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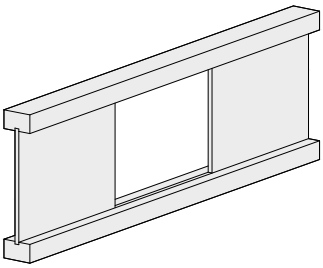
Nordic I-joists Web Opening Reinforcement

The purpose of this technical note is to guide builders in case of web damage caused to Nordic I-joists. The I-joists can be analyzed using a design software to confirm the need for repair. This technical note only applies to I-joists that require repair.

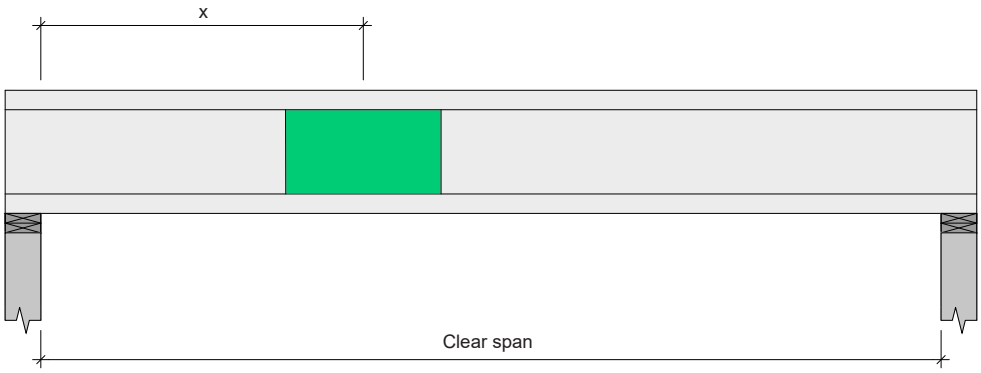


This technical note only applies if the following assumptions are met:

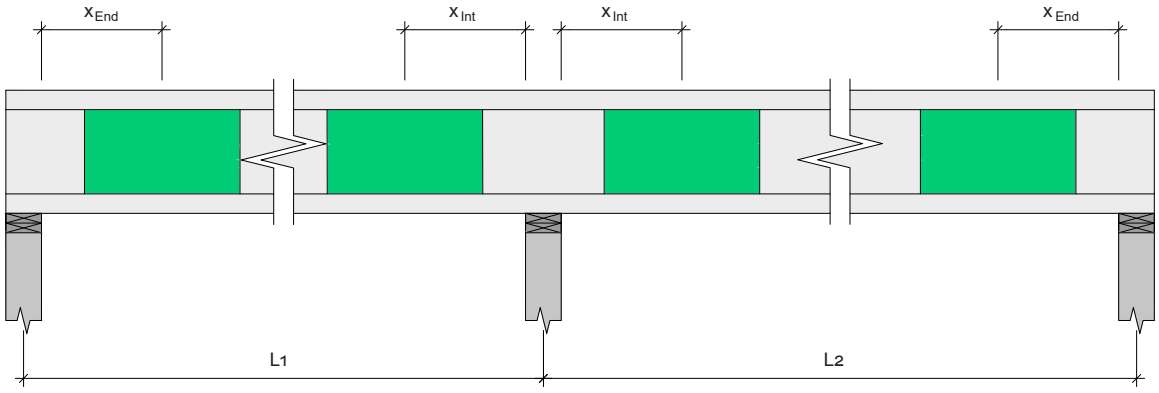
1. Flanges of the I-joist are intact and have not been damaged.
2. Uniformly distributed loads.
3. The design criteria listed above the selected table are met.

The following tables provide the minimum distance required from inside face of support to center of opening; for simple and multiple spans.

X: Minimum distance from inside face of any support to center of opening; simple spans
X_{End}: Minimum distance from inside face of end support to center of opening; multiple spans
X_{Int}: Minimum distance from inside face of intermediate support to center of opening; multiple spans



Elevation view of a simple-span joist and opening location



Elevation view of a multiple-span joist and opening location

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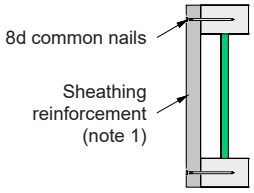
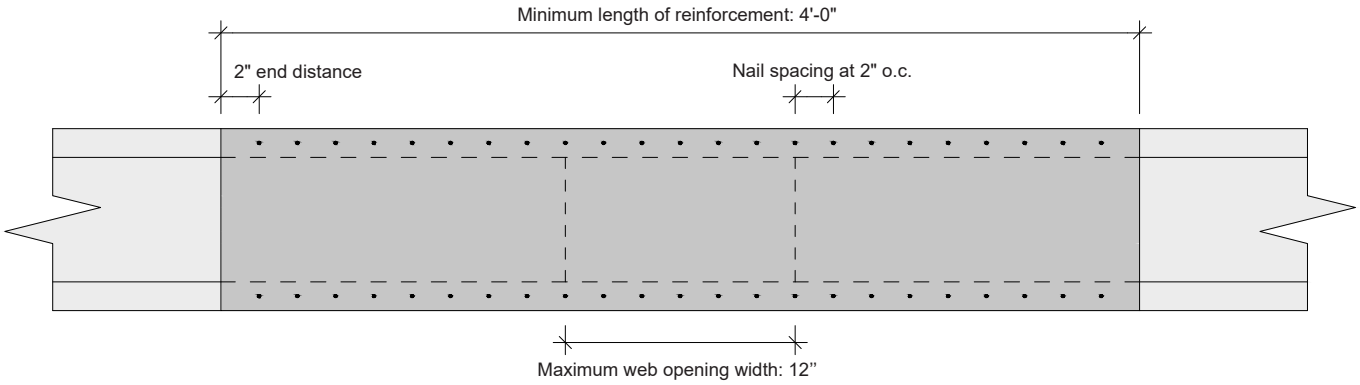
Reinforcement Detail for Nordic I-joists with Web Opening

1. Install 4-foot-long APA Rated Sheathing 48/24 or APA Rated Sturd-I-Floor 24 oc with a thickness of 23/32 inch, on one side of the joist. Depth shall match the full height of the joist. Install with face grain vertical.
2. Nail the panel with 8d common nails at 2 inches o.c., top and bottom flanges, as shown below. Nail diameter: 0.128 inch.
3. The reinforcement shall be centered on the web opening, or installed from support if the opening is 2 feet or less from support.

Note that a hole or an opening can be cut in a reinforcement, following table 6.1 or 6.2, respectively, of the Nordic Joist Technical Guide (NS-GT3).



Section view of a repaired I-joist



Elevation view of a repaired I-joist

NORDIC STRUCTURES

Design Criteria

Spans:	Simple span
Loads:	Live load = 40 psf and dead load = 10 psf
Deflection:	L/240 under total load
Sheathing:	19/32 or 23/32 in. oriented strand board (OSB) sheathing
Web opening:	Full joist web depth by maximum 12 in. long

Minimum Distance from Inside Face of Any Support to Center of Opening

Live load deflection limit of L/480

Joist depth	Joist series	On center spacing			
		12"	16"	19.2"	24"
		X	X	X	X
9-1/2"	NI-40x	3'-7"	4'-4"	4'-8"	4'-11"
	NI-60	3'-10"	4'-7"	4'-10"	5'-1"
	NI-80	5'-0"	5'-7"	5'-10"	5'-11"
11-7/8"	NI-40x	3'-4"	4'-6"	4'-11"	5'-0"
	NI-60	3'-8"	4'-9"	5'-2"	5'-6"
	NI-80	5'-2"	6'-0"	6'-4"	6'-7"
	NI-90	5'-7"	6'-5"	6'-8"	6'-11"
14"	NI-40x	2'-11"	4'-5"	4'-8"	4'-10"
	NI-60	3'-4"	4'-9"	5'-4"	5'-10"
	NI-80	5'-1"	6'-3"	6'-8"	7'-1"
	NI-90	5'-7"	6'-8"	7'-1"	7'-5"
16"	NI-60	2'-11"	4'-8"	5'-5"	6'-0"
	NI-80	4'-11"	6'-4"	6'-11"	7'-5"
	NI-90	5'-6"	6'-10"	7'-5"	7'-10"

Live load deflection limit of L/360

Joist depth	Joist series	On center spacing			
		12"	16"	19.2"	24"
		X	X	X	X
9-1/2"	NI-40x	4'-7"	5'-1"	5'-0"	4'-11"
	NI-60	4'-10"	5'-6"	5'-9"	5'-11"
	NI-80	6'-2"	6'-8"	6'-10"	6'-10"
11-7/8"	NI-40x	4'-5"	4'-10"	4'-11"	5'-0"
	NI-60	4'-10"	5'-10"	6'-3"	6'-3"
	NI-80	6'-6"	7'-3"	7'-6"	7'-8"
	NI-90	6'-11"	7'-8"	7'-11"	8'-0"
14"	NI-40x	3'-8"	4'-5"	4'-8"	4'-10"
	NI-60	4'-8"	6'-0"	6'-4"	6'-4"
	NI-80	6'-7"	7'-7"	8'-0"	8'-3"
	NI-90	7'-2"	8'-1"	8'-5"	8'-8"
16"	NI-60	4'-5"	5'-10"	6'-1"	6'-3"
	NI-80	6'-7"	7'-11"	8'-5"	8'-9"
	NI-90	7'-2"	8'-5"	8'-10"	9'-3"

Note:

1. The tabulated values are based on 2018 NDS and 2018 IRC, and represent the minimum distance from inside face of any support (X) to center of opening, for I-joist reinforced per detail on page 2.

NORDIC STRUCTURES

Design Criteria

Spans:	Multiple spans
Loads:	Live load = 40 psf and dead load = 10 psf
Deflection:	L/240 under total load
Sheathing:	19/32 or 23/32 in. oriented strand board (OSB) sheathing
Web opening:	Full joist web depth by maximum 12 in. long

Minimum Distance from Inside Face of End or Intermediate Support to Center of Opening

Live load deflection limit of L/480

Joist depth	Joist series	On center spacing							
		12"		16"		19.2"		24"	
		X_{End}	X_{Int}	X_{End}	X_{Int}	X_{End}	X_{Int}	X_{End}	X_{Int}
9-1/2"	NI-40x	3'-3"	7'-4"	3'-10"	7'-5"	3'-11"	7'-3"	4'-0"	6'-11"
	NI-60	3'-5"	7'-7"	4'-3"	8'-0"	4'-7"	8'-1"	4'-10"	8'-1"
	NI-80	4'-8"	9'-2"	5'-3"	9'-5"	5'-6"	9'-4"	-	-
11-7/8"	NI-40x	2'-9"	7'-6"	3'-5"	7'-7"	3'-9"	7'-5"	3'-11"	7'-3"
	NI-60	3'-3"	8'-2"	4'-4"	8'-10"	4'-10"	9'-1"	5'-0"	8'-10"
	NI-80	4'-8"	10'-1"	5'-7"	10'-6"	5'-11"	10'-7"	6'-2"	10'-6"
	NI-90	5'-1"	10'-8"	5'-11"	11'-0"	6'-3"	11'-0"	-	-
14"	NI-40x	1'-10"	7'-1"	2'-11"	7'-5"	3'-4"	7'-6"	3'-8"	7'-4"
	NI-60	2'-10"	8'-6"	4'-3"	9'-5"	4'-9"	9'-5"	4'-11"	9'-2"
	NI-80	4'-6"	10'-9"	5'-9"	11'-4"	6'-3"	11'-6"	6'-7"	11'-6"
	NI-90	5'-0"	11'-4"	6'-2"	11'-11"	6'-7"	12'-0"	6'-11"	11'-11"
16"	NI-60	2'-4"	8'-7"	3'-11"	9'-7"	4'-5"	9'-6"	4'-9"	9'-3"
	NI-80	4'-4"	11'-2"	5'-9"	12'-0"	6'-5"	12'-3"	6'-11"	12'-4"
	NI-90	4'-10"	11'-11"	6'-3"	12'-8"	6'-10"	12'-10"	7'-4"	12'-10"

Live load deflection limit of L/360

Joist depth	Joist series	On center spacing							
		12"		16"		19.2"		24"	
		X_{End}	X_{Int}	X_{End}	X_{Int}	X_{End}	X_{Int}	X_{End}	X_{Int}
9-1/2"	NI-40x	3'-6"	7'-8"	3'-10"	7'-5"	3'-11"	7'-3"	4'-0"	6'-11"
	NI-60	4'-5"	9'-0"	5'-0"	9'-2"	5'-0"	8'-10"	4'-11"	8'-4"
	NI-80	5'-9"	10'-10"	6'-3"	10'-10"	-	-	-	-
11-7/8"	NI-40x	2'-9"	7'-6"	3'-5"	7'-7"	3'-9"	7'-5"	3'-11"	7'-3"
	NI-60	4'-4"	9'-10"	4'-10"	9'-7"	4'-11"	9'-3"	5'-0"	8'-10"
	NI-80	5'-11"	12'-0"	6'-9"	12'-3"	7'-0"	12'-2"	-	-
	NI-90	6'-5"	12'-7"	7'-2"	12'-10"	7'-5"	12'-9"	-	-
14"	NI-40x	1'-10"	7'-1"	2'-11"	7'-5"	3'-4"	7'-6"	3'-8"	7'-4"
	NI-60	3'-8"	9'-8"	4'-5"	9'-8"	4'-9"	9'-5"	4'-11"	9'-2"
	NI-80	6'-0"	12'-10"	7'-0"	13'-2"	7'-0"	12'-8"	6'-11"	12'-0"
	NI-90	6'-6"	13'-7"	7'-6"	13'-11"	7'-11"	13'-11"	-	-
16"	NI-60	2'-10"	9'-4"	3'-11"	9'-7"	4'-5"	9'-6"	4'-9"	9'-3"
	NI-80	5'-11"	13'-6"	6'-9"	13'-5"	6'-11"	13'-0"	7'-0"	12'-5"
	NI-90	6'-6"	14'-4"	7'-9"	14'-10"	8'-3"	14'-11"	8'-6"	14'-7"

Notes:

1. The tabulated values are based on 2018 NDS and 2018 IRC, and represent the minimum distance from inside face of end support (X_{Ext}) or intermediate support (X_{Int}) to center of opening, for I-joist reinforced per detail on page 2.
2. For multiple-span applications, the end spans shall be 40% or more of the adjacent span.

NORDIC STRUCTURES

Design Criteria

Spans:	Simple span
Loads:	Live load = 40 psf and dead load = 20 psf
Deflection:	L/240 under total load
Sheathing:	19/32 or 23/32 in. oriented strand board (OSB) sheathing
Web opening:	Full joist web depth by maximum 12 in. long

Minimum Distance from Inside Face of Any Support to Center of Opening

Live load deflection limit of L/600

Joist depth	Joist series	On center spacing			
		12"	16"	19.2"	24"
		X	X	X	X
9-1/2"	NI-40x	3'-11"	4'-6"	4'-9"	4'-9"
	NI-60	4'-2"	4'-8"	4'-10"	5'-0"
	NI-80	5'-3"	5'-7"	5'-9"	5'-9"
11-7/8"	NI-40x	3'-11"	4'-9"	5'-0"	4'-11"
	NI-60	4'-2"	4'-11"	5'-3"	5'-6"
	NI-80	5'-6"	6'-1"	6'-4"	6'-5"
	NI-90	5'-11"	6'-5"	6'-8"	6'-9"
14"	NI-40x	3'-8"	4'-8"	4'-10"	4'-11"
	NI-60	4'-0"	5'-1"	5'-6"	5'-10"
	NI-80	5'-7"	6'-5"	6'-9"	6'-11"
	NI-90	6'-1"	6'-10"	7'-1"	7'-3"
16"	NI-60	3'-10"	5'-2"	5'-8"	6'-2"
	NI-80	5'-7"	6'-8"	7'-1"	7'-5"
	NI-90	6'-1"	7'-1"	7'-6"	7'-9"

Live load deflection limit of L/480

Joist depth	Joist series	On center spacing			
		12"	16"	19.2"	24"
		X	X	X	X
9-1/2"	NI-40x	4'-8"	5'-0"	4'-11"	4'-9"
	NI-60	4'-10"	5'-4"	5'-6"	5'-7"
	NI-80	6'-0"	6'-4"	6'-5"	6'-5"
11-7/8"	NI-40x	4'-9"	4'-11"	5'-0"	4'-11"
	NI-60	5'-0"	5'-9"	6'-0"	6'-1"
	NI-80	6'-5"	7'-0"	7'-2"	7'-3"
	NI-90	6'-11"	7'-4"	7'-6"	7'-6"
14"	NI-40x	4'-3"	4'-8"	4'-10"	4'-11"
	NI-60	5'-0"	6'-0"	6'-4"	6'-2"
	NI-80	6'-8"	7'-5"	7'-8"	7'-10"
	NI-90	7'-2"	7'-10"	8'-1"	8'-2"
16"	NI-60	4'-11"	6'-1"	6'-3"	6'-2"
	NI-80	6'-10"	7'-9"	8'-2"	8'-4"
	NI-90	7'-4"	8'-3"	8'-7"	8'-9"

Note:

1. The tabulated values are based on 2018 NDS and 2018 IRC, and represent the minimum distance from inside face of any support (X) to center of opening, for I-joist reinforced per detail on page 2.

NORDIC STRUCTURES

Design Criteria

Spans:	Multiple spans
Loads:	Live load = 40 psf and dead load = 20 psf
Deflection:	L/240 under total load
Sheathing:	19/32 or 23/32 in. oriented strand board (OSB) sheathing
Web opening:	Full joist web depth by maximum 12 in. long

Minimum Distance from Inside Face of End or Intermediate Support to Center of Opening

Live load deflection limit of L/600

Joist depth	Joist series	On center spacing							
		12"		16"		19.2"		24"	
		X_{End}	X_{Int}	X_{End}	X_{Int}	X_{End}	X_{Int}	X_{End}	X_{Int}
9-1/2"	NI-40x	3'-6"	7'-5"	3'-10"	7'-3"	3'-10"	7'-0"	3'-10"	6'-7"
	NI-60	3'-8"	7'-7"	4'-3"	7'-10"	4'-5"	7'-10"	4'-7"	7'-9"
	NI-80	4'-8"	9'-1"	5'-2"	9'-1"	5'-3"	9'-0"	4'-9"	7'-10"
11-7/8"	NI-40x	3'-1"	7'-7"	3'-7"	7'-5"	3'-9"	7'-3"	3'-10"	7'-0"
	NI-60	3'-7"	8'-4"	4'-5"	8'-9"	4'-9"	8'-10"	4'-10"	8'-5"
	NI-80	4'-10"	10'-1"	5'-6"	10'-3"	5'-9"	10'-2"	5'-6"	9'-5"
	NI-90	5'-3"	10'-7"	5'-10"	10'-8"	6'-1"	10'-7"	6'-2"	10'-5"
14"	NI-40x	2'-5"	7'-4"	3'-2"	7'-6"	3'-6"	7'-5"	3'-9"	7'-2"
	NI-60	3'-4"	8'-9"	4'-6"	9'-5"	4'-8"	9'-2"	4'-10"	8'-10"
	NI-80	4'-10"	10'-10"	5'-9"	11'-2"	6'-1"	11'-2"	6'-2"	10'-9"
	NI-90	5'-4"	11'-5"	6'-2"	11'-8"	6'-5"	11'-7"	6'-8"	11'-5"
16"	NI-60	3'-0"	9'-1"	4'-2"	9'-6"	4'-6"	9'-4"	4'-8"	9'-0"
	NI-80	4'-9"	11'-4"	5'-11"	11'-11"	6'-5"	12'-0"	6'-8"	11'-10"
	NI-90	5'-3"	12'-0"	6'-4"	12'-5"	6'-9"	12'-6"	7'-1"	12'-4"

Live load deflection limit of L/480

Joist depth	Joist series	On center spacing							
		12"		16"		19.2"		24"	
		X_{End}	X_{Int}	X_{End}	X_{Int}	X_{End}	X_{Int}	X_{End}	X_{Int}
9-1/2"	NI-40x	3'-7"	7'-7"	3'-10"	7'-3"	3'-10"	7'-0"	3'-10"	6'-7"
	NI-60	4'-4"	8'-8"	4'-10"	8'-9"	4'-10"	8'-5"	4'-8"	7'-9"
	NI-80	5'-5"	10'-3"	5'-10"	10'-2"	5'-9"	9'-9"	4'-9"	7'-10"
11-7/8"	NI-40x	3'-1"	7'-7"	3'-7"	7'-5"	3'-9"	7'-3"	3'-10"	7'-0"
	NI-60	4'-5"	9'-7"	4'-9"	9'-3"	4'-10"	8'-11"	4'-10"	8'-5"
	NI-80	5'-9"	11'-5"	6'-4"	11'-6"	6'-7"	11'-5"	5'-6"	9'-5"
	NI-90	6'-2"	12'-0"	6'-8"	12'-0"	6'-11"	11'-10"	-	-
14"	NI-40x	2'-5"	7'-4"	3'-2"	7'-6"	3'-6"	7'-5"	3'-9"	7'-2"
	NI-60	3'-11"	9'-8"	4'-6"	9'-5"	4'-8"	9'-2"	4'-10"	8'-10"
	NI-80	5'-10"	12'-4"	6'-8"	12'-7"	6'-9"	12'-1"	6'-2"	10'-9"
	NI-90	6'-4"	13'-0"	7'-1"	13'-1"	7'-4"	13'-0"	7'-6"	12'-9"
16"	NI-60	3'-4"	9'-6"	4'-2"	9'-6"	4'-6"	9'-4"	4'-8"	9'-0"
	NI-80	5'-11"	13'-1"	6'-8"	13'-0"	6'-9"	12'-6"	6'-8"	11'-10"
	NI-90	6'-5"	13'-9"	7'-5"	14'-0"	7'-9"	14'-0"	8'-0"	13'-9"

Notes:

1. The tabulated values are based on 2018 NDS and 2018 IRC, and represent the minimum distance from inside face of end support (X_{Ext}) or intermediate support (X_{Int}) to center of opening, for I-joist reinforced per detail on page 2.
2. For multiple-span applications, the end spans shall be 40% or more of the adjacent span.