Department of Building and Housing
Te Tari Kaupapa Whare

Determination 2010/10

The refusal of a building consent for proposed house alterations and additions at 17 Winsomere Crescent, Westmere, Auckland

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 applicant is the owner J Priest ("the applicant"), who is also the architect. The other party is the Auckland City Council ("the authority"), carrying out its duties as a territorial authority or building consent authority.

1.2 This determination arises from a decision by the authority to refuse to grant a building consent for proposed additions to a house unless changes are made to the design of the roof gutters and deck so that the slope of these elements complies with the authority's own design guidelines. I have taken the authority's decision to mean that it is not satisfied that the gutters and deck will comply with certain clauses of the Building Code (Schedule 1, Building Regulations 1992).

1.3 I consider that the matter for determination[2] is whether the authority was correct in its decision to refuse to issue the building consent. I note that various other concerns related to the building consent appear to be in the process of being resolved, and the use of the membrane as a product is not in dispute. This determination is therefore limited to the proposed falls to the deck and its gutters, and to the fall to the roof gutters. I must therefore consider whether these elements will comply with Building Code Clause E2 External Moisture in respect of shedding water from the roof, and Clause B2 Durability in respect of the ongoing performance of these building elements.

[1] The Building Act, Building Code, Compliance documents, past determinations and guidance documents issued by the Department are all available at www.dbh.govt.nz or by contacting the Department on 0800 242 243

[2] In terms of sections 177(b)(i) of the Act. 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 work

2.1 The proposed building work consists of extensive additions and alterations to an existing single-storey detached house situated on a gently sloping site in a high wind zone for the purposes of NZS 3604[3]. The work includes the addition of an upper level, with extensions and alterations to the existing ground floor. The construction is specifically engineered, with a mix of steel posts, beams and timber framing. A section through the deck is shown in Figure 1 below.

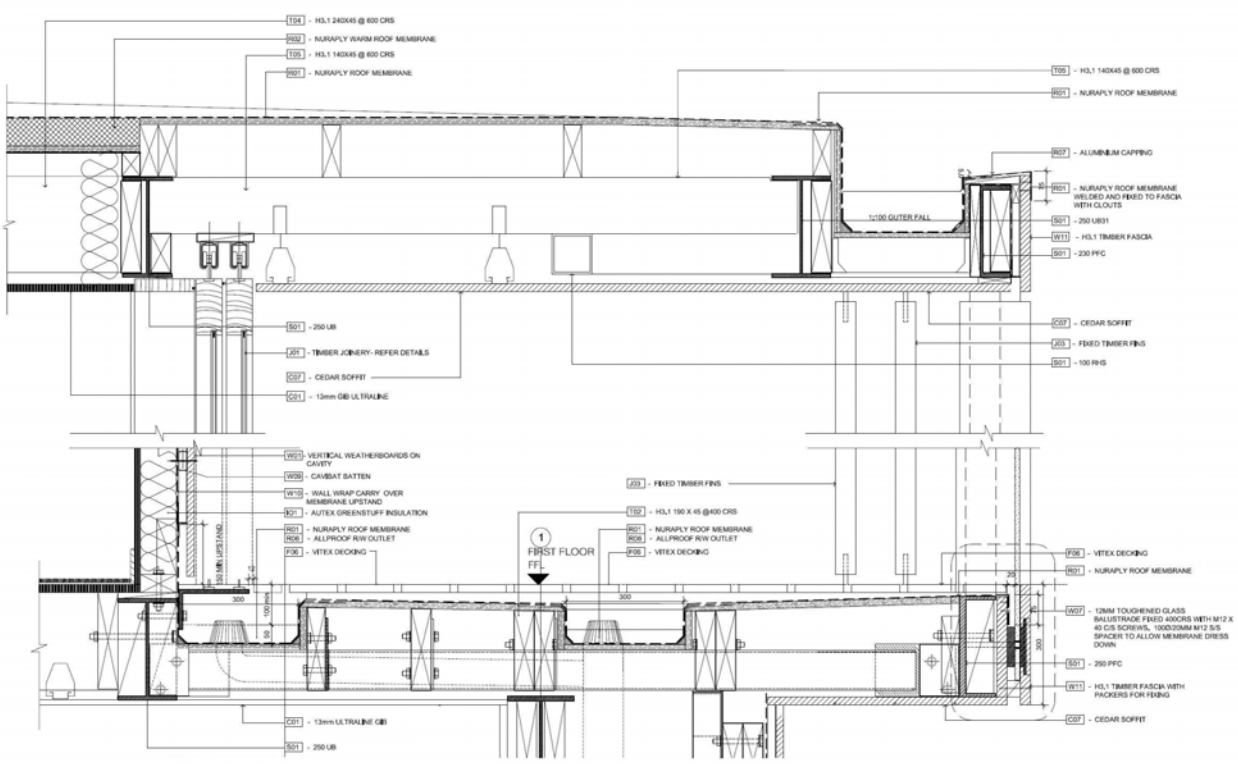

Figure 1: Section through deck and roof

2.2 The roof and associated gutters

2.2.1 The roofs and gutters are clad in membrane over plywood substrate, with the roof sloping towards 300mm wide gutters. The gutters have a fall of 1:100 and are bound by parapet walls. The roof structure includes 250mm steel beams, 240x45mm timber rafters and 100x100mm steel sections at the hips. Steel sections support the gutter substrates, with steel posts and cleats within the timber-framed parapet walls.

2.2.2 The roof membrane extends into the gutters and over the top of the parapet framing, with a sloping aluminium capping to the top of the parapet walls. The top edge of the capping is about 100mm below the roof edge of the gutter, allowing water to flow over the parapet top if the drainage capacity is exceeded, or the outlets become blocked.

2.2.3 The owner has agreed to increase the slope to the roof membranes to 1:30. The slope of the roof membranes is not in dispute.

[3] New Zealand Standard NZS 3604:1999 Timber Framed Buildings

2.3 The deck and associated gutters

2.3.1 The deck considered in this determination is a membrane-covered deck to the north elevation of the new upper level. The deck is situated partially over enclosed spaces, and the deck area is fully covered by the roof projection above. The deck floor structure is a mix of steel and timber framing. Glazed balustrades are side-fixed into the deck framing.

2.3.2 The deck membrane is installed over a plywood substrate, with free-draining timber slat decking installed over proprietary deck supports. The membrane slopes at 1:60 towards a gutter situated outside the exterior face of the wall below. A second gutter runs along the exterior wall to provide clearances to the cladding and inside floor levels. The 300mm wide gutters have a minimum depth of 60mm and a 1:100 fall.

2.4 The membrane

2.4.1 The roof, deck, and gutter membrane is a polyester-reinforced modified bituminous membrane system that is made up of two layers of 3mm thick membrane installed over 17mm H3-treated plywood. The membrane base layer is installed by cold gluing to the substrate with all lapped joints heat-welded. The membrane top layer is torched on and finished with a flexible paint coating.

A 'warm roof system', provided by the membrane supplier, is used over all enclosed spaces. This system provides a layer of rigid 70mm insulation laid over a vapour control layer that is fixed to the underlying plywood substrate. The base layer of membrane is mechanically fixed through the vapour barrier into the substrate.

2.4.2 The membrane supplier provides moulded polypropylene deck supports that allow for removable deck surfacing protecting the underlying membrane. BRANZ[4] have appraised the membrane system as suitable for flat roofs and decks protected from foot traffic.

2.4.3 The membrane supplier has provided a producer statement confirming that guarantees will be provided if the system is installed according to the specifications and noting that all slopes in the design exceed the minimum requirements of Acceptable Solution E2/AS1. The statement also notes that:

> Our technical advisers have worked with the architect on this project and have assisted her to ensure that the design meets or exceeds the requirements of the building code and [the supplier's] own design standards.

3. Background

3.1 The applicant has lodged an application for a building consent for the building work (No. B-2009-5397).

3.2 In a letter to the applicant dated 5 November 2009, the authority noted that the application had been suspended and outlined matters to be addressed before the consent could be issued. The authority listed 13 items, most of which are matters outside this determination (refer paragraph 1.3). In regard to the roof and deck falls,

[4] BRANZ Appraisal No. 547 (2007)

the authority requested that the falls be increased to 1:30, as specified in the authority's 'membrane register' (refer paragraph 6.1).

3.3 The applicant responded to the authority's letter on 9 November 2009, providing additional information and noting various revisions made to the drawings. The applicant also noted that the 'main roof falls have been increased to 1:30'. However, in regard to the deck falls required by the authority, the applicant stated:

> The deck is fully covered by a membrane roof overhead and so has been specifically engineered as an enclosed deck to comply with the falls required in the Building Code and supported by the roofing manufacturer. These details have been worked through with [the manufacturer's] technical advisor.

The applicant attached a producer statement confirming the guarantee available for the product, and added:

> As the owner and architect of this project, I am comfortable with the warranties that will be given by the roofing manufacturer and installer based on this specific design.

3.4 In a reply to the applicant dated 20 November 2009, the authority referred to its requirement for falls to the deck membrane stating that

> ... [the specified] membrane is an alternative solution, requiring you to demonstrate compliance. Please find attached the acceptable falls for this product.

The attached membrane register stated that the minimum falls for the specified membrane system were:

> Roofs and decks 1:30 (2 degrees)
> Gutters 1:60 or 1:45 (1 or 1.5 degrees) refer practice note 142.

3.5 The Department received an application for a determination on 7 December 2009 and sought clarification from the authority as to its reasons for deciding that the deck membrane did not comply with the requirements of the Building Code. Clarification was also sought from the parties regarding the matters in dispute.

3.6 In an email to the Department dated 20 January 2010, the applicant explained that, although butyl membranes at 1:40 fall were acceptable to the authority, the reason for choosing the specified membrane system was to allow for the use of the warm roof system. Although the roof fall had been changed as requested, the applicant noted:

> Whilst we revised the main roof falls to be 1:30 with little consequence to our documentation, to incorporate changes to both gutter and deck falls would require significant re-engineering and architectural detailing. We have significant amounts of steel structure in this project and tolerances are minimal.

3.7 In an email to the parties dated 20 January 2010, the Department noted that the applicant had confirmed the increase in the slope of the main roof to meet the authority's requirements and also noted that the use of the membrane product was not in dispute. The Department also confirmed that:

> ... the matter to be determined is [the authority's] refusal to issue the consent because of the proposed slope to the roof gutters and the gutters and membrane to the first floor deck. The reasons for the refusal are to be clarified by [the authority] ...

3.8 The expected structural deflection

3.8.1 The Department also asked the applicant to obtain information from the structural engineer for the project ("the engineer") regarding the likely expected deflection in the relevant parts of the upper floor structure.

3.8.2 In an email to the applicant dated 22 January 2010, the engineer noted that:

- the steel beams supporting the roof gutters are expected to deflect by less than 0.3%, compared with the 0.6% (1:100) fall specified for the roof gutters
- the timber beam supporting the deck gutter is expected to deflect by about 0.3%, compared with the 0.6% (1:100) fall specified for the deck gutters
- the steel beams supporting the deck are expected to deflect by about 0.43%, compared with the minimum 1% (1:60) fall specified for the deck floor.

3.8.3 The engineer concluded that he was 'confident that deflections in the structural framing will not impact on the proposed minimum falls' for the gutters and the deck.

4. The submissions

4.1 The authority made no submission in response to the application.

4.2 The applicant forwarded copies of:

- the consent drawings and specifications
- the producer statements from the membrane manufacturer
- the correspondence with the authority.

4.3 The draft determination was issued to the parties for comment on 28 January 2010.

4.4 Both the applicant and the authority accepted the draft on 5 February 2010 without comment.

5. The legislation

5.1 Refer to Appendix A.

The relevant sections of the Act are:

18 Building work not required to achieve performance criteria additional to or more restrictive than building code

49 Grant of building consent

The relevant provisions of the Building Code are:

B2.3.1 *Building elements* must, with only normal maintenance, continue to satisfy the performance requirements of this code ...

E2.3.1 Roofs must shed precipitated moisture ...

The relevant sections of the Acceptable Solution E2/AS1 for the membrane roofs, deck and gutters are:

8.5 Membrane Roofs and Decks

8.5.1 Limitations

8.5.4 Butyl and EPDM

6. Discussion

6.1 The authority has produced a 'membrane register' which includes minimum falls for specified membrane products. I consider that such documents may be used as advice only, and cannot take precedence over provisions of the Building Code and the Act.

6.2 The authority maintains that the membrane specified for the building work does not fall within the scope of E2/AS1, and must therefore be assessed as an alternative solution. I accept that view, although I note that the authority has no objections to the use of the particular membrane specified for this house, but only to the degree of fall proposed.

6.3 In evaluating the design of a building and its construction, it is useful to make some comparisons with the relevant Acceptable Solution, which will assist in determining whether the features of the building work are code compliant. In the case of the gutters and deck proposed for this house, I make the following observations:

E2/AS1 requirements for gutters and deck membranes (refer Appendix A)	**The proposed gutter and deck membrane system**
For deck membranes, a minimum fall of 1:60 For membrane gutters: a minimum fall of 1:100	The system has been accepted by the membrane supplier for a 20-year product warranty at the proposed deck fall of 1:60 and gutter falls of 1:100
A minimum membrane thickness of 1mm.	The membrane is a 2-layer system that results in a total membrane thickness of 6mm.
E2/AS1 is limited to membranes composed of butyl or EPDM.	The membrane product has been accepted in general by the authority.
E2/AS1 is based on flexible conventional timber framed roof and wall structures.	The membrane will be laid over a specifically engineered and relatively rigid structure.

6.4 In addition to the above, I make the following comments on some of the detailed design aspects of the elements under consideration:

The deck including the gutters

- The deck is fully covered by the roof overhang and the amount of rainfall reaching the deck membrane area will be limited. The deck membrane surface, including the joints and gutters, is protected from foot traffic by the removable decking.
- The deck is long and narrow with two deck gutters – one along the wall and the other outside the line of the lower wall, with the maximum cross fall towards the gutter limited to about 800mm.
- Ponding on the deck and gutter membranes is unlikely to occur, as the steel framing provides rigidity for the structure (refer paragraph 3.8).

- The cross-section of the 300mm wide deck gutters significantly exceed the minimum given in the Acceptable Solution E1/AS1 for the deck areas drained.

The roof gutters

- The roof gutters are supported by steel framing, resulting in a relatively rigid structure unlikely to result in ponding on the gutters (refer paragraph 3.8).
- The cross-section of the 300mm wide internal gutters is approximately five times greater than the minimum given in E1/AS1 for the maximum plan area of roof discharging into the gutter.
- At the parapet walls, the height of the outer edge of the gutters is about 100mm below the inner edge, which allows water to flow over the parapet top in the unlikely event that drainage capacity is exceeded during severe storms.

6.5 Taking into account the above observations, I consider that the membrane system proposed for the deck and gutters to this house is likely to perform at least as well as the materials and systems included within E2/AS1. I am therefore satisfied that the proposed gutters and deck for this house will meet the performance requirements of Clause E2 for the deck and roof to shed water.

6.6 I acknowledge and accept that the authority has concerns with respect to the performance of low-pitched membrane roofs to buildings where deflection of the structure may give rise to ponding. However, the new upper level to the house is a specifically-designed steel structure that is considerably more resistant to deflection than conventional timber framing.

6.7 I have seen no evidence to suggest that the membrane material itself will not meet the durability requirements of the Building Code for use in this situation. The membrane is supported by a BRANZ appraisal and is manufactured by a long-established and reputable company. The durability of the material is not disputed by the authority. I believe there is sufficient evidence to establish that the ongoing performance of the structure will not lead to the inability of the membrane to shed water. Taking these two matters into account I consider that the proposed membrane will also meet the requirements of Building Code Clause B2 Durability.

6.8 Under section 49, a building consent authority must grant a building consent if it is satisfied on reasonable grounds that the provisions of the building code would be met. In my view the authority's decision not to grant a building consent was not based on reasonable grounds given that the authority made its decision as to compliance by simply applying the predetermined falls described in its membrane register, and did not seek information from the applicant about compensating factors in the design of the building, including the expected deflection of the roof and deck structures.

6.9 The applicant has agreed to increase the falls of the main roof to comply with the authority's requirements and this matter is now therefore not in dispute and does not form part of this determination. However, for similar reasons to those outlined herein, I am of the opinion that there is also little likelihood of the originally proposed roof, with a 1:40 slope, deflecting in such a way as to cause ponding on the membrane surface.

7. The decision

7.1 In accordance with section 188 of the Building Act 2004, I hereby determine that the roof gutters and deck proposed for this building comply with Clauses B2 and E2 of the Building Code, and accordingly I reverse the authority's decision to refuse to grant the building consent, in respect only of the proposed falls to the deck membrane and gutters, and to the fall to the roof gutters.

Signed for and on behalf of the Chief Executive of the Department of Building and Housing on 12 February 2010.

John Gardiner
Manager Determinations

Appendix A: The legislation

The relevant sections of the Act are:

18 Building work not required to achieve performance criteria additional to or more restrictive than building code

(1) A person who carries out any building work is not required by this Act to—

(a) achieve performance criteria that are additional to , or more restrictive than, the performance criteria prescribed in the building code in relation to that building work; or

(b) take any action in respect of that building work if it complies with the building code.

49 Grant of building consent

(1) A building consent authority must grant a building consent if it is satisfied on reasonable grounds that the provisions of the building code would be met if the building work were properly completed in accordance with the plans and specifications that accompanied the application.

The relevant provisions of the Building Code for the roofs and deck are:

B2 Durability

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) …

(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.

E2 External moisture

E2.3.1 Roofs must shed precipitated moisture. ...

The relevant sections of the Acceptable Solution E2/AS1 for the membrane roofs, deck and gutters are:

8.5 Membrane Roofs and Decks

8.5.1 Limitations

This Acceptable Solution is limited to *membranes* composed of butyl or *EPDM* installed over plywood substrates for:

a) Roofs with a minimum fall of 1.5° (1:40),

b) *Decks* with:

i) a minimum fall of 1° (1:60) ... .

c) Internal gutters with a minimum fall of 1 in 100, with no seams in the gutters closer than 1 m to an outlet, and

d) Decks with removable raised surfaces to give level access ... .

8.5.4 Butyl and EPDM

Butyl rubber and *EPDM* rubber used for *membrane* roofing or *decks* shall:

a) Be a minimum thickness of:

i) 1 mm for roofing ... .