



Determination 2013/068

The compliance of a timber barrier to a deck, with respect to Clause B1 Structure, to a house at 99 Blue Pacific Parade, Riversdale Beach, Masterton

1. The matter to be determined

1.1 This is a determination under Part 3 Subpart 1 of the Building Act 2004¹ (“the Act”) made under due authorisation by me, John Gardiner, Manager Determinations 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 to the determination are

- the owner of the house, M Vickers (“the applicant”), acting through a licenced building practitioner
- The licenced building practitioner, G McNelly of Premier Design (“the designers”)
- Masterton District Council carrying out its duties and functions as a territorial authority or a building consent authority (“the authority”).

1.3 The matter to be determined² is whether the proposed deck balustrade will comply with Clause B1 Structure of the Building Code³ (First Schedule, Building Regulations 1992).

1.4 In making my decision, I have considered the submissions of the parties, the report of a firm of professional consultants commissioned by the Ministry to advise on this dispute (“the experts”), and the other evidence in this matter.

1.5 The relevant clauses of the Building Code are set out Appendix A.

2. The building work

2.1 The building work in question consists of a proposed barrier to a new deck. The barrier is to be constructed with eight posts, 45 x 45mm newel posts that are a maximum of 100mm apart, and a top rail consisting of 140 x 45mm and 90 x 45mm members. All the timber members are to be grade SG8⁴ and treated to H3.2.

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

² Under section 177(1)(a) of the Act

³ In this determination, unless otherwise stated, references to sections are to sections of the Act and references to clauses are clauses of the Building Code

⁴ SG - Structural Grade

- 2.2 The posts are at 1800mm centres and are fixed to the deck trimmers with two M12 stainless steel coach bolts and to the joist ends with proprietary stainless steel brackets and M12 stainless steel bolts. The top rail is secured to each post with four skewed 90 x 3.75mm stainless steel power-driven nails. The newel posts are secured to the top rail and to the deck framing with two 90 x 3.15mm stainless steel power-driven rails to each end of each newel post.
- 2.3 A section through the deck and barrier is shown in Figure 1 below.

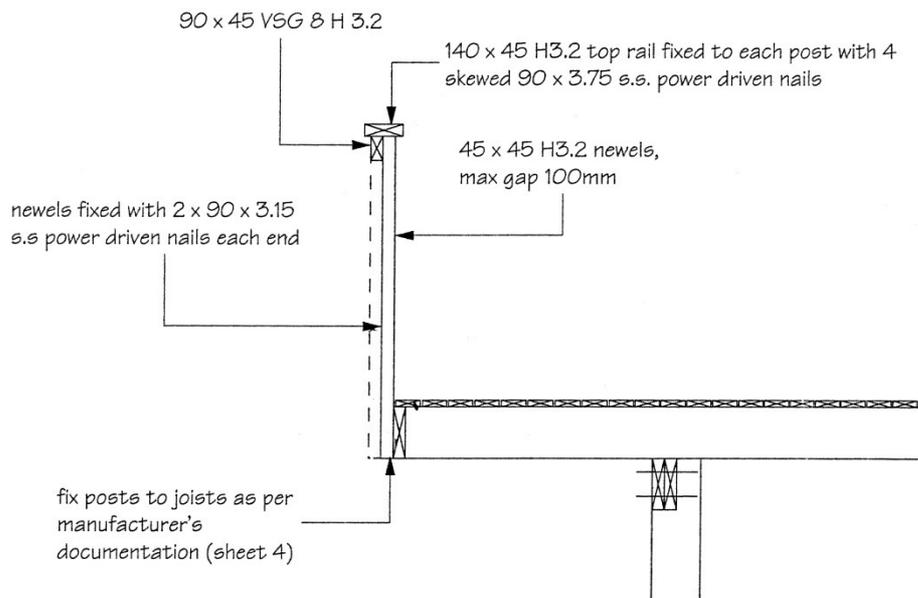


Figure 1: Part section through deck and barrier (not to scale)

3. Background

- 3.1 The designers applied for a building consent for the deck and barrier in March 2013.
- 3.2 In an email to the designers dated 19 March 2013, the authority requested additional information. As regards the deck barrier, the authority stated:
- Please specify the maximum gap between the bottom rail and deck floor
- Please indicate how the top rail, bottom rail and palings are to be fixed
- 3.3 The designers responded by email on 2 May 2013, and in respect of the barrier said:
- The newels are fixed to the deck framing as there is no bottom rail proposed ...
- ... refer updated section [on sheet 2] detailing the requirements to fix the framing with power driven s.s nails ...
- 3.4 The authority emailed the designers on 3 May 2013, noting that the barrier elevations did not align with those indicated by the designers. The authority also said that the designers need to demonstrate how the barrier fixings complied with Clause B1. It was suggested that the designers might like to refer to the published *Guidance on Barrier Design* document (“the guidance document”)⁵, or alternatively, provide another specific engineering design. The latter option ‘may need to be screened by a structural engineer’ engaged by the authority.

⁵ *Guidance on Barrier Design*. Department of Building and Housing, 2012. Published under section 175 of the Act.

- 3.5 In an email to the authority dated 9 May 2013, the designers said that they would re-draw the barrier elevations and check with the guidance document to see if it covered the design.
- 3.6 Further email correspondence passed between the authority and the designers as to the compliance of the barrier as designed, with particular reference to the adequacy of the barrier newel posts. On 20 May 2013, the authority emailed the designers listing the following three alternatives:
- the barrier to be fully designed in accordance with the guidance document, or
 - the provision of a specific engineering design by a ‘certified professional engineer’, together with a Producer Statement 1 (design certificate), or
 - the provision of a Producer Statement 2 (design review certificate) from a ‘CPEng engineer’.
- 3.7 The designers responded by email on 24 May 2013 querying why the authority could not issue a building consent, and saying that to amend the design, which the designers considered to be code-compliant, would add unreasonable cost that would have to be borne by the applicant. The email said the issue was the comparison of two sections of timber one metre long fixed in the same manner.
- 3.8 The Ministry received an application for a determination on 27 May 2013.

4. The submissions

- 4.1 The applicant did not provide a written submission with the application documentation, but did attach copies of:
- the plans
 - additional consent documentation
 - the correspondence with the authority.
- 4.2 The authority provided a written submission dated 24 May 2013. The authority did not accept that it had refused to issue a building consent; rather, it had requested additional information in respect of a design that was outside the Acceptable Solution and the guidance document. The authority referred to the guidance document, noting that it was quite specific. It also said that it had requested a specific engineering design. As the design was considered to be outside the scope of an approved solution, the authority requested that it be calculated and substantiated by a suitably qualified registered person.
- 4.3 A draft determination was issued to the parties for comment on 5 September 2013.
- 4.4 The authority accepted the draft without comment on 9 September 2013.
- 4.5 The designers did not accept the draft. In a submission received on 30 September 2013 the designers contended that:
- the 90mm nails must be skew fixed so the nails do not penetrate right through the timber; it can be assumed that a licensed building practitioner would not need to be told this via the consent

- it was not accepted that the lack of information regarding the nailing of the newel posts could be taken to mean that the proposed work was not compliant
- the work was not a departure from an Acceptable Solution as B1/AS2 ‘Timber Barriers’ had been withdrawn
- the design as submitted exceeds the design shown in the guidance document
- suitable deflection criteria was at the judgement of the design engineer; the deflection given in the standard (refer paragraph 6.2) was a recommendation and not a requirement.

4.6 In an email dated 21 October 2103 the designers reiterated the points made above but also asked whether it was reasonable for the nailing pattern for the newel posts to be detailed in the consent, i.e. was it necessary to show this level of detail. The designer considered it unreasonable that the authority had not carried out any assessment itself, and questioned why any specifically engineered design appeared to require verification by a Chartered Professional Engineer.

4.7 In response to the designers submission I note the following:

- If compliance is dependent on the method of nailing the newel posts, then in my view it is not unreasonable that the consent documents should include this level of detail; for example the layout of fixings for sheet bracing is provided, typically via manufacturer’s literature, to show how compliance is to be achieved. While I accept that it is likely that the nails are likely to be skewed, in this instance it is not unreasonable that the nailing layout be detailed.
- Paragraph 1.0.3 e) of Verification Method B1/VM1 refers to ‘an engineer with relevant experience and skills in structural engineering’ being responsible for interpreting structural design standards, and that a Chartered Professional Engineer is deemed to satisfy this requirement. However, this does not prevent someone who is not a Chartered Professional Engineer from carrying out such work so long as they have the relevant skills and experience.
- I accept that the in-depth analysis by the expert (refer paragraph 5) may well be in excess of what would be considered necessary to show compliance.

5. The experts’ report

5.1 As described in paragraph 1.4, I engaged the services of a firm of engineering consultants (“the experts”) to assist me. The experts examined the relevant information regarding the barrier and produced an initial report dated 11 July 2013 and a final report dated 13 August 2013.

5.2 The initial report was sent to the parties for comment on 11 July 2013: the report contained a comprehensive design review of the structure. In an email dated 12 July 2013, the designer responded to the report saying that the matter for determination was ‘whether a 45 x 45 newel can be used on a safety barrier in accordance with NZBC B1 – Structure’. The designer noted matters that he believed the report had not taken account of.

- 5.3 The final report noted that as the proposed construction details for the barrier were different from those recommended in NZS 3604⁶, it required specific engineering design. In order to verify the design, the experts assessed strength and deflection using modelling software and with reference to the requirements of NZS 1170⁷ and NZS 3603⁸.
- 5.4 The experts concluded that the 45x45 newel post satisfied the strength requirements, but only when the newel post was fixed to the deck members in a manner where the newel developed some bending moment capacity to reduce the overall bending strength demand. The newel did not have sufficient strength when it was considered a simply-supported beam.
- 5.5 The experts' report provided detail of the nail size and position in order to achieve the necessary bending capacity. It is noted that the proposed design did not specify how the newel posts were to be fixed other than the size of the nails used.
- 5.6 The experts considered the proposed design did not satisfy the deflection requirements: when subject to design loading, the horizontal deflection at the top of the balustrade exceeded the limit given in AS/NZS 1170 by 5%.

6. Discussion

- 6.1 I accept that the calculations shown in the experts' report confirm that provided the nailing requirements recommended by the experts are used, the 45 x 45mm newel posts comply with the Clause B1 in terms of strength. The nailing required to achieve this was not detailed in the proposed design and consequently there was insufficient evidence to show that barrier with comply with Clause B1 Structure
- 6.2 The experts' calculations indicate that the barrier does not meet the requirements of AS/NZS 1170 in respect of deflection: the deflection limit is exceeded by only a small margin (5%). The deflection limits given in AS/NZS 1170 are provided in an informative section of that standard.
- 6.3 The Building Code Clause B1.3.2 says that buildings and building elements 'shall have a low probability of causing loss of amenity through undue deformation ...' Given the deck's expected use I do not consider there will be any significant loss of amenity arising from the expected deflection.
- 6.4 The proposed design is a departure from the guidance document provided for barriers, and I consider the authority was justified in requesting further information from the designer to enable it to be satisfied on reasonable grounds that compliance with Clause B1 would be achieved. However, I note that while a Chartered Professional Engineer is deemed to be able to undertake this design work, anyone with the relevant skills and experience is also able to undertake such work.

⁶ NZS 3604:2011 Timber framed buildings

⁷ AS/NZS 1170: 2004 Structural design actions

⁸ NZS 3603:1993 Timber structures standard

7. The Decision

- 7.1 In accordance with section 188 of the Building Act 2004, I hereby determine that there is insufficient evidence to show that the deck barrier as proposed will comply with New Zealand Building Code Clause B1 Structure.

Signed for and on behalf of the Chief Executive of the Ministry of Business, Innovation and Employment on 8 November 2013.

John Gardiner
Manager Determinations and Assurance

Appendix A: the Legislation

A.1 The relevant sections of the Building Regulations 1992 include:

CLAUSE B1—STRUCTURE

OBJECTIVE

B1.1 The objective of this provision is to:

- (a) Safeguard people from injury caused by structural failure...

PERFORMANCE

B1.3.1 Buildings, building elements and sitework shall withstand the combination of loads that they are likely to experience 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.