

14-001 / April 2009

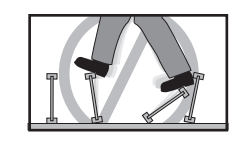
INSTALLATION GUIDE FOR RESIDENTIAL FLOORS



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SAFETY AND CONSTRUCTION PRECAUTIONS



WARNING
I-joists are unstable until completely installed with panels fully fastened to the top flanges.

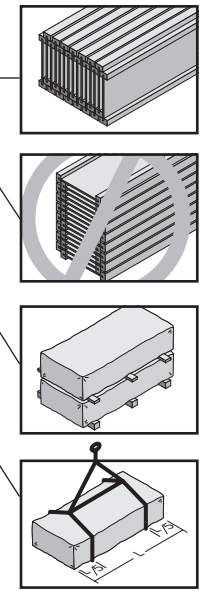
Avoid Accidents by Following these Important Guidelines:

1. Brace and nail each I-joist as it is installed, using hangers, blocking panels, rim board, and/or cross-bridging at joist ends.
2. When the building is completed, the floor sheathing will provide lateral support for the top flanges of the I-joists. Until this sheathing is applied, temporary bracing, often called struts, or temporary sheathing must be applied to prevent I-joist rollover or buckling.
 - Temporary bracing or struts must be 1x4 inch minimum, at least 8 feet long and spaced no more than 8 feet on center, and must be secured with a minimum of two 8d nails fastened to the top surface of each I-joist. Nail the bracing to a lateral restraint at the end of each bay. Lap ends of adjoining bracing over at least two I-joists.
 - Or, sheathing (temporary or permanent) can be nailed to the top flange of the first 4 feet of I-joists at the end of the bay.
3. For cantilevered I-joists, brace top and bottom flanges, and brace ends with closure panels, rim board, or cross-bridging.
4. Install and nail permanent sheathing to each I-joist before placing loads on the floor system. Then, stack building materials over beams or walls only.
5. Never install a damaged I-joist.

Improper storage or installation, failure to follow applicable building codes, failure to follow span ratings for Nordic I-joists, failure to use allowable hole sizes and locations, or failure to use web stiffeners when required can result in serious accidents. Follow these installation guidelines carefully.

STORAGE AND HANDLING GUIDELINES

1. Bundle wrap can be slippery when wet. Avoid walking on wrapped bundles.
2. Store I-joists vertically, level, and in bundles.
3. Always stack and handle I-joists in the upright position only.
4. Do not store I-joists in direct contact with the ground.
5. Protect I-joists from weather, and use spacers to separate bundles.
6. Bundled units should be kept intact until time of installation.
7. When lifting I-joists with a crane on the job site, take a few simple precautions to prevent damage to the I-joists and injury to your work crew.
 - Pick I-joists in bundles as shipped by the supplier.
 - Orient the bundles so that the webs of the I-joists are vertical.
 - Pick the bundles at the 5th points, using a spreader bar if necessary.
8. Do not handle I-joists in a horizontal orientation.
9. NEVER USE OR FIELD REPAIR A DAMAGED I-JOIST.



ALLOWABLE SPANS

1. Allowable spans are based on uniform loads. For applications with non-uniform loads, an engineering analysis may be required using the design properties found in the Nordic Joist Design/Construction Guide.
2. The allowable spans in the table indicate the allowable clear span for various joist spacings under typical residential uniform floor loads (40 psf live load and 10 psf dead load) for glued-nailed systems.
3. The live load deflection is limited to L/480.
4. Minimum bearing length shall be 1-3/4 inches for the end bearings, and 3-1/2 inches for the intermediate bearings.
5. For multiple-span applications, the end spans shall be 40% or more of the adjacent span.
6. Spans are based on a composite floor with glued-nailed sheathing meeting the requirements for APA Rated Sheathing or APA Rated STURD-I-FLOOR conforming to PS-108, PS-1, or PS-2 with a minimum thickness of 19/32 inch (40/20 or 20 o.c.) for a joist spacing of 19.2 inches or less, or 23/32 inch (48/24 or 24 o.c.) for a joist spacing of 24 inches. Adhesive shall meet APA Specification AFG-01 or ASTM D3498.
7. Bearing stiffeners are **not** required when I-joists are used with the spans and spacing given in this table, except as required for hangers.
8. SI units conversion: 1 inch = 25.4 mm
1 foot = 0.305 m

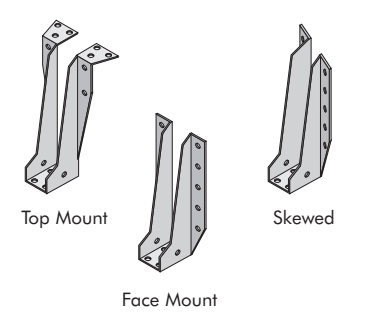
ALLOWABLE SPANS FOR NORDIC I-JOISTS

Joist Depth	Joist Series	Simple Spans				Multiple Spans			
		On Center Spacing				On Center Spacing			
		12"	16"	19.2"	24"	12"	16"	19.2"	24"
9-1/2"	NI-20	16'-7"	15'-3"	14'-5"	13'-6"	18'-1"	16'-7"	15'-8"	13'-5"
	NI-40x	18'-8"	17'-0"	16'-1"	15'-0"	20'-4"	18'-5"	16'-10"	15'-0"
	NI-60	18'-11"	17'-4"	16'-4"	15'-3"	20'-8"	18'-10"	17'-9"	16'-7"
	NI-70	20'-6"	18'-9"	17'-8"	16'-5"	22'-4"	20'-4"	19'-2"	17'-8"
	NI-80	20'-11"	19'-1"	18'-0"	16'-9"	22'-9"	20'-9"	19'-6"	18'-2"
11-7/8"	NI-20	19'-11"	18'-3"	17'-3"	16'-1"	21'-8"	19'-10"	17'-9"	14'-2"
	NI-40x	22'-2"	20'-3"	19'-2"	17'-2"	24'-2"	21'-0"	19'-2"	17'-1"
	NI-60	22'-8"	20'-8"	19'-6"	18'-2"	24'-8"	22'-6"	21'-2"	19'-8"
	NI-70	24'-5"	22'-3"	21'-0"	19'-7"	26'-8"	24'-3"	22'-10"	21'-3"
	NI-80	24'-11"	22'-8"	21'-4"	19'-11"	27'-11"	24'-8"	23'-3"	21'-7"
14"	NI-40x	25'-2"	22'-11"	21'-2"	18'-11"	26'-8"	23'-1"	21'-1"	18'-10"
	NI-60	25'-9"	23'-6"	22'-2"	20'-8"	28'-0"	25'-7"	24'-1"	21'-7"
	NI-70	27'-8"	25'-3"	23'-9"	22'-2"	30'-2"	27'-6"	25'-10"	21'-9"
	NI-80	28'-3"	25'-9"	24'-3"	22'-7"	30'-10"	28'-0"	26'-5"	24'-6"
	NI-90x	29'-4"	26'-9"	25'-2"	23'-5"	32'-0"	29'-1"	27'-5"	25'-5"
16"	NI-60	28'-6"	26'-0"	24'-7"	22'-10"	31'-1"	28'-4"	26'-0"	21'-9"
	NI-70	30'-8"	27'-11"	26'-4"	24'-6"	33'-5"	30'-5"	27'-3"	21'-9"
	NI-80	31'-4"	28'-6"	26'-10"	25'-0"	34'-2"	31'-1"	29'-3"	26'-3"
	NI-90x	32'-7"	29'-8"	27'-11"	26'-0"	35'-6"	32'-3"	30'-5"	28'-3"

ICC-ES EVALUATION REPORT ESR-1742

I-JOIST HANGERS

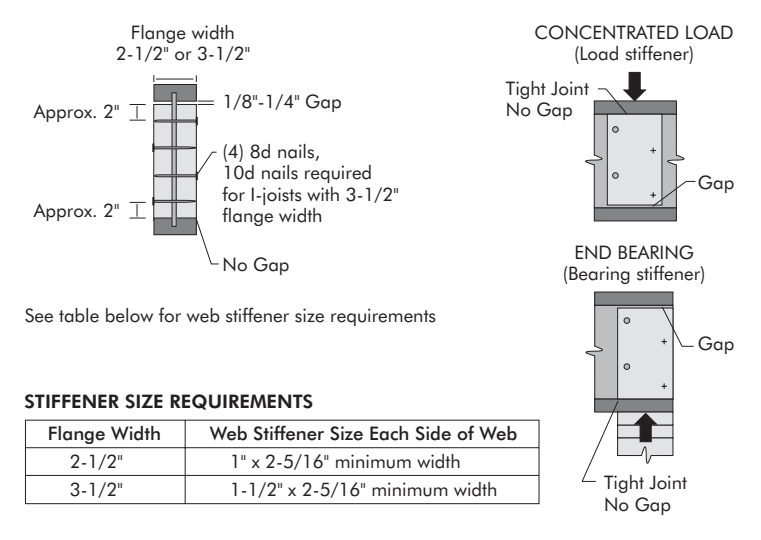
1. Hangers shown illustrate the three most commonly used metal hangers to support I-joists.
2. All nailing must meet the hanger manufacturer's recommendations.
3. Hangers should be selected based on the joist depth, flange width and load capacity based on the allowable spans.
4. Web stiffeners are required when the sides of the hangers do not laterally brace the top flange of the I-joist.



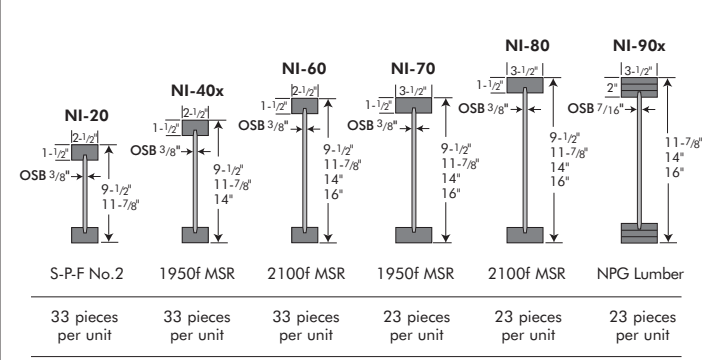
WEB STIFFENERS

- RECOMMENDATIONS:**
- A **bearing stiffener** is required in all engineered applications with design end reactions greater than 1,500 lbs, with the exception of NI-90x, which requires bearing stiffeners when end reaction values exceed 1,885 lbs. The gap between the stiffener and the flange is at the top.
 - A **bearing stiffener** is required when the I-joist is supported in a hanger and the sides of the hanger do not extend up to, and support, the top flange. The gap between the stiffener and flange is at the top.
 - A **load stiffener** is required at locations where a concentrated load greater than 1,500 lbs is applied to the top flange between supports, or in the case of a cantilever, anywhere between the cantilever tip and the support. These values are for normal duration of load, and may be adjusted for other load durations as permitted by the code. The gap between the stiffener and the flange is at the bottom.
- SI units conversion: 1 inch = 25.4 mm

FIGURE 2 WEB STIFFENER INSTALLATION DETAILS



NORDIC I-JOIST SERIES



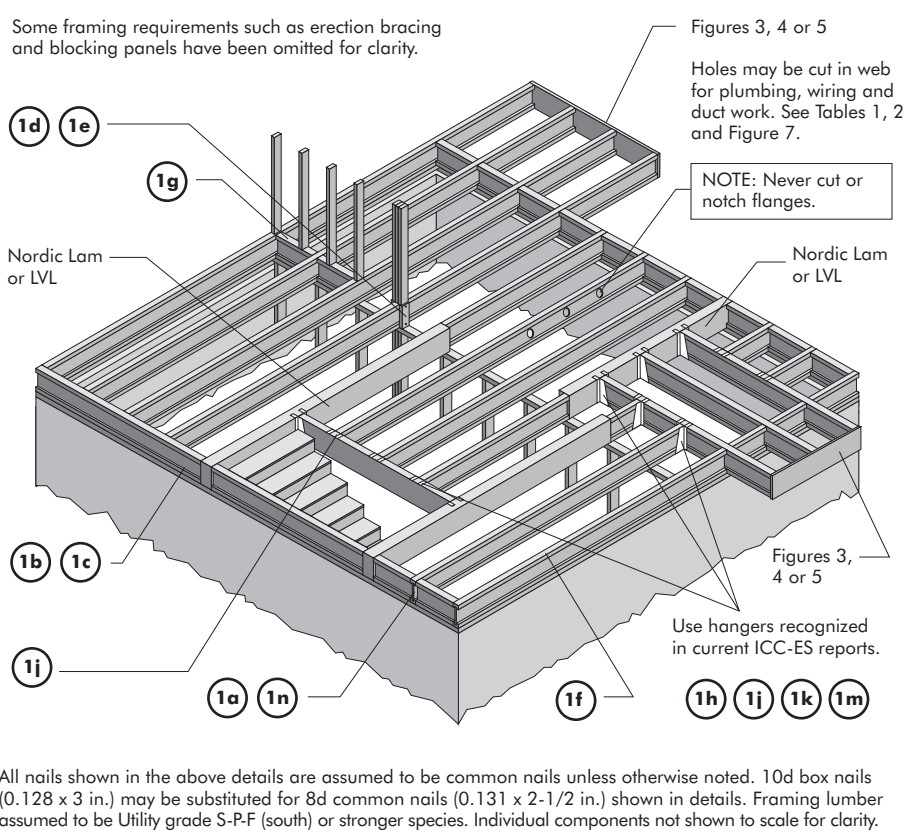
Chantiers Chibougamau Ltd. harvests its own trees, which enables Nordic products to adhere to strict quality control procedures throughout the manufacturing process. Every phase of the operation, from forest to the finished product, reflects our commitment to quality.

Nordic Engineered Wood I-joists use only finger-jointed black spruce lumber in their flanges, ensuring consistent quality, superior strength, and longer span carrying capacity.

INSTALLING NORDIC I-JOISTS

1. Before laying out floor system components, verify that I-joist flange widths match hanger widths. If not, contact your supplier.
2. Except for cutting to length, I-joist flanges should **never** be cut, drilled, or notched.
3. Install I-joists so that top and bottom flanges are within 1/2 inch of true vertical alignment.
4. I-joists must be anchored securely to supports before floor sheathing is attached, and supports for multiple-span joists must be level.
5. Minimum bearing lengths: 1-3/4 inches for end bearings and 3-1/2 inches for intermediate bearings.
6. When using hangers, seat I-joists firmly in hanger bottoms to minimize settlement.
7. Leave a 1/16-inch gap between the I-joist end and a header.
8. Concentrated loads greater than those that can normally be expected in residential construction should only be applied to the top surface of the top flange. Normal concentrated loads include track lighting fixtures, audio equipment and security cameras. Never suspend unusual or heavy loads from the I-joist's bottom flange. Whenever possible, suspend all concentrated loads from the top of the I-joist. Or, attach the load to blocking that has been securely fastened to the I-joist webs.
9. Never install I-joists where they will be permanently exposed to weather, or where they will remain in direct contact with concrete or masonry.
10. Restrain ends of floor joists to prevent rollover. Use rim board, rim joists or I-joist blocking panels.
11. For I-joists installed over and beneath bearing walls, use full depth blocking panels, rim board, or squash blocks (cripple members) to transfer gravity loads through the floor system to the wall or foundation below.
12. Due to shrinkage, common framing lumber set on edge **may never** be used as blocking or rim boards. I-joist blocking panels or other engineered wood products – such as rim board – must be cut to fit between the I-joists, and an I-joist-compatible depth selected.
13. Provide permanent lateral support of the bottom flange of all I-joists at interior supports of multiple-span joists. Similarly, support the bottom flange of all cantilevered I-joists at the end support next to the cantilever extension. In the completed structure, the gypsum wallboard ceiling provides this lateral support. Until the final finished ceiling is applied, temporary bracing or struts must be used.
14. If square-edge panels are used, edges must be supported between I-joists with 2x4 blocking. Glue panels to blocking to minimize squeaks. Blocking is not required under structural finish flooring, such as wood strip flooring, or if a separate underlayment layer is installed.
15. Nail spacing: Space nails installed to the flange's top face in accordance with the applicable building code requirements or approved building plans.

FIGURE 1 TYPICAL NORDIC I-JOIST FLOOR FRAMING AND CONSTRUCTION DETAILS



1a Attach I-joist to top plate per detail 1b

NI blocking panel

8d nails at 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	Uniform Vertical Load Transfer Capacity* (plf)
NI Joists	2,000

*The uniform vertical load capacity is limited to a joist depth of 16 inches or less and is based on the normal (10-yr) 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 detail 1d.

1b Attach rim joist to floor joist with one nail at top and bottom. Nail must provide 1 inch minimum penetration into floor joist. For 2-1/2" and 3-1/2" flange widths, toe-nails may be used.

One 8d nail at top and bottom flange

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.

Minimum bearing length shall be 1-3/4" for the end bearings, and 3-1/2" for the intermediate bearings when applicable.

Rim board

One 8d face nail at each side at bearing

Blocking Panel or Rim Joist	Uniform Vertical Load Transfer Capacity* (plf)
1-1/8" Rim Board	4,850

*The uniform vertical load capacity is limited to a rim board depth of 16 inches or less and is based on the normal (10-yr) 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 detail 1d.

1c NI or rim board blocking panel per detail 1a

1/16" for squash blocks

Squash block

Pair of Squash Blocks	Vertical Load Transfer Capacity per Pair of Squash Blocks (lbs)	
3-1/2" wide	5-1/2" wide	
2x Lumber	4,000	7,000
1-1/8" Rim Board	3,000	3,500

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

1d NI or rim board blocking panel per detail 1a

1/16" for squash blocks

Squash block

NI or rim board blocking panel per detail 1a

1/16" for squash blocks

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

Wall sheathing, as required

Provide backer for siding attachment unless sheathing is used.

Rim board may be used in lieu of I-joists. Backer is not required when rim board is used. Bracing per code shall be carried to the foundation.

1f Use single I-joist for loads up to 2,000 plf, double I-joists for loads up to 4,000 plf (filler block not required). Attach I-joist to top plate using 8d nails at 6" o.c.

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

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

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

1g Load bearing wall above shall align vertically with the bearing below. Other conditions, such as offset bearing walls, are not covered by this detail.

Blocking required over all interior supports under load-bearing walls or when floor joists are not continuous over support

Joist attachment per detail 1b

8d nails at 6" o.c. to top plate

NI blocking panel per detail 1a

Filler block per detail 1p

Install hanger per manufacturer's recommendations

Backer block attached per detail 1h. Nail with twelve 10d nails, clinch when possible.

Maximum support capacity = 1,280 lbs.

1h Backer block (use if hanger load exceeds 250 lbs) Before installing a backer block to a double I-joist, drive three additional 10d nails through the webs and filler block where the backer block will fit. Clinch. Install backer tight to top flange. Use twelve 10d nails, clinched when possible. Maximum capacity for hanger for this detail = 1,280 lbs.

Double I-joist header

Top- or face-mount hanger

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

Backer block required (both sides for face-mount hangers)

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

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

Flange Width	Material Thickness Required*	Minimum Depth**
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 S-P-F (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 2" thick flanges use net depth minus 4-1/4".

1i Top- or face-mount hanger installed per manufacturer's recommendations

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

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

1k 2x plate flush with inside face of wall or beam. 1/8" overhang allowed past inside face of wall or beam.

Top-mount hanger installed per manufacturer's recommendations

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

1m Multiple I-joist header with full depth filler block shown. Nordic Lam or LVL headers may also be used. Verify double I-joist capacity to support concentrated loads.

Filler block per detail 1p

Install hanger per manufacturer's recommendations

Backer block attached per detail 1h. Nail with twelve 10d nails, clinch when possible.

Maximum support capacity = 1,280 lbs.

1n Do not bevel-cut joist beyond inside face of wall

Attach I-joist per detail 1b

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

1p Filler block

Offset nails from opposite face by 6"

1/8" gap between top flange and filler block

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 10d nails at 12 inches o.c. (clinched when possible) on each side of the double I-joist. Total of four nails per foot required. If nails can be clinched, only two nails per foot are required.
5. The maximum load that may be applied to one side of the double joist using this detail is 620 lbf/ft. Verify double I-joist capacity.

FILLER BLOCK REQUIREMENTS FOR DOUBLE I-JOIST CONSTRUCTION

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

1r Lumber 2x4 min., extend block to face of adjacent web. Two 8d box nails from each web to lumber piece, alternate on opposite side.

NI blocking panel

Optional: Minimum 1x4 inch strap applied to underside of joist at blocking line or 1/2 inch minimum gypsum ceiling attached to underside of joists.

1s One 8d box nail at top and bottom flange

Rim board

Two 8d box nails from each web to lumber piece

2x4 min. (1/8" gap minimum)

Two 8d box nails from each web to lumber piece

I-joist blocking panel

One 8d box nail, one side only

8d box nails at 6" o.c.

Note: In some local codes, blocking is prescriptively required in the first joist space (or first and second joist space) next to the starter joist. Where required, see local code requirements for spacing of the blocking.

CANTILEVER DETAILS FOR BALCONIES (NO WALL LOAD)

3a I-JOIST CANTILEVER DETAIL FOR BALCONIES (No Wall Load)

Attach I-joists to plate at all supports per detail 1b

Rim board, or wood structural panel

I-joist, or rim board

3-1/2" min. bearing required

CAUTION: Cantilevers formed this way must be carefully detailed to prevent moisture intrusion into the structure and potential decay of untreated I-joist extensions.

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

3b LUMBER CANTILEVER DETAIL FOR BALCONIES (No Wall Load)

Full depth backer block with 1/8" gap between block and top flange of I-joist. See detail 1b. Nail with 2 rows of 10d nails at 6" o.c. and clinch.

2x8 min. Nail to backer block and joist with 2 rows of 10d nails at 6" o.c. and clinch. (Cantilever nails may be used to attach backer block if length of nail is sufficient to allow clinching.)

Cantilever extension supporting uniform floor loads only

Lumber or wood structural panel closure

3-1/2" min. bearing required

I-joist, or rim board

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

CANTILEVER DETAILS FOR VERTICAL BUILDING OFFSET (CONCENTRATED WALL LOAD)

4a Method 1 — SHEATHING REINFORCEMENT ONE SIDE

Rim board or wood structural panel closure (23/32" minimum thickness), attach per detail 1b

NI blocking panel or rim board blocking, attach per detail 1g

Attach I-joist to plate per detail 1b

8d nails

3-1/2" min. bearing required

Method 2 — SHEATHING REINFORCEMENT TWO SIDES

- Use same installation as Method 1 but reinforce both sides of I-joist with sheathing.
- 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 8d 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. Verify reinforced I-joist capacity.

4b Alternate Method 2 — DOUBLE I-JOIST

Rim board, or wood structural panel closure (23/32" minimum thickness), attach per detail 1b

NI blocking panel or rim board blocking, attach per detail 1g

Face nail two rows of 10d nails at 12" o.c. each side through one I-joist web and the filler block to other I-joist web. Offset nails from opposite face by 6". Clinch if possible (four nails per foot required, except two nails per foot required if 3" clinched).

Attach I-joists to top plate at all supports per detail 1b, 3-1/2" min. bearing required

Block I-joists together with filler blocks for the full length of the reinforcement. For I-joist flange widths greater than 3 inches place an additional row of 10d nails along the centerline of the reinforcing panel from each side. Clinch when possible.

BRICK CANTILEVER DETAILS FOR VERTICAL BUILDING OFFSET (CONCENTRATED WALL LOAD)

5a SHEATHING REINFORCEMENT

Provide full depth blocking between joists over support (not shown)

12" minimum length of sheathing reinforcement

Nail reinforcement to top and bottom joist flanges with 8d nails at 6" o.c. (offset opposite face nailing by 3" when using reinforcement on both sides of I-joist)

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 8d 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. Verify reinforced I-joist capacity.

5" max.

3-1/2" min.

5b SET-BACK DETAIL

Bearing walls

Rim board or wood structural panel closure (23/32" minimum thickness), attach per detail 1b.

Notes:

- Provide full depth blocking between joists over support (not shown for clarity)
- Attach I-joist to plate at all supports per detail 1b.
- 3-1/2" minimum I-joist bearing required.

5" max.

Back Span

Attach joists to girder joist per detail 5c.

5c SET-BACK CONNECTION

Vertical solid sawn blocks (2x6 Utility grade S-P-F (south)) nailed through joist web and web of girder using 8d nails. Alternate for opposite side.

Nail joist end using 10d nails, toe-nail at top and bottom flanges.

Hanger may be used in lieu of solid sawn blocks

5c SET-BACK CONNECTION

Notes:

- Verify girder joist capacity if the back span exceeds the joist spacing.
- Attach double I-joist per detail 1p, if required.

FIGURE 4 (continued)

Roof truss span

2'-0" maximum cantilever

Girder truss span

13'-0" maximum Jack truss

2'-0" maximum cantilever

For hip roofs with the jack 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.

CANTILEVER REINFORCEMENT METHODS ALLOWED

Joist Depth (in.)	Roof Truss Span (ft)	ROOF LOADING											
		LL = 20 psf, DL = 15 psf				LL = 30 psf, DL = 15 psf				LL = 40 psf, DL = 15 psf			
		Joist Spacing (in.)				Joist Spacing (in.)				Joist Spacing (in.)			
		12	16	19.2	24	12	16	19.2	24	12	16	19.2	24
9-1/2"	26	N	N	N	1	N	N	N	2	N	1	1	X
	28	N	N	N	1	N	N	N	2	N	1	2	X
	30	N	N	N	1	N	N	1	2	N	1	2	X
	32	N	N	1	2	N	1	2	X	N	1	2	X
	34	N	N	1	2	N	1	2	X	N	1	2	X
11-7/8"	26	N	N	N	1	N	N	1	2	N	1	1	2
	28	N	N	N	1	N	N	1	2	N	1	1	2
	30	N	N	1	1	N	N	1	2	N	1	2	X
	32	N	N	1	1	N	1	2	N	1	2	X	
	34	N	N	1	2	N	1	2	X	N	1	2	X
14"	26	N	N	N	1	N	N	1	2	N	1	2	X
	28	N	N	N	1	N	N	1	2	N	1	2	X
	30	N	N	N	1	N	N	1	2	N	1	2	X
	32	N	N	N	1	N	N	1	2	N	1	2	X
	34	N	N	N	1	N	N	1	2	N	1	2	X
16"	26	N	N	N	1	N	N	1	2	N	1	2	X
	28	N	N	N	1	N	N	1	2	N	1	2	X
	30	N	N	N	1	N	N	1	2	N	1	2	X
	32	N	N	N	1	N	N	1	2	N	1	2	X
	34	N	N	N	1	N	N	1	2	N	1	2	X

1. N = No reinforcement required.
- 1 = NI reinforced with 23/32" wood structural panel on one side only.
- 2 = NI reinforced with 23/32" wood structural panel on both sides, or double I-joist.
3. Table applies to joists 12" to 24" o.c. that meet the floor span requirements for a design live load of 40 psf and dead load of 10 psf, and a live load deflection limit of L/480. Use 12" o.c. requirements for lesser spacing.
4. 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.
5. Cantilevered joists supporting girder trusses or roof beams may require additional reinforcing.

FIGURE 5 (continued)

Roof truss span

2'-0" maximum cantilever

Girder truss span

13'-0" maximum Jack truss

2'-0" maximum cantilever

5" maximum

For hip roofs with the jack 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.

BRICK CANTILEVER REINFORCEMENT METHODS ALLOWED

Joist Depth (in.)	Roof Truss Span (ft)	ROOF LOADING											
		LL = 20 psf, DL = 15 psf				LL = 30 psf, DL = 15 psf				LL = 40 psf, DL = 15 psf			
		Joist Spacing (in.)				Joist Spacing (in.)				Joist Spacing (in.)			
		12	16	19.2	24	12	16	19.2	24	12	16	19.2	24
9-1/2"	26	N	N	N	1	N	N	N	2	N	N	1	X
	28	N	N	N	1	N	N	1	2	N	1	2	X
	30	N	N	N	1	N	N	1	2	N	1	2	X
	32	N	N	N	1	N	N	1	2	N	1	2	X
	34	N	N	N	2	N	N	2	X	N	2	X	X
11-7/8"	26	N	N	N	1	N	N	1	2	N	N	1	2
	28	N	N	N	1	N	N	1	2	N	N	1	2
	30	N	N	N	1	N	N	1	2	N	1	2	X
	32	N	N	N	1	N	N	1	2	N	1	2	X
	34	N	N	N	1	N	N	1	2	N	1	2	X
14"	26	N	N	N	1	N	N	1	2	N	1	2	X
	28	N	N	N	1	N	N	1	2	N	1	2	X
	30	N	N	N	1	N	N	1	2	N	1	2	X
	32	N	N	N	1	N	N	1	2	N	1	2	X
	34	N	N	N	1	N	N	1	2	N	1	2	X
16"	26	N	N	N	1	N	N	1	2	N	1	2	X
	28	N	N	N	1	N	N	1	2	N	1	2	X
	30	N	N	N	1	N	N	1	2	N	1	2	X
	32	N	N	N	1	N	N	1	2	N	1	2	X
	34	N	N	N	1	N	N	1	2	N	1	2	X

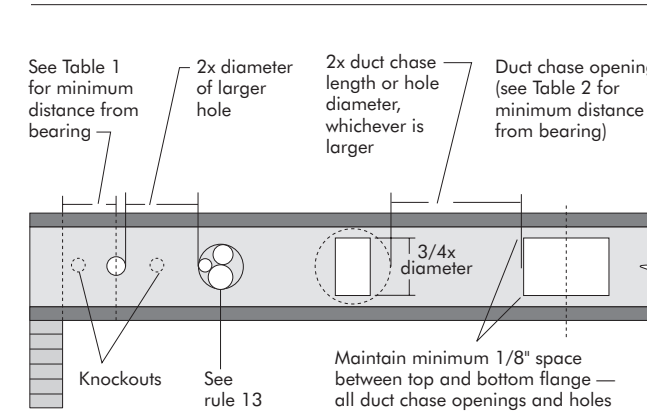
1. N = No reinforcement required.
- 1 = NI reinforced with 23/32" wood structural panel on one side only.
- 2 = NI reinforced with 23/32" wood structural panel on both sides, or double I-joist.
3. Table applies to joists 12" to 24" o.c. that meet the floor span requirements for a design live load of 40 psf and dead load of 10 psf, and a live load deflection limit of L/480. Use 12" o.c. requirements for lesser spacing.
4. 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.
5. Cantilevered joists supporting girder trusses or roof beams may require additional reinforcing.

WEB HOLES

RULES FOR CUTTING HOLES AND DUCT CHASE OPENINGS:

1. The distance between the inside edge of the support and the centerline of any hole or duct chase opening shall be in compliance with the requirements of Table 1 or 2, respectively.
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 or the maximum depth of a duct chase opening 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 or opening and the adjacent I-joist flange.
5. The sides of square holes or longest sides of rectangular holes should not exceed 3/4 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 or duct chase opening) and each hole and duct chase opening shall be sized and located in compliance with the requirements of Tables 1 and 2, respectively.
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 and/or duct chase openings.
8. Holes measuring 1-1/2 inches or smaller shall be permitted anywhere in a cantilevered section of a joist. Holes of greater size may be permitted providing they have been verified.
9. A 1-1/2 inch hole or smaller can be placed anywhere in the web provided that it meets the requirements of item 6 above.
10. For continuous joists with more than one span, use the longest span to determine hole location in either span.
11. All holes and duct chase openings shall be cut in a workman-like manner in accordance with the restrictions listed above and as illustrated in Figure 7.
12. Limit three maximum size holes and one duct chase opening per span.
13. 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 7 FIELD-CUT HOLE LOCATOR



Knockouts are prescored holes provided for the contractor's convenience to install electrical or small plumbing lines. They are 1-1/2 inches in diameter, and are spaced 15 inches on center along the length of the I-joist. Where possible, it is preferable to use knockouts instead of field-cut holes.

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-inch diameter hole in each of the four corners and then making the cuts between the holes is another good method to minimize damage to the I-joist.

A knockout is **NOT** considered a hole, may be utilized wherever it occurs and may be ignored for purposes of calculating minimum distances between holes.

TABLE 1 HOLE SIZES AND LOCATIONS — Simple or Multiple Span

Joist Depth	Joist Series	Minimum Distance from Inside Face of Any Support to Center of Hole (ft. - in.)												Span Adjustment Factor			
		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"	NI-20	0'-6"	1'-0"	2'-6"	3'-6"	5'-6"	6'-0"	...	...	...	...	...	...	...	...	...	13'-5"
	NI-40x	0'-6"	1'-0"	3'-0"	4'-6"	6'-0"	6'-6"	...	...	...	...	...	...	...	...	...	15'-0"
	NI-60	1'-6"	2'-6"	4'-0"	5'-6"	7'-0"	7'-6"	...	...	...	...	...	...	...	...	...	16'-7"
	NI-80	2'-6"	3'-6"	5'-0"	6'-6"	8'-0"	8'-6"	...	...	...	...	...	...	...	...	...	17'-8"
11-7/8"	NI-20	0'-6"	0'-6"	0'-6"	1'-0"	3'-0"	3'-0"	4'-6"	6'-6"	7'-6"	...	...	...	...	...	...	14'-2"
	NI-40x	0'-6"	0'-6"	1'-6"	2'-6"	4'-0"	4'-6"	5'-6"	7'-0"	8'-0"	...	...	...	...	...	...	17'-1"
	NI-60	0'-6"	1'-6"	3'-0"	4'-6"	6'-0"	7'-6"	8'-0"	9'-0"	10'-0"	...	...	...	...	...	...	19'-8"
	NI-80	1'-6"	2'-6"	4'-0"	5'-6"	7'-0"	7'-6"	8'-6"	10'-0"	11'-0"	...	...	...	...	...	...	21'-3"
14"	NI-20	0'-6"	0'-6"	0'-6"	1'-0"	2'-6"	2'-6"	4'-6"	6'-6"	7'-6"	...	...	...	...	...	...	22'-4"
	NI-40x	0'-6"	0'-6"	0'-6"	1'-0"	2'-6"	2'-6"	4'-6"	6'-6"	7'-6"	...	...	...	...	...	...	18'-10"
	NI-60	0'-6"	0'-6"	1'-6"	3'-0"	4'-6"	5'-6"	7'-0"	8'-0"	8'-6"	10'-0"	10'-0"	...	...	...	...	21'-7"
	NI-80	0'-6"	0'-6"	1'-6"	3'-0"	4'-6"	5'-6"	7'-0"	8'-0"	9'-6"	12'-0"	13'-6"	...	...	...	...	21'-9"
16"	NI-20	0'-6"	0'-6"	0'-6"	1'-0"	2'-6"	2'-6"	3'-6"	5'-6"	6'-6"	7'-0"	9'-0"	10'-6"	11'-0"	12'-6"	14'-6"	26'-3"
	NI-40x	0'-6"	0'-6"	0'-6"	1'-0"	2'-6"	2'-6"	4'-6"	6'-6"	7'-6"	8'-6"	9'-0"	10'-6"	11'-0"	12'-6"	14'-6"	26'-3"
	NI-60	0'-6"	0'-6"	0'-6"	1'-0"	2'-6"	2'-6"	3'-6"	5'-6"	6'-6"	7'-0"	8'-0"	10'-6"	11'-6"	12'-0"	...	25'-5"
	NI-80	0'-6"	0'-6"	0'-6"	1'-0"	2'-6"	2'-6"	3'-6"	5'-6"	6'-6"	7'-0"	8'-0"	10'-6"	11'-6"	12'-0"	...	28'-3"

1. Above table 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. For continuous joists with more than one span, use the longest span to determine hole location in either span.
4. Distances are based on uniformly loaded floor joists that meet the span requirements for a design live load of 40 psf and dead load of 10 psf, and a live load deflection limit of L/480. For other applications, contact your local distributor.

OPTIONAL HOLE CALCULATION:

The above table 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 (see Allowable Floor Spans), the hole location distance from the centerline of the hole to the face of any support (D) as given above may be reduced as follows:

Reduced = $\frac{\text{Actual} \times D}{\text{S.F.}}$

Where:

- D_{reduced} = Distance from the inside face of any support to center of hole, reduced for less-than-maximum span applications (ft).
- D_{actual} = The actual measured span distance between the inside faces of supports (ft).
- S.F. = Span Adjustment Factor given in Table 1.
- D = The minimum distance from the inside face of any support to center of hole from Table 1 above.

If $\frac{\text{Actual}}{\text{S.F.}}$ is greater than 1.0, use 1.0 in the above calculation for $\frac{\text{Actual}}{\text{S.F.}}$.

TABLE 2 DUCT CHASE OPENING SIZES AND LOCATIONS — Simple Span Only

Joist Depth	Joist Series	Minimum Distance from Inside Face of Supports to Center of Opening (ft. - in.)											
		8	10	12	14	16	18	20	22	24			
9-1/2"	NI-20	4'-6"	5'-0"	5'-0"	5'-6"	6'-0"	6'-6"	7'-0"	7'-6"	8'-0"	8'-6"	9'-0"	9'-0"
	NI-40x	5'-6"	6'-0"	6'-0"	6'-6"	7'-0"	7'-6"	8'-0"	8'-6"	9'-0"	9'-0"	9'-0"	9'-0"
	NI-60	5'-6"	6'-0"	6'-0"	6'-6"	7'-0"	7'-6"	8'-0"	8'-6"	9'-0"	9'-0"	9'-0"	9'-0"
	NI-80	5'-6"	6'-0"	6'-0"	6'-6"	7'-0"	7'-6"	8'-0"	8'-6"	9'-0"	9		