Determination No 2004/10

Durability of untreated timber veranda posts

1 THE MATTER TO BE DETERMINED

1.1 The matter before the Authority is whether untreated macrocarpa timber veranda posts ("the posts") comply with the building code (the First Schedule to the Building Regulations 1992).

1.2 There being no dispute as to whether the posts comply with clause B1 "Structure" of the building code, the Authority takes the view that it is being asked solely to determine whether the posts comply with clause B2 "Durability".

1.3 In making its determination, the Authority has not considered any other aspects of the building code.

2 THE PARTIES

2.1 The applicant was the territorial authority. The only other party was the owner acting through the builder.

3 THE BUILDING

3.1 The building concerned is a single storey house proposed for construction. In terms of NZS 3604: 1999 *Timber framed buildings*, it is in a very high wind zone, earthquake zone A, and has a design snow load of 0.93 kPa.

3.2 The house has two 1.8 m wide verandas. The outer edge of the corrugated steel roof over each veranda is supported by 125 x 125 posts on galvanised brackets set into the concrete perimeter foundation wall. The posts are untreated macrocarpa milled on site. The Authority has no information as to whether the timber is heart or sap.

3.3 The detailing of the posts and fixings is apparently such as to allow the posts to be readily replaced.

3.4 The territorial authority was not satisfied that the posts complied with clause B2 of the building code, refused to grant a building consent, and applied for this determination.

4 THE BUILDING CODE AND THE ACCEPTABLE SOLUTION

4.1 The relevant provisions of clause B2 of the building code are:

Clause B2—DURABILITY

OBJECTIVE

B2.1 The objective of this provision is to ensure that a building will throughout its life continue to satisfy the other objectives of this code.

FUNCTIONAL REQUIREMENT

B2.2 Building materials, components and construction methods shall be sufficiently durable to ensure that the building, without reconstruction or major renovation, satisfies the other functional requirements of this code throughout the life of the building.

PERFORMANCE

B2.3.1 Building elements must, with only normal maintenance, continue to satisfy the performance requirements of this code for the lesser of the specified intended life of the building, if stated or:

(a) The life of the building, being not less than 50 years, if:

- (i) Those building elements (including floors, walls, and fixings) provide structural stability to the building, or
- (ii) Those building elements are difficult to access or replace, or
- (iii) Failure of those building elements to comply with the building code would go undetected during both normal use and maintenance of the building.

(b) 15 years if:

- (i) Those building elements (including the building envelope, exposed plumbing in the subfloor space, and in-built chimneys and flues) are moderately difficult to access or replace, or
- (ii) Failure of those building elements to comply with the building code would go undetected during normal use of the building, but would be easily detected during normal maintenance.

(c) 5 years if:

- (i) The building elements (including services, linings, renewable protective coatings, and fixtures) are easy to access and replace, and
- (ii) Failure of those building elements to comply with the building code would be easily detected during normal use of the building.

4.2 The acceptable solution B2/AS1 cites NZS 3602:2003 *Timber and wood-based products for use in building* ("NZS 3602"). The relevant provisions of NZS 3602 are:

104.1

Timber and wood-based products for use in building shall comply with tables 1, 2 and 3.

The tables detail requirements, including the grade or type of product and preservative treatment, for the following:

Table 1 Wood-based building components, which provide structural stability to achieve a 50-year durability.

Table 2 Wood-based building components to achieve a 15-year durability.

Table 3 Wood-based building components to achieve a 5-year durability.

107.1

Table 1B lists the species or type, grade, moisture content and preservative treatment required for wood-based building components exposed to exterior weather conditions and dampness and not in contact with the ground.

111.1

Table 2A lists the species or type, grade, in-service moisture content and preservative treatment required for wood-based building components exposed to exterior weather conditions and dampness. Table 2B lists the requirements for wood-based building components protected from the weather and dampness.

112.1

Table 3 lists the species or type, grade, moisture content and preservative treatment required for non-structural components protected from the weather.

Table 1 – Requirements for wood-based building components to achieve a 50-year durability performance

B Members exposed to exterior weather conditions and dampness but not in ground contact (see section 107)

Ref No.	Wood-based building components	Species or type	Grade or Standard ref.	In-service moisture range%	Level of treatment to NZS 3640 or AS/NZS 1604	See clause/ section
1B.3	Posts . . .	Radiata pine	Structural grades	Not limited	H3.2	--

Table 2 – Requirements for wood-based building components to achieve a 15-year durability performance

A Members exposed to exterior weather conditions and dampness (see section 111)

Ref No.	Wood-based building components	Species or type	Grade or Standard ref.	In-service moisture range%	Level of treatment to NZS 3640 or AS/NZS 1604	See clause
2A.1	Weather-boards	Cypress species(4)	Dressing heart	18% or less	None	111.2
2A.2	Base battens					
2A.3	Fascia, barge, and coverboards					
2A.5	Exterior joinery . . .	Cypress species(4)	Select A heart	18% or less	None	-
2A.6	Timber reveals for aluminium joinery					
2A.7	External stairs, . . . veranda floors, unroofed decking . . .	Cypress species(4)	Dressing heart	Not limited	None	111.7

B Members protected from the weather and dampness (see section 111)

Ref No.	Wood based building components	Species or type	Grade or Standard ref.	In-service moisture range%	Level of treatment to NZS 3604 or AS/NZS 1604	See clause reference
2B.1	Non-load-bearing(8) interior wall framing	Cypress heart(4)	Structural grades or Framing – No. 2	20% or less	None	-
2B.2	Stair treads, risers and handrails	Cypress species(4)	Select A	16% or less	None	-

(4) Cypress species include Cupressus macrocarpa (macrocarpa) . . .

(8) Walls that provide bracing are load-bearing walls.

Table 3 – Requirements for wood-based building components to achieve a 5-year durability performance

Ref No.	Wood-based building components	Species or type	Grade or Standard ref.	In-service moisture range%	Level of treatment	See section
3.1 3.2 3.3	All interior finishing timbers . . . Shelves Any other timber component that can be easily replaced and not specified in tables 1, 2 and 3 *[sic]*	Cypress species(1)	Dressing	16% or less	None	112

(1) Cypress species include Cupressus macrocarpa (macrocarpa) . . .

5 THE SUBMISSIONS

5.1 The owner submitted:

" . . . although [the posts] are broadly covered under section 107.1.1[1] of the NZS 3602: 1995 [there is provision] under clause B2 (Durability) of the Act [*sic*] to allow for timber species that will not accept preservative treatment to be used under some circumstances.

[1] NZS 3602:1995 has been superseded by NZS 3602:2003. Clause 107.1.1 of NZS 3602:1995 said: "Exterior supporting structures such as . . . posts . . . exposed to the weather shall be . . . treated to the provisions of MP 3640 for their appropriate end use . . ."

"We believe that [the posts] fall under Clause B2 Performance Clause 2.3.1(c) of the Building Act [*sic*] that states the life span of the building element must be not less than 5 years if:

"i) The building elements are easy to access and replace

"ii) Failure of those building elements to comply with the Building Code (section 107.1.1) [*sic*] would be easily detected during normal use of the building.

"The elements in question are of a larger size than what would normally be required under NZS3604 being 125mm x 125mm.

"The elements are completely visible under all circumstances and can be easily inspected for any signs of failure.

"The elements are to be fixed in a manner that will allow for easy replacement if required in the future.

"The elements are under cover of a roof structure but are exposed to driving rain or wind blown weather conditions."

5.2 The territorial authority responded by quoting clause B2.3.1 of the building code and saying:

"1. The Building Consent that was applied for, was on the basis of 50 years or indefinite.

"2. The posts are structural whether they are easily replaceable or not.

"3. If a structural element was to fail the Building Act 1991 requires that a Building Consent be obtained for its replacement, as the structure has not met the Durability & Structural requirements of the Building Code.

"On the basis of the rational [*sic*] as set out above, if the posts were easy to replace (without details this cannot be verified) the fact remains that they are structural elements which support roof framing, therefore must be durable for the life of the building which is 50 years[2]."

6 DISCUSSION

6.1 General

6.1.1 The only matter submitted for determination was whether the building code required a durability of 5 years for the posts on the grounds that they were easy to access and replace and that any failure would be easily detected during normal use of the house.

[2] The Authority recognises that reference to "a durability of 50 years" is shorthand for the requirement of clause B2.3.1(a) that the building element concerned must, with only normal maintenance, continue to satisfy the performance requirements of the building code for the life of the building, being not less that 50 years.

6.1.2 The Authority was given no evidence that the posts would in fact achieve a durability of 5 years, but the owner submitted that they were larger than would normally be required.

6.1.3 The applicant did not suggest that the posts could be expected to achieve a durability of longer than 5 years.

6.2 The building code requirement

6.2.1 The question is whether the posts are required to comply with:

(a) Clause B2.3.1(c) on the grounds that they are easy to replace and failure to comply with clause B1 would be easily detected, as contended by the owner, or

(b) Clause B2.3.1(a)(i) on the grounds that they provide structural support for the building, as contended by the territorial authority.

6.2.2 The Authority takes the view that clause B2 must be considered in relation to the other performance requirements that the element concerned is required to satisfy over the durability period.

6.2.3 The posts clearly provide structural stability to the veranda roofs. The Authority is prepared to assume, for the purposes of this determination only, that the posts do not contribute to the structural stability of the rest of the building.

6.2.4 Clause B2.3.1(a)(i) refers to "building elements" that provide "structural stability to the building". The Authority does not read those words as excluding load-bearing building elements such as the posts (or other building elements such as parapets, cantilevered balconies, and the like) that do not provide structural stability to the building as a whole. That is because, in section 3 of the Building Act, which is cited in clause A2 of the building code, the word "building" is defined as including any "part of a building". The posts provide structural stability to parts of the building, namely the veranda roofs and therefore come within clause B2.3.1(a)(i).

6.2.5 The Authority accordingly takes the view that the posts are required to have a durability of 50 years in accordance with clause B2.3.1(a)(i).

6.3 The acceptable solution

6.3.1 The acceptable solution B2/AS1 cites NZS 3602, which requires posts exposed to exterior weather conditions and dampness but not in ground contact to be structural grade radiata pine treated to hazard class H3.2.

6.3.2 The owner accepted that the posts did not comply with the acceptable solution, but submitted that nevertheless the posts complied with clause B2 of the building code, in other words that the posts could be permitted as an alternative solution, see 5.1 above.

6.3.3 In several previous determinations, the Authority has made the following general observations about acceptable solutions and alternative solutions:

- Some acceptable solutions cover the worst case, so that in less extreme cases they may be modified and the resulting alternative solution will still comply with the building code.

- Usually, however, when there is non-compliance with one provision of an acceptable solution it will be necessary to add some other provision to compensate for that in order to comply with the building code.

6.3.4 The Authority considers that the posts come exactly within the worst case for the particular requirements of the acceptable solution quoted in 6.3.1 above. The Authority also considers that there are no special circumstances that would justify the use of the posts as an alternative solution drastically different from NZS 3602. The Authority accordingly concludes that the posts do not comply with clause B2 and therefore cannot be permitted as an alternative solution.

6.4 Other matters

6.4.1 Having come to that conclusion, the Authority does not need to consider whether the posts are easy to access and replace, whether their failure would be easily detected during normal use of the building, nor whether they would in fact have a durability of 5 years.

6.4.2 However, the Authority observes that failure of the posts to the point where they would collapse under load would not necessarily be apparent to people living in the house until it was too late. The comparatively recent fatal collapse of a timber bridge on a farm is a tragic reminder of how the gradual weakening of timber structural members can go unnoticed.

6.4.3 The Authority has not been asked to consider other means that might enable the posts to be used in compliance with the building code, such as sheathing or otherwise protecting them from exterior weather conditions and dampness and thus preventing them from rotting. Indeed, as has been said in previous determinations, such matters are for the owner to propose and for the territorial authority to accept or reject, with any of the parties entitled to submit doubts or disputes to the Authority for another determination.

6.4.4 The owner submitted that the posts were “of a larger size than what would normally be required” (but did not suggest that the oversizing was such that the posts would achieve a 50-year durability). Oversizing members is a recognised method of increasing durability in some circumstances, particularly if the members are required to retain structural integrity during a fire or are subject to corrosion. The Authority has not been given any evidence as to the rate at which timber can be expected to rot or as to the mechanism of rotting as it affects the strength of timber after any particular time. The Authority therefore offers no opinion as to whether oversizing is an appropriate method of increasing durability under fungal attack.

6.4.5 The Authority was not asked to consider anything other than the posts, but notes that other structural members exposed to the weather are specified as being macrocarpa, so that the discussion above applies equally to those members.

7 THE AUTHORITY'S DECISION

7.1 In accordance with section 20 of the Building Act, the Authority hereby determines that the posts do not comply with clause B2 of the building code. The Authority accordingly confirms the territorial authority's decision to refuse to grant a building consent in that respect.

Signed for and on behalf of the Building Industry Authority on this …… day of ……..…. 2004

John Ryan
Chief Executive