

Brief of evidence of Andrew Brown - 91 Cashel Street

I, **Andrew Geoffrey Brown** of Christchurch, Civil and Structural Engineer, state:

1. I hold a Bachelor of Engineering (Civil) (Hons) which I received in 1997. I am a Chartered Professional Engineer and a member of the Institute of Professional Engineers of New Zealand. I have been employed as a civil and structural engineer by Opus International Consultants Limited ('Opus') since 2008. Prior to that I was employed as:
 - (a) the Capital Investigations Team Leader, Capital Programme Group of Christchurch City Council between 2007 and 2008;
 - (b) Team Leader Buildings – City Solutions Group of Christchurch City Council between 2006 and 2007;
 - (c) Senior Structural Engineer – City Solutions Group of Christchurch City Council between 2002 and 2006; and
 - (d) between 1996 and 2001 I was a Graduate Structural Engineer - City Solutions Group of Christchurch City Council.

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. This has included the assessment of the seismic performance of existing buildings, and the design of retrofit solutions to improve the seismic performance of buildings. Following the September earthquake, I was involved in earthquake rapid assessments of central city buildings for Civil Defence, and, following this, assessment of numerous buildings for Opus clients. This included the design of securing and temporary works to earthquake damaged buildings.
3. On 27 December 2010 I was orally instructed by the owner of buildings at 93 and 89 Cashel Street, to inspect and design securing work for the parapets to 91 Cashel Street (the '**Building**') which had been identified as hazardous by Christchurch City Council. Building Act notices had been served on 89A and 95 Cashel Street due to the danger posed from the 91 Cashel Street roof parapet over the Cashel Street elevation. The scope of my work

was subsequently confirmed by the owner of 91 Cashel Street who had been out of Christchurch when he originally instructed me.

4. The building was a 3 storey unreinforced concrete and masonry building with a lightweight roof on timber trusses.
5. I was not provided with any information from the Christchurch City Council (the '**Council**') file for the purpose of my inspection. Nor was I provided with a copy of the Building Act notice served on the building owner, however, I read the notice taped to the Cashel Street entrance which noted the cracked parapets.
6. I was aware of the Council Level 1 Rapid Assessment that was completed on 26 December 2010 in respect of the Building which led to a Building Act notice being served on the owner of the property. I understood that it had noted that the roof parapet above the Building was cracked and potentially loose.
7. In inspecting the building I considered the impact of the 4 September 2010 earthquake and subsequent aftershocks on the structural integrity of the Building. Based on the information I had, my understanding was that there was little structural damage within the building and therefore, with the exception of the Cashel Street roof parapet, the integrity of the building was similar to that before the 26 December 2010 earthquake.
8. As instructed, my inspection was limited to inspecting the parapet of 91 Cashel Street due to it having been identified as a hazard. Together with Paul Southern of Southbuild, a building contractor, and Anna Hodgson, the property manager for Hereford Holdings who owned the two adjoining buildings, I met with the tenant of the second level to gain access to the roof. The tenant indicated that no damage had occurred to the building on Boxing Day. I inspected the remainder of the building parapets while on the roof, and identified the northwest and northeast corners of the rear elevation as additional potential hazards to be addressed. A brief external visual inspection of the building was carried out to assess whether any other damage relating to the Boxing Day earthquake could be identified. None was found.
9. I did not view the building plans in inspecting the building, however I did give consideration to the building form. I recall that there was an inspection notice (by another engineering

consultancy) posted at the stair landing of the first floor covering an inspection of the building that occurred after the 4 September earthquake.

10. I did not review any other previous reports or assessments by any engineers in relation to the Building.
11. No information from any other party relating to building standards or the inspection of buildings following an earthquake was received.
12. The cracked roof level parapets were considered to be a potentially dangerous feature of the building. The only damage observed to the parapets was to the Cashel Street elevation and the rear elevation. No other damage to other parapets was observed from either ground or roof level.
13. At the rear of the building both corners of the parapet were loose, and the unsecured brick posed a falling hazard to the area below. An approximately 0.5m length of the parapet was removed in each direction at these two corners to remove the overhead falling hazard.
14. At the front of the building the concrete lintel beam above the windows was displaced slightly towards the street and was no longer secured to the return walls. This presented a falling hazard to Cashel Mall, and the shops below and either side of 91 Cashel Street, which resulted in all three buildings being red placarded by the Council.
15. I took a series of photographs showing the damage to the parapets of 91 Cashel [**Annexure 1**].
16. I designed a temporary securing system to restrain this front parapet from falling by tying this parapet back to the side parapets with a reinforcing bar (called a "Reidbar") that was drilled and anchored through the front parapet and slightly tensioned [**BUI.CAS91.0012.2**]. This securing was a short-term measure only designed to be in place for less than six months.
17. As the securing works were designed to meet the requirements of NZS1170.0, and NZS 1170.5, information from GNS was not sought.

18. I considered the structural form of the parapets when designing the roof parapet securing works.
19. I recorded my observations and the remedial measures put in place in an email to the owner of 91 Cashel Street dated 31 December 2010 [**BUI.CAS91.0007.32**].
20. In that email, I advised the owner that the securing I had designed was a short-term solution, and offered to carry out a detailed engineering assessment and advise on a long-term solution. No response was received from the owner until after the February earthquake when he requested that we prepare a report confirming demolition as necessary.
21. The temporary securing was installed on 31 December 2010 and was certified by Opus. I was not involved in the certification process. I understand that the Council consequently removed the red placards and cordon from 89, 91, and 93 Cashel Street that had been in place prior to my inspection.
22. The securing works for the parapet performed as intended, and, despite the collapse of the floor below, the concrete parapet on Cashel Street was prevented from falling by the securing works installed and certified on 31 December 2010 as can be seen in photographs [**BUI.CAS91.007.40**].

Dated 19 January 2012

Andrew Brown





























