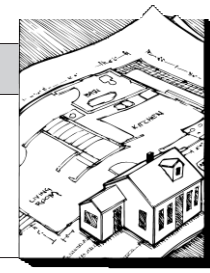


Supporting a Big Rake Overhang

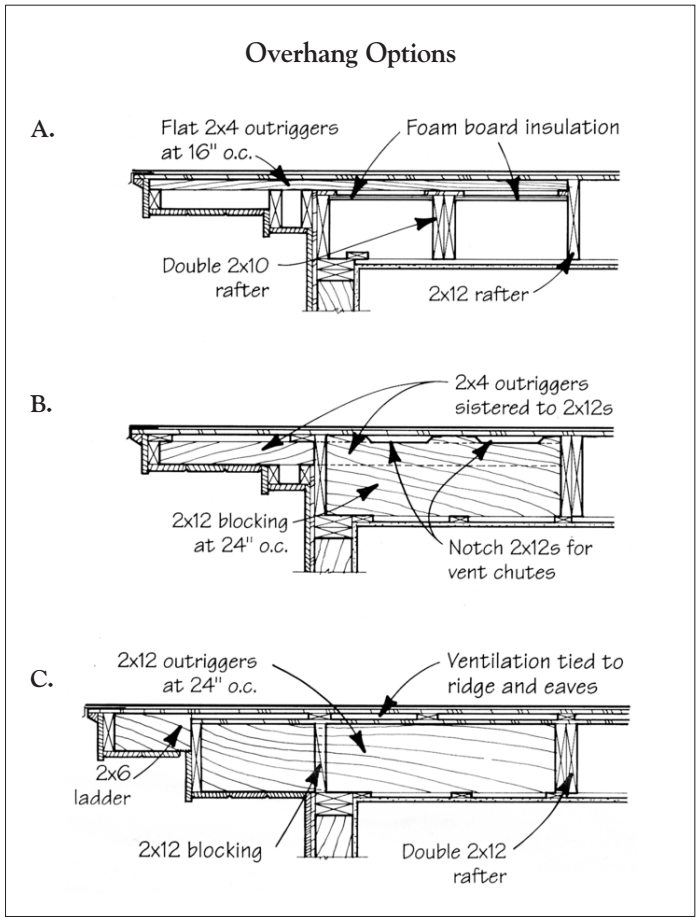
by Gordon Tully

I am a great fan of large roof overhangs. They protect the house walls, keep rainwater away from the foundations, eliminate the need for gutters, and allow you to keep casement windows and sliding doors open during summer rainstorms. Large overhangs are also a key design element in those useful and handsome styles that stem from the Craftsman tradition.

However, large overhangs present critical structural problems, which are made more complicated when the roof is insulated rather than the attic floor. I usually insulate my houses at the roof plane because this creates useful insulated space throughout the upper level, avoids unsatisfactory (and often incomplete) insulation conditions at kneewalls, and allows me to create cathedral ceilings.

Structure versus fresh air. The problem stems from the current requirement that cathedral ceilings be ventilated. Ventilation is probably unnecessary in a properly built, airtight cathedral ceiling, and indeed may create more problems than it solves. But while the issue is under debate by the experts, we must obey the codes and the avid inspectors who sometimes insist on vent chutes, even in the absence of ridge or eaves vents.

Why does ventilation create structural difficulties with broad overhangs? The problem is best understood by tracing the steps in designing a 2- to 4-foot overhang.



(A) *To support a broad overhang, the author first proposed laying a 2x4 outrigger across undersized rafters. But concerns about strength and complexity of construction nixed this plan.*
(B) *The second attempt, which was actually built, featured short 2x12s set perpendicular to the main rafters, notched at the top for ventilation. Each short 2x12 supported a sistered 2x4 outrigger that supported the overhang. This worked and was strong, but still seemed a bit unwieldy.*
(C) *The best solution also used short 2x12s set perpendicular to main rafters, but without the notches and sistered 2x4s. This configuration is strong enough to support the outermost section of overhang, which uses a conventional ladder. A second layer of roof sheathing over strapping provides unobstructed ventilation over the entire roof.*

The eaves do not present a structural problem, since one simply extends the rafters over the top plate, or sisters on a section of 2x to extend the rafters.

Making The Connection

A small rake overhang can be built with a "ladder" nailed to the wall. The framing members in the ladder act like struts, carrying the compression loads back to the wall. The roof sheathing acts like the top flange of a beam, carrying the tension loads. The thickness of the ladder framing needs to be about a third of the overhang dimension: 2x6s will carry a 16-inch overhang.

While in theory you can build a 32-inch overhang with a 2x12 ladder, other factors intervene to make this imprudent. As the overhang gets longer, the uplift from the wind becomes a more important load than the weight of snow or a worker on the roof. There is no tension tie at the bottom of a ladder, so a big wind can get up under a ladder-supported overhang and peel it up. (In areas that experience really big hurricanes, like southern Florida, all but the smallest overhangs should be avoided, regardless of how they are built.)

A large rake overhang will also fail if the sheathing is not properly nailed. And if the ladder is not cut perfectly or is made of green wood that later shrinks, it will droop. A droop that goes unnoticed on a 1-foot overhang will be obvious on a 3-foot overhang.

So, we need to cantilever the rake from the rafter framing. Typically, I double the rafter that lies 48 inches in from the gable end, then run rafters (called purlins or outriggers) parallel with the ridge. I continue the outriggers over the top plate of the gable wall to carry the rake overhang.

Unfortunately, this framing blocks off the roof ventilation in the last 4 feet of roof at each gable end. This is probably too much unventilated roof for most inspectors, so the conflict needs to be resolved.

A First Run

A recent job gave me a chance to design such an overhang. This job was my fifth collaboration with the contractor E.J. Murphy Builders of Framingham, Mass. Ned Murphy and I worked closely together to find a practical way to build a 2-foot overhang. Unless the house has a big, simple form, a big rake overhang looks best when it has an intermediate step in it. In this design, I set the step close to the wall: It looks a bit like a broad cornice molding.

The original design featured flat 2x4s set across and atop a pair of 2x10s, tied back to the first full-depth 2x12 rafter, as shown in illustration (A). Instead of plastic vent chutes, I prescribed rigid insulation panels blocked below the outriggers. The smaller 2x10 rafters gave us room for both the 2x4 outrigger (laid flat) and the needed ventilation chutes.

Ned felt this was marginally strong and hard to build, so he suggested what ended up being the final design, shown in illustration (B). Here we replaced the outer two 2x12 rafters with 2x12s set perpendicular to the main rafters. In the top of the perpendicular 2x12s we cut notches for the vent chutes. To support the overhang, we sistered 2x4 outriggers to the 2x12s, with their tops below the chutes. The result looked like a Chinese puzzle, but it proved to be the simplest solution we could come up with.

One More Time

After seeing the complications created by the intersecting framing, I had a brainstorm, which I intend to let rain onto a house currently on the drawing boards. Given the framing cost, it is probably cheaper and easier simply to add a second layer of roof sheathing on strapping over the entire roof, thus keeping the ventilation out of the roof cavity. Once you separate ventilation and structure, the details become much simpler, a really cold roof is guaranteed, and rain and snow cannot enter the framing through the ridge vent. Providing it could be done safely (slippery roofs are dangerous), a layer of housewrap could be put on the lower sheathing, under the sleepers, to guarantee a waterproof house.

The proposed overhang, shown in illustration (C) is 3 feet wide, in two steps, but with two crucial differences: I moved the step further outboard and beefed up its thickness. This allows full-thickness roof framing to run out to the first step in the overhang, with no cutouts necessary for venting. A simple ladder forms the second step, nailed to the box header that runs across the ends of the outriggers. I cantilevered this box header to support the corner. ■

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