



## Determination 2008/119

### The code compliance of monolithic cladding to a building addition at 47 Whitmore Road, Mount Roskill, Auckland



#### 1. The matter to be determined

- 1.1 This is a determination under Part 3 Subpart 1 of the Building Act 2004<sup>1</sup> (“the Act”) made under due authorisation by me, John Gardiner, Manager Determinations, Department of Building and Housing (“the Department”), for and on behalf of the Chief Executive of that Department. The applicants are the owners, E and J Solanki, (“the owners”) acting through an agent, and the other party is the Auckland 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 issue a notice to fix for 5-year-old alterations to a building because it was not satisfied that the building work complied with certain clauses of the Building Code<sup>2</sup> (First Schedule, Building Regulations 1992).

<sup>1</sup> The Building Act 2004 is available from the Department’s website at [www.dbh.govt.nz](http://www.dbh.govt.nz).

<sup>2</sup> The Building Code is available from the Department’s website at [www.dbh.govt.nz](http://www.dbh.govt.nz).

1.3 I note that the 2003 building consent included the construction of a new house at the rear of the site. The notice to fix dated 26 June 2008 relates only to the alterations to the original house and I therefore consider that the matters for determination are:

**1.3.1 Matter 1: The claddings**

Whether the wall and roof claddings as installed on the addition (“the claddings”) comply with Clause E2 External Moisture of the Building Code. By “the claddings as installed” I mean the components of the systems (such as the backing materials, the flashings, the joints and the plaster and/or the coatings) as well as the way the components have been installed and work together.

**1.3.2 Matter 2: The exterior steps**

Whether the exterior steps to the addition comply with Clause D1 Access Routes of the Building Code. (I consider this matter in paragraph 8.)

1.4 I also note that the notice indicates that some aspects of the building work contravene Clauses B1 and H1 of the Building Code. I note that there are no specific items within the notice to fix that relate directly to these clauses, and I have received no evidence relating to a dispute about them. I have therefore not considered these clauses further within this determination.

1.5 In making my decision, I have considered the submissions of the parties, the report of the independent expert commissioned by the Department to advise on this dispute (“the expert”), and the other evidence in this matter. With regard to the claddings, I have evaluated this information using a framework that I describe more fully in paragraph 6.1.

## **2. The building**

2.1 The building work consists of a single-storey addition to the corner of an existing detached house situated on an excavated sloping site, which is in a low wind zone for the purposes of NZS 3604<sup>3</sup>. The original house was built during the 1960’s as a simple single-storey “L-shaped” building with a small storage area in the basement. The house had conventional light timber frame construction, concrete perimeter foundations with suspended timber framed floors, brick veneer cladding and a clay tile hipped roof.

2.2 The building work to the original house includes plastering of the existing brick veneer, the construction of a basement garage and staircase, associated internal alterations and an addition infilling the north east corner of the existing house. The addition extends the living room area and provides a new entry porch.

2.3 The original roof has been extended over the addition, which is bounded by parapet walls that turn back into the body of the sloping roof. Except for the concrete entry porch, the addition has timber pole foundations and a suspended timber framed floor.

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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.

<sup>3</sup> New Zealand Standard NZS 3604:1999 Timber Framed Buildings

- 2.4 The expert has noted that he was unable to confirm whether the wall framing is treated, and the drawings call for wall framing to comply with NZS 3604. Given the date of construction in 2003, I consider that the external wall framing is unlikely to be treated.
- 2.5 The monolithic cladding is a system described as solid plaster over a solid backing. In this instance it consists of 4.5mm fibre-cement sheets fixed through the building wrap directly to the framing timbers, and covered by a slip layer of building wrap, under metal-reinforced solid plaster finished with a flexible paint coating system.

### 3. Background

- 3.1 The authority issued a building consent (No. BLD 36020672301) on 28 January 2003 for a new house and alterations to an existing house (refer paragraph 1.3). The alterations were constructed during 2003, with the new house not commenced until 2005 (refer paragraph 3.4).
- 3.2 The authority carried out pre-line inspections on 6 and 12 September 2003 and “stucco inspections” on 1 and 8 October 2003. The cladding inspections recorded problems relating to the window flashings. The last site visit was on 21 October 2003 and the record notes “window flashings installed OK”, but also that the parapet could not be inspected as there was no one on site.
- 3.3 In a letter to the designers dated 12 November 2003, the authority noted the “failed stucco inspections”, and stated that the completion of the plastering without satisfactory inspections meant that a “recognised building consultant” or registered engineer would need to certify that the cladding complied with NZS 4215<sup>4</sup> and Clause E2 of the Building Code.
- 3.4 In 2005, an amendment to the building consent was approved for the new house at the rear of the site, and construction started in June 2005. While inspections were carried out on the new building, no further inspections of the addition were recorded.
- 3.5 The authority carried out a final inspection of both buildings on 17 January 2008, and the record noted that the addition to the existing house would need a cladding inspection by the “weathertightness team”.
- 3.6 The authority carried out an inspection of the cladding on 27 May 2008 and issued a notice to fix on 26 June 2008. The “particulars of contravention” attached to the notice identified defects in the addition, noting the:
- lack of control joints
  - lack of clearance from the bottom of the cladding to the ground and paving
  - unsealed backing sheets and no 6mm offset at the bottom of the cladding
  - lack of clearance from the bottom of the cladding to the roofing
  - cladding cracks at the windows

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<sup>4</sup> New Zealand Standard NZS 4251: Solid plastering; Part 1: 1998 Cement plasters for walls, ceilings and soffits

- lack of slope to the parapet cappings
- lack of a drainage gap above the window head flashings
- lack of flashings between dissimilar claddings
- gap between the plaster and the existing fascia board
- lack of drainage and ventilation behind the cladding
- uneven riser heights to the entry steps.

3.7 The Department received an application for a determination on 5 September 2008.

## **4. The submissions**

4.1 In a letter accompanying the application the applicant accepted that work was needed on the addition to the existing house. The applicant proposed a scope of work to remedy the defects identified in the notice to fix and asked the Department to confirm that the proposals would result in code compliance.

4.2 I acknowledge the applicant's request and the remedial work proposed in the application. However, I believe paragraph 9 describes the appropriate course of action to be followed, which takes account of the items the applicant accepts as not being code compliant, and the findings of this determination.

4.3 The applicant forwarded copies of:

- the consent drawings
- the inspection summary and records for the addition
- the correspondence from the authority
- the notice to fix dated 26 June 2008
- the proposed scope of work to remedy the defects
- various other calculation and photographs.

4.4 The authority forwarded a CD-Rom that was entitled "Property File" that contained documents pertinent to this determination.

4.5 Copies of the submissions and other evidence were provided to the parties, which made no submission in response.

4.6 The draft determination was sent to the parties for comment on 17 November 2008. Both parties accepted the draft.

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

5.1 As discussed 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.

- 5.2 The expert inspected the house on 17 October 2008, and furnished a report that was completed on 21 October 2008. The expert noted that the foundations to the addition were shown in the consent drawings as concrete, but had been built as timber.
- 5.3 The expert noted that the plaster wall cladding was “installed unsatisfactorily” with “numerous defects including inadequate foundations and questionable window installation”.
- 5.4 The expert noted that the windows had metal head and sill flashings, with metal angles installed at the jambs to finish the plaster against. The expert removed a small section of cladding at the jamb to sill junction of the west window on the north elevation, and noted that the plaster broke up when removed. The expert observed mould on the building paper, corroding fixings and water stains on the framing.
- 5.4.1 The expert noted water marks on the soffit lining of the entry porch and carried out thermal imaging that indicated moisture penetration from the roof junction above. Thermal images of the north wall of the addition indicated areas of likely moisture penetration below the jamb to sill junctions of the windows. The expert took 9 invasive moisture readings through the cladding at areas considered to be at risk of moisture penetration and recorded 8 elevated readings as follows:
- 18% to more than 40% in the framing below the north windows
  - 22% in the framing below the south end of the east parapet
  - 20% in the framing below the rainwater head at the north east parapet corner
  - 23% in the bottom plate beside the entry porch at the north east corner.
- Moisture levels over 18%, or which vary significantly after cladding is in place, generally indicate that external moisture is entering the structure.
- 5.5 Commenting specifically on the cladding, the expert noted that:
- there are no control joints in the 7.2m north wall, which exceeds the 4m length limit between such joints recommended in NZS 4251<sup>5</sup>. I note there also appear to be no control joints at the junction of the new stucco plaster and the existing plastered brick veneer.
  - there is a large crack at the jamb to sill junction of a window and the plaster appears unsatisfactory, breaking up at the cut-out
  - there is insufficient clearance from the bottom of the plaster to the paving, the bottom of the backing sheets are exposed and there is no 6mm gap allowing moisture to “wick” up towards the bottom plate of the framing
  - there is no gap to allow drainage above the window head flashings
  - the window sill flashings lack turndowns at the ends and slope to direct water into the cladding, with associated moisture penetration apparent
  - the parapet flashings have inadequate fall and the capping joints appear unsatisfactory, with unsealed fixings and likely moisture penetration

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<sup>5</sup> New Zealand Standard NZS 4251: Solid plastering; Part 1: 1998 Cement plasters for walls, ceilings and soffits

- the junctions against the inner cladding of the parapets are not weatherproof, with inadequate flashings, insufficient clearances, gaps, exposed plywood and deteriorating fibre cement cladding sheets
  - the subfloor area is inadequately ventilated and some of the timber posts beneath the north wall of the addition are wet and have black water stains, indicating the possibility of decay in the timber.
- 5.6 The expert generally agreed with the defects identified in the notice to fix, but noted that there were no deck barriers as referred to in the notice. (I have assumed that this item was intended to refer to the tops of the parapets). The expert also noted that there were no dissimilar claddings as referred to in the notice. The authority has advised this item in the notice to fix referred to the junction of the new stucco plaster and the existing brick veneer that had been plastered.
- 5.7 The expert concluded that the cladding had not been installed to the manufacturer's instructions or to NZS 4251, which was operative at the time of construction.
- 5.8 The expert also noted that the risers to the concrete entry steps were not uniform in height. (I note that the photographs included in the expert's report show that the bottom two risers are significantly less than the heights of the remaining risers).
- 5.9 A copy of the expert's report was provided to each of the parties on 3 November 2008. The authority acknowledged the report but noted the presence of the junctions between the new and existing claddings, refer paragraph 5.6.

## **6. Evaluation of the claddings 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 Solutions<sup>6</sup>, 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 are written conservatively to 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.
- 6.1.2 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

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<sup>6</sup> 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](http://www.dbh.govt.nz).

weathertightness risk factors in previous determinations<sup>7</sup> (for example, Determination 2004/1) relating to cladding and these factors are also used in the evaluation process.

- 6.1.3 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.

## 6.2 Weathertightness risk

- 6.2.1 In relation to these characteristics I find that the addition to this building:

- is built in a low wind zone
- is a maximum of one storey high
- is fairly complex in plan and form, with parapets to the walls
- has solid plaster cladding that is directly fixed to the framing
- has external wall framing that may not be treated to a level that will provide resistance to the onset of decay if the framing absorbs and retains moisture.

- 6.2.2 The addition 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.

- 6.2.3 When evaluated using the E2/AS1 risk matrix, the weathertightness features outlined in paragraph 6.2.1 show that the elevations of the addition demonstrate a moderate weathertightness risk rating.

- 6.2.4 While the current E2/AS1 requires a drained cavity for all risk exposures for this cladding type, the relevant acceptable solution E2/AS1 at the time of construction in 2003 permitted direct-fixed solid plaster on a rigid backing. However, I note that the cladding system would have needed to incorporate the requirements of NZS 4251.

## Matter 1: The claddings

### 7. Discussion

- 7.1 Taking into account the expert's report, I am satisfied that the current performance of the cladding installed to the addition is inadequate because it has not been installed according to good trade practice or to manufacturer's recommendations at the time of construction. In particular, the cladding installation includes the systemic defects listed in paragraph 5.5, resulting in significant moisture penetration into the walls

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<sup>7</sup> Copies of all determinations issued by the Department can be obtained from the Department's website.

which may have led to decay in the untreated framing timber. Consequently I am not satisfied that the cladding system as installed complies with either Clause B2 or Clause E2 of the Building Code.

- 7.2 Because of the extent and apparent complexity of the faults that have been identified with the cladding, I am unable to conclude how the faults are to be fixed and how the building can be brought into compliance with Clauses B2 and E2.
- 7.3 I consider that final decisions on whether code compliance can be achieved by either targeted repairs or re-cladding, or a combination of both, can only be made after a more thorough investigation of the cladding. This will require a careful 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.
- 7.4 I note that the Department has produced a guidance document<sup>8</sup> on weathertightness remediation (available on the Departments website or in hard copy by calling the Department on 0800 242 243). I consider that this guide will assist the owners 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 addition.

## Matter 2: The exterior steps

### 8. Discussion

#### 8.1 The legislation and compliance documents

- 8.1.1 The provisions of the Building Code relevant to the exterior steps to the addition are:

##### **D1 Access Routes**

##### **Performance**

D1.3.3 Access routes shall:

- (f) Have stair treads, and ladder treads or rungs which:
  - (ii) have uniform rise within each flight...

- 8.1.2 The relevant sections of the Acceptable Solution D1/AS1 are:

##### **4.0 Stairways**

**4.1.3 Uniformity** – Riser height and tread depth for all steps in one flight, shall be uniform within the tolerance of  $\pm 5$  mm measured at the centreline on straight flights...

### 8.2 Conclusion

- 8.2.1 I note the expert's comment in paragraph 5.8 regarding the irregular heights of the risers to the entry steps which exceed the limits in rise uniformity given in D1/AS1. Consequently I am satisfied that the exterior steps to the addition do not comply with Clause D1 of the Building Code.

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<sup>8</sup> External moisture – A guide to weathertightness remediation



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

- 9.1 A notice to fix should be issued that requires the owners to bring the addition into compliance with the Building Code, identifying the items listed in paragraphs 5.5 and 8.2.1 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 owners to propose and for the authority to accept or reject.
- 9.2 I 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 owners 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 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 also note that a change from the consent drawings has been identified and I leave the matter of appropriate documentation of this change for the authority to resolve with the owners.

## **10. The decision**

- 10.1 In accordance with section 188 of the Building Act 2004, I hereby determine that the addition does not comply with Clauses B2, D1, and E2 of the Building Code, and accordingly confirm the authority's decision to issue a notice to fix.

Signed for and on behalf of the Chief Executive of the Department of Building and Housing on 18 December 2008.

John Gardiner  
**Manager Determinations**