DESIGN RIGHT

Roof bracing

WE COMPLETE THIS FOUR-PART *BUILD* SERIES ON CALCULATING BRACING REQUIREMENTS BY LOOKING AT ROOF BRACING.

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USING THE SAME HOUSE as in the previous articles on subfloor bracing (*Build* 132, pages 38–41) and wall bracing (*Build* 133, pages 32–36), we use NZS 3604:2011 *Timber-framed buildings* Section 10.3 to work out the roof space and roof plane bracing required.

The roof

The house has a gable roof with 300 mm overhangs at the soffit and verge on the 2-storey section and a hip roof on the single-storey section (see Figure 1). The roof is a light roof.

Bracing sometimes not required

For truss and framed roofs, roof space bracing and roof plane bracing are not required where there is sarking that meets NZS 3604:2011 clause 10.4.4 requirements or where there is a structural ceiling diaphragm complying with clause 13.5 directly attached to the rafters.

Small roof planes less than 6 m², such as dormers or porches, also do not require bracing.

Minimum bracing requirements

Table 10.16 sets out the minimum roof bracing requirements for roof plan areas, including the overhangs. Use this for gable roofs, hip roofs and combinations of these.

For a heavy roof

For each 25 m² of roof plan area or part thereof, one roof plane diagonal brace or one roof space diagonal brace is required.

For a light roof

For each 50 m² of roof plan area or part thereof, one roof plane diagonal brace or one roof space diagonal brace is required.

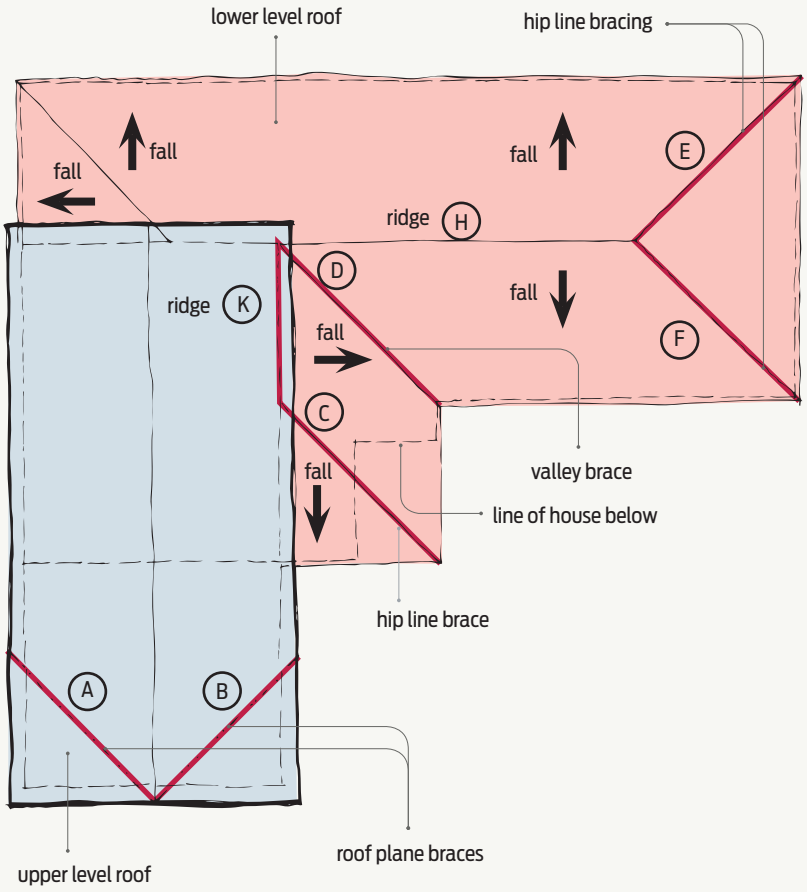

Figure 1 **Roof bracing.**

Monopitched roofs

Unless the walls have full-height bracing and a ceiling that is attached directly to the rafters, a monopitched roof must be considered as a pitched roof. Consider the highest support to be the ridge line and use heavy or light roof requirements as appropriate.

Low-slope roof

No specific provisions are required for low-slope roofs less than 5º.

Girder trusses used for low-slope roofs are likely to require some form of bracing from the top plate to the top cord – check with the fabricator.

Roof plane and space braces

Combinations of roof plane or roof space braces are permitted provided the number of total braces is achieved.

Roof plane braces

There are several options of roof plane braces (see Figure 2):

- Hips and/or valleys. There must be a minimum of two (there is an error in NZS 3604:2011, which requires three) that run from top plate to ridge. Additional valleys or hips that also run from top plate to ridge are counted as one additional brace. Valley fixing details are in NZS 3604:2011 Table 10.1, type E fixings.
- For hip fixing requirements, see Table 10.1 for fixings at the top to the ridge and at the bottom of the hip to top plate type E or F fixings.
- A single length of timber (90 x 19 mm) fixed to the underside of rafters or top cords of trusses, running at 45º from ridge to dwang between ceiling joists near and parallel to the top plate (see Figure 10.22). Fix as required in clause 10.4.2.3 and Table 10.18.
- A diagonally opposing pair of steel strap braces with a minimum capacity of 4 kN in tension, fixed to each top cord or rafter and at the ends as required in Table 10.18.

Braces are required to intersect each end of the ridge line. Additional braces (where required) are to be distributed evenly along the ridge line.

Roof space braces

See Figure 3 (or NZS 3604:2011 Figure 10.23) for roof space brace set-up and anchoring.

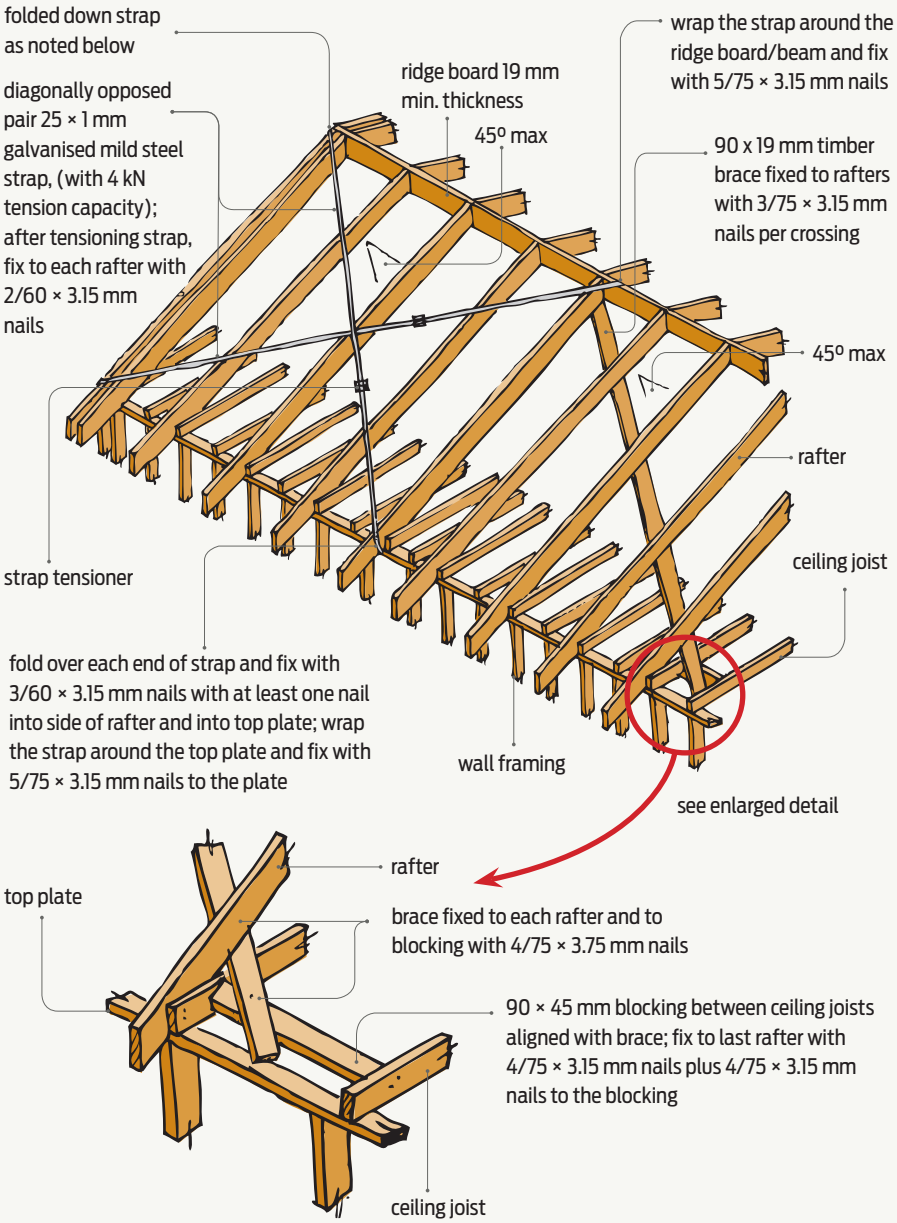

Figure 2 **Roof plane bracing alternatives.**

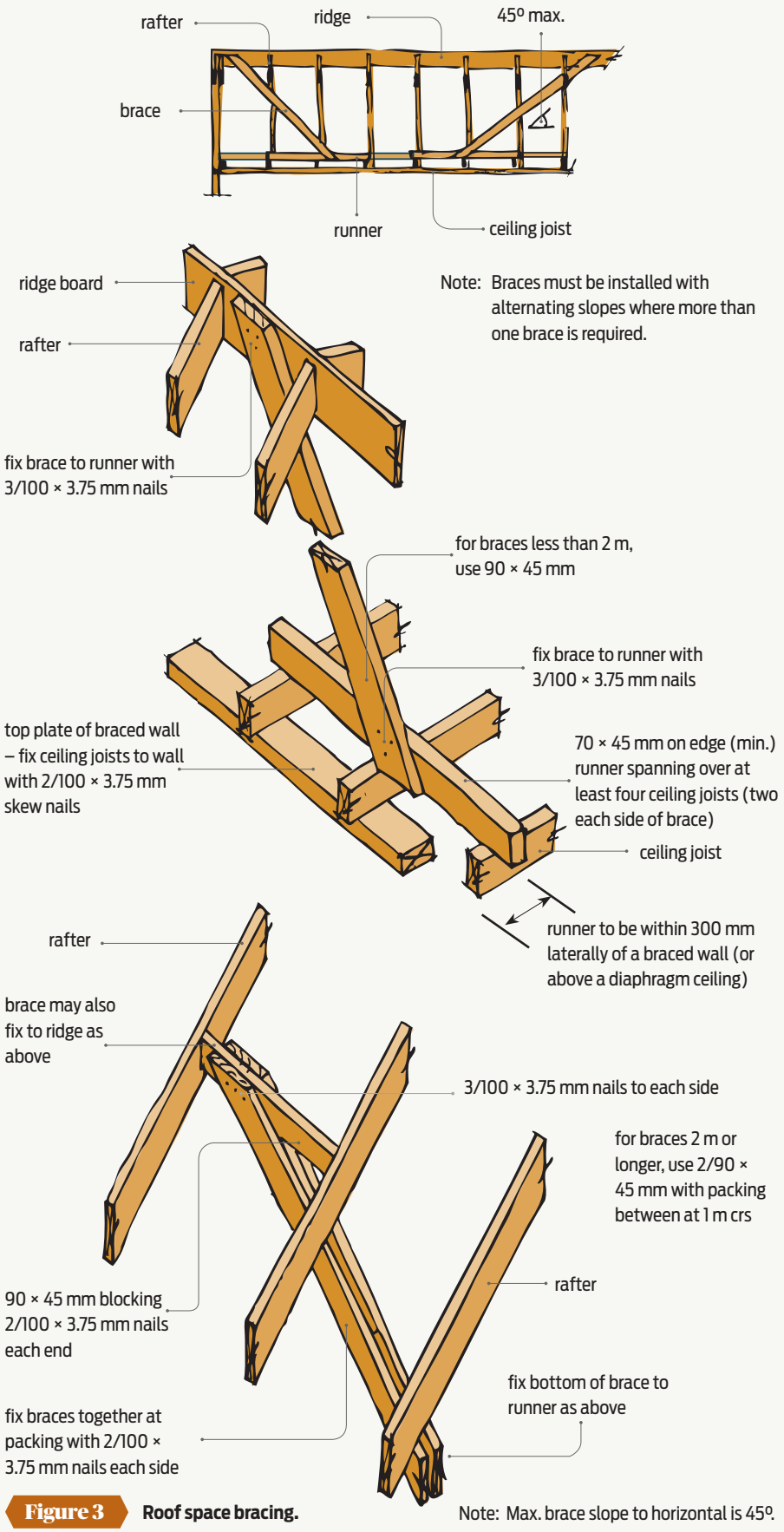

Figure 3 **Roof space bracing.**

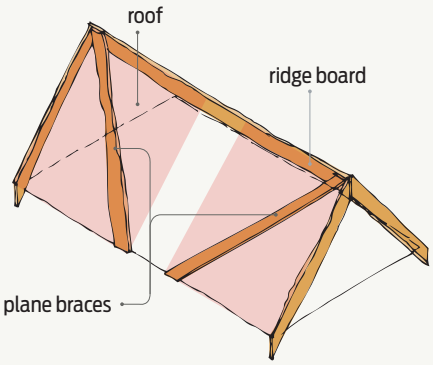

Figure 4 **Roof plane bracing.**

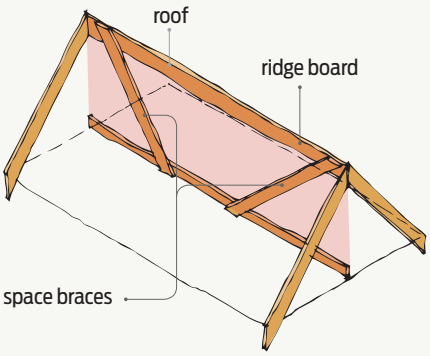

Figure 5 **Roof space bracing.**

Back to the example

The upper storey roof plan area is 5.6 × 11.2 = 62.72 m².

One roof brace is required per 50 m² with a minimum of two per ridge line.

Upper storey solution – a minimum of two braces are required for the upper storey roof (see Figure 1). Braces are marked in red (A and B).

The lower roof plan area (no soffit) = (7.040 × 6.2) + (8.1 × 3.1) + (6.2 × 3.1) = 68.7 m².

One roof brace is required per 50 m² with a minimum of two per ridge line.

Lower roof solution – minimum of two braces are required for the lower storey roof but also a minimum of two per ridge line (see Figure 1). The hips and valleys already provided will suffice without any additional braces. In Figure 1, the braces are marked in red (C and D for ridge line K and E and F for ridge line H).