

The Logic of Roof Forms

by Gordon Tully



In last month's column, we looked at the underlying logic of roof forms by examining the cross-section. This month, we'll look at the roof from the outside and see how various roofs join at the corners.

The complicated roof forms that characterize many new houses are contrived to reproduce the visual effect of a popular style. But the essence of the style is often missed because the plan has to be tortured to fit under the preconceived roof.

In other cases, the roofs look arbitrary because they are merely boxes of trusses set on the top of the building. If you remove the constraints required to design a roof over usable attic living space, you end up with Disneyland — image with no content.

To understand a particular roof configuration, you have to look underneath it and see what kind of space it encloses. Looked at in this way, many cherished stylistic devices take on more meaning when you understand that they are clever solutions to difficult architectural problems.

Square Roofs

To start, let's look at the simplest house form, a square. The upstairs plan in each case is a cross-shaped area of full standing headroom, with lower-height space in the four corners. The eaves are raised above the second floor.

The sketches in Figure 1 show four basic roof forms. (The cross-hatched area indicates the "livable" headroom area under the roof.) Gables on all

four faces (A) can be transformed into a four-sided gambrel (B) by breaking the roof outward into two pitches. If you maintain the same amount of standing headroom space, the plate can be lowered; if you hold the plate height, you get more living space with the gambrel. That is surely its functional origin, regardless of the cultural baggage it picked up along the way.

Sketch C shows a hip. Unlike the gable, a hip requires dormers to create usable space. I have shown hipped dormers, but they could just as well have gable or shed roofs.

Note that in the example, the main hip disappears at the dormers. In most real examples, the dormers are narrowed enough to allow the main hips to run through to the peak. I don't use hipped roofs for this very reason: They work best when the dormers are narrow relative to the main roof, thus cutting down on the light available on the upper floor.

Breaking the hipped roof outward creates a mansard (D), with shed dormers shown (they could just as well

Square Roof Options

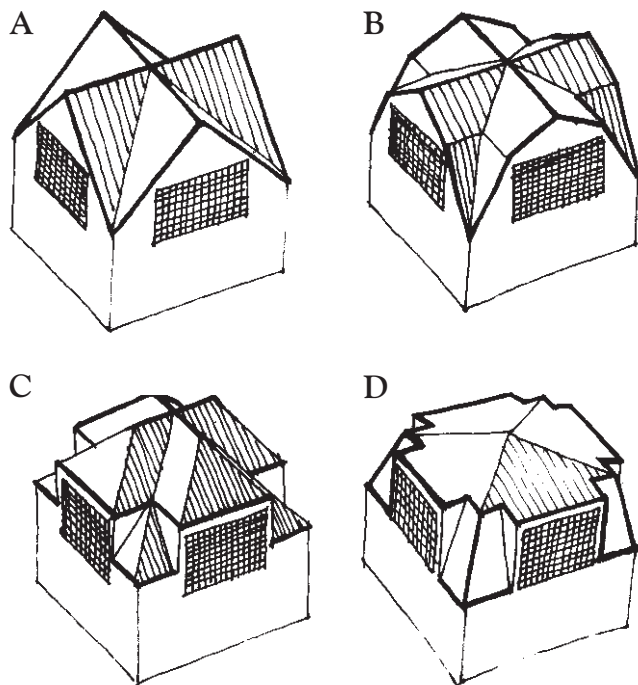


Figure 1. The cross-hatched areas in the drawings above represent space with "livable" headroom. You can change a square cross-gable roof (A) to a gambrel (B), hip (C), or mansard (D) and still maintain the same living space under the roof.

Gable Variations

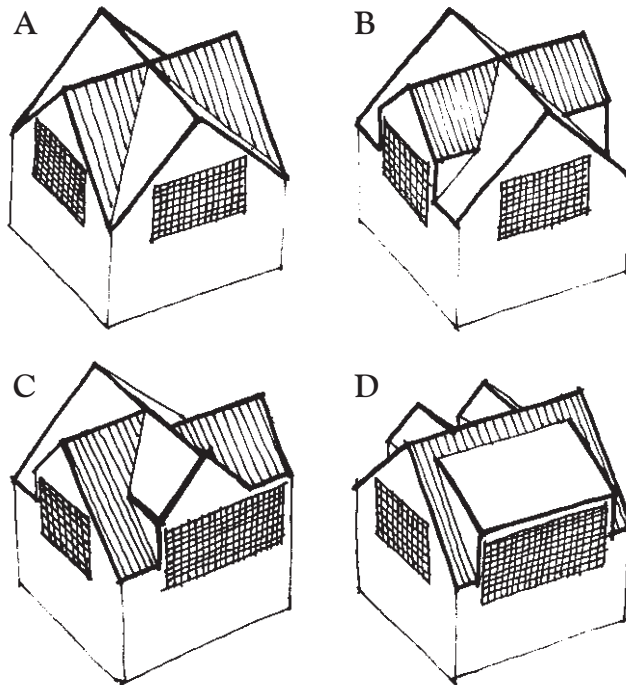


Figure 2. By thinking of the gables as individual dormers, a cross-gable roof (A) can be endlessly varied. You can reduce the width of two of the gables and keep the basic cross shape (B), or you can slide the narrow gables along the main roof for a pinwheel effect (C). Adding a shed to the rear and a pair of small gable dormers in front gives a Cape-like form (D).

Outside Corners

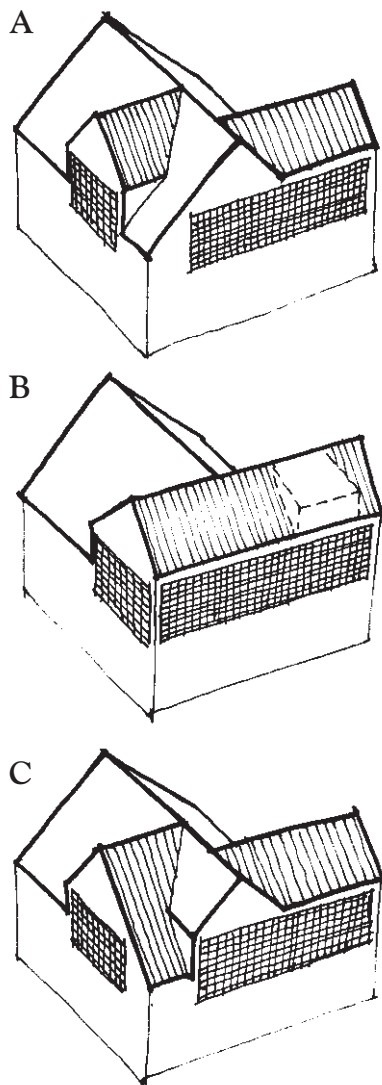


Figure 3. Here are three options for roofing the rear outside corner of an ell-shaped plan, each ell with a different width and plate height.

be gabled). As with the gambrel, the mansard roof can be lowered or the living space expanded.

Gables and Dormers: A Kit of Parts

If you think of the standing head-room spaces at the four gables as if they were dormers, the gable form is subject to almost endless variation (Figure 2).

The gable-with-dormer approach allows the dormer to be widened or narrowed (B), or slid along the main roof (C).

When you put a shed roof on a rear dormer, widen it, and put a couple of small gabled dormers on the front, you end close to the standard Cape Cod

Inside Corners

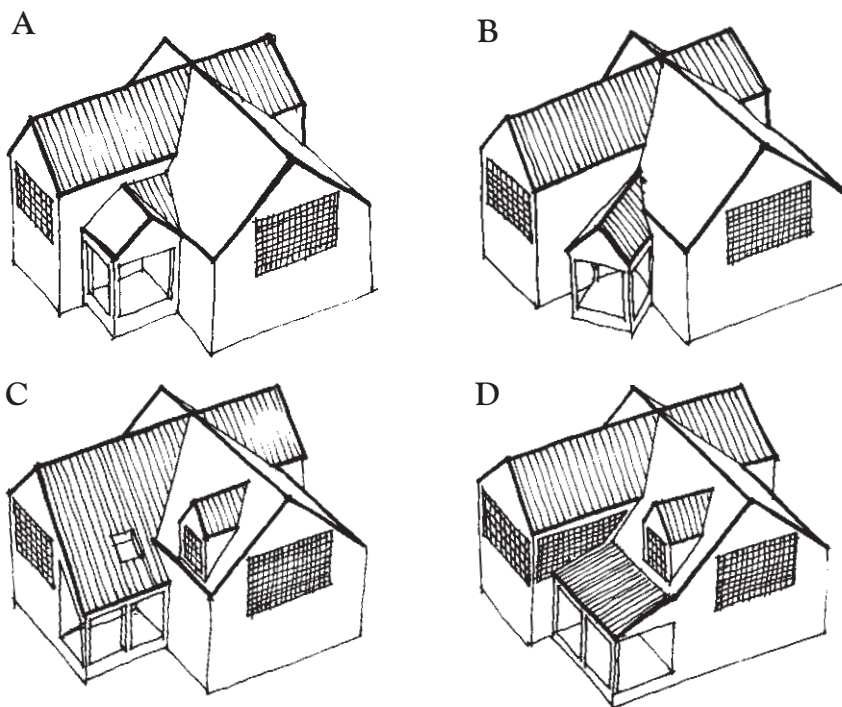


Figure 4. An inside corner is often an entry point and needs a low roof. A perpendicular gable roof (A) creates a tricky watershed area, while the acute corners of an angled gable (B) are difficult to trim. A better solution is a shed roof, which can be an extension of one of the main roofs (C) or a separate, lower roof (D).

house (D), though the raised eaves would have to go.

Extending the Gable Idea

A square plan helps clarify principles, but is a rarity. A more common form is an ell-shaped plan with the two ells having different widths (Figure 3). Looking at the rear corner of the house in A, the wider wing has the main roof, with the eaves of the narrow roof lifted high enough to clear the windows. I've added a dormer to the back of the main roof. If you extend the narrow roof and bang the larger roof into it (B), you lose the gable end and the dormer. The result is economical but boring, showing that you don't automatically get good results just by manipulating roof forms.

Adding a dormer (shown in dashed lines in B) is an obvious way to enliven the long elevation, but you need a floor-plan reason to do this — perhaps a stair hall or other room where a high ceiling is justified.

As with the square roof options, the intersection can become quite interesting, as in C. Here we are inventing with roof forms, independent of any

preconceived style. This is architectural design at work — avoiding historical copying while still using traditional forms.

Inside Corners

The ell-shaped plan adds an entirely new problem: dealing with an inside corner. To take full advantage of such a plan, you almost always need to enter at the inside corner. But this creates a problem: You need protection from rain or snow, and you need to announce the entryway (Figure 4).

One traditional approach — creating a gable or pediment over the front door — is very hard to detail at an inside corner, as A and B show. A much better approach is a lean-to porch, which can be attached in various ways. The porch roof can either be an extension of one of the main roofs (C), or a separate roof at a lower pitch (D). Dormers can be added where needed, providing you keep them an appropriate distance away from the main valley. ■

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