

### *Up On the House Top: A Primer on Roofs*

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A roof's obvious function is to protect a building from the elements: rain, snow, wind, and sun. Historically, American homes' roof styles were dictated by climate, availability of materials, technology, and the regions of origin of settlers who built them. For much of this century, however, roof styles were driven not by function, but by aesthetics. In fact, it can be argued that the roof – of which many styles are found in the US – often is what best reveals a home's architectural style.

#### **The Venerable and Versatile Gable**

A *gable* roof consists of two sloping rectangular surfaces, which come together in a horizontal seam along the roof's peak. The two planes form an inverted "V;" they rest atop the building's outer walls, rising on triangular upward extensions of the walls called gables. A house with its main entrance under a gable is referred to as *front-gabled*, while a main entrance under a rectangular roof surface indicates a *side-gabled* house. A house with a gable roof is depicted in Figure 1.

The gable roof's rectangular surfaces were originally sloped at 60° angles (with about 20 inches of rise for each 12 inches of horizontal run, or "20/12" in roofing jargon). The "pitch" was steep to accommodate thatch, the roofing material early American settlers had known in Europe.

Rain could penetrate thatch and seep into the home if the roof was not sufficiently steep. With a high pitch, water ran down the thatch and off (not into) the structure. When early settlers found that thatch was not well suited to New England's harsh winters, they replaced it with wood boards or shingles. These new materials did not *require* the extreme steepness of pitch that had been necessitated by thatch (though *some* steepness is always helpful for snow removal), yet the steep pitch remained a design standard for many decades despite the lack of a functional need.

#### **Variations on the Theme**

Because a *shed* roof has only one rectangular surface, it might be thought of as a gabled house split down the middle. The shed roof's highest elevation therefore is along one wall, rather than in the middle of the structure; see Figure 2. Shed roofs were once common in the Pacific Northwest. They were also found on what came to be called "urban half houses;" because this type of structure literally looked like only half of a house, it was considered only half finished, and was taxed accordingly.

An American adaptation of the basic gable roof developed in New England. Unlike the gable shown in Figure 1, the

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"Cap Rates in Commercial Appraisal: Chicago vs. National" (page 1) provides a discussion of capitalization rates and a comparison of rates for Chicago area commercial properties with rates nationwide; while Chicago long enjoyed "cap" rates below national averages, recent data show a convergence between Chicago and US figures. "Venus de Milo vs. Goddess of Durga: The Value of ARMs" (page 5) discusses the adjustable rate mortgage loan, examining both the market's proportion of ARM loans and the interest rate/rate cap features that allow lenders to profitably lend to different types of borrowers. "Horizontal Apartments" (page 8) presents a successful Illinois real estate investor's views on the benefits, ranging from less costly management to better tenant relations to easier resale, of investing in single family homes rather than traditional apartment buildings. "Nine Cases of Sprawl" (page 10) is an economist's explanation of reasons why we will continue to observe growth in the geographic size of America's urban areas; some of these reasons point to inefficiencies or social inequities that policy makers should strive to address. "Up On the House Top: A Primer on Roofs" (page 16) describes several styles of roofs in terms of function and aesthetics, and provides some colorful history that helps to explain why various roof styles have become popular.

# The Home Front

Figure 1: Gable

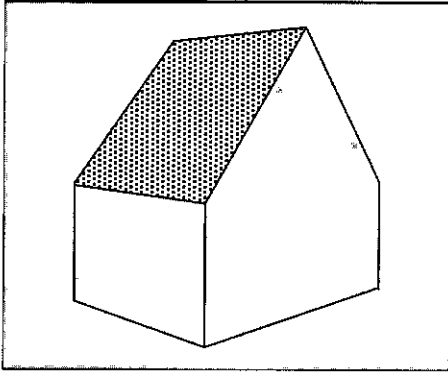


Figure 3: Saltbox

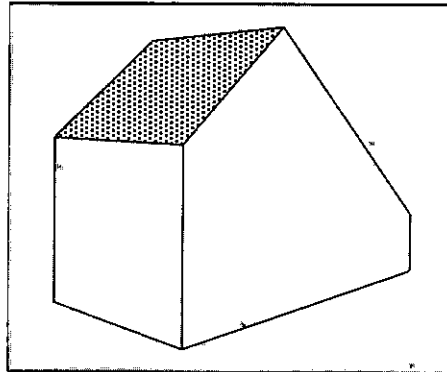
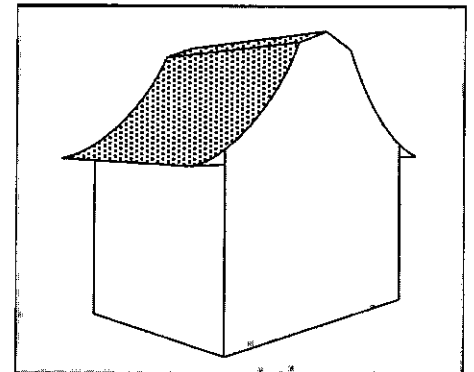


Figure 5: Rural Dutch Gambrel



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roof on the *saltbox* is asymmetric, with one rectangular side extending down, in some cases, almost to the ground (albeit with the same pitch as the other side). It was dubbed a saltbox house because its design resembled boxes people kept for storing salt; see Figure 3. The saltbox might be thought of as a traditional gable design, with one side augmented by an abutting shed having the same roof pitch. The design emerged in New England's cold climate, where the roof's long side faced north to protect the home against cold winter winds. The wall that supported the roof's south-facing short side was taller, with more windows to let sunlight penetrate the home's interior. The design is not uncommon even today, but it is unfortunate that builders often position saltboxes incorrectly on their lots (with the windowed front facing north and the roof's long protective side facing south).

A *Field Guide to American Houses* (an excellent book by Virginia and Lee McAlester, Knopf, 1984) discusses houses' architectural styles in the context of roof types. For example, a home built in the Tudor style generally has a steeply pitched gable roof (in excess of 45°, or

12/12), while the Folk Victorian typically has a moderately pitched gable (30-45°, or about 7/12-12/12) and the Craftsman has a low pitch (less than 30°, or 7/12).

Another gable variation is the *gambrel*. Whereas each of the roof designs examined above has a *single* rectangular surface on each side, the gambrel features *two* rectangular surfaces, each with a different slope, on each side of the roof. The lower surface has the steeper pitch. Figure 4 depicts a gambrel roof. The gambrel design offers more headroom under the roof for living or storage area.

There are several gambrel roof varieties. The two surfaces on each of an English gambrel's sides are about equal in length. The top surface's slope is approximately 25°; the lower surface's pitch is about 45°. The two surfaces on each side of a Dutch gambrel differ in length. The shorter top surface is pitched at about 22°, while the longer bottom surface is fairly steeply pitched, at approximately 60°. Gambrel roofs are associated with the Dutch Colonial and Georgian styles of house, among others.

One version of gambrel, seen on some Rural Dutch Colonial style homes, has short linear top surfaces, with longer

lower surfaces that are curved inward, as shown in Figure 5. The lower surfaces tend to sweep out past the walls of the house, resulting in a bell-shaped appearance. The Rural Dutch gambrel's flaring eaves, sometimes called *flying gutters*, were once a function of necessity; the wide overhangs protected old-world clay (which was mixed with lime and straw) walls from the elements. In America, more durable and stable stone and wood replaced clay, but flared eaves remained.

Nonlinear roofs are not unique to the Rural Dutch Colonial. In fact, another Dutch style of house had the *single* roof surfaces of a standard gable design, but with inward curves and flaring eaves. Another nonlinear twist on the gable is the *round* roof, with *outward* curves, a design seen on some barns. This type of roof, depicted in Figure 6, was a logical outgrowth of the gambrel, in that it made use of storage capacity above the walls. This style was popular for a period following World War I, perhaps because of its appearance. It did not gain lasting acceptance in the farming community, though, because round roofed barns were more expensive and complicated to build than their more mundane counterparts.

Figure 2: Shed

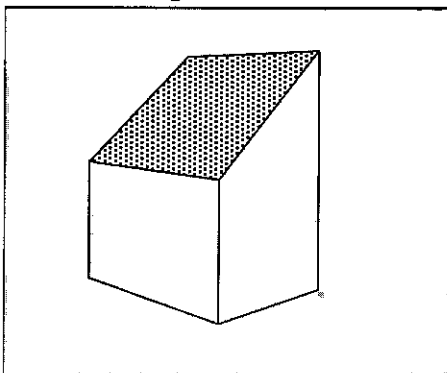


Figure 4: Gambrel

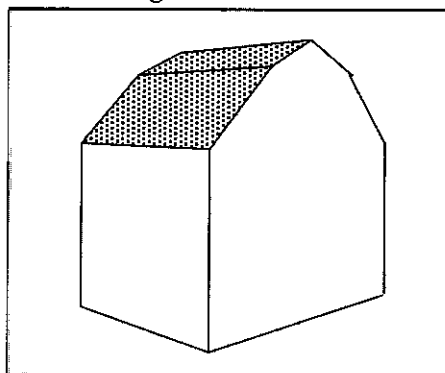
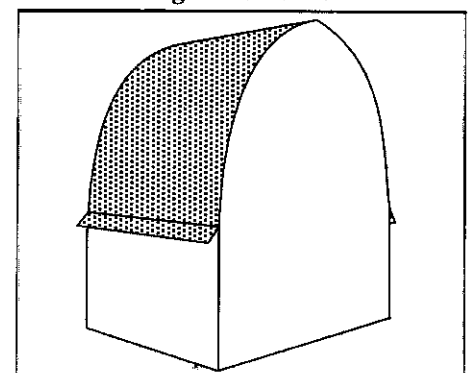


Figure 6: Round



# The Home Front

Figure 7: Hip-With-a-Ridge

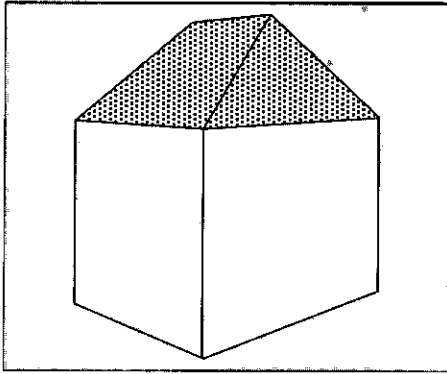


Figure 9: Mansard

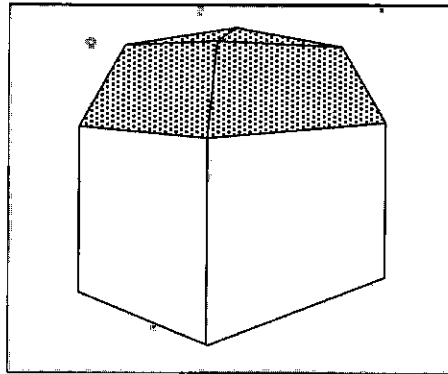
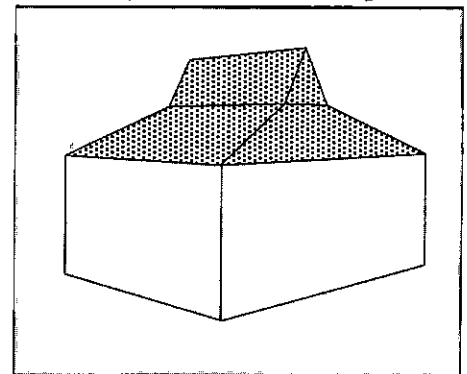


Figure 11: Gable-on-Hip



## Like, Are You Hip?

Whereas each of the roof styles discussed above is a variation on the gable design, another family of roof styles consists of variations on the *hip* roof design. A basic hip roof has four sloping surfaces, with one surface resting on each exterior wall of the house. If there is a ridge along the top of the roof where the four surfaces come together (similar to the ridge seen on a gable roof), the roof is referred to as a *hip-with-a-ridge*, shown in Figure 7. We might think of the hip-with-a-ridge as a gable roof with sloping (non-vertical) gables. Two of the four surfaces (what we might call the "sloped gables") are triangular in shape, while the others are trapezoids (four-sided figures with top widths narrower than their base widths). If there is no ridge, such that all four sloping roof surfaces meet at a single point, the roof is a *pyramid hip*. The pyramid hip, all four surfaces of which are triangular, is illustrated in Figure 8.

One variation on the hip roof is the *mansard*, a roof of French origin, depicted in Figure 9. The mansard might best be thought of as a *dual-pitched* hip roof. It actually has *eight* surfaces, a pair for each side of the house, with the lower

member of each pair displaying the steeper pitch. The mansard's lower surfaces are sometimes straight, but also can be curved inward, curved outward, or even S-shaped. Its upper portion is a basic hip style. Prior to the mansard's introduction, roofs in France were very steep, and of single pitch. The mansard's appeal is that it permits a nearly full upper story of usable space (the Second Empire style is said to have used mansard roofs to disguise living area as attic, thereby reducing property tax). Thus, the gambrel is to the gable what the mansard is to the hip. Interestingly, 17th century French architect Francois Mansart, for whom the style is named, never actually built a standard variety mansard roof.

Another dual-pitched hip roof is associated with a rural French home style found in the humid Mississippi valley. Like the mansard, this roof has two surfaces for each side of the house. In this case, however, the *lower* surfaces have the flatter pitch, with the higher surfaces rising steeply to a ridge. This roof style, illustrated in Figure 10, is thought to have evolved from a steeply pitched hip-with-a-ridge that was modified so that it could cover a porch encircling the structure.

## Putting It All Together

Two variations that combine the basic hip and gable roof styles are the *gable-on-hip* and *hip-on-gable*, hybrids shown in Figures 11 and 12, respectively. The gable-on-hip (also called *hip-gable* or *partial hip*) roof has a sloping surface resting on each of the four exterior walls. Here, the lower level is hip; the upper gable portion rests on the lower hip portion. Thus, like the dual-pitched hip, the gable-on-hip has two roof surfaces for each exterior wall. (Note the difference between this gable-on-hip and the dual-pitched hip depicted in Figure 10. With the latter, each upper roof surface is sloped, with a pitch less than 90°, whereas the former's triangular surfaces are gables that rise vertically.) The hip-on-gable is the reverse of gable-on-hip (although there are not two roof surfaces for each wall), in that its lower level is gable and its upper portion is hip.

May you never again look at a French Eclectic or Chateausque house without noticing its steeply pitched hip roof, or a Prairie or Italianate style home without noticing its low pitched hip roof. Understanding roof styles helps us to identify, and to better enjoy, the rich architecture of our diverse American housing stock. ■

Figure 8: Pyramid Hip

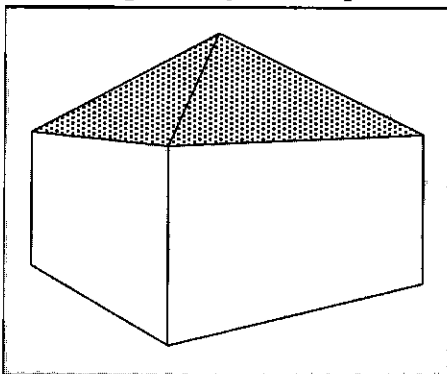


Figure 10: Dual-Pitched Hip

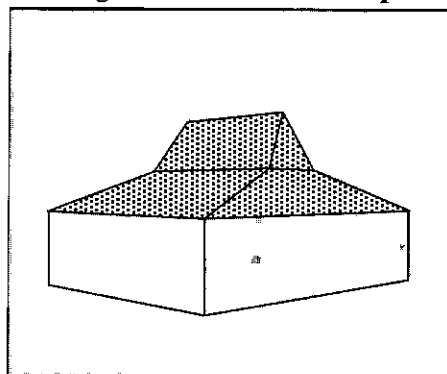


Figure 12: Hip-on-Gable

