



## Determination 2014/033<sup>1</sup>

# Whether proposed building work to repair fibre-cement overlay cladding to an earthquake-damaged house at 9 Boys Place, Christchurch will comply with the Building Code



### 1. The matter to be determined

- 1.1 This is a determination under Part 3 Subpart 1 of the Building Act 2004<sup>2</sup> (“the Act”) made under due authorisation by me, John Gardiner, Manager Determinations and Assurance, Ministry of Business, Innovation and Employment (“the Ministry”), for and on behalf of the Chief Executive of the Ministry.
- 1.2 The parties to this determination are the owners of the house, M & H Carey (“the applicants”). I have forwarded a copy of the determination to Christchurch City Council (“the authority”), even though it is not directly involved as a party.
- 1.3 I consider the Earthquake Commission (“EQC”), who proposed the scope of works, is a person with an interest in this determination.
- 1.4 The matter to be determined<sup>3</sup> is whether the proposed scope of work to repair the cladding to the house will comply with the relevant clauses<sup>4</sup> of the Building Code (Schedule 1, Building Regulations 1992).
- 1.5 In making my decision, I have considered the submission of the applicant, the report of the expert commissioned by the Ministry to advise on this dispute (‘the expert’), and the other evidence in this matter.

<sup>1</sup> Subject to a clarification under section 189 of the Building Act 2004

<sup>2</sup> The Building Act, Building Code, compliance documents, past determinations and guidance documents issued by the Ministry are all available at [www.dbh.govt.nz](http://www.dbh.govt.nz) or by contacting the Ministry on 0800 242 243.

<sup>3</sup> Under section 177(1)(a) of the Act

<sup>4</sup> In this determination, unless otherwise stated, references to sections are to sections of the Act and references to clauses are to clauses of the Building Code.

## 2. The building work and background

- 2.1 The building is a detached house that was originally built in 1955, and it appears to have been extended on the north and south elevations circa 1961. (The expert has described the front entry as being on the west elevation and this determination follows that convention.) The applicants purchased the property in 2007 and have noted that ‘two different forms of attempted repair’ were evident at that time. Further internal alterations and installation of insulation were carried out in 2009 along with the demolition of an unreinforced masonry chimney.
- 2.2 The house is a single storey construction with light timber framing and concrete piled and perimeter foundations. It is located on a flat site in a low lying area. The house is simple in plan and form and is assessed as having a low weathertightness risk.
- 2.3 Most of the wooden windows have been fitted with double-glazed powder-coated aluminium inserts. The roof is pitched, with concrete tiles and eaves of approximately 500mm.
- 2.4 The original cladding is bevel back timber weatherboards over building paper. The building paper is full height in some areas and part height in others. The applicants have submitted that there are gaps in the weatherboards on the east elevation and that as the fibre-cement cladding is installed flush with the coved concrete of the front porch it would indicate that weatherboards are absent in a section around the front door.
- 2.5 The weatherboards were over-clad in 1983 with textured fibre-cement sheeting. The fibre-cement cladding consists of a 4.5mm substrate nailed directly to the weatherboards, with a texture coating approximately 2-3mm thick incorporating reinforcing mesh at sheet joints. The texture coating consists of a trowelled marble chip acrylic plaster and is unpainted.
- 2.6 The fibre-cement sheets are installed full height, with vertical joints at approximately 1200mm centres. The joints were taped prior to texture coating, with no allowance made for thermal expansion such as control joints. The sheets are butted to exterior joinery with no perimeter or services penetration flashings.
- 2.7 The building was subject to a series of earthquakes (known as the Canterbury Earthquake sequence<sup>5</sup>) and suffered damage to the fibre-cement cladding. In the application for determination the applicants noted the following damage resulting from earthquakes:
- nails popping
  - fibre-cement sheet cracks radiating from openings, extending from pre-existing cracks, and re-opening from previously repaired cracks
  - joint tape failure
  - movement of fibre-cement sheets creating ridges in the texture coating.

## 2.8 The EQC assessment and scope of works

- 2.8.1 EQC carried out an assessment of the house on 28 June 2011. In a memorandum dated 13 July 2012 one of the assessors, who is a consulting engineer, stated that the proposed repairs were an alteration, and that after the repairs were carried out the

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<sup>5</sup> The Canterbury Earthquake Sequence includes the ‘Darfield Earthquake’ of 4 September 2010 with a moment magnitude of 7.1, followed by a series of aftershocks that included a 6.3 magnitude shake on 22 February 2011.

- external wall cladding would continue to comply with the provisions of the Building Code to at least the same extent as before the alteration.
- 2.8.2 EQC provided a scope of works dated 7 November 2013. In respect of the exterior wall cladding to all elevations the EQC assessment noted the repair option as ‘grind out / epoxy fill’ and ‘supply / install texture coat system’.
- 2.8.3 In an undated memo to the applicants, EQC noted that the original proprietary texture coating product was no longer available, and described the proposed repair solution as ‘to grind out and epoxy fill the cracks in the fibre cement sheets and to apply texture coating to the repair areas and finish with an elastomeric paint system’. EQC was of the view that there was no requirement under the Act to replace all of the fibre-cement sheets to the standard required by E2/AS1, and that the proposed repairs would meet the requirements of the Act.
- 2.9 The applicants disputed the repair strategy proposed by EQC and sought advice from representatives of the proprietary products proposed to be used. On 21 March 2013 a representative of the elastomeric paint supplier advised the applicants that there didn’t seem much sense in applying the epoxy to ‘broken sheets’ but the applicants should check with the manufacturer, and that ‘most sealants work well with cracks in masonry and plaster, when the substrate is sound’.
- 2.10 A ‘Coating Specification’ dated 21 March 2013 from the texture coating manufacturer described the minimum surface preparation suggested to allow for the application of the texture coating; this included ‘Remove any loose and flaking texture by scraping and sanding. Replace all damaged cement sheets’. The specification also noted that requirements for control joints should be checked with the sheet manufacturer or engineer.
- 2.11 On 13 May 2013 the applicants wrote to EQC stating that they had received advice from technical representatives of the products EQC proposed to use and that the proposed repair solution was not suitable for the existing cladding.
- 2.12 The applicants’ submission notes that the claim with EQC was subsequently settled and that the applicants will be responsible for carrying out the repairs to the cladding. However, the applicants remained concerned as to whether the proposed repairs to the cladding would comply with the Building Code.
- 2.13 An application for determination was received on 7 April 2014.

### **3. The submissions**

- 3.1 The applicants provided background information, including information on the cladding condition prior to the earthquakes, and a description of the building and the proposed repairs. In regards to the cladding system the applicants submitted the following (in summary):
- The building paper is part height in some places, has been penetrated by fixings for subsequent cladding layers and is in poor condition in some places.
  - Gaps have been observed in the weatherboards (east elevation), and weatherboards are absent around the front door.
  - During installation of wall insulation in 2009 bottom plates appeared dry and no moisture damage was observed.

- The cladding system cannot be considered under the Acceptable Solution E2/AS1 as it does not incorporate a drained cavity; the system must be assessed as an alternative solution.
- Insufficient evidence or information was provided by EQC to establish that the proposed repair will satisfy the requirements of Clause E2.3.2 and E2.3.7.

3.2 The applicants also supplied copies of the following:

- the EQC assessment report dated 7 November 2013 titled 'scope of works'
- various correspondence with technical representatives of the proprietary products proposed to be used in the repair
- a quote for the installation of the fibre-cement cladding dated 19 November 1983, and warranty dated 22 December 1983.

3.3 A draft determination was issued to the parties for comment on 3 July 2014.

3.4 In a response received on 18 July 2014, EQC accepted the draft determination subject to correction of some typographical errors.

3.5 The applicants did not accept the draft and provided a submission by email on 18 July 2014 (in summary):

- The expert's conclusion relies on the weatherboards being present behind the fibre-cement cladding.
- Without removing the fibre-cement or the lining and building paper it is not possible to confirm whether the weatherboards are absent in areas other than those already identified.
- Where the weatherboards are absent, the determination should consider whether the performance of the fibre-cement cladding alone (repaired as proposed) would comply with the Building Code.
- In regards to the weatherboards providing 'a cavity of sorts' this 'requires further explanation as the generally accepted cavity requirements of E2/AS1 are not satisfied ... the cavity is not open along the entirety of the base and the cavity is not vented at the soffit'.
- The repair methodology suggested by the expert is more detailed than that proposed by EQC.
- The fibre-cement manufacturer advised that if 'the sheet itself has fractured in the earthquake then these must be replaced'.

### **3.6 The clarification**

3.6.1 Following the issue of the determination on 15 August 2014, the applicants sought a clarification under section 189 of the Act on 4 September 2014. The request for clarification in general was for provision of a more detailed analysis as to how I formed my view on whether the proposed scope of work to repair the cladding will comply. The applicants also considered that a statement in the determination misrepresented their view.

3.6.2 On 26 September 2014 I wrote to the parties accepting the applicants views had been misrepresented in one statement, but that I did not consider the determination required clarification in regards to my analysis. I proposed to clarify the determination in accordance with section 189 of the Act as follows: Paragraph 5.1.9

be amended to remove the references to the applicants' views and to correct a typographic error.

- 3.6.3 EQC responded on 9 October 2014 noting that it had no objections to the clarification as proposed.
- 3.6.4 The applicants responded on 30 October 2014, noting that their main concerns remained that the conclusions in the determination 'appear to rely solely on test results in isolated area remote from areas identified in the original application'.

## **4. The expert's report**

### **4.1 General**

4.1.1 As mentioned in paragraph 1.5, I engaged an independent expert who is a Registered Building Surveyor to assist me. The expert examined relevant documentation, visited the site, and provided me with a report dated 6 June 2014 which was sent to the parties on the same date. The report described the building and proposed building work; I have incorporated this information into paragraph 2.

4.1.2 The expert made the following general comments:

- The house is in reasonable condition for its age, but the cladding hasn't been well maintained. (The applicants have advised that maintenance of the cladding has not been attended to since the earthquakes in 2010.)
- There are cladding cracks on all elevations, typically vertically at sheet joints and diagonally at window sills. The cracking is mostly confined to the west and east elevations. Deteriorating sealant applied to many cracks indicates the majority pre-dated the Canterbury Earthquake sequence.
- The fibre-cement substrate was found to be hard and timber shavings were in good condition.
- The weatherboard cladding had performed well historically on its own.
- The weatherboards remain the primary cladding to the house, with the fibre-cement overlay providing a low maintenance secondary façade or 'rain screen', with the weatherboard profile providing gaps between the two claddings that acts as a cavity of sorts. It is unlikely that the overlay cladding alone would be compliant.
- There was evidence of deterioration in the building paper at one location.
- The repairs to the cladding are exempt from the requirement to obtain building consent under Schedule 1 of Building Code.
- The Act does not require the whole building to be brought up to compliance with the current Building Code, but to perform to at least the same extent as before.

4.1.3 The expert inspected the interior, observing that the floor boards in two corners of the house where the carpet was lifted were in good condition and there was no evidence in the interior of the house of any historic or recent moisture entry. The expert carried out invasive moisture readings on all elevations, noting that all the readings 'were in the normal range'.

- 4.1.4 The expert observed that the timber weatherboard cladding has historically performed well and the expert considered this would comply with Clause E2 of the Building Code on its own.
- 4.1.5 The expert concluded that the combined weatherboard and plaster claddings have performed adequately as a system for 29 years, with water penetrating the fibre-cement cladding able to dissipate adequately over a long period. The existing cladding system was considered compliant, and any repair solution should allow the cladding to perform to at least the same extent as before the repairs.

## 4.2 The proposed repairs

- 4.2.1 The expert also made the following comments about the proposed repairs:
- The failed vertical sheet joints and diagonal cracks in the fibre-cement need repairing, and it is important to find a solution supported by one manufacturer and installer so that a warranty can be provided for the repairs.
  - Discussions with the manufacturer of the texture coating referred to in paragraph 2.10 established that
    - the sheets with diagonal cracks must be replaced
    - plaster can be built up on any replaced sheets so the finished surface is flush with the existing adjacent work
    - it is not necessary to grind out cracked joints, provided all loose and flaking plaster is removed
    - control joints are not required, but if installed, should comply with the sheet manufacturer's requirements.
- 4.2.2 The expert viewed another house repaired by the manufacturer of the texture coating that had been repaired with:
- control joints installed (if required by the sheet manufacturer)
  - loose and flaking plaster was removed, plaster over cracks, install render stop flashings<sup>6</sup> at sheet edges
  - apply plaster system over reinforcing mesh.
- 4.2.3 The expert considered the repair to the subject building using the same methodology was likely to be as successful as the example viewed.

## 4.3 EQC's response to the expert's report

- 4.3.1 EQC responded to the experts report in an email dated 30 June 2014. In summary the submission said:
- The expert 'generally agrees that the proposed building work ... meets the Building Code' and after the work the building will 'continue to comply with the Building Act to the same extent as before the repair'.
  - 'EQC's insurance cover' is only in respect of earthquake damage. The expert has 'exceeded his brief' by considering additional repairs to damage not caused by the earthquake(s).

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<sup>6</sup> Render stop flashings (or render stop beads) are proprietary extrusions located at sheet edges that the applied render is finished against to provide a clean edge to the render. Render stop beads are not used to waterproof junctions, although they may assist in achieving a weathertight joint.

- The repairs suggested by the expert are ‘in fact additional (optional) improvements. These improvements are not required to repair the earthquake damage.’ The additional repairs include replacing pre-existing cracked sheets, installing control joints and render stop flashings.

## 5. Discussion

### 5.1 Compliance of the proposed repairs

- 5.1.1 The original house is some 69 years old, and the additions are 53 years old. The existing cladding including the fibre-cement over-cladding has been in place for 29 years. I accept the expert’s observations that the cladding system (including both the weatherboards and the over-cladding) has performed satisfactorily in terms of compliance with Clauses E2 External moisture and B2 Durability.
- 5.1.2 The building work to repair the fibre-cement cladding is considered ‘repairs and maintenance’ and is therefore exempt from the need for a building consent under Schedule 1(1).
- 5.1.3 As no building consent is required the provisions of section 112 do not apply in this case. However, section 17 of the Act requires that ‘[a]ll building work must comply with the building code to the extent required by [the] Act, whether or not a building consent is required in respect of that building work’.
- 5.1.4 The relevant clauses in respect to weathertightness of the repairs are E2.3.2 and E2.3.5; the repairs to the fibre-cement cladding are required to comply with those clauses.
- E2.3.2** Roofs and exterior walls must prevent the penetration of water that could cause undue dampness, damage to building elements, or both.
- E2.3.5** Concealed spaces and cavities in buildings must be constructed in a way that prevents external moisture being accumulated or transferred and causing condensation, fungal growth, or the degradation of building elements
- 5.1.5 The expert has noted that should the fibre-cement cladding fail there is adequate protection to the framing afforded by the original weatherboards, and that the system has sufficient ventilation to allow any moisture ingress to dissipate. I accept the expert’s opinion on this matter. I am of the view that even if there was to be moisture ingress through the fibre-cement cladding, as the fibre-cement cladding is backed by the original weatherboards, the moisture ingress would not meet the test of causing ‘undue dampness’ or ‘damage’ to the underlying building elements.
- 5.1.6 I consider the overlay fibre-cement cladding is playing a secondary role in ensuring the external envelope is weathertight and therefore the repair methodology used is not critical to ensuring the cladding system as a whole will satisfy Clause E2.
- 5.1.7 The applicants have concerns about the compliance of the proposed repairs given the section of weatherboards absent around the front entry, the gaps in the weatherboards on the east elevation, and that the weatherboards may be absent in other areas.

- 5.1.8 I have taken into account the applicants concerns, however, I note that there are mitigating features that I consider assist in the performance of the external envelope such as:
- The house has a low weathertightness risk.
  - The present cladding system has performed for very nearly twice the 15-year durability period required by Clause B2.3.1(b) despite cracks to the cladding in some areas existing before the earthquake events.
  - The area around the front entrance is recessed and therefore well protected from the weather.
- 5.1.9 I note that an Acceptable Solution provides one means, but not the only means, of satisfying the requirements of the Building Code. The Building Code is a performance-based document and other means can be used to establish compliance so long as the minimum performance requirements of the Building Code are met.
- 5.1.10 Taking the above into account, I consider that the external envelope repair as proposed by EQC will satisfy Clauses E2.3.2 and E2.3.5. However, I accept the expert's advice that a repair methodology supported by a single manufacturer would be preferable.

## **5.2 The scope of the repair work**

- 5.2.1 EQC advises that its insurance cover is only in respect of earthquake damage and the expert has referred to damage that predated the earthquakes. (The EQC 'Scope of works' records work required to the exterior walls but appears to make no reference to pre-existing damage.)
- 5.2.2 The expert's advice is given respect of the repairs to the cladding system in total and does not provide a specific separation between pre-existing and earthquake damage other than in general terms.
- 5.2.3 The determination considers the compliance of the proposed work but can take no position in respect of the repair of pre-existing defects or the provision of features that might be considered betterment; that rests on agreement between the owners and EQC (see also paragraph 2.12).

## **6. Decision**

- 6.1 In accordance with section 188 of the Building Act 2004, I hereby determine that the proposed scope of work to repair the cladding to the house will comply with the relevant clauses of the Building Code.

Signed for and on behalf of the Chief Executive of the Ministry of Business, Innovation and Employment on 3 November 2014.

John Gardiner  
**Manager Determinations and Assurance**