | 22'-0" | 20'-11" | 20'-1" | 19'-3" | 18'-0" | 17'-1" | 16'-3" | 15'-7" |
| | 6' | 23'-4" | 21'-9" | 20'-7" | 19'-7" | 18'-9" | 18'-0" | 16'-10" | 16'-0" | 15'-2" | 14'-7" |
| | 8' | 20'-11" | 19'-7" | 18'-6" | 17'-7" | 16'-11" | 16'-0" | 15'-0" | 14'-2" | 13'-7" | 13'-0" |
| | 10' | 13'-2" | 13'-2" | 13'-2" | 13'-2" | 13'-2" | 13'-2" | 13'-2" | 13'-0" | 12'-5" | 11'-11" |
| 1¾" x 9½" - 2 ply | 3' | 26'-0" | 26'-0" | 26'-0" | 25'-10" | 24'-9" | 24'-0" | 22'-5" | 21'-2" | 20'-2" | 19'-4" |
| | 4' | 26'-0" | 25'-11" | 24'-6" | 23'-4" | 22'-4" | 21'-7" | 20'-2" | 19'-1" | 18'-2" | 17'-5" |
| | 5' | 25'-8" | 23'-11" | 22'-8" | 21'-7" | 20'-8" | 19'-10" | 18'-7" | 17'-7" | 16'-9" | 16'-0" |
| | 6' | 24'-0" | 22'-5" | 21'-2" | 20'-2" | 19'-4" | 18'-6" | 17'-4" | 16'-4" | 15'-7" | 15'-0" |
| | 8' | 21'-6" | 20'-1" | 19'-0" | 18'-2" | 17'-5" | 16'-6" | 15'-5" | 14'-8" | 14'-0" | 13'-5" |
| | 10' | 13'-4" | 13'-4" | 13'-4" | 13'-4" | 13'-4" | 13'-4" | 13'-4" | 13'-4" | 12'-9" | 12'-4" |
| 1¾" x 11¼" - 2 ply | 3 | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 25'-3" | 24'-0" | 23'-0" |
| | 4 | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 25'-10" | 24'-1" | 22'-9" | 21'-8" | 20'-10" |
| | 5' | 26'-0" | 26'-0" | 26'-0" | 25'-8" | 24'-7" | 23'-9" | 22'-2" | 21'-0" | 20'-0" | 19'-2" |
| | 6' | 26'-0" | 26'-0" | 25'-3" | 24'-1" | 23'-1" | 22'-2" | 20'-9" | 19'-7" | 18'-8" | 17'-11" |
| | 8' | 25'-10" | 24'-1" | 22'-9" | 21'-8" | 20'-9" | 19'-10" | 18'-7" | 17'-7" | 16'-9" | 16'-1" |
| | 10' | 23'-9" | 22'-2" | 20'-11" | 20'-0" | 19'-2" | 18'-2" | 17'-0" | 16'-1" | 15'-5" | 14'-9" |
| 1¾" x 11⅝" - 2 ply | 3 | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 25'-5" | 24'-4" |
| | 4 | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 25'-6" | 24'-1" | 22'-11" | 22'-0" |
| | 5 | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 25'-2" | 23'-6" | 22'-2" | 21'-2" | 20'-4" |
| | 6' | 26'-0" | 26'-0" | 26'-0" | 25'-5" | 24'-5" | 23'-6" | 22'-0" | 20'-9" | 19'-10" | 19'-0" |
| | 8' | 26'-0" | 25'-6" | 24'-1" | 22'-11" | 22'-0" | 21'-1" | 19'-9" | 18'-8" | 17'-9" | 17'-1" |
| | 10' | 25'-2" | 23'-6" | 22'-2" | 21'-1" | 20'-3" | 19'-4" | 18'-1" | 17'-1" | 16'-4" | 15'-8" |
| 1¾" x 14" - 2 ply | ≤ 4' | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" |
| | 5 | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 25'-1" | 24'-1" |
| | 6 | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 24'-8" | 23'-7" | 22'-7" |
| | 8' | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 25'-2" | 23'-6" | 22'-3" | 21'-2" | 20'-4" |
| | 10' | 26'-0" | 26'-0" | 26'-0" | 25'-2" | 24'-1" | 23'-1" | 21'-7" | 20'-5" | 19'-6" | 18'-8" |

Built-Up Column Load Table - 3 Ply

| Built-Up Column - Versa-Lam® LVL Column 2.1E 2800 / 2.1E 3100 | | | | | | | | | | | | | |
|---|----------------------|---|---------|---------|---------|---------|------|---|---------|---------|---------|---------|------|
| Snow load: ≤ 50 psf | | | | | | | | | | | | | |
| Built-Up Column Size | Tributary width (ft) | Wind load (psf) | | | | | | | | | | | |
| | | Maximum Built-Up Column Height (ft-in): deflection = L/180 | | | | | Max. | Maximum Built-Up Column Height (ft-in): deflection = L/360 | | | | | Max. |
| | | 20 | 25 | 30 | 35 | 40 | | 20 | 25 | 30 | 35 | 40 | |
| 1¾" x 5½" - 3 ply | 3' | 20'-2" | 18'-10" | 17'-10" | 16'-11" | 16'-3" | | 15'-8" | 14'-7" | 13'-10" | 13'-2" | 12'-7" | |
| | 4' | 18'-2" | 16'-11" | 16'-0" | 15'-3" | 14'-7" | | 14'-0" | 13'-1" | 12'-5" | 11'-10" | 11'-4" | |
| | 5' | 16'-8" | 15'-7" | 14'-9" | 14'-1" | 13'-6" | | 12'-9" | 12'-0" | 11'-4" | 10'-10" | 10'-5" | |
| | 6' | 15'-7" | 14'-6" | 13'-9" | 13'-2" | 12'-7" | | 11'-10" | 11'-1" | 10'-7" | 10'-1" | 9'-8" | |
| | 8' | 13'-10" | 13'-0" | 12'-4" | 11'-9" | 11'-4" | | 10'-6" | 9'-10" | 9'-5" | 9'-0" | 8'-7" | |
| | 10' | 12'-8" | 11'-11" | 11'-3" | 10'-9" | 10'-4" | | 9'-6" | 8'-11" | 8'-6" | 8'-2" | | |
| 1¾" x 7¼" - 3 ply | 3' | 26'-0" | 25'-1" | 23'-8" | 22'-7" | 21'-7" | | 21'-0" | 19'-7" | 18'-6" | 17'-7" | 16'-11" | |
| | 4' | 24'-4" | 22'-8" | 21'-5" | 20'-4" | 19'-7" | | 18'-10" | 17'-7" | 16'-8" | 15'-10" | 15'-3" | |
| | 5' | 22'-5" | 20'-11" | 19'-9" | 18'-9" | 18'-0" | | 17'-4" | 16'-2" | 15'-3" | 14'-7" | 14'-0" | |
| | 6' | 20'-11" | 19'-7" | 18'-6" | 17'-7" | 16'-10" | | 16'-2" | 15'-1" | 14'-3" | 13'-7" | 13'-1" | |
| | 8' | 18'-9" | 17'-7" | 16'-7" | 15'-10" | 15'-2" | | 14'-4" | 13'-6" | 12'-9" | 12'-2" | 12'-2" | |
| | 10' | 17'-3" | 16'-1" | 15'-3" | 14'-7" | 14'-0" | | 13'-1" | 12'-4" | 11'-8" | 11'-2" | 10'-9" | |
| 1¾" x 9¼" - 3 ply | 3' | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | | 26'-0" | 25'-3" | 23'-10" | 22'-8" | 21'-9" | |
| | 4' | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 25'-1" | | 24'-4" | 22'-9" | 21'-6" | 20'-6" | 19'-7" | |
| | 5' | 26'-0" | 26'-0" | 25'-5" | 24'-2" | 23'-2" | | 22'-6" | 21'-0" | 19'-10" | 18'-11" | 18'-1" | |
| | 6' | 26'-0" | 25'-3" | 23'-10" | 22'-8" | 21'-9" | | 21'-0" | 19'-7" | 18'-6" | 17'-8" | 16'-11" | |
| | 8' | 24'-4" | 22'-9" | 21'-6" | 20'-6" | 19'-7" | | 18'-10" | 17'-7" | 16'-8" | 15'-10" | 15'-3" | |
| | 10' | 22'-5" | 20'-11" | 19'-9" | 18'-10" | 18'-1" | | 17'-3" | 16'-1" | 15'-3" | 14'-7" | 14'-0" | |
| 1¾" x 9½" - 3 ply | 3' | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | | 26'-0" | 25'-11" | 24'-6" | 23'-3" | 22'-4" | |
| | 4' | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 25'-9" | | 25'-1" | 23'-5" | 22'-1" | 21'-1" | 20'-2" | |
| | 5' | 26'-0" | 26'-0" | 26'-0" | 24'-11" | 23'-10" | | 23'-1" | 21'-7" | 20'-5" | 19'-5" | 18'-8" | |
| | 6' | 26'-0" | 25'-11" | 24'-6" | 23'-4" | 22'-4" | | 21'-7" | 20'-2" | 19'-1" | 18'-2" | 17'-5" | |
| | 8' | 25'-1" | 23'-5" | 22'-1" | 21'-0" | 20'-2" | | 19'-4" | 18'-1" | 17'-1" | 16'-4" | 15'-8" | |
| | 10' | 23'-1" | 21'-7" | 20'-4" | 19'-5" | 18'-7" | | 17'-9" | 16'-8" | 15'-8" | 15'-0" | 14'-5" | |
| 1¾" x 11¼" - 3 ply | ≤ 4' | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | | 26'-0" | 26'-0" | 26'-0" | 25'-1" | 24'-0" | |
| | 5' | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | | 26'-0" | 25'-9" | 24'-4" | 23'-2" | 22'-2" | |
| | 6' | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | | 25'-10" | 24'-1" | 22'-9" | 21'-8" | 20'-10" | |
| | 8' | 26'-0" | 26'-0" | 26'-0" | 25'-1" | 24'-0" | | 23'-3" | 21'-8" | 20'-6" | 19'-7" | 18'-9" | |
| | 10' | 26'-0" | 25'-9" | 24'-4" | 23'-2" | 22'-2" | | 21'-4" | 19'-11" | 18'-10" | 18'-0" | 17'-3" | |
| 1¾" x 11⅝" - 3 ply | ≤ 4' | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 25'-5" | |
| | 5' | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | | 26'-0" | 26'-0" | 25'-9" | 24'-6" | 23'-6" | |
| | 6' | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | | 26'-0" | 25'-6" | 24'-1" | 22'-11" | 22'-0" | |
| | 8' | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 25'-5" | | 24'-7" | 23'-0" | 21'-9" | 20'-8" | 19'-10" | |
| | 10' | 26'-0" | 26'-0" | 25'-9" | 24'-6" | 23'-6" | | 22'-7" | 21'-1" | 20'-0" | 19'-1" | 18'-3" | |
| 1¾" x 14" - 3 ply | ≤ 6' | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | |
| | 8' | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | | 26'-0" | 26'-0" | 25'-9" | 24'-7" | 23'-7" | |
| | 10' | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | | 26'-0" | 25'-2" | 23'-9" | 22'-8" | 21'-9" | |

Built-Up Column Load Table - 4 Ply

| Built-Up Column - Versa-Lam® LVL Column 2.1E 2800 / 2.1E 3100 | | | | | | | | | | | |
|---|----------------------|--|---------|---------|---------|---------|--|---------|---------|---------|---------|
| Snow load: ≤ 50 psf | | | | | | | | | | | |
| Built-Up Column Size | Tributary width (ft) | Wind load (psf) | | | | | | | | | |
| | | Maximum Built-Up Column Height (ft-in): Max. deflection = L/180 | | | | | Maximum Built-Up Column Height (ft-in): Max. deflection = L/360 | | | | |
| | | 20 | 25 | 30 | 35 | 40 | 20 | 25 | 30 | 35 | 40 |
| 1¾" x 7¼" - 4 ply | 3' | 26'-0" | 26'-0" | 26'-0" | 24'-11" | 23'-11" | 23'-3" | 21'-9" | 20'-6" | 19'-6" | 18'-9" |
| | 4' | 26'-0" | 25'-1" | 23'-8" | 22'-7" | 21'-7" | 21'-0" | 19'-7" | 18'-6" | 17'-7" | 16'-11" |
| | 5' | 24'-10" | 23'-2" | 21'-11" | 20'-10" | 20'-0" | 19'-4" | 18'-0" | 17'-1" | 16'-3" | 15'-7" |
| | 6' | 23'-3" | 21'-9" | 20'-6" | 19'-6" | 18'-8" | 18'-0" | 16'-10" | 15'-11" | 15'-2" | 14'-7" |
| | 8' | 20'-11" | 19'-7" | 18'-6" | 17'-7" | 16'-10" | 16'-2" | 15'-1" | 14'-3" | 13'-7" | 13'-1" |
| | 10' | 19'-3" | 18'-0" | 17'-0" | 16'-2" | 15'-7" | 14'-9" | 13'-10" | 13'-1" | 12'-6" | 12'-0" |
| 1¾" x 9¼" - 4 ply | 3' | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 25'-1" | 24'-0" |
| | 4' | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 25'-3" | 23'-10" | 22'-8" | 21'-9" |
| | 5' | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 25'-8" | 25'-0" | 23'-3" | 22'-0" | 20'-11" | 20'-1" |
| | 6' | 26'-0" | 26'-0" | 26'-0" | 25'-1" | 24'-1" | 23'-4" | 21'-10" | 20'-7" | 19'-7" | 18'-10" |
| | 8' | 26'-0" | 25'-3" | 23'-10" | 22'-8" | 21'-9" | 21'-0" | 19'-7" | 18'-6" | 17'-8" | 16'-11" |
| | 10' | 25'-0" | 23'-3" | 22'-0" | 20'-11" | 20'-1" | 19'-3" | 18'-0" | 17'-1" | 16'-3" | 15'-7" |
| 1¾" x 9½" - 4 ply | 3' | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 25'-9" | 24'-8" |
| | 4' | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 25'-11" | 24'-6" | 23'-3" | 22'-4" |
| | 5' | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 25'-8" | 23'-11" | 22'-7" | 21'-7" | 20'-8" |
| | 6' | 26'-0" | 26'-0" | 26'-0" | 25'-10" | 24'-9" | 24'-0" | 22'-5" | 21'-2" | 20'-2" | 19'-4" |
| | 8' | 26'-0" | 25'-11" | 24'-6" | 23'-4" | 22'-4" | 21'-7" | 20'-2" | 19'-1" | 18'-2" | 17'-5" |
| | 10' | 25'-8" | 23'-11" | 22'-8" | 21'-7" | 20'-8" | 19'-10" | 18'-7" | 17'-7" | 16'-9" | 16'-0" |
| 1¾" x 11¼" - 4 ply | ≤ 5' | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 25'-7" | 24'-7" |
| | 6' | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 25'-3" | 24'-0" | 23'-0" |
| | 8' | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 25'-10" | 24'-1" | 22'-9" | 21'-8" | 20'-10" |
| | 10' | 26'-0" | 26'-0" | 26'-0" | 25'-8" | 24'-7" | 23'-9" | 22'-2" | 21'-0" | 20'-0" | 19'-2" |
| 1¾" x 11⅞" - 4 ply | ≤ 5' | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" |
| | 6' | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 25'-5" | 24'-4" |
| | 8' | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 25'-6" | 24'-1" | 22'-11" | 22'-0" |
| | 10' | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 25'-2" | 23'-6" | 22'-2" | 21'-2" | 20'-4" |
| 1¾" x 14" - 4 ply | ≤ 8' | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" |
| | 10' | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 26'-0" | 25'-1" | 24'-1" |

NOTES:

- Built-Up Column design as per NBCC 2015 and CSA O86-14.
- Maximum opening height is 75% of the column height or 10 feet, whichever is lower.
- Table assumes the followings:
 - specified compression strength perpendicular to grain for plate of 769 psi.
 - wall tributary width (from roof) ≤ 18'-0" (including a 2'-0" overhang).
 - roof slope = 12/12
 - roof standard dead load = 10 psf
 - roof standard live load = 10 psf
 - roof snow load ≤ 50 psf
 - wind load is acting on the face of the wall.
- Maximum factored vertical loads are shown on page 21.

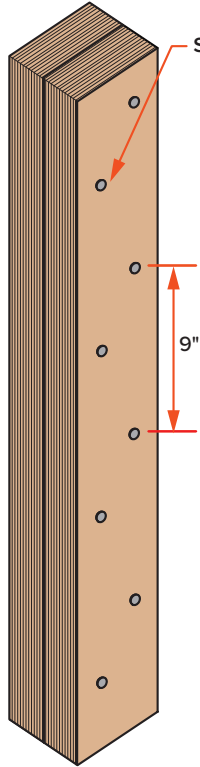
Solid Column Load Table

| Solid Versa-Lam® LVL Column 1.8E 2650 | | | | | | | | | | | |
|---------------------------------------|----------------------|---|--------|---------|---------|---------|---|---------|---------|---------|--------|
| Snow load: ≤ 50 psf | | | | | | | | | | | |
| Solid Column Size | Tributary width (ft) | Wind load (psf) | | | | | | | | | |
| | | Maximum Solid Column Height (ft-in): Max. deflection = L/180 | | | | | Maximum Solid Column Height (ft-in): Max. deflection = L/360 | | | | |
| | | 20 | 25 | 30 | 35 | 40 | 20 | 25 | 30 | 35 | 40 |
| 3½" x 5¼" | 3' | 16'-1" | 15'-0" | 14'-1" | 13'-5" | 12'-11" | 12'-6" | 11'-7" | 11'-0" | 10'-6" | 10'-0" |
| | 4' | 14'-6" | 13'-6" | 12'-9" | 12'-2" | 11'-7" | 11'-2" | 10'-5" | 9'-11" | 9'-5" | 9'-0" |
| | 5' | 13'-3" | 12'-5" | 11'-9" | 11'-2" | 10'-9" | 10'-3" | 9'-7" | 9'-1" | 8'-8" | 8'-4" |
| | 6' | 12'-5" | 11'-7" | 11'-0" | 10'-6" | 10'-0" | 9'-6" | 8'-11" | 8'-5" | 8'-0" | |
| 3½" x 7" | 3' | 21'-8" | 20'-2" | 19'-1" | 18'-1" | 17'-4" | 16'-11" | 15'-9" | 14'-11" | 14'-2" | 13'-7" |
| | 4' | 19'-7" | 18'-2" | 17'-2" | 16'-4" | 15'-8" | 15'-2" | 14'-2" | 13'-5" | 12'-9" | 12'-3" |
| | 5' | 18'-0" | 16'-9" | 15'-10" | 15'-1" | 14'-6" | 14'-0" | 13'-1" | 12'-4" | 11'-9" | 11'-3" |
| | 6' | 16'-10" | 15'-9" | 14'-10" | 14'-2" | 13'-7" | 13'-0" | 12'-2" | 11'-6" | 11'-0" | 10'-6" |
| | 8' | 15'-2" | 14'-2" | 13'-5" | 12'-9" | 12'-3" | 11'-8" | 10'-11" | 10'-4" | 9'-10" | 9'-5" |
| | 10' | 13'-11" | 13'-0" | 12'-4" | 11'-9" | 11'-3" | 10'-8" | 10'-0" | 9'-5" | 9'-0" | 8'-8" |
| 5¼" x 5¼" | 3' | 18'-7" | 17'-4" | 16'-4" | 15'-7" | 14'-10" | 14'-6" | 13'-6" | 12'-9" | 12'-2" | 11'-8" |
| | 4' | 16'-10" | 15'-7" | 14'-9" | 14'-0" | 13'-5" | 13'-1" | 12'-2" | 11'-6" | 10'-11" | 10'-6" |
| | 5' | 15'-5" | 14'-5" | 13'-7" | 13'-0" | 12'-5" | 12'-0" | 11'-2" | 10'-7" | 10'-1" | 9'-8" |
| | 6' | 14'-6" | 13'-6" | 12'-9" | 12'-2" | 11'-7" | 11'-2" | 10'-5" | 9'-11" | 9'-5" | 9'-0" |
| | 8' | 13'-0" | 12'-2" | 11'-5" | 10'-11" | 10'-6" | 10'-0" | 9'-4" | 8'-10" | 8'-5" | 8'-1" |
| | 10' | 11'-11" | 11'-2" | 10'-6" | 10'-0" | 9'-8" | 9'-1" | 8'-6" | 8'-1" | | |
| 5¼" x 7" | 3' | 25'-0" | 23'-3" | 21'-11" | 20'-10" | 20'-0" | 19'-7" | 18'-3" | 17'-3" | 16'-4" | 15'-8" |
| | 4' | 22'-7" | 21'-0" | 19'-10" | 18'-11" | 18'-0" | 17'-8" | 16'-6" | 15'-7" | 14'-9" | 14'-2" |
| | 5' | 20'-11" | 19'-5" | 18'-4" | 17'-5" | 16'-8" | 16'-4" | 15'-2" | 14'-4" | 13'-8" | 13'-1" |
| | 6' | 19'-7" | 18'-2" | 17'-2" | 16'-4" | 15'-8" | 15'-2" | 14'-2" | 13'-5" | 12'-9" | 12'-3" |
| | 8' | 17'-7" | 16'-5" | 15'-6" | 14'-9" | 14'-2" | 13'-8" | 12'-9" | 12'-0" | 11'-6" | 11'-0" |
| | 10' | 16'-3" | 15'-2" | 14'-4" | 13'-7" | 13'-1" | 12'-6" | 11'-8" | 11'-1" | 10'-7" | 10'-2" |
| 7" x 7" | 3' | 26'-0" | 25'-8" | 24'-2" | 23'-0" | 22'-0" | 21'-8" | 20'-2" | 19'-0" | 18'-1" | 17'-4" |
| | 4' | 25'-0" | 23'-3" | 21'-11" | 20'-10" | 20'-0" | 19'-7" | 18'-3" | 17'-3" | 16'-4" | 15'-8" |
| | 5' | 23'-1" | 21'-6" | 20'-4" | 19'-4" | 18'-6" | 18'-1" | 16'-10" | 15'-11" | 15'-2" | 14'-6" |
| | 6' | 21'-8" | 20'-2" | 19'-1" | 18'-1" | 17'-4" | 16'-11" | 15'-9" | 14'-11" | 14'-2" | 13'-7" |
| | 8' | 19'-7" | 18'-2" | 17'-2" | 16'-4" | 15'-8" | 15'-2" | 14'-2" | 13'-5" | 12'-9" | 12'-3" |
| | 10' | 18'-0" | 16'-9" | 15'-10" | 15'-1" | 14'-6" | 14'-0" | 13'-1" | 12'-4" | 11'-9" | 11'-3" |

NOTES:

- Solid Column design as per NBCC 2015 and CSA O86-14.
- Maximum opening height is 75% of the column height or 10 feet, whichever is lower.
- Table assumes the followings:
 - specified compression strength perpendicular to grain for plate of 769 psi.
 - wall tributary width (from roof) ≤ 18'-0" (including a 2'-0" overhang).
 - roof slope = 12/12
 - roof standard dead load = 10 psf
 - roof standard live load = 10 psf
 - roof snow load ≤ 50 psf
 - wind load is acting on the face of the wall.
- Maximum factored vertical loads are shown on page 21.

Multiple Ply Stud Connections



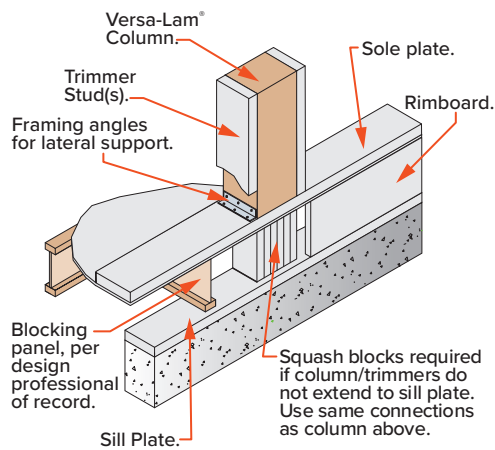
| Thickness/ ply (in) | Number of plies | Fastener type | Fastener diameter (in) | Fastener length (in) | Min. end distance (in) | Min. edge distance (in) |
|------------------------|-----------------------|---------------------------|------------------------------|-------------------------|------------------------------|-------------------------------|
| 1½ | 2 | Common Nail 3" (10d) | 0.148 | 3 | 4.0 | 2.0 |
| | | SDS ¼ x 3 | 0.250 | | | |
| | 3 | Common Nail 4½" (30d) | 0.207 | 4½ | | |
| | | SDS ¼ x 4½ | 0.250 | | | |
| | 4 | Common Nail 6" (60d) | 0.263 | 6 | | |
| | | SDS ¼ x 6 | 0.250 | | | |
| 1¾ | 2 | Common Nail 3½"(16d) | 0.162 | 3½ | | |
| | | SDS ¼ x 3 ½ | 0.250 | | | |
| | | 3¾" TrussLok | 0.228 | 3¾ | | |
| | | SDW 22338 | 0.220 | | | |
| | 3 | Common Nail 5"(40d) | 0.225 | 5 | | |
| | | 5" TrussLok | 0.228 | | | |
| | | SDW 22500 | 0.220 | | | |
| | 4 | ½" dia. Bolts | 0.500 | 7 | | |
| | | 6¾" TrussLok | 0.228 | | | |
| | | SDW 22634 | 0.220 | | | |
| | | SDS ¼ x 6 (on both sides) | 0.250 | | | |
| | | 6 | 6 | | | |

NOTE:

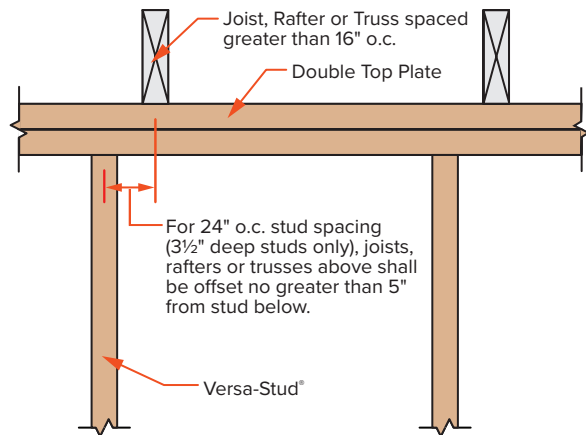
The number of rows of fasteners should be as follows:

| Stud/ column depth | Rows of fasteners (staggered) |
|--------------------------|-------------------------------------|
| 3½" | 1 |
| 5½" | 2 |
| 7¼" | 2 |
| 9¼" | 3 |
| 9½" | 3 |
| 11¼" | 3 |
| 11⅞" | 3 |
| 14" | 4 |

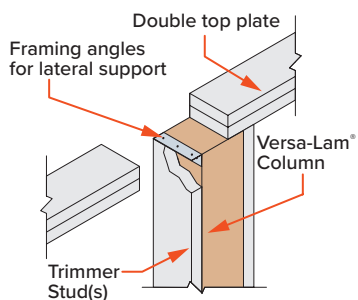
Column to Bottom Plate



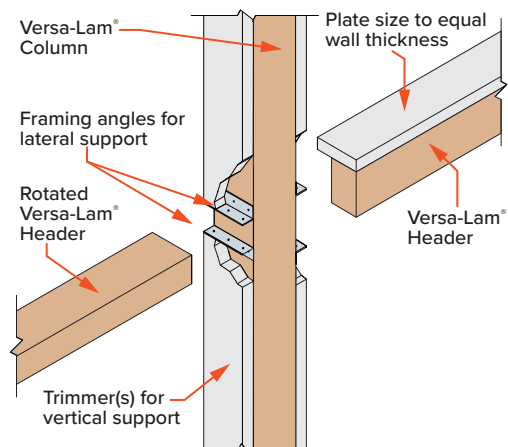
3½" Studs - 24" o.c.



Column to Top Plate



Head to Column



| Wind load (psf) | Maximum Factored Uplift Forces (for connectors), (lbs) | | | | | | | | |
|-----------------|--|-----|-----|-------|-------|-------|-------|-------|-------|
| | Stud/Column Tributary Width (in) | | | | | | | | |
| | 12 | 16 | 24 | 36 | 48 | 60 | 72 | 96 | 120 |
| 20 | 37 | 50 | 75 | 112 | 149 | 186 | 224 | 298 | 373 |
| 25 | 126 | 168 | 253 | 379 | 505 | 632 | 758 | 1 011 | 1 264 |
| 30 | 215 | 287 | 431 | 646 | 862 | 1 077 | 1 293 | 1 724 | 2 155 |
| 35 | 305 | 406 | 609 | 914 | 1 218 | 1 523 | 1 827 | 2 437 | 3 046 |
| 40 | 394 | 525 | 787 | 1 181 | 1 575 | 1 968 | 2 362 | 3 149 | 3 937 |

* Maximum Factored Uplift Forces were calculated based on the following conditions:

- roof slope = 12/12
- wall tributary width (from the roof) ≤ 18 ft. (including the 2 ft. overhang)
- roof standard dead load = 10 psf
- roof standard live load = 10 psf
- roof snow load ≤ 50 psf

| Height (ft) | Base and Top Factored Wind Reactions (for connectors) acting on the face of the wall | | | | | | | | |
|-------------|--|-----|-----|-------|-------|-------|-------|-------|-------|
| | 20 psf Wind Load | | | | | | | | |
| | Stud/Column Tributary Width (in) | | | | | | | | |
| | 12 | 16 | 24 | 36 | 48 | 60 | 72 | 96 | 120 |
| 8 | 112 | 149 | 224 | 336 | 448 | 560 | 672 | 896 | 1 120 |
| 10 | 140 | 187 | 280 | 420 | 560 | 700 | 840 | 1 120 | 1 400 |
| 12 | 168 | 224 | 336 | 504 | 672 | 840 | 1 008 | 1 344 | 1 680 |
| 14 | 196 | 261 | 392 | 588 | 784 | 980 | 1 176 | 1 568 | 1 960 |
| 16 | 224 | 299 | 448 | 672 | 896 | 1 120 | 1 344 | 1 792 | 2 240 |
| 18 | 252 | 336 | 504 | 756 | 1 008 | 1 260 | 1 512 | 2 016 | 2 520 |
| 20 | 280 | 373 | 560 | 840 | 1 120 | 1 400 | 1 680 | 2 240 | 2 800 |
| 22 | 308 | 411 | 616 | 924 | 1 232 | 1 540 | 1 848 | 2 464 | 3 080 |
| 24 | 336 | 448 | 672 | 1 008 | 1 344 | 1 680 | 2 016 | 2 688 | 3 360 |
| 26 | 364 | 485 | 728 | 1 092 | 1 456 | 1 820 | 2 184 | 2 912 | 3 640 |

For the other wind loads, multiply the factored reaction value shown in the table by the following factors:

- 25 psf = 1.25
- 30 psf = 1.5
- 35 psf = 1.75
- 40 psf = 2.0

| Stud/Column Tributary Width | Factored Vertical Forces, (lbs) |
|-----------------------------|---------------------------------|
| 12" | 1 668 |
| 16" | 2 224 |
| 24" | 3 336 |
| 3' | 5 005 |
| 4' | 6 673 |
| 5' | 8 341 |
| 6' | 10 009 |
| 8' | 13 346 |
| 10' | 16 682 |

* Factored Vertical/Axial Forces were calculated based on the following conditions:

- roof slope = 12/12
- wall tributary width (from the roof) ≤ 18 ft. (including the 2 ft. overhang)
- roof standard dead load = 10 psf
- roof standard live load = 10 psf
- roof snow load ≤ 50 psf

FRAMING ANGLES (Simpson Strong-Tie)

| Model No. | Dimensions | | | Stud depth | Nailing | | Factored Lateral Resistance* ($K_D = 1.15$) | |
|--------------|------------|------|------|------------|-----------------------|-----------------|---|-----|
| | W1 | W2 | L | | Base | Stud/Column | F1 | F2 |
| | (in) | (in) | (in) | | | | (lbs) | |
| A23 | 2 | 1½ | 2¾ | 3½ | 4 - (10d) x 1½" | 4 - (10d) x 1½" | 815 | 715 |
| A34 | 1⅞ | 1⅞ | 2½ | 3½ | 4 - (8d) x 1½" | 4 - (8d) x 1½" | 665 | 640 |
| A35 | 1⅞ | 1⅞ | 4½ | 5¼, 5½ | 6 - (8d) x 1½" | 6 - (8d) x 1½" | 955 | 920 |
| L30 | 2⅜ | 1⅜ | 3 | 3½ | 2 - 3" (10d) | 2 - 3" (10d) | 480 | |
| L50 | 2⅜ | 1⅜ | 5 | 5¼, 5½ | 3 - 3" (10d) | 3 - 3" (10d) | 720 | |
| L70 | 2⅜ | 1⅜ | 7 | 7, 7¼ | 4 - 3" (10d) | 4 - 3" (10d) | 960 | |
| L90 | 2⅜ | 1⅜ | 9 | 9¼, 9½ | 5 - 3" (10d) | 5 - 3" (10d) | 1200 | |
| LS30 | 2¼ | 2¼ | 3⅜ | 3½ | 3 - 3" (10d) | 3 - 3" (10d) | 555 | |
| LS50 | 2¼ | 2¼ | 4⅞ | 5¼, 5½ | 4 - 3" (10d) | 4 - 3" (10d) | 890 | |
| LS70 | 2¼ | 2¼ | 6⅜ | 7, 7¼ | 5 - 3" (10d) | 5 - 3" (10d) | 1090 | |
| LS90 | 2¼ | 2¼ | 7⅞ | 9¼ | 6 - 3" (10d) | 6 - 3" (10d) | 1330 | |
| Heavy Angles | | | | | | | | |
| HL35 | ¾ | ¾ | 5 | 5¼, 5½ | 4 bolts (½" diameter) | | Connectors are not load rated. Contact Simpson Strong-Tie for more information. | |
| HL43 | ¾ | ¾ | 3 | 3½ | 2 bolts (¾" diameter) | | | |
| HL46 | ¾ | ¾ | 6 | 7, 7¼ | 4 bolts (¾" diameter) | | | |

*Factored resistance is acting on the face of the stud/column/wall

FRAMING ANGLES (USP)

| Model No. | Dimensions | | | Stud depth | Nailing | | Factored Lateral Resistance* ($K_D = 1.15$) | |
|------------|------------|------|------|------------|-----------------|------------------|---|------|
| | W1 | W2 | L | | Base | Stud/Column | F1 | F2 |
| | (in) | (in) | (in) | | | | (lbs) | |
| A3 | 1⅞ | 1⅞ | 2¾ | 3½ | 4 - (10d) x 1½" | 4 - (10d) x 1½" | 1115 | 1130 |
| MP3 | 2¼ | 2¼ | 3⅜ | 3½ | 3 - 3" (10d) | 3 - 3" (10d) | 715 | |
| AC5 | 1⅞ | 2⅜ | 4⅞ | 5¼, 5½ | 3 - 3" (10d) | 3 - 3" (10d) | 1145 | 1070 |
| MP5 | 2¼ | 2¼ | 4⅞ | 5¼, 5½ | 4 - 3" (10d) | 4 - 3" (10d) | 1010 | |
| AC7 | 1⅞ | 2⅜ | 6⅞ | 7, 7¼ | 4 - 3" (10d) | 4 - 3" (10d) | 1285 | 1535 |
| MP7 | 2¼ | 2¼ | 5⅞ | 7, 7¼ | 5 - 3" (10d) | 5 - 3" (10d) | 1315 | |
| MP9 | 2¼ | 2¼ | 6⅞ | 7, 7¼ | 6 - 3" (10d) | 6 - 3" (10d) | 1410 | |
| AC9 | 1⅞ | 2⅜ | 8⅞ | 9¼, 9½ | 5 - 3" (10d) | 5 - 3" (10d) | 2135 | 1535 |
| JA3 | 2½ | 2½ | 3 | 3½ | 4 - 3½" (16d) | 4 - (10d) x 1½" | 1108 | 1005 |
| JA5 | 2½ | 2½ | 5 | 5¼, 5½ | 6 - 3½" (16d) | 6 - (10d) x 1½" | 1790 | 1915 |
| JA7 | 2½ | 2½ | 7 | 7, 7¼ | 8 - 3½" (16d) | 8 - (10d) x 1½" | 3517 | 3064 |
| JA9 | 2½ | 2½ | 9 | 9¼, 9½ | 10 - 3½" (16d) | 10 - (10d) x 1½" | 4333 | 3102 |

*Factored resistance is acting on the face of the stud/column/wall

| Stud Plate Ties (Simpson Strong-Tie) | | | | Stud Plate Ties (USP) | | |
|--------------------------------------|------------------|--|-------------------|-----------------------|------------------|--|
| Model No. | Nailing | Factored Uplift Resistance ($K_D = 1.15$) (lb) | | Model No. | Nailing | Factored Uplift Resistance ($K_D = 1.15$) (lb) |
| | | Double top plate | Single sill plate | | | |
| SSP | 7 - (10d) x 1½" | 570 | 535 | RSPT4 | 8 - (8d) x 1½" | 585 |
| | 7 - 3" (10d) | 710 | 690 | RSPT6 | 8 - (10d) x 1½" | 740 |
| DSP | 14 - (10d) x 1½" | 1,270 | 890 | RSPT6-2 | 14 - (10d) x 1½" | 1,115 |
| | 14 - 3" (10d) | 1,550 | 985 | SPT22 | 8 - 3" (10d) | 755 |
| RSP4 | 8 - (8d) x 1½" | 670 | 985 | SPT24 | 12 - 3" (10d) | 1,125 |
| SPH4 | 12 - (10d) x 1½" | 2,450 | 2,010 | SPTH4 | 12 - (10d) x 1½" | 1,275 |
| SP1 | 10 - 3" (10d) | | 810 | SPTH6 | 12 - (10d) x 1½" | 1,275 |
| SP2 | 12 - 3" (10d) | 1,220 | | | | |

Header Clips

| Header Clips/Hangers (Simpson Strong-Tie) | | | |
|---|------------|----------------|--|
| Model No. | Width (in) | Nailing | Factored Vertical/Axial Resistance ($K_D = 1.00$) (lb) |
| FC4 | 3¾" | 8 - 3½" (16d) | 1415 |
| FC6 | 5½" | 10 - 3½" (16d) | 1415 |
| HH4 | 3½" | 13 - 3½" (16d) | 1125 |
| HH6 | 5½" | 18 - 3½" (16d) | 1690 |

| Header Clips/Hangers (USP) | | | |
|----------------------------|------------|----------------|--|
| Model No. | Width (in) | Nailing | Factored Vertical/Axial Resistance ($K_D = 1.00$) (lb) |
| SFC6 | 5½" | 10 - 3½" (16d) | 775 |
| HH44 | 3¾" | 13 - 3½" (16d) | 850 |
| HH66 | 5½" | 18 - 3½" (16d) | 1365 |

| Nail Factored Lateral Resistance | | | | | |
|----------------------------------|--------------------|------------------|----------------------------------|--|--|
| Nail Type | Nail Diameter (in) | Nail Length (in) | Factored lateral resistance (lb) | End grain factored lateral resistance (lb) | Toe-nailing factored lateral resistance (lb) |
| 2½" (8d) Spiral Nail | 0.110 | 2½" | 108 | 73 | 90 |
| 2½" (8d) Common Nail | 0.128 | 2½" | 144 | 96 | 119 |
| 3" (10d) Spiral Nail | 0.132 | 3" | 152 | 102 | 127 |
| 3" (10d) Common Nail | 0.148 | 3" | 188 | 126 | 156 |
| ¾" Pneumatic Gun Nail | 0.122 | ¾" | 132 | 88 | 109 |
| ¾" (12d) Common Nail | 0.148 | ¾" | 188 | 126 | 156 |
| ¾" (16d) Spiral Nail | 0.152 | ¾" | 198 | 132 | 164 |
| ¾" (16d) Common Nail | 0.162 | ¾" | 222 | 149 | 184 |

NOTES:

- Nail factored lateral resistance as per CSA O86-14 section 12.9.4.
- Nail factored lateral resistance based upon a load duration factor of 1.00 and an equivalent specific gravity of 0.5.
- Factored lateral resistance based upon a side and main member thickness of 1½".

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