



Determination 2009/35

Determination regarding the code-compliance of an 11-year-old house with monolithic cladding at 2 Whitehead Place, Walters Bluff, 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 applicant is the owner, G Dayman (“the applicant”), acting through the architect for the building (“the architect”), 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 an 11-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 in terms of section 177(a) and 177(b)(vi) of the Act are:

1.3.1 Matter 1: The external envelope

Whether the external envelope of the house complies with Clauses B2 Durability and E2 External Moisture of the Building Code. The “external envelope” includes the cladding, its configuration and its components, junctions with other building elements, formed openings for windows, etc, penetrations, decks, parapets, and the proximity of building elements to the ground. (I consider this matter in paragraph 6). In this instance the external envelope excludes the roof.

1.3.2 Matter 2: 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 8.)

1.4 In making my decision, I have considered the applicant’s submission, the report of the expert commissioned by the Department to advise on this dispute (“the expert”) and the other evidence in this matter. With regard to the external envelope, 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 2-storey house that is situated on a steeply sloping excavated site in a high wind zone for the purposes of NZS 3604³. The house is complex in form, with a triangular shape that is 2-storeys high on the west (sea-facing) elevation and single-storey on the eastern (rear) elevation.

2.2 The construction is a mix of conventional light timber frame and specifically engineered elements, and includes concrete slabs and foundations, concrete tilt slab retaining walls, suspended concrete floors to part of the house, monolithic cladding and aluminium windows.

2.3 The roof is at varying levels bordered by monolithic-clad parapets, with 10° pitch profiled metal to the main roof and the garage roof. The north-eastern wall of the garage is a higher curved feature wall that borders the main entry and extends back to finish within the body of the main roof. The main roof extends to form a triangular canopy above the main entry.

2.4 Two smaller flat membrane-covered roof areas project out from the west and northeast elevations, one above the main deck and the other over the kitchen. The outer wall of the kitchen projection is curved, while the outer perimeter of the deck canopy is a curved parapet band.

³ New Zealand Standard NZS 3604:1999 Timber Framed Buildings

2.5 The western decks

- 2.5.1 A large deck, with a tiled floor and glass balustrades extends along most of the west elevation at the upper level, with the central section projecting out beyond the deck canopy and the northern triangular end recessed beneath the main roof.
- 2.5.2 The south end of main deck and canopy is supported by a free-standing monolithic-clad timber framed wall (“the deck column”), with the outer plaster continuing over the perimeter parapet band of the canopy above. At the northern end of the canopy, the curved parapet band extends to form a flying beam supported on circular posts.
- 2.5.3 A second smaller deck opens from the master bedroom on the southwest corner of the upper level. This deck is recessed beneath the roof and the tiled floor sits above a lower level bedroom.
- 2.6 The expert took timber samples from exterior wall framing and forwarded them to a testing laboratory for analysis, and the biodeterioration consultant’s analysis confirmed that the samples varied from positive to negative to testing for traces of boron. I note the specification calls for the framing to be “H1” but, given the date of construction during 1997, I am unable to determine the particular level and type of treatment that is described as “H1”. I therefore consider that the wall framing of this house is unlikely to be treated to a level that will provide resistance to fungal decay.
- 2.7 The monolithic cladding is a system described as solid plaster over a rigid backing. In this instance it consists of 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 solid plaster with a flexible paint coating.

3. Background

- 3.1 The authority issued a building consent for the house (No. 961406) on 18 December 1996, under the Building Act 1991. I have not seen a copy of the consent.
- 3.2 The schedule of inspections required for the building included inspections of the specifically engineered elements by the design engineer (“the engineer”), together with a list of inspections to be undertaken by the authority. The engineer reviewed the excavations, the foundation and slab reinforcing, the tilt slab reinforcing, the suspended concrete floor slabs and the steel posts and beams and provided a “Producer statement – PS4 – Construction Review” for the structural elements.
- 3.3 The schedule of inspections also included an inspection to be undertaken by the authority of ‘pre-plastering of stucco walls, backing, netting and flashing in place’.
- 3.4 The authority carried out various inspections from 7 April 1997 to 4 August 1997; I have seen no record of the above inspections. Although the building appears to have been substantially completed and occupied during the later part of 1997, no final inspection was called for at that time.
- 3.5 In letters to the applicant dated 18 February 1998 and 2 March 2000, the authority noted that no code compliance certificate had been issued and asked the applicant to arrange a final inspection of the building work.

- 3.6 The authority carried out a final inspection on 6 April 2000, and the inspection summary notes that re-inspection was required. I have not seen a record of that inspection.
- 3.7 Another final inspection was undertaken on 10 March 2003. In a letter to the applicant dated 8 April 2003, the authority noted that several items required attention and also stated:
- We do not have a record of a preplastering inspection, if you can recall when this work was done, please advise us and we will check inspectors diaries.
- 3.8 I am not aware of any further correspondence with the applicant over the next two years. Handwritten notes on the authority's records indicate that, in September 2005, the applicant sought advice in regard to the 'stucco that has not been inspected' and the authority 'suggested DBH determination'. I am not aware of any further discussions until 2008, when the applicant sought a code compliance certificate.
- 3.9 In a letter to the applicant dated 25 November 2008, the authority noted that the durability requirements of the Building Code commenced from the time of issue of the code compliance certificate. The authority noted that the building was considered to be:
- ... high risk and the existing design would now be considered outside the scope of E2/AS1. This is of particular concern because Council did not carry out a pre-plaster inspection.
- 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 authority attached a notice to fix to the above letter, which noted that, the 'inspection of pre-plaster stucco was not carried out' and the cladding's compliance with Clause E2 was not approved.
- 3.11 I note that in the notice to fix under "To remedy the contravention or non-compliance you must:" the notice provided the options of either engaging a named weathertightness specialist to undertake a full review of the cladding or of applying for a determination as a way to remedy the contravention or non-compliance. As the applicant has applied for a determination the second condition of the notice to fix has been met.
- 3.12 It is my opinion that a notice to fix may require a building to be brought into compliance with the Building Code; however naming a weathertightness specialist, or naming an application of a determination as a remedy is not appropriate within a notice to fix. I consider the suggestion of such a course of action is better suited to being included in a covering letter, which was also done on this occasion.
- 3.13 The Department received an application for a determination from the architect on 5 January 2009.

4. The submissions

4.1 In the letter accompanying the application, the architect noted that the applicants had been attempting to obtain a code compliance certificate for the house, and had elected to pursue one of the options provided in the notice to fix.

4.2 The architect forwarded copies of:

- the consent drawings and specification
- the authority's inspection records
- the engineer's producer statement – construction review
- the correspondence with the authority
- various statements, photographs and other information.

4.3 A copy of the applicant's submission was provided to the authority. The authority acknowledged the application, but made no submission.

4.4 A draft determination was issued to the parties for comment on 7 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 The architect commented on the draft determination in a letter to the Department dated 20 April 2009, outlining detailed reasons for the defects and decay identified in the expert's report. While accepting that the report had correctly identified weathertightness defects, the architect included the following points (in summary):

- The determination was sought due to the lack of a plastering inspection during construction, so the primary focus should be the stucco cladding.
- Most defects are the result of other clearly identifiable and easily remediated 'defective building practices', not specifically related to cladding defects.
- The determination should 'distinguish these matters clearly and separately' as a misleading impression is given that the cladding is the major issue.
- Although the parapet framing will need further investigation, there is no evidence of systemic failure of the stucco cladding.

The architect concluded that the determination should:

...moderate its tone with respect to the Stucco cladding as there is little evidence of failure in the main cladding enclosure itself. However further investigation is warranted and will be carried out.

4.6 I have noted the architect's concerns and have amended the determination as appropriate.

4.7 The authority proposed that the building, apart from the items requiring to be rectified as described in this determination complied, with Clause B2 Durability on 1 January 1998. This date was agreed to by the architect. In conjunction with proposing the B2 date, the authority also wrote to the architect outlining its recommendations as to process, and requirements for the remediation work.

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 19 February and 2 March 2008, and provided a report dated 11 March 2008. The expert noted that the architect was present during the first inspection, and the builder of the house was present at the second.
- 5.2 The expert noted the following areas varied from the consent details:
- The clearance from the bottom of the cladding to the ground or deck levels.
 - The deck perimeter detailing and balustrade fixings.
 - The over flashing of the parapets.
 - The window jamb and sill flashings.
- 5.3 The expert noted that the building was well maintained and generally appeared 'well constructed', with the stucco of a 'consistent standard'. The expert also noted that the stucco had been recently repainted and the surface was in good condition.
- 5.4 The architect and builder advised the expert that the parapets have membrane over the top of the framing, beneath the stucco cladding. While this is confirmed in construction photographs, the expert noted that later photographs show building wrap applied over the membrane, which allows any moisture penetrating to the membrane to drain to the fibre-cement backing sheets and then soak through to the framing.
- 5.5 The expert noted that the windows in the stucco are face-fixed, with metal head flashings and no jamb or sill flashings. The builder removed a small section of cladding at the jamb to sill junction of an east window, and the expert noted the building wrap and mesh within the plaster. I accept that the exposed junction is typical of similar locations elsewhere in the stucco walls of the house.
- 5.6 Following the first visit, the builder removed various sections of lining and cladding to allow the expert to inspect the underlying timber framing during the second inspection. The builder removed sections of:
- stucco from the base of the monolithic-clad deck column
 - stucco from the column, at the level of the upper deck floor
 - wall and ceiling linings in the garage
 - soffit lining from the north end of the main deck
 - soffit lining from the recessed deck from the master bedroom.

5.7 Moisture

- 5.7.1 The expert inspected the interior, and no evidence of moisture was observed within the house. Moisture damage was apparent in the garage.

5.7.2 The expert noted the following visual evidence of moisture penetration:

- Water stains to the garage ceiling beam.
- Water stains and soft timber to the bottom plate in the garage wall (confirmed as advanced brown rot and soft rot).
- Water marks and soft timber to the framing of the sub-floor partition below the garage floor slab.
- Black stains and damage to sub-floor wall framing beneath the north point of the triangle plan.
- Crumbling decayed timber in the deck stringer and adjacent wall plate beneath the north point of the triangle plan.
- Water dripping from under the band at the edge of the recessed deck, following dye testing of the deck balustrade fixings.
- Black stains indicating severe decay of the framing at the base of the deck column and at the level of the deck floor.
- Soft black drillings indicating severe decay in the bottom of the monolithic-clad flying beam, at the deck end, and between the post supports.
- Rusting of reinforcing mesh within some samples of removed stucco.
- Corroding steel and water marks to deck framing and plywood at the north end of the deck.
- Water marks to deck framing and plywood at the south end of the main deck, with a boundary joist sample confirmed as containing incipient brown rot.

5.7.3 The expert took 34 invasive moisture readings through the cladding at areas considered at risk, and 24 of these were elevated as follows:

- 19% in the sub-floor wall framing
- 22% in the bottom plate at the side of the door from bedroom 3
- 18% in the bottom plate below the lower bathroom window
- 23% in the bottom plate of the garage south wall
- 32% in the bottom plate of the curved wall to the north of the garage
- 23% in the bottom plate of the east study wall

The decks

- 8 readings from 32% to more than 40% in the framing of the main deck
- 23% in the inner face of the upstand of the recessed deck
- 26% on the exposed wall of the east elevation

Bedroom 2 (beneath the recessed deck)

- 22 % at the head of the door
- 24% and soft timber in the bottom plate of the south west corner

- 23% and decay in the window sill
- 24% in the bottom plate below the south window

The kitchen parapets

- 21% in the bottom plate beneath the south parapet
- 18% in the upper framing beneath the south parapet
- 18% and 23% in the upper framing beneath the north parapet

5.7.4 I note that the lowest reading was recorded at 8%. Moisture levels that vary significantly or are elevated generally indicate that external moisture is entering the structure and further investigation is required. I also note that the moisture readings were taken at the end of summer and moisture levels are likely to be higher during other times of the year.

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

- the driveway slopes towards the garage, with a channel drain at the door, and in heavy rain the water overflows the channel and ponds in the garage
- the bottom of the stucco lacks drip edges and is buried beneath the adjacent paving, allowing moisture to wick up to the framing
- there is insufficient clearance from paving or ground to the interior floor level in many areas, with some of the bottom plates below the level of the exterior ground, paving or planters
- the cladding butts against the tiles on the deck floors
- there is no evidence of control joints installed to the cladding
- there is minor cracking and holes in the cladding, with recent repainting likely to be covering past cracking
- the parapets and flying beam have flat plastered tops, with no cappings
- windows installed in the stucco have no sill flashings and lack flashings or seals between the window flanges and the cladding
- the decks are almost flat and ponding is apparent during light rain, with water accumulating beside balustrade fixings and downpipe penetrations
- the deck balustrade supports are fixed through the tiles, with moisture penetration apparent
- the wiring penetration to a light fitting to a lower bedroom is unsealed.

5.9 A copy of the expert's report was provided to the parties on 13 March 2009.

5.10 The architect responded to the expert's report in a letter to Department that was received on 20 March 2009. The architect noted that, subsequent to the expert's inspection, further investigations were carried out by the architect, the builder, the owner, and a property inspection company and it has been decided to remedy the known defects. The architect advised that the property inspection company will carry out specific investigations of the windows and the parapet walls. In view of the

proposed work, it was therefore considered by the architect that a full weathertightness assessment report, as advised by the expert, would not be necessary.

Matter 1: The external envelope

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 one or more other provisions 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, all of which raise the level of risk:

- The house is in a high wind zone.
- The house is 2-storeys high.

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.

- The house is complex in plan and form, with a complex roof form that has varying levels and complex junctions.
- There are parapets above all walls, including within the body of the roof.
- The walls have monolithic cladding fixed directly to the framing.
- There are decks, with tiled floors, extending from the upper level, with one deck situated above a lower bedroom.
- The external wall framing is not treated to a level effective in resisting decay if it absorbs and retains moisture.

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 one elevation demonstrates a very high 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 for all risk levels, this was not a requirement at the time the house was constructed.

6.4 Weathertightness performance

6.4.1 It is clear from the expert’s report that the external envelope is unsatisfactory in terms of its weathertightness.

7. Discussion

7.1 The expert’s report has demonstrated that there is significant water penetration into the walls through defects in many locations, which in turn has led to decay in the framing of this house. 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 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 I have identified the presence of a range of known weathertightness risk factors in this house. The presence of the risk factors on their own is not necessarily a concern, but they have to be considered in combination with the significant faults identified in the building envelope. It is that combination of risk factors and faults that indicate that the structure does not have sufficient provisions that would compensate for the lack of a drained and ventilated cavity. Consequently, I am not satisfied that the

house complies with either Clause B2 or Clause E2 of the Building Code. I have given further consideration to the question of B2 compliance under Matter 2 of this determination.

- 7.4 I consider that a more thorough investigation is required before the method of remediation can be decided, either by targeted repairs, re-cladding, or a combination of both. This will require a careful investigation and analysis by an appropriately qualified expert. Once that decision is made, the chosen repair option should be submitted to the authority for its consideration and approval.
- 7.5 The investigation should also involve the systematic survey of all risk locations, including the roof parapets, in order to determine the full extent of the repairs required to prevent further damage. Investigation is also necessary to establish the extent of the timber damage already sustained.
- 7.6 I note that the Department has produced a guidance document on weathertightness remediation⁶. I consider that this guide will assist the owner in understanding the issues and processes involved in remediation work and in exploring various options that may be available to them when considering the upcoming work required to the house.

Matter 2: The durability considerations

8. Discussion

- 8.1 The authority has concerns about the durability, and hence the compliance with the Building Code, of certain elements of the building taking into consideration the completion date of the building in late 1997.
- 8.2 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).
- 8.3 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.

⁶ External moisture – A guide to weathertightness remediation. This guide is available on the Department’s website, or in hard copy by phoning 0800 242 243

- 8.4 In this case the delay between the completion of most of the building work in late 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.
- 8.5 It is not disputed, and I am therefore satisfied, that all the building elements installed in the house, apart from the items requiring to be rectified as described in this determination, complied with Clause B2 on 1 January 1998. This date has been confirmed by the parties, refer paragraph 4.7.
- 8.6 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.
- 8.7 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 late 1997.
- 8.8 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.

9. What is to be done now?

- 9.1 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 5.8 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.
- 9.2 I would suggest that the parties adopt the following process to meet the requirements of paragraph 9.1. 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.

- 9.3 I draw to the authority's attention the evidence of severe moisture penetration and timber decay to the deck framing, which could compromise the structural integrity of the deck. I suggest that the authority urgently investigate the deck framing to determine the extent of damage and instigate any remedial work that might be required to ensure the continuing structural stability of these members.
- 9.4 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.
- 9.5 Once the matters set out in paragraph 9.1 have been rectified to its satisfaction, the authority may issue a code compliance certificate in respect of the building consent as amended.

10. The decision

- 10.1 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.
- 10.2 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 January 1998.
 - (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 January 1998 instead of from the time of issue of the code compliance certificate for all the building elements, with the exception of the remedial work required to fix the defects described in paragraph 5.8 of Determination 2009/35.

Signed for and on behalf of the Chief Executive of the Department of Building and Housing on 19 May 2009.

John Gardiner
Manager Determinations