

Designing Porch Roofs

Shed roofs are easy to frame, but gable roofs offer more design options

by Bobby Parks

When a deck builder first starts building porch enclosures, most of the details are already familiar. Porch floors are framed just like decks, with perhaps a little additional structural reinforcement; most “walls” are essentially vertical columns with trim and sometimes screen or glass enclosures for bug and weather protection. Porch roofs, however, are quite different from what deck builders normally encounter, and roof types, structural aspects, and framing details can vary widely with each porch project.

My company builds about 25 porches a year, and in this article I’ll describe how we approach the design and construction of their roofs. We primarily build gable or shed roofs, as they are easier to construct with the vaulted interior finishes that our clients prefer. We reserve hip roofs for detached porch structures, where they make more structural and aesthetic sense.

Limiting Factors

I start by looking at the house from the side that the porch will be attached to. Are there any gables with established roof pitches present? Are there windows that may restrict height or rule a gable out? Is removing a window to buy roof slope an option, or will I need to work around a bedroom window that’s required by code for egress? What tie-in obstacles exist? Are brick or stucco involved, which can present added challenges?

It’s also important to take note of the architecture of the house. For example, if there’s an existing 12/12 gable roof

facing the backyard, any gables on the porch will need to match it. A shallow 4/12 gable—or, in fact, any roof pitch noticeably less than 12/12—would make the porch look tacked on. Whatever’s existing sets the precedent.

The desired width of a porch and the vertical distance from the floor or deck level to the windows on that side of the house determine how steep a roof can be. For example: If the windows are 12 feet from deck level and the porch is 16 feet wide with 8-foot-high walls, the porch roof can have about a 4/12 gable pitch. (This allows for expected rafter depth, roof sheathing, and 6 inches of clearance for flashing.) If instead the same porch were 24 feet wide, the roof could have only a 2.7/12 pitch.

When the windows are even lower—which is common—and especially when other gables are present, shed roofs are a better option. They usually require modified roofing membranes or standing-seam metal roofs because most shingle manufacturers won’t warranty a roof

with less than a 4/12 pitch. Shed roofs work well visually with any gable roof, as long as they are designed and tied in properly.

Some projects can even incorporate both a gable and a shed roof, which I’ll discuss after I work through the various roof types one at a time.

Gable Roofs

We generally prefer gable roofs. Tying them into the house wall is the easiest way to build them because no complex roof framing—such as valley and jack rafters—is required, but it’s often necessary to tie them into the roof (**Figure 1, page 30**). In both cases, we use structural ridge beams to allow for open spans without wind or collar ties. The key is to size the ridge beam properly; if it doesn’t sag, the walls won’t bow. (I always use one size up from what’s recommended, for any beam application—I’ve seen too many sagging laminated beams).

We always support the outer end of the beam with a ridge support post that has a continuous load path down to a concrete pier. On the house-side, the load path can be a little trickier to figure out. With wall tie-ins, I try to tuck the end of the beam 3 inches into the house wall, making sure it bears on the second-floor bottom plate. This requires cutting out siding or stucco and inserting vertical





supports between the underside of the beam and the plate. We also need to make sure that the wall framing is adequate to support this point load on the plate down to the foundation.

When brick veneer is involved, ridge-beam installation can be even more of a challenge. Since brick veneer is non-structural, we often install an actual support post on the house-side of the ridge beam to transfer roof loads down through the floor and to a footing.

With a roof tie-in, one of the biggest concerns is that new roof loads on the existing structure will stress the old rafters or joists and cause sagging or cracks in ceiling drywall. To prevent this problem, we sometimes install up-sized cantilevered LVL ridge beams to carry some of the new loads down to the wall plates. This approach works better when tying in to steeper-pitch roofs than to shallow-pitch roofs, since the length of the cantilever is shorter (remember that cantilever spans are typically limited to $\frac{1}{4}$ the total length of the member). Often, there's no need to get inside the attic and install bracing to support the end of the new ridge; in fact, many of the tie-ins we do are onto existing vaulted roofs and ceilings where added bracing is not an option.

Determining the actual cantilever capacities of structural beams will usually require at least a call to your supplier

Figure 1. This home's full two-story wall design and small upper-floor windows allow a simple wall tie-in for the porch addition's gable roof (above left). Roof tie-ins involve more complex framing (above right), but are often needed on single-story structures where more interior porch volume is desired.



Figure 2. A shed style was the best solution for this porch roof because of restrictions placed by the existing second-story windows. It would also have been difficult to match the pitch of the existing gable roof next to the porch.

or local engineer. Additional headers, bracing, and vertical framing are frequently required to handle the new roof loads. Whenever we're in doubt, we check with our local inspector to see if our proposed solution is allowed.

Shed Roof Tie-Ins

Shed roofs can look great and are often the only option that will work with exist-

ing architecture (**Figure 2**). Tie-ins to houses with most types of siding are simple, usually requiring only that a small section of siding be removed to fasten the rafter ledger to the wall framing. This attachment is similar to deck-ledger attachment in that the rafter ledger needs to be directly attached to the house structure, and the roof assembly needs to be flashed properly.

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We size the rafter ledger to be large enough to accommodate the plumb cut of the rafters, as well as the metal hangers we'll be using. We use structural screws—typically LedgerLoks (fastenmaster.com)—rather than nails to fasten the rafter ledger through the sheathing into the wall studs. We make sure to drive a pair of fasteners into each stud, and even more fasteners into the double studs at window and door openings. In some cases, we fasten the ledger through the sheathing and into the second-floor band joist, which results in a really solid connection.

On brick houses, shed roofs require a ridge beam supported by vertical members rather than a rafter ledger fastened to the house framing. LVLs are particularly well-suited for this application. For example, on an 18-foot-wide porch we recently built, we doubled two 1³/₄-inch by 18-inch LVLs, supported the ends of the ridge beam with columns, and transferred the roof loads down to footings below the floor structure. This satisfied our inspectors and we didn't need to remove any bricks. (We use the same approach when we attach a deck ledger to a brick house.) The key is to size the beam (by referring to tables or asking your building materials supplier) and support it so that vertical loads are transferred to the footings and not to the house (**Figure 3**).

We also like to attach the beam to the wall framing to prevent lateral movement. We do this by locating the studs (especially the wider window and jack studs), drilling through the brick, and installing long lag screws. Once roof decking is installed, I don't believe any significant inward pressure is applied to the brick as long as the beam is appropriately sized. Although this has worked fine for me, you need to know what your local officials want to see when brick is involved.

Combining Gable and Shed Roofs

In some cases, we use both roof types (**Figure 4**). In the project shown here, the existing gable pitches are incorporated



Figure 3. When working with brick veneer, the author hangs the porch rafters from a structural double LVL ridge beam (top, shown before hanger installation). Note the gap between the beam and the brick (right).



Figure 4. Shed and gable roofs can be combined on a porch. When designing an addition with a gable roof, match the pitch of any existing gables.

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into the design on half of the porch footprint, while the rest of the porch is finished with a simple shed roof. Because of an existing window on the upper gable, this would otherwise have been a long shed roof or a very low-sloped gable roof. To support the room-side gable rafters, we installed a beam made up of three 1³/₄-inch by 18-inch LVLs, with columns at both the house wall and the outer porch wall handling the load. A triple LVL beam is slightly oversized for the relatively small expected roof loads, but I prefer to exceed minimum requirements. Also, the appearance of the larger beam is interesting from the inside of the porch, as it defines distinct activity zones in the room (**Figure 5**).

In fact, one of the biggest challenges of a hybrid porch roof is planning the framing so that interior spaces are divided up in some proportion that makes sense, while at the same time maintaining an open interior footprint.

Captured Doors

Sometimes it's tricky to position a porch door, either because of window restrictions, layout limitations, or budget reasons. In those situations, we'll frame a small extension and install a "captured door" that ties interior and exterior spaces together (**Figure 6**).

This technique works especially well when a bay window is located adjacent to a side door. It can also be used to offset a porch side wall that a customer does not want to see right outside a picture window.

Hip Roofs

Hip roofs are not difficult to build, but maintaining an open vaulted ceiling on the interior is a little more complicated than when framing a gable or shed roof. The bracing and additional support that hip roofs often require can be hidden above a level ceiling. But when the ceiling is vaulted and the rafters and other structural elements are exposed, an ele-

ment of finish carpentry needs to be combined with the framing.

Structural and code issues also come into play. For example, when a hip roof ties into a house and the porch has three sides, cross-beams to support the ridge and prevent the walls from spreading are

usually necessary. Generally speaking, the steeper the roof pitch, the easier it is to handle the downward and outward pressure on the walls created by the rafters supporting the ridge; most inspectors, though, will require code-complying ridge support cross-beams of significant



Figure 5. The framing for the gable and shed roof sections of the porch help define interior areas.



Figure 6. A small extension off this screened porch contains a captured doorway leading out onto the adjacent deck.

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size, regardless of roof pitch. Because of this, I usually avoid designing hip-roofed porches altogether. If I have to use a hip roof, I plan for the porch to have a level rather than a vaulted ceiling.

“Detached” hip roofs are much easier to build, since we can tie the top plates of the four walls together with metal connectors to create a “ring beam” that prevents them from spreading. When the porch is detached, it’s also easier to frame an 8-in-12 (or steeper) pitched roof without worrying about matching roof pitches on the existing house. The steeper the pitch on a hip roof, the less outward thrust on the walls, which we try to limit in height to 9 feet.

We’ve built several freestanding structures with this feature (**Figure 7**). Though probably not strictly a porch, this screened room illustrates how thinking outside the box has landed my company several projects, simply because we were able to come up with options that other contractors may not have considered. When we meet a customer, we listen to what they say about porch location and design, but we also like to propose alternative approaches.

Finishes

Regardless of the roof type, porch building is a form of remodeling. We think of it as a room addition that needs to be blended into the existing house. One way to do this is to remove all cornice overhangs so that only the new ceiling is visible. Where there is a second-floor cantilever, we resurface the soffit with the same materials used on the ceiling of the new porch.

At the end of the job, we assume that we’ll be critiqued on how well we tied the porch and roof into the house. Approach your porch designs as if you were building for yourself or your family, and you’re likely to get it right. ❖

Contributing editor Bobby Parks owns Peachtree Decks and Porches, in Alpharetta, Ga.



Figure 7. Hip roof framing, as for this detached porch (above), is more complicated than shed or gable roof framing, but when well-executed it can provide a dramatic vaulted ceiling (below).

