Mass Timber Construction

STRUCTURAL DETAILS
Nordic Structures is the leading innovator in mass timber construction. 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.
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STRUCTURE

MECHANICAL, ELECTRICAL, AND PLUMBING
1.0 General

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

1.2 The information contained in this document is provided for information purposes only. This information should not be used for any application without examination and verification of its accuracy, suitability and applicability by a licensed engineer, architect or other professional. Nordic Structures does not guarantee that the information is suitable for any general or particular use, and assumes no responsibility for the use, application of and/or reference to the information.

1.3 All dimensions are in inches (in.), unless otherwise noted.

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

2.0 Design of connections

2.1 The design of connections, including fire resistance if required, shall be in accordance with the National Design Specification (NDS) for Wood Construction 2015.

2.2 The design of connections should include considerations for structural and service performance, such as resistance, minimum distances, dimensional changes, durability, erection and fire safety, among others, as well as taking into account architectural requirements.

2.3 The connections shown in this document are provided for information purposes only, and conceptually. Note that many possibilities and variants are possible.
# LIST OF DETAILS

## Structure

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## Mechanical, electrical, and plumbing

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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, 245-7s, 245-7l, and 267-9l

- **Maximum sizes**
  - 2.70 × 19.5 m (106-1/4 in. × 64 ft)

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

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**NORDIC X-LAM LAYUP COMBINATIONS**

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<th>5 LAYERS</th>
<th>7 LAYERS</th>
<th>9 LAYERS</th>
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<td>197-7s</td>
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<td>175-5s</td>
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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

- **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

* Larger sizes available upon request

**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
PARTIALLY THREADED SCREW
@ 12 in. O.C. U.N.O.

NORDIC X-LAM SLAB

NORDIC LAM BEAM

Continuous Floor Slab on Beam

Category:
Structure, GL-CLT

DRAWING:
NS-DS2001-US

DATE: 2022-02-01
PAGE: 1.1
The 1/8 in. gap may not be required depending on the detail on the other side of the beam.
a) The 1/8 in. gap may not be required depending on the detail on the other side of the beam.
a) The 1/8 in. gap may not be required depending on the detail on the other side of the beam.
PARTIALLY THREADED SCREW
RING SHANK NAIL
1/8 in. (GAP) (a)

NORDIC LAM BEAM
STEEL DOWEL
STEEL KNIFE PLATE
NORDIC LAM CAP
NORDIC X-LAM WALL

(a) The 1/8 in. gap may not be required depending on the detail on the other side of the beam.
The 1/8 in. gap may not be required depending on the detail on the other side of the beam.
a) The 1/8 in. gap may not be required depending on the detail on the other side of the beam.
Pocket for Beam - NORDIC X-LAM WALL

1/8 in. EACH SIDE (GAP)

PARTIALLY THREADED SCREWS, STAGGERED

NORDIC X-LAM WALL

NORDIC LAM BEAM

1/8 in. (GAP)
PARTIALLY THREADED SCREWS, STAGGERED
PARTIALLY THREADED SCREWS @ 12 in. O.C. U.N.O., STAGGERED
Wall to Sill Plate, Nailed Steel Plate

- Ring Shank Nail
- Steel Plate
- Sill Plate
- Impermeable Membrane
- Non-Shrink Grout 1 in.
- Mechanical Anchor
- Concrete

Structure, Wall-Foundation
NORDIC X-LAM WALL
RING SHANK NAIL
STEEL ANGLE
SILL PLATE
IMPERMEABLE MEMBRANE
NON-SHRINK GROUT 1 in.
WALL to SILL PLATE, STEEL ANGLE
MECHANICAL ANCHORS
CONCRETE
NORDIC X-LAM WALL
RING SHANK NAIL
HOLDOWN
IMPERMEABLE MEMBRANE
NON-SHRINK GROUT 1 in.
MECHANICAL ANCHOR
CONCRETE

TITL E
Wall to Foundation, Holdown
C A T EGO R Y
Structure, Wall-Foundation
DAT E
2022-02-01
E GAPELACS

DRAWING
NS-DS2014-US
SCALE
-
DATE
2022-02-01
PAGE
1.15
Note:
1. This assembly detail offers a resistance to forces acting perpendicularly to the foundation wall.
Note:
1. For an exterior wall on foundation, careful consideration should be given to waterproofing and drainage at the junction between wall and steel C shape.
Screwed Floor/Roof Slab to Wall

Structure, Floor/Roof-Wall

NS-DS2020-US

2022-02-01

1.22
Screwed Wall to Continuous Floor Slab to Wall

Category: Structure, Floor/Roof-Wall

Drawing: NS-DS2021-US

Date: 2022-02-01

Page: 1.23
Screwed Wall to Single Floor Slab to Wall

**TITLE**
Structure, Floor/Roof-Wall

**DRAWING**
NS-DS2022-US

**SCALE**
-

**DATE**
2022-02-01

**PAGE**
1.24
Wall to Floor Slab with Steel Square to Wall

Nordic X-Lam Wall

Steel Square

Partially Threaded Screw @ 12 in. O.C. U.N.O.

Nordic X-Lam Slab

Nordic X-Lam Wall

Category: Structure, Floor/Roof-Wall

Drawing: NS-DS2023-US

Date: 2022-02-01

Page: 1.25
Wall to Floor Slab with Steel Square to Notched Wall

NORDIC X-LAM WALL

RING SHANK NAIL

STEEL SQUARE

FULLY THREADED SCREW @ 12 in. O.C.

1/8 in. (GAP)

NORDIC X-LAM SLAB

NORDIC X-LAM WALL

STRUCTURES

nordic.ca

NS-DS2

DETAILS

NORDIC LAM+

NORDIC X-LAM

45°

2022-02-01

TITL E

C A T EGO R Y DAT E

W al l t o F lo or  Sl ab wi t h S t eel Sq uare t o Not che d W a ll

NS-DS2024-US

D RAWING

SCALE

- 

DATE

2022-02-01

P AGE

1.26
TITLE
Sloped Roof Slab to Wall

CATEGORY
Structure, Floor/Roof-Wall

DRAWING
NS-DS2025-US

SCALE
-  

DATE
2022-02-01  

PAGE
1.27
NORDIC LAM LINTEL
PARTIALLY THREADED SCREW
NORDIC X-LAM WALL

1/8 in. (GAP)
 Butt Joint, One Row of Nails

Structure, Panel-Panel

GALVANIZED SPIRAL NAIL @ 6 in. O.C. U.N.O.

1/16 in. (GAP)

PLYWOOD
1/2 in. (TYP.)

1" 1"

5-1/8"

4-3/4"

19/32"
Butt Joint, Two Rows of Nails

2 ROWS OF GALVANIZED SPIRAL NAILS @ 6 in. O.C. U.N.O., STAGGERED

PLYWOOD
1/2 in. (TYP.)

1932

5-1/8"

4-3/4"

6" (U.N.O.)

1/16 in. (GAP)

6" (U.N.O.)

1/16 in. (GAP)
Butt Joint, 45° Screws

FULLY THREADED SCREW @ 12 in. O.C. U.N.O., STAGGERED

1/16 in. (GAP)

45°
TITLE
Half-lap Joint

CATEGORY
Structure, Panel-Panel

DRAWING
NS-DS2031-US
PARTIALLY THREADED SCREW @ 12 in. O.C. U.N.O.

NORDIC X-LAM WALLS
NS-DS2

DRAWING
NS-DS2033-US

CATEGORY
Structure, Wall-Wall

SCALE
-

DATE
2022-02-01

PAGE
1.35

TITLE
Notched Corner Joint with 90° Screws

PARTIALLY THREADED SCREW
@ 12 in. O.C. U.N.O.

NORDIC X-LAM WALLS

1/8 in. (GAP)

5/8"
PARTIALLY THREADED SCREW @ 12 in. O.C. U.N.O.

NORDIC X-LAM WALLS
T-joint with 90° Screws

PARTIALLY THREADED SCREW @ 12 in. O.C. U.N.O.

NORDIC X-LAM WALLS
PARTIALLY THREADED SCREWS @ 12 in. O.C. U.N.O., STAGGERED

NORDIC X-LAM WALLS

T-joint with 45° Screws

Structure, Wall-Wall

NS-DS2036-US

2022-02-01
**Base Plate with Steel Square**

- Threads rod
- Steel square
- Provide chamfer in wood to clear steel welds
- Non-shrink grout 1 in.
- Concrete
- Mechanical anchor

**NORDIC LAM COLUMN**

**DRAWING**

- **TITL E**: Base Plate with Steel Square
- **CATEGORY**: Structure, Base Plate
- **SCALE**: -
- **DATE**: 2022-02-01
- **PAGE**: 1.39
Base Plate with Knife Plate and Four Mechanical Anchors

Structure, Base Plate
Base Plate with Knife Plate and Four Hidden Mechanical Anchors

**CATEGORY**
Structure, Base Plate

**DRAWING**
NS-DS2039-US

**SCALE**
-  

**DATE**
2022-02-01
Two-storey Base Plate with Knife Plate

- Steel Dowel
- Provide Chamfer in Wood to Clear Steel Welds
- 2 Storey Base Plate with Knife Plate
- Non-Shrink Grout 1 in.
- Concrete
- Mechanical Anchor

Title: Two-storey Base Plate with Knife Plate
Category: Structure, Base Plate
Drawing: NS-DS2040-US
DATE: 2022-02-01
PAGE: 1.42
SCALE: -
Two-storey Base Plate with Glued-in Rod

CATEGORY
Structure, Base Plate

TITLE
Two-storey Base Plate with Glued-in Rod

DRAWING
NS-DS2041-US

SCALE
-

DATE
2022-02-01

PAGE
1.43

NORDIC LAM COLUMN

GLUED-IN ROD

2 STOREY BASE PLATE

NON-SHRINK GROUT 1 in.

CONCRETE

MECHANICAL ANCHOR

1/16 in. EACH SIDE (GAP)

1-5/8 in. (GAP)
Two-storey Base Plate with Glued-in Rod and Pocket

NORDIC LAM COLUMN

GLUED-IN ROD

2 STOREY BASE PLATE

FILL IN CONCRETE

CONCRETE

MECHANICAL ANCHOR

NON-SHRINK GROUT 1 in.

1/16 in. EACH SIDE (GAP)

1-5/8 in. (GAP)
Two-storey Base Plate with Glued-in Rod and Half-height Pocket

NORDIC LAM COLUMN

GLUED-IN ROD

2 STOREY BASE PLATE

FILL IN CONCRETE

CONCRETE

MECHANICAL ANCHOR

NON-SHRINK GROUT 1 in.

1/16 in. EACH SIDE (GAP)

1-5/8 in. (GAP)
DOUBLE MEMBER BEAM WITH SPACING

PROVIDE NECESSARY SPACING FOR PLUMBING

FULLY THREADED SCREW

NORDIC LAM COLUMN

NORDIC LAM BEAM

45°

45°

45°

45°

45°

2022-02-01

TITLE
Double Member Beam with Spacing

CATEGORY
Structure, Beam-Column

DRAWING
NS-DS2043-US

SCALE
-

DATE
2022-02-01

PAGE
1.46
Double Member Beam Without Spacing

CATEGORY: Structure, Beam-Column

DRAWING: NS-DS2044-US

SCALE: -  
DATE: 2022-02-01  
PAGE: 1.47
a) The 1/8 in. gap may not be required depending on the detail on the other side of the beam.
Knife Plate with Shear Key and Bearing Plate

Title: Knife Plate with Shear Key and Bearing Plate

Category: Structure, Beam-Column

DRAWING: NS-DS2046-US

SCALE: -

DATE: 2022-02-01

PAGE: 1.49

a) The 1/8 in. gap may not be required depending on the detail on the other side of the beam.
a) The 1/8 in. gap may not be required depending on the detail on the other side of the beam.
a) The 1/8 in. gap may not be required depending on the detail on the other side of the beam.
a) The 1/8 in. gap may not be required depending on the detail on the other side of the beam.
a) The 1/8 in. gap may not be required depending on the detail on the other side of the beam.
Nordic X-Lam
Nordic Lam

Title: Nailed Face-mount Hanger
Category: Structure, Joist-Beam

Drawing: NS-DS2058-US
Date: 2022-02-01
Page: 1.59
Nailed Face-mount Hanger with Concealed Flanges

Category: Joist-Beam

Date: 2022-02-01

Page: 1/4 in. (GAP)

Drawing: NS-DS2059-US

Nordic Lam Joist

Nordic Lam Beam

Ring Shank Nail

Hanger
NORDIC LAM JOIST

1/8 in. (GAP)

PROVIDE SPACING FOR SCREW HEAD

PARTIALLY THREADED SCREWS

STEEL DOWEL

STEEL KNIFE PLATE

NORDIC LAM BEAM

NORDIC LAM JOIST

NORDIC LAM BEAM

PROVIDE SPACING FOR SCREW HEAD

PARTIALLY THREADED SCREWS

STEEL DOWEL

STEEL KNIFE PLATE

NORDIC LAM JOIST

1/8 in. (GAP)

PROVIDE SPACING FOR SCREW HEAD

PARTIALLY THREADED SCREWS

STEEL DOWEL

STEEL KNIFE PLATE

NORDIC LAM BEAM

NORDIC LAM JOIST

1/8 in. (GAP)

PROVIDE SPACING FOR SCREW HEAD

PARTIALLY THREADED SCREWS

STEEL DOWEL

STEEL KNIFE PLATE

NORDIC LAM BEAM
45° Screws – Option 1

Category: Structure, Joist-Beam

Drawing: NS-DS2063-US

Date: 2022-02-01

Page: 1.64
Joist on Beam with 45° Screws and Glued-in Rod
Note:
1. For assembly details refer to technical note D-R00.
MECHANICAL, ELECTRICAL, AND PLUMBING
PROVIDE NECESSARY SPACING FOR PLUMBING

OPENING, CUT ON SITE (BY OTHERS)

METAL STUDS AND INSULATION

GYPSUM BOARD

NORDIC LAM COLUMN

NORDIC LAM BEAM

NORDIC X-LAM SLAB

PIPE

Ve rt ic al, Dou ble -membe r  B eam
gnibmulP dna ,lacirtcelE ,lacinahceM -
NORDIC LAM+
NORDIC X-LAM

TIT L E
C A T EGO R Y DAT E EGAPELACS
H orizon t al , P r e- m a c h ine d O p ening
NS-DS2 502-US
PRE-MACHINED OPENING
NORDIC X-LAM LINTEL
NORDIC X-LAM WALL

MECHANICAL, ELECTRICAL, AND PLUMBING

NS-DS2502-US
2022-02-01
2.2
Horizontal, Electrical Box with 2 in. x 3 in. Wood Studs

Category: Mechanical, Electrical, and Plumbing
TITLE
Horizontal, Joist on Beam

CATEGORY
Mechanical, Electrical, and Plumbing

DRAWING
NS-DS2506-US

SCALE
-

DATE
2022-02-01

PAGE
2.6
Legend
SA  Supply Air
H  Hood
OAI  Outdoor Air Intake
RA  Return Air
UAO  Used Air Outlet
SEC  Dryer
HRV  Heat Recovery Ventilator

Multi-residential Unit Diagram – Option 1

NS-DS2508-US
Legend
SA Supply Air
H Hood
OAI Outdoor Air Intake
RA Return Air
UAO Used Air Outlet
SEC Dryer
HRV Heat Recovery Ventilator

Multi-residential Unit Diagram – Option 2

Category: Mechanical, Electrical, and Plumbing