

Determination 2009/17

Determination regarding the code compliance of a 14-year-old house with monolithic cladding at 61 Tui Glen Road, Nelson



1. The matters to be determined

- 1.1 This is a determination under Part 3 Subpart 1 of the Building Act 2004¹ (“the Act”) made under due authorisation by me, John Gardiner, Manager Determinations, Department of Building and Housing (“the Department”), for and on behalf of the Chief Executive of that Department. The applicants are the owners, P and H Flood (“the applicants”), and the other party is the Nelson City Council (“the authority”), carrying out its duties as a territorial authority or building consent authority.
- 1.2 This determination arises from the decision of the authority to refuse to issue a code compliance certificate for a 14-year-old house because it was not satisfied that it complied with certain clauses of the Building Code² (First Schedule, Building Regulations 1992).

¹ The Building Act 2004 is available from the Department’s website at www.dbh.govt.nz.

² The Building Code is available from the Department’s website at www.dbh.govt.nz.

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.

1.3 The matters for determination are:

1.3.1 Matter 1: The cladding

Whether the cladding as installed on the house (“the cladding”) complies with Clause B2 Durability and Clause E2 External Moisture of the Building Code. By “the cladding as installed” I mean the components of the systems (such as the backing materials, the plaster, the flashings and the coatings), as well as the way the components have been installed and work together. (I consider this matter in paragraph 6.2.)

1.3.2 Matter 2: The western foundations

Whether the western foundation wall complies with Clause B1 Structure of the Building Code, taking into account the lack of an engineer’s inspections of the construction of this part of the foundations. (I consider this matter in paragraph 8.)

1.3.3 Matter 3: The durability considerations

Whether the building elements comply with Clause B2 Durability of the Building Code, taking into account the age of the building work. (I consider this matter in paragraph 9.)

1.4 In making my decision, I have considered:

- the applicants’ submission
- the report by the property inspection company (“the inspection company”) commissioned by the applicants to inspect the cladding (refer paragraph 3.6)
- the report by the engineer (“the engineer”) commissioned by the applicants to inspect the western foundations (refer paragraph 3.8)
- the report of the expert commissioned by the Department to advise on this dispute (“the expert”)
- the other evidence in this matter.

With regard to the cladding, I have evaluated this information using a framework that I describe more fully in paragraph 6.1.

2. The building work

2.1 The building work consists of a large house that is 2-storeys in part and is situated on a gently sloping coastal site in a high wind zone for the purposes of NZS 3604³. Construction is generally conventional light timber frame, and includes concrete slabs and foundations, monolithic cladding and aluminium windows. The house is fairly complex in plan and form, with profiled metal hipped and gabled roofs that have no eaves or verge projections.

2.2 The foundation along the west and the western end of the north elevations (“the western foundations”) is specifically engineered to include a reinforced concrete block retaining wall, which varies in height from 500mm to 1000mm.

³ New Zealand Standard NZS 3604:1999 Timber Framed Buildings

- 2.3 The 35° pitch roof accommodates the upper level master bedroom and ensuite, and has dormer windows to three elevations. A low-pitched roof extends to the north above the dining room, which has an attached timber pergola above a paved patio area. A low-pitched verandah extends to the west above a timber deck.
- 2.4 The expert has noted that the timber framing is Douglas fir. Given the date of construction in 1995 and the lack of other evidence, I consider the external wall framing to be untreated.
- 2.5 The monolithic cladding to the lower walls is a system described as solid plaster over a solid backing. In this instance it consists of 4.5 mm fibre-cement sheets fixed through the building wrap directly to the framing timbers, and covered by a slip layer of building wrap, and metal-reinforced 25mm to 30mm thick solid plaster with a flexible paint coating.
- 2.6 The walls to the upper dormers are clad with 7.5mm fibre-cement sheets fixed through the building wrap directly to the framing timbers, with uPVC corner jointers and a painted textured coating.

3. Background

- 3.1 The territorial authority issued a building consent for the house (No. 941206) on 14 November 1994, under the Building Act 1991. I have not seen a copy of the consent.
- 3.2 I have not seen the inspection records, but it appears that the authority carried out 7 inspections (including the foundations and floor slab) from 30 November 1994 to 15 May 1995. The specifically designed western foundation wall was not monitored by an engineer during its construction.
- 3.3 According to the applicants, the authority inspected the stucco reinforcing and slip layer prior to plastering, although there is no record of this. The authority apparently recommended that additional mesh “bandaging” be applied to joints and above windows and doors. I note that a construction photograph supplied by the applicants confirms the installation of this additional mesh.
- 3.4 Although the building appears to have been substantially completed and occupied during 1995, final finishing work and development of the loft continued over the next 10 years; and the applicants did not request a final inspection until 2004.
- 3.5 In a letter to the applicants dated 27 February 2004, the authority requested a “Producer Statement – Construction Review” for the western foundation wall and also noted:
- At this stage we are unable to consider the issue of a Code Compliance Certificate as we have no record of inspections for the preparation and the application of the stucco plaster.
- 3.6 The applicants subsequently engaged an inspection company, which inspected the cladding on 14 March 2005 and provided a report on the cladding dated 17 March 2005. The report outlined the history of the construction and described the stucco installation, noting that it had been applied by “a very experienced and respected

plasterer”. The inspection included non-invasive moisture testing, which gave no elevated readings, but did not include any invasive testing. The report concluded:

From what could be seen, it would appear that the stucco was ‘standard’ for that era of construction. The work that has been carried out has been performing in a good tradesmanlike manner that I consider is satisfactory within the terms of the Building Code, and of today’s expectations.

3.7 The inspection company’s report was provided to the authority, but I am not aware of any correspondence with the applicants over the next 2 years.

3.8 In 2007, the applicants engaged an engineer to inspect and report on the western foundations. The engineer provided a report dated 15 June 2007, which noted no defects or evidence indicating structural problems associated with the foundation wall. The engineer inspected a section of the foundation exposed at a “hand dug hole” and confirmed that the construction accorded with the foundation detail in the consent documents and a soil test indicated that the soil bearing pressure below the foundation was as required. The report concluded:

In this situation, the necessary site inspections during construction have not taken place, and therefore the critical elements of the design which are now concealed cannot be verified. The foundations appear to have performed adequately to date, however we cannot confirm whether they will continue to do so for the balance of the 50 year design life required by the NZBC.

3.9 In response to a request for a code compliance certificate, the authority wrote to the applicants on 22 October 2008, noting that the durability requirements of the Building Code commenced from the time of issue of the code compliance certificate. The authority made no reference to the western foundations, but repeated its earlier concern regarding:

...the absence of Council inspections during the preparation and application of the stucco plaster...

The authority concluded that it would not issue a code compliance certificate due to the time elapsed since the work was undertaken, as it could not:

...be satisfied on reasonable grounds that the work now meets all the requirements of the building code, especially B2 durability and E2 external moisture.

3.10 The Department received an application for a determination on 21 November 2008.

4. The submissions

4.1 In a statement accompanying the application, the applicants outlined the background to the situation, noting their lack of awareness in 1995 of their responsibility to ensure that inspections were carried out and also documented by the authority. The applicants considered that the subsequent investigations had shown:

- (a) that the house footings were well designed and constructed, and there has been no structural movement of the house
- (b) that the preparation and application of the cladding was applied in a totally satisfactory manner, complying with the 1992 Act.

- 4.2 The applicants forwarded copies of:
- the inspection company's report dated 17 March 2005
 - the engineer's report dated 15 June 2007
 - the correspondence from the authority
 - various other information.
- 4.3 The authority acknowledged the application, but made no submission.
- 4.4 A copy of the applicant's submission was provided to the territorial authority, which did not respond.
- 4.5 A draft determination was issued to the parties for comment on 23 January 2008. The draft was issued for comment and for the parties to agree a date when the house complied with Building Code Clause B2 Durability.
- 4.6 The parties accepted the draft without comment and agreed that the house complied with B2 Durability on 1 September 1995.

5. The expert's report

- 5.1 As mentioned in paragraph 1.4, I engaged an independent expert to provide an assessment of the condition of those building elements subject to the determination. The expert is a member of the New Zealand Institute of Building Surveyors. The expert inspected the house on 17 December 2008 and furnished a report that was completed on 18 December 2008.
- 5.2 The expert noted the following variations from the consent drawings:
- The dormers are clad in fibre cement sheet in lieu of stucco.
 - The east wall of the garage is straight not splayed.
 - The loft area has now been developed as a master bedroom and ensuite.
 - Water is heated by an instantaneous gas system, in lieu of a hot water cylinder.
- 5.3 The expert noted that construction appeared to be "of good quality", with the cladding generally showing that "there has been consideration given to sealing and weathering of the stucco cladding to prevent water entry at junctions and service penetrations". The expert also noted that the stucco has been recently repainted and is in good condition, with no cracking evident. The plaster thickness is 25mm to 30mm, with the mesh satisfactorily embedded into the scratch coat of the plaster, and the stucco is not "drummy".
- 5.4 The expert noted that the windows in the stucco are face-fixed, with satisfactory metal head flashings. The expert removed a small section of cladding at the jamb to sill junction of an east window, and noted the building wrap and satisfactory embedment of mesh within the plaster. At the jamb and sill, there is an additional strip of polythene over the slip layer, which is folded and returned back in behind the

window flange. I accept that the exposed junction is typical of similar locations elsewhere in the stucco walls of the house.

5.5 The expert noted that, although there is no evidence of control joints in the stucco, all shrinkage issues should have occurred during the 13 years since installation and there is no evidence of movement cracks (refer paragraph 6.4.2).

5.6 The expert inspected the interior of the house, taking non-invasive moisture readings internally, and no evidence of moisture was observed. The expert took 11 invasive moisture readings through the cladding at areas considered at risk, and 10 of these were elevated as follows:

- 21% at the cutout at the jamb to sill junction of the east bathroom window

The bottom plates

- 21% to more than 32% on the south elevation
- 24% on the north elevation
- 26% on the exposed wall of the east elevation

The dormers

- 26% and more than 35% at the jamb to sill junctions of the north dormer
- more than 28% at the bottom of the corner of the north dormer
- more than 34% the jamb to head junction of the west dormer.

I note that the reading taken in the bottom plate beneath the east verandah was 14%. Moisture levels that vary significantly generally indicate that external moisture is entering the structure and further investigation is required.

5.7 Commenting specifically on the wall cladding, the expert noted that:

- the bottom of the stucco lacks drip edges and there is no clearance from the paving or ground, allowing moisture to “wick up” to the framing
- there is insufficient clearance from paving or ground to the interior floor level in many areas
- windows in the stucco have no sill flashings and lack eaves to deflect rain away from the windows, with evidence of moisture penetration at the cutout
- the jambs of the dormer windows lack seals between the window flanges and the fibre cement cladding, with significant moisture penetration apparent
- the dormer cladding is not weathertight, and moisture is evident in the framing
- the pergola plate is fixed directly against the cladding, with no drainage gap.

5.8 A copy of the expert’s report was provided to the parties on 12 January 2009.

Matter 1: The cladding

6. Evaluation for code compliance

6.1 Evaluation framework

6.1.1 In evaluating the design of a building and its construction, it is useful to make some comparisons with the relevant Acceptable Solutions⁴, which will assist in determining whether the features of this house are code compliant. However, in making this comparison, the following general observations are valid:

- Some Acceptable Solutions cover the worst case, so that they may be modified in less extreme cases and the resulting alternative solution will still comply with the Building Code.
- Usually, when there is non-compliance with one provision of an Acceptable Solution, it will be necessary to add some other provision to compensate for that in order to comply with the Building Code.

6.2 Evaluation of the building for E2 and B2 Compliance

6.2.1 The approach in determining whether building work is weathertight and durable and is likely to remain so, is to apply the principles of weathertightness. This involves the examination of the design of the building, the surrounding environment, the design features that are intended to prevent the penetration of water, the cladding system, its installation, and the moisture tolerance of the external framing. The Department and its antecedent, the Building Industry Authority, have also described weathertightness risk factors in previous determinations⁵ (for example, Determination 2004/1) relating to cladding and these factors are also used in the evaluation process.

6.2.2 The consequences of a building demonstrating a high weathertightness risk is that building solutions that comply with the Building Code will need to be more robust. Conversely, where there is a low weathertightness risk, the solutions may be less robust. In any event, there is a need for both the design of the cladding system and its installation to be carefully carried out.

6.3 Weathertightness risk

6.3.1 This house has the following environmental and design features which influence its weathertightness risk profile:

Increasing risk

- the house is in a high wind zone
- the house is 2-storey high in part
- the house is fairly complex in plan, with a complex roof form that has dormer windows, varying slopes and complex junctions

⁴ An Acceptable Solution is a prescriptive design solution approved by the Department that provides one way (but not the only way) of complying with the Building Code. The Acceptable Solutions are available from The Department's Website at www.dbh.govt.nz.

⁵ Copies of all determinations issued by the Department can be obtained from the Department's website.

- there are no eaves and verge projections to shelter the walls
- the walls have monolithic cladding fixed directly to the framing
- a timber pergola is fixed directly to the walls
- the external wall framing is treated to a level effective in resisting decay if it absorbs and retains moisture.

Decreasing risk

- the house has an attached timber deck at the lower level.

6.3.2 The house has been evaluated using the E2/AS1 risk matrix. The risk matrix allows the summing of a range of design and location factors applying to a specific building design. The resulting level of risk can range from 'low' to 'very high'. The risk level is applied to determine what claddings can be used on a building in order to comply with E2/AS1. Higher levels of risk will require more rigorous weatherproof detailing; for example, a high risk level is likely to require a particular type of cladding to be installed over a drained cavity.

6.3.3 When evaluated using the E2/AS1 risk matrix, the weathertightness features outlined in paragraph 6.3.1 show that 1 elevation demonstrates a moderate weathertightness risk rating and the remaining elevations a high risk rating. I note that, although a drained cavity is now required by E2/AS1 for solid plaster cladding at all risk levels, this was not a requirement at the time the house was constructed.

6.4 Weathertightness performance: exterior cladding

6.4.1 Generally the cladding appears to have been installed in accordance with good trade practice. However, taking account of the expert's report, I conclude that remedial work is necessary in respect of:

- the lack of drip edges and clearances from the bottom of the cladding and the interior floor slab to the paving or ground, with high levels of moisture in the bottom plates that may have lead to decay in the timber
- the inadequate weatherproofing of the windows in the stucco cladding, which requires further investigation
- the moisture penetration into the dormer cladding and windows, with high levels of moisture in the framing that may have lead to decay in the timber
- the fixing of the timber pergola to the cladding.

6.4.2 With regard to control joints, I note that there is no indication of uncontrolled movement cracks. I consider that the seriousness of the omission is offset to some extent by the fact that the stucco cladding appears to have been installed according to good trade practice, and has been in place for 13 years with no signs of significant cracking or associated moisture entry. During the early part of the period since construction, all drying shrinkage in the plaster and supporting framing would have occurred, and the cladding's future performance will be governed solely by response to environmental factors such as imposed temperature and moisture effects, wind, earthquake forces and seasonal foundation movements.

- 6.4.3 Notwithstanding the fact that the cladding is fixed directly to the timber framing, thus limiting drainage and ventilation behind the cladding, I have noted the following compensating factors that assist the performance of some of the cladding in this particular case:
- Apart from the noted exceptions the cladding is installed to good trade practice.
 - The cladding is well-maintained and in good condition, with no cracking.
 - Apart from the lower windows, moisture penetration is limited to areas where defects have been identified.
- 6.4.4 I consider that these factors help compensate for the lack of a drained cavity and can assist the building to comply with the weathertightness and durability provisions of the Building Code.

Matter 1: The wall cladding

7. Discussion

- 7.1 I consider the expert's report establishes that the current performance of the cladding is not adequate because it is allowing water penetration into the house at present. Consequently, I am satisfied that the building does not comply with Clause E2 of the Building Code.
- 7.2 In addition, the building work 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 house to remain weathertight. Because the cladding faults on the house may allow the ingress of moisture in the future, the building work does not comply with the durability requirements of Clause B2.
- 7.3 Because the faults identified with the cladding occur in discrete areas, I am able to conclude that satisfactory rectification of the items outlined in paragraph 6.4.1 will result in the house being brought into compliance with Clauses B2 and E2.
- 7.4 However, given the relatively high moisture readings noted in some cladding locations, the age of the construction, and the likelihood of the use of untreated framing timber, I recommend that further investigation be carried out to confirm that the timber framing has not decayed as a result of prolonged moisture ingress.
- 7.5 It is emphasised that each determination is conducted on a case-by-case basis. Accordingly, the fact that particular cladding systems have been established as being code compliant in relation to a particular building does not necessarily mean that the same cladding systems will be code compliant in another situation.
- 7.6 Effective maintenance of claddings is important to ensure ongoing compliance with Clauses B2 and E2 of the Building Code and is the responsibility of the building owner. The Department has previously described these maintenance requirements, including examples where the external wall framing of the building may not be treated to a level that will resist the onset of decay if it gets wet (for example, Determination 2007/60).

Matter 2: The western foundations

8. Discussion

- 8.1 In considering the code compliance of the western foundations, I have taken into account the applicants' statement, the engineer's visual inspection of the foundations and the expert's report, and the proven performance of the foundations since their construction in late 1994.
- 8.2 I also note that the authority appears to have inspected the foundations during construction and has not raised concerns that they were not constructed in accordance with the consent drawings. The authority's concern appears to be limited to the lack of engineering oversight of the construction leading to the lack a producer statement as outlined in paragraph 3.5.
- 8.3 I make the following observations on the western foundations:
- The western foundation wall was specifically engineered, but was constructed without the oversight of an engineer.
 - The authority inspected the foundations during construction, and appears to have raised no concerns about their construction.
 - The engineer's report raised no concerns regarding the performance of the foundation wall.
 - The engineer was able to inspect the foundation where exposed and to test the bearing capacity of the soil, which all accorded with the consented detail.
 - While specifically engineered, the foundation wall is not complex.
 - The foundation wall has been in place for 13 years, with no signs of problems.
- 8.4 Based on the above observations, I consider that the foundation wall to the west and part of the north elevations is in accordance with the consented detail and is therefore likely to be in accordance with the requirements of the Building Code.

Matter 3: The durability considerations

9. Discussion

- 9.1 There are concerns about the durability, and hence the compliance with the Building Code, of certain elements of the building taking into consideration the completion of the building work during 1995.
- 9.2 The relevant provision of Clause B2 of the Building Code requires that building elements must, with only normal maintenance, continue to satisfy the performance requirements of the Building Code for certain periods ("durability periods") "from the time of issue of the applicable code compliance certificate" (Clause B2.3.1).
- 9.3 These durability periods are:
- 5 years if the building elements are easy to access and replace, and failure of those elements would be easily detected during the normal use of the building

- 15 years if building elements are moderately difficult to access or replace, or failure of those elements would go undetected during normal use of the building, but would be easily detected during normal maintenance
 - the life of the building, being not less than 50 years, if the building elements provide structural stability to the building, or are difficult to access or replace, or failure of those elements would go undetected during both normal use and maintenance.
- 9.4 In this case the delay between the completion of most of the building work in 1995 and the applicant's request for a code compliance certificate has raised concerns that various elements of the building are now well through or beyond their required durability periods, and would consequently no longer comply with Clause B2 if a code compliance certificate were to be issued effective from today's date.
- 9.5 The 14-year delay raises the matter of when all the elements of the building complied with Clause B2. I have not been provided with any evidence that the authority did not accept that those elements complied with Clause B2 at a date in 1995.
- 9.6 It is not disputed and I am therefore satisfied, that all the building elements complied with Clause B2 on 1 September 1995, refer paragraph 4.6.
- 9.7 In order to address these durability issues when they were raised in previous determinations, I sought and received clarification of general legal advice about waivers and modifications. That clarification, and the legal framework and procedures based on the clarification, is described in previous determinations (for example, Determination 2006/85). I have used that advice to evaluate the durability issues raised in this determination.
- 9.8 I continue to hold that view, and therefore conclude that:
- (a) the authority has the power to grant an appropriate modification of Clause B2 in respect of all the building elements.
 - (b) it is reasonable to grant such a modification, with appropriate notification, because in practical terms the building is no different from what it would have been if a code compliance certificate for the house had been issued in 1995.
- 9.9 I strongly recommend that the authority record this determination and any modifications resulting from it, on the property file and also on any LIM issued concerning this property.
- 10. What is to be done now?**
- 10.1 A notice to fix should be issued that requires the owner to bring the house into compliance with the Building Code, identifying the items listed in paragraph 6.4.1 referring to any further defect that might arise from further investigation (refer paragraph 7.4), but not specifying how those defects are to be fixed. It is not for the notice to fix to stipulate directly how the defects are to be remedied and the house brought to compliance with the Building Code. That is a matter for the owner to propose and for the authority to accept or reject.

- 10.2 I would suggest that the parties adopt the following process to meet the requirements of paragraph 10.1. Initially, the authority should issue the notice to fix. The owner should then produce a response to this in the form of a detailed proposal, based on further investigation as necessary and produced in conjunction with a competent and suitably qualified person, as to the rectification or otherwise of the specified issues. Any outstanding items of disagreement can then be referred to the Chief Executive for a further binding determination.
- 10.3 I note that the expert has identified some variations between the consent drawings and the house as constructed, and I leave that matter to the authority to resolve with the owners as it considers appropriate.
- 10.4 Once the matters set out in paragraph 6.4.1 have been rectified to its satisfaction, the authority may issue a code compliance certificate in respect of the building consent as amended.

11. The decision

- 11.1 In accordance with section 188 of the Building Act 2004, I hereby determine that the house does not comply with Clauses E2 and B2 of the Building Code, and accordingly confirm the authority's decision to refuse to issue a code compliance certificate.
- 11.2 I also determine that:
- (a) all the building elements installed in the house, apart from the items that are to be rectified as described in this determination, complied with Clause B2 on 1 September 1995.
 - (b) the building consent is hereby modified as follows:

The building consent is subject to a modification to the Building Code to the effect that, Clause B2.3.1 applies from 1 September 1995 instead of from the time of issue of the code compliance certificate for all the building elements, except the items to be rectified as set out in paragraph 6.4.1 of Determination 2009/17.

Signed for and on behalf of the Chief Executive of the Department of Building and Housing on 11 March 2009.

John Gardiner
Manager Determinations