

# NORDIC

DETAILS  
NORDIC LAM+ NORDIC X-LAM

NS-DS2 

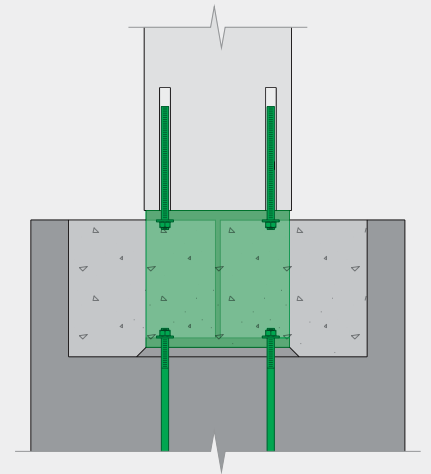
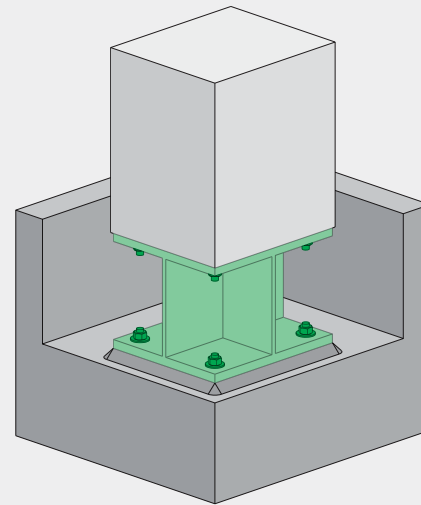
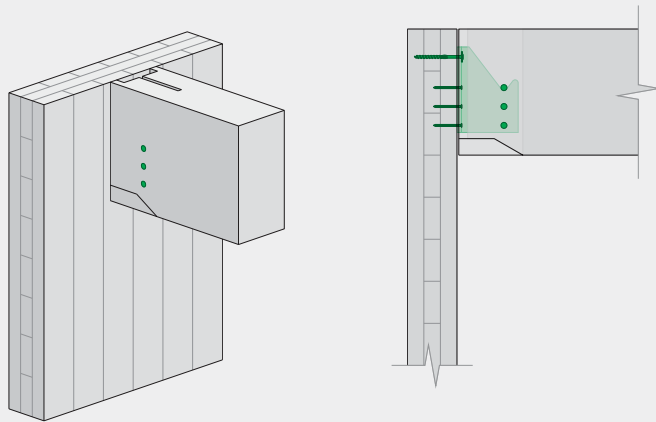
VERSION  
2022-04-21

Mass Timber Construction

## STRUCTURAL DETAILS

 NORDIC  
LAM+

 NORDIC  
X-LAM



NORDIC  
STRUCTURES

## ABOUT NORDIC

# NORDIC STRUCTURES

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.

**514-871-8526**

1 866 817-3418

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### HEAD OFFICE

**Nordic Structures**

100-1100 Canadiens-de-Montréal Avenue

Montréal, Québec H3B 2S2

[www.nordic.ca](http://www.nordic.ca)

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### GENERAL INFORMATION

[info@nordic.ca](mailto:info@nordic.ca)

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### TECHNICAL SUPPORT

[arch@nordic.ca](mailto:arch@nordic.ca)

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- vi Nordic Lam+ (glulam)

## STRUCTURE

## MECHANICAL, ELECTRICAL, AND PLUMBING

1

2

## GENERAL NOTES

### 1.0 General

- 1.1 This document supersedes all previous versions. For the latest version, consult [nordic.ca](http://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](http://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

| Category                   | Title                                                    | Drawing   | Date       | Page |
|----------------------------|----------------------------------------------------------|-----------|------------|------|
| Structure, GL-CLT          | Continuous Floor Slab on Beam                            | NS-DS2001 | 2022-02-01 | 1.1  |
| Structure, GL-CLT          | Single Floor Slab on Beam                                | NS-DS2002 | 2022-02-01 | 1.2  |
| Structure, GL-CLT          | Face-mount Hanger                                        | NS-DS2003 | 2022-02-01 | 1.3  |
| Structure, GL-CLT          | Face-mount Hanger with Concealed Flanges                 | NS-DS2067 | 2022-02-01 | 1.4  |
| Structure, GL-CLT          | Knife Plate                                              | NS-DS2004 | 2022-02-01 | 1.5  |
| Structure, GL-CLT          | Knife Plate with Cap                                     | NS-DS2005 | 2022-02-01 | 1.6  |
| Structure, GL-CLT          | Screwed Beam to Column                                   | NS-DS2006 | 2022-02-01 | 1.7  |
| Structure, GL-CLT          | Beam to Column with Knife Plate                          | NS-DS2007 | 2022-02-01 | 1.8  |
| Structure, GL-CLT          | Pocket for Beam                                          | NS-DS2008 | 2022-02-01 | 1.9  |
| Structure, GL-CLT          | Through Pocket for Beam                                  | NS-DS2009 | 2022-02-01 | 1.10 |
| Structure, Wall-Foundation | Wall to Sill Plate, Screws                               | NS-DS2010 | 2022-02-01 | 1.11 |
| Structure, Wall-Foundation | Wall to Sill Plate, Nailed Steel Plate                   | NS-DS2011 | 2022-02-01 | 1.12 |
| Structure, Wall-Foundation | Wall to Sill Plate, Holdown                              | NS-DS2012 | 2022-02-01 | 1.13 |
| Structure, Wall-Foundation | Wall to Sill Plate, Steel Angle                          | NS-DS2013 | 2022-02-01 | 1.14 |
| Structure, Wall-Foundation | Wall to Foundation, Holdown                              | NS-DS2014 | 2022-02-01 | 1.15 |
| Structure, Wall-Foundation | Wall to Foundation, Nailed Steel Angle                   | NS-DS2015 | 2022-02-01 | 1.16 |
| Structure, Wall-Foundation | Wall to Foundation, Screwed Steel Angle                  | NS-DS2016 | 2022-02-01 | 1.17 |
| Structure, Wall-Foundation | Wall to Foundation, Nailed Steel Angle and Steel C Shape | NS-DS2068 | 2022-02-01 | 1.18 |
| Structure, Wall-Foundation | Wall to Foundation, Nailed C Shape                       | NS-DS2017 | 2022-02-01 | 1.19 |
| Structure, Floor/Roof-Wall | Ledger                                                   | NS-DS2018 | 2022-02-01 | 1.20 |
| Structure, Floor/Roof-Wall | Steel Angle                                              | NS-DS2019 | 2022-02-01 | 1.21 |
| Structure, Floor/Roof-Wall | Screwed Floor/Roof Slab to Wall                          | NS-DS2020 | 2022-02-01 | 1.22 |
| Structure, Floor/Roof-Wall | Screwed Wall to Continuous Floor Slab to Wall            | NS-DS2021 | 2022-02-01 | 1.23 |
| Structure, Floor/Roof-Wall | Screwed Wall to Single Floor Slab to Wall                | NS-DS2022 | 2022-02-01 | 1.24 |
| Structure, Floor/Roof-Wall | Wall to Floor Slab with Steel Square to Wall             | NS-DS2023 | 2022-02-01 | 1.25 |
| Structure, Floor/Roof-Wall | Wall to Floor Slab with Steel Square to Notched Wall     | NS-DS2024 | 2022-02-01 | 1.26 |
| Structure, Floor/Roof-Wall | Sloped Roof Slab to Wall                                 | NS-DS2025 | 2022-02-01 | 1.27 |
| Structure, Lintel          | CLT Lintel                                               | NS-DS2026 | 2022-02-01 | 1.28 |
| Structure, Lintel          | Glulam Lintel                                            | NS-DS2027 | 2022-02-01 | 1.29 |
| Structure, Panel-Panel     | Butt Joint, One Row of Nails                             | NS-DS2029 | 2022-04-21 | 1.30 |
| Structure, Panel-Panel     | Butt Joint, Two Rows of Nails                            | NS-DS2030 | 2022-04-21 | 1.31 |
| Structure, Panel-Panel     | Butt Joint, 45° Screws                                   | NS-DS2069 | 2022-02-01 | 1.32 |
| Structure, Panel-Panel     | Half-lap Joint                                           | NS-DS2031 | 2022-02-01 | 1.33 |
| Structure, Wall-Wall       | Corner Joint with 90° Screws                             | NS-DS2032 | 2022-02-01 | 1.34 |
| Structure, Wall-Wall       | Notched Corner Joint with 90° Screws                     | NS-DS2033 | 2022-02-01 | 1.35 |
| Structure, Wall-Wall       | Corner Joint with 45° Screws                             | NS-DS2034 | 2022-02-01 | 1.36 |
| Structure, Wall-Wall       | T-joint with 90° Screws                                  | NS-DS2035 | 2022-02-01 | 1.37 |
| Structure, Wall-Wall       | T-joint with 45° Screws                                  | NS-DS2036 | 2022-02-01 | 1.38 |
| Structure, Base Plate      | Base Plate with Steel Square                             | NS-DS2037 | 2022-02-01 | 1.39 |
| Structure, Base Plate      | Base Plate with Knife Plate and Four Mechanical Anchors  | NS-DS2038 | 2022-02-01 | 1.40 |

## LIST OF DETAILS (CONTINUED)

### Structure (continued)

| Category               | Title                                                          | Drawing   | Date       | Page |
|------------------------|----------------------------------------------------------------|-----------|------------|------|
| Structure, Base Plate  | Base Plate with Knife Plate and Four Hidden Mechanical Anchors | NS-DS2039 | 2022-02-01 | 1.41 |
| Structure, Base Plate  | Two-storey Base Plate with Knife Plate                         | NS-DS2040 | 2022-02-01 | 1.42 |
| Structure, Base Plate  | Two-storey Base Plate with Glued-in Rod                        | NS-DS2041 | 2022-02-01 | 1.43 |
| Structure, Base Plate  | Two-storey Base Plate with Glued-in Rod and Pocket             | NS-DS2042 | 2022-02-01 | 1.44 |
| Structure, Base Plate  | Two-storey Base Plate with Glued-in Rod and Half-height Pocket | NS-DS2070 | 2022-02-01 | 1.45 |
| Structure, Beam-Column | Double Member Beam with Spacing                                | NS-DS2043 | 2022-02-01 | 1.46 |
| Structure, Beam-Column | Double Member Beam Without Spacing                             | NS-DS2044 | 2022-02-01 | 1.47 |
| Structure, Beam-Column | Knife Plate with Shear Key                                     | NS-DS2045 | 2022-02-01 | 1.48 |
| Structure, Beam-Column | Knife Plate with Shear Key and Bearing Plate                   | NS-DS2046 | 2022-02-01 | 1.49 |
| Structure, Beam-Column | Single Beam, Bridle Joint                                      | NS-DS2047 | 2022-02-01 | 1.50 |
| Structure, Beam-Column | Continuous Beam, Bridle Joint                                  | NS-DS2048 | 2022-02-01 | 1.51 |
| Structure, Beam-Column | Half-lap Joint                                                 | NS-DS2049 | 2022-02-01 | 1.52 |
| Structure, Beam-Column | Face-mount Hanger                                              | NS-DS2050 | 2022-02-01 | 1.53 |
| Structure, Beam-Column | Face-mount Hanger with Concealed Flanges                       | NS-DS2051 | 2022-02-01 | 1.54 |
| Structure, Beam-Column | Beam on Cleat                                                  | NS-DS2053 | 2022-02-01 | 1.55 |
| Structure, Girt-Column | Knife Plate                                                    | NS-DS2055 | 2022-02-01 | 1.56 |
| Structure, Girt-Column | Steel Plates                                                   | NS-DS2056 | 2022-02-01 | 1.57 |
| Structure, Girt-Column | 45° Screws                                                     | NS-DS2057 | 2022-02-01 | 1.58 |
| Structure, Joist-Beam  | Nailed Face-mount Hanger                                       | NS-DS2058 | 2022-02-01 | 1.59 |
| Structure, Joist-Beam  | Nailed Face-mount Hanger with Concealed Flanges                | NS-DS2059 | 2022-02-01 | 1.60 |
| Structure, Joist-Beam  | Bolted Face-mount Hanger                                       | NS-DS2060 | 2022-02-01 | 1.61 |
| Structure, Joist-Beam  | Knife Plate with Saddle                                        | NS-DS2061 | 2022-02-01 | 1.62 |
| Structure, Joist-Beam  | Knife Plate                                                    | NS-DS2062 | 2022-02-01 | 1.63 |
| Structure, Joist-Beam  | 45° Screws – Option 1                                          | NS-DS2063 | 2022-02-01 | 1.64 |
| Structure, Joist-Beam  | 45° Screws – Option 2                                          | NS-DS2064 | 2022-02-01 | 1.65 |
| Structure, Joist-Beam  | Joist on Beam with 45° Screws and Glued-in Rod                 | NS-DS2065 | 2022-02-01 | 1.66 |
| Structure, Hybrid      | Decking to Steel Beam                                          | NS-DS2066 | 2022-02-01 | 1.67 |

### Mechanical, electrical, and plumbing

| Category                             | Title                                                    | Drawing   | Date       | Page |
|--------------------------------------|----------------------------------------------------------|-----------|------------|------|
| Mechanical, Electrical, and Plumbing | Vertical, Double-member Beam                             | NS-DS2501 | 2022-02-01 | 2.1  |
| Mechanical, Electrical, and Plumbing | Horizontal, Pre-machined Opening                         | NS-DS2502 | 2022-02-01 | 2.2  |
| Mechanical, Electrical, and Plumbing | Horizontal, Electrical Box with 38 mm x 64 mm Wood Studs | NS-DS2503 | 2022-02-01 | 2.3  |
| Mechanical, Electrical, and Plumbing | Horizontal, Raised Floor                                 | NS-DS2504 | 2022-02-01 | 2.4  |
| Mechanical, Electrical, and Plumbing | Horizontal, Suspended Ceiling                            | NS-DS2505 | 2022-02-01 | 2.5  |
| Mechanical, Electrical, and Plumbing | Horizontal, Joist on Beam                                | NS-DS2506 | 2022-02-01 | 2.6  |
| Mechanical, Electrical, and Plumbing | Horizontal, Bevelled Beam                                | NS-DS2507 | 2022-02-01 | 2.7  |
| Mechanical, Electrical, and Plumbing | Multi-residential Unit Diagram – Option 1                | NS-DS2508 | 2022-02-01 | 2.8  |
| Mechanical, Electrical, and Plumbing | Multi-residential Unit Diagram – Option 2                | NS-DS2509 | 2022-02-01 | 2.9  |

CLT



## 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

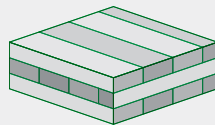
89-3s, 105-3s,  
143-5s, 175-5s,  
197-7s, 213-7l, 245-7s, 245-7l  
and 267-9l

#### Maximum sizes

2.70 × 19.5 m (106-1/4 in. × 64 ft)

#### Stress grade

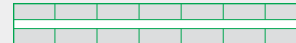
E1 (L 1950Fb and T No. 3/Stud)



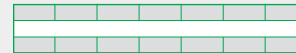
### NORDIC X-LAM LAYUP COMBINATIONS

#### 3 LAYERS

##### 89-3s

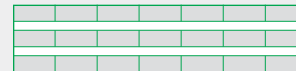


##### 105-3s

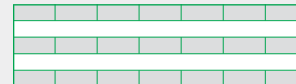


#### 5 LAYERS

##### 143-5s

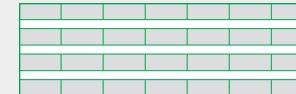


##### 175-5s

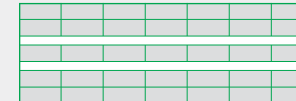


#### 7 LAYERS

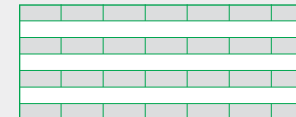
##### 197-7s



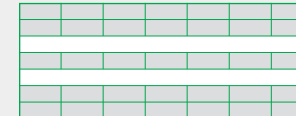
##### 213-7l



##### 245-7s

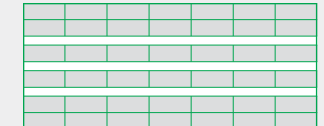


##### 245-7l



#### 9 LAYERS

##### 267-9l



## GLULAM



### 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\*

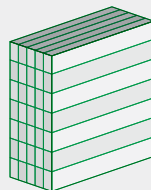
From 67 to 2435 mm  
(2-5/8 to 95-7/8 in.)

##### Lengths\*

Up to 24.4 m (80 ft)

##### Stress grade

24F-ES/NPG



\* 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

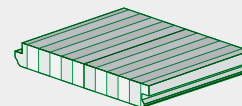
203, 305 and 406 mm  
(8, 12 and 16 in.)

##### Lengths

Up to 18.9 m (62 ft)

##### Stress grades

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



\* Larger sizes available upon request



# NORDIC

**DETAILS**  
**NORDIC LAM+ NORDIC X-LAM**

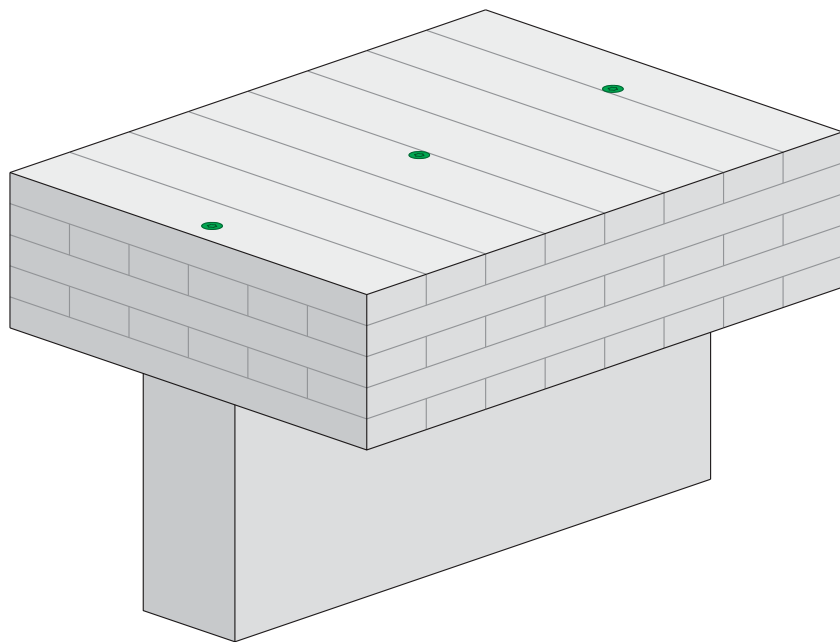
NS-DS2 

VERSION  
2022-02-01

## STRUCTURE

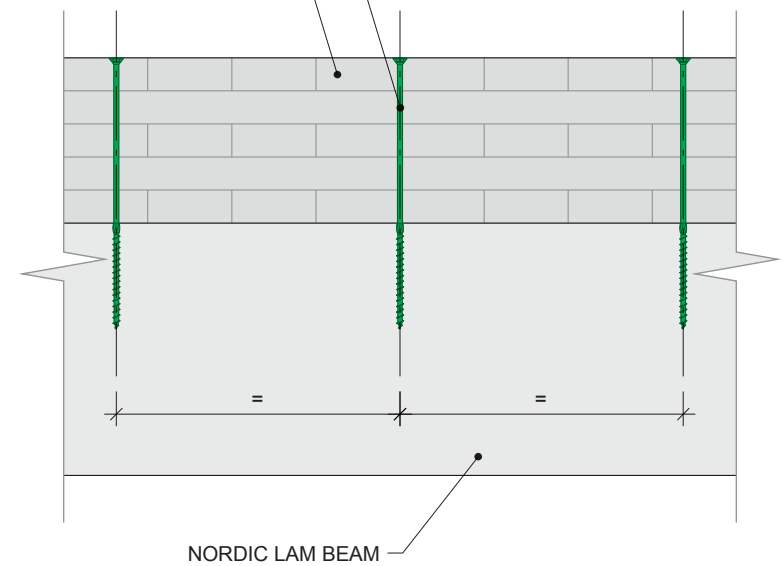
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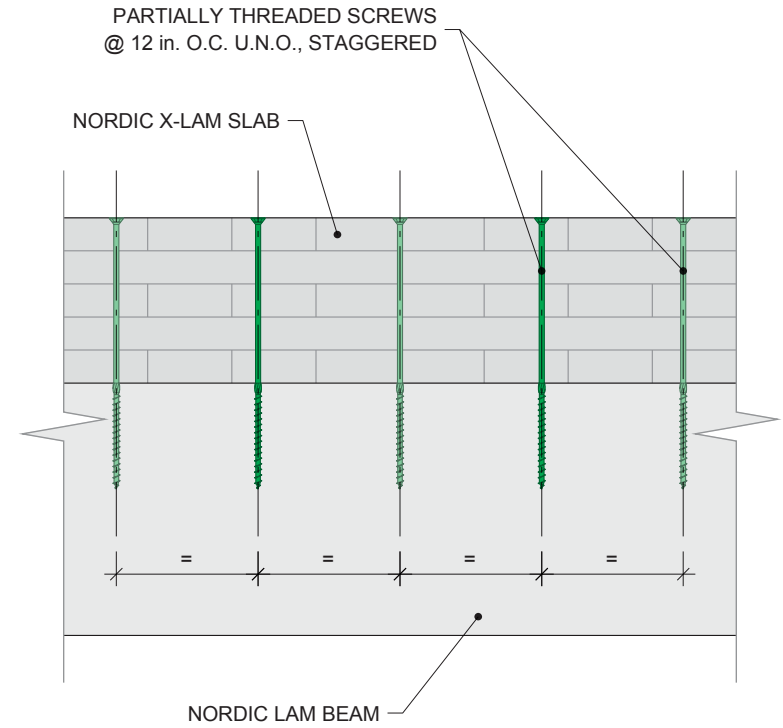
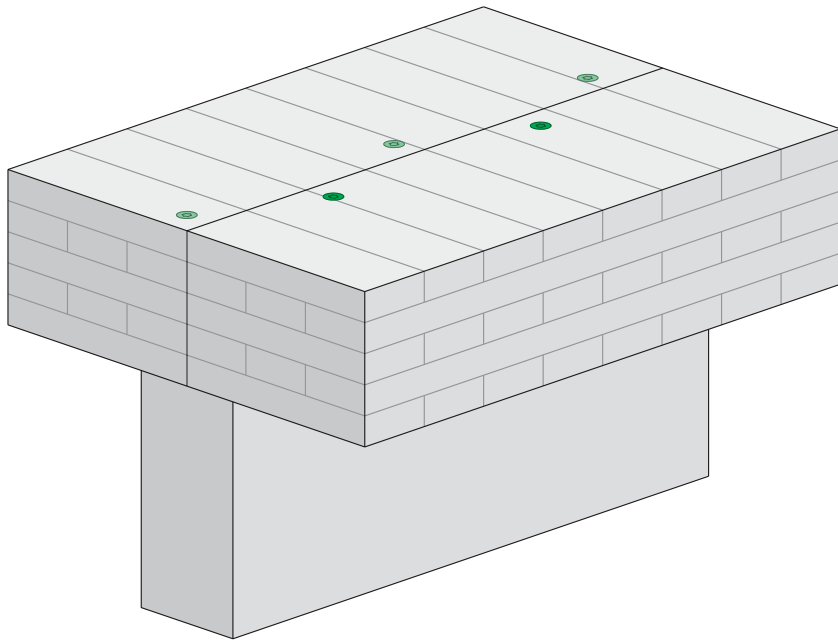
**NORDIC**  
STRUCTURES

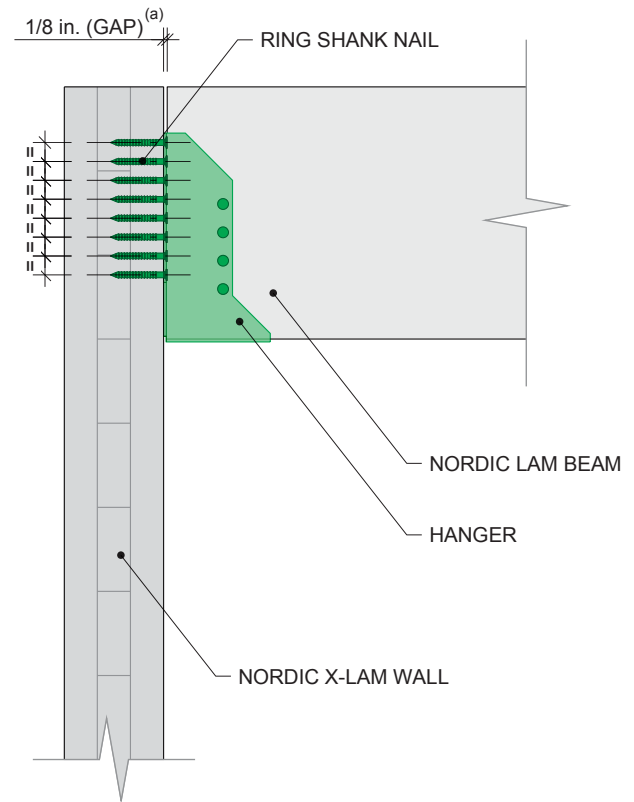
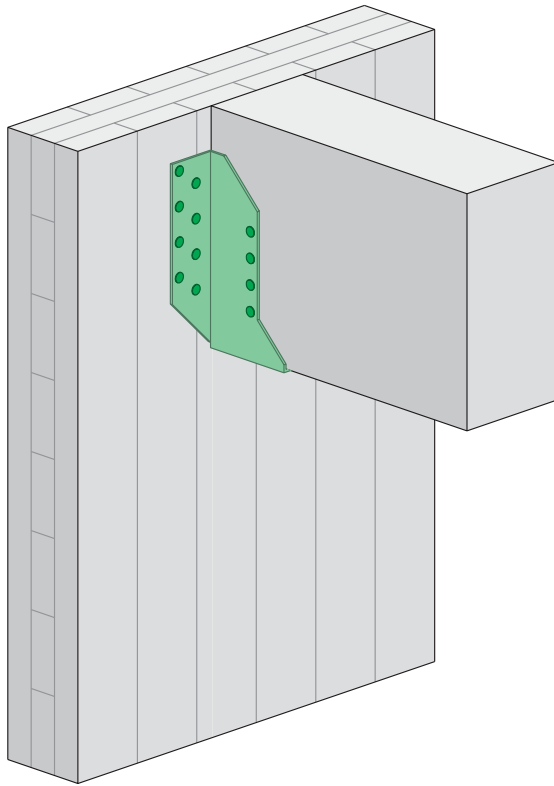


PARTIALLY THREADED SCREW  
@ 12 in. O.C. U.N.O.

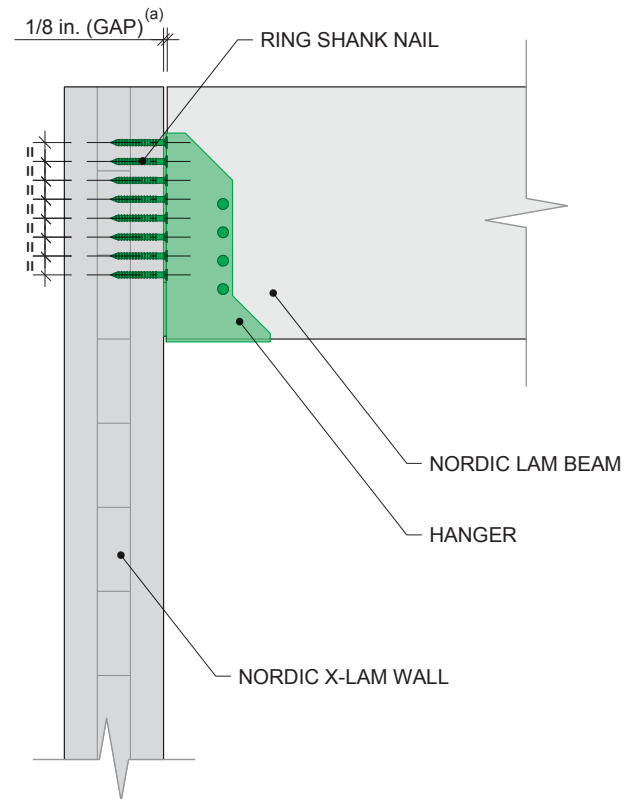
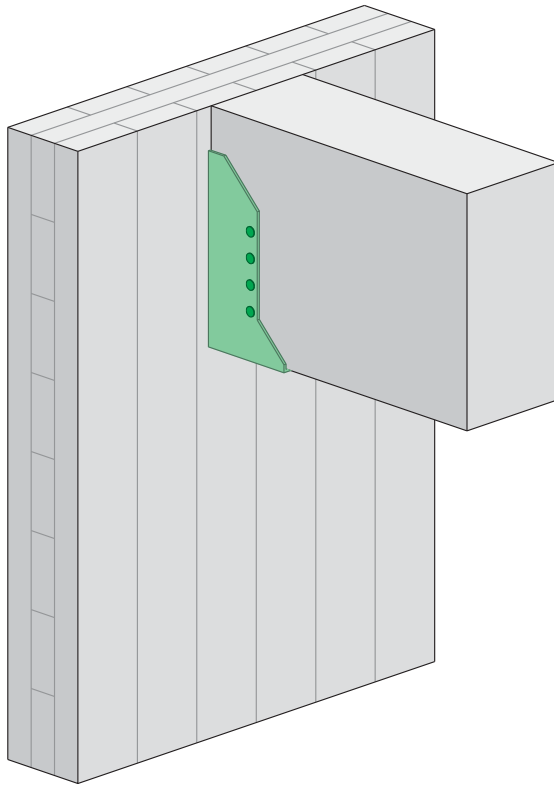
NORDIC X-LAM SLAB



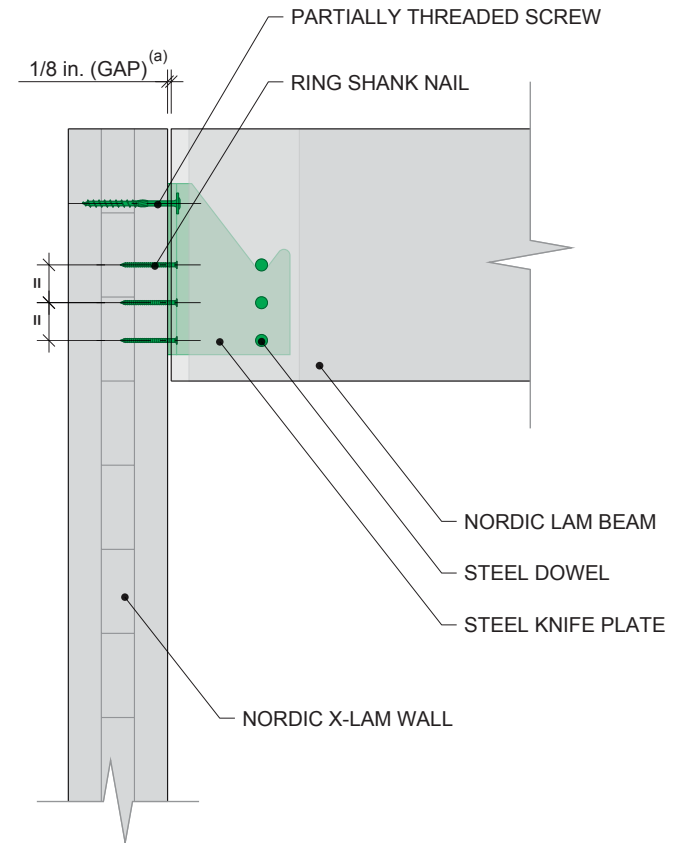
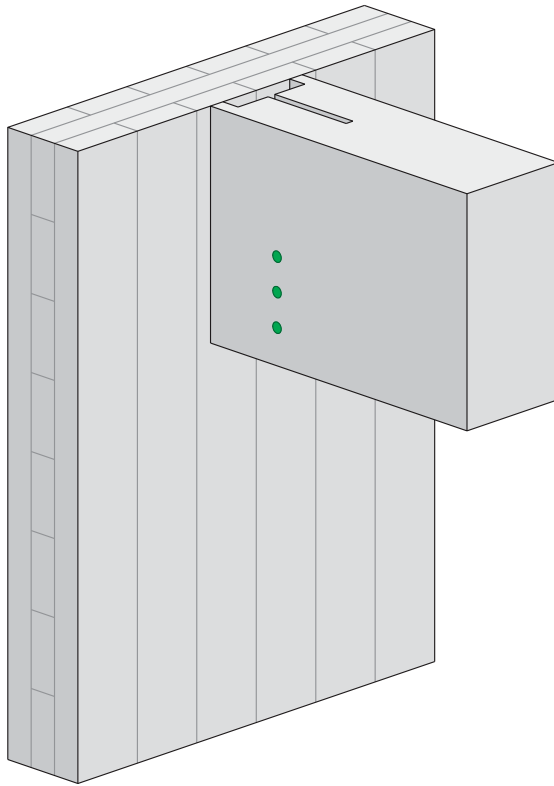




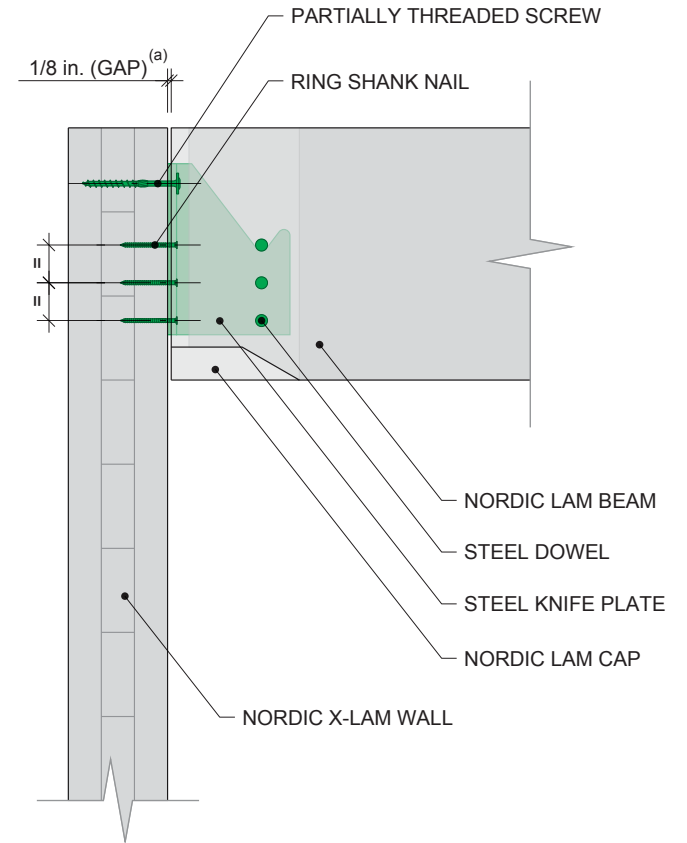
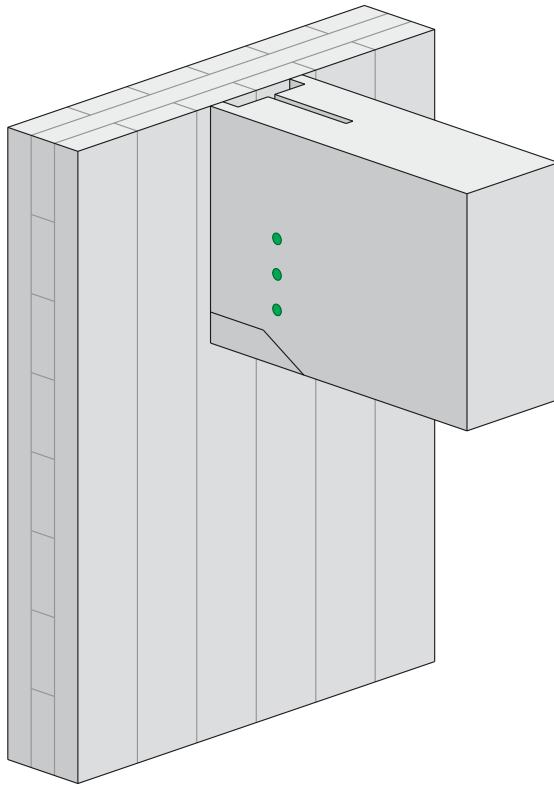
a) The 1/8 in. gap may not be required depending on the detail on the other side of the beam.



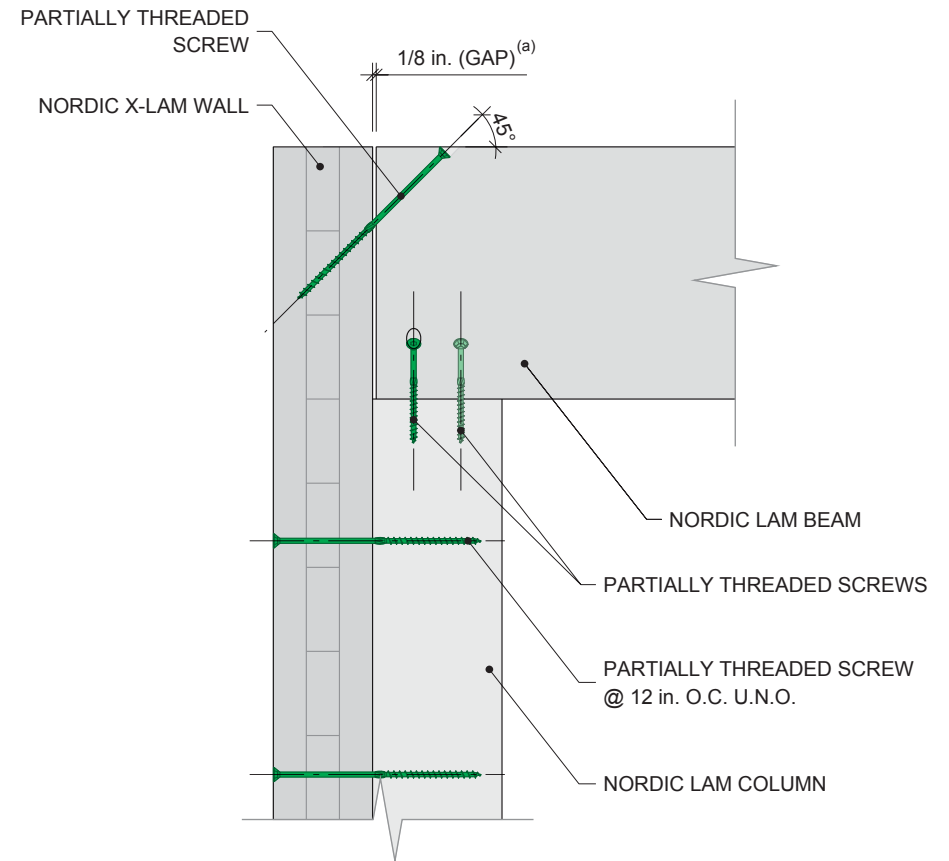
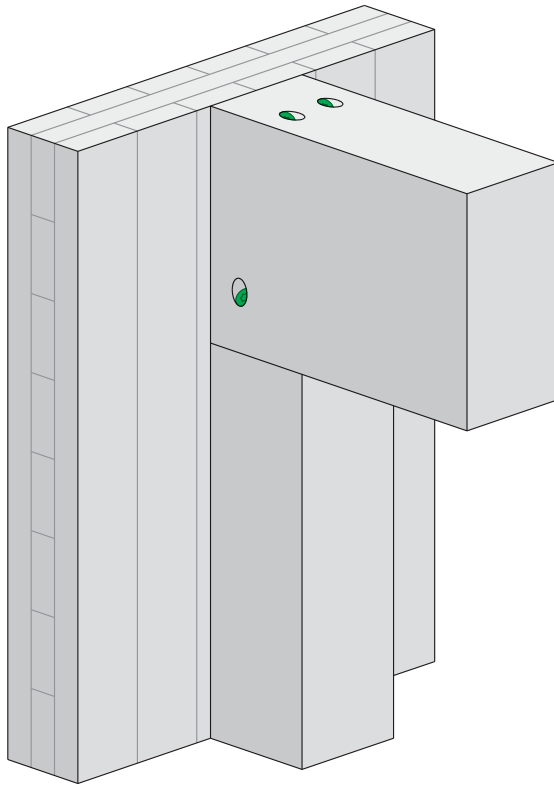
a) The 1/8 in. gap may not be required depending on the detail on the other side of the beam.



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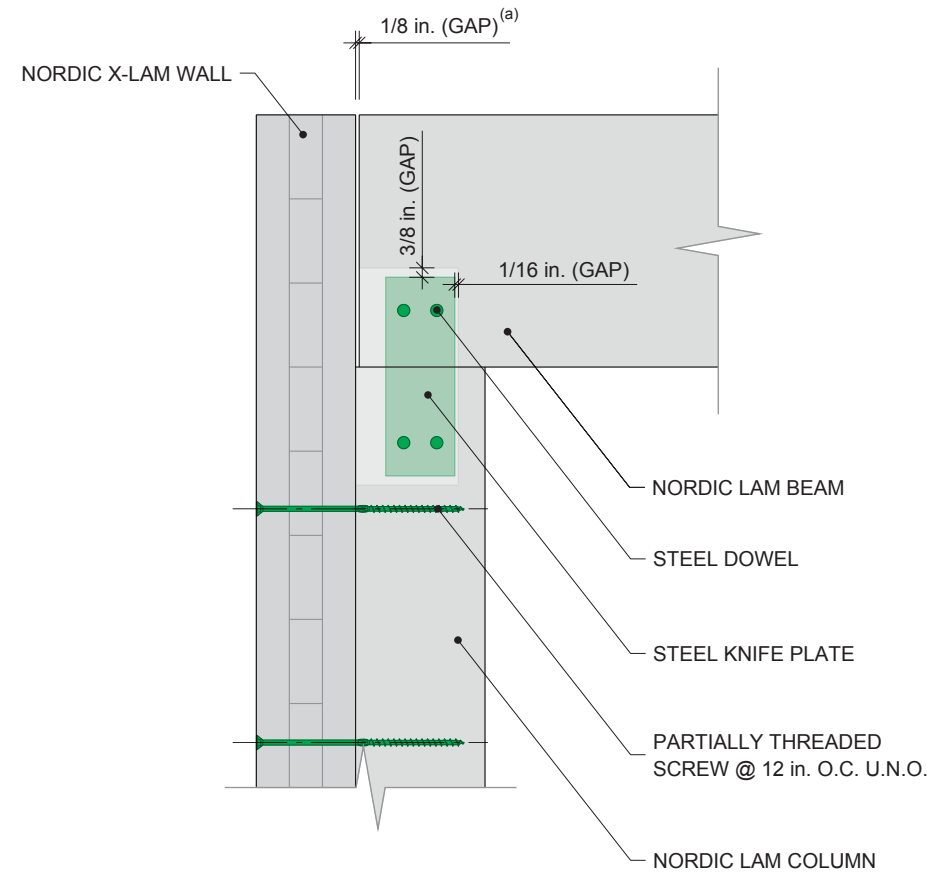
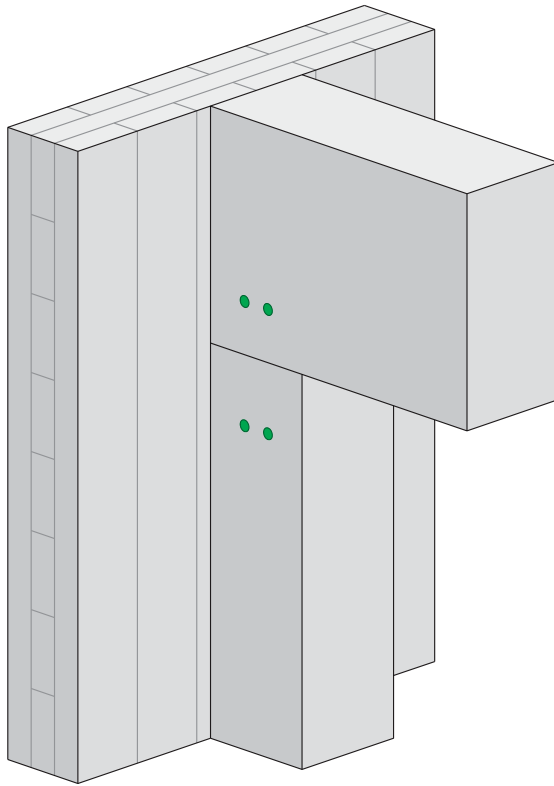


a) The 1/8 in. gap may not be required depending on the detail on the other side of the beam.

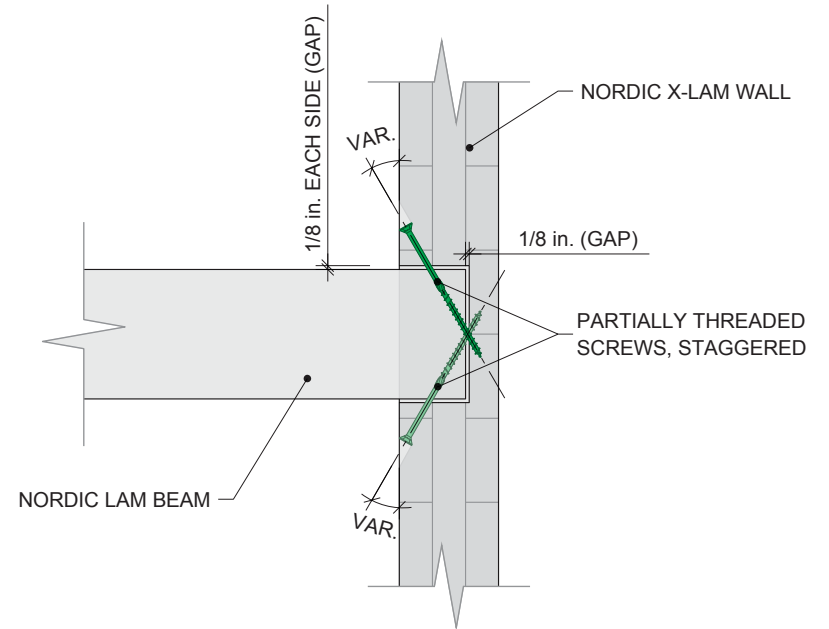
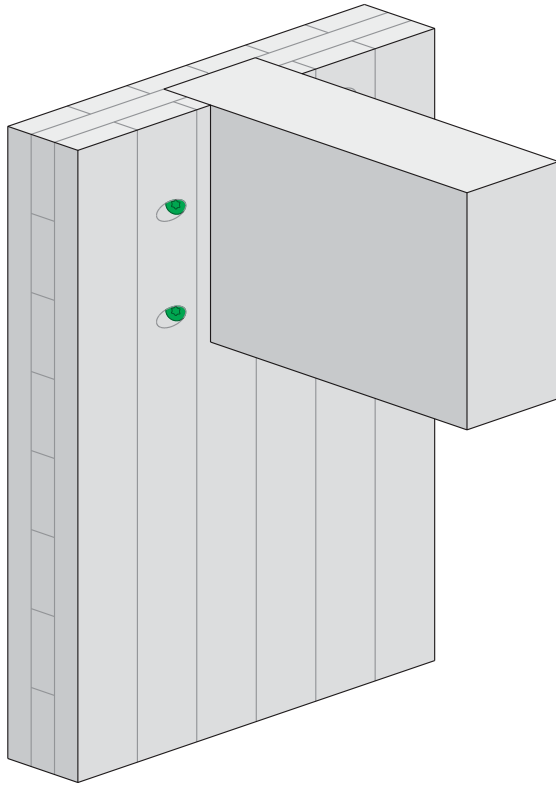


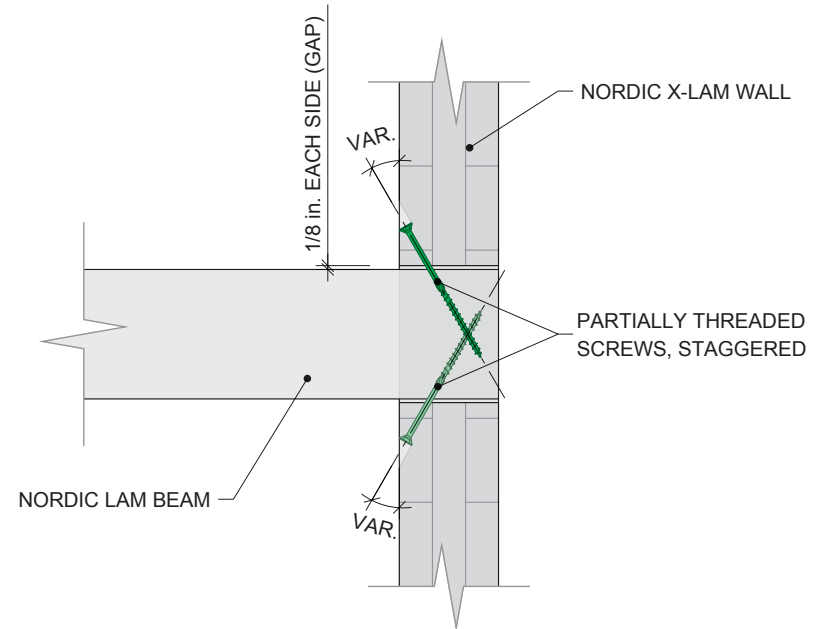
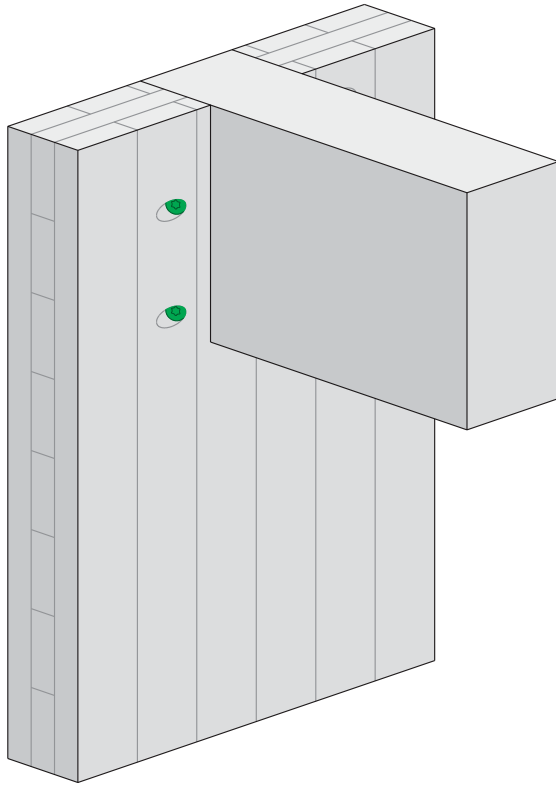
a) The 1/8 in. gap may not be required depending on the detail on the other side of the beam.

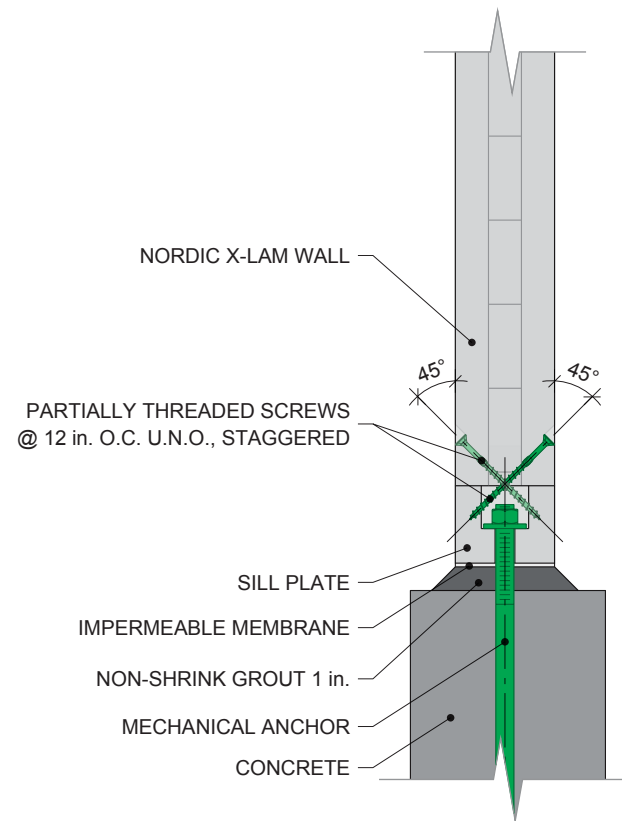
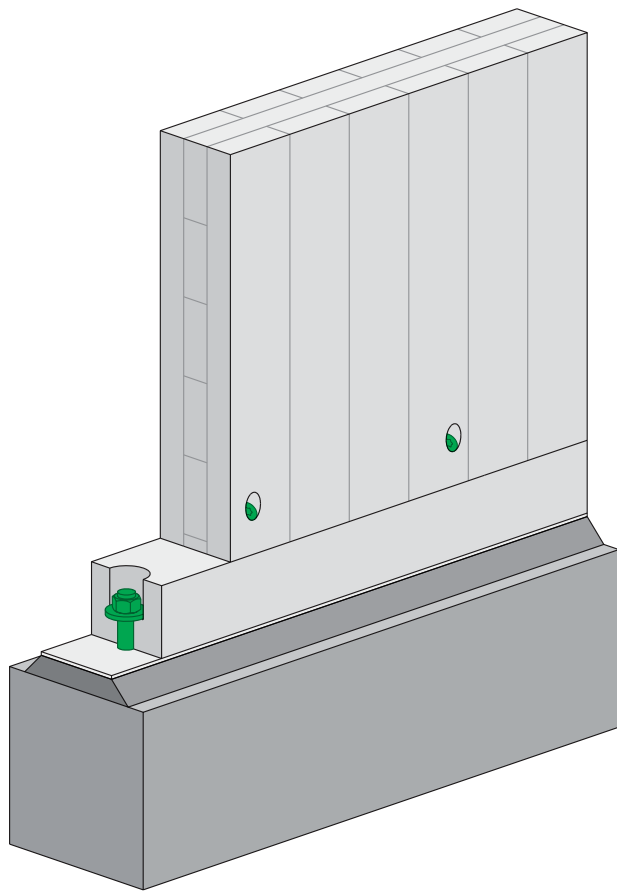


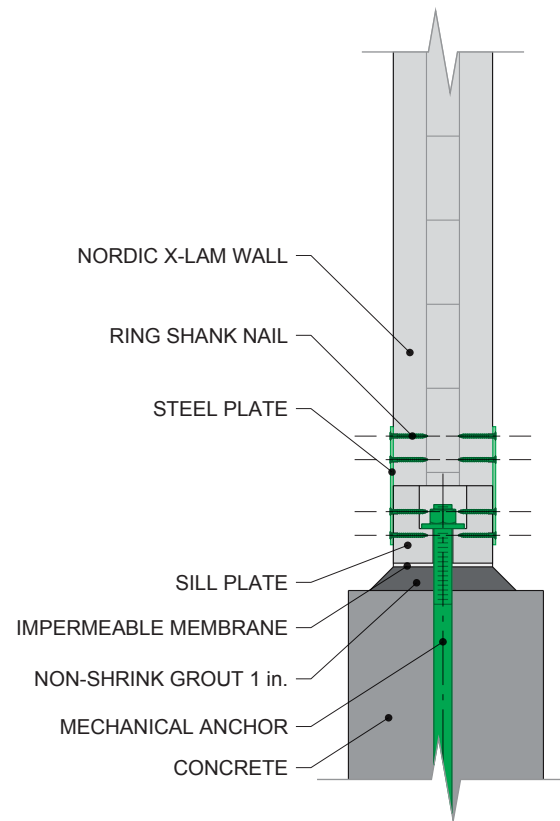
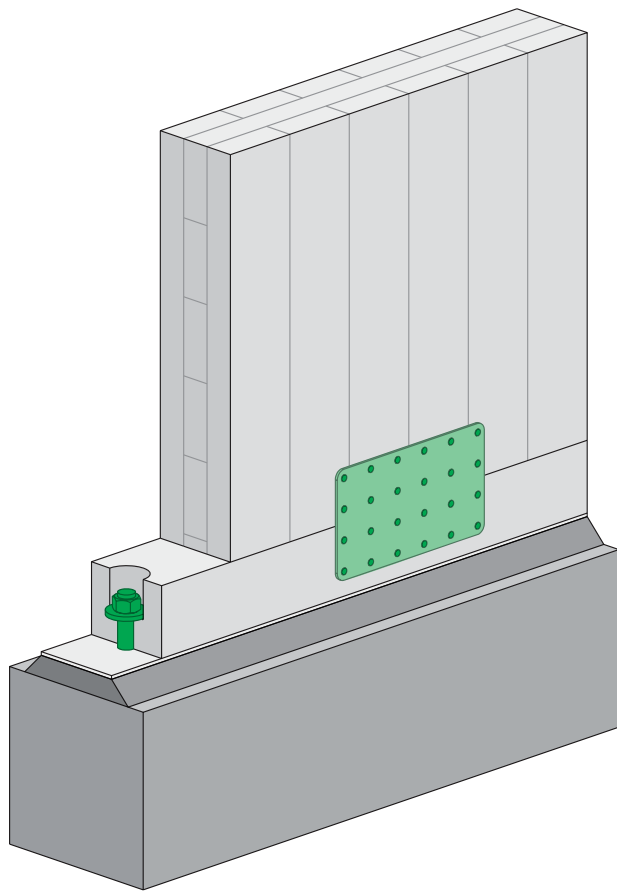


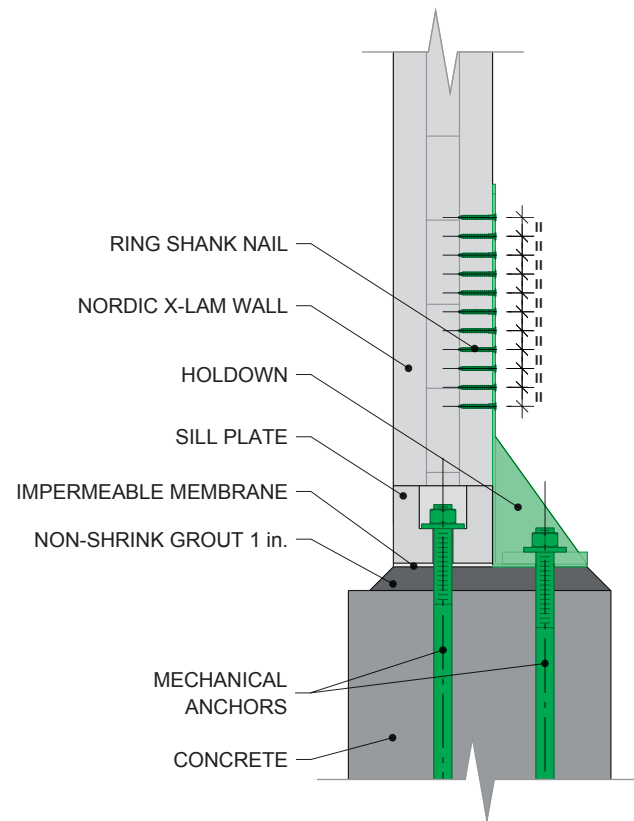
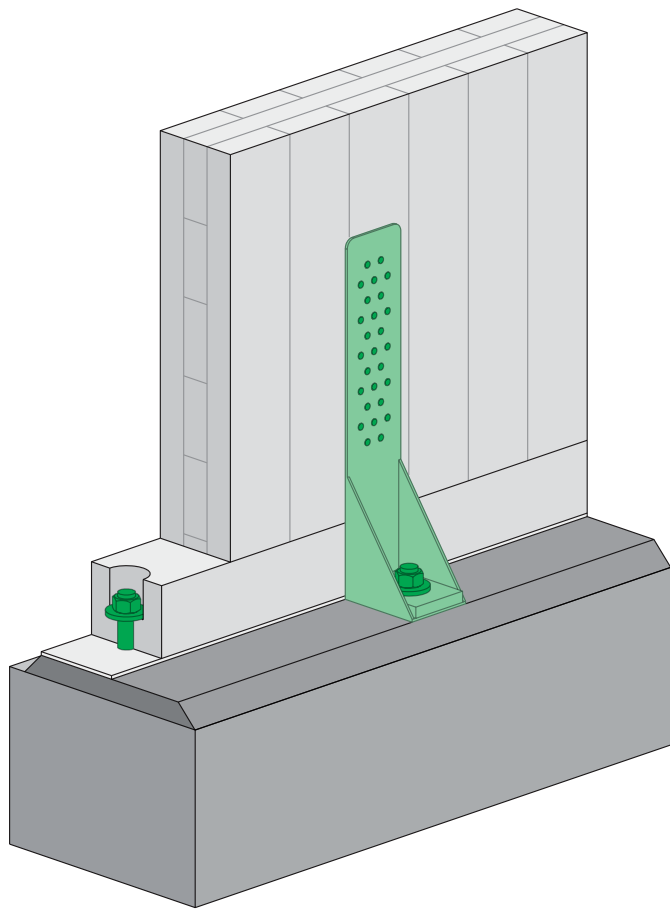
a) The 1/8 in. gap may not be required depending on the detail on the other side of the beam.

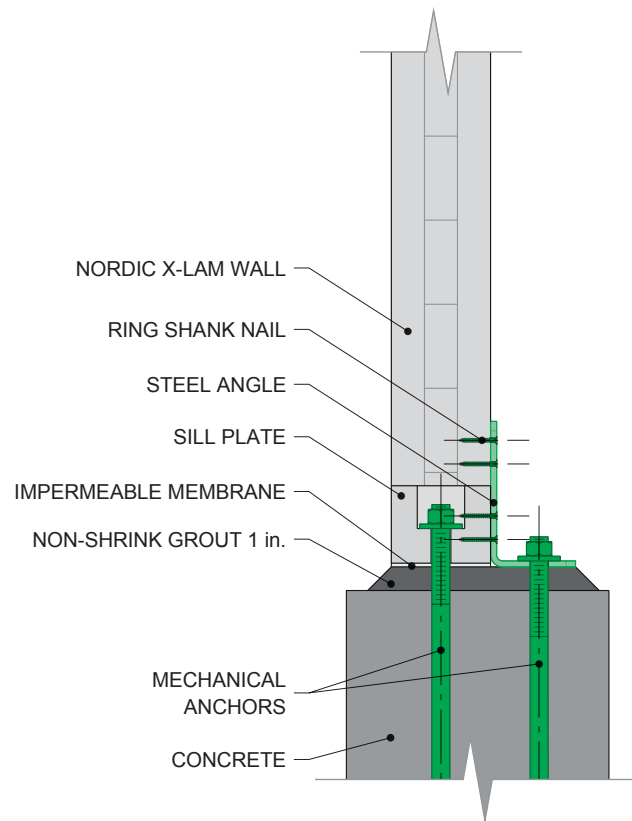
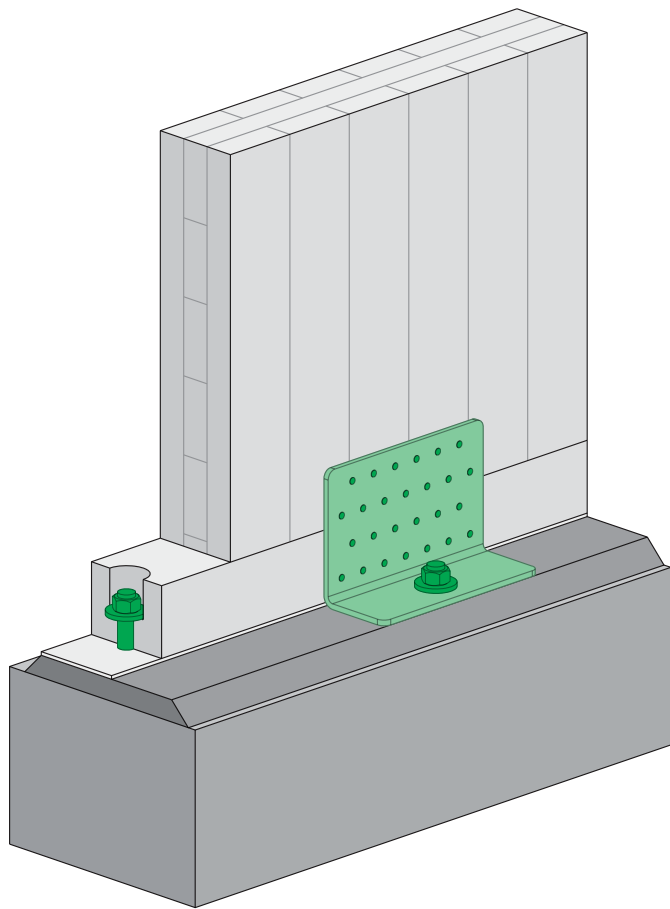


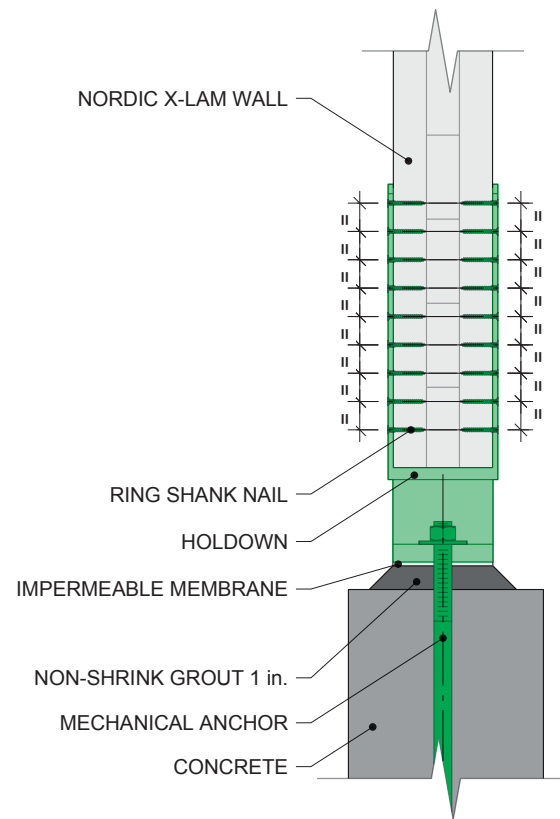
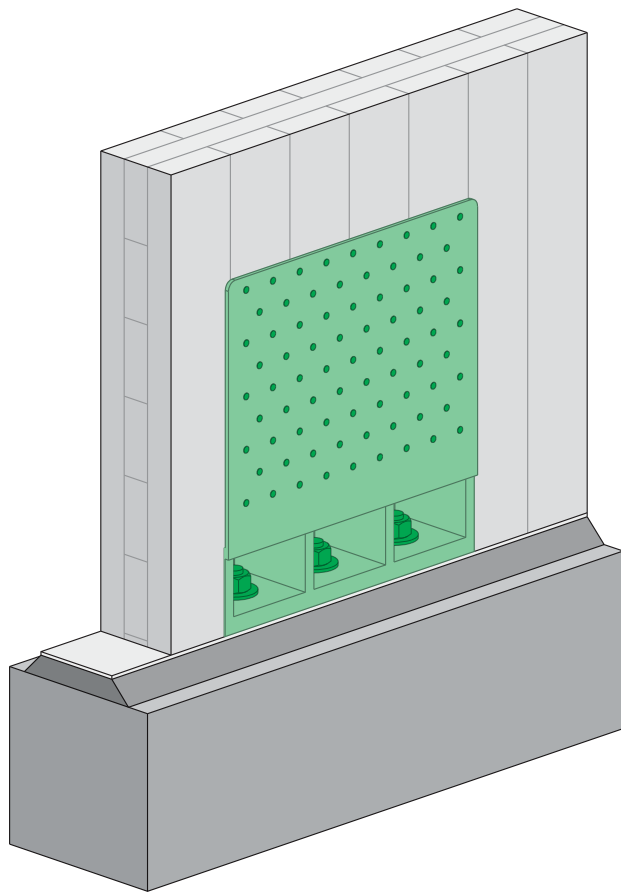




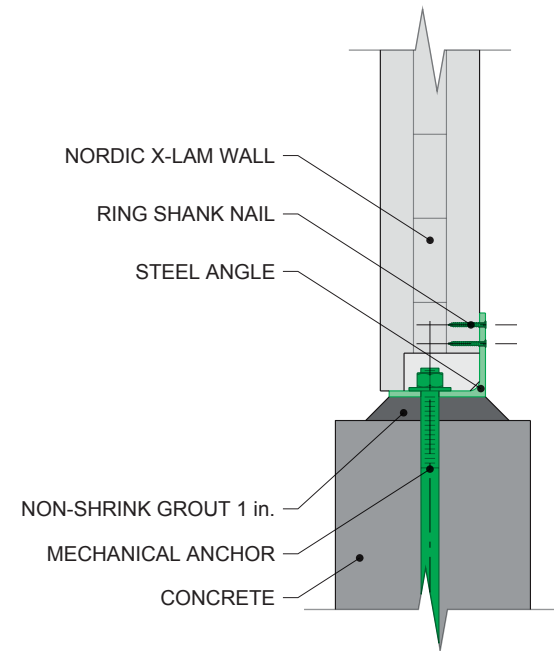
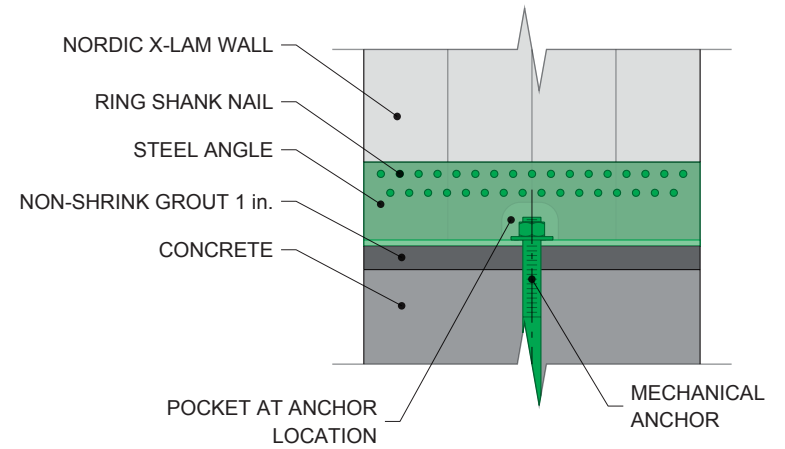
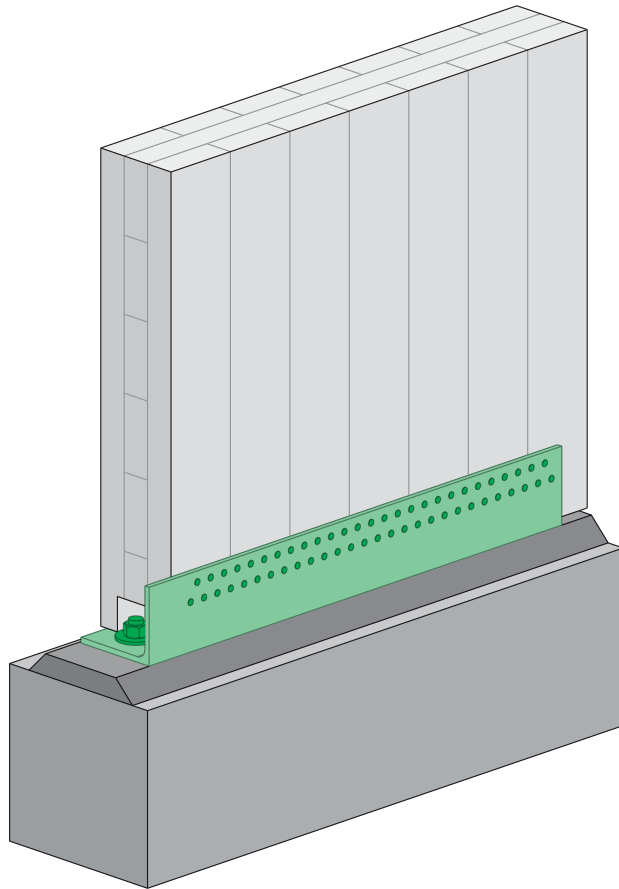


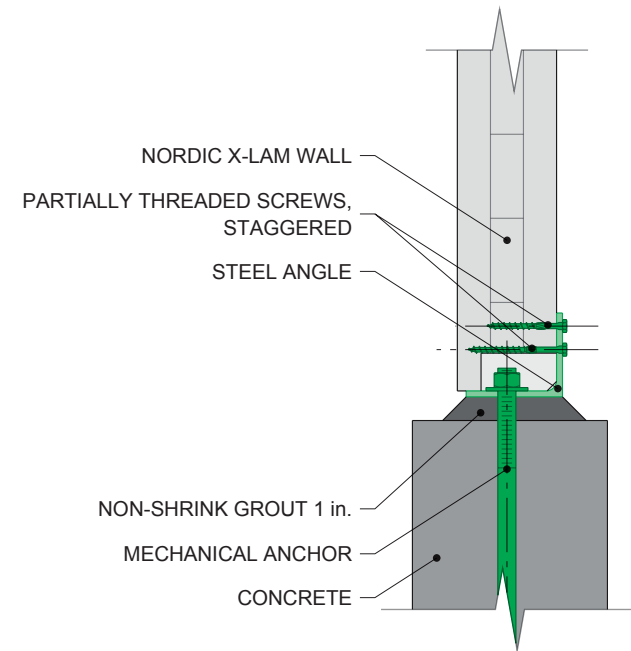
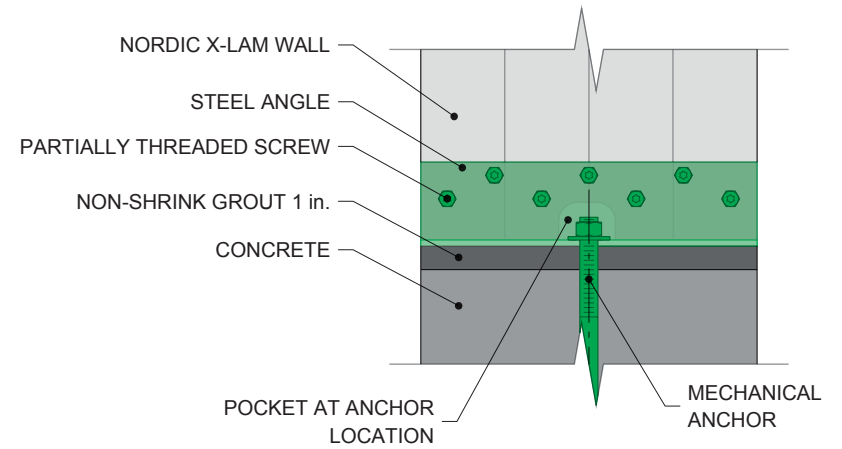
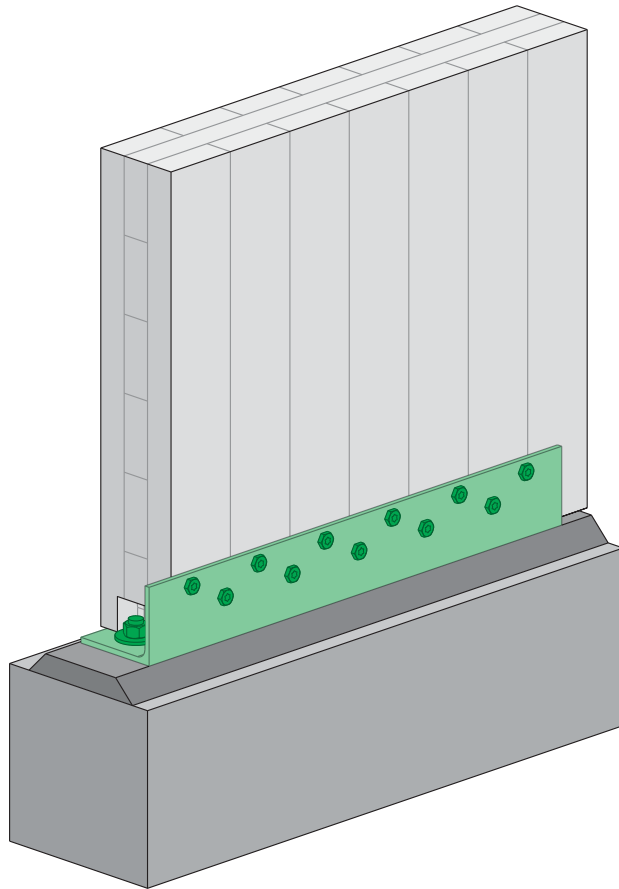






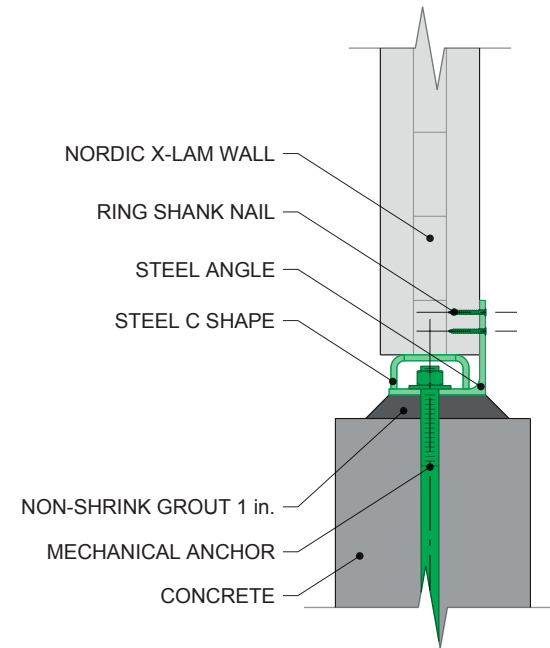
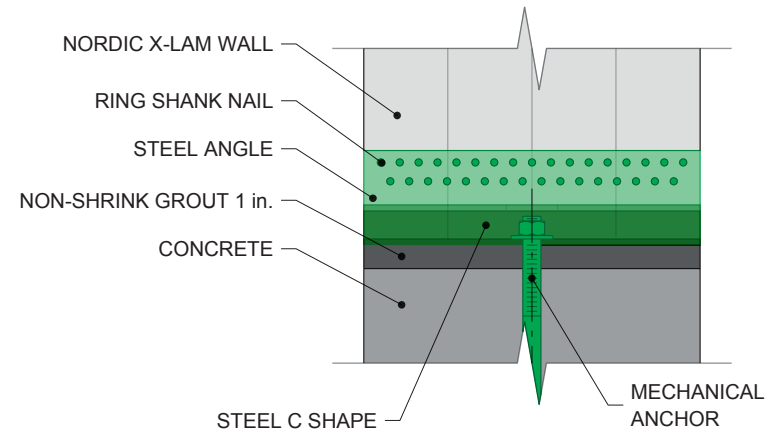
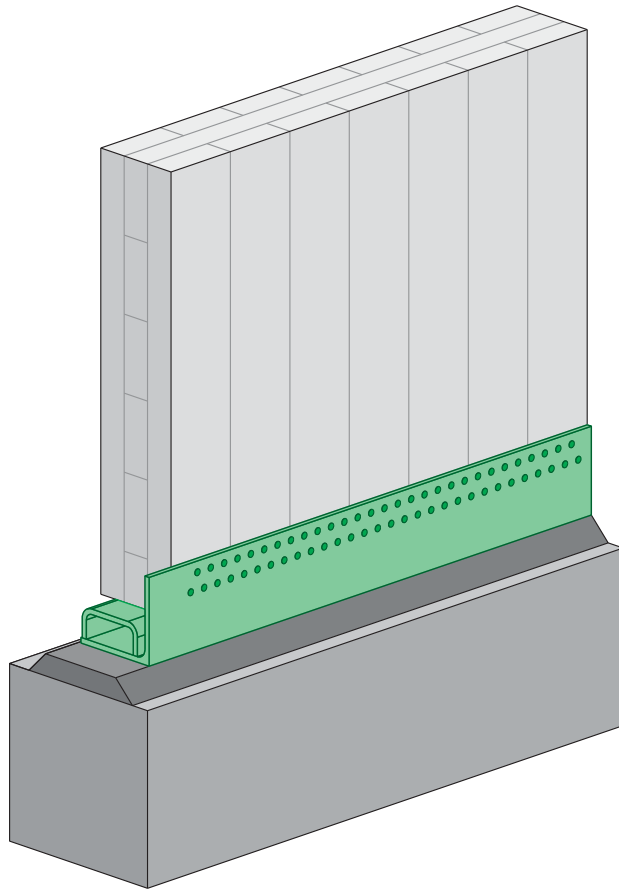


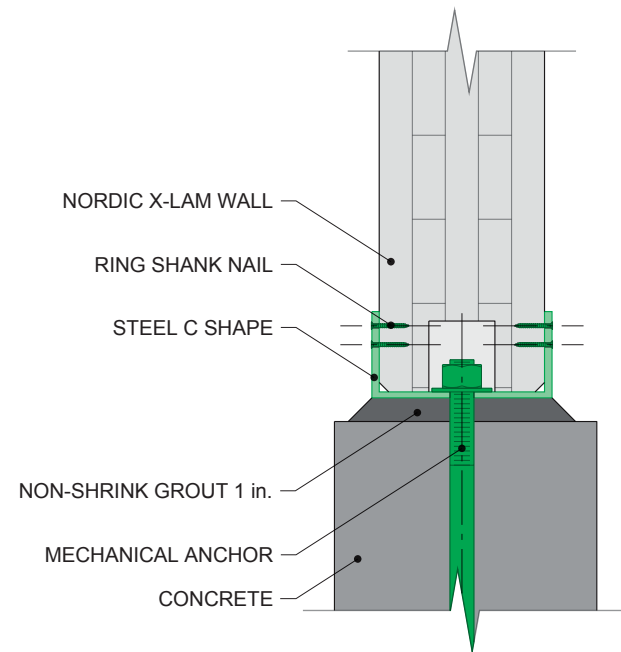
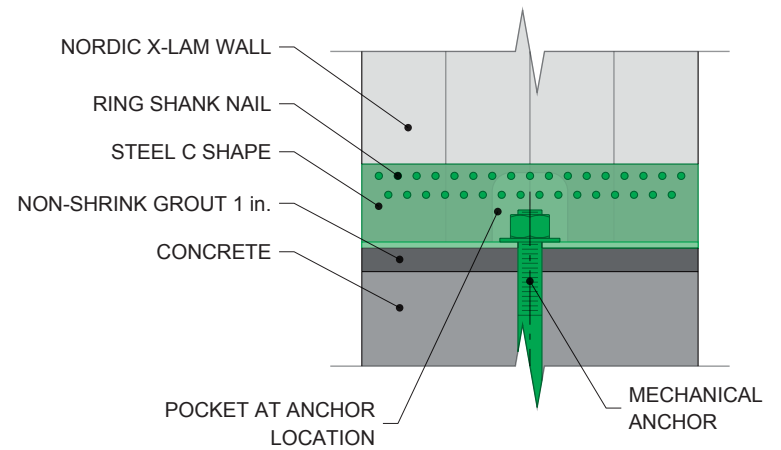
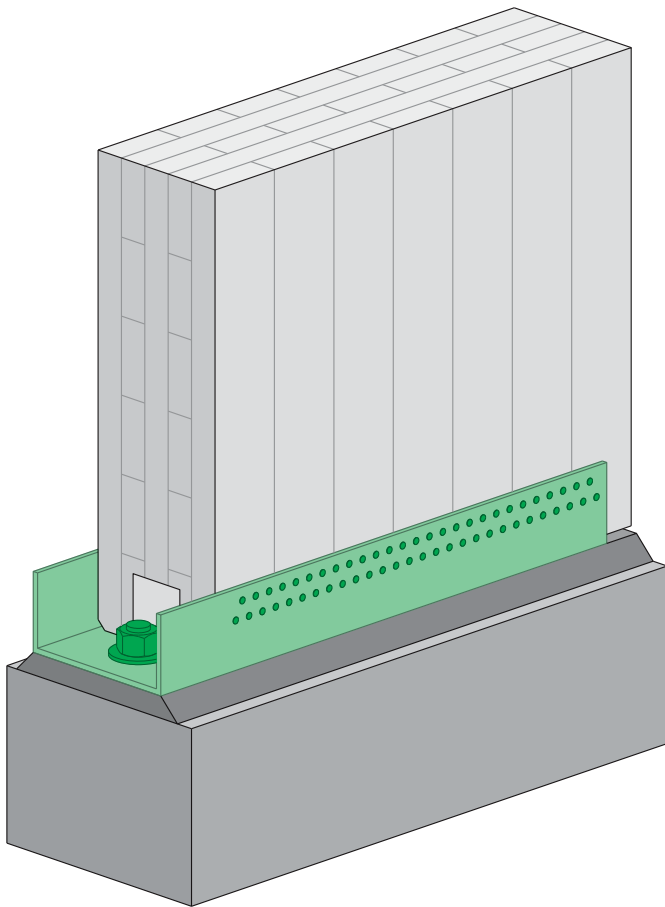




**Note:**

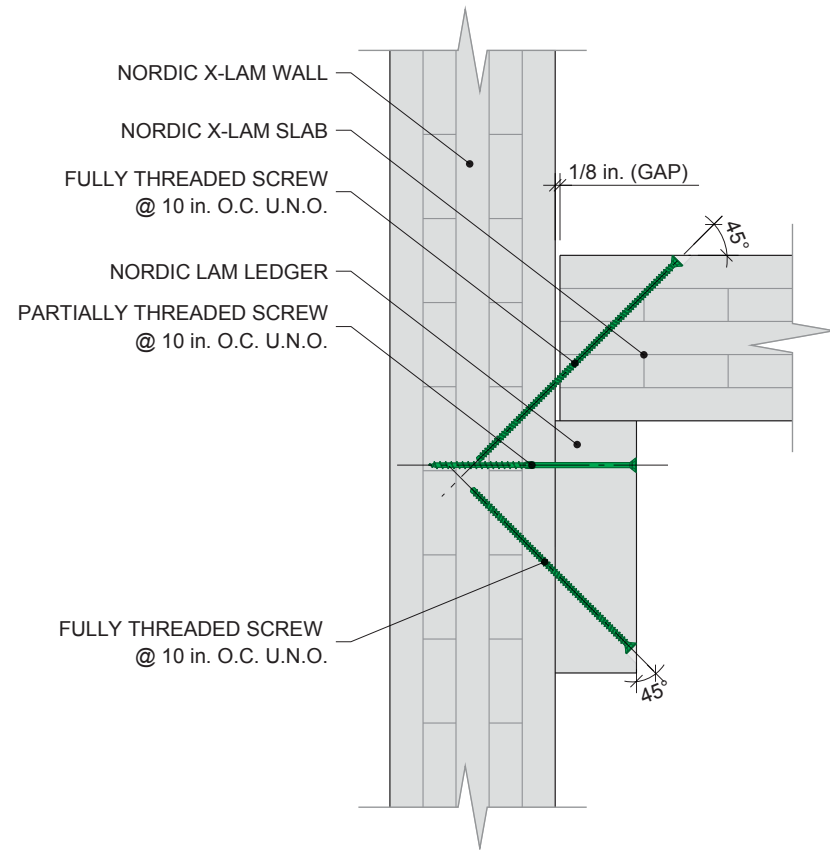
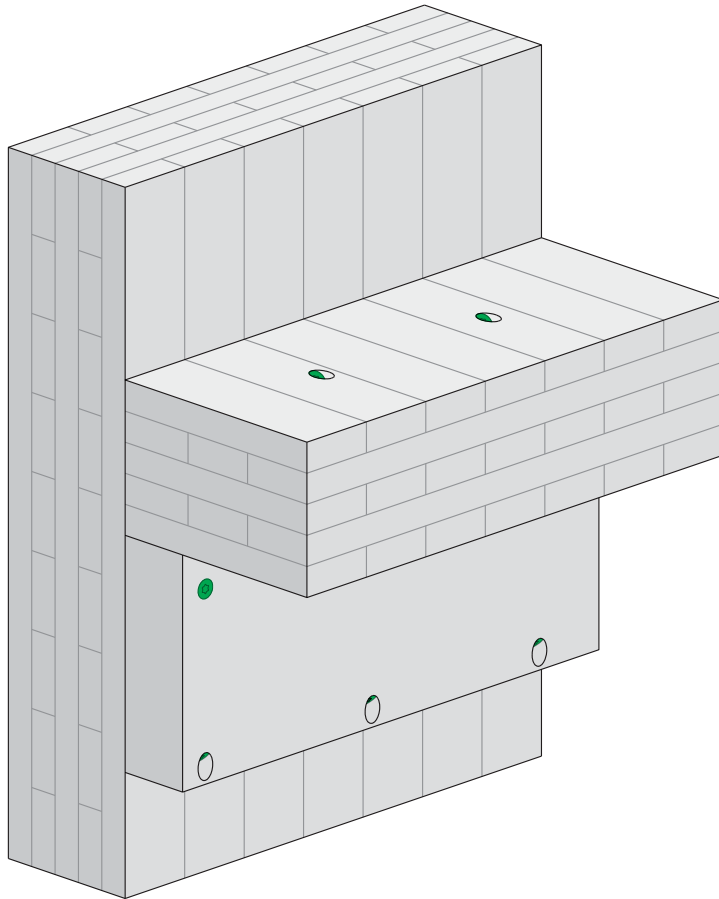
1. This assembly detail offers a resistance to forces acting perpendicularly to the foundation wall.

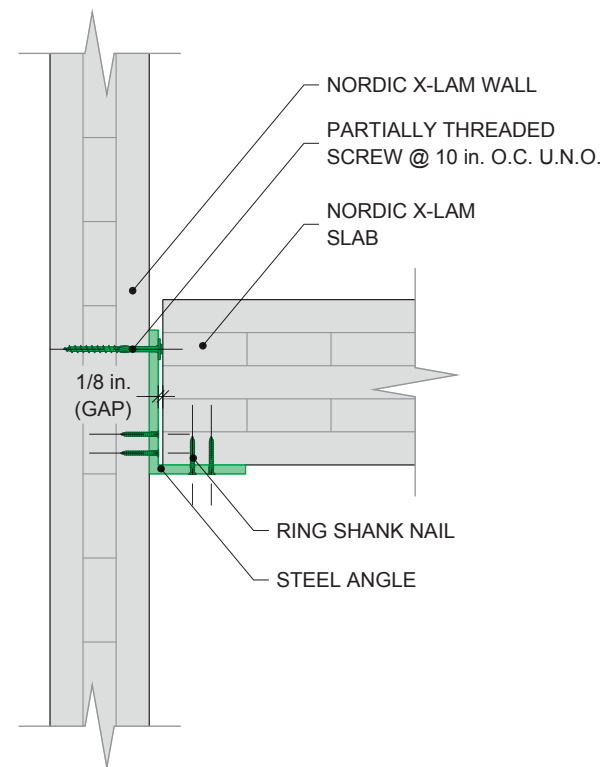
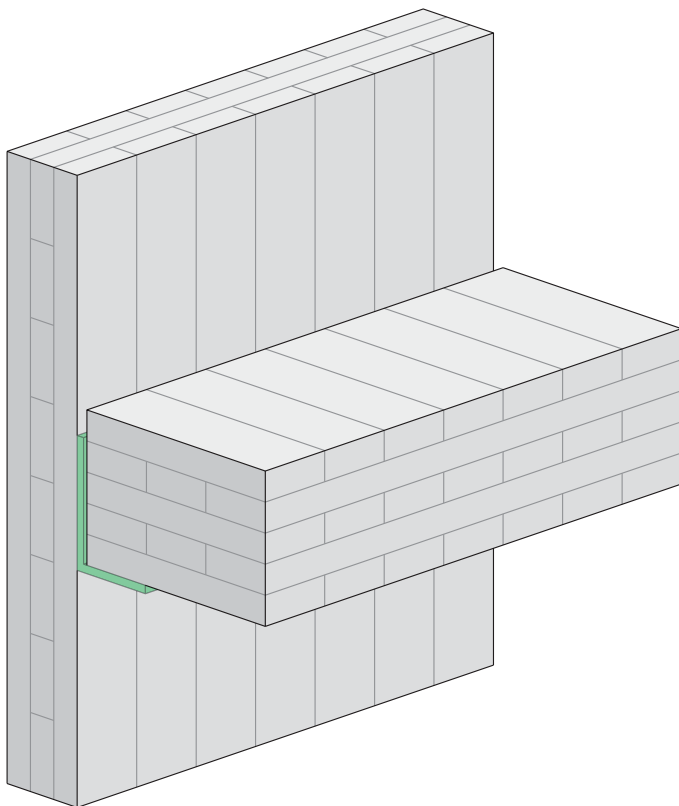


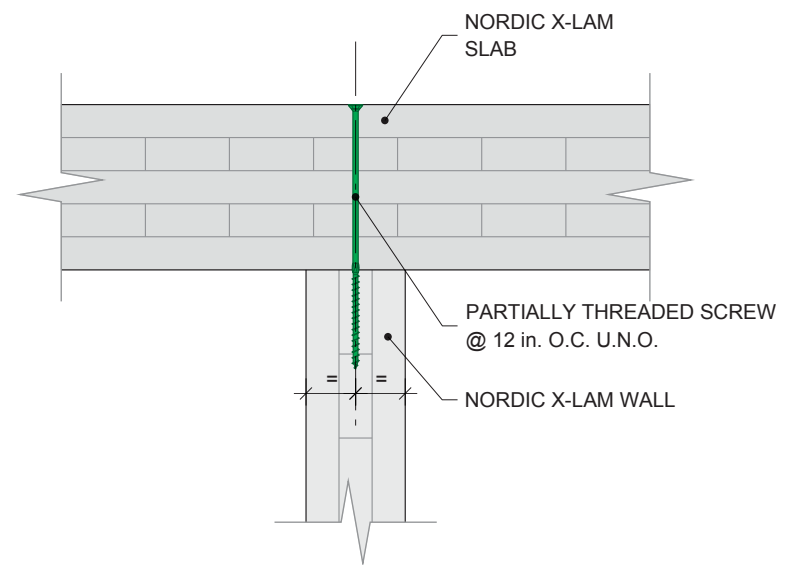
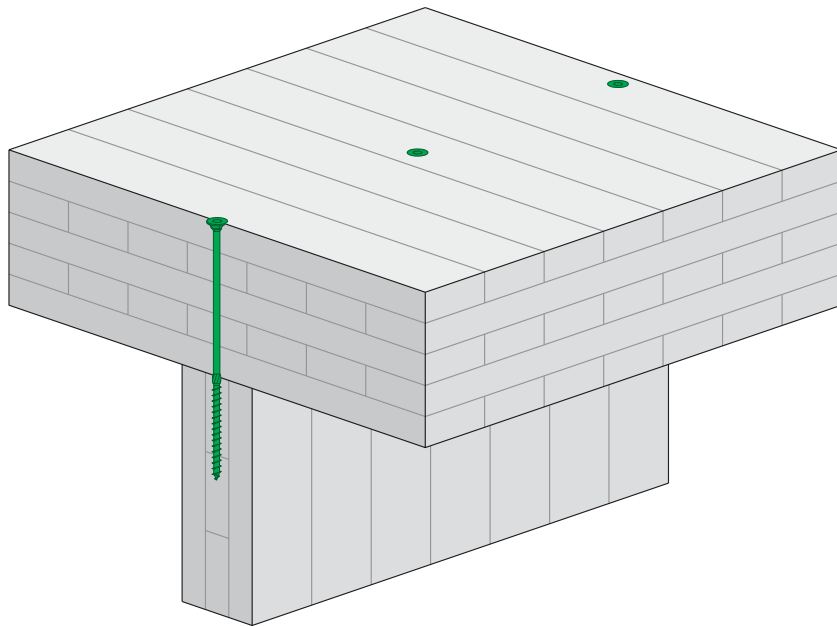


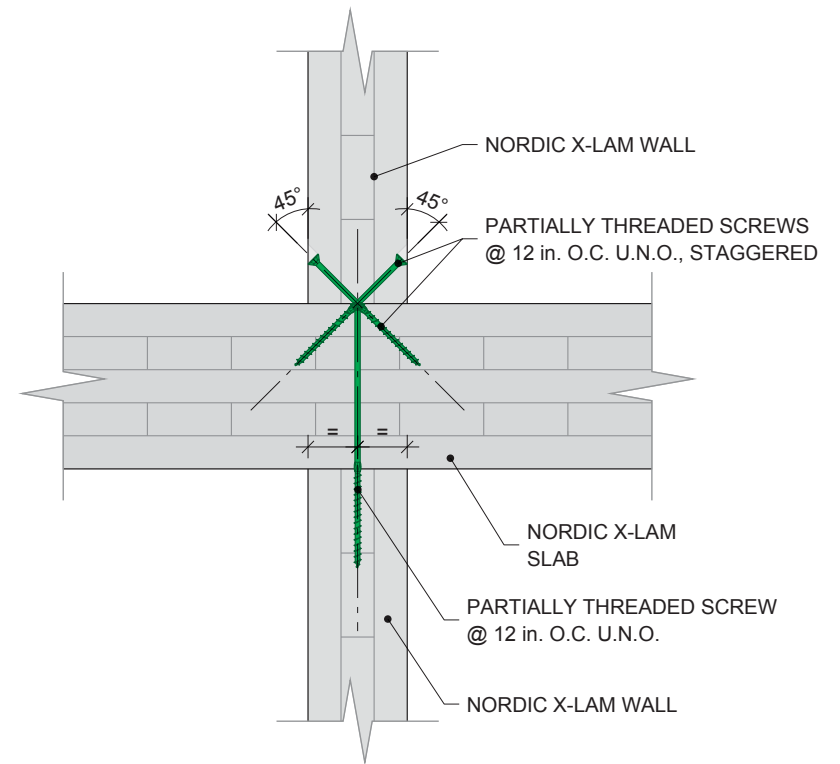
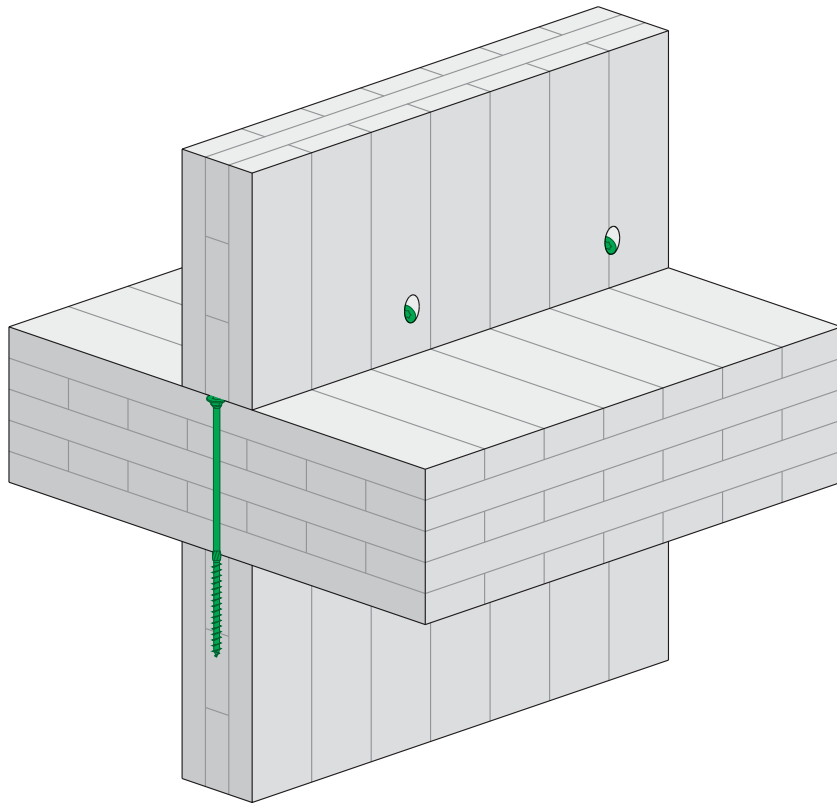
**Note:**

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.

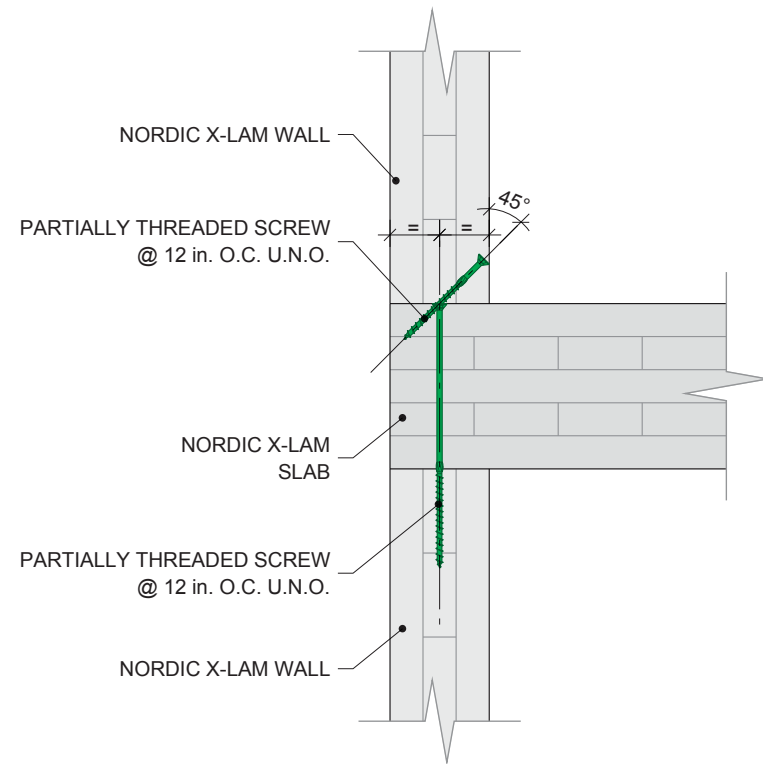
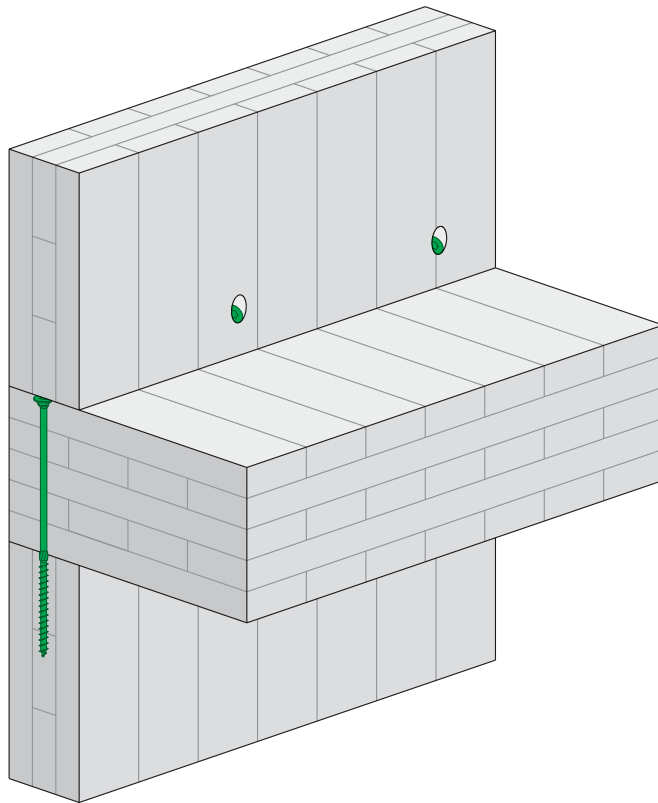


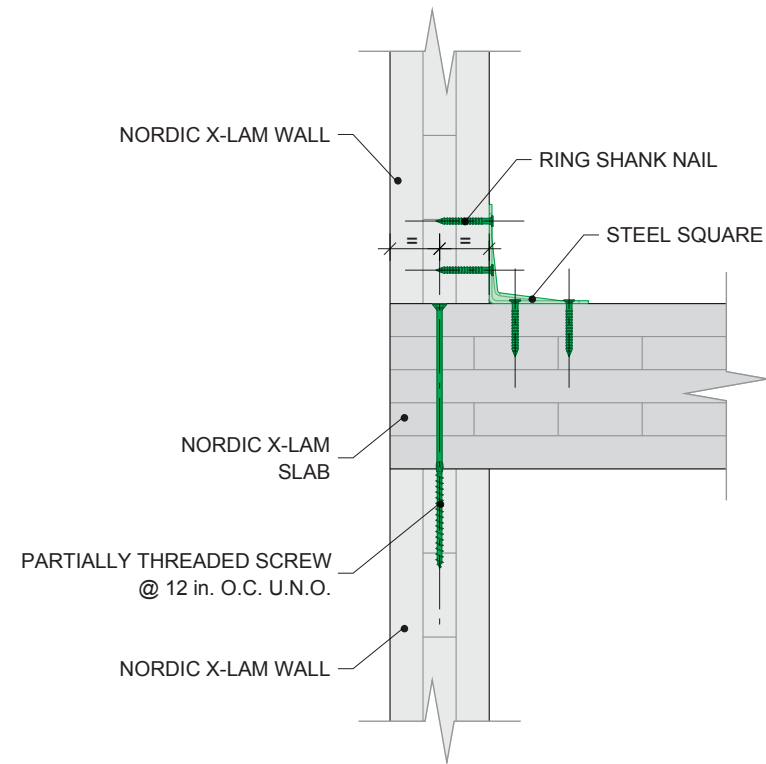
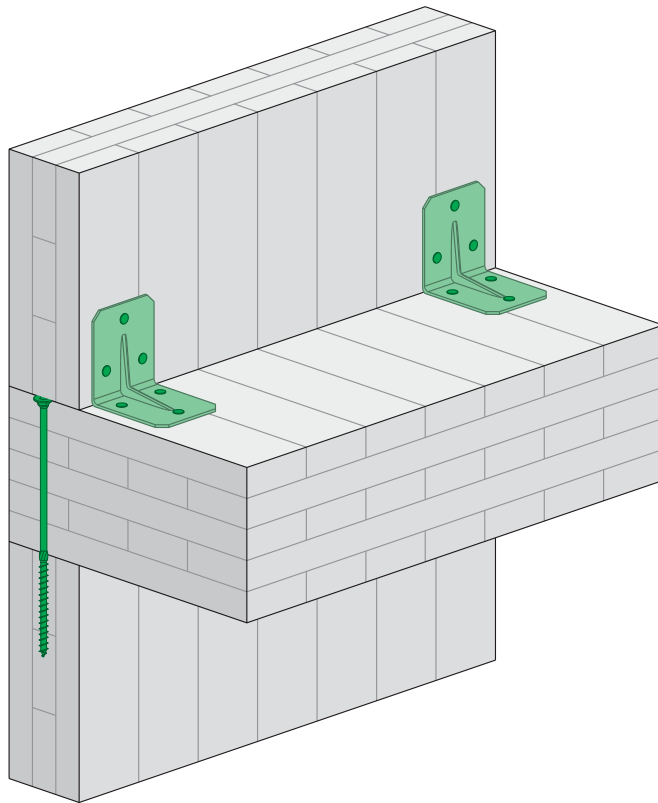


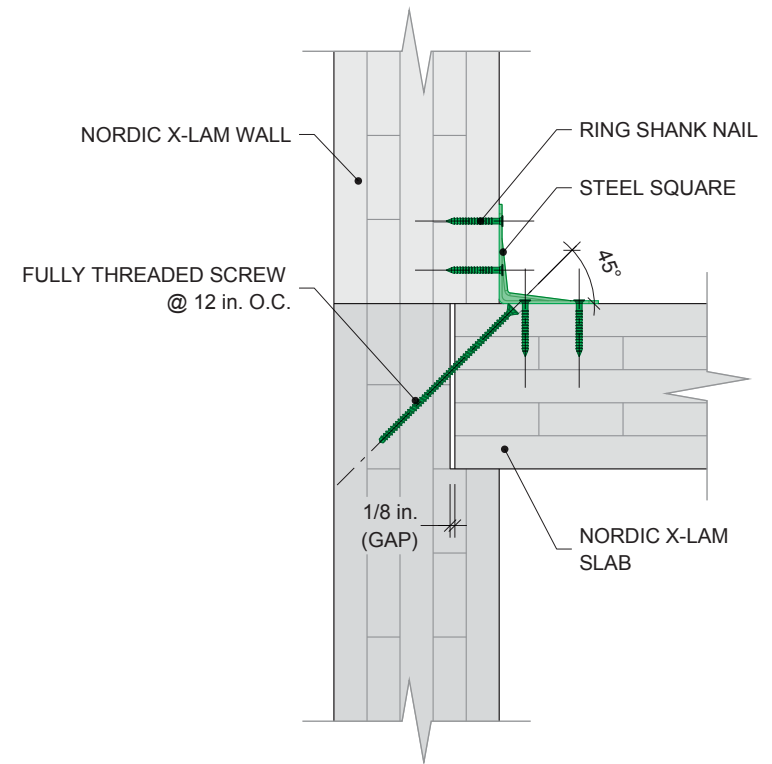
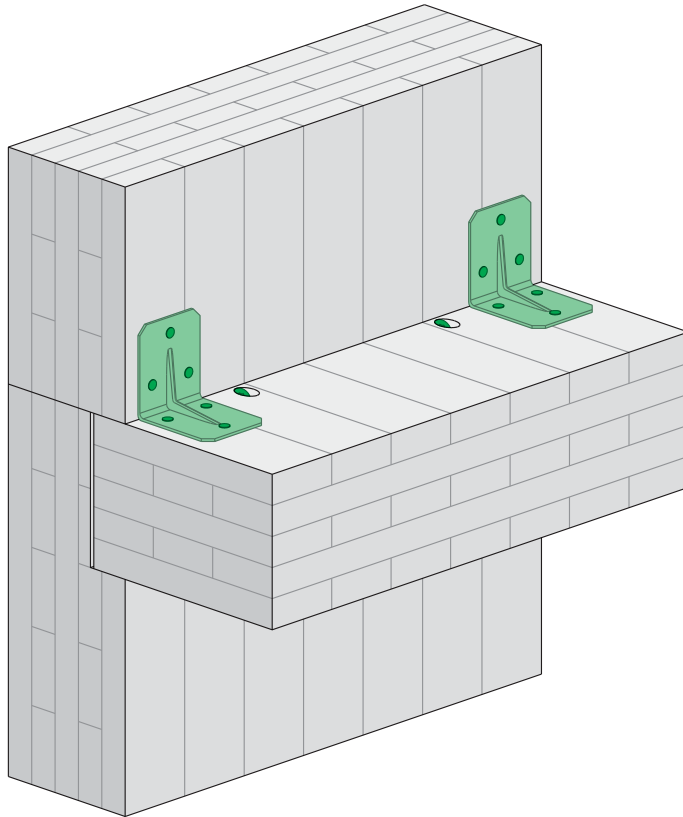


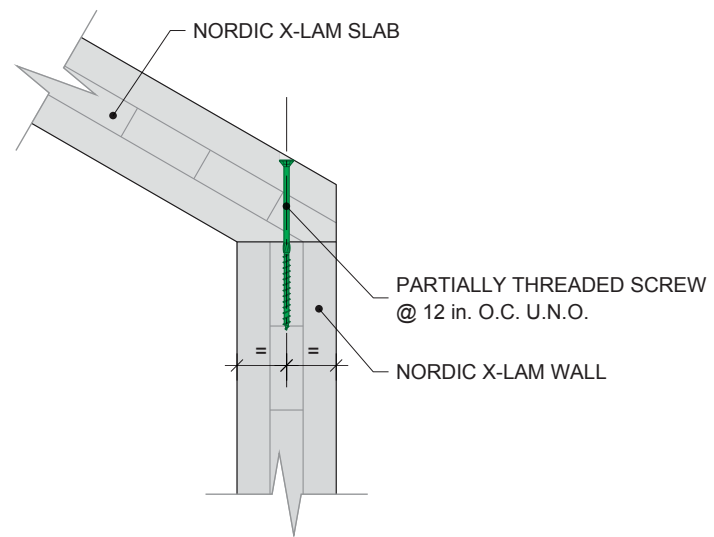
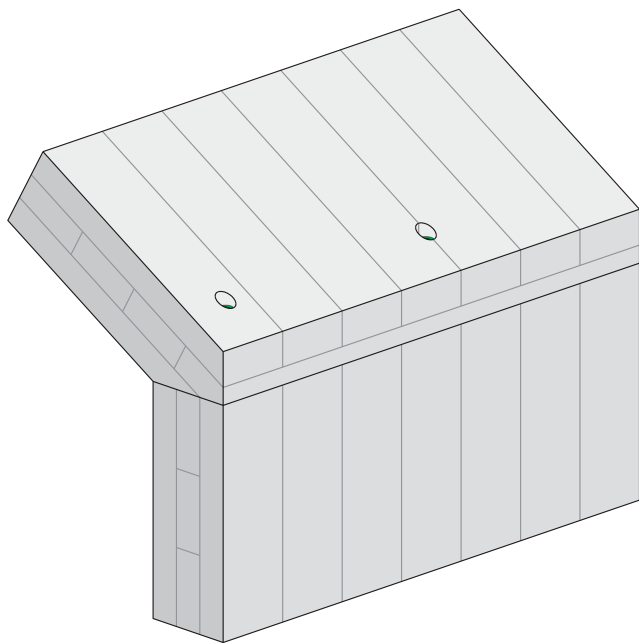


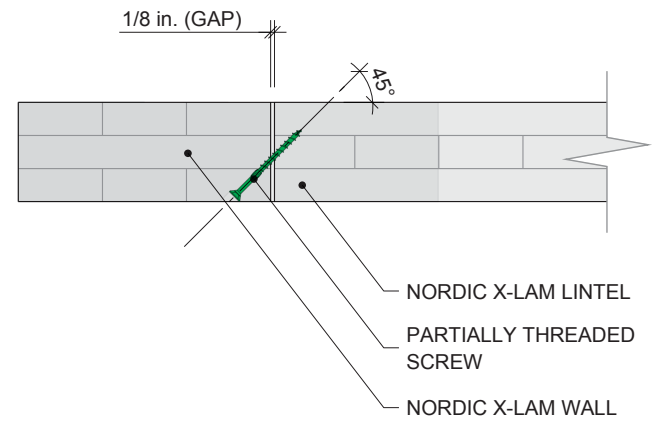
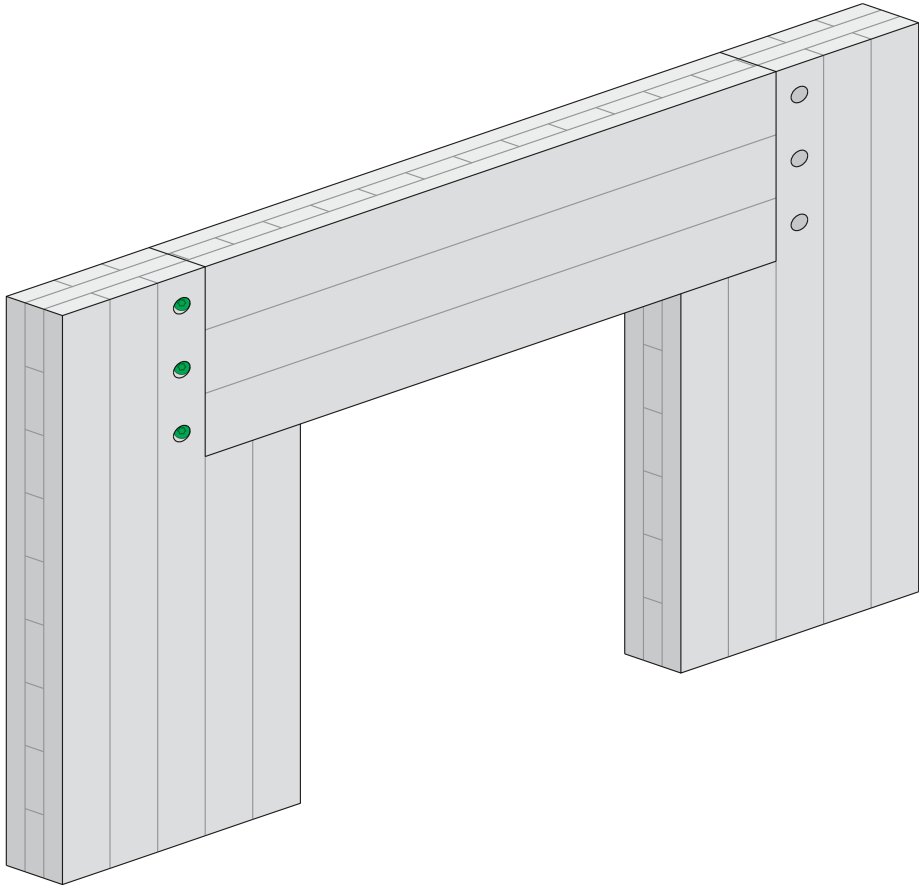


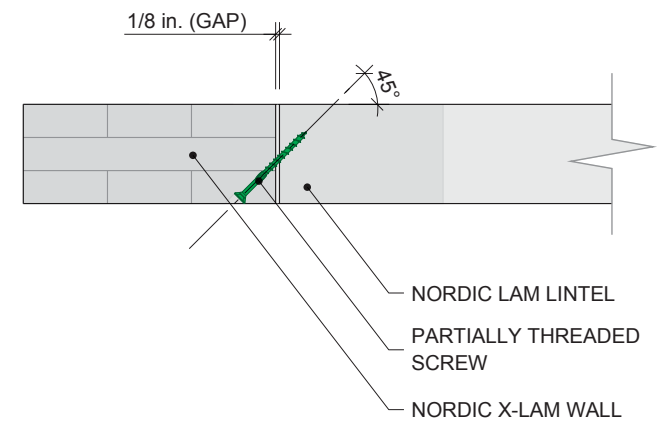
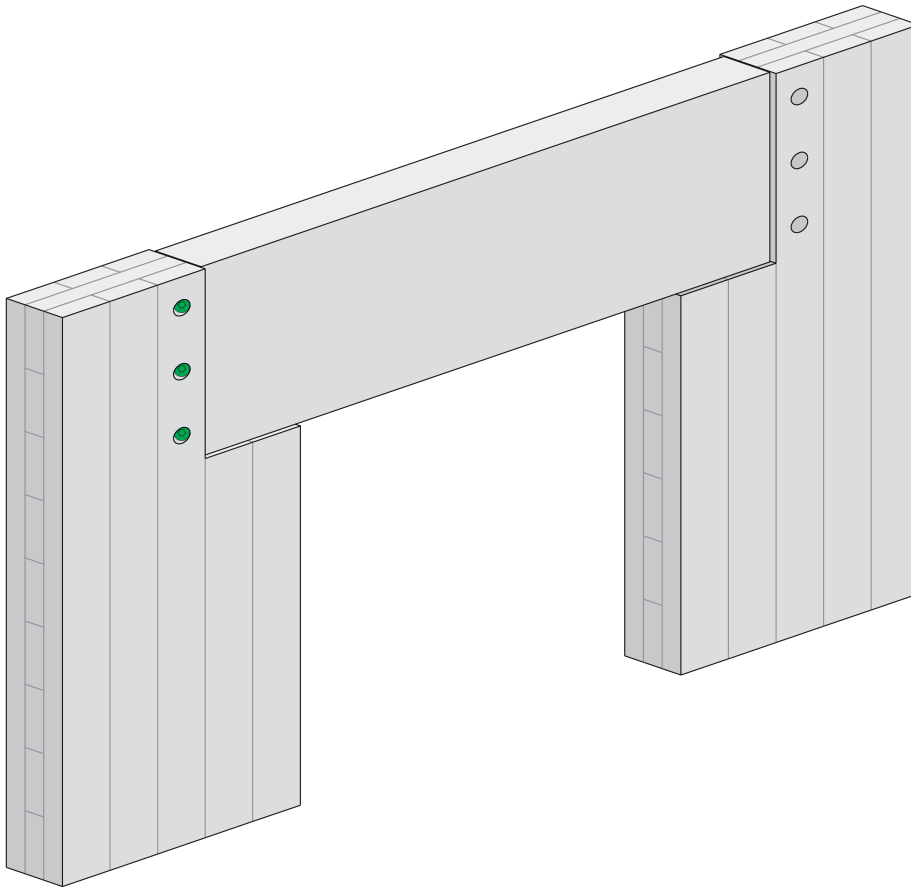


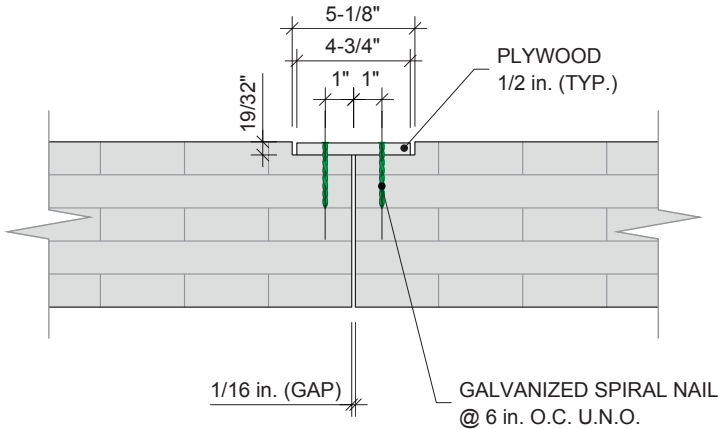
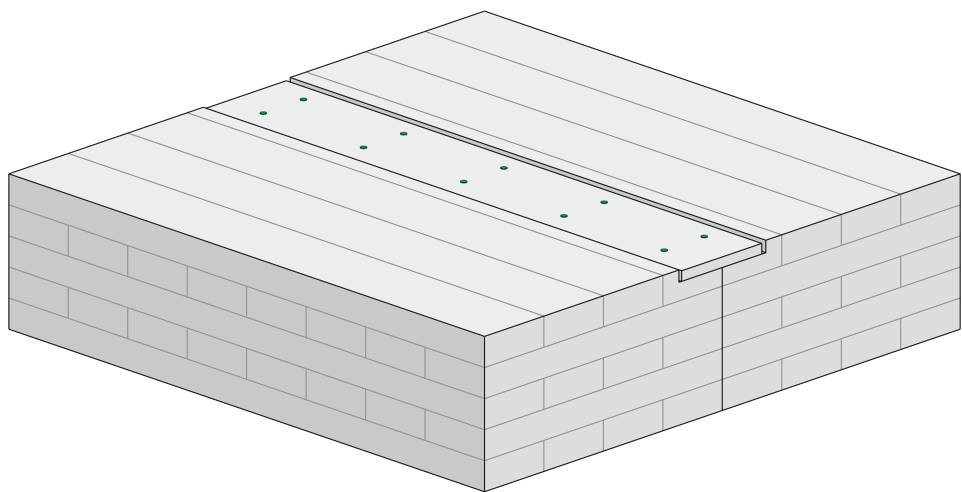


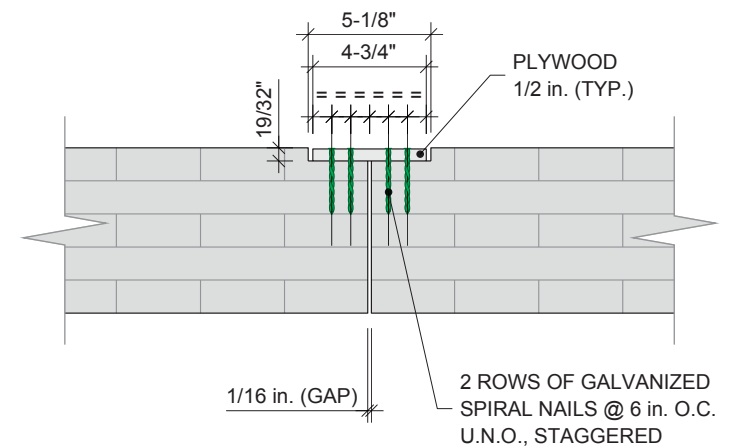
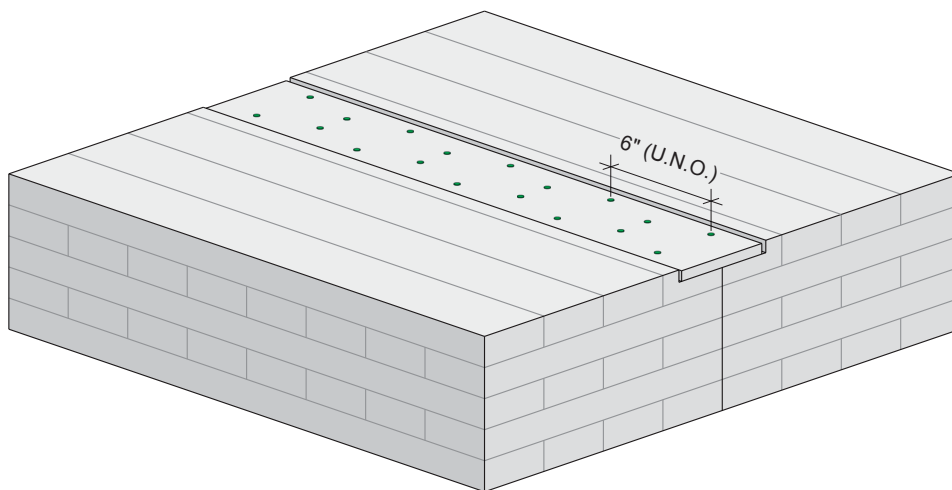




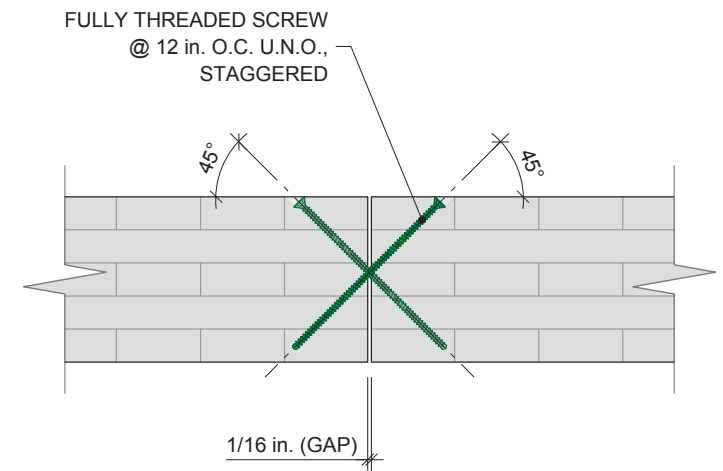
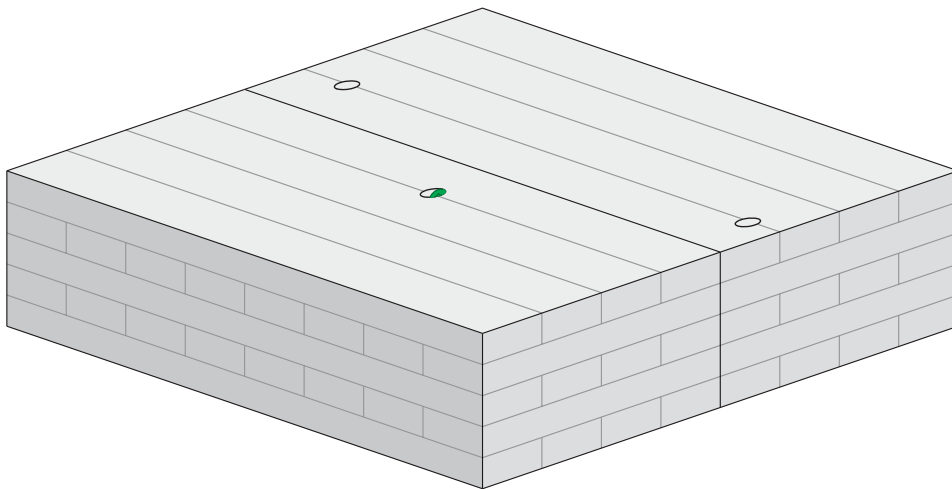


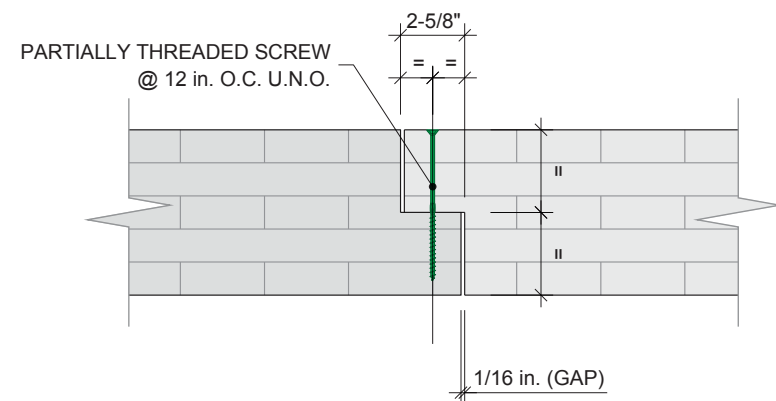
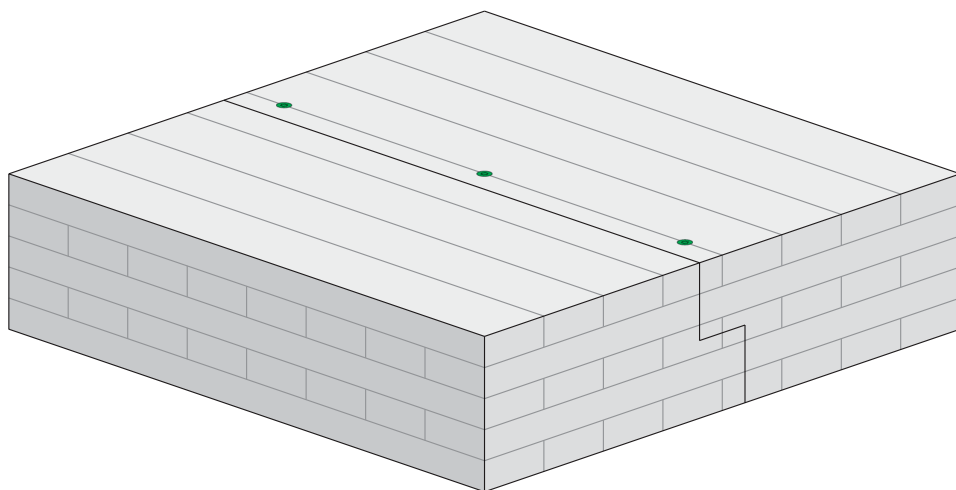


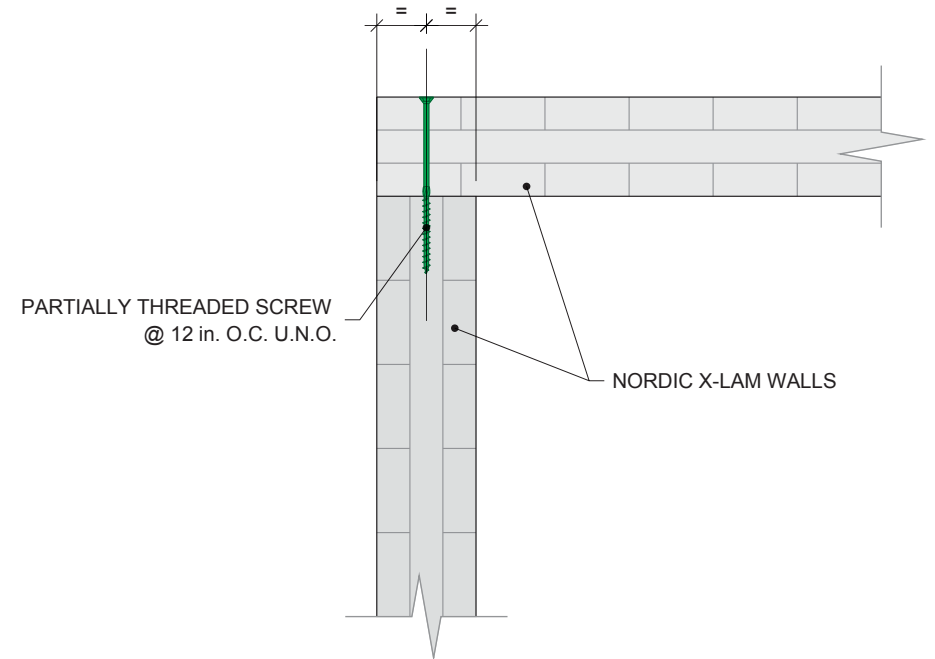
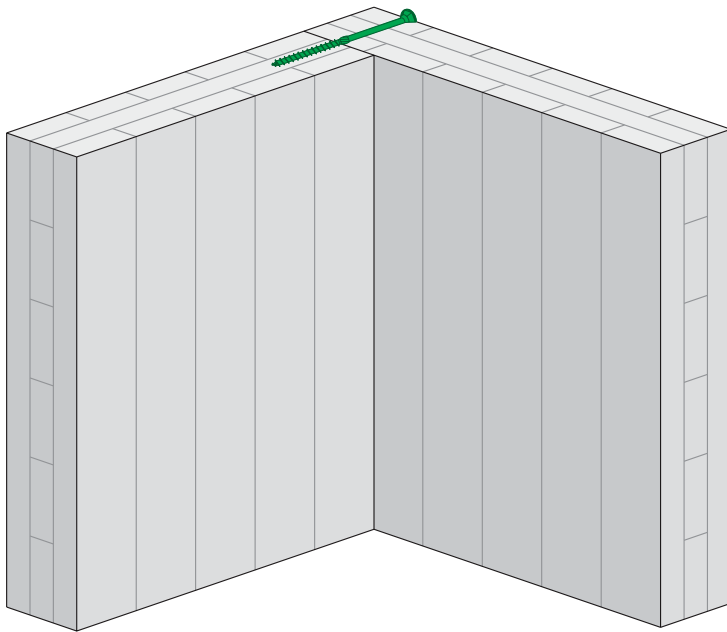


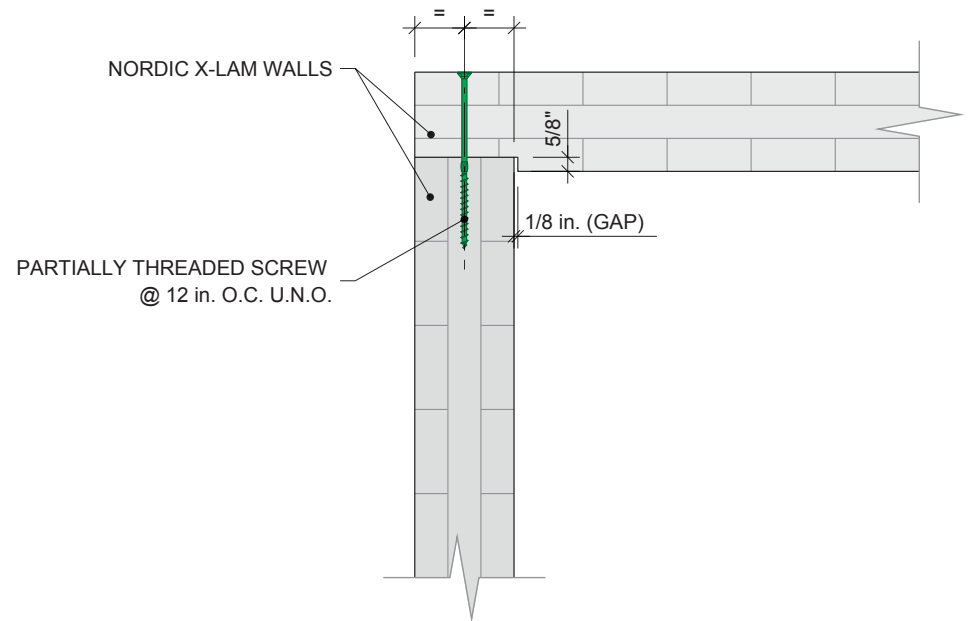
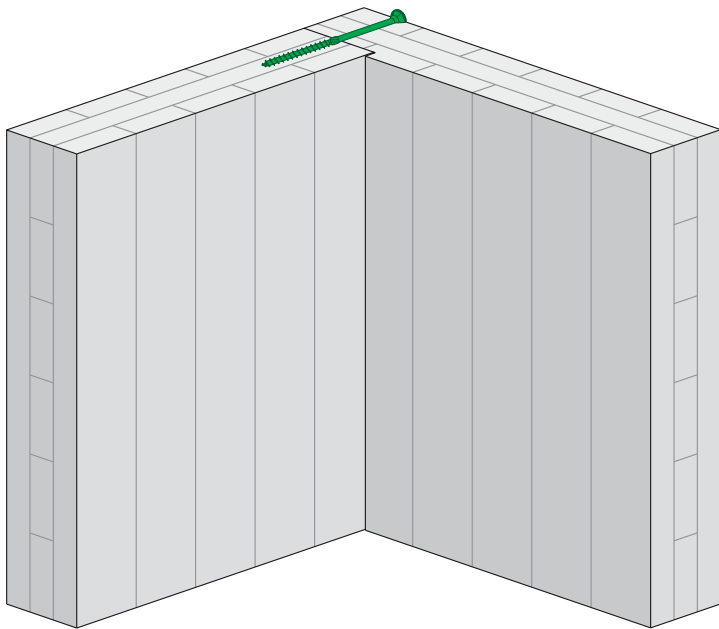


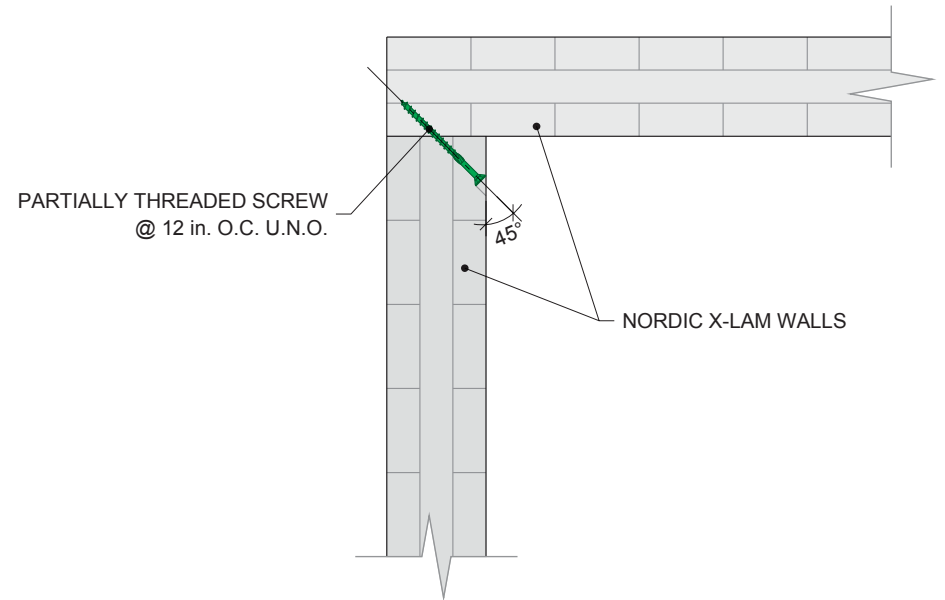
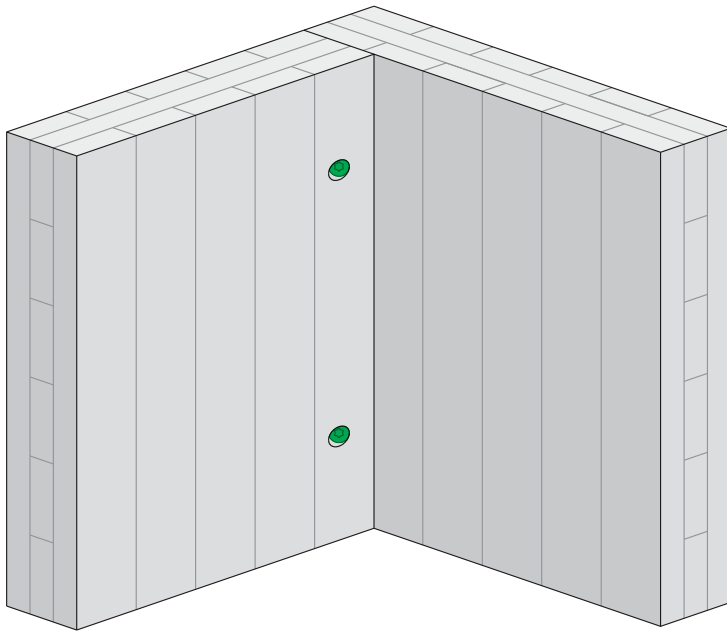


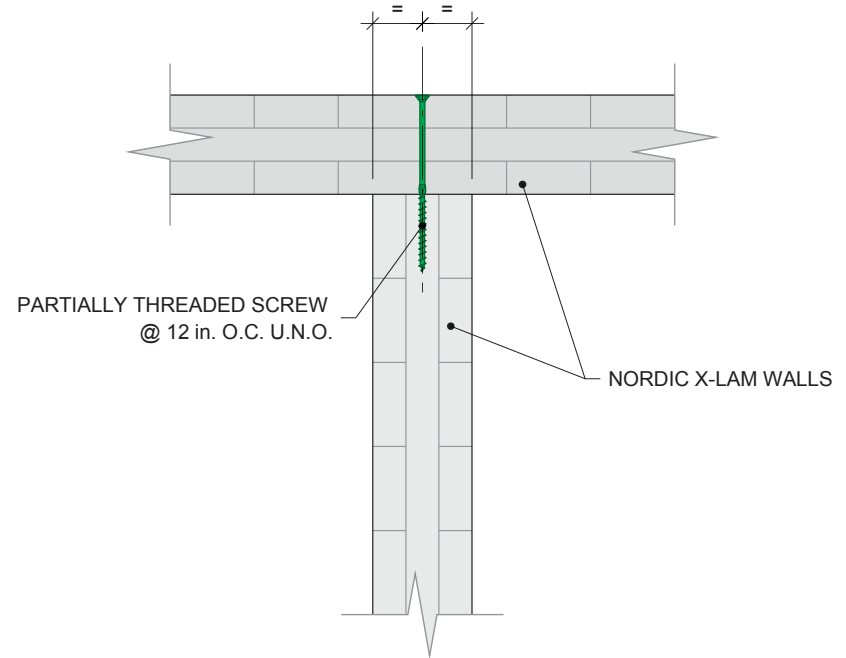
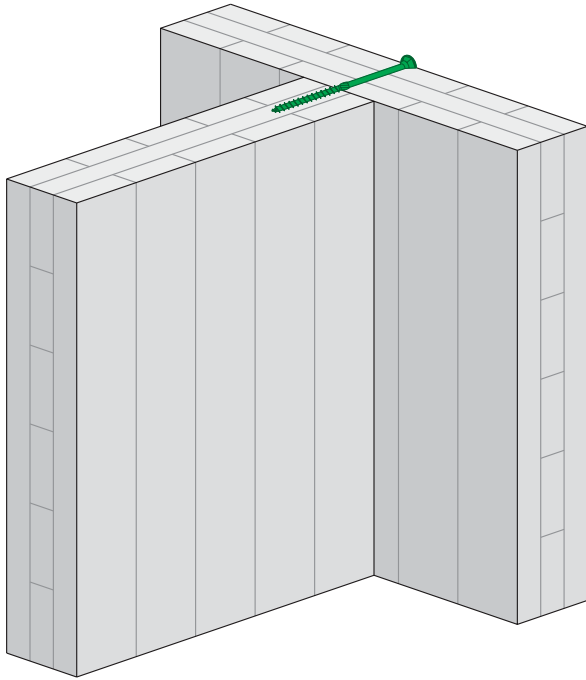


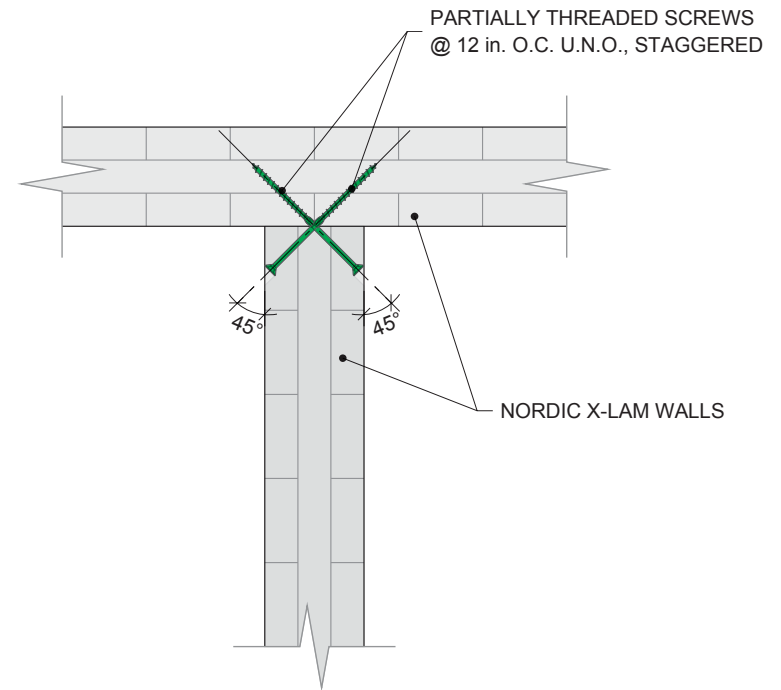
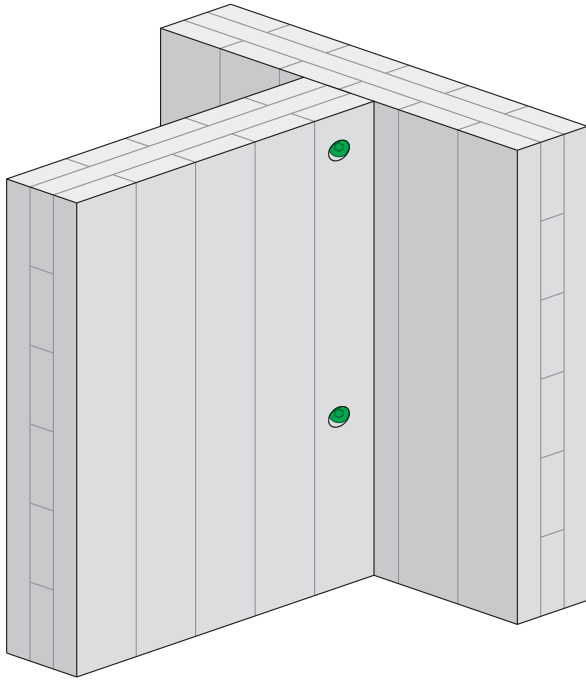


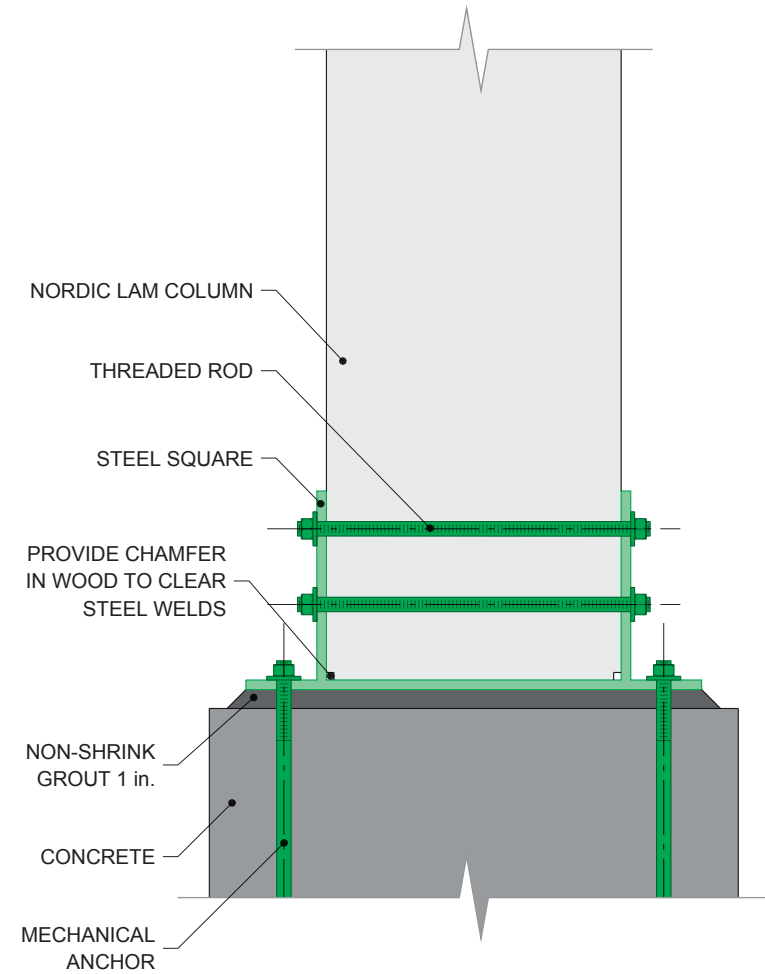
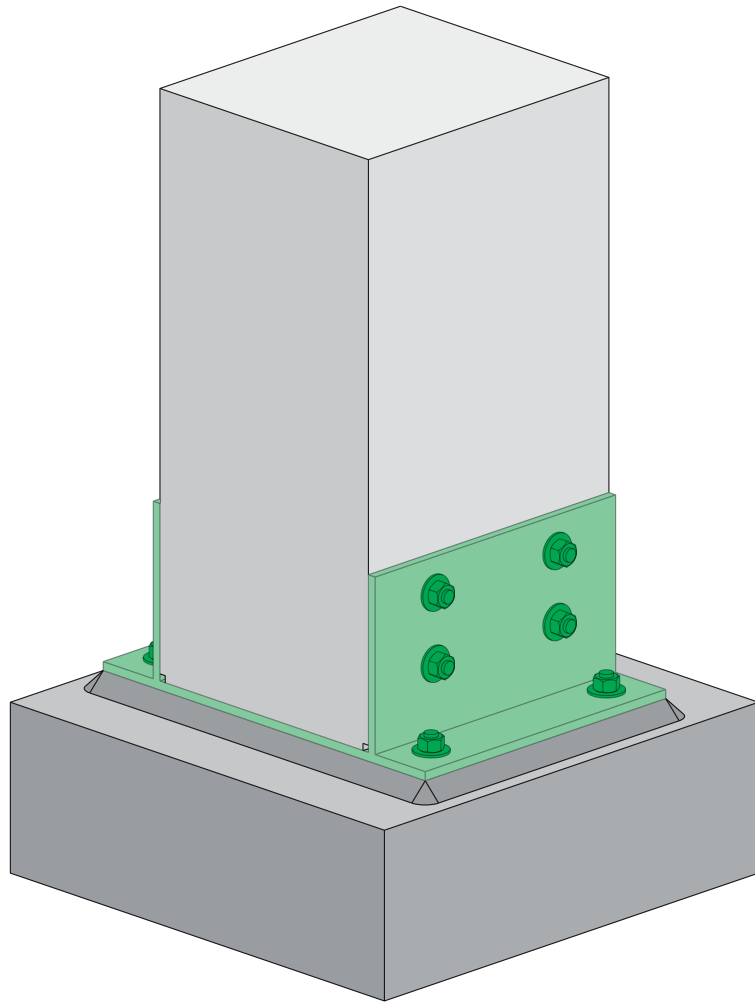




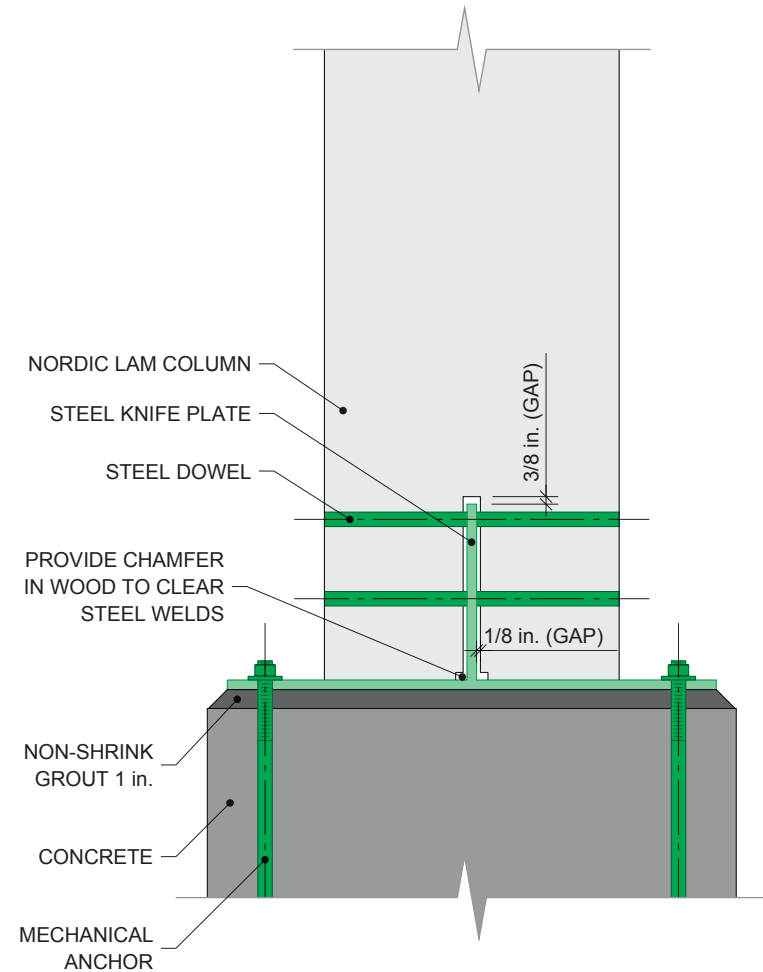
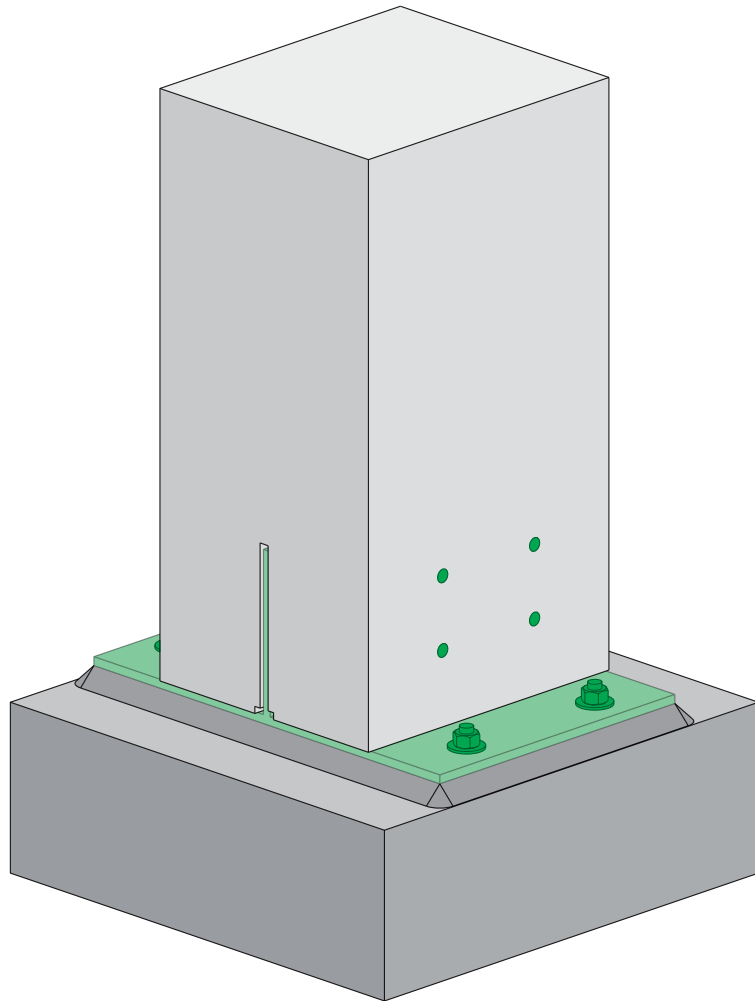


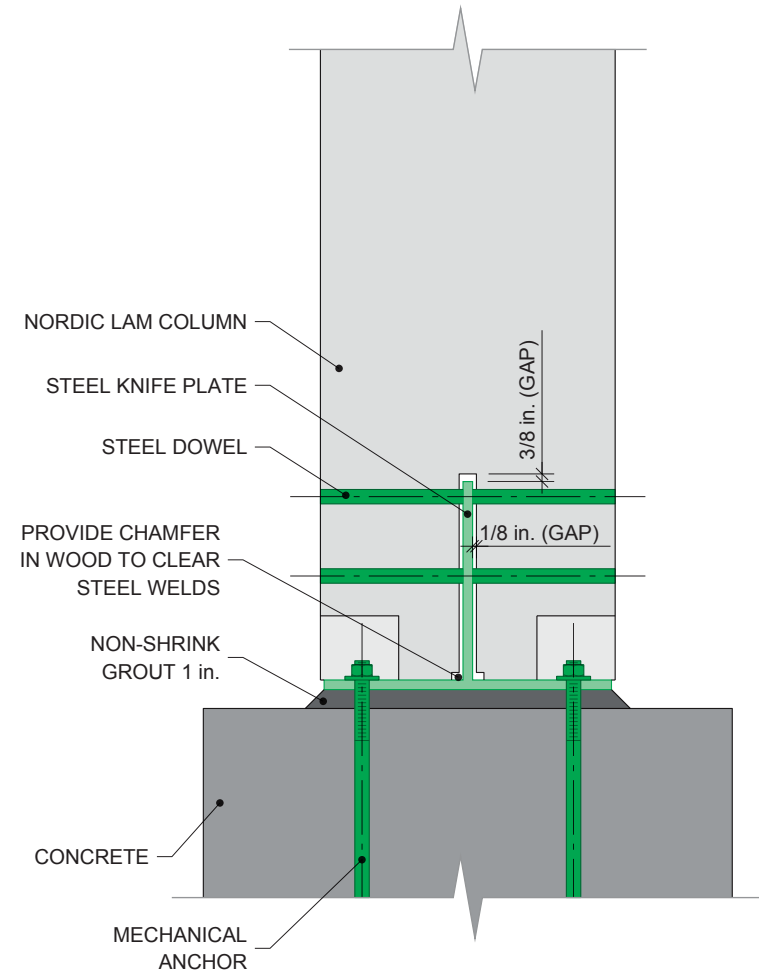
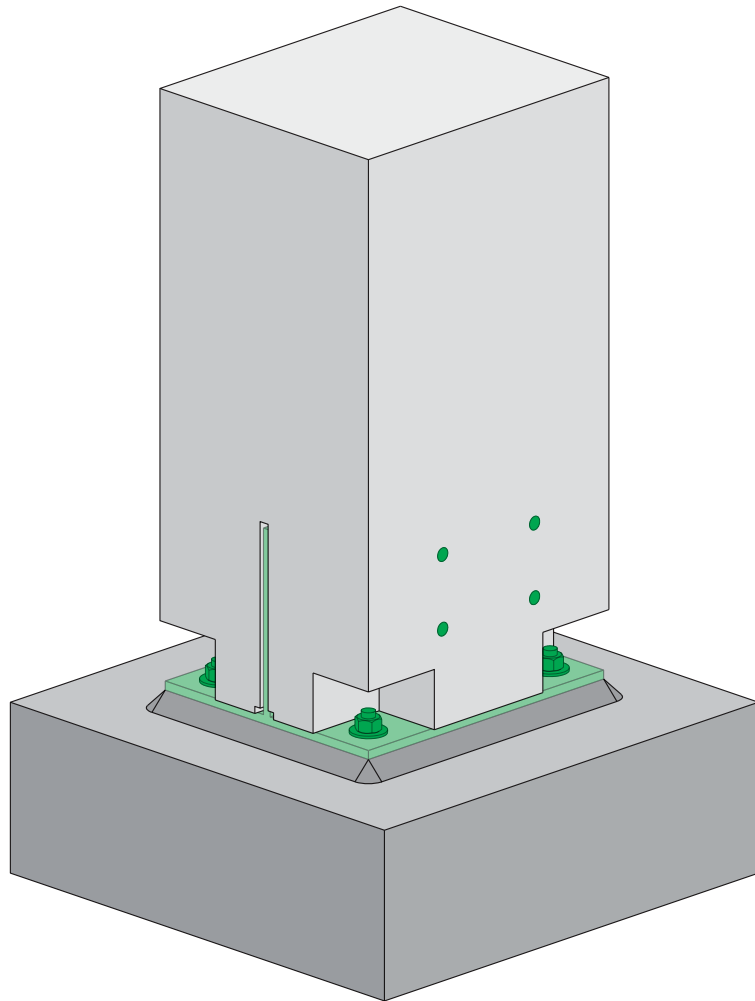


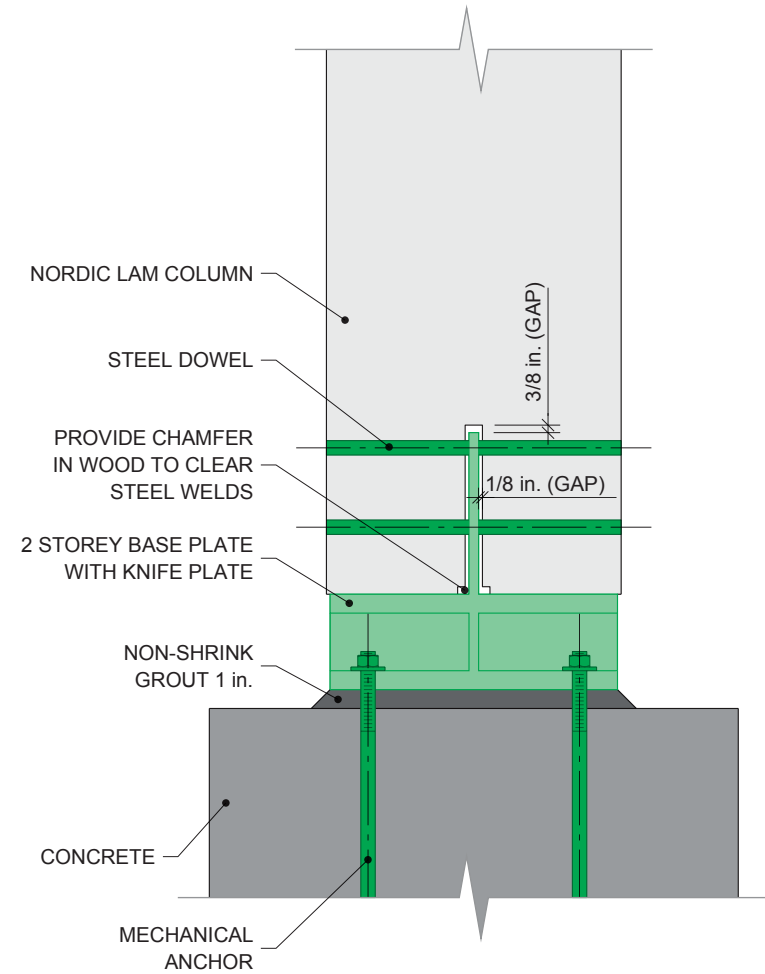
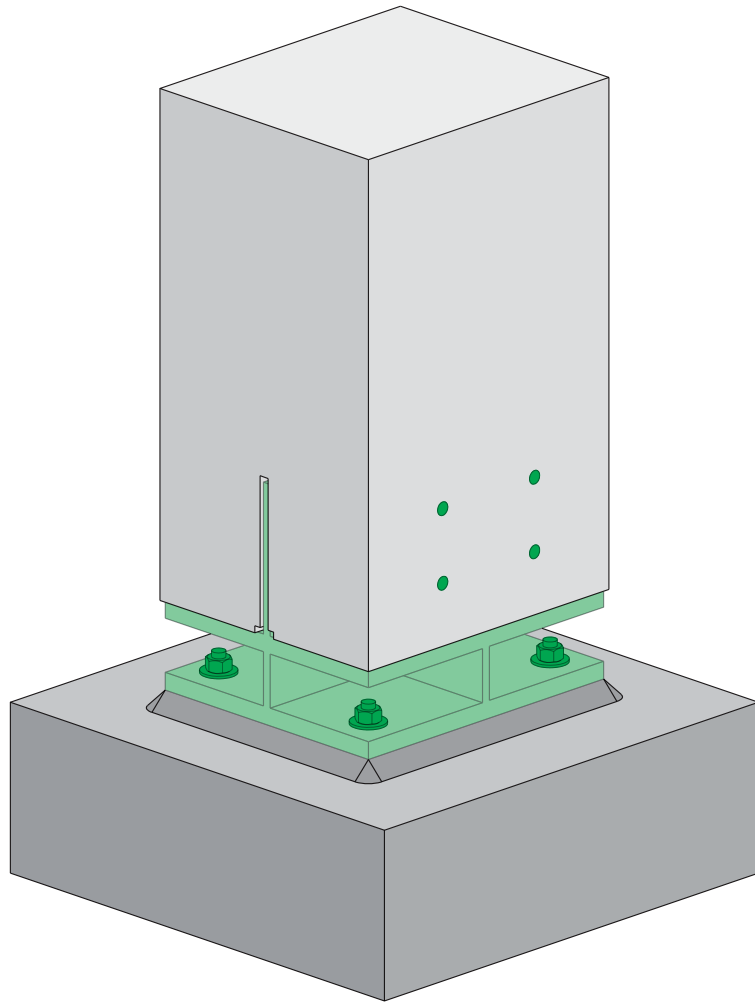


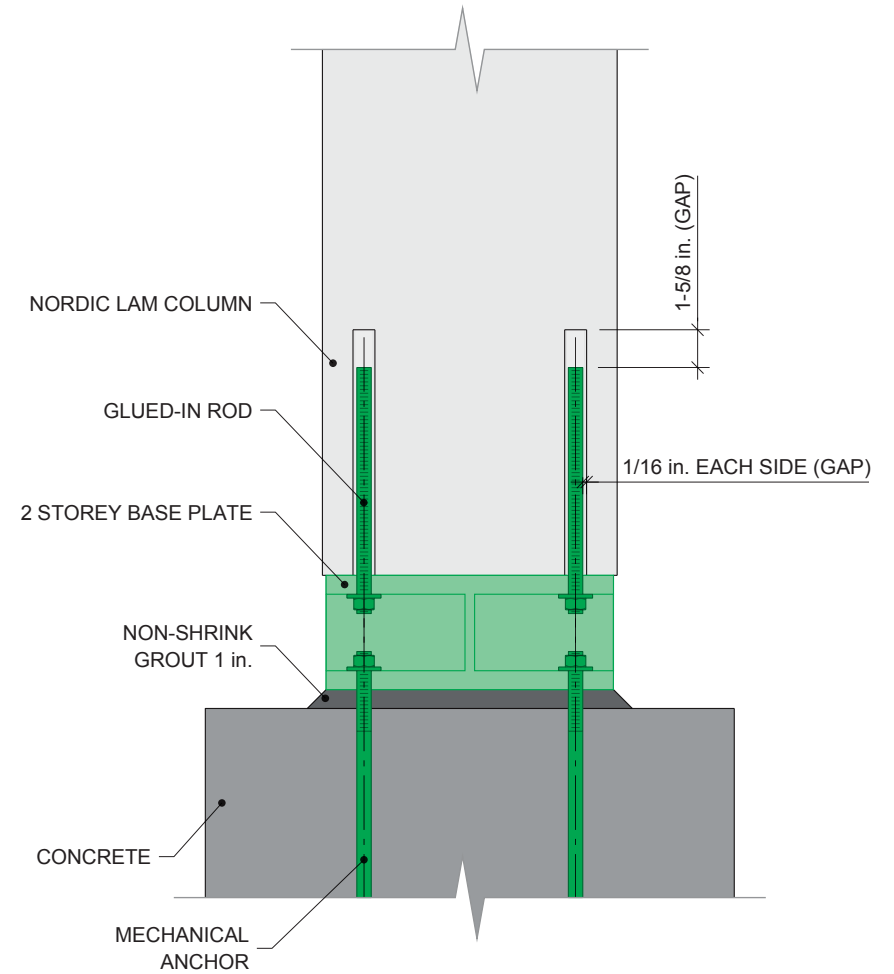
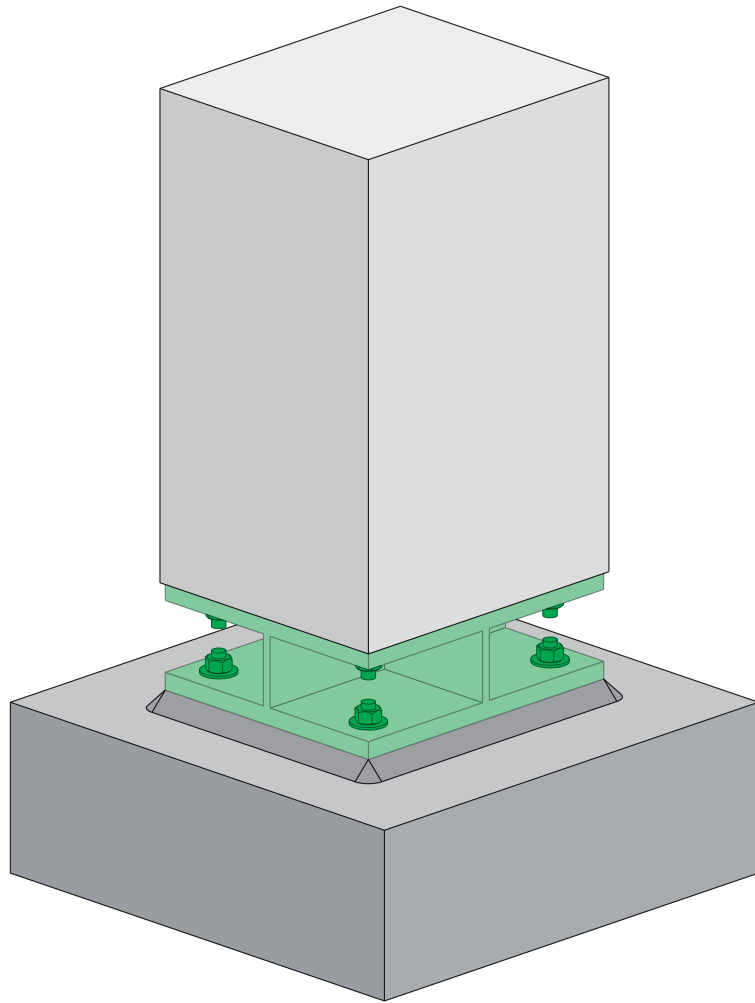


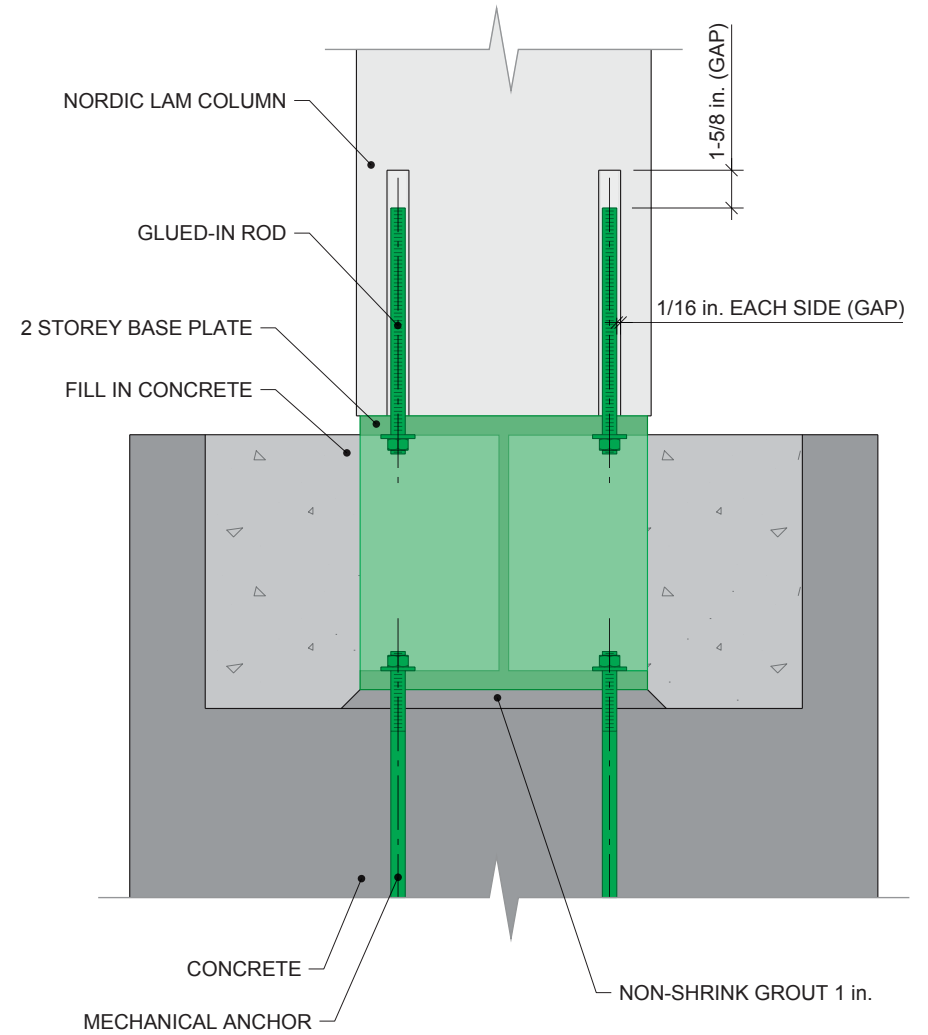
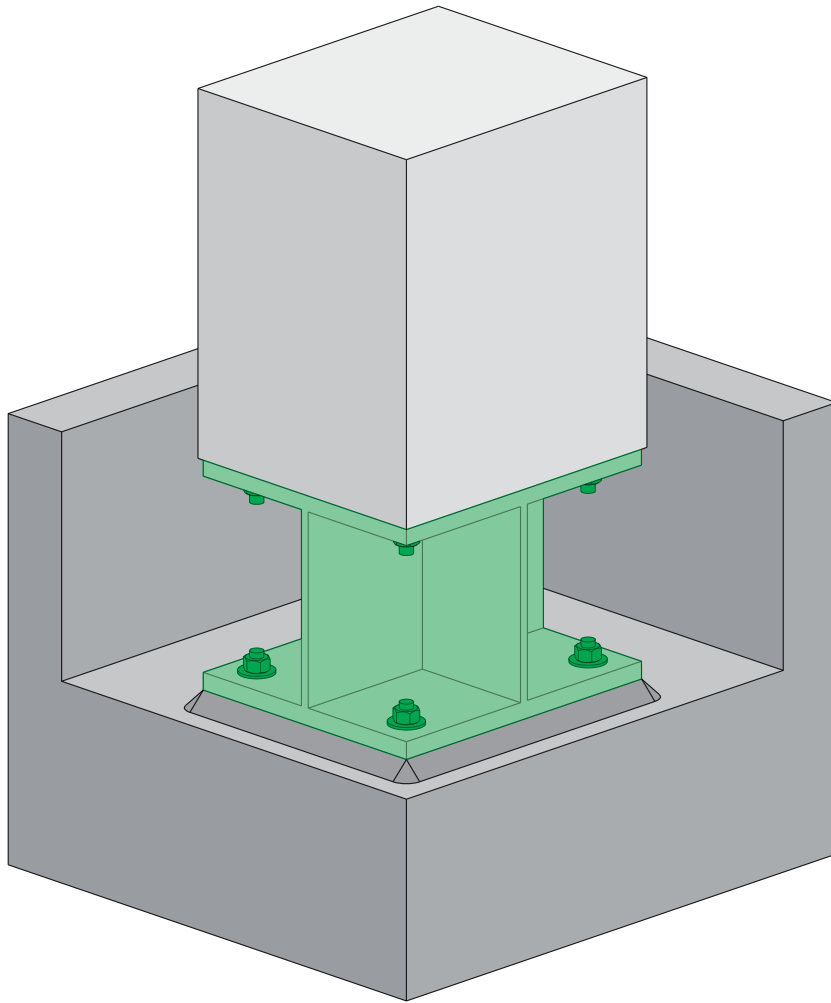


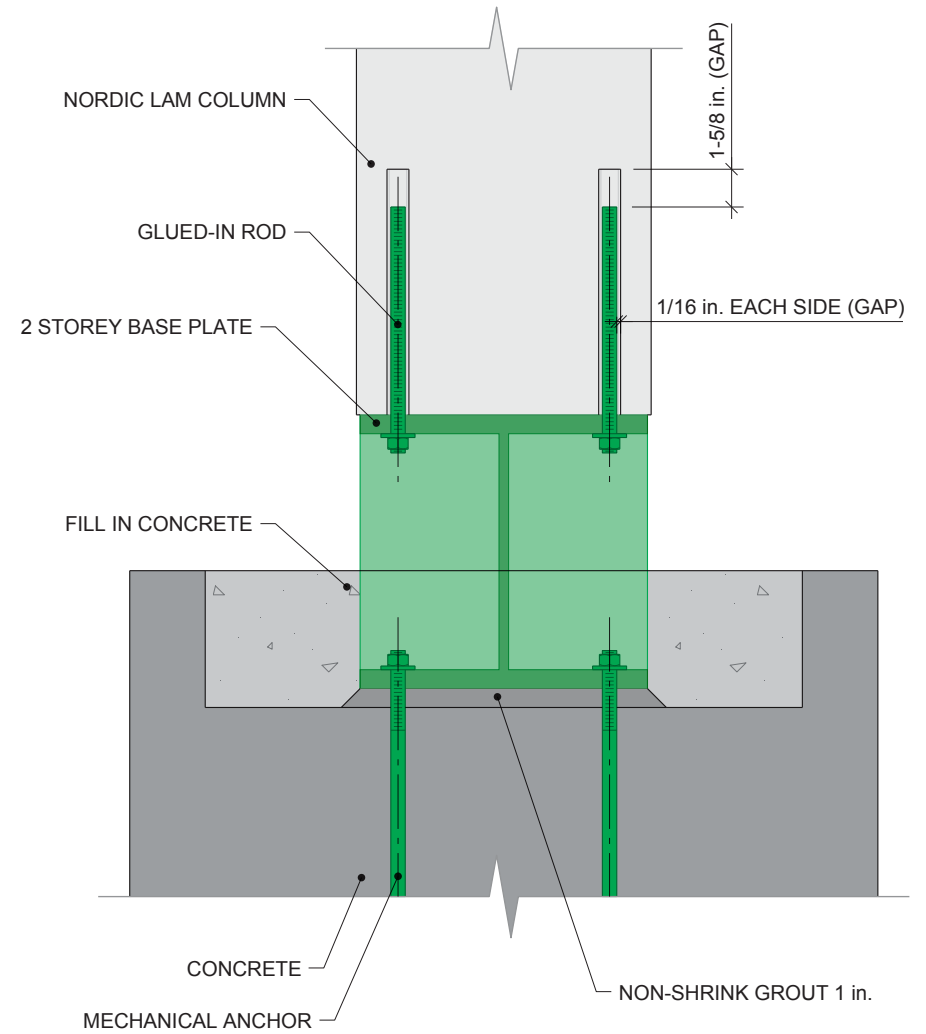
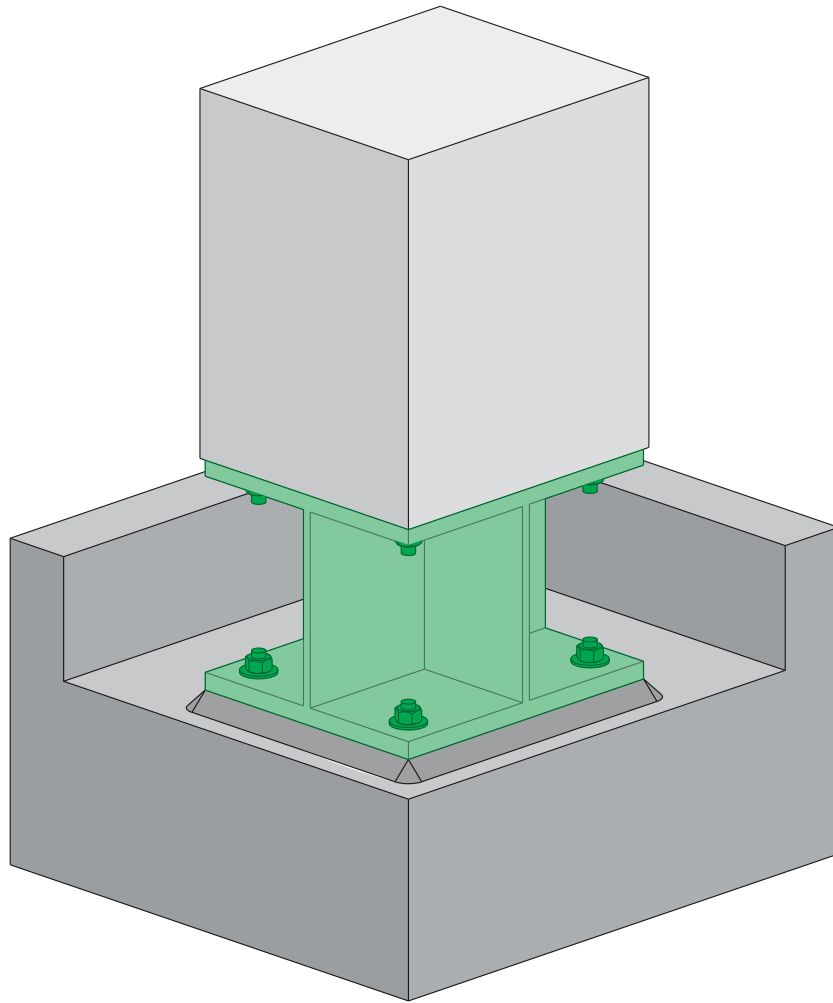


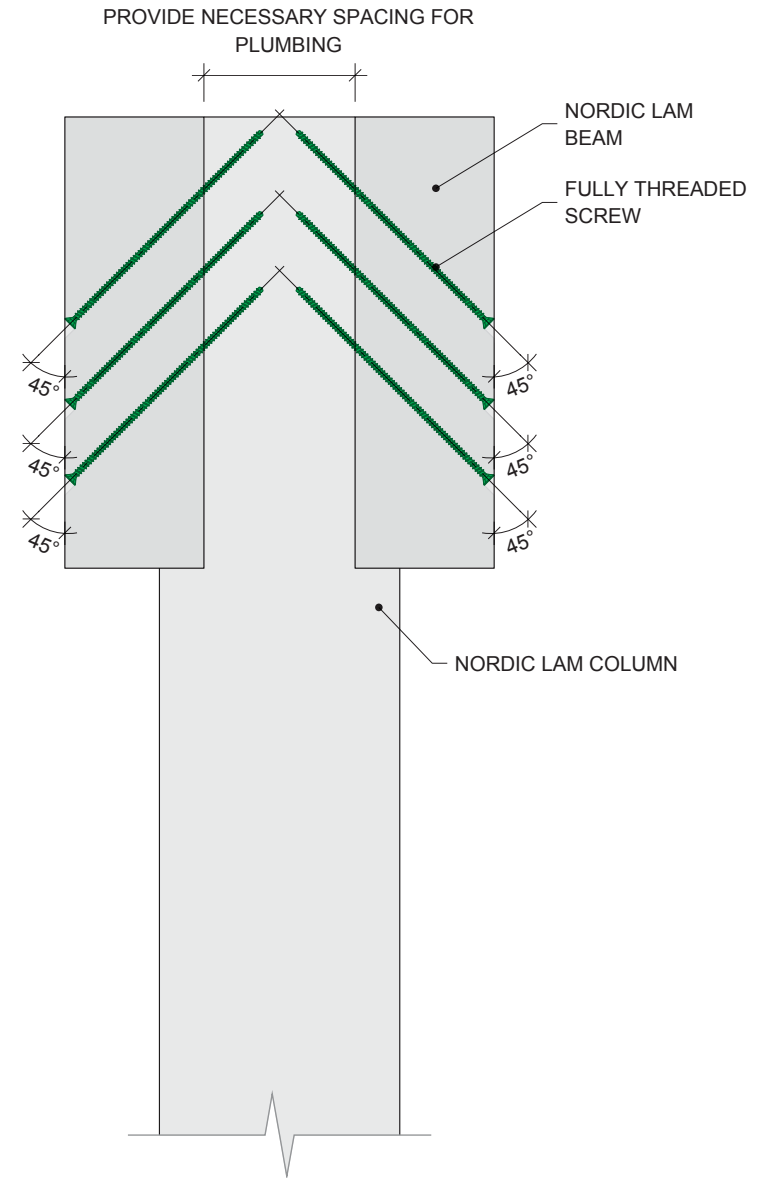
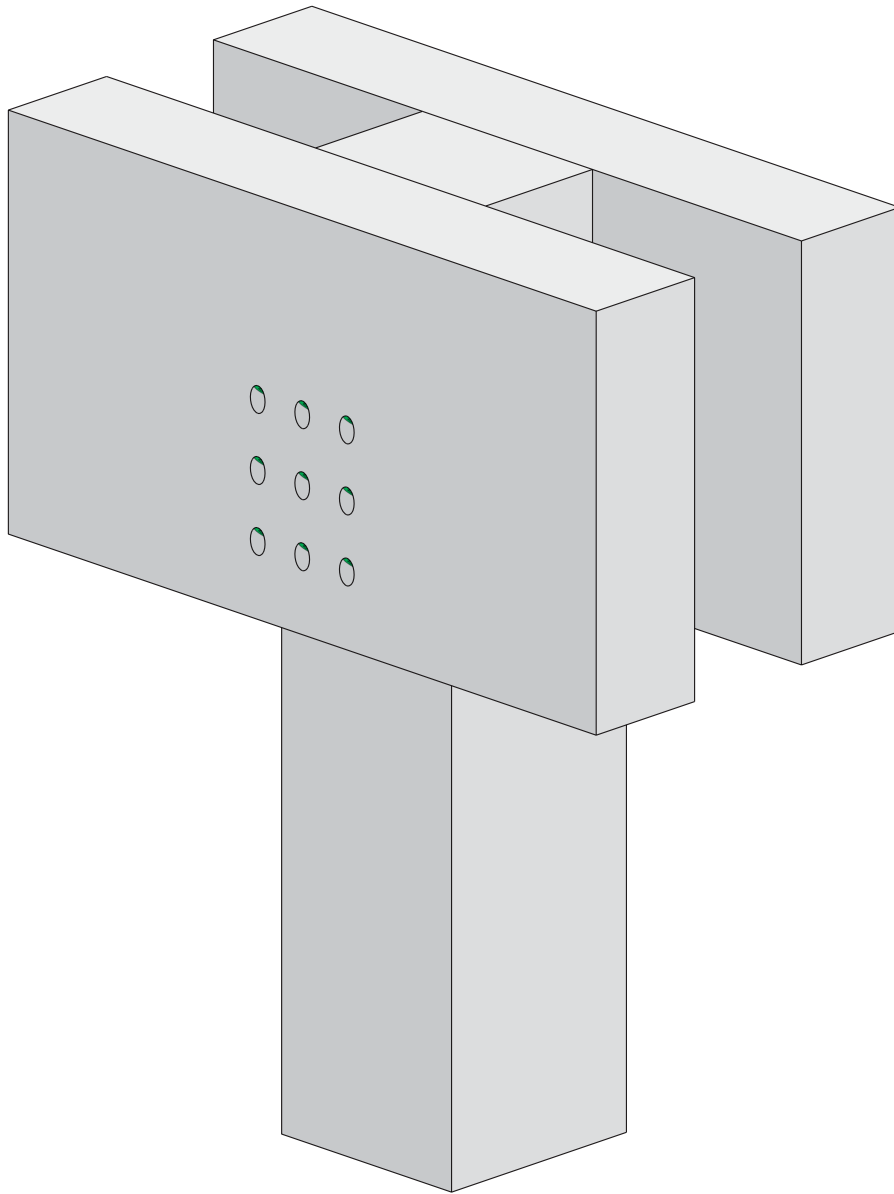


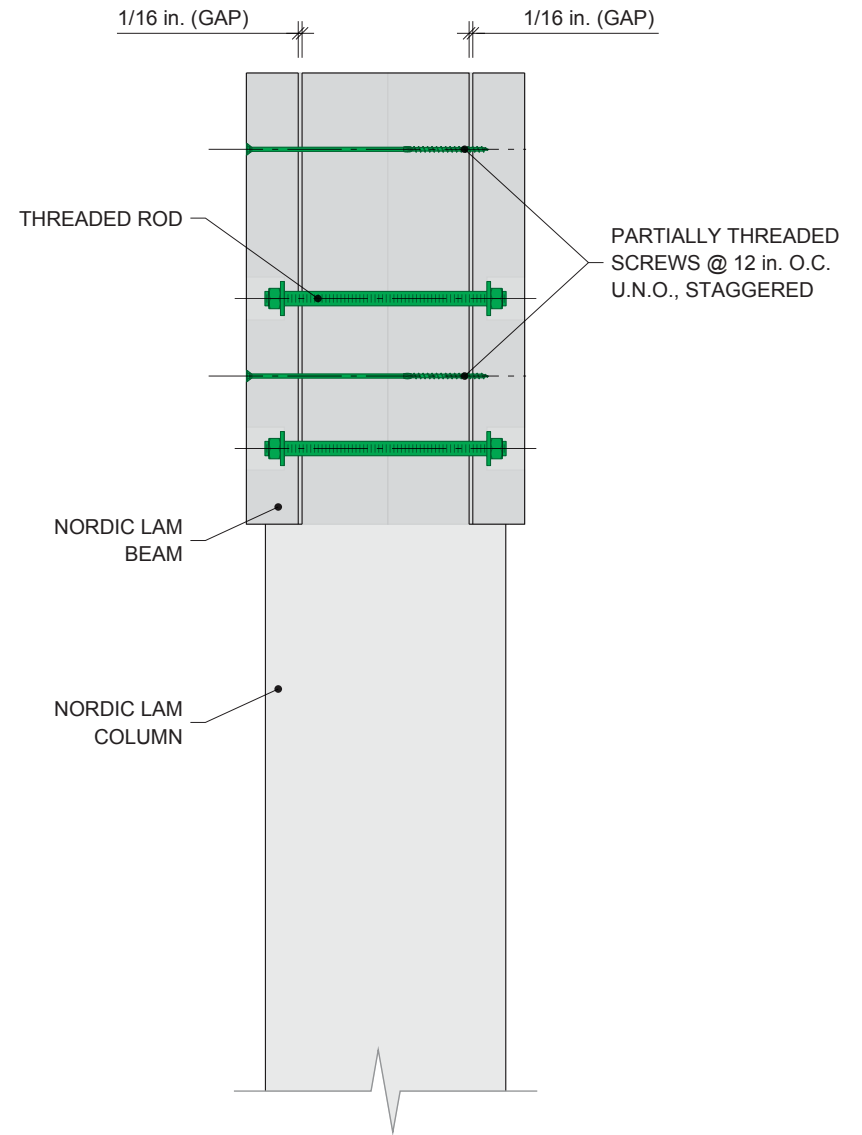
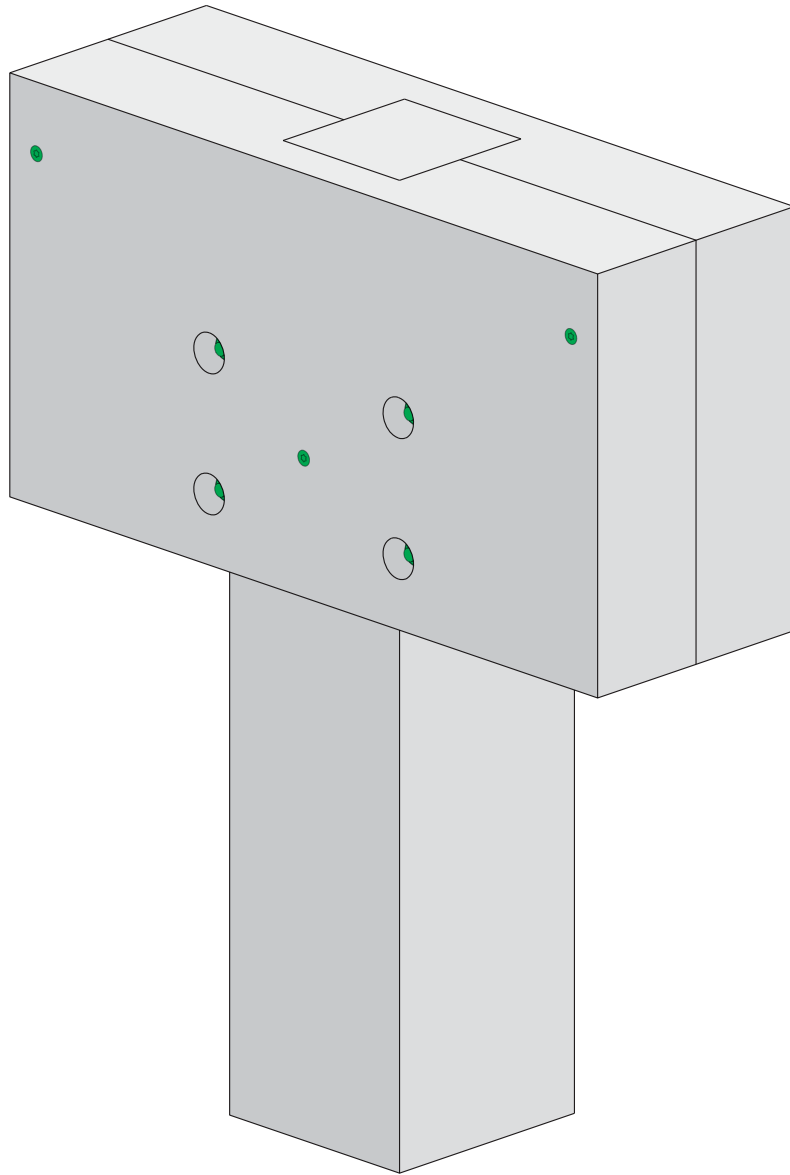




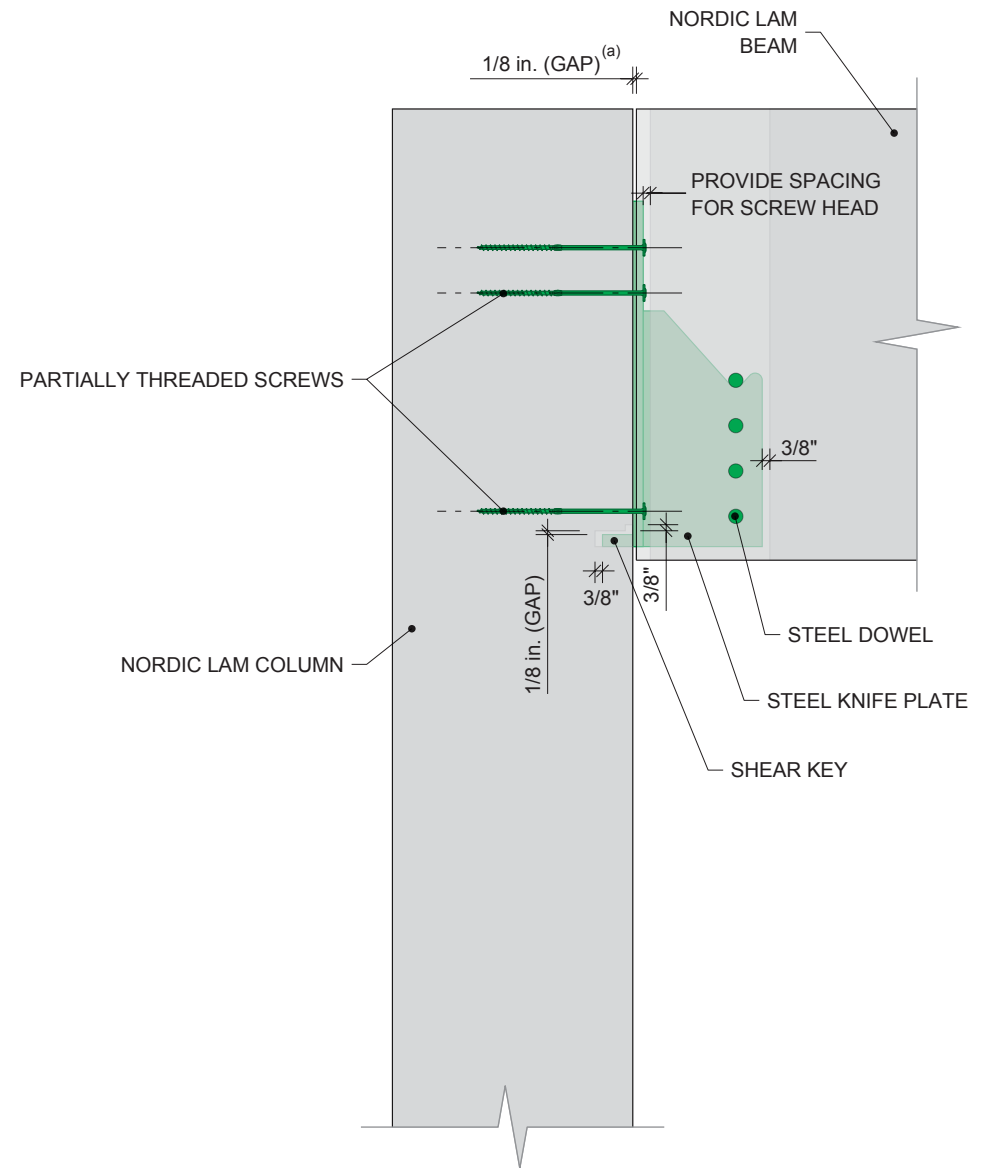
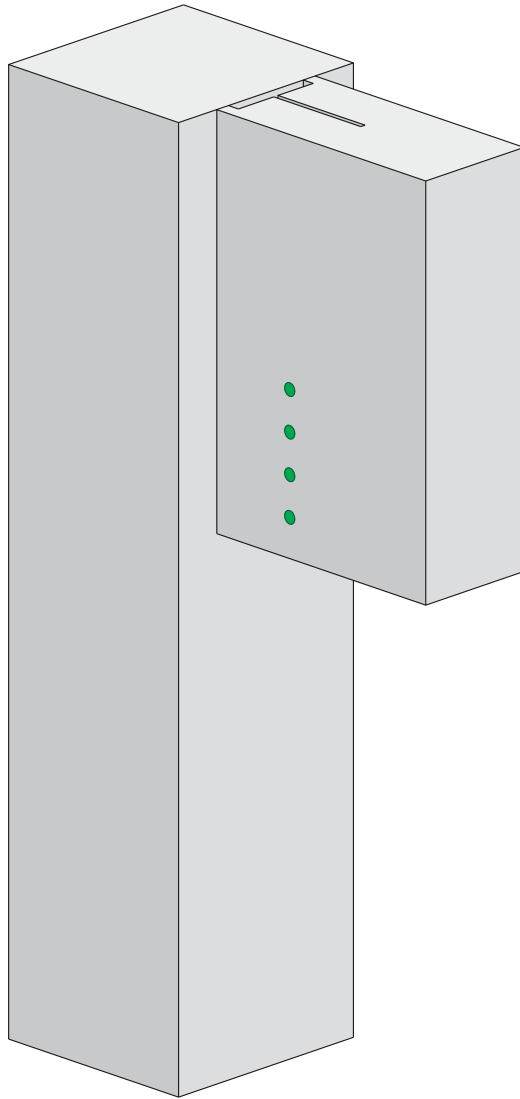




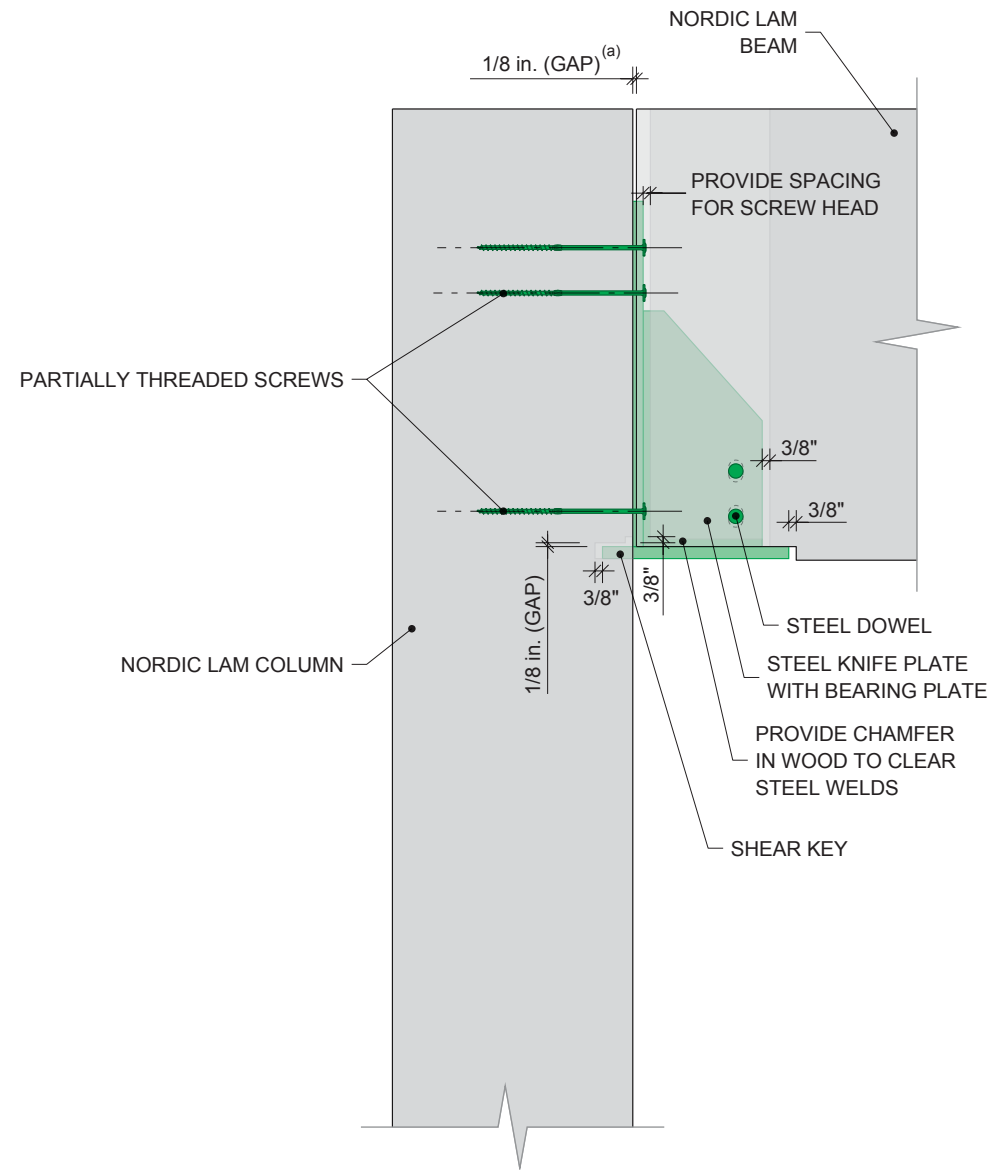
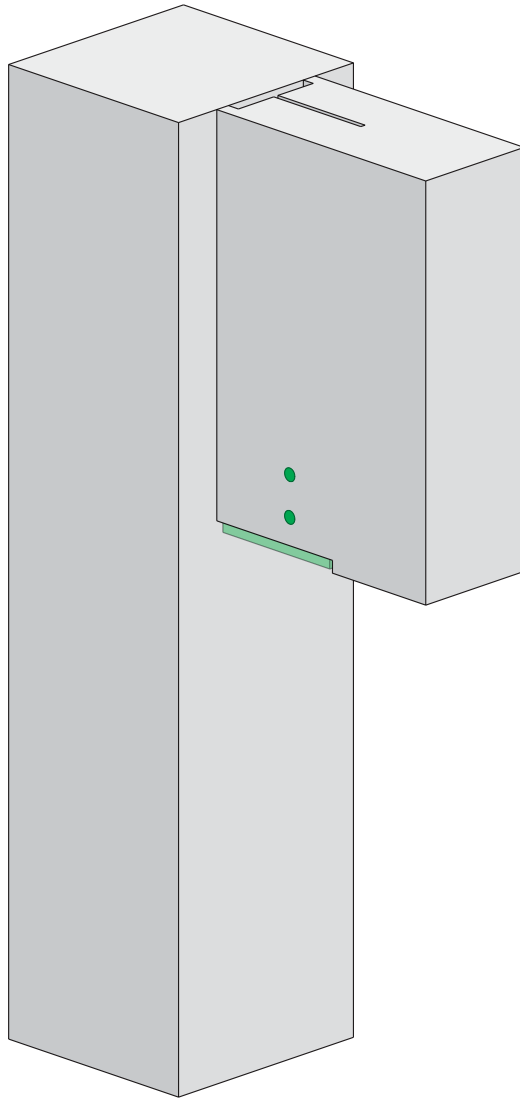




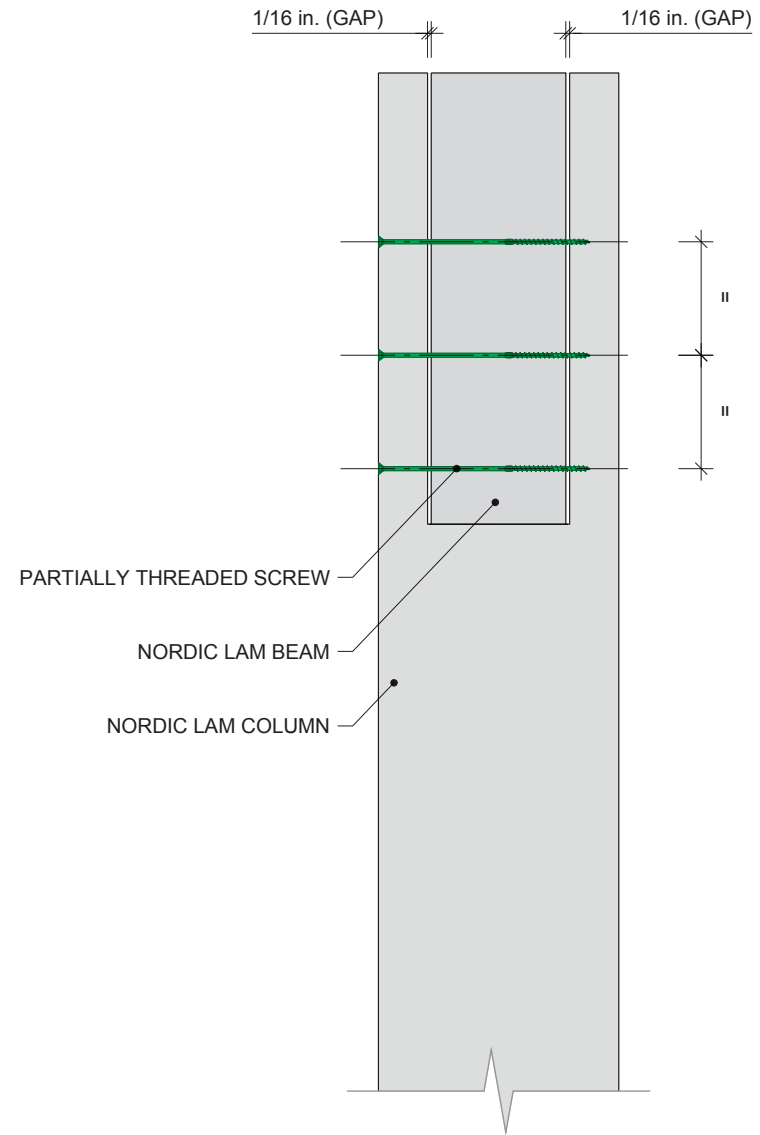
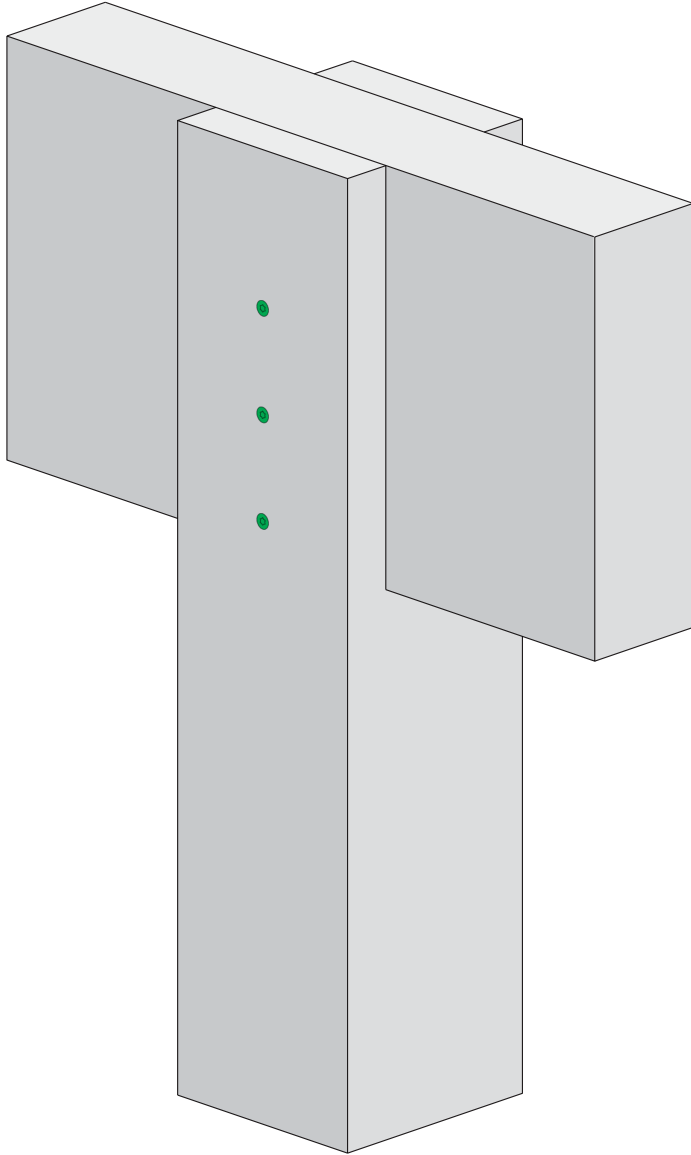


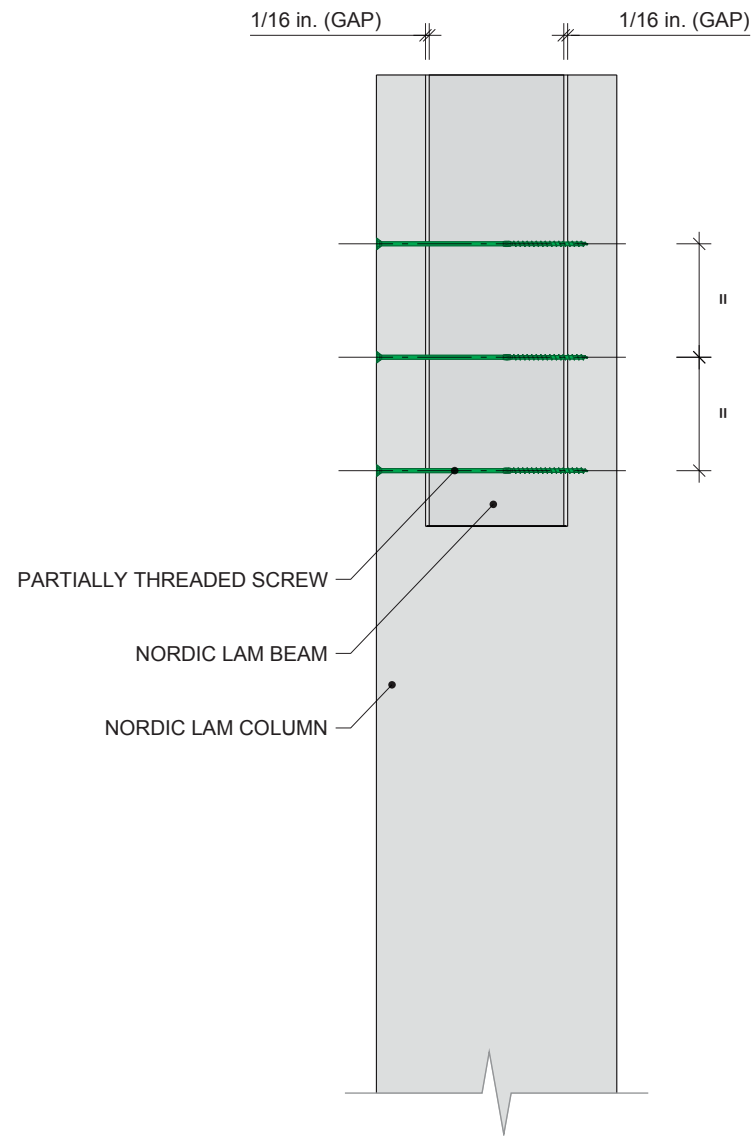
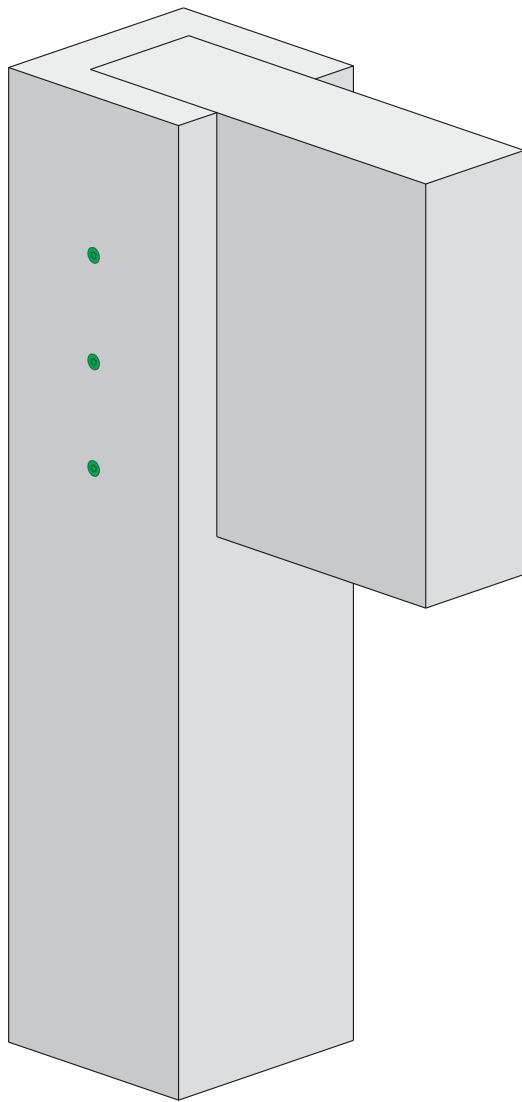


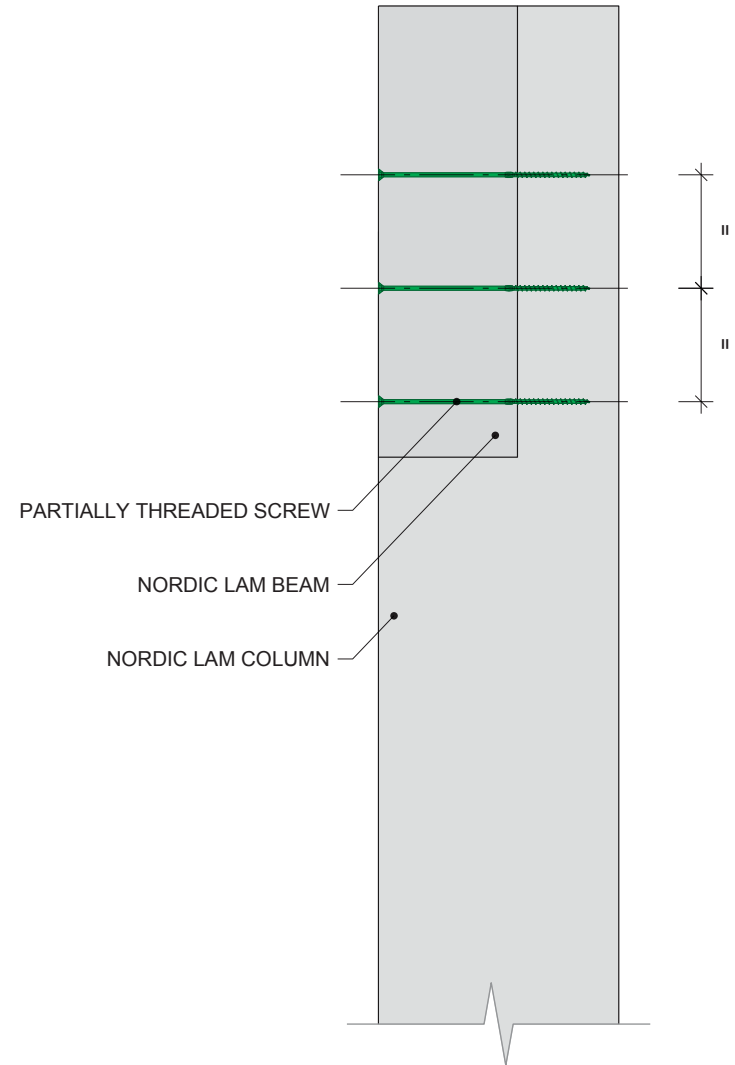
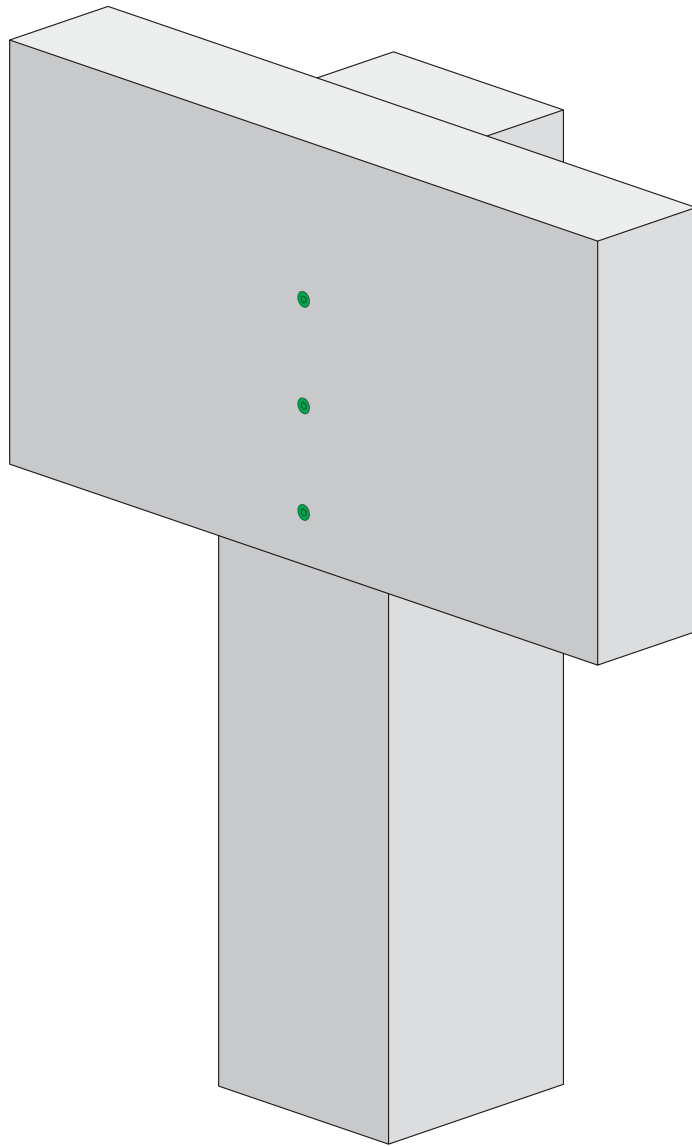
a) The 1/8 in. gap may not be required depending on the detail on the other side of the beam.

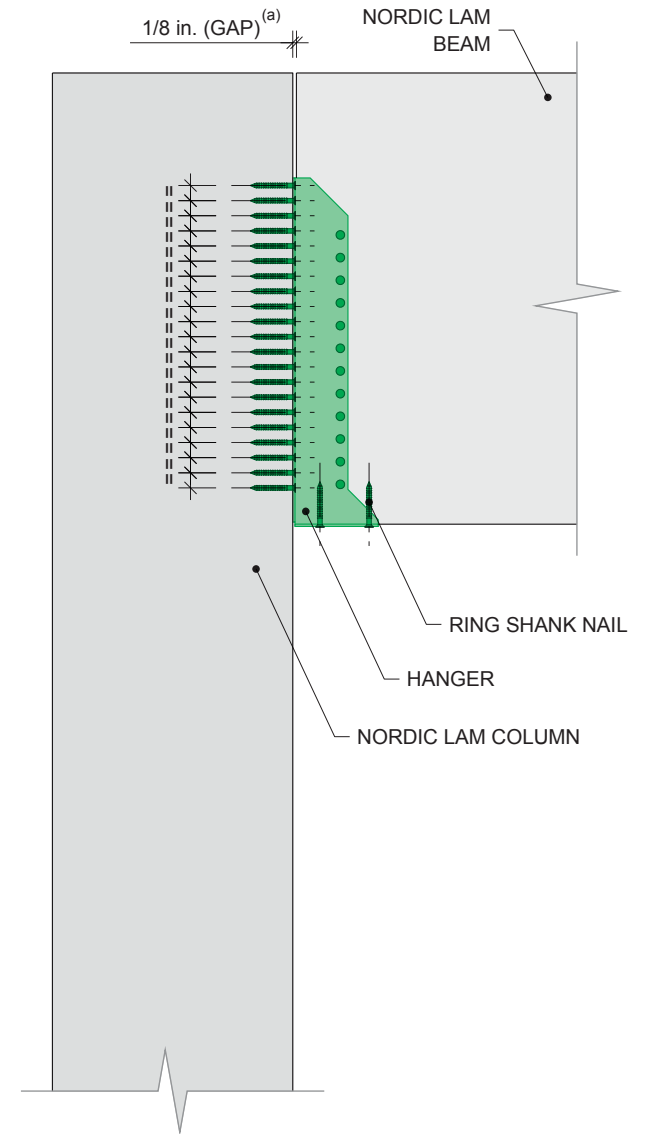
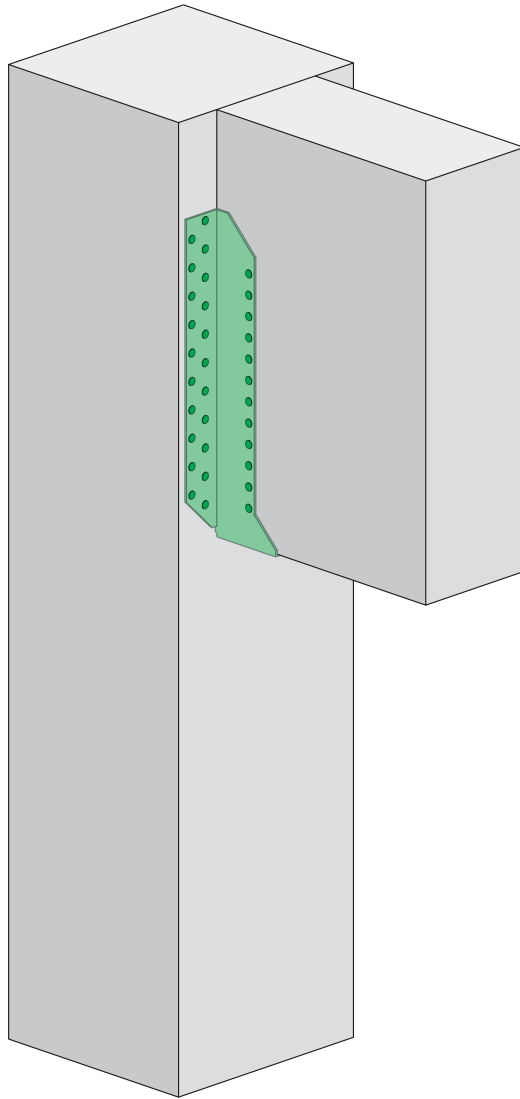


a) The 1/8 in. gap may not be required depending on the detail on the other side of the beam.

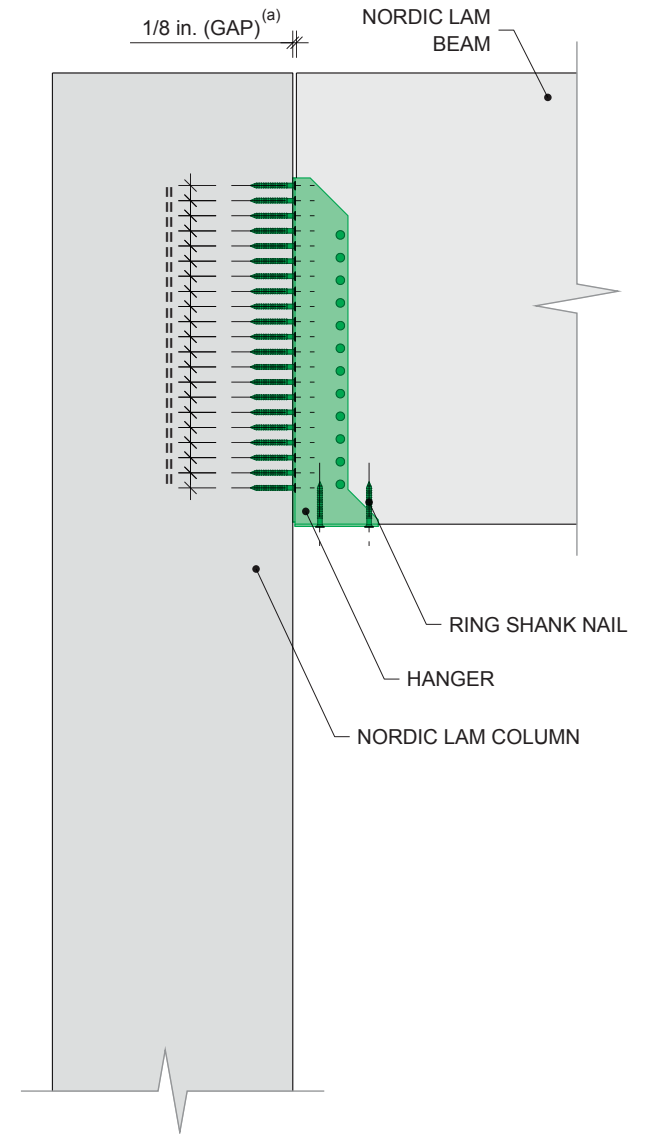
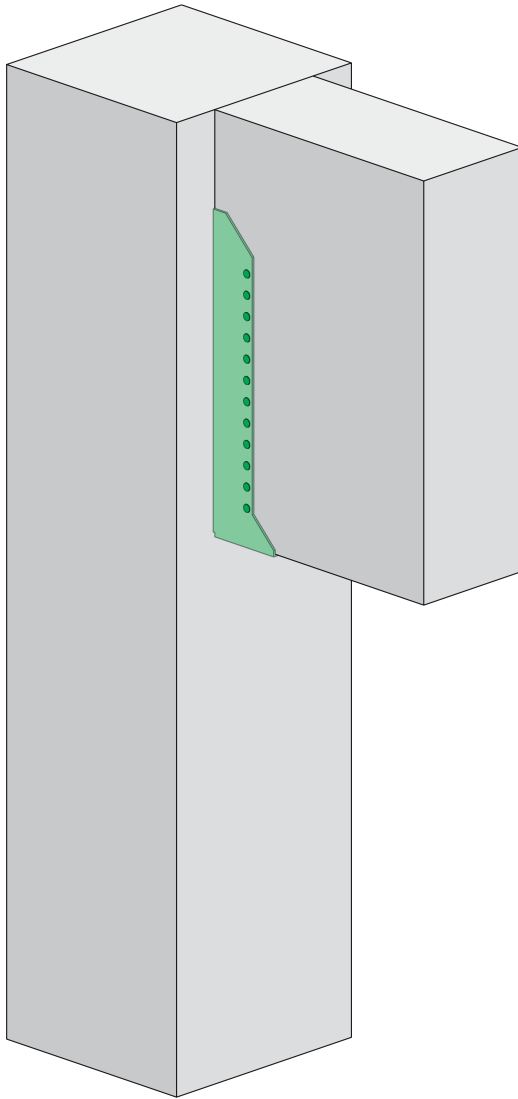




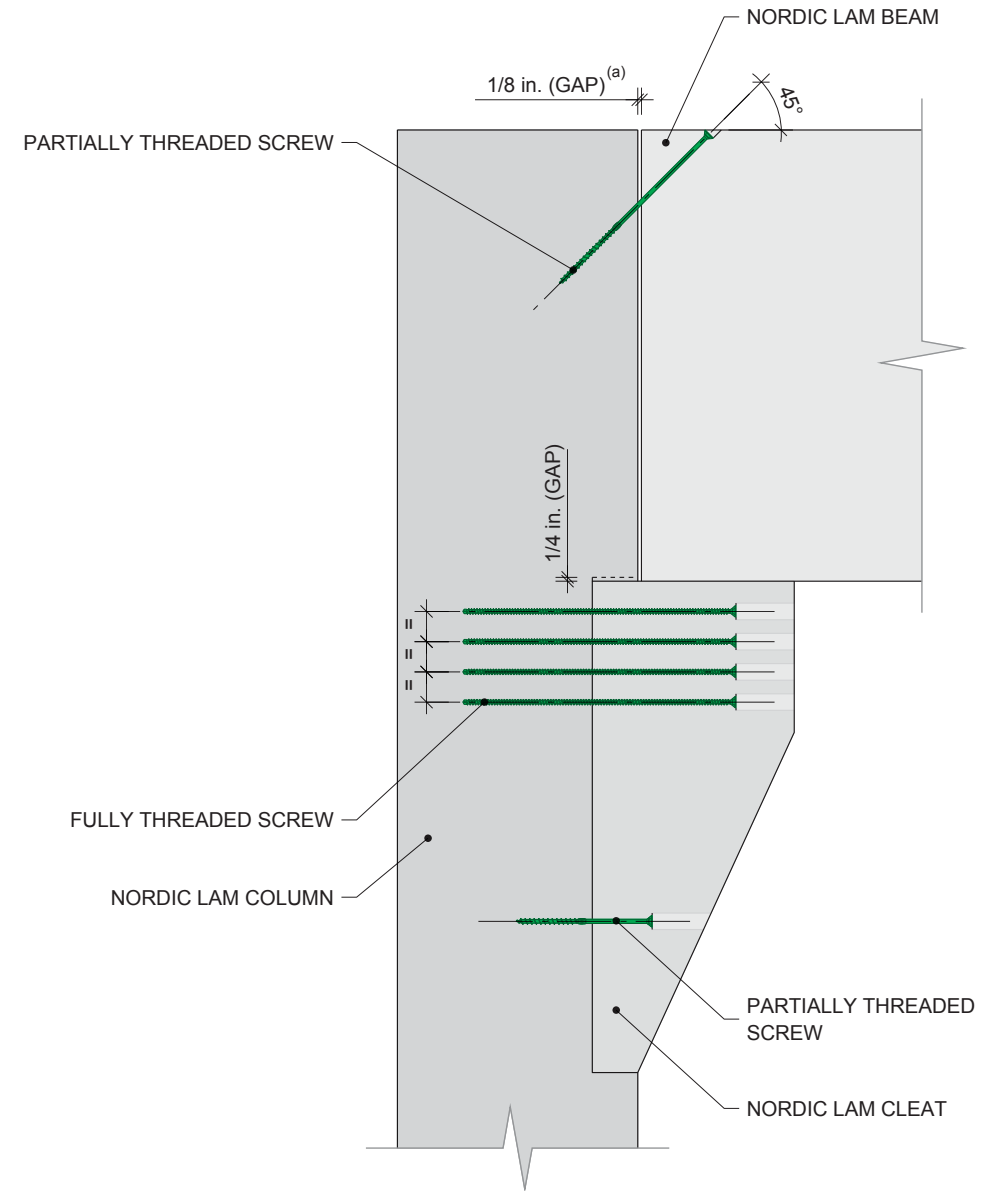
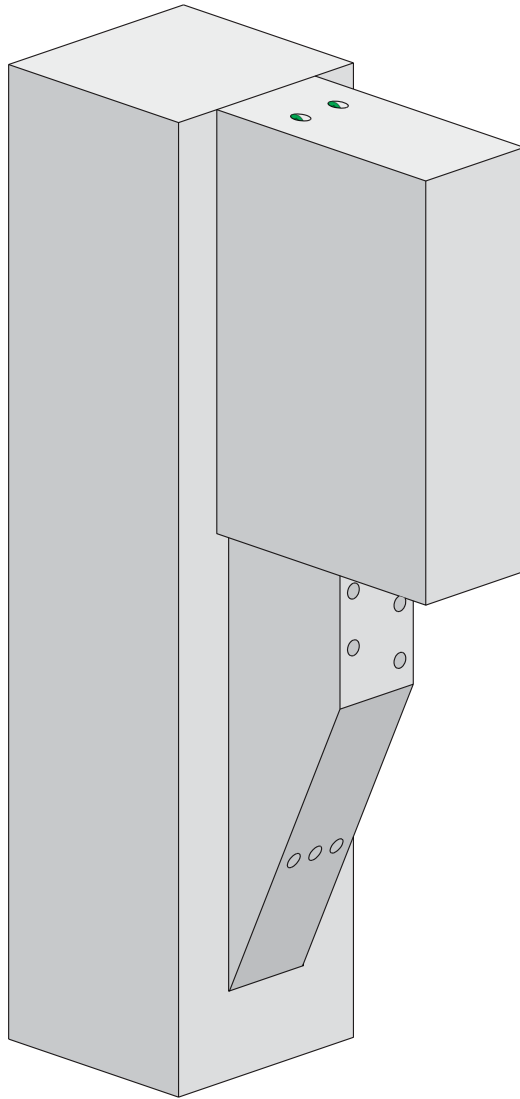




a) The 1/8 in. gap may not be required depending on the detail on the other side of the beam.

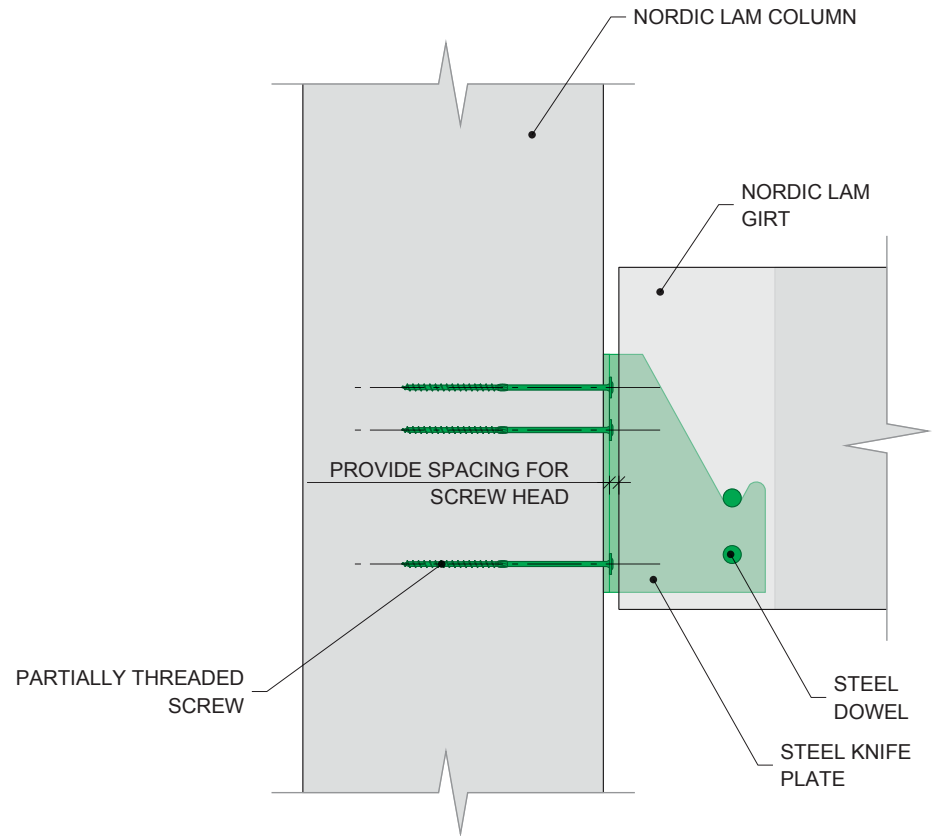
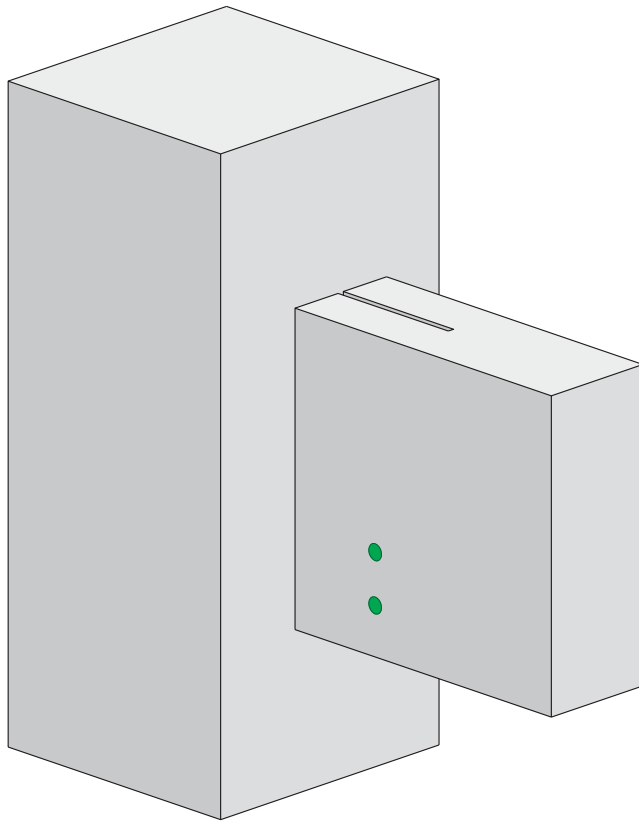


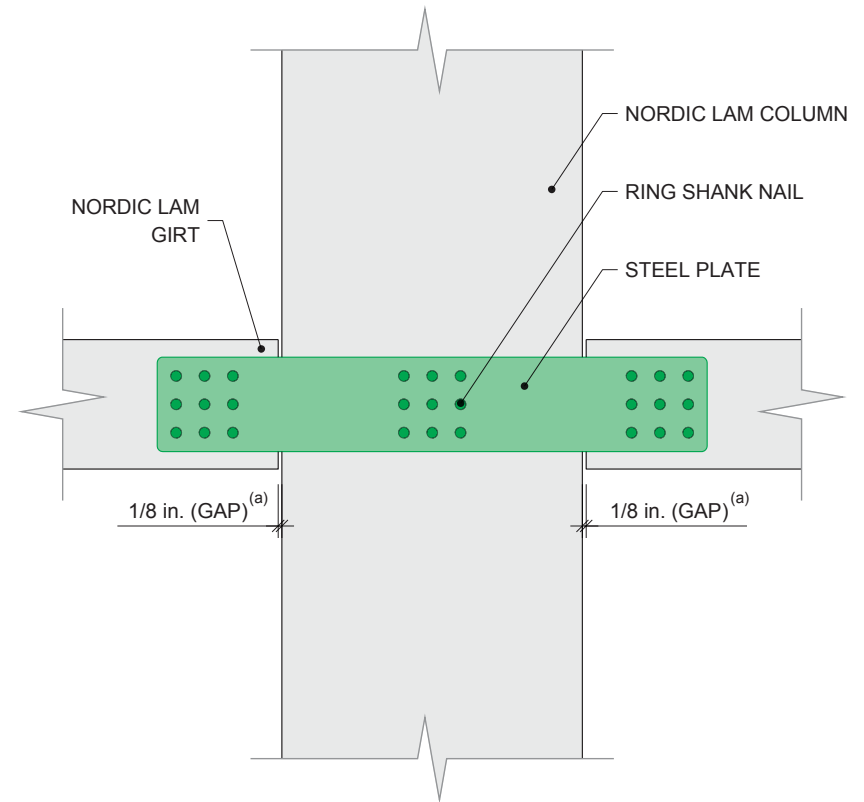
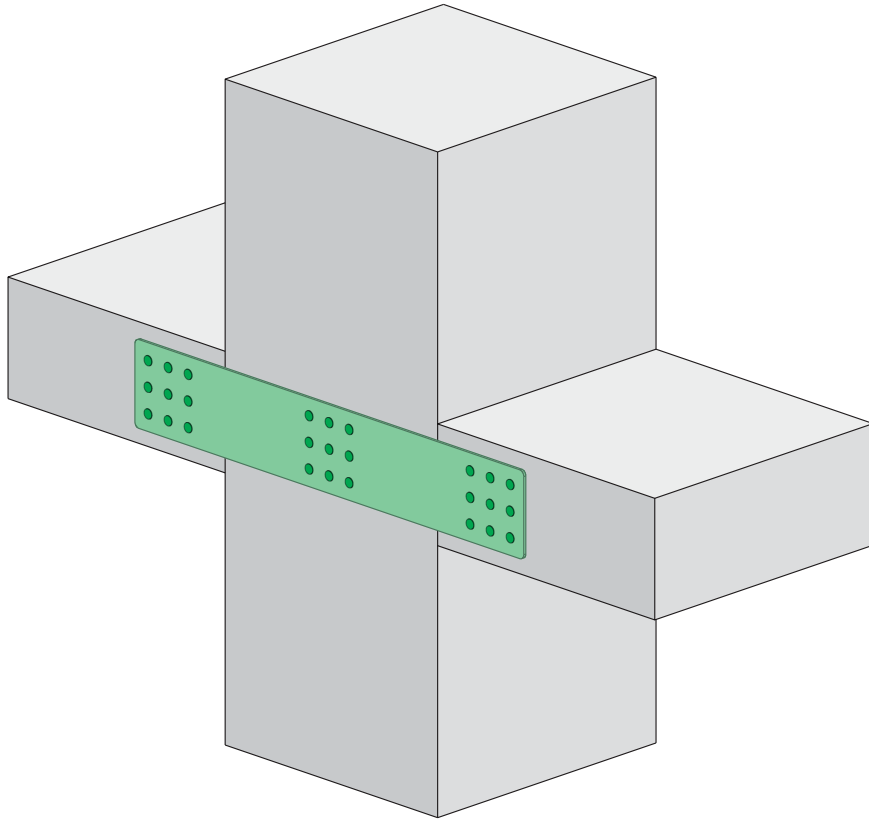
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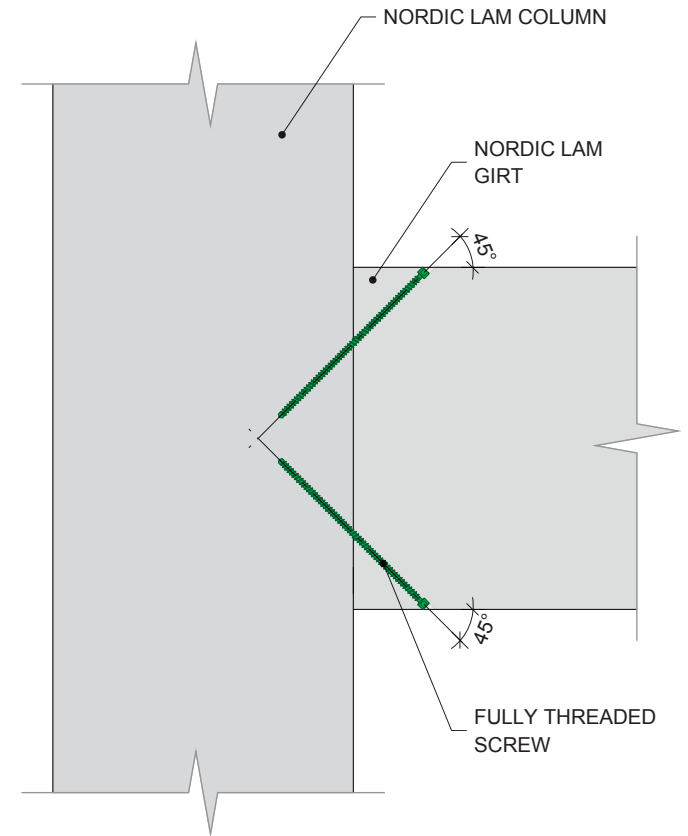
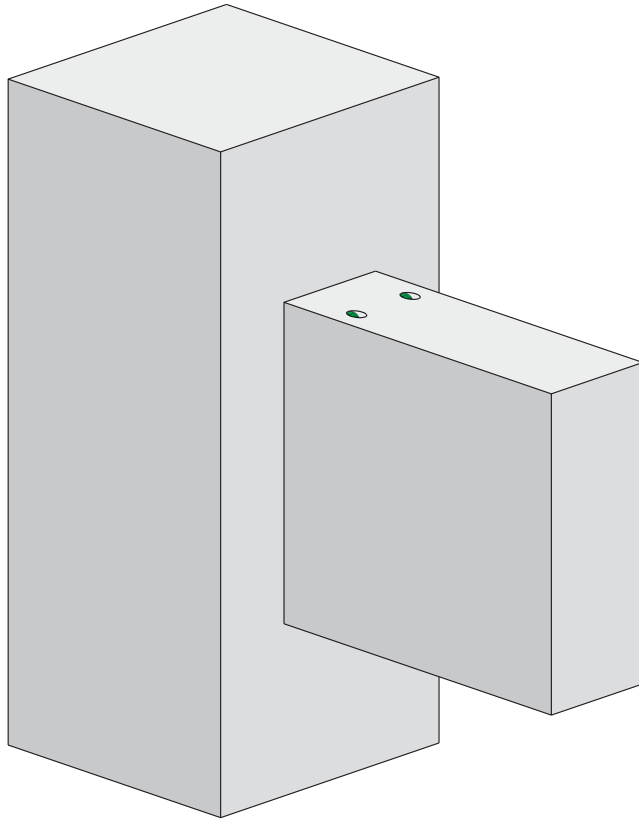
a) The 1/8 in. gap may not be required depending on the detail on the other side of the beam.

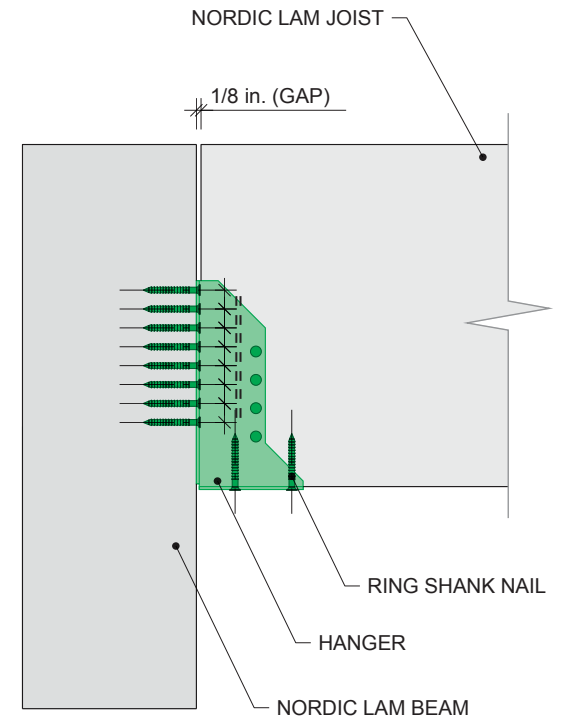
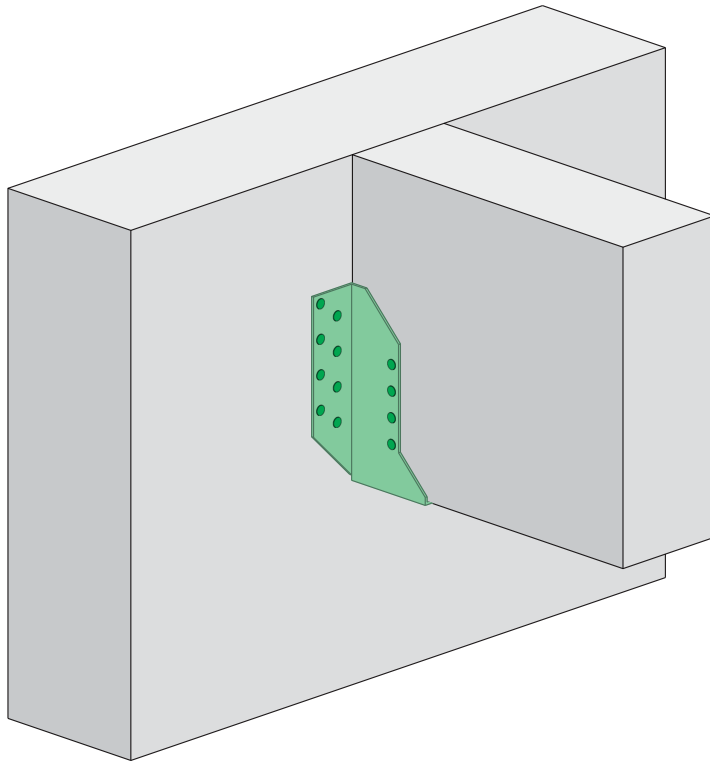


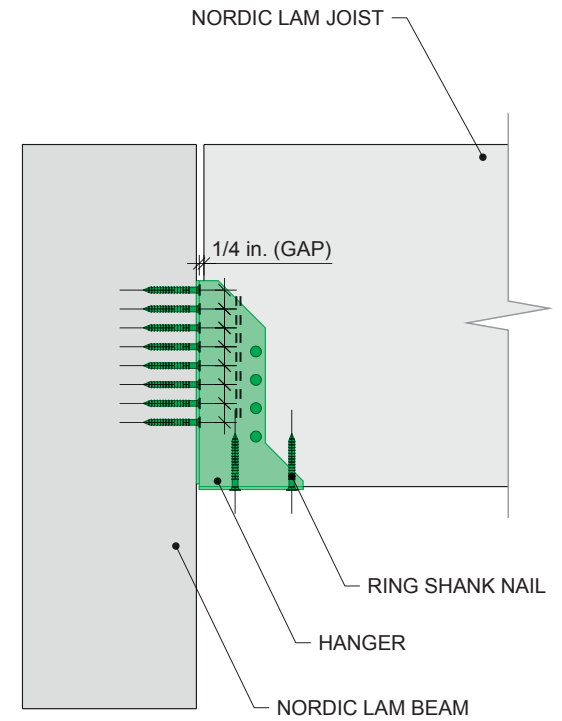
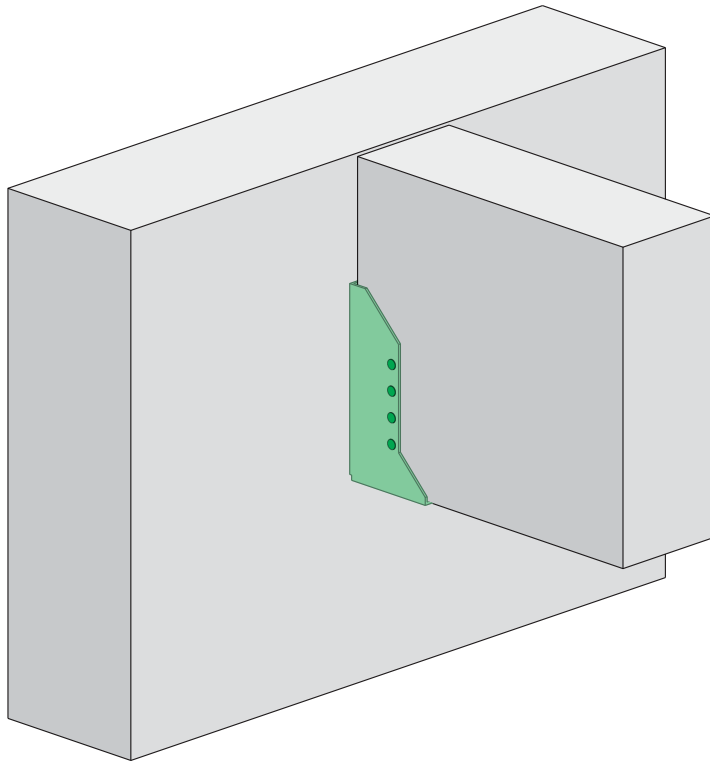


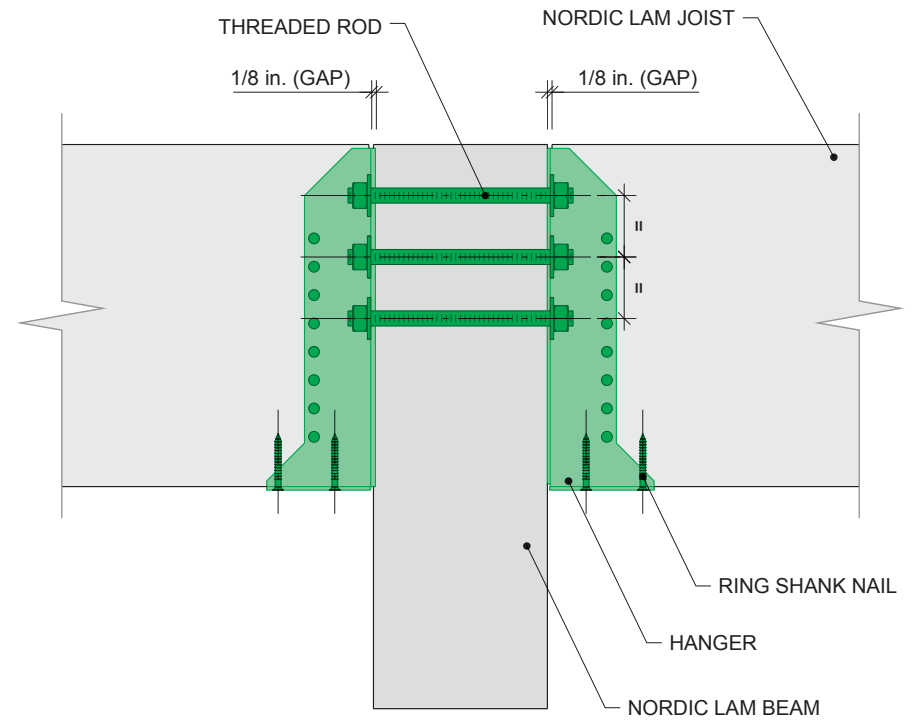
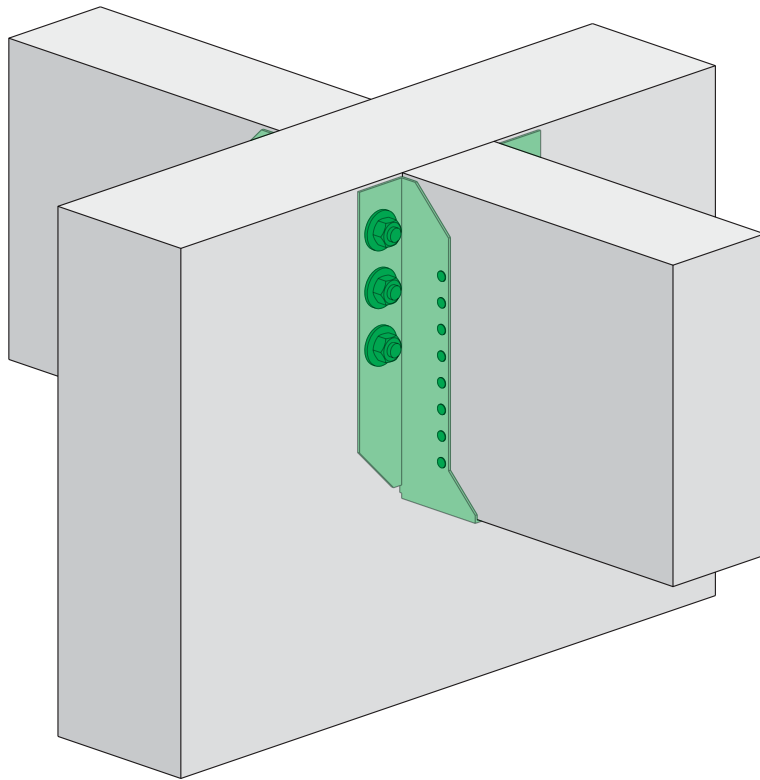


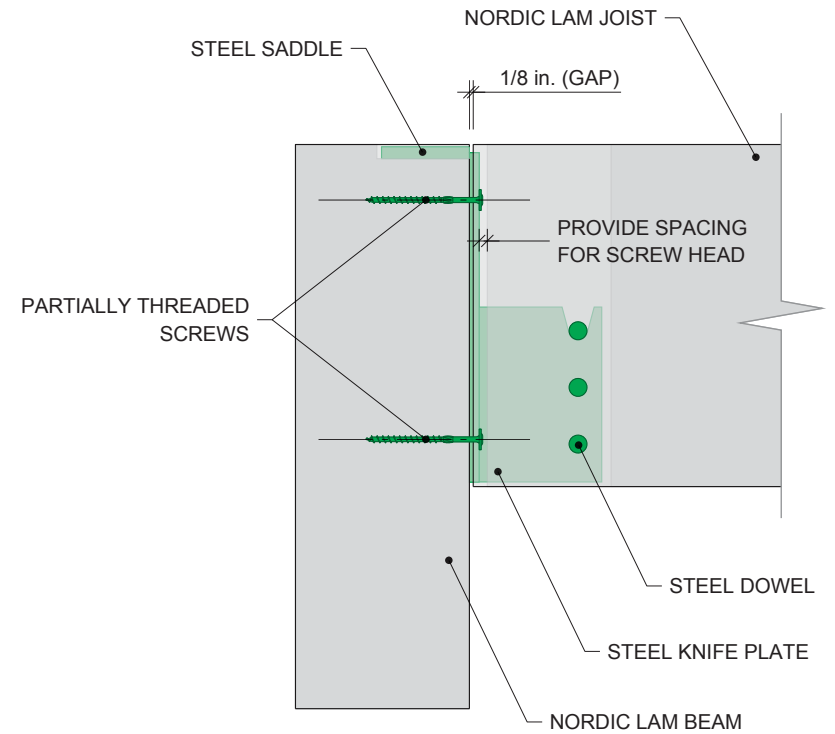
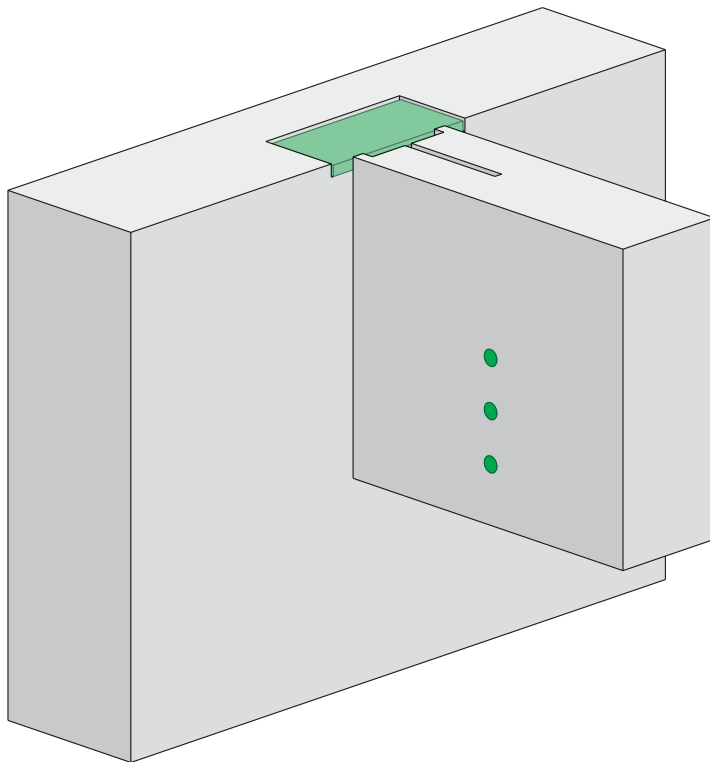
a) The 1/8 in. gap may not be required depending on the detail on the other side of the beam.

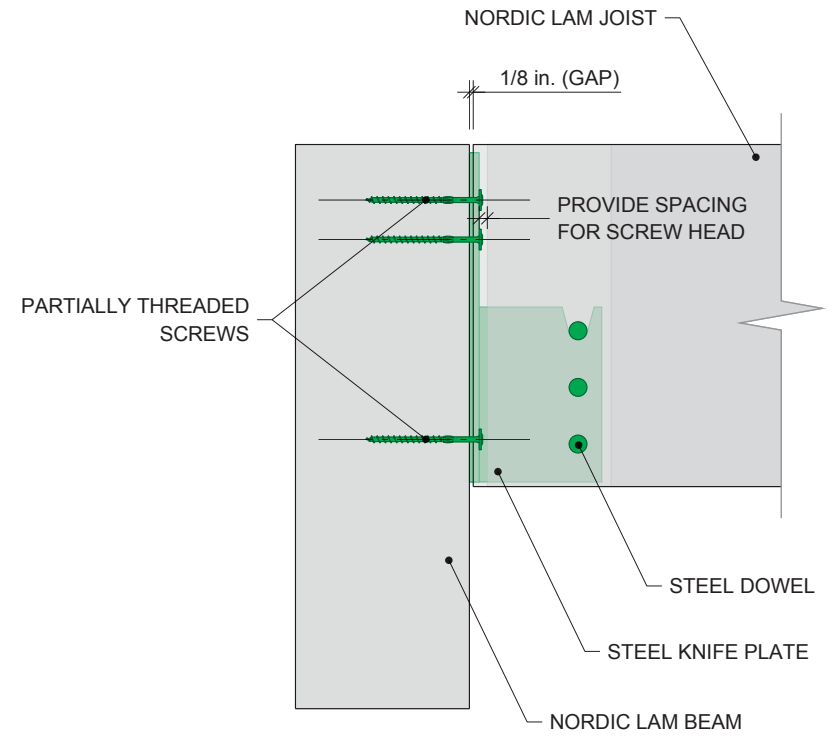
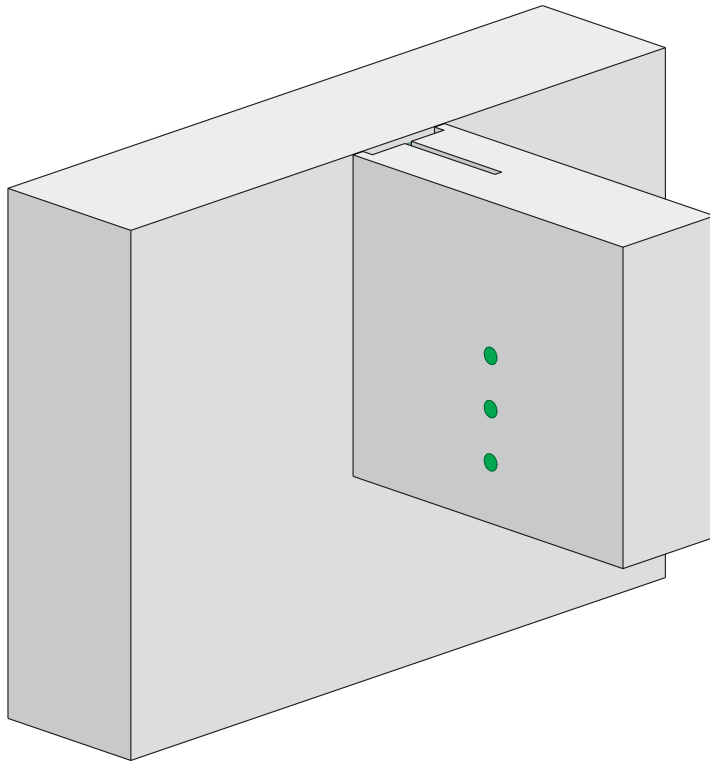




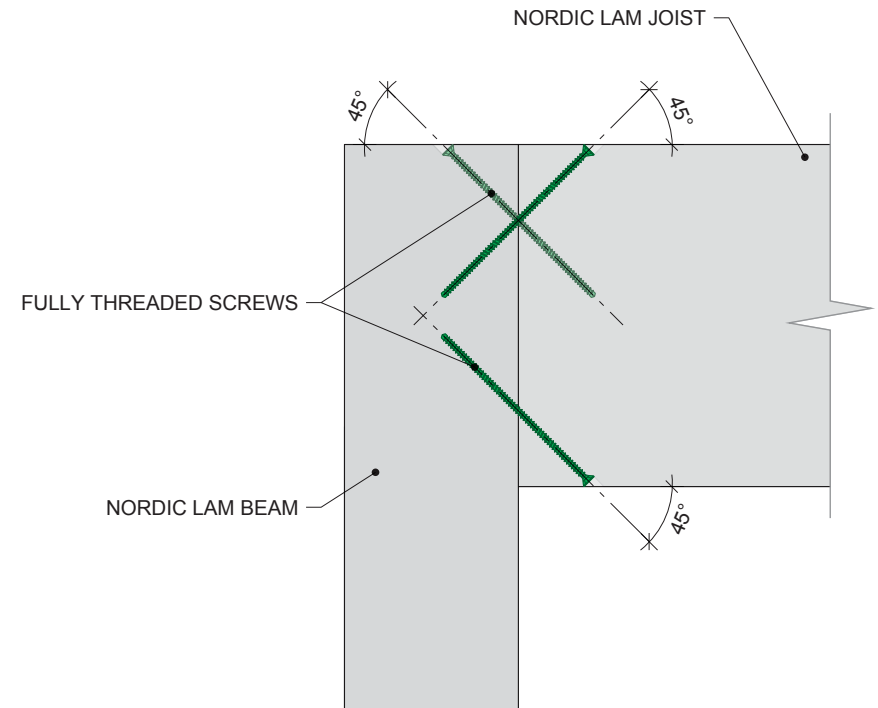
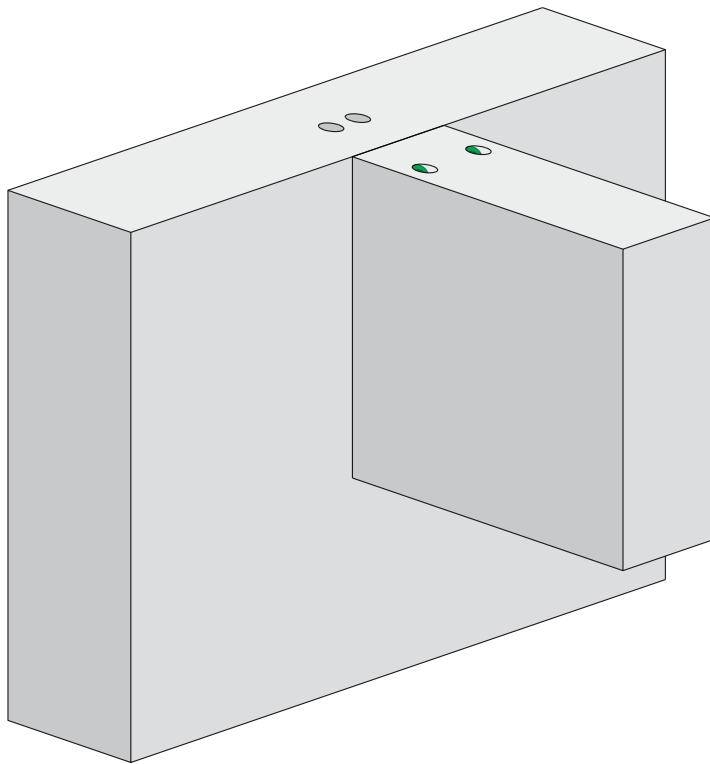


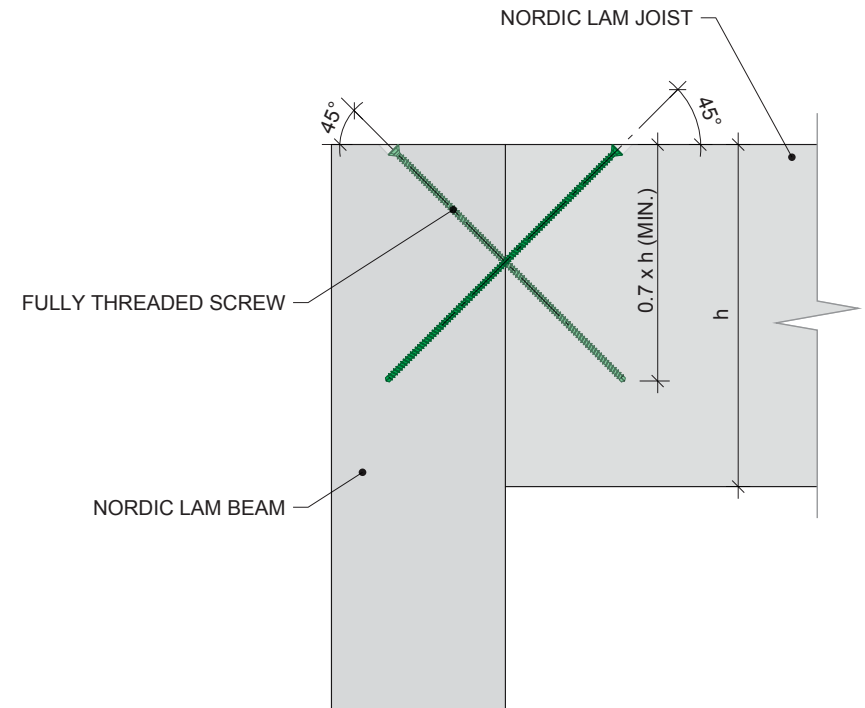
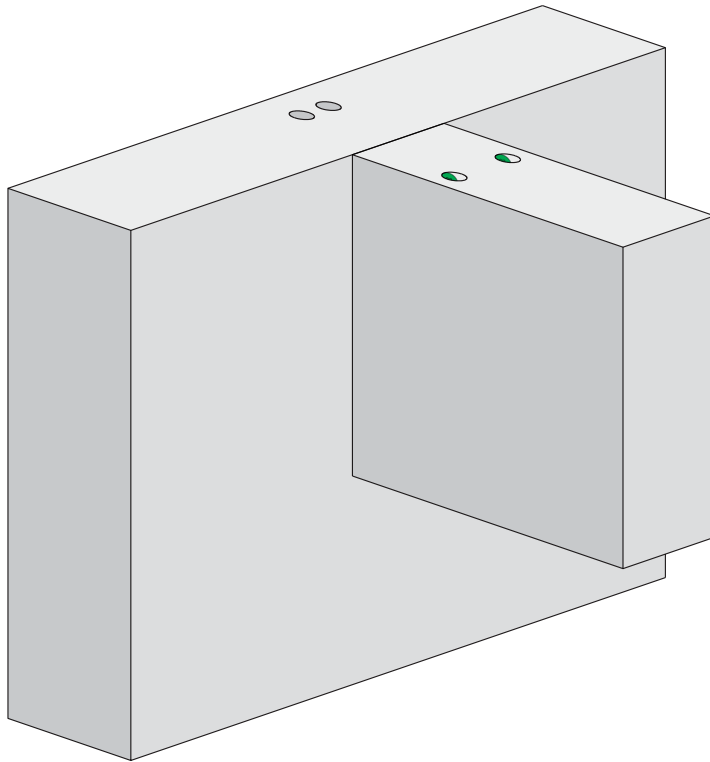


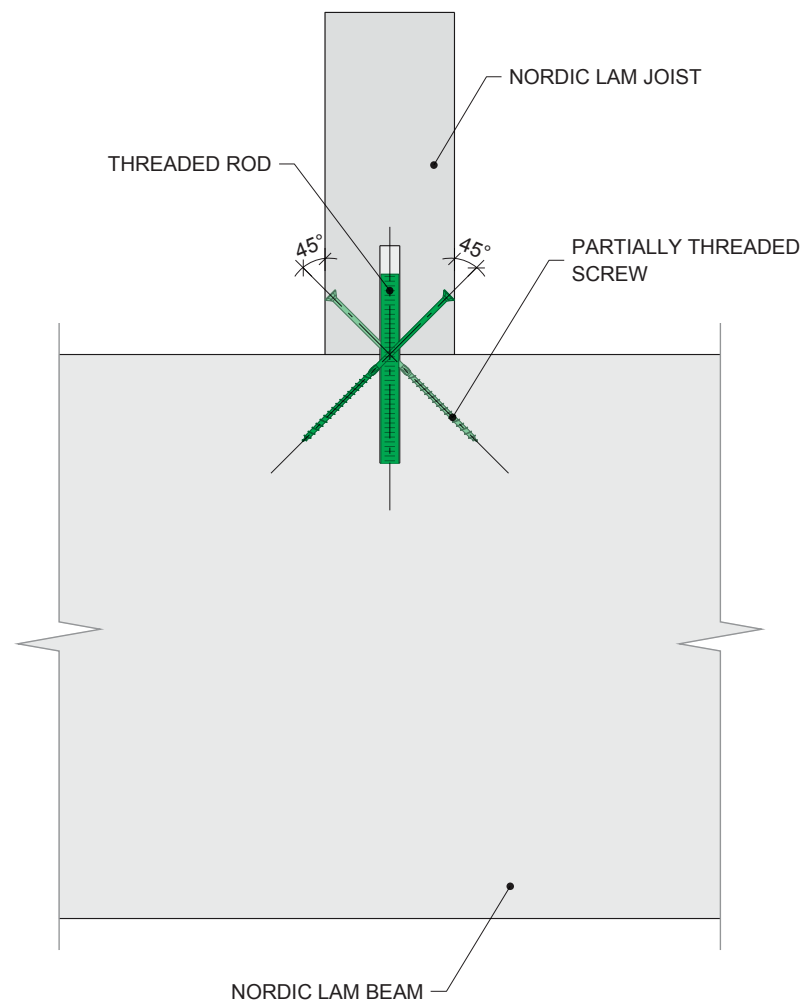
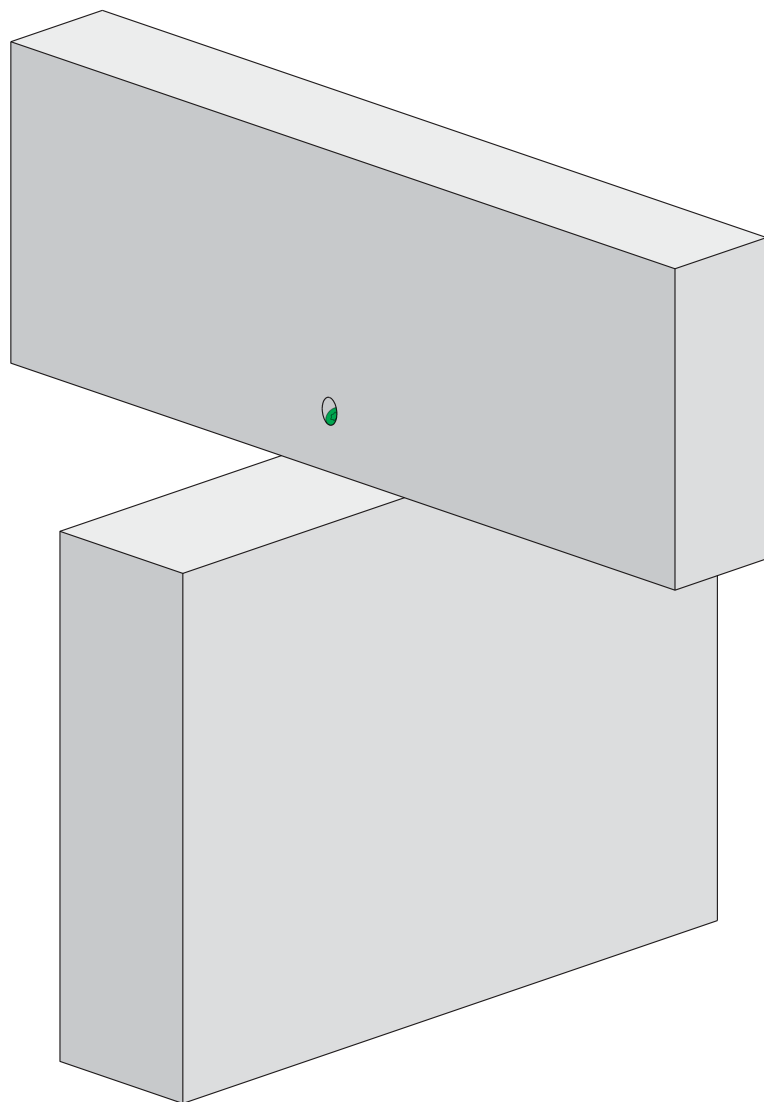


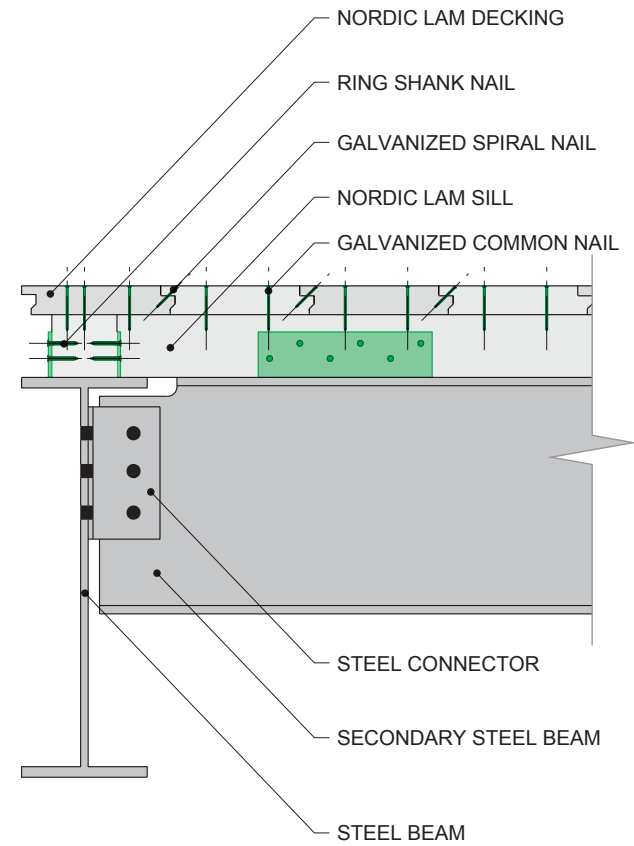
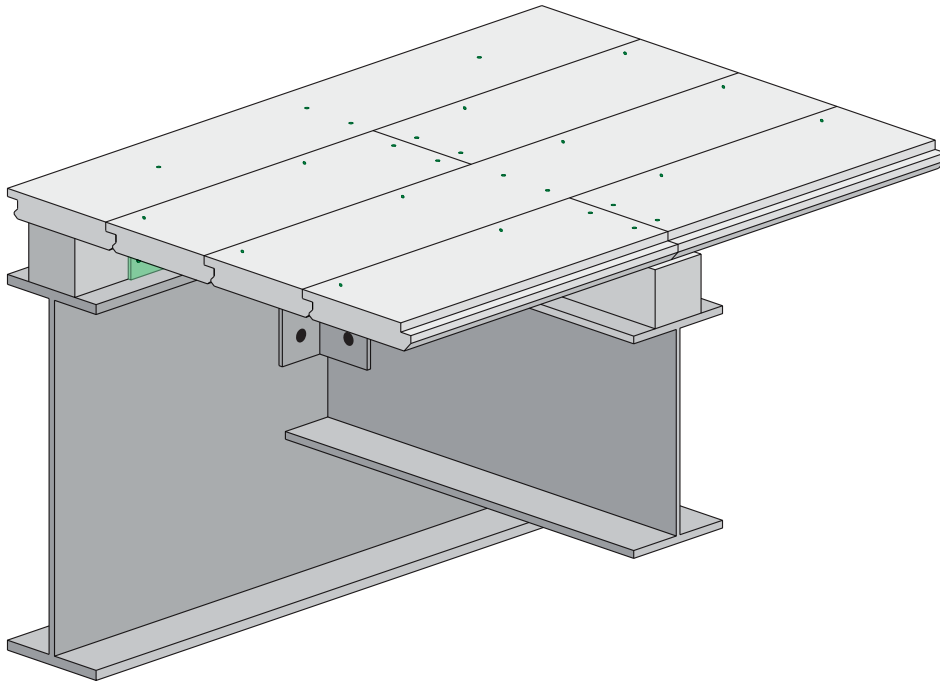












**Note:**  
1. For assembly details refer to technical note D-R00.

# NORDIC

NORDIC LAM+ DETAILS  
NORDIC X-LAM

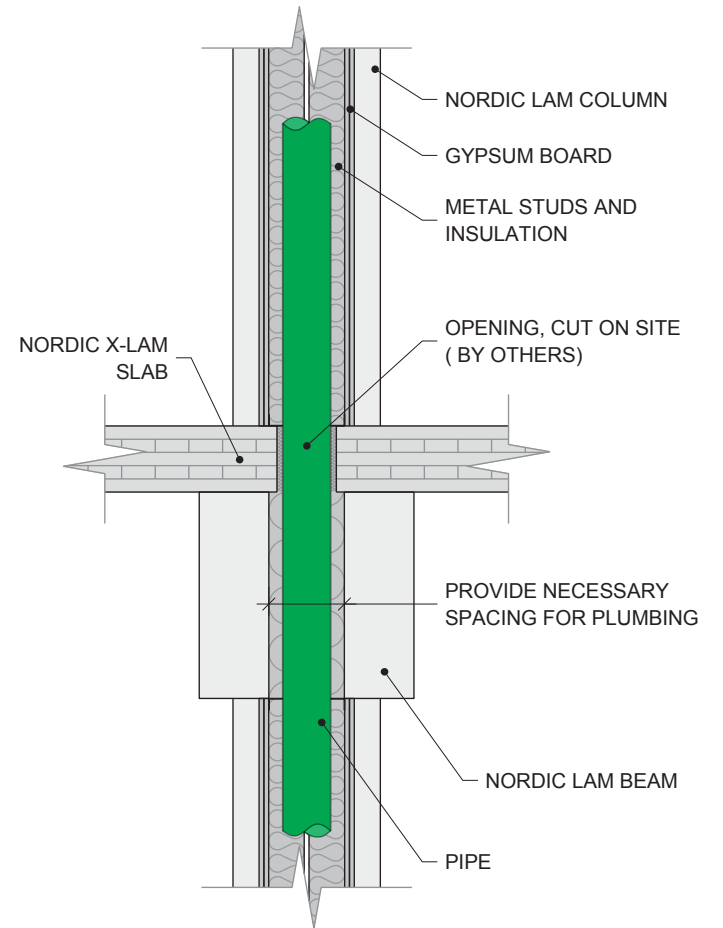
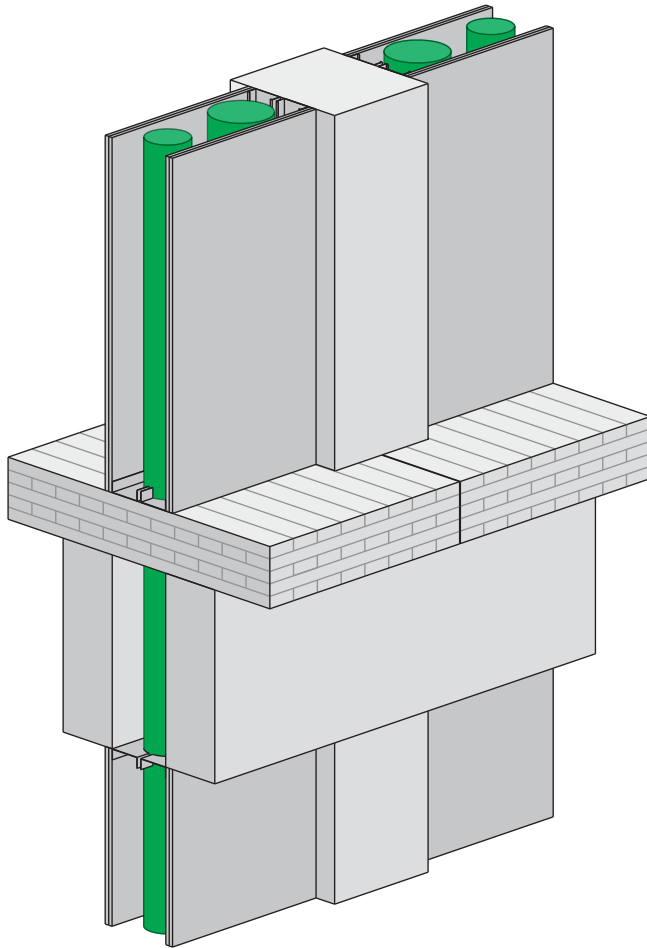
NS-DS2 

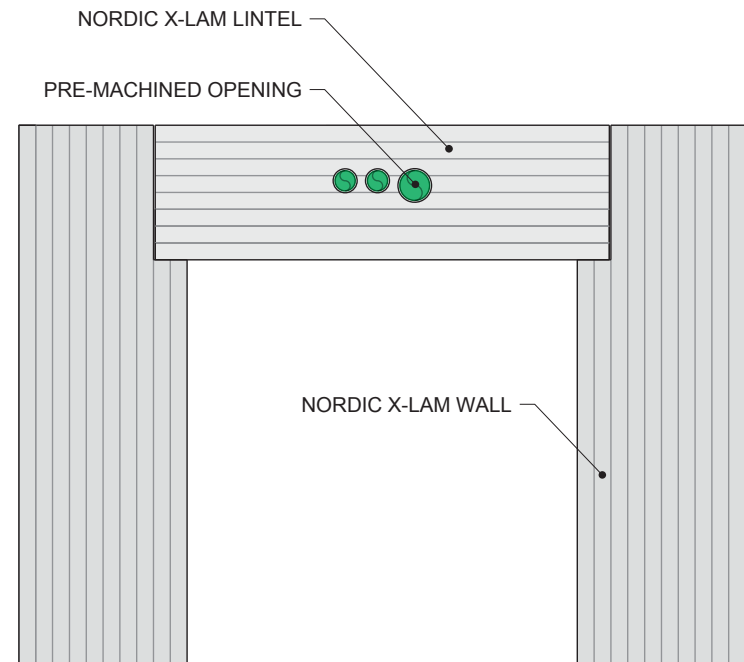
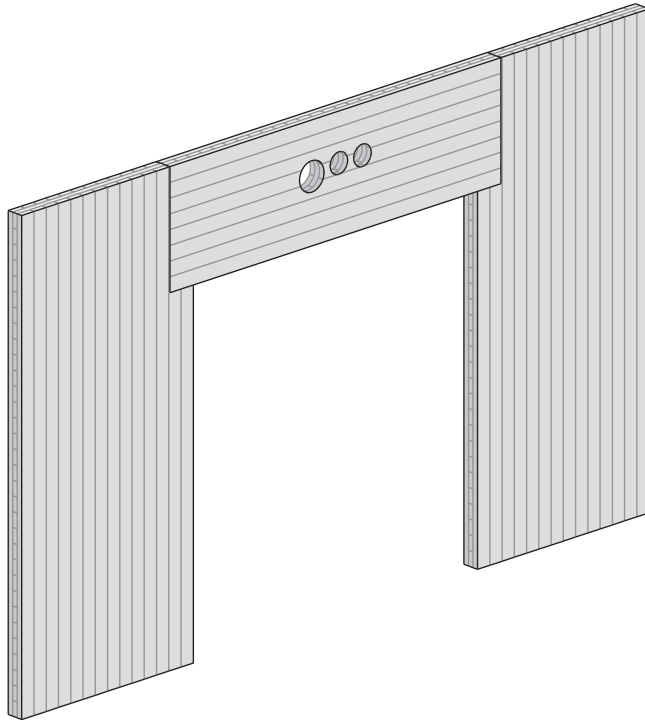
VERSION  
2022-02-01

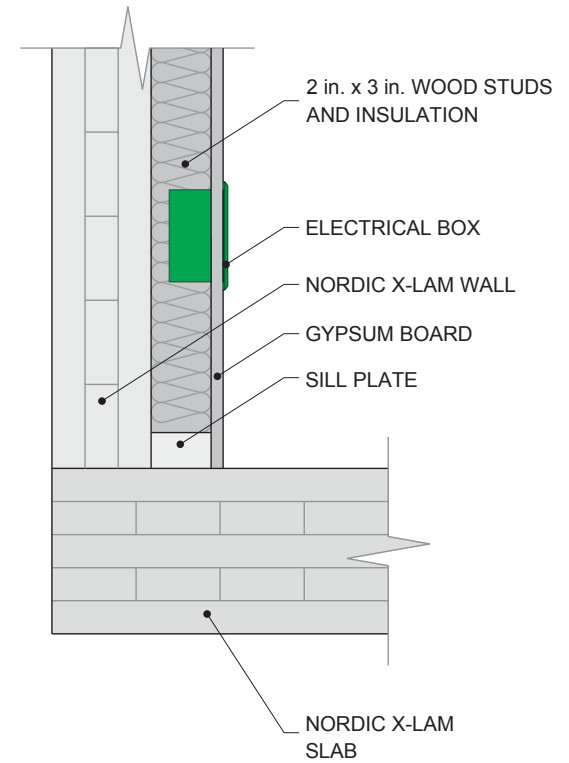
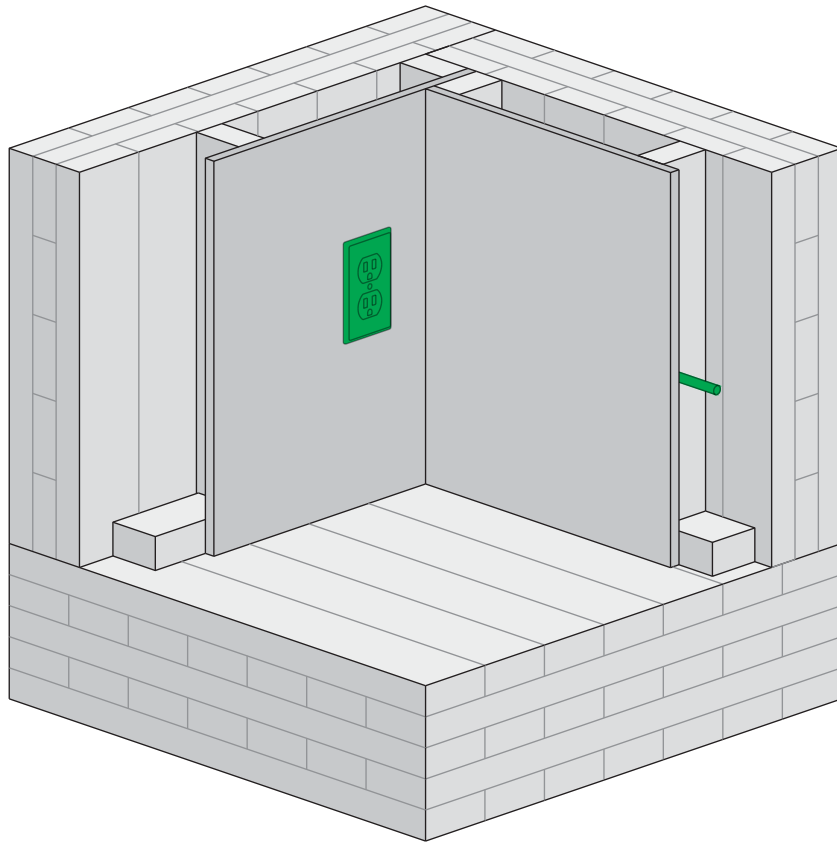
MECHANICAL, ELECTRICAL,  
AND PLUMBING

2

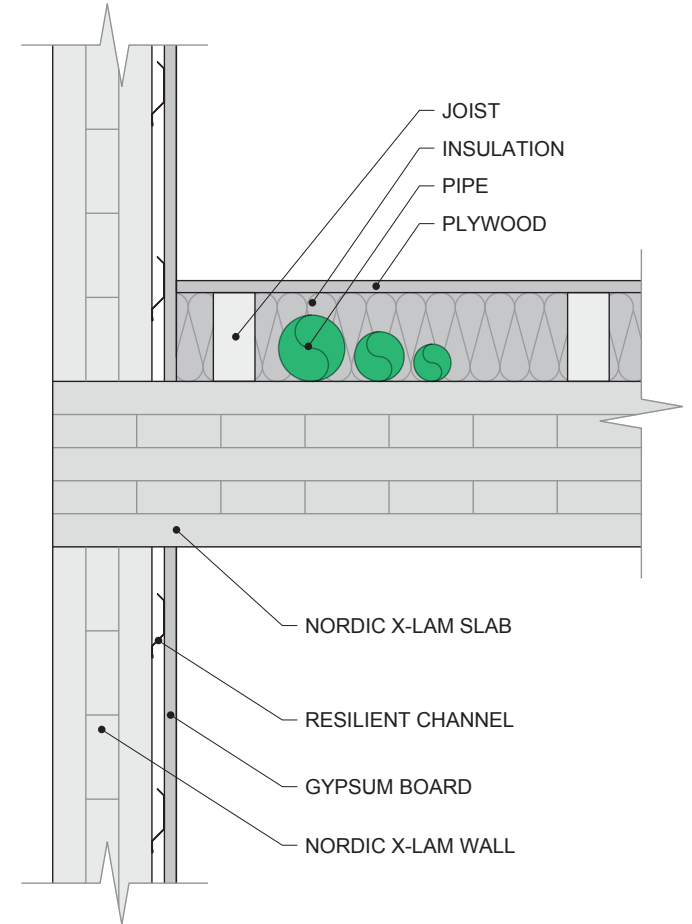
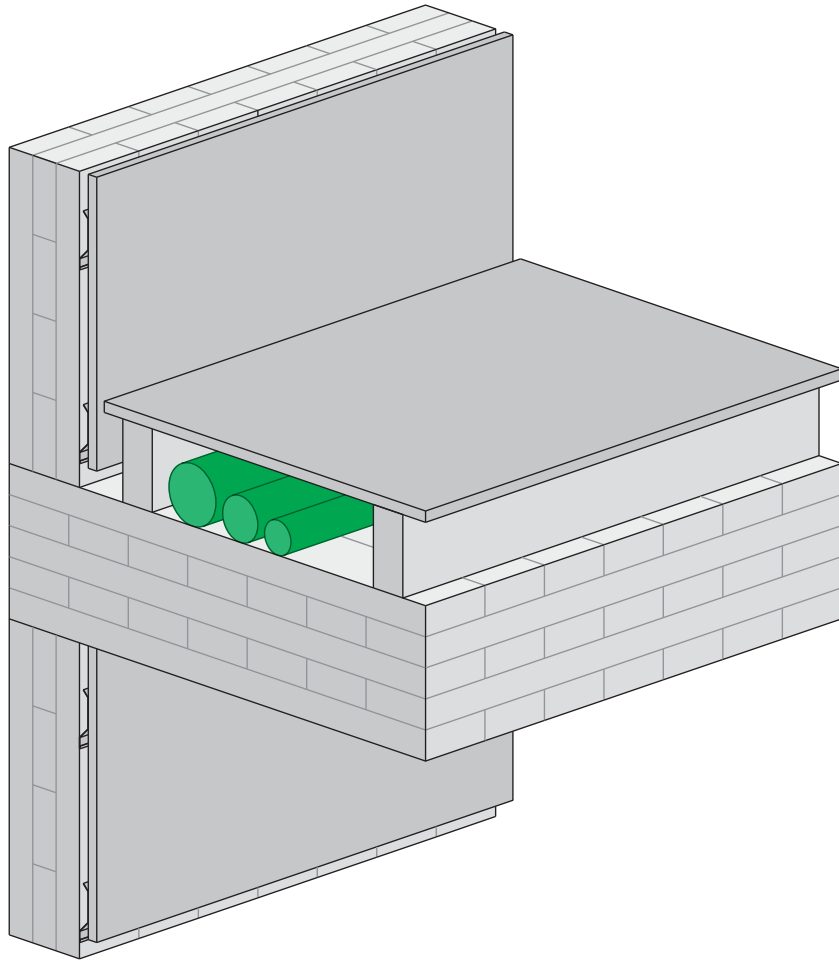
**NORDIC**  
STRUCTURES

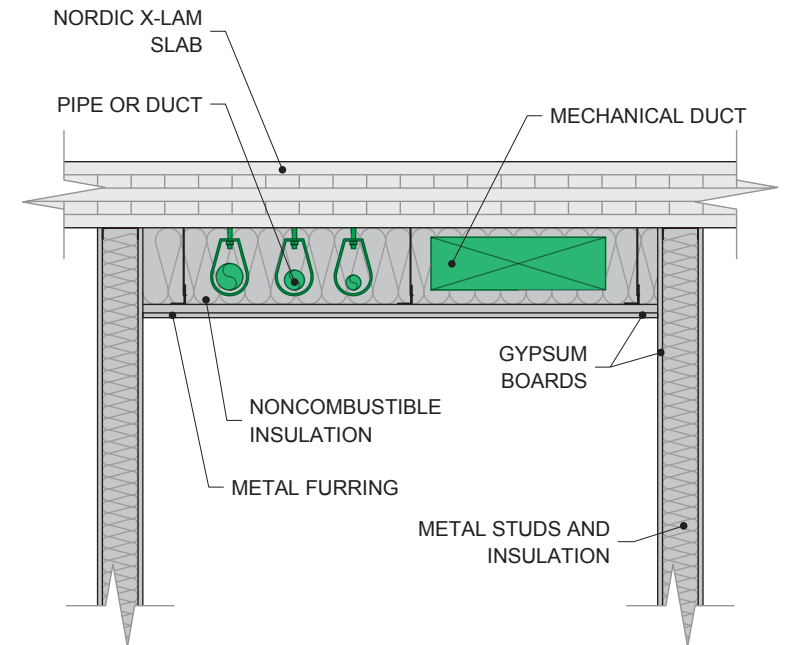
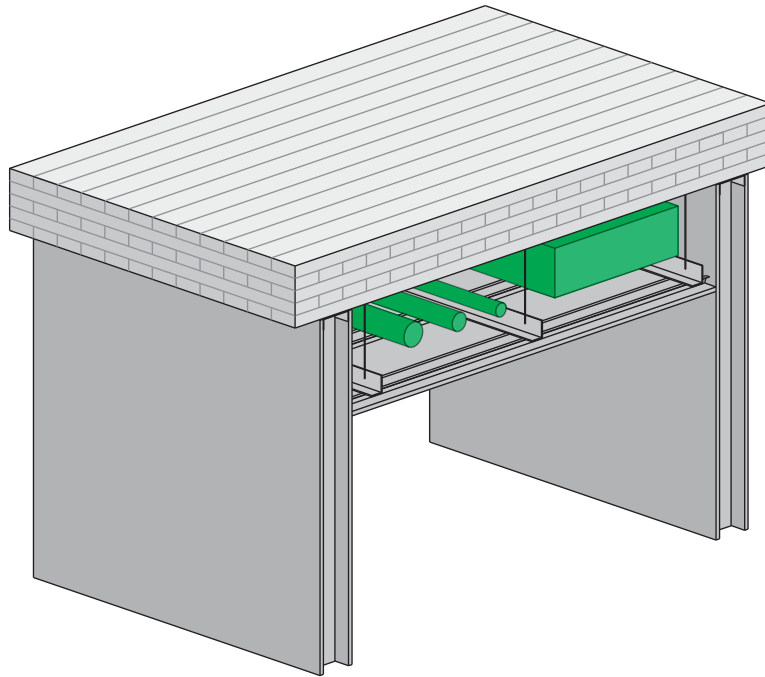


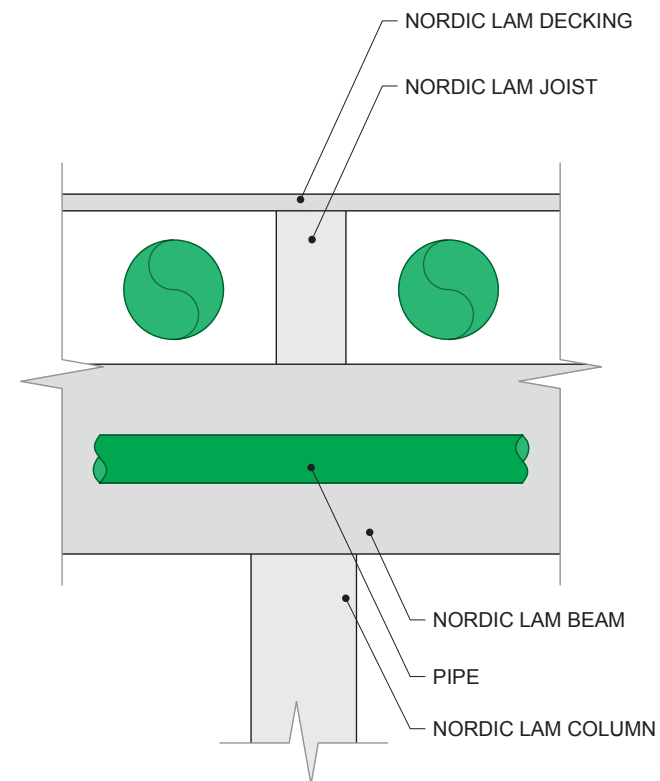
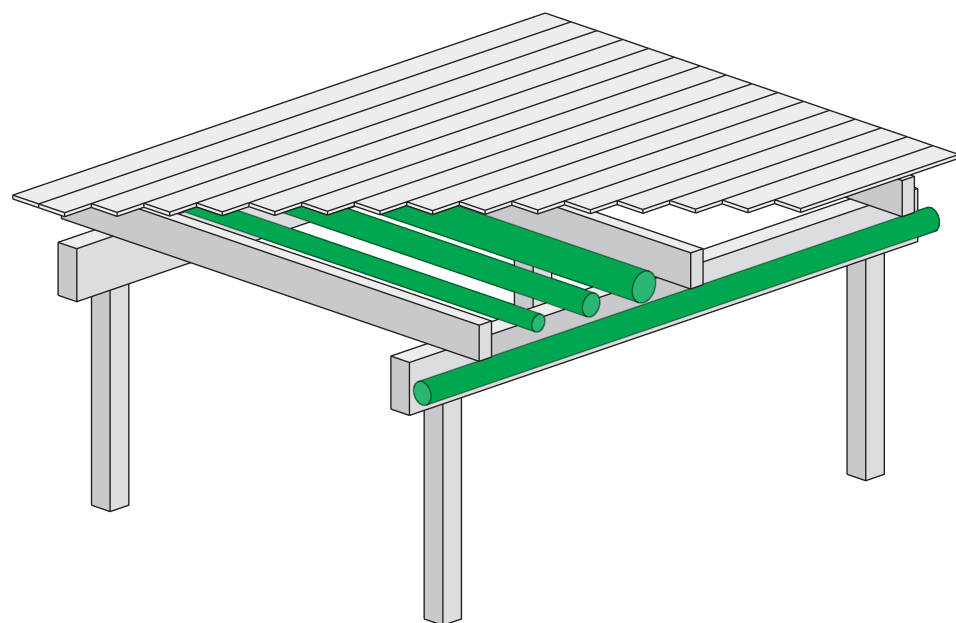


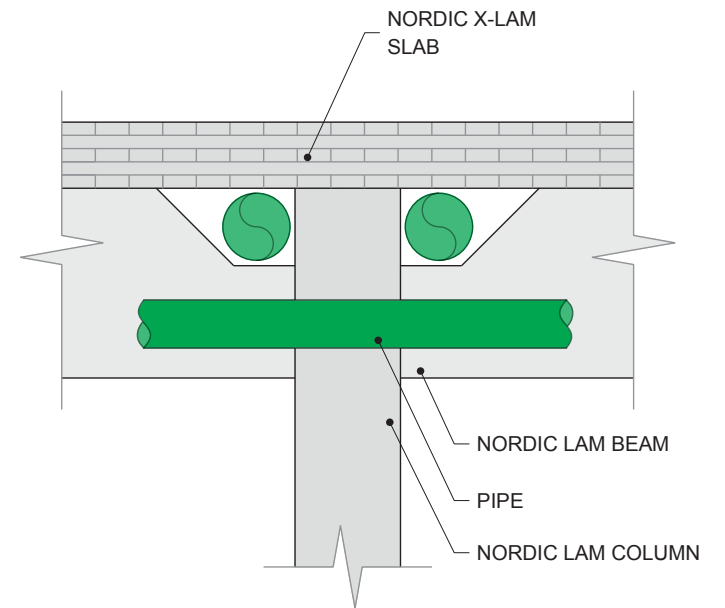
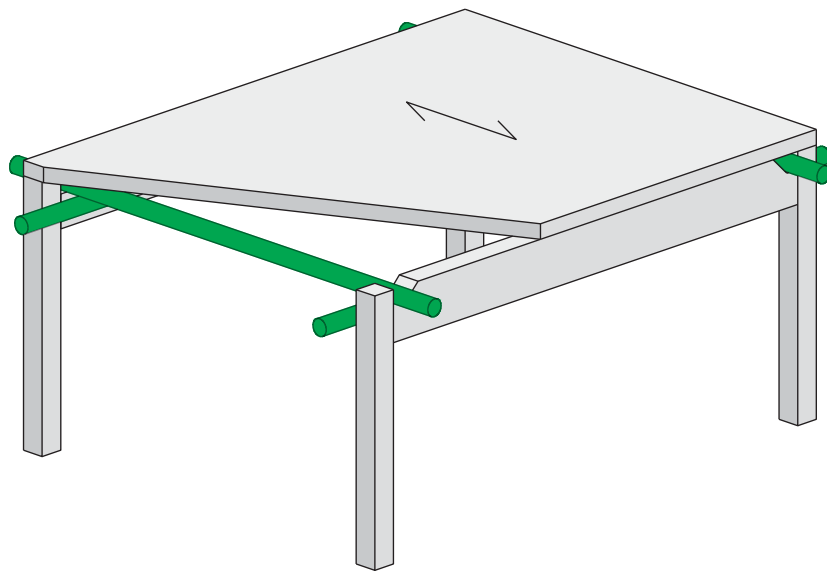


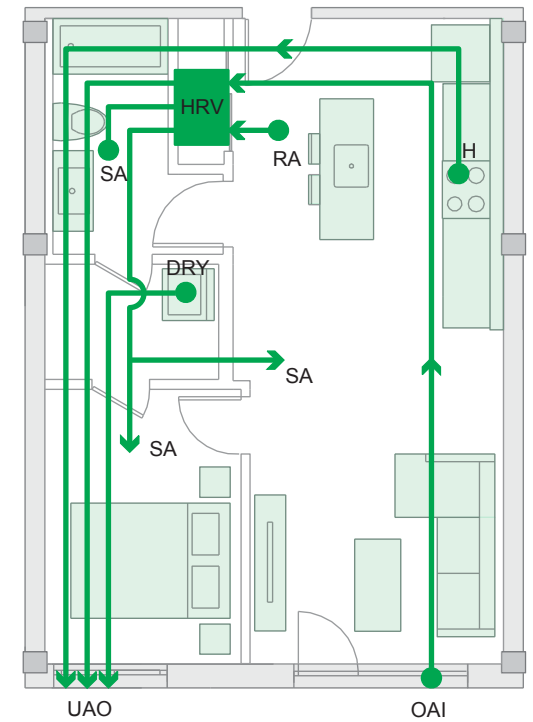
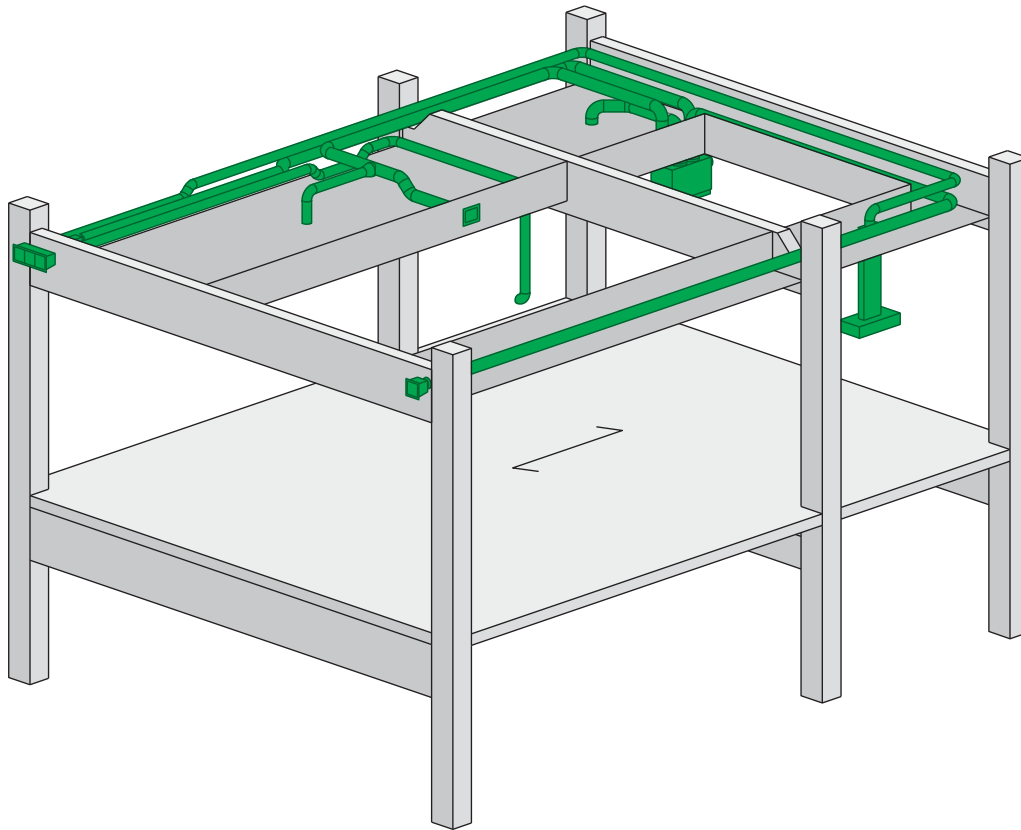






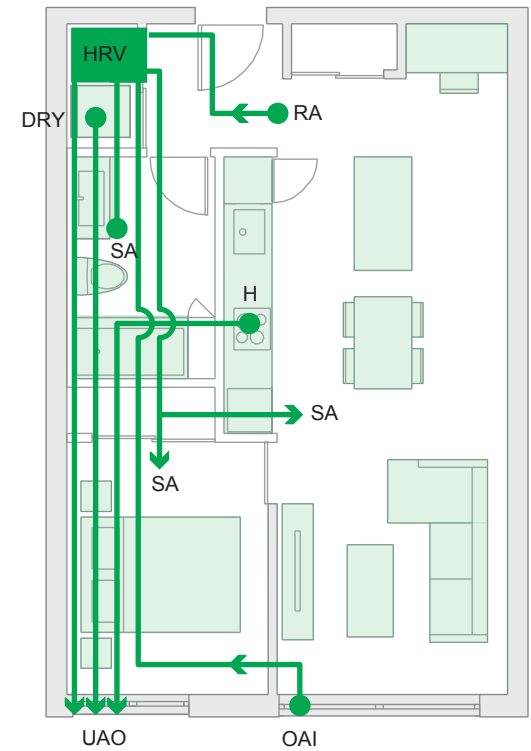
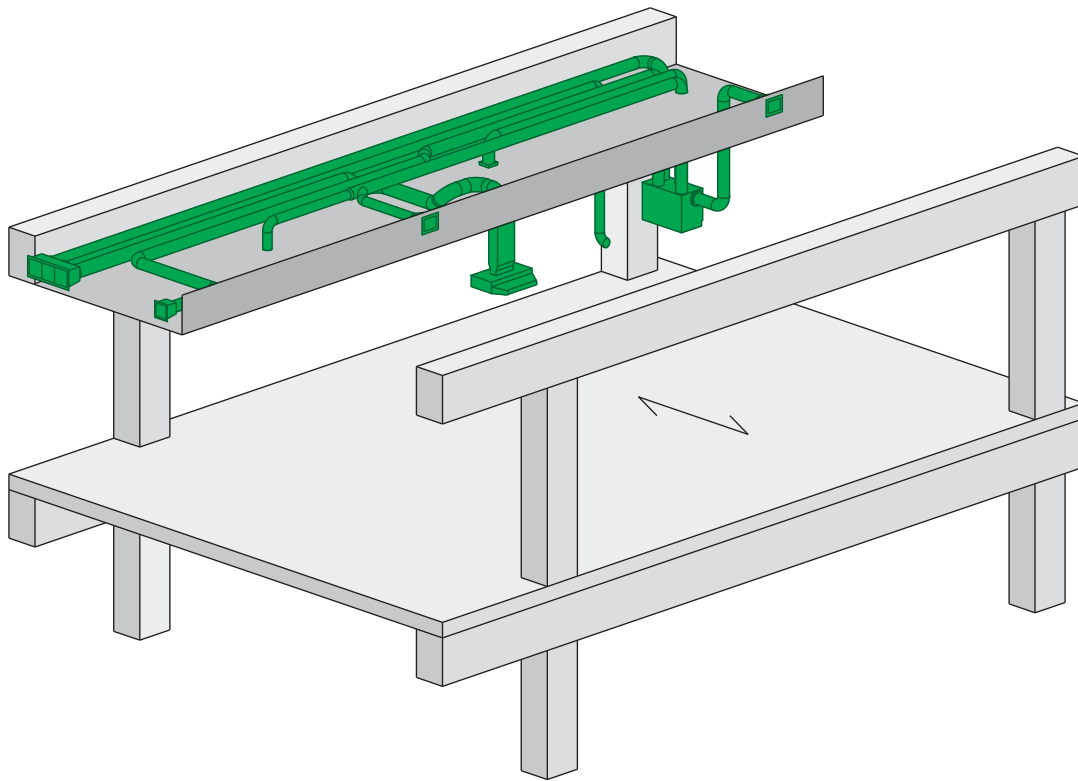






#### Legend

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



**Legend**

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- H Hood
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