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REDEFINING SHELTER: BY USING A PARAPET

Parapets in timber construction have traditionally been viewed as architectural features. However, with increasing complexity in building forms and roof profiles, an innovative approach of integrating parapets into the structural roof system is now being explored.

When engineered correctly, parapets can become a key functional aspect of a truss system, supporting loads and resisting lateral wind forces. This paper explores the practical, structural and detailing considerations of using parapets as trusses.
Parapets are located at the roof perimeter and extend vertically above or below the main roof plane. They may not always have framing behind them. Their uses range from concealing practical roof features such as gutters or services to forming modern architectural facades or creating continuity in roof outlines, especially in the case of low-pitch roofs.

If we are to integrate parapets into structural systems, they require more than just aesthetic and practical design consideration. This is particularly true when parapets are unsupported by framing, span large distances without lateral restraint, interact with services or bracing systems, or are subject to high wind uplift.
Designing parapets as trusses brings several engineering considerations. Design software is limited in this context as it often assumes standard lateral restraint at batten intervals – a feature parapets frequently lack.

Wind loading on the vertical face of parapets introduces high out-of-plane forces. This highlights one of the most critical issues: parapets often lack restraint at the top chord. With no ceiling and no top-plane input, top chords can buckle or twist under even moderate wind loads. Lateral restraint, especially at the top chord, is essential to avoid instability.
In addition to wind load, other factors such as asymmetrical web layouts and parapet heights exceeding 600 mm can lead to unusually high forces within members.

Several design measures should be considered to ensure structural performance:

- Increase the size of the end vertical plate to the bottom chord (refer to Figure 1).
- Use a capping plate or T-stiffener at the top of the parapet to act as a miniature wind beam. It must be nailed to adjacent members to enhance load resistance.
- Use 45-degree struts anchored back to the main truss or roof frame to provide mechanical restraint. It is recommended that struts be placed at centres no greater than 1800 mm (refer to Figure 2).
- Consider twin-truss detailing, where a parapet truss is reinforced with a second truss or a wailing plate directly behind it. These should be tied together with screws or nails at each crossover point to distribute the load and enhance capacity (refer to Figure 2).
- Add vertical webs at web-to-chord junctions to increase stiffness and improve load distribution. Vertical webs should be spaced no more than 900 mm apart, subject to specific project needs (refer to Figure 3).

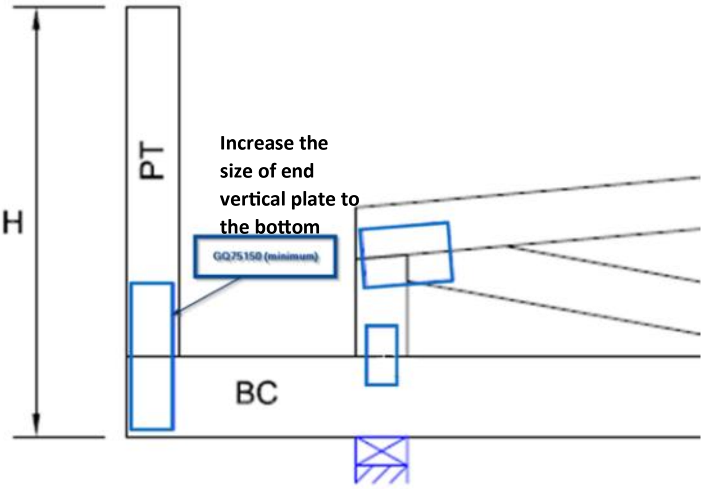

Figure 1 Minimum gang-nail size requirement

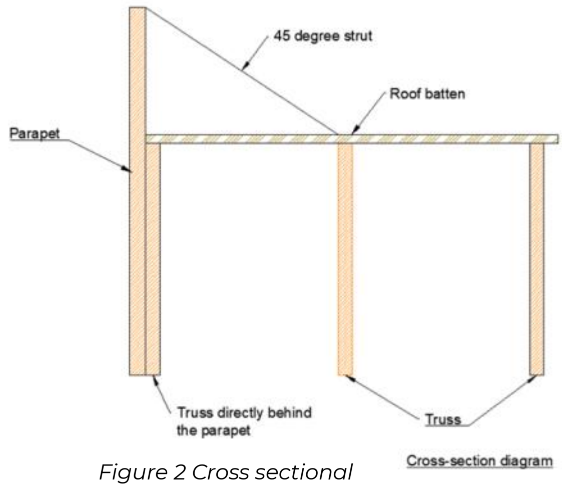

Figure 2 Cross sectional diagram

Truss manufacturers must seek engineering advice and not rely solely on software defaults for parapet design. Engineering input is essential for any parapet that exceeds 600 mm in height, lacks a backing structure or is located in regions with a wind rating above N2.

Using parapets as structural trusses is a viable solution only when supported by engineering reinforcement and careful detailing. They should not be treated as standard fascia or gable-end members. With the involvement of structural engineers and the application of conservative detailing measures, parapets can successfully function as structural truss elements.

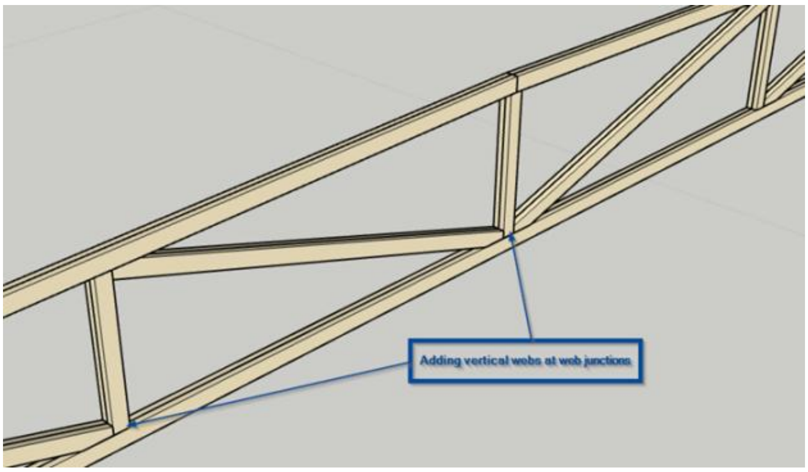

Figure 3 Vertical webs at web junctions in parapets

Wherever possible, parapets should be backed by standard trusses, and restraint methods for the top chord must be clearly defined to ensure safe and effective performance.
Industry support and guidance from experienced engineering teams, can help ensure parapet applications are approached with the structural rigour they require.

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