

Determination 2022/003

Regarding the compliance of proposed alterations to a dwelling by way of Acceptable Solutions B1/AS1 and E2/AS3

118A Melrose Road, Mt Roskill, Auckland

Summary

This determination considers whether two items of proposed building work comply with the relevant Acceptable Solutions. Item 1 concerns reinforcing bars to reinforce a concrete floor slab and whether the proposal complies with Acceptable Solution B1/AS1 for Building Code Clause B1 *Structure*. Item 2 concerns the use of a damp-proof membrane as waterproofing for a 1050mm high concrete masonry block retaining wall and a 300mm high timber framed retaining wall and whether the proposal complies with Acceptable Solution E2/AS3 for Building Code Clause E2 *External Moisture*.

The legislation which is discussed in this determination is contained in Appendix A. In this determination, unless otherwise stated, references to “sections” are to sections of the Building Act 2004 (“the Act”) and references to “clauses” are to clauses in Schedule 1 (“the Building Code”) of the Building Regulations 1992.

The Act and the Building Code are available at www.legislation.govt.nz. Information about the legislation, as well as past determinations, compliance documents (e.g., acceptable solutions) and guidance issued by the Ministry, is available at www.building.govt.nz.

1. The matter to be determined

- 1.1. This is a determination made under due authorisation by me, Katie Gordon, National Manager Determinations, Ministry of Business, Innovation and Employment (“the Ministry”), for and on behalf of the Chief Executive of the Ministry¹.
- 1.2. The parties to the determination are:
 - 1.2.1. the owner of the house, T. Mejdr (“the owner”); and
 - 1.2.2. Auckland Council (“the authority”), carrying out its duties as a territorial authority or building consent authority.
- 1.3. This determination arises from a dispute between the parties as to whether two items of proposed building work comply with the relevant Acceptable Solutions² as a way to demonstrate the work complies with the Building Code. For the purposes of this determination, the proposed building work comprises two items:
 - 1.3.1. Item 1 - the reinforcing of a concrete floor slab utilising reinforcing bars.
 - 1.3.2. Item 2 – the waterproofing of a 1050mm high concrete masonry block retaining wall and a 300mm high timber framed retaining wall, using a damp-proof membrane.
- 1.4. The authority considers that neither of the two items of proposed building work comply with the relevant Acceptable Solutions. The owner disagrees and is of the view that both items of work comply with New Zealand Standard 4229:2013³ (for the design of Concrete Masonry Buildings not Requiring Specific Engineering Design), which the owner considers is an Acceptable Solution for both clauses B1

¹ The Building Act 2004, section 185(1)(a) provides the Chief Executive of the Ministry with the power to make determinations.

² An Acceptable Solution is one way, but not the only way, to establish compliance of building work with the mandatory requirements of the Building Code, refer section 23. Section 19 of the Act also sets out that the authority must accept compliance with certain methods/documents as establishing compliance with the Building Code.

³ Standards New Zealand. (2013). *NZS 4229:2013 New Zealand Standard: Concrete Masonry Buildings not Requiring Specific Engineering Design*.

Structure and E2 *External Moisture*. The owner is of the view that the authority was required to accept the proposal complied with the Building Code on that basis.

- 1.5. Accordingly, the matter to be determined⁴, is whether the proposed building work complies with the Building Code by way of the Acceptable Solutions as outlined below:
 - 1.5.1. Item 1 – whether the proposed reinforcing of a concrete slab floor complies with Building Code Clause B1 *Structure* by way of Acceptable Solution B1/AS1, specifically paragraph 2.1.1.
 - 1.5.2. Item 2 – whether the proposed waterproofing of a 1050mm high concrete masonry block retaining wall and a 300mm high timber framed retaining wall, using a damp-proof membrane, complies with Building Code Clause E2 *External moisture* by way of Acceptable Solution E2/AS3.
- 1.6. Compliance with an Acceptable Solution is one way, but not the only way, to establish compliance of building work with the Building Code. However, at the owner's request, this determination is limited to considering whether items 1 and 2 comply with the Building Code by way of the relevant Acceptable Solutions.

2. The building work and background

- 2.1. The owner's house is a stand-alone dwelling in a residential area in Auckland, constructed in the 1960s. The dwelling originally comprised a single-level house, constructed with weatherboard clad timber-framed walls. Below this was a basement-level double garage, constructed with masonry concrete block walls.
- 2.2. The owner's section slopes down from the road, and access to the garage is from the rear of the dwelling. On the road-side, the garage is partially excavated into the bank, meaning that the rear wall and a portion of the side walls of the garage are set into the ground. The height of this excavation is greatest adjacent to the rear wall (roadside or north-west elevation) of the garage, decreasing as the land either side of the dwelling drops away (south-west and north-east elevations).
- 2.3. This determination concerns the building work related to the basement storey of the dwelling, where the garage is located. In August 2021, the applicant applied for building consent to (among other things) convert part of this garage into a bedroom/studio, with an ensuite bathroom and kitchenette (refer to Figure 1). This included the proposal to construct:
 - 2.3.1. Item 1 - a 100mm thick concrete floor slab for the studio, reinforced with 10mm diameter ('D10') 300MPa⁵ reinforcing bars distributed within the slab at 300mm spacings (also referred to as 'centres') in both directions with 'grade E' seismic rated bars ('300E').

⁴ Under section 177(1)(a) of the Act.

⁵ 300MPa is the measure of strength of the bars in megapascals (MPa).

2.3.2. Item 2 – two retaining walls that both form part of the walls for the new proposed habitable space/studio; a concrete masonry block retaining wall (refer Figure 1, indicated as the Blue line) of varying height between 850mm to 1050mm high and a 300mm high timber framed retaining wall⁶ (refer Figure 1, indicated as the Orange line), to be waterproofed using a ‘damp-proof membrane’⁷.

Figure 1: Basement Floor Plan with floor levels and new retaining walls (not to scale)

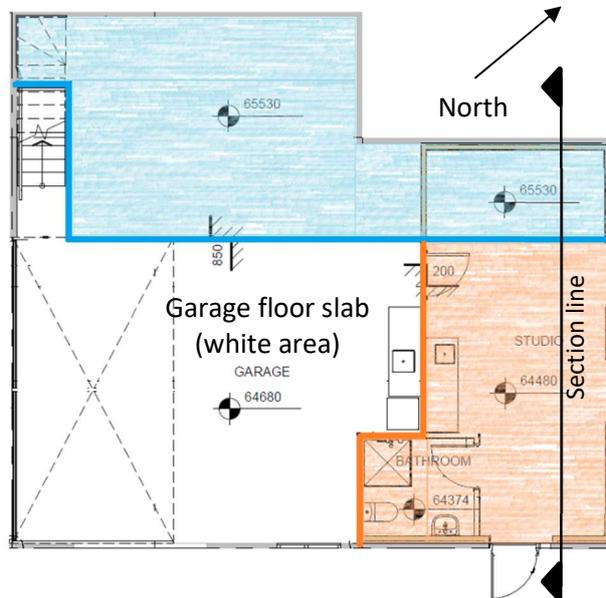
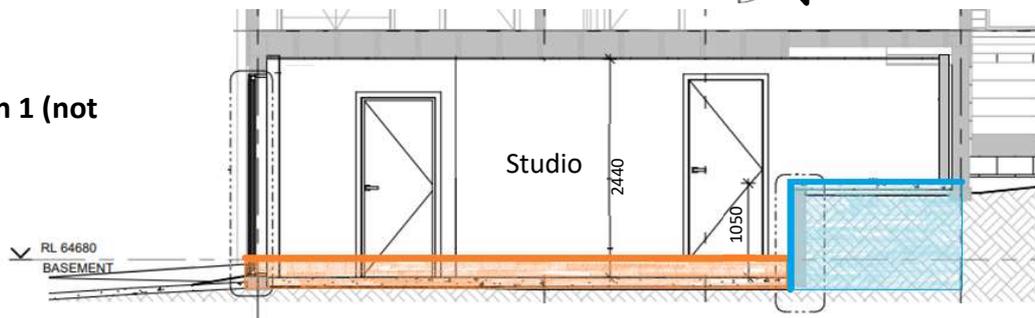


Figure 2: Section 1 (not to scale)



Legend	
	Masonry block wall
	Timber framed retaining wall (lower portion)
	Shaded floor level of slab is +850mm above garage slab
	Shaded floor level of slab is -200mm below garage slab

⁶ The timber wall sits on the new concrete slab for the studio, which is 200mm below the existing garage floor concrete slab, meaning the timber wall is below ground for the height of 300mm. The lower portion of the timber wall butts against the existing concrete slab of the garage floor which is located partway up (300mm) the height of the timber wall. For ease of reference, this determination uses the term ‘the timber framed retaining wall’ to describe the portion of the wall that is below ground.

⁷ Damp-proof membrane (or ‘DPM’) generally is a sheet material used to minimise water and water-vapour penetration into buildings, usually applied against concrete in contact with the ground, usually concrete floor slabs. I have no further details on the specific properties of the proposed damp-proof membrane.

- 2.4. In September 2021, the authority requested further information to enable it to process the building consent application. The request stated that the concrete floor slab “shall be provided with reinforcement as per B1/AS1, [paragraph] 2.0 Masonry; 2.1.1, NZS 4229, Clause 7.8.3”, as the owner’s proposed method of reinforcement using reinforcing steel bars was “not acceptable”
- 2.5. The authority also advised the owner that it would not accept the damp-proof membrane as the waterproofing for the back of the retaining wall. According to the owner, the authority instead required the waterproofing to be designed in accordance with CCANZ CP 01:2014⁸ (‘Code of Practice for Weathertight Concrete and Concrete Masonry Construction’). This required using a tanking membrane⁹ on the back of the wall, with a cavity between the back of the wall and the natural ground beyond to be backfilled with filtration gravel.
- 2.6. The owner considers that these requested changes were “more strict than [the] New Zealand Building Code compliance documents”, in particular NZS 4229:2013. The owner considers this is an Acceptable Solution for both items that the proposed building work complies with.
- 2.7. I have not been provided with all the correspondence between the parties. However, it would appear from the documentation I have seen, that the building consent was subsequently amended to reflect the authority’s requests¹⁰. The amended building consent plans were resubmitted on 4 October 2021 and the authority issued building consent (BCO10335049) on this basis on 14 October 2021.
- 2.8. The owner remained unhappy about the time and costs associated with the authority’s requirement to alter the plans, and subsequently made a complaint to the authority. Correspondence then passed between the parties in which they set out their respective views on the matter.
- 2.9. With respect to the compliance of the owner’s proposed design, the authority considered, in summary, that:
- 2.9.1. The owner’s proposed solution for Item 1 does not comply with NZS 4229, including modifications made to the Standard by its reference in Acceptable Solution B1/AS1. While the owner may still wish to pursue Building Code compliance by way of an alternative solution proposal, the owner would have to provide sufficient information to show that the proposal complies with the Building Code.
- 2.9.2. NZS 4229 is not an Acceptable Solution for clause E2. The Acceptable Solution for masonry construction is E2/AS3, which references CCANZ CP01:2014 [the ‘Code of Practice for Weathertight Concrete and Concrete

⁸ Cement & Concrete Association of New Zealand. (2014). *CCANZ – CP01: 2014 Code of Practice for weathertight concrete and concrete masonry construction*.

⁹ Tanking membrane is a resistant waterproof material that is applied to a structure to prevent penetration of liquid, either by capillary action or hydrostatic pressure.

¹⁰ And the 300mm timber framed retaining wall was amended to an in-situ concrete wall.

Masonry Construction’], but this document excludes retaining walls. All underground waterproofing membranes/tanking are alternative solutions and are not covered in either Acceptable Solutions E2/AS1 or E2/AS3. As the owner’s original drawings provided no detail of the damp proof membrane to be used, it was reasonable for the authority to request more information.

- 2.10. The owner considers that the proposed building work (both items) are in accordance with NZS 4229, which he considers to be an Acceptable Solution for both clauses B1 *Structure* and E2 *External Moisture* and should therefore have been accepted by the authority. In particular, the owner is of the view that Clause 1.1.1(c) of NZS 4229 states that the standard ensured compliance with Clause E2.3.2 and E2.3.3 (being specific performance requirements of clause E2 *External Moisture*) of the Building Code for walls and floors.
- 2.11. The parties were unable to reach an agreement on the matter. The owner applied for a determination.

3. Submissions

Owner

- 3.1. The owner’s submission set out their view that both Item 1 and Item 2 of the proposed building work comply with the Building Code, as both of the proposed designs comply with the relevant Acceptable Solutions. The owner considers that NZS 4229 is an Acceptable Solution for both Building Code clauses B1 *Structure* and E2 *External Moisture*.
- 3.2. With respect to Item 1 - the proposed reinforcing for the slab-on-ground floor:
- 3.2.1. The owner states that NZS 4229 Clause 7.8.3 and commentary to this paragraph (C7.8.3 (g) and (h)) provides that concrete slab-on-ground floors can be reinforced with reinforcing bars. They state that this is an equivalent to ‘Grade 500 E reinforcing mesh sheets’, and that D10 300MPa E Grade reinforcing steel rods at 300mm centres can be used.
- 3.2.2. The owner notes the explanatory comment in the Standard associated with Clause 7.8.3 states that ‘D10 rods at 300mm centres’ and ‘D12 rods at 450mm centres’ are equivalent to ‘665 500E welded mesh’ (the requirement outlined in paragraph 7.8.3).
- 3.2.3. The owner is of the view both paragraph 7.8.3 and commentary to this paragraph, specifically C7.8.3 (g) and (h), as expressed in the Standard forms part of the Acceptable Solution. The owner requested the authority to approve his proposed reinforcing design as an Acceptable Solution, however, the authority considered that 665 500E mesh was the only Acceptable Solution. The owner acknowledged that the latest version of Acceptable

Solution B1/AS1¹¹ amended clause 7.8.3 of NZS 4229, but considered that using D10 or D12 bars remained an Acceptable Solution, stating that:

I have been referred to the latest version of B1/AS1 which amends the NZS 4229 clause 7.8.3 however the update seems to be relevant to lapping of the reinforcing and I believe that C7.8.3 is still relevant. Also no amendment has been done to clause 7.8 which means that 300 E grade steel is still part of acceptable solution.

Therefore my dispute is if D10 [at] 300mm or D12 at 450mm shall be accepted or if this should be treated as specific engineering design.

- 3.3. With respect to Item 2 (the proposed waterproofing for the masonry retaining wall), the owner stated that his proposed design solution for the wall “was in accordance with NZS 4229 for slab on ground and masonry wall specifically”. However, while the authority accepted the detail for a damp-proof membrane for the slab-on-ground floor, it rejected the same membrane’s use for the retaining wall. It instead requested that tanking membrane should be used, and “specifically requested compliance with CNZ BG 01”¹² (‘Basement Design Guide’). However, clause 1.1.1(c) of NZS 4229 clearly states that the Standard is an Acceptable Solution for both concrete slab-on-ground floors and masonry walls, and ensures compliance with clauses E2.3.2 and E2.3.3 of the Building Code. The owner asked that his proposed design detail for the retaining wall should be accepted as a ‘E2/AS1 solution without any modification’.
- 3.4. In response to the authority’s submission the owner reiterated disagreement with the authority’s decision about the waterproofing for the retaining wall, stating the decision is based on ‘a missing reference in E2/AS1’. The owner explained the current version of NZS 4229 ‘clearly states that it is an acceptable solution for a masonry wall’. The owner disagrees with the authority’s requirement that the waterproofing for the retaining wall should be designed in accordance with the Code of Practice for Weathertight Concrete and Concrete Masonry Construction, and the authority’s opinion that NZS 4229 does not provide an Acceptable Solution for the waterproofing of masonry walls.

Authority

- 3.5. The authority’s submission stated that it considered the proposed building work (Item 1 and Item 2) to be alternative solutions.
- 3.6. With respect to Item 1, the authority considers the owner’s proposal for the concrete reinforcing is an alternative solution. This is because Acceptable Solution B1/AS1 paragraph 2.1.1 ‘updates’ clause 7.8.3 of NZS 4229, and as a result the commentary (C7.8.3) becomes ‘guidance’ and cannot be accepted as an ‘equivalent’

¹¹ MBIE. (2021). *Acceptable Solutions and Verification Methods For New Zealand Building Code Clause B1 Structure*.

¹² Concrete New Zealand. (2016). *CNZ BG 01:2016 Concrete and Concrete Masonry Basement Design Guide*. I note this document is not a referenced material in either acceptable solutions E2/AS1, E2/AS2 or E2/AS3.

proposal. The authority acknowledged the owner's proposed design could be considered as an alternative solution; however further information would be required to demonstrate compliance with clause B1 *Structure*. The authority noted that as the proposal related to structural design, a structural engineer could assist with this evidence.

- 3.7. With respect to Item 2, the authority stated that neither E2/AS1 or E2/AS3 cover 'tanking and therefore tanking is an alternative solution'. The NZ Building Code Handbook¹³ references NZS 4229 as an Acceptable Solution for clauses B1, E1 and G13, but not Clause E2. In addition, the reference section of the current version of E2/AS1 or E2/AS3¹⁴) does not reference NZS 4229 as an Acceptable Solution. Therefore, 'NZS 4229, from a tanking perspective has not been cited as a compliance document for E2.'
- 3.8. The authority further noted that while E2/AS3 references the Code of Practice for Weathertight Concrete and Concrete Masonry Construction, this document itself states at clause 1.2.2 that 'retaining walls are not covered in this document'.

4. Discussion

- 4.1. The dispute between the parties relates to whether the proposed building work is in accordance with the relevant Acceptable Solutions. The Acceptable Solutions are one way (but not the only way) to establish compliance with the Building Code. The matter to be determined is therefore whether Items 1 and 2 of the proposed building work comply with clauses B1 and E2 of the Building Code respectively by way of the relevant Acceptable Solution. I will consider the two items separately.
- 4.2. In determining this matter, I must consider the Acceptable Solutions for clauses B1 *Structure* (being Acceptable Solution B1/AS1) for Item 1 and E2 *External Moisture* (being Acceptable Solution E2/AS3) for Item 2 at the time that the application for building consent was lodged, as these were relevant Acceptable Solutions in force at the time.

Legislation

- 4.3. Section 17 of the Act requires that all new building work complies with the Building Code. However, building work is not required to achieve performance criteria that are additional to or more restrictive than that prescribed in the Building Code¹⁵. Section 19 sets out how compliance with the Building Code is established, listing various methods and documents (or 'compliance pathways'), including compliance with an Acceptable Solution.

¹³ MBIE. (2014). *New Zealand Building Code Handbook*.

¹⁴ The Ministry. (November 2020). *Verification Methods E2/VM1 and Acceptable Solutions E2/AS1, E2/AS2 and E2/AS3 For New Zealand Building Code Clause E2 External moisture*.

¹⁵ Section 18 of the Act.

- 4.4. Section 22 of the Act allows the Ministry to issue Acceptable Solutions for use in establishing compliance with the Building Code. This section also sets out that a person who complies with an Acceptable Solution must be treated as having complied with the provisions of the Building Code to which that Acceptable Solution relates.
- 4.5. Acceptable Solutions describe prescriptive step-by-step construction details, often for commonly used building materials and methods within a defined scope for a relevant Building Code clause.
- 4.6. Nothing in the Act prevents the Ministry from issuing more than one Acceptable Solution for a Building Code clause. Equally, nothing in the Act requires the Ministry to issue an Acceptable Solution for every method of construction. For example, Clause E2 *External moisture* requires the prevention of moisture from entering buildings from the exterior. This requirement applies to a wide range of building work, from small to large buildings constructed with various materials, e.g. timber, concrete or metal. Therefore, several Acceptable Solutions are needed to cover the wide breadth of construction methods. As such, Clause E2 has four acceptable solutions: Acceptable Solution E2/AS1 generally for wall and roof claddings for timber framed buildings of a certain height, Acceptable Solution E2/AS2 for Earth buildings, Acceptable Solution E2/AS3 for Concrete and concrete masonry buildings and Acceptable Solution E2/AS4 for claddings for 'light steel' framed buildings.
- 4.7. Sections 25 and 405 set out the content of an Acceptable Solution, which includes material that may be incorporated by way of reference, for example 'standards' and 'recommended practices'. Material incorporated by reference into an Acceptable Solution is able to be incorporated with 'modifications, additions, or variations' that are specified in the Acceptable Solution with the reference to that material. In other words, a standard (or other document) will only form part of an Acceptable Solution to the extent that it is referenced in that Acceptable Solution. Referencing a standard (or other document) avoids the reproduction of detailed technical information contained in the standard within the Acceptable Solution itself. As an example, Acceptable Solution E2/AS2 references New Zealand Standard 4299:1998¹⁶ for the design of 'Earth Buildings' and makes many modifications to the content of the standard.
- 4.8. A 'standard' is a consensus-based technical document. The development and revision of standards in New Zealand are set out in the Standards and Accreditation Act 2015. A standard has a defined scope of application and can also include 'informative' and 'commentary' information intended to assist with the interpretation of the corresponding requirement. A Standard may also incorporate other Standards by reference: this forms a 'tertiary reference' within the compliance pathway.
- 4.9. 'Recommended practices', or codes of practice, are a detailed document produced by a national organisation. For example, the 'Code of Practice for Weathertight

¹⁶ Standards New Zealand. (1998). *NZS 4299:1998 Earth buildings not requiring specific design*.

Concrete and Concrete Masonry Construction' is produced by the Cement & Concrete Association of New Zealand. These documents have a defined scope of application. They can include commentary intended to assist with the interpretation of the corresponding requirement. As an example, Acceptable Solution E2/AS3 references the Code of Practice for Weathertight Concrete and Concrete Masonry Construction without any modifications. Accordingly, the scope limitations included within that document are also incorporated into the Acceptable Solution.

- 4.10. In summary, the Act provides only for the Ministry to issue Acceptable Solutions. The Ministry decides what forms an Acceptable Solution, whether it incorporates additional material by reference, and the extent to which that additional material forms part of the Acceptable Solution (for example, whether the entire material is incorporated or requires modification).
- 4.11. In order to utilise an Acceptable Solution as the 'pathway' of establishing compliance with a relevant Building Code clause, a design must comply with that Acceptable Solution in full. This includes taking account of any modification to the reference material that is made in the Acceptable Solution, the defined scope of any reference material and the interpretation requirements of the document. In essence, this requires a designer to read the Acceptable Solution and modifications specified within the Acceptable Solution together with the referenced material (for example, the published standard).

Item 1 – the proposed reinforcing of the concrete floor slab

- 4.12. The owner is of the view that the proposed reinforcing bars for the concrete floor slab comply with Clause B1 because the proposal complies with the requirements of NZS 4229:2013.
- 4.13. The owner considers that NZS 4229:2013, specifically clause 7.8.3 and the commentary associated with that clause (notably C7.8.3(g) and (h)) as expressed in the Standard, form part of Acceptable Solution B1/AS1, and therefore should be accepted as complying with Building Code Clause B1.
- 4.14. New Zealand Standard 4229 clause 7.8.3 specifies the requirements for concrete slab reinforcement, generally requiring reinforcing mesh sheets with specific material properties and specific placement within the slab. Commentary associated with clause C7.8.3 discusses alternative options to mesh sheets, including alternative reinforcing bar options. Specifically, C7.8.3(g) and (h) outlines that either D10 reinforcing steel bars at 300mm centres, or D12 reinforcing steel bars at 450mm centres, should be used within the slab if using an 'equivalent reinforcing bar option' as an alternative to the steel reinforcing mesh. The clause and its associated comments are reproduced in Appendix A.
- 4.15. The proposed building work specifies D10 bars at 300mm centres, which is in accordance with commentary C7.8.3(g).

- 4.16. Clause 1.2.3 of NZS 4229 outlines that clauses prefixed with 'C' are comments to the mandatory clauses. This clause further notes that comments should not be taken as the only or complete interpretation of the corresponding clause, nor should they be used for determining the mandatory requirements of compliance with this Standard. The Standard can be complied with if the comment is ignored.
- 4.17. Acceptable Solution B1/AS1¹⁷, Paragraph 2.1 references NZS 4229:2013 as an Acceptable Solution for concrete masonry structures, and paragraph 2.1.1 modifies the standard as follows:

2.1.1 NZS 4229 Clause 7.8.3

Delete clause 7.8.3.

Replace with:

"All slab-on-ground reinforcing shall extend to within 75 mm of the outside edge of the slab (including the foundation wall) and shall consist of a minimum 2.27kg/m² welded Grade 500E reinforcing mesh sheets (1.14 kg/m² in each direction), which shall be lapped at sheet joints such that the overlap measurement between the outermost cross wires of each fabric sheet is equal to the greater of one of the following:

- the spacing of cross wires plus 50 mm;
- 150 mm; or
- the manufacturer's requirements.

Slabs shall have a maximum dimension of 18 m between free joints."

- 4.18. This means that clause 7.8.3, as it is published in NZS 4229, is 'deleted' and is no longer part of the Acceptable Solution B1/AS1. Paragraph 2.1.1 of Acceptable Solution B1/AS1 describes a replacement clause which requires concrete slab reinforcing to comprise of 'reinforcing mesh sheets' with the same specific material properties but different placement of the mesh within the slab, and does not provide for any alternatives to mesh sheets.
- 4.19. The modification to incorporate NZS 4229 by reference makes no specific mention of the associated supporting commentary C7.8.3. I consider, as clause 7.8.3 is removed and replaced, C7.8.3 as commentary to assist with the interpretation of clause 7.8.3 is either also removed, or at the very least becomes redundant in the absence of its related clause. Therefore, commentary clause C7.8.3, including C7.8.3 (g) and (h), do not form part of Acceptable Solution B1/AS1 as paragraph 2.1.1 of the Acceptable Solution removes clause 7.8.3 as it is published in NZS4229.
- 4.20. It is not to say that alternative methods of concrete slab reinforcing cannot be used; only that where reinforcing used differs to that required in paragraph 2.1.1 of the Acceptable Solution B1/AS1, another compliance pathway is required to establish that that alternative method proposed complies with the Building Code. The Building Code is performance based and provides for different compliance

¹⁷ The Ministry. (November 2019). *Acceptable Solutions and Verification Methods For New Zealand Building Code Clause B1 Structure*. Amendment 19 was the Acceptable Solution in force at the time of lodging the building consent.

pathways, for example those outlined in section 19 of the Act, so that other solutions can be proposed and used, provided they can be shown to achieve compliance with the Building Code¹⁸.

- 4.21. For completeness, I note B1/AS1 at paragraph 3.1 incorporates NZS 3604¹⁹ for the design of timber framed buildings by reference into the Acceptable Solution. Clause 7.5.8.3 of NZS 3604 requires mesh reinforcing for concrete slabs. Commentary C7.5.8.3 provides for an equivalent steel bar reinforcing option. However, similar to the discussion in paragraphs 4.17 to 4.19 of this determination, B1/AS1 also modifies the clause 7.5.8.3 of NZS 3604 by deleting the clause and replacing it with a different requirement. The same reasoning in paragraph 4.19 also applies. The commentary clause C7.5.8.3 of NZS 3604 does not form part of Acceptable Solution B1/AS1 as paragraph 3.1.9 of the Acceptable Solution removes clause 7.5.8.3 as it is published in NZS 3604. Accordingly, this compliance pathway does not establish that the proposed building work complies with Clause B1.
- 4.22. I also note NZS 3604 does not provide for below-ground timber retaining walls and incorporates the design of masonry foundation walls to NZS 4229 as a tertiary reference. However, NZS 3604 limits the incorporation of NZS 4229 into NZS 3604 at clause 6.11.1.1 noting 'this Standard shall apply only to foundation walls that are retaining not more than 600mm of soil or fill'. Accordingly, this also does not provide a compliance pathway to establish the compliance of the retaining walls of Item 2.
- 4.23. In conclusion, while the proposed building work of Item 1 is in accordance with commentary C7.8.3(g) of NZS 4229, the commentary does not form part of Acceptable Solution B1/AS1. Therefore Item 1 does not comply with Building Code Clause B1 *Structure* by way of Acceptable Solution B1/AS1, specifically paragraph 2.1.1 of Acceptable Solution B1/AS1.

Item 2 – the proposed waterproofing of the retaining walls

- 4.24. I turn now to Item 2 - the proposal to use a damp-proof membrane as waterproofing for two walls: a concrete masonry block retaining wall and a timber framed retaining wall.
- 4.25. The owner considers that the proposed solution for waterproofing the walls using the same damp-proof membrane as was being used under the new concrete floor slab of the studio, complies with the Building Code. The owner is of the view that because the proposed building work is in accordance with NZS 4229, the proposal therefore complies as an Acceptable Solution for Building Code Clause E2.

¹⁸ The Ministry provides guidance on the different ways to comply with the Building Code - <https://www.building.govt.nz/building-code-compliance/how-the-building-code-works/different-ways-to-comply/>

¹⁹ Standards New Zealand. (2011). *NZS 3604:2011 New Zealand Standard: Timber-framed buildings*.

- 4.26. The authority, on the other hand, is of the opinion that there is no Acceptable Solution (or any other compliance pathway outlined in section 19) for waterproofing retaining walls, and therefore proposals that involve waterproofing of retaining walls are alternative solutions.
- 4.27. I note NZS 4229 only provides for concrete masonry retaining walls. The timber framed retaining wall, by virtue of the use of timber, is not within the scope of NZS 4229. I therefore disagree with the owner's view that the timber framed retaining wall complies with NZS 4229. Furthermore, there are no Acceptable Solutions in respect of Clause E2 that provide for the waterproofing of timber framed retaining walls that form habitable space²⁰. Accordingly, the timber retaining wall does not comply with any Acceptable Solution for Clause E2 External moisture. I now turn to the concrete masonry retaining wall.
- 4.28. The authority is correct in stating that there is no current Acceptable Solution for Clause E2 as it relates to waterproofing concrete masonry retaining walls. The starting point for understanding this is the Acceptable Solutions themselves including their scope and referencing of material. As explained in paragraph 4.6 of this determination there are four Acceptable Solutions for clause E2 *External moisture*. Acceptable Solution E2/AS4 has a scope limited to steel framing and therefore is not relevant in this case. The three remaining Acceptable Solutions are published in one document²¹. The reference section of that document sets out all of the various Standards and other documents that are incorporated by reference within one or more of the Acceptable Solutions published in the document²². As the authority has pointed out, NZS 4229 is not listed in this section, meaning it is not referred to in any of the Acceptable Solutions published in the document. In some cases, it may have also been necessary to consider whether NZS 4229 was referenced within any of the documents included by reference into the Acceptable Solutions. However, in this case it is clear that this design is outside of the scope of each of those Acceptable Solutions so this second step is not necessary.
- 4.29. The most relevant Acceptable Solution for our purposes is E2/AS3²³, which applies to concrete and concrete masonry buildings. Paragraph 1.0 of E2/AS3 states:

20 I also note here it is not common to construct a timber-framed habitable space within a basement as it is difficult to establish code compliance of such a design particularly in respect of clauses B1 *Structure* and B2 *Durability*, as well as E2 *External moisture*.

21 The Ministry. (November 2020). *Verification Methods E2/VM1 and Acceptable Solutions E2/AS1, E2/AS2 and E2/AS3 For New Zealand Building Code Clause E2 External moisture*. Amendment 10 was the Acceptable Solution in force at the time of lodging the building consent.

22 I note here for completeness, the reference section does not list secondary or tertiary references (a Standard that is referenced within a Standard that is referenced within an Acceptable Solution) that could form part of the requirements of an Acceptable Solution.

23 E2/AS1, E2/AS2 and E2/AS4 do not include concrete masonry construction nor do they provide for the waterproofing of timber framed retaining walls within their scope, therefore are not relevant Acceptable Solutions in this case.

1.0 Concrete and Concrete Masonry Buildings

Concrete and concrete masonry construction with the scope of CCANZ CP 01, and that complies with CCANZ CP 01, will meet the performance criteria of NZBC E2.

- 4.30. CCANZ CP 01 is the Code of Practice for Weathertight Concrete and Concrete Masonry Construction of the Cement and Concrete Association of New Zealand. Clause 1.2.2 of this document outlines construction that is the out-of-scope of the document, which makes it clear that retaining walls, including those used in a basement, are not covered by the Code of Practice.

1.2 Construction excluded

1.2.2 Retaining walls

Retaining walls, including those used in a basement, are not covered in this Code of Practice.

COMMENT: Such walls are subject to a solution based on NZS 4229 or to specific design.

- 4.31. This means that CCANZ CP 01, which is referenced in E2/AS3 as an Acceptable Solution for concrete and concrete masonry construction, does not extend to retaining walls. I note that retaining walls will be buried, or at least partially buried, and therefore will experience moisture and moisture transfer in different ways than walls that are above ground. I further note, comment to clause 1.2.2, which excludes retaining walls from the Code of Practice, offers guidance on NZS 4229, or specific design, could be used to develop an alternative solution proposal to demonstrate how retaining walls could be designed to comply with Clause E2 *External moisture*.
- 4.32. The owner is of the view that NZS 4229 is an Acceptable Solution for Building Code Clause E2 because of the wording in clause 1.1.1(c) of that Standard, which the owner believes indicates that the Standard is an Acceptable Solution for Building Code Clause E2. Clause 1.1.1(c) is in the scope and interpretation section of the Standard and states:

c) Clause E2 External Moisture

Construction in accordance with this Standard will ensure against damage to building components or dampness in the building as a result of external moisture entering through the masonry walls or the concrete slab-on-ground. This Standard ensures compliance with E2.3.2 and E2.3.3 of the New Zealand Building Code for walls and floors only. This Standard is not a complete solution to Clause E2 as it does not contain provisions for the other elements of the building envelope such as roofing, exterior joinery, and flashings.

- 4.33. However, as stated above, it is not for the Standard (or any other document) to establish itself as an Acceptable Solution. To attain that status the Standard must be referenced in the Acceptable Solution itself which is issued by the Ministry. In this case the Standard has not been referenced in any of the Acceptable Solutions for

Clause E2. While it may be correct that following the guidance in the Standard may help achieve a compliant solution, this will not be an Acceptable Solution.

- 4.34. Likewise, while other documents referenced by the parties in their submissions and correspondence may prove useful in developing and assessing a compliant solution, they do not in themselves constitute Acceptable Solutions.
- 4.35. Accordingly, I agree with the authority that there is no Acceptable Solution for Clause E2 in respect of waterproofing retaining walls. As a result, the owner's proposed solution for Item 2, to use a damp-proof membrane as waterproofing for the retaining walls, does not comply with Building Code Clause E2 by way of Acceptable Solution E2/AS3 or any other Acceptable Solution for Clause E2 *External moisture*.

5. Conclusion

- 5.1. I conclude that the owner's proposed building work, being Items 1 and 2, do not comply with Clauses B1 and E2 of the Building Code by way of the relevant Acceptable Solutions.
- 5.2. With respect to the concrete reinforcing bars, this is because commentary C7.8.3 of NZS 4229, which was relied on by the owner, does not form part of the requirements of Acceptable Solution B1/AS1.
- 5.3. With respect to the use of a damp-proof membrane as waterproofing for the retaining walls, this is because there is no Acceptable Solutions for Clause E2 for the waterproofing of retaining walls. The Code of Practice for Weathertight Concrete and Concrete Masonry Construction referenced in E2/AS3 excludes retaining walls including those used in a basement.

6. Decision

6.1. In accordance with section 188 of the Building Act 2004, I determine that:

6.1.1. The proposed reinforcing of a concrete slab floor with reinforcing bars (Item 1) does not comply with Building Code Clause B1 by way of paragraph 2.1.1 Acceptable Solution B1/AS1.

6.1.2. The proposed waterproofing of a masonry block retaining wall and a timber framed retaining wall using a damp-proof membrane (Item 2) does not comply with Building Code Clause E2 by way of Acceptable Solution E2/AS3.

Signed for and on behalf of the Chief Executive of the Ministry of Business, Innovation and Employment on 1 April 2022.

Katie Gordon

National Manager Determinations

APPENDIX A – BUILDING ACT 2004

19 How compliance with building code is established

(1) A building consent authority must accept any or all of the following as establishing compliance with the building code:

- (a) compliance with regulations referred to in section 20:
- (b) compliance with an acceptable solution:
 - (ba) compliance with a verification method:
- (c) a determination to that effect made by the chief executive under subpart 1 of Part 3:
 - (ca) a current national multiple-use approval issued under section 30F, if every relevant condition in that national multiple-use approval is met:
 - (d) a current product certificate issued under section 269, if every relevant condition in that product certificate is met:
 - (e) to the extent that compliance with a requirement imposed by regulations made under the Electricity Act 1992 or the Gas Act 1992 is compliance with any particular provisions of the building code, a certificate issued under any of those regulations to the effect that any energy work complies with those requirements.

(2) In considering whether something complies with the building code, a building consent authority or, as the case may be, a regional authority—

- (a) must have regard to any relevant warning issued, and ban declared, under section 26(2); and
- (b) may have regard to any guidance information published by the chief executive under section 175.

22 Acceptable solution or verification method for use in establishing compliance with building code

(1) The chief executive may, by notice in the Gazette, issue an acceptable solution or a verification method for use in establishing compliance with the building code.

(2) A person who complies with an acceptable solution or a verification method must, for the purposes of this Act, be treated as having complied with the provisions of the building code to which that acceptable solution or verification method relates.

(3) Subsection (2) is subject to any regulations referred to in section 20.

25 Content of acceptable solution or verification method

(1) An acceptable solution or a verification method must state—

- (a) the date on which it comes into force; and

- (b) whether the acceptable solution or verification method, or parts of it, applies to building work for which a building consent has been issued before the date on which the acceptable solution or verification method comes into force.
- (2) An acceptable solution or a verification method must not contain a provision that—
- (a) relates to contractual or commercial requirements; or
 - (b) relates to regulatory approvals, dispensations, or waivers; or
 - (c) is inconsistent with this Act or the regulations.
- (3) Material may be incorporated by reference in an acceptable solution or a verification method in accordance with sections 405 to 413.

405 Incorporation of material by reference into certain instruments, solutions, and methods

- (1) The following material may be incorporated by reference into any instrument:
- (a) standards, requirements, or recommended practices of national or international organisations;
 - (b) any other written material that, in the opinion of the Minister or, as appropriate, the chief executive, is too large or is impractical to include in, or print as part of, the instrument concerned.
- (2) Material may be incorporated by reference in an instrument—
- (a) in whole or in part; and
 - (b) with modifications, additions, or variations specified in the instrument.
- (3) The incorporated material—
- (a) is the material as it exists at the time that the instrument is made or issued; and
 - (b) forms part of the instrument for all purposes and has legal effect accordingly.
- (4) In this section and in sections 406 to 413, instrument means—
- (a) any regulations; and
 - (b) any acceptable solution or verification method; and
 - (c) any Order in Council made under section 41 or 285; and
 - (d) the EPB methodology set under section 133AV.

APPENDIX B – NZS 4229:2013 NEW ZEALAND STANDARD: CONCRETE MASONRY BUILDINGS NOT REQUIRING SPECIFIC ENGINEERING DESIGN.

1.2.3

Clauses prefixed by 'C' and printed in italic type are intended as comments on the corresponding mandatory clauses. They are not to be taken as the only or complete interpretation of the corresponding clause, nor should they be used for determining in any way the mandatory requirements of compliance with this Standard. The Standard can be complied with if the comment is ignored.

7.8.3 Concrete slab reinforcement

All slab-on-ground reinforcing shall extend to within 75mm of the outside edge of the slab (including the foundation wall) and shall consist of a minimum 2.27kg/m² welded Grade 500 E reinforcing mesh sheets (1.14 kg/m² in each direction), which shall be lapped at sheet joints by 225 mm or in accordance with the manufacturer's requirements, whichever is greater. Slabs shall have a maximum dimension of 18m between free joints.

C7.8.3

If using an alternative mesh option or an alternative reinforcing bar option ensure the reinforcement is Ductility Class E, conforming with AS/NZS 4671 and of equivalent capacity. An equivalent capacity mesh means meeting each of the following:

...

Equivalent reinforcing bar options are:

(g) Grade 300 E D10 reinforcing steel bars (conforming with AS/NZS 4671) at 300mm centres each way with 30 mm top cover; or

(h) Grade 300 E D12 reinforcing steel bars (conforming with AS/NZS 4671) at 450 mm centres each way with 30 mm top cover.