



Determination 2015/069

Determination regarding the compliance of retrofitted metal sill flashings to timber windows and doors installed in a 132-year-old house at 17 Hepburn Street, Freemans Bay, Auckland

Summary

This determination considers the compliance of retrofitted metal sill flashings installed to timber windows and doors in a house. The house is over 130 years old and is being altered and refurbished.

1. The matters to be determined

1.1 This is a determination under Part 3 Subpart 1 of the Building Act 2004¹ (“the current Act”) made under due authorisation by me, John Gardiner, Manager Determinations and Assurance, Ministry of Business, Innovation and Employment (“the Ministry”), for and on behalf of the Chief Executive of the Ministry.

1.2 The parties

1.2.1 The parties to the determination are:

- the owners of the house, J and K Buchanan (“the applicants”) acting through the architect for the alterations
- the licensed building practitioner and installer of the timber joinery (“the LBP”), A McNeil
- Auckland Council (“the authority”), carrying out its duties as a territorial authority or building consent authority.

1.3 The reason for the application

1.3.1 The application for this determination arises because:

- the authority issued a building consent for alterations to an existing house that included the installation of new windows and doors (“the consented joinery”)
- the approved consent drawings showed metal sill flashings to windows and doors but these were not installed
- the authority inspected the completed installation and was not satisfied that the unflushed sills complied with certain clauses² of the Building Code

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.

² In this determination, unless otherwise stated, “sections” are sections of the Act and “clauses” are clauses of the Building Code.

(Schedule 1, Building Regulations 1992), and metal sill flashings were retrofitted at the authority's suggestion

- notwithstanding the authority's approval of the retrofitted sill flashings, the applicants are seeking confirmation of the compliance of these windows and doors.

1.4 The matter to be determined³ is therefore whether the retrofitted sills as installed to the consented joinery comply with Clause E2 External Moisture and Clause B2 Durability of the Building Code. The sill installation includes the components of the system (such as the framing, weatherboards, the timber window sills and metal flashings, air seals, and trim), as well as the way the components are installed and work together.

1.5 Matters outside this determination

1.5.1 The replacement or repair of another 17 windows ("the replacement windows") was undertaken after the installation of the consented work. The replacement windows were installed without consent under Schedule 1⁴ of the Act as the replacement of a 'comparable component or assembly'. The regulatory status of the replacement windows is not in dispute between the parties and is not considered in this determination.

1.5.2 The determination is limited to the consideration of the retrofitted sill flashings as installed to the consented joinery. I have insufficient evidence to determine the code-compliance of the replacement windows and other aspects of the joinery installation; refer paragraph 7.6

1.6 In making my decision, I have considered the submissions from the parties, the report of the expert commissioned by the Ministry to advise on this dispute ("the expert") and the other evidence in this matter. The relevant sections of the Act and Schedule 1 to the Act are included in Appendix A.

2. The building work

2.1 The building work consists of alterations to a 132-year-old detached house situated on an east-sloping site in a medium wind zone for the purposes of NZS 3604⁵. Construction of the original part of the house is traditional native timber frame, with pile foundations, rusticated weatherboard cladding, profiled metal roofing, and timber windows.

2.2 Where alteration work exposed the original framing cavity, insulation was installed. Otherwise, as expected for houses of this age, walls are not insulated and do not include building wrap. I also note that the rear faces of the original weatherboards are likely to be rough-sawn and unpainted.

2.3 The consented joinery

2.3.1 The consented joinery units are as follows:

- Two large double-hung window units installed within altered framing to the north and east walls of the living area.

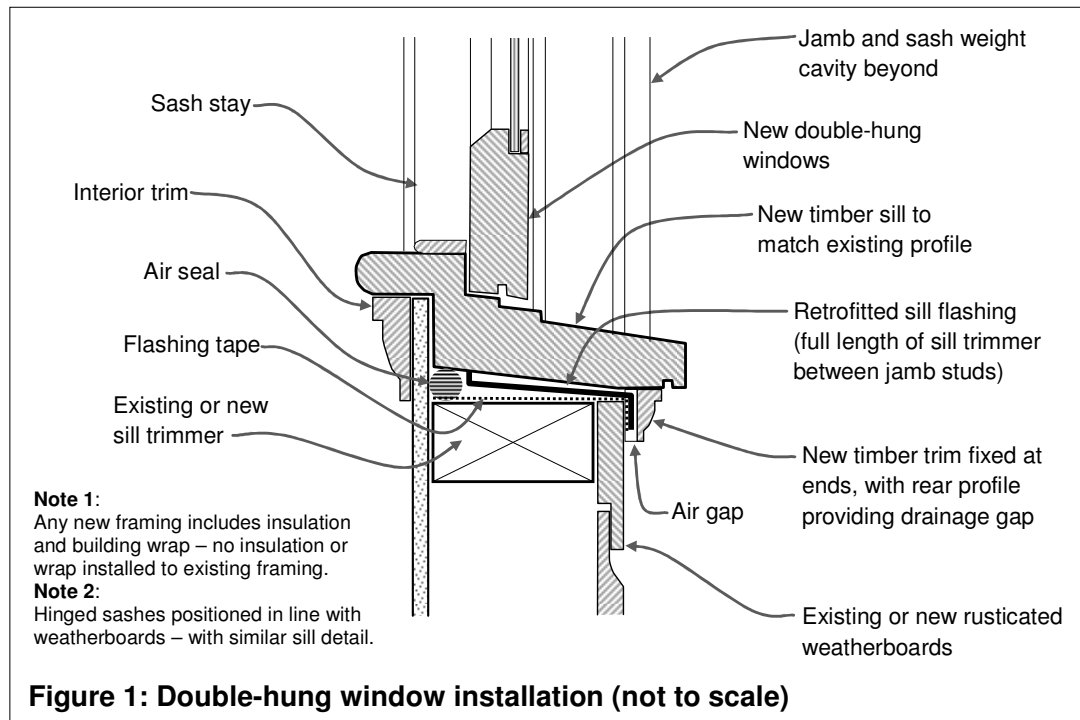
³ Under section 177(1)(a) of the Act

⁴ Schedule 1, Part 1 Exempted building work, Section 1(2)

⁵ New Zealand Standard NZS 3604:2011 Timber Framed Buildings

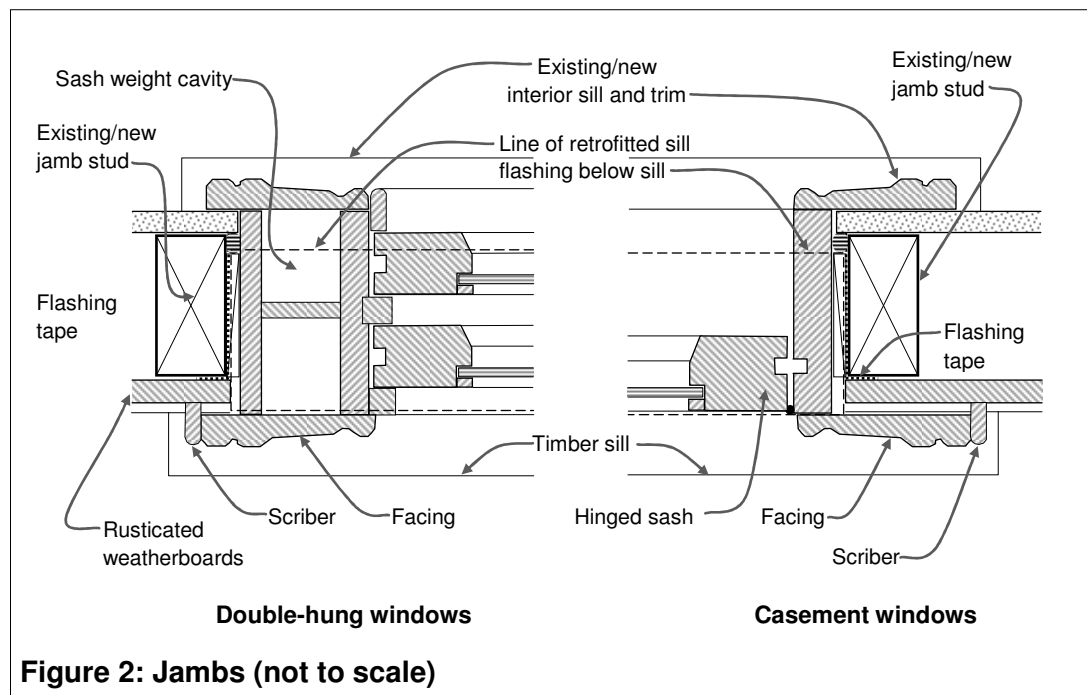
- Two casement windows into new framed openings to the north and east walls of the guest ensuite.
- Double-hung window into new framed opening to the upper level east wall of bedroom 4.
- Timber doors with sills rebated into concrete floor with a LAM⁶ membrane to the rebate

2.3.2 The installation of consented windows is shown in Figure 1.



- 2.3.3 The retrofitted metal sill flashings extend the full length of the framed openings; with the ends terminating against the flexible flashing tape where it turns up against the jamb trimmers. The jambs are shown in Figure 2.
- 2.3.4 The replacement windows were installed within original window openings. A total of ten double-hung windows were apparently replaced, and sashes were replaced in a further seven windows with the existing window frames left in place.

⁶ LAM - Liquid applied membrane



3. Background

3.1 General

3.1.1 The authority issued a building consent (No. B/2014/7420) in 2014 for alterations and refurbishment of the existing house. Included in the consented work was the installation of a number of timber joinery units into new window and door openings.

3.1.2 The consent drawings show:

- building paper wrapped over new sill trimmers
- sloping metal sill flashings supported on packing and extending over the top of new or existing weatherboards
- the sill flashings extended past jamb trimmers
- new timber window/door frames, with sill profiles to match existing joinery.

3.2 The joinery installation

3.2.1 When installing the consented windows, the installer wrapped the sill openings with flexible flashing tape and did not install the metal sill flashings. The authority did not inspect window openings prior to the joinery installation, and all installation and finishing work was completed before the omission was noted.

3.2.2 The authority inspected the completed installation and would not approve the joinery due to the omission of the sill flashings. The authority subsequently suggested that retrofitted sill flashings would be acceptable and a trial flashing was installed. The retrofitted metal flashings extended the full length of the sill trimmer, with end upstands terminated against the flexible flashing tape applied to jamb trimmers.

3.2.3 According to the architect, the authority advised that ‘the completion of that remedial insertion will be sufficient improvement to the window’s weather-tightness as to successfully pass their inspection.’ By the time of the expert’s assessment (refer

paragraph 6), all retrofitted metal flashings were fitted and window installation was complete.

3.3 Notwithstanding the authority's acceptance of the retro-fitted sill flashing system, the applicants wanted an independent decision on the compliance of the sill flashings as installed.

3.4 The Ministry received an application for a determination from the architect on 8 April 2015, with the application fee received on 21 May 2015.

4. The submissions

4.1 The initial submissions

4.1.1 The architect made a submission in a covering letter to the application, explaining the background to the situation and the reasons for the applicants seeking a determination. The applicants sought a determination on the compliance of the windows and external doors as installed, the architect noted:

... that to remove all of the windows in order to re-install them exactly as detailed by the architects will be an exercise of considerable cost and invasiveness for all involved, and it would be wasteful to do so unnecessarily.

4.1.2 The architect forwarded copies of:

- relevant extracts from the consent drawings
- construction photographs of the trial installation of the retrofitted flashing
- as-built sketches prior to and post installation of the flashing.

4.2 The first draft determination and responses received

4.2.1 The first draft determination was issued to the parties for comment on 22 June 2015. In a response received on 24 July 2015 the authority accepted the draft without comment.

4.2.2 The architect responded to the draft determination in emails to the Ministry dated 9 July, 17 August, and 28 August 2015. The following comments were made (in summary):

- The consented windows are fitted with wrap, tape and the retrofitted sill flashings, but the replacement windows have not yet been retrofitted with sill flashings.
- The solution provided by the retrofitted sill should be applied to the unconsented replacement windows. There were ten replacement windows.
- The retrofitting of sill flashings to two consented doors should be considered in addition to the windows. The doors have their sills rebated into a concrete floor with the rebate sealed with a LAM.
- Comparisons with original double-hung windows may not be relevant as it is possible that most windows were replaced during extensive renovation in 1997/1998.

4.2.3 The architect noted other associated remedial work to replace timber framing, repair existing windows, and address a leaking rainwater head. The architect responded to comments made by the LBP and provided information from the applicants. The applicants had noted two existing windows with rot.

4.2.4 In response to the architect I note the following:

- The expert's assessment was of the consented windows only (casement windows) where the retrofitted sill flashings had been installed; this did not include the two doors referred to above, or the remaining replacement windows.
- The retrofitting of sill flashings to the two doors presents a different scenario to the fitting of the sills to the timber framed openings. The LBP advises the door sills are set into sealed concrete rebates: the consequences of this junction failing are less significant than a sill failing in a timber-framed wall.
- I have commented on the retrofitting of sill flashings to the replacement joinery in paragraph 7.6.

4.2.5 The LBP responded to the draft determination in emails dated 8 July, 31 July, 25 August, and 28 August 2015, (in summary):

- Comment was made on the point at which the retrofitted sill flashing terminated relative to the jamb. The LBP provided a drawing of a replacement window viewed from the outside showing the timber sill member extending past the jamb.
- The replacement windows were installed 'like for like'⁷ with the existing windows, and were installed 'under section 42A(2)(b)'. The original windows had performed adequately for 130 years. 'No further work [i.e. the fitting or retrofitted sills] was required.'
- '...should additional sills be installed (in ... replacement units) the window as a system under current clauses in the Building Code will still fail due to the other system components not [being] installed. All literature relating to a current code compliant window system shows building wrap which all replacement windows lack.'
- The two consented doors have their sills rebated into a concrete floor, with the concreted rebate sealed with a LAM.

4.2.6 In response to the LBP I note that the following:

- The window installation components referred to by the LPB are described in Acceptable Solution E2/AS1: these features are not mandatory requirements of Clause E2 External Moisture.
- Section 42A(2) describes the conditions under which work can be carried out under section 42A(1). Section 42A(2) does not apply to the new building work but rather to the building as a whole after the alteration is carried out; the provision requires the building as a whole to remain compliant to the same extent as before the alteration was carried out.
- The replacement component or assembly is new building work, and as such it must satisfy the requirements of the Building Code under section 17.

⁷ I take the LBP's submission to mean that the replacement windows were carried out as exempt building work under Schedule 1(1)

4.3 The second draft determination and responses received

- 4.3.1 The determination was amended to take into account the submissions made by the parties, and a second draft determination was issued to the parties for comment on 28 September 2015.
- 4.3.2 The LBP initially responded on 29 September 2015 requesting clarification of the points made in paragraph 4.2.6. An officer of the Ministry responded on 30 September 2015, noting that the reference in the draft determination was intended to clarify that all new work is required to comply with the Building Code, whether consent was required or not.
- 4.3.3 In a further email dated 30 September 2015 the LBP noted he was still unsure of the application of section 42A(2)(b) as the ‘the component (window) had not failed under Schedule 1 general repair and maintenance.’ The LBP expressed his concern that adding the sill flashing requires a modification to the design of the window, being an open air gap to the underside of the sill, and that this was not how the original system was constructed. The LBP considered the modification should have been a consented replacement if the window system is to be altered.
- 4.3.4 In response to the LBP’s submission I note the following:
- The installation of the consented or replacement windows is new building work. The provisions of section 42A(2) are not relevant to the new work for the reasons given in the second bullet point in paragraph 4.2.6.
 - The work as shown in the approved consent detailed metal sill flashings to doors and windows. The consent was issued under section 49 which says that ‘the provisions of the building code would be met if the building work were properly completed in accordance with the plans and specifications that accompanied the application.’ The expert is of the opinion that the retro-fitted sills provide a compliant solution in this case and I accept that view.
 - The replacement of ‘a comparable component or assembly’ under Schedule 1 Part 1, 1(2) does not require the replaced item to follow the exact same installation detailing as the original. The installation of the replacement windows can include a metal sill with the work still being considered a ‘comparable component or assembly’ under Schedule 1.
- 4.3.5 The architect emailed on 14 October 2015 seeking clarification of the scope of the determination regarding the replacement windows. An officer of the Ministry responded on 22 October, and I have amended the draft as I consider appropriate. No further comment on the second draft determination was received from the applicants or architect.
- 4.3.6 The authority accepted the second draft without comment in a response received on 20 October 2015.

5. Establishing the code-compliance of the retrofitted sill flashings

5.1 The available evidence

5.1.1 In order for me to form a view as to the code-compliance of the retrofitted sill flashings I need to establish what evidence is available. In this case, the evidence includes:

- photographs and annotated details of the retrofitted windows flashing
- the history of use of comparable window systems in houses of a similar construction and age
- the expert's report on the retrofitted sill flashing system.

5.1.2 It is accepted that timber double-hung and casement windows have been commonly installed and replaced in similar houses throughout New Zealand over many years, with most of those houses being 100 years old or more. The predicted performance of these window sills, given normal maintenance, may therefore be compared with the systems commonly used in existing houses.

6. The expert's report

6.1 As mentioned in paragraph 1.6, I engaged an independent expert who is a member of the New Zealand Institute of Architects to assist me. The expert inspected the work on 21 May 2015, providing a report completed on 11 June 2015 which was forwarded to the parties on 11 June 2015.

6.2 General

6.2.1 The expert noted that his investigation included discussions and correspondence with the architect, observation of as-built work and review of documents provided. He noted that the consented windows are double-hung units, except for two hinged casements to the north and east walls of the guest ensuite.

6.2.2 The expert noted that the performance of the joinery units themselves was not the subject of his assessment, but that they appear to be of 'a good quality generally in that they have close fitting joints, open and close freely, and have a smooth paint finish'. The expert added that they 'are fitted with draught strips and consequently are almost certainly more air tight, and likely more watertight than the original windows.'

6.2.3 Notwithstanding the above, the expert noted 'potential points of leakage through the frames at the sills' as follows:

- The casement window to the east ensuite wall includes a weather groove that extends through to the underside of the timber sill. (I note that any moisture will be drained to the outside by the retrofitted sill flashing.)
- The jamb reveal to the replacement window to the upper playroom is not sealed to the sill and could allow moisture to penetrate the joint. (I note that the solid timber sill extends past the joint.)

6.2.4 The expert confirmed the following aspects of the house with the architect:

- The native timber framing is believed to be Kauri and no window framing required replacement due to deterioration. Any new framing is treated to a minimum H1.2 level.
- The original weatherboard walls are not insulated and fibreglass insulation has been installed only to those limited areas where the framing cavity was exposed or where new framing has been installed.
- There is no building wrap behind the original weatherboards and building wrap has been installed only to the limited areas of new weatherboards.

6.3 The onsite construction

6.3.1 The expert described the wall construction into which the consented and replacement windows were installed, noting the following:

- The construction varies, with some windows fitted into existing framed openings and other windows and doors fitting into new openings. In all cases, the rusticated weatherboards are fixed directly to the framing.
- The consented windows were installed into new or altered framing, with areas of new or exposed framing insulated and covered with building wrap.
- The replacement windows were fitted into walls with no insulation, building wrap or sill flashing under the original timber sill⁸, and the original windows had not resulted in moisture penetration prior to replacement.
- Insulation and building wrap was installed where weatherboards were replaced.

6.3.2 In relation to the installation of the windows the expert noted that:

- All consented windows and doors were fitted with building wrap, flashing tape, head flashings, and moulding.
- Flexible flashing tape was applied to the sill framing, which turned up against the base of the jamb trimmers.
- The metal sill flashings were retrofitted to the consented windows following installation, with windows left in place during the retrofitting.
- The replacement windows have sill tape installed, along with backing rods and expanding foam.

6.3.3 The expert noted that the retrofitted sill flashings needed to be assessed as an alternative solution against the history of use of similar situations and available benchmarks. In regards to the history of use for this house, the expert noted that:

- construction photographs show the sill trimmer to a replacement window free from obvious signs of deterioration
- there is no record of any request from the installer for instructions to replace damaged timber
- despite the lack of sill flashings, the original windows generally appear to have performed adequately during the over 130 years in use – well beyond the durability required by the Building Code

⁸ According to the installer and as expected for windows of this type and age

- the caveat to the above is that the history of maintenance or past replacement is not known (refer below).

6.4 Comparison with BRANZ detail

- 6.4.1 The expert used a BRANZ sill detail for timber windows⁹ as a benchmark against which to assess the likely performance of the installed windows because it described ‘similar construction and was published by an accredited third party.’
- 6.4.2 The expert assessed differences between the as-built sills (see Figure 1) and the BRANZ detail, and commented as follows (in summary with BRANZ detail features shown in brackets):

Differences	Expert’s comments
The turn-down over the weatherboards is about 20mm (35mm noted in detail)	Flashing protected by moulding more than 35mm high, providing equivalent protection.
Not fitted to low risk situation (detail notes E2/AS1 restriction for direct-fixed weatherboards to low risk)	The associated features leading to a moderate risk score remain unchanged, but history of use of original windows indicates adequate in-service performance within those circumstances.
No building wrap to most locations (building wrap shown in detail)	Original weatherboards have performed over many years and are unchanged so can be expected to continue to do so.
Sill flashing slope is minimal (detail shows slope but no minimum noted)	Providing there is some slope and no back slope, flashing should drain adequately.

6.5 Conclusion

- 6.5.1 The expert concluded that the sill fitted with the retrofitted sill flashing is likely to comply with the relevant parts of Clause E2 and B2 providing:
- all sill flashings have been retrofitted in the same manner as the trial flashing
 - the sill flashings extend beyond the jamb reveal of the window frame
 - the sill flashings slope to the outside.

7. Compliance of the consented joinery with the retrofitted sill flashings

- 7.1 I note that the timber windows are outside the scope of Acceptable Solution; paragraph 9.1.10.1 of E2/AS1 says “This Acceptable Solution is limited to aluminium window and door joinery...” In evaluating the installation of the sill details, the expert made comparisons with a relevant BRANZ recommended detail, to assist in determining whether the sills as installed are code-compliant.
- 7.2 Taking account of the expert’s comments, I make the following observations on the consented windows as installed to the house:
- Although it appears that some original windows in this house had deteriorated and been replaced some 20 years ago, at that time they would already have far exceeded the durability periods required by the Building Code if it applied.

⁹ BRANZ Weathertight Solutions Vol 1, Figure 1.1.1.2

- Similar traditional window joinery has been installed to many older houses throughout the country and has an in-service record of adequate performance over many years, providing regular maintenance is carried out.
- The consented windows are installed using traditional jamb facings and window frames, with added protection (see Figure 1 and Figure 2) provided by:
 - flexible flashing tape applied to sill framing and jamb junction
 - metal sill flashings retrofitted beneath the timber window sills, which turn up against the taped jamb/sill junction
 - exterior moulding profiled to provide drainage gap at the rear to allow any moisture reaching the sill flashing to escape to the outside
 - air seals installed to the inside face of the installation.

7.3 Taking into account the above observations, I consider that the sills to the consented windows have improved the weathertightness of those junctions in comparison to the existing windows that were removed as part of the alteration work. The expert has found that the retrofitted sills to the consented windows are compliant and I accept that view.

7.4 The expert's report, the established in-service record of similar traditional windows and the absence of any evidence to the contrary provide me with reasonable grounds to conclude that the sills to the consented windows fitted with the retrofitted metal flashing will comply with the relevant parts of Clause E2 and Clause B2 of the Building Code.

7.5 As noted in paragraph 4.2.4, the expert's assessment was of the consented windows only. The fitting of the retrofitted sill to the doors sills presents a different scenario as the door sills are located on a concrete floor in a sealed rebate. This situation is more tolerant of moisture ingress with fewer consequences in the event of this junction failing: as I have found that the retrofitted sills to the consented windows are compliant it is reasonable to conclude that the fitting of retrofitted flashings to the consented timber doors sills will be also.

7.6 In considering the retrofitted sill flashings as installed in this case I am of the view that there is nothing evident that would prevent these being installed to the replacement windows in the house where these have also been installed without sill flashings. However, I note the conditions under which these should be installed as noted by the expert in paragraph 6.5.1.

7.7 I also note the expert's comments in paragraph 6.2.3 regarding aspects of a new window frame observed during his assessment. Although the new joinery units themselves are not part of this determination, I draw these observations to the attention of the architect and the applicants for appropriate resolution.

7.8 It is emphasised that each determination is conducted on a case-by-case basis. Accordingly, the fact that a particular timber sill system has been established as being code-compliant in relation to a particular building does not necessarily mean that the same system will be code-compliant in another situation.

8. The decision

- 8.1 In accordance with section 188 of the Building Act 2004, I hereby determine that the retrofitted sills installed to the consented windows and doors comply with Clause B2 and Clause E2 of the Building Code.

Signed for and on behalf of the Chief Executive of the Ministry of Business, Innovation and Employment on 9 November 2015

John Gardiner
Manager Determinations and Assurance

Appendix A

A.1 Relevant sections of the Building Act 2004 include:

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.

42A Building work for which building consent is not required under Schedule 1

- (1) Despite section 40, subject to the conditions set out in subsection (2) and whether or not a building consent would otherwise have been required, a building consent is not required for building work in the following categories:
 - (a) building work described in Part 1 of Schedule 1; or
 - (b) building work described in Part 2 of Schedule 1 that is carried out by an authorised person (see subsection (3)); or
 - (c) building work described in Part 3 of Schedule 1 if the design of the building work has been carried out or reviewed by a chartered professional engineer and the building work has been carried out in accordance with that design.
- (2) Subsection (1) is subject to the following conditions:
 - (a) the building work complies with the building code to the extent required by this Act:
 - (b) after the building work is completed, the building,—
 - (i) if it complied with the building code immediately before the building work began, continues to comply with the building code; or
 - (ii) if it did not comply with the building code immediately before the building work began, continues to comply at least to the same extent as it did then comply:
 - (c) ...

A.2 Relevant sections of Schedule 1 to the Building Act 2004 include:

Part 1

Exempted building work

General

- 1 General repair, maintenance, and replacement
 - (1) The repair and maintenance of any component or assembly incorporated in or associated with a building, provided that comparable materials are used.
 - (2) Replacement of any component or assembly incorporated in or associated with a building, provided that—
 - (a) a comparable component or assembly is used; and
 - (b) the replacement is in the same position.