NORDIC

TECHNICAL GUIDE
NORDIC LAM

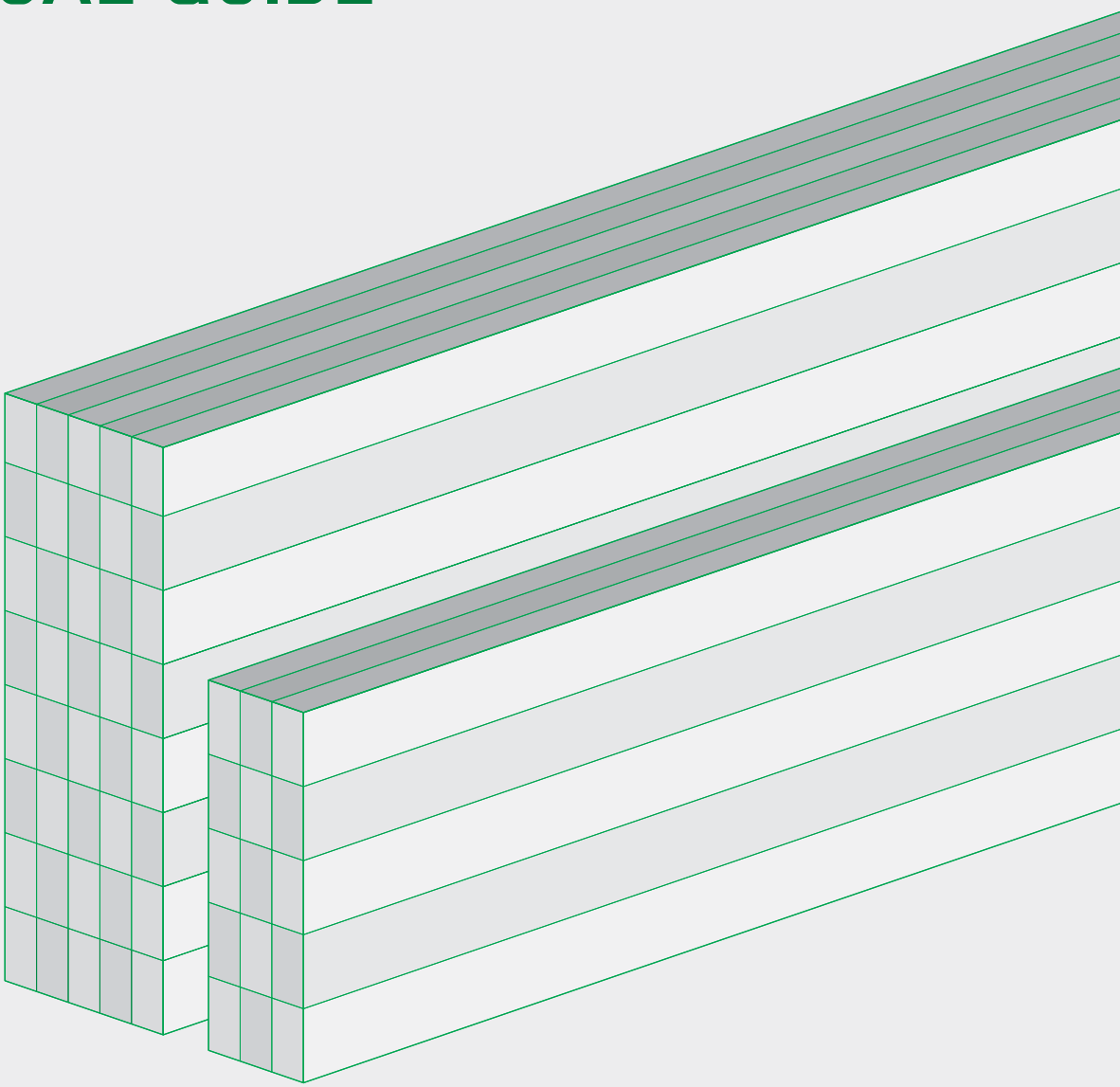
NS-GT4

VERSION
2026-05-01

Engineered Wood Products

NORDIC LAM TECHNICAL GUIDE

NORDIC LAM



NORDIC STRUCTURES

ABOUT NORDIC

NORDIC
STRUCTURES

Nordic Structures is the leading innovator in engineered wood products. Its resource comes from responsibly managed lands within the regional boreal forest. Vertical integration, from forest to structure, bolstered by Nordic's experienced design and development team, ensures consistent quality and unparalleled level of service.

514-871-8526
1 866 817-3418

HEAD OFFICE

Nordic Structures
100-1100 Canadiens-de-Montréal Avenue
Montréal, Québec H3B 2S2
www.nordic.ca

GENERAL INFORMATION

info@nordic.ca

TECHNICAL SUPPORT

tech@nordic.ca

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ENGINEERED WOOD PRODUCTS

Standard size products available
from our distributors

NS-GT3

NORDIC JOIST

NORDIC I-JOISTS

Nordic I-joists are composed of sawn lumber flanges connected by a structural oriented strand board and bonded together with exterior-grade adhesives.

NI-40x — RESIDENTIAL SERIES

2×3 1950f MSR, 3/8 in. web
Depths
9-1/2, 11-7/8 and 14 in.

NI-60

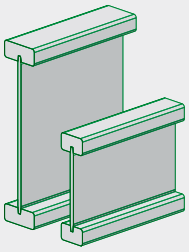
2×3 2100f MSR, 3/8 in. web
Depths
9-1/2, 11-7/8, 14 and 16 in.

NI-80

2×4 2100f MSR, 3/8 in. web
Depths
9-1/2, 11-7/8, 14 and 16 in.

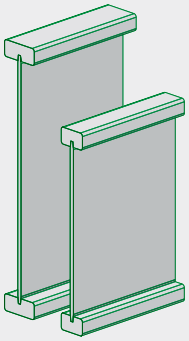
NI-90

2×4 2400f MSR, 7/16 in. web
Depths
11-7/8, 14 and 16 in.



NI-80x — COMMERCIAL SERIES

2×4 2100f MSR, 7/16 in. web
Depths
18, 20, 22 and 24 in.



NS-GT4

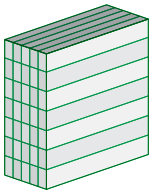
NORDIC LAM

NORDIC LAM
GLUED-LAMINATED TIMBER

Nordic Lam glued-laminated timber of industrial appearance classification consists of small wood laminations bonded together in parallel using structural adhesives.

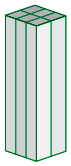
BEAMS AND HEADERS

Widths
1-3/4, 3-1/2, 5-1/2 and 7 in.
Depths
9-1/2, 11-7/8, 14, 16, 18, 20, 22 and 24 in.
Lengths*
Up to 48 ft
Stress grade
24F-1.9E



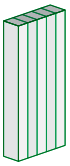
COLUMNS

Widths
3-1/2, 5-1/2 and 7 in.
Depths
3-1/2, 5-1/2 and 7 in.
Lengths*
Up to 48 ft
Stress grade
ES12



STUDS

Widths
1-1/2 and 1-3/4 in.
Depths
5-1/2 and 7-1/4 in.
Lengths*
Up to 48 ft
Stress grade
ES11



* Larger sizes available upon request

MASS TIMBER CONSTRUCTION

Products custom-manufactured
and machined for major projects

NS-GT5

NORDIC LAM+

NORDIC LAM+ GLUED-LAMINATED TIMBER

Nordic Lam+ glued-laminated timber of architectural appearance classification consists of small wood laminations bonded together in parallel using structural adhesives.

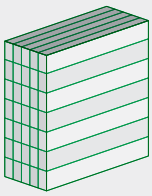
BEAMS AND COLUMNS

Widths*
38, 86, 137, 184, 215, 241, 292, 346, 395, 448, 502, 552 and 603 mm
(1-1/2, 3-3/8, 5-3/8, 7-1/4, 8-1/2, 9-1/2, 11-1/2, 13-5/8, 15-1/2, 17-5/8, 19-3/4, 21-3/4 and 23-3/4 in.)

Depths*
From 67 to 2435 mm
(2-5/8 to 95-7/8 in.)

Lengths*
Up to 24.4 m (80 ft)

Stress grade
24F-ES/NPG



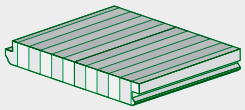
DECKING

Thicknesses*
38, 44, 54 and 89 mm
(1-1/2, 1-3/4, 2-1/8 and 3-1/2 in.)

Widths
203, 305 and 406 mm
(8, 12 and 16 in.)

Lengths
Up to 18.9 m (62 ft)

Stress grades
ES11, except 89 mm thickness in 20F-ES/CPG



* Larger sizes available upon request

NS-GT6

NORDIC X-LAM

NORDIC X-LAM CROSS-LAMINATED TIMBER

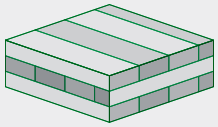
Nordic X-Lam cross-laminated timber is made of at least three orthogonal layers of graded sawn lumber that are laminated by gluing with structural adhesives.

SLABS AND PANELS

Layup combinations
89-3s, 105-3s,
143-5s, 175-5s,
197-7s, 213-7l, 244-7s, 244-7l
and 267-9l

Maximum sizes
2.565 x 19.5 m (101 in. x 64 ft)

Stress grade
E1 (L 1950Fb and T No. 3/Stud)



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TECHNICAL GUIDE
NORDIC LAM

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NORDIC LAM 1

NORDIC
STRUCTURES

NORDIC LAM

NORDIC LAM GLUED-LAMINATED TIMBER

Nordic Lam glued-laminated timber of industrial appearance classification consists of small wood laminations bonded together in parallel using structural adhesives.

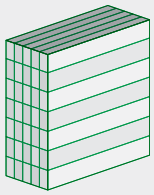
BEAMS AND HEADERS

Widths
1-3/4, 3-1/2, 5-1/2 and 7 in.

Depths
9-1/2, 11-7/8, 14, 16, 18, 20, 22 and 24 in.

Lengths*
Up to 48 ft

Stress grade
24F-1.9E



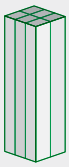
COLUMNS

Widths
3-1/2, 5-1/2 and 7 in.

Depths
3-1/2, 5-1/2 and 7 in.

Lengths*
Up to 48 ft

Stress grade
ES12



Check availability of products with your local distributor.

STUDS

Widths
1-1/2 and 1-3/4 in.

Depths
5-1/2 and 7-1/4 in.

Lengths*
Up to 48 ft

Stress grade
ES11

* Larger sizes available upon request

Nordic Lam – Specification Guide

Specifications

Glued-laminated timber (glulam) products may be used in dry service conditions, such as in most covered structures, where the average equilibrium moisture content of solid wood is less than 16 percent, as well as wet service conditions when accounted for in the design.

Additional considerations for wet use include, but are not limited to, service condition factors for the capacity, dimensional changes, architectural details, wood protection and maintenance.

Master format 06 18 00

REFERENCE STANDARD

.1 ANSI A190.1-[2022], Standard for Wood Products – Structural Glued Laminated timber.

ACTION AND INFORMATION SUBMITTALS

.1 Submit the product report published by a certification agency accredited by the International Accreditation Service at completion of fabrication.

MATERIALS

.1 Laminating stock: Spruce-Pine-Fir, [FSC certified]
.2 Sealer: Penetrating type, clear, non-yellowing liquid (Sansin KP-12UVW)
.3 Preservative: [Specify as required]
.4 Fire retardant: [Specify as required]

FABRICATION

.1 Stress grade: [24F-E/ES1M1 (beams and headers)] [and/or] [ES12/NPG (columns)] [and/or] [ES11/NPG (studs)]
.2 Service grade: [Interior] [Exterior]
.3 Appearance classification: [Industrial]
.4 Fire resistance: [Specify as required]

ERECTION

.1 Erect glued-laminated timber members in accordance with erection drawings issued for construction.

For the detailed specification guide: https://www.nordic.ca/en/documentation/technical-documents

Nordic Lam – Certifications

Product Certifications

Nordic Lam glued-laminated timber (glulam) products, certified by APA – The Engineered Wood Association (apawood.org), are manufactured in accordance with the applicable standards and associated specifications indicated below:

- ANSI A190.1, Standard for Wood Products – Structural Glued Laminated timber.
- ICC-ES–APA Joint Evaluation Report ESR-4874
- APA Product Report PR-L294

APA is a not-for-profit trade association and is accredited by the ANSI National Accreditation Board (ANAB) as an inspection agency under ISO/IEC 17020 and as a testing laboratory under ISO/IEC 17025.

The A190.1 standard is recognized in the International Building Code (IBC) and is required for using the design provisions specified in the National Design Specification (NDS) for Wood Construction.

Green Certifications

Wood – efficient and ecological

Overview of environmental certifications:

- Green Verification Report APA GR-L294
- Low Formaldehyde Emissions Products APA PR-E740
- Environmental Product Declaration (EPD), Nordic Lam
- Health Product Declaration (HPD), Nordic Lam
- Declare (ILFI), Nordic Lam
- Home Innovation NGBS Green Certified, Certificate #00200
- USDA Certified Biobased Product, Product 92%
- Cradle to Cradle Certified, Nordic Lam
- FSC-certified products available

Note: For independently verified ICC 700 NGBS (National Green Building Standard) and LEED (Leadership in Energy and Environmental Design) points, refer to APA GR-L294.

See nordic.ca for details.

Nordic Lam – Transparency Brief

The Nordic Lam business-to-business environmental product declaration (EPD) is based on a cradle-to-gate life cycle analysis (LCA). The delivery of the product to the customer, its use and eventual end-of-life processing are excluded from the EPD.

Forest Operations

The assessment of the life cycle impacts of Nordic wood product begins with its origin in managed forests and the energy use and emissions caused by its extraction. Forest management and reforestation that occurs after extraction are also included.

Nordic is committed to sustainable forestry as defined in the Forest Stewardship Council (FSC) forest management certification. Nordic's wood fiber sources fall into the following category:

- Certified sources of wood fiber come from FSC certified forests.

Glulam Production

The glued-laminated timber (glulam) production phase begins with the transportation of logs to the finished product. These processes consume fossil fuel (63.0%), electricity drawn from regional grids (25.3%), internally generated biomass (10.7%) and nuclear (1.1%).

Environmental Impacts

Atmosphere		
	Global warming potential	100.38 kg CO_2 eq.
	Ozone depletion potential	1.39E-06 kg CFC-11 eq.
	Photochemical ozone creation potential	30.99 kg O_3 eq.
Water		
	Acidification potential	1.01 kg SO_2 eq.
	Eutrophication potential	0.08 kg N eq.
Earth		
	Depletion of abiotic resources (elements)	5.16 kg
	Depletion of abiotic resources (fossil fuels)	1423.32 MJ

Material Content

Component – for 1 m^3 of Nordic Lam	**Mass (kg)**	**Mass (%)**
Wood (on oven dry basis); renewable	406 kg	99.9 %
Resins (polyurethane and isocyanate)	0.43 kg	0.1 %
Total	406.43 kg	100 %

Carbon Balance

Impact Category – for 1 m^3 of Nordic Lam	**Carbon (kg of CO_2 eq.)**
Forest carbon uptake	-741.36 kg of CO_2 eq.
Life cycle greenhouse gas emissions	100.38 kg of CO_2 eq.
Unaccounted biogenic carbon emissions	26.70 kg of CO_2 eq.
Net global warming potential	-614.27 kg of CO_2 eq.

See nordic.ca for details.

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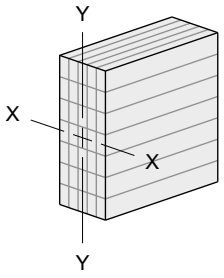
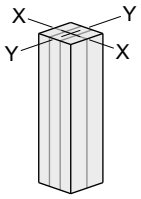
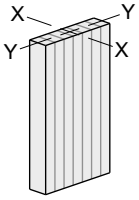
STRUCTURE 2

NORDIC
STRUCTURES

Nordic Lam – Design Properties

Nordic Lam – Design Properties

Application	Beams and headers [f]	Columns [g]	Studs [g]
Axonometry			
Appearance grade	Industrial	Industrial	Industrial
Stress grade	24F-1.9E	ES12	ES11
Layup combination	24F-E/ES1M1	ES12/NPG	ES11/NPG
Bending about X-X axis			
Bending moment, F_{bx} [a]	2,400 psi	2,400 psi	1,350 psi
Longitudinal shear, F_{vx}	250 psi	300 psi	250 psi
Compression perpendicular to grain, F_{cpx}	600 psi	600 psi	450 psi
Shear-free modulus of elasticity, E_x	1,900,000 psi	1,900,000 psi	1,600,000 psi
Apparent modulus of elasticity, $E_{x,app}$ [b]	1,800,000 psi	1,800,000 psi	1,500,000 psi
Bending about Y-Y axis			
Bending moment, F_{by} [c]			
4 or more laminations	1,100 psi	2,400 psi	1,750 psi
3 laminations	n.a.	2,400 psi	1,600 psi
Longitudinal shear, F_{vy}			
4 or more laminations	175 psi	300 psi	175 psi
3 laminations	n.a.	285 psi	166 psi
Compression perpendicular to grain, F_{cpy}	300 psi	600 psi	450 psi
Shear-free modulus of elasticity, E_y	1,600,000 psi	1,900,000 psi	1,600,000 psi
Apparent modulus of elasticity, $E_{y,app}$ [b]	1,500,000 psi	1,800,000 psi	1,500,000 psi
Axially loaded			
Compression parallel to grain, F_c			
4 or more laminations	1,150 psi	2,300 psi	1,550 psi
3 laminations	n.a.	1,700 psi	1,350 psi
Tension parallel to grain, F_t	1,050 psi	1,600 psi	975 psi
Modulus of elasticity, E_a	1,600,000 psi	1,900,000 psi	1,600,000 psi
Mean relative density, G [d]	0.41 -	0.46 -	0.41 -
Density (for member weight), ρ [e]	35 pcf	35 pcf	35 pcf

a) The volume factor, C_v, shall be calculated as per Clause 5.3.6 of the NDS, where the value of x is 10 and the width, b, is taken as the full member width.

b) The apparent modulus of elasticity values include a 5% shear deflection. For beam stability and column stability calculations, E_{min} shall be determined by multiplying the tabulated apparent modulus of elasticity by 0.528.

c) The tabulated F_{by} values are based on members 12 inches in depth. For depths less than 12 inches, F_{by} shall be permitted to be increased by multiplying by the flat use factor, C_{fu}. When depth is less than 3 inches, use the flat use factor for 3 inches.

d) Specific gravity values, G, for dowel-type fastener design in accordance with the NDS.

e) Density values, ρ, for a moisture content of 12%.

f) Nordic Lam beams and headers are symmetrical throughout the depth of the member (balanced layups).

g) Nordic Lam columns and studs are symmetrical throughout the depth and the width of the member (homogeneous layups).

Notes:

1. The tabulated values are for dry service conditions and normal duration of loading.
2. The tabulated values are applicable to members consisting of 4 or more laminations, unless otherwise noted.
3. Design of glulam members shall be in accordance with the NDS.

Beams and Headers – Standard Dimensions and Design Properties

Beams and Headers – Depths (in.)

Width (in.)			
1-3/4	3-1/2	5-1/2	7
9-1/2	9-1/2	9-1/2	9-1/2
11-7/8	11-7/8	11-7/8	11-7/8
14	14	14	14
16	16	16	16
18	18	18	18

Note:

1. Maximum length is 48 feet. Larger sizes are available upon request; please contact Nordic Structures.

Beams and Headers – Design Properties

Bending about X-X axis

Width (in.)	Depth (in.)	M_r [(a)] (lbf-ft)	V_r (lbf)	E_sI (10^6 lbf-in.^{2})	Weight (lbf/ft)
1-3/4	9-1/2	5,265	2,771	225	4.0
	11-7/8	8,226	3,464	440	5.1
	14	11,433	4,083	720	6.0
	16	14,933	4,667	1,075	6.8
	18	18,900	5,250	1,531	7.7
2-ply 1-3/4 or 3-1/2	9-1/2	10,529	5,542	450	8.1
	11-7/8	16,452	6,927	879	10.1
	14	22,867	8,167	1,441	11.9
	16	29,867	9,333	2,150	13.6
	18	37,800	10,500	3,062	15.3
3-ply 1-3/4	9-1/2	15,794	8,313	675	12.1
	11-7/8	24,678	10,391	1,319	15.2
	14	34,300	12,250	2,161	17.9
	16	44,800	14,000	3,226	20.4
	18	56,700	15,750	4,593	23.0
5-1/2	9-1/2	16,546	8,708	707	12.7
	11-7/8	25,853	10,885	1,382	15.9
	14	35,933	12,833	2,264	18.7
	16	46,933	14,667	3,379	21.4
	18	59,400	16,500	4,811	24.1
4-ply 1-3/4 or 7	9-1/2	21,058	11,083	900	16.2
	11-7/8	32,904	13,854	1,758	20.2
	14	45,733	16,333	2,881	23.8
	16	59,733	18,667	4,301	27.2
	18	75,600	21,000	6,124	30.6

a) Bending moment capacity values, M_r, shall be adjusted by the lesser of volume factor or beam stability factor, C_v or C_L, respectively, as defined in Section 5 of the NDS.

Note:

1. The tabulated values are based on dry service conditions and normal duration of loading.

Beams and Headers – Allowable Uniform Loads

Beams and Headers – Allowable Uniform Loads

Width	Depth	Criteria	Span (ft) [a]												
(in.)	(in.)		6	8	10	12	14	16	18	20	22	24	26	28	30
		LL deflection, L/360 (plf)	1,544	651	333	193	122	81	57	42	31	24	19	-	-
		TL deflection, L/240 (plf)	2,311	973	496	285	178	118	82	58	43	32	24	-	-
	9-1/2	Total load (plf)	933	654	417	288	211	160	126	101	83	69	58	-	-
		End bearing (in.)	2.7	2.6	2.1	1.7	1.5	1.5	1.5	1.5	1.5	1.5	1.5	-	-
		Intermediate bearing (in.)	6.7	5.9	4.7	3.9	3.3	3.0	3.0	3.0	3.0	3.0	3.0	-	-
		LL deflection, L/360 (plf)	3,015	1,272	651	377	237	159	112	81	61	47	37	30	24
		TL deflection, L/240 (plf)	4,517	1,903	972	560	351	233	162	117	87	66	51	39	31
	11-7/8	Total load (plf)	1,250	859	653	452	331	252	198	159	131	109	92	79	68
		End bearing (in.)	3.6	3.3	3.2	2.7	2.3	2.0	1.8	1.6	1.5	1.5	1.5	1.5	1.5
		Intermediate bearing (in.)	9.0	8.3	7.9	6.6	5.3	4.6	4.0	3.6	3.2	3.0	3.0	3.0	3.0
		LL deflection, L/360 (plf)	4,940	2,084	1,067	618	389	261	183	133	100	77	61	49	40
		TL deflection, L/240 (plf)	7,405	3,120	1,595	920	577	385	269	194	144	110	85	67	53
1-3/4	14	Total load (plf)	1,575	1,059	797	629	461	351	276	223	183	153	129	111	96
		End bearing (in.)	4.6	4.1	3.9	3.7	3.2	2.8	2.5	2.2	2.0	1.9	1.7	1.6	1.5
		Intermediate bearing (in.)	11.3	10.2	9.6	9.1	7.8	6.9	5.7	5.1	4.6	4.2	3.9	3.6	3.3
		LL deflection, L/360 (plf)	7,374	3,111	1,593	922	580	389	273	199	150	115	91	73	59
		TL deflection, L/240 (plf)	11,055	4,660	2,383	1,376	864	577	403	292	218	166	129	102	82
	16	Total load (plf)	1,924	1,266	942	750	603	460	362	292	240	201	170	146	126
		End bearing (in.)	5.6	4.9	4.6	4.4	4.1	3.6	3.2	2.9	2.6	2.4	2.2	2.1	1.9
		Intermediate bearing (in.)	13.8	12.2	11.3	10.9	10.2	8.9	8.0	7.2	6.5	5.6	5.1	4.8	4.4
		LL deflection, L/360 (plf)	10,500	4,430	2,268	1,313	827	554	389	284	213	164	129	103	84
		TL deflection, L/240 (plf)	15,742	6,637	3,394	1,961	1,232	823	576	418	312	238	186	147	118
	18	Total load (plf)	2,326	1,492	1,098	867	716	583	459	370	305	255	216	185	160
		End bearing (in.)	6.7	5.8	5.3	5.0	4.9	4.5	4.0	3.6	3.3	3.0	2.8	2.6	2.4
		Intermediate bearing (in.)	16.7	14.3	13.2	12.5	12.1	11.3	10.0	9.0	8.2	7.5	7.0	6.5	5.7

a) Span is measured center to center of supports.

Notes:

1. Tabulated values are allowable uniform loads that can be applied to the beam in addition to its self-weight, along with required bearing lengths for corresponding total loads. Selected beam shall satisfy all criteria.
2. Table is based on dry service conditions, normal duration of loading, and the most restrictive of simple or multiple spans.
3. Beam shall be laterally supported at points of bearing and along all compression edges.
4. Tabulated total loads account for bending moment and shear capacities.
5. Table assumes deflection limits of L/360 under live load (LL deflection) and L/240 under total load (TL deflection). For deflection limit of L/480 under live load, multiply live load values by 0.75.

Beams and Headers – Allowable Uniform Loads

Width (in.)	Depth (in.)	Criteria	Span (ft) [a] 6	8	10	12	14	16	18	20	22	24	26	28	30
2-ply 1-3/4 or 3-1/2	9-1/2	LL deflection, L/360 (plf)	3,087	1,302	667	386	243	163	114	83	63	48	38	30	25
		TL deflection, L/240 (plf)	4,623	1,946	992	571	356	236	163	117	86	64	49	37	29
		Total load (plf)	1,865	1,308	834	577	422	321	252	203	166	138	117	99	86
		End bearing (in.)	2.7	2.6	2.1	1.7	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
		Intermediate bearing (in.)	6.7	5.9	4.7	3.9	3.3	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
	11-7/8	LL deflection, L/360 (plf)	6,030	2,544	1,302	754	475	318	223	163	122	94	74	59	48
		TL deflection, L/240 (plf)	9,035	3,806	1,944	1,120	702	467	325	234	173	131	101	79	62
		Total load (plf)	2,499	1,717	1,306	904	661	504	396	319	262	218	185	158	136
		End bearing (in.)	3.6	3.3	3.2	2.7	2.3	2.0	1.8	1.6	1.5	1.5	1.5	1.5	1.5
		Intermediate bearing (in.)	9.0	8.3	7.9	6.6	5.3	4.6	4.0	3.6	3.2	3.0	3.0	3.0	3.0
	14	LL deflection, L/360 (plf)	9,881	4,168	2,134	1,235	778	521	366	267	200	154	121	97	79
		TL deflection, L/240 (plf)	14,809	6,241	3,189	1,841	1,155	770	537	388	289	220	170	134	107
		Total load (plf)	3,149	2,119	1,595	1,258	921	703	553	445	366	306	259	220	189
		End bearing (in.)	4.6	4.1	3.9	3.7	3.2	2.8	2.5	2.2	2.0	1.9	1.7	1.6	1.5
		Intermediate bearing (in.)	11.3	10.2	9.6	9.1	7.8	6.9	5.7	5.1	4.6	4.2	3.9	3.5	3.3
	16	LL deflection, L/360 (plf)	14,749	6,222	3,186	1,844	1,161	778	546	398	299	230	181	145	118
		TL deflection, L/240 (plf)	22,110	9,320	4,765	2,752	1,728	1,153	806	584	435	332	258	204	163
		Total load (plf)	3,848	2,532	1,885	1,500	1,205	920	724	584	480	400	336	285	245
		End bearing (in.)	5.6	4.9	4.6	4.4	4.1	3.6	3.2	2.9	2.6	2.4	2.2	2.0	1.9
		Intermediate bearing (in.)	13.8	12.2	11.3	10.9	10.2	8.9	8.0	7.2	6.5	5.6	5.1	4.7	4.3
	18	LL deflection, L/360 (plf)	21,000	8,859	4,536	2,625	1,653	1,107	778	567	426	328	258	207	168
		TL deflection, L/240 (plf)	31,485	13,274	6,789	3,922	2,464	1,646	1,151	835	624	477	372	295	237
		Total load (plf)	4,651	2,985	2,195	1,735	1,433	1,166	918	741	605	501	422	359	308
		End bearing (in.)	6.7	5.8	5.3	5.0	4.9	4.5	4.0	3.6	3.3	3.0	2.8	2.5	2.4
		Intermediate bearing (in.)	16.7	14.3	13.2	12.5	12.1	11.3	10.0	9.0	8.2	7.4	6.8	5.9	5.5

a) Span is measured center to center of supports.

Notes:

1. Tabulated values are allowable uniform loads that can be applied to the beam in addition to its self-weight, along with required bearing lengths for corresponding total loads. Selected beam shall satisfy all criteria.
2. Table is based on dry service conditions, normal duration of loading, and the most restrictive of simple or multiple spans.
3. Beam shall be laterally supported at points of bearing and along all compression edges.
4. Tabulated total loads account for bending moment and shear capacities.
5. Table assumes deflection limits of L/360 under live load (LL deflection) and L/240 under total load (TL deflection). For deflection limit of L/480 under live load, multiply live load values by 0.75.

Beams and Headers – Allowable Uniform Loads

Width	Depth	Criteria	Span (ft) [a]												
(in.)	(in.)		6	8	10	12	14	16	18	20	22	24	26	28	30
3-ply 1-3/4	9-1/2	LL deflection, L/360 (plf)	4,631	1,954	1,000	579	365	244	172	125	94	72	57	46	37
		TL deflection, L/240 (plf)	6,934	2,918	1,488	856	535	354	245	175	129	96	73	56	43
		Total load (plf)	2,798	1,962	1,251	865	633	481	378	304	249	207	175	148	126
		End bearing (in.)	2.7	2.6	2.1	1.7	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
		Intermediate bearing (in.)	6.7	5.9	4.7	3.9	3.3	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
	11-7/8	LL deflection, L/360 (plf)	9,045	3,816	1,954	1,131	712	477	335	244	183	141	111	89	72
		TL deflection, L/240 (plf)	13,552	5,708	2,915	1,681	1,053	700	487	351	260	197	152	118	93
		Total load (plf)	3,749	2,576	1,959	1,356	992	756	594	478	390	323	270	229	196
		End bearing (in.)	3.6	3.3	3.2	2.7	2.3	2.0	1.8	1.6	1.5	1.5	1.5	1.5	1.5
		Intermediate bearing (in.)	9.0	8.3	7.9	6.6	5.3	4.6	4.0	3.6	3.2	3.0	3.0	3.0	3.0
	14	LL deflection, L/360 (plf)	14,821	6,253	3,201	1,853	1,167	782	549	400	301	232	182	146	119
		TL deflection, L/240 (plf)	22,214	9,361	4,784	2,761	1,732	1,154	806	582	433	330	255	201	160
		Total load (plf)	4,724	3,178	2,392	1,888	1,382	1,054	827	659	536	444	372	316	271
		End bearing (in.)	4.6	4.1	3.9	3.7	3.2	2.8	2.5	2.2	2.0	1.8	1.7	1.5	1.5
		Intermediate bearing (in.)	11.3	10.2	9.6	9.1	7.8	6.9	5.7	5.0	4.5	4.1	3.7	3.4	3.1
	16	LL deflection, L/360 (plf)	22,123	9,333	4,779	2,765	1,741	1,167	819	597	449	346	272	218	177
		TL deflection, L/240 (plf)	33,165	13,980	7,148	4,128	2,592	1,730	1,209	876	653	498	387	306	245
		Total load (plf)	5,773	3,798	2,827	2,250	1,808	1,374	1,068	852	694	575	483	410	352
		End bearing (in.)	5.6	4.9	4.6	4.4	4.1	3.6	3.2	2.8	2.5	2.3	2.1	2.0	1.8
		Intermediate bearing (in.)	13.8	12.2	11.3	10.9	10.2	8.9	7.8	7.0	5.9	5.3	4.9	4.5	4.1
	18	LL deflection, L/360 (plf)	31,500	13,289	6,804	3,938	2,480	1,661	1,167	851	639	492	387	310	252
		TL deflection, L/240 (plf)	47,227	19,911	10,183	5,883	3,696	2,469	1,727	1,253	936	715	558	442	355
		Total load (plf)	6,977	4,477	3,293	2,602	2,149	1,721	1,339	1,069	871	721	606	516	443
		End bearing (in.)	6.7	5.8	5.3	5.0	4.9	4.5	3.9	3.5	3.2	2.9	2.6	2.4	2.3
		Intermediate bearing (in.)	16.7	14.3	13.2	12.5	12.1	11.1	9.8	8.7	7.9	7.1	6.5	5.7	5.2

a) Span is measured center to center of supports.

Notes:

1. Tabulated values are allowable uniform loads that can be applied to the beam in addition to its self-weight, along with required bearing lengths for corresponding total loads. Selected beam shall satisfy all criteria.
2. Table is based on dry service conditions, normal duration of loading, and the most restrictive of simple or multiple spans.
3. Beam shall be laterally supported at points of bearing and along all compression edges.
4. Tabulated total loads account for bending moment and shear capacities.
5. Table assumes deflection limits of L/360 under live load (LL deflection) and L/240 under total load (TL deflection). For deflection limit of L/480 under live load, multiply live load values by 0.75.

Beams and Headers – Allowable Uniform Loads

Width	Depth	Criteria	Span (ft) [a]												
(in.)	(in.)		6	8	10	12	14	16	18	20	22	24	26	28	30
		LL deflection, L/360 (plf)	4,851	2,047	1,048	606	382	256	180	131	98	76	60	48	39
		TL deflection, L/240 (plf)	7,264	3,057	1,559	897	560	371	257	184	135	101	77	59	46
	9-1/2	Total load (plf)	2,931	2,056	1,311	907	663	504	396	318	261	217	182	154	132
		End bearing (in.)	2.7	2.6	2.1	1.7	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
		Intermediate bearing (in.)	6.7	5.9	4.7	3.9	3.3	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
		LL deflection, L/360 (plf)	9,475	3,997	2,047	1,184	746	500	351	256	192	148	116	93	76
		TL deflection, L/240 (plf)	14,197	5,980	3,054	1,761	1,103	734	511	368	272	206	159	124	98
	11-7/8	Total load (plf)	3,928	2,698	2,052	1,420	1,039	792	622	501	407	336	282	239	205
		End bearing (in.)	3.6	3.3	3.2	2.7	2.3	2.0	1.8	1.6	1.5	1.5	1.5	1.5	1.5
		Intermediate bearing (in.)	9.0	8.3	7.9	6.6	5.3	4.6	4.0	3.6	3.2	3.0	3.0	3.0	3.0
		LL deflection, L/360 (plf)	15,527	6,550	3,354	1,941	1,222	819	575	419	315	243	191	153	124
		TL deflection, L/240 (plf)	23,271	9,807	5,012	2,893	1,815	1,209	844	610	454	345	268	210	168
5-1/2	14	Total load (plf)	4,949	3,329	2,506	1,978	1,448	1,104	862	687	559	463	388	330	283
		End bearing (in.)	4.6	4.1	3.9	3.7	3.2	2.8	2.5	2.2	2.0	1.8	1.7	1.5	1.5
		Intermediate bearing (in.)	11.3	10.2	9.6	9.1	7.8	6.9	5.7	5.0	4.5	4.1	3.7	3.4	3.1
		LL deflection, L/360 (plf)	23,177	9,778	5,006	2,897	1,824	1,222	858	626	470	362	285	228	185
		TL deflection, L/240 (plf)	34,744	14,645	7,488	4,324	2,715	1,812	1,266	917	684	522	406	321	257
	16	Total load (plf)	6,048	3,979	2,962	2,357	1,894	1,433	1,114	889	724	599	503	428	367
		End bearing (in.)	5.6	4.9	4.6	4.4	4.1	3.6	3.1	2.8	2.5	2.3	2.1	2.0	1.8
		Intermediate bearing (in.)	13.8	12.2	11.3	10.9	10.2	8.9	7.8	6.9	5.9	5.3	4.8	4.4	4.1
		LL deflection, L/360 (plf)	33,000	13,922	7,128	4,125	2,598	1,740	1,222	891	669	516	406	325	264
		TL deflection, L/240 (plf)	49,476	20,859	10,668	6,163	3,872	2,586	1,809	1,312	980	749	584	463	372
	18	Total load (plf)	7,309	4,690	3,450	2,726	2,252	1,795	1,396	1,114	908	752	632	537	462
		End bearing (in.)	6.7	5.8	5.3	5.0	4.9	4.5	3.9	3.5	3.2	2.9	2.6	2.4	2.3
		Intermediate bearing (in.)	16.7	14.3	13.2	12.5	12.1	11.1	9.7	8.7	7.8	7.1	6.5	5.6	5.2

a) Span is measured center to center of supports.

Notes:

1. Tabulated values are allowable uniform loads that can be applied to the beam in addition to its self-weight, along with required bearing lengths for corresponding total loads. Selected beam shall satisfy all criteria.
2. Table is based on dry service conditions, normal duration of loading, and the most restrictive of simple or multiple spans.
3. Beam shall be laterally supported at points of bearing and along all compression edges.
4. Tabulated total loads account for bending moment and shear capacities.
5. Table assumes deflection limits of L/360 under live load (LL deflection) and L/240 under total load (TL deflection). For deflection limit of L/480 under live load, multiply live load values by 0.75.

Beams and Headers – Allowable Uniform Loads

Width (in.)	Depth (in.)	Criteria	Span (ft) [a]												
			6	8	10	12	14	16	18	20	22	24	26	28	30
4-ply 1-3/4 or 7	9-1/2	LL deflection, L/360 (plf)	6,175	2,605	1,334	772	486	326	229	167	125	96	76	61	49
		TL deflection, L/240 (plf)	9,246	3,891	1,984	1,142	713	472	327	234	172	129	98	75	58
		Total load (plf)	3,730	2,616	1,669	1,154	843	642	504	404	328	270	226	191	163
		End bearing (in.)	2.7	2.6	2.1	1.7	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
		Intermediate bearing (in.)	6.7	5.9	4.7	3.9	3.3	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
	11-7/8	LL deflection, L/360 (plf)	12,060	5,088	2,605	1,507	949	636	447	326	245	188	148	119	96
		TL deflection, L/240 (plf)	18,069	7,611	3,887	2,241	1,404	934	650	468	347	262	202	158	125
		Total load (plf)	4,999	3,434	2,612	1,808	1,323	1,005	780	621	505	417	350	296	254
		End bearing (in.)	3.6	3.3	3.2	2.7	2.3	2.0	1.8	1.6	1.5	1.5	1.5	1.5	1.5
		Intermediate bearing (in.)	9.0	8.3	7.9	6.6	5.3	4.6	4.0	3.5	3.1	3.0	3.0	3.0	3.0
	14	LL deflection, L/360 (plf)	19,761	8,337	4,268	2,470	1,556	1,042	732	534	401	309	243	194	158
		TL deflection, L/240 (plf)	29,618	12,481	6,379	3,681	2,310	1,539	1,074	777	577	439	340	268	213
		Total load (plf)	6,299	4,237	3,189	2,517	1,832	1,378	1,071	853	694	574	482	409	351
		End bearing (in.)	4.6	4.1	3.9	3.7	3.1	2.7	2.4	2.1	1.9	1.8	1.6	1.5	1.5
		Intermediate bearing (in.)	11.3	10.2	9.6	9.1	7.8	6.7	5.5	4.9	4.4	3.9	3.6	3.3	3.0
	16	LL deflection, L/360 (plf)	29,498	12,444	6,372	3,687	2,322	1,556	1,093	796	598	461	363	290	236
		TL deflection, L/240 (plf)	44,220	18,639	9,530	5,504	3,456	2,306	1,612	1,167	870	664	517	408	327
		Total load (plf)	7,697	5,064	3,769	3,000	2,364	1,779	1,383	1,103	898	744	624	531	455
		End bearing (in.)	5.6	4.9	4.6	4.4	4.0	3.5	3.1	2.7	2.5	2.3	2.1	1.9	1.8
		Intermediate bearing (in.)	13.8	12.2	11.3	10.9	10.0	8.7	7.6	6.8	5.7	5.2	4.7	4.3	4.0
	18	LL deflection, L/360 (plf)	42,000	17,719	9,072	5,250	3,306	2,215	1,556	1,134	852	656	516	413	336
		TL deflection, L/240 (plf)	62,969	26,548	13,577	7,844	4,929	3,292	2,303	1,670	1,247	954	744	589	473
		Total load (plf)	9,303	5,969	4,390	3,469	2,866	2,229	1,734	1,384	1,127	934	785	667	573
		End bearing (in.)	6.7	5.8	5.3	5.0	4.9	4.4	3.8	3.4	3.1	2.8	2.6	2.4	2.2
		Intermediate bearing (in.)	16.7	14.3	13.2	12.5	12.1	10.8	9.5	8.5	7.6	6.9	6.0	5.5	5.1

a) Span is measured center to center of supports.

Notes:

1. Tabulated values are allowable uniform loads that can be applied to the beam in addition to its self-weight, along with required bearing lengths for corresponding total loads. Selected beam shall satisfy all criteria.
2. Table is based on dry service conditions, normal duration of loading, and the most restrictive of simple or multiple spans.
3. Beam shall be laterally supported at points of bearing and along all compression edges.
4. Tabulated total loads account for bending moment and shear capacities.
5. Table assumes deflection limits of L/360 under live load (LL deflection) and L/240 under total load (TL deflection). For deflection limit of L/480 under live load, multiply live load values by 0.75.

Beams and Headers – Bearing Length Requirements

Beams and Headers – Bearing Length Requirements (in.)

Reaction (lbf)	Beam width (in.)				
	1-3/4	2-ply 1-3/4 or 3-1/2	3-ply 1-3/4	5-1/2	4-ply 1-3/4 or 7
1,000	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2
2,000	2	1-1/2	1-1/2	1-1/2	1-1/2
3,000	3	1-1/2	1-1/2	1-1/2	1-1/2
4,000	4	2	1-1/2	1-1/2	1-1/2
5,000	5	2-1/2	1-3/4	1-3/4	1-1/2
6,000	5-3/4	3	2	2	1-1/2
7,000	6-3/4	3-1/2	2-1/4	2-1/4	1-3/4
8,000	7-3/4	4	2-3/4	2-1/2	2
9,000	8-3/4	4-1/2	3	2-3/4	2-1/4
10,000	9-3/4	5	3-1/4	3-1/4	2-1/2
11,000	10-1/2	5-1/4	3-1/2	3-1/2	2-3/4
12,000		5-3/4	4	3-3/4	3
13,000		6-1/4	4-1/4	4	3-1/4
14,000		6-3/4	4-1/2	4-1/4	3-1/2
15,000		7-1/4	5	4-3/4	3-3/4
16,000		7-3/4	5-1/4	5	4
17,000		8-1/4	5-1/2	5-1/4	4-1/4
18,000		8-3/4	5-3/4	5-1/2	4-1/2
19,000		9-1/4	6-1/4	6	4-3/4
20,000		9-3/4	6-1/2	6-1/4	5
21,000		10	6-3/4	6-1/2	5
22,000		10-1/2	7	6-3/4	5-1/4
23,000		11	7-1/2	7	5-1/2
24,000			7-3/4	7-1/2	5-3/4
25,000			8	7-3/4	6
26,000			8-1/2	8	6-1/4
27,000			8-3/4	8-1/4	6-1/2
28,000			9	8-1/2	6-3/4
29,000			9-1/4	9	7
30,000			9-3/4	9-1/4	7-1/4

Notes:

1. Minimum bearing length shall be 1-1/2 inch for end bearings and 3 inches for intermediate bearings.
2. Table is based on uniform loads, dry service conditions, and normal duration of loading.
3. Bearing across the full width of the beam is required.
4. Verification of the support member's bearing capacity must be carried out separately.

Beams and Headers – Multiple Member Connections

Top-loaded Beams

2-ply 1-3/4" or 3-ply 1-3/4"

- For beam depths less than 14 inches: minimum of 2 rows 16d common nails (0.162 x 3-1/2") at 12 inches o.c.
- For beam depths from 14 to 18 inches: minimum of 3 rows 16d common nails (0.162 x 3-1/2") at 12 inches o.c.
- An additional row is required when nail size is smaller than specified above (minimum 10d common nails, 0.148 x 3")

4-ply 1-3/4"

- Minimum of 2 rows 1/2-inch diameter bolts or 1/4 x 6-inch screws at 24 inches o.c.

2-ply 3-1/2"

- Minimum of 2 rows 1/2-inch diameter bolts or 1/4 x 6-inch screws at 24 inches o.c., staggered

Side-loaded Beams

Allowable uniform loads (plf) applied to either outside member

Connector	Spacing	Rows	2-ply 1-3/4"	3-ply 1-3/4"	4-ply 1-3/4" [e]	1-3/4" + 3-1/2"	1-3/4" + 3-1/2" + 1-3/4"	2-ply 3-1/2"
			Nails or screws one side or through bolts	Nails or screws both sides or through bolts	Screws one or both sides or through bolts	Nails or screws one side or through bolts	Nails or screws both sides or through bolts	Screws one or both sides or through bolts
16d Common nails (0.162 x 3-1/2") [a, b]	12"	2	470	350	-	350	315	-
		3	705	525	-	525	470	-
	6"	2	940	705	-	705	625	-
		3	1405	1055	-	1055	940	-
1/2" Through bolts (ASTM A307) [c, d]	24"	2	380	285	255	430	385	745
	12"	2	765	570	510	865	765	1490
	6"	2	1525	1145	1015	1725	1535	2980
Simpson Strong-Tie screws	Refer to Simpson Strong-Tie's literature							
MiTek screws	Refer to MiTek's literature							

a) Multiply tabulated allowable uniform loads by 0.83 for 10d common nails (0.148 x 3").

b) Minimum end distance for nails is 3 inches.

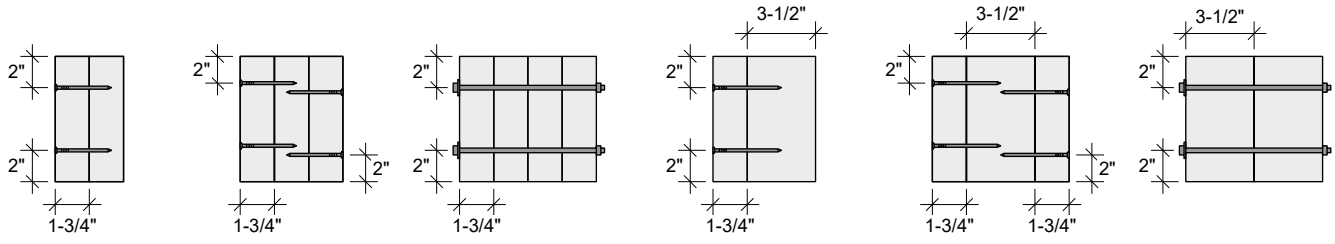
c) Bolt holes are recommended to be not more than 1/32 inch greater than the diameter of the bolts. Standard cut washers are required between the wood and the bolt head and between the wood and the nut.

d) Minimum end distance for bolts is 6 inches.

e) 4-ply beams are recommended to be used only when loads are applied to both sides, or if the beam is not fully loaded. The lesser load should be at least 25% of the higher load on the opposite side.

Notes:

1. Table is based on uniform loads, dry service conditions, and normal duration of loading.
2. Verify adequacy of beam in allowable uniform load tables or design software.
3. Stagger all fasteners installed from opposite side.



Columns – Selection Tables

Columns – Compression Capacity Parallel to Grain

Allowable axial loads (lbf)

Effective length (ft)	Width = 3-1/2"								
	Depth = 3-1/2"			Depth = 5-1/2"			Depth = 7"		
	Load duration factor			Load duration factor			Load duration factor		
	1.00	1.15	1.25	1.00	1.15	1.25	1.00	1.15	1.25
6	9,765	10,500	10,925	16,850	17,880	18,465	21,450	22,755	23,505
7	8,325	8,805	9,075	13,985	14,660	15,050	17,800	18,660	19,155
8	7,050	7,375	7,565	11,665	12,140	12,410	14,845	15,450	15,795
9	5,990	6,225	6,360	9,825	10,170	10,365	12,505	12,940	13,195
10	5,130	5,305	5,405	8,360	8,620	8,770	10,640	10,970	11,160
11	4,430	4,565	4,640	7,185	7,385	7,500	9,145	9,400	9,545
12	3,855	3,960	4,020	6,235	6,390	6,480	7,935	8,135	8,250
13	3,380	3,465	3,515	5,450	5,580	5,650	6,940	7,100	7,190
14	2,985	3,055	3,095	4,805	4,905	4,965	6,115	6,245	6,315
15	-	-	-	-	-	-	-	-	-
16	-	-	-	-	-	-	-	-	-

Effective length (ft)	Width = 5-1/2"						Width = 7"		
	Depth = 5-1/2"			Depth = 7"			Depth = 7"		
	Load duration factor			Load duration factor			Load duration factor		
	1.00	1.15	1.25	1.00	1.15	1.25	1.00	1.15	1.25
6	35,330	39,275	41,725	46,665	51,850	55,070	62,315	70,235	75,310
7	32,515	35,670	37,565	42,900	47,020	49,490	59,310	66,315	70,730
8	29,505	31,915	33,325	38,860	41,975	43,790	55,955	61,975	65,685
9	26,475	28,285	29,330	34,785	37,105	38,435	52,310	57,325	60,335
10	23,615	24,995	25,790	30,950	32,705	33,710	48,480	52,540	54,925
11	21,040	22,120	22,740	27,515	28,875	29,655	44,595	47,840	49,720
12	18,780	19,645	20,140	24,510	25,590	26,210	40,820	43,425	44,925
13	16,820	17,520	17,920	21,910	22,785	23,285	37,280	39,400	40,620
14	15,120	15,695	16,025	19,665	20,380	20,795	34,045	35,795	36,800
15	13,645	14,125	14,400	17,720	18,315	18,660	31,130	32,590	33,430
16	12,360	12,765	12,995	16,035	16,535	16,820	28,510	29,745	30,460
17	11,240	11,585	11,780	14,560	14,985	15,230	26,175	27,230	27,835
18	10,255	10,550	10,715	13,275	13,635	13,845	24,085	24,990	25,515
19	9,390	9,640	9,785	12,140	12,455	12,635	22,215	23,000	23,450
20	8,620	8,840	8,965	11,140	11,410	11,565	20,540	21,225	21,615
21	7,940	8,130	8,240	10,250	10,490	10,625	19,030	19,635	19,980
22	7,330	7,500	7,595	9,460	9,665	9,785	17,675	18,205	18,510
23	-	-	-	-	-	-	16,450	16,920	17,185
24	-	-	-	-	-	-	15,335	15,755	15,995

Notes:

1. Final design shall include a complete analysis including verification of the bearing capacity.
2. The tabulated values are the allowable axial loads that can be applied to the column in addition to its own weight.
3. Tables are based on dry service conditions, load duration factors, C_D, of 1.00 (floor load), 1.15 (snow load) or 1.25 (construction load), and axial load eccentricity of 1/6 of the column width or depth, whichever governs.

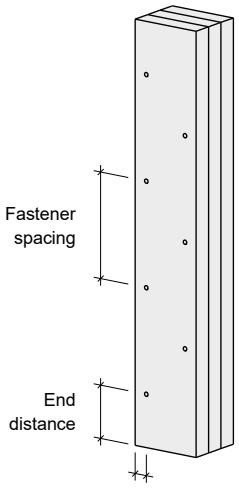
Studs – Multiple Member Connections

Built-up Columns – Fastener Pattern

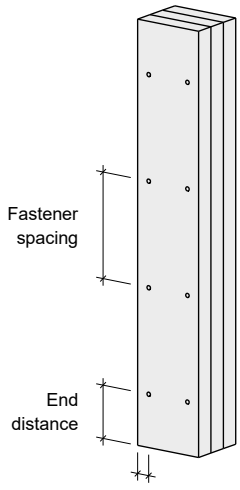
Plies			Fastener	Number of rows	Maximum fastener spacing	Minimum edge distance	Minimum end distance
Width (in.)	Depth (in.)	Number			(in.)	(in.)	(in.)
1-1/2	5-1/2	2	10d Common nails (0.148 x 3")	2	9	1-3/8	2-1/4
			1/2" Through bolts (ASTM A307)			3/4	3-1/2
		3	30d Common nails (0.207 x 4-1/2")	2	9	1-3/8	3-1/8
			1/2" Through bolts (ASTM A307)			3/4	3-1/2
		4	60d Common nails (0.263 x 6")	2	9	1-3/8	4
			1/2" Through bolts (ASTM A307)			3/4	3-1/2
	7-1/4	2	3" Common nails (0.148 x 3")	2	9	2-1/4	2-1/4
			1/2" Through bolts (ASTM A307)			3/4	3-1/2
		3	4-1/2" Common nails (0.207 x 4-1/2")	2	9	2-1/4	3-1/8
			1/2" Through bolts (ASTM A307)			3/4	3-1/2
		4	6" Common nails (0.263 x 6")	2	9	2-1/4	4
			1/2" Through bolts (ASTM A307)			3/4	3-1/2
1-3/4	5-1/2	2	16d Common nails (0.162 x 3-1/2")	2	9	1-3/8	2-1/2
			1/2" Through bolts (ASTM A307)			3/4	3-1/2
		3	40d Common nails (0.225 x 5")	2	9	1-3/8	3-3/8
			1/2" Through bolts (ASTM A307)			3/4	3-1/2
		4	1/2" Through bolts (ASTM A307)	2	9	3/4	3-1/2
	7-1/4	2	16d Common nails (0.162 x 3-1/2")	2	9	2-1/4	2-1/2
			1/2" Through bolts (ASTM A307)			3/4	3-1/2
		3	40d Common nails (0.225 x 5")	2	9	2-1/4	3-3/8
			1/2" Through bolts (ASTM A307)			3/4	3-1/2
		4	1/2" Through bolts (ASTM A307)	2	9	3/4	3-1/2

Notes:

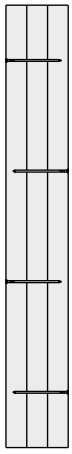
1. Individual studs assumed to be continuous over the full height of the built-up column.
2. Bolt holes are recommended to be not more than 1/32 inch greater than the diameter of the bolts. Standard cut washers are required between the wood and the bolt head and between the wood and the nut.
3. Install one row staggered, or two rows parallel in vertical direction.
4. Nails shall be driven alternately from either face along the member's length.



One row staggered



Two rows parallel



Nails driven alternately from either face

Hangers – Simpson Strong-Tie

Hangers – Simpson Strong-Tie

Face mount

Width	Depth	Hanger		Fasteners		Uplift [b]	Capacity [c]
		Model	B [a]	Header	Joist		
(in.)	(in.)		(in.)			(lbf)	(lbf)
1-3/4	9-1/2	HU9	2-1/2	24-16d	10-10d x 1-1/2"	1,545	3,075
		HUS1.81/10	3	30-16d	10-16d	2,265	4,360
	11-7/8	HU11	2-1/2	30-16d	10-10d x 1-1/2"	1,545	3,845
		HUS1.81/10	3	30-16d	10-16d	2,265	4,360
	14	HU14	2-1/2	36-16d	14-10d x 1-1/2"	1,545	4,615
		HUS1.81/10	3	30-16d	10-16d	2,265	4,360
	16	IUS1.81/16	2	16-10d	-	60	1,555
		MIU1.81/16	2-1/2	24-16d	2-10d x 1-1/2"	200	2,970
2-ply 1-3/4 or 3-1/2	9-1/2	HU410	2-1/2	18-16d	10-10d	1,545	2,305
		HGUS410	4	46-16d	16-16d	3,520	7,825
	11-7/8	HU412	2-1/2	22-16d	10-10d	1,545	2,820
		HGUS412	4	56-16d	20-16d	4,475	10,280
	14	HU416	2-1/2	26-16d	12-10d	1,545	3,330
		HGUS414	4	66-16d	22-16d	4,610	11,115
	16	HU416	2-1/2	26-16d	12-10d	1,545	3,330
		HGUS414	4	66-16d	22-16d	4,610	11,115
	18	HU416	2-1/2	20-16d	8-10d	1,305	2,565
		HGUS414	4	66-16d	22-16d	4,610	11,115
3-ply 1-3/4 or 5-1/2	9-1/2	HU610	2-1/2	18-16d	8-16d	1,545	2,305
		HGUS5.50/10	4	46-16d	16-16d	3,520	7,825
	11-7/8	HU612	2-1/2	22-16d	8-16d	1,545	2,820
		HGUS5.50/12	4	56-16d	20-16d	4,475	10,280
	14	HU614	2-1/2	24-16d	12-16d	2,320	3,330
		HGUS5.50/14	4	66-16d	22-16d	4,610	11,960
	16	HU616	2-1/2	26-16d	12-16d	2,320	3,330
		HGUS5.50/14	4	66-16d	22-16d	4,610	11,960
	18	HU616	2-1/2	26-16d	12-16d	2,320	3,330
		HGUS5.50/14	4	66-16d	22-16d	4,610	11,960
4-ply 1-3/4 or 7	9-1/2	HU410-2	2-1/2	18-16d	8-16d	1,545	2,305
		HGUS7.25/10	4	46-16d	16-16d	3,520	7,825
	11-7/8	HU412-2	2-1/2	22-16d	8-16d	1,545	2,820
		HGUS7.25/12	4	56-16d	20-16d	4,475	10,280
	14	HU414-2	2-1/2	26-16d	12-16d	2,320	3,330
		HGUS7.25/14	4	66-16d	22-16d	4,610	11,960
	16	HU414-2	2-1/2	26-16d	12-16d	2,320	3,330
		HGUS7.25/14	4	66-16d	22-16d	4,610	11,960
	18	HU414-2	2-1/2	26-16d	12-16d	2,320	3,330
		HGUS7.25/14	4	66-16d	22-16d	4,610	11,960

a) Dimension B represents the depth of the hanger.

b) Uplift values are based on Nordic Lam headers, upward loads and a load duration factor, C_D, of 1.60.

c) Capacities are based on Nordic Lam headers, downward loads and normal duration of loading.

Notes:

1. Fill all round and triangular holes.
2. Leave 1/16 inch clearance between the end of the supported joist and the header or hanger.
3. To verify hanger suitability for a specific application and for additional information, refer to Simpson Strong-Tie's literature.

Hangers – Simpson Strong-Tie

Top mount

Width	Depth	Hanger		Fasteners		Uplift [b]	Capacity [c]
		Model	B [a]	Header	Joist		
(in.)	(in.)		(in.)			(lbf)	(lbf)
1-3/4	9-1/2	MIT9.5	2-1/2	8-16d	2-10d x 1-1/2"	185	1,665
		BA1.81/9.5	3	16-16d	8-10d x 1-1/2"	1,095	4,005
	11-7/8	MIT11.88	2-1/2	8-16d	2-10d x 1-1/2"	185	1,665
		BA1.81/11.88	3	16-16d	8-10d x 1-1/2"	1,095	4,005
	14	MIT1.81/14	2-1/2	8-16d	2-10d x 1-1/2"	185	1,665
		BA1.81/14	3	16-16d	8-10d x 1-1/2"	1,095	4,005
	16	MIT1.81/16	2-1/2	8-16d	2-10d x 1-1/2"	185	1,665
		BA1.81/16	3	16-16d	8-10d x 1-1/2"	1,095	4,005
2-ply 1-3/4 or 3-1/2	9-1/2	MIT49.5	2-1/2	8-16d	2-10d x 1-1/2"	185	1,665
		BA3.56/9.5	3	16-16d	8-10d x 1-1/2"	1,095	4,005
	11-7/8	HB3.56/11.88	3-1/2	22-16d	10-16d	1,785	3,820
		BA3.56/11.88	3	16-16d	8-10d x 1-1/2"	1,095	4,005
	14	HB3.56/14	3-1/2	22-16d	10-16d	1,785	3,820
		BA3.56/14	3	16-16d	8-10d x 1-1/2"	1,095	4,005
	16	HB3.56/16	3-1/2	22-16d	10-16d	1,785	3,820
		BA3.56/16	3	16-16d	8-10d x 1-1/2"	1,095	4,005
	18	HB3.56/18	3-1/2	22-16d	10-16d	1,785	3,820
		HGLTV3.518	6	18-16d	6-16d	965	6,770
3-ply 1-3/4 or 5-1/2	9-1/2	HB5.50/9.5	3-1/2	22-16d	10-16d	1,785	3,820
		HGLTV5.37 H=9.5	6	18-16d	6-16d	965	6,770
	11-7/8	HB5.50/11.88	3-1/2	22-16d	10-16d	1,785	3,820
		HGLTV5.37 H=11.875	6	18-16d	6-16d	965	6,770
	14	HB5.50/14	3-1/2	22-16d	10-16d	1,785	3,820
		HGLTV5.37 H=14	6	18-16d	6-16d	965	6,770
	16	HB5.50/16	3-1/2	22-16d	10-16d	1,785	3,820
		HGLTV5.37 H=16	6	18-16d	6-16d	965	6,770
	18	HB5.50/18	3-1/2	22-16d	10-16d	1,785	3,820
		HGLTV5.37 H=18	6	18-16d	6-16d	965	6,770
4-ply 1-3/4 or 7	9-1/2	HB7.12/9.5	3-1/2	22-16d	10-16d	1,785	3,820
		HGLTV7.12 H=9.5	6	18-16d	6-16d	965	6,770
	11-7/8	HB7.12/11.88	3-1/2	22-16d	10-16d	1,785	3,820
		HGLTV7.12 H=11.875	6	18-16d	6-16d	965	6,770
	14	HB7.12/14	3-1/2	22-16d	10-16d	1,785	3,820
		HGLTV7.12 H=14	6	18-16d	6-16d	965	6,770
	16	HB7.12/16	3-1/2	22-16d	10-16d	1,785	3,820
		HGLTV7.12 H=16	6	18-16d	6-16d	965	6,770
	18	HB7.12/18	3-1/2	22-16d	10-16d	1,785	3,820
		HGLTV7.12 H=18	6	18-16d	6-16d	965	6,770

a) Dimension B represents the depth of the hanger.

b) Uplift values are based on Nordic Lam headers, upward loads and a load duration factor, C_D, of 1.60.

c) Capacities are based on Nordic Lam headers, downward loads and normal duration of loading.

Notes:

1. Fill all round and triangular holes.
2. Leave 1/16 inch clearance between the end of the supported joist and the header or hanger.
3. To verify hanger suitability for a specific application and for additional information, refer to Simpson Strong-Tie's literature.

Hangers – MiTek

Hangers – MiTek

Face mount

Width	Depth	Hanger		Fasteners		Uplift [b]	Capacity [c]
		Model	B [a]	Header	Joist		
(in.)	(in.)		(in.)			(lbf)	(lbf)
1-3/4	9-1/2	HD17925	2-1/2	24-16d	10-10d x 1-1/2"	1,545	3,020
		HUS179	3	30-16d	10-16d	3,410	4,555
	11-7/8	HD17112	2-1/2	30-16d	12-10d x 1-1/2"	1,550	3,255
		HUS179	3	30-16d	10-16d	3,410	4,555
	14	HD1714	2-1/2	36-16d	14-10d x 1-1/2"	1,555	3,485
		HUS179	3	30-16d	10-16d	3,410	4,555
	16	IHF1716	2-1/2	30-16d	2-10d x 1-1/2"	260	2,080
		HD1714	2-1/2	36-16d	14-10d x 1-1/2"	1,555	3,485
2-ply 1-3/4 or 3-1/2	9-1/2	HD410	2-1/2	20-16d	10-10d	1,715	2,710
		THDH410	4	46-16d	12-16d	3,470	7,820
	11-7/8	HD412	2-1/2	24-16d	12-10d	2,060	3,250
		THDH412	4	56-16d	14-16d	4,230	7,765
	14	HD414	2-1/2	26-16d	12-10d	2,060	3,520
		THDH414	4	66-16d	16-16d	4,250	9,075
	16	HD416	2-1/2	30-16d	14-10d	1,805	4,015
		THDH414	4	66-16d	16-16d	4,250	9,075
	18	HD416	2-1/2	30-16d	14-10d	1,805	4,015
		HD418	2-1/2	28-16d	8-10d	1,375	3,795
3-ply 1-3/4 or 5-1/2	9-1/2	HD5210	2-1/2	20-16d	10-16d	2,025	2,710
		THDH610	4	46-16d	16-16d	4,210	7,805
	11-7/8	HD5212	2-1/2	24-16d	12-16d	2,430	3,250
		THDH612	4	56-16d	20-16d	4,225	7,610
	14	HD5214	2-1/2	26-16d	12-16d	2,430	3,520
		THDH614	4	66-16d	22-16d	4,245	9,055
	16	HD5216	2-1/2	30-16d	14-16d	2,835	3,995
		THDH614	4	66-16d	22-16d	4,245	9,055
	18	HD5216	2-1/2	30-16d	14-16d	2,835	3,995
		THDH614	4	66-16d	22-16d	4,245	9,055
4-ply 1-3/4 or 7	9-1/2	HD7100	2-1/2	18-16d	8-16d	1,620	2,440
		THDH7210	4	46-16d	12-16d	3,440	7,760
	11-7/8	HD7120	2-1/2	22-16d	8-16d	1,620	2,980
		THDH7212	4	56-16d	14-16d	4,195	7,770
	14	HD7140	2-1/2	26-16d	12-16d	2,430	3,520
		THDH7214	4	66-16d	16-16d	4,215	8,990
	16	HD7140	2-1/2	26-16d	12-16d	2,430	3,520
		THDH7214	4	66-16d	16-16d	4,215	8,990
	18	HD7140	2-1/2	26-16d	12-16d	2,430	3,520
		THDH7214	4	66-16d	16-16d	4,215	8,990

a) Dimension B represents the depth of the hanger.

b) Uplift values are based on Nordic Lam headers, upward loads and a load duration factor, C_D, of 1.60.

c) Capacities are based on Nordic Lam headers, downward loads and normal duration of loading.

Notes:

1. For HUS and THDH models, drive joist nails into header at 30° to 45°.
2. Fill all round and diamond holes.
3. Leave 1/16 inch clearance between the end of the supported joist and the header or hanger.
4. To verify hanger suitability for a specific application and for additional information, refer to MiTek's literature.

Hangers – MiTek

Top mount

Width	Depth	Hanger		Fasteners		Uplift [b]	Capacity [c]
		Model	B [a]	Header	Joist		
(in.)	(in.)		(in.)			(lbf)	(lbf)
1-3/4	9-1/2	BPHA1795	3	14-16d	8-10d x 1-1/2"	1,335	3,285
		PHXU1795	3-1/4	8-16d	6-10d x 1-1/2"	710	3,245
	11-7/8	BPHA17118	3	14-16d	8-10d x 1-1/2"	1,335	3,285
		PHXU17118	3-1/4	8-16d	6-10d x 1-1/2"	710	3,245
	14	BPHA1714	3	14-16d	8-10d x 1-1/2"	1,335	3,285
		PHXU1714	3-1/4	8-16d	6-10d x 1-1/2"	710	3,245
	16	BPHA1716	3	14-16d	8-10d x 1-1/2"	1,335	3,285
		PHM1716	2-1/2	2-16d	2-10d x 1-1/2"	-	2,140
2-ply 1-3/4 or 3-1/2	9-1/2	HBPH3595	3-1/2	22-16d	10-16d	2,335	5,035
		HLBH3595	6	15-NA16D-RS	6-16d	1,090	7,705
	11-7/8	HBPH35118	3-1/2	22-16d	10-16d	2,335	5,035
		HLBH35118	6	15-NA16D-RS	6-16d	1,090	7,705
	14	HBPH3514	3-1/2	22-16d	10-16d	2,335	5,035
		HLBH3514	6	15-NA16D-RS	6-16d	1,090	7,705
	16	HBPH3516	3-1/2	22-16d	10-16d	2,335	5,035
		HLBH3516	6	15-NA16D-RS	6-16d	1,090	7,705
	18	HBPH3518	3-1/2	22-16d	10-16d	2,335	5,035
		HLBH3518	6	15-NA16D-RS	6-16d	1,090	7,705
3-ply 1-3/4 or 5-1/2	9-1/2	HBPH5595	3-1/2	22-16d	10-16d	2,325	4,910
		HLBH5595	6	15-NA16D-RS	6-16d	1,210	7,680
	11-7/8	HBPH55118	3-1/2	22-16d	10-16d	2,325	4,910
		HLBH55118	6	15-NA16D-RS	6-16d	1,210	7,680
	14	HBPH5514	3-1/2	22-16d	10-16d	2,325	4,910
		HLBH5514	6	15-NA16D-RS	6-16d	1,210	7,680
	16	HBPH5516	3-1/2	22-16d	10-16d	2,325	4,910
		HLBH5516	6	15-NA16D-RS	6-16d	1,210	7,680
	18	HBPH5518	3-1/2	22-16d	10-16d	2,325	4,910
		HLBH5518	6	15-NA16D-RS	6-16d	1,210	7,680
4-ply 1-3/4 or 7	9-1/2	HBPH7195	3-1/2	22-16d	10-16d	2,320	4,895
		HLBH7195	6	15-NA16D-RS	6-16d	1,205	7,670
	11-7/8	HBPH71118	3-1/2	22-16d	10-16d	2,320	4,895
		HLBH71118	6	15-NA16D-RS	6-16d	1,205	7,670
	14	HBPH7114	3-1/2	22-16d	10-16d	2,320	4,895
		HLBH7114	6	15-NA16D-RS	6-16d	1,205	7,670
	16	HBPH7116	3-1/2	22-16d	10-16d	2,320	4,895
		HLBH7116	6	15-NA16D-RS	6-16d	1,205	7,670
	18	HBPH7118	3-1/2	22-16d	10-16d	2,320	4,895
		HLBH7118	6	15-NA16D-RS	6-16d	1,205	7,670

a) Dimension B represents the depth of the hanger.

b) Uplift values are based on Nordic Lam headers, upward loads and a load duration factor, C_D, of 1.60.

c) Capacities are based on Nordic Lam headers, downward loads and normal duration of loading.

Notes:

1. Fill all round holes.
2. Leave 1/16 inch clearance between the end of the supported joist and the header or hanger.
3. To verify hanger suitability for a specific application and for additional information, refer to MiTek's literature.

NORDIC

TECHNICAL GUIDE
NORDIC LAM

NS-GT4

VERSION
2026-05-01

CONSTRUCTION DETAILS 3

NORDIC
STRUCTURES

GENERAL NOTES

1.0 General

1.1 This document supersedes all previous versions. For the latest version, consult nordic.ca or contact Nordic Structures.

1.2 While this guide emphasizes residential construction, much of the basic design information can be used for other construction applications. Review by a design professional is required for applications beyond the scope of this document.

1.3 For more information, consult nordic.ca or contact Nordic Structures.

2.0 Structure

2.1 All nails shown in the details are assumed to be common nails unless otherwise noted. 10d box nails (0.128 x 3 inches) may be substituted for 8d common nails (0.131 x 2-1/2 inches) shown in details. Individual components not shown to scale for clarity.

2.2 For APA Rim Board Plus specifications, see ANSI/APA PRR 410, Standard for Performance-rated Engineered Wood Rim Boards.

2.3 Provide adequate bearing length and bearing across the full width to support Nordic Lam beam. Refer to Chapter 2 for bearing length requirements, and consult local building code for specific requirements.

2.4 Heavy concentrated loads such as heating/cooling units, crane rails or main framing members suspended from the bottom of beams induce tension perpendicular to grain and may cause splitting. Except for light loads such as hung ceilings (including 2x-framing), sprinkler systems, lighting appliances, etc., always suspend concentrated loads from the beam top, unless designed otherwise by a qualified engineer.

3.0 Fire Resistance

3.1 Numerous fire-rated assemblies incorporate I-joists and wood structural panels. These floor-ceiling and roof-ceiling assemblies, recognized as fire-rated constructions by building codes, are illustrated in the APA Product Report PR-S274, Fire-Rated Assemblies.

3.2 A rim board can also serve as a fire barrier when it is installed in a continuous assembly on top of a wall, parallel or perpendicular to the joists. Fire-resistant rim board assemblies are shown in the APA Data File: APA Rim Board in Fire-Rated Assemblies, Form D350.

3.3 In some designs, sprinkler systems are used with Nordic Lam beams. There are a variety of sprinkler attachments that incorporate fasteners permitted by the National Fire Protection Association (NFPA), design load assumptions published by the NFPA, and published design fastener capacities. These sprinkler attachments are illustrated in details 6 of Nordic Lam Construction Details (NS-DC4).

FOR ALL
construction details →DC4

installation guide →GI41

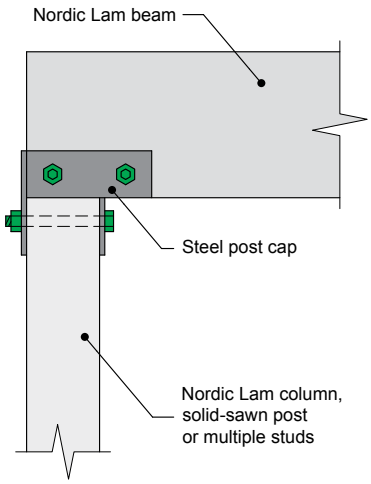
Floor Framing Details

Glulam floor beams can be installed within the floor cavity if a concealed application is desired. Most distributors stock inventory glulam in I-joist-compatible depths for use with I-joist-framing systems but glulam can also be used in most standard lumber-framing systems with minimal furring. Glulam columns are stocked in standard sizes, making them easy to conceal in any wall framing. A glulam beam can also be installed below the floor framing and then covered, therefore making it concealed. It can also be partially concealed in the floor joist cavity or left completely exposed below the floor framing.

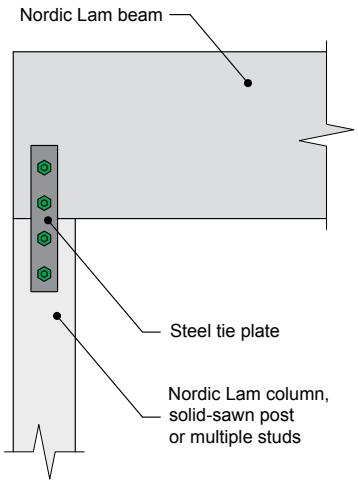
If Nordic Lam beams or columns are left exposed to add an aesthetic value, it needs to be checked, prepared and sanded before installation since its aesthetic aspect is not of primary concern.

Details 1a through 1q illustrate a variety of simple floor-framing details including glulam beams and columns.

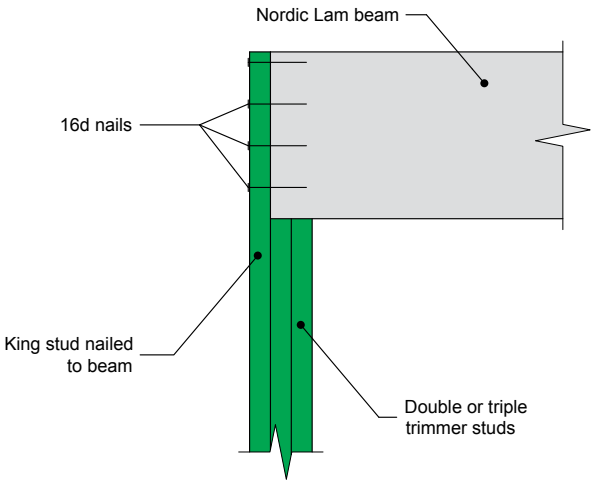
1a



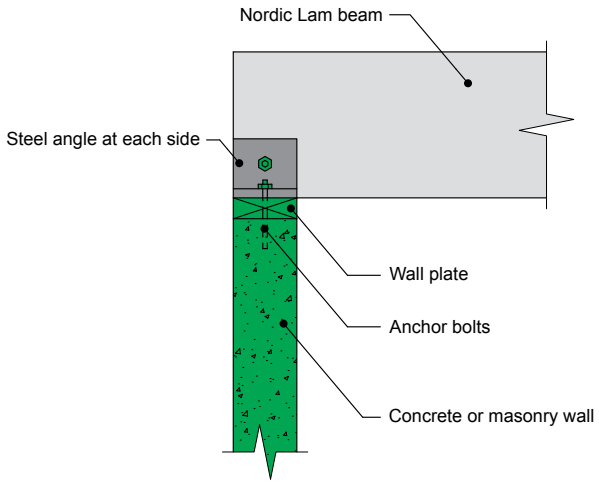
1b



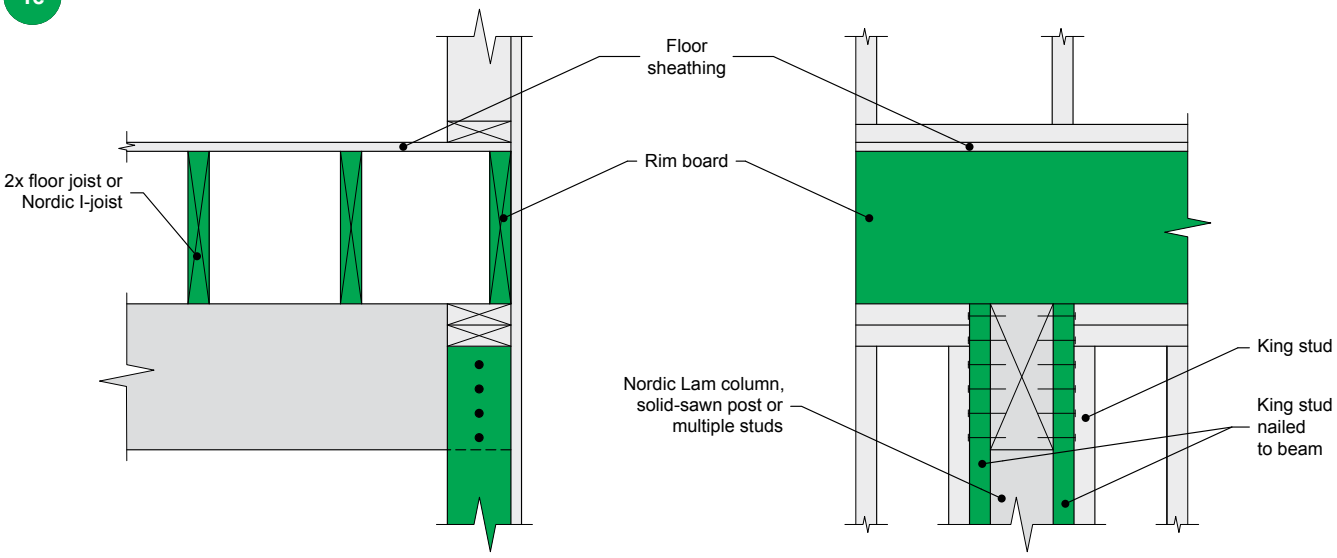
1c



1d



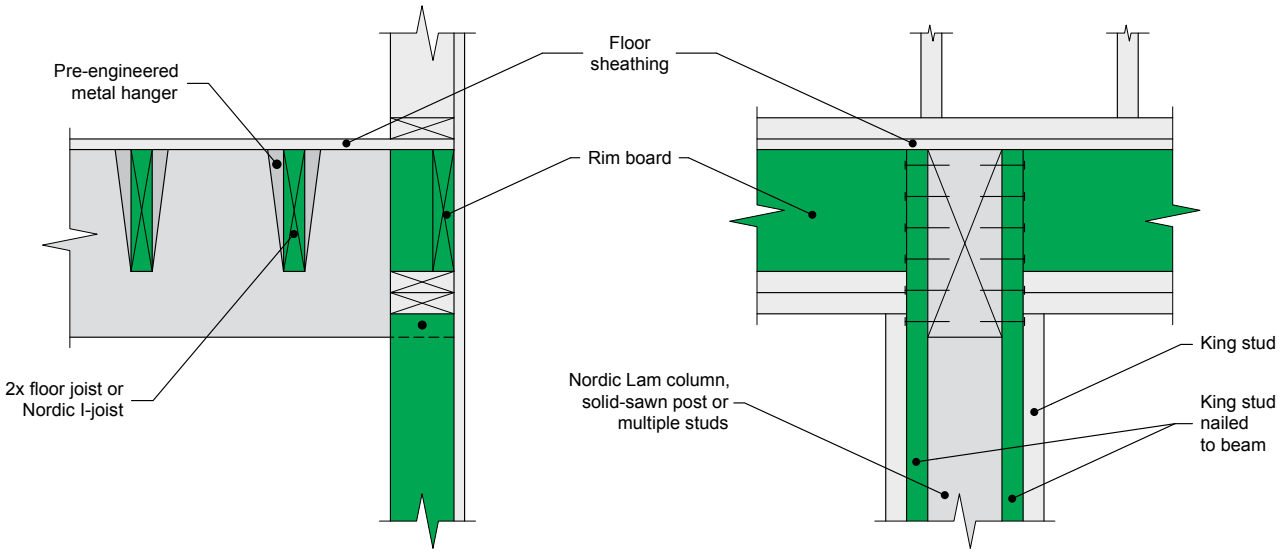
1e



Section Through Floor Joists

Section Through Nordic Lam Beam

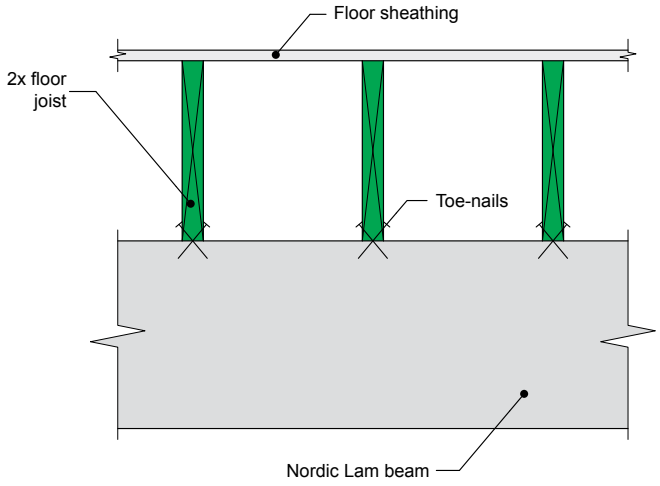
1f



Section Through Floor Joists

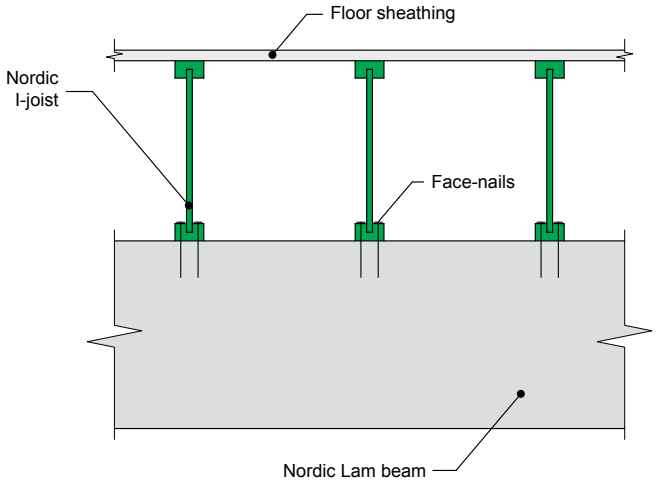
Section Through Nordic Lam Beam

1g



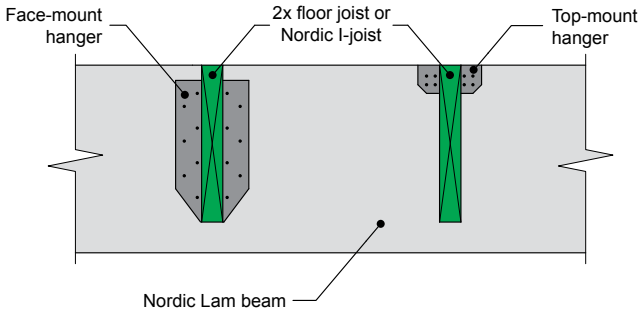
Note:
1. Blocking required between joists at bearing for lateral support, not shown for clarity.

1h



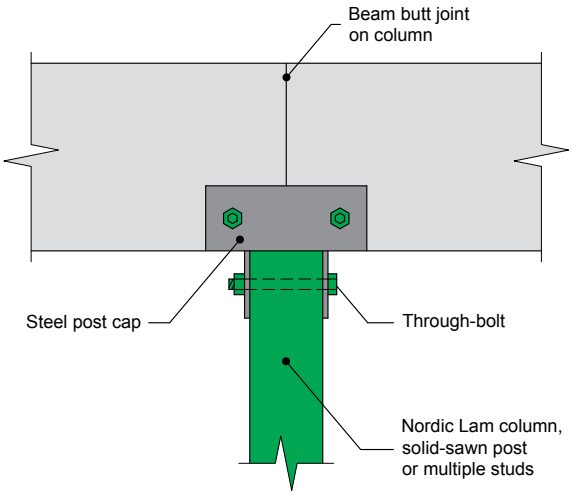
Note:
1. Blocking required between joists at bearing for lateral support, not shown for clarity.

1j



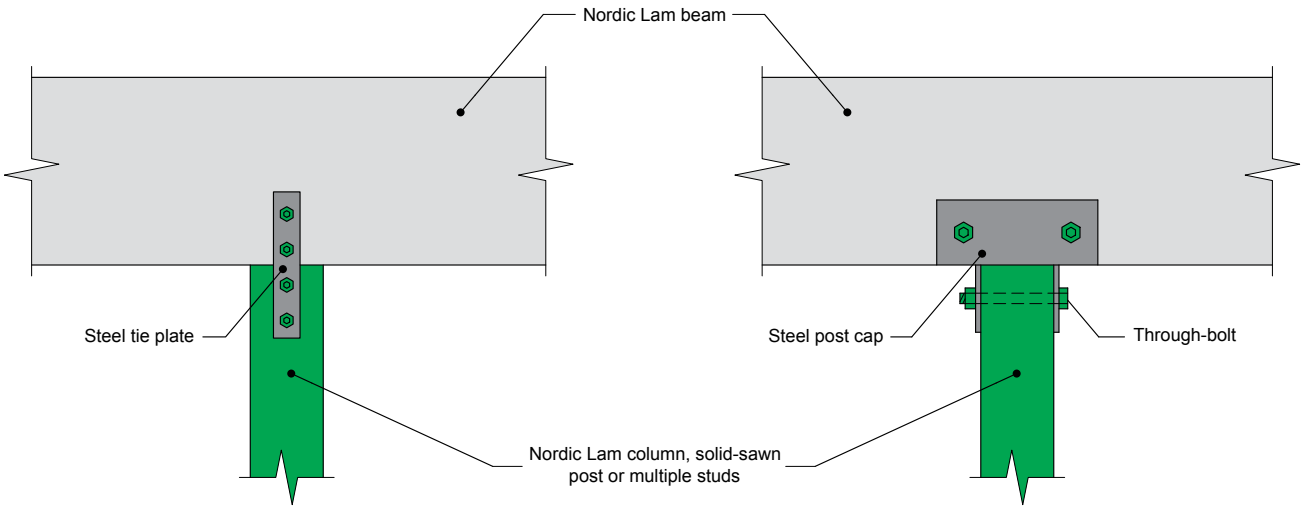
Note:
1. Hangers installed per manufacturer's recommendations.

1k

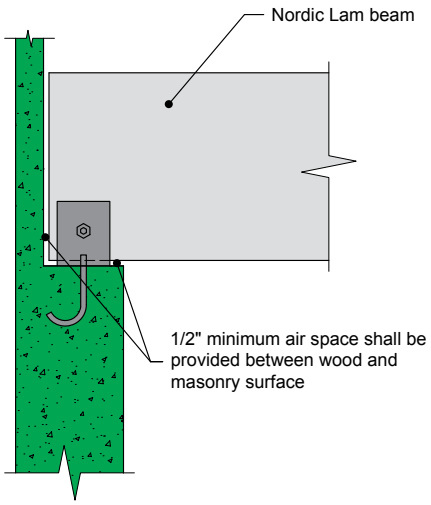


Note:
1. See detail 1m for similar details with continuous floor beam over intermediate wood supports.

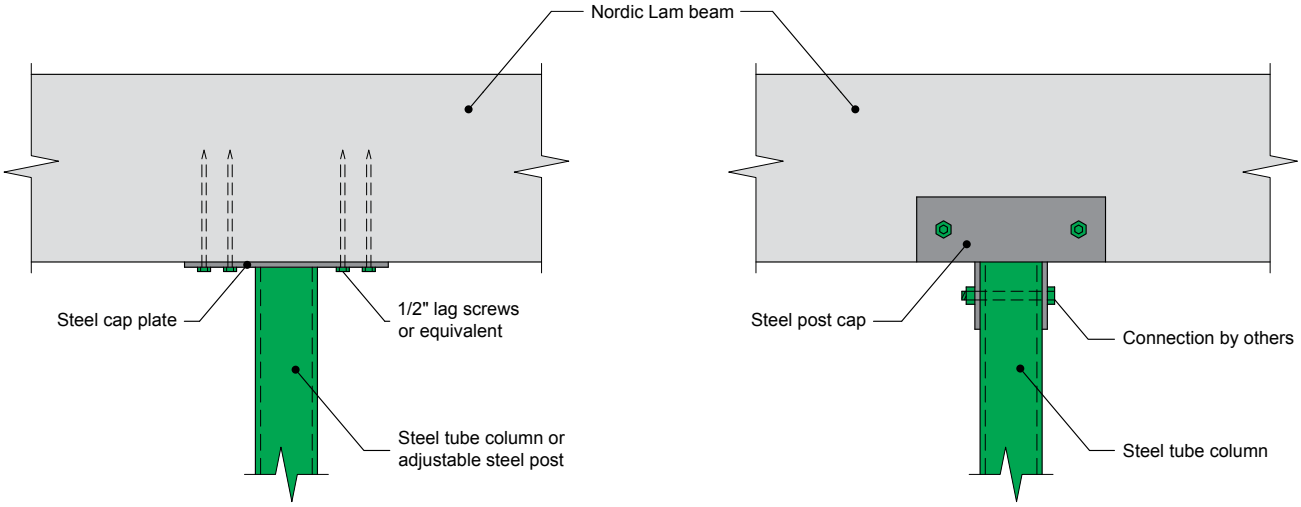
1m


Nordic Lam beam
Steel tie plate
Steel post cap
Through-bolt
Nordic Lam column, solid-sawn post or multiple studs

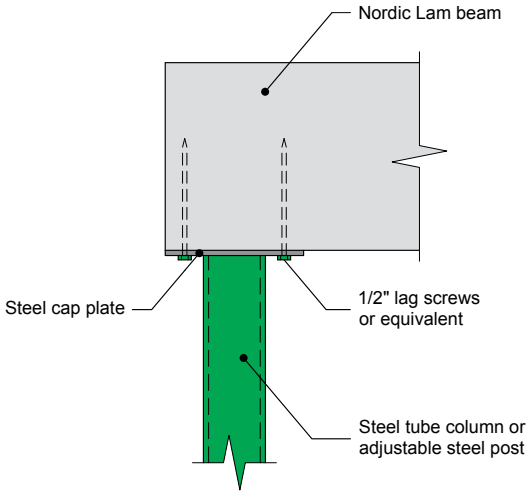
1n


Nordic Lam beam
1/2" minimum air space shall be provided between wood and masonry surface

1p


Nordic Lam beam
Steel cap plate
1/2" lag screws
or equivalent
Steel tube column or
adjustable steel post
Nordic Lam beam
Steel post cap
Connection by others
Steel tube column

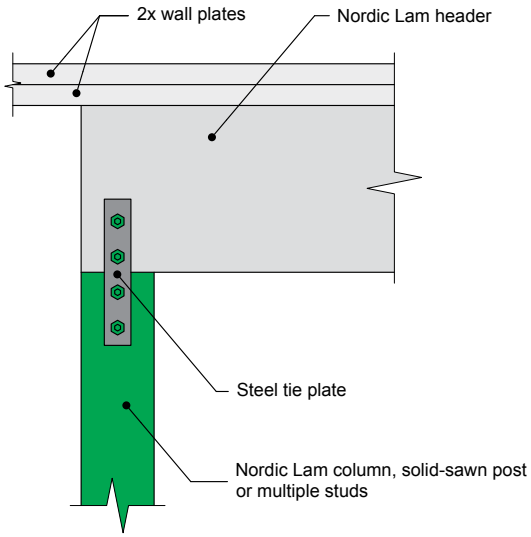
1q


Nordic Lam beam
Steel cap plate
1/2" lag screws
or equivalent
Steel tube column or
adjustable steel post

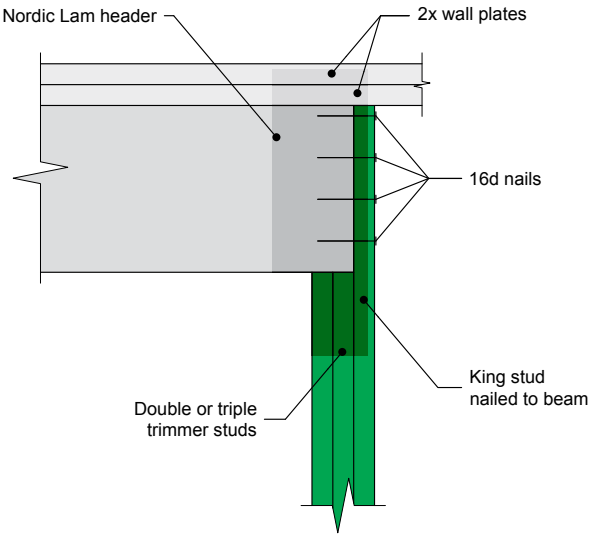
Header Framing Details

Nordic Lam beams have no camber which makes it easy to connect them with other wood frame components. They also offer long spans that are suitable for use as garage door lintels. Details 2a to 2e illustrate some of the many simple connections details that can be used with glulam in residential garage door framing.

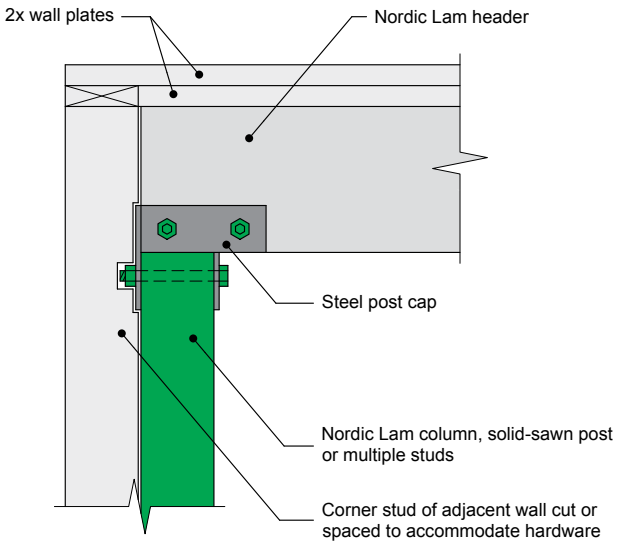
2a



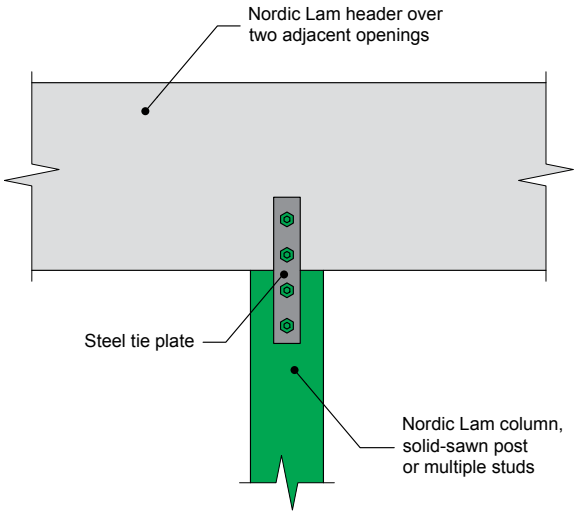
2b



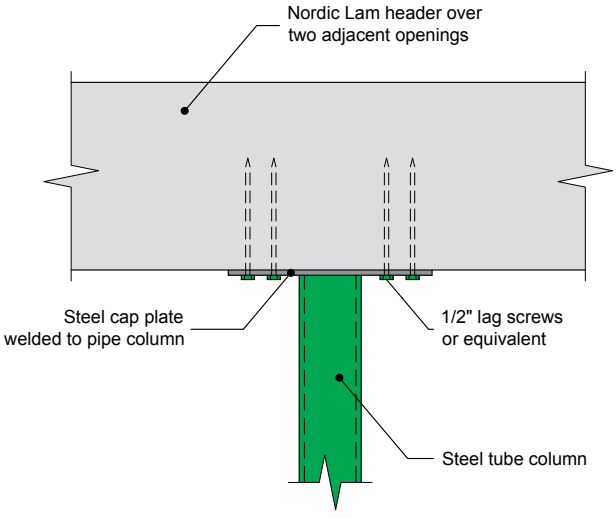
2c


2x wall plates
Nordic Lam header
Steel post cap
Nordic Lam column, solid-sawn post or multiple studs
Corner stud of adjacent wall cut or spaced to accommodate hardware

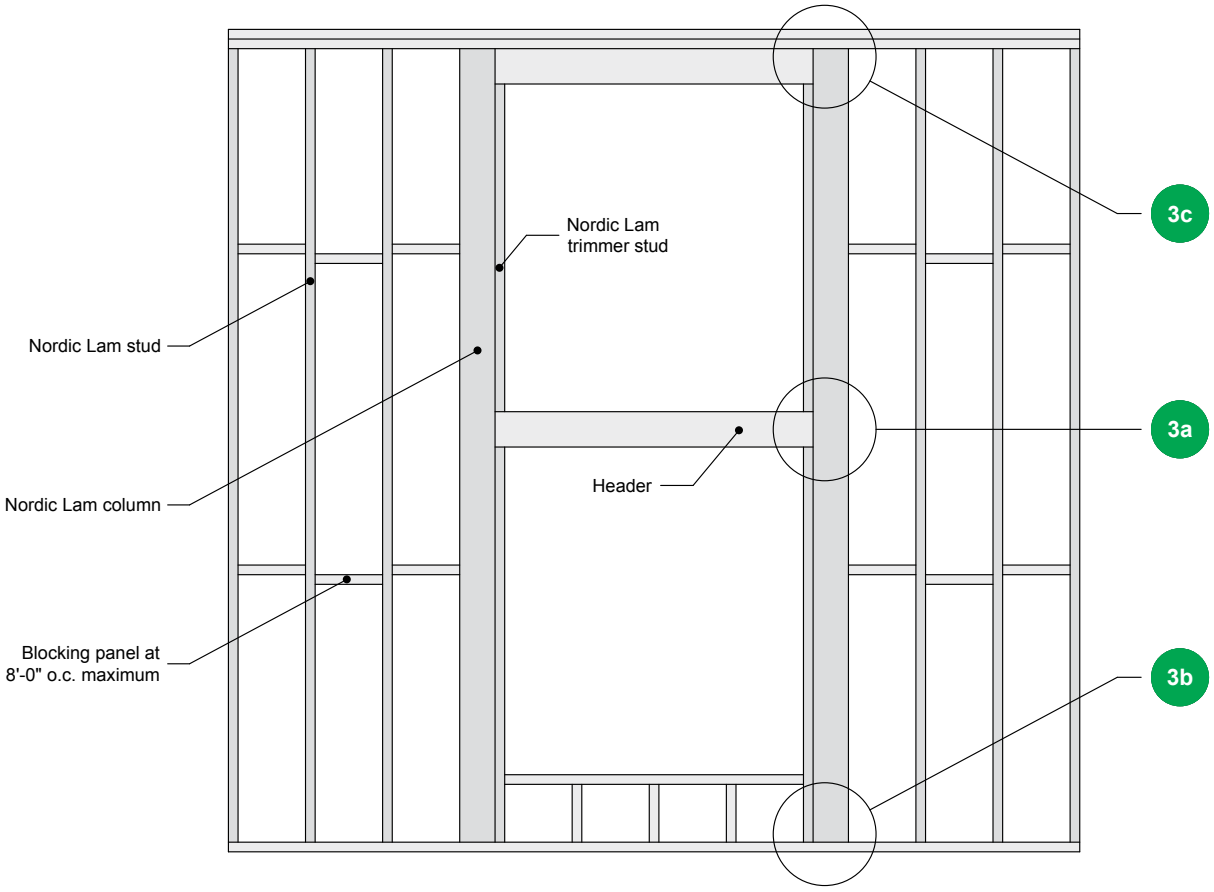
2d


Nordic Lam header over two adjacent openings
Steel tie plate
Nordic Lam column, solid-sawn post or multiple studs

2e


Nordic Lam header over two adjacent openings
Steel cap plate welded to pipe column
1/2" lag screws or equivalent
Steel tube column

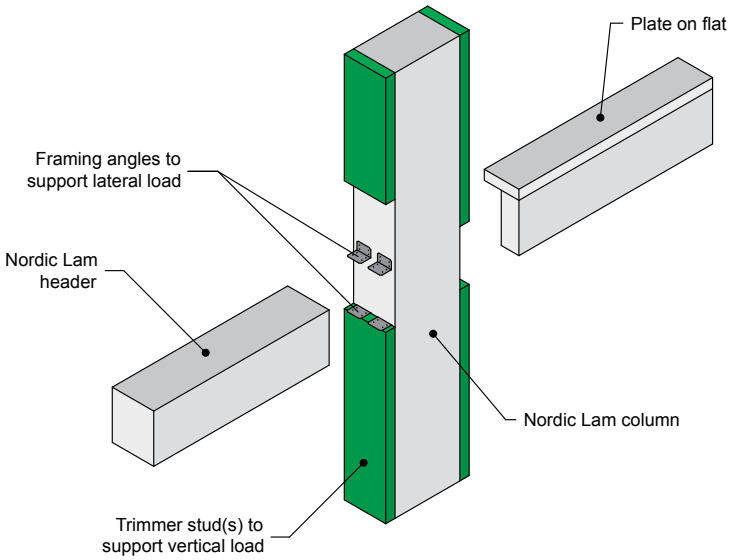
Wall and Column Framing Details



3

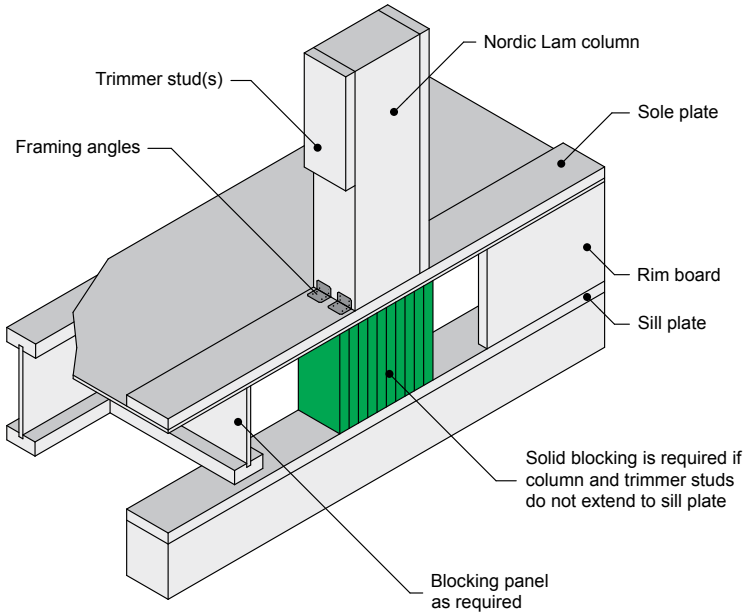
Note:
1. All additional blocking, trimmers, plates, etc. not specified should be the same as the typical stud material.

3a

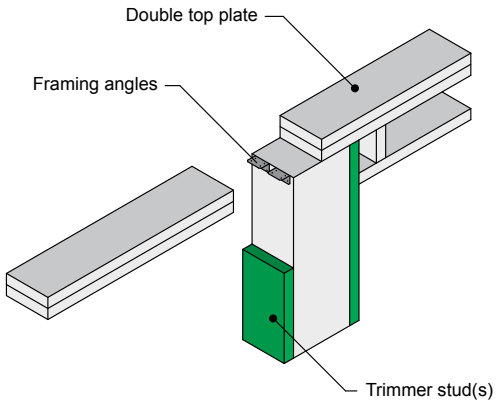


Note:
1. Plate width must equal wall thickness to provide lateral bracing. (Plate not required if header width equals the wall thickness.)

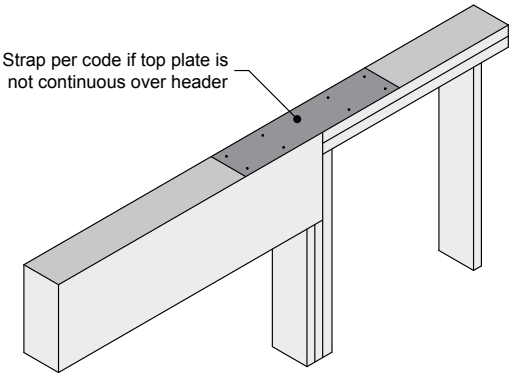
3b



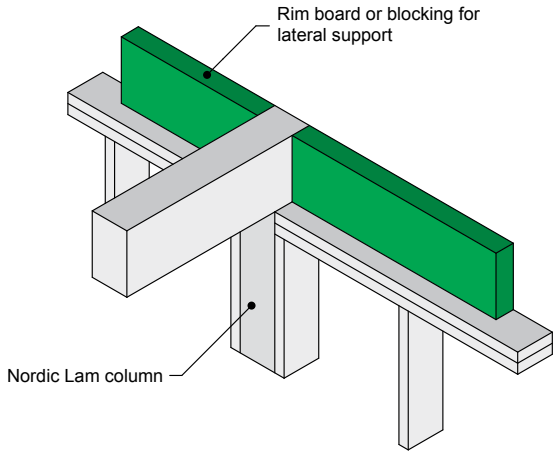
3c


Double top plate
Framing angles
Trimmer stud(s)

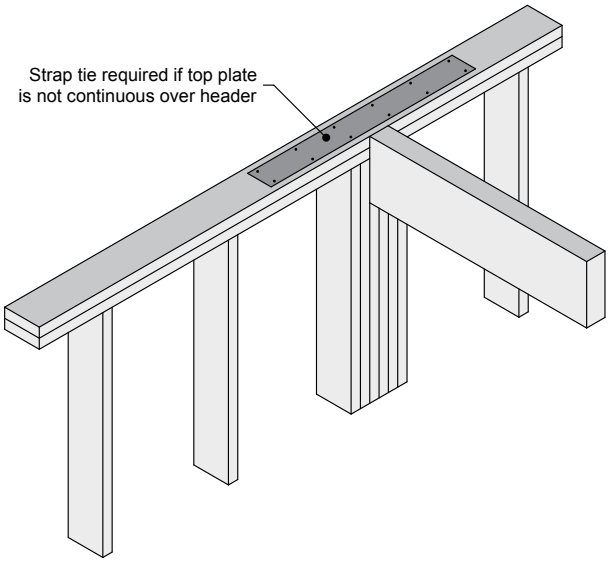
3d


Strap per code if top plate is
not continuous over header

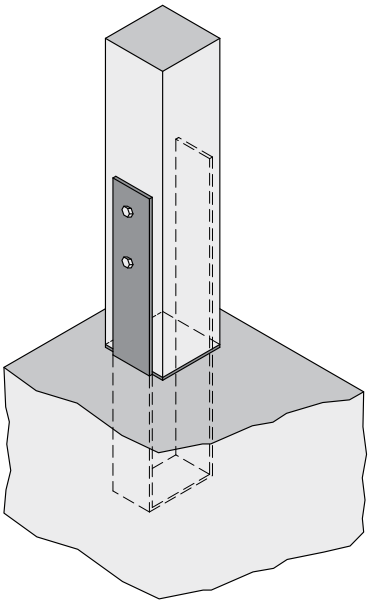
3e


Rim board or blocking for
lateral support
Nordic Lam column

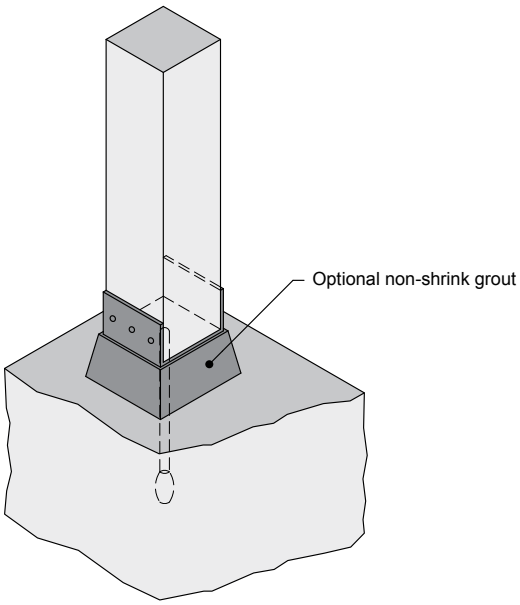
3f


Strap tie required if top plate
is not continuous over header

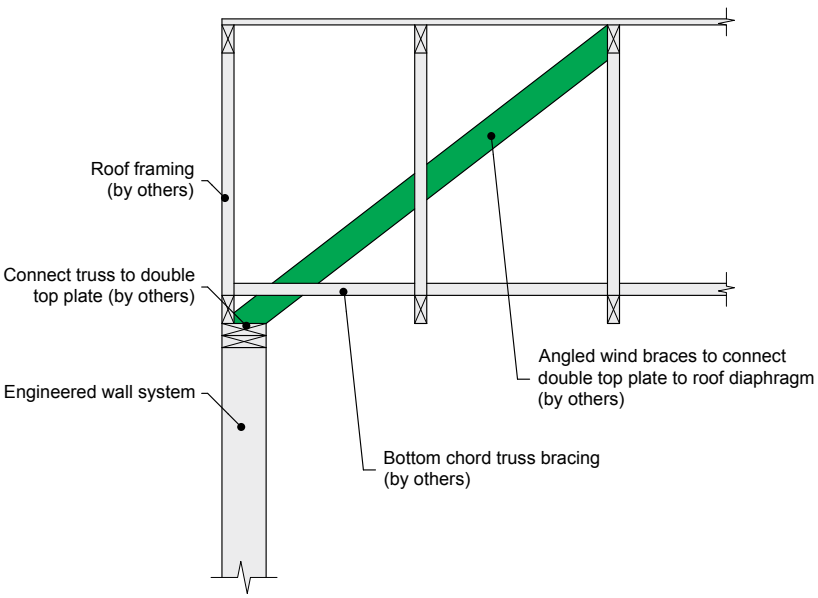
3g



3h

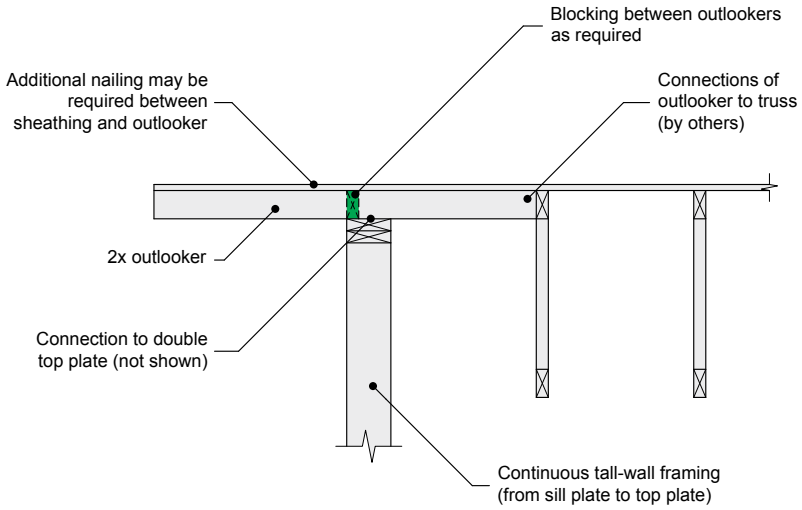


3j



Note:
1. Wall bracing is necessary if double top plate is not attached directly to the roof/floor diaphragm.

3k



Note:
1. Connection of double top plate to outlooker must be designed to transfer lateral load to roof.

Holes in Beams and Studs

Horizontal Holes

Horizontal holes in glued laminated timbers are limited in size and location to maintain the structural integrity of the beam. Detail 4 shows the zones of a uniformly loaded, simply supported beam where the field drilling of holes may be considered. These non-critical zones are located in portions of the beam stressed to less than 50 percent of specified bending strength and less than 50 percent of specified shear strength. For beams, of more complex loading or other than simple spans, similar diagrams may be developed.

Field-drilled horizontal holes should be used for access only and should not be used as attachment points for brackets or other load bearing hardware unless specifically designed as such by the engineer or designer of record.

These field drilled horizontal holes should meet the following guidelines:

1. Hole size: The hole diameter should not exceed 1-1/2 inch or 1/10 the beam depth, whichever is smaller.
2. Hole location: The hole should have a minimum clear distance, as measured from the edge of the hole to the nearest edge of the beam, of four hole diameters to the top or bottom face of the beam and eight hole diameters from the end of the beam. Note that the horizontal hole should not be drilled in the moment-critical zone, as defined in detail 4, unless approved by an engineer or architect qualified in engineered timber design.
3. Hole spacing: The minimum clear spacing between adjacent holes, as measured between the nearest edge of the holes, should be eight hole diameters based on the largest diameter of any adjacent hole in the beam.
4. Number of holes: The maximum number of holes should not exceed one hole per five feet of beam length. The hole spacing limitation, as given above, should be satisfied separately.

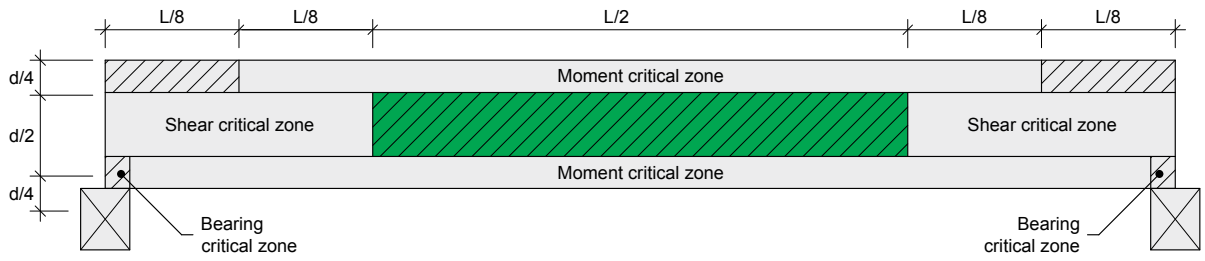
For glulam members that have been oversized or for glulam joists, the guidelines given above may be relaxed based on an engineering analysis. Regardless of the hole location, holes drilled horizontally through a member should be positioned and sized with the understanding that the beam will deflect over a period of time under in-service loading conditions. This deflection could cause distress to supported equipment or piping unless properly considered.

For any horizontal hole of a large diameter or for additional information relative to horizontal holes, see APA technical note: Effect of Large Diameter Horizontal Holes on the Bending and Shear Properties of Structural Glued Laminated Timber, V700.

Vertical Holes

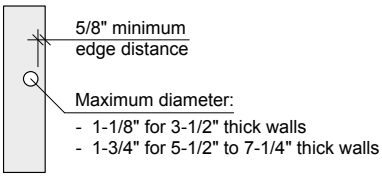
Whenever possible, avoid drilling vertical holes through glulam beams since they can cause a reduction in the capacity at that location directly proportional to the ratio of 1-1/2 times the diameter of the hole to the width of the beam. Use a drill guide to ensure a true alignment of the hole through the depth of the beam. For more information, see APA technical note: Field Notching and Drilling of Glued Laminated Timber Beams, S560.

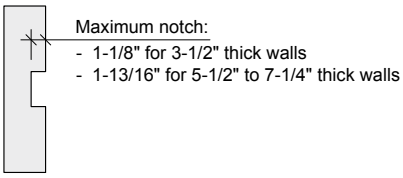
4

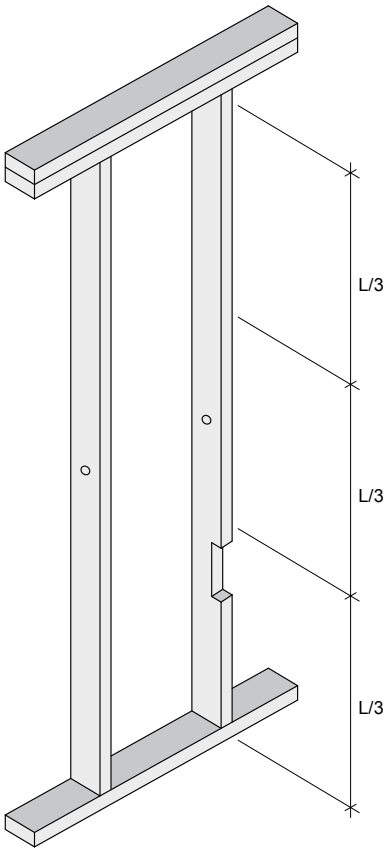


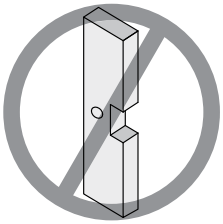
Zones where horizontal holes are permitted for passage of wires, conduit, etc.

5





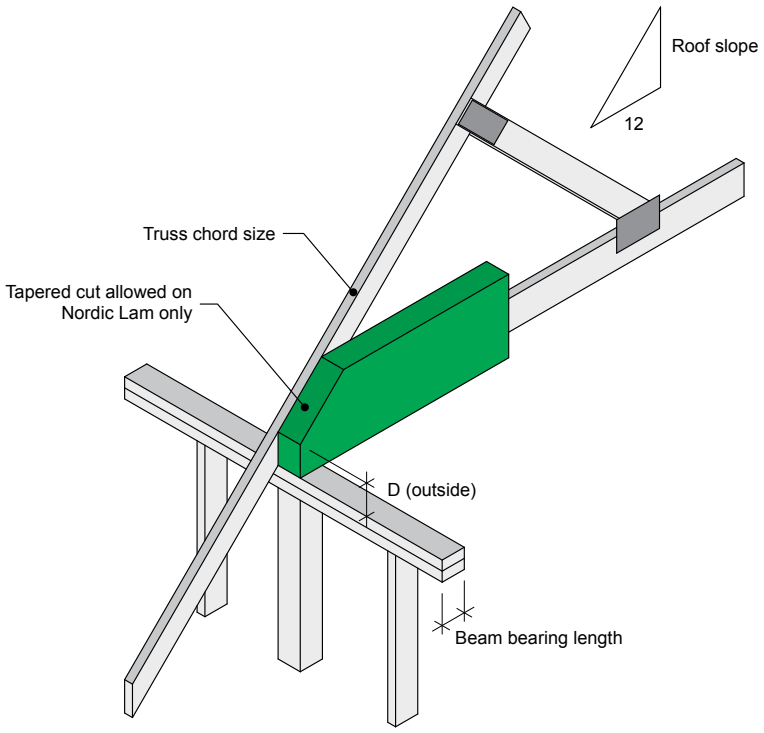




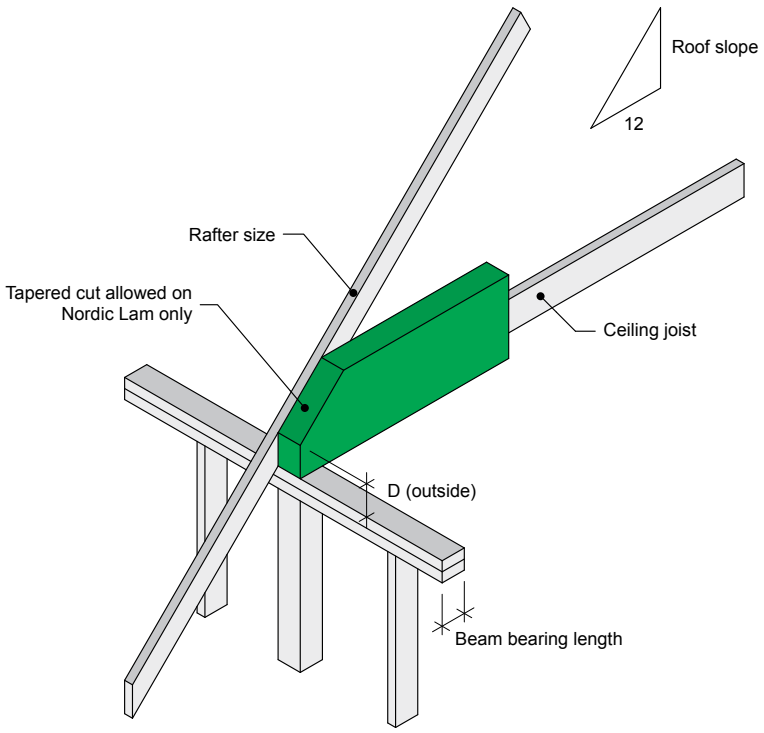
Notes:
1. One hole may be cut anywhere along the length of the stud or column but must be no closer than 5/8 inch from the edge.
2. One notch may be cut anywhere except the middle 1/3 of the length of the stud or column.
3. Bored holes shall not be located in the same section as a cut or notch in stud.

Roof Framing Details

8a



8b


Roof slope
12
Rafter size
Tapered cut allowed on
Nordic Lam only
Ceiling joist
D (outside)
Beam bearing length

NORDIC

TECHNICAL GUIDE
NORDIC LAM

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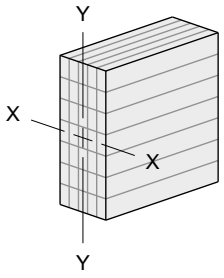
COMMERCIAL APPLICATIONS 4

NORDIC
STRUCTURES

Nordic Lam – Design Properties

Nordic Lam – Design Properties

Application	Beams and headers [f]
Axonometry	
Appearance grade	Industrial
Stress grade	24F-1.9E
Layup combination	24F-E/ES1M1
Bending about X-X axis	
Bending moment, F_{bx} [a]	2,400 psi
Longitudinal shear, F_{vx}	250 psi
Compression perpendicular to grain, F_{cpx}	600 psi
Shear-free modulus of elasticity, E_x	1,900,000 psi
Apparent modulus of elasticity, $E_{x,app}$ [b]	1,800,000 psi
Bending about Y-Y axis	
Bending moment, F_{by} [c]	
4 or more laminations	1,100 psi
3 laminations	n.a.
Longitudinal shear, F_{vy}	
4 or more laminations	175 psi
3 laminations	n.a.
Compression perpendicular to grain, F_{cpy}	300 psi
Shear-free modulus of elasticity, E_y	1,600,000 psi
Apparent modulus of elasticity, $E_{y,app}$ [b]	1,500,000 psi
Axially loaded	
Compression parallel to grain, F_c	
4 or more laminations	1,150 psi
3 laminations	n.a.
Tension parallel to grain, F_t	1,050 psi
Modulus of elasticity, E_a	1,600,000 psi
Mean relative density, G [d]	0.41 -
Density (for member weight), ρ [e]	35 pcf

a) The volume factor, C_v, shall be calculated as per Clause 5.3.6 of the NDS, where the value of x is 10 and the width, b, is taken as the full member width.

b) The apparent modulus of elasticity values include a 5% shear deflection. For beam stability and column stability calculations, E_{min} shall be determined by multiplying the tabulated apparent modulus of elasticity by 0.528.

c) The tabulated F_{by} values are based on members 12 inches in depth. For depths less than 12 inches, F_{by} shall be permitted to be increased by multiplying by the flat use factor, C_{fu}. When depth is less than 3 inches, use the flat use factor for 3 inches.

d) Specific gravity values, G, for dowel-type fastener design in accordance with the NDS.

e) Density values, ρ, for a moisture content of 12%.

f) Nordic Lam beams and headers are symmetrical throughout the depth of the member (balanced layups).

Notes:

1. The tabulated values are for dry service conditions and normal duration of loading.
2. The tabulated values are applicable to members consisting of 4 or more laminations, unless otherwise noted.
3. Design of glulam members shall be in accordance with the NDS.

Beams and Headers – Allowable Uniform Loads

Beams and Headers – Allowable Uniform Loads

Width (in.)	Depth (in.)	Criteria	Span (ft) [a] 6	8	10	12	14	16	18	20	22	24	26	28	30
3-1/2	18	LL deflection, L/360 (plf)	21,000	8,859	4,536	2,625	1,653	1,107	778	567	426	328	258	207	168
		TL deflection, L/240 (plf)	31,485	13,274	6,789	3,922	2,464	1,646	1,151	835	624	477	372	295	237
		Total load (plf)	4,651	2,985	2,195	1,735	1,433	1,166	918	741	605	501	422	359	308
		End bearing (in.)	6.7	5.8	5.3	5.0	4.9	4.5	4.0	3.6	3.3	3.0	2.8	2.5	2.4
		Intermediate bearing (in.)	16.7	14.3	13.2	12.5	12.1	11.3	10.0	9.0	8.2	7.4	6.8	5.9	5.5
	20	LL deflection, L/360 (plf)	28,807	12,153	6,222	3,601	2,268	1,519	1,067	778	584	450	354	283	230
		TL deflection, L/240 (plf)	43,193	18,212	9,316	5,384	3,384	2,262	1,583	1,150	860	658	514	408	329
		Total load (plf)	5,583	3,483	2,528	1,983	1,630	1,383	1,135	909	741	614	517	440	378
		End bearing (in.)	8.0	6.7	6.1	5.8	5.5	5.4	5.0	4.5	4.0	3.7	3.4	3.1	2.9
		Intermediate bearing (in.)	20.0	16.7	15.2	14.3	13.8	13.4	12.4	11.1	10.0	9.1	8.3	7.7	7.1
	22	LL deflection, L/360 (plf)	38,342	16,175	8,282	4,793	3,018	2,022	1,420	1,035	778	599	471	377	307
		TL deflection, L/240 (plf)	57,494	24,244	12,404	7,170	4,508	3,014	2,111	1,534	1,148	880	688	547	441
		Total load (plf)	6,677	4,034	2,887	2,246	1,837	1,553	1,344	1,091	890	738	621	529	455
		End bearing (in.)	9.6	7.8	7.0	6.5	6.2	6.0	5.9	5.3	4.8	4.4	4.0	3.7	3.4
		Intermediate bearing (in.)	24.0	19.3	17.3	16.2	15.5	15.0	14.7	13.3	11.9	10.9	9.9	9.2	8.5
	24	LL deflection, L/360 (plf)	49,778	21,000	10,752	6,222	3,918	2,625	1,844	1,344	1,010	778	612	490	398
		TL deflection, L/240 (plf)	74,646	31,480	16,108	9,313	5,857	3,917	2,745	1,996	1,494	1,146	897	714	577
		Total load (plf)	7,980	4,646	3,274	2,525	2,054	1,730	1,493	1,289	1,051	872	734	625	538
		End bearing (in.)	11.5	8.9	7.9	7.3	7.0	6.7	6.5	6.3	5.7	5.2	4.7	4.4	4.0
		Intermediate bearing (in.)	28.6	22.3	19.7	18.2	17.3	16.7	16.3	15.6	14.1	12.8	11.7	10.8	10.0

a) Span is measured center to center of supports.

Notes:

1. Tabulated values are allowable uniform loads that can be applied to the beam in addition to its self-weight, along with required bearing lengths for corresponding total loads. Selected beam shall satisfy all criteria.
2. Table is based on dry service conditions, normal duration of loading, and the most restrictive of simple or multiple spans.
3. Beam shall be laterally supported at points of bearing and along all compression edges.
4. Tabulated total loads account for bending moment and shear capacities.
5. Table assumes deflection limits of L/360 under live load (LL deflection) and L/240 under total load (TL deflection). For deflection limit of L/480 under live load, multiply live load values by 0.75.

Beams and Headers – Allowable Uniform Loads

Width	Depth	Criteria	Span (ft) [a]												
(in.)	(in.)		6	8	10	12	14	16	18	20	22	24	26	28	30
5-1/2	18	LL deflection, L/360 (plf)	33,000	13,922	7,128	4,125	2,598	1,740	1,222	891	669	516	406	325	264
		TL deflection, L/240 (plf)	49,476	20,859	10,668	6,163	3,872	2,586	1,809	1,312	980	749	584	463	372
		Total load (plf)	7,309	4,690	3,450	2,726	2,252	1,795	1,396	1,114	908	752	632	537	462
		End bearing (in.)	6.7	5.8	5.3	5.0	4.9	4.5	3.9	3.5	3.2	2.9	2.6	2.4	2.3
		Intermediate bearing (in.)	16.7	14.3	13.2	12.5	12.1	11.1	9.7	8.7	7.8	7.1	6.5	5.6	5.2
	20	LL deflection, L/360 (plf)	45,267	19,097	9,778	5,658	3,563	2,387	1,677	1,222	918	707	556	445	362
		TL deflection, L/240 (plf)	67,874	28,619	14,640	8,461	5,318	3,554	2,488	1,807	1,351	1,034	808	641	516
		Total load (plf)	8,773	5,473	3,973	3,116	2,561	2,173	1,708	1,364	1,112	922	775	659	567
		End bearing (in.)	8.0	6.7	6.1	5.8	5.5	5.4	4.8	4.3	3.8	3.5	3.2	3.0	2.7
		Intermediate bearing (in.)	20.0	16.7	15.2	14.3	13.8	13.4	11.9	10.6	9.5	8.7	7.9	7.3	6.8
	22	LL deflection, L/360 (plf)	60,251	25,418	13,014	7,531	4,743	3,177	2,232	1,627	1,222	941	740	593	482
		TL deflection, L/240 (plf)	90,347	38,098	19,492	11,268	7,085	4,737	3,318	2,411	1,804	1,383	1,081	860	694
		Total load (plf)	10,492	6,339	4,537	3,529	2,886	2,440	2,050	1,637	1,335	1,107	931	793	682
		End bearing (in.)	9.6	7.8	7.0	6.5	6.2	6.0	5.7	5.1	4.6	4.2	3.8	3.5	3.3
		Intermediate bearing (in.)	24.0	19.3	17.3	16.2	15.5	15.0	14.2	12.7	11.4	10.4	9.5	8.8	8.1
	24	LL deflection, L/360 (plf)	78,222	33,000	16,896	9,778	6,157	4,125	2,897	2,112	1,587	1,222	961	770	626
		TL deflection, L/240 (plf)	117,301	49,468	25,312	14,635	9,204	6,155	4,314	3,136	2,348	1,801	1,410	1,122	907
		Total load (plf)	12,539	7,301	5,144	3,968	3,227	2,718	2,346	1,934	1,578	1,309	1,101	938	807
		End bearing (in.)	11.5	8.9	7.9	7.3	7.0	6.7	6.5	6.0	5.4	4.9	4.5	4.2	3.9
		Intermediate bearing (in.)	28.6	22.3	19.7	18.2	17.3	16.7	16.3	14.9	13.5	12.2	11.2	10.3	9.6

a) Span is measured center to center of supports.

Notes:

1. Tabulated values are allowable uniform loads that can be applied to the beam in addition to its self-weight, along with required bearing lengths for corresponding total loads. Selected beam shall satisfy all criteria.
2. Table is based on dry service conditions, normal duration of loading, and the most restrictive of simple or multiple spans.
3. Beam shall be laterally supported at points of bearing and along all compression edges.
4. Tabulated total loads account for bending moment and shear capacities.
5. Table assumes deflection limits of L/360 under live load (LL deflection) and L/240 under total load (TL deflection). For deflection limit of L/480 under live load, multiply live load values by 0.75.

Beams and Headers – Allowable Uniform Loads

Width (in.)	Depth (in.)	Criteria	Span (ft) [a] 6	8	10	12	14	16	18	20	22	24	26	28	30
7	18	LL deflection, L/360 (plf)	42,000	17,719	9,072	5,250	3,306	2,215	1,556	1,134	852	656	516	413	336
		TL deflection, L/240 (plf)	62,969	26,548	13,577	7,844	4,929	3,292	2,303	1,670	1,247	954	744	589	473
		Total load (plf)	9,303	5,969	4,390	3,469	2,866	2,229	1,734	1,384	1,127	934	785	667	573
		End bearing (in.)	6.7	5.8	5.3	5.0	4.9	4.4	3.8	3.4	3.1	2.8	2.6	2.4	2.2
		Intermediate bearing (in.)	16.7	14.3	13.2	12.5	12.1	10.8	9.5	8.5	7.6	6.9	6.0	5.5	5.1
	20	LL deflection, L/360 (plf)	57,613	24,306	12,444	7,202	4,535	3,038	2,134	1,556	1,169	900	708	567	461
		TL deflection, L/240 (plf)	86,386	36,424	18,633	10,768	6,769	4,523	3,167	2,299	1,719	1,316	1,028	816	657
		Total load (plf)	11,166	6,966	5,057	3,966	3,260	2,726	2,121	1,694	1,380	1,144	962	818	703
		End bearing (in.)	8.0	6.7	6.1	5.8	5.5	5.3	4.7	4.2	3.8	3.4	3.1	2.9	2.7
		Intermediate bearing (in.)	20.0	16.7	15.2	14.3	13.8	13.2	11.6	10.3	9.3	8.5	7.8	7.2	6.6
	22	LL deflection, L/360 (plf)	76,683	32,351	16,564	9,585	6,036	4,044	2,840	2,070	1,556	1,198	942	755	613
		TL deflection, L/240 (plf)	114,987	48,489	24,808	14,341	9,017	6,028	4,223	3,068	2,296	1,760	1,376	1,094	883
		Total load (plf)	13,354	8,068	5,774	4,492	3,673	3,105	2,546	2,033	1,658	1,375	1,156	984	846
		End bearing (in.)	9.6	7.8	7.0	6.5	6.2	6.0	5.6	5.0	4.5	4.1	3.7	3.5	3.2
		Intermediate bearing (in.)	24.0	19.3	17.3	16.2	15.5	15.0	13.9	12.4	11.1	10.1	9.3	8.6	7.9
	24	LL deflection, L/360 (plf)	99,556	42,000	21,504	12,444	7,837	5,250	3,687	2,688	2,020	1,556	1,223	980	796
		TL deflection, L/240 (plf)	149,293	62,959	32,215	18,626	11,714	7,834	5,490	3,991	2,988	2,293	1,794	1,429	1,154
		Total load (plf)	15,959	9,293	6,547	5,050	4,107	3,459	2,986	2,402	1,959	1,625	1,367	1,164	1,002
		End bearing (in.)	11.5	8.9	7.9	7.3	7.0	6.7	6.5	5.9	5.3	4.8	4.4	4.1	3.8
		Intermediate bearing (in.)	28.6	22.3	19.7	18.2	17.3	16.7	16.3	14.6	13.1	11.9	10.9	10.1	9.4

a) Span is measured center to center of supports.

Notes:

1. Tabulated values are allowable uniform loads that can be applied to the beam in addition to its self-weight, along with required bearing lengths for corresponding total loads. Selected beam shall satisfy all criteria.
2. Table is based on dry service conditions, normal duration of loading, and the most restrictive of simple or multiple spans.
3. Beam shall be laterally supported at points of bearing and along all compression edges.
4. Tabulated total loads account for bending moment and shear capacities.
5. Table assumes deflection limits of L/360 under live load (LL deflection) and L/240 under total load (TL deflection). For deflection limit of L/480 under live load, multiply live load values by 0.75.

NORDIC

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ADDITIONAL INFORMATION 5

NORDIC
STRUCTURES

Storage and Handling Guidelines

Water-resistant wrapping is used to protect products from exposure, moisture, dirt and scratches during transit from the manufacturing plant and should be left on the products during all storage stages. Because sunlight can discolor glulam products, it is recommended to leave the wrapping as long as possible before they are to be used. If are to stay apparent in a project and it would be necessary to remove only portions of the wrapping during the erection sequence, it is rather preferable to remove all of the wrapping to avoid discoloration due to exposure to the sun.

Glulam products must be stored properly and handled with care to assure optimal performance. Sealants on the ends of beams help guard against moisture penetration and checking. A coat of sealant should be applied to the ends of any beams trimmed or otherwise cut in the field. Surface sealant, which can be applied to top, bottom, and sides of beams, resist dirt and moisture and help control checking and grain raising. Use a penetrating sealant if beams will be stained or given a natural finish.

Glulam beams are commonly loaded and unloaded with a fork lift. For greater stability, the sides of the beams, rather than the bottom faces, should rest on the forks. If a crane with slings is used to load and unload beams, provide adequate blocking between the cable and the member. Use wooded cleats or blocking to protect corners. Only non-marring fabric slings should be used to lift glulam products.

When loading beams on trucks and transporting them, stack them on lumber blocking or skids. Beams can rest on their sides or bottom faces. Secure the load with straps to keep it from shifting. Protect beam corners with “softeners” when strapping down the load.

In the distribution yard and on the jobsite, a well-drained covered site is recommended. Keep glulam members off the ground with lumber blocking, skids or rack systems. Beams should remain wrapped to protect them from moisture, dirt, sunlight, and scratches. At the jobsite, use similar storage provisions when possible.

Software

Nordic Sizer

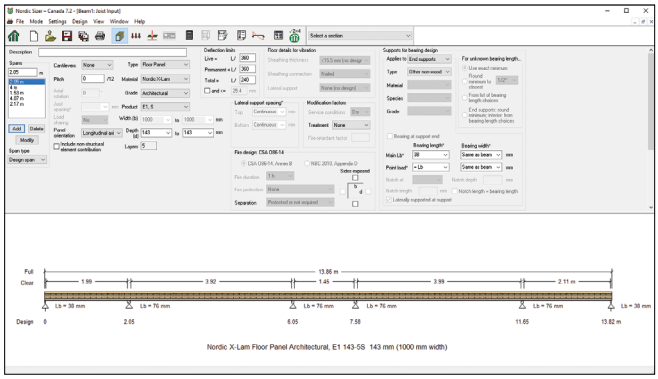
Nordic Sizer is a software program built to design individual structural elements (joists, beams, columns, studs, slabs, and panels) using the full range of Nordic engineered wood products.

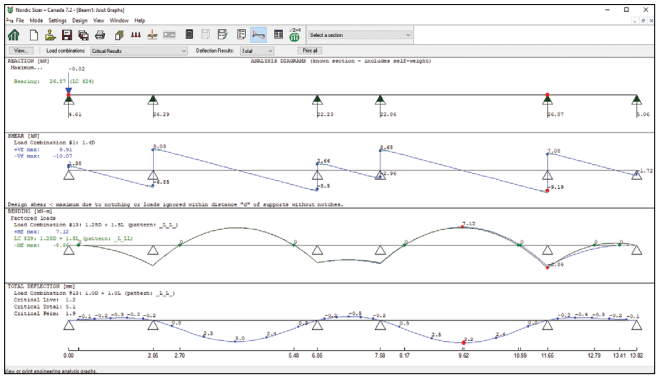
Nordic Sizer software application analyzes and designs members for specified loads in accordance with CSA O86 (Canada) or NDS (United States) standard, and automatically checks load cases and load combinations in accordance with NBC (Canada) or IBC (United States). Features include floor vibration checks and fire resistance calculations.

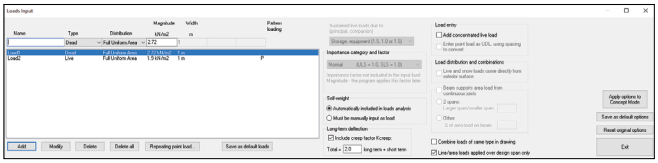
For more information: http://woodworks-software.com

DOWNLOAD & INSTALL
Download, install, and fill in the form to receive a keycode by email within the next business day.For assistance, please contact the technical support at 514-871-8526, ext. 2 or tech@nordic.ca.

WOODWORKS SOFTWARE TUTORIALS
Canadian Training Videos and User Guide
(https://cwc.ca/sizer-us-version)







NORDIC STRUCTURES

COMPANY	PROJECT
Aug. 12, 2020 15:47	Beam1

Design Check Calculation Sheet
Nordic Sizer – Canada 7.2

Loads:

Load	Type	Distribution	Pat-tern	Location [m] Start	End	Magnitude Start	End	Unit
Load1	Dead	Full Area	No			2.72(1.00m)		kN/m2
Load2	Live	Full Area	Yes			1.90(1.00m)		kN/m2
Self-weight	Dead	Full UDL	No			0.72		kN/m

Maximum Reactions (kN), Bearing Resistances (kN) and Bearing Lengths (mm) :

13.86 m
0 2.05 6.05 7.58 11.65 13.82 m

Unfactored:							
Dead	1.54	12.59	9.22	9.56	12.87		1.79
Live	1.79	7.04	7.14	7.28	7.19		1.88
Factored:							
Uplift	0.02						
Total	4.61	26.29	22.23	22.86	26.87		5.06
Bearing:							
Capacity							
Beam	161.54	282.46	305.35	304.13	282.38		161.54
Des ratio							
Beam	0.03	0.08	0.06	0.07	0.08		0.03
Load case	#24	#14	#25	#16	#29		#24
Length	38*	76	76	76	76		38*
Min req'd	38*	76*	76*	76*	76*		38*
KB	1.00	1.00	1.00	1.00	1.00		1.00
KB min	1.00	1.00	1.00	1.00	1.00		1.00
KD	1.00	0.87	0.94	0.94	0.87		1.00

*Minimum bearing length for panels is 38 mm for exterior supports and 76 mm for intermediate supports

Nordic X-Lam Floor Panel Architectural, E1 143-5S 143 mm (1000 mm width)
Supports: All - Non-wood
Total length: 13.858 m; Clear span: 2, 3.9, 1.5, 4, 2.1 m; Volume = 1.982 m^3; Panel orientation: Longitudinal axis
This section PASSES the design code check.

Limit States Design using CSA O86-14:

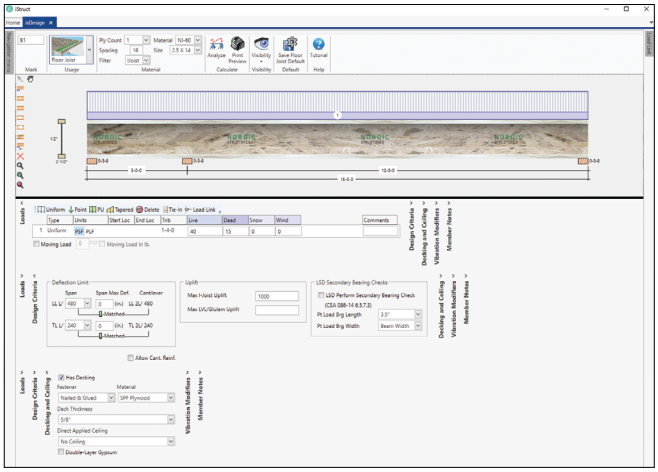
Criterion	Analysis Value	Design Value	Unit	Analysis/Design
Shear	Vf @d = 9.19	Vr = 27.95	kN	Vf/Vr = 0.33
Moment(+)	Mf = 7.12	Mr = 58.05	kN-m	Mf/Mr = 0.12
Moment(-)	Mf = 8.86	Mr = 56.95	kN-m	Mf/Mr = 0.16
Perm. Defl'n	1.9 = < L/999	11.3 = L/360	mm	0.17
Live Defl'n	1.2 = < L/999	11.3 = L/360	mm	0.11
Total Defl'n	5.1 = L/798	17.0 = L/240	mm	0.30
Vibration	Lmax = 4.070	Lv = 5.186	m	Lmax/Lv = 0.78

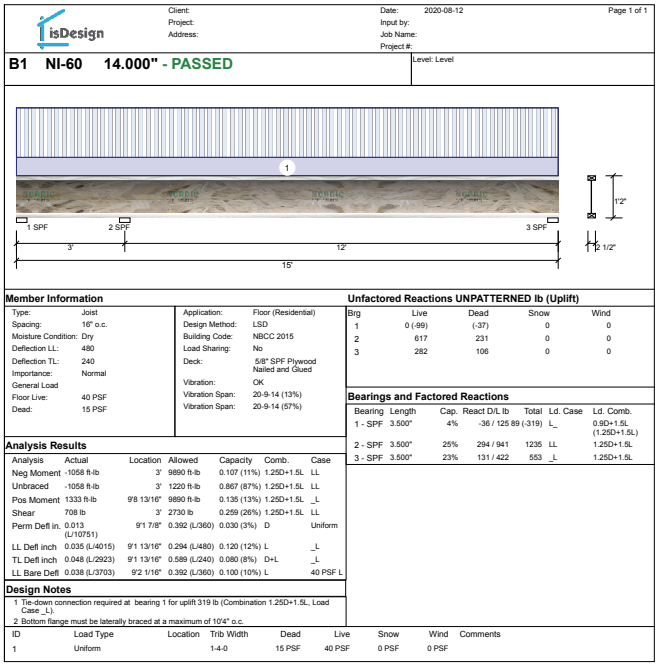
CSD – iStruct™

iStruct™ is a state-of-the-art enterprise solution for layout, design, and structural analysis that combines layout/drafting, single member design, reporting, and an incredible real time 3D experience. It supports a selection of products, including I-joists, SCL lumber, solid sawn lumber, walls, rim board, hangers, and more.

isDesign™ is a single member sizing solution that allows users to size floor and roof joists, beams, and posts by inputting span and load information. Innovative tools allow selection of the most cost-effective solution.

isPlan™ is a 3D layout and design solution that allows users to model an entire structure with 2D and 3D views. isPlan™ develops and transfers gravity loads through the entire structure and designs the structural members. Robust import and export of pdf, dxf, and dwg files combined with intuitive modeling and design tools ensure efficient and cost-effective designs.





isDesign

Client:
Project:
Address:

Date: 2020-08-12
Input by:
Job Name:
Project #:

Page 1 of 1

B1 NI-60 14.000" - PASSED

Level: Level

1 SPF 2 SPF 3 SPF
3' 12' 15'
1'2"
2 1/2"

Member Information

Type:	Joist
Spacing:	16" o.c.
Moisture Condition:	Dry
Deflection LL:	480
Deflection TL:	240
Importance:	Normal
General Load	
Floor Live:	40 PSF
Dead:	15 PSF

Application:	Floor (Residential)
Design Method:	LSD
Building Code:	NBCC 2015
Load Sharing:	No
Deck:	5/8" SPF Plywood Nailed and Glued
Vibration:	OK
Vibration Span:	20-9-14 (13%)
Vibration Span:	20-9-14 (57%)

Unfactored Reactions UNPATTERNED lb (Uplift)

Brg	Live	Dead	Snow	Wind
1	0 (-99)	(-37)	0	0
2	617	231	0	0
3	282	106	0	0

Bearings and Factored Reactions

Bearing	Length	Cap.	React D/L lb	Total	Ld. Case	Ld. Comb.
1 - SPF	3.500"	4%	-36 / 125	89 (-319)	L_	0.9D+1.5L (1.25D+1.5L)
2 - SPF	3.500"	25%	294 / 941	1235	LL	1.25D+1.5L
3 - SPF	3.500"	23%	131 / 422	553	_L	1.25D+1.5L

Analysis Results

Analysis	Actual	Location	Allowed	Capacity	Comb.	Case
Neg Moment	-1058 ft-lb	3'	9890 ft-lb	0.107 (11%)	1.25D+1.5L	LL
Unbraced	-1058 ft-lb	3'	1220 ft-lb	0.867 (87%)	1.25D+1.5L	LL
Pos Moment	1333 ft-lb	9'8 13/16"	9890 ft-lb	0.135 (13%)	1.25D+1.5L	_L
Shear	708 lb	3'	2730 lb	0.259 (26%)	1.25D+1.5L	LL
Perm Defl in.	0.013 (L/10751)	9'1 7/8"	0.392 (L/360)	0.030 (3%)	D	Uniform
LL Defl inch	0.035 (L/4015)	9'1 13/16"	0.294 (L/480)	0.120 (12%)	L	_L
TL Defl inch	0.048 (L/2923)	9'1 13/16"	0.589 (L/240)	0.080 (8%)	D+L	_L
LL Bare Defl	0.038 (L/3703)	9'2 1/16"	0.392 (L/360)	0.100 (10%)	L	40 PSF L

Design Notes

1 Tie-down connection required at bearing 1 for uplift 319 lb (Combination 1.25D+1.5L, Load Case _L).
2 Bottom flange must be laterally braced at a maximum of 10'4" o.c.

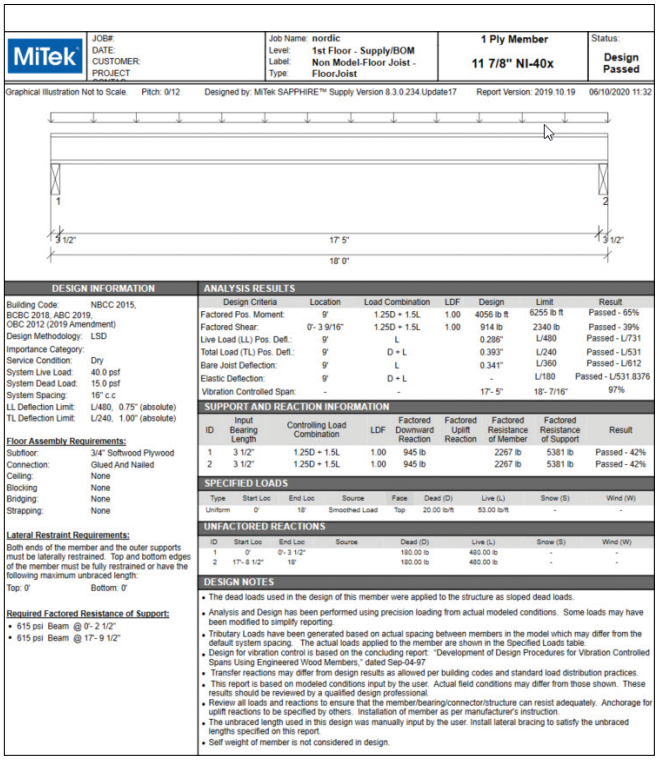
ID	Load Type	Location	Trib Width	Dead	Live	Snow	Wind	Comments
1	Uniform		1-4-0	15 PSF	40 PSF	0 PSF	0 PSF	

MiTek SAPPHIRE

MiTek – SAPPHIRE™ Structure

Built exclusively for component manufacturers, this software delivers the most powerful structural modeling, editing, and estimating functionality available anywhere.

The Formula Builder feature enables designers to create or store customized formulas, group formulas into sets, scheme and apply to jobs or individual objects. Create estimates by applying formulas to modeled objects. For options management, you can create and customize plan options directly from within a job file. You can include all member types in your options, from accessories to walls, and utilize option customization, such as special junction considerations for site-specific creation.



MiTek

JOB#:
DATE:
CUSTOMER:
PROJECT

Job Name: nordic
Level: 1st Floor - Supply/BOM
Label: Non Model-Floor Joist -
Type: FloorJoist

1 Ply Member
11 7/8" NI-40x

Status: Design Passed

Graphical Illustration Not to Scale. Pitch: 0/12 Designed by: MiTek SAPPHIRE™ Supply Version 8.3.0.234 Update17 Report Version: 2019.10.19 06/10/2020 11:32

1 2
3 1/2" 17' 5" 3 1/2"
18' 0"

DESIGN INFORMATION

Building Code: NBCC 2015, BCBC 2018, ABC 2019, OBC 2012 (2019 Amendment)
Design Methodology: LSD
Importance Category:
Service Condition: Dry
System Live Load: 40.0 psf
System Dead Load: 15.0 psf
System Spacing: 16" c.c
LL Deflection Limit: L/480, 0.75" (absolute)
TL Deflection Limit: L/240, 1.00" (absolute)

Floor Assembly Requirements:
Subfloor: 3/4" Softwood Plywood
Connection: Glued And Nailed
Ceiling: None
Blocking: None
Bridging: None
Strapping: None

Lateral Restraint Requirements:
Both ends of the member and the outer supports must be laterally restrained. Top and bottom edges of the member must be fully restrained or have the following maximum unbraced length:
Top: 0' Bottom: 0'

Required Factored Resistance of Support:
- 615 psi Beam @ 0'- 2 1/2"
- 615 psi Beam @ 17'- 9 1/2"

ANALYSIS RESULTS

Design Criteria	Location	Load Combination	LDF	Design	Limit	Result
Factored Pos. Moment:	9'	1.25D + 1.5L	1.00	4056 lb ft	6255 lb ft	Passed - 65%
Factored Shear:	0'- 3 9/16"	1.25D + 1.5L	1.00	914 lb	2340 lb	Passed - 39%
Live Load (LL) Pos. Defl.:	9'	L		0.286"	L/480	Passed - L/731
Total Load (TL) Pos. Defl.:	9'	D + L		0.393"	L/240	Passed - L/531
Bare Joist Deflection:	9'	L		0.341"	L/360	Passed - L/612
Elastic Deflection:	9'	D + L		-	L/180	Passed - L/531.8376
Vibration Controlled Span:	-	-		17'- 5"	18'- 7/16"	97%

SUPPORT AND REACTION INFORMATION

ID	Input Bearing Length	Controlling Load Combination	LDF	Factored Downward Reaction	Factored Uplift Reaction	Factored Resistance of Member	Factored Resistance of Support	Result
1	3 1/2"	1.25D + 1.5L	1.00	945 lb		2267 lb	5381 lb	Passed - 42%
2	3 1/2"	1.25D + 1.5L	1.00	945 lb		2267 lb	5381 lb	Passed - 42%

SPECIFIED LOADS

Type	Start Loc	End Loc	Source	Face	Dead (D)	Live (L)	Snow (S)	Wind (W)
Uniform	0'	18'	Smoothed Load	Top	20.00 lb/ft	53.00 lb/ft	-	-

UNFACTORED REACTIONS

ID	Start Loc	End Loc	Source	Dead (D)	Live (L)	Snow (S)	Wind (W)
1	0'	0'- 3 1/2"		180.00 lb	480.00 lb	-	-
2	17'- 8 1/2"	18'		180.00 lb	480.00 lb	-	-

DESIGN NOTES

- The dead loads used in the design of this member were applied to the structure as sloped dead loads.
- Analysis and Design has been performed using precision loading from actual modeled conditions. Some loads may have been modified to simplify reporting.
- Tributary Loads have been generated based on actual spacing between members in the model which may differ from the default system spacing. The actual loads applied to the member are shown in the Specified Loads table.
- Design for vibration control is based on the concluding report: "Development of Design Procedures for Vibration Controlled Spans Using Engineered Wood Members," dated Sep-04-97
- Transfer reactions may differ from design results as allowed per building codes and standard load distribution practices.
- This report is based on modeled conditions input by the user. Actual field conditions may differ from those shown. These results should be reviewed by a qualified design professional.
- Review all loads and reactions to ensure that the member/bearing/connector/structure can resist adequately. Anchorage for uplift reactions to be specified by others. Installation of member as per manufacturer's instruction.
- The unbraced length used in this design was manually input by the user. Install lateral bracing to satisfy the unbraced lengths specified on this report.
- Self weight of member is not considered in design.

Conversion Factors

Conversion Factors

Item	Imperial to metric			Metric to imperial		
Length	1 in.	=	25.4 mm	1 mm	=	0.0393701 in.
		=	0.0254 m	1 m	=	39.3701 in.
	1 ft	=	0.3048 m		=	3.28084 ft
	1 yd	=	0.9144 m		=	1.09361 yd
	1 mile	=	1.60934 km	1 km	=	0.621371 mile
Length / time	1 ft/s	=	0.3048 m/s	1 m/s	=	3.28084 ft/s
	1 mph	=	1.60934 km/h	1 km/h	=	0.621371 mph
Area	1 in.²	=	645.16 mm²	1 mm²	=	0.001550 in.²
	1 ft²	=	0.0929030 m²	1 m²	=	10.7639 ft²
	1 acre	=	0.404686 ha	1 ha	=	2.47105 acres
	1 mi²	=	2.58999 km²	1 km²	=	0.386102 mi²
Volume	1 in.³	=	16,387.1 mm³	1 mm³	=	0.0000610237 in.³
	1 ft³	=	0.0283168 m³	1 m³	=	35.3147 ft³
	1 yd³	=	0.764555 m³		=	1.30795 yd³
	1 fl oz (US)	=	29.5735 mL	1 mL	=	0.0338141 fl oz (US)
	1 gal (US)	=	3.78541 L	1 L	=	0.264172 gal (US)
Mass	1 oz	=	28.3495 g	1 g	=	0.0352740 oz
	1 lb	=	0.453592 kg	1 kg	=	2.20462 lb
	1 short ton (2000 lb)	=	0.907185 tons	1 ton	=	1.10231 short tons
Mass / volume	1 lb/ft³	=	16.0185 kg/m³	1 kg/m³	=	0.0624280 lbf/ft³
Force	1 lbf	=	4.44822 N	1 N	=	0.224809 lbf
Stress	1 lbf/in.² (psi)	=	0.00689476 N/mm² (MPa)	1 N/mm² (MPa)	=	145.038 lbf/in.² (psi)
Loading	1 lbf/ft² (psf)	=	0.0478803 kN/m² (kPa)	1 kN/m² (kPa)	=	20.8854 lbf/ft² (psf)
	1 lbf/ft (plf)	=	0.0145939 kN/m	1 kN/m	=	68.5218 lbf/ft (plf)
Bending moment	1 lbf-ft	=	0.00135582 kN-m	1 kN-m	=	737.561 lbf-ft
Temperature	1 °F	=	(°F - 32) / 1.8 °C	1 °C	=	32 + 1.8 (°C) °F

Notes:

1. 9.80665 N = 1.0 kg x 9.80665 m/s²
2. 1.0 Pa = 1.0 N/m²

+ construction details →**DC4**

+ installation guide →**GI41**

+ product warranty →**NS-DI002**

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