Aligning Eaves on Irregularly Pitched Roofs

Making soffits and fascias line up when intersecting roof pitches aren't the same

by Scott McBride

Spicing up a gable complicates framing and trimming. A pair of steeply pitched gables adds curb appeal to this house with a medium-pitch gable roof. Getting the rafter tails to line up required raising the wall plates on the bays, or kickouts.

Pick up a catalog of stock house plans in any supermarket these days, and you'll see that cut-up roofs—roofs with lots of hips and valleys—are back in fashion. The highly competitive new-home market has compelled builders to spice up their roofs with tasty devices such as Dutch hips and wall dormers. The desired effect is curb appeal, which is the elusive but all-important quality that plays to the homebuyer's romantic notion of what a dream house should look like.

As long as all intersecting roof slopes are inclined at the same pitch, framing a cut-up roof can be fairly straightforward: When the slopes are the same, all of the hips and the valleys run at 45° in plan. Consequently, all hip-, valley- and jack-rafter cuts can be made on a simple 45° bevel (the cheek cuts), and only two plumb-cut angles are required: the common-rafter plumb cut and the hip/valley-rafter plumb cut.

However, combining steep-roofed projections with a medium-pitch main roof is a good way to compromise between cost and curb appeal. A roof system usually starts with a main gable, and increasing the gable's pitch dramatically increases material and labor costs. Cosmetic roof features such as dormers are much smaller, so increasing their pitch won't have the same impact on cost as will increasing the pitch of the main roof.

Because the usual purpose of cosmetic features is to lend drama to a home's facade, there may be a strong incentive to make secondary roofs steeper than the main roof, especially on the street side.

While adding steeply pitched features to a medium-pitch main roof might seem like an ideal way to increase curb appeal, it complicates the framing considerably. I recently built a house that has such an unequal-pitch condition, and here I want to talk about some of the difficulties I encountered and how I resolved them.

The particulars of this job—The house is rectangular in plan, except for two rectangular bays, or kickouts, extending 16 in. beyond the front wall (photo facing page). The kickouts are topped with 12-in-12 gable roofs. The main roof of the house has a 7-in-12 pitch. Because of the different roof pitches, the valleys don't run at 45° in plan; they're angled toward the lower-pitch main roof. I had to figure out what that angle was and then how to frame the valley.

The eaves were to overhang 12 in. on both the main roof and the kickout gables, and a sloping soffit was to be nailed directly to the rafter tails. If I built the main wall and the kickout walls the same height, the kickout rafter tails would end 5 in. lower than the rafter tails on the main roof (7-in-12 vs. 12-in-12). That would misalign the fascia boards and the sloping soffits.

Complicating matters further, the rafters for the kickout gables were to be 2x6, while the main-roof rafters were to be 2x8. To get a grip on all of these variables, I headed to the drawing board.

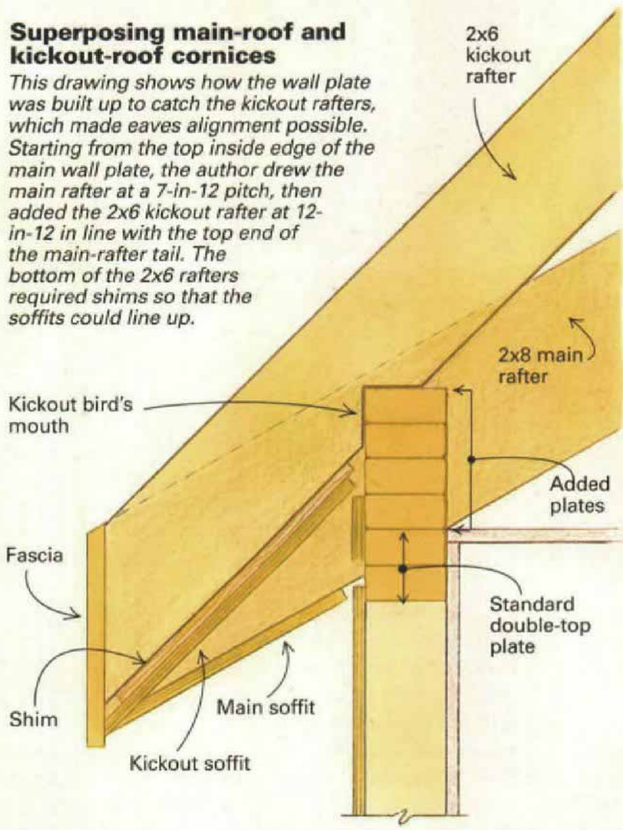
Drawing the cornice section—I always begin roof framing with a full-scale cornice section drawn on a piece of plywood or drywall (drawing right). In this case I drew one cornice section on top of the other—the 7-in-12 main roof cornice section and the 12-in-12 kickout roof cornice section. The superposed drawing provided me with the length of the rafter tails, the location of the bird's mouths, the width of the fascia and the depth of the sloping soffits. From the drawing I also determined how high I'd have to raise the kickout wall so that the kickout fascia would line up with the main fascia.

I began by drawing in the 7-in-12 overhang for the main roof, with the lower edge of the 2x8 rafter starting at the inside corner of the wall plate, the typical location for a bird's mouth. Underneath the 2x8 tail I drew the main-roof soffit. From the point where the face of the soffit meets the back of the fascia, I drew a line at a 12-in-12 pitch to represent the more steeply pitched kickout soffit. Next, I drew a parallel 12-in-12 line from the top end of the 2x8 tail of the main roof; this line represented the top edge of the kickout rafter tail. I now had the top and the bottom edges of my rafter tails aligned at a point 11¼ in. away from the wall. (The ¾-in. thickness of the fascia would increase the overhang to 12in.)

Next, I drew the 5½-in. width of the 2x6 kickout rafter. The remaining distance between the lower edge of the 2x6 and the back of the kickout soffit is made up by shimming. The shims cover the underside of the 2x6 kickout tails and extend up along the lower edge of the kickout barge rafters to keep the eave soffit flush with the rake soffit.

Raising plate aligns fascias

Additional top plates provide bearing for the kickout's 2x6 rafters while picking them up enough to line up the fascia boards.



Superposing main-roof and kickout-roof cornices

This drawing shows how the wall plate was built up to catch the kickout rafters, which made eaves alignment possible. Starting from the top inside edge of the main wall plate, the author drew the main rafter at a 7-in-12 pitch, then added the 2x6 kickout rafter at 12-in-12 in line with the top end of the main-rafter tail. The bottom of the 2x6 rafters required shims so that the soffits could line up.

At this point I could see roughly how much I needed to raise the kickout wall plate. The exact elevation of the kickout bird's mouth wasn't critical because it's in the attic above the second-story ceiling. I built up layers of 2x4 until the raised plate gave good bearing for the kickout rafters (photo and drawing, left). With the kickout rafters sitting higher on the wall than the main-roof rafters, the fascia and the sloping soffit could flow in a smooth line from one roof to the other.

Simplifying valley construction—There are two methods of building valleys. The first, called *a* framed valley, employs a valley rafter that supports jack rafters coming down from both intersecting roof surfaces. A simpler approach, known as a California roof or a farmer's valley, is to build the main roof all the way across and frame the intersecting roof on top of it. Instead of valley rafters, you nail valley boards flat on the main roof and frame jack rafters for the smaller roof only (photo p. 72). (For a description of the California approach, see FHB #79, pp. 58-61)

Because a California roof typically sits on the main-roof sheathing, it can't be used if the smaller roof will have a cathedral ceiling. But there were no cathedral ceilings in this house, so I could use the California approach to frame this roof.

Building a California roof simplified the framing significantly because an unequal-pitch valley has several peculiar traits. First, given that the overhang is the same for both roofs, the valley will not cross over the inside corner where the walls intersect, as is usually the case. Rather, it will veer toward the roof with the lower pitch. A valley rafter's location would have to be figured out beforehand from studying a plan view of the roof framing.

Furthermore, an unequal-pitch hip or valley rafter requires two different edge bevels at the point where it hangs on intersecting ridges or headers. One of the bevels will be sharper than 45°, so it cannot be cut with a standard circular saw. With the California roof, I avoided the problem of dissimilar edge bevels and the hassle of locating valley rafters.

I located the off-center valley simply by snapping lines on the main-roof sheathing. First, I in-

Drawings: Bob Goodfellow

One roof framed on another. A California roof features valley boards that lie flat on the main roof sheathing. As opposed to a valley rafter, there's only one set of jack rafters to cut and one cheek-cut setting on the circular saw.

stalled the kickout ridge and its common rafters. Then, at the peak of the kickout gable, I anchored a chalkline, stretched it diagonally across the kickout common rafters and marked a point somewhere near the eaves where the chalkline hit the main-roof sheathing. The top of the valley occurs where the kickout ridge dies into the main roof, so, by striking a line across these two points, I located the valley boards. I beveled the edges of the valley boards and nailed them flat on the main-roof sheathing.

Mitering the soffits—Once I had the kickout jack rafters and sheathing in place, I turned my attention to the cornice. Thanks to the raised plate on the kickout wall, all of the rafter tails lined up, and the fascia flowed smoothly around the comer. But now I had to make the sloping soffits do the same thing.

The main question was at what angle should the soffit boards be cut to create a clean miter at the inside corner (where the main wall and the kickout wall intersect). I could cut some scrap pieces with 45° face cuts and continue adjusting the angle by trial and error until I had a good fit. Or I could stay on the ground, figure out the angles on paper and install the soffits on the first try.

I opted for method two, and I accomplished this through graphic development. Graphic development is a way of taking a triangle that occurs in space, such as the gable end of a roof, and pushing it down on a flat surface where it can be measured accurately. All you need is a pencil, some paper, a framing square and a compass. A stubborn disposition helps, too.

To figure out the miter angles of the soffits, I began by drawing a plan view of the wall lines and the fascia lines (drawing facing page). 1 then drew in plan views of the main-roof rafter tail and the kickout rafter tail, each perpendicular to its respective wall. In addition, 1 drew elevation views of the same rafter tails. I used the numbers 7 and 12 on the framing square to draw the main-rafter elevation view and 12 and 12 for the kickout elevation view. As the plan view and the elevation view of each tail cross the wall lines, they show the vertical rise of the tails: 7 in. for the main roof, 12 in. for the kickout.

Next, I needed to draw the valley. Remember, it doesn't run at 45°. I already had the end of the valley: the point where the fascias intersected. What I needed was another point farther up the valley so that 1 could draw the valley line. Because 1 already had drawn the 12-in, kickout elevation view, 1 decided to find the point where the valley rises 12 in.

First, I extended the kickout-wall line in the direction of the valley. At this line the kickout roof rises 12 in. above the fascia, so the line represents plan views of both the kickout wall and the kickout roof's 12-in, rise line. Then, 1 extended the main rafter tail and drew a perpendicular line showing the plan view of the main roof where it rises 12 in. above the fascia. The intersection of both of the 12-in, plan-view rise lines is a point on the valley, and, by connecting this point with the inside corner of the fascias, I drew the valley in plan.

To determine the miter angles (or face cuts) for the soffit material, I used a compass to swing the 12-in, high elevation view of each common rafter tail directly over the plan view. This point represents the actual length of the rafter where it rises 12 in. (as opposed to the foreshortened length of the rafter when seen in plan).

Then, I drew lines perpendicular to the plan views of the rafters at the points where my compass intersected them. These are labeled elevation lines on the drawing. Next, I intersected the plan line of one soffit with the elevation line of the other soffit. I connected these intersecting points to the inside corner of the fascia, giving me the angle of each soffit's face cut.

Try to imagine the inside soffit edges rising up while the outside soffit edges remain "hinged" along the fascia line. When the inside edges have risen 12 in., the soffits touch along their face cuts, forming a valley, or as viewed from below, an upside-down hip (photo facing page). The meeting takes place directly over the plan view of the valley line.

The face cut for the kickout soffit was the same as the face cut for the kickout roof sheathing, which happened to be 1x6 but could just as easily have been 4x8 sheets. The sheathing sits on top of the rafters, and the soffit hangs below. Otherwise, they're the same.

Because of its steeper pitch, the kickout soffit dies square into the house for a short distance before mitering with the main-roof soffit. I could tell from the graphic development where to cut the kickout soffit along the main-wall line. The pieces fit on the first try.

Joining mitered soffits—The edge bevel for the soffits wasn't critical because the backside doesn't show. I just cut them at 45°, which undercut the pieces more than necessary and assured a tight miter. Fastening the intersecting soffits presented a problem, however, because I didn't have a valley tail to nail the ends of the soffit plywood to. (That would have been the only good reason for using a framed valley here instead of a California valley;)

To solve the problem, I connected the main-roof soffit and the kickout soffit along their intersection with a beveled 2x4 backerboard. I beveled the 2x4 to match the angle of the valley trough. The 2x4 backerboard didn't have to fit tightly between the fascia boards and the house because the ⅜-in. soffit material was pretty stiff. Instead, I just cut the ends of the backerboard for a loose fit and pulled it against the soffits with galvanized screws. □

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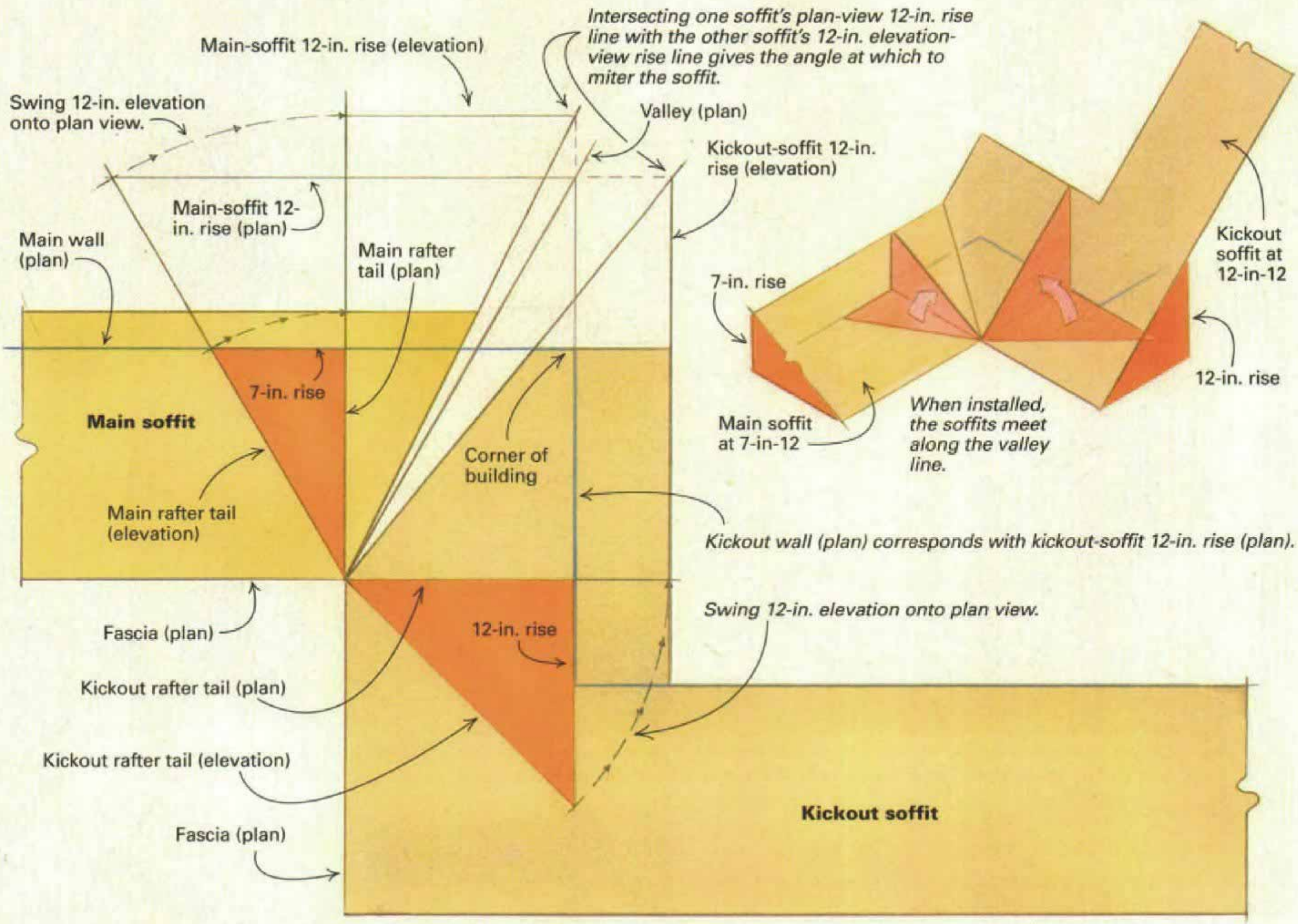
Figuring out the soffit angles

Sloping soffits make for tricky miters. One problem with this roof was getting the sloping soffits of two different roof pitches to flow smoothly around the inside corner. The miter mirrors the offset valley, so the kickout soffit dies square into the main wall. A beveled 2x4 provides backing along the miter joint.



Combining plan views and elevations. *The challenge was to miter the soffits so that when they're nailed to the rafters, the soffits intersect along the valley line. The solution was found through this graphic development (lower drawing), which shows the soffits lying flat on the paper. The first step was to draw the walls and the fascia. Next came plan views and elevations of the rafter tails. Then, with a compass, these elevations were swung back onto their plan views, which gave the widths of the soffits. Finally, the angle of the soffit miters came from intersecting the plan view of one soffit at a given rise—in this case, 12 in.—with the 12-in. elevation line of the other soffit. When the soffits are pitched at 12-in-12 and 7-in-12, they come together directly above the valley line in plan (upper drawing).*