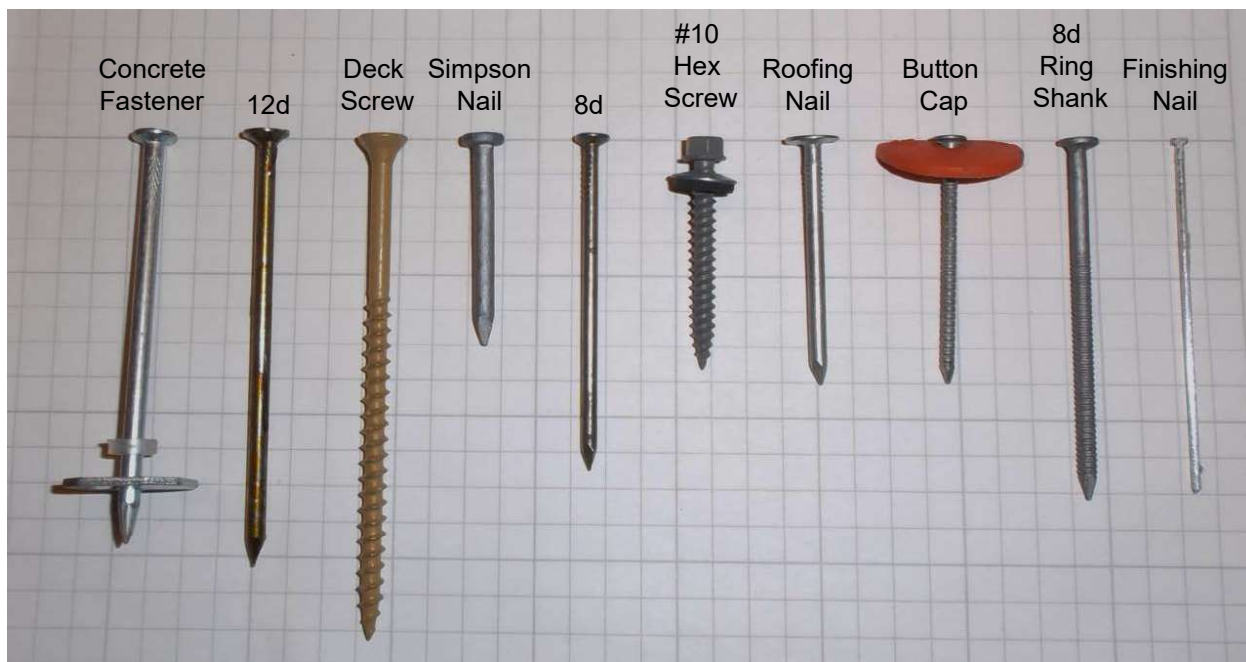


NAILING PATTERNS



Type of Fastener	Usage	Nailing Pattern
Concrete Fastener	attach framing to slab	6 inches from the stud on each end of the wall Within 4 feet of an anchor bolts Bay adjacent to a door opening
12d	temporary wall bracing	2 nails top & bottom
	joining walls together	2 nails every 18 to 24 inches; nail from both sides
	cap plate	2 nails over every stud for 2x4 walls / 3 nails over every stud for 2x6 walls / 5 at intersections
	deadwood	3 nails minimum, every 8 to 12 inches
	headers/porch beams	2-3-2 pattern, columns 12 to 18 inches apart
	trusses	2 nails each side of truss into cap plate (both ends)
	subfascia	2 nails per truss tail
Deck Screw	porch beams	4 screws to connect beam at corners / 4 screws to connect beam to framing
	brick ledger board	2 screws every 24 inches into truss
	cleats for cabinets	1 screw per stud
	countertop supports	3 screws per block
Simpson Nail	hurricane ties	Fill all holes; nails should be flush against the plate
	joist hangers	Fill all holes; nails should be flush against the plate
	hurricane straps	Fill all holes; nails should be flush against the plate
	HUGS installation	Used in combination with hex screws
8d	wall sheathing	Every 6 inches on edges / 12 inches in field
	roof decking	Every 6 inches on edges / 6 inches in field
	brick ties	One in top hole into stud
#10 Hex Screw	HUGS Installation	Used in combination with Simpson nails
Roofing Nail	Dow Blue Board	Every 24 inches horizontally and vertically into a stud
	drip edge	1 nail every 16 to 18 inches
	starter/shingles	4 per shingle
	cap shingles	2 per cap shingle
Button Cap	Poly barrier	Every 16 inches
	felt paper	Every 24 inches horizontally into trusses / 6 inches vertically
8d Ring Shank	soffit*	3-2-3 nails per truss tail/ladder panel rung
	siding	$\frac{3}{8}$ -inch down from top edge / every 16 inches horizontally into a stud
Finishing Nail*	exterior trim	1 to 2 nails every 18 to 24 inches
	interior trim	1 to 2 nails every 18 to 24 inches

* Typically fascia, soffit, and trim are installed using nail guns

** Cabinet installation uses various specialty screws, see Chapter 13

LUMBER

Type of Lumber	Sizes	Use
Solid (non-finger jointed)*	2x4	top plate cap plate headers deadwood temporary bracing permanent bracing kitchen blocking bathroom blocking HVAC closet truss support ladder panels nailers subfascia
	2x6	top plate cap plate headers
	2x12	porch beams garage door header
Finger-Jointed*	2x4	studs
	2x6	studs
Green Board (pressure treated)*	2x4	bottom plate supports for HVAC lower ledger board
	2x6	brick ledger board
	4 feet x 8 feet	decking for HVAC closet
	4x4	porch posts
Composite Post	4x4	porch posts
Sheathing [Oriented Strand Board (OSB) or engineered-material]	4 feet x 8 feet	HVAC closet
		wall and gable sheathing
		decking
		filler for headers
SmartPanel	1x4	exterior window and corner trim
	1x6	fascia and porch trim
	1x10	porch trim
	1x12	porch trim
	7¾ x 16 feet	siding
	4 feet x 8 feet	porch ceiling

*The dimension used for lumber is the finished/planed size not the actual size. For example, a 2x4 is not actually 2 inches by 4 inches. When the board is first rough sawn from the log, it is a true 2x4, but the drying process and planing of the board reduce it to the finished size of 1½ inches by 3½ inches.

Cap Plate

Measuring/Cutting

- Measure cap plates using top plates and mark measurements (in inches) on bottom plates.
- Use clear, dimensional 2x4s or 2x6s only; do not use finger jointed lumber or green board.
- At butt joints, where two walls meet end to end, the overlap is at least 4-foot either side of the joint.
- Cap plate should be cut slightly short, $\frac{1}{8}$ -inch or so to allow for "play" when installing the cap plate.
- Where walls intersect, the cap plate should completely overlap that joint to tie the two walls together (think "brick pattern").

Cap plate should not be installed until all walls have been strung and aligned.

Nailing

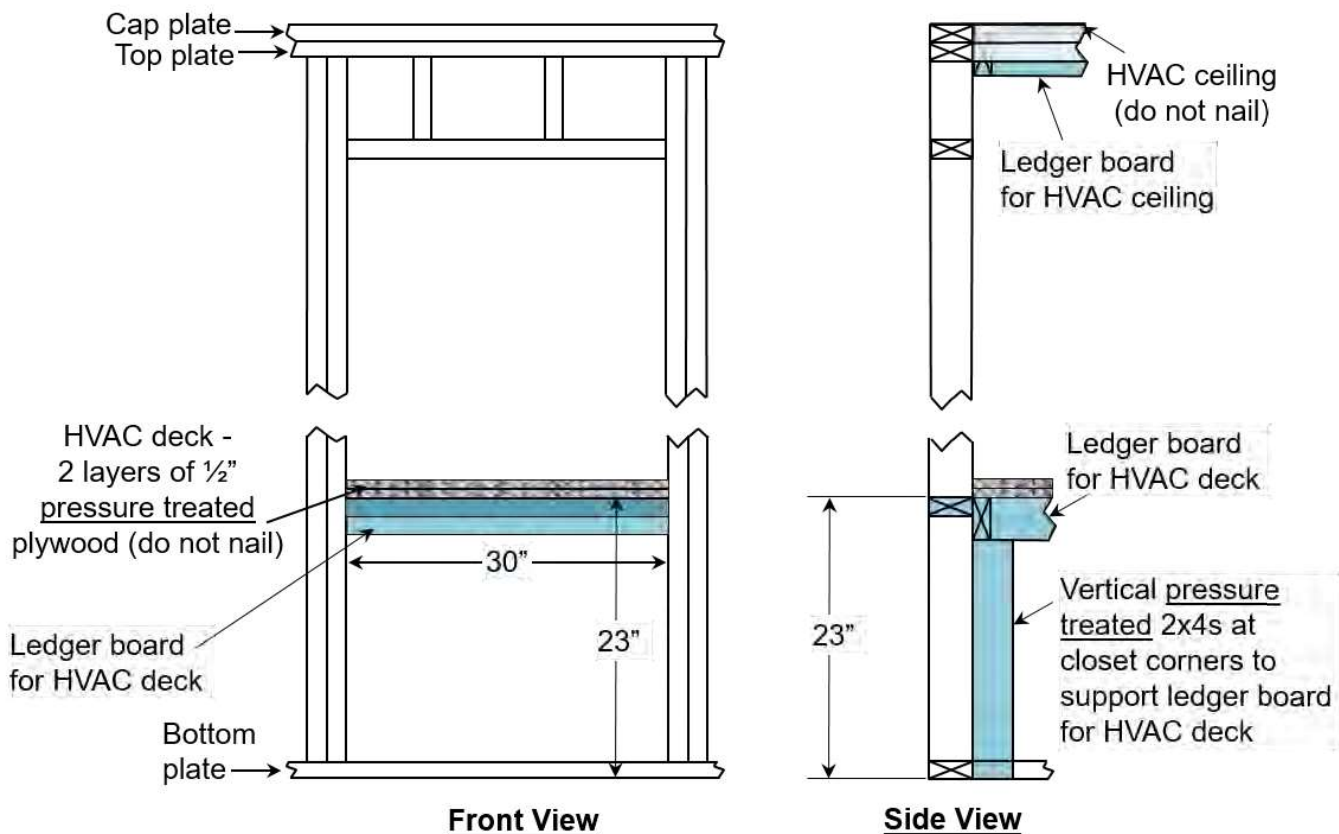
- Cap plate is nailed flush with the top plate.
- Use two 12d nails driven directly over each stud (three 12d nails on 2x6 plumbing walls). At intersecting walls, use five nails to tie-in the two intersecting wall sections.
- Begin nailing at one end of the cap plate, nailing in the same direction to help keep the cap plate flush with the top plate.



HVAC Closet

FRAMING

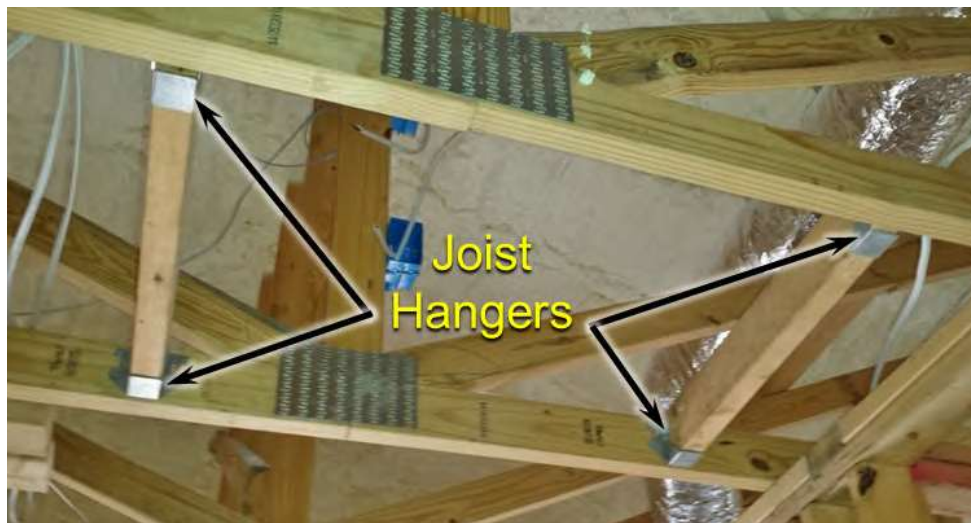
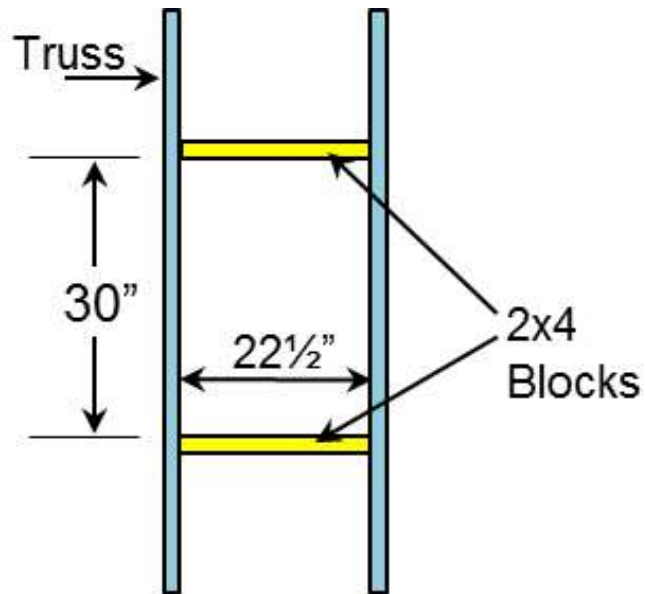
- Mark the stud locations on the slab to help provide a guide for nailing.
- The entire inside of the HVAC closet is sheathed, including the ceiling.
 - The sheathing should not sit on slab. Place scraps of sheathing on the slab and rest wall panels on the shims.
 - Using 8d nails, nail every 6 inches on the edges, every 12 inches in the field into the studs.
- Using pressure treated 2x4, cut six supports at 19½ inches. Install the supports in the corners and sides using 12d nails; nailing into studs
- Use 2x4 non-finger jointed lumber for ledger boards. Using 12d nails, install the ledger boards at the front and back first, then the sides; nail into studs.
- Cut two pieces of ½-inch pressure treated plywood to fit on top of the frame; do not nail in place.
- For the ceiling, install two 2x4 ledger boards perpendicular to the trusses. The top of the boards should align with the top of the sheathing. Cut one piece of sheathing to fit on top of the frame. Do not nail the ceiling in place.



Attic Access

- There are normally two attic accesses, one in the garage and one in the house. Consult with the Construction Supervisor or House Leader to confirm proper locations.
- The opening should be 30 inches by 22½ inches (measured from inside to inside).
- Make sure the opening is positioned so there is 3-foot of vertical clearance into the attic and there are no obstructions above it (e.g., ductwork, bracing, wires).
- Using solid, non-finger jointed 2x4 lumber with 12d nails.
- Install joist hangers (using Simpson nails in all holes) to reinforce the blocking attached to the trusses. Simpson nails should be flush against the plate.

Top
View



Deadwood

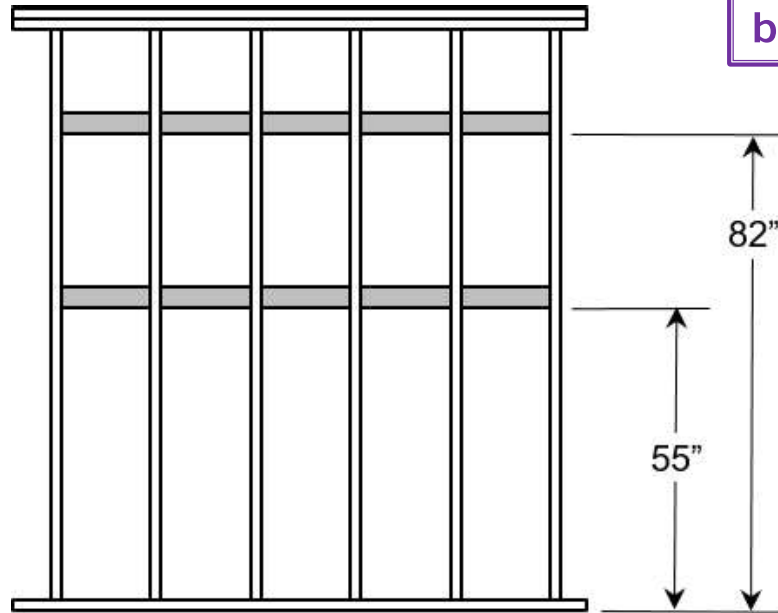
- Deadwood is placed on walls running parallel to the trusses to provide a backing for sheetrock.
- Deadwood is needed on all interior walls; trusses are not deadwood.
- Use scrap 2x4; do not use finger-jointed wood.
- Set the blocks or board along the tops of the wall so that the 3½-inch side lies partially to the cap plate with the remainder hanging over the cap.
- Nail into cap plate using at least three 12d nails.
- Install deadwood using 12d nails every 8 to 12 inches. The maximum space between two pieces should be 4 inches or less.
- Deadwood along the exterior walls should be installed prior to decking.



Kitchen & Bathroom Blocking

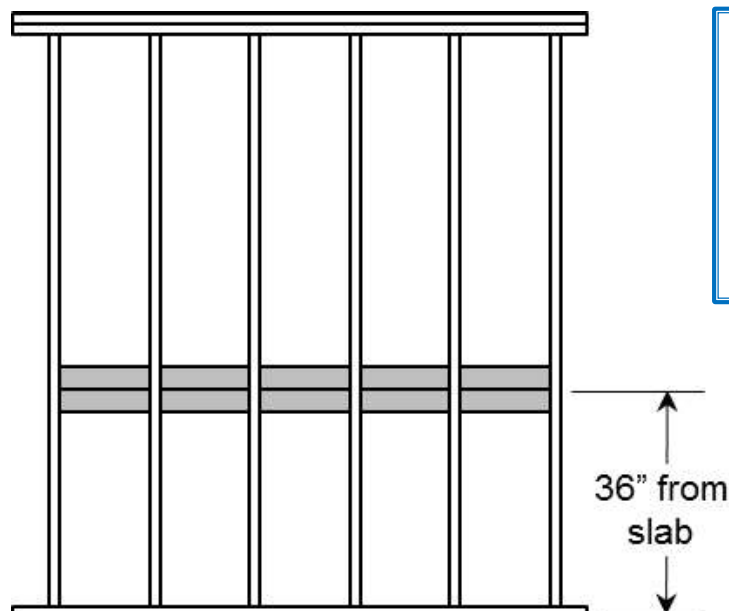
- Use solid 2x4 or 2x6 lumber; do not use finger-jointed lumber.
- Blocks are turned so the wide side of the block is flush with the interior face of the studs.
- Attach using two 12d nails on each end of the blocks, three if using 2x6 material.

Kitchen Cabinet



All measurements are from the slab to the bottom of the blocking.

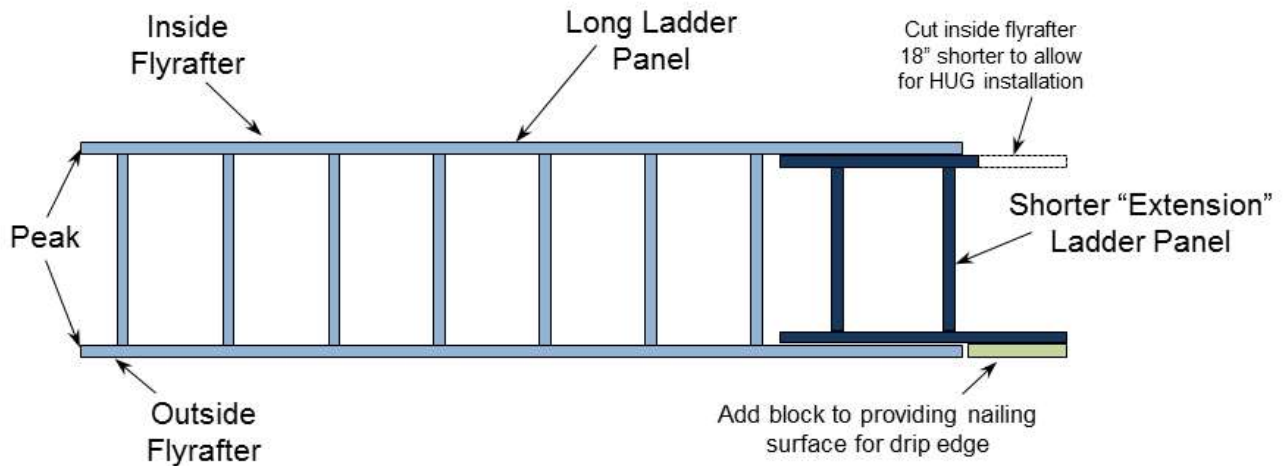
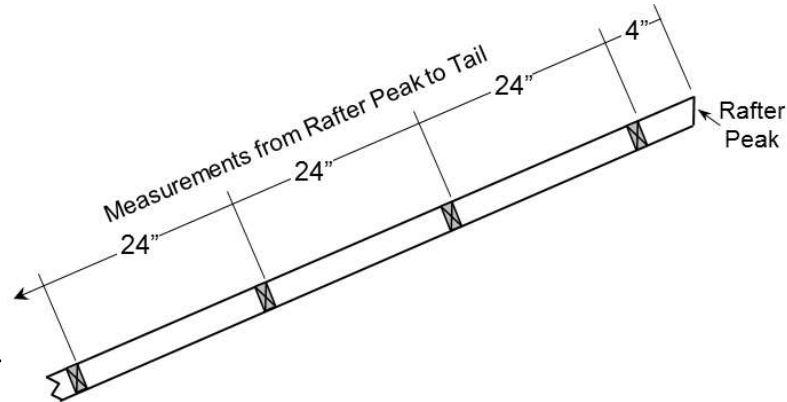
Bathroom ADA Requirements



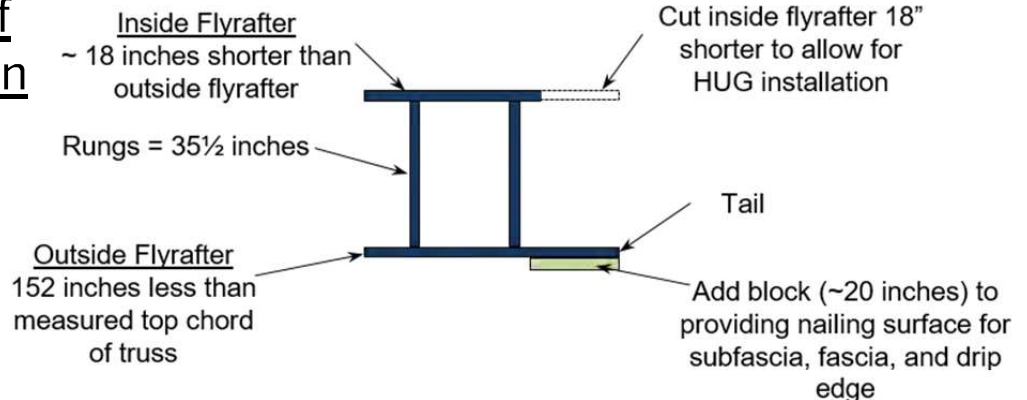
Hint: To help minimize splitting of the wood when nailing small pieces of blocking, dull the point of the nail with your hammer before nailing (the nail will then be crushing wood fibers instead of driving a wedge).

Ladder Panels

- Use the straightest lumber available and 12d nails.
- If the space between the gable end truss and first common truss is 24 inches OC, the length of the rungs should be 38½ inches. If not, determine Check with the House Leader or Construction Supervisor.
- Most gables will have a matching pair of ladder panels, so all four rafters can be clamped together to mark the rung layout.
- The first rung should be placed 4 inches from the peak. The remaining rungs are laid out 24 inches OC.
- Attach the rafters to the rungs, using two 12d nails and a 4-inch deck screw at each end.
- If the ladder panel is greater than 16 feet, it should be built in two sections.

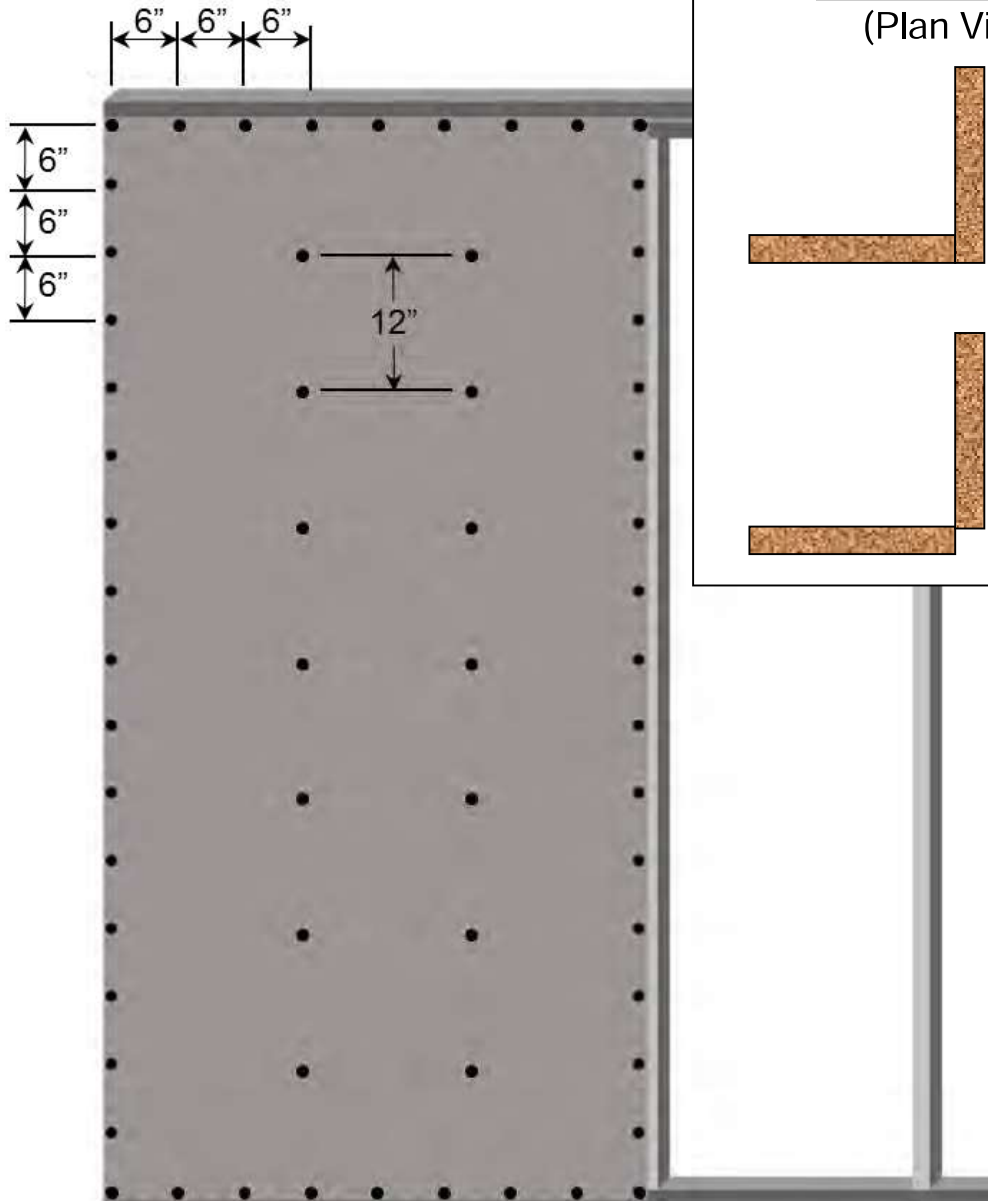


Detail of Extension



Sheathing Walls

- Begin sheathing the exterior walls at the corners using full (4-foot wide) sheets of sheathing.
- The top of the sheathing should set $\frac{3}{8}$ -inch above the top plate. Alternately, the top of the sheathing can be aligned with the top of the top plate. However, the seam between the top plate and cap plate would then need to be caulked from the exterior to help seal the house.
- Use 8d nails to nail into the studs.
- Nail every 6 inches around the outer edge and 12 inches apart on the interior (the field).
- The nailing pattern around windows and doorways is the same as for the edges, every 6 inches.



Corner Detail
(Plan View)



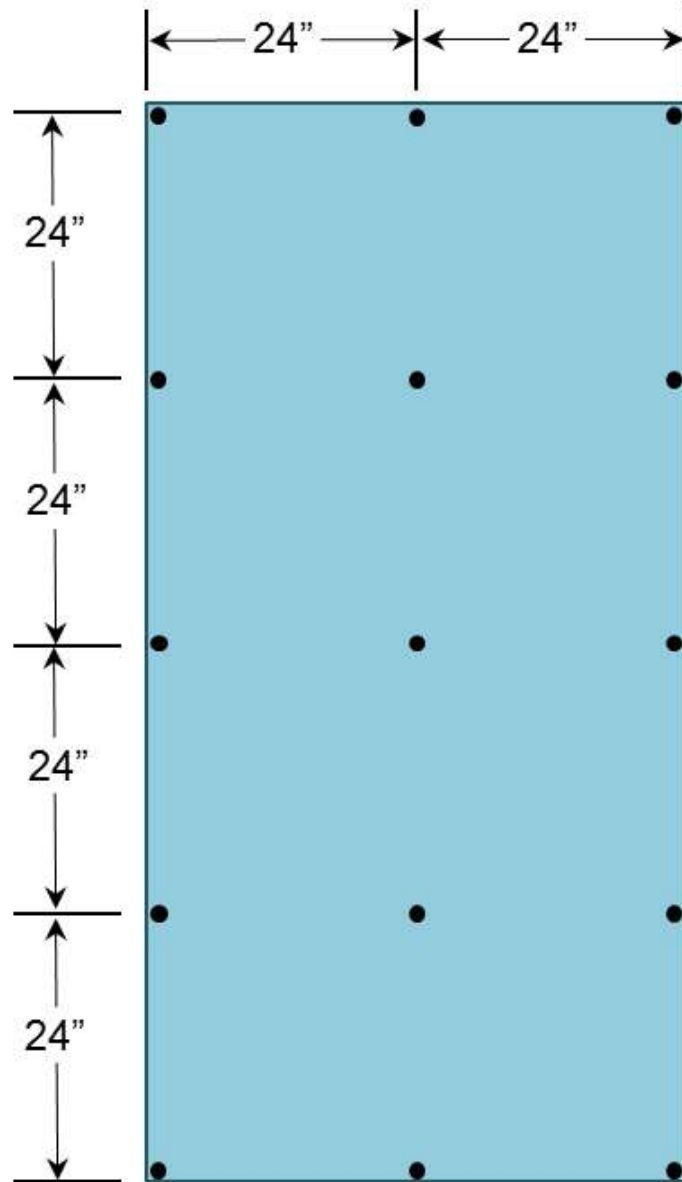
✓ Correct



✗ Incorrect

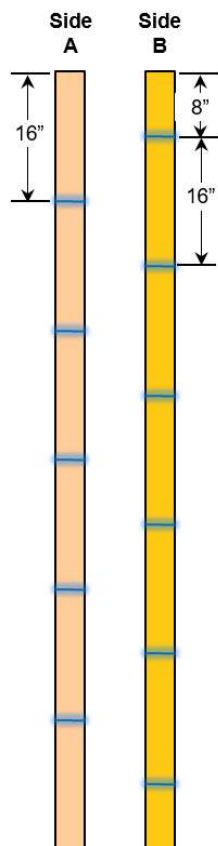
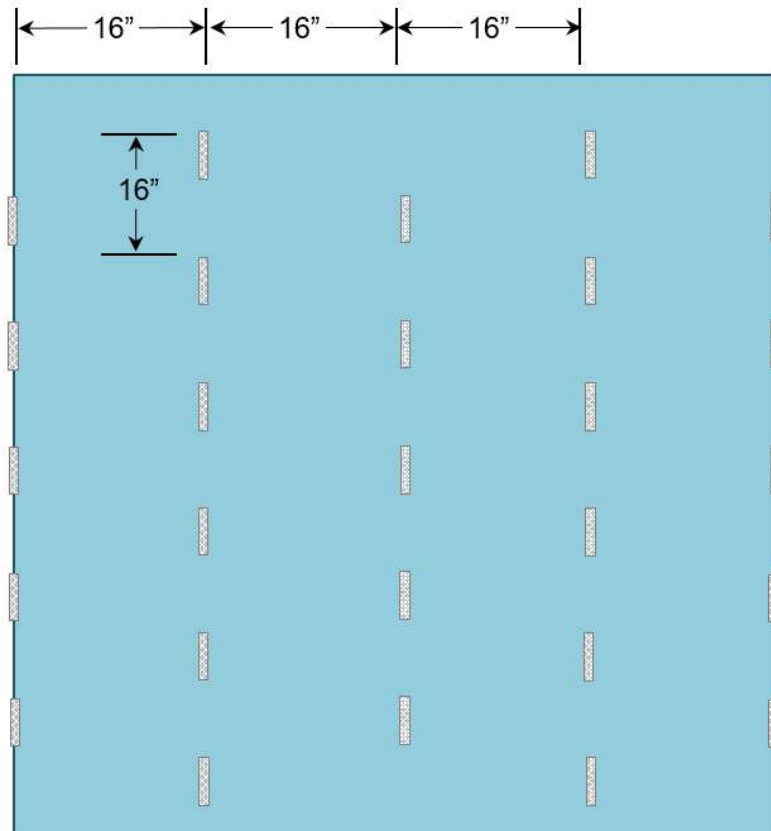
Blue Board

- The seams in the Blue Board should not overlap the seams of the sheathing on the walls or gables (e.g., stagger the joints).
- Blue Board should be aligned with the top of the sheathing.
- Install Blue Board with the label or printed side out.
- Attach Blue Board using 2-inch roofing nails every 24 inches horizontally and vertically.
- Do not allow the nails to indent the Blue Board.
- Seal all seams with clear Weathermate tape.
- Tape over the top of sheathing and Blue Board.



Brick Ties

- Using one 8d nail in the first hole from the top.
- Nail into studs.
- Spaced every 16 inches vertically and every 16 inches horizontally.

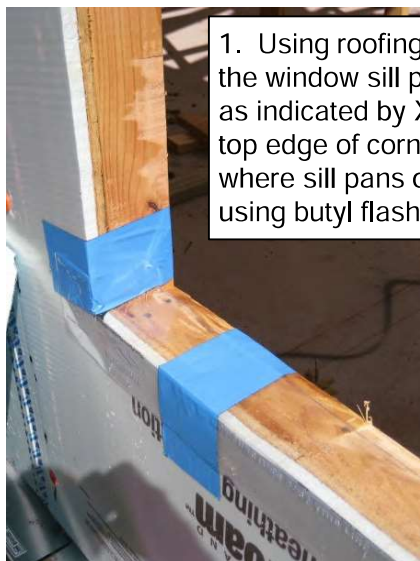


Helpful Hint: Create a "story board" using a 2x4 stud.

- Mark a 2x4 at 16 inches from the top and continue to make marks every 16 inches.
- Turn it over and make a mark 8 inches from the top and then every 16 inches the rest of the way up the board.
- Place the story board on the first stud and transfer the marks to the wall of the house.
- Then move over to the next stud location, turn the board over and make a mark matching each one on the board.
- Alternate sides of the board thereafter; this will help create a checkerboard pattern without measuring.

Windows

- Test fit the window. The opening should be no more than ½-inch larger than the window.
- The window should be closed and latched during installation.



1. Using roofing nails, nail the window sill pan in place as indicated by Xs. Seal the top edge of corners and where sill pans overlap using butyl flashing tape.



2. Run a large bead of caulk around the inside flange of the top and sides of window but not the bottom.



3. Set the window in place. Verify the window is centered in the opening and level horizontally and vertically (plumb) using a 2-foot level. Secure the window position with shims, if necessary.



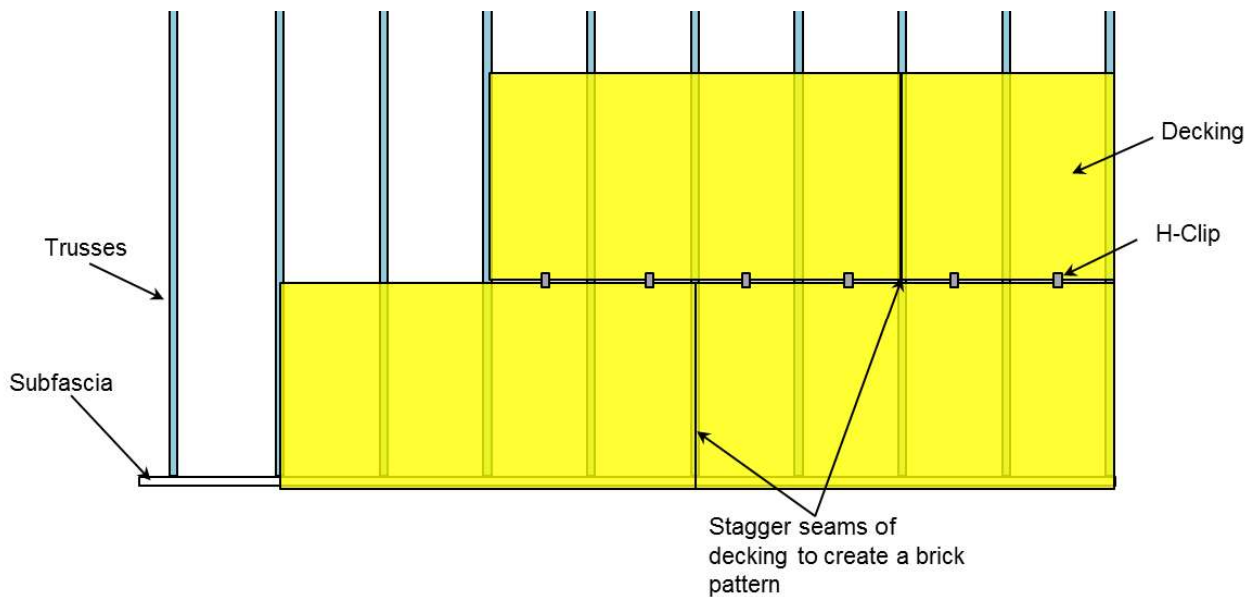
4. Place a roofing nail in every other hole in the flange on the top and side. Do not nail along the bottom.



5. Apply butyl adhesive flashing tape to the sides, then top flanges of the window, not on the bottom.

Decking

- All decking should be cut on the ground and then installed.
- To determine the width of the first row of decking, divide the length (in inches) of the top cord of the trusses by 48 (i.e., the width of decking). the resulting number will identify the number of full rows and remainder for the last row at the top of the roof.
 - If the top row will be more than 10 inches, use full width (48 inch) panel for the first row.
 - If the top row will be less than 10, the first row of decking should be ripped down to 36 inches to prevent a narrow piece at the ridge.
- To establish the location for the first row of decking, mark $47\frac{1}{2}$ inches (for full width decking) or $35\frac{1}{2}$ inches (when using a 36-inch width for the first row) from the outside top edge of the subfascia on the common trusses at the front and back of the house and the middle common truss. Using these marks, snap a chalk line across the top chords.
- It is more important to follow the chalk line than for the decking to be exactly $47\frac{1}{2}$ or $35\frac{1}{2}$ inches on every truss.
- Nail using 8d nails every 6 inches on the edges and 6 inches in the field.

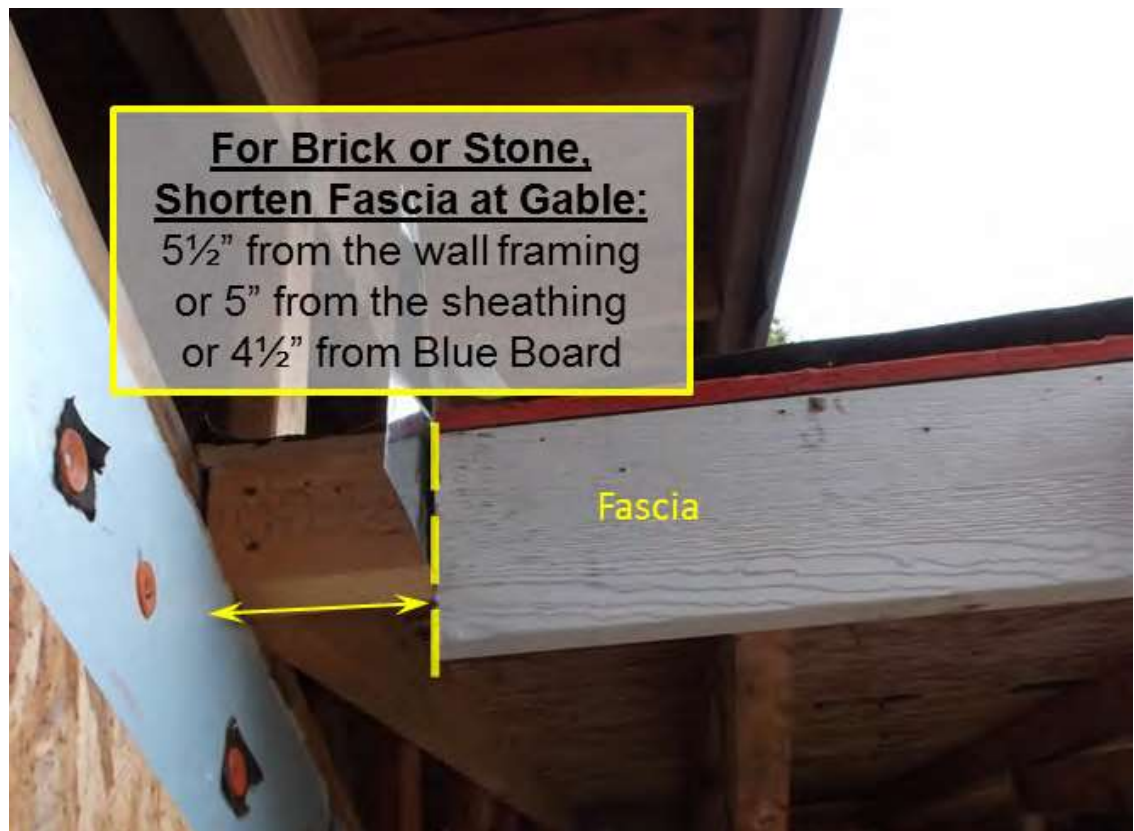
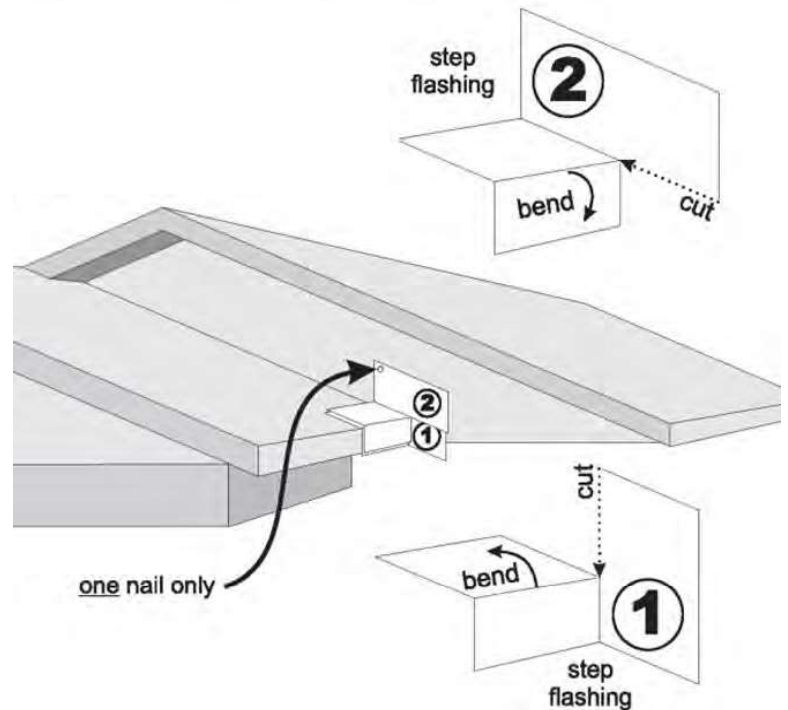


- Place H-clips between each truss on the top edge of decking. H-clips should be installed with the smaller part of the clip open, to receive the next piece/course of decking.
- When the top row of decking requires a narrow piece of decking (e.g., less than 12 inches), use two H-clips per bay and spray paint the ridge to warn people not to step there.

Kick-Out Flashing

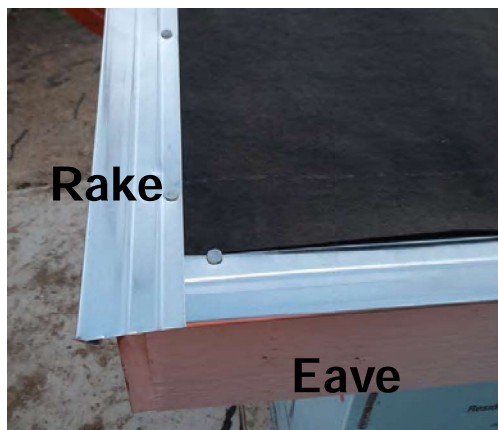
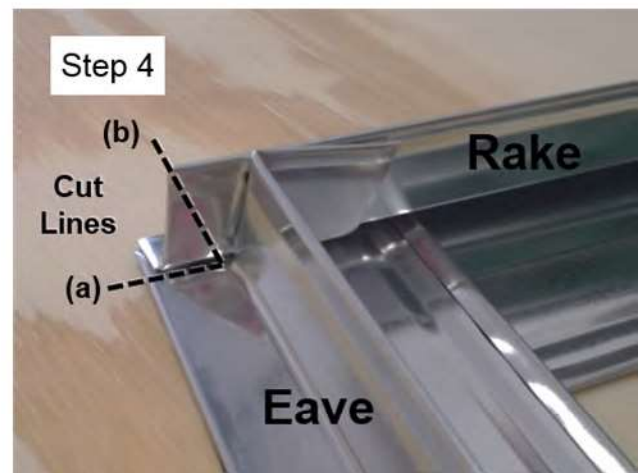
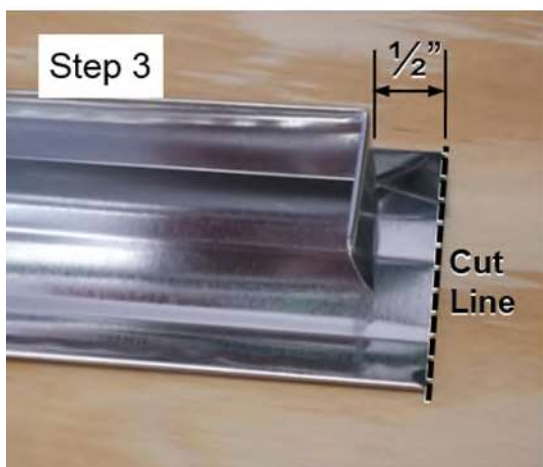
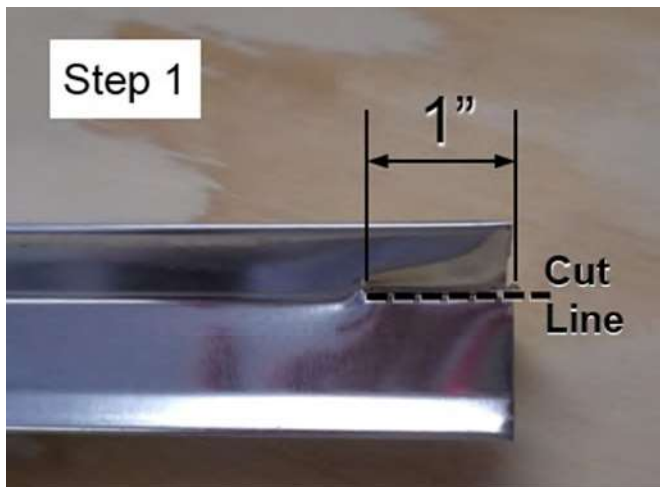
Install kick-out flashing must be installed prior to installing the drip edge and fascia.

- The decking must be trimmed flush to the subfascia board before installing the kick-out flashing.
- If the gable will be covered with brick or stone, the kick-out flashing needs to be offset from the house to allow for the brick/stone



Drip Edge

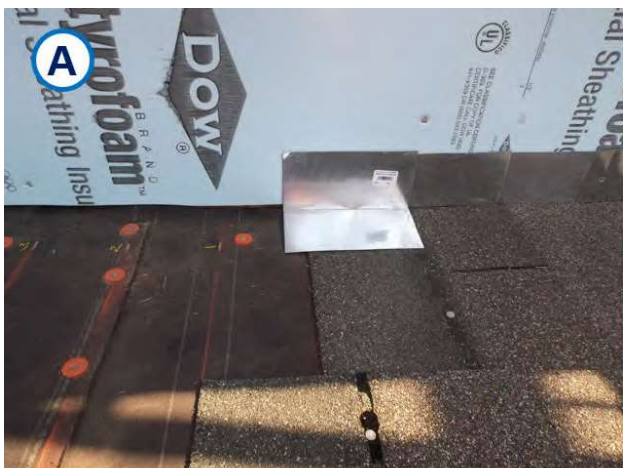
- Corners are formed by two pieces of drip edge, each a minimum of 12 inches long.
 - Step 1: For the piece along the eave, cut a slit about 1 inch long just under the lip of the drip edge.
 - Step 2: Using a speed square, bend the vertical part of the drip edge back 90 degrees. This creates a small "tab" that allows the drip edge to wrap from the eave to the rake.
 - Step 3: Trim the top portion of the eave drip edge to $\frac{1}{2}$ inch from the bend.
 - Step 4: Interlock the eave piece with the rake piece. (a) Cut the rake piece just deep enough to match the lip of the eave piece. (b) Cut the vertical piece at an angle to match the fascia/ pitch of the roof.



- Install the eave piece of the corner first; this allows the tab to wrap from the eave to the rake. The drip edge should interlock with the rake piece resting on top of the eave piece.

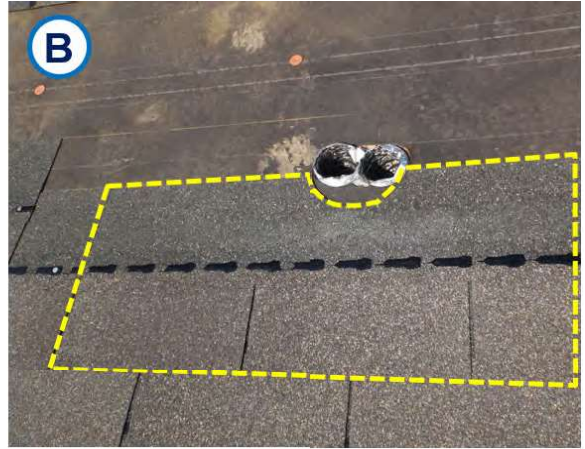
Step Flashing

- Step flashing must be installed as the roof is shingled because each row of shingles overlaps the previous piece of flashing.
- Step A - Set the step flashing in place. Use the orange or white line or tar line of the course below as a guide for the bottom edge of the flashing; flashing should not protrude farther than the bottom edge of the next shingle.
- Step B - Set the shingle in place.
- Step C - Nail the shingle in place.
- Step D - The end nail of the shingle should also go through the step flashing and hold it in place.



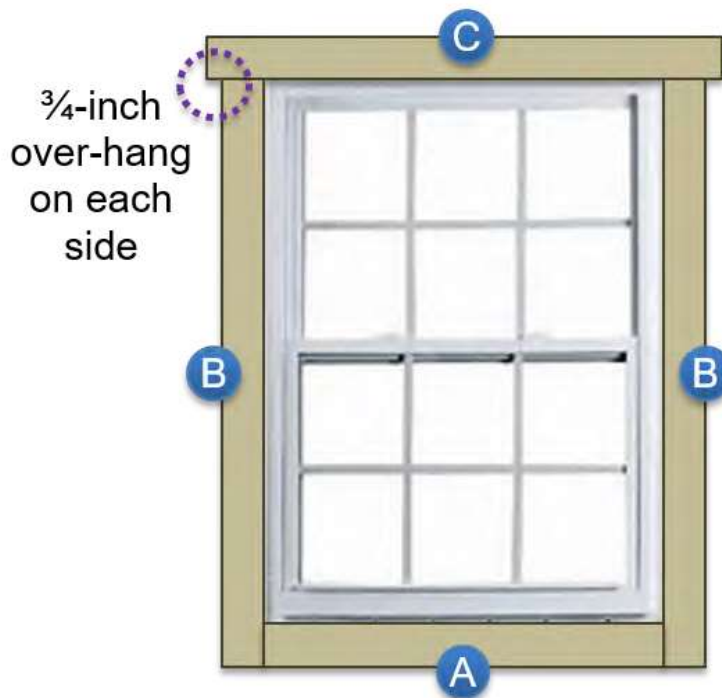
Vent Caps

- A) Shingle until the top of the shingle is just below the vent pipe. If the bottom edge of the boot will be at or below the nailing line of the shingle, the shingle will go under the boot.
- B) The shingle may need to be cut to go around the pipe.
- C) Install the boot by nailing at the marks indicated on the vent cap.
- D) Place the next course of shingles over the boot.
- E) & F) For the following course(s), it may be necessary to cut the shingle to fit around the boot.



Window Trim

- When possible, paint the siding around the window before installing the trim.
- As the trim is installed, caulk in between the joints to ensure a weatherproof seal.
- Some window frames have vinyl seams protruding at the corners, these should be removed with a knife before installing trim.
- Trim is nailed in place using a nail gun with 2½-inch finishing nails.
- Install the bottom piece (A) first, then the sides (B). To help align the side trim with the bottom, use a scrap piece of trim.
- Place the nails where the trim meets the bottom edge of the siding.
- The top piece of trim (C) should extend ¾-inch on either side of the side trim.



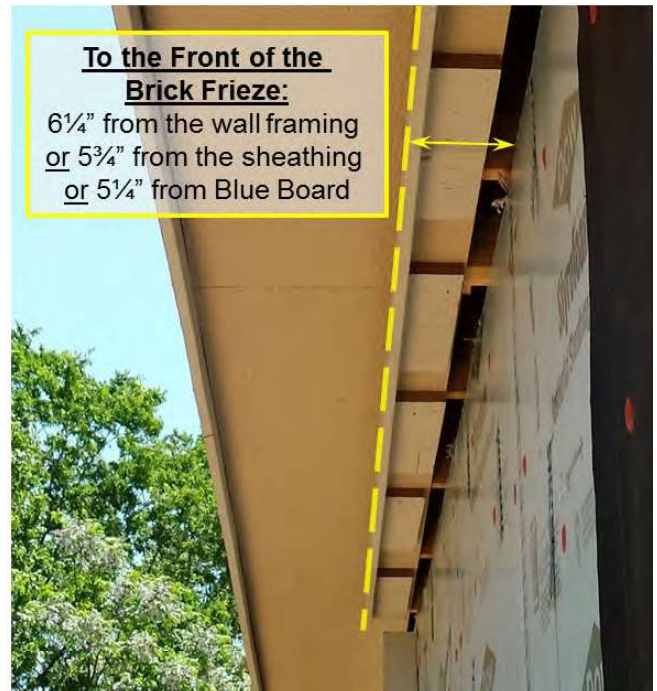
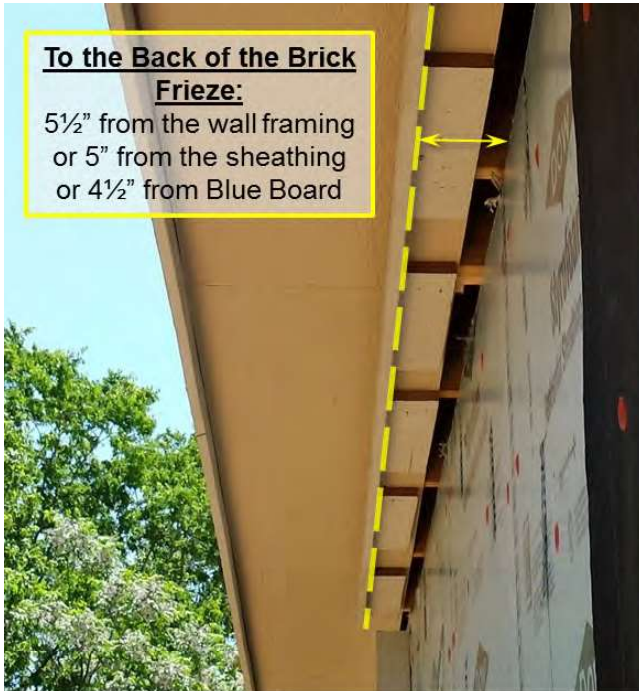
Bottom (A) fits tightly between the two "B" pieces of trim

Sides (B) are the window height + width of 1x4

Top (C) is the width of window + width of 1x4 + 1½ inches (¾" over hang each side)

Brick Frieze

- 1x4 material is used for the brick frieze.
- The brick frieze is installed $6\frac{1}{4}$ inches out from the wall framing or $5\frac{3}{4}$ inches from the sheathing or $5\frac{1}{4}$ inches from Blue Board.

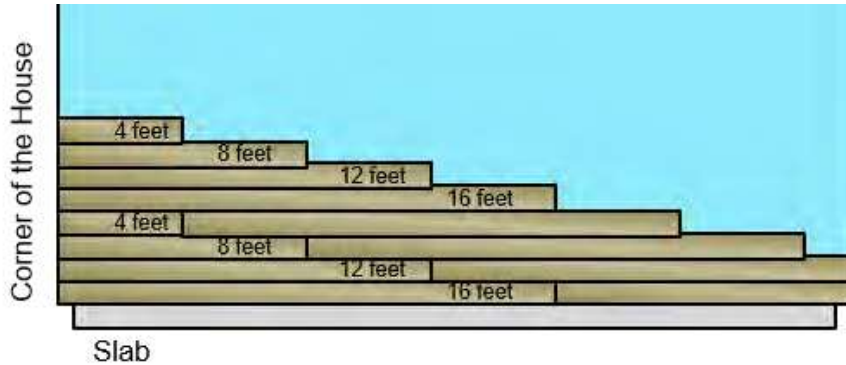


- To mount brick frieze, install a 1x4 board lying flat to provide a nailing surface.
- Install the narrow side of the frieze against the soffit and use a nail gun and $2\frac{1}{2}$ -inch finishing nails to nail through the brick frieze into the mounting board.



Siding Rules

- Use spacers to ensure a consistent 7-inch reveal.
- Seams must be staggered. There should be a minimum distance of 4 feet on either side of the seams from the row below. Create a pattern of seams that repeats every fourth row.



- There should be no joints immediately above or below windows or doors or near the corners of windows and doors.
- The bottom edges of the siding should align in the field and around corners.
- Siding seams in the middle of the field should be butted together with no gap.
- The cut edges of siding in the field should be primed.
- Use 8d ring shank nails and nail into studs. Nails should not show.
- At all of the house corners, measure first row and second rows of siding. The first row is set at 91 inches from top of the cap plate and the second row at 84 inches.

