



## Determination 2019/023

# Regarding the compliance of a proposed glass balustrade with Building Code Clause F4 Safety from falling at 540 Albert Street, Palmerston North

### Summary

This determination considered the compliance of a glass balustrade with Building Code Clause F4 Safety from falling. The determination considers whether the proposed barrier will restrict the passage of children.

### 1. The matter to be determined

- 1.1 This is a determination under Part 3 Subpart 1 of the Building Act 2004<sup>1</sup> (“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 architect, C Campbell (“the architect”), who as a Registered Architect, is deemed to be a licensed building practitioner<sup>2</sup> and therefore a party to the determination. The architect applied for the determination
  - Palmerston North City Council (“the authority”) carrying out its duties as a territorial authority or building consent authority
  - the owner of the property, B Higgins (“the owner”).
- 1.3 This determination concerns the proposed design of a glass balustrade for a new residential house (“the proposed barrier design”). The proposed barrier design was consented by the authority. However, questions about the compliance of the proposed design arose prior to the construction of the balustrade.
- 1.4 The matter to be determined<sup>3</sup> is therefore whether the proposed design of the glass balustrade complies with Clause F4.3.4(g) Safety from falling of the Building Code<sup>4</sup>.
- 1.5 In making my decision, I have considered the submissions of the parties and the other evidence in this matter.

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<sup>1</sup> The Building Act, Building Code, compliance documents, past determinations and guidance documents issued by the Ministry are all available at [www.building.govt.nz](http://www.building.govt.nz) or by contacting the Ministry on 0800 242 243.

<sup>2</sup> Registered Architect under the Registered Architects Act 2005 are treated as if they were licensed in the building work licensing class Design 3 under the Building (Designation of Building Work Licensing Classes) Order 2010.

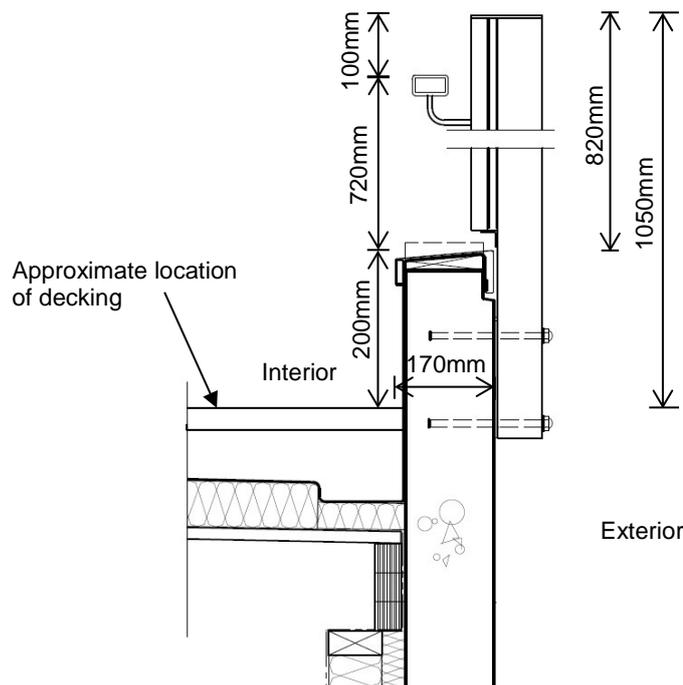
<sup>3</sup> Under section 177(1)(a).

<sup>4</sup> In this determination, references to sections are to sections of the Act and references to clauses are to clauses of the Building Code.

## 2. The building work and background

### 2.1 The building work

- 2.1.1 The new house is a four bedroom, two storey house on a flat site. Construction of the house is almost complete. The house is constructed on a concrete slab, with timber framing and textured precast concrete panel walls and clad in vertical timber weatherboard.
- 2.1.2 The house has a membrane covered deck at the first floor level, above part of the ground floor level.
- 2.1.3 The precast concrete panel walls extend 200mm above the finished floor level of the first floor level deck, creating a nib. The width of the top edge of the nib is 150mm. The nib has a flashing capping the panel, creating a 170mm wide surface, 200mm<sup>5</sup> above the finished floor level of the deck.
- 2.1.4 Proprietary glass panels are to be bolted to the outside of the concrete panels. The glass panels will extend 820mm high above the nib and flashing (refer Figure 1). The top edge of the glass panels will be 1050mm above the finished floor level of the deck.
- 2.1.5 A rectangular hollow section bracketed handrail will project from the inside of the glass panels. The top of the handrail will be 100mm below the top of the glass panels.



**Figure 1: The proposed barrier design (not to scale)**

### 2.2 Background

- 2.2.1 A building consent application for the house was made by the architect and building consent (no.46970) was subsequently granted by the authority on 29 August 2017. The granted building consent included the proposed design of the glass balustrade as detailed in Figure 1.

<sup>5</sup> It is not clear whether the 200mm height of the nib includes the 30mm height of the flashing. The drawings provided by the architect do not appear to include the timber decking, so the overall height of the step is unclear.

- 2.2.2 During construction, the company contracted to provide the proprietary glass panel system sought clarification from the architect on the proposed design, noting the 200mm high step below the barrier conflicted with their interpretation that F4/AS1<sup>6</sup> only allows for a 150mm high step. The company requested that the authority specifically approve the detail.
- 2.2.3 The architect subsequently sought clarification from the authority. In an email dated 11 December 2018, the authority stated that it had reviewed the proposed design and:
- From F4/AS1 the raised nib/wall would have to be on a 60 degree angle to restrict children climbing. If the balustrade was placed on the inside of nib/wall [the authority] would have no issues.
- 2.2.4 The architect subsequently applied for a determination on 18 December 2018.

### 3. The submissions

3.1 The architect included a submission that set out the background to the application and noted the following (in summary):

- the purpose of the barriers is to prevent small children from climbing over
- the Acceptable Solution states the overall height of a barrier is 1000mm and allows 850mm from any “step” to the top of the barrier
- there is no adverse consequence for the safety of users provided a 850mm height above the step is maintained.

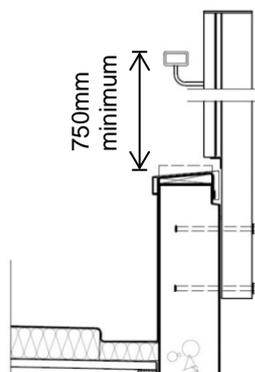
3.2 The application included:

- photos of the house
- a copy of the building consent and consented plans
- a copy of an email dated 11 December 2018 from the authority, with the authority’s view of the compliance of the proposed design.

3.3 On 20 March 2019 the authority acknowledged the determination application and submitted a copy of the correspondence with the architect but did not provide a submission outlining their views.

3.4 A draft determination was issued to the parties for comment on 24 April 2019.

3.5 On 26 April 2019 the architect responded accepting the determination, and noted the consented drawings contained a mistake in regard to the balustrade height. The handrail should have been dimensioned from the top of the nib, as below.



**Figure 2: Revised handrail dimension**

<sup>6</sup> Acceptable Solution F4/AS1 – Clause F4 Safety from falling.

3.6 I note the altered design with the top of the handrail within 750mm of the nib does not meet the minimum height requirements identified in F4/AS1 (refer paragraph 4.3.8). For the reasons discussed below, the decision in the determination would remain unchanged because the altered design does not comply.

3.7 On 16 May 2019 the authority accepted the draft determination without any further comment.

## 4. Discussion

### 4.1 The requirements of Clause F4

4.1.1 The objective of Clause F4 (outlined in Clause F4.1) is to safeguard people from injury caused by falling and the functional requirement (Clause F4.2) requires buildings to be constructed to reduce the likelihood of accidental fall.

4.1.2 Performance requirement Clause F4.3.1 of the Building Code requires the presence of barriers where people could fall one metre or more from an opening in the external envelope or floor of a building.

4.1.3 Clause F4.3.4 requires barriers in houses<sup>7</sup> to:

- (a) Be continuous and extend for the full extent of the hazard,
- (b) Be of appropriate height,
- (c) Be constructed with adequate rigidity,
- (d) Be of adequate strength to withstand the foreseeable impact of people and, where appropriate, the static pressure of people pressing against them.
- (e) Be constructed to prevent people from falling through them, and
- (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.

...

4.1.4 The matter in dispute is specifically whether the proposed barrier design is climbable and therefore does not restrict the passage of children under 6 years of age. The matter is confined to the compliance of the proposed barrier design with Clause F4.3.4(g). I have not considered the compliance of the proposed barrier design with the other performance requirements of Clause F4 or other Building Code clauses because they are not in dispute.

### 4.2 Compliance of the proposed design as an Acceptable Solution

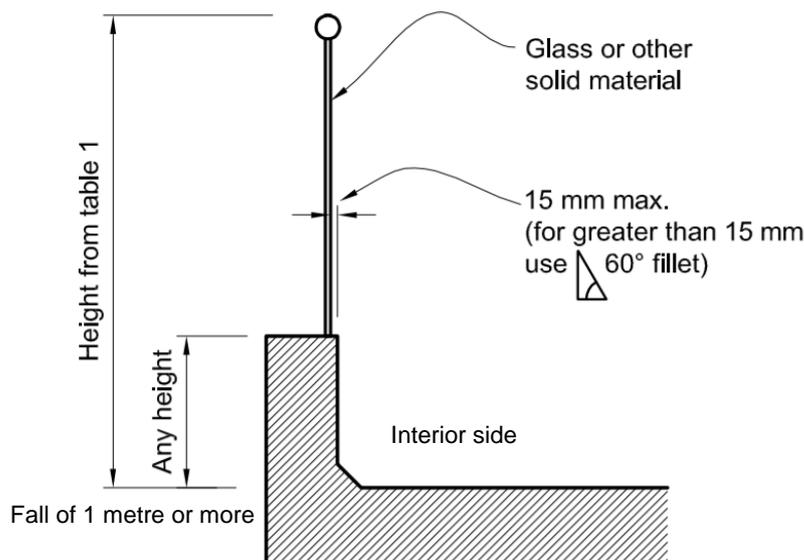
4.2.1 The architect is of the view F4/AS1 allows for a step 200mm high provided the overall height of the barrier is appropriately increased to prevent young children climbing over.

4.2.2 Acceptable Solutions are one means of establishing compliance with the Building Code through prescriptive requirements. If a barrier design satisfies Acceptable Solution F4/AS1, it is deemed to comply with Clause F4.

4.2.3 F4/AS1 describes the provisions for construction relating to heights and openings within barriers and details a number of barrier constructions. The barrier designs include measures to prevent small children from climbing over or through as well as satisfying the other performance requirements of Clause F4.

<sup>7</sup> The subject building has the classified use '2.0 Housing, 2.0.2 Detached Dwelling' as defined in Building Code Clause A1 Classified Uses. Accordingly F4.3.4(h) does not apply to this building.

- 4.2.4 F4/AS1 requires the proposed barrier in this case to have a minimum height of 1000mm as the barrier is for a deck area of a dwelling. The proposed barrier design is 1050mm in height from the finished floor level of the deck to the top of the glass balustrade, and therefore satisfies the height requirement set out in F4/AS1 in this respect.
- 4.2.5 Figure 3 of F4/AS1 shows a barrier construction for glass or other solid material (refer to Figure 3). It has a section of glass material connected to a nib. The construction allows the nib to be of any height, provided the glass section of the barrier is no more than 15mm from the edge of the interior side of the nib, or alternatively a 60° fillet is needed. The small width or fillet is to prevent the nib being used as a ledge or step. The commentary in F4/AS1 also recognises that barriers with full height vertical members are the hardest for children to climb.



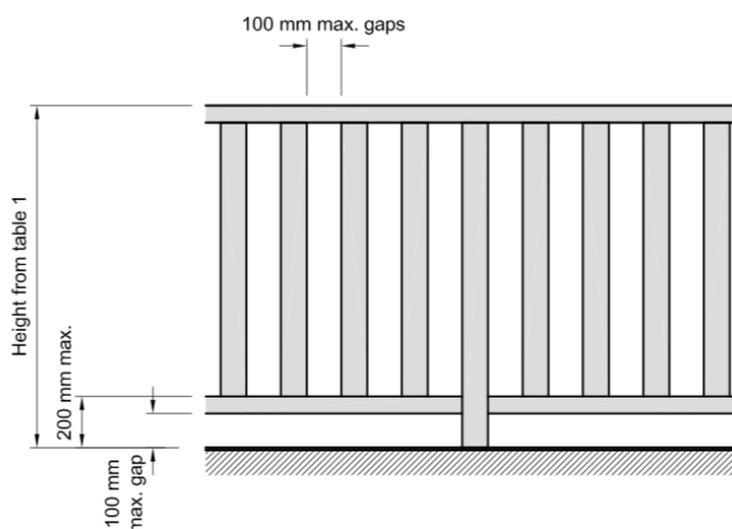
**Figure 3: F4/AS1 barrier (Figure 3) – Barriers in areas likely to be frequented by children under 6 years of age – glass or other solid material**

- 4.2.6 In this case the proposed barrier design has glass panels attached to the outside of the concrete panels. This is comparable to the nib and glass construction in Figure 3 above. However, the width at the top of the nib, including the flashing capping to the panels, at 170mm is considerably wider than 15mm allowed for in Figure 3. Alternatively, Figure 3 provides for this nib to be wider than 15mm if it incorporates a 60° fillet, which in this case has not been included in the proposed barrier design.
- 4.2.7 The proposed barrier design also incorporates a handrail, with the top of the handrail being 100mm below the top of the glass panels. The F4/AS1 construction shown in Figure 3 does not have any projections from the glass sections of the barrier, with a handrail instead located on top of the barrier.
- 4.2.8 For these reasons, the design is not in accordance with F4/AS1 and therefore the Acceptable Solution cannot be used as the means of establishing code compliance.

### 4.3 Compliance of the proposed design as an alternative solution

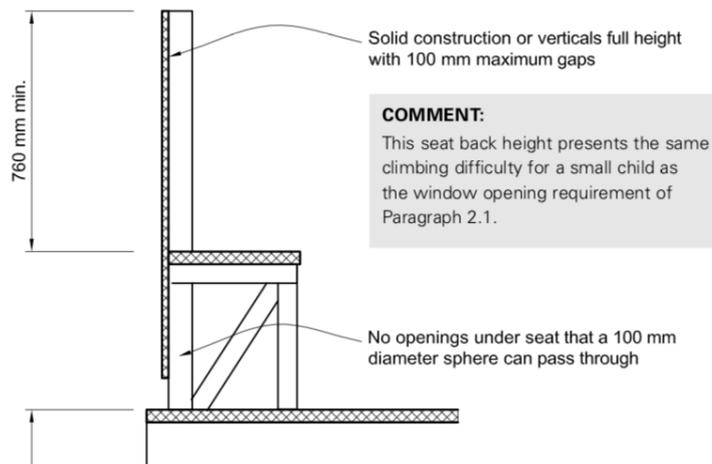
- 4.3.1 The architect has stated that the proposed barrier design is ‘an extension of the rules established in the various figures’ contained in F4/AS1. I have therefore considered whether the proposed barrier design complies as an alternative solution.

- 4.3.2 Considering the compliance of the proposed barrier design as an alternative solution requires an assessment of the likely performance of the design against the performance criteria of Clause F4, and in particular Clause F4.3.4(g). In evaluating the design, it is useful to make some comparisons with the relevant Acceptable Solutions. I have compared the constructions in F4/AS1 with the proposed design in terms of how they prevent small children from climbing them.
- 4.3.3 The proposed design has a 170mm wide nib (including the flashing). This is wide enough that it can be stood on by a young child, taking into consideration Figure 3 restricts the size of a nib to 15mm. I have considered whether any of the constructions shown in F4/AS1 include a similar climbable feature and how it is mitigated. The two following examples from F4/AS1 contain features that would act as a ledge or step for a young child to climb and stand upon.
- 4.3.4 Figure 2a of F4/AS1 shows a barrier with parallel vertical members (refer Figure 4). The construction provides for the top of the bottom horizontal member to be 200mm maximum from the floor level, and the vertical members to have spaces between them of no greater than 100mm.



**Figure 4: F4/AS1 barrier (Figure 2a) – Barriers in areas likely to be frequented by children under 6 years of age – parallel members**

- 4.3.5 In Figure 4 the spaces between the vertical members on the bottom horizontal member could be used as footholds and stood on by a young child. This is similar to the effect of the nib and flashing in the proposed barrier design. This climbable feature has been mitigated in several ways. The bottom horizontal member height is limited to 200mm maximum from the finished floor level, which ensures a maximum height to the top horizontal member is maintained that is considered appropriate in F4/AS1. Vertical members are also used to infill the barrier, which are harder for children to use to climb when compared to horizontal members.
- 4.3.6 Figure 6b of F4/AS1 shows a barrier with fixed seating on a deck for situations where the height of the fall is more than 1000mm. This construction provides for solid construction or full height vertical members with gaps no greater than 100mm. There is no minimum or maximum height of the seat itself.



**Figure 5: F4/AS1 barrier (Figure 6b) – fixed seat on a deck to housing**

- 4.3.7 The inclusion of the seat shown in this (Figure 5) construction would have a similar effect as the nib and flashing in the proposed barrier design, in that it could be climbed and stood on by a young child. In this instance, there is no maximum height for the climbable object (the seat) and instead there is a minimum height required for the back of the seat. The barrier itself also can only be constructed from solid panels or vertical members with 100mm maximum gaps, again construction types that are harder for children to use to climb. There is also no top horizontal member that a child could use as a handhold to climb the barrier.
- 4.3.8 I need to consider how the dimensions of the proposed barrier design compare with the F4/AS1 constructions in terms of heights that would prevent a small child from climbing them. Given the applicable F4/AS1 requirement for the total barrier height to be 1000mm<sup>8</sup>, the height of the Figure 4 (F4/AS1 Figure 2a) construction above the horizontal member is 800mm. The height of the Figure 5 (F4/AS1 Figure 6b) construction is 760mm. Therefore, I consider the height of the glass panels in the proposed barrier design at 820mm to extend an appropriate height above the nib and flashing.
- 4.3.9 However, as mentioned in paragraph 4.2.7, the proposed design also incorporates a handrail. The top of the handrail is 100mm below the top of the glass panels, and it projects out from the glass panels. The top of the handrail is 720mm above the nib and flashing.
- 4.3.10 The handrail projects out from the glass panels, which a young child could use to pull themselves up and scale the barrier. Using the heights from F4/AS1 as guidance, at 720mm the handrail would be easily reachable by a young child standing on the ledge created by the nib and flashing. This handrail in combination with the 170mm climbable ledge negates the fact that solid glass panels are proposed. I consider that the proposed barrier design would therefore be easier for young children to climb than constructions shown in F4/AS1.
- 4.3.11 I note the designs shown in F4/AS1 will prevent almost all children up to the age of 3 years from climbing. When looking to F4/AS1 for alternative solution proposal guidance, the fact the proposed barrier design departs significantly from those constructions is evidence that it will not restrict the passage of children under 6 years of age.

<sup>8</sup> For detached dwellings.

4.3.12 Accordingly, I am of the view that the height of the glass panels is appropriate taking into account the nib. However, due to the presence and location of the handrail the proposed design does not comply with Clause F4.3.4(g).

## **5. The decision**

5.1 In accordance with section 188 of the Building Act 2004, I hereby determine that the proposed design of the glass balustrade does not comply with Clause F4.3.4(g) of the Building Code.

Signed for and on behalf of the Chief Executive of the Ministry of Business, Innovation and Employment on 19 June 2019.

Katie Gordon  
**Manager Determinations**