

13 April 2012

Canterbury Earthquakes Royal Commission
PO Box 14053
Christchurch 8544

VIA EMAIL
Mary-
ann.hutton@royalcommission.govt.nz

Attention: Stephen Mills QC, Counsel Assisting

Dear Sir

Royal Commission of Inquiry into Building Failure Caused by the Canterbury Earthquakes:
CTV Building: 249 Madras Street – information request

Enclosed a copy of Mr Harding's response to questions posed in your letter of 28 March 2012.

Yours faithfully
SAUNDERS & CO

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Dave Harding

File CERC
1 April 2012

Stephen Mills QC
P O Box 14053
Christchurch 8544

Dear Sir,

**Royal Commission of Inquiry
Information Request**

Further to your letter of 28 March I enclose additional information as requested.

- (a) (1) I created a computer model of the building depicted on the Architectural drawings. I visited the University to input the data, and a number of days later visited again to collect the output data sheets. This process was repeated a number of times as the design developed.
- (2) The only other person involved in analysing the output results was Dr Reay.
- (3) The structural strength of the western masonry wall was not included in the data analysed. I do not recall at what stage in the design the masonry wall was added. It was intended that the wall be isolated from the building structure, and that it should behave as a non structural partition.
- (b) (1) Yes, I was previously employed at Alan Reay Consultants.
- (2) Between about 1977 and 1980.
- (3) No, I had no involvement with any multi-storey buildings during that time.
- (4) N A
- (5) During my first period of employment, I was engaged principally in the design of single storey precast concrete industrial buildings which occasionally included internal mezzanine floors. I also designed structural elements of residential buildings. I then left the firm to become the Design Engineer for the Waimakariri District Council, to gain experience in Civil Engineering design. I designed a number of roads and roundabouts, including Cost benefit studies and the design of the QE2 Drive expressway. In 1985 I was offered the opportunity to return to ARC to gain experience in the design of multi-storey buildings. Dr Reay advised me that he had now designed a number of multi-storey buildings and that he had engaged structural draughtsmen and an engineer from Holmes Wood Poole and Johnstone because of their experience in the design of such buildings. He offered me experience in the design of such buildings, and the future possibility of becoming an Associate with his firm. I note that the Engineers Code of Ethics requires that an Engineer shall not accept a commission for a project which is beyond the limits of his ability. At that time, if I had been the Principal of a Consulting Engineering firm, I would not have accepted a commission to design a multi-storey building. The understanding with Dr

Reay was that I was inexperienced in multi-storey building design but that I would gain that experience by working with Dr Reay and his team.

- (c) (1) I did not say that the draughtsmen were specifically recruited to design the CTV building. I repeated what Dr Reay had earlier told me, as set out above. My recollection is that the draughtsmen involved in the design were Terry Horn and Wayne Strachan.
 (2) I provided the draughtsmen with information as requested following my preparation of structural calculations. The draughtsmen would prepare carcass drawings from the Architectural drawings, in discussion with Dr Reay as to the setout of the drawings and the degree of detailing which was required, and the number of standard details to be employed. I would provide details of the reinforcement and member sizes, and if any further information was required, they would request it from me.
- (3) The draughtsmen were all under continuous supervision by Dr Reay. His mode of operation was to visit each draughtsman at least once each day to look over the work they were preparing, to comment on their work and to ask them what information had been provided to them by the Engineer. If he felt that the draughtsmen had been given incorrect information, or if the information provided did not follow his standard procedures, then he would come to me and tell me of the required changes. These instructions were sometimes in regard to the use of standard details, and in others they required changes in the type of materials used or the manufacturer of those materials.
- (d) (1) I said that the design features of the building, including the setout of the shear core outside the floor plate, and other architectural features were modelled on the building at 287 Durham St. It was never intended to model the structural or architectural design features of the building on Landsborough House. I was given a copy of the structural calculations for Landsborough house to use as a template for the method of how to design a building using an ETABS analysis, but not to follow the design features of that particular building.
 (2) It was never intended to model the design of the building on Landsborough House. I do not recall any discussions on the differences between these two buildings.
 (3) N A
 (4) N A
- (e) (1) I do not recall.
 (2) I believe that Dr Reay discussed my proposal for a coupled shear wall with the Client and the Architect. The inclusion of this wall was accepted subject to it being located behind the external stair, and that it should not extend beyond the stair as this would affect the Architectural aspect of the South wall. Nothing in the office was ever done without Dr Reay's approval.
- (f) (1) This is a reference to significant multi-storey buildings which require to be designed using a computer analysis such as ETABS.
 (2) I am referring to his company.
 (3) He advised me of this prior to my re employment at the company. I heard reference to many of these during my time at the company, but was not given the opportunity to view these buildings or the drawings of them.
 (4) The buildings I recall were referred to as Landsborough House, Aged Peoples' Welfare and Mair and Company. I can provide no further detail.
 (5) I consider this to be a multi-storey building of over four stories, which requires to be analysed using a computer analysis such as ETABS.

- (6) I had previous experience with single storey low rise industrial buildings, residential buildings, and low rise commercial buildings which are well proportioned and able to be seismically designed by hand using an equivalent static analysis.
- (g) (1) I agree that I would have expected to have replied to this letter, but that I have no recollection of having done so. My reluctance to confirm that I replied is the absence of a letter written by me, such as that dated 19 August 1987. and also by Dr Reay's annotation on the corner of the letter, and the handwritten notes beside item S26 which I believe to be those of Wayne Strachan.
- (2).The letter of August 1987 appears to have been written after the floors of the building have been constructed. It has nothing to do with the Building Permit.
- (3) I appear to have met Mr Tapper in 1987 to confirm that he held copies of the building drawings and calculations.
- (4) I do not recall discussing any items relating to this building with Mr Bluck.
- (5) I do not know what Dr Reay's discussions with the City Council were.
- (h) (1) I do not recall.
- (2) N A
- (3) Yes, I would have signed the drawings as the designer. Dr Reay would have signed them as having checked the design.

Yours faithfully



Dave Harding