Roof Pitch and Building Form

by Gordon F. Tully

In housing design, the overall form (or "massing," as it is called in arch biz) is largely an interaction between plan and roof. Roof forms carry with them powerful symbolism and can help create order out of a complex plan.

Theoretically, the simplest roof is flat. Many styles—including today's "post-modern" designs, which often suppress the roof by using the facade as the chief organizing element in the design—depend heavily on them.

Frank Lloyd Wright used flat roofs, or roofs with very low pitch (slope), so that only the roof edge and overhang counted in the design. Flat roofs can work with any house plan, which helps to explain how Wright developed such ingenious and perfect plans. And many modernists used flat roofs to create a cubist composition.

There was a time when flat roofs were considered technically risky, but the excellent plastic sheet materials available today are highly reliable. Despite all their advantages, however, flat roofs are looked down upon except in row housing and larger buildings.

Pitched roofs require discipline in plan—it's difficult to set a gabled roof over a wedge-shaped plan, for example. Some modernists tried it, either letting the eaves drop or the ridge rise, with uniformly disastrous results: The buildings all looked like tents or churches.

Among pitched roofs, the hipped roof is the most flexible. It's possible to cover any one-story plan—even one with odd angles—with a shallow hipped roof. Simply create valleys at the re-entrant corners and hips at the protruding corners, and let it all crash together on top. Viewed from the ground, the results can be quite elegant.

Increase the pitch, and all hell breaks loose. First, the collisions are exaggerated for all to see. Second, huge volumes are created under the roof, requiring the introduction of a second floor. Like a gable, a steeply pitched hip roof demands a disciplined plan.

For economy, nothing except possibly a flat roof can beat the simple gable roof set over a rectangular box. There are innumerable variations. Ranch houses have one-story walls capped by a low-pitched gable roof, often with a full basement below. If the basement is partially or fully exposed, you have a raised ranch ("split ranch," "bilevel" or whatever).

Some bilevels have a fully exposed basement, turning the ranch into a two-story house with the living spaces on the second floor. The "half entry" typical of bilevels is retained; it's reached by a half-flight of exterior stairs. At the back, there is always a porch resting on spindly legs. Things like this happen when economy is the only guiding principle in design.

If the roof is more steeply pitched, you can squeeze in a partial second floor, illuminated at the ends by ordinary windows and through the roof by dormers or roof windows. The form is that of a Cape Cod cottage—always a popular design.

If one side of the roof is built on a two-story wall and the other on a one-story wall, you get a "salt box." Flatten the pitch and place the roof on a two-story building, and you get a "colonial"—or a "garrison" if the second floor overhangs the first.

In each case, the basic form can be enhanced with the appropriate historical details, or other prototypes can be evoked—farmhouses and barns, for example.

One of the most useful and handsome of these gabled forms has the roof erected on a stud wall that extends past the second floor level—a form I call "raised eave" for want of a proper historical name. This form is basic to the design of Greek Revival houses, but you see it commonly on the Cape and in Maine. (I believe I have mentioned the subject in every one of these columns so far.)

The added height at the side walls increases the space on the second floor relative to the Cape Cod House. Dormers look like parapets rising from the wall below, rather than boxes set on the roof.

The raised-eave designs create a problem in resisting the roof thrust, however. When post-and-beam framing was in use, the supporting posts could run continuously between the foundation and the eaves to support the outward thrust of the roof rafters by acting as vertical cantilevers. I suspect that when balloon framing replaced post-and-beam construction, the continuous studs were used to resist the roof thrust in these houses.

In modern platform framing, the studs start anew at each level. If the roof is set on a half-high stud wall, its thrust will overturn the wall because there can be no cross-ties at the eaves. Collar ties at the attic level will hold the roof together if they are far enough down from the ridge.

Turning the roof ridge into a beam resting on internal supports removes the thrust and the problem. And there is no problem if the roof is framed with trusses designed to avoid outward movement at the eaves. Given that this technical problem is easily solved, the form is extremely useful and should be returned to favor.

Many other roof forms are possible. We'll take a look at some of them — including gambrel, Mansard and shed roofs—next month in Part II of this article. •

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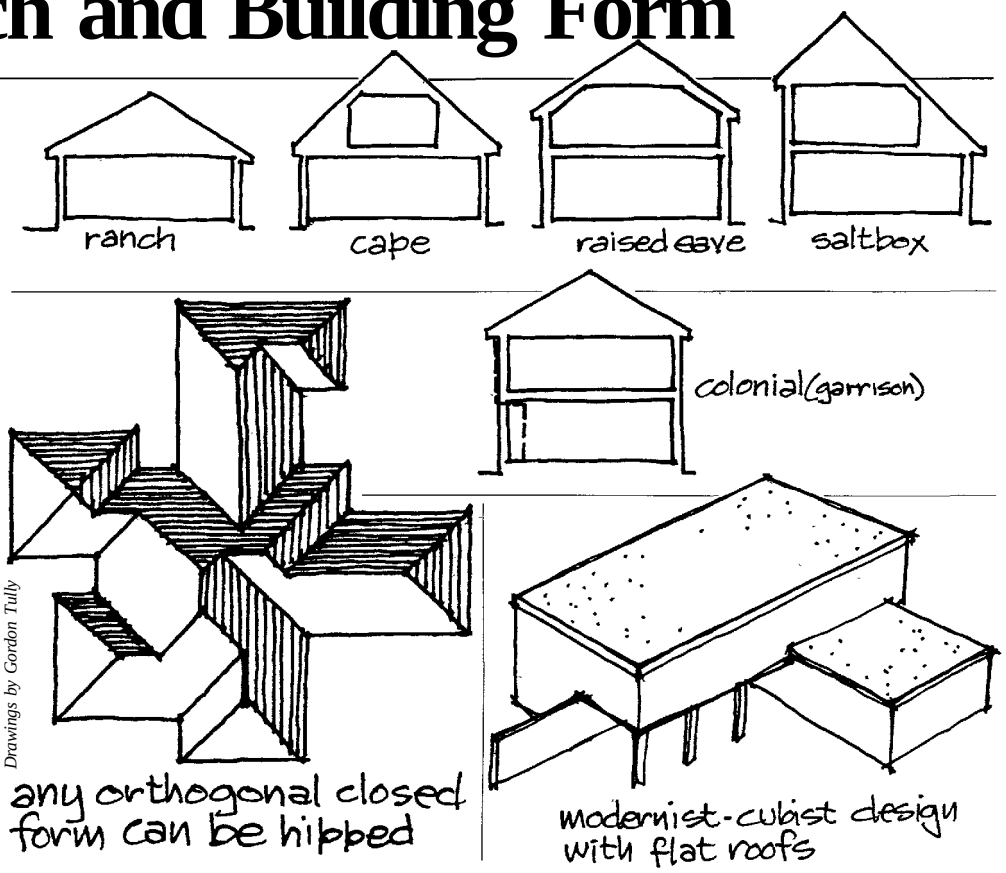

Drawings by Gordon Tully

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