



Determination 2016/045

Regarding whether a safety net will satisfy Clause F4 Safety from falling, to a timber walkway along the shoreline at Mangonui Harbour, Northland



Summary

This determination considers a raised pedestrian walkway located adjacent a harbour, and the compliance of a horizontal safety net proposed by the authority as a means of satisfying Clause F4 Safety from falling.

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:
 - Far North District Council, carrying out its duties as a territorial authority and building consent authority, acting through its Building Consents branch (“the authority”)
 - Far North District Council, as the owner of the walkway, acting through its Assets Management branch (“the owner”)
- 1.3 This determination arises from the inquiry by the authority whether a design for a horizontal safety net for a timber walkway (‘the walkway’) at Mangonui, Northland, in lieu of a vertical safety barrier, will comply with Building Code Clause F4 Safety from falling².

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, references to sections are to sections of the Act and references to clauses are to clauses of the Building Code.

- 1.4 The matter arose because the authority has decided upon the need to construct a safety barrier along the seaward side of the walkway after earlier amending the Building Consent (BC-2007-2710/1) to remove a vertical barrier from the original walkway design and subsequent construction. The authority now seeks confirmation that the proposed alternative horizontal barrier design, that is favourable with local residents by not obstructing views, complies with Clause F4.
- 1.5 The matter to be determined³ is therefore whether the proposed design for a horizontal safety net barrier to be constructed along the seaward side of the walkway complies with Clause F4 Safety from falling.
- 1.6 In deciding this matter, I have considered the submissions of the parties in this matter. I have not considered:
- whether the authority's decision to remove the safety barrier from the original walkway design and construction was correct, or
 - compliance with Clause B2 Durability.

2. The building work

- 2.1 The walkway is approximately 168m long and is located on the shoreline of the Mangonui Harbour. The walkway is in the order of 4 to 5m wide. There is understood to be a fall of about 2m to the sea bed. The walkway is adjacent to a road, carparking, retail outlets, and a hotel. Part of the walkway adjoins a small memorial park located on reclaimed land; at this point 450mm wide steps are formed along the inland edge of the walkway that can be used as seating. The park is grassed with some landscaping, and some seats provided.
- 2.2 At the north end of the walkway it merges with the footpath outside a building containing a retail outlet and residence: the building is built out over the water. On the north end of the building, there is parallel parking and a footpath. The ground falls away to the sea from the footpath: there is no barrier to the footpath.
- 2.3 The south end of the walkway terminates at three bollards over the water's edge. There are parallel carparks at the road edge to the south of the walkway, but no footpath. The ground falls away to the sea from the road edge: there is no barrier.
- 2.4 The two parts to the structure of the walkway comprise:
- At the north end - a concrete structure made from concrete piles with a concrete deck topped with timber decking, and
 - At the south end and adjacent the memorial park - a timber structure made from timber piles and timber decking.
- 2.5 There is no safety barrier to the walkway, however, there is a timber curb 100mm wide and 75mm high. There are 400x400mm large square timber bollards about 0.6m high evenly spaced along the seaward edge of the walkway.
- 2.6 A concept design for a horizontal safety net attached to the outside of the walkway was developed in July 2016 by a civil and structural engineering firm ('the designer'), as an alternative to a vertical barrier.
- 2.7 The concept takes into account use of safety nets in New Zealand for safety from falling on construction sites, the Ministry's publication *'Best practice guidelines for*

³ Under section 177(1)(a) of the current Act.

- working on roofs*', engagement with Safety Nets NZ Ltd, and engagement with the local community.
- 2.8 The concept design proposes that the safety net be located approximately 700mm below the walkway, allowing for the net to sag 200mm on impact so that the fall height is less than 1m. The net is supported so that someone falling into the net does not hit the supporting tube structure described below.
- 2.9 The design loading for the safety net has not yet been detailed to account for the possibility of more than one person falling at a time. At this time the proposed concept uses the design load for one person which is 2.2kN, or 224kg - being the load of a person falling.
- 2.10 The design proposes that the safety net is suspended from steel tubes⁴ attached to the existing piles with a pile clamp, and extending 2m beyond the outer edge of the walkway on the seaward side. The designer envisages that this would reoccur along the walkway at intervals of 4.5m for the timber part, and 5.0m for the concrete part.⁵ The net would be tensioned by a steel wires attached to the inner end of the steel tubes.
- 2.11 Concurrent to the safety net design, it is proposed that the kerb be increased in size to 200mm in height to help restrict the distance a child under the age of six years could jump horizontally from the walkway.
- 2.12 The authority proposes annual checks of the safety net fixings, tension wire, and netting. This is in line with Safety Net NZ Ltd's recommendation.
- 2.13 The progression of the concept design awaits confirmation of compliance with Clause F4, agreement for design loads, and costings from a steel fabricator and professional rigging company.

3. Background

- 3.1 A Building Consent (BC-2007-2710) was issued on 26 July 2007 for work to construct the walkway structure to the seaward side of an existing road - Waterfront Drive, Mangonui. The consent included a design for a vertical safety barrier to protect people from falling from the walkway. The consented barrier was a steel structure 1100mm high, a 60mm diameter top rail, and 20mm diameter vertical balusters at about 130mm centres.
- 3.2 The authority amended the building consent in 2009: BC 2007-2710/1 amended the original design of the walkway to remove the safety barrier. This amendment went against technical advice from the authority's officers.
- 3.3 The authority proceeded with the decision to remove the barrier design, and notified the Chief Executive of the DBH⁶ in accordance with section 68 of the Building Act 2004 on 4 August 2009. The authority then provided further details seeking support for the decision on 12 August 2009, to which the DBH acknowledged and maintained its neutrality, offering a determination pathway as an option.
- 3.4 The building work was undertaken in accordance with the amended plans excluding the barrier, and a code compliance certificate was issued on 5 April 2011.

⁴ The concept design shows the steelwork as galvanised, the authority says it is stainless steel.

⁵ The authority says the support tubes are at 2.0m intervals.

⁶ The Department of Building and Housing, being the predecessor to the Ministry.

- 3.5 A change of personnel within the authority has resulted in it re-visiting the need for a safety barrier along the walkway.
- 3.6 There is reportedly local distaste for a vertical barrier due to the potential for a vertical barrier to obstruct views. A recent meeting held with the authority and members of a local promotions group resulted in instruction to the authority to explore alternative solutions to a vertical barrier that would satisfy Clause F4.
- 3.7 One possible solution was a horizontal safety net in lieu of a vertical barrier, and the designer was engaged to progress this solution. A concept design for a safety net was provided to the authority on 11 July 2016.
- 3.8 The Ministry received an application for a determination on 28 July 2016.

4. The submissions

- 4.1 With the application for determination the authority submitted the following points in summary:
- The authority views the construction of the walkway as ‘illegal’ without a safety barrier that complies with Clause F4.
 - The area is frequented by children under the age of six years, and is exposed to the seabed on the eastern side, which averages a 2m drop below the walkway. The absence of a barrier poses a risk to users, however local residents oppose a vertical barrier as it would not suit the surrounding environment, and would obstruct the view.
 - The horizontal safety net is proposed as an alternative solution considering the local resident’s distaste for a vertical barrier. The authority seeks confirmation whether the safety net as a concept would comply with Clause F4.
- 4.2 The application was accompanied by:
- a background letter dated 28 July 2016
 - pictures of the as-built walkway
 - the seawall, reclamation and roading layout plan, and amended plan
 - code compliance certificate for BC-2007-2710-1
 - a letter dated 4 August 2009 advising the Chief Executive of the DBH of the decision to waive the requirement for a safety barrier
 - a concept design for a horizontal safety net, and supporting drawings, plans, and details.
- 4.3 The Ministry received a submission from the authority in response to the application on 4 August 2016 providing further supporting information, including:
- original plans and details of the walkway construction
 - amended design summary, plans and details
 - original Building Consent BC-2007-2710, and amendment documentation
 - resource consent documentation
 - correspondence between parties and the Ministry (or the DBH).
- 4.4 A draft determination was issued to the parties for comment on 5 September 2016.

4.5 The owner and authority responded to the draft determination in a joint submission received on 13 September 2016. The draft determination was accepted subject to the non-contentious amendments submitted in a letter and supporting Memo, which made following points in summary:

- the local community have not been consulted on the proposed horizontal safety barrier design to the degree suggested in the draft determination
- the Building Code's requirements for children under six has been applied inconsistently with respect to the logic applied to deliberate and accidental falls, reference was made to discussion in Determination 2002/006.
- the draft determination's reference to other compliance options is ambiguous and not helpful, and may lead to the matter being 're-litigated'.

5. Discussion

5.1 The applicable legislation and the requirements of Clause F4

5.1.1 In accordance with section 8 and 9 of the Act which sets out the meaning of 'building', I consider that the walkway is a building as it is a permanent and immovable structure, intended for use by people. It is not subject to any of the exclusions set out in section 9.

5.1.2 The objective of Clause F4.1 is to safeguard people from injury caused by falling. This is reinforced by Clause F4.2, which requires buildings to be constructed to reduce the likelihood of accidental fall. This requires the risk of accidental fall to be reduced, as no person can ever be completely protected from falling.⁷

5.1.3 The 'likelihood of accidental fall' relates to the chance of falling. Likely and likelihood are not defined in the Building Act or the Building Code. However, the word 'likely' has been considered in the Courts, where it was held that:

"Likely" does not mean probable, as that puts the test too high. On the other hand, a mere possibility is not enough. What is required is "a reasonable consequence or [something which] could well happen."⁸

"Likely" means that there is a reasonable probability, or that having regard to the circumstances of the case it could well happen.⁹

5.1.4 Performance requirement F4.3.1 states:

Where people could fall 1 metre or more from an opening in the external envelope or floor of a *building*, or from a sudden change in level within or associated with a *building*, a barrier shall be provided.

5.1.5 Performance requirement F4.3.4 lists the attributes of a compliant barrier.

5.2 The proposed safety net

5.2.1 The 1 metre fall height stated in Clause F4.3.1 recognises that falls from this height are likely to result in significant injury; consequently, a fall from a height less than 1m will satisfy Clause F4.3.1. The presence of the proposed safety net at a nominal 900mm below the walkway means that someone is unable to fall more than 1 metre

⁷ See Determination 2010/85 Safety from falling from an infinity edge swimming pool at a house.

⁸ Auckland City Council v Weldon Properties Limited 8/8/96, Judge Boshier, DC Auckland NP2627/95, upheld on appeal in Weldon Properties Limited v Auckland City Council 21/8/97, Salmon J, HC Auckland HC26/97.

⁹ Rotorua DC v Rua Developments Limited 17/12/99, Judge McGuire, DC Rotorua NP1327/97.

meaning Clause F4.3.1 is satisfied. The same would be true of a wide platform (or a number of platforms) placed in a similar location below the walkway.

5.2.2 The safety net also acts, in effect, as a horizontal barrier to the walkway. In this respect it should satisfy the relevant requirements of Clause F4.3.4 as considered below:

Requirements of F4.3.4, a) to h)	Compliance in relation to the proposed safety net
(a) Be continuous and extend for the full height of the hazard,	The net will be continuous for the full length of the walkway.
(b) Be of appropriate height,	The reference to an 'appropriate height' here is a moot point, however, the width of the horizontal barrier will be satisfied by the proposed 2.0m width, refer paragraph 5.2.3.
(c) Be constructed with adequate rigidity,	There is no evidence to show that the safety net will not be appropriately engineered to withstand the likely imposed loads.
(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,	This will be satisfied by the use of an appropriate mesh size that does not enable limbs, etc, to pass through or be caught in the net.
(f) In the case of a swimming pool ...	n/a
(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.	This is satisfied by the change on level being less than 1 metre.
(h) Be constructed so that they are not readily able to be used as seats.	The proposed net is not readily accessible from the walkway and is unable to be used as a seat when on the walkway. The net as a flexible mesh, with the outer edges also sloping towards the centre, would not be considered a seat in the normal sense.

5.2.3 I also consider whether or not the width of the safety net is sufficient to prevent a person from rolling further to the outer edge of the net, and therefore being at risk of a further fall. Determination 2008/081¹⁰ determined that a landing area of 1200mm wide would provide adequate protection in the case of a fall off a 500mm high deck. I acknowledge that a person intentionally running and/or jumping from the walkway may exceed the 2.0m width of the safety net, but this is a deliberate action. F4.2 says that 'buildings shall be constructed to reduce the likelihood of accidental fall' (my emphasis). Clause F4 does not contemplate deliberate actions, such as intentionally jumping from a building.

5.2.4 Accordingly, I consider that the proposal for a 2.0m extension of the safety net from the walkway is adequate in relation to a static fall. In this respect, while the proposal to increase the curb height to 200mm will provide a better visual barrier, I do not consider it has bearing on the appropriate width of the net.

¹⁰ Also published in Codewords, article 'Barriers and handrails', October 2008, Issue 032.

- 5.2.5 I acknowledge the safety net may be walked on and therefore used for purposes other than that for which it was intended. I consider the use of the net other than its intended manner requires a deliberate decision or action on the part of the user. As noted above, Clause F4.2 is framed in terms of reducing harm from accidental events, and not from deliberate decision or actions. How 'attractive' the net is to other uses will depend on its detailed design (mesh size, tension, etc) and it is suggested that this is taken account of in the detail design options.
- 5.2.6 The safety net may also, however, constitute a novelty that would draw the attention of children under the age of six as a play structure, thereby not directly restricting their passage, but rather enticing it.
- 5.2.7 Determination 2002/06 also considered the risk of a safety net attracting children under the age of six as a play structure and the implications of this. In that determination, the edge from which the proposed safety net extended did not have any visual clues as to the edge of the deck and the change in level.
- 5.2.8 With respect to the timber walkway in this determination, the raised curb and substantial timber bollards placed along the seaward edge of the walkway provide visual clues that alert the user to the edge and the change in level. It is an unlikely occurrence that a child under six years of age would inadvertently run off the edge of the walkway because they were unaware of the existence of the change in level.
- 5.2.9 I also consider that given the location of the walkway it can be reasonably assumed that children under the age of six would be supervised, and therefore deterred from jumping onto the net or intentionally using it as a play structure. In the event that a child might get on the net, it can be reasonably expected that an accompanying adult will come to the child's assistance.
- 5.2.10 I make no decision with respect to the need for the safety net in this location, or whether other compliance options exist.

6. The decision

- 6.1 In accordance with section 188 of the Building Act 2004 I hereby determine, in principle, that the proposed safety net complies with Clause F4 Safety from falling.

Signed for and on behalf of the Chief Executive of the Ministry of Business, Innovation and Employment on 23 September 2016.



John Gardiner
Manager Determinations and Assurance

Appendix A: The relevant legislation

A1 Clause F4 – Safety from falling

Objective

F4.1 The objective of this provision is to safeguard people from injury caused by falling

Functional requirement

F4.2 Buildings shall be constructed to reduce the likelihood of accidental fall.

Performance requirements

Relevant Provisions	Limits on application
<p>F4.3.1 Where people could fall 1 metre or more from an opening in the external envelope or floor of a <i>building</i>, or from a sudden change in level within or associated with a <i>building</i>, a barrier shall be provided.</p>	<p>Performance F4.3.1 shall not apply where such a barrier would be incompatible with the intended use of an area, or to temporary barriers on construction sites where the possible fall is less than 3 metres[, or to building providing pedestrian access in remote locations where the route served presents similar natural hazards].</p>
<p>F4.3.4 Barriers shall:</p> <ul style="list-style-type: none"> (i) Be continuous and extend for the full height of the hazard, (j) Be of appropriate height, (k) Be constructed with adequate rigidity, (l) Be of adequate strength to withstand the foreseeable impact of people and, where appropriate, the static pressure of people pressing against them, (m) Be constructed to prevent people from falling through them, and (n) In the case of a swimming pool, restrict the access of children under 6 years of age to the pool or the immediate pool area, (o) 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, (p) Be constructed so that they are not readily able to be used as seats. 	<p>Performance F4.3.4(f) shall not apply to any pool exempted under section 5 of the Fencing of Swimming Pools Act 1987.</p>

A2 Clause A2 - Interpretation

intended use of a building includes—

(a) any reasonably foreseeable occasional other use that is not incompatible with the intended use; and...