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# Use of let-in plywood bracing

Let-in plywood bracing has a long history of use. Some designers and manufacturers specify it, but some councils don't permit it. BRANZ has found it doesn't seem to affect structural integrity and suggests ways to resolve the uncertainty.

**LET-IN PLYWOOD BRACING** for walls is a method of construction where plywood sheets are fixed to the exterior of a timber-frame wall to contribute wall bracing capacity. It is usually positioned at the corners of the building and commonly uses a single sheet (1.2 m × 2.4 m) of 7–9 mm thick plywood.

This bracing method requires wall studs and plates to be rebated so the exterior plane of the wall is not altered by the thickness of the plywood (Figure 1). Without the rebate, this would impact the installation of cavity battens or direct-fixed cladding. Rebating is not needed when an exterior wall is fully sheathed in plywood.

## Questions about reduced performance

The rebating of the frame reduces the stud and plate depths to less than the specified 90 mm. This has raised questions about the reduction in performance potentially caused by this decrease in framing depth.

This method used on buildings constructed according to NZS 3604:2011 *Timber-framed buildings* is not accepted by some building consent authorities. One concern raised is that, once a 90 mm × 45 mm radiata pine SG8 H1.2 wall stud is ripped to accommodate the plywood, it is potentially no longer graded as SG8.

Another concern is that this means of providing bracing has never been recognised within a standard or BRANZ publication. This is even when engineers and building practitioners have provided opinions that it should not compromise the performance of a building structurally or otherwise.

## Research to find answers

BRANZ researchers undertook a Building Research Levy-funded project to understand the issues around using let-in plywood bracing and identify what, if any, actions should be taken to support or reject its use throughout New Zealand.

Methods for developing this understanding included a review of available documentation of the method along with engagement with a range of stakeholders to determine the extent and implications of its use.

## Long history of use, though few details

The use of let-in plywood is currently not described in any building standards or Acceptable Solutions for use in New Zealand. Older references to light timber-frame construction methods in New Zealand were reviewed, and while mention was made of the method, there were not enough details presented to allow for a proper engineering evaluation.

A mention was made in a BRANZ *Guideline* from November 2007 on this method. It noted that it had been commonly used for years and that, although concerns had been raised, there was not enough evidence to suggest a change in current practice at the time.

A testing report by Winstone Wallboards from 2007 on the out-of-plane stiffness of panels incorporating plywood bracing elements was not officially published but has been made available to the public. The report concluded that thinning the studs decreased the stiffness, but adding the

plywood increased it in both directions and enhanced the out-of-plane bending strength by bridging defects and effectively reinforcing the studs.

Changes in bracing capacity have not been documented using this method, even though it is assumed that the performance would be like using plywood bracing on 90 mm framing.

In addition to these documents, numerous emails and informal exchanges among engineers, manufacturers and members of the New Zealand Frame and Truss Manufacturers' Association (FTMA) indicate that there should be no significant detriments to structural or durability performance of buildings using this method. These exchanges lacked the formality required by some councils but have often been used and accepted by many councils as validation of the use of let-in plywood bracing.

## Some use regularly, others don't

A range of practitioners, manufacturers and suppliers were contacted to determine their understanding of the practice, how often they encountered it and if they felt it was acceptable.

Many practitioners acknowledged that the practice was likely to be effective, regardless of whether they included it in their designs. Some practitioners included it on a regular basis, particularly for renovation work.

Some manufacturers of prefabricated frames noted that the practice was included daily, while others opted not to include it due to production issues and questions about acceptance. ➤

### Think further than structural performance

While most of the attention around let-in plywood system performance has been focused on structural performance, it is also important to consider possible implications of other building aspects. These may include batten and cladding fixing, durability, insulation, fire performance and moisture migration.

Discussions with building scientists and practitioners have indicated that these issues can most likely be addressed by using appropriate materials and detailing. Without more research on these aspects, it is difficult to make specific recommendations due to the potential range of solutions that could be considered.

### Ways to resolve the uncertainty

Several options could resolve the uncertainty around using let-in plywood bracing including:

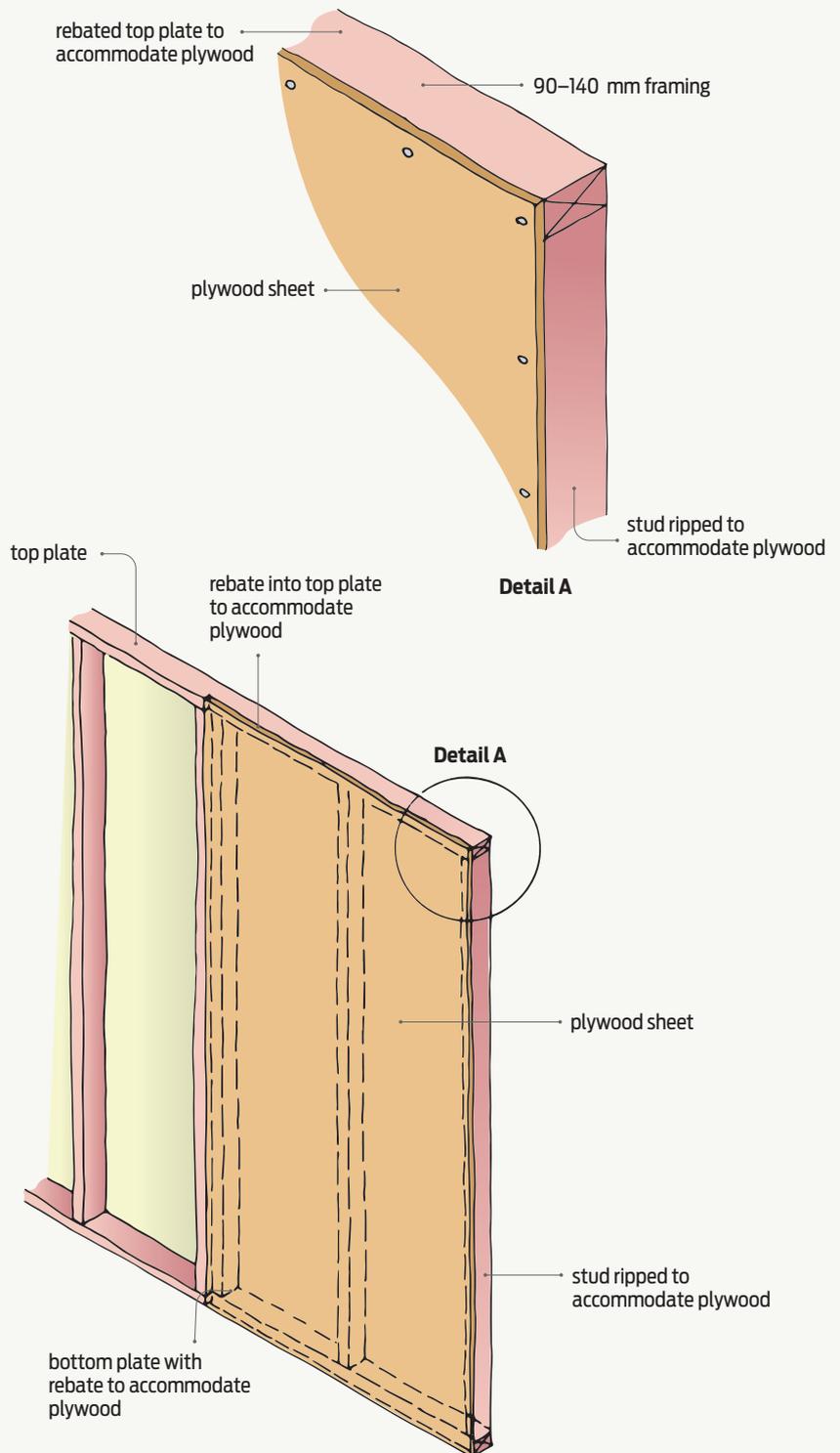
- a design producer statement from an engineering practitioner
- inclusion within an Acceptable Solution such as NZS 3604:2011 *Timber-framed buildings* – currently under revision
- BRANZ Appraisal or CodeMark certification for a specific system
- manufacturer technical literature with adequate details for compliance evaluation
- an MBIE determination.

### Consider as part of wall system

When used in conjunction with NZS 3604:2011 construction, this method is not considered to be detrimental to the structural capacity of the timber frame. This is based on the investigations by BRANZ and the extensive history of use – further evidenced by a lack of identified reports of failures in service.

However, it is important to ensure that the installation and integration within the wall system is carefully considered so as not to compromise Building Code performance requirements. ◀

**For more** ▶ A BRANZ study report due for release later this year will provide more background information.



**Figure 1** Let-in plywood bracing.