



POST-EARTHQUAKE PLASTERBOARD REPAIRS

Although some Canterbury homes have little visible earthquake damage, many are reportedly creakier due to a loss of lateral stiffness. BRANZ has developed guidance for repairing plasterboard-lined walls.

By Stuart Thurston, BRANZ Structural Engineer

A BRANZ Building Research Levy-funded project included earthquake simulations on a timber-framed plasterboard-lined room (see *Build* 127 December 2011/January 2012, page 66) to assess the effectiveness of different repair options for plasterboard walls. The guidelines for repairs are below.

Method 1: Cosmetic repair of plasterboard damage

This method is for houses where there is only light damage mainly consisting of thin vertical joint cracks from the corners of openings. Diagonal cracks from opening corners up to 50 mm long may be present. Some loss of adhesion or fastener popping may have occurred in the centre of the sheets.

There must be no damage visible at wall-to-ceiling joints, no ceiling damage and no indications of wall uplift.

REPAIR STEPS

1. A drywall screw must be fixed adjacent to any plasterboard screws or nail fixings that have popped.
2. Any plasterboard sheet centres that are loose (drummy) must be refastened.
3. On all walls exhibiting damage, use the cosmetic repair guidelines recommended by reputable gypsum plasterboard manufacturers.

EXPECTED RESULT

Although this repair may not reinstate building stiffness to that of a new house and small cracks may reappear in future serviceability, wind or earthquake events, this damage is expected to remain cosmetic only.

Method 2: Cosmetic repair of plasterboard damage plus add extra plasterboard fastening screws

Use this when damage is more substantial than for method 1, including situations where plasterboard cracks may emanate diagonally from the corners of openings up to 50 mm long and/or where wall-to-ceiling or wall-to-wall junctions show stress by visible cracking, fastener movement, wallpaper creasing or similar.

Where there is evidence of bottom plate or stud uplift, framing connections must be reinstated and repaired using method 3 or 4.

REPAIR STEPS

1. Remove all architraves and skirting in the affected areas and check for fastener stress at the bottom of the sheets. Stress may indicate bottom plate or stud uplift.

2. Any diagonal cracks greater than 50 mm long or where sheet edges are dislodged will require repairs using method 3 or 4.
3. Add suitable drywall screws in a bracing pattern around the perimeter of all full-height wall sections that are to be redecorated. Extra fastenings will not be required behind undamaged plastered or coved wall-to-ceiling junctions.
4. Tape and stop repaired joints and plasterboard cracks in accordance with good trade practice.

EXPECTED RESULT

Although this repair may not reinstate the building's stiffness to that of a new house, it is expected to be sufficiently stiff to prevent small cracks from reappearing during future serviceability, wind or earthquake events.

Method 3: Overlay new plasterboard over damaged and add wall hold-down anchors in affected areas

This method may be used on all walls with sufficient diagonal cracking, in lieu of replacing damaged sheets as in method 4. Ceilings that have been cracked must be treated in a similar fashion.

This repair method is only applicable where there is no damage to the wall framing.

REPAIR STEPS

1. Remove architraves, scotias and skirting.
2. Make small cut-outs in the corners of all plasterboard bracing elements and reinstate stud-to-plate connections. Ensure the bottom plate is tight with the floor. This may require the installation of new plate-to-floor connections.
3. Ensure the building is plumb and level.
4. Screw all loose plasterboard tight using suitable drywall screws that penetrate the timber framing by at least 20 mm. Sheets should be scraped flat along broken joints to leave a smooth planar surface to receive the overlay board.
5. Add screws along middle studs at 300 mm centres, even if glued originally, as the glued joints may have broken.
6. Overlay (either horizontally or vertically) damaged walls and ceilings with new plasterboard that is at least the same quality as the original. Cut the sheets around openings (see Figure 1).
7. Fix the overlaid plasterboard with suitable drywall screws that penetrate the timber framing by at least 20 mm. Fix at 50 mm and 150 mm from each corner of each full-height wall element and →

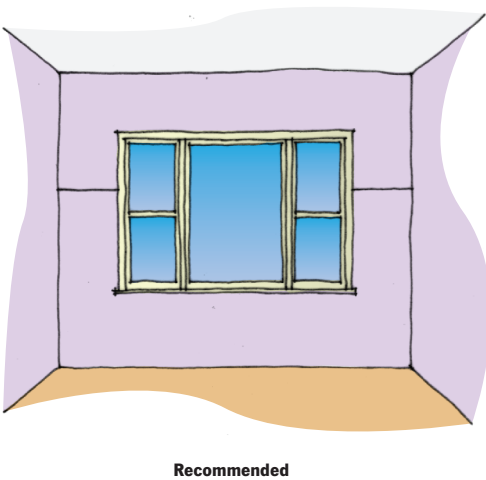
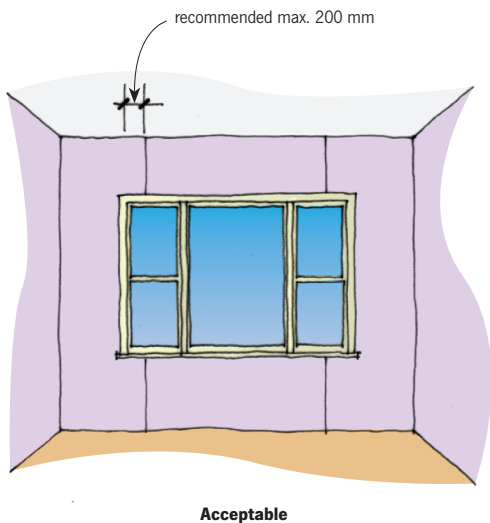
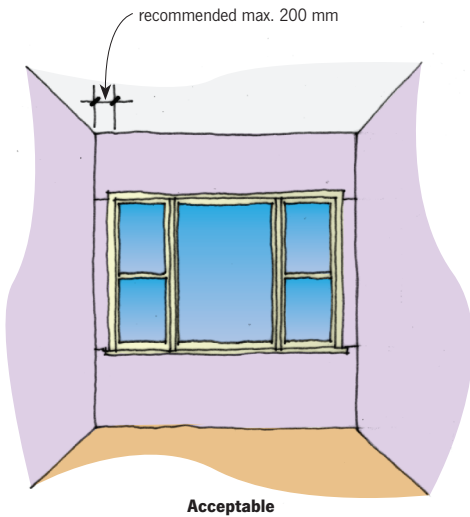


Figure 1: Sheet layout around openings.

then at 150 mm centres around the perimeter of that element. These fasteners are also used at 300 mm centres in the body of the sheets if fixed vertically or to each stud if fixed horizontally.

8. Tape and stop all joints and fastener heads in accordance with good trade practice.

9. Replace architraves, scotias and skirting.

EXPECTED RESULT

This repair is expected to result in a similar or better strength and stiffness compared to the original construction.

Method 4: Remove all wall lining and replace with new lining in affected areas

This method is to be used where the building structure is or can be made sound. There is expected to have been very significant damage to the wall linings, for example, extensive diagonal cracking. Ceilings that have been cracked must be treated the same way.

REPAIR STEPS

1. Remove scotias, skirting and plasterboard wall linings in the affected areas. Ensure temporary bracing is in place. Ensure the building is plumb and level.
2. Repair any damage to wall framing and framing connections.
3. Fix the framing and bottom plate to the foundation as if it is a bracing element.
4. Replace the damaged sheets with comparable components (for example, enhanced plasterboard must be replaced with enhanced plasterboard). All new sheets should be fixed in a bracing pattern. Cut the sheets around openings (see Figure 1).
5. Plasterboard joints are to be paper taped and plastered in accordance with good trade practices.
6. Replace architraves, scotias and skirting.

EXPECTED RESULT

This repair is expected to result in a construction with stiffness and strength very close to that of the house prior to the earthquakes.

Bracing design needed if all plasterboard lining removed

If it is necessary to replace all plasterboard lining in the house, a bracing design in accordance with NZS 3604:2011 *Timber-framed buildings* must be carried out and bracing elements installed to provide the required bracing.

While the plasterboard lining is removed, check the bottom plate fixings. Any damaged fixings should be replaced. This will result in a construction with the strength and stiffness of a new house.

Full details of the tests and the results are in BRANZ Study Report SR265, available for free download from the BRANZ Shop at www.branz.co.nz.