

Technical Q & A

Important Considerations with Conventionally Framed Valleys

by Keith Hershey & Jim Vogt, P.E.

Find out why it is necessary to provide structural framing below conventionally framed valleys.

Some builders may choose to conventionally frame a valley (i.e., over-frame) instead of using valley set truss frames. A reason given is that it is sometimes “quicker” to conventionally frame, especially with complicated roof profiles. If conventional rafter framing is used to construct a valley, certain precautions must be taken to ensure that the over-framing is adequately attached to the roof and that the supporting members (typically trusses) are capable of carrying the loads.

Question

Is it acceptable to attach and bear a conventionally framed valley rafter directly to the roof sheathing?

Answer

Section R802.6 of the 2003 International Residential Code (IRC) requires, in part, that “the ends of each rafter...shall have not less than 1-1/2 inches of bearing on wood....” Section 3.5.1.2 of the 2001 Edition of ANSI/AF&PA WFCM-2001, Wood Frame Construction Manual, which is referenced in the IRC, indicates, in part, that “rafters shall bear directly on beams, girders, ledgers or load bearing walls or be supported by approved joist hangers or framing anchors.” These requirements indicate that it is not acceptable to bear the ends of the valley rafters directly on top of the plywood or OSB roof sheathing without some type structural framing below.

There are many reasons for this. First, the valley rafters must be adequately connected at their supports to resist lateral and uplift forces caused by gravity and wind loads, respectively. Since wood structural panels used as roof sheathing in most of the United States are typically only 7/16-1/2" thick, it is very difficult to develop a nailed connection between the rafter and the sheathing that will adequately resist the lateral and uplift loads. Second, span-rated plywood or OSB panels used as roof sheathing are intended to support and transfer uniformly distributed loads from snow, wind, rain, etc., as well as limited concentrated loads from workers and construction materials. While the concentrated load from typical valley rafters will not likely cause the sheathing to fail, it may cause localized deflections in the panels that are visually noticeable and can lead to serviceability and performance problems. For these reasons it is best to provide solid bearing beneath the ends of the rafters.

The ends of the valley rafters very seldom align directly over the structural roof framing (e.g., trusses). For these instances, support can be provided by installing a continuous dimension lumber plate under the ends of the rafters or by adding dimension lumber blocking beneath the sheathing at each rafter location. Either of these options provides the additional material necessary for adequately nailing the valley rafters to the roof, as well as providing adequate support for the valley rafters and the transfer of the loads from the rafters to the trusses.

The first method involves laying a continuous dimension lumber 2x_ member flat on top of the roof sheathing along the valley line that the rafter would bear on.

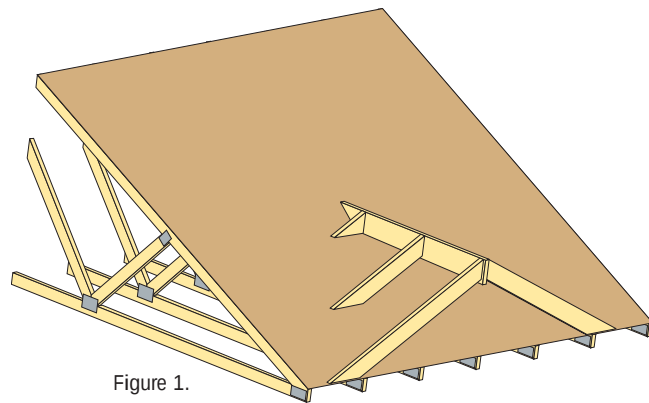


Figure 1.

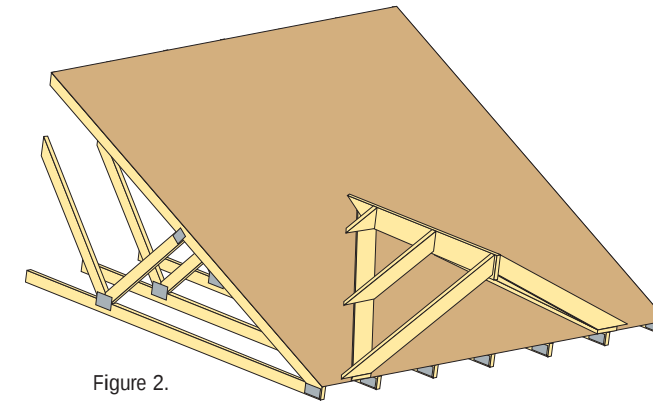


Figure 2.

This member should be sized in the same manner as a ridge board or beam, i.e., at least one size larger than the valley rafter, and positioned to be flush with the inside heel of the rafter.

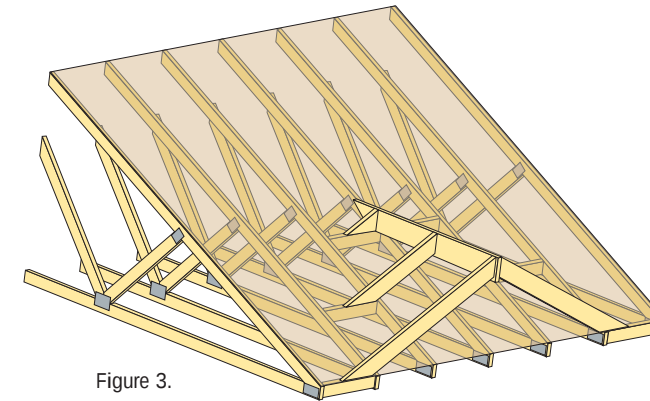


Figure 3.

The second method involves adding a piece of 2x_ blocking between the trusses at the location where the valley rafter will bear on the roof. The blocking should be cut to fit snugly between the top chords of the trusses and attached to each truss with nails or hangers capable of transferring the load from the rafter to the trusses.

There are other design issues that must also be considered when conventionally framed valleys are used in conjunction with roof trusses. First, the trusses supporting the valley rafters must be designed to support the concentrated loads from these rafters. Second, the portions of the top chords of the trusses beneath this over-framing must either be continuously braced with structural sheathing or braced with rows of lateral restraint, spaced no more than the maximum on-center spacing specified on the Truss Design Drawing, and diagonal bracing. Without the proper restraint and bracing the top chords of these trusses may be prone to buckle.

Conclusions

“Stick framing” is still used by some framers to construct valley over-framing on roofs. Unlike valley set truss frames, which distribute the upper roof load much more uniformly to the supporting roof framing of the lower roof, the load from a stick framed valley is typically transferred as a concentrated load at the location where each rafter bears on the lower roof. This concentrated load will produce localized deflections and potential sagging in the lower roof, unless the structural framing has been designed to carry the additional load and additional support framing, such as dimension lumber blocking or a continuous valley plate, are provided. These details must be worked out with the truss technician prior to the trusses being designed to ensure that these loads are accounted for and that the details are framed properly in the field. **SBC**

To pose a question for this column, email technicalqa@sbcimag.info.

at a glance

- ❑ Some builders may choose to conventionally frame a valley (i.e., over-frame) instead of using valley set truss frames.
- ❑ Requirements in the IRC and the ANSI/AF&PA WFCM-2001 indicate it is not acceptable to bear the ends of valley rafters on top of roof sheathing without structural framing below.
- ❑ Valley rafters must be adequately connected at their supports to resist lateral and uplift forces caused by gravity and wind loads.

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