INSTALLATION GUIDE

LVL Stud Wall Application

EVOLUTION®

A WORD ABOUT WALL FRAMING

EVOLUTION® LVL wall studs provide a straight, stable, and high-strength alternative to conventional dimensional lumber for residential and light commercial wood-frame construction.

Manufactured from engineered wood veneers under controlled conditions, EVOLUTION® LVL minimizes bowing, twisting, shrinking, and warping commonly associated with traditional lumber. The result is straighter walls, improved finish quality, and consistent framing performance throughout the life of the building.

EVOLUTION® LVL wall studs are suitable for use in both conventional and engineered wood-frame construction where permitted by the applicable building code and project requirements. When used in fire-resistance-rated wall assemblies, they shall be installed as part of an approved assembly in accordance with the applicable listing and building code.

This Installation Guide provides general recommendations for the storage, handling, cutting, drilling, fastening, and installation of EVOLUTION® LVL wall framing products. Always follow the project drawings and applicable building code requirements.

DRILLING AND NOTCHING

1. Free-standing columns shall not be drilled or notched except as required for the installation of approved connectors or hold-down hardware. Any drilling or notching shall be specifically designed by the Engineer of Record.
2. Cutting, drilling, and notching of conventional wall studs used in prescriptive construction shall comply with the applicable provisions of the International Building Code (IBC) or International Residential Code (IRC).
3. The allowable loads published in the EVOLUTION® LVL Wall Stud and Wall Column tables include the effects of standard code-permitted holes and notches. No additional reduction in the tabulated capacities is required for openings that comply with Notes 4 through 6.
4. One hole not exceeding 40% of the member depth is permitted within the upper or lower one-third of the member height, limited to the lesser of 3 ft or h/3 measured from the top/bottom edge, provided the hole is located at least 8'' from either end of the member. Two holes up to 1'' diameter, spaced at least 12'' o.c., are permitted in members having a depth of 5.5'' or greater.
5. One notch not exceeding 25% of the member depth is permitted within the upper or lower one-third of the member height, limited to the lesser of 3 ft or h/3 measured from the top/bottom edge, provided the notch is located at least 8'' from either end of the member. The notch length shall not exceed 3.5''.
6. A hole and a notch shall not occur at the same cross-section. Maintain a minimum clear vertical separation equal to twice the notch length or twice the hole diameter, whichever is greater.
7. Notches are not permitted in wall studs or wall columns installed in the Plank (Flatwise) orientation.
8. Openings exceeding the limitations of Notes 4 through 7 shall be designed using a net-section analysis in accordance with the National Design Specification (NDS) for Wood Construction. Appropriate reductions to the reference design values shall be applied to account for stress concentrations.

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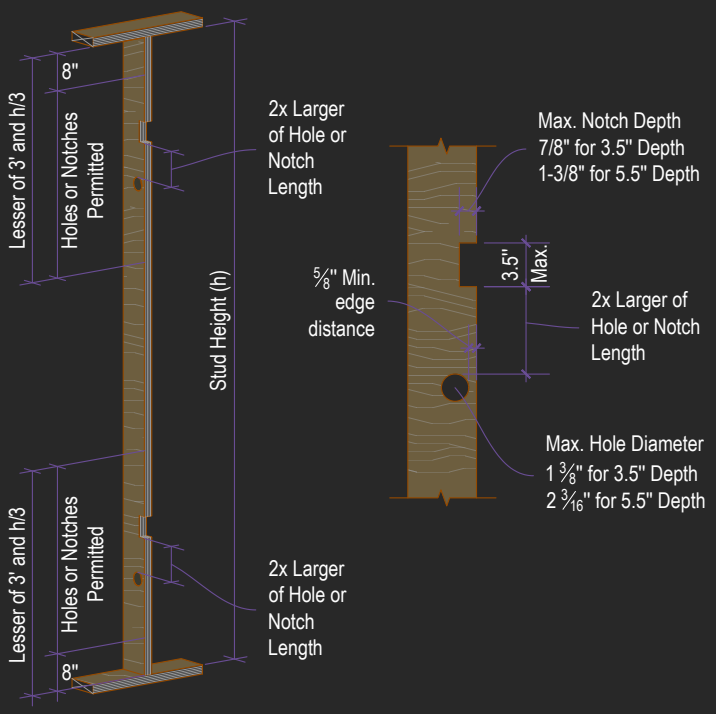


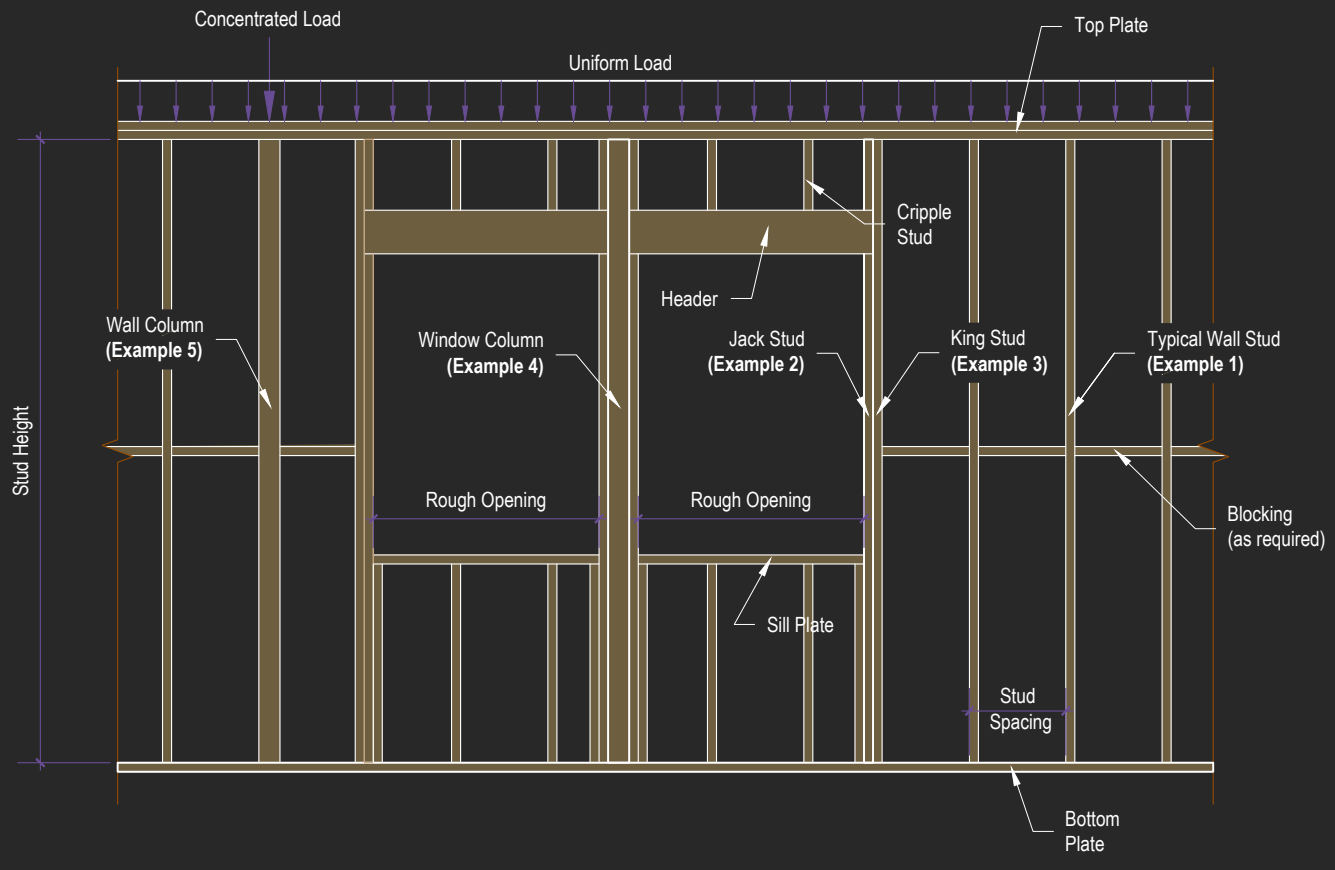
STRENGTH REDUCTION FACTORS FOR NOTCHES AND HOLES

Notches			Holes		
Bending	**Compression**	**Tension**	**Bending**	**Compression**	**Tension**
0.80	0.90	0.60	0.95	0.95	0.95

1. These reduction factors apply only to engineered designs requiring a net-section analysis for holes or notches that exceed the limitations of Notes 4 through 7.
2. Reference design values published for EVOLUTION® LVL shall be multiplied by the applicable strength reduction factors shown above when performing a net-section analysis.

TYPICAL WALL FRAMING & WALL STUD EXAMPLE

TYPICAL WALL FRAMING



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EXAMPLE 1 - WALL STUD

HOW TO SELECT A WALL STUD:

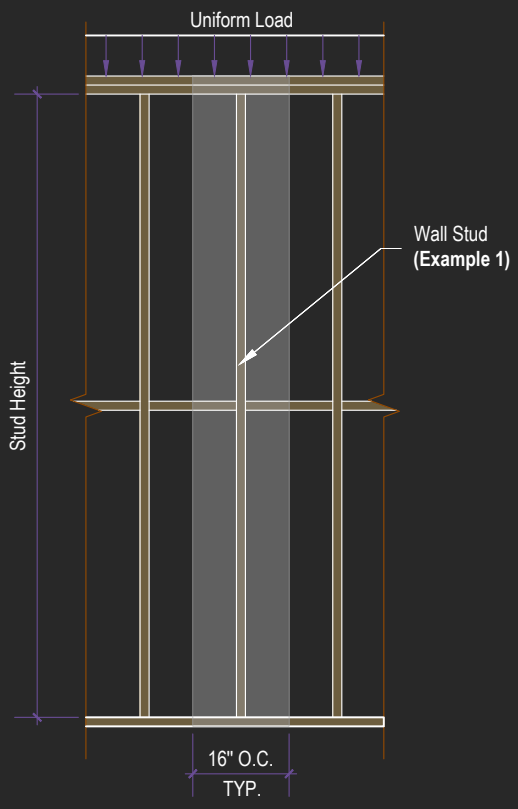
1. Determine the basic design wind speed in accordance with the applicable building code.
2. Determine the exposure category (B, C, or D).
3. Establish clear stud height (including top and bottom bearing conditions).
4. Calculate the total vertical load on each wall stud, including roof, floor(s), wall self-weight, and all applicable dead and live loads.
5. Determine governing deflection criteria based on wall finish and project requirements.
6. Select wall stud from EVOLUTION® LVL Wall Stud Capacity Tables.

DESIGN EXAMPLE:

Select an EVOLUTION® LVL wall stud for the first-story exterior wall of a two-story residential building.

DESIGN PARAMETERS:

Location:	Lexington, South Carolina
Basic Wind Speed:	115 mph (per ASCE 7 Hazard Tool)
Exposure Category:	B
Building Type:	Residential, 2-story, 40'-0" wide, Second floor joists bear at midspan Roof trusses span full width with 2'-0" overhang
Wall Height:	9'-0" (first story)
Stud Spacing:	16" o.c.
Floor Loads:	Live = 40 psf, Dead = 15 psf
Roof Loads:	Roof Live Load = 20 psf (125%), Dead = 17 psf
Second-Story Wall:	150 plf (self-weight)



SOLUTION:

1. Select a wall stud for a 9'-0" first-story exterior wall. Wall supports second floor and roof of a 40'-0" wide home. Second floor joists bear at midspan; roof trusses have a 2'-0" overhang.
2. Calculations: Roof load: (20 + 17) × (40/2 + 2) = 814 plf
   Floor load: (40 + 15) × (20/2) = 550 plf
   Wall weight: 150 plf
   Total Vertical Load: 814 + 550 + 150 = 1514 plf
3. Wall Finish: Windows and Doors (non-stucco) Deflection limit: L/175
4. Table Lookup: → Wall Stud Capacity table, 115 mph, Exposure B. → At 9'-0" height, 16" o.c. → Select grade / size with capacity ≥ 1514 plf and deflection ≥ L/175.

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JACK STUD & KING STUD EXAMPLES

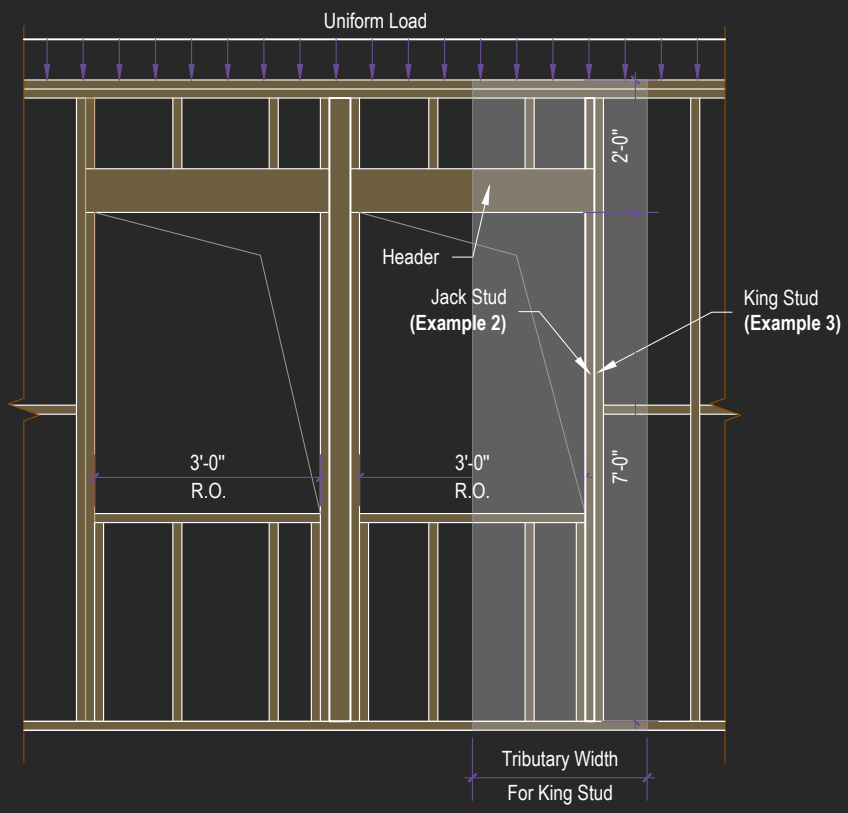
EXAMPLE 2 - JACK STUD

HOW TO SELECT A JACK STUD:

Jack studs support the vertical reaction from the header. Lateral loads shall be resisted by the adjacent king stud.

1. Determine the jack stud height — from underside of header to sill plate.
2. Determine the tributary width assigned to each jack stud.
3. Calculate the vertical reaction at the jack stud from header loads.
4. Verify capacity using the EVOLUTION® LVL Wall Stud Capacity Table.

Use the 12" o.c. row. At 12" spacing, the tabulated capacity in plf equals the allowable load per stud in pounds. Deflection does not control jack stud design.



EXAMPLE:

Select a jack stud for a 3'-0" (36") rough opening in a first-story exterior wall. EVOLUTION®

LVL header at 7'-0" above floor. Header design loads from Example 1:

roof = 814 plf, floor = 550 plf, wall = 150 plf. Add 2'-0" wall self-weight above header:

2' x 15 psf = 30 plf. Total = 1544 plf

SOLUTION:

1. Jack stud height: round header elevation up to next standard table height. Use 8'-0".
2. Tributary width: header extends 1.5" beyond opening each side. Tributary Width = 36" / 2 + 1.5" = 19.5"
3. Reaction at jack stud: P = 1544 plf x (19.5" / 12) = 2509 lb
4. From the Wall Stud Allowable Capacity Table (115 mph, Exposure B)→ 8'-0" height, 12" o.c. → select a section with allowable axial capacity ≥ 2509 lb.

Note: Verify the allowable bearing capacity of the header support. In this example, a (2) SPF 2×8 header bearing on a single jack stud does not provide adequate bearing capacity. Using an allowable compression perpendicular-to-grain stress of 425 psi for SPF lumber, the calculated bearing capacity is 1912 lb per jack stud (425 psi x 1.5 in. x 3.0 in.), which is less than the required 2509 lb reaction. Provide double jack studs at each end of the header.

JACK STUD & KING STUD EXAMPLES

EXAMPLE 3 - KING STUD

HOW TO SELECT A KING STUD:

King studs are designed as exterior wall columns. Continuous lateral support is assumed on both faces, provided by structural sheathing on the exterior and gypsum wallboard on the interior.

1. Determine the king stud height (full wall height).
2. Determine the tributary width for wind load.
3. Calculate the total vertical load on the king stud.
4. Determine the required deflection limit based on the exterior finish.
5. Select a member from the EVOLUTION® LVL Exterior Wall Column Capacity Table.

EXAMPLE:

Use the same 3'-0" rough opening shown in Example 2. Wall height = 9'-0", stud spacing = 16 in. o.c., stucco exterior finish. Design loads from Example 1: roof = 814 plf, floor = 550 plf, wall = 150 plf. Total = 1514 plf

SOLUTION:

1. King stud height = 9'-0" (full wall height).
2. Tributary width = 19.5" (jack stud tributary width) + 8" (half stud spacing) + 1.5" (stud thickness) = 29". Use the next larger tabulated tributary width: 36".
3. Vertical load = 1514 plf × (16" / 2) ÷ 12 = 1009 lb.
4. Required deflection limit = L/360.
5. Using the EVOLUTION® LVL Exterior Wall Column Capacity Table (115 mph, Exposure B)→ 9'-0" height, 36" tributary width→ 1009 lb vertical load, L/360 deflection limit→ select appropriate member

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LVL Stud Wall Application

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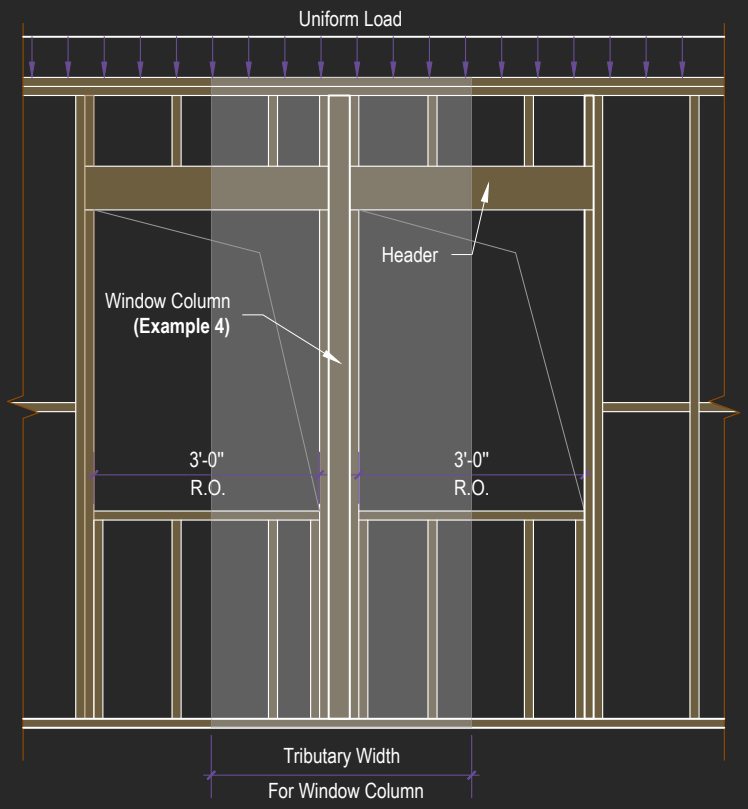
WINDOW COLUMN EXAMPLE

EXAMPLE 4 - WINDOW COLUMN

HOW TO SELECT A WINDOW COLUMN:

Window columns are designed as exterior wall columns. Continuous lateral support is assumed on both faces, provided by structural sheathing on the exterior and gypsum wallboard on the interior.

1. Determine the clear column height.
2. Determine the tributary width for wind load.
3. Calculate the total vertical load on the column.
4. Determine the required deflection limit based on the exterior finish.
5. Select a member from the EVOLUTION® LVL Exterior Wall Column Capacity Table.



EXAMPLE:

Use the same building and loading conditions as the previous examples. The window column is located between two 3'-0" rough openings. No additional concentrated load is applied to the column; only the uniform roof, floor, and wall loads are considered.

SOLUTION:

1. Column height = 9'-0".
2. Tributary width = 42.5". Use the next larger tabulated tributary width: 48".
3. Vertical load = 1514 plf × 16" ÷ 12 = 2018 lb.
4. Required deflection limit = L/360.
5. Using the EVOLUTION® LVL Exterior Wall Column Capacity Table (115 mph, Exposure B)→ 9'-0" column, 48" tributary width→ 2018 lb vertical load, L/360 deflection limit→ select appropriate member

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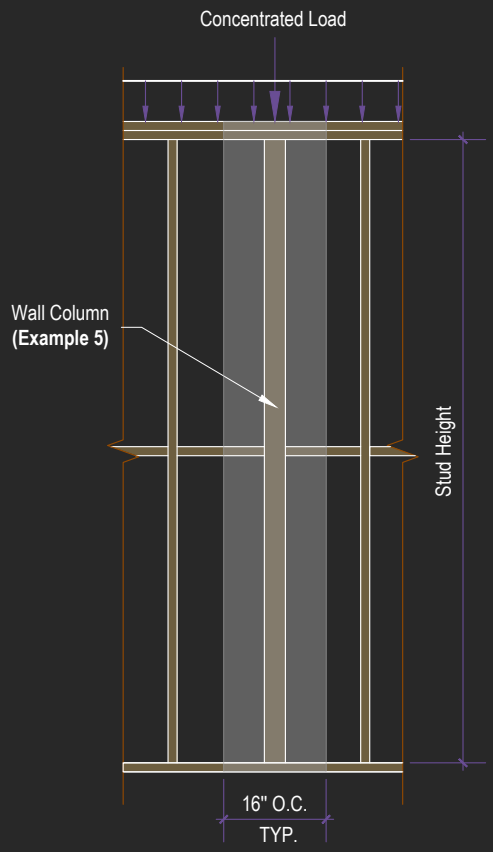
WALL COLUMN EXAMPLE

EXAMPLE 5 - WALL COLUMN



HOW TO SELECT A WALL COLUMN:

Wall columns support concentrated vertical loads transferred through the structure above — such as girder trusses, beams, or posts — in addition to distributed wall loads. Size as an exterior wall column braced on both faces.

1. Determine the clear height of the column.
2. Determine the tributary width for lateral wind pressure.
3. Calculate the total vertical load (lb) applied to the column.
4. Determine the allowable deflection ratio based on exterior finish.
5. Select the required grade and size from the EVOLUTION® LVL Exterior Wall Column Capacity Table.

EXAMPLE:

Select a wall column in the same first-story exterior wall to support a girder truss reaction of 3600 lb. Design must include the weight of the second-story wall and the load from the second floor.

SOLUTION:

1. Column height: same as typical wall stud — 9'-0".
2. Tributary width for wind pressure: same as typical wall stud —16".
3. Total vertical load on the column — girder truss load transferred through the second-story wall column plus tributary area of the second-story wall:
   Roof (girder reaction): 3600 lb
   Wall (second story): 150 plf x 16" / 12 = 200 lb
   Floor: 550 plf x 16" / 12 = 733 lb
   Total Vertical Load = 3600 + 200 + 733 = 4533 lb
4. Allowable deflection ratio: L/360 for stucco (same as typical wall stud).
5. From the Exterior Wall Column Table (115 mph, Exposure B)→ 9'-0" height, 16" TW, 4533 lb axial, L/360→ select appropriate member

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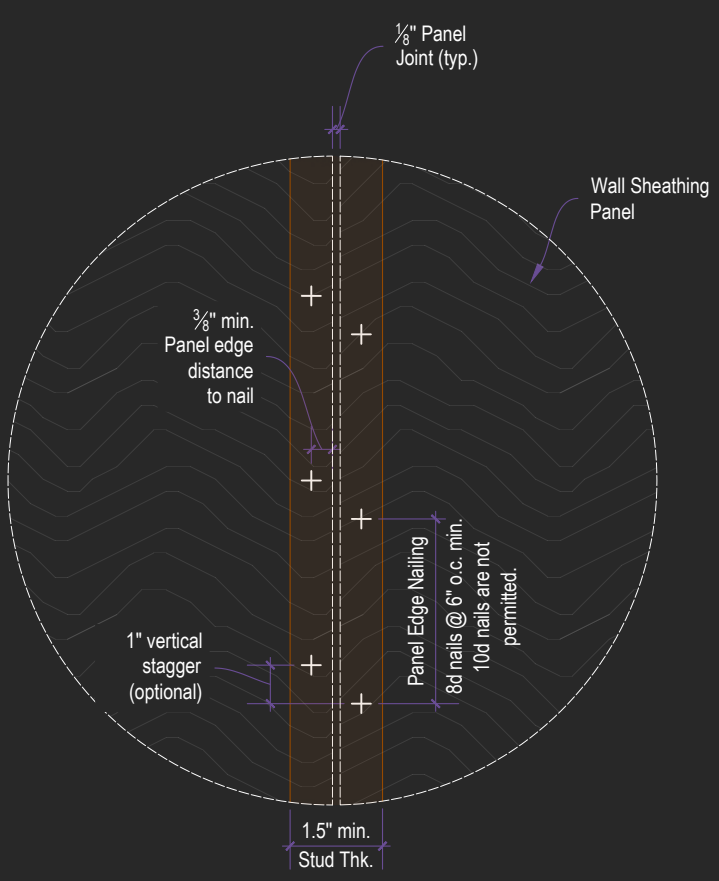
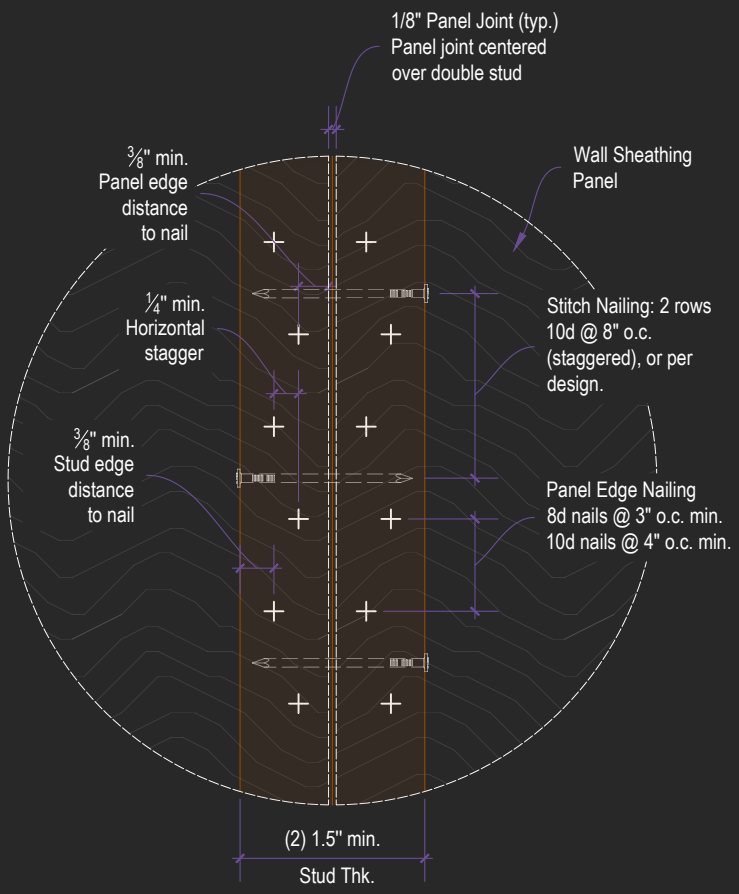
NAILING AND CONNECTION DETAILS

WALL SHEATHING PANEL EDGE NAILING



1 SINGLE STUD AT ADJOINING PANELS



2 DOUBLE STUD AT ADJOINING PANELS

NOTES:

1. The minimum thickness of a single EVOLUTION® LVL wall stud shall be 1.5''.
2. A double stud shall be provided at adjoining panel edges when:
   a. 8d common nails are spaced closer than 6'' o.c.
   b. 10d common nails are used.
3. Panel-edge nails at double studs shall be installed a minimum of ½'' from both the panel edge and the edge of the stud. Alternate nails shall be staggered horizontally by at least ¼''.
4. For double studs, the minimum panel-edge nail spacing into each stud shall be:
   a. 3'' o.c. for 8d common nails.
   b. 4'' o.c. for 10d common nails.
5. Nails larger than 10d common nails shall not be used for wall sheathing attachment.
6. For prescriptive wall framing, double studs shall be stitch-nailed together with two staggered rows of 10d common nails at 8'' o.c. in each row, unless otherwise engineered. For engineered wall systems, stitch nailing shall be designed to transfer the required lateral shear.

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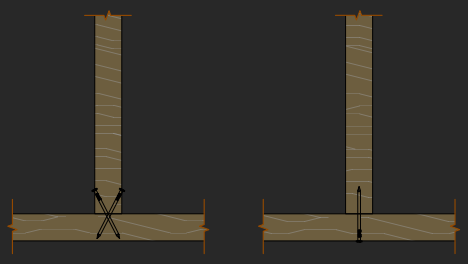
TYPICAL CONNECTIONS

NAILED PLATE CONNECTIONS

NAILED PLATE CONNECTIONS - LATERAL CAPACITY				
Nail Type	Length	Diameter	Toe-Nail (lbs)	End-Nail (lbs)
8d box	2-1/2"	0.113"	105	65
8d common	2-1/2"	0.131"	141	76
10d box	3"	0.128"	134	95
10d common	3"	0.148"	170	120
16d sinker	3-1/4"	0.148"	170	120
16d box	3-1/2"	0.135"	150	106
16d common	3-1/2"	0.162"	205	144



Toe-Nail End-Nail

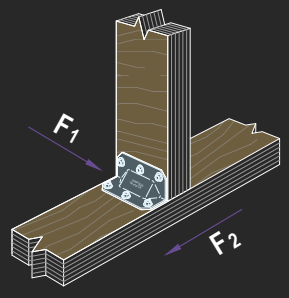
NOTES:

1. Tabulated lateral capacities are based on a load duration factor of C_d = 1.60 for wind loading.
2. Tabulated lateral capacities are calculated using an equivalent specific gravity of SG = 0.55 for both the main member and side member. When connecting to wood members with a lower specific gravity, apply the appropriate reduction factor in accordance with the applicable connection design provisions.
3. Tabulated lateral capacities for toe-nailed connections include the toe-nail adjustment factor, C_{tn} = 0.83.
4. Tabulated lateral capacities for end-nailed connections include the end-grain adjustment factor, C_{eg} = 0.67.

TYPICAL FRAMING ANCHORS

Simpson Strong-Tie

Anchor Type	Fasteners	Capacity (lbs)	
		F_1	F_2
A21	(4) 0.148" x 1 ½"	150	330*
A23	(8) 0.148" x 1 ½"	535	680*
A34	(8) 0.131" x 1 ½"	545	430
A35	(12) 0.131" x 1 ½"	650	670
GA1	(4) # 9 x 1 ½" SD	375	435
GA2	(6) # 9 x 1 ½" SD	695	820



Framing Anchors

NOTES:

1. Refer to the manufacturer's current catalogs for complete product information.
2. Capacities are based on both connected members having a specific gravity of SG = 0.50 or greater.
3. Tabulated capacities include the load duration factor for wind loading, C_d = 1.60.
4. * Connectors are required on both sides to achieve F_2 loads in both directions.

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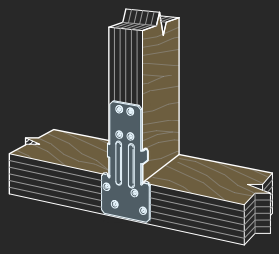
TYPICAL CONNECTIONS

TYPICAL STUD / PLATE TIES

Simpson Strong-Tie

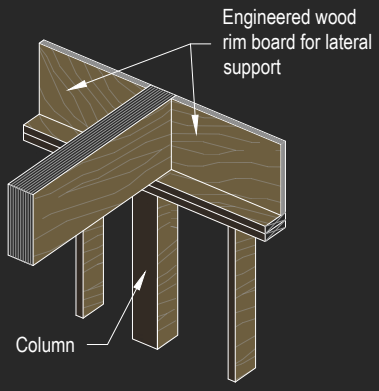
Model No.	Fasteners	Uplift (lbs)
RSP4	(8) 0.131" x 1 ½"	245
SSP	(5) 0.148" x 1 ½"	395
DSP	(10) 0.148" x 1 ½"	620
TSP	(9) 0.148" x 1 ½"	520
SP1	(10) 0.148" x 3"	555
SP2	(12) 0.148" x 3"	1010

NOTE: Refer to the manufacturer's current catalogs for complete product information.

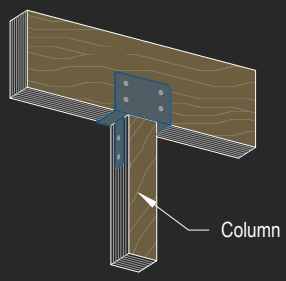


Stud / Plate Ties

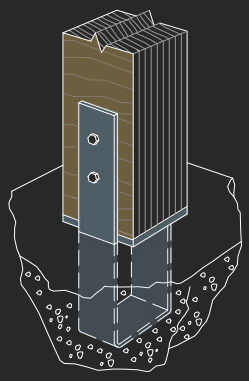
TYPICAL CONNECTIONS



Beam on Column



Beam on Column Cap



Column Base

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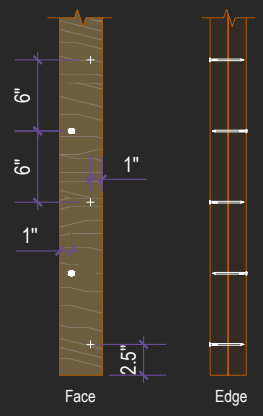
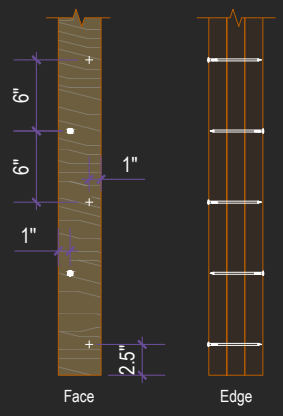
CONNECTION OF BUILT-UP COLUMNS

Built-up columns shall be designed in accordance with the NDS. The following nailing patterns are recommended for assembly of built-up LVL columns.



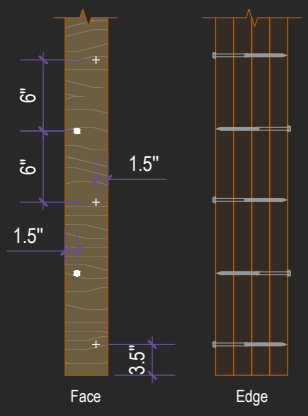
1 2-PLYS 1.5"x3.5" STUDS

With one row of 10d box nails (0.128" × 3") spaced at 6" o.c., drive alternating nails from opposite faces and offset them horizontally.



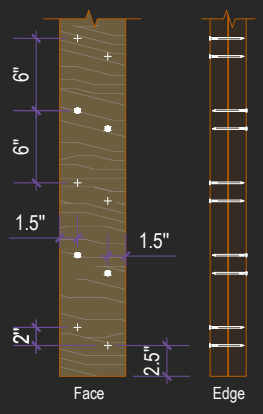
2 3-PLYS 1.5"x3.5" STUDS

With one row of 30d box nails (0.148" × 4.5") spaced at 6" o.c., drive alternating nails from opposite faces and offset them horizontally.



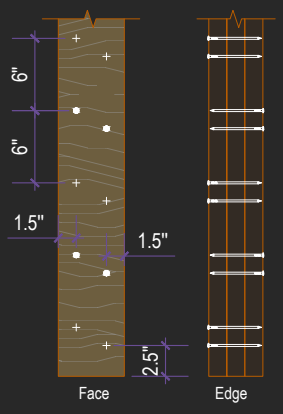
3 4-PLYS 1.5"x3.5" STUDS

With one row of 1/4" SDS × 6" screws spaced at 6" o.c., drive alternating nails from opposite faces and offset them horizontally.



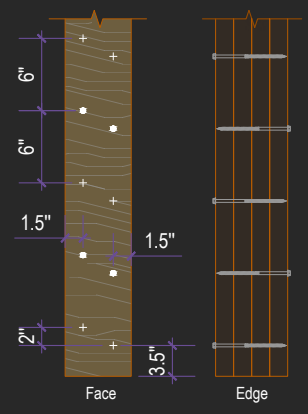
4 2-PLYS 1.5"x5.5" STUDS

With two rows of 10d box nails (0.128" × 3") spaced at 6" o.c., drive alternating nails from opposite faces. Stagger rows.



5 3-PLYS 1.5"x5.5" STUDS

With two rows of 30d box nails (0.148" × 4.5") spaced at 6" o.c., drive alternating nails from opposite faces. Stagger rows.



6 4-PLYS 1.5"x5.5" STUDS

With two rows of 1/4" SDS × 6" screws spaced at 6" o.c., drive alternating nails from opposite faces. Stagger rows.

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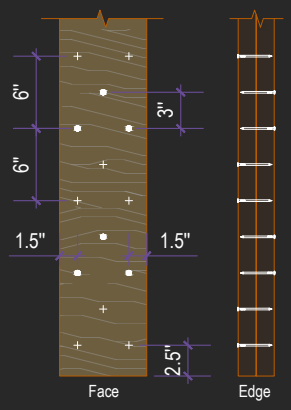

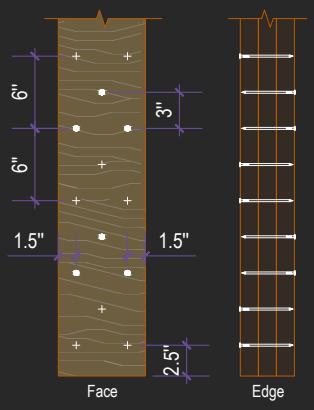

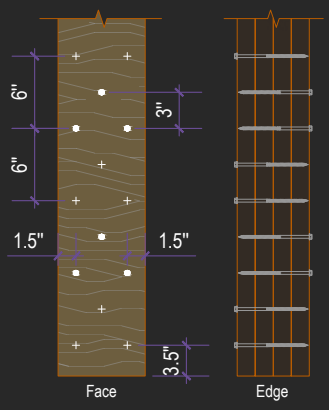

7 2-PLYS 1.5"x7.25" / 9.25" STUDS

With three rows of 10d box nails (0.128" × 3") spaced at 6" o.c., drive alternating nails from opposite faces. Stagger rows.

8 3-PLYS 1.5"x7.25" / 9.25" STUDS

With three rows of 30d box nails (0.148" × 4.5") spaced at 6" o.c., drive alternating nails from opposite faces. Stagger rows.

9 4-PLYS 1.5"x7.25" / 9.25" STUDS

With three rows of 1/4" SDS × 6" screws spaced at 6" o.c., drive alternating nails from opposite faces. Stagger rows.

NOTES:

1. Built-up LVL columns shall be designed per NDS Chapter 15. Except as specified herein, fastener spacing, row spacing,edge distance, and end distance shall comply with the NDS.
2. For NAILS only: diameter shall not exceed 0.148" (12d common) or 0.135" (16d box). Larger nails within this limit may be used.
3. 1/4" SDS structural screws (0.25" dia): limit spacing to 6" o.c. maximum for composite action (NDS 15.3.4).
4. Fasteners shall be driven alternating from opposite faces throughout the full length to ensure composite action.

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EVOLUTION®

STORAGE, HANDLING AND INSTALLATION

WARNING: IMPROPER STORAGE, HANDLING OR INSTALLATION MAY RESULT IN POOR IN-SERVICE PERFORMANCE AND UNSAFE CONSTRUCTION FOR EVOLUTION ® LVL.

1. STORAGE REQUIREMENTS

1.1 STORE EVOLUTION ® LVL FLAT AND FULLY COVERED AGAINST RAIN AND HARSH WEATHER.

1.2 STACK SUPPORT STICKERS VERTICALLY ALIGNED, MAX 8'-0'' ON-CENTER SPACING.

1.3 MAXIMUM STACKING HEIGHT FOR BUNDLED LVL: 10′-0″.

1.4 PLACE BOTTOM STICKERS ON SOLID, LEVEL DRY GROUND TO RAISE LUMBER OFF FLOOR, REDUCE GROUND MOISTURE UPTAKE AND ALLOW AIR CIRCULATION.

1.5 ALL FORKLIFT DAMAGE MUST BE REPORTED BEFORE INCOMING MATERIAL ACCEPTANCE.

2. ON-SITE HANDLING & INSTALLATION

2.1 EVOLUTION® LVL IS DESIGNED FOR DRY ENCLOSED INDOOR USE ONLY; SHIELD FROM WEATHER BEFORE AND AFTER INSTALLATION ON SITE.

2.2 ONLY LENGTH TRIMMING IS ALLOWED; FIELD DRILLING, NOTCHING OR RANDOM CUTTING IS FORBIDDEN. HEEL CUTS REQUIRE PRIOR APPROVAL FROM LOCAL EVOLUTION REPRESENTATIVE.

2.3 BASE ALL STACKS ON FIRM, LEVEL AND DRY SUBSTRATE.

2.4 DISCARD ALL VISIBLY DAMAGED LVL FROM INSTALLATION.

CAUTION: BUNDLE PLASTIC WRAP IS SLIPPERY WHEN WET.