

FRAMING TECHNIQUES

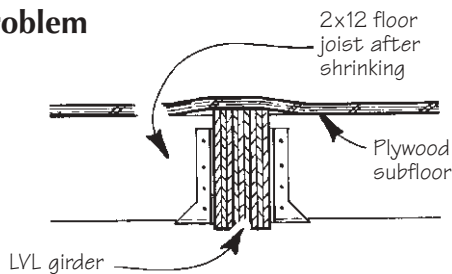
Anticipating Shrinking Lumber

Lumber Size	Actual Width	Width @ 19% MC (at Delivery)	Width @ 11% MC (Humid Climates)	Width @ 8% MC (Average Climates)	Width @ 6% MC (Arid Climates)
2x4	3 1/2"	3 1/2"	3 7/16"	3 3/8"	3 3/8"
2x6	5 1/2"	5 1/2"	5 3/8"	5 5/16"	5 5/16"
2x8	7 1/4"	7 1/4"	7 1/8"	7 1/16"	7"
2x10	9 1/4"	9 1/4"	9 1/16"	9"	8 15/16"
2x12	11 1/4"	11 1/4"	11"	10 15/16"	10 7/8"

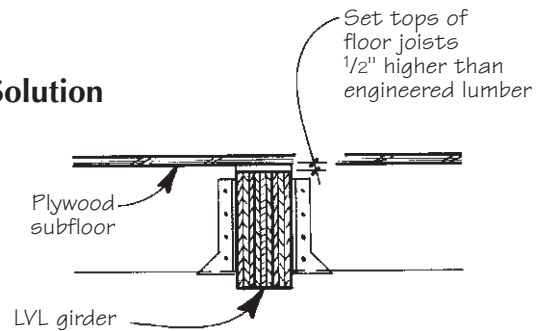
Note: Framing lumber shrinks primarily across its width; shrinkage along the lumber length is insignificant. Actual shrinkage varies depending on the lumber's moisture content when delivered and the area's climate. ("Framing Details for Wood Shrinkage," 4/96)

Flush-Framed Floor Joists

Problem



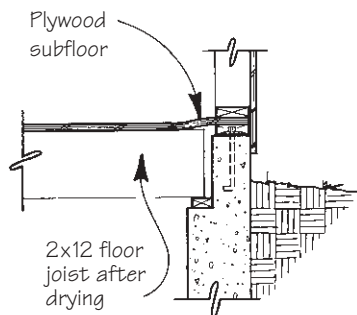
Solution



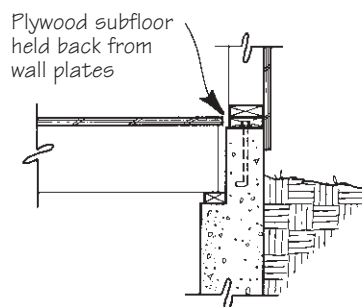
Floor joists laid flush with the top of engineered or steel beams will create a bump in the floor when they shrink (left). In these situations, install the joists 1/2 inch higher to accommodate the anticipated shrinkage (right). Where I-joists meet an engineered lumber beam, you can install them flush since shrinkage is not an issue with I-joists. ("Framing Details for Wood Shrinkage," 4/96)

Sloping Subfloor

Problem



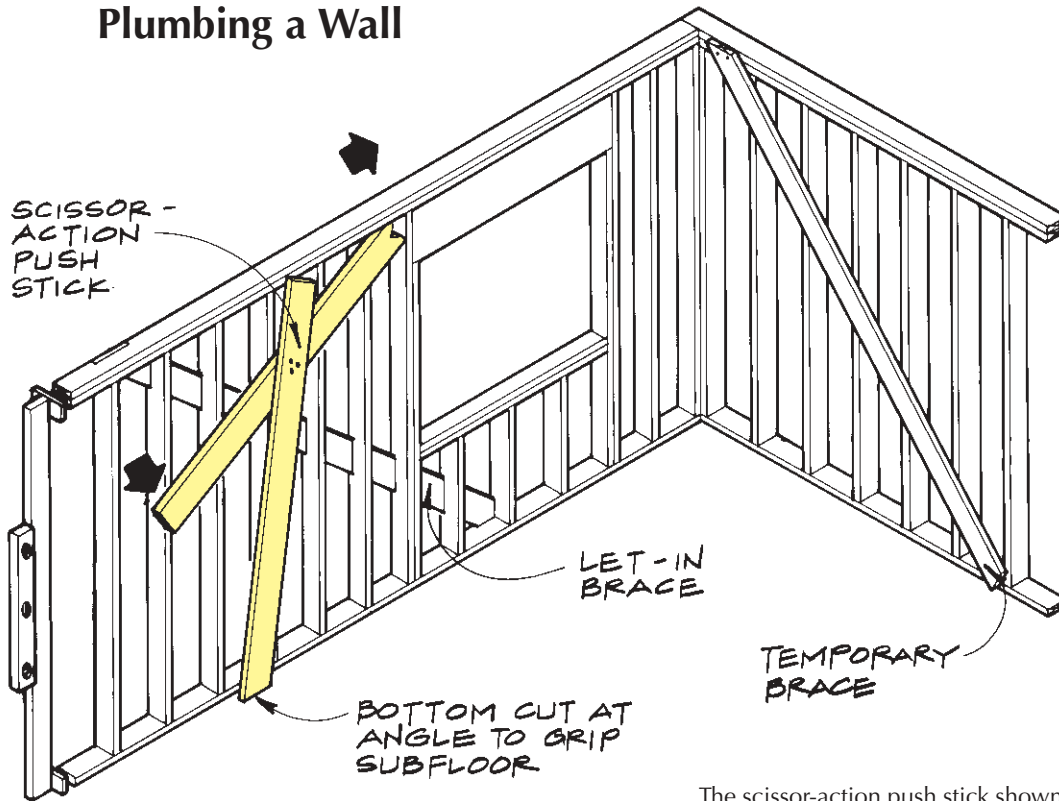
Solution



Subflooring that is installed underneath the exterior wall framing (left) will cause a slope as the floor joists shrink. Where floor joists bear on a foundation ledge, the subflooring should stop short of the exterior wall (right). This allows the subfloor to move with the joists as they shrink. ("Framing Details for Wood Shrinkage," 4/96)

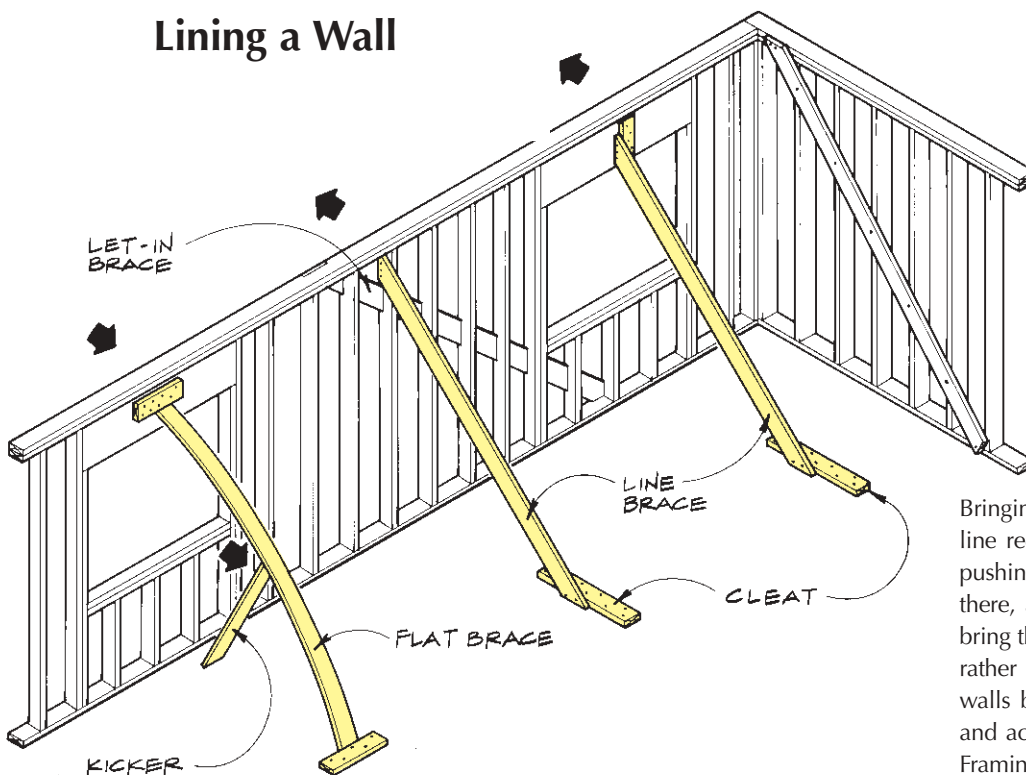
FRAMING TECHNIQUES

Plumbing a Wall



The scissor-action push stick shown here is a good site-made tool for racking tall walls with lots of blocking. It can also be used to persuade walls that bow in at the top during the "lining" procedure. ("Fast & Accurate Wall Framing," 4/91)

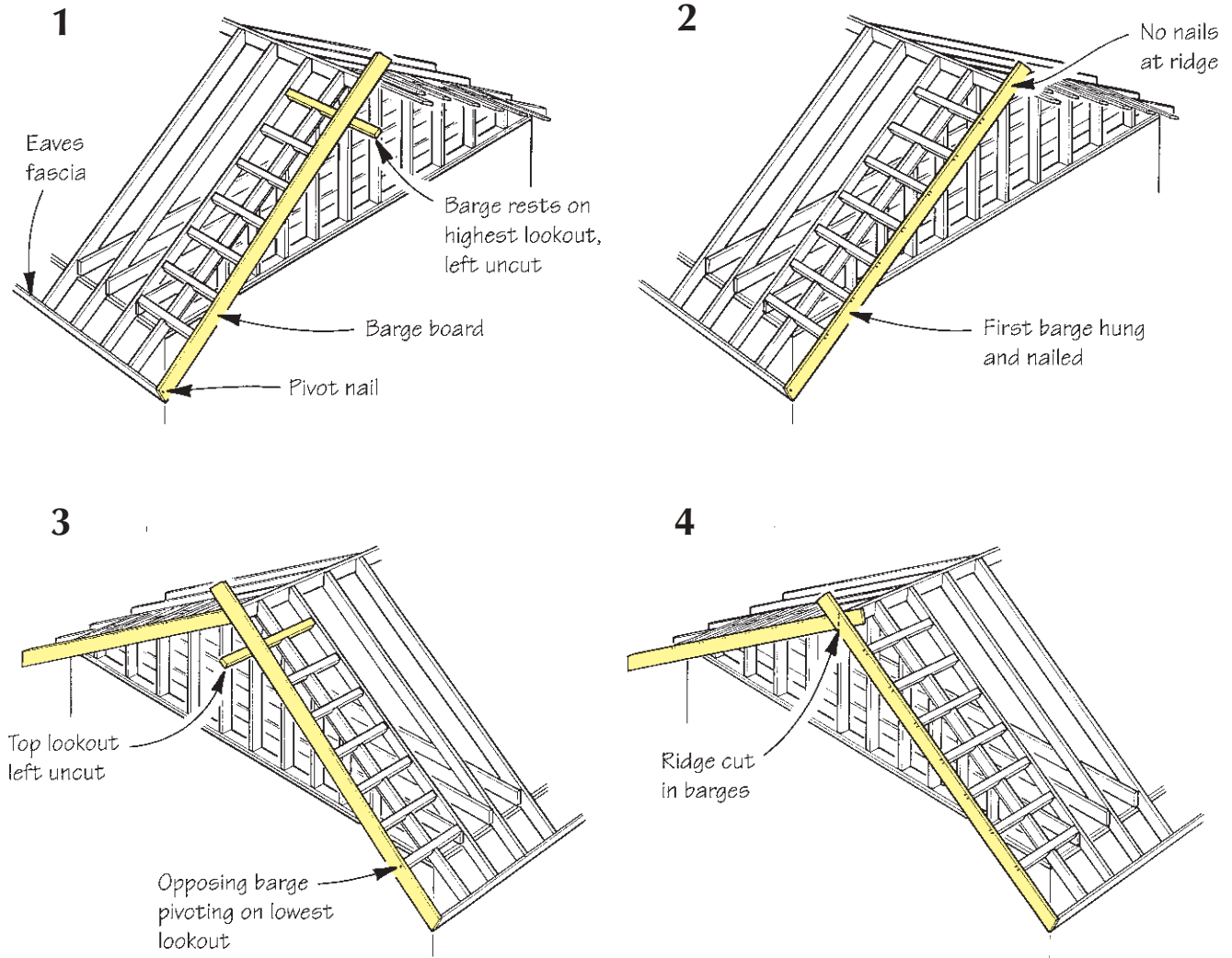
Lining a Wall



Bringing the tops of your walls into line requires standard line braces for pushing walls out and keeping them there, and flat braces with kickers to bring them in. The author uses his eye rather than a string for lining most walls because, with practice, it's fast and accurate. ("Fast & Accurate Wall Framing," 4/91)

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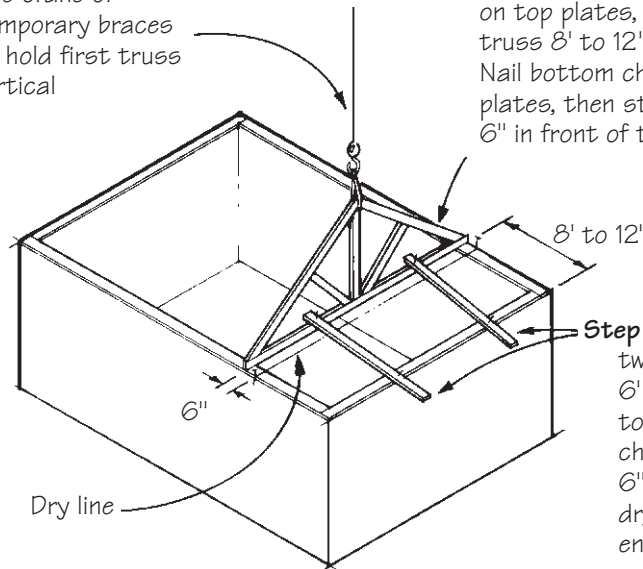
Hanging Barge Boards



The author first cuts the lookouts to length, except for the top one. He cuts the miter at the bottom of the barge board and supports it with one nail into the eaves fascia, resting the top end on the uncut lookout. He then moves to the ridge, cuts the lookout to length, and nails the barge to the lookout, but not to the ridge. He installs the opposing barge in the same way, letting it run long at the bottom. ("Fast Fascia Techniques," 8/96)

Setting Trusses Safely

Use crane or temporary braces to hold first truss vertical

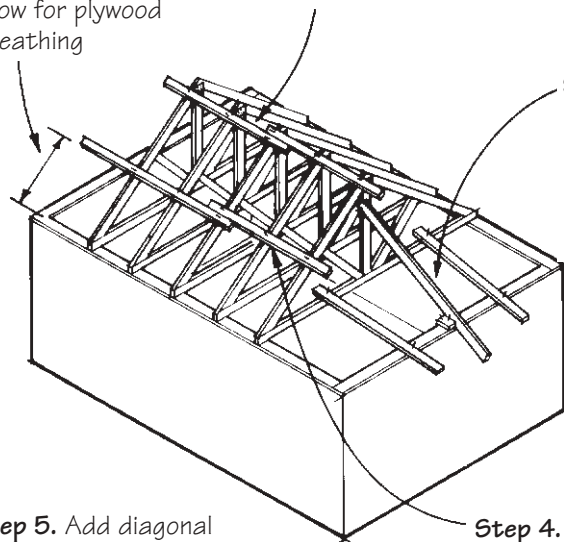


Step 1. After marking truss layout on top plates, position first truss 8' to 12' in from end wall. Nail bottom chord to top plates, then stretch dry line 6" in front of truss.

Step 2. Nail temporary two-by braces at 6' to 8' intervals to top of bottom chord. Holding 6" dimension off dry line, nail other end of braces to end wall top plate.

Keep bottom brace 5' up to allow for plywood sheathing

Top brace should be close to peak of truss



Step 3. Plumb truss, then nail temporary braces from top of truss to end wall. First truss is now rigidly braced.

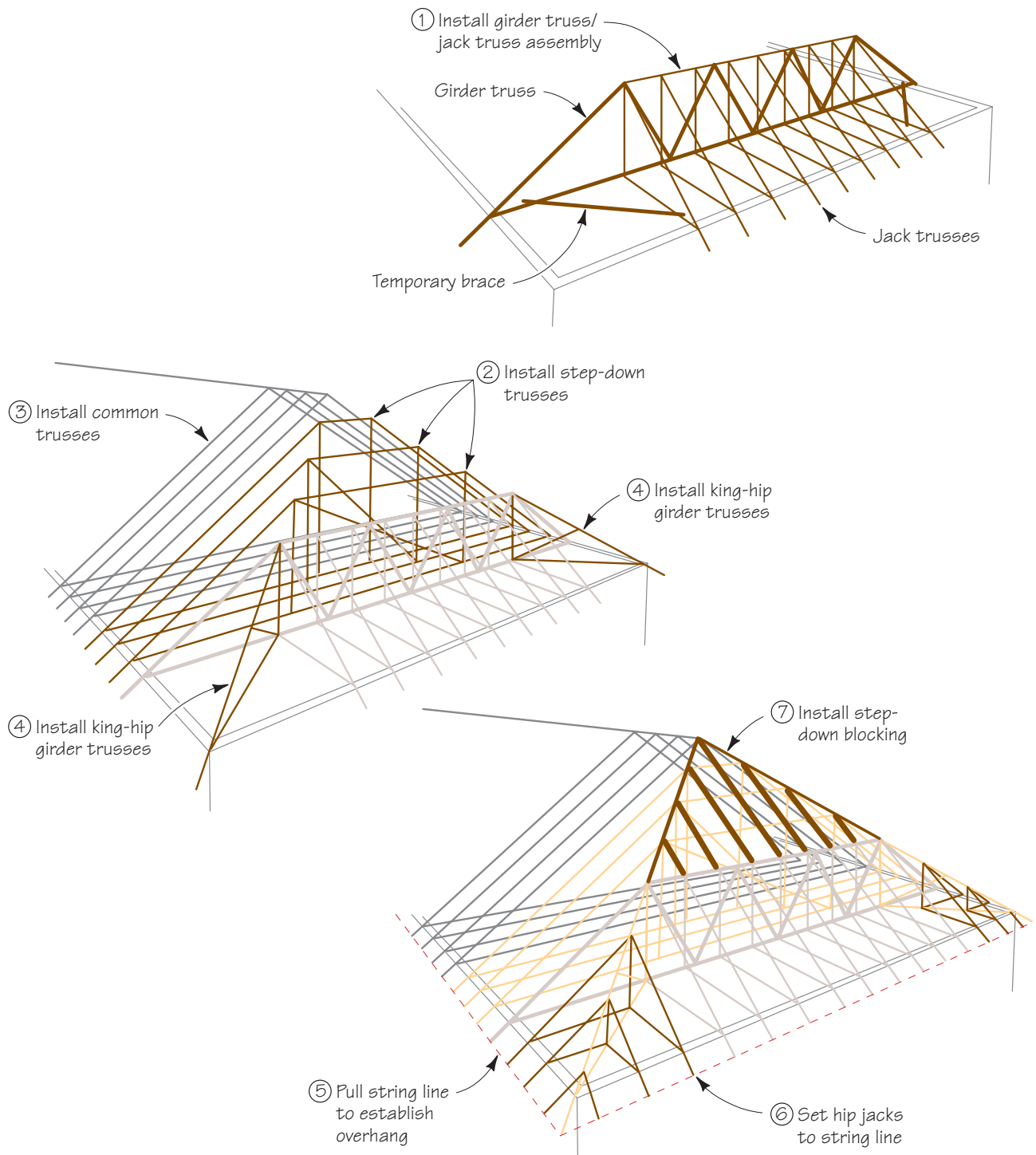
Step 5. Add diagonal bracing between vertical webs.

Step 4. As next trusses are positioned, secure them to first truss with temporary bracing at top chords and along the bottom chord.

Trusses are typically installed and braced with the first truss located directly over the end wall and braced diagonally to stakes in the ground, which can be problematic. The author's technique positions the first truss 8 to 12 feet in from the end wall, where it is then braced back to that wall. ("Truss Bracing Tips," 3/94)

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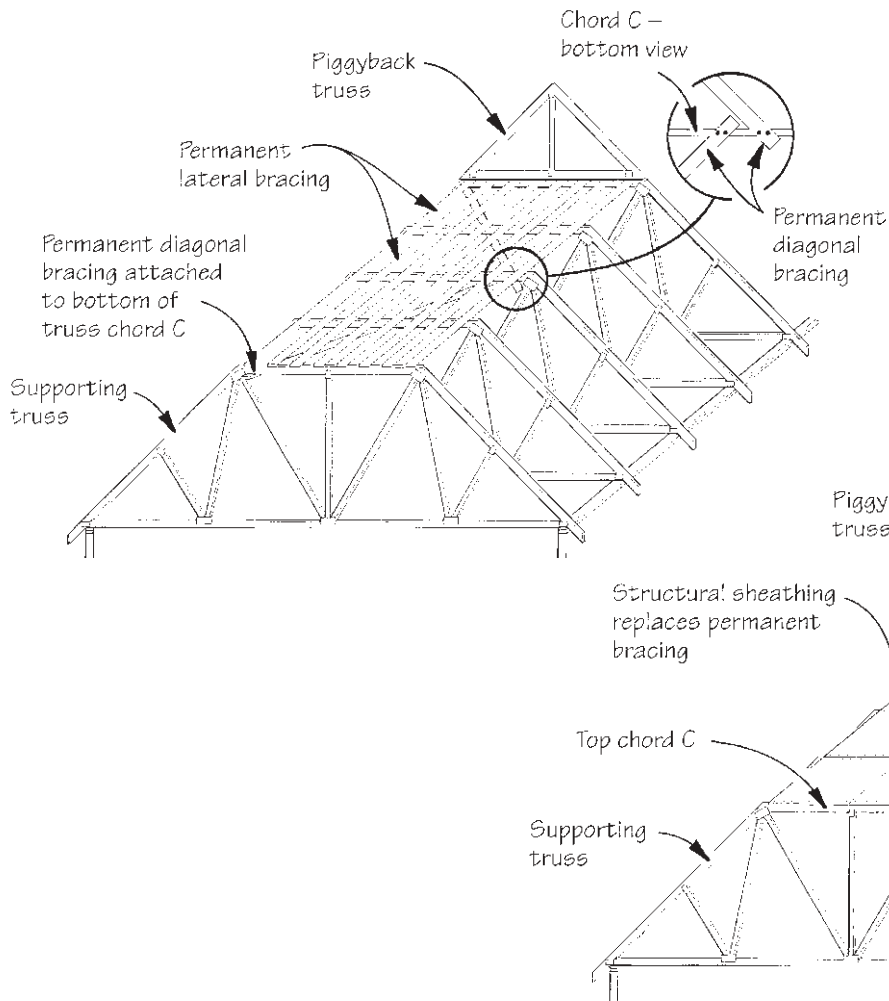
Stacking a Hip, Step by Step



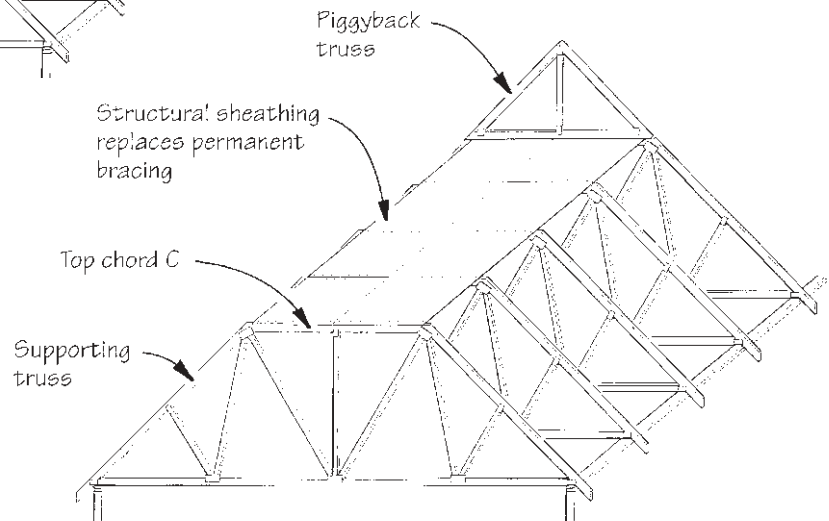
Working on level blocks on the ground, the author's crew fastens the hip jacks to the girder truss, then stiffens the whole assembly with temporary braces. The assembly is then crane-lifted and carefully set on the top plates (top). Next, the step-down trusses are assembled on the ground and lifted into place, followed by the common trusses (middle). The king hip girders are then installed, but fastened only to the girder truss, not at the plate. Finally, a string is pulled around the ends of the jacks and step-down trusses to establish the proper overhang (above). The king hip is adjusted as needed and the hip jacks set to the string. ("Installing Hip Roof Trusses," 6/97)

FRAMING TECHNIQUES

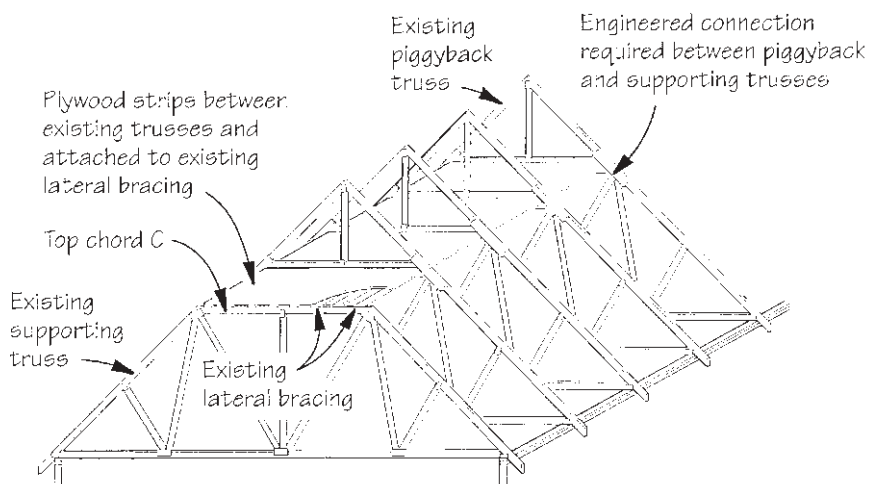
Proper Piggyback Bracing



Permanent cross-bracing installed on the bottom of chord C (left) will stabilize the lateral braces attached to the top of chord C. The diagonal braces should be installed at about 45 degrees to chord C. Structural sheathing (below) is also a simple and reliable method to provide permanent bracing for chord C. With the proper nailing, the sheathing provides diaphragm action, serving as both lateral and diagonal bracing. (*Practical Engineering*, 3/98)



Retrofit Piggyback Bracing

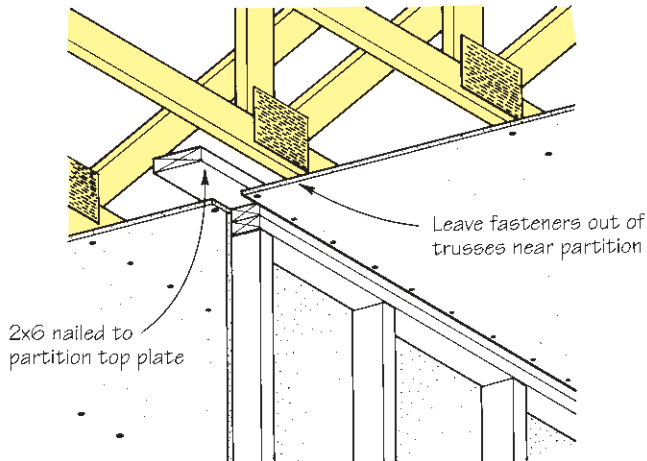


In some cases, installing strips of plywood between existing piggyback trusses may serve to stabilize the permanent lateral braces. The building designer or engineer should specify the proper nailing. (*Practical Engineering*, 3/98)

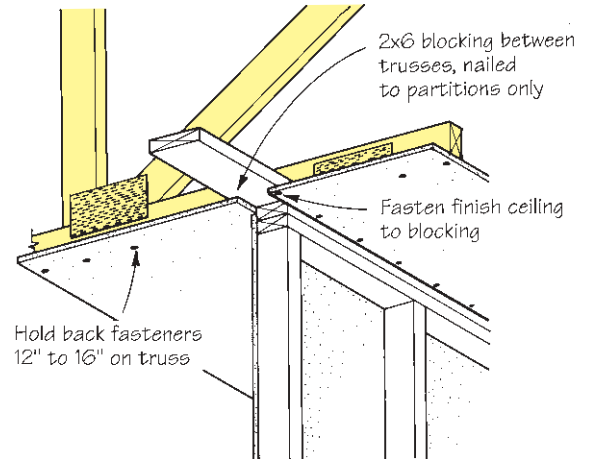
FRAMING TECHNIQUES

Truss Uplift Solutions

Parallel Partitions

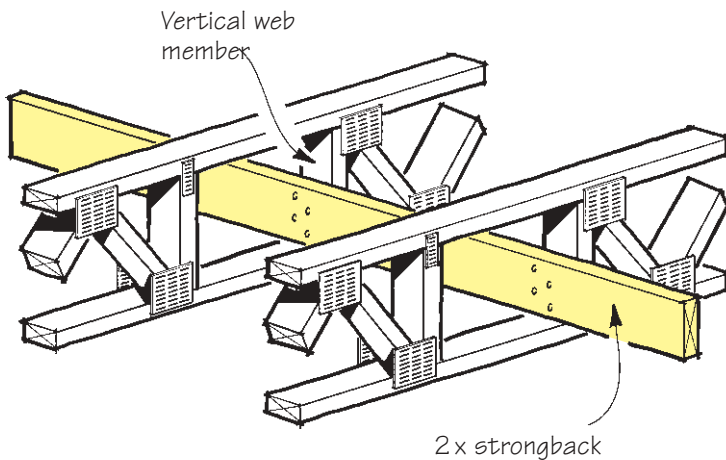


Perpendicular Partitions

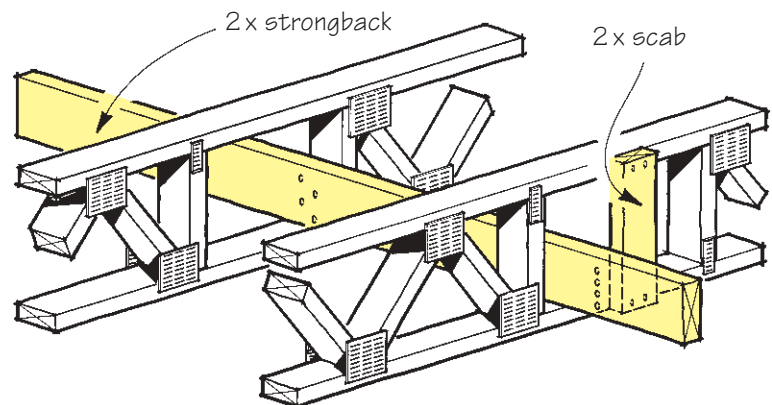


When trusses are parallel to partitions (left), install 2x6 nailers for fastening the ceiling drywall. Do not nail the drywall to the bottom chords near partitions. When trusses are perpendicular to the partitions (right), install "dead wood" blocking to attach the ceiling drywall, and hold the nailing back 12 to 16 inches on either side of the partition. ("Top Ten Job-Site Q&As," 2/92)

Attaching Strongbacks to Floor Trusses

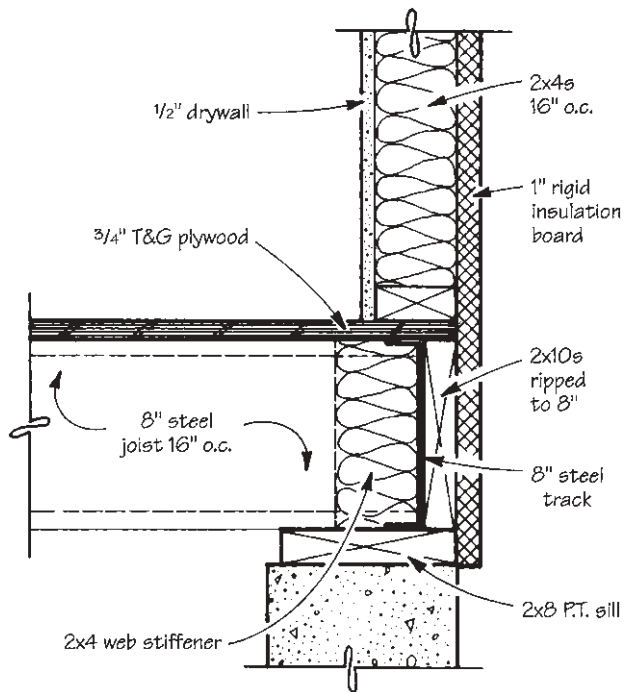


Strongbacks should be securely attached to a vertical web member at center span next to the bottom chord (left). If the vertical web members don't line up properly, you can attach a 2x4 or 2x6 scab from chord to chord and nail the strongback to the scab (below). To transfer the load, use as many nails to attach the scab as you use to attach the strongback. (*Practical Engineering*, 11/98)



STEEL FRAMING

Hybrid Framing With Wood and Steel



Because steel is much more heat-conducting than wood, the author uses wood studs for exterior walls. The steel band joist is backed with a ripped 2x10, and stuffed with batt insulation for an extra measure of thermal protection. ("Hybrid Framing With Wood & Steel," 1/94)

Sizes of Steel Framing

Studs

Widths: 1 5/8", 2 1/2", 3 5/8", 4", 6"
Gauges†: 25*, 20, 18, 16, 14, 12

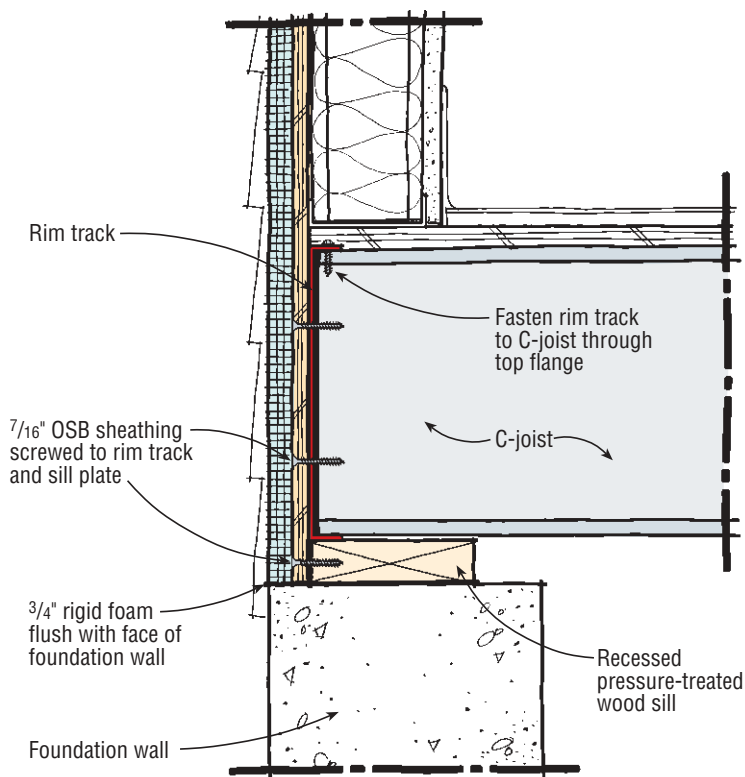
Joists

Widths: 4", 6", 8", 9 1/4", 10",
12", 14"
Gauges†: 18, 16, 14, 12

* Non-loadbearing uses only

† Gauge equivalents: 25=.019", 20=.0346",
18=.0451", 16=.0566", 14=.0713", 12=.1017"

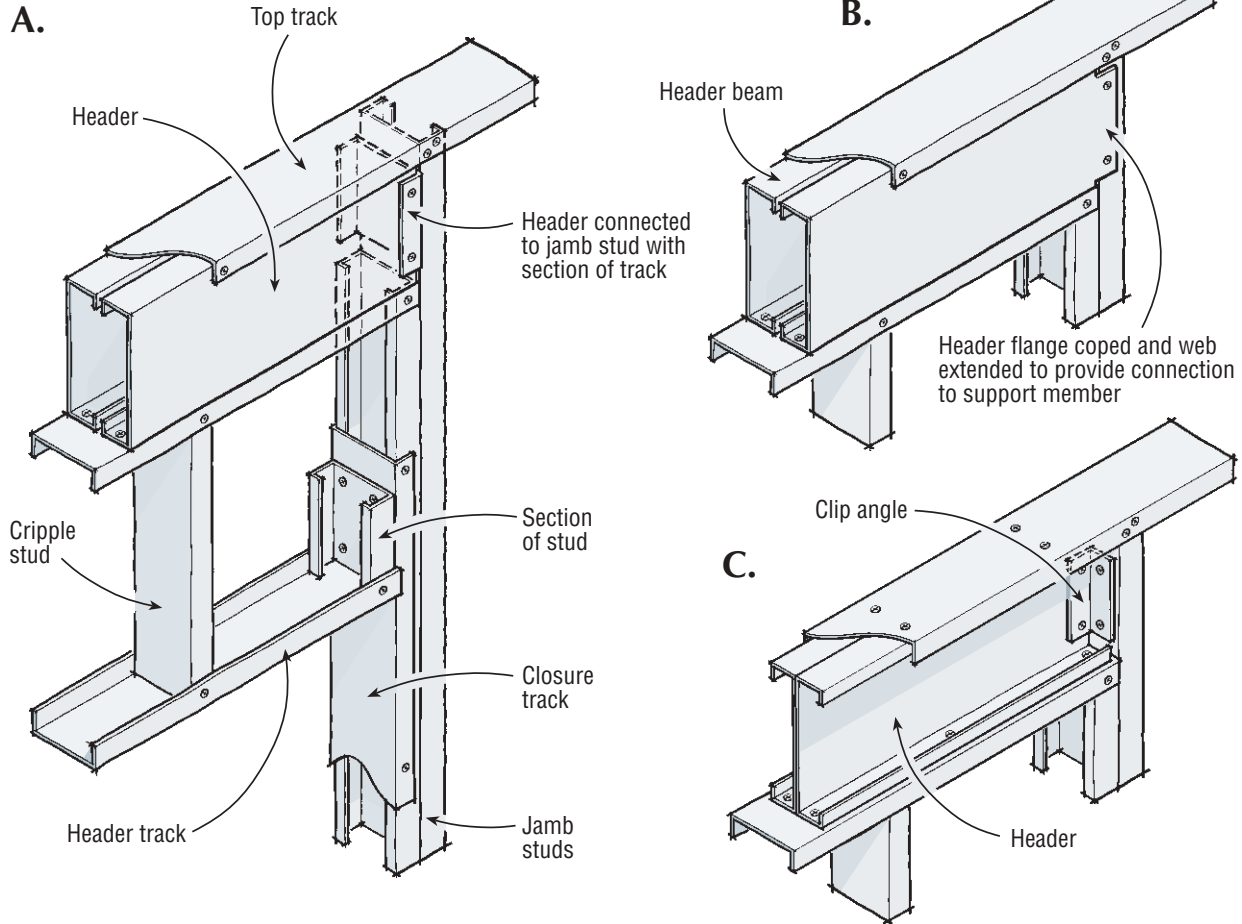
Rim Track/Sill Plate Connection



A treated-wood sill plate is recessed from the foundation wall to accommodate OSB sheathing and a layer of rigid foam. The OSB is screwed to both plate and rim track, providing a strong, continuous connection between the foundation and floor structure. ("Floor Framing With Steel," 8/00)

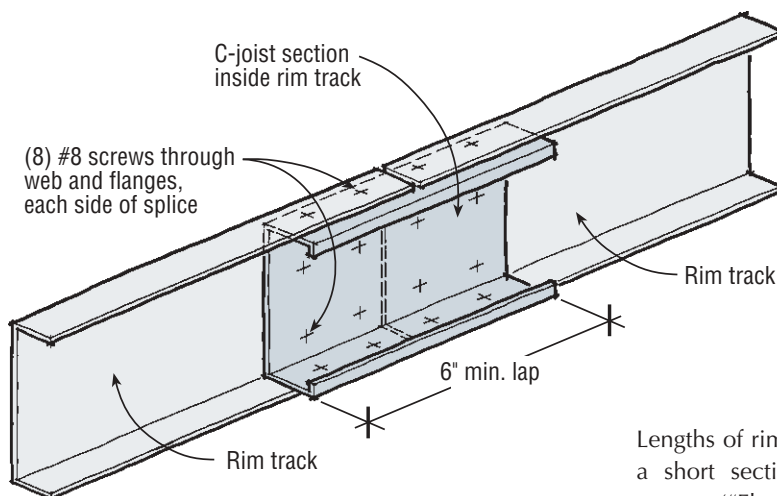
STEEL FRAMING

Headers for Steel Framing



The author mainly uses two header types, both made from two pieces of structural C steel. The profiles can be assembled face to face (A & B) or back to back (C), depending on the engineer's specifications. Connections to the studs may vary, but the author prefers the clean, solid coped joint in sketch B. ("Making the Switch to Steel," 6/00)

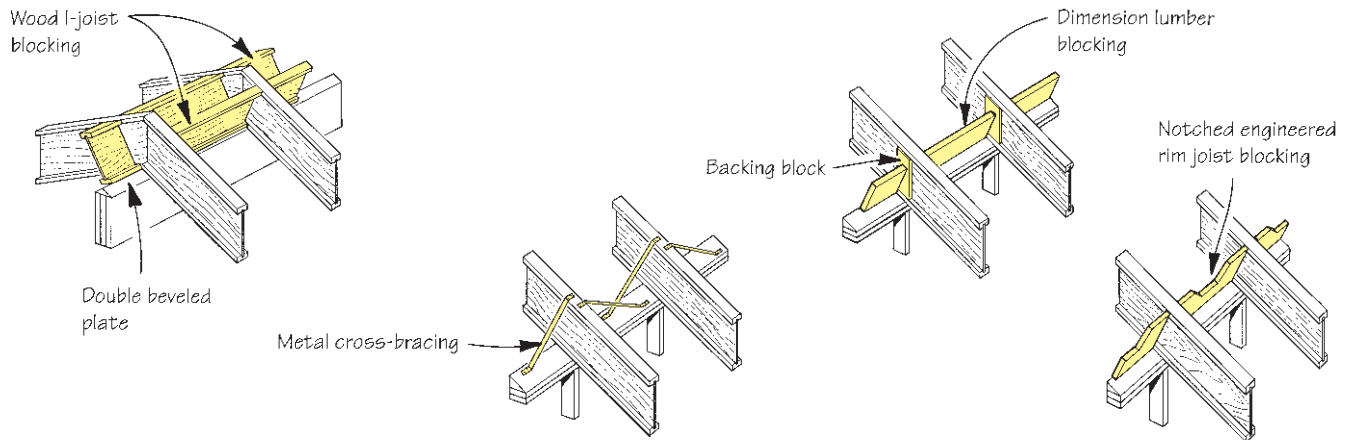
Splicing Rim Track



Lengths of rim track are easily spliced with a short section of C-joist fastened with screws. ("Floor Framing With Steel," 8/00)

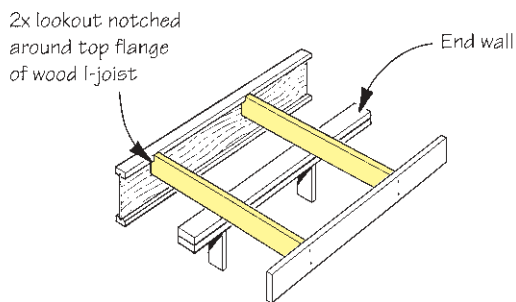
ROOF FRAMING WITH WOOD I-JOISTS

Wood I-Joist Details



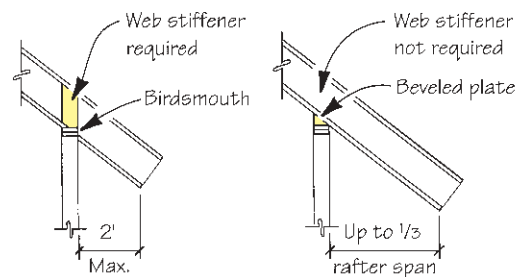
I-joists require blocking at end supports to prevent joist rollover. Short pieces of I-joist work well and provide good shear blocking for diaphragm designs (far left). Where a ventilation channel is needed, use dimension lumber (center right), metal cross-bracing (center left), or notched engineered rim joist material (far right). ("Roof Framing With Wood I-Joists," 1/97)

Gable-End Overhangs



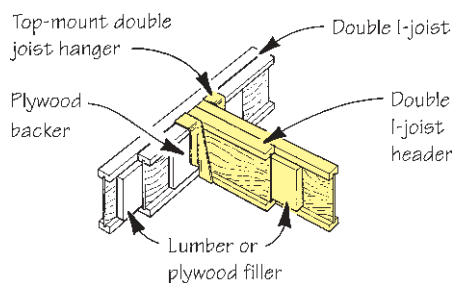
Frame gable-end overhangs with dimension lumber outriggers notched around the I-joist top flange. If the overhang exceeds the I-joist spacing, check with the manufacturer to see if a doubled I-joist is required. ("Roof Framing With Wood I-Joists," 1/97)

Birdsmouth vs. Beveled Plate



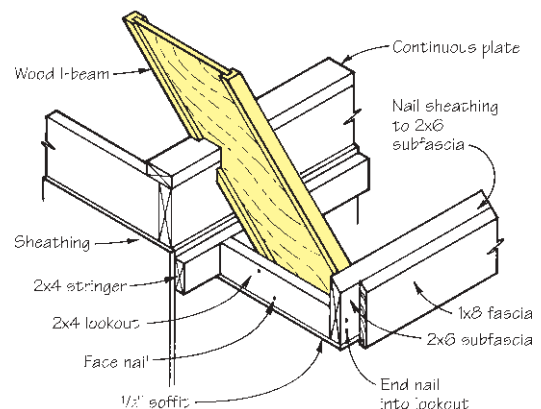
Though a beveled plate requires special fabrication, it has some advantages over cutting a birdsmouth. ("Roof Framing With Wood I-Joists," 1/97)

Headers



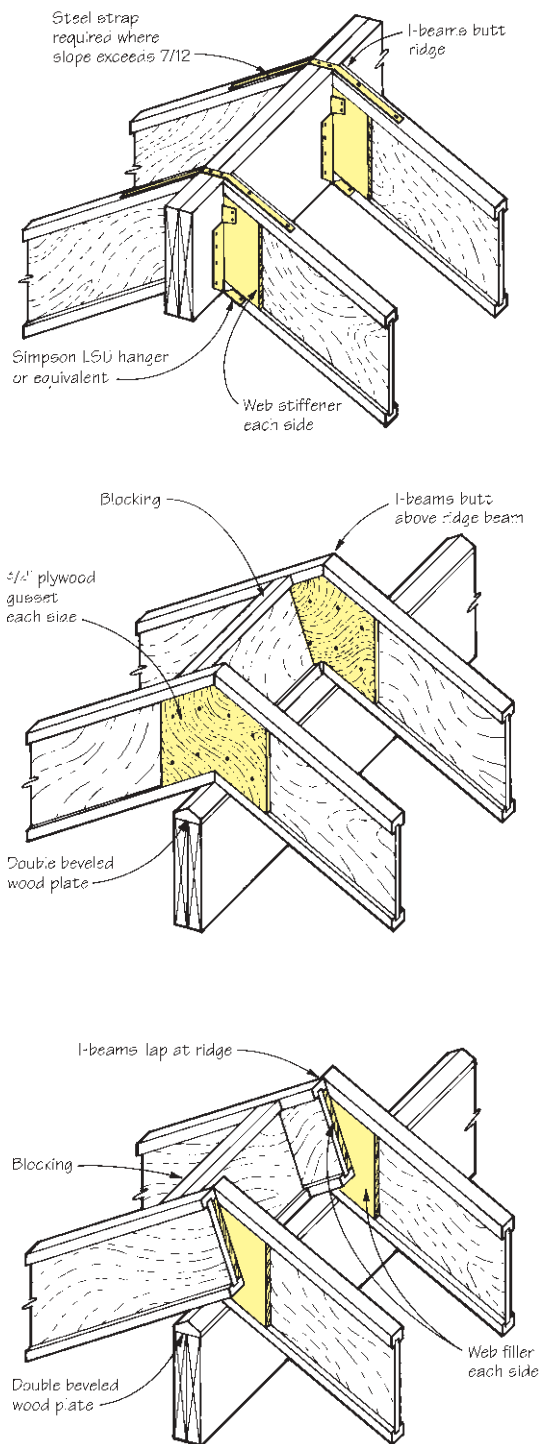
Headers at openings may require double joists, depending on the loads. Use filler blocks between the I-joists and a backer block to support the hanger. ("Roof Framing With Wood I-Joists," 1/97)

Wood I-Beam Overhang Detail



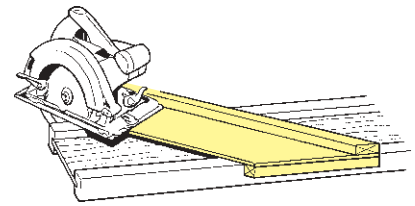
This detail creates a very stable 24-inch overhang without a lot of cross bracing and blocking. ("Roof Framing With Wood I-Beams," 10/92)

Wood I-Beam Ridge Details

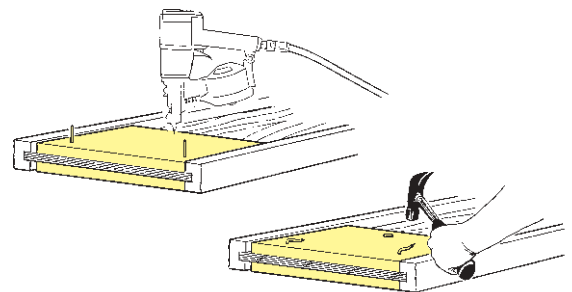


For a flush ceiling at the ridge, make plumb cuts in the rafters and tie them together with steel straps (top). The author typically exposes the ridge in the room and connects the I-beams with plywood gussets (middle). A similar approach laps the beams over the ridge (bottom). ("Roof Framing With Wood I-Beams," 10/92)

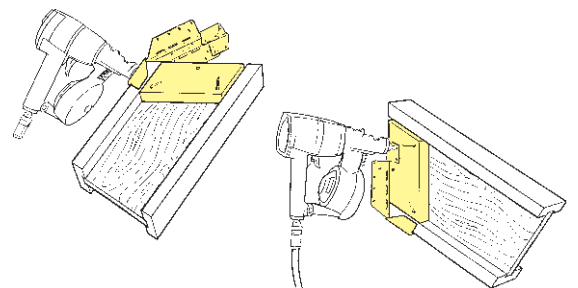
Hanging an I-Joist From a Ridge Beam



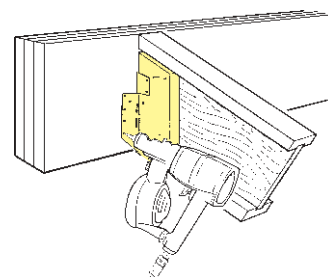
1. Make the plumb cut at the top of the I-joist. Use a piece of plywood in the web or a cutting jig for the saw shoe to ride on.



2. Attach the web stiffeners to each side with three 8d nails, leaving a 1/4-inch gap at the top. Clinch the nail points.



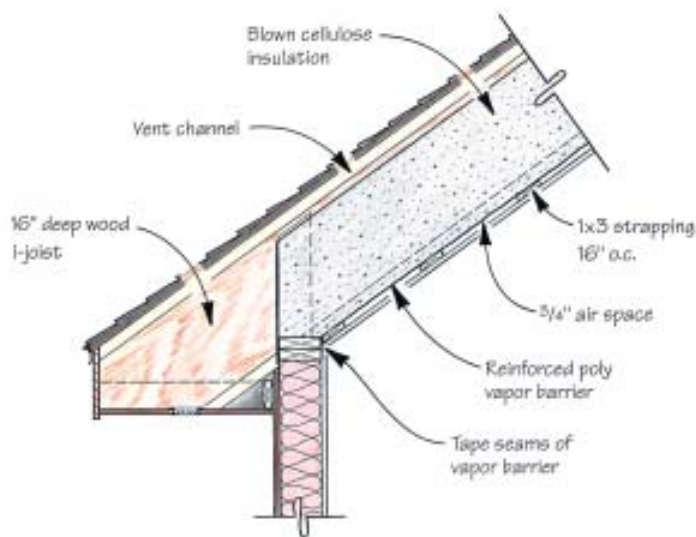
3. Attach the hanger to the I-joist. First, nail the sloped seat to the bottom of the rafter. Next, bend the hanger against the plumb cut and put the rest of the nails into the web stiffener and bottom flange.



4. Lift the I-joist into place and nail the hanger to the ridge beam. ("Roof Framing With Wood I-Joists," 1/97)

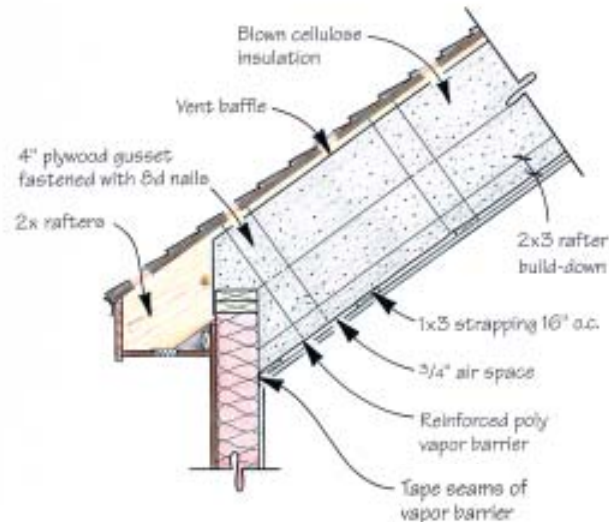
CATHEDRAL CEILING DETAILS

Deep I-Joists



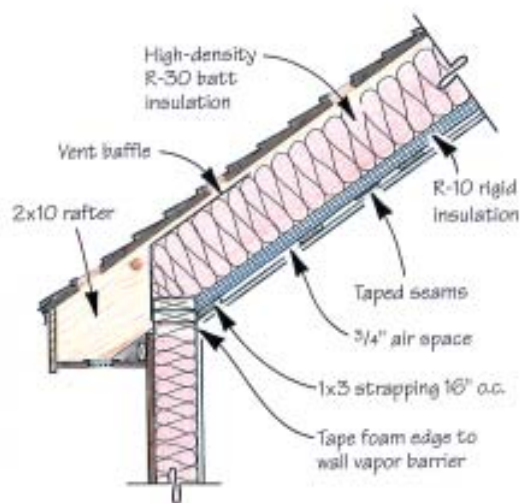
Sixteen-inch-deep wood I-joists insulated with dense-blown cellulose create a high-R cathedral ceiling. However, the high cost of the I-joists and the complicated ridge and eaves details associated with I-joists make this the author's least favorite system. ("Energy-Efficient Cathedral Ceilings," 2/97)

Plywood Gusset Build-Down



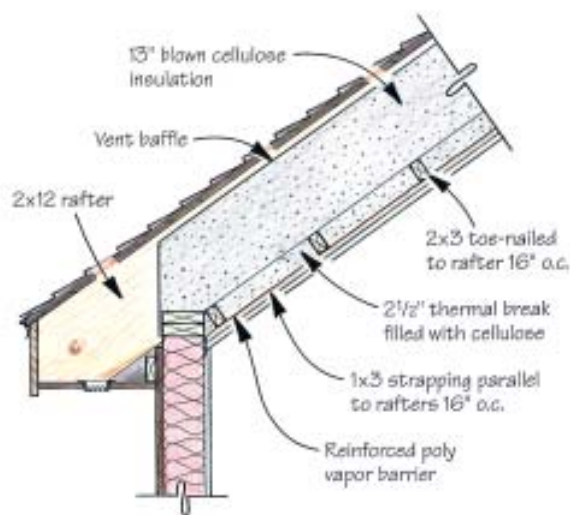
Hanging 2x3s below the rafters using plywood gussets, the author creates as wide a space as he wants for blown cellulose. The insulation also fills the space between the main rafter and the build-down, blocking heat conduction through the rafters. ("Energy-Efficient Cathedral Ceilings," 2/97)

Foil-Faced Foam



If space is limited, the author applies foil-faced foam sheets to the bottom faces of the rafters for added R-value and a thermal break. Taping the seams where sheets meet creates a good air and vapor barrier. ("Energy-Efficient Cathedral Ceilings," 2/97)

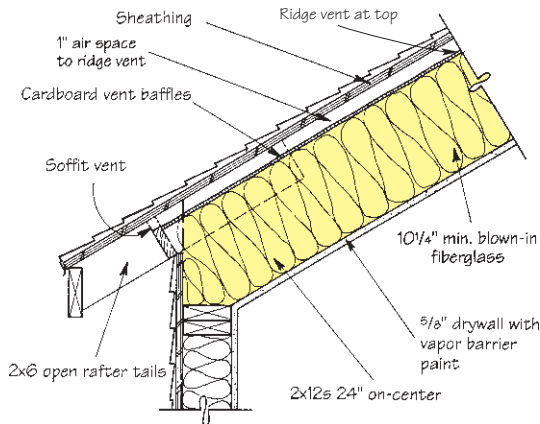
Crisscross Build-Down



In the case shown, a kneewall complicated the vapor barrier installation. To prevent that, the author recommends first insulating the entire roof plane down to the eaves, then building the kneewall. Besides giving a 13-inch-deep insulation cavity, the crisscross build-down also provides a 2 1/2-inch thermal break below the rafters. ("Energy-Efficient Cathedral Ceilings," 2/97)

CATHEDRAL CEILING DETAILS

2x12 Rafters With BIBS



Type: 2x12 rafters with blown-in fiberglass (BIBS)

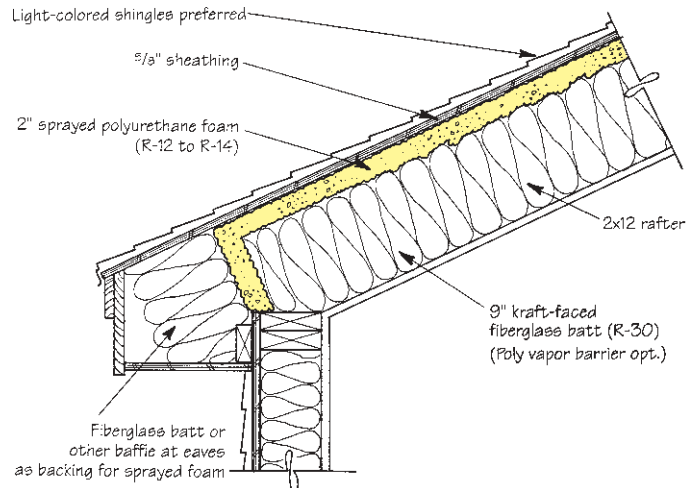
Designer: John Raabe; Langley, Wash.

R-Value: 38-40

Pros: Achieves high R-value with standard framing. Installation is fast. No settling of insulation.

Cons: Somewhat more expensive than batt insulation. ("Cathedral Ceiling Solutions," 8/91)

2x12 Hot Roof



Type: Hot roof using fiberglass and spray urethane

Builder: Paul Bourke; Leverett, Mass.

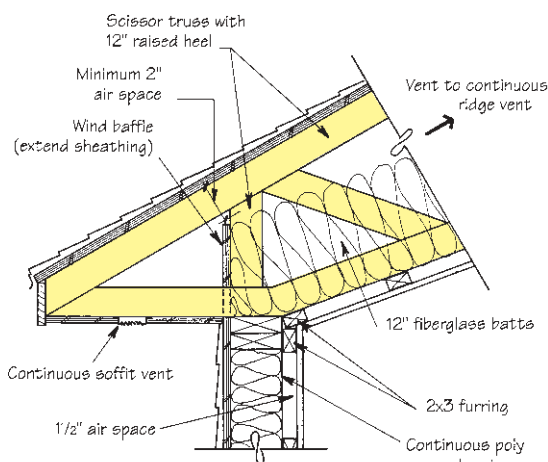
R-Value: 45 plus

Pros: No venting needed, which simplifies complex roofs with hips, valleys, skylights, etc. If properly designed, condensation should not be a problem.

Cons: Not accepted by some code officials. Ice damming an issue in high-snow areas. CFC concerns.

("Cathedral Ceiling Solutions," 8/91)

Scissor Trusses



Type: Scissor trusses with raised heels, fiberglass batts

Builder: William Baldwin; Johnston, R.I.

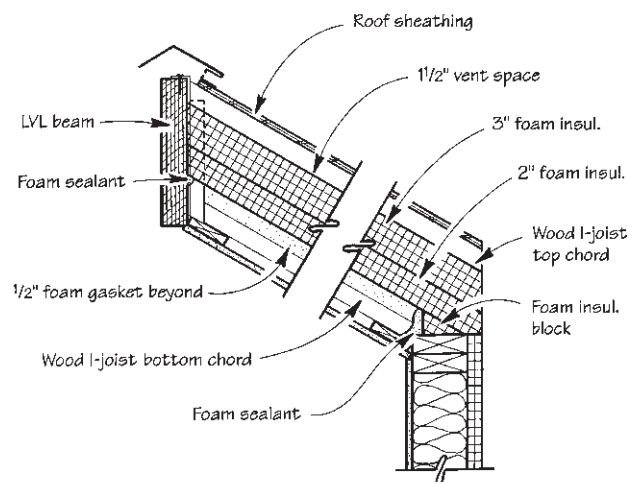
R-Value: 40

Pros: Simple detailing is cost effective. Raised heels ensure full insulation at eaves.

Cons: Batts must be carefully fitted to minimize short-circuiting at truss chords.

("Cathedral Ceiling Solutions," 8/91)

Wood I-Joists & Rigid Foam



The author uses wood I-joists and foil-faced rigid foam insulation to create a leak-free, ventilated cathedral ceiling with an R-value of 39. (*Focus on Energy*, 2/96)