

UNDER

THE COMMISSIONS OF INQUIRY ACT 1908

IN THE MATTER OF

ROYAL COMMISSION OF INQUIRY INTO
BUILDING FAILURE CAUSED BY CANTERBURY
EARTHQUAKES

KOMIHANA A TE KARAUNA HEI TIROTIRO I NGA
WHARE I HORO I NGA RUWHENUA O WAITAHA

AND IN THE MATTER OF

THE CTV BUILDING COLLAPSE

STATEMENT OF EVIDENCE OF ROBERT DAVID JURY
IN RELATION TO THE CTV BUILDING

INTERPRETATION OF SECOND COMPUSOFT NTHA

DATE OF HEARING: COMMENCING 25 JUNE 2012

STATEMENT OF EVIDENCE OF ROBERT DAVID JURY

1. My full name is Robert David Jury.
2. I am currently a Technical Director in the discipline of structural engineering in the Wellington office of Beca Carter Hollings and Ferner Ltd (Beca). I have Bachelor of Engineering (Hons) and Master of Engineering degrees conferred at the University of Canterbury in 1977 and 1978 respectively. I hold CPEng in the practice areas of structural and civil engineering. I am a Fellow of the Institution of Professional Engineers New Zealand and a Fellow of the National Society for Earthquake Engineering (NZSEE).
3. I have over thirty years' experience in the field of structural engineering consultancy, specialising in the assessment and design of structures and, in particular, the performance of structures in earthquakes. I have received several excellence awards for projects that I have been involved with including: the Auckland SkyTower, the Thorndon Overbridge Seismic Retrofit project and the Istanbul residential buildings seismic retrofit project. I have authored or co-authored over forty technical papers on various subjects relating to structural engineering. I was a member of the Standards' committee that developed the current New Zealand Loadings Standard (including the earthquake loading Standard), NZS1170, and also its predecessor, NZS4203. I was convenor for the NZSEE study group that prepared the Society's publication entitled "Assessment and Improvement of the Structural Performance of Buildings in Earthquakes", June 2006. I am currently a member of the Engineering Advisory Group that is providing technical advice to the Department of Building and Housing in response to the Christchurch earthquakes.

EVIDENCE

4. I have read the Code of Conduct for Expert Witnesses and agree to comply with it.
5. My evidence will address matters relating to changes in my opinion resulting from the second Compusoft Engineering NTHA.

6. I have read the report prepared by Compusoft Engineering dated July 2012 (First Draft Issue) and I have compared the results presented with those given in the report describing the first Compusoft Engineering NTHA, dated February 2012. I was not a member of the Expert Panel that directed these new analyses.
7. I will respond to the particular questions requested by Council Assisting the Royal Commission dated 17 July 2012.
8. In relation to the matter of the response of the CTV Building to the earthquake at 4:35am on 4 September 2010. Although the latest analysis results might arguably suggest slightly higher levels of damage than the original analyses, I still agree with the view expressed in the DBH Expert Panel Report that the reported damage after this event *appeared to be relatively minor and was not indicative of a building under immediate distress or having a significantly impaired resistance to earthquake shaking*. In reaching this position I am putting greater weighting on the observations that were reported after the September event than necessarily on either the first or the second NTHA results. The NTHA carried out for the 4 September 2010 and 22 February 2011 shaking in series indicate that the damage following 4 September had little influence on the overall performance of the building during the 22 February event.
9. In relation to the matter of the response of the CTV Building to the earthquake at 12:51pm on 22 February 2011. Notwithstanding the refinements made to the computer model, the levels of storey drift predicted by the second NTHA are comparable with those predicted by the first NTHA. This is also after inclusion of the results using the REHS record. This confirms to me that, although there are obvious changes in the elemental force envelopes and the order in which elements reach particular levels of stress, the overall levels of performance of the building predicted by the two analyses are not dissimilar given the accuracy of the analysis procedure.
10. In relation to the matter of why the CTV Building failed on 22 February 2011. The second NTHA confirm that the most likely reason for building collapse was the failure of one or more columns. This is consistent with my view and that of the DBH Expert Panel as expressed in its report. Joint failure was not predicted in the latest analyses but I do recognise that the joint model, although refined from the earlier analyses, may still not model the performance of the actual joints during this earthquake. It would appear that this issue is not likely to be resolved in the short term.
11. In relation to the matter of the sequence of failure of the CTV Building on 22 February 2011. The second NTHA provide strong support for the DBH Expert Panel collapse initiation scenarios 2 and

4. In my evidence to the Royal Commission on 10 July 2012 I indicated that collapse initiation scenario 2 was the most likely in my view. The latest NTHA results provide a stronger case for this view than the earlier analyses, but do not rule out the possibility of failure of the floor diaphragm to north wall connection on a number of floors (collapse initiation scenario 4). There still remains the possibility that these connections did not fail based on the observation made following this event and, as diaphragm connection failure is not necessary to predict column failure, I am still comfortable to retain my view that collapse initiation scenario 2 is the most likely of those that have been proffered. It is at least possible, in my view, that the NTHA predicted diaphragm connection forces are of such short duration that the magnitudes of the forces, on their own, are not sufficient to indicate failure.
12. Based on the above I confirm that the second NTHA would not lead me to change the opinions that I expressed to the Royal Commission on 10 July 2012.

Dated: 23/07/2012.



Robert David Jury