

Statement of evidence of Alistair Ronald Boyce

I, **Alistair Ronald Boyce** of Christchurch, Structural Engineer, state:

1. I hold a Bachelor of Engineering (Civil) which I received in 1997. I am a Chartered Professional Engineer and a member of the Institution of Professional Engineers of New Zealand. I have been employed as a structural engineer by Opus International Consultants Limited ('**Opus**') from 2003-2005 and again from 2008 to the present day. I am based in Opus's Christchurch office.
2. I have been involved in the design of a number of buildings and civil structures in Christchurch, and have also undertaken seismic assessments of existing buildings. After the 4 September 2010 earthquake I undertook rapid assessments of central city buildings for Civil Defence and also completed detailed assessments on buildings for other Opus clients.

Extent of Work Undertaken

3. On or about 29 December 2010 I met with Andrew Brown to discuss the work required at 91 Cashel Street (the '**Building**') in relation to the design of securing works for the roof parapets damaged in the 26 December 2010 earthquake. I understood that Andrew, following a visit to the building and in line with Opus's scope of engagement with the client, had designed the securing works and discussed these with the contractor, Southbuild. He requested that I inspect the securing works once they had been installed and provide certification of this to the Christchurch City Council (the '**Council**').
4. The securing works had been completed by SouthBuild and consisted of removing the corners of the cracked parapets at the northern end of the roof and connecting Reidbar tie rods to the loose parapet beam over Cashel Street to tie it back to the return walls.
5. On 31 December 2010 I visited the Building and carried out an external inspection of the securing works. I had not previously inspected the building. To do this inspection I accessed the roof via a crane provided by SouthBuild and confirmed that the securing works had been completed in accordance with Andrew's design. During this inspection I also briefly looked at the condition of the remaining parapets in order to see if I could

identify any other areas of damage or distress, which I could not. I then provided certification to the Council that the securing works had been completed. This certification consisted of signing a statement in respect of the Building [BUI.CAS91.0007.30].

6. I was not provided with information from the Council file before conducting my site visit. I was, however, aware from Andrew Brown that a Level 1 Rapid Assessment had been conducted in respect of the Building after the 26 December 2010 earthquake and that this identified that the roof parapet above the Building was cracked and potentially loose. Building Act notices had been served on the building owner and on the owner of the immediately adjacent buildings. I was not provided with a copy of the Building Act notices. I was aware that 91 Cashel Street had been red placarded as a result of the Boxing Day inspection.
7. My role did not involve review of the building plans, or any previous reports or assessments by other engineers. I considered the structural form of the parapets when reviewing the design of the securing works.
8. A Civil Defence briefing for engineers held on 5 September 2010 had highlighted that further aftershocks up to one magnitude less than the main earthquake event could be expected. Based on this assumption, I considered that since the Building had survived the 4 September 2010 earthquake and the 26 December 2010 earthquake with only minor damage to the roof parapets, it did not have diminished seismic capacity and its ability to withstand further aftershocks following the expected decay sequence was not materially reduced. The works were designed to the relevant New Zealand Standard, NZS 1170.5, and the securing works were designed to restore the structural capacity of the damaged feature to at least its condition before 26 December. Accordingly no further information from GNS was required before I provided my certificate.

Statement by Chartered Professional Engineer in Respect of the Building

9. The purpose of my statement dated 31 December 2010 was to confirm that I had inspected the securing works carried out by Southbuild and that I could certify that the works restored the structural integrity and performance of the roof parapets to the condition that existed prior to the earthquake on 26 December 2010.

10. The scope of Opus's engagement with the building owner was to design securing works for the damage resulting from the 26 December 2010 earthquake. The securing works installed mitigated this damage. I considered it appropriate to alter the date in paragraph "a" of the statement from 4 September 2010 to 26 December 2010 because I was working on the assumption that the works were for the purpose of remedying damage caused by the 26 December 2010 event which resulted in a red placard. Prior to that my understanding is that the building had a green placard.
11. The potentially dangerous features of the Building at 91 Cashel Street relevant to paragraph b of the statement were the cracked roof level parapets at the northern (rear) end of the roof and the loose parapet beam over the Cashel Street elevation.
12. The potentially dangerous features relevant to paragraph b in the statement were remedied by the securing works recommended by Andrew Brown and carried out to the standard identified in the statement. The loose parapet beam above the Cashel Street frontage was secured by tying it back to the side parapets.
13. The cracked roof parapets on the northern side were secured by removing parts of the parapets.
14. Following my site visit on 31 December 2010 I advised Andrew Brown that the works had been completed, and I did not have any further involvement with the Building.

Dated 17 January 2012

Alistair Boyce