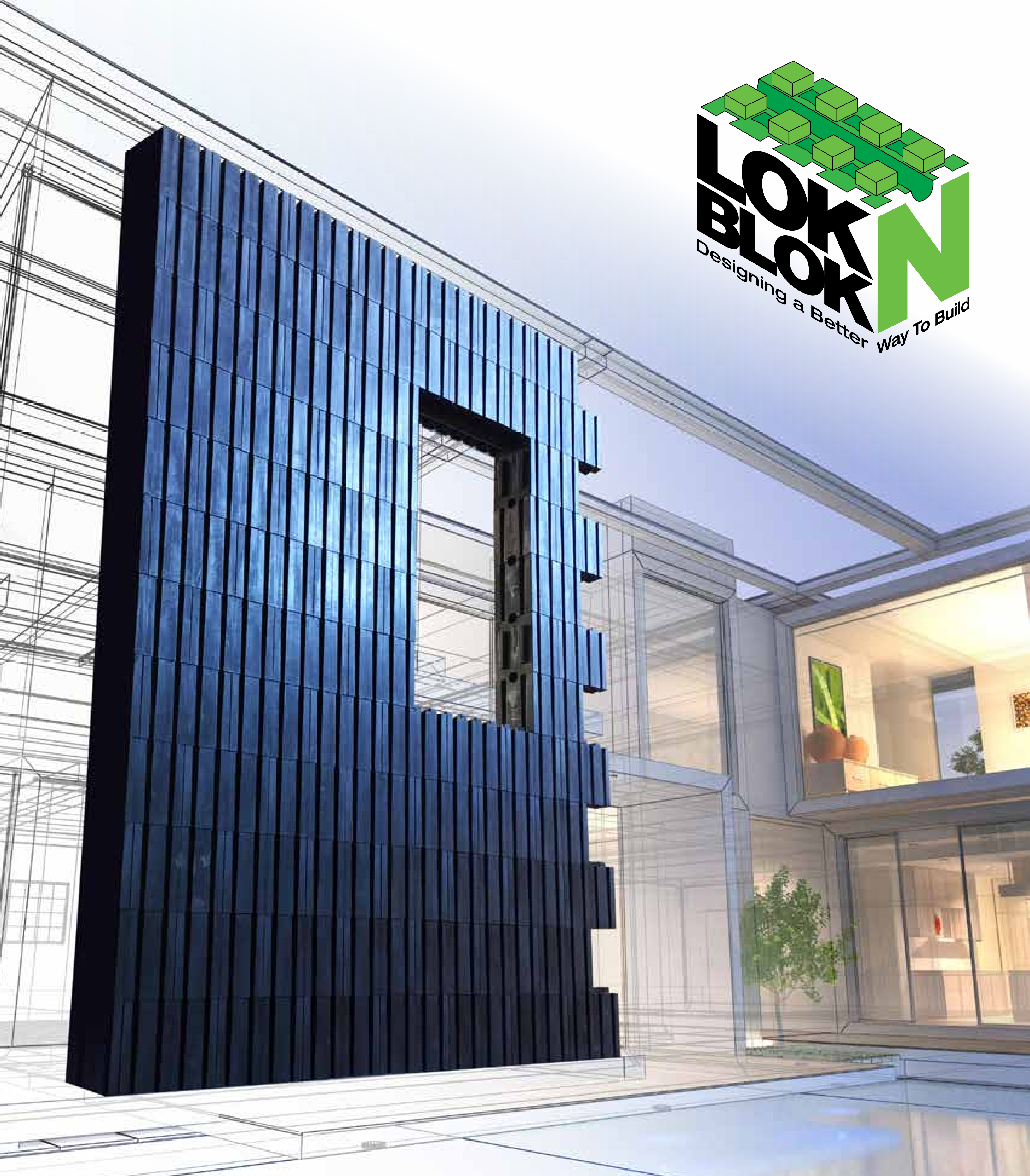


LOK
BLOK
N
Designing a Better Way To Build

DESIGN GUIDE

V1.2 | July 2022

DESIGN GUIDE

CONTENTS

Lok-N-Blok is committed to leading the world in providing cutting-edge, high-performance, sustainable, and weather-resistant building products to the construction industry.

We are meeting our goal through the design, manufacture, and distribution of Lok-N-Blok revolutionary building technologies and its ancillary product lines available locally, nationally, and internationally.

The idea for an easy to use, do-it-yourself building block which was similar to a child's set of snap-in-place toy blocks launched Lok-N-Blok. Our first model, sketched by hand, showed how the interlocking features would give the average person the ability to build a straight, self-aligning wall without the hassle associated with brick-and-mortar construction. Our first designs were produced in October of 1996.

Several key attributes were kept at the forefront of our development process. By combining the expertise of specialists from both the building and injection molding industries and involving them in the design process, we now offer a product that has the following characteristics:

- **HIGH COMPRESSIVE STRENGTH**
- **HIGH TENSILE STRENGTH**
- **FIRE RESISTANCE**
- **WATER RESISTANCE**
- **UV RESISTANCE**
- **LIGHT WEIGHT—90% LESS WEIGHT THAN A CONVENTIONAL CONCRETE MASONRY UNIT (~6.2 LBS.)**
- **EARTH FRIENDLY/GREEN/SUSTAINABILITY**
- **FIELD MODIFIABLE**
- **BACTERIA RESISTANCE**
- **MOLD RESISTANCE**
- **FIELD MODIFIABLE**
- **SOUND ABSORPTION**
- **A MINIMUM 10 TIMES STRONGER WHEN MEASURING THE DESIGN CAPABILITY WITH A CONVENTIONAL CONCRETE BLOCK.**

The final product, Lok-N-Blok, has achieved and exceeded our expectation of combining the above attributes. As a result, we believe our product solves most potential problems facing the construction industry today and is as easy to use as a child's plastic building block. Our consumer design reviews, together with an independent marketing feasibility study, lead us to believe Lok-N-Blok is a revolutionary technological breakthrough in the building industry.

Section 1

Block Design

This section describes the design, geometry, dimensions, assembly, and modification of the Lok-N-Blok product.

- Block Design
- Planning Your Design
- Connecting Blocks
- Interior Block Chases
- Block Alterations

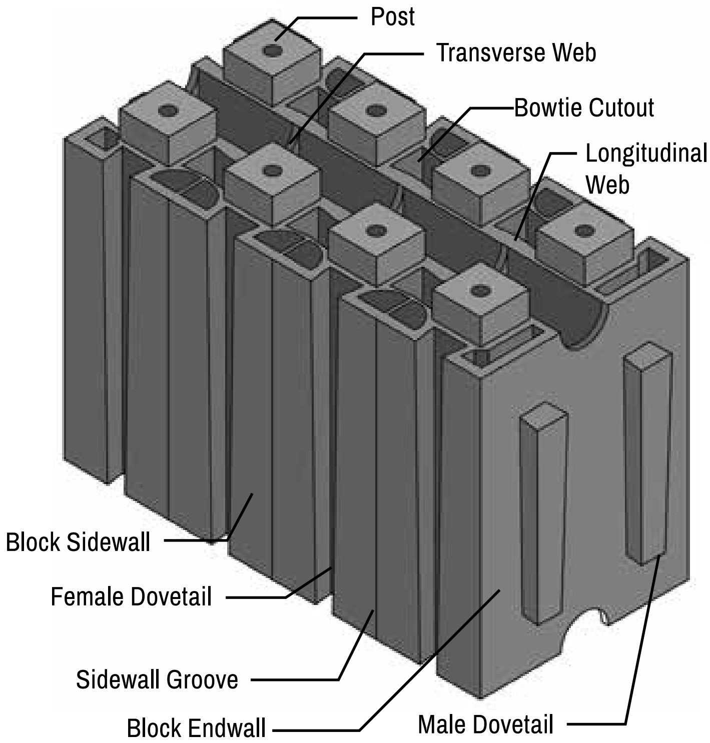
BLOCK DESIGN

Each element of Lok-N-Blok is designed to work together. The top of each block features eight square-shaped posts that are designed to fit into receivers in the base of another block. The exterior faces on three sides of the block feature female dovetails. The female dovetails taper from top to bottom and are designed to receive the male dovetail on the fourth side of the block. The tapered dovetails interlock blocks together—once it is set from above, it can only be removed the way it was installed.

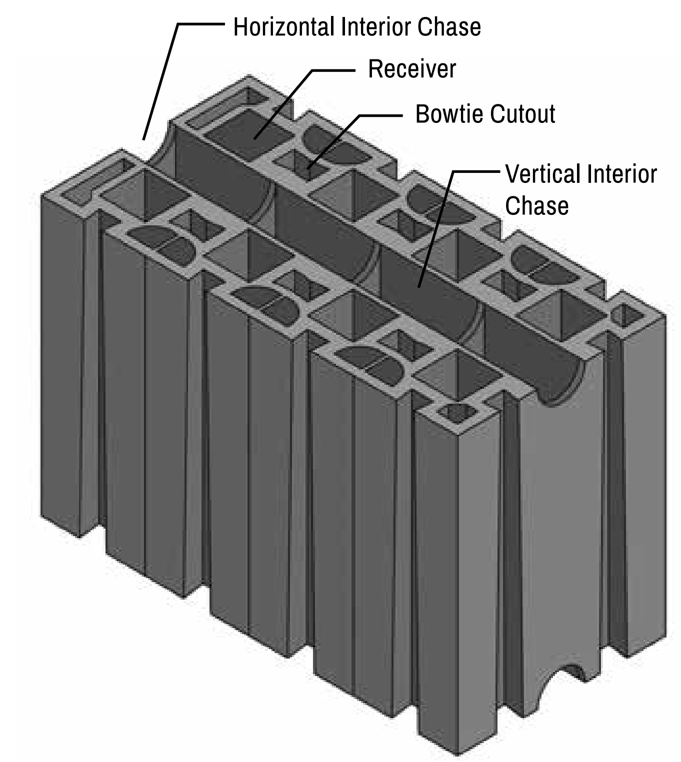
The block geometry allows blocks to be interlocked end-to-end or perpendicular to each other, as the male dovetails can lock into any pair of female dovetails around the block. The interior of the block is designed for both strength and to provide room for structural reinforcing and utilities. Three interior transverse webs create four vertical cavities for installation of reinforcing or conduit. Similarly, the bottom and top of the block have horizontal cutouts along the block length to potentially accept conduit or other utilities.

Even the interior of the blocks is purposefully designed. To accommodate openings, the block is designed to be cut in half or quarters. Vertical grooves on the surface of the block sidewalls between the female dovetails denote recommended locations to cut the block. The interior webs are strategically placed to form the face of the cut block, while the bowtie cutouts become female dovetails when cut in half.

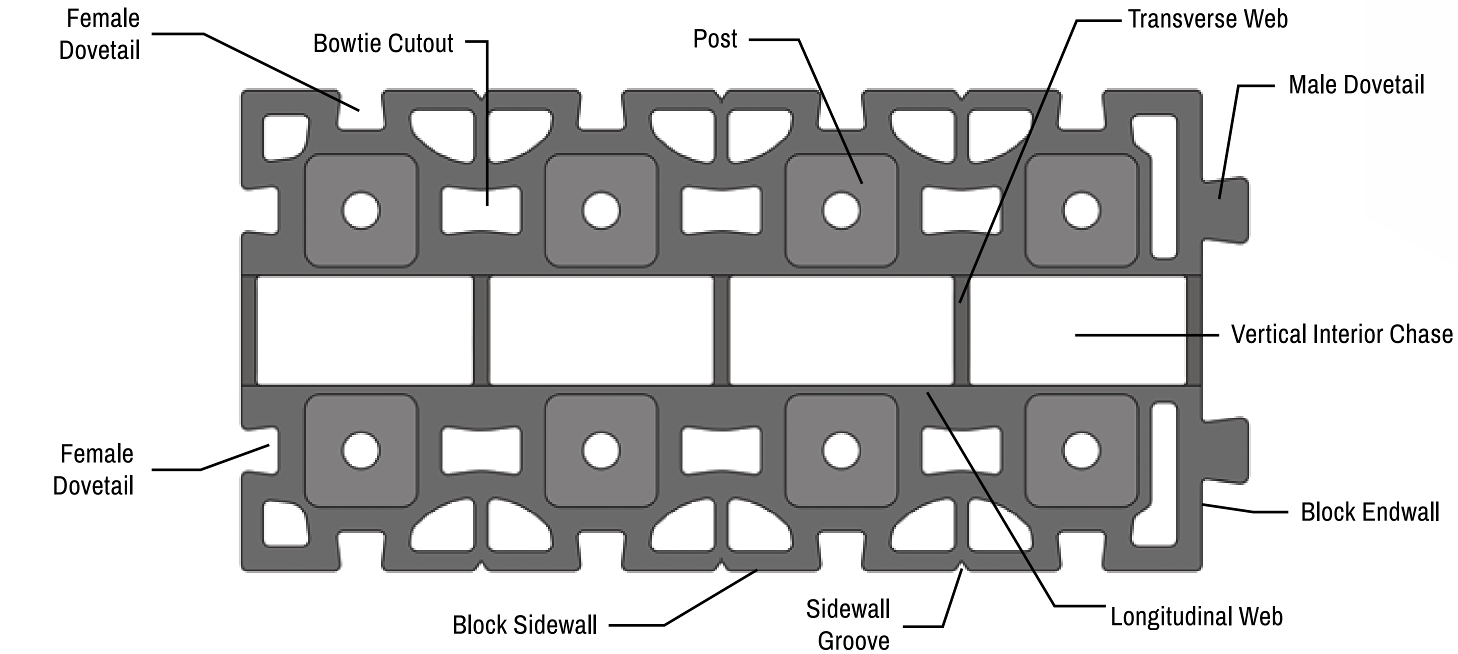
Top Isometric View



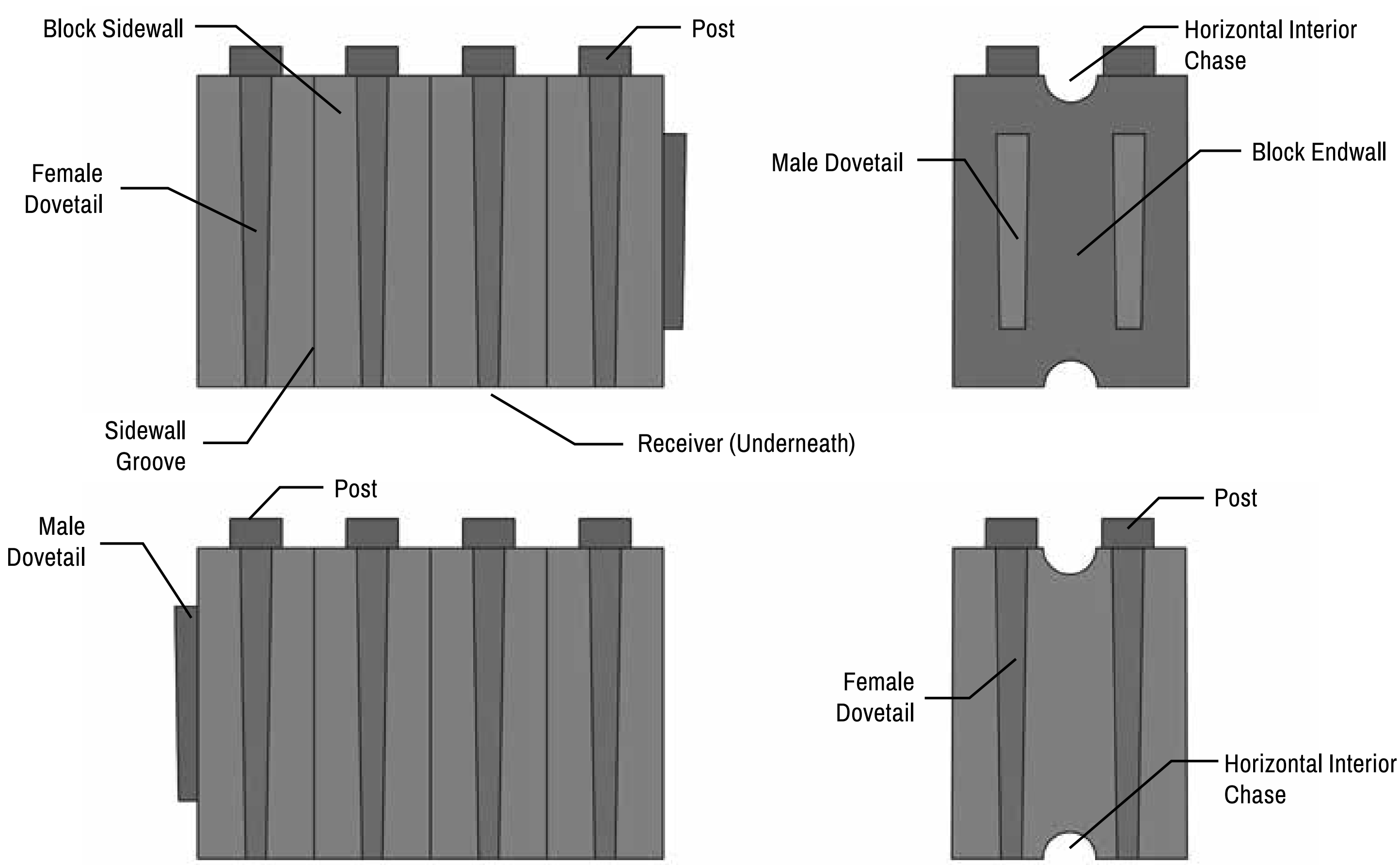
Bottom Isometric View



Plan View



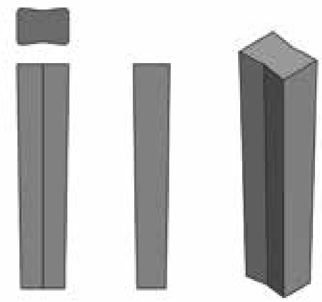
Elevations



DOVETAIL INSERT

The dovetail insert is a separate piece consisting of two back-to-back male dovetails that is used to join the blocks where two female block edges align. These pieces can be used where blocks are modified for length, when blocks are stacked in the same direction, or at T connections.

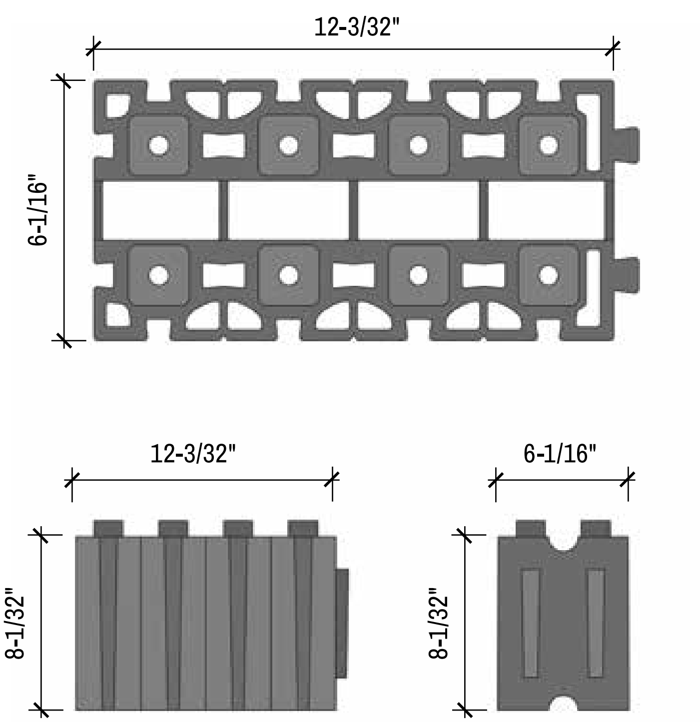
Plan , Elevations, and Isometric

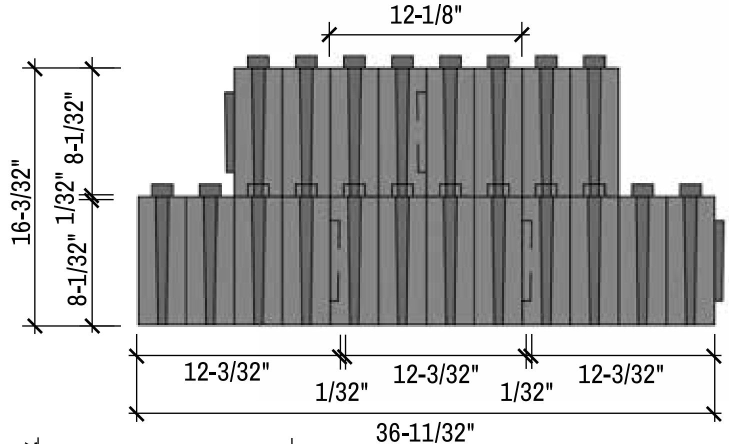


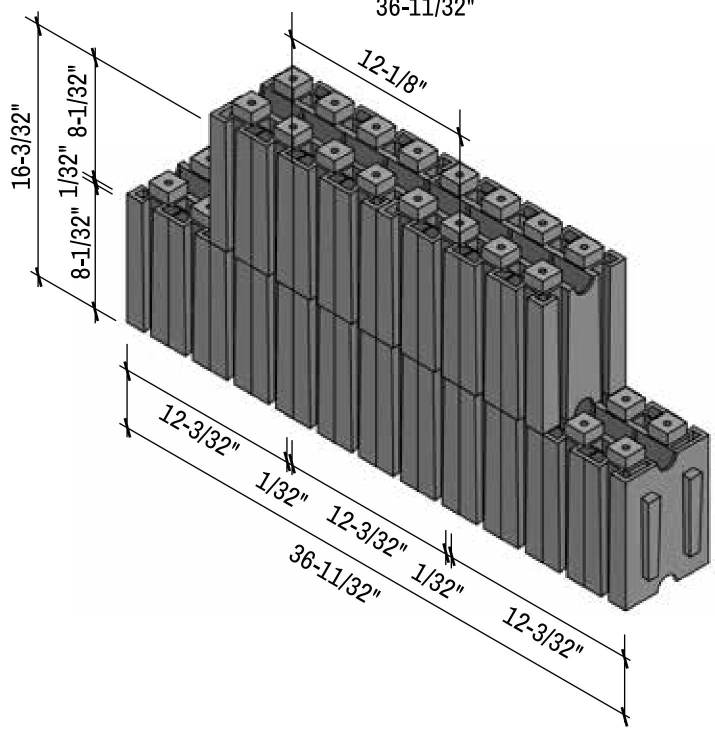
PLANNING YOUR DESIGN

Lok-N-Bloks have nominal dimensions of 12 by 6 by 8 inches. The actual blocks measure 12-3/32 by 6-1/16 by 8-1/32 inches, and when constructed, there is an additional 1/32 inch at each horizontal and vertical connection.

While blocks can be easily cut, building walls with lengths that are multiples of 6-1/16 inches in length and 8-1/16 in height will minimize block cutting.



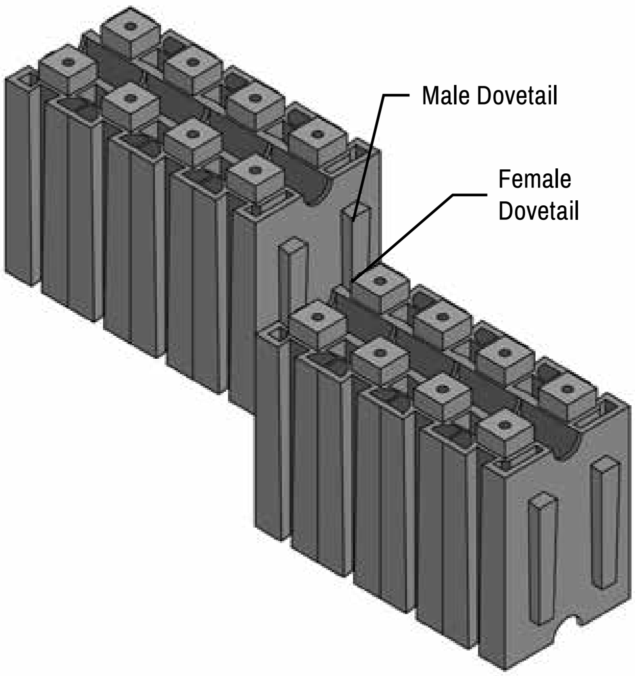




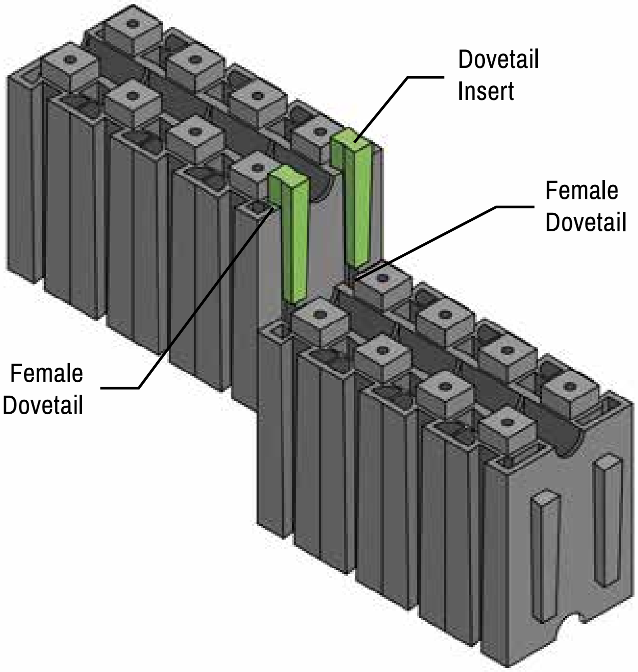
CONNECTING BLOCKS

Lok-N-Bloks are designed to slide together. For horizontal connections, the pair of male dovetails slide into a pair of female dovetails from above. The male dovetails can interlock with the female dovetails at a block endwall or with any pair of female dovetails in a block sidewall. For vertical connections, the receivers at the underside of the blocks slide over the posts at the top of the blocks.

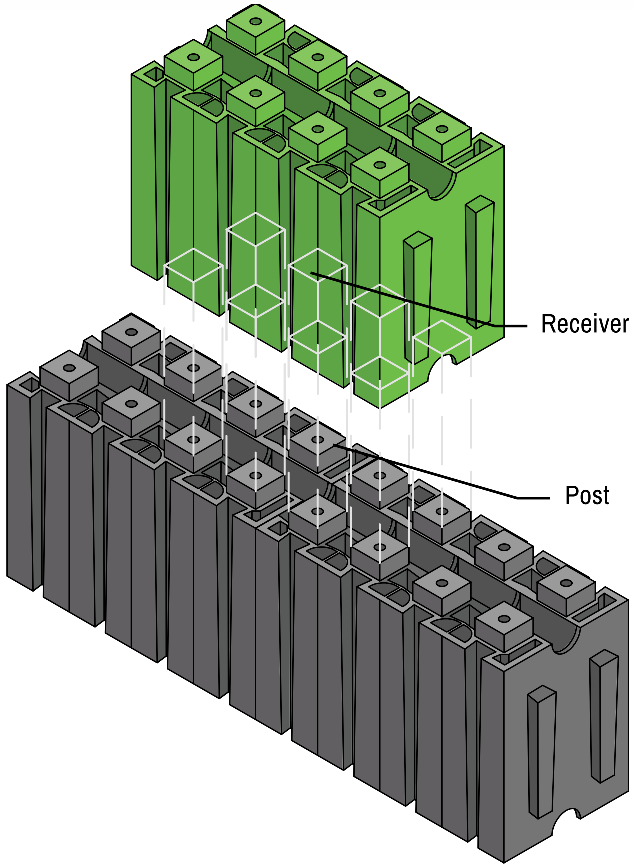
Male to Female Horizontal Connection



Female to Female Horizontal Connection



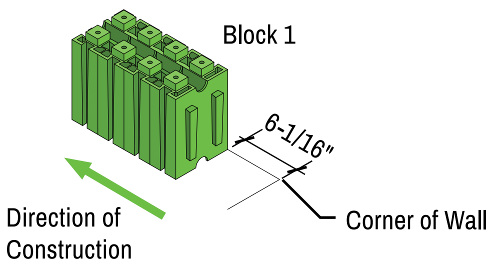
Vertical Connection



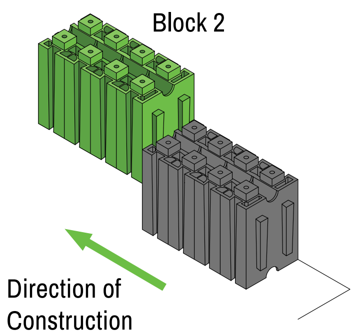
End-to-End Connection

This section provides a conceptual overview of building with the blocks; more detailed instructions are included later in the guide. To attach blocks horizontally, place a block (starter) with an exposed female end in the direction you wish to build. If at a corner, leave a 6-1/16 inch space before the edge. Slide the male dovetails of the next block down into the female dovetails. Continue placing blocks in the same manner to create a course.

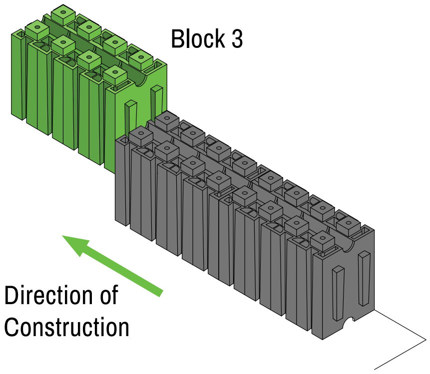
Placing a Starter Block



Connecting First Block



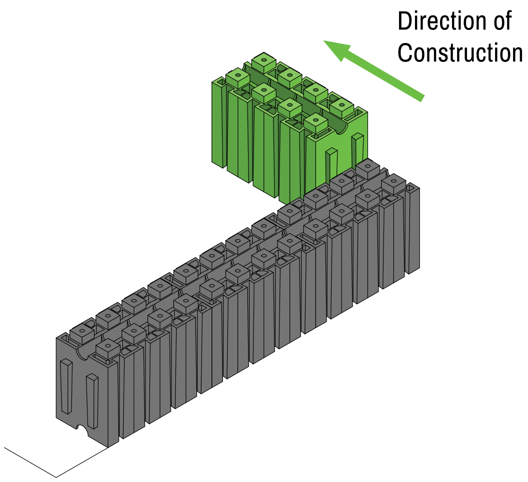
Continuing Course



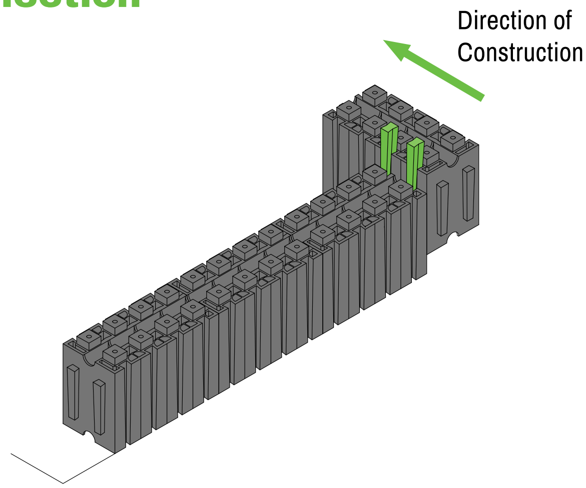
Corner Connection

To turn a corner, orient a block perpendicular to the last block and slide the male dovetails of the perpendicular block into the side wall of the corner block, or align the female dovetails of an endwall with the female dovetails in the sidewall of the perpendicular block and install dovetail inserts.

Male to Female Corner Connection



Female to Female Corner Connection



Completing a Course

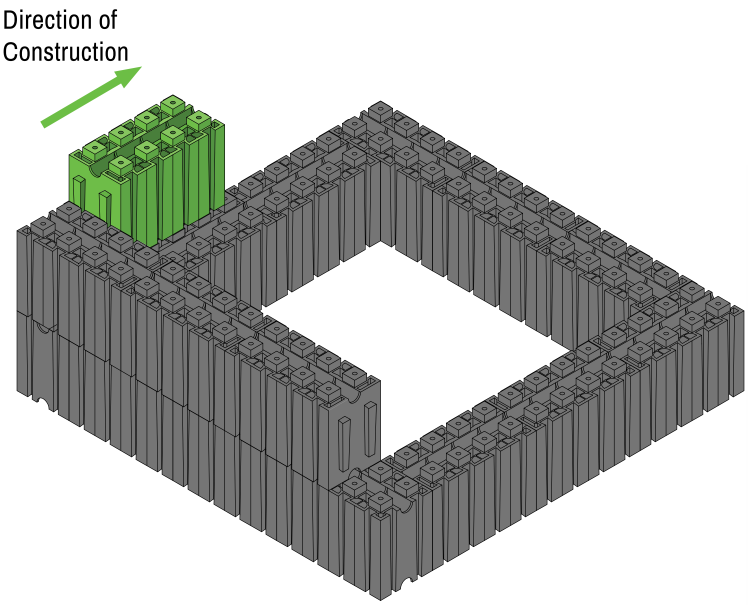
Depending on the geometry of the structure, to complete a course by connecting a block to the "starter" block, the starter block can be slightly lifted so that its male dovetails can slide down into the female dovetails of the final block. Alternatively, dovetail inserts can be used to connect two end walls with female dovetails together.

Vertical Connections

To stack blocks in courses, align the receivers of a block with the posts on the block below. The next row of blocks can be installed either direction. Depending on the dimensions of the structure, alternating the direction of placement from course to course may reduce the need to modify blocks, such as removing male dovetails at edge walls.

The Structural Design section of this guide has detailed information about the structural system used to reinforce walls constructed from Lok-N-Bloks.

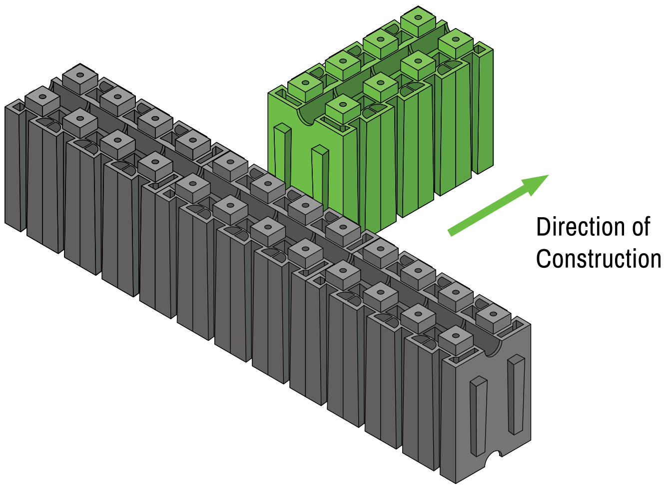
Based on the testing performed to-date, walls should be constructed with running bond rather than stacked bond.



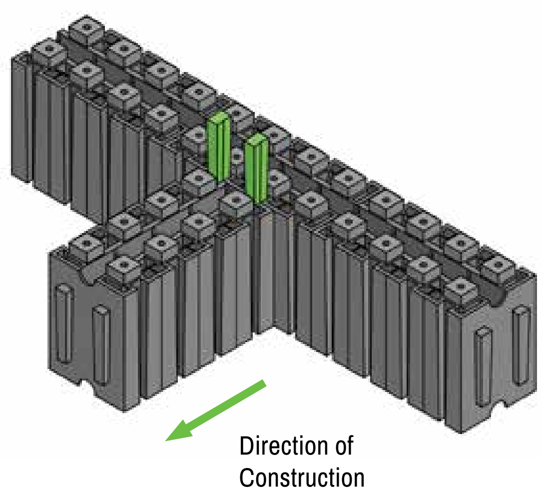
T Connections

T connections can be achieved by either sliding the male dovetails into the sidewall of a block, or by using the dovetail inserts to connect an endwall with female dovetails to the sidewall of a block.

Male to Female T Connection



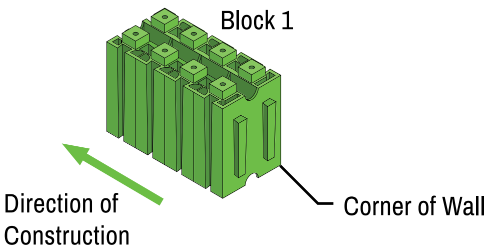
Female to Female T Connection



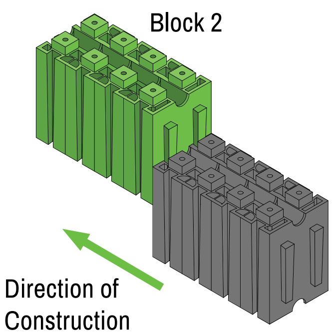
Alternate Construction

The starter block can also be placed at the edge, though removing male dovetails may be required. Place a block at the corner of the construction with an exposed female end in the direction you wish to build. Slide the male dovetails of the next block down into the female dovetails. Continue placing blocks in the same manner to create a course.

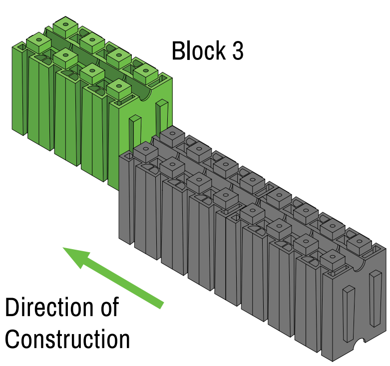
Placing a Starter Block



Connecting First Block



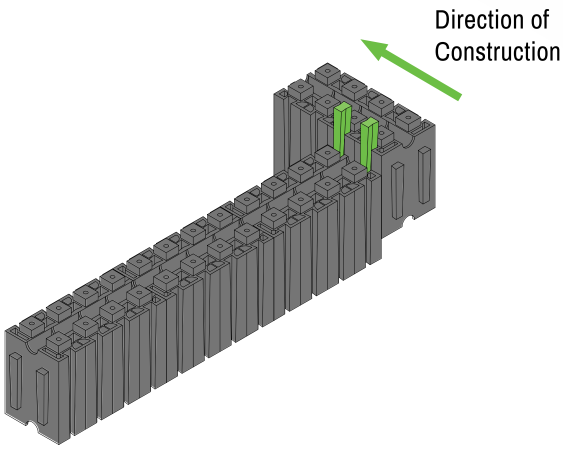
Continuing Course



Corner Connection

To turn a corner, align the female dovetails of an endwall with the female dovetails in the sidewall of the perpendicular block and install dovetail inserts.

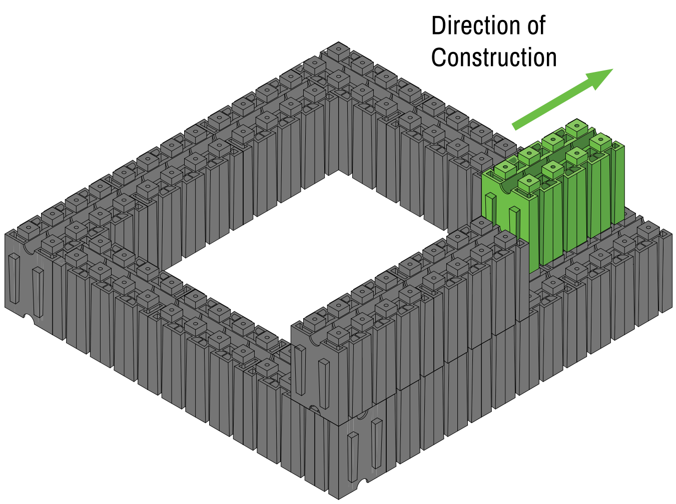
Corner Connection



Completing a Course

Use dovetail inserts to complete the course. The next course can be started by placing a block with the male dovetails at the corner in the opposite direction of the previous course.

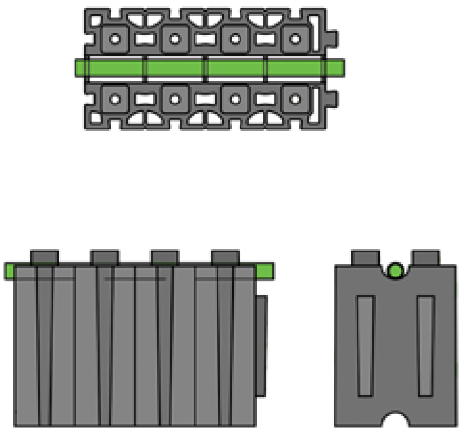
Vertical Connection

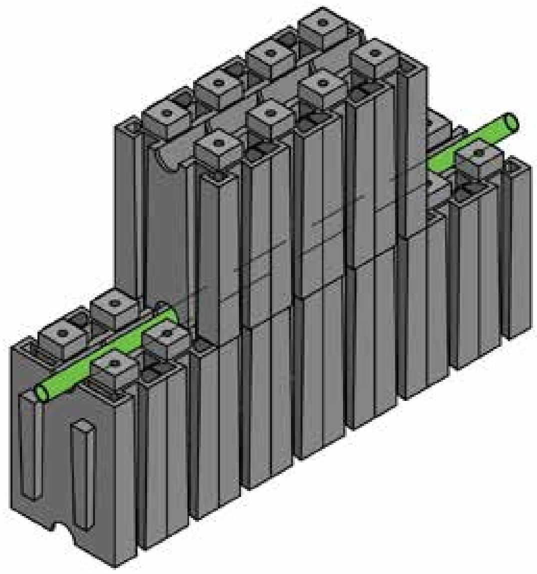


INTERIOR CHASES

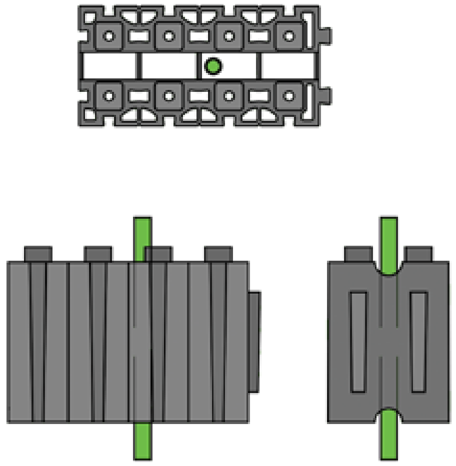
Lok-N-Bloks feature a semicircular cutout in the top and bottom of each block to allow for the installation of structural components or utilities as walls are constructed. Structural components and utilities can be placed horizontally along the top of the blocks prior to placement of the next course. Utilities can also be installed through the vertical cavities of the blocks between webs. Installation sequencing during wall construction and the coordination of structural components and utilities in block cavities should be considered during pre-construction planning.

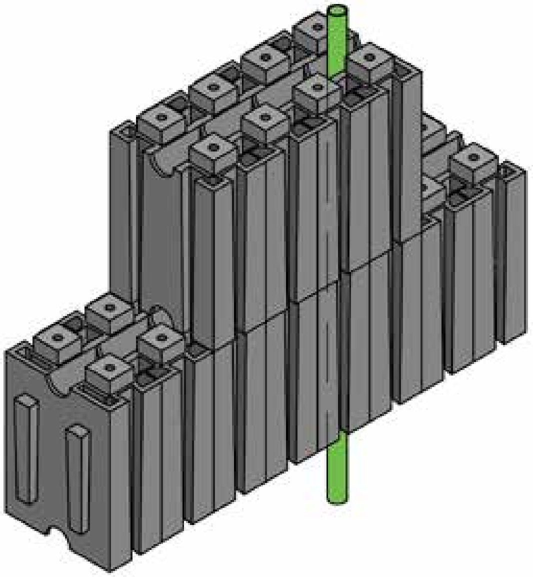
Horizontal Interior Chase





Vertical Interior Chase

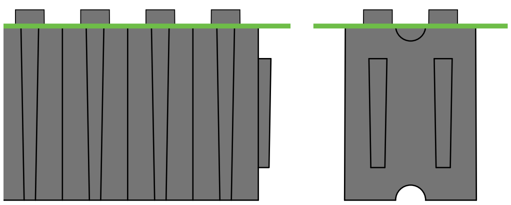


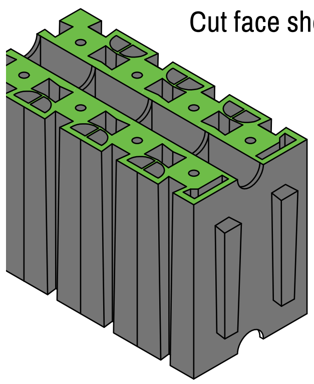


BLOCK ALTERATIONS

Lok-N-Blok is designed to be easily modified. Blocks can be cut using a table saw or other conventional construction tools. The posts at the top of the block can be removed to allow for top plates at the top of walls or for sills and thresholds. At corners, protruding male dovetails can be removed to create a flat edge that may be necessary for the attachment of cladding.

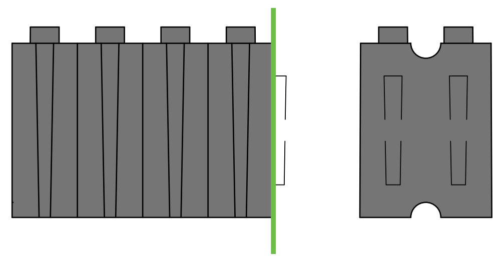
Post Removal

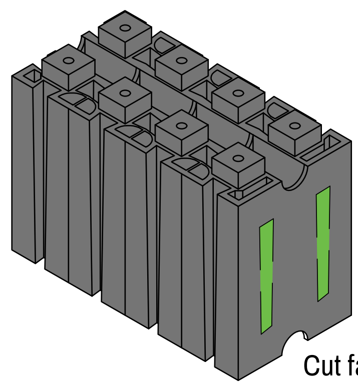




Cut face shown in green

Dovetail Removal



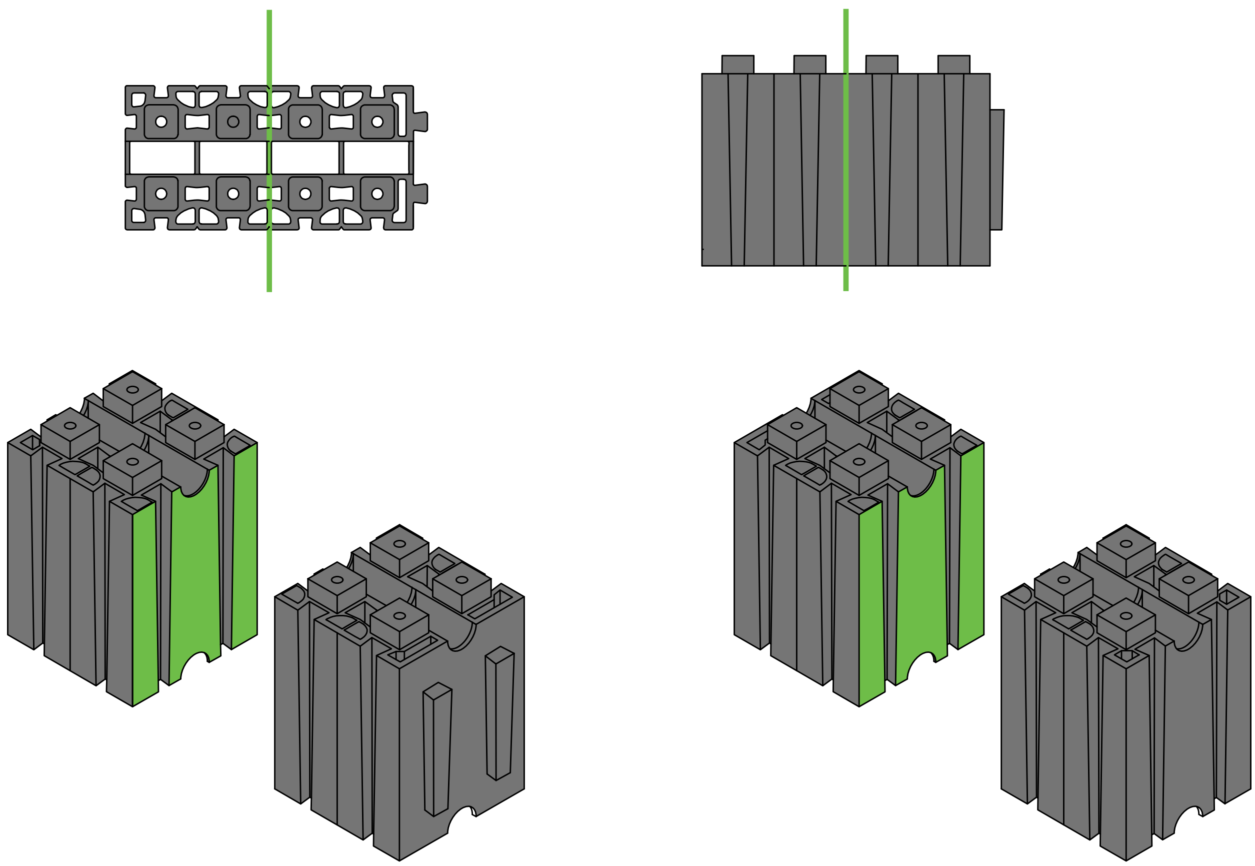


Cut face shown in green

BLOCK ALTERATIONS

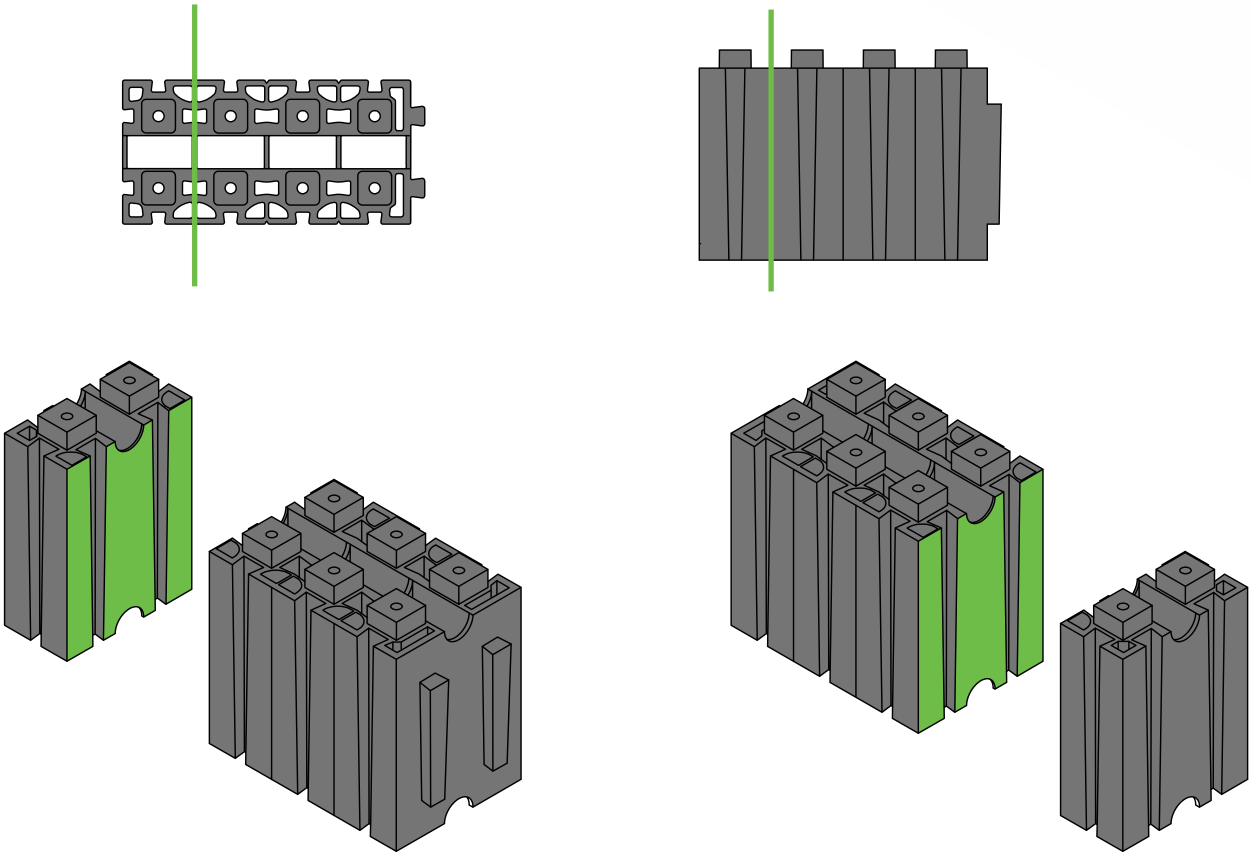
Along each block sidewall, the sidewall grooves can be used as a guide to cut the blocks into quarters. If used, the internal cutouts become female dovetails, allowing for connection to other blocks. The following diagrams show where to cut for quarter, half, and three-quarter blocks. Because of the thinner web at the block endwalls, at corners or openings the cut face should be oriented toward the interior of the wall and away from the corner/opening.

Half Blocks



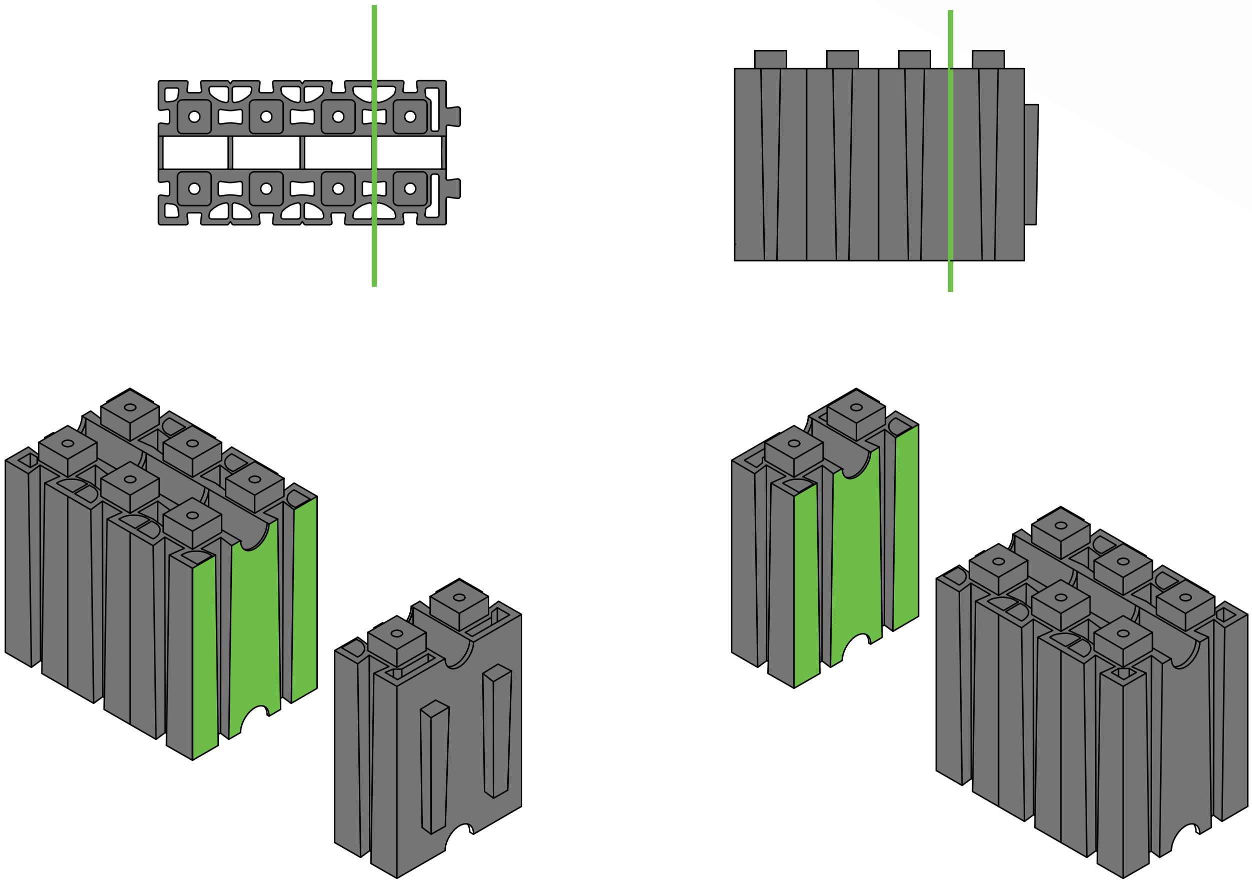
Cut faces shown in green

Quarter Female/Three-Quarter Male Block



Cut faces shown in green

Quarter Male/Three-Quarter Female Block



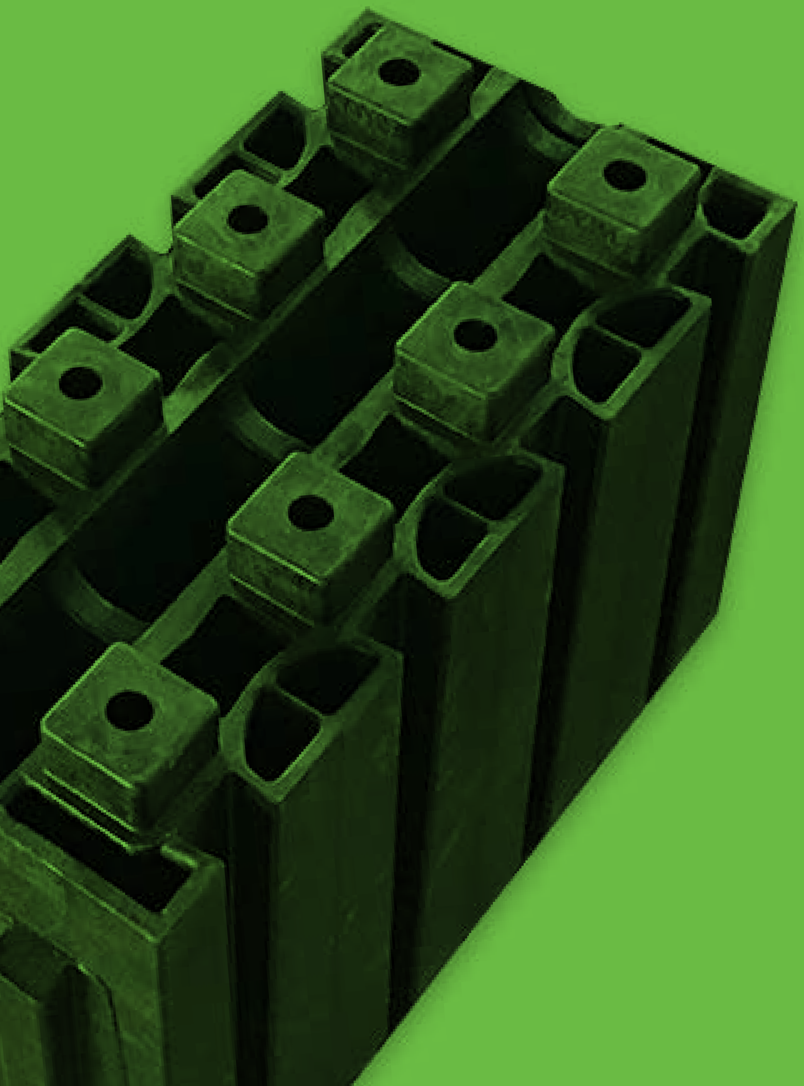
Cut faces shown in green

Section 2

Testing

This section describes the Lok-N-Blok testing program and results.

- Lok-N-Blok Testing Program
- Envion Plastic Material Properties
- Lok-N-Blok Properties



LOK-N-BLOK TESTING PROGRAM

To demonstrate equivalency with current code-prescribed construction methods, a design and testing program has been developed and implemented for Lok-N-Blok. The primary basis for the test program is ICC-Evaluation Service AC447 - *Acceptance Criteria for Fiber Reinforced Plastic Modular Wall Systems*. ICC-ES is a nonprofit company that performs technical evaluations of building products, components, methods, and materials. Acceptance criteria are developed by the ICC-ES technical staff in consultation with the report applicant and with input from other interested parties, if any. Revisions to acceptance criteria are typically approved by a committee of code officials during public hearings.

The intended purpose of working with ICC-ES as part of the testing process is twofold. First, it facilitates the implementation of a test program based on an accepted standard such as AC447, which contains minimum testing, Quality Assessment, and Quality Control requirements. Second, ICC-ES is a third-party certification body that reviews submitted technical documents. Following the review of all submitted documents ICC-ES provides an Evaluation Service Report (ESR), which is a document that presents the findings, conclusions, and recommendations from an evaluation. Until an ESR has been issued, Lok-N-Blok can provide reports documenting testing based on AC447, design details, and supporting calculations that demonstrate equivalence to the methods prescribed by IBC/IRC for submittal to a building official for review and approval.

The Lok-N-Blok testing has primarily been performed at the Janney Technical Center (JTC) on the Northbrook, Illinois campus of Wiss, Janney, Elstner Associates, Inc. The JTC was established in 1956, includes a 70,000 square foot state-of-the-art testing and applied research facility, and is accredited by the ANSI National Accreditation Board. A certificate of accreditation is provided herein. A few tests, related to thermal and fire resistance, have been performed at off-site facilities under the supervision of WJE engineers. Fire resistance tests have been performed at Underwriters Laboratories (UL) in Northbrook, Illinois, and thermal resistance tests have been performed at R & D Services in Watertown, Tennessee. Certificates of accreditation for both companies are available upon request.

ENVION PLASTIC MATERIAL PROPERTIES

DESCRIPTION	TESTING STANDARD	RESULT
Density	ASTM D792	1.131 g/cm³
Filler Content	ASTM D5630	29.95%
Flexural Modulus	ASTM D790	738,000 psi
Flexural Strength at Max Load	ASTM D790	19,150 psi
Heat Deflection at 1820 kPa	ASTM D648	148°C
Melt Flow	ASTM D1238	8.4 g/10 min
Notched Izod at 23°C (Hinge Break)	ASTM D256	1.9 ft-lbs/in
Notched Izod at -30°C (Complete Break)	ASTM D256	1.2 ft-lbs/in
Tensile Elongation at Break	ASTM D638	3.00%
Tensile Elongation at Yield	ASTM D638	2.60%
Tensile Strength at Yield	ASTM D638	12,130 psi

Notes:

1. Properties provided by Washington Penn Plastic Co. Inc.

LOK-N-BLOK PROPERTIES

DESCRIPTION	TESTING STANDARD	RESULT	TEST REPORT
COMPONENT BLOCK TESTING			
Block Prism Compression	ASTM C140	89.0 kips[5]	Test Report 01, Block Prism Compression Test, June 3, 2022
FASTENER TESTING			
Allowable Fastener Tension	ASTM E488	204 lbs	Test Report 07, Fastener Tension and Shear, Simpson Strong-Tie Strong-Drive SDWS16400 Framing Screws, June 23, 2022
Allowable Fastener Horizontal Shear	ASTM E488	240 lbs	Test Report 07, Fastener Tension and Shear, Simpson Strong-Tie Strong-Drive SDWS16400 Framing Screws, June 23, 2022
Allowable Fastener Vertical Shear	ASTM E488	228 lbs	Test Report 07, Fastener Tension and Shear, Simpson Strong-Tie Strong-Drive SDWS16400 Framing Screws, June 23, 2022

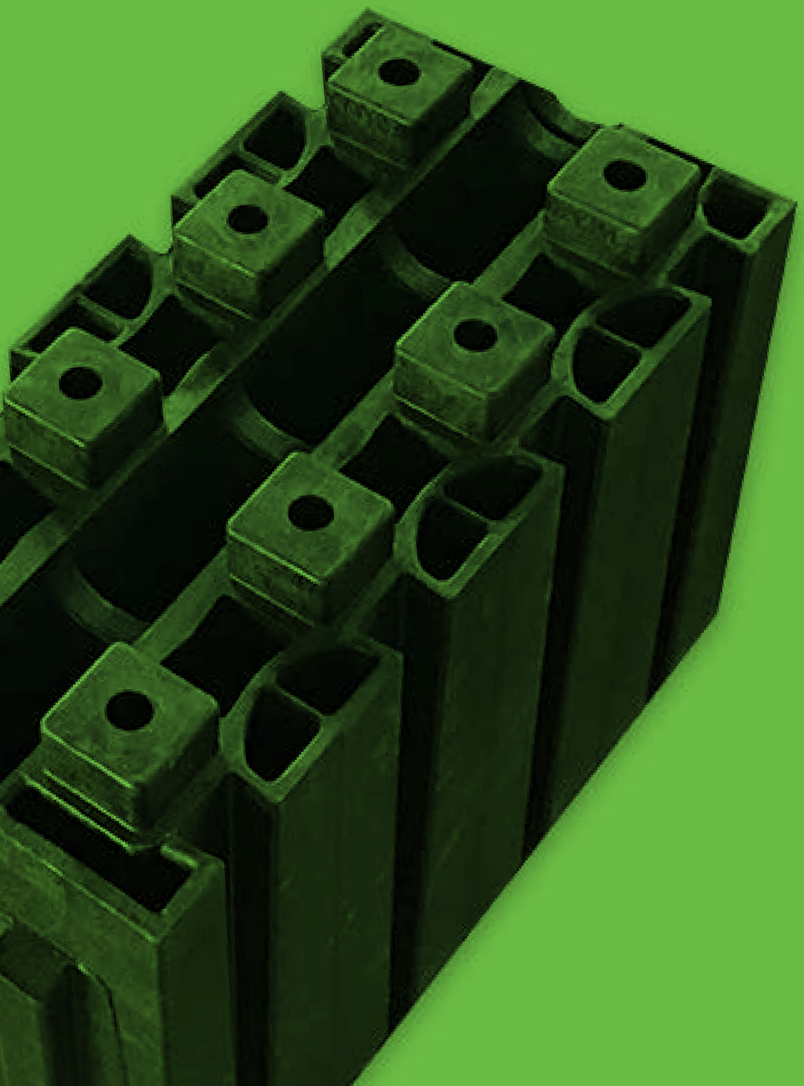
LOK-N-BLOK PROPERTIES (CONT'D)

DESCRIPTION	TESTING STANDARD	RESULT	TEST REPORT
WALL SYSTEM TESTING			
Load Testing of Home Show Booth	IBC, Section 1708, In-Situ Load Tests	Pass[6]	Load Test of Home Show Booth Mockup, September 10, 2019
Peak Net Applied Pressure	ASTM E72	86.8 psf[7]	Test Report 02, Wall Assembly Out-of-Plane Flexure, June 3, 2022
Net Applied Pressure at L/240	ASTM E72	31.5 psf[7]	Test Report 02, Wall Assembly Out-of-Plane Flexure, June 3, 2022
BUILDING ENVELOPE TESTING			
R-Value	ASTM C518	6.0[8]	Test Report 05, Building Envelope Thermal Resistance, June 10, 2022[9]
Air Leakage Test	ASTM E283	Pass	Test Report 03, Building Envelope Air Leakage, June 3, 2022
Water Penetration Test	ASTM E331	Pass	Test Report 04, Building Envelope Water Penetration, June 3, 2022
Flame Spread Index	UL 723	80	Test Report 06, Building Envelope Surface Burning Characteristics, June 10, 2022[10]
Smoke Developed Index	UL 723	500	Test Report 06, Building Envelope Surface Burning Characteristics, June 10, 2022[10]

Notes:

1. Details and design values provided herein are preliminary subject to the completion of testing except as noted above.
2. Verify that you have the most current Design Guide downloaded prior to design or construction.
3. The conceptual details and design procedure provided herein do not replace or otherwise alter the contractual responsibilities of the design and construction team members.
4. All testing performed by Wiss, Janney, Elstner Associates, Inc., except as noted.
5. Value is average of 10 samples. Refer to test report for details.
6. Test performed using design live load of 100 lbs/sf.
7. Wall clear span 107.25 inches, precompression of 1,574 pounds per lineal foot of wall.
8. R-Value is an average of 4 samples. Refer to test report for details.
9. Testing performed by R&D Services, Inc.
10. Testing performed by Underwriters Laboratories, LLC.

Section 3



Design

This section describes the available structural design procedures for Lok-N-Bloks, including structural design tables and material specifications.

- Design with Lok-N-Blok
- Definitions
- Symbols
- Material Specifications
- Design Procedure with Commentary
- Design Procedure Worksheet
- Structural Tables

DESIGN WITH LOK-N-BLOK

This section provides prescriptive and performance-based requirements, and information regarding the basis for code approval, for the use of Lok-N-Blok as a building material.

Design Scope

The design information provided herein is applicable for exterior and interior Lok-N-Blok walls in the following building types, provided they comply with the limitations indicated below:

- Detached one- and two-family dwellings
- Multiple one-family dwellings (townhouses)
- Low-rise buildings of other occupancy groups

Buildings or parts thereof, including aspects of building construction using Lok-N-Blok, that are not within the scope of this design guide shall be designed and constructed in accordance with the applicable building code. Where differences occur between provisions of this design guide and the applicable building code, the provisions of the applicable building code shall apply.

Code Approval

Approval for the use of Lok-N-Blok by the authority having jurisdiction (building official) is based on the International Building Code (IBC) and International Residential Code (IRC) Section 104.11 – Alternative Materials, Design and Methods of Construction and Equipment. The stated intent of the IBC/IRC is not to inhibit the use of new and innovative construction materials or methods, and the absence of a construction material or method from a particular edition of the IBC/IRC is not an indication that it may not be approved for use. IBC/IRC Section 104.11 codifies this intent and prescribes that an alternative material, design, or method of construction shall be approved where the building official finds that the proposed design is satisfactory and complies with the intent of the provisions of the code, and that the material or method is not less than the equivalent of that prescribed in the code in quality, strength, effectiveness, fire resistance, durability, and safety.

To demonstrate equivalency with current code-prescribed construction methods, a design and testing program has been developed and implemented for Lok-N-Blok. The primary basis for the test program is ICC-Evaluation Service AC447 - *Acceptance Criteria for Fiber Reinforced Plastic Modular Wall Systems*. Currently, the ICC-ES review process is ongoing, after which ICC-ES will provide an Evaluation Service Report (ESR), which presents the findings and conclusions from the evaluation. While receiving a final ESR may facilitate the approval of construction with Lok-N-Blok by a building official, it is not necessary for approval. Until an ESR has been issued, Lok-N-Blok can provide reports documenting testing based on AC447, design details, and supporting calculations that demonstrate equivalence to the methods prescribed by IBC/IRC for submittal to a building official for review and approval. If a building official determines that additional information is required for local approval, which the IBC/IRC prescribes must be provided in writing, Lok-N-Blok can assist in providing the necessary documentation.

Design Procedures

The design procedures described herein are based on load requirements prescribed by the 2018 and 2021 Editions of the International Building Code and International Residential Code (2018 IBC/IRC and 2021 IBC/IRC). It is the responsibility of others (design professional, contractor, and/or owner) to verify compliance with all code requirements of the authority having jurisdiction, including whether construction documents are required to be prepared by a registered design professional.

Simplified Design Procedure (Prescriptive)

Lok-N-Blok has developed a simplified, prescriptive method for the design of exterior Lok-N-Blok walls in buildings with common configurations, as described below. The simplified design procedure can also be used to design buildings with other configurations (i.e., longer wall lengths, etc.), and the necessary additional design information can be provided upon request.

Advanced Design (Performance-Based)

The design of Lok-N-Blok walls for a building of any configuration, including those where the use of the simplified design procedure is not applicable, may be performed by a design professional using engineering methods in accordance with the applicable building code. The design procedure commentary provided herein provides an overview of a recommended methodology.

Design Building Configuration Requirements

The building configuration requirements for which the prescriptive and performance-based design procedures can be used are provided in the table below. All the indicated requirements must be met to use the simplified design procedure.

REQUIREMENT	SIMPLIFIED DESIGN PROCEDURE	ADVANCED DESIGN
CODE DESIGN PARAMETERS		
Risk Category	I or II	III or IV
Soil Site Class	A, B, C, or D	E, F
Seismic Design Category	A or B	C, D, E
Basic Wind Speed	≤ 180 mph 3-second gust	> 180 mph 3-second gust
Wind Exposure Category	All	All
Wind Enclosure Classification	Enclosed or partially open	Partially enclosed or open
Ground Snow Load	≤ 70 psf	> 70 psf
BUILDING - GENERAL		
Number of stories above grade plane	≤ 2	3
Building plan aspect ratio	≤ 3:1	> 3:1
Minimum building horizontal dimension	≥ 75% of the mean roof height	< 75% of the mean roof height
Maximum building horizontal dimension	≤ 60 feet	> 60 feet

Design Building Configuration Requirements

REQUIREMENT	SIMPLIFIED DESIGN PROCEDURE	ADVANCED DESIGN
BUILDING - WALLS		
Story height	≤ 12 feet	> 12 feet
Wall alignment between stories	Aligned vertically with the walls below	Other configurations
Tension rod spacing	≤ 4 blocks (4' 0-1/2")	≤ 4 blocks (4' 0-1/2")
Distance between Qualifying Solid Walls	≤ 14 blocks (14' 1-3/4")	> 14 blocks (14' 1-3/4")
Qualifying Solid Walls at corners	At the ends of all exterior endwall and sidewall lines	Other configurations
Wall opening width	≤ 7 blocks (7' 0-7/8")	> 7 blocks (7' 0-7/8")
Blocks between narrow wall openings	≥ 2 blocks (2' 0-1/4")	Other configurations
Blocks between narrow and wide wall openings	≥ 3 blocks (3' 0-3/8")	Other configurations
Blocks between wide wall openings	≥ 4 blocks (4' 0-1/2")	Other configurations
BUILDING - FLOORS		
Floor elevations	All portions of a floor shall be at the same level	Other configurations
Floor clear spans	≤ 30 feet	> 30 feet
Floor and ceiling dead loads	≤ 10 psf	> 10 psf
Floor live loads	≤ 40 psf	> 40 psf
BUILDING - ROOFS		
Roof slope	≤ 6:12	> 6:12
Roof clear spans	≤ 60 feet	> 60 feet
Roof and ceiling dead loads	≤ 15 psf	> 15 psf
Attic live loads	≤ 20 psf	> 20 psf
Roof overhang (horizontal projection) beyond exterior walls	≤ 2 feet	> 2 feet
Dead load of overhangs	≤ 10 psf	> 10 psf

DEFINITIONS

Authority Having Jurisdiction: The organization, political subdivision, office, or individual charged with the responsibility of administering and enforcing the provisions of applicable building codes.

Basic Wind Speed: Three-second gust speed at 33 feet above the ground in Exposure C as determined in accordance with the IBC for the building site.

Dead Load: The weight of the materials of construction incorporated into the building, including but not limited to walls, floors, roofs, ceilings, stairways, built-in partitions, finishes, cladding, other similarly incorporated architectural and structural items, and fixed service equipment.

Enclosure Classification: Used to determine internal wind pressure. All buildings shall be classified as enclosed, partially enclosed, partially open, or open as defined in IBC or if there is no code as follows:

Enclosed Building: A building not complying with the requirements for a partially enclosed building.

Partially Enclosed Building: A building that complies with both of the following:

2. The total area of openings in a wall that receives positive external pressure exceeds the sum of the area of openings in the balance of the building envelope (walls and roof) by more than 10 percent, and
3. The total area of openings in a wall that receives positive external pressure exceeds 4 square feet or 1 percent of the area of the wall, whichever is smaller, and the percentage of openings in the balance of the building envelope (walls and roof) does not exceed 20 percent.

Escarpment: With respect to topographic effects that result in wind speed-up, cliff or steep slope generally separating two levels of gently sloping areas.

Exposure Categories: For each wind direction considered, the upwind exposure shall be classified as Exposure B, C, or D in accordance with IBC based on ground surface roughness that is determined from natural topography, vegetation, and constructed facilities. Exposure Category B includes urban and suburban areas, wooded areas or other terrain with numerous closely spaced obstructions having the size of closely spaced obstructions having the size of single-family dwellings or larger. Exposure Category C includes open terrain with scattered obstructions having heights generally less than 30 feet. Exposure D includes flat, unobstructed areas and water surfaces.

Exterior Endwall Line: The side of a building that is parallel to the span of the roof or floor framing.

Exterior Sidewall Line: The side of a building that is perpendicular to the span of the roof or floor framing.

Floor Joist: A horizontal structural framing member that supports floor load.

Foundation Wall: The structural element of a foundation that resists lateral soil loads, if any, and transmits the dead load of a structure and the loads and forces imposed on it to the footing, or directly to the soil or rock; includes basement, stem, and crawlspace walls.

Grade: The finished ground level adjoining the building at all exterior walls.

Grade Plane: A reference plane representing the average of the finished ground level adjoining the building at all exterior walls.

Ground Snow Load: The weight of the accumulated snow at the ground level of the building site as determined in accordance with IBC.

Hill: With respect to topographic effects that result in wind speed-up, a land surface characterized by strong relief in any horizontal direction.

IBC: The 2018 Edition of the *International Building Code*.

IRC: The 2018 Edition of the *International Residential Code*.

Ledger: A horizontal structural member fastened to the side of a wall to serve as a connection point for other structural members, typically floor joists.

Live Load: Those loads produced by the use and occupancy of the building or other structure and do not include construction or environmental loads such as wind load, snow load, rain load, earthquake load, flood load, or dead load.

Mean Roof Height: The average of the roof eave height and the height to the highest point on the roof surface, except that, for roof angle of less than or equal to 10 degrees, the mean roof height is permitted to be taken as the roof eave height.

Overall Lok-N-Blok Wall Height: The vertical distance from the top surface of the foundation wall or slab-on-ground to the bottom of the wood top plate.

Ridge: With respect to topographic effects that result in wind speed-up, an elongated crest of a hill characterized by strong relief in two directions.

Running Bond: The placement of Lok-N-Blok units such that the head joints in successive courses are horizontally offset one-half the unit length.

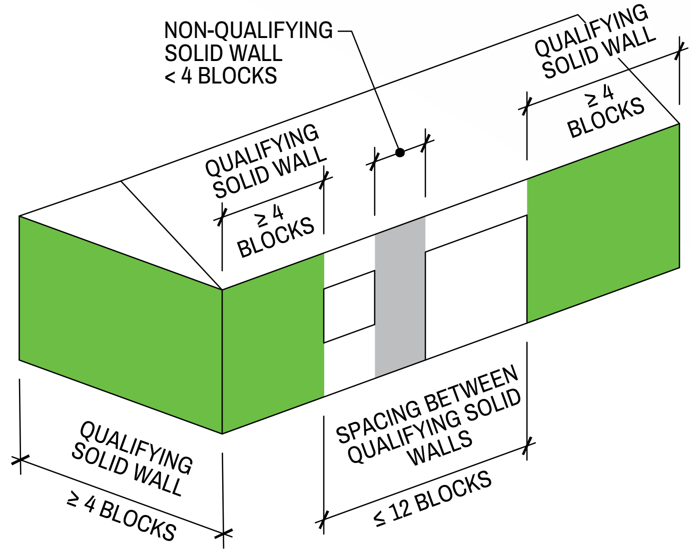
Seismic Design Category: A classification assigned to a structure per IBC based on its occupancy category and the severity of the design earthquake ground motion at a site.

Slab-on-Ground: A concrete slab, which is continuously supported by, and rests on, the soil directly below.

Solid Wall: A segment of flat wall, extending the full story height without openings or penetrations, other than for utilities and other building services passing through the wall. Such openings shall have an area of less than 30 inches square without any dimension exceeding 6 inches and shall not be located within 12 inches of the side edges of the solid wall segment.

Solid Wall, Qualifying: Solid walls with a length equal to or greater than 4 blocks (4' 0-1/2").

Solid Wall Definitions



Solid Wall, Nonqualifying: Solid walls with a length less than 4 blocks (4' 0-1/2").

Solid Walls, Required Length, L_R: The minimum Qualifying Length of Solid Walls required in each exterior endwall or sidewall line in each story.

Solid Walls, Qualifying Length: The sum of the lengths of all Qualifying Solid Walls in an exterior endwall or sidewall line. The Qualifying Length of Solid Walls must be equal to or greater than the Required Length of Solid Walls, L_R.

Stack Bond: The placement of Lok-N-Blok units in a bond pattern such that the head joints in successive courses are vertically aligned.

Story Above Grade Plane: Any story with its finished floor surface entirely above grade plane except that a basement shall be considered as a story above grade plane where the finished surface of the floor above the basement is (a) more than 6 feet above the grade plane, or (b) more than 12 feet above the finished ground level at any point.

Story: That portion of the building included between the upper surface of a floor and the upper surface of the floor or roof next above.

Story Height: The vertical distance from top to top of two successive tiers of beams or finished floor surfaces; and, for the topmost story, from the top of the floor finish to the top of the ceiling joists.

Wall Design Precompression Load, P_D: The linear, vertical precompression load required in a Lok-N-Blok wall to resist wind out-of-plane and uplift loads acting on the wall.

Wall Net Precompression Load, P_N: The linear, vertical precompression load required in a Lok-N-Blok wall to resist out-of-plane loads acting on the wall.

Wall Opening, Narrow: A wall opening that has a maximum width 1/2 block (6-1/6") less than the Maximum Tension Rod Spacing, s_R.

Wall Opening, Wide: A wall opening with width greater than the maximum Narrow Wall Opening width. Wide wall openings must implement an intermediate tension rod and are currently limited to 7 blocks (7' 0-7/8") wide using the header details presented in this design guide.

Wind Uplift Load, Basic, U_{120}: The linear, vertical load acting on the wall top plate due to wind loads prescribed in IBC for a design wind speed of 120 mph and Exposure Category B.

Wind Uplift Load, Design, U_D: The linear, vertical load acting on the wall top plate due to wind loads prescribed in IBC, based on the site-specific design wind speed, exposure category, topographic effects, and ground elevation.

SYMBOLS

SYMBOL	DEFINITION
AF_w	Wind adjustment factor from **Table 1, Wind Adjustment Factor**, to modify wind loads for various wind speeds and exposure categories
d_{so}	Spring outer diameter (in) from **Table 9, Spring Types and Properties**
h	Vertical distance from grade plane to the average height of the uppermost roof surface (ft)
h_{ef}	Foundation anchor embedment depth (in)
h_{pa}	Height of wall precompression assembly above top plate (in)
h_{si}	Compressed spring height for installation (in) from **Table 6, Spring Type A Installation Height, Table 7, Spring Type B Installation Height,** or **Table 8, Spring Type C Installation Height**
h_{so}	Uncompressed spring height (in) from **Table 9, Spring Types and Properties**
K_e	Ground elevation factor to account for reduced air density at elevations above sea level
K_s	Spring constant (lb/in) from **Table 9, Spring Types and Properties**
K_{zt}	Topographic factor from IBC

SYMBOLS (CONT'D)

SYMBOL	DEFINITION
L_E	Length of an endwall (ft)
L_R	Required length of solid walls in each sidewall and each endwall (ft)
L_S	Length of a sidewall (ft)
L_{sm}	Maximum spring compression length (in) from **Table 9, Spring Types and Properties**
L_W	Basic length of solid walls in each sidewall and each endwall (ft) from **Table 2, Basic Length of Solid Walls**, based upon a 120-mph basic wind speed, Exposure Category B, Ground Elevation Factor K_e = 1.0, Topographic Factor K_{zt} = 1.0
P_D	Wall design precompression load (lb/ft)
P_N	Wall net precompression load (lb/ft) from **Table 3, Wall Net Precompression Load**
P_{sm}	Maximum spring compression load at maximum compression length (lb) for allowable stress design from **Table 9, Spring Types and Properties**
s_R	Tension rod spacing (blocks, ft-in)
T_R	Typical rod design tension (lb) from **Table 5, Typical Rod Design Tension**
T_W	Design tension (lb) for rods adjacent to a wide wall opening
U_{120}	Basic wind uplift load (lb/ft) from **Table 4, Basic Wind Uplift Load**
U_D	Wind design uplift load (lb/ft) for allowable stress design
z_g	Ground elevation above sea level (ft)

MATERIAL SPECIFICATIONS

- Lok-N-Blok construction blocks
- Wall precompression assembly
  - Tension rods
    - Steel, ASTM A193 Grade B7
      - ASTM F1554 Grade 105 also permitted
    - 5/8 inch or 3/4 inch diameter, all thread rod, 10 threads per inch
      - Threaded at the ends only is also permitted, but all thread rod is recommended for field cutting rods to length
    - Any length, but 5 foot lengths recommended for constructability
  - Tension rod couplers
    - Match tension rods for rod diameter and thread pitch/classification
    - Ultimate tension strength to be equal to or greater than the ultimate tension strength of tension rods
  - Steel nuts
    - Match tension rods for rod diameter and thread pitch/classification
    - Ultimate tension strength to be equal to or greater than the ultimate tension strength of tension rods
  - Thrust washers
    - One-piece steel thrust ball bearing
    - Static load capacity equal to or greater than 16,000 lbs
  - Compression springs
    - Steel, grade and strength as needed to satisfy the spring properties given in **Table 9, Spring Types and Properties**
    - Maximum compression load, spring constant (stiffness), uncompressed height, maximum compression length, and outer diameter per **Table 9, Spring Types and Properties**
    - Inner diameter larger than tension rod diameter
    - Ground flush both ends
  - Steel bearing plates
    - ASTM A36 steel or ASTM A572 Grade 50
    - 3/8 inch thick
    - 8 inches long by 5 inches wide
    - Hole diameter equal to tension rod diameter plus 1/16 inch
    - Holes for tension rods to be centered in bearing plates
- Foundation anchors
  - Cast-in-place concrete anchor
    - Threaded rods
      - Steel, ASTM F1554 Grade 105
      - ASTM A193 Grade B7 also permitted
      - 5/8 inch or 3/4 inch diameter, all thread rod, 10 threads per inch
      - Hot-dipped galvanized
    - Steel nuts
      - Heavy hex
      - Match threaded rods for rod diameter and thread pitch/classification
      - Ultimate tension strength to be equal to or greater than the ultimate tension strength of tension rods
      - Hot-dipped galvanized
    - Minimum embedment depth
      - Stem wall: 21 inches
      - Slab on ground with turned down footing: 8 inches
    - Post-installed undercut anchor
      - Designed by others
      - Hot-dipped galvanized or stainless steel
      - Threaded rod extension that can be coupled to threaded tension rod
      - Tensile strength equal to or greater than the maximum spring load, Psm, in tension per Table 9, Spring Types and Properties
      - Post-installed adhesive concrete anchors not permitted

- Grout
  - BASF MasterFlow 928 non-shrink
- Wood top plates
  - 2x6 nominal size, surfaced four sides
  - No. 2 grade or better
  - Douglas Fir-Larch, Douglas Fir-Larch (North), Douglas Fir-South, Hem-Fir, Southern Pine, or Spruce-Pine-Fir
  - Minimum 8-foot lengths (10-foot lengths recommended for triple top plate with 4-block tension rod spacing)
  - Diameter of holes for tension rods equal to diameter of tension rod + 1/4 inch
- Wood ledgers
  - 2x10 or 2x12 nominal size, surfaced four sides
  - No. 1 grade or better
  - Douglas Fir-Larch, Douglas Fir-Larch (North), Douglas Fir-South, Hem-Fir, Southern Pine, or Spruce-Pine-Fir
  - Minimum 8-foot lengths
- Ledger fasteners
  - Simpson Strong-Tie Strong-Drive® SDWS Framing Screw, 4 inch length (SDWS16400)
- HW-B Detail
  - Metal straps
    - Steel, ASTM A653 SS designation
    - 16 gauge, 2 inch width
  - Fasteners
    - Simpson Strong-Tie Strong-Drive SDWS Framing Screw, 2-1/2 inch length (SDWS16212)

DESIGN PROCEDURE WITH COMMENTARY

This design procedure provides a simplified, prescriptive method for the design of exterior Lok-N-Blok walls subject to the limitations provided above. Some of the steps may be iterative if a design value or configuration established in a step creates a situation in a subsequent step that falls outside of the established limitations. The design procedure with commentary is provided below. Worksheets with the design procedure in an abbreviated form follow.

General

1. Establish building plan, wall heights, and roof geometry.
2. Determine the building Exposure Category.
3. Determine the following from the ASCE 7 Hazard Tool, https://asce7hazardtool.online/ based on the address (or coordinates) of the building site, Standard Version ASCE/SEI 7-16, and Risk Category II.
   a. Design wind speed
   b. Ground snow load
   c. Seismic design category
4. Determine the design wind load parameters.
   a. For Exposure C or D, if isolated hills, ridges, or escarpments affect the wind speed at the building site determine the topographic factor, K_{zt}, in accordance with IBC. Otherwise, $K_{zt} = 1.0$.
   b. For ground elevations above sea level, determine K_e.

      $K_e = e^{(-0.0000362 \times z_g)}$

      At sea level, $K_e = 1.0$. It is conservatively permitted to take $K_e = 1.0$ for all elevations.

Once the overall building geometry and loading information are established in steps 1 through 4 above, each exterior wall of the building shall be designed separately using steps 5 through 26 below. For each exterior wall of the structure, perform the following design steps. Each exterior wall shall be numbered (e.g., Wall 1, Wall 2, etc.).

Openings and Solid Wall Segments

All buildings shall have solid walls in each exterior endwall line and sidewall line to resist lateral forces. The site-specific wind speed, exposure category, and other wind load factors shall be used to determine the required total length of solid wall in each exterior endwall line and sidewall line as described in steps 5 through 7. The sizes and locations of wall openings and solid wall segments along the length of each wall shall be established subject to the limitations given in step 8 and the total qualifying length of solid wall requirements given in step 9.

5. Determine the Basic Length of Solid Walls for each story, L_W, from **Table 2, Basic Length of Solid Walls**.
   a. L_{W1} – Basic Length of Solid Walls for Story 1 of 2 (if applicable)
   b. L_{W2} – Basic Length of Solid Walls for Story 1 of 1 or Story 2 of 2
6. Determine the adjustment factor AF_W from **Table 1, Wind Adjustment Factor** for the site-specific wind speed and exposure category. Use the upper values for required length of solid walls.
7. Calculate the Required Length of Solid Walls for each story, L_R, which provides the necessary strength for in-plane lateral loads:

   $L_R = L_W \times AF_W \times K_{zt}$

   a. L_{R1} – Required Length of Solid Walls for Story 1 of 2 (if applicable)
   b. L_{R2} – Required Length of Solid Walls for Story 1 of 1 or Story 2 of 2
8. Establish the sizes and locations of wall openings and solid wall segments according to the following limitations:
   a. Wall openings greater than 7 blocks (7’ 0-7/8”) wide are not addressed by this design procedure.
   b. Narrow wall openings shall have at least 2 blocks (2’ 0-1/4”) between them.

c. Wide wall openings shall have at least 4 blocks (4’ 0-1/2”) between them.

d. A wide and narrow opening shall have at least 3 blocks (3’ 0-3/8”) between them.

e. A Qualifying Solid Wall, with length equal to or greater than 4 blocks (4’ 0-1/2”), shall be located at the ends of all exterior endwall and sidewall lines.

f. The distance between Qualifying Solid Walls shall be no more than 14 blocks (14’ 1-3/4”).

9. Determine the Qualifying Length of Solid Walls as the sum of the lengths of all Qualifying Solid Walls in a story.

   a. Qualifying Solid Walls are solid wall segments with length equal to or greater than 4 blocks (4’ 0-1/2”).

   b. The Qualifying Length of Solid Walls in each story shall be equal to or greater than the Required Length of Solid Walls, $\mathbf{L_R}$.

Wall Design Loads

Each exterior endwall and sidewall is precompressed to increase the stiffness and strength of the wall in order to resist in-plane and out-of-plane forces acting on the wall due to lateral loads. In addition, due to the roof assembly connection to the exterior walls, the wall precompression will be reduced when wind uplift forces act on the roof. The wall design precompression shall be calculated in step 12 as the sum of the net precompression load in a wall, determined in step 10, and the design wind uplift load acting on the top of a wall, determined in step 11.

10. Determine the wall net precompression load, $\mathbf{P_N}$, from T**able 3, Wall Net Precompression Load**. This precompression load is provided to increase the stiffness and strength of the wall to resist in-plane and out-of-plane forces.

11. Determine the wind design uplift load, $\mathbf{U_D}$. This is the linear resultant of the applicable code-prescribed design wind uplift forces acting on the part of the roof that is tributary to the wall.

    a. Determine the basic wind uplift load, $\mathbf{U_{120}}$, from **Table 4, Basic Wind Uplift Load**, which is based on a design wind speed of 120 mph and Exposure Category B.

    b. Determine the adjustment factor $\mathbf{AF_W}$ from T**able 1, Wind Adjustment Factor** for the site-specific wind speed and exposure category. Use the lower values for design wind uplift load. Note that this adjustment factor will be different than that determined in step 6.

    c. Calculate the design wind uplift load as $\mathbf{U_D}$, which can account for design wind speeds other than 120 mph, exposure categories other than B, topographic wind speed up effects, and differences in air density and wind pressure at elevations other than sea level. $\mathbf{U_D}$ greater than 2000 lb/ft is not addressed by this design procedure.

    $$U_D = U_{120} \times AF_W \times K_{zt} \times K_e$$

    d. Calculate the wall design precompression load:

    $$P_D = P_N + U_D$$

    This design value represents the linear load applied to the top of the wall by the precompression assembly so that the wall net precompression load is maintained in the wall when code-prescribed wind uplift forces act on the roof.

Tension Rod Design

The maximum tension rod spacing is established and used to determine the typical rod design tension necessary to provide the design precompression load to the wall. If wide wall openings are present in a wall line, the design tension for the first rod on either side of the opening must be greater than the typical rod design tension due to the wind uplift load acting on the wall above the opening.

12. Select the tension rod spacing, $\mathbf{s_R}$. The maximum tension rod spacing shall be 4 blocks (4’ 0-1/2”).

13. Determine $\mathbf{T_R}$, the typical rod design tension, from **Table 5, Typical Rod Design Tension**.

14. For tension rods adjacent to a wide wall opening, the rod design tension, $\mathbf{T_W}$, shall be determined by multiplying the typical rod design tension, $\mathbf{T_R}$, by an adjustment factor to account for the opening:

    $$T_W = T_R \times (1 + (\text{opening width}) / (4 \times s_R))$$

Spring Design

A spring type for the wall precompression assembly shall be selected in step 16, by identifying a type that is permitted for the combination of overall wall height and rod design tension. Then, the required properties for the selected spring type are determined in steps 17 and 18. The spring compressive capacity must be greater than the rod design tension to allow for precompression losses due to compressive creep. The precompression losses, and therefore the difference between rod design tension and spring compressive capacity, will be larger for taller walls as reflected by the tables in steps 16 and 17.

15. Select a spring type by identifying a permitted type for the combination of overall wall height and rod design tension from **Table 6, Spring Type A Installation Height, Table 7, Spring Type B Installation Height,** or **Table 8, Spring Type C Installation Height**.
16. Determine the compressed spring installation height, h_{si}, from **Table 6, Spring Type A Installation Height, Table 7, Spring Type B Installation Height,** or **Table 8, Spring Type C Installation Height**, depending on the selected spring type. The compressed spring installation height depends on the rod design tension and losses in rod tension due to wall deformation, which depends on the overall wall height.
17. Determine the properties for the selected spring type from **Table 9, Spring Types and Properties**.

Wall Precompression Assembly Details

Based on the selected spring type, the height of the wall precompression assembly and the spring and bearing plate dimensions can be established. Roof trusses or rafters must have sufficient clearance above the wall top plate to accommodate the height of the wall precompression assembly. Concrete anchors and thrust washers shall also be designed or selected based on the maximum spring compression load, $\mathbf{P_{sm}}$.

18. Determine the uncompressed spring height ($\mathbf{h_{so}}$) from **Table 9, Spring Types and Properties**.
19. Calculate the height of wall precompression assembly:

    $\mathbf{h_{pa} = h_{so} + 4}$ **inches**
20. Determine the required bearing plate size from **Table 9, Spring Types and Properties**.
21. Design concrete anchors with a tensile strength equal to or greater than 2000 lbs plus the maximum spring compression load, $\mathbf{P_{sm}}$.
22. Select thrust washers with a compression strength equal to or greater than 2000 lbs plus the maximum spring compression load, $\mathbf{P_{sm}}$.

If applicable, steps 16 through 23 should be repeated for tension rods adjacent to a wide wall opening.

Additional Construction Details

Determine the required top of wall detail, based on the wind design uplift load and the rod design spacing, in steps 24 and 25. If applicable, determine the number of fasteners required to connect a ledger board to the Lok-N-Blok wall, based on the sidewall and endwall lengths, in step 26.

23. Determine the required top of wall detail from **Table 10, Top of Wall Detail**. If HW-A is required, HW-B can also be used.
24. If HW-B is required or selected, determine the minimum number of fasteners at each strap end (each side of the wall) from **Table 11, HW-B Strap Fasteners**.
25. If the wall supports an elevated floor, determine the minimum number of ledger fasteners per block from **Table 12, Ledger Fasteners per Block**. If the wall being designed is a sidewall, use the number of fasteners specified for a sidewall. If the wall being designed is an endwall, use the number of fasteners specified for an endwall.

DESIGN PROCEDURE WORKSHEET

1. Establish building plan, wall heights, and roof geometry.

2. Determine the building Exposure Category:
3. Determine the following from the ASCE 7 Hazard Tool, https://asce7hazardtool.online/ based on the address (or coordinates) of the building site, Standard Version ASCE/SEI 7-16, and Risk Category II.
   a. Design wind speed
   b. Ground snow load
   c. Seismic design category
4. Determine the design wind load parameters.
   a. Determine the adjustment factor AF_W from **Table 1, Wind Adjustment Factor**.
   b. Determine the topographic factor, K_{zt}, in accordance with IBC.
   c. Determine the ground elevation factor, K_e.

For each exterior wall of the structure, perform the following design steps. Number each exterior wall (e.g., Wall 1, Wall 2, etc.).

OPENINGS AND SOLID WALL SEGMENTS Wall 1 Wall 2 Wall 3 Wall 4

5. Determine the Basic Length of Solid Walls for each story, $\mathbf{L_W}$, from **Table 2, Basic Length of Solid Walls**.
   a. $\mathbf{L_{W1}}$ – Basic Length of Solid Walls for Story 1 of 2 (if applicable)
   b. $\mathbf{L_{W2}}$ – Basic Length of Solid Walls for Story 1 of 1 or Story 2 of 2
6. Determine the adjustment factor $\mathbf{AF_W}$ from **Table 1, Wind Adjustment Factor**. Use the upper values for required length of solid walls.
7. Calculate the Required Length of Solid Walls for each story:

   $L_R = L_W \times AF_W \times K_{zt}$

   a. $\mathbf{L_{R1}}$ – Required Length of Solid Walls for Story 1 of 2 (if applicable)
   b. $\mathbf{L_{R2}}$ – Required Length of Solid Walls for Story 1 of 1 or Story 2 of 2
8. Establish the sizes and locations of wall openings and solid wall segments.
9. Determine the Qualifying Length of Solid Walls, the sum of the lengths of all Qualifying Solid Walls in a story, and check that this length is equal to or greater than the Required Length of Solid Walls, $\mathbf{L_R}$.

WALL DESIGN LOADS

10. Determine the wall net precompression load, $\mathbf{P_N}$, from **Table 3, Wall Net Precompression Load**.
11. Determine the wind design uplift load, $\mathbf{U_D}$.
    a. Determine the basic wind uplift load, $\mathbf{U_{120}}$, from **Table 4, Basic Wind Uplift Load**.
    b. Determine the adjustment factor $\mathbf{AF_W}$ from **Table 1, Wind Adjustment Factor**. Use the lower values for design wind uplift load.
    c. Calculate the wind design uplift load:

    $U_D = U_{120} \times AF_W \times K_{zt} \times K_e$

12. Calculate the wall design precompression load:

    $P_D = P_N + U_D$

TENSION ROD DESIGN

13. Select the tension rod spacing, $\mathbf{s_R}$.
14. Determine $\mathbf{T_R}$, the typical rod design tension, from **Table 5, Typical Rod Design Tension**.
15. If applicable, calculate the design tension for rods adjacent to a wide wall opening:

    $T_W = T_R \times (1 + (\text{opening width}) / (4 \times s_R))$

SPRING DESIGN

Wall 1 | Wall 2 | Wall 3 | Wall 4

16. Select a spring type from **Table 6, Spring Type A Installation Height, Table 7, Spring Type B Installation Height**, or **Table 8, Spring Type C Installation Height**, based on a permitted combination of overall wall height and rod design tension.
17. Determine the spring installation height, h_{si}, from **Table 6, Spring Type A Installation Height, Table 7, Spring Type B Installation Height**, or **Table 8, Spring Type C Installation Height**, based on the selected spring type.
18. Determine the properties for the selected spring type from **Table 9, Spring Types and Properties**.

WALL PRECOMPRESSION ASSEMBLY DIMENSIONS AND DETAILS

19. Determine the uncompressed spring height (h_{so}) from **Table 9, Spring Types and Properties**.
20. Calculate the height of wall precompression assembly:

    $h_{pa} = h_{so} + 4$ **inches**
21. Determine the required bearing plate size from **Table 9, Spring Types and Properties**.
22. Design concrete anchors with a tensile strength equal to or greater than the maximum spring compression load, P_{sm}.
23. Select thrust washers with a compression strength equal to or greater than the maximum spring compression load, P_{sm}.

If applicable, steps 16 through 23 should be repeated for tension rods adjacent to a wide wall opening.

ADDITIONAL CONSTRUCTION DETAILS

24. Determine the required top of wall detail from **Table 10, Top of Wall Detail**.
25. If HW-B is required or selected, determine minimum number of fasteners at each strap end (each side of the wall) from **Table 11, HW-B Strap Fasteners**.
26. Determine the minimum number of ledger fasteners per block from **Table 12, Ledger Fasteners per Block**, if applicable. If the wall being designed is a sidewall, use the number of fasteners specified for a sidewall. If the wall being designed is an endwall, use the number of fasteners specified for an endwall.

OPENINGS AND SOLID WALL SEGMENTS

Wall _ Wall _ Wall _ Wall _

5. Determine the Basic Length of Solid Walls for each story, $\mathbf{L_W}$, from **Table 2, Basic Length of Solid Walls**.
   a. $\mathbf{L_{W1}}$ – Basic Length of Solid Walls for Story 1 of 2 (if applicable)
   b. $\mathbf{L_{W2}}$ – Basic Length of Solid Walls for Story 1 of 1 or Story 2 of 2
6. Determine the adjustment factor $\mathbf{AF_W}$ from **Table 1, Wind Adjustment Factor**. Use the upper values for required length of solid walls.
7. Calculate the Required Length of Solid Walls for each story:

   $L_R = L_W \times AF_W \times K_{zt}$

   a. $\mathbf{L_{R1}}$ – Required Length of Solid Walls for Story 1 of 2 (if applicable)
   b. $\mathbf{L_{R2}}$ – Required Length of Solid Walls for Story 1 of 1 or Story 2 of 2
8. Establish the sizes and locations of wall openings and solid wall segments.
9. Determine the Qualifying Length of Solid Walls, the sum of the lengths of all Qualifying Solid Walls in a story, and check that this length is equal to or greater than the Required Length of Solid Walls, $\mathbf{L_R}$.

WALL DESIGN LOADS

10. Determine the wall net precompression load, $\mathbf{P_N}$, from **Table 3, Wall Net Precompression Load**.
11. Determine the wind design uplift load, $\mathbf{U_D}$.
    a. Determine the basic wind uplift load, $\mathbf{U_{120}}$, from **Table 4, Basic Wind Uplift Load**.
    b. Determine the adjustment factor $\mathbf{AF_W}$ from **Table 1, Wind Adjustment Factor**. Use the lower values for design wind uplift load.
    c. Calculate the wind design uplift load:

       $U_D = U_{120} \times AF_W \times K_{zt} \times K_e$

12. Calculate the wall design precompression load:

    $P_D = P_N + U_D$

TENSION ROD DESIGN

13. Select the tension rod spacing, $\mathbf{s_R}$.
14. Determine $\mathbf{T_R}$, the typical rod design tension, from **Table 5, Typical Rod Design Tension**.
15. If applicable, calculate the design tension for rods adjacent to a wide wall opening:

    $T_W = T_R \times (1 + \text{(opening width)} / (4 \times s_R))$

SPRING DESIGN

Wall _ Wall _ Wall _ Wall _

16. Select a spring type from **Table 6, Spring Type A Installation Height, Table 7, Spring Type B Installation Height**, or **Table 8, Spring Type C Installation Height**, based on a permitted combination of overall wall height and rod design tension.
17. Determine the spring installation height, $\mathbf{h_{si}}$, from **Table 6, Spring Type A Installation Height, Table 7, Spring Type B Installation Height**, or **Table 8, Spring Type C Installation Height**, based on the selected spring type.
18. Determine the properties for the selected spring type from **Table 9, Spring Types and Properties**.

WALL PRECOMPRESSION ASSEMBLY DIMENSIONS AND DETAILS

19. Determine the uncompressed spring height ($\mathbf{h_{so}}$) from **Table 9, Spring Types and Properties**.
20. Calculate the height of wall precompression assembly:

    $\mathbf{h_{pa} = h_{so} + 4}$ **inches**
21. Determine the required bearing plate size from **Table 9, Spring Types and Properties**.
22. Design concrete anchors with a tensile strength equal to or greater than the maximum spring compression load, $\mathbf{P_{sm}}$.
23. Select thrust washers with a compression strength equal to or greater than the maximum spring compression load, $\mathbf{P_{sm}}$.

If applicable, steps 16 through 23 should be repeated for tension rods adjacent to a wide wall opening.

ADDITIONAL CONSTRUCTION DETAILS

24. Determine the required top of wall detail from **Table 10, Top of Wall Detail**.
25. If HW-B is required or selected, determine minimum number of fasteners at each strap end (each side of the wall) from T**able 11, HW-B Strap Fasteners**.
26. Determine the minimum number of ledger fasteners per block from **Table 12, Ledger Fasteners per Block**, if applicable. If the wall being designed is a sidewall, use the number of fasteners specified for a sidewall. If the wall being designed is an endwall, use the number of fasteners specified for an endwall.

Table 1, Wind Uplift Adjustment Factor (AF_W)

DESIGN WIND SPEED (MPH)	EXPOSURE CATEGORY		
	B	C	D
FOR REQUIRED LENGTH OF SOLID WALLS (STEP 6)			
110	0.74	0.91	0.98
120	0.81	1.00	1.10
130	0.91	1.10	1.22
140	0.98	1.20	1.32
150	1.07	1.31	1.43
160	1.16	1.41	1.58
170	1.24	1.51	1.66
180	1.32	1.65	1.79
FOR DESIGN WIND UPLIFT LOAD (STEP 11)			
110	0.60	0.84	0.99
120	0.72	1.00	1.18
130	0.84	1.17	1.38
140	0.98	1.36	1.60
150	1.12	1.56	1.84
160	1.28	1.78	2.10
170	1.44	2.01	2.37
180	1.62	2.25	2.65

Table 2, Basic Length of Solid Walls (L_W, ft)

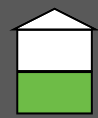
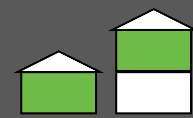
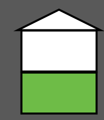
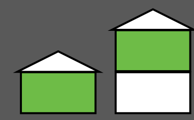
STORY LOCATION			
DESIGN WALL LENGTH (FT)	PERPENDICULAR WALL LENGTH (FT)	MINIMUM L_{W1} (FT)	MINIMUM L_{W2} (FT)
10	10	6	4
	20	Note 1	5
	30	Note 1	8
20	10	6	4
	20	11	5
	30	15	8
	40	19	10
	50	Note 1	13
	60	Note 1	16
30	10	7	4
	20	11	6
	30	15	8
	40	19	10
	50	23	13
	60	28	16
40	20	12	7
	30	16	9
	40	20	11
	50	23	13
	60	28	16

Table 2, Basic Length of Solid Walls (L_W, ft)

STORY LOCATION			
DESIGN WALL LENGTH (FT)	PERPENDICULAR WALL LENGTH (FT)	MINIMUM L_{W1} (FT)	MINIMUM L_{W2} (FT)
50	20	13	8
	30	18	10
	40	21	12
	50	25	14
	60	28	16
60	20	15	8
	30	19	11
	40	23	13
	50	26	16
	60	30	18

Notes:

1. Design values in development.

Table 3, Wall Net Compression Load (P_N, lb/ft)

EXPOSURE CATEGORY	DESIGN WIND SPEED (MPH)	STORY HEIGHT (FT)				
		8	9	10	11	12
B	110	1000	1000	1000	1000	1000
	120	1000	1000	1000	1000	Note 2
	130	1000	1000	1000	1000	Note 2
	140	1000	1000	1000	1000	Note 2
	150	1000	1000	1000	Note 2	Note 2
	160	1000	1000	1000	Note 2	Note 2
	170	1000	1000	1000	Note 2	Note 2
	180	1000	1000	Note 2	Note 2	Note 2
C	110	1000	1000	1000	1000	Note 2
	120	1000	1000	1000	1000	Note 2
	130	1000	1000	1000	Note 2	Note 2
	140	1000	1000	1000	Note 2	Note 2
	150	1000	1000	Note 2	Note 2	Note 2
	160	1000	1000	Note 2	Note 2	Note 2
	170	1000	1000	Note 2	Note 2	Note 2
	180	1000	1000	Note 2	Note 2	Note 2
D	110	1000	1000	1000	1000	Note 2
	120	1000	1000	1000	Note 2	Note 2
	130	1000	1000	1000	Note 2	Note 2
	140	1000	1000	Note 2	Note 2	Note 2
	150	1000	1000	Note 2	Note 2	Note 2
	160	1000	1000	Note 2	Note 2	Note 2
	170	1000	Note 2	Note 2	Note 2	Note 2
	180	1000	Note 2	Note 2	Note 2	Note 2

Notes:

1. Values based on out-of-plane wall testing, subject to L/240 deflection limit per IBC.
2. Design values pending additional out-of-plane wall testing.

Table 4, Basic Wind Uplift Load (U_{120}, lb/ft)

ROOF SPAN (FT)	h/L		
	≤ 0.50	0.75	≥ 1.00
15	300	300	400
20	400	400	500
25	400	500	600
30	500	600	700
40	700	800	900
50	800	1000	1100
60	1000	1200	1300

Notes:

1. L shall be the lesser of L_S and L_E.

Table 5, Typical Rod Design Tension (T_R, lb)

WALL DESIGN COMPRESSION LOAD (P_D, LB/FT)	TENSION ROD SPACING (BLOCKS, S_R)				
	2 BLOCKS 2' - 0-1/4"	2-1/2 BLOCKS 2' – 6-5/16"	3 BLOCKS 3' – 0-3/8"	3-1/2 BLOCKS 3' – 6-7/16"	4 BLOCKS 4' – 0-1/2"
1000	2100	2600	3100	3600	4100
1100	2300	2800	3400	3900	4500
1200	2500	3100	3700	4300	4900
1300	2700	3300	4000	4600	5300
1400	2900	3600	4300	5000	5700
1500	3100	3800	4600	5400	6100
1600	3300	4100	4900	5700	6500
1700	3500	4300	5200	6100	6900
1800	3700	4600	5500	6400	7300
1900	3900	4800	5800	6800	7700
2000	4100	5100	6100	7100	8100
2100	4300	5400	6400	7500	8500
2200	4500	5600	6700	7800	8900
2300	4700	5900	7000	8200	9300
2400	4900	6100	7300	8500	9700

Table 5, Typical Rod Design Tension (T_R, lb, cont'd)

WALL DESIGN COMPRESSION LOAD (P_D, LB/FT)	TENSION ROD SPACING (BLOCKS, S_R)				
	2 BLOCKS 2' - 0-1/4"	2-1/2 BLOCKS 2' – 6-5/16"	3 BLOCKS 3' – 0-3/8"	3-1/2 BLOCKS 3' – 6-7/16"	4 BLOCKS 4' – 0-1/2"
2500	5100	6400	7600	8900	Note 1
2600	5300	6600	7900	9200	Note 1
2700	5500	6900	8200	9600	Note 1
2800	5700	7100	8500	10000	Note 1
2900	5900	7400	8800	Note 1	Note 1
3000	6100	7600	9100	Note 1	Note 1

Notes:

1. Configuration not permitted based on provided spring types.

Table 6, Spring Type A Installation Height (h_{si}, in)

ROD DESIGN TENSION (T_R OR T_W, LB)	OVERALL LOK-N-BLOK WALL HEIGHT (FT)								
	8	10	12	14	16	18	20	22	24
2000	6-3/4	6-5/8	6-1/2	6-3/8	6-1/4	6-1/4	6-1/8	6	NP
2100	6-3/4	6-5/8	6-1/2	6-3/8	6-1/4	6-1/8	6	NP	NP
2200	6-3/4	6-5/8	6-1/2	6-3/8	6-1/4	6-1/8	6	NP	NP
2300	6-3/4	6-5/8	6-1/2	6-3/8	6-1/4	6-1/8	6	NP	NP
2400	6-5/8	6-1/2	6-3/8	6-1/4	6-1/8	6	6	NP	NP
2500	6-5/8	6-1/2	6-3/8	6-1/4	6-1/8	6	NP	NP	NP
2600	6-5/8	6-1/2	6-3/8	6-1/4	6-1/8	6	NP	NP	NP
2700	6-1/2	6-1/2	6-3/8	6-1/4	6-1/8	6	NP	NP	NP
2800	6-1/2	6-3/8	6-1/4	6-1/8	6	NP	NP	NP	NP
2900	6-1/2	6-3/8	6-1/4	6-1/8	6	NP	NP	NP	NP
3000	6-1/2	6-3/8	6-1/4	6-1/8	6	NP	NP	NP	NP
3100	6-3/8	6-1/4	6-1/8	6-1/8	6	NP	NP	NP	NP
3200	6-3/8	6-1/4	6-1/8	6	NP	NP	NP	NP	NP
3300	6-3/8	6-1/4	6-1/8	6	NP	NP	NP	NP	NP

Table 6, Spring Type A Installation Height (h_{si}, in, cont'd)

ROD DESIGN TENSION (T_R OR T_W, LB)	OVERALL LOK-N-BLOK WALL HEIGHT (FT)								
	8	10	12	14	16	18	20	22	24
3400	6-3/8	6-1/4	6-1/8	6	NP	NP	NP	NP	NP
3500	6-1/4	6-1/8	6	NP	NP	NP	NP	NP	NP
3600	6-1/4	6-1/8	6	NP	NP	NP	NP	NP	NP
3700	6-1/4	6-1/8	6	NP	NP	NP	NP	NP	NP
3800	6-1/4	6-1/8	6	NP	NP	NP	NP	NP	NP
3900	6-1/8	6	NP	NP	NP	NP	NP	NP	NP
4000	6-1/8	6	NP	NP	NP	NP	NP	NP	NP
4100	6-1/8	6	NP	NP	NP	NP	NP	NP	NP
4200	6	6	NP	NP	NP	NP	NP	NP	NP
4300	6	NP	NP	NP	NP	NP	NP	NP	NP
4400	6	NP	NP	NP	NP	NP	NP	NP	NP
4500	6	NP	NP	NP	NP	NP	NP	NP	NP
>4500	NP	NP	NP	NP	NP	NP	NP	NP	NP

Notes:

1. NP = Combination not permitted based on spring types provided in Table 9.
2. Wall deformation due to long-term creep and temperature shrinkage of Lok-N-Blok wall estimated to be 0.5%.

Table 7, Spring Type B Installation Height (h_{si}, in)

ROD DESIGN TENSION (T_R OR T_W, LB)	OVERALL LOK-N-BLOK WALL HEIGHT (FT)								
	8	10	12	14	16	18	20	22	24
2000	8-3/4	8-5/8	8-1/2	8-3/8	8-1/4	8-1/8	8	7-7/8	7-3/4
2100	8-5/8	8-1/2	8-3/8	8-1/4	8-1/4	8-1/8	8	7-7/8	7-3/4
2200	8-5/8	8-1/2	8-3/8	8-1/4	8-1/8	8	7-7/8	7-3/4	7-5/8
2300	8-5/8	8-1/2	8-3/8	8-1/4	8-1/8	8	7-7/8	7-3/4	7-5/8
2400	8-1/2	8-3/8	8-3/8	8-1/4	8-1/8	8	7-7/8	7-3/4	7-5/8

Table 7, Spring Type B Installation Height (h_{si}, in, cont'd)

ROD DESIGN TENSION (T_R OR T_W, LB)	OVERALL LOK-N-BLOK WALL HEIGHT (FT)								
	8	10	12	14	16	18	20	22	24
2500	8-1/2	8-3/8	8-1/4	8-1/8	8	7-7/8	7-3/4	7-5/8	7-1/2
2600	8-1/2	8-3/8	8-1/4	8-1/8	8	7-7/8	7-3/4	7-5/8	7-1/2
2700	8-1/2	8-3/8	8-1/4	8-1/8	8	7-7/8	7-3/4	7-5/8	7-1/2
2800	8-3/8	8-1/4	8-1/8	8	7-7/8	7-3/4	7-5/8	7-5/8	7-1/2
2900	8-3/8	8-1/4	8-1/8	8	7-7/8	7-3/4	7-5/8	7-1/2	7-3/8
3000	8-3/8	8-1/4	8-1/8	8	7-7/8	7-3/4	7-5/8	7-1/2	7-3/8
3100	8-1/4	8-1/8	8	7-7/8	7-7/8	7-3/4	7-5/8	7-1/2	7-3/8
3200	8-1/4	8-1/8	8	7-7/8	7-3/4	7-5/8	7-1/2	7-3/8	7-1/4
3300	8-1/4	8-1/8	8	7-7/8	7-3/4	7-5/8	7-1/2	7-3/8	7-1/4
3400	8-1/8	8	8	7-7/8	7-3/4	7-5/8	7-1/2	7-3/8	7-1/4
3500	8-1/8	8	7-7/8	7-3/4	7-5/8	7-1/2	7-3/8	7-1/4	7-1/8
3600	8-1/8	8	7-7/8	7-3/4	7-5/8	7-1/2	7-3/8	7-1/4	7-1/8
3700	8-1/8	8	7-7/8	7-3/4	7-5/8	7-1/2	7-3/8	7-1/4	7-1/8
3800	8	7-7/8	7-3/4	7-5/8	7-1/2	7-3/8	7-1/4	7-1/4	7-1/8
3900	8	7-7/8	7-3/4	7-5/8	7-1/2	7-3/8	7-1/4	7-1/8	7
4000	8	7-7/8	7-3/4	7-5/8	7-1/2	7-3/8	7-1/4	7-1/8	7
4100	7-7/8	7-3/4	7-5/8	7-1/2	7-1/2	7-3/8	7-1/4	7-1/8	7
4200	7-7/8	7-3/4	7-5/8	7-1/2	7-3/8	7-1/4	7-1/8	7	NP
4300	7-7/8	7-3/4	7-5/8	7-1/2	7-3/8	7-1/4	7-1/8	7	NP
4400	7-3/4	7-5/8	7-5/8	7-1/2	7-3/8	7-1/4	7-1/8	7	NP
4500	7-3/4	7-5/8	7-1/2	7-3/8	7-1/4	7-1/8	7	NP	NP
4600	7-3/4	7-5/8	7-1/2	7-3/8	7-1/4	7-1/8	7	NP	NP
4700	7-3/4	7-5/8	7-1/2	7-3/8	7-1/4	7-1/8	7	NP	NP
4800	7-5/8	7-1/2	7-3/8	7-1/4	7-1/8	7	NP	NP	NP
4900	7-5/8	7-1/2	7-3/8	7-1/4	7-1/8	7	NP	NP	NP
5000	7-5/8	7-1/2	7-3/8	7-1/4	7-1/8	7	NP	NP	NP
5100	7-1/2	7-3/8	7-1/4	7-1/8	7-1/8	7	NP	NP	NP
5200	7-1/2	7-3/8	7-1/4	7-1/8	7	NP	NP	NP	NP

Table 7, Spring Type B Installation Height (h_{si}, in, cont'd)

ROD DESIGN TENSION (T_R OR T_W, LB)	OVERALL LOK-N-BLOK WALL HEIGHT (FT)								
	8	10	12	14	16	18	20	22	24
5300	7-1/2	7-3/8	7-1/4	7-1/8	7	NP	NP	NP	NP
5400	7-3/8	7-1/4	7-1/4	7-1/8	7	NP	NP	NP	NP
5500	7-3/8	7-1/4	7-1/8	7	NP	NP	NP	NP	NP
5600	7-3/8	7-1/4	7-1/8	7	NP	NP	NP	NP	NP
5700	7-3/8	7-1/4	7-1/8	7	NP	NP	NP	NP	NP
5800	7-1/4	7-1/8	7	NP	NP	NP	NP	NP	NP
5900	7-1/4	7-1/8	7	NP	NP	NP	NP	NP	NP
6000	7-1/4	7-1/8	7	NP	NP	NP	NP	NP	NP
6100	7-1/8	7	NP	NP	NP	NP	NP	NP	NP
6200	7-1/8	7	NP	NP	NP	NP	NP	NP	NP
6300	7-1/8	7	NP	NP	NP	NP	NP	NP	NP
6400	7	NP	NP	NP	NP	NP	NP	NP	NP
6500	7	NP	NP	NP	NP	NP	NP	NP	NP
6600	7	NP	NP	NP	NP	NP	NP	NP	NP
6700	7	NP	NP	NP	NP	NP	NP	NP	NP
>6700	NP	NP	NP	NP	NP	NP	NP	NP	NP

Notes:

1. NP = Combination not permitted based on spring types provided in Table 9.
2. Wall deformation due to long-term creep and temperature shrinkage of Lok-N-Blok wall estimated to be 0.5%.

Table 8, Spring Type C Installation Height (h_{si}, in)

ROD DESIGN TENSION (T_R OR T_W, LB)	OVERALL LOK-N-BLOK WALL HEIGHT (FT)								
	8	10	12	14	16	18	20	22	24
2000	10-5/8	10-1/2	10-3/8	10-1/4	10-1/8	10	10	9-7/8	9-3/4
2100	10-5/8	10-1/2	10-3/8	10-1/4	10-1/8	10	9-7/8	9-3/4	9-5/8
2200	10-5/8	10-1/2	10-3/8	10-1/4	10-1/8	10	9-7/8	9-3/4	9-5/8

Table 8, Spring Type C Installation Height (h_{si}, in, cont'd)

ROD DESIGN TENSION (T_R OR T_W, LB)	OVERALL LOK-N-BLOK WALL HEIGHT (FT)								
	8	10	12	14	16	18	20	22	24
2300	10-1/2	10-3/8	10-1/4	10-1/8	10	10	9-7/8	9-3/4	9-5/8
2400	10-1/2	10-3/8	10-1/4	10-1/8	10	9-7/8	9-3/4	9-5/8	9-1/2
2500	10-1/2	10-3/8	10-1/4	10-1/8	10	9-7/8	9-3/4	9-5/8	9-1/2
2600	10-3/8	10-1/4	10-1/8	10	10	9-7/8	9-3/4	9-5/8	9-1/2
2700	10-3/8	10-1/4	10-1/8	10	9-7/8	9-3/4	9-5/8	9-1/2	9-3/8
2800	10-3/8	10-1/4	10-1/8	10	9-7/8	9-3/4	9-5/8	9-1/2	9-3/8
2900	10-1/4	10-1/8	10	10	9-7/8	9-3/4	9-5/8	9-1/2	9-3/8
3000	10-1/4	10-1/8	10	9-7/8	9-3/4	9-5/8	9-1/2	9-3/8	9-1/4
3100	10-1/4	10-1/8	10	9-7/8	9-3/4	9-5/8	9-1/2	9-3/8	9-1/4
3200	10-1/8	10	10	9-7/8	9-3/4	9-5/8	9-1/2	9-3/8	9-1/4
3300	10-1/8	10	9-7/8	9-3/4	9-5/8	9-1/2	9-3/8	9-1/4	9-1/8
3400	10-1/8	10	9-7/8	9-3/4	9-5/8	9-1/2	9-3/8	9-1/4	9-1/8
3500	10	10	9-7/8	9-3/4	9-5/8	9-1/2	9-3/8	9-1/4	9-1/8
3600	10	9-7/8	9-3/4	9-5/8	9-1/2	9-3/8	9-1/4	9-1/8	9
3700	10	9-7/8	9-3/4	9-5/8	9-1/2	9-3/8	9-1/4	9-1/8	9
3800	10	9-7/8	9-3/4	9-5/8	9-1/2	9-3/8	9-1/4	9-1/8	9
3900	9-7/8	9-3/4	9-5/8	9-1/2	9-3/8	9-1/4	9-1/8	9	9
4000	9-7/8	9-3/4	9-5/8	9-1/2	9-3/8	9-1/4	9-1/8	9	8-7/8
4100	9-7/8	9-3/4	9-5/8	9-1/2	9-3/8	9-1/4	9-1/8	9	8-7/8
4200	9-3/4	9-5/8	9-1/2	9-3/8	9-1/4	9-1/8	9	9	8-7/8
4300	9-3/4	9-5/8	9-1/2	9-3/8	9-1/4	9-1/8	9	8-7/8	8-3/4
4400	9-3/4	9-5/8	9-1/2	9-3/8	9-1/4	9-1/8	9	8-7/8	8-3/4
4500	9-5/8	9-1/2	9-3/8	9-1/4	9-1/8	9	9	8-7/8	8-3/4
4600	9-5/8	9-1/2	9-3/8	9-1/4	9-1/8	9	8-7/8	8-3/4	8-5/8
4700	9-5/8	9-1/2	9-3/8	9-1/4	9-1/8	9	8-7/8	8-3/4	8-5/8
4800	9-1/2	9-3/8	9-1/4	9-1/8	9	9	8-7/8	8-3/4	8-5/8
4900	9-1/2	9-3/8	9-1/4	9-1/8	9	8-7/8	8-3/4	8-5/8	8-1/2

Table 8, Spring Type C Installation Height (h_{si}, in, cont'd)

ROD DESIGN TENSION (T_R OR T_W, LB)	OVERALL LOK-N-BLOK WALL HEIGHT (FT)								
	8	10	12	14	16	18	20	22	24
5000	9-1/2	9-3/8	9-1/4	9-1/8	9	8-7/8	8-3/4	8-5/8	8-1/2
5100	9-3/8	9-1/4	9-1/8	9	9	8-7/8	8-3/4	8-5/8	8-1/2
5200	9-3/8	9-1/4	9-1/8	9	8-7/8	8-3/4	8-5/8	8-1/2	8-3/8
5300	9-3/8	9-1/4	9-1/8	9	8-7/8	8-3/4	8-5/8	8-1/2	8-3/8
5400	9-1/4	9-1/8	9	9	8-7/8	8-3/4	8-5/8	8-1/2	8-3/8
5500	9-1/4	9-1/8	9	8-7/8	8-3/4	8-5/8	8-1/2	8-3/8	8-1/4
5600	9-1/4	9-1/8	9	8-7/8	8-3/4	8-5/8	8-1/2	8-3/8	8-1/4
5700	9-1/8	9	9	8-7/8	8-3/4	8-5/8	8-1/2	8-3/8	8-1/4
5800	9-1/8	9	8-7/8	8-3/4	8-5/8	8-1/2	8-3/8	8-1/4	8-1/8
5900	9-1/8	9	8-7/8	8-3/4	8-5/8	8-1/2	8-3/8	8-1/4	8-1/8
6000	9	9	8-7/8	8-3/4	8-5/8	8-1/2	8-3/8	8-1/4	8-1/8
6100	9	8-7/8	8-3/4	8-5/8	8-1/2	8-3/8	8-1/4	8-1/8	8
6200	9	8-7/8	8-3/4	8-5/8	8-1/2	8-3/8	8-1/4	8-1/8	8
6300	9	8-7/8	8-3/4	8-5/8	8-1/2	8-3/8	8-1/4	8-1/8	8
6400	8-7/8	8-3/4	8-5/8	8-1/2	8-3/8	8-1/4	8-1/8	8	8
6500	8-7/8	8-3/4	8-5/8	8-1/2	8-3/8	8-1/4	8-1/8	8	NP
6600	8-7/8	8-3/4	8-5/8	8-1/2	8-3/8	8-1/4	8-1/8	8	NP
6700	8-3/4	8-5/8	8-1/2	8-3/8	8-1/4	8-1/8	8	8	NP
6800	8-3/4	8-5/8	8-1/2	8-3/8	8-1/4	8-1/8	8	NP	NP
6900	8-3/4	8-5/8	8-1/2	8-3/8	8-1/4	8-1/8	8	NP	NP
7000	8-5/8	8-1/2	8-3/8	8-1/4	8-1/8	8	8	NP	NP
7100	8-5/8	8-1/2	8-3/8	8-1/4	8-1/8	8	NP	NP	NP
7200	8-5/8	8-1/2	8-3/8	8-1/4	8-1/8	8	NP	NP	NP
7300	8-1/2	8-3/8	8-1/4	8-1/8	8	8	NP	NP	NP
7400	8-1/2	8-3/8	8-1/4	8-1/8	8	NP	NP	NP	NP
7500	8-1/2	8-3/8	8-1/4	8-1/8	8	NP	NP	NP	NP
7600	8-3/8	8-1/4	8-1/8	8	8	NP	NP	NP	NP

Table 8, Spring Type C Installation Height (h_{si}, in, cont'd)

ROD DESIGN TENSION (T_R OR T_W, LB)	OVERALL LOK-N-BLOK WALL HEIGHT (FT)								
	8	10	12	14	16	18	20	22	24
7700	8-3/8	8-1/4	8-1/8	8	NP	NP	NP	NP	NP
7800	8-3/8	8-1/4	8-1/8	8	NP	NP	NP	NP	NP
7900	8-1/4	8-1/8	8	8	NP	NP	NP	NP	NP
8000	8-1/4	8-1/8	8	NP	NP	NP	NP	NP	NP
8100	8-1/4	8-1/8	8	NP	NP	NP	NP	NP	NP
8200	8-1/8	8	8	NP	NP	NP	NP	NP	NP
8300	8-1/8	8	NP	NP	NP	NP	NP	NP	NP
8400	8-1/8	8	NP	NP	NP	NP	NP	NP	NP
8500	8	8	NP	NP	NP	NP	NP	NP	NP
8600	8	NP	NP	NP	NP	NP	NP	NP	NP
8700	8	NP	NP	NP	NP	NP	NP	NP	NP
8800	8	NP	NP	NP	NP	NP	NP	NP	NP
>8800	NP	NP	NP	NP	NP	NP	NP	NP	NP

Notes:

1. NP = Combination not permitted based on spring types provided in Table 9.
2. Wall deformation due to long-term creep and temperature shrinkage of Lok-N-Blok wall estimated to be 0.5%.

Table 9, Spring Size and Properties

SPRING PROPERTIES	SPRING TYPE		
	A	B	C
Maximum Compression Load (P_{sm}, lb)	6000	8000	10000
Spring Constant (K_s, lb/in)	3000	2666	2500
Uncompressed Spring Height (h_{so}, in)	8	10	12
Maximum Compression Length (L_{sm}, in)	2	3	4
Spring Outer Diameter (d_{so}, in)	2-3/4	3-3/4	4-3/4

Table 10, Top of Wall Detail

WIND DESIGN UPLIFT LOAD (U_D, LB/FT)	TENSION ROD SPACING (BLOCKS, S_R)				
	2 BLOCKS 2' - 0-1/4"	2-1/2 BLOCKS 2' – 6-5/16"	3 BLOCKS 3' – 0-3/8"	3-1/2 BLOCKS 3' – 6-7/16"	4 BLOCKS 4' – 0-1/2"
300	TYP	TYP	TYP	TYP	TYP
400	TYP	TYP	TYP	TYP	TYP
500	TYP	TYP	TYP	TYP	TYP
600	TYP	TYP	TYP	HW-A	HW-A
700	TYP	TYP	TYP	HW-A	HW-A
800	TYP	TYP	HW-A	HW-A	HW-A
900	TYP	HW-A	HW-A	HW-A	HW-A
1000	TYP	HW-A	HW-A	HW-A	HW-A
1100	TYP	HW-A	HW-A	HW-A	HW-B
1200	HW-A	HW-A	HW-A	HW-B	HW-B
1300	HW-A	HW-A	HW-A	HW-B	HW-B
1400	HW-A	HW-A	HW-A	HW-B	HW-B
1500	HW-A	HW-A	HW-B	HW-B	HW-B
1600	HW-A	HW-A	HW-B	HW-B	HW-B
1700	HW-A	HW-A	HW-B	HW-B	HW-B
1800	HW-A	HW-B	HW-B	HW-B	HW-B
1900	HW-A	HW-B	HW-B	HW-B	HW-B
2000	HW-A	HW-B	HW-B	HW-B	HW-B

Notes:

1. TYP refers to Top of Wall Typical Details.
2. HW-A refers to Top of Wall High Wind A Details.
3. HW-B refers to Top of Wall High Wind B Details.
4. HW-B may be used when HW-A is required.

Table 11, Top of Wall High Wind B (HW-B) Details

WIND DESIGN UPLIFT LOAD (U_D, LB/FT)	TENSION ROD SPACING (BLOCKS, S_R)				
	2 BLOCKS 2' - 0-1/4"	2-1/2 BLOCKS 2' – 6-5/16"	3 BLOCKS 3' – 0-3/8"	3-1/2 BLOCKS 3' – 6-7/16"	4 BLOCKS 4' – 0-1/2"
300	TYP	TYP	TYP	TYP	TYP
400	TYP	TYP	TYP	TYP	TYP
500	TYP	TYP	TYP	TYP	TYP
600	TYP	TYP	TYP	4	4
700	TYP	TYP	TYP	4	4
800	TYP	TYP	4	4	5
900	TYP	4	4	4	5
1000	TYP	4	4	5	6
1100	TYP	4	5	5	6
1200	4	4	5	6	7
1300	4	5	5	6	7
1400	4	5	6	7	8
1500	4	5	6	7	8
1600	5	6	7	8	9
1700	5	6	7	8	9
1800	5	6	7	8	10
1900	5	6	8	9	10
2000	6	7	8	9	11

Notes:

1. The indicated number of strap fasteners is required at each end of the strap (each side of the wall).
2. TYP refers to Top of Wall Typical Details and indicates that HW-B Detail is not required.

Table 12, Ledger Fasteners per Block

SIDE WALL LENGTH (FT)	END WALL LENGTH (FT)	SIDE WALL FASTENERS	END WALL FASTENERS
10	10	4	2
	20	4	3
	30	6	3
20	10	4	2
	20	4	2
	30	5	2
	40	5	3
	50	5	3
	60	6	3
30	10	4	2
	20	4	2
	30	5	2
	40	5	2
	50	5	2
	60	5	3
40	20	4	2
	30	4	2
	40	5	2
	50	5	2
	60	5	2
	20	4	2
50	30	4	2
	40	4	2
	50	5	2
	60	5	2
	20	4	2
	30	4	2

Table 12, Ledger Fasteners per Block (cont'd)

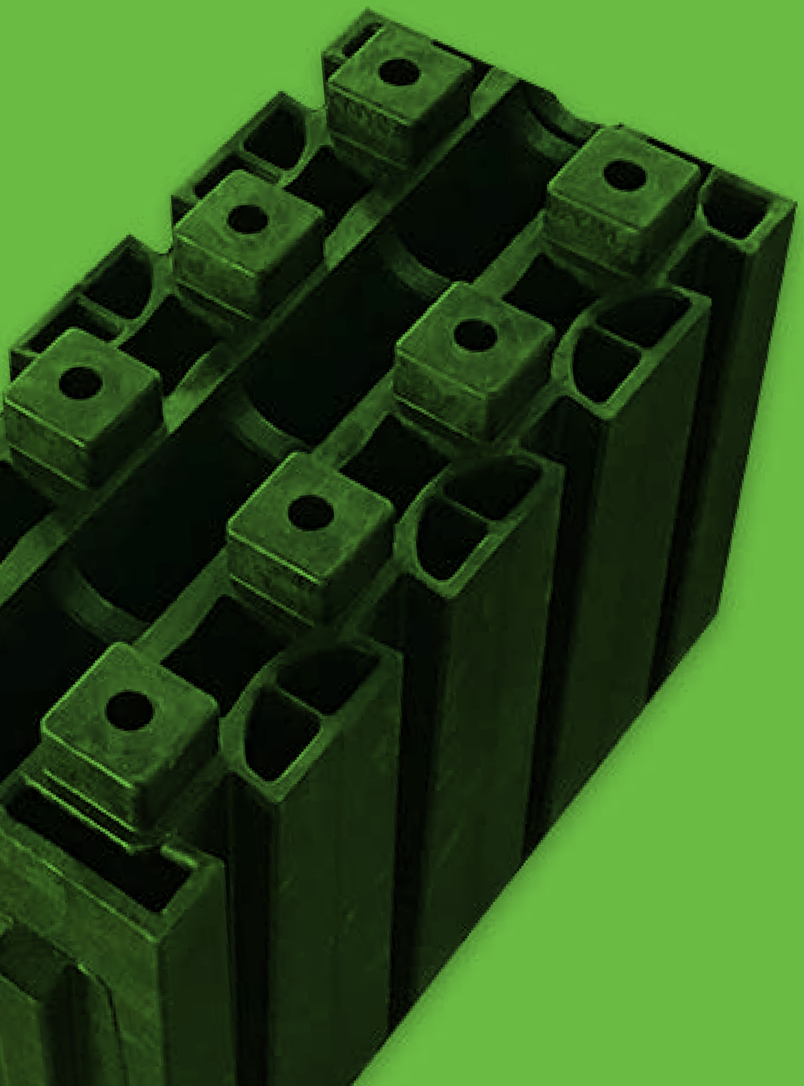
SIDE WALL LENGTH (FT)	END WALL LENGTH (FT)	SIDE WALL FASTENERS	END WALL FASTENERS
60	40	4	2
	50	4	2
	60	5	2
	40	4	2
	50	4	2
	60	5	2

Section 4

Structural Details

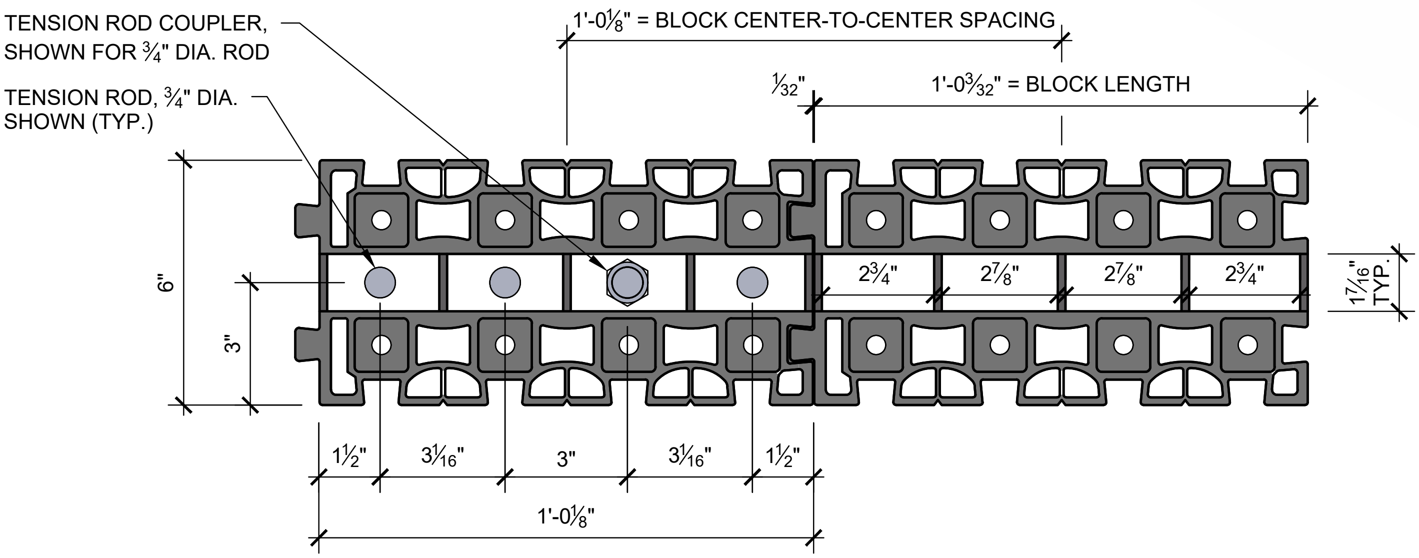
This section describes the structural design details for the tensioning system, as well as openings, foundation, roof, and floor joist elements.

- Details



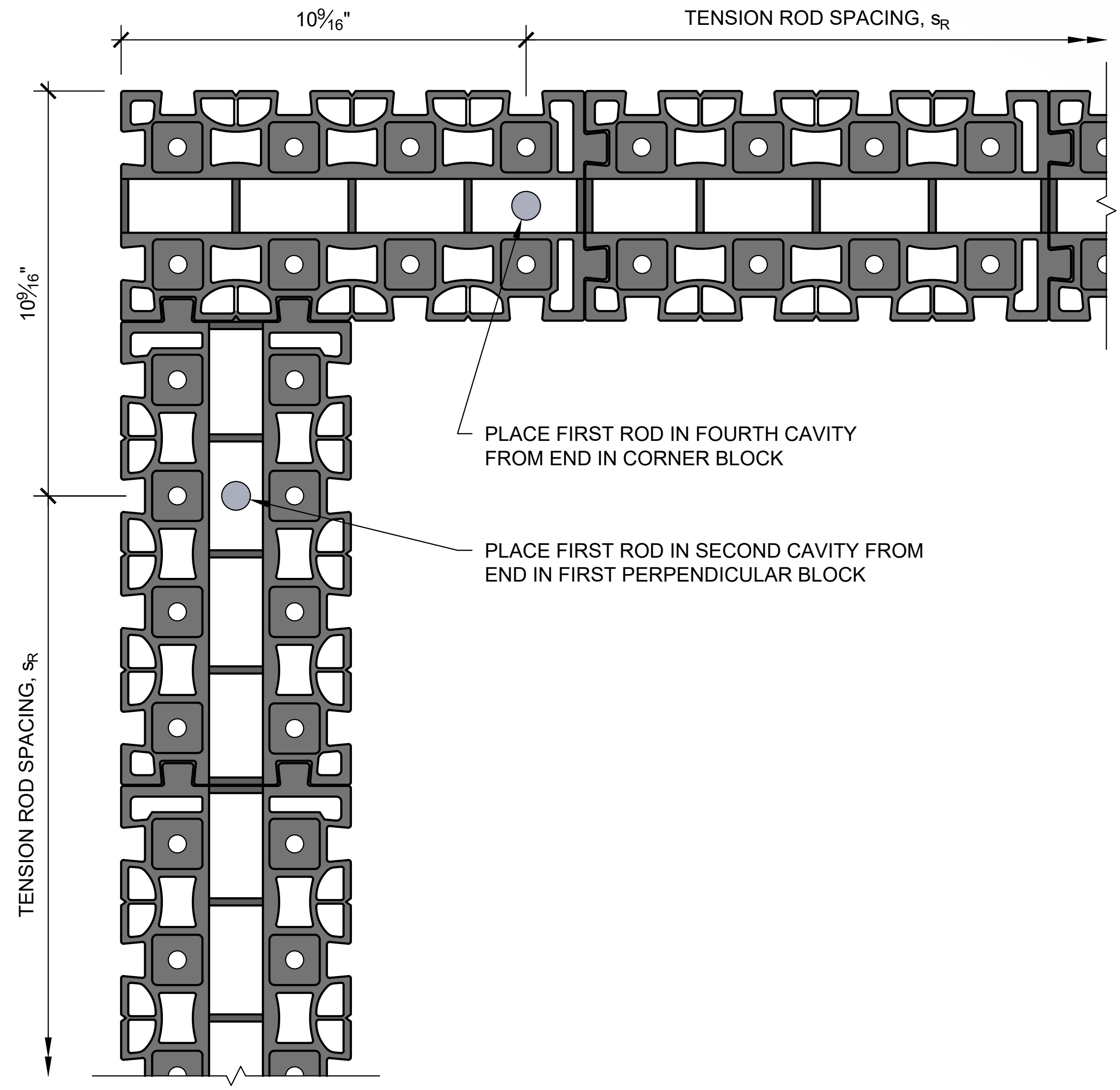
STRUCTURAL DETAILS

Block Dimensions and Vertical Tension Rod Locations Plan

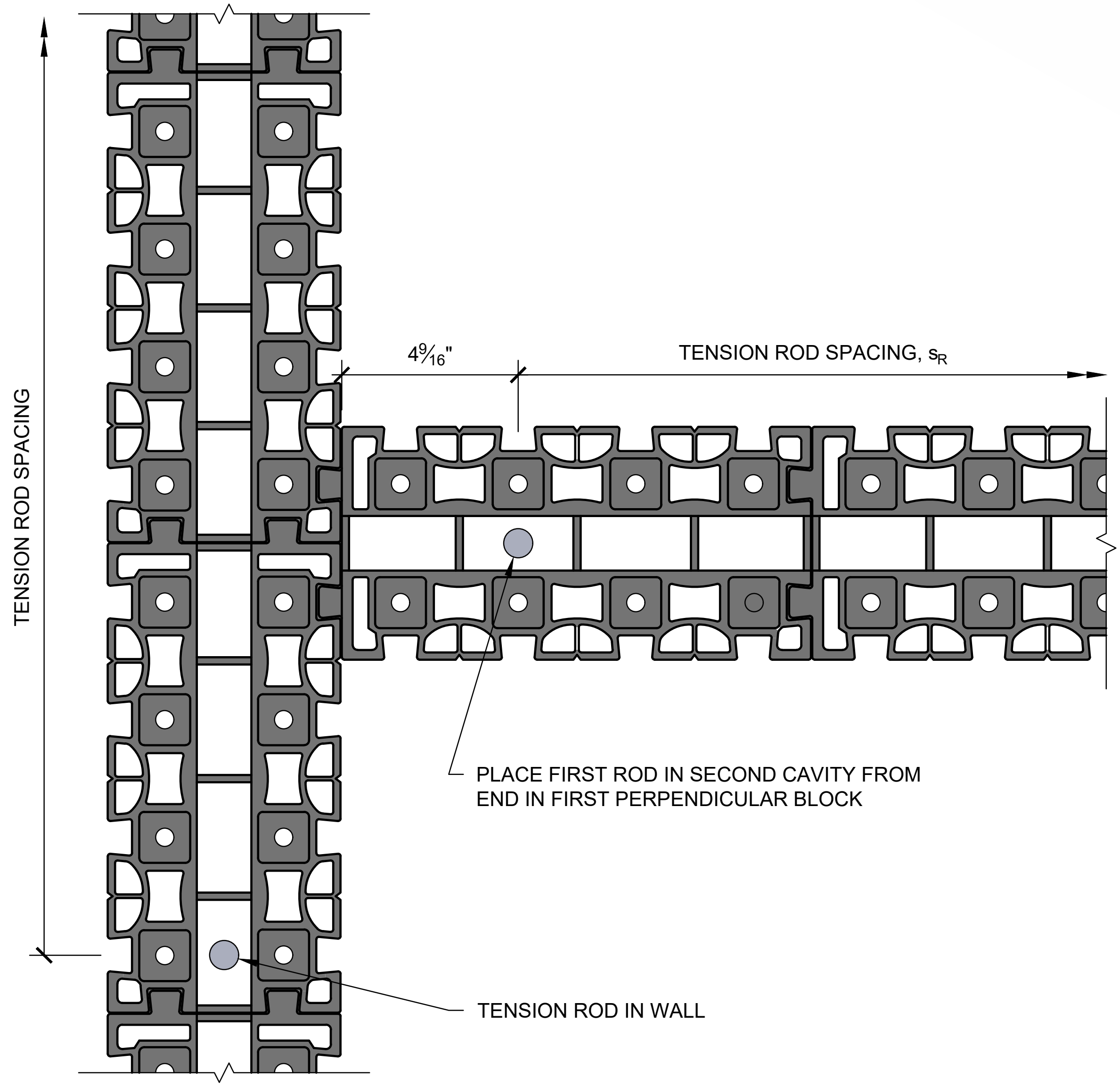


NOTE: PLAN SHOWS POSSIBLE TENSION ROD PLACEMENT LOCATIONS WITHIN BLOCK CAVITIES. ACTUAL TENSION ROD PLACEMENT LOCATIONS BASED ON WALL DESIGN.

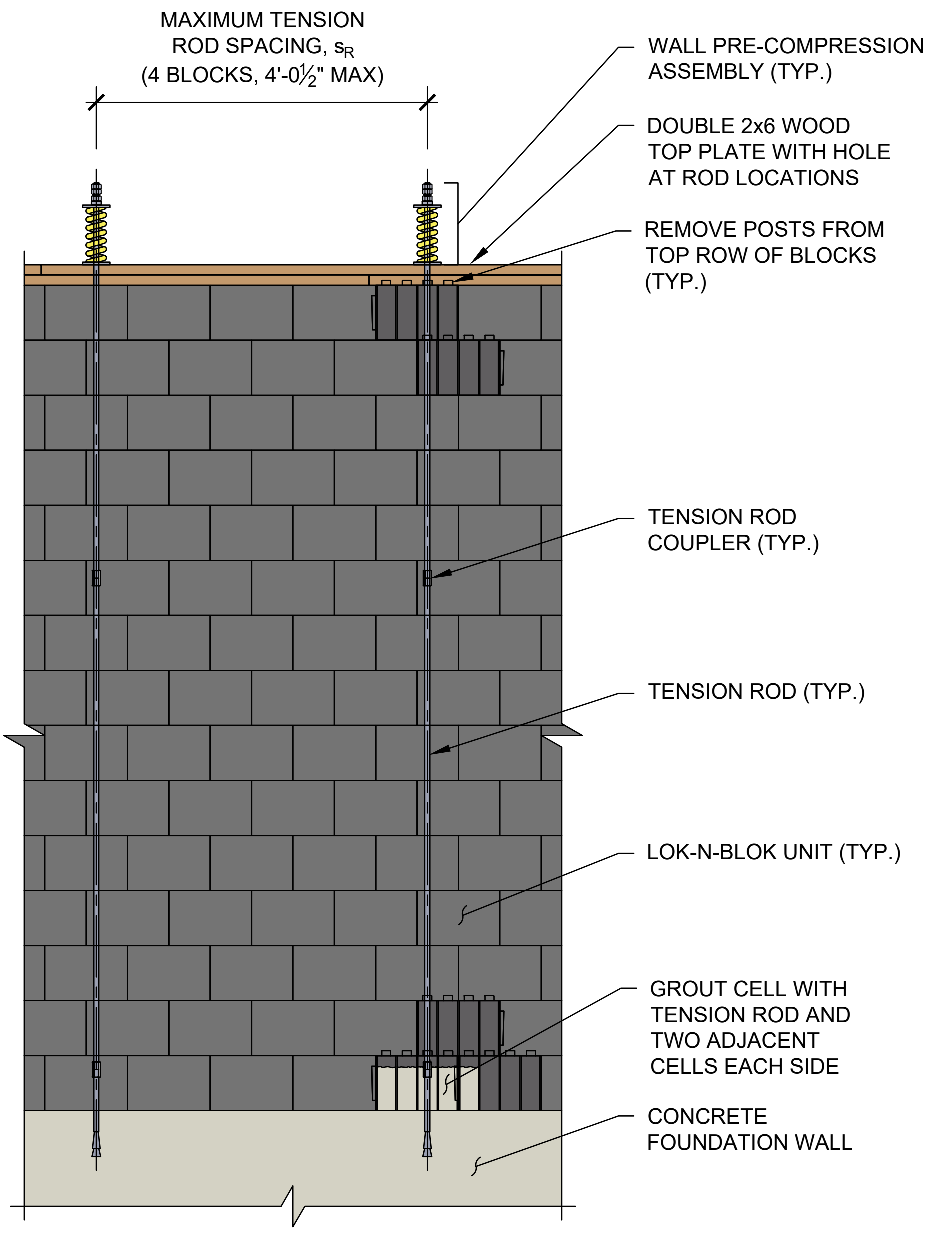
Rod Placement at Exterior Corner Plan

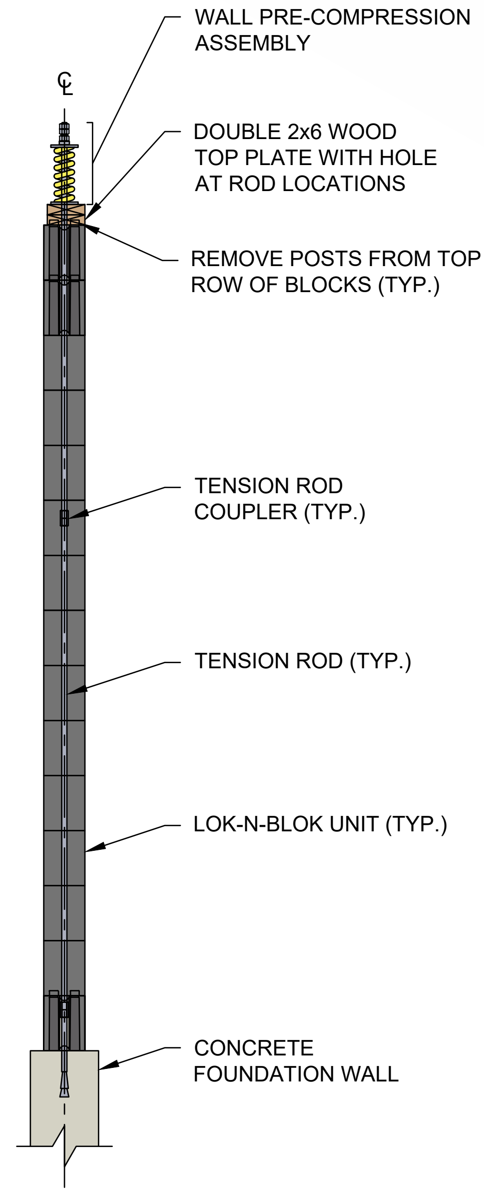


Rod Placement at Interior Corner Plan

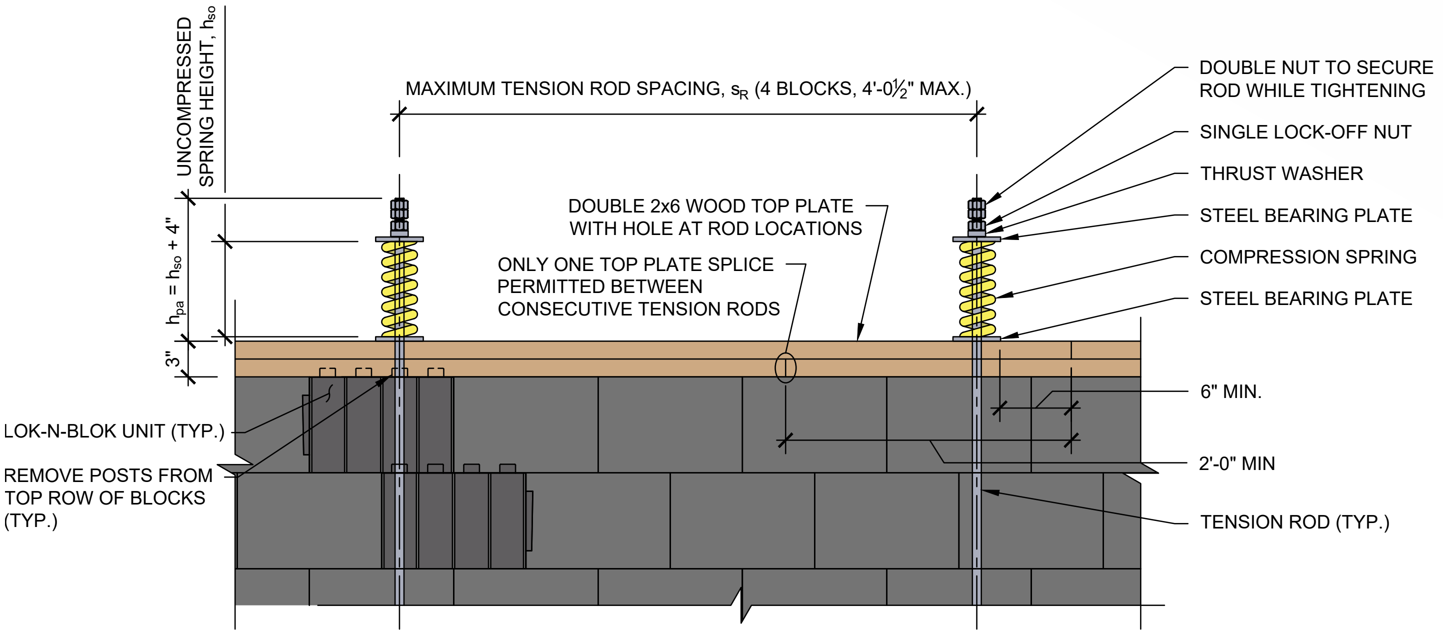


Typical Blank Wall Elevation and Section

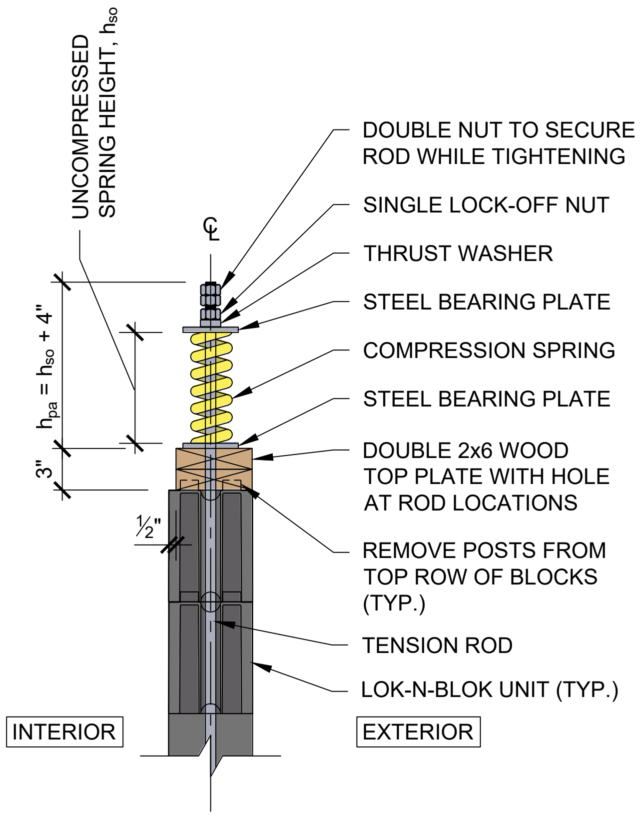




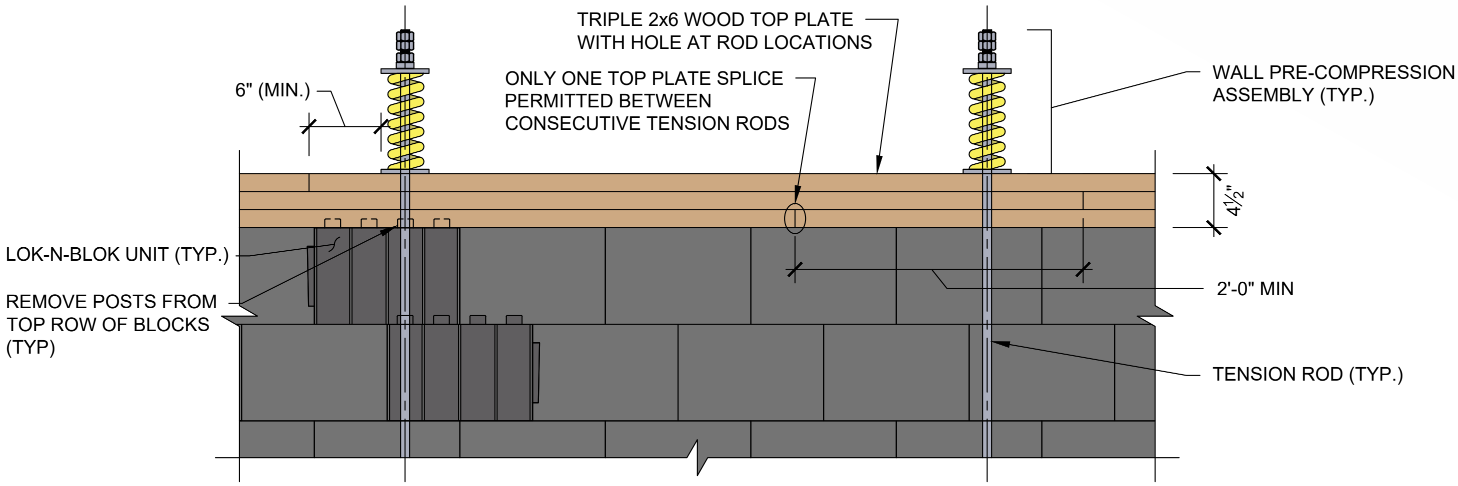
Top of Wall Elevation - Typical Detail (TYP)



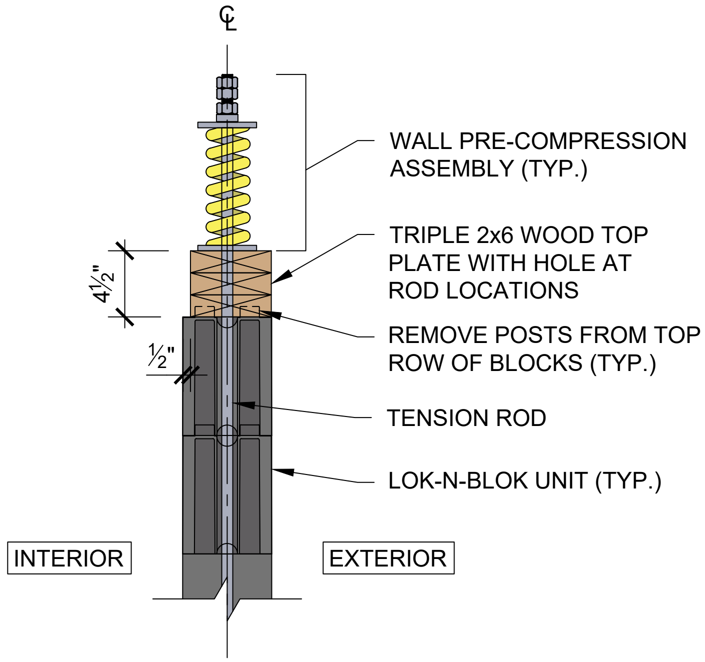
Top of Wall Vertical Section - Typical Detail (TYP)



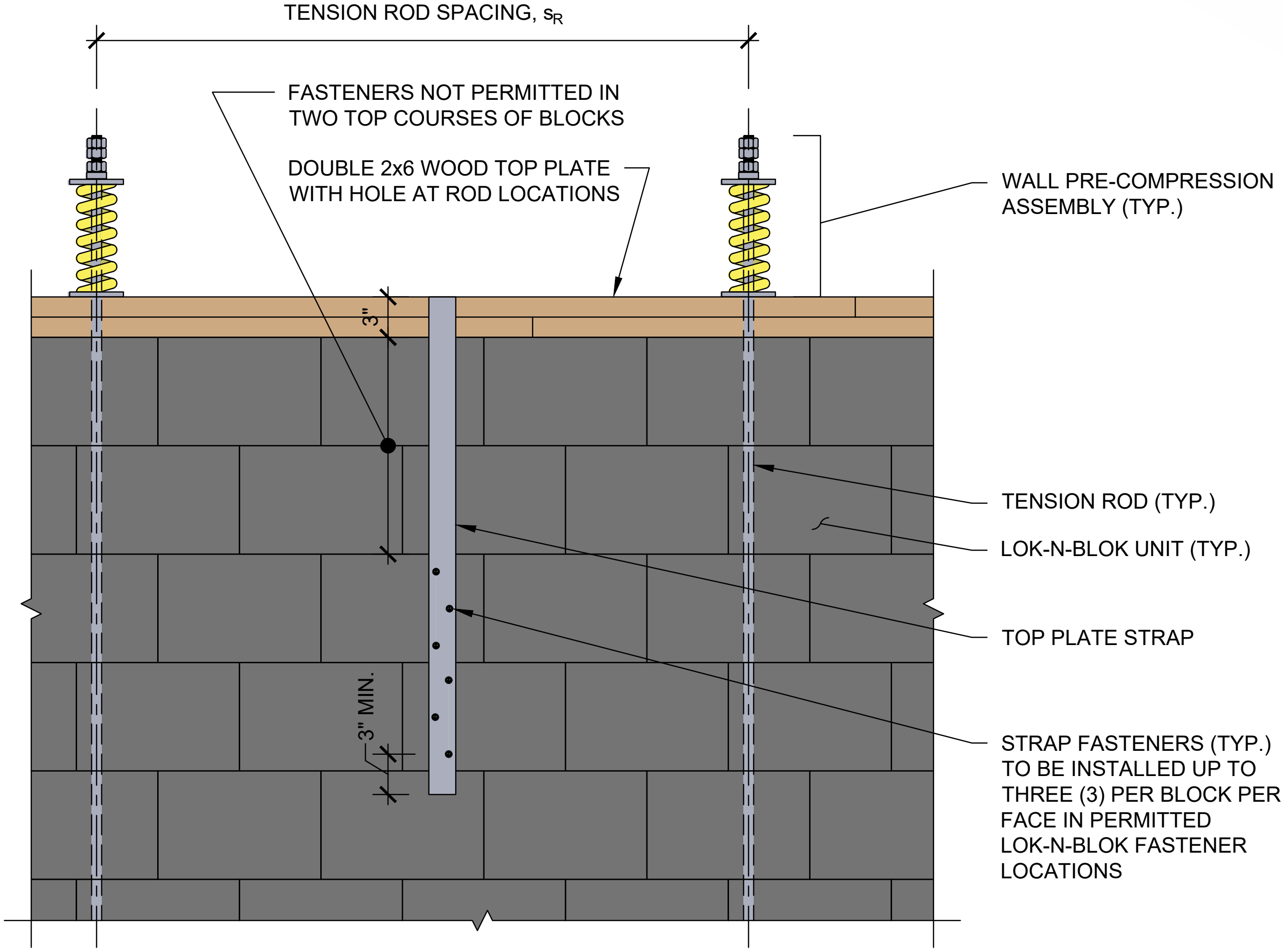
Top of Wall Elevation - High Wind A (HW-A)



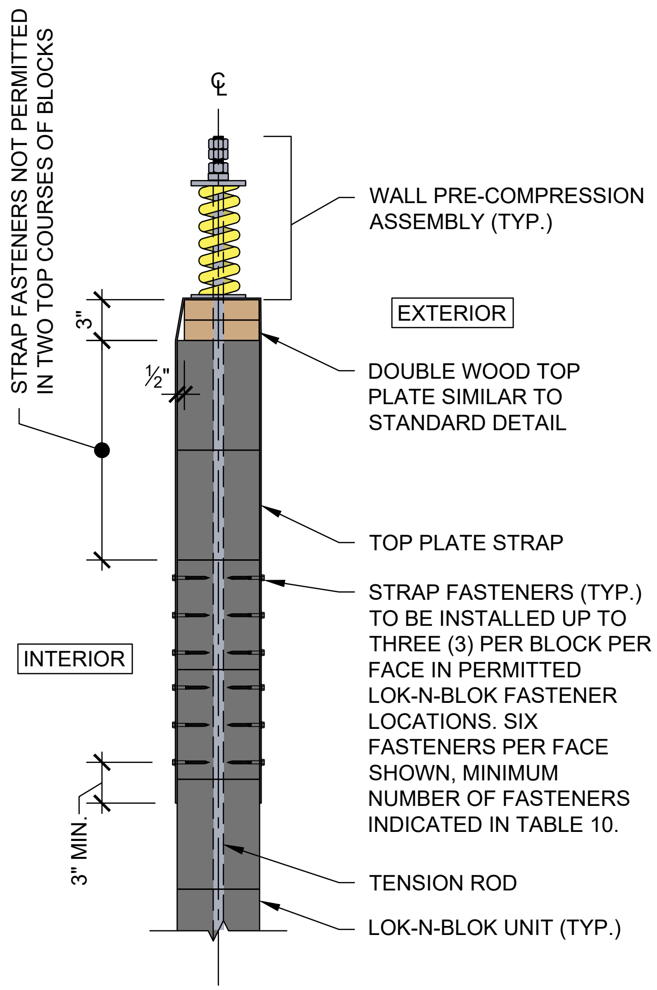
Top of Wall Vertical Section - High Wind A (HW-A)



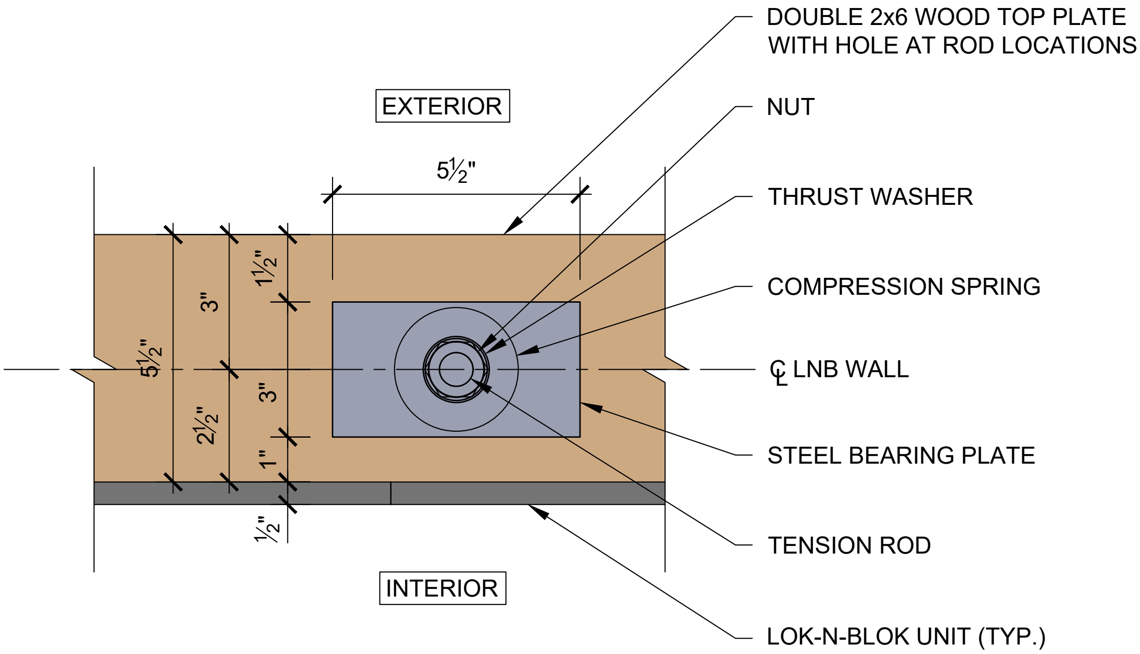
Top of Wall Elevation - High Wind B (HW-B)



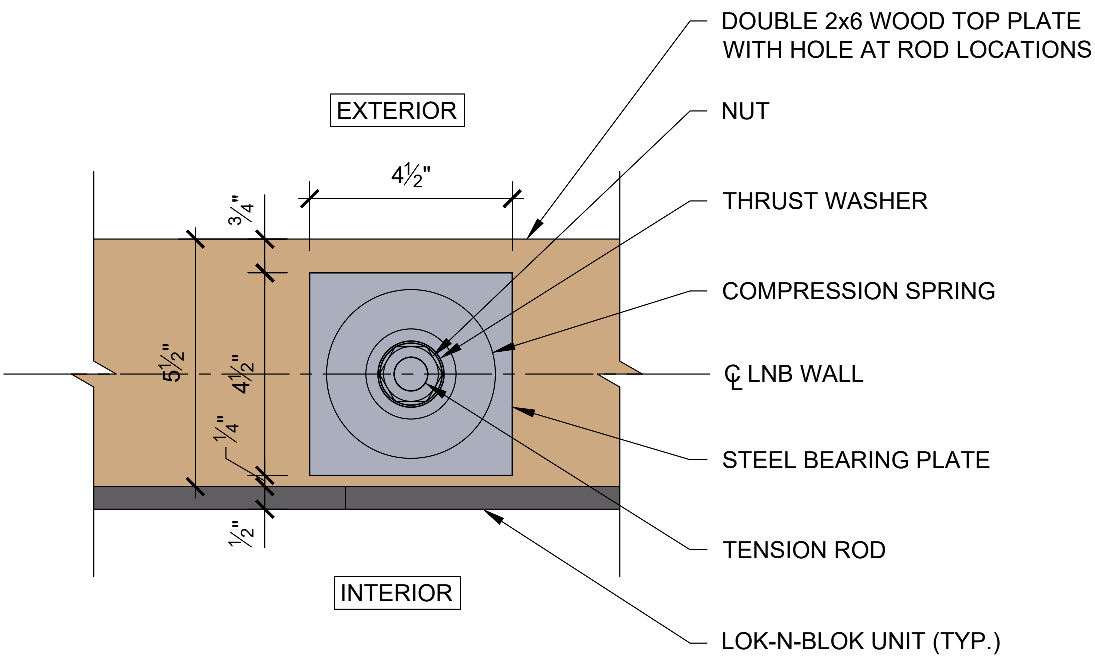
Top of Wall Vertical Section - High Wind B (HW-B)



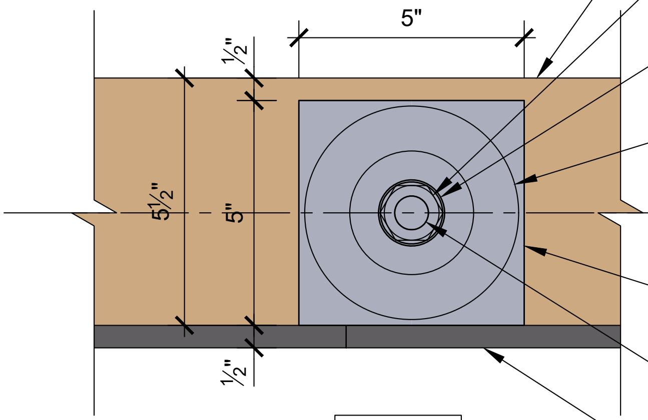
Top of Wall Plan Standard Detail: Spring Type 1



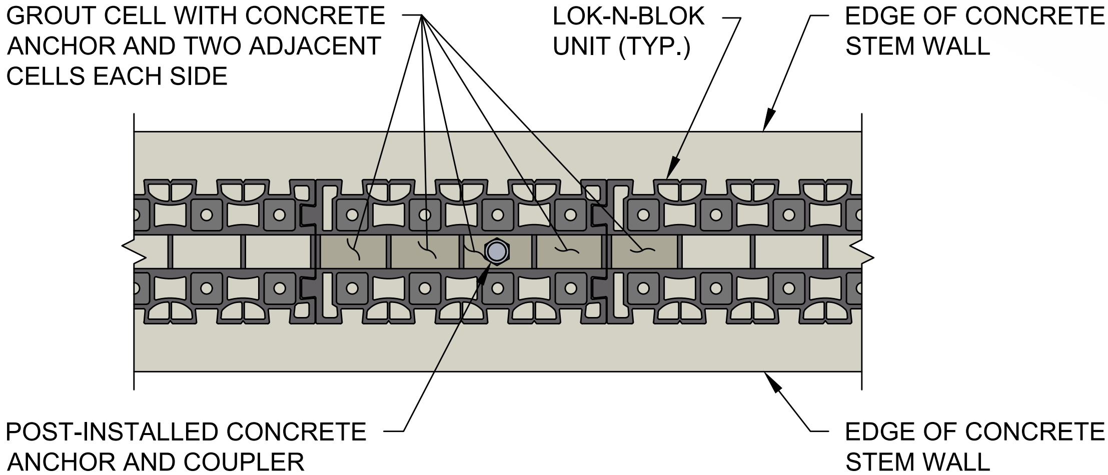
Top of Wall Plan Standard Detail: Spring Type 2



Top of Wall Plan Standard Detail: Spring Type 3

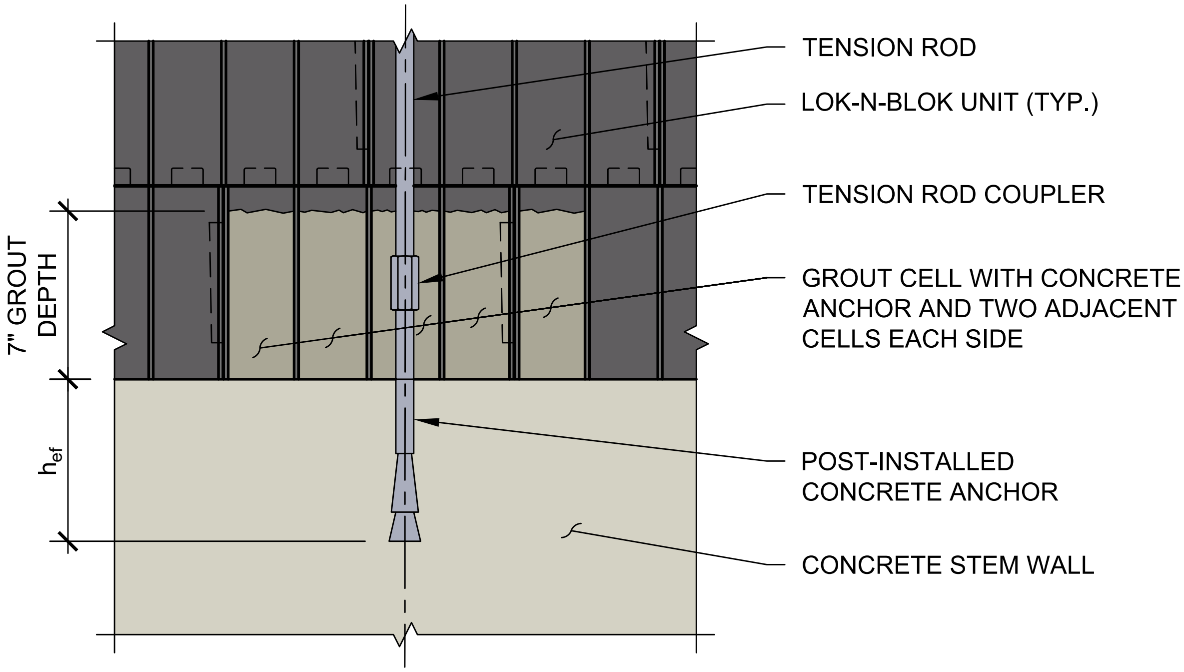


Concrete Stem Wall Foundation Plan - Post-Installed Anchor with Grouted Block

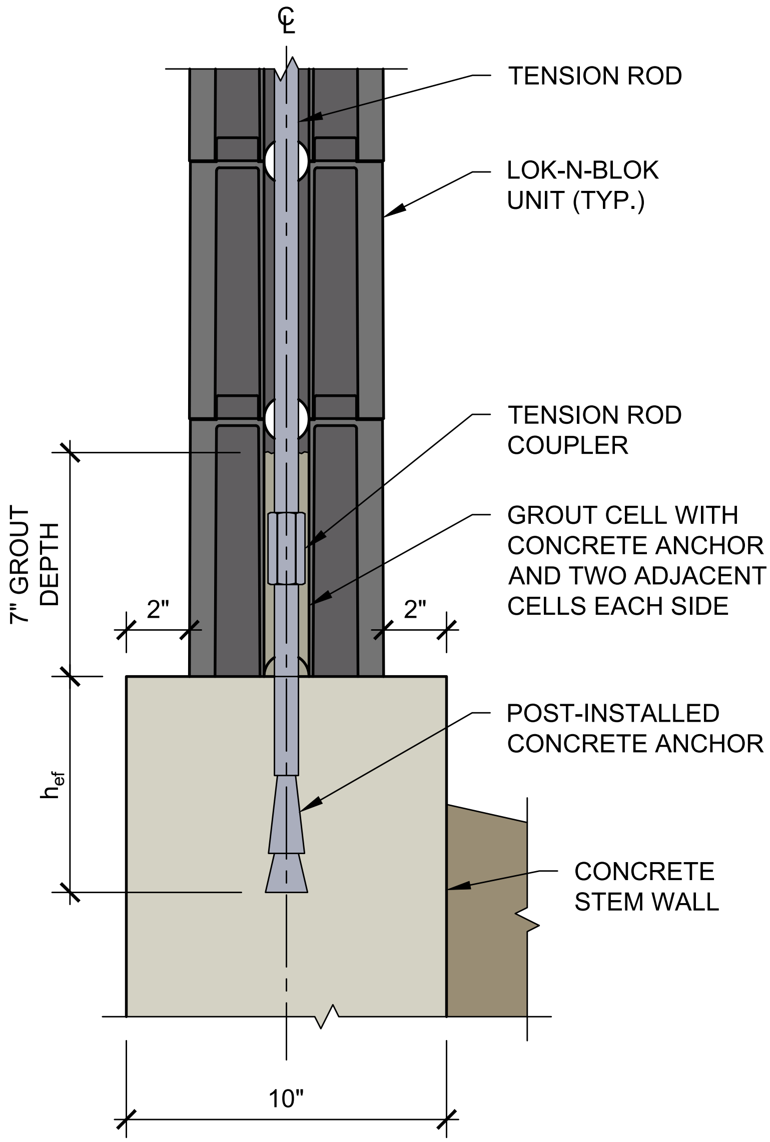


NOTE:
SEE CONCRETE STEM WALL FOUNDATION SECTION - POST-INSTALLED ANCHOR WITH GROUTED BLOCK.

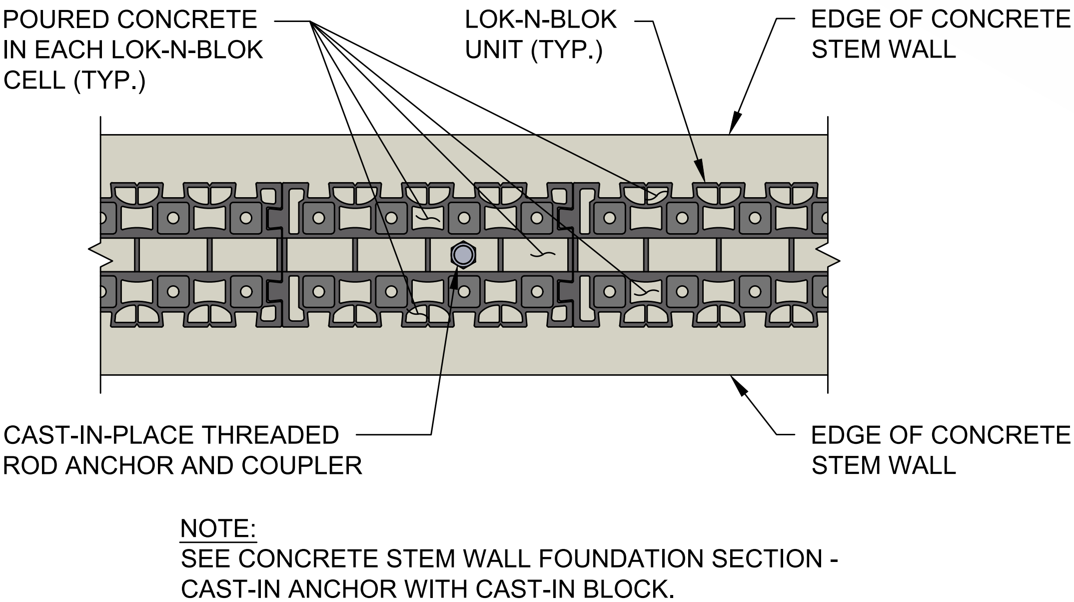
Concrete Stem Wall Foundation Elevation - Post-Installed Anchor with Grouted Block



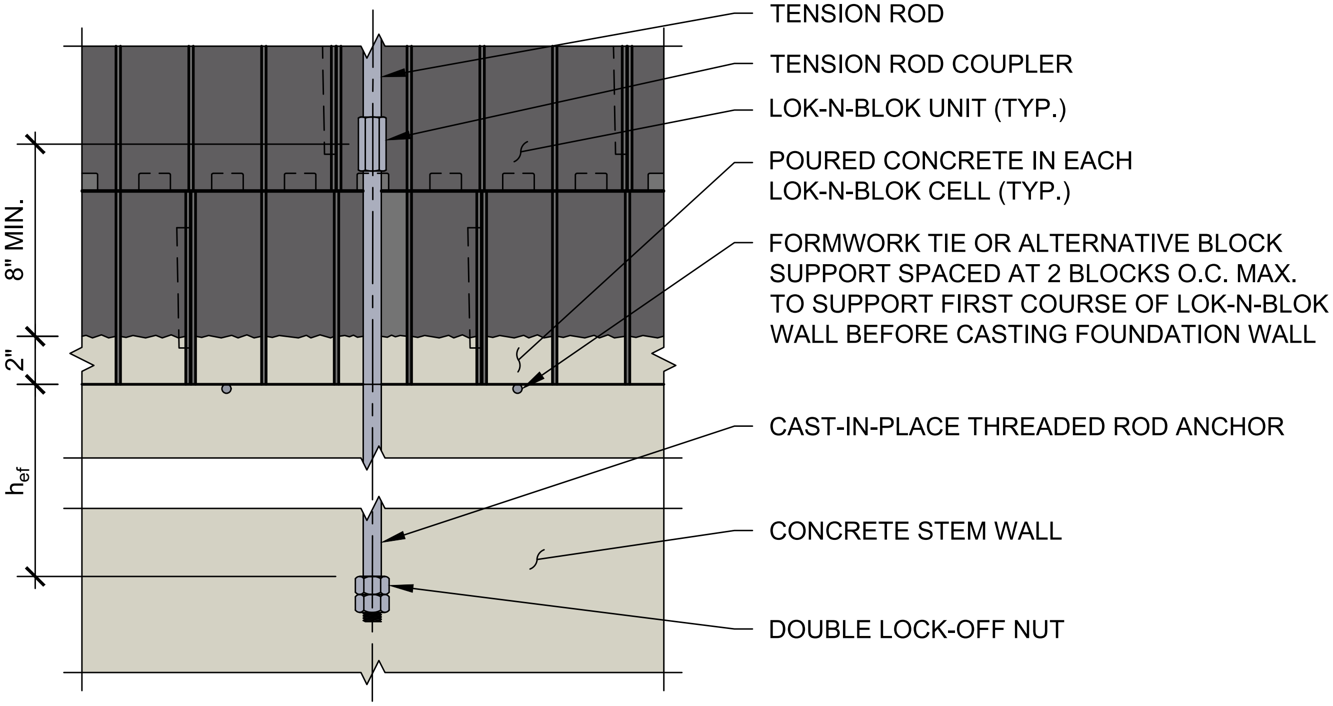
Concrete Stem Wall Foundation Section - Post-Installed Anchor With Grouted Block



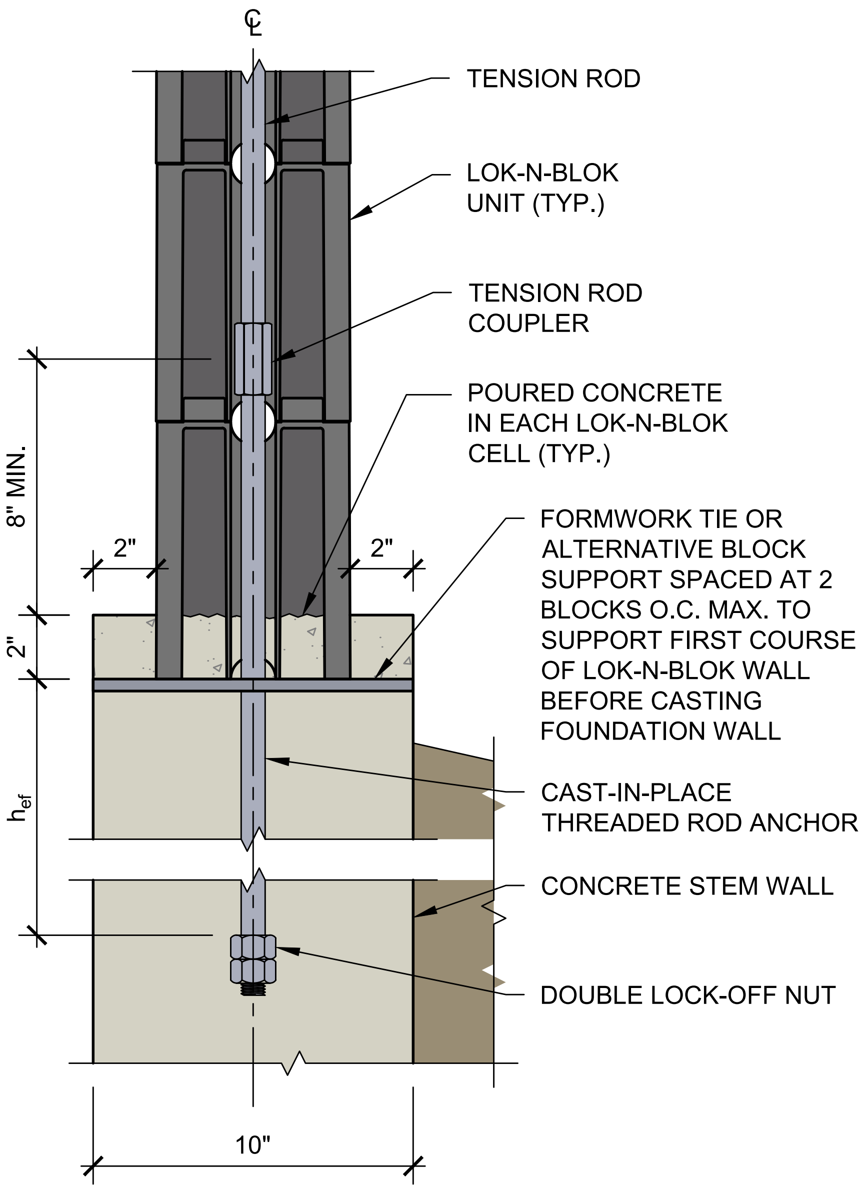
Concrete Stem Wall Foundation Plan - Cast-In Anchor with Cast-In Block



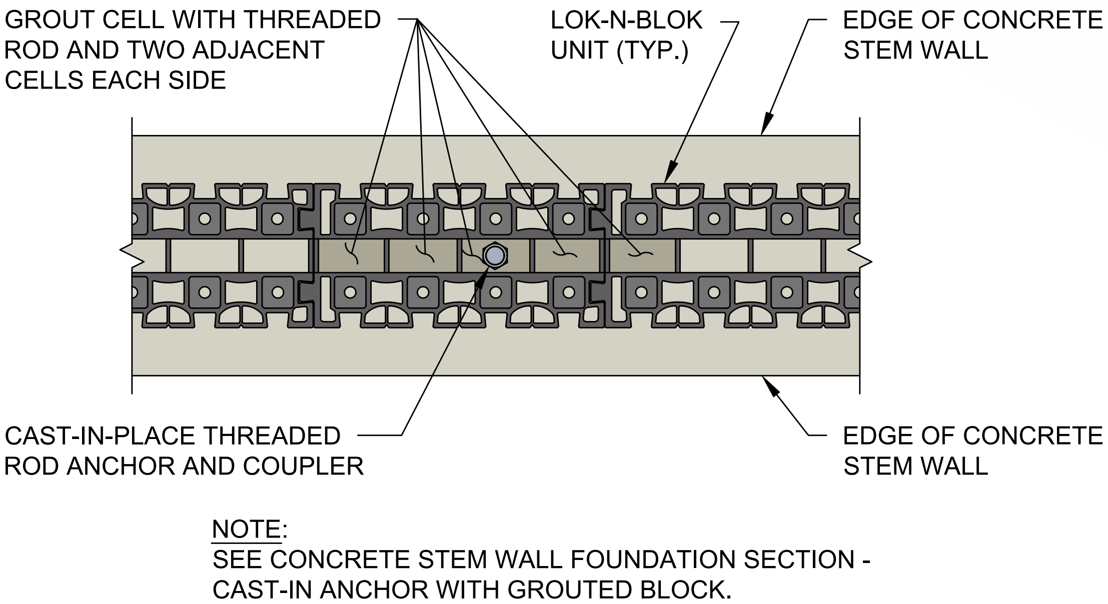
Concrete Stem Wall Foundation Elevation - Cast-In Anchor with Cast-In Block



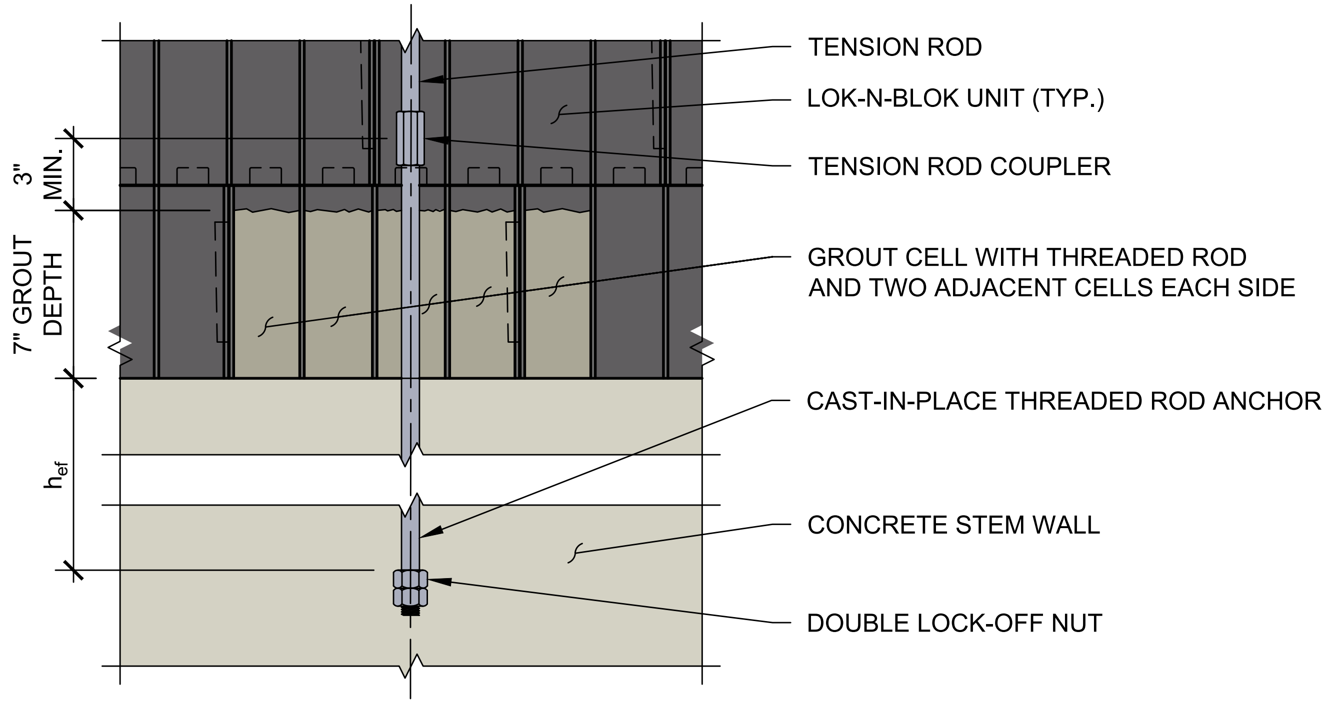
Concrete Stem Wall Foundation Section - Cast-In Anchor with Cast-In Block



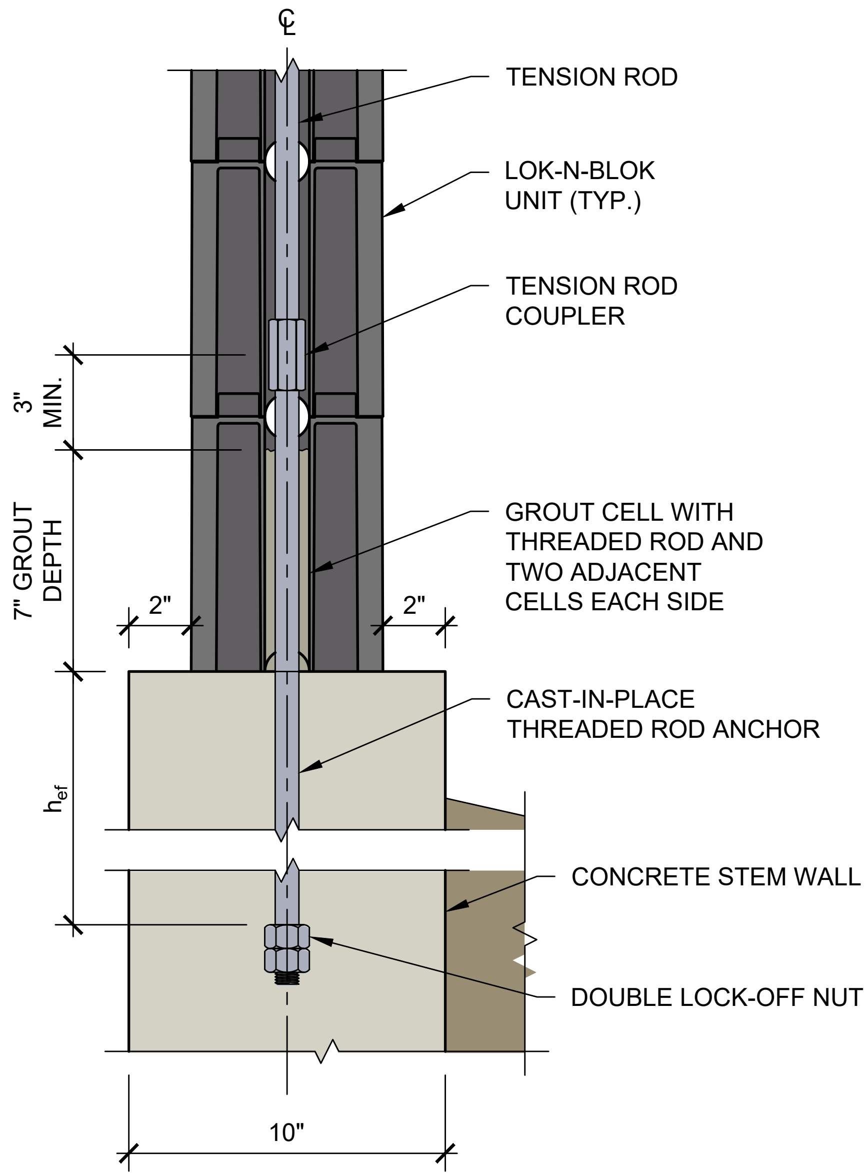
Concrete Stem Wall Foundation Plan - Cast-In Anchor with Grouted Block



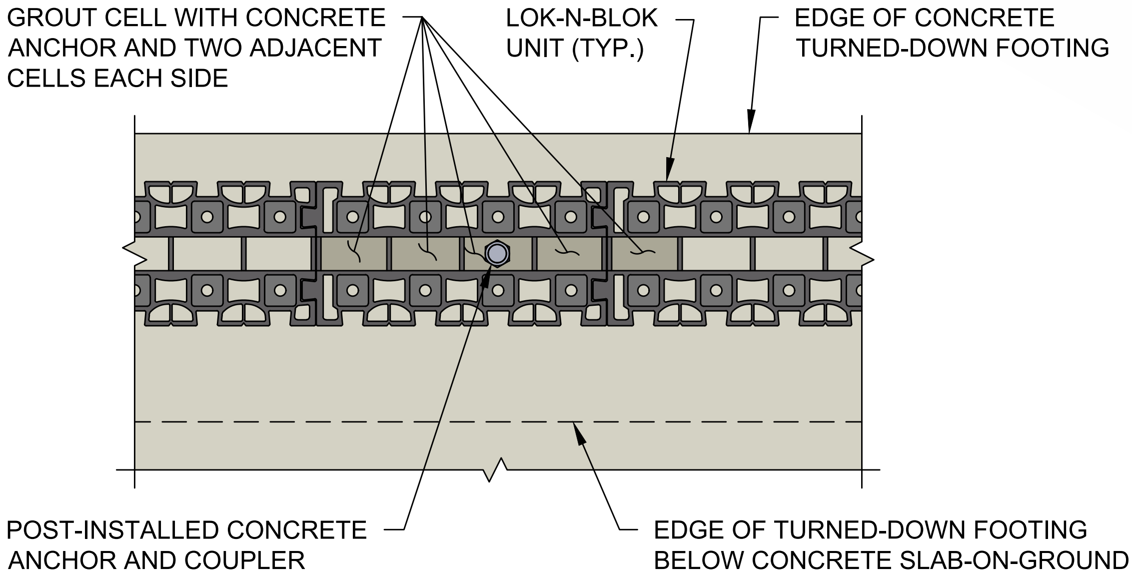
Concrete Stem Wall Foundation Elevation - Cast-In Anchor with Grouted Block



Concrete Stem Wall Foundation Section - Cast-In Anchor with Grouted Block

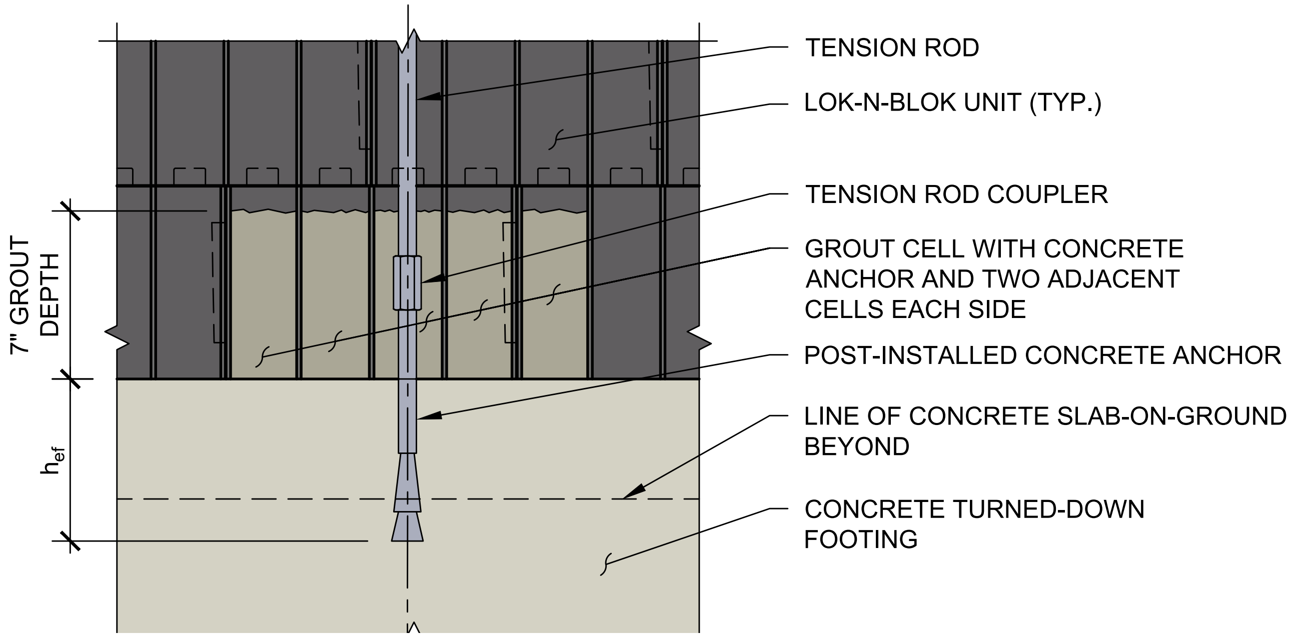


Concrete Slab-On-Ground Foundation Plan - Post-Installed Anchor with Grouted Block

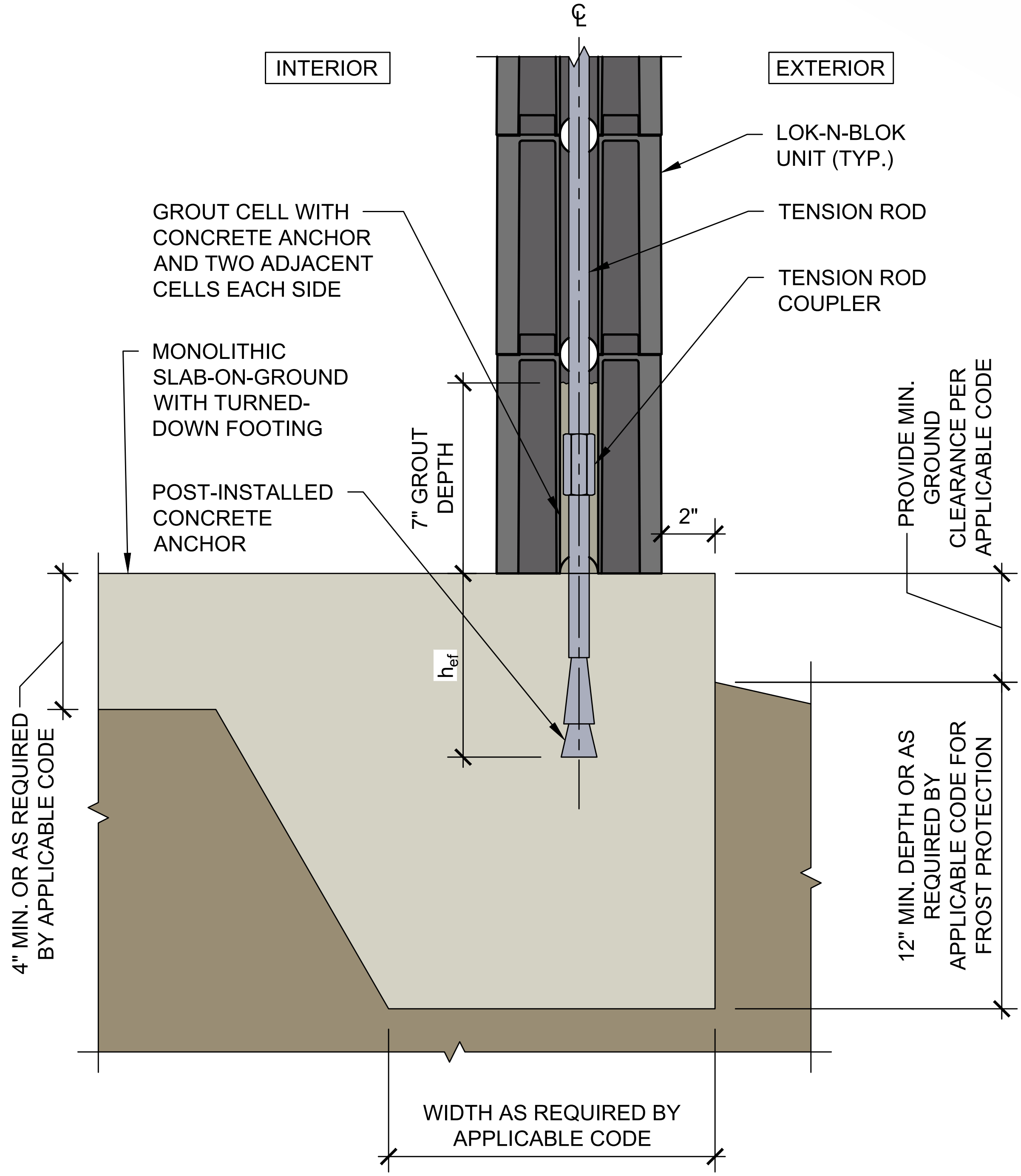


NOTE:
SEE CONCRETE SLAB-ON-GROUND FOUNDATION SECTION - POST-INSTALLED ANCHOR WITH GROUTED BLOCK.

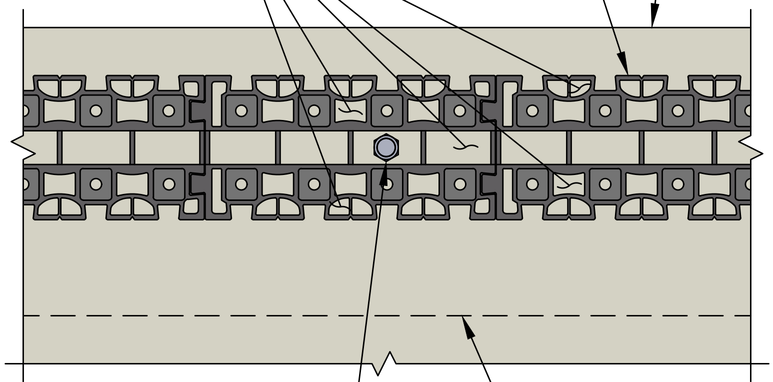
Concrete Slab-On-Ground Foundation Elevation - Post-Installed Anchor with Grouted Block



Concrete Slab-On-Ground Foundation Section - Post-Installed Anchor with Grouted Block

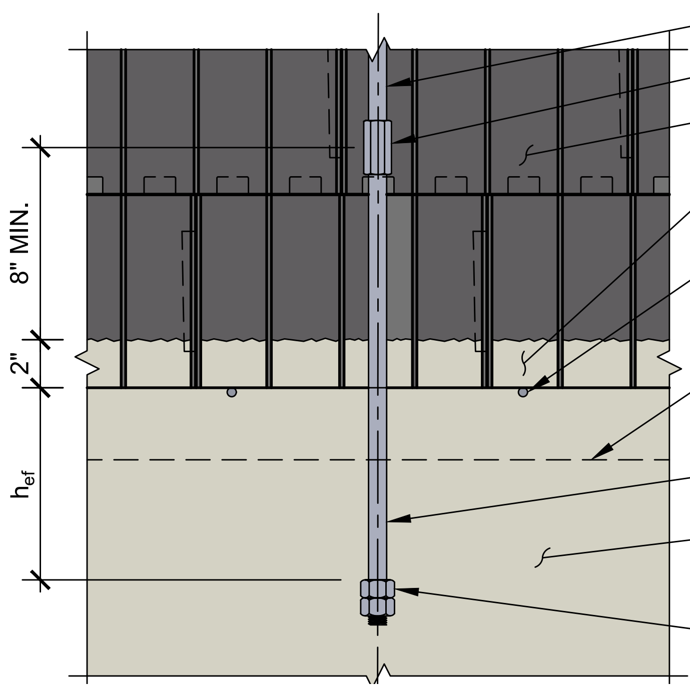


Concrete Slab-On-Ground Foundation Plan - Cast-In Anchor with Cast-In Block

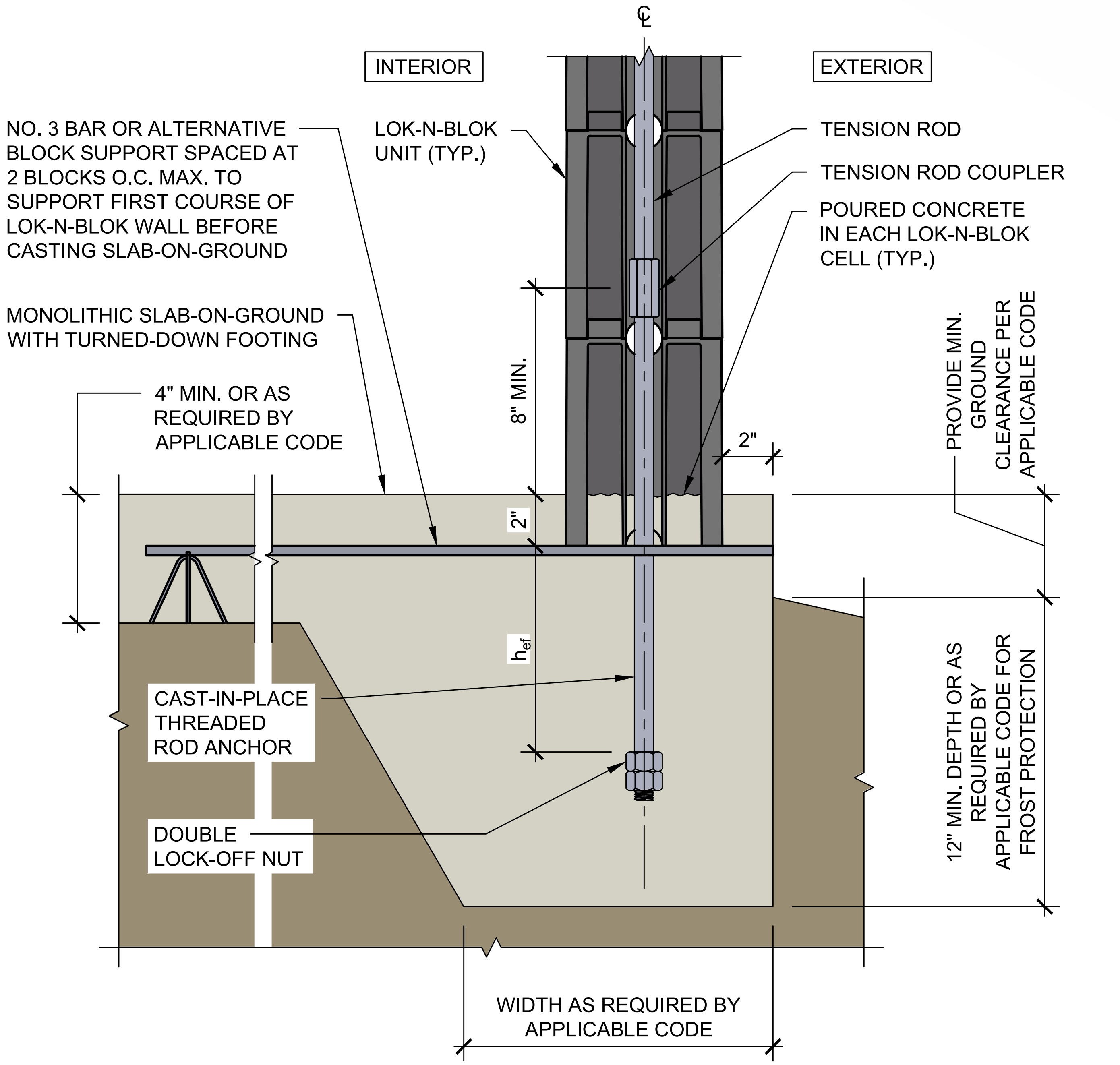


NOTE:
SEE CONCRETE SLAB-ON-GROUND FOUNDATION SECTION - CAST-IN ANCHOR WITH CAST-IN BLOCK.

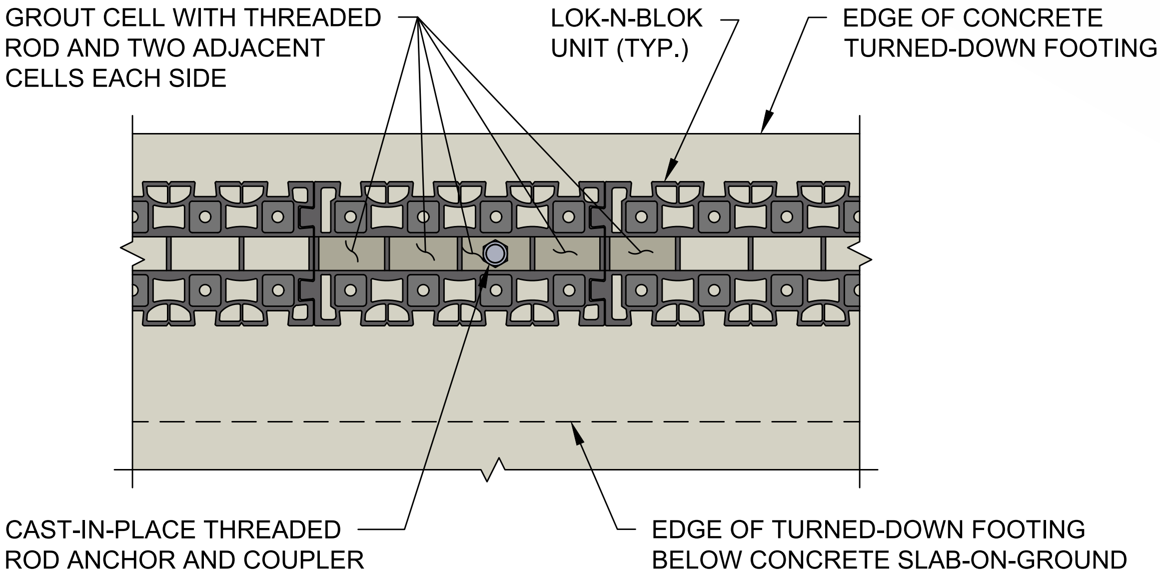
Concrete Slab-On-Ground Foundation Elevation - Cast-In Anchor with Cast-In Block



Concrete Slab-On-Ground Foundation Section - Cast-In Anchor with Cast-In Block

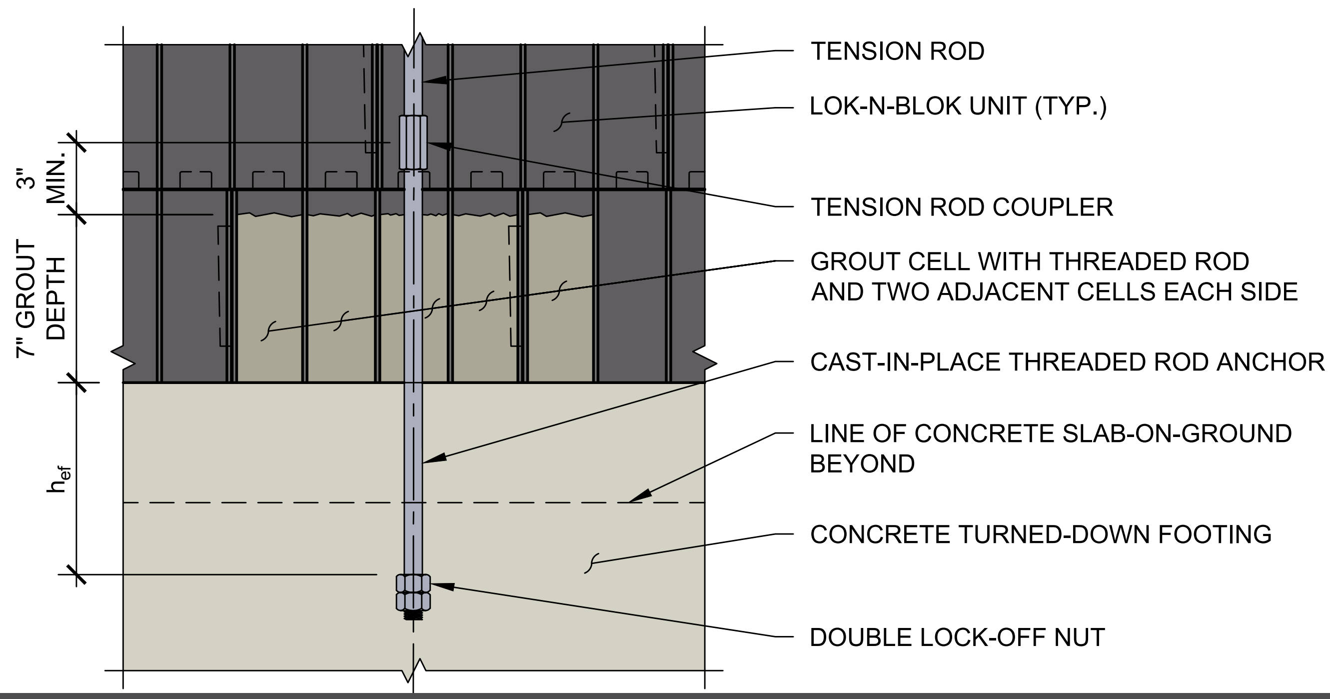


Concrete Slab-On-Ground Foundation Plan - Cast-In Anchor with Grouted Block

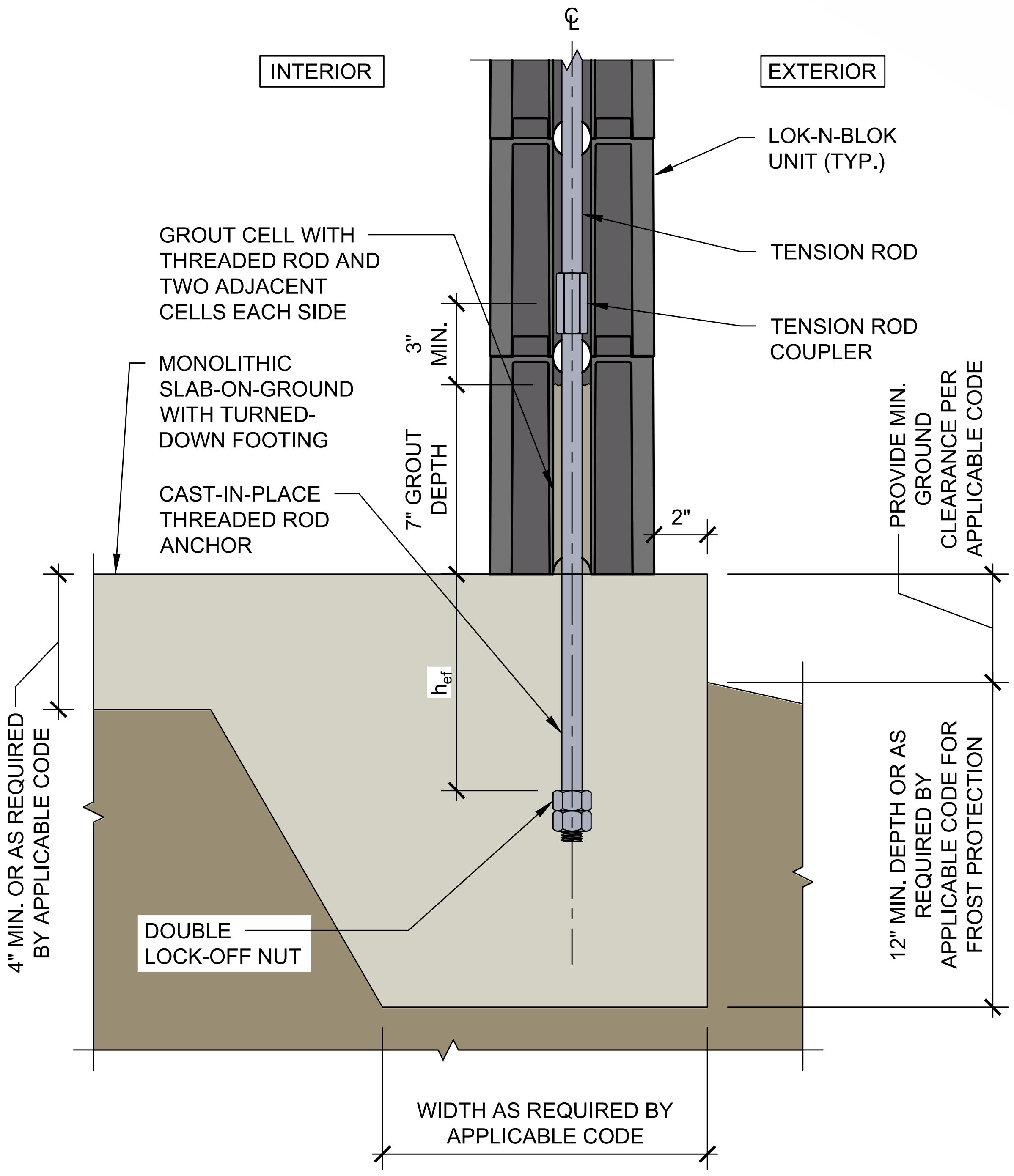


NOTE:
SEE CONCRETE SLAB-ON-GROUND FOUNDATION SECTION - CAST-IN ANCHOR WITH GROUTED BLOCK.

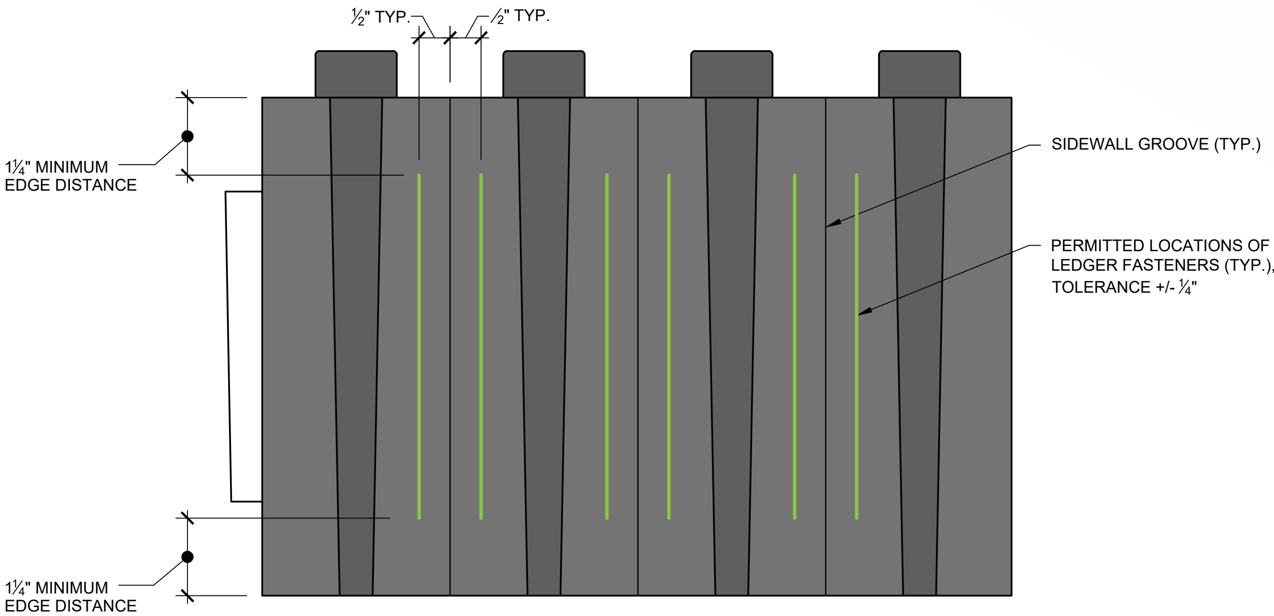
Concrete Slab-On-Ground Foundation Elevation - Cast-In Anchor with Grouted Block



Concrete Slab-On-Ground Foundation Section - Cast-In Anchor with Grouted Block

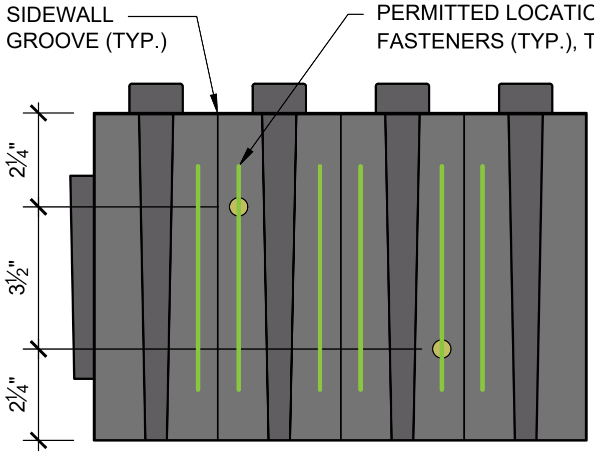


Permitted Ledger Board Fastener Locations: Lok-N-Blok

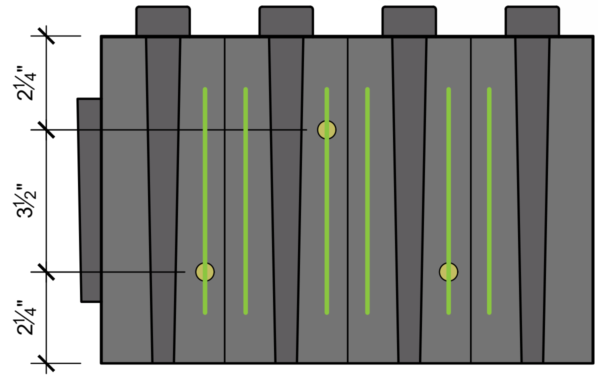


NOTE:
THE FASTENERS FOR THE LEDGER BOARD ARE ONLY PERMITTED TO BE INSTALLED AT THE LOCATIONS INDICATED BY THE GREEN LINES IN THE FIGURE ABOVE, WITH A TOLERANCE OF ¼". THE MINIMUM HORIZONTAL AND VERTICAL SPACING BETWEEN FASTENERS IS 1½". THE PUBLISHED ALLOWABLE DESIGN LOADS ARE BASED ON THESE REQUIREMENTS.

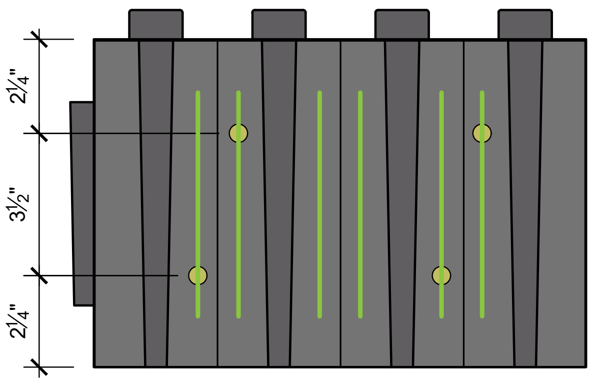
Permitted Ledger Board Fastener Locations: Lok-N-Blok



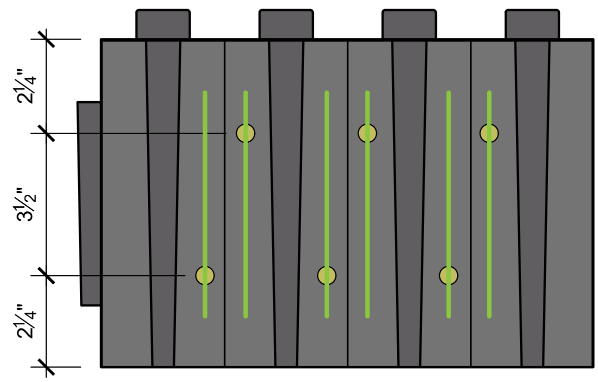
2 FASTENERS



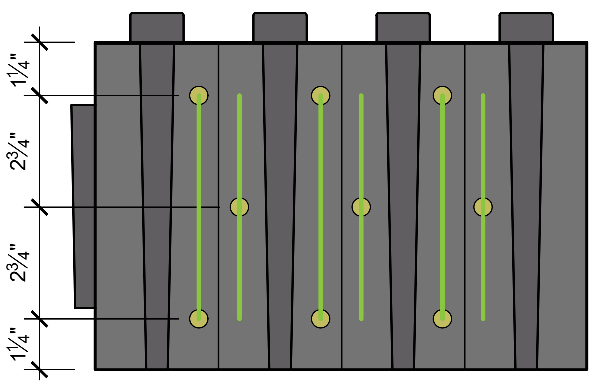
3 FASTENERS



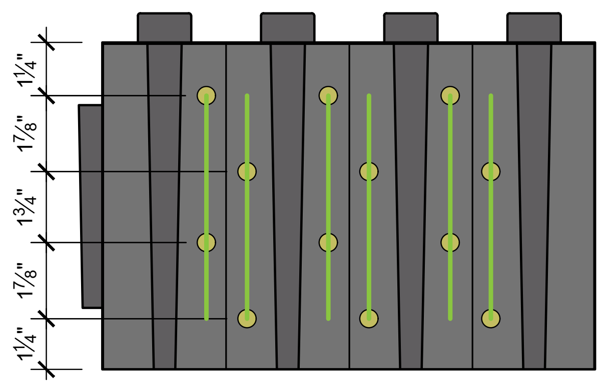
4 FASTENERS



5-6 FASTENERS



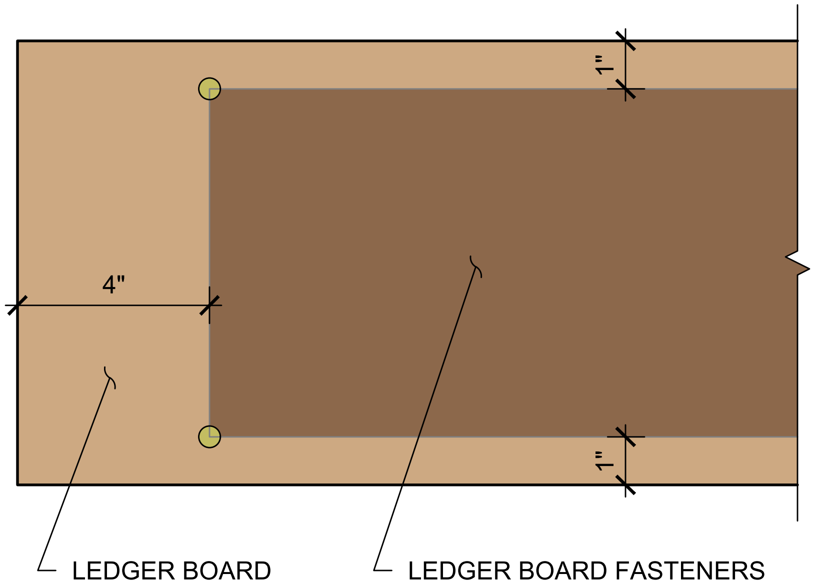
7-9 FASTENERS



10-12 FASTENERS

NOTE:
THESE FIGURES PROVIDE RECOMMENDED FASTENER PATTERNS IN THE LOK-N-BLOK UNIT FOR VARIOUS NUMBERS OF FASTENERS PER BLOCK. OTHER PATTERNS THAT SATISFY ALL OF THE APPLICABLE REQUIREMENTS HEREIN (SPACING, LOCATION, AND EDGE DISTANCE) ARE ALSO PERMITTED.

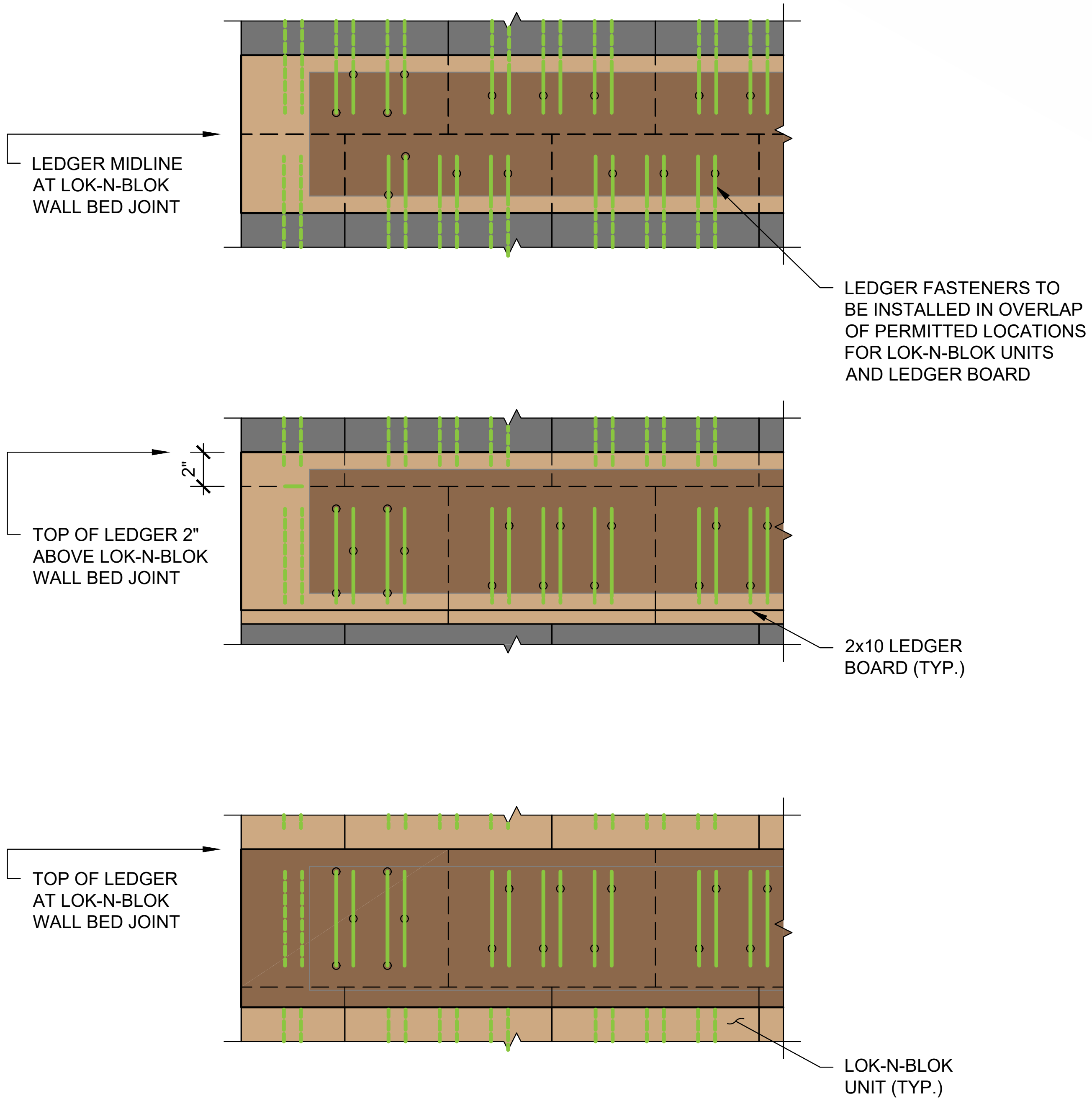
Permitted Fastener Locations: Ledger Board



NOTE:
FASTENER LOCATIONS IN LEDGER BOARD TO MEET ALL NATIONAL DESIGN SPECIFICATION FASTENER SPACING, END DISTANCE, AND EDGE DISTANCE REQUIREMENTS.

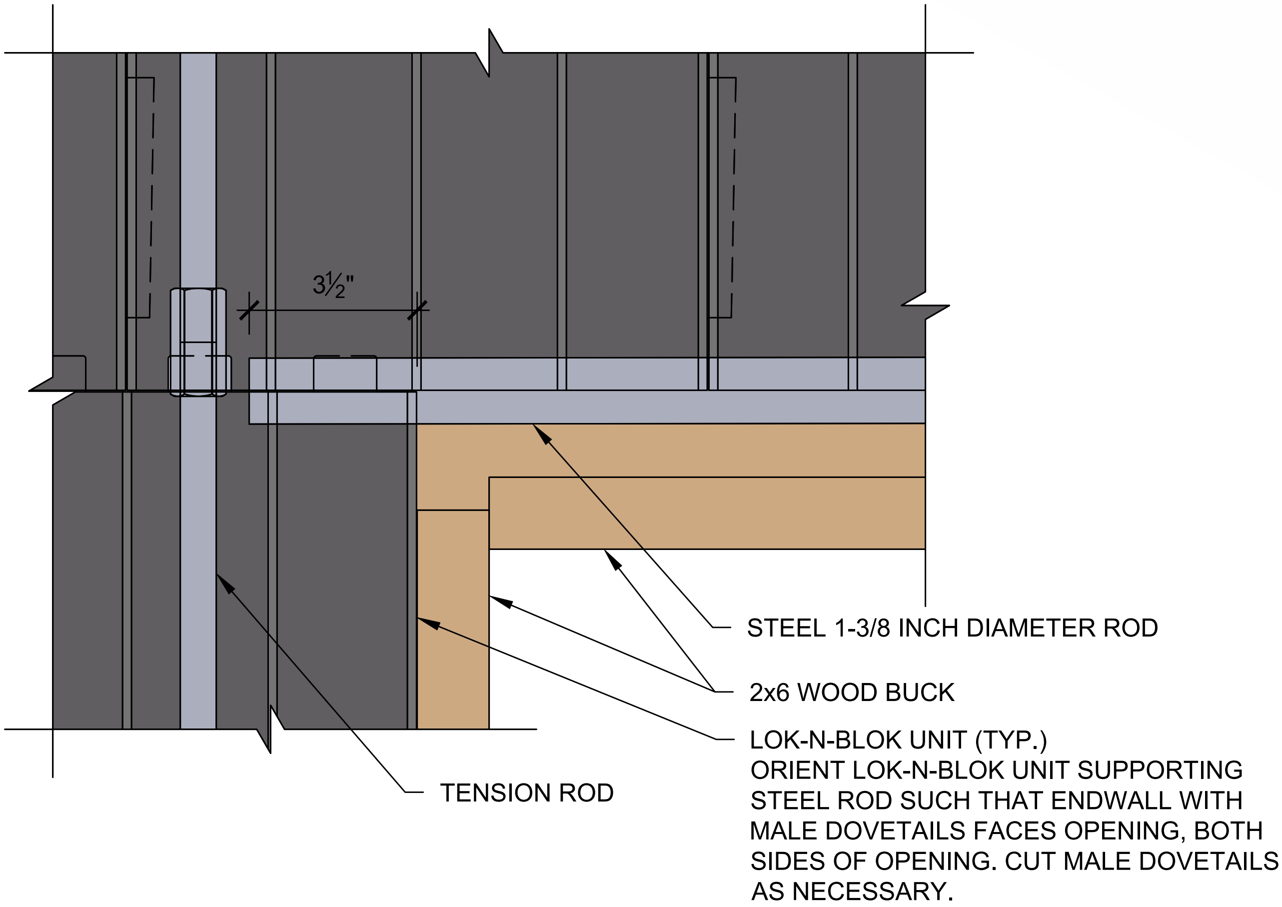
NOTE:
THIS FIGURE SHOWS THE PERMITTED STRUCTURAL FASTENER LOCATIONS IN THE LEDGER BOARD PER SIMPSON STRONG-TIE IAPMO UES ER-192 FOR SDWS16400 FRAMING SCREWS. THE REQUIREMENTS ARE SPECIFIC TO SIMPSON STRONG-TIE SDWS16400 FRAMING SCREWS, WHICH ARE THE ONLY PERMITTED LEDGER BOARD FASTENERS FOR LOK-N-BLOK BASED ON TESTING TO DATE. FOR ALLOWABLE DESIGN LOADS FOR THE SDWS FRAMING SCREWS IN VARIOUS SPECIES OF LEDGER BOARD, SEE SIMPSON STRONG-TIE IAPMO UES ER-192. THE DESIGN OF THE LEDGER BOARD IS OUTSIDE OF THE SCOPE OF THIS DESIGN GUIDE.

Recommended Ledger Board Fastener Patterns

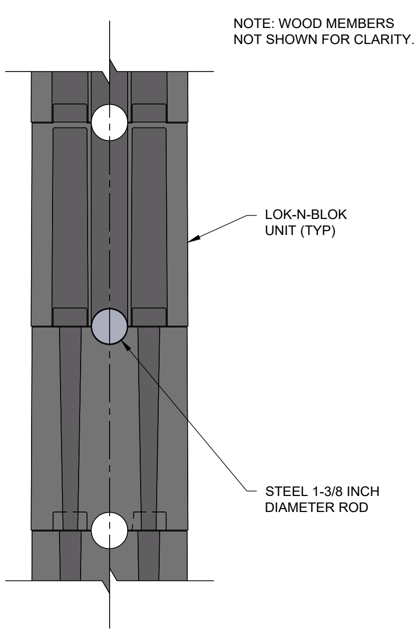


NOTE:
THESE FIGURES PROVIDE SAMPLE LEDGER BOARD FASTENER PATTERNS FOR SIX FASTENERS PER BLOCK AND A 2x10 LEDGER FOR VARIOUS VERTICAL POSITIONS OF THE LEDGER BOARD RELATIVE TO THE LOK-N-BLOK WALL BED JOINTS. OTHER PATTERNS THAT SATISFY ALL OF THE APPLICABLE REQUIREMENTS HEREIN (SPACING, LOCATION, AND EDGE DISTANCE) FOR BOTH THE LOK-N-BLOK UNIT AND THE LEDGER BOARD ARE ALSO PERMITTED. PATTERNS FOR OTHER LEDGER BOARD SIZES AND NUMBER OF FASTENERS PER BLOCK SHOULD BE DETERMINED ON A PER-PROJECT BASIS.

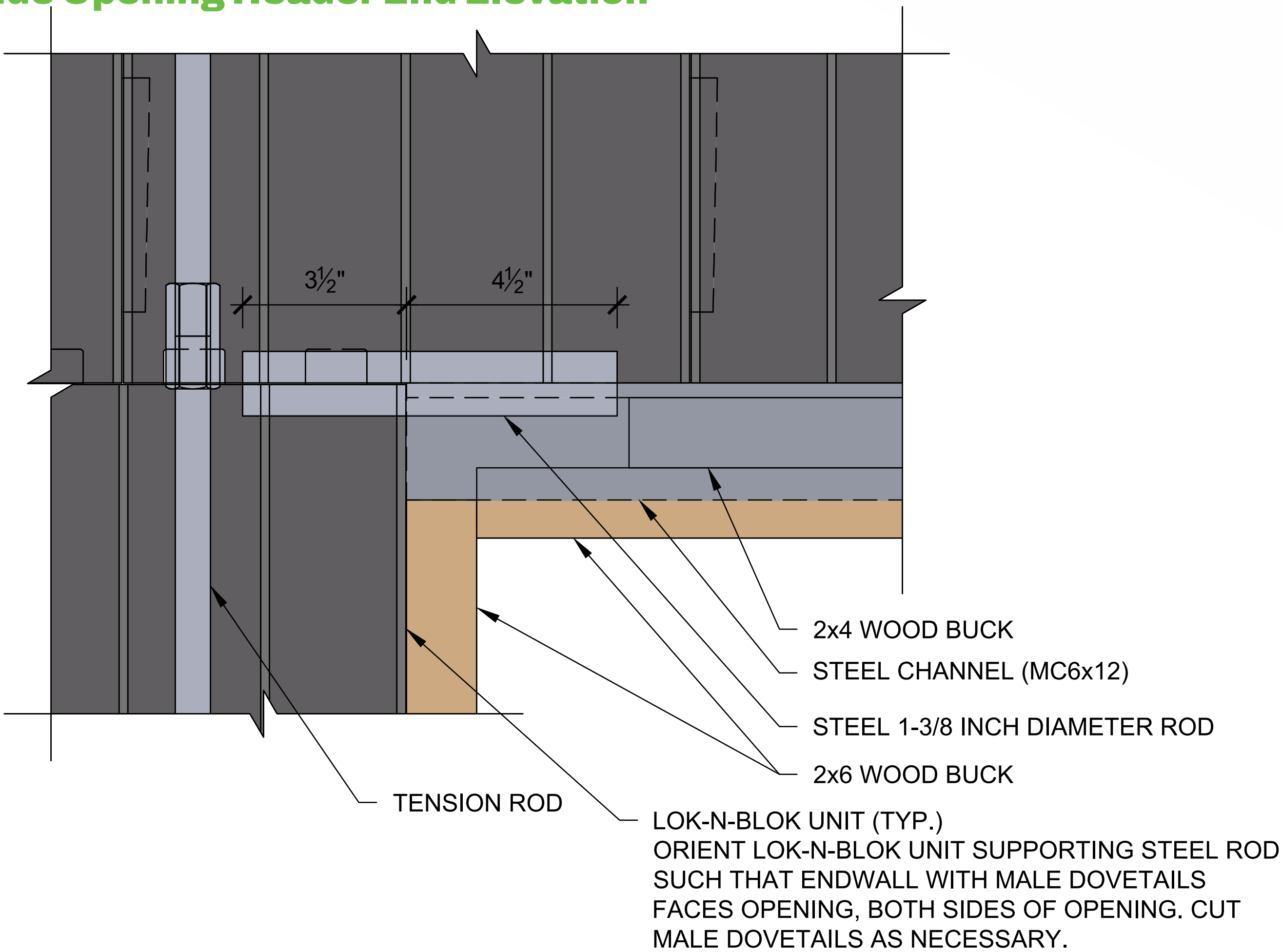
Narrow Opening Header End Elevation



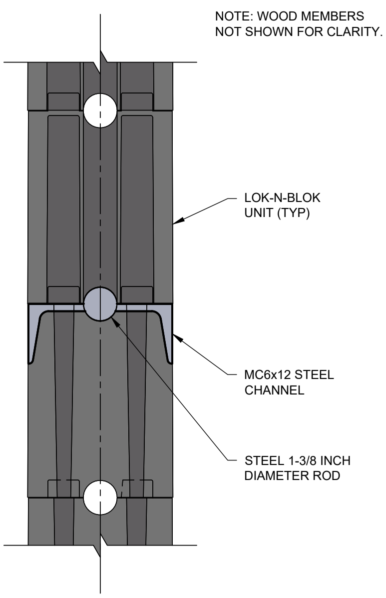
Narrow Opening Header Section



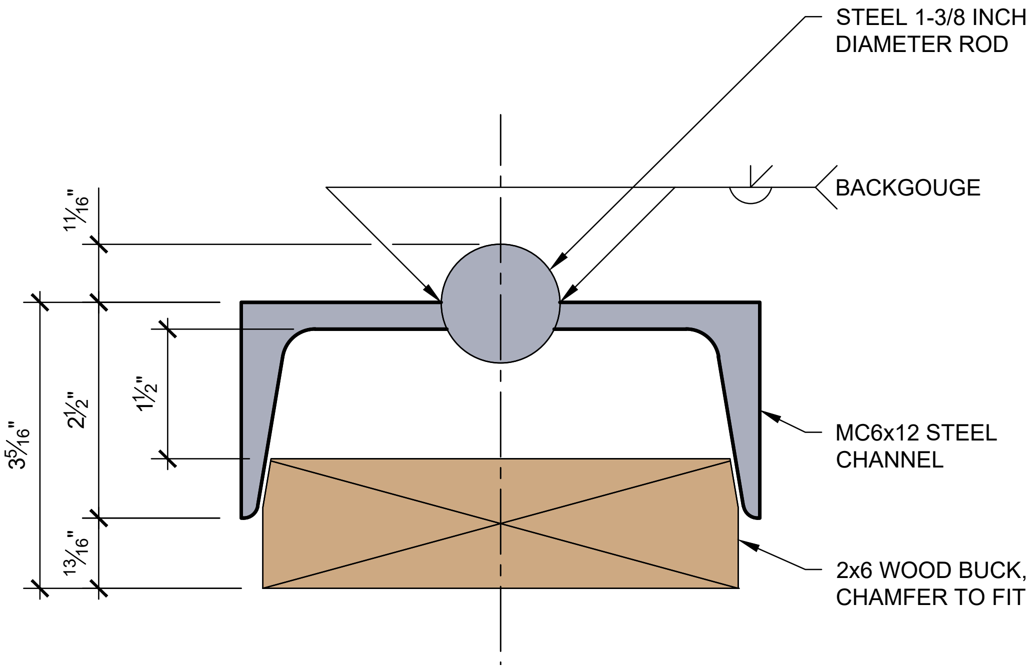
Wide Opening Header End Elevation



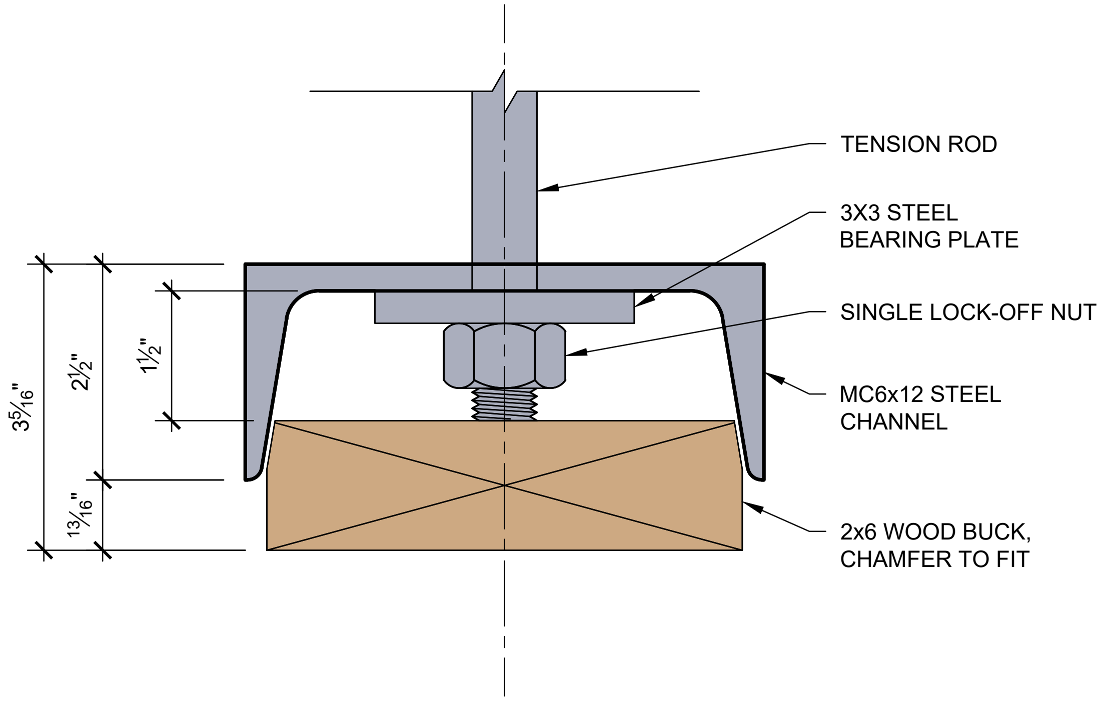
Wide Opening Header End Section



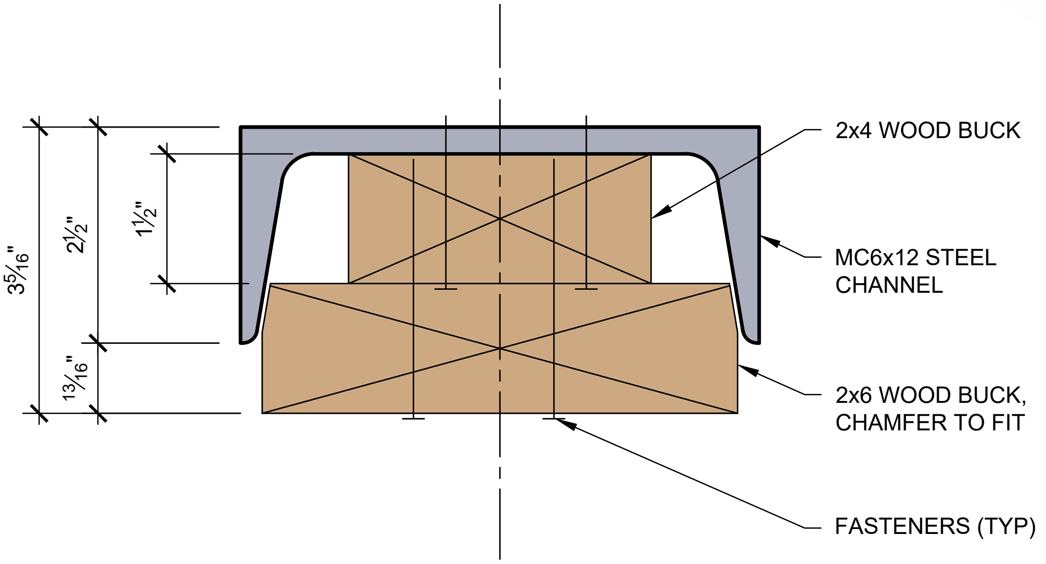
Wide Opening Header Section at End



Wide Opening Header Section at Tension Rod



Wide Opening Header Section Along Length

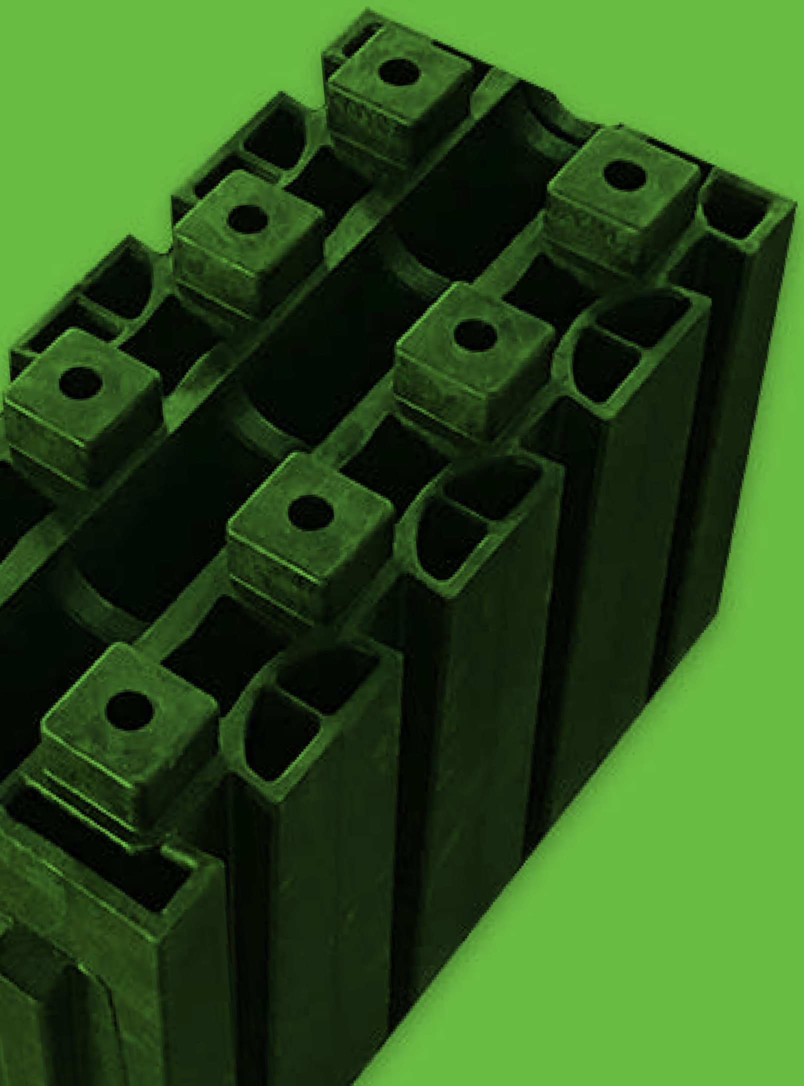


Section 5

Architectural Details

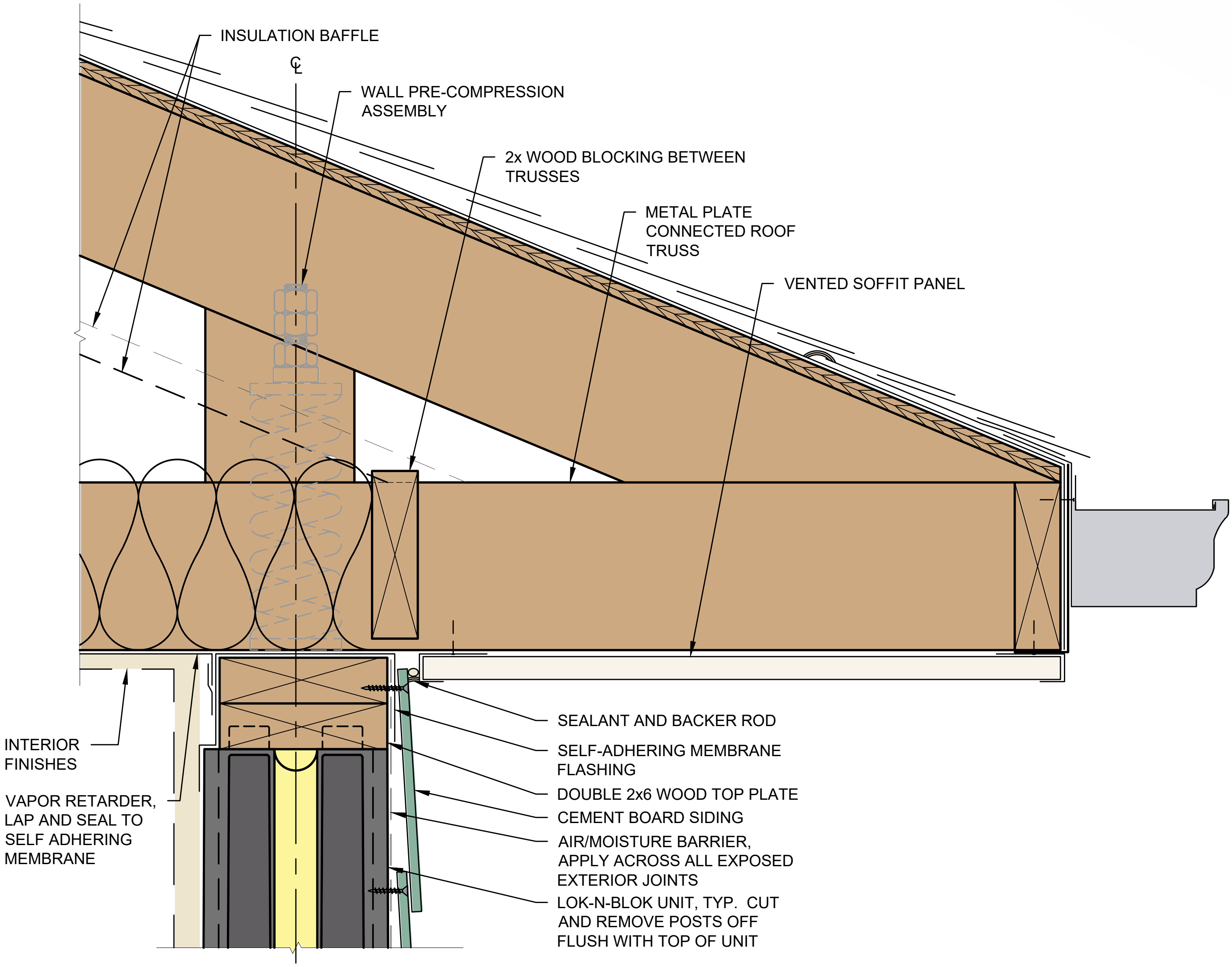
This section includes architectural details, including insulation options, air/water barrier integration, window connections, cladding attachment, and accommodating penetrations.

- Details

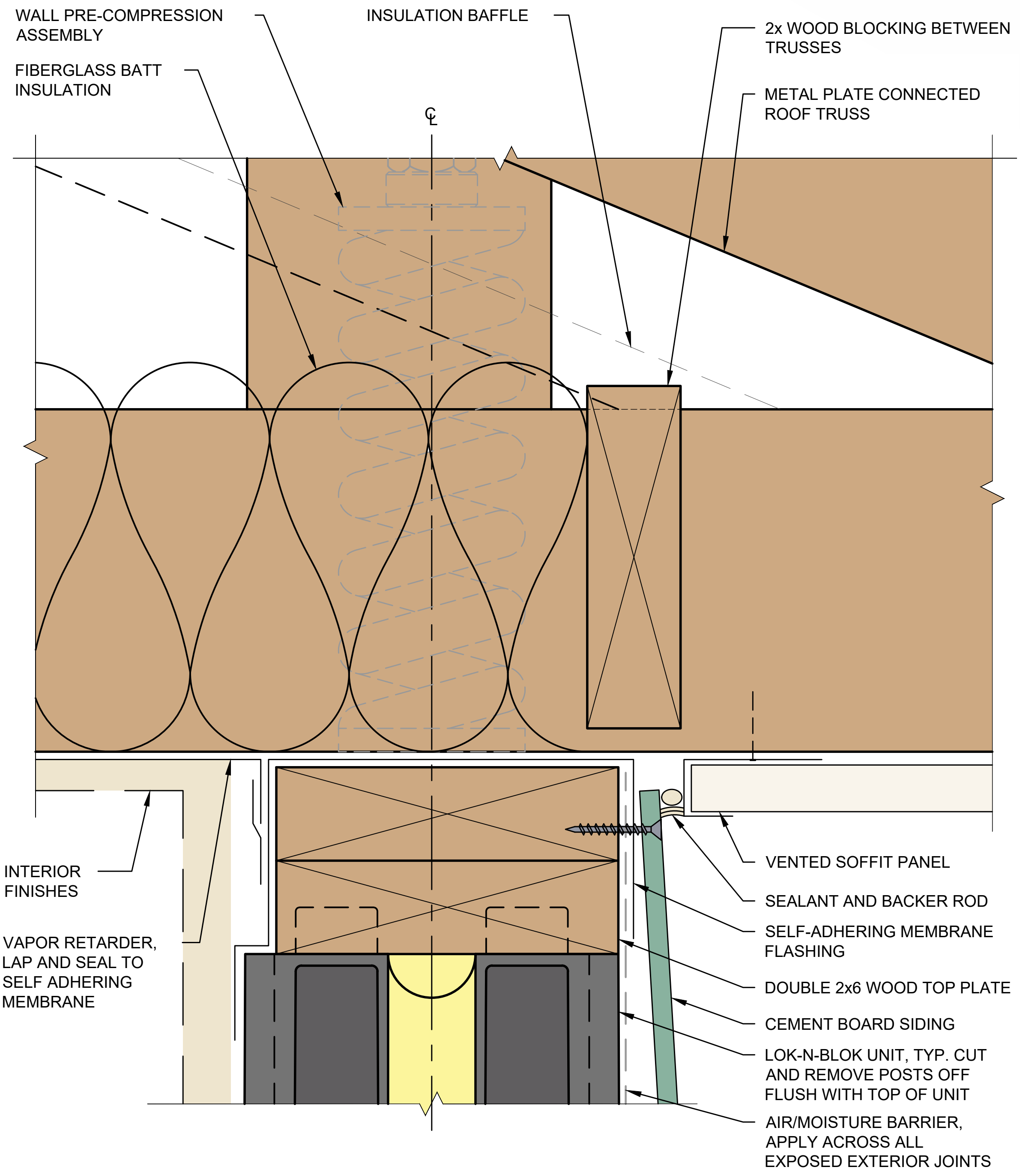


ARCHITECTURAL DETAILS

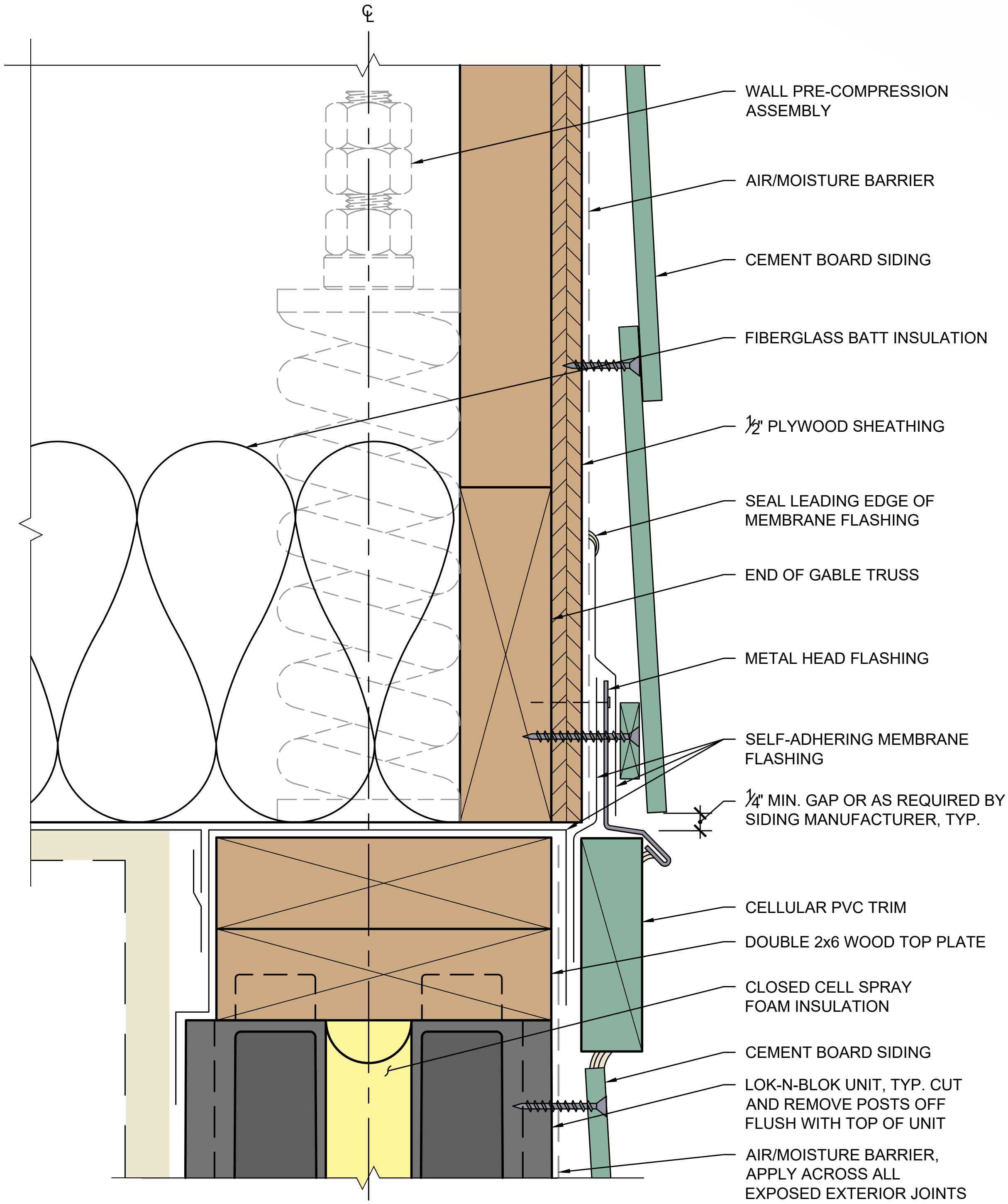
Top of Wall Detail - Interior Insulation



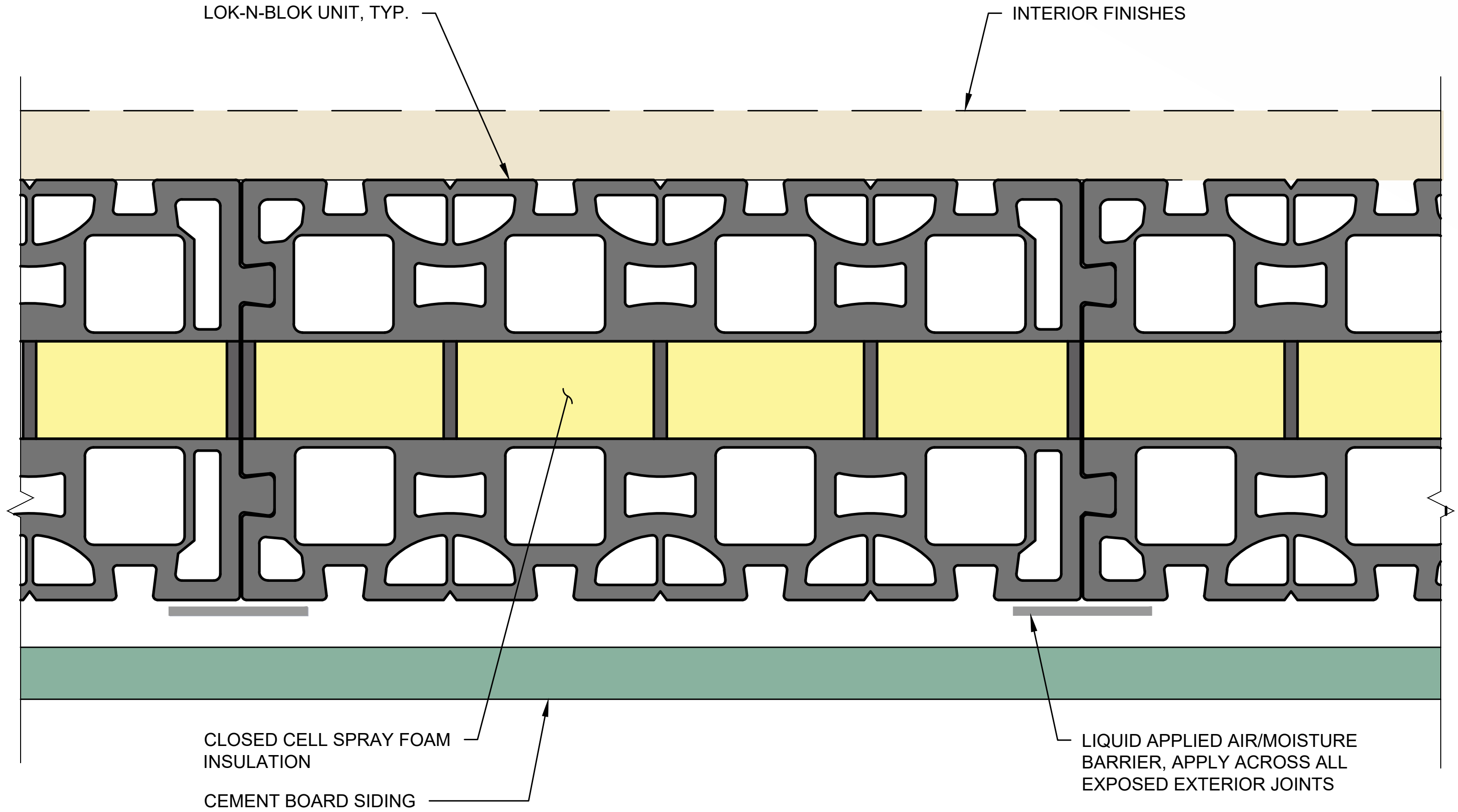
Top of Wall Detail - Interior Insulation



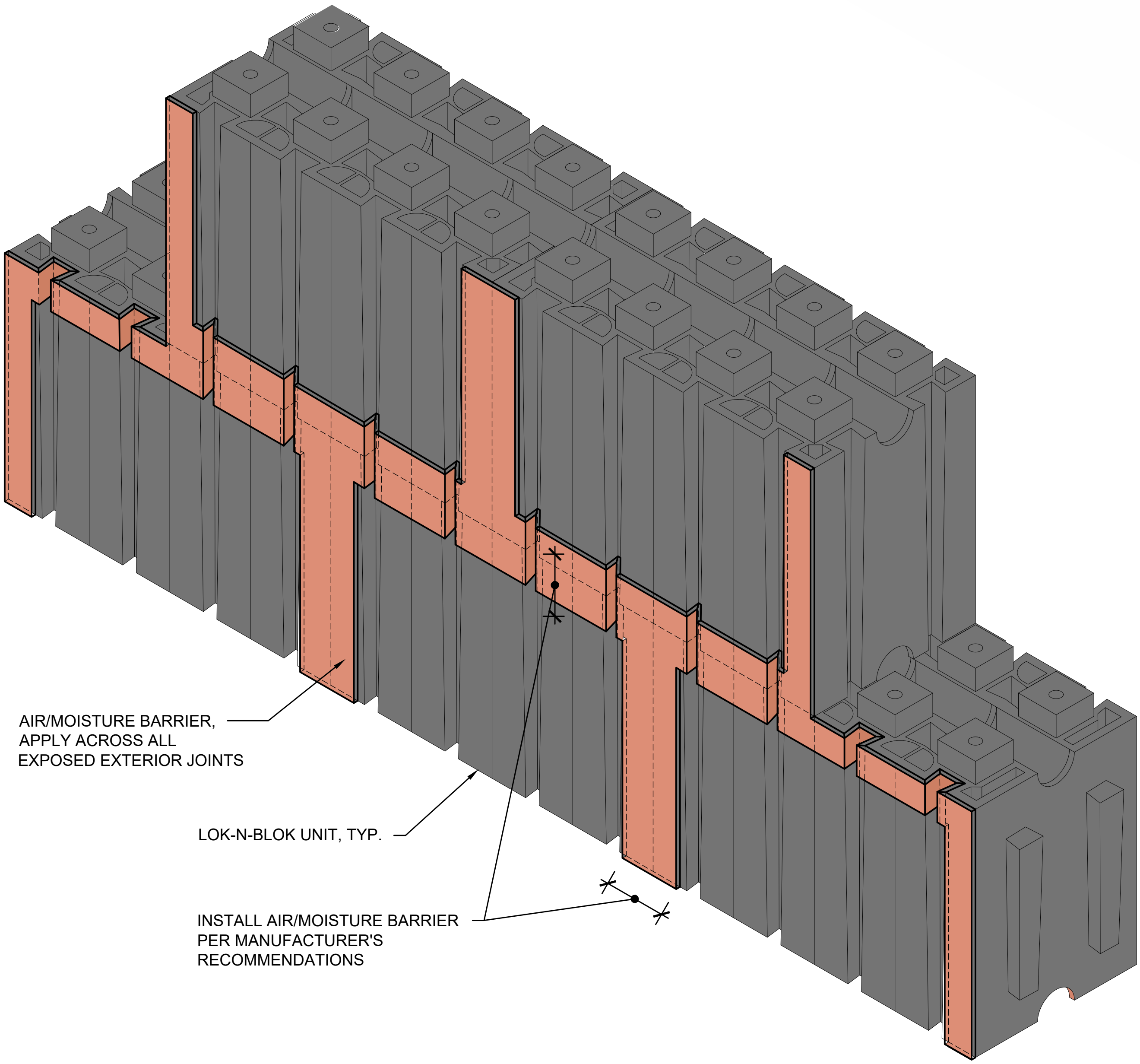
Gable Endwall Detail - Interior Insulation



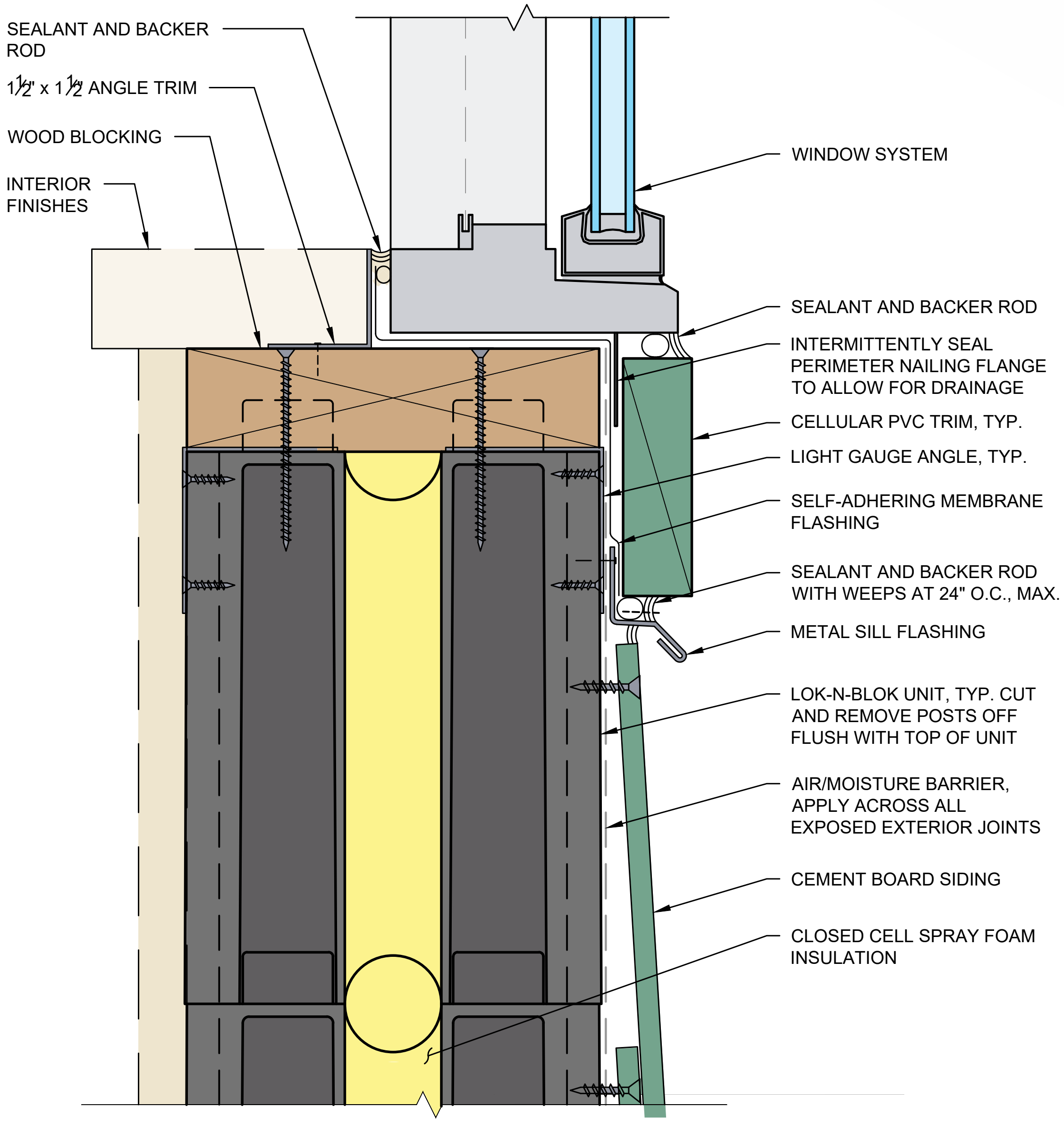
Plan View Wall Section- Interior Insulation



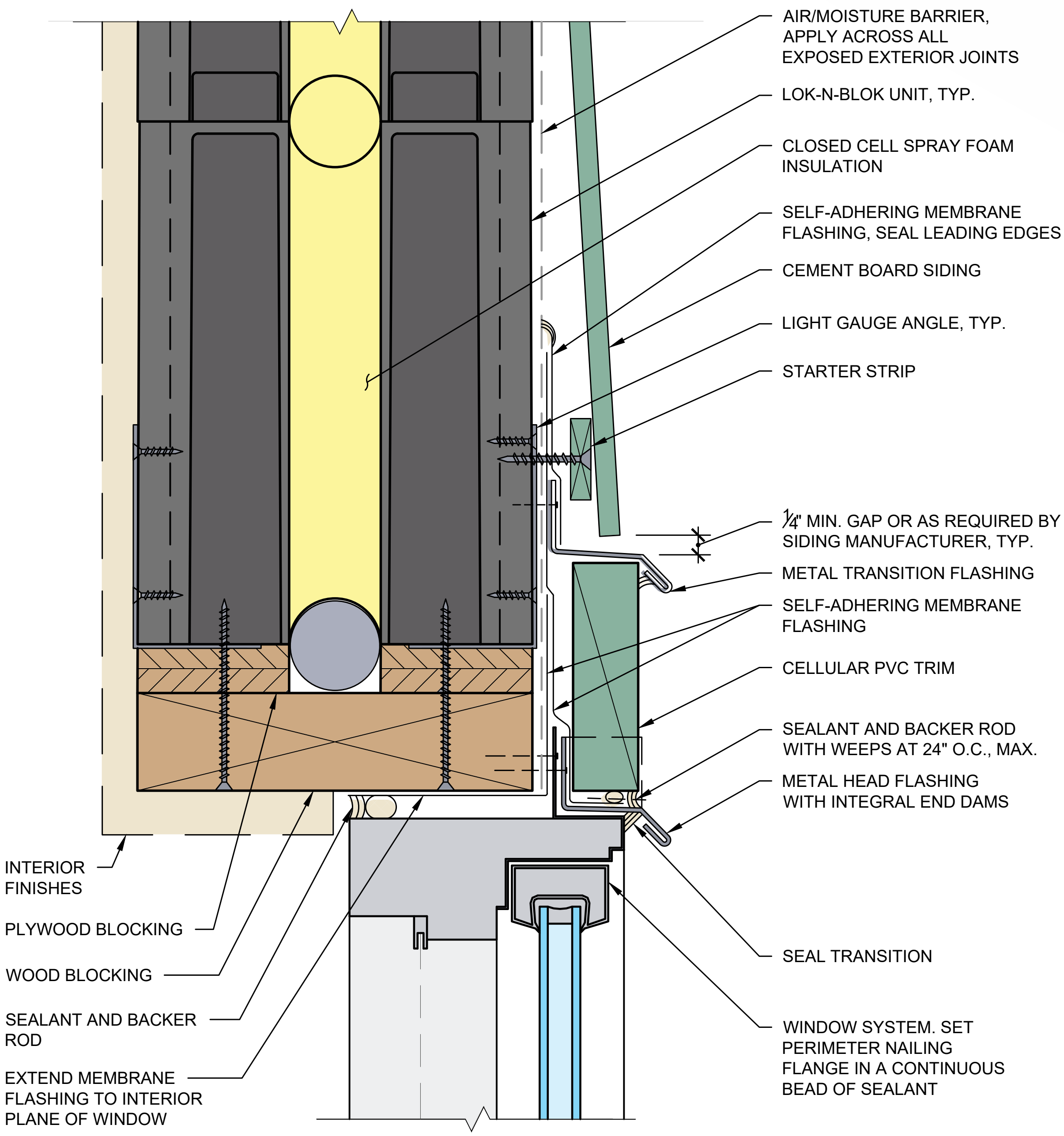
Air/Moisture Barrier Isometric Detail



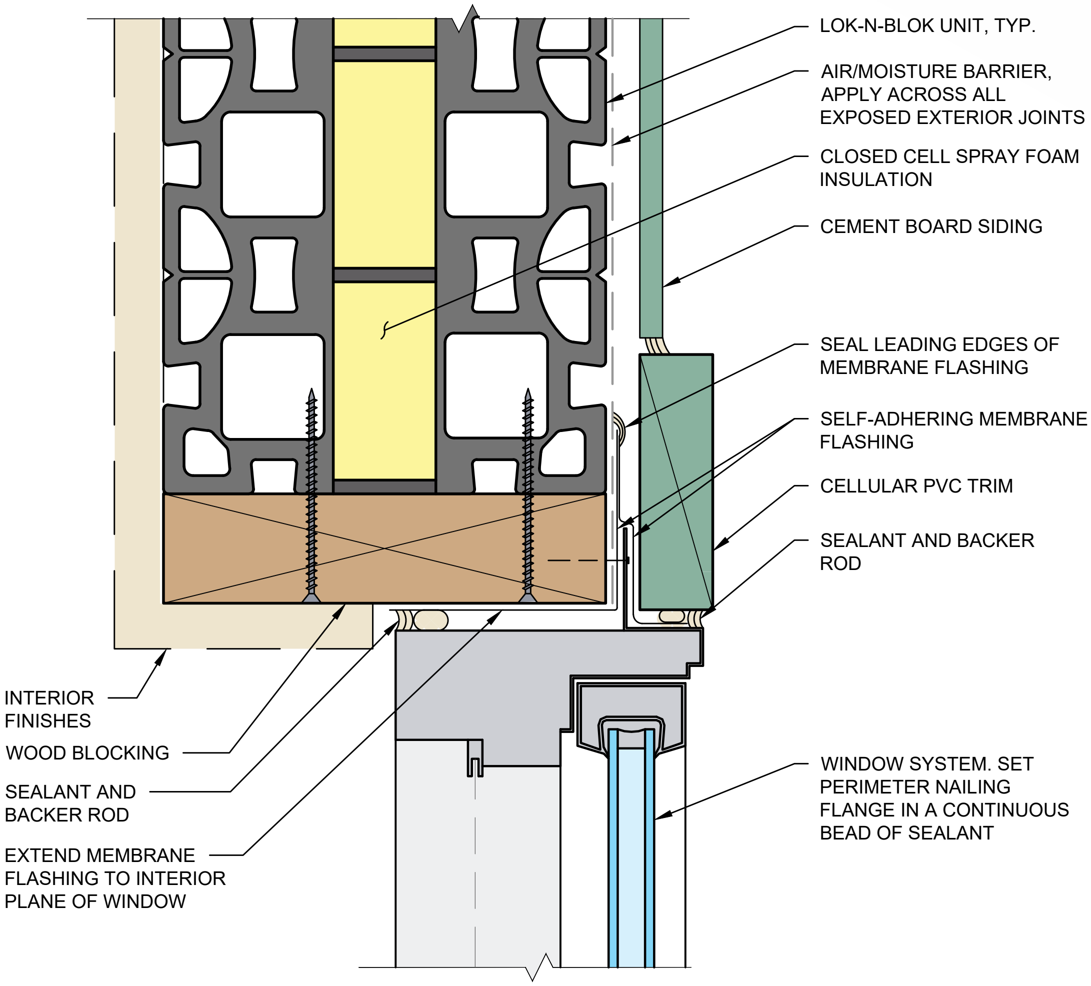
Window Sill Detail - Interior Insulation



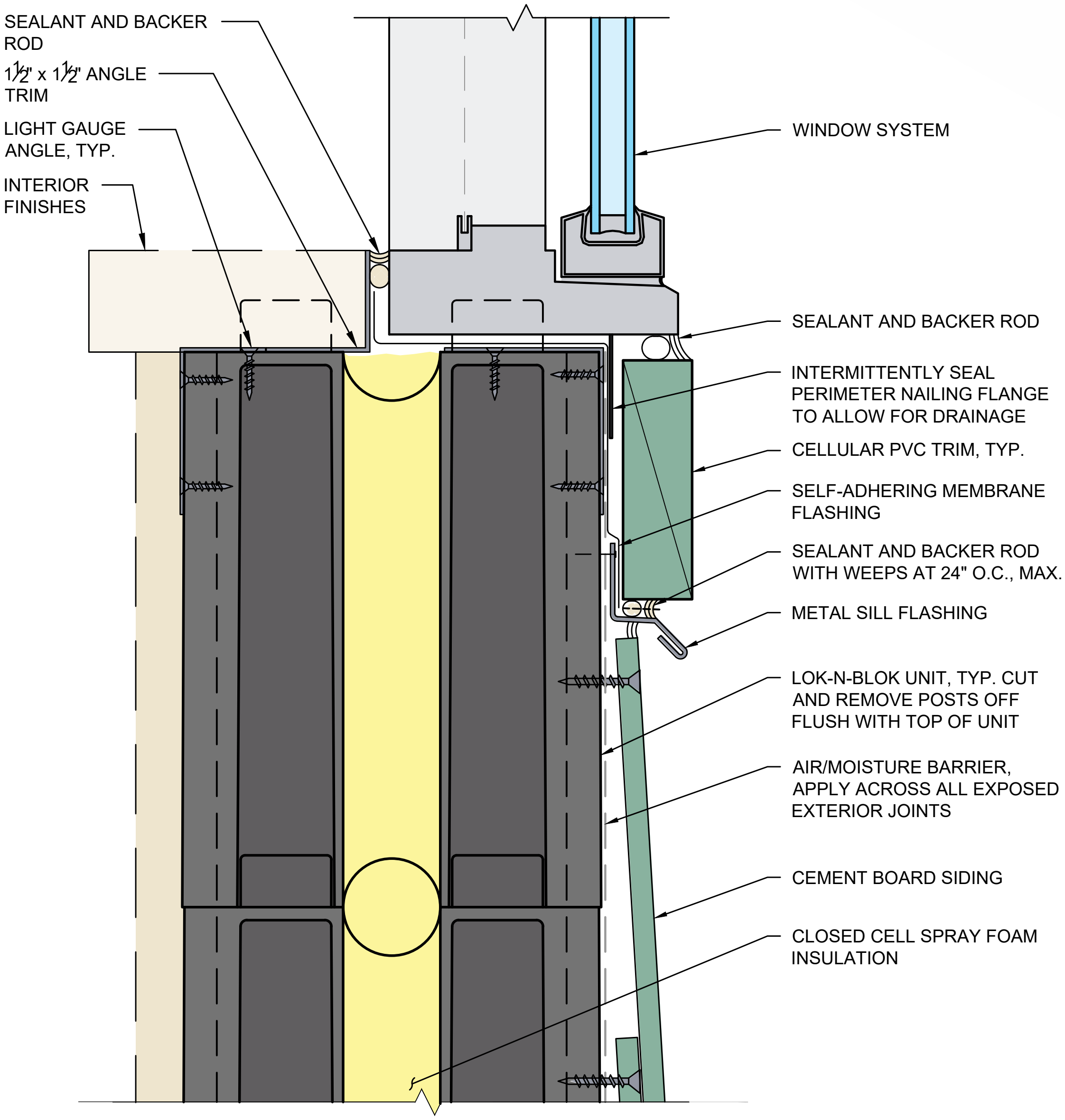
Window Head Detail - Interior Insulation



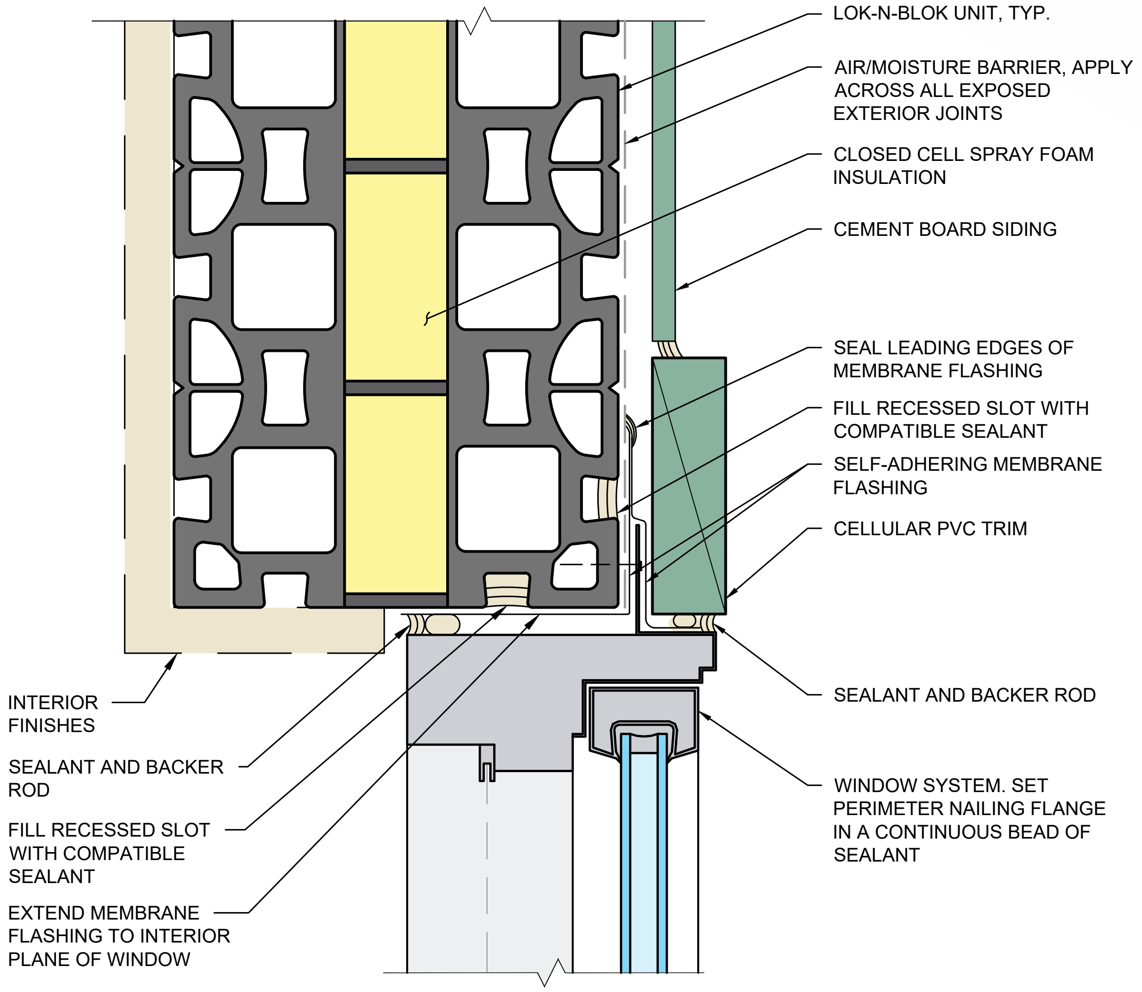
Window Jamb Detail - Interior Insulation



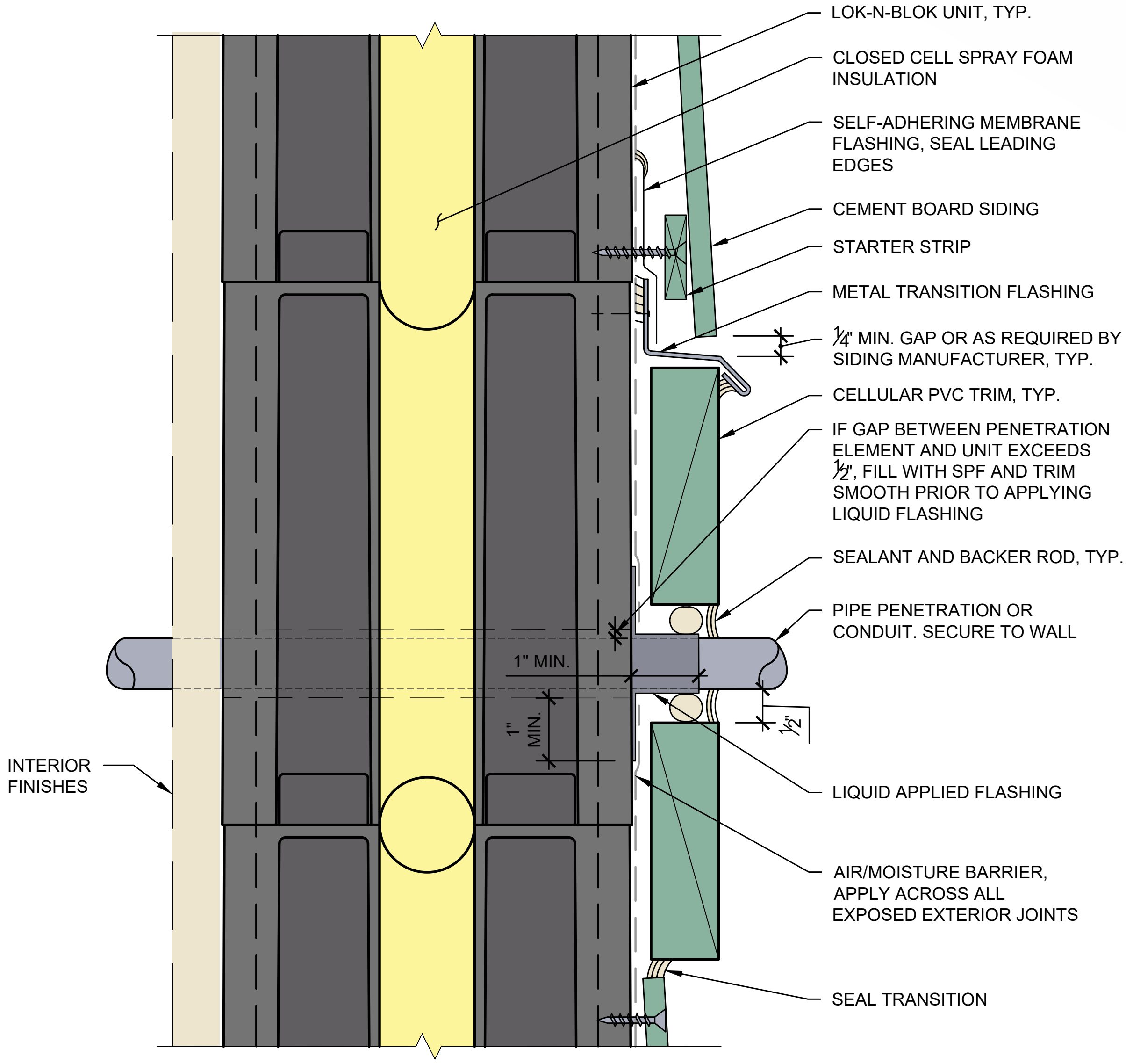
Window Sill Detail - Flanged Window



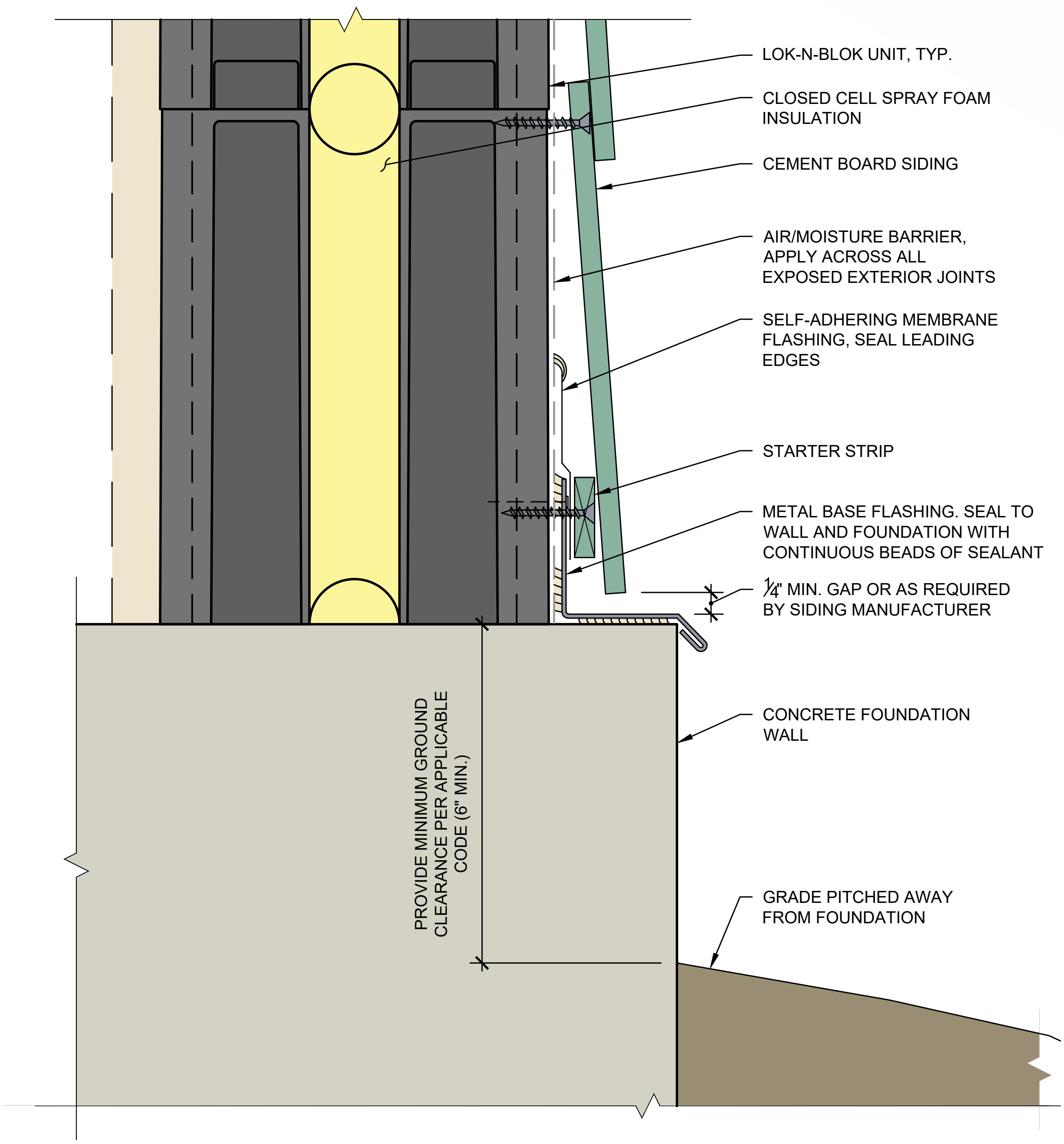
Window Jamb Detail - Flanged Window



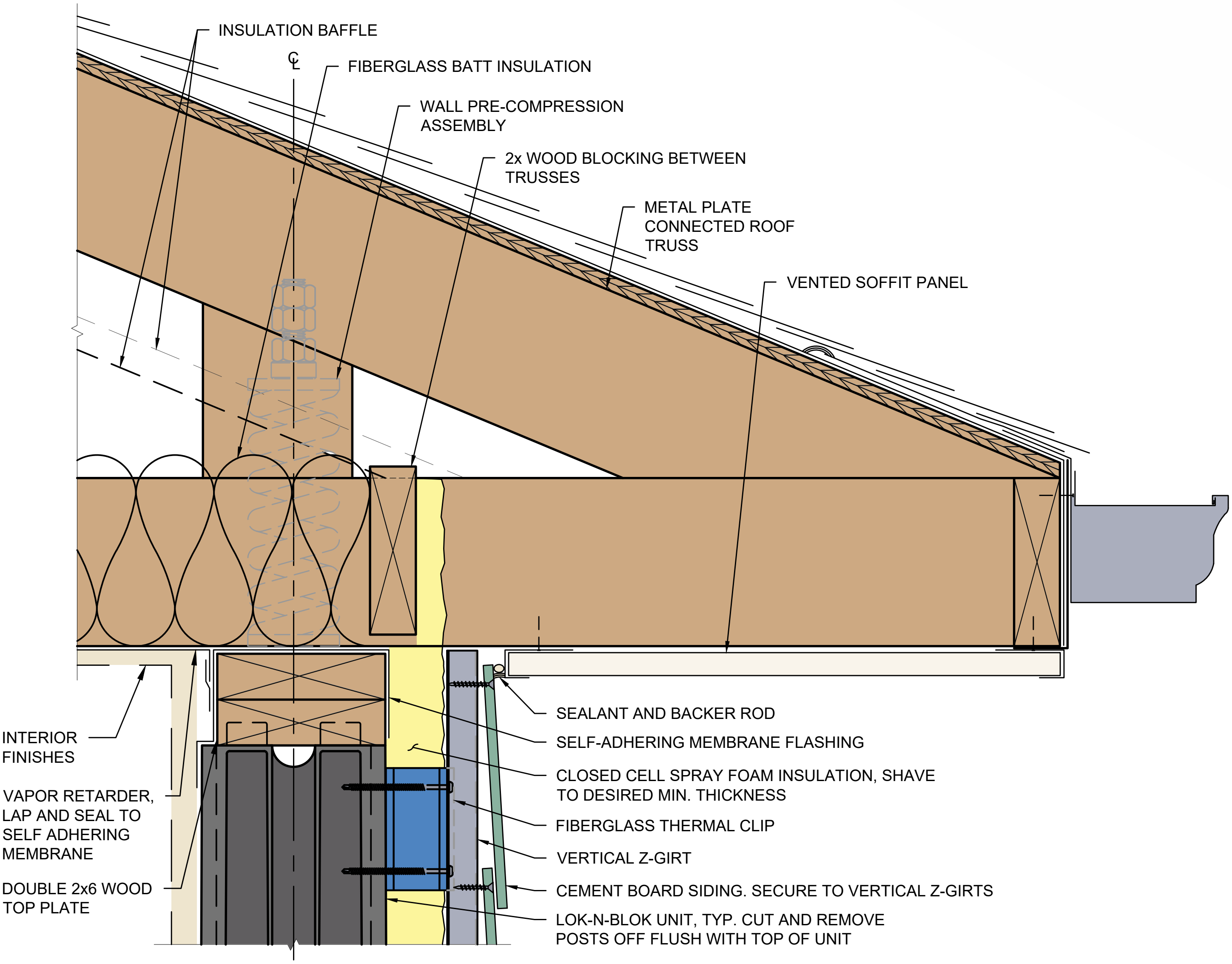
Wall Penetration Detail - Interior Insulation



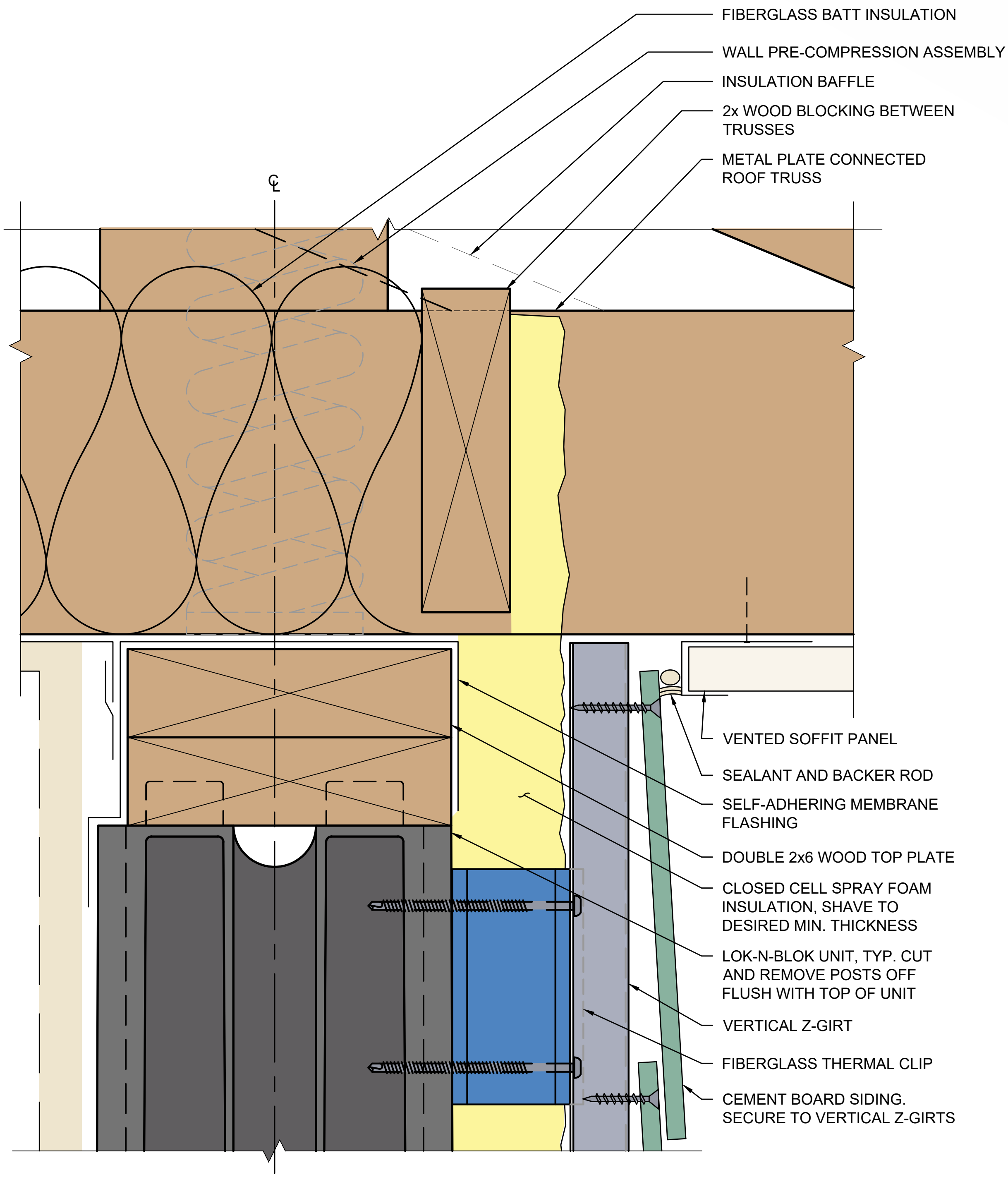
Base of Wall Section - interior insulation



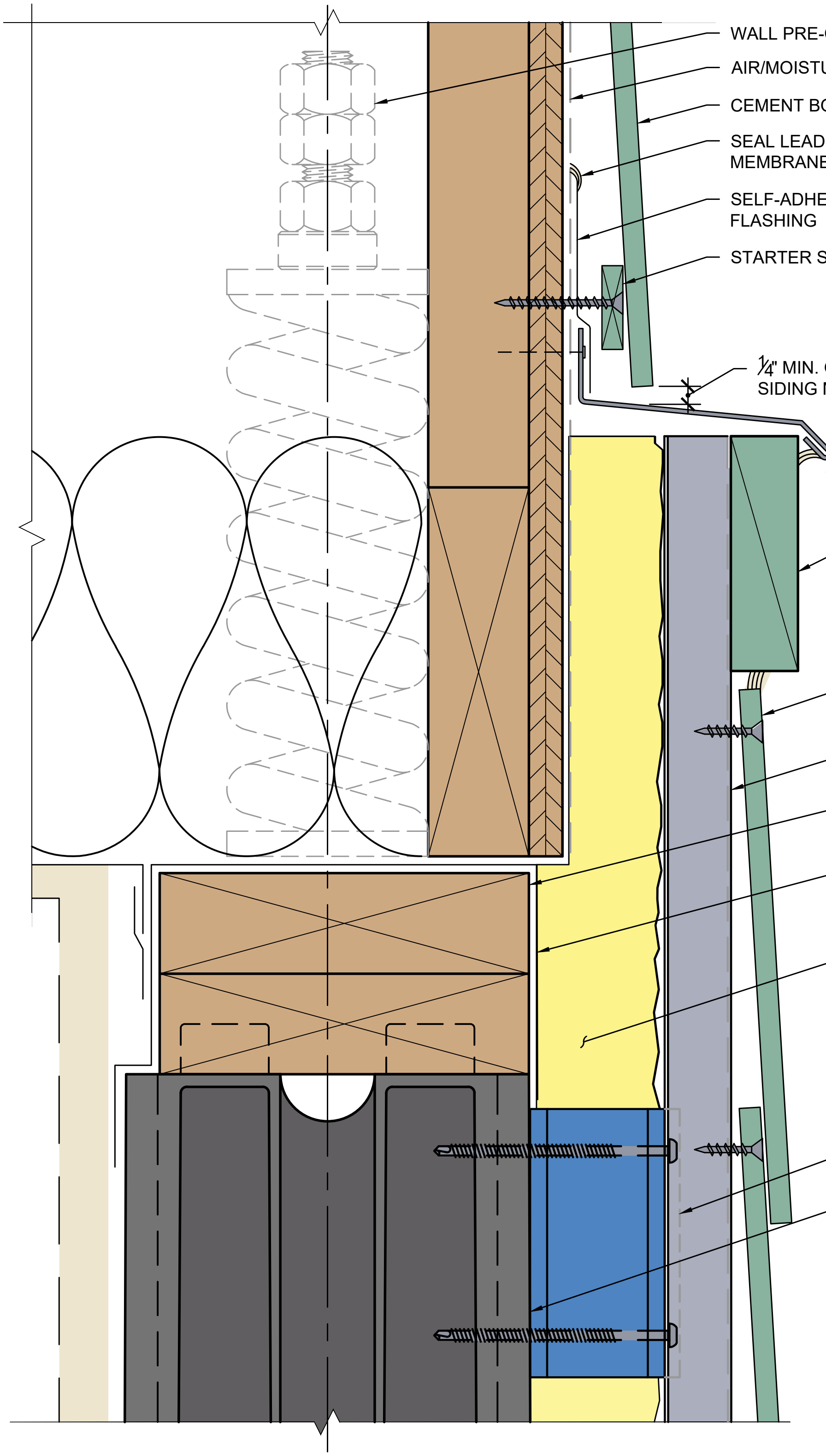
Top of Wall Detail - Exterior Insulation



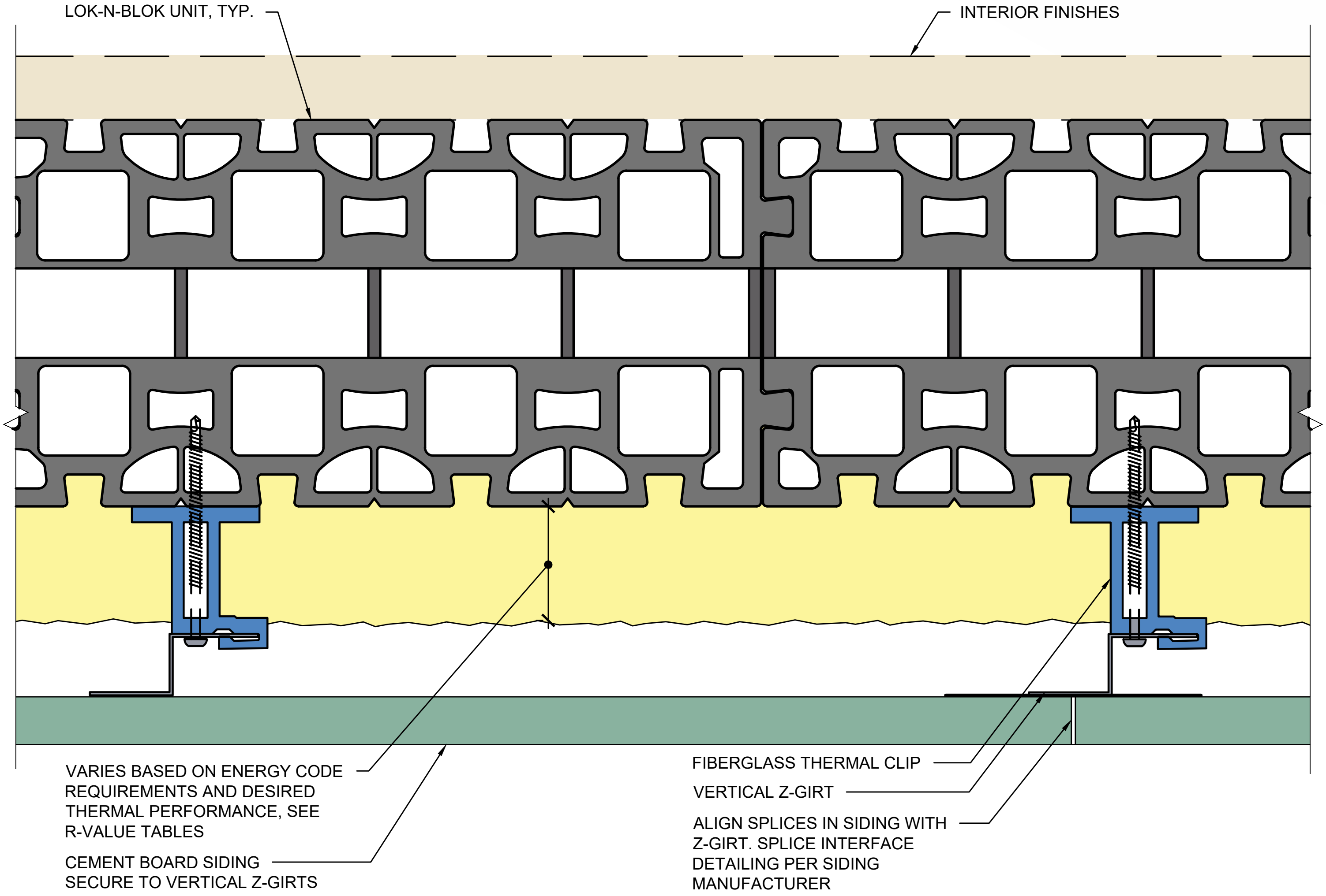
Top of Wall Detail - Exterior Insulation



Gable Endwall Detail - Exterior Insulation



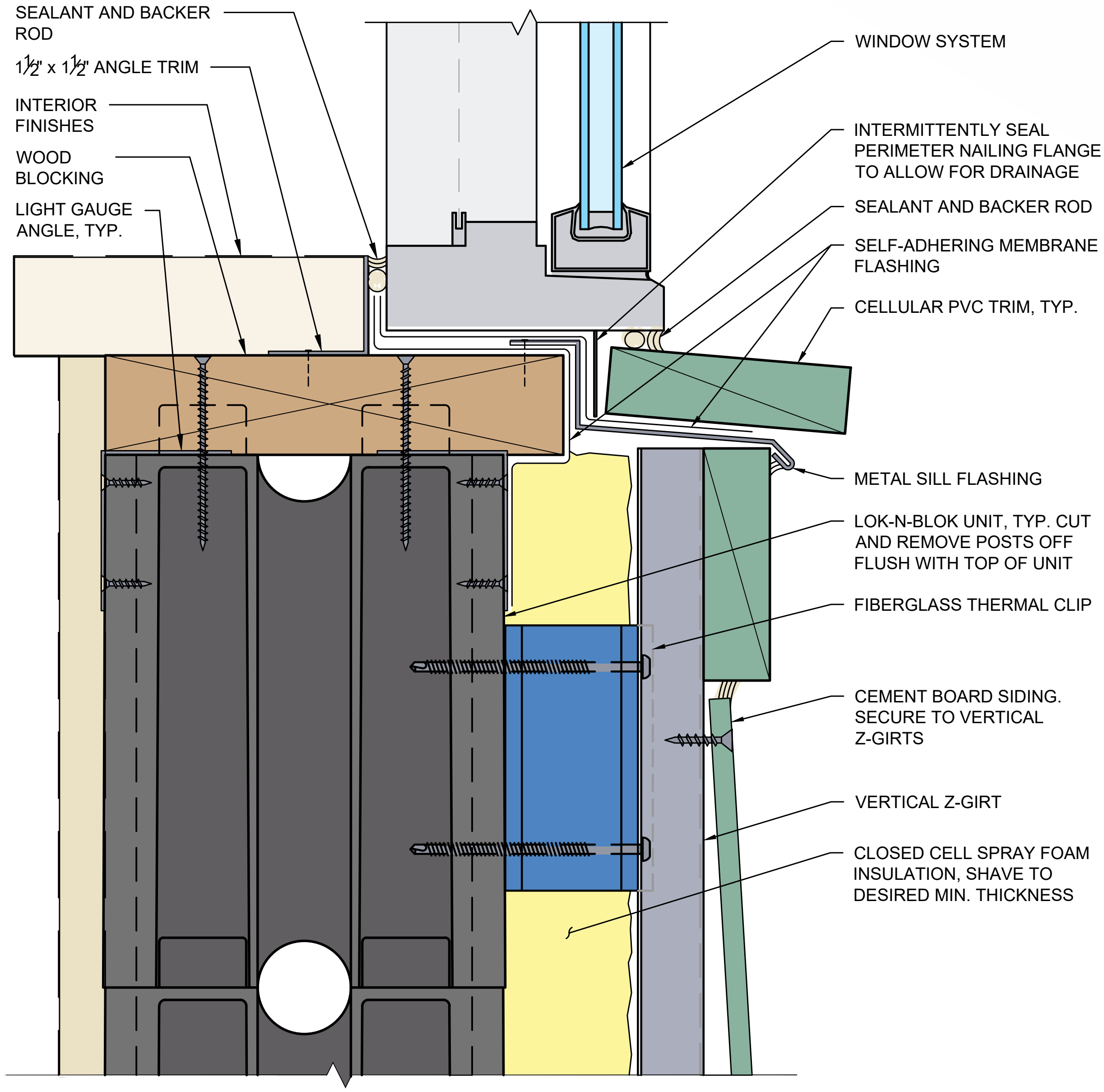
Plan View Wall Section- Exterior Insulation



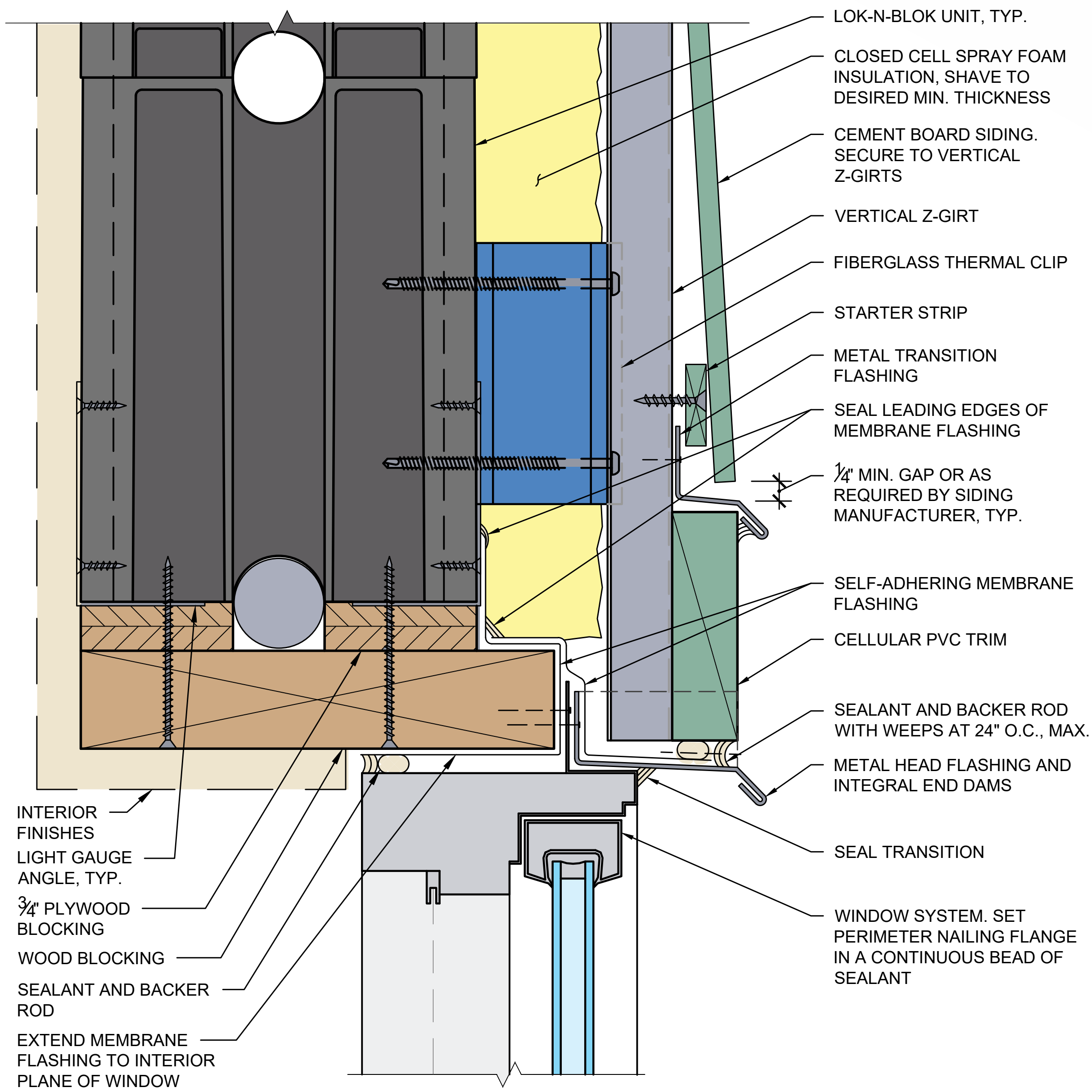
NOTES:

1. THERMAL CLIP SPACING IS DEPENDENT ON DESIGN WIND PRESSURE AND CLADDING DEFLECTION LIMITS.

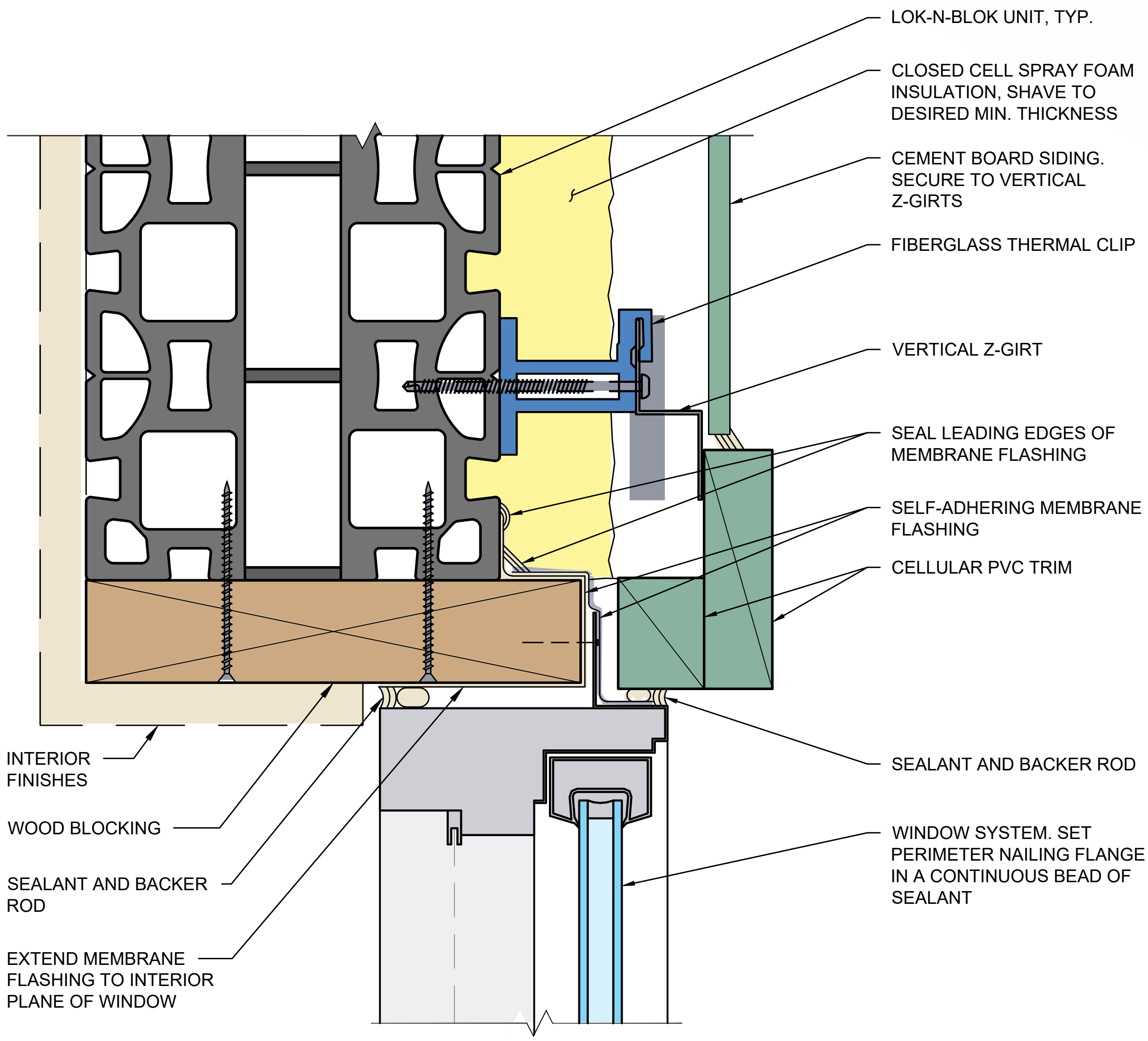
Window Sill Detail - Exterior Insulation



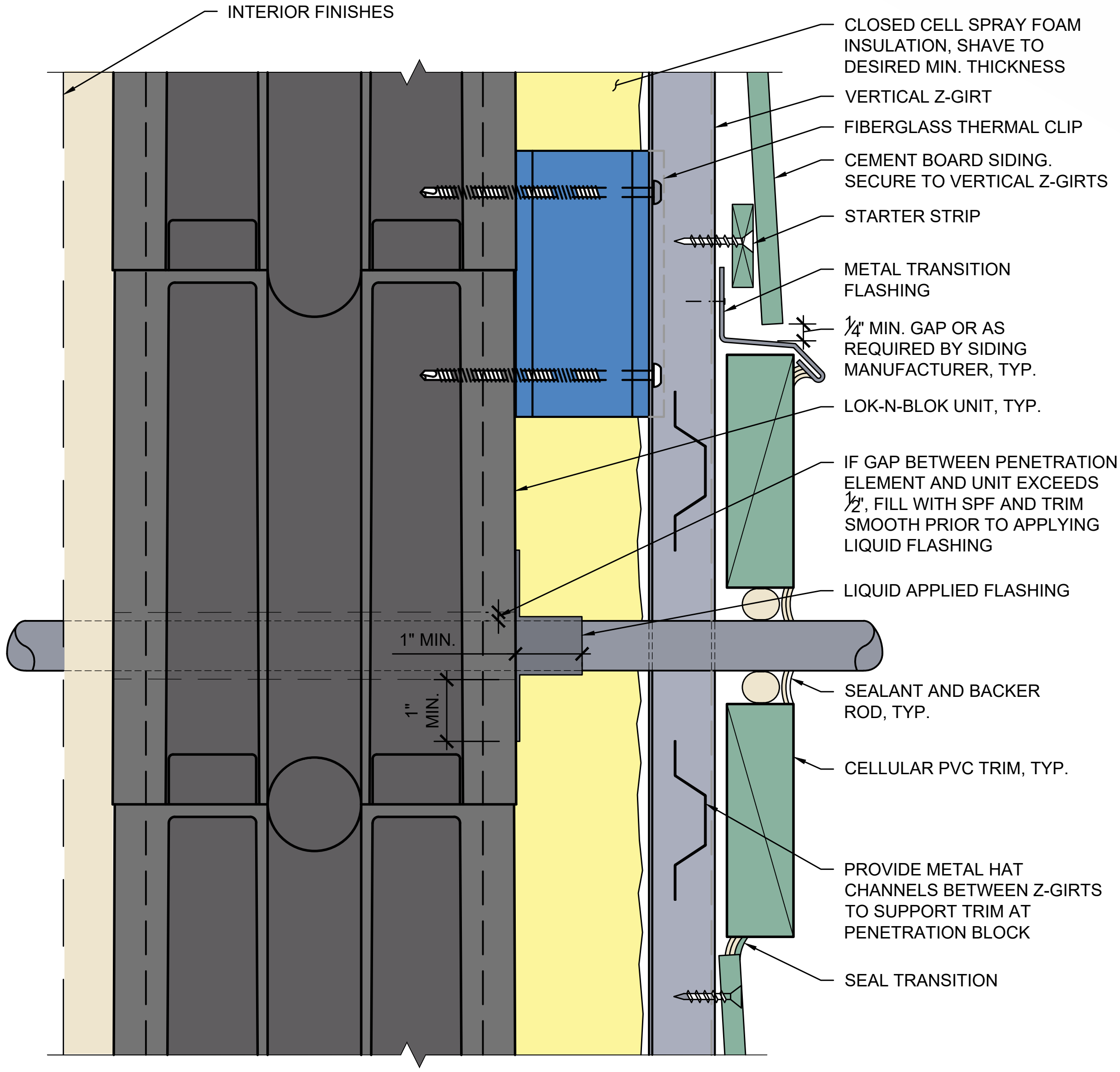
Window Jamb Detail - Exterior Insulation



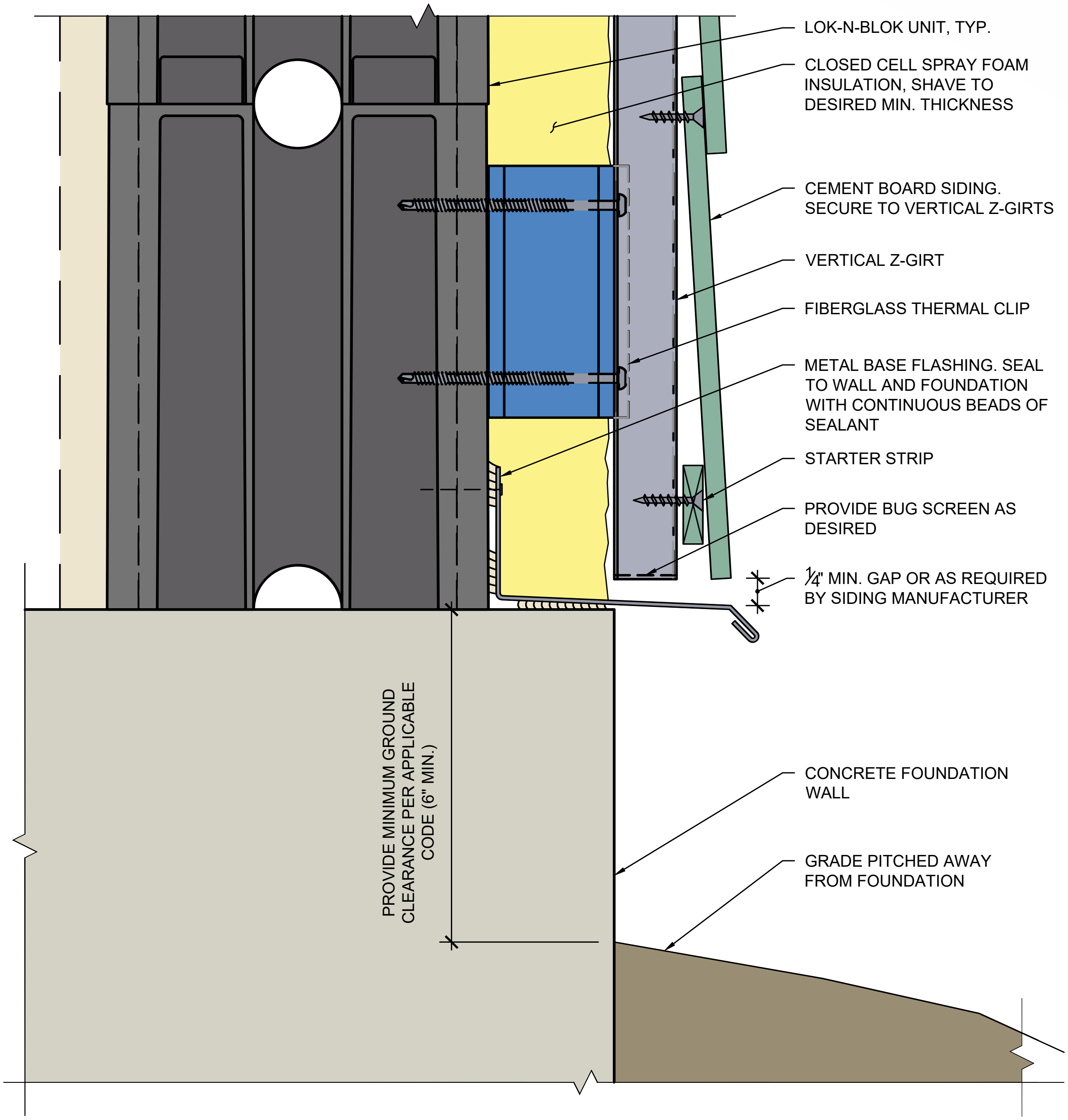
Window Jamb Detail - Exterior Insulation



Wall Penetration Detail - Exterior Insulation



Base of Wall Section - Exterior Insulation



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