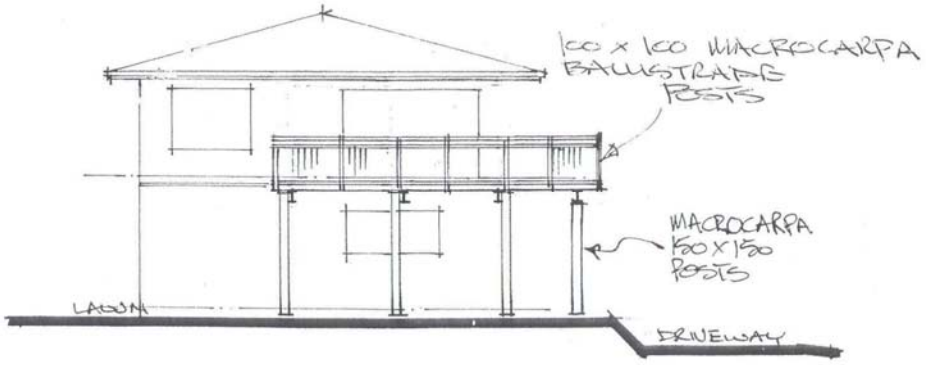
Determination 2007/135

Determination regarding heart macrocarpa posts and decking to a house at 51 Wastney Terrace, Nelson



1. The matter to be determined

1.1 This is a determination under Part 3 Subpart 1 of the Building Act 2004[1] ("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. The applicants are the owners, P Hoare and A Young ('the applicants"), and the other party is the Nelson City Council ("the territorial authority").

1.2 This determination arises from the decision of the territorial authority to refuse to issue an amended building consent for alterations to the kitchen and the construction of a deck at the above address because it is not satisfied that the timber used in construction of the deck complies with clause B2 of the Building Code[2] (First Schedule, Building Regulations 1992).

[1] The Building Act 2004 is available from the Department's website at www.dbh.govt.nz.
[2] The Building Code is available from the Department's website at www.dbh.govt.nz.

1.3 The matter for determination is whether the exposed structural elements of the deck, which are made of heart Mexican cypress, comply with clause B2 "Durability" of the Building Code. I note that all timber is referred to as macrocarpa but I accept the advice that the timber is Mexican cypress which is the same species as macrocarpa with effectively the same characteristics (refer to note 6 Table 1 of NZS 3602:2003). Accordingly all timber is referred to by the species name, cypress.

1.4 The application was in respect of the durability of the posts but in letters dated 26 March and 25 June 2007 the territorial authority refers to the deck rail and deck barrier. I have therefore considered the durability of all timber used in the deck structure including the balustrade posts.

1.5 I note that there are a number of other matters raised in the territorial authority's letter of 25 June 2007 regarding compliance with clauses F4 and B1 of the Building Code, but in accord with the application, the determination is limited to the matter outlined in paragraph 1.3.

1.6 In making my decision, I have considered the submissions of the parties, the 2004 report, a site inspection report and the other evidence in this matter. I have evaluated this information using a framework that I describe more fully in paragraph 6.

1.7 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. The building

2.1 The building work consists of kitchen alterations, and alterations and additions to an existing desk at first floor level. The building is a detached two-story house situated on a sloping site.

2.2 The deck consists of 19mm thick heart cypress planks supported on treated Pinus radiata joists which are at 400mm centres. The joists are supported on a framework of 180mm deep steel beams which are in turn bolted to the 150mm x150 mm cypress columns. The balustrade is supported by 100mm by 100mm posts at which appear to be 2400mm centres. The balustrade is to have a top rail and glazed barrier. While these are not the subject of this determination, the territorial authority should verify that the glass sheet used for the barrier will comply with B1 for whatever span is used.

2.3 The main deck support columns have copper caps to their tops and are connected to the foundations with stainless steel connection brackets and plates. There is a gap of approximately 30mm between the bottom of the posts and the concrete foundations.

2.4 The applicants have confirmed that the cut ends of the columns and posts have been treated with "Metalex" timber preservative and the decking and posts have had two coats of Wattyl Forestwood Oil applied to them. I note "Metalex" contains copper napthenate.

2.5 The balustrade posts do not have copper capping nor do they appear to have been subject to any preservative treatment.

3. Background

3.1 The applicants have applied to amend the building consent for the building work to incorporate cypress to be used on the deck in lieu of treated Pinus radiata and a changed balustrade detail.

3.2 Work went ahead without territorial authority approval for the amendment but the deck was not completed. At present access is closed off until the balustrade is complete.

3.3 In a letter to the applicants dated 25 June 2007 the territorial authority raised a number of matters that required resolution (but do not form part of this determination) in addition to which the territorial authority said:

> Cypress species [Mexican cypress and macrocarpa are two of the species] is outside the scope of NZS 3602[3]:2003 when subject to rain wetting.
>
> Our reasoning is
>
> a The determination [Determination 2004/71] mentioned in the Ensis report deals with verandah posts, not deck posts.
>
> b. The verandah posts [in Determination 2004/71] were 200 x 200.
>
> c. The determination was adjudged against a superseded New Zealand Standard [NZS 3602:1995].
>
> d. The timber would have to be certified as being 100% Heartwood by a duly experienced organization . . .
>
> e. The verandah roof provides a degree of protection from weather and a greater degree of monitoring than your proposed.
>
> Because of this we are still unable to consent to the use of Macrocarpa in the proposed situation.

3.4 In a letter to the applicants dated 2 May 2007, the territorial also said:

> The report supplied for Macrocarpa is not a thorough and scientific investigation into determining the durability of the timber, but an opinion of one individual. The opinion was also expressed 18 months ago for a separate situation and design parameters. Due to the recent investigation into Macrocarpa joists and structural element failure within 7 years of construction, and the reasons expressed above, we ask that you revise the specification of the posts and joist to comply with NZS 3602:2003.

3.5 An application for a determination was received by the Department on 17 August 2007.

[3] New Zealand Standard NZS 3602:2003 Timber and wood-based products for use in building

4. The submissions

4.1 The applicants provided amended drawings, photographs of the deck and correspondence from the territorial authority.

4.2 In support of the application the structural engineer for the applicants sought advice from ENSIS[4] as to the suitability of cypress for this deck. The subsequent report from a senior ENSIS scientist quotes Determination 2004/71 as appropriate to this application. A paper from ENSIS[4] described circumstances where heart cypress could be considered to provide decay resistance equivalent to timber treated with preservative to a level of H3.2. Timber exposed to weather conditions and dampness, but which is not in contact with the ground, is required to be treated to this level in order to meet the requirements of NZS 3602:2003.

4.3 I therefore accept that the circumstances are similar to those now under consideration here. I have therefore considered the specialist advice ("the 2004 report") received for Determination 2004/71, which was provided by an expert in the preservative treatment of timber, as relevant to this determination. The 2004 report therefore forms part of the evidence in this matter.

5 The site inspection

5.1 In order to confirm the timber is heart wood I arranged for a local timber merchant, with knowledge of timber in local use, to inspect the deck to verify the timber used.

5.2 He identified the wood as "lusitanica", a cypress species known as Mexican cypress. There does not appear to be any evidence of sapwood in the 150mm x 150mm main columns. However there is some evidence of sapwood in 3 of the balustrade posts and a significant presence of sapwood in the decking.

5.3 Photographs showed no capping to the balustrade posts and that some cracks can be seen in some places in the columns.

6 Evaluation for code compliance

6.1 Evaluation framework: durability of exposed timbers

6.1.1 The relevant provision of clause B2 of the Building Code requires that building elements must, with only normal maintenance, continue to satisfy the performance requirements of the Building Code for certain periods ("durability periods") "from the time of issue of the applicable code compliance certificate" (clause B2.3.1).

6.1.2 In the case of the timber supports and posts, this durability period is:

- the life of the building, being not less than 50 years, if the building elements provide structural stability to the building, or are difficult to access or replace, or failure of those elements would go undetected during both normal use and maintenance.

[4] ENSIS is an unincorporated joint venture between Australia's CSIRO and New Zealand's Scion (formerly the Forrest Research Institute)

6.1.3 In evaluating the design of a building and its construction, it is useful to make some comparisons with the relevant Acceptable Solution[5], in this case B2/AS1, which provides NZS 3602:2003 as an acceptable solution for meeting the durability requirements of timber used in the building.

- Table 1 of NZS 3602:2003 specifies H3.2 treated radiata pine for posts and beams exposed to exterior weather conditions and dampness, but not in ground contact, where a 50 year durability performance is required (cypress species is not listed for this use).
- Table 2 of NZS 3602:2003 specifies no treatment level for cypress species for the following members exposed to exterior weather conditions and dampness, where a 15 year durability performance is required.

> External stairs, stair handrails and balustrades, verandah floors, unroofed decking (which can easily be replaced) with either a paint, stain clear or no finish

Therefore the decking can be assessed as an acceptable solution to Clause B2 and the posts as an alternative solution.

6.1.4 While it is useful to make some comparisons with the relevant Acceptable Solution to assist in determining whether a particular building element is durable, in making this comparison, the following general observations are valid:

- Some Acceptable Solutions are conservatively written to cover the worst case, so that they may be modified in less extreme cases and the resulting alternative solution will still comply with the Building Code.
- Usually, when there is non-compliance with one provision of an Acceptable Solution, it will be necessary to add one or more other provisions to compensate for that in order to comply with the Building Code.

6.1.5 The approach in determining whether the timber posts are durable involves an examination of their positions within the building, the surrounding environment, the design features likely to limit water penetration into the timber, and the moisture tolerance of the timber used in the posts. The consequences of an element demonstrating low risks and consequences of moisture penetration and damage is that solutions that comply with the Building Code may be less robust.

6.2 Durability risk

6.2.1 In relation to the risk characteristics, I note the following:

(a) With respect to the construction features of the deck:

- The 150mm x 150 mm veranda posts are sized with a significant reserve in their structural capacity.
- All deck timbers and the balustrade posts are fully exposed to the weather.

[5] An Acceptable Solution is a prescriptive design solution approved by the Department that provides one way (but not the only way) of complying with the Building Code. The Acceptable Solutions are available from The Department's Website at www.dbh.govt.nz.

- The decking and balustrade post timber can be readily replaced, while the columns that support the deck can be replaced with a moderate amount of difficulty.

(b) With respect to the use of the timber in this instance:

- The timber is well ventilated and is therefore able to dry out if it becomes wet.
- A copper cap or timber preservative is used to protect the end grain of the main vertical timbers.

(c) With respect to the durability of this timber species:

- Cypress species are moderately durable timbers and are the equivalent of Pinus radiata treated to H3.1, according to table 1 of NZS 3602:2003.

6.2.2 When assessed according to the weathertightness features listed in paragraph 6.1.3, I consider that the elevations with exposed timbers demonstrate a low durability risk.

6.3 Durability performance

6.3.1 With regard to the particular exposed timber posts in this house, I consider that the following factors compensate for the lack of treatment as specified in NZS 3602:2003.

- The exposure of the timber to high winds will assist drying the timbers and removing debris that can trap moisture at junctions.
- The end grain of the vertical members is or will be protected from moisture absorption by copper caps. The members are or will be coated with preservative.
- The members are protected from the weather to a limited degree by the decking.
- The posts and decking are clearly visible and accessible.

7 Discussion

7.1 The territorial authority has raised a number of reasons (refer paragraph 3.3) as to why cypress is outside the scope of NZS 3602:2003 and why the previous determination is not relevant to the current application.

7.2 Given the specific request and information given to ENSIS, its report is relevant to the facts in this case as discussed in paragraphs 4.2 and 4.3. I therefore consider that within the following considerations the columns and posts will meet building code performance requirements.

7.3 The review of macrocarpa in the report supporting the 2004 determination (see paragraph 4.2) established several criteria that should be considered before

concluding that, in specific cases cypress species may achieve equivalent performance of H3.2.

- The members are situated where they can dry easily and will not be wet for prolonged periods. There will be no ground contact.
- The size and orientation of the posts.
- The degree of exposure to the weather.
- The use of insitu preservative and mechanical flashings.
- The timber should be heartwood.

Whether this application applies to veranda posts or deck columns the same elements and rationale can be considered for each alternative solution. The structural requirements of a deck are generally more demanding than those of a veranda but in this case do not affect the consideration of the durability requirements.

7.4 With respect to the matter raised by the territorial authority in paragraph 3.4, I note the "*structural element failure within 7 years of construction*" is a reference to the unsubstantiated report of the failure of macrocarpa timber in a deck structure in the upper North Island. It is not known what grade of timber was used or what level of treatment (if any) had been applied. The reference can only be considered hearsay evidence.

7.5 The posts and decking are clearly visible and easily accessible for regular inspections and maintenance.

7.6 The site inspection identified the columns as heart timber but noted cracks and signs of weathering. These should be treated with preservative and painted for protection from the weather to prevent further cracking and consequent damage. The balustrade posts are fully exposed and if they are to be included in the amendment to the consent they will require capping and coating with preservative, Metalex or similar. They are also visible and easily accessible.

7.7 I therefore take the view that the information submitted to me, together with the particular risks and circumstances as outlined in paragraphs 6.2.1, has established that the exposed timber decking and columns in this deck meet or will meet the durability requirements of clause B2 of the Building Code. If the balustrade posts are treated as described in paragraph 7.6 they will also meet the requirements of B2.

7.8 I emphasise that each determination is conducted on a case-by-case basis. Accordingly, the fact that particular timber elements have been established as being code compliant in relation to a particular building does not necessarily mean that the same timber elements will be code compliant in another situation.

7.9 Effective maintenance is important to ensure ongoing compliance with clause B2 of the Building Code and is the responsibility of the building owner. Clause B2.3.1 of the Building Code requires that the element be subject to "normal maintenance", however that term is not defined in the Act.

7.10 I take the view that normal maintenance is that work generally recognised as necessary to achieve the expected durability for a given building element. With respect to the exposed timber decking and posts used in this house, normal maintenance tasks should include but not be limited to:

- regular inspection of the exposed timber and replacement of any decking that may be subject to deterioration
- regular cleaning and removal of any debris built up around timber junctions.

8 The decision

8.1 In accordance with section 188 of the Building Act 2004, I hereby determine that the decking complies with clause B2 of the Building Code but that the columns and balustrade posts do not comply with B2. However, when the columns and balustrade posts have been treated, as described in paragraph 7.6, the deck will comply with B2 and the territorial authority should issue an amended building consent.

Signed for and on behalf of the Chief Executive of the Department of Building and Housing on 5 December 2007.

John Gardiner
Manager Determinations