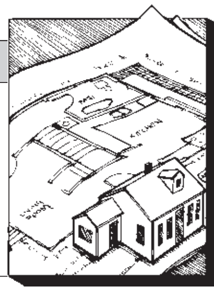

Attic & Eaves Details

by Gordon Tully

People who design insulation systems start with the "typical details"—cross sections through uninterrupted walls. This is pretty silly, since in most houses insulation problems occur at places where materials change or the building turns a corner.

One particularly vexing place where insulation systems break down is the intersection of roof and wall. I have written in another column on the visual importance of the exterior roof-wall intersection. What goes on inside is equally important and often influences the exterior appearance. In fact, solving the insulation details may lead you to better exterior eaves details.

Eaves at Unoccupied Attic Floors

In the typical one- or two-story house with an occupied attic, the eaves are at the same level as the floor (see Figure 1). The rafters rest on the top plate of the wall and nestle alongside the attic or floor joists. If a roof truss is used, the lower and upper chords often intersect at the top of the wall. This joint is troublesome, because if not done properly it squeezes the insulation (just where you want it thick to prevent ice dams) and invites cold air from the roof ventilation system into the ceiling insulation.

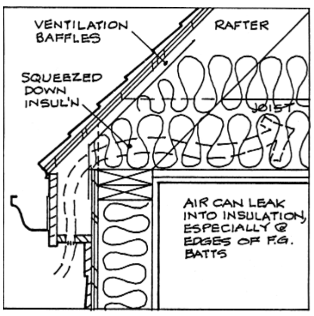

Figure 1. *When the eaves are at floor level, the rafters squeeze the insulation just where you want it thick to prevent ice dams. This also invites air from the roof ventilation system into the ceiling insulation.*

If you are using trusses, make sure you request shop drawings from the truss manufacturer. In my experience, no matter what you draw, the manufacturer will send through the design cheapest to build. But for a modest extra amount, they can easily add depth to the trusses, either by blocking between the bottom and top chords, or by adding another member underneath the top chord (see Figure 2). Try for as much depth as you can at the eaves, ideally the full dimension of the attic insulation. At some point, the manufacturer may complain, and you will have to compromise.

If you are using joists, put a band joist around the attic floor, and add a shoe on top of the joists to receive the rafters (see Figure 3). This will add the depth of the rafter to the depth of the joists and greatly improve the insulation at the eaves.

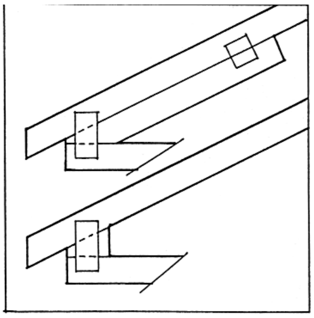

Figure 2. *When using trusses, have the manufacturer add depth at the eaves, either by blocking between the bottom and top chords, or by adding another member beneath the top chord.*

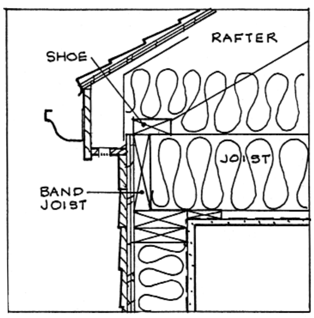

Figure 3. *When using joists, put a band joist around the attic floor and add a shoe on top of the joists to receive the rafters. This allows room for a full depth of insulation.*

Eaves at Occupied Attics

When the attic is used for living space, as in a Cape Cod or a gambrel-roofed house, where do you run the insulation? When possible, run it between the rafters, because experience shows that insulated cathedral ceilings are much more airtight than insulated attic floors.

By insulating at roof level, you avoid the nasty problems created when the homeowner insists on using the uninsulated space behind the kneewall for storage. You also avoid the air leakage that inevitably occurs through the floor system from inside the kneewall area where the floor insulation ends. Finally, it is often nice architecturally to leave out the kneewall, or make it very short. The wrong way to build this detail is shown in Figure 4; the right way is shown in Figure 5.

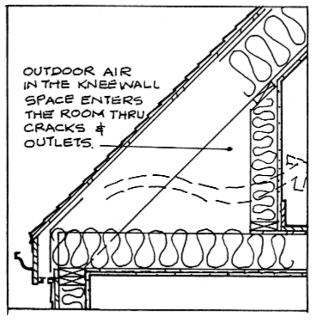

Figure 4. *Avoid insulating kneewalls this way. Whenever possible, run the insulation between the rafters instead, because experience shows that insulated cathedral ceilings are much more airtight than insulated attic floors and kneewalls.*

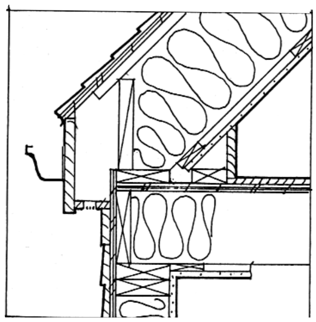

Figure 5. *Leaving out the kneewall or making it very short can make interesting interior spaces. Thicker-than-usual rafters allow for sufficient insulation.*

Notice that the rafters are thicker than needed for structure in order to accommodate a sufficient thickness of blown-in (my preference) or batt insulation. The floor deck runs right to the outside of the building, as in a normal second floor, and prevents air from entering the floor system.

I was amazed to find that an apartment with very low kneewalls commanded a higher rent than a larger, full-height apartment nearby.

Use a Half-Wall

I have expounded several times on the architectural virtues of a half-wall at an upper story. The space is really usable all the way to the outside wall, if the half-wall is 4 feet high or so. You get almost an entire second floor, unlike the Cape design where you need an ugly shed dormer to get more than half a story of space upstairs.

The half-wall cuts down the scale of the upper floor on the inside, and creates interesting, highly attractive (and salable) under-the-roof spaces. For example, I was amazed to find recently that a local apartment under a roof with very low kneewalls (making it awfully hard to furnish) commanded a higher rent than a larger, full-height apartment directly across the street.

The half-high second-floor wall has an excellent effort on the outside of the house compared to a full-height second floor. Dormer sidewalls are not as tall, and the dormer window sills drop down below the eaves line, greatly improving the scale of the house.

When using a half-wall, the insulation naturally runs up the wall and continues between the rafters, as in a cathedral ceiling.

One problem with half-walls is that they make it impossible to tie the rafters to the floor system to resist outward thrust. The easiest way to solve this problem is to use a bearing ridge supported on interior posts. Another way is to cantilever the studs from the floor below. Both these systems are illustrated in Figure 6. In either case, please make sure a structural engineer has a look at the design, as you are stepping outside the boundaries of normal framing.

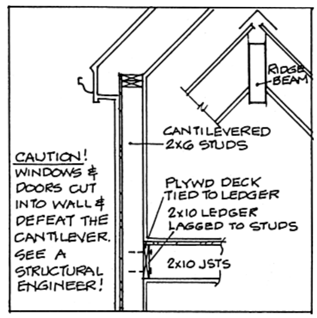

Figure 6. *Half-walls add space, but they make it impossible to tie the rafters to the floor system to resist outward thrust. A bearing ridge supported on interior posts may solve the problem, or cantilever the studs from the floor below.*

Infiltration Control

In an unoccupied attic, the vapor retarder/air barrier runs continuously across the ceiling, at least in theory. To achieve a truly continuous ceiling vapor retarder, pieces of the vapor retarder must be installed above the top plate of the interior partitions.

In an occupied attic, the vapor barrier must inevitably stop at the intervening floor system, as it does at any floor. Some people go to elaborate lengths to create a continuous barrier through the floor system. If you can manage such a thing, fine. But an increasing number of investigators question whether a vapor retarder is necessary in the first place; this seems to be misplaced effort, and I never do it.

Regardless of the theory of vapor retarders you subscribe to, no prudent builder or designer would omit one altogether. Wait until some important industry standard is revised and you are in good company before you dump the vapor retarder.

To create the most continuous vapor retarder possible, and more important, to avoid drafty spaces between kneewalls and roof, it is best to keep the insulation and retarder running in the plane of the roof, not in the kneewall. ■

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