



Determination 2017/027

Regarding the compliance of space saver stairs as an alternative solution at 26 Oceanair Drive, Pauanui

Summary

This determination considers the compliance of space saver stairs to a mezzanine level in a house. The determination discusses how the intended use of the mezzanine level will affect the Acceptable Solution design requirements, and whether the stairs comply with Clause D1 as an alternative solution.

1. The matters to be determined

- 1.1 This is a determination under Part 3 Subpart 1 of the Building Act 2004¹ (“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 owners of the house, M and T Procter, and B and M Procter (“the owners”)
 - the licensed building practitioner concerned with the relevant building work who applied for this determination, A Taylor (“the applicant”), acting through an agent
 - Thames-Coromandel District Council (“the authority”), carrying out its duties as a territorial authority or building consent authority.
- 1.3 The matter to be determined² is whether the space saver stairway complies as an alternative solution with the requirements of Clause D1 Access Routes of the Building Code³ (First Schedule, Building Regulations 1992).
- 1.4 In making my decision, I have considered the submissions of the parties and the other evidence in this matter.
- 1.5 The relevant sections of the Act, clauses of the Building Code and Acceptable Solutions are set out the Appendices.

2. Matters outside this determination

- 2.1 The compliance of the mesh safety net with B1, B2 and F4 regarding the opening to mesh and its use as a balustrade, has been identified by the authority in their submission. However, the applicant only applied for a determination in respect of the compliance of the stairway with Clause D1.

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 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 to clauses of the Building Code.

- 2.2 This determination is limited to the matter outlined in paragraph 1.3. I have not considered any other aspects of the Act or compliance of the building work in other respects.

3. The building work and background

- 3.1 The building work considered in this determination consists of a proposed one storey house with a mezzanine level. The consented drawings show a ground floor plan consisting of bedrooms, kitchen, laundry and two decks. The mezzanine floor plan shows an open space for storage.

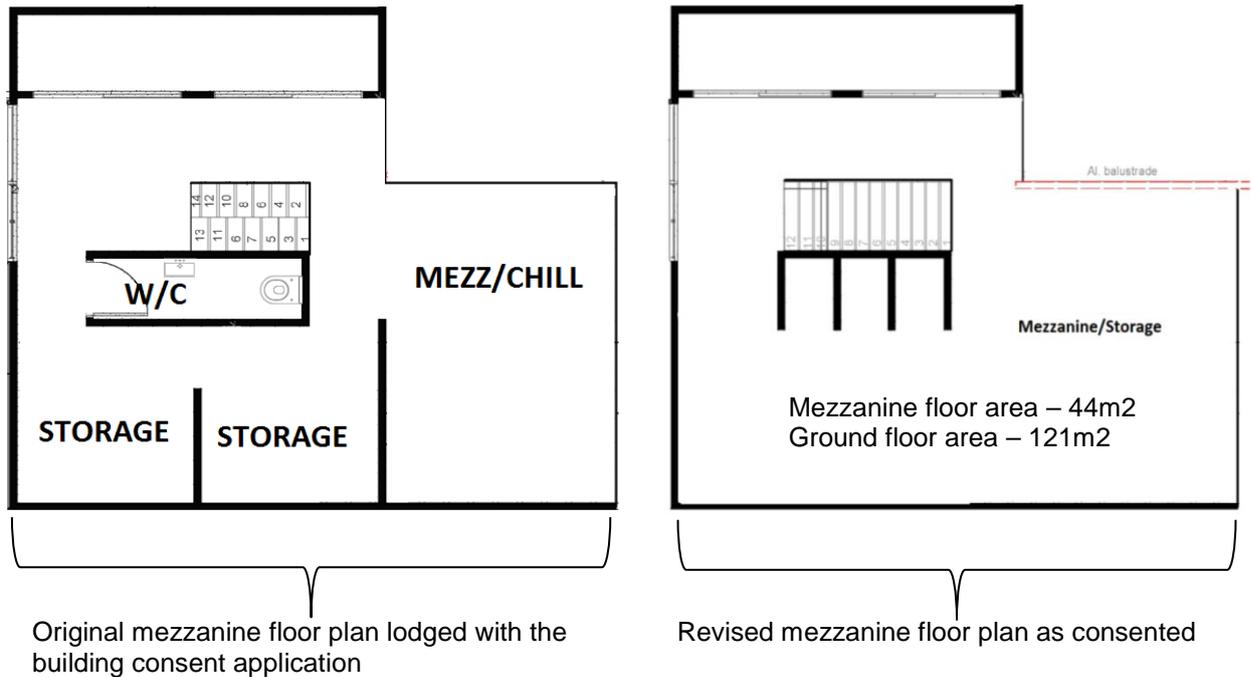


Figure 1: Mezzanine floor plans (not to scale)

- 3.2 The original lodged plans (Figure 1) show the mezzanine level with storage areas, ‘chill’ space and a toilet and basin. The applicant informed the authority that it would also be used as an overflow sleeping space. The proposed access between the ground floor and mezzanine level was by means of a space saver stairway with 14 risers at 190mm, 13 treads at 250mm with 25mm overhang.
- 3.3 The authority sent a request for information letter dated 30 September 2016 noting that it was of the view that the stairway to the mezzanine level was classified as a ‘secondary private stairway’, and requested that the designer provide the relevant construction details for the stairs.
- 3.4 The applicant responded in a letter dated 10 October 2016 providing a revised set of plans and additional stair detail showing the riser and tread dimensions for the space saver stairs.
- 3.5 On 13 October 2016 the authority wrote an email to the applicant and outlined its outstanding queries in response to the revised response. The authority stated that the space saver stairs did not meet the requirements for a ‘secondary private stairway’ as set out in D1/AS1.
- 3.6 The applicant responded with revised plans and an ‘alternative solution’ report for the space saver stairs on 17 October 2016.

- 3.7 On 18 October 2016 there was correspondence between the authority and applicant discussing the classification of the stair, and the intended use of the mezzanine level. This resulted in the applicant proposing that they would remove the toilet and basin, and the level would be primarily for storage. They requested confirmation from the authority that the stair classification of ‘minor private stairway’ would be acceptable.
- 3.8 The authority responded on 19 October 2016 and confirmed that it was of the view that a minor private stairway would be suitable as access to a level that was designated for storage purposes only.
- 3.9 The applicant responded to the authority in a letter dated 25 October 2016, and provided the revised drawings of the mezzanine level, with the removal of the toilet and the revised intended use of the area (refer Figure 1).
- 3.10 The consent for the house, on the basis of the revised layout, was issued under building consent No. ABA/2016/708 by the authority on 27 October 2016.
- 3.11 The consented drawings note the approved stairs with ‘13 risers @ 205mm, 12 treads 220mm o/a with 225mm overhang included’, and the width of the stairway is shown as 920mm.
- 3.12 The applicant decided that they wished to install the space saver stair after the building consent was issued, as an amendment to the consent. The authority had already declined to accept the design as it did not believe that it complied with the Building Code.
- 3.13 The Ministry received the application for a determination on 28 November 2016.

4. The submissions

- 4.1 In a covering letter dated 22 November 201, the applicant stated the following (in summary):
- They were of the understanding that space saver stairs met the requirements of Clause D1 and was a design accepted by building consent authorities, as they had seen evidence of it being used elsewhere in New Zealand.
 - The applicant acknowledged that the authority was of the view that as long as there was a toilet present and the mezzanine level was to be used as a sleeping area, the stair would be classified as a ‘secondary private stairway’.
 - The applicant wanted to revert to what was originally proposed for the mezzanine level with the space saver stairs. The mezzanine level was to provide space for storage, an overflow sleeping area, and could be used as a secondary living area for the children.
 - They clarified that the toilet was intended to facilitate the use of this multifunctional space. Any further development would change the mezzanine’s intended use and the stairway design would be affected. (I note that the applicant did not clarify what they consider is “further development”.)
 - They state that although there is a toilet and basin in the space, the primary use of the level will be for storage. In the alternative solution report, they classified the stairway as a ‘secondary private stairway’ due to the more onerous requirements set out in D1/AS1.

- A result of the design meeting the maximum area in terms of site coverage meant that the designer could not include external storage, such as a garage. This resulted in the inclusion of the mezzanine level for storage.
- The proposed space saver stair does not meet the pitch guidelines set out in D1/AS1, and the Acceptable Solution cannot be used to establish compliance with Clause D1.

4.2 The applicant provided an 'alternative solution' report with the following key points (in summary):

- The proposed stairway design has the following measurements:
 - Pitch: 56° (using the measurement method in D/AS1)
 - Riser: 190.3mm
 - Tread: 250mm
- The space saver stair design meets the performance requirements of Clause D1. References have been provided from the United Kingdom Building Regulations and the International Building Code, that cover alternating tread stair design (see Appendix B). The proposed stair design satisfies the requirements set out in the international building codes and regulations.

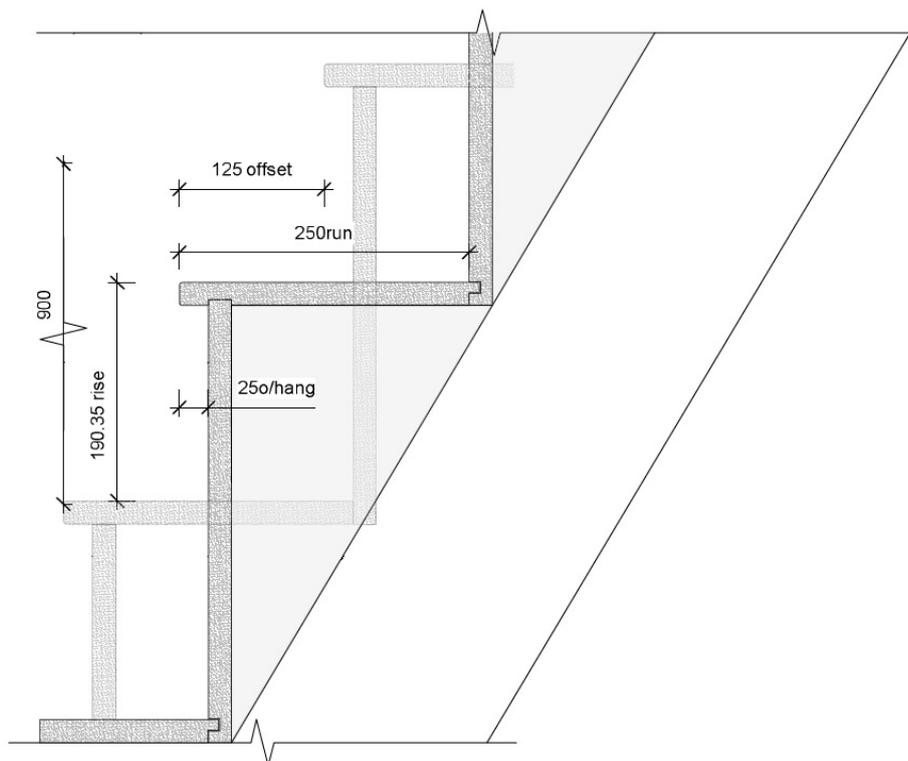


Figure 2 – Stair tread and riser dimensions

4.3 The applicant provided copies of:

- floor plans and drawings of the stairway
- photograph of an example of space saver stairs that has been used in a building in New Zealand
- correspondence between the authority and the applicant
- excerpts from international building codes and regulations (see Appendix B).

- 4.4 On 19 December 2016, in response to a request from the Ministry, the applicant provided a new drawing showing the stair design with handrails to each side of the stairway.
- 4.5 The authority acknowledged the application for determination and provided a submission dated 22 December 2016. The authority is of the view that the alternative solution proposed for the stair design does not satisfy the requirements of Clause D1.
- 4.6 The authority attached copies of:
- correspondence between the applicant and the authority
 - floor plans of the dwelling
 - a Producer Statement from the manufacturer for the aluminium balustrade.
- 4.7 A draft determination was issued to the parties for comment on 17 February 2017.
- 4.8 The applicant accepted the draft determination on 21 February 2017 with additional comments clarifying the parties to the determination and addressing an error in the consented drawings. The determination has been altered to reflect these comments.
- 4.9 The authority did not accept the draft determination on 1 March 2017 with additional comments submitted as follows:
- It viewed the stairs as a secondary private stairway during the consenting process because the ‘Mezz/Chill’ space had a toilet, and the applicant stated it would be used as a sleeping area and a living space for children.
 - The children’s living space and stairs would be frequently used.
 - The authority does not consider that the stairway will comply with the performance clause D1.1(a) to “Safeguard people from injury during movement into, within and out of buildings,…”
 - The building could have been designed to provide a stairway that satisfied the requirements as set out in D1/AS1.
 - The International Building Code states the space saver stairs are only proposed in commercial uses and not residential. The space saver stairs would not be ‘acceptable’ in residential situations.
 - The determination has not assessed the safety of the users and compliance with the main objective of Clause D1, when the applicant has ‘clearly stated’ the mezzanine level will be used by children.
- 4.10 My response to the authority’s comments in regards to the draft determination is below, unless covered elsewhere in the determination.
- 4.11 There are two graspable handrails that satisfy the requirement of D1/AS1 proposed to both sides of the stairway. I consider that the handrails will help to prevent a fall, and exceeds the Acceptable Solution where only one handrail is required to satisfy D1/AS1.
- 4.12 I note that a different gait will be required to ascend and descend the stairs. I am of the view that this will slow a person moving along the stairs, and would reduce the risk of injury.

5. Discussion

5.1 The legislation

- 5.1.1 Clause D1.3.1(c) requires that access routes shall enable people to
- (c) Move into spaces within *buildings* by such means as corridors, doors, stairs, ramps and lifts,
- 5.1.2 Clause D1.3.3 requires that access routes shall:
- (f) Have stair treads, and ladder treads or rungs which:
 - (i) provide adequate footing, and
 - (ii) have uniform rise within each flight and for consecutive flights,
 - (j) Have smooth, reachable and graspable *handrails* to provide support and to assist with movement along a stair or ladder,
 - (k) Have *handrails* of *adequate* strength and rigidity as required by Clause B1 "Structure",

5.2 The Acceptable Solution

- 5.2.1 The applicant is proposing the space saver stairs as a 'secondary private stairway' as they wish to alter the mezzanine level to be a multiuse space (see paragraph 4.1). A secondary private stairway is defined in D1/AS1 as:
- A private stairway other than a main or minor private stairway, intended to provide access to another floor containing only bedrooms, bathroom or similar accommodation
- 5.2.2 It is important to clarify the intended use and subsequently the classification of the stairway, as it will affect the design requirements of the stair. The intended use of the space has been a point of discussion by both parties, with the consented use noted as 'primarily for storage'.
- 5.2.3 The intended use of a space includes 'any reasonable foreseeable occasional use that is not incompatible with the intended use'⁴. The applicant has stated that the space is primarily for storage, an overflow sleeping space, and could be used as a secondary living room for the children.
- 5.2.4 I note that in the applicant's submission they stated the primary use of the mezzanine level was for storage. They stated that the design reached the maximum site coverage under the District Plan and additional storage such as a garage could not be proposed. The applicant has mentioned that the level could be used as a secondary living space for children, and the authority is of the view that this will result in frequent access.
- 5.2.5 The pitch of the roof results in the ceiling sloping at an angle that rapidly reduces the head height of the space as an occupant moves further into the space (see Figures 3 and 4). The habitable area of the mezzanine level is approximately 10m², whereas the total area of the level is 44m². The priority for storage is evident with a larger area dedicated to storage compared to the space that could be used for overflow sleeping space or as a secondary living space.

⁴ Under section 7 of the Act

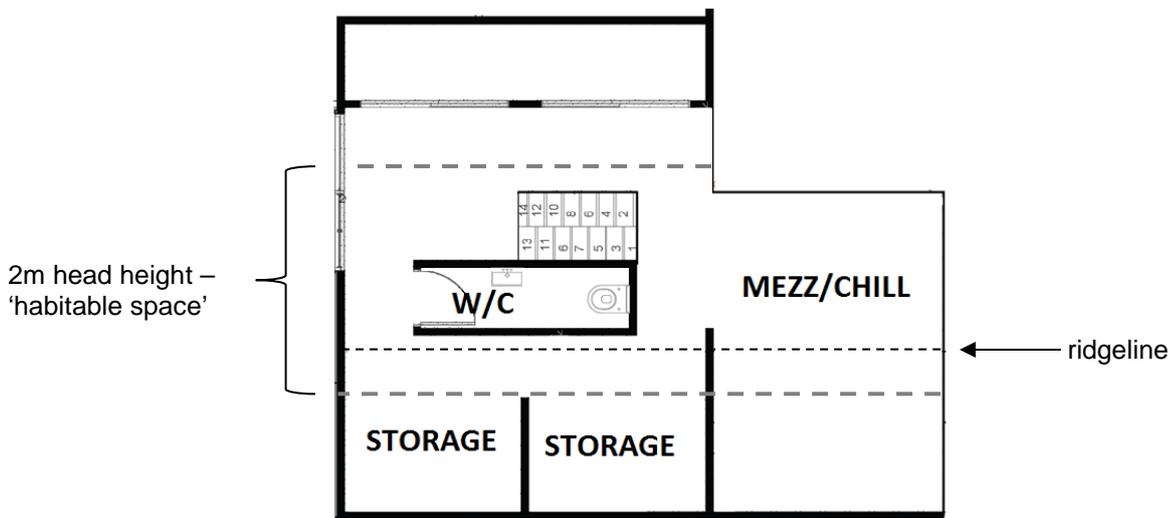


Figure 3: Mezzanine showing habitable space (not to scale)

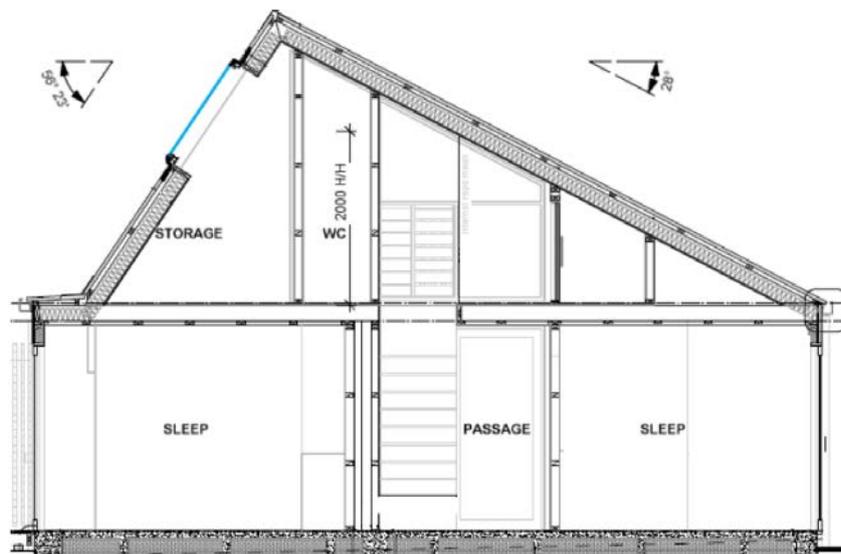


Figure 4: Section that was lodged with the original building consent (not to scale)

- 5.2.6 I consider that the lack of habitable space will reduce the likelihood of the space being frequently accessed, with storage proposed to occupy the majority of the level. Also, I note that the stair is in effect only leading to one space, and would not be used as thoroughfare to reach other frequently used spaces.
- 5.2.7 To ensure that a person moving along the stairs will not trip, appropriate tread and riser dimensions are set out in D1/AS1. The space saver stair with a 190mm riser satisfies both secondary and main private heights under D1/AS1. The tread at 250mm satisfies the secondary definition and is 30mm shorter than the 280mm required for the main private tread. The 250mm tread is designed with adult foot lengths in mind and the tread is adequate for a child's foot.
- 5.2.8 I consider the proposed stair design meets the requirements for a 'secondary private stairway' as set out in section 4.1 of D1/AS1 except for 4.1.1, because the pitch exceeds the maximum. Therefore, the stair is not in accordance with the Acceptable Solution and the applicant was correct to propose it as an alternative solution.

5.3 Compliance as an alternative solution

5.3.1 Considering the proposed alternative solution requires an assessment of the likely performance within the context of this particular house. In evaluating the design, it is useful to make some comparisons with the relevant Acceptable Solutions.

5.3.2 The proposed space saver stairs meet the requirements set out in section 4.1 of D1/AS1 in relation to:

- uniform riser and tread dimensions
- slip-resistant surfaces
- maximum tread projection.

5.3.3 The only example of a design that is similar to space saver stairs in D1/AS1 is for a staggered rung-type ladder (see Figure 5). I note that ladders are acceptable to use in residential situations where they are used for access to ‘infrequently used spaces such as attics and lofts.’ The intended use discussion established my view that the mezzanine level will be infrequently accessed. I consider the criterion of infrequent use an important distinction that allows for an alternative method of access to be proposed where access is infrequent.

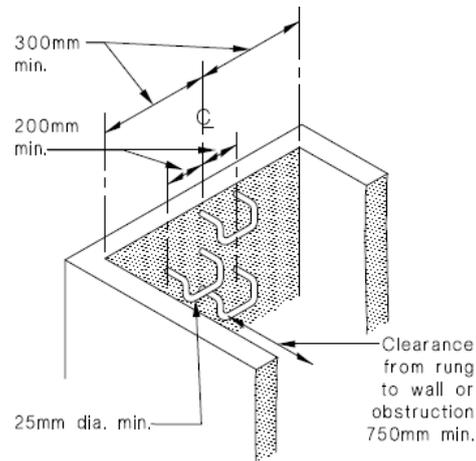


Figure 5 – Staggered rung ladder from D1/AS1

5.3.4 Space saver stairs are not considered in D1/AS1, and therefore the applicant supplied international building regulations and codes as evidence that the proposed space saver stairs comply with Clause D1 as an alternative solution.

5.3.5 The applicant referred to the ‘alternating tread stair’ design requirements as set out in the United Kingdom Building Regulations 2010: Part K1 “The UK regulations” as follows:

only in a loft conversion, (I consider the mezzanine level similar to a loft as it is a smaller partial level in the roof space, and provides access to a single room)

- only when there is not enough space for a stair that satisfies paragraphs 1.2-1.24 (these paragraphs relate to the design requirements for an ordinary stair, while paragraphs 1.25 onward relate to “special stairs”) and,
- the stair is for access to only one habitable room and, if desired a bathroom and/or a toilet (although this must not be the only toilet in the dwelling).

5.3.6 The space saver stairway design meets the requirements of the UK regulations as follows (see Appendix B for requirements):

- The design complies with Diagram 1.10 (refer Figure 6) with the 190mm rise (under the maximum 220mm) and 250mm tread (exceeding the minimum 220mm).
- The only point of difference is the stair design has closed risers to meet the requirements of paragraph 4.1.8(a) of D1/AS1.
- The original floor plan included only one handrail to the stair, with a mesh balustrade proposed. On 19 December 2016 the applicant submitted a revised stair detail indicating ‘two fully graspable handrail either side of the stairwell’, with profiles that are graspable and satisfy D1/AS1.
- The alternating treads are uniform with parallel nosings.
- A paint system that is designed to reduce the hazard of slipping has been proposed by the applicant.
- 2m head height is identified on the consented section drawing.

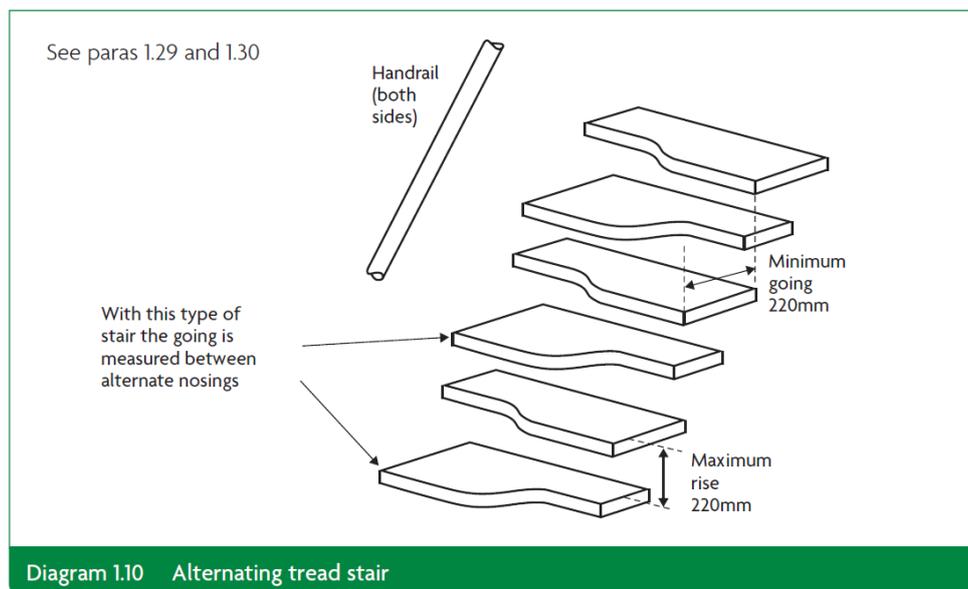


Figure 6 – Alternating tread diagram taken from the UK regulations

5.4 Conclusions

- 5.4.1 D1/AS1 does not cover space saver stairs and it was appropriate for the applicant to refer to international regulations and codes to support the application for building consent as an alternative solution.
- 5.4.2 The stairs enable the occupants to move between the mezzanine level and the ground floor meeting the requirement of Clause D1.3.1(c).
- 5.4.3 The stair treads will provide adequate footing with the tread of 250mm proposed and a uniform rise as required by Clause D1.3.3(f).
- 5.4.4 The revised drawings show two handrails that are graspable to satisfy the requirements of D1/AS1, and comply with Clause D1.3.3(j).
- 5.4.5 The proposed space saver stairs differs from the solutions described in D1/AS1. The alternative solution report provided by the applicant sets out how compliance with

the performance requirements of Clause D1 was met. Therefore, I believe the authority were incorrect to refuse to accept the proposed alternative solution as complying with Clause D1.

- 5.4.6 I note in the alternative solution report, the paragraphs cited from the international building regulations and codes are incorrect. The applicant will need to revise their alternative solution report to reflect the proposed stair design, with two handrails and correct references, when the application is made for an amendment to the consent.
- 5.4.7 It is emphasised that each determination is conducted on a case-by-case basis. Accordingly, the fact that this space saver stair has been established as being code compliant in relation to a particular building does not necessarily mean that the same stairway will be code compliant in another situation.

6. The decision

- 6.1 In accordance with section 188 of the Building Act 2004, I hereby determine that the space saver stair design as an alternative solution complies with Clause D1.3.1(c), D1.3.3(f), and D1.3.3(j) of the Building Code.

Signed for and on behalf of the Chief Executive of the Ministry of Business, Innovation and Employment on 26 April 2017.

John Gardiner
Manager Determinations and Assurance

Appendix A: The Building Code and the Acceptable Solution

A.1 The relevant section of the Building Act 2004:

intended use, in relation to a building,—

(a) includes any or all of the following:

(i) any reasonably foreseeable occasional use that is not incompatible with the intended use:

(ii) normal maintenance:

(iii) activities undertaken in response to fire or any other reasonably foreseeable emergency; but

(b) does not include any other maintenance and repairs or rebuilding

A.2 The relevant provisions of Building Code Clause D1 - Access routes, include:

D1.3.3 Access routes shall:

(j) Have smooth, reachable and graspable *handrails* to provide support and to assist with movement along a stair or ladder

(f) Have stair treads, and ladder treads

or rungs which:

(i) provide *adequate* footing, and

(ii) have uniform rise within each flight and for consecutive flights,

(g) Have stair treads with a leading edge that can be easily seen,

(j) Have smooth, reachable and graspable *handrails* to provide support and to assist with movement along a stair or ladder,

(k) Have *handrails* of *adequate* strength and rigidity as required by Clause B1 "Structure",

A.3 The relevant paragraphs and figures from Acceptable Solution for Clause D1 Access, D1/AS1, include:

Definitions

Handrail

A rail to provide support to, or assist with the movement of a person.

Minor private stairway

A private stairway not on a main thoroughfare, and intended to provide infrequent access to a single room which is not a living area or kitchen.

Pitch line

The line joining the leading edge or nosings (if any) of successive stair treads within a single flight of a stairway.

Private stairway

A stairway used, or intended to be used, by the occupants of a single household unit.

Secondary private stairway

A private stairway other than a main or minor private stairway, intended to provide access to another floor containing only bedrooms, bathroom or similar accommodation

Appendix B: United Kingdom Regulations, British Standards, and International Code Council Building Code

B.1 United Kingdom Building Regulations 2010 Approved Document K: Protection from falling, collision and impact (2013 edition)

Appendix A - Alternating tread stair definition

A stair with paddle-shaped treads where the wide portion is on alternate sides on consecutive treads (see paragraphs 1.29 and 1.30).

For dwellings

1.9 Steps may have open risers if they comply with both of the following guidance.

- a. Overlap treads by a minimum of 16mm.
- b. Construct the steps so that a 100mm diameter sphere cannot pass through the open risers.

Alternating tread stairs in dwellings

1.29 You may use alternating tread stairs – in one or more straight flights – only in a loft conversion, and only when there is not enough space for a stair that satisfies paragraphs 1.2-1.24, and the stair is for access to only one habitable room, and if desired, a bathroom and/or a WC (although this must not be the only WC in the dwelling).

1.30 The construction of an alternating tread stair should comply with all of the following:

- a. Comply with Diagram 1.10.
- b. Make alternating steps uniform with parallel nosings.
- c. Have slip-resistant surfaces on treads.
- d. Ensure that the tread sizes over the wider part of the step are in line with the dimensions in Table 11.
- e. Comply with paragraph 1.9b.
- f. Provide a minimum clear headroom of 2m.

B.2 International Code Council: International Building Code (2000)

ALTERNATING TREAD DEVICE. A device that has a series of steps between 50 and 70 degrees (0.87 and 1.22 rad) from horizontal, usually attached to a center support rail in an alternating manner so that the user does not have both feet on the same level at the same time.

1011.14 Alternating tread devices.

Alternating tread devices are limited to an element of a *means of egress* in buildings of Groups F, H and S from a mezzanine not more than 250 square feet (23 m²) in area and that serves not more than five occupants; in buildings of Group I-3 from a guard tower, observation station or control room not more than 250 square feet (23 m²) in area and for access to unoccupied roofs. *Alternating tread devices* used as a means of egress shall not have a rise greater than 20 feet (6096 mm) between floor levels or landings.

1011.14.1 Handrails of alternating tread devices.

Handrails shall be provided on both sides of alternating tread devices and shall comply with Section 1014.

1011.14.2 Treads of alternating tread devices.

Alternating tread devices shall have a minimum tread depth of 5 inches (127 mm), a minimum projected tread depth of 8¹/₂ inches (216 mm), a minimum tread width of 7 inches (178 mm) and a maximum riser height of 9¹/₂ inches (241 mm). The tread depth shall be measured horizontally between the vertical planes of the foremost projections of adjacent treads. The riser height shall be measured vertically between the leading edges of adjacent treads. The riser height and tread depth provided shall result in an angle of ascent from the horizontal of between 50 and 70 degrees (0.87 and 1.22 rad). The initial tread of the device shall begin at the same elevation as the platform, landing or floor surface.

Exception: *Alternating tread devices* used as an element of a *means of egress* in buildings from a mezzanine area not more than 250 square feet (23 m²) in area that serves not more than five occupants shall have a minimum tread depth of 3 inches (76 mm) with a minimum projected tread depth of 10¹/₂ inches (267 mm). The rise to the next alternating tread surface shall not exceed 8 inches (203 mm).

- F – Factory and Industrial (see Section 303)

306.1 Factory Industrial Group F.

Factory Industrial Group F occupancy includes, among others, the use of a building or structure, or a portion thereof, for assembling, disassembling, fabricating, finishing, manufacturing, packaging, repair or processing operations that are not classified as a Group H hazardous or Group S storage occupancy.

- H – High Hazard (see Section 307)

[F] 307.1 High-hazard Group H.

High-hazard Group H occupancy includes, among others, the use of a building or structure, or a portion thereof, that involves the manufacturing, processing, generation or storage of materials that constitute a physical or health hazard in quantities in excess of those allowed in *control areas* complying with Section 414, based on the maximum allowable quantity limits for *control areas* set forth in Tables 307.1(1) and 307.1(2). Hazardous occupancies are classified in Groups H-1, H-2, H-3, H-4 and H-5 and shall be in accordance with this section, the requirements of Section 415 and the *International Fire Code*. Hazardous materials stored, or used on top of roofs or canopies, shall be classified as outdoor storage or use and shall comply with the *International Fire Code*.

- S – Storage (see Section 311)

311.1 Storage Group S.

Storage Group S occupancy includes, among others, the use of a building or structure, or a portion thereof, for storage that is not classified as a hazardous occupancy.