Department of Building and Housing
Te Tari Kaupapa Whare

Determination 2009/38

Determination regarding the code compliance of a 12-year-old house with monolithic cladding at 516A Waimea Road, Nelson

1. The matters to be determined

1.1 This is a determination under Part 3 Subpart 1 of the Building Act 2004[1] ("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, J and C Erikson ("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 12-year-old house because it was not satisfied that it complied with certain clauses of the Building Code[2] (First Schedule, Building Regulations 1992).

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

[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.

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.

1.3.2 Matter 2: The deck barrier

Whether the barrier on the first floor deck ("the deck barrier") complies with Clause F4 "Safety From Falling" of the Building Code.

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.

1.4 I note that the building consent covered moving an existing house towards the street, and the construction of a new house in the new rear section. No matters have been raised by the parties with regard to the existing house, and this determination is therefore limited to the new house.

1.5 In making my decisions, I have considered the submissions of the parties, the report of the expert commissioned by the Department to advise on this dispute ("the expert"), and the other evidence in this matter. I have evaluated this information using a framework that I describe more fully in paragraph 6.

2. The building work

2.1 The building work consists of a large house, which is two-storeys in part and is situated on a flat site in a medium wind zone for the purposes of NZS 3604[3]. Construction is generally conventional light timber frame, and includes concrete slabs and foundations, monolithic cladding and aluminium windows.

2.2 The house is fairly complex in plan and form, with 30^{o} pitch profiled metal hipped and gabled roofs. The lower level forms an "L" shape around a pool, with verandahs and doors facing the pool at western internal corner. The south-western end of the lower roof has eaves projections of 600mm, with 400mm projections around the west corner of the upper roof. Elsewhere, there are no eaves or verge projections.

2.3 The master bedroom extends beyond the upper roof with a flat membrane roof and parapets. The angled bay projection opens onto a tiled deck set within the body of the roof to the northwest "leg" of the "L" shape. The monolithic-clad inner walls of the inset form the deck barrier, with a capped upstand at the roof junction.

2.4 A gable-roofed garage to the north corner is not part of the consented building work, but is attached to the house with an internal gutter at the junction. On the southeast boundary, a free-standing timber framed firewall supports the outer edge of a flat roofed carport area. Monolithic-clad timber framed boundary fences extend from either side of the firewall, and are not part of the building work.

2.5 The expert noted that the specification called for the timber framing to be H1 treated. However, I am unable to determine the particular level and type of treatment that is

[3] New Zealand Standard NZS 3604:1999 Timber Framed Buildings

described as "H1", as this may not provide resistance to fungal decay. Given the date of construction in 1997 and the lack of other evidence, I consider the external wall framing to be untreated.

2.6 The monolithic cladding is a system described as solid plaster over a rigid backing. In this instance the backing 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 bitumen-based building wrap, and metal-reinforced 25mm thick solid plaster with a flexible paint coating.

3. Background

3.1 The authority issued a building consent for the house (No. 951323) under the Building Act 1991. Based on correspondence from the authority to the applicant, the consent appears to have been issued in March 1996, although 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 a final inspection in February or March 1997. On 7 March 1997, the authority issued a notice to rectify that listed five outstanding items. The applicant stated that these items have been rectified.

3.3 According to the applicants, the items were rectified, but no reinspection was carried out and no code compliance certificate was applied for as 'over time this was forgotten'.

3.4 On 20 October 2008 the authority wrote to the applicants in response to a request for a code compliance certificate, noting that the durability requirements of the Building Code commenced from the time of issue of the code compliance certificate. 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.'

3.5 The Department received an application for a determination on 2 February 2009.

4. The submissions

4.1 In a brief statement accompanying the application, the applicants outlined the background to the situation and explained that the need for a code compliance certificate had only recently arisen.

4.2 The applicants forwarded copies of:

- the consent drawings
- the notice to rectify dated 7 March 1997
- the letter from the authority dated 20 October 2008

4.3 A copy of the applicant's submission was provided to the authority, who did not respond.

4.4 A draft determination was issued to the parties for comment on 14 April 2009. The draft was issued for comment and for the parties to agree a date when the house complied with Building Code Clause B2 Durability.

4.5 Both parties accepted the draft. The authority proposed a date of 1 March 1997 and the applicant proposed a date of 7 March 1997. There is very little difference between the two proposed dates. However, I have accepted the more conservative of the two dates (being 1 March 1997) for inclusion in the final determination.

5. The expert's report

5.1 As mentioned in paragraph 1.5, 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 13 March 2009 and furnished a report that was completed on 18 March 2009.

5.2 The expert noted the following variations from the consent drawings:

- The verandah posts are steel in lieu of stucco-clad timber.
- The handrail to the deck has not been installed.
- The pergola over the deck has not been constructed.

5.3 The expert noted that construction generally 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 and paintwork appeared to be in good condition, with only one crack noted.

5.4 The expert removed several small sections of stucco and noted that the plaster was applied in two layers, the final thickness is about 25mm, and the stucco is not "drummy". The expert noted that, in the areas opened up, there was 'poor mesh embedment' into the scratch coat of the plaster.

5.5 The expert noted that the windows in the stucco are face-fixed, with metal head flashings, except where window heads butt against soffit linings. The expert removed a small section of cladding at the jamb to sill junction of a northeast lower window, and noted the bitumen-based slip layer and embedment of mesh. At the jamb and sill, there was an additional strip of bitumen-based damp proof course over the slip layer, with the plaster extended behind the window flange. I accept that the exposed junction is typical of similar locations elsewhere in the house.

5.6 The expert noted that, although there is no evidence of control joints in the stucco, all shrinkage issues should have occurred during the 12 years since installation and there is no evidence of movement cracks (refer paragraph 7.4.2).

5.7 The expert tested for back-flashings and flashing upstands behind the stucco at apron flashings, gutters and the deck balustrade to wall junction, and confirmed upstands and flashings to these areas.

5.8 Moisture levels

5.8.1 The expert inspected the interior of the house, taking non-invasive moisture readings internally, and no evidence of moisture was observed.

5.8.2 The expert took five invasive moisture readings through the cladding at areas considered at risk, and readings ranged from 11% to 13% except for:

- 17% at the bottom plate on the south-west elevation
- decay observed in the bottom plate of the free-standing firewall on the south-east boundary.

Moisture levels that vary significantly generally indicate that external moisture is entering the structure and further investigation is required.

5.8.3 I note that moisture readings were taken at the end of summer, and levels are likely to be higher during wetter times of the year.

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

The walls

- there is a crack in the plaster
- in some areas, the bottom of the stucco lacks drip edges and clearance from the paving or ground, which allows moisture to wick up to the framing
- there is insufficient clearance from paving or ground to the interior floor level in some areas
- the stucco to the firewall has no clearance, and the bottom plate has decayed.

Windows and doors

- the window jambs lack seals between the window flanges and the plaster
- the unflashed window sills have no drainage gaps at the flanges.

The upper deck and bedroom bay

- the tiled gutter to the deck leads to an outlet, with no additional overflow
- the stucco extends into the tiled gutter on the deck and onto the tiled deck floor
- the parapet cappings to the flat roofed bay have insufficient cover to the stucco.

The junction with the garage

- the end of the garage fascia butts against the house wall, and is able to direct water into the stucco cladding
- the stucco extends into the internal gutter between the house and the garage, and the end of the gutter is poorly weatherproofed.

5.10 Although it is not part of the consented work, the expert also noted that the boundary fence on either side of the firewall is clad in 4.5mm fibre-cement sheet, with inadequate clearances, no drip edges and cracks at the sheet joint sealant.

5.11 The expert also noted that the deck barrier is only 815mm high because no handrail has been installed to the barrier.

5.12 A copy of the expert's report was provided to the parties on 30 March 2009.

6. Evaluation for code compliance

6.1 Evaluation framework

6.1.1 I have evaluated the code compliance of this building by considering the following two broad categories of the building work:

- The weathertightness of the external building envelope (Clause E2) and durability (Clause B2 in so far as it relates to Clause E2).
- The remaining relevant code requirements.

In the case of this house, weathertightness considerations are addressed first.

6.1.2 In evaluating the design of a building and its construction, it is useful to make some comparisons with the relevant Acceptable Solutions[4], 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 one or more other provisions to compensate for that in order to comply with the Building Code.

Matter 1: The cladding

7. Discussion

7.1 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, and 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 determinations[5] (for example, Determination 2004/1) relating to cladding and these factors are also used in the evaluation process.

[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.

7.2 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.

7.3 Weathertightness risk

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

Increasing risk

- the house is two-storeys high in part
- the house is fairly complex in plan and form, with complex roof junctions
- many of the walls have no eaves and verge projections to shelter the cladding
- the house has monolithic wall cladding fixed directly to the framing
- there is an upper level deck set within the body of a lower roof
- the external wall framing is not treated to a level effective in resisting decay if it absorbs and retains moisture

Decreasing risk

- the house is in a medium wind zone.

7.3.2 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.

7.3.3 When evaluated using the E2/AS1 risk matrix, the weathertightness features outlined in paragraph 7.3.1 show that one 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.

7.4 Weathertightness performance: exterior cladding

7.4.1 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 crack in the cladding
- the lack of drip edges and clearances from the bottom of the cladding and the interior floor slab to the paving or ground
- the decayed bottom plate in the boundary firewall

- the lack of clearance from the cladding to the deck tiles
- the lack of provision for overflow from the upper deck
- the lack of a handrail to the deck barrier
- the lack of cover of the parapet capping over the cladding
- the inadequate weatherproofing at the junction of the garage with the house.

7.4.2 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 12 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.

7.4.3 Although the windows have generally demonstrated their weathertightness also for 12 years, and will very likely achieve the minimum code requirement of 15 years, the jambs to plaster joins are still a point of potential weakness and should be further protected. Further protection and ongoing maintenance of the jamb to plaster joins is essential to ensure ongoing compliance with Clauses E2 and B2 of the windows.

7.4.4 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 only one crack.
- Moisture penetration is limited to areas where clearance defects have been identified.

7.4.5 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.

7.5 Weathertightness conclusion

7.5.1 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.

7.5.2 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.

7.5.3 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 7.4.1 will result in the house being brought into compliance with Clauses B2 and E2.

7.5.4 It is emphasized 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.

7.5.5 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 deck barrier

8. Discussion

8.1 I consider the expert's report establishes that the height of the deck barrier is not adequate because a handrail has not been installed to the barrier in accordance with the building consent. Consequently, I am satisfied that the barrier does not comply with Clause F4 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 1997.

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 the building work in 1997 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 12-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 1997.

9.6 It is not disputed, and I am therefore satisfied, that all the building elements complied with Clause B2 on 1 March 1997, refer paragraph 4.5.

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 1997.

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 7.4.1 and referring to any further defects that might be discovered in the course of investigation and rectification, 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 The notice to rectify listed five items, refer to paragraph 3.2. I leave it to the authority to confirm that these items have been rectified to its satisfaction.

10.4 I also note that the expert has identified some variations between the consent drawings and the house as constructed. I also note the expert's comments on the condition of the boundary fence. I leave both of these matters to the authority to resolve with the owners as it considers appropriate.

10.5 Once the matters set out in paragraph 7.4.1 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 cladding does not comply with Building Code Clauses E2 and B2
- the deck barrier does not comply with Building Code Clause F4

and accordingly I 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 March 1997.

(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 March 1997 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 7.4.1 of Determination 2009/38

Signed for and on behalf of the Chief Executive of the Department of Building and Housing on 28 May 2009.

John Gardiner
Manager Determinations