



Determination 2018/009

Regarding the refusal to issue a code compliance certificate in respect of remedial work to the decks to Units 220, 221, 224, 225, 228, 229, 232, and 233 at Terrace Downs Villas, Lake Coleridge Road, Darfield



Summary

This determination considers the compliance of the remedial work carried out to eight decks. The determination considers the authority's reasons for refusing to issue the code compliance certificate and whether the building work complies with the requirements of the Building Code.

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, Katie Gordon, Manager Determinations, Ministry of Business, Innovation and Employment ("the Ministry"), for and on behalf of the Chief Executive of the Ministry.

1.2 The parties to the determination are:

- the following owners acting through the project manager of the remedial work as their agent ("the agent"):
 - A Meyer, the owner of Unit 220
 - N & B Armstrong, the owners of Unit 221
 - J Yeo, the owner of Unit 224
 - T Haynes, the owner of Unit 225
 - M & S Bailey, the owners of Unit 228

¹ The Building Act, Building Code, compliance documents, past determinations and guidance documents issued by the Ministry are all available at www.building.govt.nz or by contacting the Ministry on 0800 242 243.

- J Mullins, the owner of Unit 229
 - G Armitage & R McElerea, the owners of Unit 232
 - V & T Treacy, the owner of Unit 233
 - Body Corporate 336323
 - Selwyn District Council (“the authority”), carrying out its duties as a territorial authority or building consent authority.
- 1.3 This determination arises from the decision of the authority to refuse to issue code compliance certificates for the remedial work to the decks to the eight units. The refusal arose because the authority is not satisfied the building work complies with certain clauses² of the Building Code (First Schedule, Building Regulations 1992); in particular in regard to the weathertightness of the decks.
- 1.4 The matter to be determined³ is therefore whether the authority correctly exercised its power of decision in refusing to issue code compliance certificates for the eight units. In deciding this matter, I must consider whether the decks comply with Clauses B2 Durability, D1 Access Routes, E2 External moisture, and F4 Safety from falling. However, the determination does not consider other matters related to these consents and the determination’s decision is only made in respect of the decks’ compliance with these code clauses.
- 1.5 In making my decision, I have considered the submissions of the parties, the report of the independent expert commissioned by the Ministry to advise on this dispute (“the expert”) and the other evidence in this matter.

2. The building work

2.1 The existing units

- 2.1.1 This determination is in respect of the remedial work to existing decks to eight upper level units. There are four units per two storey building, with two units on each level. The units are part of a larger development known as Terrace Downs.
- 2.1.2 The buildings are constructed on a sloping site. Each building is constructed primarily of precast concrete wall panels with concrete foundations and floor slabs. The precast concrete wall panels extend above the first level and support the timber framed roof.
- 2.1.3 The floors of the first level are constructed using proprietary hollow core pre-stressed concrete planks with an in-situ concrete topping.
- 2.1.4 One exterior wall of each unit adjacent to the deck is timber-framed. Those walls are clad with cedar battens over plywood, fixed directly to the framing.

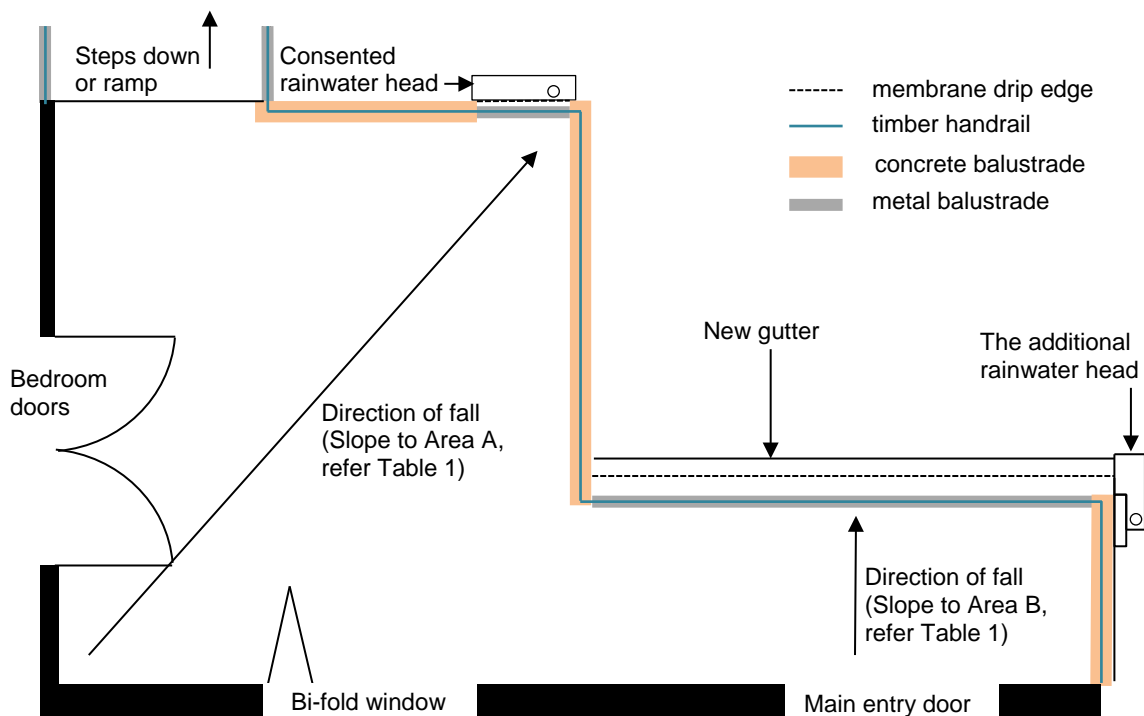
2.2 The remedial work

- 2.2.1 The existing deck membrane and screed has been removed and replaced with a membrane over a vapour barrier and new modified plaster screed.
- 2.2.2 The membrane is a reinforced plasticised polyvinyl chloride (PVC) membrane 1.14mm thick intended for use on pedestrian decks and walkways. The membrane is coloured and has an embossed finish. It is supplied in roll form and fixed with a solvent-based adhesive. The membrane has a current BRANZ Appraisal.

² In this determination, references to sections are to sections of the Act and references to clauses are to clauses of the Building Code.

³ Under sections 177(1)(b) and 177(2)(d) of the current Act.

- 2.2.3 The membrane surface has a coefficient of friction⁴ (μ) of 0.6, and according to the BRANZ Appraisal, can be used on slopes up to 9° (1:6) using D1/VM1⁵.
- 2.2.4 The existing balustrade has been removed and reinstated over the new membrane, and a new balustrade section has been installed where a section of precast concrete was removed to install a new rainwater head that drains the majority of the deck.
- 2.2.5 A narrow portion of the deck drains to a new gutter, which was to drain directly to an existing downpipe. Another rainwater head has been installed between the end of the gutter and the downpipe, which is a departure from the work shown in the consented drawings.
- 2.2.6 The cladding to the timber-framed wall has been removed and replaced with exterior plywood on cavity battens. The compliance of the wall is not in dispute between the



parties, and is not discussed within this determination.

Figure 1: As-built plan of a typical deck (plan for units 220, 224, 226, & 232 mirrored, not to scale)

3. Background

3.1 The 2003 building consent

- 3.1.1 The authority issued a building consent for the construction of 16 villas, being blocks 5 to 8 of the Terrace Downs development on 29 August 2003 under the Building Act 1991 (“the former Act”).

⁴ This is the value of friction between two objects. The value usually ranges from 0 to 1, with 0 meaning there is no friction between objects

⁵ Verification Method D1/VM1. D1/VM1 was amended 6 January 2017 to remove the test methods used to verify compliance with Clause D1.

- 3.1.2 A code compliance certificate was issued for the construction of these four blocks on 2 September 2004. Repairs to some decks were carried out to remedy weathertightness issues that had arisen after the code compliance certificate was issued.
- 3.1.3 In 2014 a determination⁶ (“the first determination”) was issued about the compliance of three decks, two of which are also the subject of this determination (Units 220 and 221). The determination found the decks did not comply with Clause B2 Durability, and E2 External moisture.
- 3.1.4 Following this, an investigation was carried out that found the defects requiring remediation, including issues related to the waterproofing and inconsistent deck falls. A remedial plan was developed and applications for 8 building consents for the remedial work (one consent application for each unit) were lodged with the authority by the agent.
- 3.1.5 In a letter dated 20 January 2017, the authority issued a request for information (“RFI”) to the agent regarding the eight applications. The RFI, amongst other questions, queried the design of the decks as follows:
- Please confirm the existing heights between the top of deck at the scupper outlet and interior [finished floor level]. To achieve the 1:40 fall of the decking membrane specification may require up to 90mm of fall. This does not seem consistent with Sheet 08 reference to “existing 30mm fall recreated in membrane”.
- 3.1.6 On 1 February 2017 the agent contacted the authority acknowledging the falls stated in the BRANZ Appraisal would not be achieved due to physical constraints. However, he noted a positive fall to a new larger deck outlet was proposed. He provided a letter from the manufacturer in support of the design that stated the following:
- The construction drawings for the eight units have been reviewed by the manufacturer.
 - The membrane will perform to its requirements and a 20-year product warranty will be provided.
 - The product advantages include the solvent-welded joints, all the accessories are welded to the membrane, the wide membrane would reduce joins, and laps are low-profile assisting in shedding water.
- 3.1.7 On the same day the authority responded as follows:
- The product use is outside the scope of E2/AS1⁷ and would be assessed as an alternative solution.
 - The relationship between the manufacturer’s requirements and the BRANZ Appraisal requirements needed clarifying.
 - A sample of the product warranty is required.
- 3.1.8 The membrane manufacturer reviewed the consent drawings stating:
- The membrane is considered as an alternative solution.
 - The scope of its BRANZ Appraisal is aligned to the requirements of E2/AS1 because the Acceptable Solution is “recognised generally as “best practice””.

⁶ Determination 2014/019 Regarding the decision to issue a code compliance certificate in respect of the decks to Units 220, 221, and 237, at Terrace Downs Villas, Lake Coleridge Road, Darfield.

⁷ Acceptable Solution E2 External moisture

- There are design constraints preventing the usual minimum falls from being achieved, the achievable fall will range between 1:40 and 1:120.
- 3.1.9 The manufacturer said a 20-year product warranty would be provided because:
- The service life of the membrane “significantly exceeds the minimum requirement of 15 years for durability”.
 - The deck is not enclosed, has outward falls, water would not pond for any length of time or back-up, and there are no internal gutters.
 - There are adequate membrane upstands at walls and thresholds.
 - The screed is on a concrete substrate and has a limited catchment area.
 - The finished welded membrane forms a single continuous sheet, all joins, details, and cuts are joined fully welded.
 - It is “improbable” the deck will be immersed for any length of time, but the membrane can sustain immersion.
 - The membrane is the only product that is “fully trafficable, non-slip, appraised waterproofing system” and would remain safe and durable.
 - Only approved applicators can purchase and install the membrane.
 - The manufacturer will inspect the completed work to ensure it’s installed to the specification.
- 3.1.10 The manufacturer suggested the deck falls be increased and acknowledged the physical constraints would not allow for this, but still recommended the proposed membrane as a suitable product.
- 3.1.11 Further correspondence continued between the agent and the authority regarding the deck membrane warranty. In an email dated 28 February 2017, the authority stated it views the extent of warranty offered and the review by the manufacturer, as contributing to the credibility of the product as a compliant alternative solution.

3.2 The building consent and inspections

- 3.2.1 The authority issued separate consents for each of the eight units around March 2017. The building consents proposed the work described above, which also included door alterations, and internal and external remedial work associated with adjacent chimneys.
- 3.2.2 The following inspections were carried out:
- Post wrap – passed 12 May 2017
 - Preline – passed 29 May 2017
 - Framing/pre-wrap – passed 29 May 2017
 - Deck/Roof membrane – passed 19 July 2017

3.3 The final inspections and refusal of code compliance certificate

- 3.3.1 The agent applied for a code compliance certificate for Unit 225 on 3 July 2017.

3.3.2 The final inspection was carried out on 19 July 2017, and was failed as the authority required further information:

Please provide confirmation for changes to flashing installed to edge of deck area.

Confirm compatibility of product contact.

Stop ends into rain head not formed.

3.3.3 The agent sent through the inspection by the membrane manufacturer dated 28 July 2017, which confirmed the 20-year warranty would be provided. The manufacturer also confirmed the flashings used were compatible as they were proprietary products. The agent provided a photograph of the formed stop-ends.

3.3.4 On 7 August 2017, the authority carried out another “Deck/Roof membrane” inspection, and identified issues with the membrane edges, ponding and the warranty.

3.3.5 At the same visit, another final inspection was carried out identifying additional issues in regard to Clause D1, and the installation of the additional rainwater head as an unauthorised amendment to the building consent.

3.3.6 In a letter dated 16 August 2017, the authority refused to issue the code compliance certificates⁸ for the following reasons:

- The deck as part of the access route does not comply with Clause D1.3.3(c), because the cross falls are less than 1% and in other places greater than 2%.
- There is evidence of water ponding in various places on the decks, which does not comply with Clause E2.3.1.
- The membrane will not comply with Clause B2.3.1 because inadequate falls will allow moisture to damage the membrane.
- The building consent required a “Warranty of Workmanship” from the membrane installer for a period of 15 years. The warranty received was for 5 years.
- The gutter discharged into a rainwater head, which differed from the building consent. The rainwater head “does not comply with...E2/AS1 Figure 63.”
- The membrane does not return 50mm to each side of the consented rainwater head as shown in the building consent, and in E2/AS1 Figures 63 and 57.
- A metal fastening bar/over-flashing to the membrane edges has not been installed.
- The building consent required scaffolding to be in place for the inspection of the completed chimney gutter. The scaffolding was not in place and the authority cannot be satisfied the work complies with the building consent.

3.3.7 In a letter dated 21 August 2017, the agent responded to the authority (in summary):

General

- The work was undertaken in an existing building and the provisions of section 112(b)(ii) apply, and compliance with section 112 had been achieved with respect to Clause D1 Access, and the falls to the deck membrane.

⁸ I have only seen the refusal for Unit 225 but identical refusals were issued for the other seven units at the same time.

Clause D1

- The BRANZ Appraisal states it has a coefficient of friction of 0.6 and can be used on pedestrian decks with slopes of up to 9°. The Appraisal also states the membrane can be used on access routes and accessible routes as defined by Clause D1, up to the slopes specified in D1/AS1 Table 2.
- D1/AS1 states where the surface of an access route is subject to wetting, the surface shall have a cross fall of no less than 1:100.
- The consented drawings show the 30mm cross fall. The as-built deck exceeded the consented 30mm cross fall, and compliance with section 112(b)(ii) has been achieved.
- The cross fall was approved by the authority when it issued the consent.

Ponding

- The low cross falls to the deck were raised during the consenting stage and were subsequently approved by the manufacturer.
- The joint in the sheet material allows the water to sit along its edge. The membrane has an embossed surface to provide slip resistance, which prevents the “fast shedding” of water. However, the decks drain positively to the outlets.
- The membrane is fully welded and fully encapsulates the entire deck surface and upstands.

The additional rainwater head

- The decision to install the additional rainwater head was made on site when the existing rainwater heads were removed. What had been built was not in accordance with the building consent.

The membrane

- The consented drawings do not show the membrane extending an additional 50mm past the scupper outlet.
- The remaining membrane edges now have metal bars installed over their edges.
- Proprietary PVC-coated metal drip edges have been installed.
- The membrane installer has provided a 15-year installation warranty.

3.3.8 In a letter dated 13 September 2017 the authority acknowledged the receipt of the 15-year installation warranty and disagreed with the agent’s interpretation of section 112. The authority concluded its decision to refuse to issue the code compliance certificate had not changed and the agent could apply for a determination.

3.3.9 Correspondence between the parties continued without resolution, and the Ministry received an application for a determination on 18 October 2017.

4. The submissions**4.1 The initial submissions**

4.1.1 The agent made a submission that outlined the background to the situation and provided copies of:

- the building consent, consented drawings and specifications
- correspondence from the membrane manufacturer and between the parties

- some inspection records
- code compliance certificate application
- various warranties and Producer Statements
- photographs of the construction
- Determination 2014/019.

4.1.2 The authority acknowledged the determination application on 6 November 2017, and provided a submission, including photographs of the water ponding. The authority provided identical refusals for the code compliance certificates, and after a review of the documentation had identified areas of non-compliance missed from the original refusal letters for three units as follows:

- Unit 221 – the reinstalled barrier was only 990mm high and did not comply with Clause F4.3.4(b).
- Unit 224 – various areas of the membrane had not adhered to the substrate and did not comply with Clauses B1.3.1, B1.3.2, and B2.3.1.
- Unit 228 – the reinstalled barrier had openings greater than 100mm and did not comply with Clause F4.3.4(e).

4.1.3 The authority stated another site inspection was carried out on 8 September 2017. This inspection found grates and lids had been added to the additional rainwater heads. The authority noted the consented rainwater heads were constructed with a “very narrow entry slot” and debris had started to accumulate in them. It considered “normal cleaning and maintenance” of these rainwater heads would be difficult given its position and the narrow opening.

4.2 The draft determination and responses received

4.2.1 A draft determination was issued to the parties for comment on 9 February 2018.

4.2.2 On 12 February 2018 the agent responded to the draft stating the work to non-invasively remedy the blisters on Units 224 and 233 would be undertaken immediately.

4.2.3 The following day, the agent accepted the determination on behalf of all the owners.

4.2.4 On 14 February 2018 the authority responded to draft determination stating it did not accept the draft decision and made the following comments (in summary):

- The determination does not respond to the expert’s comment regarding sealing the hole at the back of the rainwater heads. The photographs appear to show water could travel along the membrane to enter the lower units at the vertical tilt-panel corner joints.
- The tops of the barriers remained at the same original height, but the deck levels have been altered. Firstly, without a building consent as stated in the first determination⁹, and then further as part of this remedial work. The deck floor has been raised at the unit walls and lowered at the outer edges.
- In regard to the barriers, the authority considered Determination 2008/004¹⁰ was more relevant to this situation than Determination 2009/060¹¹ (the latter

⁹ In Determination 2014/019, work to the deck membranes had been carried out to Units 220 and 221 only.

¹⁰ Determination 2008/004 Relocating and re-using safety barriers in the alteration of existing bridges on Fitzgerald Avenue, Christchurch; Department of Building and Housing; 18 January 2008

determination was considered in the draft). It held this view because Determination 2009/060 noted the decision may have been different had the decks themselves been altered or extended. In Determination 2008/004, the view was taken that the existing relocated barrier needed to increase in height before it was re-erected. It believes this reasoning should apply to the gap at the bottom of the barrier to Unit 228.

4.2.5 On 16 February 2018 the agent provided photographs of the original deck level and handrail height, and responded to the authority's submission:

- The original consented work had the deck surface tiled over a liquid applied membrane, which was replaced without a building consent to remedy the weathertightness defects.
- The photograph of the original tiled surface shows the base plate of the existing barrier is directly on top of the tiled surface. The new screed for the new membrane has been constructed so a plinth underneath the barrier is not required.
- The deck level reinstatement is back to the same level as the original tiled deck levels and the handrails are installed in the same fixing locations.

4.2.6 I have taken account of the parties' submissions and amended the final determination as 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 and inspected the house on 27 November 2017. The expert's report was received on 11 December 2017 and was sent to the parties on the same day.

5.2 Comparison with the consented plans

5.2.1 The expert noted the overall shape and form of the decks remained unchanged from the consented drawings, and metal balustrades adjacent to the entry door have been reused and mounted in the same fastening holes.

5.2.2 The expert noted the rainwater heads and the ends of the external gutter slightly varied from the consented documents.

5.3 Investigations and observations

5.3.1 The expert carried out visual inspections of all eight decks, hosed each deck with water for 10 minutes, and sprayed the junctions of the new balustrade openings of all eight decks for 15 minutes each side. Units 224 and 229 were hosed for 30 minutes (the ceiling spaces beneath these desks were inspected for water ingress as below).

5.3.2 The expert removed a section of the bedroom ceiling below the balustrades in Units 222 and 227 (the units underneath the decks to Units 224 and 229). In the ceiling cavity the expert found evidence of past moisture ingress, but no evidence of current moisture ingress. No water entry was observed under the carpet in the bedroom.

5.3.3 Visual inspections of six ground floor units included non-invasive testing of the internal linings at the external corners and by lifting carpets. However, the expert

¹¹ Determination 2009/060 Refusal to issue a building consent that incorporates the re-use of existing barriers for a house at 2/7 View Road, Campbells Bay, North Shore City; Department of Building and Housing; 4 August 2009

noted the limitations of the inspection in the ability to recreate a situation causing a leak.

5.4 Cross falls

5.4.1 The expert measured the decks' cross falls to areas A and B noted in Figure 1 as follows:

Table 1

Unit	Area A	Area B
220	0.5°	2.3°
221	0.4°	1.8°
224	0.6°	1.7°
225	0.5°	1.1°
226	0.8°	1.9°
229	0.7°	1.4°
232	0.7°	1.9°
233	0.6°	2.0°

5.5 Balustrade heights

5.5.1 The expert measured the height of all the balustrades in response to the authority's assertion that one unit's balustrade was not appropriately high to comply with Clause F4. He measured the balustrade heights at the locations shown in Figure 2 with results shown in Table 2.

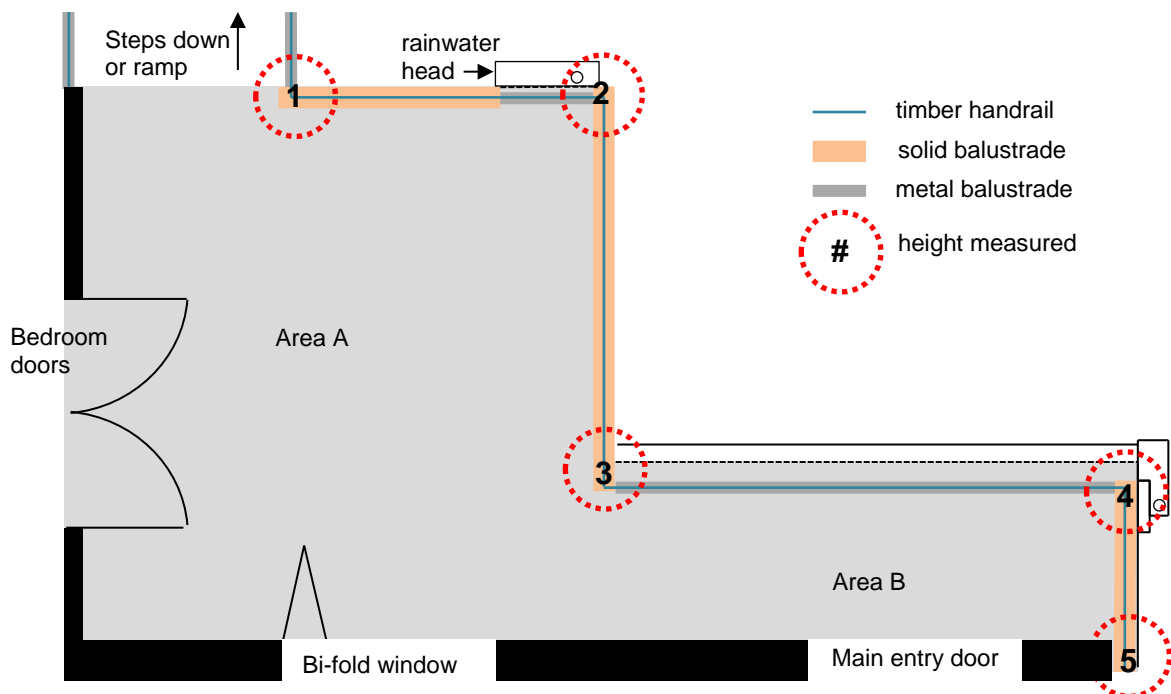


Figure 2: Balustrade height at locations shown (plan for units 220, 224, 226, and 232 mirrored, not to scale)

Table 2: Balustrade heights measured (in mm)

Unit	Location				
	1	2	3	4	5
220	990	1000	990	1000	950
221	1000	1000	980	990	950
224	990	1000	1000	990	960
225	1000	1000	1000	1000	980
226	980	1000	990	1000	980
229	1000	1000	1000	1000	1000
232	990	1000	990	1000	950
233	980	1000	1000	1000	990

5.6 The expert's comments regarding the authority's refusal

5.6.1 The expert provided comments regarding the authority's refusal, which are summarised below.

Table 3: The expert's comments

In response to the authority's refusal letter dated 16 August 2017	
Cross falls	<ul style="list-style-type: none"> Deck falls are at right angles to the direction of travel between the deck entrance and entry to the units. The consented 30mm fall has been exceeded on all balconies, resulting in a fall of 0.4° or greater (but less than 1:40 fall specified in E2/AS1). Most decks exceeded the 1:50 (1.14°) slope stated D1/AS1. A "safe fall" is required to comply with Clause D1. Unit 220 has the steepest cross fall (2.3°) but did not feel unsafe to walk along. The BRANZ Appraisal for the membrane allowed its use on slopes of up to approximately 9°, exceeding what has been built.
Water ponding and inadequate falls	<ul style="list-style-type: none"> After wetting the decks, water ponding was visible for up to 2 hours on Units 220, 221, 224, 225 and 232. Falls on all eight decks exceeded 30mm. Ponding is caused by "slight undulations in the screed on a very shallow pitch". It was "unreasonable" to expect a flat finish on a screeded surface. The membrane is relatively coarse and provides a high surface tension that would slow the dispersal of water on the shallow slope. The manufacturer has inspected the decks and confirmed it would honour the warranty at the falls achieved. The seams were well-sealed by heat welding. Generally membrane decks fail at junctions; there appeared to be no risk of the decks leaking due to the slight ponding evident.
Warranty	<ul style="list-style-type: none"> The 15-year warranty has been provided by the manufacturer.
Additional rainwater head	<ul style="list-style-type: none"> E2/AS1 is only one means of achieving compliance. The rainwater head had been "tidily constructed" and was adequately sized to cope with the runoff. The overflow is low enough to prevent water pooling inside the gutter.

In response to the authority's refusal letter dated 16 August 2017	
Membrane return	<ul style="list-style-type: none"> There is no detail in the consented documents that shows the membrane returning 50mm each side of the rainwater head. The figures from E2/AS1 are not mandatory requirements. A suitable alternative had been provided with the membrane carried out beyond the edge of the wall to divert water onto the drip edge.
Metal flashing	<ul style="list-style-type: none"> Metal fastening bars have been completed to all eight decks.
In response to the authority's submission dated 6 November 2017	
Balustrade height	<ul style="list-style-type: none"> The balustrades have been reinstated without any changes and fixed into the same position as before. The new screed may have reduced the height from the top of the handrails to the finished deck level. All the decks, but one, had a shortfall of between 20-50mm. As the thickness of the original deck covering is not known it is unclear if this is a reduction from what existed prior to the building work. However, a shortfall in height was likely present before the consent for the alteration.
Membrane Blisters	<ul style="list-style-type: none"> A blister 200x1400mm has formed on the deck of Unit 224 where the membrane has detached from the membrane substrate. No evidence to suggest the membrane will suffer accelerated deterioration as a result, but there was a risk of damage from outdoor furniture or foot traffic. A tear in the membrane could also cause a failure to meet Clause E2. Another blister was found on the deck to Unit 233.
Barrier openings greater than 100mm	<ul style="list-style-type: none"> The consented documents approved the re-use of existing barriers that likely already had this size opening.
Rainwater head maintenance	<ul style="list-style-type: none"> There was no reduction in the gutter's cross-sectional area where it extended into the rainwater head. The cover was "very easy" to remove and replace. The rainwater head was "very easy" to clean out.
Water staining	<ul style="list-style-type: none"> This appears to be from cooling water used by a concrete saw that was not cleaned off properly. There was no water flowing down below the rainwater heads when water-testing the decks.

5.7 Quality of finish observations

5.7.1 The expert considered the quality of finish on the work to the exterior envelope was generally to an acceptable standard.

5.8 The expert's conclusions

5.8.1 The expert considered the following items required remedial work for code compliance:

- The blisters under the membrane on Unit 224 and 233 were at risk of damage, which could lead to a failure of Clause E2.
- The balcony balustrades were less than 1000mm high in some places, which did not comply with Clause F4.

5.9 The authority and agent's responses

5.9.1 On 18 December 2017 the authority made a submission in response to the expert's report. The agent responded to the authority's comments on 15 January 2018.

Table 4: Summary of responses to the expert's report

Authority's 18 December 2017 submission	Agent's 15 January 2018 submission
<ul style="list-style-type: none"> • Clause D1.3.3(c) requires a safe cross fall and a safe slope in the direction of travel. • The BRANZ Appraisal is silent on cross falls. • D1/AS1 paragraph 1.2.2 provides guidance on cross falls. 	<ul style="list-style-type: none"> • The cross fall did not feel unsafe to walk along. • Section 112 applies to the building work.
<ul style="list-style-type: none"> • New work, such as the new screed and membrane, has to comply with section 17. 	<ul style="list-style-type: none"> • 30mm cross fall was in the 2003 consents for the original buildings and was repeated in the consented drawings for this work. • There were restrictions in the remediation design of the decks to provide positive falls because of the existing building features. • The authority approved the falls as consented and inspected the work.
<ul style="list-style-type: none"> • Building consent application stated E2/AS1 as the means of compliance. • The additional rainwater head "does not comply with [E2/AS1] fig 63" because the overflow is not 1.5 times the diameter of the downpipe. • Onsite observations indicate the rainwater heads are prone to block with debris. 	<ul style="list-style-type: none"> • The rainwater head alterations were deemed a "minor alteration" and a lodgement to amend the drawings was not required. • The appropriate guidance comes from "NZ Metal Roofing and Wall cladding Code of Practice" not from E2/AS1. • The Code of Practice requires the overflow opening to have an area equal to the size of the downpipe, which has been provided.
<ul style="list-style-type: none"> • The manufacturer's warranty excludes loss or damage due to ponded water. 	<ul style="list-style-type: none"> • The manufacturer's warranty excluded loss of damage if there is a lack of positive drainage. The decks have a positive fall to the outlets and gutter. • The manufacturer has inspected the completed decks and confirmed the warranty remains valid.
<ul style="list-style-type: none"> • The detail on the consented drawings states "Decking membrane lapped into rainwater head and glued in place". 	<ul style="list-style-type: none"> • A drip edge has been formed using the decking membrane. • The rainwater head extends past the scupper opening to act as a stop end and divert water into the rainwater head.
<ul style="list-style-type: none"> • The reinstated barriers are new work, and section 112 does not apply. 	<ul style="list-style-type: none"> • Balustrade height has not changed from what previously existed, section 112 applies.
<ul style="list-style-type: none"> • The membrane has "become unstable and a loss of amenity has occurred" due to lack of adhesion, poor application or excessive moisture in the substrate. 	<ul style="list-style-type: none"> • Blisters have likely formed due to the high temperatures during construction. • The blisters will be repaired by using a non-invasive method of heating and rolling to adhere the membrane. • No loss of amenity has been experienced.

Authority's 18 December 2017 submission	Agent's 15 January 2018 submission
<ul style="list-style-type: none"> The reinstated barriers to Unit 228 have openings greater than 100mm (where the gap at the bottom has increased due to the removal of the original tiles). This is new work. 	-
<ul style="list-style-type: none"> Normal cleaning and maintenance does not normally involve using a ladder and screw driver to remove the cover of the rainwater head. Normal maintenance and cleaning means accessing the rainwater head from the deck and being able to remove any items that may have blown in. 	<ul style="list-style-type: none"> Regular maintenance to rainwater systems would require access equipment. The use of a ladder for routine maintenance work to remove any debris is considered normal practice.

6. Discussion

6.1 The authority disputed the as-built remedial work to the deck complies with Clauses B1, B2, D1, and F4; and also considers the maintenance of the rainwater heads and the installation of the additional rainwater head was done without the consent being amended. I consider these matters below.

6.2 Clause B2 Durability, and E2 External moisture

6.2.1 I note the metal flashings, water staining, and warranty issues identified by the authority appear to no longer be in dispute. The metal flashings have been installed to the appropriate membrane edges. The expert stated the water staining was in relation to construction and not an indication the building was leaking. Also, the authority has received the 20-year product warranty.

Membrane falls and water ponding

6.2.2 The authority considers water ponding and inadequate falls mean the decks do not comply with Clause E2.3.1 and Clause B2.3.1.

6.2.3 The expert considered the ponding is caused by a combination of slightly uneven screed and the embossed surface of the membrane itself. He considered achieving a completely even screed surface on a low slope was not possible in practice. The embossed surface of the membrane also contributes to a slower dispersal of the water with the low slope.

6.2.4 The falls to the as-built decks are in most instances in excess of the falls described in the building consent. I also consider the falls able to be achieved in this case are restricted by the physical layout of the existing building which must impact on the practical options available to the designer and builder. The expert observed the seams were well sealed through heat welding. He also noted generally membrane decks fail at the junctions; there was no apparent risk of the decks leaking as the ponding occurred in the centre of the decks away from any junctions. Given the building's construction, the membrane is also unlikely to be affected by any future movement of the substrate (e.g. sagging or settlement) as might be the case with a timber-framed building or deck.

- 6.2.5 It is unclear why the authority now questions the adequacy of the falls when they exceed the falls detailed in the approved building consent. The authority also received information and assurances from the membrane manufacturer the membrane will perform satisfactorily in this situation. The manufacturer reviewed the drawings before construction commenced and agreed the membrane would perform adequately in the low fall, noting the type of membrane was unlikely to be adversely affected by immersion in water. The manufacturer has inspected the decks and confirmed the 20-year product warranty would be provided.
- 6.2.6 I am of the view the limited degree of ponding and low falls will not affect the ability of the decks to meet its durability and weathertightness requirements under Clauses B2 and E2.

The membrane's return into the rainwater head

- 6.2.7 The consented drawings show the membrane glued to a metal angle with the membrane also fully adhered to the portion of the angle that laps down into the rainwater head.
- 6.2.8 As installed, the membrane has been glued by solvent welding to a proprietary PVC-coated metal angle that laps into the rainwater heads. The agent has confirmed the PVC-coated angle is compatible with the membrane.
- 6.2.9 I agree with the expert the membrane extended in this manner into the rainwater heads is compliant and amounts to a minor deviation from the solution described in E2/AS1.
- 6.2.10 The expert identified a hole underneath the membrane drip edge to the rainwater head, typical of all eight units, which is reasonably well protected by the drip-edge and diverter. However, he recommended sealing the hole as a maintenance item.

6.3 The blistering of the membrane (Clauses B1 and B2)

- 6.3.1 There are two areas where the membrane has not adequately adhered to the deck substrates of Unit 224 and Unit 233. The authority stated the blister on Unit 224 does not comply with Clause B1.3.1, B1.3.2, and B2.3.1.

Compliance with B1 Structure

- 6.3.2 The authority has said that the membrane does not comply with Clauses B1.3.1 and B1.3.2 as the membrane has “become unstable and a loss of amenity has occurred” due the blistering of the membrane.
- 6.3.3 The Objective of Clause B1 Structure is to:
- (a) safeguard people from injury caused by structural failure
 - (b) safeguard people from loss of amenity caused by structural behaviour, and
 - (c) ...

Performance requirement B1.3.1 says:

Buildings, building elements and sitework shall have a low probability of rupturing, becoming unstable, losing equilibrium, or collapsing during construction or alteration and throughout their lives

Performance requirement B1.3.2 says:

Buildings, building elements and sitework shall have a low probability of causing loss of amenity through undue deformation, vibratory response, degradation, or other physical characteristics throughout their lives, or during construction or alteration when the building is in use.

- 6.3.4 The membrane acts as a waterproofing layer to prevent water entering the building envelope under Clause E2. The Objective of Clause B1 is to safeguard people from injury caused by structural failure and from loss of amenity caused by structural behaviour. The membrane is not contributing in any way to the structural performance of the building or the decks. While there is a possibility of the blisters tearing, this failure has performance consequences for the building in terms of Clause E2 External moisture, and not Clause B1 Structure. There is no loss of amenity to the building's users in terms of structural performance.
- 6.3.5 I consider the performance requirements of Clause B1 are not relevant to the compliance of the membrane in this instance.

Compliance with B2 Durability

- 6.3.6 In regard to durability concerns, I agree with the expert's observations the blistered membrane will not necessarily deteriorate faster, but is at increased risk of damage from foot traffic and outdoor furniture. A tear or other defect in the membrane would have adverse consequences in terms of Clause E2 as water penetration would likely occur.
- 6.3.7 I consider it unlikely the membrane, if not remedied, will continue to comply with Clause E2 for the minimum period of 15 years required by Clause B2. I am of the view the repair of the blisters is necessary for compliance with Clause B2 to be achieved. The agent has stated the blisters would be fixed in January 2018.

6.4 Clause D1 Access routes

- 6.4.1 The deck provides the only access route to the units. Clause D1.3.3 requires access routes to:
- ...(c) have a safe cross fall, and safe slope in the direction of travel
- 6.4.2 The authority is of the view the decks, as the access route to the unit, do not comply with Clause D1.3.3(c). Its view is based upon paragraph 1.2.2 of D1/AS1 that says an access route "shall not have a cross fall steeper than 1:50", which is a slope of 1.14°. I note this matter does not appear to have been raised in response to the application for consent (other than the fall being insufficient to satisfy Clause E2), nor was it raised when the work was being inspected.
- 6.4.3 Based upon the expert's measurements, in seven of the eight decks one area (Area B in Figure 2) exceeded the 1.14° slope stated in D1/AS1. However, Acceptable Solutions provide only one means of establishing compliance. Some Acceptable Solutions cover the worst case scenario, so they may be modified in less extreme cases and the resulting alternative solution will still comply with the Building Code.
- 6.4.4 In this case, I am of the view the deck slope satisfies Clause D1.3.3(c) for the following reasons:
- The maximum cross-falls exceeding the 1.14° limit range from 1.4° - 2.3°. At most, this exceeds the 1.14° limit by 0.26° - 1.16°.

- The membrane surface has adequate coefficient of friction to be used on slopes up to 9°.
- The area of deck with the slope exceeding 1.14° is narrow, and there is a full-length barrier and handrail along the “down slope” side of the deck at this point.
- The expert’s observation of the greatest slope, at 2.3°, did not feel unsafe to walk along. The slope in the direction of travel did not feel unsafe.

6.5 Clause F4 Safety from falling

6.5.1 There are areas where height of the deck barriers is less than 1000mm above the surface of the deck¹². In its submission dated 6 November 2017 the authority also said the opening below the reinstated balustrade to Unit 228 exceeded 100mm and therefore did not satisfy Clause F4.3.4(e) (the authority did not state what the opening dimension was).

6.5.2 The agent says section 112 applies as the barriers are existing building elements. However, the authority considers the barriers are new building work and must comply fully under section 17.

Barrier height

6.5.3 The expert measured the barrier heights to the decks and, in places, found a shortfall of between 10-50mm below the 1000mm minimum barrier height stated in Acceptable Solution to Clause F4, F4/AS1, most notably at the higher points in the deck screed. A 40-50mm shortfall was measured in respect of a very short section of barrier next to the entry door to four of the eight units.

6.5.4 In relation to the barrier heights the following is noted:

- The timber rail along the top of the precast concrete walls (including the section of new balustrade) is existing building work and has not been altered or removed.
- The reinstated barriers (i.e., the reused balustrades) have been installed at the same height as before.
- The top of the new membrane and screed will have been installed in a similar position to the existing screed (which as originally consented had a tiled finished surface).
- The areas where the barrier heights are less than 1000mm are limited in length and for the most part (i.e. at the outer edge of the screed) the shortfall in height is between 10-20mm.

6.5.5 I accept the expert’s opinion that it is very likely that the shortfall in height existed before the remedial work commenced.

Balustrade openings

6.5.6 In respect of the gap to the reinstated barrier to the deck to Unit 228; the expert’s report contains one photo that shows packers (in the order of 6mm thick) under the vertical supports to a section of balustrade. Another photo in the same report (supplied to the Ministry at a higher resolution), shows a 105mm gap to a similar

¹² The 1000mm barrier height satisfies Acceptable Solution F4 Safety from falling

reinstalled barrier but where no packers had been installed. A photo from the first determination's expert report, dated 25 September 2013, shows a significant packer under the vertical support to a similar section of balustrade suggesting the gap under the original barrier was greater than 100mm at that time.

- 6.5.7 A situation similar to this has been previously considered in Determination 2009/060¹³ and I consider the decisions made in respect of the barrier in that determination are also relevant here. In Determination 2009/060 the existing barriers to a deck and walkway were removed and reinstated in the same position as before to allow recladding to be carried out on a house. The determination considered:
- The barriers were incidental to the remedial work being undertaken.
 - The barriers themselves are only subject to minor alterations to accommodate the recladding work.
 - The barriers are to be reinstated in exactly the same location as before.
 - The barriers complied with the Building Code to the same extent as before the alteration.
 - A different decision may have been reached if the deck and walkway had been altered or extended.
- 6.5.8 The authority has referred to the decision reached in Determination 2008/004 as relevant to the gap beneath the relocated balustrade. In Determination 2008/004 some of the existing pedestrian barriers to a road bridge were removed, the bridge widened, new footpaths constructed; and the existing barriers relocated to the new footpaths. The provision of the pedestrian barriers were an integral part of the substantial alteration work to the bridge and the existing barriers were to be relocated to a significantly different position than before. Determination 2008/004 also noted the significance difference between old barrier height and the Building Code's requirements at that time, and required the relocated barrier to be upgraded.
- 6.5.9 I do not consider the decision in Determination 2008/004 is applicable to this situation. Determination 2008/004 is about the re-use of the barriers in another location, not about the removal and reinstatement of an existing building element in the same position in order to carry out building work on a closely-related part of the building.
- 6.5.10 The definition of "building work" in section 7 of the Act includes "work for, or in connection with, the alteration of a building". The building work in this case is the act of removing a building element and fixing it in the same position as before; it does not include the fabrication of the building element itself which is an existing feature.
- 6.5.11 The balustrades have been removed in order to carry out the remedial building work on the decks. The balustrades, as an existing building element, have been reinstated in the same position and at the same height as they were prior to the building work being carried out. Their removal and reuse is incidental to the remedial work being undertaken.
- 6.5.12 The building work as detailed and approved in the building consent is the installation of suitable fixings to reposition the balustrades in place. The removal and reuse of the balustrades by itself is not building work.

¹³ Determination 2009/060 Refusal to issue a building consent that incorporates the re-use of existing barriers for a house at 2/7 View Road, Campbells Bay, North Shore City; Department of Building and Housing; 4 August 2009

- 6.5.13 The performance of the balustrade in terms of Clause F4 must be assessed as an existing building element against the requirements of section 112. There is no evidence to show the compliance of the reinstated barrier is worse than it was before, but there is evidence to suggest it did not comply before the remedial work commenced. I note that the areas where the balustrades fail to comply with the Building Code do so to only a minor extent.

Conclusion

- 6.5.14 As a result, section 112(1)(b)(ii) applies in this situation, as the barriers, both in respect of the shortfall to some barrier heights and the gap under the balustrade to Unit 228, “did not comply with the other provisions of the Building Code immediately before the building work began, [and will] continue to comply at least to the same extent as it did then comply”. The compliance of the deck barriers is no worse than it was immediately before the work began.
- 6.5.15 I consider the barriers comply with Clause F4 to the extent required under section 112.

6.6 Maintenance of rainwater heads

- 6.6.1 The authority is concerned the “normal cleaning and maintenance” to the additional rainwater heads will be “very difficult”. The authority considers these rainwater heads should be cleaned from the deck and the use of a ladder and screw driver is beyond “normal”.
- 6.6.2 I accept the expert’s observation the rainwater heads were easily accessed, and he had no concerns regarding their maintenance. I do not consider it unreasonable to expect a ladder and screwdriver to be needed when carrying out maintenance on a building.

6.7 Is an amendment required to the building consent?

- 6.7.1 There are two mechanisms in the Act that provide for changes to a building consent while it is still open, as is the case here: section 45(4) in respect of amendments to building consents, and section 45A for minor variations.
- 6.7.2 Rainwater heads have been installed instead of the gutter discharging directly to the downpipe. The expert observed the additional rainwater heads have been “tidily” installed and are appropriately-sized for the catchment area. The additional rainwater heads use similar materials and components as the consented rainwater heads. They are of a similar complexity, located externally to the building, and have a low risk of failure.
- 6.7.3 A rainwater head allows for the collection of larger amounts of water and disposes it in a more efficient manner than that consented. It is more robust solution than the gutter discharging directly to the downpipe.
- 6.7.4 I am of the view the installation of additional rainwater heads is a minor variation. A minor variation has been described in Ministry guidance¹⁴ as a change that does not usually affect compliance with the Building Code. A minor variation will often achieve the same outcome but in a different manner.

¹⁴ *Guidance to building consent amendments*, <https://www.building.govt.nz/projects-and-consents/build-to-the-consent/making-changes-to-your-plans/guidance-to-building-consent-amendments/minor-variations/> Ministry of Business, Innovation and Employment.

- 6.7.5 I consider the additional rainwater heads are a minor variation to the consents.
- 6.7.6 The size of the overflow to the additional rainwater heads is a point of contention between the parties, with the authority's position the additional rainwater head is not compliant because its design is a departure from E2/AS1. To satisfy E2/AS1 the overflow is required to be 1.5 times the size of the downpipe. The agent referred to the requirement in "NZ Metal Roof and Wall Cladding Code of Practice"¹⁵ for the overflow opening of a rainwater head to have a cross-sectional area equal to that of the downpipe. The membrane decks are outside the scope of both E2/AS1 and the Code of Practice. However, Acceptable Solutions are generally conservative, so an alternative solution could be proposed that wouldn't satisfy E2/AS1 requirements but still complies with Clause E2.
- 6.7.7 In this instance, I am of the view the overflow with the same size as the downpipe is adequately sized. The purpose of the overflow is to provide visual warning maintenance is required. Should the overflow and the downpipe both become blocked, water can overflow from the gutter itself. I am of the view the overflow is adequate.

7. What happens next?

- 7.1 Section 45A specifies an application for a minor variation does not need to be on a prescribed form, and does not require the authority to issue an amended consent. However, the minor variation for the rainwater heads should be noted on the building consent.
- 7.2 I consider additional work is required to rectify the blisters to the decks to Units 224 and 233. Once this work has been carried out, I see no reason for the code compliance certificates to be withheld in terms of the compliance of the eight decks.

8. The decision

- 8.1 In accordance with section 188 of the Building Act 2004, I hereby determine that:

- the decks comply with Clause D1.3.3(c)
- the deck barriers comply with Clause F4 Safety from falling to the extent required by the Act
- the deck membranes to the decks to Units 220, 221, 225, 228, 229, and 232 comply with Clause E2 External moisture
- the deck membranes to the decks to Units 224 and 233 do not comply with Clause B2 Durability as it applies to E2 External moisture with respect to the blistering of the membranes to these two decks

and accordingly:

- the authority was correct to refuse to issue a code compliance certificate in respect of the deck membranes to Units 224 and 233, and I confirm that decision

¹⁵ <https://www.metalroofing.org.nz/cop>

- the authority was incorrect to refuse to issue a code compliance certificate in respect of the decks to Units 220, 221, 225, 228, 229 and 232, and I reverse the authority's decision, thus requiring the authority make a new decision taking into account the discussion in this determination.

Signed for and on behalf of the Chief Executive of the Ministry of Business, Innovation and Employment on 23 March 2018.

Katie Gordon
Manager Determinations

Appendix A

1. The relevant sections of the Building Act discussed in this determination:

Section 17 All building work must comply with building code

All building work must comply with the building code to the extent required by this Act, whether or not a building consent is required in respect of that building work.

Section 45A Minor variations to building consents

- (1) An application for a minor variation to a building consent—
 - (a) is not required to be made in the prescribed form; but
 - (b) must comply with all other applicable requirements of section 45.
- (2) Sections 48 to 50 apply, with all necessary modifications, to an application for a minor variation.
- (3) A building consent authority that grants a minor variation—
 - (a) must record the minor variation in writing; but
 - (b) is not required to issue an amended building consent.

Section 112 Alterations to existing buildings

- (1) A building consent authority must not grant a building consent for the alteration of an existing building, or part of an existing building, unless the building consent authority is satisfied that, after the alteration,—
 - (a) the building will comply, as nearly as is reasonably practicable, with the provisions of the building code that relate to—
 - (i) means of escape from fire; and
 - (ii) access and facilities for persons with disabilities (if this is a requirement in terms of section 118); and
 - (b) the building will,—
 - (i) if it complied with the other provisions of the building code immediately before the building work began, continue to comply with those provisions; or
 - (ii) if it did not comply with the other provisions of the building code immediately before the building work began, continue to comply at least to the same extent as it did then comply.

2. The relevant Clauses of the Building Code discussed in this determination:

B1.3.1

Buildings, building elements and sitework shall have a low probability of rupturing, becoming unstable, losing equilibrium, or collapsing during construction or alteration and throughout their lives.

B1.3.2

Buildings, building elements and sitework shall have a low probability of causing loss of amenity through undue deformation, vibratory response, degradation, or other physical characteristics throughout their lives, or during construction or alteration when the building is in use.

B2.3.1

Building elements must, with only normal maintenance, continue to satisfy the performance requirements of this code for the lesser of the specified intended life of the building, if stated, or:

- (a) the life of the building, being not less than 50 years, if:
 - (i) those building elements (including floors, walls, and fixings) provide structural stability to the building, or
 - (ii) those building elements are difficult to access or replace, or
 - (iii) failure of those building elements to comply with the building code would go undetected during both normal use and maintenance of the building.
- (b) 15 years if:
 - (i) those building elements (including the building envelope, exposed plumbing in the subfloor space, and in-built chimneys and flues) are moderately difficult to access or replace, or
 - (ii) failure of those building elements to comply with the building code would go undetected during normal use of the building, but would be easily detected during normal maintenance.

D1.3.3

Access routes shall...

- (c) have a safe cross fall, and safe slope in the direction of travel

F4.3.4

Barriers shall...

- (b) be of appropriate height...
- (g) restrict the passage of children under 6 years of age when provided to guard a change of level in areas likely to be frequented by them...