



## Determination 2013/067

# Regarding the code-compliance of stone cladding proposed for the recladding of a house in Remuera, Auckland



### 1. The matter to be determined

1.1 This is a determination under Part 3 Subpart 1 of the Building Act 2004<sup>1</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 the determination are:

- T Koia, who is a Registered Architect and therefore a licensed building practitioner under the Building Act<sup>2</sup>, and who is the applicant in this case (“the architect”)
- Auckland Council (“the authority”), carrying out its duties as a territorial authority or building consent authority.

1.3 This determination arises because stone veneer cladding was originally proposed as part of an application for a building consent to remediate weathertightness defects to a monolithic-clad house. The authority refused to accept the stone cladding without further information because it was not satisfied that it would comply with certain clauses<sup>3</sup> of the Building Code (Schedule 1, Building Regulations 1992). Although the owners of the house have now elected to change the cladding, the architect

<sup>1</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>2</sup> Registered Architects under the Registered Architects Act 2005 are treated as if they were licensed in the building work licensing class Design 3 under the Building (Designation of Building Work Licensing Classes) Order 2010, and therefore the architect is considered a party to the determination.

<sup>3</sup> In this determination, unless otherwise stated references to sections are sections of the Act and clauses are clauses of the Building Code.

applied for a determination on the compliance of the stone veneer cladding system originally proposed for the house.

- 1.4 The matter to be determined<sup>4</sup> is therefore whether the stone veneer cladding system originally proposed for the house (“the stone cladding”) would have complied with Clause B1 Structure, Clause E2 External Moisture and Clause B2 Durability of the Building Code. The stone cladding system includes the components of the system (such as the stone tiles, the adhesive, the waterproofing membrane, the backing sheets and the cavity), as well as the way the components would have been installed and work together.

## 1.5 Matters outside this determination

- 1.5.1 The authority has also questioned the stone veneer’s compliance with Clause F2 Hazardous building materials. I consider that compliance with Clause F2 will rely on the stone veneer’s compliance (or otherwise) with Clauses B1, B2 and E2. Clause F2 is therefore included within the matter outlined in paragraph 1.4.
- 1.5.2 Although the owners of the house have now changed the cladding, this determination uses the characteristics of the house in order to assess the code-compliance of the stone cladding as it was originally proposed.
- 1.6 In making my decision, I have considered the submissions of the parties, the report of the expert commissioned by the Ministry to advise on this dispute (“the expert”) and the other evidence in this matter.

## 2. The building work

- 2.1 The building work is the proposed recladding of a three-storey detached house as detailed in the application that had been made for a building consent. The house is situated on a sloping site in a low wind zone<sup>5</sup> for the purposes of NZS 3604. The ground floor is a concrete part basement, with two floors of light timber framing above. The proposed work included the construction of a new roof, replacement of upper level decks and recladding of all walls to the upper two floors.
- 2.2 The new roof extends over the upper level decks, with framed supporting columns extended up to support framed beams beneath roof overhangs. Most walls were to be clad in horizontal cedar shiplap weatherboards fixed over a cavity, with some areas clad in the decorative stone tile veneer considered in this determination.

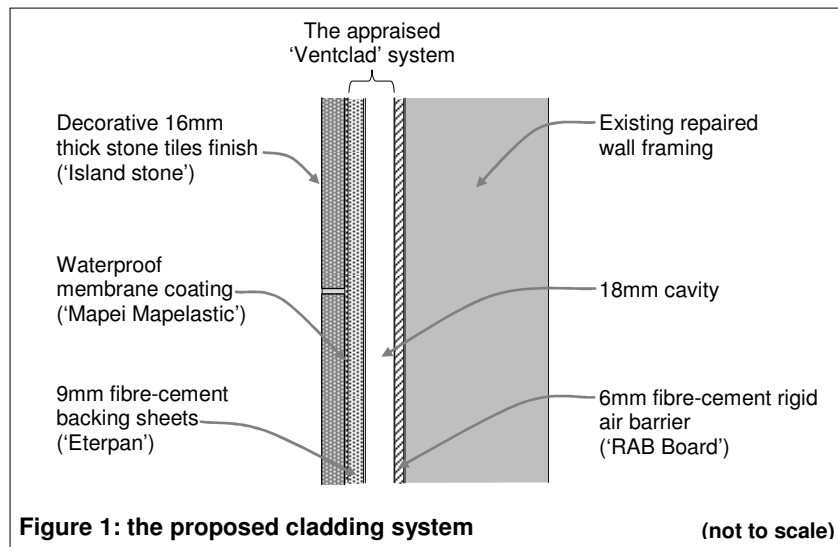
## 2.3 The stone cladding system

- 2.3.1 The stone cladding system consists of 16mm natural stone tiles fixed to 9mm fibre-cement backing sheets that are coated with a waterproof membrane and fixed through 18mm cavity battens and rigid underlay to the framing as shown in Figure 1.

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<sup>4</sup> Under section 177(1)(a) of the Act

<sup>5</sup> According to the architect’s drawings



2.3.2 The proposed stone cladding system incorporates the following components:

- A proprietary cladding system incorporating fibre-cement sheets fixed over a drained cavity. The system has a current BRANZ appraisal<sup>6</sup>, which states that it has been ‘appraised for use with jointing and textured finish systems’ that are also covered by a current BRANZ appraisal.
- A liquid applied waterproofing membrane applied over the fibre-cement sheets to form an underlay to the tiles. The membrane system has a current BRANZ appraisal<sup>7</sup>, which notes that the membrane:
  - is intended for use under ceramic or stone tile finishes on external decks
  - must be continually protected from exposure to UV
  - must be confirmed as compatible with the tiling adhesive.
- An adhesive system conforming to EN 12002 and ES 12004<sup>8</sup>, applied in accordance with BRANZ Best Practice Tiling Guide.
- 16mm dense rectangular tiles with low porosity finished with a water-based solvent-free impregnator to further decrease to porosity of the stone. Tiles grouted with proprietary grout and silicon.

2.3.3 Framed columns and beams to the upper decks were also clad with stone tiles. Vertical faces are similar to the system shown in Figure 1, with backing sheets to beam soffits fixed directly to the beam framing.

<sup>6</sup> BRANZ Appraisal No. 457 (2010) amended 21 August 2013

<sup>7</sup> BRANZ Appraisal No. 485 (2012) amended 19 June 2013

<sup>8</sup> European Standard EN 12002:2008 Adhesives for tiles - Determination of transverse deformation for cementitious adhesives and grouts, and European Standard EN 12004:2007 Adhesives for tiles - Requirements, evaluation of conformity, classification and designation

### 3. Background

3.1 The original house was built in 1997 with monolithic cladding fixed directly to the timber framing. A code compliance certificate was issued for the house in June 2002 but evidence of moisture ingress subsequently resulted in the architect's proposal.

3.2 The architect applied for a building consent on behalf of the owners in December 2012, with the original documents supporting the application including wall areas clad with the decorative stone tiling system shown in Figure 1. The proposed work was described as:

RECLAD – Re roof and full reclad to upper storeys. Various changes to building to comply step down changes. New balconies.

3.3 Correspondence with the architect followed, with most items raised by the authority satisfactorily resolved. However, the stone veneer remained a concern to the authority and the architect sought advice from the stone supplier, which was provided to the authority.

#### 3.4 The stone supplier's advice

3.4.1 In a letter to the architect dated 18 March 2013, the stone supplier noted that the authority appeared to assert that:

... whilst a component of the system has been independently verified (by BRANZ in this instance) as compliant with E2/AS1, when you add further components to the system, the complete system (inclusive of the BRANZ appraised waterproofing system) no longer is assessed as watertight.

3.4.2 The supplier listed the components that made up the proposed stone cladding system (see paragraph 2.3.2) and took the view that relevant components had already been independently verified and adding the tile layer would 'be further enhancing the system with 100% coverage of the glue, stone, sealer component'. The resulting system would therefore be 'a very robust solution which more than complies'.

3.4.3 The stone supplier attached email correspondence with the suppliers of the fibre-cement backings sheets, who provided information on testing carried out as follows (in summary):

- Weathertightness tests have been carried out to demonstrate compliance with AS/NZS4284<sup>9</sup>, with the original test using fibre-cement sheets with butt joints and no plaster finish. No testing has been carried out using stone or brick slips.
- The 9mm fibre-cement backing sheets will support face loads of 80kg/m<sup>2</sup>, but the stone veneer and adhesive etc is the responsibility of the stone supplier.

3.4.4 The stone supplier also sought advice about the situation from the Ministry, which made the following points in an email dated 13 March 2013 (in summary):

- BRANZ Appraisals have no status in law and their acceptance for demonstrating compliance is up to an authority.
- An authority cannot insist that you demonstrate compliance with the Building Code in any particular way (such as by E2/VM1 with its method based on AS/NZS4284, which is only one way of compliance).

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<sup>9</sup> AS/NZS 4284:2008 Testing of building facades

- You are entitled to not follow the Compliance Documents, but it is up to you to present for the authority's consideration how compliance is achieved.
- In this case, this would involve demonstrating why the layers of weathering protection will meet weathertightness and durability performance requirements by keeping the weather out so that undue dampness and damage will not result.

### **3.5 The authority's position**

- 3.5.1 In a letter to the architect dated 12 April 2013, the authority outlined its position on the proposed stone cladding system, noting that this was an alternative solution which required 'far more information and details' than acceptable solutions.
- 3.5.2 In the case of the proposed stone cladding system evidence was required to support its compliance in the form of one or a combination of (in summary):
- a current Certificate of Accreditation under the Act
  - an opinion as to compliance from 'a competent, suitably qualified and experienced independent source'
  - a current appraisal certificate.
- 3.5.3 The authority also required some technical and installation information and concluded that, with the information provided to date it was 'unable to be satisfied that compliance with the code can be achieved.'
- 3.6 The situation remained unresolved and the Ministry received an initial application for a determination from the architect on 14 May 2013.
- 3.7 In an email to the Ministry dated 30 May 2013, the architect attached a revised application and noted that the owners of the house had elected to change the cladding. However, the architect still wished to proceed with a determination based on the original recladding proposal.

## **4. The submissions**

### **4.1 The architect's submission**

- 4.1.1 In an email attaching the revised application the architect outlined the reasons for wishing to proceed with a determination, noting:

The increasing demand for lightweight stone cladding systems, particularly in Christchurch.

We have a number of projects coming up that have specified the same cladding solution.

We are currently working on a heritage building in Christchurch that is unlikely to be saved if we cannot reduce the mass of the stone and fix it to a modern lightweight structure.

- 4.1.2 The architect forwarded copies of

- some of the drawings
- a one-page statement listing the products used for the stone cladding
- the structural engineering design information for the stone cladding

- technical and product information on components of the system.

## **4.2 The authority's submission**

4.2.1 The authority made a submission in the form of a letter to the Ministry dated 17 June 2013 which outlined the background to the matter, noting that the stone cladding system as a whole had no product certification and the information provided:

...in support of the [stone cladding system] includes reference and use of a combination of different cladding systems, building products and materials before the stone is adhered to the substrate which creates the overall cladding system.

4.2.2 The authority considered it had insufficient information for assessing compliance with Clauses B1, B2, E2 and F2 of the Building Code and outlined sections of the Act that it considered relevant to its consideration of the stone cladding; in particular:

- Section 45, which requires applications for building consents to be supported by 'any other information' that the authority 'reasonably requires'.
- Section 49, which states that an authority must grant building consent 'if it is satisfied on reasonable grounds' that the work will comply with the Building Code if completed in accordance with the consent documents.

4.2.3 The authority forwarded a CD-Rom, entitled 'Property File', which contained some additional documents pertinent to this determination including

- documentation for the original house
- the recladding drawings and specifications
- all correspondence regarding the proposed stone cladding
- various certificates, producer statements, warranties and other information.

4.3 A draft determination was issued to the parties for comment on 9 September 2013.

4.4 The authority and the architect accepted the draft without further comment in responses received on 11 September and 31 October 2013 respectively.

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

5.1 As mentioned in paragraph 1.6, I engaged an independent expert to assist me. The expert is a member of the New Zealand Institute of Architects. The expert provided a report dated 29 July 2013 which was provided to the parties on 1 August 2013.

5.2 The expert noted that the scope of his assessment was to provide an opinion on whether the information provided was sufficient to demonstrate that the proposed stone veneer cladding would have complied with Building Code Clauses B1, B2 and E2.

5.3 The expert described the proposed stone cladding system, noting that the system is an assembly of products with no independent appraisal of the system as a whole (see paragraph 2.3.2).

## 5.4 Underlying components

5.4.1 The expert commented on the underlying components of the system and noted that the proprietary fibre-cement cladding part of the system is well supported and appears not to be in dispute.

5.4.2 In regard to the proposed waterproofing membrane, the expert considered the conditions in the BRANZ Appraisal and noted the following:

- Although based on its use on decks, vertical application to walls is less onerous as incident rainfall is less and run off is more rapid. It is therefore reasonable to accept that the membrane would adequately waterproof a wall.
- The scope is limited to applications where the membrane is protected from UV light and physical damage, which is the case for the proposed stone veneer.
- The tile adhesive must be compatible with the membrane and tiling carried out in accordance with AS 3958.1<sup>10</sup> and the BRANZ Good Tiling Practice Guide.

5.4.3 The expert considered that the appraisals for the fibre-cement cladding system and the membrane can be read together to provide reasonable evidence that adequately protected membrane-coated backing sheets would comply with Clauses E2 and B2 of the Building Code – leaving the proposed stone tiling to be considered on its own merits.

5.4.4 Taking account of the adequacy of the underlying components, the expert noted that the stone tiles therefore have only two functions: decoration and protection of the substrates.

## 5.5 The stone tiles

5.5.1 The function of the tile veneer to protect the underlying membrane and backing sheets requires evidence to demonstrate

- adequate durability of the tile layer
- sufficient adhesive and membrane strength to ensure the weight is supported, with no dislodging of tiles, membrane and/or the underlying fibre-cement backing sheets
- compatibility of tile adhesives and mortar with the underlying membrane.

5.5.2 The expert compared the information on the specified stone tiles provided by the supplier against benchmark figures in the relevant standard for ‘dimension stone’<sup>11</sup> ASTM C568<sup>12</sup>. The expert noted that the specified tiles exceeded minimum values in the standard as follows:

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<sup>10</sup> Australian Standard AS 3958.1-2007 Ceramic tiles - Guide to the installation of ceramic tiles

<sup>11</sup> Natural stone or rock that has been selected and fabricated (i.e., trimmed, cut, drilled, ground, or other) to specific sizes or shapes

<sup>12</sup> ASTM C568 / C568M – 10: Standard Specification for Limestone Dimension Stone

	<b>ASTM C568</b> <i>(minimum values for high density limestone)</i>	<b>Stone supplier's figures for specified tiles</b>
Density (kg/m <sup>3</sup> )	2560	2680
Water absorption	3%	0.11%
Compressive strength (Mpa)	55	123.03
Modulus of rupture (Mpa)	6.89	20.87

5.5.3 Whilst not directly indicating durability, the expert noted that the time for limestone failure is typically measured in decades to centuries and independent testing to confirm the supplier's figures would be sufficient to indicate that the tiles would satisfy the 15-year durability code requirements in the position proposed<sup>13</sup>.

5.5.4 In regard to the tile adhesive, the expert considered that the manufacturer's values for adhesion strength should also be supported by independent verification or testing.

## 5.6 Structural aspects of the system

5.6.1 The expert noted the engineer's Producer Statement – Design for the system, which provides evidence that the fixing of the fibre-cement backing sheets is sufficient to carry the weight of the tile veneer.

5.6.2 The expert asked the structural engineer for an opinion on structural aspects of the stone veneer system and, in an email to the expert dated 19 June 2013, the engineer noted the following (in summary):

- independent verification of adhesive strength would be appropriate
- however, even assuming only 25% contact and 25% of strength figures, adhesion would be well in excess of design loads for the site
- all underlying timbers must be dry to minimise drying shrinkage movement
- subject to verification of strength, the proposed adhesive meets the requirements of B1 Structure.

## 5.7 Control joints

5.7.1 The expert noted that control joints were not required for the underlying fibre-cement cladding system due to the limited dimensions. However, the appraisal for the membrane underlying the tile veneer calls for control joints in the tile layer in accordance with BRANZ Good Practice Guide.

5.7.2 The expert noted that no control joints are shown in the drawings and considered these would be needed 'at least at corners, possibly over some of the lintels, and likely on the two storey columns.'

<sup>13</sup> With the particular site not exposed to frost, high pollution levels, sea spray or other environment causes of deterioration



## **5.8 The expert's conclusions**

- 5.8.1 The expert considered that the information on the proposed stone veneer lacked
- provision for control joints to the tiles
  - a history of satisfactory use of the same or comparable cladding systems, or independent test data/ verification of
    - the stone properties provided by the supplier
    - the strength values provided by the adhesive manufacturer
    - the strength values provided by the membrane manufacturer.
- 5.8.2 Without the above, the expert concluded that 'there was insufficient information to enable a decision on reasonable grounds that the proposed cladding would comply with the New Zealand Building Code.'

## **6. Compliance of the stone cladding system**

### **6.1 General**

- 6.1.1 Section 49(1) of the Act requires an authority to
- ... grant a building consent if it is satisfied on reasonable grounds that the provisions of the building code would be met if the building work were properly completed in accordance with the plans and specifications that accompanied the application.
- 6.1.2 In order for the authority to form a view as to code-compliance of the proposed stone veneer it needed to consider the evidence in the consent application and to seek further information as required to allow it to be satisfied, on reasonable grounds, that the building would comply with the Building Code if built in accordance with the plans and specifications submitted.
- 6.1.3 The Act allows the authority to set reasonable requirements for the documentation that accompanies applications for building consents. The authority is entitled to set minimum requirements to ensure that the proposed building work is clearly documented and to require the applicant to clearly demonstrate and document how compliance is to be achieved for those areas it considers unclear.

### **6.2 Conclusion**

- 6.2.1 I consider the expert's report provides me with reasonable grounds to conclude that the stone cladding system is likely to comply with Clauses B1 and E2 of the Building Code if completed in accordance with the drawings and specifications.
- 6.2.2 However, the stone cladding is also required to comply with the durability requirements of Clause B2. Clause B2 requires that a building continues to satisfy all the objectives of the Building Code throughout its effective life, and that includes the requirement for the cladding to remain structurally sound and weathertight. I consider there is insufficient evidence that the proposed stone cladding system will comply with Clause B2, insofar as it applies to Clauses B1 and E2.
- 6.2.3 Because items identified by the expert relate to the verification of limited discrete components of the system, I am able to conclude that the satisfactory provision of the information outlined in paragraph 5.8.1 will result in the proposed stone veneer system demonstrating compliance with Clause B2 of the Building Code.

- 6.2.4 Given the provision of satisfactory information, this will satisfy the requirement to avoid the risk of potential hazards to people from the stone cladding system and will therefore also demonstrate compliance with Clause F2 of the Building Code.
- 6.2.5 I take the view that the evidence included within the consent application, when supplemented with the remaining information outlined in paragraph 5.8.1 will be sufficient for the authority to establish compliance with the Building Code. I do not consider the authority is justified in additionally requiring product certification, independent opinion or appraisal of the entire stone cladding system in order to determine its compliance with the Building Code.
- 6.2.6 It is emphasised that each determination is conducted on a case-by-case basis. Accordingly, the fact that a particular stone cladding system may be established as being code-compliant in relation to a particular building does not necessarily mean that the same system will be code-compliant in another situation.

## **7. The decision**

- 7.1 In accordance with section 188 of the Building Act 2004, I hereby confirm that the documentation provided does not provide reasonable grounds to be satisfied that the proposed stone veneer cladding, if completed in accordance with the plans and specifications, would comply with Clause B2 Durability insofar as it relates to Clause B1 Structure and Clause E2 External Moisture of the Building Code.

Signed for and on behalf of the Chief Executive of the Ministry of Business, Innovation and Employment on 8 November 2013.

John Gardiner  
**Manager Determinations and Assurance**