Determination 2006/89

Refusal of a code compliance certificate for two buildings with monolithic cladding systems at 12B Wicklam Lane, Albany

1. The dispute to be determined

1.1 This is a determination under Part 3 Subpart 1 of the Building Act 2004[1] ("the Act") made under due authorisation by me, John Gardiner, Determinations Manager, Department of Building and Housing, for and on behalf of the Chief Executive of that Department. The applicants are the owners Mr and Mrs Wood ("the applicants") and the other party is the North Shore City Council ("the territorial authority").

1.2 The dispute for determination is whether the territorial authority's decision to decline to issue a code compliance certificate for a 4-year-old house and a 3-year old house ("the units") because it was not satisfied that the monolithic cladding to the walls of the units complied with clauses B2 "Durability" and E2 "External Moisture" of the Building Code[2] (First Schedule, Building Regulations 1992) is correct.

1.3 The question to be determined is whether I am satisfied on reasonable grounds that the monolithic wall cladding as installed to the walls of the units ("the cladding"), complies with the Building Code (see sections 177 and 188 of the Act). By "the

[1] The Building Act 2004 is available from the Department's website at www.dbh.govt.nz.
[2] The Building Code is available from the Department's website at www.dbh.govt.nz.

monolithic wall cladding as installed" I mean the components of the system (such as the backing materials, the flashings, the joints and the coatings) as well as the way the components have been installed and work together.

1.4 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. I have not considered any other aspects of the Act or the Building Code.

2. The buildings

2.1 The building work consists of two detached houses situated on a large excavated south-sloping site, which is in a medium wind zone for the purposes of NZS 3604[3]. The houses were built by different builders, with the larger house ("Unit 1") built prior to the minor unit ("Unit 2"); and have varying designs and layouts while including some common construction methods and features.

2.2 The individual houses

2.2.1 Unit 1

2.2.1.1 Unit 1 is two storeys high to the front southwest elevation and one-storey to the rear northeast elevation, with a basement garage set into the slope. Construction is conventional light timber frame, with a concrete slab and concrete block foundations and retaining walls to the two-storey portion and a timber-framed floor to a single-storey wing that extends from the main house to the northeast. The house shape is fairly simple in plan, with aluminium windows, monolithic wall cladding and a 20^{o} profiled metal hipped roof. A small gable extends from the upper wall to form an entrance canopy above a mid-floor landing with monolithic-clad balustrades and paved entry steps leading up from the driveway. Eave projections are more than 700mm overall above all walls except at the entrance gable, which has no eaves or verges. A horizontal band of monolithic cladding is used at the inter-storey level.

2.2.1.2 Unit 1 has timber slat decks at the upper level, which extend from above the garage door at the front around the house to the rear door of the single-storey wing on the southeast elevation. Both ends of the deck have monolithic clad balustrades, while the large rear deck areas are close to ground level and have no balustrades.

2.2.2 Unit 2

2.2.2.1 Unit 2 is a small two-bedroom house that is two storeys high at the front south elevation and one-storey to the rear north elevation, with a basement garage set into the slope. The upper floor cantilevers by about 600mm above the garage wall at the front. At the rear, the upper floor extends 1200mm past the basement retaining wall, supported on timber subfloor framing. Recesses are set into the central sections of the upper north and south elevations, with the walls set back to align with the basement walls below. Construction is conventional light timber frame; with a

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

concrete slab and concrete block foundations and retaining walls to the basement, aluminium windows, monolithic wall cladding and a 12.5^{o} profiled metal skillion gable roof. The house shape is simple in plan, with eaves projections of more than 700mm overall and verge projections of 300mm.

2.2.2.2 Unit 2 has timber slat decks at the upper level, which extend from the upper floor entrance recess on the south elevation around the house to finish above a retaining wall on the east elevation. Both ends of the deck have open timber balustrades, while the west deck walkway and the north deck are close to ground level and have no balustrades. The upper floor entrance deck is reached by timber steps that lead up from the driveway.

2.3 The expert commissioned by the Department to inspect the cladding ("the expert") noted that the general wall framing timber he was able to inspect did not appear to be treated (although the subfloor framing of Unit 1 appeared to be CCA treated). The specification calls for wall framing to comply with NZS 3602, which at the time of construction permitted the use of kiln-dried untreated timber, provided that its in-service moisture content did not exceed 18%. Based on this evidence, I consider that the external wall framing is unlikely to be treated.

2.4 The cladding system to both units is what is described as monolithic cladding, and is a "Harditex" system with 7.5 mm thick fibre cement sheets fixed through the building wrap to the framing, and finished with an applied textured coating system.

2.5 I have received no copies of producer statements or warranties for the cladding.

3. Sequence of events

3.1 The territorial authority issued one building consent for both units on 20 August 2001, and during construction carried out various inspections on Unit 1 including a pre-line on 14 December 2001 and a post-line on 19 December 2001.

3.2 It appears that Unit 1 was substantially completed early in 2002, as a "Master Build Guarantee" notes that only a few items remained to be completed as at 21 March 2002. Construction of Unit 2 commenced in 2003, and the territorial authority carried out various inspections including a pre-line on 24 April 2003.

3.3 The territorial authority carried out final inspections on both of the houses on 30 July 2003, and the inspection record noted several outstanding items for each unit. A re-check inspection was carried out on 5 April 2005, and the inspection summary notes "…still items to be completed. Also left weathertightness letter with owner". The applicants were given a standard letter dated 5 April 2005, in which the territorial authority explained that a weathertightness inspection was required as:

> Consented building works in North Shore City Council clad with any type of monolithic cladding without a cavity will be reviewed on a case by case basis before determining if a code compliance certificate (CCC) can be issued.

3.4 A further re-check inspection was carried out on 26 January 2006, and all items listed as outstanding in the final inspection of 30 July 2003 were marked as "OK".

3.5 The territorial authority carried out a "Weathertightness" inspection on 8 February 2004, and the inspection report noted various risk factors and defects. In a letter to the applicants dated 24 February 2004, the territorial authority explained that the Building Code required the durability of the cladding to be 15 years and that of the timber framing to be 50 years. The territorial authority outlined its concerns with regard to monolithic claddings and listed certain weathertightness risk factors identified with the building, together with a list of defects and stated that, due to the risk factors and defects, it could not be satisfied on reasonable grounds that the cladding system complied with clauses E2 and B2 of the Building Code.

3.6 The territorial authority did not issue a Notice to Rectify as required under section 142 of the Building Act 1991 ("the previous Act").

3.7 An application for a determination was received by the Department on 24 March 2006. The Department requested further information on the buildings from the applicants, which was received on 6 May 2006.

4. The submissions

4.1 The applicants made a submission in the form of a letter to the Department dated 17 March 2006, outlining the history of the construction and noting that the construction of both units had been inspected and approved by the territorial authority. The applicants concluded:

> As far as we are concerned we have done the right things and had the house built by a registered builder to Council standards.

4.2 The applicants forwarded copies of:

- the drawings for both units
- the specifications for Unit 2
- some of the inspection records
- the correspondence from the territorial authority
- various other statements.

4.3 The territorial authority made a submission in the form of a letter to the department dated 11 April 2006, which explained that it could not be satisfied that the houses complied with the building code due to "cladding issues", and noted that:

> The matter to be determined is:
>
> - Whether the installed cladding system complies with clauses B2.3.1 and E2.3.2 of the New Zealand Building Code.

4.4 The territorial authority forwarded copies of:

- the building consent
- the as-built drawings
- the inspection records.

4.5 Copies of the submissions and other evidence were provided to each of the parties. Neither party made any further submissions in response to the submission of the other party.

4.6 A copy of the draft determination was sent to the parties for comment on 21 August 2006.

4.7 The applicants responded to the draft determination on 4 September 2006, and noted that most of the defects noted in paragraphs 6.3.2.1 and 6.3.3.1 should have been identified when the buildings were inspected during construction, concluding:

> Overall we are unhappy that the faults identified appear to be quite obvious and cannot understand why they were not pointed out to the builder at the time and fixed.

4.8 The territorial authority responded to the draft determination on 6 September 2006, querying the expert's comments on the lack of window sill flashings and drainage gaps. (I note that these matters were subsequently clarified by correspondence between the department and the expert following the completion of the report). The territorial authority also commented on the lack of jamb flashings to the garage door of Unit 1, the unsealed fibre cement behind deck ribbon plates and the possibly untreated floor joists of Unit 2. I have considered these comments and have amended the draft as I consider appropriate.

5. The expert's report

5.1 The expert inspected the claddings of the units on 18 July 2006, and furnished a report that was completed on 24 July 2006. The expert noted there appeared to be no significant cracking in the claddings, and penetrations were generally well-sealed. The expert removed a small section of the horizontal band to Unit 1, and noted that the construction of the horizontal control joint appeared satisfactory.

5.2 Subsequent communication between the department and the expert confirmed that the windows in each unit were face-fixed, with no sill flashings and the coatings applied after the window installation. The expert scraped away small sections of coating at the jambs of several windows in each unit to observe the window installation. I accept that the locations opened are typical of similar locations around the building.

5.3 The expert took non-invasive moisture readings through linings of exterior walls throughout both units, and noted several elevated readings in the basement of Unit 1, and no elevated readings in Unit 2.

5.3.1 Unit 1 – invasive moisture readings

5.3.1.1 The expert took 30 invasive moisture readings through the wall cladding of Unit 1, at window sills, bottom plates and other risky areas, and 9 elevated readings were recorded. Areas where elevated readings were recorded are as follows:

- 6 readings from 19% to 24% in the bottom plates (including beside garage doors) of the basement
- 20% and 24% at the deck to wall junctions
- 24% at one balustrade to wall junction (with 18% at the other)

5.3.2 Unit 2 – invasive moisture readings

5.3.2.1 The expert took 18 invasive moisture readings through the wall cladding of Unit 2, at window sills, bottom plates and other risky areas, and 12 elevated readings were recorded. Elevated readings were recorded as follows:

- 4 readings from 21% to 22% in the bottom plates beside the garage doors
- 6 readings from 20% to 23% at the deck to wall junctions
- 23% under the master bedroom east window
- 21% in the bottom plate at the northeast corner

Moisture levels above 18% recorded after cladding is in place generally indicate that external moisture is entering the structure.

5.4 Unit 1 – specific comments

5.4.1 The expert made the following specific comments on the cladding of Unit 1:

- there are no vertical control joints installed to 6 walls, where the length of Harditex exceeds the 5.4 m limit recommended by the manufacturer
- the cladding of the basement walls has insufficient clearance above the paving, with the bottom edge of the fibre cement backing sheet buried in some areas – and moisture is penetrating into the bottom plate
- the bottom edge of the south corner of the cladding to the subfloor area is buried and moisture is penetrating the exposed subfloor framing (which appears to be CCA-treated)
- the garage doors lack head flashings and the timber reveals butt against the cladding (with sealant at the junction) and also butt against the paving
- the ribbon plates of the decks are bolted directly against unsealed fibre cement with the decking against the cladding in most areas, which prevents moisture from draining and has lead to elevated moisture levels in the adjacent framing
- the balustrades have flat monolithic-clad tops with no cappings or evidence of saddle flashings at the junctions with the walls – leading to elevated and borderline moisture levels at the wall junctions

- the windows lack seals between the jamb flanges and the unsealed fibre cement, and there are cracks where the coating has been applied over the edges of the jamb flanges, with no drainage gaps at the window sill flanges to allow moisture from the jamb flashings to drain to the outside

- the ends of the roof apron flashings to the small canopy roof gable lack kickouts, with reliance on the heavy use of sealant for weatherproofing.

5.5 Unit 2 – specific comments

5.5.1 The expert made the following specific comments on the cladding of Unit 2:

- the clearance from the floor joists (which appear to be untreated) above the clay soil in the north subfloor area is inadequate

- the bottom edge of the cladding to the basement south wall is buried beneath the driveway paving – and moisture is penetrating into the bottom plate

- the timber reveals to the garage doors jambs butt against the paving

- while ribbon plates of the decks are packed off the wall to provide a drainage gap, this does not apply at the sides of the north and south recesses, where the boundary deck joists butt against the uncoated cladding

- the deck slats butt against the cladding in most areas, preventing moisture from draining away and leading to elevated moisture levels in the adjacent framing

- some windows appear to lack seals between the jamb flanges and the unsealed cladding, and there are no drainage gaps at the window sill flanges to allow moisture from the jamb flashings to drain to the outside

- the main soil pipe has sagged, breaking the sealant of the penetration.

5.5.2 Although internal non-invasive moisture readings in Unit 2 were not elevated (refer paragraph 5.3), the expert noted that the interior was "literally dripping wet with condensation" that was filling the window channels and draining to the outside where it was pooling on the paving below. The expert also observed that this unit is very small with a skillion roof.

5.6 Copies of the expert's report were provided to each of the parties on 25 July 2006.

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 Solution[4], in this case E2/AS1, which will

[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.

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 some other provision 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 determinations[5] (refer to Determination 2004/1 *et al*) 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 Unit 1

6.2.1.1 In relation to these characteristics I find that Unit 1:

- is built in a medium wind zone

- is a maximum of two storeys high

- is reasonably simple in plan and form

- has eaves projections of more than 700mm above all walls

- has attached timber slat decks, with some monolithic-clad balustrades

- has monolithic cladding which is fixed directly to the framing

- has external wall framing that is untreated so will provide no resistance to the onset of decay if the framing absorbs and retains moisture.

6.2.1.2 When evaluated using the E2/AS1 risk matrix, two elevations of Unit 1 demonstrate a low weathertightness risk and two elevations a medium risk.

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

6.2.2 Unit 2

6.2.2.1 In relation to these characteristics I find that Unit 2:

- is built in a medium wind zone
- is a maximum of two storeys high
- is simple in plan and form
- has eaves projections of more than 700mm and verges of 300mm
- has attached timber slat decks, with some open timber balustrades
- has monolithic cladding which is fixed directly to the framing
- has external wall framing that is untreated so will provide no resistance to the onset of decay if the framing absorbs and retains moisture.

6.2.2.2 When evaluated using the E2/AS1 risk matrix, three elevations of Unit 2 demonstrate a low weathertightness risk and one elevation a medium risk.

6.2.3 The E2/AS1 risk matrix is an assessment tool that is intended to be used at the time of application for consent, before the building work has begun and, consequently, before any assessment of the quality of the building work can be made. Poorly executed building work introduces a risk that cannot be taken into account in the consent stage but must be taken into account when the building as actually built is assessed for the purposes of issuing a code compliance certificate.

6.3 Weathertightness performance

6.3.1 Generally the cladding to the units appears to have been installed in accordance with good trade practice. However, some junctions, penetrations and edges are not well constructed and these areas are as outlined below for each unit.

6.3.2 Unit 1

6.3.2.1 The areas referred to in paragraph 6.3.1 are described in paragraph 5.4.1 and in the expert's report as being the:

- lack of vertical control joints
- inadequate clearance of the cladding and garage door reveals above the ground or paving
- lack of head flashings and poor sealing at the jambs to the garage doors
- lack of drainage gaps at the deck to wall junctions, with the ribbon plates bolted directly against unsealed fibre cement
- lack of adequate weatherproofing of the balustrade to wall junctions

- lack of drainage gaps at the window sill flanges and lack of seals between the window jamb flanges and the cladding
- lack of adequate kickouts at the ends of the apron flashings to the canopy.

6.3.3 Unit 2

6.3.3.1 The areas referred to in paragraph 6.3.1 are described in paragraph 5.5.1 and in the expert's report as being the:

- inadequate clearance of the subfloor joists above the ground
- inadequate clearance of the cladding and garage door reveals above the paving
- lack of adequate drainage gaps at the timber deck to wall junctions
- lack of drainage gaps at the window sill flanges and lack of seals between some window jamb flanges and the cladding
- broken seal at the penetration of the soil pipe through the cladding.

6.3.3.2 I note the expert's comment that the deck boundary joists at the short lengths of wall to the sides of the recesses butt against uncoated cladding, but consider that the shelter provided by the roof overhangs will protect these areas from moisture penetration. I therefore consider that these areas are adequate in the circumstances.

6.3.3.3 I also note the expert's comment that the subfloor joists appear to be untreated, and draw this to the attention of the territorial authority for further investigation and consideration when assessing ground clearance and ventilation requirements.

6.3.3.4 I also note the expert's comment in paragraph 5.5.2 with regard to the high levels of internal moisture apparent in Unit 2, and draw this to the owners' attention (as ongoing internal moisture can result in the risk of moisture damage to internal elements of the house). While internally generated moisture is not the subject of this determination, I note that this house is very small with a skillion roof (which will aggravate problems associated with internally generated moisture), and I recommend that attention be given to increasing the ventilation to this unit.

6.3.4 Notwithstanding the fact that the cladding of the units 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 of these two units in this particular case:

- The monolithic cladding of the units has generally been installed to reasonable trade practice and to the manufacturer's instructions
- The units have eaves or verge projections that provide good protection to the monolithic cladding areas below them.

6.3.5 I consider that these factors help compensate for the lack of a ventilated cavity and can assist the units to comply with the weathertightness and durability provisions of the Building Code.

7. Conclusion

7.1 I am satisfied that the current performance of the cladding is not adequate because it is allowing water penetration into the units at present. Consequently, I am satisfied that the buildings do not comply with clause E2 of the Building Code.

7.2 In addition, the units are 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 building to remain weathertight. Because the cladding faults on the units are likely to allow the ingress of moisture in the future, the buildings do not comply with the durability requirements of clause B2.

7.3 Subject to further investigations that may identify other faults, I consider that, because the faults that have been identified with the cladding system occur in discrete areas, I am able to conclude that satisfactory rectification of the items outlined in paragraph 6.3.2.1 (for Unit 1) and paragraph 6.3.3.1 (for Unit 2) should be expected to result in the buildings becoming and remaining weathertight and in compliance with clauses B2 and E2.

7.4 Effective maintenance of the claddings (in particular of monolithic claddings) is important to ensure ongoing compliance with clauses B2 and E2 of the Building Code. This is the responsibility of the building owner. Clause B2.3.1 of the Building Code requires that the cladding be subject to “normal maintenance”, however that term is not defined in the Act.

7.5 I take the view that normal maintenance is that work generally recognised as necessary to achieve the expected durability for a given building element. With respect to the cladding, the extent and nature of the maintenance will depend on the material, or system, its geographical location and level of exposure. Following regular inspection, normal maintenance tasks shall include but not be limited to:

- where applicable, following manufacturers’ maintenance recommendations
- washing down surfaces, particularly those subject to wind-driven salt spray
- re-coating protective finishes
- replacing sealant, seals and gaskets in joints.

7.6 As the external wall framing of these buildings is untreated, periodic checking of its moisture content should also be carried out as part of normal maintenance.

7.7 It is emphasised that each determination is conducted on a case-by-case basis. Accordingly, the fact that a particular cladding system has been established as being

code compliant in relation to a particular building does not necessarily mean that the same cladding system will be code compliant in another situation.

7.8 In the circumstances, I decline to incorporate any waiver or modification of the Building Code in this determination.

8. The decision

8.1 In accordance with section 188 of the Act, I hereby determine that the monolithic cladding system as installed does not comply with clause E2 of the Building Code. There are a number of items to be remedied to ensure that the units become and remain weathertight and thus meet the durability requirements of the code. Consequently, I find that the buildings do not comply with clause B2. Accordingly, I confirm the territorial authority's decision to refuse to issue a code compliance certificate.

8.2 I also find that rectification of the items outlined in paragraph 6.3.2.1 (for Unit 1) and paragraph 6.3.3.1 (for Unit 2) will consequently result in the buildings being weathertight and in compliance with clauses B2 and E2. Work to correct these items may expose additional associated defects that are not yet apparent. All rectification work is to be completed to the approval of the territorial authority.

8.3 I note that the territorial authority has not issued a notice to fix. A notice to fix should be issued that requires the owners to bring the cladding into compliance with the building code, without specifying the features that are required to be incorporated. It is not for me to decide directly how the defects are to be remedied and the cladding brought to compliance with the building code. That is a matter for the owner to propose and for the territorial authority to accept or reject.

8.4 I would suggest that the parties adopt the following process to meet the requirements of paragraph 8.3. Initially, the territorial authority should issue a notice to fix, listing all the items that the territorial authority considers to be non-compliant. The owner 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.

Signed for and on behalf of the Chief Executive of the Department of Building and Housing on 14 September 2006.

John Gardiner
Determinations Manager