I-Joist Construction Details

CANADIAN LIMIT STATES DESIGN

PERFORMANCE RATED I-JOISTS IN FLOOR AND ROOF FRAMING

APA

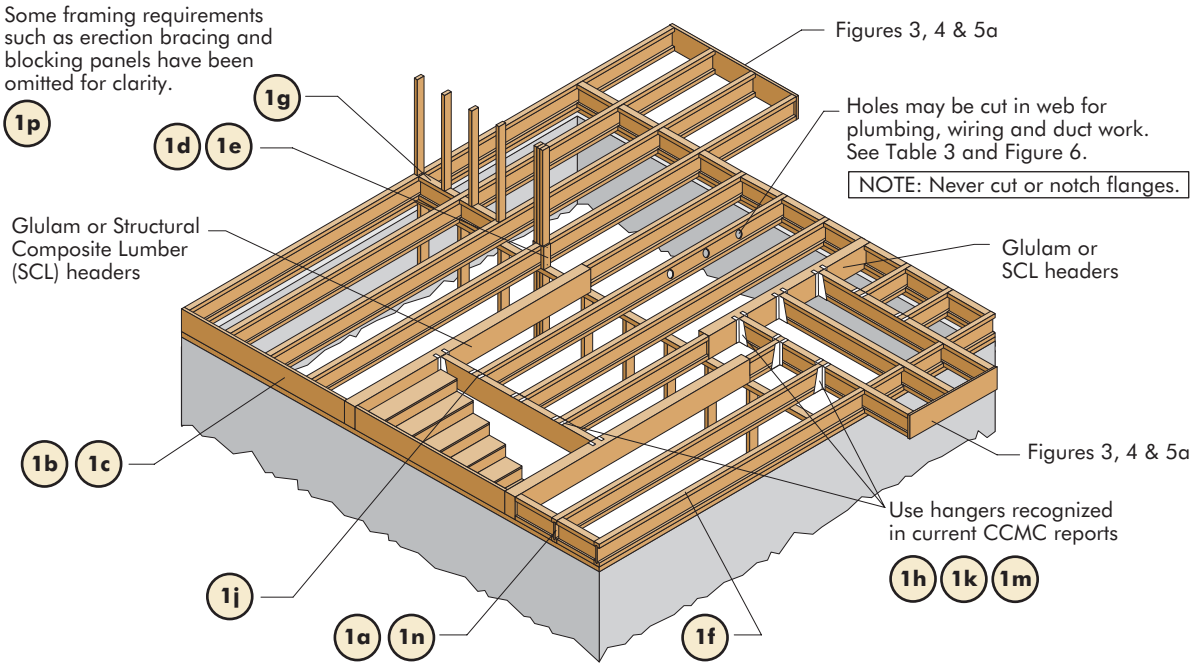
This installation guide includes recommended construction details for Performance Rated I-Joists in floor and roof applications. In addition to floor and roof framing details, this guide includes recommendations for cantilevers and placement of web holes.

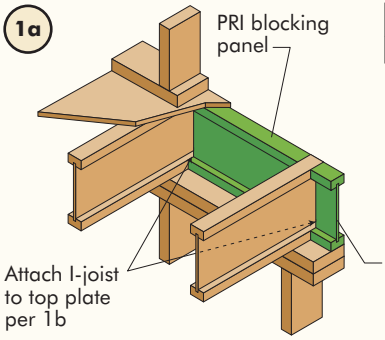
Good installation begins with specification of the correct joist for the application. Many Performance Rated I-Joists include in their trademarks allowable spans for uniformly loaded residential floor construction at various I-joist spacings. To determine which I-joist is needed, select the span and then choose the I-joist that meets the span, spacing, and loading criteria. For more inform-ation on selecting APA I-joists, and for design tables, refer to ***APA Performance Rated I-joists – Limit States Design, Form E720CA,*** available on APA's web site at www.apawood.org

FIGURE 1

TYPICAL PERFORMANCE RATED I-JOIST FLOOR FRAMING AND CONSTRUCTION

Click on circled numbers for enlarged view of detail.

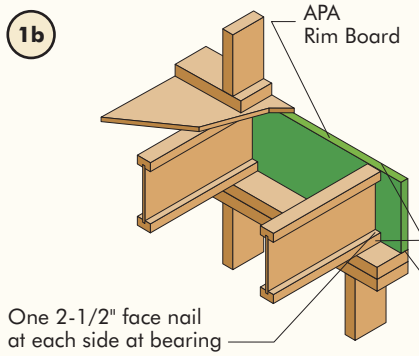




Blocking Panel or Rim Joist	Maximum Factored Uniform Vertical Load* (plf)
PRI Joists	3300

*The uniform vertical load is limited to a joist depth of 16 inches or less and is based on standard term load duration. It shall not be used in the design of a bending member, such as joist, header, or rafter. For concentrated vertical load transfer capacity, see 1d.

2-1/2" nails @ 6" o.c. to top plate (when used for lateral shear transfer, nail to bearing plate with same nailing as required for decking)



Blocking Panel or Rim Joist	Maximum Factored Uniform Vertical Load* (plf)
1-1/8" APA Rim Board Plus	8090
1-1/8" APA Rim Board	7340
1" APA Rim Board	5500

*The uniform vertical load capacity is limited to a rim board depth of 16 inches or less and is based on standard term load duration. It shall not be used in the design of a bending member, such as joist, header, or rafter. For concentrated vertical load transfer capacity, see 1d.

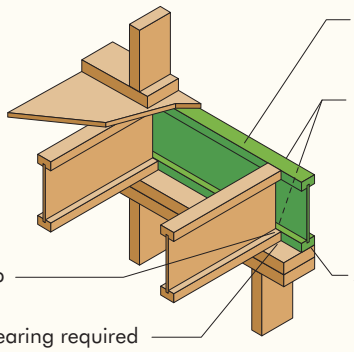
One 2-1/2" nail at top and bottom flange

Attach APA Rim Board to top plate using 2-1/2" common or box toenails @ 6" o.c.

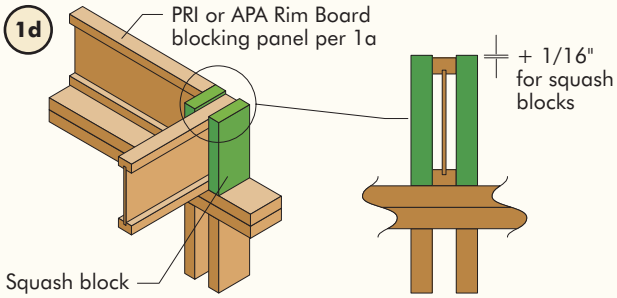
To avoid splitting flange, start nails at least 1-1/2" from end of I-joist. Nails may be driven at an angle to avoid splitting of bearing plate.

All nails shown in the details above are assumed to be common nails unless otherwise noted. Framing lumber assumed to be Spruce-Pine-Fir. Individual components not shown to scale for clarity.

1c



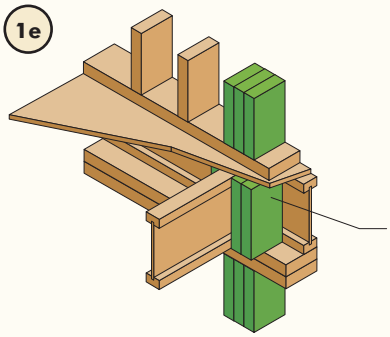
1d



Pair of Squash Blocks	Maximum factored vertical load per pair of squash blocks (lb)	
	3-1/2" wide	5-1/2" wide
2x lumber	5800	9500
1-1/8" APA Rim Board, Rim Board Plus, or Rated Sturd-I-Floor 48 oc	4500	5800
1" APA Rim Board or Rated Sturd-I-Floor 32 oc	4000	5800

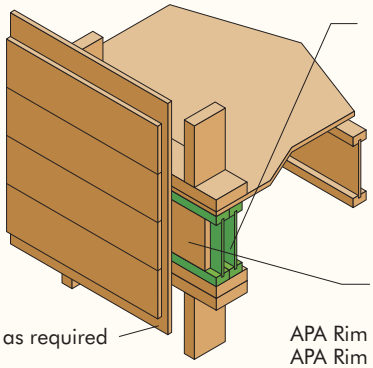
Provide lateral bracing per 1a, 1b, or 1c

1e



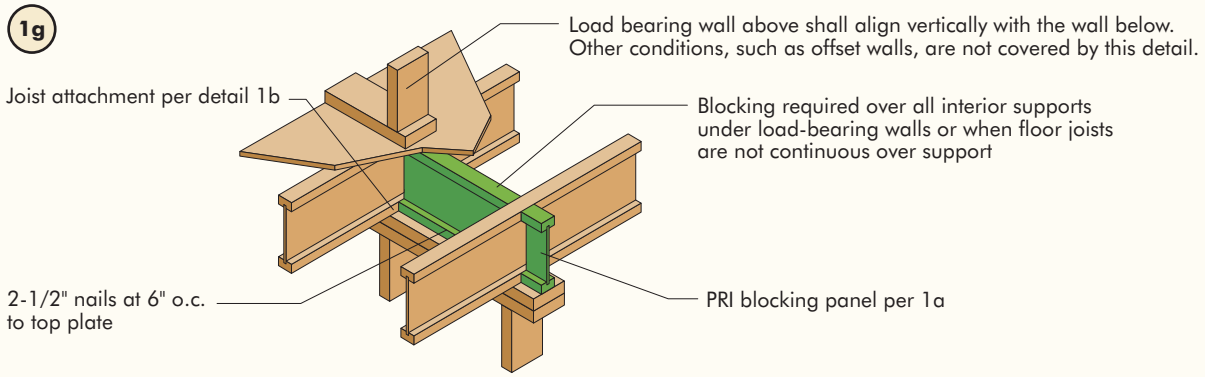
Transfer load from above to bearing below. Install squash blocks per 1d. Match bearing area of blocks below to post above.

1f



All nails shown in the details above are assumed to be common nails unless otherwise noted. Framing lumber assumed to be Spruce-Pine-Fir. Individual components not shown to scale for clarity.

1g

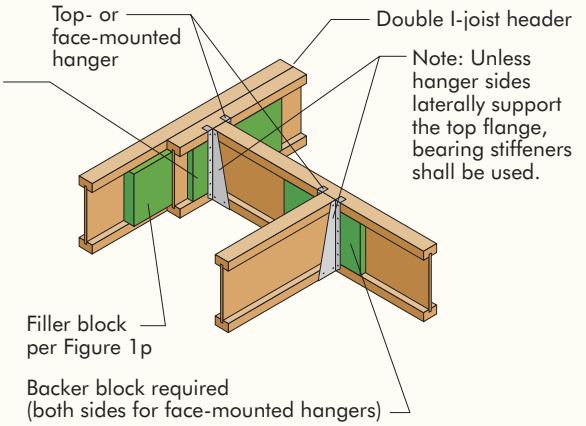


1h

Backer block (use if factored hanger load exceeds 360 lbs.) Before installing a backer block to a double I-joist, drive 3 additional 3" nails through the webs and filler block where the backer block will fit. Clinch. Install backer tight to top flange. Use twelve 3" nails, clinched when possible. Maximum factored resistance for hanger for this detail = 1620 lbs.

BACKER BLOCKS (Blocks must be long enough to permit required nailing without splitting)

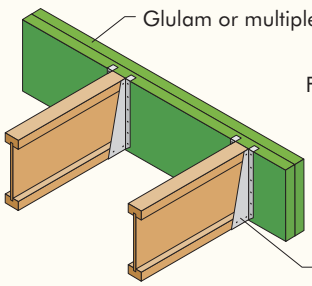
Flange Width	Material Thickness Required*	Minimum Depth**
1-1/2"	19/32"	5-1/2"
1-3/4"	23/32"	5-1/2"
2-5/16"	1"	7-1/4"
2-1/2"	1"	5-1/2"
3-1/2"	1-1/2"	7-1/4"



For hanger capacity see hanger manufacturer's recommendations. Verify double I-joist capacity to support concentrated loads.

* Minimum grade for backer block material shall be Utility grade SPF (south) or better for solid sawn lumber and Rated Sheathing grade for wood structural panels.
** For face-mount hangers use net joist depth minus 3-1/4" for joists with 1-1/2" thick flanges. For 1-5/16" thick flanges use net depth minus 2-7/8".

1j



Glulam or multiple structural composite lumber (SCL) beams

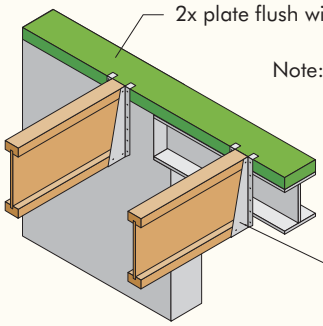
For nailing schedules for multiple SCL beams, see the manufacturer's recommendations

Top- or face-mounted hanger installed per manufacturer's recommendations

Note: Unless hanger sides laterally support the top flange, bearing stiffeners shall be used.

All nails shown in the details above are assumed to be common nails unless otherwise noted. Framing lumber assumed to be Spruce-Pine-Fir. Individual components not shown to scale for clarity.

1k

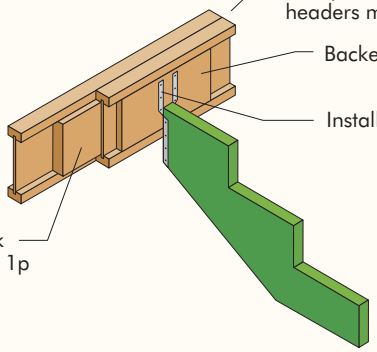


2x plate flush with inside face of wall or beam

Note: Unless hanger sides laterally support the top flange, bearing stiffeners shall be used.

Top-mounted hanger installed per manufacturer's recommendations

1m



Multiple I-joist header with full depth filler block shown. Glulam and multiple SCL headers may also be used. Verify double I-joist capacity to support concentrated loads.

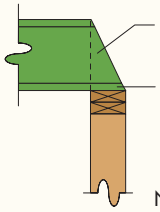
Backer block attach per 1h. Nail with twelve 3" nails, clinch when possible.

Install hanger per manufacturer's recommendations

Filler block per Figure 1p

Maximum factored support = 1620 lbs.

1n



Do not bevel-cut joist beyond inside face of wall

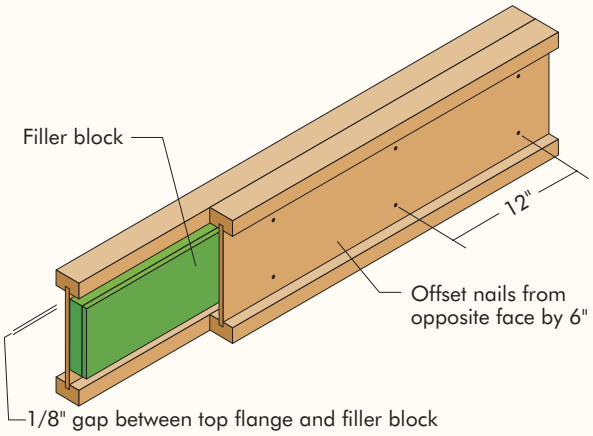
Attach I-joist per 1b

Note: Blocking required at bearing for lateral support, not shown for clarity.

All nails shown in the details above are assumed to be common nails unless otherwise noted. Framing lumber assumed to be Spruce-Pine-Fir. Individual components not shown to scale for clarity.

1p **FILLER BLOCK REQUIREMENTS FOR DOUBLE I-JOIST CONSTRUCTION**

Flange Width	Net Depth	Filler Block Size
1-1/2"	9-1/2" 11-7/8"	1-1/8" x 6" high 1-1/8" x 8" high
1-3/4"	9-1/2" 11-7/8" 14" 16"	1-3/8" x 6" 1-3/8" x 8" 1-3/8" x 10" 1-3/8" x 12"
2-5/16"	11-7/8" 14" 16"	2" x 8" 2" x 10" 2" x 12"
2-1/2"	9-1/2" 11-7/8" 14" 16"	2-1/8" x 6" 2-1/8" x 8" 2-1/8" x 10" 2-1/8" x 12"
3-1/2"	11-7/8" 14" 16"	3" x 8" 3" x 10" 3" x 12"



Notes:

1. Support back of I-joist web during nailing to prevent damage to web/flange connection.
2. Leave a 1/8-inch gap between top of filler block and bottom of top I-joist flange.
3. Filler block is required between joists for full length of span.
4. Nail joists together with two rows of 3" nails at 12 inches o.c. (clinched when possible) on each side of the double I-joist. Total of 4 nails per foot required. if nails can be clinched, only 2 nails per foot are required.
5. The maximum factored load that may be applied to one side of the double joist using this detail is 860 lbf/ft.

All nails shown in the details above are assumed to be common nails unless otherwise noted. Framing lumber assumed to be Spruce-Pine-Fir. Individual components not shown to scale for clarity.

TABLE 1

STIFFENER SIZE REQUIREMENTS

PRI Flange Width	Web Stiffener Size Each Side of Web
1-1/2"	15/32" x 2-5/16" minimum width
1-3/4"	19/32" x 2-5/16" minimum width
2-5/16"	1" x 2-5/16" minimum width
2-1/2"	1" x 2-5/16" minimum width
3-1/2"	1-1/2" x 2-5/16" minimum width

FIGURE 2

WEB STIFFENER INSTALLATION DETAILS

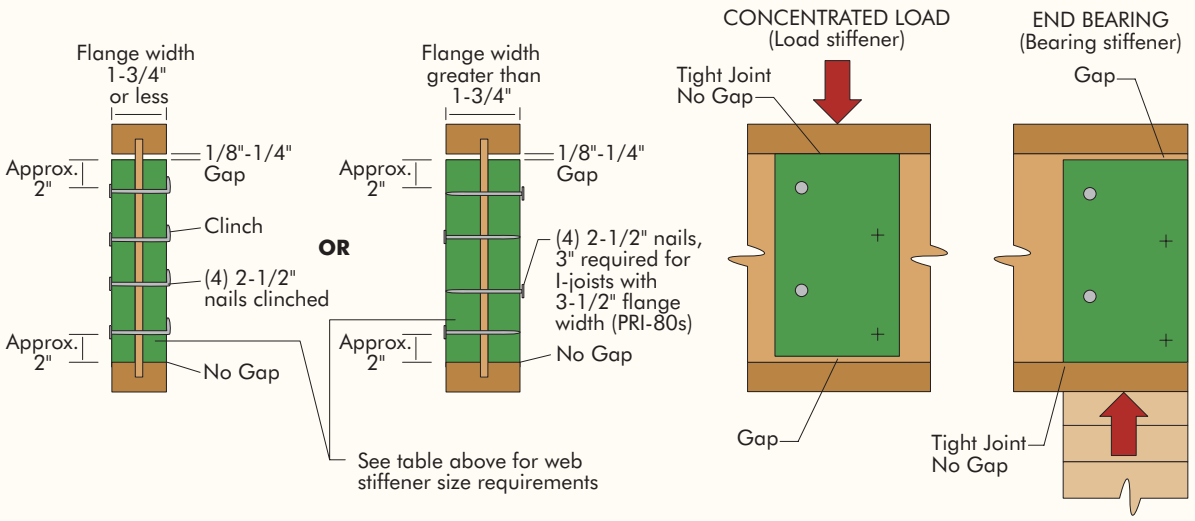


FIGURE 3

I-JOIST CANTILEVER DETAIL FOR BALCONIES

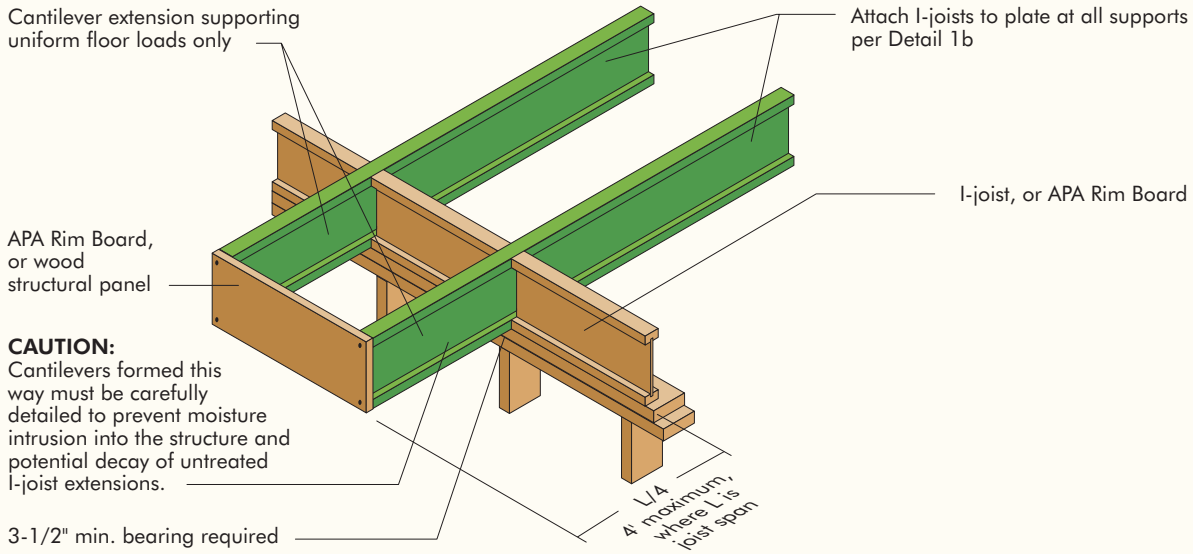
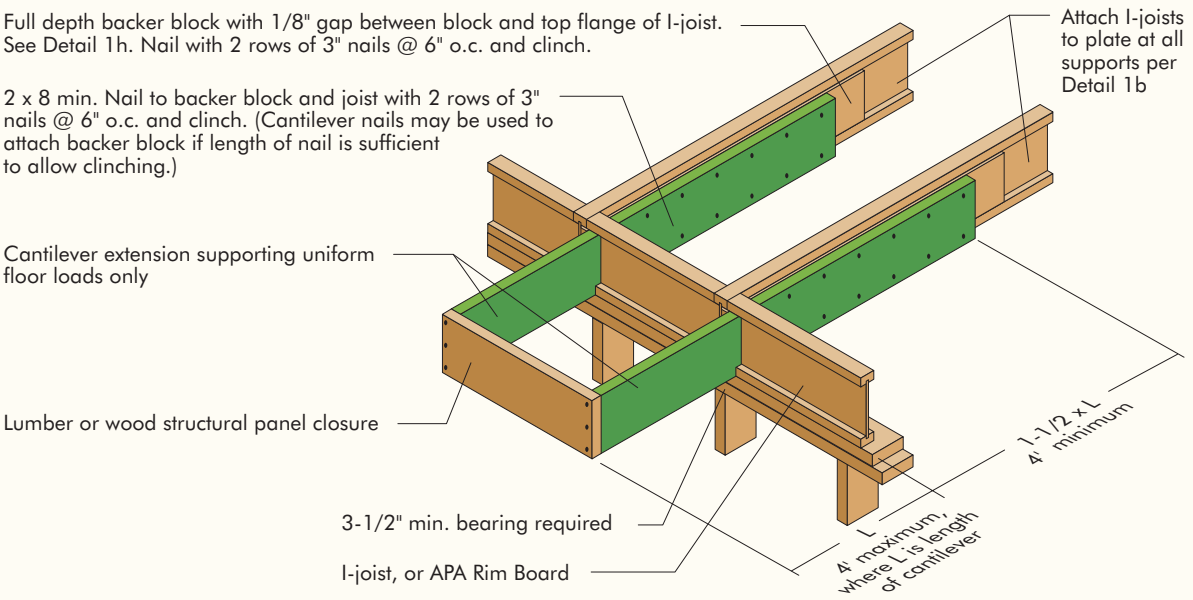


FIGURE 4

LUMBER CANTILEVER DETAIL FOR BALCONIES

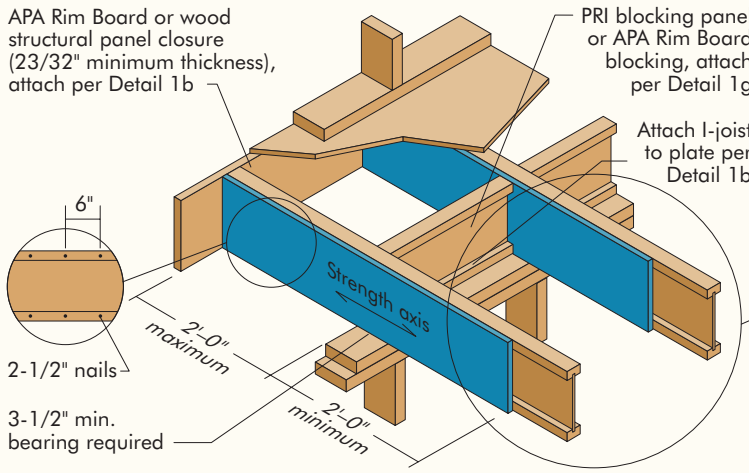


Note: This detail is applicable to cantilevers supporting a maximum specified uniform live load of 60 psf.

FIGURE 5a

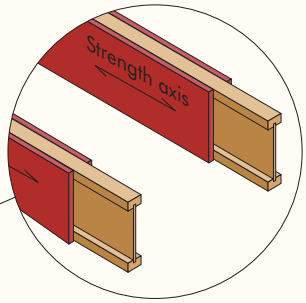
CANTILEVER DETAIL FOR VERTICAL BUILDING OFFSET

Method 1
SHEATHING REINFORCEMENT ONE SIDE



Method 2
SHEATHING REINFORCEMENT TWO SIDES

Use same installation as Method 1 but reinforce both sides of I-joist with sheathing or APA Rim Board.



Use nailing pattern shown for Method 1 with opposite face nailing offset by 3"

Note: APA RATED SHEATHING 48/24 (minimum thickness 23/32") required on sides of joist. Depth shall match the full height of the joist. Nail with 2-1/2" nails at 6" o.c., top and bottom flange. Install with face grain horizontal. Attach I-joist to plate at all supports per Detail 1b

Alternate Method 2
DOUBLE I-JOIST

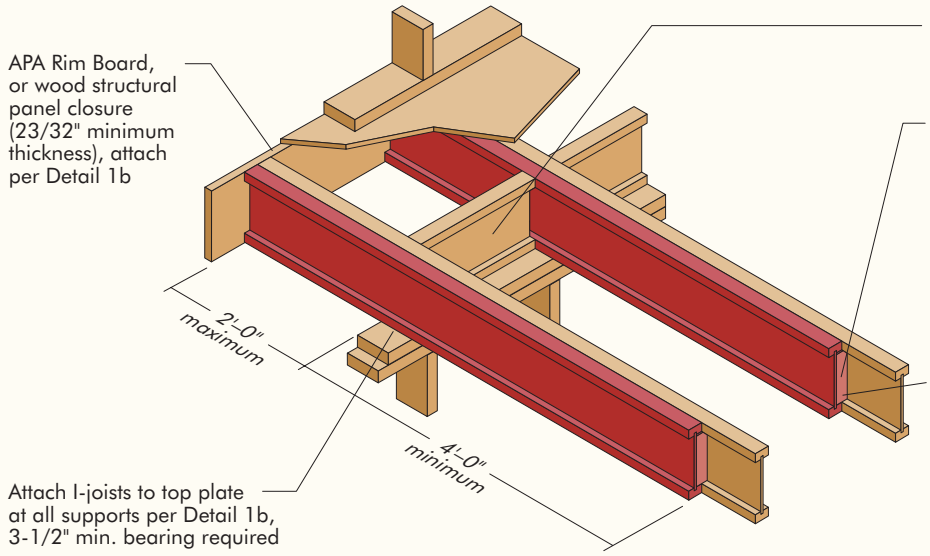
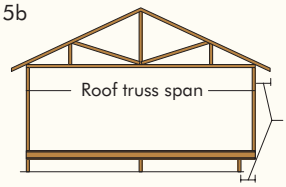
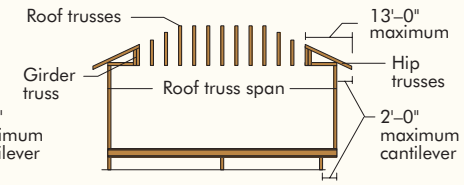


FIGURE 5b



See Table below for APA PRI reinforcement requirements at cantilever.



For hip roofs with the hip trusses running parallel to the cantilevered floor joists, the I-joist reinforcement requirements for a span of 26 ft. shall be permitted to be used.

TABLE 2

PRI CANTILEVER REINFORCEMENT METHODS ALLOWED

Joist Depth (in.)	Roof Truss Span (ft)	ROOF LOADINGS: TL = 35 psf, LL not to exceed 20 psf — Joist Spacing (in.) 12	16	19.2	24	TL = 45 psf, LL not to exceed 30 psf — Joist Spacing (in.) 12	16	19.2	24	TL = 55 psf, LL not to exceed 40 psf — Joist Spacing (in.) 12	16	19.2	24
9-1/2	26	N	N	N	1,2	N	N	1,2	2	N	1,2	2	X
	28	N	N	1,2	1,2	N	N	1,2	2	N	1,2	2	X
	30	N	N	1,2	1,2	N	1,2	1,2	2	N	1,2	2	X
	32	N	N	1,2	2	N	1,2	1,2	X	N	1,2	2	X
	34	N	N	1,2	2	N	1,2	2	X	N	2	X	X
	36	N	N	1,2	2	N	1,2	2	X	N	2	X	X
11-7/8	26	N	N	N	1,2	N	N	1,2	1,2	N	1,2	1,2	2
	28	N	N	1,2	1,2	N	1,2	1,2	1,2	N	1,2	1,2	2
	30	N	N	1,2	1,2	N	1,2	1,2	2	N	1,2	1,2	2
	32	N	N	1,2	1,2	N	1,2	1,2	2	N	1,2	1,2	2
	34	N	N	1,2	1,2	N	1,2	1,2	2	N	1,2	2	2
	36	N	N	1,2	1,2	N	1,2	1,2	2	N	1,2	2	2
	38	N	1,2	1,2	2	N	1,2	1,2	2	1,2	1,2	2	X
14	26	N	N	N	1,2	N	N	N	1,2	N	N	1,2	1,2
	28	N	N	N	1,2	N	N	1,2	1,2	N	N	1,2	2
	30	N	N	N	1,2	N	N	1,2	1,2	N	1,2	1,2	2
	32	N	N	N	1,2	N	N	1,2	1,2	N	1,2	1,2	2
	34	N	N	N	1,2	N	N	1,2	2	N	1,2	1,2	2
	36	N	N	1,2	1,2	N	1,2	1,2	2	N	1,2	1,2	2
	38	N	N	1,2	1,2	N	1,2	1,2	2	N	1,2	1,2	2
	40	N	N	1,2	1,2	N	1,2	1,2	2	N	1,2	2	2
16	26	N	N	N	1,2	N	N	1,2	1,2	N	N	1,2	1,2
	28	N	N	N	1,2	N	N	1,2	1,2	N	1,2	1,2	2
	30	N	N	N	1,2	N	N	1,2	1,2	N	1,2	1,2	2
	32	N	N	N	1,2	N	N	1,2	1,2	N	1,2	1,2	2
	34	N	N	1,2	1,2	N	N	1,2	2	N	1,2	1,2	2
	36	N	N	1,2	1,2	N	1,2	1,2	2	N	1,2	1,2	2
	38	N	N	1,2	1,2	N	1,2	1,2	2	N	1,2	2	2
	40	N	N	1,2	1,2	N	1,2	1,2	2	N	1,2	2	2
	42	N	N	1,2	1,2	N	1,2	1,2	2	N	1,2	2	X

Notes

(1) N = No reinforcement required.
1 = PRIs reinforced with 23/32" wood structural panel on one side only.
2 = PRIs reinforced with 23/32" wood structural panel on both sides or double I-joist.
X = Try a deeper joist or closer spacing.

(2) Color coding in Table is matched to details in Figure 5a.

(3) Maximum load shall be: 15 psf roof dead load, 50 psf floor total load, and 80 plf wall load. Wall load is based on 3'-0" maximum width window or door openings. For larger openings, or multiple 3'-0" width openings spaced less than 6'-0" o.c., additional joists beneath the opening's cripple studs may be required.

(4) Table applies to joists 12" to 24" o.c. Use 12" o.c. requirements for lesser spacings.

(5) For conventional roof construction using a ridge beam, the Roof Truss Span column above is equivalent to the distance between the supporting wall and the ridge beam. When the roof is framed using a ridge board, the Roof Truss Span is equivalent to the distance between the supporting walls as if a truss is used.

(6) Cantilevered joists supporting girder trusses or roof beams may require additional reinforcing.

WEB HOLE SPECIFICATIONS

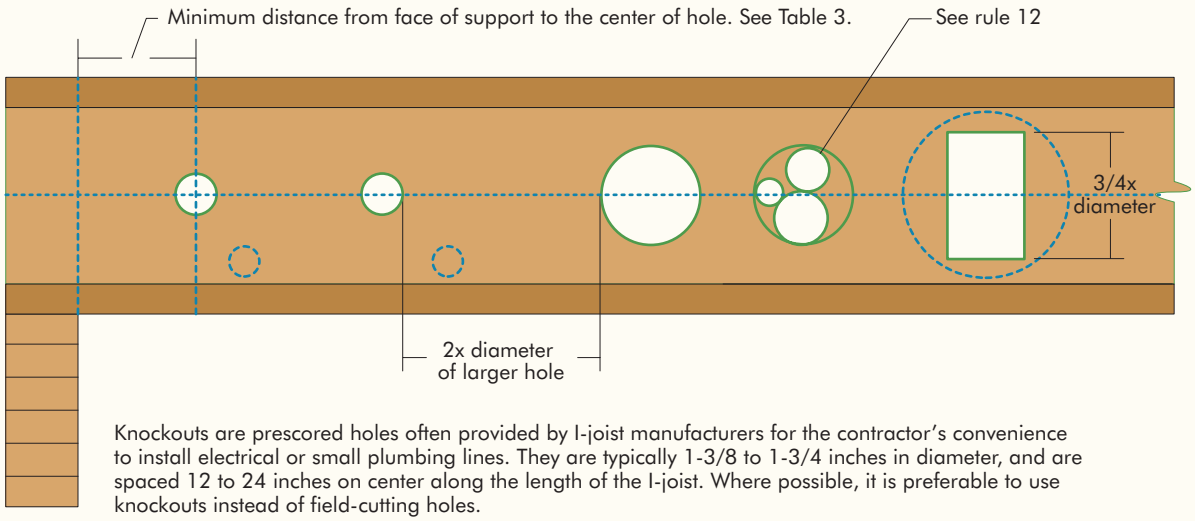
One of the benefits of using I-joists in residential floor construction is that holes may be cut in the joist webs to accommodate electrical wiring, plumbing lines and other mechanical systems, therefore minimizing the depth of the floor system.

Rules for cutting holes in PRI Joists

1. The distance between the inside edge of the support and the centerline of any hole shall be in compliance with the requirements of Table 3.
2. I-joist top and bottom flanges must NEVER be cut, notched, or otherwise modified.
3. Whenever possible field-cut holes should be centered on the middle of the web.
4. The maximum size hole that can be cut into an I-joist web shall equal the clear distance between the flanges of the I-joist minus 1/4 inch. A minimum of 1/8 inch should always be maintained between the top or bottom of the hole and the adjacent I-joist flange.
5. The sides of square holes or longest sides of rectangular holes should not exceed three fourths of the diameter of the maximum round hole permitted at that location.
6. Where more than one hole is necessary, the distance between adjacent hole edges shall exceed twice the diameter of the largest round hole or twice the size of the largest square hole ***(or twice the length of the longest side of the longest rectangular hole)*** and each hole must be sized and located in compliance with the requirements of Table 3.
7. A knockout is ***not*** considered a hole, may be utilized anywhere it occurs and may be ignored for purposes of calculating minimum distances between holes.
8. Holes measuring 1-1/2 inches shall be permitted anywhere in a cantilevered section of a PRI Joist. Holes of greater size may be permitted subject to verification.
9. A 1-1/2-inch hole can be placed anywhere in the web provided that it meets the requirements of Rule number 6 above.
10. All holes shall be cut in a workman-like manner in accordance with the restrictions listed above and as illustrated in Figure 6.
11. Limit 3 maximum size holes per span.
12. A group of round holes at approximately the same location shall be permitted if they meet the requirements for a single round hole circumscribed around them.

FIGURE 6

PRI JOIST TYPICAL HOLES



Knockouts are prescored holes often provided by I-joist manufacturers for the contractor's convenience to install electrical or small plumbing lines. They are typically 1-3/8 to 1-3/4 inches in diameter, and are spaced 12 to 24 inches on center along the length of the I-joist. Where possible, it is preferable to use knockouts instead of field-cutting holes.

Cutting the Hole

- Never drill, cut or notch the flange, or over-cut the web.
- Holes in webs should be cut with a sharp saw.
- For rectangular holes, avoid over cutting the corners, as this can cause unnecessary stress concentrations. Slightly rounding the corners is recommended. Starting the rectangular hole by drilling a 1" diameter hole in each of the 4 corners and then making the cuts between the holes is another good method to minimize damage to I-joist.

TABLE 5

LOCATION OF CIRCULAR HOLES IN PRI JOIST WEBS
Simple or Multiple Span for Dead Loads up to 10 psf and Live Loads up to 40 psf[1][2][3][4]

Joist Depth	Joist	SAF[5]	Minimum Distance from Inside Face of Any Support to Center of Hole (ft-in.) — Round Hole Diameter (in.)														
			2	3	4	5	6	6-1/4	7	8	8-5/8	9	10	10-3/4	11	12	12-3/4
9-1/2"	PRI-20	13'-5"	0'-7"	0'-11"	2'-2"	3'-6"	5'-3"	5'-8"									
	PRI-30	13'-10"	0'-9"	2'-0"	3'-3"	4'-7"	6'-1"	6'-6"									
	PRI-40	14'-6"	0'-7"	1'-8"	3'-0"	4'-4"	5'-9"	6'-3"									
	PRI-50	14'-5"	1'-1"	2'-4"	3'-8"	5'-0"	6'-6"	6'-11"									
	PRI-60	15'-3"	1'-8"	3'-0"	4'-4"	5'-8"	7'-3"	7'-8"									
11-7/8"	PRI-20	13'-5"	0'-7"	0'-8"	0'-8"	0'-9"	1'-11"	2'-5"	3'-10"	5'-11"	7'-4"						
	PRI-30	15'-0"	0'-7"	0'-8"	0'-8"	1'-9"	3'-4"	3'-9"	5'-0"	6'-10"	8'-0"						
	PRI-40	16'-7"	0'-7"	0'-8"	1'-2"	2'-5"	3'-9"	4'-1"	5'-1"	6'-8"	7'-11"						
	PRI-50	16'-1"	0'-7"	0'-8"	0'-11"	2'-6"	4'-1"	4'-6"	5'-10"	7'-8"	8'-11"						
	PRI-60	18'-2"	0'-8"	1'-10"	3'-2"	4'-5"	5'-10"	6'-2"	7'-4"	8'-11"	10'-0"						
	PRI-70	18'-6"	0'-7"	1'-2"	2'-5"	3'-9"	5'-2"	5'-8"	7'-0"	8'-10"	10'-2"						
	PRI-80	19'-10"	1'-11"	3'-2"	4'-6"	5'-10"	7'-3"	7'-8"	8'-10"	10'-6"	11'-7"						
	PRI-90	20'-5"	0'-7"	0'-8"	1'-4"	3'-0"	4'-9"	5'-3"	6'-8"	8'-8"	10'-0"						
14"	PRI-40	18'-3"	0'-7"	0'-8"	0'-8	0'-9"	1'-10"	2'-2"	3'-2"	4'-7"	5'-5"	6'-0"	7'-7"	9'-4"			
	PRI-50	16'-1"	0'-7"	0'-8"	0'-8"	0'-9"	0'-9"	1'-1"	2'-6"	4'-6"	5'-9"	6'-7"	8'-10"	10'-7"			
	PRI-60	19'-9"	0'-7"	0'-8"	0'-8"	1'-7"	3'-2"	3'-6"	4'-9"	6'-6"	7'-8"	8'-4"	10'-4"	11'-11"			
	PRI-70	18'-6"	0'-7"	0'-8"	0'-8"	0'-11"	2'-6"	2'-11"	4'-2"	5'-11"	7'-0"	7'-10"	10'-1"	12'-0"			
	PRI-80	22'-7"	0'-7"	1'-9"	3'-0"	4'-4"	5'-8"	6'-1"	7'-1"	8'-7"	9'-7"	10'-3"	12'-2"	13'-10"			
	PRI-90	23'-2"	0'-7"	0'-8"	0'-9"	2'-4"	3'-11"	4'-4"	5'-7"	7'-4"	8'-6"	9'-3"	11'-3"	12'-10"			
16"	PRI-40	19'-8"	0'-7"	0'-8"	0'-8"	0'-9"	0'-9"	0'-10"	1'-5"	2'-9"	3'-7"	4'-1"	5'-6"	6'-7"	7'-0"	8'-9"	10'-9"
	PRI-50	16'-1"	0'-7"	0'-8"	0'-8"	0'-9"	0'-9"	0'-10"	0'-10"	0'-10"	1'-9"	2'-6"	4'-6"	6'-0"	6'-8"	9'-7"	11'-11"
	PRI-60	19'-9"	0'-7"	0'-8"	0'-8"	0'-9"	0'-9"	0'-10"	1'-10"	3'-6"	4'-6"	5'-2"	7'-3"	8'-11"	9'-6"	11'-10"	13'-9"
	PRI-70	18'-6"	0'-7"	0'-8"	0'-8"	0'-9"	0'-9"	0'-10"	1'-0"	2'-11"	4'-1"	4'-10"	6'-11"	8'-7"	9'-1"	11'-6"	13'-6"
	PRI-80	23'-11"	0'-7"	0'-8"	0'-8"	1'-7"	3'-2"	3'-7"	4'-10"	6'-6"	7'-7"	8'-3"	10'-2"	11'-8"	12'-2"	14'-3"	16'-0"
	PRI-90	25'-7"	0'-7"	0'-8"	0'-8"	0'-10"	2'-3"	2'-8"	3'-10"	5'-5"	6'-5"	7'-1"	8'-10"	10'-4"	10'-10"	13'-3"	15'-3"

Notes:

(1) Above tables may be used for I-joist spacing of 24 inches on center or less.

(2) Hole location distance is measured from inside face of supports to center of hole.

(3) Distances in this chart are based on uniformly loaded joists.

(4) Hole sizes and/or locations that fall outside of the scope of this table may be acceptable based on analysis of actual hole size, span, spacing and loading conditions.

(5) SAF = Span Adjustment Factor, used as defined below:

OPTIONAL:

Table 5 is based on the I-joists being used at their maximum span. If the I-joists are placed at less than their full allowable span, the maximum distance from the centerline of the hole to the face of any support (D) as given above may be reduced as follows:

$$D_{reduced} = \frac{L_{actual}}{SAF} \times D$$

Where: $D_{reduced}$ = Distance from the inside face of any support to center of hole, reduced for less-than-maximum span applications (ft). The reduced distance shall not be less than 6 inches from the face of support to edge of the hole.

L_{actual} = The actual measured span distance between the inside faces of supports (ft).

SAF = Span Adjustment Factor given in Table 5.

D = The minimum distance from the inside face of any support to center of hole from Table 5 above.

If $\frac{L_{actual}}{SAF}$ is greater than 1, use 1 in the above calculation for $\frac{L_{actual}}{SAF}$.

RIM BOARD HOLE SPECIFICATIONS

The maximum allowable hole size for an APA Rim Board shall be 2/3 of the Rim Board depth as shown below. The length of the Rim Board segment containing a hole shall be at least 8 times the hole size.

TABLE 4

RIM BOARD HOLE SIZES AND MINIMUM LENGTH

Rim Board Depth (in.)	Maximum Allowable Hole Size[a][b] (in.)	Minimum Length of Rim Board Segment[c] for the Maximum Allowable Hole Size (in.)
9-1/2	6-1/4	50
11-7/8	7-3/4	62
14	9-1/4	74
16	10-1/2	84

(a) These hole provisions do not apply to Rim Board installed over openings, such as doors or windows.

(b) The diameter of a round hole or the longer dimension of a rectangular hole.

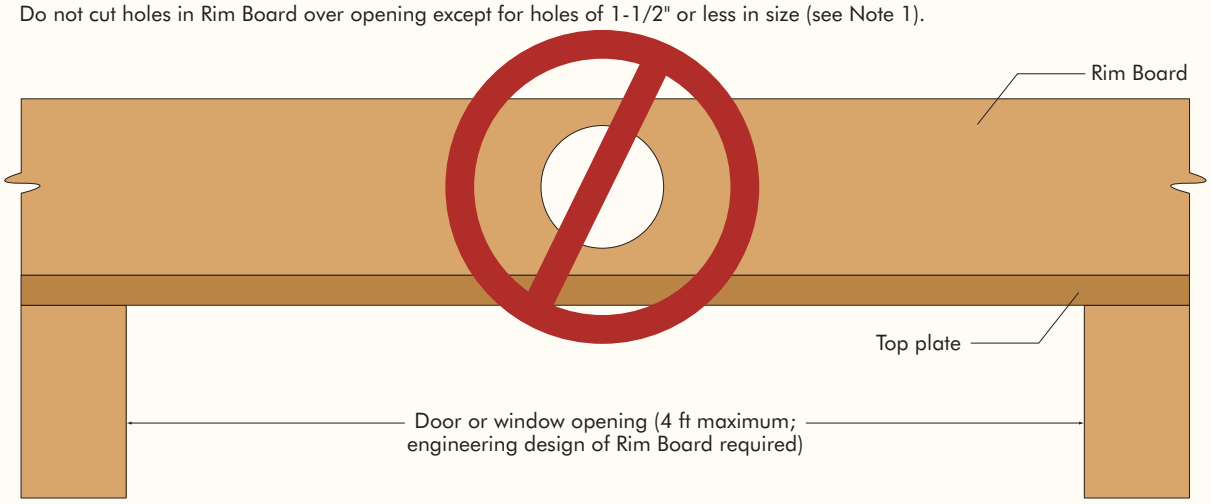
(c) The length of Rim Board segment per wall line. For multiple holes, the minimum length of Rim Board segment shall be 8 times the sum of all hole sizes.

Application Notes

1. Do not cut holes in Rim Board installed over openings, such as doors or windows, where the Rim Board is not fully supported, except that holes of 1-1/2 inches or less in size are permitted provided they are positioned at the mid-depth and in the middle 1/3 of the span (see Note 5 for minimum hole spacing).

FIGURE 7

RIM BOARD OVER AN OPENING



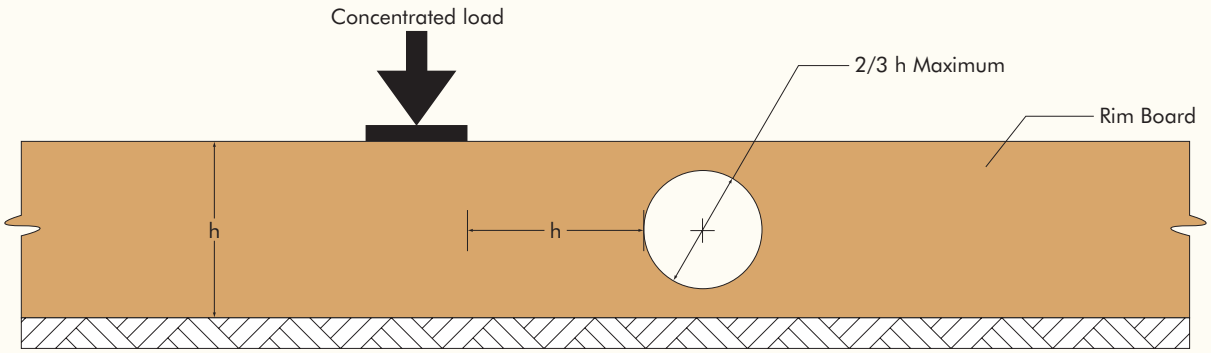
2. Field-cut holes should be vertically centered in the Rim Board and at least one hole diameter or 6-inches, whichever is less, clear distance away from the end of the wall line. Holes should never be placed such that they interfere with the attachment of the Rim Board to the ends of the floor joist, or any other code-required nailing.

3. While round holes are preferred, rectangular holes may be used providing the corners are not over-cut. Slightly rounding corners or pre-drilled corners with a 1-inch-diameter bit is recommended.

4. When concentrated loads are present on the Rim Board (loads not supported by any other vertical-load-carrying members such as squash blocks), holes should not be placed in the Rim Board within a distance equal to the depth of the Rim Board from the area of loading.

FIGURE 8

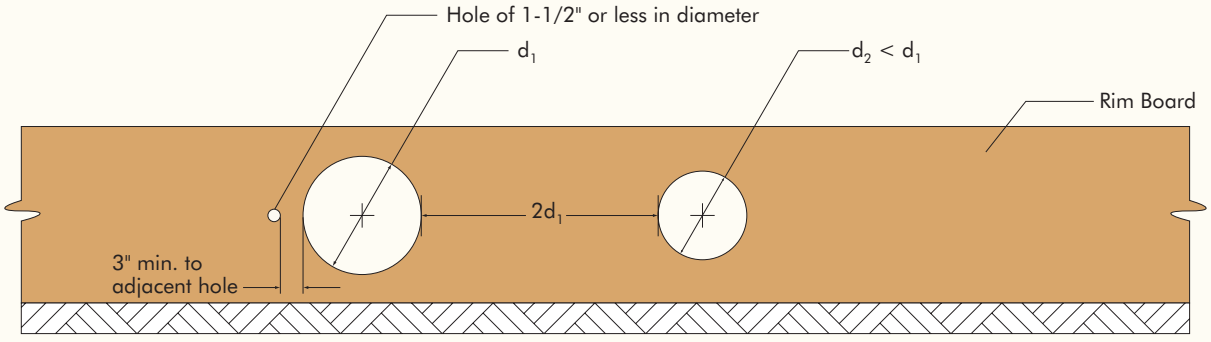
RIM BOARD NEAR CONCENTRATED VERTICAL LOAD



5. For multiple holes, the clear spacing between holes shall be at least two times the diameter of the larger hole, or twice the length of the longest side of the longest rectangular hole. This minimum hole spacing does not apply to holes of 1-1/2-inches or less in diameter, which can be placed anywhere in the Rim Board (see Note-1 for holes over opening) except that the clear distance to the adjacent hole shall be 3-inches minimum.

FIGURE 9

MULTIPLE HOLES FOR RIM BOARD

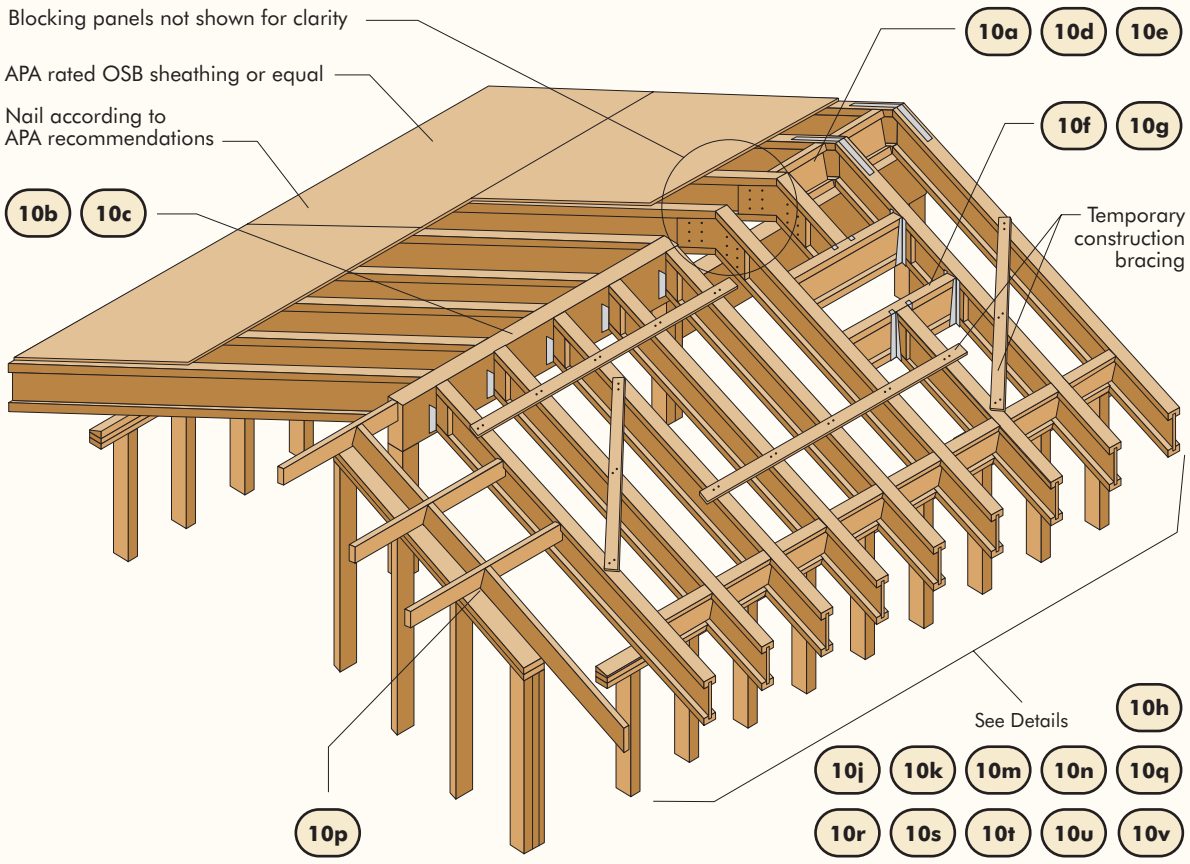


6. All holes shall be cut in a workman-like manner in accordance with the limitations listed above.

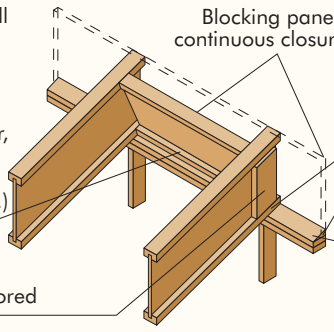
FIGURE 10

TYPICAL PERFORMANCE RATED I-JOIST ROOF FRAMING AND CONSTRUCTION

Click on circled numbers for enlarged view of



10a Upper End, Bearing on Wall



Blocking panel, x-bridging, or 23/32" APA Rated Sheathing 48/24 as continuous closure. (Validate use of x-bridging with local building code.)

2-1/2" nails at 6" o.c. – minimum 3 - 2-1/2" nails per blocking panel. (When used for lateral shear transfer, match nail type and sheathing edge nailing ("boundary nailing" for engineered diaphragm applications.) Use minimum 2-1/2" nails.

Minimum attachment: For slope 1/4:12, one 3" box nail, face nail at each side of bearing. For slope > 1/4:12 design joist attachment to beveled plate to transfer lateral thrust.

Attach beveled plate to framing with 1 - 3-1/2"

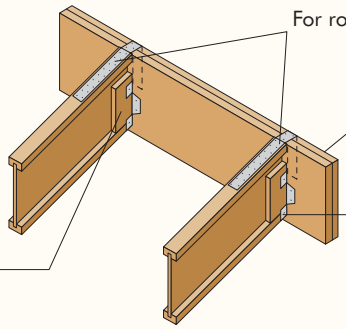
Beveled plate for slopes greater than 1/4:12. Code-recognized connectors may be substituted. For slopes greater than 4:12 connectors are required to resist lateral thrust.

Bearing stiffener required when factored end reaction exceeds 2440 lbs.

Note: Additional connection may be required for wind uplift.

All nails shown in the details above are assumed to be common nails unless otherwise noted. Framing lumber assumed to be Spruce-Pine-Fir. Individual components not shown to scale for clarity.

10b Peak Connection



For roof slopes between 1/4:12 and 12:12, provide a strap tie nailed at a minimum of 3" spacing or in accordance with the recommendation of the strap manufacturer

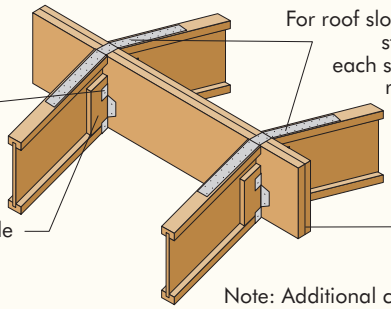
Ridge beam (Glulam or LVL)

Adjustable Slope Hanger with a minimum factored uplift resistance of 450 lbs.

Beveled bearing stiffener required each side

Note: Additional connection may be required for wind uplift.

10c I-Joist to Ridge Beam Connection



For roof slopes between 1/4:12 and 12:12, provide a strap nailed at a minimum of 3" spacing on each side of roof slope or in accordance with the recommendation of the strap manufacturer

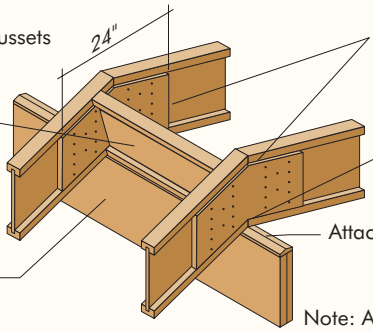
Adjustable Slope Hanger with a minimum factored uplift resistance of 450 lbs.

Beveled bearing stiffener required each side

Ridge beam (Glulam or LVL)

Note: Additional connection may be required for wind uplift.

10d I-Joist Connection with Wood Structural Panel Gussets



23/32" x 2'-0" wood structural panel (front and back sides) with 12 - 2-1/2" nails into each joist with nails clinched. When unfactored roof live load exceeds 40 psf, horizontal orientation of gusset strong axis is required. Gap 1/8" at top.

Blocking panel or x-bridging. Attach per 10a.

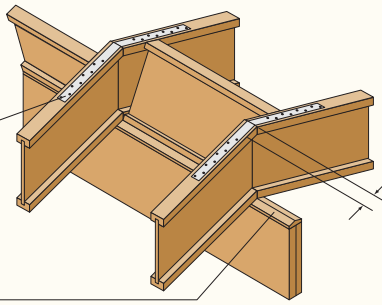
Attach per 10a

Attach beveled plate to framing with 1 - 3-1/2" at 16" o.c.

Support beam or wall

Note: Additional connection may be required for wind uplift.

10e I-Joist Connection with Tie Strap



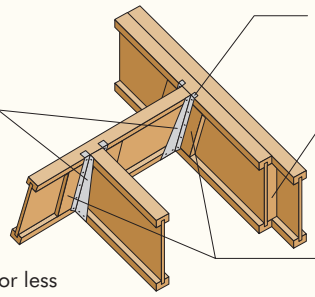
Tie strap nailed at a minimum of 3" spacing or in accordance with manufacturer's recommendations

Strap nails: Leave 2-3/8" minimum end distance

Beveled bearing plate

All nails shown in the details above are assumed to be common nails unless otherwise noted. Framing lumber assumed to be Spruce-Pine-Fir. Individual components not shown to scale for clarity.

10f Roof Opening
Top Mounted Hangers



Top mounted hanger per manufacturer's recommendations

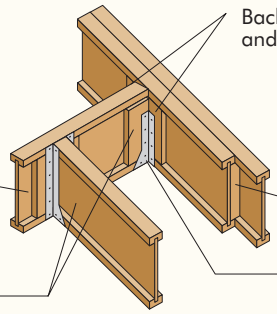
Filler blocking per Figure 1p

Bearing stiffeners required when hanger does **NOT** support I-joist top flange

Backer block. If top-mounted hanger is fully supported by top flange, backer block only required on hanger side. If face nailing is required, then second backer block (filler block if multiple I-joist) is required. Nail with 10 - 3" nails for flanges up to 1-3/4" wide. Use 12 - 3" nails for flanges wider than 1-3/4".

Application limited to 4:12 slope or less

10g Roof Opening, Face-Mounted Hangers



Backer block on both sides of web (or backer block and filler block, if multiple I-joists), nail with 12 - 3" nails, clinch when possible

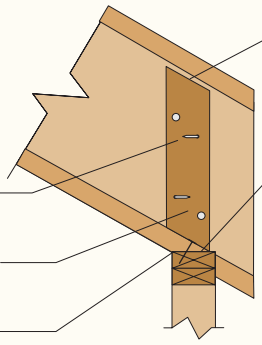
Header may be I-joist, LVL, glulam, or lumber

Filler blocking per Figure 1p

Bearing stiffeners required when hanger does not support I-joist top flange

Face-mount hanger per hanger manufacturer's recommendations

10h Birdsmouth Cut & Bevel Cut Bearing Stiffener



1/8" gap at top

Permitted on low end of I-joist only

One 3" box nail, face nail at each side of bearing (face nail where flange is 7/8" to 1" thick)

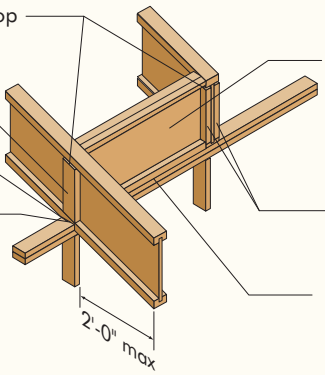
Bearing stiffeners required each side of I-joist. Bevel-cut bearing stiffener to match roof slope.

4 - 2-1/2" nails (two each side) clinched when possible

Birdsmouth cut shall bear fully and not overhang the inside face of plate

Note: Additional connection may be required for wind uplift.

10j Birdsmouth Cut with Overhang
(Permitted on low end of I-joist only)



1/8" gap at top

Blocking I-joist or panel or x-bridging. (Validate use of x-bridging with local building code.) See 10u for vent holes.

Bearing stiffener required each side (attach per 10h)

Attach joist to top plate per 10h

Bearing stiffeners

Birdsmouth cut at bearing

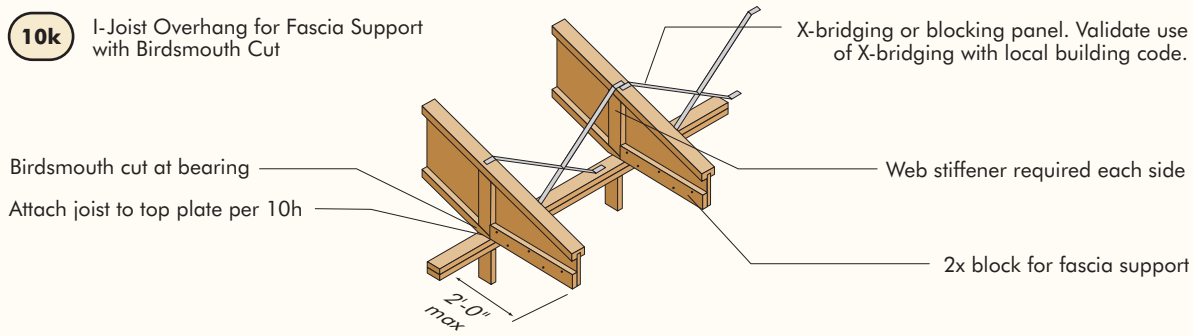
Attach blocking per 10a

Note: Additional connection may be required for wind uplift.

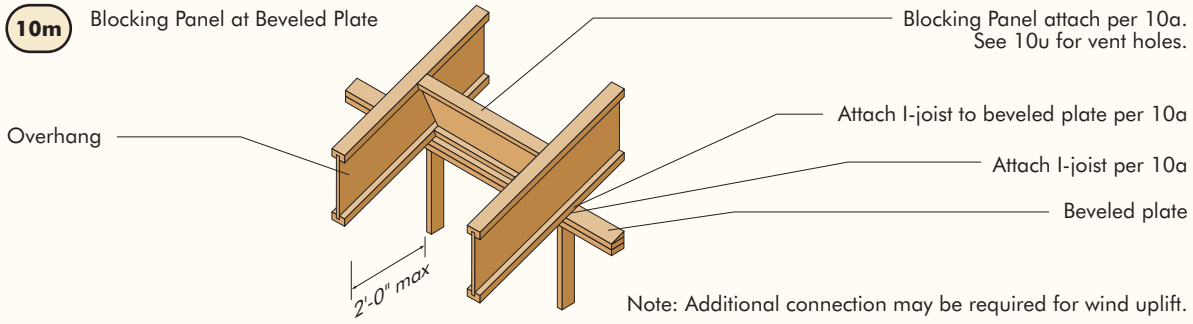
Note: Outside corner of blocking panel may be trimmed if it interferes with roof sheathing. In such cases, position blocking panel on top plate to minimize trimming and still allow required nailing into top plate.

All nails shown in the details above are assumed to be common nails unless otherwise noted. Framing lumber assumed to be Spruce-Pine-Fir. Individual components not shown to scale for clarity.

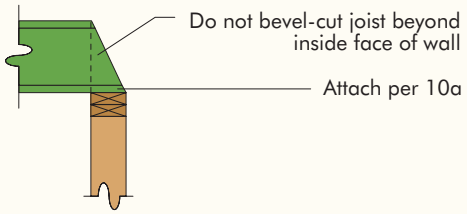
10k I-Joist Overhang for Fascia Support with Birdsmouth Cut



10m Blocking Panel at Beveled Plate



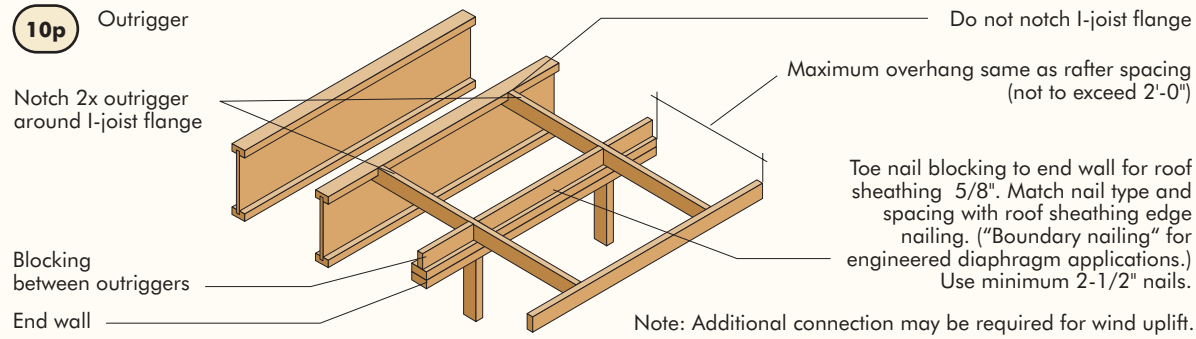
10n I-Joist with Bevel-Cut End



Note: Blocking or x-bridging required at bearing for lateral support, not shown for clarity.

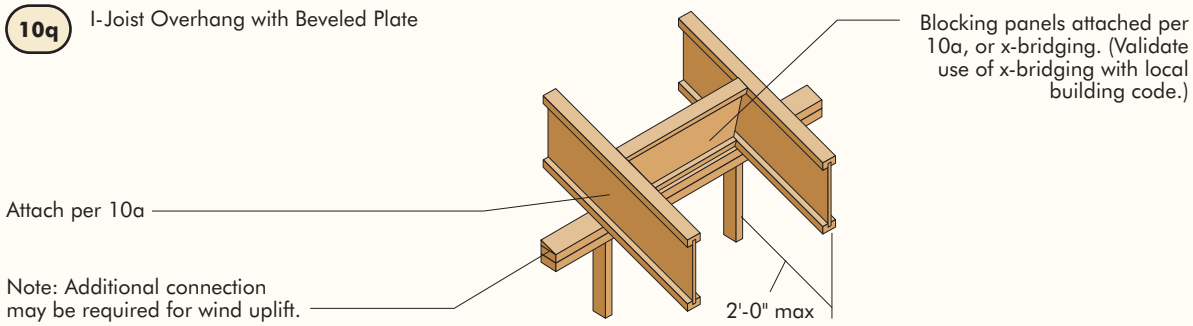
Note: Additional connection may be required for wind uplift.

10p Outrigger

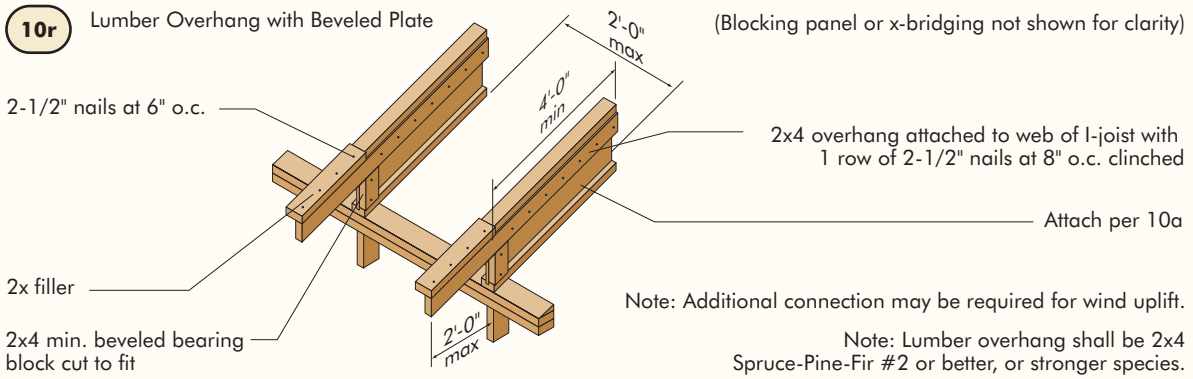


All nails shown in the details above are assumed to be common nails unless otherwise noted. Framing lumber assumed to be Spruce-Pine-Fir. Individual components not shown to scale for clarity.

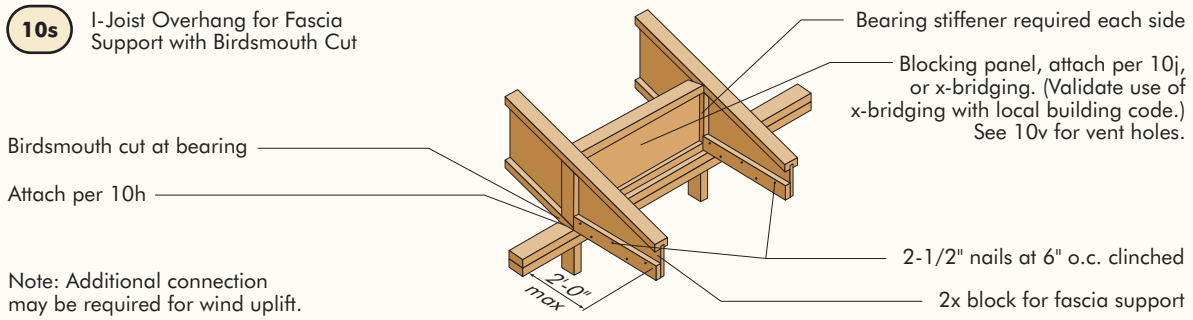
10q I-Joist Overhang with Beveled Plate



10r Lumber Overhang with Beveled Plate

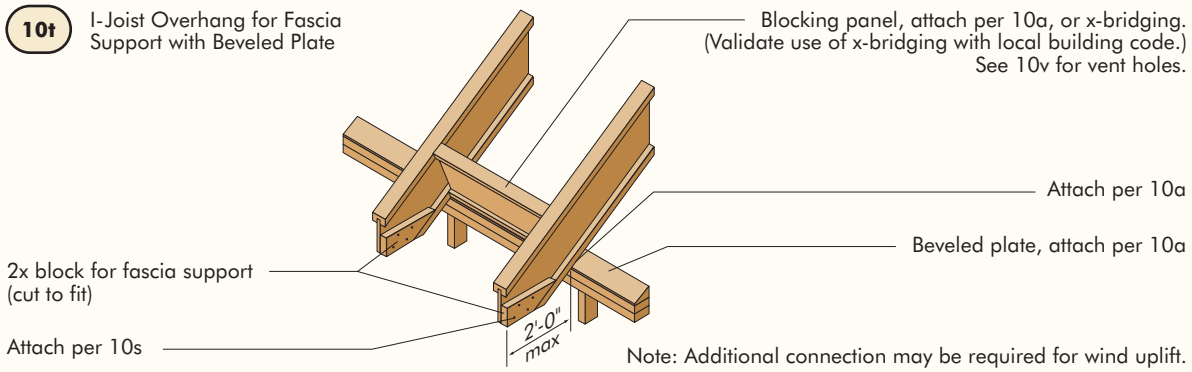


10s I-Joist Overhang for Fascia Support with Birdsmouth Cut

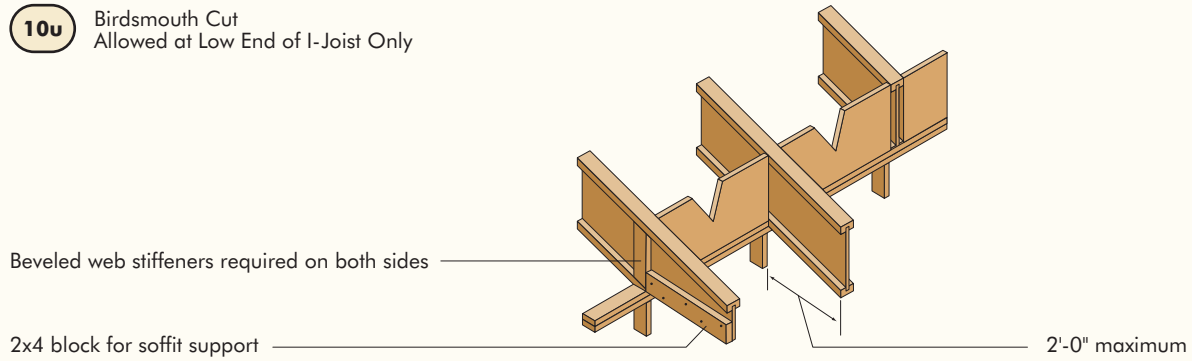


All nails shown in the details above are assumed to be common nails unless otherwise noted. Framing lumber assumed to be Spruce-Pine-Fir. Individual components not shown to scale for clarity.

10t I-Joist Overhang for Fascia Support with Beveled Plate

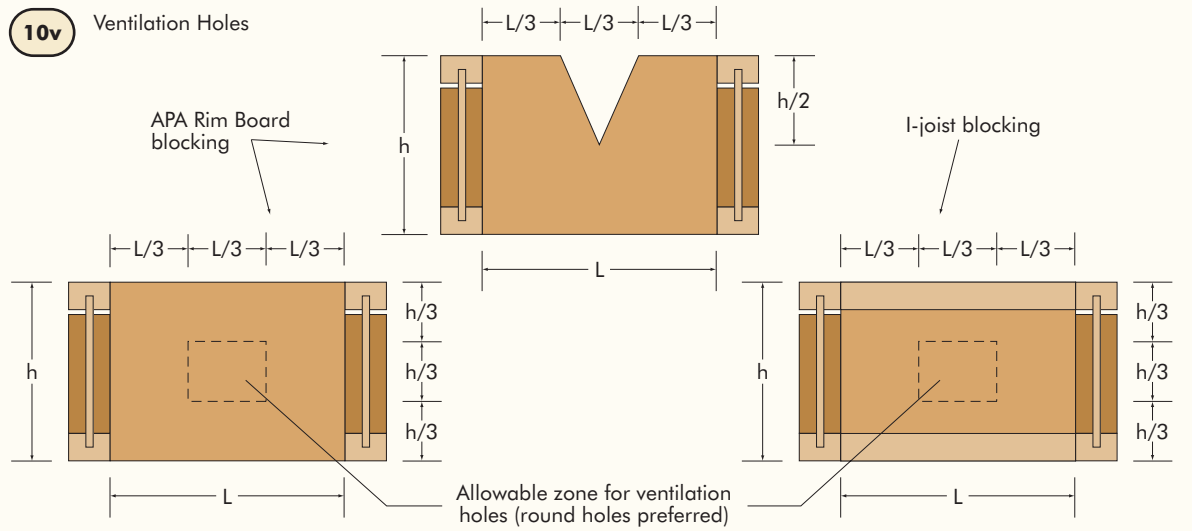


10u Birdsmouth Cut Allowed at Low End of I-Joist Only



Note: Corrosion-resistant wire cloth screening, hardware cloth, perforated vinyl or similar material shall cover the ventilation holes per code.

10v Ventilation Holes



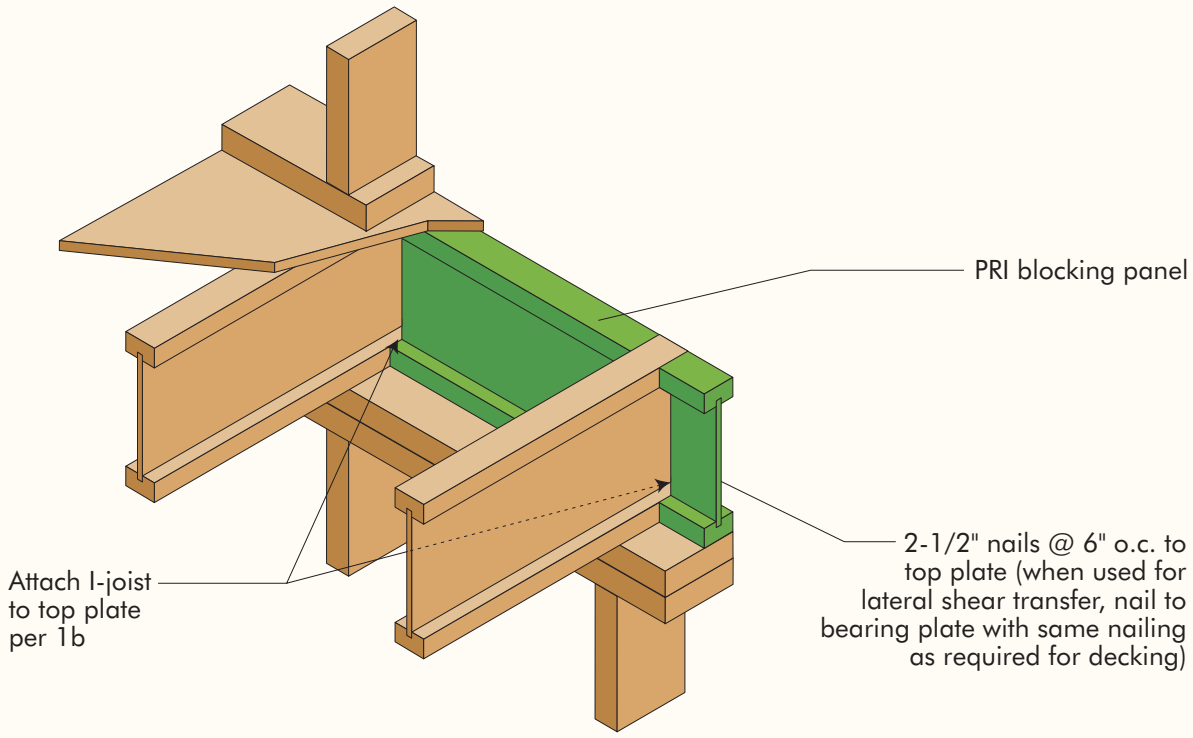
Note: Corrosion-resistant wire cloth screening, hardware cloth, perforated vinyl or similar material shall cover the ventilation holes per code.

All nails shown in the details above are assumed to be common nails unless otherwise noted. Framing lumber assumed to be Spruce-Pine-Fir. Individual components not shown to scale for clarity.

1a

Blocking Panel or Rim Joist	Maximum Factored Uniform Vertical Load* (plf)
PRI Joists	3300

*The uniform vertical load is limited to a joist depth of 16 inches or less and is based on standard term load duration. It shall not be used in the design of a bending member, such as joist, header, or rafter. For concentrated vertical load transfer capacity, see 1d.



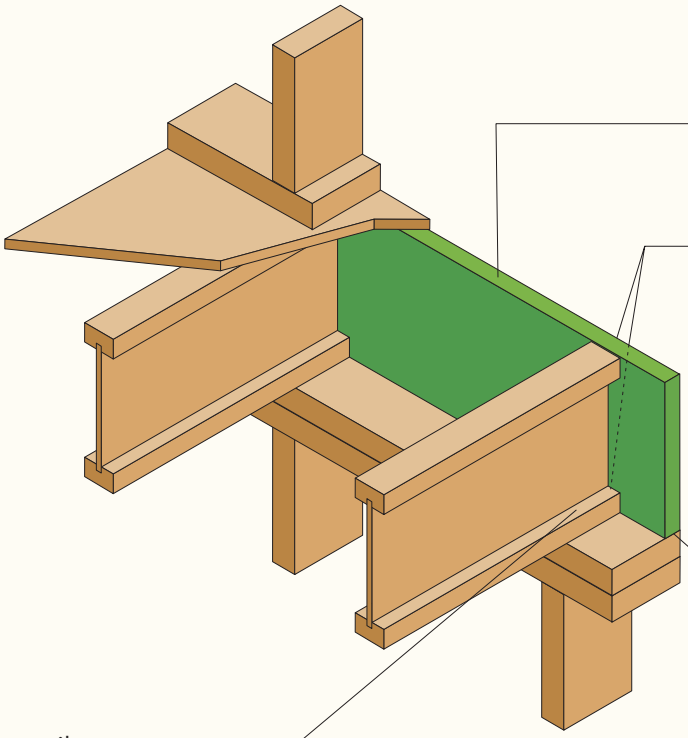
All nails shown in the detail above are assumed to be common nails unless otherwise noted. Framing lumber assumed to be Spruce-Pine-Fir. Individual components not shown to scale for clarity.

Click here to return to Figure 1

1b

Blocking Panel or Rim Joist	Maximum Factored Uniform Vertical Load* (plf)
1-1/8" APA Rim Board Plus	8090
1-1/8" APA Rim Board	7340
1" APA Rim Board	5500

*The uniform vertical load capacity is limited to a joist depth of 16 inches or less and is based on standard term load duration. It shall not be used in the design of a bending member, such as joist, header, or rafter. For concentrated vertical load transfer capacity, see 1d.

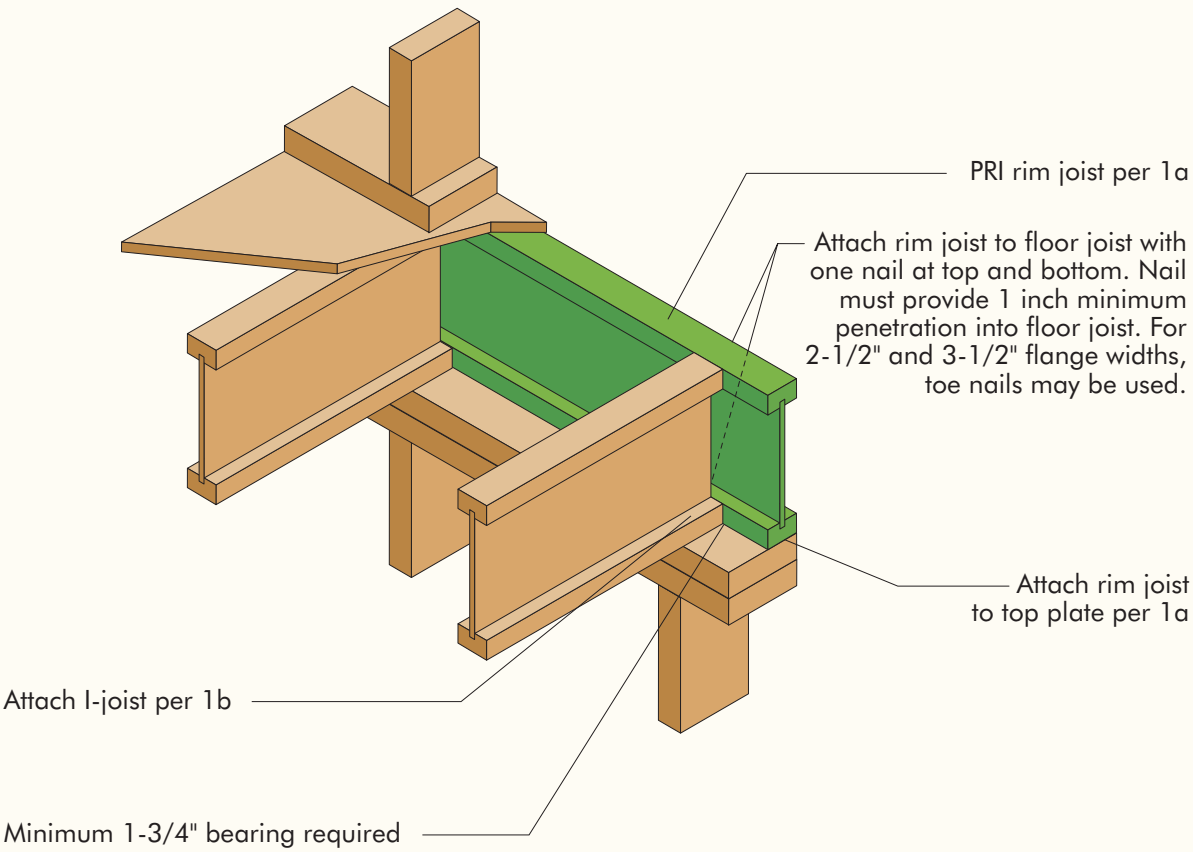


To avoid splitting flange, start nails at least 1-1/2" from end of I-joist. Nails may be driven at an angle to avoid splitting of bearing plate.

All nails shown in the detail above are assumed to be common nails unless otherwise noted. Framing lumber assumed to be Spruce-Pine-Fir. Individual components not shown to scale for clarity.

Click here to return to Figure 1

1c



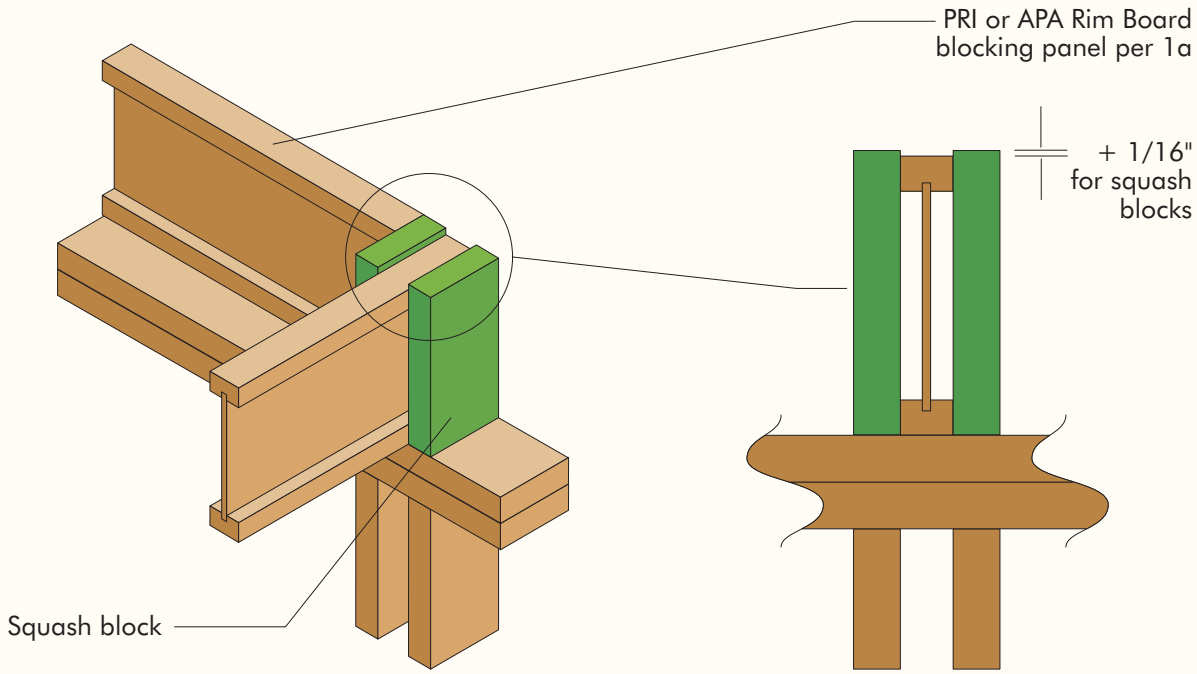
All nails shown in the detail above are assumed to be common nails unless otherwise noted. Framing lumber assumed to be Spruce-Pine-Fir. Individual components not shown to scale for clarity.

Click here to return to Figure 1

1d

Pair of Squash Blocks	Maximum factored vertical load per pair of squash blocks (lb)	
	3-1/2" wide	5-1/2" wide
2x lumber	5800	9500
1-1/8" APA Rim Board, Rim Board Plus, or Rated Sturd-I-Floor 48 oc	4500	5800
1" APA Rim Board or Rated Sturd-I-Floor 32 oc	4000	5800

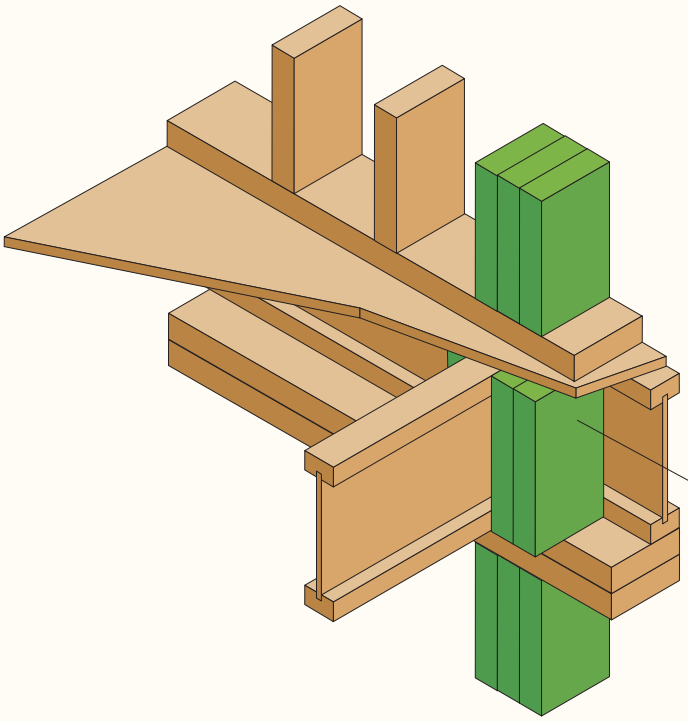
Provide lateral bracing per 1a, 1b, or 1c



All nails shown in the detail above are assumed to be common nails unless otherwise noted. Framing lumber assumed to be Spruce-Pine-Fir. Individual components not shown to scale for clarity.

Click here to return to Figure 1

1e

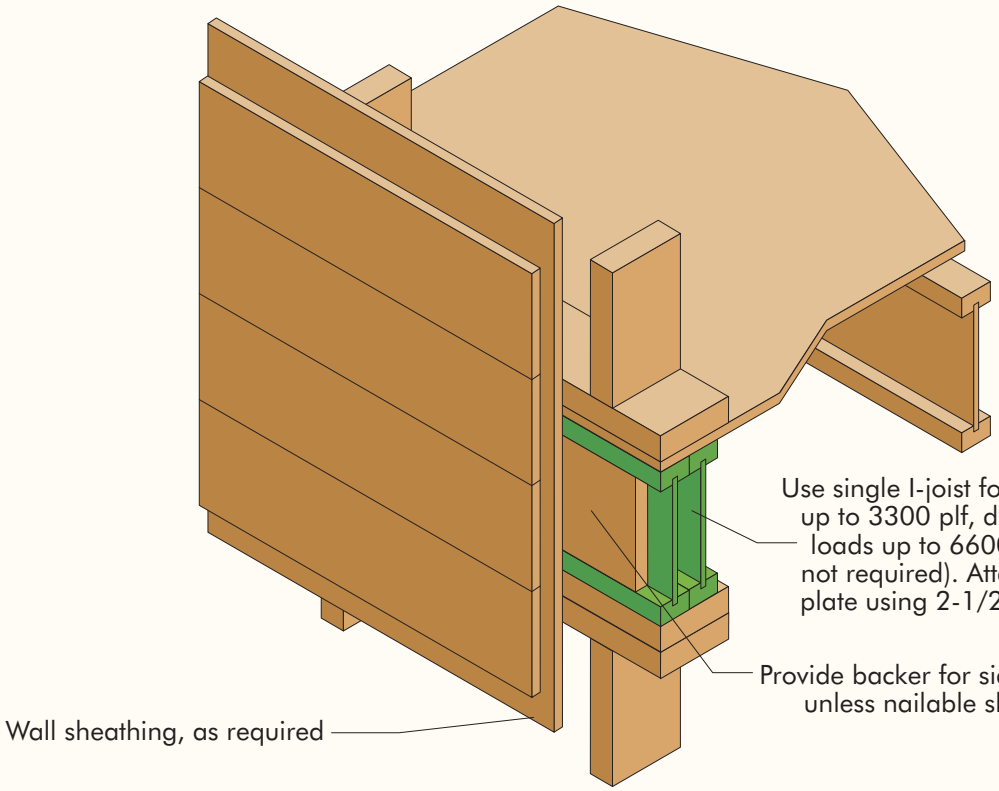


Transfer load from above to bearing below. Install squash blocks per 1d. Match bearing area of blocks below to post above.

All nails shown in the detail above are assumed to be common nails unless otherwise noted. Framing lumber assumed to be Spruce-Pine-Fir. Individual components not shown to scale for clarity.

Click here to return to Figure 1

1f

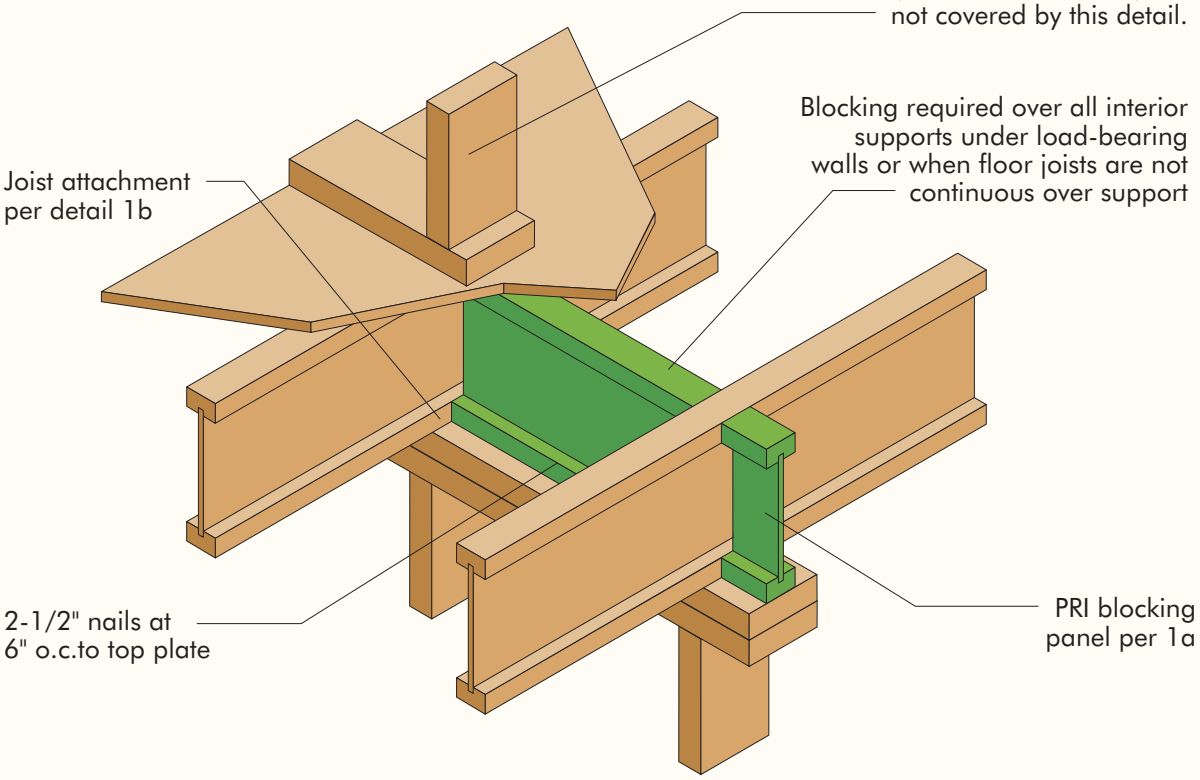


APA Rim Board may be used in lieu of I-joists.
Backer is not required when APA Rim Board is used.

All nails shown in the detail above are assumed to be common nails unless otherwise noted. Framing lumber assumed to be Spruce-Pine-Fir. Individual components not shown to scale for clarity.

Click here to return to Figure 1

1g



All nails shown in the detail above are assumed to be common nails unless otherwise noted. Framing lumber assumed to be Spruce-Pine-Fir. Individual components not shown to scale for clarity.

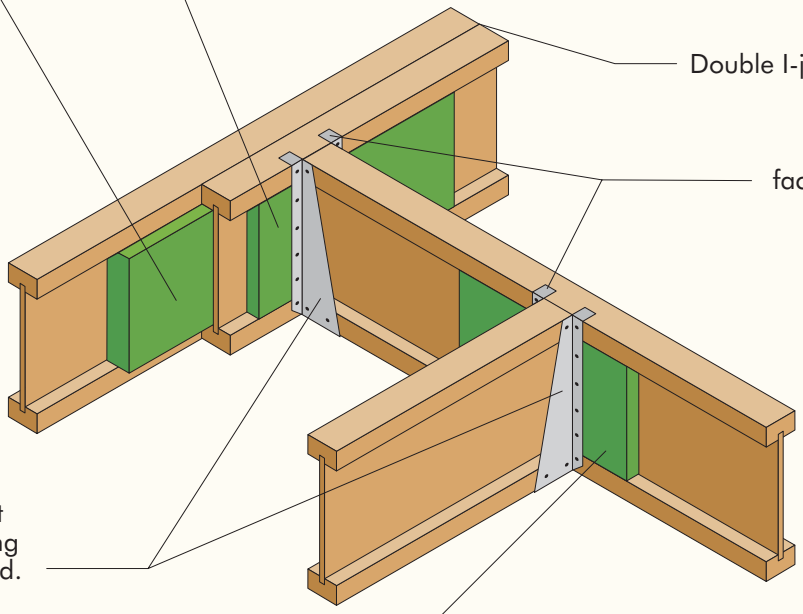
Click here to return to Figure 1

1h **Backer block (use if factored hanger load exceeds 360 lbs.)** Before installing a backer block to a double I-joist, drive 3 additional 3" nails through the webs and filler block where the backer block will fit. Clinch. Install backer tight to top flange. Use twelve 3" nails, clinched when possible. Maximum factored resistance for hanger for this detail = 1620 lbs.

BACKER BLOCKS (Blocks must be long enough to permit required nailing without splitting)

Flange Width	Material Thickness Required*	Minimum Depth**
1-1/2"	19/32"	5-1/2"
1-3/4"	23/32"	5-1/2"
2-5/16"	1"	7-1/4"
2-1/2"	1"	5-1/2"
3-1/2"	1-1/2"	7-1/4"

* Minimum grade for backer block material shall be Utility grade SPF (south) or better for solid sawn lumber and Rated Sheathing grade for wood structural panels.
** For face-mount hangers use net joist depth minus 3-1/4" for joists with 1-1/2" thick flanges. For 1-5/16" thick flanges use net depth minus 2-7/8".

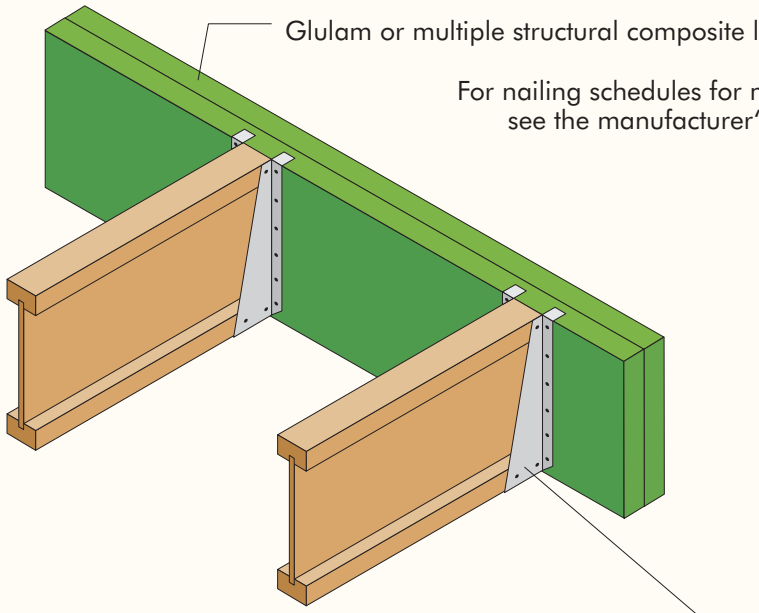


For hanger capacity see hanger manufacturer's recommendations.
Verify double I-joist capacity to support concentrated loads.

All nails shown in the detail above are assumed to be common nails unless otherwise noted. Framing lumber assumed to be Spruce-Pine-Fir. Individual components not shown to scale for clarity.

Click here to return to Figure 1

1i

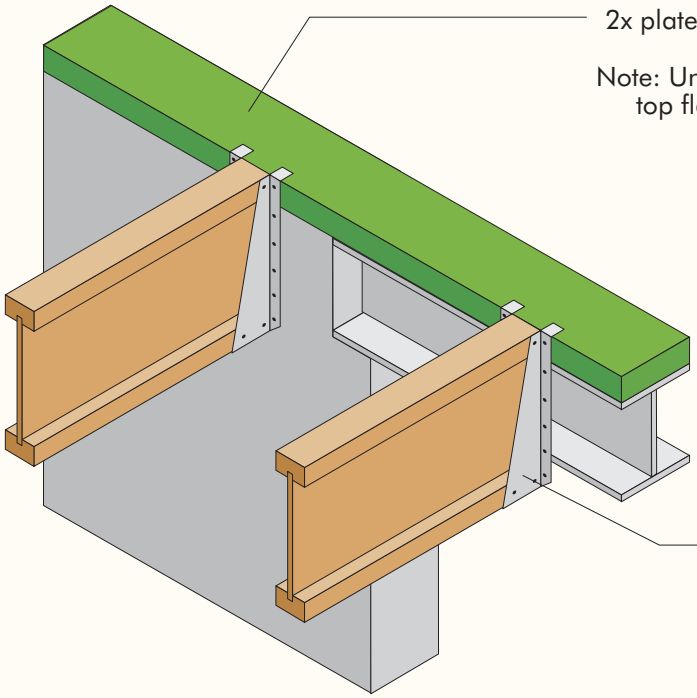


Note: Unless hanger sides laterally support the top flange, bearing stiffeners shall be used.

All nails shown in the detail above are assumed to be common nails unless otherwise noted. Framing lumber assumed to be Spruce-Pine-Fir. Individual components not shown to scale for clarity.

Click here to return to Figure 1

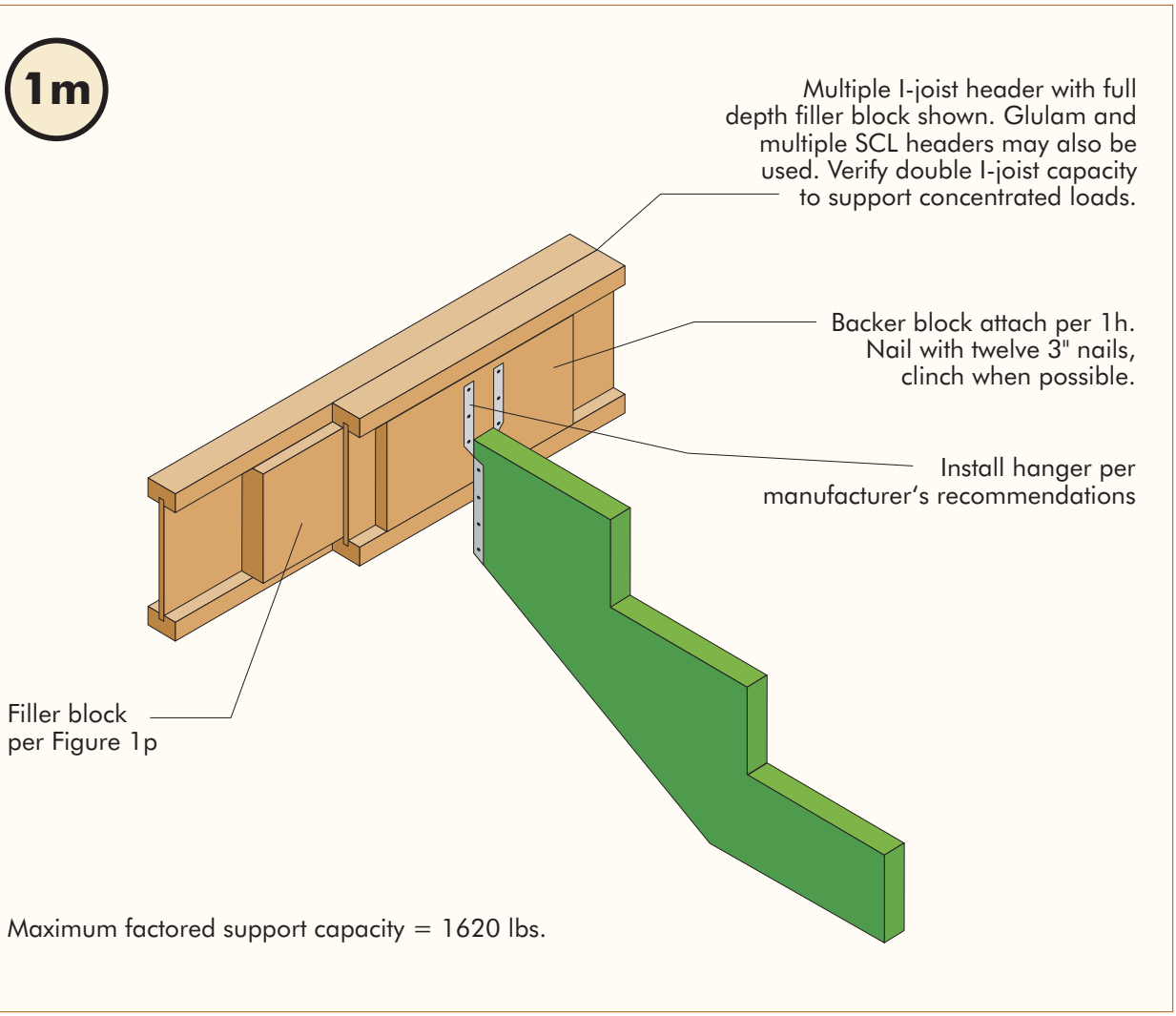
1k



All nails shown in the detail above are assumed to be common nails unless otherwise noted. Framing lumber assumed to be Spruce-Pine-Fir. Individual components not shown to scale for clarity.

Click here to return to Figure 1

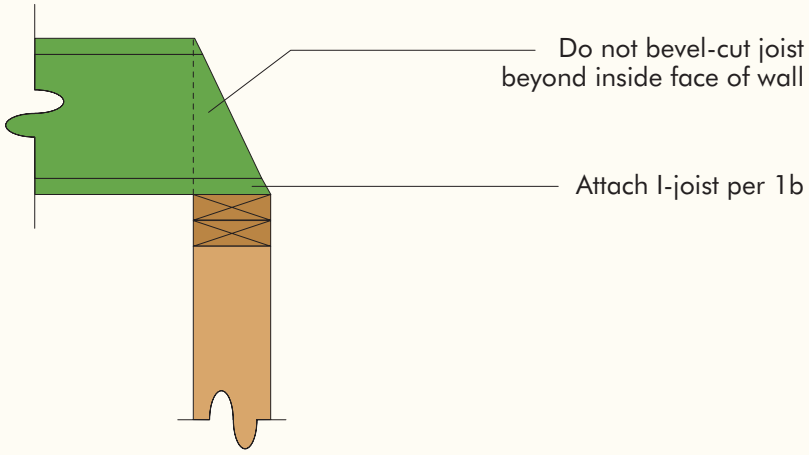
1m



All nails shown in the detail above are assumed to be common nails unless otherwise noted. Framing lumber assumed to be Spruce-Pine-Fir. Individual components not shown to scale for clarity.

Click here to return to Figure 1

1n



Note: Blocking required at bearing for lateral support, not shown for clarity.

All nails shown in the detail above are assumed to be common nails unless otherwise noted. Framing lumber assumed to be Spruce-Pine-Fir. Individual components not shown to scale for clarity.

Click here to return to Figure 1

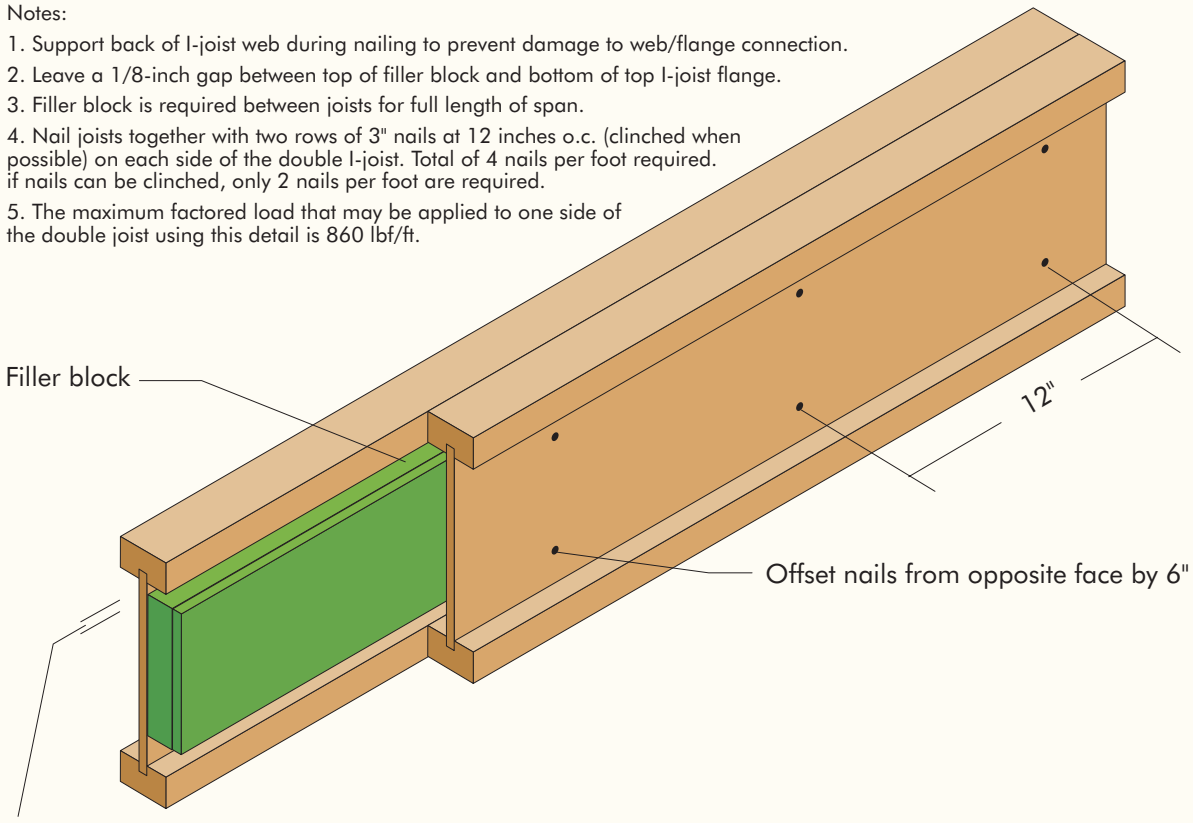
1p

FILLER BLOCK REQUIREMENTS FOR DOUBLE I-JOIST CONSTRUCTION

Flange Width	Net Depth	Filler Block Size
1-1/2"	9-1/2"	1-1/8" x 6" high
	11-7/8"	1-1/8" x 8" high
1-3/4"	9-1/2"	1-3/8" x 6"
	11-7/8"	1-3/8" x 8"
	14"	1-3/8" x 10"
	16"	1-3/8" x 12"
2-5/16"	11-7/8"	2" x 8"
	14"	2" x 10"
	16"	2" x 12"
2-1/2"	9-1/2"	2-1/8" x 6"
	11-7/8"	2-1/8" x 8"
	14"	2-1/8" x 10"
	16"	2-1/8" x 12"
3-1/2"	11-7/8"	3" x 8"
	14"	3" x 10"
	16"	3" x 12"

Notes:

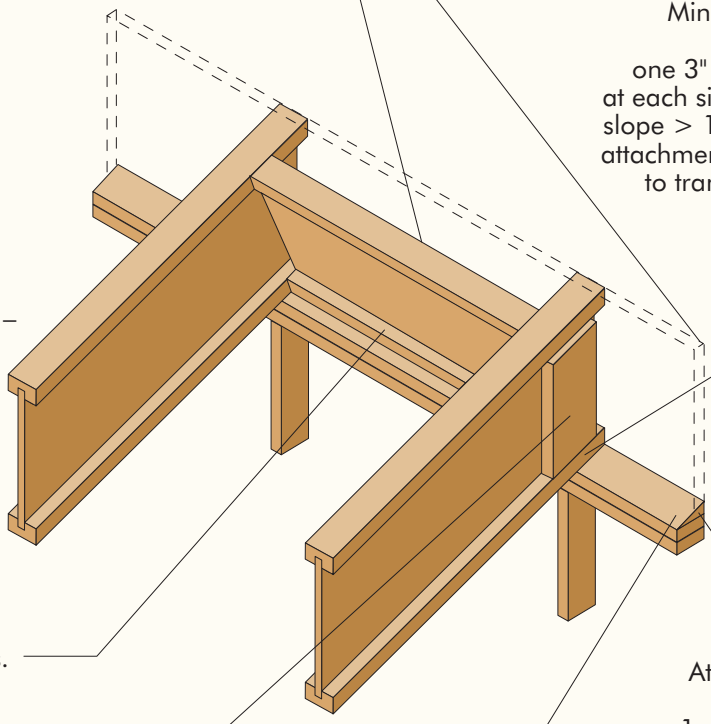
1. Support back of I-joist web during nailing to prevent damage to web/flange connection.
2. Leave a 1/8-inch gap between top of filler block and bottom of top I-joist flange.
3. Filler block is required between joists for full length of span.
4. Nail joists together with two rows of 3" nails at 12 inches o.c. (clinched when possible) on each side of the double I-joist. Total of 4 nails per foot required. if nails can be clinched, only 2 nails per foot are required.
5. The maximum factored load that may be applied to one side of the double joist using this detail is 860 lbf/ft.



All nails shown in the detail above are assumed to be common nails unless otherwise noted. Framing lumber assumed to be Spruce-Pine-Fir. Individual components not shown to scale for clarity.

Click here to return to Figure 1

10a Upper End, Bearing on Wall

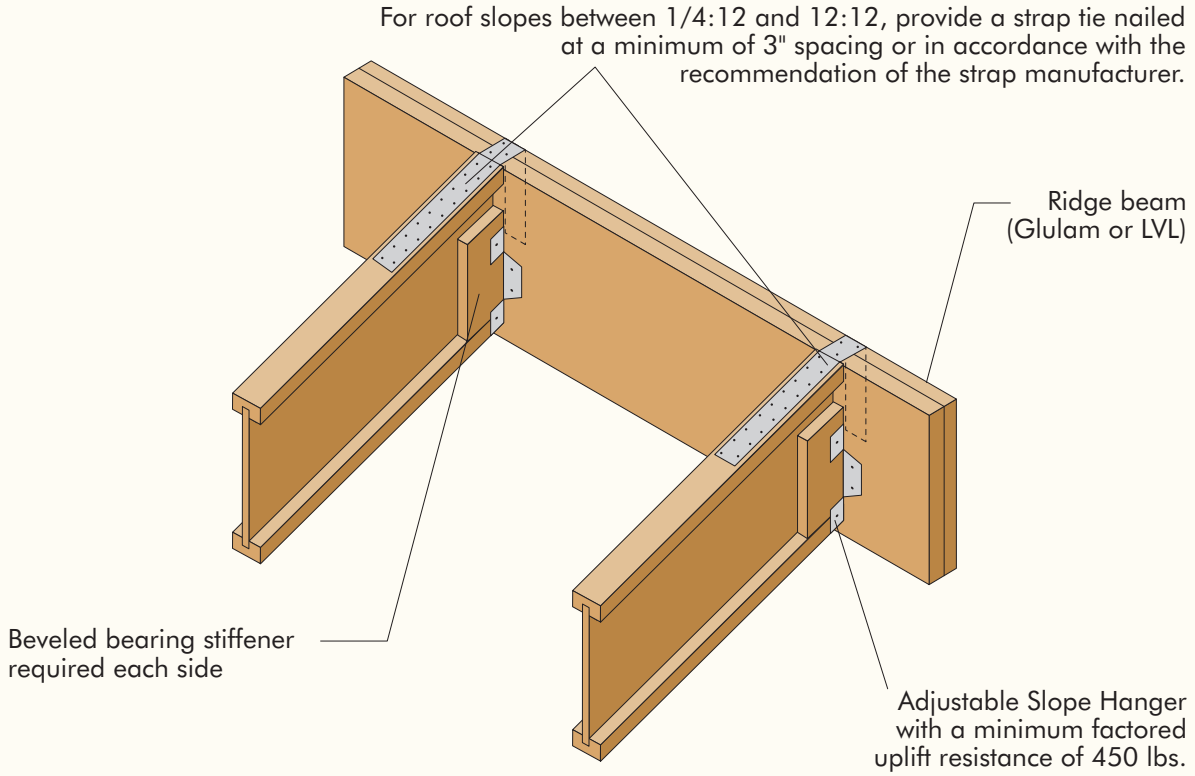


Note: Additional connection may be required for wind uplift.

All nails shown in the detail above are assumed to be common nails unless otherwise noted. Framing lumber assumed to be Spruce-Pine-Fir. Individual components not shown to scale for clarity.

Click here to return to Figure 10

10b Peak Connection

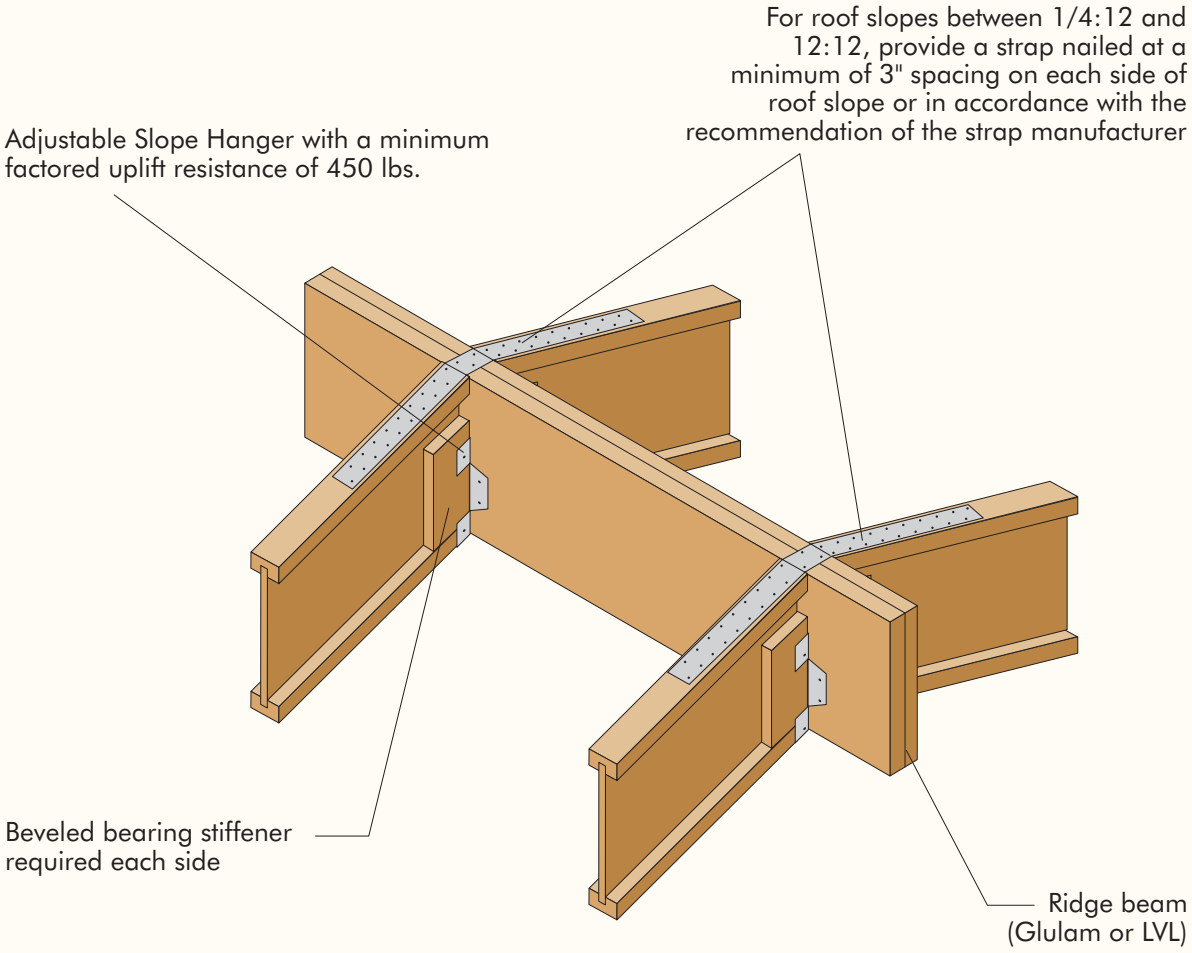


Note: Additional connection may be required for wind uplift.

All nails shown in the detail above are assumed to be common nails unless otherwise noted. Framing lumber assumed to be Spruce-Pine-Fir. Individual components not shown to scale for clarity.

Click here to return to Figure 10

10c I-Joist to Ridge Beam Connection

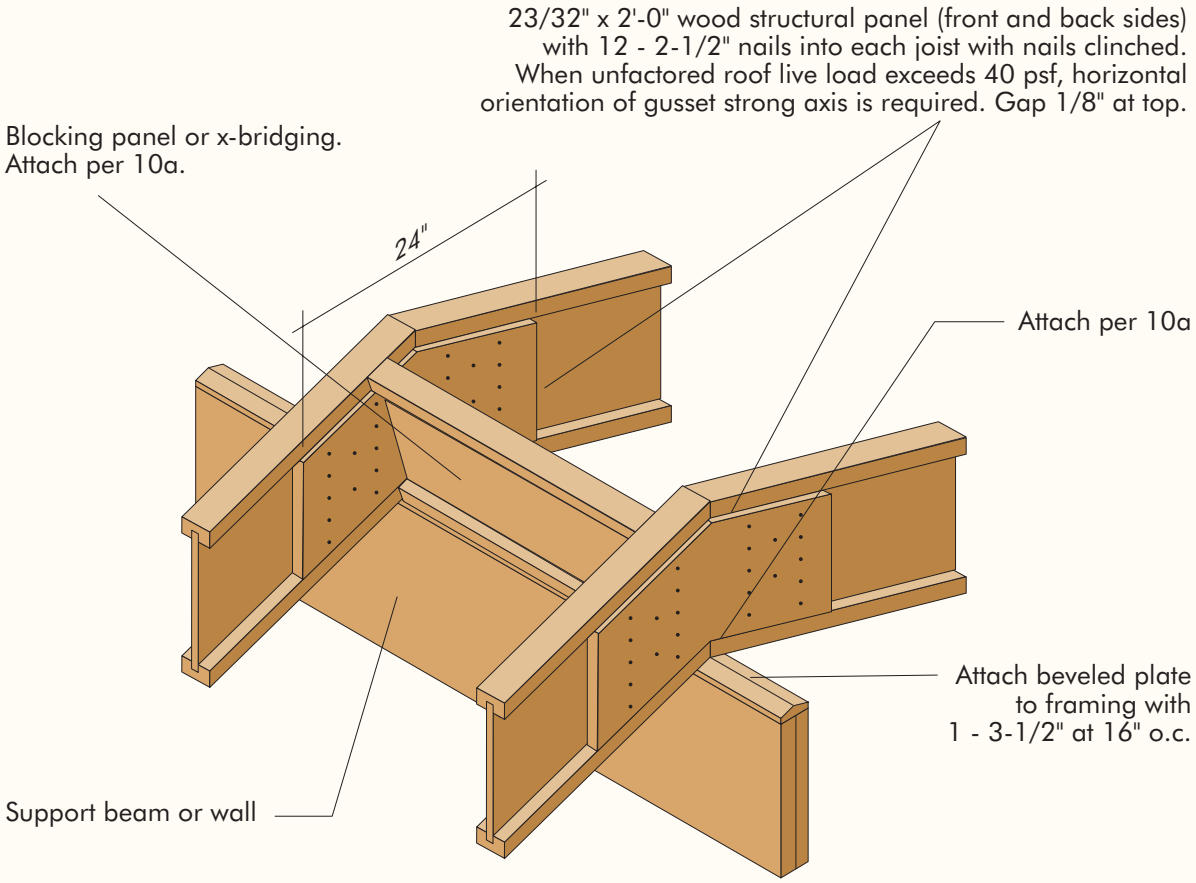


Note: Additional connection may be required for wind uplift.

All nails shown in the detail above are assumed to be common nails unless otherwise noted. Framing lumber assumed to be Spruce-Pine-Fir. Individual components not shown to scale for clarity.

Click here to return to Figure 10

10d I-Joist Connection with Wood Structural Panel Gussets

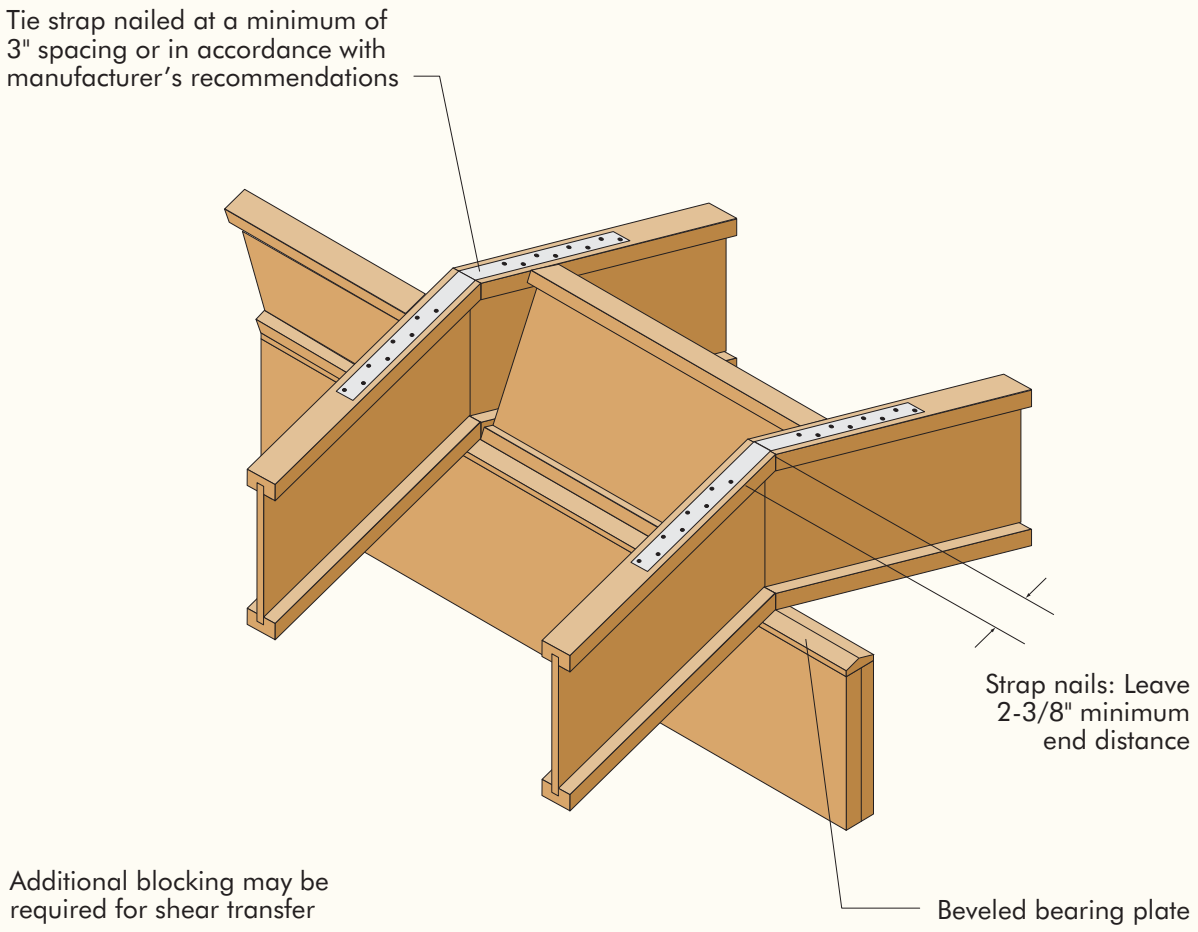


Note: Additional connection may be required for wind uplift.

All nails shown in the detail above are assumed to be common nails unless otherwise noted. Framing lumber assumed to be Spruce-Pine-Fir. Individual components not shown to scale for clarity.

Click here to return to Figure 10

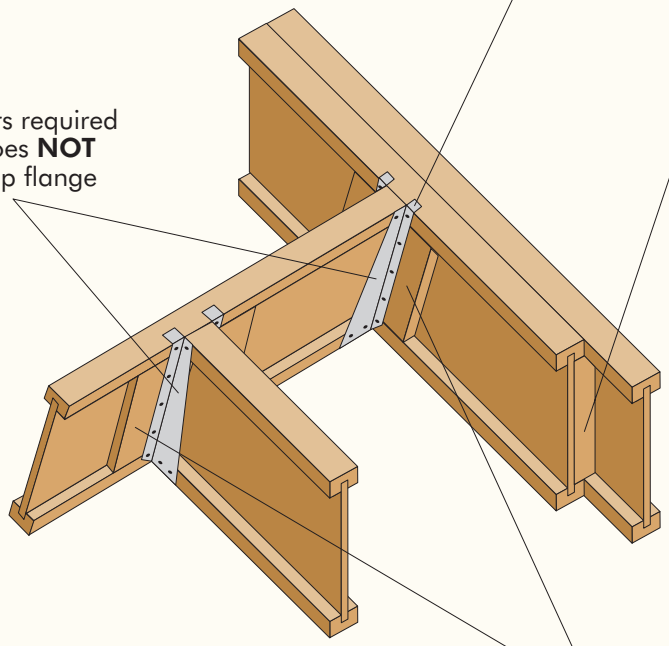
10e I-Joist Connection with Tie Strap



All nails shown in the detail above are assumed to be common nails unless otherwise noted. Framing lumber assumed to be Spruce-Pine-Fir. Individual components not shown to scale for clarity.

Click here to return to Figure 10

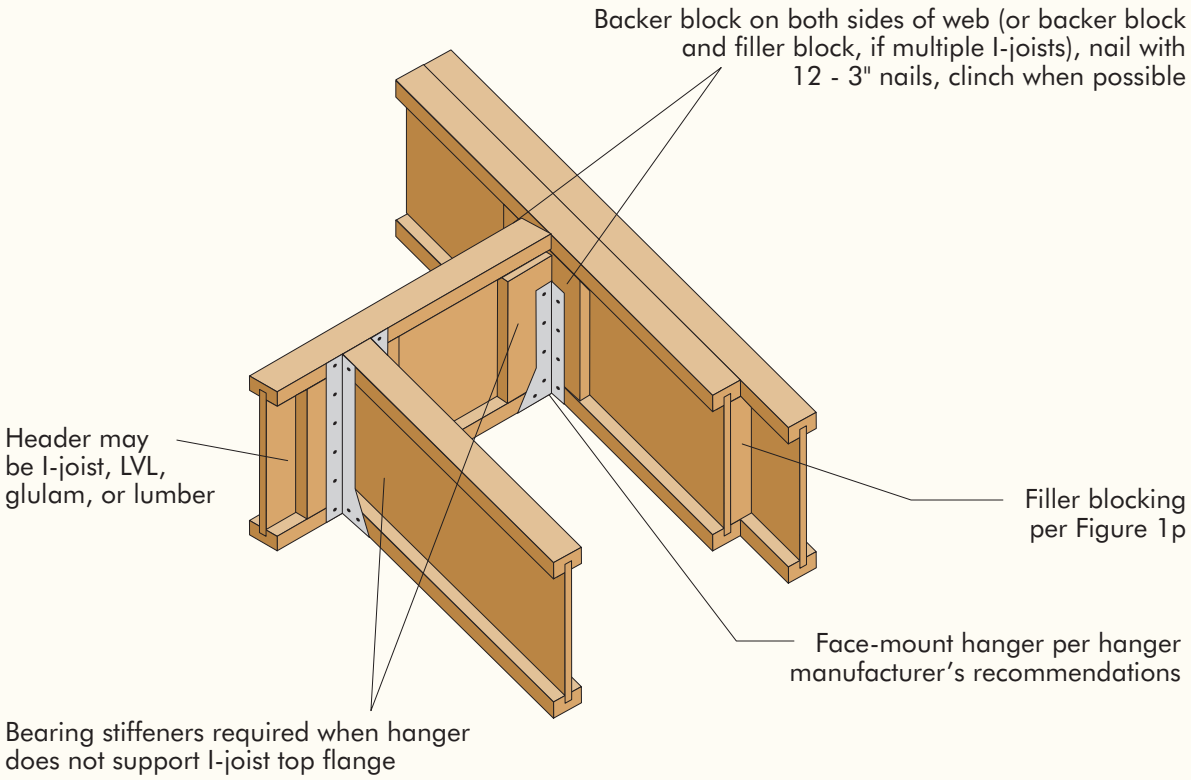
10f Roof Opening Top Mounted Hangers



All nails shown in the detail above are assumed to be common nails unless otherwise noted. Framing lumber assumed to be Spruce-Pine-Fir. Individual components not shown to scale for clarity.

Click here to return to Figure 10

10g Roof Opening, Face-Mounted Hangers

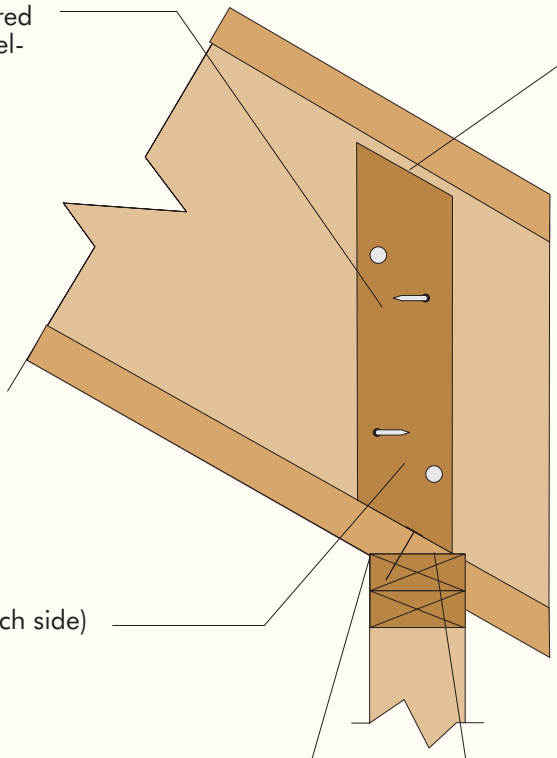


All nails shown in the detail above are assumed to be common nails unless otherwise noted. Framing lumber assumed to be Spruce-Pine-Fir. Individual components not shown to scale for clarity.

Click here to return to Figure 10

10h Birdsmouth Cut & Bevel Cut Bearing Stiffener

Permitted on low end of I-joist only

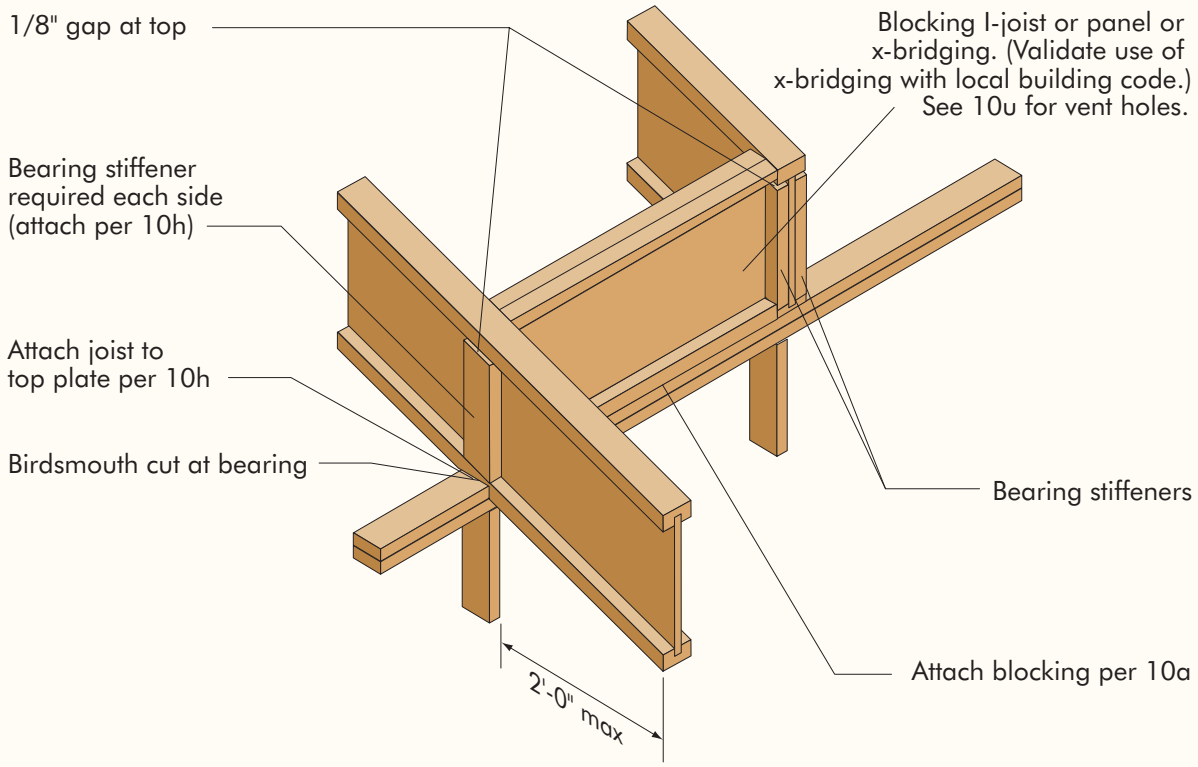


Note: Additional connection may be required for wind uplift.

All nails shown in the detail above are assumed to be common nails unless otherwise noted. Framing lumber assumed to be Spruce-Pine-Fir. Individual components not shown to scale for clarity.

Click here to return to Figure 10

10j Birdsmouth Cut with Overhang (Permitted on low end of I-joist only)



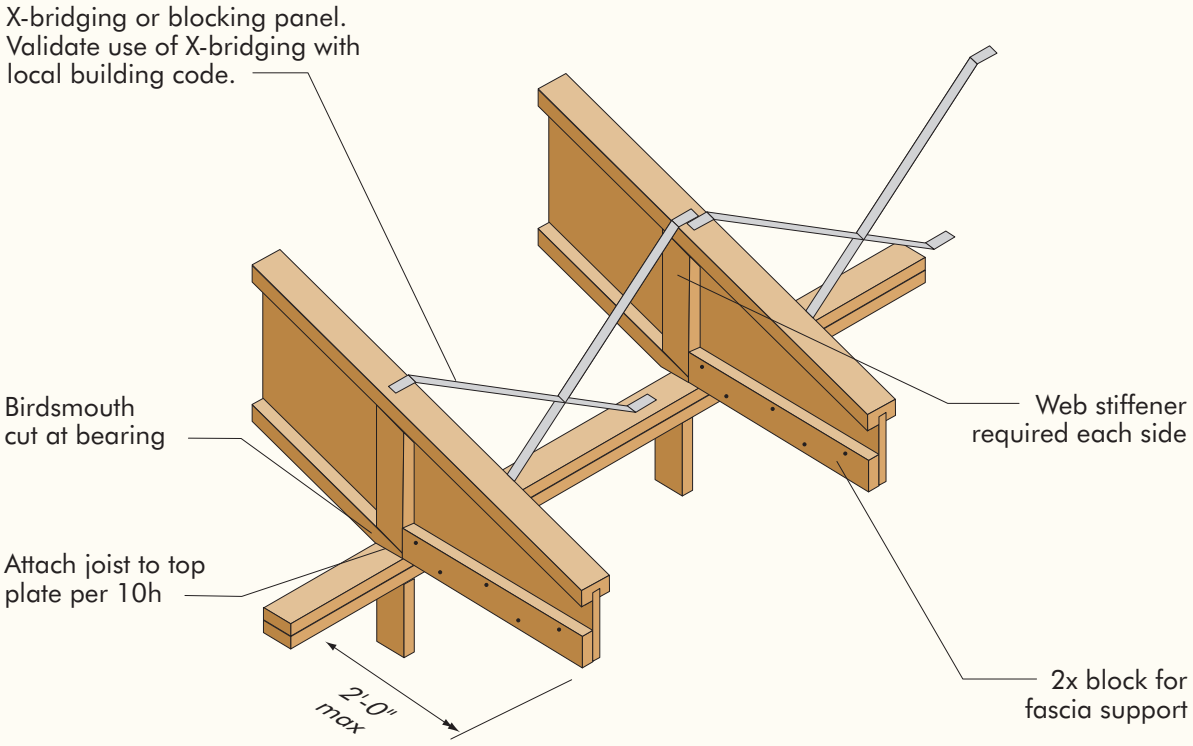
Note: Additional connection may be required for wind uplift.

Note: Outside corner of blocking panel may be trimmed if it interferes with roof sheathing. In such cases, position blocking panel on top plate to minimize trimming and still allow required nailing into top plate.

All nails shown in the detail above are assumed to be common nails unless otherwise noted. Framing lumber assumed to be Spruce-Pine-Fir. Individual components not shown to scale for clarity.

Click here to return to Figure 10

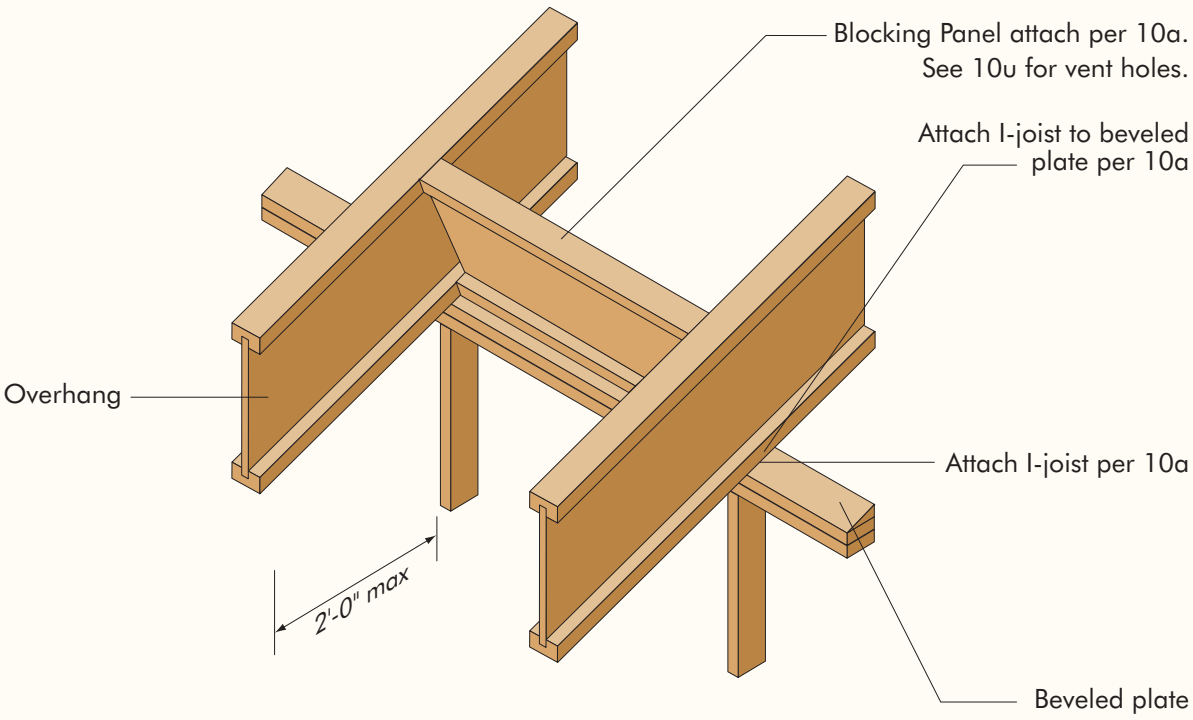
10k I-Joist Overhang for Fascia Support with Birdsmouth Cut



All nails shown in the detail above are assumed to be common nails unless otherwise noted. Framing lumber assumed to be Spruce-Pine-Fir. Individual components not shown to scale for clarity.

Click here to return to Figure 10

10m Blocking Panel at Beveled Plate

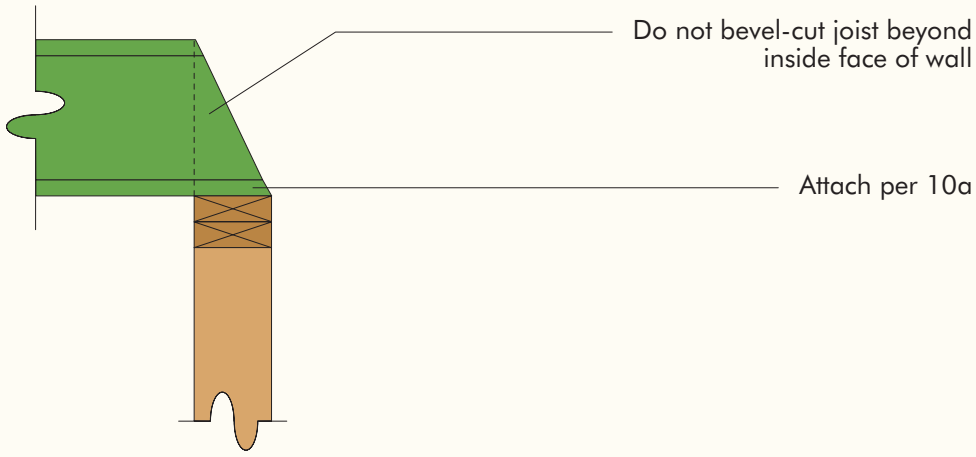


Note: Additional connection may be required for wind uplift.

All nails shown in the detail above are assumed to be common nails unless otherwise noted. Framing lumber assumed to be Spruce-Pine-Fir. Individual components not shown to scale for clarity.

Click here to return to Figure 10

10n I-Joist with Bevel-Cut End



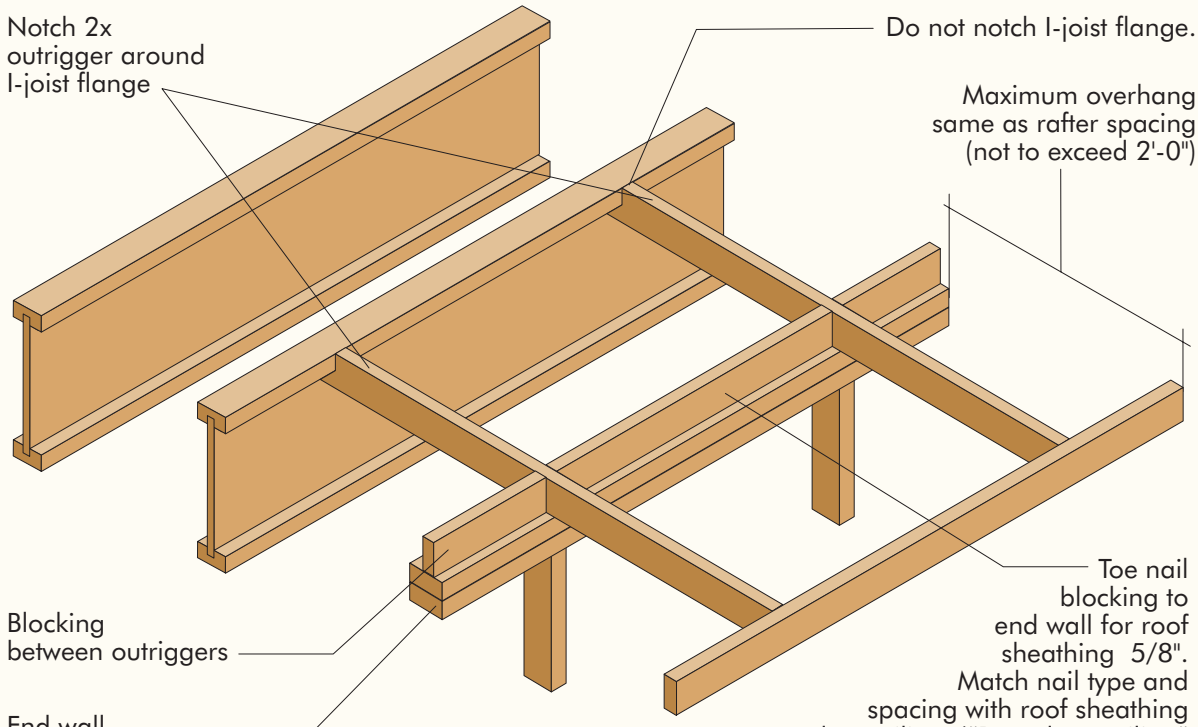
Note: Blocking or x-bridging required at bearing for lateral support, not shown for clarity.

Note: Additional connection may be required for wind uplift.

All nails shown in the detail above are assumed to be common nails unless otherwise noted. Framing lumber assumed to be Spruce-Pine-Fir. Individual components not shown to scale for clarity.

Click here to return to Figure 10

10p Outrigger

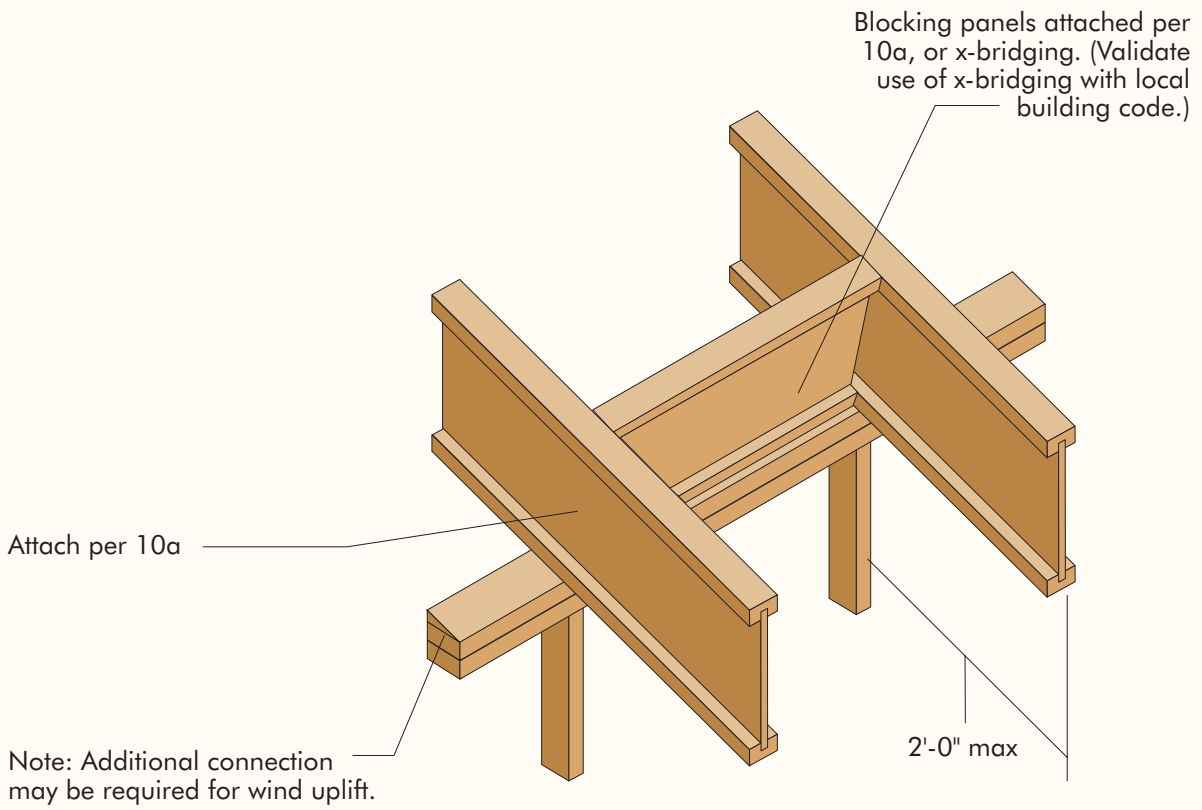


Note: Additional connection may be required for wind uplift.

All nails shown in the detail above are assumed to be common nails unless otherwise noted. Framing lumber assumed to be Spruce-Pine-Fir. Individual components not shown to scale for clarity.

Click here to return to Figure 10

10q I-Joist Overhang with Beveled Plate

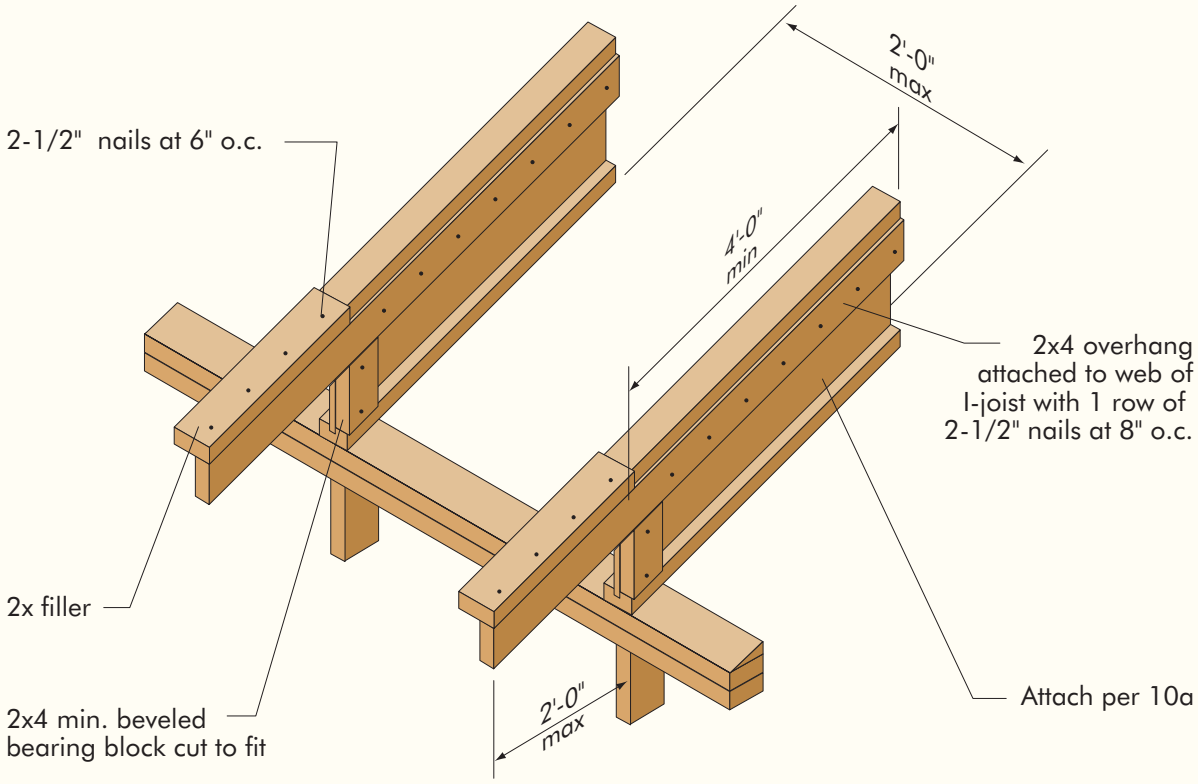


All nails shown in the detail above are assumed to be common nails unless otherwise noted. Framing lumber assumed to be Spruce-Pine-Fir. Individual components not shown to scale for clarity.

Click here to return to Figure 10

10r Lumber Overhang with Beveled Plate

(Blocking panel or x-bridging not shown for clarity)



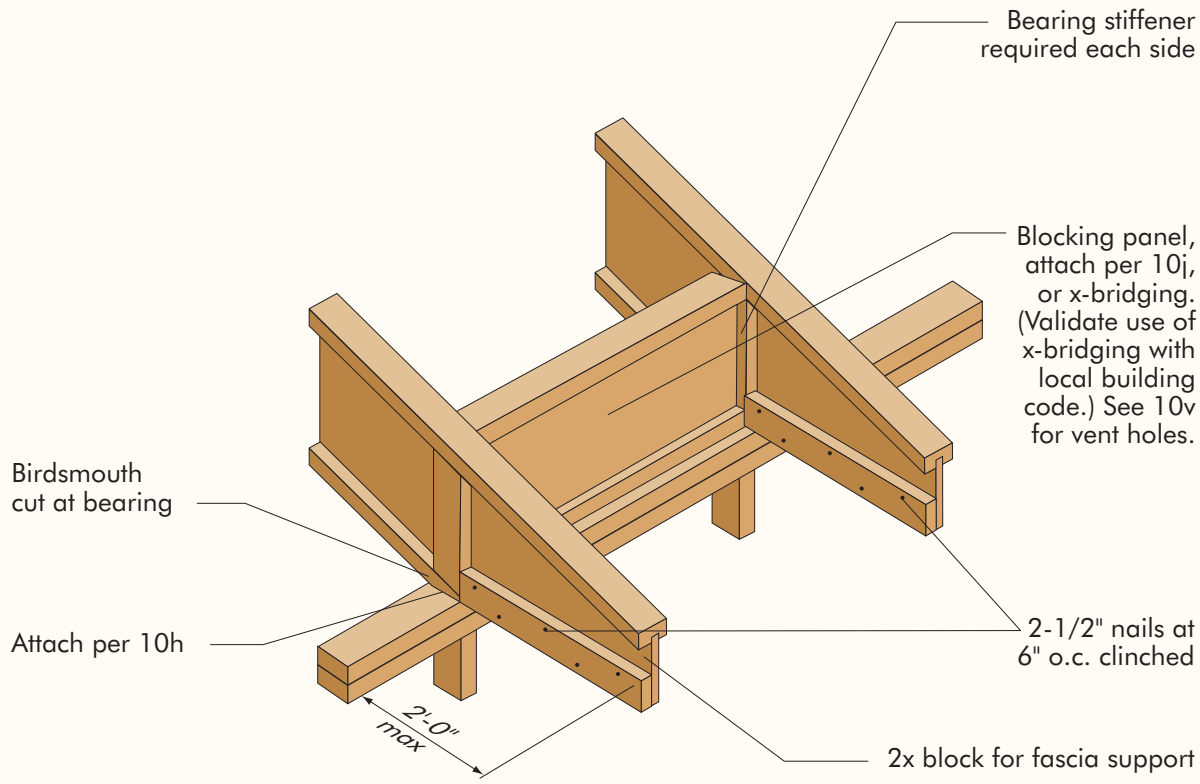
Note: Additional connection may be required for wind uplift.

Note: Lumber overhang shall be 2x4 Spruce-Pine-Fir #2 or better, or stronger species.

All nails shown in the detail above are assumed to be common nails unless otherwise noted. Framing lumber assumed to be Spruce-Pine-Fir. Individual components not shown to scale for clarity.

Click here to return to Figure 10

10s I-Joist Overhang for Fascia Support with Birdsmouth Cut

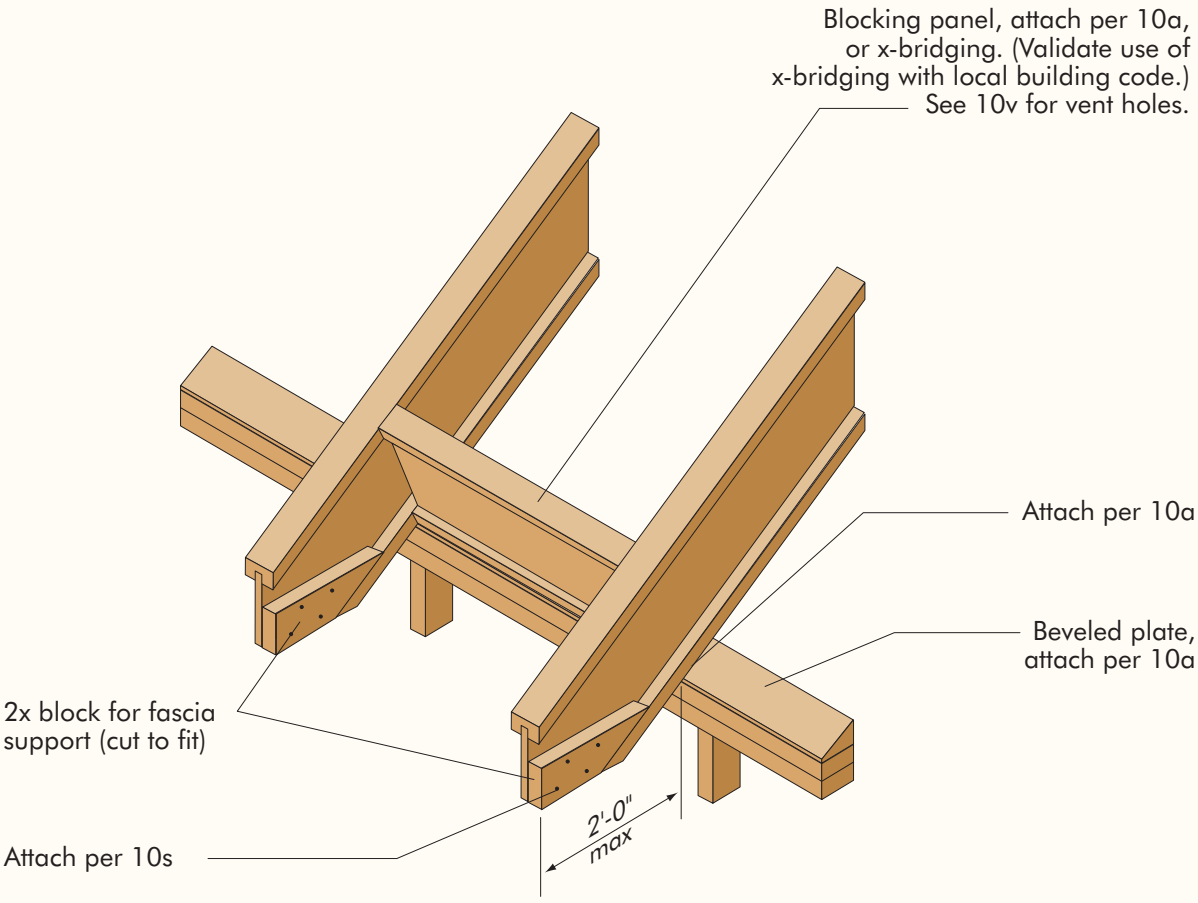


Note: Additional connection may be required for wind uplift.

All nails shown in the detail above are assumed to be common nails unless otherwise noted. Framing lumber assumed to be Spruce-Pine-Fir. Individual components not shown to scale for clarity.

Click here to return to Figure 10

10t I-Joist Overhang for Fascia Support with Beveled Plate

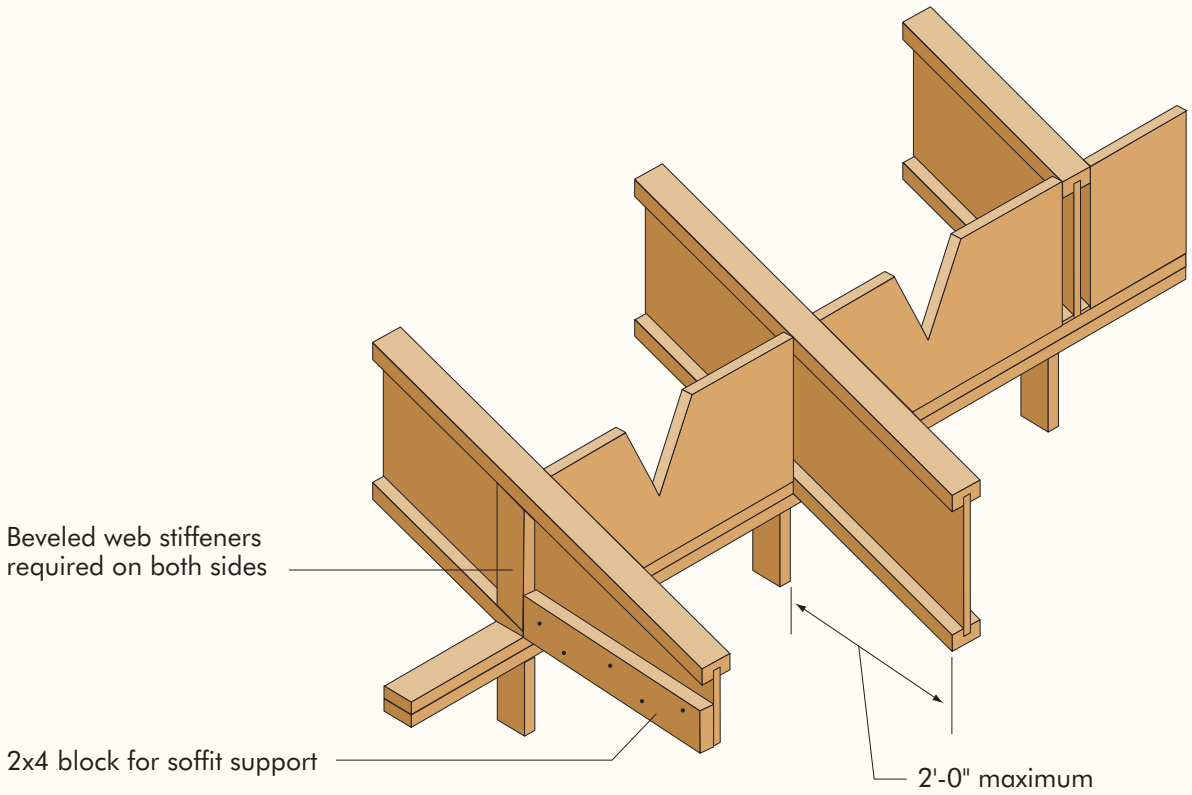


Note: Additional connection may be required for wind uplift.

All nails shown in the detail above are assumed to be common nails unless otherwise noted. Framing lumber assumed to be Spruce-Pine-Fir. Individual components not shown to scale for clarity.

Click here to return to Figure 10

10u Birdsmouth Cut Allowed at Low End of I-Joist Only

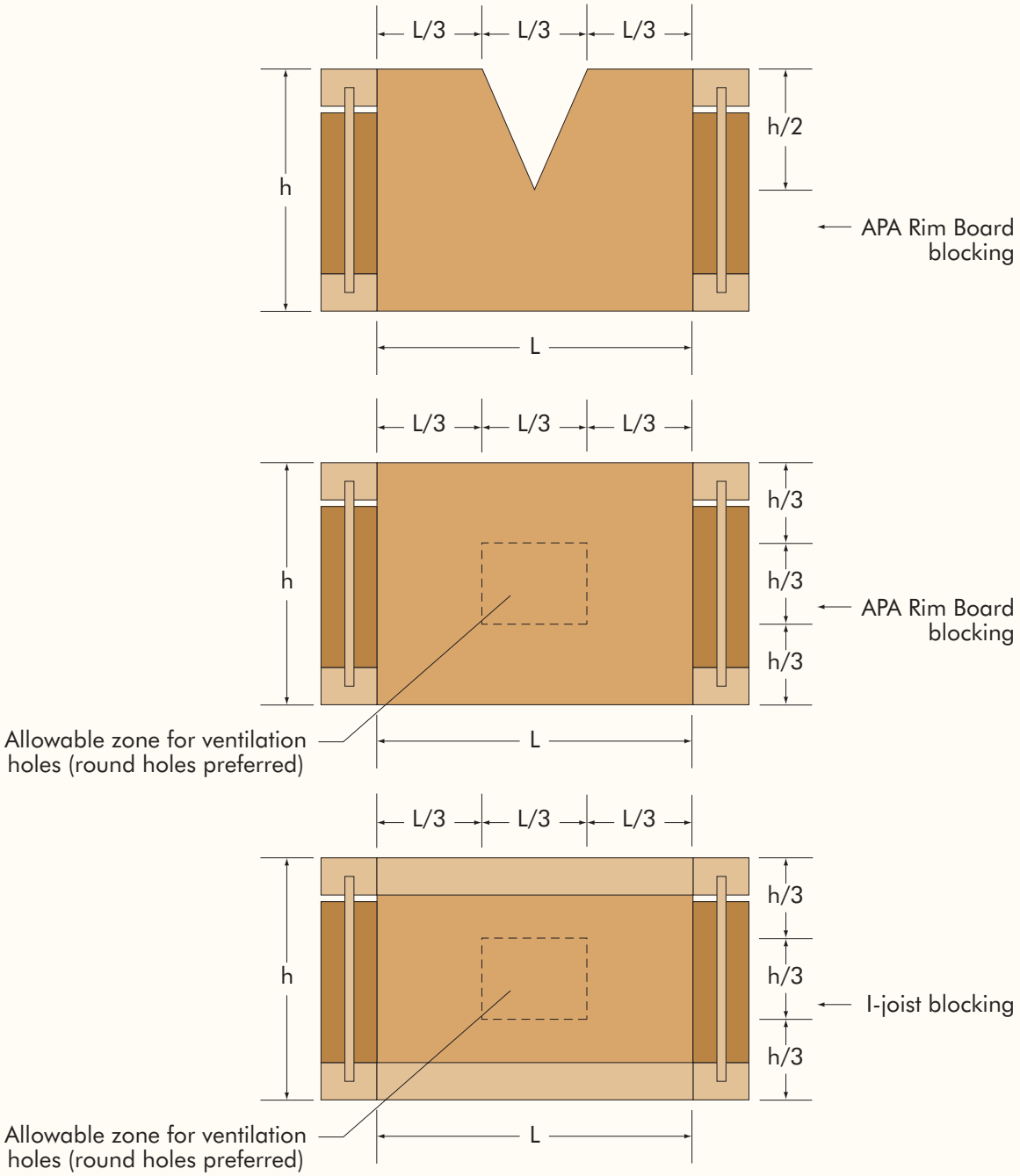


Note: Corrosion-resistant wire cloth screening, hardware cloth, perforated vinyl or similar material shall cover the ventilation holes per code.

All nails shown in the detail above are assumed to be common nails unless otherwise noted. Framing lumber assumed to be Spruce-Pine-Fir. Individual components not shown to scale for clarity.

Click here to return to Figure 10

10v Ventilation Holes



Note: Corrosion-resistant wire cloth screening, hardware cloth, perforated vinyl or similar material shall cover the ventilation holes per code.

All nails shown in the detail above are assumed to be common nails unless otherwise noted. Framing lumber assumed to be Spruce-Pine-Fir. Individual components not shown to scale for clarity.

Click here to return to Figure 10

I-Joist Construction Details

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(253) 620-7400 ▪ E-mail Address: help@apawood.org

Form No. EWS E715A CA/Revised March 2008

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