

# HOW-TO-BUILD GUIDE

## PERGOLA

### WHAT YOU CAN BUILD USING THIS GUIDE

This guide shows you how to build a free-standing timber pergola. The design is suitable for an open-framed structure only. It is not suitable where roof cladding such as shingles or corrugated roofing or a solid wall cladding is required.

Contact your local territorial authority to check that the height, type and location of the pergola you intend to build comply with all local planning and building rules and whether a building or resource consent is required before construction. A consent is often not required for the type of pergola described in this guide.

### PLANNING YOUR PERGOLA

These instructions are for a 2.4 m square by 2.4 m high free-standing timber pergola. The materials you require will need to be calculated based on the actual size and type of pergola you intend to build.

### MATERIALS

Posts	100 x 100 mm H5 treated radiata pine timber, 3.3 m long (4)
Beams	150 x 50 mm H3.2 treated radiata pine timber, 3 m long (4)
Rafters	150 x 50 mm H3.2 treated radiata pine timber, 3 m long (5)
Purlins (optional)	75 x 50 mm H3.2 treated radiata pine timber 3 m long
Bolts	12 mm hot-dip galvanised steel bolts
Nails	75 mm hot-dip galvanised jolt-head nails
Concrete	aggregate and cement pre-mixed in bags
Braces/pegs	scrap timber for temporary braces/pegs

### WORK SEQUENCE

#### Construction

1. Confirm the location of your pergola and drive a peg into the ground to mark one corner. Measure a distance of 2.4 m in one direction – this will be one side of the pergola, so ensure that you have the side aligned in your preferred direction. Drive a peg into the ground to mark the second corner. Measure out 2.4 m at right angles to the second peg and mark the ground with a temporary mark. Then mark out another 2.4 m temporary mark at right angles to this mark (see Figure 1).
2. You will now have a 2.4 m square marked on the ground with two corners marked by pegs and two marked with temporary marks. To confirm the square is actually square, measure diagonally from each peg to the opposite corner. These dimensions need to be the same, so adjust the temporary marks until the diagonal dimensions are equal and drive a peg into the ground in place of the temporary marks. Double-check your measurements to ensure the distance between each peg at each side of the square is 2.4 m (see Figure 1).

### Posts

3. The posts must be cast into concrete footings. You will need to dig 700 mm deep by 300 mm diameter or 300 mm square holes at each corner peg – use the corner peg as the mark for the centre of the post holes.
4. Place 100 mm thick dry concrete mix in the holes. Install four 3.3 m long, 100 x 100 mm posts and brace them vertically with temporary braces and pegs (see Figure 2).
5. Check that the posts are plumb and square and the inside dimension between each post around the outside of the square is 2.4 m. The diagonal dimension between posts should be equal – you may need to adjust the temporary braces to achieve this. Once you have confirmed that your post set-out is accurate and the pergola is square, firmly nail off the temporary braces (see Figure 2).
6. Place more concrete into each hole and tamp with a length of timber to compact the concrete to a level 50 mm below the finished ground level. Then add the required amount of water for the volume of pre-mixed concrete you have used. Allow sufficient time for the concrete to cure (see Figure 2).

### Beams

7. Measure up from the ground 2.4 m on one post and mark at this point. Using a string line, level this mark around to the other three posts and mark accordingly – this will be the position for the underside of the beams (see Figure 2).
8. Take four 3 m long 150 x 50 mm timber beams. Put a mark 300 mm in from each end of the beams to allow a 300 mm overhang of the beams to each post. If you want to cut an angle or decorative shape on the end of each beam at this stage, ensure that any such shape is created within the outer 150 mm of each beam so it does not encroach onto the post when the beams are installed.
9. Fix the beams to the preferred two sides of the pergola by temporarily nailing one beam each side of the posts. Ensure that the underside of the beams are aligned to the mark on the posts 2.4 m up from the ground, and the marks on the beams 300 mm in from each end align with the outside face of the posts, creating a 300 mm overlap for each end of the beams (see Figures 3-5).
10. Drill two 12 mm holes through both beams and the post at each corner. The holes should be centred 40 mm down from the top and up from the bottom of each beam (see Figure 4).
11. Install 12 mm bolts with nuts and washers to each of the holes through both beams and the post (see Figure 4).

### Rafters

12. Five rafters need to be installed to span across the beams from one side of the pergola to the other. Mark the position of the rafters at each end of the pergola on the inside line of the posts and then mark four equal spaces along the beams to locate the three intermediate rafters.
13. Take the five 3 m long, 150 x 50 mm timber rafters and make a mark 250 mm in from the end of each rafter to allow a 225 mm overhang of each rafter to the beam. If you want to cut an angle or decorative shape into each end of the rafters at this stage, again ensure that any shape occurs within 150 mm of the end of the rafter.
14. Position the two end rafters on edge over the beams, with the rafters located on the outside face of the posts and the marks 250 mm in from the end of the rafters aligned to the outside face of the outside beams. Skew-nail the rafters to each of the beams with 75 mm galvanised jolt-head nails to each side of the rafters. Cut the posts off level with the top of the adjoining rafters (see Figures 4 and 5).
15. Position the remaining three intermediate rafters equally spaced on the marks on the beams and nail in the same manner as the end rafters.

### Purlins

16. Installation of purlins is optional, but they will add a more decorative effect to the pergola and help keep the rafters straight (see Figures 3-5).
17. Six purlins need to be installed to span over the rafters. Mark the position of the purlins at each end of the pergola on the inside line of the posts, and then mark three equal spaces along the rafters to locate the two other purlins.
18. Cut six 2.8 m long 75 x 50 mm timber purlins and make a mark 200 mm in from the end of each purlin to allow a 200 mm overhang of each purlin to the outer rafters.
19. Position the two outer purlins on edge over the rafters, with the purlins located on the inside face of the posts and the marks 200 mm in from the end of the purlins aligned to the outside face of the outer rafters. Skew-nail the purlins to each of the rafters with 75 mm galvanised jolt-head nails to each side of the purlins.
20. Position the remaining purlins on the marks on the rafters and nail in the same manner as the outer purlins.

### MORE INFORMATION

It may be necessary to refer to the New Zealand Standard for light timber frame construction, NZS 3604:1999 Timber Framed Buildings, for more detailed information if your project varies from these instructions.

Figure 1

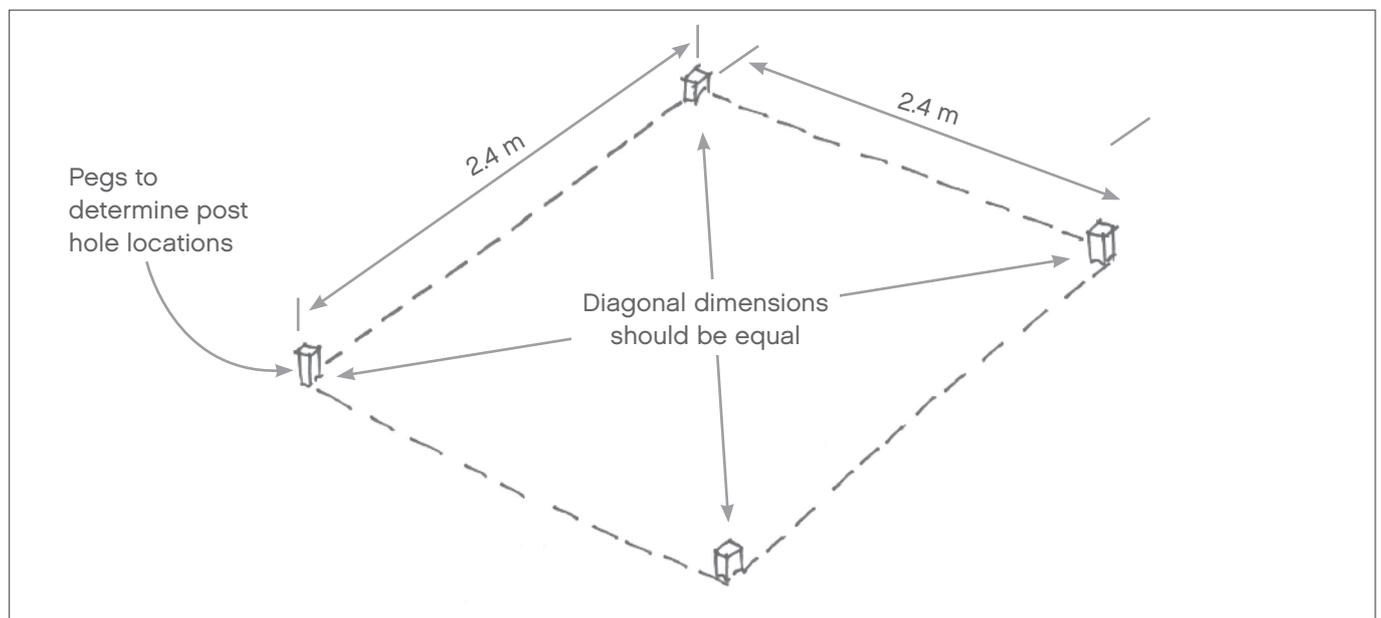


Figure 2

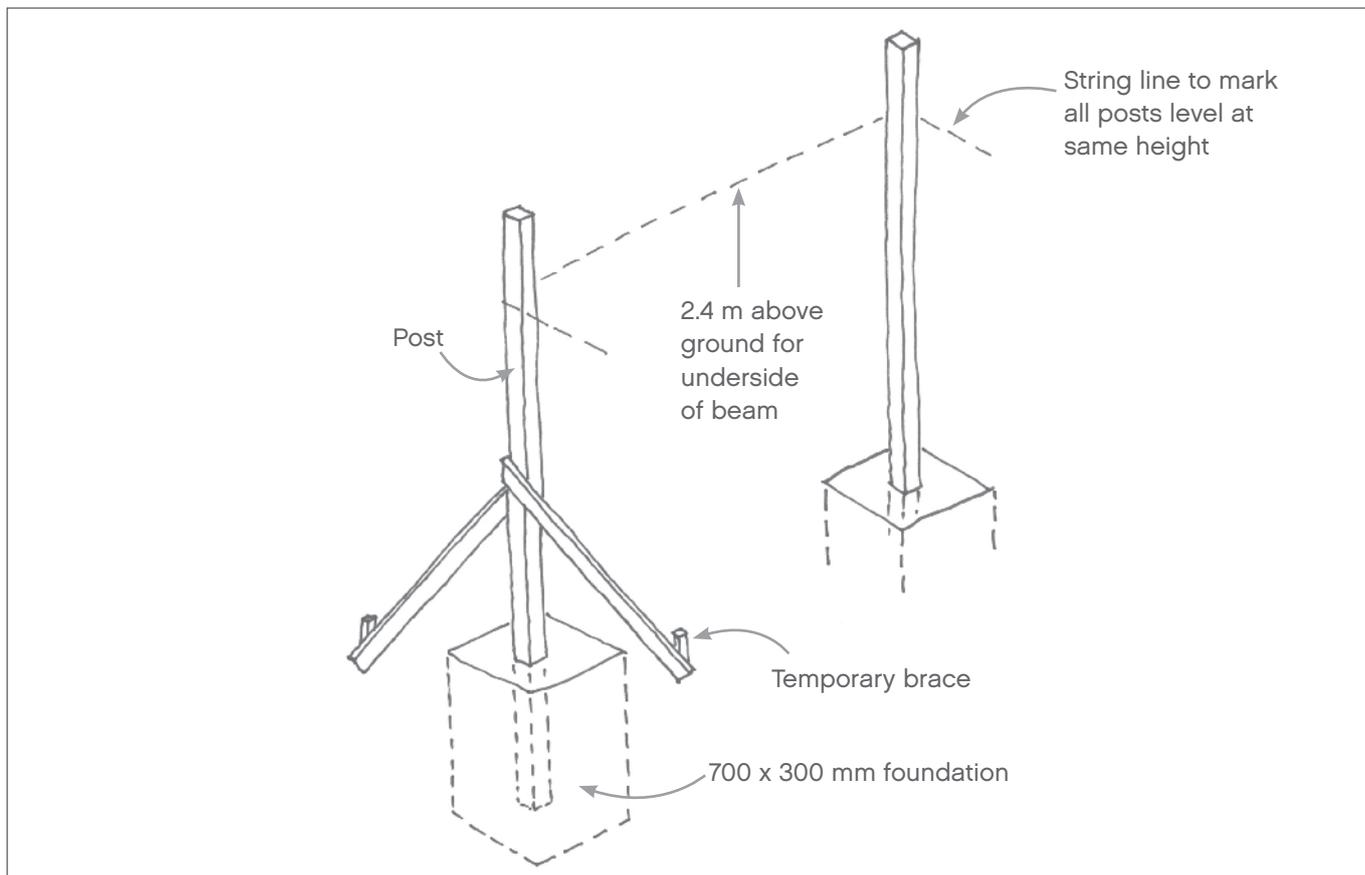


Figure 3

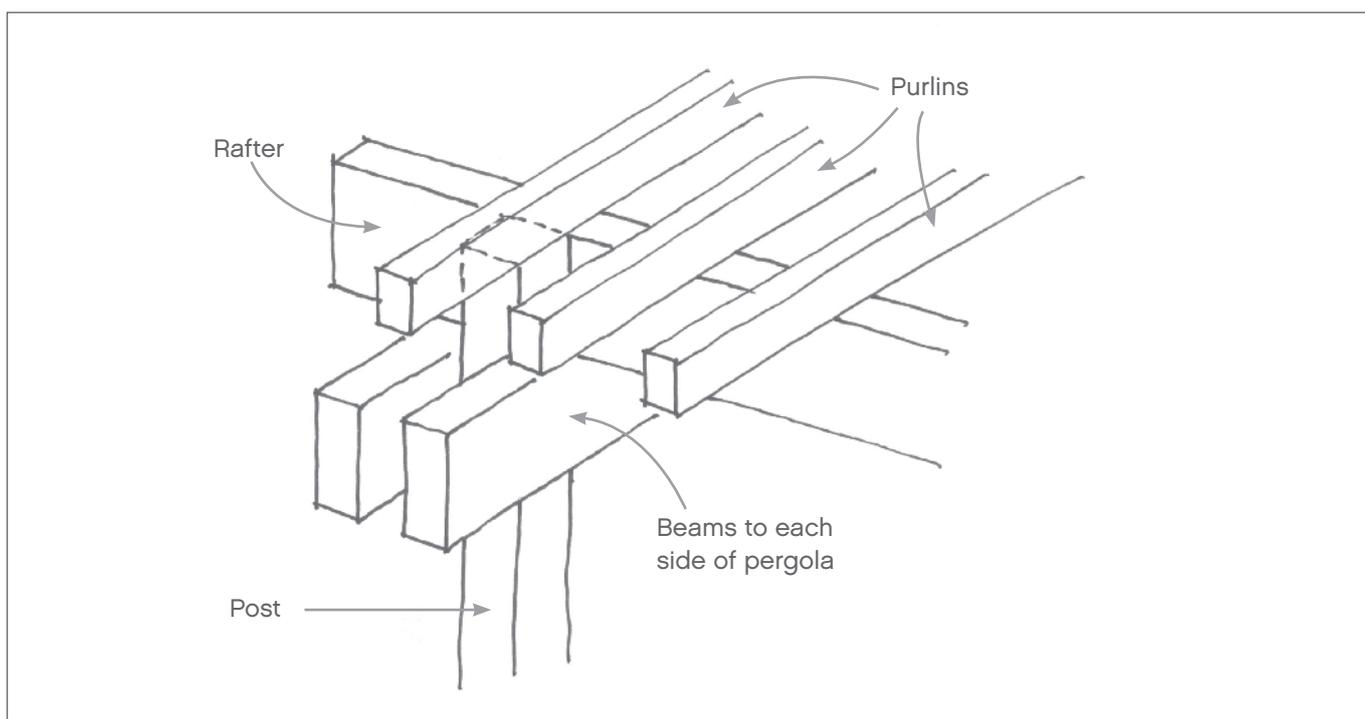


Figure 4

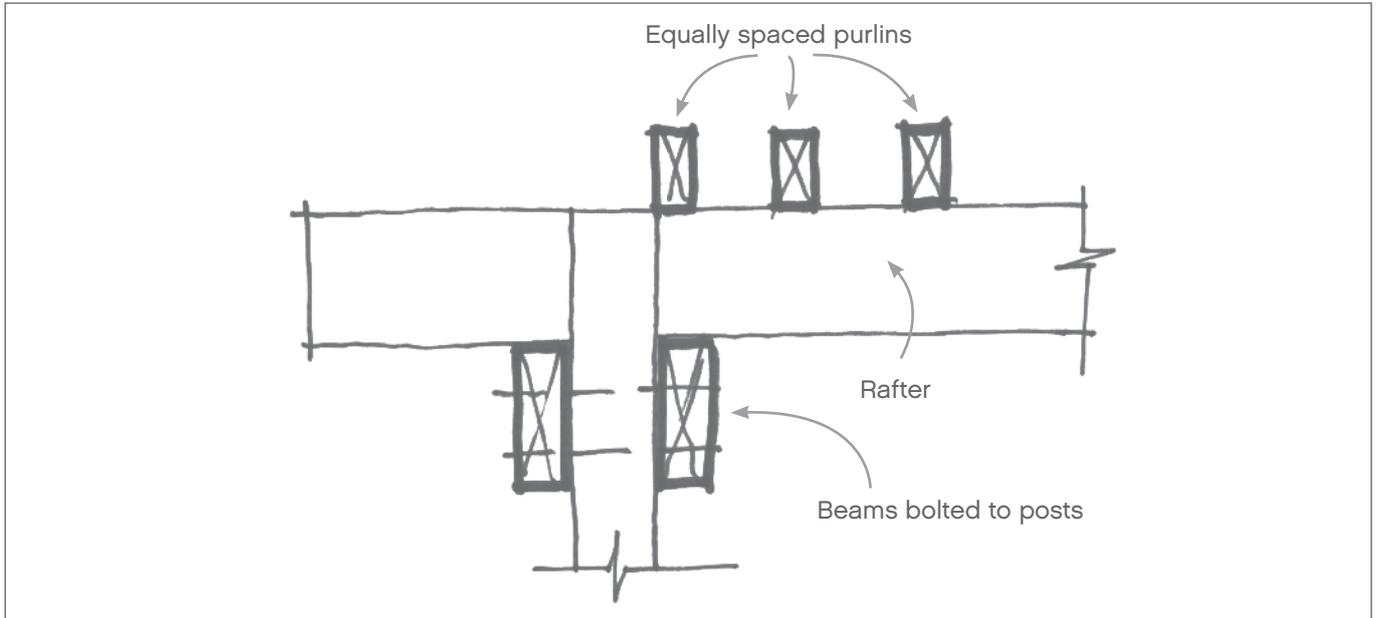
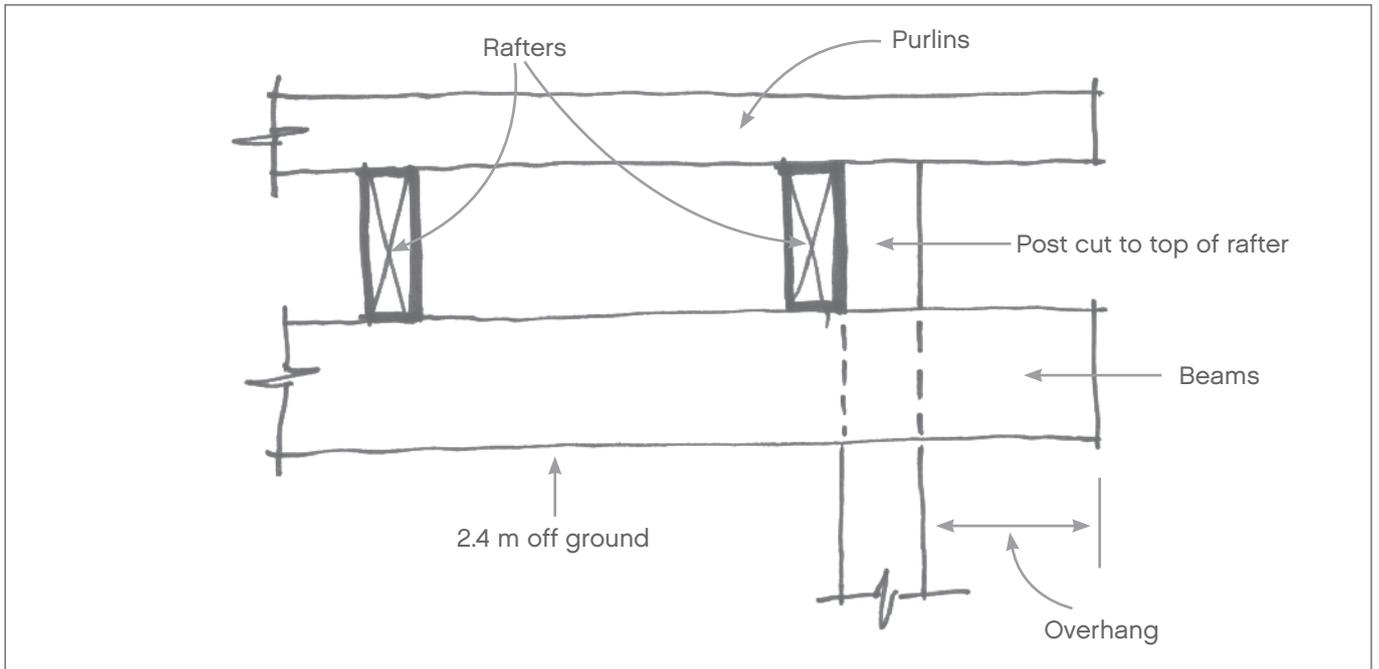


Figure 5



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