



Choosing a Roof Form

by Gordon Tully

Roof forms developed for practical and visual reasons. In many instances, those forms became associated with specific styles. Sadly, this has led designers to choose a roof form because it “looks authentic” or because it creates a particular effect.

I prefer to look at roof forms as a kit of tools, there for our use, with nothing to prevent us from mixing and recombining them, as the designers of the late 19th century were wont to do.

In this column I’ll address how to design a roof to enclose living space, in contrast to a roof that simply sits above the top floor like an inappropriate hat.

Roof Form Follows Wall Height

When designing multistory homes, I often found myself checking the headroom at the outside wall. After making several passes at the subject, I realized the height of the outside wall was the most important factor in working out the roof.

For example, a staircase might rise up along an outside wall, then turn to clear the roof. Working between section and plan views, I would have to

determine how many stair risers fit before the headroom ran out.

Other times I’ve struggled with ways to widen the plan under a roof. How would I get two bedrooms side by side within the width of a dormer? How much standing headroom was there under the gable roof?

In all cases the problem to solve was the relationship between the roof section and the location, in plan, of stand-up, “livable” space under the roof.

Make-or-Break Heights

The make-or-break issue for roof design revolves around the crucial heights of the outside wall and, in some locales, the standard 6'-8" door height. Some zoning ordinances define usable space as anything with a ceiling height over 4 feet. You, of course, need to use the measurements required by your local codes and ordinances to determine, for example, whether you have a legal-width room under the roof.

Roof on the Floor

The simplest two-story house has one full story with a 12/12 pitch roof

coming down to the second-floor level. In an effort to maintain a vapor barrier and guarantee adequate insulation, I always detail this type of house with the rafters sitting directly on the second-floor deck, not on the top plate. Built this way, the intersection between the ceiling attached to the rafters and the finished floor is about 6 inches in from the outside wall. This intersection is crucial to planning, so I work out the eaves detail before getting too far into the plan.

In our example of a new Cape with a 12/12 roof, the door-height line will be 7 feet 2 inches in from the outside face of the wall. If the house were 24 feet wide, this would yield 9 feet 8 inches of space above door-height under the roof, and the ridge (if you didn’t install a dropped ceiling) would be at 11 feet 6 inches. To get two 8-foot-8-inch-wide bedrooms in, the house would need to be 32 feet wide, and the ridge would be at 15 feet 6 inches (see Figure 1).

Raising the roof. As an exercise, draw this same 32-foot-wide design with the two bedrooms, then set the walls in by 4 feet on each side so you are back to a 24-foot-wide house, as in the middle drawing of Figure 1. What happens to the roof? The eaves rise up by 4 feet, but everything else is exactly as it was. The message is, don’t start with the roof form and try to squeeze space in under it. If you let the eaves height vary, you will find many more solutions to roofing a house.

Finding Room Under the Roof

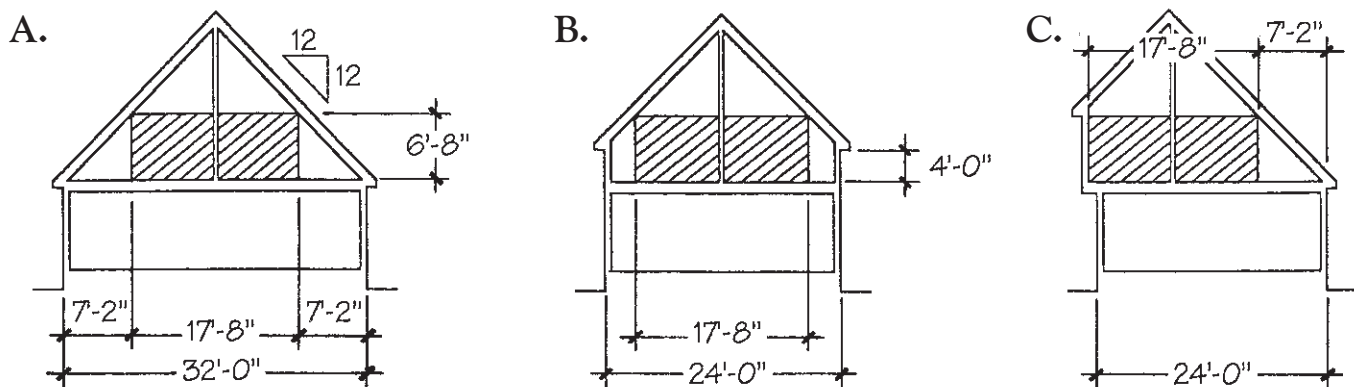


Figure 1. The modern Cape with 12/12 pitch roof (A) must be 32 feet wide to squeeze in two upstairs bedrooms with a “livable” headroom height of 6 feet 8 inches. Raising the eaves 4 feet (B) offers the same livable space upstairs, but allows the downstairs to be 8 feet narrower. Shifting the livable space off-center and raising one exterior wall to full height creates a classic Garrison Colonial Saltbox (C).

Lowering the Pitch

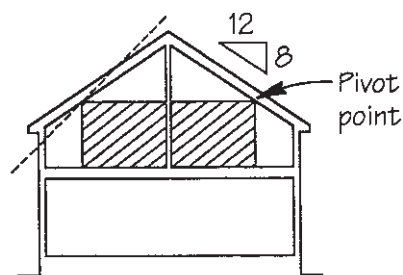


Figure 2. Another way to find headroom upstairs is to first establish the livable space, then vary the pitch by “pivoting” the roof around the outside corner of the space. This results in a lower-pitched roof and a style reminiscent of many 19th century houses.

Shifting the roof. Now shift the 24-foot first floor over so that one side of the roof comes back down onto the floor, as in the Cape. From the section view in Figure 1, you can see we have reinvented the Garrison Colonial Saltbox.

“Garrison” means the second story overhangs the first story. The name is derived from the mistaken idea that this Medieval structural system was intended for defense. “Saltbox” refers to a common, New England, two-story farmhouse type with a lean-to kitchen at the back. The name (I am repeatedly told) describes the shape of the contemporary box that salt came in. I have never seen one of these boxes, so can only pass on the story.

But more important than the names, if you start with plan and section when trying to solve a problem (in this case, getting the second floor over to one side), you’ll generate historical forms for good, contemporary reasons. This is a much better way to arrive at historic forms than merely striving for the overall appearance.

Playing with the Pitch

Now let’s fiddle with the roof pitch by pivoting the roof around the corner of the outside wall of the same two bedroom spaces (Figure 2). As the pitch goes down, you need a wider plan or a higher plate to yield the same livable headroom. Many of the one-and-a-half-story, raised-eaves houses built during the 19th century have 6/12 or 8/12 pitch roofs, which keeps

the ridge lower but still provides plenty of useful space upstairs.

Breaking In

Another way to vary the pitch is to “break” the roof. You can do it either of two ways: in or out. Breaking in is helpful when you are trying to pitch a porch roof so that the high point lands below a windowsill.

When the main roof extends out over the porch, as in Figure 3, the dormer either has to extend out or you have to cut into the roof down to windowsill height, as was done frequently in the Bungalow style.

By breaking the roof pitch at the porch, however, the dormer moves back into the plane of the main house wall, and you end up with a nice raised-eaves house with an attached porch.

Break Out

Now break the roof the other way, so it bulges out, and you arrive at a gambrel roof form. Typical of the Dutch Colonial style, this design can be generated either by a desire to “look

Porch Roof Options

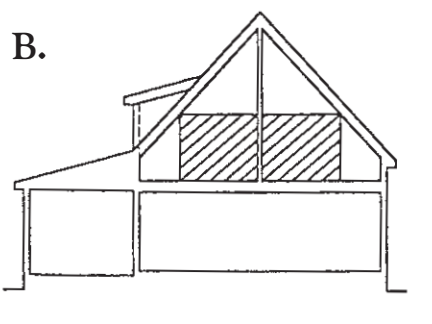
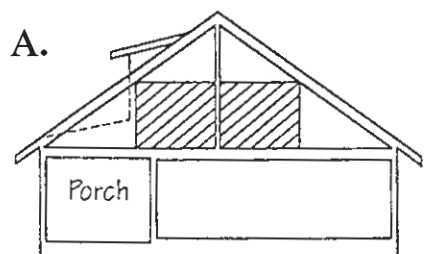


Figure 3. There are two ways to detail a porch roof so that its high side lands below upper-story windows. The Bungalow solution (A) cantilevers the bedrooms over the outside wall; accommodating a window then presents a waterproofing challenge. Raising the eaves wall (B) makes it simpler to place the window above the plane of the porch roof.

Dutch” or, more practically, to widen the amount of usable space on the upper floor (Figure 4).

Push the broken roof to the extreme and run it around all sides of a squarish house and you end up with a mansard roof, a difficult form to deal with, but one that nonetheless evolved to maximize livable space. Gluing a phony mansard box onto the outside of a two-story house results in unsuccessful exterior decoration, not architecture (Figure 5). So let’s all agree to avert our eyes when this design comes into view.

The focus of this column has been on simple buildings with a uniform cross-section. The real fun begins when you start turning corners and adding large cross-gables and dormers, but that must wait until next month. ■

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Gambrel

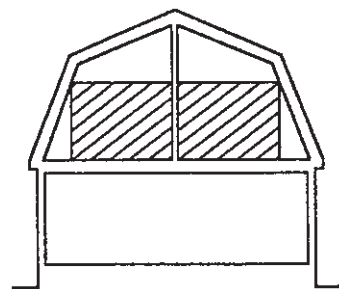


Figure 4. Breaking the roof pitch to create a gambrel results in more usable space.

Phony Mansard

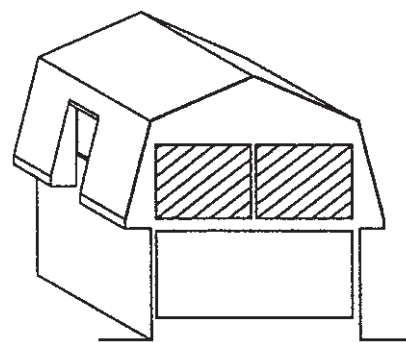


Figure 5. Avoid tacking on a phony mansard in a search for room upstairs. According to the author, this eyesore will get you drummed out of the corps.