

Pergola and verandah framing tips

Part 1 – Attaching the structure

Gary Russell has many years experience in the building trade and has contributed to a number of trade magazines. He shares building tips, techniques and trade secrets with us.

BY GARY RUSSELL

Verandah and pergola frames attached to the house are essentially the same, except that pergolas often have a level roof structure, while verandah roofs need a fall to drain rainwater. Frames can be built as pergolas but designed with the option of installing roof cladding in the future. Many do, and even if they never change it to a verandah, it's a positive selling point if the house is ever put on the market.

As always, you should check with the local building authority if permits are required, and remember that in most cases a licensed plumber is required to install guttering, downpipes, stormwater pipes and the roof cladding if it's iron.

Remember too that the **foundation** is the ground upon (or within) which the **footing** is constructed – it's easy to confuse them.

Metal framing brackets

Using galvanised brackets, like joist hangers or multi-grips, for butt joints is quite common (diagram 1). They certainly provide a strong joint, however many clients I've worked for believe they look quite unappealing in exposed locations. I tend to agree; therefore I've not referred to their use in the following and instead detailed other jointing methods. If you're building a verandah and propose to line the ceiling, then they won't be seen. In high wind areas or with large structures requiring heavy timber members, you may not have a choice. Building authorities often make

them mandatory, especially in those areas prone to cyclones.

Attaching to existing house

Rafters are sometimes connected directly to the fascia board on existing houses, which can be fine for smaller rafters, but I prefer to fix a pitch plate to the fascia, and then the rafters to that (diagram 2). Although you'll use more timber, there are several advantages with this method. When deeper rafters are required for longer spans or aesthetic appeal, it looks neater than having them hang below the fascia as shown, there's more room to fix battens on top of the rafters (much quicker than having to fix them between), and also to fit the roof cladding under the existing gutter. Standard off-the-shelf 'soaker flashing' can be used too, which is cheaper than custom made non-standard flashing, as may otherwise be required. Another positive is you can often 'back -nail' (or screw) through the pitch plate into the rafters rather than the more time-consuming skew (angle) nailing from the front.

If attaching the pitch plate to a clad wall frame such as weatherboards, don't remove any cladding to fix the plate – just fix it on top of the cladding and use longer and stronger/thicker nails or screws to penetrate the wall studs (diagram 3). This probably seems logical, but you wouldn't believe how many times I've seen building books

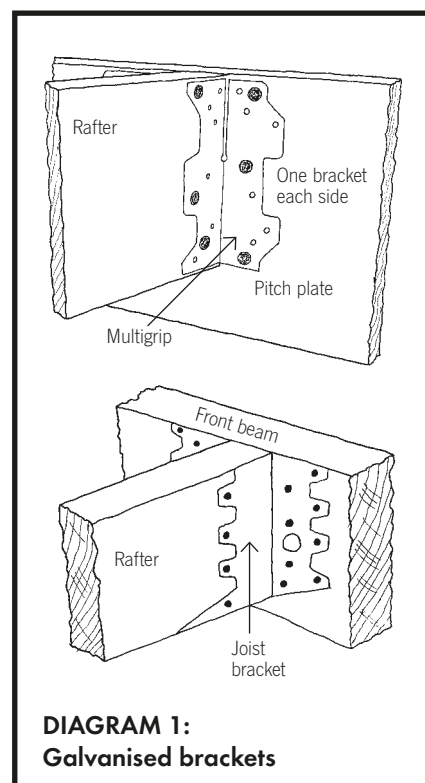
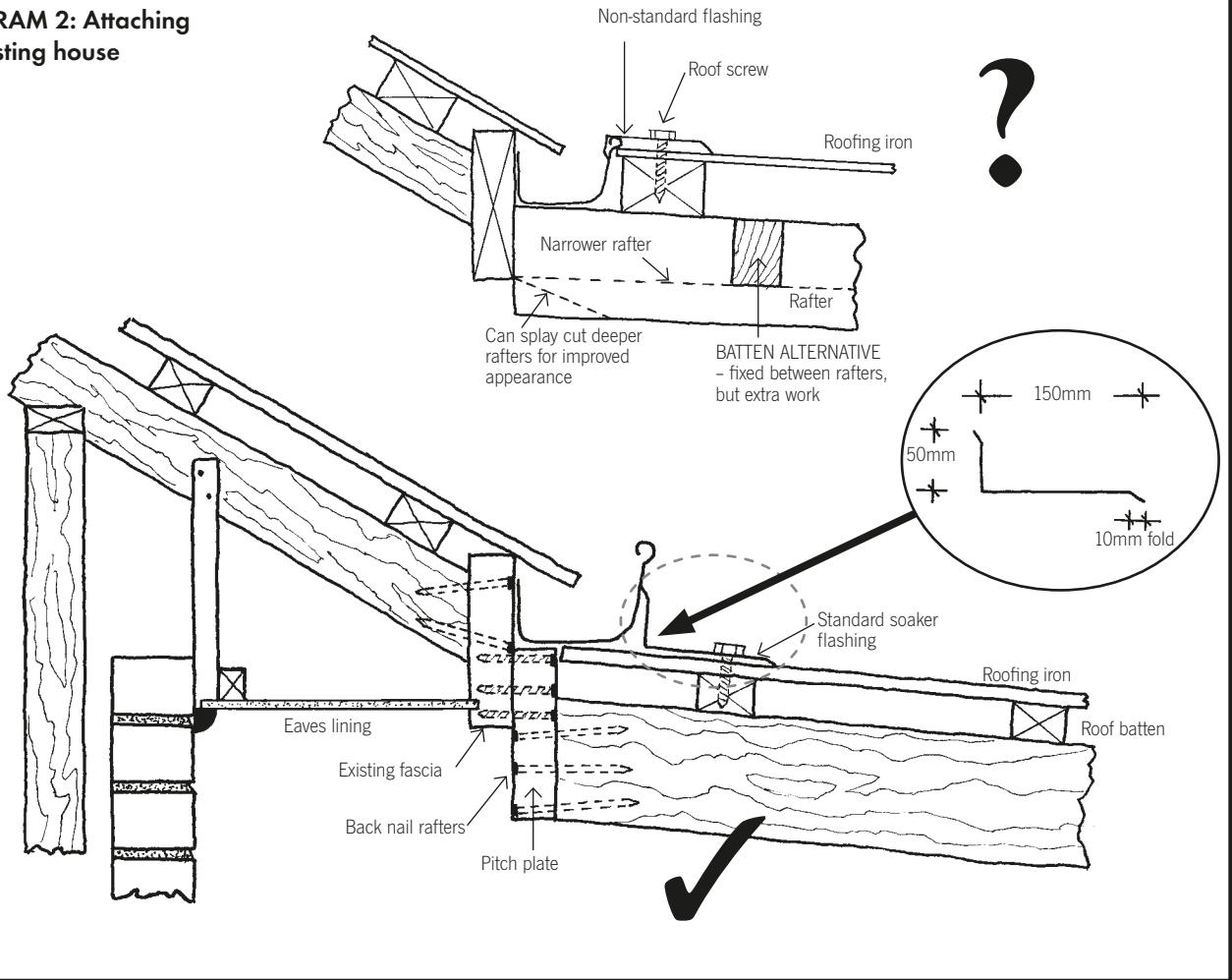


DIAGRAM 1:
Galvanised brackets

DIAGRAM 2: Attaching to existing house



suggest removing the cladding to fit the plate. It creates a significant amount of extra work. The easiest way to fix pitch plates to brick walls is with 'self tapping masonry screws' (diagram 3). They hold tight, are quick to install and come in a large variety of head types and sizes.

BEWARE

Bricks near the top of walls without any roof or ceiling load bearing upon them can often dislodge easily, particularly on older houses where the strength of the mortar has diminished with time. Note that with brick veneer construction, the brick walls are only a non-load bearing facade - wall frames take the roof load. Drill holes slowly and carefully, or if possible, position the pitch plate further down where the wall will be more stable from the collective weight of the extra bricks above.

Simply use a masonry bit to drill holes through the timber and into the bricks in one operation. The screws cut their own thread as they're installed. They're ideal for fixing close to the edges of bricks as they don't rely on expansion for grip, which is handy if the bricks are not solid - i.e. they've got holes in them. Choose a solid part between the holes for fixing (at the ends and sometimes the middle) and never fix into the mortar course because it won't be strong enough.

Hexagon head screws are the best to install as they don't need countersinking and are easier to screw in using a ratchet and socket - they need to be driven slowly to cut tight, high-grip threads, but remember to keep them clear of the proposed rafter butt joint locations. Over flashing won't be needed if the new structure is close to the underside of a building with eaves lining, unless you're in an area prone to wind-driven horizontal rain.

Posts

Mass concrete footings with post stirrups is a more expensive system (diagram 4), but because high winds can create a strong lifting force to the underside of the roof cladding, the extra weight that concrete provides is considered necessary to prevent the structure from moving. In extreme cases the verandah can completely come adrift from the house.

As pergolas have no roof cladding, the wind problem is negligible even with closely-spaced shade battens, so it's more practical to plant the posts directly into the ground (diagram 4). This method also provides a high level of bracing to keep the structure rigid, whereas on verandahs, once the roof cladding is installed it acts as bracing (unless they're tiles). Ensure though that you compact the soil around the posts by ramming it in layers with the top of a crowbar. To maximise the bracing aspect, dry cement

BEWARE

1. Before fixing the pitch plate to existing timber fascias, ensure they're adequately fixed into the ends of the house rafters. Time and weather can rust or loosen nails, and the extra weight bearing on the fascia from the new structure can potentially cause separation or even total collapse. Fascias may not be strong enough to support wider frames. They may have to be removed and the pergola/verandah rafters fixed to the existing house roof or wall frame.

2. Sheet metal fascias that are often used nowadays can't be used to support rafters or pitch plates. Their use is purely cosmetic with practically no load bearing capacity. They'll have to be removed and the pitch plate fixed directly to the existing house rafter ends.

3. If the proposed verandah roof cladding is tile (concrete or terracotta), alternative design and fixing methods may have to be employed as they weigh about five times more per square metre than corrugated or ribbed roofing iron.

powder can be mixed in with the excavated soil before backfilling (cement stabilised). About three or four shovels per hole is adequate. Ground moisture eventually hardens the mix.

If using timber treated against rot, don't cut the end that goes into the ground. This diminishes the effectiveness of the treatment potentially causing premature rotting. One disadvantage of in-ground posts is that they won't last as long as those on stirrups, even with the most rot-resistant timber. Anywhere between 20 and 50 years is considered the average life span for the portion below ground, depending on the timber species or level of treatment.

Fix rafters to pitch plate

If the pitch plate is fixed directly to a wall frame without any internal or external wall cladding, you should be able to nail or screw into the rafters

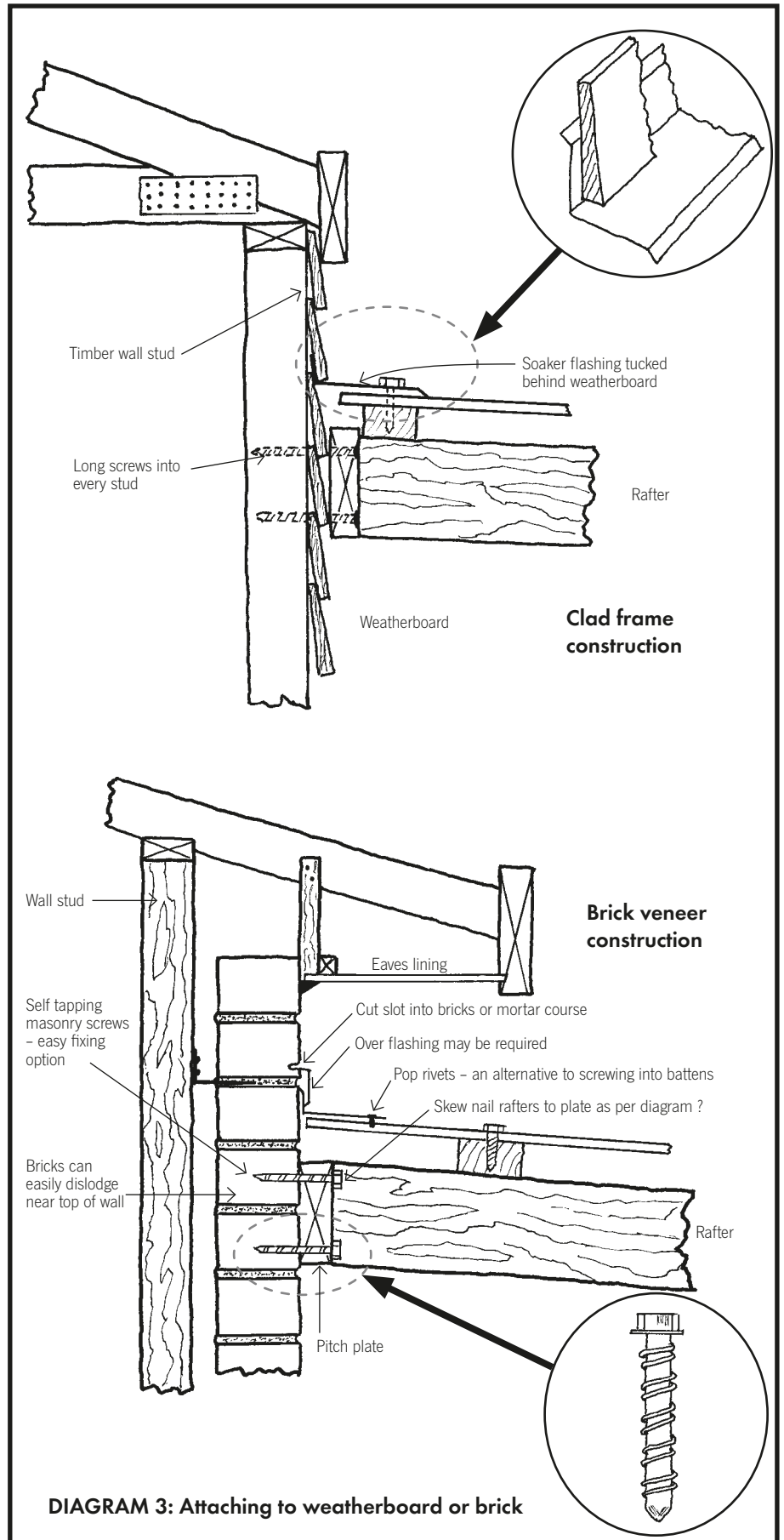
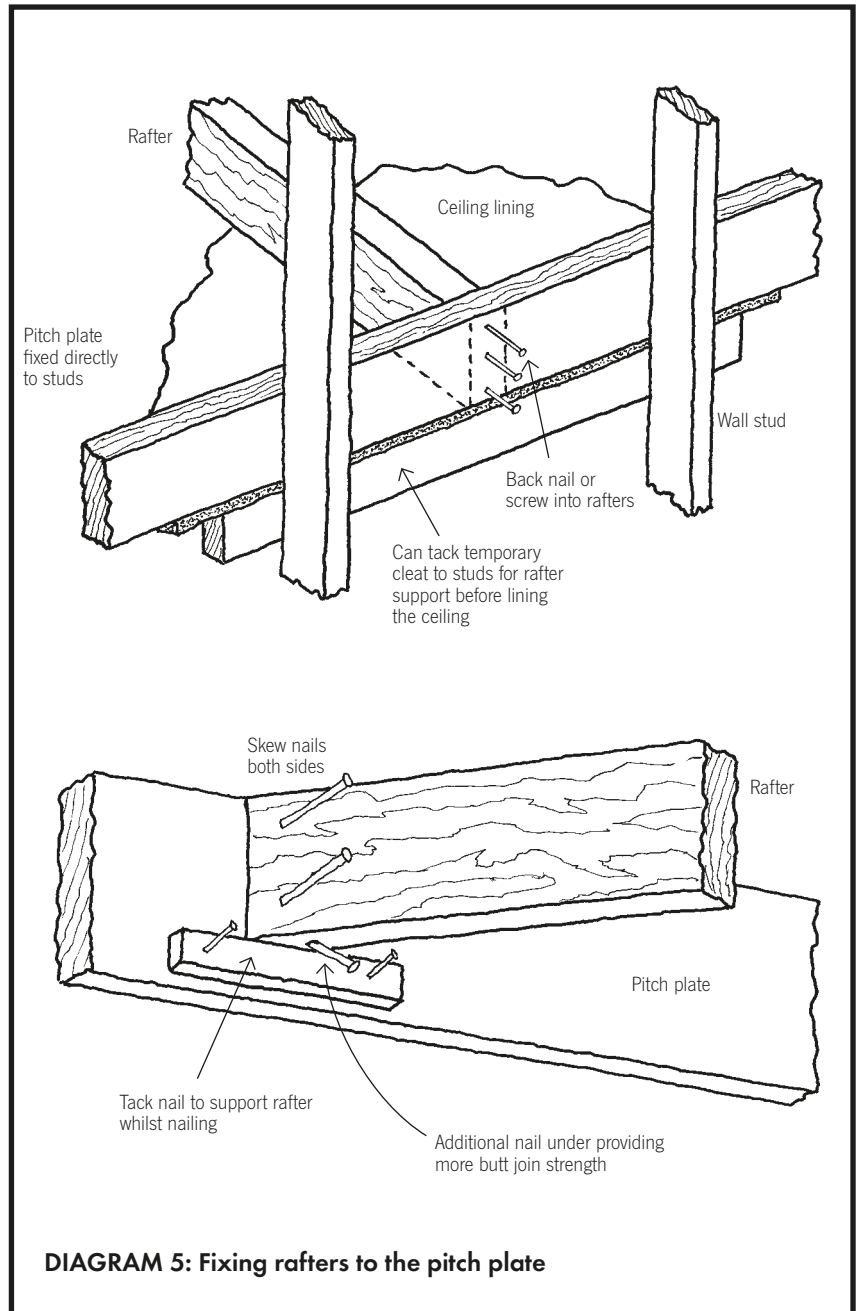
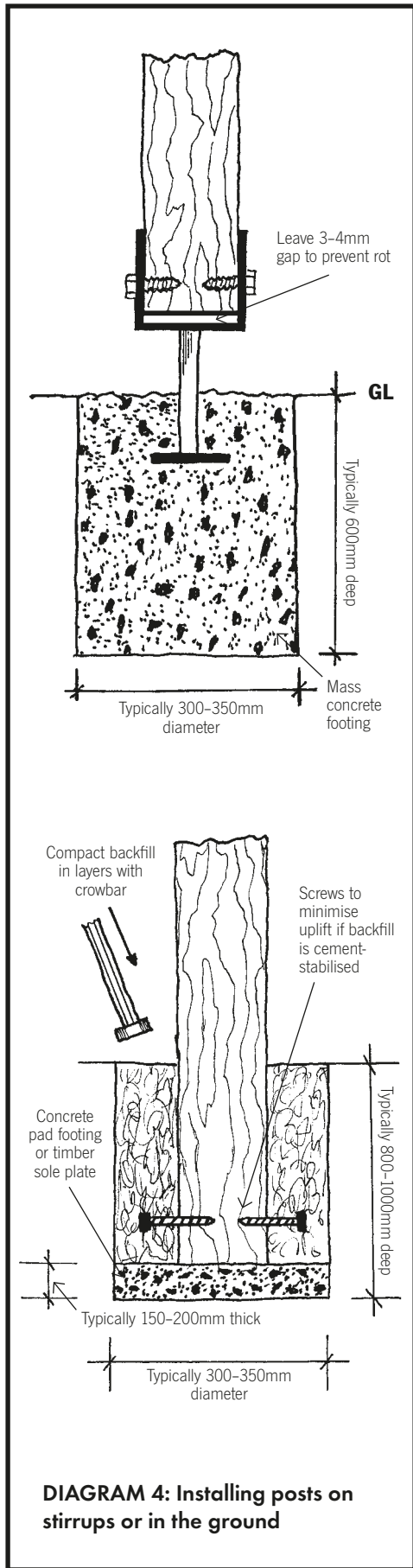


DIAGRAM 3: Attaching to weatherboard or brick



While concrete footings with post stirrups is a more expensive system, they are long lasting and provide more resistance to a lifting force in areas of high wind.

Framing member spans

If framing members are too small, not strong enough or both, they'll sag or even snap and collapse. To prevent this, engineers calculate the maximum distance all the common timber sizes of each available stress grade (strength rating) can span without this happening. These are contained in the 'span tables' of the Australian Standard 'AS 1684, Residential timber-framed

construction,' and when a building permit is required they must be adhered to.

The tables are very extensive, covering every possible member that could form part of a timber frame. I'll only include here a small sample portion of a commonly used timber and stress grade on verandah and pergola frames - seasoned softwood (usually radiata

pine) with an F8 stress grade, based on the weight of an iron roof in a non-cyclonic location (diagram 6). Note the difference between 'span' and 'spacing.' Span is the distance of a timber member between supporting members, and spacing is the centre to centre distance between members, which is often referred to as 'centres' by most tradies.

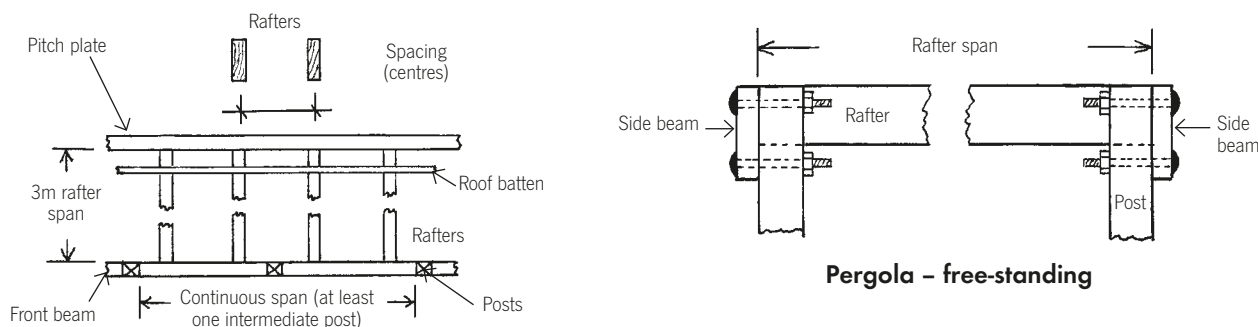


DIAGRAM 6: Sample of span tables from Australian Standards

Rafters

At 900mm spacings will span between pitch plate and front beam of 2 side beams of a pergola.

| | |
|------------|--------|
| 90 x 45mm | 2200mm |
| 140 x 45mm | 4600mm |
| 190 x 45mm | 6000mm |

Beam - front or side (pergola)

Will span between posts with a structure width of 3 metres and rafters 900mm spacing (centres) based on 'continuous span.'

| | |
|------------|--------|
| 140 x 45mm | 2850mm |
| 190 x 45mm | 3850mm |

Roof battens

At 900mm spacing (centres) will span between rafters (note batten on edge will span further)

| | |
|-----------|--------|
| 70 x 35mm | 800mm |
| 90 x 35mm | 1050mm |
| 45 x 90mm | 1200mm |

from behind. A nail gun is quick, but if you have to nail from the front (diagram 5), they often split the sides of the rafters or the nails won't self-countersink. Because framing gun nails are relatively thin, trying to punch them home with a nail punch often proves fruitless. They'll either just bend or the large head will split the timber if it hasn't already. You could finish up with a rather messy and structurally unsound job. The alternative will take longer, but quality results are assured.

Firstly, drill angled pilot holes in the sides of each rafter before lifting them into place. They should be slightly

smaller than the nails' diameter, or if screwing, approximately the size of the screws' solid core. I generally use 100mm bullet head galvanised nails - two each side for 150mm deep rafters and three for 250mm deep. Hammer the nails in as far as possible without denting the sides of the rafters with the hammer head and then finish driving and countersinking with a large nail punch. ■

Attach the pitch plate directly on top of the existing cladding, using longer and stronger fixings to penetrate the wall studs.

