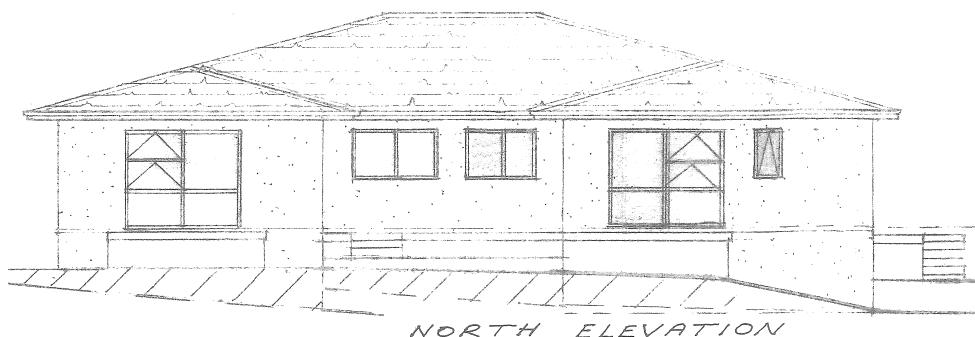




Determination 2010/128

Dispute over a building consent for a house with lightweight concrete panel walls at 10 Clare Place, Mt Wellington, Auckland



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, Department of Building and Housing (“the Department”), for and on behalf of the Chief Executive of that Department.

1.2 The parties to the determination are:

- the applicant, who is the owner and builder of the proposed house, J Caldwell (“the applicant”)
- the Auckland Council (“the authority”), carrying out its duties as a territorial authority or building consent authority.

1.3 This determination arises from a decision by the authority to refuse to grant a building consent for a proposed house, because it considered it had received insufficient information in the supporting documentation to be satisfied that the proposed house would comply with certain clauses² of the Building Code (Schedule 1, Building Regulations 1992). The authority’s primary concerns relate to the weathertightness of the autoclaved aerated concrete panel system proposed for the exterior walls of the house (see paragraph 3.6).

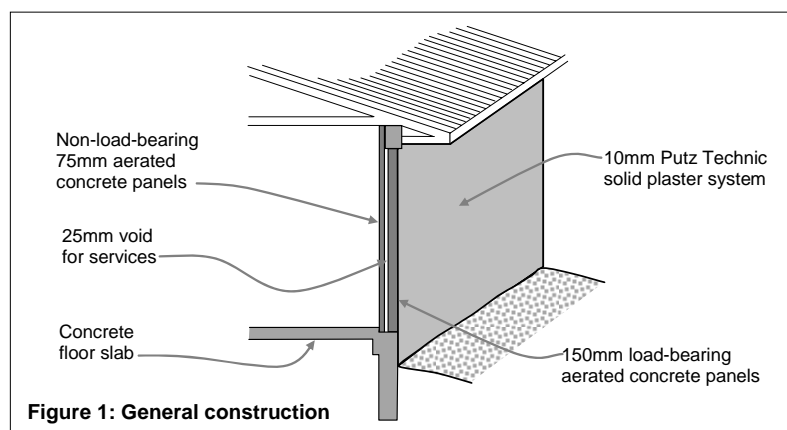
¹ The Building Act 2004 and the Building Code are available from the Department’s website at www.dbh.govt.nz.

² In this determination, unless otherwise stated, references to sections and clauses are to sections of the Act and clauses of the Building Code.

- 1.4 The matter to be determined³ is therefore whether the authority correctly exercised its powers in refusing to issue a building consent. In deciding this matter, I must consider whether the autoclaved aerated concrete (“AAC”) panel system proposed for the exterior walls of this house will comply with Clause E2 External Moisture and Clause B2 Durability of the Building Code. By “the AAC panel system” I mean the components of the system (such as the AAC panels, the plaster coating, the windows, the junctions and the flashings) as well as the way the components have been installed and work together.
- 1.5 The authority has queried some aspects relating to compliance with other clauses of the Building Code, which appear to be in the process of being resolved between the parties as part of the routine checking of the documents. This determination is therefore restricted to the matter described above. In making my decision, I have considered the submissions of the parties and the other evidence in this matter.

2. The building work

- 2.1 The proposed building work is a single-storey detached house on a sloping site in a low wind zone for the purposes of NZS 3604⁴. The house accommodates seven bedrooms in a simple U-shaped plan, with small concrete deck areas extending to the north. The design is assessed as having a low weathertightness risk.
- 2.2 The construction is specifically engineered, with concrete slabs and foundations, concrete block foundations walls, a suspended concrete slab over a small basement store, composite AAC panel walls, uPVC windows and pressed metal roofing. The 18° pitch hipped roof is single level with eaves projections of more than 600mm.
- 2.3 The proposed general construction is shown in Figure 1:



- 2.4 The exterior solid plaster system is a proprietary mineral plaster system that is specifically recommended for use on AAC panels or blockwork. The plaster is applied in three coats, with fibreglass mesh reinforcing embedded within the second coat. Additional mesh is used at high stress areas such as corners and panel joints.

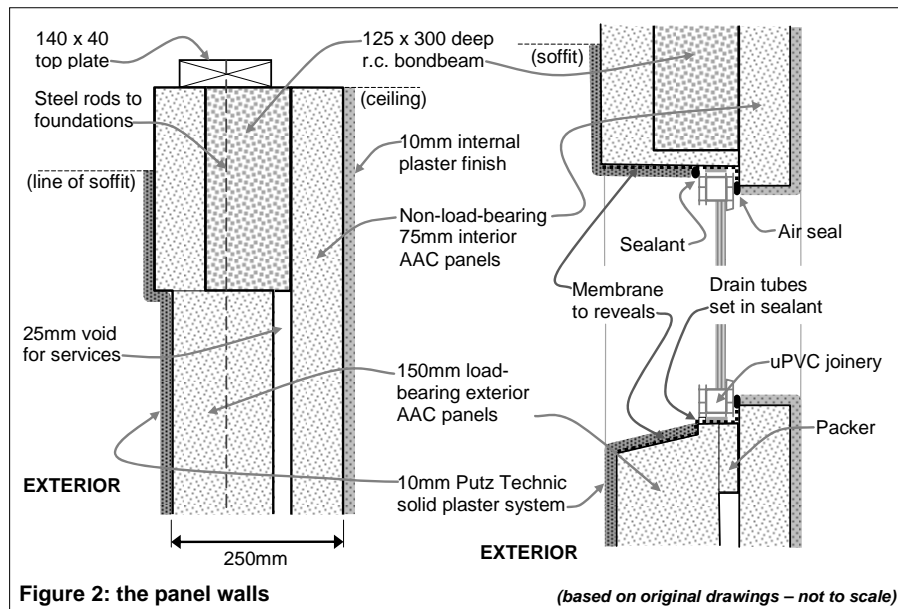
³ Under section 177(2)(a) of the Act

⁴ New Zealand Standard NZS 3604:1999 Timber Framed Buildings

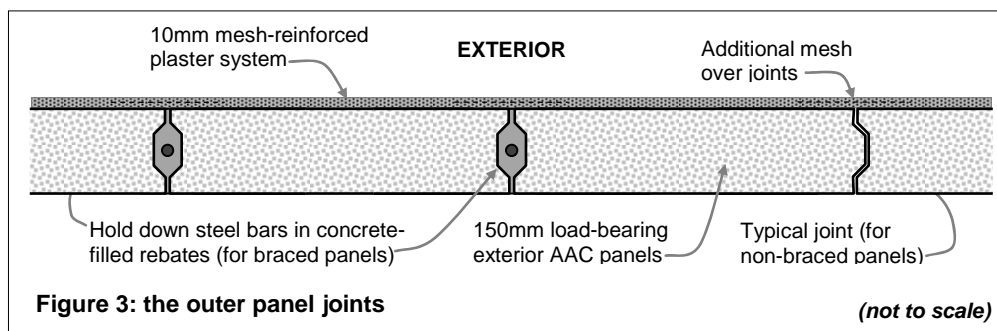
2.5 The AAC panel wall system

2.5.1 The AAC panels are a proprietary lightweight concrete material supplied in a variety of thicknesses, which can be cut and shaped on site using conventional tools.

2.5.2 The composite panel system and the joinery installation within the proposed AAC panel walls is shown in the sketches in Figure 2:



2.5.3 The full-height 600mm wide x 150mm thick outer AAC panels are load-bearing, with a reinforced concrete bond beam connected to the reinforced concrete foundations with steel hold down bars at the rebated joints of AAC panels nominated as ‘braced panels’ in the drawings. Typical joints of non-braced AAC panels are tongue-in-groove. The joints are sketched in Figure 3.



2.6 Windows and doors

2.6.1 As shown in Figure 2, bond beams act as lintels to window and door openings, with interior panels forming 20mm rebates around the openings. Membrane coating is shown extending down the rebate and across the exterior reveals. The uPVC joinery is installed against the outer face of the rebate, with plastered interior reveals and air seals to the junctions. Window heads are about 180mm below the soffits and the joinery frames are recessed by about 130mm from the face of the wall.

- 2.6.2 The drawings show joinery frames set into the rough openings using uPVC ‘shims’, with ‘drain tubes’ shown under the uPVC sill profile, a slope of 15° to the plastered sills and sealant beads at head and jamb junctions.

3. Background

- 3.1 The applicant lodged an application for a building consent for the building work (No. B/2010/5281). I have not seen a copy of the application, but it appears to have been in September 2010. The application included no technical product specifications, installation instructions or independent appraisal of the AAC panel system.
- 3.2 The design engineer provided a producer statement design (“PS1”) dated 27 September 2010 for the structural design of the AAC wall system and other structural elements. A condition was that the PS1 was subject to ‘all proprietary products meeting their performance specification requirements’.
- 3.3 In letters to the applicant dated 6 October and 15 October 2010, the authority listed various matters that needed to be addressed before the consent could be issued. The applicant met with the authority on 29 October 2010 to supply some of the requested information and some matters were resolved.
- 3.4 In a letter to the applicant dated 29 October 2010, the authority identified six items that remained to be addressed. In regard to weathertightness of the walls, the outstanding items included provision of (in summary):
- manufacturer’s ‘product and installation literature’ for the AAC panels
 - weatherproofing details of the boiler flue penetration through the roof.
 - amended details for windows and doors, in order to accord with manufacturer’s recommendations
 - weatherproofing details for the meter box penetration
 - clarification of clearances below the plaster coating to paving or ground.
- 3.5 The applicant emailed the authority on 4 November 2010 to explain that technical ‘product and installation literature’ was not available for the AAC concrete product. The applicant described the construction method proposed and referred the authority to the engineer’s drawings. Further emails followed on without resolution, with the applicant asking the authority to:
- ...tell me exactly what [the authority] is looking for when you say “the [authority] is unable to be satisfied compliance with the code has been demonstrated”.
- 3.6 In a response on 5 November 2010, the authority provided additional general explanation about the process and evidence needed to demonstrate the compliance of alternative solutions such as the AAC panels; noting that this would typically include a technical manual as well as ‘a statement from an independent third party approved testing laboratory’. The authority stated:
- In this instance it is compliance with clause E2 that we are unsure of. It is important that this construction method is considered a system. That is, it is how the panels, penetrations and anything else come together to perform, NOT the individual components independent of each other.

- 3.7 In a letter to the applicant dated 8 November 2010, the authority's structural engineer identified various structural matters that needed to be addressed, including the provision of 'the manufacturer's technical specifications for the exterior and interior wall panels'. (As outlined in paragraph 3.2, the PS1 was subject to 'all proprietary products meeting their performance specification requirements', so I regard this letter as being part of the expected process of assessing the engineering design and therefore not pertinent to the matter to be determined.)
- 3.8 The Department received an application for a determination on 11 November 2010.

4. The submissions

- 4.1 The applicant made no submission and forwarded copies of:
- the drawings and specification
 - some of the correspondence with the authority
 - various other statements and information.
- 4.2 The authority provided copies of all documentation received as part of the consent application, which included:
- the engineer's calculations, details and PS1 dated 27 September 2010
 - all correspondence with the applicant
 - the uPVC window manufacturer's recommended installation details
 - various other statements and information.

4.3 The draft determination

- 4.3.1 A draft determination was issued to the parties for comment on 23 November 2010. The authority generally accepted the draft determination on 25 November 2010 and proposed several non-contentious amendments which I have taken into account; amending the determination accordingly.
- 4.3.2 The applicant submitted some amended details on 25 November 2010, which he considered to satisfactorily address items identified in the draft determination (see paragraph 6.4.6). In a letter to the Department dated 1 December 2010, the authority attached comments on these amended details and added:
- It is not [the authority's] role to provide a design solution for the applicant and the attachments are not to be considered as such, they are simply comments.
- 4.3.3 The applicant did not accept the draft determination and requested a hearing in order to explain his product and his proposed amendments.

5. The hearing

5.1 The hearing was held on 9 December 2010. I was accompanied by a Referee engaged by the Chief Executive under section 187(2) of the Building Act 2004. The applicant attended and the authority was represented by one of its officers. A consultant of the Department also attended.

5.2 I generally described the limits of determinations in relation to this particular matter. Although the draft determination had identified certain shortfalls in some aspects of the drawings, I explained that it is not the Department's role to approve building consent application documents. As outlined in paragraph 7.2, detailed checking is the authority's responsibility; and that includes making final decisions on such matters as the weathertightness of building consent applications.

5.3 Both parties spoke at the hearing and the evidence presented enabled me to amplify or clarify various matters of fact and was of assistance to me in preparing this determination.

5.4 The authority's submission

5.4.1 The authority's verbal submission included:

- amplifying comments made in its response to the draft determination
- explaining its concerns associated with new products that have limited local history
- describing its experience of problems related to the proposed product, while accepting that the context was different to that of the proposed building
- expanding on the requirements needed for describing how a proposed alternative solution would comply with the Building Code
- explaining its comments on the applicant's amended details, while accepting that the particular house was a design with a low weathertightness risk.

5.5 The applicant's submission

5.5.1 The applicant's verbal submission included:

- explaining his use of the AAC product and the same wall construction used elsewhere within the region
- explaining that the 'cavity' between the panels was not drained, as it was intended as a void for running services within the walls
- showing a physical example of the proposed amended profile of the AAC to create a rebate at window and door openings and describing how the amended details would provide adequate weathertightness to the junctions
- expanding on the additional protection afforded by the eaves and recesses in the design of this particular house

- showing how other items identified in the draft determination had been addressed in his amendments, adding that a meterbox would not now need to be installed.

5.6 Conclusion

5.7 The parties discussed the remaining points of difference, agreeing on an appropriate method for recording how compliance for the alternative solution is achieved. The applicant passed a set of amended drawings to the authority and the parties agreed that, pending the provision of full documentation, the matters were resolved.

5.8 The parties also agreed that a further draft determination was not necessary in the circumstances. Taking into account the submissions, I have amended the determination accordingly.

6. The Building Code compliance of the AAC wall system

6.1 The available evidence

6.1.1 In order for the authority to form a view as to code compliance of the AAC wall system it needed to consider the evidence that was available. In this case, the evidence consists of:

- the available technical information on the wall system, including:
 - the detailed drawings for the house
 - the engineer's descriptions of the AAC panel wall system
- the history of use of comparable wall systems.

6.2 The available technical information

6.2.1 The authority has sought additional technical information and independent appraisal certification for the AAC product, while also stating that its primary concern is the weathertightness of the exterior walls (see paragraph 3.6).

6.2.2 I am of the view that the proposed AAC wall system generally comprises:

- the structural aspects covered by the engineers calculations, details and producer statement; all of which are subject to the usual queries and requests for further information from the authority's engineers (see paragraph 3.7)
- the weathertightness aspects of the AAC panels, the panel joints and the surface coating; along with the intersections of the wall system with other elements such as windows and doors, penetrations and other junctions expected to be included in the architectural drawings and specifications for the house.

6.2.3 The weathertightness details therefore need to be considered on their merits and are not dependent on a general appraisal or certification of AAC as a product. I consider the authority has been provided with sufficient information on which to make its assessment as to weathertightness. The authority assessed the information it had received to date and has properly questioned some aspects of the documentation.

6.3 The history of use

- 6.3.1 With regard to joinery installation details and other junctions, the AAC wall system proposed for this house may be compared to a reinforced concrete block or similar structure. I also note the joinery and surface finishes are commonly used products.
- 6.3.2 While it is accepted that this type of AAC material has been used in some other countries for many years, its use in New Zealand is relatively recent and the ability to predict the performance of this particular product over an expected lifetime of 50 years or more is limited. However, I also note that AAC panels or blocks have been in common use as veneers for more than a decade; and also that the proposed solid plaster exterior coating to the AAC is a recognised proprietary coating system.

6.4 Weathertightness

- 6.4.1 The evaluation of building work for compliance with the Building Code and the risk factors considered in regards to weathertightness have been described in numerous previous determinations (for example, Determination 2004/1).

Weathertightness risk

- 6.4.2 While the use of the E2/AS1 risk matrix is limited to buildings and claddings within the scope of that acceptable solution⁵, it may be appropriate to use the risk matrix for assessing the overall weathertightness risk of other forms of construction such as concrete wall construction – providing careful consideration is given to, and account taken of, any particular nature and risks that may arise from the construction.
- 6.4.3 This house has the following features that influence its weathertightness risk profile:

Features decreasing risk

- the house is single-storey and is in a low wind zone
 - the plan and form is simple, with a continuous roof and no complex junctions
 - all walls have 600mm eaves projections to shelter the walls and windows
 - the external AAC panels are finished with a continuous plaster system
 - there is no exterior timber framing that could decay if it becomes wet.
- 6.4.4 These features show that all elevations of the house demonstrate a low weathertightness risk rating.

⁵ Risk definitions and scores in E2/AS1 Table 1 and Table 2 are limited to claddings specified in E2/AS1 Para 3.3, which are installed over conventional timber frame construction.

The weathertightness of the AAC walls

6.4.5 With regard to the likely weathertightness of the proposed AAC wall system, I make the following observations on the proposed construction of this house:

- The AAC exterior panels are 150mm thick and finished with a continuous modified plaster and paint system.
- The plaster system is a recognised proprietary product, recommended by the manufacturer as appropriate for application to AAC surfaces.
- The windows and doors are recessed by about 130mm, with the heads about 180mm below 600mm deep soffits and sloping sills.
- There is a BRANZ Appraisal⁶ on the weathertightness performance of the specified uPVC windows when installed in typical cladding types.

6.4.6 However, there are areas where I consider that some details provided in the application for a building consent are unclear or not sufficient to ensure the weathertightness, including but not limited to:

- details of the window and door installation, which are not accordance with the window manufacturer's recommended details for comparable concrete block or precast concrete construction, in regard to:
 - window frames installed directly against the rebate, instead of set within the interior reveal with added flanges overlapping the rebates
 - because of the window position, the lack of sealants extended behind the uPVC window flanges to provide an effective seal
 - the reliance on a thin bead of sealant applied after the plaster coating
 - the lack of the continuous drainage gap along the sill flange
 - the lack of a backing rod to the air seals
 - the lack of clarity regarding the drip edge to the window heads
- the lack of detail regarding weatherproofing joints at braced panels
- the lack of detail on weatherproofing penetrations through the roof and walls
- the lack of sufficient expanded details and cross-referencing between plans, elevations, sections and details
- inconsistencies between the structural details and the architectural details, in regard to the AAC thickness on the outer face of the bond beam.

Weathertightness conclusion

6.4.7 The authority has sought independent verification of the AAC wall system in the form of accreditation, appraisals, test reports or similar. However, I take the view that such general reports would be unlikely to include specific consideration of weathertightness detailing as this is up to the designer to provide for a particular building. The authority would then still be required to make its own assessment of the system against the requirements of Clauses E2 and B2.

⁶ BRANZ Appraisal No.543 (2007)

- 6.4.8 In the case of this proposed house, the structural aspects of the AAC wall system is detailed in the structural plans, specification and structural calculations, while the remaining details, including some weathertightness details, are contained in the architectural plans and corresponding specification.
- 6.4.9 In this instance the weathertightness of the AAC wall system itself will be dependent on the weathertightness risk features of the building as a whole, the features that protect the walls from the weather, the application of the plaster coating, the weathertightness detailing, and the consequences and likelihood of failure on the building elements themselves. These features can be considered on their merits and independently of the AAC panels as a structural system.
- 6.4.10 Providing the matters noted in paragraph 6.4.6 are resolved to the satisfaction of the authority, I have reasonable grounds to conclude that the AAC wall system proposed for this building will be weathertight and durable when installed in accordance with good trade practice.
- 6.4.11 It is emphasised that each determination is conducted on a case-by-case basis. Accordingly, the fact that a particular wall system has been established as being code compliant in a specific instance, does not of itself mean that the same system will be code compliant in other situations.

7. What is to be done now?

- 7.1 I suggest that the applicant should now modify the building consent application, taking into account the findings of this determination and including the items outlined in paragraph 6.4.6, together with any other items raised by the authority as part of its routine checking processes.
- 7.2 I note that the detailed examination of construction details for weathertightness remains the responsibility of the authority and not the Department. If remaining details cannot be agreed with the authority, any items of disagreement can then be referred to the Chief Executive for a further binding determination.

8. The decision

- 8.1 In accordance with section 188 of the Act, I hereby determine that the authority correctly exercised its power in refusing to issue a building consent, as there was inadequate documentation to establish that the proposed wall details would comply with Building Code Clauses B2 and E2.

Signed for and on behalf of the Chief Executive of the Department of Building and Housing on 16 December 2010.

John Gardiner
Manager Determinations