HEARING RESUMES THURSDAY 6 SEPTEMBER 2012 AT 9.33 AM

JUSTICE COOPER:

Mr Mills.

MR MILLS:

I ended yesterday dealing with the construction issues and in terms of the written submissions, it's at page 119, and I'd got down to that sub-heading "Staff". So just I suppose to recontextualise this really it's a walk through what we know about the construction issues on that site in an effort to get some insight, some understanding of what undoubtedly and indisputably were some construction problems that have emerged from it including the one that I've mentioned about the failure to roughen the concrete connections which has some potentially seriousness.

Now on the issue of staff, and I don't think I need to read all of this through, because it's relatively straightforward, but the evidence that was given was that at any one time there were between eight and 14 staff on the site plus Mr Jones. I thought the most telling bit of evidence about this potentially was the evidence from Mr Jones that it was hard to get good staff at the time, presumably quite a lot of building pressure on in Christchurch and staff in demand and he commented that if they were good they were kept on, otherwise he'd get rid of them, which of course implies that for some period he had people that weren't that good before he learned that and got rid of them but that seemed to be the staffing pressure and as the submission says at 576 it is of course conceivable that the difficulty employing good tradesmen could have been a factor in some of the things that we've seen.

I turn next to the question of supervision both by Mr Harding and also by the Council. I think the Commissioners are aware supervision of the construction by Mr Harding, or by Dr Reay's firm, was part of the contract between Williams Construction and Dr Reay's firm. Mr Harding said in evidence that he visited the site regularly and completed inspection reports but as his submission says there are some indicators that the supervision was not as thorough as it should have been. The first bit of evidence about that came from Mr Jones, the foreman. He said that he would ring Mr Harding for every

concrete pour except the columns, he didn't do it on that because as he put it, the steel was already sticking out of the columns for them to see at their initial inspection, so he didn't think he needed to have him there when they were pouring those columns, but he did say that sometimes when he would phone Mr Harding telling him there was going to be a concrete pour he didn't arrive and he would just call back and say, if you don't see us go ahead. Mr Jones said this didn't concern him. Mr Harding denied this had occurred and, unfortunately, we don't have any inspection records from Mr Harding to confirm it one way or another. That was the evidence Mr Jones gave.

Now the more significant issue I think around this question of the failure to roughen the concrete ends and also the issue with the bent-back bars going into the north shear core that I mentioned yesterday, Mr Brooks said on that that these precast beams would be delivered to the building site and sit there stacked for some time and on that basis the evidence, and also the submission, is that there was an opportunity if inspections were being carried out for both the bent-back steel and also the failure to roughen the, or the fact they had initially at any rate smooth ends on the precast beams, to be picked up and noticed. Mr Harding certainly should have been aware of the critical significance of roughening those connected ends and, as I've said, the precast beams with the steel bent back also in my submission ought to have been visible if inspections were being properly carried out.

The other puzzling thing about inspections is at the Council end and the Council records that we obtained show a five month gap, and this is at paragraph 580, they show a five month gap in inspections between April and August 1987. Now Mr Scott said in evidence that he thought the gap showed a problem with the Council inspection staff and their reliance on the design engineer carrying out the supervision but he said he also formed the impression that the Council inspectors were relying on the design engineer to carry out supervision. Mr Leo O'Loughlin from the Council, who was a building inspector with the Council at the time, said that the number of inspections at least on those inspection records for the CTV building was, to use his words, "A bit light," for a building of that size in relation to both the number of inspections and their extent. So it wasn't just the numbers. It was what was indicated on those inspection records about the extent that the

inspection that was recorded, and he thought that was a bit light. But he did also record, and there is some evidence to support this, that at the time inspections were being carried out sometimes and not being recorded and there is I think at least one piece of evidence that indicates one inspection at least that was recorded that wasn't recorded on the inspection records, but just the one. There was a reference in a document which indicated there had been an inspection and it wasn't recorded. That's the only evidence we have other than those inspection records which, as Mr O'Loughlin said, were light, a bit light.

Now I say at paragraph 582 that certainly my submission to the Commission is that particularly on this failure to roughen the faces of the precast beams that that ought to have been identified first of all by Mr Shirtcliff, if he was doing what he was hired to do, at least what Mr Brooks said he was hired to do, and also by Mr Jones and Mr Harding and also those bent-back reinforcement bars, particularly as the evidence is that those bent-back bars in the beam that went into the north shear wall were on every level except level 2. So it's not as though it was just a one-off incident. It happened all the way up. So one wonders about how this wasn't picked up.

The submission there is also that the Council inspections should have been better than they were.

Now as the Commissioners will no doubt recall the Williams Construction witnesses were asked if they had an explanation for how this could have occurred, how these problems with construction emerged. The only one who proffered a view on this was Mr Brooks as I recall it, others were at a loss to explain it, particularly Mr Jones, the foreman.

The submissions just then develop a bit more fully. The question of the failure to roughen the ends of the beam connections and also the issue of bent-back bars.

Turning first to the failure to roughen the concrete surfaces. That was in my submission both a design issue and a construction issue. It wasn't just a construction issue. It was also a design issue which comes back to Mr Harding and Alan Reay's firm. There was a lack of consistency in the way the drawings and the specifications dealt with that and I've set out the terms of the specification on this issue in paragraph 585. I won't read it out.

Then the structural drawings, they detailed roughening on most inside surfaces of shell beams but they didn't detail any roughening on the ends of beams where they would meet the in situ concrete of a column. So some inconsistency in the drawings.

The submission is at 587 that the potentially very serious failing in the structural drawings in this regard, the responsibility for that must lie principally with Mr Harding and with Dr Reay's firm and with Dr Reay himself to the extent that supervision has been inadequate. But the evidence also from Mr Jones that he was aware of the fact, or he was aware of the concept of the need to roughen the concrete connections but didn't give any thought to it at the time he said, that too is worrying about the quality of the personnel from Williams Construction who were doing this work and the quality of the on-site construction management.

I think it also emerged during the hearing, and this is mentioned at paragraph 588, that it would have been difficult to have achieved this in relation to the beam ends, simply because of the way they fitted in to the columns. I think Mr Jones said that, that he thought it would be very difficult.

Turning then to the question of the bent-back steel connecting rods that we saw in that photograph from the Hyland Smith report for DBH. As it says at paragraph 589 the photograph showed the steel connecting bars in one of the shell beams that was connected in an east-west direction to the north shear core and they were as you will recall completely wrapped back around the end of that beam with the indentation of the ribbing in the steel bars impressed into the concrete on that north core. Now the drawings show those H24 bars as one would expect going directly into the north shear core. So this was a significant departure from what was required and whether that, how much effect that ultimately had on the collapse sequence is uncertain. I think the suggestion is it certainly was not something that would have played a key role in this but nonetheless that connection to the north shear core was known to be critical and to have done this on every level except level 2 is somewhat astonishing.

Now Mr Brooks said, this is paragraph 590, that the bars could not have been physically bent back on site, they were far too strong for that. That wasn't disputed by anyone else in evidence, and he thought it was more likely to

have been the result of an error with regard to what was received from the supplier.

0945

One possibility I suppose is it was intended for one of the other parts of the building connections which did have, in some areas, rounded steel endings but certainly not for this location. Now that might suggest the problem originated with the steel fabricators who were delivering to the site but, again, my submission is that this should have been picked up somewhere in the course of this work by one or other of Mr Harding, Mr Jones or Mr Shirtcliff and possibly by a Council inspector. These were very important connections. Mr Brooks acknowledged that and said it was a serious problem and, in his view, was one that clearly contributed to the failure of the building although, of course, his view on that is just one to be weighed, certainly not as positive.

But what it does do, as I say at the end of paragraph 592, it's another issue that raises concerns about how the project was managed on site, the level of quality control.

The final issue on the construction problems referred to here is the spiral reinforcing and this was the question of taking the end of the spiral reinforcing on the columns up through the beam column joint and I think you'll probably recall the evidence around this and how difficult it would have been to have got that spiral up through the beam column joint. I think the view that's probably emerged is that that single spiral, which is all that would have gone up through there, wouldn't have made any real difference to the performance of that beam column joint but, again, it was something that wasn't done. Mr Jones said it was difficult to get it through the beam column joints and he said one circle of the steel would be 'the max', in his words. The post-collapse evidence that the Commission heard was that there was virtually no evidence of the spiral confinement being carried up through the beam column joint and, in fact, Mr Harding's drawings were inconsistent on this as well, some places showing it going through and others not.

At paragraph 594 there's a mention to an issue that I think I touched on yesterday and that's that photograph the Commission saw of the very badly aligned vertical steel in one of the columns. We only have one example of that, at least photographically, but it did show that there was a potential

problem with properly confining that steel so it went up vertically in the columns as they were being poured as it was intended to do. Mr Jones said in evidence that he remembered thinking that the reinforcement and the size of the columns made the building light, having regard to its height. He also noted the spiral reinforcing was quite light but these were, as the evidence emerged, issues he kept to himself. He was asked about why he didn't say something about his views and he, despite the fact he said that he was a bit worried about some of this but, as I've said at paragraph 597, in essence he said that he did not raise any of these concerns as he had learned to keep quiet not having an engineering degree.

And 598 just records the concern that he didn't raise these issues as the foreman on the site with either Mr Harding or the Council.

So, in conclusion, contrary, I think, to where the evidence started from with Mr Scott in particular, in my submission, the evidence that emerges is that this was a troubled site, that there were a number of things that occurred on that site which could explain why construction issues didn't get dealt with at the level that they should have been in all cases and in at least one case that had potentially some real significance. So the construction issues may have played some role, that's my submission, in relation to what occurred and, in any event, do raise some wider concerns, I think, about how these complex buildings are being constructed, who's doing that work and how it's being supervised and managed.

I turn then, finally, to the issues in 1990 about the discovery by Holmes Consulting Group that there was what would now be described as a critical structural weakness in the floor diaphragm north shear core connection. That's at paragraph 601 and following.

The factual history of this, I suspect, is probably pretty fresh in everyone's minds because it was at the end of the hearing. So what I'll do initially is just to note some broader questions about this aspect of the hearing, this aspect of the enquiry and then touch on some of the specific points in the paragraphs. It seems to me that there is importance in what occurred here on at least two levels and the first one is in relation to how Dr Reay's firm and Mr Banks, as an employee of that firm and I think he may have been a director as well at the time, dealt with the issues that emerged because I think what we

see there may have some wider inferences for other aspects of the conduct which the Commission will have to consider.

Secondly, of course, there are some specific issues related to the identification of a critical structural weakness and what the obligations are on a structural engineer who discovers a critical structural weakness and on that we've heard evidence from Mr Robertson and got direct evidence about what the structural engineers involved thought their obligations were and my submission is there are some wider issues coming out of that as well which are important.

Now one aspect of this particular part of the hearing which has attracted some attention and is important was that no building permit was sought for this retrofit work. The Council has been firm in its view, a view that I share having read the relevant bylaw provisions that a building permit was required, but none was sought. Now, in this context, I need to raise a further issue and counsel for Dr Reay and his firm are aware of the issue that I'm about to refer to and I'll deal with it in the way I've been asked to deal with it.

JUSTICE COOPER:

Asked to deal with it by whom?

MR MILLS:

I said I, oh by Mr Palmer. I've advised Mr Palmer of this –

JUSTICE COOPER:

Who?

MR RENNIE:

(inaudible 09.53.31) matter raised on Monday. My friend wrote to us. We have replied on an interim and incomplete basis and our stipulation was that if my friend intended to raise it he must apprise the Commission of our reply.

JUSTICE COOPER:

All right that's fine.

MR MILLS:

Now the issue relates to some further information, some documentary information that, certainly as far as counsel assisting is concerned, only came to our attention very recently. It relates to some records from the Council file and I immediately have to acknowledge that it appears that the documents have been with the Commission staff for I'm not sure how long but certainly a period before they reached counsel assisting but the relevance of what was in that large file of documents had not been appreciated apparently until recently and that then led to the documents I'm about to refer to being brought to the attention of myself and other counsel assisting.

Now what the documents relate to is work that was done by Dr Reay's firm in 1991, I hope I've got my dates right here, at the same time really as, well almost exactly the same time as the issues around the drag bar had surfaced.

0955

And what I'll do momentarily is I'll have the key documents from the Council record brought up so you can see them, I think that's the easiest way to deal with this. But what it is, is it was fit out work that was being done for the ANZ Bank and you've already heard from evidence that was given by Dr Reay and Mr Banks about what triggered them to their concern that people were moving into the building and steps needed to be taken to deal with this critical structural weakness, that that related to the ANZ fit out. Now what has emerged is at the same time as that was going on, and the evidence that was given about that, then in parallel with that Dr Reay's firm had been engaged by I think the, probably the architects involved in doing that work which was Wilkie & Bruce to do some structural work. Now the point that my friend Mr Rennie has just reiterated, and as I say I was well aware of it and was going to say it myself, is that I sent these further documents to Dr Reay's counsel immediately upon receiving them essentially, and asked some questions about these documents which seemed to me to be relevant to the inquiry and would have been relevant at the time questions were being asked about the drag bar questions. They've also been sent by, I think by Mr Palmers' firm to, passed on to Mr Banks, and what I've been asked to say, and it's accepted, that in both cases the answer was that they had no memory of these particular documents.

JUSTICE COOPER:

Who has no memory sorry?

MR MILLS:

No memory, neither Dr Reay nor Mr Banks had any memory of these, of this matter or of these particular documents. And I'm just looking at the correspondence now to make sure there's nothing else that I need to particularly put forward. Yes, what the response says in the nub of it is that Dr Reay was not personally involved in any way in this matter. It is Mr Banks who's signed off on the structural drawings. He has no recollection of it and nor does Mr Coombes who was also apparently involved in this and was at the time I think with Dr Reay's firm. And then the similar letter has come back from Duncan Cotterill on behalf of Mr Banks saying that they have sought comments from Mr Banks on the issues that I have raised and he too says he does not recall the work referred to. Those letters can of course be made available at some point if the Commission wants to look at them.

JUSTICE COOPER:

Well they should be part of the record if we can have recourse to.

MR MILLS:

Yes, I'll arrange that, I've only got the single copies now but I'll arrange copies for the Commissioners.

JUSTICE COOPER:

Mr Rennie?

MR RENNIE:

We have several copies Sir if that would be of assistance now?

JUSTICE COOPER:

Well providing you're happy. I was just thinking if we're going to refer to this issue, and I have no idea whether we will or not in the report, we'll need to have the basis for doing so.

MR RENNIE:

Yes well I, it was just that my friend was going on, and the Commissioners would be assisted by copies, they could be made available now.

JUSTICE COOPER:

Well I imagine he's told us the substance of it and, has he?

MR RENNIE:

I'll deal with it in due course Sir.

JUSTICE COOPER:

All right, thank you.

MR MILLS:

The issue of most significance about this in my submission is that a building permit was sought for this work. So contemporaneously with the decision that no building permit is required for the drag bar retrofit, a building permit was sought for the structural work that was involved here, and that's what I'm now going to let you have a look at. I hope we can bring this up. The reference, there's actually several different references, I think the one that is probably the most helpful in terms of the issues that I'm raising is BUI.MAD249.0144A.3. Now that's the structural work carried out by Alan Reay Consultants as part of this application and you'll see down at the bottom there where it's got the little block for approved, the initials and I don't think there's any dispute about this, the initials are Mr Banks and the date is September 1991 so it's really contemporaneous with the issues around the drag bars. And you'll see there the structural work that was involved here. It involved drilling some holes, I think in the south wall actually. I'll just give you a moment to look at that so that you can locate yourself in it.

JUSTICE COOPER:

What level is it on, do we know?

MR MILLS:

Well that I'm not sure of from this.

JUSTICE COOPER:

Did the ANZ Bank occupy several floors?

MR MILLS:

They did, they did. I can't tell you off hand how many. I don't know that that's been given in evidence but they were to be a, the major tenant in there. And then once you've had a look at that I'll take you to the, to another document which shows the permit application. I can take you to some other documents which might help to locate some of this, if you're finished with that one? I mean obviously you can go back to it at your, at any time and look at it, now –

JUSTICE COOPER:

Well how many sheets were subject to this permit?

MR MILLS:

I can only say that what I've been given is one, two, three, four and actually I see, I don't know whose writing this is but one of these pages has got handwritten on it, "249 Madras Street alterations ground floor" so that appears to be the answer to your question Your Honour.

JUSTICE COOPER:

So those, how many sheets have you got?

MR MILLS:

I've got four.

JUSTICE COOPER:

And they consecutively numbered?

MR MILLS:

Well no they're not entirely. Wait a minute they might be, just a second.

JUSTICE COOPER:

I'm thinking of 1, 2, 3, 4.

MR MILLS:

There certainly is a 1, 2, well yes they are consecutively numbered with the exception of 16. Yes the first two are architectural. Would you like me to take you back so you can see the early ones?

1005

I took you to that one first because that is the Alan Reay document. Let's go back then to the first in this sequence of the numbering which is page 1, this is an architectural drawing. Looks as though I was wrong in saying it was Wilkie & Bruce, it was still Alan Wilkie at this point.

JUSTICE COOPER:

How did these documents come into the Royal Commission's hands?

MR MILLS:

From the Council I think, I think there was a general request for documents from the Council and these emerged last week I think.

JUSTICE COOPER:

But we had them longer than last week?

MR MILLS:

Oh, yes I fully acknowledge that we've had them but no significance was attached to these by whoever it was that was doing the review of the documents, or unless for some reason did suddenly attach significance to it and brought it to my attention.

JUSTICE COOPER:
Right.

MR MILLS:
So then we'll go to page 2 which is also an Alan Wilkie drawing.

JUSTICE COOPER:
Yes.

MR MILLS:
And then the third one is the one we started with which was the Alan Reay drawing and then I will just take you to the permit page which does indicate, as this is numbered 16, we obviously hold documents in between but these are the ones that have been regarded as relevant in the ones that have been given to me, so we will now go to page 6 – no wait a minute, we will go now to BUI.MAD249.0010A.16.

JUSTICE COOPER:
Yes.

MR MILLS:
So that's the –

JUSTICE COOPER:
Can we just have a look at the document second from the left in the top line.

MR MILLS:
Second enlarged.

JUSTICE COOPER:

Yes thank you.

MR MILLS:

Now no doubt if these had been identified within the counsel assisting staff, earlier we would have asked questions around them in the course of the hearing but at this – as we didn't, at this point I simply content myself with making a couple of points that I think are apparent from the documents. The first one is that a permit was sought for this but at the same time a permit was not sought for the drag bars and in my submission the issues involved in what we see here were not as significant as the issues involved in the drag bars. Secondly, because it runs contemporaneously with the, essentially contemporaneously with the drag bar issues and I don't place any great significance on this I just recorded as a matter of accuracy that evidence that Dr Reay has given that his firm had nothing to do with the CTV building prior to its collapse other than the drag bar issue is not correct.

And also and I don't put – again I don't place great significance on this I just note it that the evidence that the Commission heard about what triggered the concern with Dr Reay, Mr Banks and his firm about the need to get busy with doing something about the weakness that Holmes had identified, it does seem likely that it would have been connected as well, although they don't recall these events, with the fact that the firm itself was engaged to work on the ANZ fit-out. So it seems unlikely that that wasn't part of what triggered the realisation that a fit-out was going on and something need to be done about the diaphragm connections and I think that's about all I can really say just on the basis of what is in front of us at this stage of the hearing.

JUSTICE COOPER:

Thank you.

MR MILLS:

Well coming back then to the issues that are dealt with in the submissions. Because the – as I said before I think the facts are pretty familiar to the Commission, I thought it might be more helpful if I just myself picked out the

points that emerged more for the first time in the hearing itself that weren't in the original briefs of evidence or in the documents and on my list the first of them was Dr Reay describing the issue as fundamental engineering and a straight blunder, which he referred to in cross-examination. Mr Wilkinson similarly describing the problem as absolutely fundamental engineering, this is referred to in the materials but I just pulled out of it some points that I think might be more helpful than just going all the way through it. The fact that despite identifying this at least in his evidence as a fundamental design error, Dr Reay didn't take any steps to require a full audit of the building and you will recall that during the course of the hearing I think it was put, certainly put to Mr Banks, I think to Dr Reay as well that the reason for that, that the inference might well be drawn that because of concerns about liability issues that were clearly on the table at this time, that might have played a factor in that and might also have been a factor in the decision not to apply for a building permit and I reiterate that. Dr Reay didn't tell Mr Banks how inexperienced David Harding was, I think that is the other issue that emerged that was new and significant.

JUSTICE COOPER:

I suppose that's, you know, consistent with Dr Reay's view that Mr Harding was sufficiently experienced.

MR MILLS:

Well that is one way to read the evidence but he's just discovered that something involving fundamental engineering has gone wrong with this building and in that context, in my submission, it is surprising that that didn't become a relevant issue for Mr Banks when he was being asked to take a look at the retrofit issue, and you will recall that Mr Banks said, and this is referred to in paragraph 609 of the submission, that for him it would have been relevant to have known that and it might have affected the enquiries he would want to make about the building.

1015

The next point on my list of things that I think emerged more clearly during the course of the oral testimony was the extent to which Dr Reay, and to some

extent also Mr Banks, sought to shift responsibility onto Holmes Consulting Group for the fact that these wider enquiries weren't made by emphasising that the Holmes report had indicated that in other respects it appeared to be code compliant. And those issues are then picked up in the written submissions at paragraph 610 where the submission is made that this attempt was disingenuous and should be rejected by the Commission and the reasons for that are set out, the first one being that the report was not a full peer review but a pre-purchase review and if one looks at this as a purely legal question in my submission there would be no prospect that Dr Reay would be able to say, I'm entitled to rely on a report from HCG directed to another party but that's a narrow legal view of it. More substantively, as the submissions say at point (b) the report on its face was clearly limited. The terms of the report made it clear that there had been limited time available, that the review was limited to a brief inspection of the building and documents and approximate calculations, the report specifically said that the conclusions were qualified by those facts, and as the Commission will no doubt recall the conclusion itself about code compliance was simply that it generally complies with current design loading and materials codes. Now I would also have thought, and this point is made as well in paragraph 610, that if this really was a significant basis for relying on that aspect of the Holmes report that in light of those clear indications about limitations in the way the report had been done you would have picked up the phone to Mr Hare or Mr Wilkinson and asked him how carefully have you done a review of the building to base that conclusion on, that it's code compliant? So in my submission the Commission should not support a view that Dr Reay and Mr Banks and the firm were entitled to treat this as a sign-off on code compliance, in light of what they had found.

The next point on my list of factors that emerge more clearly was the long and inexplicable delay, and it wasn't explained, between January/February 1990 and September 1991 when activity really got underway on this, including a long gap between receiving legal advice, which I think was March 2001. So the waiting for legal advice does not explain the length of that delay.

As we saw I think during the course of the oral testimony and the questions and answers the contemporaneous written record of correspondence with

both the receivers KPMG and subsequently with Madras Equities strongly support the conclusion that the full nature of the problem that had been identified was never adequately conveyed and Mr Banks accepted, I think, that the way in which those letters were worded didn't convey it although he suggested that perhaps they weren't entirely an accurate record of the meetings that those letters followed but on the face of those letters he didn't dispute that it did not clearly convey exactly what Holmes had identified and the seriousness of it.

We know of course the Council was never notified because no permit was sought.

We know that the receivers KPMG didn't advise Madras Equities and on my count at least of how many individuals and entities were made aware of the existence of this critical structural weakness in the building prior to the 22nd of February there's 10. So a lot of entities and individuals were aware of this. The Council was not - and that's the point I emphasise just looking at this in terms of a regulatory issue. The Council didn't know this. Didn't know that it had issued a permit which it now accepts was non-complying in relation to this issue.

Now I've said this before but I just reiterate that at that time Mr Tapper was still with the Building Department of the Council and one would think it likely that he might have been the reviewing engineer had a permit come in on this building, identifying an issue of this kind, which seems likely to have been the diaphragm issue he recorded in his original letter of 27 August 1986.

So in my submission what we see here in addition to the specific issues is a wider issue raising some concerns which will still be, in my submission, relevant going into the future about how to handle the identification of a critical structural weakness in a building and what happens once a structural engineer becomes seized of that knowledge. I don't say there's easy answers to it but I think this clearly, to me at any rate, identifies an issue that isn't satisfactory. So those are the issues that I would identify at any rate as the –

JUSTICE COOPER:

Well we've had to grapple with that issue -

MR MILLS:

I know you have.

JUSTICE COOPER:

- in a different context about –

MR MILLS:

Yes.

JUSTICE COOPER:

- knowledge that people have after a significant earthquake and what duties people should have, not just engineers of course. So this is a different context of people becoming aware of a problem just in the ordinary everyday situation.

MR MILLS:

Yes it is, yes and I think that the, while it isn't just isolated as Your Honour says to the question of a structural engineer learning these issues I think because of the way in which a structural engineer is likely to find out about this there are some particular difficulties and issues that arise with that because not infrequently I would assume, and it's what's happened here actually, that the structural engineer receives that information in what might be considered to be a confidential relationship and so they're seized it might be contended of information in confidence and how they can then deal with that does raise I think some quite tricky issues.

1025

And, of course, the IPENZ ethics rules, which we heard Mr Robertson on, endeavour to deal with this but while it'll obviously be a matter for the Commission to consider what he had to say I think, in the end, he acknowledged that there were some rather conflicting and contradictory principles that that imposed on the structural engineer who becomes aware of these issues in passing it on, which includes both, in effect, private issues about passing it on to the original design engineer but also a reference to

public interest issues and the ethics rules don't, themselves, seek to guide the structural engineer on how to weigh those potentially rather contradictory duties that arise under those ethical rules and you'll recall Mr Robertson saying that he thought that structural engineers would welcome some greater clarity around this and would also be receptive to that including an obligation to advise the regulatory body, in this case being the Council.

JUSTICE COOPER:

And to be protected when they do so.

MR MILLS:

Yes, indeed. I mean from one point, from one perspective it's not dissimilar to whistle blower legislation but I think there are some issues around this which do require some pretty hard thought. I don't suggest that that's straight forward but what I do say is the fact that so many entities and individuals were aware in one form or another that there was a problem with this building but the principal regulator, being the Christchurch City Council, was never made aware of it and, in my submission it's not a difficult inference to draw that had they been made aware of this through the application for a building permit it would likely have triggered a series of events that would have led to some closer scrutiny of this building, particularly as Mr Tapper was still likely to be the reviewing engineer on this I think is not an unfair inference either. So it just highlights a problem, I think.

Now turning then to the final aspect of this and that is the question how effective the drag bars were once they were installed. The Commission heard differing views on this. I think that it would be undisputed and the submissions record this that they'd never been as effective as if they'd been done in the first place and we heard evidence that they should have gone back to line 3, should have gone much further back. So leaving aside the question of were these well done or not, was the building code compliant after this, it would have been a lot better job if it had been part of the original construction. And evidence to that effect was given by both Professor Priestley and Dr Jacobs and I've referred to that in paragraph 628 of the written submission.

Again, as the Commission will no doubt record, Dr O'Leary, who was called by the Council, gave evidence that the building remained non-compliant in the east-west direction after these drag bars were installed.

JUSTICE COOPER:

Where's that in your submission?

MR MILLS:

I'll just find that brief 'cos that's the end of my note that I've been working from, it's one of the things that I didn't record.

JUSTICE COOPER:

There may be a reason for that.

MR MILLS:

Don't think so.

JUSTICE COOPER:

Well I'll make a note of it anyway.

MR MILLS:

Certainly in his evidence. It may not have been put into his –

JUSTICE COOPER:

I remember the evidence, I don't remember reading it in your submission.

MR MILLS:

No well I think that might be, it's really just drawing my attention to the fact that its dealt with in the code compliance section so you'll find it in paragraph 363. It should have been carried over into here and it wasn't.

The other issue about the drag bars on which different views were held was the decision to only install them on three levels, not to install them on levels 2 and 3 and I've referred to that at paragraph 626 of the written submission. Now Mr Banks defended that. There was I think the view put to him in cross-

examination that, and to Dr Reay as well, that it reflected the minimisation approach that others had said Dr Reay's firm took. It wasn't accepted but nonetheless Mr Hare said he would not have done that and, as the Commission will recall, his original proposal, which was only preliminary, had drag bars on all floors and certainly from a cost point of view, given the cost of putting the drag bars in, came in at about $4300 or thereabouts. Putting them in on two more floors from a cost perspective was negligible and I think the submission certainly that I would make to the Commission, and it relies in part upon evidence from Mr Jacobs about a conservative approach to these issues, is that it would have been the right thing to have done this on all levels. Whether the absence of this on the levels 2 and 3 played any role in the collapse sequence is unclear, at least on the evidence I'm aware of. It might have. What we do know is that the latest time history analysis did identify the prospect of collapse initiating occurring on those floors and they were the floors that did not have the drag bar connections. And I can't take it any further than that.

Now I don't think that leaves me with anything in particular I need to go back to in the written submissions unless the Commission's got questions around them, I think they're all there, and I think I've picked out the main points. There's nothing difficult about the facts here I don't think, at least in terms of the narrative.

Now there's only one other issue I wanted to touch on before sitting down so there's no need for any reply at any point and that is just some issues that arise with the closing submissions that you're about to hear from counsel for Dr Reay and his firm and I had noted yesterday, I think, a concern with one of the transcript references relied on. I haven't been through them all but there are others which I just simply invite the Commission to look at in terms of what's said in the body of the closing and in the transcript.

The first one is at paragraph 55 and it's the transcript footnote reference 50 – and I just note these. The next one is at paragraph 56 (f). This is the one I mentioned yesterday which says that Mr Harding re-did the ETABS calculation from scratch which, in my view, is not supported by the transcript and I just also say to the Commission that if one goes further in the transcript, and I'll give you the reference, it was my cross-

JUSTICE COOPER:

Just in relation to 56(f), you probably told us yesterday, which is the incorrect –

MR MILLS:

This is the statement that Mr Harding re-did the ETABS calculation from scratch which is a footnote reference 73 and they invite the Commission to look at page 28, lines 1-4.

JUSTICE COOPER:

Page 29 of?

MR MILLS:

Lines 1-4.

JUSTICE COOPER:

Of the –

MR MILLS:

The same reference. And also at the transcript at 20120731.72 at lines 2–26, which is my cross-examination of Mr Harding. Then, this is really questions of documents, if you go to page 19 of the intended closing to that subparagraph (i), which refers to Mr Harding being able to satisfy Mr Tapper the concerns raised in his letter of 27 August 1986 had been satisfied.

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If one goes to the footnote references 81 and 83, then at least in my view of this, it doesn't refer to satisfying the issues in that letter, it relates to a fire rating issue and the document reference for that is BUI.MAD249.0259A.4. Then paragraph 57 which I think accuses or says that it was unfair of counsel assisting which was me of course in this case, making a submission about Dr Reay's acceptance of responsibility and I stand by what – the accuracy of what I said and I think if the Commissioners are interested if one just looks at the transcript references that are referred to, I think it is accurate to say that

as far as Dr Reay was concerned, Dr Reay personally, that what I said was correct. And then finally, and as I say I stopped at this point because it was getting late, paragraph 63, is a reference to Mr Horn in what he said about Mr Harding and again if one looks at the transcript references footnoted at 97 and 98, I suggest that one will find read in context that it is rather less fulsome than is said there. Unless there is any other matters the Commission want to raise with me, that is the submissions from counsel assisting.

JUSTICE COOPER:

Well, what you say about what appears to be a criticism that you have, counsel assisting have strayed outside their proper role and brought evidence before the Commission that shouldn't have been brought, I think that's what I infer –

MR MILLS:

Yes.

JUSTICE COOPER:

Reading between the lines?

MR MILLS:

I don't think one needs to read between the lines too much, yes I take it that's the statement that has been made and of course not surprisingly I say that is wrong but more substantively it is wrong. The suggestion that you will hear – I think it is more than a suggestion that counsel assisting came up with a theory which it then sought to prove is simply not borne out by the demonstrable facts. Counsel assisting went down a myriad of highways and byways on this matter in endeavouring to provide the Commissioners which is our fundamental task, with the evidence that – to the best of your judgement and ability was the evidence the Commission needed to properly answer its terms of reference and that has been throughout what our focus has been. To provide to you the Commissioners to the best of our ability the evidence that we think you need to answer your terms of reference. If there is a complaint that this has resulted in issues of responsibility being identified and submitted

to you as they have been in the last day and a half, then in my view that is squarely within the terms of reference as applies to, as it applied to this particular building. It is not possible because of the facts as they have emerged, at least as we have seen them, to deal with why did this building collapse which is right at the forefront of the terms of reference applicable here without looking at the individual roles and the individual decisions that were made by the principal players in this and that of course has included Dr Reay's firm, Dr Reay himself and Mr Harding, as well as others, the Council, Williams Construction, Holmes Consulting Group and so on. The submission that I've made is that there are various contributing events that have led to why this building collapsed. Of course the earthquake itself is the trigger at one level but as I've said the building had significant design defects which that earthquake found and in my submission that is why, to take the next term of reference that is at the forefront of your inquiry, that is why this building collapsed as it did when others did not. It is not because it was struck by an earthquake event that other buildings didn't experience, it is because there were deficiencies in this building which made it vulnerable to that very strong earthquake when it came. So, I reject categorically – of course it will be for others to judge it, but from my perspective I reject categorically the suggestion that there was an agenda here which we sought to prove and that we strayed outside and urged the Commission I suppose to stray outside its terms of reference.

JUSTICE COOPER:

Thank you Mr Mills.

MR MILLS:

Thank you Sir.

JUSTICE COOPER:

Mr Rennie, I think you are next aren't you on the – what I take it as an agreed batting order.

MR RENNIE:

It is Sir thank you. Your Honour and Commissioners as you are by now well aware I appear with my colleagues for Dr Reay in relation to the initial period when the firm was Alan Reay Consulting Engineer and for Alan Reay Consultants Ltd which conducted the engineering practice in the latter stage and down to the present time. When I opened, believe it or not back in June, I said that we had come for the purpose of participating in an investigation to find out what happened, that is the approach which we have sought to take. It is the focus of the submissions which I am about to put to you and with the Commission's leave I just intend to turn for a moment to say one thing and that is Sir to the people behind me, many of whom I know have been here for a long time and who have had to put up with the fact that my back has been to you. It is a discourtesy which I regret, it is discourtesy which the parties which I represent regret and I want you to know that you have at all times been at the forefront of our minds and that is the purpose we address today.

Now Your Honour in closing submissions there are 11 in total. My friend, as counsel assisting, has just dealt with the first, there is another to come later. It would appear that that will be tomorrow. I mean no discourtesy to him or to the Commission but I have a matter tomorrow which was fixed last year and I regret I will not be able to be here for that but I will ensure that I am familiar with it Sir.

1045

JUSTICE COOPER:

So that's Mr Elliott's?

MR RENNIE:

That's right Sir. I don't wish there to be any implication that the fact that I'm not able to be here demeans that in any way. The other submissions which are before the Commission, I thought I would briefly refer to before passing to my own. There is a submission on behalf of Mr Banks. It is in my respectful submission a model submission. It is neutral, it is thorough, it is referenced. I could not add to it. We have some equivalent material in our submissions. When I come to it I will simply place it on the record and pass on without dealing with it.

JUSTICE COOPER:

Do I infer that, from that praise that you adopt what's said on –

MR RENNIE:

I was about to say Sir, you may take it that what my friend says in her written submissions covers what we would say. There is a submission from the Christchurch City Council and in large measure there is very little difference between us in respect of the topics which we address in common such as code compliance in particular. And as I observed to the Commission yesterday, you have some detailed material before you from several parties on code compliance and I don't intend to embark upon a detailed they say this, we say that exercise. Not, I believe, being the best use of oral time.

JUSTICE COOPER:

Yes well that's a very helpful position to take Mr Rennie.

MR RENNIE:

I obviously will address any matter I'm asked to and I will refer briefly to key points. There is a submission on behalf of Mr Harding. I mean no disrespect to my friend who presents it, to say that it is essentially a repetition of evidence you have heard which he wishes to feature, and to the extent that the parties that I represent need to address it, it will be addressed in our references in the submission I'm about to come to.

Next, there is a submission from the Ministry which, as I understand it, is the reincarnation of the former Department of Building and Housing, along with a lot of other matters. It is very brief. I think it just says on behalf of the Ministry that they would like to know the answers, and I don't intend to address that further.

There is a submission from Holmes Consulting, and Mr Hare. I believe that to be fully dealt with in the submissions I'm about to come to.

And the remaining submissions of Coatsworth, Calvert and Shirtcliff don't directly impact the matters that I have to deal with.

At paragraph 5 of our submissions I record the sequence of acknowledgements and apologies which have already been given. They are important and I will come back to that in another way. The narrative in that passage is otherwise historical and brings us through to paragraph 10 which is the terms of reference of the Commission.

Counsel assisting, who has just finished, was asked by Your Honour about an issue which has developed at several points in these submissions which relates to the proposition that counsel assisting have developed and presented a theory, poorly supported we will say, and we believe we will show. I will come to that later but I would just like to make the point that we have not at any point in time objected to any facts coming before the Commission. It is not an issue about what facts you look at. You are entitled to look at any facts because it is an investigation. The point is rather whether it is a matter for counsel assisting to say to you, as my friend repeatedly did yesterday, that the submissions are the shared views that counsel have come to, the opinions are not for them, they are for you. For counsel to say, as he did until I lost count, "I think, I think, I think," if I were to take up your time with what I think much would be consumed but nothing would be gained. Or as again was said on many occasions, "it seems to me". It is not with respect what it seems to counsel assisting. It is what you as Commissioners find on what is brought before you.

There are three statements relevant to the role of counsel assisting. They are referred to, the first of which is on page 7 at the foot in footnote 9. The second is in the Law Commission's 2008 report, a new inquiries act in chapter 13 where it adopts the English statement from counsel assisting the Hutton Inquiry, which was the inquiry in which, the investigation into the death of David Kelly the scientist who became involved in the issue of weapons in Iraq. The third appears on the Commission's website.

JUSTICE COOPER:

Just what this Hutton Inquiry reference, is that in your submissions?

MR RENNIE:

No I wasn't going to give you the detail beyond just saying that that Sir was what the Law Commission said, but I was simply going to go to what is on this Commission's website which says the role of counsel assisting is to supervise and conduct the investigation, including gathering all relevant information, documentation and interviewing witnesses. To be a sounding board for the Commission. To establish open consultation with all parties and encourage co-operation. To call evidence at the hearings. To carry out other functions as the Commission directs. It may be that the Commission has directed counsel assisting to tell you what their opinions are, what they think and how things seem to them. I respectfully suspect that (a) you would not have done so, and (b) were you to have inadvertently done so, you would know that you would not have wished to do so.

JUSTICE COOPER:

Well what Mr Rennie, if instead of saying these are the shared views of counsel, I think, it seems to me, which are the words that you've criticised in Mr Mills' submission, there had been a submission couched in terms such as it may be that the facts would justify a conclusion that, are you saying that that would be inappropriate for counsel to say?

MR RENNIE:

Sir the common formula over the 30 plus years that I have appeared in Commissions is that counsel assisting will say, "Witness A says this. Witness B says that. You may think that witness B is to be preferred to witness A because of," whatever the reason is.

JUSTICE COOPER:

So counsel assisting can never make a submission that's based on inference?

MR RENNIE:

Counsel assisting can draw attention to a possible inference but then it's a matter for the Commission to decide whether to adopt that inference.

JUSTICE COOPER:

Well Mr Mills made it quite clear that what we did with his submission was a matter for the Commission as of course it is.

MR RENNIE:

Indeed Sir, and he read paragraph 34 in that regard, of his submission, which says that. And if Your Honour thinks that I'm labouring this, the point is that it is, as I shall come to, very important to recognise that views that counsel assisting have formed of some facts peripheral facts, not at the core of the terms of reference but which nonetheless occupied nearly three-quarters of yesterday's submissions are not the primary answer to the terms of reference.

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The terms of reference the Commission will know are building focus. Why did the CTV building failed severely. Why the failure of the CTV building caused extensive injury and death and so on. Those are ascertainable engineering focused facts. Whether behind that Dr Reay did or didn't adequately interview Mr Harding, a man who he'd previously employed and who had headed an engineering unit at a very large District Council tells you nothing about the answers to the terms of reference.

JUSTICE COOPER:

Well let's just examine that. Why buildings differed in the extent to which they failed as the result of the Canterbury earthquakes. Let's just suppose, just suppose for the sake of argument that we decided that a building had been badly designed and that's why it failed and others didn't. We could do that, couldn't we?

MR RENNIE:

Absolutely Sir.

JUSTICE COOPER:

And wouldn't all the evidence that touched on why that building had been badly designed and why the Council had issued a building permit or consent, be relevant to that inquiry?

MR RENNIE:

Evidence of sufficient credibility.

JUSTICE COOPER:

Well that's a different point Mr Rennie.

MR RENNIE:

Yes, I am emphasising this –

JUSTICE COOPER:

That goes to the credibility and worth of the evidence not its relevance.

MR RENNIE:

And with respect Sir I said we have not objected to any evidence – because you are entitled to all of it.

JUSTICE COOPER:

I know you haven't which is why I am finding this stance that you are adopting now puzzling because evidence, the only evidence which should be called before a Royal Commission or any other sort of tribunal is evidence which is relevant so I've assumed that in the absence of objection you've taken the view that the evidence that has been called by counsel assisting is relevant.

MR RENNIE:

With respect Sir, we have taken the view that the Commission perceives it to be relevant and it is the Commission's role to judge that relevance.

JUSTICE COOPER:

Right, well then on the example that I have just given you, I have understood you to agree with me that evidence that relates to why the CTV building was

the subject of a – why it was designed the way it was, why it was permitted, are relevant.

MR RENNIE:

Absolutely Sir, and I about to discuss that but the point I wish to make is that the departure point is the building, why did the building fail, that is an engineering issue. Then it may be that the Commission says it failed because it has design defects, it had construction defects. It may be the Commission's view that it failed because it was exposed to earthquake forces well beyond what the design provided for.

JUSTICE COOPER:

Maybe.

MR RENNIE:

It may be that the Commission finds that it was damaged in its history at some point such that it did not have the resilience it was expected to have on the day in which the earthquake arrived but having gone through that layer Sir you may look behind it and if there is a design defect in the building you may say who designed the building. Then you may say –

JUSTICE COOPER:

And what the design defect was and why it arose.

MR RENNIE:

Yes and you may say was the work that was delivered by this firm, work which was at an appropriate engineering standard for the time or was it not and then it may be depending on how the Commission reads its terms of reference that you consider that you go to the next tier to look inside the firm and say, well how did it come about that the firm made this mistake or if we move it to the Council, how did it come about that the Council missed this point.

JUSTICE COOPER:

Well are you saying that we can or we cannot inquire into those matters?

MR RENNIE:

I have with respect Sir just said you can, but there is an important difference between what you can do and what you have to do. The terms of reference require you to answer the engineering questions, whether you wish to go beyond that into the personalities and historical events that counsel assisting has spent so much time on is a matter solely for you.

JUSTICE COOPER:

Well all right, so but one of the reasons that could legitimately lead us to do that would surely be that to do so might shed light on why this building failed and others didn't.

MR RENNIE:

And I believe I have acknowledged that Sir, but I am doing this because I am about to have to enter into the topics that counsel assisting have spent so much time on. In counsel assisting submissions there isn't even a section called, the earthquake.

JUSTICE COOPER:

Well, all right, I mean – I don't know how to respond to that Mr Rennie, I mean we all know that there has been an earthquake. We've delivered a report on the earthquake.

MR RENNIE:

Absolutely Sir.

JUSTICE COOPER:

But if we can reach these issues, I don't know really why you've seen it necessary to criticise counsel for raising evidence relevant to them and just before you respond to that, there is another term of reference altogether, which invites us to investigate the roles of central government, local government, the building and construction industry and other elements of the

private sector in developing and enforcing legal and best practice requirements.

MR RENNIE:

Indeed Sir.

JUSTICE COOPER:

Now it would be odd if we weren't to have that terms of reference in mind when conducting our investigation into the biggest tragedy which was a consequence of the February earthquake.

MR RENNIE:

I would expect you Sir to and later I refer to it as the biggest tragedy, not only of this earthquake but perhaps of any event in the history of this country. I am not seeking to diminish that. But the departure point in the terms of reference Sir are the engineering questions starting with the earthquake. Did the building fall down because the earthquake was of so unusual character, force, direction? Did the building fall down because its particular period and ability to sustain those forces differed from others? If a few milliseconds more might have brought down for example the Clarendon Tower. It's – my friends seek to portray this as some single exceptional personality driven situation. With respect it is not and that is why I am emphasising this because so much time was spent yesterday on second and third hand triviality of what may or may not have been said to somebody at some point in time when the core issues are those that I am about to go to.

JUSTICE COOPER:

All right well that is a submission that counsel have concentrated on unimportant matters it seems to me.

MR RENNIE:

Sir CP Scott –

JUSTICE COOPER:

Not a submission that they have brought irrelevant evidence before the Commission.

MR RENNIE:

No, no and I didn't say – I made the point about facts Sir, but I was about to say CP Scott of the *Manchester Guardian* claims that he wrote in 1921, "Comment is free but the facts are sacred," and it is with respect the facts of what this matters here and yet my friend in one of his parting words to the Commission was, "Other issues of the conduct which the Commission will have to consider." Conduct, is again an opinion matter.

Now Your Honour moving forward from that at 11 on page 3, I say it is submitted that in summary there were three key areas which require consideration in the case of the CTV building.

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The cause or causes of the collapse; whether the design and/or construction of the CTV building contributed to the collaps; and the nature and effectiveness of the inspections of the CTV building post, before September and Boxing Day 2010 earthquake.

And then I say in 12, in considering the evidence received by the Commission four important factors need to be borne in mind at all times:

The exceptional earthquakes, plural, which were the primary cause of all the matters for investigation were of such a nature, location, force and direction as to impose demands on Christchurch buildings which had not been foreseen nor specifically designed to meet. While a structural designer is expected to provide for all situations whether anticipated or not the 4 September 2010 earthquake was unprecedented in its effects and location proximate to Christchurch arising from the previously unknown Greendale fault. The 22nd February earthquake arose from a different fault in a different direction and with a proximity to the centre of Christchurch which gave it devastating effect. None of the engineers who had any connection with the CTV building at anytime in its pre-22 February history anticipated this.

The second point, 1986 Knowledge. Between 1986 and 22 February 2011 there had been major advances in knowledge of earthquakes in structural design and building materials and in knowledge of their characteristics and

especially in computer modelling and verification of structural design. Each event which occurred is to be assessed in terms of the knowledge at the time, and in the case of the 1986 events the terms of reference make this expressly clear. We are talking, if the Commission pleases, of the standards of the day. Information Gaps. Despite all efforts the information available to the Commission in incomplete. The gaps that exist are not to be filled by guesswork or by speculation. Their proper elements is in the way in which they affect the ability of the Commission to achieve a level of confidence about each finding that it is to make and just today the Commission will have seen counsel assisting referring to some documents which in fact are part of the documents held by the DBH back at the time of their report, that's how old they are, and on which they –

JUSTICE COOPER:

Well they're from 1991. That's how old they are.

MR RENNIE:

Yes they're from 1991 and I'll deal with them a little bit later on Sir but the point to make at this stage is it's just one illustration of how at any point in time something may gain a new significance or a missing document may be found and the gaps, with respect, are not to be filled by guesswork or speculation. Inquisitorial Approach. The essential purpose of the Commission is to obtain information and accordingly its function and mode of operation are essentially inquisitorial and informal as distinct from the adversarial and formalised procedures appropriate to a Court or judicial tribunal. It looks as if I wrote that Sir but it actually comes verbatim from the Royal Commission on the Thomas case. And then I quote the Privy Council emphasising the distinction between litigation and enquiries. I'm not going to read that passage aloud but it's a very important distinction because it relates to the point in 13. In an enquiry there is not a burden of proof on any party and while the standard of proof is a civil standard, since the essential purpose is to obtain information, not prosecute a charge, it is for the Commission to determine the level of confidence it must hold about facts when making a factual finding. Great care is needed at all times to ensure that the reliability of each matter presented in

evidence is weighted and assessed. This is especially so when much of the everywhere relates to a time more than 25 years ago when some witnesses are not available and some documents no longer exist or cannot be found. In particular evidence from a witness who has no recollection but asserts that something must have happened is of little or no value unless there is other evidence tending to corroborate it. Hearsay evidence is similarly of very little probative value. Where an orally reported memory is contradicted by contemporary written record the latter will normally prevail.

In summary it's emphasised that the 1986 events and design work are to be assessed against the knowledge, information available and the practices adopted at the time of the design and not with perfect hindsight vision. It's wrong to apply a hindsight judgment to the events leading to the 22nd of February 2011 earthquake. That earthquake was unprecedented and unexpected in New Zealand in terms of its size and force. As a result territorial authorities around the country are assessing thousands of buildings within their respective territory leading to buildings being taken out of use and/or subject to upgrade requirements. Christchurch did not have the benefit of such a warning.

The Commission of Enquiry does not determine liability. In this instance the terms of reference state that expressly. The Oxford English dictionary gives as the primary meaning of liability the condition of being liable or answerable by law or equity. Accordingly findings of act don't extend to include findings as to the legal consequences of those facts.

Now I've already referred to our approach to the issues, that we have sought to identify the truth as to what caused the collapse of the CTV building and our response has been to investigate and understand what happened regardless of the outcome. Counsel assisting appeared to find it significant that there were some matters in which Professor Mander expressed an expert view and Dr Reay said something different. What would be significant would be if those differences didn't exist. In a litigation situation of course counsel tries to align factual witnesses with expert witnesses but this is an enquiry. Often the answer is found by finding there are those differences and then working out why. We tried to do that with the Department of Building and Housing but they rebuffed us, we're still committed, and we've dedicated substantial

internal and external resources to this, comprehensive response to the DBH report, comprehensive concrete testing programme in the USA was undertaken, world recognised experts in several fields have been engaged and the equivalent of a full-time, in-house engineer committed to provide technical and general assistance to the work. They even retained some lawyers.

Now the concrete is worth one quick mention and that is this. Again, if this was a litigation situation it would be tempting to pick up the DBH report and say, there was something wrong with the concrete, that's the explanation, that's the cause and move the focus away from the engineers. Not only did we not do that we spent a lot of money to show that that was not the explanation. We made every effort to complete that work to a high forensic standard independently with no pre-determined outcome. Now the particular focus has been to put the issues in the hands of independent experts and be guided by them. In counsel assisting submissions there's a section headed, "Collapse Causes ARCL Theories," and there then follows some references to such things as the boring of holes and the construction of the staircase. They weren't theories. They were, as it was put, scenarios. They were elements which have been omitted from the collapse theories that counsel assisting were focussed on and the witnesses they called. And counsel assisting said to Dr Reay, "Isn't it interesting that each of the matters you've raised is a matter for which you're not responsible." What was really interesting was that each of the matters omitted from consideration by counsel assisting was a matter for which Dr Reay and his firm were not responsible. We have addressed every issue whether it was for us, irrelevant to us or against us.

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Now limitations on scope, I refer to some further difficulties which affect the level of confidence which can be derived, and some of that I've dealt with. The passage of time in respect of the fire. The DBH report which has been an obstacle rather than an assistance in so many ways, but as I say in 24, Your Honour, very early on when I tackled that, pointed out to me quite correctly that the Commission is not affected or limited by that in any way.

At 25, the failure to preserved evidence. Messrs Frost and Heywood did an admirable job but much of their good work was undone in subsequent stages,

particularly by the removal of debris from the site and the destruction of the north core tower. As a result it will never be know whether, for example, there was differential subsidence of the foundations or what occurred in the lower part of the south wall. Professor Shepherd detailed how a proper forensic investigation is to be undertaken. Your investigation is under informed in important respects, and the suggestion of counsel assisting that guidelines for best practice structural failure investigations would be of assistance in New Zealand is endorsed.

It was back in the very early stages when Dr Hyland and Mr Smith gave evidence but the Commission may recall that they felt that the legal basis for retaining debris, for preserving the site and so on, did not exist. It could be debated whether they were right about that, but a debate isn't necessary for this purpose, which is to recognise the need. And one may contrast the CTV situation with the DC10 crash in Antarctica, where despite all the differences, all the difficulties, all the deaths, scale, plans, forensic photography, onsite forensics were achieved. At paragraph 27 on page 8 –

JUSTICE COOPER:

Just to confirm, we've had the discussion we needed to have about paragraph 26, I assume that's why you're?

MR RENNIE:

Yes, I'm not avoiding it Sir. I thought I'd probably stretched the Commission's tolerance on the topic and I'm certainly not, I'm not gliding past it Sir. If I can hit it again with a sledgehammer I shall do so.

JUSTICE COOPER:

No there's no need for that.

MR RENNIE:

Paragraph 27 on page 8 Sir. The transcript of evidence from the hearing spans over 4200 pages. Much evidence has been presented about what people think they would have done. Much less about what they were certain was done, and even less corroborated by other evidence. This is

understandable, given the length of time since the key events and the fact that memories dim. The key task for the Commission in considering each issue in the terms of reference is to identify these different types of evidence and utilise the most reliable evidence in each particular issue.

And then Sir I go to discuss credibility. Credibility is obviously an issue. In 29 I suggest that Mr Harding in particular displayed a tendency to remember events only when helpful to his position, and I give some illustrations of that and how he, his brief was written one way and then he suddenly in my submission worked out that the third party might include him, and so he shifted.

And at 30, the fact of course that he was completely out of sequence in relation to the West Park matters.

At the top of page 9 his ultimate acknowledgement that it was a long time ago. 31 discuss the position of the structural draughtsmen. Now there was an exchange between counsel assisting and the Commission yesterday about this in which I understood counsel to suggest that there might be some doubt as to whether the time records which were produced were contemporary. In fact, in Dr Reay's brief and the reference is REAY.0002.14, he quite specifically said that, "As a result of locating additional records in historical files held by ARCL, I have located the ARCE records from the time of the CTV project." Counsel assisting also suggested that Mr Fairmaid and Mr Strachan had cast some doubt on those records. In fact, Mr Fairmaid said, and the reference was TRANS.20120815.94, "I think they are probably accurate," he said, and Mr Strachan said, and I regret I've misplaced the transcript reference but I can provide it, "Now that I've seen the full unedited timesheets I can reconcile why I thought I could recognise the majority of timesheets. The work was done by someone I had trained." Mr Horn –

JUSTICE COOPER:

So just on that issue, who do you say we should consider was the draughtsman for the above ground work? Mr Horn?

MR RENNIE:

Principally Mr Horn. It's accepted that Mr Fairmaid did some and that did some influenced by Mr Strachan. Mr Horn may have had his own concerns about what he saw from the work that he'd done. It may well be that the Commission would infer that his willingness to agree that he'd done the foundations about which there was no issue was a fairly selective approach which only accounted for part of his recorded time. It did not explain why, if he'd done some work that he acknowledged and which must've generated time for the time records, there would be a discrepancy between the total time and that time unless he could say what else it was he'd done. The question of the style of the work being overwritten by the tracing I discuss in 31(c) going on into (d) and in my submission the clear evidence uncontradicted is that the time records are a contemporary record, albeit a compilation of daily time records of who did what at the time. The reference for the passage from Strachan which I gave you is TRANS2012.08.06.32.

And when the Commission looks at credibility as I say in paragraph 34, it's proper to also examine the credibility of Dr Reay. But the only challenge came from counsel assisting who seemed to confuse their opinion on his demeanour and his approach to his evidence with issues of credibility as he finally to his embarrassment admitted to the Commission, he actually is partly deaf. When he first gave evidence he visibly struggled to focus and respond, an understandable reaction to finally being able to give evidence. Unlike other witnesses who would say what they must have or thought they would've done when he didn't remember he said so.

1125

There has been judicial recognition of his character and abilities on other occasions. Mr Banks' departure from the firm led to litigation and a decision of the High Court, French, J. And French, J found that – and I cite paragraph 7, "The business was founded by its namesake for second defendant Dr Alan Reay. Dr Reay is one of New Zealand's foremost structural engineers and lead consultants. The evidence established that he is an engineer of exceptional ability whose work has been acclaimed not only in New Zealand but also overseas." The Commission may find it of interest that Mr Banks and Dr Reay were locked in that litigation which ran for some time and it is greatly to the credit of Mr Banks I suggest that he came, did not mention that, put it

aside and gave a professional account of what he had done. Earlier in the report of the Commission of Inquiry into the collapse of the viewing platform at Cave Creek near Punakaiki on the West Cost the Commission Judge Noble said, "Dr Reay has high academic qualifications, is a learned theoretician with very sound practical skill and is conservative and careful in his approach. Very substantial weight can be attached to his evidence which was of great assistance. In cross-examination he demonstrated all the hallmarks of the expert witness giving careful consideration to questions, providing balanced answers and being prepared to acknowledge that another expert might hold a different opinion. Dr Reay was readily prepared to concede he may be wrong on matters of factual recall but he stood firm where he had the basis to do so. He precisely stated what he could and couldn't remember and rarely expressed an assumption of what could have happened." Mr Banks like Dr Reay put aside past differences to give evidence of similar quality. The visible surprise of counsel assisting that Mr Banks had not discussed his evidence with ARCL or its lawyers demonstrates a failure to recognise the professionalism with which each responded. Likewise Dr Reay admittedly on advice did not read the expert evidence in advance of giving his own. Counsel assisting claim, but Dr Reay's knowledge of Mr Strachan's evidence contradicts this, is wrong. Mr Strachan was a factual witness. Dr Reay's knowledge of Mr Latham's evidence reflected the fact that that related to an ARCL project not to evidence from external experts.

Now, there then follows a discussion on documentation, 39 and 40 and I don't propose to read that. I think the Commission is well informed about what it is not informed about if I can put it that way.

41, which is the history of the building at page 12. 41 discusses how the job came in.

42, the wrong claim that Dr Reay had said something he didn't say about that.

43, relating to the plans being give to Alan Willkie and 44, Mr Brooks' account of his involvement.

45, the preliminary work.

46, ARCE was a relatively new entrant into this area of structural work. Previously ARCE's practice had focused mainly on Dr Reay's work in the concrete lift slab form of construction that Dr Reay and ARCL have become

renowned for. Other work involved developing building systems. For Fletcher Brown Built in smaller scale buildings. However ARC was facing an increasing number of inquiries from clients looking to design efficient multi-storey office buildings and began to expand into this area and to advance this development. They say in a) Mr Henry was hired and then draughtspeople were hired, both with relevant experience. Counsel assisting have tied to Mr Harding the tag that he was inexperienced and I shall come on to discuss that but that tag is entirely unjustified.

In 47, he was known to be looking for a position for this type of work. He wanted to leave the Waimairi District Council where he'd been for four and a half years as leader of the civil engineering team. Counsel assisting say he was out of structural work over that period. That was not his evidence, he had designed the structural work on the hydroslide for the Council. He started to describe all the other work that he had embarked on to find out about hydroslides and do them elsewhere but the Commission may recall I stopped him on the basis that amongst your concerns was not the state of hydroslides in the balance of the country.

He had worked on concrete work in the bridges and those areas of structural design and the Waimairi District Council at the time its population of about 70,000 putting it in a scale larger than most provincial centres in New Zealand. And his work there followed over seven years in structural engineering first at Hardie and Andersen and then with Dr Reay. Dr Reay became aware of Mr Harding's availability, offered him a position. He agreed to return to pursue his interest in multi-storey new buildings and to gain more structural engineering experience and at that time he had engineering experience several years greater than Mr Henry. That may be a convenient time.

HEARING ADJOURNS: 11.31 AM

HEARING RESUMES: 11.47 AM

MR RENNIE:

Page 14, paragraph 48, Gravity Shear Wall Approach. Through the hearing the CTV building has been variously described as non-descript, innovative, revolutionary, quite simple and straightforward. In many cases it wasn't remembered at all by persons who worked on it, such as Mr Horn and Mr Fairmaid. From the outset it was designed as a gravity shear wall building. Dr Reay gave Mr Harding the calculations and file for Landsborough House which had been designed by Mr Henry. There was some contention about whether the south shear wall was always a feature of the design. Mr Harding's evidence was that it was added after he did an initial ETABS run. Dr Reay's firm recall was the south shear wall was always on the drawings from the inception of the design. That position was supported by Mr Scott, possibly Mr Willkie. Certainly Mr Willkie's drawings show the wall and these drawings were lodged with the Council some weeks prior to the structural drawings which followed later. The adoption of a gravity shear wall approach per se is not to be criticised. Mr Henry unhesitatingly agreed that a building of this type could be constructed using this method and he noted that by then he'd been involved in the design of several such buildings himself, including Landsborough, Bradley Nuttal and the Aged People's Welfare building. Mr Henry's evidence reflects the fact that whereas most multi-storey buildings prior to the 1980s were mostly moment frames, after this time shear wall stabilised gravity frame systems had become relatively common place, at least in Christchurch. Mr Henry also gave evidence that he discussed the Landsborough House structure with Professor Paulay. There was no suggestion that the Professor raised any concern with the proposed gravity shear wall basis to the design. Mr Henry's evidence was that aside from commenting on the eccentricity of the building and a possible loss of stiffness, which issues Mr Henry stated he'd addressed in ETABS analysis, he said Professor Paulay did not raise any such fundamental issues with regard to Landsborough House. Mr Hare described the approach as one he was

familiar with and which did not give rise to any concerns in principle on his part and in their 1990 report, which I discuss later, Holmes Group referred to the gravity structure as sound. There is no suggestion from any engineer that the building could not be designed this way. Mr Tapper's notes were about implementation, not about whether the design principle could be executed.

The allocation of the task to Mr Harding. As noted the task of carrying out the structural design of the CTV building was allocated to Mr Harding. Dr Reay was involved at a preliminary stage and introduced Mr Harding to the Williams team. Since rejoining ARCE Mr Harding had already completed the structural design of the Westpark Towers, including a new ETABS analysis which had been started by Mr Henry before he left and he designed a four storey medical accommodation building. Shortly before he became an associate the CTV building job was assigned to him as his project.

Mr Harding commenced work on the CTV building March 1986. At this particular time he had the following skills and expertise. He was an Honours graduate from Canterbury University School of Engineering, May 1973. He was a fully qualified registered engineer May 1976 under the Engineers' Registration Act. By 1986 he was 35 years old, had seven years experience as a structural engineer at Hardie and Anderson and ARCE from 1973 to 1980, followed by four and a half years as leader at the Waimairi District Council Civil Engineering team. By 1986 he also had 10 years post registration experience and had applied for and been accepted as a member of the New Zealand Institution of Engineers, subsequently becoming a Chartered Professional Engineer under the 2002 registration system.

He was engaged at a senior level. It was intended he would become an associate of ARCE, a proposition which Mr Harding saw as attractive and he, in fact, became an associate while the CTV building design was underway. Dr Reay confirmed in his evidence that Mr Harding's role was a senior one that he wanted, considered himself qualified for and was entitled to. The job he took on when he rejoined ARCE was one he aspired to, he wanted to have contact with architects, builders and the like. The CTV job and the associated responsibility was exactly the sort of job that Mr Harding also aspired to. He accepted that this job was a challenge that he wanted to take on and said that Dr Reay was giving him the opportunity to do one. Mr Harding was as

confident in himself to do this job as Dr Reay was in him. Mr Harding clearly believed he could do this work. He took the job on and, with one exception, did not seek assistance. During cross-examination, on being taken through each key element of the building, Mr Harding asserted his competence at the time to undertake each key task. He confidently stated that the elements of the structural design were all matters within his skills and expertise noting "There was nothing new". With the exception of the south shear wall Mr Harding was unable to recall any other occasion when he went to Dr Reay to raise issues of concern or needed to. Dr Reay was available to Mr Harding if there were specific issues that he wanted to raise. Mr Harding said he had a high level of confidence that if he followed the Landsborough House work then he could design a good building. He had access to the full file for Landsborough and he could have inspected that building also if he wanted to.

I just emphasise Mr Harding's account, it's at TRANS.20120730.28 going over to 29. This is his description. He says Dr Reay told him "To ask Alan if I had any queries and to keep him appraised of my progress with the design. I accepted this requirement and acted accordingly". That's Mr Harding's account of what he did.

At the top of page 18 Mr Harding said he was not calling out for supervision or review. Dr Reay confirmed that Mr Harding never communicated any lack of competence to do the job. If he had the job would not have been taken on. Mr Harding had taken over and completed the Westpark Tower job with no known issues. Mr Harding was initially under the impression that the Westpark Tower design was completed after the CTV job. He said in his evidence that having run the ETABS analysis for the CTV job he felt that he was in a position to do ETABS on the Westpark job so he wasn't suggesting he lacked the necessary skills for the Westpark job but he later accepted, having reflected on the documentation that the calculations for Westpark Tower, including the ETABS work, were done prior to the CTV building. The inescapable conclusion is that Mr Harding, having completed the ETABS analysis on the Westpark Tower believed he was in a position to proceed with the CTV building analysis. He did not make any suggestion that he did not have the necessary skills for the Westpark Tower job. While the analysis on the Westpark Tower building had been started by Mr Henry Mr Harding re-did

the ETABS calculations from scratch, I'll come back to that in a moment. Ultimately the load path and beam column joint defects that have been identified with Mr Harding's design are not related to the ETABS analysis.

Now counsel assisting this morning raised an issue about whether it is correct to say that Mr Harding re-did the ETABS calculations from scratch and he drew attention here and at several other points in the following pages, up to about paragraph 65, to references that he questioned. They have been checked. I stand by those. My friend may have a view as to how to interpret them. In my submission, as I've said, the judge on that is the Commission. But in addition, in relation to the question of the ETABS calculations being done from scratch the Commission has available to it the actual calculations. The reference is BUI.CAS056.0003. There are 224 pages of calculations, ETABS calculations. Pages 1–43 are the ETABS work of Mr Henry. Pages 44–224 are the ETABS work of Mr Harding as confirmed by the transcript reference. Subject to the fact that I've just been passed a note by my junior to say that not all those pages are ETABS calculations. I now understand, they are all calculations. Not every calculation is an ETABS calculation.

Now the point I want to make about this, if the Commission pleases, is this. You have had the ETABS process described to you to go out fill in the forms, cards are punched, the computer is run, you get your answer back. It either tells you that the building will stay up or fall down and if the latter you do it again. The Westpark building was built on the calculations on ETABS that Mr Harding did, which were second in time, not on the ETABS calculations that Mr Henry did, which were simply some initial work. The Commission may recall that I cross-examined Mr Henry on the proposition that he would not have walked away from this job and would have handed it over and would have had an ongoing engagement with Mr Harding. That all seems fundamentally logical but he categorically denied it and that's a very good example of the problem with information that the Commission faces. One would expect that there might have been something as trivial as bills for ETABS work or something like that but the evidence you have before you, contrary to the logic that Mr Henry would have gone on to assist Mr Harding Mr Henry says he didn't and Mr Harding doesn't claim that he did.

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Continuing as to his suitability for the job. He had previous experience. This is paragraph (g) on page 18 with the Concrete Code from his earlier time at ARCE and at civil engineering context and of course the hydroslide at the Waimairi District Council. Likewise at Hardie & Anderson. Likewise in his earlier time at ARCE. That work experience, all of it directly relevant to such matters as load paths and beam column joints.

At the top of page 19, paragraph (h). Mr Harding had attended key seminars before joining ARCE and in July 1986 he attended an intensive three-day seminar on design of concrete structures at a time prior to his signing off on the CTV plans. He acknowledges his attendance. He acknowledged that any issues from the three-day seminar could have been taken up, or taken into account, it was presented by Park and Paulay, and he confirmed that after going to the seminar he was fully informed on the construction issues raised in the papers presented. He also recalled he attended with Dr Reay another seminar relating to eccentrically braced frames. Now footnote 79 for which I apologise, because in the typeface it's come out we perhaps should have supplied a microscope –

JUSTICE COOPER:

No, well I can read it which is quite an acid test I can assure you. Are you having trouble with it Mr Rennie?

MR RENNIE:

I do have some limitations in that regard Sir and all I want to say is that if Your Honour can read it that's brilliant.

JUSTICE COOPER:

Thanks.

MR RENNIE:

Because I don't have to attempt to.

JUSTICE COOPER:

That's right.

MR MILLS:

But the point I want to make is the significance of this seminar is a bit of a watershed point because if Mr Harding, as counsel assisting would have it, didn't know what he should have known then clearly the content of that seminar would have told him what he didn't know and what he should have known. On the other side of the coin if Mr Harding did know what to do in this area of design, or if he thought he knew but was mistaken on some points the content of the seminar will have either confirmed his knowledge or brought to his attention what he didn't know and then (inaudible 12:03:46) Mr Harding was able to satisfy Mr Tapper with the concerns raised, when the famous letter of 22nd August had been satisfied, and Mr Tapper signed the structural approval. Mr Harding apparently attended a meeting with Mr Tapper in relation to the design during the permit stage as he recorded in a later letter. Mr Harding's calculations and plans met Mr Bluck's due diligence standards.

Now this is another of the references that counsel assisting has questioned. He said that the reference which we give, or the proposition about the meeting, is in fact a letter about a fire rating issue. Well to a point it is but in fact there's much more of significance in that letter including confirmation about the meeting and I'll come to that a little later on.

The other point that counsel assisting made yesterday about Mr Harding's dealings with Mr Tapper was, he put to the Commission the following proposition, that there was no change identified between what Mr Tapper looked at on the drawings and what was finally given a permit. He said there was no change between the 27 August letter and the subsequent permit approval. But with respect on that my friend is clearly wrong because the opening part of Mr Tapper's letter said, in the point before he came to the section saying, "Please attend to the following matters," he cited bylaw 105, clause 28.1, "That all drawings, computations and other data submitted shall be signed by the architect, engineer or designer responsible for their production and shall clearly," he actually said, "indentify him and his firm or organisation," and then he said, "There is no indication on the plans that they have been checked and approved for issue and construction," and he actually

also said over the page in relation to sheet 19, "Not to microfilm-able standards." So it's clear, in my submission, that the signed off plans post-date that letter. What became of the ones that Mr Tapper looked at? Well there was evidence from the City Council that at that time plans were microfilmed. There is internal evidence in the letter that Mr Tapper intended that the plans be microfilmed. The Council's evidence was that after microfilming they might be put aside or they might be disposed of or they might be put aside and then disposed of. So the evidence on the face of that letter is that what Mr Tapper was addressing was an earlier version of the plans and we have only this much guidance as to what the changes may have been between 27 August and 10 September. We know that each matter which Mr Tapper raised in his letter, and the Council's copy as the Commission has it, is BUI.MAD249.0141.14 each matter and for that matter every matter he's ticked off. So with respect the submission that Mr Harding was able to satisfy Mr Tapper that the concerns raised in the letter had been satisfied is consistent with the available information and not as my friend would have it contradicted. (j), page 19. Despite suggesting otherwise in his evidence it's clear that Mr Harding dealt directly with Williams throughout the Design Build project. He fully met their expectations as an engineer. Mr Harding was described as the principal engineer for the building by Mr Brooks. He was involved from the outset. Similarly Mr Scott said that he liaised with Mr Harding right from the stage of preliminary structural details. The evidence of those involved in the construction was that Mr Harding was tasked with inspecting and approving all concrete pours, all reinforcing steel in position prior to pouring including inspecting concrete in the columns after the form work had been stripped and verifying and approving concrete dockets. Mr Harding was said to be there on a regular basis. Mr Scott described Mr Harding as the engineer that Williams principally dealt with during the course of the CTV project and Mr Scott described that. Similarly Mr Harding personally approved and initialled every drawing satisfying Mr Tapper's requirement for the designer to sign the drawing.

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I'll later come on to the reference that I've mentioned, the letter said to be about the fire rating, and in that when we get there Mr Harding specifically

confirms that site inspections have been carried out by the engineering firm. He says "we" but he's not quite specific by whom. And he says that the firm was satisfied that the work was carried out correctly and in accordance with the plans.

Now Dr Reay has made it clear throughout his evidence that if there's found to be an issue with the structural design of the CTV building that caused the collapse, he accepts responsibility for such issue or issues as principal of the firm. He made that statement on the first occasion he gave evidence at the hearing. Therefore unfair of counsel assisting to submit that Dr Reay "finally" publicly acknowledged that his firm was responsible. He's never suggested otherwise. In fact if you go back to the opening the same position –

JUSTICE COOPER:

Your opening on his behalf?

MR RENNIE:

Yes, the same position can be found where we have said that we have come to find out what happened and to be accountable for what we were accountable for when it's turned out what that is. To the extent that it relates to liability, this issue should not have been raised by counsel assisting. So in summary the evidence is that Mr Harding was a fully qualified, experienced and very competent engineer. What Mr Nichols called him. Thirty five years old at the time with 13 years' post graduate experience, 10 years' post registration experience. New Zealand Institution of Engineers gave him a title of registered engineer. He had the knowledge and experience and professional requirement to work within his ability and knowledge. He'd know the steps he needed to take if he wasn't doing so. He was either to cease work or to obtain the necessary knowledge to complete the work. Mr Harding's claim now that he was not sufficiently experienced is not credible, and on the evidence not one he would have made in 1986.

Clause 6 of the Institute's code of ethics contains a provision that members not misrepresent their competence and Mr Harding, if he knew that the building was outside the level of his expertise, it was incumbent on him to say so.

In paragraph 60, while he had limited experience in designing multi-storey buildings at the time he came to the CTV job, that is to a large extent irrelevant to the faults that have been identified in the building design. He had considerable experience using the relevant codes. He believed he had a good understanding of the key elements of design under those codes, including load paths and ductility. From his time, approximately four years at Hardie & Anderson and previously at ARCE he had experience as a structural engineer in designing both new and existing buildings to code compliance. He worked on the four storey medical accommodation building before rejoining ARCE, followed by having responsibility for testing a major fibreglass structure, reporting on it to the Christchurch Drainage Board chief engineer. A large part in the design of a nine storey West Park Tower. Responsibility for inspections during the construction phase, and this work was all carried out to the complete satisfaction of Dr Reay and the clients. Dr Reay's assessment given in evidence that he was confident in Mr Harding's experience and perceived competence for the job. Dr Reay relied in part on the fact that an important aspect to gaining registration under the Act is that an engineer knows what it is that he or she doesn't know and knows how to go and find out and deal with it.

The top of page 22, Dr Reay's assessment of him. Paragraph 62 Mr Scott's assessment of him.

Paragraph 63, likewise Mr Harding seems to have been perceived by experienced draughtspeople in the ARC office to have been competent and appropriately allocated the job. Mr Horn described Mr Harding as a conservative engineer who seemed to produce the right numbers. Another reference questioned by my friend, confident if the Commission goes to the reference you'll find that's a fair statement of what he said. Mr Horn accepted that if he felt the engineer he was working with was not competent he'd be pushing back and raising questions, and he had no recollection of having to push back to Mr Harding. None of the structural draughtsmen, some of considerable experience, raised any concern about the design. Mr Nichols described Mr Harding and it's set out there what he said, "Very competent engineer whose design work I considered to be characterised with elegant

simplicity, practicality and economic construction." And Mr Harding himself believed he had the skills.

So Your Honour and Commissioners we come to what I describe as a single mysterious error. There is therefore a striking contrast and a mystery in respect of Mr Harding's CTV design work. No issue whatsoever has been identified with any work Mr Harding did in any part of his career as an engineer before the CTV work or in the 26 years that followed. When he was at ARCE before and after the CTV job his work was respected. And from June 1986 he worked as an associate, and therefore from that point forward as principal. Even now under the intense scrutiny of this inquiry, no issues have been found with any other job Mr Harding worked on.

Mr Banks gave evidence he'd been involved in construction monitoring – "he", that's Mr Banks – had been involved in construction monitoring on the Heatherlea Apartments which Mr Harding had designed. Mr Banks referred to this work in the context of expressing his surprise at the error made by Mr Harding on the CTV job and it's set out in transcript quote. Mr Banks was being questioned by my friend and he indicated that he had just been looking at Mr Harding's work, and clearly he was fully satisfied with the quality and competence of Mr Harding's work and he was surprised by the issue he had identified with the CTV building. The context of Mr Harding's experience and level of seniority, there was no reason for Dr Reay to review his colleague's work. I'll say a little bit more about such review later on. Unless specifically approached by Mr Harding with a request for such input, he was a near equal to Dr Reay, he wasn't a junior or inexperienced engineer. The time he designed the CTV building Mr Harding was fully entitled to practice on his own account during the work he then did. He became an associate and he has since remained a principal in an engineering firm until today in good standing. The mystery therefore is how or why did Mr Harding, contrary to his known ability and expertise, make basic errors in this one project and after 4200 pages of evidence we still do not know.

Supervision of work at page 24. A number of witnesses at the hearing were asked to comment on the issue of supervision of structural engineers within an engineering practice. Those asked to comment included Mr Jury, Mr Falloon, Mr Henry, Dr O'Leary and Mr O'Loughlin. None was in a position to

comment on ARCE in the mid 1980s era or on any firm of similar size. There was no evidence establishing that an associate in a firm working as a principal, as Mr Harding was by June 1986, would have been supervised. To the contrary, in the larger firms persons at that level would have been providing the supervision.

71 I provide a summary of the information about each of those persons and I'm not going to read that.

At 72 Dr Reay's evidence was that he relied on the Council review as a check of the work from his office and this applied as much to Dr Reay's work and Mr Henry's work as to Mr Harding's. Submitted it's entirely reasonable in the permitting processes of the time. In addition the way in which building permits were then given led to such an approach. If a design certificate was called for by Council, the standard wording of that certificate was that the design in the opinion of the certifying engineer complied with the codes. Whether it complied with the bylaws was solely a matter for Council determination.

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An Engineer's ACNZ certificate, that is to say design certificate constitutes the engineer's opinion that the design complies with the New Zealand standards as specified. If the Council bylaws require additional design criteria then this would normally be a matter for the Council itself to assess and it is understood that as a matter of practice the Council did not require any certification other than to the relevant New Zealand standards. On the evidence it is probable that no design certificate was ever called for and indeed the evidence was, that such a certificate would not have been called for if the Council found the calculations were in order. At the time design certificates were sought when the Council did not look at calculations or wanted the engineer to take direct responsibility. That was the clear thrust of Mr McCarthy's evidence when he said that the design certificate was the alternative to the provision of that drawings and calculations. Mr O'Loughlin's evidence was consistent –

JUSTICE COOPER:

Mr McCarthy wasn't there of course was he?

MR RENNIE:

No.

JUSTICE COOPER:

The significant thing on this issue is what the bylaw says isn't it?

MR RENNIE:

Yes, I absolutely agree and Mr McCarthy did his best but it is, I agree, important to remember that he was not there and indeed some of the practices he was familiar with came from another centre and I am not even sure that one can say that he could clearly demonstrate that they were what were followed in Christchurch.

JUSTICE COOPER:

Well that's right but this is one of those provisions where there was a bylaw provision, it is not something that is in the standard as I recall?

MR RENNIE:

Correct.

JUSTICE COOPER:

So, it seems to be, an either or situation in the Council's own bylaw, presumably people were familiar with that at the time.

MR RENNIE:

Yes. Now the evidence about a number of engineers who worked in very small, one or at most two engineer practices did not show a practice of internal peer review. Engineers who had worked in that situation for a time included Mr Falloon, Mr Henry, Mr Cusiel, Mr Harding, Mr Banks, Mr Tyndall and Dr Reay. A sole practice engineer would and did rely on structural designs presented to a territorial authority for permit or consent and that is consistent with ARCE in 1986.

Counsel assisting have submitted that the CTV job should not have been taken on at all because Dr Reay had insufficient experience and competence in the design of complex multi-level structures. Dr Reay had done such work but was not currently engaged in it. The examples given in evidence included Ibis House and the Kamahi building and one can work out from that evidence that Dr Reay would have been somewhat younger and certainly with much less experience than Mr Harding when he did each of those. (inaudible 12:23:15) details and footnote 124 which my junior has kindly read for me. Mr Henry did such work when at ARCE without requiring any input from Dr Reay, it is only now known that Mr Harding's experience and competency is not seen as equivalent to that of Mr Henry. The evidence is that Dr Reay and Mr Harding each believed the opposite at the time.

We then come to construction, 77, is put but I don't intend to read it.

78, the extent to which there may have been any flaws in the construction is difficult to assess fully in the light of the complete collapse and inadequate forensic operation.

79, Mr Brooks identified a construction issue and produced the diagram. Second issue is the beam to wall connection. This is the matter of the bottom bars being bent up. Mr Brooks evidence was the bars could not have been bent on that way on site and it seems more likely to have been a defect in the precast beam as supplied. Regardless it should not have been installed in that form and this represents another construction fault with the result that the connection was considerably less robust than it should have been and that fault is shown in the photographs at the top of the next page.

This – the failure to roughen the ends of the precast beams where they connected with in situ concrete is a further issue. This detail was sufficiently shown in the drawings and specification and the practice was also a standard construction practice which Williams should have followed. Other potential construction flaws cannot be resolved, perhaps there were issues with the west wall cement mortar. Perhaps there were issues with the concrete, although the concrete hot tub session tends to have disproved that possibility.

Standards and bylaws. Now, this if Your Honour pleases is the section that I said I would move through a little rapidly and a lot of work was done in putting

this submission together and I can say that we tried to boil it down to the key points.

Paragraph 84, we referred to the bylaw and the relevant codes.

Paragraph 85, deals with compliance and in turn with the fact that schedule 2 specifying the codes is not part of the bylaw.

We come on to the legal effect of the standards. There are two ways in which standards may be incorporated by reference into a bylaw. The first is that some or all of the provisions of the standard may form part of the actual bylaw thereby becoming binding because they are the bylaw itself and an example of this method is given. The second is that the bylaw may provide that compliance has been achieved if the requirements of the standard are met. In the latter case the standard is not itself law. Its requirements are binding only to the extent that they are made in its best requirement by a bylaw. Generally the position is that one may comply with the bylaw by other means and so without complying with every part of the standard. Clause 5 in tandem with schedule 2 is an instance of this method of incorporation. This use of standards included by reference has been upheld by the Court of Appeal even where the standard itself was no longer in force and that is *Parlane's* case. In *Parlane*'*s* case of course dramatically shows that the standard of itself has no legal force, but the bylaw can give it legal force.

The two standards in this case were therefore absolutely binding on designers at the time the CTV building was constructed, only to the extent that they were specifically incorporated in the bylaw such as clause 11.2.5.1. They were a method which you followed and entitled the designer to require the Council to accept that the bylaw had been complied with. Such an entitlement may at times have been part of the differences between engineers and the Council which are said to have arisen.

In both cases subsequent revocation of the standard by the Standards Council is irrelevant. If provisions of a standard are being included within the bylaw then they have lost the character of the standard to which they came and they are now provisions of a bylaw. We discussed that.

Paragraph 91, one particular issue that requires mention in this context is that raised in paragraph 370 of the closing submissions of counsel assisting. The submission is made that clause 11.1.5 (d) of the bylaw refers to a major

earthquake not a design level earthquake and even if it is accepted that major means design level neither the bylaw nor the codes allow the designer to design on the basis that a building is only required to withstand an earthquake at design level but to collapse in an earthquake only marginally stronger. However no such check, that should be by the engineer, was required by the bylaw or the code and in fact in their paper, design of concrete structures presented at the July 1986 seminar attended by Mr Harding, there needs to be a pause before I get to the next bit, but Park, Paulay, Preistley and Gaerty noted the following:

"In many countries for example in New Zealand only one level of earthquake load is considered in design, the level being that corresponding to a major earthquake."

So contrary to my learned friend those are respected experts considered a design level earthquake and a major earthquake to be the same thing.

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The bylaw and code do not contemplate two or more design level or above design level earthquakes in quick succession. No-one can say what might have occurred to the CTV building on 22 February 2011 had that been a one-off event without the lead-up of the 4 September earthquake and subsequent aftershocks.

The submissions of counsel assisting go on to state that the underlying purpose of the bylaw design requirements is to avoid collapse and to minimise the probability of injury and death. Counsel assisting submit that that purpose can't be met if the designer seeks to draw a line beyond which collapse and death are virtually certain. It's accepted that the purposes identified are implicit in the bylaw. Even more obviously every structural engineer design always has as its main purpose and objective human safety and then the control of building damage from earthquakes. But the only quantitative means to assess whether these purposes are achieved is via design checks. Design checks already contain safety factors, so something that just passes the code should not be extremely vulnerable. Passing the code means an acceptable level of design with a risk that may be higher than significantly exceeding the code but an acceptable risk nonetheless.

We then go to the broader context of standards and bylaws. In 94 point out they were not a complete instruction manual but they were rather a starting point. They had some mandatory requirements. They had some that were advisory. There were some that were subject to stated qualifiers and they were intended to operate in tandem with the growing expertise of professional and expert engineers, and what I've just put to you emerges from the foreward quoted in paragraph 95.

96, the top of the – sorry page 32 is what I meant to say, the top of the page. There was a specific caution that the use of more advanced techniques of earthquake analysis can easily lose validity. So there was an expressed caution in the foreward that in dealing with the standards more advanced techniques of earthquake analysis would not necessarily provide the guidance that the engineer required.

96 – reference to New Zealand standards in the 1980s, prescribed design methods for particular types but left some degrees of freedom, again that's shown in the forewards.

97 - from the evidence the Commission has heard it's clear that a number of the engineers, that's to say the engineers you've heard, saw the application of standards as something of an art informed by experience and based on an accumulation of practical knowledge. Yet no such reservation or requirement for experience appeared in the bylaws or the general law.

To a lawyer a concept that a person holding the required authorisations to undertake work in a legal sense cannot undertake it because of some professional experience overlay requirement not written but to be inferred from some arcane knowledge of older engineers is in direct conflict with the authority given by the bylaw.

In addition is an issue as to how a bylaw, itself subordinate legislation, can incorporate within its mandatory requirement standards which are not written in that way, that's to say as mandatory requirements. That's to be found in some elements in the Christchurch bylaws as the balance of that paragraph discusses.

Paragraph 100 refers to the severe limits in the 1980s on the ability of the designer to achieve certainty and concludes, "In turn the Council which in those days had important review and approval roles but had even less ability

to carry out calculations on other respects then had to form an overall judgment."

Page 33 – this leads to a situation where mere compliance with the bylaws may lead to a design which is bylaw compliant but unsafe and where a safe design may be open to attack as not complying with the bylaws. In addition seemingly mandatory requirements, eg for symmetry, are modified by words like, "As far as practicable." It even becomes a matter of opinion which elements of the structure are identified as being the main elements and so on. In reality in design and construction it's not only accepted the standards will be used as a basis for bylaws the standards appear to be written for that purpose.

This method of tertiary legislation and its adoption of standards as part of the bylaws is controversial. The Legislation Advisory Committee of Parliament in Appendix 4 of its guidelines makes general recommendations which can be read as discouraging this, that's to say this approach, but as noted above the Court of Appeal in *Parlane* was willing to uphold a bylaw which applied a standard which had been withdrawn.

And finally a bylaw which cannot be understood or applied may be set aside.

Code Deficiencies.

Mr Latham a structural engineer at ARCL prepared detailed reports showing how the code could have been interpreted. It became evident through the work of Mr Latham and others, principally Dr O'Leary, that the codes were deficient in a number of respects. At various points they were ambiguous, confusing and contradictory. A summary of some of these possible issues as highlighted in evidence is set out below. And Your Honour this is now part of the material I was going to go through with relative speed.

JUSTICE COOPER:

Yes.

MR RENNIE:

There are references to the standards and the ambiguities.

109 – Professor Mander referred to the secondary member provision in clause 3.5.14.3 as a possible loophole in the code and he later elaborated on that. I

think it was Mr Smith who was minded to see, it was Mr Smith, minded to see a related provision, I think it was point 1, as just being a mistake in the code which should be ignored. Well that may be a good engineering perspective in terms of design but of course for a lawyer to say, well we will disregard this regulation or this section in the statute because we think it's a mistake is legally incomprehensible.

JUSTICE COOPER:

Well it used to be I suppose but sometimes the Courts take that view don't they if something's obviously wrong in a statute. But there is a tension, it's apparent to me there's a tension –

MR RENNIE:

Yes.

JUSTICE COOPER:

– between the two professions as to what you do with standards such as these.

MR RENNIE:

That's right and of course the focus in this case is if you're Mr Harding setting out working to the code and expecting the Council to apply the bylaw, you needn't even be Mr Harding, you could be any engineer in 1986. You've got a provision in the bylaw that says that if you design to meet the code it's deemed to meet the bylaw but you've still got the judgment from the Council about whether you've met the code. It creates tension in both the functional sense that Your Honour has referred to. Not surprising it may have created tension between engineers and council also and it's a structural problem because the code to some extent is a guideline and is discretionary and in other parts is mandatory whereas a bylaw by its very definition is mandatory and of course what has happened in the Christchurch bylaw as in a number of others, because it's modelled off the standard bylaw as my friend will discuss in more detail, is if parts in the standard that have been seen as particularly key by the Council are migrated into the bylaw which of itself seems a very

good, safe process until you suddenly realise that that means that the Council has applied a value judgment as to which bits of the code it thought was important enough to go into the bylaw.

JUSTICE COOPER:

Well this is one of Mr Mills' submissions.

MR RENNIE:

Mmm, yes.

JUSTICE COOPER:

Yes.

MR RENNIE:

Well it's not everything we disagree on Sir.

110 – the beam column joints. There's a discussion there which again is important

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…there's a discussion there which, again, is important but which in the same category of the earlier Code citations we table, I hope it assists the Commission.

And at 35 we pass onto design issues, and again at the top of page 38 we discuss asymmetry. The words "as nearly as practicable". The Commission may recall I asked Mr Henry about those. I invited him to reconcile the design that he had done to that provision and he pointed to those words. So we have a subjective element which is in the middle of what otherwise might have been intended to be a mandatory requirement and to discuss that 116, 117, 118, 119 say it's impossible to define as nearly as is practicable for all purposes.

120, Dr O'Leary identified the problem and suggested drilling down further into the standard.

121, the Code did not specify a clear limit on the acceptable degree of eccentricity and there was no defined point at which acceptable became unacceptable and quote the DBH report comment on that.

Page 37 – In the current Code there is still no limit on the permitted degree of eccentricity. The current Code, like its predecessor, provides a requirement to carry out a more in-depth analysis if there is high eccentricity but there is no maximum limit. Quantification of eccentricity limits would be a valuable enhancement to future codes and we respectfully note that your Commission has already said something similar in the reports that you've issued.

123 – The asymmetry of the CTV building was not raised as an issue by the Council or Holmes which, it is submitted, is representative of the thinking at the time. In fact the Holmes report stated the layout and design of the building is quite simple and straightforward. These contemporaneous Christchurch based assessments are far more reliable than a 26 year hindsight assessment. There are many other buildings in Christchurch that have similar levels of asymmetry and eccentricity to the CTV building. One such example is Landsborough House and, in fact, Mr Henry discussed, as I've said, the asymmetric shear wall layout with Professor Paulay who agreed the proposed layout was acceptable. There are, or indeed were, several other buildings in Christchurch that have similar levels of asymmetry to the CTV building that were not discussed at the hearing.

Connections between the diaphragms and the north shear core.

Cite the standard in 124.

125 While in hindsight using a lower force from the parts and portions section derived loads does not achieve a rational capacity design approach it's nonetheless what the Code stated and required. At the time it was considered that using parts and portions loads provided an additional factor of safety and it was the appropriate measured to use.

Discuss the drag bars in 126 and the diaphragm analysis in 127.

Moving to non-seismic detailing of columns and beam column joints. There are two issues here, whether the approach was permissible at all. Could columns be considered as secondary elements and did they need ductility regardless and did the columns remain elastic at V-delta.

As discussed above Mr Henry, Mr Hare and others all noted that designing shear wall protected gravity load systems was an acceptable and not uncommon method of design. During the design of Landsborough House, Mr Henry had discussions as I've said.

NZS3101 1982 considered primary frames acting in parallel with stiff shear walls to be secondary elements. Secondary elements could still have been required to be designed with the additional seismic requirements if the drifts were sufficiently large. Similarly with limited ductile provisions of a non-seismic provisions could have been used if the drifts allowed.

In applying that Code, with the single exception of Dr Jacobs, all experts agreed that the columns were secondary elements. Despite this counsel assisting in closing submissions have submitted that Code compliance is a question of law and experts opinions are not definitive. Counsel assisting submit that an approach generally adopted by engineers does not prove it was lawful.

These submissions invite the Commission to disregard expert evidence as to how the Bylaw was, in fact, understood and applied and complied with at the relevant time, and issue of fact which is before the Commission to determine and on which the position is clear.

Invite the Commission to adopt the legal interpretation where the issue arises in respect of the meaning of a Code or standard of engineering practice not a statute. The Bylaw provided that compliance with such Code would be deemed by the local authority to be compliance with the Bylaw. That does not require the detail of the engineering work to correspond exactly to the Bylaw. To the contrary 'deemed' in itself contemplates that there might be a discrepancy between Code compliance and the provisions of the Bylaw and over-rides any such difference.

JUSTICE COOPER:

I'm finding that bit elusive, that submission, because if you take that to its logical extent you can do whatever you like.

MR RENNIE:

I don't think it's quite that broad, Sir, but what the Bylaw says is "Compliance with the Concrete Code is deemed to be compliance with the Bylaw". So if there's a discrepancy between the Bylaw and the Concrete Code that's resolved if you have complied with the Concrete Code because you're deemed to have complied with the Bylaw. It's like one of those wonderful

regulation devices that says a cow shall for the purposes of the regulations be deemed to be horse. That's the essential concept, Sir.

JUSTICE COOPER:

Well just a minute, possibly I'm a donkey but –

MR RENNIE:

Well no, Sir, I'm not aware of any provision that makes you that, Sir, and I certainly wouldn't advance that argument but what I'm saying here is that the Bylaw, perhaps if I go back to the second sentence "The Bylaw provided that compliance with such Code would be deemed by the local authority to be compliance with the Bylaw" that's the starting point, and then I say that does not require the detail of the engineering work to correspond exactly to the Bylaw.

JUSTICE COOPER:

But it has got to correspond with the Concrete Code.

MR RENNIE:

Absolutely and what, the point of this submission is my friend says that complying with the Code isn't good enough because the issue's a question of law. But the point I'm making is the way the Bylaw is structured complying with the Code means that you are, in fact (inaudible -12.48.51)

JUSTICE COOPER:

Yes I understand that but that's once you've got compliance with the Concrete Code.

MR RENNIE:

That's why it wasn't as broad as Your Honour suggested. You've got to be in line with the Code. But if you are in line with the Code and you look at the Bylaw and find the Bylaw has a provision which conflicts with the Code, that is not a matter that you actually have to address because you have been deemed to have complied with the Code. Now whether that's a good

structure is an entirely different matter but I'm responding to my friend's proposition. All these engineers said that's what we did at the time. We considered that to comply with the Code, therefore it complied with the Bylaw and my friend says the fact that lots of engineers say that doesn't mean it's lawful and what I'm addressing is that it was, whether it's wise or unwise is not where we're at.

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JUSTICE COOPER:

Okay but on your, I understand that now thanks. On your first point in paragraph (a) is this where you can't, it is a question, if it's a question of law what an expert says the practice was can't affect that question can it?

MR RENNIE:

The only way that it can affect it Sir, and it really come on to some extent to what I discuss in (d) also is that there are occasions upon which a Court will hear evidence from experts as to how a technical provision in the statute is understood and applied in practice. And that's why I'm saying that here with the single exception of Dr Jacobs, who of course is looking at it now not then, you have every other engineer saying, "Well that was permissible and that was what was done in 1986."

JUSTICE COOPER:

Yes but it can't be a weight of numbers thing can it?

MR RENNIE:

No, if not we'd all be out finding more engineers Sir, but credible evidence from these engineers, many of whom have quite distinct positions otherwise, but that was as a matter of fact in the industry at the time considered to be compliance is something which I'm saying in (a) the Commission should not disregard. What weight you give it is another matter altogether and I'm saying my friend has invited you to disregard that.

JUSTICE COOPER:

Well, but in the end what has to be resolved is legal proposition?

MR RENNIE:

Yes and that's really why I should move to (d) Sir which is our old friend section 5(j) of the Acts Interpretation Act and it says, "Every Act and every provision et cetera shall be deemed remedial." Now there was an exchange with my friend counsel assisting as to whether, what the position might be under the Interpretation Act 1999, but we don't have to address that because this is pre 1999 and a bylaw was within the old Act, although in general a bylaw is not within the new Act, there are some exceptions to that.

JUSTICE COOPER:

That's what I thought.

MR RENNIE:

Yes. The new Act Sir, very briefly, talks about an "instrument" which can under some circumstances be a bylaw, but it's a bylaw which has to be made by or with the authority of the Minister or the executive council.

JUSTICE COOPER:

And not by a local authority.

MR RENNIE:

And not simplicitor by a local authority. If you had a process for the local authority made a bylaw subject to the Minister's consent it would then come inside the 1999 Act.

JUSTICE COOPER:

Like things used to do under the Transport Act bylaws?

MR RENNIE:

Yes. But back in 1924 it was a one size fits all, which was section 5(j). The latter part of that Sir says that such matters accordingly, I'm reading halfway down, "Accordingly receive such fair, large and liberal construction and interpretation as will best ensure the alignment of the object of the Act and of

such provision or enactment according to its true intent, meaning and purpose."

JUSTICE COOPER:

Attainment. The attainment of the object of the Act.

MR RENNIE:

Yes, I'm sorry Sir. The attainment. Probably now to 133 Sir.

Primary elements. Gravity loadings, the columns were primary elements. Then when considering the more particular than 4203 definition in 3101, columns were secondary elements with respect to the lateral load resisting system whilst still constituting primary elements for gravity loads. And I cite the code. Not unclear. Not ambiguous and not inconsistent with 4203. It's just more descriptive. And further 4203 states under the heading of "General Design Principles",

"Design shall be in accordance with the appropriate material code, subject to the general principles of design set out below."

There were no specific requirements set out in 4203 for gravity elements acting in conjunction with ductile shear walls.

The submission of counsel assisting is the columns required ductility regardless of whether they were a secondary element, because in the case of failure there was a risk to life. This is in 4203 and with respect to that clause "ductility" is not defined.

This raises the question of how ductility is to be measured. A common measure of ductility is the ratio of ultimate displacement to the elastic displacement. The authors of the DBH report have calculated the elastic limit and the failure limit of the columns of the CTV building at tables 13 and 14. And I then set out the ratios of failure limit to elastic limit.

At 136 all ratios are in excess of 1, indicating some level of ductility. It can be concluded the columns did possess some level of ductility, albeit not as much as they could have had if the detailing followed the seismic provisions. The current concrete code classifies structures as nominally ductile if they are designed with a ductility factor between 1.0 and 1.25, or limited ductile if they are designed with a ductility factor between 1.25 and 3.0. Therefore the CTV

column ductility factors in the range of 1.9 to 2.5 are consistent with the classifications of structures with some level of ductility in the current codes.

It is also noted that the failure limit calculated in the DBH report is probably estimated too low, as the authors assumed failure at a concrete strain of 0.004. This may be the point at which the columns can no longer contribute any lateral resistance however they could possibly still carry the gravity loads at strains of 0.007 to 0.008. A point acknowledged by Mr Holmes in his peer review report. Adopting a higher failure strain would increase the rates above and demonstrate an increased level of ductility.

138. It is acceptable to assume gravity frames, acting in conjunction with other lateral load resisting systems such as shear walls, as secondary elements in the current codes.

139. A relevant quote from the current Code in respect of secondary members.

140. The secondary elements clauses remain virtually unchanged in both the 1995 and 2006 codes. The Code still has the same clause which considers primary gravity frames in parallel with shear walls to be secondary elements, demonstrating that there has been no major shift in the classification of secondary elements from the 1980s codes to today.

What has changed is the detailing requirements for columns that are not required to be designed with the additional requirements for seismic loadings. This is implicitly a later recognition that, while not known at the time, the previous 1982 code was inadequate and it has subsequently been rectified. Far more stringent levels of confinement are required for non-seismic columns. This occurred for the first time in 1995, some 9 years after the CTV building was designed.

Finally, it is observed that if the issue of seismic detailing were as clear as counsel assisting argues, then the Council and Holmes would certainly have each identified it.

143. The discussion of V delta and that goes on through 144, 145, 146, 147, 148 this curious matter of the requirement to neglect the foundation rotations which Mr Latham battled with.

149 and at 150 in summary, it can be shown that the columns remain elastic, and accordingly were entitled to be designed without the additional seismic

requirements as outlined in part (a) clause. 3.5.14.3 of NZS3101 and that's the level of detailing which is required.

Next the shear reinforcement of columns. A short but significant point I won't read. I don't need to read 153 to 155 or 155 to 159 because counsel assisting accepted that those were in fact correct. And at the top of page 44 the photograph I just wish to say that that's a very good example of why we, and therefore you need a good forensic evidence because there's a photograph absolutely worn out statement about a photograph being worth a thousand words. It has certainly spared you a thousand words from me on that issue.

Minimum transverse reinforcement of beam column joints at the foot of page 44 and then going over on 45 is the diaphragm design and that may be a good place to take a break.

HEARING ADJOURNS: 1.01 PM

HEARING RESUMES: 2.17 PM

MR RENNIE:

Sir I am at page 45, paragraph 161. The matter of diaphragm design and what is put very briefly there is still important and that is on more of these matters where the 1986 product literature and practice provided for Hi-Bond to be used in relation to 664 mesh now not considered – well just now not accepted.

And 162, the fact that although the slab reinforcement was marginally less than the code specified minimum if the contribution from the Hi-bond decking is ignored. Two things to take into account, obviously are firstly, the contribution from the decking, and secondly, the lapping situation which has some impact as well.

The Spandrel Panel in my submission, is a non-issue notwithstanding the significance attached to that in the Hyland-Smith report and that brings us on to the question about how the defects arose.

And in 165 I set out the points which is the Commission knows from the exchange this morning I put as a theory that counsel assisting have developed. Well I've discussed that issue about counsel assisting what I am now going to discuss is just simply the points as points.

JUSTICE COOPER:

These are the issue which form the basis of general comment earlier. Is that right, these are the particulars as it were?

MR RENNIE:

Indeed Sir, yes and what I've said to the Commission just to repeat to it, relates to the breadth of view that you have available to you as the evidence you may look at and I am now going to treat these four points as simply being matters where you had some evidence and I have to address what our submission is on that evidence and the format is listed there. Of course they come back up as headings on the next page and I am going to move through to 168 which is the question of office culture.

Now notwithstanding the proposition that there was some alleged office culture, of not designing buildings stronger than necessary. The reason for that significant evidence about what the real process in the office was.

In 169 Dr Reay said he considered the firm had a culture of quality that to deliver that quality there were several factors that were important. One of them code was compliance, another was buildability. He said, "I always had the view that if the building was difficult to build, it would probably not be built well, errors would occur, and there was a culture of delivering quality drawings that could be easily read and were complete in terms of the necessary detail."

And Mr Horn confirmed that he called them, "shop drawings" and said that meant, "Every aspect of it pulled to pieces and itemised so you could hand it to a man in gumboots to build it." And Mr Fairmaid independently used the same term, noting that "pre-cast componentry and structural steel componentry was detailed to a higher degree and that enabled builders to be

more accurate about what they were doing in terms of delivery of those components."

And accuracy was a point that Dr Reay emphasised and he said, and I quote in 171, If I found people designing things that I thought looked like they were just guessing and adding reinforcing or concrete I would ask them to justify it to ensure that they were actually designing what they were doing and not guessing what they were doing."

Mr Harding later accepted under cross-examination that his evidence regarding Dr Reay's intolerance of overdesign or the inclusion of unnecessary design elements was an attitude Dr Reay had in relation to efficient design not an attitude as to compliance of design.

173, Mr Smith's evidence about the position in the office.

174, Mr Horn agreeing in principle with what Mr Harding had to say.

175, Mr Strachan comparing the office to an environment he had worked in. He described that other office as "real head down, bum up, no talking, tight control, whereas Alan wasn't." In the context that he said that, that was clearly intended to be a positive statement. And on the issue of building no stronger or more expensive than necessary Mr Strachan referred to the practice more as the end result of a series of developments that fine-tuned those buildings.

Mr Fairmaid refuted Mr Harding's evidence of a general philosophy not to include anything that couldn't be justified saying that in reality it was more about buildability. He said, "I think the perception might have been less reinforcing in concrete wall panels but the reality was that the building systems enabled buildings to be built very efficiently."

Pulling together these various threads of evidence together it is submitted that there is no basis to level any criticism at the practices of ARCE in terms of its design philosophy. Designing to code was clearly the prime objective. The fact that the firm had a policy of design efficiency focussing on buildability is not a reason for deficiencies in the CTV design, not least because there is no evidence of any such outcome in any other work and substantial evidence of engineering design awards received. And the reference there will take the Commission should it need to do so to the many design awards that ARCE and in turn ARCL has received over the years and you may reasonably infer

that outside organisations giving those awards don't give them to work which they perceive to be of anything other than first quality.

Suitability of Mr Harding for the job I have discussed.

Inappropriate or wrongly specified materials. The short point at the end of that is that the Hi-Bond evidence turned out in the end to be firstly a Williams matter and secondly, consistent with 1986 practice. Dr Jacobs dealt with that and there was no contention of any other product being inappropriately or wrongly specified.

Then we come to the influence over the permit process. Some witnesses believed almost all of them from anecdote or hearsay that the building permit for the CTV Building was somehow pushed through by the influence of Dr Reay. Mr Henry said in his evidence that ARCL did not like the scrutiny of Mr Tapper and would go to Mr Bluck to override Mr Tapper. Dr Reay denied, on multiple occasions, that this occurred even as a general proposition, and certainly not on this job.

Mrs Tapper's evidence that her husband went as counsel assisting briefed it, "On and on about the CTV building" proved to relate to a period of approximately one week, at the end of which Mr Tapper attended a meeting where he clearly intended to present his views, and commented (jokingly or not) that he might lose his job. Whether he was being light-hearted or serious, that evening he told his wife that the issue was resolved and he never mentioned it again. Mrs Tapper's evidence was hearsay, and in her initial brief it was significantly overstated. Once she had the opportunity to state it her way it gained a completely different character.

In the light of the memorandum of counsel for the City Council dated 22 August 2012, it might not even have related to the CTV building because they identify another possibility.

But I'm proceeding in 186 on the assumption that it is more probably the CTV building.

JUSTICE COOPER:

Just on this hearsay point. It is pretty limited sort of observation to make. You don't engage with the relevant provisions of the Evidence Act at all?

MR RENNIE:

Well put it this way Sir, this being an investigation you are entitled to receive such evidence as is relevant, and I accept that Mrs Tapper's evidence is relevant that Mr Nichols' evidence is relevant, and I was a little mystified by my friend counsel assisting's submissions on hearsay because not only has no objection as to hearsay been taken to my knowledge by any party but the parties that I represented have cross-examined both witnesses on it, which if we were going to take a point that would have been the time to take it, and in the Council's case in relation to Mr Nichols they actually obtained and filed a second brief which added substantial information. So I don't understand Sir that there is an admissibility issue at all.

There is an issue as to the weight to be given to the evidence and as I expect to show in a moment, the evidence on any view of it is actually helpful in clarifying some aspects of the permitting process. So that is why I haven't dealt with the Evidence Act because one, it is an objection, it may well have been available but it has not been taken. And secondly, as I expect to show you in a moment there are some points from it which are likely to be of assistance to the Commission.

And 186 assuming that it is more probably the CTV building, two important additional facts emerge. First, it is then clear that the building and its compliance had such exceptional attention from Mr Tapper that it must have been scrutinised at permit stage with almost military thoroughness. Next, once he signed the structural consent on the permit form on 10 September 1986, he cannot have continued to hold concerns, as he did not mention it again and Mrs Tapper said that in later years he went into the building for filming that was to say with the television channel with Grey Power.

Mr Peter Nichols mentioned that Dr Reay could go over the head of the engineer assessing the bylaw compliance and speak to Brian Bluck directly. Dr Reay accepted that he had direct contact with Mr Bluck on occasion, but he was not alone in this respect, and he explained the many other matters that he had occasion to speak with Mr Bluck about.

Mr Nichols' evidence in respect of the CTV building related to a conversation with Mr Bluck in the nearby street within an obscured view of

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the partly built building where Mr Bluck assured Mr Nichols that he had in Mr Nichols' words, "Carried out due diligence and had been convinced by Alan Reay that his reservations were unfounded." Mr Nichols expanded on this in cross-examination when he said that he understood Mr Bluck's reference to due diligence to mean that, "He had been pretty thorough about having it checked." In addition, Mr Nichols referred to Dr Reay convincing him in respect of the innovative design concept, but it is not known whether that related to this building, another building such as Landsborough, or a more general discussion on construction techniques.

I just pause there to briefly discuss orally Mr Nichols, what Mr Nichols could see in Cashel Street that day and the Commission may recall that I identified that Mr Nichols, that between him and the partially completed building which on his account had reached level 4, there was a building which I put to him as being a one storey building, it is in fact clear from the sales documentation of the receivers that the intervening building was in fact a two storey building although it looked like one in the photo.

So what could Mr Nichols, and for that matter Mr Bluck see? Well they could see the south face of the building at the level 4 level. Mr Nichols' reaction at the time, corrected in his second brief of evidence was he couldn't see a shear wall. Well of course there was none on the east side. There was none on the west side and he hadn't picked up, or indeed it may not have yet reached that level, that there was a shear wall on the south side and the whole of the bulk of the building sat between him and the north side. So what he could see that day was something which looked like a gravity structure with no shear wall. Not surprised that he had that reaction. And in his second brief of evidence he –

JUSTICE COOPER:

Well the evidence, the significance of the evidence is not about Mr Nichols' opinion of whether it was a good design. The significance of it is what Mr Bluck said to him about it.

MR RENNIE:

And the second significance Sir, with respect, which I'm coming to is that in his second brief of evidence he said from the Council briefed him that having viewed the plans he no longer retained any concern about the building. So that, with respect, was a material deficiency in the original briefing of Mr Nichols.

Now at 189 Sir all witnesses were agreed that Mr Bluck would not be overridden. He was described by a number of witnesses, and I've set out what Professor Mander, Mr Henry, Mr Nichols and Dr Reay each said about Mr Bluck.

COMMISSIONER FENWICK:

Professor Mander talking about Mr Bluck. How did Professor Mander know anything about Mr Bluck? Had he worked in Canterbury before?

MR RENNIE:

Professor Mander Sir?

COMMISSIONER FENWICK:

Yes?

MR RENNIE:

I can't assist you immediately with that Sir. My reference is obviously to the evidence that Professor Mander gave, Professor Mander coming from this district by origin –

COMMISSIONER FENWICK:

From the railways, yes. It seems strange he would've had any interaction with Mr Bluck that's why I'm querying it. What can we put on this?

MR RENNIE:

Professor Mander's evidence Sir was that when in railways he had responsibility for railways' property for approximately two years.

COMMISSIONER FENWICK:

And that would've involved the city council even though it was a government department at the time?

MR RENNIE:

Well patently at one level not, but in terms of collegiality between engineers, possibly so. Professor Mander would certainly have been an engineer in this city at that time that Mr Bluck was alive both when at the Council and in retirement.

COMMISSIONER FENWICK:

Just check the CV and see where he did work, thank you.

MR RENNIE:

I'm not wishing to be unhelpful Sir but it wasn't a matter that Professor Mander was pressed on at the time as I recall it. In all events, Mr Henry, Mr Nichols and Dr Reay were qualified by experience in respect of Mr Bluck. My citation is not dependent upon Professor Mander.

At 190 – I'm sorry? I'm assisted obviously by the industrious team on my right and the reference to which the quotation from Professor Mander is given, 197, we'll take one for the transcript and in the transcript Professor Mander said,

"I knew Bryan Bluck from many years ago,"

and then he was asked to be clear,

"He was the former Christchurch City Council chief engineer,"

and the professor continued,

"And I was unaware until recently that he'd passed away but I knew him from in the days when I was a student and he was a man to be revered in the city. He knew everything and he's the sort of person that would've had all this knowledge in his head."

190, details of Mr Bluck's professional credentials attest to his qualifications and extensive experience. He was made a Fellow of the Institution of Professional Engineers in 1994.

When Mr Hare went to visit Mr Bluck in 1990, Mr Bluck identified, in considerable detail, four possible issues for Mr Hare. Mr Hare's notes record that they discussed easements, construction of the fire escape, and the

vehicle entrance. Mr Hare also recalled a discussion about fire egress. Clearly Mr Bluck had a detailed knowledge about the building. He never mentioned any issue with the structural design or the permit process. An appointment was made for the meeting. And Mr Bluck as a careful person would have obtained the building file before or at the meeting with Mr Hare (though the latter did not recall if he did).

Put simply there is no reliable evidence to support a contention that Dr Reay exercised any influence over Mr Bluck or Mr Tapper in relation to the permitting of the CTV job. To the contrary, the evidence demonstrates that the Council did a thorough review of the building and was satisfied that a permit should issue. Further, the chronology of events proves that the authorisation process followed a prompt standard practice incorporating a detailed review by the Council. And I then set out a schedule which the Commission will recall I put orally in cross-examination.

Tuesday 26 August the Council receives the structural drawings.

Wednesday 27 August Mr Tapper writes to ARCE with queries and requirements that were sent to ARCE's post office box address. There were then two working days for which there's no record.

A weekend.

Monday the 1st of September Mr Harding received Mr Tapper's letter of 27 August 1986 and we know that from the pencil note in the top right-hand corner.

The following Friday of that week Mr Harding replied to the Tapper letter of 27 August 1986.

A weekend intervenes.

There are two working days and Mr Tapper signs off on the structural aspects of the building in the permit documentation.

Now I've asked that the letter referred to in 193 be put up on the screen. There's a reference given for it at footnote 212 but that reference for some reason doesn't seem to be a valid reference on the online system. The reference which it's readily accessible at is WIT.READ.0001B.51 and this is a letter from the Mr Harding on the 19th of August 1987 and as counsel assisting said it does refer to the matter of fire resistance rating, but it contains two other relevant statements.

1440

As you will see it says in relation to the matter of permitting,

"From site inspections carried out by this office we consider that the floor slabs and their reinforcement were constructed in conformity with our drawings and specifications."

It refers to a recent, which must be 1987, meeting.

"I have had a recent meeting with Mr Tapper and can confirm also that the Council hold copies of our drawings and calculations," and the letter also confirms that there had been a discussion with the Council at the permitting stage. As I say in 193, it is logical that there was a review discussion and decision on the permit application in the period between 5 September when the reply to the Tapper questions was sent and 10 September when the sign-off occurred.

JUSTICE COOPER:

This is a 1987 letter though.

MR RENNIE:

That's right Sir.

JUSTICE COOPER:

So what sign-off are you talking about?

MR RENNIE:

I'm talking about the 10 September 1986 sign-off which is the last item in the permitting sequence in the table in paragraph 192. This is a later issue. This letter is about a later issue but it refers to there having been a discussion at the permitting stage.

JUSTICE COOPER:

Yes.

MR RENNIE:

It's quite possible that that meeting took place on the 8th, 9th or 10th of September. So what we do know is that both Mr Bluck and Mr Tapper were satisfied because Mr Bluck told Mr Nichols that and Mr Tapper signed the papers and ceased talking to his wife about it. We then come to the next section which is the post-construction drag bars and I indicated that given the acceptance of what my friend for Mr Banks is going to address on this I was not intending to read this out and that is still the case.

There are two matters that I wish to deal with and the first is the matter that my friend, counsel assisting, raised this morning, 3 September, the question as to whether at the same time there was some construction work in relation to the fitout of the building for the ANZ Bank. The evidence tends to indicate the bank actually occupied the whole of the building and we have, and will hand in, the letter that counsel assisting sent to us on the 3rd and the response which we sent on the 4th.

Now beyond that Sir I think, with respect, this is a complete red hearing but whether it is or whether it isn't – whether it is or whether it isn't, and I'm not going to spend time on it, beyond what I'm about to say, we have not at this stage been able to confirm that any work was done under the 1991 permit. These papers have been, papers that my friend refers to have been available for a long time and in fact in a more extensive set are in the DBH papers which also contain extensive permit plans for an internal fitout of the building in 1993 for which the architect was Warren & Mahoney. Our letter of the 4th of September comprehensively covers any relevance in our submission that this matter could have for the Commission. If, however, the Commission on looking at it were to consider that you would wish to have additional information we would undertake to provide a memorandum or affidavit in respect of the additional detail as to whether the works to our knowledge were ever undertaken and if I may borrow a sentence from the Christchurch City Council that applied to us on this occasion, "A comprehensive search of our records has been undertaken without finding any material relevant to this matter other than the copy of the DBH file which we hold as a result of this enquiry."

JUSTICE COOPER:

So this will be uploaded onto our system?

MR RENNIE:

That would be my understanding Sir. While we're on the subject of uploading. there is a recollection that I may otherwise forget to mention. Quite a body of material was uploaded yesterday which apparently has been provided by Mr Shirtcliff and I simply acknowledge that we are aware of it and we do not perceive any of it to be a matter that we have to address.

Now Sir at 199 –

JUSTICE COOPER:

What about the Commission? Should we be addressing it?

MR RENNIE:

It may be of interest to you in forming a view about Mr Shirtcliff, Sir.

JUSTICE COOPER:

Yes.

MR RENNIE:

I anticipate that you will be invited to form views about Mr Shirtcliff but that, of course, is not a matter that I'm addressing on behalf of those I represent. To give you an idea of the nature of the matter Sir there's a letter offering, in the position with Williams, there's a monthly report of Williams Construction that contains a brief reference to the CTV. There's a considerable amount of material about the Durham Towers project that he was engaged on. Some of it at least may be material you will wish to look at but I didn't want you to discover tomorrow when you reach Mr Shirtcliff's submission that it was there and I had not referred to it.

JUSTICE COOPER:

So you're not interested in that material?

MR RENNIE:

No Sir in fact I think the only thing in it which is relevant to the CTV that I could find was a single snippet of information where Williams recorded that Prime West had lost their intended tenant for the building and construction was no longer as urgent as it had been, which may partly explain why the job then dragged on but again not a matter for us.

At 199 Sir counsel assisting labelled it puzzling that Dr Reay didn't tell Mr Banks of David Harding's experience, and if I may borrow a phrase my friend used at times, and slightly change it, you cannot tell somebody something you do not know.

At the top of page 55 there's reference to Mr Robertson and there was reference a little earlier today to a whistle blower type situation. The whistle blower law, the Protected Disclosures Act, correctly applies only to persons in employment in relation to information about their employer. The common law protects people, explicitly protects people, in cases where it is necessary to disclose such information. It is supplemented in the case of the medical profession by further statutory protection for doctors who disclose information against a patient's interests.

JUSTICE COOPER:

The common law applies in relation to imminent danger.

MR RENNIE:

It also deals with allegations of defamation or breach of confidence where the public interest outweighs the private right Sir.

JUSTICE COOPER:

Yes but we're, we've got a different issue here haven't we where, and maybe it's, the discussion I had with Mr Mills was in part about the analogous situation which we have come across on occasions in this enquiry where people have known about

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about a building being in a dangerous state and they have for one reason or another not said anything about it and we're concerned about that as a matter of (overtalking 14:50:21).

MR RENNIE:

And with respect Sir some of the parties that I represent they being the only people of all those who knew who actually told anybody, but the point I wanted to make is that it would be a mistake to call it a whistle blower situation.

JUSTICE COOPER:

I see, all right.

MR RENNIE:

It's not that.

JUSTICE COOPER:

No, it's not.

MR RENNIE:

And the point I wanted to go on to make Sir was that in the medical profession it's being found necessary to have an additional statutory protection additional to the common law for the doctor and you may consider that the hazards to life speaking generally in engineering matters would justify a similar provision for engineers.

JUSTICE COOPER:

Yes, we are thinking about that.

MR RENNIE :

Yes, I just thought that –

JUSTICE COOPER:

And the – although it's not an employer / employee situation a professional engineer nevertheless will have either an express or apply to contract which might have to be broken.

MR RENNIE:

Well indeed Sir and of course there are other professions that have to address this issue. I mean the legal profession obviously has had to address the issue where you are aware of a practitioner who to put it bluntly should be denounced to the disciplinary people and I mention the matter simply to move it away from a whistle blower concept which is an employment situation, to talk about the general professional duty which more relevantly I suggest has arisen in the medical field.

Now Sir that brings us through to the matter of the subsequent inspections at paragraph 208, and I intend to simply present that and take that as read, that relates to the matters of Mr Tyndall and Mr Mitchell and the stairwell and so forth.

The change of use from 212 onwards is comprehensively dealt with in the Council's submissions and while I – while there are some points on which we would differ I don't believe they are matters that I should take up time on in submission.

At 219 we make reference to building management, the drilling of holes, an issue which was not one of light relief as counsel assisting written submissions stated although they appeared to fall back on that a bit this morning. I do say that the witness who voluntarily came forward was unreasonably brushed aside by counsel assisting who it is clear thought him and his issues a joke and they weren't, but the extent of slab and beam weakening from such works cannot now be resolved.

JUSTICE COOPER:

The problem though with that evidence is that it has no probative value, that's what it may be behind counsel treating it lightly. How can it, how can one possibly do anything with that evidence other than discard it.

MR RENNIE:

I put it here Sir in the context of good building management and my friend quoted the question I put that the evidence only went to show that an unknown number of – the holes had been drilled on an unknown number of occasions and in an unknown number of locations, I can't put it higher than

that, but you with respect on the face of it can't make much use of that information about that event with this building but I do suggest with respect you can weigh it as an example of the issues about building management, because what seems to come through in much of the evidence is until now an assumption that buildings once built somehow take care of themselves, we've had a lot of focus what was needed to be done to get a well designed and constructed building but that's the beginning of the responsibility which then becomes a management and maintenance responsibility. We will never know if this building had been managed in a different way whether it would have been occupied on the 22nd of February or not.

Now Sir at 220 the September 2010 earthquake, discuss that and at 221 set out the second NTHA findings as to likely damage following that earthquake. One of the appendices to these submissions is a compilation which counsel have had made by I think one or more solicitors from going through the transcript of all the references to the observed damage of whatever nature in the building after September 2010. And our submission is that there was clearly damage and we accept that the NTHA identified the items likely to be amongst the most significant elements of that and in saying that at paragraph 221 I respectfully recall to the Commission that as a result of the objections of Compusoft on a – on what was stated to be a commercial confidentiality basis, the parties that I represent found that Dr Reay and Mr Leyton were excluded from the NTHA process.

Now at 222 we say that there are many indicators of some damage, it seems likely there was some slab separation from the north shear wall, it's also likely there was south shear separation. The inference is from analysis however such insight is important because visually such damage is unlikely to have been directly observable.

The photos which appear below go over to 223. It's also quite possible that in parts the slab delaminated from the Hi-Bond during or as a result of the September earthquake but this could not be seen without pulling up carpets which did not occur. Observed from the floor below Mr Coatsworth considered the Hi-Bond looked satisfactory but this would not identify any delamination above the Hi-Bond. Professor Priestley identified the possibility of cracking on the floor mesh and noted that this damage may not be visible to

an inspecting engineer. The reports of the occupants in the building are difficult to ignore. They report, almost universally, increased liveliness, discomfort and noise following the September 2010 earthquake. In Schedule 4 annexed, as I have said, all such evidence has been extracted from the transcript as a reference. The suggestion that the building did not sustain any serious damage in the September 2010 earthquake is simply unable to be reconciled with these many and varied observations.

JUSTICE COOPER:

Mr Rennie, we're grateful for that schedule thank you.

MR RENNIE:

Thank you Sir.

There's then a discussion of the post-September assessments 225 to 232. Although important they are peripheral to what I wish to focus on and I will just put them forward as read Sir.

September 2010 to February 2011 – Between 4 September 2010 and 22 February 2011 a number of relevant events occurred. Mr Drew failed to act on Mr Coatsworth's recommendations for further investigation of the pin board lining. He also recommended a security fence be erected around the south wall fire escape to protect against injury from falling plaster, but that too was not actioned by

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Mr Drew. Changes of occupancy which we've been to. The building sustained many small quakes and a larger one on 26 December 2010. Following a level 1 rapid inspection on 27 December 2010 a green sticker was assigned by the Council. The level 2 inspection form included a prompt for the inspector to recommend that a level 2 or detailed engineering evaluation be carried out. Unfortunately, having regard to the nature of the building and the proximity and intensity of the Boxing Day earthquake, this box was not ticked and accordingly there was no further follow up from the Council.

Tenants, especially after 26 December complained of noise, floor movement, a hump in the floor, cracked windows, broken cement. An experienced

contractor, Mr Reynish, judged from a wall to frame gap that the building had gone out of square: He said,

"While I was on level 6 I noticed large gaps around the perimeters of the windows along the eastern side and part of the south side of the building. The join between the steel window frame and the concrete window opening is generally filled with silicone but in some places the steel window frame had pulled completely away from it and you could feel a draft.

In my opinion the concrete building had moved but the window had stayed square, the metal, the metal in the glass of the window frame was square and stayed still and the building had moved and that's what it looked like to me."

Now that was after 26 December. And I just wish to emphasise in that regard that it seems to be clear that in the variety of earthquakes that occurred from 4 September onwards, the immediate effect of those may have differed from location to location throughout the CBD, and the focus is in this case on this particular building, but of course the information we have is about earthquakes as to the scale but not as to locational impact.

The "building manager" Mr Drew, perceived and I put him quotes because he wasn't really in any practical sense, perceived a need for further engineering review but after one phone call did nothing more.

The building on the Les Mills site next door was demolished. The effects of the removal of the old building, including the excavation of foundations along the west wall (after which the building movement became greater) and the vibrations from the wrecking ball are unknown.

For the Boxing Day earthquake the evidence of two witnesses is particularly relevant. Jo-Anne Vivian, describing the state of the building after the event reports being, "Shocked at the extent of the mess," and refers to, and produces photos of filing cabinets having fallen over, shelving emptied on to the floor and ornaments broken. Ms Vivian contacted the Council to raise a concern about cracks in a structural pillar but withdrew her request for an engineering inspection after being assured by Mr Drew that the building had been inspected by an engineer after the Boxing Day quake, which of course it hadn't. Mr Drew says he was relying on the Council green sticker. Council records are consistent with Ms Vivian's evidence. And it's submitted that particular weight can be attached to her perception of damage requiring

engineering review. In addition what she reported to Mr Drew was damage from the 26 December quake – a clear signal of more damage than that which Mr Coatsworth had reviewed.

The second important new evidence is that of Mr Higgins, confirmed in a photograph he took in February 2011 which is not the photograph on that page. The photograph on that page is one taken by Mr Coatsworth in October 2010. When you compare the two a marked change in the level of damage can be observed. Mr Coatsworth confirmed that he would have taken a photo of this damage if it had been there when he visited the building. That's his photo in October and over the page at the bottom, the February photo of the same location where it can be seen that there is significant additional damage.

JUSTICE COOPER:

That's the Higgins' photo is it?

MR RENNIE:

Correct, that is Mr Higgins' photo. The top photo is Mr Coatsworth's.

At 236, the CTV building had now been through a design-level earthquake, many aftershocks including a major aftershock, and was damaged. Its remaining resilience in the face of a further major aftershock cannot now be assessed but was clearly significantly reduced from design levels.

237, Professor Mander discussed low cycle fatigue in the context of the earthquake and referred to the frequency, looked at the five with the highest recorded peak ground acceleration, noted that all five events had notable spectral response in the T = 1 second period range which will produce ongoing cumulative damage, he said, on a structure with periods in the range of 1 to 2 seconds.

JUSTICE COOPER:

Now the written word there is "demand", you read "damage"?

MR RENNIE:

I'm sorry, cumulative demand.

JUSTICE COOPER:

"Demand" is right?

MR RENNIE:

"Demand" is right Sir. Professor Mander concluded, the CTV building was exposed to cyclic demands considerably greater than what one would expect to observe back at the time structures were designed in the 1980s. It would have been prudent for all concerned to have been suspicious about the ability of the CTV building, designed as it was in 1986, to have withstood the earthquake sequence without a material loss of fatigue capacity in fatigue-prone regions such as column bars and also its associated loss of strength in the concrete damage-prone elements, in particular the beam-column joints. Only a structural analysis with references to the building plans, seismic and other information could allay those suspicions.

Building survival to the excessive demands of the Canterbury earthquake sequence can only be attributed to a measure of overstrength. Ductility is not a substitute for strength.

Under questioning, Professor Mander emphasised that the type of damage resulting from low cycle fatigue may not be visible and more sophisticated techniques, such as ultrasonic tomography, may be necessary. That is to say necessary to find it.

239, on 22 February 2011 at 12.51pm the magnitude 6.3 earthquake struck, tragically leading to the collapse of the CTV building and the loss of 115 lives. A fire broke out in the remains of the building in the aftermath.

So going to collapse hypotheses.

The discussion which follows on collapse hypotheses and concrete has been prepared with the assistance of Dr Bradley, utilising also the work of Professor Mander, Mr Haavik and the evidence hot tubs. I say that not in any sense to reduce my accountability to the submissions Sir but to indicate that equally it's not a lawyer's collapse hypothesis.

During the hearing into the failure of the CTV building there have been several collapse sequences proposed by different experts. We now set out a comparative analysis of the principal scenarios.

242, the DBH report identifies four collapse initiators. Scenarios 1 to 4. The Commission has heard about those extensively, I'm not going to read that.

243, the DBH report scenarios make no mention of beam-column joint failure. The focus in these scenarios is on exterior columns, whereas the interior columns had greater gravity loading. A conventional strength hierarchy analysis of the CTV structural elements illustrates that the beam-columns are critical, followed by the columns and then beams.

In the DBH report there is a large emphasis placed on several eyewitness accounts. It is important to note both the potential unreliability of eyewitness reports (particularly in isolation in such devastating situations), as well as the possible inability of eyewitnesses (both non-technical and even technical) to distinguish between large deformations in the structure that result from the initiation of collapse, and the consequent large deformations once a collapse mechanism has formed (particularly in the case of eyewitness views external to the structure, in the event of failure due to structural element on the interior of the structure ie, not on lines 1 or F.

A number of expert witnesses offered a critique of the Hyland Smith collapse analysis in the DBH report and proffered their own collapse scenarios. Their respective positions are discussed below.

We then

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discussed Mr Holmes, Professor Priestley, Professor Mander 255, and I am passing through those for the simple reason that you have had each of those set out and they are essentially summaries, hope to be helpful summaries of what each of those hypothesises were but they are summaries.

At 261, the second NTHA. At the direction of the Royal Commission an expert panel was convened as you know. Following the first meeting of the expert panel it became immediately apparent that many of the assumptions in the NTHA model used in the DBH report were inappropriate in view of the potential failure mechanisms which may have occurred and therefore additional analyses were suggested.

263 lists the six improvements in the original NTHA design which were implemented in the second NTHA design.

JUSTICE COOPER:

My impression is from Professor Mander's evidence that he thought that the second set of NTHA results were about as good as we could get.

MR RENNIE:

That is my understanding Sir, yeah. I don't have a submission criticising the second NTHA in respects other than the exclusion of Dr Reay and Mr Latham which of course doesn't affect the finding as far as I know. Your Honour may recall that when Dr Hyland and Mr Smith were first called part of the cross-examination which I conducted was focused on the fact that the original NTHA was delayed, deficient and so on and the parties that I represent, particularly both appreciate and recognise the Commission's initiative in having the second NTHA carried our Sir, it has been a valuable exercise in the hearing and one expects at the outcome as well.

JUSTICE COOPER:

Good.

MR RENNIE:

264. And that is without renewing a proposal for a shaking table Sir.

JUSTICE COOPER:

I make the same comment.

MR RENNIE:

264. Despite the improvements in the model there remain significant limitations. Now this is not a criticism that I have just been addressing with you Sir. It is simply, we need to recognise how far the model takes us. There are difficulties and I am not going to read them all out, there are difficulties in modelling the beam column joint, the drag bars, the beam column pullout, beam bar pullout, the bar buckling. There was a debate about the values to be given to concrete strength and there is an issue about the values to be given for foundation soil. Large displacements at (g) and sensitivity studies.

And those Sir are listed as I say because in the end the NTHA is a guide not a determination as we say in 265. However good the study the results can never be considered determinative as they are entirely dependent on inputs and assumptions made in modelling the structure.

At 266, bearing in mind what I've just said, the revised NTHA results are summarised.

Section (a) I have already read under the previous discussion of the 4 September earthquake.

Section (b), during the 22 February 2011 earthquake drag bar disconnection at all floors early in the analysis (in all four analysis cases). Column failure in the lower levels of the structure. Potential pull out of the beams (based on post-processing) and considerable damage to the beam-column joints (noting the earlier limitation that modelling did not predict degradation adequately). And we have prepared in case it is of assistance to the Commission schedule one to the submissions and schedule one is a table. It appears at page 88 in which we have summarised the position of four experts on the collapse hypothesis scenarios and what we have described in the right-hand last column is the NTHA insight into each of the hypothesis that I have been discussing up to this point in time.

JUSTICE COOPER:

In that schedule where, as with Professors Priestley and Mander, there's blank, does that mean it is the same as –

MR RENNIE:

The disagree one is right across the – the boxes all three Sir –

JUSTICE COOPER:

Right so in respect of all those matters they agreed with Mr Holmes, is that the sense of it?

MR RENNIE:

If you take by way of example Sir the second line, failure initiated due to excessive drift in columns.

JUSTICE COOPER:

Yes.

MR RENNIE:

Hyland-Smith's that was their preferred scenario. Holmes, Priestley and Mander, disagree and the insight from the NTHA is, it is not clear. That is to say that it is not clear what the insight was, not that it was not clear –

JUSTICE COOPER:

So I was right, what I put to you was that in respect of those, one, two, three, four, five, first five hypotheses, Messrs Holmes, Priestley and Mander were all of the same view?

MR RENNIE:

Correct Sir.

JUSTICE COOPER:

Yep. Well that is a useful schedule too thank you.

MR RENNIE:

Thank you Sir.

Now, the next section at 268 is concrete. It is important in this respect, that disappointingly counsel assisting in their submission effectively was that one will not know what the position was with the concrete.

JUSTICE COOPER:

I took that to mean that it wasn't possible to come up with a precise concrete strength but that we could proceed with confidence that it was as specified or higher?

MR RENNIE:

Well if it is to be read that way and I may well have misunderstood Sir, then we are in much the same space as I am.

JUSTICE COOPER:

That is the position isn't it Mr Mills? Yes he confirms that Mr Rennie.

MR RENNIE:

Well with that happy harmony Sir I may just go to 276 on concrete where we submit that the Commission should rely on the evidence of five independent witnesses practising within their field of expertise who assert that the concrete strength was not an issue in the CTV structure or its collapse.

I think what my friend has just said modifies what I say in 278 and I can move forward from concrete to the probable – the issue of the probable collapse theory.

Now the Commission's terms of reference include to inquire why the CTV building failed severely and this, we say is probably the single most important issue.

We had anticipated that closing submissions of counsel assisting would propose an answer and that our submissions would respond to it and it wasn't possible to take an overview of all the evidence until that was complete.

But in fact while the opening of counsel assisting identified a number of questions and issues presumably aimed at providing the information necessary to answer the central question, why the building failed severely in the closing submissions, their closing submission, this essential question remains unanswered.

Those submissions propose that it seems unlikely the Commission will be able to reach a definitive view on the precise order of the collapse sequence and that the consensus of expert evidence is that there are several, "critical structural weaknesses" in the building, with one or more plausibly the initiating event.

JUSTICE COOPER:

But that is exactly what I understood Mr Mills to be submitting.

MR RENNIE:

Yes well I'm venturing one step further Sir to propound that there is in fact one analysis –

JUSTICE COOPER:

One?

MR RENNIE:

Which can be adopted, not several. That is where I am going.

283 onwards discusses what is meant by critical –

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JUSTICE COOPER:

Just a minute, sorry, sorry to interrupt. At 282 you say, oh, there you're describing counsel's submissions.

MR RENNIE:

I'm describing those submissions.

JUSTICE COOPER:

Yes, all right.

MR RENNIE:

Not these, I'm sorry, probably a very bad choice of words but counsel assisting submissions propose it's unlikely you'll be able to reach a definitive view and what I'm saying is that on the probability basis there is sufficient evidence to reach a view and we have discarded what we had assembled which we thought was going to be our response, favourable or unfavourable, accepting or not accepting, to something from counsel assisting and we now put forward what we propose on the evidence to be on the test of probability the probable collapse theory.

In 283/284 we discuss the, what is meant by the expression critical structural weakness.

In 285 we say that the imported paragraph 19 of closing submissions of counsel assisting is that despite the acknowledgement that the forces to which the CTV building was subjected on 22 February were well above a design-

level earthquake, the vulnerabilities in the building referred to as critical structural weaknesses are proposed as material contributors to the cause, and I quote from paragraph 19. The submission implicit in this is that the CTV building failed severely because it had alleged critical structural weaknesses but that says nothing about why the building collapsed in the way that it did and minimises to an unrealistic degree the important defects that both the 4 September 2010 design-level earthquake and the 22 February – that should be 2011 – above design-level earthquake with it's extremely high vertical accelerations had on the collapse of the building.

The closest counsel assisting's closing submissions come to proposing a collapse scenario involves somewhat nebulous reliance upon critical structural weaknesses with no single possibility gaining precedent.

While referring to several critical weaknesses the closing submissions do not here specify what these are and what they are relative to the initiating event or what the initiating event is.

Relative to the actual collapse of the building not one matter has been proven to be a critical structural weakness contributing to the collapse.

Considering the level and range of evidence presented to the Commission this lack of an answer is an important omission and we say at least an attempt at a more definitive answer should be made. With hesitation, since this work has had to be done unexpectedly and in a compressed timeframe. An attempt at analysing the evidence and proposing a conclusion on the probable reasons is not put forward.

JUSTICE COOPER:

I really don't understand the way you're putting this Mr Rennie. Which of the expert witnesses did what you're now going to do from the bar?

MR RENNIE:

I'm sorry Sir, which of the expert witnesses did what I'm going –

JUSTICE COOPER:

This scenario that you're putting forward of an explicit initiating cause and collapse scenario, which of the witnesses gave evidence of that?

MR RENNIE:

Sir the scenario is a composite of the evidence that all witnesses gave and in my submission it is entirely appropriate for counsel to put forward an analysis of that evidence which we have done in schedule 2 and to propound that. Now the Commission can –

JUSTICE COOPER:

But didn't all the witnesses say that that couldn't be done?

MR RENNIE:

I'm, no I don't think that they did Sir. I think they each put forward their individual scenarios. I've just been through those.

JUSTICE COOPER:

As, as possibilities but in the context that they couldn't be certain that it was the correct one.

MR RENNIE:

Well they put forward their preferred scenarios in each case Sir.

JUSTICE COOPER:

All right.

MR RENNIE:

Sir I anticipated that this may or may not be of assistance to the Commission so I've dealt with it in the submissions by putting what I've just put to you Sir and the actual analysis is in schedule 2. Now the Commission may find it of no help. That is entirely over to the Commission. The Commission may disagree with it. That may be a useful step forward in terms of your ability to determine whether you can answer the first term of reference with a probable reason.

COMMISSIONER FENWICK:

When we have questions about the material in schedule 2 are you able to answer them?

MR RENNIE:

I wouldn't make a broad claim that I can answer every single one Sir because it's a composite piece of work.

COMMISSIONER FENWICK:

The other issue is of course we did write a minute asking people to look specifically at that south wall and to load track through it and we got very little response from you or from your, Alan Reay Consulting and the consultants we had, or from anyone else on those issues. Now we're suddenly having something which is related to that whole area we asked for information but we can't ask, it appears now we can't ask the experts who apparently put this together, with questions that we have got about its validity and the validity of the assumption.

MR RENNIE:

Sir I understand your criticism. When we received the submission for counsel assisting and found that it did not attempt the reconciliation of the evidence which I am now seeking to present which is clearly a composite piece of work I formed the view that we should nonetheless do that as in my submission is customarily done by parties at enquiries in pulling together the evidence at the end of the hearing. And that is what has been done but if the Commission considers that it is not able to sufficiently test what is there, and we put it there in summary with all the references, then obviously it's open to the Commission to say, well you might be right, you might be wrong, but it hasn't helped us – at least we're trying. I -

JUSTICE COOPER:

I don't accept your proposition Mr Rennie that this is the sort of thing that is commonly done in a closing address. If it is the position that you want to suggest that there is this scenario that you consider is established on the evidence, in eventually every other situation with which I've been familiar it

would have at least been put to somebody in the course of the hearing, with relevant expertise. Now I'm not saying that we won't receive it but once again I don't understand why this comes forward in a context where it's introduced as something that is a criticism of counsel assisting. I mean –

MR RENNIE:

No Sir for once I'm not making it as a criticism of counsel assisting –

JUSTICE COOPER:

Well you've expressed that you're surprised that it hasn't been done by counsel assisting and you've had to do it in such a short time. Well –

MR RENNIE:

Well Your Honour draws on Your Honour's experience. I can only say I draw on mine and I don't recall over the inquiries that I've been in, which have involved a number of occasions of tragic death in a number of matters absolutely unrelated to this personal life, I don't recall one where the closing submissions have not in fact identified the findings which it is suggested the Commission should make.

JUSTICE COOPER:

Well of course you can do that but in a situation where as I understand the evidence those experts who have looked at the matter have been most reluctant to come down on a particular initiating event, identifying simply various possibilities it seems, it seems odd to me that you would adopt the stance you're adopting whilst at the same time saying that you were expecting counsel assisting to do it and so you haven't had sufficient time, as much time as you'd like to put your version of events, that's the -

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MR RENNIE:

I'm explaining Sir why having received the submissions the task was then tackled.

JUSTICE COOPER:

To supply an omission, that's what you're suggesting?

MR RENNIE:

My basic submission Sir is that having come this far with this much evidence to have the proposal put before us that the central question can't be answered deserves at least a little more testing and that is what I am seeking to do.

JUSTICE COOPER:

Well I don't accept the characterisation of the stance of counsel assisting as being that the question can't be answered anymore than that was the position of any of the experts who dealt with this issue. Position is that there were a number of possible initiating causes. Now I don't – and this is maybe a question of interpretation of the terms of reference but I have never seen them as requiring us to find an initiating cause. That was simply the approach that the Department of Building and Housing took. I've never seen that as something that was binding on us. If there were an obvious answer to this question well by all means, but as I see the evidence, although you can persuade me to the contrary, there are a number of competing initiating causes as a result of identified design defects in this building and you seem to be about to go where none of the eminent consulting engineers who appeared before us were prepared to go and say this is the answer. Now by all means do that but your case may be compelling but I don't find it at all surprising or deficient that counsel assisting didn't go down that path, having regard to the evidence.

MR RENNIE:

I think there were three issues wrapped up in that. The first relates to counsel assisting and I think what I have said earlier has been read across to see more of a criticism in that what I have just said, than was intended.

JUSTICE COOPER:

Well paragraph 290 you have a look at paragraph 290 of the submission that you've just made?

MR RENNIE:

I'm well familiar with it Sir, I wrote it. The statement there simply says that it is perceived and I'm about to deal with this, this is my second point, to be an important omission. But the second point which is the one that Your Honour has put to me is that the Commission does not see it as necessary, necessarily I should say, involved in the term of reference to identify an initiating cause. In that event I acknowledge that counsel assisting's perception of the task and the Commission's perception of the task are aligned and it is I that am out of line. That brings me back to the third point Sir which is my perception of what I considered would be useful, the utility of which struck me with a force which certainly I don't perceive in terms of how the Commission sees it. I was going to say Sir, so given that we are at a break point, I would respectfully suggest that it may be appropriate to take the break at that point and I will consider the position in the break and we might then return in some manner or another to the topic.

JUSTICE COOPER:

Well by all means but just let me respond to your second point. If you are of a different view as to the proper interpretation of the terms of reference well then of course I will hear you on that matter. Secondly I do not wish anything I have said to prevent you presenting what you say is the single, is the initiating event is the collapse scenario which as I understand it you say is compelled, is compelled by the evidence. By all means go ahead and do that, if that's what you wish to do.

MR RENNIE:

I can just deal with that backwards Sir. I never said it was better than probable. Probable's –

JUSTICE COOPER:

Well that's good enough for an inquiry like this isn't it?

MR RENNIE:

Yeah, but probable –

JUSTICE COOPER:

On the balance of probability, this is –

MR RENNIE:

Probable (overtalking 15:35:14) possibles and sometimes the possibles win Sir.

JUSTICE COOPER:

Balance of probabilities would apply.

MR RENNIE:

The second point because I don't wish there to be any ambiguity before we break, is that I'm not going to address you on the proposition that you are compelled to reach a finding on this issue under the terms of reference because it is open to you specifically to construe your terms of reference in such manner as you consider best serves the purpose of the Commission and I acknowledge that it would be open to you to decide that this was not an issue, but you found it necessary to discharge the task so I'm not going to do that and I did not intend to suggest that. I simply said I had an anticipation of the alignment and I thought I would be in the same position as the Commission but I am not and Your Honour has previously said that I may if I wish present this material, I acknowledge that, I would like to consider in the break the extent to which I continue to do that.

JUSTICE COOPER:

Well if I may just have the final word, we could if – if we could we would, we might as a result of this consideration, but as presently advised I find it difficult to see how we could get there on the evidence and if that's the position we ended up in I wouldn't regard that as any kind of failure under the terms of reference, I think you're agreeing with it now.

MR RENNIE:

Accept that Sir, accept that.

HEARING ADJOURNS: 3.38 PM

HEARING RESUMES: 3.52 PM

JUSTICE COOPER:

Yes Mr Rennie.

MR RENNIE:

Thank you Sir. I have some short distinct points to make. I acknowledge Professor Fenwick's criticism as to the extent of response to the past questions to the south shear wall and I regret that. On the last day that one participates in a hearing looking back one can always see things that one might have done better but I just want to –

JUSTICE COOPER:

But you weren't alone. I mean this is not a criticism that's directed at your client in particular.

MR RENNIE:

Well I'm very grateful to you Sir for that because we've tried to do a lot of things.

JUSTICE COOPER:

Yes.

MR RENNIE:

But the moment the Professor mentioned it I thought, you're right, and I thought I owed it to you Sir to say that.

JUSTICE COOPER:

Well thank you.

MR RENNIE:

The second thing is that the material which I have been intending to proceed to is 100% drawn from the evidence. It is interpretative. It is perhaps open to the criticism that some of the interpretation I confess was done by lawyers who we know by now are not good engineers but reviewed and contributed to and then at a later stage illustrated.

JUSTICE COOPER:

Yes.

MR RENNIE:

I acknowledge that the Commission is willing to receive it and I appreciate that. I acknowledge Professor Fenwick's view that, observation, because of course as a member of the Commission you're entitled to a view or an observation Sir, that the only person you could ask about it would be me and that might be more of light relief than information gathering and what I propose to do Sir is take up the indication that I can present it in the sense of putting it forward.

JUSTICE COOPER:

Yes.

MR RENNIE:

I am not in doing that seeking to avoid answering anything about it but I am putting it forward on the basis that at the very least, agree or disagree, it provides insight into elements of the evidence and if it does more than that then that will be helpful and if it doesn't that's a matter for your judgment.

JUSTICE COOPER:

All right.

MR RENNIE:

Subject to that Sir I will move forward to page, when I say I present it, I table it, I'm not quite sure what I do in a formal sense but of course it's both for

discussion in schedule 2 and page 84 the heading is encouraging headed "Other Matters" and –

JUSTICE COOPER:

Well Mr Rennie what you're saying is you're effectively inviting us to take that part of your submissions as read.

MR RENNIE:

Correct Sir.

JUSTICE COOPER:

Yes, all right. Well we have all read it.

MR RENNIE:

Thank you Sir. "Other Matters."

JUSTICE COOPER:

Yes.

MR RENNIE:

We know that you had a separate hearing on post-earthquake inspection processes, in fact I was able to see some of it on line and I think on reflection it's perhaps a pity that we didn't attend for some of it because of course we did look at this issue of notices and so forth and we had done some work on that and that's in schedule 3 and we just contribute that. It's a piece of work which was begun by Professor Mander, was then developed by Dr Bradley, was looked back over from the legal perspective. We hope it might be useful. We appreciate it might have been better earlier in the week.

JUSTICE COOPER:

Well it may well be and we'll certainly read it with interest.

MR RENNIE:

Thank you Sir and the other, only other matter I had down under "Other Matters" I dealt with, and it's not actually in the words there, I just noted it, which was the question of the destruction of evidence which I've already dealt with in the forensic exercises there.

Then we have a question which many people have asked about why did the CTV building collapse when other buildings did not and this of course is not quite the same as the initiation issue and we set in 301 a discussion of the factors in that and in 301.2 a list of the damage, 301.3 we refer to the construction faults, 301.4 we go to the question of not as much remaining plastic deformation capacity, 301.5 the question of the design of the building being permitted by the code.

JUSTICE COOPER:

Can I just clarify your final position is that the building complied. Is that right?

MR RENNIE:

The reason for the pause, Sir, is it is difficult to answer in that we have said throughout the building did not comply in respect to the beam column joints and the north shear wall connection, and in our column by column analysis we identify two in a conditional candidate of three columns that were on the margin of compliance. So that's essentially a summary of our position as to compliance.

JUSTICE COOPER:

Well that doesn't seem to be what you're saying in 301.5.

MR RENNIE:

301.5 relates to the design being permitted. This is the conceptual design not the –

JUSTICE COOPER:

This kind of building?

MR RENNIE:

This kind of building, yes Sir, yes.

JUSTICE COOPER:

Right, okay.

MR RENNIE:

You could build this kind of building, yes.

JUSTICE COOPER:

Yes, well I understand now.

MR RENNIE:

Yes, yes and there's just one additional point that I would like to add emphasis to in relation to the section that I'm now discussing and I'm doing it I think I should fairly say to the Commission partly because I think it's an important point but partly because one of the people attending today who tells me he's been here through the hearing sees it as an important point and that is that the building survived the 4 September quake. It was damaged. Why wasn't it, the question he puts to me, why wasn't it that it was found following that to have come through what it was expected to survive and not been further used? And that does seem to be something which has been learnt out of the Christchurch situation, that there were many buildings which, whose practical life had ended.

JUSTICE COOPER:

Just, I'm not quite sure if I'm following you. Are you saying that the building, well I just don't follow what you've just said I'm sorry.

MR RENNIE:

The building was designed to survive the quake that it sustained on 4 September.

JUSTICE COOPER:

Yes.

MR RENNIE:

But after that it was not perceived that that survival was a point at which the building was not safe for further use.

JUSTICE COOPER:

Right so you're saying, and is that your submission, that it wasn't, should not have been used following the 4 September earthquake?

MR RENNIE:

Yes, we list the damage identified from the NTHA in respect of the post 4 September. It's even more our position after the 26 December earthquake. I showed you the photograph of the further cracking that Mr Higgins took. I took you to Mr Reynish's evidence about the building being seen to be out of square. Yes this is wonderful hindsight. Yes, it's not how we thought about building standards but one of the key points that come out surely is that after building space, the level that the 4 September earthquake imposed, the risk was much greater than was perceived.

COMMISSIONER FENWICK:

And would that apply to all the other buildings in Christchurch which had a similar level of apparent damage. Would you say they should not have been used again?

MR RENNIE:

The –

COMMISSIONER FENWICK:

And I might add all other buildings which had a same apparent level of damage but were built under the same, in the same period, would you say they should also have all been closed?

MR RENNIE:

That Sir independent of anything else was of course Professor Mander's view which he was vigorously challenged, but on the basis of an approach that a building which has sustained that level of earthquake force should be validated by a proper structural review before it is reoccupied is clearly a desirable outcome.

COMMISSIONER FENWICK:

That would sort of close the city for about four or five years wouldn't it while he got all those reviews done to that sort of depth. Is that, do you think would be acceptable?

MR RENNIE:

Well I have two things to say about that Sir. I have no information that would enable me to agree or disagree as to the closure of the city for four or five years and the second thing is it would be, it is a matter for value judgment which is a personal judgment as between the risk that is run by not doing it and the situation which is created by doing it and in this case it would have been better to have the discomfort than to have the risk.

COMMISSIONER FENWICK:

You're aware of course of the reaction after the Boxing Day earthquake and the urgent need seen there to get the city back and into use, you know, so freely available, and the pressure that went on then to open up the city. So you're well aware of that? You don't think that would have applied equally after the 4th of September?

MR RENNIE:

Sir I'm certain, and we're in the grave danger of ending up with my view on something, and this is my view, but we are being asked, if I'm aware, and it's obviously not a matter on which I've taken instructions from the client, the answer to both quakes is certainly, yes, but the submission that I'm making, which is a submission for the client, is that the actual risk which existed was under-perceived in respect of buildings which proved to be dangerous.

JUSTICE COOPER:

Your submission as I'm understanding it Mr Rennie is in part, perhaps in large part, based on what we now know –

MR RENNIE:

Absolutely Sir, yes.

JUSTICE COOPER:

– about the design of this building amongst other things. Is that right?

MR RENNIE:

I'm in the lessons learned department Sir.

JUSTICE COOPER:

Yes, yes.

MR RENNIE:

I happen to work in a building in Wellington which was built in the same year in which I have not been able to access my office because large drag bars have been bolted into it and I can tell you Sir that before this case if we had a quake I'd go to work the next day. I can tell you now that I wouldn't. It's the lessons learnt Sir.

JUSTICE COOPER:

Yes, all right.

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MR RENNIE:

That brings me, if the Commission pleases, to the section conclusion. The 22 February 2011 Christchurch earthquake was one of New Zealand's worst natural disasters. Indeed, the size of the area it impacted, the number of persons affected, and the injuries and deaths which it caused probably make it the worst. In turn, the collapse of the CTV building was the worst single event in that disaster. The Royal Commission has been established so that we may learn from what occurred, identify the causes, and – so far as is

humanly possible – ensure that we are better prepared and better protected in any future quake. The terms of reference detail that, and the questions to be answered. Royal Commissions have a proud and very lengthy history. The origin of Royal Commissions can be traced back to eleventh century England with William the Conqueror's appointment of an inquiry to prepare the Domesday Book of land ownership. In New Zealand the response to the most serious disasters has been Royal Commissions from which have come improvements in public safety. Each Commission learns from the past so that we may look forward and do better. Those involved in these investigations feel many emotions – anger at what has occurred; pain and sadness at the death and injury which has occurred; often disbelief at the accident causes found. Disasters do not distinguish between those who die and those who live – the innocent injured, those who should have prevented the disaster, and those who have erred are all victims in the effect on their lives. The Commission investigation process is rigorous, independent, and searching. But the process is neither a pillory at which those alleged to have erred are paraded and humiliated; nor a time of atonement. Punishment and apology are both relevant to the disaster, but not for the purpose of the investigation or its outcome.

For Alan Reay Consultants Ltd and Dr Reay, the collapse of the CTV building was stunning and then distressing. Their regret at this was stated in opening, expressed again when Dr Reay first gave evidence, and again as a later personal statement of apology. It detracts from these apologies, and achieves nothing else, for counsel for the families to suggest cynicism in response. It is also wrong in fact. Our submissions have therefore dealt with the matters for investigation, and proposed answers. It is the outcome of that which is of such vital importance to the future. To the families and friends of those who died; to the injured and all who have cared and will care for them; to those impacted by the collapse in any way, and to the engineering profession of which Dr Reay and ARCL are proud to be a part, a pledge is made to continue to work to ensure that such an event will not occur again. Thank you Sir.

JUSTICE COOPER:

Thank you Mr Rennie. Mr Rennie, I infer we won't be seeing you again after today.

MR RENNIE:

I am sorry Sir but I hope you won't be offended if I say, I hope not.

JUSTICE COOPER:

I just want to thank you for your assistance throughout the inquiry and right down to today and the well organised submission that you have presented to us.

MR RENNIE:

And I in turn would like to not only express appreciation to the Commission and all its staff and counsel assisting for a task whose magnitude I can scarcely describe and to express the best for your work in completing your report.

JUSTICE COOPER:

Thank you very much for that. Mr Palmer and Ms Patterson, does the same apply to you, or will you also not be here from today?

MR RENNIE:

For them Sir, the last useful thing I can do, they will be here Sir.

JUSTICE COOPER:

Okay, all right, thank you. Yes Ms Smith? Now can I just raise another matter before you start. I'd be grateful, I understand, I haven't been told this officially but I understand that bereaved family members have another important method to which they will need to attend tomorrow relating to the Coronial inquiry and consequently Mr Elliott, it would be desirable, I am given to understand that there would be a preference if your submission could be completed by, in time for this other event to occur approximately in the middle of the day, do you know anything of this?

MR ELLIOTT:

Yes Your Honour I am aware that there is a meeting scheduled tomorrow at 11 o'clock.

JUSTICE COOPER:

Oh, it is at 11, I was told it was at one.

MR ELLIOTT:

I think it was to go between 11 and one or two. So is Your Honour suggesting that –

JUSTICE COOPER:

I'd just, I have no idea what discussions you may have had but if you wanted to alter the order that we would be relaxed about that.

MR ELLIOTT:

Thank you, Your Honour well can I consider that and discuss it further with counsel.

JUSTICE COOPER:

Yes certainly.

MR ELLIOTT:

And it may be that the result of that is that I would perhaps go first tomorrow at 9.30.

JUSTICE COOPER:

Yes, well I raise it in case that's what would be preferred. Yes now Ms Smith, third time lucky.

MS SMITH:

Indeed. Thank you Sir, just while we are on that, I hadn't appreciated that we would spill over into Friday when this matter was first dealt with so I have

another appointment tomorrow morning so I would seek that my appearance be excused after today.

JUSTICE COOPER:

Certainly yes, counsel may come and go.

MS SMITH:

Turning then to the submissions on behalf of Mr Banks. Mr Banks' involvement with the CTV building was in the early 1990s and as was clear in the evidence that was given on the section was limited to retro-fit work to install drag bars which was addressing an area of non-compliance which had been identified by Holmes Consulting Group and it was accepted by Mr Banks that once Holmes Consulting had raised the issue it was then for Alan Reay Consultants Limited to then deal with it. Mr Banks communicated with Mr Hare and Mr Wilkinson subsequently however ensure that his understanding of the issue was correct and what he was doing, address the concern that Holmes had identified.

Just to be clear on this issue, Mr Banks had no involvement with the original design or construction of the CTV building. Mr Harding had left Alan Reay Consultants which I will refer to as ARC immediately prior to Mr Banks joining the firm. Mr Banks recalls being told in 1990 that Mr Harding had designed the building but he was not briefed on Mr Harding's experience with this type of building and as has already been alluded to in his evidence, he said that this was relevant information which, if it had been given, might have affected his inquiries.

Just turning very briefly to the point that my friend raised this morning which was in relation to the fit-out work that was undertaken in 1991 and this is the new information that is now before the Commission, and including the response from Mr Palmer which also includes the response that we have provided on behalf of Mr Banks. It was said this morning –

JUSTICE COOPER:

Which is that he can't remember, is that right?

MS SMITH:

Indeed. The issue was raised on Monday and was forwarded through from Buddle Finlay to us to seek some comment on that which was provided and that is provided by way of a letter of the 4th of September. I just wanted to clarify one thing with respect to Mr Banks. It was said this morning that, sorry Dr Reay had given evidence that his firm had no further involvement with the building and that turned out to be incorrect. Mr Banks had referred to some further involvement with the building in his brief of evidence and that was at paragraph 68 when he referred to providing advice to an architect regarding infilling of a precast façade panel and what the letter says that it is possible

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that Mr Banks does not know that this was part of the same fit out work. The difficulty is, is that as was also set out in Mr Banks' evidence, he has been completely reliant on information that has been provided to him both by Dr Reay and also by the Royal Commission. He doesn't have any information independent of that, and so without that information he's unable to recall whether he was involved in this aspect. It's notable, however, that the design says that it was completed by Mr Coombes of ARC and while Mr Banks' signature is in the approved box of that one plan, it is possible that his only involvement was limited to approving that drawing only.

Just returning then to paragraph 3 of the submissions. In 1990 Mr Banks was advised by Mr Hare of Holmes that he had identified an issue with the connection of the diaphragm to the north core and he was later provided with a report from Holmes which identified this area of concern, and I won't go through the rest of that paragraph because it's well known what the report stated. But it's clear Mr Banks does not know who provided a copy of the Holmes' report to ARC.

Mr Mills says that there has been an attempt to shift responsibility onto Holmes for why a wider inquiry was not undertaken. Mr Banks says that that is not the case. Mr Banks relied on a number of issues including the Holmes' report in focusing on just the specific area of concern that was raised by Mr Hare, and in not undertaking the general review of the design. In particular he referred to the number of people that had reviewed the building before him. He referred to Dr Reay, the draughtspeople, the Council, the inspectors and

the contractors, and the reference to contractors is significant because you will recall Mr Banks' evidence was that the lack of ties would've been evident on site to a contractor or an inspecting engineer. Mr Banks also relied on his review of the calculations and it appeared to him as though a page was missing or omitted in the calculation process, and it seemed quite clear to him that if there was a problem it was in this one area because the calculations had stopped short. Mr Banks' evidence was that there was nothing else that alerted him to any red flags about the overall building design. And you will remember he referred to undertaking a review of a particular aspect in the toilet area of the north core, and his conclusion and his calculations there didn't cause any concern either.

Counsel assisting submits that the attempt to rely on the Holmes' report is disingenuous and on behalf of Mr Banks that is rejected. Although counsel assisting says that the report is fairly limited, it is submitted that it is not the case. In my submission Sir the care must be taken when reviewing a document with the benefit of hindsight and in dissecting its contents, not knowing all of the issues that are now being examined and questioned. At the time the report was not identified to Mr Banks as being a draft and it did not cause Mr Banks to consider a more detailed review should be undertaken, and it is submitted it would not, having regard to the fact that Mr Banks was not privy to any other information about the original design or the construction of the building. The Holmes' report stated that Holmes had reviewed a set of architectural drawings made available by the architect and some structural drawings. They had reviewed the full design documentation, soils investigation and a complete set of drawings from the offices of ARC, spoken with the Council, and undertaken an inspection of the building, with the exception of levels 1 and 4.

It is accepted that the report notes that Holmes' review was brief, but the review undertaken nevertheless appeared extensive, and there was nothing to indicate that a further general review was required. The reference to view a complete set of drawings is significant and these of course were the ARC's full set of structural drawings. It was submitted this morning Sir that Alan Reay Consultants should have rung Mr Hare and said, "Well how carefully have you reviewed this?" In my submission Sir that's not a requirement of another

engineer, but it is notable that Mr Banks did speak with Mr Hare and Mr Wilkinson to ensure, as I have said, what he was doing addressed the concern that they had raised. There was nothing in his subsequent discussions with either Mr Hare or Mr Wilkinson which led Mr Banks to believe that a further general review of the building was warranted. Mr Hare accepted in evidence that he did not speak to Mr Banks about any other issue other than the lack of ties on lines D and D/E after the Holmes' review was undertaken. Mr Banks also gave evidence which was unchallenged that it was clear in his discussions with Mr Wilkinson that Holmes' concern was limited only to the tying of the floors to some of the shear walls and that Mr Wilkinson advised that Holmes had no concern with any of the other walls. At no time did Holmes suggest that there were any other issues identified or that their report was limited such that a further more general review may be warranted. Ultimately it is my submission that there was nothing to indicate to Mr Banks that a further more general review was required.

Counsel assisting submits that Mr Banks' subsequent conduct was influenced by liability concerns. It is implied that his actions were affected by the prospect of a claim, and the suggestion is that a full review was not undertaken for fear of a claim if the sale did not proceed. Mr Banks rejects this suggestion entirely. There is no evidence to support it. Mr Banks accepted ARC's obligation to follow through with addressing the problem, and did so. ARC carefully followed normal notification processes with its insurer. That's consistent with professional indemnity insurer requirements and clearly it is quite formal, but did not impact or prevent ARC from rectifying the problem. Mr Banks had noted that, "Preliminary advice from insurance point of view is no further action was required," but ARC didn't let the matter rest there and the fact that advice was sought on the obligation to notify the owner and that advice was sought and paid for by the insurer is in my submission, suggests in my submission that ARC was taking a contrary position to that which had been advised to it by the insurer and it was seeking to notify the new owner of the issue in spite of the insurer's preliminary advice, and it ultimately did that.

Counsel assisting submits that there was a "charade" perpetuated by Mr Banks in relation to the H12 bars. In my submission it is that counsel

assisting has misunderstood the evidence that Mr Banks gave on that point. I have identified there in paragraph 8 the evidence that Mr Banks gave, which was,

"*From the drawings it appeared that there were only a limited number of light 12 millimetre bars, although their location was not clear and there were no larger ties to the floor. It appeared therefore that the effectiveness of the wall system to carry north-south seismic loads may have been reduced without better tying of the two eastern walls to the floors. These walls are in gridlines D and DE.*"

In my submission that is a straightforward factual matter, stated accurately and consistent with the observations of Holmes. Mr Banks has never suggested that the presence of H12 bars would have had anything other than a minor benefit. However, it had been suggested to him by Dr Reay that the area of non-compliance might have been addressed in construction. And it was for that reason that holes were drilled in October 1991 prior to the installation of the drag bars. Through those investigations only the presence of some H12 bars was located. That meant that the issue had not been resolved in construction, not that the H12 bars had unexpectedly been located. Of course Mr Banks' view is that they were expected to be there because of course they were evident on the drawings.

The remedial works were undertaken 21 months after the issue was identified in early 1990. There was a difference of opinion, you'll recall, between Mr Robertson and Mr Wilkinson as to whether the time that was taken was reasonable. Mr Robertson believed the matter should have been dealt with more expeditiously and he gave his timeframe of 3 to 6 months. Mr Wilkinson considered a longer timeframe of 21 months was acceptable in the

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the circumstances and he drew the analogy to the time that counsel allows for earthquake prone buildings to be upgraded which of course is far in excess of the 21 months.

Counsel assisting submits that neither Dr Reay or Mr Banks could satisfactorily explain that delay. From Mr Banks's perspective he held no information as I have alluded to in his own right relating to the building and he relied on information that has been provided to him. His evidence was that

there was a gap in documentation between April 1991 and September 1991 and he can't remember what occurred during that period. Mr Banks therefore accepted that he couldn't because of the circumstances and also the time that has passed, 21 years, explain the delay that occurred, and in my submission care needs to be taken if the Royal Commission intends to draw conclusions about the delay because the gaps in the evidence do not establish what the reasons for that delay are. Ultimately Mr Banks accepts that the process took longer than desirable but this was impacted by a lack of communication from the owner both with ARC and also by the subsequent purchaser, and ultimately in all of this of course the work was done albeit in September 1991.

Counsel assisting has submitted that further clarification of an engineer's ethical obligations is required particularly where the owner is a receiver whose first obligation is to the debenture holder and this may be an issue that the Royal Commission wishes to address. Mr Banks' position was that he notified the owner at the time and he did not consider that the owner would measure that information against obligations to the debenture holder in anyway, or in the way that has now been suggested that they may have.

Counsel assisting suggest that Mr Banks may have been laying low hoping that the problem might disappear. And in my view Sir the submission is inflammatory and there's no evidence to support it. To the contrary Mr Banks raised the issue with the receiver and he and Dr Reay had met with them and as you will remember Mr Banks could not recall that meeting but referred to a particular letter which recorded the fact that he was there.

Mr Banks didn't seek to downplay the issue, it's notable that KPMG had a copy of the Holmes report and as we now know that report referred to the area of concern, meaning that in the event of the earthquake the building would effectively separate from the shear walls well before the shear walls themselves reached their full design strength and KPMG understood this, they also referred to it in their letter of the 2nd of February as well as to non-compliance with the current design codes. So in my submission there was no laying low by Mr Banks, ARC actively sought out the new owner when it became aware that the building had been sold and although in a very technical sense it had complied with the letter of the ethical obligations which is to advise the owner of the problem, Mr Banks did not rest on having just

done that. It's fair to say it was a surprise to him that KPMG appeared not to have passed on that information to the new purchasers because it clearly held that information some time prior to the sale of that building.

Mr Banks does not accept that he adopted the attitude that the issue was not overly significant, he did not attempt to minimise the reality of the situation in dealings with KPMG or later with Madras Equities. His evidence was that although repair might be considered minor, he would not have advised that the problem was of a minor nature because the issue was a serious one that needed to be addressed and that was his evidence. The fact that he did not attempt to minimise it is also reflected in Mr Ibbotson's letter of the 30th of September which confirms the advice that had been given to it that there may be an engineering design fault omission in the structure which could impact on insufficient loadings to meet earthquake requirements. And Mr Ibbotson was clear in his response that he was aware of the significance of the problem.

Much has been made of who paid for the remedial works, and in my submission the person who ultimately paid for it is completely irrelevant to the work that was undertaken and why. And I've said at paragraph 16 if this is an attempt to tarnish the design undertaken by Mr Banks it is rejected and I've noted there that the matter of payment was to be addressed in a meeting between ARC and Madras Equities Limited later and unfortunately no evidence was adduced as to whether or not that meeting took place, what was discussed and ultimately the reasons why payment fell where it did. As I've said however ultimately who bore the cost of those works has no impact on whether the works were designed to meet the standards of the day and that is the evidence that Mr Banks has given before this Commission and that is the focus of his evidence.

Returning then to the design that was undertaken. Mr Banks designed the drag bars to exceed by some margin of standards of the day and I've included in there at paragraph 17 and I'm not going to go into it in too much detail but the discussion that occurred between the relevant standards and also with best practice and Mr Banks accepts that sometimes there can be a lag between standards and best practice but you'll recall the discussion that we had around the first amendment to the relevant New Zealand Standard 4203 coming in 1992 which didn't address any of the issues that would have been

relevant to the design in the early 1990s. And Mr Banks's evidence was that he would not have been aware of any standards whether they were in New Zealand standards or international standards at that time beyond which was contained in NZS 4023 and the reference, it's not included in the submissions is the transcript at 20120817.15 lines 9 to 11.

At paragraph 18 the criticism of Mr Banks appears to be that he did not take a conservative approach of installing drag bars on all levels and it's not clear to me at least what is meant by a conservative approach. It's notable that Dr Leary didn't raise any issue with the lack of drag bars on levels 1 and 2, and he considered that those levels complied and further considered drag bars could possibly also have been omitted one floor higher.

The reliance is placed on the preliminary assessment of a remedial design which was undertaken by Mr Hare to support a submission by counsel assisting that the easy approach would have been to install drag bars on all levels, and there's also reference as well to the cost of that actually being minimal in the overall scheme. Again my submission is that the cost of the remedial solution is irrelevant. What Mr Banks did was undertake detailed calculations to confirm the deficiency and the remedial solution required. As noted by counsel assisting Mr Banks said that it was not simply a matter of taking the easy approach but rather a matter of properly calculating the loads and Mr Banks went further to say that as an engineer he looks to whether and where the strength is needed and that is what he did in this case.

At paragraph 20 I've referred there to the suggestion that Mr Banks should have used the capacity design. Mr Banks is clear on the basis on which he approached this design. Clause 11.1.5 of the bylaw states that general structural design and design loadings complying with NZS 4203 shall be approved as complying with the requirements of 11.1.5. Now that was a difficulty we had in that hearing about the relevant numbering but you'll get the point that I'm making. Further, clause 11.2.3 says that members shall be proportioned for the adequate strength in accordance with the recognised New Zealand standard and the relevant standard for the floor diaphragm was the concrete standard and it is clause 10.5.6.1 of that standard that says to use the parts and portions for the capacity design, the diaphragm design,

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whichever is the lesser.

And it is noted that in the submissions from counsel assisting at paragraph 129 dealing with design that when the building was originally designed that was the position that he adopted that it should have been found using the parts and portions criteria or the forces associated with capacity design and overstrength.

In paragraph 21 Mr Banks rejects the submission that the "easy" course was not adopted because it may have been part of the culture developed under Dr Reay which Mr Harding described as detailing only what was absolutely necessary. Mr Banks evidence is that he was not working to the limit of the code and he was not aiming just to meet the code. The design had a number of conservatisms built into in which Mr Banks had applied. And in particular you will recall that Mr Banks had determined the relevant loads according to the Parts and Portions and in his discussions with Mr Wilkinson agreed to round those up by to the 300 kilonewtons that had been discussed with Mr Wilkinson. Further, the ties were not required to transfer the load, oh, sorry the weight of the walls which were included in the calculations thereby adding another 11-12% of conservatism into the design. So my submission that is not an approach consistent with designing to only what was necessary.

There has been reference to the evidence from Dr Priestley and Dr Jacobs, however it is not clear whether they have actually reviewed the calculations undertaken by Mr Banks or Mr Hare and in my submission their comments need to reflect that they are necessarily, like most people, approaching this issue with the benefit of 22 years of hindsight and of course that in time there has been significant advances in engineering design and development. In my submission it is significant that both ARC and HCG reviewed the matter in 1990 and independently came up with very similar solutions to the issue which had been identified.

Dr Jacobs says that the drag bars should have extended back to line 3 and counsel assisting relies on this statement in his submissions. However, Dr Jacobs has not commented on how that might have been achieved given there was a beam in the way preventing extension of the angle directly back to line 3. And Mr Banks' view is that he does not accept that the drag bars

needed to connect to the slab back to line 3 to be effective and neither, it seems, neither did Mr Hare.

As I have stated it is notable that HCG's design or the preliminary design undertaken by Mr Hare was a very similar solution to that designed by Mr Banks and I've said both solutions were reached independently of the other. However, in my submission any comparison beyond that and specifically with regard to the detail of Mr Hare's preliminary assessment of a remedial design is inappropriate. It is acknowledged by Mr Banks that the preliminary assessment indicated drag bars on each level but the solution we have to remember was developed prior to the discussion between Mr Banks and Mr Hare regarding redistribution on the lower floors. Mr Hare had agreed that redistribution could be considered, but had not done so in his earlier calculations. In my submission, care also needs to be taken when relying on that aspect where a, sorry when referring to Mr Hare's preliminary design because it was undertaken as a preliminary design for costing purposes only and of course we discussed the matter that it was undertaken at level six of course where the loads would be higher and therefore the likely remedial solution and works would be also higher and then simply applied down the rest of the building without actually looking at the rest of the building individually.

In my submission therefore the comparison with Mr Hare's design is inappropriate; it is not comparing like with like. It wasn't a final design that Mr Hare had produced; it was a possible remedial detail and it was established or developed purely for costing purposes. Mr Hare acknowledged that he was making an unfair comparison. He accepted that he had used the highest floor where the loads were highest and therefore where the greatest amount of remedial work was required and the difference is that he had set out in his evidence and the conclusions on those were dealt with in cross-examination and counsel assisting has drawn now on only one of those, whereby they, counsel assisting has submitted that the drag bars detailed by Mr Hare were longer than those which Mr Banks had designed. The real issue in my submission is that Mr Hare's design only had an overlap with the floor slab of 1350 mm compared to the ARC design which had a longer overlap. So ultimately in my submission the drag bars as designed by Mr Banks were

stronger with more steel area, a longer drag bar overlap with the floor slab, and they also removed less of the floor slab to effect the repair and that arises because of the number of holes that were to be drilled through the floor slab.

Mr Hare said that he would not have agreed to omit the drag bars at the lower two floors but he did acknowledged that his evidence was affected by hindsight. And further, Mr Banks did discuss the issue with Mr Hare in 1990 and no such concern was raised at that time – and I have referred you there in paragraph 26 to Mr Banks' file note of that conversation of the 14th of February 1990. And it is acknowledged that Mr Hare said that that was not an accurate record of the conversation but in my submission Mr Banks' file note of the conversation must be relied on in favour of Mr Hare's recollection of what he described as a short conversation some 22 years ago. Mr Banks' evidence was that had Mr Hare raised a concern he would have noted it and he did not.

Turning then to the issue of the building permit. It is quite clear and it is acknowledged by Mr Banks that when the drag bars were installed no separate building permit was obtained. Mr Banks does not accept the submission that by not applying for a permit it was a further attempt to minimise the potential issues with the building and avoid making the Council aware of them and enlarging the liability risk. There is simply no evidence to support that submission. Mr Banks' evidence was that the building permit process was much less structured that it is now and –

JUSTICE COOPER:

What did he mean by that?

MS SMITH:

Well I think you can – you will recall his evidence that he wasn't overly familiar with the permitting process, or sorry the bylaw at that time and what he referred to in his evidence was that the recent attempts that he has made now to obtain information on works that were done to the building shows that while the bylaw may have required it, not all works of this nature were actually recorded by way of an application for a permit or either recorded in the Council's files. Mr Banks' evidence is quite – and he was clear in his

statement around this that he would expect this type of work now to require a permit or a consent.

JUSTICE COOPER:

But is there any – you don't argue that it wasn't required at the time do you, under the bylaw:

MS SMITH:

No. I mean the bylaw seems quite clear. The issue though is that the reference that I make is in terms of the lessons learned and this is the issue that Mr Banks was most concerned about, and you recall that we had this discussion during the hearing around his statement that he would expect to – this type of work to require a permit now and he would do so. But recent experience that he has been aware of is that some councils don't actually take that view. And that is because of the exclusion in clause, I think it's AG of schedule 1 of the Building Act.

JUSTICE COOPER:

Yes but why didn't he seek a building consent or building permit back in 1991?

MS SMITH:

Mr Banks has no recollection of why that was not done.

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JUSTICE COOPER:

Well, so all we can conclude that you're submitting is that for some unknown reason he didn't seek a building consent. Is that the best we can do?

MS SMITH:

That is the best that you can do, that no consent was applied for by ARC for these works.

JUSTICE COOPER:

Well we know that wasn't but we're wondering why?

MS SMITH:

Unfortunately Mr Banks can't shed any light on that.

Just dealing with a point at paragraph 29, and this is the issue that Mr Robertson and Mr Wilkinson spoke to in terms of changes to the IPENZ Code of Conduct regarding notification to a Territorial Authority and Mr Banks would also welcome a change to require engineers who become aware of a building which is non-compliant with the code applicable at the time of the original permit, requiring them to legally inform the Territorial Authority about that non-compliance and as we've noted this morning in a way that is of course protective of engineers when they do that.

I don't intend to read paragraphs 30 to 33, and simply ask that those be taken as read but I have alerted again to that issue that has been recently discovered in paragraph 33 and I consider or I submit that that is an issue that needs to be dealt with or least clarified.

So in conclusion Mr Banks designed the retrofit work to exceed the applicable standards of the day and this doesn't appear to have been disputed. He gave clear evidence as to the process which he followed and as noted by him in his evidence the Hyland January 2012 report refers to the fact that the parts and portions section in the relevant standard didn't appear to account for full displacement and strength demands or a higher mode response characteristics of the structural system and I've put the relevant quote in there at paragraph 34.

And Mr Banks has acknowledged that he agrees with those comments now but at the time he applied the relevant standard as it was the relevant standard of the day and of note as well is that, that was also applied by the engineers from Holmes in the discussion that he had with them over the relevant loadings. The fact that no changes were made to that standard relevant to the retrofit work when it was amended in 1992 also goes in my submission to Mr Banks' design complying with best practice.

So in my submission the design of the drag bars is more of an issue as to the adequacy of the standard rather than the adequacy of the design, acknowledging the significant research in the intervening period resulting in major changes to the standards.

And I've noted there at paragraph 36 the reference in Mr Banks' statement to the comments made by Charles Clifton in table 2 on page 7 of his report, which shows that the diaphragm demand based on the actual ground accelerations was 2859 kilonewtons at all levels of the building and this of course differs from the relevant standard at the time which reduced the loads going down the building, and it also compares with the diaphragm demand of 1241 kilonewtons at the top of the building reducing to 761 kilonewtons at the lower levels calculated at that time using the relevant standard.

Now the work that was undertaken by Mr Frost has been noted quite understandably with, or held in high regard given what he did at the time given his other focuses. In his evidence he noted that:

"The upward slope of the floor slabs towards the north core is a strong indication that separation from the north core occurred later rather than earlier in the collapse sequence. If the floor slabs had separated from the north core before they lost support along the central column lines I believe that we would have found them in a more horizontal orientation, or even sloping down towards the north core after the collapse".

Mr Banks has approached this matter by reviewing what he did at the time by reference to the relevant standards. He hasn't made any comment about the other design issues because of course he wasn't involved in those but in relation to the retrofit work which he was involved in, regrettably it seems that the actual seismic loads that are applied to this building based on this recent modelling were substantially greater than anticipated by the standard of the day which was applied by Mr Banks. And in spite of that it appears that the drag bars did do their intended task and Mr Frost's observations and comments are consistent with that, but is stated in his evidence Mr Banks does not know what caused the collapse of this building and like all of those involved he looks to this inquiry to consider all of the issues and to help ensure that nothing like this could ever happen again.

JUSTICE COOPER:

Thank you. There's at least 10 minutes Mr Laing during which we wouldn't progress very far with your submissions and I was wondering whether you

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might like to defer to Mr Allan who by contrast could probably start and finish?

MR LAING:

Yes Sir, I'm more than happy to do that Sir and I'll still have a talk to Mr Elliott as to how he wants to do tomorrow.

JUSTICE COOPER:

Thank you. Mr Allan would that be convenient for you?

MR ALLAN:

It would convenient for me Sir, I'm quite grateful for that.

May it please the Commission, throughout this hearing the objective of the Ministry of Business Innovation and Employment has been singular. To assist the Commission by objectively contributing to the pool of relevant evidence. Consonant with that approach, this closing address will be short.

The Ministry's principal contribution has been its commissioned reports, namely Dr Hyland's site examination and material report. Dr Hyland and Mr Smith's building collapse report, and the expert panel report. Although these reports have espoused views relevant to the issues of concern to the Commission, the Ministry has not sought to advocate or defend them.

Even in the face of supercilious criticism of this evidence the Ministry has held fast to the view that the purpose of this hearing is to assist the Commission not the Ministry to reach conclusions concerning the CTV building. Indeed, the conclusions required of this Commission extend well beyond those reached in the Ministry's commissioned reports.

The Ministry has taken the view that the evidence it has adduced will stand or fall on its own merits. The Ministry has accepted that there might be aspects of the reports about which reasonable minds might reasonably disagree. Indeed the reports themselves acknowledge this.

That said, the closing submissions of counsel assisting amply demonstrate the issues elucidated in those reports are all relevant issues. For all that, the analysis of them might now be more refined, almost without exception each of the identified design and construction deficiencies remain identified deficiencies.

The Ministry has of course been cognisant that the reports have informed the structure of this hearing, even though the scope of the reports is much less broad than the scope of this inquiry, they have provided a foundation for this hearing. To that extent the Ministry has assumed a stake in the process if not the findings of this hearing. It is to that extent that the Ministry has facilitated the preparation of supplementary written evidence and the appearance of witnesses at the various expert panel sessions.

Overall it is hoped that the reports and the additional evidence adduced and facilitated by the Ministry has assisted this hearing proceed as it has with clear focus.

It is certainly the case that this greater focus and breadth of inquiry has been of considerable benefit to the Ministry. It has highlighted the importance of regulating more than simply practices and professions or owners and industries. It has underscored that the regulation of the building and construction sector requires a systemic approach. It has demonstrated how a systemic approach requires responsibilities and accountabilities from design

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and consenting to construction and use to be comprehensive and clearly defined.

Perhaps most significantly this hearing has highlighted that checks and balances are the essence of an effective regulatory system. From a regulatory perspective good systemic design like good seismic design should incorporate redundancy. Failure in one part of the system should be picked up in another.

Without intending to diminish or amplify any individual failings, in the Ministry's view the tragedy of the CTV collapse lies in a concatenation of failure. In this case in an unlikely and most unhappy way the systems checks and balances failed through want of clarity of responsibility and certainty of accountability.

These areas are key drivers of the Ministry's ongoing work programme. In short this hearing has bolstered the Ministry's case for further reform. Consequent upon the 2009 Department of Building and Housing review of the Building Act the Ministry has already taken measures to approve accountabilities and it will continue to do so. Most particularly the evidence adduced in this hearing has cast a light on the engineering profession. The

Ministry is acutely concerned that the installation of drag bars in the CTV building and the risks that gave rise to this were known to many but not the Christchurch City Council. As the agency responsible for administering the Chartered Professional Engineers of New Zealand Act the Ministry will invite the profession, through its apex Council and its membership body IPENZ to revise and clarify the code of ethics including with respect to the disclosure of commissioned work, non-compliant work and scope of competency.

In conclusion the Ministry expresses its gratitude to the Commission for the opportunity to participate in this hearing and hopes that the evidence it has adduced most particularly through the considerable efforts of Dr Hyland and Mr Smith has been of assistance to the Commission. To the families and friends of victims including survivors of the CTV building collapse the Ministry offers an assurance that the impetus this hearing has added to its reform programme will result in safer buildings in the future.

JUSTICE COOPER:

Thank you Mr Allan. We're grateful for that and for the assistance that you were able to give in focussing the evidence that was to be called by the Ministry. This never was intended to be a hearing about the former Department's inquiry and reports and we're appreciative that you recognised that. In relation to the issues that you raise about engineering regulation and conduct you will be aware of course that we are having a hearing next week on that subject. I don't know whether you –

MR ALLAN:

Yes and I'll be here.

JUSTICE COOPER:

You'll be there?

MR ALLAN:

Yes.

JUSTICE COOPER:

Very good. Thank you.

MR ALLAN:

Thank you Sir.

JUSTICE COOPER:

So Mr Elliott.

MR ELLIOTT ADDRESSES JUSTICE COOPER – TIMETABLING

HEARING ADJOURNS: 5.00 PM