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GANG-NAIL GUIDELINES No.142

ANOTHER MITEK ADVANTAGE

ON THE VERGE OF GETTING IT RIGHT PART 2 - CONSTRUCTION

In last month's article we visited the design aspect of gable ends. This month it's time to put theory into practice and discuss the consequences of the design assumptions on the construction process.

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It's not enough just to get the correct member and nailplate sizes and camber as generated by the computer software.

The design process makes certain assumptions about how all the components are supported and interact with each other in the same system.

These assumptions have to be clearly understood and carried out in practice to achieve an acceptable result on site.

An easy one to get wrong is the length of the 'backspan' of verge members.

A relatively short 'backspan' with a small amount of movement at its support end will translate into a larger deflection at the far end, even if the timber size and grade is sufficient for the loads - See Fig 1.

A bare minimum of 'backspan' equal to overhang may at times be satisfactory but a greater 'backspan' would be desirable, preferably 1.5 times.

A gable end is a system of elements *working together* and the adequate performance of each element is necessary.

The verge support members, outriggers or sprockets, are attached to two or more trusses at the end of the structure.

If these trusses, or the connections, have a differential movement at the verge member support points then the end of the verge overhang will not remain in line with the rest of the roof plane.

Two common, and ironically, related errors are:

- *Fixing* the end truss to the end wall or gable wall framing when it is designed **with** a camber.
- *Not fixing* the end truss to the gable wall framing when it is designed **not** to have a camber. Raking trusses may be designed with the assumption of support over the full span; this assumption is also valid even when the truss is not directly over the end wall - as long as there are gable studs in place to support the verge member.

The unintentional relative movements of the two trusses that support the gable overhang are

continued overleaf

Figure 1: Got it wrong!

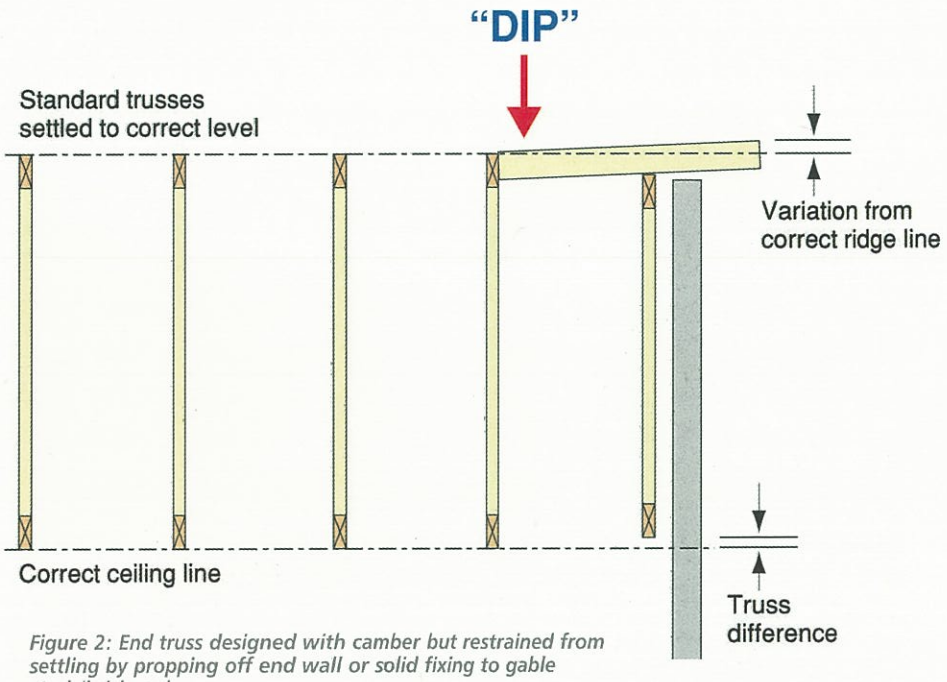

Figure 2: End truss designed with camber but restrained from settling by propping off end wall or solid fixing to gable studs/brickwork.

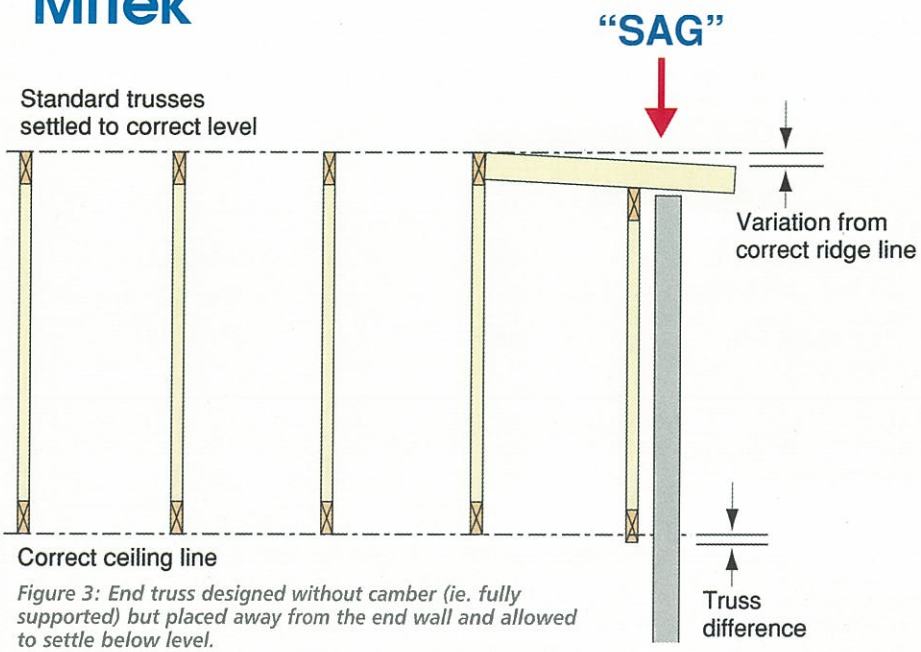

Figure 3: End truss designed without camber (ie. fully supported) but placed away from the end wall and allowed to settle below level.

probably the greatest cause of callouts to do with sagging or dipping roof lines at gable ends or over masonry party walls.

Considering the two diagrams (Figures 2 and 3) it is clear that the end of the outrigger will show about double the actual truss difference, hence exaggerating the effect on the roof line.

The construction issue that is probably the most commonly observed fault is connections.

The size of verge support members relative to the other elements of a roof seems to lead to either an "under-valuing" or a misunderstanding of the connection requirements.

This is particularly true in the case of sprockets where they are "slung" under the supporting trusses.

Here, any loose connections will "take up" when the roof is loaded and translate into differential movement giving an unsightly eave.

Often a couple of skew nails are used to 'hold everything in place' without full consideration of all loads, including wind and maintenance.

A tie-down strap that is well tensioned during nailing will reduce the potential for deflections.

One critical connection is where there is a structural fascia along the truss overhang to support the barge rafter end at the extreme corner (Fig 4).

This fascia has to be properly attached to all elements including every truss overhang (Fig 5).

Either screws or a framing anchor will give a much firmer connection than nailing into the end grain of the top chord.

As we noted last month: a gable end is actually quite a complex system to get right.

Complete and effective communication between the truss designer and installers is essential to achieving the desired final outcome.

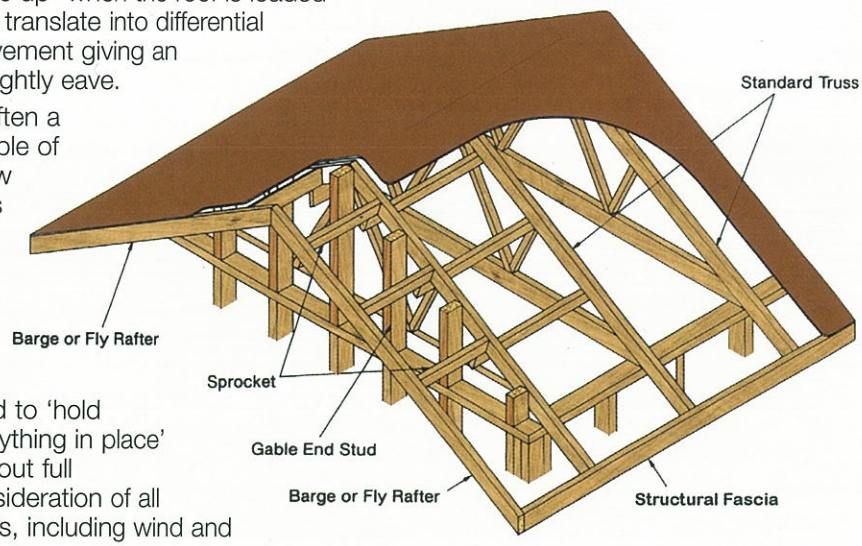

Figure 4: Note the structural fascia supporting the barge (aka "fly" or "verge") rafter.

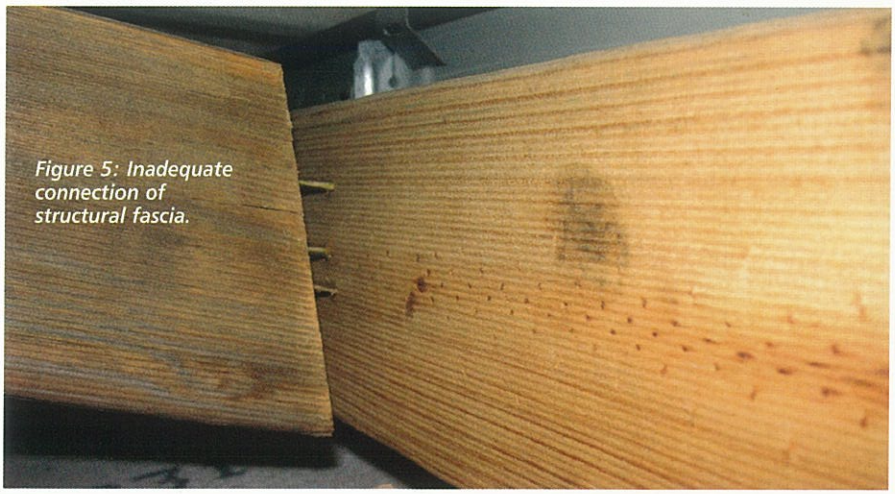

Figure 5: Inadequate connection of structural fascia.

Discussion between fabricator and builder could include any or all of the following:

- Preferred 'backspan' of verge support members.
- Support conditions for the gable end truss.
- Connection options for verge members, structural fascia and barge rafters.

With correct design and construction corresponding to the design assumptions, the result will be safe, strong and look just the way it was drawn by the building designer. TTN