



Determination 2008/118

16 December 2008

A notice to fix for a house at 8 Benson Road, Remuera, Auckland



1. The matter to be determined

- 1.1 This is a determination under Part 3 Subpart 1 of the Building Act 2004¹ (“the Act”) made under due authorisation by me, John Gardiner, Manager Determinations, Department of Building and Housing (“the Department”), for and on behalf of the Chief Executive of that Department. The applicants are the owners D, J and A Fong (“the applicants”), 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 a 9-year-old house because it is not satisfied that the building work complies with certain clauses of the Building Code² (First Schedule, Building Regulations 1992).
- 1.3 The matter for determination is whether the cladding as installed on the house (“the cladding”) complies with Clause E2 External Moisture and Clause B2 Durability of

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.

the Building Code. By “the cladding as installed” I mean the components of the system (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.

- 1.4 I note that the notice to fix indicates that some aspects of the building work contravene Clauses B1 and E3 of the Building Code. I note that there are no specific items within the notice 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. 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 house that is 2-storeys in part and is situated on an excavated sloping site in a medium wind zone for the purposes of NZS 3604³. Construction is generally conventional light timber frame with concrete slabs and foundations, concrete block retaining walls, monolithic cladding and aluminium windows. The house is complex in plan and form, with 20° pitch clay tile roofs at varying levels, and eaves and verge projections that vary from gutter or fascia only to 430mm.
- 2.2 An enclosed deck, with open metal balustrades and membrane floor extends from the master bedroom on the upper north east corner. The deck is supported by a monolithic-clad column, which continues up to support the roof overhang above. Monolithic-clad columns also support a canopy from the ground floor lounge to the north and a 2-storey high entrance canopy to the west.
- 2.3 The expert has noted that the timber exposed at a cut-out was marked as “kiln dried – keep dry”. Given this evidence and the date of construction in 1999, I consider that the external wall framing is untreated.
- 2.4 The monolithic cladding is a proprietary system that is described by the manufacturer as a “solid render system”. The cladding system consists of 4.5mm fibre-cement sheets fixed through the building wrap directly to the framing timbers, and covered with 3 coats of fibreglass mesh-reinforced modified plaster finished with a flexible coating system. The system includes purpose-made flashings to windows, edges and other junctions.
- 2.5 The expert has noted that the technical information dated January 1999 stated that vertical control joints should be provided for walls exceeding 15m in length and horizontal control joints for walls over 5m in height. I note that the coating system has a current BRANZ Appraisal Certificate (No.477) for use over a drained cavity. Within that certificate, vertical control joints are specified at a maximum of 5.4m.

³ New Zealand Standard NZS 3604:1999 Timber Framed Buildings

3. Background

- 3.1 The authority issued a building consent (No. BLD 36990080001) on 23 February 1999. I note that the consent was issued under the Building Act 1991 (“the former Act”). I have not seen a copy of the building consent.
- 3.2 The authority carried out various inspections of the construction, including a “stucco” inspection on 2 July 1999. The house appears to have been substantially completed during 1999, although a final inspection was not undertaken until 2003.
- 3.3 A final inspection and re-check inspections were carried out, with the last on 8 October 2003. In a letter to the applicants dated 10 November 2003, the authority noted that a code compliance certificate would be processed once the as-built drainage plan was submitted.
- 3.4 The authority made further visits to assess the cladding during December 2003. In a letter to the applicants dated 28 January 2004, the authority stated that, as monolithic cladding had been installed without a cavity, further investigation was required.
- 3.5 Following a cladding inspection on 23 February 2004, the authority wrote to the applicants stating that it was not satisfied that the building complied with Clause E2 of the Building code and attached a Notice to Rectify that outlined the defects identified in the cladding. I am not aware of further correspondence between the parties until the authority carried out a further inspection on 26 May 2006
- 3.6 In a letter to the applicants dated 4 July 2006, the authority attached a notice to fix and stated that it could not issue a code compliance certificate as it could not be satisfied that the building work complied with the building code.
- 3.7 The attached notice to fix, also dated 4 July 2006, stated that the authority was not satisfied that the building work complied with the consent, or with some clauses of the Building Code, or with the Building Act. The “particulars of contravention or non-compliance” attached to the notice listed defects and requirements regarding:
- cladding not installed per the manufacturer's specifications
 - cladding not installed per the acceptable/alternative solutions approved for the building consent
 - cladding not installed per accepted trade practice
 - drainage and ventilation of the cladding
 - durability issues
 - changes to the building consent.
- The authority required the applicants to prepare a proposed scope of work to address the areas of non-compliance. (I summarise the items within the notice to fix in paragraph 9.1.)
- 3.8 The applicants subsequently engaged a specialist property inspection company (“the inspection company”) to inspect the house, undertake moisture testing and to assist in their application for a code compliance certificate.

- 3.9 The inspection company inspected the house and provided a report dated 27 January 2007. The report noted that no invasive testing had been carried out and the thermal imaging undertaken was a guide only to identify areas of concern. The results indicated various areas with high moisture levels and identified various cladding defects considered likely to have led to these.
- 3.10 The applicants submitted the inspection company's report to the authority. In an email to the applicants dated 26 February, the authority noted the moisture concerns and the need for further investigation as identified in the report and recommended the applicants to engage a "suitably qualified building expert" to investigate possible damage and advice on remedial work to remedy the situation.
- 3.11 The applicants subsequently engaged a weathertightness consultant ("the consultant") to "review requirements for remedial work as required to obtain code compliance". The consultant reviewed the first report and, in a letter to the applicants dated 12 July 2007, noted the following (in summary):
- The inspection company had not undertaken any invasive moisture tests.
 - The timber framing was likely to be untreated.
 - All areas of potential problems should have linings removed for inspection.
 - Causes for elevated moisture should be confirmed.
 - Radical solutions are unlikely to be required.
 - The most important thing is to ensure durability of the structure.
 - Providing problem areas are identified and satisfactorily repaired, it should not be necessary to upgrade the cladding to meet current requirements.
- 3.12 In an email to the consultant dated 27 July 2007, the authority requested the development of a more specific scope of work once the linings were removed, with details provided for the remedial work. The authority also suggested that the applicants apply for a "waiver to B2 Durability" considering the age of the house, and I understand that the applicants are resolving this with the authority.
- 3.13 The applicants subsequently engaged a specialist moisture detection company to install moisture detection probes in the wall framing. The company installed 90 probes and reported on the results of monitoring moisture levels. A report issued on 26 August 2008 identified various areas with high moisture contents, and a summary dated 26 August 2008 noted that the results showed "some isolated areas that are not performing – most likely due to isolated defects".
- 3.14 The Department received an application for a determination on 9 September 2008.

4. The submissions

- 4.1 Within the application the applicants noted that the matter for determination was to answer "is the notice to fix properly issued?"
- 4.2 The applicants forwarded copies of:

- the consultant's letter dated 12 July 2007
 - the moisture detection company's report and summary
 - the notice to fix dated 4 July 2006
 - limited technical information on the cladding system.
- 4.3 The authority forwarded a CD-Rom that was entitled "Property File" that contained documents pertinent to this determination, including:
- the consent drawings
 - the inspection summary and some inspection records
 - correspondence with the applicants and the consultant
 - the Notice to Rectify dated 23 February 2004
 - the inspection company's report dated 27 January 2007.
- 4.4 Copies of the submissions and other evidence were provided to the parties, which made no submission in response.
- 4.5 The draft determination was sent to the parties for comment on 14 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 Architects. The expert inspected the house on 14 October 2008 and furnished a report that was completed on 24 October 2008.
- 5.2 The expert noted that the cladding installation was "sufficiently competent that there were few cracks". The coating appeared "generally uniform, well adhered and free from premature fading, chalking and other deterioration". However the expert noted that various cladding and roof flashing defects indicated possible inconsistent "attention to detail and coordination of trades".
- 5.3 The expert noted that the cladding was a solid plaster system in lieu of the flush finished fibre-cement system shown in the consent drawings.
- 5.4 The expert also noted that some areas were not complete, including:
- some of the exterior tiling
 - some linings were not stopped or painted
 - a trench dug on the west side, to expose the retaining wall tanking.
- 5.5 The expert noted that the technical information dated January 1999 stated that vertical control joints should be provided for walls exceeding 15m in length and

horizontal control joints for walls over 5m in height (refer paragraph 2.5), and the only area that exceeded these dimensions was the cladding on the chimney.

- 5.6 On the south and east elevations, the expert noted that the bottom plates sit above concrete block foundation walls, with the plaster continuous over both. The expert removed a section of plaster at the junction below the kitchen window, and noted that no flashing had been installed. Along most of the west elevation, concrete block retaining walls extend up to window sill level, with the tops plastered to form sloping cappings. No flashing could be detected at the junction with the bottom plate of the guest bedroom.
- 5.7 The expert observed metal head flashings and uPVC sill flashings at the face-fixed windows to the kitchen and family room, which appeared satisfactory. The expert noted that the remaining windows were recessed, with plastered reveals and metal head flashings. The expert removed a small section of cladding at the jamb to sill junction of the guest ensuite window, and noted uPVC jamb and sill flashings with sealant applied between the window flanges and the flashings. The expert observed no sealant or soaker at the junction between the jamb and sill flashings. I accept that the exposed junction is typical of similar locations elsewhere in the building.
- 5.8 The expert inspected the interior of the house, taking non-invasive moisture readings internally, and noted some elevated moisture readings and nail popping. The expert used the installed moisture detection probes to take 41 invasive moisture readings, and noted 16 elevated readings as follows:

- Seven from 18% to 27% in the bottom plates of the garage.
- Six from 19% to 30% in the bottom plates of the family room.
- 21% and more than 40% in the bottom plates of the lounge.
- 22% in the joist under the upstand to the upper deck, with soft drillings.

Moisture levels over 18%, or which vary significantly after cladding is in place, generally indicate that external moisture is entering the structure.

- 5.9 Commenting specifically on the wall cladding, the expert noted that:
- there are no clearances from the bottom of the cladding to paving around the entrance columns and parts of the garage – allowing moisture to migrate towards the bottom plate of the framing
 - there are no flashings under the plaster at the junctions of the bottom plates with the concrete block foundation walls and retaining walls, and associated cracking and moisture penetration is apparent
 - the retaining wall tanking exposed at the trench along the west elevation requires further investigation, as there is unprotected block-work below the tanking and elevated moisture levels in skirtings
 - there are no horizontal control joints in the chimney cladding, which is higher than 5 metres, and there is a horizontal crack in the cladding
 - the junctions of the window jamb and sill flashings lack sealant or soakers, and there are no drainage gaps at the sills

- there are some isolated cracks in the cladding, including at window reveals
- the garage door head lacks a drip edge to stop water tracking across the reveal
- the bottom of the column cladding butts against the deck membrane, and the wall cladding clearance will be insufficient when the deck tiles are laid
- the upstand on the north edge of the deck has a flat top with plaster over torch-on membrane, and moisture has penetrated into the joist near the wall – indicating a lack of adequate flashings at some nearby junction, which needs further investigation
- some penetrations through the cladding are not sealed and, although the meter box is sealed, it lacks a head flashing.

5.10 Commenting specifically on the roof cladding, the expert noted that:

- the ends of the lead apron flashings do not overlap the barge tiles, and there is possible associated moisture penetration
- the end of the apron flashing at the junction of the tiled roof with the flat roof above the lounge does not overlap a cut tile and water is able to be blown into the framing, with very high moisture levels recorded in bottom plates below
- the membrane on the flat roof above the lounge extends over an uncapped parapet at the west wall, where it is lifting away from the framing and allowing moisture to penetrate behind the plaster.

5.11 The expert also noted that, although the deck slope is less than 1:60, the deck is small and fully sheltered by the roof projection above, with drainage over the eastern edge.

5.12 The expert also commented on the items identified in the notice to fix, which I summarise in paragraph 9.1.

5.13 The expert also commented on various parts of the inspection company's report, noting that some of the conclusions drawn from non-invasive thermal images had not been borne out by further investigation.

5.14 A copy of the expert's report was provided to each of the parties on 3 November 2008.

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:

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.

- 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 weathertightness risk factors in previous determinations⁵ (for example, Determination 2004/1) relating to cladding and these factors are also used in the evaluation process.

6.1.3 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 this building:

- is built in a low wind zone
- is a maximum of two storeys high
- is complex in plan and form, with roofs at varying levels
- has roof projections of 430mm above most walls
- has an upper floor enclosed deck, which is protected by the roof
- has solid plaster cladding that is directly fixed to the framing
- has external wall framing that is not treated to a level that will provide resistance to the onset of decay if the framing absorbs and retains moisture.

6.2.2 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.

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

- 6.2.3 When evaluated using the E2/AS1 risk matrix, the weathertightness features outlined in paragraph 6.2.1 show that all elevations of the house demonstrate a high weathertightness risk rating and would now require the incorporation of a drained cavity. However, this was not a requirement at the time of construction in 1999.

7. Discussion

- 7.1 Generally the claddings appear to have been installed in accordance with good trade practice and the manufacturer's recommendations, but some areas have not been satisfactorily completed. Taking account of the consultant's reports, I conclude that investigation and remedial work is necessary in respect of the areas outlined in paragraphs 5.9 and 5.10.
- 7.2 I note the expert's comment in paragraph 5.11, and accept that the deck slope is adequate in the circumstances.
- 7.3 Notwithstanding the fact that the cladding is fixed directly to the timber framing, thus limiting drainage and ventilation behind the cladding, I have noted certain compensating factors that assist the performance of the cladding in this particular case:
- apart from the noted exceptions, the cladding is installed to good trade practice
 - moisture penetration seems limited to areas where defects have been identified.
- 7.4 I consider that these factors help compensate for the lack of a drained cavity to the walls, and provide some assurance that the building work will comply with the weathertightness and durability provisions of the Building Code.

8. Conclusion

- 8.1 I consider the expert's report establishes that the current performance of the cladding is not adequate because there is evidence of moisture penetration. Consequently, I am satisfied that the house does not comply with Clause E2 of the Building Code.
- 8.2 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 are likely to allow the ingress of moisture in the future, the building work does not comply with the durability requirements of Clause B2.
- 8.3 Because the faults identified occur in discrete areas, I am able to conclude that investigation and satisfactory rectification of the items outlined in paragraphs 5.9 and 5.10 will result in the roof and wall claddings being brought into compliance with Clauses B2 and E2.
- 8.4 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).

9. Summary response to the notice to fix

9.1 The following table summarises conclusions on the items listed within the notice to fix dated 4 July 2006, referring to related paragraphs within this determination:

Notice to fix		My conclusion about the remedial work required	Paragraph references
Item	Summarised requirement		
2.1 Not to manufacturer's specifications			
a)	Inadequate cladding clearances	Some remedial work required	5.9
b)	No control joints installed	Remedial work required. Vertical joints not required at the time of construction. Horizontal joint required only in chimney cladding.	5.5 5.9
c)	Gap required at base of cladding	Nil. Not required for this type of cladding	
d)	No drip edges installed	Remedial work required to garage door head	5.9
e)	Inadequate clearances to inside floor levels	Some remedial work required	5.9
f)	No slope to top of deck upstand	Remedial work required	5.9
g)	No drainage gap at sills	Remedial work required	5.9
2.2 Not to relevant code requirements at the time			
a)	Inadequate clearances to inside floor levels	Some remedial work required	5.9
2.3 Not to accepted trade practice			
a)	Lack of flashings between cladding and top of retaining wall	Remedial work required	5.9
b)	Apron flashings do not overlap barge tiles	Remedial work required	5.10
c)	Inadequate cladding clearances to roof	No remedial work required. Clearances generally adequate	
d)	Penetrations inadequately sealed	Some remedial work required	5.9
2.4 Drainage and ventilation			
	Inadequate drainage and ventilation of cladding	No remedial work required Direct fixed cladding adequate in circumstances	7.3
3.0 Durability issues			
	Concerned re times measured from CCC issue	TA and applicants to resolve	
4.0 Changes to building consent			
a)	Cladding system changed	TA and applicants to resolve	

10. What is to be done now?

10.1 I note that the authority has issued a notice to fix that required provision for adequate ventilation, drainage and vapour dissipation, or the installation of an early warning

system. Under the Act, a notice to fix can require the owner to bring the house into compliance with the Building Code. The Building Industry Authority has found in a previous Determination 2000/1 that a Notice to Rectify, the equivalent of a notice to fix, cannot specify how that compliance can be achieved. I concur with that view.

10.2 The authority shall withdraw the notice to fix. A new notice to fix is to be issued in its place that requires the owners to bring the house into compliance with the Building Code, identifying the items listed in paragraphs 5.9 and 5.10 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 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.

10.3 I would suggest that the parties adopt the following process to meet the requirements of paragraph 10.2. 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.

10.4 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.

11. The decision

11.1 In accordance with section 188 of the Building Act 2004, I hereby determine that the house does not comply with Clauses B2 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 16 December 2008.

John Gardiner
Manager Determinations