Q A client wants to create a vaulted ceiling in an addition with a shallow, 4:12-pitch roof. The rafters are 16 inches o.c., with no structural ridge. Can I raise the ceiling joists to create the vaulted ceiling?

A Darren Tracy, PE, owner of West Branch Engineering, in Saratoga Springs, N.Y., responds: Yes, you can raise the ceiling joists, but with restrictions. Because you do not have a structural ridge, you must utilize rafter ties. Ceiling joists can serve as rafter ties to resist outward thrust on the walls from the rafter loads if they are installed parallel to the rafters and in accordance with code.

Figure R802.4.5 of the 2018 IRC states that a rafter tie can be raised a maximum distance of "HC" above the top of rafter support walls. HC is determined by a simple formula in which that height is a function of the ridge height (HR): The ratio of HC/HR cannot exceed 1/3 (see illustration, below). For example, in a roof structure where the ridge height is 9 feet above the top of the support walls, the maximum height that a rafter tie can be raised is 3 feet (3/9 = 1/3).

Additionally, be sure to adhere to the specific fastening requirements in the 2018 IRC Table R802.5.2 for the rafter-to-rafter-tie (ceiling joist) connections. That table provides the number of 16d nails at each connection based on rafter slope, rafter spacing, and snow load.

Section R802.5.2 also states, "Where the ceiling joists are installed above the bottom third of the rafter height, the ridge shall be installed as a beam." In other words, to raise the ceiling joists more than one-third of the ridge height, a structural ridge would be required. With a properly engineered structural ridge, rafter ties can be eliminated completely. Also section R802.4.4 states that a roof with a pitch less than 3:12 requires a structural ridge.

As a final note, do not confuse rafter ties with collar ties. Collar ties, which are designed primarily to resist wind uplift, are required in the upper third of the attic space. Unlike ceiling joists, collar ties can be made of less-substantial material (1x4 minimum) and can be spaced up to 4 feet apart. Ridge straps can be used in lieu of collar ties to resist uplift.

Creating a Vaulted Ceiling

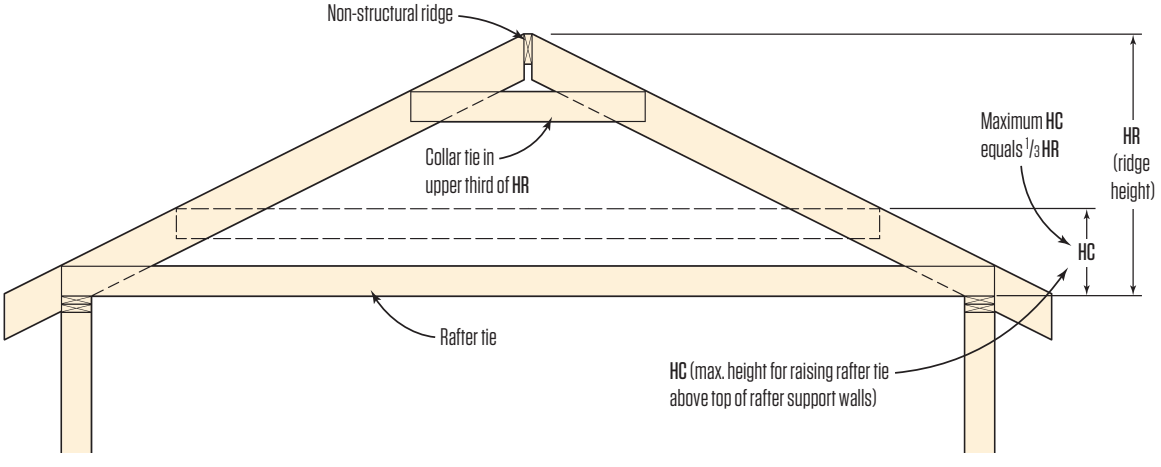

Illustration: Tim Healey

In a roof with a non-structural ridge, rafter ties (which resist the outward thrust of the rafters) can be raised a maximum distance (HC) that is no more than one-third the distance between the top of the supporting wall plates and the top of the ridge (HR). Collar ties (designed primarily to resist wind uplift) must be located in the upper third of HR.

Q One of my fellow workers insists that the cellophane strips on the backs of asphalt shingles have to be removed before the shingles are installed. Another co-worker says that it's OK to leave them in place. Which one is right?

A Reed Hitchcock, executive vice president of the Asphalt Roofing Manufacturers Association (ARMA), asphalt roofing.org, responds: Your question is a valid one, but something that ultimately should not be of any concern to roofing contractors or installers. Here is the story behind those cellophane strips.

As you know, asphalt shingles are shipped and stored in bundles. Each shingle is manufactured with an adhesive strip that allows it to adhere to its neighbor above when they are installed. The adhesive on the shingle is activated by heat—usually from sunlight beating down on the shingled roof.

But shingles can also be subject to heat during shipping and storage, especially in the hot summer months. And many supply houses store pallets of shingles where they are exposed to direct sunlight. To prevent shingles from sticking to each other while still in the bundle, manufacturers add a small strip of cellophane on the back of each shingle. In the industry, this strip is often referred to as "release tape." The cellophane release tape lines up with the adhesive strip on the shingle below it in the bundle to keep the shingles from sticking together.

Because the cellophane strips have no effect on the performance of asphalt shingles, it's fine to leave them in place as you install the shingles. In fact, the effort to remove them is unnecessary and just adds an extra step for the contractor. The only time that a cellophane strip should be removed is on the extremely rare occasion that it sticks to the adhesive layer of an adjacent shingle instead of remaining stuck to the back of the shingle being taken from the bundle.

For those contractors who still insist on removing the cellophane strips as the shingles are installed, rest assured that doing so has no adverse effect on the installation or performance of the shingles. But something to consider is that once removed, those lightweight plastic strips tend to fly around. Chasing down and disposing of all those wayward strips can create even more work for the contractor.

So our recommendation is to just ignore the strips. Once a shingle is taken from the bundle to be installed, the cellophane strip has served its purpose.