Boise Cascade®
ENGINEERED WOOD PRODUCTS

WESTERN INSTALLATION GUIDE

BCI® Joist, Versa-Lam® LVL, Versa-Rim®, Boise Cascade® Rimboard OSB and Versa-Strand®

Lifetime Guaranteed Quality and Performance

Boise Cascade warrants its BCI® Joist, Versa-Lam®, and ALLJOIST® products to comply with our specifications, to be free from defects in material and workmanship, and to meet or exceed our performance specifications for the normal and expected life of the structure when correctly stored, installed and used according to our Installation Guide.

Boise Cascade has not evaluated the effects of any pressure or topical applications or treatments on its BCI® Joist, Versa-Lam®, and ALLJOIST® products.

For information about Boise Cascade's engineered wood products, including sales terms and conditions, warranties and disclaimers **visit our website at www.BCewp.com**

To locate your nearest Boise Cascade Engineered Wood Products distributor, call **1-800-232-0788**

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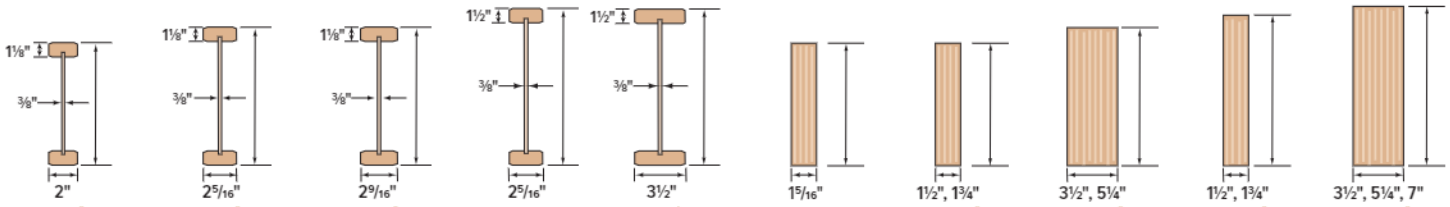
WIG book 07/2014 rev. 11/16/2018

Western Product Profile



BCI® 5000 1.7	BCI® 6000 1.8	BCI® 6500 1.8	BCI® 90 2.0	BCI® 90 2.0	Versa-Lam® LVL 1.5E 1800	Versa-Lam® LVL 1.8E 2400	Versa-Lam® LVL 1.8E 2650	Versa-Lam® LVL 2.1E 2800	Versa-Lam® LVL 2.1E 3100
9½", 11⅞", 14", 16"	9½", 11⅞", 14", 16"	9½", 11⅞", 14", 16"	11⅞", 14", 16", 18"	11⅞", 14", 16", 18", 20"	9½" to 16"	9½" to 16"	9½" to 16"	5½" to 18"	5½" to 24"

Product depths offered are listed below the product name.

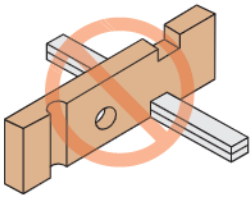
Some products may not be available in all markets. Contact your Boise Cascade EWP representative for availability.

BCI® and Versa-Lam® LVL products shall be installed in dry-use applications only, per their respective ICC-ES®/APA® joint ESR evaluation reports.

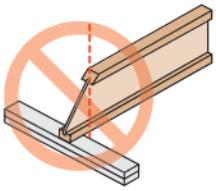
WARNING

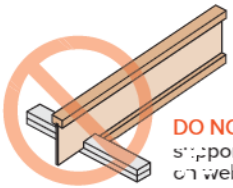
THE FOLLOWING USES ARE NOT ALLOWED

DO NOT notch or drill beams without prior approval from Boise Cascade EWP Engineering.



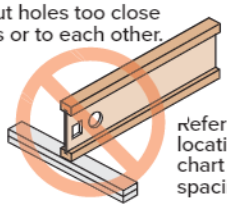
DO NOT cut beyond inside edge of bearing.





DO NOT support joist on web

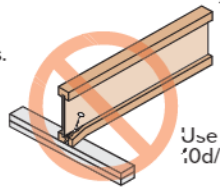
DO NOT cut holes too close to supports or to each other.



Refer to hole location and sizing chart for size and spacing.

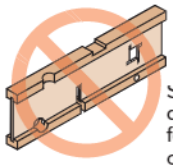
DO NOT nail closer than 1½" from end of joist

DO NOT use 16d common nails.



Use 8d nails or 10d/16d box nails.

DO NOT cut or notch flange

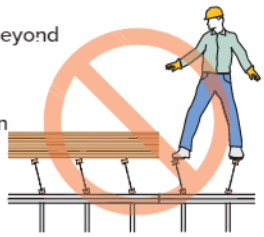


See roof and floor details this sheet, for allowed cutting of flange.

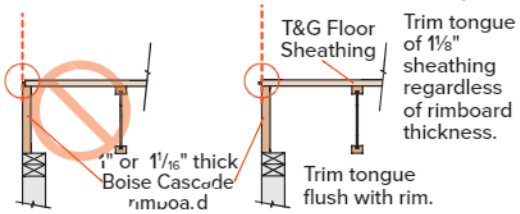
DO NOT walk on joist until proper bracing is in place.

DO NOT load joist beyond design capacity

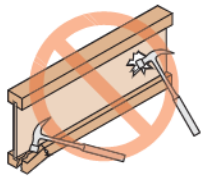
DO NOT stack building materials on unbraced joists.



DO NOT install tongue of floor sheathing flush with either 1" or 1⁄16" thick Boise Cascade® rimboard (tongue OK with 1⅛" and thicker Boise Cascade® rimboard).



DO NOT hammer on web unless removing knockout holes.



DO NOT hammer on flange.

SAFETY WARNING

DO NOT ALLOW WORKERS ON BCI® JOISTS UNTIL ALL HANGERS, BCI® RIM JOISTS, RIM BOARDS, BCI® BLOCKING PANELS, X-BRACING AND TEMPORARY 1x4 STRUT LINES ARE INSTALLED AS SPECIFIED BELOW. SERIOUS ACCIDENTS CAN RESULT FROM INSUFFICIENT ATTENTION TO PROPER BRACING DURING CONSTRUCTION. ACCIDENTS CAN BE AVOIDED UNDER NORMAL CONDITIONS BY FOLLOWING THESE GUIDELINES:

- Build a braced end wall at the end of the bay, or permanently install the first eight feet of BCI® Joists and the first course of sheathing. As an alternate, temporary sheathing may be nailed to the first four feet of BCI® Joists at the end of the bay
- All hangers, BCI® rim joists, rim boards, BCI® blocking panels, and x-bracing must be completely installed and properly nailed as each BCI® Joist is set.
- Install temporary 1x4 strut lines at no more than eight feet on center as additional BCI® Joists are set. Nail the strut lines to the sheathed area, or braced end wall, and to each BCI® Joist with two 8d nails.
- The ends of cantilevers must be temporarily secured by strut lines on both the top and bottom flanges.
- Straighten the BCI® Joists to within ½ inch of true alignment before attaching strut lines and sheathing
- Remove the temporary strut lines only as required to install the permanent sheathing.
- Failure to install temporary bracing may result in sideways buckling or roll over under light construction loads.
- Do not stack construction materials (sheathing, drywall, etc.) in the middle of BCI® Joist spans, contact Boise Cascade EWP engineering for proper storage and shoring information.

BUILDING CODE EVALUATION REPORTS:

BCI® JOISTS BLDG CODE EVALUATION REPORTS

- ICC-ES®/APA® ESR-1336 (IBC, IRC)

VERSA-LAM® LVL BLDG CODE EVALUATION REPORTS

- ICC-ES®/APA® ESR-1040 (IBC, IRC)

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About Floor Performance

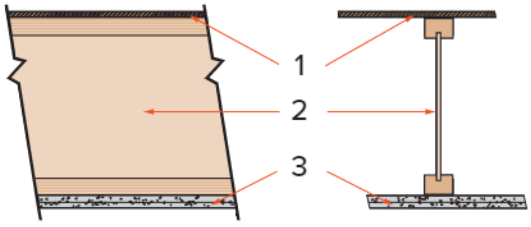
Homeowner's expectations and opinions vary greatly due to the subjective nature of rating a new floor. Communication with the ultimate end user to determine their expectation is critical. ***Vibration*** is usually the cause of most complaints. Installing lateral bridging may help, however, squeaks may occur if not installed properly. Spacing the joists closer together does little to affect the perception of the floor's performance. The most common methods used to increase the performance and reduce vibration of wood floor systems is to ***increase the joist depth, limit joist deflections, glue and screw a thicker, tongue-and-groove subfloor, install the joists vertically plumb with level-bearing supports, and install a direct-attached ceiling to the bottom flanges of the joists.***

The floor span tables listed below offer three very different performance options, based on performance requirements of the homeowner.

Joist Depth	BCI® Joist Series	★★★THREE STAR★★★ Live Load deflection limited to L/480: The common industry and design community standard for residential floor joists, **33% stiffer than L/360 code minimum.** However, floor performance may still be an issue in certain applications, especially with 9½" and 11⅞" deep joists without a direct attached ceiling.					★★★★FOUR STAR★★★★ **Live Load deflection limited to L/960+:** In addition to providing a floor that is **100% stiffer than the three star floor**, field experience has been incorporated into the values to provide a floor with a premium performance level for the more discriminating homeowner.					CAUTION ★MINIMUM STIFFNESS ALLOWED BY CODE★ CAUTION **Live Load deflection limited to L/360:** Floors that **meet the minimum building code** L/360 criteria are structurally sound to carry the specified loads; however, there is a much higher risk of floor performance issues. This table should only be used for applications where floor performance is not a concern.				
		12" o.c.	16" o.c.	19.2" o.c.	24" o.c.	32" o.c.	12" o.c.	16" o.c.	19.2" o.c.	24" o.c.	32" o.c.	12" o.c.	16" o.c.	19.2" o.c.	24" o.c.	32" o.c.
9½"	5000 1.7	17'–1"	15'–1"	14'–3"	13'–9"	12'–0"	11'–6"	11'–6"	10'–0"	10'–0"	9'–6"	18'–11"	17'–0"	15'–3"	13'–1"	12'–0"
	6000 1.8	17'–11"	16'–5"	15'–6"	14'–5"	13'–2"	11'–6"	11'–6"	10'–0"	10'–0"	9'–10"	19'–10"	18'–2"	17'–2"	15'–0"	13'–5"
	6500 1.8	18'–3"	16'–10"	15'–11"	14'–10"	13'–7"	11'–6"	11'–6"	10'–0"	10'–0"	10'–0"	20'–3"	18'–8"	17'–5"	16'–5"	14'–3"
11⅞"	5000 1.7	20'–2"	18'–5"	17'–3"	16'–1"	13'–11"	15'–6"	14'–4"	13'–3"	11'–7"	11'–3"	21'–3"	19'–4"	17'–7"	15'–9"	13'–11"
	6000 1.8	21'–3"	19'–5"	18'–4"	17'–1"	14'–10"	15'–6"	15'–1"	14'–3"	13'–3"	12'–0"	22'–6"	21'–6"	20'–0"	17'–1"	14'–10"
	6500 1.8	21'–11"	20'–0"	18'–11"	17'–7"	14'–10"	16'–0"	15'–7"	14'–9"	13'–8"	12'–3"	24'–3"	22'–2"	20'–11"	18'–10"	14'–10"
	60 2.0	23'–3"	21'–3"	20'–0"	18'–8"	16'–4"	18'–0"	16'–7"	15'–7"	14'–6"	13'–2"	25'–5"	23'–6"	22'–3"	20'–5"	16'–4"
	90 2.0	26'–3"	24'–0"	22'–6"	21'–1"	19'–2"	19'–0"	18'–2"	17'–6"	16'–2"	14'–8"	28'–0"	26'–6"	25'–0"	23'–2"	19'–4"
14"	5000 1.7	22'–1"	21'–0"	19'–2"	17'–2"	13'–11"	18'–0"	16'–5"	15'–6"	14'–5"	13'–1"	24'–4"	21'–0"	19'–2"	17'–2"	13'–11"
	6000 1.8	24'–2"	22'–2"	21'–0"	19'–6"	15'–5"	18'–1"	17'–1"	16'–3"	15'–2"	13'–9"	26'–9"	25'–1"	23'–10"	19'–6"	15'–5"
	6500 1.8	24'–10"	22'–9"	21'–5"	20'–0"	15'–5"	19'–5"	17'–9"	16'–8"	15'–6"	14'–1"	27'–6"	25'–1"	24'–1"	20'–6"	15'–5"
	60 2.0	26'–5"	24'–2"	22'–9"	21'–5"	18'–1"	20'–8"	18'–10"	17'–9"	16'–5"	14'–11"	29'–3"	26'–8"	25'–3"	21'–10"	18'–4"
	90 2.0	29'–9"	27'–1"	25'–7"	23'–8"	20'–7"	22'–3"	21'–1"	19'–9"	18'–4"	16'–7"	32'–10"	30'–0"	28'–3"	26'–0"	20'–9"
16"	6000 1.8	26'–9"	24'–5"	23'–1"	21'–10"	18'–9"	20'–11"	19'–1"	18'–0"	16'–7"	15'–2"	29'–6"	26'–6"	25'–4"	23'–0"	18'–9"
	6500 1.8	27'–3"	25'–1"	23'–8"	21'–1"	18'–9"	21'–6"	19'–7"	18'–5"	17'–0"	15'–7"	30'–4"	28'–1"	26'–6"	24'–1"	18'–9"
	60 2.0	29'–3"	26'–8"	25'–2"	24'–10"	18'–4"	23'–10"	21'–10"	20'–7"	19'–0"	16'–4"	32'–4"	29'–6"	27'–4"	24'–10"	18'–4"
	90 2.0	32'–11"	29'–11"	28'–2"	26'–1"	19'–7"	25'–8"	23'–4"	21'–11"	20'–3"	18'–4"	36'–4"	33'–2"	31'–3"	26'–2"	19'–7"
18"	90 2.0	35'–11"	32'–8"	30'–9"	28'–7"	23'–10"	28'–1"	25'–6"	24'–11"	23'–2"	20'–0"	39'–8"	36'–2"	34'–7"	31'–7"	23'–10"
20"	90 2.0	38'–10"	35'–4"	33'–4"	30'–1"	24'–8"	30'–4"	27'–6"	26'–11"	24'–0"	20'–8"	42'–11"	39'–1"	36'–10"	32'–1"	24'–8"

- Span table is based on a residential floor load of 40 psf live load and 10 psf dead load (12 psf dead load for 90 2.0 joists).
- Span values assume 23/32" minimum plywood/OSB rated sheathing is glued and nailed to joists for composite action (joists spaced at 32" o.c. require sheathing rated for such spacing - 7/8" plywood/OSB).
- Span values represent the most restrictive of simple or multiple span applications. Analyze multiple span joists with BC Calc® sizing software if the length of any span is less than half the length of an adjacent span.
- Span values are the maximum allowable clear distance between supports. Table values assume minimum bearing lengths without web stiffeners for joist depths of 16" inches and less (18" & 20" joists require web stiffeners at all bearing locations).
- Floor tile will increase dead load and may require specific deflection limits, contact Boise Cascade EWP Engineering for further information.
- This table was designed to apply to a broad range of applications. It may be possible to exceed the limitations of this table by analyzing a specific application with the BC Calc® sizing software.

One-Hour Fire Resistance Assembly



See the US version of the Boise Cascade Fire Design & Installation Guide for specific assembly information and other fire resistive options or contact your local Boise Cascade representative.

ICC-ES®/APA® ESR-1336

FIRE ASSEMBLY COMPONENTS

1. Min. 23/32" thick tongue and groove sheathing (exterior glue), installed with long edge perpendicular to joist length, staggered one joist spacing with adjacent sheets, and glued to joists with construction adhesive.
2. BCI® joists at 24" o.c. or less
3. Two layers 5/8" Type X or two layers ½" Type C gypsum board, installed per Figures 2 or 3 of ICC-ES/APA® ESR-1336.

SOUND ASSEMBLY COMPONENTS

When constructed with resilient channels

- Add carpet & pad to fire assembly: STC=54 IIC=68 or
- Add 3½" glass fiber insulation to fire assembly: STC=55 IIC=46 or
- Add an additional layer of minimum 5/8" sheathing and 9½" glass fiber insulation to fire assembly: STC=61 IIC=50

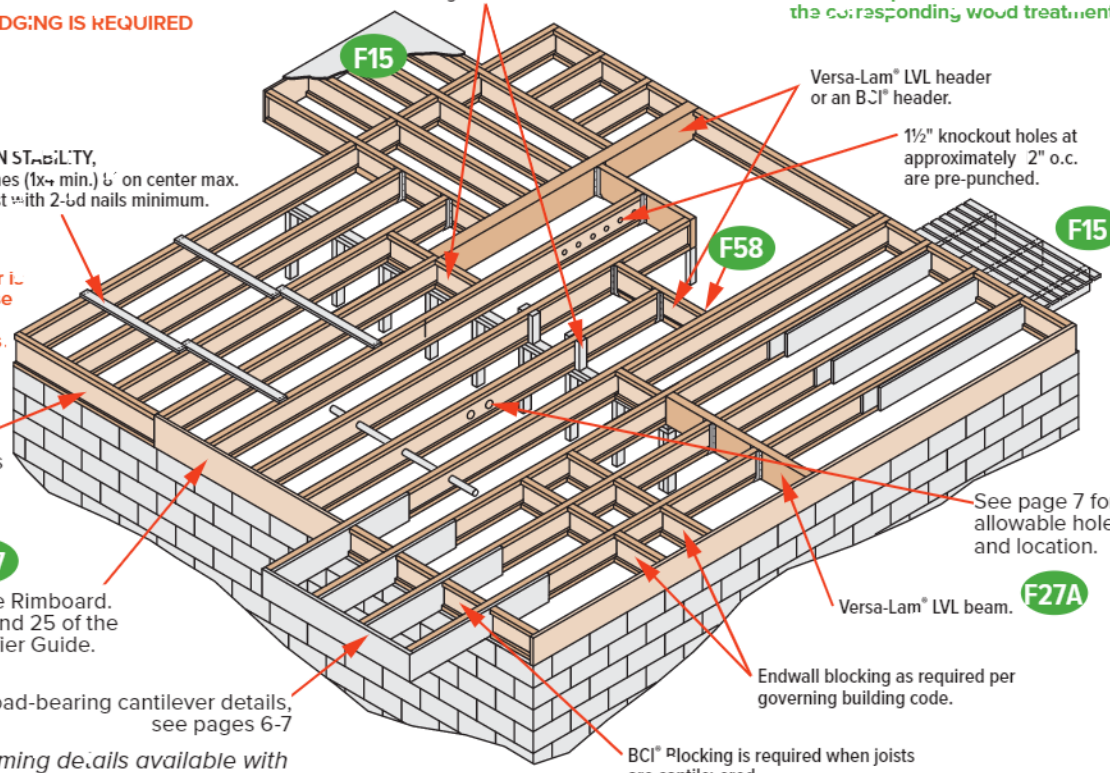
BCI® Joists — Floor Framing

NOTE
The illustration below is showing several suggested applications for the Boise Cascade EWP products. It is not intended to show an actual house under construction.

NO MIDSPAN BRIDGING IS REQUIRED FOR BCI® JOISTS

F06 F09
BCI® blocking or 2x4 "squash" block on each side required when supporting a load-bearing wall above.

When installing Boise Cascade EWP products with treated wood, use only connectors/fasteners that are approved for use with the corresponding wood treatment.

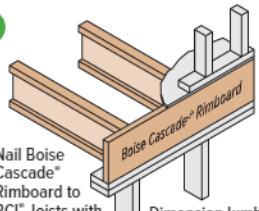


Additional floor framing details available with BC Framer® software

BCI® Joists — Floor Framing Details

END BEARING DETAILS

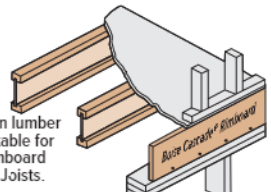
F07



Nail Boise Cascade® Rimboard to BCI® Joists with 8d nail into each flange.

Dimension lumber is not suitable for use as rim board with BCI® Joists.

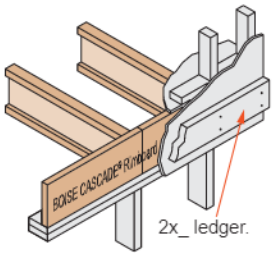
F07A



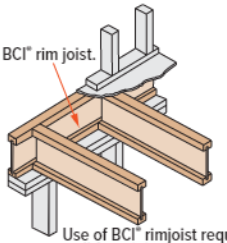
Dimension lumber is not suitable for use as rimboard with BCI® Joists.

Blocking may be required perpendicular to wall, consult design professional of record and/or local building official.

F07B

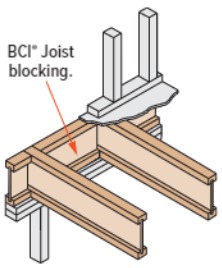


F02

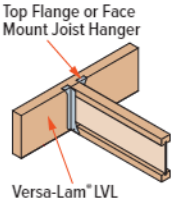


Use of BCI® rimjoist requires 2x6 wall for minimum joist bearing.

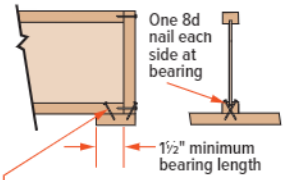
F01



F27A

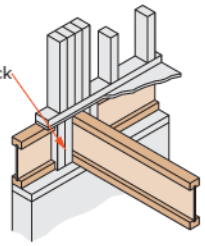


F52

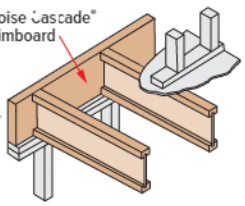


To limit splitting flange, start nails at least 1½" from end. Nails may need to be driven at an angle to limit splitting of bearing plate.

F08



F03

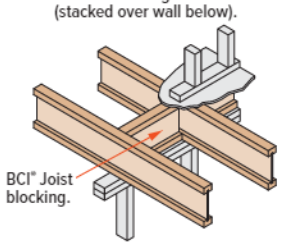


Blocking required underneath braced wall panels and shear walls, consult design professional of record.

INTERMEDIATE BEARING DETAILS

F06

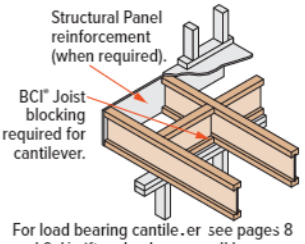
For load bearing wall above (stacked over wall below).



F05

Structural Panel reinforcement (when required).

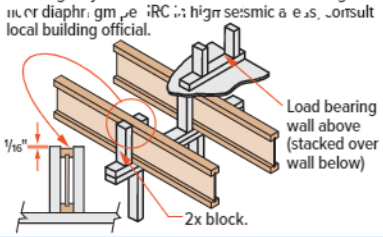
BCI® Joist blocking required for cantilever.



For load bearing cantilever see pages 8 and 9. Uplift on backspan shall be considered in all cantilever designs.

F09

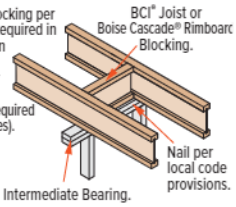
Blocking may be required at intermediate bearings for floor diaphragm per IRC® in high seismic areas, consult local building official.



F28

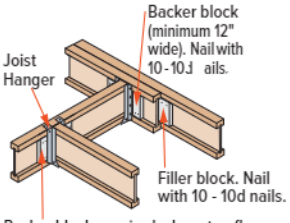
Floor Joist Blocking per IRC® 502.7 Required in seismic design categories D_0 and higher for floor diaphragm (required for all joist types).

BCI® Joist or Boise Cascade® Rimboard Blocking.



Cross bracing OK as blocking only if support below is not a braced wall panel or shear wall and no wall exists above

F10

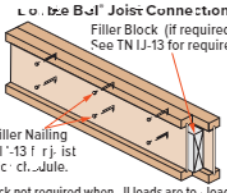


Backer block required where top flange joist hanger load exceeds 250 lbs. Install tight to top flange.

F58

Double BCI® Joist Connection

Filler Block (if required) See TN IJ-13 for requirements.

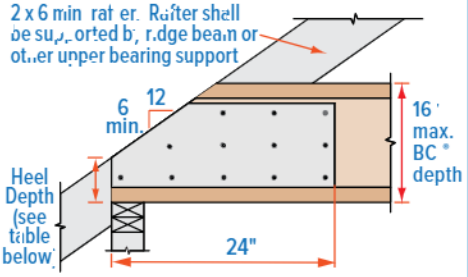


- Filler block not required when all loads are to be loaded and evenly applied to each ply (except BCI® 90 and AJS® 25, 40). Side loads and/or uneven loads require filler block
- See Boise Cascade Technical Note IJ-13 for further information.
- Fasten floor sheathing to rim per diaphragm nailing schedule.

F14

BCI® Joist Slope Cut Reinforcement

Detail below restores original allowable shear/reaction value to cut end of BCI® joist. BCI® Joist shall not be used as a collar or rafter tension tie.



2x blocking required at bearing (not shown for clarity). 3/32" min. plywood/OSB rated sheathing as reinforcement. Install reinforcement with face grain horizontal. Install on both sides of the joist, tight to bottom flange. Leave minimum ¼" gap between reinforcement and bottom of top flange. Apply construction adhesive to contact surfaces and fasten with 3 rows of min. 10d box nails at 6" o.c. Alternate nailing from each side and clinch.

Minimum Heel Depth						
End Wall Bearing	Roof Pitch					
	6/12	7/12	8/12	9/12	10/12	12/12
2 x 4	4⅛"	4⅝"	4¼"	4⅜"	4⅝"	4¼"
2 x 6	3⅛"	3³⁄₁₆"	2⅝"	2¾"	2⅞"	2¼"

LATERAL SUPPORT

- BCI® Joists shall be laterally supported at the ends with hangers, rimboard, BCI® rim joist or blocking panels. BCI® blocking panels or rimboard are required at cantilever supports
- Blocking may be required at intermediate bearings for floor diaphragm per IRC® in high seismic areas, consult local building official.

MINIMUM BEARING LENGTH FOR BCI® JOISTS

- Minimum end bearing: 1½" for all BCI® joists. 3½" is required at cantilever and intermediate supports.
- Longer bearing lengths allow higher reaction values. Refer to the building code evaluation report or the BC Calc® software.

NAILING REQUIREMENTS

- BCI® rim joist, rim board or closure panel to BCI® joist
  - Rims or closure panel 15/16 inches thick and less: 2-8d nails, one each in the top and bottom flange.
  - BCI® 5000 rim joist: 2-10d box nails, one each in the top and bottom flange.
  - BCI® 6000/60 rim joist: 2-16d box nails, one each in the top and bottom flange.
  - BCI® 6500/90 rim joist: Toe-nail top flange to rim joist with 2-10d box nails, one each side of flange.
- BCI® rim joist, rim board or BCI® blocking panel to support:
  - Min. 8d nails @ 6" o.c. per IRC®.
  - Connection per design professional of record's specification for shear transfer.
- BCI® joist to support:
  - 2-8d nails, one on each side of the web, placed 1½ inches minimum from the end of the BCI® Joist to limit splitting.
- Sheathing to BCI® joist:
  - Prescriptive residential floor sheathing nailing requires 8d common nails @ 6" o.c. on edges and 12" o.c. in the field (IRC® Table R602.3(1))
  - See closest allowable nail spacing limits on page 24 for top of diaphragm nailing specified at closer spacing than above. Maximum bracing spacing for full lateral stability: 18" for BCI® 5000, 24" for larger BCI® joist series.
  - 14 gauge staples may be substituted for 8d nails if the staples penetrate at least 1 inch into the joist.
  - Wood screws may be acceptable, contact local building official and/or Boise Cascade EWP Engineering for further information.

BACKER AND FILLER BLOCK DIMENSIONS

Series	Backer Block Thickness	Filler Block Thickness
5000 1.7	¾" or ⅞" wood panels	Two ¾" wood panels or 2 x
6000 1.8	1⅛" or two ½" wood panels	2 x _ + 7/16" or ½" wood panel
6500 1.8	1⅛" or two ⅝" wood panels	2 x _ + ⅝" or ¾" wood panel
60 2.0	1⅛" or two ½" wood panels	2 x _ + 7/16" or ½" wood panel
90 2.0	1½" lumber	Double 2 x lumber

Cut backer and filler blocks to a maximum depth equal to the web depth minus ¼" to avoid a forced fit.

***Detail F 9 Table Double Squash Block Vertical Load [lb/ft]**

Size	Joist Spacing [in]			
	12	16	19.2	24
2x4	4463	3347	2759	2231
2x6	7013	5259	4383	3506

1. Squash blocks are to be in full contact with upper floor and lower wall plate.
2. Capacities shown are for a double squash blocks at each joist, SPF or better.

WEB STIFFENER REQUIREMENTS

- See *Web Stiffener Requirements* on page 7

PROTECT BCI® JOISTS FROM THE WEATHER

- BCI® Joists are intended only for application that will provide permanent protection from the weather. Bundles of product should be covered and stored off of the ground on stickers.

BCI® RIM JOISTS AND BLOCKING

Depth [in]	Series	Vertical Load Capacity (plf)	
		No W.S.(1)	W.S.(2)
9½"	5000 1.7, 6000 1.8, 6500 1.8	2300	N/A
11⅞"	5000 1.7, 6000 1.8, 6500 1.8	2150	N/A
	60 2.0, 90 2.0	2500	N/A
14"	5000 1.7, 6000 1.8, 6500 1.8	2050	N/A
	60 2.0, 90 2.0	2400	N/A
16"	6000 1.8, 6500 1.8	1900	2500
	60 2.0, 90 2.0	2300	2700
18"	60 2.0, 90 2.0	N/A	2700
20"	90 2.0	N/A	2700

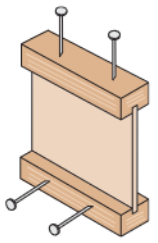
(1) No web stiffener required.
(2) Web stiffeners required at each end of blocking values not applicable for rim joists.
N/A: Not applicable

Closest Allowable Nail Spacing

BCI® Joists — Nail Size		All BCI® Joists			
		Nailing Perpendicular to Glue Line (Wide Face)		Nailing Parallel to Glue Line (Narrow Face)	
		O.C. Spacing [inches]	End of Joist [inches]	O.C. Spacing [inches]	End of Joist [inches]
8d Box	(0.113"ø x 2.5")	6	1½	4	1½
8d Common	(0.131"ø x 2.5")	6	1½	4	3
10d & 12d Box	(0.128"ø x 3", 3.25")	2	1½	4	3
16d Box	(0.135"ø x 3.5")	2	1½	4	3
10d & 12d Common & 16d Sinker	(0.148"ø x 3", 3.25")	3	2	6	4
16d Common	(0.162"ø x 3.5")	3	2	6	4

- If more than one row of nails is used, the rows must be offset at least ½ inch.
- Simpson Strong-Tie A35 connectors may be attached to the side of BCI® 60s and 90s joist flanges only. Use nails as specified by Simpson Strong-Tie; do not attach connectors on both sides of a flange at the same location.

BCI® Joists



Nailing Perpendicular to Glue Lines (Wide Face)

Nailing Parallel to Glue Lines (Narrow Face)

BCI® Joists — Load Bearing Cantilever Details

KEY TO TABLE
0 No Reinforcement Required
WS Web Stiffeners at Supports
1 Web Stiffeners Plus One Reinforcer
2 Web Stiffeners Plus Two Reinforcers
X Use Deeper Joists or Closer Spacing

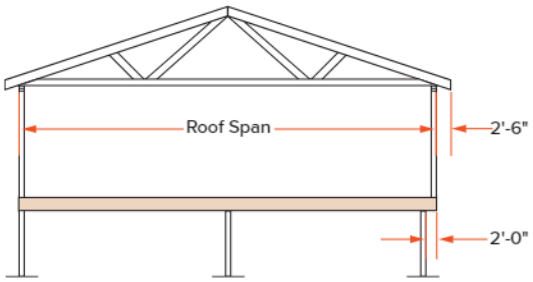
BCI® Joists

Joist Depth [in]	Joist Series	Roof Truss Span [ft]	Roof Total Load [psf]								
			35			45			55		
			Joist Spacing [in]								
			16	19.2	24	16	19.2	24	16	19.2	24
9½"	5000 1.7	24	0	0	0	0	0	X	0	X	X
		26	0	0	0	0	0	X	0	X	X
		28	0	0	X	0	0	X	0	X	X
		30	0	0	X	0	X	X	X	X	X
		32	0	0	X	0	X	X	X	X	X
		34	0	0	X	0	X	X	X	X	X
		36	0	0	X	0	X	X	X	X	X
		38	0		X	X	X	X	X	X	X
		40	0		X	X	X	X	X	X	X
	6000 1.8	24	0	0	0	0	0	0	0	0	X
		26	0	0	0	0	0	0	0	0	X
		28	0	0	0	0	0	1	0	0	X
		30	0	0	0	0	0	X	0	1	X
		32	0	0	0	0	0	X	0	X	X
		34	0	0	0	0	0	X	0	X	X
		36	0	0	WS	0	0	X	0	X	X
		38	0	0	1	0	1	X	0	X	X
		40	0	0	X	0	X	X	1	X	X
	6500 1.8	24	0	0	0	0	0	0	0	0	1
		26	0	0	0	0	0	WS	0	0	X
		28	0	0	0	0	0	1	0	0	X
		30	0	0	0	0	0	1	0	1	X
		32	0	0	0	0	0	X	0	1	X
		34	0	0	0	0	0	X	0	*	X
		36	0	0	WS	0	0	X	0	1	X
		38	0	0		0		X	0	X	X
		40	0	0	1	0	1	X	1	X	X
11⅞"	5000 1.7	24	0	0	0	0	0	WS	0	0	X
		26	0	0	0	0	0	WS	0	0	X
		28	0	0	0	0	0	WS	0	WS	X
		30	0	0	0	0	0	X	0	WS	X
		32	0	0	WS	0	0	X	0	X	X
		34	0	0	WS	0	0	X	0	X	X
		36	0	0	WS	0	WS	X	0	X	X
		38	0	0	1	0	WS	X	WS	X	X
		40	0	0	X	0	X	X	X	X	X
	6000 1.8	24	0	0	0	0	0	0	0	0	1
		26	0	0	0	0	0	0	0	0	1
		28	0	0	0	0	0	WS	0	0	X
		30	0	0	0	0	0	1	0	WS	X
		32	0	0	0	0	0	1	0	*	X
		34	0	0	0	0	0	1	0	1	X
		36	0	0	WS	0	0	X	0	1	X
		38	0	0	WS	0	0	X	0	1	X
		40	0	0	1	0	WS	X	0	1	X
	6500 1.8	24	0	0	0	0	0	0	0	0	1
		26	0	0	0	0	0	WS	0	0	X
		28	0	0	0	0	0	WS	0	0	X
		30	0	0	0	0	0	1	0	1	X
		32	0	0	0	0	0	1	0	WS	X
		34	0	0	0	0	0	1	0	1	X
		36	0	0	WS	0	0	X	0	1	X
		38	0	0	WS	0	0	X	0	1	X
		40	0	0	1	0	WS	X	0	1	X
	60 2.0	24		0	0	0	0	0	0	0	1
		26	0	0	0	0	0	0	0	0	1
		28	0	0	0	0	0	0	0	0	X
		30	0	0	0	0	0	1	0	0	X
		32	0	0	0	0	0	1	0	0	X
		34	0	0	0	0	0	X	0	1	X
		36	0	0	0	0	0	X	0	1	X
		38	0	0	0	0	0	X	0	1	X
		40	0	0	1	0	0	X	0	X	X
	90 2.0	24	0	0	0	0	0	0	0	0	0
		26	0	0	0	0	0	0	0	0	0
		28	0	0	0	0	0	0	0	0	0
		30	0	0	0	0	0	0	0	0	0
		32	0	0	0	0	0	0	0	0	0
		34	0	0	0	0	0	0	0	0	1
		36	0	0	0	0	0	0	0	0	1
		38	0	0	0	0	0	0	0	0	1
		40	0	0	0	0	0	0	0	0	2

Joist Depth [in]	Joist Series	Roof Truss Span [ft]	Roof Total Load [psf]								
			35			45			55		
			Joist Spacing [in]								
			16	19.2	24	16	19.2	24	16	19.2	24
14"	5000 1.7	24	0	0	0	0	0	0	0	0	WS
		26	0	0	0	0	0	WS	0	0	WS
		28	0	0	0	0	0	WS	0	0	1
		30	0	0	0	0	0	WS	0	WS	X
		32	0	0	0	0	0	WS	0	WS	X
		34	0	0	WS	0	0	1	0	WS	X
		36	0	0	WS	0	0	1	0	WS	X
		38	0	0	WS	0	WS	X	0	1	X
		40	0	0	WS	0	WS	X	WS	X	X
	6000 1.8	24	0	0	0	0	0	0	0	0	WS
		26	0	0	0	0	0	0	0	0	WS
		28	0	0	0	0	0	WS	0	0	WS
		30	0	0	0	0	0	WS	0	0	1
		32	0	0	0	0	0	WS	0	0	X
		34	0	0	0	0	0	WS	0	WS	X
		36	0	0	WS	0	0	WS	0	WS	X
		38	0	0	WS	0	0	1	0	WS	X
		40	0	0	WS	0	0	1	0	1	X
	6500 1.8	24	0	0	0	0	0	0	0	0	WS
		26	0	0	0	0	0	0	0	0	WS
		28	0	0	0	0	0	WS	0	0	WS
		30	0	0	0	0	0	WS	0	0	1
		32	0	0	0	0	0	WS	0	0	X
		34	0	0	0	0	0	WS	0	WS	X
		36	0	0	WS	0	0	WS	0	WS	X
		38	0	0	WS	0	0	1	0	WS	X
		40	0	0	WS	0	0	X	0	1	X
	60 2.0	24	0	0	0	0	0	0	0	0	WS
		26	0	0	0	0	0	0	0	0	WS
		28	0	0	0	0	0	0	0	0	WS
		30	0	0	0	0	0	WS	0	0	1
		32	0	0	0	0	0	WS	0	0	1
		34	0	0	0	0	0	WS	0	0	1
		36	0	0	0	0	0	WS	0	WS	1
		38	0	0	0	0	0	1	0	WS	X
		40	0	0	0	0	0	1	0	1	X
	90 2.0	24	0	0	0	0	0	0	0	0	0
		26	0	0	0	0	0	0	0	0	0
		28	0	0	0	0	0	0	0	0	0
		30	0	0	0	0	0	0	0	0	0
		32	0	0	0	0	0	0	0	0	0
		34	0	0	0	0	0	0	0	0	WS
		36	0	0	0	0	0	0	0	0	WS
		38	0	0	0	0	0	0	0	0	WS
		40	0	0	0	0	0	0	0	0	WS

1. Cut 48" long reinforcers to match the joist depth. Use min. 23/32" plywood OSB rated sheathing, Exposure 1 48/24 Span Rating panels. The face grain must be horizontal (measure the 48" dimension along the long edge of the panel).
2. Fasten the reinforcer to the joist flanges with 8d nails at 6" o.c. When reinforcing both sides, stagger the nails to avoid splitting the joist flanges.
3. Attach web stiffeners per Intermediate *Web Stiffener Nailing Schedule* on page 9.
4. Use the BC Calc® software to analyze conditions that are not covered by this table. It may be possible to exceed the limitations of this table by analyzing a specific application with BC Calc® software.

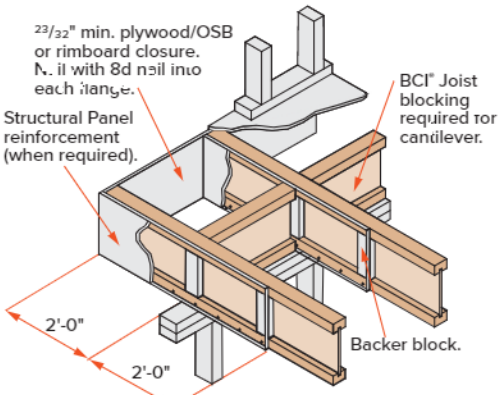
Reinforced Load Bearing Cantilever Detail



- The tables and details on pages 8 and 9 indicate the type of reinforcements, if any, that are required for load-bearing cantilevers up to a maximum length of 2'-0". Cantilevers longer than 2'-0" cannot be reinforced. **However, longer cantilevers with lower loads may be allowable without reinforcement. Analyze specific applications with the BC Calc® software.**

PLYWOOD / OSB REINFORCEMENT (If Required per Table on page 8 or BC Calc® Analysis)

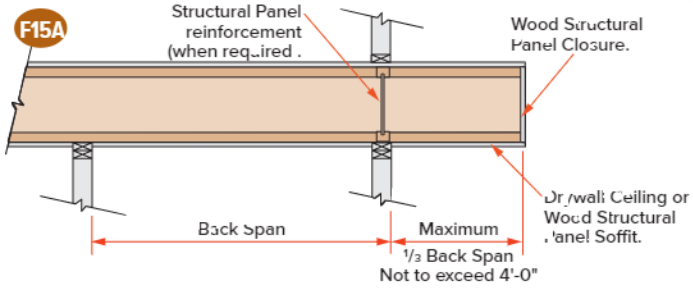
- 23/32" Min. x 48" long plywood / OSB rated sheathing must match the full depth of the BCI® Joist. Nail to the BCI Joist with 8d nails at 6" o.c. and nail with 4-8d nails into backer block. When reinforcing both sides, stagger nails to limit splitting. Install with horizontal face grain.
- The tables on page 8 assume a wall weight of 100 plf, in addition to the roof loading shown. Applications with loading that exceeds the loads shown shall be analyzed with BC Calc® software.
- These requirements assume a 100 PLF wall load. Additional support may be required for other loadings, see BC Calc® software.



Non-Load Bearing Wall Cantilever Details

BCI® Joists are intended only for applications that provide permanent protection from the weather. Impervious moisture barrier systems shall be detailed and installed in details F15A and F15B in accordance with 2018 IBC® Sections 107.2.5 and 110.3.6.

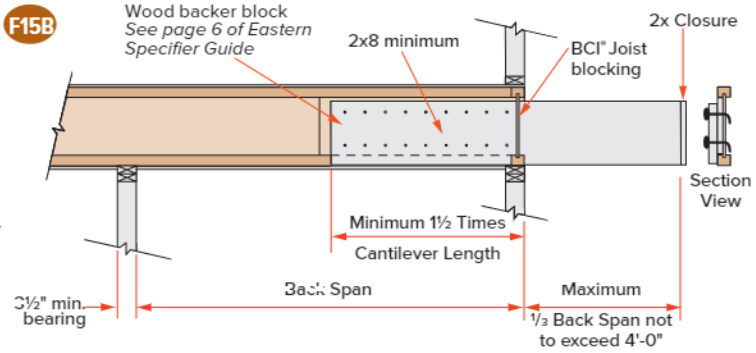
F15A



- Analyze BCI® Joist cantilever condition with BC Calc® software.

Fasten the 2x8 minimum to the BCI® Joist by nailing through the backer block and joist web with 2 rows of 10d nails at 6" on center. Clinch all nails. For BCI® 90 joists, nail each side with 2 rows (4 rows total) of 16d nails at 6" on-center.

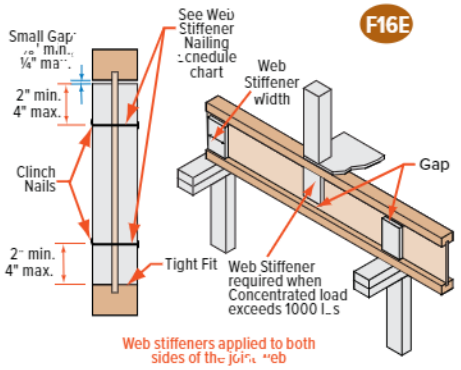
F15B



- Loading shall not exceed 60 psf live load and 10 psf dead load. At least three joist members shall be present and spaced at 24" o.c. or less.
- Lumber joist shall be No. 2 Dense Southern Pine, No.1/No.2 SPF, No.2 Hem-fir, or No.2 Douglas fir, or higher grade.
- Provide positive drainage, durable materials, and venting as required in 2018 IBC Sections 2304.12.2.5 and 2304.12.2.6. Lumber joist shall be sloped.

Web Stiffener Requirements

F16E



Web Stiffener Specifications

BCI® Joist Series	For Structural Capacity (Min. Thick)	Lateral Restraint in Hanger	Minimum Width
5000 1.7	5/8"	3/4"	2 5/16"
6000 1.8	3/4"	7/8"	2 5/16"
6500 1.8	3/4"	1" or 1 1/8"	2 5/16"
60 2 0	3/4"	7/8"	2 5/16"
90 2.0	2x4 flat (vertical)		

NOTES

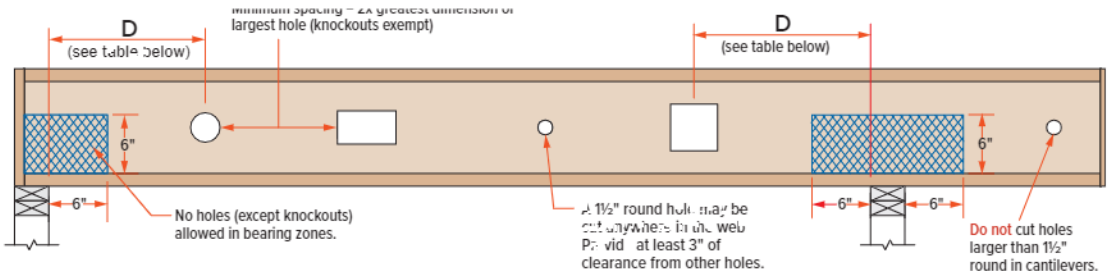
- Web stiffeners are optional except as noted below.
- Web stiffeners are always required for all 70" and 20" BCI® Joists at all bearing locations.
- Web stiffeners are always required in hangers that do not extend up to support the top flange of the BCI® Joist. Web stiffeners may be required with certain sloped or skewed hangers or to achieve uplift values. Refer to the hanger manufacturer's installation requirements.
- Web stiffeners are always required in certain roof applications. See Roof Framing Details on page 14.
- Web stiffeners are always required under concentrated loads that exceed 1000 pounds. Install the web stiffeners snug to the top flange in this situation. Follow the nailing schedule for intermediate bearings.
- Web stiffeners may be cut from structural rated wood panels, engineered rimboard or 2x lumber (BCI® 90 only).
- For Structural Capacity: Web stiffeners needed to increase the BCI® Joist's reaction capacity at a specific bearing location.
- Lateral Restraint in Hanger: Web stiffeners required when hanger does not laterally support the top flange (e.g., adjustable height hangers). Web stiffeners may be of multiple thickness (e.g., BCI® 65th), double ½" panel OK).
- Web stiffeners may be used to increase allowable reaction values. See BCI® Design Properties on page 24 or the BC Calc® software.

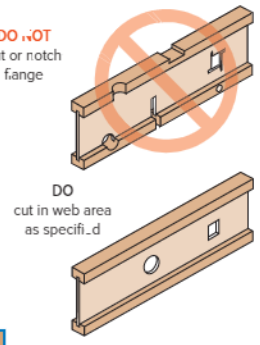
Web Stiffener Nailing Schedule

BCI® Joist Series	Joist Depth	Bearing Location	
		End	Intermediate
5000 1.7	9 1/2"	2-8d	2-8d
	11 7/8"	2-8d	3-8d
	14"	2-8d	5-8d
	16"	2-8d	6-8d
6000 1.8	9½"	2-8d	2-8d
	11⅞"	2-8d	3-8d
	14"	2-8d	5-8d
	16"	2-8d	6-8d
6500 1.8	9½"	2-8d	2-8d
	11⅞"	2-8d	3-8d
	14"	2-8d	5-8d
	16"	2-8d	6-8d
60 2 0	11⅞"	2-8d	3-8d
	14"	2-8d	5-8d
	16"	2-8d	6-8d
90 2 0	11⅞"	3-16d	3-16d
	14"	5-16d	5-16d
	16"	6-16d	6-16d
	18"	7-16d	7-16d
	20"	8-16d	8-16d

BCI® Joist Hole Location & Sizing

BCI® Joists are manufactured with 1½" round perforated knockouts in the web at approximately 12" on center





Minimum distance from support, listed in table below, is required for all holes greater than 1½"

MINIMUM DISTANCE (D) FROM ANY SUPPORT TO THE CENTERLINE OF THE HOLE

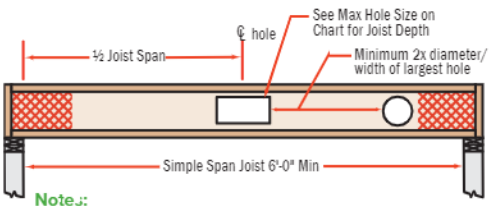
Round Hole Diameter [in]			2	3	4	5	6	7	8	8⅞	10	11	12	13	14	15
Rectangular Hole Side [in]			-	-	-	3	5	7				-	-	-		-
Any 9½" Joist	Span [ft]	8	1'-0	1' 1"	1'-8"	2' 4"	2'-11	3' 7"								
		12	1-0"	1' 7"	2'-7"	3' 6"	4'-5"	5' 4"								
		16	1'-0"	2' 2"	3'-5"	4' 8	5'-11"	7' 2"								
Round Hole Diameter [in]			2	3	4	5	6	7	8	8⅞	10	11	12	13	14	15
Rectangular Hole Side [in]					-	2	3	5	7	8	-	-				
Any 11⅞" Joist	Span [ft]	8	1'-0"	1' 1"	1'-6"	2' 0"	2'-5"	2' 11"	3'-5"	3' 10"						
		12	1-0	1' 7"	2'-3"	3' 0"	3'-8"	4' 5"	5'-1"	5' 8"						
		16	1'-2"	2' 1"	3'-0"	4' 0"	4'-11"	5' 10"	6'-10"	7' 8"						
		20	1'-5	2' 7"	3'-10"	5' 2"	6'-2"	7' 4"	8'-6"	9' 7"						
Round Hole Diameter [in]			2	3	4	5	6	7	8	8⅞	10	11	12	13	14	15
Rectangular Hole Side [in]			-	-	-		2	3	5	6	8	9	-	-	-	-
Any 14" Joist	Span [ft]	8	1'-0"	1' 1"	1'-2"	1' 2"	1'-6	1' 11"	2'-4"	2' 9"	3'-3"	3' 8"				
		12	1'-0"	1' 1"	1'-2"	1' 7"	2'-3'	2' 11"	3'-6"	4' 1"	4'-10"	5' 6"				
		16	1'-0"	1' 1"	1'-3"	2' 2"	3'-0"	3' 10"	4'-9"	5' 6"	6'-6"	7' 4"				
		20	1'-0"	1' 1"	1'-7"	2' 8"	3'-9"	4' 10"	5'-11"	6' 10"	8'-1"	9' 2"				
		24	1'-0	1' 1"	1'-11	3' 3"	4'-6"	5' 10"	7'-1"	8' 3"	9'-9	11' 0"				
Round Hole Diameter [in]			2	3	4	5	6	7	8	8⅞	10	11	12	13	14	15
Rectangular Hole Side [in]			-	-	-	-	-	2	5	5	6	8	9	12	-	-
Any 16" Joist	Span [ft]	8	1'-0	1' 1"	1'-2"	1' 2"	1'-3'	1' 3"	1'-7'	1' 11"	2'-4"	2' 9"	3'-2"	3' 7"		
		12	1'-0"	1' 1"	1'-2"	1' 2"	1'-3"	1' 9"	2'-4"	2' 11"	3'-7"	4' 2"	4'-9"	5' 4"		
		16	1'-0	1' 1"	1'-2"	1' 2"	1'-7"	2' 5"	3'-2"	3' 10"	4'-9"	5' 7"	6'-4"	7' 2"		
		20	1'-0"	1' 1"	1'-2"	1' 2"	2'-0	3' 1"	4'-0"	4' 10"	5'-11"	6' 11"	7'-11"	8' 11"		
		24	1'-0"	1' 1"	1'-2	1' 3"	2'-5"	3' 7"	4'-9"	5' 10"	7'-2"	8' 4"	9'-6"	10' 9"		
Round Hole Diameter [in]			2	3	4	5	6	7	8	8⅞	10	11	12	13	14	15
Rectangular Hole Side [in]			-	-	-			-	2	3	5	6	7	9	10	11
18" BCI® 90 2.0 Joist	Span [ft]	16	1'-0"	1' 1"	1'-2"	1' 2"	1'-5	1' 11"	2'-4"	2' 9"	3'-3"	3' 8"	4'-2"	4' 8"	5'-1"	5' 7"
		16	1'-0"	1' 1"	1'-2"	1' 4"	1'-11	2' 7"	3'-2"	3' 8"	4'-5"	5' 0"	5'-7"	6' 3"	6'-10"	7' 5"
		20	1'-0	1' 1"	1'-2"	1' 8"	2'-5"	3' 3"	4'-0"	4' 8"	5'-6"	6' 3"	7'-0"	7' 9"	8'-7"	9' 4"
		24	1'-0"	1' 1"	1'-2"	2' 0"	2'-11"	3' 10"	4'-9"	5' 7"	6'-7"	7' 6"	8'-5"	9' 4"	10'-3"	11' 2"
		28	1'-0	1' 1"	1'-4"	2' 5"	3'-5"	4' 6"	5'-7"	6' 6"	7'-9"	8' 9"	9'-10"	10' 11"	12'-0	13' 1"
Round Hole Diameter [in]			2	3	4	5	6	7	8	8⅞	10	11	12	13	14	15
Rectangular Hole Side [in]			-	-	-	-	-	-		2	3	5	6	7	8	10
20" BCI® 90 2.0 Joist	Span [ft]	12	1'-0	1' 1"	1'-2"	1' 2"	1'-3"	1' 6"	1'-11"	2' 3"	2'-9"	3' 2"	3'-7"	3' 11"	4'-4"	4' 9"
		16	1'-0"	1' 1"	1'-2"	1' 2"	1'-6"	2' 1"	2'-7"	3' 1"	3'-8"	4' 3"	4'-9"	5' 3"	5'-10"	6' 4"
		20	1'-0"	1' 1"	1'-2"	1' 3"	1'-11"	2' 9"	3'-3"	3' 10"	4'-7"	5' 3"	5'-11	6' 9"	7'-4"	8' 2"
		24	1'-0"	1' 1"	1'-2"	1' 6"	2'-4"	3' 1"	3'-11"	4' 9"	5'-6"	6' 4"	7'-2"	7' 11"	8'-9"	9' 9"
		28	1'-0"	1' 1"	1'-2"	1' 9"	2'-8"	3' 5"	4'-7"	5' 5"	6'-6"	7' 5"	8'-4"	9' 3"	10'-3"	11' 2"

- Select a table row based on joist depth and the actual joist span rounded up to the nearest table span. Scan across the row to the column headed by the appropriate round hole diameter or rectangular hole side. Use the longest side of a rectangular hole. The table value is the closest that the centerline of the hole may be to the centerline of the nearest support
- The entire web may be cut out. **DO NOT** cut the flanges. Holes apply to either single or multiple joists in repetitive member conditions.
- For multiple holes, the amount of uncut web between holes must equal at least twice the diameter (or longest side) of the largest hole.
- 1½" round knockouts in the web may be removed by using a short piece of metal pipe and hammer.
- Holes may be positioned vertically in the web, provided they don't extend into either flange
- This table was designed to apply to design conditions covered by uniform load PLF tables only, shown elsewhere in this publication. Use BC Calc® software to check other hole sizes or holes under other design conditions, including joists supporting concentrated loads. It may be possible to exceed the limitations of this table by analyzing a specific application with the BC Calc® software.

Large Rectangular Holes in BCI® Joists

Hole size table based on maximum uniform load of 40 psf live load and 10 psf dead load, at maximum spacing of 24" on-center.

Single Span Joist

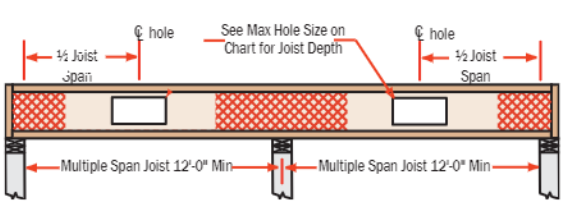


Notes:

Additional holes may be cut in the web provided they meet the specifications as shown in the hole distance chart shown above or as allowed using BC Calc® sizing software.

Joist Depth	Maximum Hole Size	
	Simple Span	Multiple Span
9½"	6" x 14"	6" x 12"
11⅞"	7" x 16" 8" x 15"	8" x 12"
14"	9" x 16" 10" x 15"	8" x 15"
16"	9" x 18" 11" x 16"	10" x 14"

Multiple Span Joist



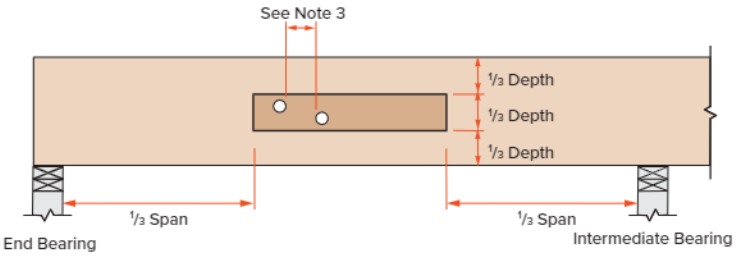
Larger holes may be possible for either Single or Multiple span joists; use BC Calc® sizing software for specific analysis.

Allowable Holes in Versa-Lam® LVL Beams

Notes

1. Square and rectangular holes are not permitted.
2. Round holes may be drilled or cut with a hole saw only where within the shaded area of the beam.
3. The horizontal distance between adjacent holes must be at least two times the size of the larger hole.
4. Do not drill more than three access holes in any four foot long section of beam.
5. The maximum round hole diameter permitted is:

Beam Depth	Max. Hole Diameter
5½"	¾"
7¼"	1"
9¼" and greater	2"



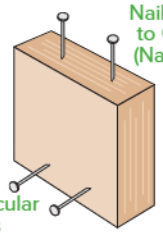
6. These limitations apply to holes drilled for plumbing or wiring access only. The size and location of holes drilled for fasteners are governed by the provisions of the *National Design Specification® for Wood Construction*.
7. Beams deflect under load. Size holes to provide clearance where required.
8. This hole chart is valid for beams supporting uniform load only. For beams supporting concentrated loads or for beams with larger holes, use BC Calc® sizing software (www.BCCalc.com) or contact Boise Cascade EWP Engineering.

Closest Allowable Nail Spacing

Versa-Lam® LVL Products Nail Size		Nailing Parallel to Glue Lines (Narrow Face)						Nailing Perpendicular to Glue Lines (Wide Face)	
		Versa-Lam® LVL 1½"		Versa-Lam® LVL 1¾"		Versa-Lam® LVL 3½" & Wider		All Products	
		O.C. [in]	End [in]	O.C. [in]	End [in]	O.C. [in]	End [in]	O.C. [in]	End [in]
8d Box	(0.113"ø x 2.5")	3	1½	2	1	2	½	2	½
8d Common	(0.131"ø x 2.5")	3	2	3	2	2	1	2	1
10d & 12d Box	(0.128"ø x 3" 3.25")	3	2	3	2	2	1	2	1
16d Box	(0.135"ø x 3.5")	3	2	3	2	2	1	2	1
10d & 12d Common & 16d Sinker	(0.148"ø x 3" 3.25")	4	3	4	3	2	2	2	2
16d Common	(0.162"ø x 3.5")	6	4	6	3	2	2	2	2

- Offset and stagger nail rows from floor sheathing and wall sole plate.
- Simpson Strong-Tie A35 and LP14 connectors may be attached to the side Versa-Lam® LVL/ Versa-Rim® LVL. Use nails as specified by Simpson Strong-Tie.

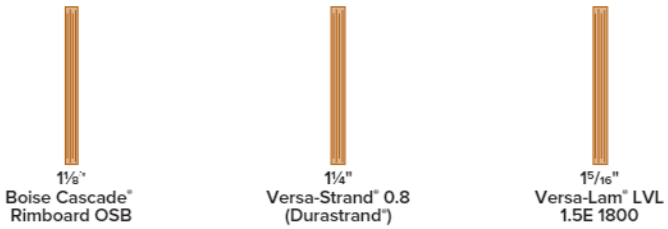
Versa-Lam® LVL & Versa-Rim® Products



Nailing Notes

1) For 1¾" thickness and greater, 2 rows of nails (such as for a metal strap) are allowed (use ½" minimum offset between rows and stagger nails).

Boise Cascade Rimboard Properties



★Product may not be available. Check with supplier or Boise Cascade representative for availability.

Product	Type	Vertical Load Capacity				Maximum Floor Diaphragm Lateral Capacity [lb/ft]	Specific Gravity for Lateral Nail Design	Allowable Design Values			
		Uniform [plf]		Point [lb]				Flexural Stress [lb/in²]	Modulus of Elasticity [lb/in²]	Horizontal Shear [lb/in²]	Compression Perpendicular to Grain [lb/in²]
		16" Depth & Less	18" & 20" Depth	16" Depth & Less	18" & 20" Depth						
1⅛" Boise Cascade Rimboard OSB [2]	OSB	4950	3200	3500	3500	200	0.5	Limited span capabilities, see note 2			
1¼" Versa-Strand™ 0.8 (Dura-Strand) [3]	OSB	5700	3500	5900	5500	240 w/ 8d nails @ 6" o.c. 330 w/ 8d nails @ 4" o.c.	---[3]	1130	800,000	355	1415
1⁵/₁₆" Versa-Lam® LVL 1.5 1800 [1]	LVL	6000	5450	4450	4450	Permitted per building code for all nominal 2" thick framing blocked and unblocked diaphragms (4" nail spacing & greater)	0.5	1800	1,400,000	225	525

Closest Allowable Nail Spacing - Narrow Face [in]		Product		
		1⅛" Boise Cascade® Rimboard OSB [2]	1¼" Versa-Strand™ 0.8 (Dura-Strand) [3]	1⁵/₁₆" Versa-Lam® LVL 1.5 1800 [1]
8d Box	(0.113"ø x 2.5")	3	3	3
8d Common	(0.131"ø x 2.5")	3	3	3
10d & 12d Box	(0.128"ø x 3", 3.25")	See publication in note 2 for further nailing information.	3	3
16d Box	(0.135"ø x 3.5")		3	3
10d & 12d Common & 16d Sinker	(0.148"ø x 3", 3.25")		4	4
16d Common	(0.162"ø x 3.5")		6	6

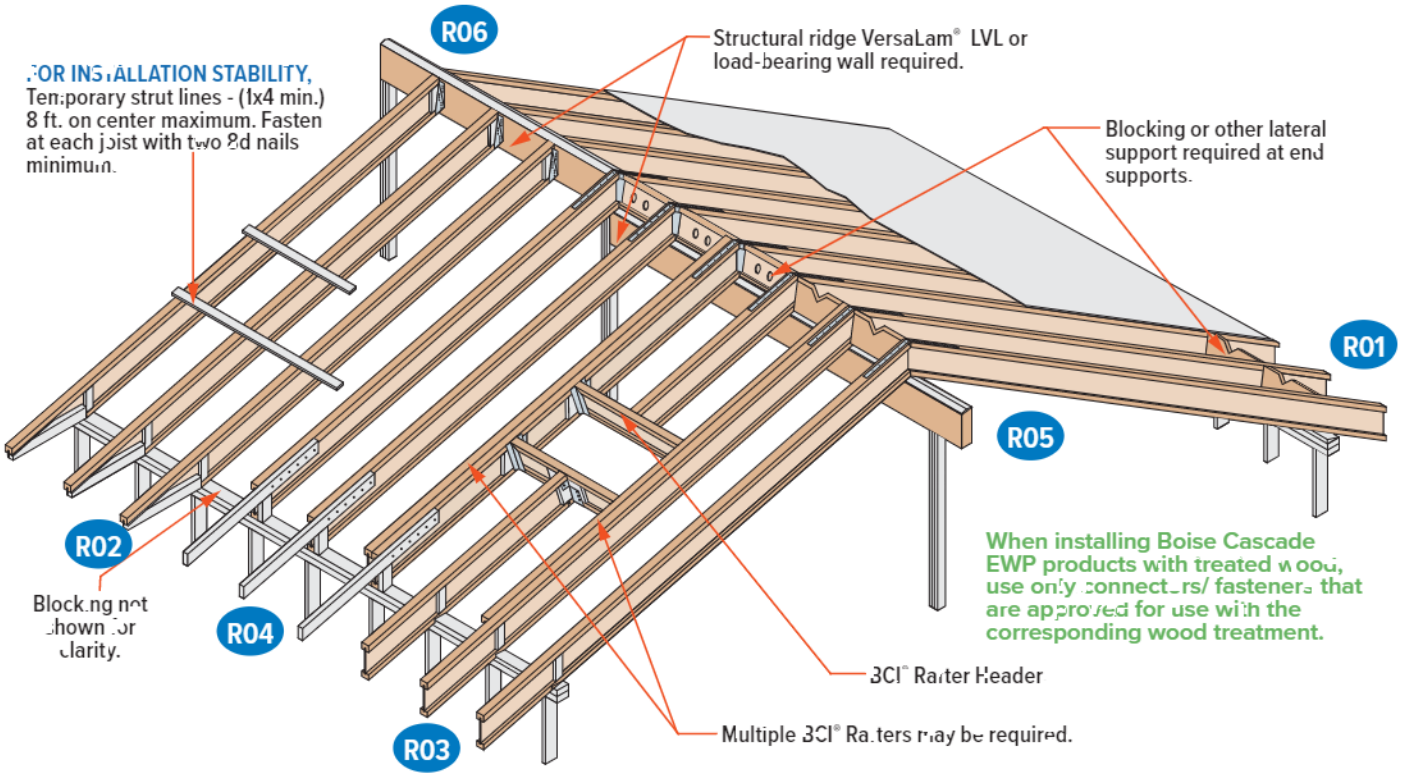
Notes

1. See ICC-ES®/APA® ESR-1040 for further information.
2. See *Performance Rated Rim Boards, APA® Form No. W345N* for further product information.

BCI® Joists, Versa-Lam® LVL, and ALLJOIST® must be stored, installed and used in accordance with the Boise Cascade EWP Installation Guide, building codes, and to the extent not inconsistent with the Boise Cascade EWP Installation Guide, usual and customary building practices and standards. Versa-Lam® LVL, ALLJOIST® and BCI® Joists must be wrapped, covered, and stored off of the ground on stickers at all times prior to installation. Versa-Lam® LVL, ALLJOIST® and BCI® Joists are intended only for applications that assure no exposure to weather or the elements and an environment that is free from moisture from any source, or any pest, organism or substance which degrades or damages wood or glue bonds. Failure to correctly store, use or install Versa-Lam® LVL, ALLJOIST® and BCI® Joist in accordance with the Boise Cascade EWP Installation Guide will void the limited warranty.

BCI® Rafters

Additional roof framing details available with BC Framer® software



SAFETY WARNING

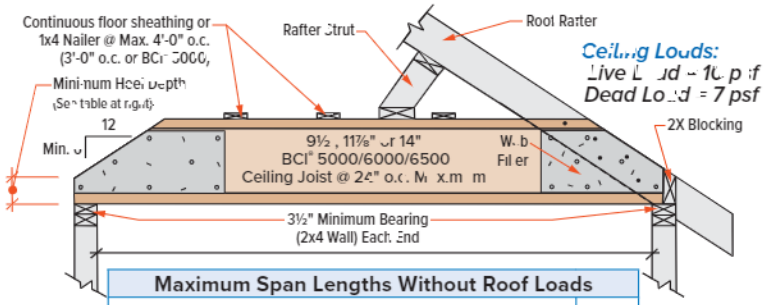
DO NOT ALLOW WORKERS ON BCI® JOISTS UNTIL ALL HANGERS, BCI® RIM JOISTS, RIM BOARDS, BCI® BLOCKING PANELS, X-BRACING AND TEMPORARY 1X4 STRUT LINES ARE INSTALLED AS SPECIFIED BELOW.

SERIOUS ACCIDENTS CAN RESULT FROM INSUFFICIENT ATTENTION TO PROPER BRACING DURING CONSTRUCTION. ACCIDENTS CAN BE AVOIDED UNDER NORMAL CONDITIONS BY FOLLOWING THESE GUIDELINES.

- Build a braced end wall at the end of the bay, or permanently install the first eight feet of BCI® Joists and the first course of sheathing. As an alternate, temporary sheathing may be nailed to the first four feet of BCI® Joists at the end of the bay.
- All hangers, BCI® rim joists, rim boards, BCI® blocking panels, and x-bracing must be completely installed and properly nailed as each BCI® Joist is set.
- Install temporary 1x4 strut lines at no more than eight feet on center as additional BCI® Joists are set. Nail the strut lines to the sheathed area, or braced end wall, and to each BCI® Joist with two 8d nails.
- The ends of cantilevers must be temporarily secured by strut lines on both the top and bottom flanges.
- Straighten the BCI® Joists to within ½ inch of true alignment before attaching strut lines and sheathing.
- Remove the temporary strut lines only as required to install the permanent sheathing.
- Failure to install temporary bracing may result in sideways buckling or roll-over under light construction loads.

BCI® Ceiling Joist with Bevel End Cut (For Limited-Access Attics Only)

BCI® Joist shall not be used as collar/tension tie. Roof rafter shall be supported by ridge beam or other upper bearing support.



Maximum Span Lengths Without Roof Loads	
9½" BCI® 5000 1.7 / 6000 1.8 / 6500 1.8	19'-6"
11⅞" BCI® 5000 1.7 / 6000 1.8 / 6500 1.8	22'-0
14" BCI® 6000 1.8 / 6500 1.8	25'-0"

(If roof loads present, see Notes 2 & 3 at right)

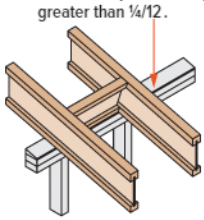
Minimum Heel Depths	Joist Depth	End Wall	
		2 x 4	2 x 6
	9½"	2½"	1½"
	11⅞"	3½"	2½"
	14"	4½"	3½"

Notes.

1) Detail is to be used only for ceiling joists with no access to attic space.
2) Ceiling joist must be designed to carry all roof load transferred through rafter struts as shown.
3) BCI® ceiling joist end reaction may not exceed 550 pounds.
4) Minimum roof slope is 6/12.
5) Nail roof rafter to BCI® top flange with 1 - 10d (3" long) box or larger nail.
6) 1x4 nailers must be continuous and nailed to a braced end wall.
7) Install a web filler on each side of BCI® Joist at beveled ends. Nail roof rafter to BCI® Joist per building code requirements for ceiling joist to roof rafter connection.

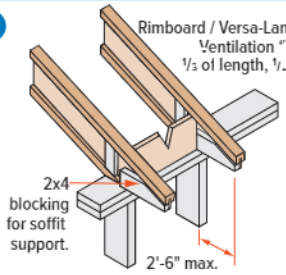
Additional roof framing details available with BC Framer® software

R01



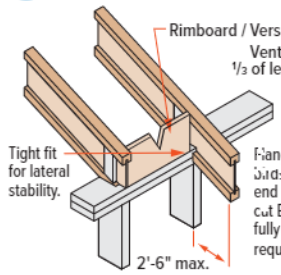
Simpson VPA or USP TMP connectors or equal can be used in lieu of beveled plate for slopes from 3/12 to 12/12.

R02



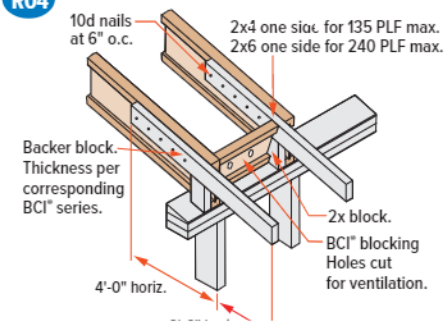
Flange of BCI® Joists may be birdsmouth cut only at the low end of the joist. Birdsmouth cut BCI® Joist flange must bear fully on plate, web stiffener required each side. Bottom flange shall be fully supported.

R03

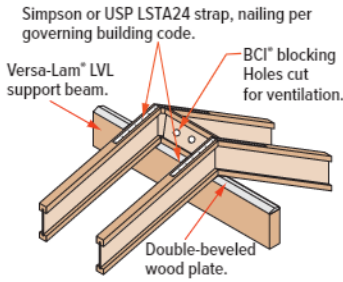


Flange of BCI® Joists may be birdsmouth cut only at the low end of the joist. Birdsmouth cut BCI® Joist flange must bear fully on plate, web stiffener required each side.

R04

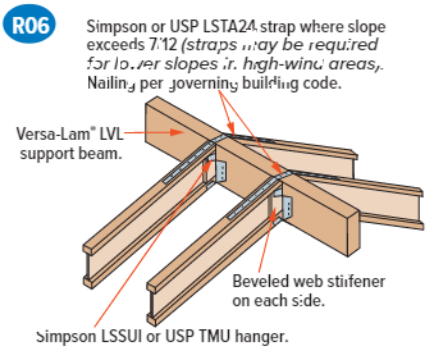


R05

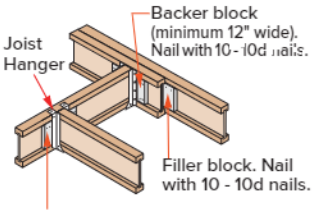


Blocking on both sides of ridge may be required for shear transfer per design professional of record.

R06

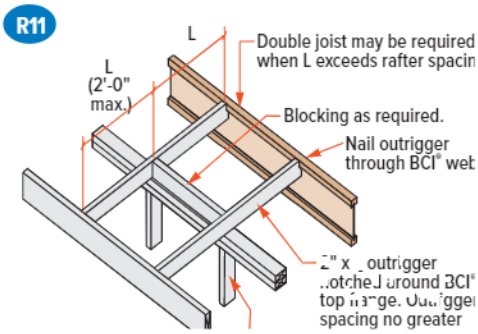


R07

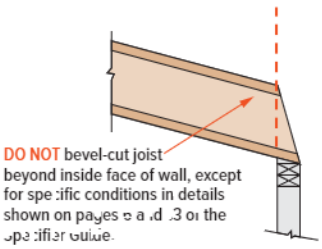


Backer block required where top flange joist hanger load exceeds 250 lbs. Install tight to top flange.

R11



DN05



NOTES TO ROOF FRAMING DETAILS

LATERAL SUPPORT

- BCI® Joists must be laterally supported at end supports (including supports adjacent to overhangs) with hangers, rimboard, or blocking (Versa-Lam® LVL, Boise Cascade® Rimboard or BCI® Joist). Metal cross bracing or other x-bracing provides adequate lateral support for BCI® Joists; consult governing building code for roof diaphragm connection provisions.

MINIMUM BEARING LENGTH FOR BCI® JOISTS

- Minimum end bearing 1½" for all BCI® Joists. 3½" is required at cantilever and intermediate supports.
- Longer bearing lengths allow higher reaction values. Refer to the building code evaluation report or the BC Calc® software.

NAILING REQUIREMENTS

- BCI® rim joist, rim board or closure panel to BCI® joist.
  - Rims or closure panel 1¾ inches thick and less: 2-8d nails, one each in the top and bottom flange.
  - BCI® 5000 rim joist: 2-10d box nails, one each in the top and bottom flange.
  - BCI® 6000/60 rim joist: 2-16d box nails, one each in the top and bottom flange.
  - BCI® 6500/90 rim joist: Toe-nail top flange to rim joist with 2-10d box nails, one each side of flange.
- BCI® rim joist, rim board or BCI® blocking panel to support:
  - Min. 8d nails @ 6" o.c. per IRC®.
  - Connection per design professional of record's specification for shear transfer.
- BCI® joist to support:
  - 2-8d nails, one on each side of the web, placed 1½ inches minimum from the end of the BCI® Joist to limit splitting.
- Sheathing to BCI® joist:
  - Prescriptive residential floor sheathing nailing requires 8d common nails @ 6" o.c. on edges and @ 12" o.c. in the field (IRC® Table R602.3(1)).
  - See closest allowable nail spacing limits on page 24 for floor diaphragm nailing specified at closer spacing than IRC®.
  - Maximum nail spacing for minimum lateral stability: 18" for BCI® 5000, 24" for larger BCI® joist series.
  - 14 gauge staples may be substituted for 8d nails if the staples penetrate at least 1 inch into the joist.
  - Wood screws may be acceptable, contact local building official and/or Boise Cascade EWP Engineering for further information.

BACKER AND FILLER BLOCK DIMENSIONS

Series	Backer Block Thickness	Fille. Block Thickness
5000 1.7	¾" or ⅞" wood panels	Two ¾" wood panels or 2 x _
6000 1.8	1⅛" or two ½" wood panels	2 x _ + ⅞" or ½" wood panel
6500 1.8	1⅛" or two ⅝" wood panels	2 x _ + ⅝" o ¾" wood panel
60 2.0	1⅛" or two ½" wood panels	2 x _ + 7/16" or ½" wood panel
90 2.0	2 x lumber	Double 2 x _ lumber

- Cut backer and filler blocks to a maximum depth equal to the web depth minus ¼" to avoid a forced fit.

WEB STIFFENER REQUIREMENTS

- See *Web Stiffener Requirements* on page 9.

PROTECT BCI® JOISTS FROM THE WEATHER

- BCI® Joists are intended only for applications that provide permanent protection from the weather. Bundles of BCI® Joists should be covered and stored off of the ground on stickers.

MAXIMUM SLOPE

- Unless otherwise noted, all roof details are valid for slopes of 12 in 12 or less.

VENTILATION

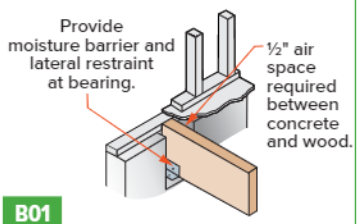
- The 1½ inch, pre-stamped knock-out holes spaced at 12 inches on center along the BCI® Joist may all be knocked out and used for cross ventilation. Deeper joists that what is structurally needed may be advantageous in ventilation design. Consult local building official and/or ventilation specialist for specific ventilation requirements.

BIRDSMOUTH CUTS

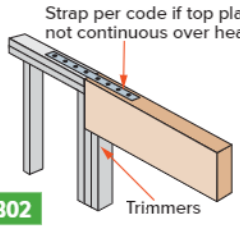
- BCI® Joists may be birdsmouth cut only at the low end support. BCI® Joists with birdsmouth cuts may cantilever up to 2'-6" past the low end support. The bottom flange must sit fully on the support and may not overhang the inside face of the support. High end supports and intermediate supports may not be birdsmouth cut.

Versa-Lam® LVL Beam Details

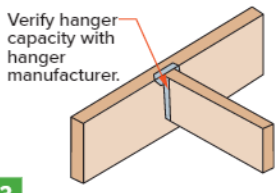
BEARING AT CONCRETE/MASONRY WALLS — B01



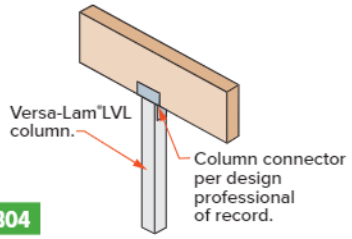
BEARING FOR DOOR OR WINDOW HEADER — B02



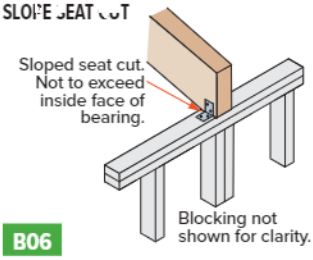
BEAM TO BEAM CONNECTOR — B03



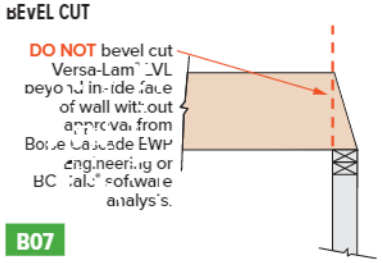
BEARING AT COLUMN — B04



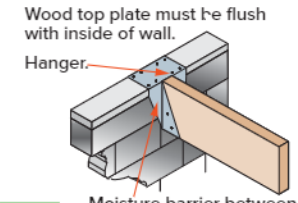
SLOPE SEAT CUT — B06



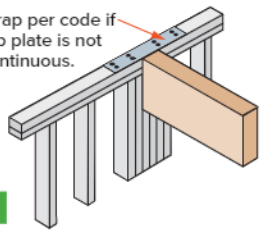
BEVEL CUT — B07



BEAM TO CONCRETE/MASONRY WALLS — B08



BEARING FRAMING INTO WALL — B09



INSTALLATION NOTES

- Minimum of ½" air space between beam and wall pocket or adequate bearing must be provided between beam and concrete/masonry.
- Adequate bearing shall be provided. If not shown on plans, please refer to load tables on pages 3-5 of this guide.
- Versa-Lam® LVL beams are intended for interior applications only and should be kept as dry as possible during construction.
- Continuous lateral support of top of beam shall be provided (side or top bearing framing).

Multiple Member Connectors

Side-Loaded Applications

Number of Members	Maximum Uniform Side Load [plf]							
	Nailed [3]		½" Dia. Through Bolt [4]			⅝" Dia. Through Bolt [4]		
	2 rows 16d Sinkers @ 12" o.c.	3 rows 16d Sinkers @ 12" o.c.	2 rows @ 24" o.c. staggered	2 rows @ 12" o.c. staggered	3 rows @ 6" o.c. staggered	2 rows @ 24" o.c. staggered	2 rows @ 12" o.c. staggered	3 rows @ 6" o.c. staggered
1¾" Versa-Lam® LVL (Depths of 18" and less)								
2	420	705	505	1010	2020	560	1120	2245
3 [5]	350	525	375	755	1515	420	840	1685
4 [3]	use bolt schedule		335	670	1345	370	745	1495
3½" Versa-Lam® LVL								
2 [3]	use bolt schedule		855	1715	N/A	1125	2250	N/A

1. Design values apply to common bolts that conform to ANSI/ASME standard B18.21-1981 (ASTM A307 Grades A&B, SAE J429 Grades 1 or 2, or higher). A washer not less than a standard cut washer shall be between the wood and the bolt head and between the wood and the nut. The distance from the edge of the beam to the bolt holes must be at least 2" for ½" bolts and 2½" for ⅝" bolts. Bolt holes shall be the same diameter as the bolt.
2. The nail schedules shown apply to both sides of a 3-member beam.
3. 16d box nails = 0.135" diameter x 3.5" length, 16d sinker nails = 0.148" diameter x 3.25" length.
4. 7" wide beams must be top loaded or loaded from both sides (lesser side shall be no less than 25% of opposite side).

Top-Loaded Applications

For top-loaded beams and beams with side loads less than shown in Side-Loaded Applications table above:

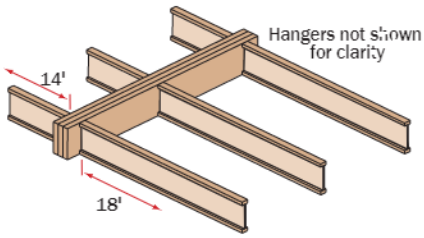
Plies	Depth	Nailing [2]	Maximum Uniform Load From One Side
(2) 1¾" plies	Depths 11⅞" & less	2 rows 16d box/sinker nails @ 12" o.c.	400 plf
	Depths 14" - 18"	3 rows 16d box/sinker nails @ 12" o.c.	600 plf
	Depth = 24"	4 rows 16d box/sinker nails @ 12" o.c.	800 plf
(3) 1¾" plies [1]	Depths 11⅞" & less	2 rows 16d box/sinker nails @ 12" o.c.	300 plf
	Depths 14" - 18"	3 rows 16d box/sinker nails @ 12" o.c.	450 plf
	Depth = 24"	4 rows 16d box/sinker nails @ 12" o.c.	600 plf
(4) 1¾" plies	Depths 18" & less	2 rows ½" bolts @ 24" o.c., staggered	335 plf
	Depth = 24"	3 rows ½" bolts @ 24" o.c., staggered every 8"	505 plf
(2) 3½" plies	Depths 18" & less	2 rows ½" bolts @ 24" o.c., staggered	855 plf
	Depth 20" - 24"	3 rows ½" bolts @ 24" o.c., staggered every 8"	1285 plf

1. The nail schedules shown apply to both sides of a 3-member beam.
2. 16d box nails = 0.135" diameter x 3.5" length, 16d sinker nails = 0.148" diameter x 3.25" length.
3. Beams wider than 7" must be designed by the engineer of record.
4. All values in these tables may be increased by 15% for snow-load roofs and by 25% for non-snow load roofs where the building code allows.
5. Use allowable load tables or BC Calc® software to size beams.
6. An equivalent specific gravity of 0.5 may be used when designing specific connections with Versa-Lam®.
7. Connection values are based upon the NDS, 2018 edition.
8. FastenMaster *TrussLok®*, Simpson Strong-Tie *SDW or SDS*, and USP *WS* screws may also be used to connect multiple member Versa-Lam® LVL beams, *contact Boise Cascade EWP Engineering for further information.*

Designing Connections For Multiple Versa-Lam® LVL Members

When using multiple ply Versa-Lam® LVL beams to create a wider member, the connection of the plies is as critical as determining the beam size. When side loaded beams are not connected properly, the inside plies do not support their share of the load and thus the load-carrying capacity of the full member decreases significantly. The following is an example of how to size and connect a multiple-ply Versa-Lam® LVL floor beam.

Given: Beam shown below is supporting residential floor load (40 psf live load, 10 psf dead load, and is spanning 16'-0". Beam depth is limited to 14".



Find: A multiple ply Versa-Lam® LVL that is adequate to support the design loads and the member's proper connection schedule.

1. Calculate the tributary width that beam is supporting:
   14' / 2 + 18' / 2 = 16'
2. Use PLF tables on pages 3-5 of this guide or BC Calc® to size beam.
   A Triple Versa-Lam® LVL 2.1 2800 1¾" x 14" is found to adequately support the design loads
3. Calculate the maximum plf load from one side (the right side in this case).
   Max. Side Load = (18' / 2) x (40 + 10 psf) = 450 plf
4. Go to the **Multiple Member Connection Table, Side-Loaded Applications, 1¾" Versa-Lam® LVL, 3 members.**
5. The proper connection schedule must have a capacity greater than the max. side load:
   Nailed: 3 rows 16d sinkers @ 12" o.c:
   525 plf is greater than 450 plf OK
   Bolts: ½" diameter 2 rows @ 12" staggered:
   755 plf is greater than 450 plf OK

Boise Cascade®
ENGINEERED WOOD PRODUCTS

PRODUCTOS DE INGENIERÍA EN MADERA PARA EL OESTE GUÍA DE INSTALACIÓN

Calidad y rendimiento garantizado para toda la vida

Boise Cascade garantiza que sus productos de BCI® Joist Versa-Lam®, y ALLJOIST® se acatan a nuestras especificaciones, estarán libres de defectos de material y fábrica, y satisfacen o exceden nuestras especificaciones de rendimiento para la vida normal y esperada de la estructura, cuando sean correctamente almacenados, y cuando se instalen y usen según nuestra guía de instalación.

Boise Cascade no ha evaluado los efectos de cualquier presión o aplicaciones tópicas o tratamientos en su vigas BCI®, Versa-Lam® y los productos ALLJOIST®.

Para información sobre productos de ingeniería en madera de Boise Cascade, incluyendo términos y condiciones de venta, garantías y descargas de responsabilidad, visite nuestra página de internet en el **www.BC.com/ewp**
Para localizar a su distribuidor de productos de ingeniería en madera de Boise Cascade más cercano, llame al **1-800-232-0788.**

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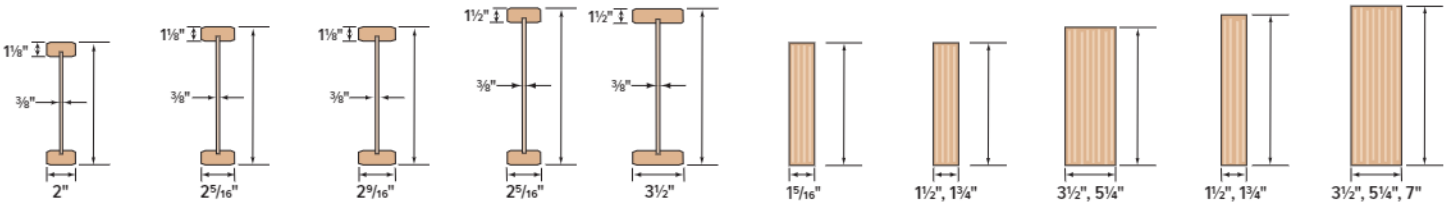
Descripción de productos para el Oeste



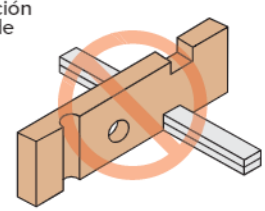
BCI® 5000 1.7	BCI® 6000 1.8	BCI® 6500 1.8	BCI® 60 2.0	BCI® 90 2.0	Versa-Lam LVL 1.5E 1800	Versa-Lam LVL 1.8E 2400	Versa-Lam LVL 1.8E 2650	Versa-Lam® LVL 2.1E 2800	Versa Lam® LVL 2.1E 3100
9½", 11⅞", 14", 16"	9½", 11⅞", 14", 16"	9½", 11⅞", 14", 16"	11⅞", 14", 16", 18"	11⅞", 14", 16", 18", 20"	9½" to 16"	3½" to 16"	5½" to 16"	5½" to 18"	5½" to 24"

Product depths offered are listed below the product name. BCI® 60 and 90 deep depths are available from White City. Es posible que el producto no esté disponible. Infórmese sobre disponibilidad con con un representante de Boise Cascade.
Los productos BCI y Versa-Lam deben ser instalados en aplicaciones de uso en seco solamente de acuerdo a sus reportes de evaluación ESR.

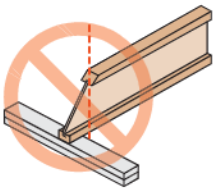
ADVERTENCIA

LOS SIGUIENTES USOS NO SE PERMITEN

NO ranure ni perfore vigas sin la aprobación del departamento de ingeniería de Boise Cascade EWP.

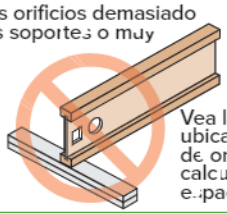


NO corte más allá del borde interior del soporte.



NO apoye la viga en el alma (panel).

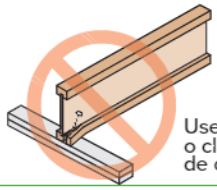
NO corte los orificios demasiado cerca de los soportes o muy juntos.



Vea la tabla de ubicación y tamaño de orificios para calcular tamaño y espaciamiento.

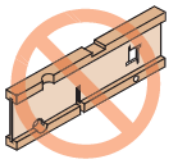
NO clave menos de 1½ pulgadas del borde de la viga.

NO use clavos comunes 16d.



Use clavos 8d o clavos 10d/16d de caja.

NO corte ni ranure el reborde.



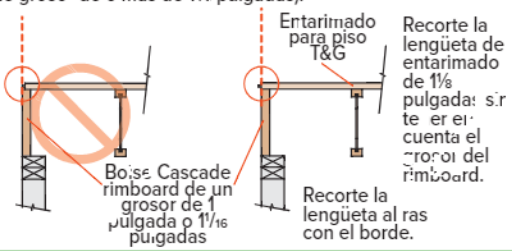
Ver detalles para techo y piso en esta hoja respecto a las maneras permitidas para cortar el reborde

NO camine sobre las vigas hasta que estén correctamente sujetadas.

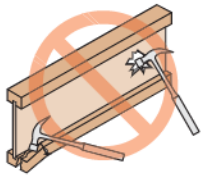
NO cargue la viga con más peso del que permite el diseño.

NO amontone materiales de construcción en las vigas no sujetadas.

NO INSTALE la lengüeta del entarimado del piso al ras con la Boise Cascade rimboard de un grosor de 1 pulgada o 1 1/16 pulgadas (lengüeta OK usando Boise Cascade rimboard de grosor de 1⅛ pulgadas).



NO martillar en la red a menos que retire los agujeros de nocaut.



NO martille en la brida.

Advertencia de Seguridad

NO PERMITA QUE LOS TRABAJADORES CAMINEN SOBRE LAS BCI® JOISTS HASTA QUE NO SE HAYAN INSTALADO TODOS LOS COLGADORES, BCI® RIM JOISTS (VIGAS DE BORDE BCI®), RIMBOARDS (TABLAS DE BORDE), BCI® BLOCKING PANELS (PANELES DE BLOQUEO BCI®), ARRIOSTRAMIENTO EN "X" Y LÍNEAS DE SOPORTE TEMPORAL 1X4 TAL COMO QUEDA ESPECIFICADO ABAJO. PUEDEN RESULTAR ACCIDENTES SERIOS POR FALTA DE ATENCIÓN AL ARRIOSTRAMIENTO (SOPORTE) CORRECTO DURANTE LA CONSTRUCCIÓN. LOS ACCIDENTES PUEDEN EVITARSE BAJO CIRCUNSTANCIAS NORMALES, SI SE OBSERVAN LAS SIGUIENTES PAUTAS:

- Construya una pared arriostrada a los extremos del recuadro o instale permanentemente los primeros ocho pies de BCI® Joists y el primer plano de entarimado. De otra forma, se puede colocar un entarimado provisional en los primeros cuatro pies de BCI® Joists en el extremo del recuadro.
- Todos los colgadores BCI® rim joists, rimboards, BCI® blocking panels y arriostramiento en "X", deben estar completamente instalados y correctamente clavados conforme se vaya acomodando cada BCI® Joist.

  Se deben instalar líneas de refuerzo provisionales de 1x4, a una distancia máxima de ocho pies en centro conforme se vayan acomodando BCI® Joists adicionales. Clave las líneas de refuerzo al área ya entarimada, o a la pared de extremo arriostrada, y a cada BCI® Joist con dos clavos 8d.
- Los extremos de voladizos deben estar sujetados temporalmente por líneas de refuerzo en los rebordes superiores e inferiores.
- Enderece las BCI® Joists a una alineación de menos de ½ pulgada de variación de la alineación justa antes de sujetar las líneas de refuerzo y el entarimado.
- Remueva las líneas de refuerzo temporal sólo conforme sea necesario para instalar el entarimado permanente.
- El no instalar el arriostramiento provisional puede resultar en que las vigas se encorven de lado o se voltéen bajo una carga ligera de construcción.
- No apile materiales de construcción (entarimado, muro en seco – drywall,etc.) en el medio de los tramos entre las BCI® Joists. Póngase en contacto con Ingeniería Boise Cascade EWP para información de almacenaje apropiado y apuntalamiento.

INFORMES DE EVALUACIÓN DEL CÓDIGO DE CONSTRUCCIÓN:

Informes de evaluación del código de construcción para BCI® Joists

- ICC-ES®/APA® ESR-1336 (IBC, IRC)

Informes de evaluación del código de construcción para Versa-Lam® LVL

- ICC-ES®/APA® ESR-1040 (IBC, IRC)

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Tablas de tramos de piso residencial

Referente al rendimiento del piso

Las expectativas y opiniones de propietarios de vivienda varían enormemente debido a la naturaleza subjetiva de evaluar un nuevo piso. La comunicación con el usuario final para determinar sus expectativas es crítica. La vibración es por lo general la causa de la mayoría de las quejas. La instalación de un arriostrado lateral puede ayudar, sin embargo, puede ocurrir que rechine si no se instala correctamente. Disminuir el espacio entre las vigas no afectará mucho la percepción del rendimiento del piso. Los metodos en uso más comunes para aumentar el rendimiento y reducir la vibración de sistemas de pisos de madera consisten en aumentar la profundidad de la viga, limitar desviaciones de viga, pegar y atornillar un subsuelo más grueso, a ranura y lengüeta, instalar las vigas verticalmente piomadas con soportes de carga nivelados, e instalar un techo directamente fijado a los rebordes de fondo de las vigas.

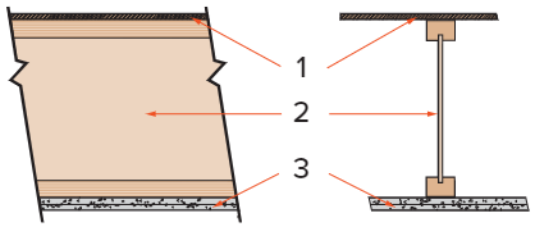
Las tablas de tramos de piso enlistadas abajo, ofrecen tres diferentes opciones de rendimiento, basadas en los requerimientos del propietario de la vivienda.

Joist Depth	BCI® Joist Series	★★★THREE STAR★★★ Live Load deflection limited to L/480: The common industry and design community standard for residential floor joists, 33% stiffer than L/360 code minimum. However, floor performance may still be an issue in certain applications, especially with 9½" and 11⅞" deep joists without a direct-attached ceiling.					★★★★FOUR STAR★★★★ Live Load deflection limited to L/960+: In addition to providing a floor that is 100% stiffer than the three star floor, field experience has been incorporated into the values to provide a floor with a premium performance level for the more discriminating homeowner.					CAUTION ★MINIMUM STIFFNESS ALLOWED BY CODE★ CAUTION Live Load deflection limited to L/360: Floors that meet the minimum building code L/360 criteria are structurally sound to carry the specified loads; however, there is a much higher risk of floor performance issues. This table should only be used for applications where floor performance is not a concern.				
		12" o.c.	16" o.c.	19.2" o.c.	24" o.c.	32" o.c.	12" o.c.	16" o.c.	19.2" o.c.	24" o.c.	32" o.c.	12" o.c.	16" o.c.	19.2" o.c.	24" o.c.	32" o.c.
9½"	5000 1.7	17'-1"	15'-7"	14'-5"	13'-5"	12'-0"	17'-6"	15'-6"	14'-0"	12'-6"	9'-6"	18'-11"	17'-0"	15'-6"	13'-11"	12'-0"
	6000 1.8	17'-11"	16'-5"	15'-6"	14'-5"	13'-2"	17'-6"	15'-6"	14'-0"	12'-6"	9'-10"	19'-10"	18'-2"	17'-2"	15'-9"	13'-8"
	6500 1.8	18'-5"	16'-10"	15'-11"	14'-10"	13'-6"	17'-6"	15'-6"	14'-0"	12'-6"	10'-0"	20'-5"	18'-8"	17'-8"	16'-5"	14'-3"
11⅞"	5000 1.7	20'-2"	18'-5"	17'-0"	15'-9"	13'-4"	17'-6"	15'-6"	14'-0"	12'-6"	11'-5"	22'-3"	19'-4"	17'-7"	15'-9"	13'-4"
	6000 1.8	21'-3"	19'-5"	18'-4"	17'-1"	14'-10"	17'-6"	15'-6"	14'-3"	13'-3"	12'-0"	23'-6"	21'-6"	20'-0"	17'-11"	14'-10"
	6500 1.8	21'-11"	20'-0"	18'-11"	17'-7"	14'-10"	16'-6"	15'-7"	14'-9"	13'-3"	12'-5"	24'-3"	22'-2"	20'-11"	18'-10"	14'-10"
	60 2.0	23'-3"	21'-3"	20'-1"	18'-6"	16'-4"	16'-0"	16'-7"	15'-6"	14'-6"	13'-2"	25'-9"	23'-6"	22'-3"	20'-9"	16'-4"
	90 2.0	26'-3"	23'-11"	22'-6"	20'-11"	19'-1"	19'-0"	18'-7"	17'-6"	16'-2"	14'-8"	29'-6"	26'-6"	25'-0"	23'-3"	19'-4"
14"	5000 1.7	22'-11"	21'-0"	19'-8"	18'-2"	13'-11"	19'-0"	16'-5"	15'-6"	14'-5"	13'-1"	24'-4"	21'-0"	19'-2"	17'-2"	13'-11"
	6000 1.8	24'-2"	22'-2"	20'-11"	19'-6"	15'-5"	18'-11"	16'-3"	15'-3"	15'-2"	13'-9"	26'-9"	23'-11"	21'-10"	19'-6"	15'-5"
	6500 1.8	24'-10"	22'-9"	21'-5"	20'-0"	15'-5"	19'-5"	17'-9"	16'-8"	15'-6"	14'-1"	27'-6"	25'-1"	23'-6"	20'-6"	15'-5"
	60 2.0	26'-5"	24'-2"	22'-9"	21'-3"	16'-4"	20'-8"	18'-10"	17'-9"	16'-5"	14'-11"	29'-3"	26'-8"	25'-3"	21'-10"	16'-4"
	90 2.0	29'-9"	27'-1"	25'-6"	23'-8"	19'-6"	23'-3"	21'-1"	19'-9"	18'-4"	16'-7"	32'-10"	30'-0"	28'-3"	26'-0"	19'-6"
16"	6000 1.8	26'-9"	24'-5"	23'-1"	20'-10"	15'-9"	20'-11"	19'-1"	18'-0"	16'-9"	15'-2"	29'-6"	25'-6"	23'-4"	20'-10"	15'-9"
	6500 1.8	27'-5"	25'-1"	23'-8"	21'-5"	15'-9"	21'-6"	19'-7"	18'-5"	17'-2"	15'-7"	30'-4"	26'-11"	24'-6"	21'-5"	15'-9"
	60 2.0	29'-3"	26'-8"	25'-2"	21'-10"	16'-4"	24'-10"	22'-10"	19'-11"	18'-2"	16'-4"	32'-4"	29'-6"	27'-4"	21'-10"	16'-4"
	90 2.0	32'-11"	29'-11"	28'-2"	26'-1"	19'-7"	25'-8"	23'-4"	21'-11"	20'-3"	18'-4"	36'-4"	33'-2"	31'-3"	26'-2"	19'-7"
18"	90 2.0	35'-11"	32'-8"	30'-9"	28'-7"	23'-10"	28'-7"	25'-5"	23'-11"	22'-2"	20'-0"	39'-8"	36'-2"	34'-1"	31'-9"	23'-10"
20"	90 2.0	38'-10"	35'-4"	33'-4"	30'-11"	24'-8"	30'-4"	27'-6"	25'-11"	24'-0"	21'-8"	42'-11"	39'-1"	36'-10"	32'-11"	24'-8"

- Los valores de las tablas están basados en cargas para piso residencial de 40 libras de carga viva por pie cuadrado (40 libras por pie cuadrado de carga muerta para BCI 90 2.0 joists).

  Los valores de las tablas asumen que el entarimado de madera laminada (plywood/paneles de fibras orientadas reforzadas clasificados OSB) de mínimo 23/32 pulgadas se encuentran pegados y clavados a viga para la acción compuesta (las vigas espaciadas a 32 pulgadas en centro requieren entarimado tasado para tal espaciamiento entarimado de madera laminada/paneles de fibras orientadas reforzadas OSB de ⅞ pulgadas).
- Los valores de la tabla representan las aplicaciones de tramo simple o múltiple más conservadoras. Analyze multiple span joists with BC Calc® sizing software if the length of any span is less than half the length of an adjacent span.
- Los valores de la tabla son la maxima distancia despejada permitida entre soportes.
- Los valores de la tabla asumen largos mínimos de soporte sin refuerzo del alma para profundidades de viga de 16 pulgadas y menos
- Floors tile with increased dead load and may require specific deflection limits, contact Boise Cascade EWP Engineering for further information
- Esta tabla fue diseñada para uso con una variedad de aplicaciones. Puede ser posible exceder las limitaciones de esta tabla analizando una aplicación específica con el programa BC Calc® para medidas.

One-Hour Fire Resistance Assembly



See the US version of the Boise Cascade Fire Design & Installation Guide for specific assembly information and other fire resistive options or contact your local Boise Cascade representative.

ICC-ES®/APA® ESR-1336

FIRE ASSEMBLY COMPONENTS

1. Min. 23/32" thick tongue and groove sheathing (exterior glue), installed with long edge perpendicular to joist length, staggered one joist spacing with adjacent sheets, and glued to joists with construction adhesive.
2. BCI® Joists at 24" o.c. or less.
3. Two layers ⅝" Type X or two layers ½" Type C gypsum board, installed per Figures 2 or 3 of ICC-ES®/APA® ESR-1336.

SOUND ASSEMBLY COMPONENTS

When constructed with resilient channels

- Add carpet & pad to fire assembly: STC=54 IIC=68 or
- Add 3½" glass fiber insulation to fire assembly. STC=55 IIC=46 or
- Add an additional layer of minimum ⅝" sheathing and 9½" glass fiber insulation to fire assembly: STC=61 IIC=50

BCI® Joists — Armadura de pisos

NOTA
La figura inferior muestra varios usos sugeridos para los productos de Boise Cascade EWP. No pretende mostrar una casa real en construcción.

NO SE REQUIERE ARRIOSTRADO (PUENTEO) DEL PUNTO MEDIO ENTRE SOPORTES DEL PISO PARA LOS BCI® JOISTS

PARA ESTABILIDAD DE INSTALACIÓN
Instale líneas de refuerzo temporales (1x4 mínimo) centradas a 8 pies, máximo. Sujete en cada viga con un mínimo de 2 clavos 8d.

La madera de dimensión no es adecuada para uso como tabla de orilla en los sistemas de piso BCI®.

F06 F09
Se requiere bloqueo de BCI® Joist o bloque 2x4 de presión a cada lado cuando se esté apoyando por encima un muro de carga.

Al instalar productos EWP de Boise Cascade con madera tratada use solo conectores/ sujetadores que estén aprobados para uso con el correspondiente tratamiento de madera

F15

Cabecero Versa-Lam® LVL or cabecero de BCI® Joist.

Los agujeros ciegos de 1½ pulgadas centrados a aproximadamente 12 pulgadas son orificios pre-perforados.

F58

F15

F01 F02
BCI® rim joist. Ver los detalles del piso a continuación

F07
Boise Cascade Rimboard, ver páginas 6 y 25 de la Guía de Especificaciones para el Oeste.

Ver página 19 para tamaños y ubicación permitidos de agujeros.

F27A

Viga Versa-Lam® LVL

Para detalles de viga voladiza de soporte, ver páginas 18 y 19

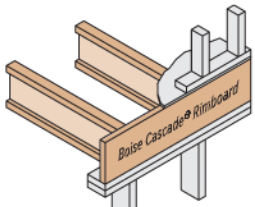
Bloqueo de muro extremo como lo requiere el código de construcción en vigor.

Se requiere bloqueo de BCI® Joist cuando se instalan BCI® Joists en voladizo.

BCI® Joists — Detalles de armadura de pisos

DETALLES DE SOPORTE DE LOS EXTREMOS

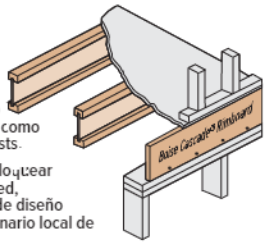
F07



Clave Boise Cascade Rimboard a BCI® Joists con clavo 8d en cada reborde.

Madera aserrada en tamaños corrientes no es adecuada para uso como rim board con BCI® Joists

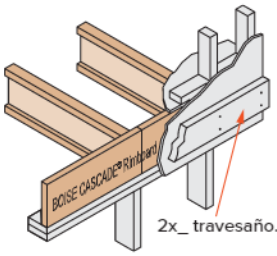
F07A



Madera aserrada en tamaños corrientes no es adecuada para uso como rim board con BCI® Joists.

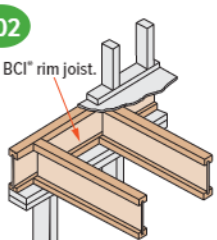
Puede ser necesario bloquear perpendicular a la pared, consultar profesional de diseño de registro y / o funcionario local de construcción.

F07B



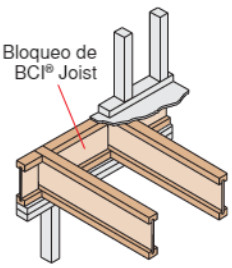
2x_ travesaño.

F02

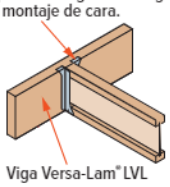


El uso de la vigueta BCI® requiere una pared de 2x6 para un rodamiento de vigueta mínimo.

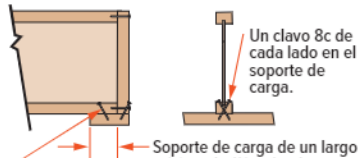
F01



F27A

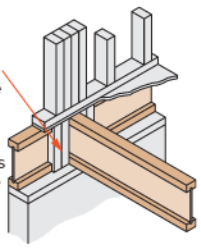


F52

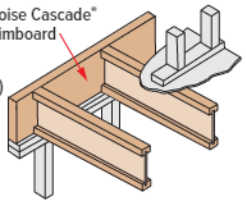


Para limitar partir el reborde, comience clavando al menos 1½ pulgadas a partir del extremo. Los clavos puede que se tengan que colocar en un ángulo para limitar que se parta la placa de apoyo.

F08



F03



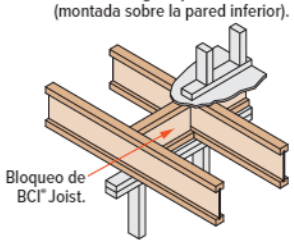
Nota: La viga de piso BCI® (viga de piso BCI®) debe estar conectado para cargar la pared superior cuando no esté montada sobre la pared inferior.

Se requiere bloqueo debajo de los paneles de pared arriostrados y paredes de corte, consulte al profesional de diseño de registro.

DETALLES PARA SOPORTE INTERMEDIO

F06

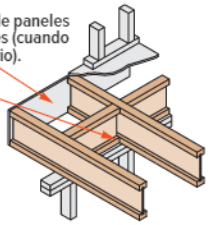
Pared de carga superior (montada sobre la pared inferior).



F05

Aplicación de paneles estructurales (cuando sea necesario).

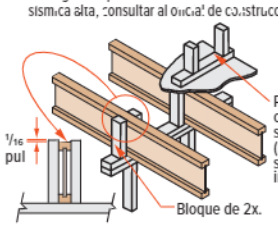
Se requiere bloqueo de BCI® Joist para el voladizo.



Para el voladizo de soporte de carga, consulte las páginas 8 y 9 de la guía del especificador. La evaluación en el tramo posterior realizada no incluyó el diseño de voladizo.

F09

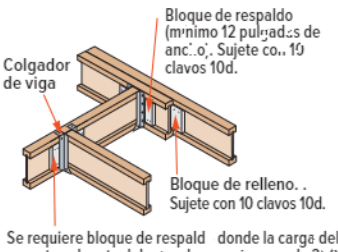
El bloqueo puede ser requerido en soportes intermedios para el diafragma de piso de acuerdo a las áreas de actividad sísmica alta, consultar al oficial de construcción local.



Double Squash Block Vertical Load [lb/ft]				
Size	Joist Spacing [in]			
	12	16	19.2	24
2x4	4463	3347	2789	2231
2x6	7013	5259	4383	3506

1. Squash blocks are to be in full contact with upper floor and lower wall plate.
2. Capacities shown are for a double squash block at each joist SPF or better.

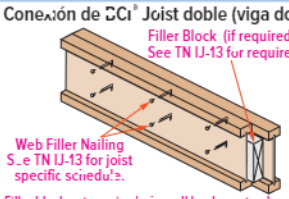
F10



Se requiere bloque de respaldo donde la carga del soporte colgante del reborde superior exceda 250 libras. Instale firmemente al reborde superior.

F58

Conexión de BCI® Joist doble (viga doble)



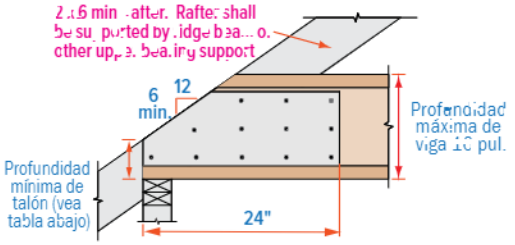
- Filler block not required when all loads are top loaded, are evenly applied to each ply (except BCI® 90 and JS® 25/30). Side loads and/or uneven top loads require filler block.
- See Boise Cascade Technical Note IJ-13 for further information.
- Use full floor sheathing to each ply per diaphragm nailing schedule.

F14

Refuerzo de viga en corte en pendiente

BCI® Joist Refuerza del corte de pendiente

El detalle abajo restaura el valor original del esquileo/reacción a corte del extreme de la BCI® Joist. BCI® Joist no será utilizado como lazo de la tensión del collar o de la viga.



2x blocking required at bearing (not shown for clarity). 7/32" min. plywood/OSB rated sheathing as reinforcement installed with face grain horizontal. Install on both sides of the joist, tight to bottom flange. Leave minimum ¼" gap between reinforcement and bottom of top flange. Apply construction adhesive to contact surfaces and fasten with 2 rows of min. 10d box nails at 6" o.c. Alternate nailing from each side and clinch.

Profundidad mínima de talón						
Soporte de pared de extremo	Inclinación del techo					
	6/12	7/12	8/12	9/12	10/12	12/12
2 x 4	4⅜"	4⅝"	4¼"	4¼"	4¼"	4¼"
2 x 6	3⅜"	3⅝"	2⅝"	2¾"	2¾"	2¼"

SOPORTE LATERAL

- BCI® Joists shall be laterally supported at the ends with hangers, rim board, BCI® rim joist or blocking panels. BCI® blocking panels or rimboard are required at cantilever supports
- Blocking may be required at intermediate bearings for floor diaphragm per IRC in high seismic areas, consult local building official

LONGITUD MÍNIMA DE SOPORTE PARA BCI® JOISTS

- Minimum end bearing: 1½" for all BCI® Joists. 3½" is required at cantilever and intermediate supports.
- Mayor longitud de soporte permite valores de reacción más altos. Vea el informe de la evaluación del código de construcción o el programa de software BC Calc.

REQUISITOS DE CLAVADO

- BCI® rim joist, rim board o panel de cierre a BCI® Joist:
  - Bordes o panel de cierre de un grosor de 15/32 pulgada o mayor con 2 clavos 8d uno en el reborde superior y otro en el reborde inferior
  - BCI® 5000 rim joist: 2 clavos de caja 10d uno en el reborde superior y otro en el reborde inferior
  - BCI® 5000/60 rim joist: 2 clavos de caja 10d uno en el reborde superior y otro en el reborde inferior.
  - BCI® 6500/90 rim joist: Clave en X el reborde superior a la viga de borde con 2 clavos de caja 10d uno por cada lado del reborde.
- BCI® rim joist, rim board o panel de bloqueo BCI® al soporte
  - Mínimo 8d clavos centrados a 6 pulgadas por IRC®.
  - Cuando se use para transferencia de fuerza de empuje, siga las especificaciones del diseñador del edificio.
- BCI® joist al soporte:
  - 2 clavos 8d, uno por cada lado del alma, ubicados a un mínimo de 1½ pulgadas del extremo de la BCI® Joist para evitar que se parta.
- Entarimado a BCI® Joist:
  - Clavar residencial precepto de alrededor de piso requiere los clavos comunes de 8d a 6" o.c. en los bordes y 12" o.c. en el campo Tabla IRC® R602.3(1).
  - Vea el clavo admisible más cercano que espacia los límites en altas en el repaño para diafragma de piso que clava especificado en el espaciamiento más cerca que IRC®.
  - El máximo espaciamiento de clavo para la estabilidad lateral mínima 48" para BCI® 5000 24" para mayor BCI® serie de vigas.
  - Grapas de calibre 14 pueden reemplazar las uñas od, si las grapas penetran en la viga durante un mínimo de 1 pulgada.
  - Los tornillos de madera pueden ser aceptables; para más información, póngase en contacto con el oficial encargado del código local de construcción y/o Boise Cascade EWP Engineering.

DIMENSIONES PARA BLOQUES DE RESPALDO Y DE RELLENO

Serie	Grosor de bloque de respaldo	Grosor de bloque de relleno
5000 1.7	¾" or ⅞" wood panels	Two ¾" wood panels or 2 x
6000 1.8	1⅛" or two ½" wood panels	2 x + 7/16" or ½" wood panel
6500 1.8	1⅛" or two ⅝" wood panels	2 x + ⅝" or ¾" wood panel
60 2.0	1⅛" or two ½" wood panel	2 x + 7/16" or ½" wood panel
90 2.0	2 x lumber	Double 2 x lumber

Corte los bloques de respaldo y de relleno a una profundidad máxima igual a la profundidad del alma menos una ¼ pulgada para evitar un ajuste forzado.

REQUISITOS PARA EL REFUERZO DEL ALMA

Vea en la página 15 "Requisitos para el refuerzo del alma"

PROTEJA LAS BCI® JOISTS DEL TIEMPO (CLIMA)

- Las BCI® Joists están diseñadas sólo para aplicaciones que proporcionan protección permanente del tiempo (clima). Los bultos de BCI® Joists deben almacenarse cubiertas elevadas del suelo y con espaciadores.

BCI® RIM JOISTS Y BCI® BLOQUEO

Profundidad [pul.]	Serie	Capacidad de carga vertical [plf]	
		NO WS.(1)	W.S.(2)
9½"	5000 1.7, 6000 1.8, 6500 1.8	2300	N/A
11⅞"	5000 1.7, 6000 1.8, 6500 1.8	2500	N/A
	60 2.0, 90 2.0	2500	N/A
14"	5000 1.7, 6000 1.8, 6500 1.8	2000	N/A
	60 2.0, 90 2.0	2400	N/A
16"	5000 1.8, 6500 1.8	1900	2500
	60 2.0, 90 2.0	2300	2500
18"	60 2.0, 90 2.0	N/A	2400
20"	90 2.0	N/A	2100

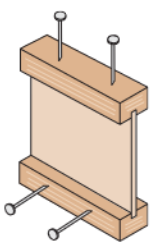
(1) No web stiffeners required at each end or blocking.
(2) Web stiffeners required at each end or blocking. Values not applicable for rim joists.
N/A Not applicable

Espaciamiento mínimo de clavado

BCI® Joists — Tamaño de clavo		Todas las BCI® Joists			
		Clavado perpendicular a las líneas de pegamento (cara ancha)		Clavado paralelo a líneas de pegamento (cara angosta)	
		Espaciamiento centro a centro (pulgadas)	Extremo de viga (pulgadas)	Espaciamiento centro a centro (pulgadas)	Extremo de viga (pulgadas)
8d de caja	(0.113"ø x 2.5")	2	1½	4	1½
8d común	(0.131"ø x 2.5")	2	1½	4	3
10d & 12d de caja	(0.128"ø x 3", 3.25")	2	1½	4	3
16d de caja	(0.135"ø x 3.5")	2	1½	4	3
10d & 12d común & 16d grabador	(0.148"ø x 3", 3.25")	3	2	6	4
16d común	(0.162"ø x 3.5")	3	2	6	4

- Si se aplica más de una fila de clavos, las filas habrán de compensarse por un mínimo de ½ pulgada.
- Los conectores Simpson Strong-Tie A35 pueden colocarse al lado de BCI® bridas de vigas de los años 60 y 90 solamente. Use clavos como especifica el Simpson Strong-Tie; no coloque conectores a ambos lados de un reborde en la misma posición.

BCI® Joists



Clavado perpendicular a las líneas de pegamento (cara ancha)

Clavado paralelo a las líneas de pegamento (cara angosta)

BCI® Joists — Detalles de voladizo de carga

Profundidad de viga [pul]	Serie de viga	Tramo de la armadura del techo [pies]	Carga total del techo [ppc]								
			35			45			55		
			Carga total del techo [ppc]								
			16	19.2	24	16	19.2	24	16	19.2	24
9¼"	5000 1.7	24	0	0	0	0	0	X	0	X	X
		26	0	0	0	0	0	X	0	X	X
		28	0	0	X	0	0	X	0	X	X
		30		0	X	0	X	X	X	X	X
		32	0	0	X	0	X	X	X	X	X
		34		0	X	0	X	X	X	X	X
		36	0	0	X	0	X	X	X	X	X
		38	0	X	X	X	X	X	X	X	X
		40	0	X	X	X	X	X	X	X	X
	6000 1.8	24		0	0	0	0	0	0	0	X
		26	0	0	0	0	0	0	0	0	X
		28		0	0	0	0	1	0	0	X
		30	0	0	0	0	0	X	0	1	X
		32	0	0	0	0	0	X	0	X	X
		34	0	0	0	0	0	X	0	X	X
		36	0	0	WS	0	0	X	0	X	X
		38	0	0	1	0	1	X	0	X	X
		40	0	0	X	0	X	X	1	X	X
	6500 1.8	24	0	0	0	0	0	0	0	0	1
		26	0	0	0	0	0	1S	0	0	X
		28	0	0	0	0	0	1	0	0	X
		30	0	0	0	0	0	1	0	1	X
		32	0	0	0	0	0	X	0	1	X
		34	0	0	0	0	0	X	0	1	X
		36	0	0	1V	0	0	X	0	1	X
		38	0	0	1	0	1	X	0	X	X
		40		0	1	0	1	X	1	X	X
11⅞"	5000 1.7	24	0	0	0	0	0	1S	0	0	X
		26	0	0	0	0	0	1	0	0	X
		28	0	0	0	0	0	1S	0	1	X
		30	0	0	0	0	0	X	0	WS	X
		32	0	0	WS	0	0	X	0	X	X
		34		0	WS	0	0	X	0	X	X
		36	0	0	WS	0	WS	X	0	X	X
		38		0	1	0	1S	X	1S	X	X
		40	0	0	X	0	X	X	X	X	X
	6000 1.8	24	0	0	0	0	0	0	0	0	1
		26	0	0	0	0	0	0	0	0	1
		28		0	0	0	0	1S	0	0	X
		30	0	0	0	0	0	1	0	0	X
		32		0	0	0	0	1	0	1	X
		34	0	0	0	0	0	1	0	1	X
		36	0	0	1V	0	0	X	0	1	X
		38	0	0	1S	0	0	X	0	1	X
		40	0	0	1	0	1V	X	0	X	X
	6500 1.8	24	0	0	0	0	0	0	0	0	1
		26	0	0	0	0	0	0	0	0	1
		28	0	0	0	0	0	0	0	0	X
		30	0	0	0	0	0	1	0	0	X
		32	0	0	0	0	0	1	0	1S	X
		34	0	0	0	0	0	1	0	1	X
		36	0	0	1V	0	0	X	0	1	X
		38	0	0	1S	0	0	X	0	1	X
		40	0	0	1	0	1V	X	0	X	X
	60 2.0	24	0	0	0	0	0	0	0	0	1
		26	0	0	0	0	0	0	0	0	1
		28	0	0	0	0	0	0	0	0	X
		30	0	0	0	0	0	1	0	0	X
		32	0	0	0	0	0	1	0	0	X
		34	0	0	0	0	0	X	0	1	X
		36	0	0	0	0	0	X	0	1	X
		38		0	0	0	0	X	0	1	X
		40	0	0	1	0	0	X	0	X	X
	90 2.0	24		0	0	0	0	0	0	0	0
		26	0	0	0	0	0	0	0	0	0
		28	0	0	0	0	0	0	0	0	0
		30	0	0	0	0	0	0	0	0	0
		32		0	0	0	0	0	0	0	0
		34	0	0	0	0	0	1	0	0	1
		36		0	0	0	0	0	0	0	1
		38	0	0	0	0	0	0	0	0	1
		40	0	0	0	0	0	0	0	0	2

Profundidad de viga [pul]	Serie de viga	Tram. de la armadura de techo [pies]	Carga total del techo [ppc]								
			35			45			55		
			Carga total del techo [ppc]								
			16	19.2	24	16	19.2	24	16	19.2	24
14	5000 1.7	4	U	U	[illegible]	U	[illegible]	[illegible]	0	0	WS
		2	[illegible]	[illegible]	0	0	0	WS	[illegible]	[illegible]	WS
		8	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	WS		0	
		3[illegible]	0	0		0	[illegible]	WS	0	WS	X
		32	[illegible]	0	0	0	[illegible]	WS	[illegible]	WS	X
		34	[illegible]	[illegible]	WS	0	[illegible]		0	WS	[illegible]
		36			WS		0		0	WS	[illegible]
		38	[illegible]	[illegible]	[illegible]VS	[illegible]	[illegible]VS	[illegible]	[illegible]		[illegible]
		40	[illegible]	[illegible]	[illegible]VS	[illegible]	[illegible]VS	[illegible]	[illegible]VS	[illegible]	[illegible]
	6000 1.8	[illegible]	[illegible]	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]VS
		26	[illegible]	0	[illegible]	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]VS
		28	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]VS	0	[illegible]	[illegible]VS
		3[illegible]	[illegible]	[illegible]	0	[illegible]	0	[illegible]VS	0	[illegible]	
		32	[illegible]	[illegible]	0	[illegible]	[illegible]	[illegible]VS	[illegible]	[illegible]	
		34	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]VS	[illegible]	[illegible]VS	[illegible]
		36	[illegible]	0	[illegible]	0	[illegible]	[illegible]VS	[illegible]	[illegible]VS	[illegible]
		38	[illegible]	0	[illegible]VS	0	[illegible]	1	[illegible]	[illegible]VS	[illegible]
		40	[illegible]	[illegible]	[illegible]VS	[illegible]	[illegible]	1	0	1	[illegible]
	6500 1.8	[illegible]	[illegible]	[illegible]	0	[illegible]	[illegible]	[illegible]	[illegible]	0	WS
		26	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	WS
		28	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	WS	[illegible]	[illegible]	WS
		3[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	WS	[illegible]	[illegible]	
		32	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	WS	[illegible]	[illegible]	X
		34	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	WS	0	WS	X
		36	0	0	WS	0	0	WS	0	WS	[illegible]
		38	[illegible]		WS		[illegible]			[illegible]VS	[illegible]
		40	[illegible]	0	0	[illegible]VS	0		0		[illegible]
	60 2.0	4	[illegible]	0	0	0	[illegible]	0		0	[illegible]VS
		26	0	0		0	[illegible]		0		[illegible]VS
		8			0		0	0	0	0	[illegible]VS
		3[illegible]	0	0	0	0	0	[illegible]VS	0		
		32	[illegible]		0		[illegible]	[illegible]VS		0	
		34	0	0		0	[illegible]	[illegible]VS	0	[illegible]	
		36	[illegible]	0	[illegible]	[illegible]	[illegible]	WS	[illegible]	WS	X
		38	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	WS	X
		4[illegible]	[illegible]	[illegible]	WS		0		0		[illegible]
	90 2.0	[illegible]	0	0	0	0	0	[illegible]	0		
		26	[illegible]		0		[illegible]	0	[illegible]	[illegible]	[illegible]
		28	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0	0	0
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		34	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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		38	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		4[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
16	6000 1.8	[illegible]	[illegible]	[illegible]	0	[illegible]	[illegible]	0	[illegible]	[illegible]	WS
		26	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	WS
		8	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0	WS
		3[illegible]	0	0	[illegible]	0	[illegible]	WS	[illegible]	[illegible]	WS
		32	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	WS	[illegible]	[illegible]	WS
		34	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	WS	[illegible]	WS	WS
		36	0	0	[illegible]	0	[illegible]	WS	[illegible]	WS	[illegible]
		38	[illegible]	[illegible]	WS	[illegible]	[illegible]	WS	0	WS	[illegible]
		4[illegible]	[illegible]	[illegible]	WS	[illegible]	0	[illegible]VS	0	[illegible]VS	[illegible]
	6500 1.8	[illegible]	[illegible]	[illegible]	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]VS
		2	0	0		0	[illegible]	[illegible]	0	0	[illegible]VS
		8	[illegible]	0	0	0	[illegible]	[illegible]VS		0	[illegible]VS
		30	0	0		0	[illegible]	[illegible]VS	0		[illegible]VS
		32			0		0	[illegible]VS	0	0	[illegible]VS
		34	0	0	0	0	0	[illegible]VS	0	[illegible]VS	[illegible]VS
		36	[illegible]		0		[illegible]	[illegible]VS		[illegible]VS	[illegible]
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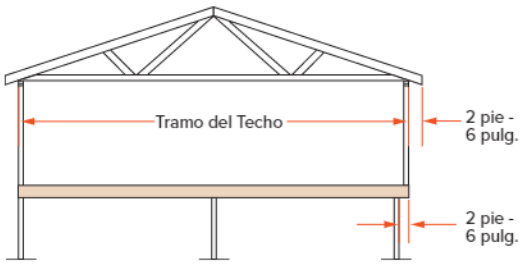
		[illegible]	[illegible]	[illegible]	[illegible]VS	[illegible]	[illegible]	[illegible]VS		[illegible]VS	[illegible]
	60 2.0	24	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	WS
		26	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0	0	WS
		8	[illegible]	0	0	0	[illegible]	[illegible]	[illegible]	[illegible]	WS
		30	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	WS	[illegible]	[illegible]	WS
		32	[illegible]	0	[illegible]	[illegible]	[illegible]	WS	0	0	WS
		34	[illegible]	0	0	0	[illegible]	WS	[illegible]	WS	WS
		36	0	0		0	[illegible]	WS	0	WS	
		38			0		0	WS	0	WS	
		[illegible]	[illegible]	[illegible]	WS	[illegible]	0	WS	[illegible]	[illegible]VS	
	90 2.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		2[illegible]	0	0	[illegible]	0	[illegible]	[illegible]	[illegible]	0	[illegible]
		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		30	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0	[illegible]
		32	[illegible]	[illegible]	0	[illegible]	[illegible]	[illegible]	[illegible]	0	0
		34	[illegible]	0	[illegible]	0	[illegible]	[illegible]	[illegible]	[illegible]	WS
		36	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	WS
		38	0	[illegible]	[illegible]	0	[illegible]	[illegible]	0	[illegible]	WS
		[illegible]	[illegible]	[illegible]	0	[illegible]	[illegible]	0	[illegible]	[illegible]	WS

CLAVE DE LA TABLA

0	No se requiere refuerzo
WS	Refuerzo del alma en el soporte
1	Refuerzos de panel más un refuerzo
2	Refuerzos de panel más dos refuerzos
X	Use viga de más profundidad o espaciamiento más próximo

1. Corte refuerzos de 48 pulgadas con la misma profundidad de la viga. Use entablado de madera laminada/panel de fibras orientadas reforzados tasado OSB de mínimo 23/32 pulgadas, del grado "exposure 1", paneles tasados para tramo 48/24. La fibra de la cara debe ser horizontal (mida la dimensión de 48 pulgadas por el borde largo del panel).
2. Sujete el refuerzo a los rebordes de la viga con clavos 8d, centrados a 6 pulgadas. Cuando se refuerzen los dos lados, habrá que alternar los clavos para que no se partan los rebordes de la viga.
3. Sujete los refuerzos del alma según las especificaciones de clavado de refuerzo del alma que aparecen en la tabla en la página 21.
4. Use el programa de software BC CALC para analizar condiciones que no aparecen en esta tabla. Puede que sea posible exceder las limitaciones de esta tabla analizando una aplicación específica con el programa de software BC Calc®.

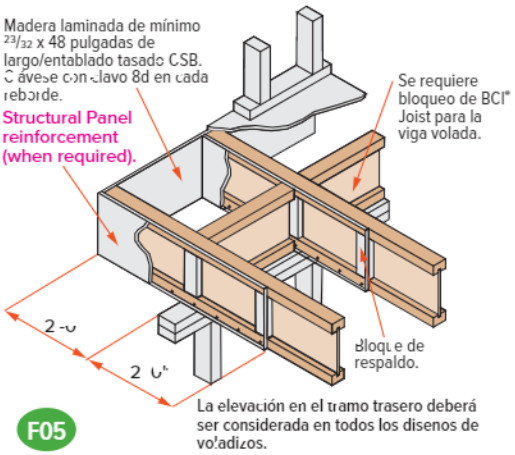
Detalles de voladizo de carga reforzado



- Las tablas y detalles que se muestran enn esta guía indican el tipo de refuerzos si hicieran falta, que se requieren para vigas voladas de soporte de carga de hasta un largo máximo de 2 pies, 0 pulgadas. Vigas voladas de un largo mayor de 2 pies, 0 pulgadas no se pueden reforzar **No obstante, vigas voladas más largas con cargas menores puede que se permitan sin llevar refuerzo. Analice aplicaciones específicas con el programa de software de BC Calc.**

REFUERZO DE MADERA LAMINADA/ENTABLADO OSB (si así se requiere de acuerdo a la tabla de viga volada de soporte)

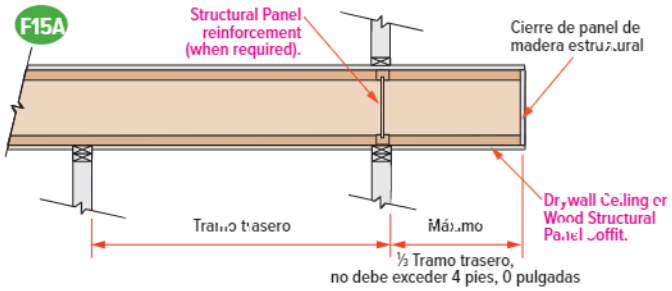
- Madera laminada de mínimo 23/32 x 48 pulgadas de largo/entablado tasado OSB debe igualar la profundidad completa de la BCI® Joist. Clávese a la BCI® Joist con clavos 8d a 6 pulgadas en centro y clávese con 4 clavos 8d en el bloque de respaldo. Cuando se refuerzan ambos lados, alterne los clavos para evitar que se parta la madera. Instalar con la fibra de cara horizontal
- The tables on page 19 assume a wall weight of 100 plf in addition to the roof loading shown. Applications with loading that exceeds the loads shown shall be analyzed with BC Calc® software.
- Estos requisitos suponen una carga de pared de 100 PLF. Es posible que se requiera soporte adicional para otras cargas. consulte el software BC Calc®.



La elevación en el tramo trasero deberá ser considerada en todos los diseños de voladizos.

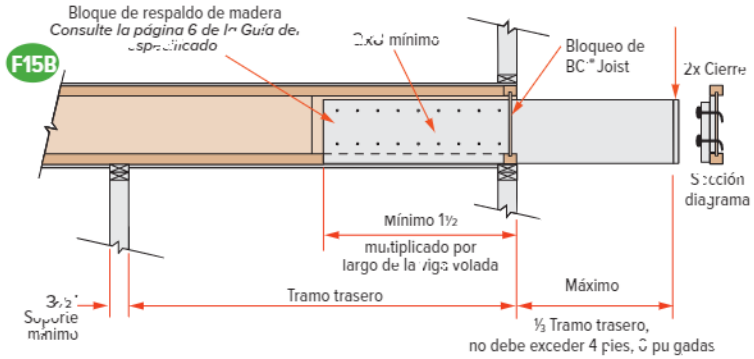
Detalles de voladizo con pared sin carga

BCI® Joists are intended only for applications that provide permanent protection from the weather. Impervious moisture barrier systems shall be detailed and installed in detail F15A and F15B in accordance with 2018 IBC® Sections 107.2.5 and 110.3.8.



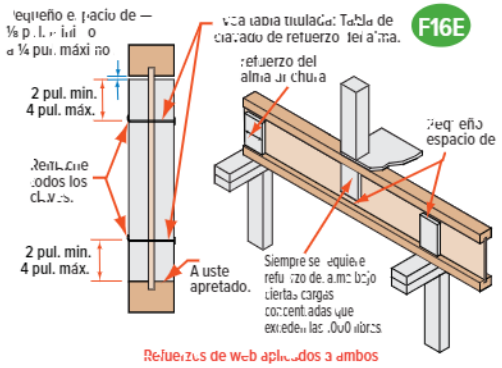
- Analizar la condición de voladizo BCI® Joist con el software BC Calc®.

Sujete el 2x8 mínimo al BCI® Joist clavando a través del bloque de respaldo y alma de la viga con 2 filas de clavos 10d, centrados a 6 pulgadas. Use clavos 16d con BCI® 90 2.0 joists. Remache todos los clavos.



- Loading shall not exceed 60 psf live load and 10 psf dead load. At least three joist members shall be present and spaced at 24" o.c. or less.
- Lumber joist shall be No. 2 Dense Southern Pine, No. 2/No.2 SPF, No.2 Hem-fir, or No.2 Douglas fir or higher grade.
- Provide positive drainage, durable materials, and venting as required in 2018 IBC Sections 2304.12.2.5 and 2304.12.2.6. Lumber joist shall be sloped.

Requisitos para refuerzo del alma



Refuerzo del alma de panel estructural

Serie	Para la capacidad estructural (Grueso mínimo)	Restricción lateral en percha	Anchura mínima
5000 1.7	5/8"	3/4	2-5/16"
6000 1.8	3/4"	7/8"	2-5/16"
6500 1.8	3/4"	1" or 1⅛"	2-5/16"
60 2.0	3/4"	7/8"	2-5/16"
90 2.0	madera de construcción 2x4 (vertical)		

Notas

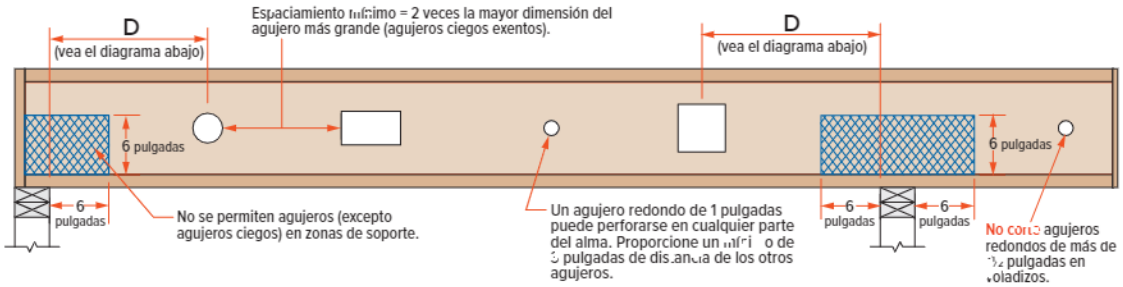
- Los refuerzos del alma son opcionales, excepto como queda especificado en lo siguiente.
- Siempre se requiere refuerzo del alma en los colgadores que no se extienden a proporcionar soporte al reborde superior de la BCI® Joist. Se pueden requerir refuerzos del alma con ciertos tipos de colgadores con sesgue o ángulo o para lograr valores de elevación. Vea los requisitos de instalación del fabricante del colgador.
- Siempre se requieren refuerzos del alma en ciertas aplicaciones de techo. Ver "Detalles de armadura de techos" en la página 22-23.
- Siempre se requiere refuerzo del alma bajo ciertas cargas concentradas que exceden las 1000 libras. Instale los refuerzos de panel pegados al reborde superior en esta situación. Siga las especificaciones de clavado para soportes de carga intermedios.
  Web stiffeners may be cut from structural rated wood panels, engineered rimboard or 2x lumber (BCI® 90 only.)
- For Structural Capacity: Web stiffeners needed to increase the BCI® Joist's reaction capacity at a specific bearing location
- Lateral Restraint in Hanger: Web stiffeners required when hanger does not laterally support the top flange (e.g., adjustable height hangers). Web stiffeners may be of multiple thickness (e.g., BCI® 6500, double ½" panel OK).
- Se pueden usar los refuerzos del alma para aumentar los valores de reacción permitidos. Vea la guía de especificaciones o el programa de software BC Calc®.

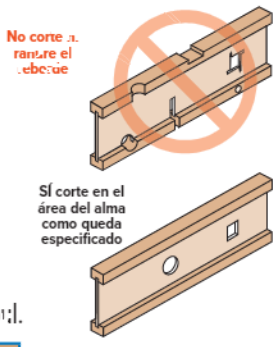
Tabla de clavado de refuerzo del alma

Serie de Viga	Profundidad de Viga	Ubicación del soporte de carga	
		Final/Extremo	Intermedio
5000 1.7	9½"	2-8d	2-8d
	11⅞"	2-8d	3-8d
	14"	2-8d	5-8d
	16"	2-8d	6-8d
6000 1.8	9½"	2-8d	2-8d
	11⅞"	2-8d	3-8d
	14"	2-8d	5-8d
	16"	2-8d	6-8d
6500 1.8	9½"	2-8d	2-8d
	11⅞"	2-8d	3-8d
	14"	2-8d	5-8d
	16"	2-8d	6-8d
60 2.0	11⅞"	2-8d	3-8d
	14"	2-8d	5-8d
	16"	2-8d	6-8d
90 2.0	11⅞"	3-16d	3-16d
	14"	5-16d	5-16d
	16"	6-16d	6-16d
	18"	7-16d	7-16d
	20"	8-16d	8-16d

Posición y tamaños de agujeros en BCI® Joists

BCI® Joists se fabrican con agujeros ciegos de perforado redondo de 1½ pulgadas en el alma centrados a aproximadamente 12 pulgadas





Distancia mínima del soporte, en la lista siguiente de la tabla, es necesario para todos los agujeros mayores que 1½ pul.

Distancia mínima (D) de cualquier soporte a la línea central del agujero

Diámetro de agujero redondo (pul.)		2	3	4	5	6	7	8	8⅞	10	11	12	13	14	15
Lado de agujero rectangular (pul.)		-	-	-	3	5	7	-	-	-		-	-	-	-
Cualquier viga de 9½ pul.	Tramo [pies] 8	1'-0"	1' 1"	1'-8"	2'-4"	2'-11"	3'-7"								
	12	1'-0"	1' 7"	2'-7"	3'-6"	4'-5"	5' 4"								
	16	1'-0"	2'-2"	3'-1"	4'-8"	5'-11"	7' 2"								
Diámetro de agujero redondo (pul.)		2	3	4	5	6	7	8	8⅞	10	11	12	13	14	15
Lado de agujero rectangular (pul.)		-	-	-	2	3	5	7	8	-		-	-	-	-
Cualquier viga de 11⅞ pul.	Tramo [pies] 8	1'-0"	1' 1"	1'-6"	2'-0"	2'-5"	2' 11"	3'-5"	3'-10"						
	12	1'-0"	1' 7"	2'-3"	3'-0"	3'-8"	4'-5"	5'-1"	5'-9"						
	16	1'-2"	2'-1"	3'-0"	4'-0"	4'-11"	5' 10"	6'-10"	7'-8"						
	20	1'-5"	2'-7"	3'-10"	5'-0"	6'-2"	7' 4"	8'-6"	9'-7"						
Diámetro de agujero redondo (pul.)		2	3	4	5	6	7	8	8⅞	10	11	12	13	14	15
Lado de agujero rectangular (pul.)			-	-	-	2	3	5	6	8	9	-	-		-
Cualquier viga de 14 pul.	Tramo [pies] 8	1'-0"	1'-1"	1'-2"	1'-2"	1' 6"	1'-11"	2'-4"	2'-9"	3'-3"	3'-8"				
	12	1' 0"	1'-1"	1'-2"	1'-7"	2' 3"	2'-11"	3'-6"	4'-1"	4'-10"	5'-6"				
	16	1'-0"	1'-1"	1'-3"	2'-2"	3'-0"	3' 10"	4'-9"	5'-6"	6'-6"	7' 4"				
	20	1'-0"	1' 1"	1'-7"	2'-8"	3'-9"	4'-10"	5'-11"	6'-10"	8'-1"	9'-2"				
	24	1'-0"	1' 1"	1'-11"	3'-3"	4'-6"	5'-10"	7'-1"	8'-3"	9'-9"	11' 0"				
Diámetro de agujero redondo (pul.)		2	3	4	5	6	7	8	8⅞	10	11	12	13	14	15
Lado de agujero rectangular (pul.)		-		-	-	-	2	3	5	6	8	9	10	-	
Cualquier viga de 16 pul.	Tramo [pies] 8	1'-0"	1' 1"	1'-2"	1'-2"	1'-3"	1'-3"	1'-7"	1'-11"	2'-4"	2'-9"	3'-2"	3'-7"		
	12	1'-0"	1' 1"	1'-2"	1'-2"	1' 3"	1'-9"	2'-4"	2'-11"	3'-7"	4'-2"	4'-9"	5'-4"		
	16	1' 0"	1'-1"	1'-2"	1'-2"	1'-7"	2'-5"	3'-2"	3'-10"	4' 9"	5'-7"	6'-4"	7'-2"		
	20	1' 0"	1'-1"	1'-2"	1'-2"	2' 0"	3'-0"	4'-0"	4'-10"	5' 11"	6'-11"	7'-11"	8'-11"		
	24	1'-0"	1'-1"	1'-2"	1'-3"	2' 5"	3'-7"	4'-9"	5'-10"	7' 2"	8'-4"	9'-6"	10'-9"		
Diámetro de agujero redondo (pul.)		2	3	4	5	6	7	8	8⅞	10	11	12	13	14	15
Lado de agujero rectangular (pul.)		-		-	-	-	-	2	3	5	6	7	9	10	11
18 pul. BCI® 90 2.0 Joist	Tramo [pies]] 12	1'-0"	1'-1"	1'-2"	1'-2"	1'-5"	1' 11"	2'-4"	2'-9"	3'-3"	3' 9"	4'-2"	4'-8"	5'-1"	5'-7"
	16	1'-0"	1' 1"	1'-2"	1'-4"	1'-11"	2' 7"	3'-2"	3'-8"	4'-5"	5'-0"	5'-7"	6'-3"	6'-10"	7' 5"
	20	1'-0"	1' 1"	1'-2"	1'-8"	2'-5"	3'-3"	4'-0"	4'-8"	5'-6"	6'-3"	7'-0"	7'-9"	8'-7"	9' 4"
	24	1' 0"	1' 1"	1'-2"	2'-0"	2'-11"	3' 10"	4'-9"	5'-7"	6'-7"	7'-6"	8'-5"	9'-4"	10' 3"	11'-2"
	28	1' 0"	1'-1"	1'-4"	2'-5"	3'-5"	4'-6"	5'-7"	6'-6"	7' 9"	8'-9"	9'-10"	10'-11"	12' 0"	13'-1"
Diámetro de agujero redondo (pul.)		2	3	4	5	6	7	8	8⅞	10	11	12	13	14	15
Lado de agujero rectangular (pul.)		-	-	-	-		-	-	2	3	5	6	7	8	10
20 pul. BCI® 90 2.0 Joist	Tramo [pies] 12	1' 0"	1'-1"	1'-2"	1'-2"	1'-3"	1'-6"	1'-11"	2'-3"	2' 9"	3'-2"	3'-7"	3'-11"	4'-4"	4' 9"
	16	1'-0"	1' 1"	1'-2"	1'-2"	1'-6"	2' 1"	2'-7"	3'-1"	3'-8"	4' 3"	4'-9"	5'-3"	5'-10"	6'-4"
	20	1'-0"	1'-1"	1'-2"	1'-3"	1'-11"	2' 7"	3'-3"	3'-10"	4'-7"	5' 3"	5'-11"	6'-7"	7'-4"	8'-0"
	24	1'-0"	1' 1"	1'-2"	1'-6"	2'-4"	3' 1"	3'-11"	4'-7"	5'-6"	6'-4"	7'-2"	7'-11"	8'-9"	9' 7"
	28	1'-0"	1'-1"	1'-2"	1'-9"	2'-8"	3' 8"	4'-7"	5'-5"	6'-6"	7' 5"	8'-4"	9'-3"	10' 3"	11'-2"

- Seleccione una fila de la tabla basada en la profundidad y tramo actual de la viga redondeando al siguiente tramo en la tabla.

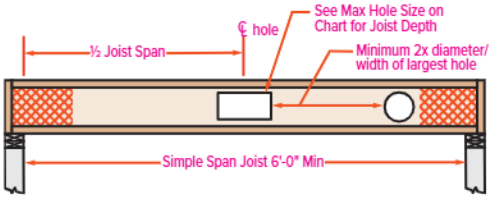
  Revise la fila hasta encontrar la columna que muestre el diámetro de agujero redondo o de lado rectangular apropiado.

  Use el lado más largo de un agujero rectangular. El valor de la tabla indica la distancia más corta permitida de la línea central del agujero a la línea central del soporte más cercano.
- Se puede recortar el alma entero. NO CORTE los rebordes. Los agujeros se aplican a las vigas sencillas o múltiples en condiciones de miembros repetitivos.
- Para agujeros múltiples la cantidad de alma sin cortar entre los agujeros debe ser igual a un mínimo del doble del diámetro o del lado más largo del agujero más grande.
- Los agujeros ciegos redondos de 1½ pulgadas en el alma pueden perforarse usando un trozo corto de tubería metálica y un martillo.
- Los agujeros pueden posicionarse verticalmente en cualquier parte del alma. La viga puede acomodarse con los agujeros de 1½ pulgadas volteados hacia arriba o hacia abajo.
- Esta tabla fue diseñada para aplicarla a las condiciones de diseño cubiertas en otras tablas de esta publicación. Use el programa BC CALC® para verificar otros tamaños de agujeros o agujeros bajo otras condiciones de diseño. Puede que sea posible exceder las limitaciones de esta tabla analizando una aplicación específica con el programa de software BC CALC®.

Large Rectangular Holes in BCI® Joists

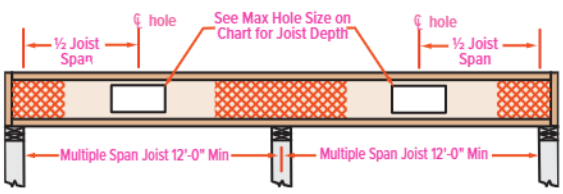
Hole size table based on maximum uniform load of 40 psf live load and 10 psf dead load, at maximum spacing of 24" on-center.

Single Span Joist



Joist Depth	Maximum Hole Size	
	Simple Span	Multiple Span
9½"	6" x 14"	6" x 12"
11⅞"	7" x 16" 8" x 15"	8" x 12"
14"	9" x 16" 10" x 12"	8" x 15"
16"	9" x 18" 11" x 16"	10" x 14"

Multiple Span Joist



Notes:

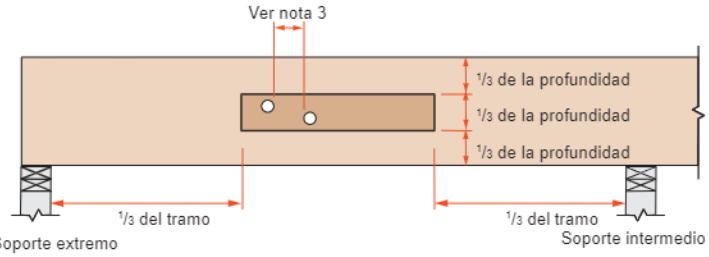
Additional holes may be cut in the web provided they meet the specifications as shown in the hole distance chart shown above or as allowed using BC Calc® sizing software.

Larger holes may be possible for either Single or Multiple span joists; use BC Calc® sizing software for specific analysis.

Agujeros permitidos en Vigas Versa-Lam®

Notes

1. No se permiten agujeros cuadrados ni rectangulares.
2. Pueden taladrarse agujeros redondos con un serrucho de agujeros en cualquier área sombreada de la viga.
3. La distancia horizontal entre agujeros contiguos debe ser por lo menos el doble de la medida del agujero más grande.
4. No taladre más de tres agujeros de acceso en una sección de cuatro pies de cualquier viga.
5. El tamaño máximo permitido para agujero redondo es de.



Profundidad de viga	Diámetro máximo de agujero
5½"	¾"
7¼"	1"
9¼ pul. y más	2"

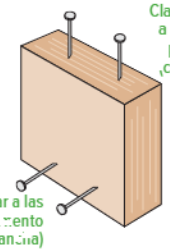
6. Estas limitaciones se aplican sólo a los agujeros taladrados para acceso de fontanería o alambrado. El tamaño y la ubicación de los agujeros taladrados para fiadores están regulados por las disposiciones de las "Las especificaciones nacionales de diseño para la construcción de madera (*National Design Specifications for Wood Construction*).
7. Beams deflect under load. Size holes to provide clearance where required.
8. Esta tabla de agujeros es válida sólo para vigas que soportan carga uniforme. Para vigas que soportan cargas concentradas o para vigas con agujeros más grandes, comuníquese con Ingeniería de Boise Cascade EWP.

Espaciado de uñas más cercano y permitido

Productos Versa-Lam® LVL Tamaño de clavo		Clavado paralelo a las líneas de pegamento (cara angosta) [1]						Clavado perpendicular a las líneas de pegamento (cara ancha)	
		Versa-Lam® LVL 1¾"		Versa Lam® LVL 1¼		Versa Lam® LVL 3½" & Wider		Todos los productos	
		Espaciamiento centrado (pulgadas [4])	Extremo de viga (pulgadas)	Espaciamiento centrado (pulgadas)	Extremo de viga (pulgadas)	Espaciamiento centrado (pulgadas)	Extremo de viga (pulgadas)	Espaciamiento centrado (pulgadas)	Extremo de viga (pulgadas)
8d de caja	(0.113"ø x 2.5")	3	1½	2	1	2	½	2	½
8d común	(0.131"ø x 2.5")	3	2	3	2	2	1	2	1
10d & 12d de caja	(0.128"ø x 3", 3.25")	3	2	3	2	2	1	2	1
16d de caja	(0.135"ø x 3.5")	3	2	3	2	2	1	2	1
10d & 12d común & 16d grabador	(0.148"ø x 3", 3.25")	4	3	4	3	2	2	2	2
16d común	(0.162"ø x 3.5")	6	4	6	3	2	2	2	2

- Acode y alterne las filas de clavos del entarimado y placa de asiento de la pared.
- Conectores Simpson Strong-Tie A35 y LPT4 pueden conectarse al lado de Versa-Lam® LVL. Use clavos de acuerdo a las especificaciones de Simpson Strong-Tie.

Productos Versa-Lam® LVL & Versa Rim®



Notas de clavado

1) Para grosor de 1¾ pulgadas y más, se permiten 2 filas de clavos (como para correa de metal) – (use desplazamiento horizontal mínimo de ½ pulgada entre las filas y alterne los clavos).

Características de Boise Cascade Rimboard

1⅛" Boise Cascade® Rimboard OSB

1¼" Versa-Strand® 0.8 (Durastrand®)

1⅝" Versa-Lam® LVL 1.5E 1800

★Es posible que el producto no esté disponible. Consulte con el proveedor o el representante de Boise Cascade para conocer la disponibilidad.

Producto	Type	Capacidad de carga vertical – Uniforme [plf] – 12 Pul. Profundidad o menos	Capacidad de carga vertical – Uniforme [plf] – 18 & 20 Pul. Profundidad	Capacidad de carga vertical – Punto [lb] – 16 Pul. Profundidad o menos	Capacidad de carga vertical – Punto [lb] – 18 & 20 Pul. Profundidad	Máxima capacidad lateral del diafragma del piso [libras/pies]	Gravedad especifica para el diseño lateral de uñas	Valores de diseno permitidos – Tension flexional [lb/in²]	Módulo de elasticidad [lb/in²]	Cortante horizontal [lb/in²]	Compresión perpendicular a la fibra [lb/in²]
1⅛" Boise Cascade® Rimboard OSB [2]	OSB	4850	3200	3500	3500	200	0.5	Capacidades de tramo limitadas, ver nota 2			
1¼" Versa-Strand™ 0.8 (Dura-Strand) [3]	OSB	5700	3500	5900	5500	240 / 8d nails @ 6" o.c. 330 w/ 8d nails @ 4" o.c.	---[3]	1130	800,000	355	1415
1⅝" Versa-Lam® LVL 1.5E 1800 [1]	LVL	6000	5450	4450	4450	Permitido por el código de construcción para todos los diafragmas de piso armado de 2 pulgadas de grosor de espesor bloqueados y desbloqueados (4" espaciado de uñas y mayor)	0.5	1800	1,400,000	225	525

Espaciamiento más cercano entre clavos permitido - Lado angosto [pul.]		Producto – 1⅛" Boise Cascade® RimBoard [4] / 1⅛" Boise Cascade® Rimboard OSB [4]	1⅛" Boise Cascade® Rimboard OSB [2]	1⅝" Versa-Lam® LVL 1.5E 1800 [1]	1¼" Versa-Lam® LVL 2.1 1800 [1]
8d de caja	(0.113"ø x 2.5")	3	-	3	3
8d común	(0.131"ø x 2.5")	3	-	-	-
10d & 12d de caja	(0.128"ø x 3", 3.25")	Ver nota 2 para información sobre el clavado		3	3
16d de caja	(0.135"ø x 3.5")			3	3
10d & 12d común & 16d grabador	(0.148"ø x 3", 3.25")			[4]	[4]
16d común	(0.162"ø x 3.5")			[4]	[4]

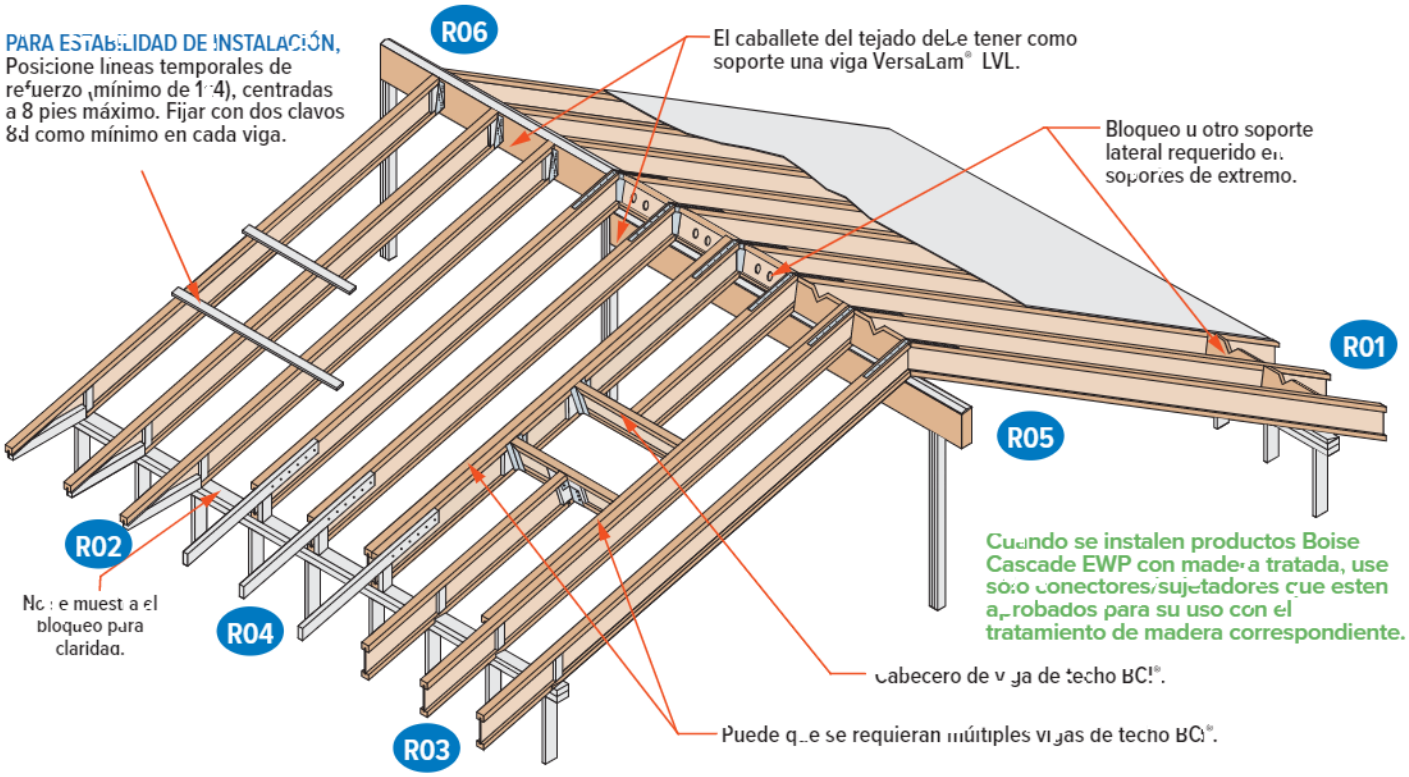
Notas

1. Ver "CC-ES®/APA® ESR-1040 para más información del producto.
2. Ver rendimiento de Rim Boards, *APA® Form No. W345N* para información de producto adicional.

Las vigas BCI®, Versa-Lam® y ALLOIST® se deben almacenar, instalar y usar según esta Guía de instalación, los códigos de construcción, y de forma que sea consistente con esta Guía de instalación, y según las prácticas normales y usuales de construcción. Las vigas Versa-Lam®, ALLOIST® y BCI® deben ser envueltas, cubiertas, y elevadas del suelo en espaciadores a toda hora antes de ser instaladas. Las vigas versa-Lam®, ALLOIST® y BCI® joists están diseñadas para usos que aseguran que no serán expuestas a la intemperie o a los elementos y en un ambiente libre de humedad de cualquier tipo, cualquier plaga, organismo o sustancia que descomponga o dañe la madera o las uniones de pegamento. El incumplimiento de las instrucciones para almacenamiento, uso o instalación correcta de las vigas Versa Lam®, ALLOIST® y BCI® de acuerdo a la Guía de Instalación de Boise Cascade EWP, anulará la garantía limitada.

Vigas de techo BCI®

Detalles adicionales para armadura de pisos se encuentran disponibles a través del programa de software BC Framer



Advertencia de Seguridad

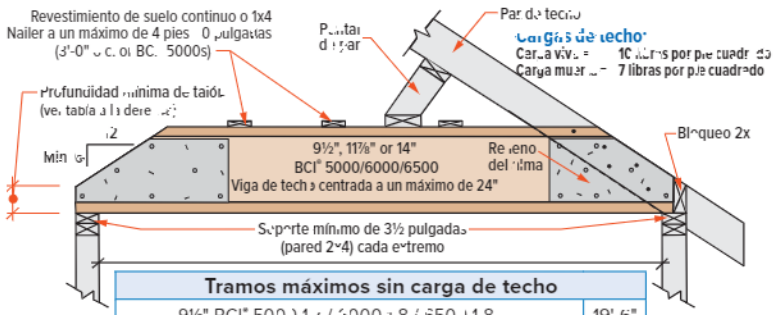
NO PERMITA TRABAJADORES EN BCI® JOISTS HASTA QUE NO SE HAYAN INSTALADO TODOS LOS COLGADORES, BCI® RIM JOISTS (VIGAS DE BORDE BCI®), RIMBOARDS (TABLAS DE BORDE), BCI® BLOCKING PANELS (PANELES DE BLOQUEO BCI®), ARRIOSTRAMIENTO EN "X" Y LINEAS DE SOPORTE TEMPORAL 1X4 TAL COMO QUEDA ESPECIFICADO ABAJO.

ACCIDENTES SERIOS POR FALTA DE ATENCION AL ARRIOSTRAMIENTO (SOPORTE) CORRECTO DURANTE LA CONSTRUCCION. LOS ACCIDENTES PUEDEN EVITARSE BAJO CIRCUNSTANCIAS NORMALES, SI SE OBSERVAN LAS SIGUIENTES PAUTAS:

- Construya una pared arriostrada a los extremos del recuadro o instale permanentemente los primeros ocho pies de BCI® Joists y el primer plano de entarimado. De otra forma, se puede clavar un entarimado provisional en los primeros cuatro pies de BCI® Joists en el extremo del recuadro
- Todos los colgadores BCI® rim joists, rimboards, BCI® blocking panels y arriostramiento en "X", deben estar completamente instalados y correctamente clavados conforme se vaya.
- Se deben instalar líneas de refuerzo provisionales de 1x4, a una distancia máxima de ocho pies en centro conforme se vayan acomodando BCI® Joists adicionales. Clave las líneas del puntal al área envainada o pared del final vigorizada, y a cada Viga BCI® con dos 8d clavos.
- Los extremos de voladizos deben estar sujetados temporalmente por líneas de refuerzo en los rebordes superiores e inferiores
- Enderece las BCI® Joists a una alineación de menos de pulgada de variación de la alineación justa antes de sujetar las líneas de refuerzo y el entarimado.
- Remueva las líneas de refuerzo temporal solo conforme sea necesario para instalar el entarimado permanente.
- El no instalar el arriostramiento provisional puede resultar en que las vigas se encorven de lado o se voltéen bajo una carga ligera de construcción.
- No apile materiales de construcción (entarimado, muro en seco – drywall,etc.) en el medio de los tramos entre las BCI® Joists. Póngase en contacto con Ingeniería Boise EWP para información de almacenaje apropiado y apuntalamiento.

BCI® Ceiling Joist (Viga de techo BCI®) con corte de bisel en el extremo (sólo para desvanes de acceso limitado)

La viguetа de BCI® no será utilizada para collar/lazo de tensión. El viga de la azotea será apoyado por la viga del techo u otro soporte de rodadura superior.



Tramos máximos sin carga de techo	
9½" BCI® 5000 1.7 / 6000 1.8 / 6500 1.8	19'-6"
11⅞" BCI® 5000 1.7 / 6000 1.8 / 6500 1.8	22'-0"
14" BCI® 5000 1.8 / 6500 1.8	24'-0"

(Si existe carga de techo, vea las notas 2 y 3 de abajo)

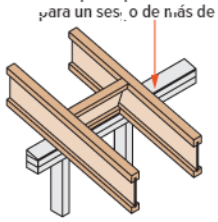
Profundidad mínima de talón	Profundidad de viga	pared de extremo	
		2 x 4	2 x 6
	9½"	2½"	1½"
	11⅞"	3½"	2½"
	14"	4½"	3½"

Notas:

1) El detalle es para que se use sólo con vigas de techo sin acceso al espacio de desván.
2) La viga de techo debe ser diseñada para llevar toda la carga del techo transferida por los puntales de par como queda mostrado.
3) La reacción al extremo de la viga de techo BCI® no debe exceder 550 libras.
4) La inclinación de techo mínima es 6/12.
5) Clave la par al BCI® top flange (reborde superior BCI®) con clavos 1-10d de caja (3 pulgadas de largo).
6) El clavado de 1x4 debe ser continuo y clavado a la pared extrema apuntalada.
7) Instalar un refuerzo del alma en cada lado del BCI® Joist al extremo biselado. Clavar la par al BCI® Joist de acuerdo a los requisitos del código de construcción para la conexión de viga de techo a la par.

Detalles adicionales para armadura de techos se encuentran disponibles a través del programa de software BC Framer®

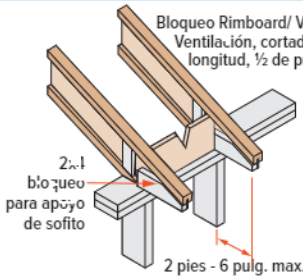
R01



Se requiere placa biselada de 2x para un sesgo de más de 3/12

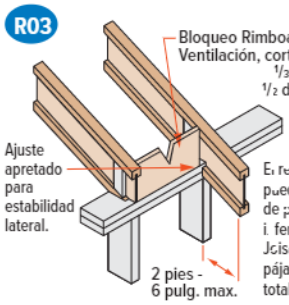
Se pueden usar conectores Simpson VPA o USP TMP o sus iguales, en lugar de la placa biselada para sesgos de 3/12 a 12/12.

R02



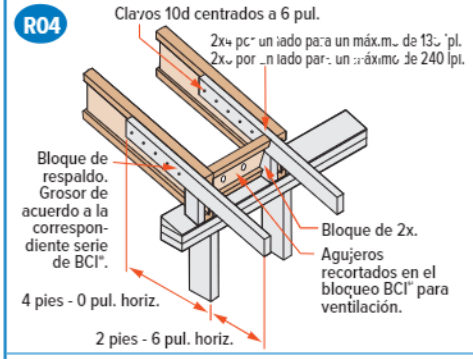
El reborde BCI® Joists puede ser cortado en pico de pájaro sólo al extremo inferior de la viga. Un BCI® Joist con corte de pico de pájaro debe soportar totalmente en la placa. Se requiere refuerzo de alma a cada lado. El reborde de fondo deberá estar totalmente soportado.

R03

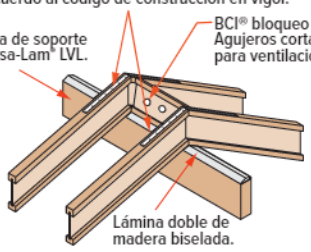


El reborde de BCI® Joists puede ser cortado en pico de pájaro sólo al extremo inferior de la viga. Un BCI® Joist con corte de pico de pájaro debe estar soportado totalmente en la solera; se requiere refuerzo del alma por cada lado.

R04

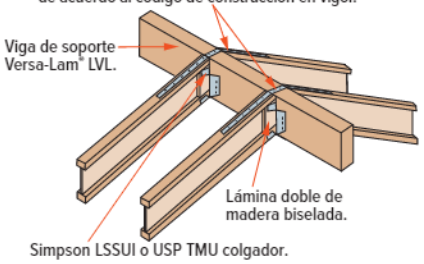


R05

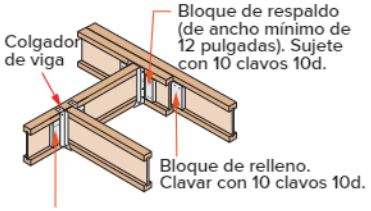


El bloqueo en ambos lados de la cresta puede ser necesario para la transferencia de cizallamiento por diseño profesional de registro.

R06

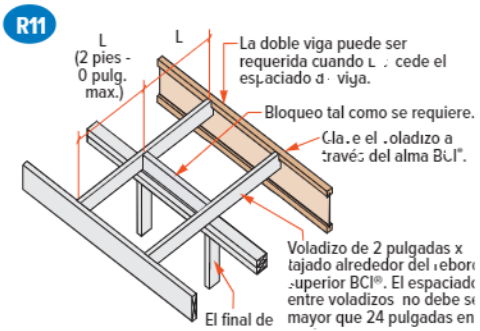


R07

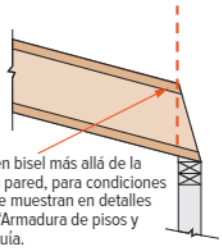


Se requiere bloque de respaldo donde la carga del colgador de viga exceda 250 libras. Instalar apretado a la brida superior

R11



DN05



No corte la viga en bisel más allá de la cara interior de la pared, para condiciones específicas que se muestran en detalles en la sección de "Armadura de pisos y techos" en esta guía.

NOTAS PARA DETALLES DE ARMADURA DE TECHOS

SOPORTE LATERAL

- BCI® Joists must be laterally supported at end supports (including supports adjacent to overhangs) with hangers, rimboard, or blocking (Versa-Lam® LVL, Boise Cascade Rimboard or BCI® Joist, metal cross-bracing or other bracing provides adequate lateral support for BCI® Joists. Consult governing building code for roof diaphragm connection provisions.

LONGITUD MÍNIMA DE SOPORTE PARA BCI® JOISTS

- Minimum end bearing: 1½" for all BCI® Joists. 3½" is required at cantilever and intermediate supports.
- Mayor longitud de soporte permite valores de reacción más altos. Ver el informe de la evaluación del código de construcción o el programa de software BC Calc™.

REQUISITOS DE CLAVADO

- BCI® rim joist, rim board o panel de cierre a BCI® Joist:
  - Borde o panel de cierre de un grosor de 15/32 pulgadas o menos 2 clavos 8d, uno en el reborde superior y otro en el reborde interior.
  - BCI® 5000 rim joist: 2 clavos de caja 10d, uno en el reborde superior y otro en el reborde interior.
  - BCI® 6000/60 rim joist: 2 clavos de caja 10d, uno en el reborde superior y otro en el reborde inferior.
  - BCI® 6500/90 rim joist: Clave en X el reborde superior a la viga de borde con 2 clavos de caja 10d, uno por cada lado del reborde.

  BCI® rim joist, rim board o panel de bloqueo BCI® al soporte:
  - Mínimo 8d clavos centrados a 6 pulgadas por IRC®.
  - Cuando se use para transferencia de fuerza de empuje, siga las especificaciones del diseñador del edificio.
- BCI® joist al soporte:
  - 2 clavos 8d, uno por cada lado del alma, ubicados a un mínimo de 1 pulgadas del extremo de la BCI® Joist para evitar que se parta.
- BCI® joist la cubierta:
  - Clavar residencial preservativo de enfundar de piso residencial prescriptivo requerido 8 clavos comunes - centrados a 6 pul. en los bordes y centrados a 12 pul. en el campo (IRC® Tabla R602.3(1)).
  - Vea el clavado admisible más cercano que espacia los límites en altas entrepano para diafragma de piso que clava especificado en el espaciamiento mas cerca que IRC® en página 17.
  - El máximo espaciamiento de clavo para la estabilidad lateral mínima. 12" para BCI® 4000s, 5000s, 24" para mayor BC® serie de vigas.
  - Grapas de calibre 18 pueden reemplazar las uñas 8d, si las grapas penetran en la viga durante un mínimo de 1 pulgada.
  - Los tornillos de madera pueden ser aceptables; para más información, póngase en contacto con el oficial encargado del código local de construcción y/o Boise Cascade EWP Engineering.

DIMENSIONES PARA BLOQUES DE RESPALDO Y DE RELLENO

Serie	Grosor de bloque de respaldo	Grosor de bloque de relleno
5000 1.7	paneles de madera de 15/32 o 7/8 pul.	2 paneles de madera de ¾ pul. o 2x
6000 1.8	paneles de madera de 15/32 o dos paneles de madera de ½ pul.	2x4 o 7/8 pul. o panel de madera del ½ pul.
6500 1.8	paneles de madera de 15/32 o dos paneles de madera de 5/8 pul.	2x4 o ⅞ pul. o panel de madera del ¾ pul.
60 2.0	paneles de madera de 15/32 o dos paneles de madera de ½ pul.	2x4 o 7/8 pul. o panel de madera del ½ pul.
90 2.0	2x4 madera de construcción	doble 2x4 madera de construcción

- Corte los bloques de respaldo y de relleno a una profundidad máxima igual a la profundidad del alma menos una pulgada para evitar un ajuste forzado.

REQUISITOS PARA EL REFUERZO DEL ALMA

- Vea en la página 19 "Requisitos para el refuerzo del alma.".

PROTEGER LAS VIGAS BCI® DEL CLIMA

- Las BCI® Joists están diseñadas sólo para aplicaciones que proporcionan protección permanente del tiempo (clima) Los bultos de BCI® Joists deben almacenarse cubiertas elevadas de suelo y con espaciadores.

INCLINACIÓN MÁXIMA

- A no ser que se especifique de otra forma, todos los detalles de techo son válidos para inclinaciones de 12 en 12 menos.

VENTILACIÓN

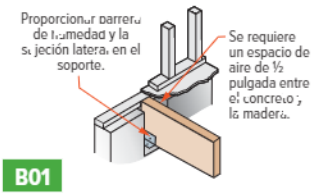
- Los agujeros pre-estampados de 1 pulgadas con espaciamiento a 12 pulgadas en centro a lo largo de la BCI® Joist pueden abrirse y usados para ventilación. Deeper joists that what is structurally needed may be advantageous in ventilation design. Consulte con un experto en ventilación para requisitos específicos.

CORTES EN PICO DE PÁJARO

- En las BCI® Joists cortes de pico de pájaro pueden hacerse sólo en el soporte del extremo inferior. Las BCI® Joists con cortes de pico de pájaro pueden extenderse hasta 2 pies, 6 pulgadas más allá del soporte del extremo inferior. El reborde bajo debe descansar completamente en el soporte y no puede extenderse sobre la cara interior del soporte. Los soportes de extremos superiores e intermedios no deben cortarse en pico de pájaro.

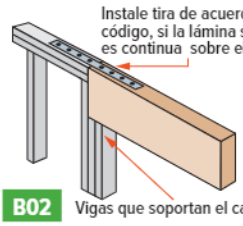
Detalles de Vigas Versa-Lam®

SOPORTE EN PAREDES DE CONCRETO / MAMPOSTERÍA



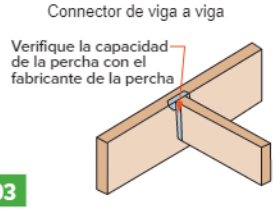
B01

SOPORTE PARA CABECERO DE PUERTA O VENTANA



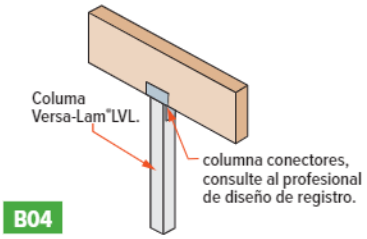
B02

CONNECTOR DE VIGA A VIGA



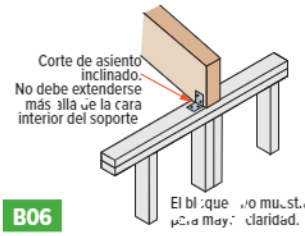
B03

SOPORTE EN LA COLUMNA



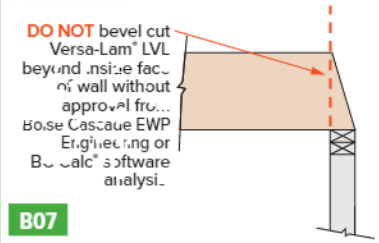
B04

CORTE DE ASIENTO INCLINADO



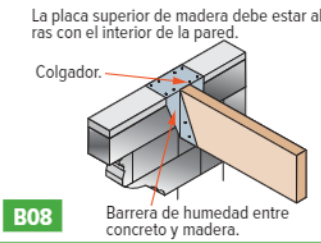
B06

CORTE BISELADO



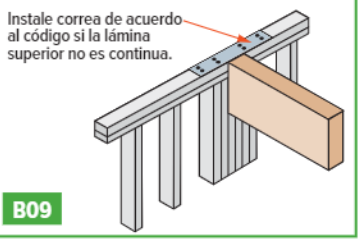
B07

VIGA A PARED DE MAMPOSTERÍA O CONCRETO



B08

ARMAR LA VIGA EN LA PARED



B09

NOTAS PARA LA INSTALACIÓN

- Se deberá proporcionar un mínimo de ½ pulgada de espacio de aire entre la viga y espacio de la pared o barrera adecuada entre la viga y el concreto/mampostería
- Deberá proporcionarse el soporte adecuado. Si no se muestra en los planos, por favor refiérase a tablas de carga en la Guía de Especificaciones de su región, páginas 28-30.
- Las vigas Versa-Lam® LVL están diseñadas para uso interior únicamente y deberían mantenerse secas lo máximo posible durante la construcción.
- Deberá proporcionarse apoyo lateral continuo a la parte superior de la viga (armadura de soporte lateral o superior).

Conectores de Múltiples Miembros

Aplicaciones con carga lateral

Número de miembros	Carga lateral uniforme máxima [libras por pie lineal – lpl]							
	Clavado[3]		Perno pasante de ½ pulg. diámetro[4]		Tornillo pasante de ⅝ pulg. diámetro[4]			
	3 filas grabadores 16d, centrados a 12 pulgadas	3 filas grabadores 16d, centrados a 12 pulgadas	2 filas, centrados a 24 pulgadas, alternados	2 filas, centrados a 12 pulgadas, alternados	3 filas, centrados a 16 pulgadas, alternados	2 filas, centrados a 24 pulgadas, alternados	3 filas, centrados a 12 pulgadas, alternados	4 filas, centrados a 8 pulgadas alternados
Versa-Lam® LVL de 1¾ pulgadas (profundidades de 18 pulgadas y menos)								
2	470	705	505	1010	2020	560	1120	2245
3[5]	350	525	375	755	1515	420	840	1685
4[5]	Aplique plan de especificaciones para pernos		335	670	1345	370	745	1495
Versa Lam® LVL de 3½ pulgadas								
2[5]	Aplique plan de especificaciones para pernos		855	1715	N/A	1125	2250	N/A

1. Valores de diseño se aplican a pernos comunes que conforman a ANSI/ASME Standard B18.2.1 y SAE J429 grados 1 o 2, o más alto). Una arandela de perno, cuyo corte no sea un pequeño que el de una plancha estándar, deberá estar entre la madera y la cabeza del perno y entre la madera y la tuerca. La distancia del borde de la viga a los orificios del perno debe ser al menos 2 pulgadas para pernos de ½ pulgada y 2½ pulgadas para pernos de ⅝ pulgadas. Los orificios del perno deberán ser del mismo diámetro que la del perno.
2. Las especificaciones de clavado mostradas se aplican a los dos lados de una viga de tres miembros.
3. 16d clavos de la caja = 0.135 pul. diámetro x 3.5 pul. el largo, 16d clavos de la grabador = 0.148 pul. diámetro x 3.25 pul. el largo.
4. Las vigas de 7 pulgadas deben tener carga superior o carga por ambos lados (El lado de carga lateral menor no deberá ser menos del 25% del lado opuesto).

Aplicaciones con carga superior

Para vigas con cargas superiores y vigas con cargas laterales menores a las que se muestran:

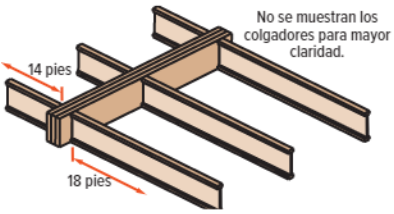
Capas	Profundidad	Clavado	Máxima carga uniforme por un lado
(2) capas de 1¾ pul.	Profundidad 11⅞ pul. y menos	2 filas clavos grabadores/de caja 16d, centrados a 12 pulgadas	400 libras por pie lineal
	Profundidad 14 - 18 pul.	3 filas clavos grabadores/de caja 16d, centrados a 12 pulgadas	600 libras por pie lineal
	Profundidad – 24 pul.	4 filas clavos grabadores/de caja 16d, centrados a 12 pulgadas	800 libras por pie lineal
(3) capas de 1¾ pul.[2]	Profundidad 11⅞ pul. y menos	2 filas clavos grabadores/de caja 16d, centrados a 12 pulgadas	600 libras por pie lineal
	Profundidad 14 - 18 pul.	3 filas clavos grabadores/de caja 16d, centrados a 12 pulgadas	450 libras por pie lineal
	Profundidad = 24 pul.	4 filas clavos grabadores/de caja 16d, centrados a 12 pulgadas	600 libras por pie lineal
(4) capas de 1¾ pul.	Profundidad 18 pul. y menos	2 filas pernos de ½ pul. centrados a 24 pul. y alternados	335 libras por pie lineal
	Profundidad = 24 pul.	3 filas pernos de ½ pul. centrados a 24 pul. y alternados cada 8 pulgadas	505 libras por pie lineal
(2) capas de 3½ pul.	Profundidad 14 pul. y menos	2 filas pernos de ½ pul. centrados a 24 pul. y alternados	855 libras por pie lineal
	Profundidad 20 - 24 pul	3 filas pernos de ½ pul. centrados a 24 pul. y alternados cada 8 pulgadas	1285 libras por pie lineal

1. Las especificaciones de clavado mostradas se aplican a los dos lados de una viga de tres miembros.
2. 16d clavos de la caja = 0.135 pul. diámetro x 3.5 pul. el largo, 16d clavos de la grabador = 0.148 pul. diámetro x 3.25 pul. el largo.
3. Las vigas más anchas de 7 pulgadas deben ser diseñadas por el ingeniero del registro.
4. Todos los valores de estas tablas pueden ser aumentados en 15% para techos con carga de nieve y en 25% para techos sin carga de nieve donde el código de construcción lo permita.
5. use tabla de cargas permitidas o el programa de software BC Calc® para determinar los tamaños de las vigas.
6. Una gravedad específica equivalente a 0.5 puede ser usada para el diseño de conexiones específicas con Versa-Lam® LVL.
7. Los valores de conexión están basados en NDS, 2018 la edición.
8. Los faste Master Trusswork, Simpson Strong-Tie DSP, SDWS, y tornillos USP WS también pueden ser usados para conectar múltiple miembro de vigas Versa-Lam® LVL, contacte a ingeniería de Boise Cascade EWP para información adicional.

El diseño de conexiones para miembros múltiples de Versa-Lam® LVL

Cuando se usen varias capas de vigas Versa-Lam® LVL para crear un miembro más ancho, la conexión de las capas es tan importante como la determinación del tamaño de la viga. Cuando las vigas con carga lateral no están correctamente conectadas, las capas internas no soportan su parte de la carga, disminuyendo así considerablemente la capacidad de carga del miembro total. Lo siguiente es un ejemplo de cómo determinar el tamaño y como conectar varias capas de vigas Versa-Lam® LVL para piso.

Hecho: La viga mostrada abajo soporta un piso residencial (con carga viva de 40 libras por pie cuadrado, 10 libras por pie cuadrado peso muerto), con una anchura de 16 pies, 0 pulgadas. La profundidad de la viga es limitada a 14 pulgadas.



Encuentre: Una Versa-Lam® LVL de capas múltiples de 1¾ pulgadas que sea adecuada para soportar las cargas de diseño y las especificaciones indicadas para ese miembro

1. Calcule la anchura tributaria de la viga que soporta
   14 pies / 2 + 16 pies / 2 = 16 pies
2. Use las tablas de Pl F bras por pie lineal) en las páginas 28-30 del guía de especificación de su región o BC Calc® para calcular el tamaño de la viga.
   una viga triple de 1¾ pulgadas x 14 pulgadas Versa-Lam® LVL 2.1 3100 ha demostrado ser adecuada para soportar las cargas de diseño.
3. Calcule la máxima carga de libras por pie lineal (en este caso, el lado derecho).
   Carga Lateral Máxima =
   (18 pies / 2) x (40 + 10 por pie cuadrado) = 450 libras por pie lineal
4. Vea la Tabla de conexiones de miembros múltiples, Aplicaciones de carga lateral, Versa-Lam® LVL de 1¾ pulgadas, 3 miembros
5. Las especificaciones para la conexión indicada deben tener una capacidad mayor a la máxima carga lateral:
   Clavado: 3 filas de clavos grabadores 16d centrados a 12 pulgadas:
   525 libras por pie lineal es mayor a 450 libras por pie lineal CORRECTO
   Pernos: ½ pulgada de diámetro 2 filas, centrados y alternados a 12 pulgadas:
   755 libras por pie lineal es mayor a 450 por pie lineal CORRECTO