



## Determination 2010/75

### Refusal to issue a code compliance certificate for a 12-year-old addition to house at 11 Duders Avenue, North Shore City



#### 1. The matters 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, Department of Building and Housing (“the Department”), for and on behalf of the Chief Executive of that Department. The applicants are the owners I and C Fraser (“the applicants”) and the other party is North Shore 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 alterations to a 12-year-old house (“the addition”), because it is not satisfied that the building work complies with certain clauses<sup>2</sup> of the Building Code (First Schedule, Building Regulations 1992). The authority’s primary concerns about the compliance of the addition relate to weathertightness.

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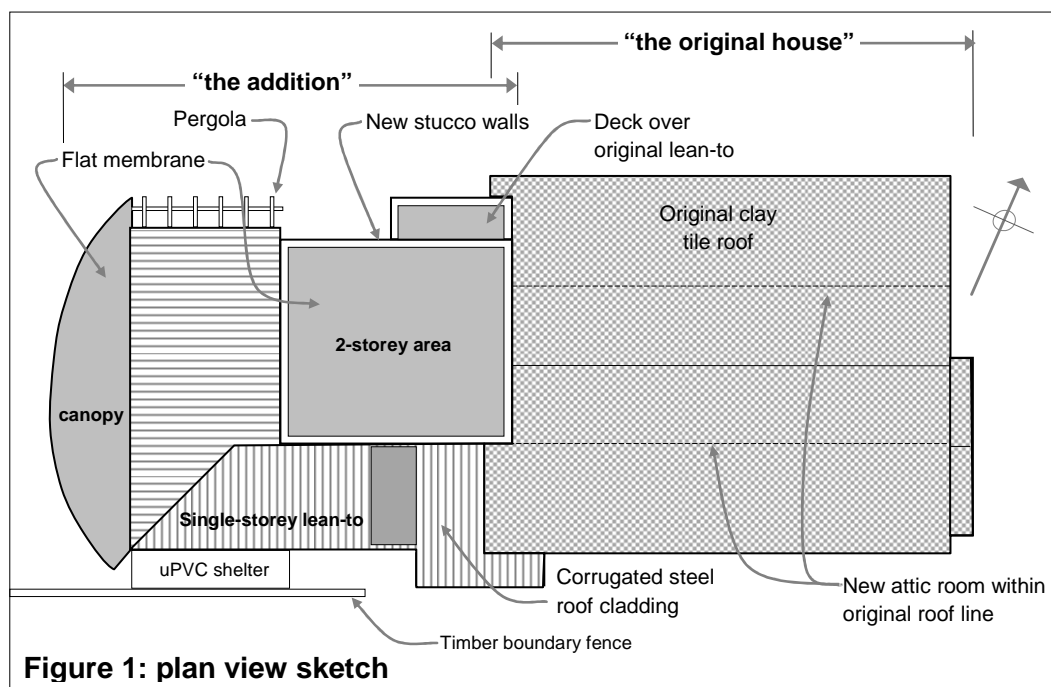
<sup>1</sup> The Building Act, Building Code, Compliance documents, past determinations and guidance documents issued by the Department are all available at [www.dbh.govt.nz](http://www.dbh.govt.nz) or by contacting the Department on 0800 242 243.

<sup>2</sup> In this determination, unless otherwise stated, references to sections are to sections of the Act and references to clauses are to clauses of the Building Code.

- 1.3 The matter to be determined<sup>3</sup> is therefore whether the authority was correct to refuse to issue a code compliance certificate. In deciding this, I must consider whether the external building envelope of the addition (“the envelope”) complies with Clause E2 External Moisture and Clause B2 Durability of the Building Code. The envelope includes the components of the systems (such as the wall claddings, the windows, the roof cladding and the flashings), as well as the way the components have been installed and work together.
- 1.4 I note the authority has stated that the applicants may apply for a modification in respect of the durability provisions of Clause B2. The applicants have confirmed they intend to seek a modification and I therefore leave this matter to the parties to resolve, once the cladding and all associated work has been made code compliant.
- 1.5 In making my decision, 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 6.1.

## 2. The building work

- 2.1 The building work considered in this determination consists of an addition, with associated alterations, to an existing house on a flat site in a high wind zone for the purposes of NZS 3604<sup>4</sup>. The addition is assessed as having a moderate to high weathertightness risk (see paragraph 6.2).



<sup>3</sup> Under section 177(b)(i) of the Act

<sup>4</sup> New Zealand Standard NZS 3604:1999 Timber Framed Buildings

- 2.2 The original 1930's house was a small single-storey timber-framed house ("the original house"), with a timber-framed subfloor, clay tile gable roof, stucco wall cladding and timber windows.
- 2.3 The addition is to the rear of the house as shown in Figure 1, and provides:
- a new kitchen, dining and family area on the ground floor
  - two small bedrooms and a bathroom in the upper level, with a developed attic area under the original roof and a new window to the east gable end wall
  - a new upper level deck from an upper level bedroom, above the walls of the original lean-to to the house.
- 2.4 Construction of the addition is generally conventional light timber frame, with a concrete slab and foundations, monolithic and timber weatherboard wall claddings, membrane and profiled metal roof claddings, and timber windows to match the original windows. The altered house is fairly complex in plan and form, with three different roof claddings at varying pitches and levels, and the upper level roof bordered by parapets.
- 2.5 An enclosed deck opens off an upper floor bedroom and is constructed above the Rimu framing of an original lean-to. The original walls are extended in new timber framing to form the deck balustrades, with the new stucco blended with the old. The inside faces of the balustrades are clad in timber weatherboards and a metal capping is installed to the top.
- 2.6 The expert carried out site spot tests that indicated the external wall framing was boron treated. The expert also took two timber samples from interior and exterior wall framing and forwarded them to a testing laboratory for analysis. This confirmed that the interior wall framing sample was untreated, while the sample from the clad balustrade was boron treated, with a preservative site-applied at a later stage. Given this evidence, I consider that the exterior wall framing of this addition is likely to be boron treated, while the interior wall framing is not treated.

## **2.7 The claddings**

- 2.7.1 The monolithic cladding to the two-storey section matches the appearance of the original stucco cladding. The cladding is a system described as solid plaster ("stucco") over a solid backing of 4.5 mm fibre-cement sheets fixed through the building wrap directly to the framing, and covered by a slip layer of building wrap, 25mm thick metal-reinforced solid plaster and a flexible paint coating.
- 2.7.2 The remaining walls are clad in stain-finished cedar bevel-backed weatherboards fixed through the building wrap directly to the framing. Timber facings are installed at external corners and around the heads and jambs of the timber windows, with timber scribes at the jamb facings. The inner faces of the deck balustrades are also clad with weatherboards.

### 3. Background

- 3.1 The authority issued a building consent (No. D 10355) for the addition on 17 May 1996 under the Building Act 1991 and carried out inspections of the construction between December 1996 and September 1998.
- 3.2 Construction appears to have been carried out in two stages. The ground floor work was completed first, with a final inspection carried out on 26 November 1997. Remaining work was completed the following year, with a final inspection carried out on 23 September 1998. The inspection record noted 'CCC can now be issued Stage 2 now complete.' There was no reference in the inspection records to any pre-plaster inspections of the mesh or flashings.
- 3.3 According to the applicants, the authority's final inspection had identified the lack of an overflow outlet to the deck, which has only recently been installed. I note that the expert reported that remedial work was undertaken on the deck in October 2008 (refer paragraph 5.2.3).

#### 3.4 The authority's decision

- 3.4.1 During 2009, the applicants applied for a code compliance certificate for the addition and the authority carried out a weathertightness inspection of the building work. In a letter to the applicants dated 30 October 2009, the authority explained that the 'allowance of moisture ingress, together with the use of untreated timber framing, has become a major problem to the structural integrity of buildings' and that it now usually required 'invasive moisture testing and investigation' in order to be satisfied about the compliance of direct-fixed monolithic cladding systems.
- 3.4.2 The authority identified 15 design and construction features that it considered to be risk factors for the addition. The authority also stated:
- The visual inspection recently carried out by our weathertightness inspector has revealed the following defects:
1. Joints to roof membrane
  2. Bottom edge of solid plaster where cut for new weatherboards and barrier caps to be painted.
  3. Fixings to downpipe clips
  4. Plaster buried in ground.
- 3.4.3 The authority noted that the above may not be a complete list of defects and that further investigation was needed. The authority also noted a spreader was required to a downpipe, along with as-built plans for the changes to the deck.
- 3.4.4 The authority stated that, due to the risk factors and defects, it could not be satisfied on reasonable grounds that the cladding systems complied with clauses E2 and B2 of the Building Code; recommending that a 'certified weathertightness surveyor' investigate the weathertightness of the cladding, confirm the moisture levels in the exterior framing and propose remedial work if necessary.
- 3.5 The Department received an application for a determination on 9 April 2010 and sought further information, which was received on 4 May 2010.

## **4. The submissions**

4.1 The applicants outlined the background of the project. The applicants also noted that there had been one leak since the addition was completed in 1998, which had been repaired prior to seeking the code compliance certificate.

4.2 The applicants submitted copies of:

- a drawing of the addition
- the letter dated 23 March 2009 from the authority.

4.3 The authority made no submission in response to the application and later.

4.4 A draft determination was issued to the parties for comment on 30 June 2010.

4.5 The applicant generally accepted the draft determination on 21 July 2010. However, the applicant made a number of comments which I have considered; amending the determination as I consider appropriate. These included (in summary):

- A 'waiver' in respect of the durability provisions will be sought.
- The expert's inspection followed 'exceptionally heavy rain' and the marginal readings should be given 'the benefit of doubt'.
- The required repairs should be limited to the north elevation, as there is no evidence of significant leaks or decay on other walls and breaking into the existing cladding elsewhere may leave it in a worse state.
- The draft determination suggests that all windows should be repaired under a notice to fix, whereas this is not necessary if there is no evidence of problems.
- A notice to fix should be restricted to the 'rectification of the defects that have caused the high/elevated moisture readings on the north face'.

4.6 The authority provided copies of the inspection summary and accepted the draft determination on 27 July 2010, subject to several non-contentious amendments. I have considered the authority's comments and have amended the draft as I consider appropriate.

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

5.1 As mentioned in paragraph 1.5, I engaged an independent expert to assist me. The expert is a member of the New Zealand Institute of Building Surveyors. The expert inspected the addition on 10 June 2010 and provided a report dated 17 June 2010.

### **5.2 General**

5.2.1 The expert noted that, although the house had been very poorly maintained, the overall quality of workmanship was very high. Except for the items noted in paragraph 5.6, the quality of cladding installation was generally high, with the weatherboards 'exceptionally well installed' and the stucco finish 'high quality'. Roof claddings generally appeared to be 'above average', with 'carefully installed' barge and apron flashings.

- 5.2.2 The expert noted various changes from the consent drawings, including:
- two small bedrooms in lieu of the master bedroom shown in the drawings
  - various other changes to doors, windows and skylights
  - some other minor interior layout changes.
- 5.2.3 The owner explained to the expert that leaks around the deck doors had been repaired in 2008. The expert removed two weatherboards from the balustrade to examine the remedial work, noting that this included:
- the removal and reinstatement of the deck doors and window
  - the application of timber preservative to the balustrade framing
  - the removal and replacement of the deck membrane
  - the replacement of the stucco to the inner face of the balustrades with weatherboards
  - the installation of a copper capping to the balustrade.

### **5.3 Windows and doors**

- 5.3.1 The timber doors and windows were designed to match the appearance of the original windows, including the solid timber sills. The expert removed a scribe and facing to the joinery to the upper deck, noting that window jambs were very wide, with a central weathergroove to the outer face.
- 5.3.2 Within the weatherboard cladding, timber windows and doors were installed in a traditional manner with sill flashings and facings. Scribes were installed at the jambs and the metal head flashings overlapped timber mouldings installed above the facings. The expert noted that the installation appeared satisfactory.
- 5.3.3 The windows in the stucco cladding included metal head and sill flashings. However, the expert could see no evidence of jamb flashings, as the plaster appeared to overlap the wide timber jambs with no underlying flashings.

### **5.4 Moisture levels**

- 5.4.1 The expert inspected the interior of the house and no evidence of current moisture ingress was noted. However, old water stains from the deck leak were noted in the particle board flooring beside the deck doors, along with a short length of dry, but obviously decayed, bottom plate. The expert also noted water marks in the original ceiling space resulting from a hole in the original the cladding.
- 5.4.2 The expert took about 20 invasive moisture readings through the stucco from the exterior at areas considered at risk. Another 27 invasive moisture readings were taken from the interior, using long probes inserted into bottom plates to record moisture levels at about 10mm behind the cladding. The expert established that equilibrium moisture contents (“EMC’s”) at known ‘dry’ areas were 11% to 13% in first floor areas and 13% to 14% in ground floor areas.

5.4.3 The expert reported that the readings fell within the following categories:

- 15 below 16% (“low”)
- 17 at 17% to 20% (“marginal”)
- 9 at 21% to 25% (“elevated”)
- 4 at 26% to 30% (“high”)
- 2 over 30% (“very high”).

5.5 Elevated moisture readings were recorded in the following locations:

**Stucco cladding**

- 1 marginal, 2 elevated in the ground floor bottom plate of the 2-storey wall
- 1 elevated, 2 high in the first floor bottom plate of the 2-storey wall
- 2 marginal, 4 elevated in the ground floor rimu bottom plate (below the deck)
- 1 low, but with obvious decay in the bottom plate beside the deck door
- 2 marginal under the new attic east window in the original gable end wall
- 1 marginal below the junction of the original roof to the upper south wall
- 1 elevated under the end of a window sill butting against the north stucco

**Windows and doors in the stucco cladding**

- 1 marginal, 1 elevated at the sill, and 1 marginal at the head of the upper bathroom window in the south wall
- 1 very high in the Rimu framing above the study window (below the deck)
- 1 very high under the window sill of the northwest upper bedroom.

5.6 Commenting specifically on the external envelope, the expert noted that:

**General - stucco**

- there are some minor cracks to the stucco cladding
- some pipe penetrations through the cladding are not adequately sealed
- the new framing of the deck balustrades extends the original Rimu wall framing to the ground floor study, with no horizontal flashing installed and the new and old stucco joined over the junction. Moisture readings indicate that moisture is penetrating this junction
- although past leaks to the upper deck have been satisfactorily remedied and current moisture levels are low, obvious decay remains in a bottom plate – the extent of which needs to be investigated
- at the junction of the original roof with the south upper wall, the top of the barge flashing is not weatherproof, with gaps apparent and marginal moisture levels in the framing below

**Windows and doors**

- windows and doors have not been adequately maintained, with peeling paint, splitting and crazing, and a leak to the bottom joint of the sash to the upper deck door
- there is no provision for drainage of the stucco above the window head flashings, no jamb flashings and no drainage gap at the sill flashings, with high moisture levels recorded in the framing to some of the windows
- the above also applies to the attic window installed into the east gable end of the original stucco, with elevated moisture levels recorded below that window
- taking into account the age of the building work, further investigation of some windows is needed, to determine the extent, if any, of remedial work required to windows with no evidence of significant moisture penetration to date

**The roof**

- laps to the upper membrane roof are lifting in a number of areas, risking water entry into the substrate and framing through joint failures
- the downpipe from the upper roof discharges directly onto the lead apron flashing over the original tile roof, with no spreader installed to divert the concentrated flow
- the insulation to the skillion roof section in the original house is separated from the old tiles by building paper pushed between rafters with no air gap, which does not allow moisture to escape or dissipate.

5.7 The expert made the following additional comments on the exterior envelope:

- Although control joints are not installed to the stucco cladding, there are very few cracks and no sign of associated moisture penetration after 12 years.
- Although the pergola is fixed through the weatherboards, the junction is sheltered by the verge, with no sign of associated moisture ingress.
- Although clearances under the weatherboards are reduced at the western corners, these areas are fairly well sheltered and moisture levels are acceptable.
- The unpainted edges of stucco identified by the authority are now painted.
- The ‘buried’ stucco cladding identified by the authority has been remedied by separating the garden from the plaster.

5.8 The expert also noted that clear uPVC roofing had been installed between part of the south wall and the timber boundary fence, which may not comply with Clause C3 Spread of fire.

5.9 A copy of the expert’s report was provided to the parties on 18 June 2010.



## 6. Weathertightness

6.1 The evaluation of building work for compliance with the Building Code and the risk factors considered in regards to weathertightness have been described in numerous previous determinations (for example, Determination 2004/1).

### 6.2 Weathertightness risk

6.2.1 The addition has the following environmental and design features which influence its weathertightness risk profile:

#### Increasing risk

- the addition is in a high wind zone and is two-storeys high in part
- the addition is complex in plan and form, with roof levels that incorporate complex roof-to-wall junctions
- there are two different types of wall cladding, fixed directly to the framing
- an upper level deck, with clad balustrades, is situated above a study
- the upper walls extend to form parapets, which offer no shelter to the cladding

#### Decreasing risk

- there are eaves and verge projections above lower walls to shelter the cladding
- the external wall framing is treated to a level that provides resistance to decay if it absorbs and retains moisture.

6.2.2 When evaluated using the E2/AS1 risk matrix, these features show that the addition demonstrates a moderate to high weathertightness risk rating. I note that, if the details shown in the current E2/AS1 were adopted to show code compliance, the stucco cladding would require a drained cavity at all risk levels. However, I also note that this was not a requirement of E2/AS1 at the time of construction.

### 6.3 Weathertightness performance

6.3.1 Taking account of the expert's report, I conclude that remedial work, or further investigation, is necessary in respect of the areas outlined in paragraph 5.6.

6.3.2 I note the expert's comments in paragraph 5.7, and I accept that these areas are adequate in the particular circumstances of this addition.

6.3.3 Notwithstanding the fact that the stucco cladding is fixed directly to the timber framing, thus limiting drainage and ventilation, I have noted the following compensating factors that assist the performance of the stucco in this particular case:

- Apart from noted exceptions, the stucco is installed to good trade practice.
- Moisture penetration appears to be associated with identified defects.
- Apart from an isolated area relating to a past leak that has now been remedied, the framing appears to be sound.

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, providing the cladding is well maintained.

## **6.4 Weathertightness conclusion**

- 6.4.1 I consider the expert's report establishes that the current performance of the building envelope is not adequate because there is evidence of moisture penetration into the timber framing, with high moisture levels recorded particularly in the north elevation. Consequently, I am satisfied that the addition does not comply with Clause E2 of the Building Code.
- 6.4.2 In addition, the building envelope 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 addition to remain weathertight. Because the cladding faults on the addition are likely to allow the ingress of moisture in the future, the building work does not comply with the durability requirements of Clause B2.
- 6.4.3 Because the faults identified with the claddings occur in discrete areas, I am able to conclude that satisfactory investigation and rectification of the items outlined in paragraph 5.6 will result in the building envelope being brought into compliance with Clauses B2 and E2 of the Building Code.
- 6.4.4 I note that the claddings have been very poorly maintained, which is likely to have contributed to moisture penetration through the external envelope. 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)
- 6.4.5 I also note the expert's comment in paragraph 5.8, and I conclude that adding the uPVC canopy between the house and the timber boundary fence does not comply with Clause C3 Spread of fire.

## **7. What is to be done now?**

- 7.1 A notice to fix should be issued that requires the owner to bring the addition into compliance with the Building Code, including the defects identified in paragraph 5.6 and paragraph 6.4.5, but not specifying how those defects are to be fixed. It is not for the notice to fix to specify how the defects are to be remedied and the building brought to compliance with the Building Code. That is a matter for the owners to propose and for the authority to accept or reject.
- 7.2 I also note the applicant's comments in paragraph 4.5, which question whether every window requires repair; taking into account the remaining limited durability that would be required should a modification be granted. The resolution of this issue will require further detailed investigation and will therefore also be a matter for the owners to propose and for the authority to accept or reject.

- 7.3 I suggest that the parties adopt the following process to meet the requirements of paragraph 7.1. Initially, the authority should issue the notice to fix. The applicants should then produce a response to this in the form of a detailed proposal, produced in conjunction with a competent and suitably qualified person, as to the investigation and rectification or otherwise of the specified matters. Any outstanding items of disagreement can then be referred to the Chief Executive for a further binding determination.
- 7.4 The expert has also noted various changes from the consent drawings which have also been raised by the authority. I leave this matter to the parties to resolve.

## **8. The decision**

- 8.1 In accordance with section 188 of the Building Act 2004, I hereby determine that:
- the external building envelope does not comply with Building Code Clauses E2 and B2 (insofar as it applies to E2)
  - the roof connecting the house to the boundary fence does not comply with Clause C3 Spread of fire.
- and accordingly, I confirm the authority's decision to refuse to issue a code compliance certificate for the addition.

Signed for and on behalf of the Chief Executive of the Department of Building and Housing on 23 August 2010.

John Gardiner  
**Manager Determinations**