

Under the Commissions of Inquiry Act 1908
In the matter of Royal Commission of Inquiry into building failure
caused by Canterbury Earthquakes

Brief of Evidence of
Hannah Elizabeth Clarke in respect of
43 Lichfield Street

Dated: February 2012

Date of Hearing: 27 February 2012

Lane Neave
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I, **Hannah Elizabeth Clarke**, of Christchurch, Structural Engineer, say that:

1. My full name is Hannah Elizabeth Clarke. I am a structural engineer for Powell Fenwick Consultants Limited. I have a Bachelor of Engineering Degree (Hons), a MIPENZ (Structure) and a CPEng. I have eight years post graduate experience.
2. Following the 4 September 2010 earthquake I was asked to carry out a walk through inspection at the Ballantynes building of areas requested by the client, Paul O'Connell.
3. In terms of the nature of the inspection that I carried out on 6 September 2010, it was a visual walk through inspection just of the specific areas that were defined by Mr O'Connell. Mr O'Connell led me around the areas of the building which he wanted to be inspected. This did not include the car park levels of the Anderson building. My report following this inspection is dated 7 September 2010 [**BUI.LIC43**]. In the areas I was asked to inspect, I did not observe any issues that required urgent attention to ensure the ongoing stability of the building.
4. Following the receipt of my report dated 7th September 2010, Ballantynes requested that a further inspection of the same areas be carried out for the purposes of specifying repairs that were necessary in terms of the damage.
5. I conducted a further visual inspection of the retail areas on 19 November 2010 for the purposes of specifying repairs to the damage noted during the inspection on 6 September 2010. I was not asked to inspect the car park areas of the Anderson building and Mr O'Connell outlined that the original building designers for the Anderson building had inspected the car park floors and were preparing a specification for the minor repairs required to these areas. My report following this inspection is dated 14 December 2010 [**BUI.LIC43.0007**].
6. The areas that I inspected showed relatively small signs of damage. There was some damage to the internal linings, particularly in the South-East corner in the kitchen area of the tea room. The floor finishes and ceiling tiles which bridged over the seismic joint with the adjoining Moule Building also showed signs of damage. This sort of damage is to be expected for items which span across this gap. The nature of the damage observed was non structural.

7. I was not asked to, and I did not, inspect the exterior of the Anderson building fronting onto Lichfield St on either of my inspections prior to 22 February 2011.
8. In terms of the risk posed by further after shocks following 4 September 2010, I was aware that after shocks would continue for a period of time. The expectation was that these after shocks would be lower in magnitude and less damaging than the 4 September earthquake.
9. I do not recall accessing any information from the Council on building standards or inspections around this time and my recollection is that there was none available. I do recall some discussion in early December 2010 around proposed changes to the earthquake prone building policy in terms of the level of strength required if an earthquake prone building was to be strengthened. Similarly, I did not receive any information from any other party that related to building standards or the inspection of buildings following an earthquake.
10. The building plans were not provided by Mr O'Connell. When it came to drafting my second report, I used the first floor fire safety features plans from 2001 to draw a basic site plan to define the floor building areas.
11. The Anderson building was designed and constructed in the early 2000s and as such should have complied with the earthquake prone building policy issued by the Christchurch City Council.
12. In the same light, due to the recent design and construction of the Anderson building, I would not expect it to have had any earthquake strengthening carried out yet.
13. I have been asked to comment on the general failure mechanism of the building, in particular the failure of the concrete façade panels. Prior to this Royal Commission of Inquiry, I had no knowledge of the damage sustained to the building in February 2011. The knowledge I now have is based on the photos provided under the secure log in and conversation with my colleague, Stuart Winterbourne, who inspected the building post February. I understand the building was a two-way ductile frame and that during February the damage was observed as being close to the capacity of the building. The precast façade panels appear to have failed by loss of

connection. Having not viewed the damage personally I cannot comment further.

14. As mentioned above, I was not instructed to inspect the concrete panel connections. During the visual inspections of the retail areas that I was asked to inspect, there was no sign of any structural damage. The brief to Powell Fenwick Consultants excluded the car park areas as these were being carried out by the original design engineers, so panel connections were not viewed during our inspections.
15. I have been asked to comment on whether the design and/or fixing of such concrete panels has been a problem with other buildings and requires review. I have inspected other buildings and seen photos of others in the media where the precast panels have lost connection as a result of the excessive forces experienced during February.
16. I have been asked to comment on the spandrel panels, their design and fixing. As per my previous comments, the car park did not form part of my brief for inspection. Accordingly I did not inspect these areas after the September earthquake. However, to attempt to answer the question, it would have been impossible to know whether the spandrel panel had starters in it to the floor slab without looking at drawings. An inspection of the spandrels would likely have shown any damage to the fixings if there was any damage present. If there was damage visible to the exposed fixings, a further review would have been conducted, which would have involved obtaining the drawings to determine whether there was any alternative fixing for the spandrels or whether they relied entirely on the exposed fixings. A visual inspection of the spandrels would not have involved a review of the suitability of the fixings if they were not damaged. Inspections were to determine damage causing diminished capacity, not a full building analysis to determine where buildings sat in terms of compliance with today's standards or suitability of detailing secondary elements.

DATED

February 2012



Hannah Elizabeth Clarke