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GN GUIDELINES No.209

ANOTHER MITEK ADVANTAGE – DECEMBER 2014

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MEETING SHALLOW TRUSSES HEAD ON

Flat and shallow roofs are popular features in modern metropolitan homes because they take maximum advantage of small blocks of land to build spacious homes.

They however present a number of interesting and challenging issues for the truss designer.

The first is that shallow trusses are simply less efficient than deeper ones. They attract much higher forces in their components while at the same time tend to deflect more.

To compensate for this, larger timber members or higher grade materials are usually necessary to help meet strength and stiffness requirements. The temptation to economise on stiffness and permit large cambers should be resisted, especially when the next issue comes into play.

This is when there are sizeable air conditioning or heating units to fit between truss webs in a confined roof space which is often not an easy task.

The simple solution for the truss designer is to remove one or more webs that are in the way.

However, the resulting "non-triangulated" truss is very inefficient, more flexible, and prone to even higher stress and deflections (please refer to GN Guidelines Nos. 106 and 149 for warnings on this issue).

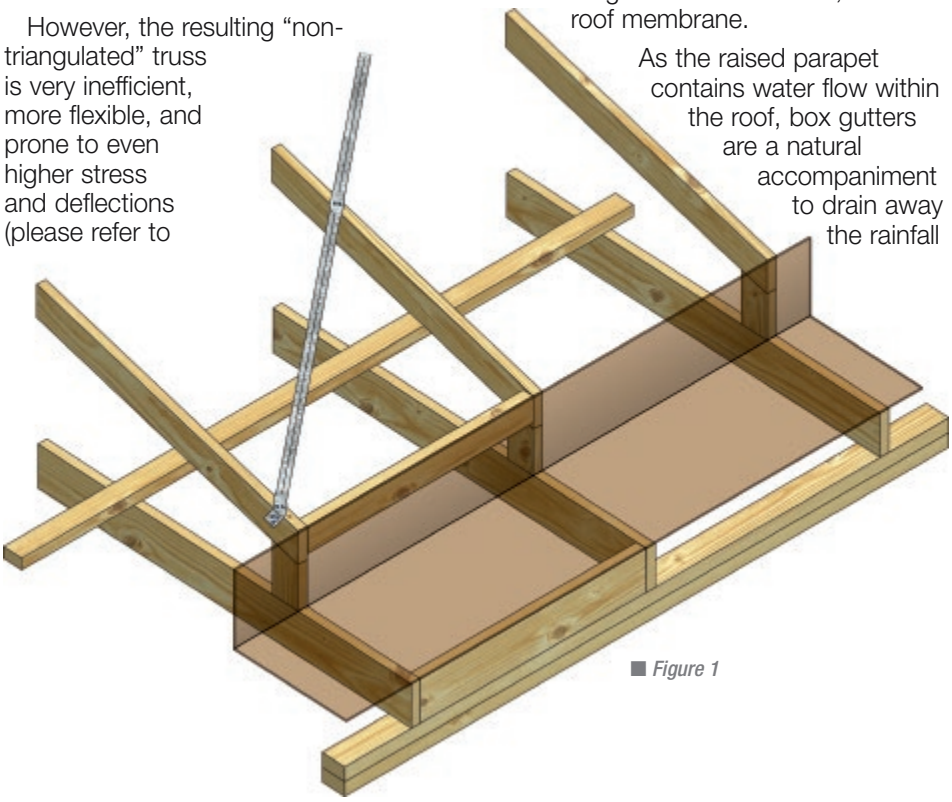
Rather than removing webs, opportunities should be sought to forming the void by increasing panel lengths and spreading the diagonal webs apart so that triangulation is not lost entirely.

If an untriangulated opening is unavoidable, consider the possibility of locating it near the centre of the truss and furthest away from supports to minimise the negative effects of non-triangulation.

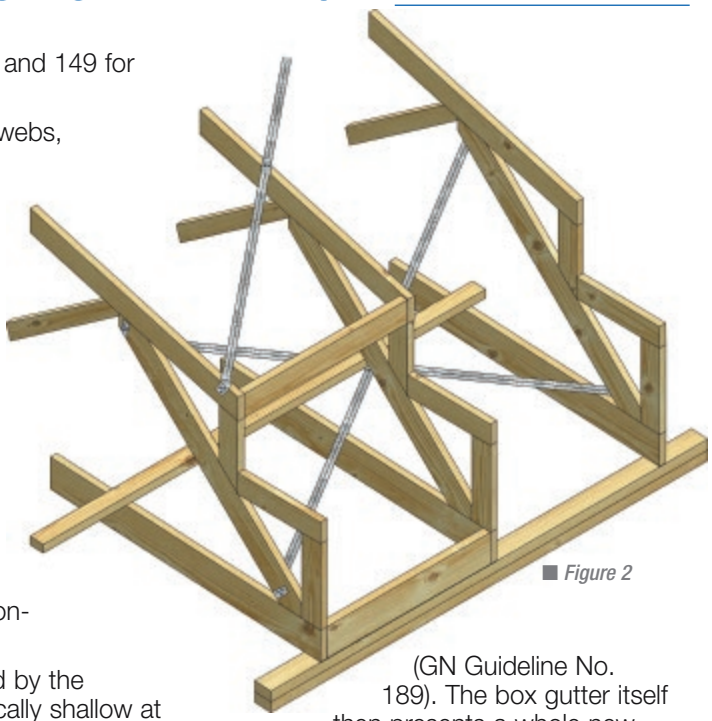
Some trusses depicted by the architect are so impractically shallow at the low end; there is physically no room to fit any webs between the chords. It virtually becomes a solid beam that in turn blocks any services required to run through the roof space.

This type of architecture often involves a parapet around the perimeter of the building to conceal the thin, shallow roof membrane.

As the raised parapet contains water flow within the roof, box gutters are a natural accompaniment to drain away the rainfall (GN Guideline No. 189). The box gutter itself then presents a whole new range of issues.



■ *Figure 1*



■ *Figure 2*

In GN Guidelines No. 181, Brett Bolden explained how roof bracing needs to transfer forces back to the supporting structure and the designer and builder has to be wary of any missing links where the SpeedBrace is discontinuous or not securely anchored to the supporting structure.

Box gutters are a potential contributor to this missing link.

How bracing around the box gutter can be accomplished depends on a number of factors, such as how big the box gutter is and how it is being framed up.

If the truss has a simple bottom chord extension to form the box gutter, bracing can be provided by way of plywood sheeting and/or SpeedBrace in the vertical and horizontal planes of the box gutter (Figure 1).

If the truss is deep enough to form web triangulation around the box gutter for a more efficient design, SpeedBrace may be installed along the plane of the last diagonal timber web to continue the roof bracing diaphragm down to the supporting structure (Figure 2).

Always take the opportunity of consulting your truss engineer about getting the most out of your truss designs.

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